

Product Catalogue

Brake and Air Suspension Products for Trailers



KNORR-BREMSE



Introduction

This catalogue is designed to provide an overview of the range of products for trailer air braking and suspension systems available from Knorr-Bremse. The catalogue is divided into sections relating to product groups including air supply, valves, electronic brake control, actuation and air disc brake, air suspension/lift axle control plus miscellaneous products. In each section a selection of popular part numbers and their technical details are shown. Finally, there is a section containing data sheets for trailer brake calculations and system design.

From time to time, we may update individual sections. The latest version of documents can be found on our website: www.Knorr-BremseCVS.com where they can be downloaded free of charge.

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Contents

Brake System Diagrams

Air Supply

Valves

Electronic Brake Control

Wheel Brake

Air Suspension

Miscellaneous

Data Sheets

Index



| Section Product | Type/Part No. family | Doc. No. | PD No. |
|---|---------------------------------|-----------------|---------------|
| Brake System Diagrams | | | |
| Brake System Diagram - ABS | | Y011336 | |
| Brake System Diagrams - EBS | | Y011337 | |
| Air Supply | | | |
| In-line Air Filter | LA2103 | Y011340 | PD-053-200 |
| Charging Valves | DR4... | Y011382 | PD-074-000 |
| Valves | | | |
| Load Sensing Valves - manual (for Relay Emergency Valves) | BR13.. | Y011343 | PD-102-000 |
| Load Sensing Valve - mechanically controlled | BR43.. | Y011344 | PD-103-000 |
| Load Sensing Valves (Air Suspension) | BR55.. | Y011345 | PD-104-000 |
| Relay Valve | AC574..., RE11.. | Y011357 | PD-106-000 |
| Relay Emergency Valves | AS3..., AS7... | Y011341 | PD-107-000 |
| Pressure Limiting Valves | DB11.. | Y011348 | PD-108-000 |
| Coupling Heads | KU13..., KU14..., KU41.. | Y011338 | PD-109-000 |
| Pressure Proportioning Valves | DB21.. | Y011347 | PD-110-000 |
| Adapter Valves | DB21.. | Y092386 | PD-110-200 |
| Pressure Retaining Valves | DB21.. | Y092387 | PD-110-300 |
| Quick Release Valves | RE21..., KX..., 1194339 | Y011358 | PD-111-400 |
| Single Check Valves | AE51.. | Y011355 | PD-112-100 |
| Double Check Valves | AE41..., 1111419000, 295358 | Y011356 | PD-112-200 |
| Throttle Check Valve | SEB00778 | Y011384 | PD-112-400 |
| Manoeuvring Valve (Semi-trailer) | AE4261 | Y011350 | PD-113-110 |
| Manoeuvring Valves (Drawbar Trailers) | AE4211, AE4257 | Y011349 | PD-113-120 |
| Park / Shunt Valves | AE424. | Y011353 | PD-113-210 |
| Park / Shunt Valves with Integrated Emergency Function | AE431. | Y050820 | PD-113-220 |
| Park / Shunt Valve with Integrated Charging Valve | AE437. | Y095829 | PD-113-230 |
| Trailer Park Valves | AE4262, AE4264 | Y011351 | PD-113-300 |
| 3/2 Control Valves | AE4265, AE4266 | Y011383 | PD-120-321 |
| Solenoid Valves | AE9120, EA1152 | Y011360 | PD-121-000 |
| Shut-Off Valves | AE21.. | Y011352 | PD-122-000 |
| Electronic Brake Control | | | |
| Pressure Control Valve for <i>iCargo</i> | BR9169 | Y114019 | PD-200-120 |
| ABS Relay Modulator Valves | BR92.. | Y011362 | PD-200-200 |
| Trailer ABS (KB3-TA) | ES200. | Y011361 | PD-203-100 |
| Trailer ABS (A18) | ES2005 | Y011365 | PD-203-200 |
| Trailer ABS (KB4TA) | ES1305 | Y095835 | PD-203-300 |
| TEBS4 Brake Module | ES205. | Y011366 | PD-214-100 |
| TEBS G2/G2.1 Brake Module | ES2060 | Y050635 | PD-214-200 |
| Trailer Electro-Pneumatic Module (TEPM-S / TEPM-P) | ES207. | Y095618 | PD-214-600 |
| Trailer Roadtrain Module (TRM) | EZ2085 | Y095620 | PD-214-800 |
| Wheel Speed Sensors | 04860001..., 04860010.. | Y011363 | PD-261-000 |
| Pressure Sensor | K015173 | Y095830 | PD-262-200 |
| Deflection Sensor | K026919 | Y095832 | PD-264-200 |
| Cables for Trailer ABS | | Y095697 | PD-272-010 |
| Cables for Trailer EBS | | Y107795 | PD-272-020 |
| Diagnostic Cables for Trailer ABS/EBS | | Y107796 | PD-272-030 |
| Trailer Information Module (TIM G2) | K009166 | Y050665 | PD-273-920 |

Contents (by Section)

Doc. No. Y011335 (EN - Rev. 003)
November 2011

| Section Product | Type/Part No. family | Doc. No. | PD No. |
|--|---------------------------------|-----------------|---------------|
| <u>Wheel Brake</u> | | | |
| Diaphragm Brake Chambers for Trailers (Overview) | | Y115383 | PD-400-000 |
| Brake Chambers (S-cam), long stroke | BX3..., BZ3... | Y011367 | PD-403-200 |
| Brake Chambers (Disc) - with Clamp Ring | BS3... | Y011368 | PD-405-000 |
| Brake Chambers (Disc) - OBC generation | BS3... | Y103245 | PD-405-100 |
| Spring Brake Actuators for Trailers (Overview) | | Y115384 | PD-413-000 |
| Spring Brakes (S-cam) - diaphragm/piston | BX9..., BZ9... | Y011370 | PD-413-100 |
| Spring Brakes (S-cam) - diaphragm/diaphragm | BX7... | Y011369 | PD-413-200 |
| Spring Brakes (Disc) - diaphragm/piston | BS9... | Y011372 | PD-415-100 |
| Spring Brakes (Disc) - diaphragm/diahrpragm | BS7... | Y011371 | PD-415-200 |
| Air Disc Brakes | SN5, SN6, SN7, SK7 | Y011373 | PD-420-000 |
| Brake Pad Wear Indicator Kits | K000... | Y011374 | PD-430-451 |
| <u>Air Suspension</u> | | | |
| Levelling Valves | SV13..., SV14.. | Y011375 | PD-500-000 |
| Raise / Lower Valves (conventional) | SV31.. | Y011376 | PD-501-000 |
| Raise / Lower Valves (single circuit) | SV32.. | Y011377 | PD-501-050 |
| Raise / Lower Valve (with Speed Pulse function) | SV3801 | Y095621 | PD-501-100 |
| Lift Axle Valve, Manual/Pneumatic | AE1124 | Y011380 | PD-503-100 |
| Lift Axle Valves - Pneumatic | LS1..., LS2..., LS3... | Y011379 | PD-503-200 |
| Lift Axle Valves - TEBS controlled | AE1141 | Y050267 | PD-503-400 |
| Height Limiting Valve (Air Suspension) | AE1103 | Y011378 | PD-504-000 |
| <u>Miscellaneous</u> | | | |
| Manifold Block | LS50..., LS60.. | Y011385 | PD-520-700 |
| Brake Hose | BS.... | Y095694 | PD-523-200 |
| Plastic Pipe and Coils | KR..., PET... | Y095692 | PD-523-600 |
| Air Reservoirs | VB.... | Y095687 | PD-524-000 |
| Tyre Pressure Monitoring System (TPMS) | | Y095833 | PD-551-000 |
| <u>Data Sheets</u> | | | |
| Data Sheet for Brake Calculations | | Y011386 | |
| <u>Index</u> | | | |
| Index (alphabetical) | | | |

| Part No. | Type No. | PD No. | Page |
|---------------|----------|------------|------|
| 0481007043 | - | PD-503-200 | 2 |
| 0486000126100 | - | PD-261-000 | 1 |
| 0486000134000 | - | PD-261-000 | 1 |
| 0486000135000 | - | PD-261-000 | 1 |
| 0486000136000 | - | PD-261-000 | 1 |
| 0486001032100 | - | PD-261-000 | 1 |
| 0486001033100 | - | PD-261-000 | 1 |
| 0486001066100 | - | PD-261-000 | 1 |
| 0486001078000 | - | PD-261-000 | 1 |
| 0486001079000 | - | PD-261-000 | 1 |
| 0486105002 | - | PD-203-200 | 2 |
| 090.0011 | - | PD-551-000 | 2 |
| 090.0021 | - | PD-551-000 | 2 |
| 1111419000 | - | PD-112-200 | 1 |
| 1194339 | - | PD-110-400 | 1 |
| 1194507 | - | PD-272-030 | 9 |
| 201.0007 | - | PD-551-000 | 2 |
| 201.0014 | - | PD-551-000 | 2 |
| 2264462374100 | - | PD-272-010 | 16 |
| 2264462375100 | - | PD-272-010 | 16 |
| 2264462391100 | - | PD-272-010 | 15 |
| 2264462392100 | - | PD-272-010 | 15 |
| 2264462393100 | - | PD-272-010 | 15 |
| 2264462394100 | - | PD-272-010 | 15 |
| 2264462395100 | - | PD-272-010 | 15 |
| 2264462396100 | - | PD-272-010 | 14 |
| 2264462397100 | - | PD-272-010 | 14 |
| 2264462398100 | - | PD-272-010 | 14 |
| 2264462399100 | - | PD-272-010 | 14 |
| 2264462400100 | - | PD-272-010 | 14 |
| 2264462403100 | - | PD-272-010 | 16 |
| 240.0162 | - | PD-551-000 | 2 |
| 260.0232 | - | PD-551-000 | 2 |
| 260.0254 | - | PD-551-000 | 2 |
| 260.0266 | - | PD-551-000 | 2 |
| 260.0270 | - | PD-551-000 | 2 |
| 264.0228 | - | PD-551-000 | 2 |
| 264.0332 | - | PD-551-000 | 2 |
| 269.0155 | - | PD-551-000 | 2 |
| 295358 | - | PD-112-200 | 1 |
| AC574AY | - | PD-106-000 | 1 |
| AS3000A | - | PD-107-000 | 2 |

| Part No. | Type No. | PD No. | Page |
|-----------|----------|------------|------|
| AS3050A | - | PD-107-000 | 2 |
| AS3100A | - | PD-107-000 | 2 |
| AS7000A | - | PD-107-000 | 2 |
| AS7100A | - | PD-107-000 | 2 |
| BS1100 | - | PD-523-200 | 1 |
| BS1100/1 | - | PD-523-200 | 1 |
| BS1300 | - | PD-523-200 | 1 |
| BS1300/1 | - | PD-523-200 | 1 |
| C56918 | - | PD-203-100 | 2 |
| EB00669 | - | PD-104-000 | 3 |
| I14911 | AE4100 | PD-112-200 | 1 |
| I28323 | AE2100 | PD-122-000 | 1 |
| I40405 | AE4105 | PD-112-200 | 1 |
| I43387 | DB2110 | PD-110-300 | 1 |
| I50402 | DB2111 | PD-110-300 | 1 |
| I53929 | DB2113 | PD-110-300 | 1 |
| I60422 | AE5102 | PD-112-100 | 1 |
| I60496 | AE1103 | PD-504-000 | 1 |
| I61235 | DB1102 | PD-108-000 | 1 |
| I61236 | DB1103 | PD-108-000 | 1 |
| I61237 | DB1105 | PD-108-000 | 1 |
| I63411024 | AE9120 | PD-121-000 | 1 |
| | | PD-503-200 | 2 |
| I69846 | DR4125 | PD-074-000 | 2 |
| I69850 | DR4232 | PD-074-000 | 2 |
| I69857 | DR4341 | PD-074-000 | 2 |
| I69866 | DR4350 | PD-074-000 | 2 |
| I70676 | RE2108 | PD-110-400 | 1 |
| I74908 | RE2113 | PD-110-400 | 1 |
| I76202 | RE1121 | PD-106-000 | 1 |
| I83153 | SV3111 | PD-501-000 | 1 |
| I84575 | BR1305 | PD-102-000 | 1 |
| | | PD-107-000 | 2 |
| I84576 | BR1306 | PD-102-000 | 1 |
| I85168 | RE1131 | PD-106-000 | 1 |
| I86024 | SV3115 | PD-501-000 | 1 |
| I86153 | DB2114 | PD-110-000 | 1 |
| I86154 | DB2115 | PD-110-000 | 1 |
| I86155 | DB2116 | PD-110-000 | 1 |
| I86156 | DB2118 | PD-110-000 | 1 |
| I86157 | DB2121 | PD-110-000 | 1 |
| I86158 | DB2122 | PD-110-000 | 1 |

Contents (by Part Number)

Doc. No. Y011335 (EN - Rev. 003)
November 2011

| Part No. | Type No. | PD No. | Page |
|------------|----------|------------|------|
| I86159 | DB2123 | PD-110-000 | 1 |
| I87047 | - | PD-121-000 | 1 |
| I87970 | - | PD-121-000 | 1 |
| I90693 | - | PD-261-000 | 1 |
| I90969 | SV3130 | PD-501-000 | 1 |
| I92200 | RE2118 | PD-110-400 | 1 |
| I94095 | EE1100 | PD-524-000 | 2 |
| | | PD-524-000 | 3 |
| I97269 | VB1005 | PD-524-000 | 3 |
| I97953 | DB1147 | PD-108-000 | 1 |
| I99633 | SV1418 | PD-500-000 | 1 |
| I99660 | LA2103 | PD-053-200 | 1 |
| II14535 | BS3300 | PD-405-000 | 1 |
| II14891 | DB2135 | PD-110-300 | 1 |
| II15229 | BS3350 | PD-405-000 | 1 |
| II16774 | - | PD-261-000 | 1 |
| II17092 | BZ9502 | PD-413-100 | 1 |
| II17354 | KU1310 | PD-109-000 | 2 |
| II17355 | KU1311 | PD-109-000 | 2 |
| II18068 | AE4257 | PD-113-120 | 1 |
| II19422 | ZB3131 | PD-262-400 | 1 |
| II19425 | SV1395 | PD-500-000 | 1 |
| II19802 | AE4262 | PD-113-300 | 1 |
| II19803 | AE4261 | PD-113-110 | 1 |
| II30267 | DR4341 | PD-074-000 | 2 |
| II30522 | BR9231 | PD-200-200 | 1 |
| | | PD-203-100 | 2 |
| II30531 | SV1441 | PD-500-000 | 1 |
| II30618 | BS3509 | PD-405-000 | 1 |
| II30619 | BS9304 | PD-415-100 | 1 |
| II31098 | BS3404 | PD-405-000 | 1 |
| II31099 | BS3453 | PD-405-000 | 1 |
| II31100 | BS3551 | PD-405-000 | 1 |
| II31226 | BS9451 | PD-415-100 | 1 |
| II31227 | BS9397 | PD-415-100 | 1 |
| II31407000 | BS9404 | PD-415-100 | 1 |
| II31408 | BS9503 | PD-415-100 | 1 |
| II31663 | BS9349 | PD-415-100 | 1 |
| II31782 | BS3251 | PD-405-000 | 1 |
| II31783 | BS9297 | PD-415-100 | 1 |
| II31997 | BZ9317 | PD-413-100 | 1 |
| II32128 | BZ9646 | PD-413-100 | 1 |

| Part No. | Type No. | PD No. | Page |
|--------------|----------|------------|------|
| II32611 | EA1152 | PD-121-000 | 1 |
| II32614 | BR9232 | PD-200-200 | 1 |
| | | PD-203-100 | 2 |
| II32718 | BX9504 | PD-413-100 | 1 |
| II33198A | BZ3370 | PD-403-200 | 1 |
| II33261 | AE2110 | PD-122-000 | 1 |
| II33262 | KU1304 | PD-109-000 | 2 |
| II33263 | KU1305 | PD-109-000 | 2 |
| II33441A | BX3534 | PD-403-200 | 1 |
| II33442A | BX3535 | PD-403-200 | 1 |
| II33444A | BX3604 | PD-403-200 | 1 |
| II33445A | BX3605 | PD-403-200 | 1 |
| II33453 | BZ9318 | PD-413-100 | 1 |
| II33454 | BZ9319 | PD-413-100 | 1 |
| II33458A | BX3416 | PD-403-200 | 1 |
| II33479A | BX3417 | PD-403-200 | 1 |
| II33581 | ES1210 | PD-203-100 | 2 |
| II33582 | ES1215 | PD-203-100 | 2 |
| II3358712000 | EK3040 | PD-272-010 | 19 |
| II335874000 | EK3040 | PD-272-010 | 19 |
| II335878000 | EK3040 | PD-272-010 | 19 |
| II3358810000 | EK3027 | PD-272-010 | 18 |
| II3358812000 | EK3027 | PD-272-010 | 18 |
| II3358813000 | EK3027 | PD-272-010 | 18 |
| II3358815000 | EK3027 | PD-272-010 | 18 |
| II335888000 | EK3027 | PD-272-010 | 18 |
| II34910 | SV1447 | PD-500-000 | 1 |
| II3541523000 | EK3022 | PD-272-010 | 18 |
| II354156000 | EK3022 | PD-272-010 | 18 |
| II354158000 | EK3022 | PD-272-010 | 18 |
| II354159000 | EK3022 | PD-272-010 | 18 |
| II3541612000 | EK3033 | PD-272-010 | 20 |
| II3541615000 | EK3033 | PD-272-010 | 20 |
| II354162000 | EK3033 | PD-272-010 | 20 |
| II354163000 | EK3033 | PD-272-010 | 20 |
| II354163500 | EK3033 | PD-272-010 | 20 |
| II354165000 | EK3033 | PD-272-010 | 20 |
| II354169000 | EK3033 | PD-272-010 | 20 |
| II3541710000 | EK3013 | PD-272-010 | 20 |
| II3541712000 | EK3013 | PD-272-010 | 20 |
| II354172000 | EK3013 | PD-272-010 | 20 |
| II354173000 | EK3013 | PD-272-010 | 20 |

| Part No. | Type No. | PD No. | Page |
|--------------|----------|------------|------|
| II354174000 | EK3013 | PD-272-010 | 20 |
| II35417500 | EK3013 | PD-272-010 | 20 |
| II354178000 | EK3013 | PD-272-010 | 20 |
| II354184000 | EK3050 | PD-272-030 | 10 |
| II354185000 | EK3050 | PD-272-030 | 10 |
| II354188000 | EK3050 | PD-272-030 | 10 |
| II36043 | SV3133 | PD-501-000 | 1 |
| II36055 | AE4264 | PD-113-300 | 1 |
| II36061 | AE4265 | PD-120-321 | 1 |
| II36062 | AE4266 | PD-120-321 | 1 |
| II36069 | SV3161 | PD-501-000 | 1 |
| II36075 | SV3162 | PD-501-000 | 1 |
| II36088 | SV1460 | PD-500-000 | 1 |
| II36107 | SV3164 | PD-501-000 | 1 |
| II36114 | SV1465 | PD-500-000 | 1 |
| II36115 | SV1466 | PD-500-000 | 1 |
| II36125 | AE4246 | PD-113-210 | 2 |
| II36129 | AE4247 | PD-113-210 | 2 |
| II36131 | AE4247 | PD-113-210 | 2 |
| II36133 | AE4232 | PD-107-000 | 2 |
| II36145 | SV3200 | PD-501-050 | 1 |
| II36225 | SV3240 | PD-501-050 | 1 |
| II36226004 | - | PD-501-050 | 1 |
| | | PD-501-100 | 1 |
| II36338 | BS9196 | PD-415-100 | 1 |
| II36381 | EZ1022 | PD-272-030 | 10 |
| II36383 | ES2001 | PD-203-100 | 2 |
| II36384 | ES2002 | PD-203-100 | 2 |
| II36386 | - | PD-203-100 | 2 |
| II36413 | ES2005 | PD-203-200 | 2 |
| II3641712000 | EK3028 | PD-272-010 | 19 |
| II36418500 | EK3029 | PD-272-010 | 19 |
| II367381 | EK3101 | PD-272-020 | 34 |
| II367382 | EK3101 | PD-272-020 | 34 |
| II367383 | EK3101 | PD-272-020 | 34 |
| II367391 | EK3100 | PD-272-020 | 35 |
| II367393 | EK3100 | PD-272-020 | 35 |
| II367395 | EK3100 | PD-272-020 | 35 |
| II367397 | EK3100 | PD-272-020 | 35 |
| II3674115000 | EK3110 | PD-272-020 | 32 |
| II367419000 | EK3110 | PD-272-020 | 32 |
| II36744 | - | PD-203-100 | 2 |

| Part No. | Type No. | PD No. | Page |
|--------------|----------|------------|------|
| II36750 | - | PD-214-100 | 3 |
| II3675610000 | EK3130 | PD-272-010 | 8 |
| | | PD-272-020 | 24 |
| II3675612000 | EK3130 | PD-272-010 | 8 |
| | | PD-272-020 | 24 |
| II3675615000 | EK3130 | PD-272-010 | 8 |
| | | PD-272-020 | 24 |
| II367562000 | EK3130 | PD-272-010 | 8 |
| | | PD-272-020 | 24 |
| II367563000 | EK3130 | PD-272-010 | 8 |
| | | PD-272-020 | 24 |
| II367564000 | EK3130 | PD-272-010 | 8 |
| | | PD-272-020 | 24 |
| II367565000 | EK3130 | PD-272-010 | 8 |
| | | PD-272-020 | 24 |
| II367566000 | EK3130 | PD-272-010 | 8 |
| | | PD-272-020 | 24 |
| II367568000 | EK3130 | PD-272-010 | 8 |
| | | PD-272-020 | 24 |
| II36836 | BR5522 | PD-104-000 | 1 |
| II37090 | BR9233 | PD-200-200 | 1 |
| II37091 | BR9234 | PD-200-200 | 1 |
| II37140 | BS3315 | PD-405-000 | 1 |
| II37274 | BX9400 | PD-413-100 | 1 |
| II37276 | BX9402 | PD-413-100 | 1 |
| II37277 | BX9519 | PD-413-100 | 1 |
| II37520 | BS9193 | PD-415-100 | 1 |
| II38110F | BS9335 | PD-415-100 | 1 |
| II38465F | BS9379 | PD-415-100 | 1 |
| II38466F | BS3326 | PD-405-000 | 1 |
| II38467F | BS9338 | PD-415-100 | 1 |
| II38528F | BS3436 | PD-405-000 | 1 |
| II38529F | BS3462 | PD-405-000 | 1 |
| II38530F | BS3547 | PD-405-000 | 1 |
| II38533F | BS9479 | PD-415-100 | 1 |
| II38578F | BS9376 | PD-415-100 | 1 |
| II38581F | BS9485 | PD-415-100 | 1 |
| II38924F | BS3361 | PD-405-000 | 1 |
| II39782 | ES2053 | PD-214-100 | 3 |
| II39782N50 | ES2053 | PD-214-100 | 3 |
| II397872 | EK3122 | PD-272-020 | 40 |
| II397873 | EK3122 | PD-272-020 | 40 |

Contents (by Part Number)

Doc. No. Y011335 (EN - Rev. 003)
November 2011

| Part No. | Type No. | PD No. | Page |
|--------------|----------|------------|------|
| II397874 | EK3122 | PD-272-020 | 40 |
| II397882 | EK3123 | PD-272-020 | 39 |
| II397883 | EK3123 | PD-272-020 | 39 |
| II397884 | EK3123 | PD-272-020 | 39 |
| II3979310000 | EK3115 | PD-272-020 | 33 |
| II3979312000 | EK3115 | PD-272-020 | 33 |
| II397938000 | EK3115 | PD-272-020 | 33 |
| II397951 | EK3125 | PD-272-020 | 42 |
| II397952 | EK3125 | PD-272-020 | 42 |
| II39798 | ES2050 | PD-214-100 | 3 |
| II39802F1 | EK3126 | PD-272-020 | 43 |
| II39808F | EZ1034 | PD-214-100 | 7 |
| | | PD-272-030 | 7 |
| II39809F | EZ1031 | PD-214-100 | 7 |
| | | PD-272-030 | 8 |
| II39810F | EZ1035 | PD-214-100 | 8 |
| II39812F | EZ1032 | PD-214-100 | 7 |
| | | PD-272-030 | 8 |
| II39814F1 | EK3127 | PD-272-020 | 43 |
| II39814F2 | EK3127 | PD-272-020 | 43 |
| II39908FA | BZ3261 | PD-403-200 | 1 |
| II40324FA | BZ3263 | PD-403-200 | 1 |
| II40391F1 | EK3108 | PD-272-020 | 38 |
| II40391F2 | EK3108 | PD-272-020 | 38 |
| II40394F | EK3109 | PD-214-100 | 8 |
| II40998F | - | PD-501-050 | 4 |
| K000367 | SV1485 | PD-500-000 | 1 |
| K000461 | - | PD-430-451 | 1 |
| K000613 | DR4150 | PD-074-000 | 2 |
| K000630 | DR4256 | PD-074-000 | 2 |
| K000636 | DR4370 | PD-074-000 | 2 |
| K000644 | DR4378 | PD-074-000 | 2 |
| K000670 | - | PD-430-451 | 1 |
| K000937 | - | PD-430-451 | 1 |
| K000938 | - | PD-430-451 | 1 |
| K000952 | KU1400 | PD-109-000 | 2 |
| K000953 | KU1401 | PD-109-000 | 2 |
| K000954 | KU1410 | PD-109-000 | 2 |
| K000955 | KU1411 | PD-109-000 | 2 |
| K000956 | KU1412 | PD-109-000 | 2 |
| K000957 | KU1413 | PD-109-000 | 2 |
| K001349 | AE5131 | PD-112-100 | 1 |

| Part No. | Type No. | PD No. | Page |
|----------|----------|------------|------|
| K001893 | DB2145 | PD-110-200 | 1 |
| K001939 | DB2146 | PD-110-300 | 1 |
| K002018 | SV3240 | PD-501-050 | 1 |
| K002270 | - | PD-272-020 | 45 |
| K002271 | - | PD-272-020 | 45 |
| K002272 | - | PD-272-020 | 45 |
| K002273 | - | PD-272-020 | 46 |
| K002274 | - | PD-272-010 | 7 |
| | | PD-272-020 | 23 |
| K002275 | - | PD-272-010 | 7 |
| | | PD-272-020 | 23 |
| K002276 | - | PD-272-010 | 7 |
| | | PD-272-020 | 23 |
| K002277 | - | PD-272-020 | 24 |
| K002278 | - | PD-272-020 | 24 |
| K002279 | - | PD-272-020 | 24 |
| K002280 | - | PD-272-020 | 23 |
| K002281 | - | PD-272-020 | 23 |
| K002283 | - | PD-272-020 | 44 |
| K002284 | - | PD-272-020 | 44 |
| K002285 | - | PD-272-020 | 46 |
| K002286 | - | PD-272-020 | 38 |
| K002287 | - | PD-272-010 | 11 |
| | | PD-272-020 | 29 |
| K002288 | - | PD-272-020 | 33 |
| K002289 | - | PD-272-020 | 33 |
| K002290 | - | PD-272-010 | 12 |
| | | PD-272-020 | 29 |
| K002291 | - | PD-272-010 | 12 |
| | | PD-272-020 | 29 |
| K002294 | - | PD-272-020 | 32 |
| K002301 | EK3135 | PD-272-030 | 9 |
| K002640 | KU1414 | PD-109-000 | 2 |
| K002641 | KU1415 | PD-109-000 | 2 |
| K002647 | SV1485 | PD-500-000 | 1 |
| K002947 | EK3102 | PD-272-020 | 36 |
| K002949 | EK3102 | PD-272-020 | 36 |
| K002950 | EK3102 | PD-272-020 | 36 |
| K002951 | EK3140 | PD-272-020 | 41 |
| K002952 | EK3141 | PD-272-020 | 41 |
| K002953 | EK3142 | PD-272-020 | 39 |
| K002954 | EK3142 | PD-272-020 | 39 |



| Part No. | Type No. | PD No. | Page |
|----------|----------|------------|------|
| K003848 | - | PD-272-010 | 10 |
| | | PD-272-020 | 27 |
| K003979 | BS3263 | PD-405-100 | 1 |
| K004098 | EK3150 | PD-272-010 | 12 |
| | | PD-272-020 | 25 |
| K004152 | KU4128 | PD-109-000 | 2 |
| K004229 | KU4124 | PD-109-000 | 2 |
| K004230 | KU4128 | PD-109-000 | 2 |
| K004231 | KU4124 | PD-109-000 | 2 |
| K004236 | ES1305 | PD-203-300 | 2 |
| K004246 | ES1305 | PD-203-300 | 2 |
| K004569 | EK3129 | PD-272-020 | 42 |
| K004583 | BS3300 | PD-405-100 | 1 |
| K004631 | BS3326 | PD-405-100 | 1 |
| K004664 | BS3758 | PD-405-100 | 1 |
| K004754 | EK3102 | PD-272-020 | 36 |
| K004756 | EK3102 | PD-272-020 | 36 |
| K004775 | - | PD-272-020 | 33 |
| K005378 | - | PD-272-020 | 30 |
| K005814 | BS3436 | PD-405-100 | 1 |
| K005816 | BS3862 | PD-405-100 | 1 |
| K005817 | BS3547 | PD-405-100 | 1 |
| K006096 | - | PD-272-030 | 9 |
| K006368 | AE4211 | PD-113-120 | 1 |
| | | | |
| K007202 | - | PD-272-010 | 10 |
| | | PD-272-020 | 27 |
| K007205 | - | PD-272-010 | 11 |
| | | PD-272-020 | 28 |
| K007217 | - | PD-272-010 | 10 |
| | | PD-272-020 | 27 |
| K007218 | - | PD-272-010 | 10 |
| | | PD-272-020 | 27 |
| K007219 | - | PD-272-010 | 10 |
| | | PD-272-020 | 27 |
| K007524 | EK3102 | PD-272-020 | 37 |
| K007525 | EK3107 | PD-214-100 | 8 |
| | | PD-272-020 | 34 |
| K008422 | BR9169 | PD-200-120 | 1 |
| K008430 | - | PD-272-020 | 6 |
| K008431 | - | PD-272-020 | 6 |
| K008432 | - | PD-272-020 | 7 |
| K009166 | - | PD-272-920 | 1 |

| Part No. | Type No. | PD No. | Page |
|----------|----------|------------|------|
| K010710 | - | PD-272-020 | 7 |
| K010711 | - | PD-272-020 | 7 |
| K010712 | - | PD-272-020 | 33 |
| K010713 | - | PD-272-020 | 15 |
| K010714 | - | PD-272-020 | 16 |
| K010715 | - | PD-272-020 | 14 |
| K010716 | - | PD-272-020 | 14 |
| K010718 | - | PD-272-020 | 8 |
| K010837 | EZ1037 | PD-272-030 | 8 |
| K010838 | - | PD-272-010 | 6 |
| K010839 | - | PD-272-010 | 6 |
| K010890 | | PD-524-000 | 3 |
| K010893 | | PD-524-000 | 3 |
| K010894 | | PD-524-000 | 3 |
| K010895 | | PD-524-000 | 3 |
| K010896 | | PD-524-000 | 3 |
| K011307 | | PD-524-000 | 3 |
| K011308 | | PD-524-000 | 3 |
| K013218 | - | PD-272-020 | 16 |
| K013661 | KU4128 | PD-109-000 | 2 |
| K013662 | KU4124 | PD-109-000 | 2 |
| K013663 | KU4128 | PD-109-000 | 2 |
| K015173 | - | PD-214-800 | 1 |
| | | PD-262-200 | 1 |
| K015313 | - | PD-272-010 | 4 |
| K015380 | AE4311 | PD-113-220 | 2 |
| K015384 | AE 1141 | PD-503-400 | 1 |
| K015468 | - | PD-272-010 | 5 |
| K015849 | AE4311 | PD-113-220 | 2 |
| K016629 | - | PD-272-010 | 8 |
| | | PD-272-020 | 25 |
| K016630 | - | PD-272-010 | 8 |
| K016630 | - | PD-272-020 | 25 |
| K016991 | - | PD-272-010 | 7 |
| K017003 | - | PD-272-010 | 7 |
| | | PD-272-020 | 23 |
| K017224 | AE 1141 | PD-503-400 | 1 |
| K018111 | KU4124 | PD-109-000 | 2 |
| K018631 | - | PD-272-030 | 8 |
| K019288 | - | PD-272-020 | 6 |
| K019300 | ES2060 | PD-214-200 | 5 |
| K019302 | ES2060 | PD-214-200 | 5 |

Contents (by Part Number)

Doc. No. Y011335 (EN - Rev. 003)
November 2011

| Part No. | Type No. | PD No. | Page |
|------------|----------|------------|------|
| K019309 | ES2060 | PD-214-200 | 5 |
| K019310 | ES2060 | PD-214-200 | 5 |
| K019312 | ES2060 | PD-214-200 | 5 |
| K019340 | ES2060 | PD-214-200 | 5 |
| K019342 | ES2060 | PD-214-200 | 5 |
| K019349 | ES2060 | PD-214-200 | 5 |
| K019350 | ES2060 | PD-214-200 | 5 |
| K019352 | ES2060 | PD-214-200 | 5 |
| K019786 | - | PD-272-010 | 11 |
| | | PD-272-020 | 28 |
| K019882 | AE 1141 | PD-503-400 | 1 |
| K020123 | AE4311 | PD-113-220 | 2 |
| K021138 | - | PD-272-020 | 8 |
| K021335 | - | PD-272-020 | 9 |
| K021336 | - | PD-272-020 | 12 |
| K021337 | - | PD-272-020 | 12 |
| K021338 | - | PD-272-020 | 12 |
| K021340 | - | PD-272-020 | 10 |
| K021342 | - | PD-272-020 | 11 |
| K021343 | - | PD-272-020 | 11 |
| K021345 | - | PD-272-020 | 9 |
| K021346 | - | PD-272-020 | 9 |
| K021643 | - | PD-272-020 | 15 |
| K021644 | - | PD-272-020 | 15 |
| K021940 | ES2070 | PD-214-600 | 2 |
| K022269 | - | PD-272-010 | 4 |
| | | PD-272-010 | 14 |
| K022270 | - | PD-272-010 | 4 |
| | | PD-272-010 | 14 |
| K022271 | - | PD-272-010 | 4 |
| | | PD-272-010 | 14 |
| K022272 | - | PD-272-010 | 14 |
| | | PD-272-020 | 21 |
| K022273 | - | PD-272-010 | 5 |
| | | PD-272-010 | 14 |
| K022274 | - | PD-272-010 | 5 |
| K022279 | - | PD-272-020 | 21 |
| K022847 | SV3801 | PD-501-100 | 1 |
| K022901K50 | - | PD-501-100 | 1 |
| K025259 | - | PD-262-400 | 1 |
| K025699 | AE4371 | PD-113-230 | 2 |
| K025700 | AE4370 | PD-113-230 | 2 |

| Part No. | Type No. | PD No. | Page |
|----------|----------|------------|------|
| K026197 | - | PD-272-020 | 29 |
| K026894 | BS7304 | PD-415-200 | 1 |
| K026896 | BS7309 | PD-415-200 | 1 |
| K026900 | BS7318 | PD-415-200 | 1 |
| K026901 | BS7319 | PD-415-200 | 1 |
| K026903 | BS7751 | PD-415-200 | 1 |
| K026904 | BS7755 | PD-415-200 | 1 |
| K026905 | BS7756 | PD-415-200 | 1 |
| K026919 | - | PD-262-400 | 1 |
| K027542 | - | PD-272-020 | 13 |
| K027811 | - | PD-272-020 | 17 |
| K027813 | - | PD-272-020 | 17 |
| K027814 | - | PD-272-020 | 19 |
| K027815 | - | PD-272-020 | 21 |
| K027817 | - | PD-214-800 | 1 |
| K027823 | - | PD-272-020 | 22 |
| K027826 | - | PD-272-020 | 8 |
| K027827 | - | PD-272-020 | 8 |
| K027833 | - | PD-272-020 | 17 |
| K027834 | - | PD-272-020 | 24 |
| K027836 | - | PD-272-020 | 17 |
| K027900 | ES2071 | PD-214-600 | 2 |
| K028000 | - | PD-272-020 | 8 |
| K028001 | - | PD-272-020 | 8 |
| K028491 | - | PD-272-020 | 6 |
| K028583 | - | PD-272-020 | 7 |
| K028584 | EZ1034 | PD-272-030 | 7 |
| K028585 | - | PD-272-020 | 13 |
| K028586 | - | PD-272-020 | 14 |
| K031733 | BX7408 | PD-413-200 | 1 |
| K031734 | BX7409 | PD-413-200 | 1 |
| K031736 | BX7401 | PD-413-200 | 1 |
| K031737 | BX7402 | PD-413-200 | 1 |
| K031738 | BX7516 | PD-413-200 | 1 |
| K031739 | BX7523 | PD-413-200 | 1 |
| K031740 | BX7525 | PD-413-200 | 1 |
| K031744 | BX7611 | PD-413-200 | 1 |
| K031745 | BX7612 | PD-413-200 | 1 |
| K031748 | BX7514 | PD-413-200 | 1 |
| K035570 | AE 1141 | PD-503-400 | 1 |
| K036198 | EZ2085 | PD-214-800 | 1 |
| K037584 | BR5504 | PD-104-000 | 1 |

| Part No. | Type No. | PD No. | Page |
|--------------|----------|------------|------|
| K037587 | BR5524 | PD-104-000 | 1 |
| K037590 | BR4352 | PD-103-000 | 1 |
| K037970 | BX7515 | PD-413-200 | 1 |
| K038536 | BX7518 | PD-413-200 | 1 |
| K041990 | BZ9646 | PD-413-100 | 1 |
| K044708 | - | PD-272-020 | 17 |
| K045570 | BS7402 | PD-415-200 | 1 |
| K045718 | BS7403 | PD-415-200 | 1 |
| K045719 | BS7404 | PD-415-200 | 1 |
| K051015 | - | PD-103-000 | 1 |
| K058249 | - | PD-272-020 | 20 |
| K058250 | - | PD-272-020 | 20 |
| K058256 | - | PD-272-020 | 20 |
| K058332 | - | PD-272-020 | 18 |
| K058333 | - | PD-272-020 | 18 |
| K058334 | - | PD-272-020 | 18 |
| K058340 | - | PD-272-020 | 18 |
| KR1006-100 | - | PD-523-600 | 1 |
| KR1008-100 | - | PD-523-600 | 1 |
| KR10101-100 | - | PD-523-600 | 1 |
| KR1012-100 | - | PD-523-600 | 1 |
| KR1015-100 | - | PD-523-600 | 1 |
| KR1018-50 | - | PD-523-600 | 1 |
| KR206100-100 | - | PD-523-600 | 1 |
| KR208100-100 | - | PD-523-600 | 1 |
| KR210100-100 | - | PD-523-600 | 1 |
| KR212150-100 | - | PD-523-600 | 1 |
| KR215150-100 | - | PD-523-600 | 1 |
| KR218200-50 | - | PD-523-600 | 1 |
| KX1294/2 | - | PD-110-400 | 1 |
| KX1294/4 | - | PD-110-400 | 1 |
| KX2000/1 | - | PD-110-400 | 1 |
| KX2196/1 | - | PD-110-400 | 1 |
| KX2552/3 | - | PD-110-400 | 1 |
| LS1051 | - | PD-503-200 | 2 |
| LS1500 | - | PD-503-200 | 2 |
| LS2000 | - | PD-503-200 | 2 |
| LS2510 | - | PD-503-200 | 2 |
| LS3000 | - | PD-503-200 | 2 |
| LS5000 | - | PD-520-700 | 1 |
| LS5001 | - | PD-520-700 | 1 |
| LS6000 | - | PD-520-700 | 1 |

| Part No. | Type No. | PD No. | Page |
|---------------|----------|------------|------|
| LS6001 | - | PD-520-700 | 1 |
| PET.76.900-00 | - | PD-523-600 | 2 |
| PET.76.900-10 | - | PD-523-600 | 2 |
| PET.76.900-30 | - | PD-523-600 | 2 |
| PET.76.900-31 | - | PD-523-600 | 2 |
| PET.76.900-35 | - | PD-523-600 | 2 |
| PET.76.900-36 | - | PD-523-600 | 2 |
| PET.76.901-00 | - | PD-523-600 | 2 |
| PET.76.901-10 | - | PD-523-600 | 2 |
| PET.76.901-30 | - | PD-523-600 | 2 |
| PET.76.901-31 | - | PD-523-600 | 2 |
| PET.76.901-35 | - | PD-523-600 | 2 |
| PET.76.901-36 | - | PD-523-600 | 2 |
| SEB00409 | AS3018 | PD-107-000 | 2 |
| SEB00651 | BR5504 | PD-104-000 | 1 |
| SEB00659 | BR4352 | PD-103-000 | 3 |
| SEB00662 | AE1124 | PD-503-100 | 1 |
| SEB00667 | AE1125 | PD-503-100 | 1 |
| SEB00778 | - | PD-112-400 | 1 |
| SEB00933 | BR4370 | PD-103-000 | 1 |
| SEB01068 | - | PD-103-000 | 1 |
| SEB01241 | BR5524 | PD-104-000 | 1 |
| SEB01263 | - | PD-103-000 | 1 |
| SEB01314 | - | PD-403-200 | 2 |
| SEB01315 | - | PD-403-200 | 2 |
| SEB01316 | - | PD-403-200 | 2 |
| SEB01321 | - | PD-403-200 | 2 |
| SEB01322 | - | PD-403-200 | 2 |
| SEB01326 | BR5522 | PD-104-000 | 1 |
| SEB01344 | BR5523 | PD-104-000 | 1 |
| SEB01510 | BR5524 | PD-104-000 | 1 |
| SEB01538 | DB2144 | PD-110-200 | 1 |
| VB3206/2 | - | PD-524-000 | 1 |
| VB3246/2 | - | PD-524-000 | 1 |
| VB3276/2 | - | PD-524-000 | 1 |
| VB3301/206 | - | PD-524-000 | 2 |
| VB33015/206 | - | PD-524-000 | 2 |
| VB3302/206 | - | PD-524-000 | 2 |
| VB3302/246 | - | PD-524-000 | 2 |
| VB3302/276 | - | PD-524-000 | 2 |
| VB3303/246 | - | PD-524-000 | 2 |
| VB3303/276 | - | PD-524-000 | 2 |

Contents (by Part Number)

Doc. No. Y011335 (EN - Rev. 003)
November 2011

| Part No. | Type No. | PD No. | Page |
|-------------|----------|------------|------|
| VB3304/246 | - | PD-524-000 | 2 |
| VB3304/276 | - | PD-524-000 | 2 |
| VB3304/310 | - | PD-524-000 | 2 |
| VB3306/246 | - | PD-524-000 | 2 |
| VB3306/276 | - | PD-524-000 | 2 |
| VB3306/310 | - | PD-524-000 | 2 |
| VB3306/396 | - | PD-524-000 | 2 |
| VB3308/310 | - | PD-524-000 | 2 |
| VB3308/396 | - | PD-524-000 | 2 |
| VB33085/276 | - | PD-524-000 | 2 |
| VB3310/2 | - | PD-524-000 | 1 |
| VB3310/396 | - | PD-524-000 | 2 |
| VB3396/2 | - | PD-524-000 | 1 |
| VB3701/206 | - | PD-524-000 | 2 |
| VB3702/206 | - | PD-524-000 | 2 |
| VB3702/246 | - | PD-524-000 | 2 |
| VB3703/246 | - | PD-524-000 | 2 |
| VB3703/276 | - | PD-524-000 | 2 |
| VB3704/246 | - | PD-524-000 | 2 |
| VB3704/276 | - | PD-524-000 | 2 |
| VB3706/276 | - | PD-524-000 | 2 |
| VB3706/310 | - | PD-524-000 | 2 |
| VB3706/396 | - | PD-524-000 | 2 |
| VB3708/310 | - | PD-524-000 | 2 |
| VB3708/396 | - | PD-524-000 | 2 |
| VB3710/396 | - | PD-524-000 | 2 |
| VB4302/206 | - | PD-524-000 | 3 |
| VB4302/246 | - | PD-524-000 | 3 |
| VB4303/246 | - | PD-524-000 | 3 |
| VB4303/276 | - | PD-524-000 | 3 |
| VB4304/246 | - | PD-524-000 | 3 |
| VB4304/276 | - | PD-524-000 | 3 |
| VB4304/310 | - | PD-524-000 | 3 |
| VB4306/276 | - | PD-524-000 | 3 |
| VB4306/310 | - | PD-524-000 | 3 |
| VB4306/396 | - | PD-524-000 | 3 |
| VB4308/396 | - | PD-524-000 | 3 |
| VB4310/396 | - | PD-524-000 | 3 |
| VB8306/396 | - | PD-524-000 | 3 |
| VB8308/396 | - | PD-524-000 | 3 |
| VSM2215A | - | PD-524-000 | 2 |
| | | PD-524-000 | 3 |

| Part No. | Type No. | PD No. | Page |
|----------|----------|------------|------|
| Z000737 | - | PD-214-100 | 3 |
| Z005464 | - | PD-272-030 | 9 |
| Z005474 | - | PD-272-030 | 8 |
| Z006844 | - | PD-501-050 | 4 |
| | | PD-501-100 | 2 |
| Z007887 | - | PD-214-100 | 7 |
| | | PD-272-030 | 10 |

Brake System Diagrams

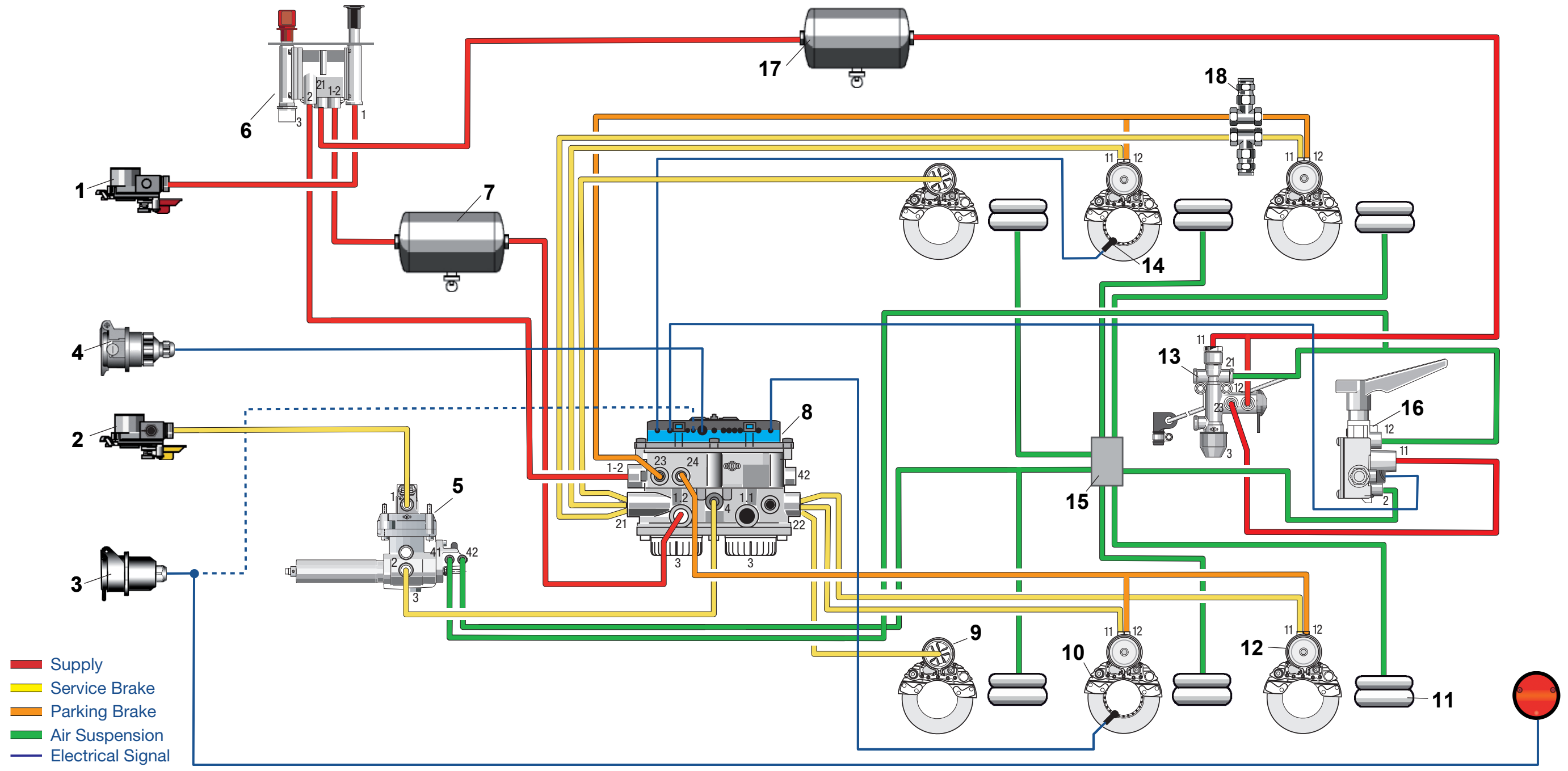
| PD No. | Product | Type/Part No. family |
|--------|-----------------------------|----------------------|
| | Brake System Diagram - ABS | |
| | Brake System Diagrams - EBS | |



Semi-trailer Air Brake and Suspension System with KB4TA ABS (2S/2M brake system and air suspension system with raise/lower valve)



Y011336 (Rev. 002)
September 2011



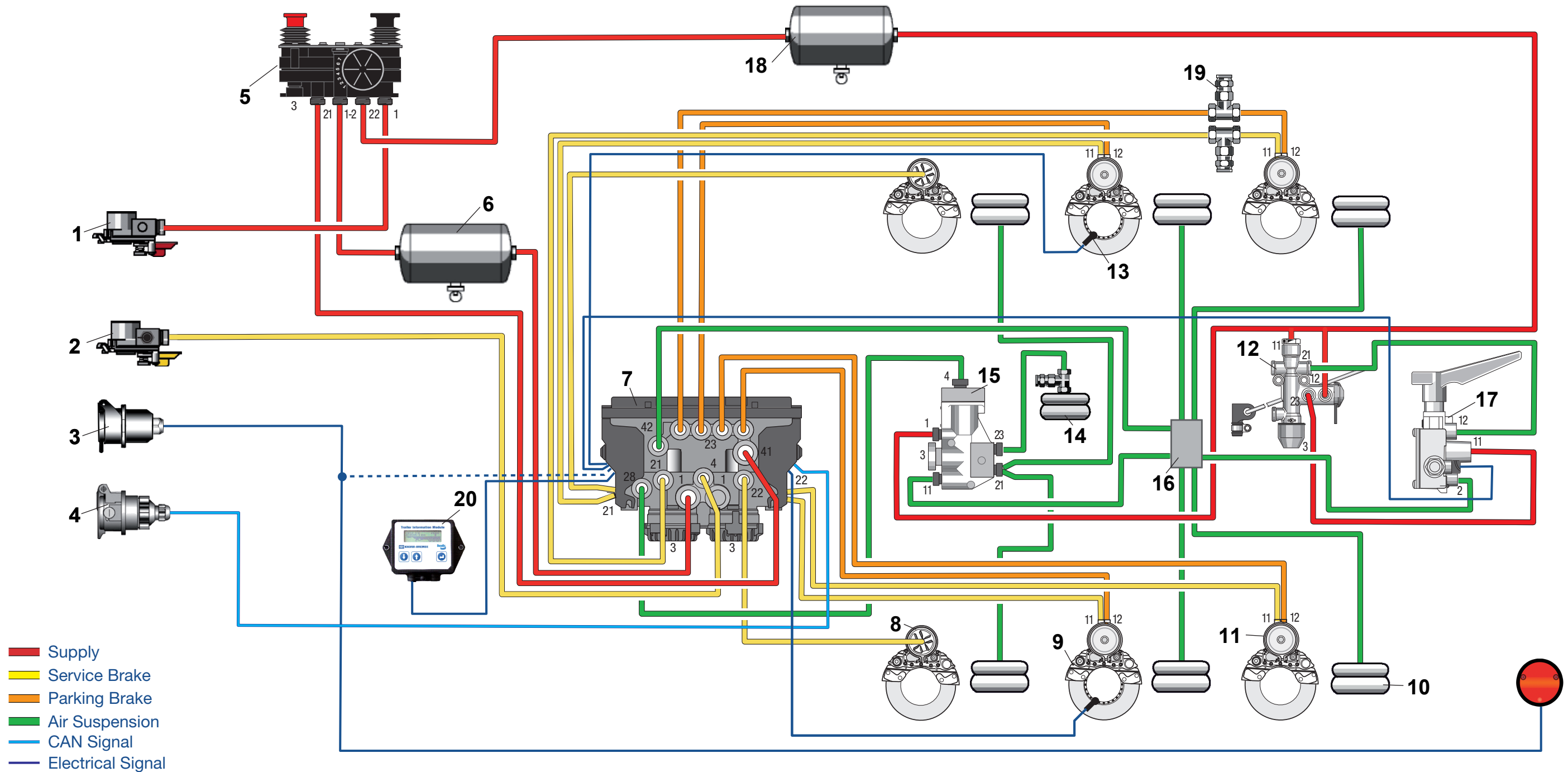
Item No. K002453

- | | | | |
|--|--|---|--|
| 1 Coupling Head "Supply" with Filter | 6 Park/Shunt Valve with integral Emergency Function and Charging Valve | 10 Air Disc Brake | 15 Manifold Block |
| 2 Coupling Head "Control" with Filter and Test Connector | 7 Air Reservoir (Service and Parking) | 11 Air Suspension Bellows | 16 Raise/Lower Valve with Speed Pulse reset to ride height |
| 3 ISO 1185 Connector (24N) | 8 KB4TA Brake Module | 12 Spring Brake | 17 Air Reservoir (Air Suspension) |
| 4 ISO 7638 Connector (ABS) | 9 Brake Chamber | 13 Levelling Valve with Height Limitation | 18 Test Connector |
| 5 Load Sensing Valve | | 14 Sensing Ring and Wheel Speed Sensor | |

Semi-trailer Air Brake and Suspension System with TEBS G2.1 (2S/2M brake system and suspension system with air controlled lift axle)



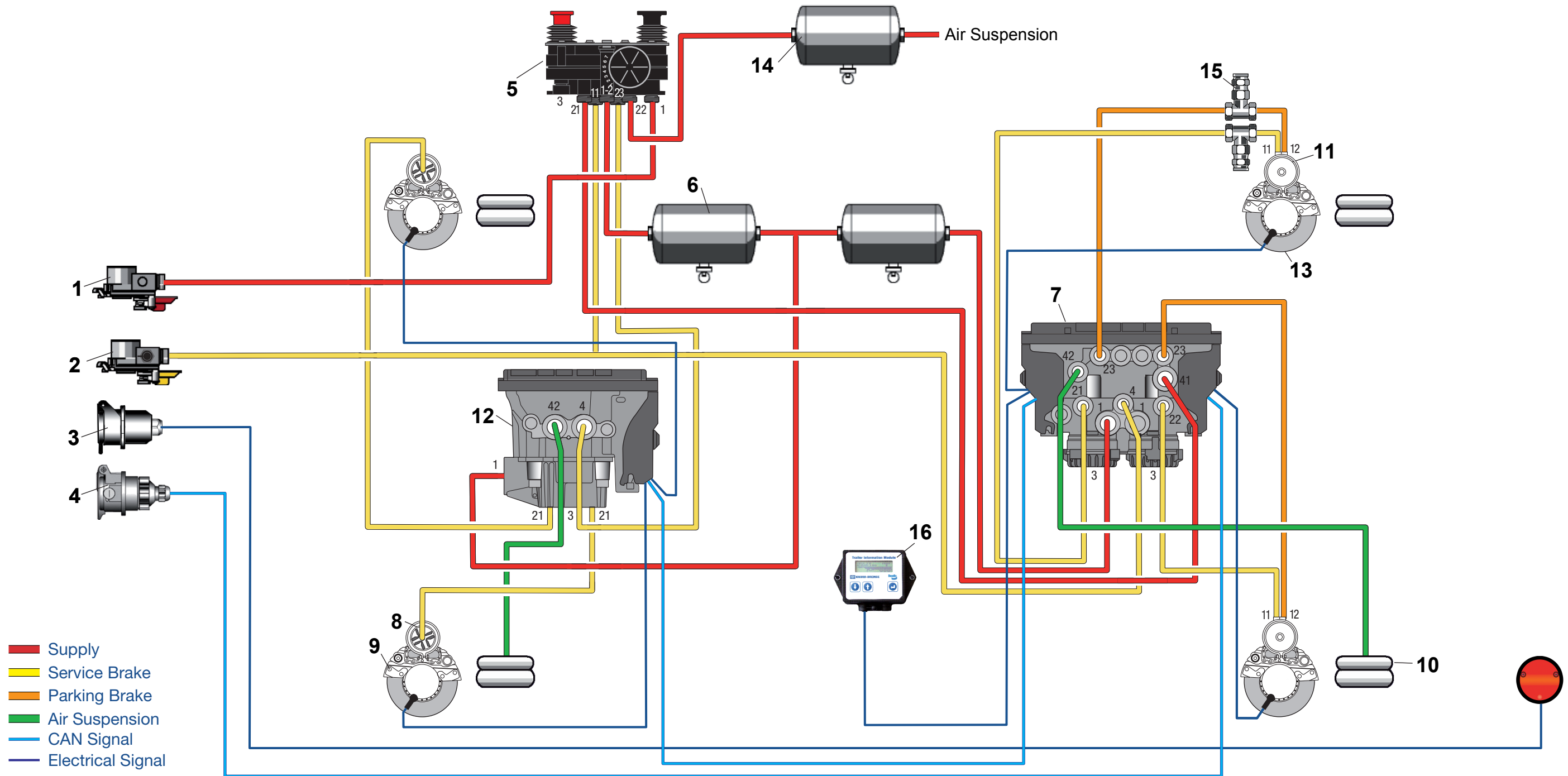
Y011337 (Rev. 002)
September 2011



- | | | | |
|--|---------------------------------------|---|--|
| 1 Coupling Head "Supply" with Filter | 6 Air Reservoir (Service and Parking) | 11 Spring Brake | 16 Manifold Block |
| 2 Coupling Head "Control" with Filter and Test Connector | 7 TEBS G2 Brake Module | 12 Levelling Valve with Height Limitation | 17 Raise/Lower Valve with Speed Pulse reset to ride height |
| 3 ISO 1185 Connector (24N) | 8 Brake Chamber | 13 Sensing Ring and Wheel Speed Sensor | 18 Air Reservoir (Air Suspension) |
| 4 ISO 7638 Connector (EBS) | 9 Air Disc Brake | 14 Lift Bellows | 19 Test Connector |
| 5 Park/Shunt Valve with integrated Charging Valve | 10 Air Suspension Bellows | 15 Lift Axle Control Valve | 20 Trailer Information Module (TIM G2) |

Drawbar Trailer Air Brake System with TEBS G2.1 (4S/3M brake system)

Y011337 (Rev. 002)
September 2011



- 1 Coupling Head "Supply" with Filter
- 2 Coupling Head "Control" with Filter and Test Connector
- 3 ISO 1185 Connector (24N)
- 4 ISO 7638 Connector (EBS)

- 5 Park/Shunt Valve with integrated Charging Valve and Front Axle Release Valve
- 6 Air Reservoir (Service and Parking)
- 7 TEBS G2.1 Brake Module
- 8 Brake Chamber

- 9 Air Disc Brake
- 10 Air Suspension Bellows
- 11 Spring Brake
- 12 Trailer Electro-Pneumatic Module Premium (TEPM-P)

- 13 Sensing Ring and Wheel Speed Sensor
- 14 Air Reservoir (Air Suspension)
- 15 Test Connector
- 16 Trailer Information Module (TIM G2)



| PD No. | Product | Type/Part No. family |
|------------|--------------------|----------------------|
| PD-053-200 | In-line Air Filter | LA2103 |
| PD-074-000 | Charging Valves | DR4... |



Product DATA

LA2103 In-line Air Filter

Doc. No. Y011340 (Rev. 001)
March 2011

PD-053-200

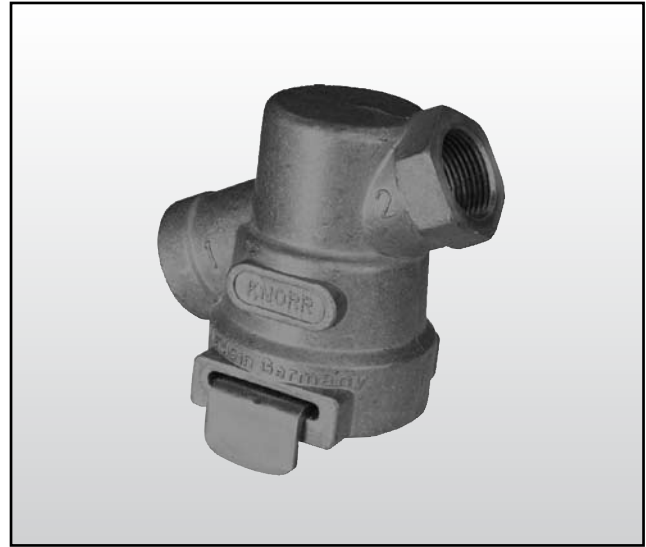
Function

Air filters are used in air braking systems to protect sensitive pneumatic devices from contamination.

The **LA2103 In-line Air Filter** is typically fitted in the 'supply' and 'control' lines on trailers to protect the trailer braking system from contamination that may be present in the air supply from the towing vehicle, particularly as a result of coupling and uncoupling of the lines.

To stop a blocked filter element trapping air pressure in the 'supply' or 'control' lines, the **LA2103 In-line Air Filter** has a by-pass feature which allows air to flow through unfiltered.

The condition of the filter element should be checked regularly and cleaned if necessary.



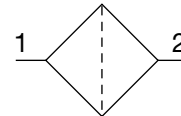
Note: An in-line air filter is already integrated in coupling heads KU14..

Technical Features

Maximum operating pressure: 20 bar
 Operating temperature range: -40 °C to +80 °C
 Weight: 0.2 kg approx.

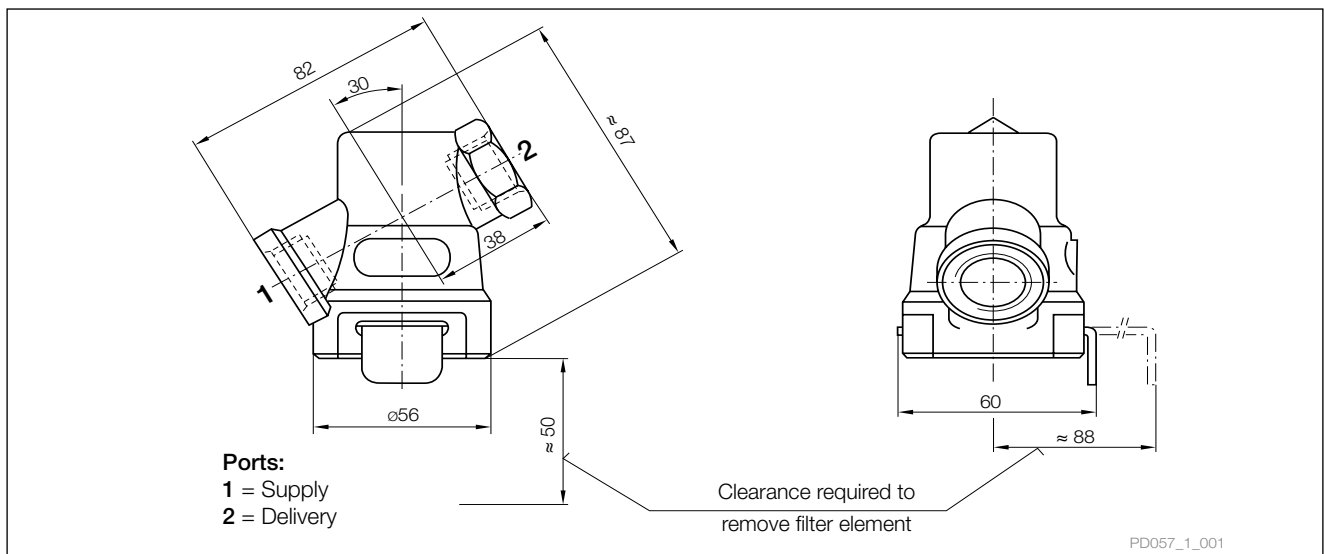
Standard Symbol as DIN ISO 1219

LA2103



| Part No. | Type No. | Port Threads |
|----------|----------|--------------|
| I99660 | LA2103 | M22x1.5 - 13 |

Dimensions



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Item No.: K002467





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Function

A **Charging Valve** is used where a protected air supply pressure or pressure sensitive signal is required.

Charging Valves are typically used to provide charging priority to the brake system reservoirs (known as sequential charging), i.e. the **Charging Valve** prevents suspension and auxiliary system reservoirs being charged before the brake system reservoirs are adequately charged.

The valves stop air pressure being delivered until a set opening pressure is reached. Once the supply pressure falls below the closing pressure of the valve the pressure must build up again to the opening pressure before any further delivery to the system takes place.

Charging Valves fall into three main categories:

Charging Valves with full feedback (e.g. DR4150). Once the valve is open, air can flow unrestricted in both directions through the valve down to the closing pressure of the valve. If supply pressure drops further, delivered pressure will feed back through the by-pass check valve and this will continue until both supply and delivery pressures are equalised.

This type of valve can be used to control the load-dependent lowering of the lifting axle if the lift axle control valve AE1124 is used (see PD-503-100, Document No. Y011380).

Charging Valves with limited feedback (e.g. DR4256). Once the valve is open, air can flow unrestricted in both directions through the valve down to the closing pressure of the valve. However if the supply pressure drops below the closing pressure of the valve the downstream pressure will no longer feed back and the delivered pressure is isolated from the supply pressure.

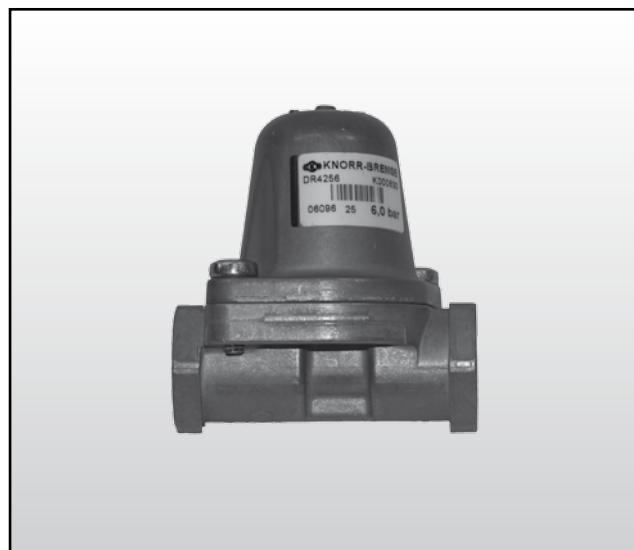
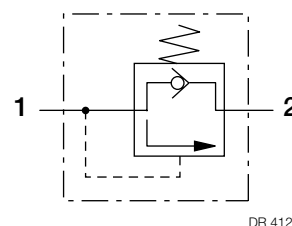
This type of valve is generally used in the supply to auxiliary air reservoirs on trucks and buses to ensure charging priority is initially given to the service brake reservoirs but where these air reservoirs are required to "back up" the service brake reservoirs down to the closing pressure of the valve.

Charging Valves without feedback (non-feedback) (e.g. DR43..). Once the valve is open, air can flow through the valve to increase the downstream pressure. However, if the supply pressure drops, a check valve prevents the return flow of air.

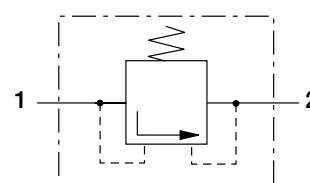
This type of valve can be used in the supply to the air suspension reservoirs to ensure charging priority is initially given to the service brake reservoirs and then, once the air suspension reservoirs are charged, the pressure in the reservoirs is unaffected by any change in the pressure of the service brake reservoirs.

Technical Features

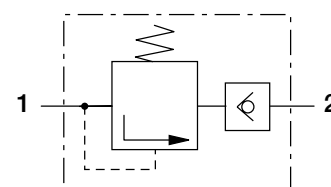
| | |
|------------------------------|------------------|
| Maximum operating pressure: | 20 bar |
| Operating temperature range: | -40 °C to +80 °C |
| Weight: | 0.2 kg approx. |

**Standard Symbol as DIN ISO 1219****DR4150 - full feedback**

DR 4125

DR4256 - limited feedback

DR 4232

**DR4370, - non-feedback
DR4378**

DR 4341

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DR41..., DR42..., DR43..

Charging Valves

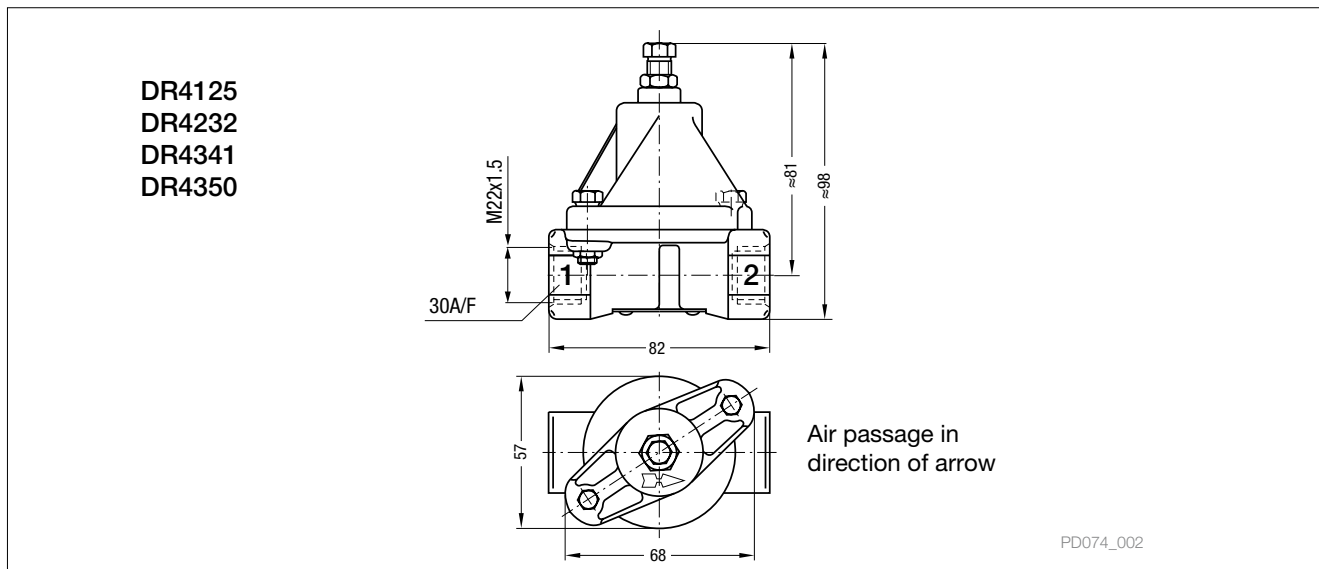
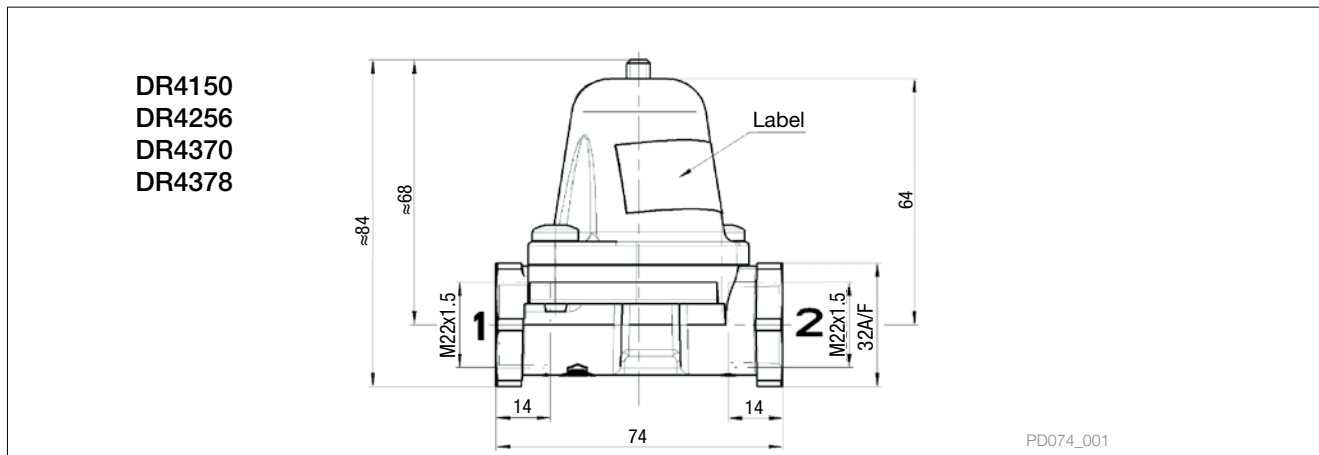
Doc. No. Y011382 (Rev. 002)
March 2011

Range Overview

| Part No. | Type No. | Opening Pressure [bar] | Closing Pressure [bar] | Feedback | Port Threads | Replaces: | |
|----------|----------|------------------------|------------------------|----------|--------------|-------------------|----------|
| | | | | | | Part No. | Type No. |
| K000613 | DR4150 | 1) ¹⁾ | 2) ²⁾ | Full | M22x1.5-14 | I69846 | DR4125 |
| K000630 | DR4256 | 6.0 | 5.0 | Limited | | I69850 | DR4232 |
| K000636 | DR4370 | 1) ¹⁾ | 2) ²⁾ | None | | I69866 | DR4350 |
| K000644 | DR4378 | 6.0 | 5.2 | None | | I69857 II30267 | DR4341 |

Some other pressure settings are available.

Dimensions



¹⁾ Setting Range 1 to 12 bar. After setting, mark the opening pressure on label.
²⁾ Closing pressure is dependent on the setting of the opening pressure.

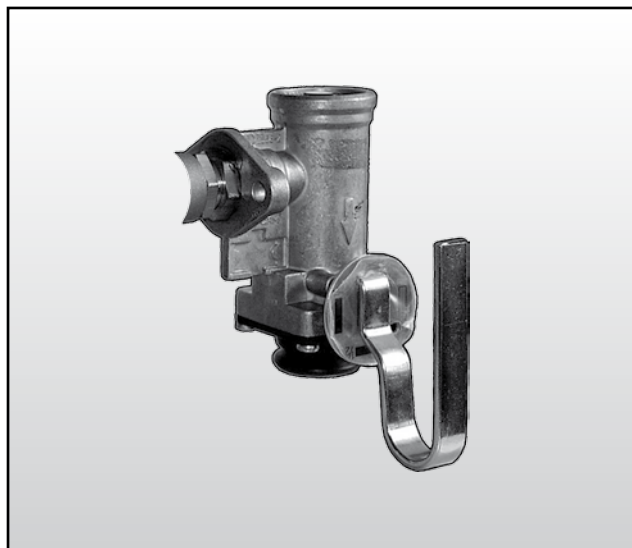


| PD No. | Product | Type/Part No. family |
|------------|--|-------------------------------|
| PD-102-000 | Load Sensing Valve - manual (for Relay Emergency Valves) | BR13.. |
| PD-103-000 | Load Sensing Valve - mechanically controlled | BR43.. |
| PD-104-000 | Load Sensing Valves (Air Suspension) | BR55.. |
| PD-106-000 | Relay Valve | AC574..., RE11.. |
| PD-107-000 | Relay Emergency Valves | AS3..., AS7... |
| PD-108-000 | Pressure Limiting Valves | DB11.. |
| PD-109-000 | Coupling Heads | KU13.., KU14.., KU41.. |
| PD-110-000 | Pressure Proportioning Valves | DB21.. |
| PD-110-200 | Adapter Valves | DB21.. |
| PD-110-300 | Pressure Retaining Valves | DB21.. |
| PD-111-400 | Quick Release Valves | RE21.., KX....., 1194339 |
| PD-112-100 | Single Check Valves | AE51.. |
| PD-112-200 | Double Check Valves | AE41.., 1111419000, 295358 |
| PD-112-400 | Throttle Check Valve | SEB00778 |
| PD-113-110 | Manoeuvring Valve (Semi-trailer) | AE4261 |
| PD-113-120 | Manoeuvring Valves (Drawbar Trailers) | AE2111, AE4257 |
| PD-113-210 | Park/Shunt Valves | AE424. |
| PD-113-220 | Park/Shunt Valves with Integrated Emergency Function | AE431. |
| PD-113-230 | Park/Shunt Valve with Integrated Charging Valve | AE437. |
| PD-113-300 | Trailer Park Valves | AE4262, AE4264 |
| PD-120-321 | 3/2 Control Valves | AE4265, AE4266 |
| PD-121-000 | Solenoid Valves | AE9120, EA1152 |
| PD-122-000 | Shut-Off Valves | AE21.. |



Function

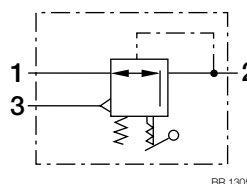
The **manually operated Load Sensing Valve**, in connection with a Relay Emergency Valve, is used to adjust the applied service brake pressure in relation to the load imposed on the trailer's axles



Technical Features

Maximum Operating Pressure: 8.5 bar
 Operating Temperature Range: -40 °C to +80 °C
 Weight: 0.6 kg approx.

Standard Symbol as DIN ISO 1219



Range Overview

| Part No. | Type No. | Brake Released position | Possible range of pressure adjustment at port 2 [bar] in lever position: | | |
|----------|----------|-------------------------|--|------------|---------------|
| | | | Unladen | Half Laden | Fully Laden |
| | | | | | |
| I84575 | BR1305 | with | 1.8 - 2.5 | 3.0 - 4.5 | ¹⁾ |
| I84576 | BR1306 | without | 1.8 - 2.5 | 3.0 - 4.5 | ¹⁾ |

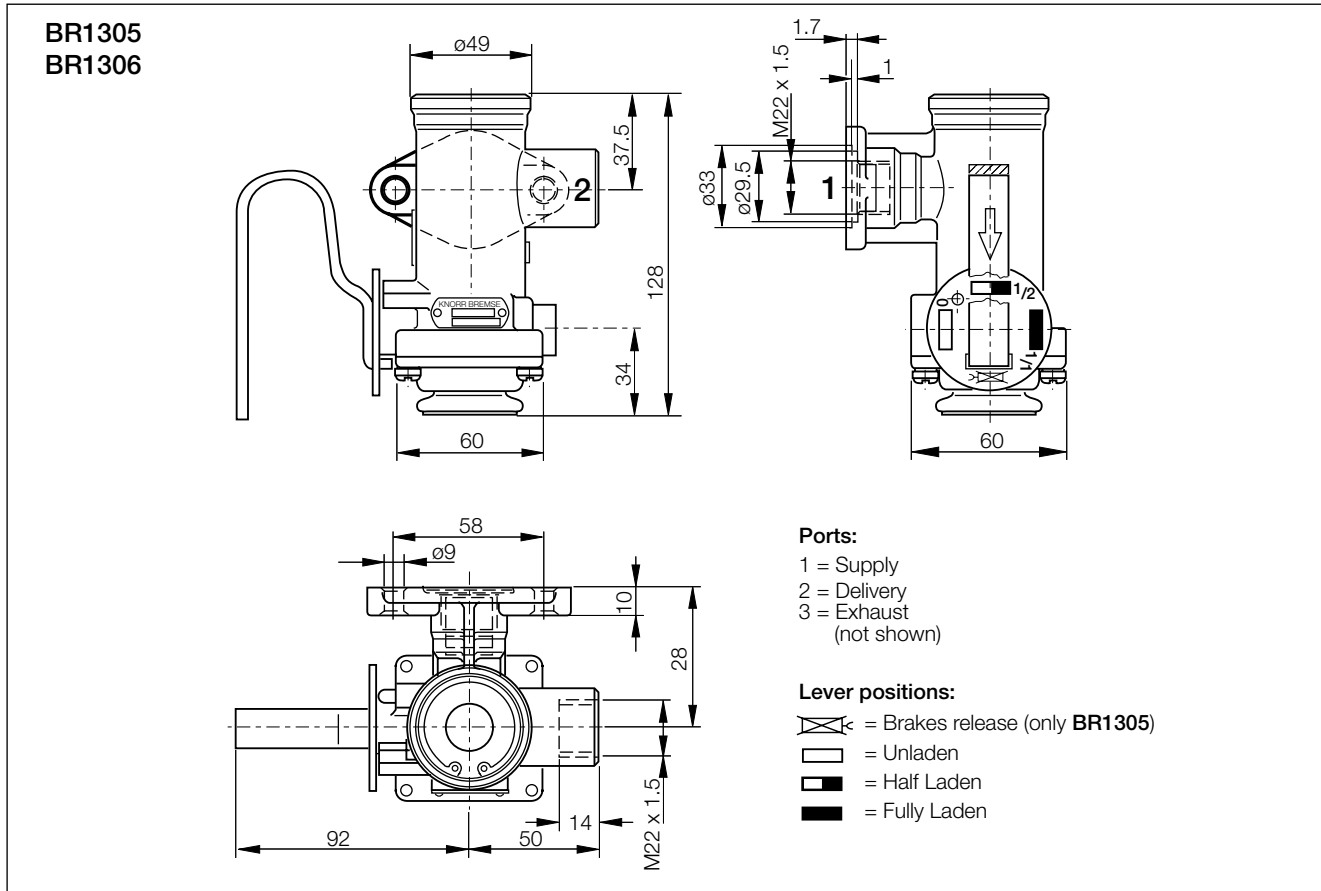
¹⁾ 1:1 Regulation up to tank pressure

BR13..

Load Sensing Valves - manual

Doc. No. Y011343 (Rev. 001)
March 2011

Dimensions



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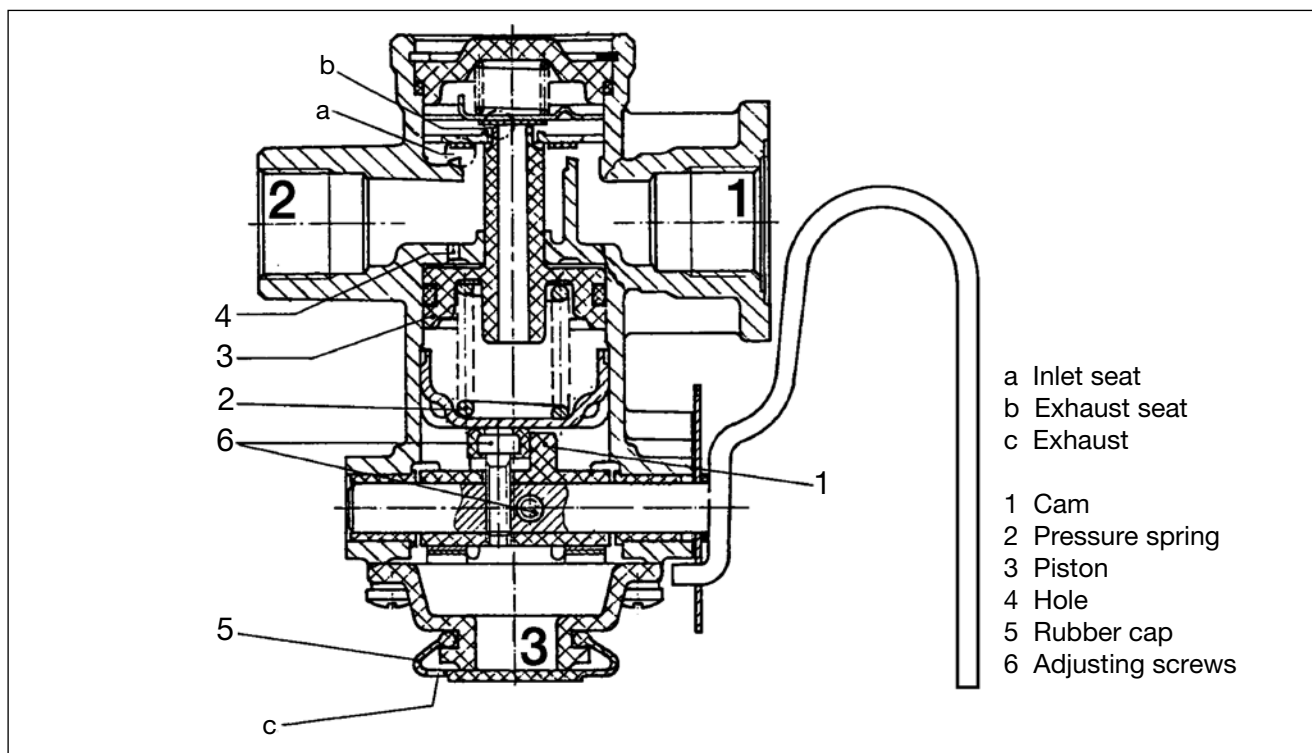
Adjustment of the Unladen and Half Laden Pressures

After removing the rubber cap (5) from port 3 use a 4mm hexagon key to adjust the unladen and half laden pressure on each adjusting screw (6) independently. Change the position of the lever to gain access to the screws (6) relevant to each lever position.

Rotation of the screws (6):

Clockwise direction to reduce pressure.

Anti-clockwise direction to increase pressure.



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Function

The **Load Sensing Valve** is used to adjust the applied service brake pressure in relation to the load imposed on the vehicle's axles. The mechanical suspension **Load Sensing Valve** uses the movement between the vehicle's chassis and axle to "sense" the load imposed on the axles.

The valve is installed on the chassis and a linkage is required to connect the control arm of the valve to the axles. Any movement of the chassis changes the position of the valve's control arm which, in turn, alters the ratio of input pressure to output pressure.

Versions of the **Load Sensing Valve** are available with standard relay or relay emergency feature and with static or dynamic operation. A static valve uses the braking ratio at commencement of braking throughout the brake application. A dynamic valve adjusts the braking ratio throughout the brake application to counteract the effect of axle load change due to load transfer.

To adjust the rate of change of control ratio due to change in axle load, the effective length of the lever can be adjusted.

A trailer data plate showing the setting of the **Load Sensing Valve** is required by law.

Technical Features

Maximum Operating Pressure: 8.5 bar
 Operating Temperature Range: -40 °C to +80 °C
 Working Angle: 20°
 Weight: 2.3 kg approx.

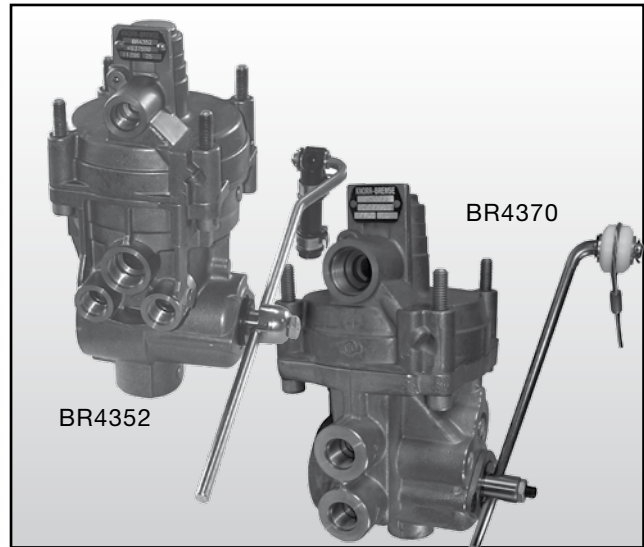
Range Overview

| Part No. | Type No. | Operation Type | Relay Emergency Valve | Relay Function | Remark |
|-----------------------|----------|----------------|-----------------------|----------------|-----------------|
| K037590 ¹⁾ | BR4352 | dynamic | with | with | with rigid link |
| SEB00933 | BR4370 | static | without | without | with cable link |

| Part No. | Type No. | Port Threads | | | | |
|-----------------------|----------|--------------|---------|------------------------------|---------|---------|
| | | 1 | 1-2 | 2 | 3 | 4 |
| K037590 ¹⁾ | BR4352 | M16x1.5 | M22x1.5 | M16x1.5 (4x) M22x1.5 (2x) | - | M16x1.5 |
| SEB00933 | BR4370 | M22x1.5 | - | M16x1.5 (2x) | M22x1.5 | - |

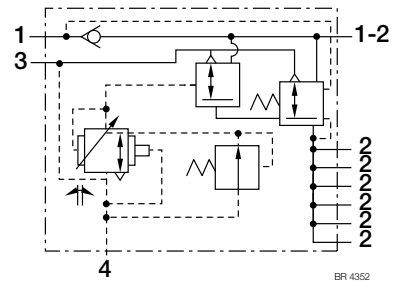
Maximum adjustable lever length: 300 mm.

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging.

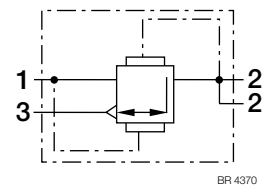


Standard Symbol as DIN ISO 1219

BR4352



BR4370



Service Parts:

Lever with Rubber Links for BR4352:
SEB01068

Lever with Cable Link for BR4370:
SEB01263

Accessories:

Tandem Axle Linkage **K051015 ¹⁾**

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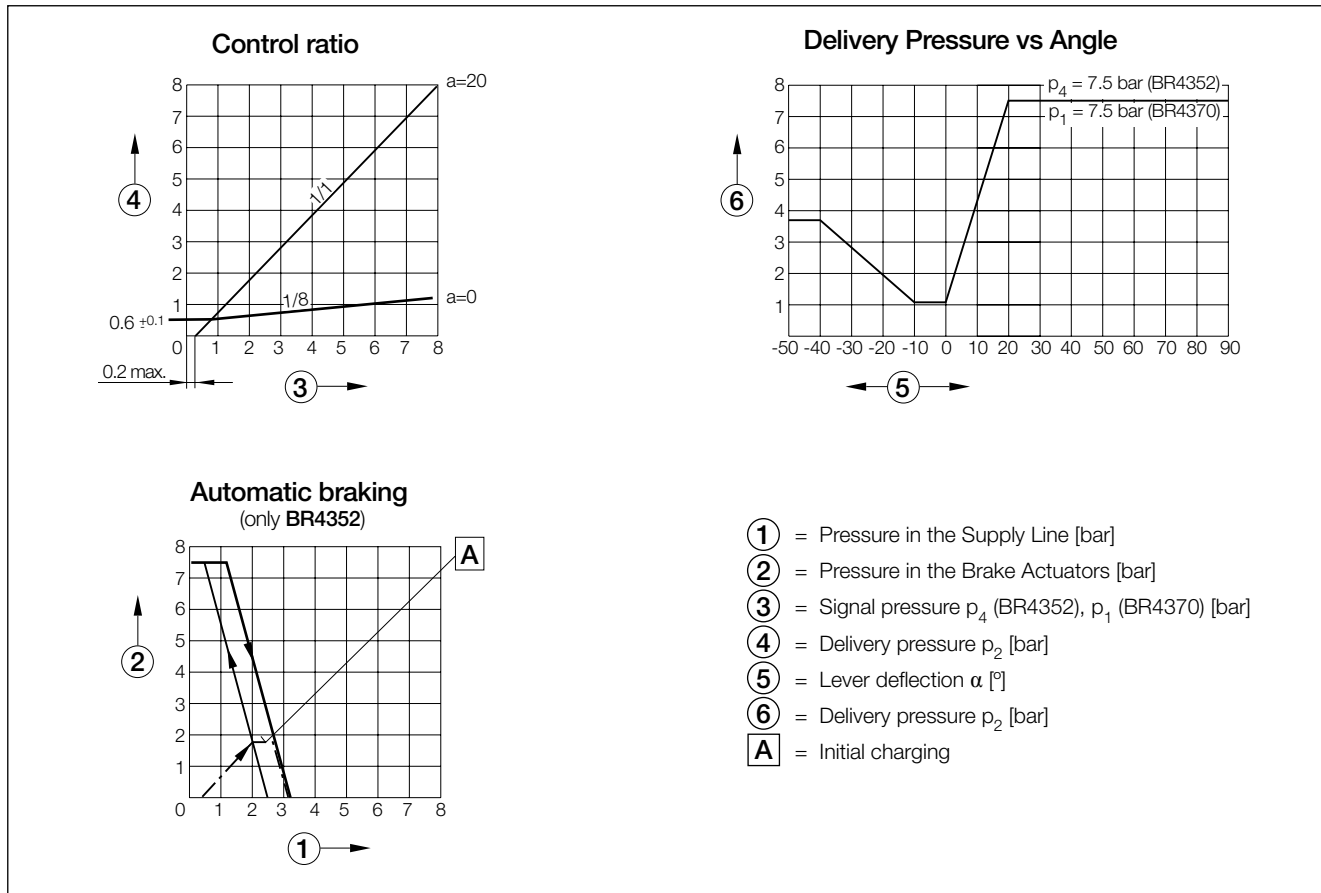
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BR43..

Load Sensing Valve - mechanically controlled

Doc. No. Y011344 (Rev. 003)
August 2011

Functional Diagrams



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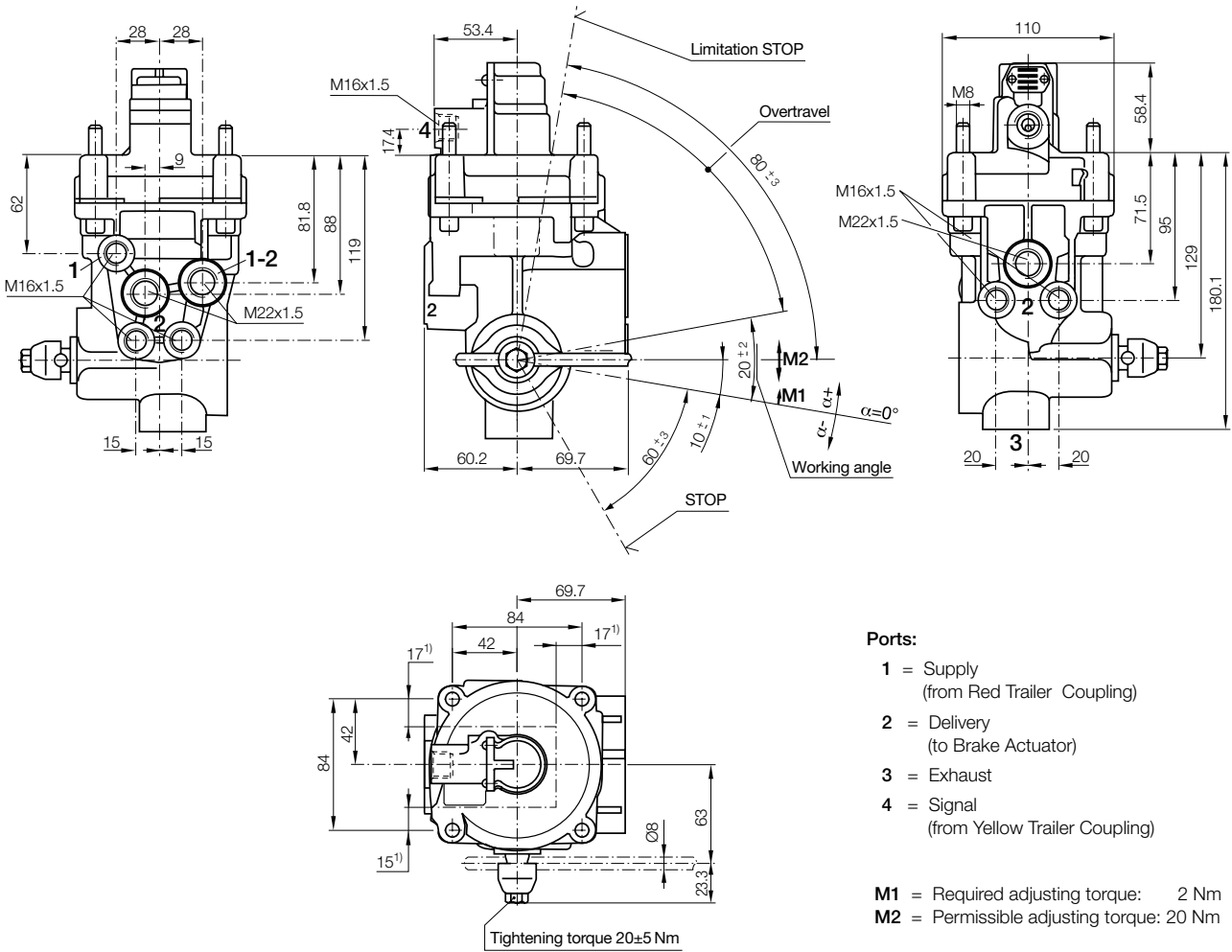
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Dimensions

BR4352 - K037590 (replaces BR4352 - SEB00659)



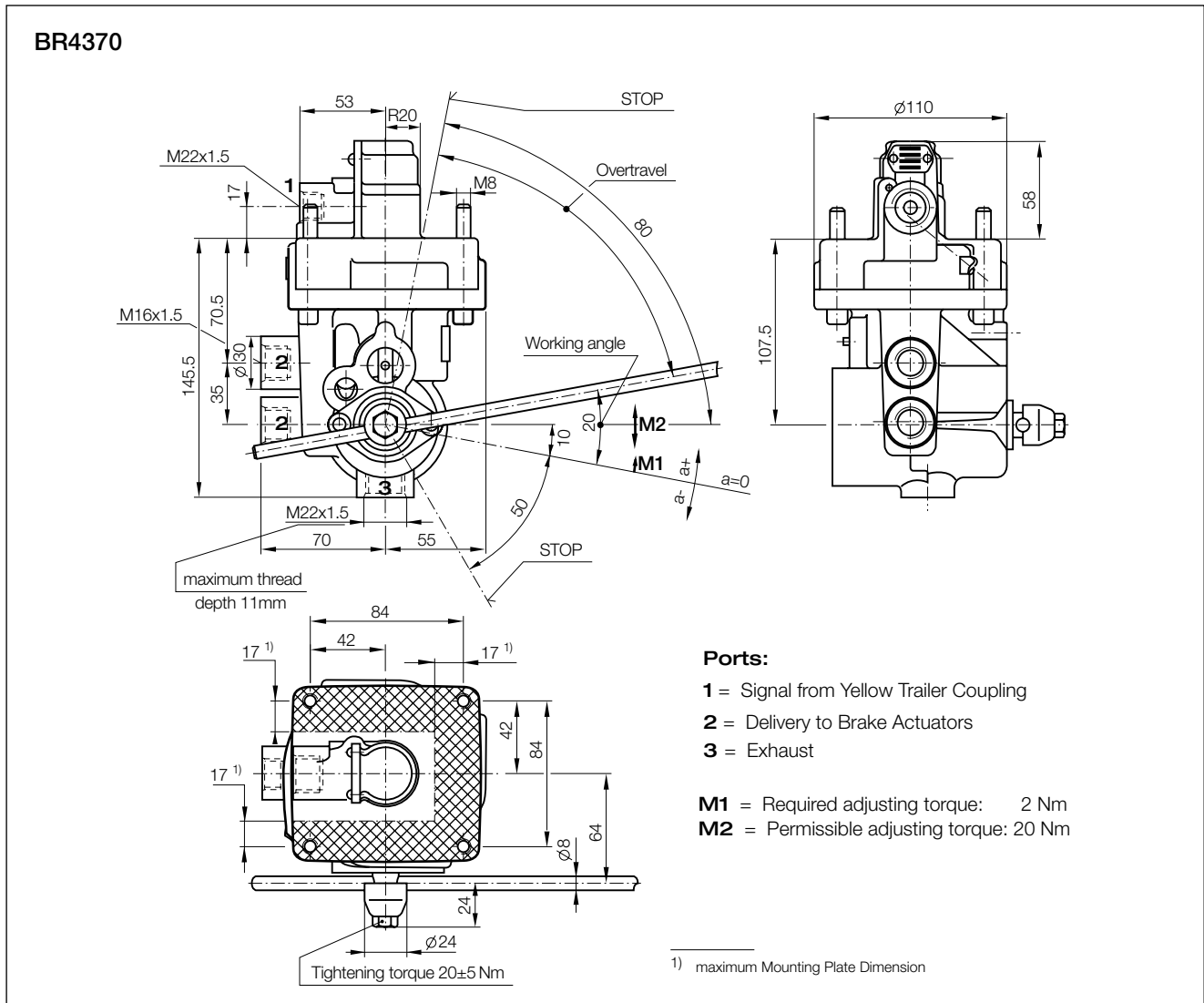
1) maximum Mounting Plate Dimension

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Load Sensing Valve Data Plate

| | | | | | |
|--|---|--|--|---|---|
| | | Automatisch-Lastabhängige Bremskraftregelrichtung (ALB) für Typ: Load Sensing Device for Type: Dispositif de correction automatique de freinage pour type: | | | |
| Vorderachse, Front Axle, Essieu avant | | Hinterachse, Rear Axle, Essieu arrière | | | |
| Feder-Nr Spring No Ressort No | | Feder-Nr Spring No Ressort No | | | |
| Ventile Nr Valves No Valves No | | Ventile Nr Valves No Valves No | | | |
| l = <input type="text"/> mm | | Eingangsdruck Input Pressure Pression de entrée <input type="text"/> bar | | l = <input type="text"/> mm | |
| Achslast Axle Load Charge essieu kg | Ausgangsdruck Output Pressure Pression de sortie bar | Weg s am Hebel Stroke s at Lever Course s ou Levier mm | Achslast Axle Load Charge essieu kg | Ausgangsdruck Output Pressure Pression de sortie bar | Weg s am Hebel Stroke s at Lever Course s ou Levier mm |
| | | | | | |

DIN 74267-C for mechanically controlled suspension, **BR43..**:

Part No.: **3EB01629**

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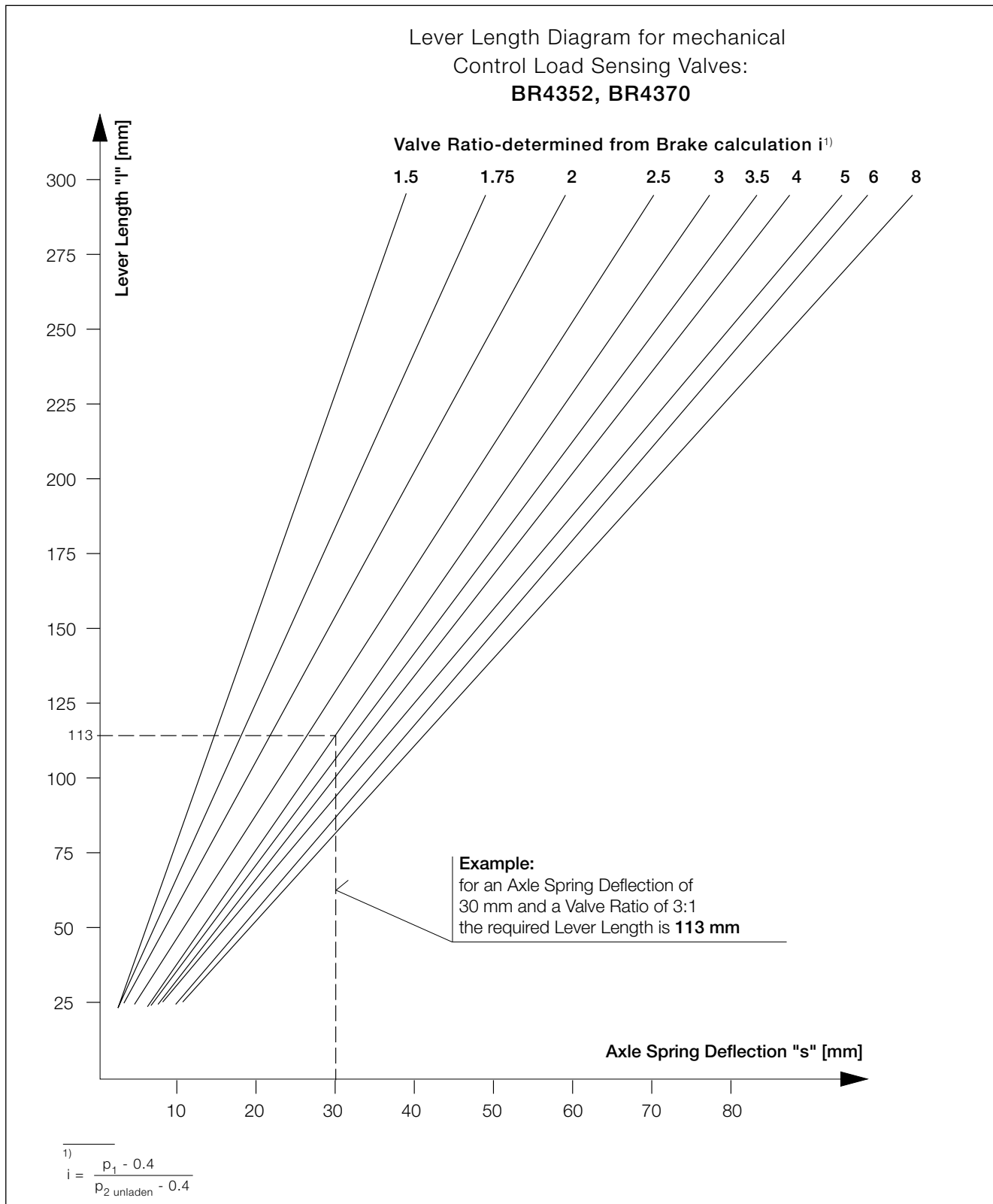
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BR43..

Load Sensing Valve - mechanically controlled

Doc. No. Y011344 (Rev. 003)
August 2011

Determining the Lever Length "l" - graphical method



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Determining the Lever Length "l" - arithmetic method

| | | |
|---|---------------------------------|--|
| Axle Spring Deflection: | s [mm] = | |
| Control (Yellow) Line pressure - input: | p_1 [bar] = | |
| Load dependent brake actuator pressure - unladen: | $p_{2 \text{ unladen}}$ [bar] = | |
| Load dependent brake actuator pressure - laden: | $p_{2 \text{ laden}}$ [bar] = | |

| | | |
|------------------------|---|--|
| Valve Ratio (unladen): | $i_L = \frac{p_{2 \text{ unladen}} - 0.4}{p_1 - 0.4} =$ | |
| Valve Ratio (laden): | $i_V = \frac{p_{2 \text{ laden}} - 0.4}{p_1 - 0.4} =$ | |

| | | |
|--------------------------------------|--------------------------------|--|
| Secondary variable A [angle degree]: | $A = 22.8 \times i_L - 12.8 =$ | |
| Secondary variable B [angle degree]: | $B = 22.8 \times i_V - 12.8 =$ | |
| Secondary variable C: | $C = \sin(A) - \sin(B) =$ | |

| | | |
|------------------------|--|--|
| Lever Length „l“ [mm]: | $l = \frac{\text{Axle Spring Deflection } s}{\text{Secondary variable C}} =$ | <div style="border: 1px solid black; width: 150px; height: 40px; margin: 0 auto;"></div> |
|------------------------|--|--|

A computer calculation program is available on request.

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BR43..

Load Sensing Valve - mechanically controlled

Doc. No. Y011344 (Rev. 003)
August 2011

How to adjust a mechanically controlled Load Sensing Valve BR43..

- Determine the lever length with the help of the brake calculation, the nomogram and the formula.
- Fit the Cable attachment on the lever at this length.
- Write the following data on the Load Sensing Valve Data Plate: input pressure; output pressure of the Load Sensing Valve, unladen and laden, axle load, unladen and laden; lever length and spring deflection.
- With the lever of the Load Sensing Valve horizontal, the connecting link should be at right angles to it. The length of the link can be adjusted using the clamp screw.
- Ensure that the vehicle is on level ground and chock the wheels.
- Axle weight must be according to the data of the axle manufacturer for an unladen vehicle.
- Check that sufficient service pressure is available.
- Connect pressure gauges to the Control Line input of the Load Sensing Valve and to the output (Brake Actuators).
- Apply input (Control Line) pressure as stated on the Data Plate.
- Read the output pressure on the gauge and correct if necessary (shorten the link to give lower unladen brake pressure and vice versa).
- See Attention note below.
- Disconnect the cable and with reference to a suitable measuring device, raise the lever a distance „s“, i.e. the distance of spring deflection as taken from the data plate.
- Apply input (Control Line) pressure as stated on the Data Plate.
- Read the output pressure and check it is the same as the Laden pressure as defined on the data plate. If it is not then correct by adjusting the lever length (shorten to increase output pressure and vice versa). Check and adjust until both unladen (with cable fitted) and laden settings are correct. See Attention note below.

After finishing the test ensure that the lever and cable clamps are tightened securely.

Attention:

To adjust valve BR4370 with static characteristic the supply pressure must be released to make any adjustment and then the output pressure re-checked.

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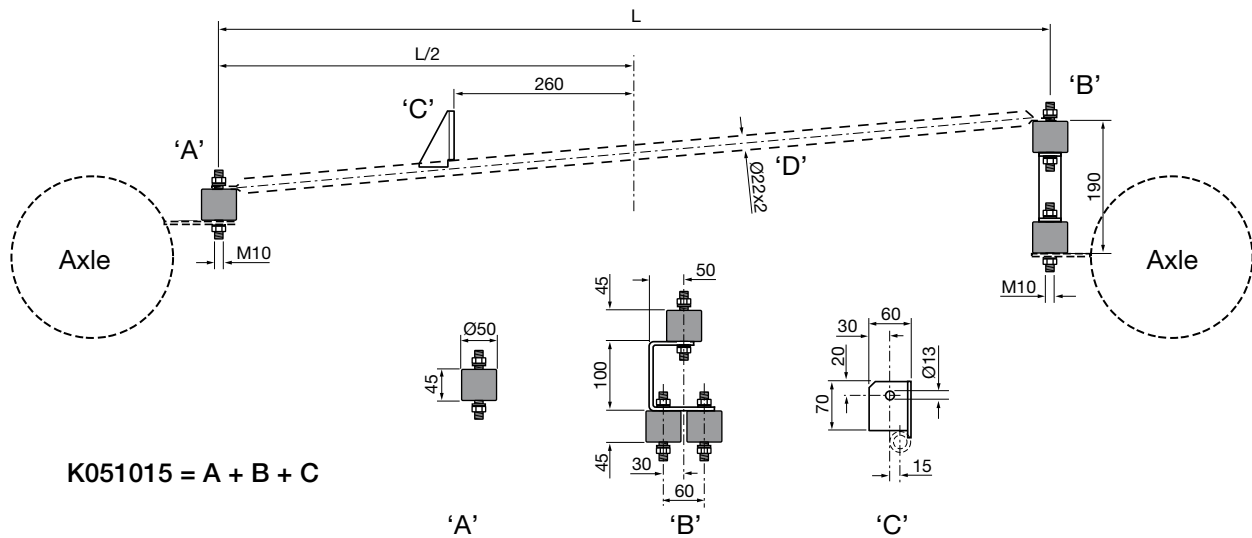


Rubber mounting for suspension equalisation**Function**

Rubber mounts are used in mechanically suspended tandem bogies to get an elastic connection between the axles. The arrangement as shown below, 'averages' the movements of both axles.

Installation recommendation

Use the tandem axle mounting kit K051015(see drawing) to connect the linkage of the Load Sensing Valve to the axles. Attach mounting brackets to the axles for the rubber mountings ("A" and "B"). The rubber mountings are connected to each other using a tube or angle section link "D". Part "C" provides an attachment point on link "D" for the Load Sensing Valve linkage.



Note: Item "D" is not supplied by Knorr-Bremse and must be manufactured by the installer to the necessary dimensions.

For further information contact your Knorr-Bremse distributor.



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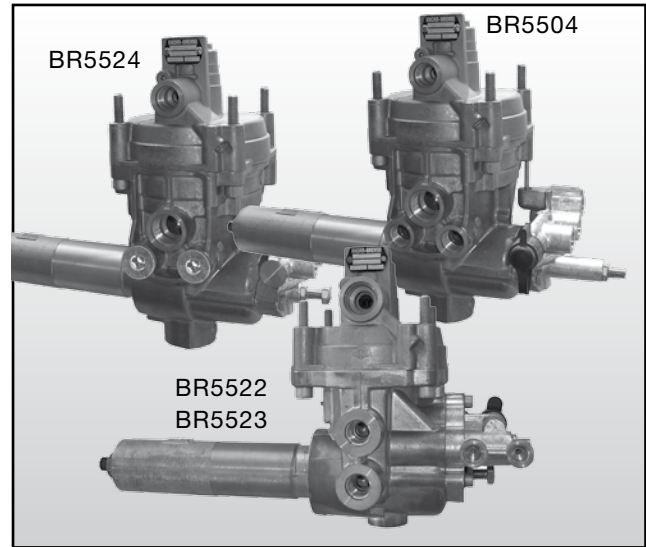


Function

The **Load Sensing Valve** is used to modify the applied service brake pressure in relation to the load imposed on the vehicle's axles. The pneumatic suspension **Load Sensing Valve** uses the pressure in the air suspension bags to 'sense' the load imposed on the axles and determine the valve's braking ratio.

Versions of the valve are available with and without relay and emergency features, also with static or dynamic operation. A static valve uses the braking ratio at commencement of braking application. A dynamic valve adjusts the braking ratio throughout the brake application to help counteract the effect of load transfer.

A trailer data plate, showing the settings of the **Load Sensing Valve**, is required by law (See page 3).



Technical Features

Maximum Operating Pressure: 8.5 bar
 Operating Temperature Range: -40 °C to +80 °C
 Weight: see table

Range Overview

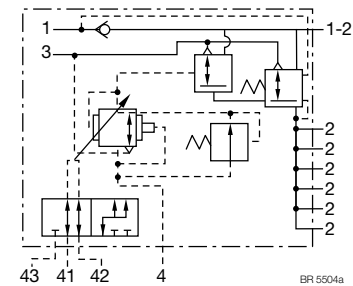
| Part No. | Type No. | Operation | Relay Emergency Valve | Relay feature | Weight approx. [kg] |
|-------------------------|----------|-------------------|-----------------------|---------------|---------------------|
| K037584 ¹⁾²⁾ | BR5504 | static or dynamic | with | with | 3.1 |
| II36836 ³⁾ | BR5522 | static | without | without | 2.1 |
| SEB01344 ⁴⁾ | BR5523 | dynamic | without | without | 2.4 |
| K037587 ¹⁾⁵⁾ | BR5524 | dynamic | with | with | 3.0 |

| Part No. | Type No. | Test Point connection "43" | Air Suspension connection | basic setting | |
|-------------------------|----------|----------------------------|---------------------------|--|--|
| | | | | unladen | laden |
| K037584 ¹⁾²⁾ | BR5504 | with | p_{41} / p_{42} | $p_1/p_{1-2}=8 \text{ bar}; p_4=6.5 \text{ bar}$ | |
| | | | | $p_{41}/p_{42}=0.8 \text{ bar}$ $p_2=2 \text{ bar}$ | $p_{41}/p_{42}=5.1 \text{ bar}$ $p_2=6.5 \text{ bar}$ |
| II36836 ³⁾ | BR5522 | with | p_{41} / p_{42} | $p_1=6.5 \text{ bar}$ | |
| | | | | $p_{41}/p_{42}=0.6 \text{ bar}$ $p_2=2.6 \text{ bar}$ | $p_{41}/p_{42}=4.6 \text{ bar}$ $p_2=6.5 \text{ bar}$ |
| SEB01344 ⁴⁾ | BR5523 | with | p_{41} / p_{42} | $p_1=6.5 \text{ bar}$ | |
| | | | | $p_{41}/p_{42}=0.5 \text{ bar}$ $p_2=2.3 \text{ bar}$ | $p_{41}/p_{42}=3.2 \text{ bar}$ $p_2=6.5 \text{ bar}$ |
| K037587 ¹⁾⁵⁾ | BR5524 | without | p_{42} | $p_1/p_{1-2}=8 \text{ bar}; p_4=6.5 \text{ bar}$ | |
| | | | | $p_{42}=0.5 \text{ bar}$ $p_2=2 \text{ bar}$ | $p_{42}=4.4 \text{ bar}$ $p_2=5.2 \text{ bar}$ |

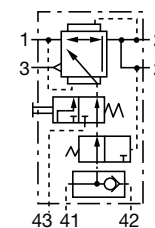
¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K037584N00.
²⁾ K037584 replaces SEB00651.
³⁾ II36836 replaces SEB01326.
⁴⁾ SEB01344 will be phased out with no replacement.
⁵⁾ K037587 replaces SEB01241 and SEB01510.

Standard Symbol as DIN ISO 1219

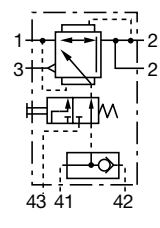
BR5504



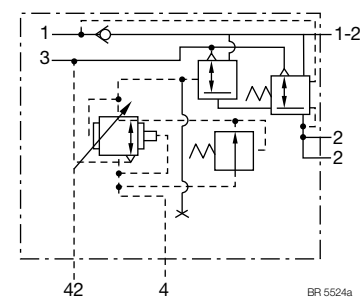
BR5522



BR5523



BR5524



BR55..

Load Sensing Valves (Air Suspension)

Doc. No. Y011345 (Rev. 003)
August 2011

| Part No. | Type No. | Air Port Threads | | | | |
|-------------------------|----------|------------------|---------|------------------------------|---------|-------------|
| | | 1 | 1-2 | 2 | 4 | 41/42 or 42 |
| K037584 ¹⁾²⁾ | BR5504 | M16x1.5 | M22x1.5 | M16x1.5 (4x) M22x1.5 (2x) | M16x1.5 | M12x1.5 |
| II36836 ³⁾ | BR5522 | M22x1.5 | – | M16x1.5 (2x) | – | M12x1.5 |
| SEB01344 ⁴⁾ | BR5523 | M22x1.5 | – | M16x1.5 (2x) | – | M12x1.5 |
| K037587 ¹⁾⁵⁾ | BR5524 | M16x1.5 | M22x1.5 | M22x1.5 (2x) | M16x1.5 | M12x1.5 |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K037584N00.

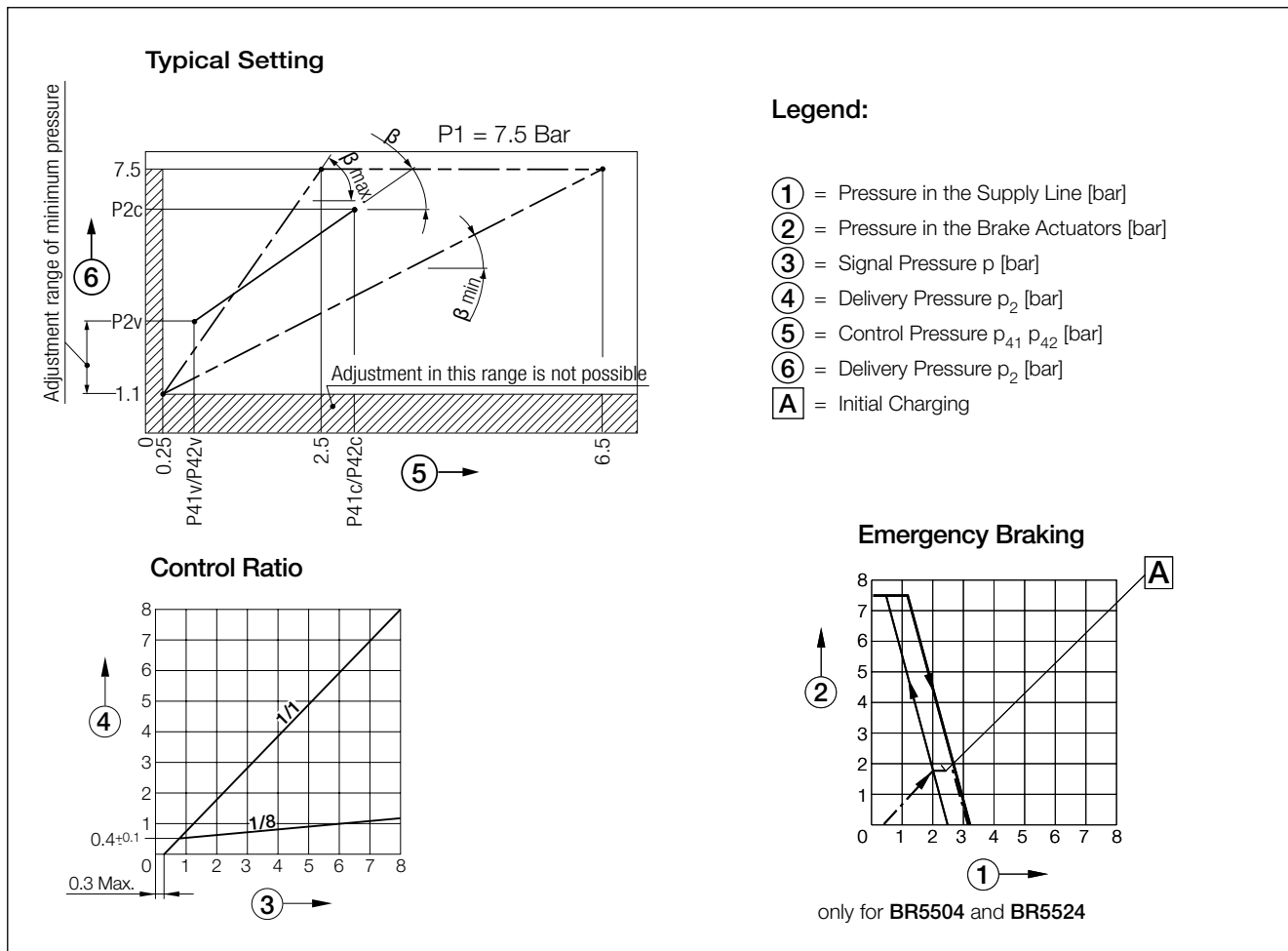
²⁾ K037584 replaces SEB00651.

³⁾ II36836 replaces SEB01326.

⁴⁾ SEB01344 will be phased out with no replacement.

⁵⁾ K037587 replaces SEB01241 and SEB01510.

Performance charts



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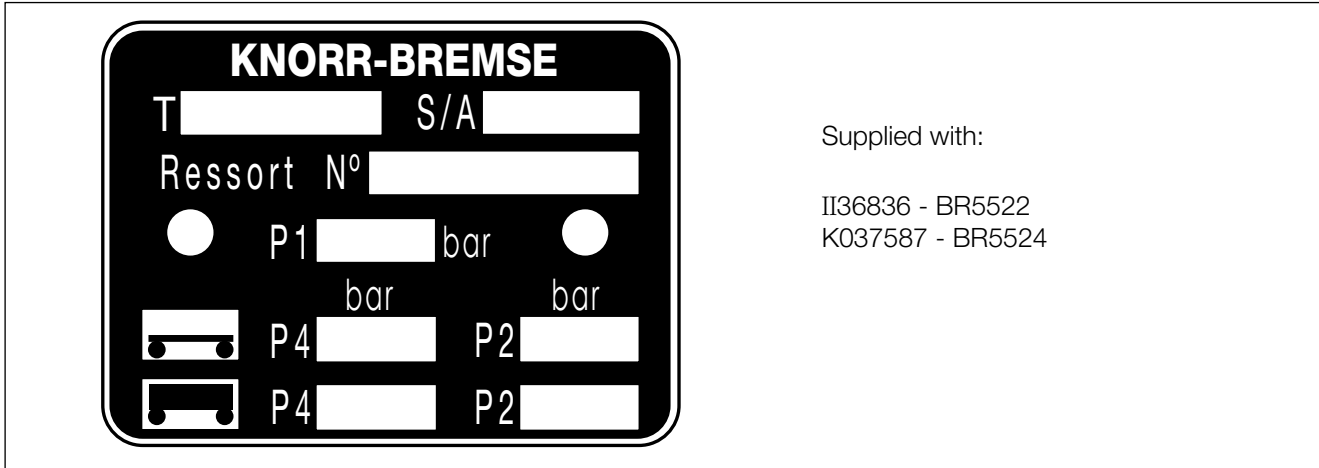
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Load Sensing Valve Data Plate for pneumatic Load Sensing Valve **BR55..**
Part No.: EB00669



Supplied with:

II36836 - BR5522
K037587 - BR5524

The fitting of the data plate is essential to ensure that the optimum performance from the **Load Sensing Valve** can be maintained once the trailer is in service.

The plate should be stamped with the following data:

- T = Part No. of the Load Sensing Valve fitted to the trailer
- S/A = Date of fitting (Week/Year).
- P1 = The inlet pressure at the Load Sensing Valve (used for setting unladen & laden valve ratios)
- P2 = The outlet pressures required when the Load Sensing Valve is set correctly (unladen & laden)
- P4 = The air suspension bag pressures for the unladen & laden weights.

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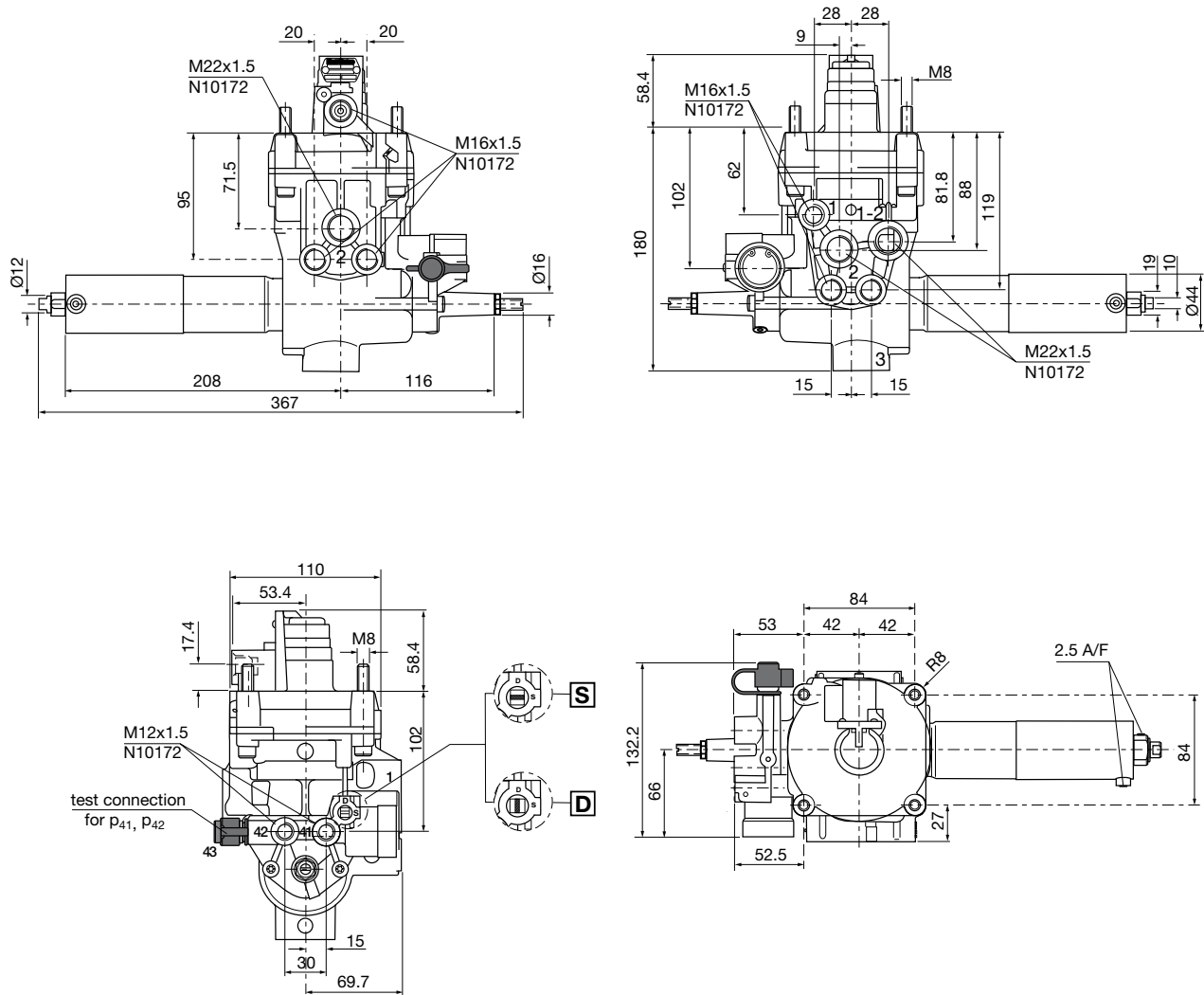
BR55..

Load Sensing Valves (Air Suspension)

Doc. No. Y011345 (Rev. 003)
August 2011

Dimensions

BR5504 - K037584 (replaces BR5504 - SEB00651)



Ports:

- 1 = Supply (from red trailer coupling)
- 1-2 = Trailer reservoir
- 2 = Delivery to brake actuators
- 3 = Exhaust
- 4 = Signal (from yellow trailer coupling)
- 41 = Signal (from air suspension)
- 42 = Signal (from air suspension)
- 43 = Test connection

S = "Static" setting

D = "Dynamic" setting

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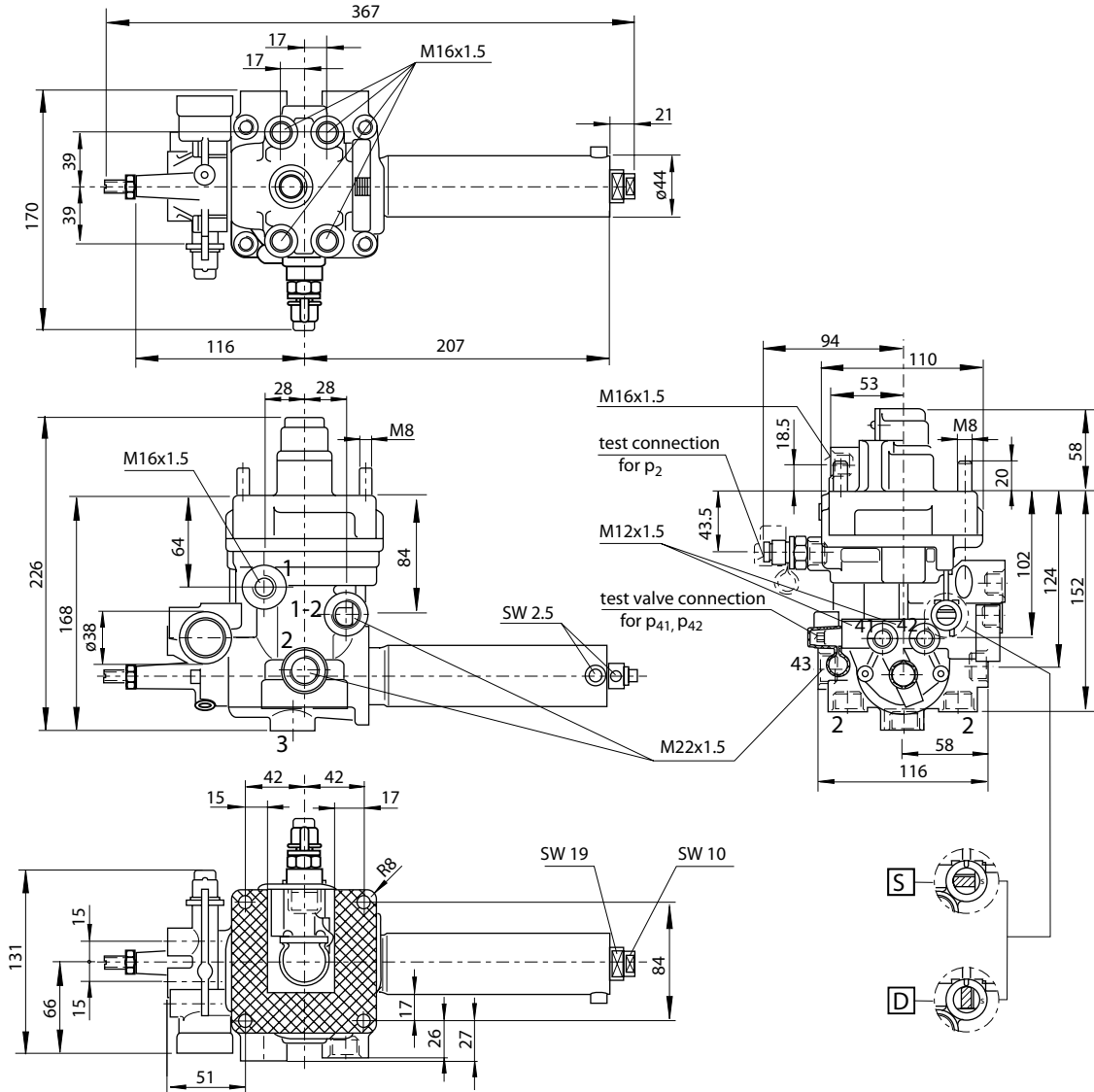
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BR5504 - SEB00651 (replaced by BR5504 - K037584)



Ports:

- 1 = Supply (from red trailer coupling)
- 1-2 = Trailer reservoir
- 2 = Delivery to brake actuators
- 3 = Exhaust
- 4 = Signal (from yellow trailer coupling)
- 41 = Signal (from air suspension)
- 42 = Signal (from air suspension)
- 43 = Test fitting

S = "Static" setting

D = "Dynamic" setting

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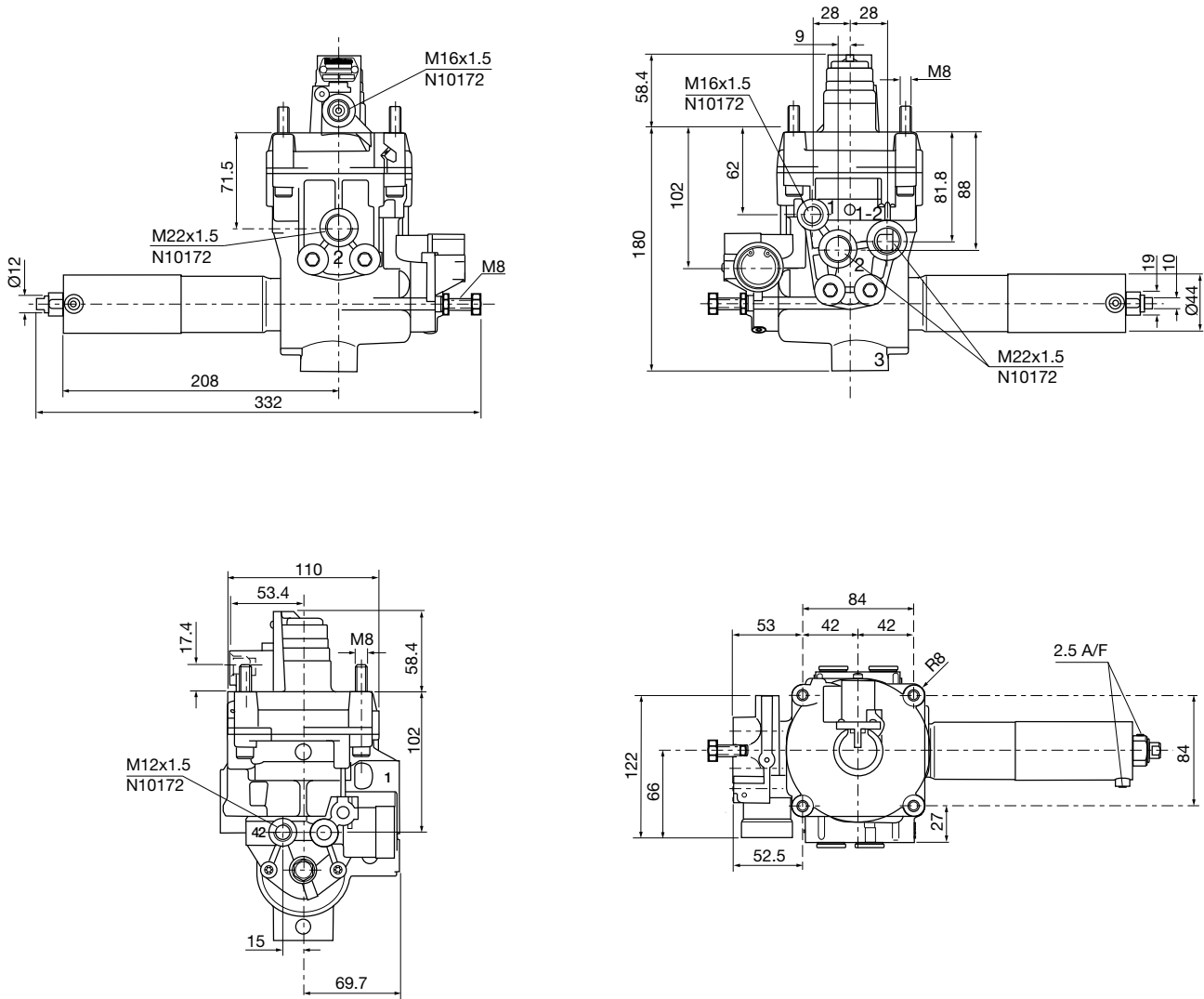
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BR55..

Load Sensing Valves (Air Suspension)

Doc. No. Y011345 (Rev. 003)
August 2011

BR5524 - K037587 (replaces BR5524 - SEB01241 & SEB01510)



Ports:

- 1 = Supply (from red trailer coupling)
- 1-2 = Trailer reservoir
- 2 = Delivery to brake actuators
- 3 = Exhaust
- 4 = Signal (from yellow trailer coupling)
- 42 = Signal (from air suspension)

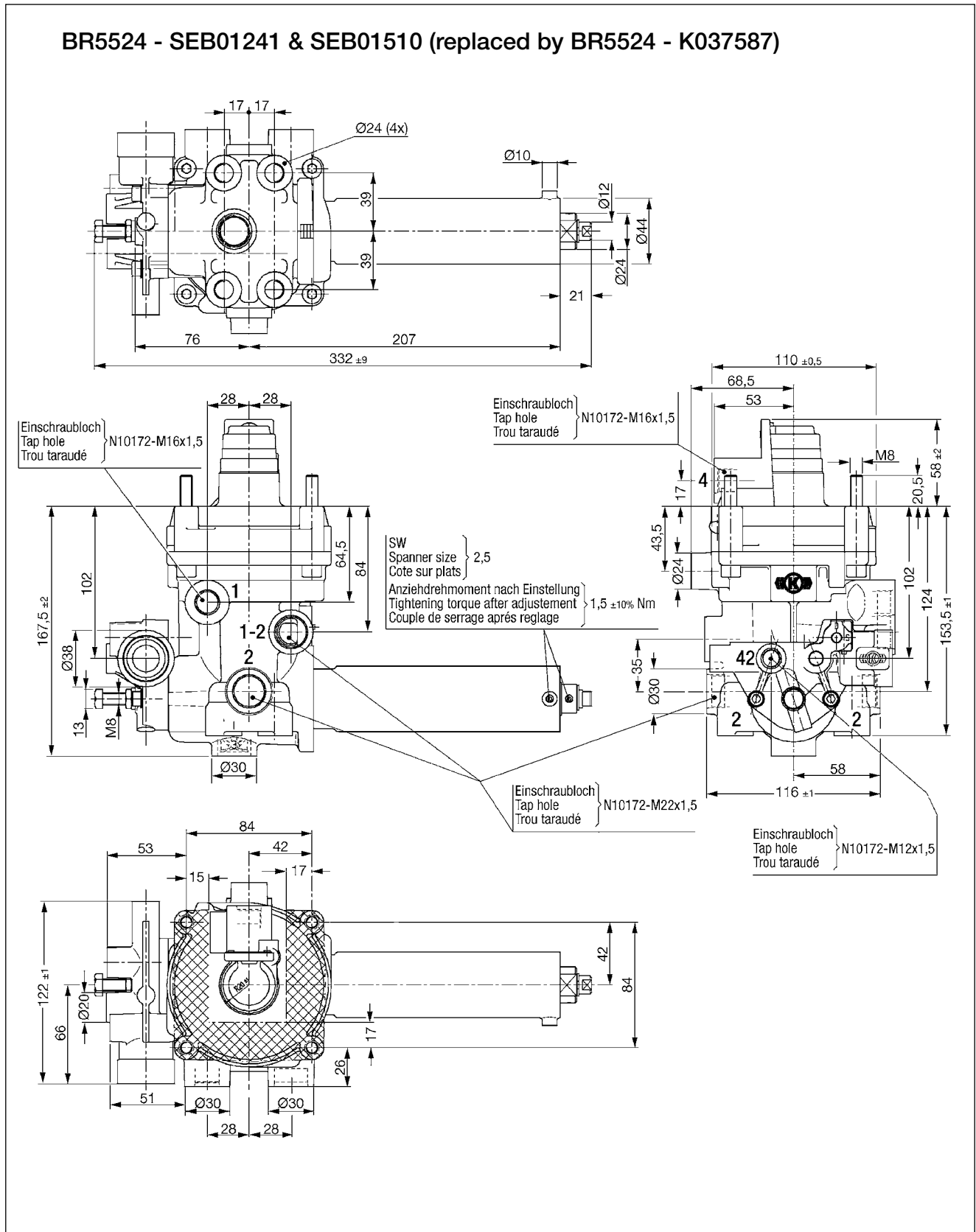
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BR5524 - SEB01241 & SEB01510 (replaced by BR5524 - K037587)



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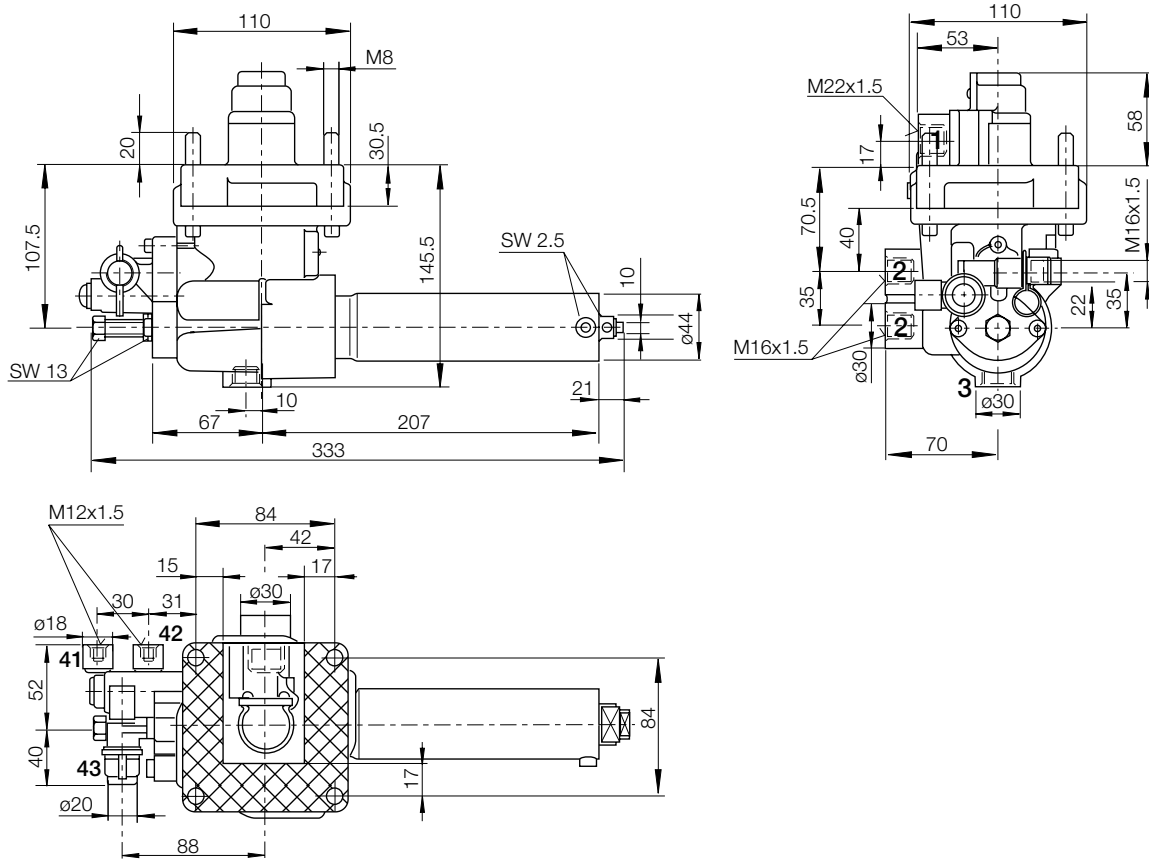
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BR55..

Load Sensing Valves (Air Suspension)

Doc. No. Y011345 (Rev. 003)
August 2011

BR5522
BR5523



Ports:

- 1 = Signal (from REV)
- 2 = Delivery to brake actuators
- 3 = Exhaust
- 41 = Signal (from air suspension)
- 42 = Signal (from air suspension)
- 43 = Test Fitting

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Item No. K002462



Checking and adjustment

| Part No. | Type No. | Operation | Relay Emergency Valve | Relay feature | Air Port Threads | | |
|----------|----------|----------------|-----------------------|---------------|------------------|----|----|
| | | | | | 41 | 42 | 43 |
| K037584 | BR5504 | Static/Dynamic | with | with | X | - | X |
| II36836 | BR5522 | Static | without | without | X | X | X |
| SEB01344 | BR5523 | Dynamic | without | without | X | X | X |
| K037587 | BR5524 | Dynamic | with | with | - | X | - |

Explanation of the port characteristic

| | |
|------------|--|
| Port 1 | <ul style="list-style-type: none"> Supply pressure in valves with Relay feature. Connected to Trailer Reservoir Signal pressure in valves without Relay feature Supply pressure in valves with integrated Relay Emergency Valve. Connected to Supply (Red) Line |
| Port 1-2 | Supply pressure (in valves with integrated Relay Emergency Valve). Connected to Trailer Reservoir |
| Port 2 | Controlled output pressure |
| Port 4 | Signal pressure (only valves with Relay feature). Connected to Control (Yellow) Line |
| Port 41/42 | Air suspension bellows pressure |
| Port 43 | Simulation port (allows simulated bellows pressure for adjusting the load sensing valve) |

For adjusting the valve ratio, the following steps are necessary:

1. Set "static" or "dynamic" (only **BR5504**).
2. Adjust output brake pressure p2 "**unladen**".
3. Calculation and adjustment of the **average** value of the characteristic.
4. Check the output brake pressure p2 "**laden**".
5. Check the responsiveness.
6. Adjustment of the minimum brake pressure.

Following tools are needed to adjust the load sensing valve:

- Open ended spanners sizes 10, 13 and 19 mm
- Hexagon Allen Key size 2.5 mm
- Slot-head screwdriver

Important notes:

- Read the pressure values from the Load Sensing Valve Plate or from the brake calculation
- Keep the type label free of paint
- Pressurise the ports from 0 bar up to the required pressure. If the charging is interrupted or if the required pressure is not reached, repeat the charging from 0 bar up to the required pressure
- When adjusting the valve, the signal pressures (input and air suspension) must be reduced to zero
- The exhaust port must point downwards

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BR55..

Load Sensing Valves (Air Suspension)

Doc. No. Y011345 (Rev. 003)
August 2011

1. Adjustment "static/dynamic" (BR 5504 only)

Exhaust any pressure in Port 4, test valve is not connected.

static: push in screw "E" and turn in clockwise direction from "D" to "S" (90°)
dynamic: push in screw "E" and turn in anti-clockwise direction from "S" to "D" (90°)

2. Adjustment of the brake output pressure p2 "unladen"

- Refer to pages 9 & 10 - Release lock nut "a", undo screw "A" for **BR5504** up to dimension 24 mm and for **BR552**. up to dimension 45 mm. Tighten lock nut "a".
- Loosen grub screws "b" and "c".
- Supply quoted "unladen" suspension pressure to port **42**.
- Supply input pressure to port **1 (BR5522, BR5523)** or port **4 (BR5504, BR5524)** with quoted input pressure and check quoted "unladen" output brake pressure is achieved.
- If value is not correct, remove input pressure and turn screw „B" whilst holding screw "C" (clockwise to increase pressure)
- Re-apply input signal pressure and check delivered pressure. Repeat as necessary.

3. Calculation and adjusting the average value of the characteristic line

Formula: $p2 \text{ average value} = (p2 \text{ laden} + p2 \text{ unladen}) / 2$
 $p41/42 \text{ average value} = (p41/p42 \text{ laden} + p41/42 \text{ unladen}) / 2$

Example: $p2 \text{ average value} = (6.5 + 2.4) / 2 = 4.45$
 $p41/42 \text{ average value} = (3.6 + 0.4) / 2 = 2.0$

Adjusting the average value:

- Supply calculated "average" suspension pressure to port **42**.
- Supply input pressure to port **1 (BR5522, BR5523)** or port **4 (BR5504, BR5524)** with quoted input pressure and check calculated "average" output brake pressure is achieved.
- If value is not correct, remove input pressure and turn screw "C" whilst holding screw "B" (clockwise to decrease pressure)
- Re-apply input pressure and check delivered pressure. Repeat as necessary.

4. Checking of the brake pressure p2 "laden"

- Supply quoted "laden" suspension pressure to port **42**.
- Supply input pressure to port **1 (BR5522, BR5523)** or port **4 (BR5504, BR5524)** with quoted input pressure and check quoted "laden" output brake pressure is achieved.
- If value is not correct, remove input pressure and turn screw "C" whilst holding screw "B" (clockwise to decrease pressure)
- Re-apply input pressure and check delivered pressure. Repeat as necessary..

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5. Checking the responsiveness

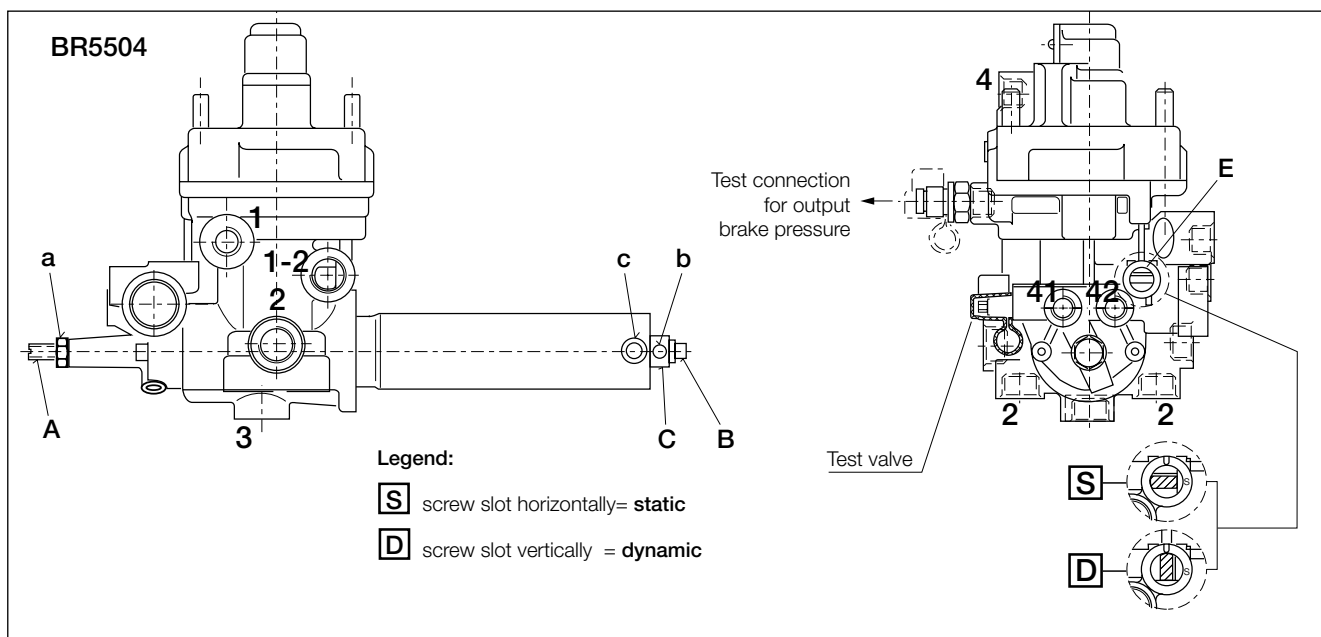
- Supply pressure to the suspension signal port(s) or test valve at a value 0.3 bar higher than the quoted "unladen" suspension.
- Supply input pressure to port **1** (**BR5522**, **BR5523**) or port **4** (**BR5504**, **BR5524**) with quoted input pressure and check that output brake pressure is slightly higher than the quoted "unladen" value.
- If the output pressure is not higher repeat adjustment, see item 2.
- Supply pressure to the suspension signal port(s) or test valve at a value 0.3 bar lower than the quoted "laden" suspension.
- Supply input pressure to port **1** (**BR5522**, **BR5523**) or port **4** (**BR5504**, **BR5524**) with quoted input pressure and check that output brake pressure is slightly lower than the quoted "laden" value.
- If the output pressure is not lower repeat adjustment, see item 3.
- Tighten screws b and c with 1.5 Nm after exhausting the suspension signal port(s) or test valve.
- Repeat the unladen, laden and responsiveness checks.

6. Adjusting the minimum brake pressure

- Ensure there is no pressure at the suspension signal port(s) or test valve.
- Supply input pressure to port **1** (**BR5522**, **BR5523**) or port **4** (**BR5504**, **BR5524**) with quoted input pressure and check that the output pressure is 0.1 - 0.2 bar lower than the quoted "unladen" value.
This represents the minimum brake pressure in the event that the suspension pressure is lost.
- If necessary release lock nut "a" and adjust the minimum brake pressure by turning screw "A" (clockwise rotation = pressure increase).
- Tighten lock nut "a".

Maintenance:

The Load Sensing Valve is maintenance-free.



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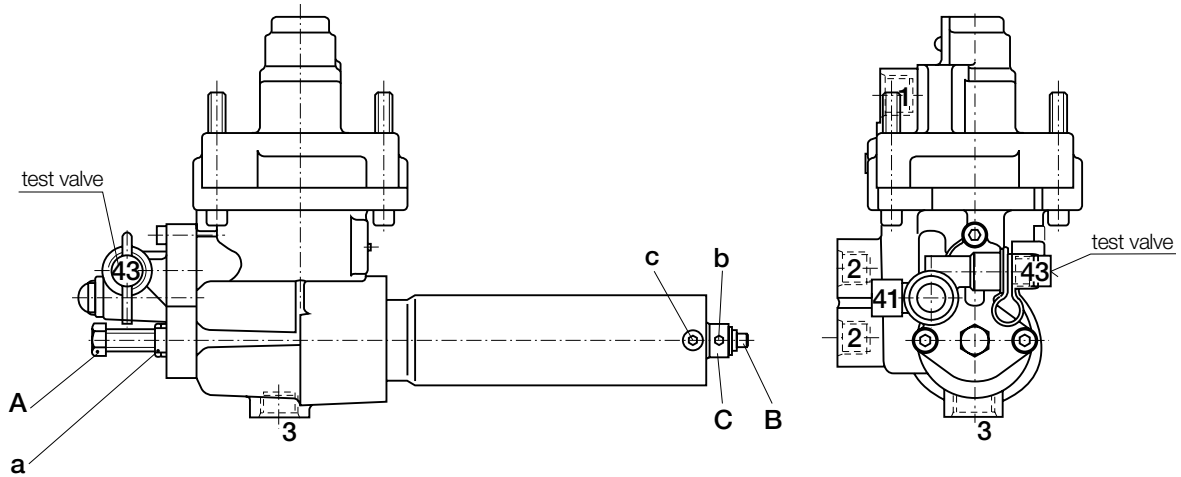
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BR55..

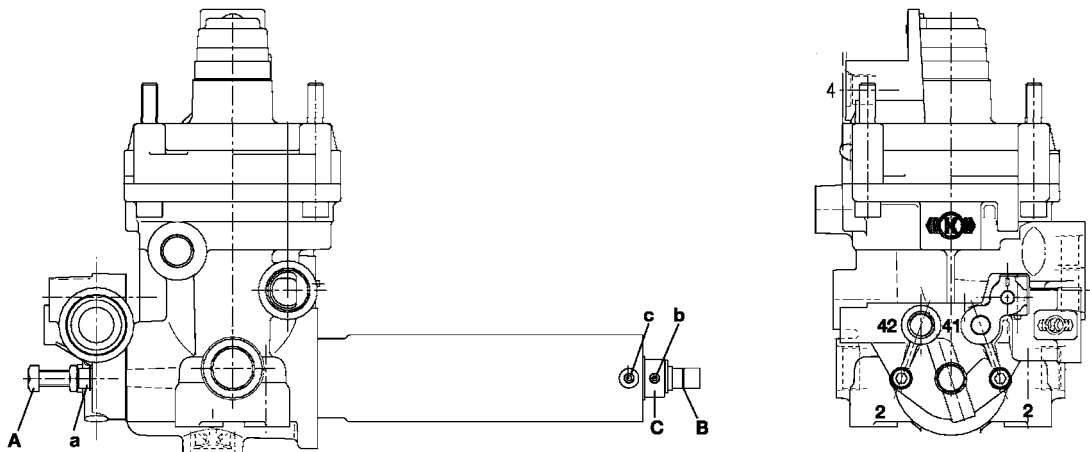
Load Sensing Valves (Air Suspension)

Doc. No. Y011345 (Rev. 003)
August 2011

BR5522
BR5523



BR5524



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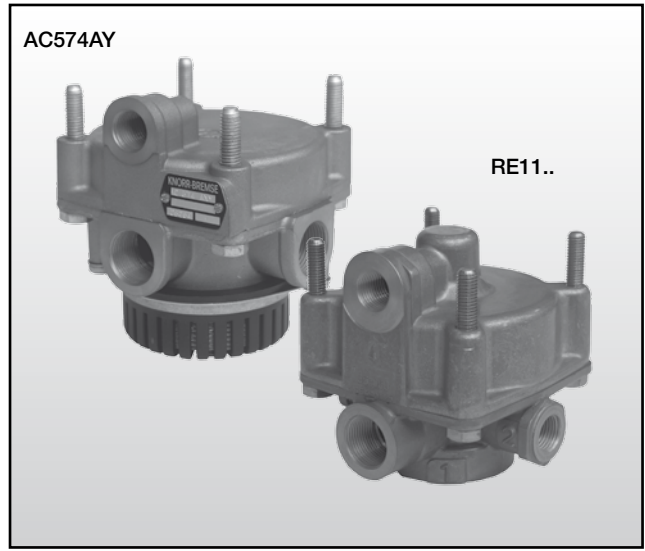


Function

In response to an air pressure signal from a control valve, the **Relay Valve** will speed up brake applications by providing rapid and precise control of a large volume of air.

Technical Features

Maximum operating pressure: 8.5 bar
 Operating Temperature Range: -40 °C to +80 °C
 Nominal way through: 13 mm
 Weight: 1.1 kg approx.

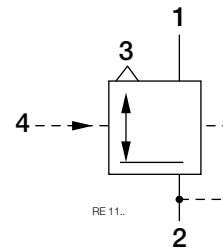


Range Overview

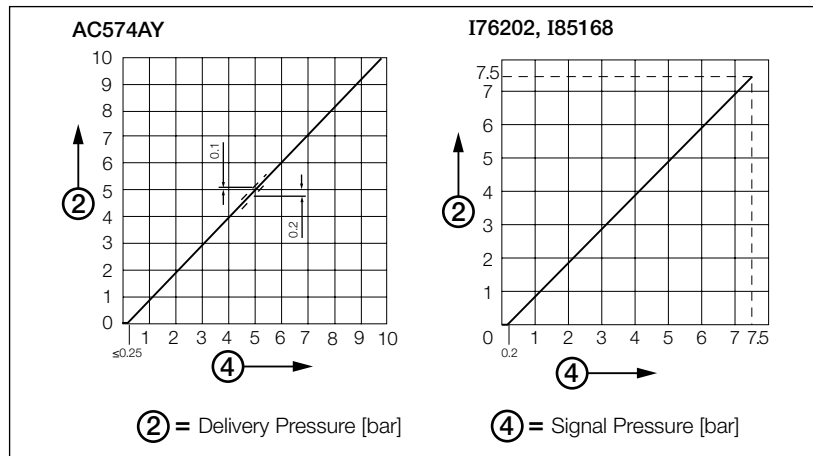
| Part No. | Type No. | Air Port Threads | | | |
|----------|----------|------------------|--------------|------------|---------|
| | | 1 | 2 | 3 | 4 |
| AC574AY | - | M22x1.5 | M22x1.5 (2x) | (Silencer) | M16x1.5 |
| I76202 | RE1121 | M22x1.5 | M16x1.5 (2x) | M22x1.5* | M16x1.5 |
| I85168 | RE1131 | M22x1.5 | M22x1.5 (2x) | M22x1.5* | M16x1.5 |

* with exhaust flap fitted

Standard Symbol as DIN ISO 1219



Performance Chart



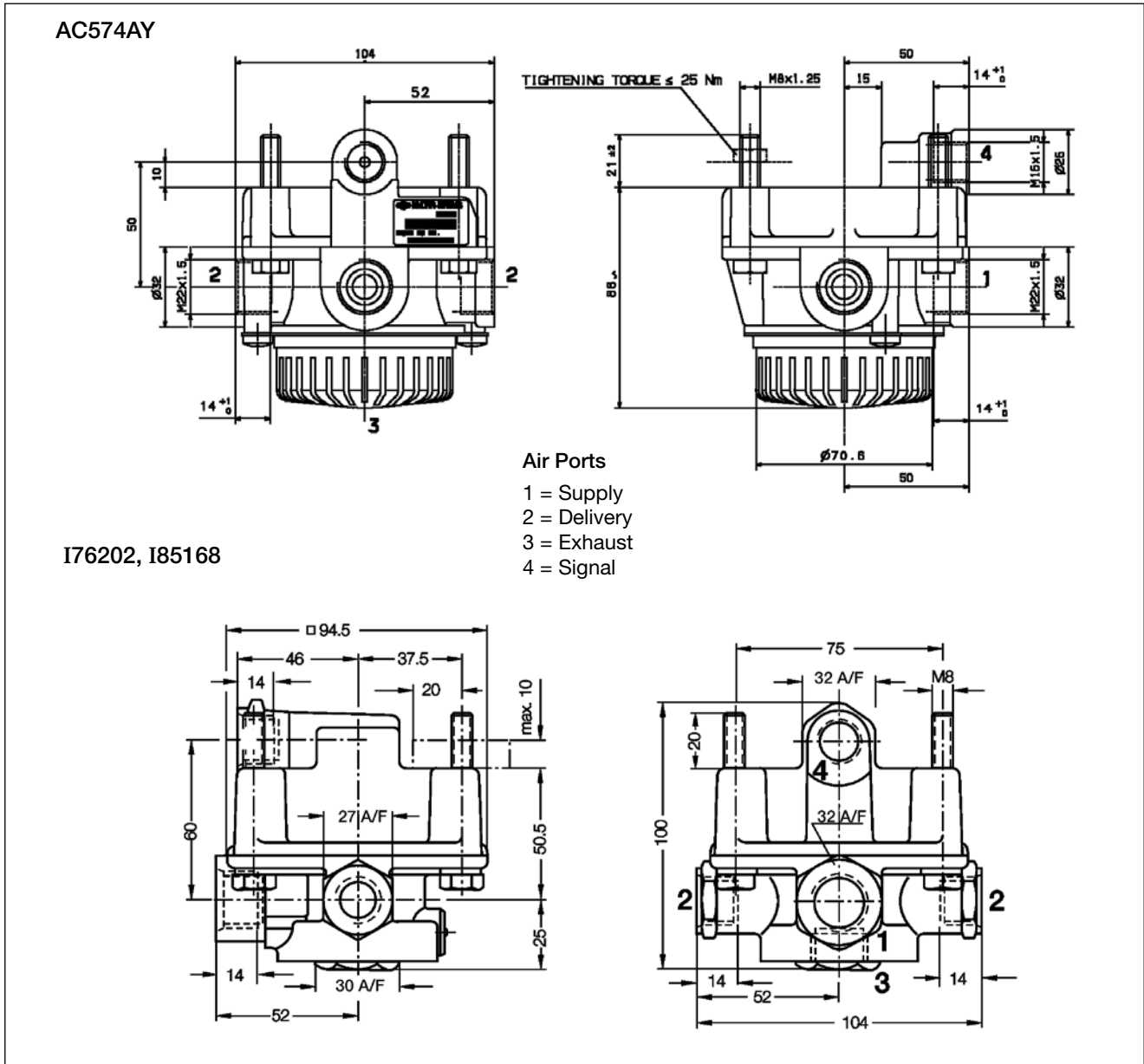
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AC574..., RE11..

Relay Valve

Doc. No. Y011357 (Rev. 001)
March 2011

Dimensions



Installation

- 1) Mount the **Relay Valve** upright in a protected position and ensure that the piping runs do not allow moisture to drain into the valve.
- 2) Never block the exhaust port or allow it to be close to any part of the vehicle.



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Item No.: K02474

Function

The **Relay Emergency Valve** transmits the brake demand of the driver to the trailer's service brakes.

In the event of a loss of pressure in the trailer supply (red) line, for example from an intentional or accidental uncoupling, the emergency feature of the valve will automatically apply the trailer service brakes using the air stored in the trailer's reservoir. This function is also present when charging the trailer from zero pressure; the trailer service brakes will be partially applied until the charge pressure exceeds approximately 3.0 bar – see "Emergency Braking" graph on page 2.

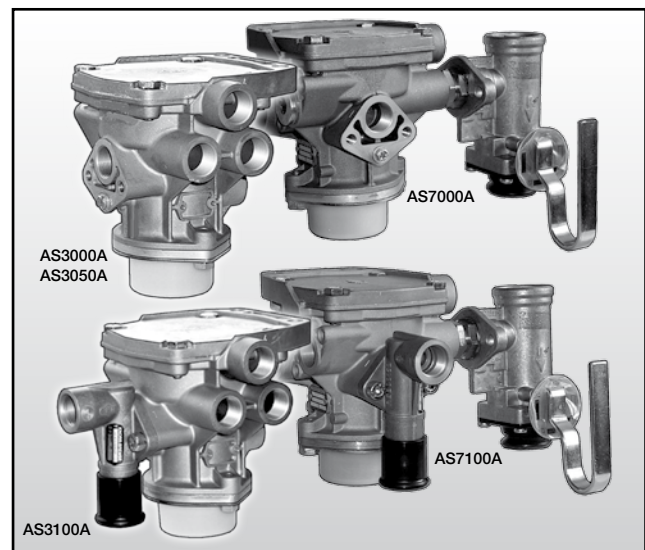
Most **Relay Emergency Valves** have a predominance feature that generates a pressure to the service brakes (port 2) higher than the signal pressure (port 4). This feature is used to compensate for threshold pressure losses through the trailer braking system and aims to ensure equal pressure at the control (yellow) line and brake actuators.

The **AS3100A** version incorporates a manoeuvring valve that allows the release and application of the trailer service brakes when the trailer is not coupled to the towing vehicle. If the reservoir pressure is below approximately 2.5 bar the service brakes cannot be released. The manoeuvring valve returns automatically to the driving position when the supply (red) line is recoupled.

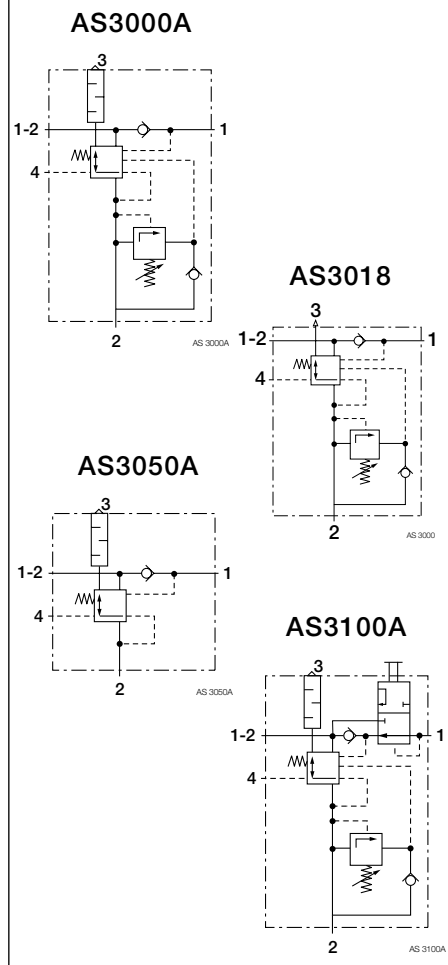
The **Relay Emergency Valves AS3000A, AS3050A and AS3100A** have an integrated exhaust silencer

The **Relay Emergency Valve AS7000A** is a combination of AS3000A and manual load sensing valve BR1305 (see PD-102-000, Document No. Y011343). With this valve, when the trailer is not coupled its service brakes can be released by moving the load sensing valve lever to the "brake release" position.

The **Relay Emergency Valve AS7100A** is a combination of AS3100A and manual load sensing valve BR1306 (see PD-102-000, Document No. Y011343). With this valve, when the trailer is not coupled its service brakes can be applied and released by pressing the black button on the manoeuvring valve (see **AS3100A** above).



Standard Symbol as DIN ISO 1219



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AS3..., AS7...

Relay Emergency Valves

Doc. No. Y011341 (Rev. 002)
March 2011

Technical Features

| | | | | |
|------------------------------|------------------|----------|----------------|---------|
| Maximum operating pressure: | AS3... | 10.0 bar | AS7... | 8.5 bar |
| Operating temperature range: | -40 °C to +80 °C | | | |
| Weight (approx.): | AS3000A | 1.6 kg | AS3050A | 1.6 kg |
| | AS3018 | 1.7 kg | AS3100A | 1.9 kg |
| | AS7000A | 2.3 kg | AS7100A | 2.5 kg |

Range Overview

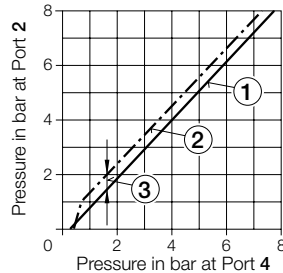
| Part No. | Type No. | Predominance | | Manoeuvring Valve | Manual Load Sensing | Ports | |
|----------|----------|--------------------------------------|-----------------|-------------------|---------------------|-----------|----------------------------------|
| | | Adjustment range [bar] ¹⁾ | Preset to [bar] | | | 1, 1-2, 4 | 2 |
| AS3000A | - | 0 - 0.5 | 0 | None | None | M22 x 1.5 | M22 x 1.5 (3x) |
| SEB00409 | AS3018 | 0 - 0.5 | 0 | None | None | M22 x 1.5 | M16 x 1.5 (4x) M22 x 1.5 (2x) |
| AS3050A | - | without | - | None | None | M22 x 1.5 | M22 x 1.5 (3x) |
| AS3100A | - | 0 - 0.5 | 0 | II36133 AE4232 | None | M22 x 1.5 | M22 x 1.5 (3x) |
| AS7000A | - | 0 - 0.5 | 0 | None | I84575 BR1305 | M22 x 1.5 | M22 x 1.5 (1x) |
| AS7100A | - | 0 - 0.5 | 0 | II36133 AE4232 | I84576 BR1306 | M22 x 1.5 | M22 x 1.5 (1x) |

¹⁾ see Warning note on page 6

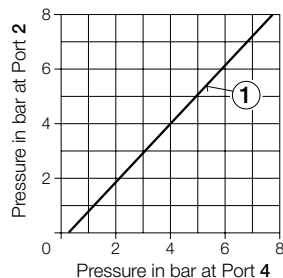
Performance Charts

Service Braking

AS3000A, AS3018
AS3100A

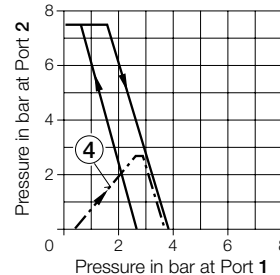


AS3050A



Emergency Braking

AS3000A, AS3018
AS3050A, AS3100A



- ① = Predominance at 0 bar
- ② = Predominance at 0.5 bar
- ③ = Predominance Setting Range
- ④ = Initial charging

VF00075_128EN

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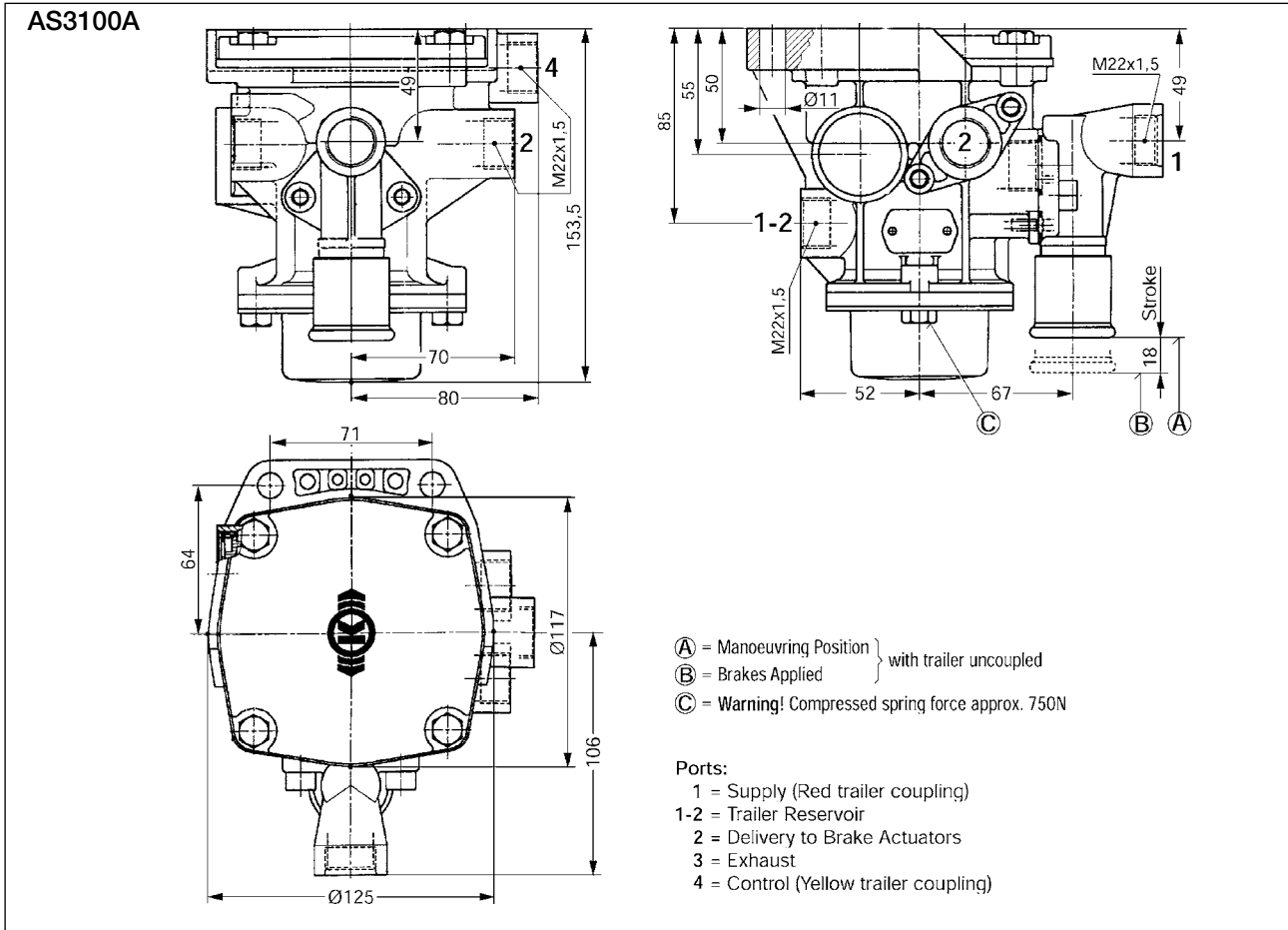
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AS3..., AS7...

Relay Emergency Valves

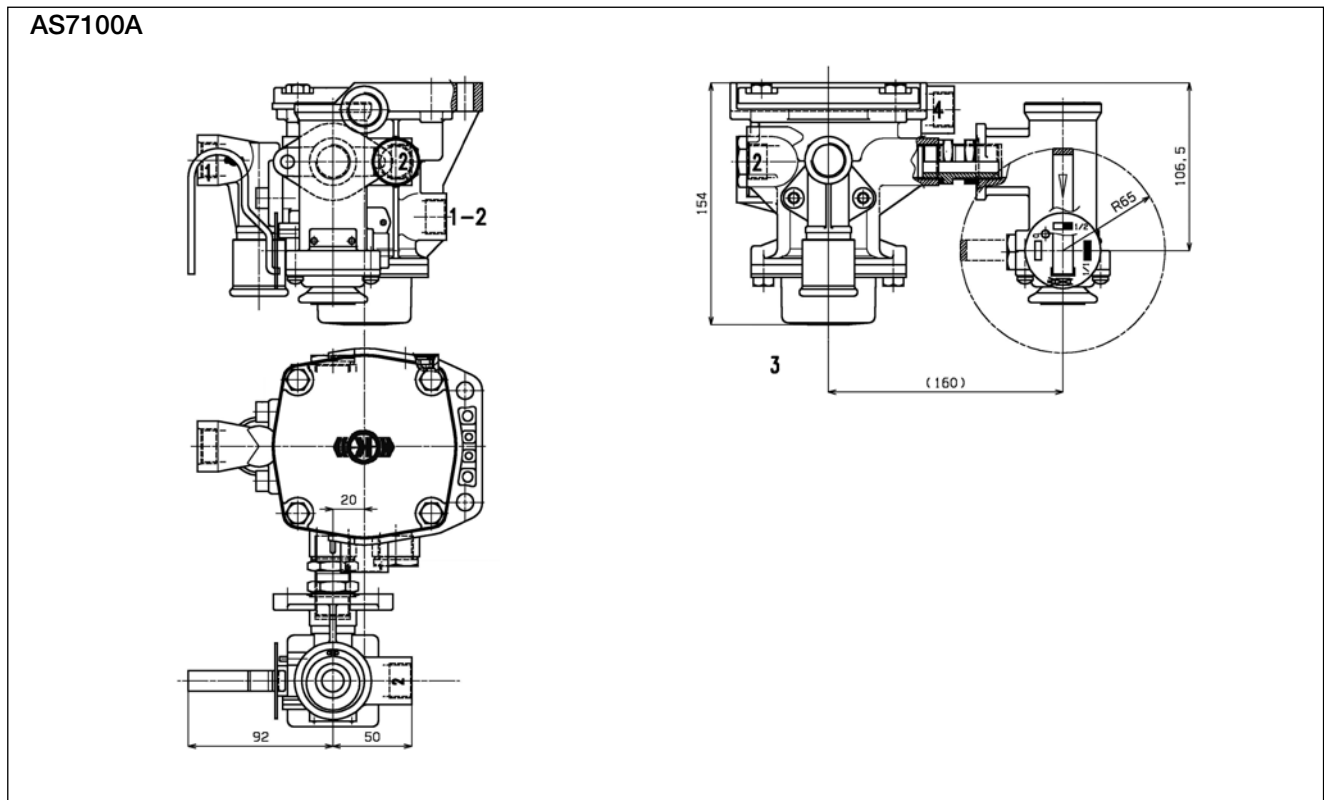
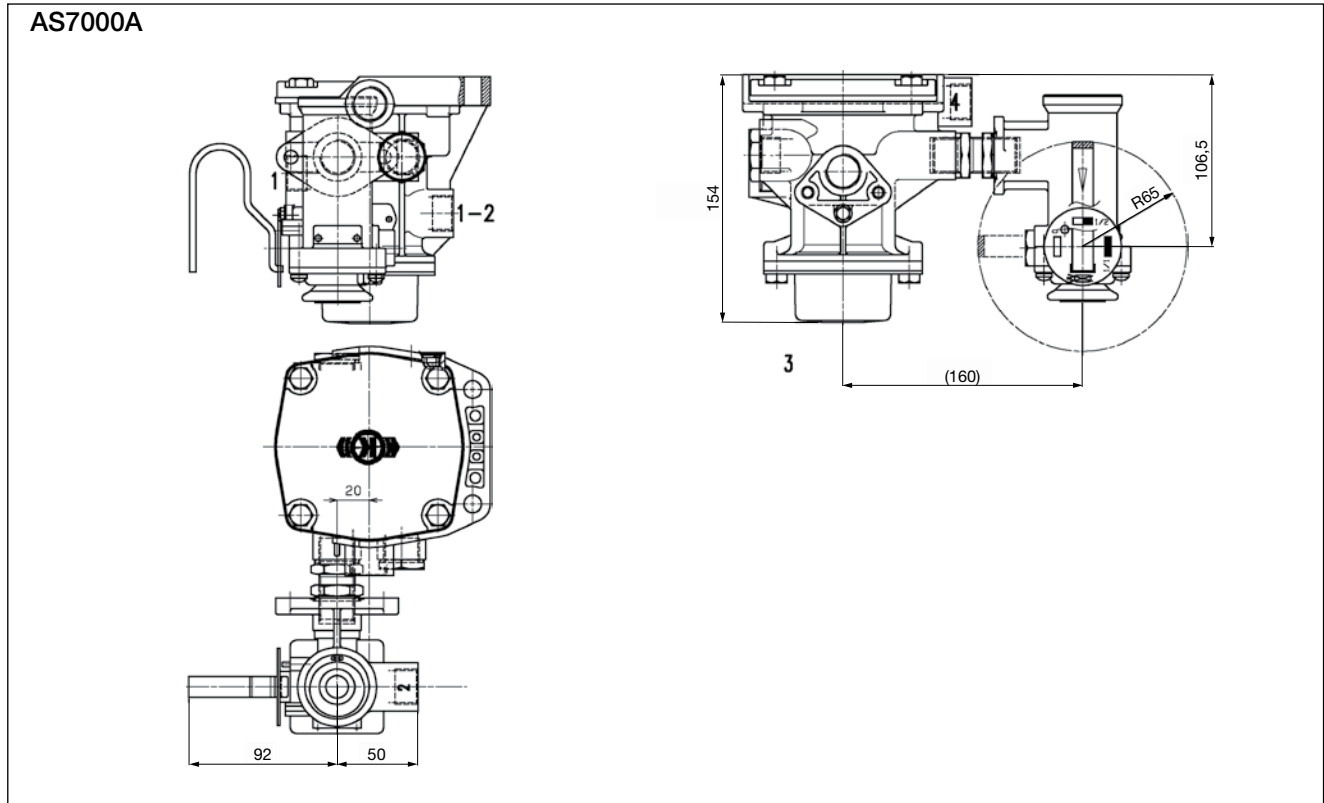
Doc. No. Y011341 (Rev. 002)
March 2011



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AS3..., AS7...

Relay Emergency Valves

Doc. No. Y011341 (Rev. 002)
March 2011

Testing and Setting

Testing of the Predominance pressure

- Connect air pressure gauges to Ports **2** and **4** of the valve.
- With a constant air pressure (>6 bar) at Port **1** and a constant 2.0 bar pressure at Port **4**, measure the pressure at Port **2**.
- Predominance is present if the pressure at Port **2** is greater than the pressure at port **4**.
- Predominance levels are specified with 2.0 bar at Port **4**.

Adjustment of the Predominance pressure:



VF00075_156

- No pressure at port 4
- Insert a key (to DIN 3116) or small pair of circlip pliers (see photo) into the plastic disc (1).
- Turn the disc clockwise to increase the predominance or anticlockwise to reduce the predominance - see **WARNING** below.
- Apply 2.0 bar pressure to Port **4** and measure the pressure at Port **2**, repeat procedure if required, remembering to remove the pressure from Port **4** before each adjustment.

WARNING:

The predominance is only allowed to be set within the legal bands.

Additionally it should only be set in accordance with the vehicle manufacturer's instructions.

The predominance must not exceed 0.5 bar.



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Function

A **Limiting Valve** is used to limit the downstream (delivered) pressure to a value less than the main system pressure.

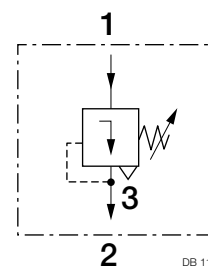
In a braking system a typical use of the valve is to limit the pressure on the rear axle of a drawbar trailer as well as in the air suspension or auxiliary systems.

The valves are fully adjustable, the limited output pressure is changed by turning the adjusting screw on the bottom of the valve.

For ease of installation, the DB11.. range of valves has an integral mounting bracket

**Technical Features**

Maximum operating pressure: 12 bar
 Operating Temperature Range: -30 °C to +80 °C
 Weight: 0.5 kg approx.

Standard Symbol as DIN ISO 1219**Range Overview**

| Part No. | Type No. | Limited pressure [bar] | Adjustment range [bar] | Air port threads |
|----------|----------|------------------------|------------------------|------------------|
| I61235 | DB1102 | 5.7 | 0 to 10 | M22x1.5 |
| I61236 | DB1103 | 5.3 | | |
| I61237 | DB1105 | 4.8 | | |
| I97953 | DB1147 | 1.8 | | |

Other variants are available.

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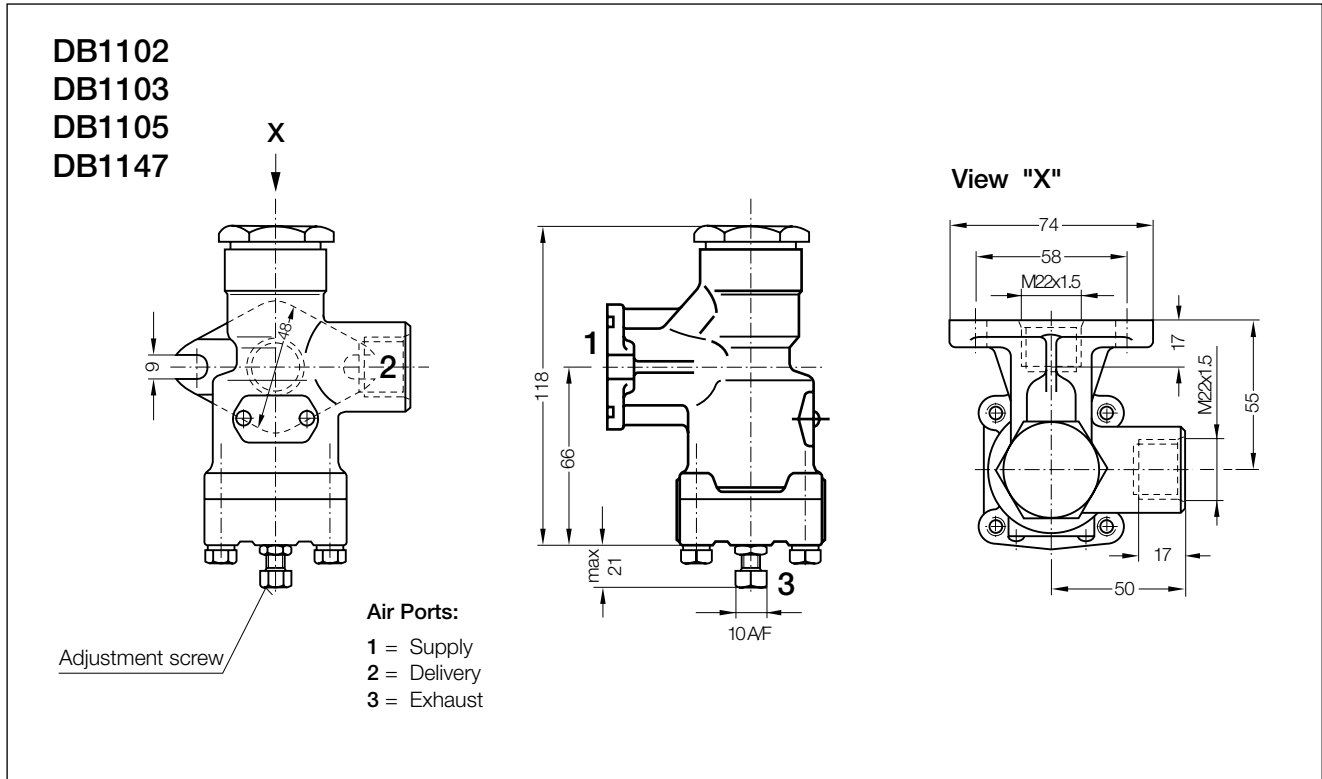
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DB11..

Pressure Limiting Valves

Doc. No. Y011348 (Rev. 001)
March 2011

Dimensions



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Function

Coupling heads are used to connect the braking systems of the towing vehicle and trailer.

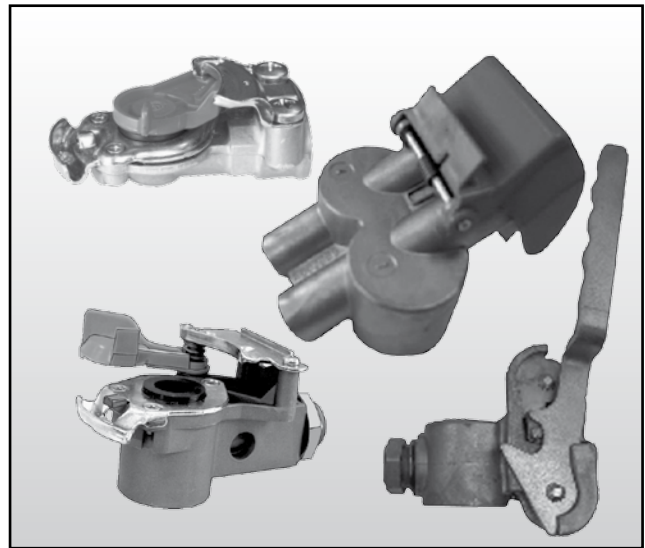
Coupling heads are generally colour coded to indicate the 'supply' (red) and 'control' (yellow) air line connections and are designed as defined in DIN ISO 1728 to prevent incorrect connection.

KU13 and KU14 Coupling Heads are designed for use on trailers and semi-trailers. **KU41 Coupling Heads** are designed for use on towing vehicles. See table on page 2 for details.

The **KU14 Coupling Heads** have an integral filter to protect the air braking and auxiliary systems of the trailer from contamination. To prevent a blocked filter element trapping air pressure in the 'supply' or 'control' line, a by-pass feature allows air to flow through unfiltered. Some of these versions are also fitted with an ISO test connector to facilitate measurement of the line pressure.

The **KU14 Coupling Heads** for semi-trailers have a mounting thread and are supplied with a lock nut to prevent the rotation of the coupling head when connecting or disconnecting the air line.

The **KU1414/KU1415 Coupling Heads** are known as 'Quattro-matic' **Coupling Heads** and they incorporate the connections for both 'supply' and 'control' lines. These couplings are normally compatible with similar design coupling heads from other manufacturers.



Technical Features

KU13.. and KU41..

| | |
|------------------------------|------------------|
| Maximum operating pressure: | 8.5 bar |
| Operating temperature range: | -40 °C to +80 °C |
| Filter: | not integrated |
| Weight: | 0.2 kg approx. |

KU1400 - KU1413

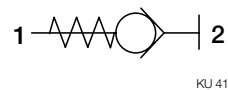
| | |
|------------------------------|------------------|
| Maximum operating pressure: | 8.5 bar |
| Operating temperature range: | -40 °C to +80 °C |
| Filter: | integrated |
| Weight: | 0.3 kg approx. |

KU1414 and KU1415

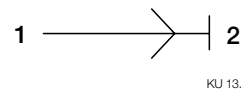
| | |
|------------------------------|--|
| Maximum operating pressure: | 10.0 bar |
| Operating temperature range: | -40 °C to +80 °C |
| Filter: | integrated |
| Weight: | KU1414 0.9 kg approx. KU1415 0.5 kg approx. |

Standard Symbol as DIN ISO 1219

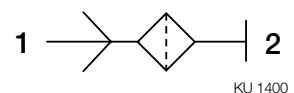
For towing vehicles:
KU41..



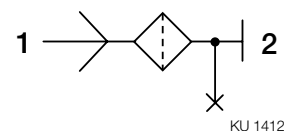
For trailers:
KU13..



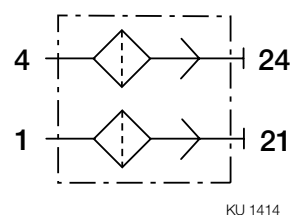
KU1400, KU1401,
KU1410, KU1413



KU1411, KU1412



KU1414, KU1415



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KU13..., KU14..., KU41...

Coupling Heads

Doc. No. Y011338 (Rev. 001)
March 2011

Range Overview

| Part No. | Type No. | Port Thread (F) | Mounting Thread (M) | Filter | Test Point | Self-sealing | Application/ Colour | Vehicle Application | For further details see |
|----------|----------|---------------------------------|---------------------|---------|--------------------|--------------------|---------------------------------|---------------------------------|--|
| II33262 | KU1304 | M22x1.5 | - | No | No | No | 'Control' (yellow) | Semi-trailer and full trailer | - |
| II33263 | KU1305 | | | | | | 'Supply' (red) | | |
| II17354 | KU1310 | M16x1.5 | - | No | No | 'Supply' (red) | | | |
| II17355 | KU1311 | | | | | 'Control' (yellow) | | | |
| K000952 | KU1400 | M16x1.5 | M24x1.5 | Yes | No | No | 'Supply' (red) | Semi-trailer | - |
| K000953 | KU1401 | | - | | | | 'Supply' (red) | Centre-axle and drawbar trailer | |
| K000954 | KU1410 | | M24x1.5 | | | | 'Control' (yellow) | Semi-trailer | |
| K000955 | KU1411 | M16x1.5 | - | Yes | Yes | No | 'Control' (yellow) | Centre-axle and drawbar trailer | - |
| K000956 | KU1412 | | M24x1.5 | | | | 'Control' (yellow) | Semi-trailer | |
| K000957 | KU1413 | | - | | 'Control' (yellow) | | Centre-axle and drawbar trailer | | |
| K002640 | KU1414 | | M16x1.5 | | M22x1.5 | | Yes | No | |
| K002641 | KU1415 | Centre-axle and drawbar trailer | | Y011011 | | | | | |
| K004229 | KU4124 | M16x1.5 | - | No | No | Yes | 'Supply' (red) | Towing vehicle | For further details please contact your local Knorr-Bremse representative or the relevant vehicle manufacturer |
| K004231 | | | | | | | | | |
| K013662 | | | | | | | | | |
| K018111 | | | | | | | | | |
| K004152 | KU4128 | M16x1.5 | - | No | No | Yes | 'Control' (yellow) | Towing vehicle | For further details please contact your local Knorr-Bremse representative or the relevant vehicle manufacturer |
| K004230 | | | | | | | | | |
| K013661 | | | | | | | | | |
| K013663 | | | | | | | | | |

Dimensions

Trailer Coupling Heads (without Filters)

**KU1305
KU1310**

KU1305 - G = M22x1.5
KU1310 - G = M16x1.5

Ports:
1 = Supply
2 = Delivery

Miscoupling Safeguard for 'Supply' Line

**KU1304
KU1311**

KU1304 - G = M22x1.5
KU1311 - G = M16x1.5

Miscoupling Safeguard for 'Control' Line

PD109_001

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Doc. No. Y011338 (Rev. 001)
March 2011

Coupling Heads

Trailer Coupling Heads (with Filters)

KU1400
KU1401 ¹⁾

1) No mounting thread
2) No test connector

KU1410 ²⁾ **KU1411** ¹⁾
KU1412 **KU1413** ^{1), 2)}

Ports:
1 = Supply
2 = Delivery

PD109_003

Towing Vehicle Coupling Heads (Self-sealing)

KU4124

KU4128

Ports:
1 = Supply
2 = Delivery

PD109_002

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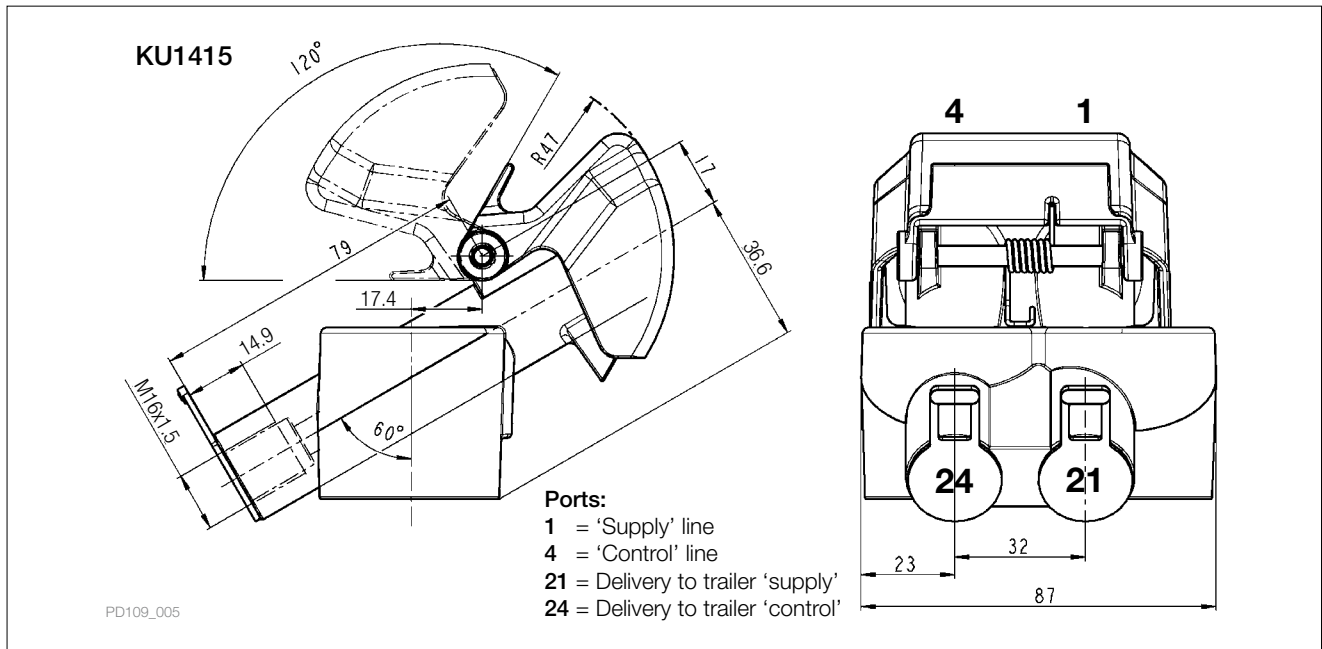
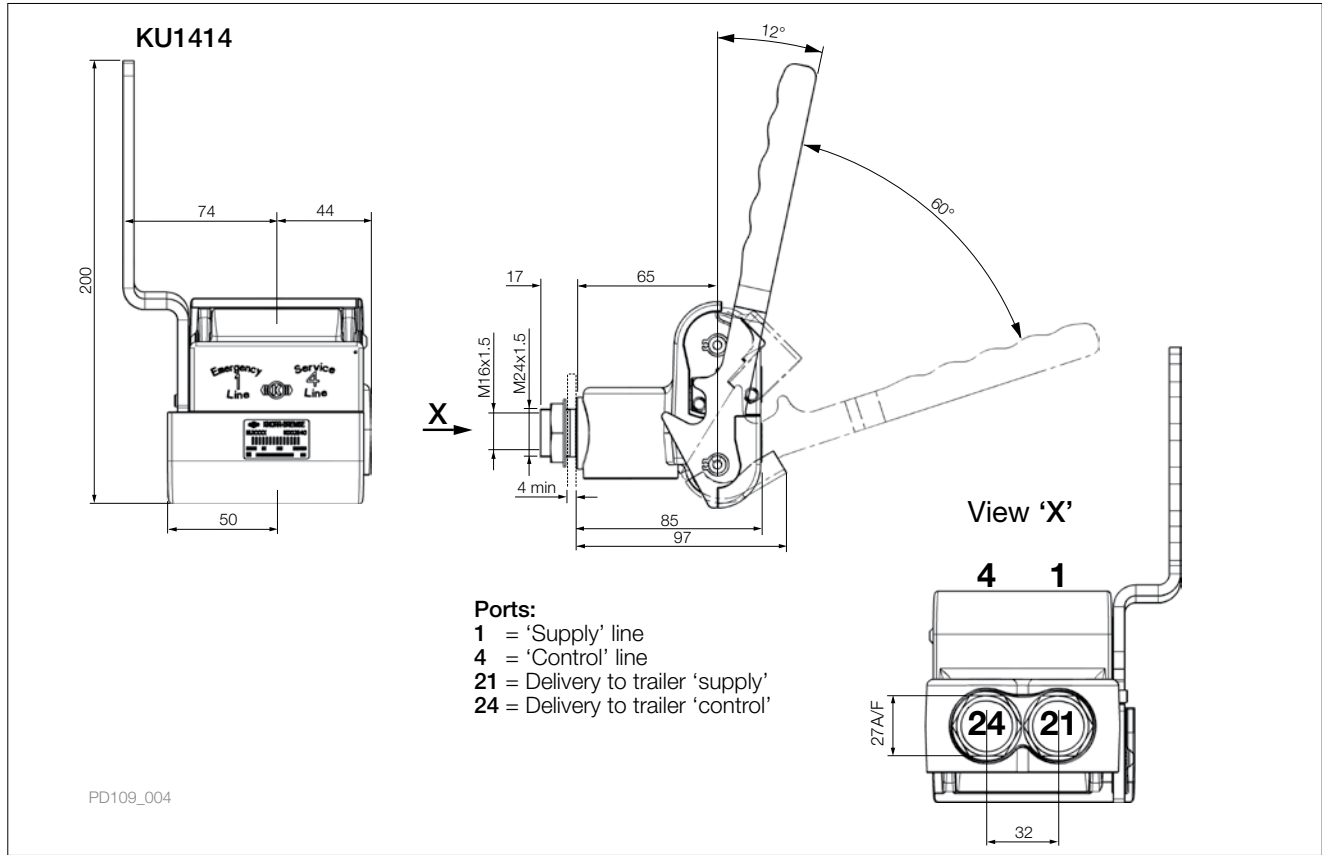
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KU13..., KU14..., KU41..

Coupling Heads

Doc. No. Y011338 (Rev. 001)
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Doc. No. Y011338 (Rev. 001)
March 2011

Installation Instructions

| | | |
|--------------------------|----------|-------|
| Max. Tightening torques: | M16x1.5: | 45 Nm |
| | M22x1.5: | 60 Nm |
| | M24x1.5: | 70 Nm |

Maintenance Advice

In service, the filter can be easily inspected for contamination without having to disassemble the body of the air filter.

If the filter is heavily contaminated, the bayonet type lock on the bottom of the filter must be pushed in and turned by 90° anti-clockwise at the same time. The filter can then be removed and washed out if necessary.

Re-assembly of the filter is carried out in reverse order.

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Function

A **Pressure Proportioning Valve** is used to reduce the downstream (delivered) pressure by a fixed ratio relative to the supply pressure.

The valve has a quick release function to speed up the exhaust of delivered air.

A typical application would be on trailers where larger actuators are used than the maximum axle load would require.

Note: These valves should be not used in combination with EBS since it would cause a conflict between electrical and pneumatic control systems.

The valve has an integral mounting bracket for ease of installation.



Technical Features

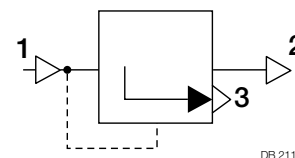
| | |
|------------------------------|------------------|
| Maximum operating pressure: | 10 bar |
| Operating Temperature Range: | -40 °C to +80 °C |
| Air port threads: | M22 x 1.5 |
| Weight: | 0.6 kg approx. |

Range Overview

| Part No. | Type No. | Reduction ratio | Pressure [bar] | |
|----------|----------|-----------------|----------------|-----------------|
| | | | Control Port 1 | Delivery Port 2 |
| 186153 | DB2114 | 2.00:1 | 6.5 | 3.1 |
| 186154 | DB2115 | 1.50:1 | | 4.1 |
| 186155 | DB2116 | 1.15:1 | | 5.4 |
| 186156 | DB2118 | 1.35:1 | | 4.6 |
| 186157 | DB2121 | 1.80:1 | | 3.4 |
| 186158 | DB2122 | 1.25:1 | | 5.0 |
| 186159 | DB2123 | 2.70:1 | | 2.3 |

Valves are also available with exhaust silencers fitted.

Standard Symbol as DIN ISO 1219



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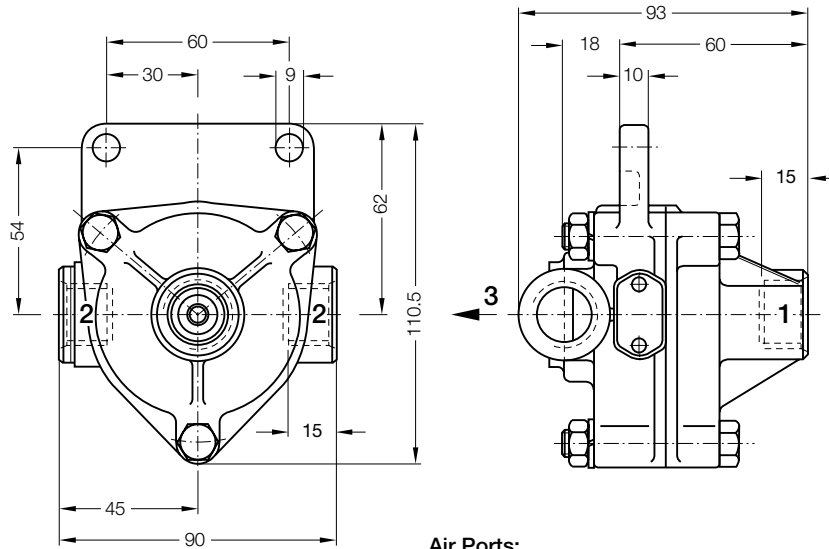
DB21..

Pressure Proportioning Valves

Doc. No. Y011347 (Rev. 001)
March 2011

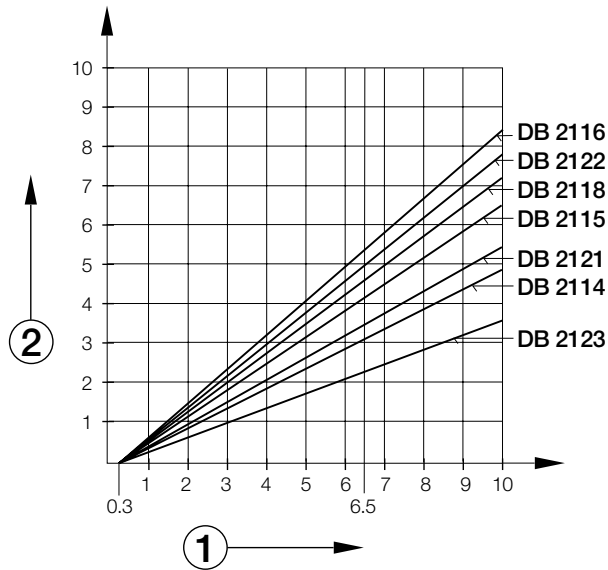
Dimensions

DB2114
DB2115
DB2116
DB2118
DB2121
DB2122
DB2123



Air Ports:
1 = Supply
2 = Delivery
3 = Exhaust

Performance Graphs



① = Supply Pressure at Port 1 [bar]
② = Delivery Pressure at Port 2 [bar]



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Function

During low pressure brake applications, the **Adapter Valve** reduces the downstream (delivered) pressure to a value less than the supplied pressure. The valve is typically installed in the service brake system of the front axle of a drawbar trailer to help balance the lining wear between front and rear axle(s).

At higher brake pressure applications, there is no reduction in delivered pressure.

The valve incorporates a quick release feature to speed up the exhaust of the brakes.

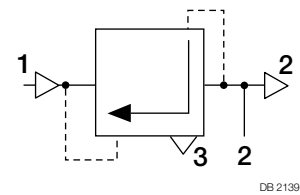
The valve is not adjustable.



Technical Features

Maximum operating pressure: 10 bar
 Operating Temperature Range: -40 °C to +80 °C
 Weight: 0.56 kg approx.

Standard Symbol as DIN ISO 1219



Range Overview

| Part No. | Type No. | Characteristic | | Air Port Threads | | |
|----------|----------|------------------|------------------|------------------|---------|--------------------------|
| | | Supply [bar] | Delivery [bar] | 1 | 2 | 3 |
| SEB01538 | DB2144 | 0.45 / 3.5 / 5.7 | 0.1 / 1.8 / 5.7 | M16x1.5 | M16x1.5 | M22x1.5 with silencer |
| K001893 | DB2145 | 0.45 / 5.1 / 6.0 | 0.1 / 3.65 / 6.0 | | | |

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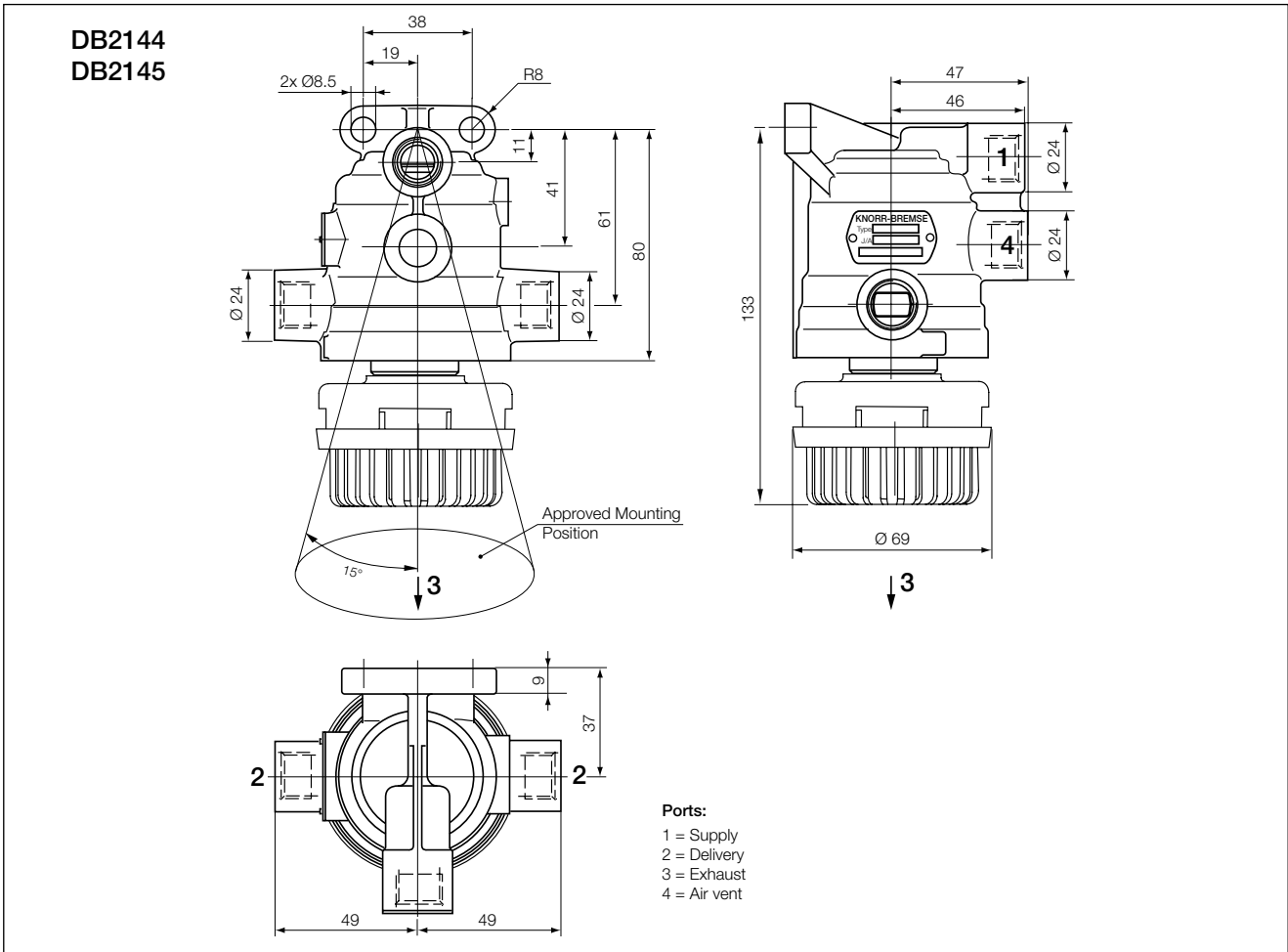
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DB21..

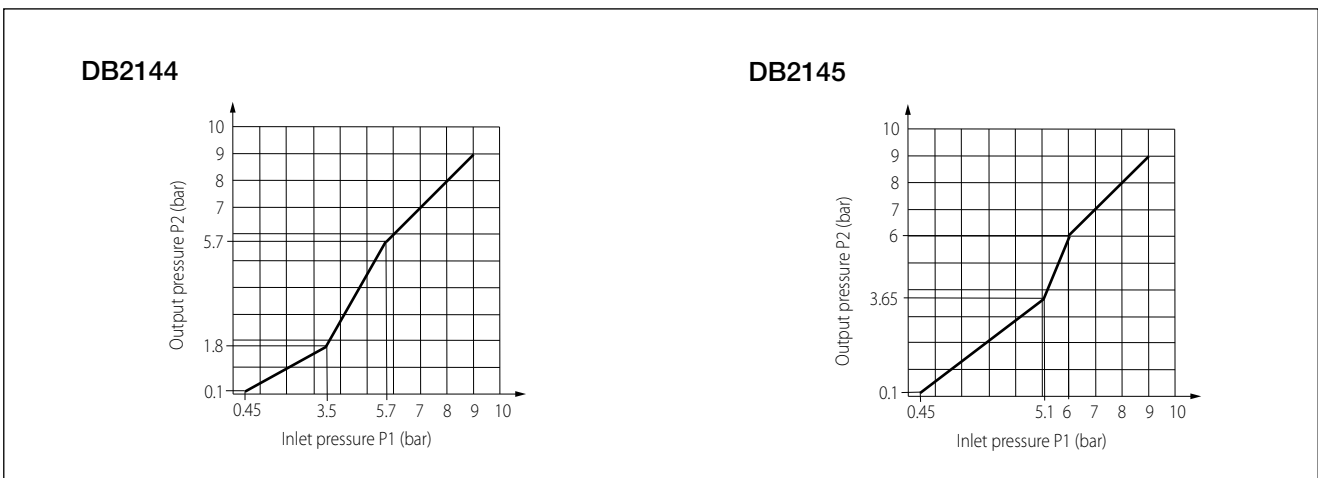
Adaptor Valves

Doc. No. Y092386 (Rev. 000)
March 2011

Dimensions



Performance Graphs



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Function

A **Retention Valve** is typically installed on the front axle of a drawbar trailer where the brake chambers are larger than those on the rear axle. At low braking pressures, overbraking of the front axle can sometimes occur.

A **Retention Valve** is used to reduce pressure by a specific ratio until the supply pressure rises above the valve's run-out pressure (where the input to output ratio of the valve returns to 1:1). The retention (threshold) pressure is the pressure at which the valve starts to deliver air to the service brake actuators and this pressure is adjustable.

The valve incorporates a quick release feature to hasten the exhaust of the brakes.

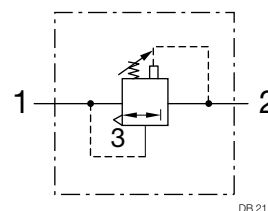
Valves with varying ratios and run-out pressures are available to suit most applications.



Technical Features

Maximum operating pressure: 8.0 bar
 Operating Temperature Range: -25 °C to +60 °C
 Weight: 0.5 kg approx.

Standard Symbol as DIN ISO 1219



Range Overview

| Part No. | Type No. | Threshold Pressure [bar] | Reference Pressure [bar] | Output Pressure [bar] | Air Port Threads | Support Bracket |
|----------|----------|--------------------------|--------------------------|-----------------------|------------------|-----------------|
| I43387 | DB2110 | 0.5 | 1.6 | 1.5 | M22x1.5 | – |
| I50402 | DB2111 | 0.9 | 1.6 | 0.9 | | – |
| I53929 | DB2113 | 0.6 | 1.6 | 1.3 | | – |
| II14891 | DB2135 | 0.5 | 1.6 | 1.5 | | with |
| K001939 | DB2146 | 0.8 | 1.6 | 1.0 | | – |

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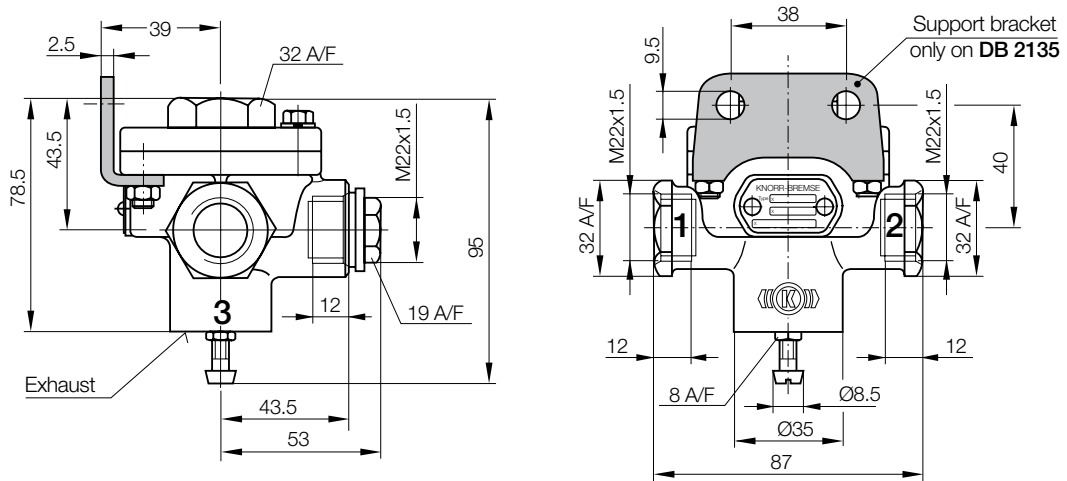
DB21..

Pressure Retaining Valves

Doc. No. Y092387 (Rev. 000)
March 2011

Dimensions

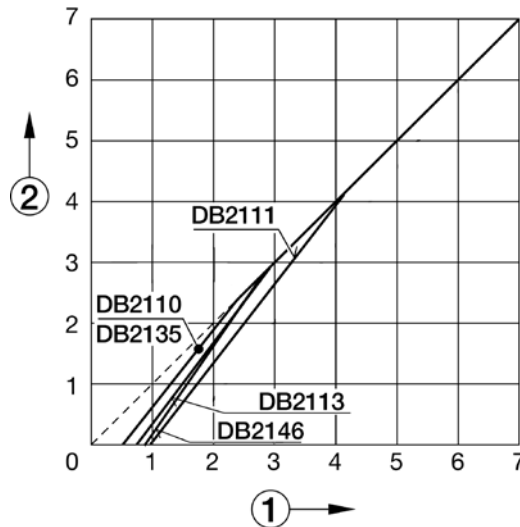
DB2110
DB2111
DB2113
DB2135
DB2146



Ports:

- 1 = Supply
- 2 = Delivery
- 3 = Exhaust

Performance Graphs



- ① = Pressure at Port 1 [bar]
- ② = Pressure at Port 2 [bar]



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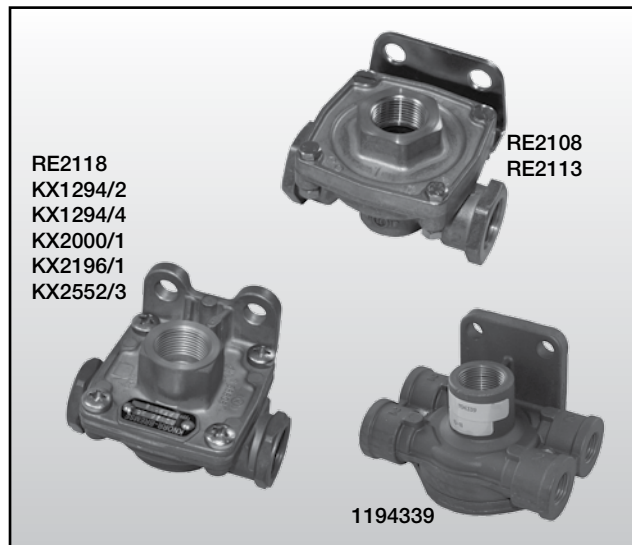
Function

The **Quick Release Valve** is generally used in the supply to the spring portions of spring brake actuators to speed up the application of the parking brake.

The **Quick Release Valve** KX2552/3 with by-pass can be useful in air suspension systems in ensuring the complete venting of the air bag

Technical Features

Maximum operating pressure: 10 bar
 Operating Temperature Range: -40 °C to +80 °C
 Weight: see table



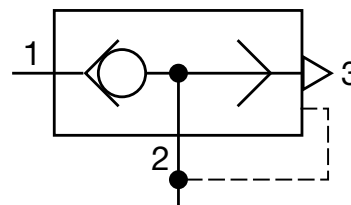
Range Overview

| Part No. | Type No. | Air Port Threads | | |
|-----------|----------|------------------|-------------|-------------------------|
| | | 1 | 2 | 3 |
| I70676 | RE2108 | M22x1.5 | 2 x M22x1.5 | Exhaust flap in M22x1.5 |
| I74908 | RE2113 | | | |
| I92200 | RE2118 | | | |
| KX1294/2 | - | M16x1.5 | 2 x M16x1.5 | M16x1.5 |
| KX1294/4 | - | M22x1.5 | 2 x M16x1.5 | M16x1.5 |
| KX2000/1* | - | M22x1.5 | 2 x M22x1.5 | M22x1.5* |
| KX2196/1 | - | M22x1.5 | 2 x M16x1.5 | M16x1.5 |
| KX2552/3* | - | M22x1.5 | 2 x M16x1.5 | M22x1.5* |
| 1194339* | - | M22x1.5 | 4 x M16x1.5 | M22x1.5* |

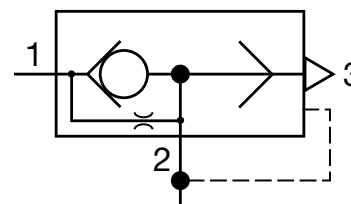
| Part No. | Type No. | Exhaust Way Through | By-pass | Weight (kg) approx. |
|-----------|----------|---------------------|----------|---------------------|
| I70676 | RE2108 | Ø 14 mm | Ø 1.5 mm | 0.4 |
| I74908 | RE2113 | Ø 10 mm | Ø 1.5 mm | 0.4 |
| I92200 | RE2118 | - | - | 0.3 |
| KX1294/2 | - | - | - | 0.3 |
| KX1294/4 | - | - | - | 0.3 |
| KX2000/1* | - | - | - | 0.3 |
| KX2196/1 | - | - | - | 0.3 |
| KX2552/3* | - | - | Ø 2.0 mm | 0.3 |
| 1194339* | - | - | - | 0.4 |

Standard Symbol as DIN ISO 1219

RE2118
KX1294/2/4
KX2000/1
KX2196/1
1194339



RE2108
RE2113
KX2552/3



* without Exhaust Flap I46367 in Port 3.
It can be purchased separately.

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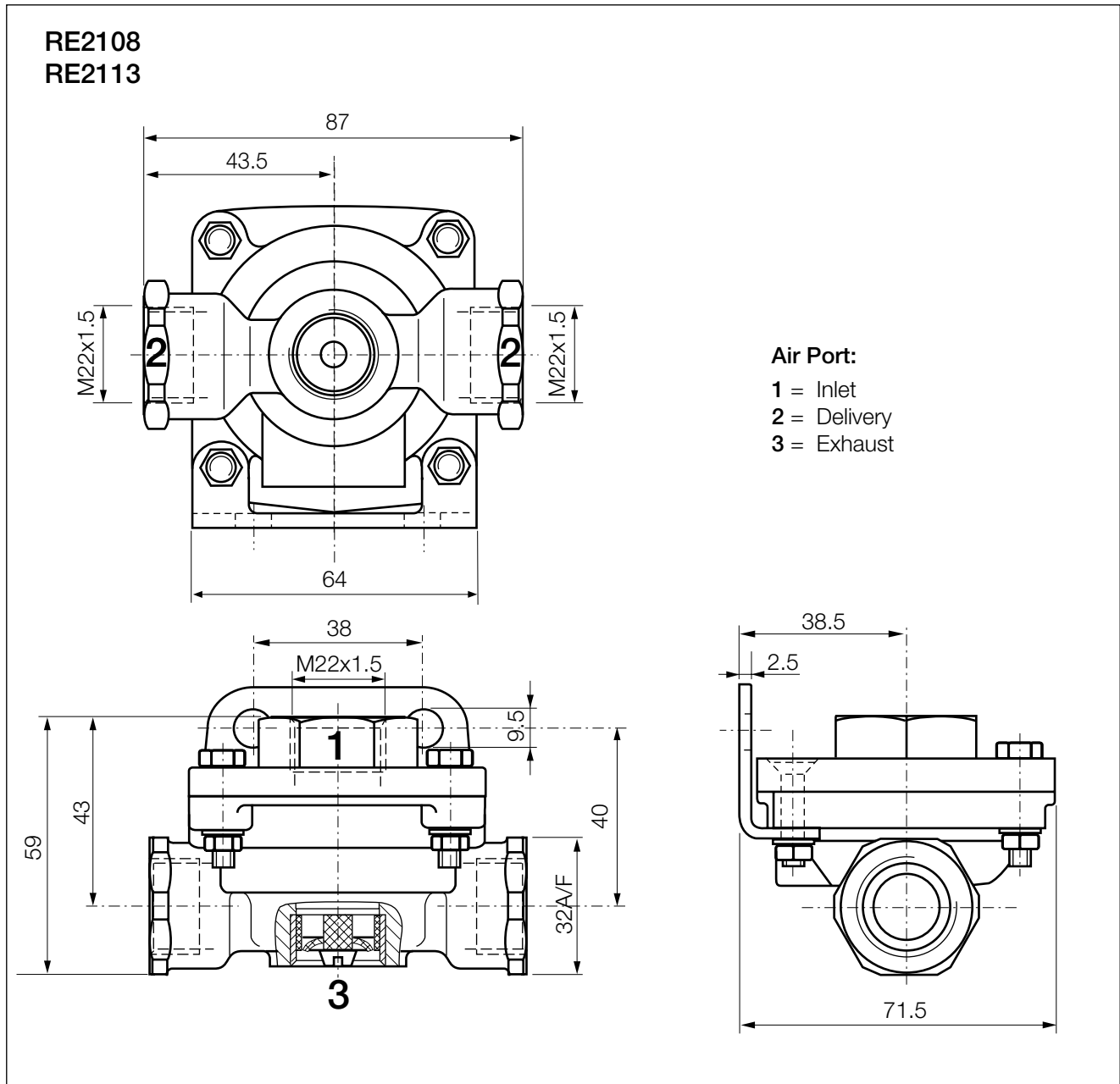
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RE21..., KX....., 1194339

Quick Release Valves

Doc. No. Y011358 (Rev. 001)
February 2012

Dimensions



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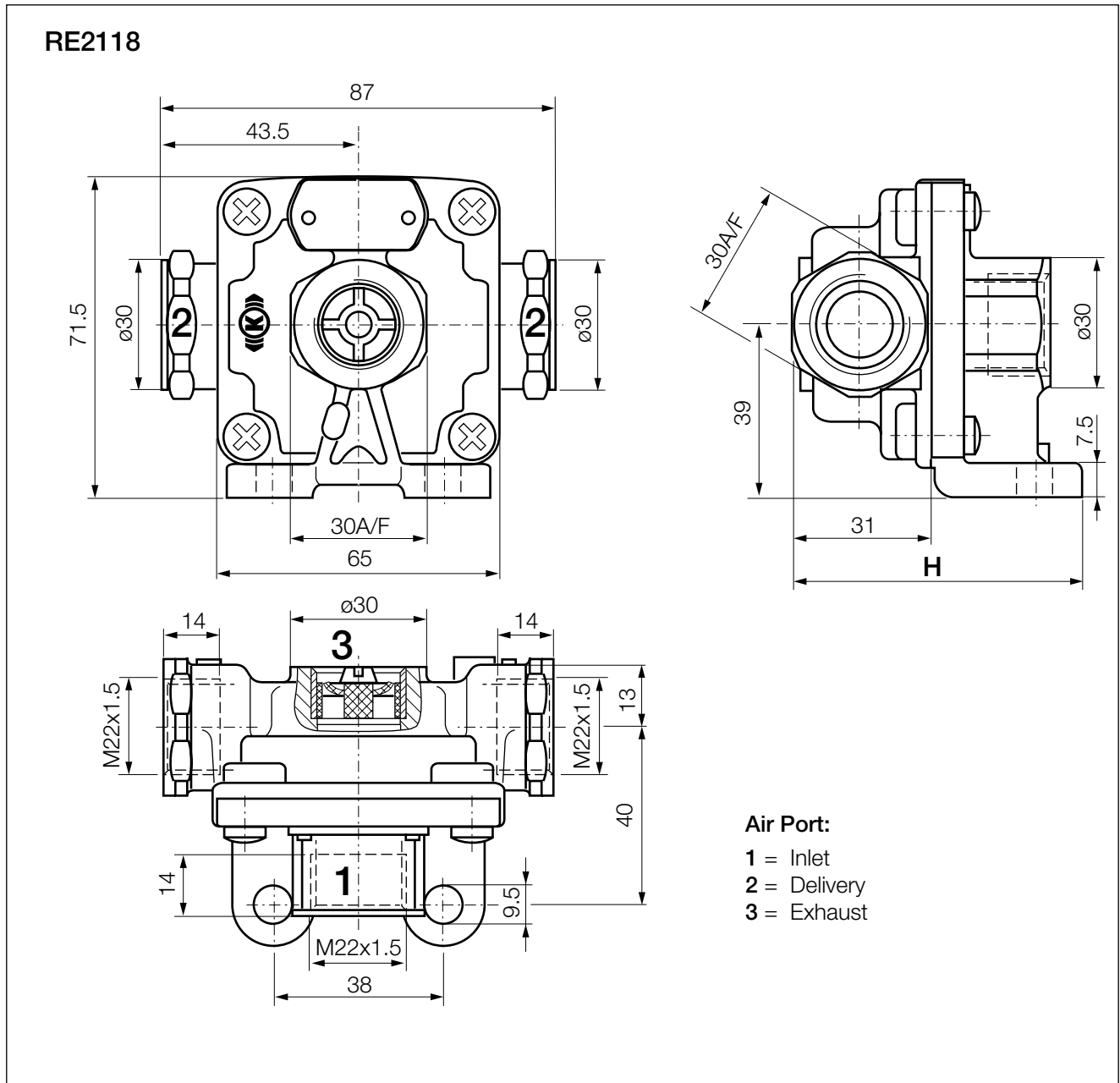
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RE21..., KX...., 1194339

Doc. No. Y011358 (Rev. 001)
February 2012

Quick Release Valves



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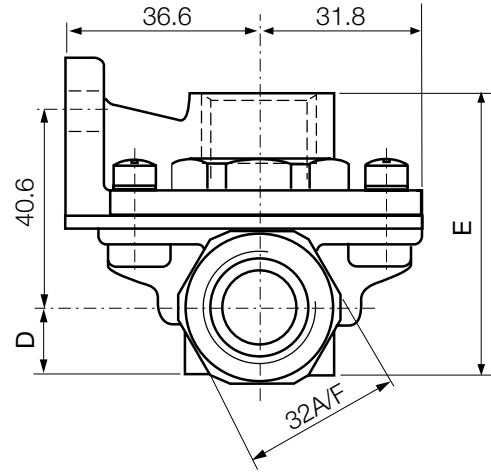
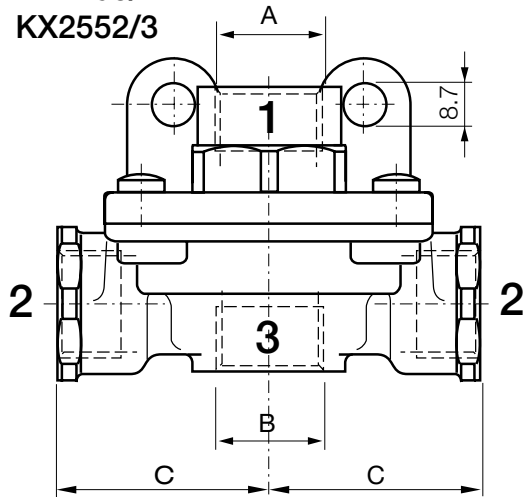


RE21..., KX....., 1194339

Quick Release Valves

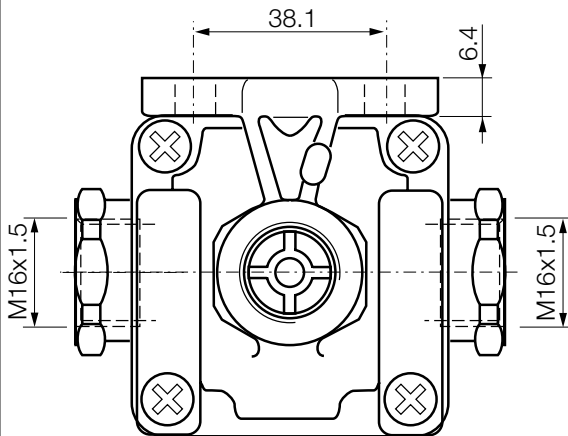
Doc. No. Y011358 (Rev. 001)
February 2012

KX1294/2
KX1294/4
KX2196/1
KX2552/3



Air Port:

- 1 = Inlet
- 2 = Delivery
- 3 = Exhaust



| Part No. | A | B | C | D | E |
|----------|---------|---------|------|------|------|
| KX1294/2 | M16x1.5 | M16x1,5 | 41.4 | 13.5 | 43.9 |
| KX1294/4 | M22x1.5 | M16x1,5 | 41.4 | 13.5 | 43.9 |
| KX2196/1 | M22x1.5 | M16x1,5 | 41.4 | 13.5 | 43.9 |
| KX2552/3 | M22x1.5 | M22x1,5 | 41.9 | 14.5 | 44.3 |

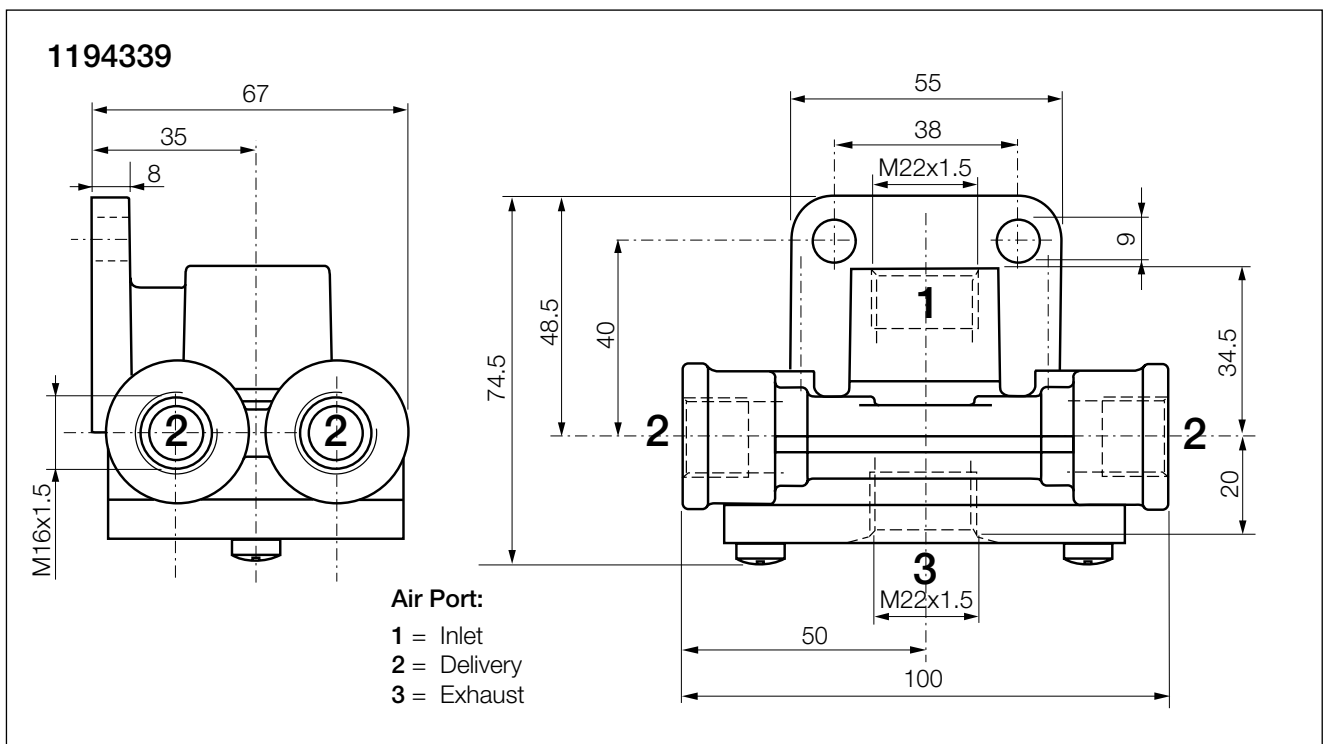
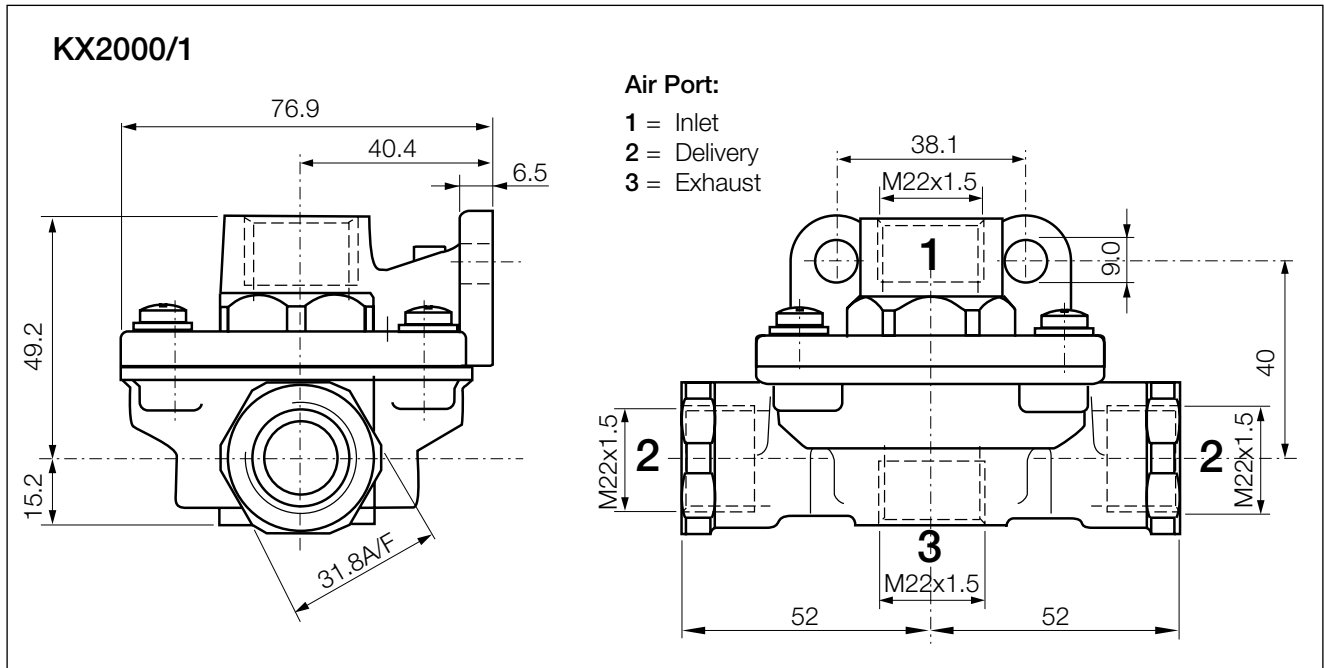
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Installation instructions

- 1) Mount the Quick Release Valve in an upright position, exhaust port 3 facing downwards.
- 2) Never block the exhaust port or allow it to be close to any part of the vehicle.

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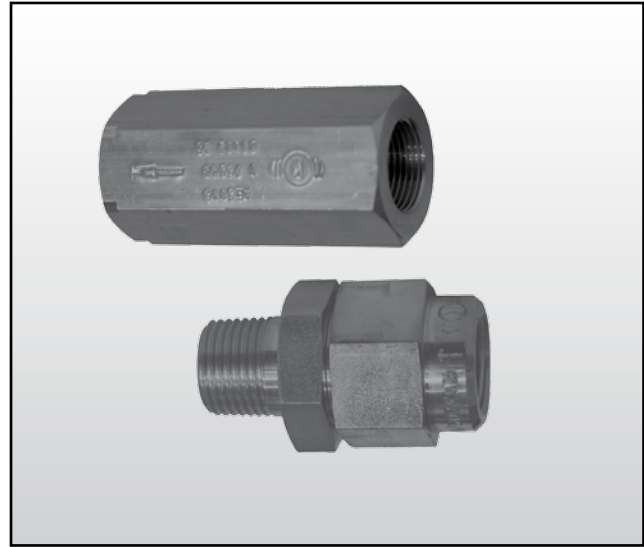
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Function

The **Single Check Valve** ensures air pressure flows in one direction only.

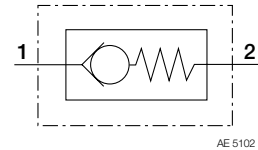


Technical Features

| | AE5102 | AE5131 |
|------------------------------|-------------------|------------------|
| Maximum operating pressure: | 22 bar | 13 bar |
| Operating Temperature Range: | -45 °C to +160 °C | -45 °C to +80 °C |
| Way through: | 8 mm dia. | 9 mm dia. |
| Weight: | 0.15 kg approx. | 0.06 kg approx. |

Standard Symbol as DIN ISO 1219

AE5102
AE5131



Range Overview

| Part No. | Type No. | Air Port Thread - Depth / Length | Design |
|----------|----------|--|-------------------------|
| I60422 | AE5102 | M22x1.5 (Internal)- 14 | Light alloy, hexagon |
| K001349 | AE5131 | M22x1.5 (Internal)- 12 M22x1.5 (External)- 14 | |

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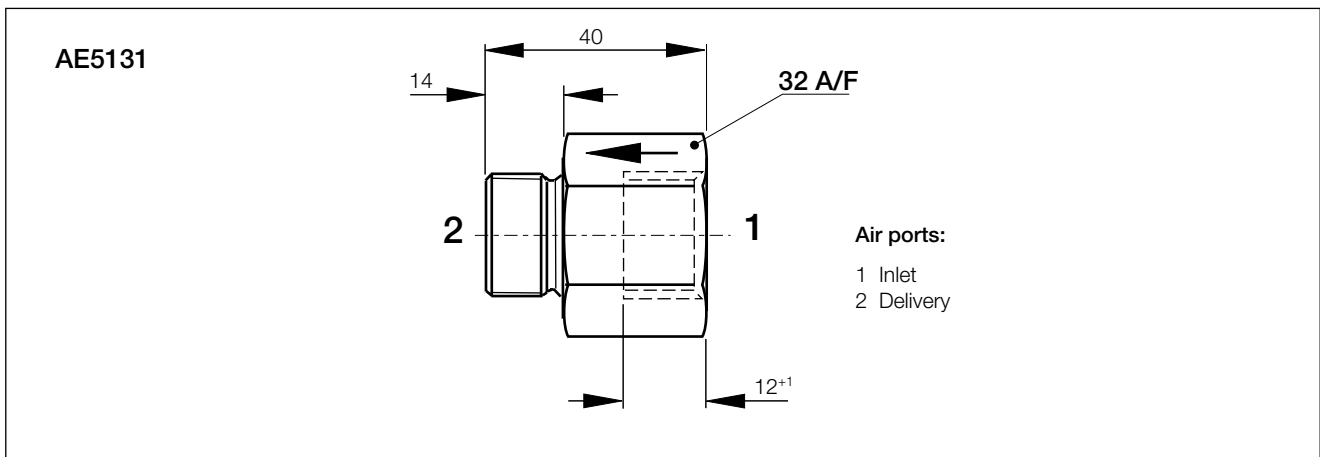
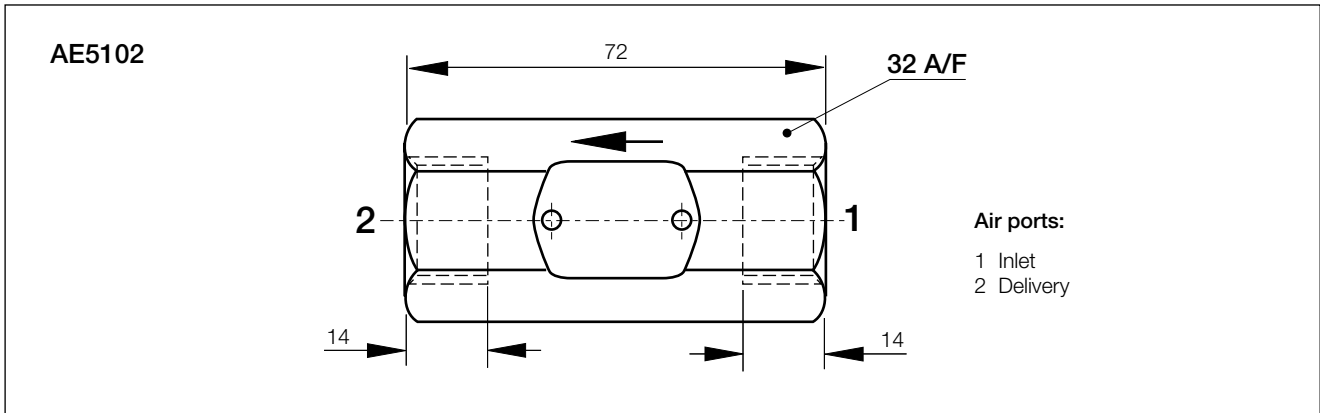
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AE51..

Single Check Valves

Doc. No. Y011355 (Rev. 001)
March 2011

Dimensions



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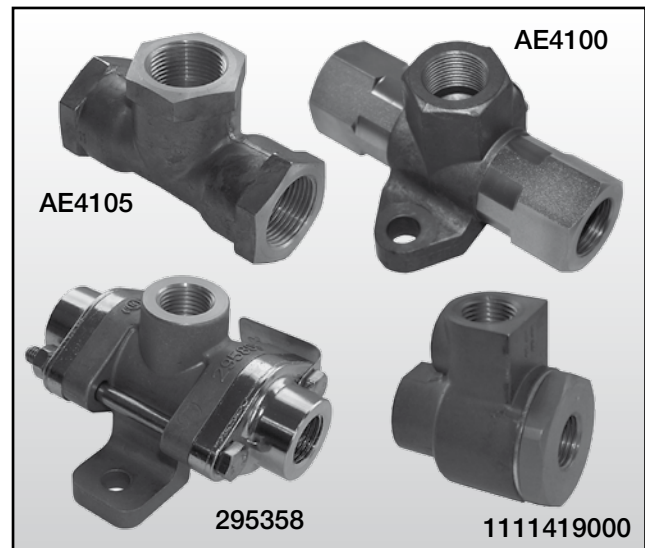
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Function

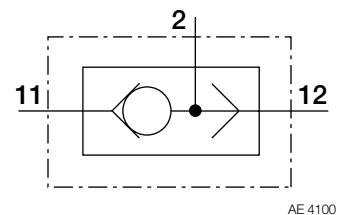
A **Double Check Valve** can accept signal pressures from two separate sources, the higher pressure will be delivered and the lower pressure will be isolated.

The **Double Check Valve** is often used as an anti-compounding device for vehicles equipped with spring brake actuators.

If a vehicle is parked (no pressure in spring portions of the spring brake actuators) and the service brake is subsequently applied, the **Double Check Valve** directs service pressure into the spring portions of the spring brake actuators. This eliminates the compounding force of a simultaneous parking brake and service brake application which can damage the vehicle's foundation brakes.

**Technical Features**

| | |
|--------------------------------|------------------|
| Maximum operating pressure: | 10 bar |
| Operating Temperature Range: | -40 °C to +80 °C |
| Way through: | |
| I14911-AE4100 | Ø 8-16 mm |
| I40405-AE4105 | Ø 14 mm |
| 295358 | Ø 11 mm |
| Minimum pressure differential: | 0.15 bar |
| Weight: | |
| I14911-AE4100 | 0.40 kg approx. |
| I40405-AE4105 | 0.10 kg approx. |
| 1111419000 | 0.11 kg approx. |
| 295358 | 0.32 kg approx. |

Standard Symbol as DIN ISO 1219**Range Overview**

| Part No. | Type No. | Air Port Threads | Design |
|-------------------|---------------|------------------|-----------------|
| I14911 | AE4100 | M22x1.5 | With bracket |
| I40405 | AE4105 | M22x1.5 | Without bracket |
| 1111419000 | - | M16x1.5 | Without bracket |
| 295358 | - | M16x1.5 | With bracket |

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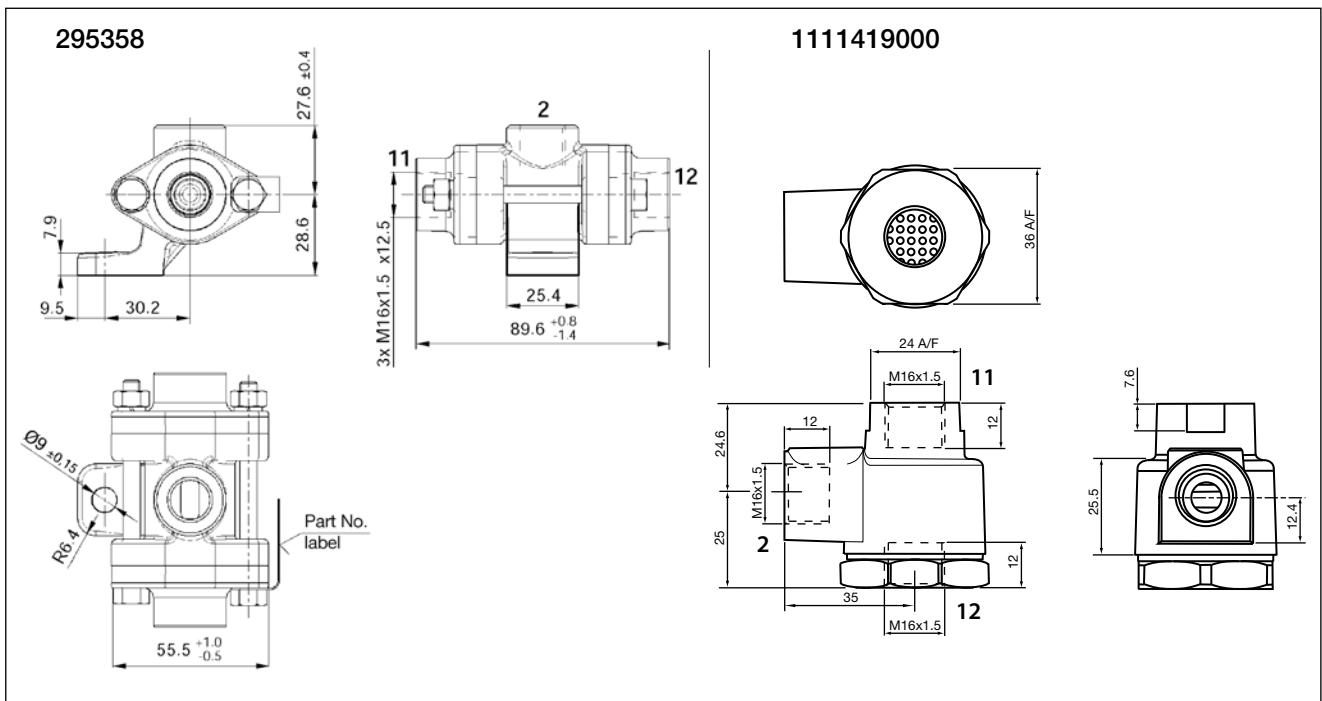
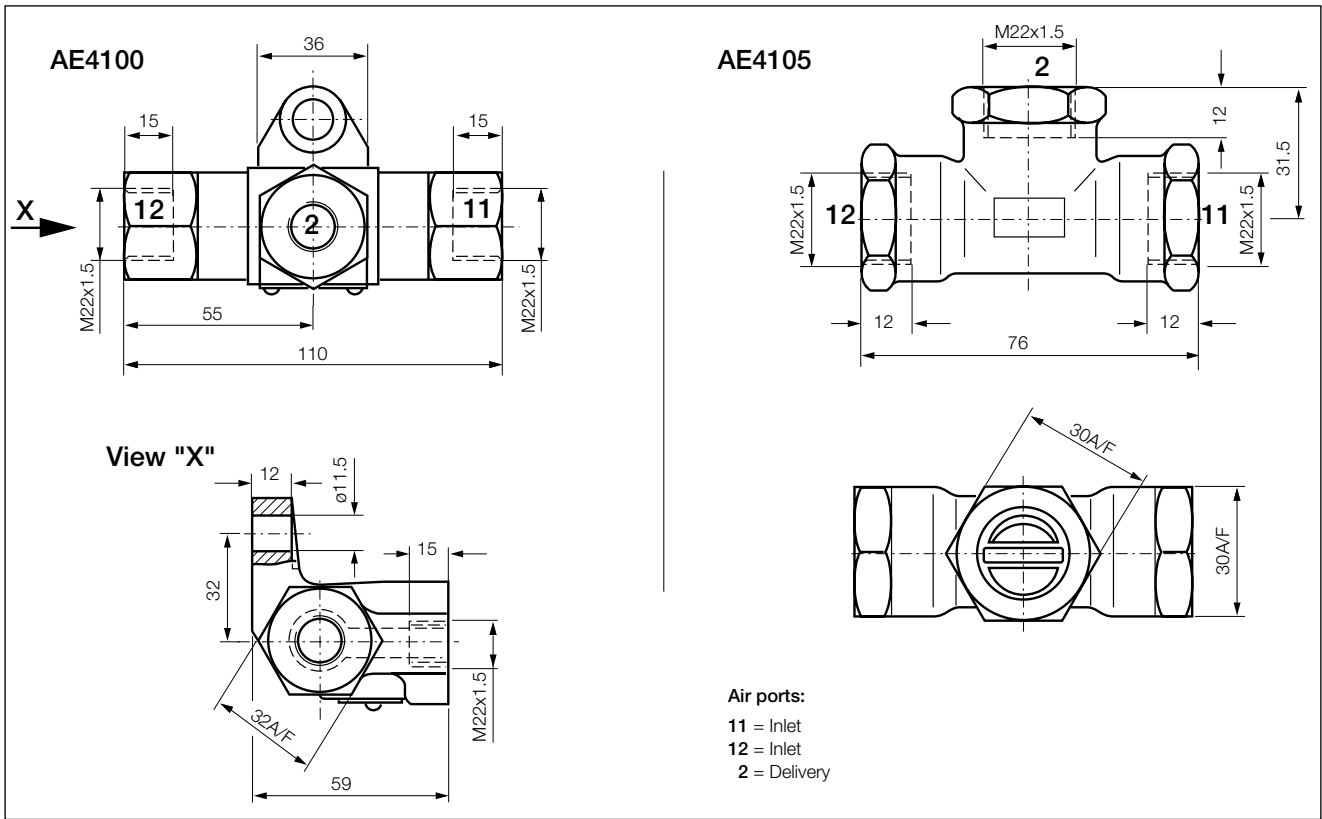
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AE41..., 1111419000, 295358

Double Check Valves

Doc. No. Y011356 (Rev. 001)
March 2011

Dimensions



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Function

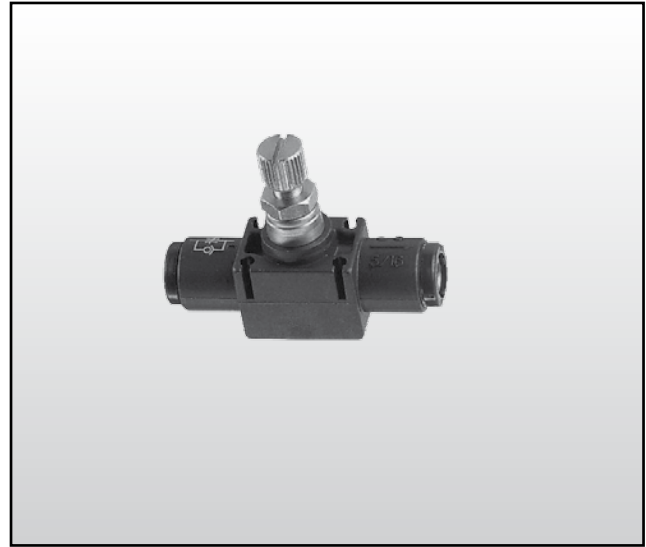
The **Throttle Check Valve** is used in air systems to control the rate of air flow in one direction whilst allowing full flow in the other direction.

The valve is typically used on trailers in combination with a small reservoir prior to the charging valve in the control line of an axle lifting valve AE1124 (see PD-503-100, Document No. Y011380).

The **Throttle Check Valve** and reservoir act to dampen any pressure variations (caused by cornering or rough road surface) in the non-lift axle suspension systems that can otherwise cause the lift axle of a semi-laden trailer to lower.

As the load imposed on the non-lift axle suspension is reduced, air pressure from the damping reservoir can flow un-throttled back into the suspension system.

The flow rate through the valve is adjustable using the 'setting screw'. The valve is supplied complete with pre-installed "push-in" pipe fittings.

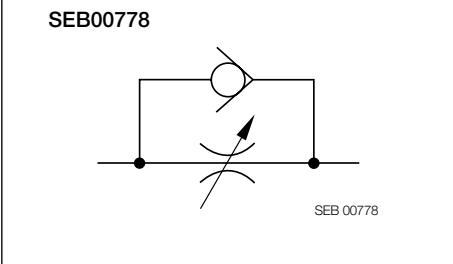


Technical Features

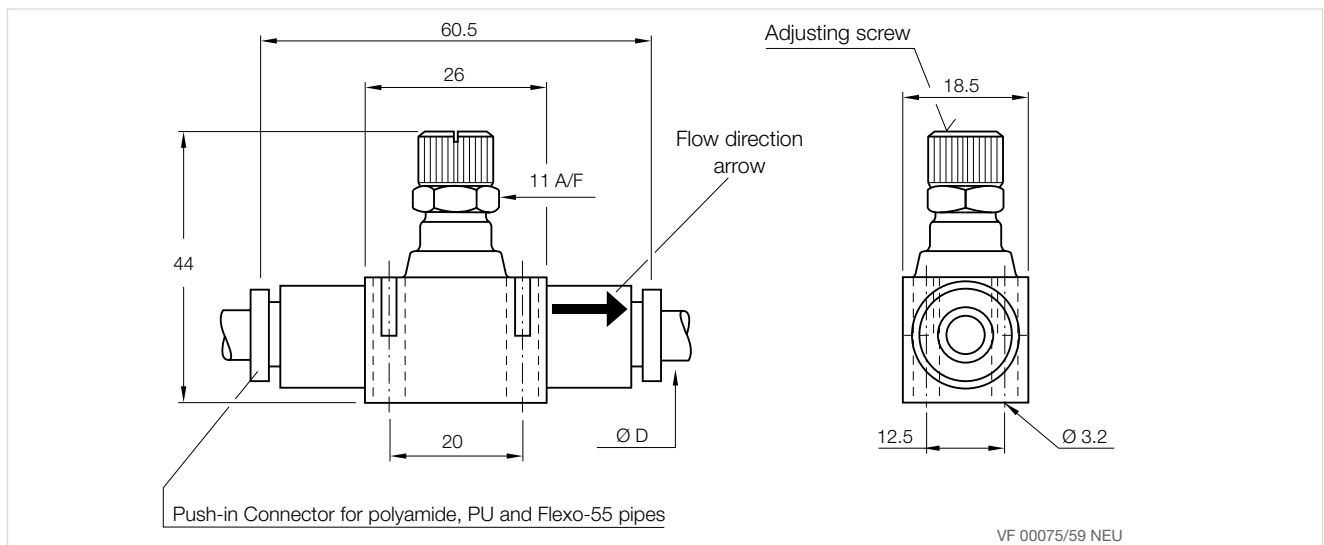
Maximum operating pressure: 10 bar
 Operating temperature range: -40 °C to +80 °C
 Maximum 'way through': Ø 2.5 mm
 Weight: 0.05 kg approx.

| Part No. | Type No. | Fittings for Pipe Diameter "D" |
|----------|----------|--------------------------------|
| SEB00778 | - | 8 mm |

Standard Symbol as DIN ISO 1219



Dimensions



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Function

The **Manoeuvring Valve** on the trailer allows the service brakes of an un-coupled trailer to be released for manoeuvring/"shunting" purposes by pushing in the knob.

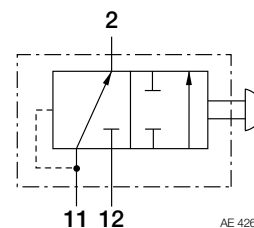
When the supply (red) line is disconnected pushing in the knob of the **Manoeuvring Valve** allows air pressure from the trailer reservoir to be fed to the relay emergency valve thus automatically releasing the service brakes.

When the trailer is re-coupled, connection of the supply (red) line will cause the knob to automatically return to the 'driving' position.

Caution: Always ensure that after manoeuvring, the valve's knob is pulled out and the trailer park valve is correctly applied.



Standard Symbol as DIN ISO 1219



Technical Features

Maximum operating pressure: 8.0 bar
 Operating temperature range: -40 °C to +80 °C
 Air port threads: M16x1.5
 Way through: Ø 4.5 mm
 Weight: 0.5 kg approx.

| Part No. | Type No. | Mounting | Lock in place (in end position) | Non-return Valve (port 12) | Knob |
|----------|----------|---|------------------------------------|-------------------------------|--------------------------------------|
| II19803 | AE4261 | In Supply Line or via a Mounting Plate | with | without | Round, black with function symbol |

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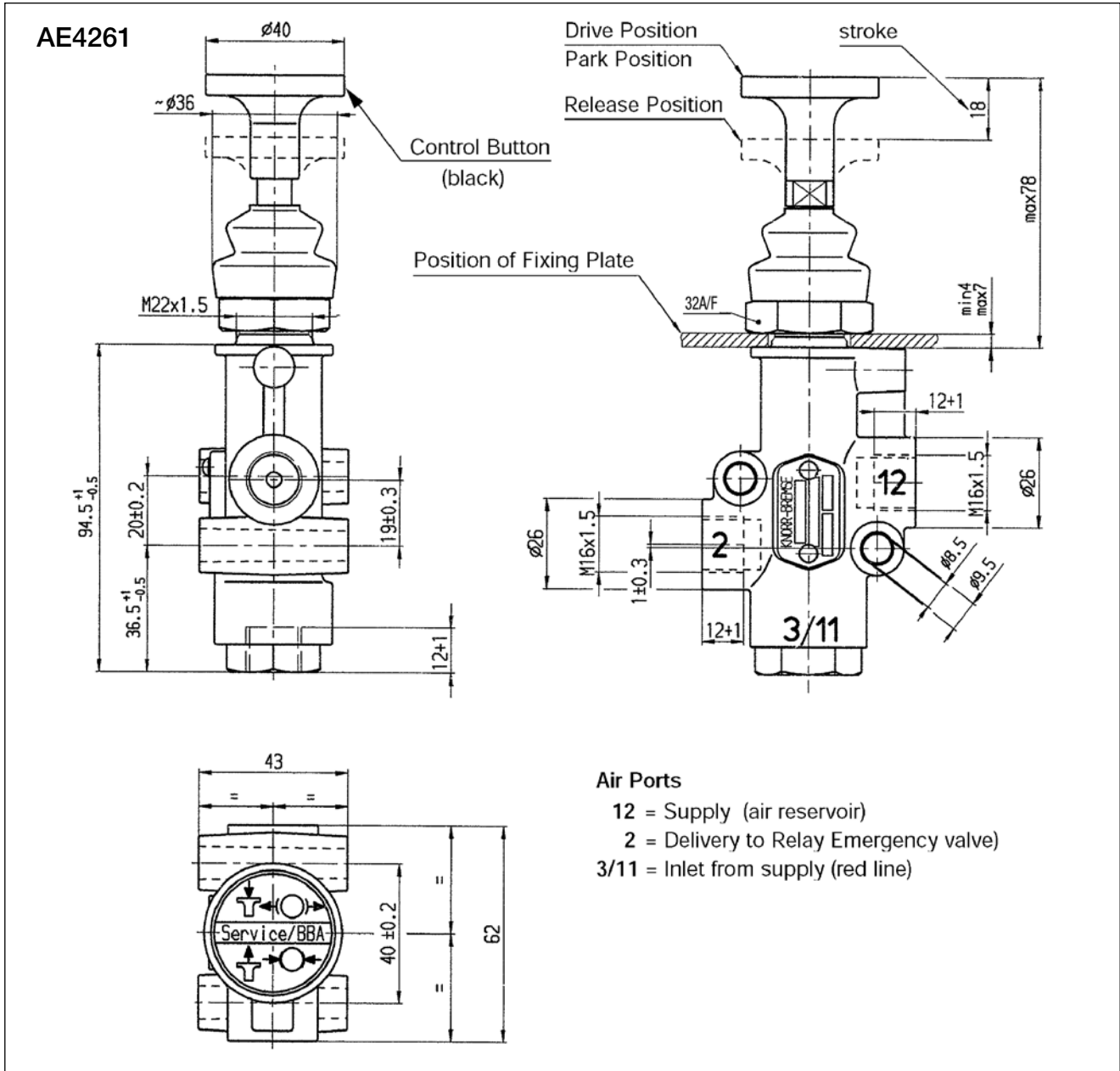
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AE4261

Manoeuvring Valve (Semi-trailer)

Doc. No. Y011350 (Rev. 001)
March 2011

Dimensions



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Function

The **Manoeuvring Valve** (also known as Release Valve or Shunt Valve) is used on drawbar trailers. Uncoupling the supply (red) line to the trailer causes all of the brake actuators to be applied through the action of the emergency function on the trailer. The **Manoeuvring Valve** is used to temporarily release the brakes to enable manoeuvring of the uncoupled trailer.

Drawbar trailers fitted with a relay emergency valve and an ABS system use **Manoeuvring Valve AE4257**. When the black knob is pushed in the emergency function is reset and the service brakes on all axles are released to give full trailer manoeuvrability.

Drawbar trailers fitted with TEBS use **Manoeuvring Valve AE4211** in combination with a park/shunt valve with integrated emergency function AE4311 (see PD-113-220, Document No. Y050820). These trailers are normally fitted with brake chambers on the front axle and spring brakes on the rear axle(s):

- To release the front axle service brakes to facilitate uncoupling and re-coupling of the trailer push in only the knob of the **Manoeuvring Valve AE4211**.
- To achieve release of all the brakes thus providing full manoeuvrability push in only the black knob of AE4311. This will release the spring brakes and signal **AE4211** to release the service brakes on the front axle.

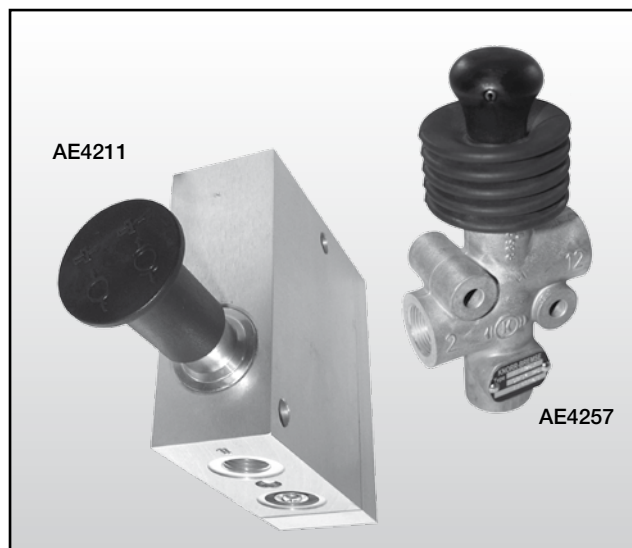
For both types of **Manoeuvring Valve**, when the supply line of the trailer is re-coupled and pressurised an internal actuating valve automatically returns the knob to the driving position.

Technical Features

| | |
|------------------------------|------------------|
| Maximum operating pressure: | 8.5 bar |
| AE4211 | |
| Operating temperature range: | -40 °C to +80 °C |
| Weight: | 1.1 kg approx. |
| AE4257 | |
| Operating temperature range: | -25 °C to +80 °C |
| Weight: | 0.5 kg approx. |

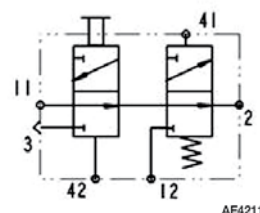
Range Overview

| Part No. | Type No. | Port Threads | Torque max. | Mounting Holes | Torque max. |
|----------|----------|--------------|-------------|----------------|-------------|
| K006368 | AE4211 | M16x1.5 | 45 Nm | 2 x Ø8.5 | 20 Nm |
| II18068 | AE4257 | M22x1.5 | 60 Nm | 2 x Ø8.5 | 20 Nm |

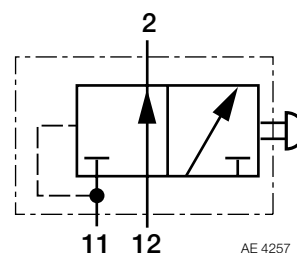


Standard Symbol as DIN ISO 1219

AE4211



AE4257



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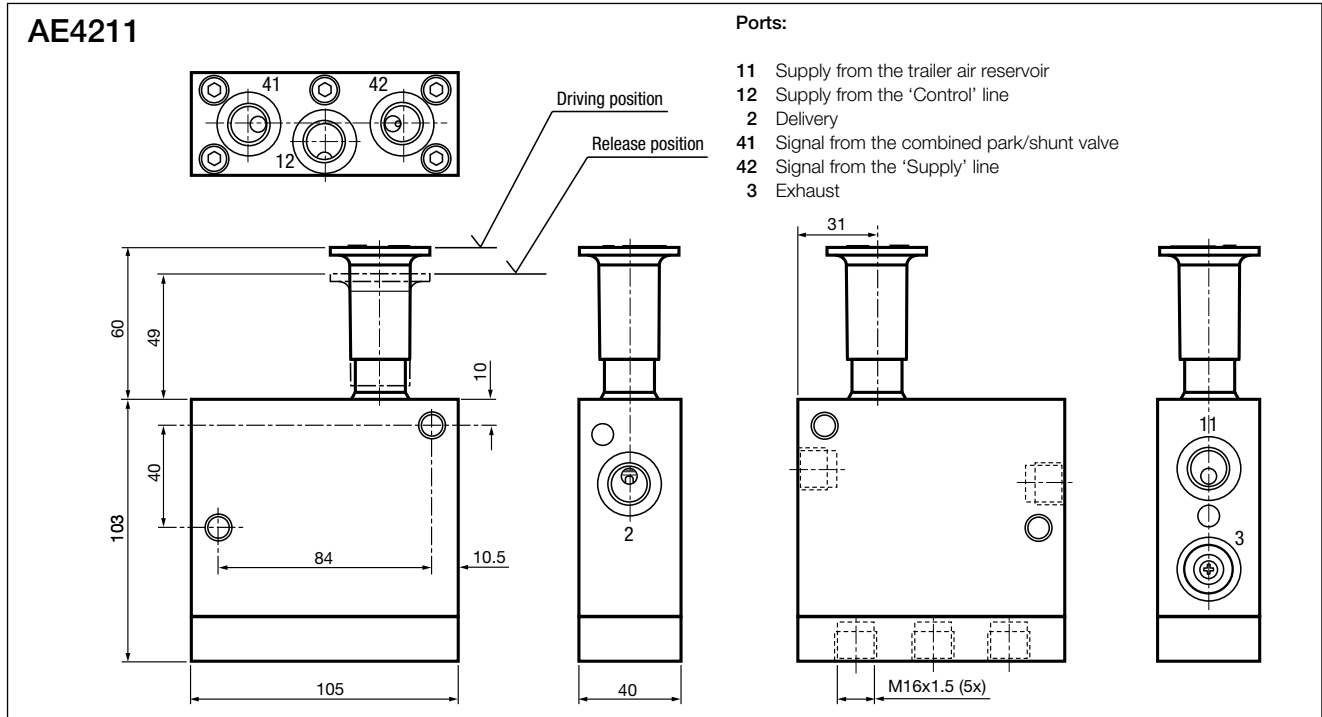
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AE4211, AE4257

Manoeuvring Valves (Drawbar Trailers)

Doc. No. Y011349 (Rev. 002)
March 2011

Dimensions



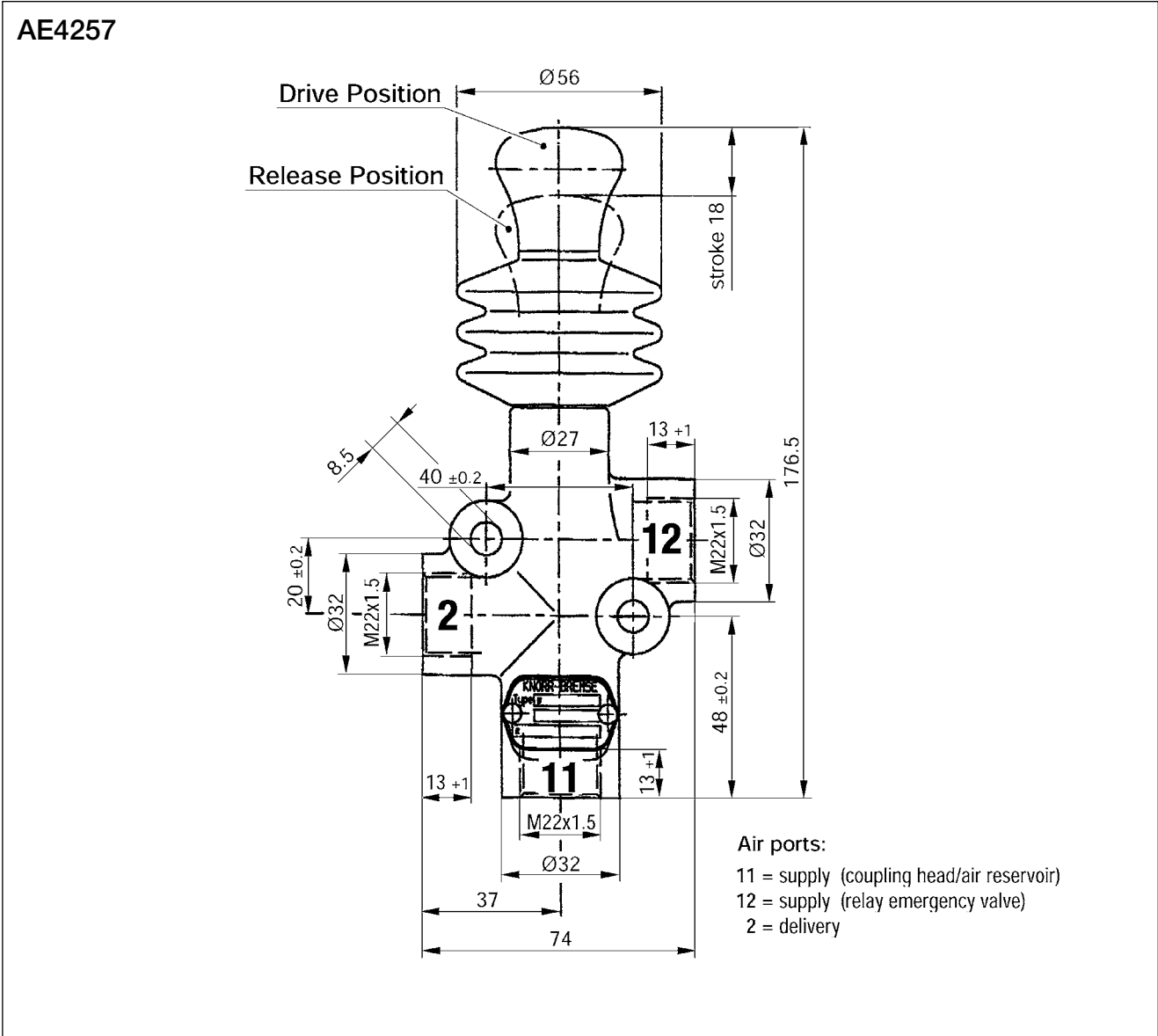
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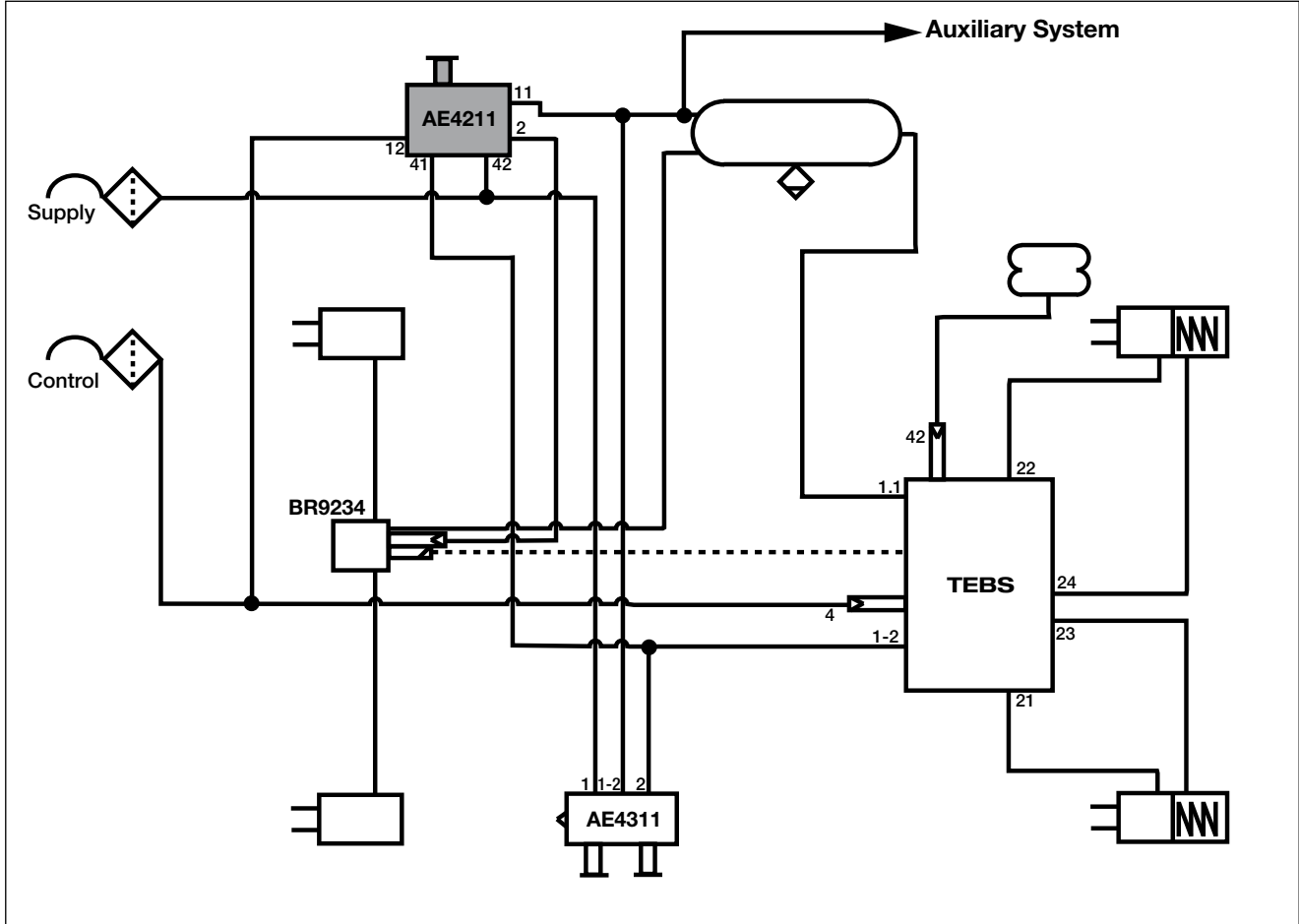
AE4211, AE4257

Manoeuvring Valves (Drawbar Trailers)

Doc. No. Y011349 (Rev. 002)
March 2011

Installation Example

Installation Example - AE4211, 2-Axle Drawbar Trailer with Spring Brakes and TEBS



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Function

The **Park/Shunt Valve** incorporates the park and shunt (manoeuvring) functions for use on trailers equipped with spring brake actuators.

The park function of the **Park/Shunt Valve** supplies and releases pressure to the spring portions of the spring brake actuators. When the trailer is parked, the security pin should be inserted behind the red park button to avoid accidental release of the spring brake actuators. Whether coupled or uncoupled, the red button must be pulled out to correctly park the trailer using its spring brake actuators.

The shunt function of the **Park/Shunt Valve** allows the service brakes of an uncoupled trailer to be released for manoeuvring purposes. In the absence of supply (red) line pressure to the trailer, pushing in the red button to release the parking brakes and then pushing in the black button supplies air pressure from the trailer reservoir to the emergency valve and thereby releases the service brakes. If the black button is left pushed in, when the trailer is re-coupled, air pressure in the supply (red) line will re-set the button to the 'driving' position so that the emergency valve is once again supplied with pressure from the towing vehicle.

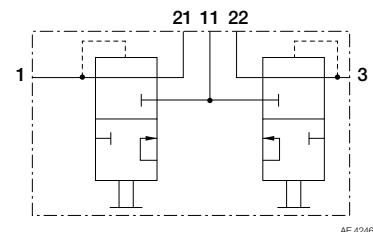
Versions of the **Park/Shunt Valve** are available with an integral non-return valve. This has been introduced to overcome the problem of spring brakes starting to apply in the event of reduced trailer reservoir pressure during prolonged ABS cycling.

When using a **Park/Shunt Valve** with integral non-return valve, extreme care should be taken to ensure that the trailer is correctly parked using the red button. If the trailer is parked on service brakes only, i.e. only supply (red) line is disconnected, and the trailer air pressure depletes, the spring brake actuators will not apply as the non-return valve holds the pressure in the spring portions.

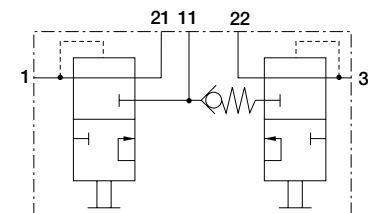
Caution: Always ensure that the Red Button is pulled out and the trailer is correctly parked, before coupling or uncoupling the trailer.

Technical Features

| | |
|------------------------------|------------------|
| Operating pressure: | 8.5 bar |
| Maximum operating pressure: | 10.0 bar |
| Operating temperature range: | -40 °C to +80 °C |
| Weight: | 0.9 kg approx. |
| Label: | EB02234 |

**Standard Symbol as DIN ISO 1219****AE4246 - II36125****AE4247 - II36129**

AE 4246

AE4247 - II36131

AE 4247

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AE424.

Park/Shunt Valves

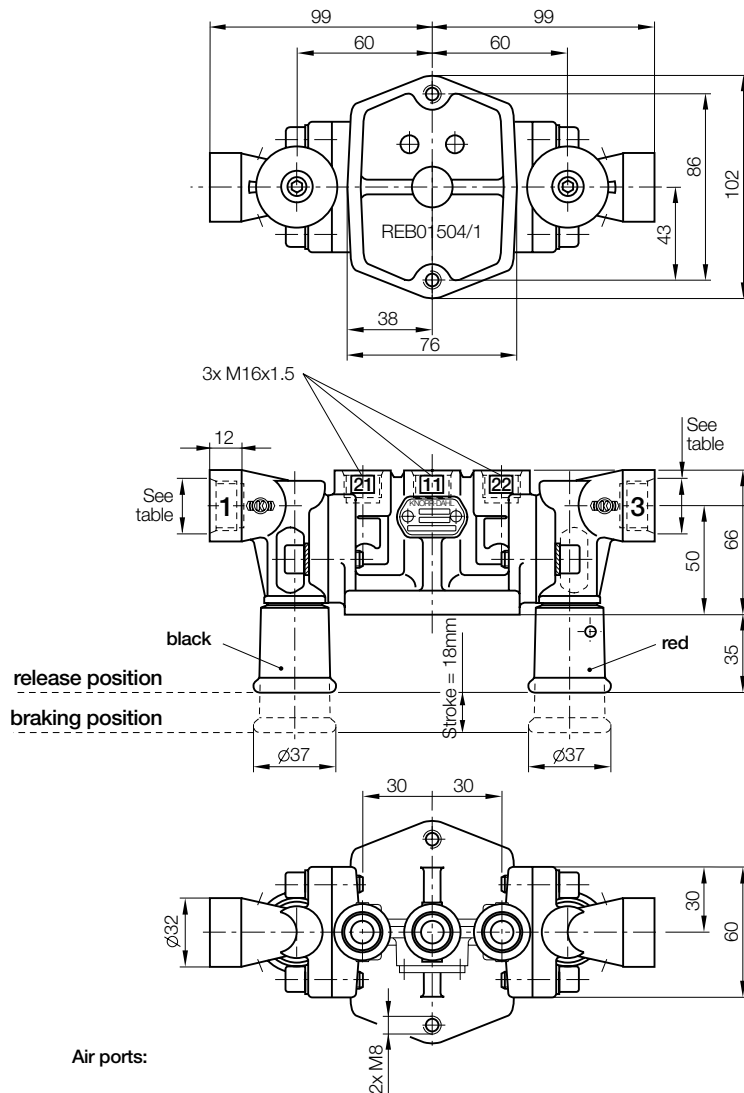
Doc. No. Y011353 (Rev. 001)
March 2011

Range Overview

| Part No. | Type No. | Air Port Threads 1 and 3 | Non-Return Valve | Information Plate & Security Pin |
|----------|----------|--------------------------|------------------|----------------------------------|
| II36125 | AE4246 | M22x1.5 | without | with |
| II36129 | AE4247 | M16x1.5 | without | with |
| II36131 | AE4247 | M16x1.5 | with | with |

Dimensions

AE4246
AE4247



Air ports:

- 1 = Inlet "supply line"
- 11 = Inlet "reservoir"
- 21 = Delivery "Relay emergency valve"
- 22 = Delivery "Spring brake"
- 3 = Exhaust



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Function

The **Park/Shunt Valve AE431** is used on trailers that are equipped with spring brakes. It is connected to the supply line (red) and enables the manual release and application of the trailer spring brakes. The **AE431** valve's emergency function ensures that, in the event of loss of pressure in the supply line (red) resulting from uncoupling or failure of the supply line whilst driving, the trailer's spring brakes will automatically be applied by exhausting their air supply and not by applying the trailer's service brakes as with traditional relay emergency valves (REVs). This means there is no longer a need for a separate relay emergency valve and ensures that the trailer is safely parked using the spring brakes, especially when the air pressure depletes.

An additional benefit of this functionality is that the spring brakes are automatically applied every time the trailer is uncoupled. This helps the spring brakes to retain their output force since the springs do not remain compressed for long periods of time.

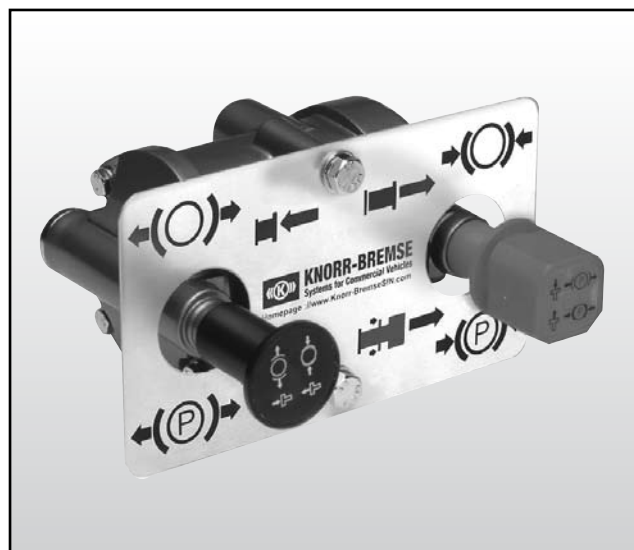
This feature also reduces the possibility of air leakage when the trailer is uncoupled since, in contrast with trailers with a REV, nearly all pipes and hoses are exhausted.

Some variants of the **Park/Shunt Valve** are available with an integrated charging valve and push-to-connect fittings. This means that these valves have two additional delivery ports, e.g. for the air suspension which will simplify the piping work.

Both knobs of the **AE431** control the spring brakes:

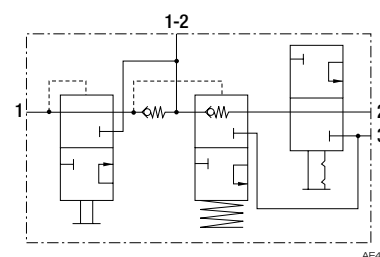
- The red knob is used to operate the parking brake. It has a safety function incorporating a locking sleeve that protects against unintentional operation.
- The black knob is used for manoeuvring the uncoupled trailer. However, in contrast with conventional release valves, it operates the spring brakes. It can only be pushed in when the trailer is uncoupled and re-connection of the supply line (red) will cause it to pop out automatically returning it to the driving position.

The mounting plate **Z006845** (see page 2) explains the operation of the two knobs and can be ordered separately.

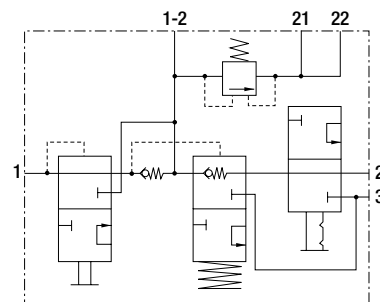


Standard Symbols as DIN ISO 1219

Without integrated charging valve



With integrated charging valve



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AE431.

Park/Shunt Valves with Integrated Emergency Function

Doc. No. Y050820 (Rev. 000)
March 2011

Technical Features

Maximum Operating Pressure: 10 bar
 Operating Temperature Range: -40 °C to +80 °C
 Weight: 1.45 kg approx.

Charging Valve function:

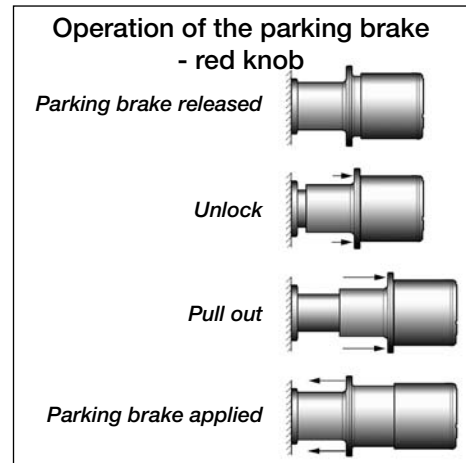
Opening Pressure: 6.0 bar
 Closing Pressure: 5.2 bar

Service Brake Priority:

When charging the trailer's air systems the service brake reservoir is given priority up to a pressure of 3.0 bar.

Emergency function:

In the event of a pressure drop at port 1 below 2.6 bar, the spring brakes are automatically applied.

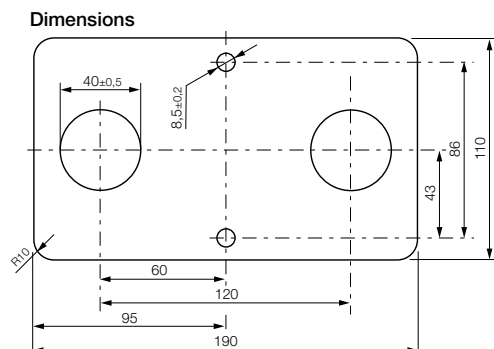
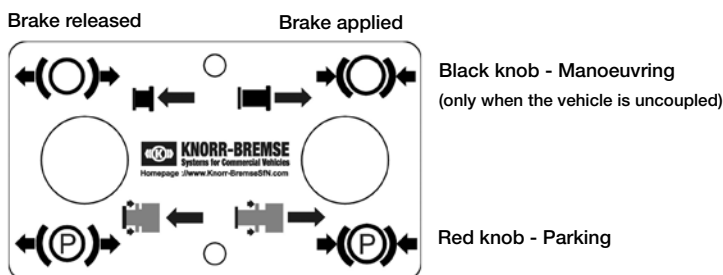


Range Overview

| Part No. | Type No. | Air Port Threads | | Remark | Charging Valve | Fittings supplied (push to connect) |
|----------|----------|-----------------------|-----------------------|------------------|----------------|--|
| | | 1, 1-2, 21, 22 | 2 | | | |
| K015849 | AE4311 | M16x1.5 – DIN 3852 | M22x1.5 – DIN 3852 | With rubber flap | No | No |
| K015380 | | | | | Yes | No |
| K020123 | | | | | Yes | Yes |

| Port | Use for | Push-to-Connect Fittings to suit pipe size |
|------|--|---|
| 1 | Supply (from red supply line) | 8x1 |
| 1-2 | Supply/delivery (from/to reservoir) | 12x1.5 |
| 2 | Delivery (to spring portions of Spring Brakes) | 8x1 |
| 3 | Exhaust | - |
| 21 | Delivery (to auxiliaries) | 8x1 |
| 22 | Delivery (to auxiliaries) | 8x1 |

Mounting Plate (Part No. Z006845)



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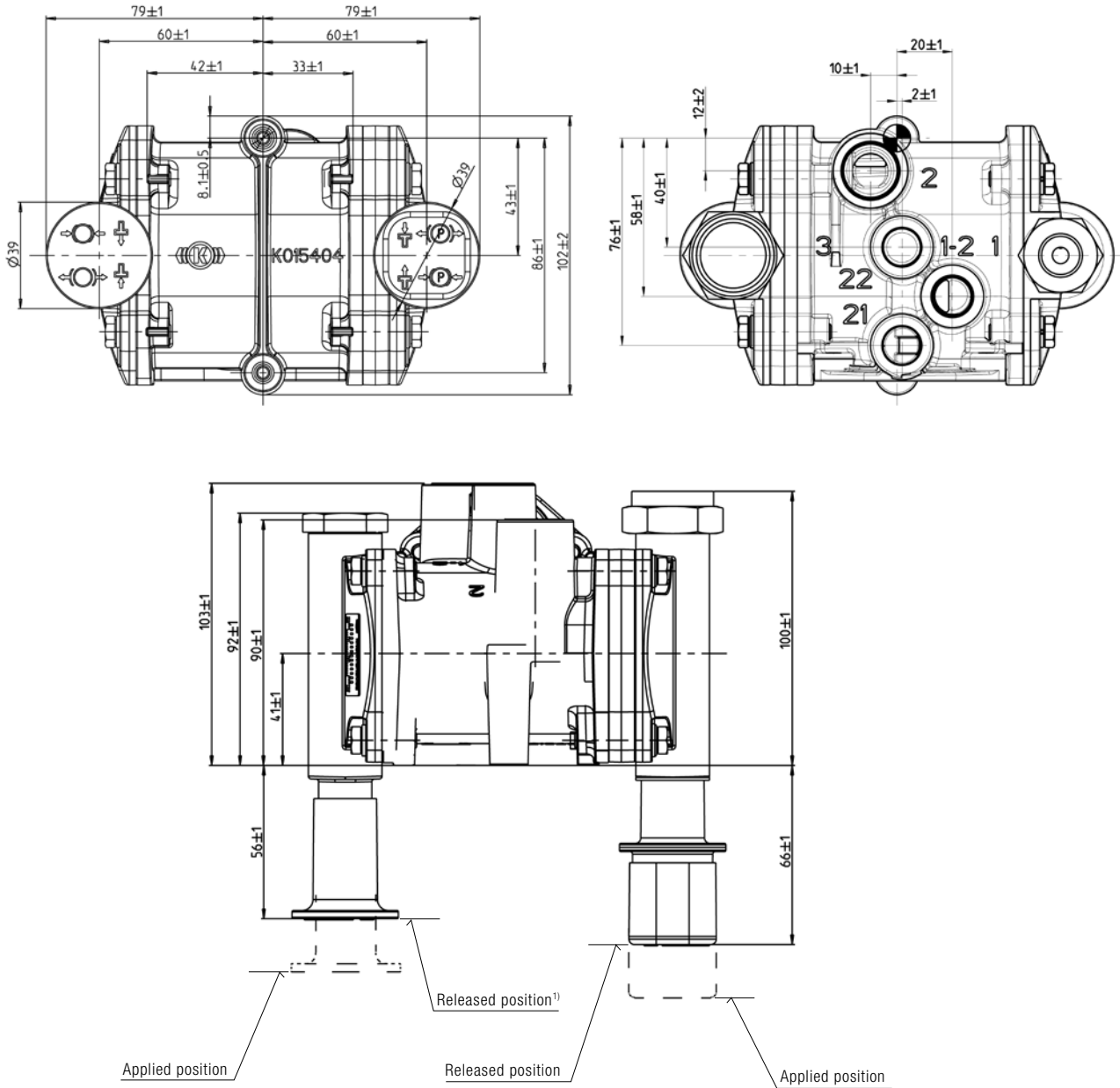
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Dimensions

AE4311 - K015849



Air ports:

- 1 = Supply (from red supply line)
- 1-2 = Supply/delivery (from/to reservoir)
- 2 = Delivery (to spring portions of Spring Brakes)
- 21 = Delivery (to auxiliaries)
- 22 = Delivery (to auxiliaries)
- 3 = Exhaust

¹⁾ For the **black** knob:
only possible when the supply line (red) is not pressurised

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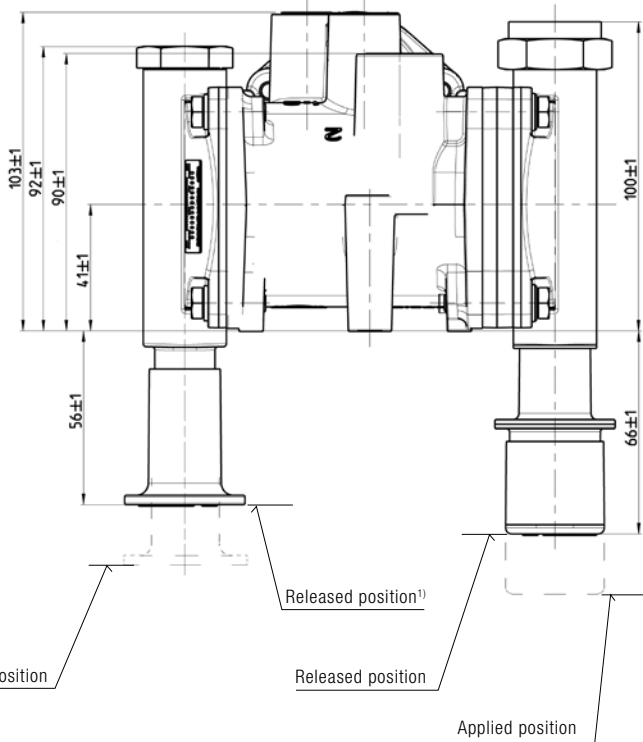
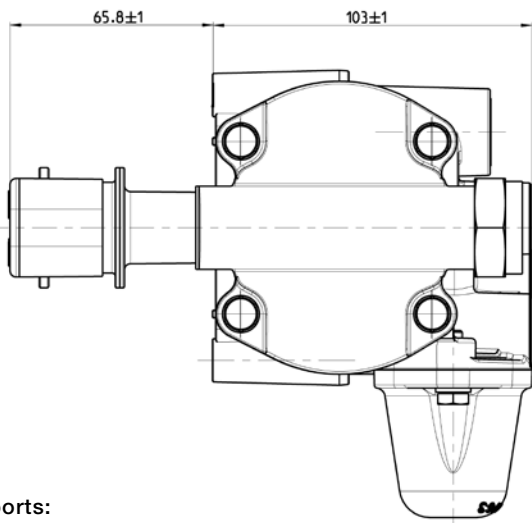
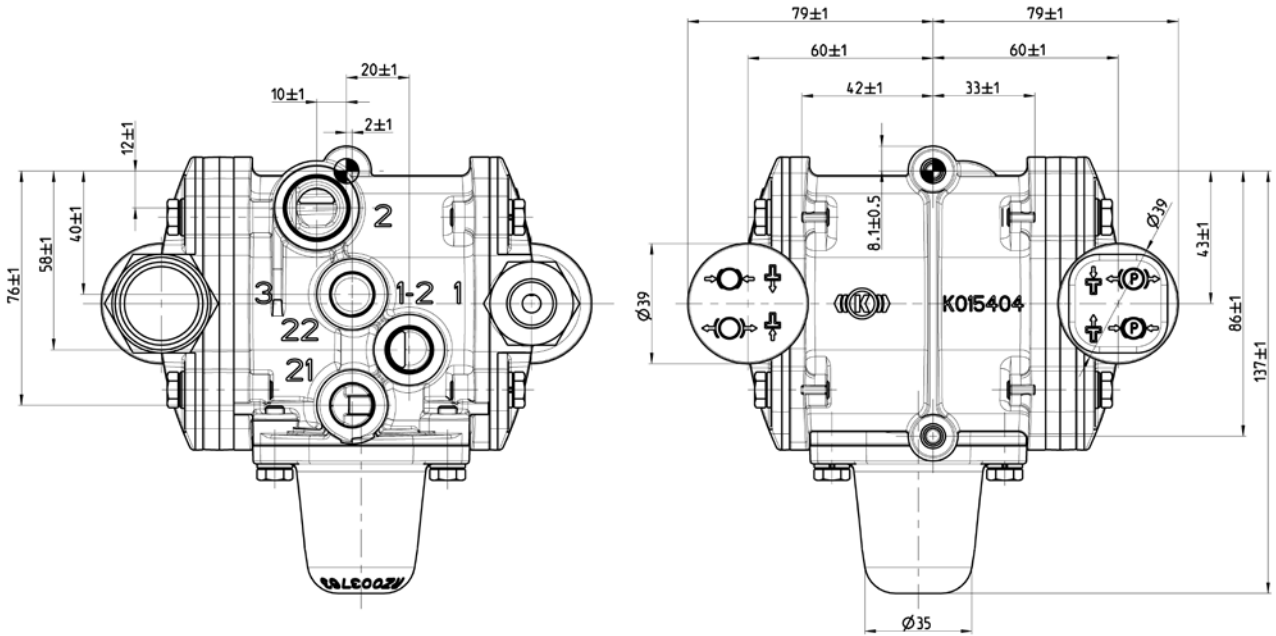
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AE431.

Park/Shunt Valves with Integrated Emergency Function

Doc. No. Y050820 (Rev. 000)
March 2011

AE4311 – K015380



Air ports:

- 1 = Supply (from red supply line)
- 1-2 = Supply/delivery (from/to reservoir)
- 2 = Delivery (to spring portions of Spring Brakes)
- 21 = Delivery (to auxiliaries)
- 22 = Delivery (to auxiliaries)
- 3 = Exhaust

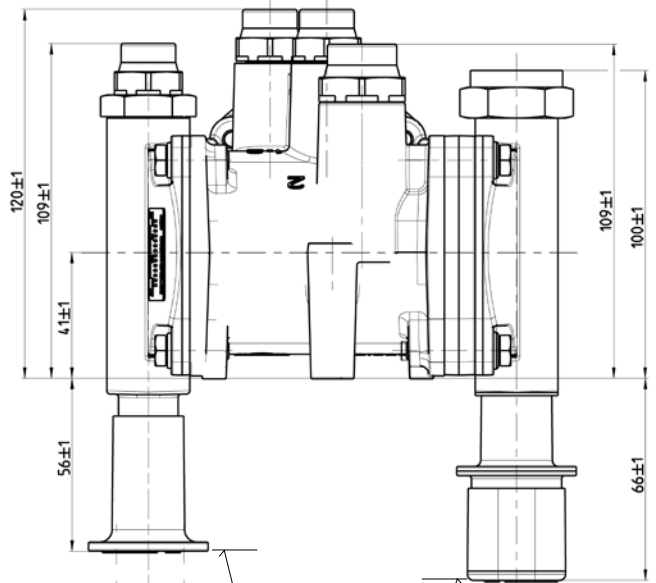
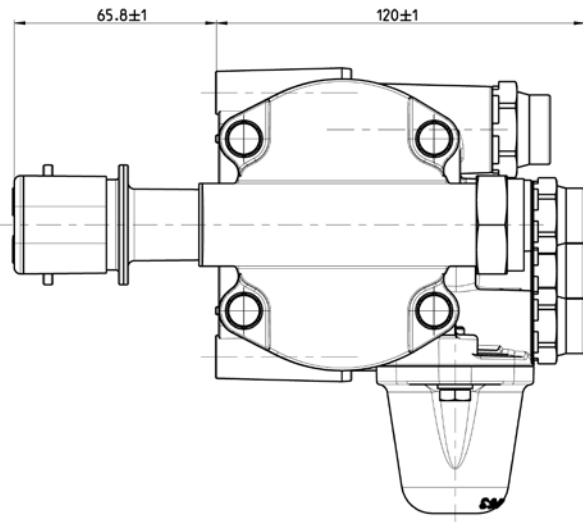
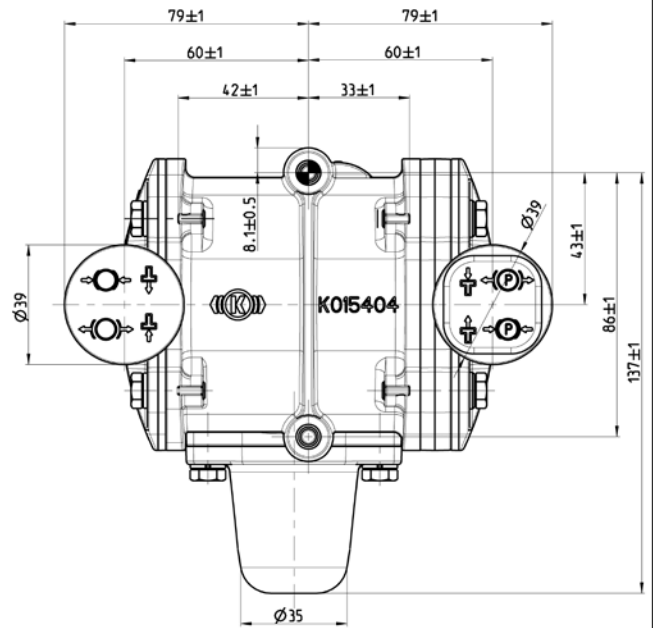
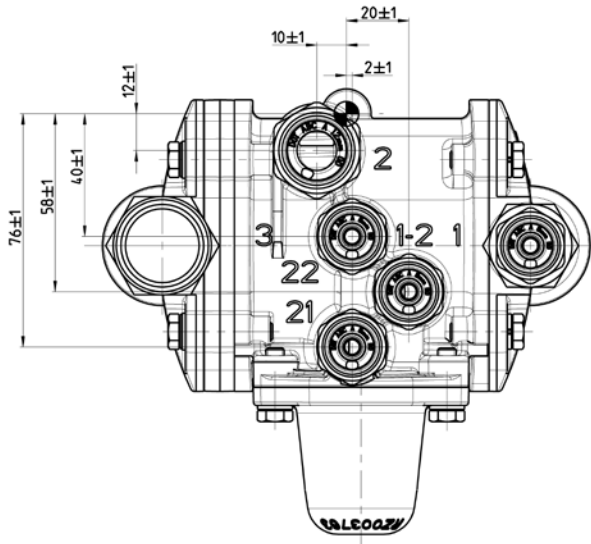
1) For the **black** knob:
only possible when the supply line (red) is not pressurised

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Item No.: K050466



AE4311 – K020123



Air ports:

- 1 = Supply (from red supply line)
- 1-2 = Supply/delivery (from/to reservoir)
- 2 = Delivery (to spring portions of Spring Brakes)
- 21 = Delivery (to auxiliaries)
- 22 = Delivery (to auxiliaries)
- 3 = Exhaust

1) For the **black** knob:
only possible when the supply line (red) is not pressurised

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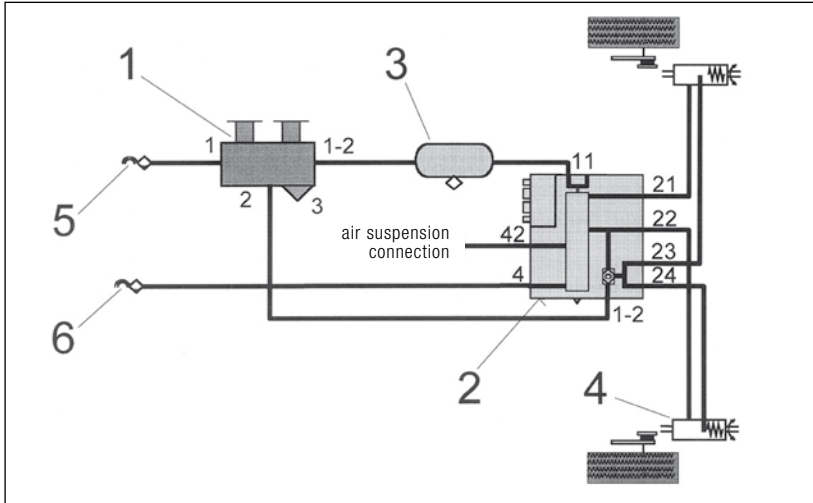
AE431.

Park/Shunt Valves with Integrated Emergency Function

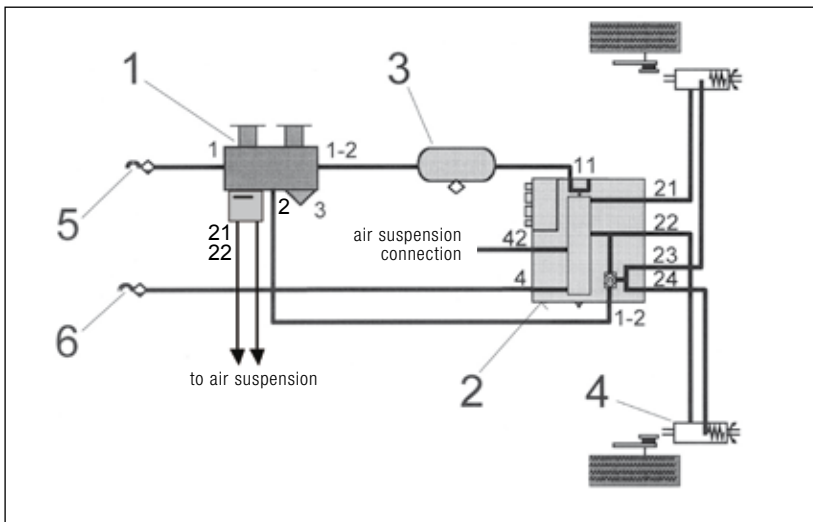
Doc. No. Y050820 (Rev. 000)
March 2011

Installation example AE4311 with EBS

Park / Shunt Valve without Integrated Charging Valve



Park / Shunt Valve with Integrated Charging Valve



| Item | Designation |
|------|---|
| 1 | Park / Shunt Valve with integrated emergency function |
| 2 | TEBS / TEBS G2 brake module |
| 3 | Reservoir |
| 4 | Spring Brake Actuator |
| 5 | Coupling Head with filter. Supply - Red |
| 6 | Coupling Head with filter. Control - Yellow |



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Function

The **Park/Shunt Valve AE437**. enables the manual release and application of the trailer brakes. This variant is designed to be used with the TEBS G2.1 Brake Module which incorporates the automatic brake function to improve its response time.

The **Park/Shunt Valve AE437**. is built with a plastic housing and equipped with an integral charging valve and push-to-connect fittings.

The plastic housing protects against corrosion and ensures a long life.

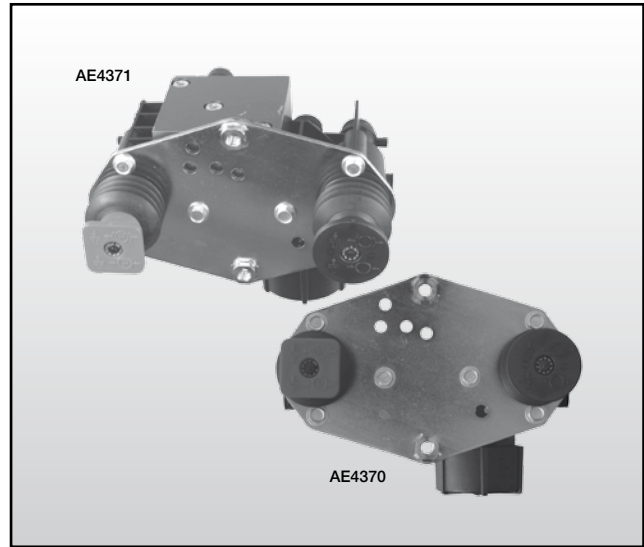
The charging valve ensures the priority charging of the brake reservoir before supplying pressure to the auxiliary circuit (air suspension). In the event of pressure loss in the brake system or auxiliary circuit the valve will protect the pressure in the intact circuit.

The **Park/Shunt Valve AE4370** for semi and centre-axle trailers has the following functionality:

- Manual control of the parking brake (red knob).
- Manoeuvring (shunt) function for use when the trailer is uncoupled (black knob).

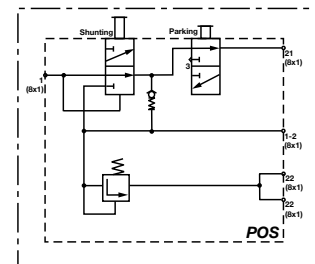
The **Park/Shunt Valve AE4371** for drawbar trailers has an integral front axle valve. This valve ensures that the service brakes on the front axle of a drawbar trailer are applied when the supply line is disconnected.

By pulling out the red knob and pushing in the black knob, the brakes on the front axle will be released for coupling the drawbar trailer to the truck.

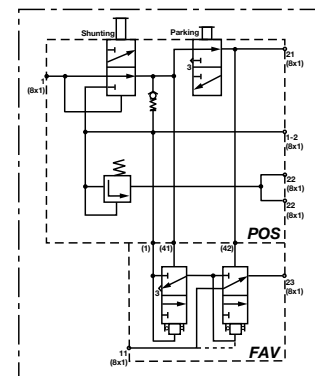


Standard Symbol as DIN ISO 1219

AE4370



AE4371



Technical Features

| | |
|------------------------------|--|
| Maximum operating pressure: | 10.0 bar |
| Operating temperature range: | -40 °C to +80 °C |
| Weight: | AE4370 1.1 kg approx. AE4371 2.0 kg approx. |

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AE437.

Park/Shunt Valve with Integrated Charging Valve

Doc. No. Y095829 (Rev. 000)
March 2011

Range Overview

| Part No. | Type No. | Integral Charging Valve | Integral Front Axle Valve | Number of Connections | Push-to-Connect Fittings supplied |
|-----------------------|----------|-------------------------|---------------------------|-----------------------|-----------------------------------|
| K025700 ¹⁾ | AE4370 | Yes | No | 5 | Yes |
| K025699 ¹⁾ | AE4371 | Yes | Yes | 7 | Yes |

Information Plate: K056570 ¹⁾

¹⁾ The part number will carry a suffix, "N##" which defines the packaging requirements of different market sectors, e.g. N00, N50. Example: K025700N00 - is supplied without packaging.

| Port | Valve | | Connection | Push-to-Connect Fittings (to suit pipe size) |
|------|--------|--------|---|--|
| | AE4370 | AE4371 | | |
| 1 | X | X | Supply (from red line) | 8 x 1 |
| 1-2 | X | X | Supply/Delivery (from/to brake reservoir) | 8 x 1 |
| 11 | | X | Supply (from yellow line) | 8 x 1 |
| 21 | X | X | Delivery (to TEBS G2.1 Brake Module) | 8 x 1 |
| 22 | X | X | Delivery (to auxiliaries) | 8 x 1 |
| 23 | | X | Delivery (to front axle service brakes) | 8 x 1 |
| 3 | X | X | Exhaust | |

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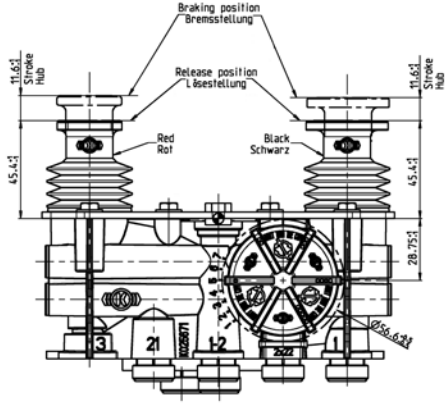
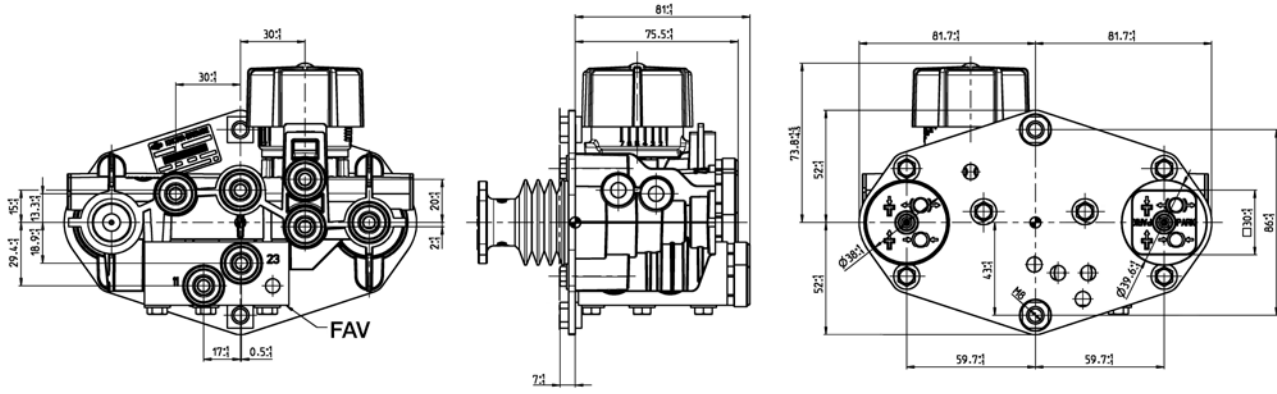
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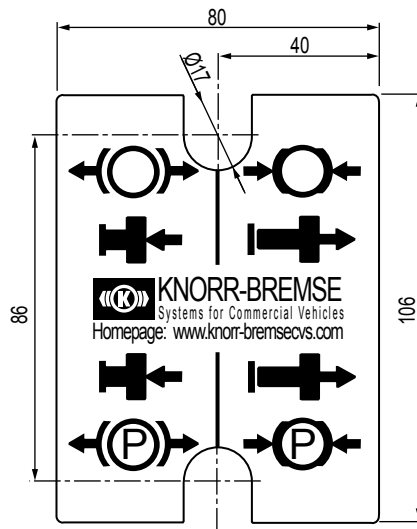
Dimensions

AE4370
AE4371



| Park/Shunt Valve | Front Axle Valve (FAV) |
|------------------|------------------------|
| AE4370 | No |
| AE4371 | Yes |

K056570



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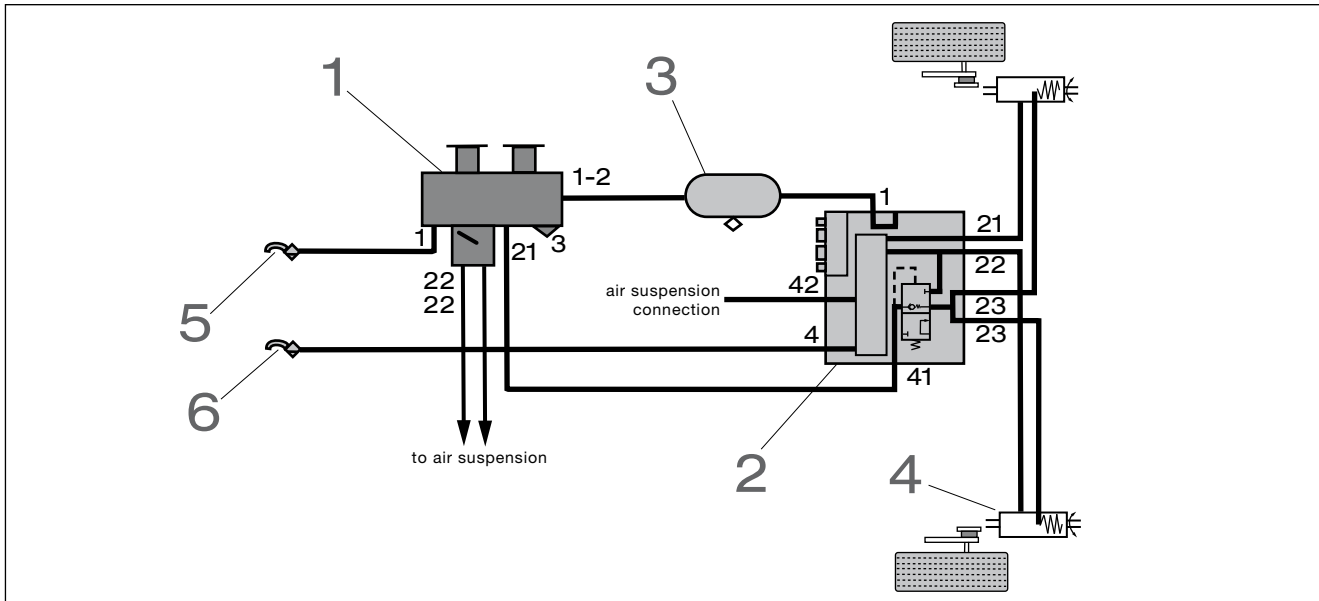
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AE437.

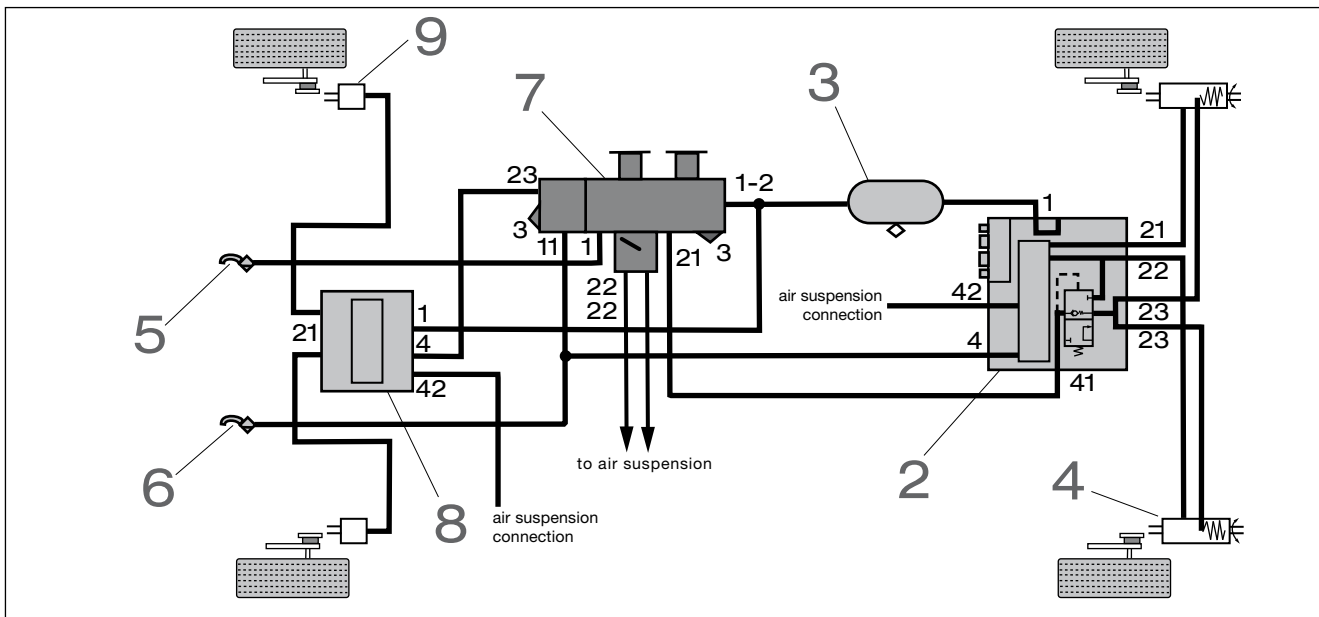
Park/Shunt Valve with Integrated Charging Valve

Doc. No. Y095829 (Rev. 000)
March 2011

Installation example AE4370 with TEBS G2.1



Installation example AE4371 with TEBS G2.1 and TEPM-P



| Item | Description | Item | Description |
|------|---|------|---|
| 1 | Park/Shunt Valve with integrated charging valve | 6 | Coupling head with filter (Control) - Yellow |
| 2 | TEBS G2.1 brake module | 7 | Park/Shunt Valve with integrated charging valve and integral front axle valve |
| 3 | Brake reservoir | 8 | Trailer Electro-Pneumatic Module Premium (TEPM-P) |
| 4 | Spring brake actuator | 9 | Brake chamber |
| 5 | Coupling head with filter (Supply) - Red | | |



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Function

The **Trailer Park Valve** operates the parking brake function of trailers equipped with spring brake actuators.

Whether coupled or uncoupled, the red control button must always be pulled out to correctly park the trailer.

By pushing in the control button, the spring portions of the spring brake actuators are supplied with air so that the parking brake is released.

Caution: Always ensure that the red control button is pulled out and the trailer is correctly parked, before coupling or uncoupling the trailer.

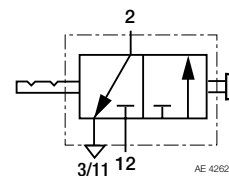


Technical Features

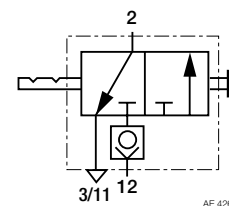
| | |
|------------------------------|--|
| Maximum operating pressure: | 8.0 bar |
| Operating temperature range: | -40 °C to +80 °C |
| Way through | 4.5 mm (for AE4262) 3.8 mm (for AE4264) |
| Weight: | 0.5 kg approx. |

Standard Symbol as DIN ISO 1219

AE4262



AE4264



Range Overview

| Part No. | Type No. | Air Ports 12 and 2 | Mounting | Control Button | Lock in place (in end positions) | Non-return Valve (port 12) |
|----------|----------|-----------------------|-------------------|-------------------------------------|-------------------------------------|-------------------------------|
| II19802 | AE4262 | M16x1.5 | in Supply Line | red, square with function symbol | with | without |
| II36055 | AE4264 | | | | | with |

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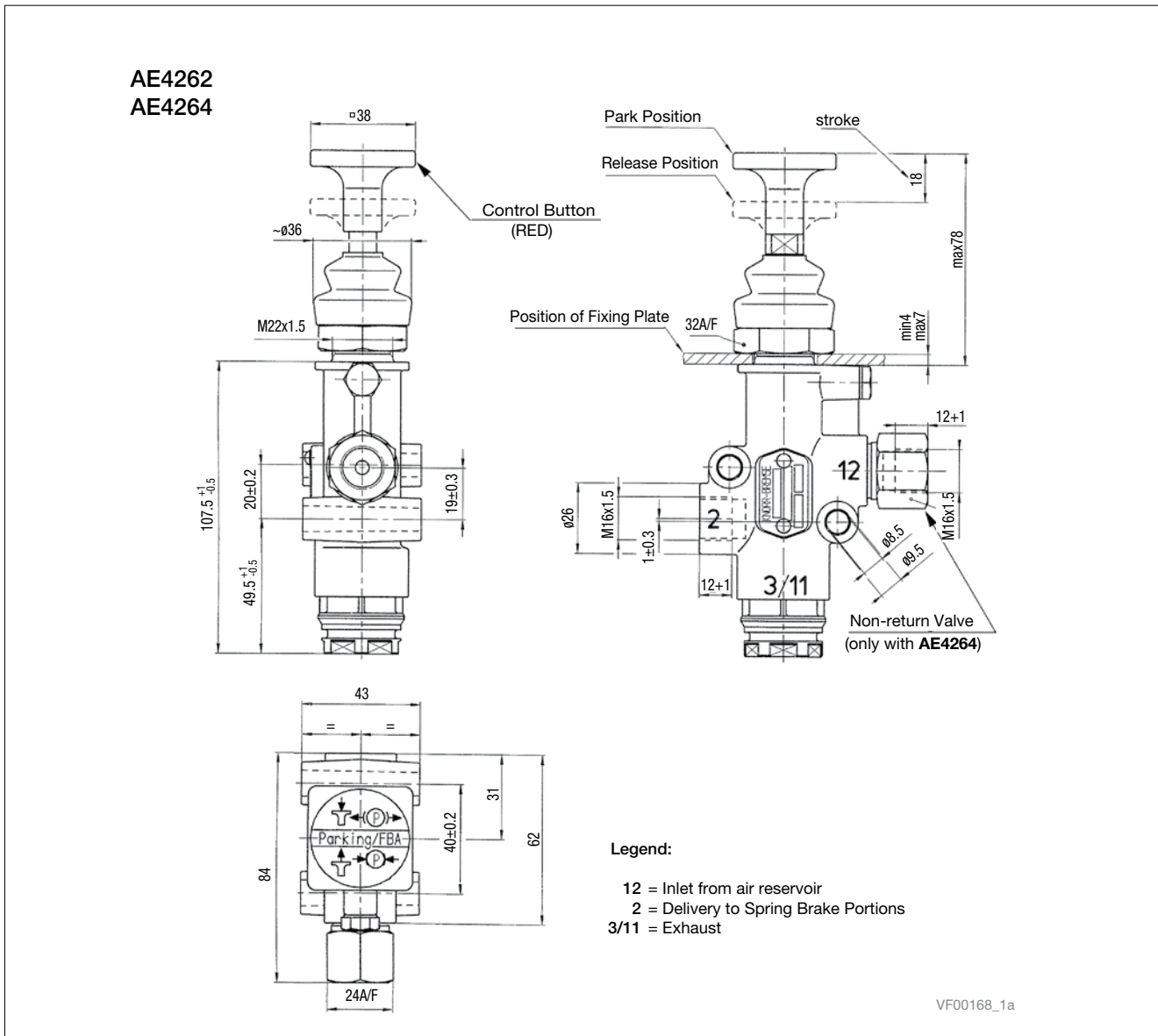
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AE4262, AE4264

Trailer Park Valves

Doc. No. Y011351 (Rev. 001)
March 2011

Dimensions



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Function

These **3/2 Control Valves** are used for auxiliary systems on trailers. By pushing in the knob, port 2 is pressurised; by pulling out the knob, port 2 is exhausted.

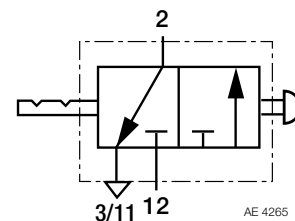
The valve exists in two versions that differ in the colour of the knob - only for identification purposes regarding its function on the vehicle. The valve with the green knob is typically used to lower lift axles on unladen vehicles (see PD-503-200, Document No. Y011379), the one with the white knob is used for auxiliary functions that are not related to lift axle control (e.g. operating cylinders). Both valves have detents in the end positions.



Technical Features

Maximum operating pressure: 8.0 bar
 Operating temperature range: -40 °C to +80 °C
 Way through: Ø 4.5 mm
 Weight: 0.4 kg approx.

Standard Symbol as DIN ISO 1219



Range Overview

| Part No. | Type No. | Air Port Threads 12 and 2 | Knob | |
|----------|----------|------------------------------|--------|----------------------------------|
| | | | Colour | Shape |
| II36061 | AE4265 | M16x1.5 | Green | Round, without symbols |
| II36062 | AE4266 | | White | |

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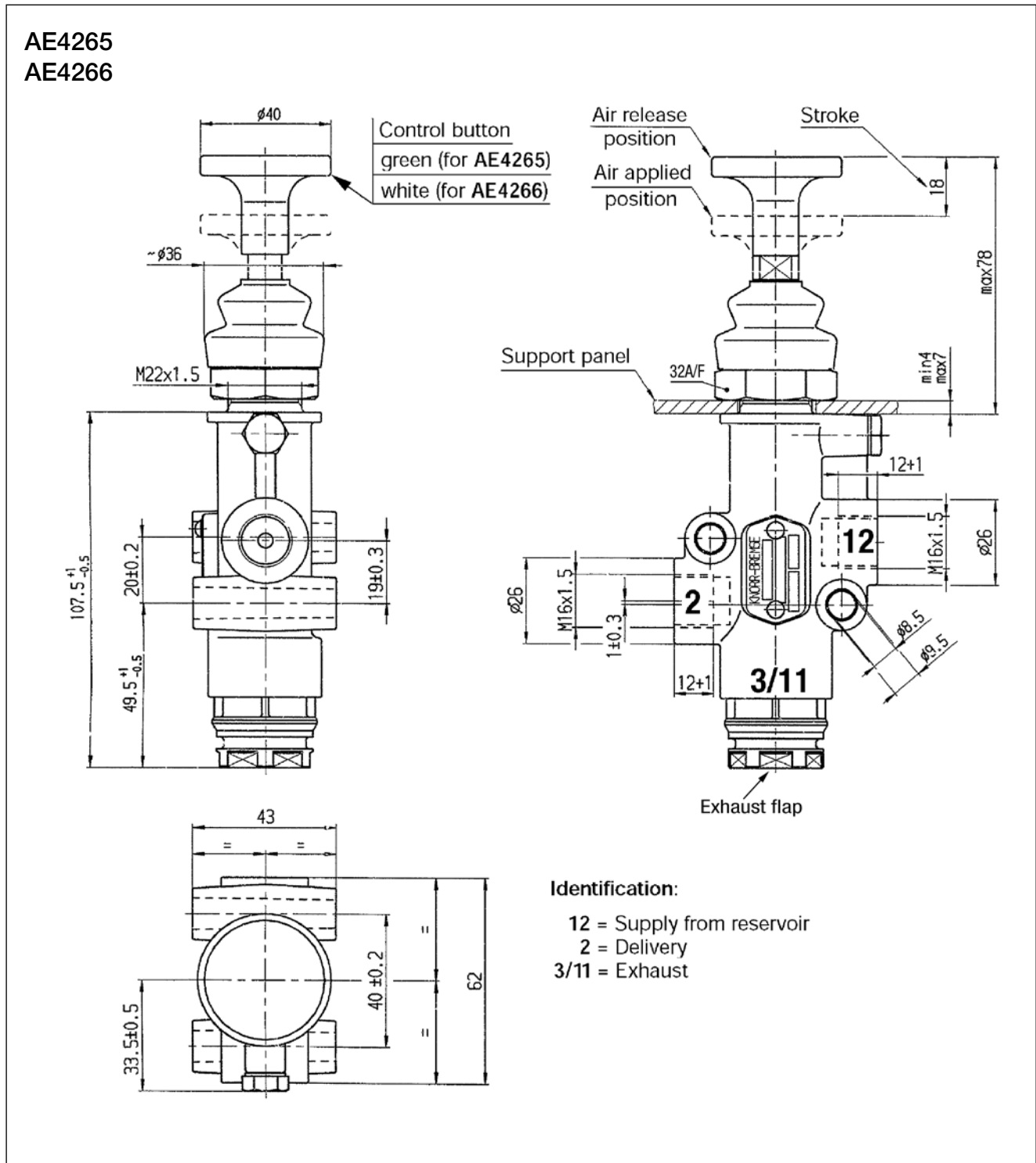
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AE4265, AE4266

3/2 Control Valves

Doc. No. Y011383 (Rev. 001)
March 2011

Dimensions



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Function

AE9120 Solenoid Valve (normally 'open')

The **AE9120 Solenoid Valve** is an electro-pneumatic device which is normally 'open' (exhausts when powered) and is used to control the supply of air to other pneumatic equipment. When the solenoid is powered with 24V, the valve exhausts air from port **A** through the exhaust port **P**. Removal of the electrical power causes the valve to deliver air from port **A**.

A typical application for **AE9120** is to exhaust spring brake actuators that are used for locking steering axles or to lower lift axles (see PD-503-200, Document No. Y011379).

AE9120 is delivered with an electrical connector, that can be used with standard cables with bare ends.

EA1152 Solenoid Valve (normally 'closed')

The **EA1152 Solenoid Valve** is normally 'closed' (delivers when powered). When it is powered with 24V, the valve delivers air from port **2**. Removal of the electrical power causes the valve to vent the delivered air to atmosphere through the exhaust port **3**.

EA1152 has an M27x1 threaded electrical connector for which adapter cables are available.



Technical Features

| | AE9120 | EA1152 |
|------------------------------|------------------|-------------------|
| Operating Pressure: | 10 bar | 10 bar |
| Operating Temperature Range: | -40 °C to +45 °C | -40 °C to +80 °C |
| Voltage: | 24 V ±10 % | 24 V +20 % - 10 % |
| On-time: | 100 % | 100 % |
| Power Input: | 10 W | 15.6 W |
| Degree of Protection: | IP 65 | IP 68 |
| Weight: | 0.5 kg approx. | 0.9 kg approx. |
| Flow Diameter: | 1.9 mm | 4 mm |

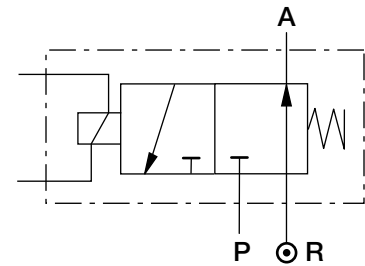
Product Overview

| Part No. | Type No. | Air Port Threads | | | Remark |
|-----------|----------|------------------|--------------|-------------|------------------|
| | | R (supply) | A (delivery) | P (exhaust) | |
| I63411024 | AE9120 | M14x1.5 | M14x1.5 | With filter | With cable gland |

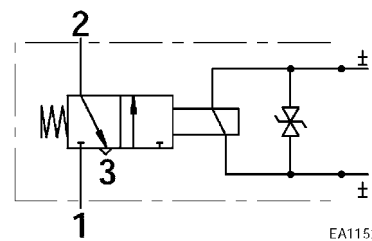
| Part No. | Type No. | Air Port Threads | | | Remark |
|----------|----------|------------------|--------------|-------------|-----------------|
| | | 1 (supply) | 2 (delivery) | 3 (exhaust) | |
| II32611 | EA1152 | M12x1.5 | M12x1.5 | With filter | M27x1 connector |

Standard Symbol as DIN ISO 1219

AE9120



EA1152



Cables for EA1152

| Part No. | Length [m] | M27x1 Connector |
|----------|------------|-------------------------|
| 187047 | 6 | With straight connector |
| 187970 | 6 | With 90° connector |

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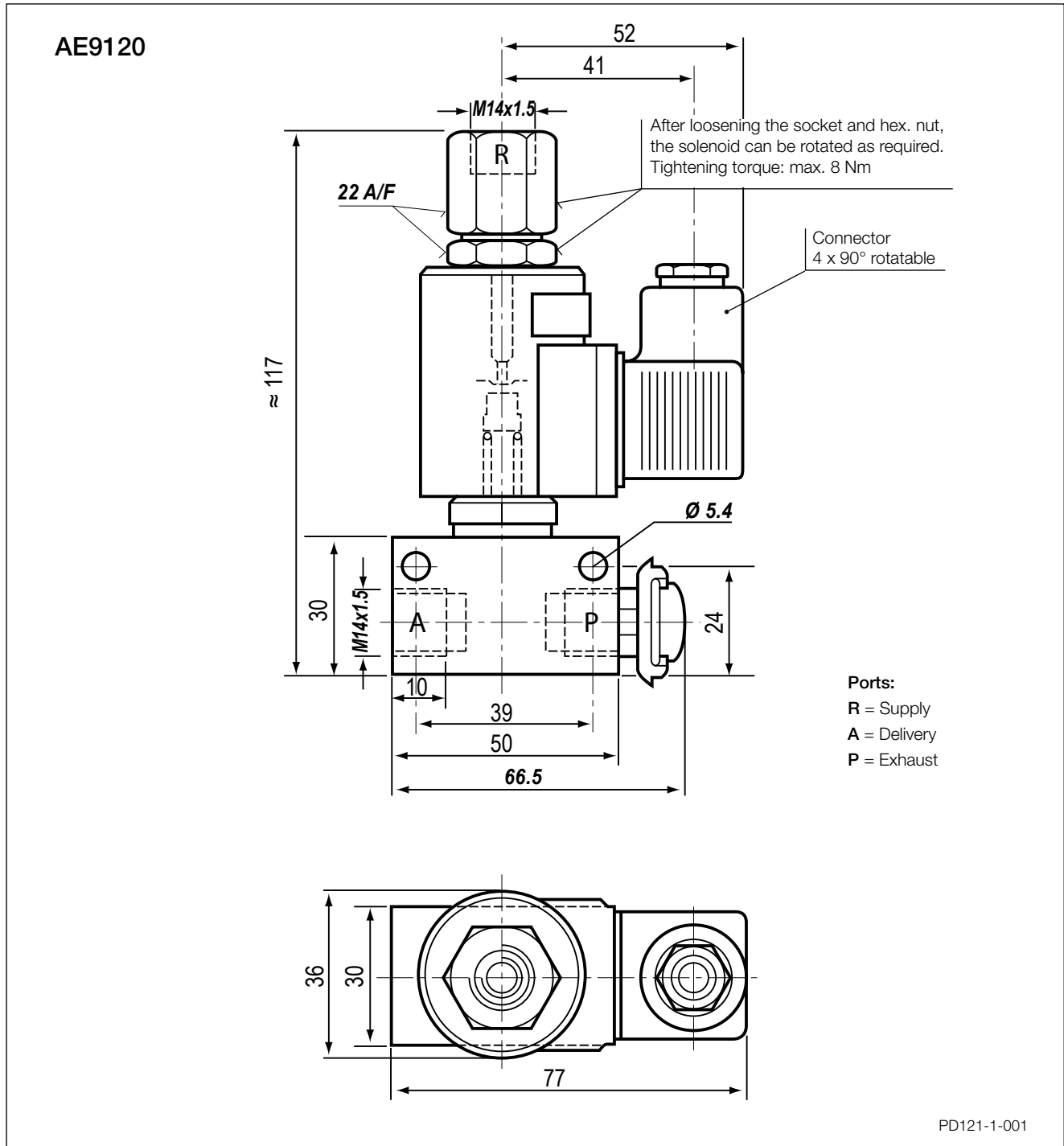
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AE9120, EA1152

Solenoid Valves

Doc. No. Y011360 (Rev. 002)
March 2011

Dimensions



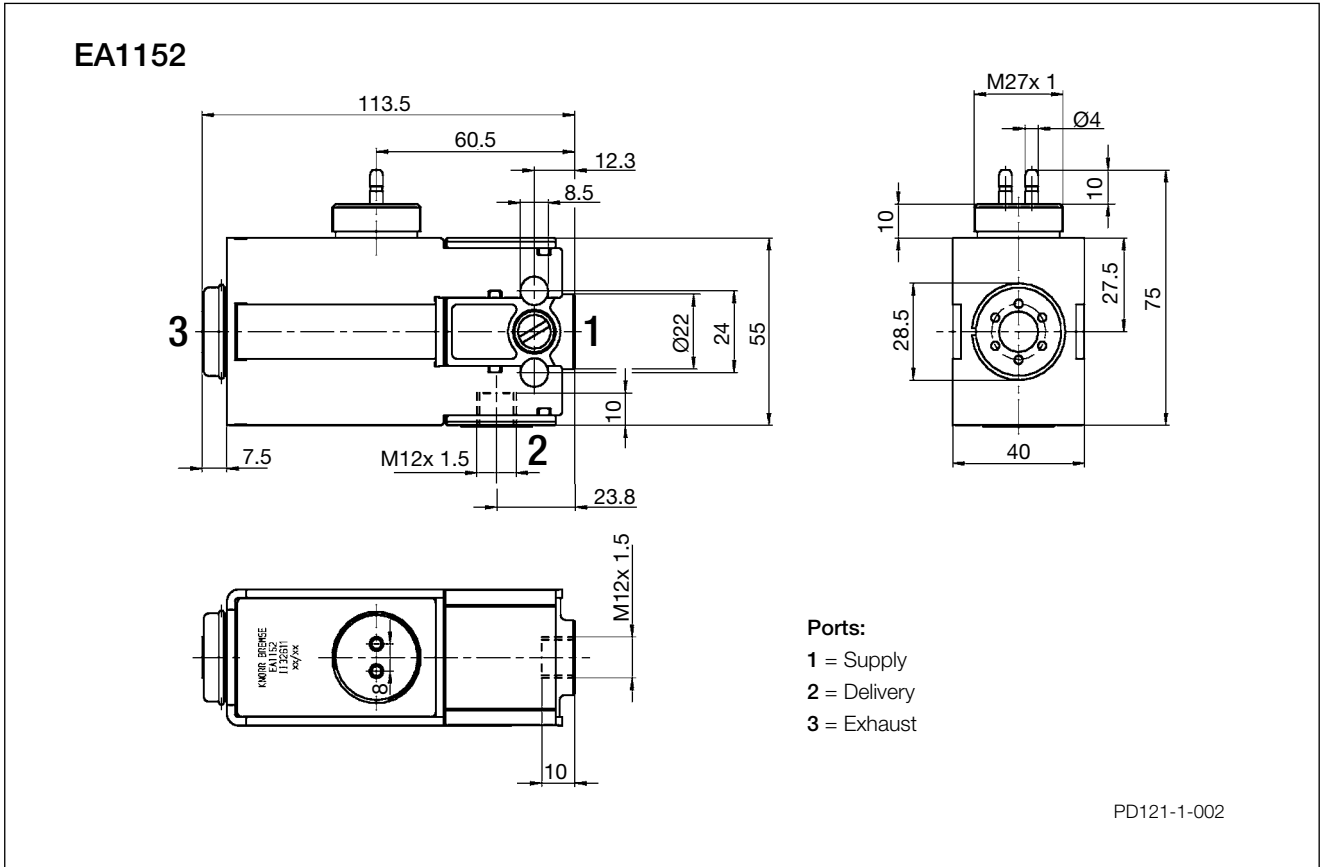
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Doc. No. Y011360 (Rev. 002)
March 2011



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Function

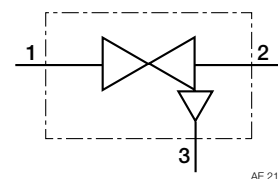
The **Shut-Off Valve** is used in air systems to control the supply of air.

The valve is manually operated via a lever which, when rotated, shuts off the delivery pressure from the valve.

The delivered pressure exhausts back through the valve to atmosphere.

**Technical Features**

Maximum operating pressure: 10 bar
 Operating temperature range: -40 °C to +80 °C
 Weight: 0.4 kg approx.

Standard Symbol as DIN ISO 1219**Range Overview**

| Part No. | Type No. | Port Threads | Remarks |
|----------|----------|--------------|---|
| I28323 | AE2100 | M22x1.5 | With exhaust |
| II33261 | AE2110 | M22x1.5 | With exhaust and two shut-off positions |

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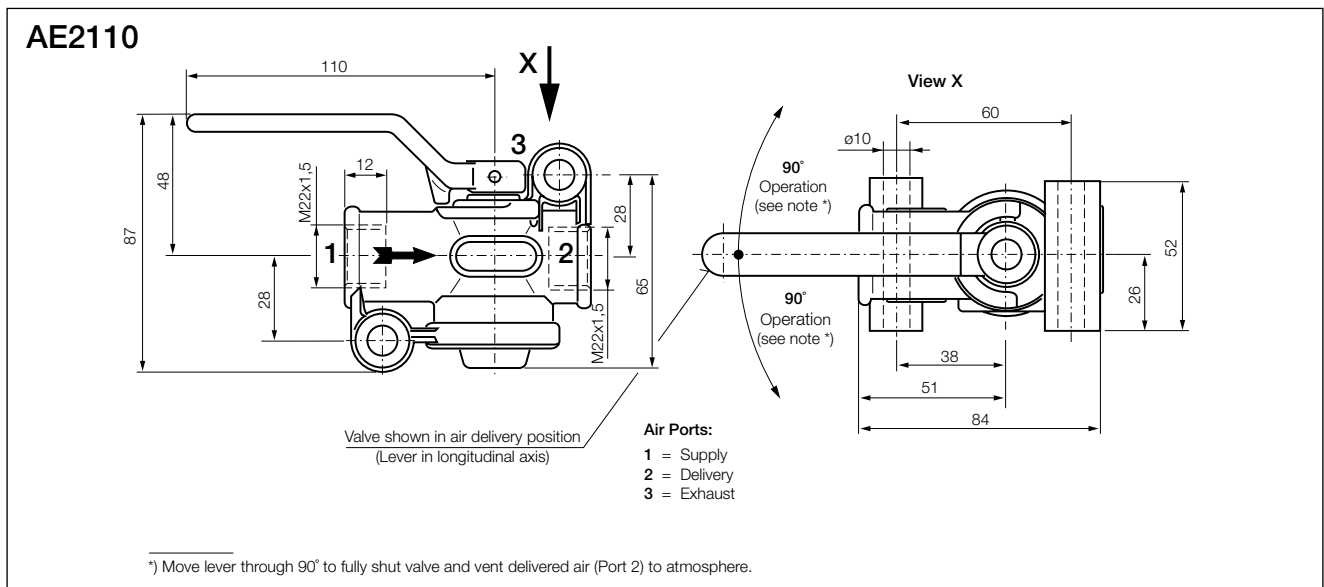
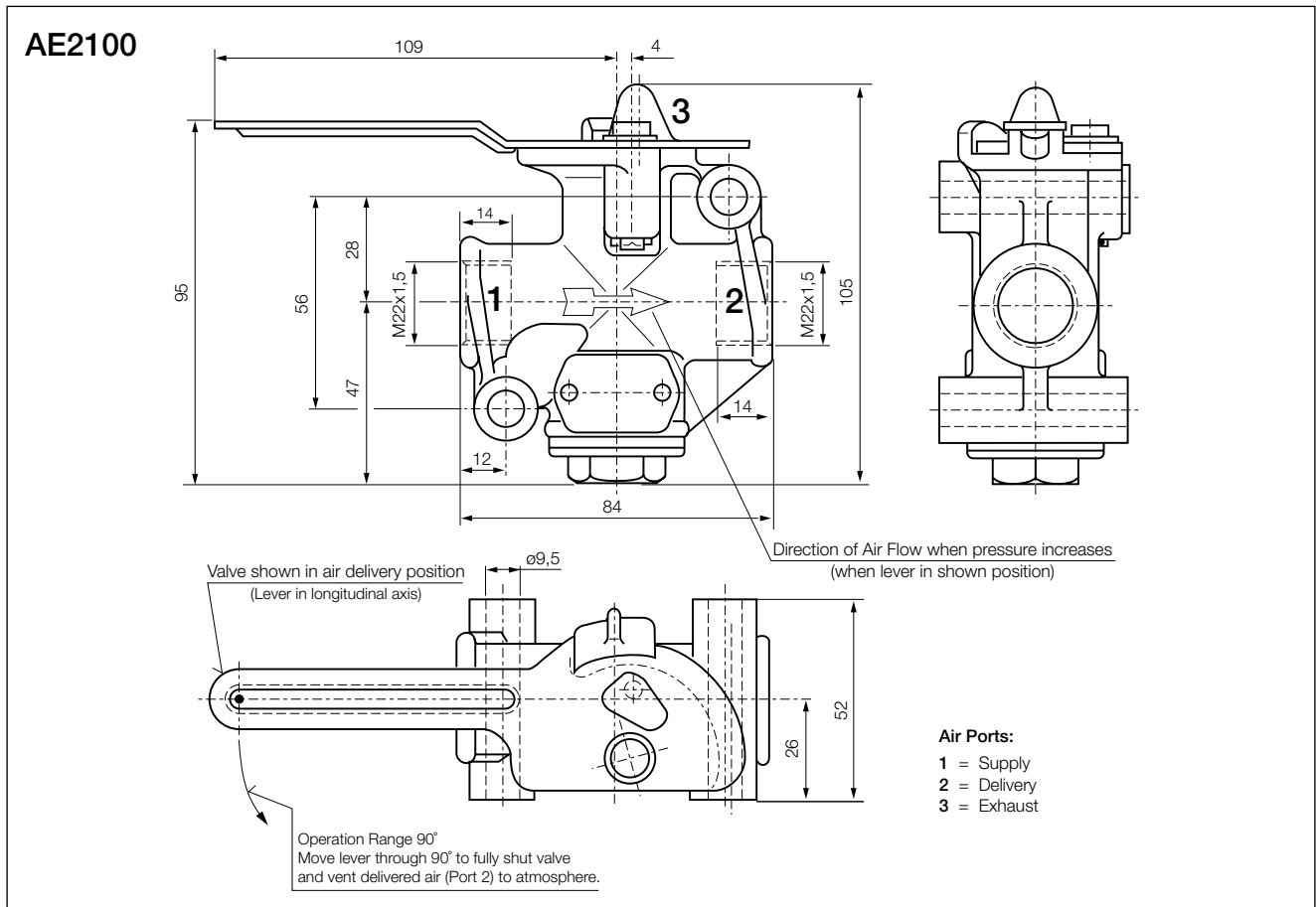
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AE21..

Shut-off Valves

Doc. No. Y011352 (Rev. 001)
March 2011

Dimensions



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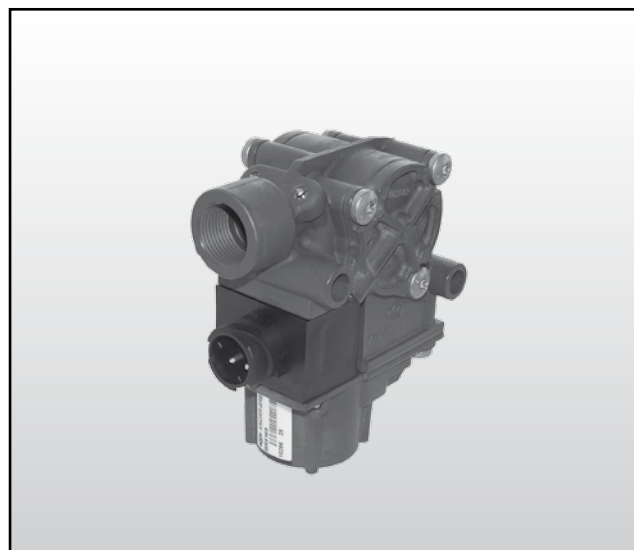
| PD No. | Product | Type/Part No. family |
|------------|--|---------------------------|
| PD-200-120 | Pressure Control Valve for <i>iCargo</i> | BR9169 |
| PD-200-200 | ABS Relay Modulator Valves | BR92.. |
| PD-203-100 | Trailer ABS (KB3-TA) | ES200. |
| PD-203-200 | Trailer ABS (A18) | ES2005 |
| PD-203-300 | Trailer ABS (KB4TA) | ES1305 |
| PD-214-100 | TEBS4 Brake Module | ES205. |
| PD-214-200 | TEBS G2/G2.1 Brake Module | ES2060 |
| PD-214-600 | Trailer Electro-Pneumatic Module (TEPM-S / TEPM-P) | ES207. |
| PD-214-800 | Trailer Roadtrain Module (TRM) | EZ2085 |
| PD-261-000 | Wheel Speed Sensors | 04860001... 04860010.. |
| PD-262-200 | Pressure Sensor | K015173 |
| PD-264-200 | Deflection Sensor | K026919 |
| PD-272-010 | Cables for Trailer ABS | |
| PD-272-020 | Cables for Trailer EBS | |
| PD-272-030 | Diagnostic Cables for Trailer ABS/EBS | |
| PD-273-920 | Trailer Information Module (TIM G2) | K009166 |



Function

The **Pressure Control Valve** consists of two electrically signalled 2-way valves which enable the pressure in the delivery from the valve to be increased, decreased or held constant at any pressure up to its supply pressure.

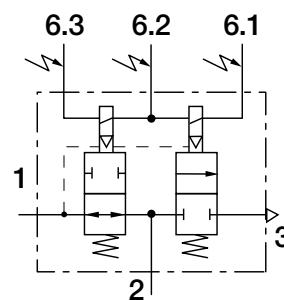
Pressure Control Valve BR9169 is used for dynamic axle load and 'effective' wheelbase adjustment on trailers fitted with the *iCargo* function (see Document No. Y109235). The adjustments occur when electrical signals from the TEBS G2 brake module result in the **Pressure Control Valve BR9169** reducing, maintaining or increasing the pressure in the air suspension bellows of the axle controlled by *iCargo* until the required weight distribution is achieved. The valve is connected into the air suspension system on the axle controlled by *iCargo*.



Technical Features

Maximum operating pressure: 10 bar
 Operating temperature range: -40 °C to +80 °C
 Nominal voltage: 12 V DC
 Weight: 0.7 kg approx.

Standard Symbol as DIN ISO 1219



| Part No. | Type No. | Port threads | | Electrical connection |
|-----------------------|----------|--------------|---------|-----------------------|
| | | 1 | 2 | |
| K008422 ¹⁾ | BR9169 | M22x1.5 | M22x1.5 | Bayonet DIN72585 |

¹⁾ will carry the suffix N00 which denotes that it is supplied without packaging.

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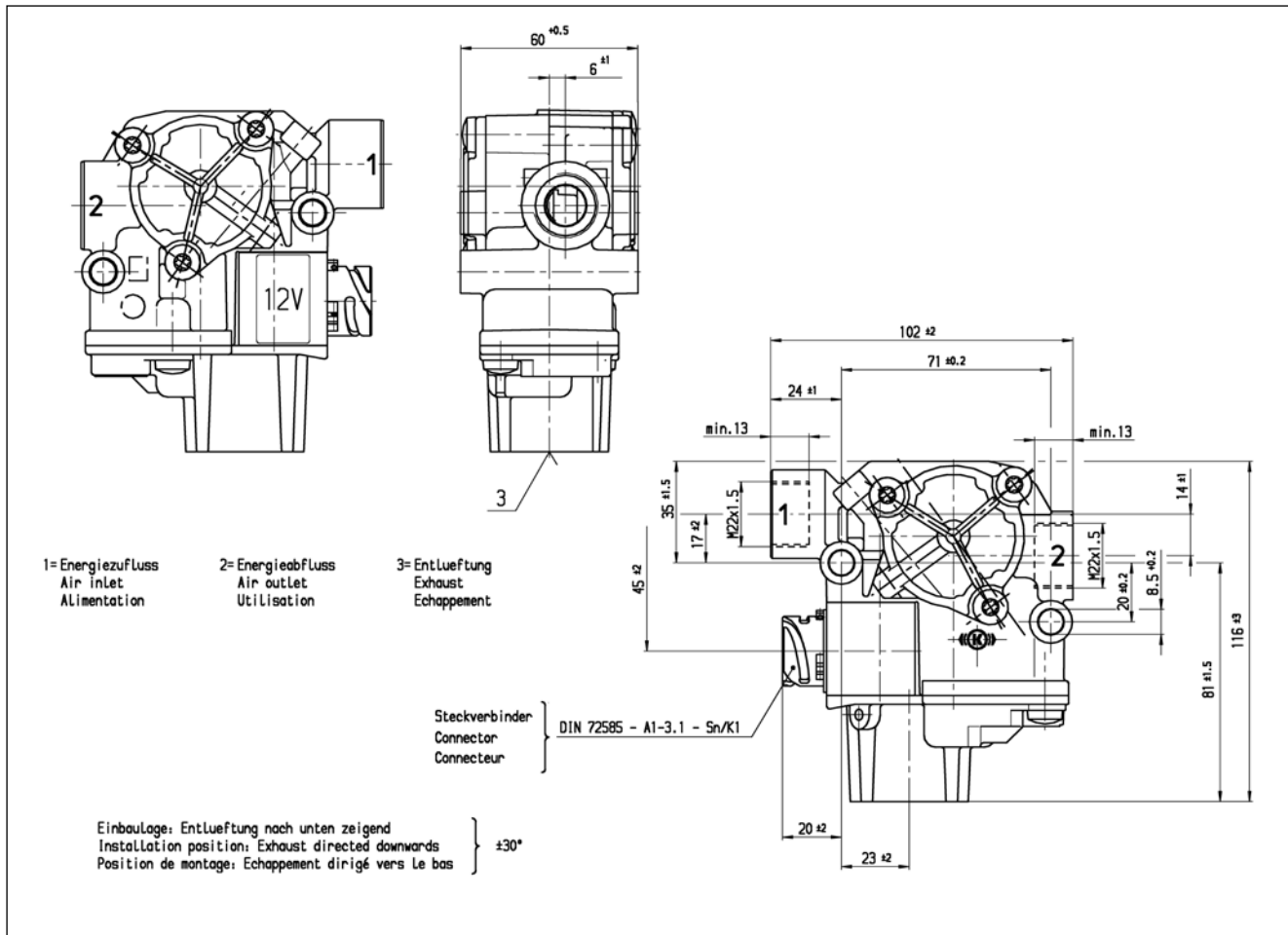
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BR9169

Pressure Control Valve for *iCargo*

Doc. No. Y114019 (Rev. 000)
June 2011

Dimensions



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Function

The **Relay Modulator Valve** is a modulator with integrated relay valve and is used on trailers with ABS/EBS to control the service brake pressure in one or more brake actuators.

In a trailer air brake system, under non-ABS conditions, the **Relay Modulator Valve** acts as a standard relay valve and in response to an air pressure signal, speeds up brake applications by providing rapid and precise control of large volumes of air.

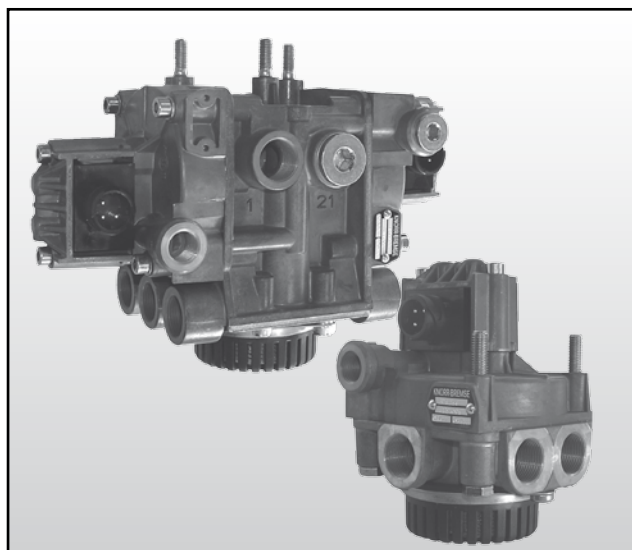
However, if during braking, the anti-lock braking system's ECU detects that a sensed wheel is decelerating too rapidly and wheel lock is imminent, it sends electronic signals to the **Relay Modulator Valve** controlling that wheel. The modulator valve then rapidly modulates the braking pressure between the three states of "release", "hold" and "apply". This continues until the risk of wheel lock is overcome.

The **Relay Modulator Valve** is available in both single and dual relay form. The **Dual Relay Modulator Valve** can be used as an alternative to two single valves fitted across the axle. The **Dual Relay Modulator Valves** use a single signal and a single supply port with the delivery ports independently controlled by their respective modulators.

The **Dual Relay Modulator Valve** is used as a part of the Trailer Module Assemblies ES200. (See PD-203-100, Document No. Y011361 and PD-203-200, Document No. Y011365).

The **Single Relay Modulator Valve** can also be used as a third modulator in systems using TEBS (See PD-215-100, Document No. Y011366).

Please note that valves are supplied complete with exhaust silencers.



Standard Symbol as DIN ISO 1219

See page 4

Technical Features

| | |
|------------------------------|------------------|
| Maximum operating pressure: | 10 bar |
| Operating temperature range: | -40 °C to +75 °C |
| Nominal voltage: | 24 V DC |
| Single modulator: | 1.2 kg approx. |
| Dual modulator: | 2.9 kg approx. |

Range Overview

| Part No. | Type No. | Single or Dual | Port threads | | | Electrical connection | Used in Trailer Module Assembly | | |
|-----------------------|----------|----------------|--------------|--------------------------------------|---------|-----------------------|---------------------------------|--------------------|------------------|
| | | | 1 | 2 | 4 | | System | Part No. | Type No. |
| II30522 | BR9231 | Dual | M22x1.5 | (22) 3 x M22x1.5 (23) 3 x M22x1.5 | M16x1.5 | Threaded M24x1 | KB3-TA | II36383 II36384 | ES2001 ES2002 |
| II37090 ¹⁾ | BR9233 | Dual | M22x1.5 | (22) 3 x M22x1.5 (23) 3 x M22x1.5 | M16x1.5 | Bayonet DIN72585 | A18 | II36413 | ES2005 |
| II32614 | BR9232 | Single | M22x1.5 | 4 x M22x1.5 | M16x1.5 | Threaded M24x1 | - | - | - |
| II37091 ¹⁾ | BR9234 | Single | M22x1.5 | 4 x M22x1.5 | M16x1.5 | Bayonet DIN72585 | - | - | - |

¹⁾ will carry the suffix N00 which denotes that it is supplied without packaging.

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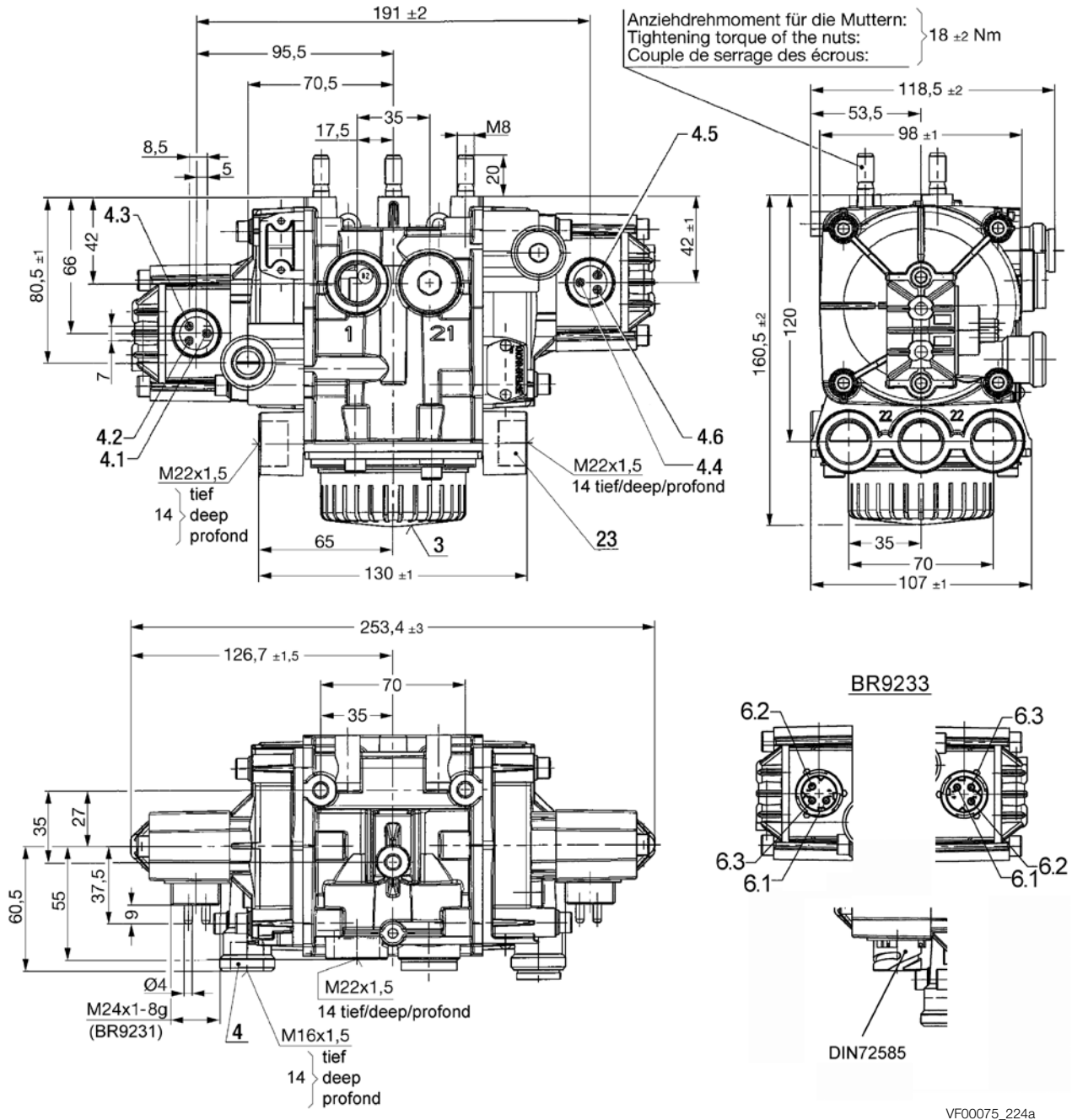
BR92..

ABS Relay Modulator Valves

Doc. No. Y011362 (Rev. 002)
April 2011

Dimensions

BR9231
BR9233



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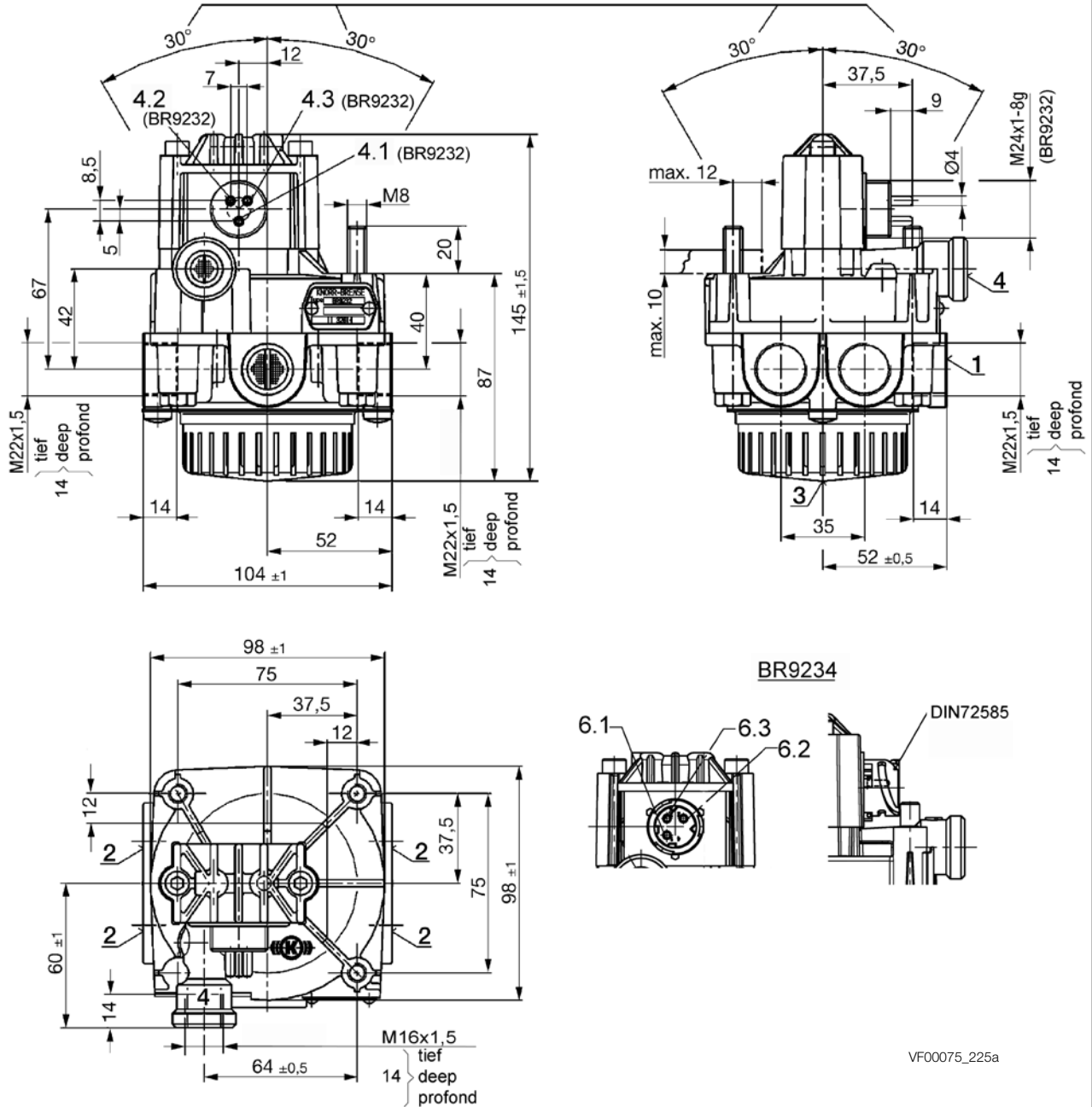
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BR9232
BR9234

Zulässige Einbaulage
Admissible installation position
Position d'installation admise



VF00075_225a

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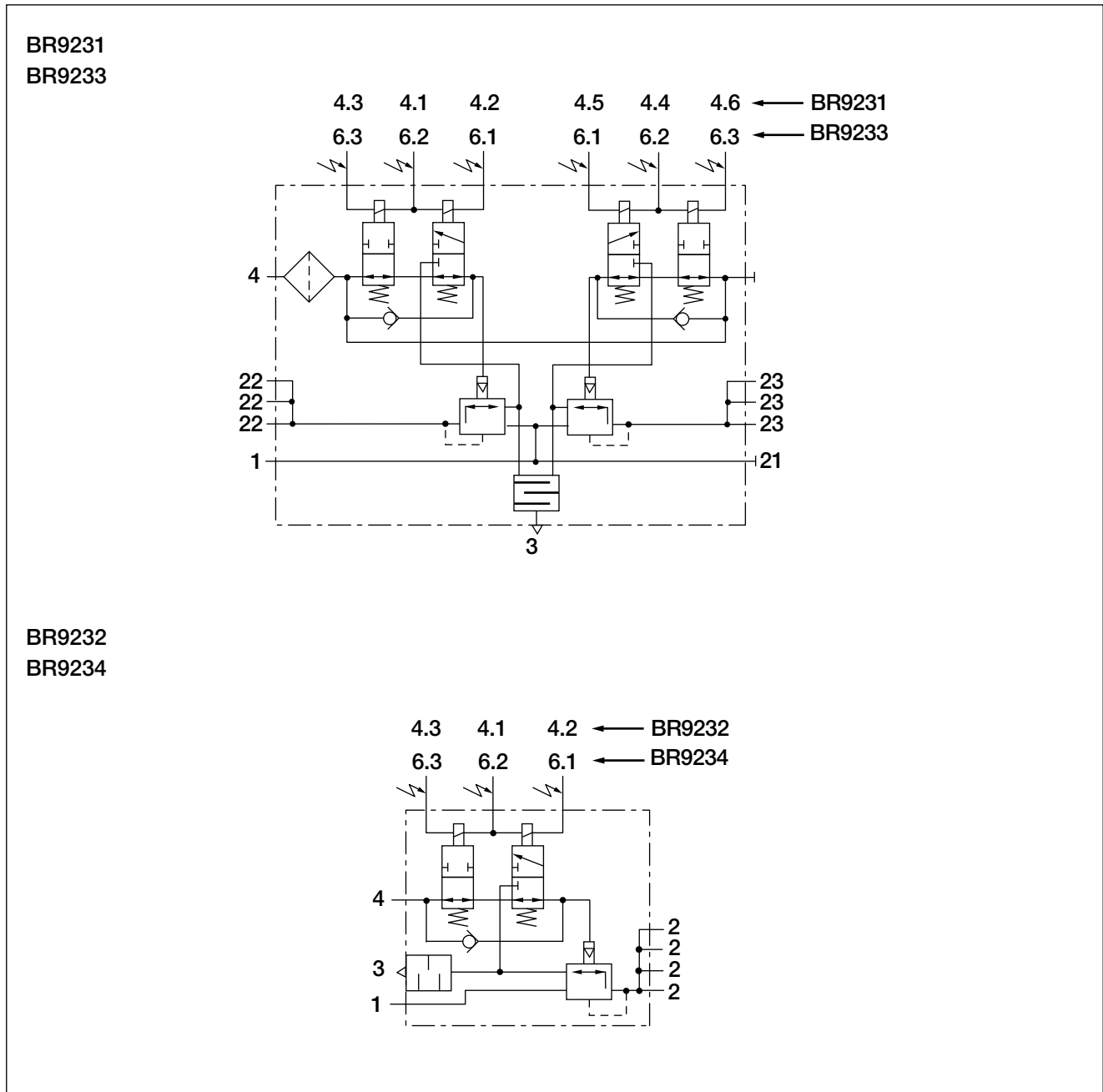
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BR92..

ABS Relay Modulator Valves

Doc. No. Y011362 (Rev. 002)
April 2011

Standard Symbols as DIN ISO 1219



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Function

The **KB3-TA** generation of anti-lock braking system (ABS) is used on trailers with air brake systems working with disc or drum brakes. The trailer module is a combination of a KB3-TA electronic control unit (ECU) with a dual relay modulator valve and modulator cables.

The ECU of **KB3-TA** is available in 2S/2M, 4S/2M and 4S/3M configurations with 2 power supply variations to suit a wide range of applications. The ECU can be powered via ISO 7638 only, or a combination of ISO 7638 and ISO 1185 (24N).

For 4S/2M and 2S/2M versions, power supply and sensor extension cables are required (see PD-272-000, Document No. Y095697) to complete the **KB3-TA** system. For 4S/3M, an additional single modulator (see PD-200-200, Document No. Y011362) and modulator cable (see PD-272-000, Document No. Y095697) will also be required.

The **KB3-TA** system complies with 71/320 EWG, annex X and ECE-R13.

The ECU compares the signals received from the wheel speed sensors (see PD-261-000, Document No. Y011363) with its pre-programmed internal logic.

If, whilst braking, the ECU detects that a sensed wheel is decelerating too rapidly and wheel lock is imminent, it sends electrical signals to the modulator valve controlling that wheel. The modulator valve then rapidly modulates the braking pressure between the 3 states of "release", "hold" and "apply". This continues until the risk of wheel lock is overcome.

All ECUs have automatic recognition of lift or steering axles and can be easily set to reconfigure themselves to other specifications. Trailer and service history data can be stored and retrieved via PC diagnostics from the memory of the ECU. The ECU has a non-volatile memory so that stored information is not lost when power is removed.

The **ES1210** ECU has an output connection for retarder control (RET) or velocity output (VT). The velocity output can be analog or pulsed. The ECU also has intelligent operating data acquisition (IODA) which incorporates an odometer and differential odometer.

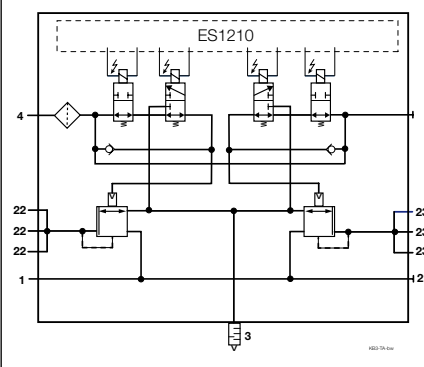
Technical Features

| | |
|------------------------------|------------------|
| Maximum operating pressure: | 10 bar |
| Operating temperature range: | -40 °C to +75 °C |
| Weight: | 3.7 kg approx. |
| Nominal Voltage: | 24 V DC |



Standard Symbol as DIN ISO 1219

ES2001



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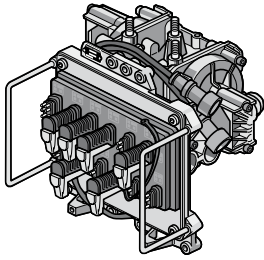
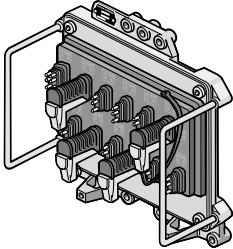
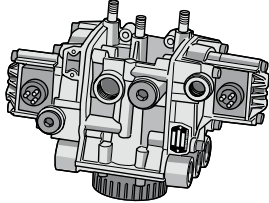
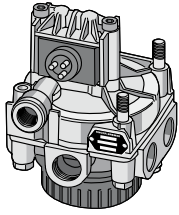

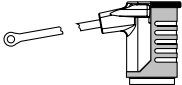
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ES200.

Trailer ABS (KB3-TA)

Doc. No. Y011361 (Rev. 003)
March 2011

Range Overview

| Part No. | Type No. | Description | Image |
|----------------|---|---|---|
| II36383 | ES2001 | Trailer Module (consists of Electronic Control Unit ES121. and Modulator - ABS Dual Relay Valve BR9231) Power supply: ISO 7638 4S/3M max. |  |
| II36384 | ES2002 | Power supply: ISO 1185 or ISO 7638 4S/2M max. | |
| II33581 | ES1210 | Electronic Control Unit Power supply: ISO 7638 4S/3M max. |  |
| II33582 | ES1215 | Power supply: ISO 1185 or ISO 7638 4S/2M max. | |
| II30522 | BR9231 | Modulator (ABS Dual Relay Valve) Electrical Connection threaded M24x1 |  |
| II32614 | BR9232 (replaces BR9200) | Modulator (ABS - Relay Valve) Electrical Connection threaded M24x1 |  |
| C56918 | - | Mounting Bracket for Modulator (not pictured) | |
| II36744 | - | Closing Cap (only as spare part) |  |
| II36386 | - | Closing Cap for Diagnostic Port (only as spare part) |  |

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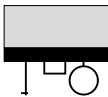

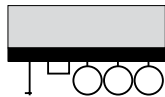
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
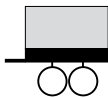
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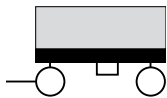
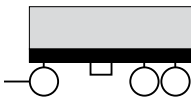
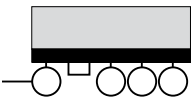
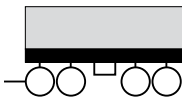

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System Variants

| Semi-trailer | | | | |
|---|---|---|-------|--|
|  |  |  | | |
| 2S/2M | | | | |
| | | | 4S/2M | |
| | | | 4S/3M | |

| Centre axle trailer | |
|---|---|
|  |  |
| 2S/2M | |
| | 4S/2M |
| | 4S/3M |

| Drawbar trailer | | | | |
|---|---|---|--|---|
|  |  |  |  |  |
| 4S/3M | | | | |

Additional documentation (available from your Knorr-Bremse representative):

- | | |
|------------------------------------|---------------------------|
| Installation manual | C14404 |
| System specification ES1210 | C16225 |
| System specification ES1215 | C16226 |
| System description | C14405 |
| Approval document | EB 118.E.FTP98/24952/A/03 |

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ES200.

Trailer ABS (KB3-TA)

Doc. No. Y011361 (Rev. 003)
March 2011

Diagnostics

The ECU of the **KB3-TA** system is self-diagnosing. In the event of a fault, the towing vehicle's "in-cab" and/or the trailer headboard warning light will illuminate and all components detected as defective are shut down either selectively or in total. In the event of any ABS shutdown all braking functions revert to standard (non-ABS) operation.

To ensure fast and effective trouble shooting, the ECU is provided with a universal diagnostic interface which allows connection to a hand held blink code switch or to a personal computer (PC) with extended functions.

Once a fault has been rectified, the resetting of the ECU is achieved simply by removing and re-applying power to the unit. Faults are stored in the ECU memory and can be recalled and erased as required.

The ECU integrated test modules check the following components of the ABS system

- connected components (wheel speed sensors, modulators)
- complete wiring (extension cables and connecting cables to the wheel speed sensors and modulators, and power supply cables) and plug connections to the peripheral components.

Blink Code Diagnostics

Functions:
Information is shown in three blocks of coloured flashes of an LED on the ECU

- Change / read "system configuration"
- Installation test
- Read / delete fault code memory

A full blink code list is available.

The diagram illustrates the diagnostic setup. On the left, the EZ1022 cable is shown with a connector for the EK3050 hand-held device. The EK3050 device is a rectangular unit with a handle and a display. It is connected to the diagnostic port of the ES200 ABS ECU unit, which is a rectangular metal box with various terminals and components visible on its top surface.

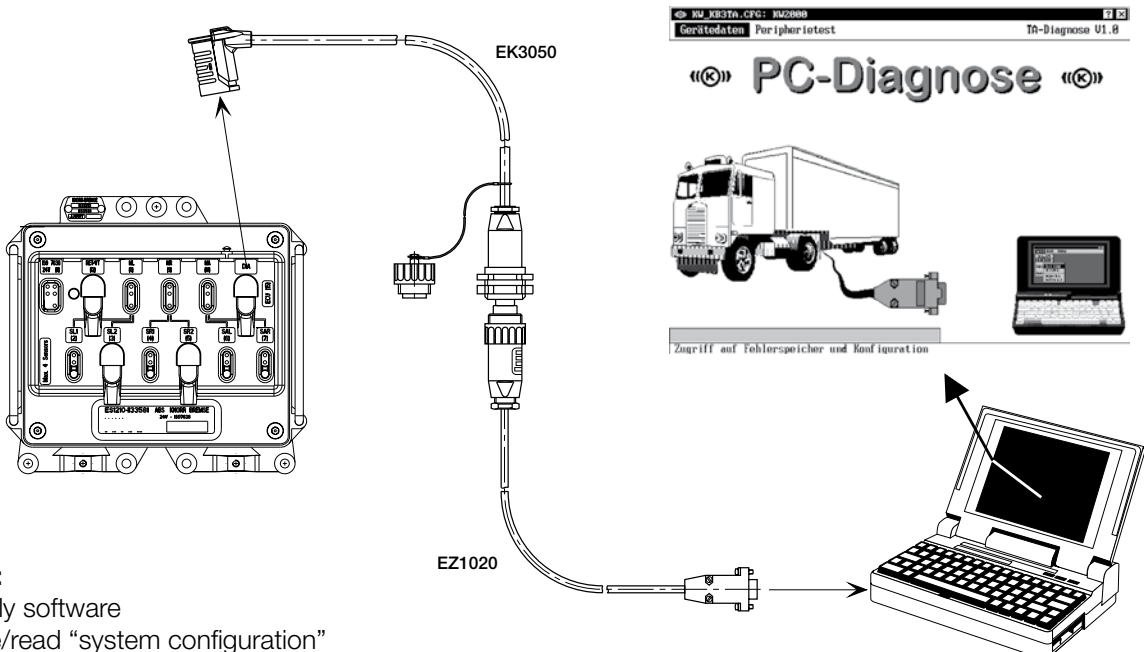
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PC Diagnostics



Functions:
User friendly software

- Change/read "system configuration"
- Installation test
- Read/delete fault code memory
- Read further information: odometer, differential odometer, retarder control, velocity output

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ES200.

Trailer ABS (KB3-TA)

Doc. No. Y011361 (Rev. 003)
March 2011

Test Report (record of system check using blink code adaptor)

Test Report

Knorr-Bremse ABS KB 3 TA or A 18 for Trailers

The system check took place using onboard diagnosis (blink code diagnosis) with blink code adapter EZ1022 – II36361 acc. to installations instruction C16226, C16228 and installation instructions for the A18 / ES2005.

| |
|----------------------------|
| Vehicle Type |
| Vehicle Identification-No. |
| Chassis-No. |

| |
|----------------------|
| Vehicle manufacturer |
|----------------------|

1. Installed system variant

(please tick the appropriate boxes)

| | | |
|---------------------------|----------|--------------------------|
| Configuration and sensing | 4S/3M | <input type="checkbox"/> |
| | 4S/2M | <input type="checkbox"/> |
| | 2S/2M | <input type="checkbox"/> |
| Power supply | ISO 7638 | <input type="checkbox"/> |
| | ISO 1185 | <input type="checkbox"/> |

A system configuration of the above variant was

successfully executed

not successfully executed

(use in original configuration)

2. Installed ECU

(please tick the appropriate boxes)

| | | |
|-------------------|------------|--------------------------|
| ES1210 | (ES2001) | <input type="checkbox"/> |
| ES1215 | (ES2002) | <input type="checkbox"/> |
| ES1216 | (ES2003) | <input type="checkbox"/> |
| 0 486 105 002 100 | (ES2005) | <input type="checkbox"/> |

3. Installation test

(please tick the appropriate boxes)

(Correct function of the sensors and correct allocation of the modulators)

| | |
|------|--------------------------|
| SL 1 | <input type="checkbox"/> |
| SL 2 | <input type="checkbox"/> |
| SR 1 | <input type="checkbox"/> |
| SR 2 | <input type="checkbox"/> |
| SAL | <input type="checkbox"/> |
| SAR | <input type="checkbox"/> |

Checked:

Date

Stamp / Signature



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Function

The **A18** generation of anti-lock braking system (ABS) is used on trailers with air brake systems working with disc or drum brakes. The trailer module assembly **ES2005** is the assembly of an **A18** electronic control unit (ECU) and dual relay modulator valve **BR9233** (see PD-200-000, Document No. Y011362). The ECU's 2S/2M configuration suits semi-trailer and centre axle trailer applications. The ECU can be powered via ISO 7638 only or a combination of ISO 7638 and ISO 1185 (24N).

The ECU requires a power supply / diagnostic wiring harness and a modulator / sensor wiring harness (see PD-272-010, Document No. Y095697) to complete the **A18** Anti-Lock Braking System. Installation is simple compared to other systems since only two plugs have to be connected to the ECU. The modulator and sensor cables are colour coded to ensure ease of identification.

For trailer management purposes the **A18** ECU has "intelligent operating data acquisition" (IODA) which incorporates an odometer.

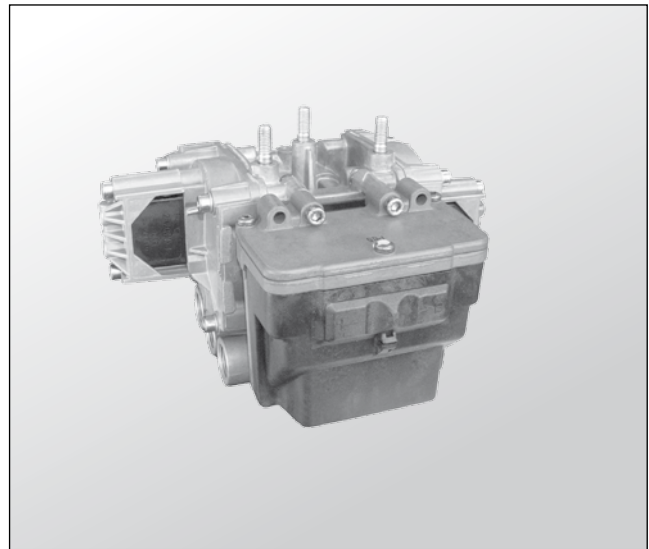
The **A18** ECU has a "velocity output" (VT) connection which can be used to signal an external device at a predetermined speed. This is preset to switch on at 15 km/h but can be adjusted in 5 km/h increments between 0 and 125 km/h. It is also possible to program the hysteresis and the kind of signal (permanent or pulsed) via diagnostic software *ECUtalk*[®].

The **A18** ECU is self-diagnosing. In the event of a fault, the towing vehicle's "in-cab" or the trailer headboard warning light will illuminate and all components detected as defective are shut down either selectively or in total. In the event of a total ABS shut down all braking functions revert to standard operation.

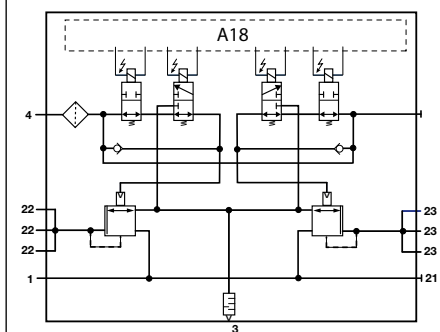
To ensure fast and effective trouble shooting, the ECU is provided with a universal diagnostic interface which, with diagnostic software *ECUtalk*[®], allows connection to a personal computer (PC) for fault diagnosis, odometer reading and velocity output parameter setting. Alternatively, a diagnostic blink code switch (**EZ1022**) can be connected to the interface and, via its integral light, can be used to display the diagnostic blink code. This can be achieved by depressing the switch for two seconds.

Once a fault has been rectified, the resetting of the ECU is simply achieved by removing and re-applying power to the unit. All faults are stored in the ECU memory and can be recalled and erased as required. When the system has been installed, manufacturers can perform an "end of line" (EOL) test using a PC and the diagnostic software. The **A18** ECU is available as a separate item or as a part of the trailer module assembly **ES2005**.

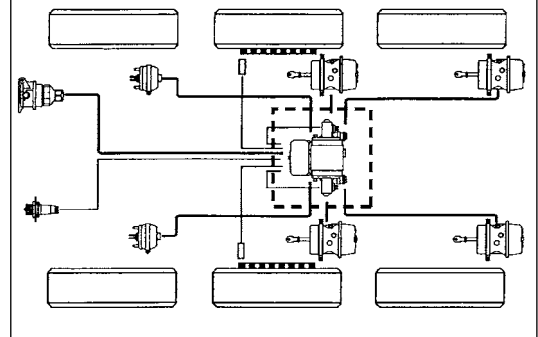
A trailer mounted warning display can also be connected to the diagnostic port. This display is called a "magic eye" and switches automatically to red when a fault in the ECU is detected.



Standard Symbol as DIN ISO 1219



Compact assembly unit: ECU and Dual Relay Modulator Valve



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ES2005

Trailer ABS (A18)

Doc. No. Y011365 (Rev. 002)
March 2011

Technical Features

| | |
|------------------------------|--|
| Operating pressure: | 10.0 bar |
| Max. permissible pressure: | 12.5 bar |
| Operating temperature range: | -40 °C to +75 °C |
| Weight: | ES2005 3.4 kg approx. 0486105002 0.5 kg approx. |
| Degree of Protection: | DIN 40050 part 9 |
| Nominal voltage: | 24 V DC |
| Max. Uni Output Signal: | 1A |

Range Overview

| Part No. | Type No. | Description | Configuration | Power Supply |
|------------|----------|--|---------------|---------------------|
| II36413 | ES2005 | Compact Assembly Unit (ECU + ABS Modulator) | 2S/2M | ISO 7638 & ISO 1185 |
| 0486105002 | - | ECU only | 2S/2M | ISO 7638 & ISO 1185 |

| Part No. | Type No. | Port | Used for | Port threads | Number of ports | Tightening torque |
|----------|----------|------|--|--------------|------------------|-------------------|
| II36413 | ES2005 | 1 | Supply | M22x1.5 | 1 | 60 Nm |
| | | 12 | Supply | M22x1.5 | 1 (plugged) | 60 Nm |
| | | 22 | Delivery to service brake actuators | M22x1.5 | 3 | 60 Nm |
| | | 23 | Delivery to service brake actuators | M22x1.5 | 3 | 60 Nm |
| | | 4 | Control | M16x1.5 | 2 (1 plugged) | 45 Nm |

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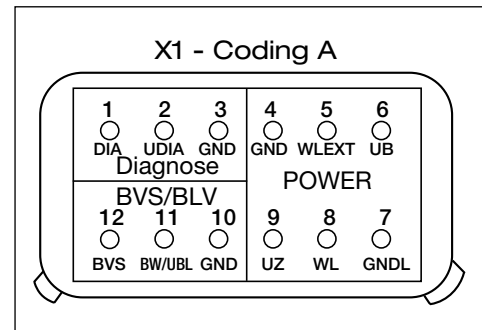
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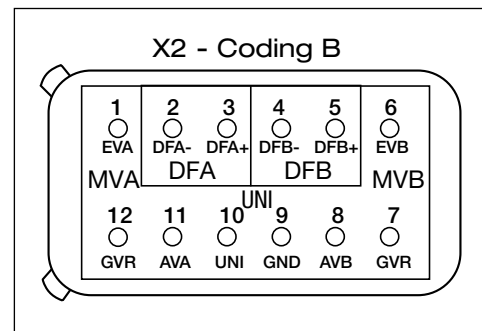
Doc. No. Y011365 (Rev. 002)
March 2011

Electrical connections

| Pin | Signal | Description |
|-------|---------|---|
| X1-1 | DIA | input/output level converter/ diagnosis |
| X1-2 | UDIA | output supply level converter/ diagnosis |
| X1-3 | GND | output earth level converter/ diagnosis |
| X1-4 | GND | input earth control unit |
| X1-5 | WLEXT | output external warning light for Stop Light supply |
| X1-6 | UB | input supply control unit battery |
| X1-7 | GNDL | input earth control unit |
| X1-8 | WL | output warning light |
| X1-9 | UZ | input supply control unit ignition |
| X1-10 | GND | output earth Stop Light supply |
| X1-11 | BVW/UBL | input supply Stop Light supply |
| X1-12 | BVS | no configuration |



| Pin | Signal | Description |
|-------|--------|-------------------------------|
| X2-1 | EVA | output inlet valve A |
| X2-2 | DFA- | input speed sensor A |
| X2-3 | DFA+ | input speed sensor A |
| X2-4 | DFB- | input speed sensor B |
| X2-5 | DFB+ | input speed sensor B |
| X2-6 | EVB | output inlet valve B |
| X2-7 | GVR | output earth valve B |
| X2-8 | AVB | output outlet valve B |
| X2-9 | GND | output earth universal output |
| X2-10 | UNI | output universal output |
| X2-11 | AVA | output outlet valve A |
| X2-12 | GVR | output earth valve A |



Diagnostics

The X1 Connector has pins dedicated for diagnostics. It is normal to have a diagnostic socket on the trailer connected to these pins.

A blink code switch or PC with the ECUtalk[®] diagnostic software can be connected to the diagnostic socket.

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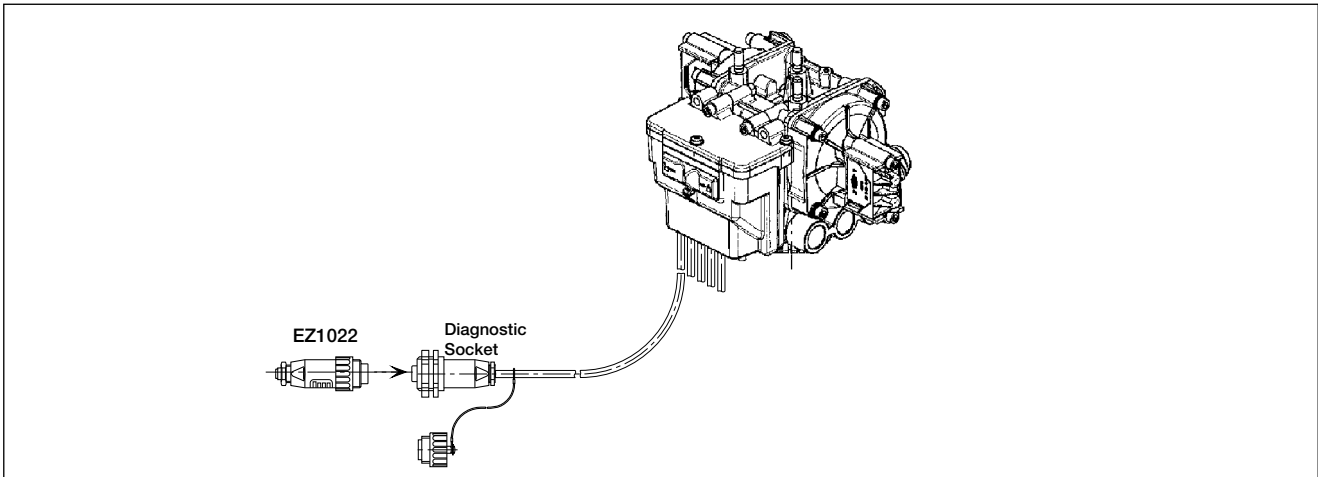
ES2005

Trailer ABS (A18)

Doc. No. Y011365 (Rev. 002)
March 2011

Blink Code diagnostics

With a blink code switch (**EZ1022**) connected to the diagnostic socket the blink code output is visible at the blink code switch (which has an integrated LED) and on the warning light in the towing vehicle.



Calling up the Blink Codes

To call up the blink codes, follow these instructions:

- Switch ignition **ON**
- Connect Blink Code Switch to the external diagnostic plug
- Depress the switch for at least two seconds
- Release the switch
- Count the number of blink pulses of the LED (two blocks of pulses).

The blink code is decoded from the two blocks:

- The first block provides information about the actual system configuration
- The second block provides information about the kind of malfunction or the faulty component.

| Block 1 | | Block 2 | |
|-----------------------|--------------|----------------------------------|-----------------|
| Configuration | Blink Pulses | ABS fault | Blink Pulses |
| 2S/2M | 2 | ABS OK | 1 |
| | | Speed sensor DFA ²⁾ | 2 ¹⁾ |
| | | Speed sensor DFB ²⁾ | 3 ¹⁾ |
| | | Solenoid valve MVA ²⁾ | 8 |
| | | Solenoid valve MVB ²⁾ | 9 |
| | | GVR, GNDL (earth) | 11 |
| | | Power Supply | 12 |
| Universal output | 13 | | |
| Control unit internal | 14 | | |

¹⁾ Having detected too big a gap between speed sensor and sensing ring, the last blink impulse will appear with doubled time (0.4 sec).

²⁾ An even number of blink pulses refers to a component (DFA/MVA) or cable on the left, an odd number of blink pulses refers to a component (DFB/MVB) on the right side of the vehicle seen in forward driving direction.

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Doc. No. Y011365 (Rev. 002)
March 2011

Delete fault code memory

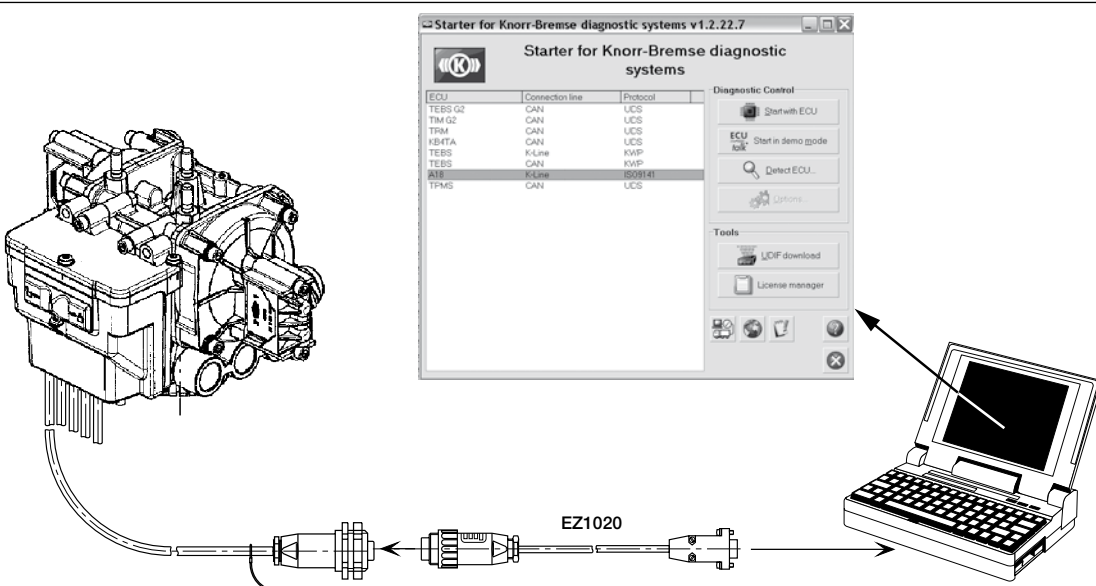
After the fault has been eliminated, the fault code memory must be deleted.

- Ignition **OFF**
- Depress Blink Code Switch
- Ignition **ON**
- Wait for at least two seconds
- Release switch
- LED flashes continuously ==> system OK
- Check the blink code again

Please note that we advise for initial installation and End of Line checks the use of Knorr-Bremse's PC Diagnostics Program 'ECUtalk®'.

The ECU's integrated blink code diagnostics cannot be used for this purpose because it senses only electrical faults in external components and does not sense the correct allocation of the wheel speed sensors and solenoid valves to the corresponding wheels.

PC Diagnostics



| ECU | Connection line | Protocol |
|---------|-----------------|----------|
| TEES G2 | CAN | UCS |
| TM G2 | CAN | UCS |
| TRM | CAN | UCS |
| KBTA | CAN | UCS |
| TEES | K-Line | KWP |
| TEES | CAN | KWP |
| RIB | K-Line | 3099E41 |
| TPMS | CAN | UCS |

Functions:

User friendly software

- Change/read System Configuration
- Installation Test
- Read/delete fault code memory
- Read further information: odometer, differential odometer, velocity output

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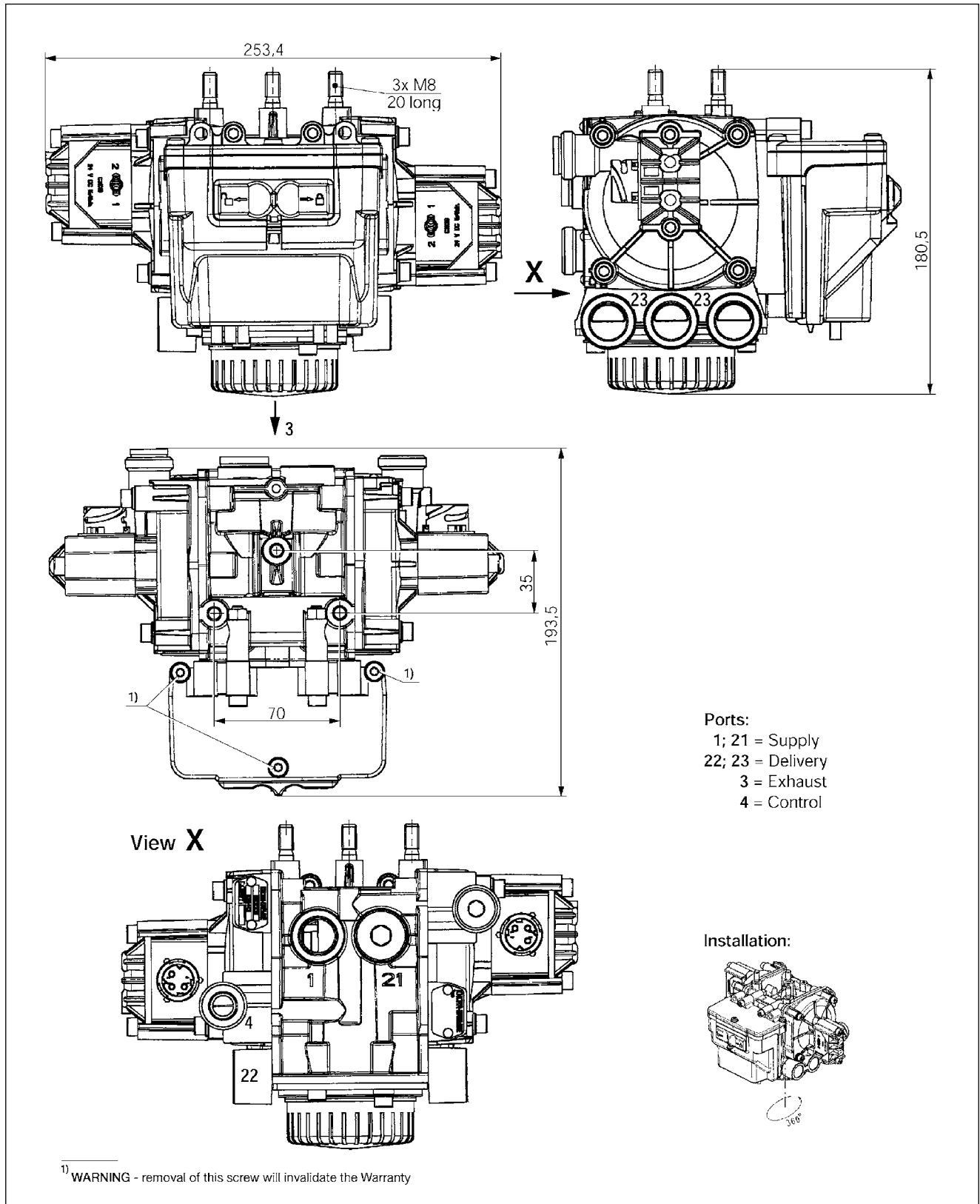
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ES2005

Trailer ABS (A18)

Doc. No. Y011365 (Rev. 002)
March 2011

Dimensions



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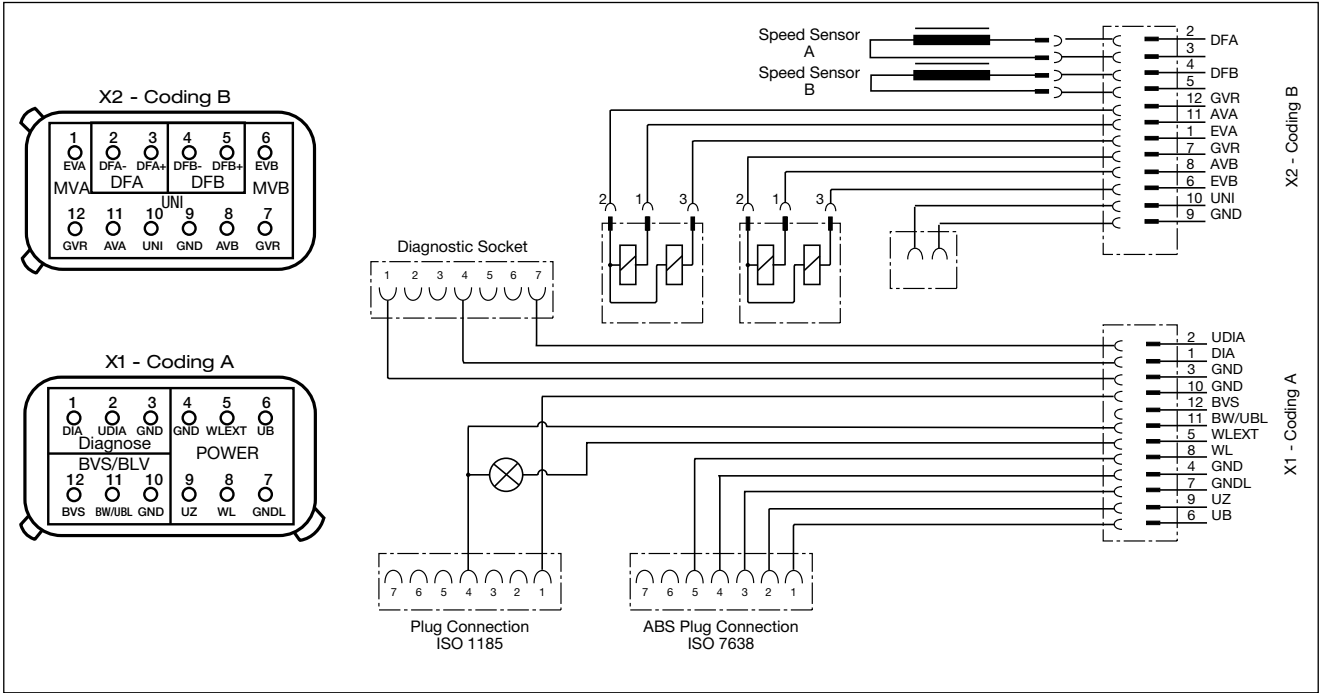
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Wiring Diagram



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ES2005

Trailer ABS (A18)

Doc. No. Y011365 (Rev. 002)
March 2011

Test Report (record of system check using blink code adaptor)

Test Report

Knorr-Bremse ABS KB 3 TA or A 18 for Trailers

The system check took place using onboard diagnosis (blink code diagnosis) with blink code adapter EZ1022 – II36361 acc. to installations instruction C16226, C16228 and installation instructions for the A18 / ES2005.

| |
|----------------------------|
| Vehicle Type |
| Vehicle Identification-No. |
| Chassis-No. |

| |
|----------------------|
| Vehicle manufacturer |
|----------------------|

1. Installed system variant

(please tick the appropriate boxes)

| | | |
|---------------------------|----------|--------------------------|
| Configuration and sensing | 4S/3M | <input type="checkbox"/> |
| | 4S/2M | <input type="checkbox"/> |
| | 2S/2M | <input type="checkbox"/> |
| Power supply | ISO 7638 | <input type="checkbox"/> |
| | ISO 1185 | <input type="checkbox"/> |

A system configuration of the above variant was

successfully executed

not successfully executed

(use in original configuration)

2. Installed ECU

(please tick the appropriate boxes)

| | | |
|-------------------|------------|--------------------------|
| ES1210 | (ES2001) | <input type="checkbox"/> |
| ES1215 | (ES2002) | <input type="checkbox"/> |
| ES1216 | (ES2003) | <input type="checkbox"/> |
| 0 486 105 002 100 | (ES2005) | <input type="checkbox"/> |

3. Installation test

(please tick the appropriate boxes)

(Correct function of the sensors and correct allocation of the modulators)

| | |
|------|--------------------------|
| SL 1 | <input type="checkbox"/> |
| SL 2 | <input type="checkbox"/> |
| SR 1 | <input type="checkbox"/> |
| SR 2 | <input type="checkbox"/> |
| SAL | <input type="checkbox"/> |
| SAR | <input type="checkbox"/> |

Checked:

Date

Stamp / Signature



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Function

The Knorr-Bremse **KB4TA module ES1305** is an integrated ABS electronic control unit and dual modulator valve for air braked trailers with mechanical or air suspension.

KB4TA is powered via ISO 7638. As an additional safety feature the ISO 1185 connection is included as standard so, in the event that there is no ISO 7638 powering, the ABS function is maintained.

Note: Stop lamp powering should only be considered as a backup in the event of failure of the ISO 7638 connection.

The **KB4TA** module is designed for all normal system variants from 2S/2M up to 4S/3M. The configuration as supplied is 2S/2M, but with the integrated auto-configuration the module detects additional sensors and adjusts upward to 4S/2M automatically. Other configurations and additional functions can be quickly and effectively achieved using PC Software *ECUtalk®*. For 4S/3M applications an additional external (third) ABS modulator (BR9234) is necessary (see PD 200-200, Document No. Y011362).

Depending on the version, the **KB4TA** ECU has the option of various auxiliary functions:

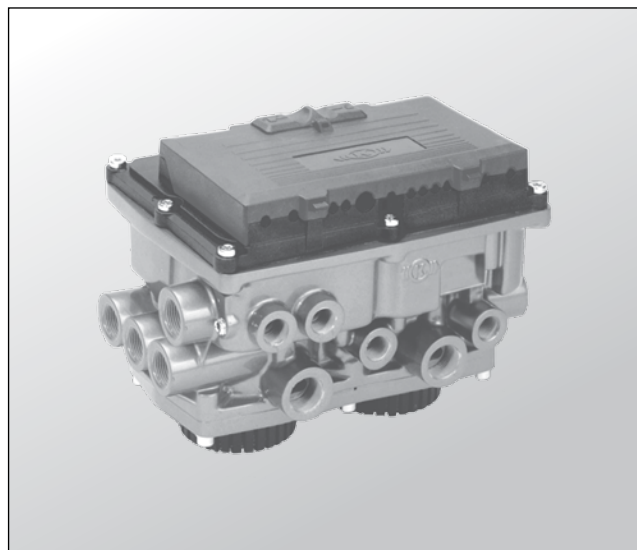
- Odometer/trip counter/service interval
- Reset to Ride (RtR)
- Independent Speed Switch (ISS)
- ABS Active
- Brake wear monitoring
- Stop lamp powering
- Headboard warning lamp ¹⁾
- 24V output

The **KB4TA** module incorporates an anti-compounding feature. If the service and parking brakes are applied at the same time, the anti-compounding feature prevents compounding of the forces applied to the foundation brake and possible damage.

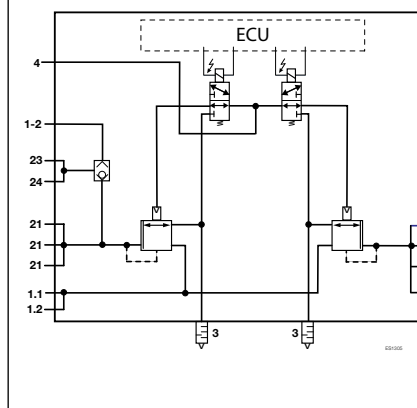
To ensure fast and effective trouble shooting, the **KB4TA** ECU is provided with a universal diagnostic interface which, with diagnostic software *ECUtalk®*, allows connection to a personal computer (PC) for fault diagnosis, odometer reading and velocity output parameter setting. Alternatively, a diagnostic blink code can be displayed on the towing vehicle's "in-cab" and/or the trailer headboard warning light. This can be activated via the stop lamp supply by depressing the foot brake valve in the towing vehicle.

The **KB4TA** module is designed to be used as the service replacement part for the Knorr-Bremse KB3TA, A9 & A18 trailer ABS modules.

- ¹⁾ **The use of a headboard mounted warning lamp is prohibited on vehicles approved to ECE Regulation 13 unless national requirements specifically allow the installation.**



Standard Symbol as DIN ISO 1219



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ES1305

Trailer ABS (KB4TA)

Doc. No. Y095835 (Rev. 000)
February 2012

Technical Features

| | |
|------------------------------|------------------------|
| Max. operating pressure: | 12.5 bar |
| Operating temperature range: | -40 °C to +65 °C |
| Weight: | 5.7 kg approx. |
| Degree of Protection: | DIN 40050 part 9 IP69K |
| Nominal voltage: | 24 V DC |

Range Overview

| Part No. | Type No. | As supplied | | |
|----------|----------|---------------|-----------------|------------------------|
| | | Configuration | Stop Lamp Power | AUXIO 1 |
| K004236 | ES1305 | 2S/2M | Enabled | Return to ride height |
| K004246 | ES1305 | 2S/2M | Enabled | Headboard warning lamp |

Depending on the module and configuration, up to two outputs are available:

| ES1305 | Configuration | |
|----------------------------|---------------------------------------|---------------------------|
| | 2S/2M - 4S/2M | 4S/3M |
| With stop lamp powering | 1 output or 1 input | - |
| Without stop lamp powering | 2 outputs or 1 output + 1 input | 1 output or 1 input |

Parameterisation possible:

| Outputs | K004236 | K004246 |
|--------------------------------|---------|---------|
| Off | √ | √ |
| 24 V | √ | √ |
| Trailer headboard warning lamp | √ | √ |
| RtR | √ | |
| ISS | √ | |
| ABS active | √ | |
| Inputs | K004236 | K004246 |
| Brake pad wear sensing | √ | √ |

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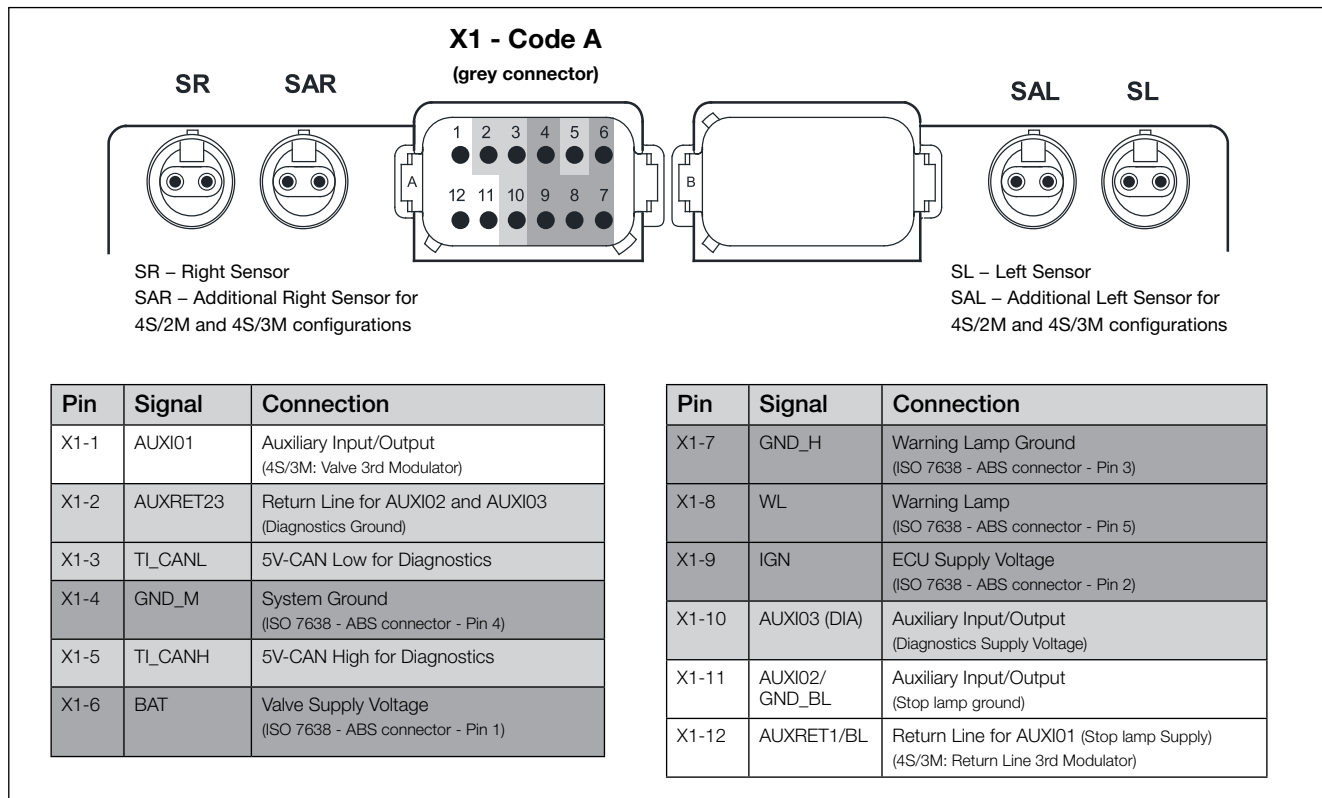


Pneumatic Connections

| Port | Used for | Port threads | Number of ports | Tightening torque max. |
|-------------------|---|--------------------|-----------------|------------------------|
| 1.1 ¹⁾ | Supply | M22x1.5 | 1 | 60 Nm |
| 1.2 ¹⁾ | Supply | M22x1.5 | 1 | 60 Nm |
| 1-2 | Connection to park/shunt valve | M22x1.5 | 1 | 60 Nm |
| 21 | Delivery to brake chambers (service brake) | M22x1.5 | 3 | 60 Nm |
| 22 | Delivery to brake chambers (service brake) Test Connector (optional) | M22x1.5 M16x1.5 | 3 1 | 60 Nm 45 Nm |
| 23 | Delivery to parking brake | M16x1.5 | 1 | 45 Nm |
| 24 | Delivery to parking brake | M16x1.5 | 1 | 45 Nm |
| 4 | Control | M16x1.5 | 1 | 45 Nm |
| 42 | Not used (plugged) | - | 1 | - |

¹⁾ If only one port is used: use port 1.1 and plug port 1.2.

Electrical connections



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ES1305

Trailer ABS (KB4TA)

Doc. No. Y095835 (Rev. 000)
February 2012

Diagnostics

KB4TA offers two independent possibilities for diagnostics:

- Blink Code diagnostics (ABS warning lamp in the cab and/or headboard warning lamp). 4S/3M configuration and end of line testing (EOL) is not possible with this option
- direct access to the module via PC and software *ECUtalk*® (all relevant configurations and EOL are possible)

Blink Code diagnostics

The **KB4TA** module provides diagnostic and configuration functions through Blink Code diagnostics. This means that a technician, even without diagnostic tools, can read a series of 'blinks' of the ABS warning lamp(s) (in the cab of the towing vehicle and/or on the trailer headboard) to access the fault codes being generated. However to enter this diagnostic mode the **KB4TA** module must be wired to accept both permanent (ISO 7638) and stop lamp (ISO 1185) power supplies.

Calling up the Blink Codes

To call up the blink codes, follow these instructions:

- Vehicle must be stationary with brakes released.
- Switch ignition "**ON**".
- Wait until the system has completed its start-up (static) test.
- In the towing vehicle, apply and release the service (foot) brake within the first 15 seconds after switching ON the ignition:

| Number of times to apply and release the service (foot) brake | Function displayed on warning lamp(s) (Note: The codes will be displayed after a delay of 5 secs.) |
|---|---|
| 3 | Active faults |
| 4 | Inactive faults |
| 5 | Erase stored faults |
| 6 | ABS configuration |
| 7 | Odometer 'mileage' |

Note:

If stop lamp power is applied continuously (foot brake applied continuously) for more than five seconds, blink code diagnostics will be disabled until the next time the ignition is switched ON.

- The fault blink code(s) will be displayed in two blocks, record the blink code(s) and refer to the blink code chart.
- The ABS configuration blink code will be displayed in three blocks, the first shows the number of wheel speed sensors (2 or 4), the second shows the number of modulators (2 or 3) and the third shows the control mode which can be ignored.
- The odometer blink code will display the 'mileage' (distance in km) to the nearest 1,000 km. For example: 152,431 km will be displayed as 152; i.e. one blink (pause), five blinks (pause), two blinks. Zeros will be displayed by the ABS warning lamp blinking twice rapidly. Odometer 'mileage' cannot be altered with blink code diagnostics. Complete odometer information can be retrieved using the PC diagnostic tool *ECUtalk*®.
- After display of the blink codes the warning lamp(s) will remain on for five seconds and then return to the normal operating mode.

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Blink Code Label

| 1st Blink Code | | 2nd Blink Code | |
|----------------|----------------------|----------------|--|
| Code | Location | Code | Description |
| 1 | All | 1 | No faults present |
| 2 | Sensor SL | 1 | Wheel speed sensor air gap too big |
| 3 | Sensor SR | 2 | Loss of wheel speed sensor signal |
| 4 | Sensor SAL | 3 | Noisy wheel speed sensor signal |
| 5 | Sensor SAR | 4 | Short or open circuit wheel speed sensor |
| | | 5 | Tyre size differential out of range |
| | | 6 | Wheel speed sensor configuration error |
| 6 | Power | 1 | Voltage too high |
| | | 2 | Voltage too low |
| | | 3 | Excessive resistance on ISO 7638 Pin1 |
| 7 | Modulator 22 | 2 | Exhaust solenoid short or open circuit |
| 8 | Modulator 21 | 3 | ABS valve installation error |
| 9 | AUXIO1 / Modulator 2 | 4 | Valve configuration error |
| 10 | Common | 1 | Internal short to ground |
| | | 2 | AUXIO1 or Modulator 2 short to ground |
| | | 3 | ABS valve dynamic error – all valves |
| | | 4 | Excessive ABS activity |
| | | 5 | AUXIO1 or Modulator 2 short to battery |
| 11 | ECU | 1 | Internal error |
| | | 2 | Configuration error |
| 12 | AUXIO1 | 1 | Short or open circuit |
| 13 | AUXIO2 | | |
| 14 | System | 2 | Service interval exceeded |


KNORR-BREMSE 

Trailer-ABS KB4TA

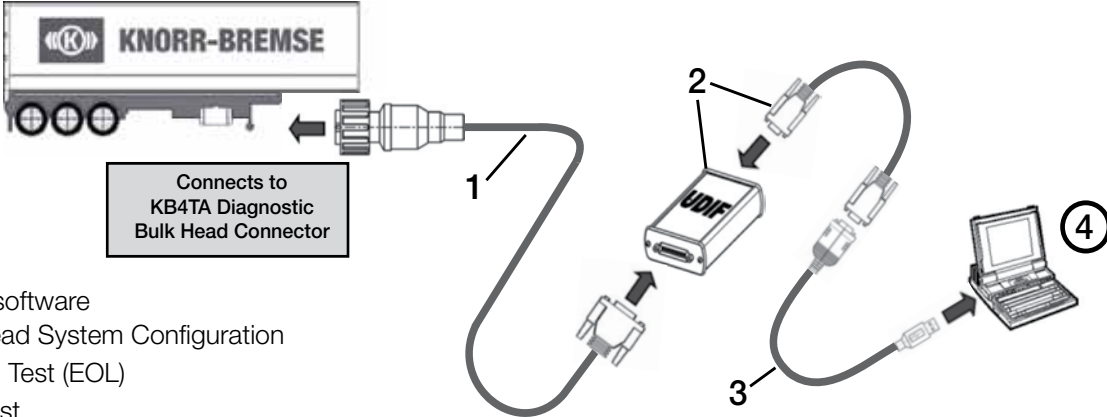
To read current and stored faults:

- Ensure that the ABS is powered via the ISO 7638 connection.
- Apply and release the brake pedal at 1 second intervals:
 - 3 times to read current faults
 - 4 times to read stored faults.
- After a period of 5 seconds the blink codes will be displayed.
- Observe the trailer ABS lamp in the towing vehicle and record the blink code sequence.
- A description of each blink code is shown in the table.
- After rectifying any faults, check that the trailer ABS warning lamp in the towing vehicle is not illuminated after turning the ignition off and on. This may necessitate driving the vehicle at a speed >10km/h.

Note: Blink code information is only available when the Stop Lamp power option and either 2S/2M or 4S/2M ABS are configured.

Bendix 

PC Diagnostics



Connects to KB4TA Diagnostic Bulk Head Connector

Functions:
User friendly software

- Change/read System Configuration
- Installation Test (EOL)
- System Test
- Read/delete fault code memory
- Read/reset further information: odometer, trip counter, service interval

| Pos. | Description | Part No. | Type No. | Details |
|------|---|----------|----------|--|
| 1 | Diagnostic cable (blue marking) | K010837 | EZ1037 | length = 3m |
| 2 | Diagnostic Set Universal Diagnostic Interface (UDIF) | II39809F | EZ1031 | includes connecting cable Z005474 (9-pin sub-D-plug and 9-pin sub D-socket) |
| 3 | Connecting cable | Z007887 | | optional for USB-connection to PC |
| 4 | Diagnostic software "ECUtalk®" | | | Download from www.knorr-bremsecvs.com |

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ES1305

Trailer ABS (KB4TA)

Doc. No. Y095835 (Rev. 000)
February 2012

Dimensions

Technical drawings of the ES1305 Trailer ABS unit showing front, side, and rear views with dimensions and port labels.

Dimensions:

- Front view height: 192
- Side view height: 74
- Side view width: 135
- Rear view height: 169.5
- Rear view width: 233
- Port offset: 30±2
- Port thread: M10x1.5

Port labels: 1, 1.1, 1.2, 2, 2.1, 2.2, 3, 4, 4.2, 11, 12, 21, 22, 23, 24.

Tightening torque 40±5 Nm

If port 22 is not used (e.g. for a test connector), it should be plugged with sealing ring 453807 and plug 457338

Guarantee expires after undoing of the screw(s)

Maximum torque for port threads to DIN 3853

| | |
|---------|---------|
| M16x1.5 | = 45 Nm |
| M22x1.5 | = 60 Nm |

Air inlet: 1.1, 1.2 Connect supply to 1.1 and plug 1.2 when only on port is used

Air inlet/outlet: 1-2 Exhaust: 3

Air outlet: 21, 22, 23, 24 Control: 4, 4.2 (not used, plugged)

View without connector cover

Other Documentation

See also KB4TA System and Installation Instructions Y026787



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Function

The electronic braking system for trailers (**TEBS**) combines, in one compact **Brake Module**, the electronic control unit, the sensor technology and the pneumatic control.

The braking functions of anti-lock and load sensing control are both electronically managed within the module as integrated features. This provides more accurate and consistent control of the generated braking force including reduced hysteresis compared to a conventional braking system, thereby improving tractor-trailer compatibility, optimising the brake pad wear and helping to reduce the overall operating costs of the trailer.

The anti-compounding function is also housed within the module.

As an additional option, the function Roll Stability Program (RSP) is available. Should a driver underestimate the vehicle speed when carrying out a manoeuvre, particularly when the trailer is laden with a high centre of gravity, there is a real danger that the trailer will become unstable and roll over. Even if the driver becomes aware of the condition of the trailer, it is normally too late to prevent an accident.

The RSP function of TEBS helps to avoid this by automatically applying the brakes of selected trailer wheels. By monitoring lateral acceleration, load and speed, the system is able to determine when an unstable condition is imminent. Should this condition arise, the brakes are automatically applied to reduce vehicle speed and hence lateral acceleration, thereby enhancing vehicle stability. When the threat of instability is no longer present, the brakes are automatically released and the system reverts to normal operation. RSP is available as an option within TEBS and can be realised without any additional components having to be installed on the trailer. Operation of the TEBS and RSP function is independent of the specifications of the tractor.

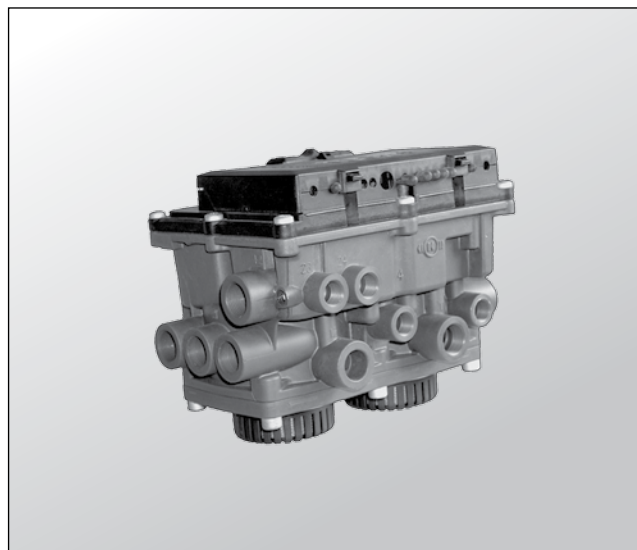
RSP is available for semi-trailers, centre-axle, and drawbar trailers.

The following auxiliary functions may be configured to the associated auxiliary connections of the TEBS:

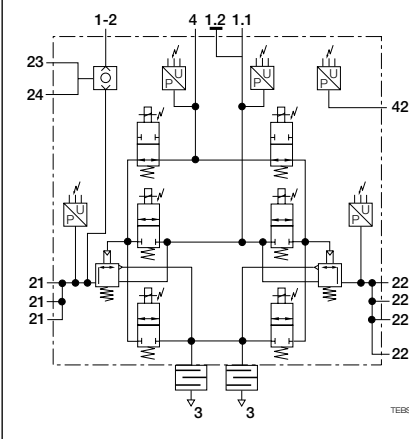
1. Standard Auxiliary Functions:

1.1 Outputs

- **Fully Automatic Lift Axle Control:** The ECU provides an electrical signal for the Knorr-Bremse lift axle control valve **AE114**, and ensures that the legal requirements are fulfilled by preventing overloading of the axles. The TEBS electronics can control up to two lift axle control valves, each valve may then be connected to 1 or 2 lifting axles
- **RtR ("Reset to Ride"):** In conventional suspension control systems, the raise/lower valve is often not reset to the drive position before the vehicle is moved and damage can be caused to the suspension and brakes. To prevent this happening, the TEBS ECU can be programmed to supply an electrical signal to a raise/lower valve with suitable functionality such that when the vehicle exceeds a pre-determined threshold speed, this signal causes the raise/lower valve to automatically switch to the drive position.



Standard Symbol as DIN ISO 1219



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ES205.

TEBS 4 Brake Module

Doc. No. Y011366 (Rev. 003)
March 2011

- **ISS (Integrated Speed Switch):** The TEBS provides an electrical output signal when a pre-programmed vehicle speed has been reached.
This signal may be used to fulfil numerous operational requirements such as locking of steering axles etc.
The signal can be programmed to switch from 0 V to 24V or 24V to 0 V.
The hysteresis, i.e. the difference between switch on and switch off speeds, can be adjusted to 10%, 20%, 40% or 80%.
- **24 V Supply:** Provides a permanent power supply that may be used to power additional brake and running gear systems / functions on the trailer.
- **ABS active:** When the ABS of the trailer is active, a 24V signal is transmitted by the ECU. Typically this function may be used to switch off a retarder installed on the trailer while ABS is active.
- **RSP active:** When the RSP of the trailer is active, a 24V signal is transmitted by the ECU.
- **TOC (Trailer Occurrence Counter):** Every kilometre travelled, the ECU transmits a 24V signal for a period of time and this may be used to trigger an external mileage counter.

1.2 Inputs:

The TEBS ECU has the ability to evaluate and/or react to three sensor inputs as follows:

- **Brake Pad Wear control:** When an input is received that the wear limit of at least one brake has been reached, the information is stored by the ECU and can be displayed by a Magic Eye or the information can be accessed at a later date via PC diagnostics or TIM. In addition, an electrical signal will be transmitted to the towing vehicle via pin 5 of the ISO 7638 connector causing the yellow warning lamp to flash each time the system is initially powered and the vehicle is stationary.

A CAN signal is also transmitted via pins 6 and 7 of the ISO 7638 which may be used in the driver's information display (if the towing vehicle has such a device).
- **Traction Assist:** Raises the front lift axle when the trailer is laden to increase the imposed load on the towing vehicle's drive axle to improve traction. Axle overload and speed restrictions apply when this function is operational.
- **Disable Lift Axle Control:** Signals the lift axle(s) to lower when raised; this allows manual activation via a signal transmitted by the towing vehicle or by an electrical switch mounted on the trailer. This can be used to assist manoeuvring or for rolling road testing.

2. Non-Standard Auxiliary Functions (via ADL):

Should a customer require a function, other than those normally available, it is possible to create a non-standard function by the use of a special program file known as Auxiliary Design Language (ADL) produced by Knorr-Bremse.

Should such a function be required, contact must be made through the local Knorr-Bremse representative. When available, the special file needed to fulfil the function can be written to the ECU via the PC Diagnostic Program.

3. Stop Lamp powering:

To obtain full functionality, any trailer electronic braking system requires a permanent power supply (achieved by using the legally specified ISO 7638 connection in 5 or 7 pin format); this ensures load sensing, anti-lock control (ABS) and all auxiliary functions are automatically maintained. In the event of a failure of this power supply, whilst trailer braking will be maintained via the pneumatic back-up function, all electronically controlled functionality would no longer be active. Continued operation of the vehicle without electrical power to the ECU and so without load sensing and ABS, may therefore result in tyre flat spotting, trailer instability and higher brake operating temperatures leading to increased brake pad wear. To overcome this problem, the TEBS ECU can be installed so that it will continue to operate by taking power from the Stop Lamp circuit and thereby load sensing and anti-lock functions remain active.

NOTE:

Stop Lamp powering should only be considered as a back-up function to ensure some safety features are retained. Operation of the vehicle over a longer period without a fully functioning ISO 7638 connector is not legal.

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Doc. No. Y011366 (Rev. 003)
March 2011

Technical Features

| | |
|------------------------------|--------------------------------------|
| Operating pressure: | 10.0 bar |
| Max. permissible pressure: | 12.5 bar |
| Operating temperature range: | -40 °C to +65 °C |
| Weight: | ES2050, ES2053 5.7 kg approx. |
| Nominal voltage: | 24 V DC |

Towing vehicle requirements

Trailers fitted with an Electronic Braking System (TEBS) only comply with the legal requirements of Regulations 98/12/EC and ECE Regulation 13/09 Supplement 08, when the towing vehicle is equipped with an electrical interface of the following specification:

| | |
|------------------------------|-------|
| ISO 7638: 1985 | 5 Pin |
| ISO 7638: 1997 Part 1 (24 V) | 5 Pin |
| ISO 7638: 1997 Part 1 (24 V) | 7 Pin |

Range Overview

| Part No. | Type No. | Possible ABS Configuration | Auxiliary Functions | | | | RSP |
|--------------------------|----------|----------------------------|--|-----------------|-----------------|---------|-----|
| | | | X1 connector ¹⁾ Total Auxiliaries: 2 | | X2 connector | | |
| | | | Max. Out | Max. In | Max. Out | Max. In | |
| II39798 ³⁾ | ES2050 | 2S-4S/2M | 1 | 1 ²⁾ | 3 | 2 | No |
| II39782 ³⁾ | ES2053 | 2S-4S/2M | 1 | 1 ²⁾ | 3 | 2 | Yes |
| II39782N50 ⁴⁾ | | 4S/3M | 1 | 1 ²⁾ | 1 ⁵⁾ | 2 | Yes |

- 1) Only possible if TIM or Magic Eye are **not** used; maximum number of configurable Auxiliaries on X1 connector: 2
- 2) No "Traction Help", no "Disable Lift Axle Control"
- 3) The part number may have the suffix F004 in which case the Module will be supplied with a system plate and an information sticker.
- 4) Replaces **II36419 - ES2050 and II39783F - ES2041**. The part number will carry a suffix "N50" which defines that it is supplied with packaging.
- 5) Two of the X2 Auxiliary Outputs are required to power the external ABS Modulator Valve (**BR9234** - see PD-200-200, Document No. Y011362) in the 4S/3M system

Part No. for Service Kit

| | |
|---------|---|
| II36750 | Cover |
| Z000737 | Blanking Plug for X2 Connector (on request) |

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ES205.

TEBS 4 Brake Module

Doc. No. Y011366 (Rev. 003)
March 2011

Dimensions

ES2050
ES2053

View without connector cover

Tightening torque of the nuts 40 +5 Nm

Unused port 22 should be plugged with sealing ring 453807 and screw plug 457338

Guarantee expires after opening of the screw(s)

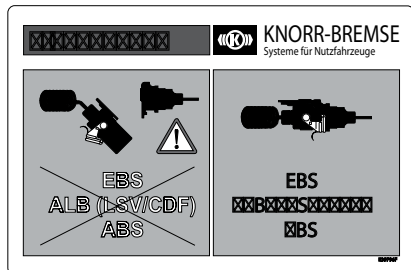
Max. tightening torque for connecting thread to DIN 3853 } M16x1.5 = 45 Nm
M22x1.5 = 60 Nm

Air inlet: 1.1; 1.2
Exhaust: 3
Air inlet / Air outlet: 1-2

Air outlet: 21; 22; 23; 24
Control port: 4; 42
Connect supply to 1.1 and close 1.2 when only one port is used

Information sticker, TEBS power supply

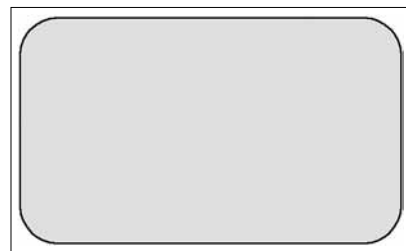
Part No.: II39796F
Size [mm]: 150 x 100



VF00075_188.eps

EBS-System Plate ¹⁾:

Part No.: II39797F
Size [mm]: 170 x 110

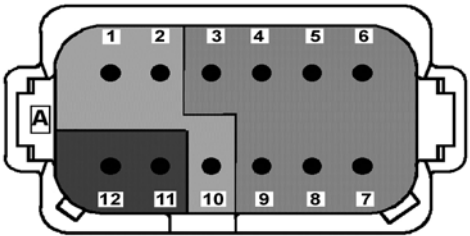


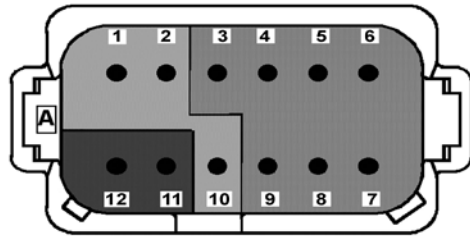
VF00075_189.jpg

¹⁾ The System Plate is a sticker which can be printed via the ECUtalk® software and a laser printer.
Caution! A laser printer must be used but do not print more than 5 stickers at a time.

Doc. No. Y011366 (Rev. 003)
March 2011

Electrical connections

| X1 - connector | | |
|--|--|---|
|  <p style="text-align: center;">VF00075/191</p> | | |
| Pin | Diagnosis via K-Line or TIM or Magic Eye | Diagnosis via CAN |
| 1 | Diagnostics | Input C - signal |
| 2 | Diagnostics - ground | ground |
| 3 | ISO 11992 CAN low | (ISO 7638: 1,5 mm ² WH / BN) |
| 4 | Modulator - ground | (ISO 7638: 4,0 mm ² BN) |
| 5 | ISO 11992 CAN high | (ISO 7638: 1,5 mm ² WH / GN) |
| 6 | Modulator - 24 V | (ISO 7638: 4,0 mm ² RD) |
| 7 | ECU - ground | (ISO 7638: 1,5 mm ² YE) |
| 8 | Warning Lamp | (ISO 7638: 1,5 mm ² WH) |
| 9 | ECU - 24 V | (ISO 7638: 1,5 mm ² BK) |
| 10 | Diagnostics - 24 V | AUX 4 (24 V) |
| 11 | Stop Lamp - ground | (ISO 1185: 1,0 mm ² BN) |
| 12 | Stop Lamp - 24 V | (ISO 1185 1,0 mm ² YE) |

| X2 - connector | | |
|---|--------------------|---|
|  <p style="text-align: center;">VF00075/191</p> | | |
| Pin | 2S / 2M 4S / 2M | 4S / 3M |
| 1 | AUX 1 (24 V) | External ABS Modulator (BR9234) - Hold Valve (1,0 mm ² YE) |
| 2 | AUX 2 (24 V) | External ABS Modulator (BR9234) - Release Valve (1,0 mm ² BK) |
| 3 | AUX 3 (24 V) | |
| 4 | Input supply (5 V) | |
| 5 | Input A - signal | |
| 6 | Input A - ground | |
| 7 | Input B - ground | |
| 8 | Input B - signal | |
| 9 | - | |
| 10 | - | |
| 11 | ground | |
| 12 | ground | External ABS Modulator (BR9234) - Ground (1,0 mm ² WH) |

Pneumatic connections

| Port | Qty | Used for | Port Thread |
|-------------------|-----|--|-------------|
| 1.1 ¹⁾ | 1 | Supply to reservoir | M22 x 1.5 |
| 1.2 ¹⁾ | 1 | Supply to reservoir | M22 x 1.5 |
| 1-2 | 1 | To AE431. park/shunt valve | M22 x 1.5 |
| 21 | 3 | Delivery to brake chambers, right side | M22 x 1.5 |
| 22 | 3 | Delivery to brake chambers, left side | M22 x 1.5 |
| 22 | 1 | Test connector | M16 x 1.5 |
| 23 | 1 | Delivery to spring portions of spring brakes, right side | M16 x 1.5 |
| 24 | 1 | Delivery to spring portions of spring brakes, left side | M16 x 1.5 |
| 4 | 1 | Brake demand - Control (Yellow) Line | M16 x 1.5 |
| 42 | 1 | Air suspension bag pressure | M16 x 1.5 |

¹⁾ If only one supply port is required, 1.1 must be used and 1.2 must be plugged.

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ES205.

TEBS 4 Brake Module

Doc. No. Y011366 (Rev. 003)
March 2011

Additional Documentation

Documentation is available from your Knorr-Bremse technical sales representative and/or on the Knorr-Bremse website www.knorr-bremsecvs.com which gives detailed information about the electronic braking system such as a system description and detailed installation instructions.

| | | |
|---------------------------|---|----------------|
| Customer News | ECUtalk® Download | Y049770 |
| Information Document | TEBS4 Homologation Document | C16427 |
| Installation Instructions | TEBS4 | Y002324 |
| Product Data | ABS Relay Modulator Valves (PD-200-200) | Y011362 |
| Product Data | Cables for Trailer ABS and EBS (PD-272-000) | Y095697 |
| Product information | Electronic Braking System for Trailers | P-3528 |
| Product News | ECUtalk® Vista compatibility | Y055547 |
| Service Information | Identification of TEBS Module | Y018096 |
| Service News | TEBS4 Installation/Storage/Maintenance | Y025056 |
| Service News | TEBS4 Update Package SW521.17 | Y052195 |
| User Manual | ECUtalk® Diagnostics | Y031901 |

Legal Requirements

TEBS has been approved in accordance with the requirements of Annex XIV of the Directive 98/12/EC and Annex 19 of ECE Regulation 13 with respect to ABS performance (see approval report EB 130 and the information document C16427/E).

The system also fulfils the requirements of the ECE regulation 13/09 Supplement 8 with respect to the prescribed requirements for vehicles with an electric control line and electric control transmission. (See approval report No. EB 133 and the information document C16428/E).

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Diagnostics

Universal Diagnostic Interface (UDIF)

Function

In order to configure the TEBS, carry out End Of Line testing and system checks, special hardware and software is required.

The hardware consists of a diagnostic interface and cables to connect TEBS electronics to the PC. Two different versions of software are available; a full version for the trailer manufacturer and a diagnostic version specifically designed for workshops. The software ECUtalk® can be downloaded free of charge from the Internet. To use the software a PIN is required, which can be purchased over the Internet after appropriate training has been completed.

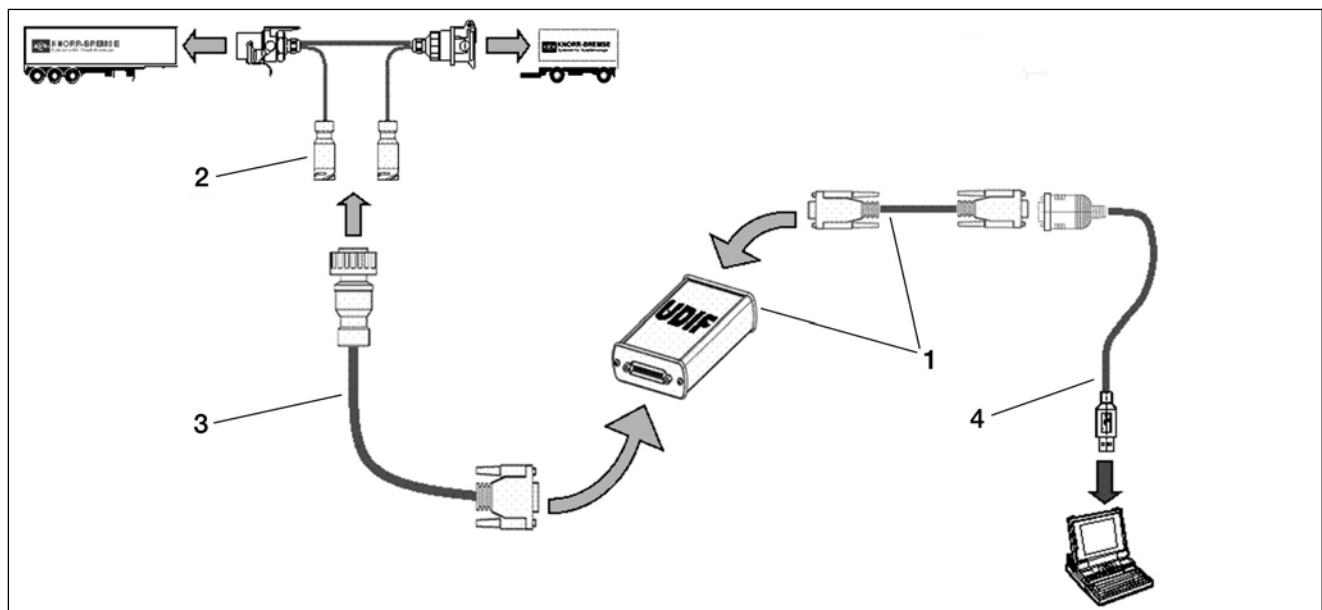


Options

The later generations of TEBS do not require a specific diagnostic connection at the side of the trailer as PC diagnostic can be carried out via pins 6 and 7 of the ISO 7638 interface (CAN connection).

This diagnostic interface can be connected to the TEBS via an adapter cable, which is also connected to a standard ISO 7638 connection (5 pin or 7 pin) to power the TEBS.

| Pos. | Name | Part No. | Type No. | Remarks |
|------|---------------------|----------|----------|--|
| 1 | Diagnostic Set UDIF | II39809F | EZ1031 | Including connection cable Z005474 (9-pin sub-D-plug and 9-pin sub-D-socket) |
| 2 | Adapter cable | II39808F | EZ1034 | See PD-272-030, Document No. Y107796 |
| 3 | Diagnostic cable | II39812F | EZ1032 | See PD-272-030, Document No. Y107796 |
| 4 | Connection cable | Z007887 | - | Optional for USB-connection to PC |
| 5 | Diagnostic software | - | - | Download from www.knorr-bremseCVS.com |



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ES205.

TEBS 4 Brake Module

Doc. No. Y011366 (Rev. 003)
March 2011

Diagnostics (contd.)

Trailer Information Module (TIM) (II39810F - EZ1035)

Function

The Trailer Information Module (TIM) is a trailer mounted display for direct reading of diagnostic and trailer related information. It may also be used as a hand held diagnostic tool. It enables access to information available within the TEBS ECU without using PC diagnostics.

The display is made up of 4 lines each having 20 characters. Operation is simple by means of three buttons (see picture). In addition to diagnostic and checking functions, TIM offers access to the following information:

- Active/stored faults
- System voltage
- Pad Wear
- Mileage
- Frequency of RSP activity
- Axle Load



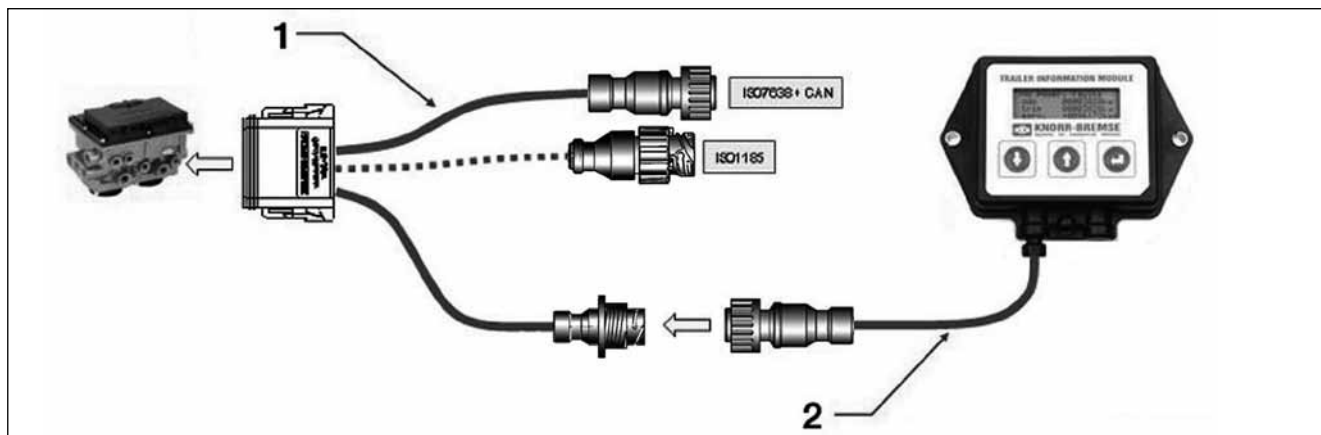
Note: As with Magic Eye, when using a TIM, no Input C or Output AUX 4 / Output AUX 5 functionality is possible via the X-connector as an external diagnostic connection is required.

Technical features

Operating temperature range: -20 °C to +70 °C
 Weight: **EZ1035** 0.4 kg approx
 Nominal voltage: 24 V DC

Options

| Pos. | Description | Part No. | Type No. | Remarks |
|------|------------------|-----------------|-----------------------------|--|
| 1 | Connection cable | K007525 | EK3107 ¹⁾ | ISO 7638 + CAN and ISO1185, see PD-272-020, Document No. Y107795 |
| | | II40394F | EK3109 ¹⁾ | ISO 7638 + CAN, see PD-272-020, Document No. Y107795 |
| 2 | TIM | II39810F | EZ1035 | Cable length = 1m |



¹⁾ A Mounting Kit (Part No: **K005378**), consisting of a closure cap, a spring ring and a nut, may be used



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Function

The electronic braking system for trailers (**TEBS G2**) combines, in one compact assembly, the electronic control unit, the sensor technology and the pneumatic control.

The braking functions of anti-lock and load sensing control are both electronically managed within the module as integrated features. This provides more accurate and consistent control of the generated braking force including reduced hysteresis compared to a conventional braking system, thereby improving tractor-trailer compatibility, optimising the brake pad wear and helping to reduce the overall operating costs of the trailer.

The anti-compounding function is also housed within the module offering four delivery ports to the spring brake chambers.

The Knorr-Bremse **TEBS G2 Brake Module** offers the following new features compared with the first generation:

- an optional pneumatic auxiliary port which can be programmed to support all available auxiliary functions.
- Variants of the module are available with push-to-connect (PTC) fittings.
- All electrical connections face downwards for improved accessibility.

The **TEBS G2.1 Brake Module** is similar to the **TEBS G2 Brake Module** except that in place of the anti-compounding double check valve it has:

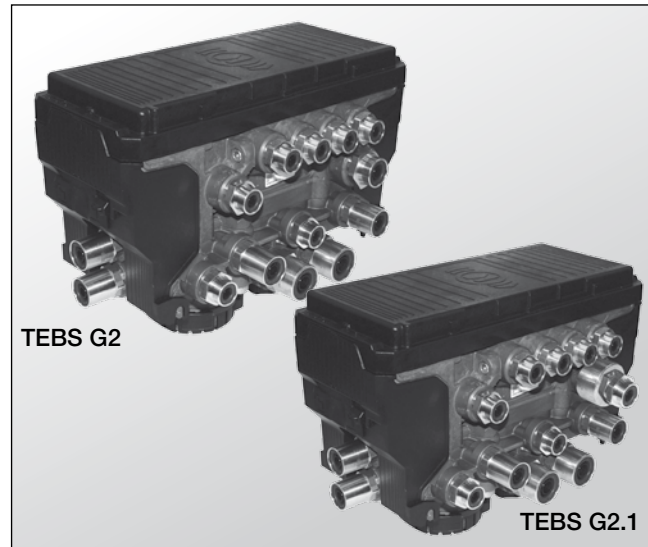
- Integrated emergency valve to provide the automatic brake function. The integrated emergency valve vents the spring brakes directly at the **TEBS G2.1 Brake Module** ensuring faster response. The emergency valve also performs the anti-compounding function.

On the **TEBS G2.1 Brake Module** the park/shunt valve is connected to port 41 (in the same position as port 12 on the **TEBS G2 Brake Module**).

The service-proven anti-roll system, RSP (Roll Stability Program), is included as standard in all **TEBS G2 Brake Modules**.

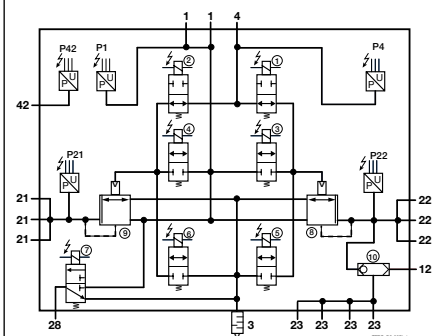
Technical Features

| | |
|------------------------------|------------------|
| Operating pressure: | 10.5 bar |
| Max. permissible pressure: | 12.5 bar |
| Operating temperature range: | -40 °C to +65 °C |
| Weight: | 5.7 kg approx. |
| Nominal Voltage: | 9 to 32 V DC |

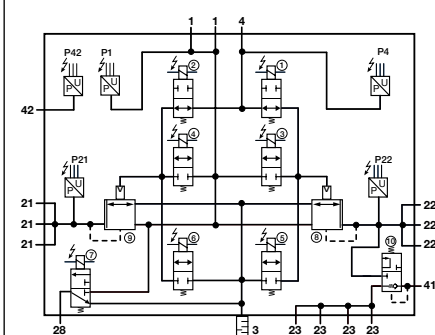


Standard Symbol as DIN ISO 1219

TEBS G2



TEBS G2.1



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ES2060

TEBS G2/G2.1 Brake Module

Doc. No. Y050635 (Rev. 000)
March 2011

Towing vehicle requirements

Trailers fitted with an electronic braking system (TEBS) only comply with the legal requirements of regulations 98/12/EC and ECE R13/11 supplement 3*, when the towing vehicle is equipped with an electrical interface of the following specification:

| | |
|------------------------------|-------|
| ISO 7638: 1985 | 5 Pin |
| ISO 7638: 1997 Part 1 (24 V) | 5 Pin |
| ISO 7638: 1997 Part 2 (24 V) | 7 Pin |

The following auxiliary functions may be configured to the associated auxiliary connections of the **TEBS G2/G2.1 Brake Modules**:

1. Standard Auxiliary Functions:

1.1 Outputs

- **Tilt Angle:** The brake module provides an electrical or pneumatic signal when a pre-programmed maximum angle has been reached. This signal can be utilised to switch off a lifting device for the tipping body.
- **Steering Axle Lock:** The brake module provides an electrical or pneumatic signal when a pre-programmed vehicle speed has been reached. The signal can be programmed to switch from 0 V to 24 V or 24 V to 0 V.
- **Fully Automatic Lift Axle Control:** The brake module provides an electrical or pneumatic signal for the Knorr-Bremse lift axle control valve AE114, and ensures that the legal requirements are fulfilled by preventing overloading of the axles. The module can control up to two lift axle control valves, each valve may then be connected to 1 or 2 lifting axles.
- **Speed Pulse:** In conventional suspension control systems, the Raise / Lower valve is often not reset to the drive position before the vehicle is moved and damage can be caused to the suspension and brakes. To prevent this happening, the brake module can be programmed to supply an electrical or pneumatic signal to the Raise / Lower valve. When the vehicle exceeds a pre-determined threshold speed, this signal causes the Raise / Lower valve to automatically switch to the "drive" position.
- **ISS:** The brake module provides an electrical or pneumatic signal when a pre-programmed vehicle speed has been reached. This signal may be used to fulfil numerous operational requirements such as locking of steering axles etc. The signal can be programmed to switch from 0 V to 24 V or 24 V to 0 V.
- **24 V Supply:** provides a permanent power supply that may be used to power additional brake and running gear systems / functions on the trailer.
- **ABS active:** When the ABS of the trailer is active, a 24 V or a pneumatic signal is transmitted by the brake module. Typically this function may be used to directly control a retarder installed on the trailer.
- **RSP active:** When the Roll Stability Program (RSP) of the trailer is active, a 24 V or a pneumatic signal is transmitted by the brake module.
- **P_{out}:** Brake modules that have the P₂₈ function available can be programmed to provide a constant pressure supply.

* As of 2010. Contact Knorr-Bremse for further information.

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1.2 Inputs:

The TEBS G2 brake module has the possibility to evaluate and / or react to sensor inputs as described below. These functions can be programmed to two tristate inputs available on the IN/OUT connector, the wheel speed sensor input ports E and F or the AUXIO ports 1-3:

- **Brake pad wear control:** when an input is received that the wear limit of at least one brake has been reached, the information can be accessed via PC diagnostics, Magic Eye or TIM G2. In addition, an electrical signal will be transmitted to the towing vehicle via Pin 5 of the ISO 7638 connector causing the yellow warning lamp to flash each time the system is initially powered and the vehicle is stationary.
- **TH_M / TH_P:** Traction Help actuated by a momentary / permanent switch respectively. This function raises the front lift axle when the trailer is laden to increase the imposed load on the towing vehicle. At the same time a lift axle that is placed behind the centre of the bogie will be lowered. Axle overload and speed restrictions apply when this function in operational.
- **MH_M / MH_P:** Manoeuvring Help actuated by a momentary / permanent switch respectively. This function lowers the front lift axle to decrease the effective wheelbase of the vehicle. At the same time a lift axle that is placed behind the centre of the bogie will be lifted. Axle overload and speed restrictions apply when this function in operational.
- **LL_ALL_M / LL_ALL_P:** This function lowers all lift axles as long as a momentary / permanent switch respectively is activated.
- **LL_LAC1_M / LL_LAC1_P:** This function lowers all lift axles assigned to LAC1 as long as a momentary / permanent switch respectively is activated.
- **LL_LAC2_M / LL_LAC2_P:** This function lowers all lift axles assigned to LAC2 as long as a momentary / permanent switch respectively is activated.
- **LLTH:** This is a combined function which offers the traction help and lift axle lowering via the same input. The following logic is implemented:
 - signal active for a time < 5 seconds = Traction Help
 - signal active for a time > 5 seconds = lift axle lowering
 - signal active for a time >10 seconds = will be ignored, TEBS reverts to normal lift axle control mode
- **Road Laying Function (RLF):** Provides a predefined brake pressure output to all axles, when signalled to do so from an input switch.
- **Road Laying Function Enable (RLFE):** Input indicates that the brakes will be applied to stop vehicle moving away from the asphalt laying machine while the asphalt is being transferred - used in conjunction with RLF (see above).

2. Non-Standard Auxiliary Functions:

Should a customer require a function other than those normally available it is possible to create a non standard function by the use of a special file known as ADL (Auxiliary Design Language) produced by Knorr-Bremse. Should such a function be required contact must be made through the local Knorr-Bremse representative. When available, the special file needed to fulfil the function can be written to the ECU of the brake module via the PC Diagnostic Program. The module offers a possibility to have an interface to the service braking system, under certain circumstances.

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ES2060

TEBS G2/G2.1 Brake Module

Doc. No. Y050635 (Rev. 000)
March 2011

3. Stop lamp powering:

To obtain full functionality, any trailer electronic braking system requires a permanent power supply (achieved by using the legally specified ISO 7638 connection in 5 or 7 pin format); this ensures load sensing, anti-lock control and all auxiliary functions are automatically maintained. In the event of a failure of this power supply, whilst trailer braking will be maintained via the pneumatic back-up function, all electronically controlled functionality would no longer be active.

Continued operation of the vehicle without electrical power, irrespective of axle load, may therefore result in higher brake operating temperatures leading to increased brake pad wear, tyre flat spotting and trailer instability. To overcome this problem, the TEBS G2 ECU can be installed so that it will continue to operate by taking power from the stop lamp circuit and thereby load sensing and anti-lock functions remain active.

Note: Stop lamp powering should only be considered as a backup function to ensure some safety features are retained in the event of failure of the ISO 7638 connection.

Legal Requirements

TEBS G2/G2.1 has been approved in accordance with the requirements of annex XIV of the Directive 98/12/EC and annex 19 of ECE Regulation 13 with respect to ABS performance:

- | | |
|------------------------|------------|
| - ABS approval report | EB 154.1 E |
| - Information document | Y038142/E |

The system also fulfils the requirements of the ECE Regulation 13/11 Supplement 3* with respect to the prescribed requirements for vehicles with an electric control line and electric control transmission.

- | | |
|-------------------------------|-----------|
| - Electronics approval report | EB 155.1E |
| - Information document | Y038143/E |

Additional Documentation

Documentation is available on the Knorr-Bremse website www.knorr-bremseCVS.com which gives detailed information about the electronic braking system such as a system description and detailed installation instructions.

- | | |
|------------------------|---------|
| TEBS G2 Product Manual | Y037243 |
|------------------------|---------|

Options

All variants offer:

- ABS configurations 2S/2M and some variants 4S/2M.
- RSP.
- Operating voltage range extended to 9 - 32 Volts.
- Four pneumatic ports to the spring brakes.
- Internal 5 V CAN J1939.
- Configuration of different braking characteristics for the CAN and pneumatic brake demands.

Additionally:

- Variants of TEBS G2 after internal Software version V03 (e.g. K019...V03..., see description on page 5) and variants of TEBS G2.1 offer ABS configurations of 2S/2M up to 6S/3M system configuration.
- TEBS G2.1 has an integrated automatic brake function.

The following tables show possible variants which differ concerning the fittings provided:

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| Module | Part Number ¹⁾ | Type Number | P28 | PTC Fittings | ABS | Smart Update |
|-----------|---------------------------|-------------|------------------|--------------|----------|--------------|
| TEBS G2 | K019300 | ES2060 | Pneumatic signal | no | 2S-6S/3M | no |
| TEBS G2 | K019302 | ES2060 | Pneumatic signal | yes | 2S-6S/3M | no |
| TEBS G2 | K019309 | ES2060 | Pneumatic signal | no | 2S-6S/3M | yes |
| TEBS G2.1 | K019310 | ES2060 | Pneumatic signal | no | 2S-6S/3M | no |
| TEBS G2.1 | K019312 | ES2060 | Pneumatic signal | yes | 2S-6S/3M | no |
| TEBS G2 | K019340 | ES2060 | Test point port | no | 2S/2M | no |
| TEBS G2 | K019342 | ES2060 | Test point port | yes | 2S/2M | no |
| TEBS G2 | K019349 | ES2060 | Test point port | no | 2S/2M | yes |
| TEBS G2.1 | K019350 | ES2060 | Test point port | no | 2S/2M | no |
| TEBS G2.1 | K019352 | ES2060 | Test point port | yes | 2S/2M | no |

| Module | Part Number ¹⁾ | Type Number | Integrated Emergency Function | To be used with Park/Shunt Valve | Use for |
|-----------|---------------------------|-------------|-------------------------------|----------------------------------|---------|
| TEBS G2 | K019300 | ES2060 | no | AE4311 | OE |
| TEBS G2 | K019302 | ES2060 | no | AE4311 | OE |
| TEBS G2 | K019309 | ES2060 | no | AE4311 | IAM |
| TEBS G2.1 | K019310 | ES2060 | yes | AE4370/AE4371 | OE |
| TEBS G2.1 | K019312 | ES2060 | yes | AE4370/AE4371 | OE |
| TEBS G2 | K019340 | ES2060 | no | AE4311 | OE |
| TEBS G2 | K019342 | ES2060 | no | AE4311 | OE |
| TEBS G2 | K019349 | ES2060 | no | AE4311 | IAM |
| TEBS G2.1 | K019350 | ES2060 | yes | AE4370 | OE |
| TEBS G2.1 | K019352 | ES2060 | yes | AE4370 | OE |

¹⁾ The part number of the module will carry two suffixes, firstly "V##" which represents the software revision of the product, e.g. V01, V02 etc., and secondly "N##" which defines the packaging requirements of different market sectors, e.g. N00, N50. Example: K019300V02N50 - is supplied with software to revision 02 and packaged as described below.

Note: The N50 variant will be shipped in a box containing the data labels II39797F, II39796F and II40392F. These data labels may also be ordered separately.

Service parts: Silencer K000847K50

The following table lists the port variants of the brake module and their uses:

| Port | Thread | Number | Used for | PTC Fittings ²⁾ (to suit pipe size) |
|------------------|---------|--------|--|---|
| 1.1 | M22x1.5 | 1 | Supply to Reservoir | 15x1.5 |
| 1.2 | M22x1.5 | 1 | Supply to Reservoir | 15x1.5 |
| 12 ³⁾ | M22x1.5 | 1 | Park/Shunt Valve | 12x1.5 |
| 21 | M16x1.5 | 3 | Delivery to brake chambers to wheel speed sensor D/F | 12x1.5 |
| 22 | M16x1.5 | 3 | Delivery to brake chambers to wheel speed sensor C/E | 12x1.5 |
| 23 | M16x1.5 | 4 | Delivery to parking brake | 8x1 |
| 4 | M16x1.5 | 1 | Brake demand (Yellow Line) | 8x1 |
| 41 ⁴⁾ | M16x1.5 | 1 | Park/Shunt Valve | 8x1 |
| 42 | M16x1.5 | 1 | Air spring pressure | 8x1 |
| 28 | M16x1.5 | 1 | Test point/Pneumatic signal | 8x1 |

²⁾ Not all part numbers will contain a set of fittings. ³⁾ TEBS G2 modules only. ⁴⁾ TEBS G2.1 modules only.

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ES2060

TEBS G2/G2.1 Brake Module

Doc. No. Y050635 (Rev. 000)
March 2011

All variants offer the following possible electrical connections for auxiliary equipment:

- AUXIO 1 electrical output (6, 12 or 24 V) or digital input
- AUXIO 2 electrical output (6, 12 or 24 V) or digital input
- AUXIO 3 electrical output (24 V) or digital input
- SENS_SUP external sensor supply or Tri-state input
- SENS_IN1 external sensor input or Tri-state input
- Input S-E digital input or Tri-state input
- Input S-F digital input or Tri-state input

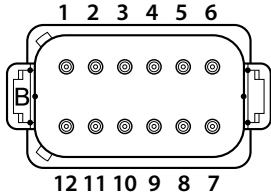

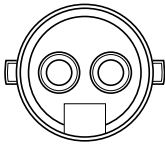
Note: Tri-state inputs allow control using a single wire connection where the following conditions will be recognised as requiring a change of state:

- change from open circuit to 12 / 24 V
- change from open circuit to ground

Note: When configuring inputs it is recommended that the tri-state inputs on pins 4 and 5 are used first followed by sensor inputs S-E and S-F and then AUXIO connections on pins 1, 2 and 3.

Note: Some variants also offer the possibility to use the port P₂₈ to control pneumatic auxiliary equipment (see table on page 5)

Electrical Connections

| In - Out Connector | | Power Connector | | Wheel Speed Sensor Connector | | |
|---|---|---|-----------------------|---|-----------|---|
|  | |  | |  | | |
| Pin Number | Function | Pin Number | Function | System | Connector | Function |
| 1 | AUXIO 1 | 1 | Battery Supply (+) | 2S/2M | S-C | Wheel Speed Sensor |
| 2 | AUXIO 2 | 2 | Electronic Supply (+) | | S-D | |
| 3 | AUXIO 3 | 3 | Electronic Ground (-) | | S-E | Optional Aux Input (Digital or Tri-state) |
| 4 | Sensor Supply [SENS_SUP] (5V or Tri-state Input) | 4 | Battery Ground (-) | | S-F | |
| 5 | Sensor Input 1 [SENS_IN1] (Analogue or Tri-state) | 5 | Warning Lamp | 4S/2M | S-C | Wheel Speed Sensor |
| 6 | Sensor Ground or Magic Eye or C3 | 6 | TT CAN-H (ISO 11992) | | S-D | |
| 7 | Stop Lamp Supply (+) | 7 | TT CAN-L (ISO 11992) | | S-E | |
| 8 | Stop Lamp Ground (-) | | | | S-F | |
| 9 | TI CAN-L (J1939) | | | | | |
| 10 | TI CAN-H (J1939) | | | | | |
| 11 | AuxRet 12 (Return for AUXIO 1 & 2) | | | | | |
| 12 | AuxRet 3 | | | | | |

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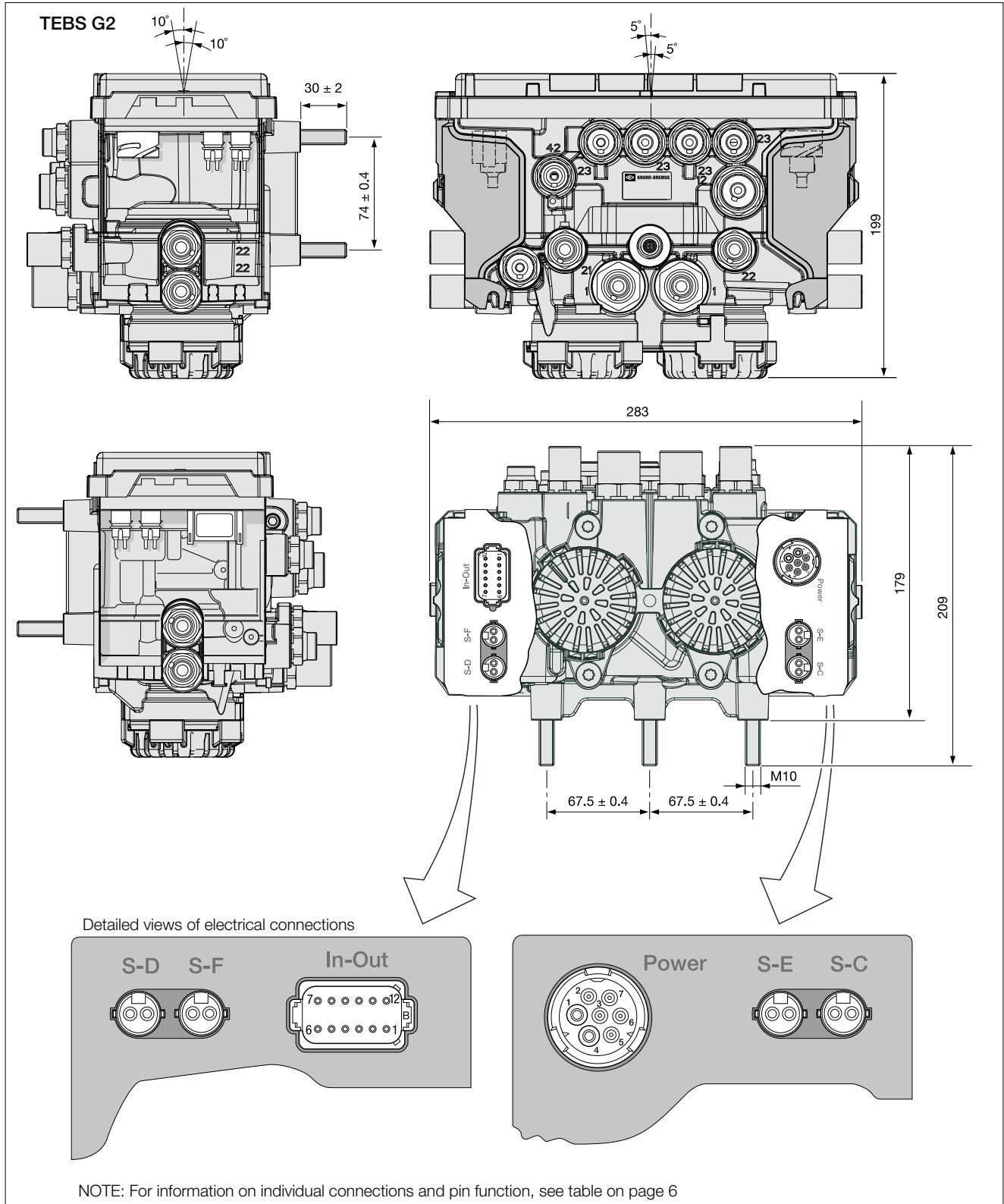
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Dimensions



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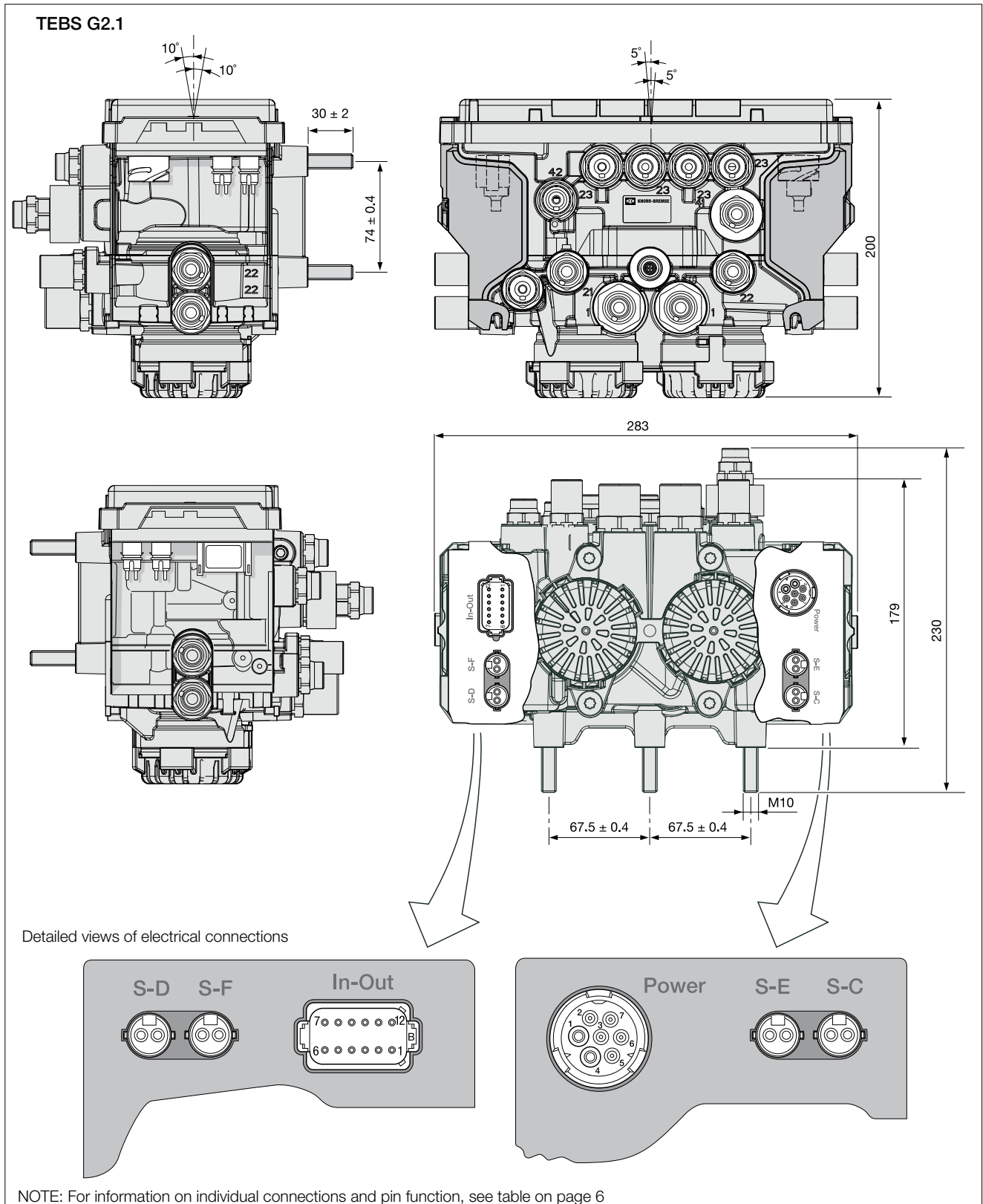
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ES2060

TEBS G2/G2.1 Brake Module

Doc. No. Y050635 (Rev. 000)
March 2011



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Item No. K026739

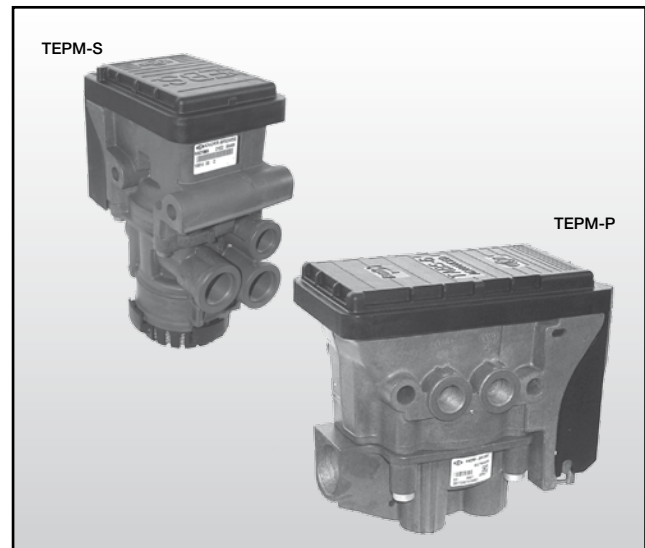
Function

The **Trailer Electro-Pneumatic Module** is used as a 3rd modulator to extend the functionality of the TEBS G2/G2.1 Brake Module to cover full trailers, semi-trailers and centre-axle trailers that require 4S/3M or 6S/3M configurations.

The **Trailer Electro-Pneumatic Module** has pressure control channel(s) with internal pressure sensor(s) and also provides connection for wheel speed sensor inputs which are processed and sent via the J1939 CAN to the TEBS G2/G2.1 Brake Module. The module receives the required brake demand over the J1939 CAN from the TEBS G2/G2.1 Brake Module which is responsible for both load sensing and ABS functions.

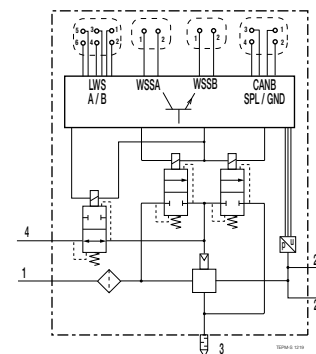
Trailer Electro-Pneumatic Module Standard (TEPM-S) has an internal pressure sensor and three solenoids controlled by an electronic controller. The module also provides connection for two wheel speed sensor inputs.

Trailer Electro-Pneumatic Module Premium (TEPM-P) extends the functionality provided by the TEPM-S by providing two additional internal pressure sensors (suspension load and brake demand) and two additional delivery ports. The module also provides two additional auxiliary input/output pins (AuxIO), which can be used to expand the existing capability provided by the TEBS G2/G2.1 Brake Module. In addition the module has provision for two analogue inputs allowing external load and brake demand sensors to be connected as required. The integrated ECU is designed for 12 V and 24 V systems to suit worldwide applications.

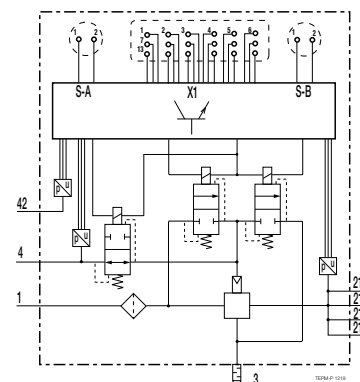


Standard Symbol as DIN ISO 1219

TEPM-S



TEPM-P



Technical Features

TEPM-S

| | |
|------------------------------|------------------|
| Maximum operating pressure: | 12.5/10.0 bar |
| Operating temperature range: | -40 °C to +80 °C |
| Weight: | 1.70 kg approx. |
| Nominal voltage: | 24 V |
| Operating voltage: | 18 to 32 V |

TEPM-P

| | |
|------------------------------|------------------|
| Maximum operating pressure: | 10.0 bar |
| Operating temperature range: | -40 °C to +85 °C |
| Weight: | 2.35 kg approx. |
| Nominal voltage: | 12/24 V |
| Operating voltage: | 9 to 32 V |

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ES207.

Trailer Electro-Pneumatic Module (TEPM-S / TEPM-P)

Doc. No. Y095618 (Rev. 001)
March 2011

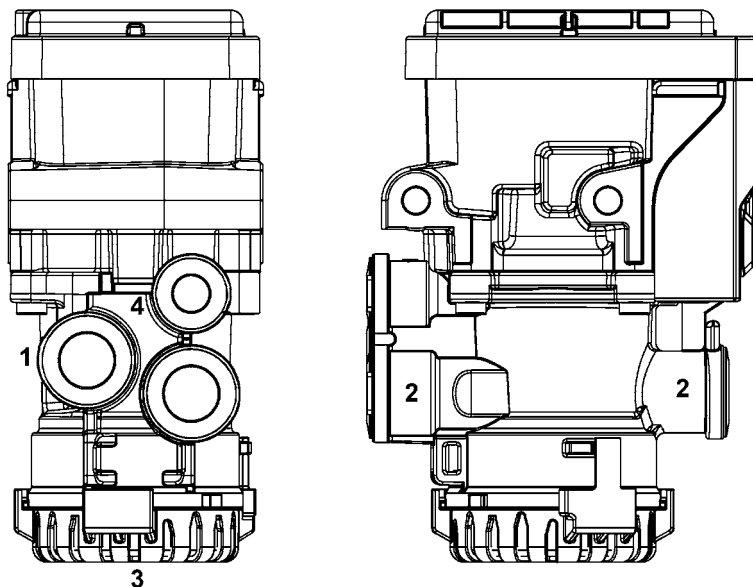
Range Overview

| Part No. | Type No. | Model | Air Connections | Recommended Torque | Installation fixings | Recommended Torque |
|-----------------------|----------|--------|----------------------------|--------------------|----------------------|--------------------|
| K021940 ¹⁾ | ES2070 | TEPM-S | 1 x M16x1.5 3 x M22x1.5 | 45 Nm 60 Nm | 2 x Ø8.5 | 20 ± 4 Nm |
| K027900 ¹⁾ | ES2071 | TEPM-P | 6 x M16x1.5 1 x M22x1.5 | 45 Nm 60 Nm | 2 x Ø10.2 | 40 ± 5 Nm |

¹⁾ The part number of the module will carry two suffices, firstly "V##" which represents the software revision of the product, e.g. V01, V02 etc., and secondly "N##" which defines the packaging requirements of different market sectors, e.g. N00, N50. Example: K021940V00N00 - is supplied with software to revision 00 and is supplied without packaging.

Pneumatic Connections

TEPM-S



| Port | Number of ports | Thread | Connection/remarks |
|------|-----------------|---------|---|
| 1 | 1 | M22x1.5 | Supply from reservoir |
| 2 | 2 | M22x1.5 | Delivery to brake chambers (max. 2 x Type 30) |
| 4 | 1 | M16x1.5 | Control pressure from yellow line |

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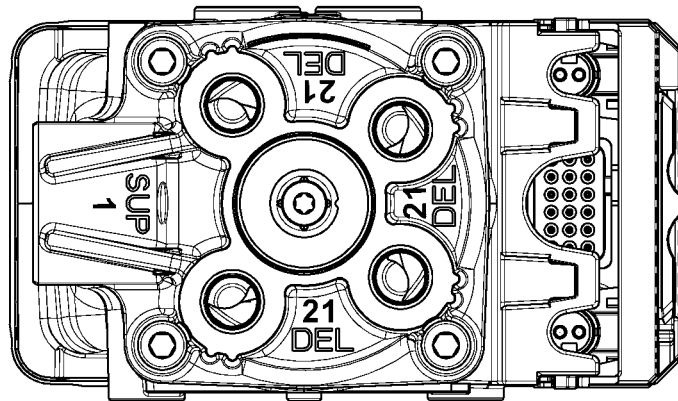
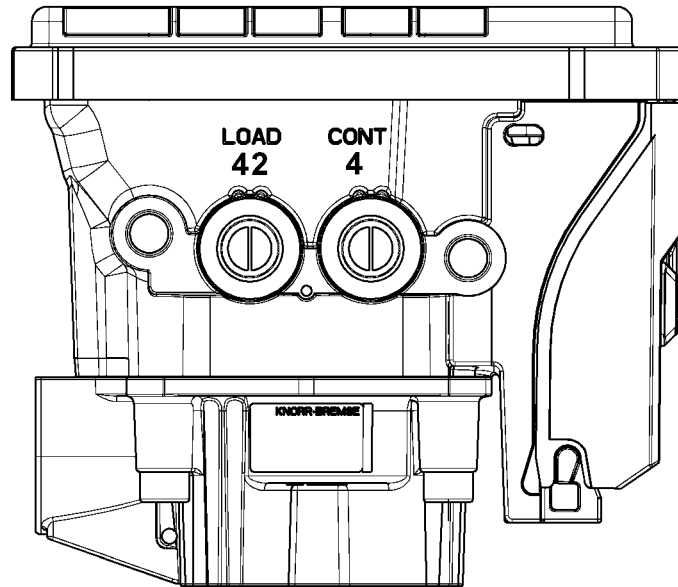
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TEPM-P



| Port | Number of ports | Thread | Connection/remarks |
|------|-----------------|---------|---|
| 1 | 1 | M22x1.5 | Supply from reservoir |
| 21 | 4 | M16x1.5 | Delivery to brake chambers (max. 4 x Type 30) |
| 4 | 1 | M16x1.5 | Control pressure from yellow line |
| 42 | 1 | M16x1.5 | Air suspension |

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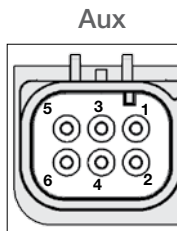
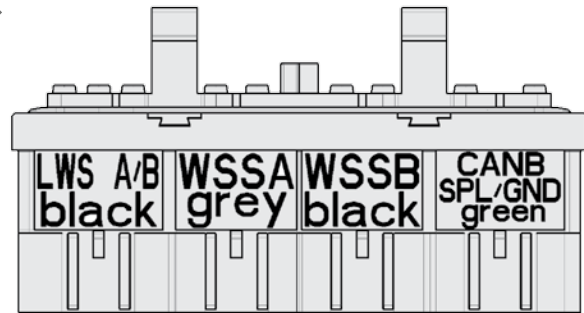
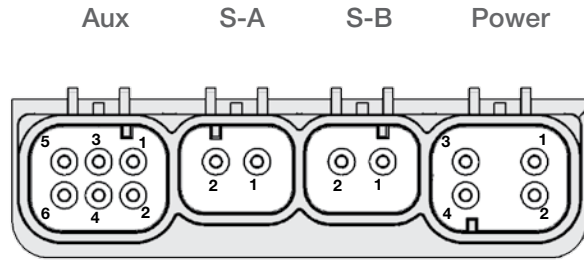
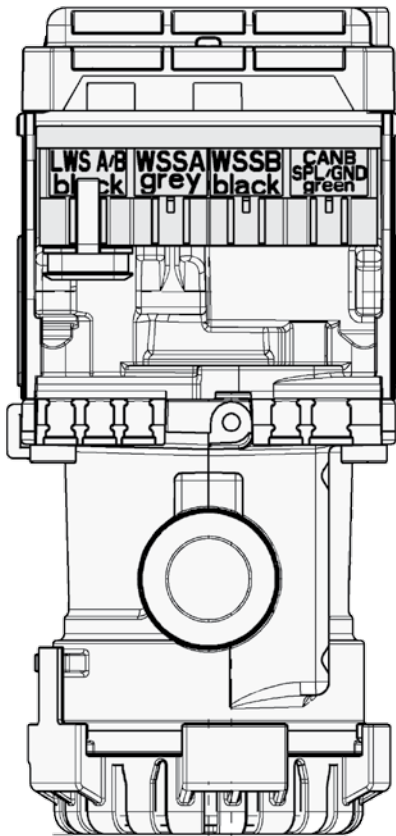
ES207.

Trailer Electro-Pneumatic Module (TEPM-S / TEPM-P)

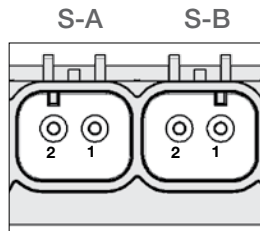
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Electrical Connections

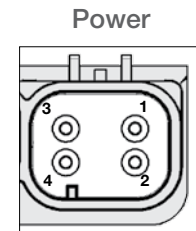
TEPM-S



| Pin No. | Function |
|---------|--|
| 1 | Not used - blanking plug fitted to the Aux connector - optional external load sensing connection |
| 2 | |
| 3 | |
| 4 | |
| 5 | |
| 6 | |



| | |
|-----|--|
| S-A | Wheel speed sensor inputs for 4S/3M and 6S/3M configurations |
| S-B | |



| Pin No. | Function |
|---------|-----------------|
| 1 | Battery ground |
| 2 | Battery supply |
| 3 | 5 V TI CAN High |
| 4 | 5 V TI CAN Low |

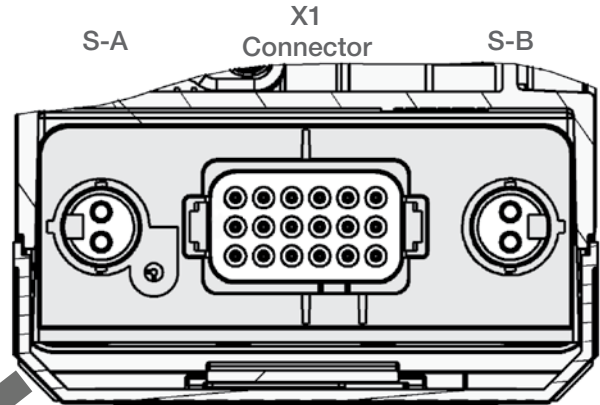
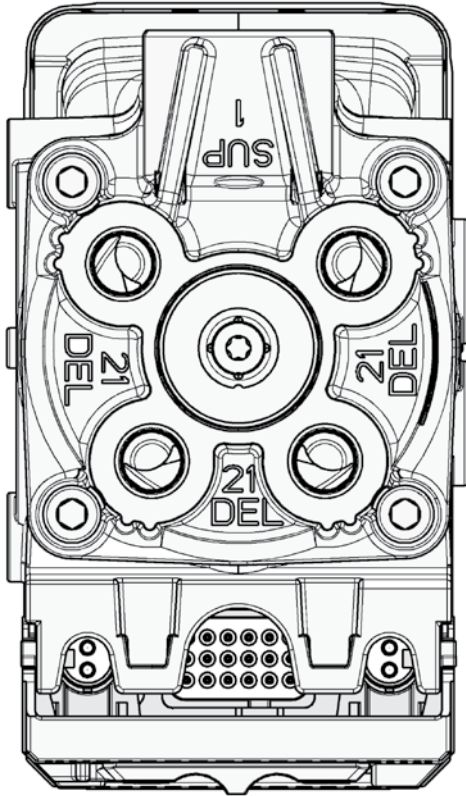
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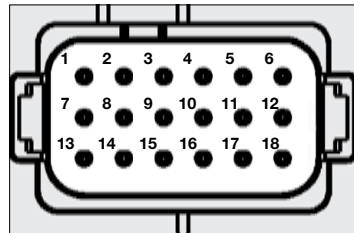
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TEPM-P



X1
Connector



S-A
S-B



| Pin No. | Function | Pin No. | Function |
|---------|-----------------|---------|----------------------|
| 1 | 5 V TI CAN Low | 10 | Ground Sensor 1 |
| 2 | Not used | 11 | Supply Sensor 2 |
| 3 | Not used | 12 | Not used |
| 4 | Supply Sensor 1 | 13 | Not used |
| 5 | Not used | 14 | AUXIO1 |
| 6 | Supply | 15 | Ground AUXIO 1 and 2 |
| 7 | 5 V TI CAN High | 16 | Ground Sensor 2 |
| 8 | AUXIO2 | 17 | Input Sensor 2 |
| 9 | Input Sensor 1 | 18 | Ground |

| | |
|-----|--|
| S-A | Wheel speed sensor inputs for 4S/3M and 6S/3M configurations |
| S-B | |

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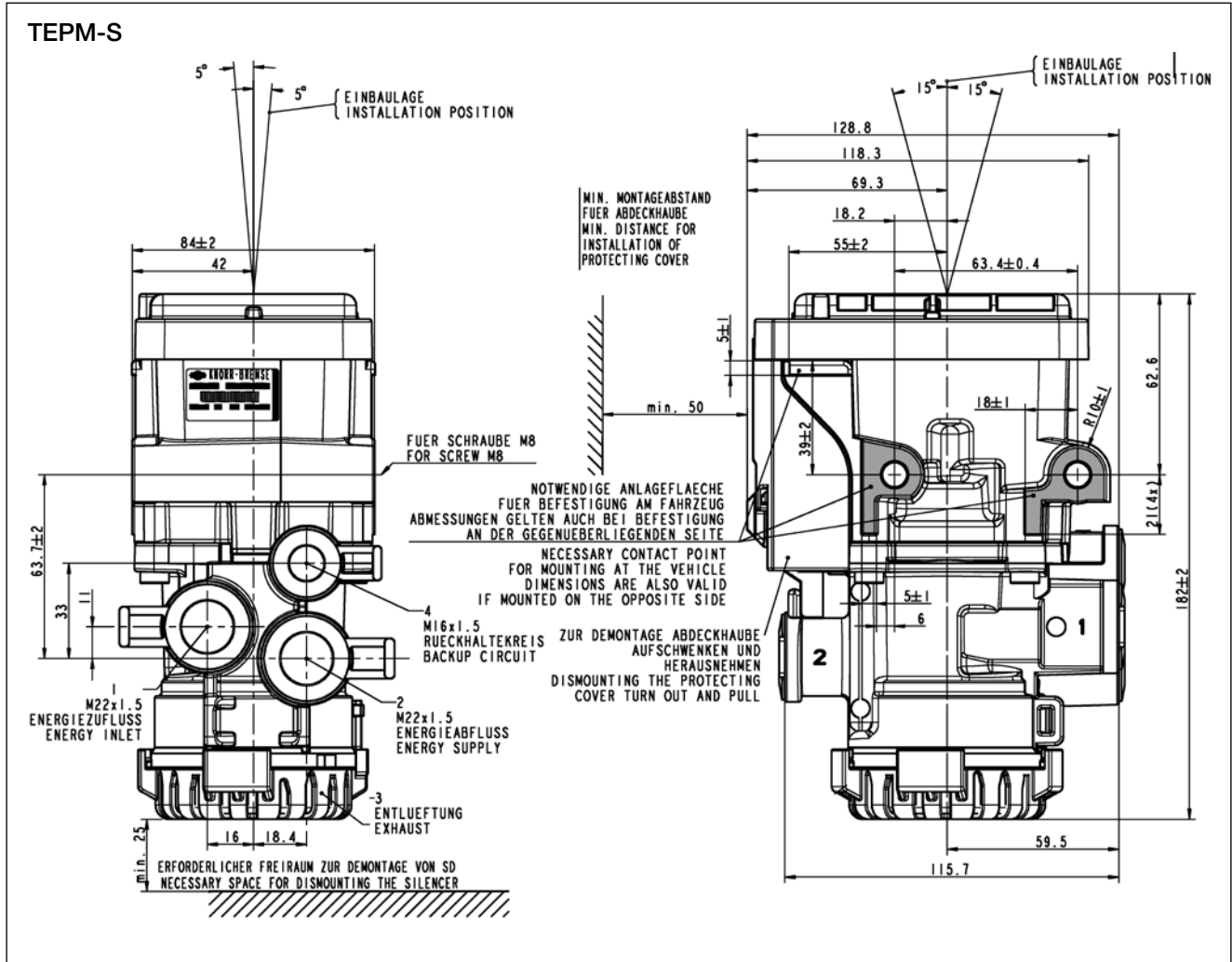
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ES207.

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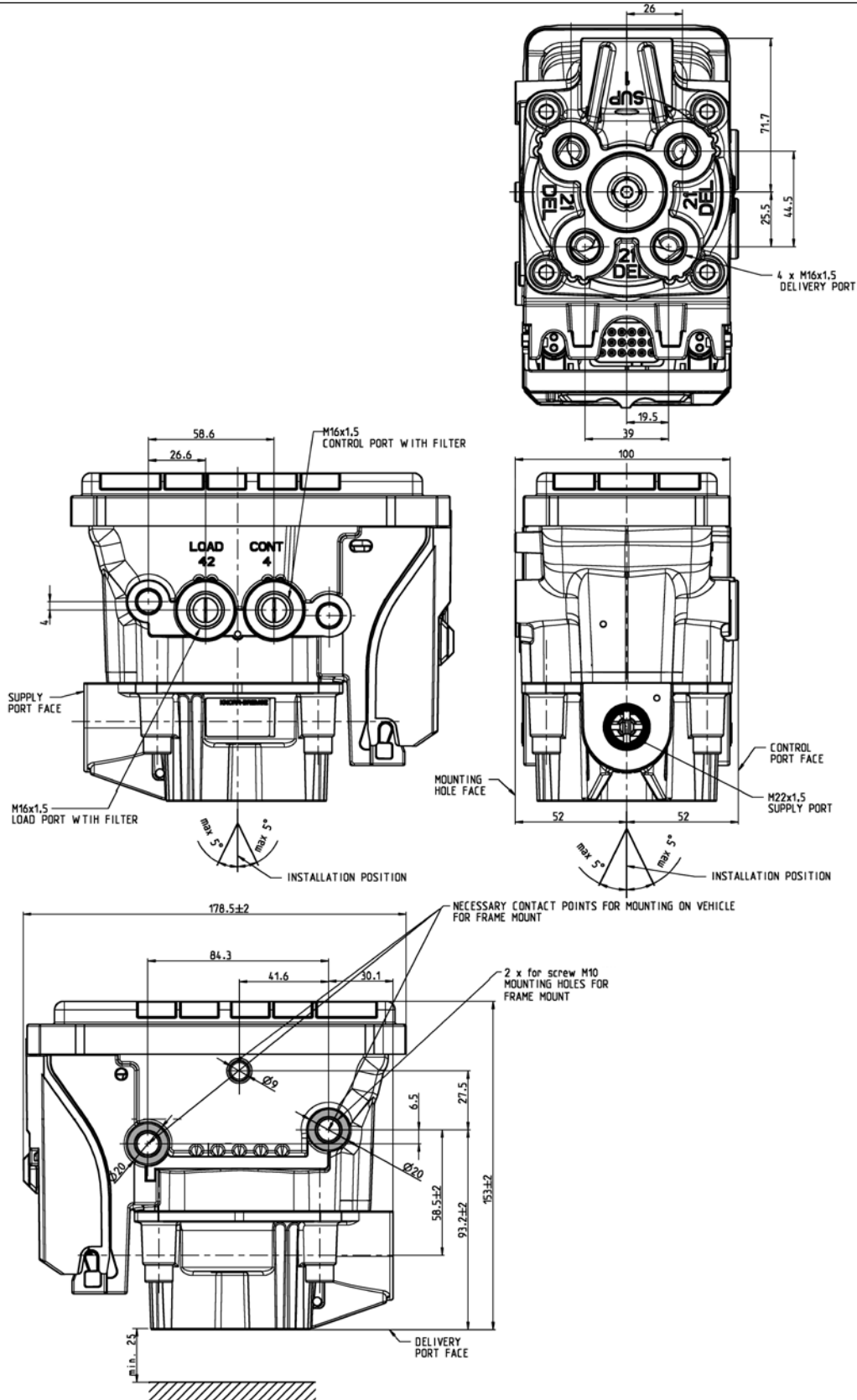
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TEPM-P



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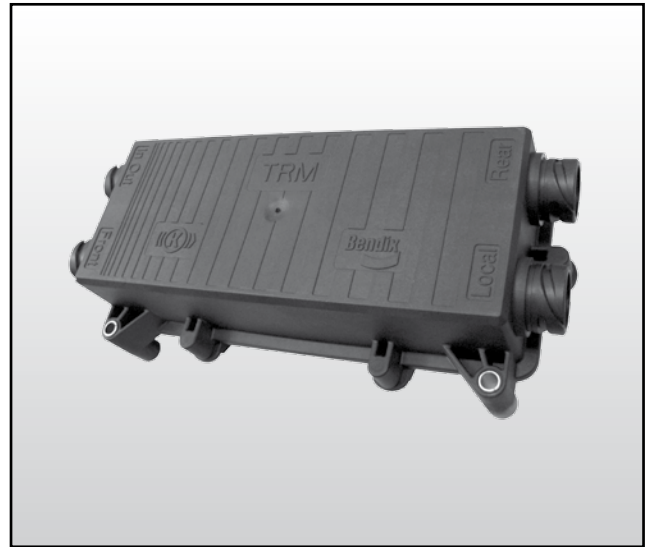


Function

The **Trailer Roadtrain Module (TRM)** is used as an amplifier or splitter for the ISO 11992 CAN bus. Using the TRM enables the realisation of a braking CAN bus of more than 40m overall.

All four electrical connections use the standard bayonet connector for the power supply of electronic braking systems. The incoming Power Supply Line /CAN from the ISO 7638 is distributed to the outgoing ports "Local" and "Rear". Each of those ports can be used to connect a TEBS G2 system.

The fourth port "In-Out" can be used to connect two external **pressure sensors** in the "Control" line. The information derived from the sensors is then transformed into a corresponding CAN signal. By doing so the TRM creates a reliable CAN brake demand for the connected TEBS G2 systems.

**Technical Features****TRM**

Operating temperature range: -40 °C to +80 °C
Weight: 1.15 kg approx.
Voltage range: 9 to 32 V DC

Pressure sensor

Operating temperature range: -45 °C to +80 °C
Weight: 0.07 kg approx.
Input pressure range: 0.6 to 13.0 bar
Nominal output voltage: 0.574 V at 0.6 bar
4.480 V at 13.0 bar

Range Overview

| Part No. | Type No. | Description | Bayonet Connectors | Pins |
|-----------------------|----------|--------------------------------|--------------------|-------|
| K036198 ¹⁾ | EZ2085 | Trailer Roadtrain Module (TRM) | 4 | 4 x 7 |

| Part No. | Type No. | Description | Used for |
|-----------------------|----------|-----------------|---|
| K027817 ²⁾ | - | Closure cap | Closing unused bayonet connectors |
| K015173 ²⁾ | - | Pressure sensor | Monitoring the pneumatic brake demand and converting it into an electric signal |

¹⁾ The part number of the module will carry two suffices, firstly "V##" which represents the software revision of the product, e.g. V01, V02 etc., and secondly "N##" which defines the packaging requirements of different market sectors, e.g. N00, N50. Example: K036198V00N00 - is supplied with software to revision 00 and is supplied without packaging.

²⁾ The part number will carry a suffix, "N##" which defines the packaging requirements of different market sectors, e.g. N00, N50. Example: K015173N00 - is supplied without packaging.

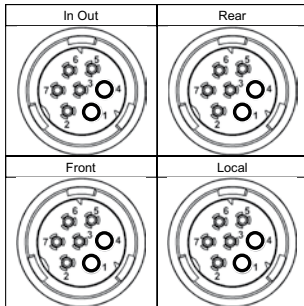
EZ2085

Trailer Roadtrain Module

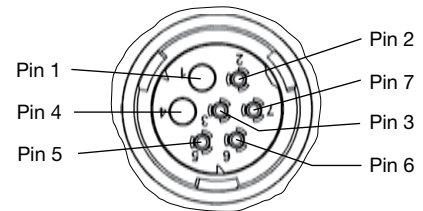
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Connectors

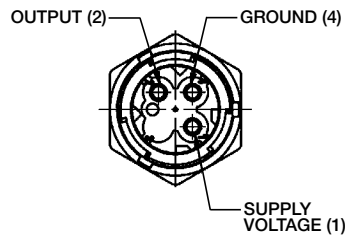
TRM



| Pin Configuration | | | | |
|-------------------|---------------------|---------------------|---------------------|--------------------|
| Pin | "Rear" Connector | "Front" Connector | "Local" Connector | "In-Out" Connector |
| 1 | Battery supply | Battery supply | Battery supply | SENS_SUP 1 |
| 2 | ECU supply | ECU supply | ECU supply | SENS IN 1 |
| 3 | ECU ground | ECU ground | ECU ground | SENS IN 2 |
| 4 | Battery ground | Battery ground | Battery ground | GND |
| 5 | Warning lamp signal | Warning lamp signal | Warning lamp signal | Tristate_IN |
| 6 | TT CAN High | TT CAN High | TT CAN High | AuxIO |
| 7 | TT CAN Low | TT CAN Low | TT CAN Low | n.n. |



Pressure sensor



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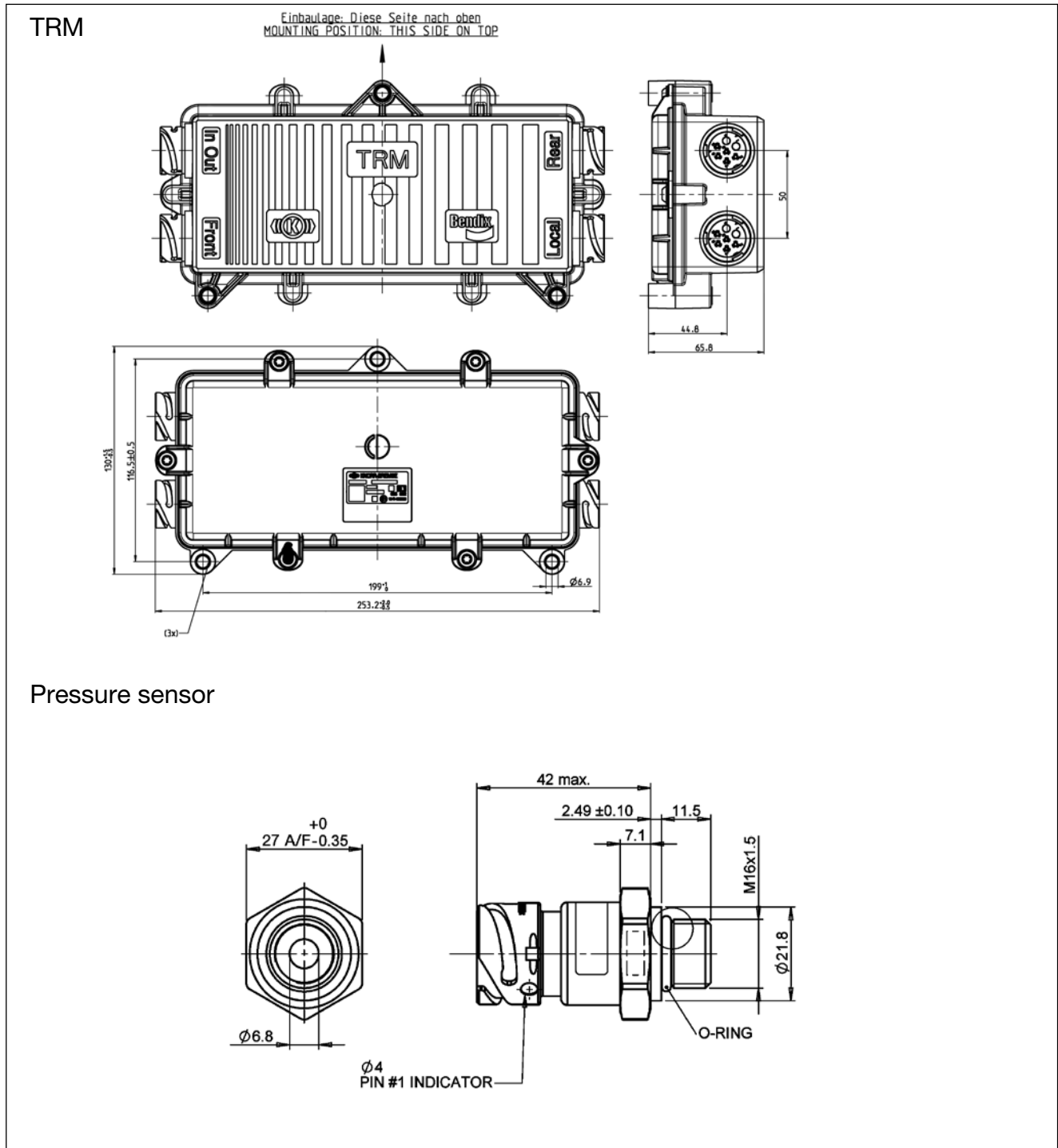
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EZ2085

Trailer Roadtrain Module

Doc. No. Y095620 (Rev. 000)
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Installation

TRM

- Only use M6 (8.8) fixing screws.
- Tightening torque 7.8 Nm \pm 0.2 Nm.
- A self-locking nut must be used on every fixing screw.
- A grommet must be used between the TRM and the truck/trailer and between the truck/trailer and the nut.
- If a connector on the TRM is not connected to a bayonet plug then it must be fitted with a closure cap - part number K027817.
- Only mount the TRM directly onto the vehicle frame. The installation position must be agreed with Knorr-Bremse.
- The TRM must be mounted on a flat 'closed' surface. Other mountings are possible only with the approval of Knorr-Bremse.
- The vent orifice on the rear face of the TRM must not be blocked or obstructed.
- Cables must not be connected with voltage applied.
- Mounting and environmental conditions must be in accordance with the Knorr-Bremse specification.

Pressure sensor

- The recommended mounting is with the pressure supply port pointing downwards (maximum +/- 15° from vertical axis).
- Tightening torque for pressure supply port 30 Nm \pm 6 Nm.

For further information see Product Manual Y037243



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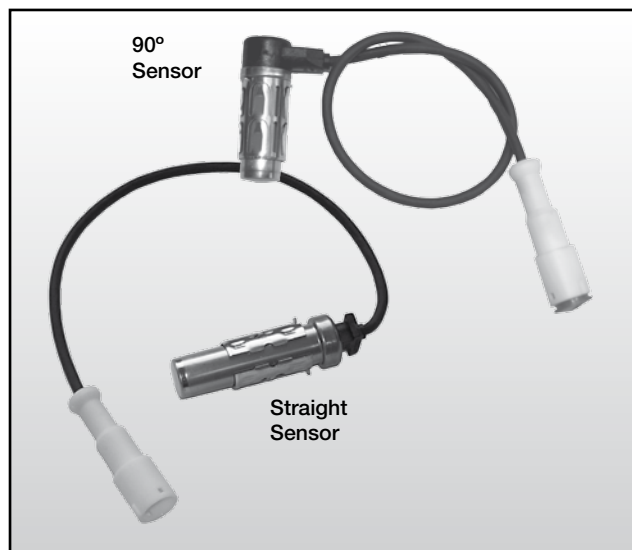


Function

When fitted in conjunction with a toothed sensing ring (pole wheel), the **Wheel Speed Sensor** supplies the ECU of the trailer's ABS with precise wheel speed information.

The **Wheel Speed Sensor** is available in various cable lengths and is supplied with a standard two pin socket for connection to a sensor extension cable (see PD-272-000, Document No. Y095697).

The **Wheel Speed Sensor** is held in the mounting hole on the axle by the sensor bush. When fitting a new sensor always fit a new bush. Note: the bush may not be supplied with the sensor (see table below).

**Technical Features**

Operating Temperature Range:

| | |
|--------------|-------------------|
| Speed Sensor | -40 °C to +160 °C |
| Cable | -40 °C to +180 °C |
| Plug | -40 °C to +80 °C |

Range Overview

| Part No. | Type No. | Length [m] | 90° Sensor | Straight Sensor | Bush and Grease |
|---------------|----------|------------|------------|-----------------|-----------------|
| 0486000126100 | - | 0.4 | X | | |
| 0486000134000 | - | 0.4 | X | | X |
| 0486000135000 | - | 2.0 | X | | X |
| 0486000136000 | - | 1.0 | X | | X |
| 0486001032100 | - | 0.3 | | X | |
| 0486001033100 | - | 1.0 | | X | |
| 0486001066100 | - | 1.7 | | X | |
| 0486001078000 | - | 0.3 | | X | X |
| 0486001079000 | - | 1.7 | | X | X |

Part No. for Service Parts:

Sensor Bush: II16774

Assembly Grease: I90693

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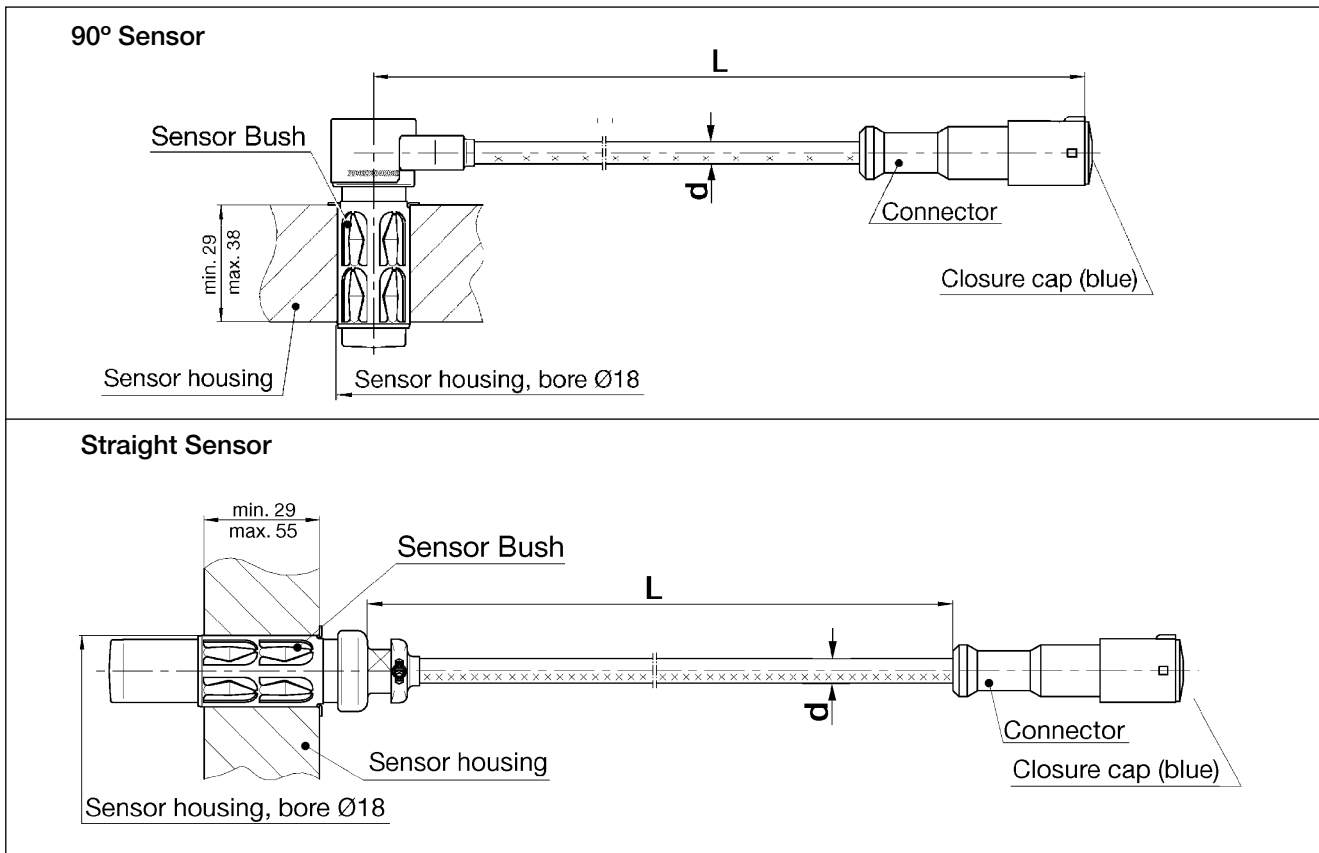
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04860001.., 04860010..

Wheel Speed Sensors

Doc. No. Y011363 (Rev. 002)
March 2011

Dimensions



| Part No. | Type No. | Length (L) [m] | Dia. (d) [mm] | 90° Sensor | Straight Sensor | With Sensor Bush and Grease |
|---------------|----------|-------------------|------------------|---------------|--------------------|--------------------------------|
| 0486000126100 | - | 0.4 | 4.4 | X | | No |
| 0486000134000 | - | 0.4 | 4.4 | X | | Yes |
| 0486000135000 | - | 2.0 | 4.4 | X | | Yes |
| 0486000136000 | - | 1.0 | 4.4 | X | | Yes |
| 0486001032100 | - | 0.3 | 4.4 | | X | No |
| 0486001033100 | - | 1.0 | 4.4 | | X | No |
| 0486001066100 | - | 1.7 | 4.4 | | X | No |
| 0486001078000 | - | 0.3 | 4.4 | | X | Yes |
| 0486001079000 | - | 1.7 | 4.4 | | X | Yes |



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Function

The **Pressure Sensor** is used to measure air pressure and supply this information in an electrical form to the appropriate electronic device.

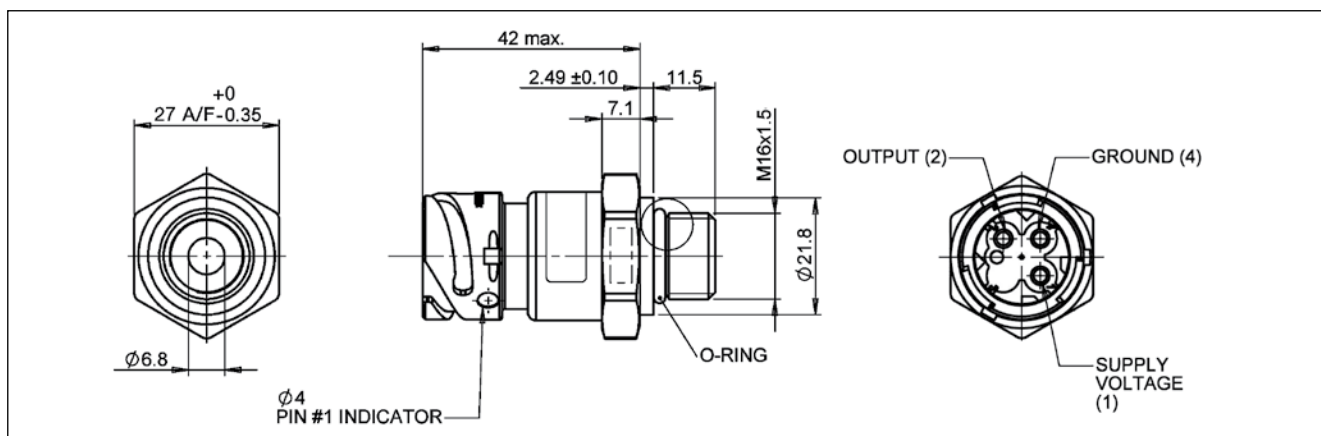
The **Pressure Sensor K015173¹⁾** has three possible applications on trailers fitted with Trailer EBS (TEBS) systems:

- to measure the pressure in the Control (yellow) line on trailers fitted with the Trailer Roadtrain Module (TRM) (see PD-214-800, Document No. Y095620). When used in this application two **Pressure Sensors** are used to ensure 'electrical redundancy' (continued operation should there be no signal from one sensor).
- to provide an external load input from the trailer suspension system when it is not practical to connect this pneumatically to the TEBS brake module.
- to provide an external load input from the trailer suspension system to the Trailer Electro-Pneumatic Module Standard (TEPM-S) (see PD-214-600, Document No. Y095618) in a 4S/3M system.

For details of suitable cables see PD-272-020, Document No. Y107795.

**Technical Features**

| | |
|------------------------------|---|
| Maximum operating pressure: | 13 bar |
| Nominal input voltage: | 5 V ± 0.25 V DC |
| Nominal output voltage: | 0.574 V at 0.6 bar 4.480 V at 13 bar |
| Operating Temperature Range: | -45 °C to +80 °C |
| Weight: | 0.07 kg approx. |

Dimensions

¹⁾ Part No. will carry the suffix N00 denoting that it is supplied without packaging.

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Function

The **Deflection Sensor** is used on trailers with mechanical suspension. Using the linkage to the axle(s) the sensor measures the deflection of the suspension and supplies this information as an electrical signal to the TEBS brake module.

The **Deflection Sensor K026919**¹⁾ comprises a level sensor with an attached adjustable mechanical linkage. The connection* from the linkage to the axle must be created separately.

For detailed information on installation and setting up of the **Deflection Sensor** see Service Manual Y053529.

* not supplied.

**Technical Features**

Weight: 0.38 kg approx.

Level sensor

Nominal input voltage: 5 V ± 0.5 V DC

Nominal output voltage: 5 V at -45°

0 V at +45°

Nominal operating angle: -40° to +40°

Operating Temperature Range: -45 °C to +85 °C

Range Overview

| Part No. | Type No. | Description | Linkage |
|-----------------------|----------|------------------------|--------------|
| K026919 ¹⁾ | - | Deflection Sensor | included |
| K025259 ²⁾ | - | Level Sensor | not included |
| II19422 | ZB3131 | Linkage (Level Sensor) | - |

¹⁾ Part No. will carry the suffix B90 denoting that it is a collection of products sold under one part number.

²⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging.

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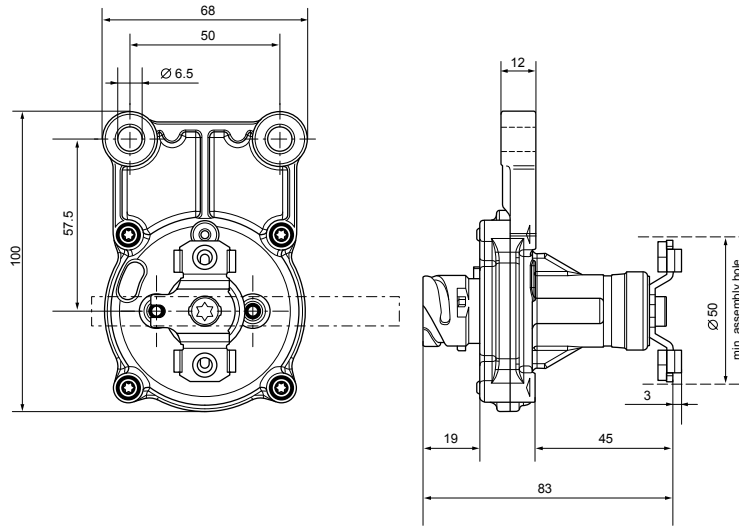
K026919

Deflection Sensor

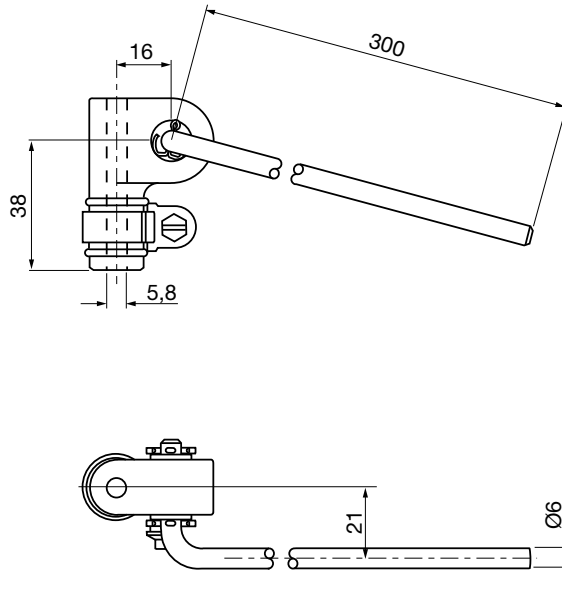
Doc. No. Y095832 (Rev. 000)
September 2011

Dimensions

**Level Sensor
K025259**



**Linkage
ZB3131**



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Function

Cables are used in trailer ABS systems to:

- provide electrical power to the components in the system.
- communicate signals to the ABS ECU from sensors monitoring trailer characteristics.
- communicate control commands from the ABS ECU to modulators to enable any required braking intervention.

Power Supply Cables are used to distribute electrical power from the towing vehicle to electrically powered braking and auxiliary equipment of the trailer. The main power supply to the trailer is through a plug or socket according to ISO 7638.

The cables are available in various lengths and are normally supplied with a bayonet connector to ensure easy and safe connection.

Modulator Cables are used to supply electrical power from the ABS ECU:

- to the primary (first and second) modulators on systems where the connection is external (KB3-TA and A18)
- to the external third modulator on 4S/3M systems.

The cables are available separately for the KB3-TA system and as part of a wiring harness for the A18 systems.

Wheel Speed Sensor Cables are used to connect the ECU to the wheel speed sensors so that their wheel speed signals can be sent. The wheel speed sensor is supplied with only a short length of cable and so will often require a **Wheel Speed Sensor Extension Cable** to enable connection.

NOTE: *In this document the cables are divided into sections:*

- *Each section covers the system for which the cables are intended (KB4TA, A18 and KB3-TA).*
- *To help in finding the right cable, at the head of each page is a photograph of the ABS module from the relevant system*
- *Cables which can be used in more than one system have photographs of all relevant modules at the head of the page*
- *Each section starts with details of power supply cables, then shows modulator cables, wheel speed sensor cables and auxiliary cables.*

**Technical Features**

Operating Temperature Range: -40 °C to +80 °C

See tables for other features.

Colour Coding used in this document

| | | | | | |
|----|-------|----|-------|----|--------|
| BK | Black | GN | Green | YE | Yellow |
| BN | Brown | RD | Red | | |
| BU | Blue | WH | White | | |

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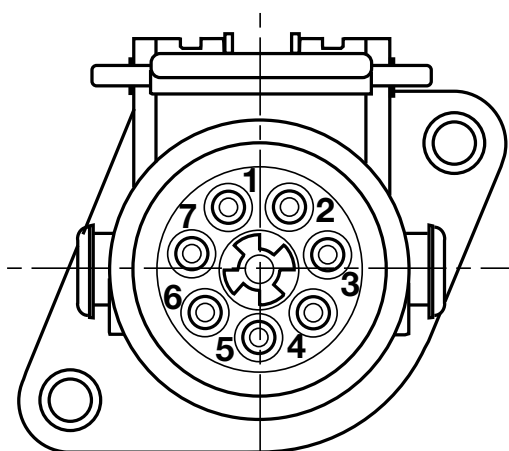
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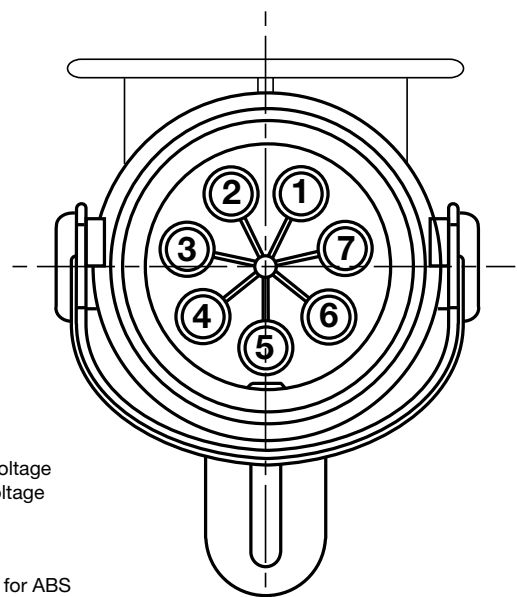
Cables for Trailer ABS

Doc. No. Y095697 (EN - Rev. 000)
September 2011

Pin Configurations

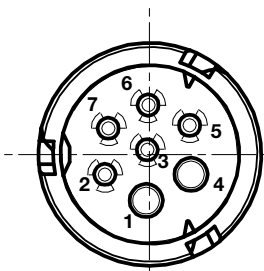


ISO 7638 Socket
(24 V)

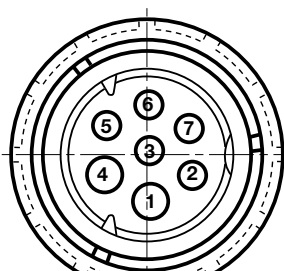


ISO 7638 Plug
(24 V)

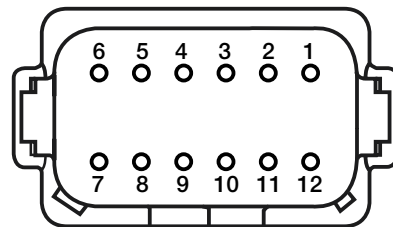
- Pin 1 red Valve supply voltage
- Pin 2 black ECU supply voltage
- Pin 3 yellow ECU ground
- Pin 4 brown Valve ground
- Pin 5 white Warning lamp
- Pin 6 - not connected for ABS
- Pin 7 - not connected for ABS



Bayonet Socket

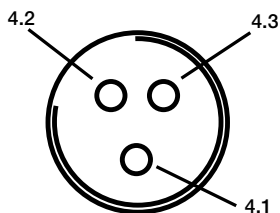


Bayonet Plug



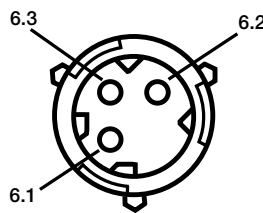
Deutsch Plug

Modulator connectors



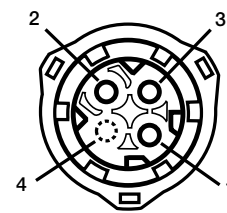
M24x1 Connector - Socket

- 4.1 - Common
- 4.2 - Release Valve
- 4.3 - Hold Valve



DIN72585 Bayonet Socket

- 6.1 - Release Valve
- 6.2 - Common
- 6.3 - Hold Valve



DIN72585 Bayonet Plug

- 1 - Release Valve
- 2 - Common
- 3 - Hold Valve
- 4 - not connected

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Range Overview - KB4TA Cables



KB4TA ABS Module

Power Supply Cable Options

| | | Trailer | |
|--|---|--|---|
| | | Semi-trailer | Drawbar or Centre-axle Trailer |
| ISO 7638 Connector direct to KB4TA ABS Module | | | |
| ISO 7638 Connector + ISO 1185 connection | either | Cable K015313 (page 4) | - |
| | or | Cable K015468 (page 5) + ISO 7638 Socket K002290 (page 12) | Cable K015468 (page 5) + ISO 7638 Plug K002291 (page 12) |
| ISO 7638 Connector to KB4TA ABS Module via intermediate connector | | | |
| ISO 7638 Connector to intermediate connector | | Cable K022269 / 70 / 71 (page 4) | Cable K022273 / 74 (page 5) |
| | plus | Intermediate connector to KB4TA module + diagnostic socket | Harness K010838 (page 6) |
| | or plus | Intermediate connector to KB4TA module + diagnostic socket + ISO 1185 connection | Harness K010839 (page 6) |
| or plus | Intermediate connector to KB4TA module + diagnostic socket + 3rd modulator connection | Harness K016991 (page 7) | |

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Cables for Trailer ABS

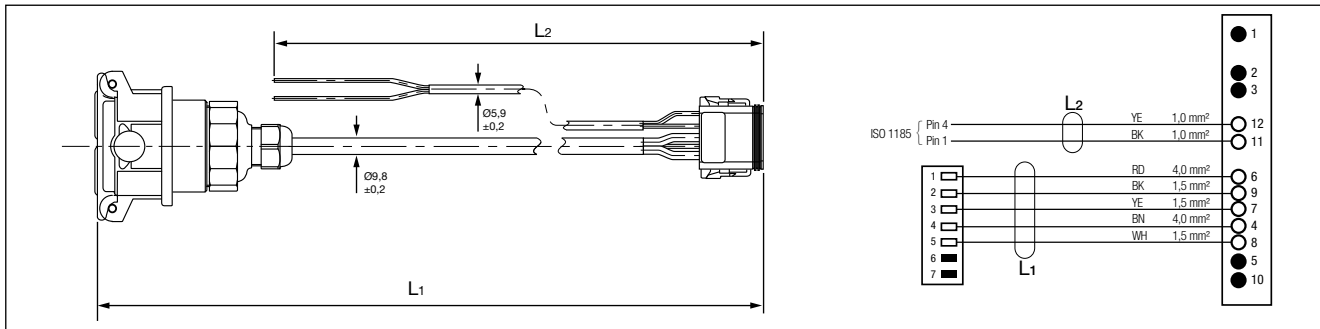
Doc. No. Y095697 (EN - Rev. 000)
September 2011

Range Overview - KB4TA Cables (contd.)



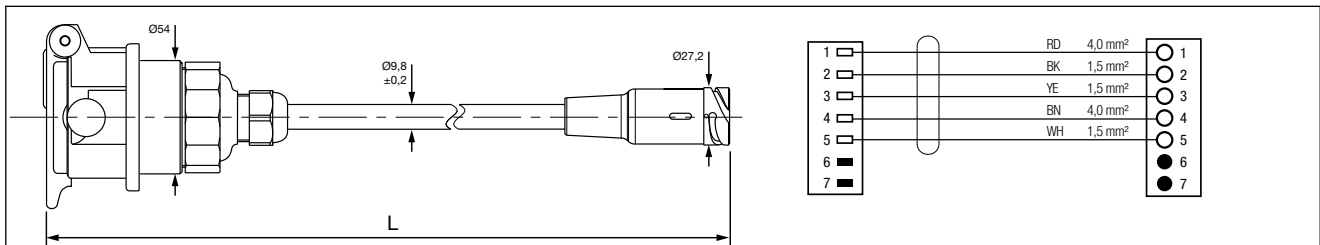
KB4TA ABS Module

Power Supply Cable (for semi-trailers) with ISO 7638 Socket and ISO 1185 Connection



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--|--|
| K015313 ¹⁾ | - | L ₁ = 12.0 L ₂ = 12.0 | L ₁ = power supply (ISO 7638) L ₂ = stop lamp supply (ISO 1185) |

Power Supply Cable (for semi-trailers) with ISO 7638 Socket



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|--|
| K022269 ¹⁾ | - | 8.0 | Use with Power Supply Wiring Harness (page 6 and 7) |
| K022270 ¹⁾ | - | 12.0 | |
| K022271 ¹⁾ | - | 14.0 | |

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Range Overview - KB4TA Cables (contd.)



KB4TA ABS Module

Power Supply Cable (for drawbar and centre-axle trailers) with ISO 7638 Plug

| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|---|
| K022273 ¹⁾ | - | 8.0 | Use with Power Supply Wiring Harness (page 6 and 7) |
| K022274 ¹⁾ | - | 10.0 | |

Power Supply Cable with ISO 7638 and ISO 1185 Connections

| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--|--|
| K015468 ¹⁾ | - | L ₁ = 12.0 L ₂ = 12.0 | L ₁ = power supply (ISO 7638) L ₂ = stop lamp supply (ISO 1185) Use with ISO 7638 Plug or Socket (page 11) |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K015468N00

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Cables for Trailer ABS

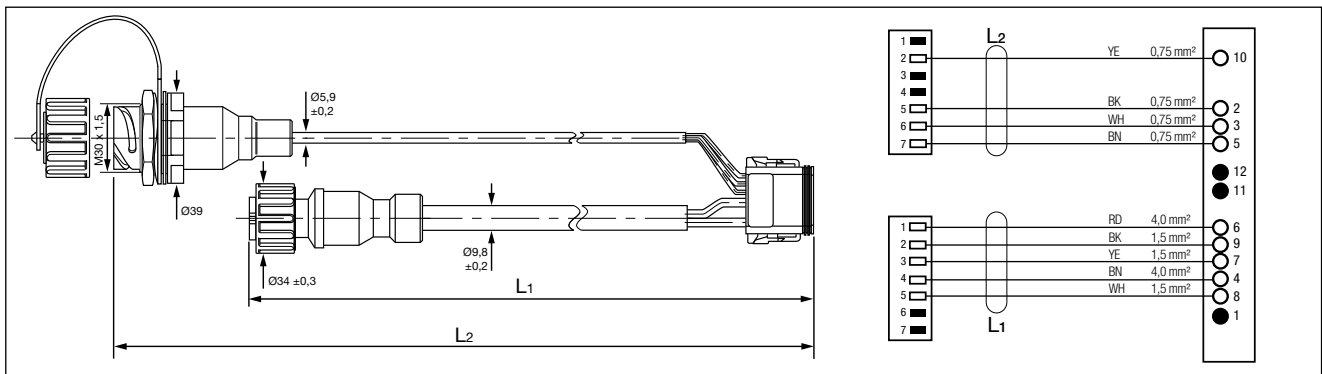
Doc. No. Y095697 (EN - Rev. 000)
September 2011

Range Overview - KB4TA Cables (contd.)



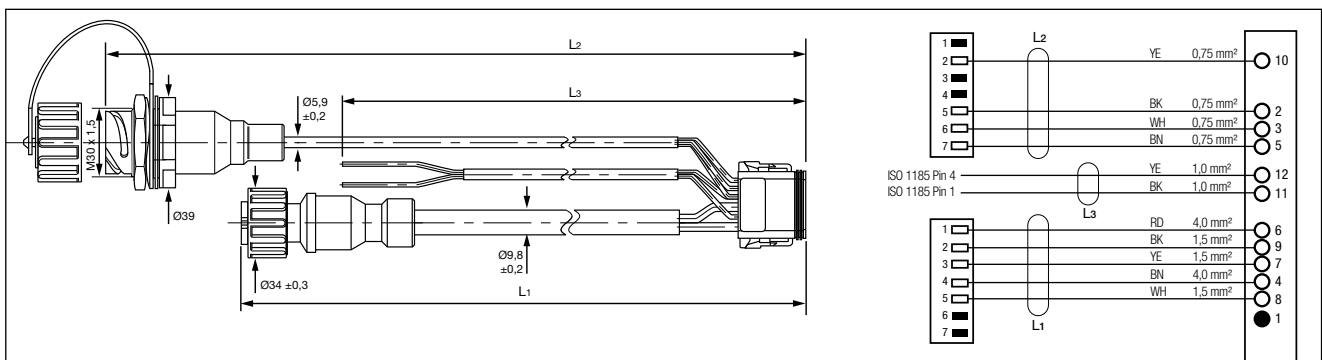
KB4TA ABS Module

Power Supply Wiring Harness (ISO 7638 only) with Diagnostic Socket



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--|--|
| K010838 ¹⁾ | - | L ₁ = 0.5 L ₂ = 6.0 | L ₁ = power supply (ISO 7638) L ₂ = diagnostic socket Use with Power Supply Cable (page 4 and 5) |

Power Supply Wiring Harness (ISO 7638 and ISO 1185) with Diagnostic Socket



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--|--|
| K010839 ¹⁾ | - | L ₁ = 0.5 L ₂ = 6.0 L ₃ = 8.0 | L ₁ = power supply (ISO 7638) L ₂ = diagnostic socket L ₃ = stop lamp supply (ISO 1185) Use with Power Supply Cable (page 4 and 5) |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K010839N00

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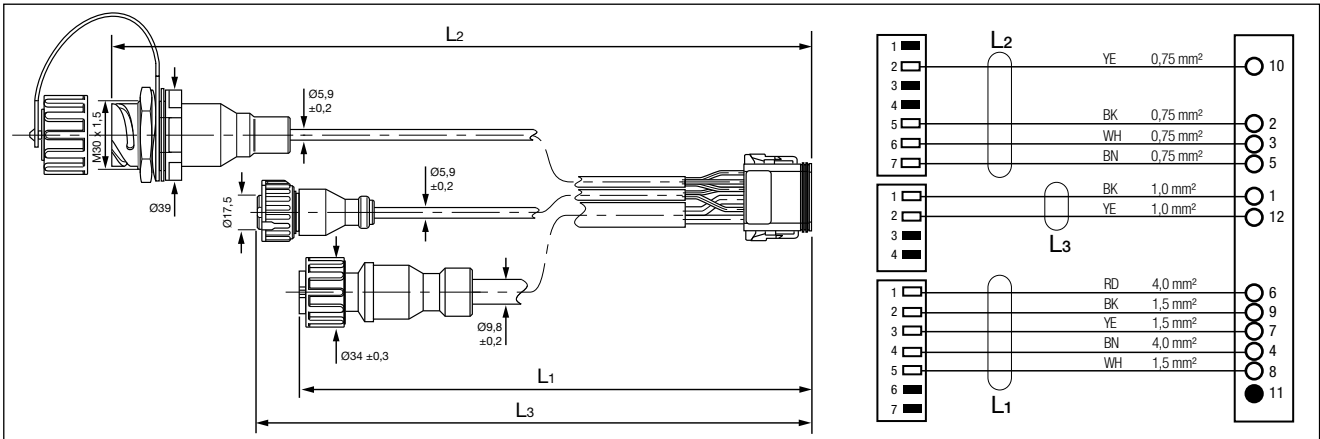


Range Overview - KB4TA Cables (contd.)



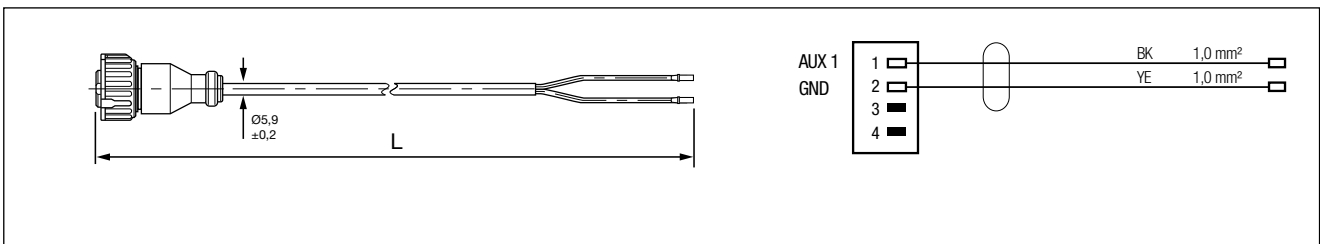
KB4TA ABS Module

Power Supply Wiring Harness (ISO 7638 only) with Diagnostic Socket and 3rd Modulator



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|---|---|
| K016991 ¹⁾ | - | L ₁ = 0.5 L ₂ = 6.0 L ₃ = 10.0 | L ₁ = power supply (ISO 7638) L ₂ = diagnostic socket L ₃ = 3rd modulator (4S/3M system) Use with Power Supply Cable (page 4 and 5) |

3rd Modulator cable



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|---|
| K002274 ¹⁾ | - | 2.0 | Open ends for connecting to Deutsch Connector Black wire to Pin 1 Yellow wire to Pin 12 |
| K002275 ¹⁾ | - | 6.5 | |
| K002276 ¹⁾ | - | 10.0 | |
| K017003 ¹⁾ | - | 15.0 | |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K017003N00

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Cables for Trailer ABS

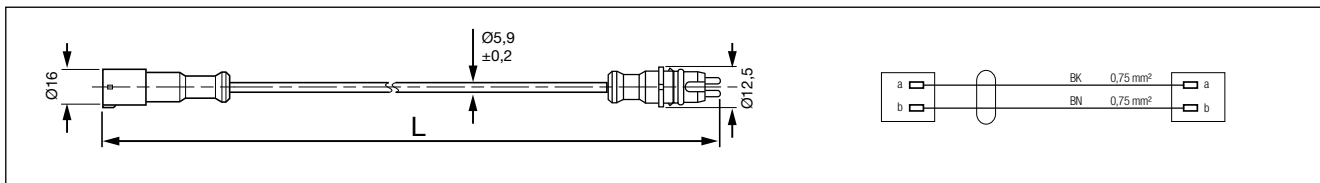
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Range Overview - KB4TA Cables (contd.)



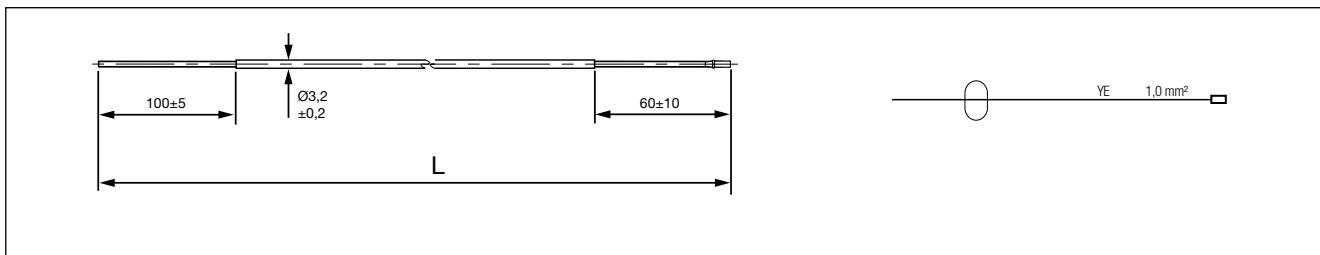
KB4TA ABS Module

Wheel Speed Sensor Extension Cable



| Part No. | Type No. | Cable length L [m] | Comments |
|--------------|----------|--------------------|---|
| II367562000 | EK3130 | 2.0 | Use to connect KB4TA ABS module with wheel speed sensor |
| II367563000 | | 3.0 | |
| II367564000 | | 4.0 | |
| II367565000 | | 5.0 | |
| II367566000 | | 6.0 | |
| II367568000 | | 8.0 | |
| II3675610000 | | 10.0 | |
| II3675612000 | | 12.0 | |
| II3675615000 | | 15.0 | |

External Warning Lamp Cable



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|--|
| K016629 ¹⁾ | - | 7.0 | Open end for connecting to Deutsch Connector Pin 1 - AuxIO 1 or Pin 11 - AuxIO 2 |
| K016630 ¹⁾ | - | 15.0 | |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K016630N00

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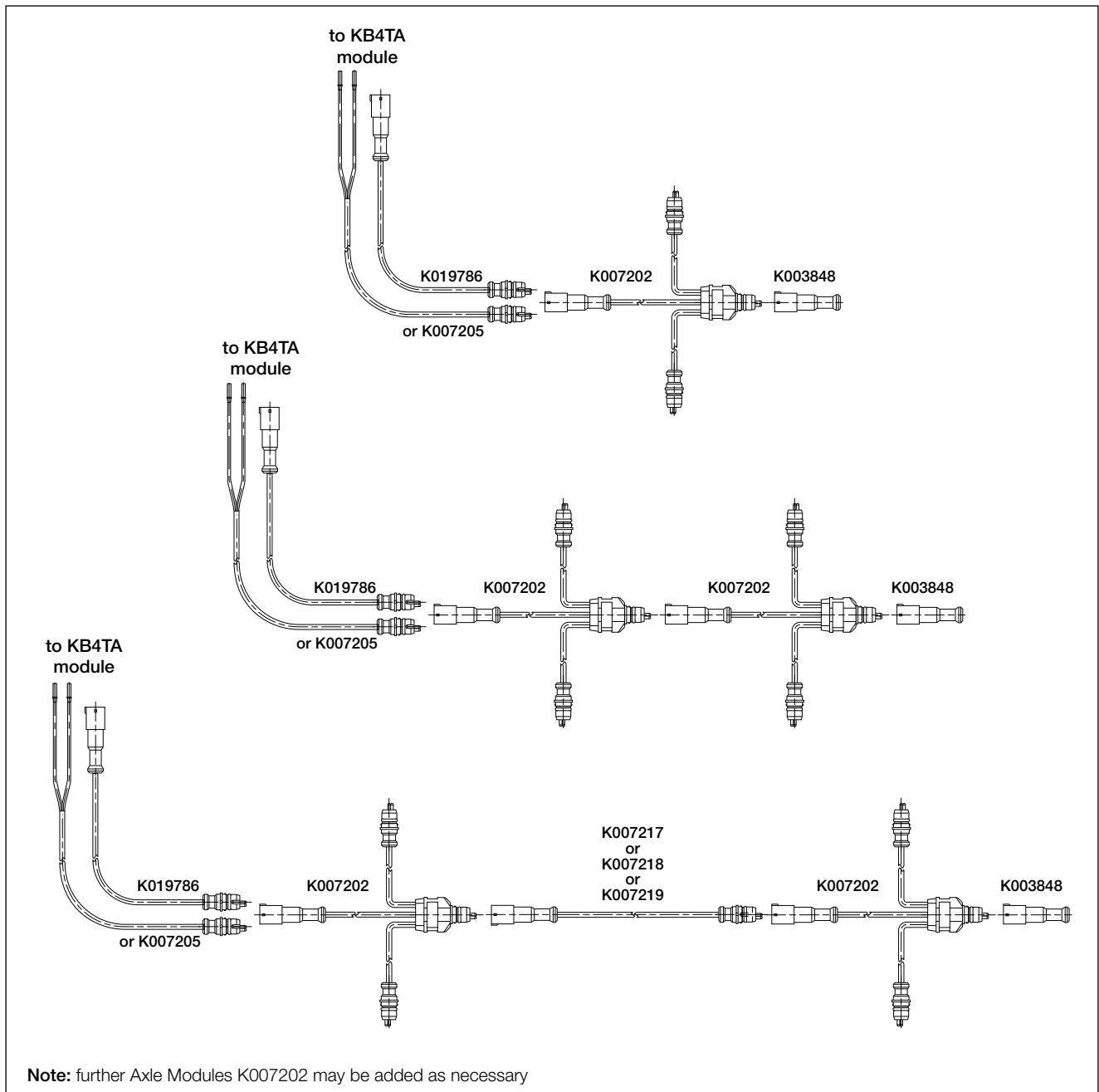


Range Overview - KB4TA Cables (contd.)



KB4TA ABS Module

Pad Wear Sensing - Installation examples



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Cables for Trailer ABS

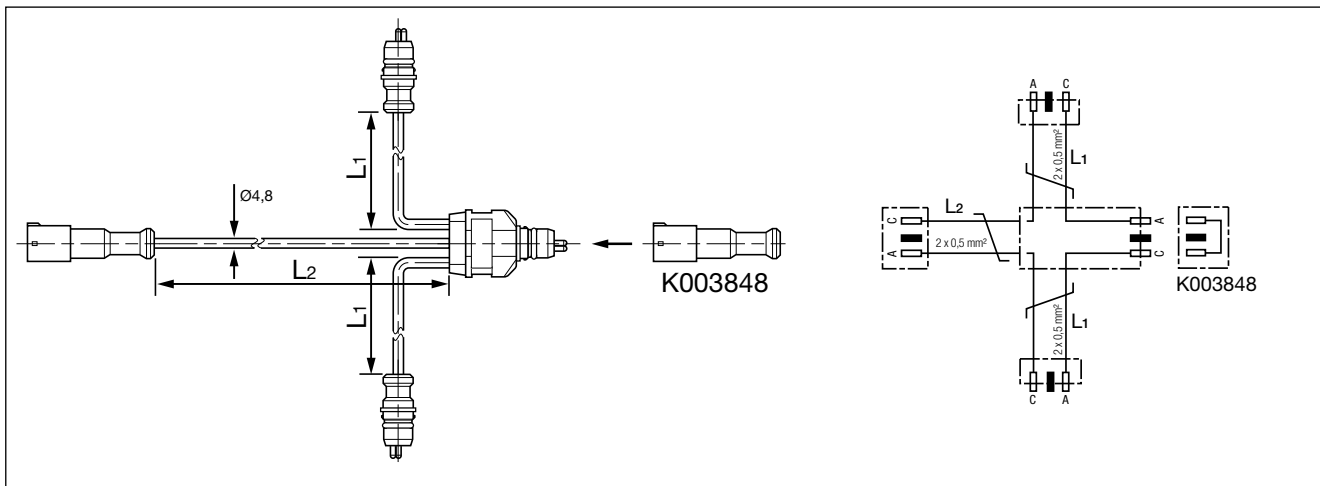
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Range Overview - KB4TA Cables (contd.)



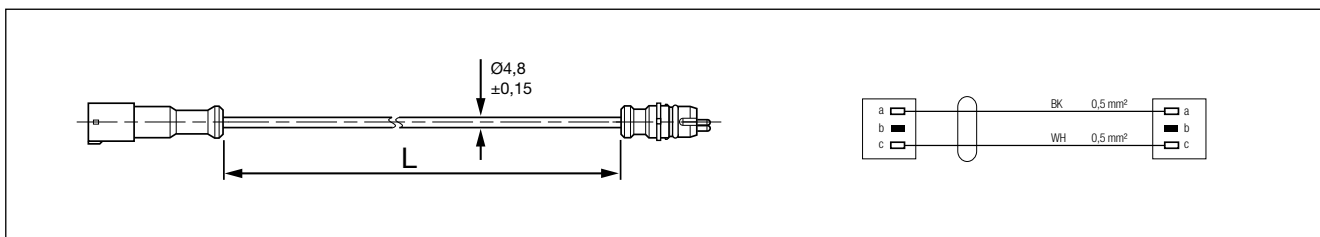
KB4TA ABS Module

Axle Module for Pad Wear Sensing



| Part No. | Type No. | Cable length L [m] | Comments |
|----------|----------|--|--|
| K007202 | - | L ₁ = 2.0 L ₂ = 2.0 | L ₁ = pad wear sensor L ₂ = connecting or extension cable |
| K003848 | - | - | Closure Cap for Axle Module K007202 |

Extension Cable for Pad Wear Sensing



| Part No. | Type No. | Cable length L [m] | Comments |
|----------|----------|--------------------|--|
| K007217 | - | 1.0 | To connect two Axle Modules K007202 together |
| K007218 | - | 3.0 | |
| K007219 | - | 5.0 | |

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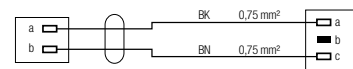
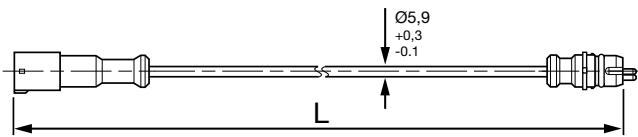
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Range Overview - KB4TA Cables (contd.)

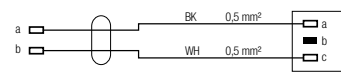
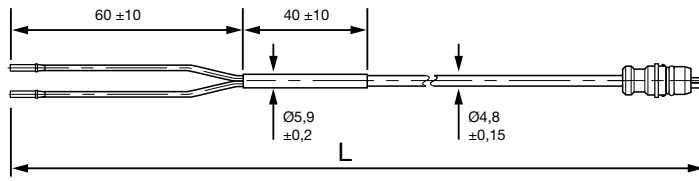


KB4TA ABS Module

Connecting Cable for Pad Wear Sensing

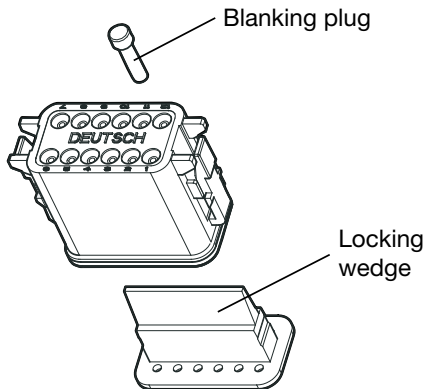


| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|---|
| K019786 ¹⁾ | - | 1.0 | To connect Axle Module K007202 to KB4TA ABS Module (SAL or SAR) |



| Part No. | Type No. | Cable length L [m] | Comments |
|----------|----------|--------------------|---|
| K007205 | - | 1.0 | To connect Axle Module K007202 to KB4TA ABS Module (Deutsch plug) |

Accessories



| Part No. | Type No. | Description |
|-----------------------|----------|---|
| K002287 ¹⁾ | - | 12-pin Deutsch Plug (includes: 1x Deutsch plug 1 x Locking wedge 12 x Blanking plugs) |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K002287N00

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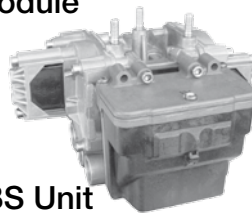
Cables for Trailer ABS

Doc. No. Y095697 (EN - Rev. 000)
September 2011

Range Overview - Accessories for KB4TA, A18 and KB3-TA

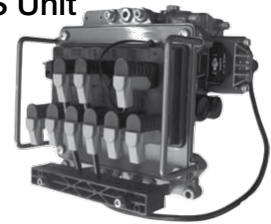


KB4TA ABS Module

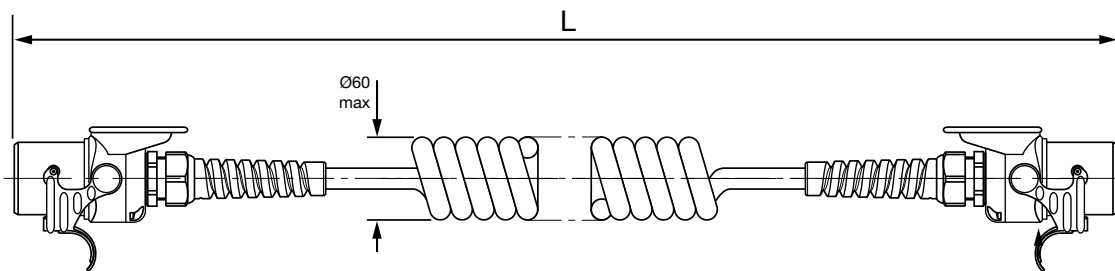


A18 ABS Unit

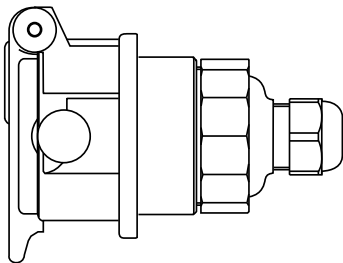
KB3-TA ABS Unit



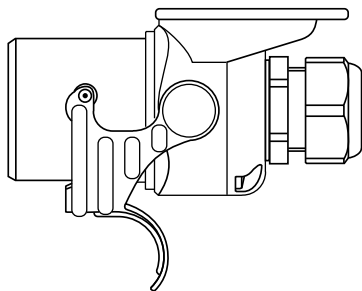
“Susie” Cable for towing vehicle to trailer connection



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|--|
| K004098 ¹⁾ | EK3150 | 1.0 - 4.0 | With 7 pin connectors, for connecting ABS or EBS With buckling protection |



| Part No. | Type No. | Description |
|----------|----------|-------------------------|
| K002290 | - | ISO 7638 Socket (7 pin) |



| Part No. | Type No. | Description |
|----------|----------|-----------------------|
| K002291 | - | ISO 7638 Plug (7 pin) |

¹⁾ The part number will carry a suffix “N00” which defines that it is supplied without packaging. Example K002287N00

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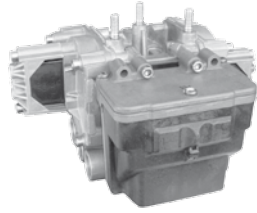
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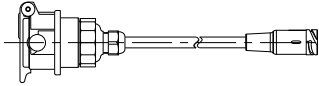
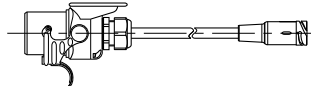
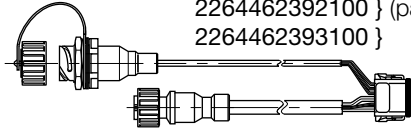
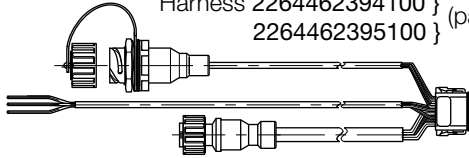


Range Overview - A18 Cables



A18 ABS Unit

Power Supply Cable Options

| | | Trailer | |
|--|------|--|---|
| | | Semi-trailer | Drawbar or Centre-axle Trailer |
| ISO 7638 Connector to A18 ABS Unit via intermediate connector | | | |
| ISO 7638 Connector to intermediate connector | | Cable K022269 / 70 / 71 (page 14)  | Cable K022273 / 74 (page 14)  |
| or plus | plus | Intermediate connector to A18 ABS Unit + diagnostic socket | Harness 2264462391100 } 2264462392100 } (page 15) 2264462393100 }  |
| | plus | Intermediate connector to A18 ABS Unit + diagnostic socket + ISO 1185 connection | Harness 2264462394100 } 2264462395100 } (page 15)  |

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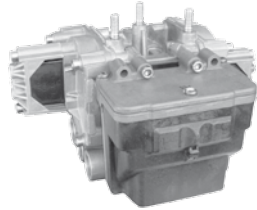
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Cables for Trailer ABS

Doc. No. Y095697 (EN - Rev. 000)
September 2011

Range Overview - A18 Cables (contd.)



A18 ABS Unit

Power Supply Cable for semi-trailers with ISO 7638 Socket

| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|-------------------------------|
| K022269 ¹⁾ | - | 8.0 | replaces 2264462396100 |
| K022270 ¹⁾ | - | 12.0 | replaces 2264462397100 |
| K022271 ¹⁾ | - | 14.0 | replaces 2264462398100 |

Use with Power Supply Wiring Harness (page 14)

Power Supply Cable for drawbar trailers with ISO 7638 Plug

| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|-------------------------------|
| K022273 ¹⁾ | - | 8.0 | replaces 2264462399100 |
| K022274 ¹⁾ | - | 10.0 | replaces 2264462400100 |

Use with Power Supply Wiring Harness (page 14)

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K022274N00

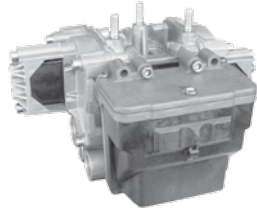
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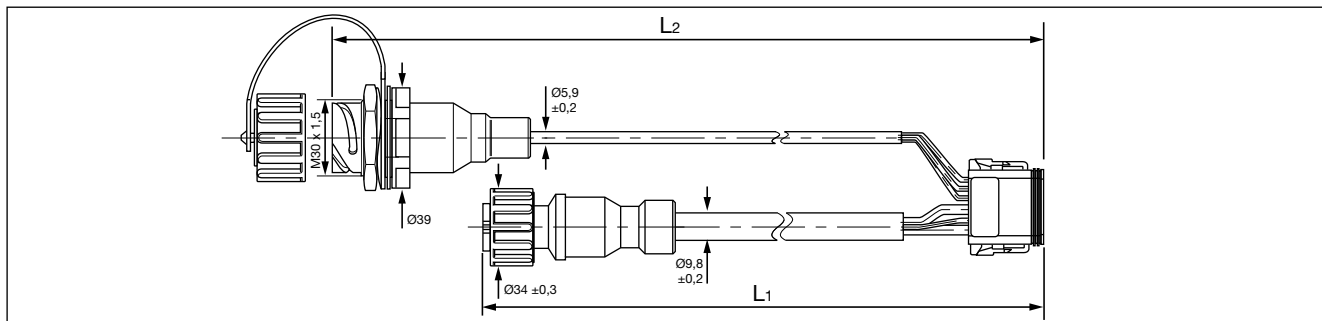
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Range Overview - A18 Cables (contd.)



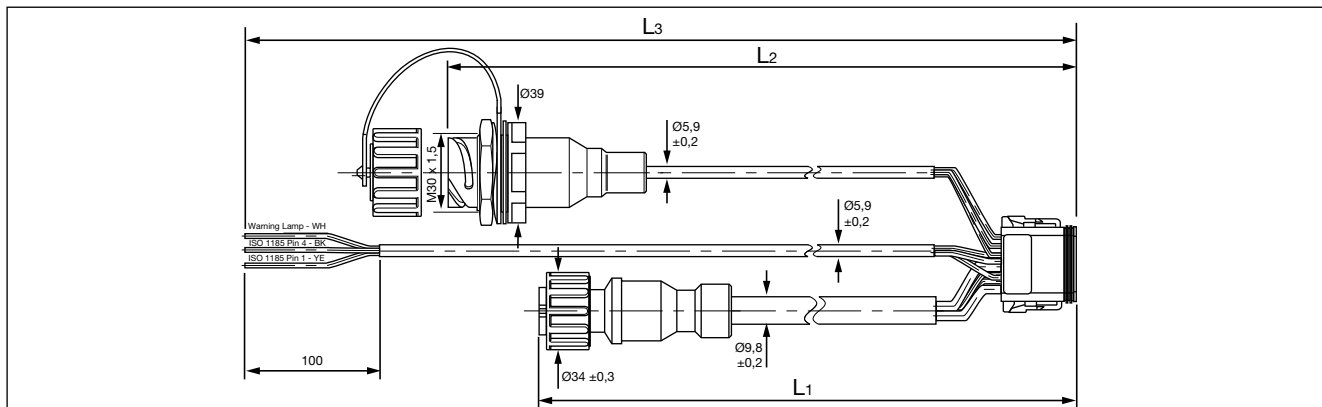
A18 ABS Unit

Power Supply Wiring Harness (ISO 7638 only) with Diagnostic Socket



| Part No. | Type No. | Cable length L [m] | Comments |
|---------------|----------|---|---|
| 2264462391100 | - | L ₁ = 0.5 L ₂ = 3.0 | L ₁ = power supply (ISO 7638) L ₂ = diagnostic socket (Bayonet) Use with Power Supply Cable (page 13) |
| 2264462392100 | - | L ₁ = 0.5 L ₂ = 5.0 | |
| 2264462393100 | - | L ₁ = 0.5 L ₂ = 12.0 | |

Power Supply Wiring Harness (ISO 7638 and ISO 1185) with Diagnostic Socket



| Part No. | Type No. | Cable length L [m] | Comments |
|---------------|----------|--|---|
| 2264462394100 | - | L ₁ = 0.5 L ₂ = 5.0 L ₃ = 13.0 | L ₁ = power supply (ISO 7638) L ₂ = diagnostic socket (Bayonet) L ₃ = stop lamp supply (ISO 1185) Use with Power Supply Cable (page 13) |
| 2264462395100 | - | L ₁ = 0.5 L ₂ = 12.0 L ₃ = 13.0 | |

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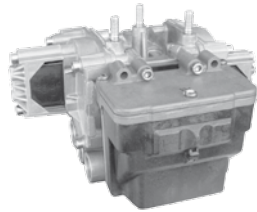
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Cables for Trailer ABS

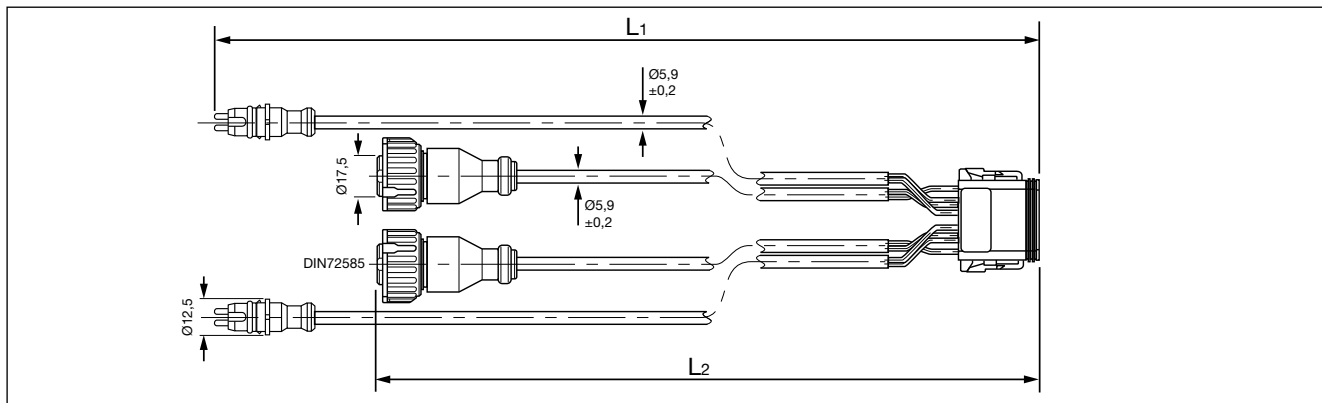
Doc. No. Y095697 (EN - Rev. 000)
September 2011

Range Overview - A18 Cables (contd.)



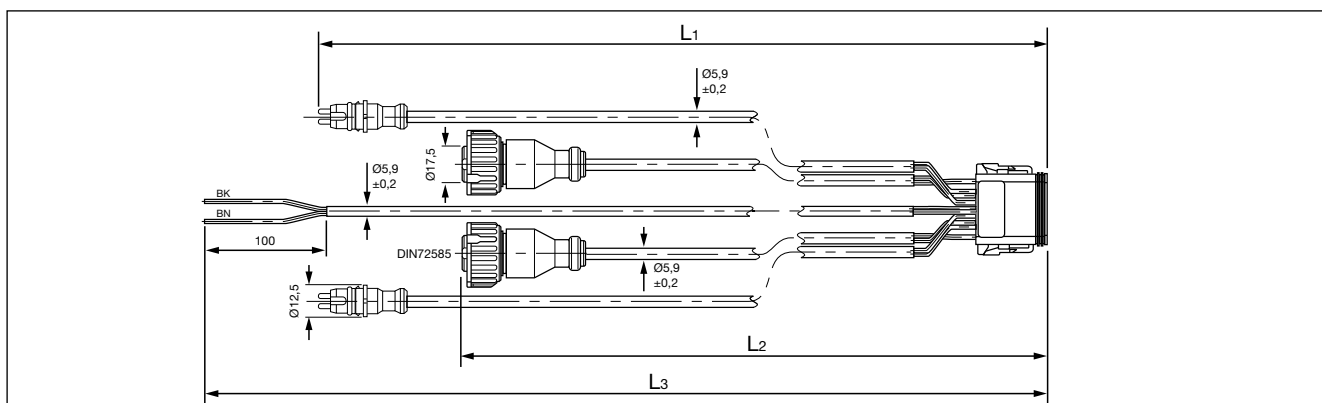
A18 ABS Unit

Modulator Wiring Harness with Wheel Speed Sensor Extension Cables



| Part No. | Type No. | Cable length L [m] | Comments |
|---------------|----------|--|--------------------------------------|
| 2264462374100 | - | L ₁ = 4.0 L ₂ = 0.5 | L ₁ = wheel speed sensors |
| 2264462375100 | - | L ₁ = 6.5 L ₂ = 0.5 | L ₂ = modulators |

Modulator Wiring Harness with Wheel Speed Sensor Extension Cables and UNI output



| Part No. | Type No. | Cable length L [m] | Comments |
|---------------|----------|--|--|
| 2264462403100 | - | L ₁ = 3.0 L ₂ = 0.5 L ₃ = 6.5 | L ₁ = wheel speed sensors L ₂ = modulators L ₃ = UNI output |

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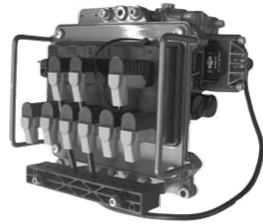
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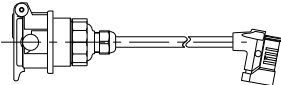
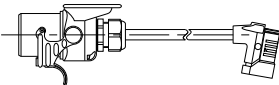
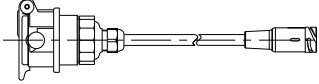
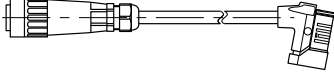
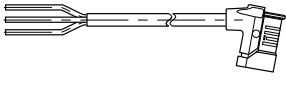


Range Overview - KB3-TA Cables



KB3-TA ABS Unit

Power Supply Cable Options

| | | Trailer | |
|---|---|--|---|
| | | Semi-trailer | Drawbar or Centre-axle Trailer |
| ISO 7638 Connector direct to KB3-TA ABS Unit | | | |
| ISO 7638 Connector only | | Cable EK3027 (page 18)  | Cable EK3022 (page 18)  |
| | | | |
| ISO 7638 Connector to KB3-TA ABS Unit via intermediate connector | | | |
| ISO 7638 Connector to intermediate connector | | Cable EK3028 (page 19)  | - |
| | plus Intermediate connector to KB3-TA unit + diagnostic socket | Cable EK3029 (page 19)  | - |
| ISO 1185 Connection direct to KB3-TA ABS Unit | | | |
| ISO 1185 Connection only | | Cable EK3040 (page 19)  | |

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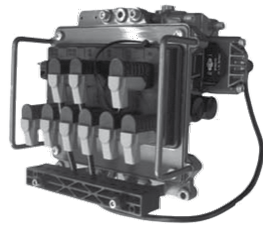
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Cables for Trailer ABS

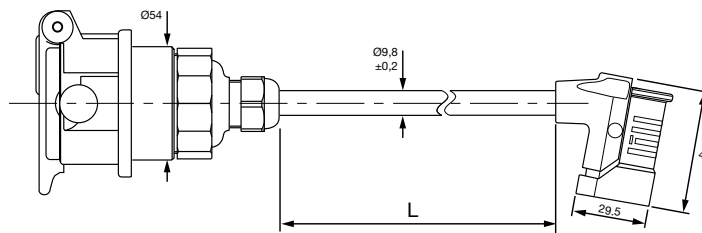
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September 2011

Range Overview - KB3-TA Cables (contd.)



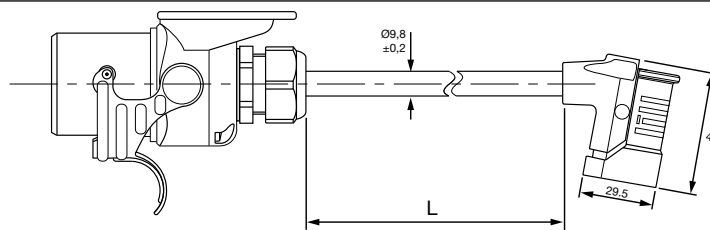
KB3-TA ABS Unit

Power Supply Cable for semi-trailers with ISO 7638 Socket



| Part No. | Type No. | Cable length L [m] | Comments |
|--------------|----------|--------------------|----------|
| II335888000 | EK3027 | 8.0 | |
| II3358810000 | | 10.0 | |
| II3358812000 | | 12.0 | |
| II3358813000 | | 13.0 | |
| II3358815000 | | 15.0 | |

Power Supply Cable for drawbar trailers with ISO 7638 Plug



| Part No. | Type No. | Cable length L [m] | Comments |
|--------------|----------|--------------------|----------|
| II354156000 | EK3022 | 6.0 | |
| II354158000 | | 8.0 | |
| II354159000 | | 9.0 | |
| II3541523000 | | 23.0 | |

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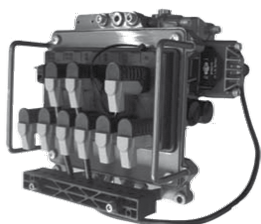
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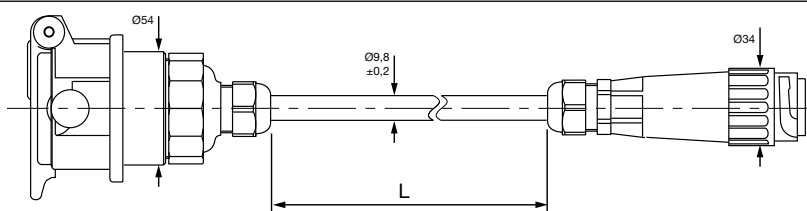


Range Overview - KB3-TA Cables (contd.)



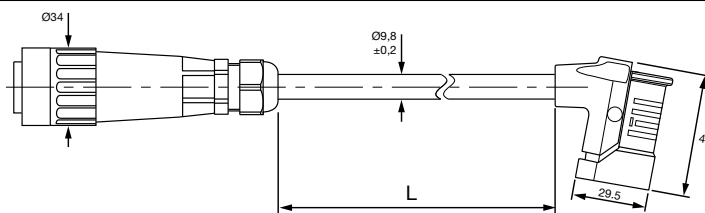
KB3-TA ABS Unit

Power Supply Cable (Split) for semi-trailers with ISO 7638 Socket



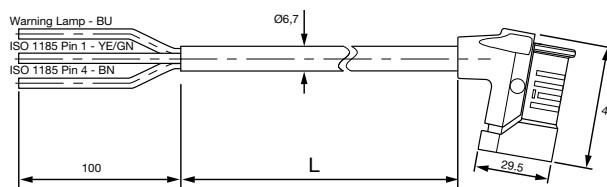
| Part No. | Type No. | Cable length L [m] | Comments |
|--------------|----------|--------------------|-----------------------------|
| II3641712000 | EK3028 | 12.0 | Use with EK3029 (see below) |

Power Supply Cable (Split) for semi-trailers with ISO 7638 Socket



| Part No. | Type No. | Cable length L [m] | Comments |
|------------|----------|--------------------|-----------------------------|
| II36418500 | EK3029 | 0.5 | Use with EK3028 (see above) |

Power Supply Cable for ISO 1185 Connection



| Part No. | Type No. | Cable length L [m] | Comments |
|--------------|----------|--------------------|--|
| II335874000 | EK3040 | 4.0 | Use with ECU ES1215 / Trailer Module ES2002 |
| II335878000 | | 8.0 | |
| II3358712000 | | 12.0 | |

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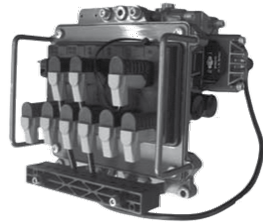
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Cables for Trailer ABS

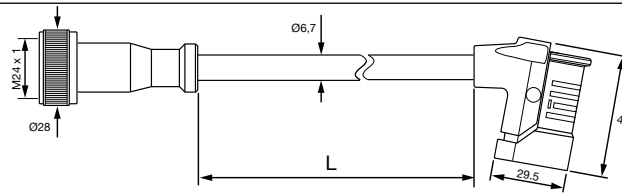
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September 2011

Range Overview - KB3-TA Cables (contd.)



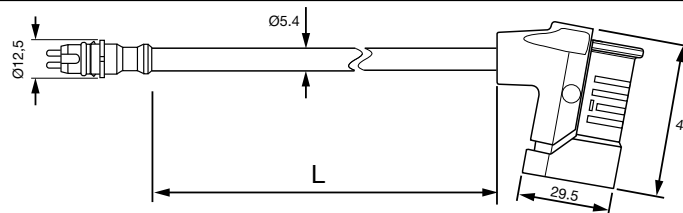
KB3-TA ABS Unit

Modulator Cable



| Part No. | Type No. | Cable length L [m] | Comments |
|--------------|----------|--------------------|----------------------------|
| II35417500 | EK3013 | 0.5 | M24x1 Modulator Connection |
| II354172000 | | 2.0 | |
| II354173000 | | 3.0 | |
| II354174000 | | 4.0 | |
| II354178000 | | 8.0 | |
| II3541710000 | | 10.0 | |
| II3541712000 | | 12.0 | |

Wheel Speed Sensor Extension Cable



| Part No. | Type No. | Cable length L [m] | Comments |
|--------------|----------|--------------------|----------|
| II354162000 | EK3003 | 2.0 | |
| II354163000 | | 3.0 | |
| II354163500 | | 3.5 | |
| II354165000 | | 5.0 | |
| II354169000 | | 9.0 | |
| II3541612000 | | 12.0 | |
| II3541615000 | | 15.0 | |



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Function

Cables are used in trailer EBS systems to:

- provide electrical power to the components in the system.
- communicate signals to the ECU from sensors monitoring trailer characteristics.
- communicate control commands from the ECU to modulators/modules to enable any required braking intervention.
- communicate control commands from the towing vehicle.

Power Supply Cables are used to distribute electrical power from the towing vehicle to electrically powered braking and auxiliary equipment on the trailer. The main power supply to the trailer is through a plug or socket according to ISO 7638. The ISO 7638 connection carries the CAN signal from/to the towing vehicle and so the EBS **Power Supply Cables** also provide the CAN signal to the ECU.

The cables are available in various lengths and are normally supplied with a bayonet connector to ensure easy and safe connection.

Modular Cables / Wiring Harnesses are available in many configurations and are used to supply electrical signals and power to auxiliary equipment including the external third modulator on 4S/3M systems.

Wheel Speed Sensor Cables are used to connect the ECU to the wheel speed sensors so that their wheel speed signals can be sent. The wheel speed sensor is supplied with only a short length of cable and so will often require a **Wheel Speed Sensor Extension Cable** to enable connection.

NOTES: *The text in the 'Comments' columns describes the typical usage. Other connections are possible for most cables.*

In this document the cables are divided into sections:

- *Each section covers the system for which the cables are intended (TEBS4 and TEBS G2/G2.1).*
- *To help in finding the right cable, at the head of each page is a photograph of the module from the relevant system.*
- *Cables which can be used in more than one system have photographs of all relevant modules at the head of the page.*
- *Each section starts with details of power cables, then shows modulator cables, wheel speed sensor cables and auxiliary cables.*



Technical Features

Operating Temperature Range: -40 °C to +80 °C

See tables for other features.

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Cables for Trailer EBS

Doc. No. Y107795 (EN - Rev. 000)
February 2012

Colour Coding used in this document

| | | | | | |
|----|-------|----|-------|----|--------|
| BK | Black | GN | Green | YE | Yellow |
| BN | Brown | RD | Red | | |
| BU | Blue | WH | White | | |

Other Documentation

For information on systems and components mentioned in this document please refer to:

| | |
|--|----------------------------------|
| ABS Relay Modulator Valves | PD-200-200, Document No. Y011362 |
| Diagnostic Cables for Trailer ABS/EBS | PD-272-030, Document No. Y107796 |
| Pressure Sensor | PD-262-200, Document No. Y095830 |
| Deflection Sensor | PD-264-200, Document No. Y095832 |
| TEBS4 Brake Module | PD-214-100, Document No. Y011366 |
| TEBS G2/G2.1 Brake Module | PD-214-200, Document No. Y050635 |
| Trailer Electro-Pneumatic Module (TEPM-S/TEPM-P) | PD-214-600, Document No. Y095618 |
| Tyre Pressure Monitoring System (TPMS) | PD-551-000, Document No. Y095833 |
| Wheel Speed Sensors | PD-261-000, Document No. Y011363 |

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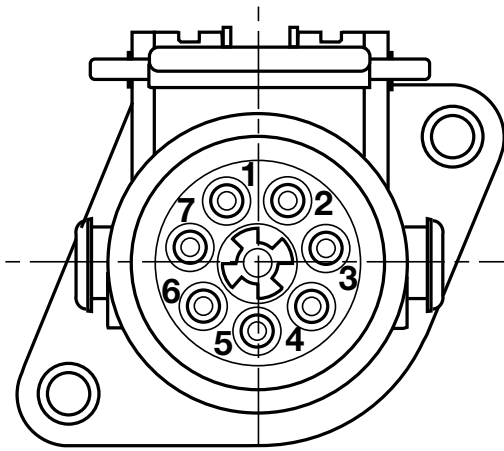
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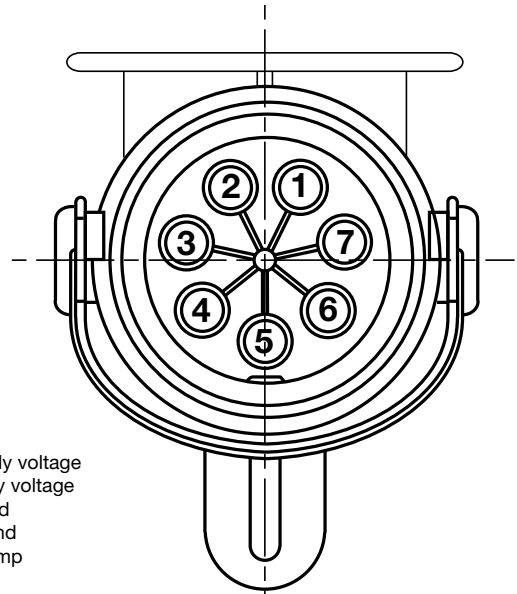


Pin Configurations

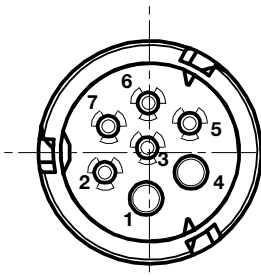


ISO 7638 Socket
(24 V)

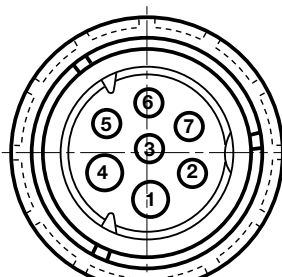
- | | | |
|-------|-------------|----------------------|
| Pin 1 | red | Valve supply voltage |
| Pin 2 | black | ECU supply voltage |
| Pin 3 | yellow | ECU ground |
| Pin 4 | brown | Valve ground |
| Pin 5 | white | Warning lamp |
| Pin 6 | white/green | CAN-Hi |
| Pin 7 | white/brown | CAN-Lo |



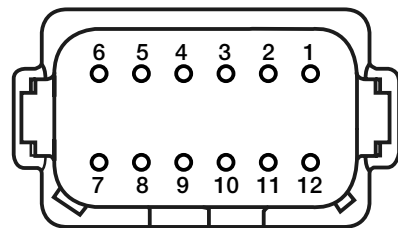
ISO 7638 Plug
(24 V)



Bayonet Socket

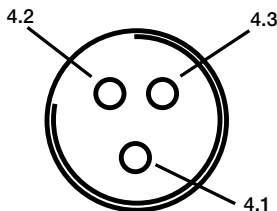


Bayonet Plug



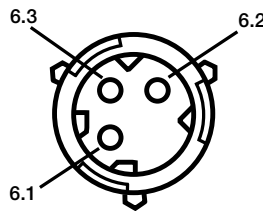
Deutsch Plug

Modulator connectors



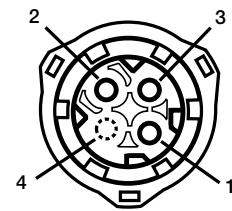
M24x1 Connector - Socket

- 4.1 - Common
- 4.2 - Release Valve
- 4.3 - Hold Valve



DIN72585 Bayonet Socket

- 6.1 - Release Valve
- 6.2 - Common
- 6.3 - Hold Valve



DIN72585 Bayonet Plug

- 1 - Release Valve
- 2 - Common
- 3 - Hold Valve
- 4 - not connected

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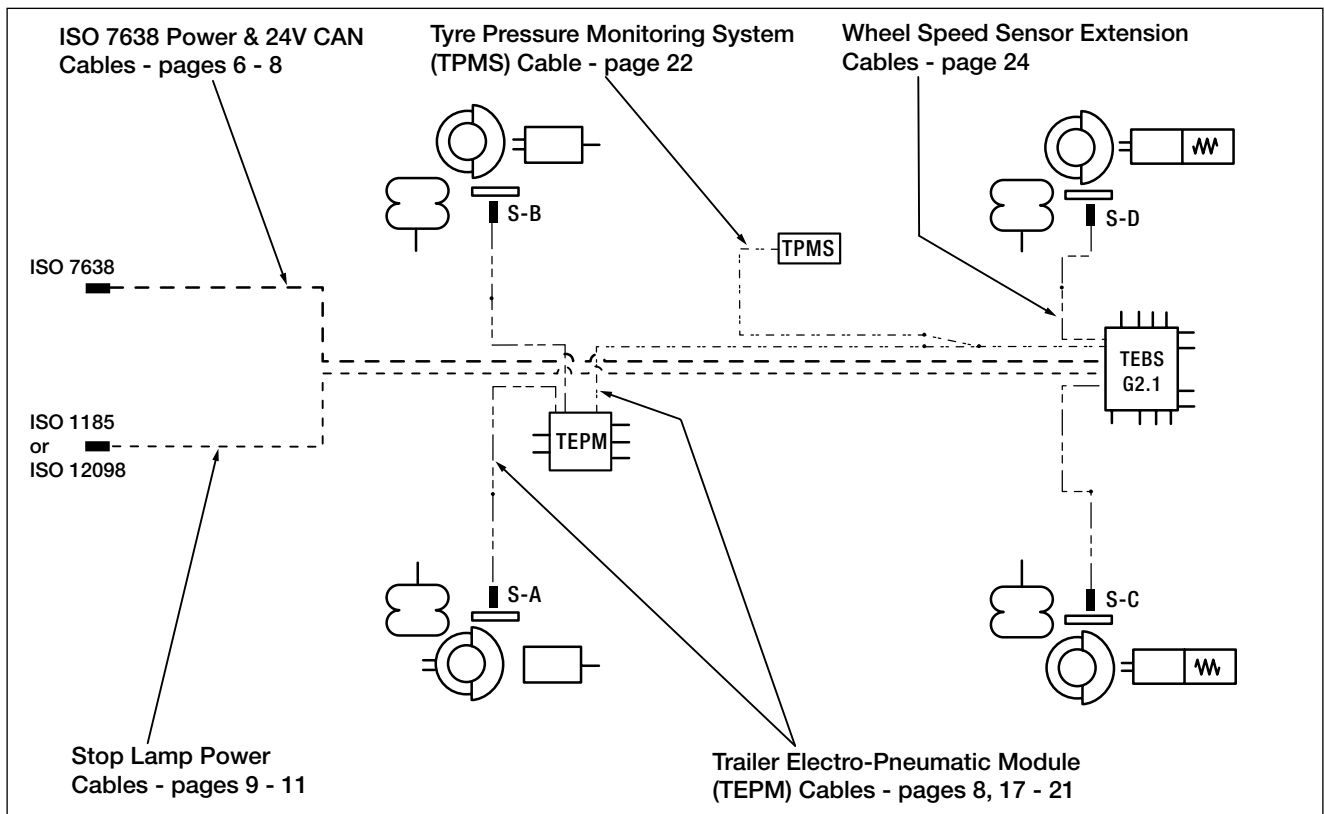
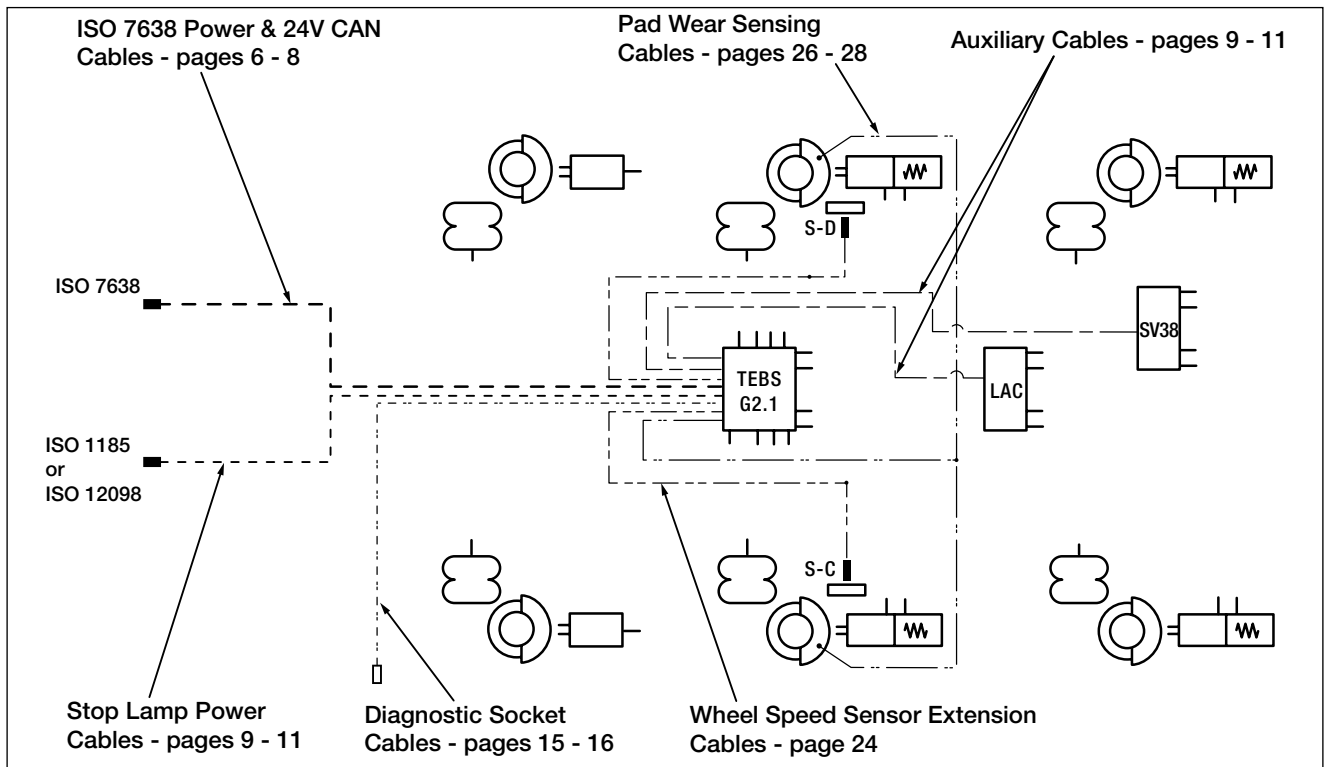
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Cables for Trailer EBS

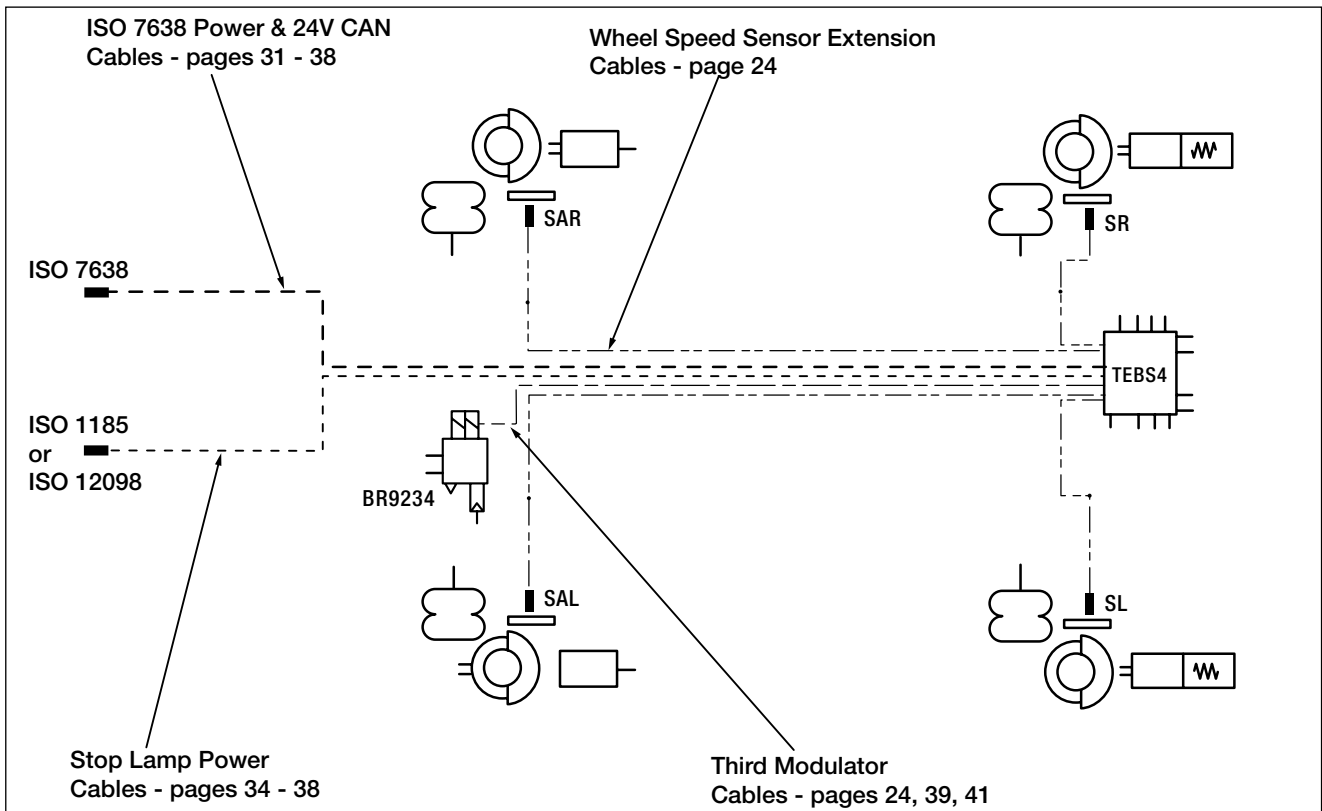
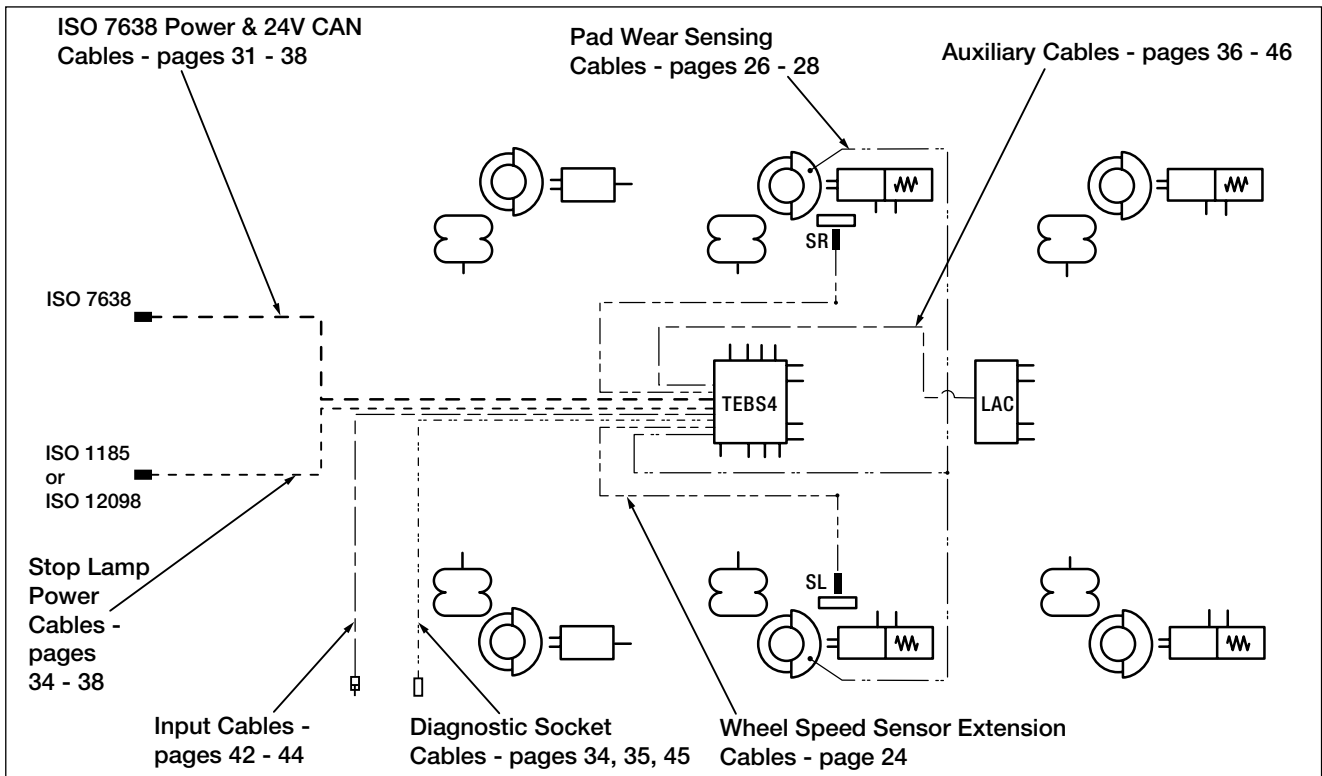
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February 2012

Cable Selection Guide - TEBS G2/G2.1 (typical systems)



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Cable Selection Guide - TEBS4 (typical systems)



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Cables for Trailer EBS

Doc. No. Y107795 (EN - Rev. 000)
February 2012

Range Overview - TEBS G2/G2.1 Cables

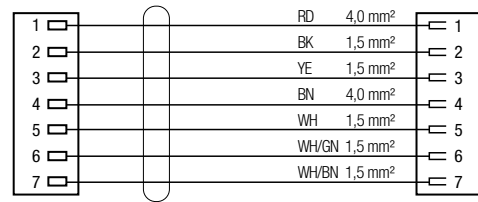
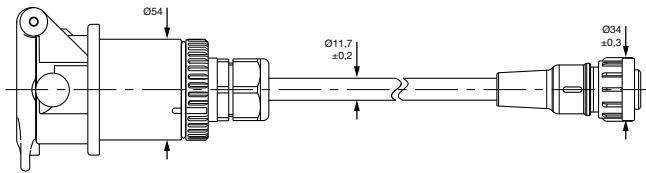


TEBS G2 Brake Module

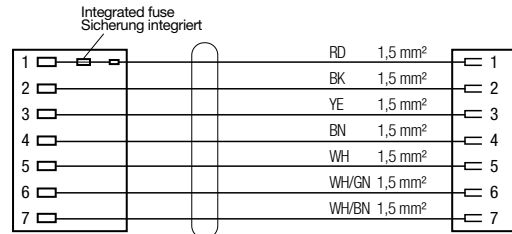
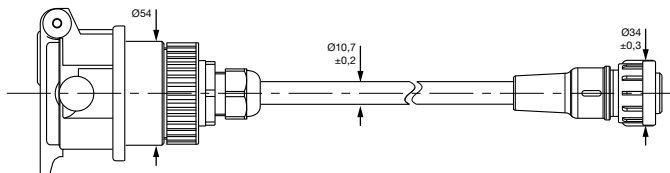


TEBS G2.1 Brake Module

Power Cable (for semi-trailers) with ISO 7638 Socket and Power Connector



| Part No. | Type No. | Cable length [m] | Comments |
|-----------------------|----------|------------------|----------|
| K028491 ¹⁾ | - | 0.5 | |
| K008430 ¹⁾ | - | 10.0 | |
| K008431 ¹⁾ | - | 13.0 | |



| Part No. | Type No. | Cable length [m] | Comments |
|-----------------------|----------|------------------|--------------|
| K019288 ¹⁾ | - | 13.0 | Fused socket |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K019288N00

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Range Overview - TEBS G2/G2.1 Cables (contd.)

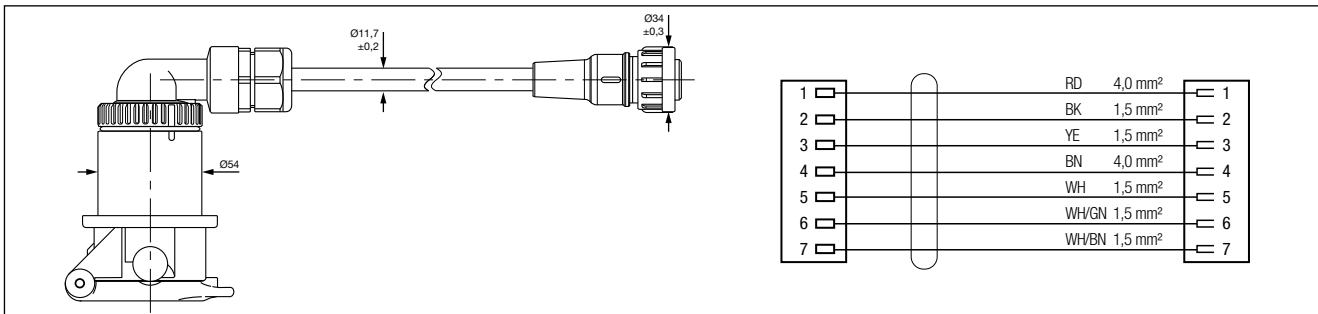


TEBS G2 Brake Module



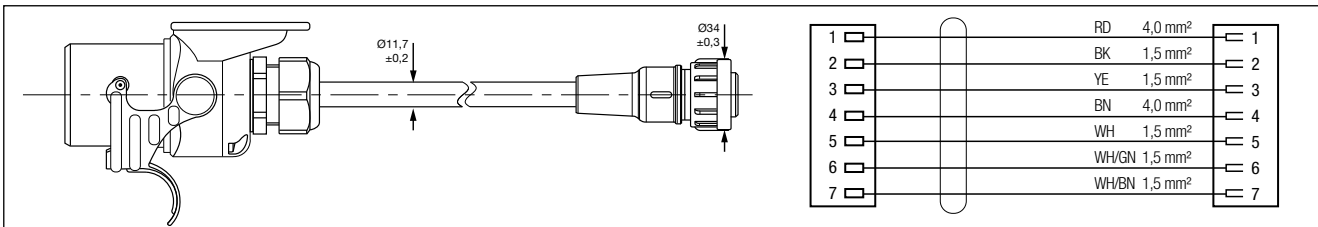
TEBS G2.1 Brake Module

Power Cable (for semi-trailers) with ISO 7638 Socket and Power Connector (contd.)



| Part No. | Type No. | Cable length [m] | Comments |
|-----------------------|----------|------------------|----------|
| K028583 ¹⁾ | - | 13.0 | |
| K008432 ¹⁾ | - | 16.0 | |

Power Cable (for drawbar and centre-axle trailers) with ISO 7638 Plug and Power Connector



| Part No. | Type No. | Cable length [m] | Comments |
|-----------------------|----------|------------------|----------|
| K010710 ¹⁾ | - | 10.0 | |
| K010711 ¹⁾ | - | 13.0 | |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K010711N00

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Cables for Trailer EBS

Doc. No. Y107795 (EN - Rev. 000)
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Range Overview - TEBS G2/G2.1 Cables (contd.)

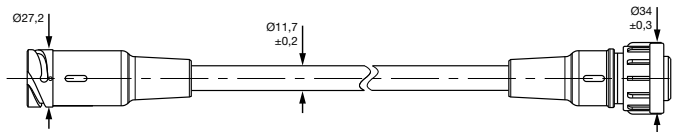


TEBS G2 Brake Module



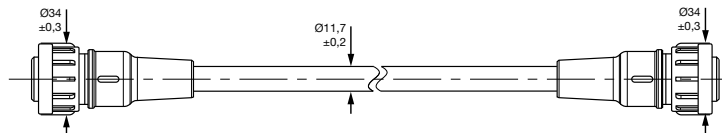
TEBS G2.1 Brake Module

Power Extension/Trailer Electro-Pneumatic Module (TEPM) Connecting Cable



| Part No. | Type No. | Cable length [m] | Comments |
|-----------------------|----------|------------------|--|
| K028000 ¹⁾ | - | 2.0 | Power extension cable or (TEPM) connecting cable |
| K021138 ¹⁾ | - | 4.0 | |
| K028001 ¹⁾ | - | 10.0 | |
| K027826 ¹⁾ | - | 11.0 | |
| K027827 ¹⁾ | - | 13.0 | |

Power Connecting Cable



| Part No. | Type No. | Cable length [m] | Comments |
|-----------------------|----------|------------------|--------------------------------------|
| K010718 ¹⁾ | - | 0.5 | Adapter to connect TEBS4 Power cable |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K010718N00

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Range Overview - TEBS G2/G2.1 Cables (contd.)

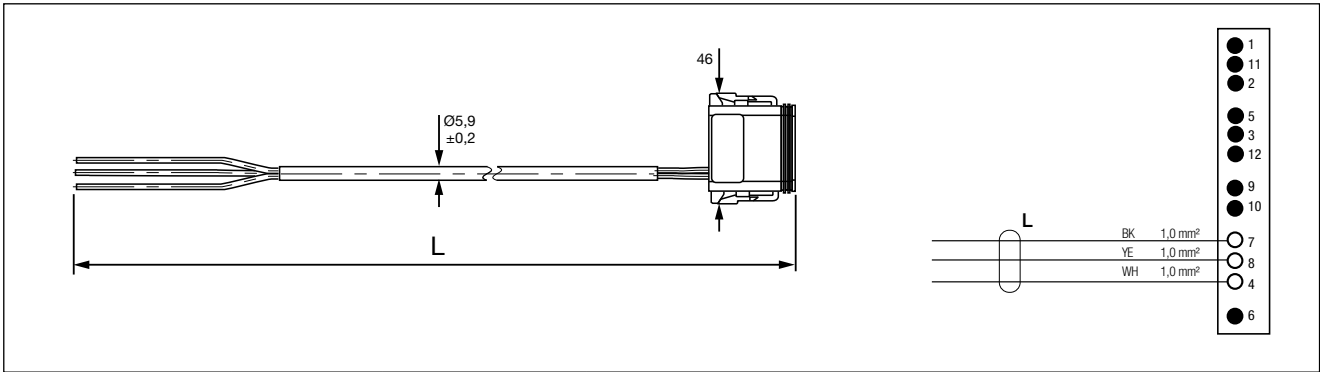


TEBS G2 Brake Module



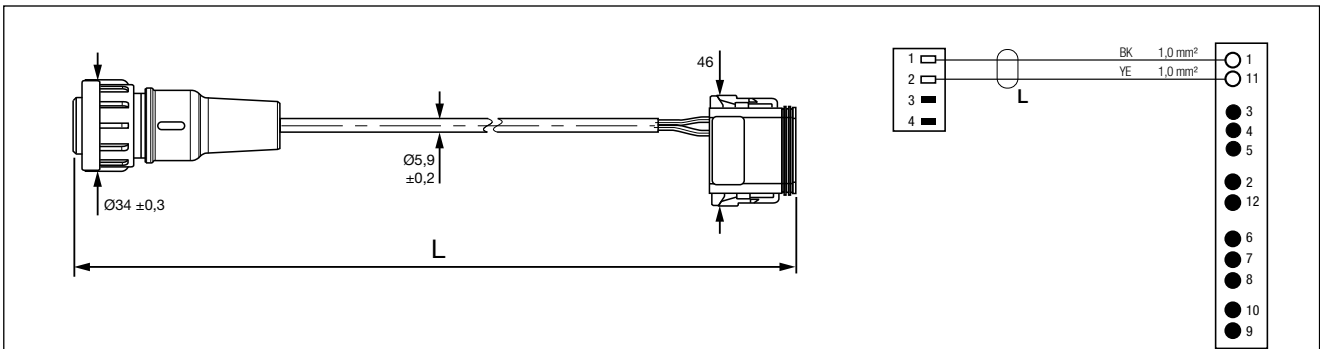
TEBS G2.1 Brake Module

In-Out Cable for ISO 1185 Connection



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|----------------|
| K021345 ¹⁾ | - | 7.0 | with open ends |
| K021346 ¹⁾ | - | 15.0 | |

In-Out Cable for Speed Pulse



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|----------|
| K021335 ¹⁾ | - | 6.5 | |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K021335N00

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Cables for Trailer EBS

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Range Overview - TEBS G2/G2.1 Cables (contd.)

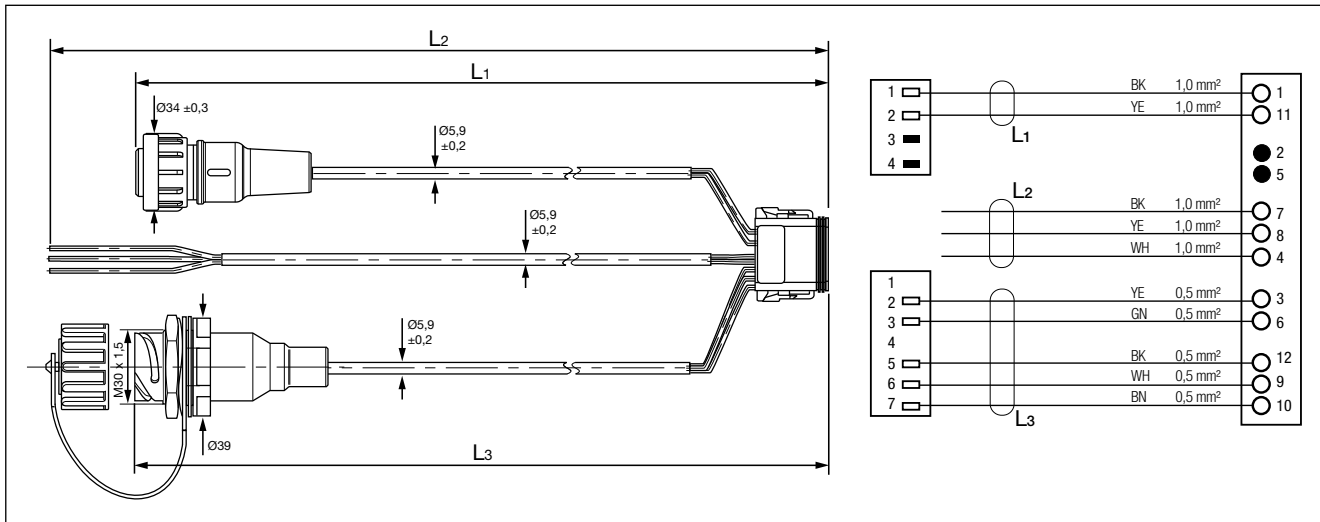


TEBS G2 Brake Module



TEBS G2.1 Brake Module

In-Out Cable for ISO 1185 Connection, Speed Pulse or Lift Axle Control and Diagnostic Socket



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--|--|
| K021340 ¹⁾ | - | L ₁ = 6.5 L ₂ = 7.0 L ₃ = 6.0 | L ₁ = speed pulse or lift axle control L ₂ = stop lamp supply (ISO 1185) with open ends L ₃ = diagnostic socket |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K021340N00

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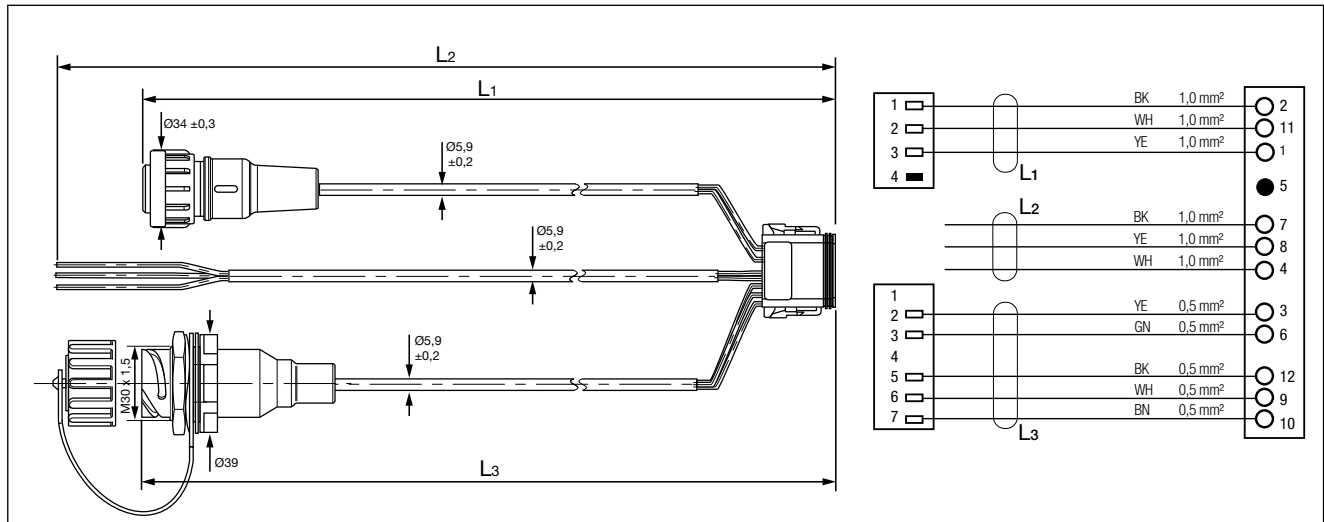


TEBS G2 Brake Module



TEBS G2.1 Brake Module

In-Out Cable for ISO 1185 Connection, Speed Pulse or Lift Axle Control and Diagnostic Socket (contd)



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|---|---|
| K021342 ¹⁾ | - | L ₁ = 2.0 L ₂ = 7.0 L ₃ = 6.0 | L ₁ = speed pulse or lift axle control |
| K021343 ¹⁾ | - | L ₁ = 2.0 L ₂ = 15.0 L ₃ = 6.0 | L ₂ = stop lamp supply (ISO 1185) with open ends L ₃ = diagnostic socket |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K021343N00

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Cables for Trailer EBS

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Range Overview - TEBS G2/G2.1 Cables (contd.)

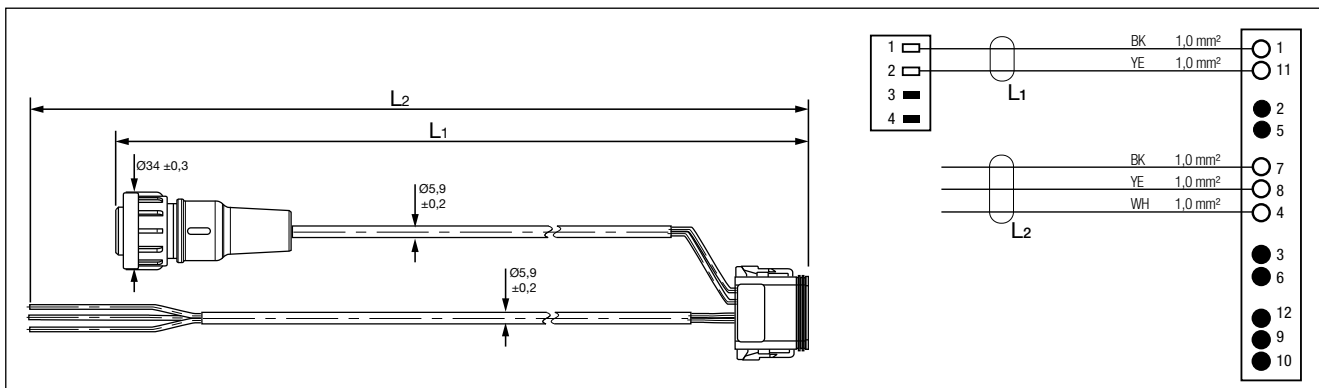


TEBS G2 Brake Module



TEBS G2.1 Brake Module

In-Out Cable for ISO 1185 Connection and Speed Pulse or Lift Axle Control Connection



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|---|--|
| K021336 ¹⁾ | - | L ₁ = 6.5 L ₂ = 7.0 | L ₁ = speed pulse or lift axle control L ₂ = stop lamp supply (ISO 1185) with open ends |
| K021337 ¹⁾ | - | L ₁ = 6.5 L ₂ = 15.0 | |
| K021338 ¹⁾ | - | L ₁ = 2.0 L ₂ = 7.0 | |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K021338N00

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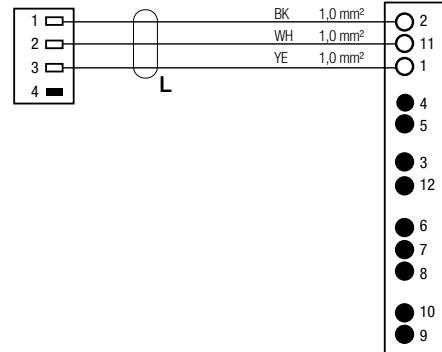
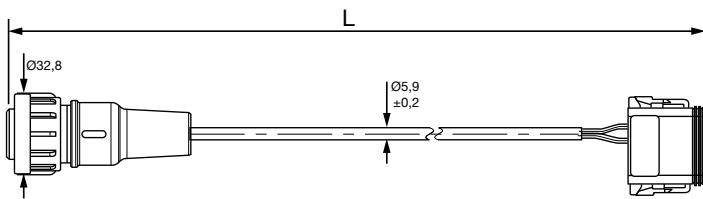


TEBS G2 Brake Module



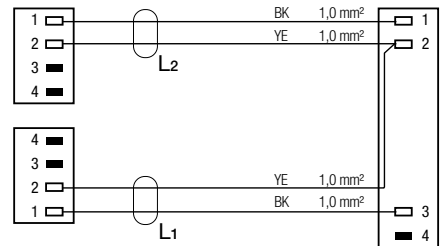
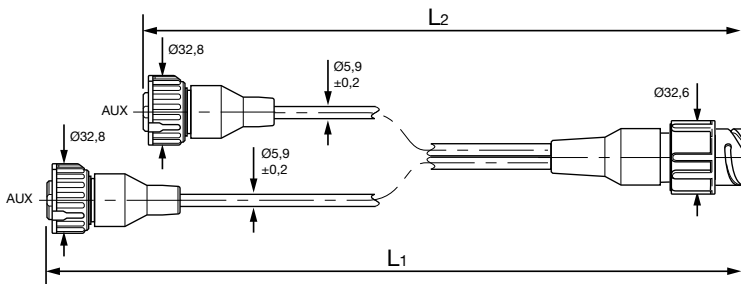
TEBS G2.1 Brake Module

In-Out Cable with Bayonet Connector



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|---|
| K028585 ¹⁾ | - | 2.0 | for use with Bayonet Splitter K027542 (see below) |

Bayonet Splitter



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--|---|
| K027542 ¹⁾ | - | L ₁ = 4.5 L ₂ = 1.0 | for use with In-Out Cable K028585 (see above) |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K027542N00

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Cables for Trailer EBS

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Range Overview - TEBS G2/G2.1 Cables (contd.)

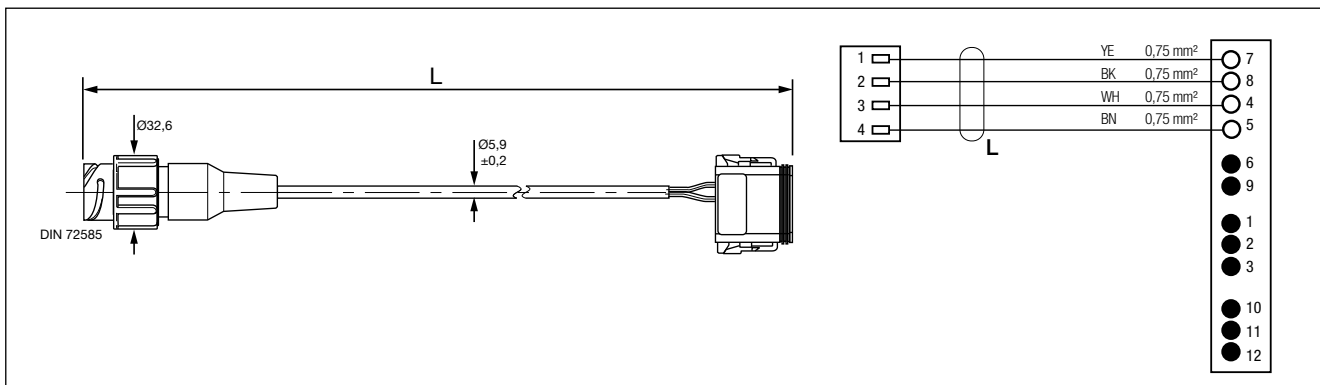


TEBS G2 Brake Module



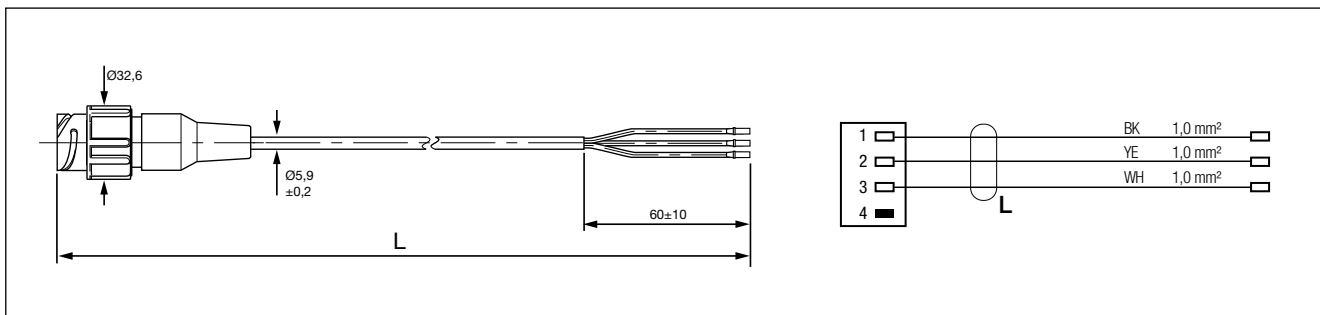
TEBS G2.1 Brake Module

In-Out Cable with Bayonet Connector



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|----------------------------|
| K028586 ¹⁾ | - | 1.5 | for Stop Lamp and Tristate |

Modular Cable with Bayonet Connector



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|---|
| K010715 ¹⁾ | - | 1.0 | for Stop Lamp or Traction Help (TH) or advanced Lift Axle Control (LLTH) with open ends |
| K010716 ¹⁾ | - | 7.0 | |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K010716N00

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Range Overview - TEBS G2/G2.1 Cables (contd.)

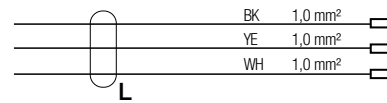
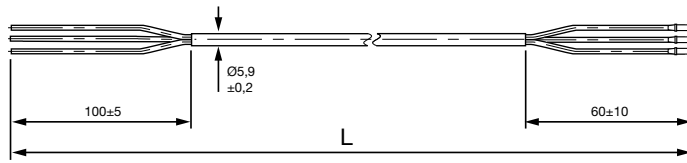


TEBS G2 Brake Module



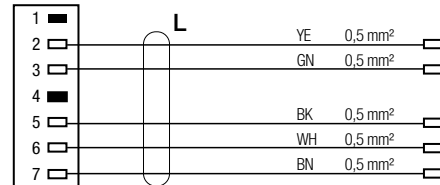
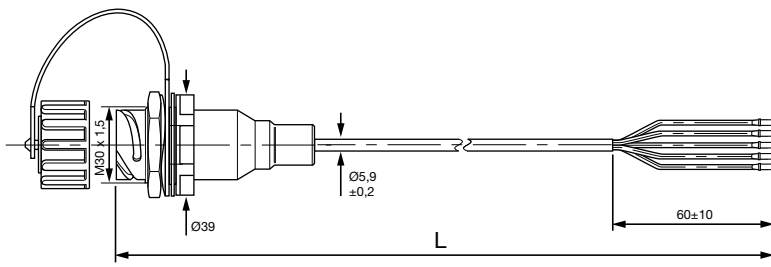
TEBS G2.1 Brake Module

Modular Cable with open ends



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|---|
| K021643 ¹⁾ | - | 7.0 | for several connections such as Stop Lamp or Tristate |
| K021644 ¹⁾ | - | 15.0 | |

Modular Cable with Diagnostic Socket (5 pin)



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|--------------------|
| K010713 ¹⁾ | - | 6.0 | e.g. for Magic Eye |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K010713N00

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Cables for Trailer EBS

Doc. No. Y107795 (EN - Rev. 000)
February 2012

Range Overview - TEBS G2/G2.1 Cables (contd.)

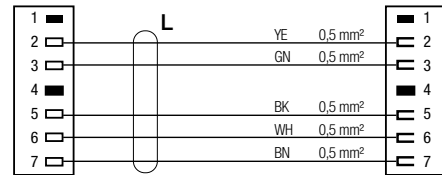
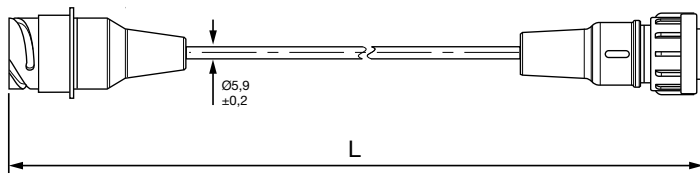


TEBS G2 Brake Module



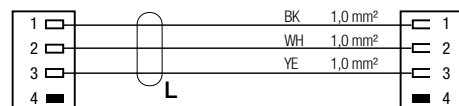
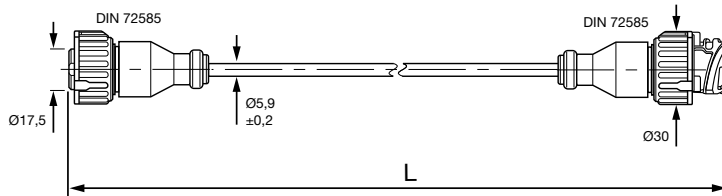
TEBS G2.1 Brake Module

Diagnostic Socket Extension Cable



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|--------------------|
| K010714 ¹⁾ | - | 11.0 | e.g. for Magic Eye |

Bayonet Connector (3 pin) Extension Cable



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|----------------------|
| K013218 ¹⁾ | - | 4.0 | for several features |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K013218N00

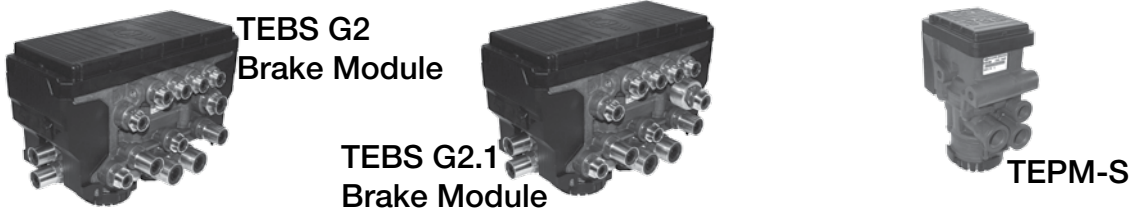
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Range Overview - TEBS G2/G2.1 Cables - 4S/3M System (contd.)



Power and CAN Connecting Cable for Trailer Electro-Pneumatic Module (TEPM-S)

| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|--|
| K027813 ¹⁾ | - | 3.0 | for Trailer Electro-Pneumatic Module Standard (TEPM-S) via K022272 or K022279 (see page 21) connected to TEBS G2/G2.1 Brake Module |

Auxiliary Cable - TEPM-S

| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|---------------------|
| K044708 ¹⁾ | - | 3.0 | for Pressure Sensor |

Wheel Speed Sensor Cable - TEPM-S

| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|----------|
| K027811 ¹⁾ | - | 2.0 | |
| K027836 ¹⁾ | - | 3.0 | |
| K027833 ¹⁾ | - | 6.0 | |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K027811N00

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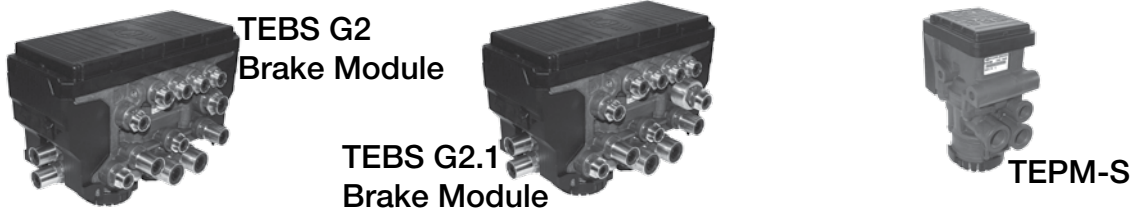
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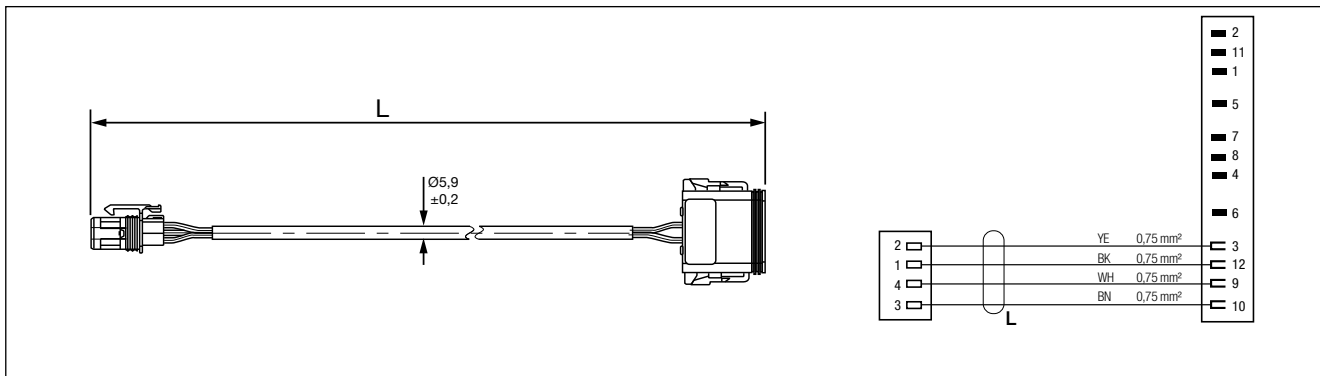
Cables for Trailer EBS

Doc. No. Y107795 (EN - Rev. 000)
February 2012

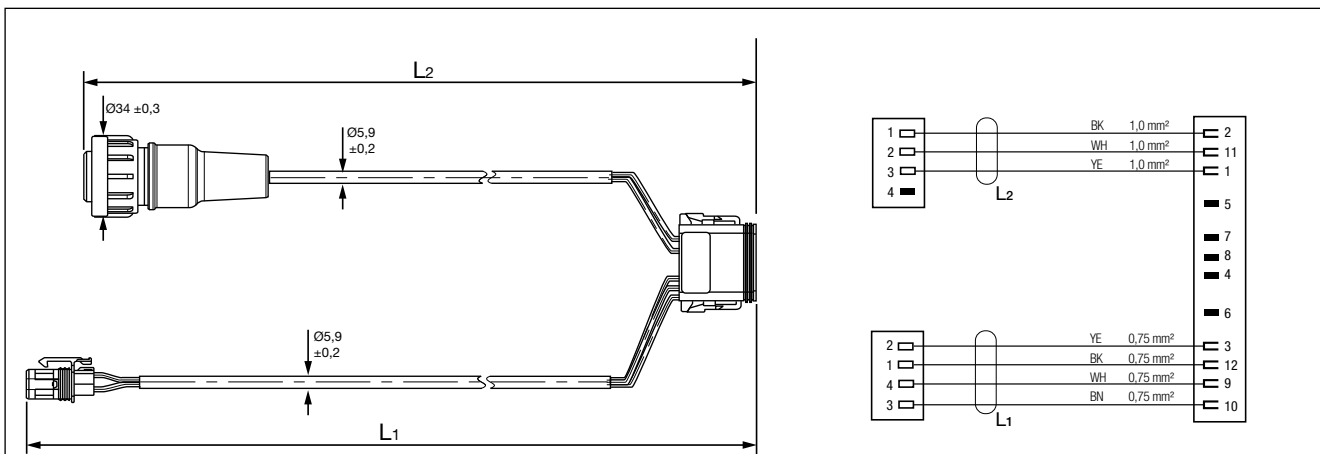
Range Overview - TEBS G2/G2.1 Cables - 4S/3M System (contd.)



In-Out Cables for TEPM-S



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|---|
| K058332 ¹⁾ | - | 2.0 | For connecting TEBS G2/G2.1 with third modulator (TEPM-S) |
| K058333 ¹⁾ | - | 7.0 | |
| K058334 ¹⁾ | - | 9.0 | |



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|----------------------------|--|
| K058340 ¹⁾ | - | $L_1 = 3.0$ $L_2 = 2.0$ | L_1 for connecting TEBS G2/G2.1 with third modulator (TEPM-S) L_2 for several AUXIO connections |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K058340N00

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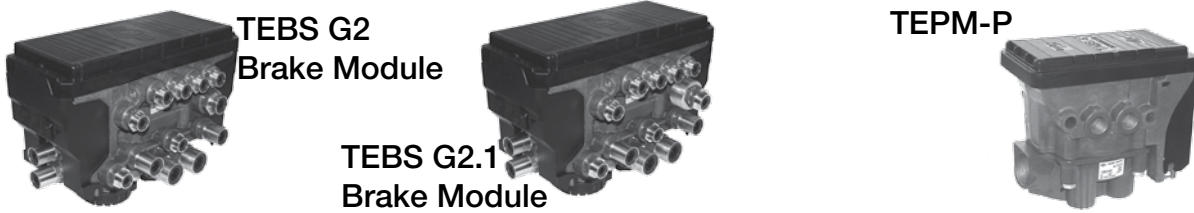
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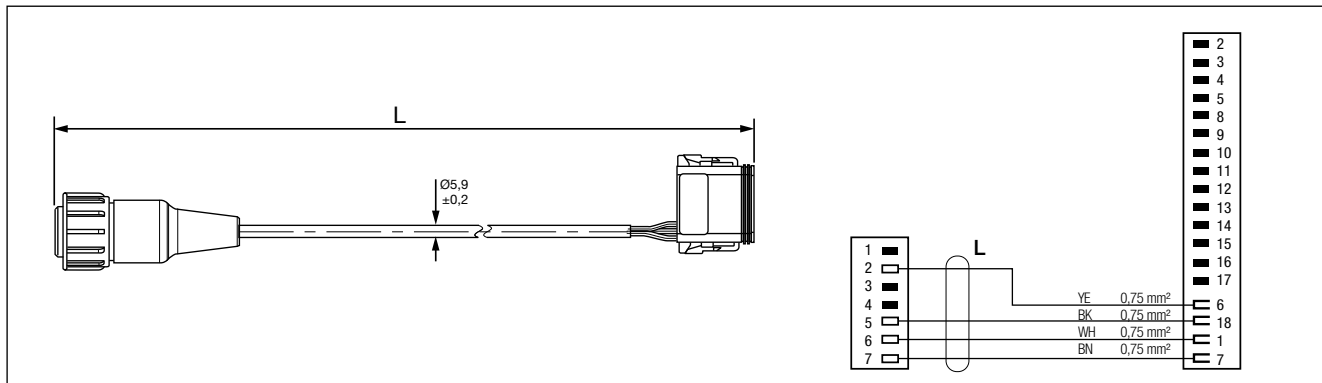
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Range Overview - TEBS G2/G2.1 Cables - 4S/3M System (contd.)



Power and CAN Connecting Cable for Trailer Electro-Pneumatic Module (TEPM-P)



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|--|
| K027814 ¹⁾ | - | 3.0 | for Trailer Electro-Pneumatic Module Premium (TEPM-P) via K022272 ou K022279(see page 21) connected to TEBS G2/G2.1 Brake Module |

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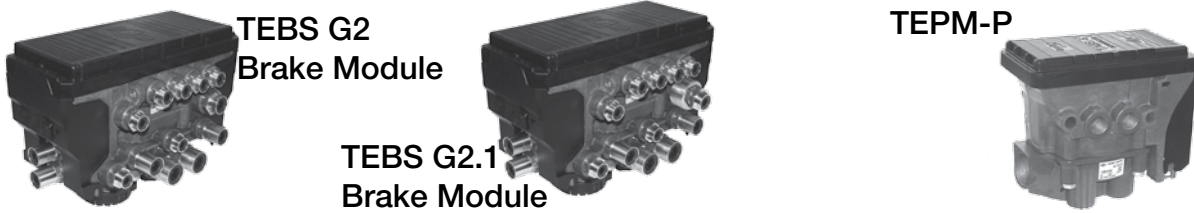
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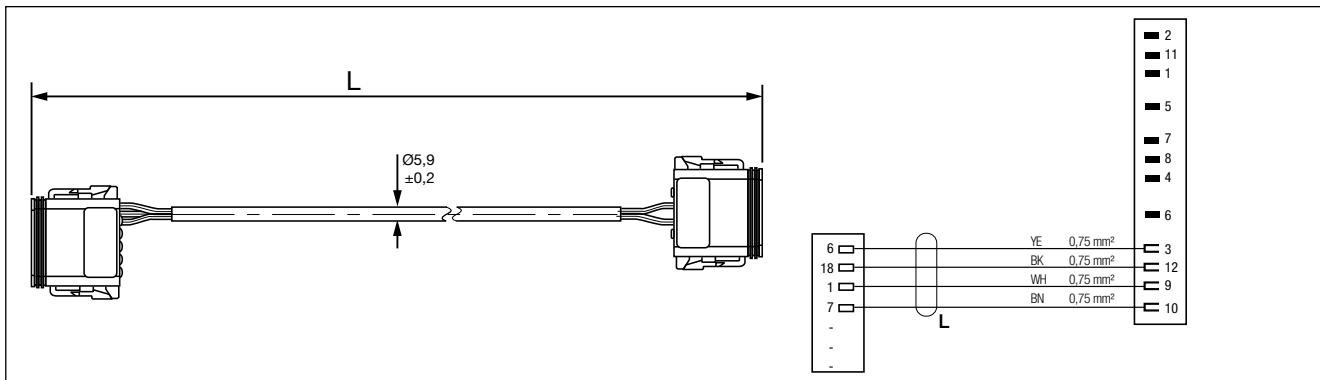
Cables for Trailer EBS

Doc. No. Y107795 (EN - Rev. 000)
February 2012

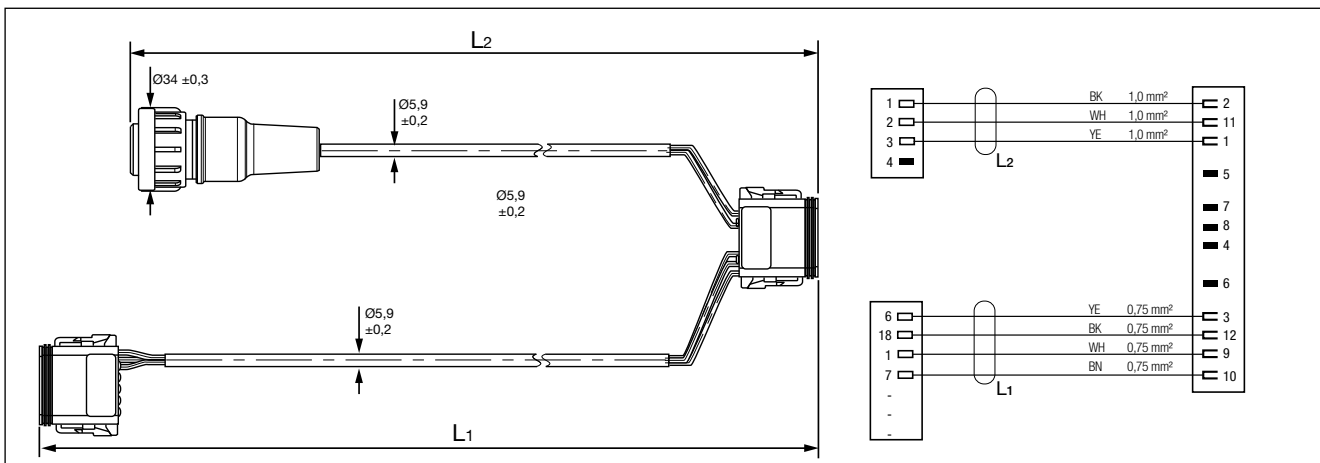
Range Overview - TEBS G2/G2.1 Cables - 4S/3M System (contd.)



In-Out Cables for TEPM-P



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|---|
| K058249 ¹⁾ | - | 7.0 | For connecting TEBS G2/G2.1 with third modulator (TEPM-P) |
| K058250 ¹⁾ | - | 9.0 | |



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--|--|
| K058256 ¹⁾ | - | L ₁ = 9.0 L ₂ = 6.5 | L ₁ for connecting TEBS G2/G2.1 with third modulator (TEPM-P) L ₂ for several AUXIO connections |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K058256N00

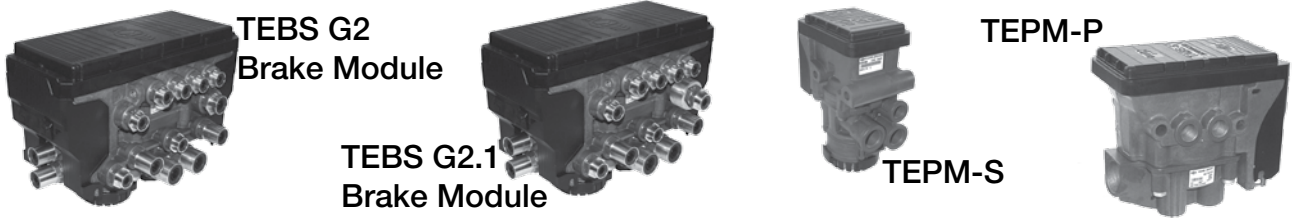
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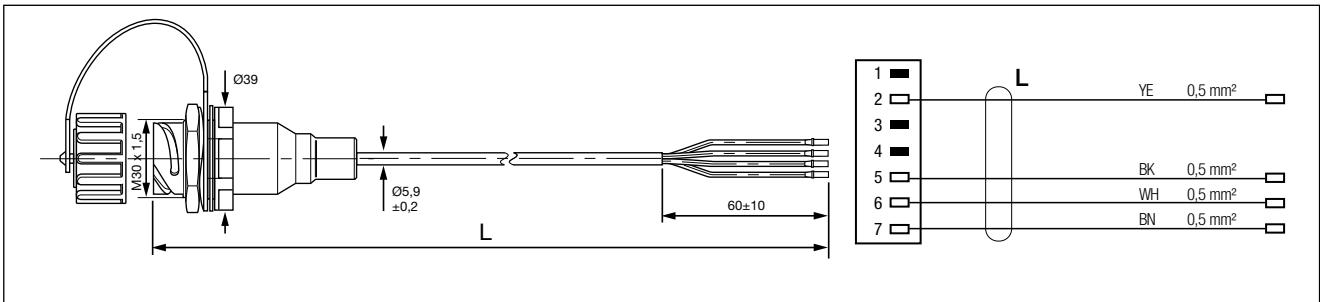
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Range Overview - TEBS G2/G2.1 Cables - 4S/3M System (contd.)

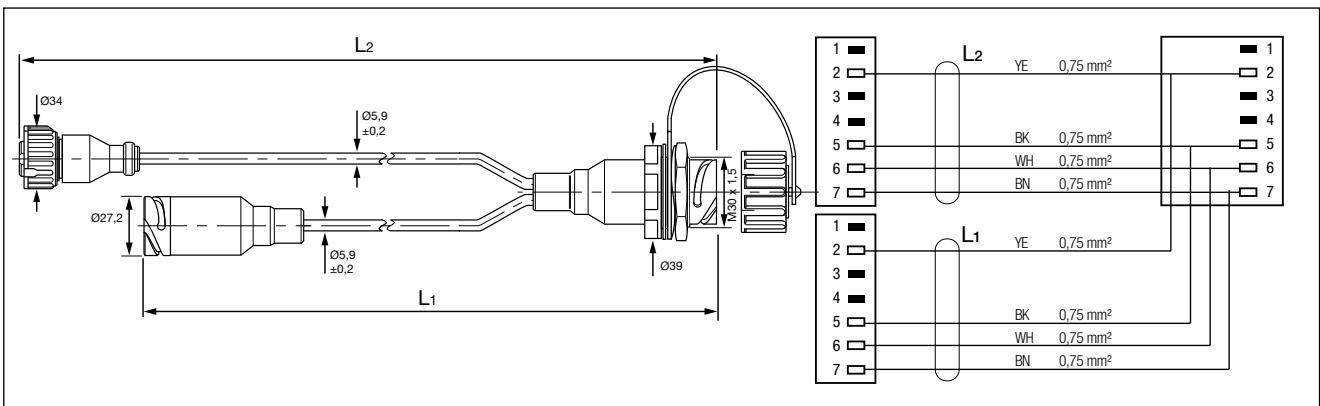


Auxiliary Cables



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|--|
| K022272 ¹⁾ | - | 4.0 | For TEPM in 4S/3M system or for Tyre Pressure Monitoring System (TPMS) or for Diagnostics/TIM G2 |
| K022279 ¹⁾ | - | 6.0 | |

5 V CAN Splitter Cable



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--|--|
| K027815 ¹⁾ | - | L ₁ = 1.0 L ₂ = 3.0 | For TEPM in 4S/3M system or for Tyre Pressure Monitoring System (TPMS) or for Diagnostics/TIM G2 |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K027815N00

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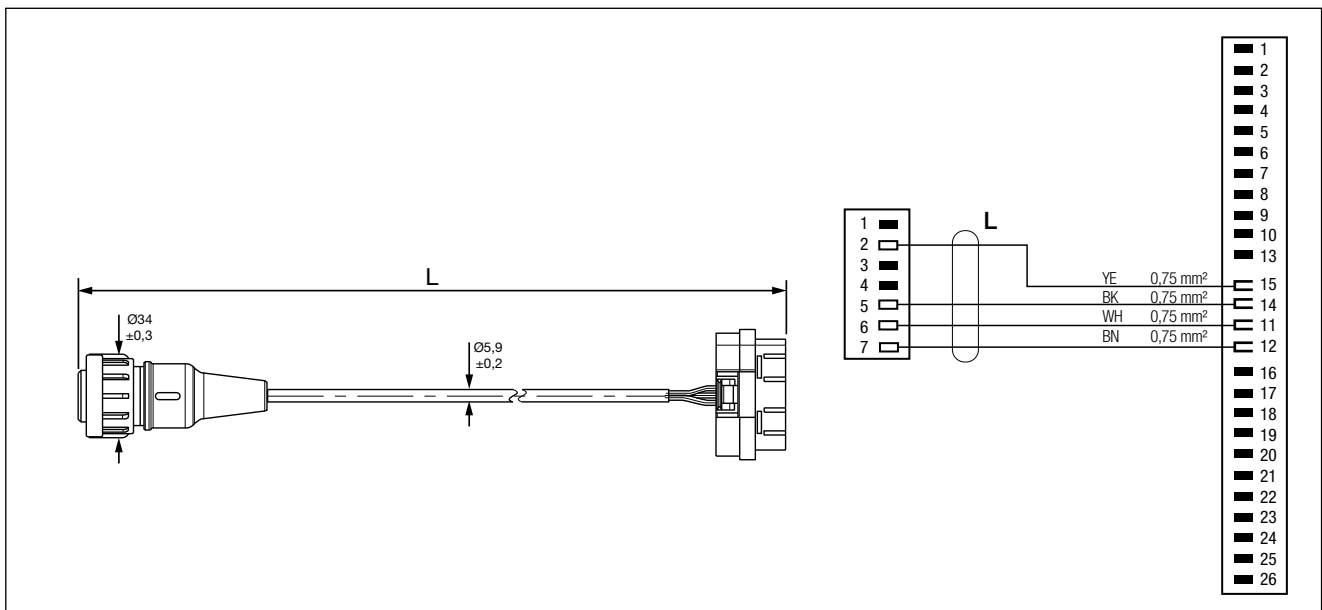
Cables for Trailer EBS

Doc. No. Y107795 (EN - Rev. 000)
February 2012

Range Overview - TEBS G2/G2.1 Cables - Tyre Pressure Monitoring System (TPMS)



Connecting Cable



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|--|
| K027823 ¹⁾ | - | 0.9 | to connect the TPMS module via K027815 and K022272 or K022279 (see page 21) to the TEBS G2/G2.1 Brake Module |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K027823N00

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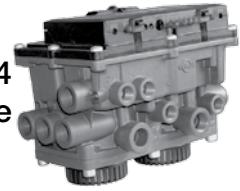
Range Overview - Auxiliary Cables for *TEBS G2/G2.1* and *TEBS4*



**TEBS G2
Brake Module**

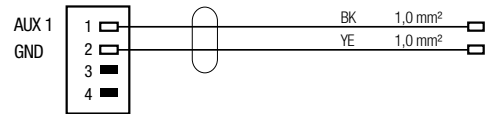
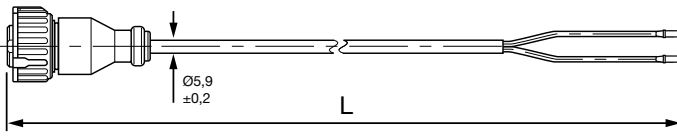


**TEBS G2.1
Brake Module**

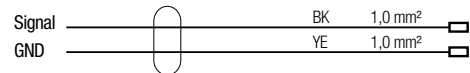
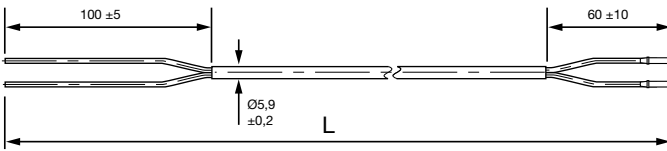


**TEBS4
Brake Module**

Connecting Cable for auxiliaries (2 pins)



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|---|
| K002274 ¹⁾ | - | 2.0 | with one end open (with pins to suit the Deutsch connector) for several AUX connections |
| K002275 ¹⁾ | - | 6.5 | |
| K002276 ¹⁾ | - | 10.0 | |
| K017003 ¹⁾ | - | 15.0 | |



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|--|
| K002280 ¹⁾ | - | 7.0 | with two ends open (one with pins to suit the Deutsch connector) for several AUX connections |
| K002281 ¹⁾ | - | 15.0 | |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K002281N00

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Cables for Trailer EBS

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February 2012

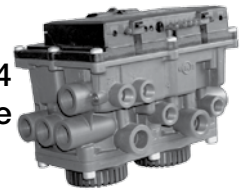
Range Overview - Auxiliary Cables for TEBS G2/G2.1 and TEBS4 (contd.)



**TEBS G2
Brake Module**

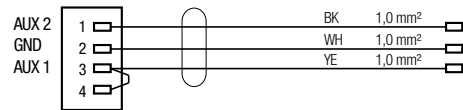
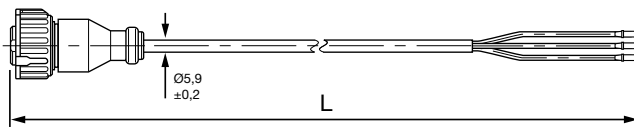


**TEBS G2.1
Brake Module**



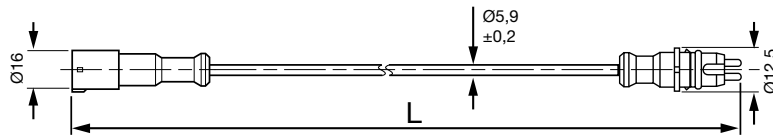
**TEBS4
Brake Module**

Connecting Cable for auxiliaries with Bayonet Connector (3 pins)



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|--|
| K002277 ¹⁾ | - | 3.0 | TEBS G2/2.1 - for sensor input from mechanical, pneumatic or hydraulic suspension TEBS4 - for third modulator (BR9234) connection |
| K002278 ¹⁾ | - | 9.0 | |
| K002279 ¹⁾ | - | 15.0 | |
| K027834 | - | 18.0 | |

Wheel Speed Sensor Extension Cable



| Part No. | Type No. | Cable length L [m] | Comments |
|--------------|----------|--------------------|---|
| II367562000 | EK3130 | 2.0 | For extending the wheel speed sensor cable to enable connection to the brake module |
| II367563000 | | 3.0 | |
| II367564000 | | 4.0 | |
| II367565000 | | 5.0 | |
| II367566000 | | 6.0 | |
| II367568000 | | 8.0 | |
| II3675610000 | | 10.0 | |
| II3675612000 | | 12.0 | |
| II3675615000 | | 15.0 | |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K002279N00

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Range Overview - Auxiliary Cables for *TEBS G2/G2.1* and *TEBS4* (contd.)



**TEBS G2
Brake Module**

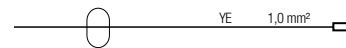
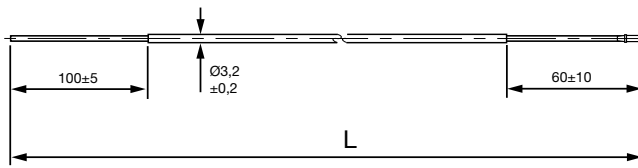


**TEBS G2.1
Brake Module**



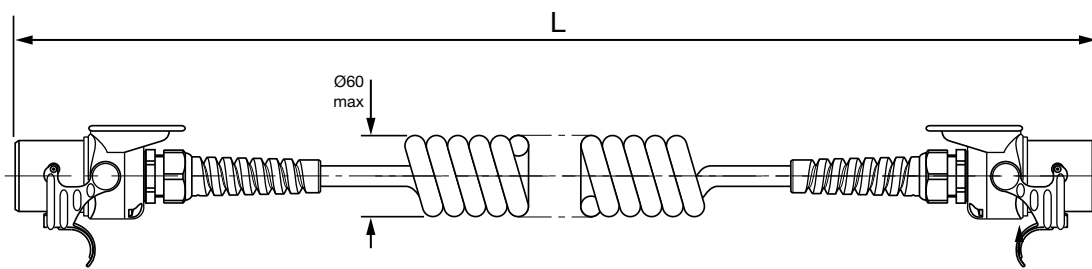
**TEBS4
Brake Module**

Cable with open ends



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|-----------------------------|
| K016629 ¹⁾ | - | 7 | for Stop Lamp (for example) |
| K016630 ¹⁾ | - | 15 | |

Connecting Cable - towing vehicle to trailer



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|--|
| K004098 ¹⁾ | EK3150 | 1.0 - 4.0 | With 7 pin connectors, for connecting ABS or EBS With buckling protection |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K004098N00

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Cables for Trailer EBS

Doc. No. Y107795 (EN - Rev. 000)
February 2012

Range Overview - Auxiliary Cables for TEBS G2/G2.1 and TEBS4 (contd.)



TEBS G2
Brake Module

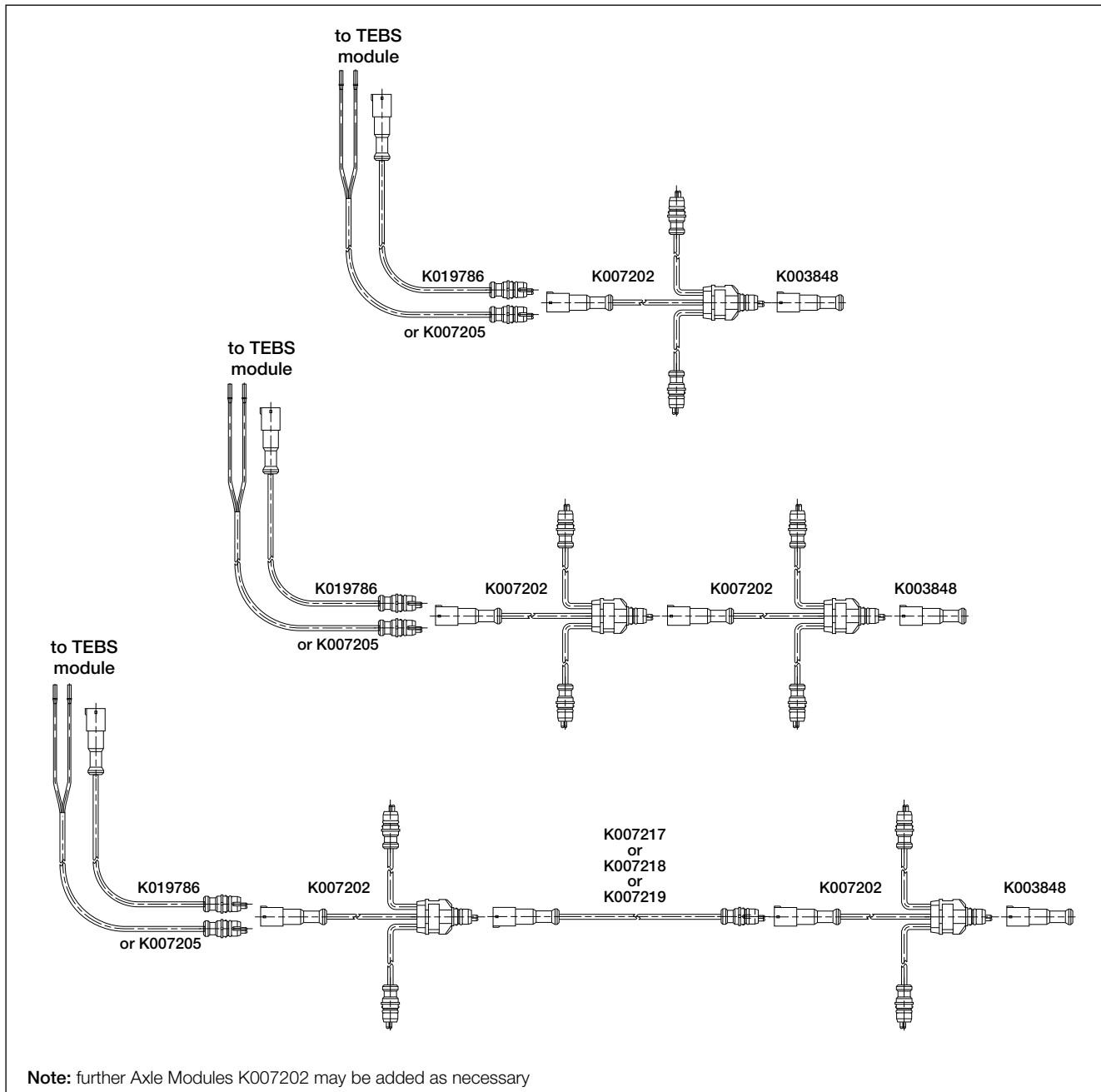


TEBS G2.1
Brake Module



TEBS4
Brake Module

Pad Wear Sensing - Installation examples



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Item No.: K056491



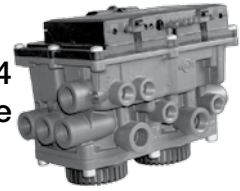
Range Overview - Auxiliary Cables for TEBS G2/G2.1 and TEBS4 (contd.)



TEBS G2
Brake Module

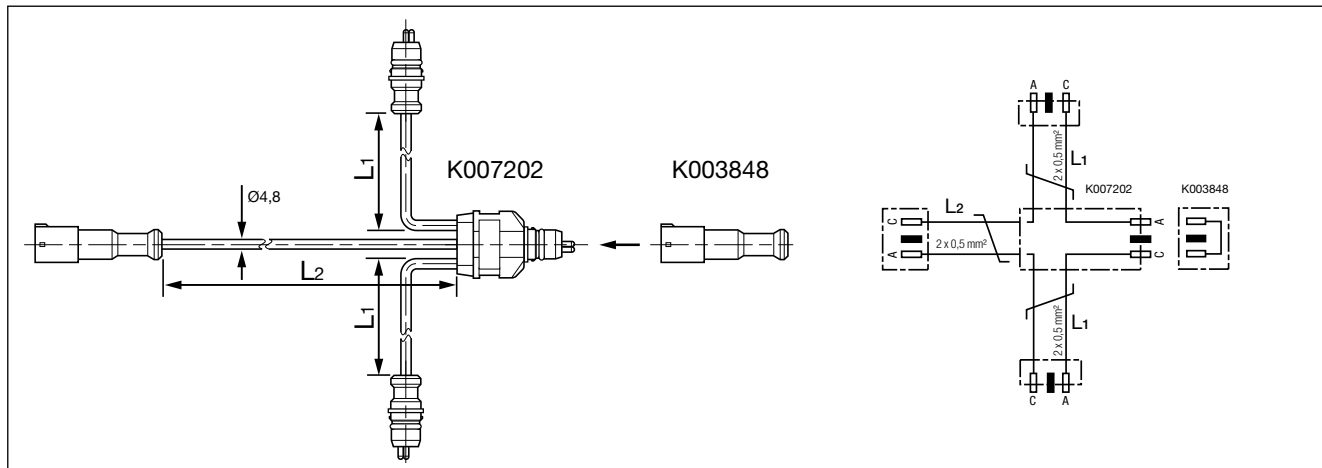


TEBS G2.1
Brake Module



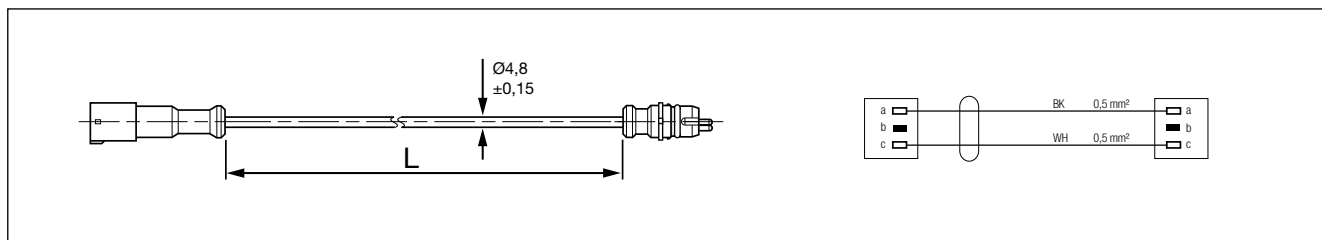
TEBS4
Brake Module

Axle Module for Pad Wear Sensing



| Part No. | Type No. | Cable length L [m] | Comments |
|----------|----------|----------------------------|--|
| K007202 | - | $L_1 = 2.0$ $L_2 = 2.0$ | L_1 = pad wear sensor L_2 = connecting or extension cable |
| K003848 | - | - | Closure Cap for Axle Module K007202 |

Extension Cable for Pad Wear Sensing



| Part No. | Type No. | Cable length L [m] | Comments |
|----------|----------|--------------------|--|
| K007217 | - | 1.0 | To connect two Axle Modules K007202 together |
| K007218 | - | 3.0 | |
| K007219 | - | 5.0 | |

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Cables for Trailer EBS

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February 2012

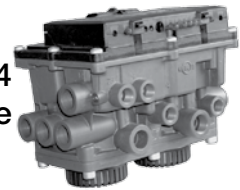
Range Overview - Auxiliary Cables for TEBS G2/G2.1 and TEBS4 (contd.)



**TEBS G2
Brake Module**

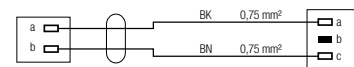
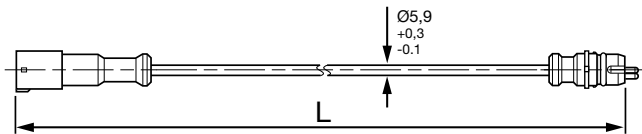


**TEBS G2.1
Brake Module**

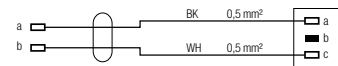
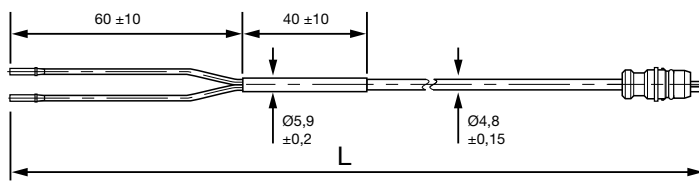


**TEBS4
Brake Module**

Connecting Cable for Pad Wear Sensing



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|--|
| K019786 ¹⁾ | - | 1.0 | To connect Axle Module K007202 to TEBS Module (TEBS4 Module - SAL or SAR TEBS G2/G2.1 Module - S-E or S-F) |



| Part No. | Type No. | Cable length L [m] | Comments |
|----------|----------|--------------------|--|
| K007205 | - | 1.0 | To connect Axle Module K007202 to TEBS Module (Deutsch plug) |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K019786N00

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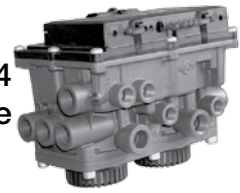
Range Overview - Accessories for *TEBS G2/G2.1 and TEBS4*



**TEBS G2
Brake Module**

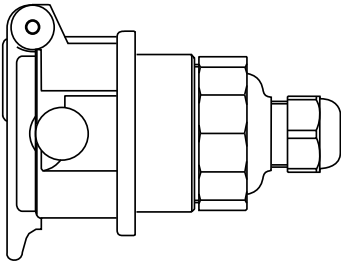


**TEBS G2.1
Brake Module**

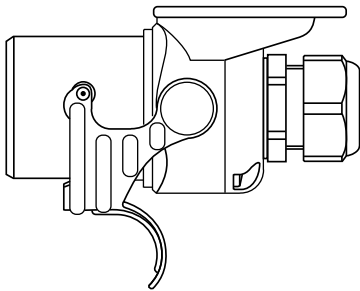


**TEBS4
Brake Module**

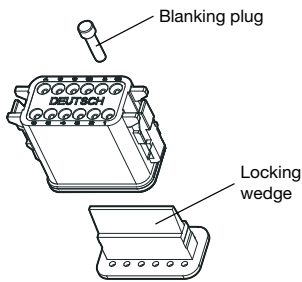
Accessories



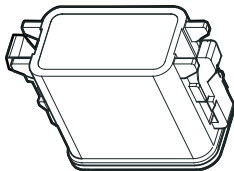
| Part No. | Type No. | Description |
|----------|----------|-------------------------|
| K002290 | - | ISO 7638 Socket (7 pin) |



| Part No. | Type No. | Description |
|----------|----------|-----------------------|
| K002291 | - | ISO 7638 Plug (7 pin) |



| Part No. | Type No. | Description |
|-----------------------|----------|--|
| K002287 ¹⁾ | - | 12-pin Deutsch Plug (TEBS G2/2.1 - In-Out TEBS4 - X2) includes: 1 x Deutsch plug 1 x Locking wedge 12 x Blanking plugs |



| Part No. | Type No. | Description |
|-----------------------|----------|---|
| K026197 ¹⁾ | - | Blanking Plug for In-Out Connector with blue seal |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K026197N00

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Cables for Trailer EBS

Doc. No. Y107795 (EN - Rev. 000)
February 2012

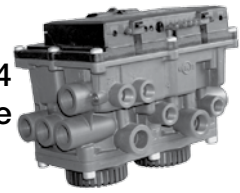
Range Overview - Accessories for *TEBS G2/G2.1 and TEBS4 (contd.)*



**TEBS G2
Brake Module**

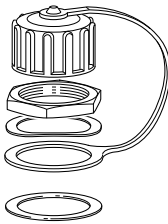


**TEBS G2.1
Brake Module**



**TEBS4
Brake Module**

Accessories (contd.)



| Part No. | Type No. | Description |
|----------|----------|------------------------------------|
| K005378 | - | Mounting kit for Diagnostic Socket |

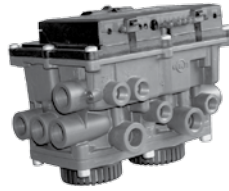
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Range Overview - TEBS4 Cables



TEBS4 Brake Module

Power Supply Cable Options

| | | Trailer | |
|--|--|---|---|
| | | Semi-trailer | Drawbar or Centre-axle Trailer |
| ISO 7638 Connector direct to TEBS4 Brake Module | | | |
| ISO 7638 Connector only | | Cable K002294 (page 32) | - |
| ISO 7638 Connector to TEBS4 Brake Module via intermediate connector | | | |
| ISO 7638 Connector to intermediate connector | either | Cable EK3110 (page 32) | Cable EK3115 (page 33) |
| | or | Cable K002288 / 89 / K004775 (page 33) + ISO 7638 Socket K002290 (page 29) | Cable K002288 / 89 / K004775 (page 33) + ISO 7638 Plug K002291 (page 29) |
| | Intermediate connector to TEBS4 module (ISO 7638 only) | Cable K002286 (page 38) | |
| | Intermediate connector to TEBS4 module + ISO 1185 connection | Harness EK3108 (page 38) | |
| | Intermediate connector to TEBS4 module + diagnostic socket | Harness EK3101 (page 34) | |
| | Intermediate connector to TEBS4 module + diagnostic socket + ISO 1185 connection | Harness EK3100 / 07 (page 35) | |
| | Intermediate connector to TEBS4 module + ISO 1185 connection + auxiliary socket | Harness EK3102 (page 36) | |

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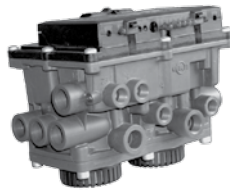
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Cables for Trailer EBS

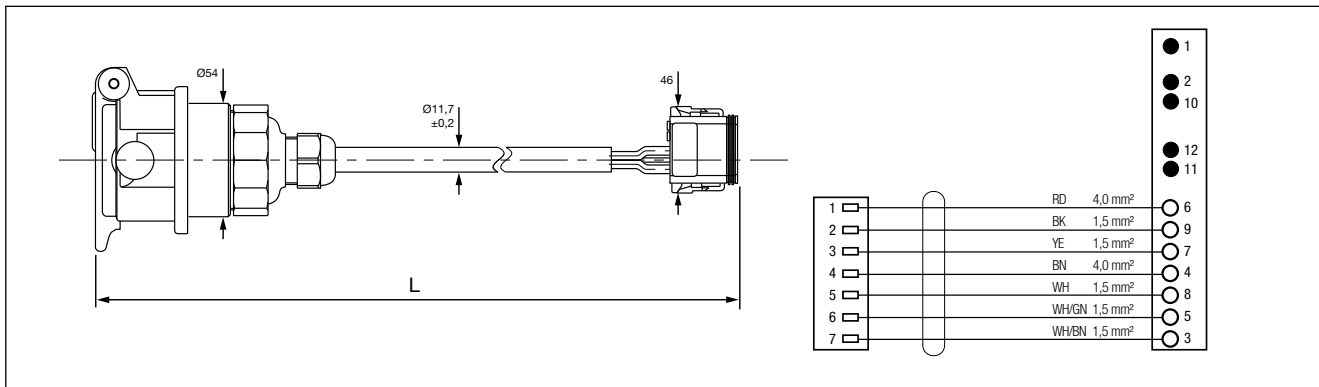
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February 2012

Range Overview - TEBS4 Cables (contd.)



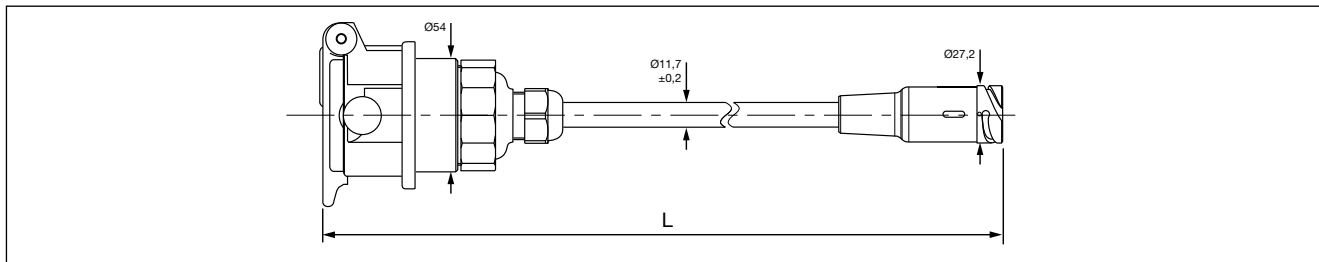
TEBS4 Brake Module

Power Cable (for semi-trailers) with ISO 7638 Socket and X1 Connector



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|----------|
| K002294 ¹⁾ | - | 12.0 | |

Power Cable (for semi-trailers) with ISO 7638 Socket



| Part No. | Type No. | Cable length L [m] | Comments |
|--------------|----------|--------------------|--|
| II367419000 | EK3110 | 9.0 | Use with X1 Power Supply Harness (pages 34 to 38) |
| II3674115000 | | 15.0 | |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K002294N00

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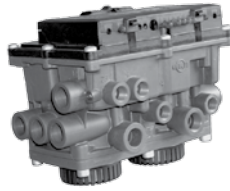
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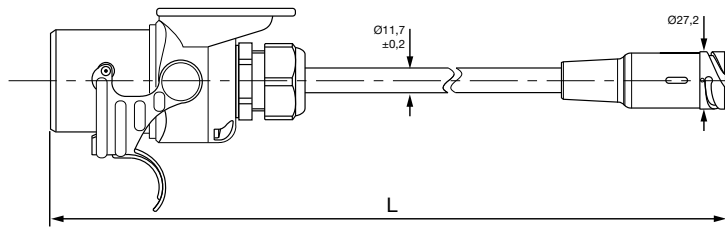


Range Overview - TEBS4 Cables (contd.)



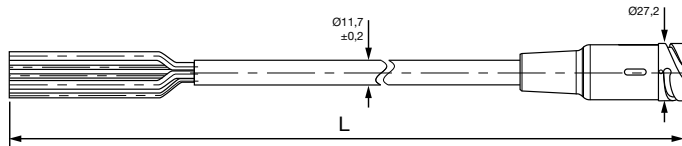
TEBS4 Brake Module

Power Cable (for drawbar and centre-axle trailers) with ISO 7638 Plug



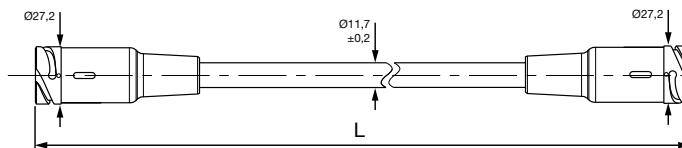
| Part No. | Type No. | Cable length L [m] | Comments |
|--------------|----------|--------------------|---|
| II397938000 | EK3115 | 8.0 | Use with X1 Power Supply Harness (pages 34 to 38) |
| II3979310000 | | 10.0 | |
| II3979312000 | | 12.0 | |

Power Cable without plug



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|---|
| K002288 ¹⁾ | - | 13.0 | Use with separate ISO 7638 socket/plug (page 29) and X1 Power Supply Harness (pages 34 to 38) |
| K002289 | - | 17.5 | |
| K004775 | - | 23.5 | |

Power Connecting Cable



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|---|
| K010712 ¹⁾ | - | 0.5 | Adapter to connect TEBS G2 Power Cable to TEBS4 |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K010712N00

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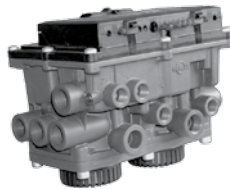
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Cables for Trailer EBS

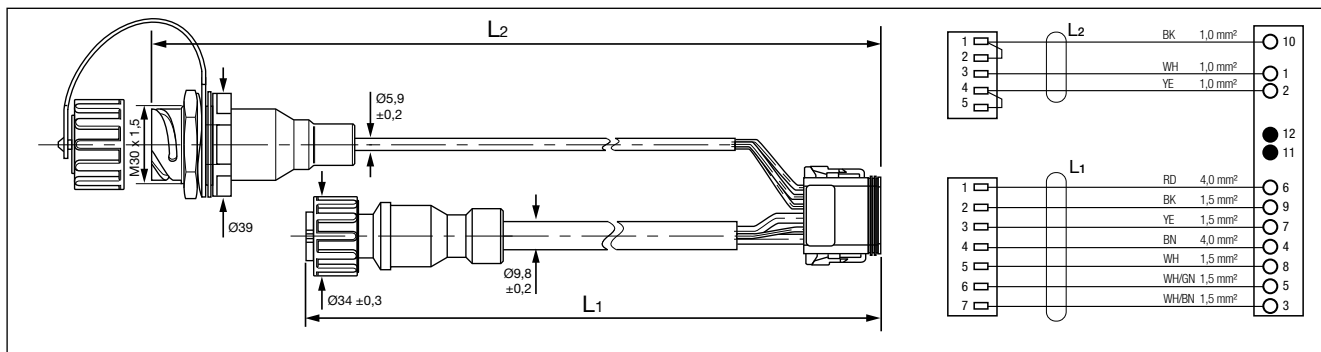
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February 2012

Range Overview - TEBS4 Cables (contd.)



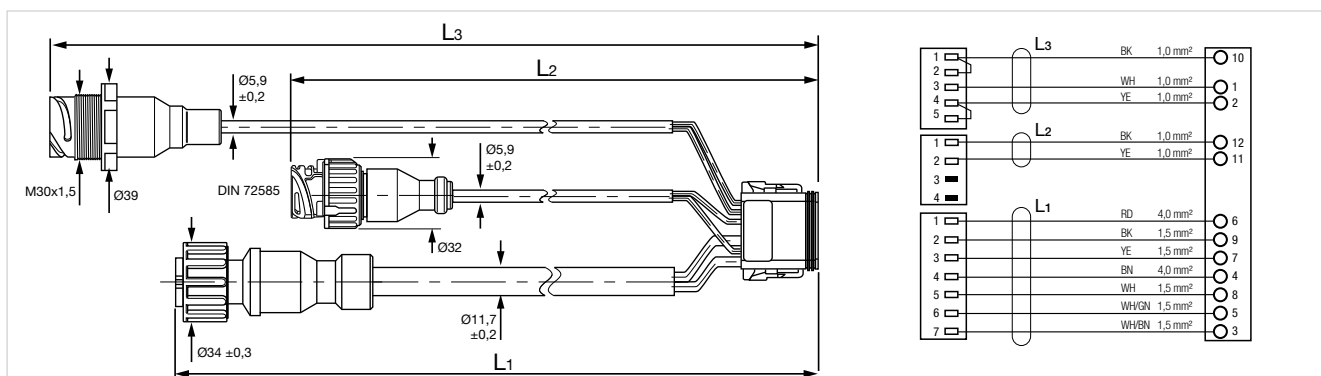
TEBS4 Brake Module

X1 Power Supply Harness (ISO 7638 only) with Diagnostic Socket



| Part No. | Type No. | Cable length L [m] | Comments |
|----------|----------|--|--|
| II367381 | EK3101 | L ₁ = 0.5 L ₂ = 4.0 | L ₁ = power supply (ISO 7638) |
| II367382 | | L ₁ = 0.5 L ₂ = 5.0 | L ₂ = diagnostic socket |
| II367383 | | L ₁ = 0.5 L ₂ = 6.0 | Use with Power Supply Cable (page 32 and 33) |

X1 Power Supply Harness (ISO 7638 and ISO 1185) with Diagnostic Socket



| Part No. | Type No. | Cable length L [m] | Comments |
|----------|----------|--|---|
| K007525 | EK3107 | L ₁ = 0.5 L ₂ = 1.0 L ₃ = 4.0 | L ₁ = power supply (ISO 7638) L ₂ = stop lamp supply (ISO 1185) L ₃ = diagnostic socket (without mounting kit) Use with Power Supply Cable (page 32 and 33) |

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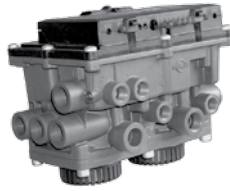
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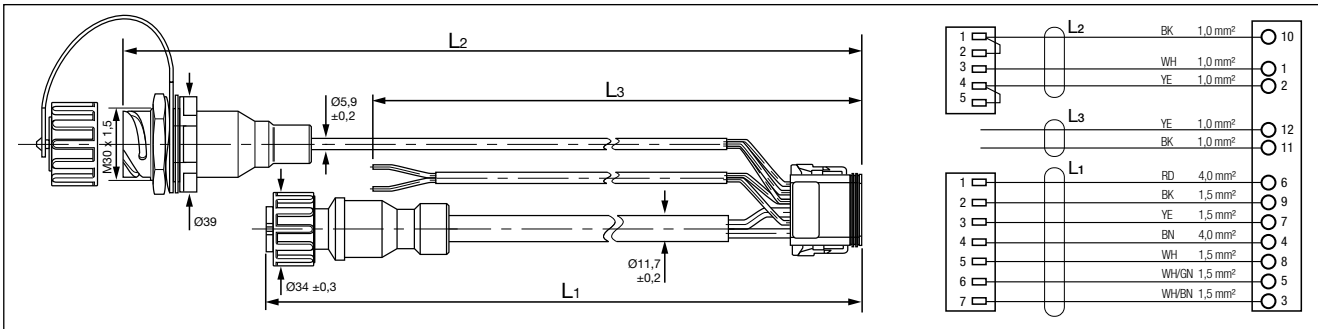


Range Overview - TEBS4 Cables (contd.)



TEBS4 Brake Module

X1 Power Supply Harness (ISO 7638 and ISO 1185) with Diagnostic Socket (contd.)



| Part No. | Type No. | Cable length L [m] | Comments |
|----------|----------|---|--|
| II367391 | EK3100 | L ₁ = 0.5 L ₂ = 4.0 L ₃ = 1.0 | L ₁ = power supply (ISO 7638) L ₂ = diagnostic socket L ₃ = stop lamp supply (ISO 1185) Use with Power Supply Cable (page 32 and 33) |
| II367393 | | L ₁ = 0.5 L ₂ = 6.0 L ₃ = 1.0 | |
| II367395 | | L ₁ = 0.5 L ₂ = 4.0 L ₃ = 12.0 | |
| II367397 | | L ₁ = 0.5 L ₂ = 6.0 L ₃ = 12.0 | |

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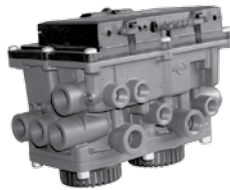
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Cables for Trailer EBS

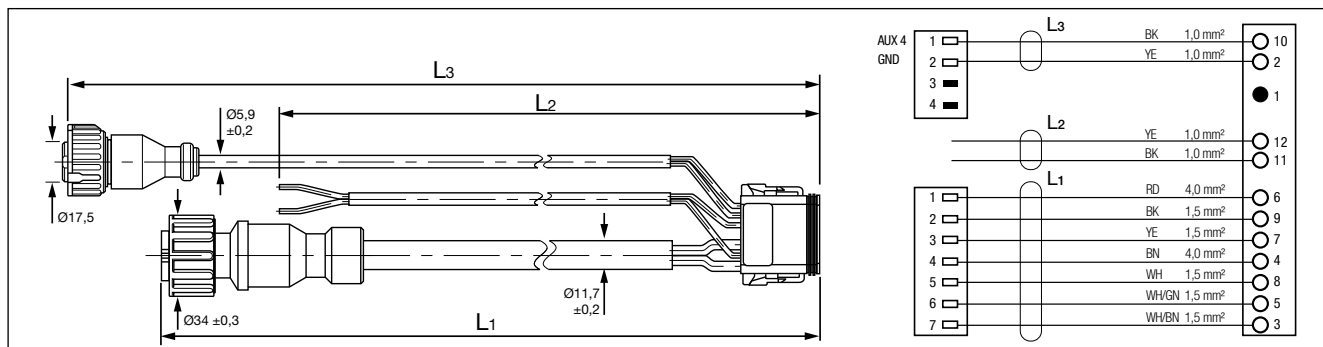
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February 2012

Range Overview - TEBS4 Cables (contd.)



TEBS4 Brake Module

X1 Power Supply Harness (ISO 7638 and ISO 1185) with Auxiliary Socket (Aux 4)



| Part No. | Type No. | Cable length L [m] | Comments |
|----------|----------|---|---|
| K002947 | EK3102 | L ₁ = 0.5 L ₂ = 12.0 L ₃ = 2.0 | L ₁ = power supply (ISO 7638) L ₂ = stop lamp supply (ISO 1185) L ₃ = auxiliary socket (Aux 4) Use with Power Supply Cable (page 32 and 33) |
| K002949 | | L ₁ = 0.5 L ₂ = 6.0 L ₃ = 6.0 | |
| K002950 | | L ₁ = 0.5 L ₂ = 12.0 L ₃ = 6.0 | |
| K004754 | | L ₁ = 0.5 L ₂ = 1.0 L ₃ = 4.0 | |
| K004756 | | L ₁ = 0.5 L ₂ = 12.0 L ₃ = 4.0 | |

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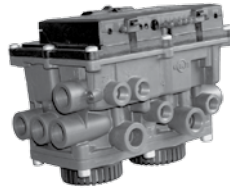
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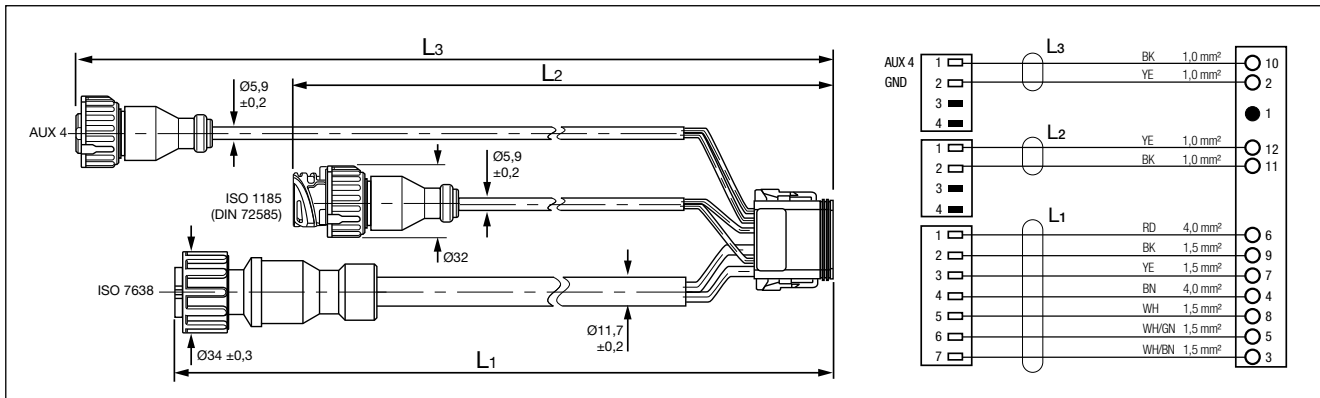


Range Overview - TEBS4 Cables (contd.)



TEBS4 Brake Module

X1 Power Supply Harness (ISO 7638 and ISO 1185) with Auxiliary Socket (Aux 4) (contd.)



| Part No. | Type No. | Cable length L [m] | Comments |
|----------|----------|--|---|
| K007524 | EK3102 | L ₁ = 0.5 L ₂ = 1.0 L ₃ = 4.0 | L ₁ = power supply (ISO 7638) L ₂ = stop lamp supply (ISO 1185) L ₃ = auxiliary socket (Aux 4) Use with Power Supply Cable (page 32 and 33) |

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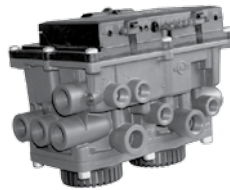
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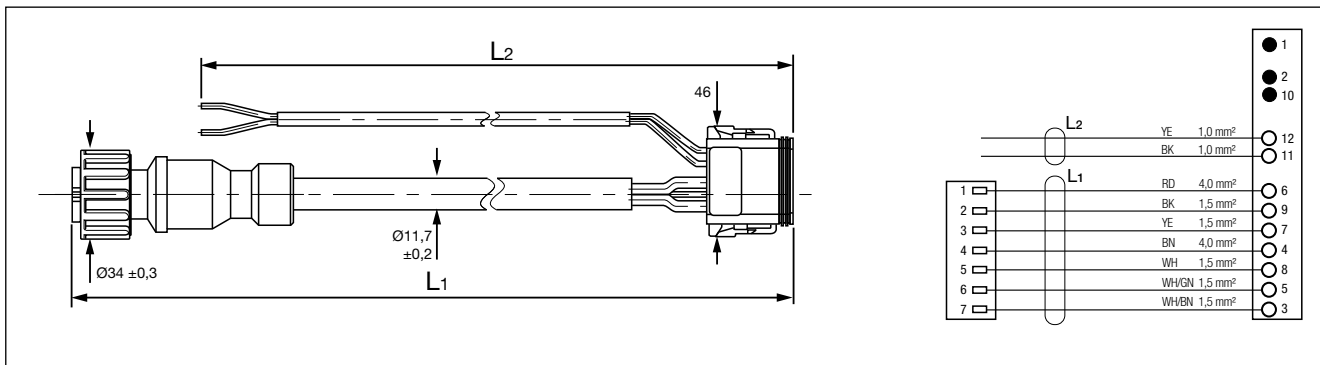
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Range Overview - TEBS4 Cables (contd.)



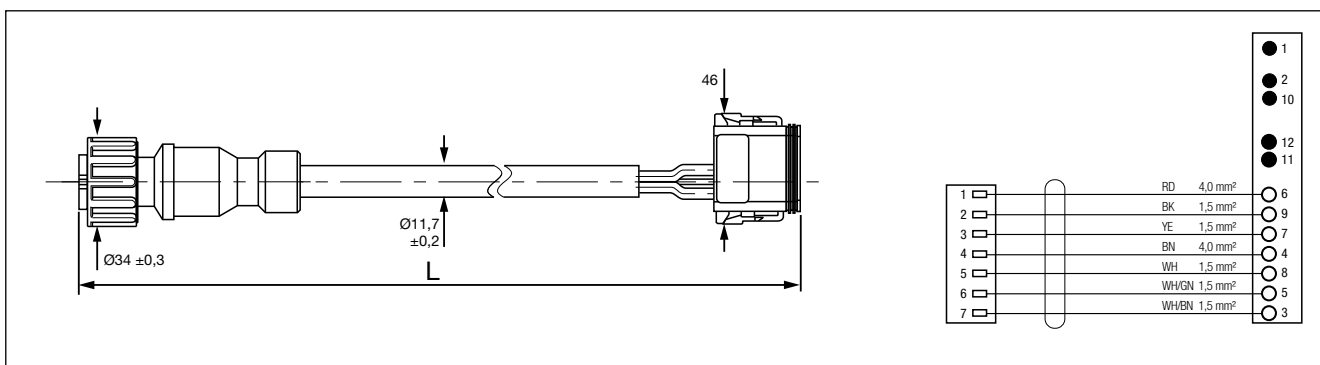
TEBS4 Brake Module

X1 Power Supply Harness (ISO 7638 and ISO 1185)



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------|----------|-----------------------------|--|
| II40391F1 | EK3108 | $L_1 = 0.5$ $L_2 = 1.0$ | L_1 = power supply (ISO 7638) L_2 = stop lamp supply (ISO 1185) Use with Power Supply Cable (page 32 and 33) |
| II40391F2 | | $L_1 = 0.5$ $L_2 = 12.0$ | |

X1 Power Supply Harness (ISO 7638)



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|---|
| K002286 ¹⁾ | - | 0.5 | L = power supply (ISO 7638) Use with Power Supply Cable (page 32 and 33) |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K002286N00

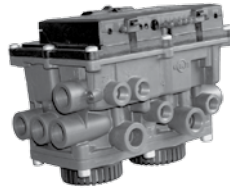
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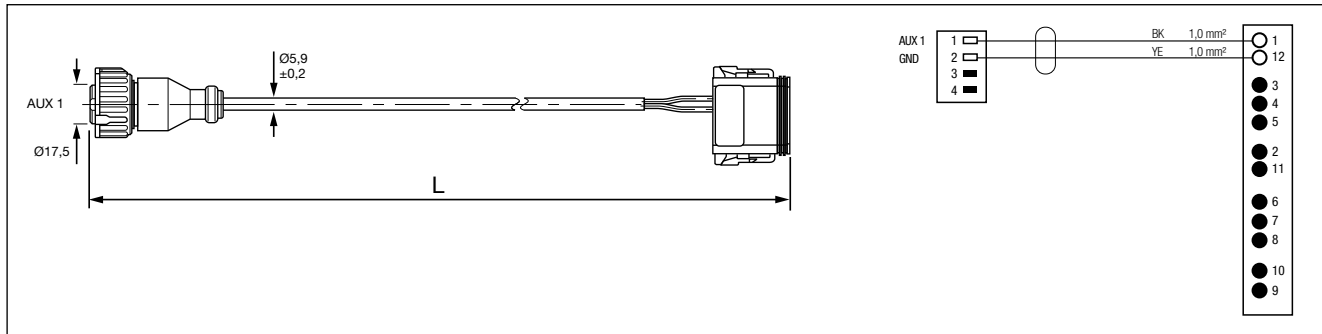
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Range Overview - TEBS4 Cables (contd.)



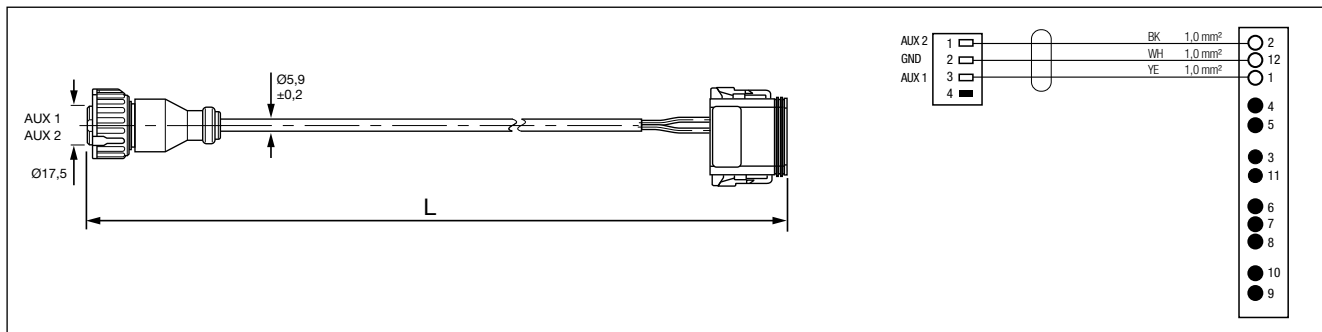
TEBS4 Brake Module

X2 Connector Harness with Auxiliary Connector (Aux 1)



| Part No. | Type No. | Cable length L [m] | Comments |
|----------|----------|--------------------|----------|
| II397882 | EK3123 | 4.0 | |
| II397883 | | 6.0 | |
| II397884 | | 2.0 | |

X2 Connector Harness with Auxiliary Connector (3rd Modulator or Aux 1 & 2)



| Part No. | Type No. | Cable length L [m] | Comments |
|----------|----------|--------------------|--|
| K002953 | EK3142 | 3.0 | for connecting third modulator BR9234 or other Aux 1/2 devices |
| K002954 | | 9.0 | |

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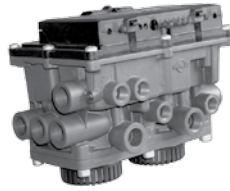
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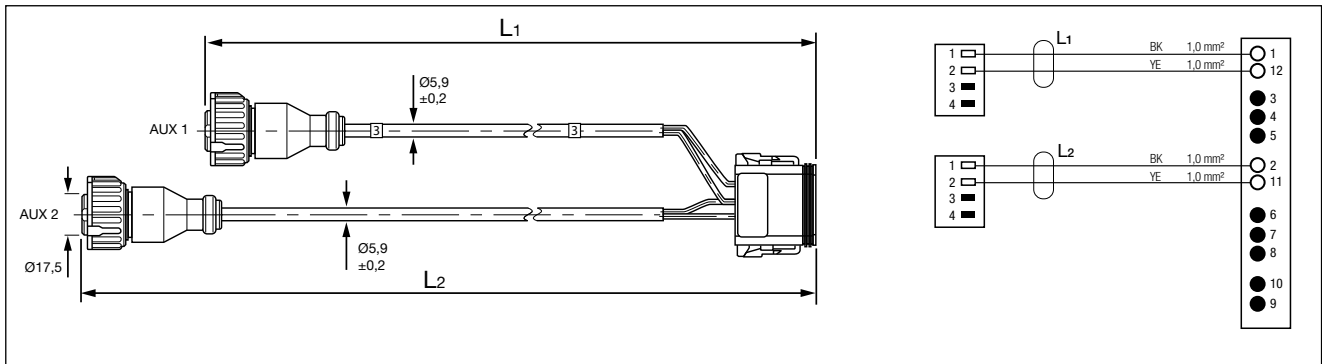
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February 2012

Range Overview - TEBS4 Cables (contd.)



TEBS4 Brake Module

X2 Connector Harness with Auxiliary Connectors (Aux 1 and Aux 2)



| Part No. | Type No. | Cable length L [m] | Comments |
|----------|----------|--|--|
| II397872 | EK3122 | L ₁ = 6.0 L ₂ = 1.0 | L ₁ = Aux 1 L ₂ = Aux 2 |
| II397873 | | L ₁ = 6.0 L ₂ = 6.0 | |
| II397874 | | L ₁ = 6.0 L ₂ = 2.0 | |

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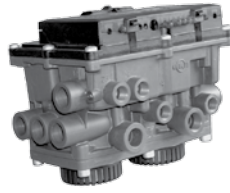
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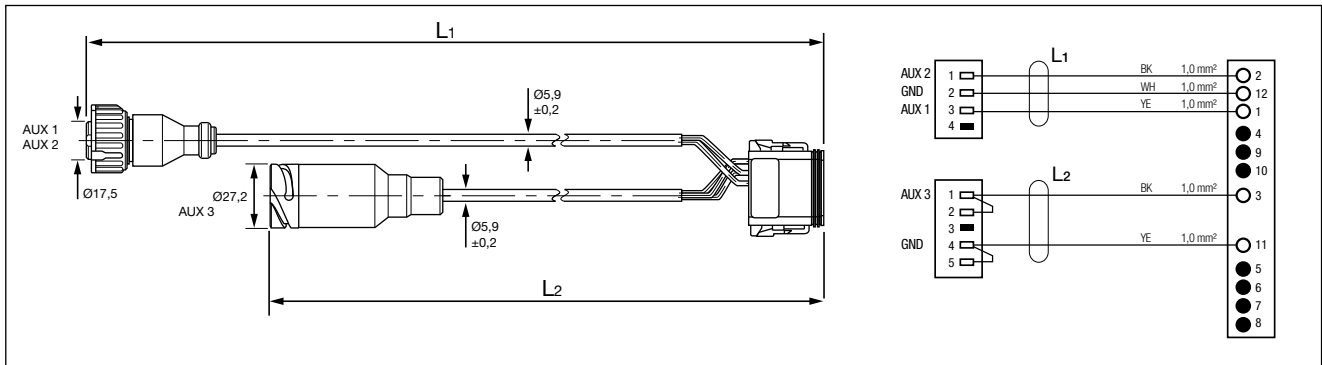


Range Overview - TEBS4 Cables (contd.)

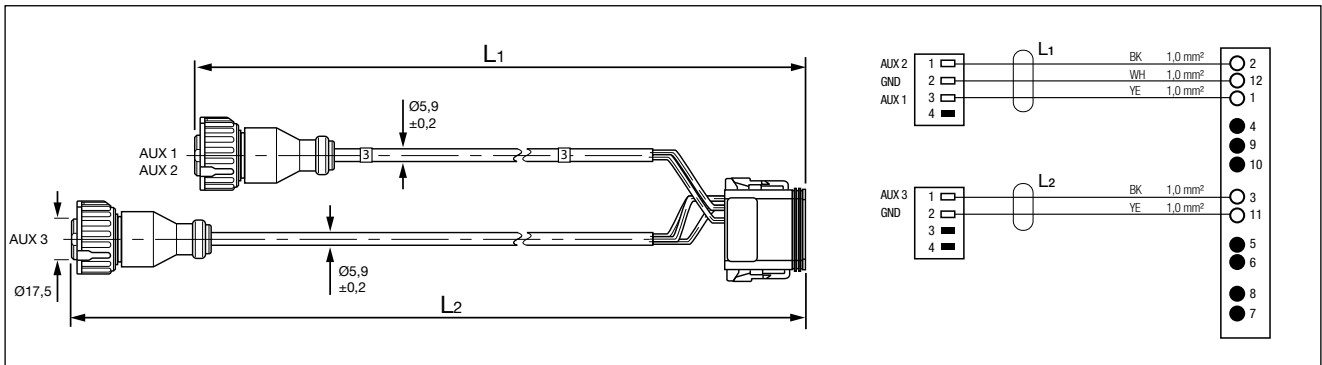


TEBS4 Brake Module

X2 Connector Harness with Auxiliary Connectors (3rd Modulator or Aux 1, Aux 2 and Aux 3)



| Part No. | Type No. | Cable length L [m] | Comments |
|----------|----------|--|---|
| K002951 | EK3140 | L ₁ = 9.0 L ₂ = 6.0 | L ₁ = BR9234 or other Aux 1/2 devices L ₂ = Aux 3 - bayonet splitter |



| Part No. | Type No. | Cable length L [m] | Comments |
|----------|----------|--|--|
| K002952 | EK3141 | L ₁ = 3.0 L ₂ = 6.0 | L ₁ = BR9234 or other Aux 1/2 devices L ₂ = Aux 3 |

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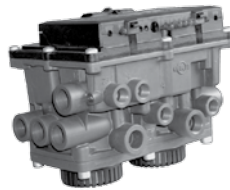
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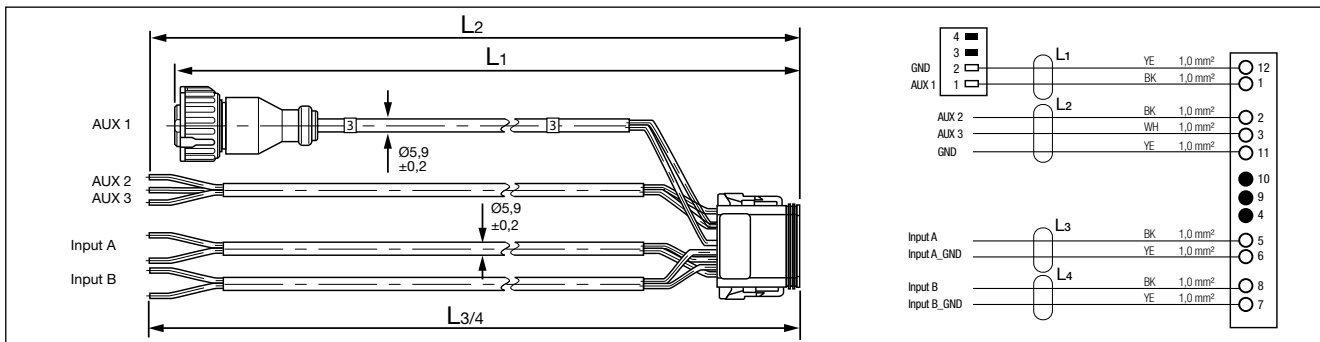
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Range Overview - TEBS4 Cables (contd.)

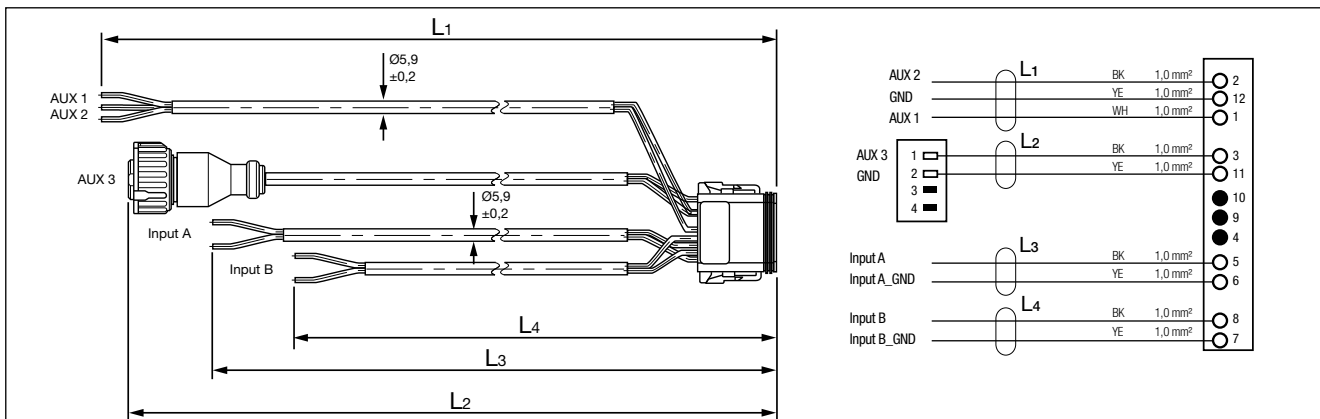


TEBS4 Brake Module

X2 Connector Harness with Auxiliary Connectors and input cables



| Part No. | Type No. | Cable length L [m] | Comments |
|----------|----------|--|--|
| II397951 | EK3125 | L ₁ = 4.0 L ₂ = 1.0 L ₃ = 1.0 L ₄ = 1.0 | L ₁ = Aux 1 L ₂ = Aux 2 & 3 |
| II397952 | | L ₁ = 6.0 L ₂ = 1.0 L ₃ = 1.0 L ₄ = 1.0 | L ₃ = Input A L ₄ = Input B |



| Part No. | Type No. | Cable length L [m] | Comments |
|----------|----------|--|--|
| K004569 | EK3129 | L ₁ = 1.0 L ₂ = 1.2 L ₃ = 1.0 L ₄ = 1.0 | L ₁ = Aux 1 & 2 or BR9234 L ₂ = Aux 3 L ₃ = Input A L ₄ = Input B |

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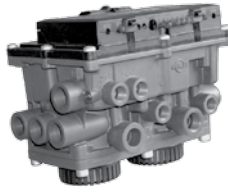
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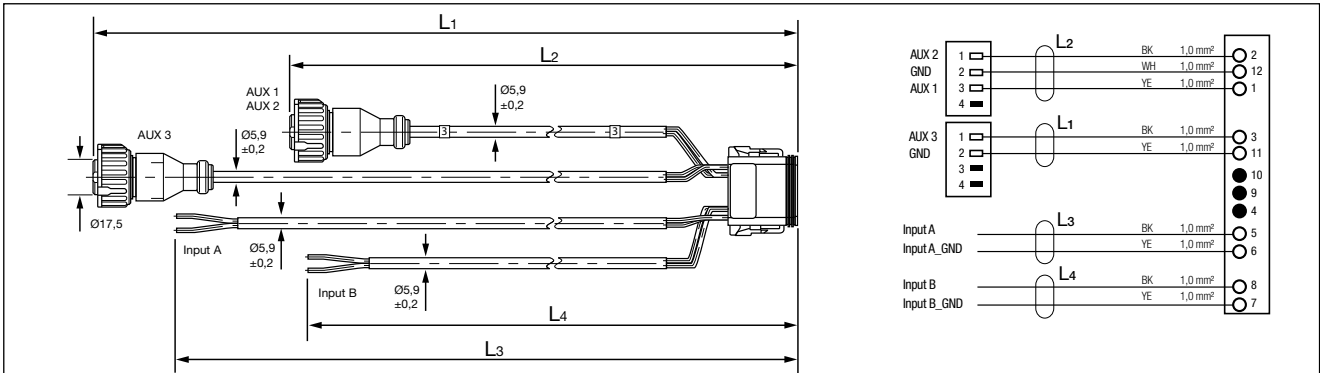


Range Overview - TEBS4 Cables (contd.)

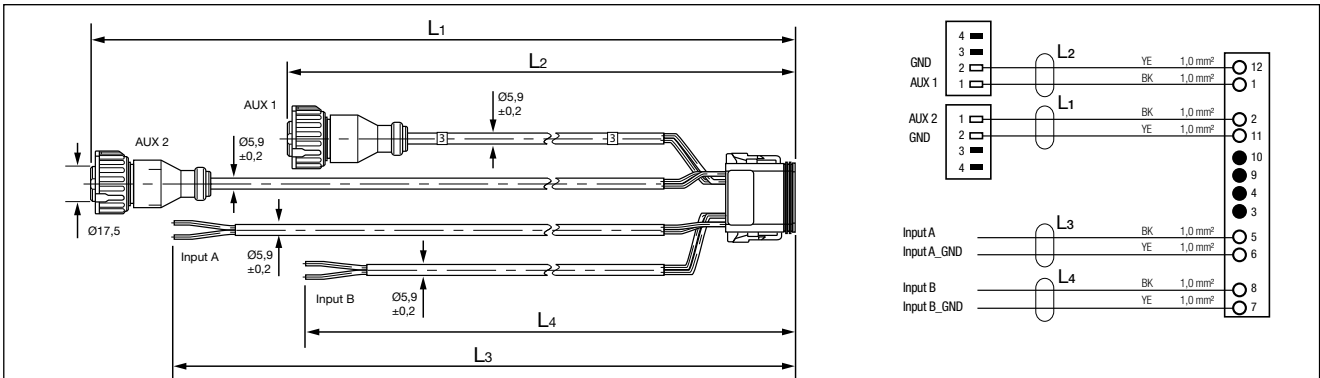


TEBS4 Brake Module

X2 Connector Harness with Auxiliary Connectors and input cables (contd.)



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------|----------|--|---|
| II39802F1 | EK3126 | $L_1 = 2.0$ $L_2 = 6.0$ $L_3 = 1.0$ $L_4 = 1.0$ | $L_1 = \text{Aux 3}$ $L_2 = \text{Aux 1 \& 2 or BR9234}$ $L_3 = \text{Input A}$ $L_4 = \text{Input B}$ |



| Part No. | Type No. | Cable length L [m] | Comments |
|-----------|----------|---|--|
| II39814F1 | EK3127 | $L_1 = 6.0$ $L_2 = 2.0$ $L_3 = 15.0$ $L_4 = 7.0$ | $L_1 = \text{Aux 2}$ $L_2 = \text{Aux 1}$ |
| II39814F2 | | $L_1 = 6.0$ $L_2 = 2.0$ $L_3 = 6.0$ $L_4 = 6.0$ | $L_3 = \text{Input A}$ $L_4 = \text{Input B}$ |

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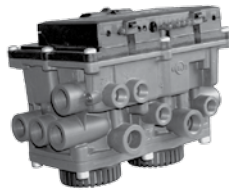
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Cables for Trailer EBS

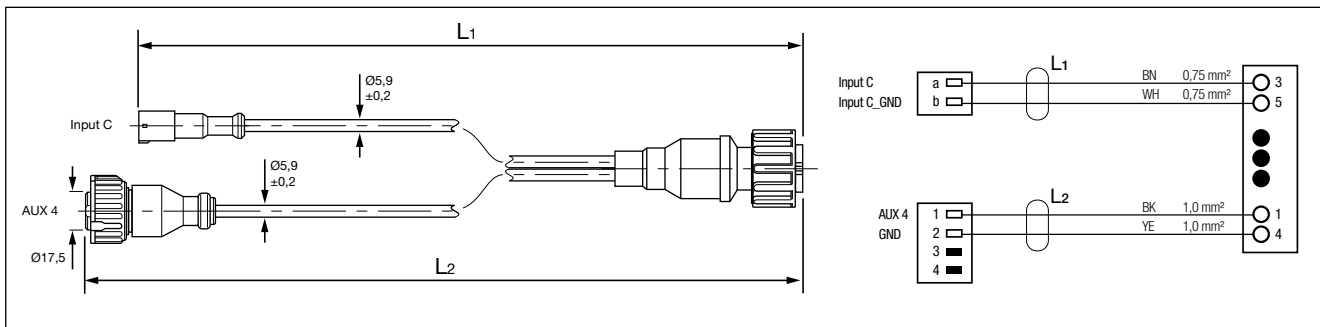
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Range Overview - TEBS4 Cables (contd.)



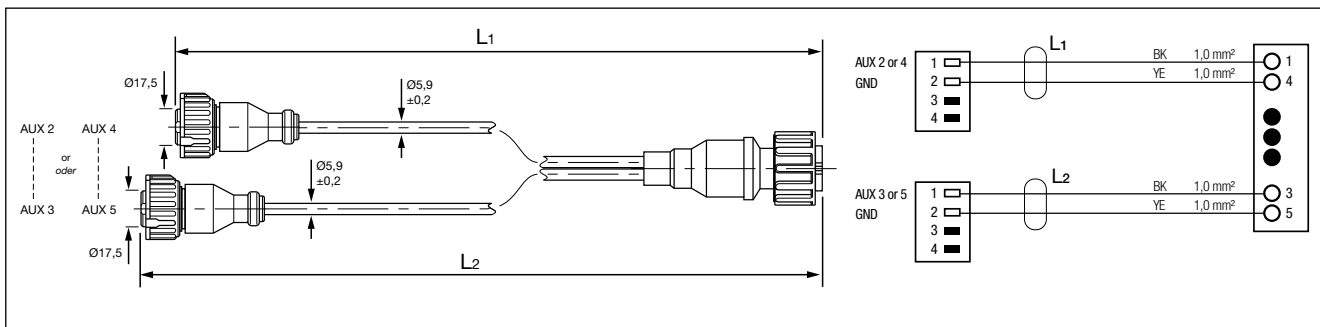
TEBS4 Brake Module

Connecting Cable for Aux 4 and Input C



| Part No. | Type No. | Cable length L [m] | Comments |
|----------|----------|--|--|
| K002283 | - | L ₁ = 1.0 L ₂ = 3.0 | L ₁ = Input C L ₂ = Aux 4 Used in conjunction with K002270/71/72 |

Connecting Cable - Bayonet Splitter



| Part No. | Type No. | Cable length L [m] | Comments |
|----------|----------|--|--|
| K002284 | - | L ₁ = 1.0 L ₂ = 3.0 | L ₁ = Aux 2 or Aux 4 L ₂ = Aux 3 or Aux 5 Used in conjunction with K002270/71/72 |

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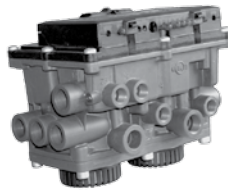
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Range Overview - TEBS4 Cables (contd.)



TEBS4 Brake Module

Connecting Cable for Diagnostic Socket

| Part No. | Type No. | Cable length L [m] | Comments |
|-----------------------|----------|--------------------|--|
| K002270 ¹⁾ | - | 2.0 | Diagnostic Socket without mounting kit or AUX 4 and Input C or several AUX |
| K002271 ¹⁾ | - | 6.0 | |
| K002272 ¹⁾ | - | 15.0 | |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K002272N00

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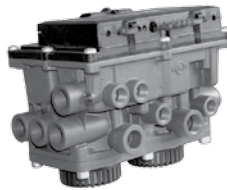
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Cables for Trailer EBS

Doc. No. Y107795 (EN - Rev. 000)
February 2012

Range Overview - TEBS4 Cables (contd.)



TEBS4 Brake Module

Connecting Cable - Bayonet Splitter

| Part No. | Type No. | Cable length L [m] | Comments |
|----------|----------|--------------------|----------------------------------|
| K002273 | - | 6.0 | Used in conjunction with K002285 |

Connecting Cable - 2 x reset to ride height outputs

| Part No. | Type No. | Cable length L [m] | Comments |
|----------|----------|--------------------|----------------------------------|
| K002285 | - | 0.5 | Used in conjunction with K002273 |



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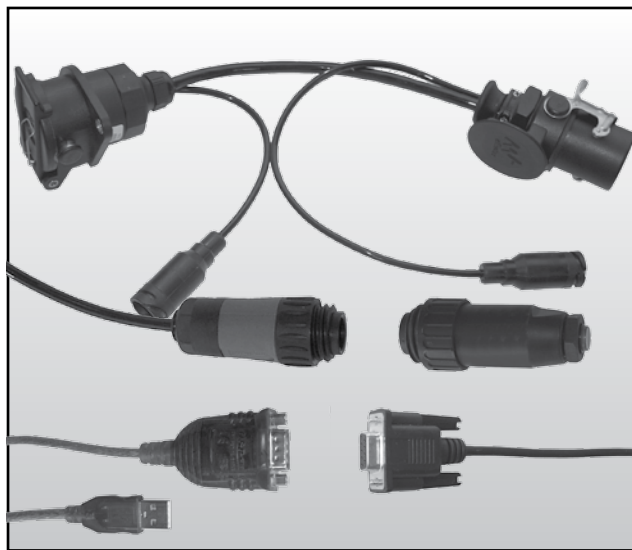
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Function

Diagnostic Cables are used in trailer ABS and EBS systems to:

- provide electrical power to the diagnostic equipment where necessary
- supply status information to the diagnostic equipment

Newer EBS-equipped trailers can be diagnosed through the ISO 7638 connection. Older EBS-equipped trailers and newer ABS-equipped trailers will have a diagnostic socket installed. Details of the cables/harnesses with diagnostic socket are shown in PD-272-010, Document No. Y095687 for ABS systems and PD-272-020, Document No. Y107795 for EBS systems.



Included in this document are details of various diagnostic cables and the Universal Diagnostic Interface which is required to diagnose KB4TA ABS and TEBS systems using the Knorr-Bremse ECUTalk® diagnostic software.

Also included are details of diagnostic cables using the blink code adaptor, which can be used to access fault code information stored in the ECUs of the A18 and KB3-TA ABS systems.

Technical Features

Operating Temperature Range: -40 °C to +80 °C

See tables for other features.

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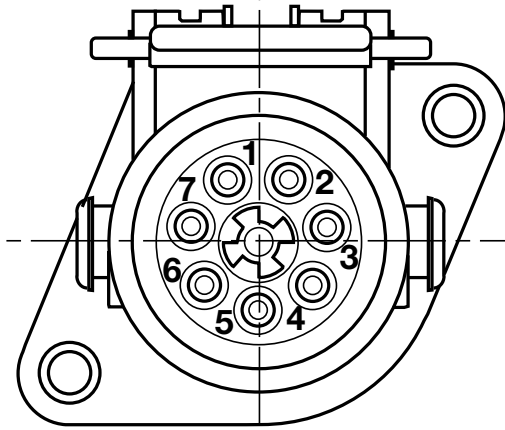
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Diagnostic Cables for Trailer ABS/EBS

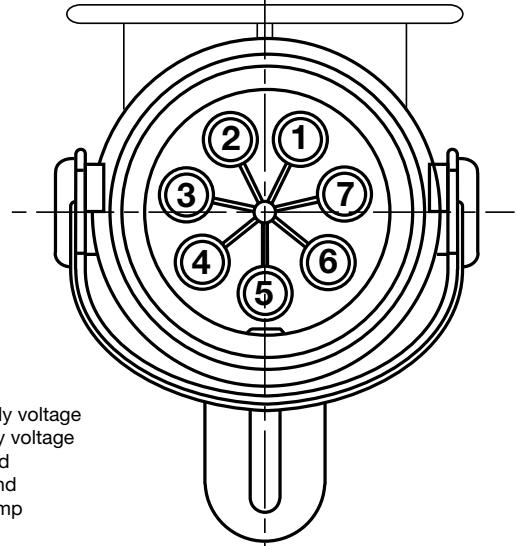
Doc. No. Y107796 (EN - Rev. 000)
May 2012

Pin Configurations



**ISO 7638 Socket
(24 V)**

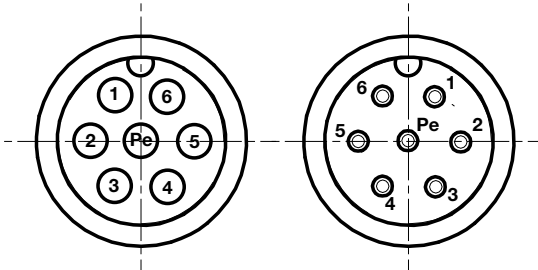
- | | | |
|-------|-------------|----------------------|
| Pin 1 | red | Valve supply voltage |
| Pin 2 | black | ECU supply voltage |
| Pin 3 | yellow | ECU ground |
| Pin 4 | brown | Valve ground |
| Pin 5 | white | Warning lamp |
| Pin 6 | white/green | CAN-Hi |
| Pin 7 | white/brown | CAN-Lo |



**ISO 7638 Plug
(24 V)**

DIAGNOSTIC CONNECTORS

Older Amphenol Connector



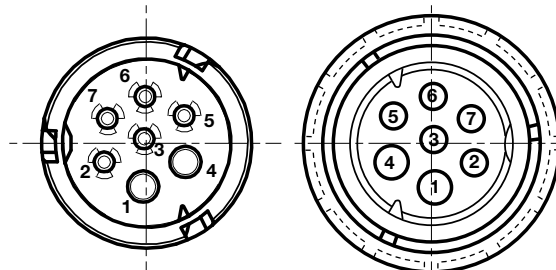
Diagnostic Socket

Diagnostic Plug

- 1 - 24 V
- 2 - not connected
- 3 - 24 V (linked to Pin 1)
- 4 - DIA-K
- 5 - DIA-K (linked to Pin 4)
- 6 - DIA-K (linked to Pin 4)
- Pe - GND

- 1 - 24 V
- 2 - not connected
- 3 - not connected
- 4 - DIA-K
- 5 - not connected
- 6 - not connected
- Pe - GND

Later Bayonet Connector



Diagnostic Socket

Diagnostic Plug

- 1 - not connected
- 2 - 24 V
- 3 - DIA-K
- 4 - not connected
- 5 - GND
- 6 - CAN-L
- 7 - CAN-H

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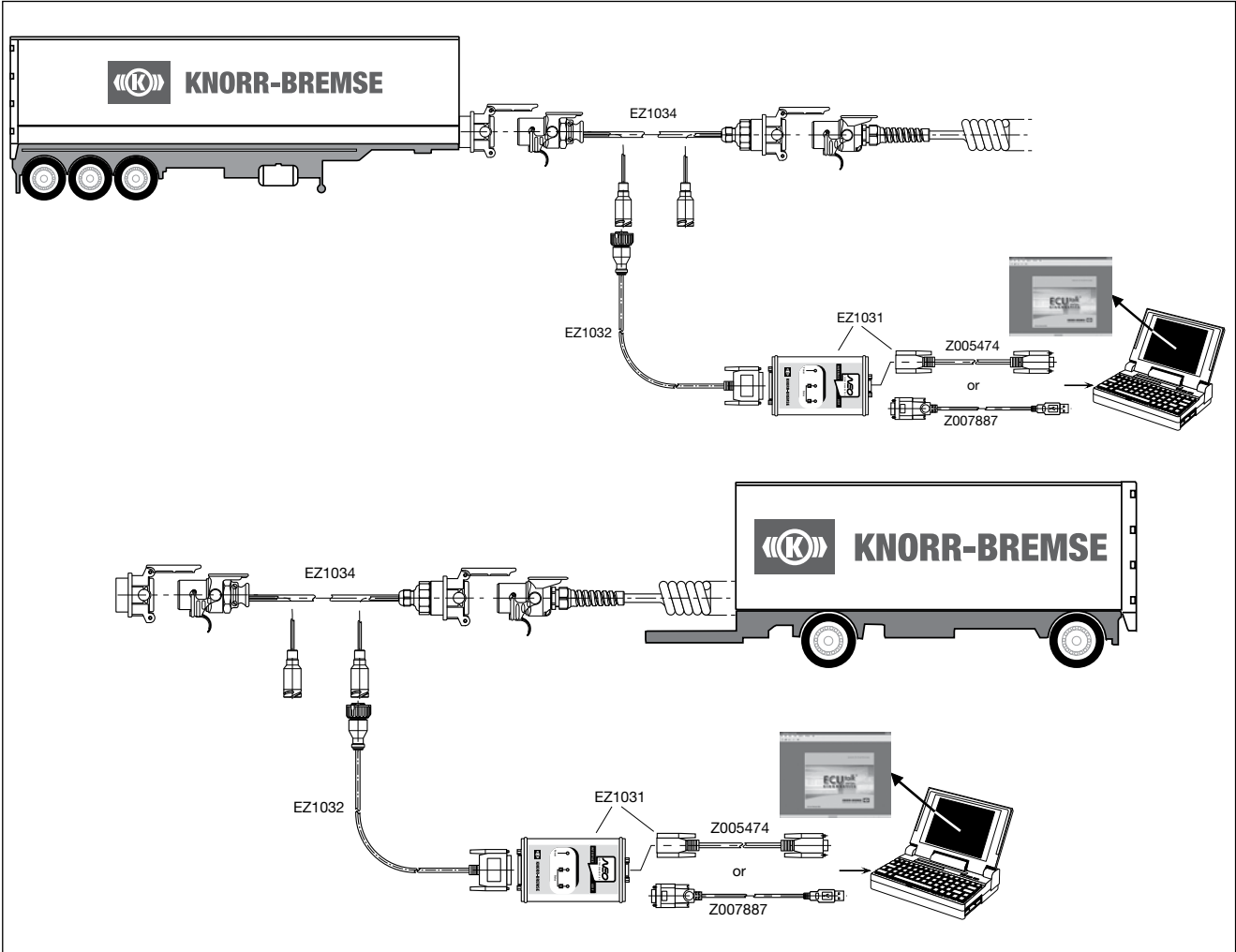
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Diagnostic set up

PC Diagnostics via 24 V CAN - TEBS4 and TEBS G2/2.1



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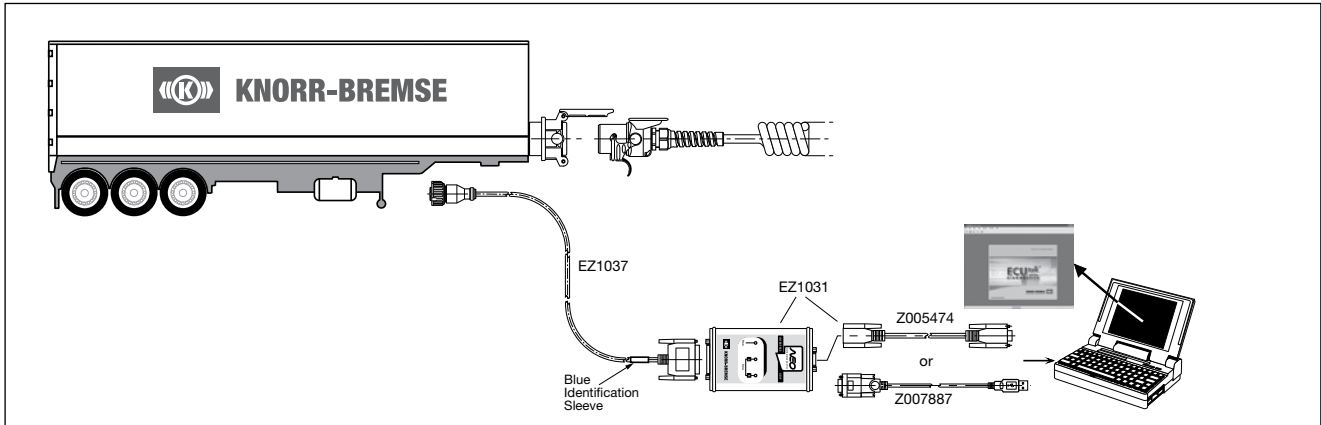
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Diagnostic Cables for Trailer ABS/EBS

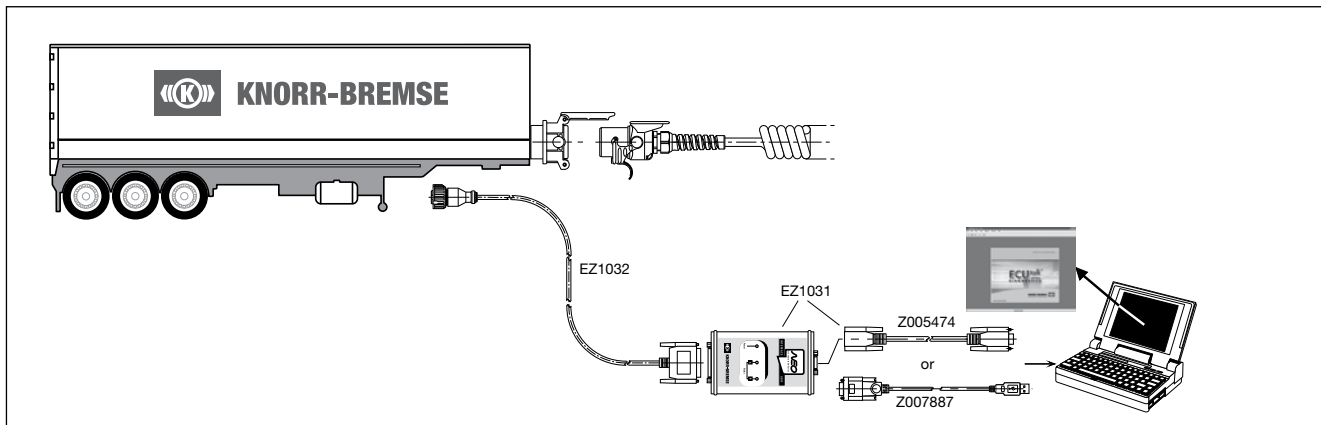
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Diagnostic set up (contd.)

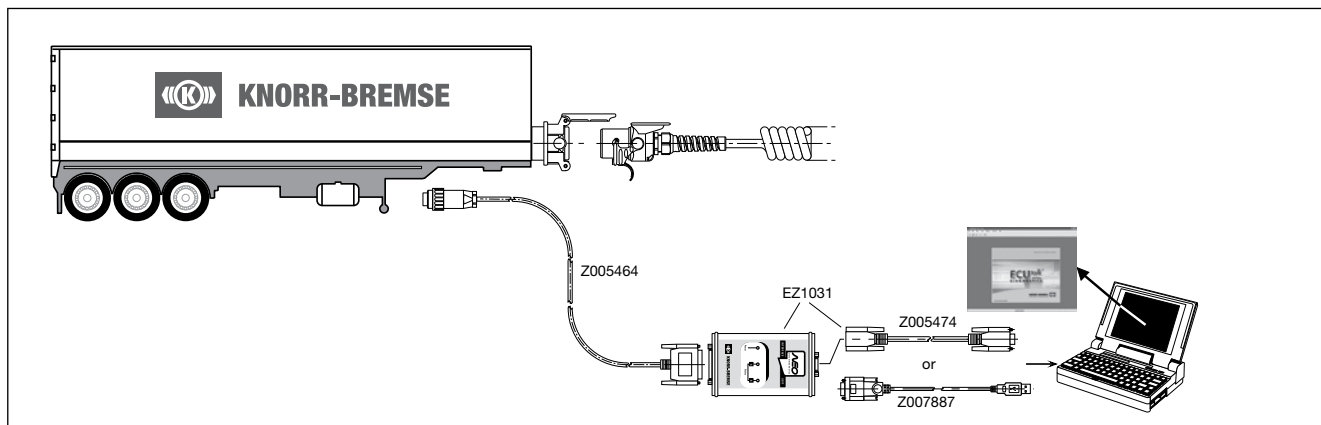
PC Diagnostics via Diagnostic Socket (Bayonet 5 V CAN) - TEBS G2/2.1 and KB4TA



PC Diagnostics via Diagnostic Socket (Bayonet K-Line) - TEBS4 and A18



PC Diagnostics via Diagnostic Socket (Amphenol K-Line) - TEBS4 and A18



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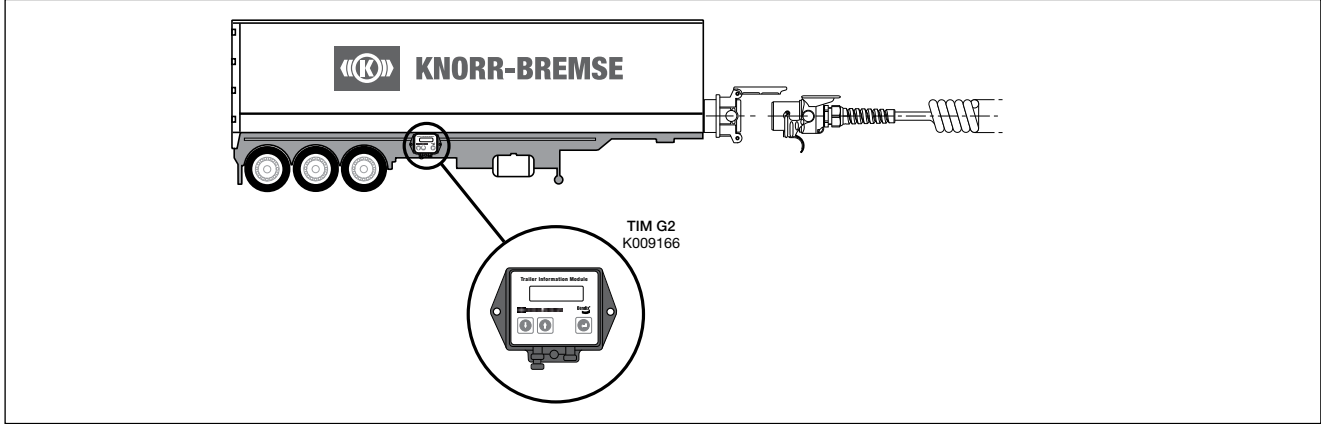
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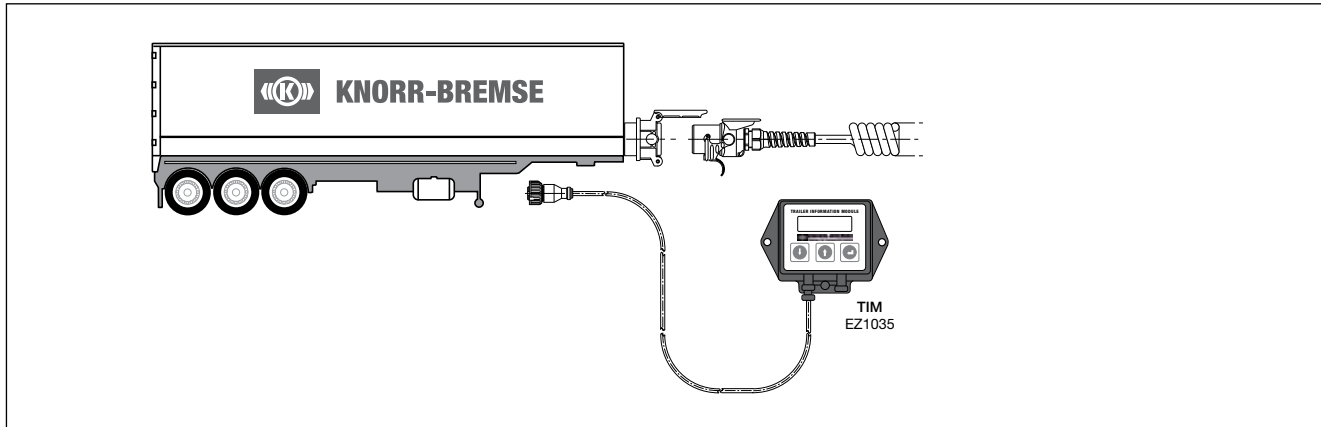


Diagnostic set up (contd.)

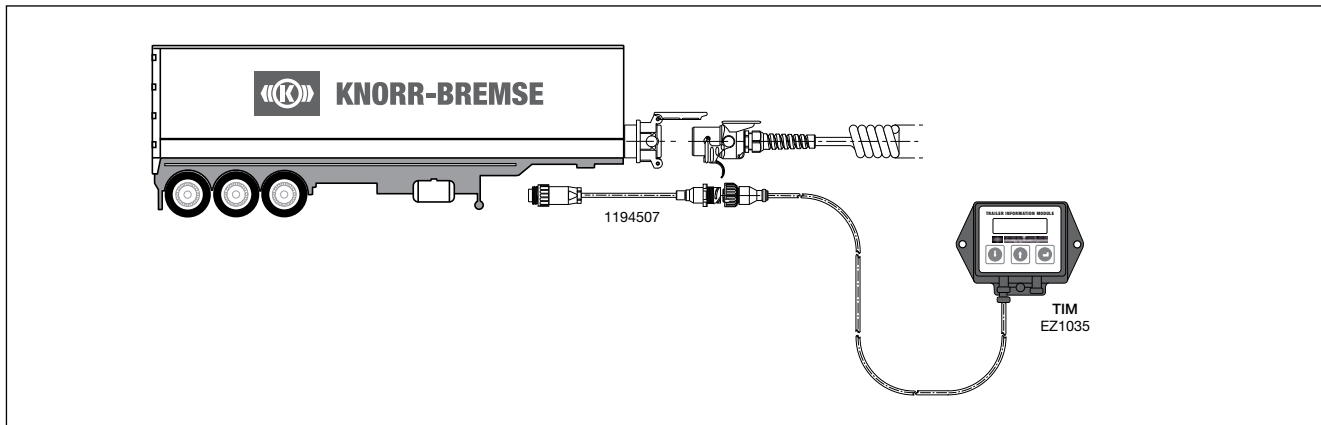
TIM G2 Diagnostics via Diagnostic Socket (Bayonet - 5 V CAN) - TEBS G2/2.1



TIM Diagnostics via Diagnostic Socket (Bayonet K-Line) - TEBS4



TIM Diagnostics via Diagnostic Socket (Amphenol K-Line) - TEBS4



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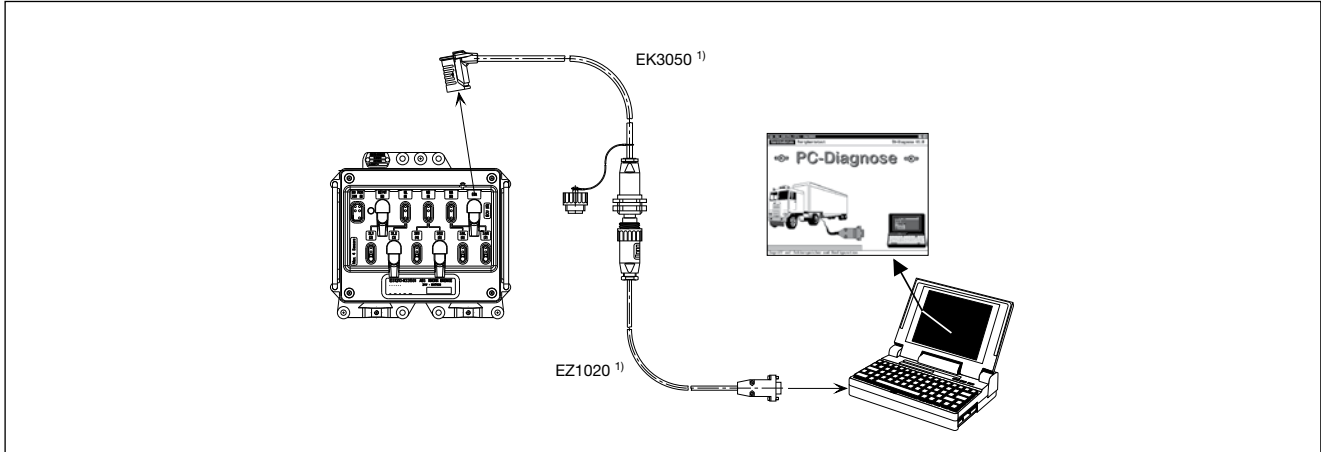
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Diagnostic Cables for Trailer ABS/EBS

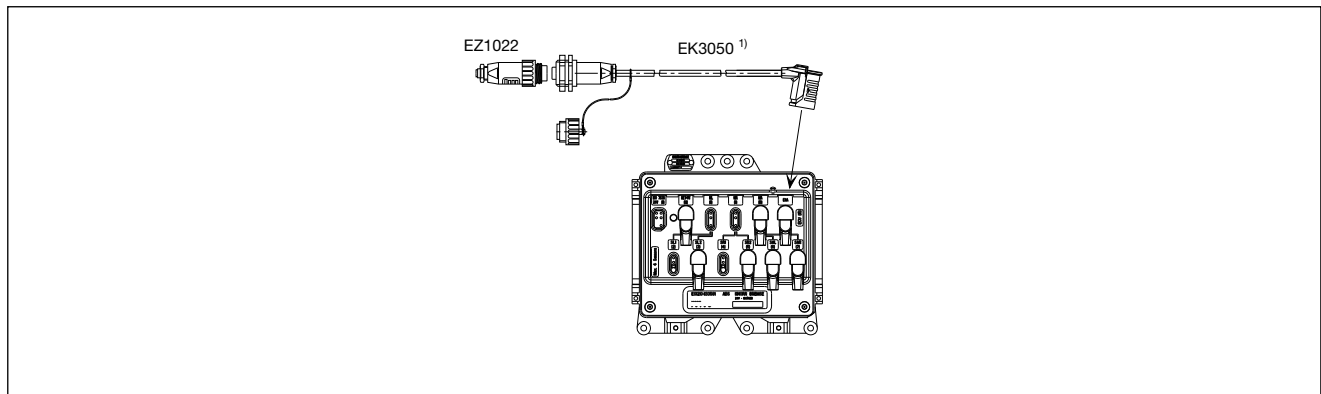
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Diagnostic set up (contd.)

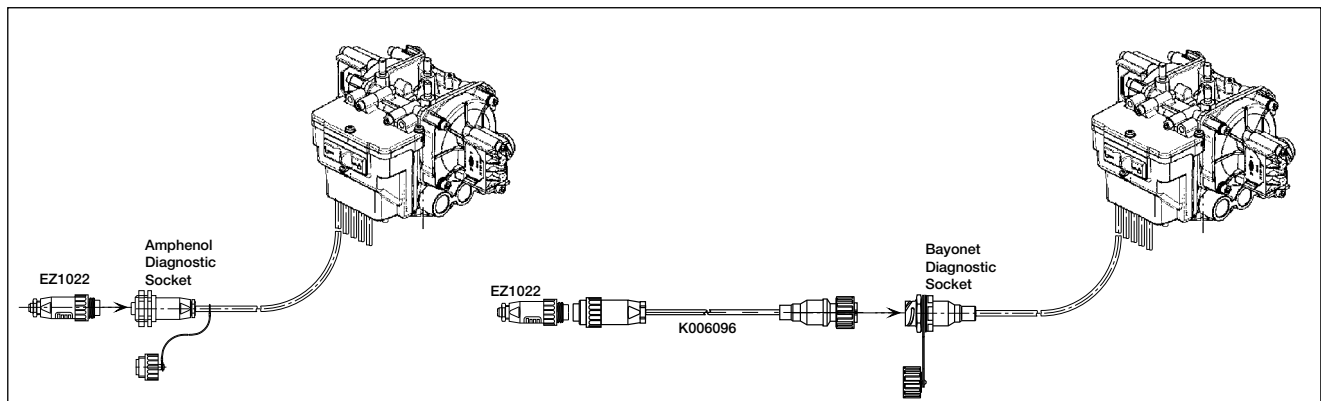
PC Diagnostics (DOS-based software) via Diagnostic Socket (Amphenol) - KB3-TA



Blink Code Diagnostics via Diagnostic Socket (Amphenol) - KB3-TA



Blink Code Diagnostics via Diagnostic Socket (Amphenol and Bayonet) - A18



¹⁾ Cable is no longer in production but is available while stocks last

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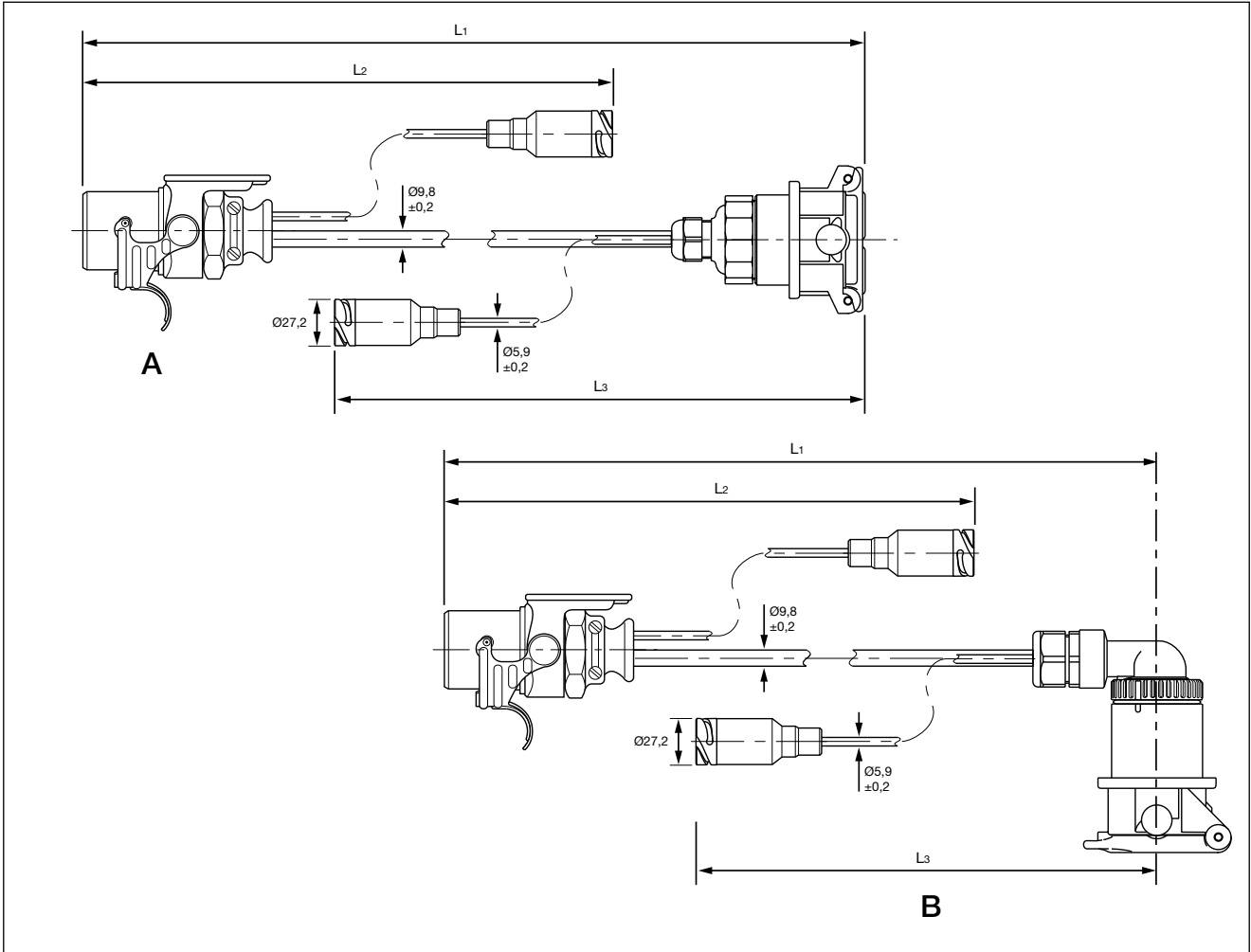
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Range Overview - Diagnostic Cables

ISO 7638 Plug/Socket 24 V CAN Adaptor Cable - TEBS4 and TEBS G2/2.1



| Part No. | Type No. | Cable length [m] | Drawing | Comments |
|----------|----------|---|---------|---|
| II39808F | EZ1034 | L ₁ = 0.45 L ₂ = 0.60 L ₃ = 0.35 | A | Suits all types of trailer with 24 V system |
| K028584 | | L ₁ = 0.60 L ₂ = 0.45 L ₃ = 0.35 | B | Suits all types of trailer with 12 V system |

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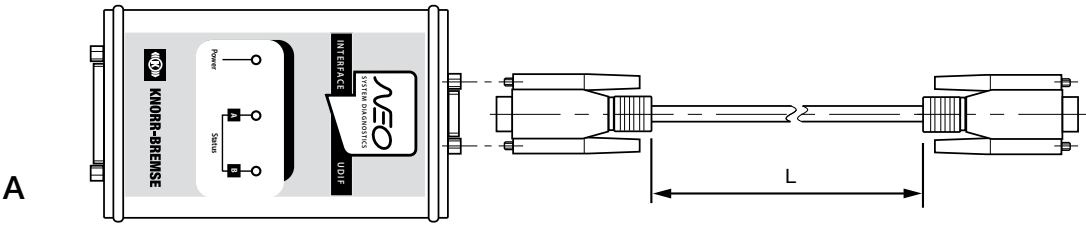
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Diagnostic Cables for Trailer ABS/EBS

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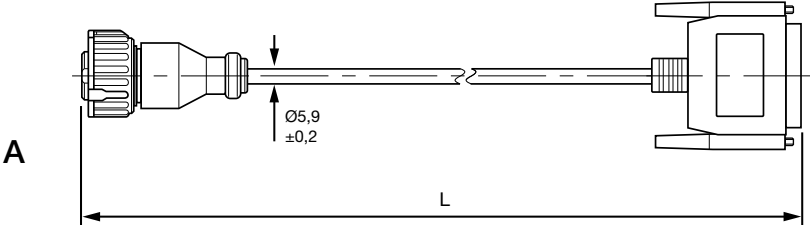
Range Overview - Diagnostic Cables (contd.)

Universal Diagnostic Interface (UDIF) and Cable - TEBS4, TEBS G2/2.1, KB4TA and A18



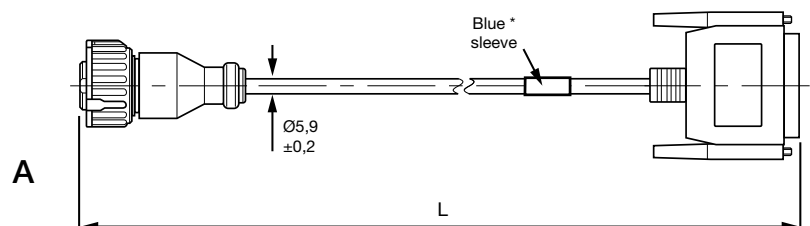
| Part No. | Type No. | Cable length [m] | Drawing | Comments |
|----------|----------|------------------|---------|---|
| II39809F | EZ1031 | 1.5 | A | Includes UDIF K018631 and Cable Z005474 with RS232 Sub-D 9-pin Connectors |

24 V CAN to UDIF Cable - TEBS4 and TEBS G2/2.1



| Part No. | Type No. | Cable length [m] | Drawing | Comments |
|----------|----------|------------------|---------|--|
| II39812F | EZ1032 | 3.0 | A | For use with Adaptor Cable II39808F-EZ1034 UDIF Connector is Sub-D 25-pin |

Diagnostic Plug (Bayonet) to UDIF Cable - TEBS G2/2.1 and KB4TA



| Part No. | Type No. | Cable length [m] | Drawing | Comments |
|-----------------------|----------|------------------|---------|---|
| K010837 ¹⁾ | EZ1037 | 3.0 | A | * Blue identification sleeve on cable UDIF Connector is Sub-D 25-pin |

¹⁾ The part number will carry a suffix "N00" which defines that it is supplied without packaging. Example K010837N00

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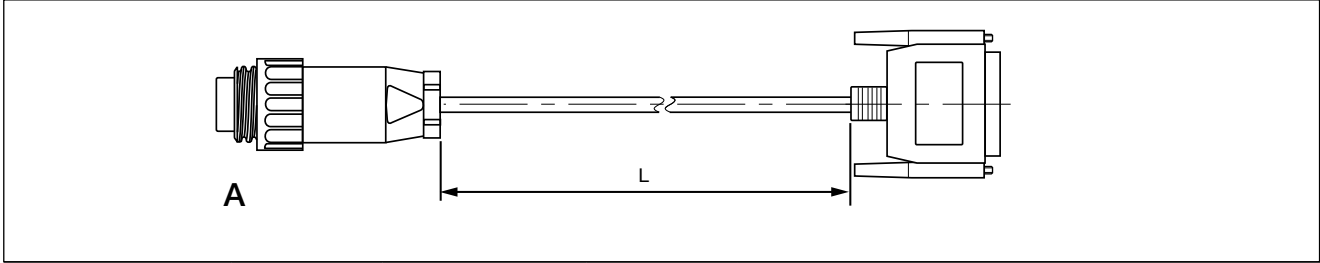
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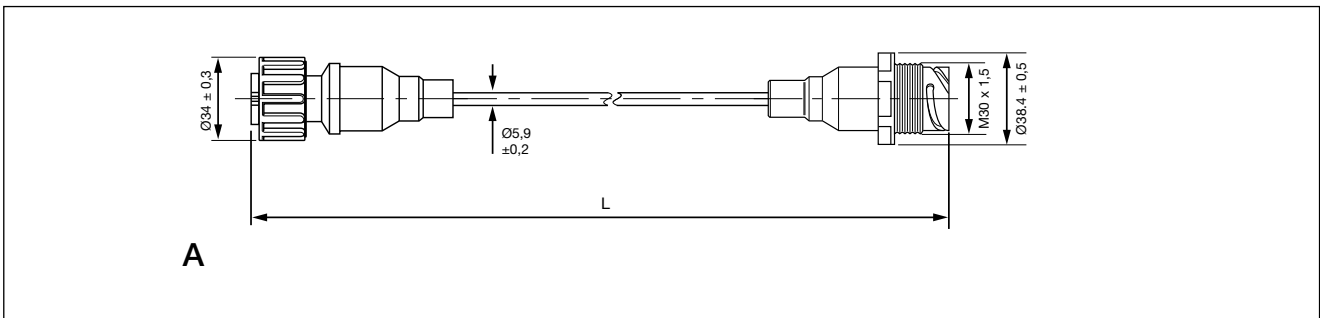
Range Overview - Diagnostic Cables (contd.)

Diagnostic Plug (Amphenol) to UDIF Cable - TEBS4 and A18



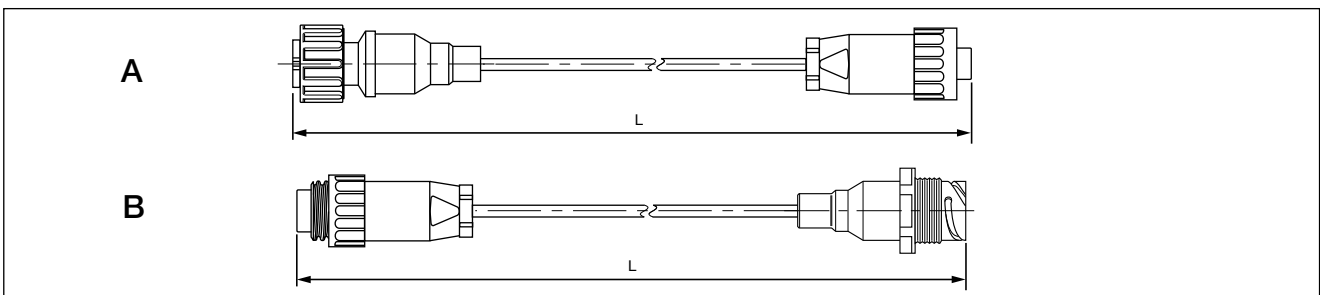
| Part No. | Type No. | Cable length [m] | Drawing | Comments |
|----------|----------|------------------|---------|--------------------------------|
| Z005464 | - | 3.0 | A | for Amphenol Diagnostic Socket |

Diagnostic Socket (Bayonet) Extension Cable - TEBS4, KB3-TA and A18



| Part No. | Type No. | Cable length [m] | Drawing | Comments |
|----------|----------|------------------|---------|----------|
| K002301 | EK3135 | 10.0 | A | |

Adaptor Cable - Bayonet Diagnostic to Amphenol Diagnostic



| Part No. | Type No. | Cable length [m] | Drawing | Comments |
|----------|----------|------------------|---------|---|
| K006096 | - | 0.50 | A | A18 - Bayonet Plug to Amphenol Socket |
| 1194507 | - | 0.50 | B | TEBS4 - Amphenol Plug to Bayonet Socket |

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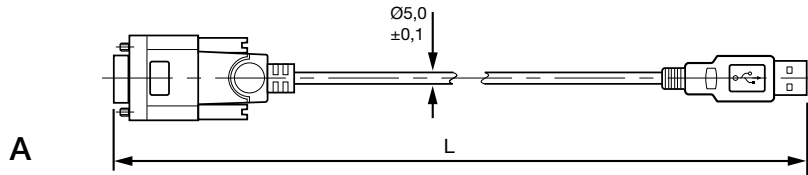
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Diagnostic Cables for Trailer ABS/EBS

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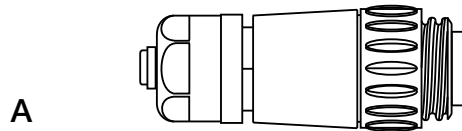
Range Overview - Diagnostic Cables (contd.)

RS232 Sub-D 9-pin Connector to PC USB Adaptor Cable - TEBS4, TEBS G2/2.1, KB4TA and A18



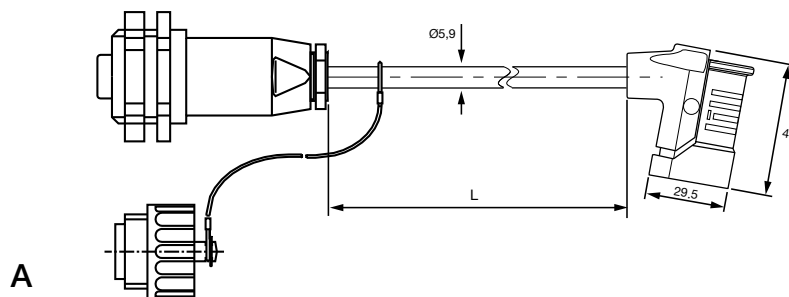
| Part No. | Type No. | Cable length [m] | Drawing | Comments |
|----------|----------|------------------|---------|---|
| Z007887 | - | 1.8 | A | For use with UDIF and Cable II39809F-EZ1031 |

Blink Code Adaptor - KB3-TA and A18



| Part No. | Type No. | Cable length [m] | Drawing | Comments |
|----------|----------|------------------|---------|--|
| II36381 | EZ1022 | | A | Screws into Amphenol Diagnostic Socket |

Diagnostic Cable - KB3-TA



| Part No. | Type No. | Cable length [m] | Drawing | Comments |
|---------------------------|----------|------------------|---------|----------------------------|
| II354184000 ¹⁾ | EK3050 | 4.0 | A | Amphenol Diagnostic Socket |
| II354185000 ¹⁾ | | 5.0 | | |
| II354188000 ¹⁾ | | 8.0 | | |

¹⁾ Cable is no longer in production but is available while stocks last



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Function

The **Trailer Information Module (TIM G2)** is a trailer mounted display for direct reading of diagnostic and trailer related information. It may also be used as a hand held diagnostic tool. It enables access to information available within the ECUs of the TEBS G2 brake module and other Knorr-Bremse systems, such as SmarTire, without using PC diagnostics.

The **TIM G2** provides a graphical display with back light and the same menu structure as the previous **TIM**. The operation is simple by means of three buttons (see picture). In addition to diagnostic and checking functions, **TIM G2** offers access to a wide range of information and the following key features:

- Real Time Clock
- User interface can be customised (initial menu)
- Activation of input functions (e.g. traction help, lowering of lift axles...)
- Patented Smart Update for configuration parameters to be stored in a second ECU
- Optional Trailer Data Recorder (TDR)
- Up to 7 languages available from the menu



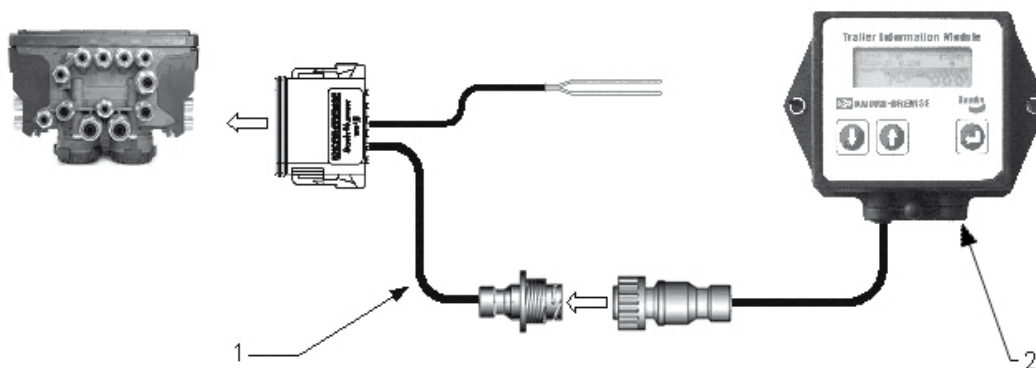
Technical Features

Operating temperature range: -20 °C to +70 °C
 Weight: 0.4 kg approx.
 Voltage range: 9 to 32 V DC

Options

| Pos. | Name | Part No. | Type No. | Remarks |
|------|------------------|------------------------------|----------|---|
| 1 | Connection cable | | | For information on suitable cables see PD-272-000, Document No. Y095697 |
| 2 | TIM G2 | K009166 ¹⁾ | | Cable length = 1m |

¹⁾ The part number of the module will carry two suffixes, firstly "V##" which represents the software revision of the product, e.g. V01, V02 etc., and secondly "N##" which defines the packaging requirements of different market sectors, e.g. N00, N50. Example: K009166V00N00 - is supplied with software to revision 00 and is supplied without packaging.



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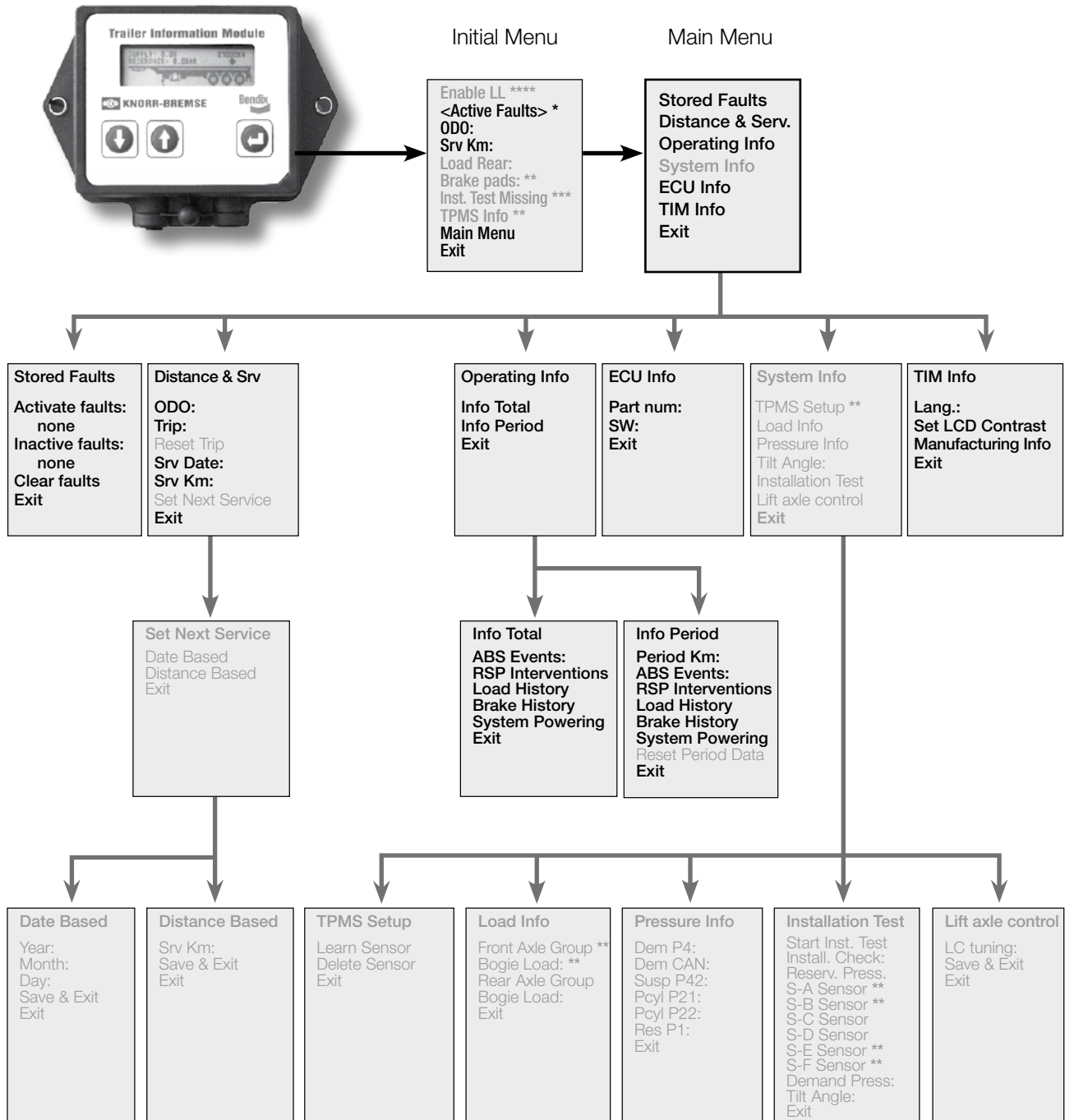
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K009166

Trailer Information Module (TIM G2)

Doc. No. Y050665 (Rev. 000)
March 2011

Menu Structure



Menu options that are greyed out are not available in BATTERY mode.

- * Only if active faults are present
- ** Only if configured
- *** Only if installation test is missing
- **** Either "Disable LL" or "Enable LL" depending on the actual state

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Operating Instructions

Operation of the TIM G2 menu is possible by means of three buttons (Fig. 1). Using the "scroll up" / "scroll down" buttons, the cursor can be moved up or down respectively in the menu; the "ENTER" button is used to select the required option.

The "Exit" option at the bottom of every menu allows the user to return to the previous menu.

The graphical display of the TIM G2 is limited to four lines, therefore a scroll bar is displayed on the right hand side to indicate the position of the cursor within the current menu listing.

If the option where the cursor is located has a sub-menu the cursor is a solid triangle (Fig.2), if the option is a parameter the cursor is an open triangle (Fig.3).

Whenever the TIM G2 is reading data from the brake module a symbol is displayed for all the parameters showing that the updating process is still in progress.

The TIM G2 can be used as a trailer monitoring system for tyre pressure and temperature (Fig. 4) (See PD-551-000, Document No. Y095833).

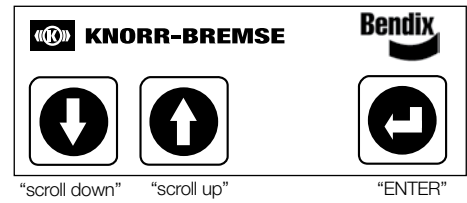


Fig. 1

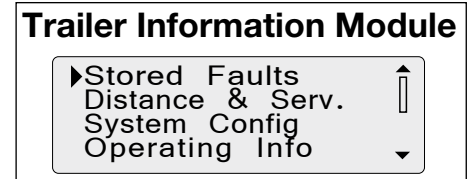


Fig. 2

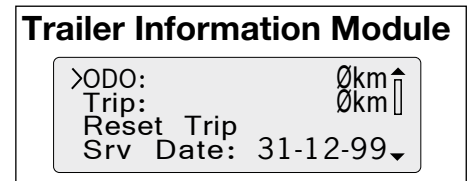


Fig. 3

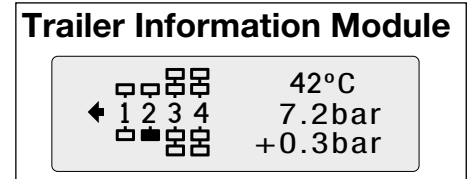
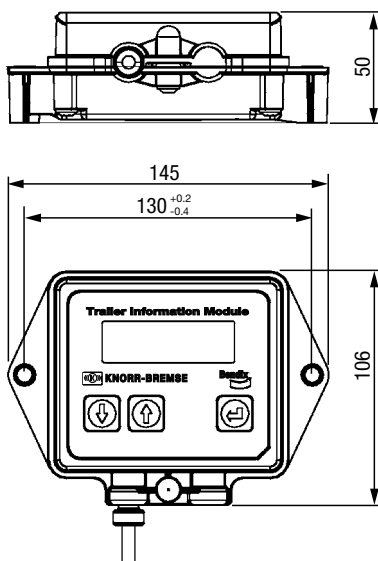


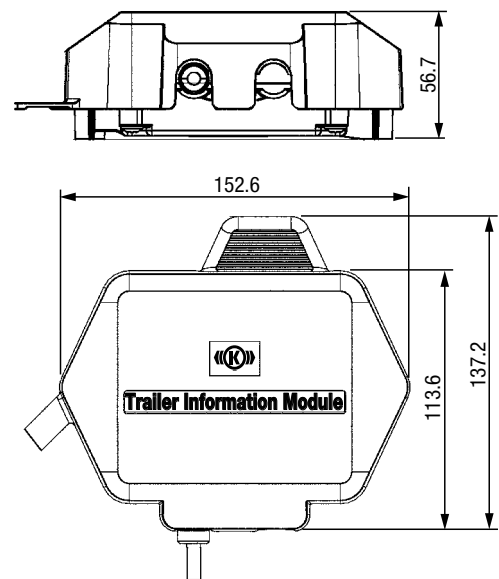
Fig. 4

Dimensions

Without cover



Including cover



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| PD No. | Product | Type/Part No. family |
|------------|--|---------------------------------------|
| PD-400-000 | Diaphragm Brake Chambers for Trailers (Overview) | |
| PD-403-200 | Brake Chambers (S-cam), long stroke | BX3..., BZ3... |
| PD-405-000 | Brake Chambers (Disc) - with Clamp Ring | BS3... |
| PD-405-100 | Brake Chambers (Disc) - OBC generation | BS3... |
| PD-413-000 | Spring Brake Actuators for Trailers (Overview) | |
| PD-413-100 | Spring Brakes (S-cam) - diaphragm/piston | BZ9..., BX9... |
| PD-413-200 | Spring Brakes (S-cam) - diaphragm/diaphragm | BX7... |
| PD-415-100 | Spring Brakes (Disc) - diaphragm/piston | BS9... |
| PD-415-200 | Spring Brakes (Disc) - diaphragm/diaphragm | BS7... |
| PD-420-000 | Air Disc Brakes | SN5..., SN6..., SN7..., SK7... |
| PD-430-451 | Brake Pad Wear Indicator Kits | K000... |



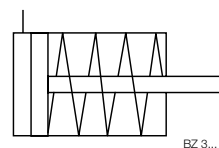
Function

Diaphragm Brake Chambers are used to provide the input force to actuate the vehicle's foundation brake and provide the service brake force.

The input force for the service brake is achieved by air pressure acting on an internal synthetic rubber diaphragm which generates a force transmitted through a push plate and push rod.

Diaphragm Brake Chambers are available to suit all types of foundation brake:

- Brake chambers of the BX3... and BZ3... series are designed for S-Cam drum brakes, which have been used traditionally on trucks and trailers.
- Brake chambers of the BS3... series are designed for disc brakes, which are generally standard fitment on modern trucks and trailers. The new generation of OBC (optimized brake chamber) BS3... brake chambers are identified by the rolled joint between the two halves of the unit.

**Standard Symbol as DIN ISO 1219****Further Documentation**

Further information can be found on documents:

| | |
|------------|--|
| PD-403-200 | Brake Chambers (S-cam), long stroke (for trailers) |
| PD-405-000 | Brake Chambers (Disc) - with Clamp Ring (for trailers) |
| PD-405-100 | Brake Chambers (Disc) - OBC generation (for trailers) |

| |
|----------------------|
| Document No. Y011367 |
| Document No. Y011368 |
| Document No. Y103245 |

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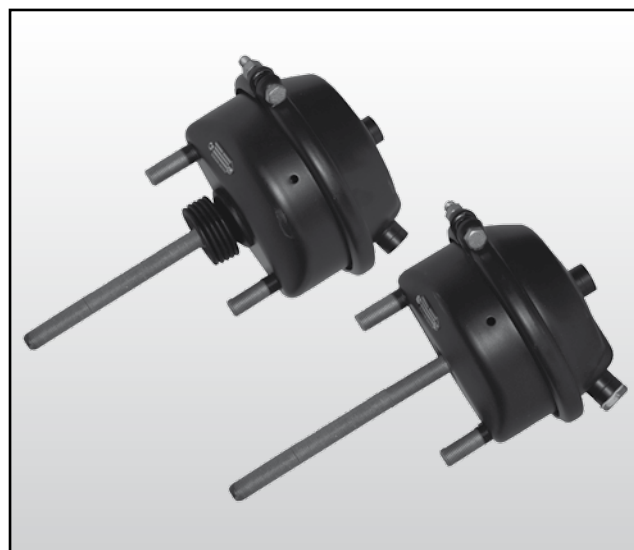
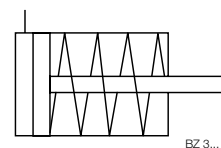
Function

This range of **Brake Chambers** is used on axles fitted with drum brakes. The single diaphragm cylinder provides the service brake function.

See PD-400-000, Document No. Y115383 for the full range of **Brake Chambers** for trailers.

Technical Features

Maximum Operating Pressure: 8.5 bar
 Operating Temperature Range: -40 °C to +80 °C
 Push rod stroke: 75 mm
 Air ports: M16x1.5 centre & side
 Surface treatment: Powder coated
 Weight: See table

**Standard Symbol as DIN ISO 1219**

BZ 3...

Range Overview

| Part No. | Type No. | Type | Push Rod Seal | TÜV Inspection Report | Weight approx. [kg] |
|-----------|----------|------|----------------|-----------------------|---------------------|
| II39908FA | BZ3261 | 12 | Sealing Washer | 361-0024-04-FBKV | 2.1 |
| II33198A | BZ3370 | 16 | | | 2.7 |
| II33479A | BX3417 | 20 | | | 3.2 |
| II33441A | BX3534 | 24 | | | 3.5 |
| II33445A | BX3605 | 30 | | | 4.3 |
| II40324FA | BZ3263 | 12 | Rubber Boot | | 2.1 |
| II33458A | BX3416 | 20 | | | 3.2 |
| II33442A | BX3535 | 24 | | | 3.5 |
| II33444A | BX3604 | 30 | | | 4.3 |

Other versions are available.

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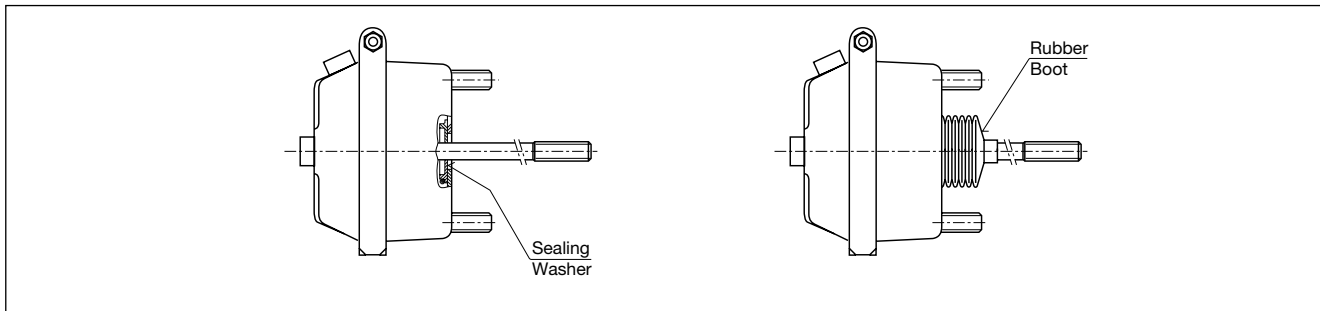
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BX3..., BZ3...

Brake Chambers (S-cam), long stroke

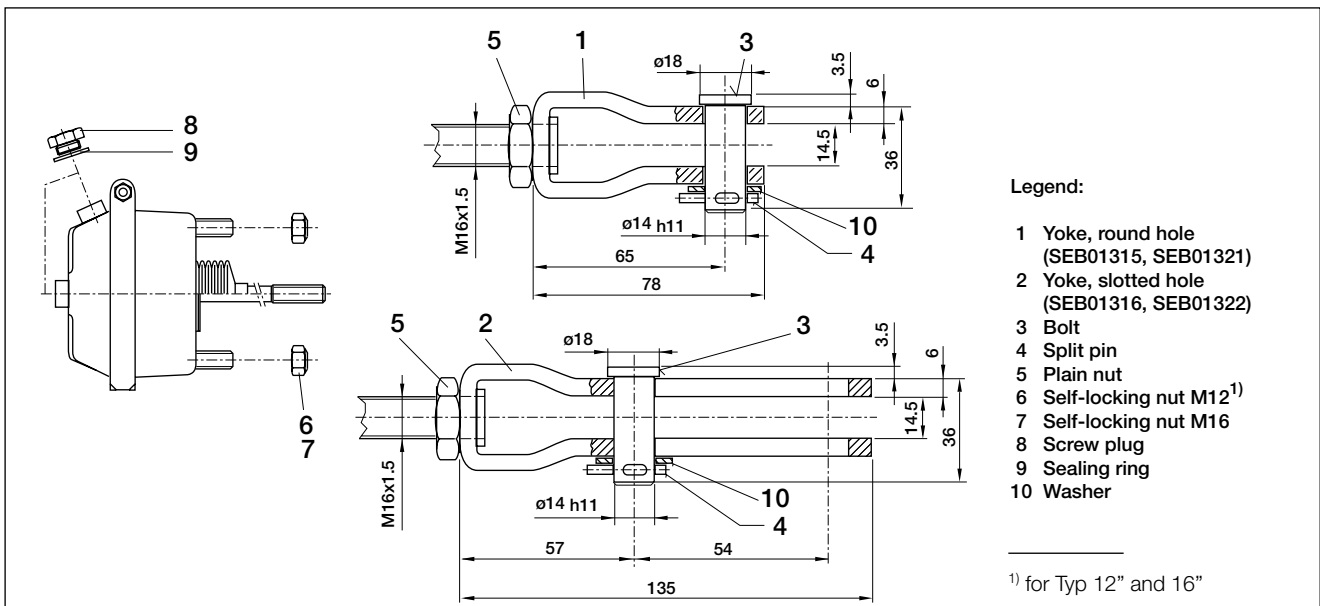
Doc. No. Y011367 (Rev. 004)
September 2011

Push Rod Seal



Installation Kits/Yokes for BX3..., BZ3...

| Part No. | Yoke type | Description |
|----------|--------------|--|
| SEB01321 | Round hole | Installation Kit with Yoke to suit Types 12 and 16 |
| SEB01322 | Slotted hole | |
| SEB01314 | Round hole | Forged Yoke for Types 20, 24 and 30 |
| SEB01315 | Round hole | Installation Kit with Yoke to suit Types 20, 24 and 30 |
| SEB01316 | Slotted hole | |



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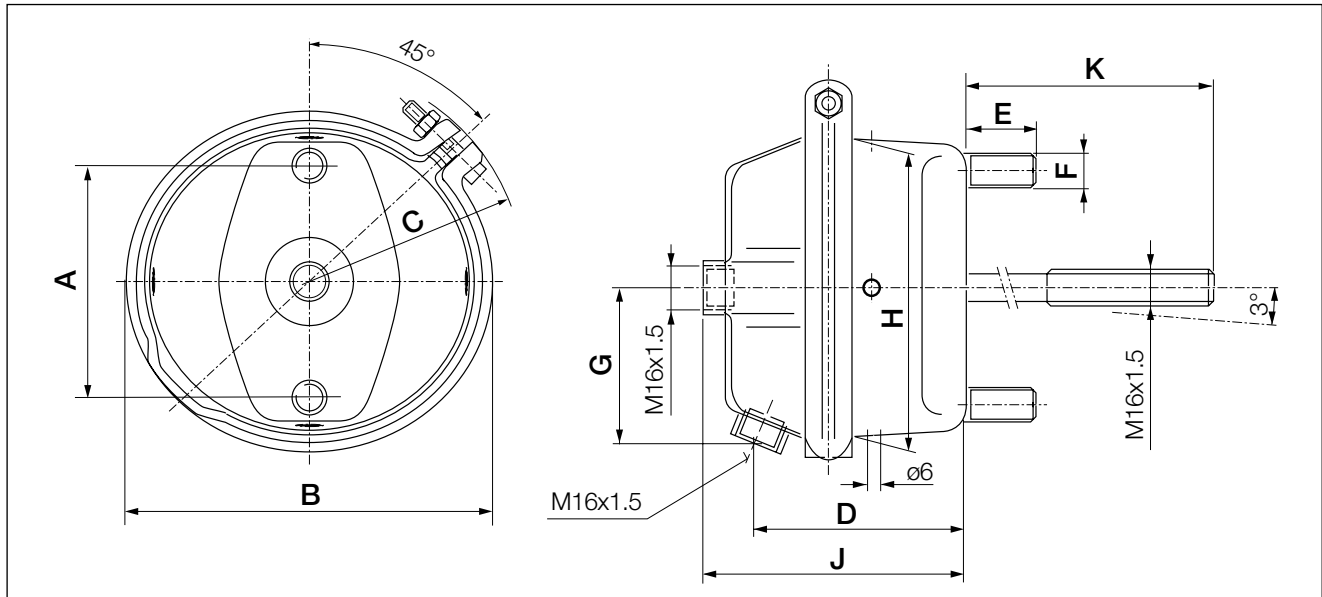
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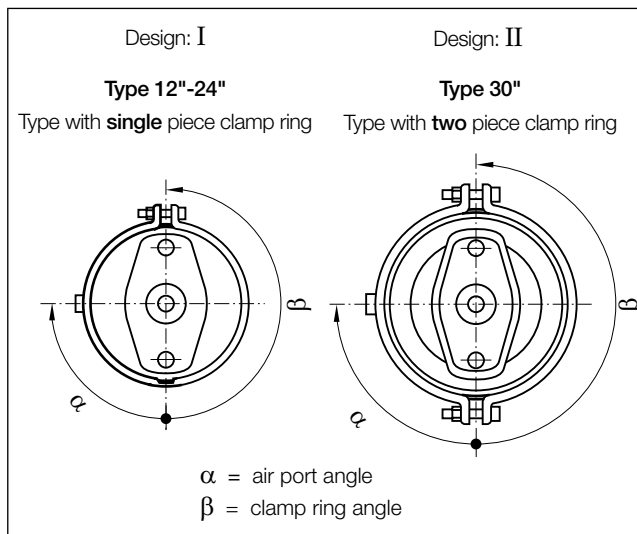


Dimensions



| Part No. | Type No. | Type [sq in] | A [mm] | B [mm] | C [mm] | D [mm] | E [mm] | F | G [mm] | H [mm] | J [mm] | K [mm] |
|-----------|----------|--------------|--------|--------|--------|--------|--------|----------|--------|--------|--------|--------|
| II39908FA | BZ3261 | 12 | 76.2 | 145 | 92 | 95 | 37 | M12x1.75 | 65 | 121 | 127 | 190 |
| II40324FA | BZ3263 | 12 | 76.2 | 145 | 92 | 95 | 37 | M12x1.75 | 65 | 121 | 127 | 190 |
| II33198A | BZ3370 | 16 | 76.2 | 167 | 101 | 99 | 38 | M12x1.75 | 76 | 141 | 132.5 | 190 |
| II33458A | BX3416 | 20 | 120.7 | 175 | 105 | 100 | 43.2 | M16x1.5 | 82 | 149 | 132.5 | 190 |
| II33479A | BX3417 | 20 | 120.7 | 175 | 105 | 100 | 43.2 | M16x1.5 | 82 | 149 | 132.5 | 190 |
| II33441A | BX3534 | 24 | 120.7 | 188 | 111 | 100 | 43.2 | M16x1.5 | 90 | 161 | 133.0 | 190 |
| II33442A | BX3535 | 24 | 120.7 | 188 | 111 | 100 | 43.2 | M16x1.5 | 90 | 161 | 133.0 | 190 |
| II33444A | BX3604 | 30 | 120.7 | 209 | 121 | 106 | 42.7 | M16x1.5 | 99 | 184 | 139.5 | 190 |
| II33445A | BX3605 | 30 | 120.7 | 209 | 121 | 106 | 42.7 | M16x1.5 | 99 | 184 | 139.5 | 190 |

Mounting Position



| Part No. | Type No. | Type [sq in] | Air Port Angle α | Clamp Ring | |
|-----------|----------|--------------|-------------------------|---------------|--------|
| | | | | Angle β | Design |
| II39908FA | BZ3261 | 12 | 0° | 135° | I |
| II40324FA | BZ3263 | 12 | | | I |
| II33198A | BZ3370 | 16 | | | I |
| II33458A | BX3416 | 20 | | | I |
| II33479A | BX3417 | 20 | | | I |
| II33441A | BX3534 | 24 | | | I |
| II33442A | BX3535 | 24 | | | I |
| II33444A | BX3604 | 30 | | | II |
| II33445A | BX3605 | 30 | | | II |

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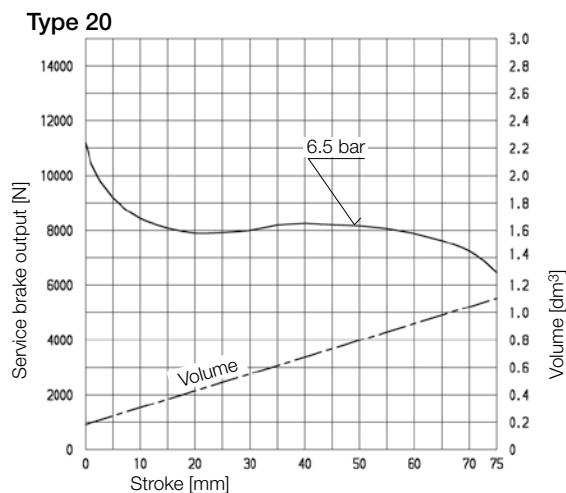
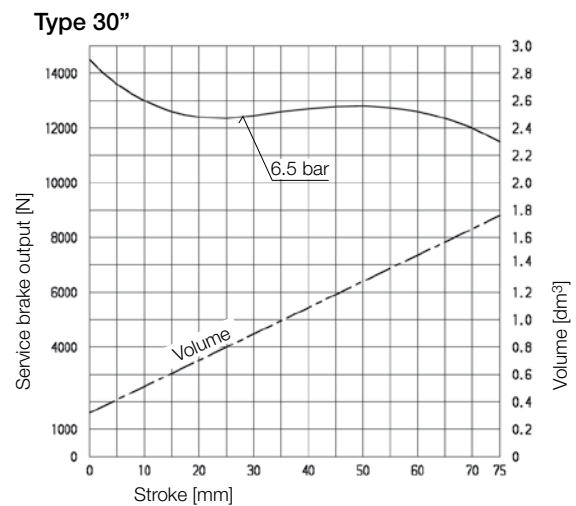
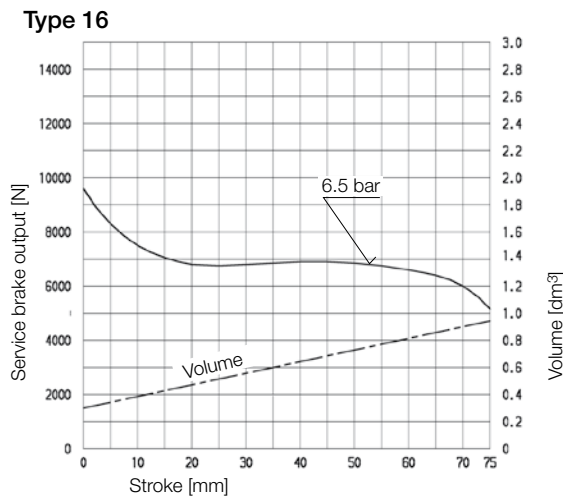
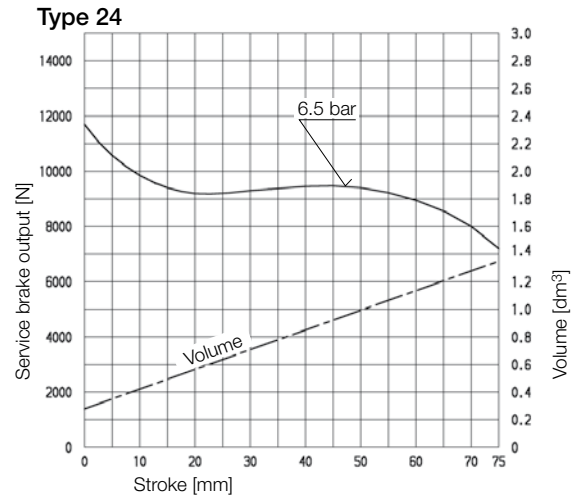
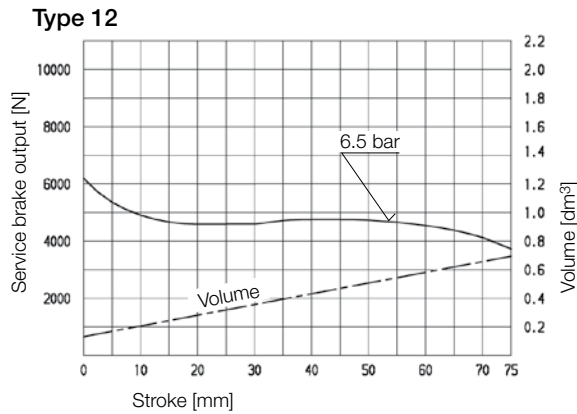
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BX3..., BZ3...

Brake Chambers (S-cam), long stroke

Doc. No. Y011367 (Rev. 004)
September 2011

Performance Charts



The output forces correspond to the requirements of DIN 74060

- Th_A = Piston force, average
 - S_P = Effective piston stroke
 - V = Volume at 2/3 of stroke
- as seen in the TÜV report 361-0024-04-FBKV.

| Type | Th_A [kN] at 6.5 bar | S_P [mm] at 6.5 bar | V [l] |
|------|---------------------------|--------------------------|---------|
| 12 | 4.64 | 68.00 | 0.50 |
| 16 | 6.92 | 68.88 | 0.75 |
| 20 | 8.11 | 68.88 | 0.85 |
| 24 | 9.30 | 71.00 | 0.93 |
| 30 | 12.60 | 74.50 | 1.30 |

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Installation and Mounting instructions

For reliable and safe mounting of brake chambers, please note the following points:

- Use suitable mounting bracket with adequate stability (material thickness)
- Hole dimensions according to DIN
- Plain mounting face, only primed (maximum thickness 0.1mm), not finish painted
- Direct contact of the full surface of the brake chamber mounting face must be made with the mounting bracket. No spacing washers, adapter plates or other elements are allowed.
- Check length of push rod, it may need to be shortened.
- The angle between push rod and slack adjuster and between push rod and mounting bracket should be approximately 90 deg. when the push rod is at its mid-stroke position.
- During installation, the slack adjuster should be rotated towards the yoke to insert the yoke pin. On no account should the push rod be pulled out from the brake chamber to meet the slack adjuster.
- Maximum pivoting angle of push rod in all directions = 3°
- For mounting studs, use only self-locking nuts without washers of any kind.
- General requirements of mechanical engineering concerning progressive tightening must be followed.
- Tightening torque 180 ⁺³⁰ Nm for M16 x 1.5 thread
- Tightening torque 75 ⁺¹⁵ Nm for M12 x 1.75 thread
- For further information please contact the Knorr-Bremse, the axle or trailer manufacturer.

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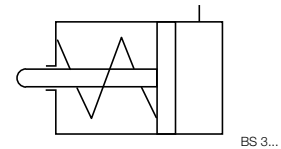
Function

This range of **Brake Chambers** is used on axles fitted with air disc brakes and provides the service brake function. The chambers have a mounting seal integrated in the non-pressure housing which prevents the entry of dirt or water into the caliper.

See PD-400-000, Document No. Y115383 for the full range of **Brake Chambers** for trailers.

Technical Features

| | |
|----------------------------------|----------------------|
| Maximum operating pressure: | 10 bar |
| Operating temperature range: | -40 °C to +80 °C |
| Push rod stroke: | 57 mm |
| Air ports: | M16x1.5 |
| Sealing of non-pressure housing: | Rubber Boot |
| Pivoting angle of piston rod: | 4° in all directions |
| Weight: | See table |

**Standard Symbol as DIN ISO 1219****Range Overview**

| Part No. | Type No. | Type | TÜV-Inspection Report | Weight approx. [kg] |
|----------|----------|------|-----------------------|---------------------|
| II31782 | BS3251 | 14 | 353-432-97FBTN | 3.1 |
| II14535 | BS3300 | 16 | BZ.102.0 | 3.1 |
| II37140 | BS3315 | 16 | BZ.103.0 | 3.1 |
| II38466F | BS3326 | 16 | 353-433-97FBTN | 3.1 |
| II15229 | BS3350 | 18 | 353-434-97FBTN | 3.1 |
| II38924F | BS3361 | 16 | BZ.103.0 | 3.2 |
| II31098 | BS3404 | 20 | 356-308-94FBTN | 3.2 |
| II38528F | BS3436 | 20 | 356-308-94FBTN | 3.2 |
| II31099 | BS3453 | 22 | 356-309-94FBTN | 3.4 |
| II38529F | BS3462 | 22 | 356-309-94FBTN | 3.4 |
| II30618 | BS3509 | 24 | 356-310-94FBTN | 3.5 |
| II38530F | BS3547 | 24 | 356-310-94FBTN | 3.6 |
| II31100 | BS3551 | 27 | 356-311-94FBTN | 4.5 |

Other versions are available.

NOTES:

This range will be superseded by the "Optimised Brake Chamber" (OBC) Generation (see PD-405-100, Document No. Y103245). TÜV-Comparison Report No. TÜV-361-0046-05-FBKV comparing this generation with the OBC generation is available.

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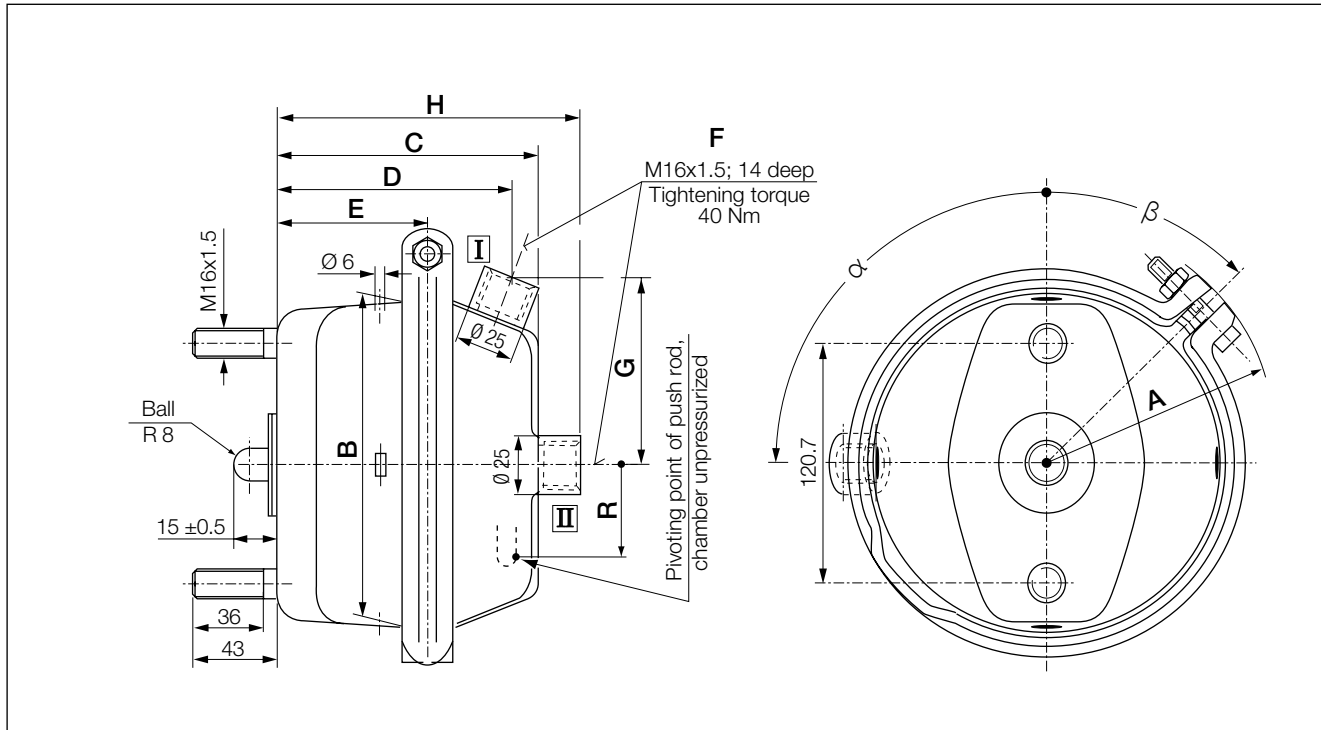
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BS3...

Brake Chambers (Disc) - with Clamp Ring

Doc. No. Y011368 (Rev. 003)
September 2011

Dimensions



| Part No. | Type No. | Type [sq in] | A [mm] | B [mm] | C [mm] | D [mm] | E [mm] | F | G [mm] | H [mm] | R [mm] | α [°] | β [°] |
|----------|----------|--------------|--------|--------|--------|--------|--------|----|--------|--------|--------|--------------|-------------|
| II31782 | BS3251 | 14 | 101 | 144 | 104 | 97.5 | 66 | I | 76 | - | 42 | 90 | 45 |
| II14535 | BS3300 | 16 | 106 | 144 | 104 | 93.5 | 66 | I | 83 | - | 47 | 90 | 45 |
| II37140 | BS3315 | 16 | 106 | 144 | 104 | - | 66 | II | - | 122.5 | 45 | - | 90 |
| II38466F | BS3326 | 16 | 106 | 144 | 104 | - | 66 | II | - | 122.5 | 45 | - | 90 |
| II15229 | BS3350 | 18 | 106 | 144 | 104 | 93.5 | 66 | I | 83 | - | 50 | 90 | 45 |
| II38924F | BS3361 | 16 | 106 | 144 | 104 | - | 66 | II | - | 122.5 | 45 | - | 90 |
| II31098 | BS3404 | 20 | 111 | 145 | 104 | 98 | 66 | I | 81 | - | 52 | 90 | 45 |
| II38528F | BS3436 | 20 | 111 | 145 | 104 | - | 66 | II | - | 122.5 | 52 | - | 90 |
| II31099 | BS3453 | 22 | 111 | 145 | 104 | 94.5 | 66 | I | 85.9 | - | 52 | 90 | 45 |
| II38529F | BS3462 | 22 | 111 | 145 | 104 | - | 66 | II | - | 122.5 | 52 | - | 90 |
| II30618 | BS3509 | 24 | 117 | 155 | 113 | 97.5 | 66 | I | 91 | - | 57.5 | 90 | 45 |
| II38530F | BS3547 | 24 | 117 | 155 | 113 | - | 66 | II | - | 122.5 | 57.5 | - | 90 |
| II31100 | BS3551 | 27 | 123 | 185.5 | 115 | 97.5 | 67 | I | 98 | - | 58 | 0 | 45 |

NOTE:

This range will be superseded by the new OBC Generation (see PD-405-100, Document No. Y103245)

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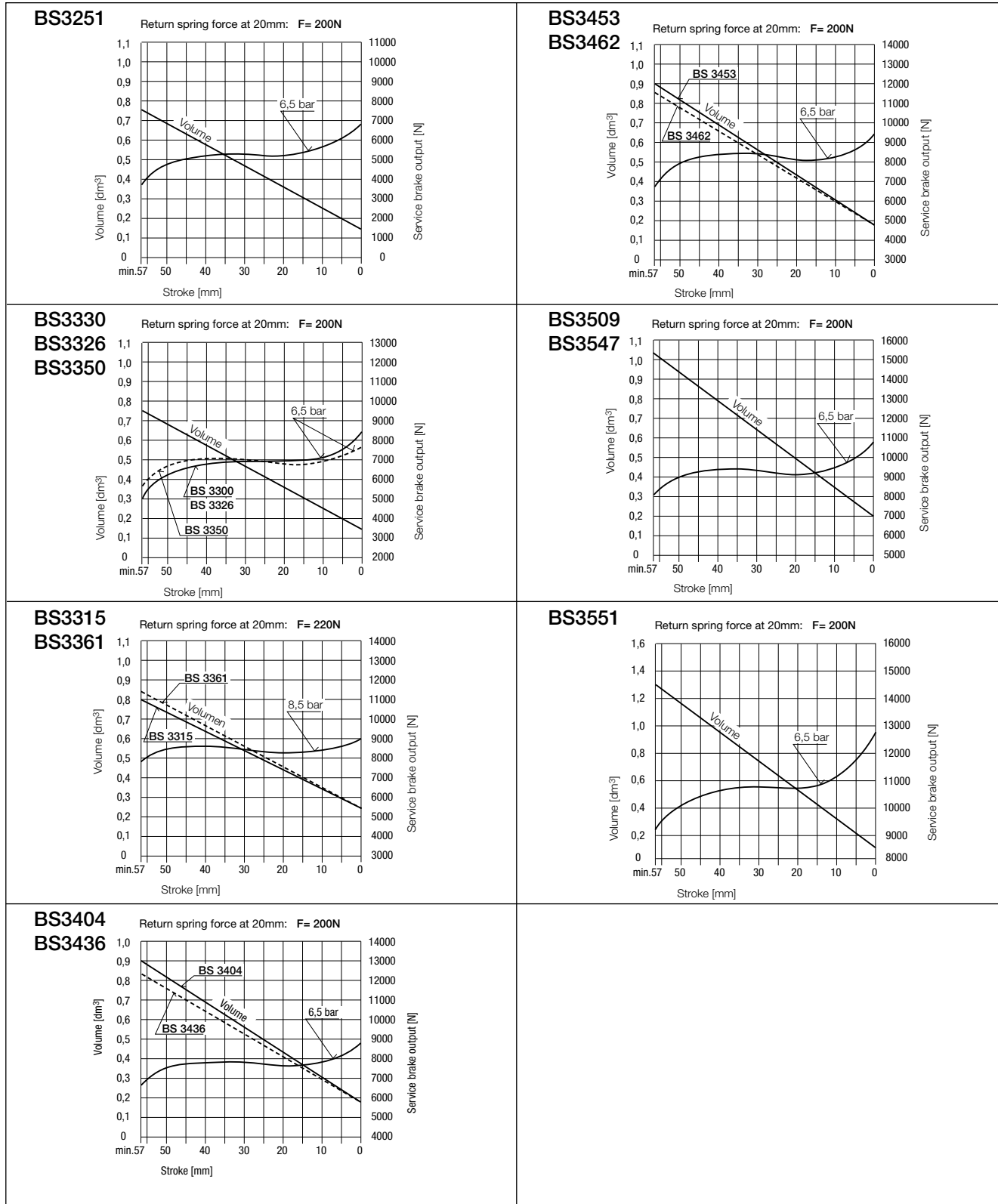
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Performance Charts



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BS3...

Brake Chambers (Disc) - with Clamp Ring

Doc. No. Y011368 (Rev. 003)
September 2011

Installation and Mounting instructions

Detailed information concerning the mounting of disc brake actuators can be found in the Service Manual for Air Disc Brakes *Y006471*.

Special Note: If the actuator is supplied with the drain holes plugged, remove lowest plug (as viewed when the actuator is installed).



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Function

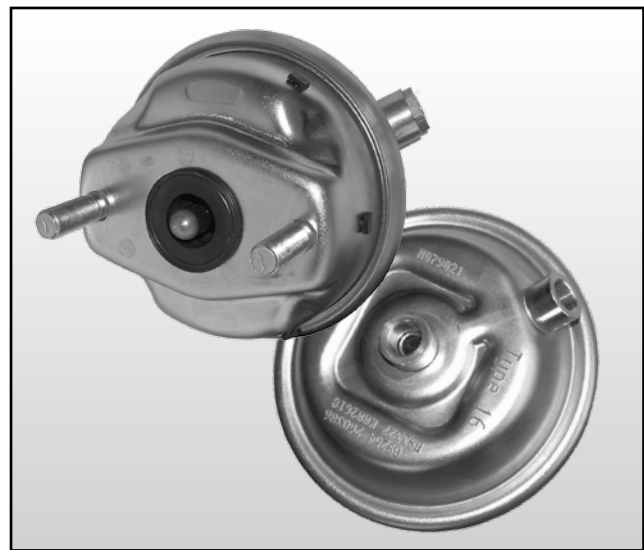
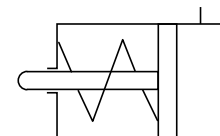
This range of **Brake Chambers** is used on axles fitted with air disc brakes and provides the service brake function. The chambers have a mounting seal integrated in the non-pressure housing which prevents the entry of dirt or water into the caliper.

The **OBC ('Optimised Brake Chamber') Brake Chambers** have a rolled joint between the front and rear pressings, i.e. there is no clamp ring. This provides improved leakage protection and reduced weight.

See PD-400-000, Document No. Y115383 for the full range of **Brake Chambers** for trailers

Technical Features

| | |
|----------------------------------|----------------------|
| Maximum Operating Pressure: | 10 bar |
| Operating Temperature Range: | -40 °C to +80 °C |
| Push rod stroke: | 57 mm |
| Air ports: | M16x1.5 |
| Sealing of non-pressure housing: | Rubber Boot |
| Pivoting angle of Piston Rod: | 4° in all directions |
| Weight: | See table |

**Standard Symbol as DIN ISO 1219**

BS 3...

Range Overview

| Part No. | Type No. | Type | TÜV-Inspection Report | Weight approx. [kg] |
|----------|----------|------|-----------------------|---------------------|
| K003979 | BS3263 | 14 | 361-0046-05-FBKV | 2.9 |
| K004583 | BS3300 | 16 | | 2.8 |
| K004631 | BS3326 | 16 | | 2.8 |
| K004664 | BS3758 | 18 | | 2.8 |
| K005814 | BS3436 | 20 | | 3.0 |
| K005816 | BS3862 | 22 | | 3.1 |
| K005817 | BS3547 | 24 | | 3.5 |

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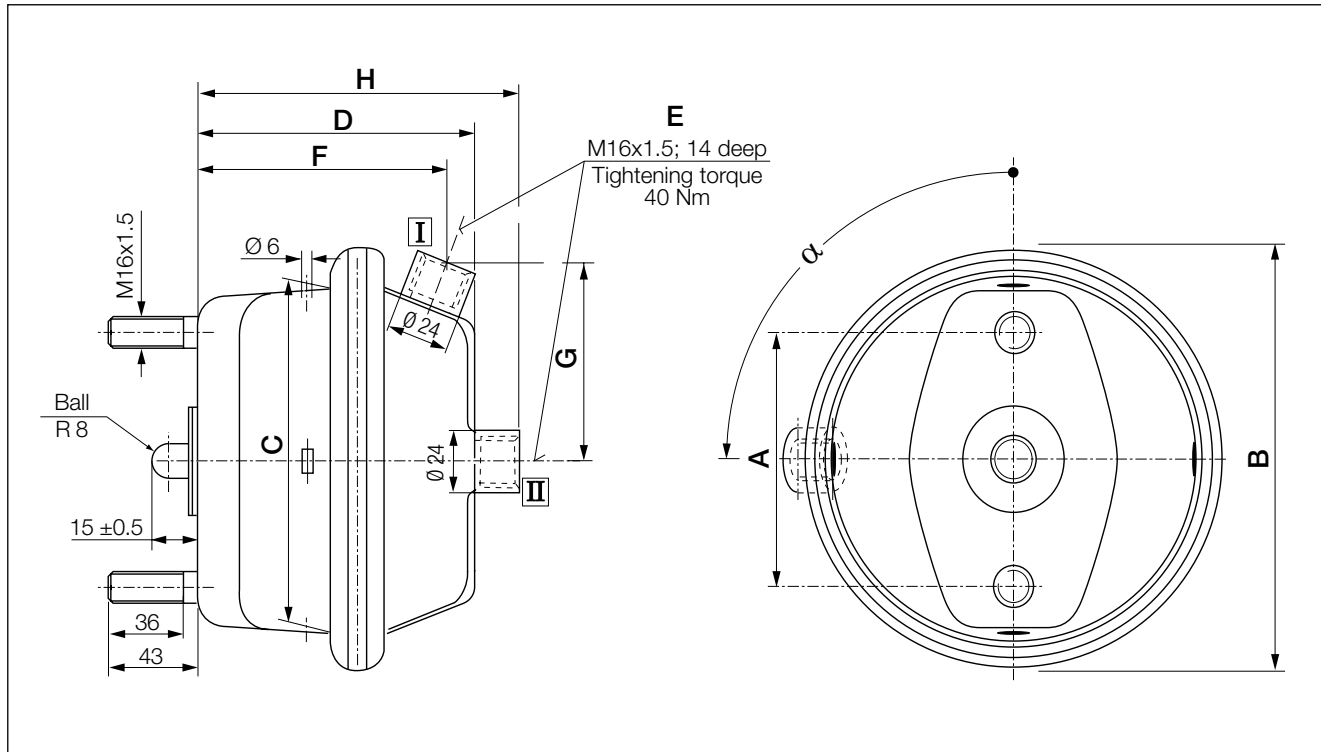
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BS3...

Brake Chambers (Disc) - OBC generation

Doc. No. Y103245 (Rev. 001)
September 2011

Dimensions



| Part No. | Type No. | Type [sq in] | A [mm] | B [mm] | C [mm] | D [mm] | E (port) | F [mm] | G [mm] | H [mm] | α [°] |
|----------|----------|--------------|--------|--------|--------|--------|----------|--------|--------|--------|--------------|
| K003979 | BS3263 | 14 | 120.7 | 169 | 144 | 100.7 | I | 94.2 | 72.5 | - | 270 |
| K004583 | BS3300 | 16 | 120.7 | 169 | 144 | 100.7 | I | 94.2 | 72.5 | - | 90 |
| K004631 | BS3326 | 16 | 120.7 | 169 | 144 | 100.7 | II | - | - | 114.7 | - |
| K004664 | BS3758 | 18 | 120.7 | 169 | 144 | 100.7 | II | - | - | 114.7 | - |
| K005814 | BS3436 | 20 | 120.7 | 177 | 145 | 101.7 | II | - | - | 115.7 | - |
| K005816 | BS3862 | 22 | 120.7 | 177 | 145 | 101.7 | II | - | - | 115.7 | - |
| K005817 | BS3547 | 24 | 120.7 | 189 | 155 | 101.7 | II | - | - | 115.7 | - |

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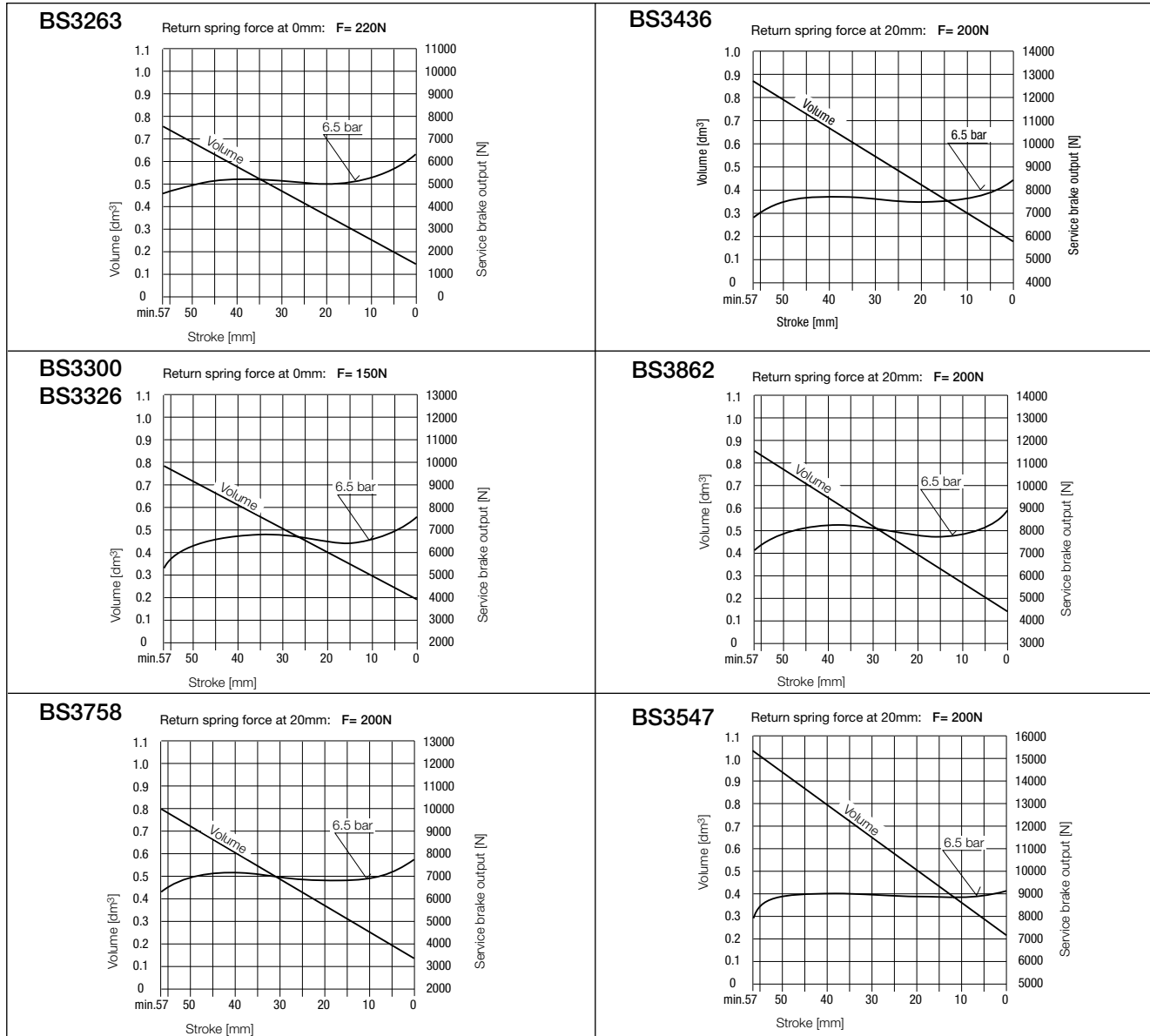
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BS3...

Brake Chambers (Disc) - OBC generation

Doc. No. Y103245 (Rev. 001)
September 2011

Installation and Mounting instructions

Detailed information concerning the mounting of disc brake actuators can be found in the Service Manual for Air Disc Brakes *Y006471*.

Special Note: If the actuator is supplied with the drain holes plugged, remove lowest plug (as viewed when the actuator is installed).



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Function

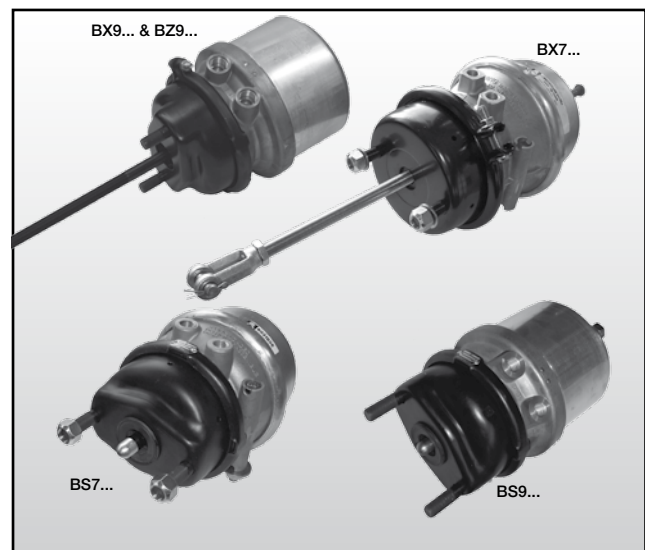
Spring Brake Actuators are used to provide the input force to actuate the vehicle's foundation brake and provide the service brake force and the parking brake force.

The input force for the service brake is achieved by air pressure acting on an internal synthetic rubber diaphragm which generates a force transmitted through a push plate and push rod. This part of the spring brake performs the same function as a brake chamber.

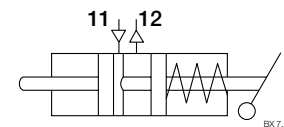
The input force for the parking brake is provided by an internal power spring (in the spring portion) acting through the same push rod. During normal operation this spring is held compressed by air pressure acting on either a synthetic rubber diaphragm or a piston. The force is applied by releasing this air pressure.

Spring Brake Actuators are available to suit all types of foundation brakes used on trailers:

- **Spring Brake Actuators** of the BX7..., BX9... or BZ9... series are designed for S-Cam drum brakes have been used traditionally on trucks and trailers. The BX7... series have a diaphragm holding the power spring compressed, and the BX9... and BZ9... series have a piston holding the power spring compressed.
- **Spring Brake Actuators** of the BS7... and BS9... series are designed for disc brakes, which are generally standard fitment on modern trucks and trailers. The BS7... series have a diaphragm holding the power spring compressed and the BS9... series have a piston holding the power spring compressed.



Standard Symbol as DIN ISO 1219



Further Documentation

Further information can be found on documents:

| | | |
|------------|---|----------------------|
| PD-413-100 | Spring Brakes (S-cam), diaphragm/piston for trailers | Document No. Y011370 |
| PD-413-200 | Spring Brakes (S-cam), diaphragm/diaphragm for trailers | Document No. Y011369 |
| PD-415-100 | Spring Brakes (Disc), diaphragm/piston for trailers | Document No. Y011372 |
| PD-415-200 | Spring Brakes (Disc), diaphragm/diaphragm for trailers | Document No. Y011371 |

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Function

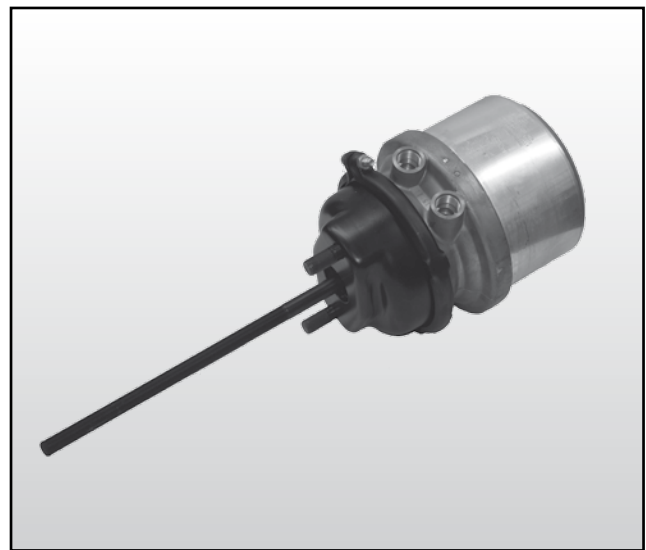
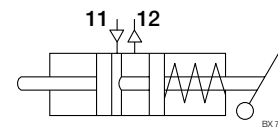
This range of **Spring Brakes** is used on axles fitted with drum brakes to provide the service and parking brake functions.

The internal wind-off mechanism allows the parking brake force to be removed if air pressure is no longer present.

See PD-413-000, Document No. Y115384 for the full range of **Spring Brakes** for trailers.

Technical Features

| | |
|------------------------------|---|
| Maximum operating pressure: | Port 11 ; 10 bar Port 12 ; 8.5 bar |
| Full hold-off pressure: | 5.5 bar |
| Operating temperature range: | -40 °C to +80 °C |
| Push rod stroke: | See table |
| Port threads: | See table |
| Release device: | Mechanical |
| Weight: | See table |

**Standard Symbol as DIN ISO 1219****Range Overview**

| Part No. | Type No. | Size | | Port Threads | Stroke [mm] | TÜV-Inspection Report | Weight approx. [kg] |
|--|----------|----------------------|----------------------|----------------------------|-------------|---|---------------------|
| | | Service Brake [Type] | Parking Brake [Type] | | | | |
| II31997 ¹⁾⁴⁾ | BZ9317 | 16 | 24 | M16x1.5 | 57 | Service Brake 361-0132-05-FBKV Spring Brake 361-0133-05-FBKV | 7.8 |
| II33453 ²⁾ | BZ9318 | 16 | 24 | M16x1.5 | 57 | | 8.0 |
| II33454 ²⁾ | BZ9319 | 16 | 24 | M16x1.5 | 57 | | 8.0 |
| II37274 ¹⁾⁵⁾ | BX9400 | 20 | 24 | M22x1.5 Voss ⁵⁾ | 57 | | 8.1 |
| II37276 ¹⁾⁵⁾ | BX9402 | 20 | 30 | M22x1.5 Voss ⁵⁾ | 57 | | 9.4 |
| II17092 ²⁾ | BZ9502 | 24 | 24HF ⁶⁾ | M16x1.5 | 57 | | 8.2 |
| II32718 ¹⁾⁴⁾ | BX9504 | 24 | 30 | M16x1.5 | 57 | | 9.5 |
| II37277 ¹⁾⁵⁾ | BX9519 | 24 | 24 | M22x1.5 Voss ⁵⁾ | 64 | | 8.1 |
| II32128 ¹⁾⁴⁾ K041990 ¹⁾³⁾⁴⁾ | BZ9646 | 30 | 30 | M16x1.5 | 64 | | 10.9 |

¹⁾ without rubber boot ²⁾ with rubber boot and welded yoke ³⁾ will carry the suffix N00 denoting that it is supplied without packaging

⁴⁾ with installation kit SEB00536 ⁵⁾ with installation kit II37099 ⁶⁾ HF = high force

Other versions are available.

Installation kit **SEB00536** contains: Yoke, yoke pin, split pin, lock nut for yoke, hexagon self-locking mounting nut (2x)

Installation kit **II37099** contains: Port adapter (M22x1.5 to M16x1.5) (2x), yoke, yoke pin, split pin, lock nut for yoke, hexagon self-locking mounting nut (2x)

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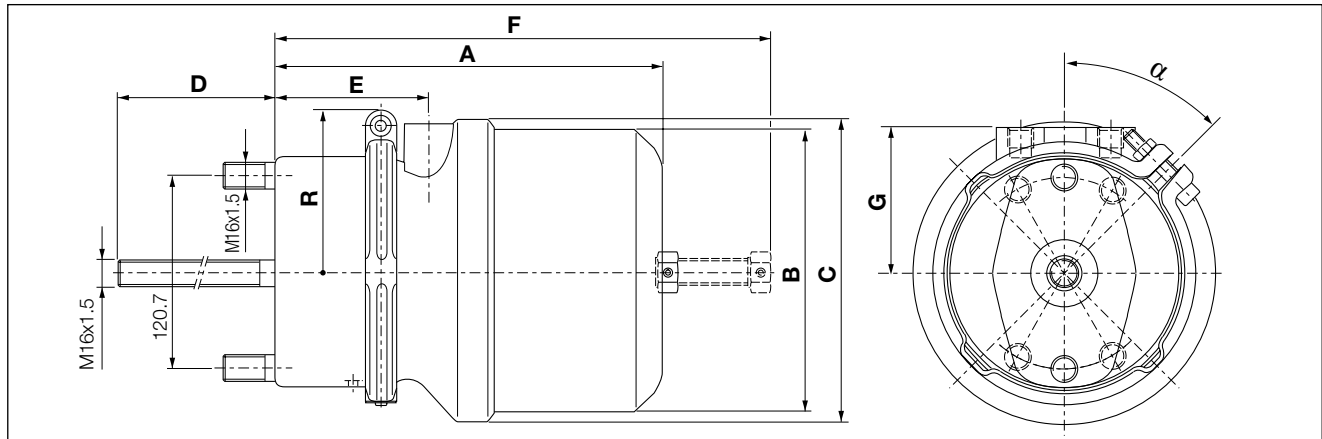
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BX9..., BZ9...

Spring Brakes (S-cam) , diaphragm/piston

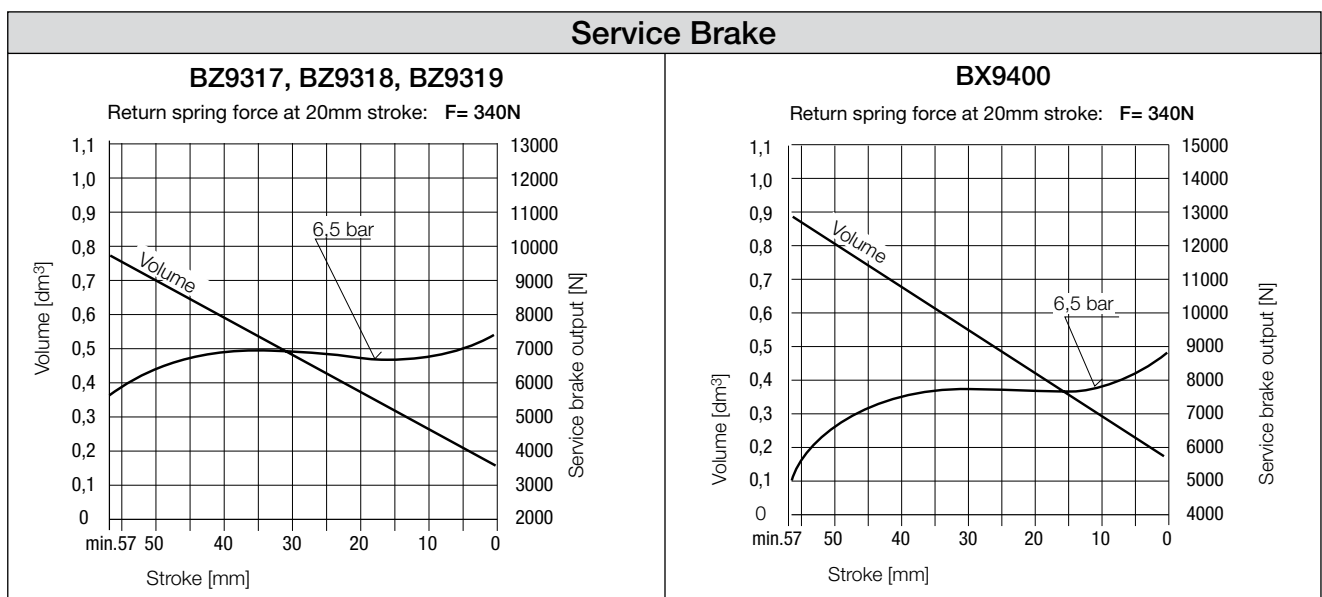
Doc. No. Y011370 (EN - Rev. 004)
September 2011

Dimensions



| Part No. | Type No. | A [mm] | B [mm] | C [mm] | D [sq in] | E [mm] | F [mm] | G [mm] | R [mm] | α [°] |
|--------------------|----------|--------|--------|--------|-----------|--------|--------|--------|--------|-------|
| II31997 | BZ9317 | 240 | 175 | 190 | 300 | 96 | 318 | 90 | 106 | 45 |
| II33453 | BZ9318 | 240 | 175 | 190 | 60 | 96 | 318 | 90 | 106 | 45 |
| II33454 | BZ9319 | 240 | 175 | 190 | 60 | 96 | 318 | 90 | 106 | 315 |
| II37274 | BX9400 | 240 | 175 | 190 | 300 | 96 | 318 | 90 | 111 | 45 |
| II37276 | BX9402 | 256 | 190 | 106 | 300 | 96 | 335 | 97 | 111 | 45 |
| II17092 | BZ9502 | 240 | 175 | 190 | 300 | 96 | 318 | 90 | 114 | 45 |
| II32718 | BX9504 | 256 | 190 | 206 | 300 | 96 | 335 | 97 | 114 | 45 |
| II37277 | BX9519 | 254 | 175 | 190 | 200 | 103 | 300 | 90 | 114 | 45 |
| II32128 K041990 | BZ9646 | 272 | 190 | 206 | 300 | 104 | 357 | 102.5 | 123 | 45 |

Performance Charts



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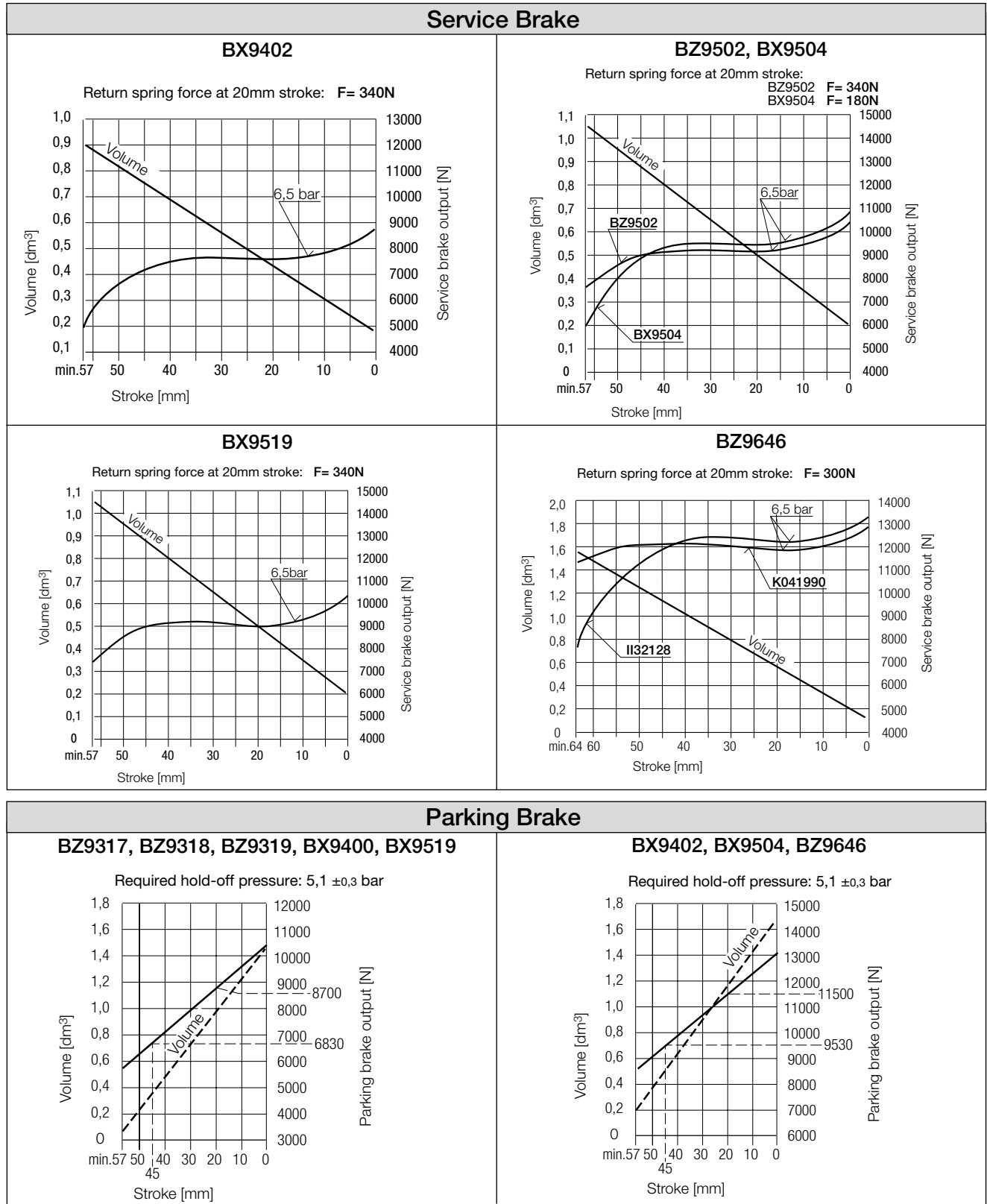
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Performance Charts (continued)



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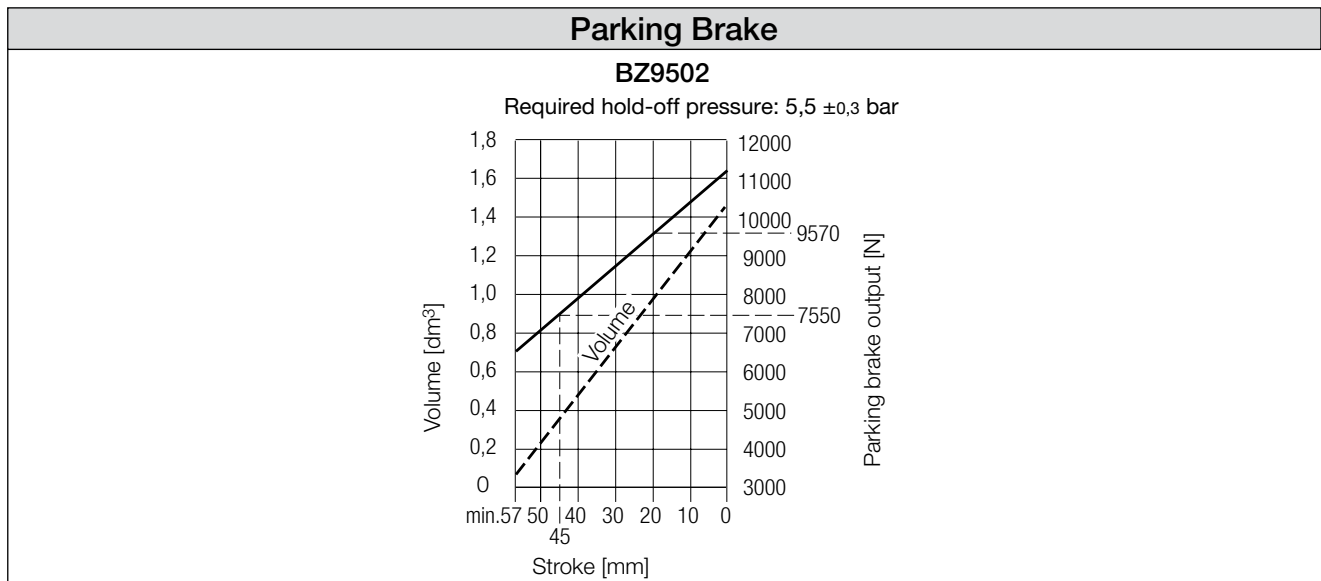


BX9..., BZ9...

Spring Brakes (S-cam) , diaphragm/piston

Doc. No. Y011370 (EN - Rev. 004)
September 2011

Performance Charts (continued)



Installation and Mounting instructions

For reliable and safe mounting of spring brakes, please note the following points:

- Use suitable mounting bracket with adequate stability (material thickness)
- Hole dimensions according to DIN
- Plain mounting face, only primed (maximum thickness 0,1 mm), not final coated
- Direct contact of the full surface of the spring brake mounting face must be made with the mounting bracket. No spacing washers, adapter plates or other elements are allowed.
- Ensure adequate clearance is provided behind the actuator to allow the wind-off bolt to be unscrewed.
- Check length of push rod, it may need to be shortened.
- The angle between push rod and slack adjuster and between push rod and mounting bracket should be approximately 90 deg. when the push rod is at its mid-stroke position.
- During installation, the slack adjuster should be rotated towards the yoke to insert the yoke pin. On no account should the push rod be pulled out from the actuator to meet the slack adjuster.
- Maximum pivoting angle of push rod in all directions = 3°
- For mounting studs, nuts and plain washers must be used.
- General requirements of mechanical engineering concerning stepwise tightening must be followed
- Tightening torque 180+20 Nm
- For further information please contact Knorr-Bremse, the axle or trailer manufacturer.

Winding-off the Power Spring

In case of failure in the air system, to release the actuator's spring force:

- Turn nut (A/F 24 mm) at the rear of the actuator in an anti-clockwise direction (max. 35 Nm).

Attention: Use only the correct sized ring or open-ended spanner!

Attention: The parking brake portion of the **Spring Brake** contains a very high spring load and it is strongly recommended that you do not attempt any disassembly of this portion. This should also be taken into consideration when disposing of spring brakes of any type.



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Function

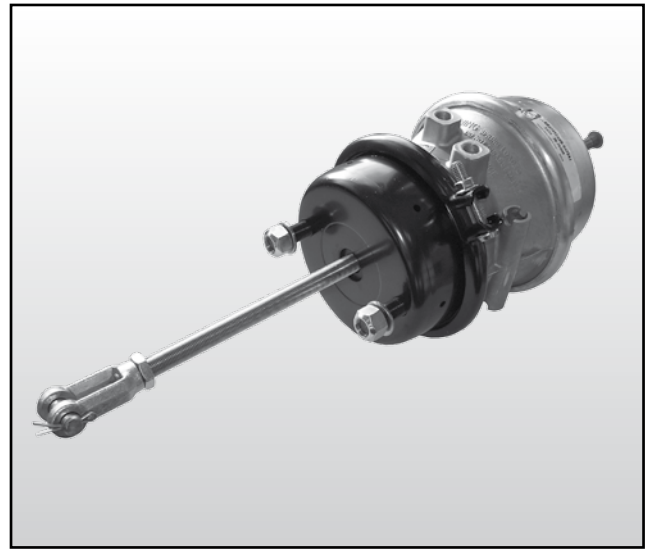
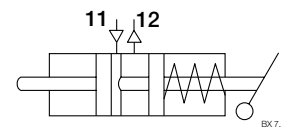
This range of **Spring Brakes** is used on axles fitted with drum brakes to provide the service and parking brake functions.

The internal wind off mechanism allows the parking brake force to be removed if air pressure is no longer present.

See PD-413-000, Document No. Y115384 for the full range of **Spring Brakes** for trailers.

Technical Features

| | | |
|-----------------------------|-----|------------------|
| Maximum operating pressure | | 8.5 bar |
| Full hold-off pressure: | T24 | 7.0 bar |
| | T30 | 5.5 bar |
| Operating temperature range | | -40 °C to +80 °C |
| Push rod stroke | | See table |
| Port threads; | | M16x1.5 |
| Release device: | | Mechanical |
| Weight | | See table |

**Standard Symbol as DIN ISO 1219****Range Overview**

| Part No. | Type No. | Size | | Stroke [mm] | TÜV-Inspection Report | Weight approx. [kg] |
|--------------------------|----------|----------------------|----------------------|-------------|---|---------------------|
| | | Service Brake [Type] | Parking Brake [Type] | | | |
| K031736 ¹⁾ | BX7401 | 20 | 24 | 57 | Service Brake 361-0134-05-FBKV Spring Brake 361-0135-05-FBKV | 7.8 |
| K031737 ¹⁾ | BX7402 | 20 | 24 | 57 | | 7.7 |
| K031733 ¹⁾ | BX7408 | 20 | 30 | 76 | | 8.8 |
| K031734 ¹⁾ | BX7409 | 20 | 30 | 76 | | 8.8 |
| K031748 ¹⁾ | BX7514 | 24 | 30 | 63.5 | | 9.5 |
| K037970 ¹⁾ | BX7515 | 24 | 30 | 76 | | 9.7 |
| K031738 ¹⁾ | BX7516 | 24 | 24 | 63.5 | | 8.2 |
| K038536 ¹⁾ | BX7518 | 24 | 30 | 63.5 | | 9.5 |
| K031739 ^{1) 2)} | BX7523 | 24 | 30 | 76 | | 9.7 |
| K031740 ¹⁾ | BX7525 | 24 | 30 | 76 | | 9.7 |
| K031744 ¹⁾ | BX7611 | 30 | 30 | 63.5 | | 9.4 |
| K031745 ¹⁾ | BX7612 | 30 | 30 | 63.5 | | 9.3 |

¹⁾ The part number will carry a suffix, "N##" which defines the packaging requirements of different market sectors, e.g. N00, N50.
Example: K031736N00 - is supplied without packaging.

²⁾ Replaces BX7515

Other versions are available.

Service Parts:

| | |
|------------|--------------|
| K037837 | yoke (round) |
| K040394K50 | release tool |
| K050194K50 | closure cap |

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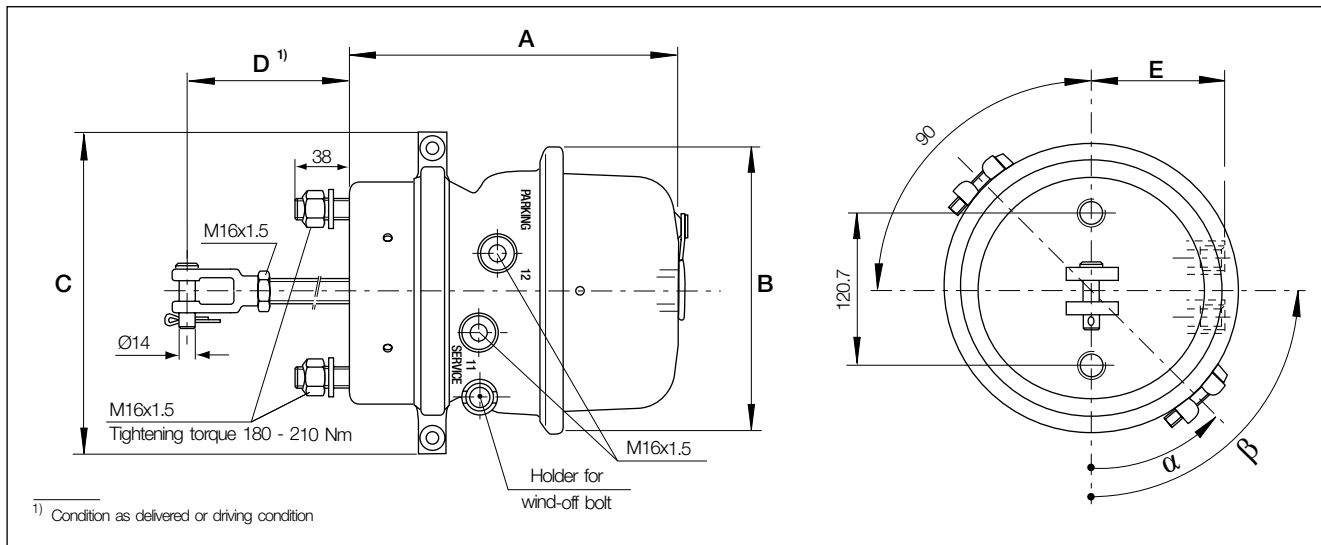
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BX7...

Spring Brakes (S-cam) , diaphragm/diaphragm

Doc. No. Y011369 (EN - Rev. 003)
September 2011

Dimensions



| Part No. | Type No. | A [mm] | B [mm] | C [mm] | D [mm] | E [mm] | α [°] | β [°] |
|--------------------------|----------|--------|--------|--------|--------|--------|--------------|-------------|
| K031736 ¹⁾ | BX7401 | 230 | 187 | 218 | 285 | 89 | 0 | 90 |
| K031737 ¹⁾ | BX7402 | 230 | 187 | 218 | 227 | 89 | 0 | 90 |
| K031733 ¹⁾ | BX7408 | 279 | 206 | 234 | 227 | 94 | -45 | 90 |
| K031734 ¹⁾ | BX7409 | 279 | 206 | 234 | 227 | 94 | -45 | 0 |
| K031748 ¹⁾ | BX7514 | 255 | 206 | 234 | 250 | 91 | 0 | -90 |
| K037970 ¹⁾ | BX7515 | 270 | 206 | 234 | 250 | 94 | -45 | 90 |
| K031738 ¹⁾ | BX7516 | 241 | 187 | 234 | 280 | 89 | 0 | -90 |
| K038536 ¹⁾ | BX7518 | 255 | 206 | 234 | 227 | 91 | 0 | -90 |
| K031739 ^{1) 2)} | BX7523 | 270 | 206 | 234 | 250 | 94 | -45 | 90 |
| K031740 ¹⁾ | BX7525 | 270 | 206 | 234 | 227 | 94 | -45 | 90 |
| K031744 ¹⁾ | BX7611 | 240 | 206 | 254 | 280 | 100 | 0 | -90 |
| K031745 ¹⁾ | BX7612 | 240 | 206 | 254 | 227 | 100 | 0 | -90 |

¹⁾ The part number will carry a suffix, "N##" which defines the packaging requirements of different market sectors, e.g. N00, N50.
Example: K031736N00 - is supplied without packaging.

²⁾ Replaces BX7515

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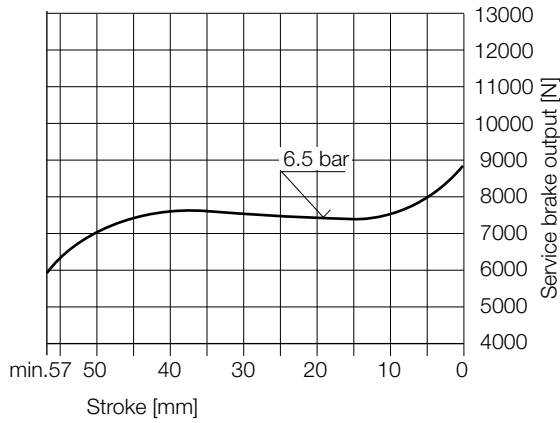
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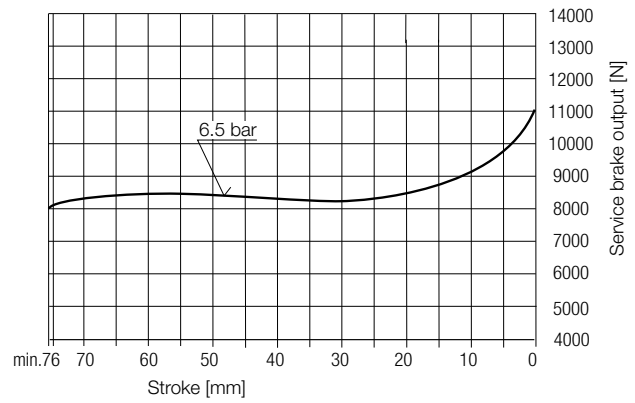
Performance Charts

Service Brake

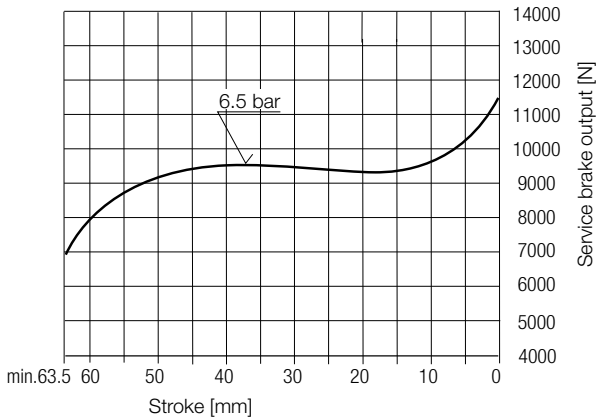
BX7401, BX7402



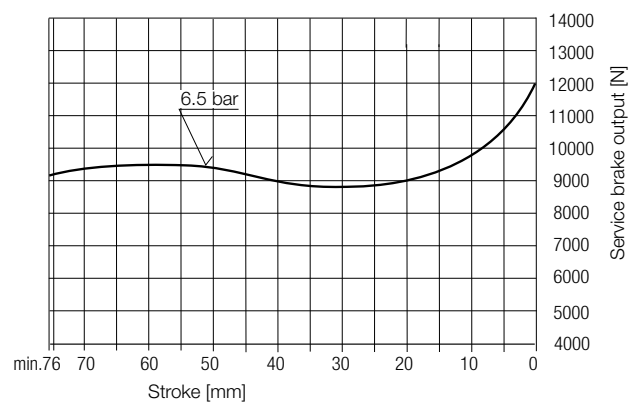
BX7408, BX7409



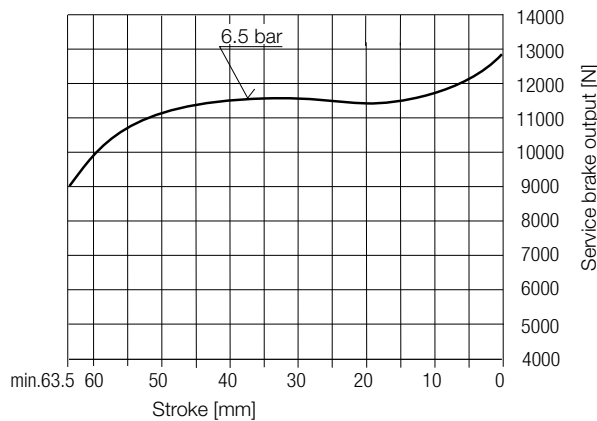
BX7514, BX7516, BX7518



BX7515, BX7523, BX7525



BX7611, BX7612



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BX7...

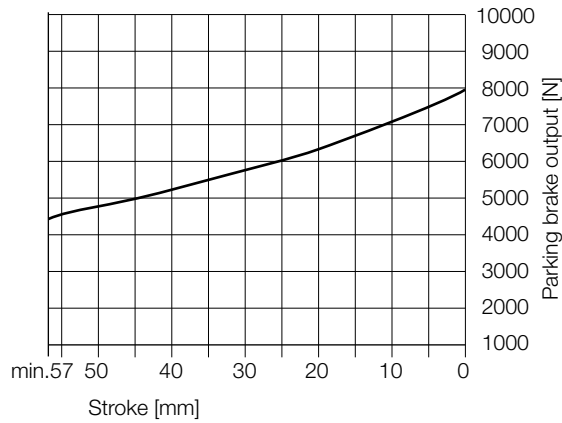
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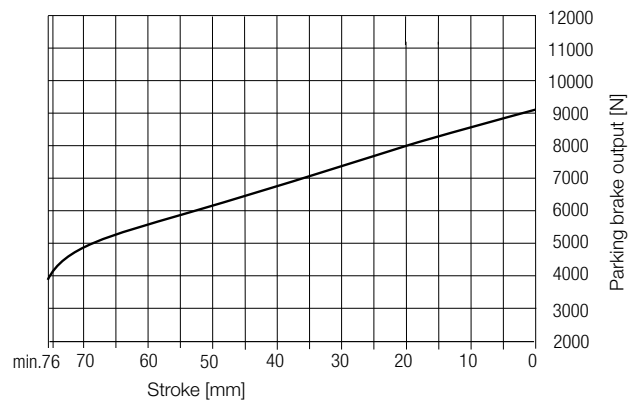
Performance Charts (continued)

Parking Brake

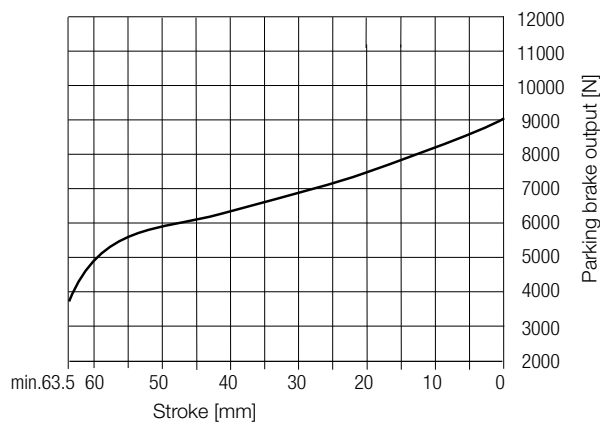
BX7401, BX7402



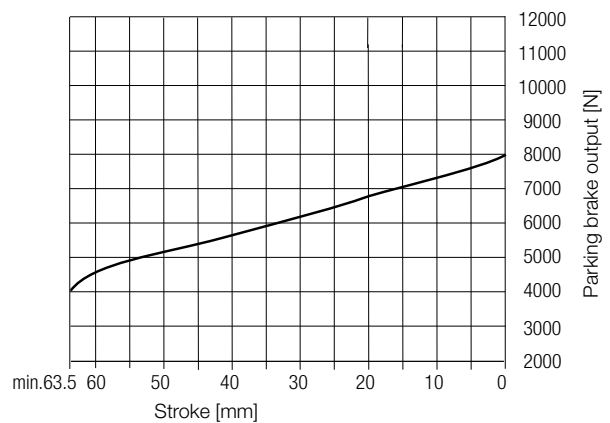
BX7408, BX7409, BX7515, BX7523, BX7525



BX7514, BX7518, BX7611, BX7612



BX7516



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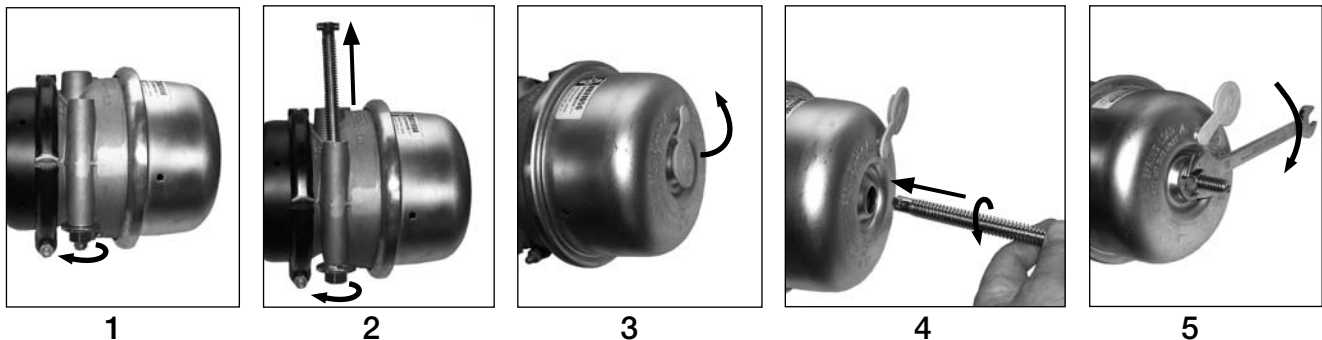
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Installation and Mounting instructions

- Use suitable mounting bracket with adequate stability (material thickness)
- Hole dimensions according to DIN
- Plain mounting face, only primed (maximum thickness 0.1 mm), not final coated
- Direct contact of the full surface of the spring brake mounting face must be made with the mounting bracket. No spacing washers, adapter plates or other elements are allowed.
- Ensure adequate clearance is provided behind the actuator to allow the wind-off bolt to be removed
- Check length of push rod, it may need to be shortened.
- The angle between push rod and slack adjuster and between push rod and mounting bracket should be approximately 90 deg. when the push rod is at its mid-stroke position.
- During installation, the slack adjuster should be rotated towards the yoke to insert the yoke pin. On no account should the push rod be pulled out from the actuator to meet the slack adjuster.
- Maximum pivoting angle of push rod in all directions = 3°
- For mounting studs, nuts and plain washers must be used.
- General requirements of mechanical engineering concerning progressive tightening must be followed.
- Tightening torque 180+30 Nm
- For further information please contact Knorr-Bremse, the axle or trailer manufacturer.

Winding-off the Power Spring



In case of failure in the air system, to release the actuator's spring force:

- Ensure wheels are chocked.
- Remove release bolt from its holder (Figs. 1 & 2)
- Unclip closure cap (Fig. 3).
- Fully insert "T" end of the release bolt into the spring portion and rotate to engage in the internal slot (Fig. 4)
- Fit washer and nut.
- Rotate the nut (19 mm AF) in a clockwise direction (Fig. 5). Max. torque 68 Nm.

Attention: Use only the correct sized ring or open-ended spanner!

Attention: The parking brake portion of the **Spring Brake** contains a very high spring load and it is strongly recommended that you do not attempt any disassembly of this portion. This should also be taken into consideration when disposing of spring brakes of any type.



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Function

This range of **Spring Brakes** is used on axles fitted with air disc brakes to provide the service and parking brake functions.

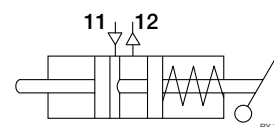
The internal wind-off mechanism allows the parking brake force to be removed if air pressure is no longer present.

The **Spring Brakes** have a mounting seal integrated in the non-pressure housing which prevents the entry of dirt or water into the caliper.

See PD-413-000, Document No. Y115384 for the full range of **Spring Brakes** for trailers.

Technical Features

| | |
|-------------------------------------|---|
| Maximum operating pressure | Port 11 ; 10.2 bar Port 12 ; 8.5 bar |
| Full hold-off pressure | 5.2 bar |
| Operating temperature range | -40 °C to +80 °C |
| Sealing of the non-pressure housing | Rubber boot |
| Push rod stroke: | 57 mm |
| Port threads: | M16x1.5 |
| Release device | Mechanical |
| Weight | See table |

**Standard Symbol as DIN ISO 1219****Range Overview**

| Part No. | Type No. | Size | | TÜV Inspection Report | Weight approx. [kg] |
|------------|----------|----------------------|----------------------|---|---------------------|
| | | Service Brake [Type] | Parking Brake [Type] | | |
| II37520 | BS9193 | 12 | 16 | Service Brake 361-0130-05-FBKV Spring Brake 361-0131-05-FBKV | 6.9 |
| II36338 | BS9196 | 12 | 16 | | 6.9 |
| II31783 | BS9297 | 14 | 16 | | 6.9 |
| II30619 | BS9304 | 16 | 24 | | 7.3 |
| II38110F | BS9335 | 16 | 24 | | 7.3 |
| II38467F | BS9338 | 16 | 24 | | 7.4 |
| II31663 | BS9349 | 18 | 16 | | 6.7 |
| II38578F | BS9376 | 16 | 16 | | 6.9 |
| II38465F | BS9379 | 16 | 16 | | 6.9 |
| II31227 | BS9397 | 16 | 16 | | 6.8 |
| II31407000 | BS9404 | 20 | 24 | | 8.0 |
| II31226 | BS9451 | 22 | 24 | | 8.0 |
| II38533F | BS9479 | 20 | 24 | | 7.5 |
| II38581F | BS9485 | 20 | 24 | | 7.5 |
| II31408 | BS9503 | 24 | 24 | | 7.7 |

Other versions are available.

Installation kit **II36860** contains: Hexagon lock nut (2x)

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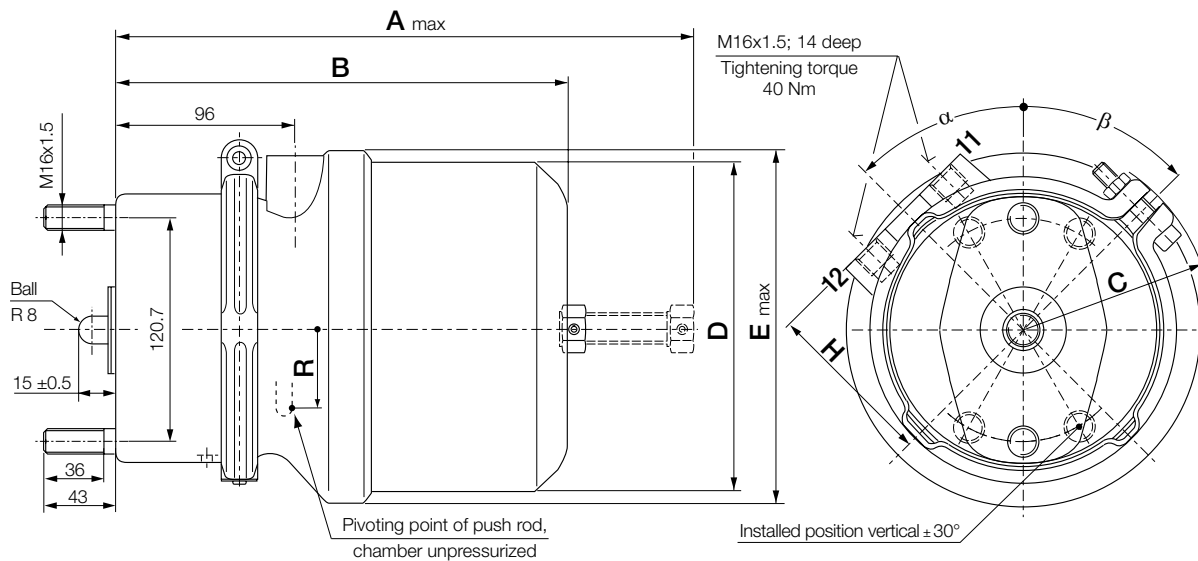
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BS9...

Spring Brakes (Disc) , diaphragm/piston

Doc. No. Y011372 (EN - Rev. 004)
September 2011

Dimensions



| Part No. | Type No. | A max. [mm] | B [mm] | C [mm] | D [mm] | E max. [mm] | H [mm] | R [mm] | α [°] | β [°] |
|------------|----------|-------------|--------|--------|--------|-------------|--------|--------|-------|-------|
| II37250 | BS9193 | 327 | 246 | 106 | 161 | 176 | 81 | | 43 | 90 |
| II36338 | BS9196 | 327 | 246 | 106 | 161 | 176 | 81 | | -43 | -90 |
| II31783 | BS9297 | 327 | 246 | 106 | 161 | 176 | 81 | 43 | 90 | 45 |
| II30619 | BS9304 | 318 | 240 | 106 | 176 | 191 | 90 | 43 | 90 | 45 |
| II38110F | BS9335 | 318 | 240 | 106 | 176 | 191 | 90 | 43 | 0 | 0 |
| II38467F | BS9338 | 318 | 240 | 106 | 176 | 191 | 90 | 43 | 90 | 90 |
| II31663 | BS9349 | 327 | 246 | 106 | 161 | 176 | 81 | 50 | 90 | 45 |
| II38578F | BS9376 | 327 | 246 | 106 | 161 | 176 | 81 | 47 | 0 | 0 |
| II38465F | BS9379 | 327 | 246 | 106 | 161 | 176 | 81 | 47 | 90 | 90 |
| II31227 | BS9397 | 327 | 246 | 106 | 161 | 176 | 81 | 47 | 90 | 45 |
| II31407000 | BS9404 | 318 | 240 | 111 | 176 | 191 | 90 | 52 | 90 | 45 |
| II31226 | BS9451 | 318 | 240 | 111 | 176 | 191 | 90 | 54 | 90 | 45 |
| II38533F | BS9479 | 318 | 240 | 111 | 176 | 191 | 90 | 52 | 90 | 90 |
| II38581F | BS9485 | 318 | 240 | 111 | 176 | 191 | 90 | 52 | 0 | 0 |
| II31408 | BS9503 | 318 | 240 | 117 | 176 | 191 | 90 | 57.5 | 90 | 45 |

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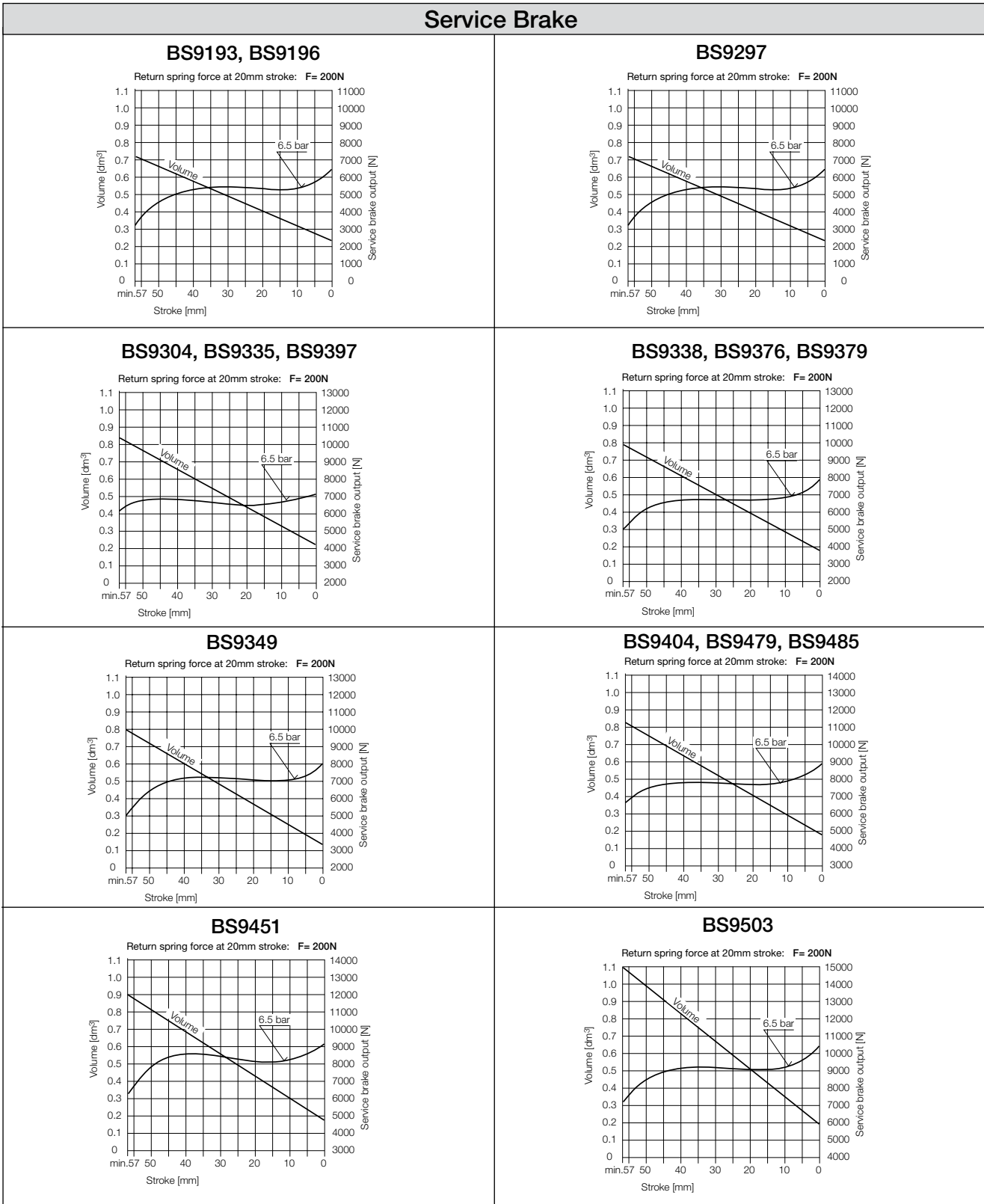
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Performance Graphs

Service Brake



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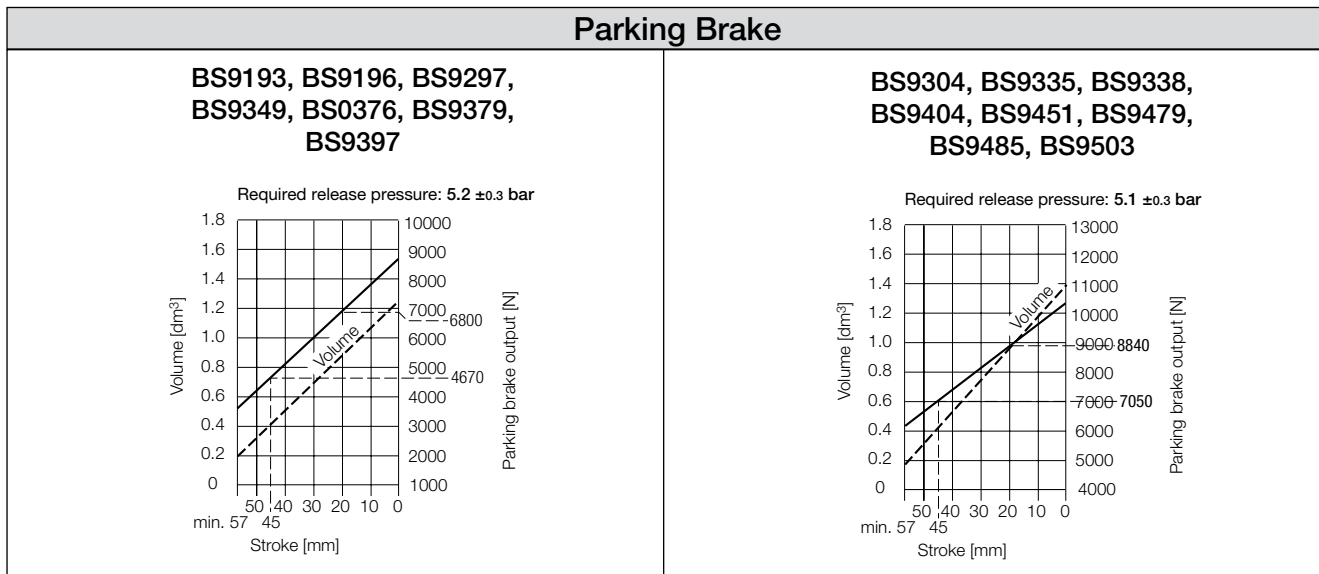


BS9...

Spring Brakes (Disc) , diaphragm/piston

Doc. No. Y011372 (EN - Rev. 004)
September 2011

Performance Graphs (continued)



Installation and Mounting instructions

Detailed information concerning the mounting of brake actuators on disc brakes can be found in the service manual **Y006471**.

Special Note: If the actuator is supplied with the drain holes plugged, remove lowest plug (as viewed when the actuator is installed).

Winding-off the Power Spring

In case of failure in the air system, to release the actuator's spring force:

- Ensure wheels are chocked
- Turn nut (24 mm A/F) at the rear of the actuator in an anti-clockwise direction (max. 35 Nm).

Attention: Use only the correct sized ring or open-ended spanner!

Attention: The parking brake portion of the **Spring Brake** contains a very high spring load and it is strongly recommended that you do not attempt any disassembly of this portion. This should also be taken into consideration when disposing of spring brakes of any type.



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Function

This range of **Spring Brakes** is used on axles fitted with air disc brakes and provides the service and parking brake functions.

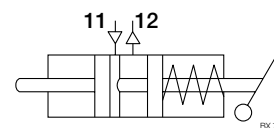
The internal wind off mechanism allows the parking brake force to be removed if air pressure is no longer present.

The **Spring Brakes** have a mounting seal integrated in the non-pressure housing which prevents the entry of dirt or water into the disc brake caliper.

See PD-413-000, Document No. Y115384 for the full range of **Spring Brakes** for trailers.

Technical Features

| | |
|-------------------------------|------------------|
| Maximum operating pressure: | 10.3 bar |
| Full hold-off pressure: | 5.5 bar |
| Operating temperature range: | -40 °C to +80 °C |
| Sealing of secondary chamber: | Rubber Boot |
| Push rod stroke: | 57 mm |
| Port threads: | M16x1.5 |
| Release device: | Mechanical |
| Weight: | See table |

**Standard Symbol as DIN ISO 1219****Range Overview**

| Part No. | Type No. | Size | | TÜV Inspection Report | Weight approx. [kg] |
|-----------------------|----------|----------------------|----------------------|---|---------------------|
| | | Service Brake [Type] | Parking Brake [Type] | | |
| K026894 ¹⁾ | BS7304 | 16 | 24 | BZ 105.0 | 6.9 |
| K026896 ¹⁾ | BS7309 | 16 | 24 | Service Brake 361-0136-05-FBKV Spring Brake 361-0137-05-FBKV | 6.9 |
| K026900 ¹⁾ | BS7318 | 16 | 24 | | 6.9 |
| K026901 ¹⁾ | BS7319 | 16 | 24 | | 6.9 |
| K026903 ¹⁾ | BS7751 | 18 | 24 | | 6.9 |
| K026904 ¹⁾ | BS7755 | 18 | 24 | | 6.9 |
| K026905 ¹⁾ | BS7756 | 18 | 24 | | 6.9 |
| K045570 ¹⁾ | BS7402 | 20 | 24 | | 7.1 |
| K045718 ¹⁾ | BS7403 | 20 | 24 | | 7.1 |
| K045719 ¹⁾ | BS7404 | 20 | 24 | | 7.1 |

¹⁾ The part number will carry a suffix, "N##" which defines the packaging requirements of different market sectors, e.g. N00, N50. Example: K026894N00 - is supplied without packaging.

Other versions are available.

Actuator mounting kit available comprising 2 off hexagon lock nuts: Part Number **II36860**.

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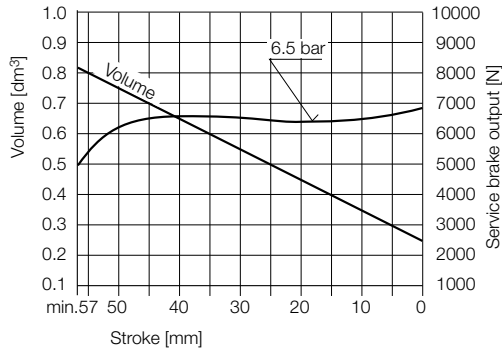
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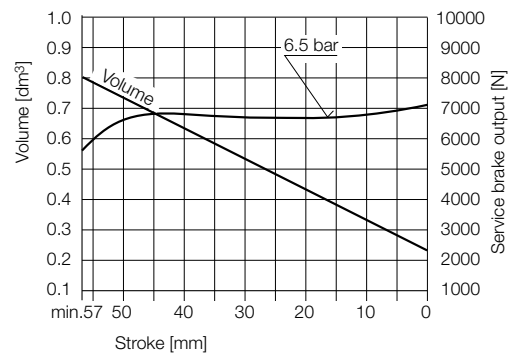
Performance Charts

Service Brake

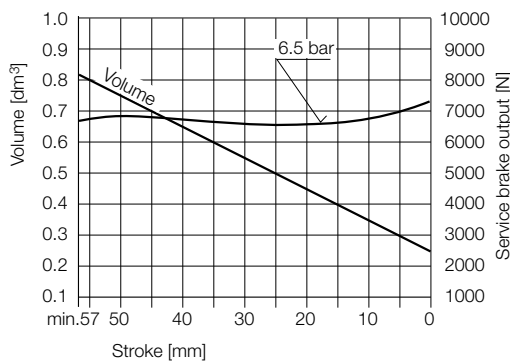
BS7304



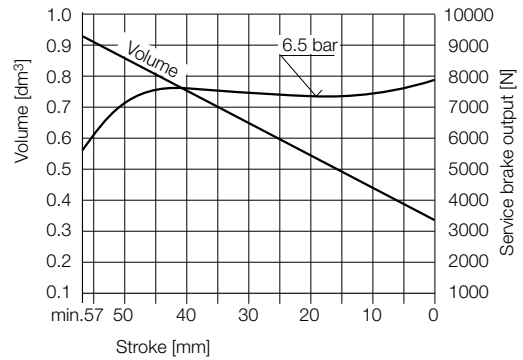
BS7309, BS7318, BS7319



BS7751, BS7755 BS7756



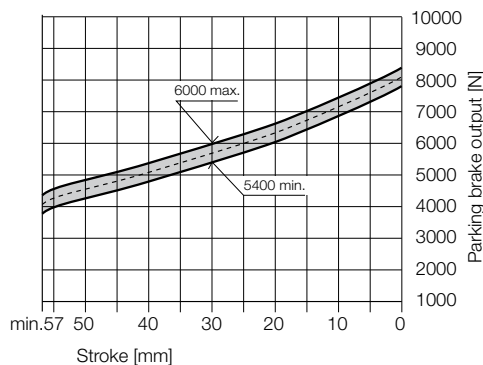
BS7402, BS7403 BS7404



Parking Brake

BS7304, BS7309, BS7318, BS7319, BS7402, BS7403, BS7404, BS7751, BS7755, BS7756

Maximum required hold-off pressure 5.5 bar



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BS7...

Spring Brakes (Disc), diaphragm/diaphragm

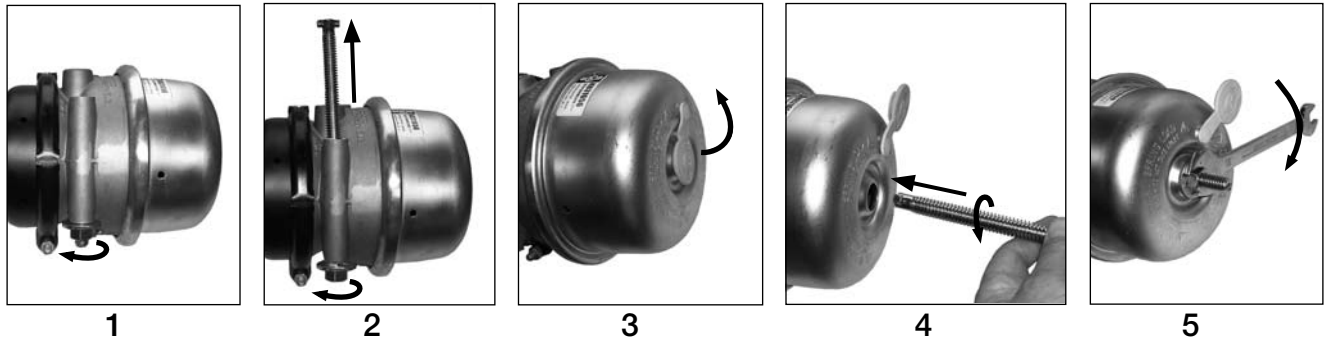
Doc. No. Y011371 (EN - Rev. 004)
September 2011

Installation and Mounting instructions

Detailed information concerning the mounting of disc brake actuators can be found in the service manual **Y006471**.

Special Note: If the actuator is supplied with the drain holes plugged, remove the lowest plug (as viewed when the actuator is installed).

Winding-off the Power Spring



In case of failure in the air system, to release the actuator's spring force:

- Ensure wheels are chocked.
- Remove release bolt from its holder (Figs. 1 & 2)
- Unclip closure cap (Fig. 3).
- Fully insert "T" end of the release bolt into the spring portion and rotate to engage in the internal slot (Fig. 4)
- Fit washer and nut.
- Rotate the nut (19 mm AF) in a clockwise direction (Fig. 5). Max. torque 68 Nm.

Attention: Use only the correct sized ring or open-ended spanner!

Attention: The parking brake portion of the **Spring Brake** contains a very high spring load and it is strongly recommended that you do not attempt any disassembly of this portion. This should also be taken into consideration when disposing of spring brakes of any type.



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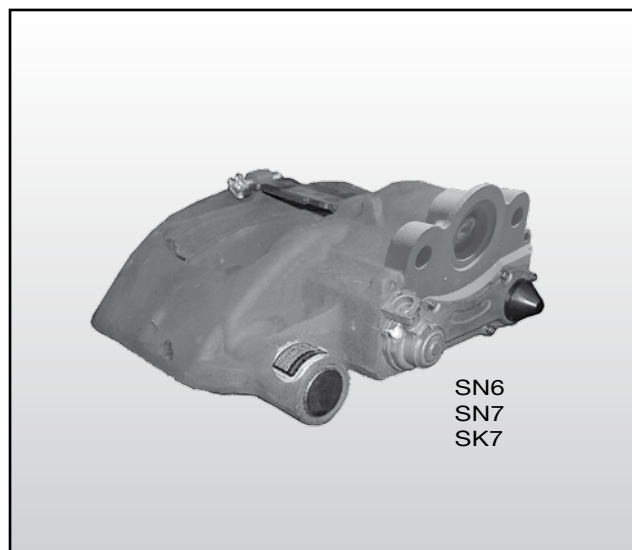
Function

The SN range of **Air Disc Brakes** is a natural evolution of the SB range. The brake is designed with a floating caliper and can be activated by either a brake chamber to provide the service brake function or a spring brake to provide the service and parking brake functions.

For trailers with a wheel size of 22,5", an **Air Disc Brake** has been designed specifically for trailer applications. This brake is called the SK7 and its main features are high fade resistance and low weight. Additionally, the SK7 has 2 mm more brake pad thickness compared with the SN6 and SN7 versions.

Main Features

- Monobloc caliper
- Compact design
- Reduced weight
- Optimised sealing at the caliper to actuator interface (see PD-405-100, Document No. Y103245) and the fixed guide pin
- Optimised protection of the guide pins, both bearings totally closed (SN7 / SK7)
- Interchangeability between SN and SB
- Possibility of pad wear control via pad wear indicators

**Technical Features**

| | SN5 | SN6 | SN7 | SK7 |
|--|------|------|------|------|
| Suitable for wheel rim size [inch] | 17.5 | 19.5 | 22.5 | 22.5 |
| Internal transmission ratio | 10.0 | 15.6 | 15.6 | 15.6 |
| Rotor disc diameter [mm] | 335 | 374 | 430 | 430 |
| Rotor disc thickness (new) [mm] | 34 | 45 | 45 | 45 |
| Rotor disc thickness (min.) [mm] | 28 | 37 | 37 | 37 |
| Pad friction material thickness (new) [mm] | 19 | 21 | 21 | 23 |
| Pad friction material thickness (min.) [mm] | 2 | 2 | 2 | 2 |
| Brake efficiency [%] | ≥95 | ≥95 | ≥95 | ≥95 |
| Weight without disc, including pads [kg] (may alter depending on variant) | 24.0 | 33.5 | 41.5 | 36.6 |
| Sealing boot (disc brake caliper to actuator interface) | Yes | Yes | Yes | Yes |

Further information on air disc brakes, discs and actuators, as well as brake pads, service kits and service tools can be found in:

Service Manual SN5 (document number Y015044- #)
Service Manual SN6, SN7, SK7 (document number Y006471- #)

- Refer to website for latest revision

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Function

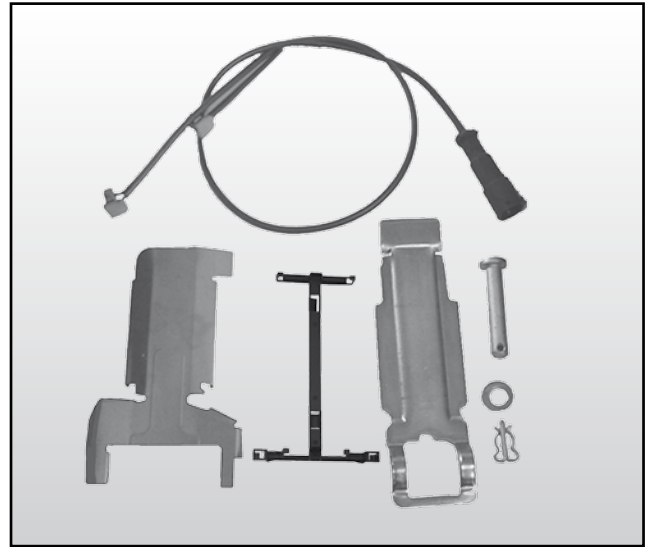
The **Brake Pad Wear Indicator Kit** is used for monitoring the Pad friction material thickness.

Wear is "monitored" by two sensors which are located directly into cut-outs in both the inner and outer brake pads.

When the wear limit (2 mm remaining pad thickness) is reached, the sensors contact the brake disc and, depending on the version, make or break an electrical circuit. This electrical change of state can be used by the electronic braking system (TEBS) for pad wear control or simply to provide a visual warning in the cab that the pads must be replaced.

There are different warning displays for pad wear control, some can be mounted on the trailer (see PD-214-200, Document No. Y050635).

There are two versions of the **Brake Pad Wear Indicator Kit**. One contains just the pad wear sensors with cable, cable guide and protection plate. The other also includes a new pad retainer kit for installations where the old style pad retainer is still in use.

**Range Overview**

| Part No. | Description | for Disc Brake |
|----------|---|---------------------------|
| K000461 | Kit including pad retainer kit (long cable version) | SB7... / SN7... |
| K000670 | | SB6... / SN6... / SK7... |
| K000937 | Basic kit (long cable version) | SB6... / SN6... |
| K000938 | Basic kit (short cable version) | SB7... / SN7..., / SK7... |

Pad Retainer

old type



new type



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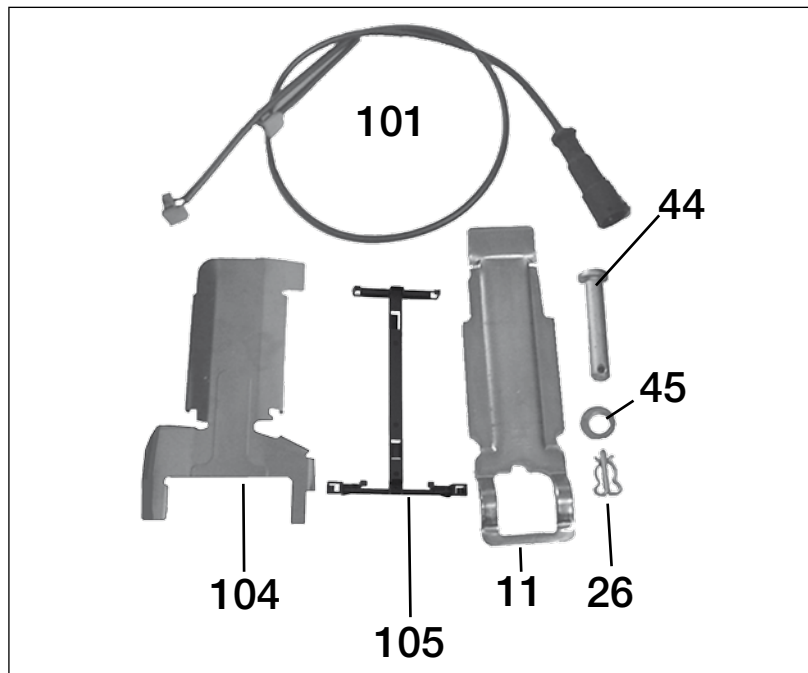
K000...

Brake Pad Wear Indicator Kits

Doc. No. Y011374 (Rev. 003)
March 2011

Contents of the Kits

| Contents | Item | Kit Part No. | | | |
|-----------------------------|--------------|--------------|---------|---------|---------|
| | | K000461 | K000670 | K000937 | K000938 |
| Sensors with cable (682 mm) | 101 | X | X | X | - |
| Sensors with cable (294 mm) | 101 | - | - | - | X |
| Protection Plate | 104 | X | X | X | X |
| Cable Guide | 105 | X | X | X | X |
| Pad Retainer Kit | Pad Retainer | 11 | X | X | - |
| | Spring Clip | 26 | X | X | - |
| | Pin | 44 | X | X | - |
| | Washer | 45 | X | X | - |



TÜV - Report: TÜH ATC-TB 2003 - 080.80



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| PD No. | Product | Type/Part No. family |
|------------|---|------------------------|
| PD-500-500 | Levelling Valves | SV13.., SV14.. |
| PD-501-000 | Raise/Lower Valves (conventional) | SV31.. |
| PD-501-050 | Raise/Lower Valves (single circuit) | SV32.. |
| PD-501-100 | Raise/Lower Valve (with Speed Pulse function) | SV3801 |
| PD-503-100 | Lift Axle Valve - Manual/Pneumatic | AE1124 |
| PD-503-200 | Lift Axle Valves - Pneumatic | LS1..., LS2..., LS3... |
| PD-503-400 | Lift Axle Valves - TEBS controlled | AE1141 |
| PD-504-000 | Height Limiting Valve (Air Suspension) | AE1103 |



Function

On vehicles fitted with air suspension, the **Levelling Valve** ensures that the axle suspension air bags maintain a constant chassis height irrespective of the vehicle load.

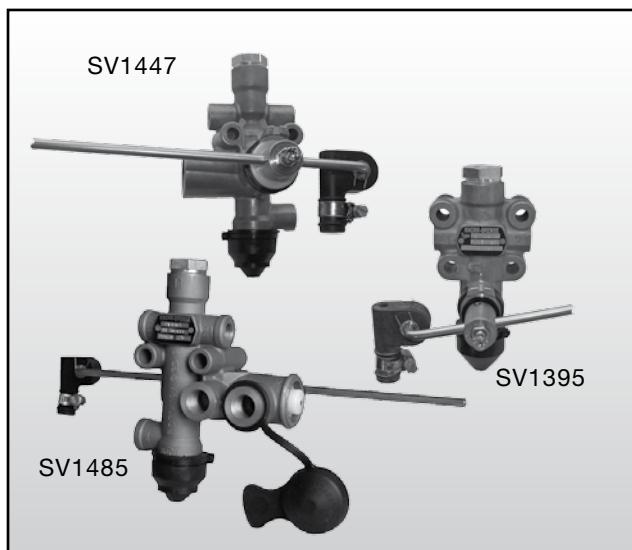
Levelling Valves with the "Height Limitation" feature prevent the chassis height being manually raised above a set limit.

Levelling Valves with the "Second Ride Height" feature allow the driver to pneumatically signal the valve and raise the chassis to an alternative ride height.

Cross Throttling prevents the rapid flow of air between the two outlet ports **21** (left and right side of the vehicle).

Technical Features

Maximum Operating Pressure: 12 bar
 Operating Temperature Range: -40 °C to +80 °C
 Weight: 0.7 kg approx.
 Lever length: 300 mm
 Lever design: Round, with rubber joint



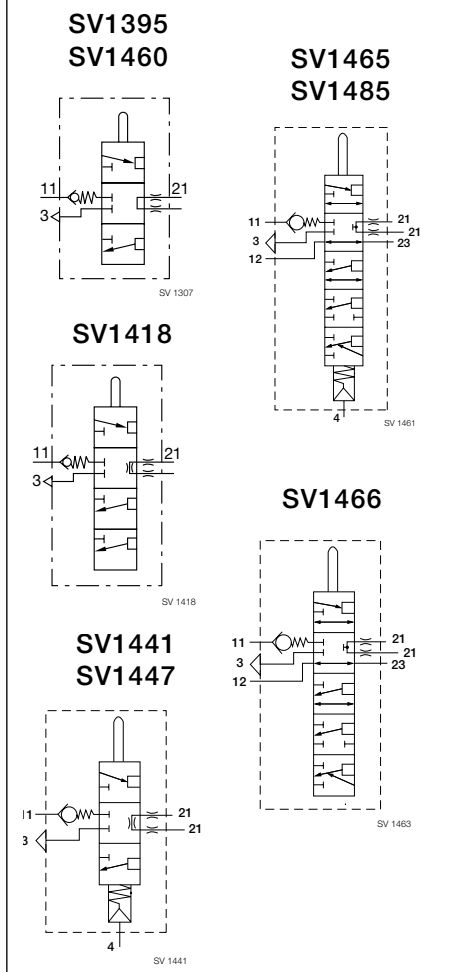
Range Overview

| Part No. | Type No. | Replaces | Second Ride Height (preset) | Height Limitation (adjustable) | Secondary Exhaust |
|-----------------------|----------|------------|-----------------------------|--------------------------------|-------------------|
| II19425 ¹⁾ | SV1395 | SV1307 | – | – | – |
| I99633 ²⁾ | SV1418 | – | – | – | – |
| II30531 | SV1441 | – | 12° | – | – |
| II34910 | SV1447 | – | 17.5° | – | – |
| II36088 ³⁾ | SV1460 | – | – | – | – |
| II36114 | SV1465 | SV1440, 61 | 12° | 20°-50° ⁴⁾ | with |
| II36115 | SV1466 | SV1410, 63 | – | 20°-50° ⁴⁾ | with |
| K000367 | SV1485 | – | 10° | 20°-50° ⁴⁾ | with |
| K002647 ⁵⁾ | SV1485 | – | 10° | 20°-50° ⁴⁾ | with |

The rubber joint at the lower end of the vertical linkage is available separately: Part Number: **K001406**

- ¹⁾ Standard valve without additional features
- ²⁾ Without additional features, higher volumetric flow
- ³⁾ Standard valve without additional features, plastic body
- ⁴⁾ Height Limitation adjustable, see adjustment instructions
- ⁵⁾ Ports **12** and **23** are fitted with blanking plugs

Standard Symbol as DIN ISO 1219



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SV13.., SV14..

Levelling Valves

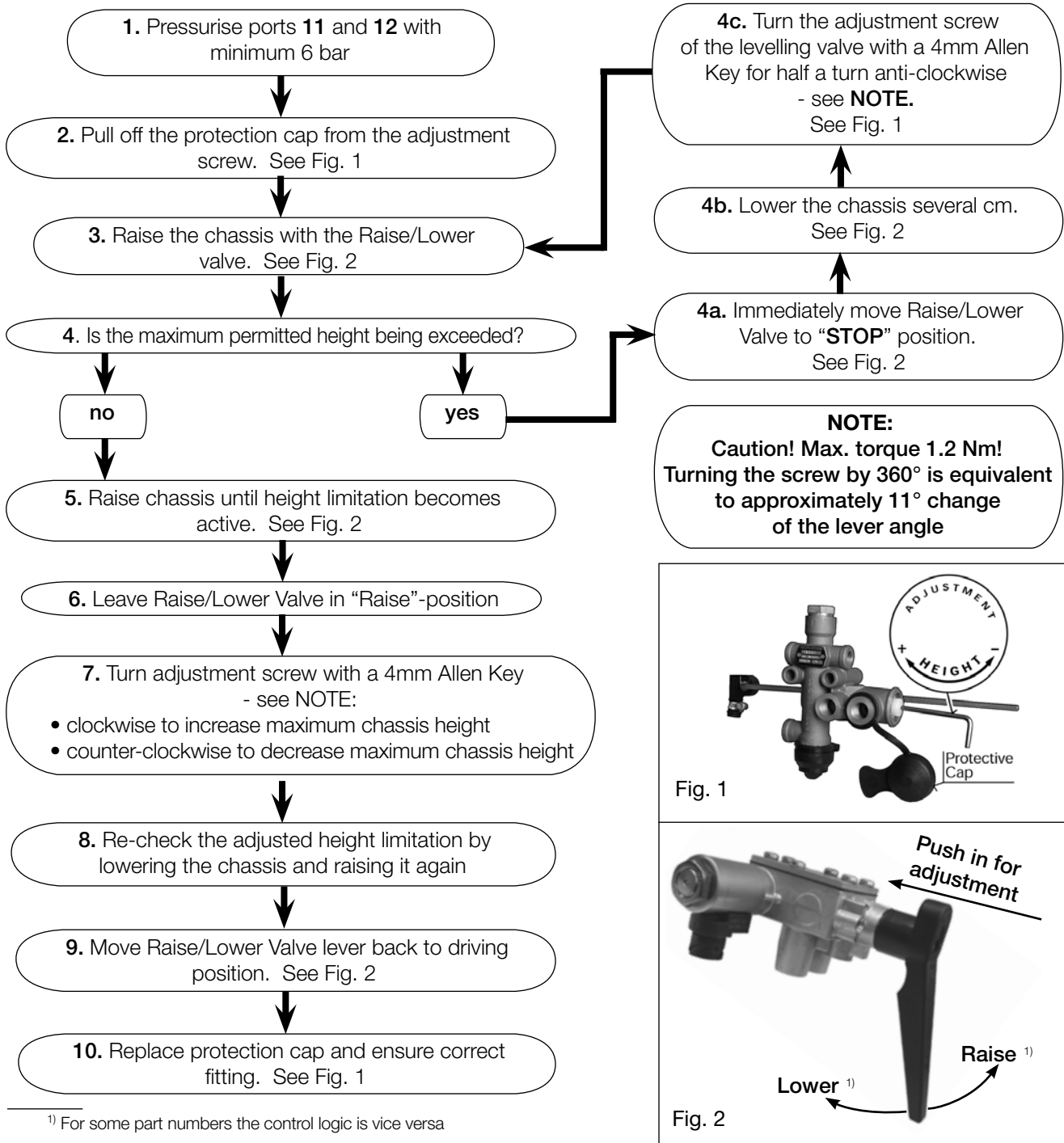
Doc. No. Y011375 (Rev. 003)
March 2011

Instructions for adjusting the height limitation

(applies to the following levelling valves: **SV1461, SV1462, SV1463, SV1466** and **SV1485**)

Levelling valves with Height Limitation shut off the air supply to the Raise/Lower valve at a certain angle of the lever and thereby limit the maximum chassis height. This angle is supplied pre-set to 25° but can be adjusted within the range 20° to 50°. Note: If the adjustment range is not sufficient, the lever length can be changed (see pages 3 and 4).

The adjustment is carried out as follows:



¹⁾ For some part numbers the control logic is vice versa

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Doc. No. Y011375 (Rev. 003)
March 2011

Second Ride Height and Height Limitation features: Calculation of the correct lever length

When the Second Ride Height feature is activated, further angular travel of the lever is permitted and the chassis rises to a higher position; the increase in angle is a fixed value for each valve. If the lever length is changed, the second ride height can be further adjusted.

The Height Limitation feature is adjusted using the integrated hexagon socket (see instructions on page 2). For cases where the adjustment range is not sufficient, additional height can be achieved by increasing the lever length. The quotient of Lever Length and Height Limitation must be in the range 1.3 to 2.9.

The following formulae for calculating the lever length will give an approximate value for the static condition.

| Type No. | Second Ride Height (RH2) | Height Limitation (HL) |
|----------|--------------------------|----------------------------------|
| SV1465 | $L = 4.8 \times RH2$ | $1.3 \leq \frac{L}{HL} \leq 2.9$ |
| SV1466 | – | $1.3 \leq \frac{L}{HL} \leq 2.9$ |
| SV1485 | $L = 5.8 \times RH2$ | $1.3 \leq \frac{L}{HL} \leq 2.9$ |
| SV1441 | $L = 4.8 \times RH2$ | – |
| SV1447 | $L = 3.3 \times RH2$ | – |

Example:

Second Ride Height for SV1485:

RH2 (requested) = 40 mm

HL (requested) = 100 mm

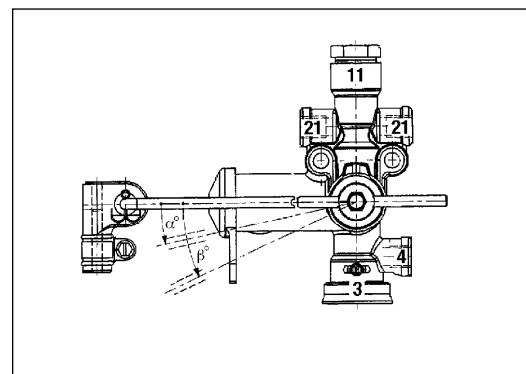
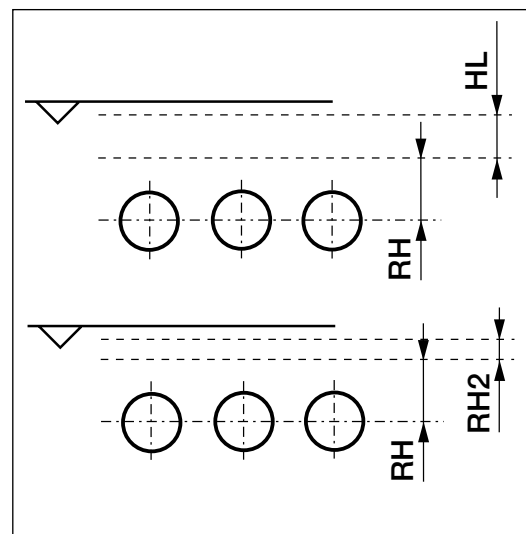
$L = 5.8 \times 40\text{mm} = 232\text{ mm}$

$$\frac{L}{HL} = \frac{232\text{ mm}}{100\text{ mm}} = 2.32$$

$$1.3 \leq 2.32 \leq 2.9$$

When the angle of the height limitation is reached, the valve is in the following condition:

- connection 11 – 21 closed
- connection 12 – 23 closed
- secondary exhaust for 23 open



| Type No. | Second Ride Height [α] | Height Limitation [β] |
|----------|------------------------|-----------------------|
| SV1441 | 12° | – |
| SV1447 | 17.5° | – |
| SV1465 | 12° | 20° - 50° |
| SV1466 | – | 20° - 50° |
| SV1485 | 10° | 20° - 50° |

Legend:

- L** = Lever length of Levelling Valve
- RH** = Ride Height (height of the chassis while driving with the Levelling Valve lever in the horizontal position)
- RH2** = Second Ride Height (increased chassis height above RH when pressurising port 4, e.g. when driving with a lift axle raised)
- HL** = Height Limitation (maximum possible chassis height above RH when operating the Raise/Lower Valve)

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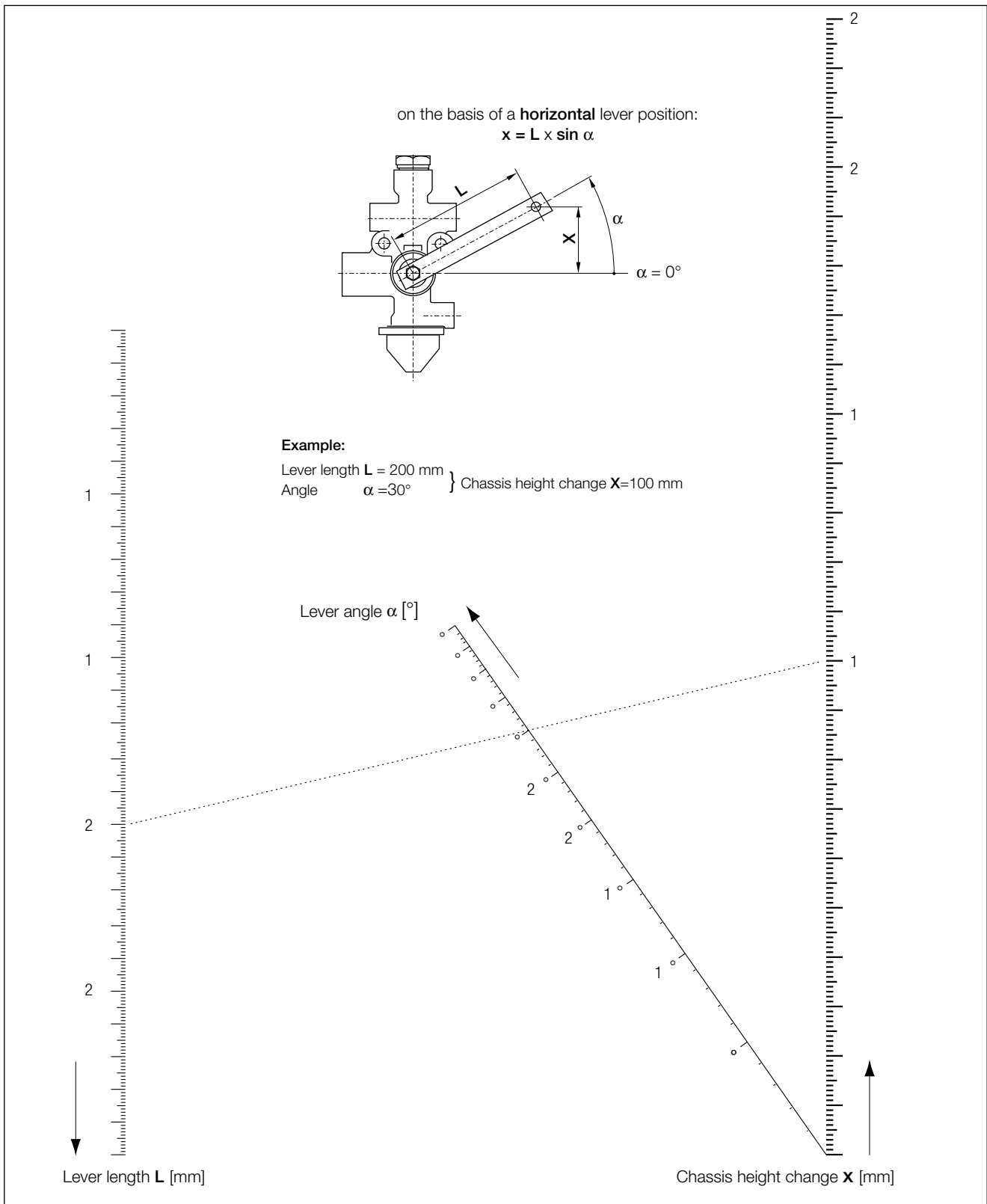
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SV13.., SV14..

Levelling Valves

Doc. No. Y011375 (Rev. 003)
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Graphic Diagram for determining the Chassis height change "X" and the lever length "L"



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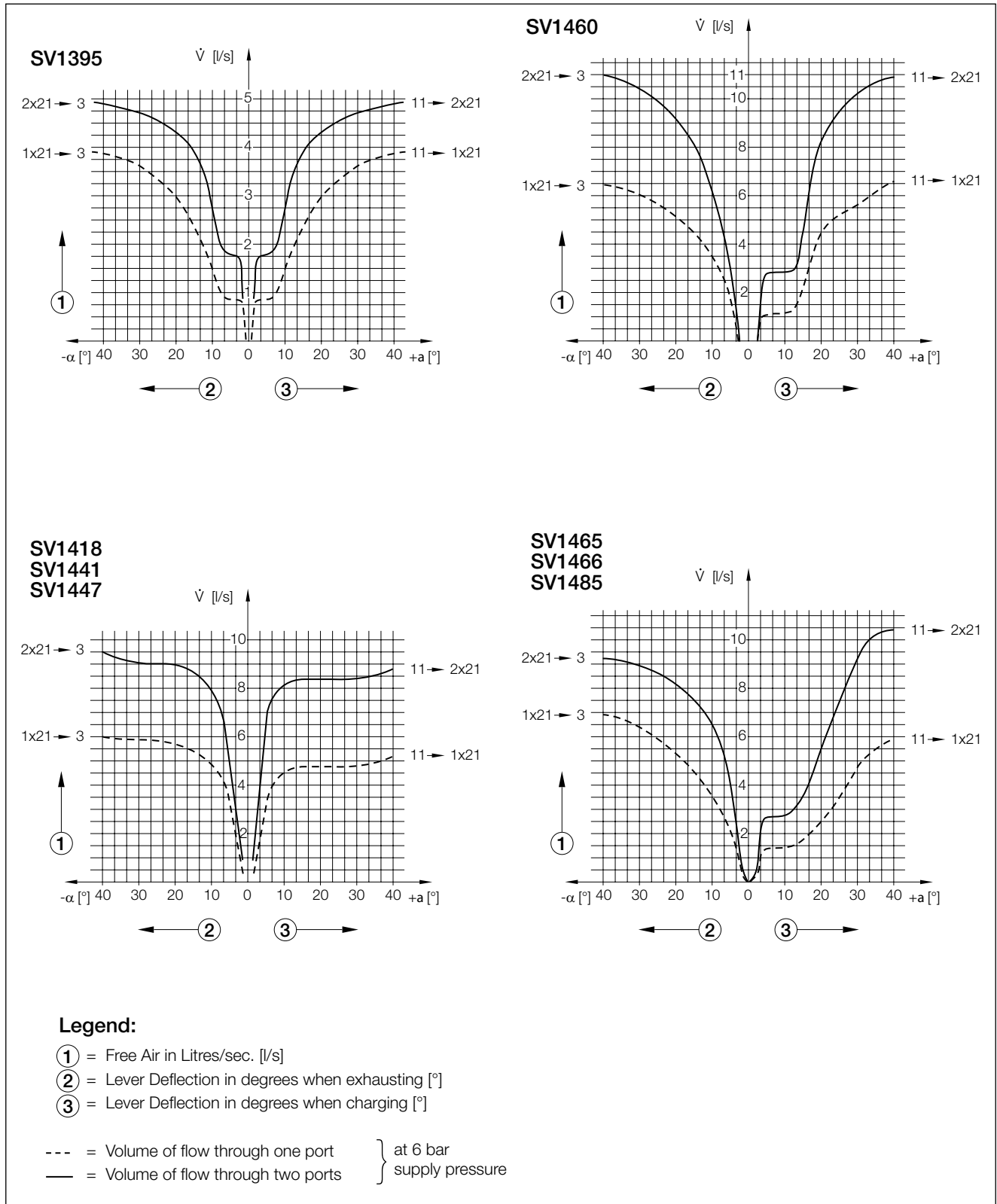
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March 2011

Performance Charts



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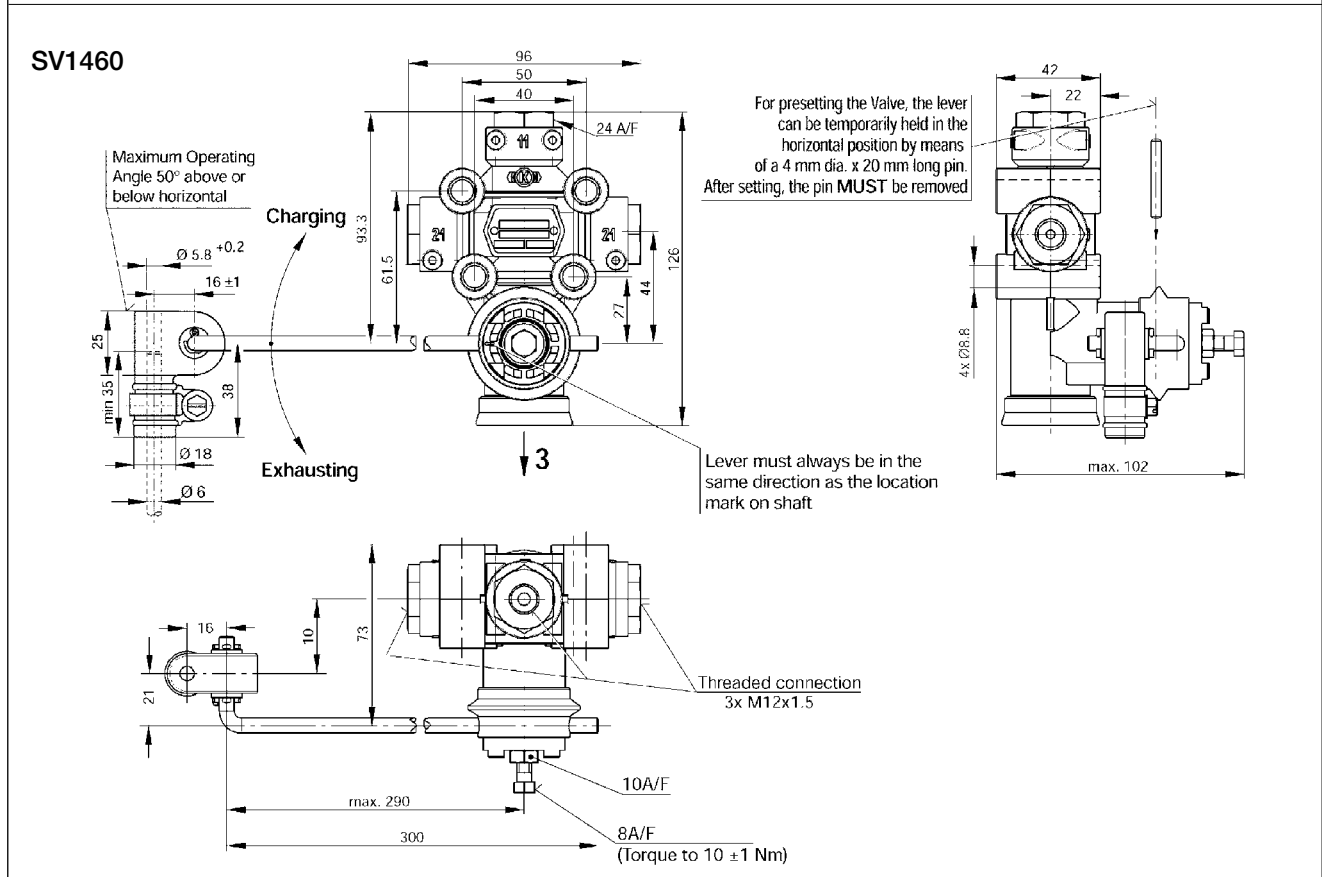
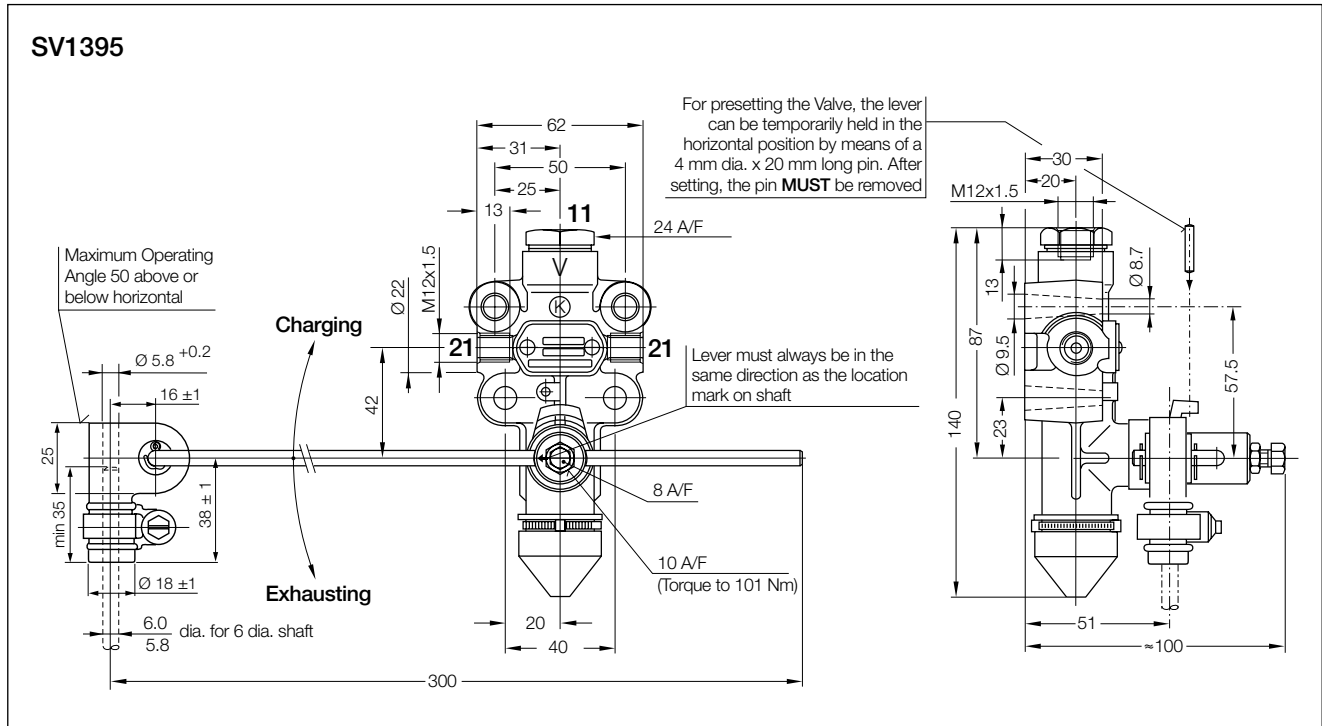
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SV13.., SV14..

Levelling Valves

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Dimensions



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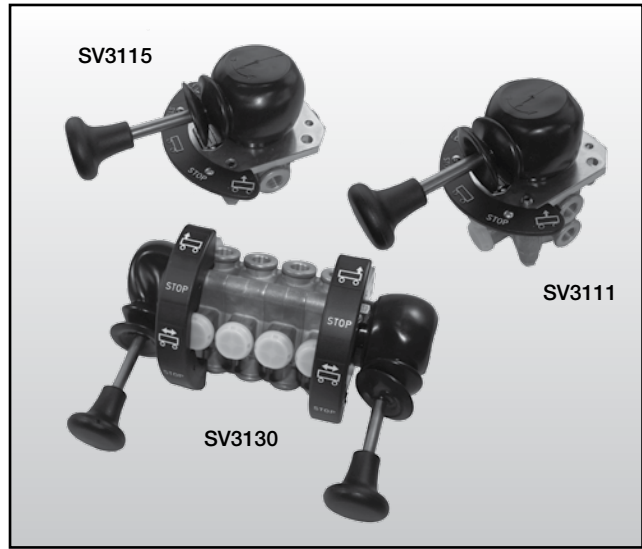
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Function

Raise/Lower Valves are fitted on vehicles with air suspension and allow manual control of air bag volume to raise or lower the vehicle chassis as required.

The valve is available with 1,2 or 4 control circuits to suit different suspension configurations. If required valves can be supplied with a "dead man's handle" (automatic return to the "STOP" position).

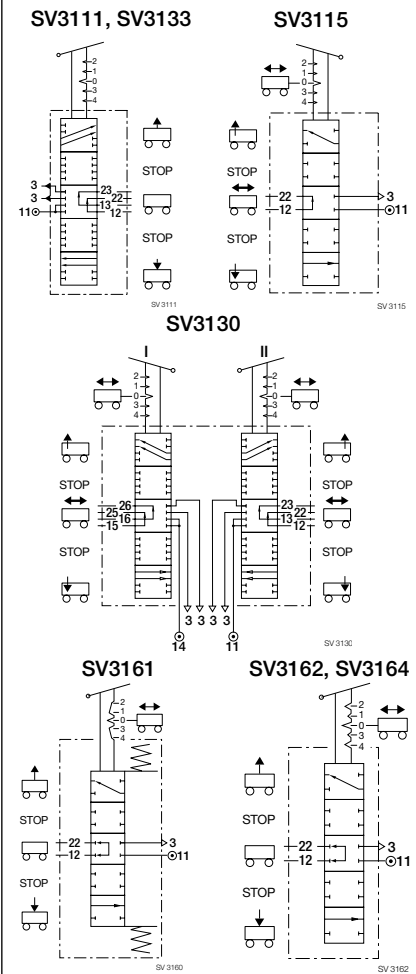
Raise/Lower Valves SV3161 to SV3164 have an increased flow diameter to reduce the time taken to raise a tandem or tri-axle chassis.



Technical Features

| | |
|--------------------------------|--|
| Maximum Operating Pressure: | 18 bar |
| Operating Temperature Range: | -40 °C to +80 °C |
| Weight: | One Circuit: 1.1 kg approx. Two Circuits: 1.5 kg approx. Four Circuits: 3.0 kg approx. |
| Single circuit air suspension: | RWTÜV-report: AL232.OE RWTÜV-report: 112 IR 03 001 Rev. 01 DEKRA-report: 200 208 105 |

Standard Symbol as DIN ISO 1219



Range Overview

| Part No. | Type No. | No. of Levers | No. of Control Circuits | Number of Control Circuits on | | "Dead Man's Handle" | Flow Dia. |
|-----------------------|----------|---------------|-------------------------|-------------------------------|----------|---------------------|-----------|
| | | | | Lever I | Lever II | | |
| I83153 | SV3111 | 1 | 2 | 2 | – | – | 5 mm |
| I86024 | SV3115 | 1 | 1 | 1 | – | – | 5 mm |
| I90969 | SV3130 | 2 | 4 | 2 | 2 | – | 5 mm |
| II36043 | SV3133 | 1 | 2 | 2 | – | with | 5 mm |
| II36069 | SV3161 | 1 | 1 | 1 | – | with | 6 mm |
| II36075 ¹⁾ | SV3162 | 1 | 1 | 1 | – | – | 6 mm |
| II36107 | SV3164 | 1 | 1 | 1 | – | – | 6 mm |

¹⁾ Without symbol plate

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SV31..

Raise/Lower Valves (conventional)

Doc. No. Y011376 (EN - Rev. 002)
February 2012

Dimensions

SV3111
SV3133¹⁾

Legend:
(A) = Drive position, locked

Ports:
11 = Supply from reservoir or levelling valve
12, 13 = Supply from levelling valve
22, 23 = Delivery to air suspension bags
3 = Exhaust

¹⁾ With "Dead Man's Handle"

VF00075_13Ä01EN

SV3130

Legend:
(A) = Drive position, locked

Ports:
11, 14 = Supply from reservoir or levelling valve
12, ..., 16 = Supply from levelling valve
22, ..., 26 = Delivery to air suspension bags
3 = Exhaust

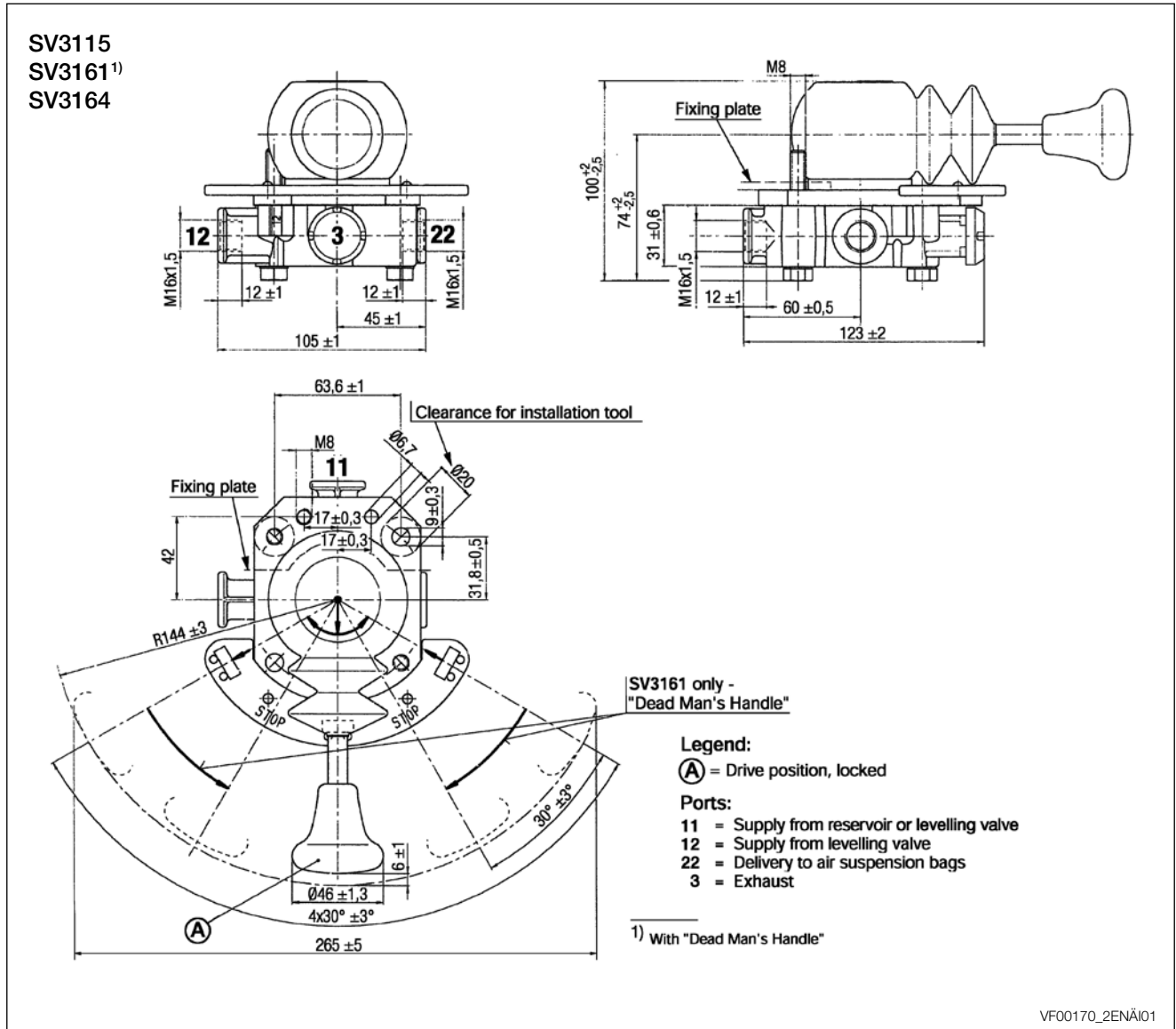
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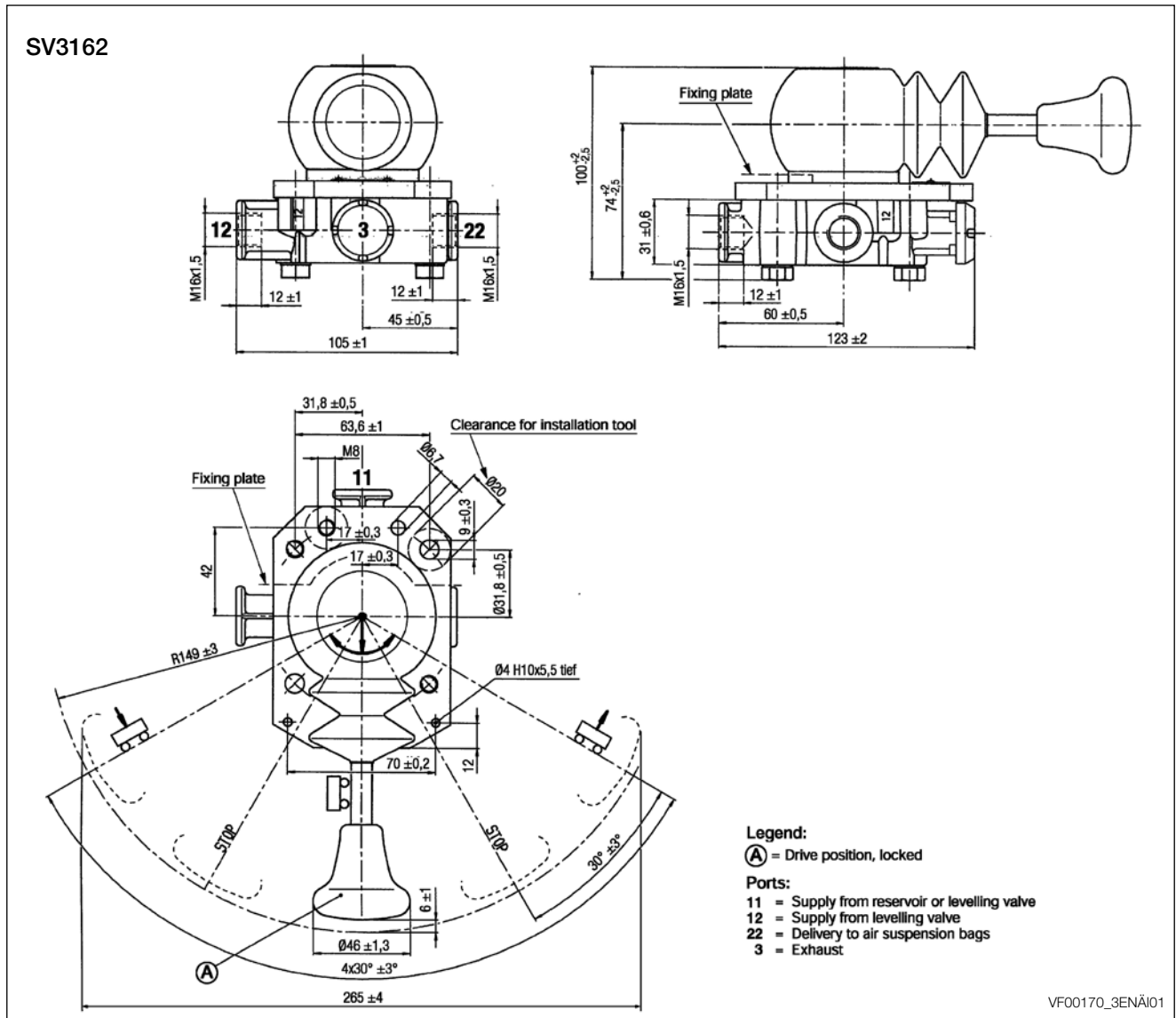
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SV31..

Raise/Lower Valves (conventional)

Doc. No. Y011376 (EN - Rev. 002)
February 2012



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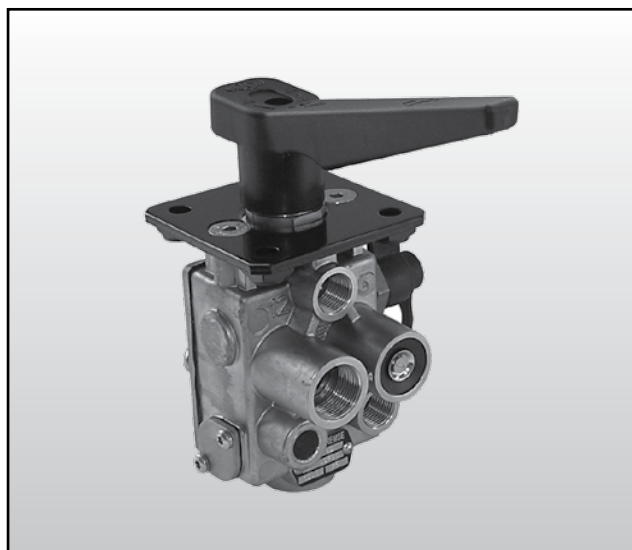
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Function

Raise/Lower Valves are fitted on vehicles with air suspension and allow manual control of air bag volume to raise or lower the vehicle chassis as required.

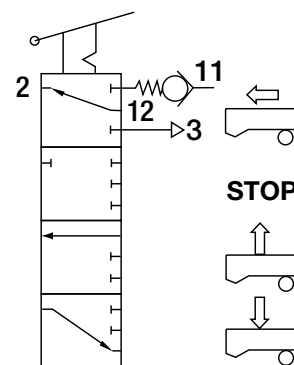
Some valves are fitted with a test connector to permit easy measurement of the air bag pressure.



Technical Features

| | |
|------------------------------|---|
| Maximum operating pressure: | 13.0 bar |
| Maximum suspension pressure: | 10.0 bar |
| Operating temperature range: | -40 °C to +60 °C |
| Weight: | 0.8 kg approx. |
| Test reports: | RWTÜV-report: AL232:OE RWTÜV-report: 112IR 03 001 Rev. 01 DEKRA-report: 200 208 105 |

Standard Symbol as DIN ISO 1219



Range Overview

| Part No. | Type No. | Test Connector | Adaptor Plate II40998F | Legend Plate Z006844 |
|----------|----------|----------------|------------------------|----------------------|
| II36145 | SV3200 | No | No | No |
| II36225 | SV3240 | Yes | Yes | No |
| K002018 | SV3240 | Yes | Yes | Yes |

Part No. for Service Kit:

Lever and screw: II36226004
Tightening torque: 4 Nm

| Port | Thread | Connection | Max. torque |
|------|---------|--|-------------|
| 11 | M22x1.5 | Supply (from air reservoir or levelling valve port 23) | 60 Nm |
| 12 | M16x1.5 | From levelling valve port 21 | 45 Nm |
| 2 | M16x1.5 | Delivery to air bags | 45 Nm |
| 3 | - | Exhaust | |

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SV32..

Raise/Lower Valves (single circuit)

Doc. No. Y011377 (EN - Rev. 003)
October 2011

Dimensions

SV3200

Driving Position
Raise/Lower Position

Adaptor Plate*

M16x1.5
M22x1.5
M16x1.5

min. 40 50

Driving Position:
Lever cannot be moved to Raise or Lower position

Auto-Stop

max. 15° max. 15°

Lower STOP Raise

Ports:
11 = Supply from Reservoir or Air Suspension Levelling Valve port 23
12 = Supply from Air Suspension Levelling Valve port 21
2 = Delivery to Air Suspension Bags
3 = Exhaust

Mounting Position:

Driving Direction 0-90°

* for dimensions see 'Adaptor Plate'

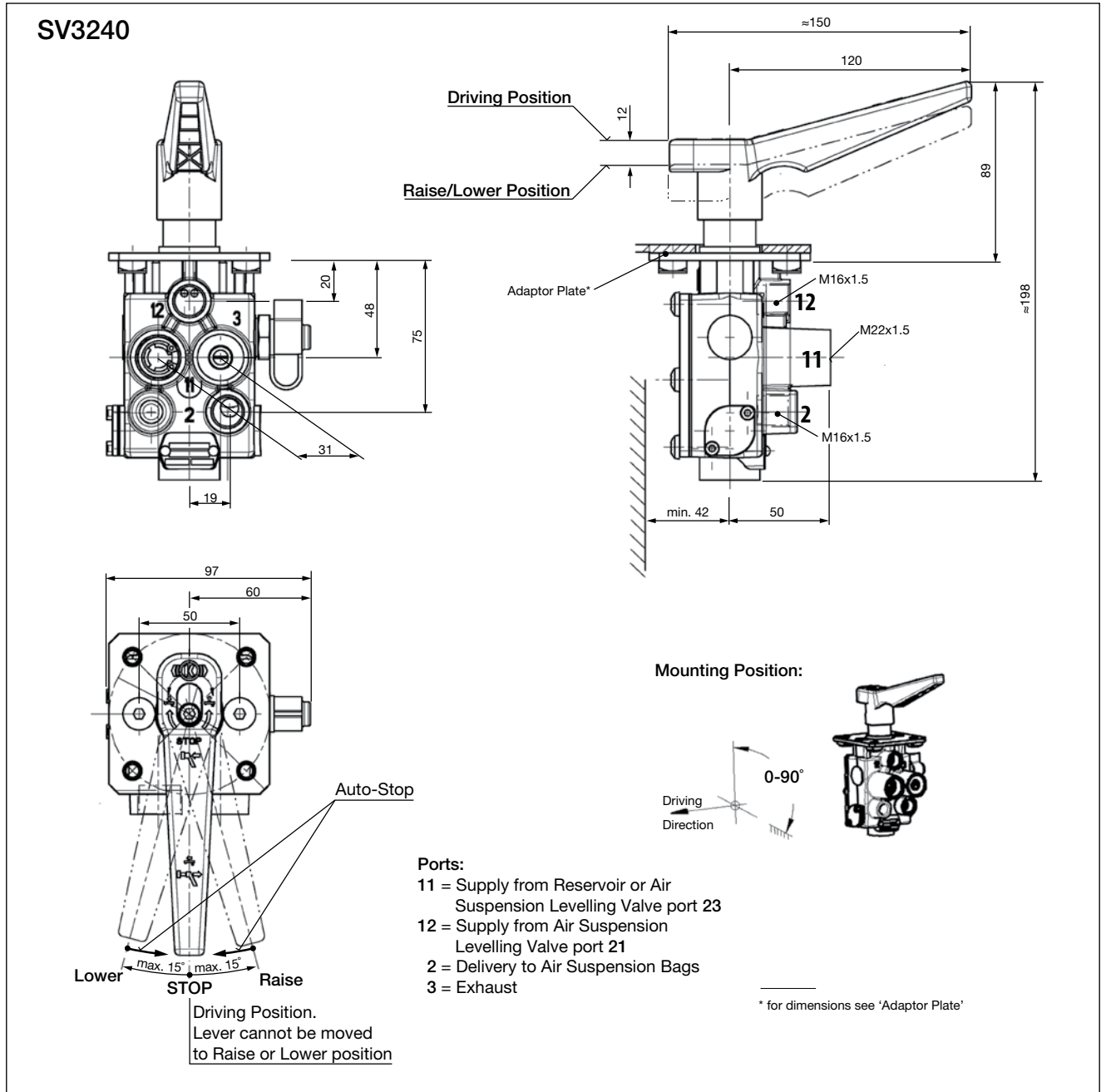
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SV32..

Raise/Lower Valves (single circuit)

Doc. No. Y011377 (EN - Rev. 003)
October 2011

Legend Plate

| | |
|---|---|
| DRIVE FAHRT ROUTE MARCIA MARCHA | RAISE / LOWER HEBEN / SENKEN MONTÉE / DESCENTE ALZA / ABBASSA SUBIR / BAJAR |
| | |
| | |

Part No.
Z006844

Adaptor Plate

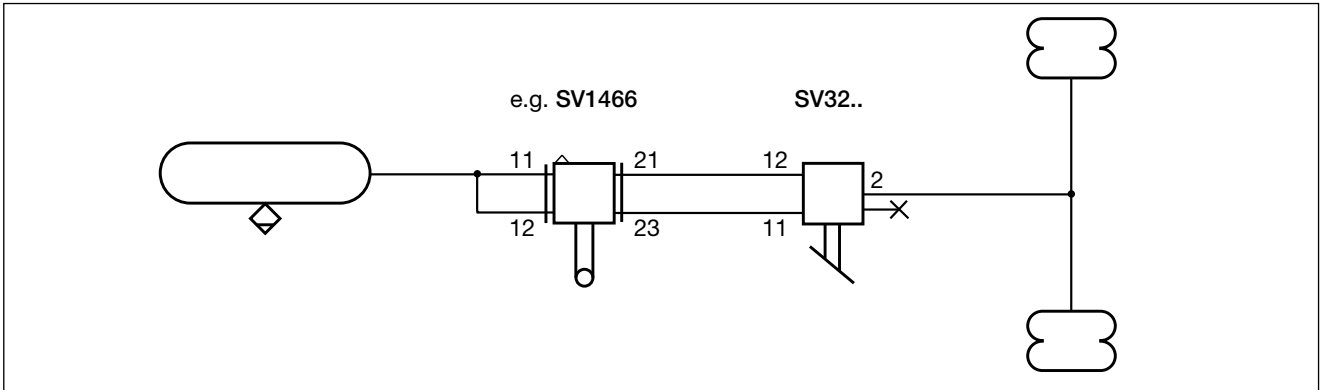
Part No.
II40998F

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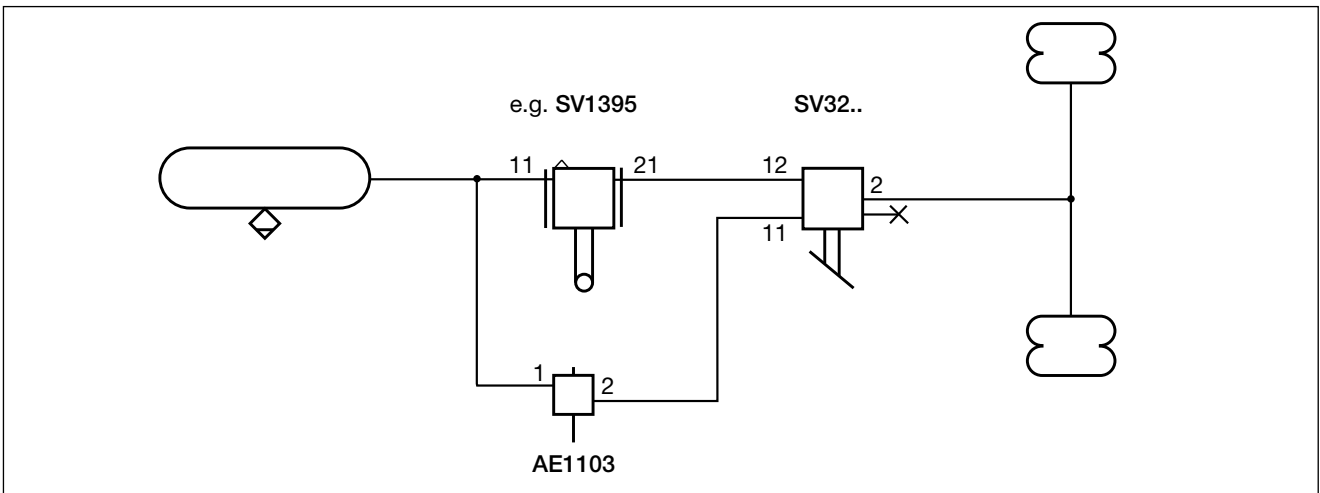
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Installation examples

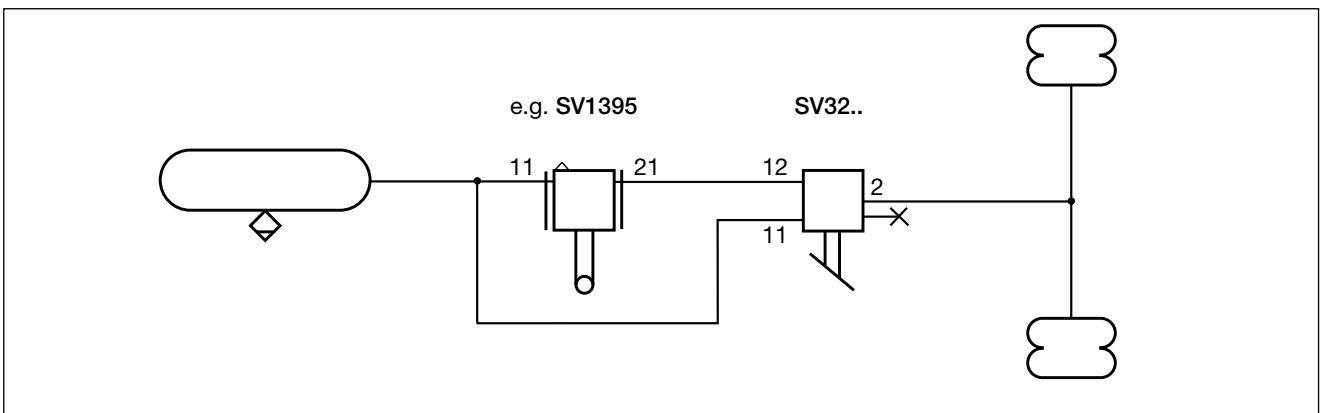
Air suspension system with lift axle, Levelling Valve with height limitation



Air suspension system with lift axle, Levelling Valve with separate Height Limiting Valve



Air suspension system with lift axle, without height limitation



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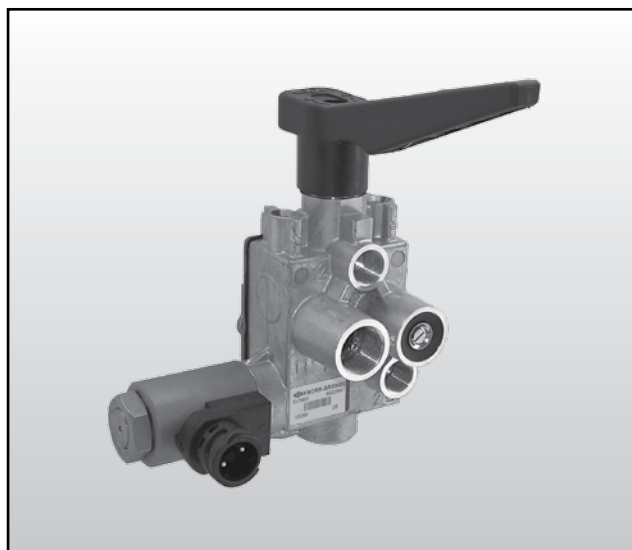


Function

Raise/Lower Valves are fitted on vehicles with air suspension and allow manual control of air bag volume to raise or lower the vehicle chassis as required.

The **SV3801** version is available with a "speed pulse" activated function to provide the 'reset to ride height' function. When the "speed pulse" is activated, the valve reverts to the driving position restoring the air bags to the normal running condition and the chassis moves back to the normal ride height to avoid possible suspension damage. This also ensures that the correct air suspension pressure is used to control the load sensing function.

The "speed pulse" is provided by a programmable function within the ECU of the ABS or EBS which monitors wheel speed sensor signals.



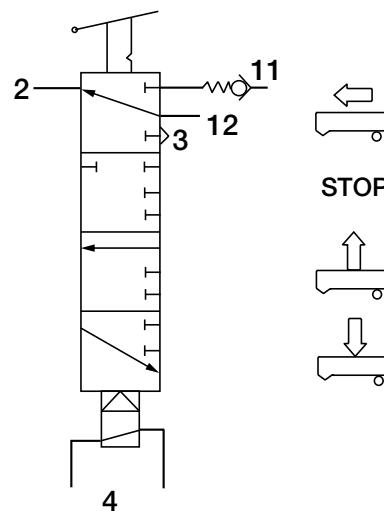
Technical Features

| | |
|-------------------------------------|------------------------------------|
| Maximum operating pressure: | 13.0 bar |
| Maximum suspension pressure: | 10.0 bar |
| Nominal voltage: | 24 V |
| Power rating: | 45 W |
| Operating temperature range: | -40 °C to +60 °C |
| Weight: | 1.3 kg approx. |
| Test reports: | RWTÜV-report: AL232:OE |
| (for single circuit air suspension) | RWTÜV-report: 112IR 03 001 Rev. 01 |
| | DEKRA-report: 200 208 105 |

| Part No. | Type No. | Electrical Connector | Push-to-Connect Fittings supplied |
|----------|----------|----------------------|-----------------------------------|
| K022847 | SV3801 | Bayonet DIN 72585 | No |

| Connection | | Used for | Max. torque |
|------------|----------------------|-----------------------------|-------------|
| 11 | M22x1.5 | Supply (from air reservoir) | 60 Nm |
| 12 | M16x1.5 | From levelling valve | 45 Nm |
| 2 | M16x1.5 | Delivery to air bags | 45 Nm |
| 3 | - | Exhaust | |
| 4 | Bayonet DIN 72585 | Auto reset | |

Standard Symbol as DIN ISO 1219



Part No. for Service Kit:

Lever and screw: **II36226004**
Tightening torque: 4 Nm

Solenoid: **K022901K50**
Tightening torque: 6±1 Nm

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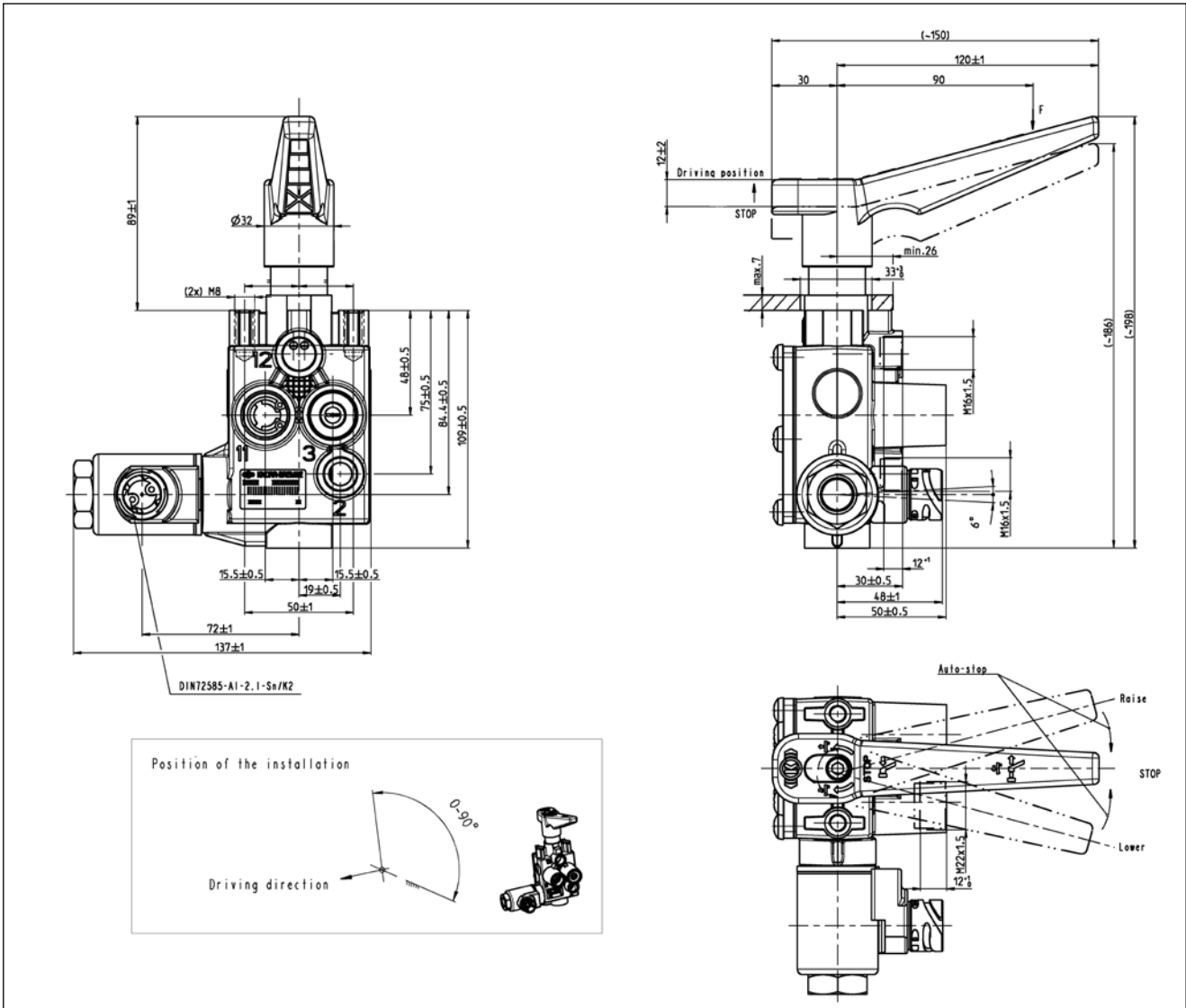
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SV3801

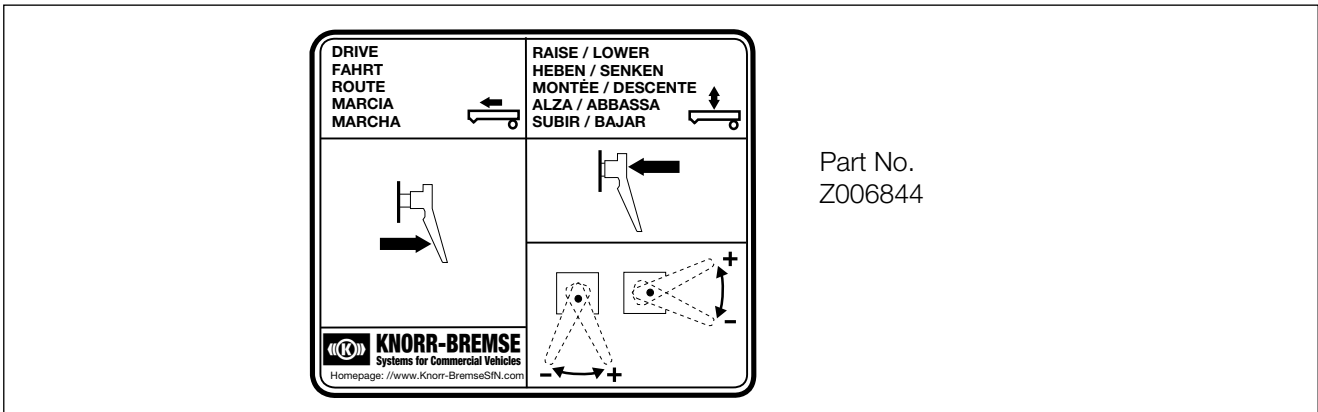
Raise/Lower Valve (with Speed Pulse function)

Doc. No. Y095621 (EN - Rev. 001)
February 2012

Dimensions



Legend Plate



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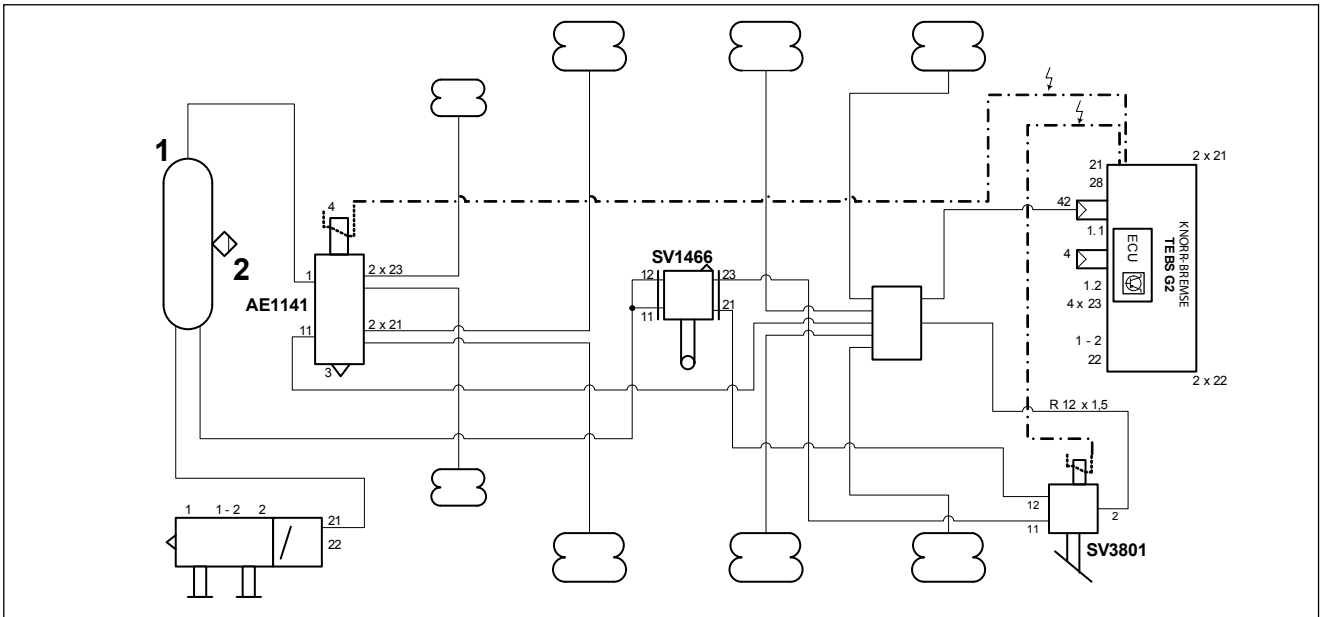


Installation examples

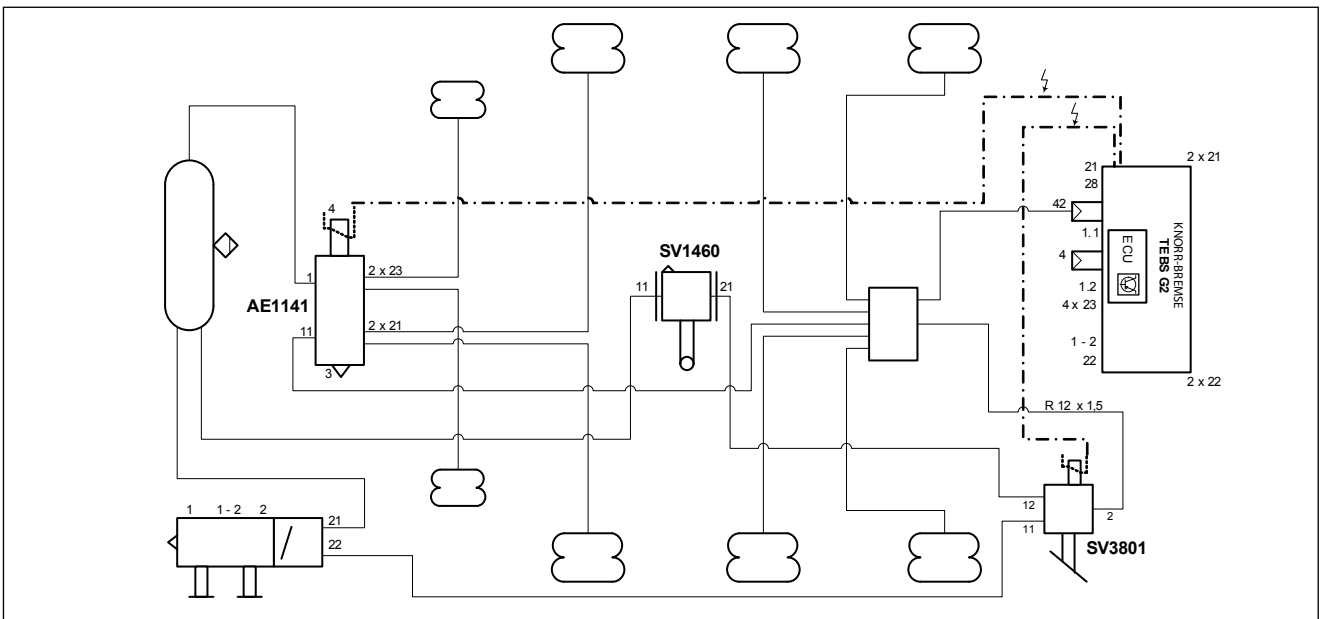
The Raise / Lower Valve SV3801 with "speed pulse" function is used in air suspension systems both with and without height limitation.

This replaces the older Raise/Lower Valves which required a special version of the valve if the system had height limitation.

Air suspension system with lift axle, with height limitation



Air suspension system with lift axle, without height limitation



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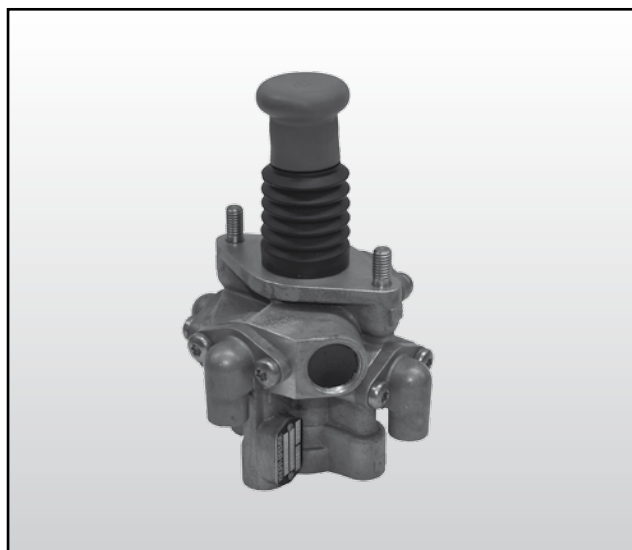


Function

The **Lift Axle Valve** is generally used in conjunction with a charging valve having full feedback (see PD-074-000, Document No. Y011382) on vehicles with air suspension to raise and lower a lift axle (see system diagram on page 3).

When the vehicle is sufficiently laden, pressure in the non-lift axle suspension system exceeds the opening pressure of the charging valve and air flows to signal the **Lift Axle Valve**. The lift axle bellows are then automatically exhausted, the lift axle is lowered and its air bags are connected to the non-lift axle suspension system.

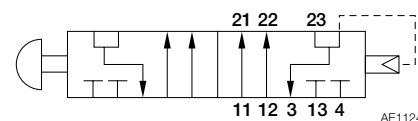
When the vehicle is unladen, the lift axle can be manually raised by depressing the push button on the **Lift Axle Valve** and lowered by pulling it out again.



Technical Features

| | |
|------------------------------|------------------|
| Maximum operating pressure: | 8.5 bar |
| Operating temperature range: | -40 °C to +80 °C |
| Maximum way through: | Ø 6.0 mm |
| Weight: | 1.1 kg approx. |

Standard Symbol as DIN ISO 1219



Range Overview

| Part No. | Type No. | Port Thread 11, 12, 13, 21, 22, 23, 4 | Pressure Retention Valve | Comments |
|----------|----------|--|--------------------------|---|
| SEB00662 | AE1124 | M12x1.5 | - | |
| SEB00667 | AE1125 | M12x1.5 | SEB01237 | Obsolete - replaced by SEB00662 plus SEB01237 |

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AE1124

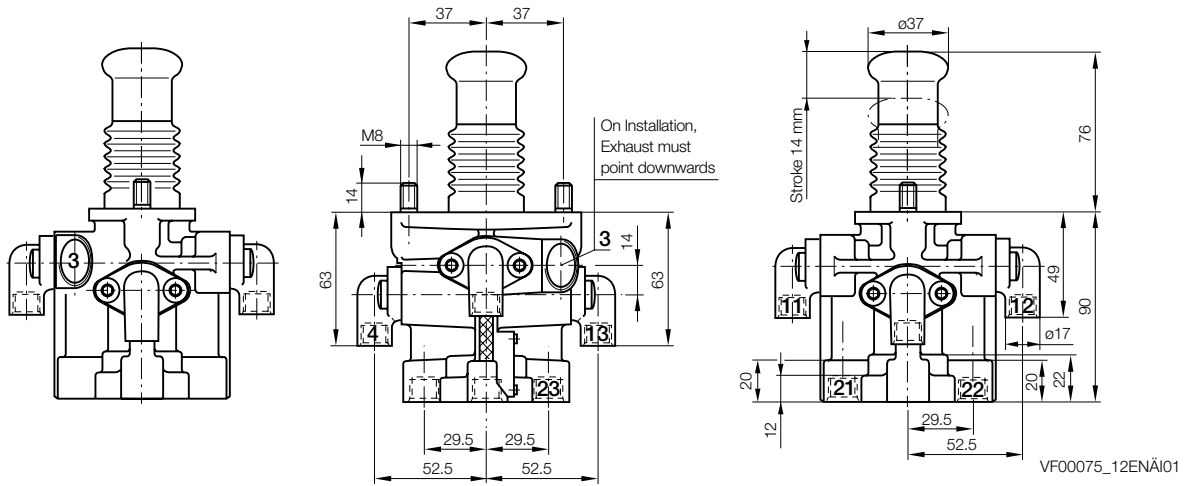
Lift Axle Valve - Manual/Pneumatic

Doc. No. Y011380 (Rev. 001)
March 2011

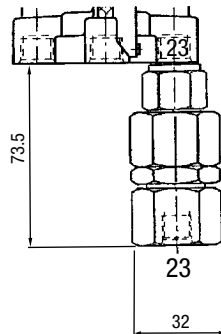
Dimensions

Air Port Identification:

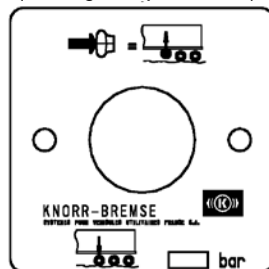
- 11 = Right side air supply from levelling valve / non-lift axle air bag(s)
- 12 = Left side air supply from levelling valve / non-lift axle air bag(s)
- 13 = Air supply for lifting bellows from suspension reservoir
- 14 = Exhaust
- 21 = Right side air delivery to lift axle air bag
- 22 = Left side air delivery to lift axle air bag
- 23 = Air connection for lifting bellows
- 3 = Exhaust
- 4 = Signal from Charging Valve



**Pressure Retention Valve
SEB01237**



**Operation Instruction Plate
Part Number EB01505
(no longer in production)**

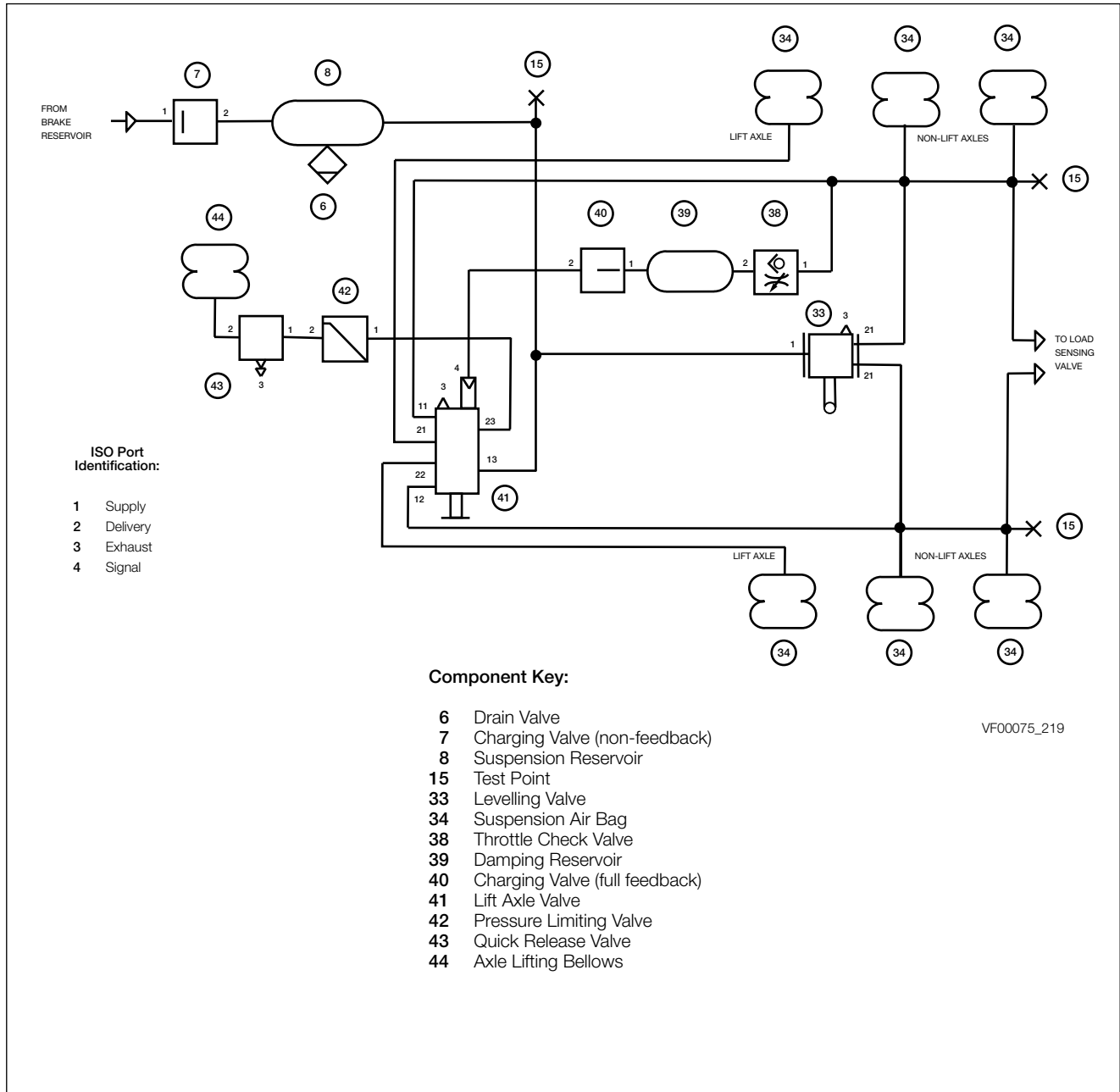


VF00075_218

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System Diagram: Example on a 3-axle semi-trailer



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Function

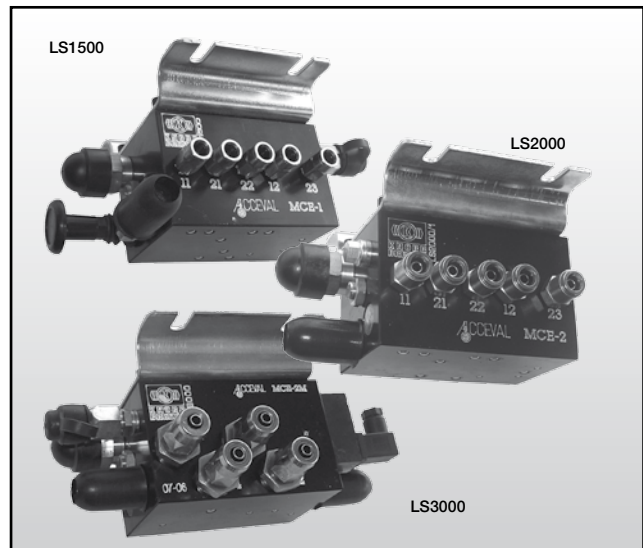
Pneumatic Lift Axle Control Valves are used for the semi-automatic or fully automatic control of air suspended lift axles.

All valves automatically lower the lift axle when a pre-determined pressure is reached in the suspension air bags of the non-lift axle(s). The pressure at which the valve lowers the lift axle is fully adjustable. Versions with single and dual circuit control are available.

With the additional use of a solenoid valve, a version of the valve is available which allows temporary lifting of the laden axle. This feature is signalled electronically from the tractor cab and is designed to provide additional traction capability on the tractor's drive axles since, when the trailer lift axle is raised, the drive axle will see an increase in load. Note: The national legal requirements for this function must be taken into account!

Pneumatic Lift Axle Control Valves are supplied complete with pre-installed "push-in" fittings.

A mounting support is also included with the valve.

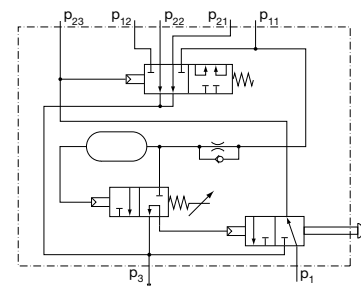


Technical Features

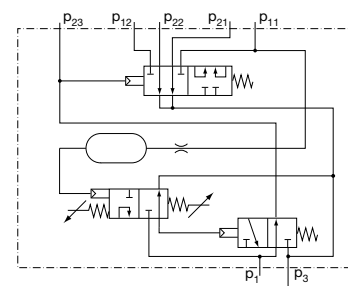
| | |
|------------------------------------|----------------------------|
| Maximum operating pressure: | 14.0 bar |
| Operating temperature range: | -35 °C to +80 °C |
| Weight: | 0.9 kg approx. |
| "Push-In" fittings: | Ø 8.0 mm |
| Nominal way through: | Ø 5.0 mm |
| Adjusting range - automatic lower: | 2.3 to 5.8 bar |
| Adjusting range - automatic raise: | 0.9 to 2.7 bar |
| Damping reservoir: | Integral |
| Test Report: | TÜV Report No. 390-0582-96 |

Standard Symbol as DIN ISO 1219

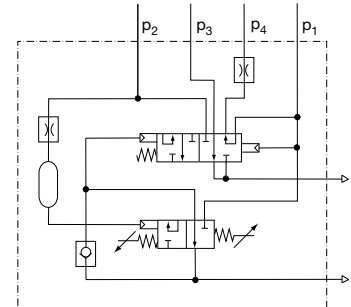
LS1500



LS2000



LS3000



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LS1..., LS2..., LS3...

Lift Axle Valves - Pneumatic

Doc. No. Y011379 (Rev. 003)
March 2011

Range Overview

| Part Number | Semi-automatic: Manual Raise Automatic Lower | Fully Automatic: Automatic Raise Automatic Lower | Temporary Raise of Laden Axle * | Manual Lower of Unladen Axle ** | Control of two lift axles by two valves | Number of control circuits |
|-------------|--|--|------------------------------------|------------------------------------|---|----------------------------------|
| LS1500 | Standard | - | - | - | Standard | 2 |
| LS2000 | - | Standard | Option | Option | Standard | 2 |
| LS3000 | - | Standard | Option | Option | Standard | 1 |

* see Traction Assist section - page 6

** see Lowering the Lift Axle section - page 7

Optional Accessories

| Part Number/ Type Number | Description | For use with | Comments |
|---|--|----------------------------|--|
| LS2510 | Solenoid valve to temporarily raise laden axle | LS2000 LS3000 | See Traction Assist section - page 6 |
| I63411024 AE9120 | Solenoid valve to lower unladen axle | LS1500 LS2000 LS3000 | See Lowering the Lift Axle section - page 7 |
| II36061 AE4265 ¹⁾ 0481007043 ²⁾ | Manual push/pull valve and solenoid valve to lower unladen axle | LS2000 LS3000 | See Lowering the Lift Axle section - page 7 |
| LS1051 | Lift bag pressure retention valve, retains a pressure of 0.5 bar and thereby protects the lift bag from damage | LS1500 LS2000 LS3000 | If requested by the trailer manufacturer |
| DB11.. | Lift bag pressure limiting valve | | |

1) AE4265 = push/pull valve

2) 0481007043 = valve with rotating button

Maintenance

The synthetic exhaust filter must be changed annually.

Part Number: **LS2888**

Mounting Position

The valve must be mounted in a way that no water can enter the exhaust filter.

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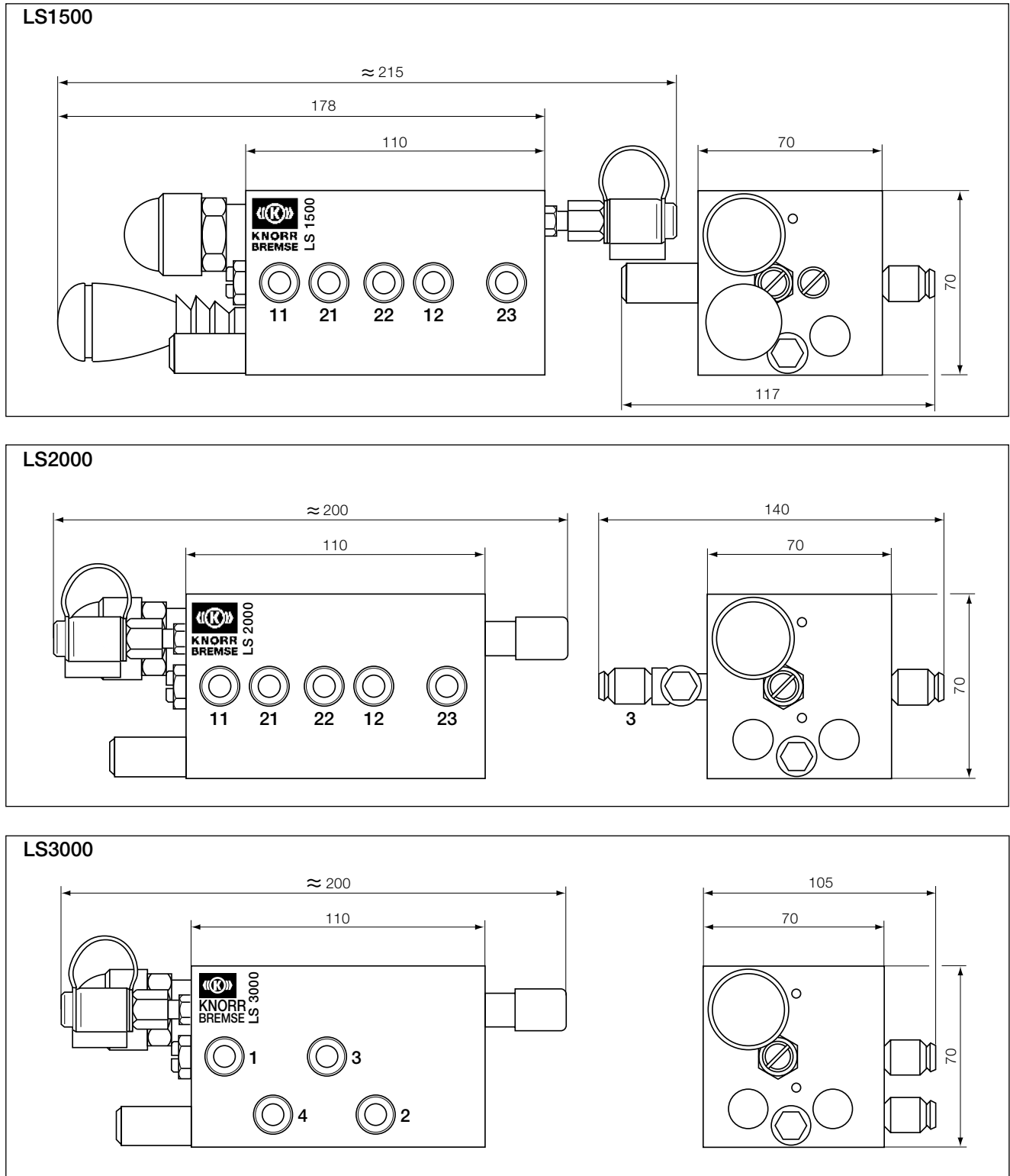
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Dimensions



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LS1..., LS2..., LS3...

Lift Axle Valves - Pneumatic

Doc. No. Y011379 (Rev. 003)
March 2011

Setting Procedure

Note: The default settings are:

| | |
|--------------------------------------|---------|
| Automatic "Lower Lift Axle" pressure | 3.4 bar |
| Automatic "Raise Lift Axle" pressure | 1.7 bar |

1. Connect the valve according to the system diagram on the test bench or on the vehicle.
2. Inflate port **1** with supply pressure (min. 6.5 bar).
3. Connect a pressure regulating valve to the "Test and Simulation" port to simulate the switching pressures for "Lower" and "Raise".

Set pressure for Automatic "Lower Lift Axle"

4. Slacken locknut (27 mm A/F under the black protection cap), whilst holding the slot-headed screw.
5. Turn the slot-headed screw:

| |
|--|
| clockwise = increase the pressure at which the axle is lowered |
| anticlockwise = decrease the pressure at which the axle is lowered |
6. Whilst holding the slot-headed screw, tighten the locknut and replace protection cap.

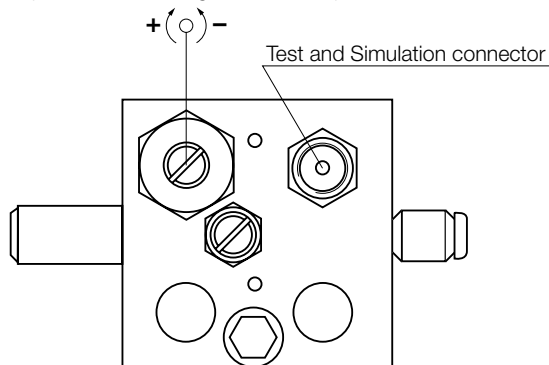
Adjust pressure for Automatic "Raise Lift Axle" (LS2000 and LS3000 only)

7. If automatic "Lower Lift Axle" pressure has been adjusted, the automatic "Raise Lift Axle" pressure will have changed by a similar amount, i.e. a 0.5 bar increase in "Lower Lift Axle" pressure will result in an increase of approximately 0.5 bar in the "Raise Lift Axle" pressure.
8. If the automatic "Raise Lift Axle" pressure needs to be adjusted remove the yellow protection cap.
9. See the Control Pressure Diagram for the possible range of adjustment of this pressure.
10. Turn the internal hexagon socket:

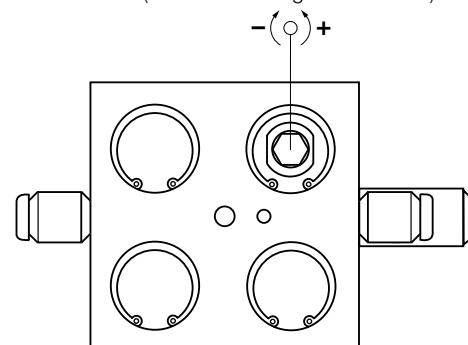
| |
|--|
| clockwise = decrease the pressure at which the axle is raised |
| anticlockwise = increase the pressure at which the axle is raised. |
11. Replace the yellow protection cap.

Adjusting Screws:

Screw for setting the pressure for lowering
(automatic lowering of the lift axle)



Screw to adjust the control range
(automatic raising of the lift axle)



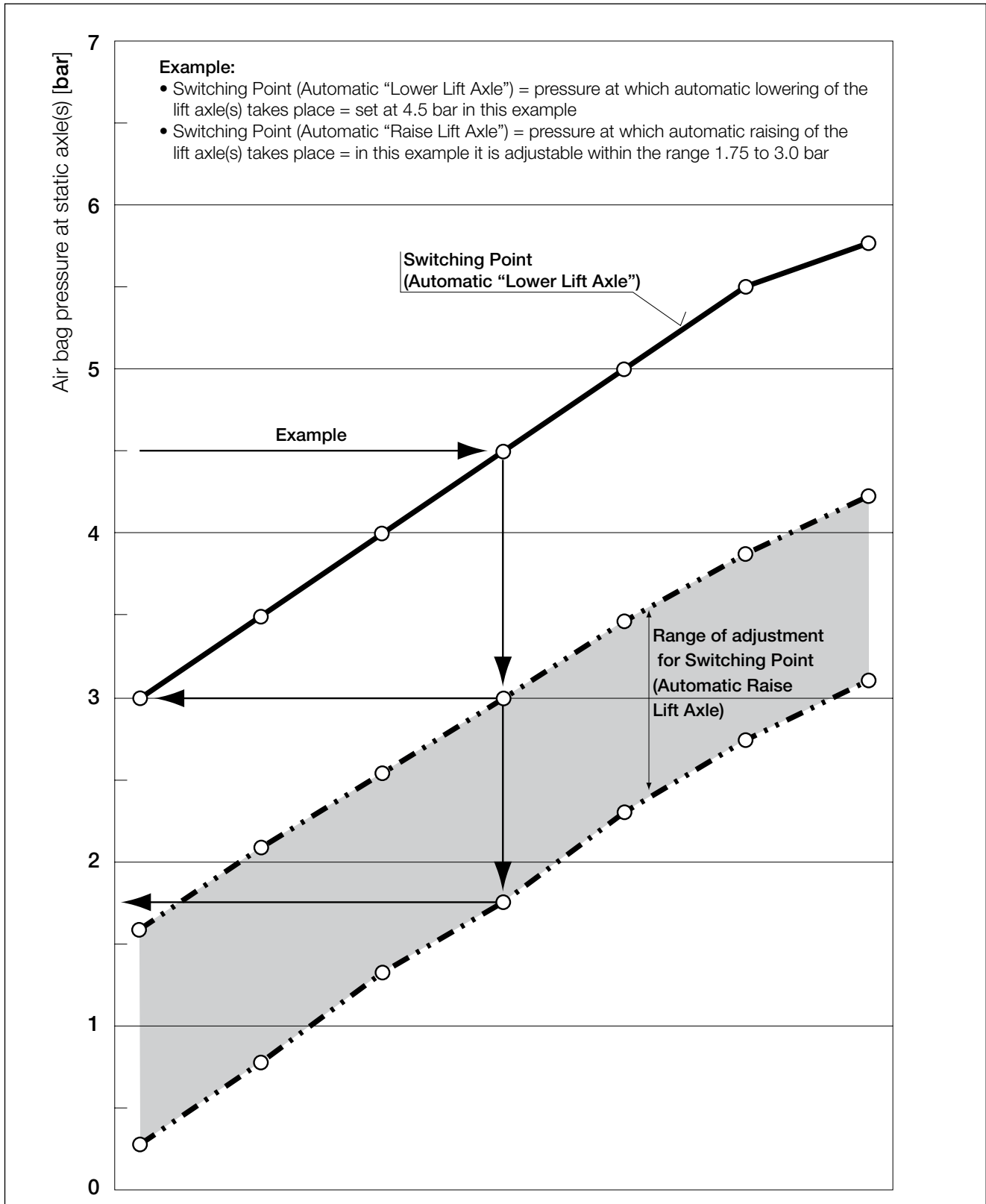
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Control Pressure Diagram



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LS1..., LS2..., LS3...

Lift Axle Valves - Pneumatic

Doc. No. Y011379 (Rev. 003)
March 2011

Traction Assist

The "Traction Assist" function allows temporary lifting of a laden axle on a semitrailer. This will result in an increase in load on the tractor's drive axle and therefore improved traction.

The use of "Traction Assist" must adhere to any national legal requirements.

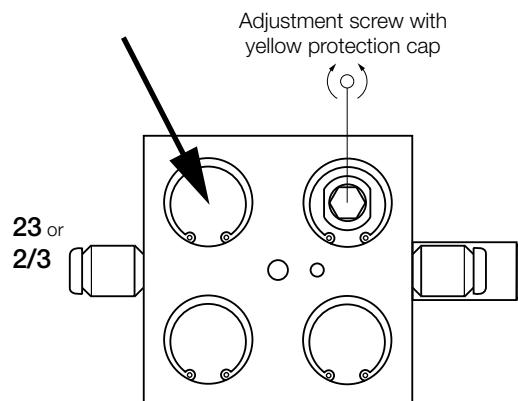
The control device in the tractor should be a spring return tip switch.

"Traction Assist" is achieved by upgrading LS2000 or LS3000.

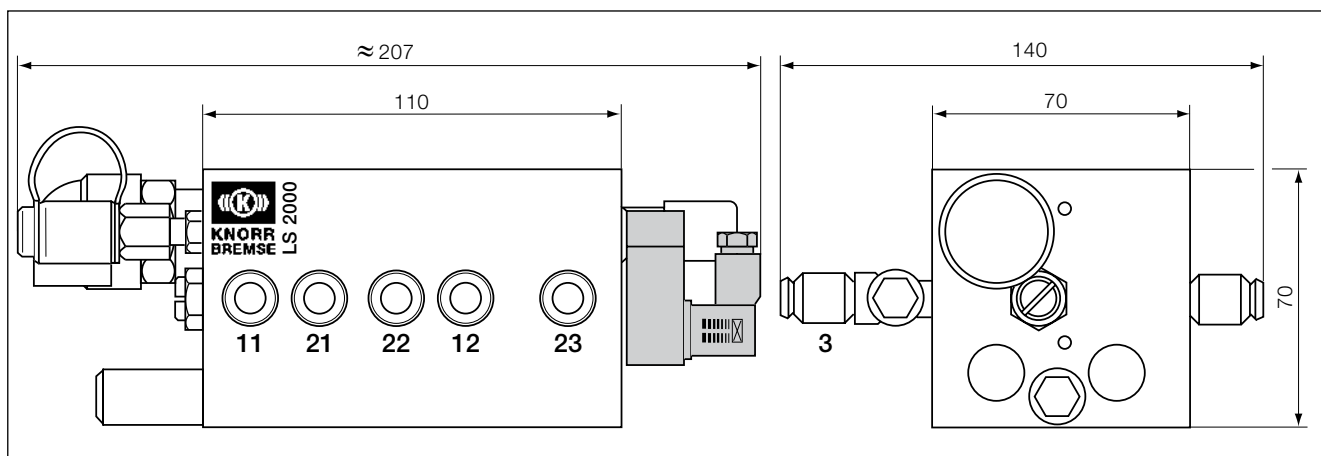
- Additional component required:
One Solenoid Valve LS2510 (ready for assembly)
Please order separately!

Assembly:

- On LS2000 and LS3000 remove circlip holding the blanking plate (see arrow).
- Insert the Solenoid Valve LS2510 (with pre-assembled plate and circlip).
- Connect the control cable to the solenoid valve. The cable should then be securely attached to the chassis leading to the point where it is to be connected to the tractor interface (normally via the 24S electrical trailer connection).



Dimensions, with solenoid for "Traction Assist"



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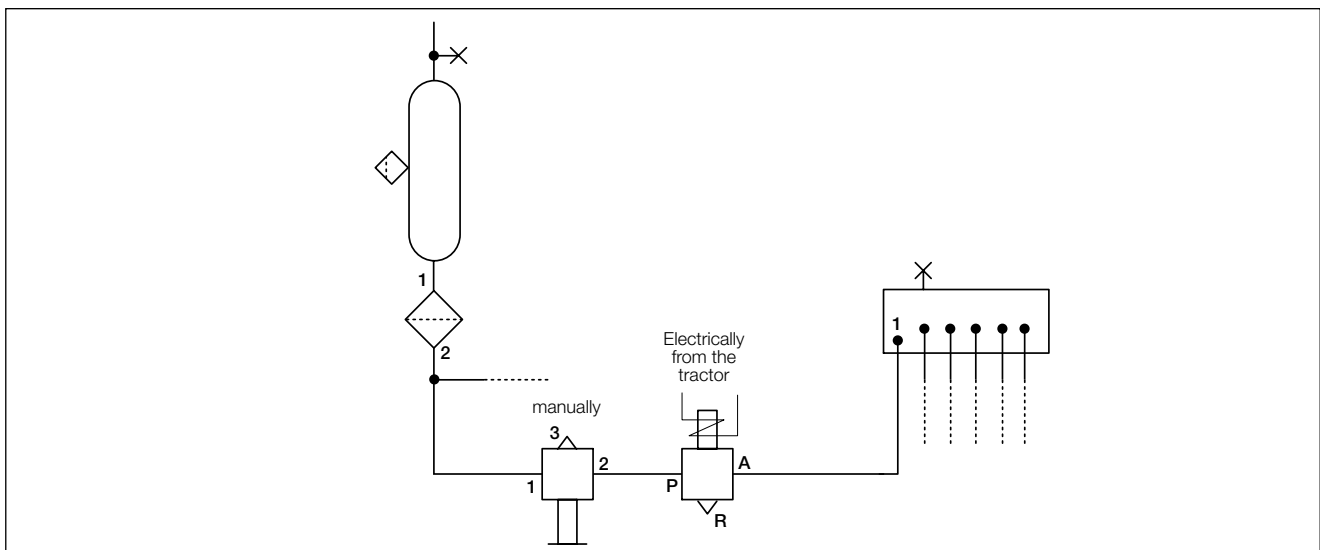
Lowering the Lift Axle

When using the fully automatic valves, LS2000 or LS3000, the lift axle is always raised when the vehicle is unladen. However, there may be situations when the lift axle needs to be lowered when the vehicle is unladen.

For example:

- When checking the brakes on a rolling road
- When parking the vehicle
- To reduce the turning radius (by reducing the effective wheelbase)

The required 3/2 Valves can be installed individually or in-line in the supply line to port **1** of the **Lift Axle Valve**.



Examples:

| | |
|--------------------|---|
| II36061 (AE4265) | 3/2 Valve with push button to lower lift axle manually |
| 0481007043 | 3/2 Valve with turning button to lower lift axle manually |
| 163411024 (AE9120) | 3/2 Valve to lower lift axle electrically (signalled from the towing vehicle) |

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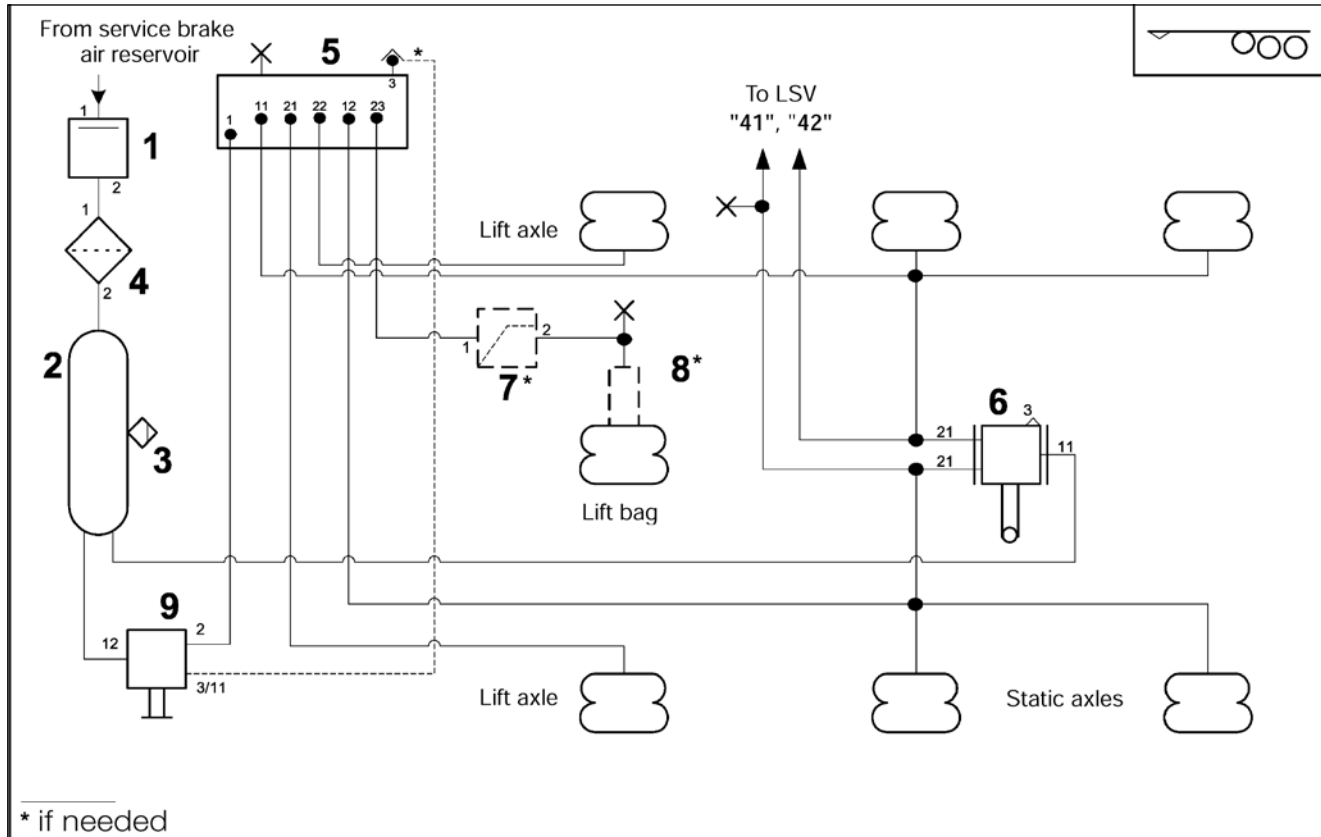
LS1..., LS2..., LS3...

Lift Axle Valves - Pneumatic

Doc. No. Y011379 (Rev. 003)
March 2011

System Diagram Example, dual circuit:

3-axle bogie without Raise / Lower Valve
1 Lift Axle with fully automatic control



* if needed

| Pos. | Quantity | Name of component | Type No. |
|------|----------|------------------------------------|-------------|
| 1 | 1 | Charging Valve "Non Feedback" | DR4378 |
| 2 | 1(2)(3) | Air reservoir V = ...l; Ø = ... mm | VB33.. |
| - | 2(4)(6) | Mounting clamps | VB1... |
| 3 | 1(2)(3) | Drain valve | EE1100 |
| 4 | 1 | In-line filter | LA2103 |
| 5 | 1 | Fully-automatic Lift Axle Control | LS2000 |
| 6 | 1 | Levelling valve | SV1395/1460 |
| - | 1 | Rubber Joint for SV1... | K001406 |
| 7 | 1 | Pressure Limiting Valve | DB11.. |
| 8 | 1 | Pressure Retention Valve | LS1051 |
| 9 | 1 | 3/2 valve, manual control | AE4265 |

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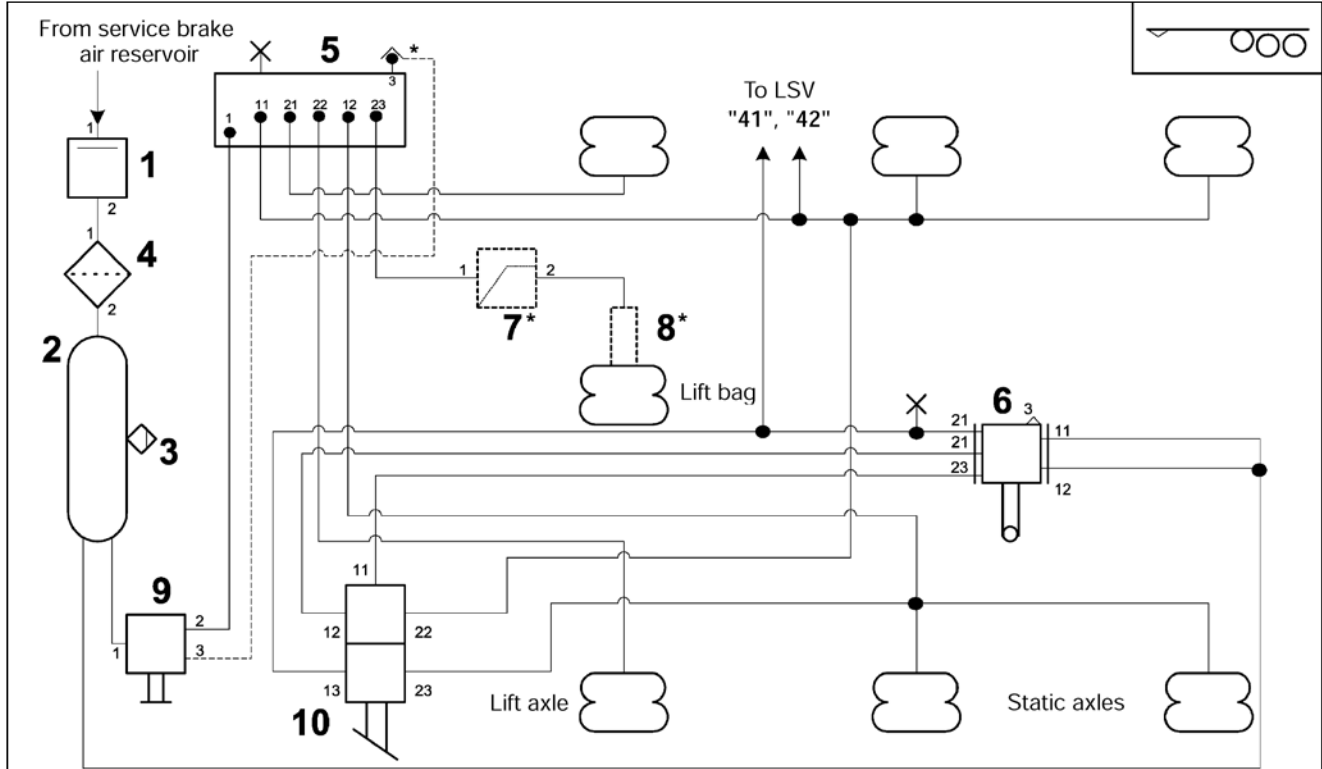
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Doc. No. Y011379 (Rev. 003)
March 2011

System Diagram Example, dual circuit:

3-axle bogie with Raise / Lower Valve
1 Lift Axle with fully automatic control



* if needed

| Pos. | Quantity | Name of component | Type No. |
|------|----------|--|----------|
| 1 | 1 | Charging Valve "Non Feedback" | DR4378 |
| 2 | 1 | Air reservoir V = ...l; Ø = ... mm | VB33.. |
| - | 2 | Mounting clamps | VB1... |
| 3 | 1 | Drain valve | EE1100 |
| 4 | 1 | In-line filter | LA2103 |
| 5 | 1 | Fully-automatic Lift Axle Control | LS2000 |
| 6 | 1 | Levelling valve with height limitation | SV1466 |
| - | 1 | Rubber Joint for SV1... | K001406 |
| 7 | 1 | Pressure Limiting Valve | DB11.. |
| 8 | 1 | Pressure Retention Valve | LS1051 |
| 9 | 1 | 3/2 valve, manual control | AE4265 |
| 10 | 1 | Raise / Lower Valve | SV3111 |
| - | 1 | Mounting Bracket for SV 31.. | 3111DK |

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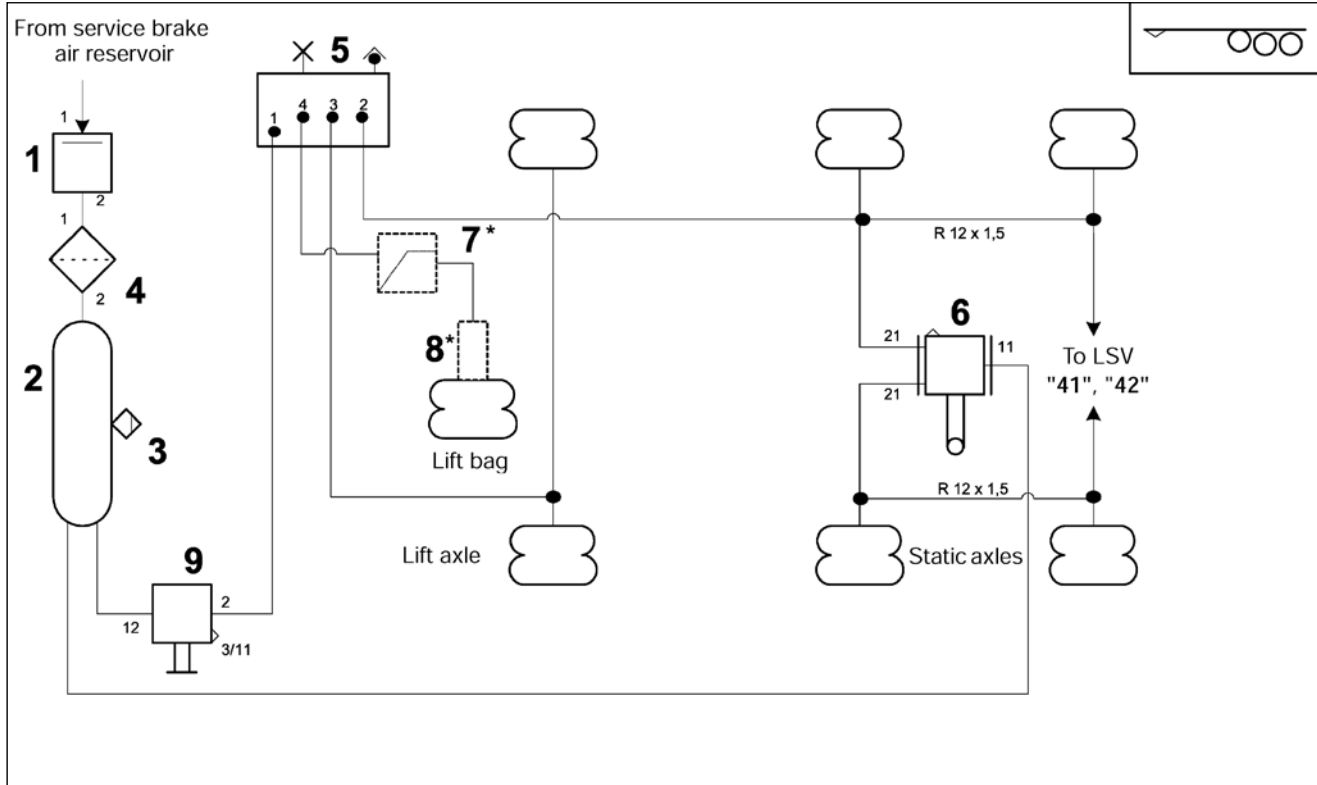
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LS1..., LS2..., LS3...

Lift Axle Valves - Pneumatic

Doc. No. Y011379 (Rev. 003)
March 2011

System Diagram Example, single circuit: air suspension system for 3-axle semi-trailer with fully automatic control lift axle control



* if needed

| Pos. | Quantity | Name of component | Type No. |
|------|----------|---|-------------|
| 1 | 1 | Charging Valve "Non Feedback" | DR4378 |
| 2 | 1 | Air reservoir V = ...l; Ø = ... mm | VB33.. |
| - | 2 | Mounting clamps | VB1... |
| 3 | 1 | Drain valve | EE1100 |
| 4 | 1 | In-line filter | LA2103 |
| 5 | 1 | Fully-automatic Lift Axle Control, single circuit | LS3000 |
| 6 | 1 | Levelling valve | SV1395/1460 |
| - | 1 | Rubber Joint for SV1... | K001406 |
| 7 | 1 | Pressure Limiting Valve | DB11.. |
| 8 | 1 | Pressure Retention Valve | LS1051 |
| 9 | 1 | 3/2 valve, manual control | AE4265 |

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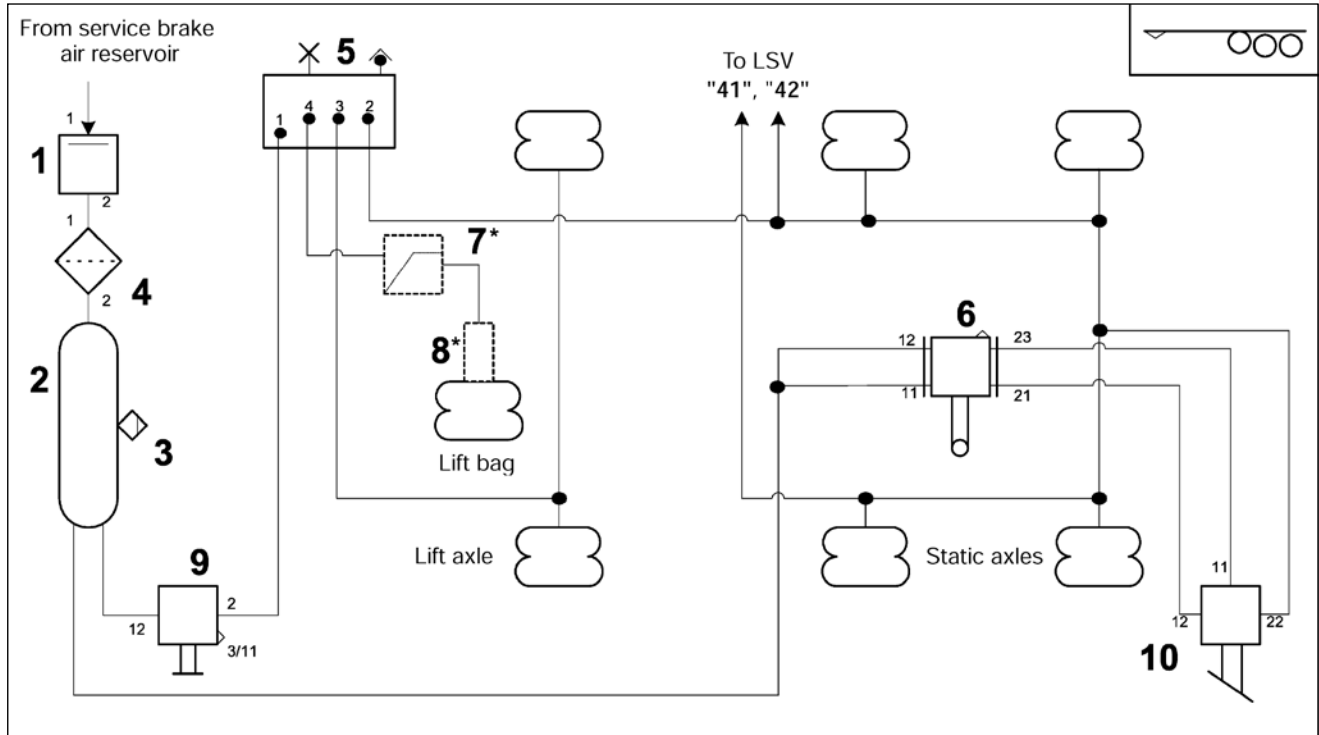
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Doc. No. Y011379 (Rev. 003)
March 2011

System Diagram Example, single circuit: air suspension system for 3-axle semi-trailer with fully automatic control lift axle control, with raise/lower function



* if needed

| Pos. | Quantity | Name of component | Type No. |
|------|----------|---|----------------|
| 1 | 1 | Charging Valve "Non Feedback" | DR4378 |
| 2 | 1 | Air reservoir V = ...l; Ø = ... mm | VB33.. |
| - | 2 | Mounting clamps | VB1... |
| 3 | 1 | Drain valve | EE1100 |
| 4 | 1 | In-line filter | LA2103 |
| 5 | 1 | Fully-automatic Lift Axle Control, single circuit | LS3000 |
| 6 | 1 | Levelling valve | SV1466 |
| - | 1 | Rubber Joint for SV1... | K001406 |
| 7 | 1 | Pressure Limiting Valve | DB11.. |
| 8 | 1 | Pressure Retention Valve | LS1051 |
| 9 | 1 | 3/2 valve, manual control | AE4265 |
| 10 | 1 | Raise Lower Valve, single circuit | SV316./SV32... |

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Function

The TEBS controlled **Lift Axle AE1141** Valve is used for trailers with electronic braking systems to control the lift axle(s) fully automatically according to the vehicle load.

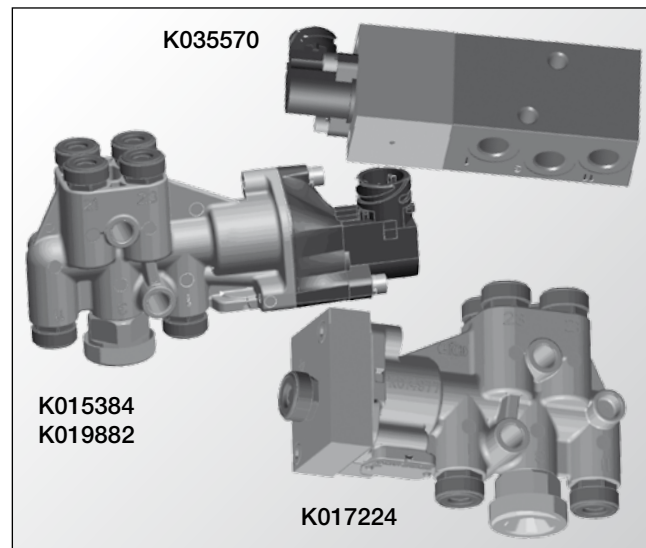
Within the product range there are variants available with a solenoid and those where control is purely pneumatic. Some variants are delivered with push-to-connect (PTC) fittings, these variants have two ports "21" and two ports "23" to simplify the piping work.

The load sensing and the electronic control functions are achieved by the TEBS brake module via port "42". Without electric power supply, any lift axles are lowered.

The lift axle(s) can be lowered manually if the vehicle is unladen e.g. with the **3/2 Control Valve AE4265**.

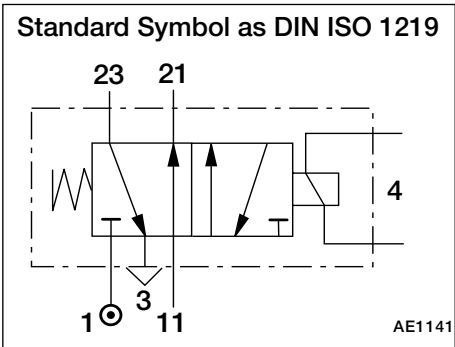
(Note: This is not permissible if the TEBS incorporates RSP. In this case the lift axle is lowered by an electrical signal sent from the TEBS brake module; see page 2)

The valve can also be used as a solenoid valve for other applications as lift axle control. System diagram examples can be found on page 2-3.



Technical Features

| | |
|--|------------------|
| Maximum operating pressure: | 10 bar |
| Operating temperature range: | -40 °C to +80 °C |
| Nominal voltage: | See table |
| Weight: | See table |
| Min. switching pressure for pneumatic version: | 5 bar |



Product Overview

| Part No. | Type No. | Solenoid | Ports 1, 11, 21, 23 | Port 3 | Weight approx. |
|--------------------|----------------|----------|---------------------|------------------------------|----------------|
| K035570 #)* | AE 1141 | 24 V | M16 x 1.5 | M16 x 1.5 | 0.80 kg |
| K015384 #) | | 24 V | PTC** for R8x1 | M16 x 1.5 with exhaust valve | 0.55 kg |
| K017224 #) | | - | | | 0.55 kg |
| K019882 #) | | 12 V | | | 0.55 kg |

#) Part No. will carry the suffix N00 denoting that it is supplied without packaging
 * Replaces valves K008546 and K014117
 ** PTC = push-to-connect

Part No. for Service Kit:
 Solenoid - 12V: **K020018K50**
 Solenoid - 24V: **K016334K50**

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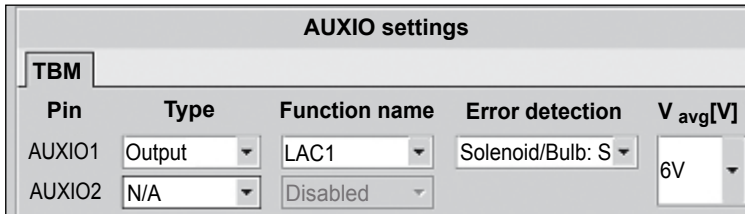
AE1141

Lift Axle Valves - TEBS controlled

Doc. No. Y050267 (Rev. 001)
August 2011

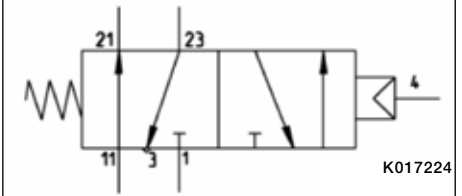
Installation Instructions

When using the AE1141 – K019882 in conjunction with the TEBS G2 brake module, this valve needs to be connected to AUXIO1 or 2. The output voltage for these ports has to be set to 6 V.



Screenshot from the diagnostic program

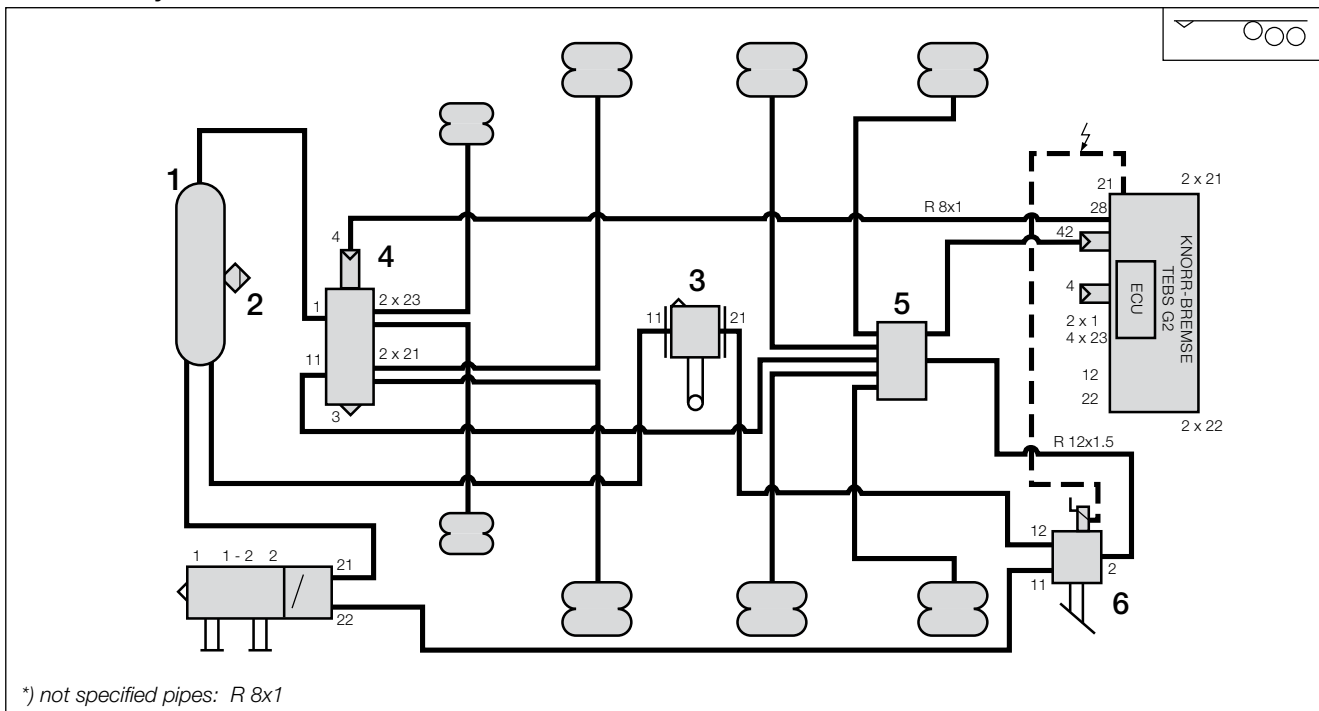
Standard Symbol as DIN ISO 1219



Note: This is necessary to protect the 12 V solenoid against overheating.

System Diagram

Air suspension system for a 3 axle semi-trailer with raise/lower function, one fully automatic lift axle controlled by the TEBS G2 brake module.



*) not specified pipes: R 8x1

| Pos. | Qty | Description |
|------|-----|--|
| 1 | - | Reservoir |
| 2 | - | Drain Valve |
| - | - | Clamping band for Pos. 1; d=...mm |
| 3 | 1 | Leveling Valve without height limitation |
| - | 1 | Rubber joint at the lower end, for pos. 3 |
| 4 | 1 | Lift Axle Valve, pneumatically controlled |
| 5 | 1 | Distributor block |
| 6 | 1 | Raise/Lower Valve, electrically controlled |

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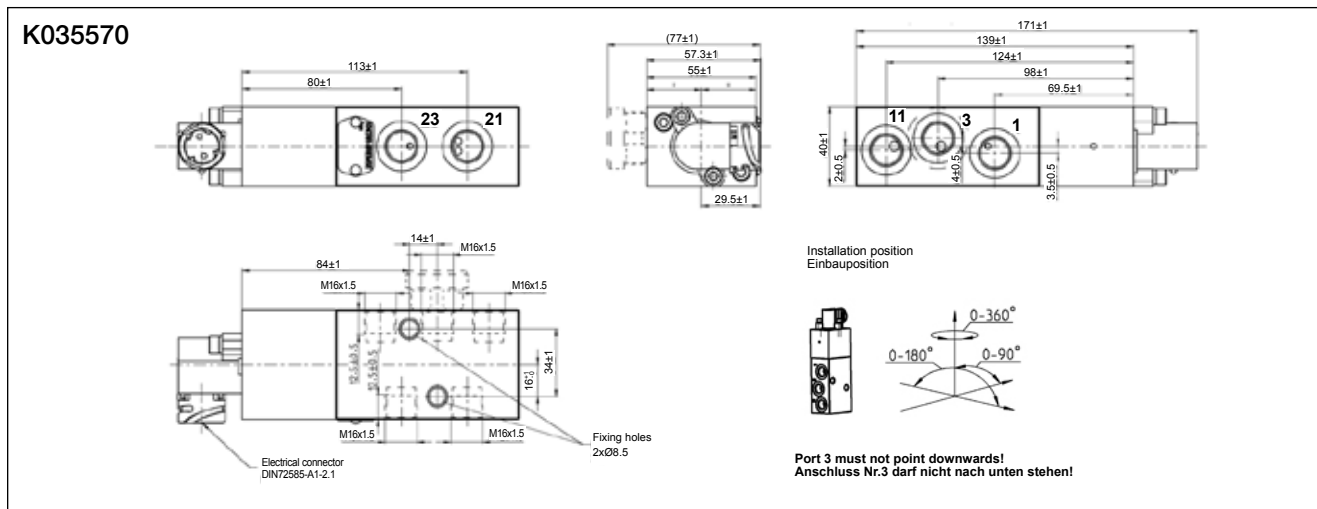
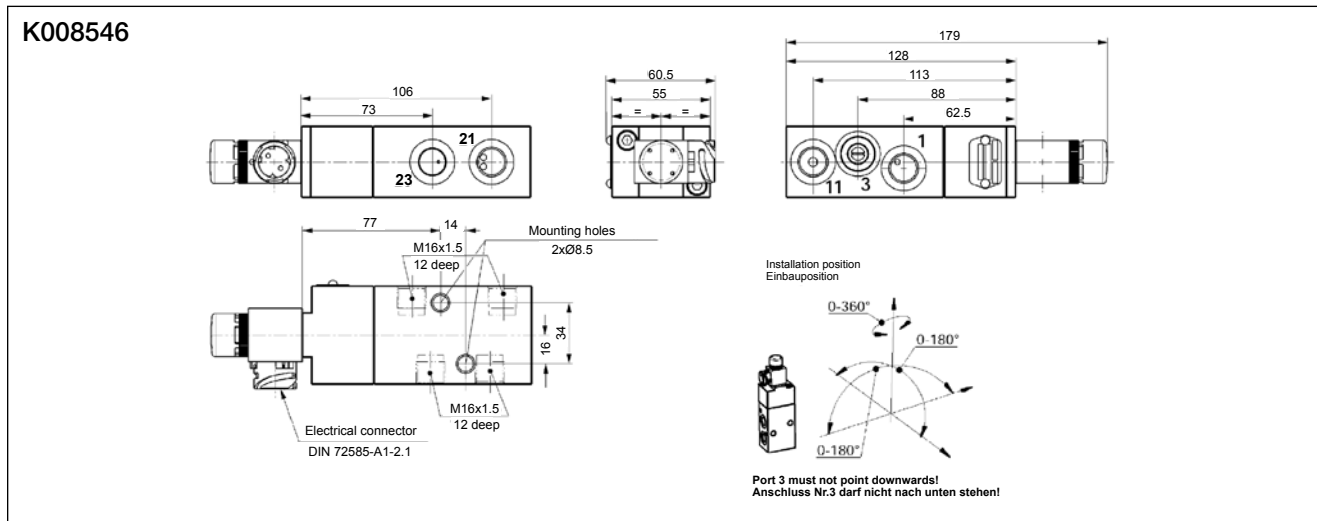
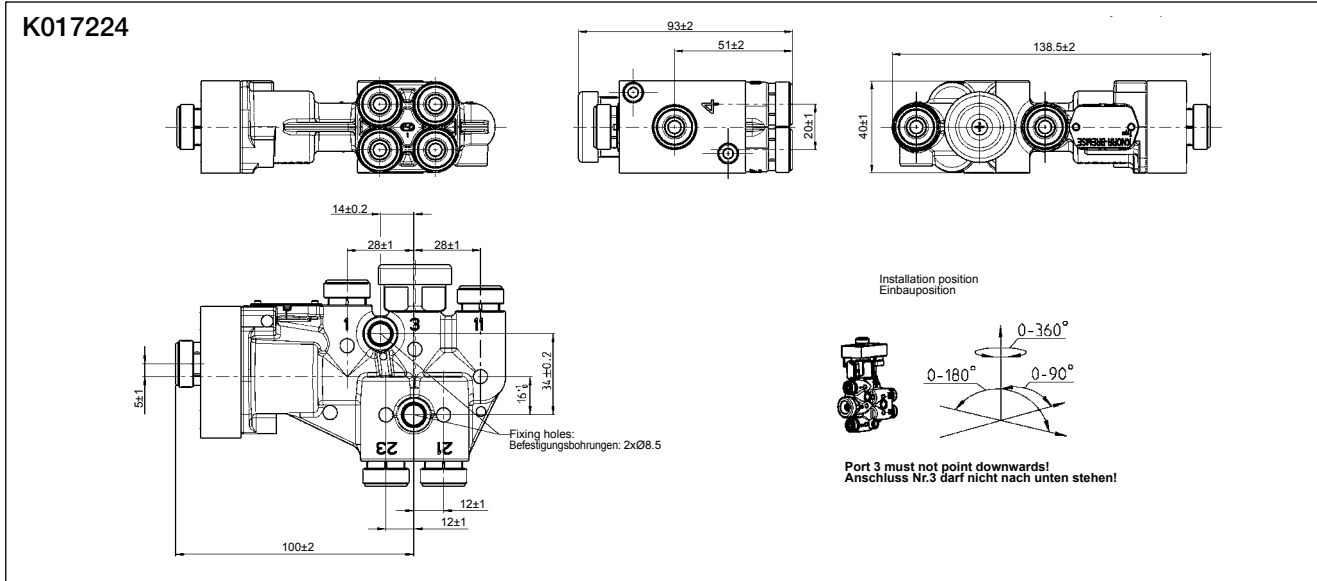
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AE1141

Lift Axle Valves - TEBS controlled

Doc. No. Y050267 (Rev. 001)
August 2011



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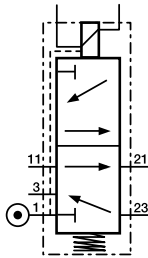
Item No.: K050460



System Diagrams

Lift Axle Valves, electrically controlled

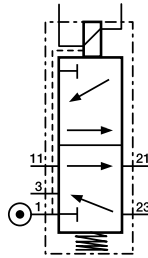
Supplied with current: Charged



Legend:

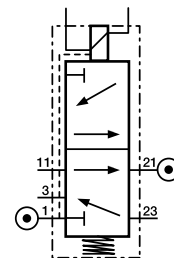
- 1 = Supply
- 23 = Output
- 3 = Exhaust
- 11 = To lock
- 21 = To lock

Supplied with current: Exhausted



- 1 = Supply
- 23 = To lock
- 3 = Exhaust
- 11 = Input
- 21 = Output

Supplied with current: Alternated circuit



- 1 = Supply
- 23 = To lock
- 3 = Output
- 11 = Output
- 21 = Input

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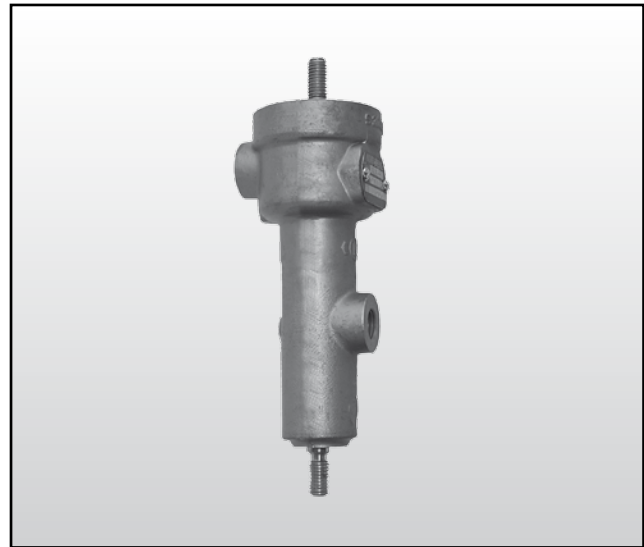
Function

The **AE1103 Height Limiting Valve** is used on trailers with air suspension when a levelling valve without integrated height limitation feature (see PD-500-000, Document No. Y011375) is installed in combination with a raise / lower valve and the suspension has no mechanical limit stop. The **Height Limiting Valve** protects the air suspension bellows and other mechanical parts from damage caused by over inflation.

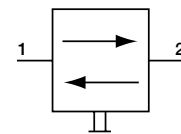
The valve is connected in the supply line of the raise / lower valve and is attached to the vehicle's chassis and an axle via a linkage¹⁾.

In the "RAISE" position, the raise / lower valve increases the volume in the air suspension bellows to increase the chassis height. As the height increases, the linkage attached to the valve's stem becomes taut. The chassis height will increase until the valve's stem is pulled and the supply of air to the raise / lower valve is cut off.

The number of valves required depends on the load distribution on the trailer. If the load is distributed equally on the trailer, one valve is enough for two levelling valves, if distributed unequally, two **Height Limiting Valves** are needed for two levelling valves. On drawbar trailers, one **Height Limiting Valve** has to be used for the front axle and a second valve for the rear axle.

**Standard Symbol as DIN ISO 1219**

AE1103

**Technical Features**

Maximum operating pressure: 10 bar
 Operating temperature range: -40 °C to +80 °C
 Weight: 0.7 kg approx.

Range Overview

| Part No. | Type No. | Port Threads | Way through |
|----------|----------|--------------|-------------|
| I60496 | AE1103 | M12x1.5 | 10 mm dia. |

¹⁾ Please note that the linkage is not supplied by Knorr-Bremse

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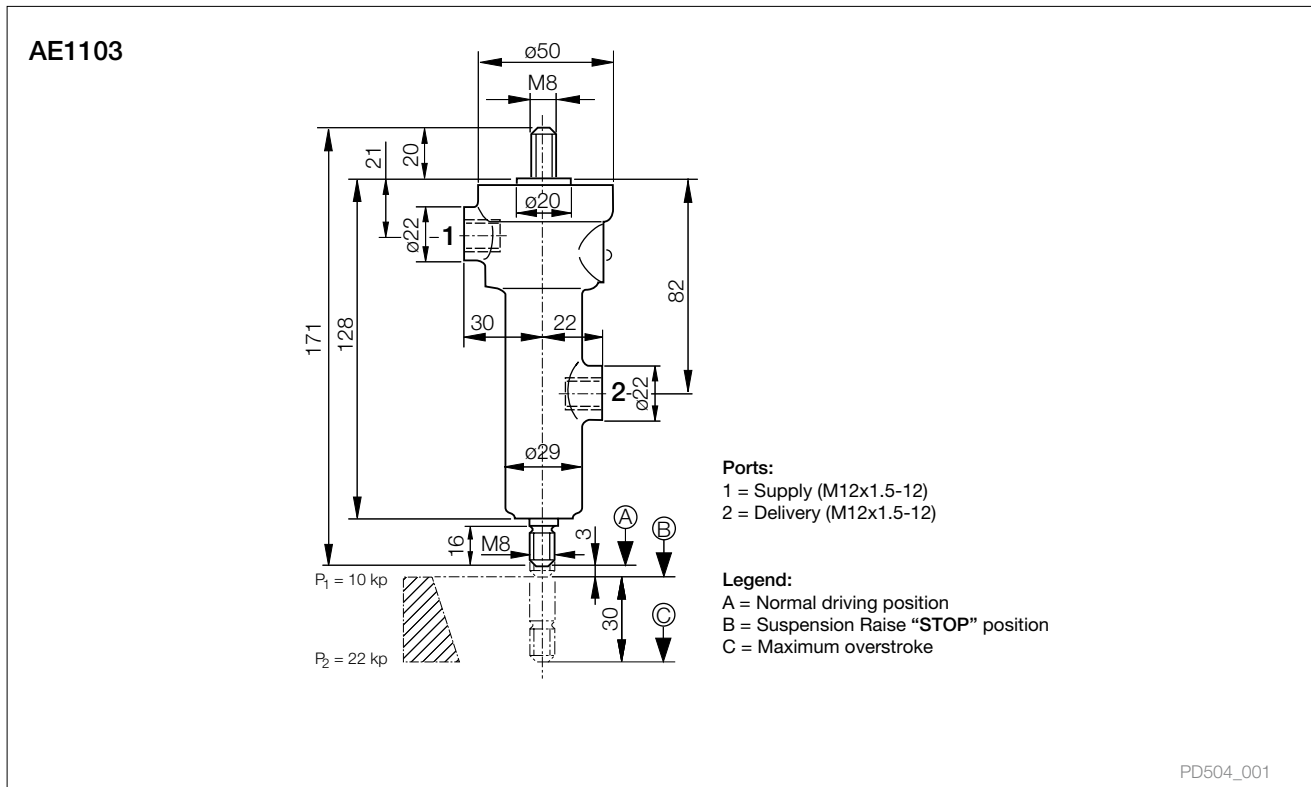
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AE1103

Height Limiting Valve (Air Suspension)

Doc. No. Y011378 (Rev. 002)
March 2011

Dimensions



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| PD No. | Product | Type/Part No. family |
|------------|--|----------------------|
| PD-520-700 | Manifold Block | LS50., LS60.. |
| PD-523-200 | Brake Hose | BS.... |
| PD-523-600 | Plastic Pipe and Coils | KR....., PET... |
| PD-524-000 | Air Reservoirs | VB.... |
| PD-551-000 | Tyre Pressure Monitoring System (TPMS) | SmarTire |



Product DATA

LS500.., LS600.. Manifold Block

Doc. No. Y011385 (Rev. 003)
September 2011

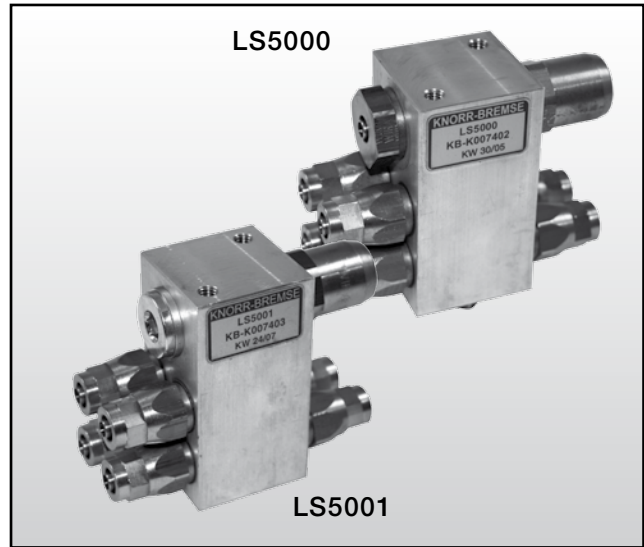
PD-520-700

Function

The **Manifold Block** is used in single-circuit air suspension systems on semi-trailers or centre-axle trailers, where it is used for connecting the air suspension bags to the Raise/Lower Valve and the Lift Axle Control Valve (optional).

The **Manifold Block** is delivered with push-in fittings saving the installer a significant number of connectors and installation time.

The **Manifold Block LS5000** or **LS6000** is normally used on 3-axle semi-trailers without lift axle and **LS5001** or **LS6001** on 3-axle semi-trailers with one lift axle.

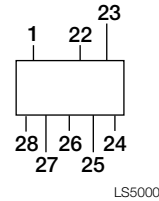


Technical Features

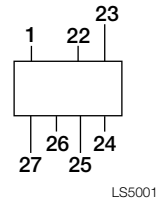
Maximum Operating Pressure: 10 bar
 Operating Temperature Range: -40 °C to +60 °C
 Weight: 0.4 kg approx.
 Surface treatment: Elox

Standard Symbol as DIN ISO 1219

LS5000
LS6000



LS5001
LS6001



Range Overview

| Part No. | Supply Connection (Push-in Fitting) | Delivery Connections (Push-in Fitting) | Type of Push-in Fitting |
|----------|-------------------------------------|--|------------------------------|
| LS5000 | 1 x 12x1.5 | 7 x 8x1 | screwed in (replaceable) |
| LS5001 | 1 x 12x1.5 | 6 x 8x1 | |
| LS6000 | 1 x 12x1.5 | 7 x 8x1 | pressed in (not replaceable) |
| LS6001 | 1 x 12x1.5 | 6 x 8x1 | |

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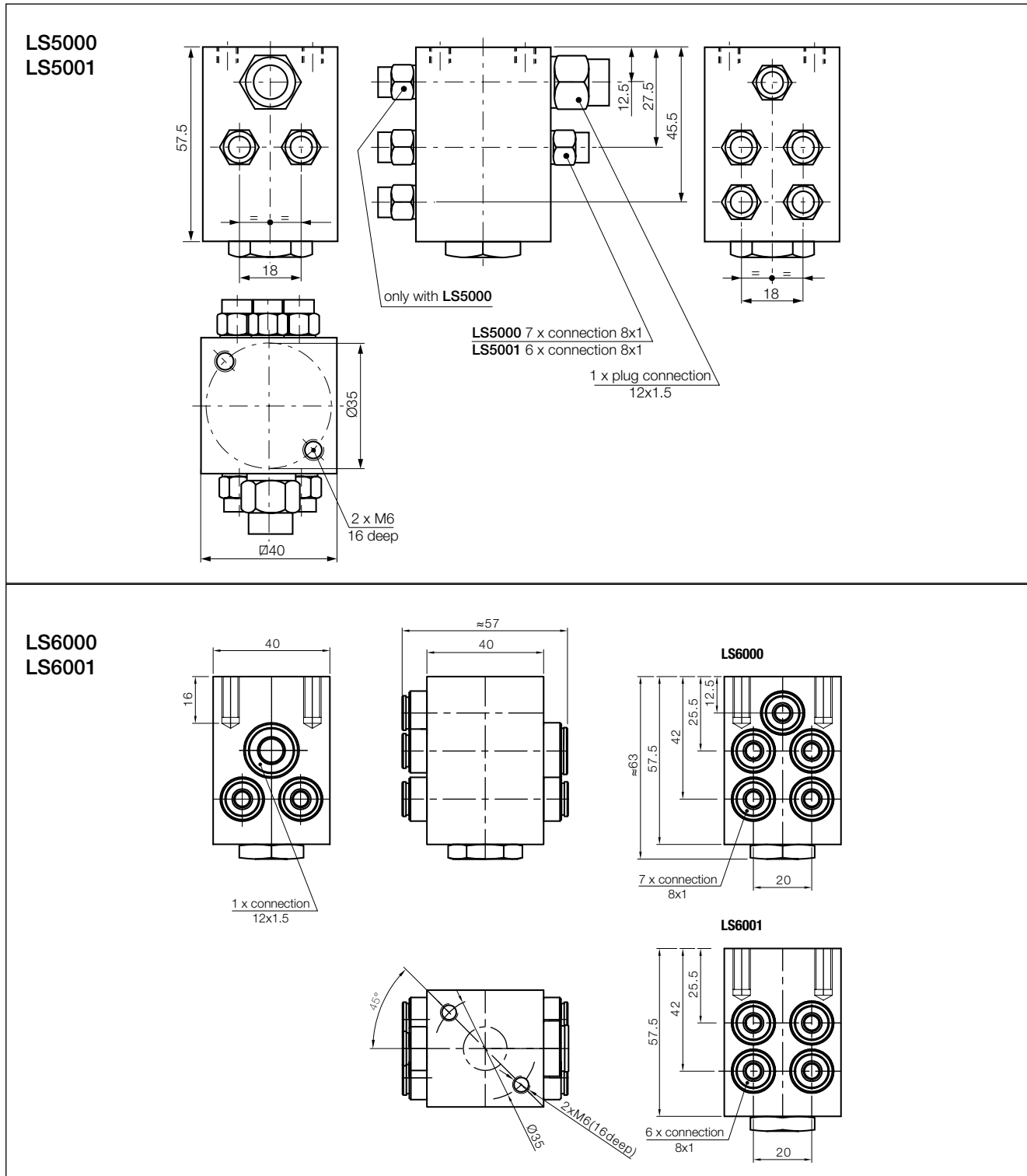


LS50..., LS60...

Manifold Block

Doc. No. Y011385 (Rev. 003)
September 2011

Dimensions



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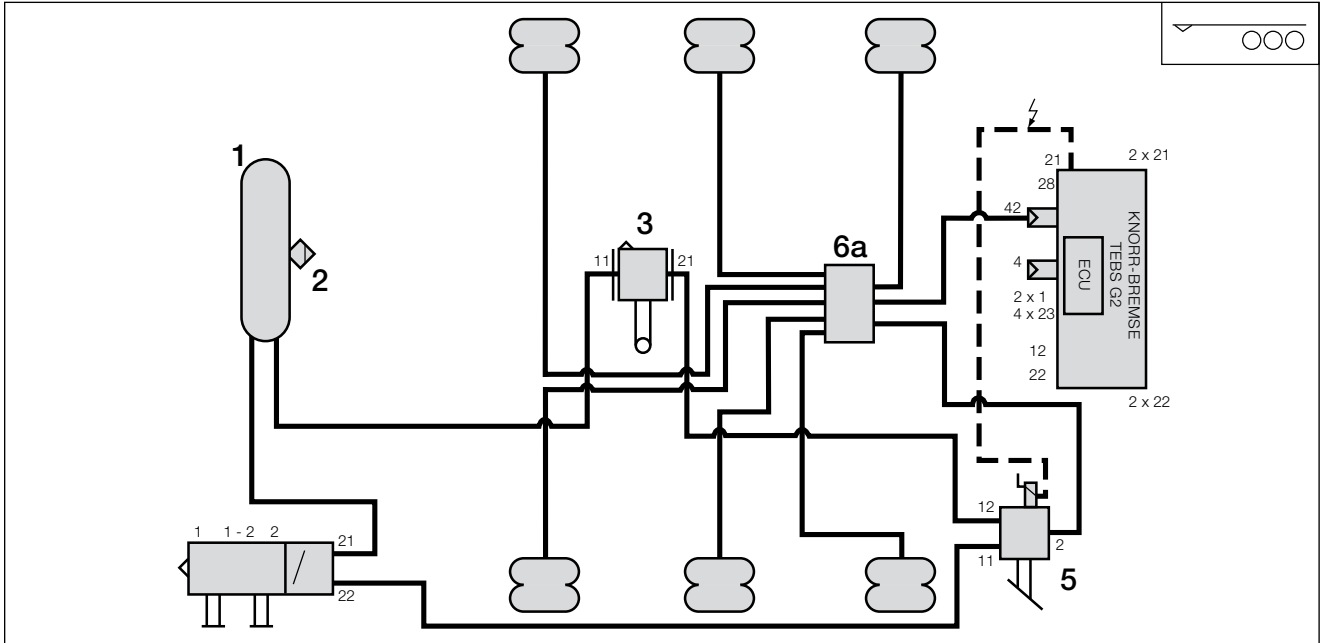
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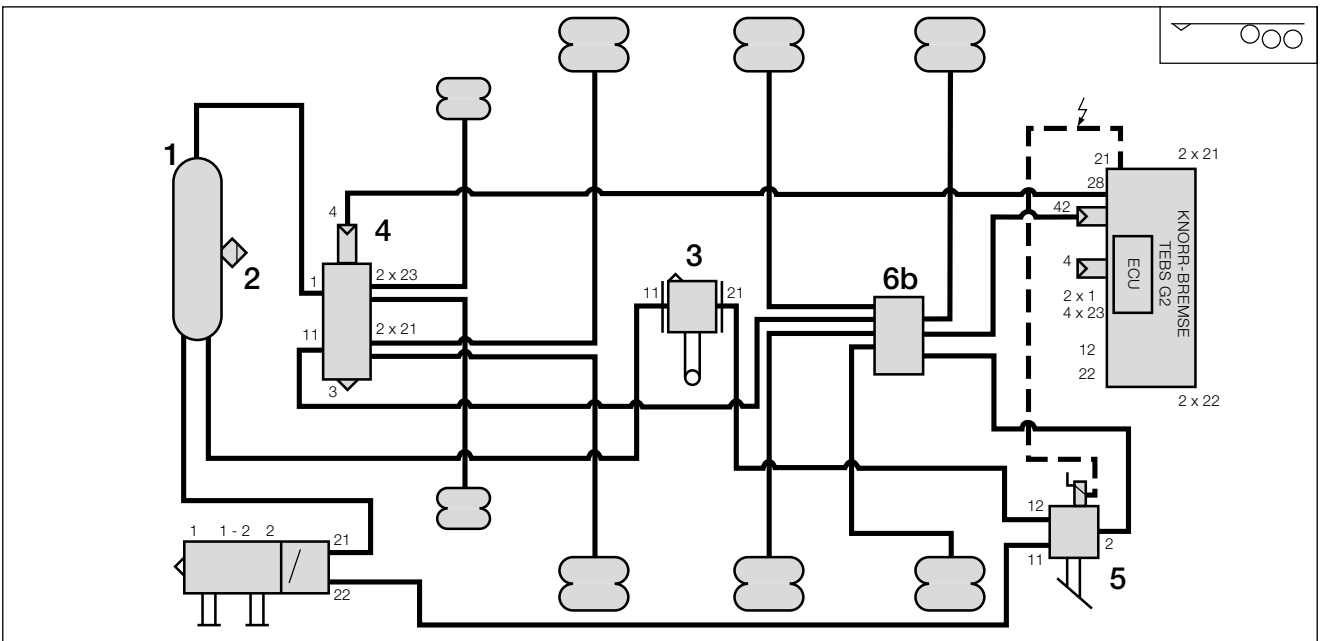
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System Diagram

Air suspension system for a 3 axle semi-trailer with raise/lower function (no lift axle).



Air suspension system for a 3 axle semi-trailer with raise/lower function and one fully automatic lift axle.



| Pos. | Description | Pos. | Description |
|------|--|------|--|
| 1 | Reservoir | 4 | Lift Axle Valve, pneumatically controlled |
| 2 | Drain Valve | 5 | Raise/Lower Valve, electrically controlled |
| 3 | Leveling Valve without height limitation | 6 | Manifold Block, 6a = LS5000 or LS6000, 6b = LS5001 or LS6001 |

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Function

Brake Hoses are typically used to connect to the brake actuators since they offer a high degree of flexibility - necessary due to suspension deflection.

**Technical Features**

| | |
|------------------------------|---|
| Maximum Operating Pressure: | 10 bar |
| Operating Temperature Range: | -40 °C bis +70 °C |
| Material: | Rubber brake hose DIN 74310, or Elastomer with textile layer, TÜV-approved |
| Supply Dimension: | 40 m roll |

Range Overview

| Part No. | Inside dia. x Wall thickness [mm] | Outside dia. [mm] | Textile layer |
|----------|--------------------------------------|----------------------|------------------------|
| BS1100 | 11 x 3.5 | 18 | Premium reinforcement |
| BS1100/1 | 11 x 3.5 | 18 | Standard reinforcement |
| BS1300 | 13 x 6.0 | 25 | Premium reinforcement |
| BS1300/1 | 13 x 6.0 | 25 | Standard reinforcement |

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Function

Plastic Pipes are used to interconnect the air braking and auxilliary equipment.

Coils are typically used to connect the drawing vehicle and the trailer air systems. Available in various lengths, colours and with different coupling connections.

Technical Features

| | |
|------------------------------|------------------|
| Maximum Operating Pressure: | 15 bar |
| Operating Temperature Range: | -40 °C to +60 °C |
| Material: | see tables |
| Plastic Pipe: | |
| Supply Dimension: | roll - see table |
| Coil: | |
| Outside dia.: | 12.0 mm |
| Wall thickness: | 1.5 mm |

**Range Overview - plastic pipe (black)**

| Part No. | Type No. | Outside dia. x Wall thickness [mm] | Roll size [m] | Standard (Material) |
|-------------|----------|--|------------------|----------------------------|
| KR1006-100 | - | 6 x 1.0 | 100 | DIN 73378 (Polyamid 12) |
| KR1008-100 | - | 8 x 1.0 | | |
| KR10101-100 | - | 10 x 1.0 | | |
| KR1012-100 | - | 12 x 1.5 | | |
| KR1015-100 | - | 15 x 1.5 | | |
| KR1018-50 | - | 18 x 2.0 | 50 | |

| Part No. | Type No. | Outside dia. x Wall thickness [mm] | Roll size [m] | Standard (Material) |
|--------------|----------|--|------------------|---------------------------|
| KR206100-100 | - | 6 x 1.0 | 100 | ISO 7628 (Hytrel 8163) |
| KR208100-100 | - | 8 x 1.0 | | |
| KR210100-100 | - | 10 x 1.0 | | |
| KR212150-100 | - | 12 x 1.5 | | |
| KR215150-100 | - | 15 x 1.5 | | |
| KR218200-50 | - | 18 x 2.0 | 50 | |

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KR...., PET...**Plastic Pipe and Coils**Doc. No. Y095692 (EN - Rev. 000)
November 2011**Range Overview - coils**

| Part No. | Type No. | No. of coils | Connector Thread | Sleeve Colour | Standard (Material) |
|---------------|----------|--------------|------------------|---------------|----------------------------|
| PET.76.900-00 | - | 16 | M22x1.5 | Yellow | DIN 73378 (Polyamid 12) |
| PET.76.901-00 | - | 16 | M22x1.5 | Red | |
| PET.76.900-10 | - | 16 | M16x1.5 | Yellow | |
| PET.76.901-10 | - | 16 | M16x1.5 | Red | |
| PET.76.900-30 | - | 20 | M22x1.5 | Yellow | |
| PET.76.901-30 | - | 20 | M22x1.5 | Red | |
| PET.76.900-31 | - | 20 | M16x1.5 | Yellow | |
| PET.76.901-31 | - | 20 | M16x1.5 | Red | |
| PET.76.900-35 | - | 23 | M22x1.5 | Yellow | |
| PET.76.901-35 | - | 23 | M22x1.5 | Red | |
| PET.76.900-36 | - | 23 | M16x1.5 | Yellow | |
| PET.76.901-36 | - | 23 | M16x1.5 | Red | |

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Function

Air Reservoirs are used to store the compressed air for the vehicle air braking, suspension and auxiliary systems.

They are available in steel or aluminium. Some reservoirs are supplied with welded mounting brackets. Reservoirs without mounting brackets need to be mounted with suitable mounting straps.

Note: aluminium reservoirs are approximately 60% lighter than steel reservoirs of the same capacity.

**Technical Features**

| | |
|-------------------------------------|---|
| Pressure rating: | EN 286-2, with CE-symbol |
| Material: | Steel, black primed or Aluminium |
| Maximum Operating Pressure; | |
| Steel | 12.5 bar |
| Aluminium | 206, 246, 276 mm dia. 12.5 bar 310, 396 mm dia. 11.0 bar |
| Operating Temperature Range: | |
| Steel | -40 °C to +100 °C |
| Aluminium | -40 °C to +65 °C |
| Air Port Threads: | M22x1.5 |
| Weight: | see tables |

Standard Symbol as DIN ISO 1219

S-VB-02

Range Overview - mounting straps for steel and aluminium reservoirs

| Part No. | Reservoir diameter [mm] | Type |
|----------|-------------------------|---|
| VB3206/2 | 206 | Two piece, zinc plated, powder coated |
| VB3246/2 | 246 | |
| VB3276/2 | 276 | |
| VB3310/2 | 310 | |
| VB3396/2 | 396 | |

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VB....**Air Reservoirs**Doc. No. Y095687 (Rev. 001)
September 2011**Range Overview - steel reservoirs without mounting brackets**

| Part No. | Volume [l] | Dia (D) [mm] | Length (L) [mm] | Weight approx. [kg] | Ports |
|-------------|------------|--------------|-----------------|---------------------|----------------|
| VB3301/206 | 10 | 206 | 370 | 4.8 | 4 x M22x1.5 |
| VB33015/206 | 15 | 206 | 530 | 6.4 | |
| VB3302/206 | 20 | 206 | 690 | 8.2 | |
| VB3302/246 | 20 | 246 | 500 | 7.3 | |
| VB3302/276 | 20 | 276 | 416 | 7.0 | |
| VB3303/246 | 30 | 246 | 720 | 10.0 | |
| VB3303/276 | 30 | 276 | 585 | 9.4 | |
| VB3304/246 | 40 | 246 | 940 | 12.8 | |
| VB3304/276 | 40 | 276 | 760 | 11.8 | |
| VB3304/310 | 40 | 310 | 620 | 11.3 | |
| VB3306/246 | 60 | 246 | 1369 | 18.1 | |
| VB3306/276 | 60 | 276 | 1110 | 16.7 | |
| VB3306/310 | 60 | 310 | 895 | 15.6 | |
| VB3306/396 | 60 | 396 | 580 | 16.8 | |
| VB3308/310 | 80 | 310 | 1170 | 19.6 | |
| VB3308/396 | 80 | 396 | 750 | 21.1 | |
| VB33085/276 | 85 | 276 | 1543 | 23.8 | |
| VB3310/396 | 100 | 396 | 915 | 25.4 | |

Manufacturer: Linnemann-Schnetzer

| Part No. | Volume [l] | Dia (D) [mm] | Length (L) [mm] | Weight approx. [kg] | Ports |
|------------|------------|--------------|-----------------|---------------------|----------------|
| VB3701/206 | 10 | 206 | 370 | 4.8 | 4 x M22x1.5 |
| VB3702/206 | 20 | 206 | 690 | 8.2 | |
| VB3702/246 | 20 | 246 | 500 | 8.2 | |
| VB3703/246 | 30 | 246 | 720 | 10.2 | |
| VB3703/276 | 30 | 276 | 686 | 9.6 | |
| VB3704/246 | 40 | 246 | 940 | 13.7 | |
| VB3704/276 | 40 | 276 | 760 | 11.8 | |
| VB3706/276 | 60 | 276 | 1110 | 18.2 | |
| VB3706/310 | 60 | 310 | 895 | 18.2 | |
| VB3706/396 | 60 | 396 | 580 | 22.3 | |
| VB3708/310 | 80 | 310 | 1170 | 22.3 | |
| VB3708/396 | 80 | 396 | 750 | 22.3 | |
| VB3710/396 | 100 | 396 | 915 | 31.2 | |

Manufacturer: Bosal

Drain Valve:

Part No. **I94095** (without seal)Type No. **EE1100****VSM2215A** (with integral seal)

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Range Overview - steel reservoirs with mounting brackets

| Part No. | Type No. | Volume [l] | Dia (D) [mm] | Length (L) [mm] | Weight approx. [kg] | Ports |
|--------------------|--------------------------|---------------|-----------------|--------------------|---------------------------|-------------|
| I97269 | VB1005 | 5 | 154 | 342 | 3.5 | 2 x M22x1.5 |
| K011307 K011308 | VB6304/276 VB6306/310 | 40 60 | 276 310 | 758 893 | 13.9 18.1 | 5 x M22x1.5 |

Manufacturer: Linnemann-Schnetzer

Range Overview - aluminium reservoirs without mounting brackets

| Part No. | Volume [l] | Dia. (D) [mm] | Length (L) [mm] | Weight approx. [kg] | Ports | Exterior finish |
|------------|---------------|------------------|--------------------|---------------------------|-------------|-----------------|
| VB4302/206 | 20 | 206 | 695 | 4.0 | 4 x M22x1.5 | Natural |
| VB4302/246 | 20 | 246 | 505 | 4.3 | | |
| VB4303/246 | 30 | 246 | 724 | 5.7 | | |
| VB4303/276 | 30 | 276 | 590 | 4.5 | | |
| VB4304/246 | 40 | 246 | 945 | 6.2 | | |
| VB4304/276 | 40 | 276 | 766 | 6.8 | | |
| VB4304/310 | 40 | 310 | 620 | 5.5 | | |
| VB4306/276 | 60 | 276 | 1115 | 8.2 | | |
| VB4306/310 | 60 | 310 | 900 | 8.7 | | |
| VB4306/396 | 60 | 396 | 585 | 8.7 | | |
| VB4308/396 | 80 | 396 | 755 | 10.4 | | |
| VB4310/396 | 100 | 396 | 920 | 12.0 | | |
| VB8306/396 | 60 | 396 | 585 | 7.8 | | |
| VB8308/396 | 80 | 396 | 755 | 9.5 | | |

Manufacturer: Linnemann-Schnetzer

Range Overview - aluminium reservoirs with mounting brackets

| Part No. | Type No | Volume [l] | Dia (D) [mm] | Length (L) [mm] | Weight approx. [kg] | Ports | Exterior finish |
|----------|------------|---------------|-----------------|--------------------|---------------------------|-------------|-----------------|
| K010890 | VB7302/246 | 20 | 246 | 510 | 4.3 | 5 x M22x1.5 | Natural |
| K010893 | VB7306/310 | 60 | 310 | 898 | 8.7 | | |
| K010894 | VB7306/396 | 60 | 396 | 592 | 8.7 | | |
| K010895 | VB7308/396 | 80 | 396 | 750 | 10.4 | | |
| K010896 | VB7310/396 | 100 | 396 | 909 | 12.0 | | |

Manufacturer: Linnemann-Schnetzer

Drain Valve:

Part No. **I94095** (without seal)
Type No. **EE1100****VSM2215A** (with integral seal)
-

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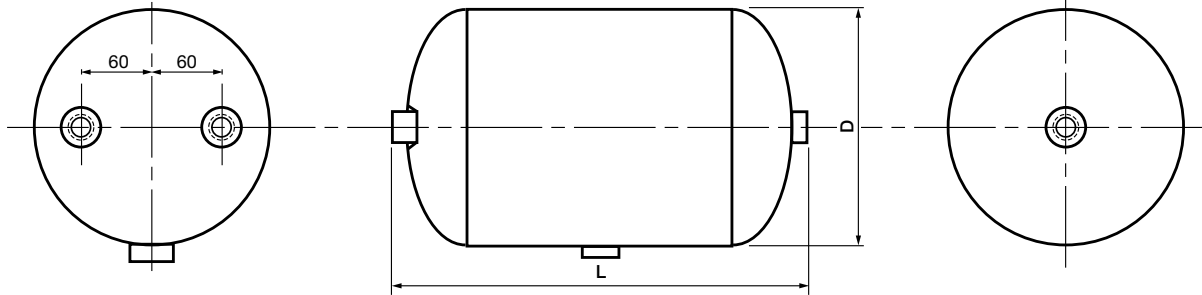
VB....

Air Reservoirs

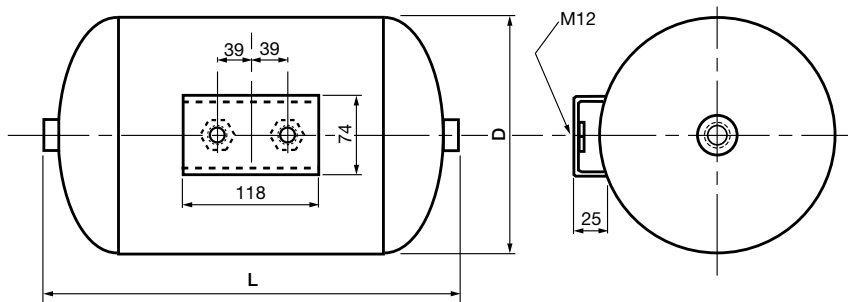
Doc. No. Y095687 (Rev. 001)
September 2011

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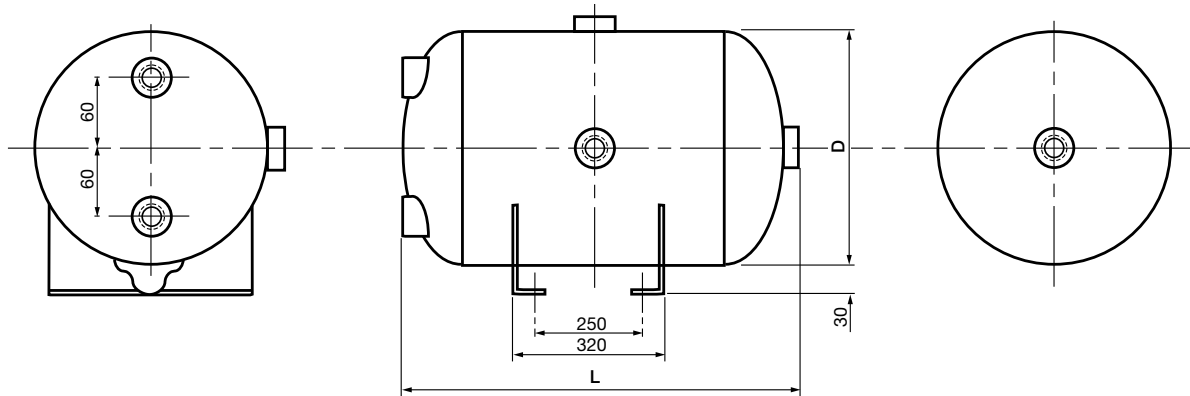
VB33.., VB37.., VB43.., VB83..



VB1005



VB63.., VB73..



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Item No. K057783

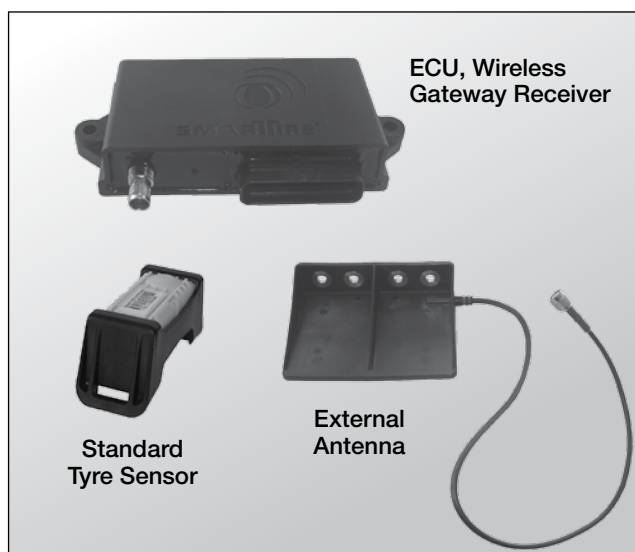




Function

The **Tyre Pressure Monitoring System (TPMS)** is a system to alert the driver if any monitored tyre runs under its normal pressure or above its normal temperature. To do this a battery powered pressure sensor is rim mounted in each tyre. The sensor measures tyre pressure and temperature and sends the data wirelessly to a chassis mounted electronic control unit (ECU, Wireless Gateway Receiver). The ECU interprets the data from each tyre sensor and sends it to various user-selected devices. Possibilities are:

- via TEBS G2 / G2.1* CAN on the trailer to the truck and then shown on the display
- via TEBS G2 / G2.1* to a stand alone display
- via RS232 to an installed Telematic unit
- ECUtalk® Diagnostics
- TIM G2



Simultaneous communication with different systems is possible.

Using an external antenna optimises the wireless data transmission from sensor to final receiver.

The design and installation of the system means that all sensors are separately initialized. This prevents a false sensor signal and ensures that no signals from other systems on the trailer will be registered by the ECU.

* TPMS is supported by TEBS G2 Brake Modules with Part Number starting K01930 (Premium version of TEBS G2/G2.1) with Software version 700.124.1.8 and "V04" in the Part Number.

Technical Features

ECU, Wireless Gateway Receiver

Operating temperature range: -40 °C to +85 °C
 Weight: 0.4 kg approx.
 Voltage range: 9 to 36 V DC

Tyre Sensor

Operating temperature range: -40 °C to +125 °C
 Weight: 0.05 kg approx.
 Pressure range: 0 to 13 bar

External antenna

Operating temperature range: -40 °C to +85 °C
 Weight: 0.2 kg approx.

Maintenance hand tool

Operating temperature range: -20 °C to +70 °C
 Weight: 1.2 kg approx.

LF tool

Operating temperature range: -25 °C to +70 °C
 Weight: 0.4 kg approx.

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SMARTTIRE

Tyre Pressure Monitoring System (TPMS)

 Doc. No. Y095833 (EN - Rev. 000)
 February 2012

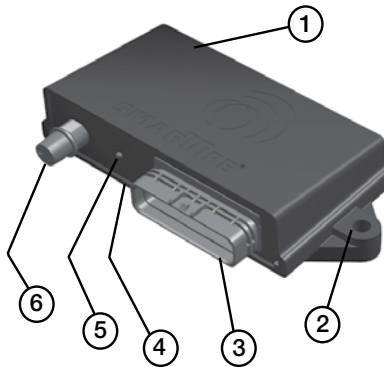
Range Overview

| Part No. | Type No. | Description | |
|------------------------|----------|---|-------------|
| 090.0011 | - | Maintenance Tool | |
| 090.0021 | - | LF Tool | |
| 201.0007 | - | Tyre Sensor/Transmitter (yellow) | |
| 201.0014 ¹⁾ | - | ECU - Wireless Gateway Receiver with UDS trailer | |
| 240.0162 | - | External Antenna | |
| 260.0270 | - | Coaxial cable 10FT TNC F / TNC M | Length 3 m |
| 260.0254 | - | | Length 6 m |
| 260.0266 | - | | Length 9 m |
| 260.0232 | - | | Length 12 m |
| 264.0228 | - | Cradle 37 mm | |
| 264.0332 | - | Strap, stainless steel clamp, max. length to suit 578 mm dia. | |
| 269.0155 | - | Label, rim | |

¹⁾ The part number of the module will carry two suffixes, firstly "V##" which represents the software revision of the product, e.g. V01, V02 etc., and secondly "N##" which defines the packaging requirements of different market sectors, e.g. N00, N50. Example: 201.0014V00N00 - is supplied with software to revision 00 and is supplied without packaging.

Features

ECU, Wireless Gateway Receiver



- 1) **Housing**
Robust black nylon 6/6 plastic housing
- 2) **Mounting**
2 x Ø7.5 mm reinforced holes for chassis mounting
- 3) **Connector**
26-way TYCO AMP Superseal
- 4) **Potting**
Polyurethane material to ensure IP67 protection
- 5) **Diagnostic LED**
Red LED with blink codes for various diagnostic conditions
- 6) **Antenna connection**
TNC threaded connection to connect supplementary antenna

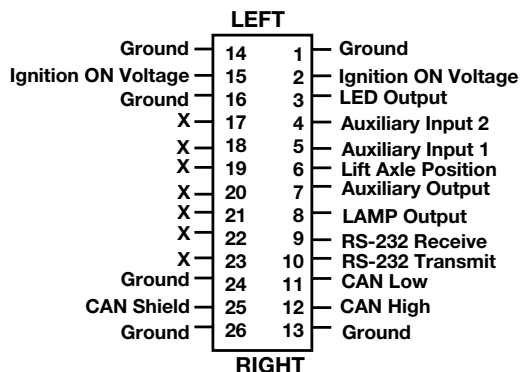
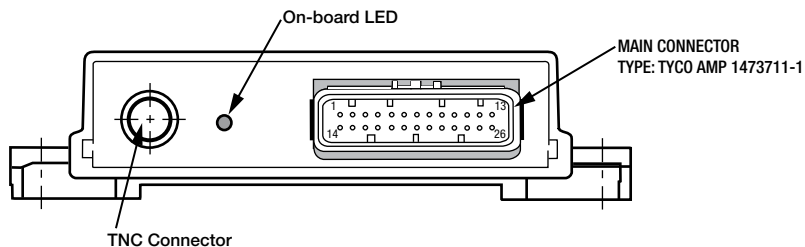
- Communication via J1939 interface (J1708 option)
- RS232 interface option (e.g. to Telematics unit, third party ECU or for testing)
- 3 control outputs to drive LED warning light, incandescent bulb, buzzer, or other control function (2 x 2A high-side, 1 x 100mA low-side)
- Weather-proof, robust chassis-mount enclosure (IP67 rating)
- Tested to SAE J1455 standards. Radio and EMC approvals in NAFTA, EU
- Retains alerts after power down and has on-board LED for advanced diagnostics
- Programmable pressure and temperature alert levels including temperature compensation
- Internal antenna plus connection for external antenna

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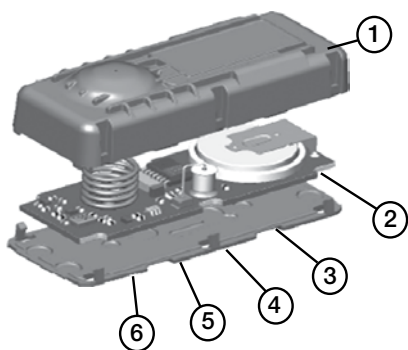
Line colours versus Pin Numbers for SmartWave Harnesses (configuration may vary by harness in terms of populated pins):

| Pin | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|-------------|-------|-----|--------|-----|------|------|-------------|--------|-------|------|-------|----------------|-------|
| Line Colour | Black | Red | Orange | Red | Grey | Pink | White & Red | Purple | White | Blue | Green | Yellow | Black |
| Pin | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 |
| Line Colour | Black | Red | Black | N/A | N/A | N/A | N/A | N/A | N/A | N/A | Black | Clear or White | Black |

The general purpose I/O lines are:

- 3 digital inputs 0 - 32 V (pins 4, 5 and 6)
- 2 high-side drivers, 2 A max. each (pins 7 and 8)
- 1 low-side LED driver, 0.15 A max. (pin 3)
- Pins 1, 14, 24, 26, 13: Common Grounds

Tyre Pressure and Temperature Sensor/Transmitter



- 1) Housing**
Lightweight, 2 piece plastic housing
- 2) Battery**
BR2450 lithium battery
- 3) Centrifugal switch**
Senses motion to change transmission modes
- 4) ASIS**
Application Specific Integrated Sensor – pressure and temperature sensor that also provides the processing of the data
- 5) LF Coil**
Acts as pick-up for the hand-tool signal to cause an activation of a transmission or change modes
- 6) Helical antenna**
Optimizes signal transmission throughout the full rotation of the wheel

- Measures air pressure, temperature, internal battery voltage and detects motion of the wheel
 - Operating pressure accuracy ± 0.17 bar (± 2.5 psi)
 - Operating temperature accuracy ± 3 °C @ 0 to 50 °C
- Sensor function:
 - measures pressure & temperature every 12 seconds; transmits immediately if pressure difference is greater than 0.2 bar (3 psi), otherwise every 3 to 5 minutes
- Universal attachment to wheel via stainless steel strap
- Self contained lithium battery power with life >5 yrs
- Transmits data to receiver wirelessly on 433.92 MHz
- Tested and proven with unmatched environmental resistance
- Can be activated by hand-tool for manual pressure checks
- Optional sensors with other functions are available

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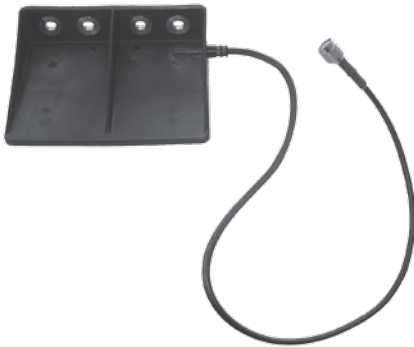


SMARTTIRE

Tyre Pressure Monitoring System (TPMS)

Doc. No. Y095833 (EN - Rev. 000)
February 2012

External Antenna



- Receives the RF data from the wheel modules and transmits to the receiver
- Robust, easy to install and inexpensive solution

Maintenance Tool



- Robust service and maintenance tool to support the TPM system
- Used in conjunction with sensors to check pressure and temperature of tyre
- Displays and records sensor ID, pressure, temperature and battery status
- Can be used to learn new sensor IDs and program them into the receiver
- Adaptable for altitude compensation
- Ability to add new features via software upload

LF Tool



- Robust Service Tool for the TPM System
- Activation of the sensors to transmit pressure and temperature. Report is displayed on the tool.
- Activation of the sensors for start-up (allocation of the sensors in relation to the tyres)

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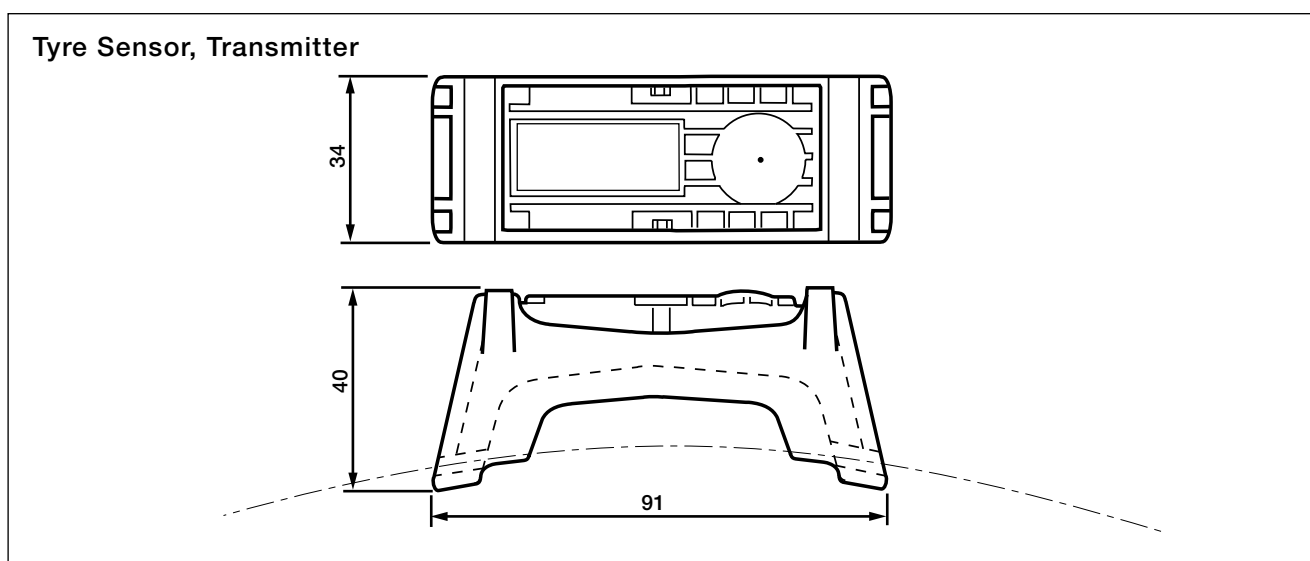
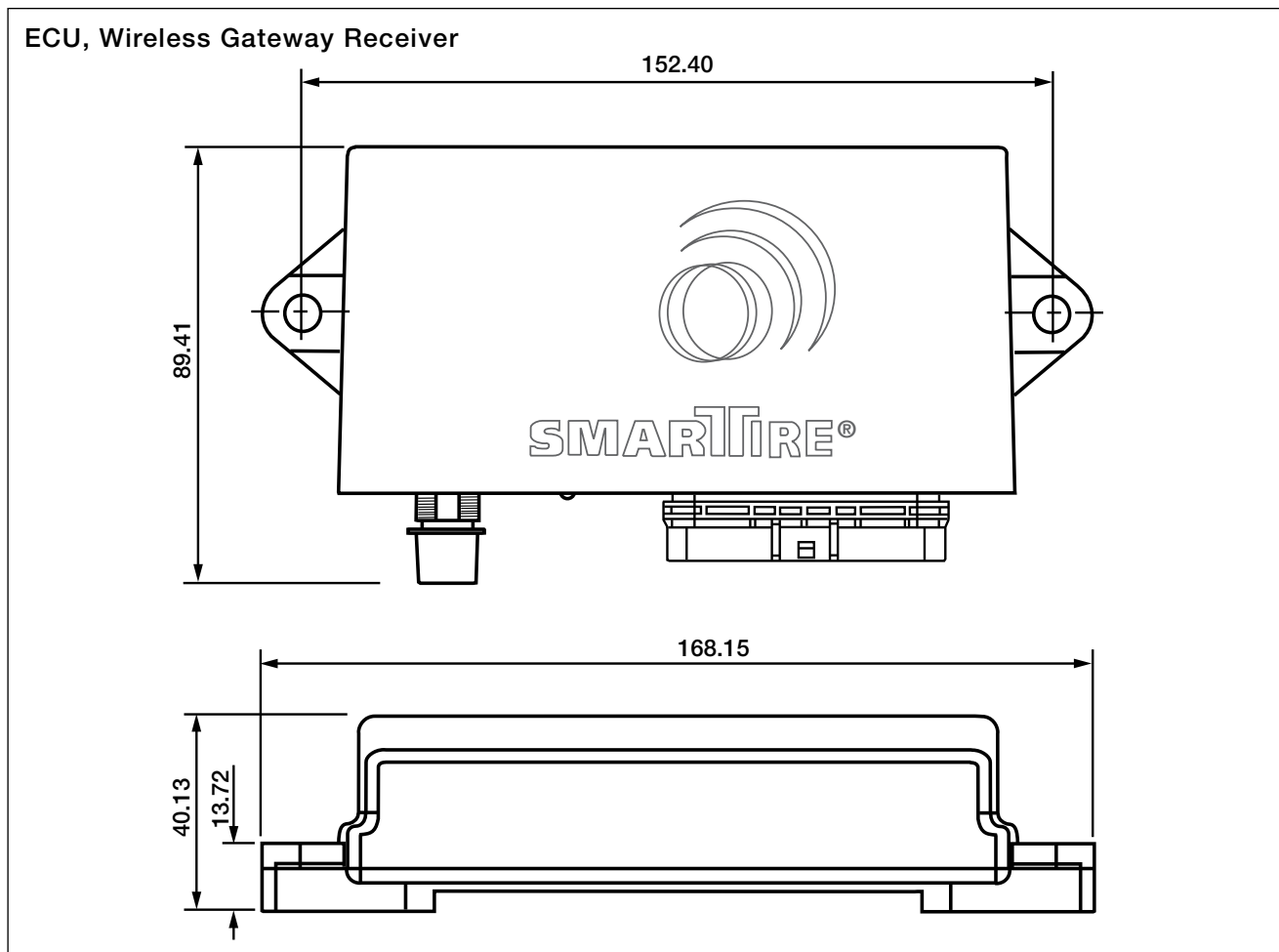
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Dimensions (mm)



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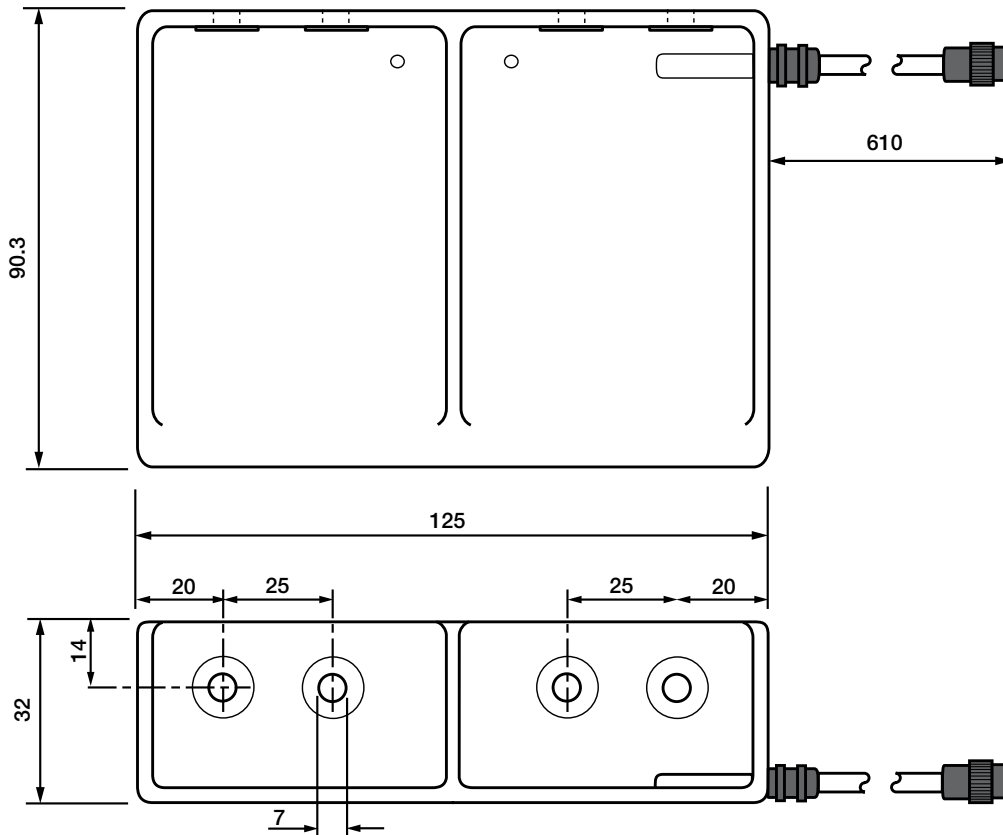




Tyre Pressure Monitoring System (TPMS)

Doc. No. Y095833 (EN - Rev. 000)
February 2012

External Antenna



Monitoring/Diagnostic

Several methods of monitoring the tyre pressure and temperature are available:

Directly on the trailer



- Knorr-Bremse offers the TIM G2 (Part No. K009166; see PD-273-920, Document No. Y050665) as a trailer monitoring system for tyre pressure and temperature
- Graphical display
- Simple operation (3 buttons)
- Individual tyre pressure read out
- Tyre temperature
- Deviation from nominal pressure (incl. temperature compensation)

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and / or

Via TEBS G2 / G2.1 and CAN to display in the cab

- If you require this variant, for further information please contact your truck partner or local Knorr-Bremse representative.

and / or

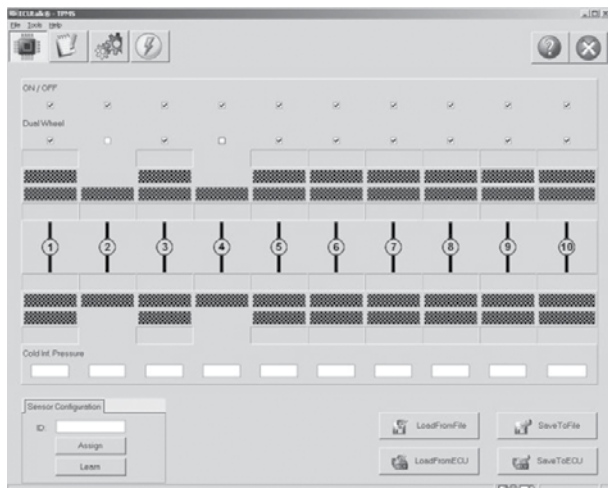
Via Telematic link

- There are two possibilities:
 - via RS232 (by arrangement with your Telematic supplier - additional cables required)
 - via J1939 (by arrangement with your Telematic supplier - installation required)

and

Diagnostics via ECUTalk®

- This platform runs all Knorr-Bremse diagnostic programs (for TEBS 4, TEBS G2, TIM, TIM G2, TRM, etc.) and as of Version 2.2.4.3 via this diagnostic tool it is possible to access the tyre pressure monitoring system.
- To do this it is necessary to obtain the Knorr-Bremse diagnostic hardware and software and additionally a PIN for using the ECUTalk®



- Diagnostic platform for programming via 9-pin J1939 connection
- Program new pressure sensors
- Changing tyre pressure and temperature parameters
- Fault report

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SMARTTIRE

Tyre Pressure Monitoring System (TPMS)

 Doc. No. Y095833 (EN - Rev. 000)
 February 2012

Diagnostics directly at the ECU, Wireless Gateway Receiver

- If there is no ECU*talk*® available, you also can diagnose the system at the ECU directly. An LED for that purpose is installed.
- If the LED is blinking and there is no data being transmitter from the receiver, but the display is powered and has initialized, check the blink code:

| Alarms | Priority | On-board LED | Solution |
|----------------------------------|----------|--------------------------|--|
| No alarm | 0 | Off | |
| Second level low pressure (SAL) | 13 | Off | |
| Previous SAL | 13 | Off | |
| SAL cleared | 0 | Off | |
| First level high pressure (FAL) | 11 | Off | |
| First level low pressure (FAL) | 11 | Off | |
| FAL cleared | 0 | Off | |
| High temperature | 9 | Off | |
| Previous high temperature | 9 | Off | |
| High temperature cleared | 0 | Off | |
| RF sub-section fault | 7 | Pattern flashing code: 7 | Replace ECU, Wireless Gateway Receiver |
| Internal error | 7 | Pattern flashing code: 7 | Replace ECU, Wireless Gateway Receiver |
| ROM to both copy performed | 5 | Pattern flashing code: 5 | Check settings with DDT |
| Set up fault | 5 | Pattern flashing code: 5 | Check settings with DDT |
| Sensor fault set | 3 | Pattern flashing code: 3 | Diagnose sensor fault |
| Previous sensor fault | 3 | Pattern flashing code: 3 | Diagnose sensor fault |
| Sensor fault cleared | 0 | Off | |
| Factory to custom copy performed | 1 | Pattern flashing code: 1 | Normal operation |
| Custom to factory copy performed | 1 | Pattern flashing code: 1 | Normal operation |
| Black box initialized | 1 | Pattern flashing code: 1 | Normal operation |
| Watchdog reset | 1 | Pattern flashing code: 1 | Normal operation |
| Autolearn complete | 1 | Pattern flashing code: 1 | Normal operation |

Note: The flash pattern will have periods of 0.3 seconds ON and 0.3 seconds OFF repeating every 6 seconds. The number of ON phases in every 6-second window will identify the code. For example if the repeated pattern displayed is 0.3 seconds ON, 0.3 seconds OFF, 0.3 seconds ON, 5.1 seconds OFF then the flash code is 2.

Note:

When working on a trailer ensure that all typical safety instructions are followed - see Document No. Y075876.

For further instructions and information please see the TPMS Installation guide or contact your Knorr-Bremse representative.

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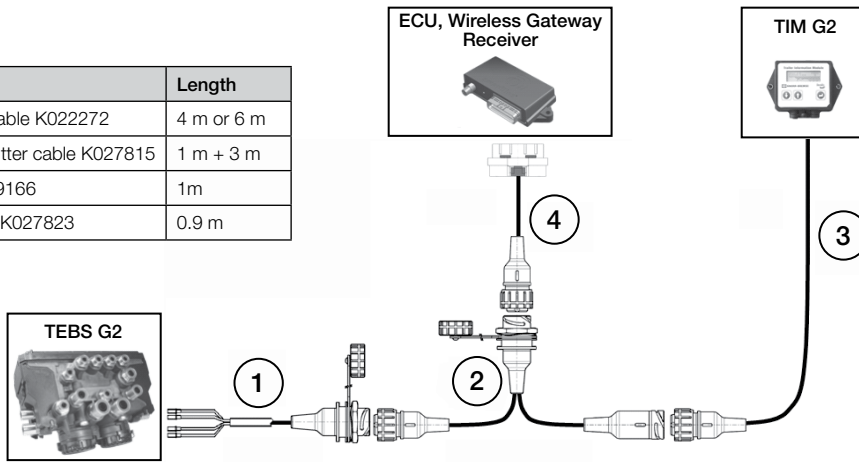




System Configurations

For standard semi- and centre-axle trailers

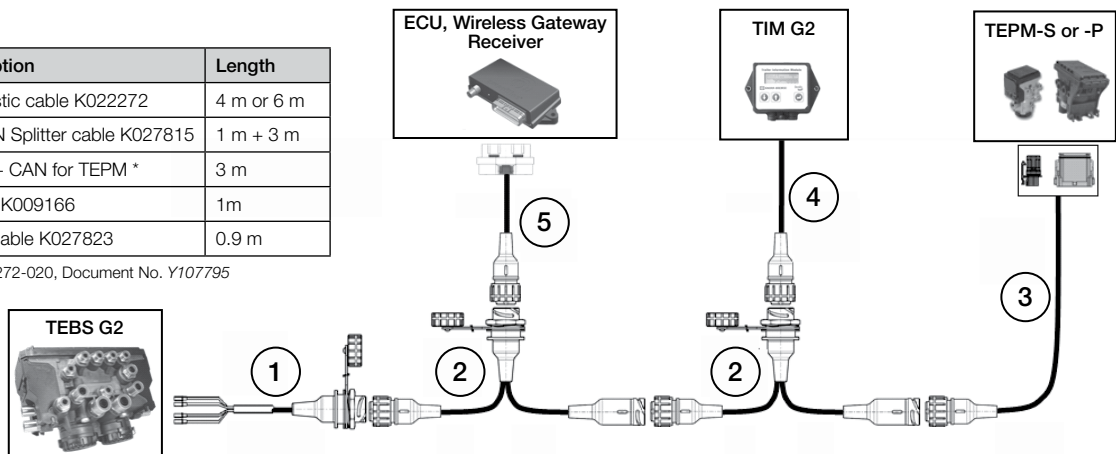
| No. | Description | Length |
|-----|--------------------------------|------------|
| 1 | Diagnostic cable K022272 | 4 m or 6 m |
| 2 | 5 V CAN Splitter cable K027815 | 1 m + 3 m |
| 3 | TIM G2 K009166 | 1m |
| 4 | TPMS cable K027823 | 0.9 m |



For drawbar trailers

| No. | Description | Length |
|-----|--------------------------------|------------|
| 1 | Diagnostic cable K022272 | 4 m or 6 m |
| 2 | 5 V CAN Splitter cable K027815 | 1 m + 3 m |
| 3 | Power + CAN for TEPM * | 3 m |
| 4 | TIM G2 K009166 | 1m |
| 5 | TPMS cable K027823 | 0.9 m |

* See PD-272-020, Document No. Y107795



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| PD No. | Product | Type/Part No. family |
|--------|---------|-------------------------|
|--------|---------|-------------------------|

Data Sheet for Brake Calculations



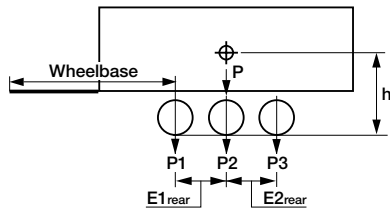
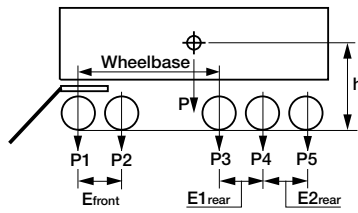
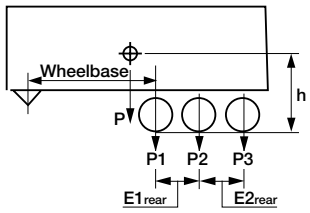
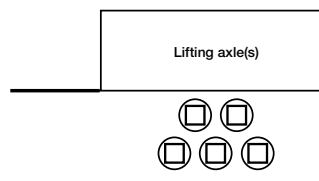
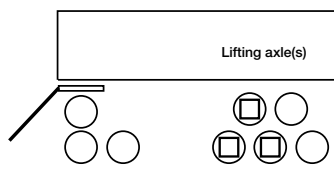
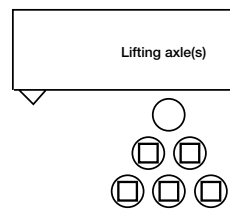


Product DATA

Data Sheet for Brake Calculations

Doc. No. Y011386 (Rev. 001)
August 2011

TRAILER DATA

| | | | |
|---|--|---|---|
| Trailer Manufacturer: | | Model No./Type: | |
| <input type="checkbox"/> Centre Axle Trailer  | | <input type="checkbox"/> Drawbar Trailer  | |
| <input type="checkbox"/> Semi-Trailer  | | | |
| | Unladen weight [kg] | Laden weight [kg] | Brake Actuators Make/Service & Parking size |
| Total | P | | |
| Axle 1 | P1 | | |
| Axle 2 | P2 | | |
| Axle 3 | P3 | | |
| Axle 4 | P4 | | |
| Axle 5 | P5 | | |
| Height of Centre of Gravity [mm] | h | Unladen: | Laden: |
| Wheelbase [mm]: | | E1rear [mm]: | |
| Efront [mm] (drawbar only): | | E2rear [mm]: | |
| Tyre Size or Dynamic Tyre Radius: | | | |
| Trailing steer axle | <input type="checkbox"/> Yes | <input type="checkbox"/> No | |
| Suspension type | <input type="checkbox"/> Air suspension | <input type="checkbox"/> Mechanical suspension | |
| Spring deflection (mechanical suspension) - unladen to laden travel [mm]: | | | |
| Suspension type | <input type="checkbox"/> Balanced (non-reactive) | <input type="checkbox"/> Not balanced (reactive) | |
| Air Suspension manufacturer and Type No.: | Air Spring Bellows diameter [mm]: | Suspension arm lengths [mm]: L ₁ = L ₂ = | Bellows pressure [bar]: unladen = laden = |
| Position of Lift Axle(s) (please identify position and order of lifting with 1, 2, etc. in relevant box/boxes or 'X' if no order) | | | |
| <input type="checkbox"/> Centre Axle Trailer  | | <input type="checkbox"/> Drawbar Trailer  | |
| <input type="checkbox"/> Semi-Trailer  | | | |
| Axle Manufacturer: | | Axle Type: | |
| Brake Manufacturer/Type: | | Test Report No.: | |
| Preferred slack adjuster lever length (S-cam brake): | | (if not available, provide technical data) | |
| <p>To help Knorr-Bremse complete your brake calculation quickly and efficiently, please complete all relevant sections of the Data Sheet</p> | | | |

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BRAKING SYSTEM DESIGN REQUIREMENTS

| | | | |
|--|--|--|---|
| Trailer Manufacturer: | | Model No.: | |
| Contact: | Tel.: | Email: | |
| <input type="checkbox"/> Without ABS | V _{max.} [km/h]: | | |
| <input type="checkbox"/> With ABS | Desired ABS configuration | | |
| <input type="checkbox"/> With TEBS | <input type="checkbox"/> 2S/2M | <input type="checkbox"/> 4S/2M | <input type="checkbox"/> 4S/3M <input type="checkbox"/> 6S/3M |
| Number of teeth on the sensing ring: | | | |
| With separate REV | <input type="checkbox"/> Yes | <input type="checkbox"/> No | |
| With Trailer Information Module (TIM) | <input type="checkbox"/> Yes | <input type="checkbox"/> No | |
| Traction Help | <input type="checkbox"/> Yes | <input type="checkbox"/> No | |
| RSP | <input type="checkbox"/> Yes | <input type="checkbox"/> No | |
| Spring brake parking | <input type="checkbox"/> Yes | <input type="checkbox"/> No | |
| Combined park/shunt valve | <input type="checkbox"/> Yes | <input type="checkbox"/> No | |
| Release valve for the front axle(s) (Drawbar trailers) | <input type="checkbox"/> Separate <input type="checkbox"/> None | <input type="checkbox"/> Integrated in park/shunt valve | |
| Air suspension control | <input type="checkbox"/> Single circuit | <input type="checkbox"/> Dual circuit | |
| Levelling valve with height limitation | <input type="checkbox"/> Yes | <input type="checkbox"/> No | |
| Rapid exhaust of the air suspension bellows | <input type="checkbox"/> Yes | <input type="checkbox"/> No | |
| Datum height adjustment (2nd ride height) | <input type="checkbox"/> Yes | <input type="checkbox"/> No | |
| Raise/lower valve | <input type="checkbox"/> Yes | <input type="checkbox"/> No | |
| with 'Speed Pulse' reset | <input type="checkbox"/> Yes | or with automatic return to STOP position | <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Separate lowering of each side | <input type="checkbox"/> Yes | <input type="checkbox"/> No | |
| Lift axle control | <input type="checkbox"/> Via TEBS | | |
| or conventional | <input type="checkbox"/> Fully automatic | <input type="checkbox"/> Semi-automatic | |
| Forced lowering of the lifting axle(s) | <input type="checkbox"/> Electrical <input type="checkbox"/> Both | <input type="checkbox"/> Manual <input type="checkbox"/> None | |
| iCargo function required | <input type="checkbox"/> Yes | <input type="checkbox"/> No | |
| iCorner function required | <input type="checkbox"/> Yes | <input type="checkbox"/> No | |
| To help Knorr-Bremse complete your brake calculation quickly and efficiently, please complete all relevant sections of the Data Sheet | | | |
| If the trailer is not easy to describe, please provide additional data (sketches) | | | |

**Knorr-Bremse makes every effort to ensure that the calculation produced from the data supplied meets the requirements of EEC legislation at the time the calculation is undertaken.
It is the customer's responsibility to verify the calculation by completing a physical test.**

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| PD No. | Product | Type/Part No. family |
|--------|---------|-------------------------|
|--------|---------|-------------------------|

Index (alphabetical)



| Product | Type/Part No. family | PD No. |
|---|-----------------------------|------------|
| 3/2 Control Valves | AE4265, AE4266 | PD-120-321 |
| ABS Relay Modulator Valves | BR92.. | PD-200-200 |
| Adapter Valves | DB21.. | PD-110-200 |
| Air Disc Brakes | SN5, SN6, SN7, SK7 | PD-420-000 |
| Air Reservoirs | VB.... | PD-524-000 |
| Brake Chambers (Disc) - OBC generation | BS3... | PD-405-100 |
| Brake Chambers (Disc) - with Clamp Ring | BS3... | PD-405-000 |
| Brake Chambers (S-cam), long stroke | BX3..., BZ3... | PD-403-200 |
| Brake Hose | BS.... | PD-523-200 |
| Brake Pad Wear Indicator Kits | K000... | PD-430-451 |
| Cables for Trailer ABS | | PD-272-010 |
| Cables for Trailer EBS | | PD-272-020 |
| Charging Valves | DR4... | PD-074-000 |
| Coupling Heads | KU13.., KU14..., KU41.. | PD-109-000 |
| Deflection Sensor | K026919 | PD-264-200 |
| Diagnostic Cables for Trailer ABS/EBS | | PD-272-030 |
| Diaphragm Brake Chambers for Trailers (Overview) | | PD-400-000 |
| Double Check Valves | AE41..., 1111419000, 295358 | PD-112-200 |
| Height Limiting Valve (Air Suspension) | AE1103 | PD-504-000 |
| In-line Air Filter | LA2103 | PD-053-200 |
| Levelling Valves | SV13.., SV14.. | PD-500-000 |
| Lift Axle Valve, Manual/Pneumatic | AE1124 | PD-503-100 |
| Lift Axle Valves - Pneumatic | LS1..., LS2..., LS3... | PD-503-200 |
| Lift Axle Valves - TEBS controlled | AE1141 | PD-503-400 |
| Load Sensing Valves (Air Suspension) | BR55.. | PD-104-000 |
| Load Sensing Valves - manual (for Relay Emergency Valves) | BR13.. | PD-102-000 |
| Load Sensing Valve, mechanically controlled | BR43.. | PD-103-000 |
| Manifold Block | LS50.., LS60.. | PD-520-700 |
| Manoeuvring Valve (Semi-trailer) | AE4261 | PD-113-110 |
| Manoeuvring Valves (Drawbar Trailers) | AE4211, AE4257 | PD-113-120 |
| Park / Shunt Valves | AE424. | PD-113-210 |
| Park / Shunt Valve with Integrated Charging Valve | AE437. | PD-113-230 |
| Park / Shunt Valves with Integrated Emergency Function | AE431. | PD-113-220 |
| Plastic Pipe and Coils | KR..., PET... | PD-523-600 |
| Pressure Control Valve for <i>iCargo</i> | BR9169 | PD-200-120 |
| Pressure Limiting Valves | DB11.. | PD-108-000 |
| Pressure Proportioning Valves | DB21.. | PD-110-000 |
| Pressure Retaining Valves | DB21.. | PD-110-300 |
| Pressure Sensor | K015173 | PD-262-200 |
| Quick Release Valves | RE21.., KX..., 1194339 | PD-111-400 |
| Raise / Lower Valve (with Speed Pulse function) | SV3801 | PD-501-100 |
| Raise / Lower Valves (conventional) | SV31.. | PD-501-000 |
| Raise / Lower Valves (single circuit) | SV32.. | PD-501-050 |
| Relay Emergency Valves | AS3..., AS7... | PD-107-000 |
| Relay Valve | AC574..., RE11.. | PD-106-000 |
| Shut-Off Valves | AE21.. | PD-122-000 |
| Single Check Valves | AE51.. | PD-112-100 |
| Solenoid Valves | AE9120, EA1152 | PD-121-000 |

Index (alphabetical)

Doc. No. Y011335 (EN - Rev. 003)
November 2011

| Product | Type/Part No. family | PD No. |
|--|-------------------------|------------|
| Spring Brake Actuators for Trailers (Overview) | | PD-413-000 |
| Spring Brakes (S-cam) - diaphragm/diaphragm | BX7... | PD-413-200 |
| Spring Brakes (S-cam) - diaphragm/piston | BX9..., BZ9... | PD-413-100 |
| Spring Brakes (Disc) - diaphragm/diahrpragn | BS7... | PD-415-200 |
| Spring Brakes (Disc) - diaphragm/piston | BS9... | PD-415-100 |
| TEBS G2/G2.1 Brake Module | ES2060 | PD-214-200 |
| TEBS4 Brake Module | ES205. | PD-214-100 |
| Throttle Check Valve | SEB00778 | PD-112-400 |
| Trailer ABS (A18) | ES2005 | PD-203-200 |
| Trailer ABS (KB3-TA) | ES200. | PD-203-100 |
| Trailer ABS (KB4TA) | ES1305 | PD-203-300 |
| Trailer Electro-Pneumatic Module (TEPM-S / TEPM-P) | ES207. | PD-214-600 |
| Trailer Information Module (TIM G2) | K009166 | PD-273-920 |
| Trailer Park Valves | AE4262, AE4264 | PD-113-300 |
| Trailer Roadtrain Module (TRM) | EZ2085 | PD-214-800 |
| Tyre Pressure Monitoring System (TPMS) | | PD-551-000 |
| Wheel Speed Sensors | 04860001.., 04860010.. | PD-261-000 |

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