2007
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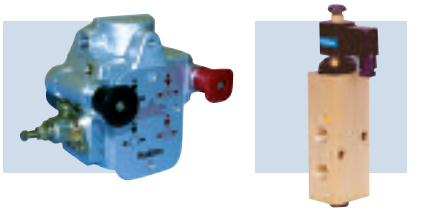
Trailer Product Catalogue Europe



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TELEMATIC TRAILER MANAGEMENT

The following drawing and function symbols comply with DIN 74 253, May 1979 edition, and DIN ISO 1219, August 1978 edition.

The drawing symbols (DIN 74 253) can be used for the schematic representation of braking systems (circuit plan) in motor vehicles.

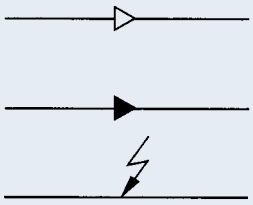
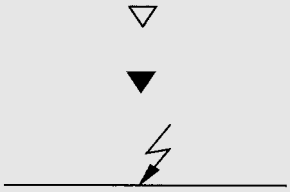
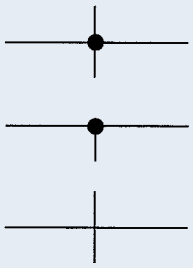
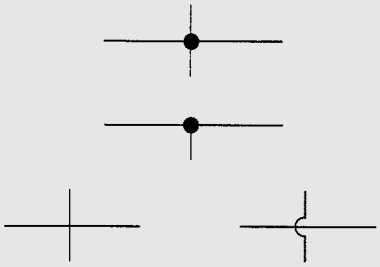
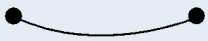
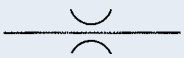
The connections on the symbols are shown in accordance with DIN ISO 6786, December 1981 edition. These identifications are not part of the symbols, but can be added to improve comprehension.

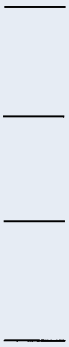
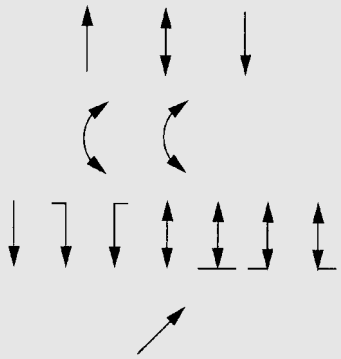
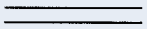
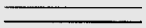
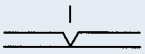
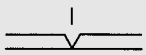
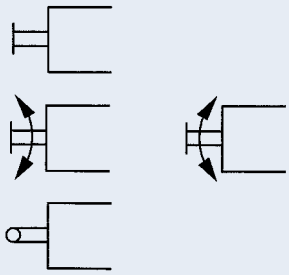
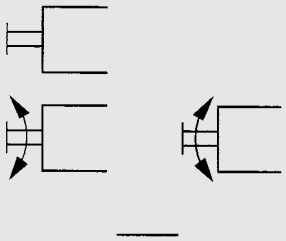
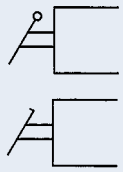
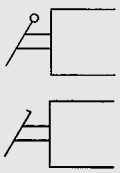
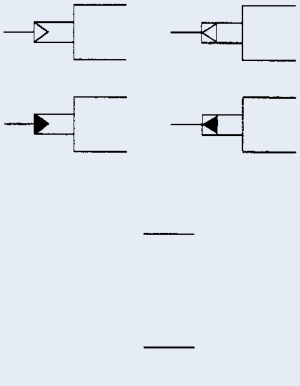
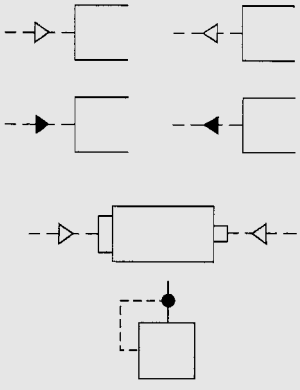
The function symbols (DIN ISO 1219) are intended to explain the internal operations of components or parts thereof. They consist of one or more basic signs and in general one or more function signs.

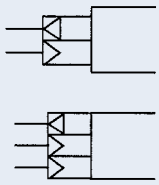
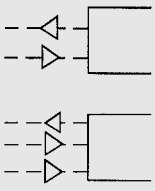
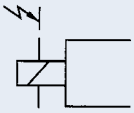
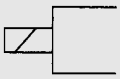
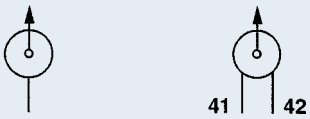
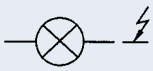
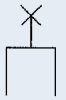
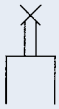
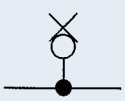
The components are shown in the off position in circuit diagrams, and if this is not present, in the initial position of the control system. If this is not the case, a note must be provided. e.g. working position.

Note:

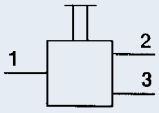
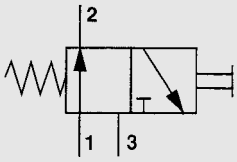
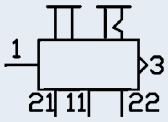
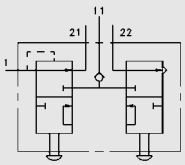
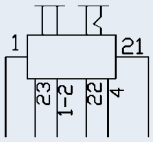
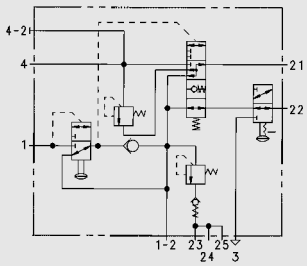
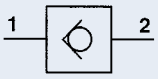
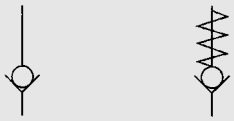
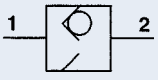
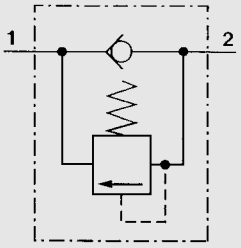
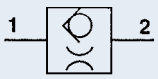
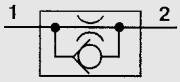
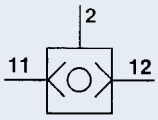
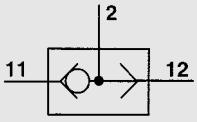
The drawing and function symbols shown on the following pages are an extract from the corresponding DIN. Only those symbols are shown here that are necessary for trailer vehicles.

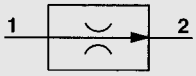
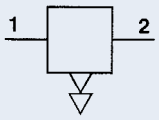
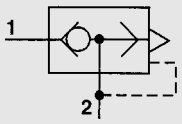
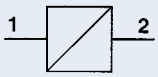
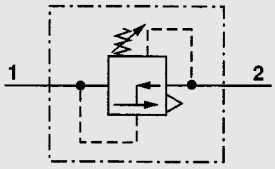
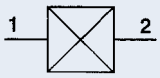
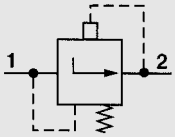
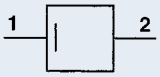
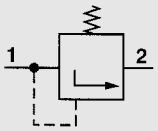
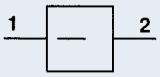
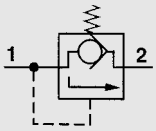
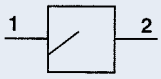
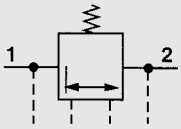
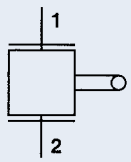
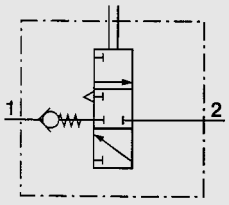
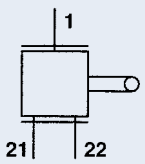
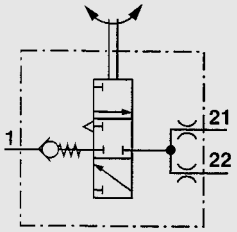
Drawing symbols in accordance with DIN 74253	Function symbols in accordance with DIN ISO 1219	Description
		General lead/line
		Lead/line marking: Direction of flow and medium Pneumatics Hydraulics Electrics
		Crosses with connection: No connection
		Arrangement of lines: Loop
		Flexible lead/line for connecting moveable parts
		Coiled tubing
		Throttle in the lead/line
		Circle symbol for different applications: pumps, compressors, motors, etc
		Square and rectangle: Symbols for equipment, cylinders and controls
		Diamond for filters, separators, etc.

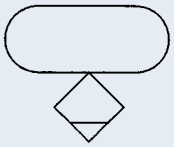
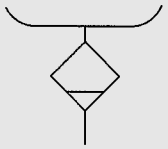
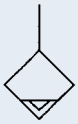
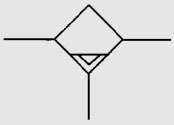
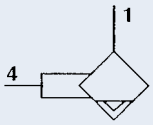
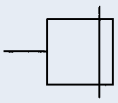
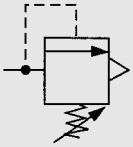
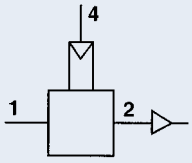
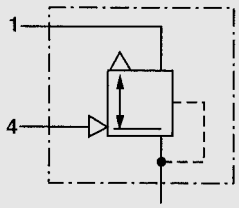
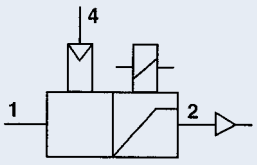
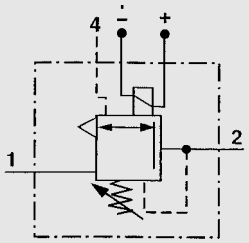
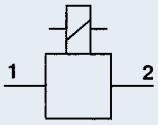
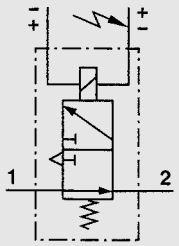
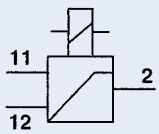
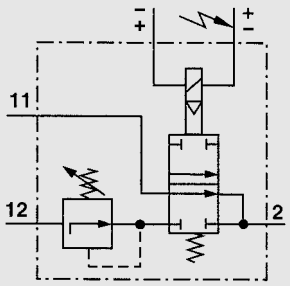
Drawing symbols in accordance with DIN 74253	Function symbols in accordance with DIN ISO 1219	Description
		Border for sub-assemblies: several devices combined in the block
		Arrows to show: The direction of flow Rotability, direction of rotation Travel and direction of flow within the equipment Diagonal arrow as sign of adjustability
Controls		
		Linkage, lever and mechanical connection
		Mechanical catch for pre-defined switch position.
		Mechanical control General Rotating Via linkage
		Mechanical control: Via hand lever Via running plate
		Triggers: Pneumatics Hydraulics Via control surfaces Via cut-off ports in the equipment

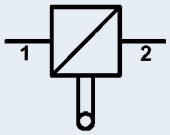
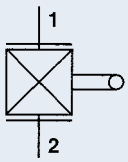
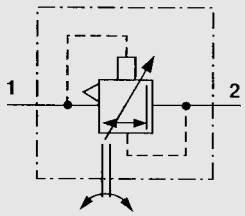
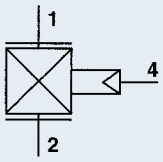
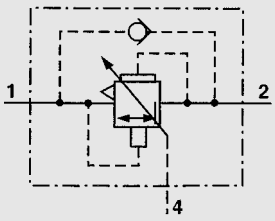
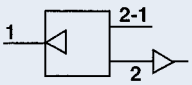
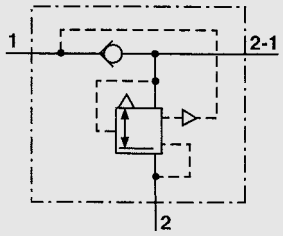
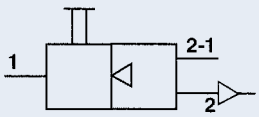
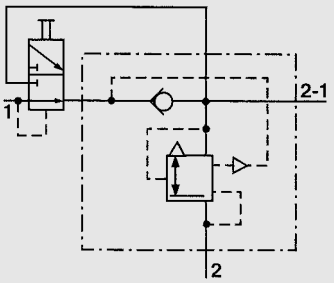
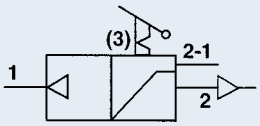
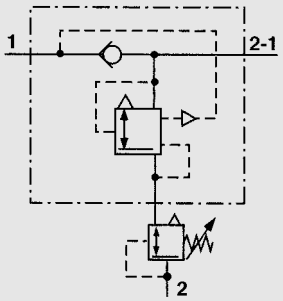
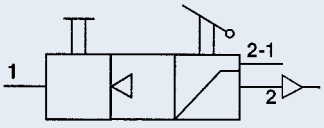
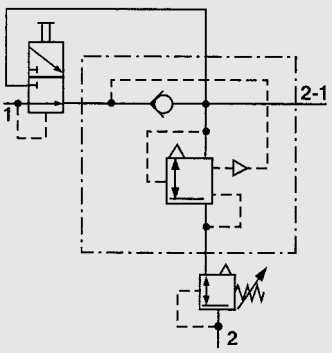
Drawing symbols in accordance with DIN 74253	Function symbols in accordance with DIN ISO 1219	Description
		Multiple control: Twin Via pressure drop Via increase in pressure Triple
		Electrical control: Via solenoid valve
 	 	Slack adjuster: Manual Automatic
Warning devices		
		Pressure gauge:: Single:
 	 	Pressure gauge: Double Low pressure indicator
 	 	Lamps Buzzers
Test connections and filling connections		
  	 	Test and filling connections: Within the lead On the equipment On the equipment with mechanical control
		Filling connection only: Not possible to remove

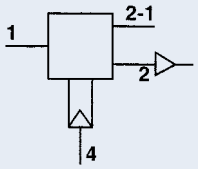
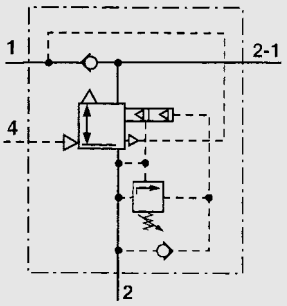
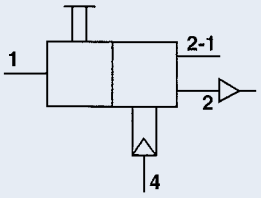
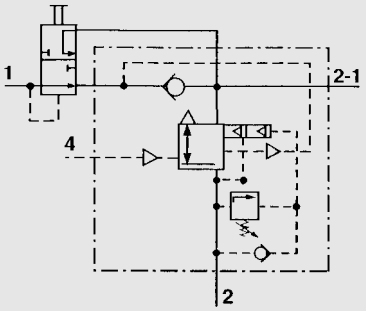
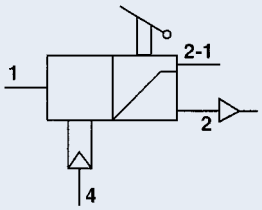
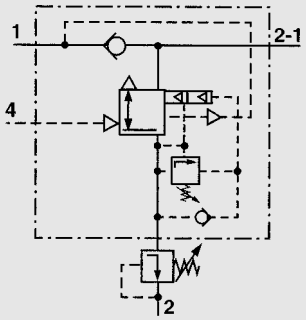
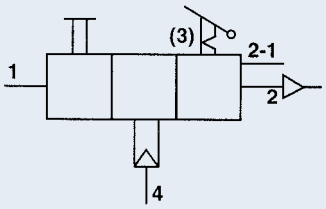
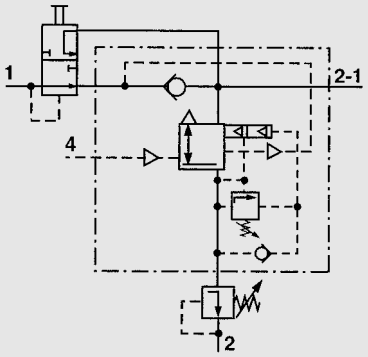
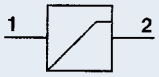
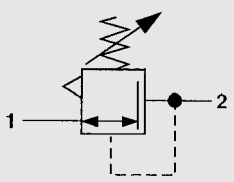
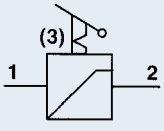
DIN/ISO Symbols

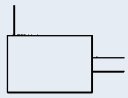
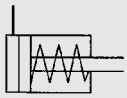
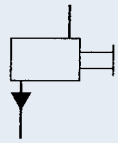
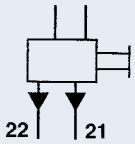
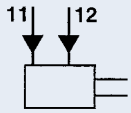
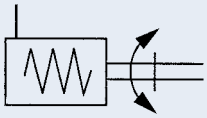
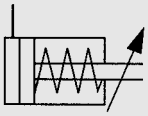
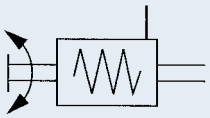
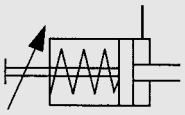
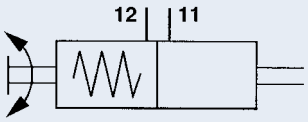
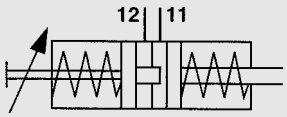
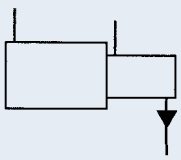
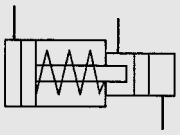
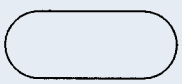
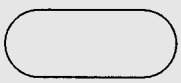
Drawing symbols in accordance with DIN 74253	Function symbols in accordance with DIN ISO 1219	Description
Valves		
		General valve: Square symbol
		3/2-directional control valve, manually operated
		Twin release valve
		Trailer Control Module
		Non-return valve
		Non-return valve with restricted backflow
		One-way restrictor
		Two-way valve

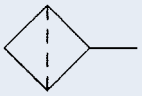
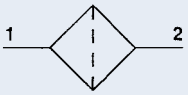
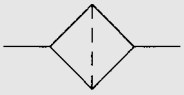
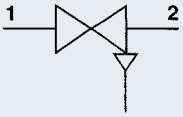
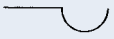
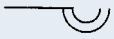
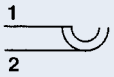
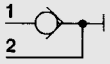
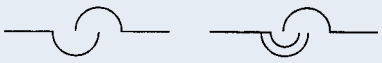
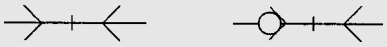
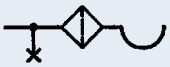
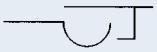
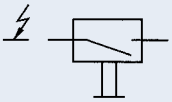
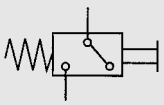
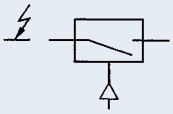
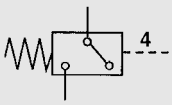
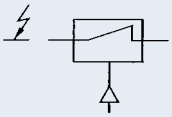
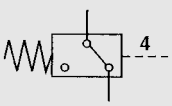
Drawing symbols in accordance with DIN 74253	Function symbols in accordance with DIN ISO 1219	Description
Valves		
		Throttle valve
		Quick exhaust valve
		Proportioning pressure regulator (control valve) with kinked characteristic curve
		Proportioning pressure regulator (control valve) with straight characteristic curve
		Overflow valve: Without backflow
		With backflow
		With restricted backflow
		Height control valve: With one energy outlet
		With two unequal energy outlets

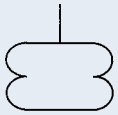
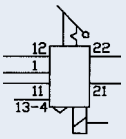
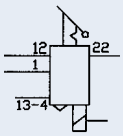
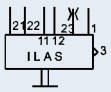
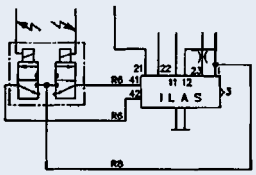
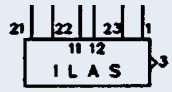
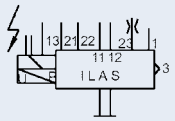
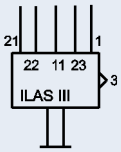
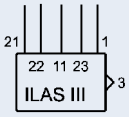
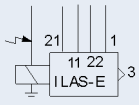
Drawing symbols in accordance with DIN 74253	Function symbols in accordance with DIN ISO 1219	Description
Valves		
		Water-drainage valve Manually operated
		Automatically operated
		Controlled by impulse
		Safety valve
		Relay valve
		With solenoid relay valve
		Solenoid valve
		Electromagnetically operated brake valve with pressure control

Drawing symbols in accordance with DIN 74253	Function symbols in accordance with DIN ISO 1219	Description
Valves		
		Control valve
		Automatic braking force regulator: Mechanically controlled
		Pneumatically controlled
		Trailer brake valve: Single line Without release valve
		With release valve
		With manually adjustable braking force regulator
		With release valve and manually adjustable braking force regulator

Drawing symbols in accordance with DIN 74253	Function symbols in accordance with DIN ISO 1219	Description
Valves		
		Trailer brake valve Dual line: Without release valve
		Trailer brake valve Dual line: With release valve
		With manually adjustable braking force regulator
		With manually adjustable braking force regulator and release valve
		Pressure control valve:
	—	Manually operated

Drawing symbols in accordance with DIN 74253	Function symbols in accordance with DIN ISO 1219	Description
Valves		
		Compressed air cyclinder:
		Hydraulic cylinder: Master cylinder, single circuit
		Master cylinder, dual circuit
		Hydraulic cylinder: Slave cylinder, single circuit
		Slave cylinder, dual circuit
		Spring loaded cylinder: Pulling with release device
		Pressing with release device
		Combination brake cylinder: Pressing with release device
		Servo-cylinder with hydraulic master cylinder
		Air brake reservoir
		Fluid container

Drawing symbols in accordance with DIN 74253	Function symbols in accordance with DIN ISO 1219	Description
Valves		
		Suction filter
		Line filter
		Shutoff valve
Without venting		
		With venting
		Coupling head
		Without shutoff device
		With shutoff device
		With shutoff device and two connections
		Coupled
		With filter
		With filter and test connection
		Dummy coupling
		Coupled
		Electric switch, N.O. contact, mechanically controlled
		N.O. contact, pneumatically controlled
		N.C. contact, pneumatically controlled
		General symbol

Drawing symbols in accordance with DIN 74253	Function symbols in accordance with DIN ISO 1219	Description
Valves		
	—	Pneumatic bellows
		COLAS Dual circuit
		Single circuit
	—	ILAS Manually controlled
	—	Manually controlled and electrically controlled
	—	Automatically controlled
	—	Automatically controlled with electric control
	—	ILAS III Manually controlled
	—	Automatically controlled
	—	ILAS-E
		Venting
		Venting Outlet ventilation
		Direct on the equipment
		With vent line
	—	Metal bellows

Identification of ports on components in air braking systems as per DIN ISO 6786

A standard has been drawn up in FAKRA and ISO regarding the identification of ports on components in air braking systems, and appeared as a Standard under the number DIN ISO 6786 in December 1981.

This Standard includes DIN 74 254, 04/1976 edition, in which the international standard ISO 6786, 06/1980 edition was incorporated unchanged.

The main features of the Standard are that ports on components

– are identified by numbers and not letters. This avoids the possibility of letters being incorrectly understood outside Germany.

– are not numbered consecutively, but instead the numbers of the port identification should themselves give an indication of the function of the port in the unit.

The identification consists of a number with up to two digits. The meaning of the first digit is:

0 vacuum connection

1 supply port

2 delivery port

3 port to atmosphere (exhaust)

4 control port

5 not used

6 not used

7 antifreeze port

8 lub. oil port (compressor)

9 coolant port (compressor)

A second digit is then to be added if a number of ports of the same kind are possible or present, e.g. where there are several circuits. The meaning of the second digit is left to the manufacturer. It should start at 1 and rise consecutively, e.g. 21, 12, 43, etc.

These mean:

21 = 1. delivery port

12 = 2. supply port

43 = 3. control port

If a modular system is employed, it may be necessary to deviate from this.

The following numbers may not be freely allocated:

71 antifreeze inlet

72 antifreeze outlet

81 lub. oil inlet

82 lub. oil inlet

91 coolant inlet

92 coolant outlet

Where there are a number of ports of the same kind coming from a single space, they are not distinguished. They are given the same identification.

If a port can fulfil several functions in one and the same installation, it must be identified by two (first) digits. These are to be separated by a horizontal dash. See the example.

If a connection can fulfil different functions in different installation instances, the identification must be agreed between the operator and manufacturer (e.g. directional control valves).

The identification should shown on the components next to the ports, and can also be situated next to the drawings of the ports in braking system layout diagrams.

It applies to air braking systems for motor vehicles and their trailers, including cases where the transmission equipment to the part is in part hydraulic.

A Relay Emergency Valve is given here as an example.

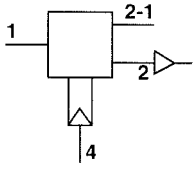
The ports here are:

1 supply port from the supply coupling head

2-1 delivery and supply port (connection to the air tank)

2 delivery port to the next brake component

4 control port from service coupling head



Brake

Assembly Diagrams

Semi-trailer with ABS

Semi-trailer with ABS and spring brake

Semi-trailer with EB+ and spring brake

Semi-trailer with EB+, Trailer Control Module and spring brake

Semi-trailer with EB+ (integr. two-way valve), Trailer Control Module and spring brake

Full trailer with ABS

Full trailer with ABS and spring brake

Full trailer with EB+, Trailer Control Module and spring brake

Air Suspension

Assembly Diagrams

Semi-trailer with COLAS

Semi-trailer with COLAS and height limitation

Semi-trailer with COLAS, ILAS-E and height limitation

Semi-trailer with COLAS, ILAS-E, height limitation and rapid exhaust

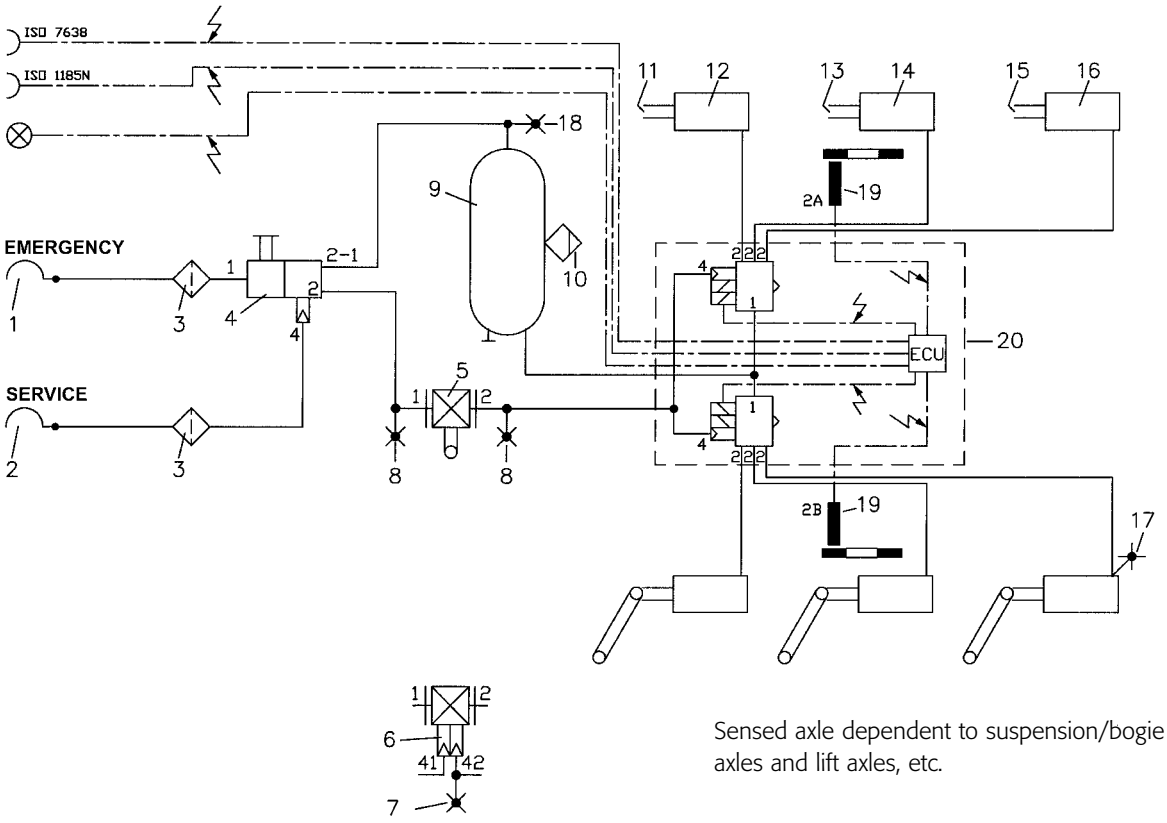
Semi-trailer with COLAS, ILAS-E, height limitation and rapid exhaust when unloading

Full trailer with 2 x COLAS

Full trailer with 2 x COLAS and height limitation

Full trailer with 2 x COLAS, ILAS III and height limitation

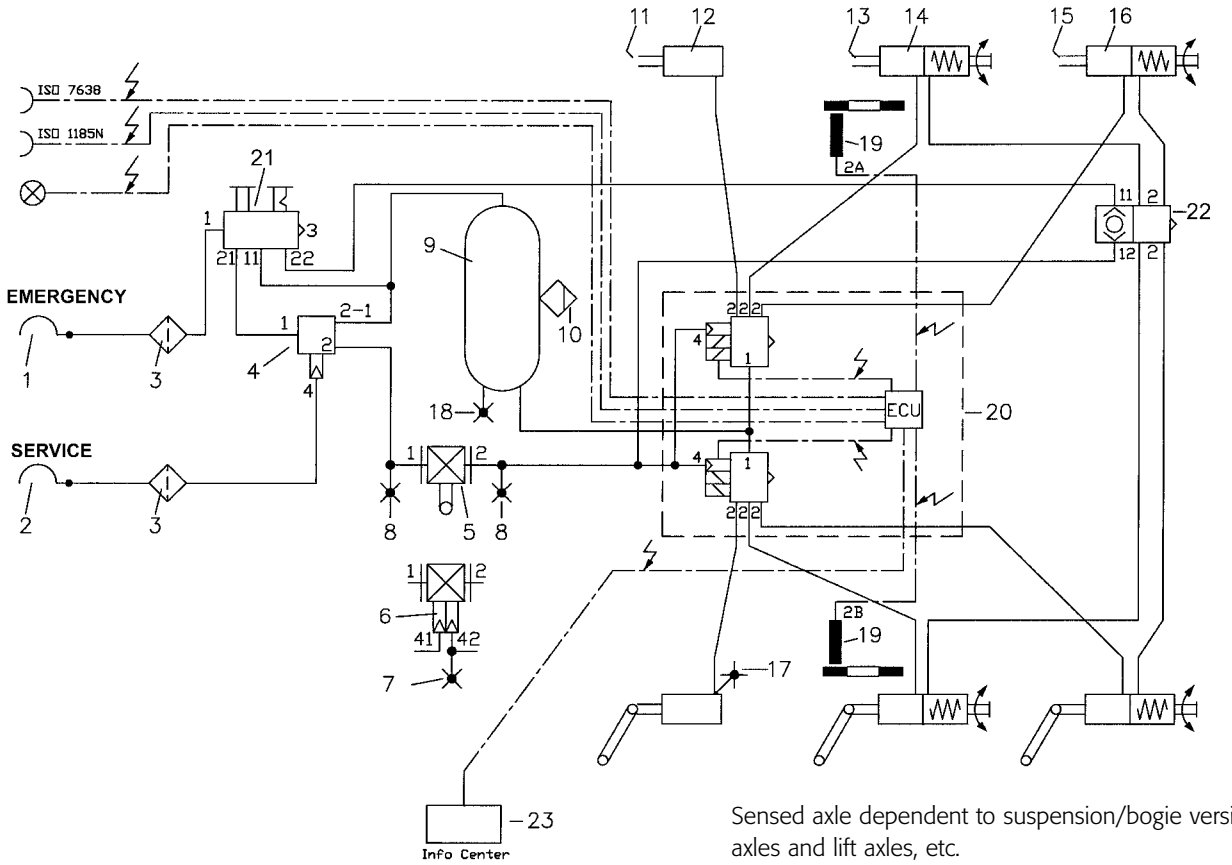
Semi trailer with ABS



Sensed axle dependent to suspension/bogie version, number of axles and lift axles, etc.

Pos.	Volume	Name	Part No
1	1	COUPLING HEAD "EMERGENCY"	334 055 ...
2	1	COUPLING HEAD "SERVICE"	334 054 ...
3	2	LINE FILTER	310 005 011
4	1	RELAY EMERGENCY VALVE with SHUNT VALVE	350 026 ...
5	1	LSV, mech.contr. (altern. to pneum.contr. LSV)	601 ... ...
6	1	LSV, pneum.contr. (altern. to mech.contr. LSV)	602 005 ...
7	1	SIMULATING POINT for pneum.contr. LSV	318 072 001
8	2	TEST POINT (ISO 3583) , M16*1.5-D=10mm	318 057 001
9	1	AIR TANK (EN) , V >= ... ltr.	030 09
10	1	DRAIN VALVE , manual	315 019 001
11	2	YOKE, LONG HOLE	003 0336 09
12	2	DIAPHRAGM CHAMBER, TYPE ..	120 ... 101
13	2	YOKE, LONG HOLE	003 0336 09
14	2	DIAPHRAGM CHAMBER, TYPE ..	120 ... 101
15	1	YOKE, LONG HOLE	003 0336 09
16	1	DIAPHRAGM CHAMBER, TYPE ..	120 ... 101
17	1	TEST POINT (ISO 3583), M 16*1.5	318 078 001
18	1	TEST POINT (ISO 3583), M 22*1.5	318 040 001
19	2	SENSOR with SLEEVE	950 364 503
20	1	MODULAR - ABS - KIT (2S/2M)	364 ... ...
		Addition for ABS:	
	1	Wiring for MODULAR 2	364 ... ...
	1	POWER CABLE (ISO 7638)	364 ... ...
	1	POWER CABLE (ISO 1185) Option	364 ... ...

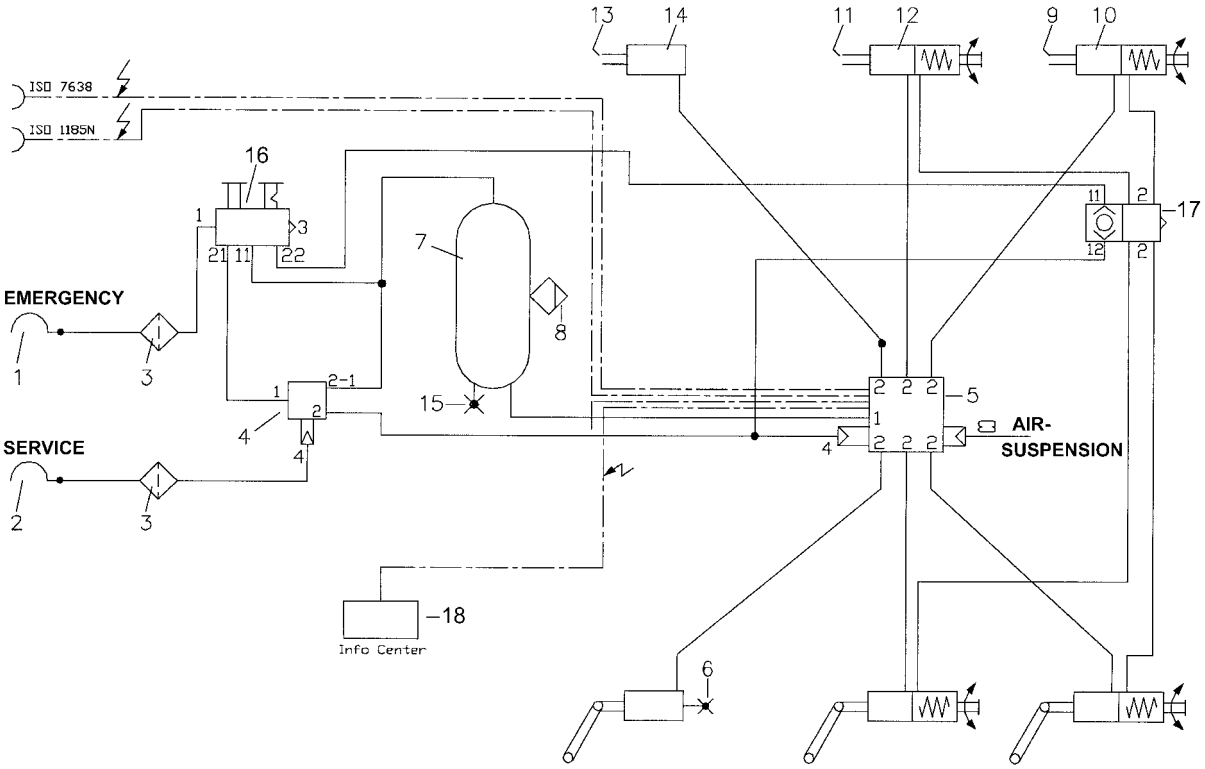
Semi trailer with ABS and spring brakes



Sensed axle dependent to suspension/bogie version, number of axles and lift axles, etc.

Pos.	Volume	Name	Part No	
1	1	COUPLING HEAD “EMERGENCY”	334 055 ...	
2	1	COUPLING HEAD “SERVICE”	334 054 ...	
3	2	LINE FILTER	310 005 011	
4	1	RELAY EMERGENCY VALVE w. PREDOMINANCE	351 008 ...	
5	1	LSV, mech.contr. (altern. to pneum.contr. LSV)	601 … …	
6	1	LSV, pneum.contr. (altern. to mech.contr. LSV)	602 005 ...	
7	1	SIMULATING POINT for pneum.contr. LSV	318 072 001	
8	2	TEST POINT (ISO 3583) , M16*1.5-D=10mm	318 057 001	
9	1	AIR TANK (EN), V >= ... ltr.	030 09	
10	1	DRAIN VALVE, manual	315 019 001	
11	2	YOKE	003 6164 09	
12	2	DIAPHRAGM CHAMBER, TYPE	120 ... 101	
13	2	YOKE	003 6164 09	
14	2	COMBINED SERVICE/SPRING BRAKE CHAMBER, TYPE../..	346 … …	
15	1	YOKE	003 6164 09	
16	2	COMBINED SERVICE/SPRING BRAKE CHAMBER, TYPE../..	346 … …	
17	1	TEST POINT (ISO 3583), M 16*1.5	318 078 001	
18	1	TEST POINT (ISO 3583), M 22*1.5	318 040 001	
19	2	SENSOR with SLEEVE	950 364 503	
20	1	MODULAR 2 - KIT	364 315 ... or	364 308 ...
21	1	DOUBLE PUSH/PULL VALVE	352 045 001	
22	1	COMBINED QUICK RELEASE/2-WAY VALVE	350 036 …	
		Addition for ABS:		
	1	POWER CABLE 12m (ISO 7638)	364 357 021	
	1	INFO - CENTRE	Option	364 317 …
	1	WIRING for MODULAR 2 (2S/2M)	364 … …	

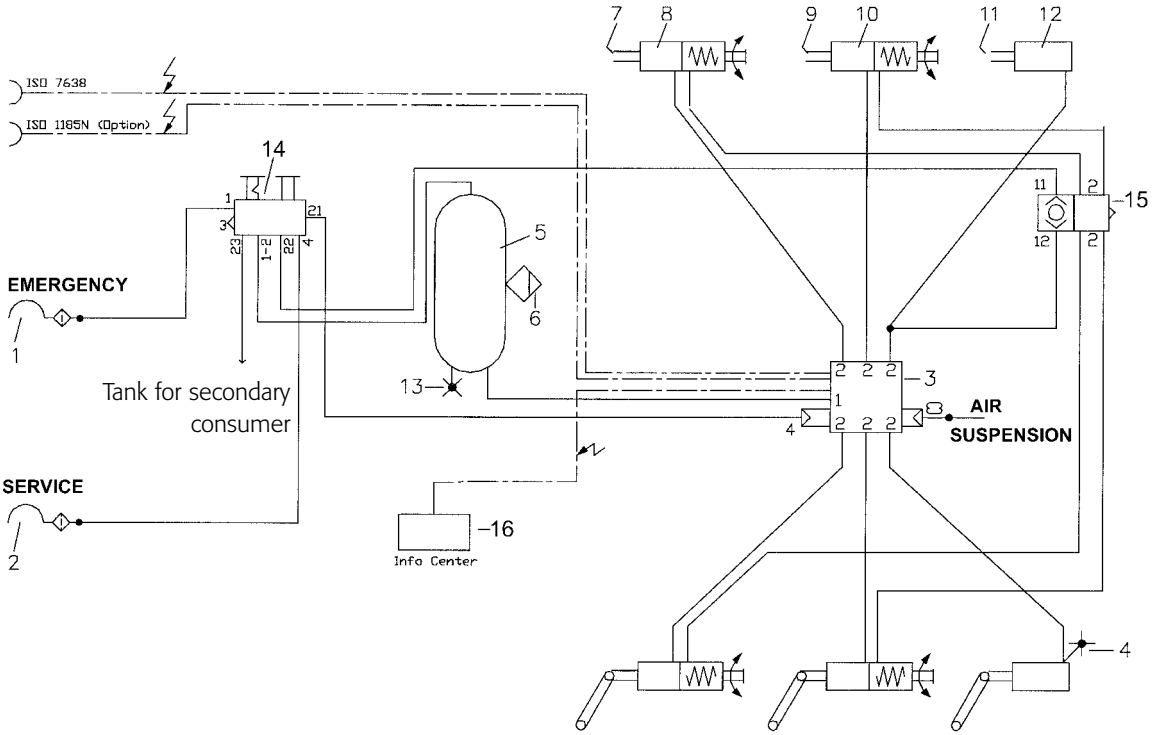
Semi trailer with EB+ and spring brakes



Pos.	Volume	Name	Part No
1	1	COUPLING HEAD "EMERGENCY"	334 055 ...
2	1	COUPLING HEAD "SERVICE"	334 054 ...
3	2	LINE FILTER	310 005 011
4	1	RELAY EMERGENCY VALVE for EBS - SYSTEM	351 033 ...
5	1	EB+ SYSTEM, alternative 2S/1M or 2S/2M or 4S/2M	810 ... ...
6	2	TEST POINT (ISO 3583), M 16*1.5	318 078 001
7	1	AIR TANK (EN), V >= ... ltr.	030 09
8	1	DRAIN VALVE, manual	315 019 001
9	2	YOKE	003 6164 09
10	2	COMBINED SERVICE/SPRING BRAKE CHAMBER, TYPE../..	346 ... ...
11	2	YOKE	003 6164 09
12	2	COMBINED SERVICE/SPRING BRAKE CHAMBER, TYPE../..	346 ... ...
13	2	YOKE	003 6164 09
14	2	DIAPHRAGM CHAMBER, TYPE	120 ... 101
15	1	TEST POINT (ISO 3583), M 22*1.5	318 040 001
16	1	DOUBLE PUSH/PULL VALVE	352 045 001
17	1	COMBINED QUICK RELEASE/2-WAY VALVE	350 036 ...

		Addition for EB+:	
	1	CABLE for EBS 24N - ISO 1185	814 ... ...
	1	POWER CABLE - ISO 7638	814 ... ...
	4	SENSOR KIT (acc. to System 2 or 4 Stück)	950 ... ...
18	1	INFO - CENTRE	(Option) 815 ... ...

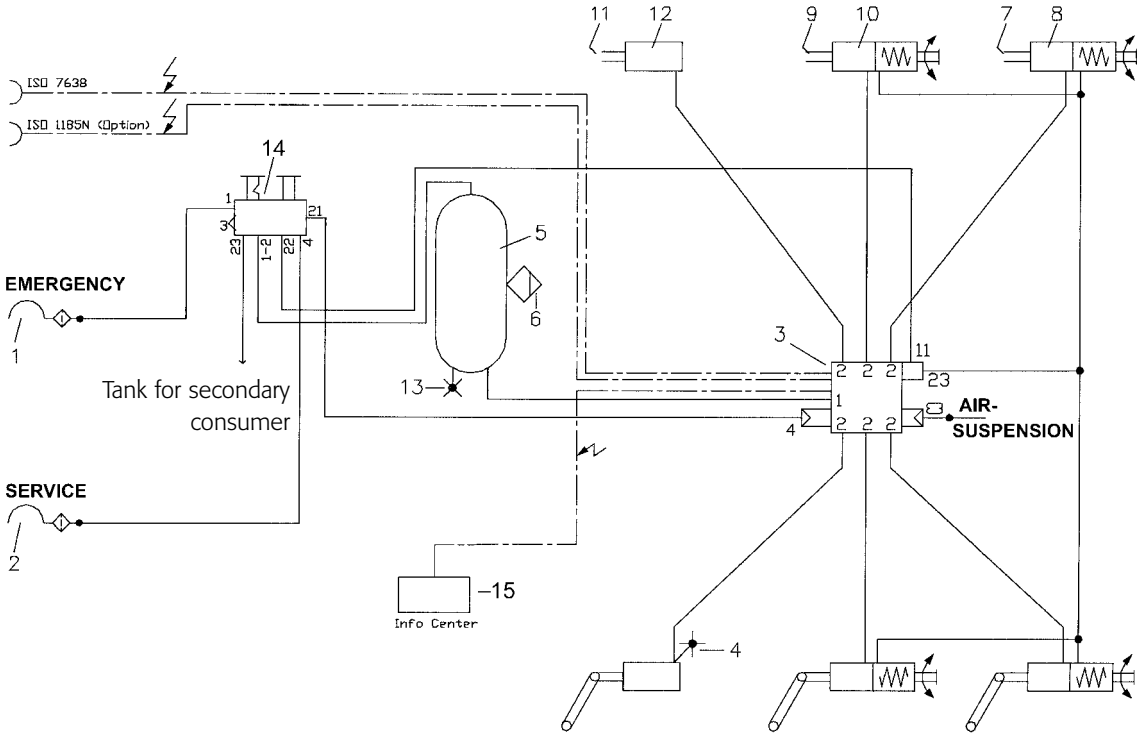
Semi trailer with EB+, Trailer Control Module and spring brakes



Pos.	Volume	Name	Part No
1	1	COUPLING HEAD with FILTER "EMERGENCY"	334 055 411
2	1	COUPLING HEAD with FILTER "SERVICE"	334 054 411
3	1	EB+ SYSTEM, alternative 2S/1M or 2S/2M or 4S/2M	810 ... ...
4	1	TEST POINT (ISO 3583), M 16*1.5	318 078 001
5	1	AIR TANK (EN), V >= ... ltr.	030 09
6	1	DRAIN VALVE, manual	315 019 001
7	2	YOKE	003 6164 09
8	2	COMBINED SERVICE/SPRING BRAKE CHAMBER, TYPE../..	... ...
9	2	YOKE	003 6164 09
10	2	COMBINED SERVICE/SPRING BRAKE CHAMBER, TYPE../..	... ...
11	2	YOKE	003 6164 09
12	2	DIAPHRAGM CHAMBER, TYPE	... ...
13	1	TEST POINT (ISO 3583), M 22*1.5	318 040 001
14	1	TRAILER CONTROL MODULE	352 067 001
15	1	COMBINED QUICK RELEASE/2-WAY VALVE	350 036 ...

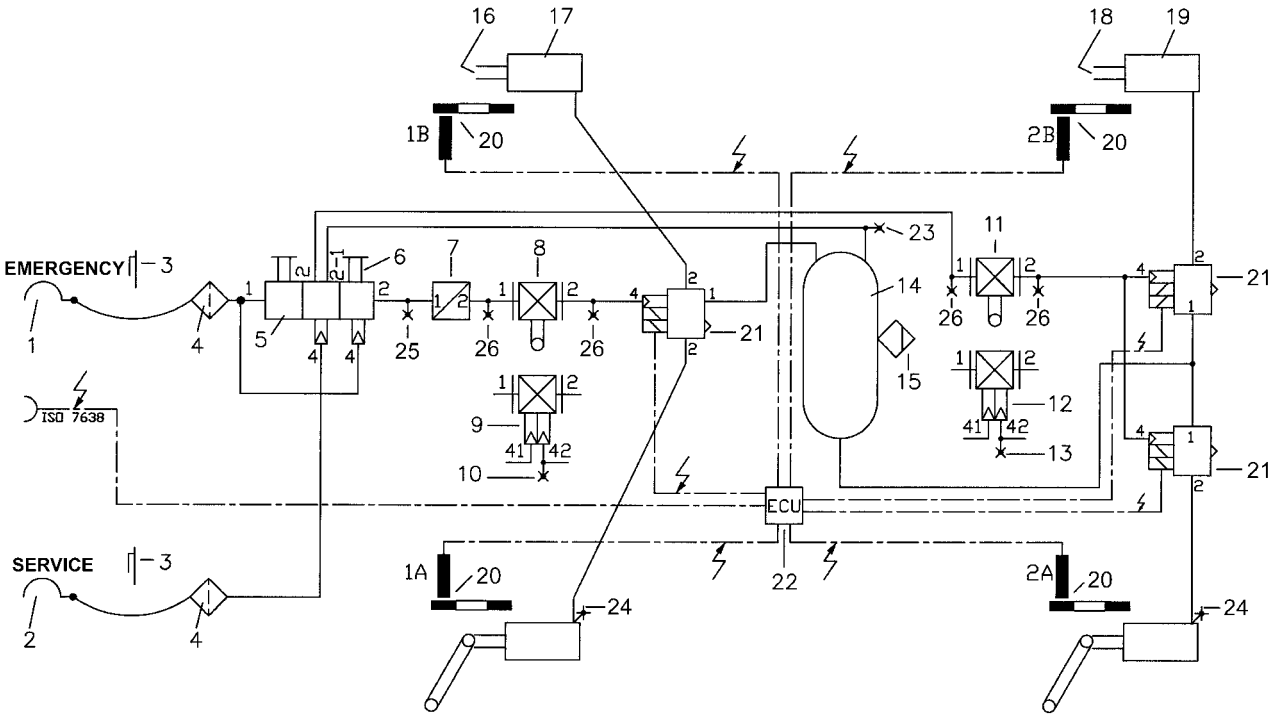
		Addition for EB+:	
	1	CABLE for EBS 24N - ISO 1185	814 ... ...
	1	POWER CABLE - ISO 7638	814 ... ...
	4	SENSOR KIT (acc. to System 2 or 4 Stück)	950 364 503
16	1	INFO - CENTRE	(Option) 815 ... ...

Semi trailer with EB+ (integr. 2-way valve), Trailer Control Module and spring brakes



Pos.	Volume	Name	Part No
1	1	COUPLING HEAD with FILTER "EMERGENCY"	334 055 411
2	1	COUPLING HEAD with FILTER "SERVICE"	334 054 411
3	1	EB+ SYSTEM, alternative 2S/1M or 2S/2M or 4S/2M	810 .. ...
4	1	TEST POINT (ISO 3583), M 16*1.5	318 078 001
5	2	AIR TANK (EN), V >= ... ltr.	030 09
6	2	DRAIN VALVE, manual	315 019 001
7	2	YOKE	003 6164 09
8	2	COMBINED SERVICE/SPRING BRAKE CHAMBER, TYPE../..	... ...
9	2	YOKE	003 6164 09
10	2	COMBINED SERVICE/SPRING BRAKE CHAMBER, TYPE../..	... ...
11	2	YOKE	003 6164 09
12	2	DIAPHRAGM CHAMBER, TYPE	... ...
13	1	TEST POINT (ISO 3583), M 22*1.5	318 040 001
14	1	TRAILER CONTROL MODULE	352 067 001
		Addition for EB+:	
	1	CABLE for EBS 24N - ISO 1185	814 ... ...
	1	POWER CABLE - ISO 7638	814 ... ...
	4	SENSOR KIT (acc. to System 2 or 4 Off)	950 364 503
15	1	INFO - CENTRE	(Option) 815 ... ...

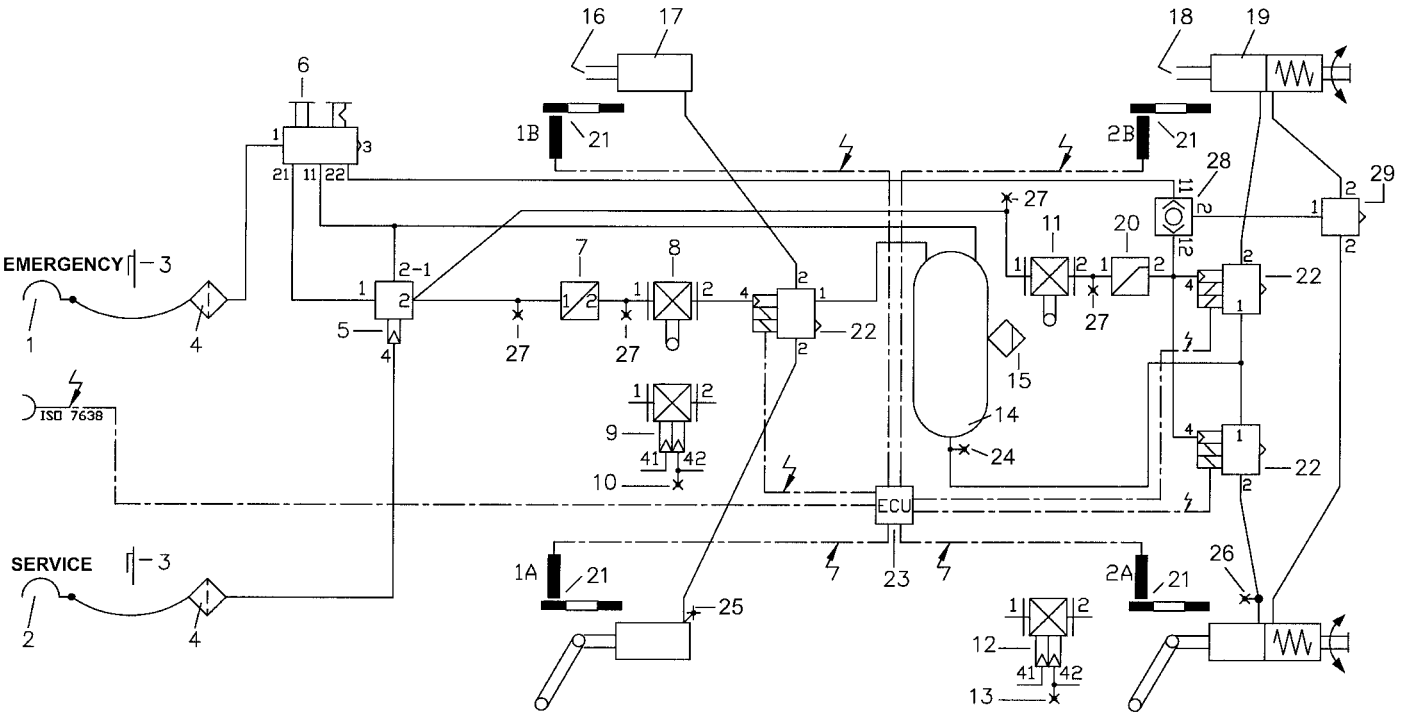
Full trailer with ABS



Pos.	Volume	Name	Part No
1	1	COUPLING HEAD “EMERGENCY”	334 055 ...
2	1	COUPLING HEAD “SERVICE”	334 054 ...
3	2	DUMMY COUPLING	334 028 001
4	1	LINE FILTER	310 005 011
5	1	RELAY EMERGENCY VALVE with SHUNT VALVE	350 026 ...
6	1	SHUNT VALVE, autom. for front axle	352 007 401
7	1	REGULATING VALVE with kinked CHARACTERISTIC	356 005 ...
8	1	LSV, mech.contr. (altern. to pneum.contr. LSV)	601 ... ...
9	1	LSV, pneum.contr. (altern. to mech.contr. LSV)	602 005 ...
10	1	SIMULATING POINT for pneum.contr. LSV	318 072 001
11	1	LSV, mech.contr. (altern. to pneum.contr. LSV)	601 ... ...
12	1	LSV, pneum.contr. (altern. to mech.contr. LSV)	602 005 ...
13	1	SIMULATING POINT for pneum.contr. LSV	318 072 001
14	1	AIR TANK (EN), V = ... ltr.	030 09
15	1	DRAIN VALVE, manual	315 019 001
16	2	YOKE	003 6164 09
17	1	DIAPHRAGM CHAMBER, TYPE	120 ... 101
18	2	YOKE	003 0336 09
19	1	DIAPHRAGM CHAMBER, TYPE	120 ... 101
20	4	SENSOR with SLEEVE	950 364 503
21	3	MODAL-ABS-VALVE	364 ... ...
22	1	ABS-BOX (MODAL-ABS)	364 129 ...
23	1	TEST POINT (ISO 3583), M 22*1.5	318 040 001
24	2	TEST POINT (ISO 3583), M 16*1.5	318 078 001
25	1	TEST POINT (ISO 3583), M 12*1.5	318 036 001
26	4	TEST POINT (ISO 3583), M16*1.5-D=10mm	318 057 001

		Addition for ABS:	
	1	POWER CABLE 12 m (ISO 7638)	364 123 001
	3	VALVE CABLE, red, blue, yellow (on demand)	364 122 ...
	4	SENSOR CABLE (on demand 3, 5, 8 or 10 m)	364 ... ...

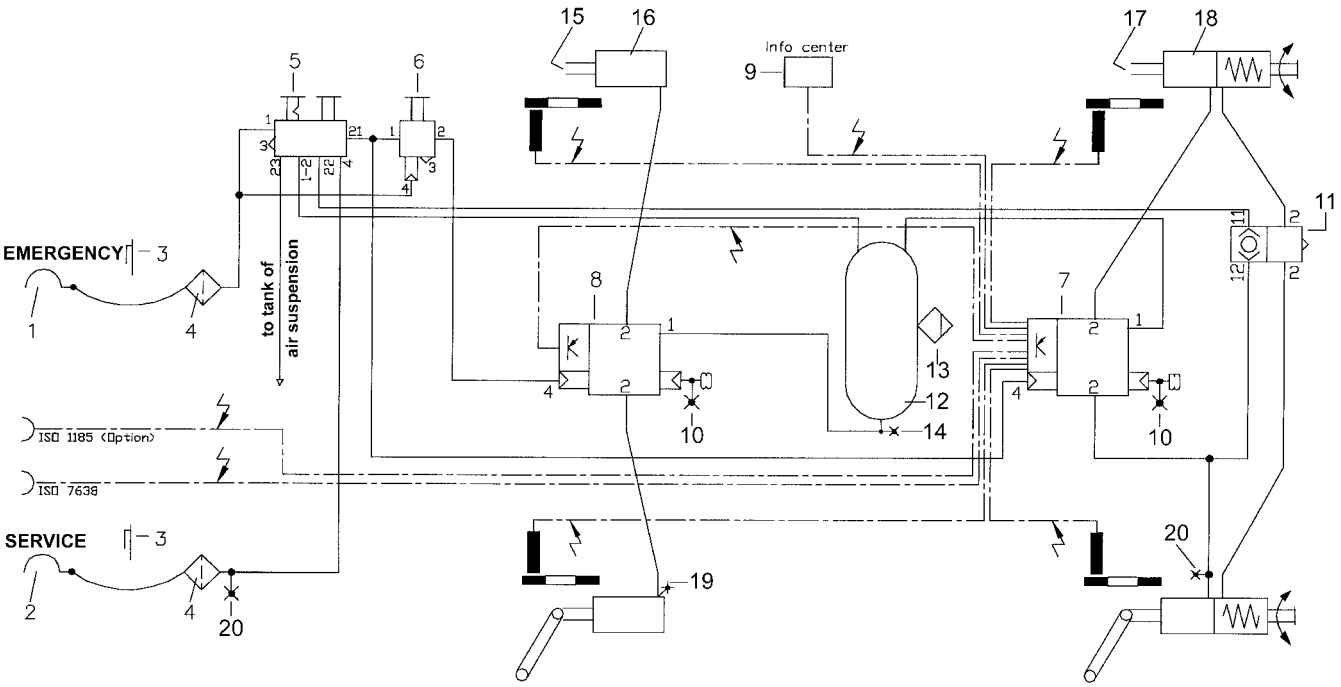
Full trailer with ABS and spring brakes



Pos.	Volume	Name	Part No
1	1	COUPLING HEAD "EMERGENCY"	334 055 ...
2	1	COUPLING HEAD "SERVICE"	334 054 ...
3	2	DUMMY COUPLING	334 028 001
4	2	LINE FILTER	310 005 011
5	1	RELAY EMERGENCY VALVE with PREDOMINANCE	351 008 ...
6	1	DOUBLE PUSH/PULL VALVE	352 045 001
7	1	REGULATING VALVE with kinked CHARACTERISTIC	356 005 ...
8	1	LSV, mech.contr. (altern. to pneum.contr. LSV)	601 ... ...
9	1	LSV, pneum.contr. (altern. to mech.contr. LSV)	602 005 ...
10	1	SIMULATING POINT for pneum.contr. LSV	318 072 001
11	1	LSV, mech.contr. (altern. to pneum.contr. LSV)	601 ... ...
12	1	LSV, pneum.contr. (altern. to mech.contr. LSV)	602 005 ...
13	1	SIMULATING POINT for pneum.contr. LSV	318 072 001
14	1	AIR TANK (EN), V = ... ltr.	030 09
15	1	DRAIN VALVE, manual	315 019 001
16	2	YOKE	003 6164 09
17	2	DIAPHRAGM CHAMBER, TYPE	120 ... 101
18	2	YOKE	003 6164 09
19	2	COMBINED SERVICE/SPRING BRAKE CHAMBER, TYPE../..	346 ... ...
20	1	PRESSURE LIMITING VALVE, setable	357 012 031
21	4	SENSOR with SLEEVE	950 364 503
22	3	MODAL-ABS-VALVE	364 ... ...
23	1	ABS-ECU for MODAL	364 ... ...
24	1	TEST POINT(ISO 3583), M 22*1.5	318 040 001
25	1	TEST POINT (ISO 3583), M 16*1.5	318 078 001
26	1	TEST POINT (ISO 3583), M 12*1.5	318 036 001
27	4	TEST POINT (ISO 3583), M16*1.5-D=10mm	318 057 001
28	1	2-WAY VALVE	333 004 001
29	1	QUICK RELEASE VALVE	356 023 ...
	1	Alternative for Pos. 28 and 29: COMBINED QUICK RELEASE VALVE with 2-WAY VALVE	350 037 ...

	Addition for ABS:	
1	Power supply cable12 m(ISO 7638) DA	364 123 001
3	Valve cable, red, blue yellow (depending on requirement)	364 122 ...
4	Sensor cable (depending on requirement 3, 5, 8, or 10 m)	364

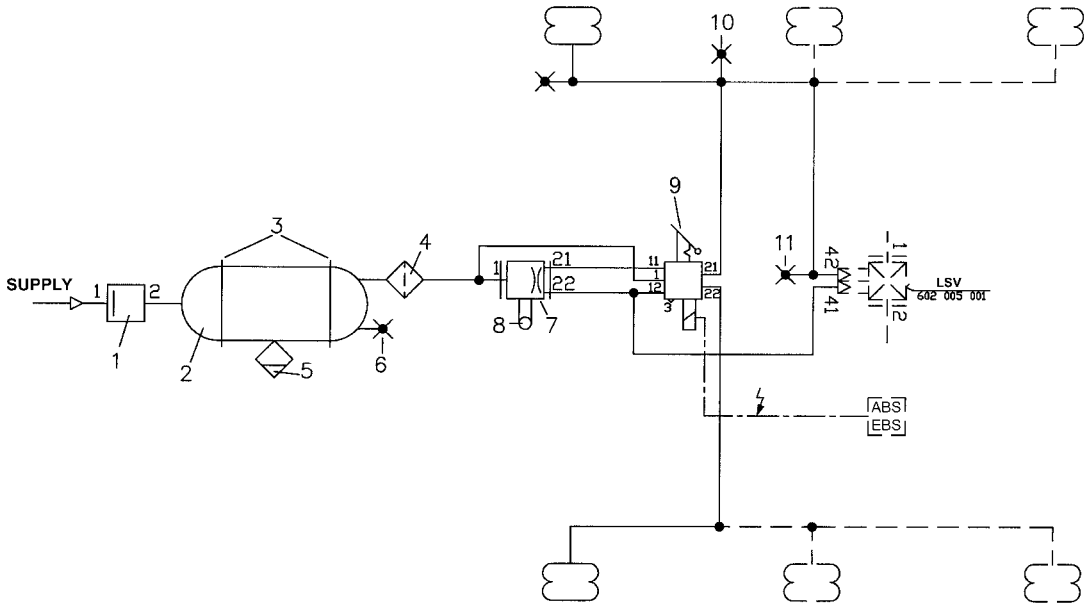
Full trailer with EB+, Trailer Control Module and spring brakes



Pos.	Volume	Name	Part No
1	1	COUPLING HEAD “EMERGENCY”	334 055 ...
2	1	COUPLING HEAD “SERVICE”	334 054 ...
3	2	DUMMY COUPLING	334 028 001
4	2	LINE FILTER	310 005 011
5	1	TRAILER CONTROL MODULE	352 067 001
6	1	SHUNT VALVE, autom. for front axle 352 007 ... or	352 005 ...
7	1	EBS MODULATOR with ECU (MASTER-ECU)	810 ... ...
8	1	EBS MODULATOR with ECU (SLAVE-ECU)	810 ... ...
9	1	INFO – CENTRE (Option)	815 ... ...
10	2	SIMULATING POINT for air suspension pressure	318 072 001
11	1	COMBINED QUICK RELEASE VALVE with 2-WAY VALVE	350 037 111
12	1	AIR TANK (EN), V >= ... ltr.	030 09
13	1	DRAIN VALVE, manual	315 019 001
14	1	TEST POINT (ISO 3583), M 22*1.5	318 040 001
15	2	YOKE	003 09
16	2	DIAPHRAGM CHAMBER, TYPE	... ...
17	2	YOKE	003 09
18	2	COMBINED SERVICE/SPRING BRAKE CHAMBER, TYPE../..	... ...
19	1	TEST POINT (ISO 3583), M 16*1.5	318 078 001
20	2	TEST POINT (ISO 3583), M 12*1.5	318 036 001
	2	CLAMP BAND for AIR TANK, D = ... mm	030 09

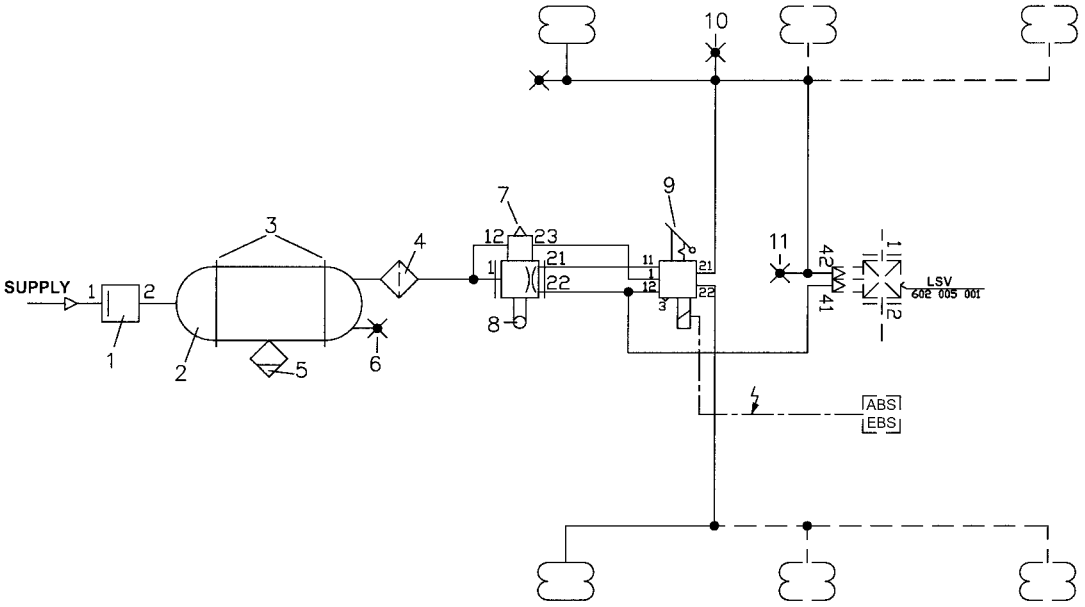
	Addition for EB+:	
1	LABEL (EBS)	028 5262 09
1	POWER CABLE - ISO 7638	814 ... ...
1	POWER CABLE - ISO 1185 (Option)	814 ... ...
1	REMOTE CABLE (MASTER-SLAVE)	814 ... ...
1	SENSOR KIT	950 ... ...

Semi trailer with COLAS



Pos.	Volume	Name	Part No
1	1	PRESSURE PROTECTION VALVE w/o backflow	314 012 104
2	1	AIR TANK (EN), V >= ... ltr.	030 09
3	2	CLAMP BAND, D = ... mm	030 09
4	1	LINE FILTER	310 005 011
5	1	DRAIN VALVE, manual	315 019 001
6	1	TEST POINT (ISO 3583), M 22*1.5	318 040 001
7	1	LEVELLING VALVE (NYLON)	612 035 ...
8	1	LINKAGE	612 025 001
9	1	COLAS with RtR	338 051 ...
10	2	TEST POINT (ISO 3583), M 12*1.5	318 036 001
11	1	SIMULATING POINT for LSV	318 072 001

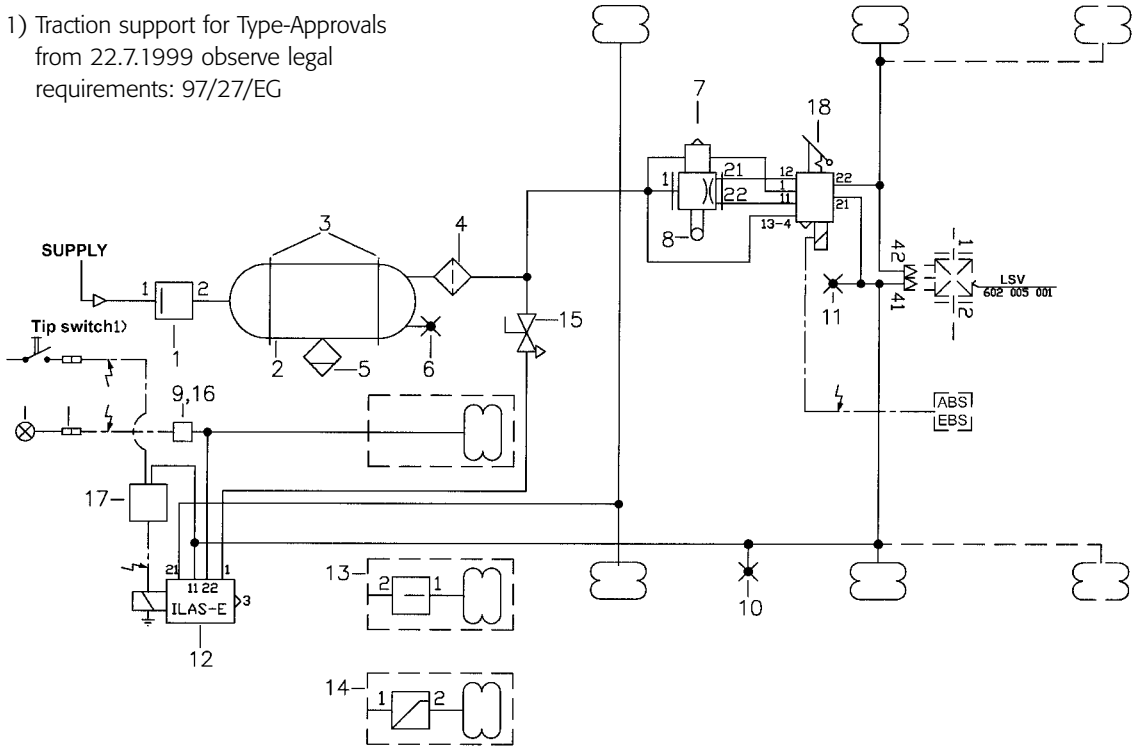
Semi trailer with COLAS and Height limitation



Pos.	Volume	Name	Part No
1	1	PRESSURE PROTECTION VALVE w/o backflow	314 012 104
2	1	AIR TANK (EN), V >= ... ltr.	030 09
3	2	CLAMP BAND, D = ... mm	030 09
4	1	LINE FILTER	310 005 011
5	1	DRAIN VALVE, manual	315 019 001
6	1	TEST POINT (ISO 3583), M 22*1.5	318 040 001
7	1	LEVELLING VALVE with HEIGHT LIMITATION	612 032 ...
8	1	LINKAGE	612 025 001
9	1	COLAS with RtR	338 051 ...
10	2	TEST POINT (ISO 3583), M 12*1.5	318 036 001
11	1	SIMULATING POINT for LSV	318 072 001

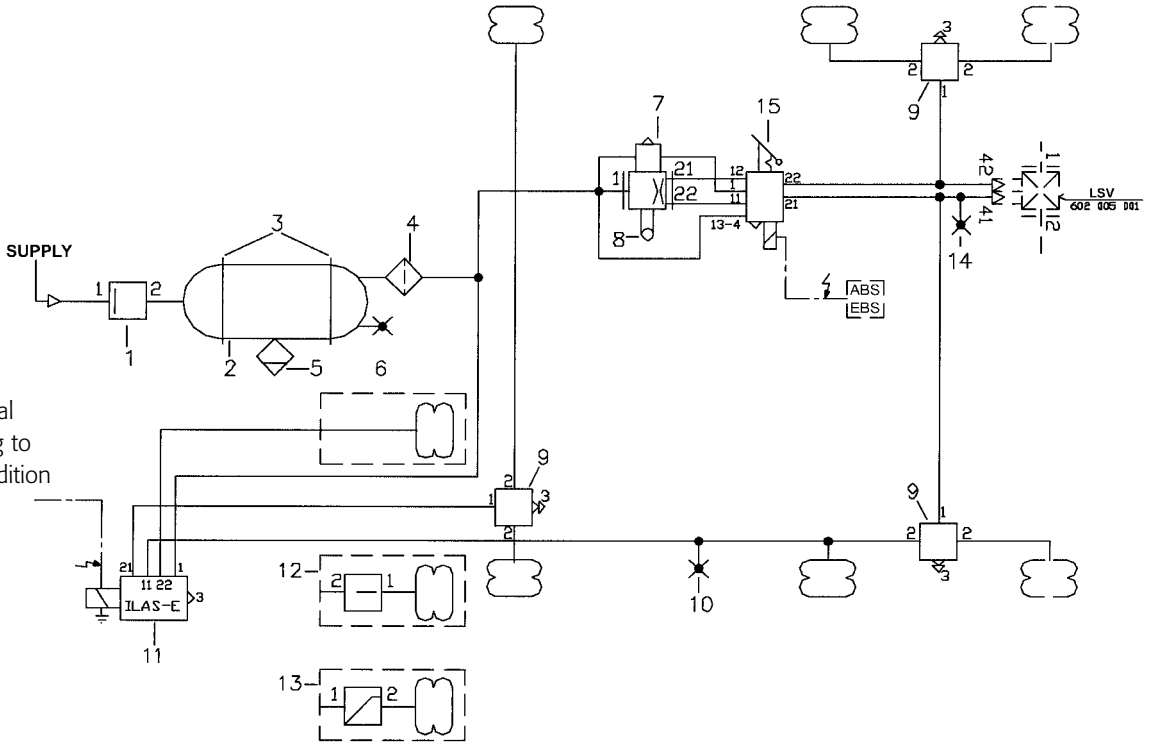
Semi trailer with COLAS, ILAS-E and Height limitation

1) Traction support for Type-Approvals from 22.7.1999 observe legal requirements: 97/27/EG



Pos.	Volume	Name	Part No	
1	1	PRESSURE PROTECTION VALVE w/o backflow	314 012 104	
2	1	AIR TANK (EN), V >= ... ltr.	030 09	
3	2	CLAMP BAND, D = ... mm	030 09	
4	1	LINE FILTER	310 005 011	
5	1	DRAIN VALVE, manual	315 019 001	
6	1	TEST POINT (ISO 3583), M 22*1.5	318 040 001	
7	1	LEVELLING VALVE with HEIGHT LIMITATION	612 032 001	
8	1	LINKAGE	612 025 001	
9	1	PRESSURE SWITCH	361 007 ...	
10	1	TEST POINT (ISO 3583), M 12*1.5	318 036 001	
11	1	SIMULATING POINT for LSV	318 072 001	
12	1	ILAS - E	352 061 … or	352 062 …
13	1	PRESSURE PROTECTION VALVE with BACKFLOW to keep RESIDUAL PRESSURE	314 013 012	
14	1	PRESSURE LIMITING VALVE, SETABLE	357 012 031	
15	1	SHUT-OFF COCK with exhaust (FOR SERVICE)	334 047 001	
16	1	PROTECTIVE CAP for Pos. 9	025 0500 09	
17	1	PRESSURE SWITCH	041 0133 09	
18	1	COLAS with RtR	338 051 012	

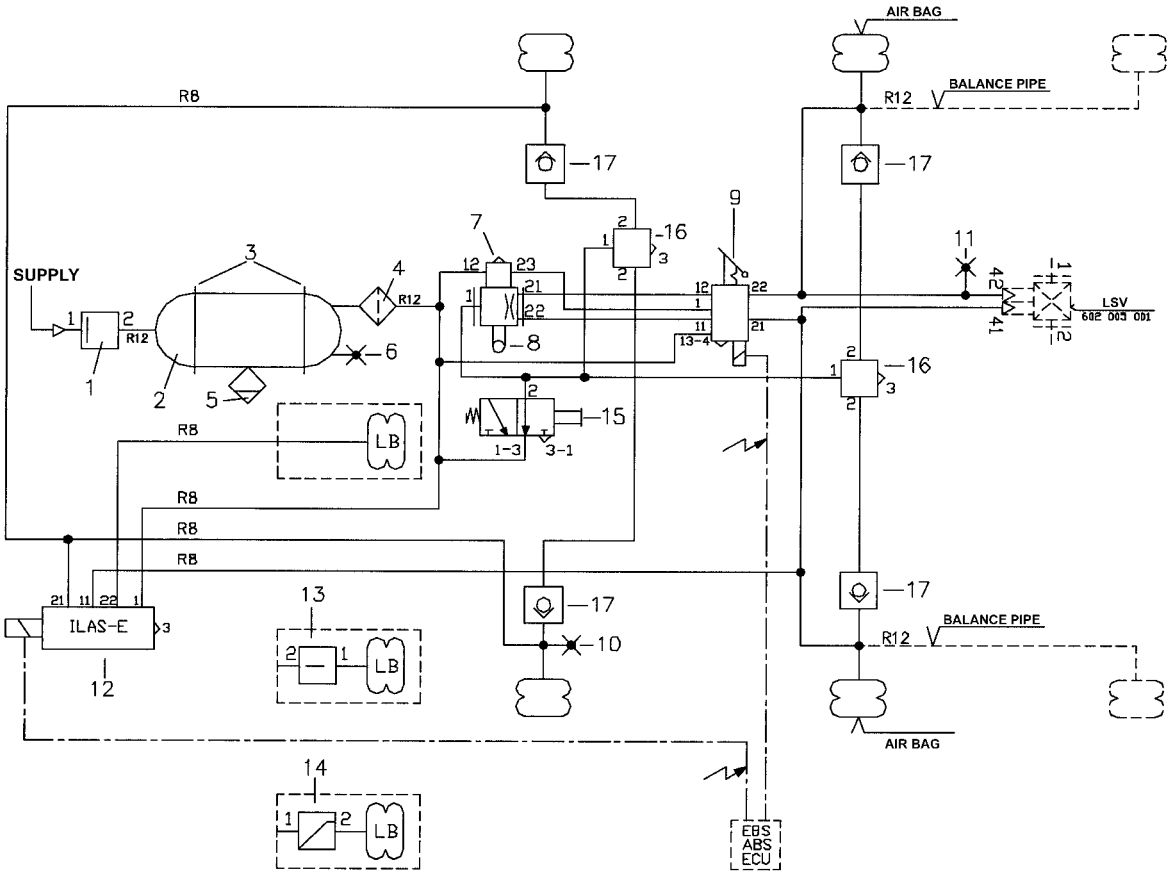
Semi trailer with COLAS, ILAS-E, Height limitation and quick exhaust



Pos.	Volume	Name	Part No	
1	1	PRESSURE PROTECTION VALVE w/o backflow	314 012 104	
2	1	AIR TANK (EN), V >= ... ltr.	030 09	
3	2	CLAMP BAND, D = ... mm	030 09	
4	1	LINE FILTER	310 005 011	
5	1	DRAIN VALVE, manual	315 019 001	
6	1	TEST POINT (ISO 3583), M 22*1.5	318 040 001	
7	1	LEVELLING VALVE with HEIGHT LIMITATION	612 032 ...	
8	1	LINKAGE	612 025 001	
9	3	QUICK RELEASE VALVE	356 001 011	
10	1	TEST POINT (ISO 3583), M 12*1.5	318 036 001	
11	1	ILAS-E*	352 061 001 or	352 062 001
12	1	PRESSURE PROTECTION VALVE with BACKFLOW to keep RESIDUAL PRESSURE (e.g SAF)	314 013 012	
13	1	PRESSURE LIMITING VALVE, SETABLE (e.g. BPW)	357 012 031	
14	1	SIMULATING POINT for LSV	318 072 001	
15	1	COLAS with RtR	338 051 011 or	338 051 012

*) Item 11, ILAS with thread M16*15
Or alternatively with plug and socket connections

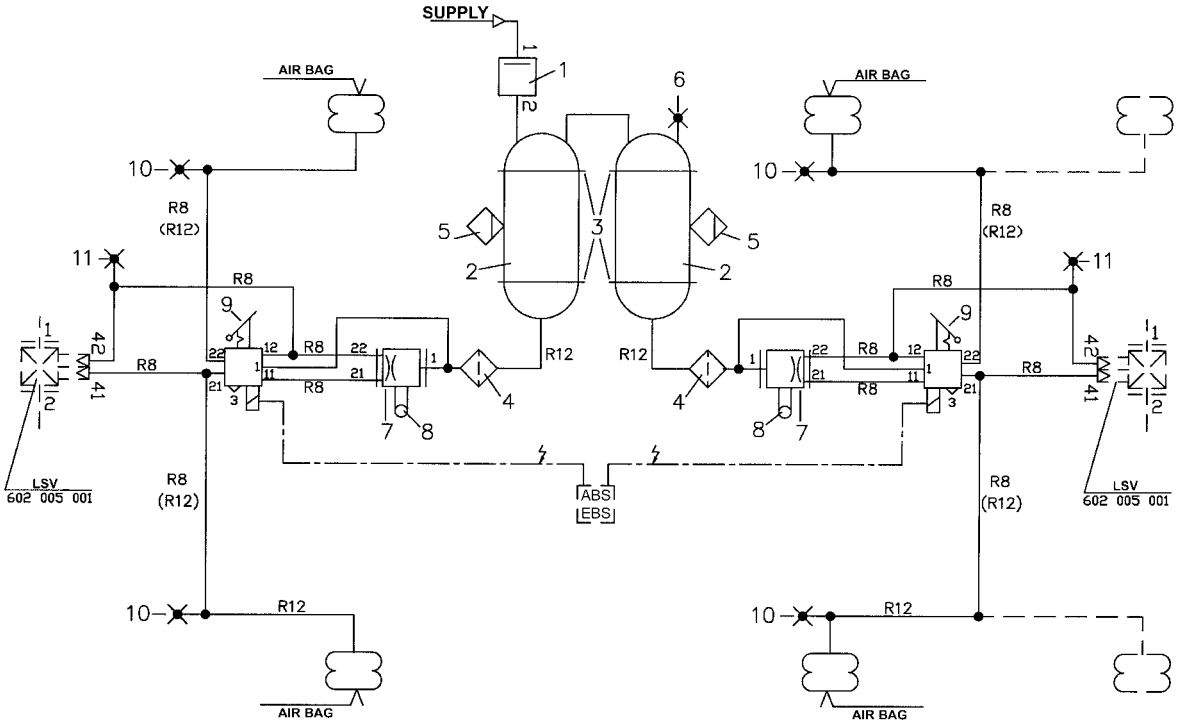
Semi trailer with COLAS, ILAS-E, Height limitation and quick exhaust



Pos.	Volume	Name	Part No	
1	1	PRESSURE PROTECTION VALVE w/o backflow	314 012 104	
2	1	AIR TANK (EN), V >= ... ltr.	030 09	
3	2	CLAMP BAND for AIR TANK, D = ... mm	030 09	
4	1	LINE FILTER	310 005 011	
5	1	DRAIN VALVE, manual	315 019 001	
6	1	TEST POINT (ISO 3583), M 22*1.5	318 040 001	
7	1	LEVELLING VALVE with HEIGHT LIMITATION	612 032 ...	
8	1	LINKAGE	612 025 001	
9	1	COLAS (with RtR)	338 051	...
10	1	TEST POINT (ISO 3583), M 12*1.5	(Option)	318 036 001
11	1	SIMULATING POINT for LSV)	318 072 001	
12	1	ILAS - E	352 06....	
13	1	PRESSURE PROTECTION VALVE with BACKFLOW to keep RESIDUAL PRESSURE (e.g SAF)	314 013 012	
14	1	PRESSURE LIMITING VALVE, SETABLE (e.g. BPW)	357 012 031	
15	1	3/2- WAY VALVE with push rod	551 018 001	
16	2	QUICK RELEASE VALVE	356 006 011 or	356 001 011
17	4	CHECK VALVE	314 001 001	

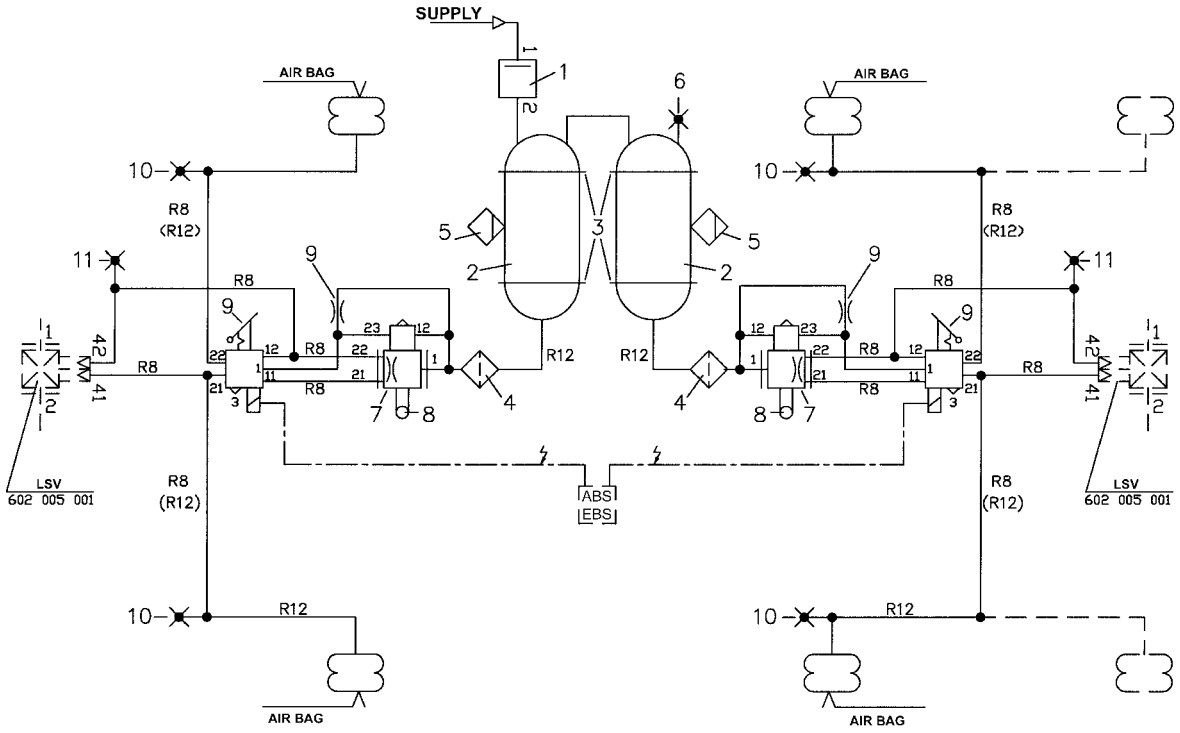
Check the faultless function of the system.
This must be confirmed by the trailer manufacturer!

Full trailer with 2 x COLAS



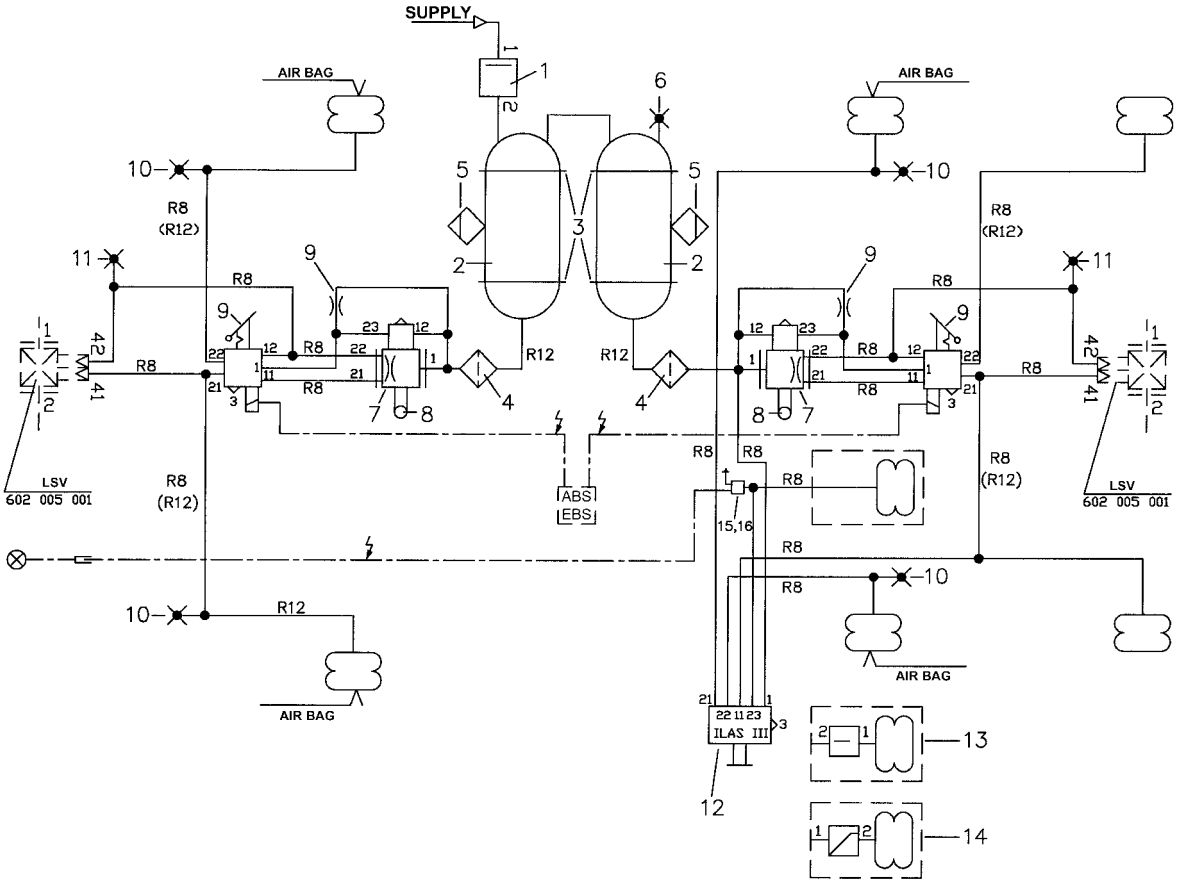
Pos.	Volume	Name	Part No
1	1	PRESSURE PROTECTION VALVE w/o backflow (6,0 bar)	314 012 104
2	2	AIR TANK (EN), V >= ... ltr	030 09
3	4	CLAMP BAND, D = ... mm	030 09
4	2	LINE FILTER	310 005 011
5	2	DRAIN VALVE, manual	315 019 001
6	1	TEST POINT (ISO 3583), M 22*1.5	318 040 001
7	2	LEVELLING VALVE (NYLON)	612 035 ...
8	2	LINKAGE	612 025 001
9	2	COLAS (with RtR, with DEAD MAN HANDLE)	338 051 ...
10	4	TEST POINT (ISO 3583), M 12*1.5	318 036 001
11	2	SIMULATING POINT for LSV	318 072 001

Full trailer with 2 x COLAS and Height limitation



Pos.	Volume	Name	Part No
1	1	PRESSURE PROTECTION VALVE w/o backflow (6,0 bar)	314 012 104
2	2	AIR TANK, D = ... mm	030 09
3	4	CLAMP BAND, D = ... mm	030 09
4	2	LINE FILTER	310 005 011
5	2	DRAIN VALVE, manual	315 019 001
6	1	TEST POINT (ISO 3583), M 22*1.5	318 040 001
7	2	LEVELLING VALVE with HEIGHT LIMITATION	612 032 ...
8	2	LINKAGE	612 025 001
9	2	COLAS (with RtR, with DEAD MAN HANDLE)	338 051 ...
10	4	TEST POINT (ISO 3583), M 12*1.5	318 036 001
11	2	SIMULATING POINT for LSV	318 072 001

Full trailer with 2 x COLAS, ILAS III and Height limitation



Pos.	Volume	Name	Part No	
1	1	PRESSURE PROTECTION VALVE w/o backflow (6,0 bar)	314 012 104	
2	2	AIR TANK, D = ... mm	030 09	
3	4	CLAMP BAND, D = ... mm	030 09	
4	2	LINE FILTER	310 005 011	
5	2	DRAIN VALVE, manual	315 019 001	
6	1	TEST POINT (ISO 3583), M 22*1.5	318 040 001	
7	2	LEVELLING VALVE with HEIGHT LIMITATION	612 032 ...	
8	2	LINKAGE	612 025 001	
9	2	COLAS (with RtR, with DEAD MAN HANDLE)	338 051 ...	
10	4	TEST POINT (ISO 3583), M 12*1.5	318 036 001	
11	2	SIMULATING POINT for LSV	318 072 001	
12	1	ILAS III	352 051 ... or	352 047 ...
13	1	PRESSURE PROTECTION VALVE, (e.g. SAF)	Option	314 013 012
14	1	PRESSURE LIMITING VALVE, (e.g. BPW)	Option	357 012 031
15	1	PRESSURE SWITCH (0.5 bar) SWITCH-ON TYPE	361 007 201	
16	1	PROTECTIVE CAP	025 0500 09	

Saddle for Air Tank, 003/030 .... ..

Use

Securing the air tank

Installation instructions

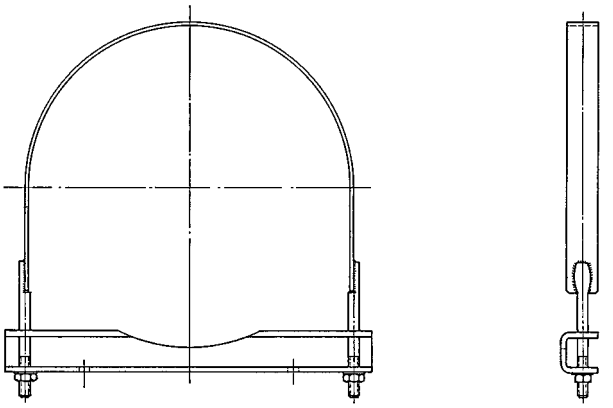
The tank is secured using the saddle or the bracket on the tank, if there is one. The saddle must be mounted clear of the seams at the tank ends and must not exert any stresses on the tank that might adversely affect its safety in operation. Insulation strips must be placed between the tank and saddle if necessary. Tanks can be installed horizontally or vertically. Make sure that a water drain connection is at the lowest point of the tank. Take appropriate measures to ensure that all condensation is drained or that condensation cannot accumulate.

Testing

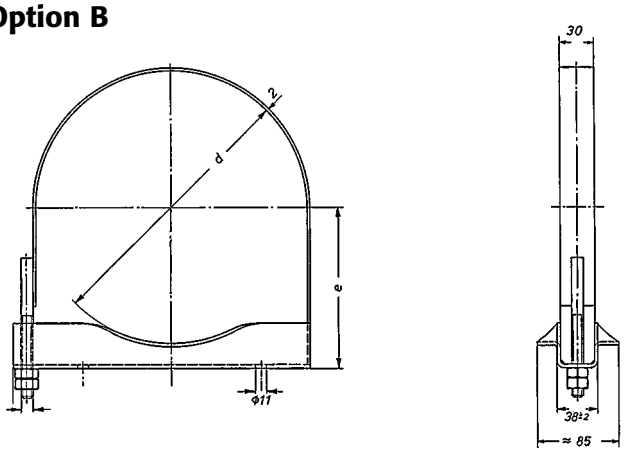
- Mounting, cracks
- Check the insulation strips for damage

Saddle for air tank

Option A



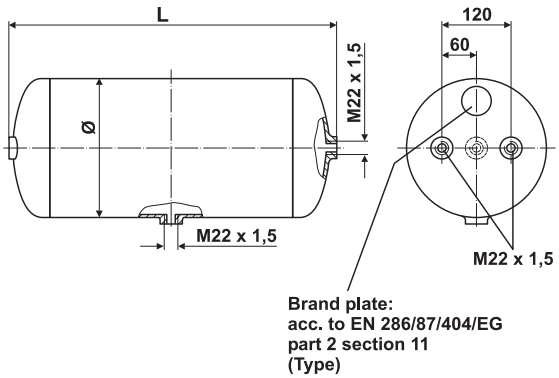
Option B



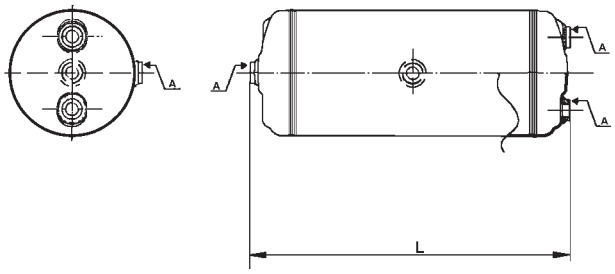
Versions

Part No	Diameter (mm)	Belt	Nut	Version	Remark
003 0008 09	206	with	2	A	
003 0009 09	276	with	2	A	
003 0010 09	246	with	2	A	
003 0011 09	310	with	2	A	
030 2001 09	206	with	1	B	
030 2001 09F	206	with	2	A	pair
030 2002 09	246	with	1	B	
030 2002 09F	246	with	2	A	pair
030 2003 09	276	with	1	B	
030 2003 09F	276	with	2	A	pair
030 2004 09	310	with	1	B	
030 2004 09F	310	with	2	A	pair
030 2006 09	396	with	1	B	
030 2006 09F	396	with	2	A	pair
032 3000 01S	300	with	2	A	pair
032 4000 01S	246	with	2	A	pair
032 5000 01S	396	with	2	A	pair
71137S					pair for purge tank

030 3.. ... Steel tank



030 3.. ... Aluminium tank



Symbol

Use

The air reservoir stores the compressed air produced by the compressor.

Function

The air reservoir consists of a cylindrical body and dished ends with sockets welded into them. A connection is provided for draining the reservoir. Both interior and exterior surfaces of the reservoir are coated with an anti-rust agent. The reservoirs correspond with DIN 74281. One of the dished ends bears the brand plate showing following data:

DIN 74281
Year of manufacture
factory No.
ZU-No (Approval No)
Part No.
max. service pressure in bar
Volume in litres

Assembly guidelines

The air reservoir should be mounted by means of brackets, in the lowest position as possible so that the supply from the compressor and pressure governor runs downwards to the reservoir. It is particularly important that the pipe line to the air reservoir cannot form water traps, in order to prevent water in the system freezing. The connection for the drain valve must point downwards and be easily accessible. The reservoirs are subjected to a type approval test, therefore welding on reservoirs is not permitted.

Air operated ancillary devices

Additional air reservoirs for ancillary devices should be connected with the air brake reservoirs by means of a charging valve without limited back flow. The charging valves should be adjusted to the calculated working pressure of the brake system. The volume of the additional air reservoir depends on the air consumption of the ancillary devices. No additional air reservoirs are required for the cylinders of the engine brake or for operation of secondary, or group drives and differential lock. They may be connected to the air reservoirs by means of charging valves without back flow.

Maintenance

Drain air reservoir daily.
Replace damaged air reservoirs.

Technical Data

Operating pressure max.	12.5 bar
Operating temperature	-40°C + 100°C
Thread	M 22 X 1.5

Versions

Steel tank (pe max. 12,5 bar)

Version acc. to EN 286 Part 2,

Dimensions acc. to DIN 74281 (see drawing steel tank)

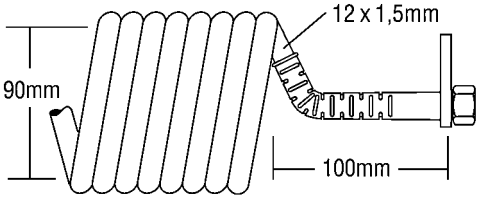
Versions Steel tank

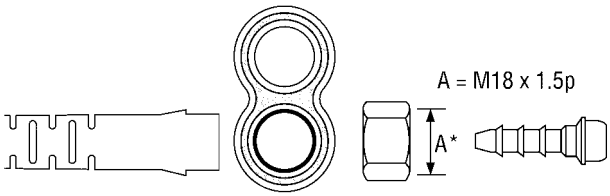
Part-No	Volume (liter)	Diameter (mm)	Length L (mm)	Ports
030 3502 09	10	206	370	3
030 3505 09	20	206	690	4
030 3506 09	20	246	500	4
030 3509 09	30	246	720	4
030 3512 09	40	276	760	4
030 3513 09	37	246	850	4
030 3515 09	40	246	940	4
030 3516 09	60	276	1100	4
030 3517 09	60	396	580	4
030 3518 09	60	246	1350	4
030 3520 09	80	396	750	4
030 3521 09	85	276	1500	4
030 3522 09	100	396	915	4
030 3608 09	60	310	895	4
030 3620 09	40	310	620	4
030 3636 09	15	206	530	3
71136	6			3
71139	5			3

Versions Aluminium tank

Part-No	Volume (litre)	Diameter (mm)	Length L (mm)	Ports (A)
030 1003 9612C	100	396	906	4
030 1020 615C	10	206	356	3
030 1520 615C	15	206	535	3
030 2024 615C	20	246	505	3
030 2524 615C	25	246	599	3
030 3024 615C	30	246	730	3
030 3030 014C	30	300	501	3
030 4027 615C	40	276	745	3
030 4031 013C	40	310	617	3
030 512 515D	5	125	490	3
030 515 215A	5	152	356	3
030 515 215B	5	152	356	3
030 520 615F	5	206	189	3
030 6027 615C	60	276	111	4
030 6031 013C	60	310	893	4
030 6039 612C	60	396	571	4
030 8039 612C	80	396	736	4

033016009 **033016509**





Matching fittings

032 0411 09, reducer, M 18 x 1.5 to M 22 x 1.5

032 0415 09, bulkhead connector, M 18 x 1.5 to M 22 x 1.5

032 0418 09, elbow, M 18 x 1.5 to M 22 x 1.5

032 0417 09, elbow, M 18 x 1.5 to M 16 x 1.5

032 0513 09, hexagon nut, M 16 x 1.5

032 0599 09, seal, M 16 x 1.5

Symbol

Use

Connecting the air braking system of the tractor unit to that of the semi-trailer, or connecting different-length components within an air braking system.

Description (TÜV-tested)

Certificate no. TÜV EMA-7.970185378

All compressed air coils with plastic colour-coded kink protection are TÜV-tested in order to comply with the demanding safety parameters of DIN 74323 - the acknowledged standard for compressed air coils.

- M18 (internal thread) connectors to push on with "rotating nuts".
- Moulded colour-coded kink protection
- Supplied with unique retaining loops as standard
- 20-turn coloured coils printed as per DIN 73378
- tested with 10,000 bends (to ISO 7375)

Installation instructions

Where two matching coupling heads need to be coupled together, particularly when they are fitted with covers, make sure that there is sufficient free space around the fixed coupling head.

Road trains and articulated trains

The position and length of the lines is governed by the arrangement of the coupling heads and the maximum angle of 75° (90° for an articulated train) between the centre line of the drawbar and the longitudinal axis of the tractor unit. Complete freedom of movement without any tensile force in the lines and without the lines chafing against each other must be ensured up to an angle of 60° (75° in the case of articulated trains). Movement without damaging the lines must be possible at angles between 60° and 75° (75° and 90° for articulated trains).

Testing

for condition, porosity, cracks, chafing and leaks.

Technical data

Tubing:	12 x 1.5
Medium:	air
Service pressure:	p_e max. 10 bar
Service temperature:	-40°C to +70°C
Thread:	M 18 x 1.5

Versions

033 0160 09: 4 metres effective length for service (yellow)
033 0165 09: 4 metres effective length for supply (red)

Application

The line filter is installed in air brake systems. It cleans the compressed air, there by protecting the equipment from faults and defects. The brake system remains operable in both directions, even when the filter element is blocked.

Function

The filter element comprises a plastic sump reinforced by longitudinal ribbing and a sealing seat. Two springs firmly hold the filter element in position. If the filter element is blocked, the filter lifts from its seat and the compressed air flows unfiltered through the line filter.

Installation

The line filter is installed in the pipeline so that the hook-type snap ring faces downwards. Sufficient space for removing the filter insert must be left beneath the line filter. The direction of flow is arbitrary, however, flow from 1 to 2 is preferred.

Maintenance

The filter element should be cleaned at regular service intervals. The element can be removed by pressing in the cover and releasing the hook-type snap ring without it being necessary to remove the filter body from the brake line.

Checking

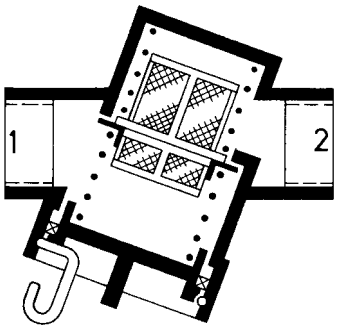
Check the line filter for blocking and leaks.

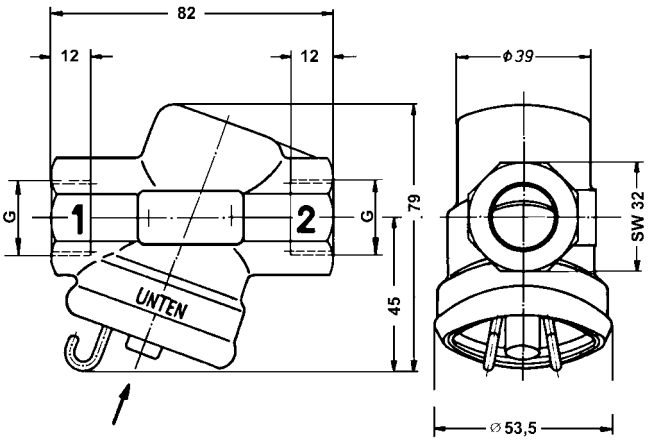
Technical Data

Medium:	Air
Operating pressure:	max. 20 bar
Operating temperature:	-40°C + 80°C
Port description:	1 = Supply
	2 = Delivery

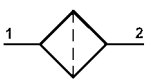
Versions

310 005 001: M16x1.5
310 005 011: M22x1.5

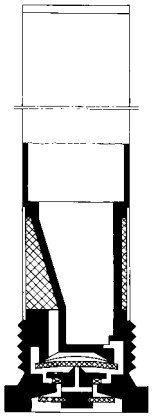




Symbol



315 016 ...



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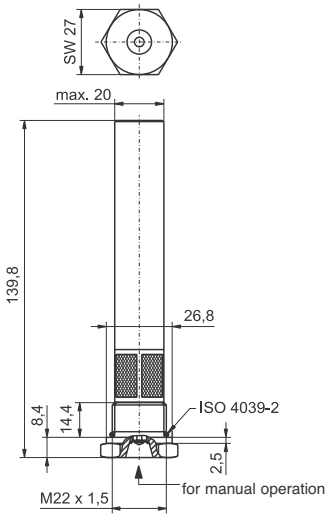

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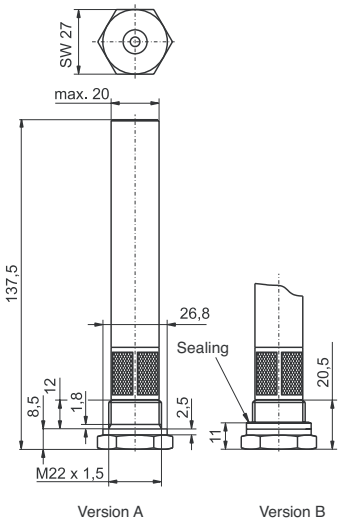


Use

The automatic drain valve automatically drains the water/moisture collected in the air reservoir.

Function

The diaphragm covers the outlet port. Compressed air and water/moisture arrive through the filter and in the circular sealing area released by the diaphragm in the pressure room underneath the diaphragm. If the operating pressure falls in the air reservoir, then the diaphragm is pressed on the circular sealing area and removed from the outlet port. The water/moisture is expelled through the outlet port.

The outlet port is closed, as soon as the pressure is equalized above and below the diaphragm.

Assembly guidelines

The drain valve is screwed into the lowest connection port of the air reservoir M22 X 1.5 using a backing washer & O ring.

Maintenance

The drain valve must be maintained corresponding to legally stipulated requirements.

The integrated filter should be periodically cleaned and replaced if necessary.

Testing

Examine Function and Density of the Drain valve .

- Examine density, e.g. with a leak tester -spray Part number 905 002 001.
- Function, drop pressure approx. 0.2 to 0.8 bar in the air reservoir. Response pressure (drainage) see index types, must be matched at correct function.

Technical Data

Operating pressure:	max. 20 bar
Operating temperature:	-40°C +80°C
Fixing torque:	40-50 Nm
Water/Moisture output:	ca. 0.5 cm^3
Thread:	M 22 x 1.5

Versions

Part. No.	Version	Op. pressure p_e in bar	Respond pressure Δp in bar
315 016 001	A	8.0 bar	ca. 0.2 bar
		15.0 bar	ca. 0.5 bar
315 016 011	A	8.0 bar	ca. 0.8 bar
315 016 021	B	8.0 bar	ca. 0.2 bar
315 031 021		8.0 bar	ca. 0.2 bar
		8.0 bar	ca. 0.2 bar
		10.0 bar	ca. 0.2 bar
		12.0 bar	ca. 0.4 bar

Symbol

Use
The drain valve is used for venting and draining the air tank.

Function
In the neutral position, the valve plunger together with the seal is pressed onto the housing seat by the compression spring. By laterally pulling or pushing the valve plunger, the seal is raised from the housing seat allowing the water/moisture to drain off.

Assembly guidelines
The drain valve is screwed into the lowest connection socket of the air tank.

Care must be taken if a linkage or cable is used for actuating the valve to ensure that, after actuation, the valve plunger once again returns into the neutral position.

Maintenance
The drain valve must be maintained corresponding to legally stipulated requirements.

During winter, the valve must be actuated daily, otherwise every 1000 km or after 20 hours of operation.

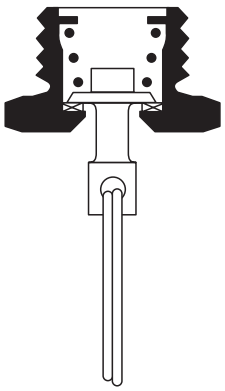
Testing
In addition to checking its function, the valve must also be checked for leaks.

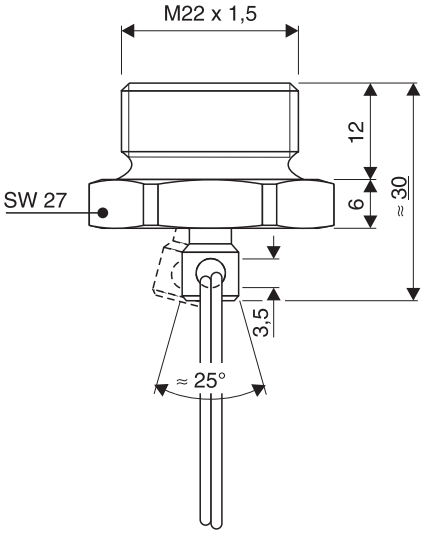
Technical data
Operating pressure:	p_e max. 20 bar
Operating temperature:	-46°C to +80°C
Fixing torque:	40 Nm
Thread:	M 22 x 1.5

Versions
Part-No.	Ring	Op. pressure p_e in bar	DIN Designation
315 019 001	ohne	20,0 bar	DIN 74292-B-20
315 019 011	mit	20,0 bar	DIN 74292-B-20

Sealing ring 032 0601 09

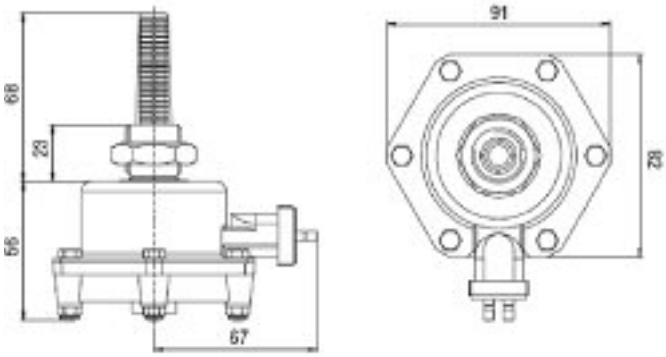
315 019 ...





Symbol

Dimensions



Haldex Automatic Drain Valve (ADV) will drain all water and oil collected in the reservoir in which it is installed. The principle of low velocity of the compressed air flow and high cooling efficiency in the reservoir causes liquids to condense and fall to the lowest point of the air reservoir, where the ADV is installed. The liquid is drained at every brake light application or at a frequency following a timer or both.

The function is the principle of an electric coil, creating a magnetic field each time it is activated. The core, sensitive to the magnetic field created, is then forced to move upwards from the lower outlet drain to the upper inlet drain, making the first ejection of collected liquids. When the magnetic field is off, the core falls down to the lower drain again due to the air pressure in the reservoir and a second ejection takes place.

Installation Dimensions

Haldex ADV is easy to install in any reservoir, preferably where the most impurities such as water and oil are collected. The preferred direction for the electrical connection must be decided and then the metric nut or the conical NPTF-thread tightened.

An electric cable must be connected between the drain valve and a relay, located in a clean and dry area, according to Haldex proposed schematics. When activating the brake lights or a timer, the function is recognised with a double operation from the drain valve. For testing the manual draining function, the red button at the lowest point of the drain valve (only types without drain collector) must be pressed.

Specification

Weight	0.65 kg
Max working pressure	2.0 MPa (20 bar)
Air consumption	50 cc free air per operation at 0,8 MPa
Draining capacity	1.3 cc water per operation at 0.8 MPa
Electric power	12V/1A 24V/0,5A
Ambient temperature	-40°C to +80°C
Recommended operating temperature	+ 5°C to + 65°C
Isolation class	IP68
Electrical connection	DIN, Deutsch, AMP, Packard M24x1, 4 mm pin M27x1, 4 mm pin Pigtail 300, 1000 mm
Reservoir connection	M22 x 1.5 1/2" NPTF 1/4" NPTF

Spare parts

71327
Complete kit for ADV universal

For all ADVs

93100
Drain box kit with swivel

78240
Draining box kit

93100

78240

54183S
Valve lifter

For all ADVs and Conseps

Except: see draining box kit 78240 and 93100

Brake relays

76281S
Relay 24V

Fits all ADVs and Conseps 24V

76282S
Relay 12V

Fits all ADVs and Conseps 12V

76281S

76282S

Time and Brake Relays

041 0136 09
Time and brake relays 24V

Fits all ADVs and Conseps 24V

041 0137 09
Time and brake relays 12V

Fits all ADVs and Conseps 12V

041 0136 09

041 0137 09

76283S M24

76284S M27
Electrical connection kit

78166 12V/M24

87255 24V/M24
78165 24V/M27

Coil kit

89455 12V

89454 24V

Coil kit

With port

91917 24V DIN

91918 24V Deutsch

90821 24V AMP

91919 24V Packard

Coil kit

Trailer air braking system

Twin-circuit braking system as per Directive 71/320/EEC

When the red supply line is disconnected, on automatic coupling heads in tractor units the valve in the coupling head opens.

The compressed air then flows through the line filter to the automatic shunt valve and from there to supply port 1 of the Relay Emergency Valve (REV).

When the depressurized system is first filled, the compressed air flows from the REV to the storage tank and to port 12 of the automatic shunt valve, and also through delivery ports 2 to the brake cylinders at the front and rear axles. The brake is therefore initially actuated, although no pressure has been applied in the yellow service line.

After the pressure in the supply line has risen to about 3.5 - 4 bar, the REV switches over and exhaust the brake cylinder, while the storage tank continues to be filled up to service pressure. The brake system is now in the released or driving position.

Actuation of the service brake

When the service brake in the tractor unit is actuated, the trailer control valve admits compressed air to the yellow service line. The braking pressure is then passed on to control port 4 of the REV.

The REV then feeds compressed air through delivery ports 2 to the downstream unit (LSV (automatic load sensing), ABS, EBS). The LSV (the EBS) controls the pressure as a function of the load condition so that the pressure to the brake cylinders on the front and rear axles can be controlled as a function of the load.

When the brake is released, the brake line is exhausted via the exhaust on the trailer control valve in the tractor unit.

The REV/ABS/EBS exhaust the brake cylinders on the front and rear axles through its exhaust port.

Connection lines between the tractor unit and the trailer uncoupled or broken away

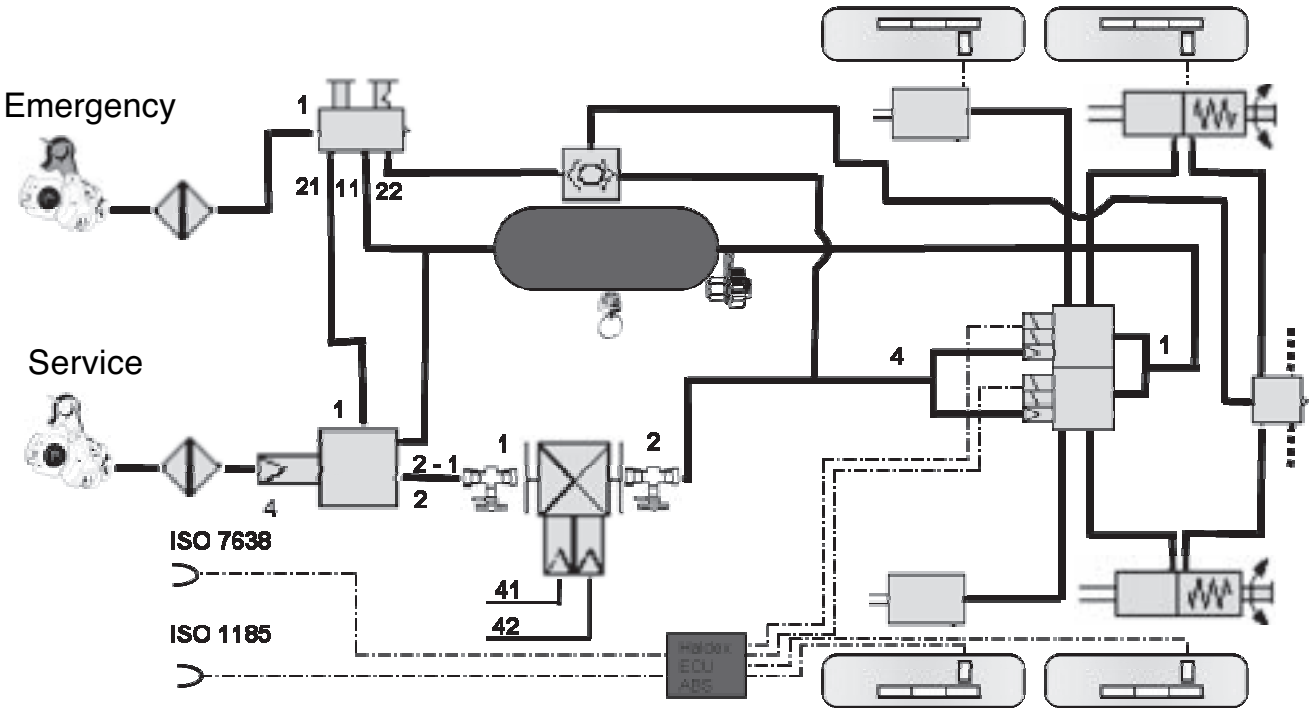
If the supply line is uncoupled or breaks away, the trailer brake control valve initiates emergency braking (automatic braking with the SB) by exhausting this line.

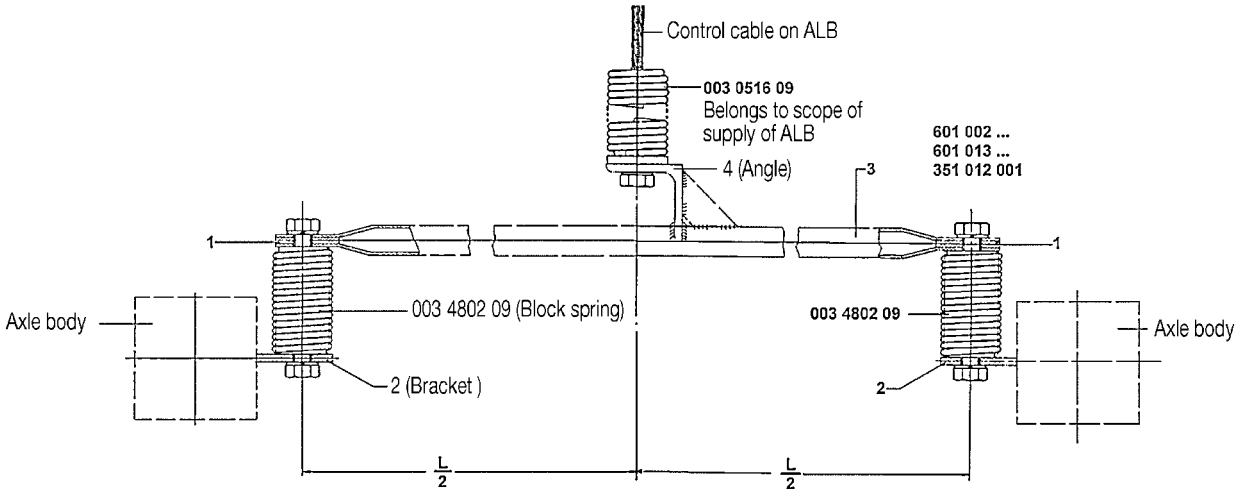
If the brake line breaks away, nothing happens unless the service brake is actuated. When the service brake in the tractor unit is actuated, the supply line is exhausted via the “defect” in the brake line, whereupon the trailer brake valve initiates emergency braking (automatic braking with the SBS*).

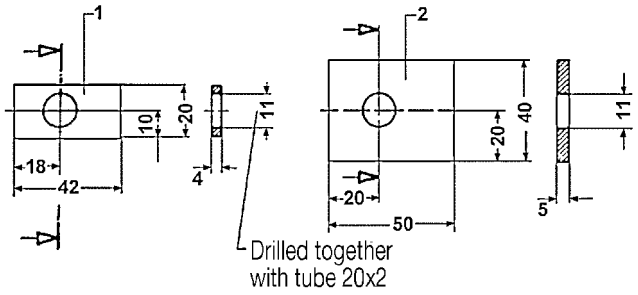
For manoeuvring an uncoupled trailer, the brake can be released by actuating the automatic shunt valve fitted in the supply line (black knob). When this valve is actuated, compressed air flows from the storage tank from port 12 to port 2 and then on to the supply port of the REV, whereupon the REV releases the brake.

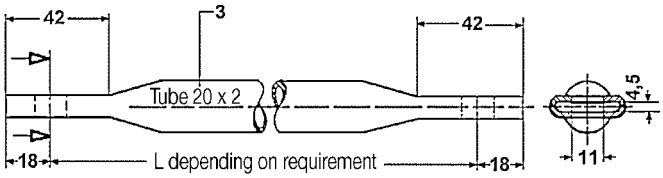
The release action can only be carried out if the pressure in the storage tank is greater than 3 bar.

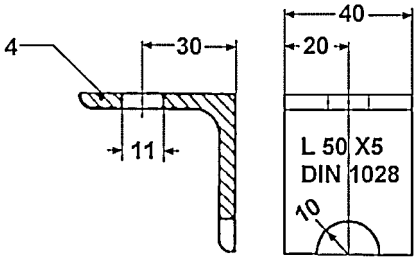
* = service brake system











Use

The tandem axle attachment linkage is used for neutral control of the automatic load-sensing valve when attached to a tandem axle. It largely avoid the transmission to the load-sensing control of "axle tramp" that often occur, and allows undisturbed linkage operation when cornering.

Method of operation

Control of a load-sensing valve should be as vibrationless as possible for operational reasons and to reduce wear and tear. This is difficult if it is controlled directly by the vehicle springs. Considerable vibrations occur with tandem axles. Since they are coupled together, however, a point exists between the axles which is vibrationless, where the linkage of the load-sensing valve can be attached. For this reason, the two axles are connected with a tube and the load-sensing valve is controlled from the "neutral" point.

Since on some tandem axles the axle base can change as the springs deflect and the axles twist under braking, the connection is elastic by means of block springs. The block springs also allow sideways drift when cornering.

The non-wearing design of the tandem axle attachment results in high operational reliability.

Mounting:

The tandem axle attachment linkage consists of two block springs with brackets and a connecting tube. One bracket is welded to each axle of the tandem axle, at the point specified by the manufacturer, and one block spring mounted there. The length and shape of the connecting tube is then determined and its ends fabricated. The ends of the tubes are flattened, and flat steel bar inserted and drilled.

The finished tube is bolted to the block springs with hexagon-head bolts and spring washers.

The control strap (load-sensing valve) is then attached to the neutral point on the connecting tube, or depending on space, secured near to it with an angle bracket (4). (The "neutral point" generally lies in the middle of the unit).

Use

The Haldex pressure switch is used for automatic electrical control of a solenoid valve (e.g. on ILAS - E).

Method of operation

If the pressure increases by a specified amount the electrical circuit is made, and broken again if there is a corresponding pressure decrease.

Installation instructions

Installation position as desired, using the angle bracket provided. The installation site must be chosen so that there is enough space above it to remove the cap covering the electrical connection and the pressure adjustment facility. The electrical connection is made using the terminals provided after removing the cap. Observe the terminal allocations for the required connection logic. Seal off the electrical connection cable with an appropriate PG 13.5 gland (with a seal). The pneumatic connection is to the $^1/_4$" port.

Adjustment

Remove the 4 screws on the cap. Unscrew the locking pin upwards. Set the switching pressures in accordance with the graph.

Important: Only change the switching pressures with the switch under pressure.

Testing

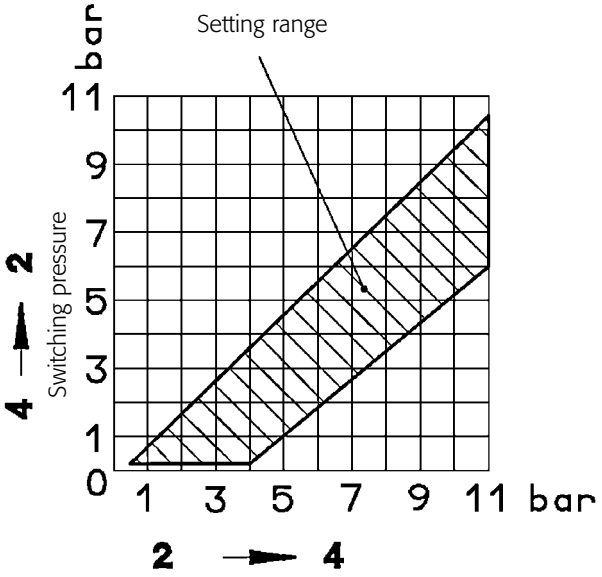
Test for operation and leaks.

Technical data

Service pressure:	p_e = 15 bar
Weight:	approx. 0.36 kg
Current type:	D.C.
Degree of protection:	DIN 40050-IP 55
Set switching pressure:	2 to 4 1.8 bar
	4 to 2 1.3 bar
Pneumatic port:	$^1/_4$" thread
Switching capacity:	max. 8A (ohmic load)
	max. 7A (inductive load: L/R 3ms)

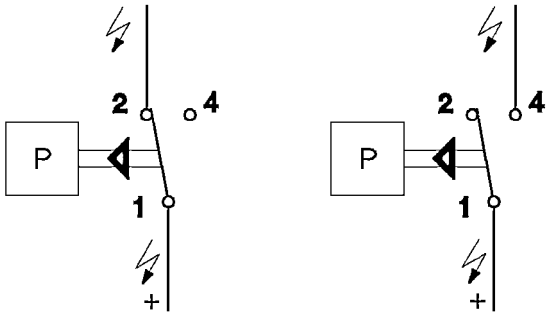
Versions

041 0133 09	Connecting thread G $^1/_4$" ISO 228



Switching pressure

Connection logic



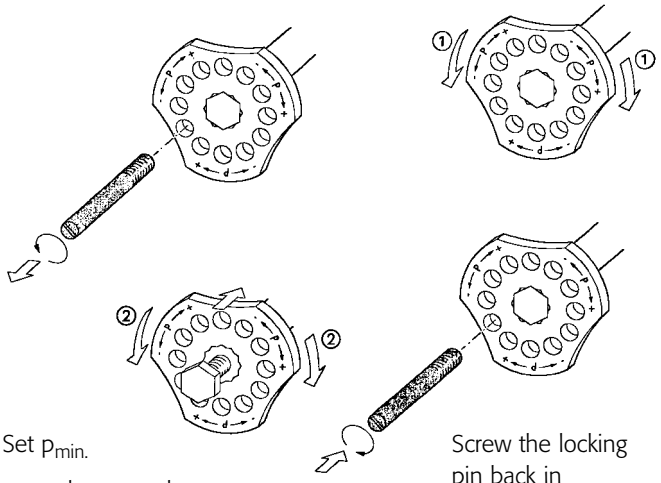
Opening or closing

Important: Only change the switching pressures with the switch under pressure.

Unscrew the locking pin

Set $p_{max.}$

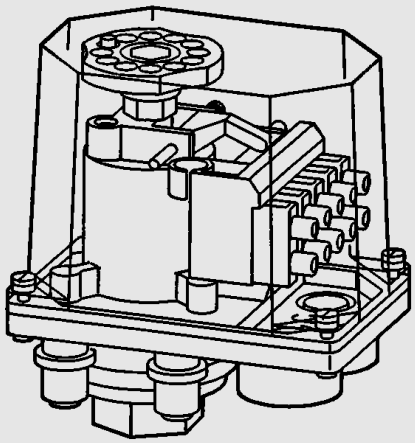
$p_{min.}$ does not change



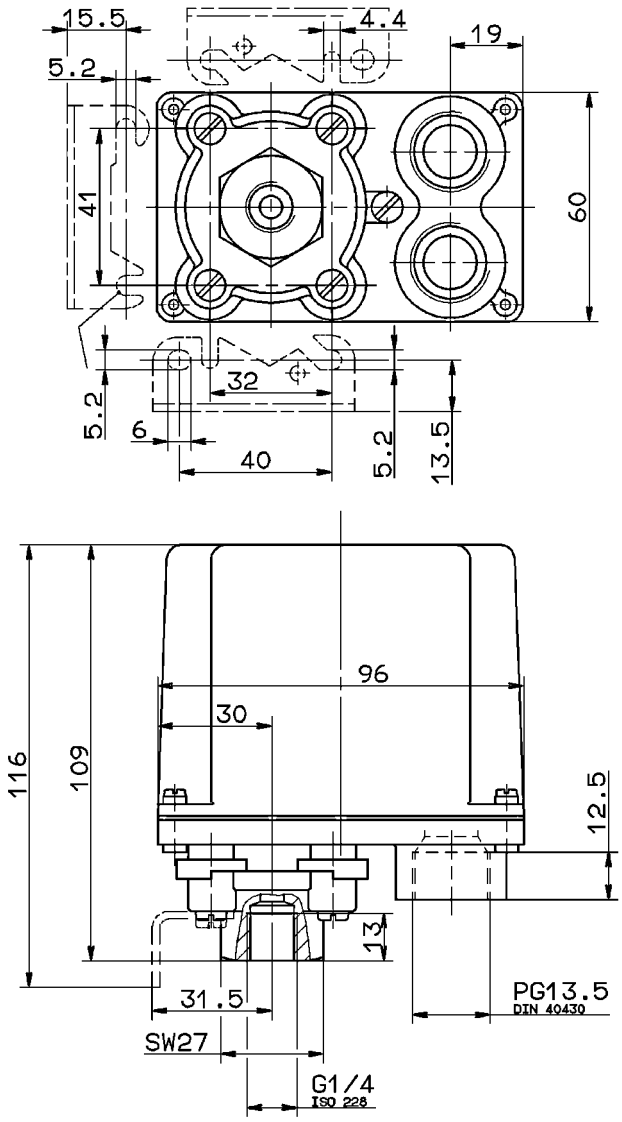
Set $p_{min.}$

$p_{max.}$ does not change

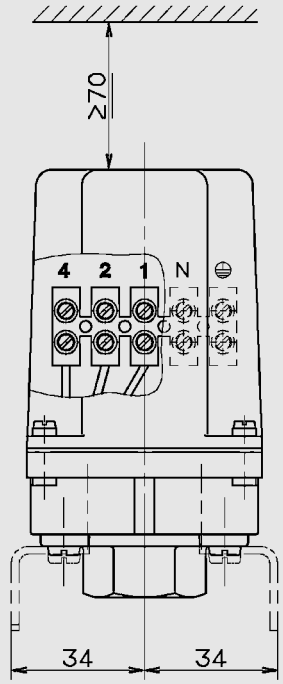
Screw the locking pin back in



Angle bracket provided



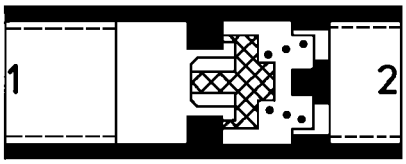
Space requirement for switch adjustment



Application
The check valve secures lines in which compressed air is to flow in only one direction against return flow and an undesirable drop in pressure.

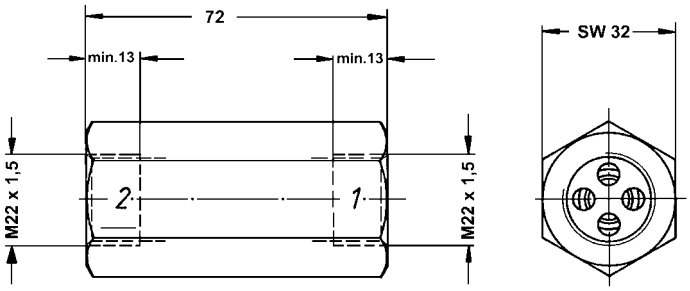
Function
The compressed air flowing in at connection 1 lifts the check valve from its seat against the force of the spring and flows to port 2.

If the pressure is reduced at port 1, the check valve is pressed against its seat, return flow of the compressed air is no longer possible.



Installation
The valve can be installed in any position while the direction of flow from 1 to 2 must be observed.

Checking
Functional check: when the pressure is reduced at connection 1, there must be no drop in pressure at connection 2.



Maintenance
The check valve must be maintained as part of the legally stipulated regulations

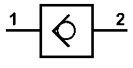
Technical Data

Medium:	Air
Operating pressure:	p_e max. 10 bar
Operating temperature:	-40°C +80°C
Flow cross-section:	45 mmÇ
Port description:	1 = Supply
	2 = Delivery

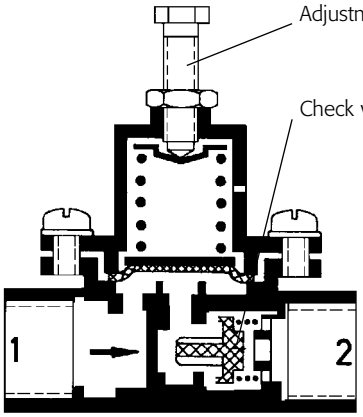
Versions

314 001 001:	M22x1.5

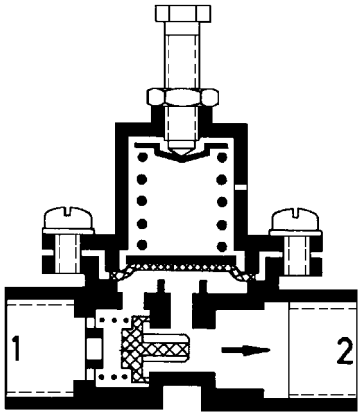
Symbol



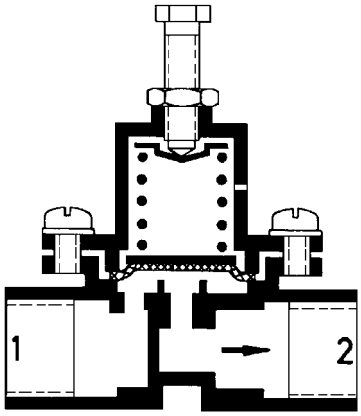
314 012 ...



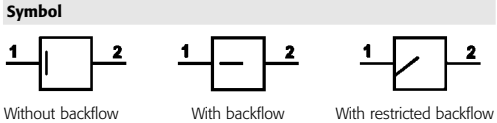
314 013 ...



314 014 ...



Symbol



Application

Feeding of auxiliary circuits (e.g. air suspension) with air from another circuit. Protection of the different air circuits.

There are 3 types of pressure protection valves:

A - with back flow 314 013 ...

B - with limited back flow 314 014 ...

C - without back flow 314 012 ...

Operation

Charge position

Air flows through port 1 and pressurizes the under side of the diaphragm. After reaching the adjusted opening pressure the diaphragm moves off its seat and air flows through port 2 and thus to the auxiliary circuit. On the valve without back flow in addition the before port 2 located check valve is opened.

Protect position

At a relatively large drop in pressure at port 2, e.g. a defect in the auxiliary circuit, air from port 1 flows into port 2, until the spring presses the diaphragm onto its sealing seat. In port 1 the protected pressure remains.

Back flow position

In the back flow position in port 2, the pressure indicated in the index remains.

1. Valve without back flow C

   A drop in pressure at port 1 the check valve closes resulting in no back flow from 2 to 1.

2. Valve with back flow A

   A drop in pressure at port 1 the check valve opens, whereby air from port 2 can flow to port 1.

3. Valve with limited back flow B

A drop in pressure at port 1, air flows from 2 to 1, until the power of the spring over comes the pressure beneath the diaphragm, sealing the protected pressure in port 2.

If a defect occurs in port 2 (ventilation to 0 bar) protected pressure must remain in port 1 (on all versions).

Installation instructions

Mechanical and Pneumatic

The pressure protection valve is normally installed directly into the vehicle reservoir using an M22 bulkhead connector (vehicle piping diagram required before installation). The air flow direction from 1 to 2 (see arrow on valve) must be observed.

Port 1	IN	from Reservoir
Port 2	OUT	to Auxiliary

From the index table, versions stated opening pressures are to be observed.

Maintenance

If defects are noted during vehicle examinations or when driving, then the unit should be changed.

Testing

Check for correct function and air leaks.

Check opening - and protect pressures (closing pressures) with test gauges. In the port 1 and/or 2 the pressures must be in according to the index versions and data of the vehicle manufacturer. -

Density check, e.g. with a leak tester spray part number 905 002 001.

Technical data

Medium: Air

Operating pressure:	maximum 20 bar
Operating temperature:	- 40°C + 80°C
Ports:	M 22 x 1.5
Port description:	1 = inlet port 2 = delivery port

Versions

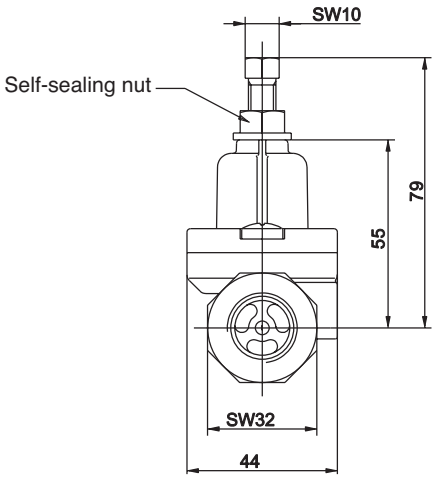
without backflow

Part number	Designation to DIN	Opening pressure in p_e ... bar
314 012 001	C4,5 DIN 74279	4.5 - 0.3
314 012 002	C5,0 DIN 74279	5.0 - 0.3
314 012 003	C5,5 DIN 74279	5.5 - 0.4
314 012 004	C6,0 DIN 74279	6.0 - 0.4
314 012 005	C6,5 DIN 74279	6.5 - 0.4
314 012 104*	C6,0 DIN 74279	6.2 - 0.2

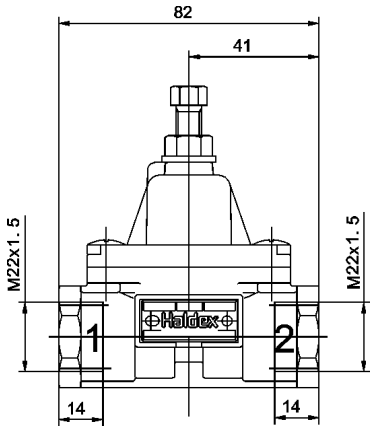
without backflow

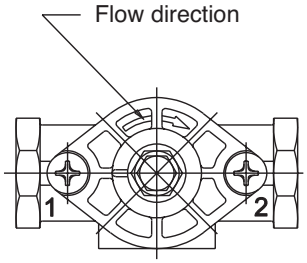
Part number	Designation to DIN	Opening pressure in p_e ... bar
314 013 001	A 4,5 DIN 74279	4.5 - 0.3
314 013 002	A 6,0 DIN 74279	6.0 - 0.4
314 013 003	A 5,5 DIN 74279	5.5 - 0.4
314 013 005	A 6,5 DIN 74279	6.5 - 0.4
314 013 006	A 3,5 DIN 74279	3.5 - 0.3
314 013 008	A 7,3 DIN 74279	7.3 - 0.4
314 013 023	A 8,3 DIN 74279	8.3 - 0.4
314 013 012**	A 0,8 DIN 74279	0.8 - 0.3
314 110 001	A 4,5 - 22	4.5 - 0.3

Installation drawing 314 ... ...



Installation drawing 314 ... ...

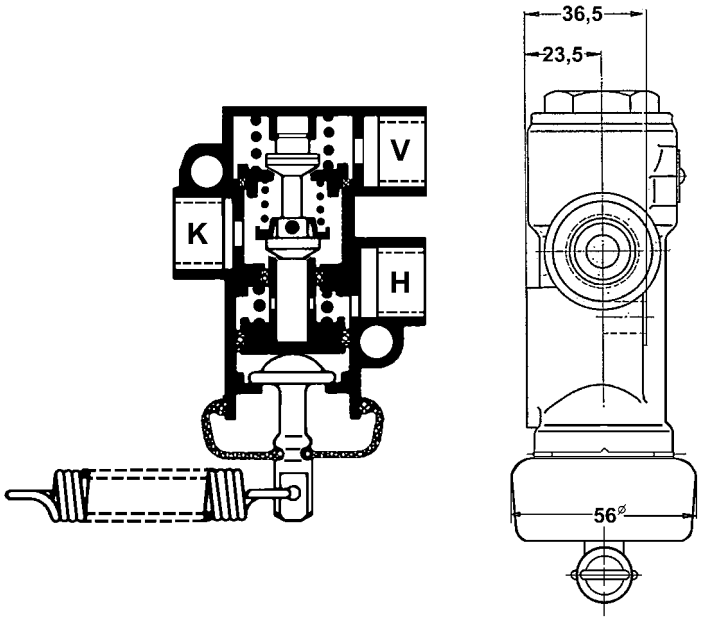


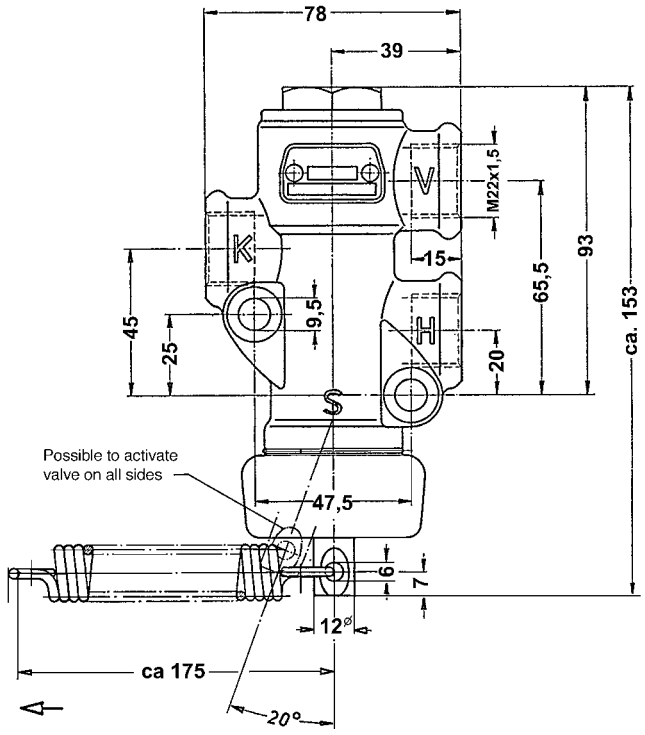


with limited backflow

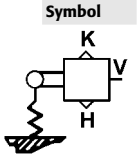
Part number	Designation to DIN	Opening pressure in p_e ... bar	Closing pressure in p_e ... bar
314 014 001	B 4,5 DIN 74279	4.5 - 0.3	3.5
314 014 002	B 6,0 DIN 74279	6.0 - 0.4	5
314 014 003	B 6,2 DIN 74279	6.2 - 0.4	5.7 ± 0.2
314 014 005	B 5,5 DIN 74279	5.5 - 0.4	
314 014 008	B 7,3 DIN 74279	7.3 - 0.4	
314 014 012	B 0,5 DIN 74279	0.5 + 0.2	0.8 - 0.2
314 014 031	B 10 DIN 74279	10 - 0.4	

* = Mainly to protect air suspension system.
** = For protection pressure in lift bag. Port 1 mounted in direction to lift bag.





Symbol



Use

The mechanically-operated 3/2 way-valve is used for directly charging or exhausting consumers / control lines. It is employed mainly in tipper vehicles to dump the air from the air spring support bellows when tipping in order to increase the vehicle stability when unloading.

Method of operation

In the released position, the air spring bellows pressure is applied to port "V". Port "K" is connected to atmosphere. Port "H" is not used (see the diagram).

When the spring is pulled, the actuator pin is pushed and port "V" connected to port "K", so that the pressure at port "V" can escape to atmosphere through port "K".

Installation instructions

The valve can be installed in any position. It is mounted by means of two holes drilled in the valve body. It can be actuated from all sides by a spring or chain.

Testing

Test for operation and leaks.

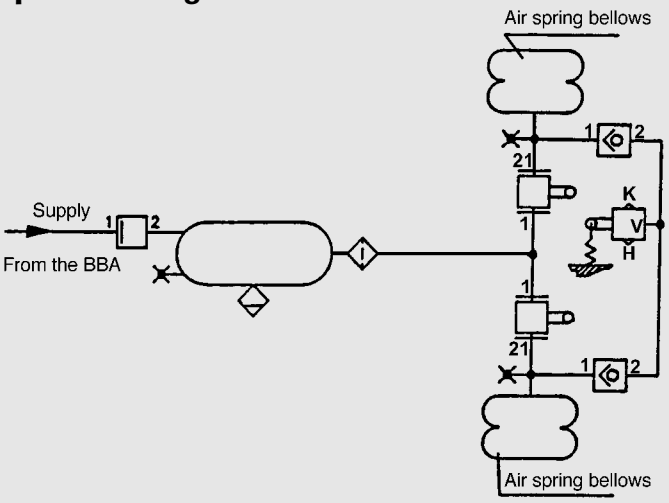
Technical data

Service pressure:	p_e max. 8 bar
Service temperature:	-40°C to +80°C
Actuation force:	70-80 N
Ports:	M 22 x 1.5
Port designation:	K = exhaust V = connection to air spring support bellows H = not used here

Versions

329 007 001

Specimen diagram



Use

The two-way valve, also known as a double check valve, is used for alternately filling a line controlled by two different lines. It is installed in braking systems to prevent the forces of the service brake (SB) and parking brake (PB) from being compounded together.

Method of operation

When ports 11 and 12 are pressurised, the piston is pressed against one of the opposing valve seats, and the higher pressure becomes effective. The compressed air then flows on via port 2.

Installation instructions

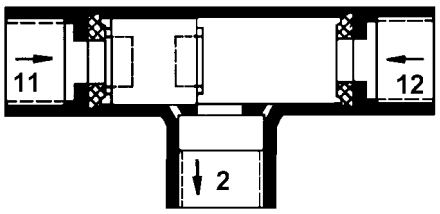
The valve should be installed so that the two ports 11 and 12 are horizontal.

Testing

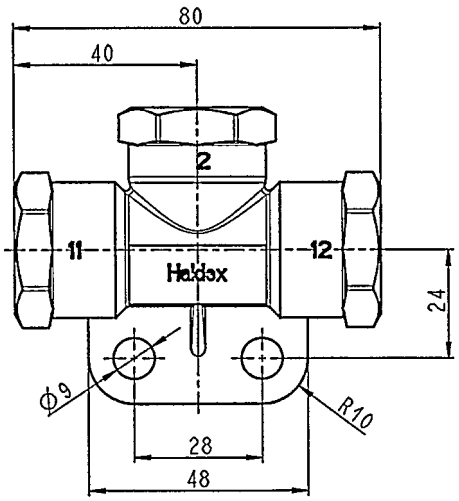
Test for operation and leaks.

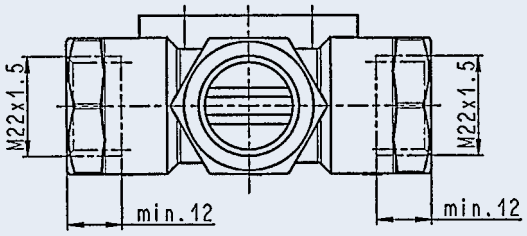
Technical data

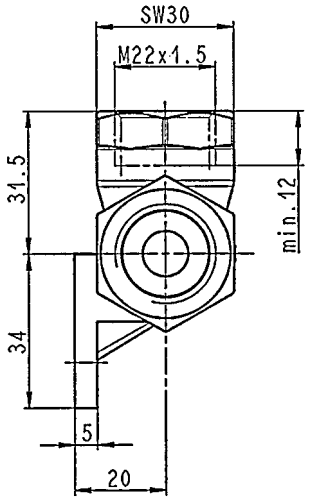
Medium:	air
Service pressure:	p_e max. 10 bar
Service temperature:	-40°C to +80°C
Ports:	M 22 x 1.5
Port designation:	11 = 1. supply port 12 = 2. supply port 2 = delivery port



333 001



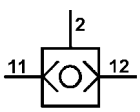




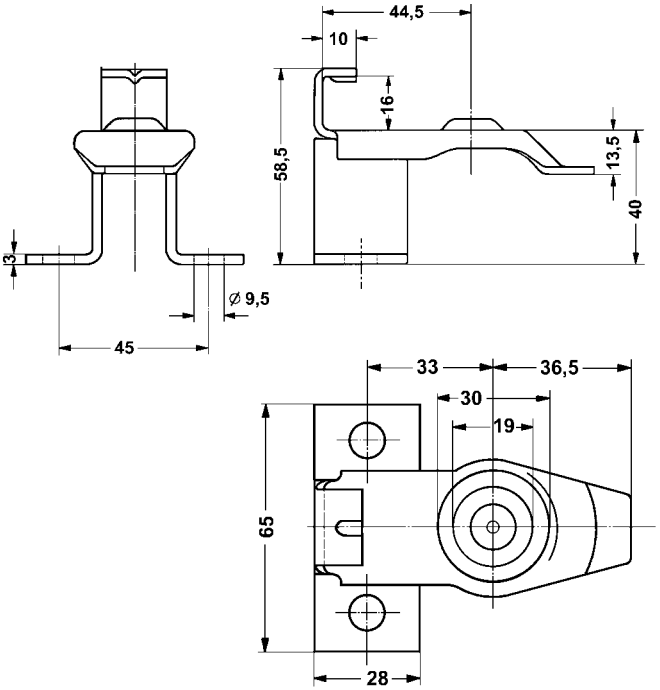
Versions:

Part No	Type	Port 1	Port 12	Port 2	max. operating pressure (bar)	Difference of closing pressure (bar)
333 001 101	Two-way valve w. piston	M 22 x 1.5	M 22 x 1.5	M 22 x 1.5	10	0.2

Symbol



334 028 001



Application
The dummy coupling is used for locking and retaining the coupling heads on Tractors & Semi Trailers so that the flexible coupling lines can be correctly held in position when the coupling head is uncoupled. In this way, the lines are protected against damage and dirt is prevented from entering the brake System.

Function
After uncoupling, the flexible air pipes at the front of the trailer the air pipes must be fitted into the dummy couplings on the back of the truck. The couplings are then turned until they engage in the retainer of the dummy couplings.

Installation
In the case of semi -trailer tractors, the dummy coupling is installed on the rear wall of the driver's cab, on Centre Axle Trailers and full Draw Bar trailers a suitable position on the front wall of the trailers must be found and the dummy couplings mounted in such a way as to ensure that the connected air lines cannot become loose.

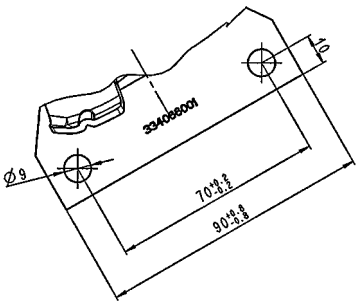
Maintenance
The support surface for the sealing ring of the coupling head must be cleaned. Care must be taken to ensure that the vent hole is not blocked.

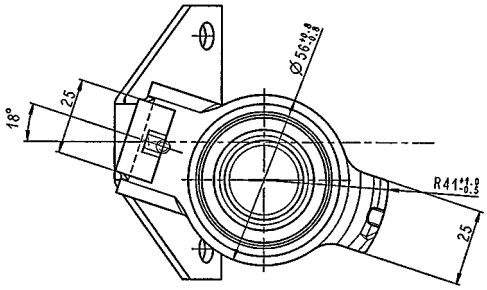
Checking
Check the mounting of the dummy coupling, ensure the sealing surfaces and the vent hole are clean.

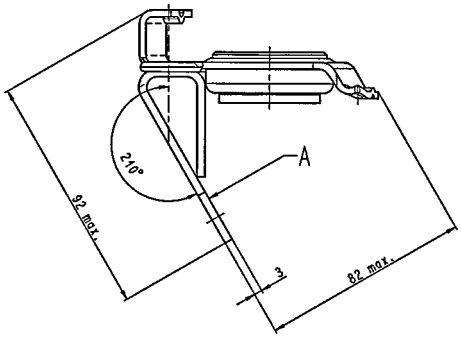
Technical Data
Operating pressure: -46°C +80°C

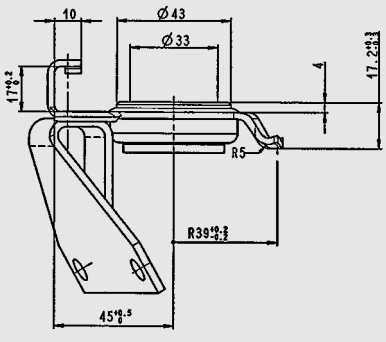
Versions
334 028 001 for coupling heads w/o automatic shut off.
334 066 001 for coupling heads with automatic shut off.

334 066 001









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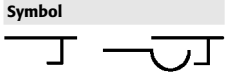


Coupling Head (Mainland Europe) 334 0.. ...

Use

The coupling head with valve is used in the tractor unit, and the coupling head with pin in the trailer, to connect the control lines in single-line air braking systems.

Method of operation

When connecting the coupling heads of trucks or tractors and trailers, the pin pushes the valve downwards and the valve seal is opened. The sealing rings are pressed against each other and seal off the coupling connection.

After the shut-off cock is opened, compressed air flows from the tractor unit air tank through the connected coupling heads into the air tank of the trailer. The shut-off cock must be shut off before uncoupling.

After uncoupling, the cover must be closed or the coupling head connected to the dummy coupling provided so as to prevent ingress of dirt.

If the tractor unit breaks away and the coupling heads disconnect, the spring pressed the valve on to the valve seat and closes the passage. The control line exhausts completely through the coupling head in the trailer, and the Relay Emergency Valve initiates emergency braking of the trailer.

Installation instructions

The coupling head with valve must be mounted at the end of the truck or tractor unit. The coupling head must be fitted to the right of the trailer coupling, looking in the direction of travel. The coupling face must point to the left. The coupling head must be positioned so that coupling poses no difficulty. The coupling head with pin must be mounted on the brake hose on the trailer. The coupling face must point to the right. If the trailer breaks away, the hose coupling must disconnect automatically.

Note: Single-line operation is only permitted up to a maximum of 25 km/h.

Service

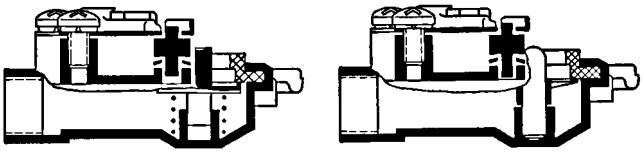
Replace damaged sealing rings.

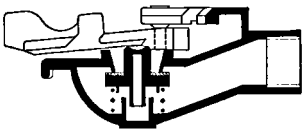
Testing

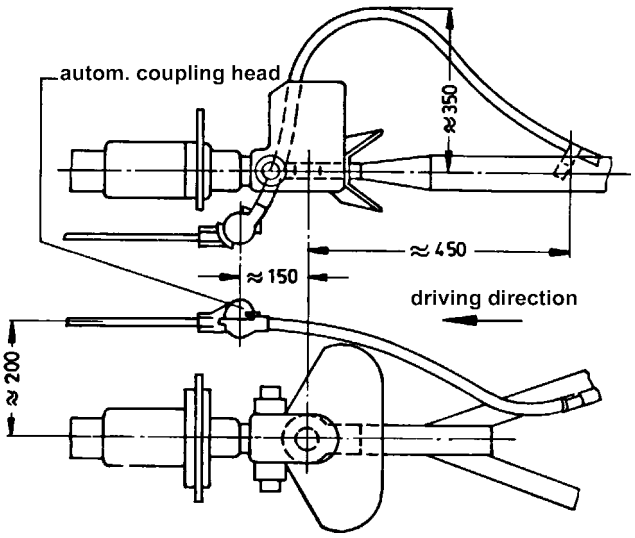
Check that the coupling head latches into place and does not leak.

Technical data

Service pressure:	see the table of versions
Service temperature:	-40°C to +80°C





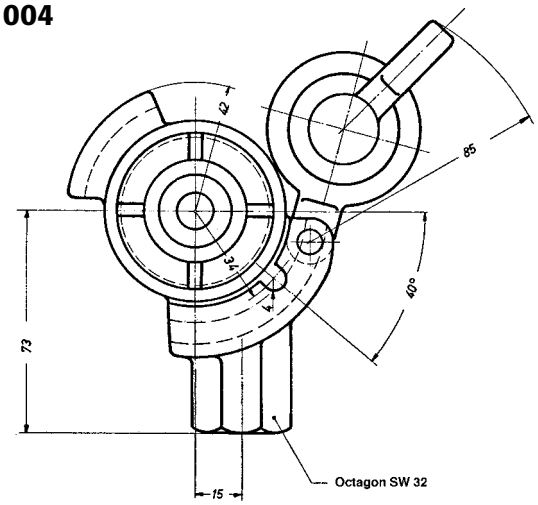


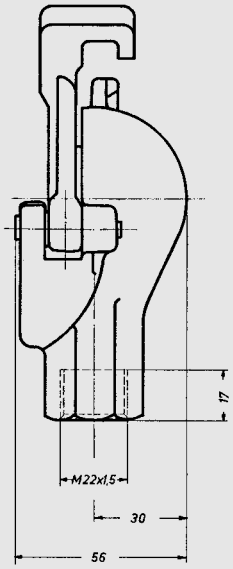
Versions

Part-No	Colour	1-Line	Port	Operating pressure	Remark
334 004 001	Black	Emergency/Service	M22x1.5	8.0 bar	autom. shut, Plastic cover
334 007 001	Black	Emergency/Service	M22x1.5	8.0 bar	with pin, Plastic cover
334 043 001	Black	Emergency/Service	M22x1.5	10.0 bar	autom. shut, Plastic cover

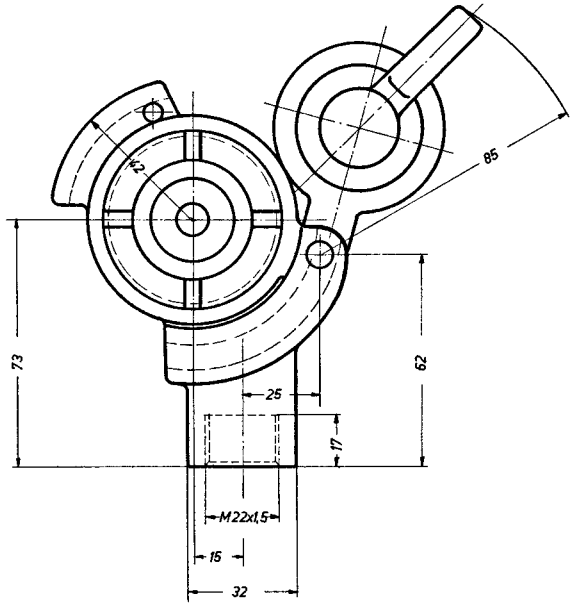
Symbol

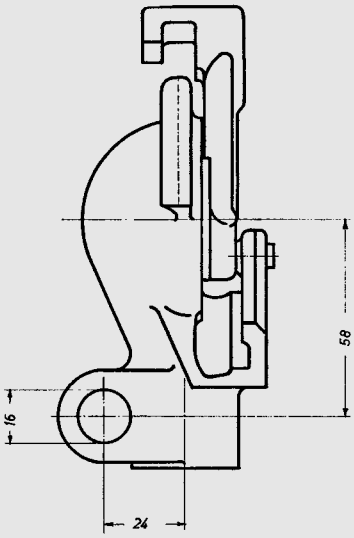
334 004



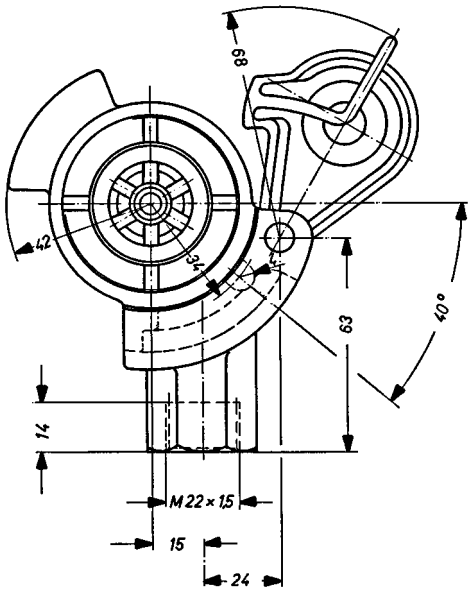


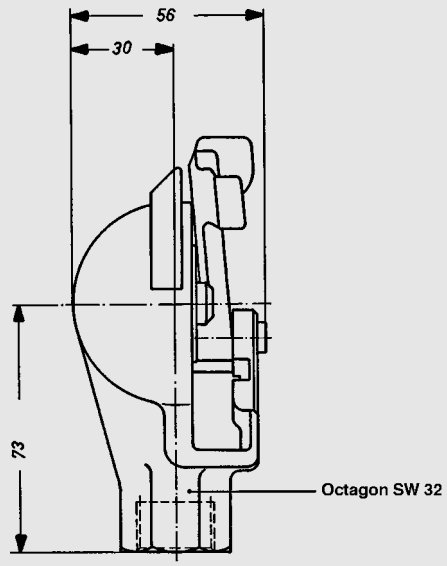
334 007





334 043





Application

The coupling heads are installed in two-line air brake systems for connecting the supply and brake lines of the towing vehicle to the trailer. The coupling heads comply with ECE/EC regulations and ISO specifications R 1728. They can be coupled with coupling heads corresponding to the standard SAE J 318 or VG 74342. The coupling heads are installed only on towing vehicles.

Function

Stop lugs which prevent the coupling head "supply" (red cover) being coupled with the coupling head "brake" (yellow cover) are provided on the housing of the coupling heads. When coupling together, the sealing ring of the mating coupling head presses the pressure piece downwards on to the rocker valve. The through passage at the sealing seat is opened and the compressed air flows through the coupled connection.

In version 334 040 ... and 334 042 ... (only used in the supply line in the towing vehicle), after coupling, the compressed air flows to the trailer and at the same time to connection 2 and therefore to the trailer control valve. When uncoupling, the rocker valve returns to its initial position and closes the valve seat.

Installation

The coupling head for the supply line is installed on the towing vehicle on the right-hand side as viewed in the direction of driving and the coupling head for the brake line to the left. The coupling surfaces must point to the right, coupling must take place without difficulties.

The coupling head 334 025 ... (without automatic shut-off) can be installed in the brake line when the coupling head 334040... and 334042 ... is installed in the supply line.

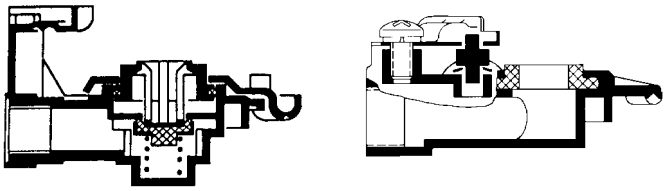
This renders a shut-off valve unnecessary The coupling heads must be installed in accordance with the ISO standard 1728.

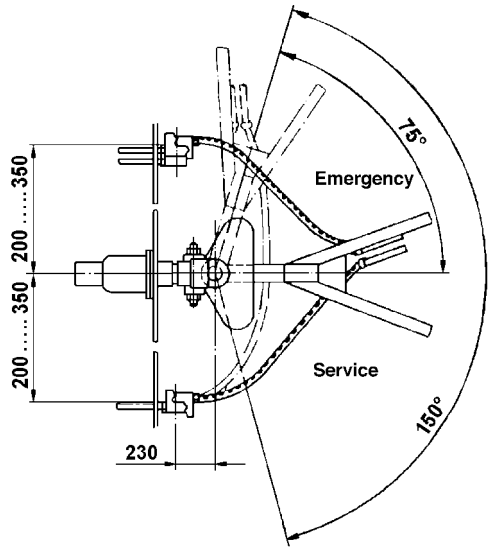
Maintenance

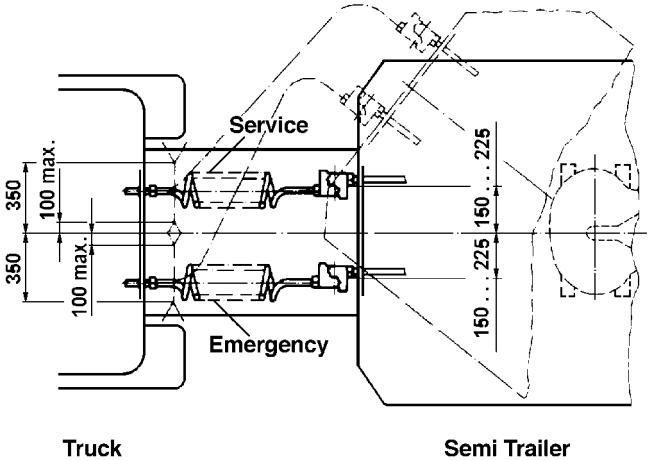
After uncoupling, the cover must be closed in order to prevent dirt from entering. Damaged sealing rings must be renewed. The coupling heads must be maintained as part of the legal regulations.

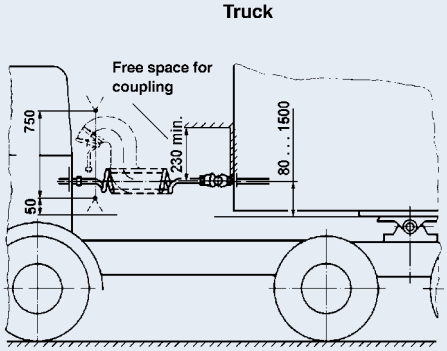
Checking

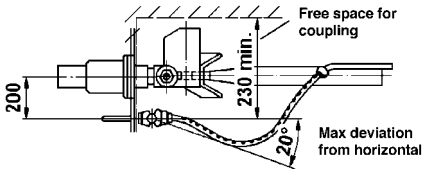
Check whether the coupling head engages correctly and ensure it does not leak. Check sealing rings for damage.



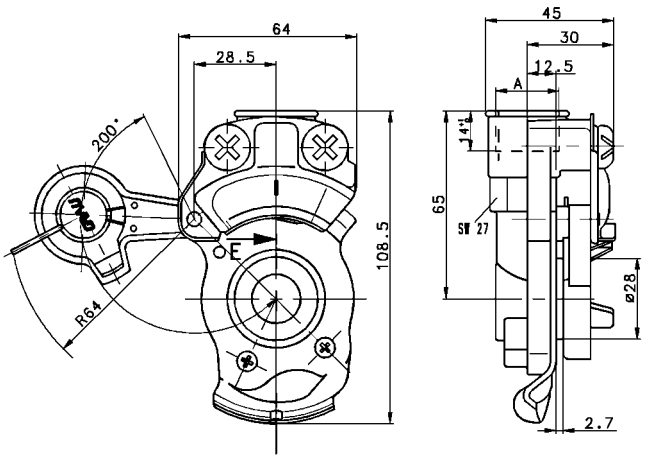




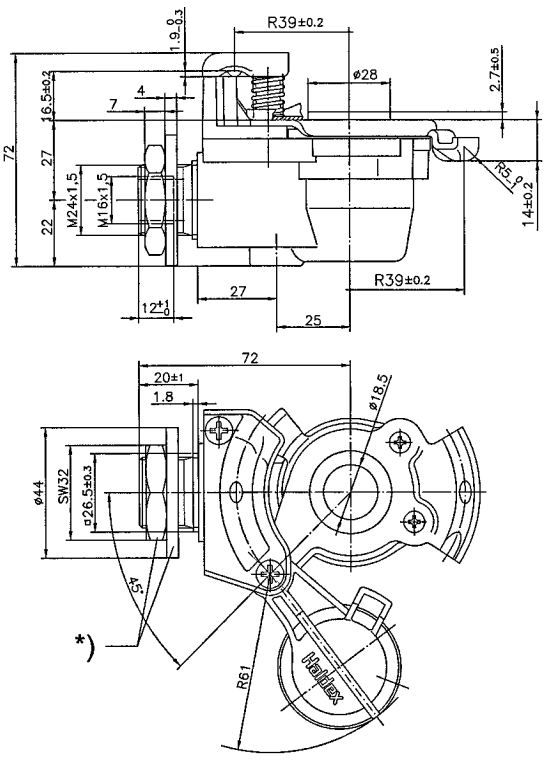




334 054 ...

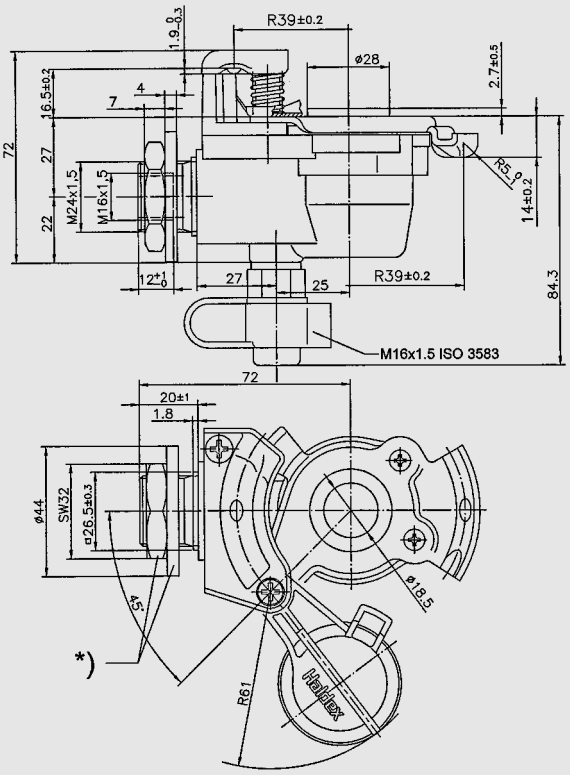


334 054 401



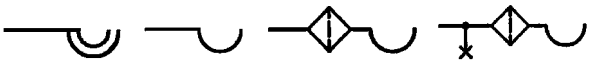
*) Part Number. 950 334 004

334 054 441

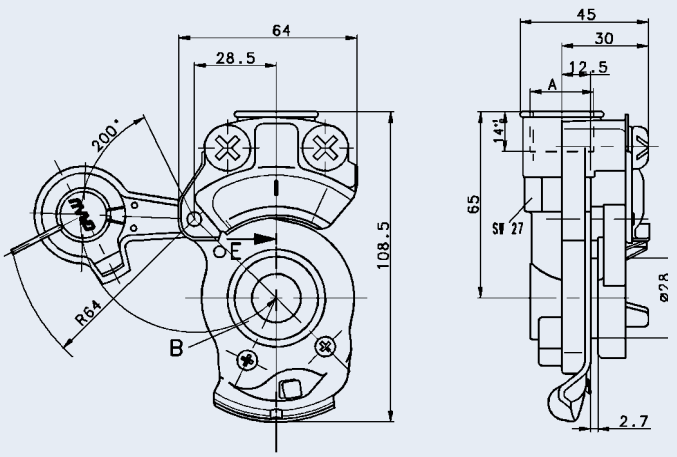


*) Part Number. 950 334 004

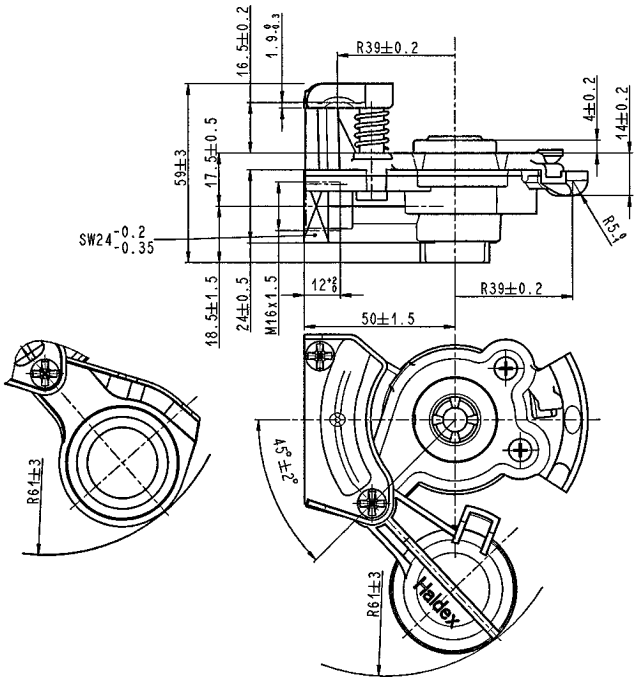
Symbol



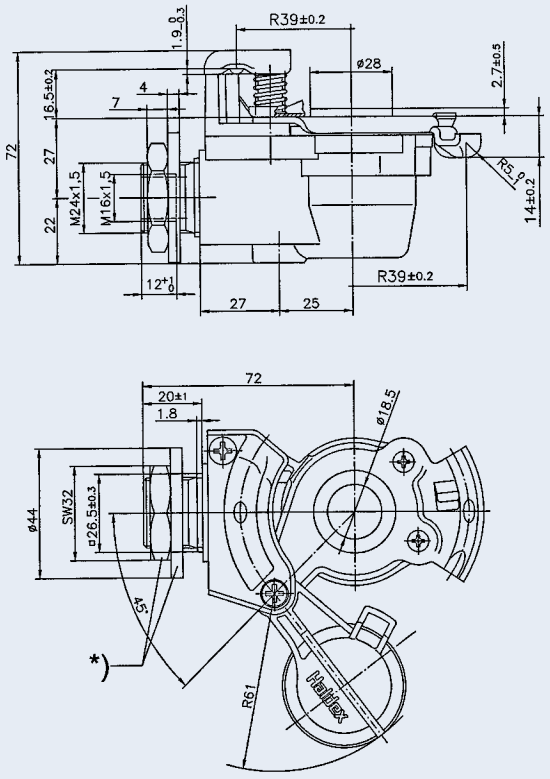
334 055 ...



334 063 001

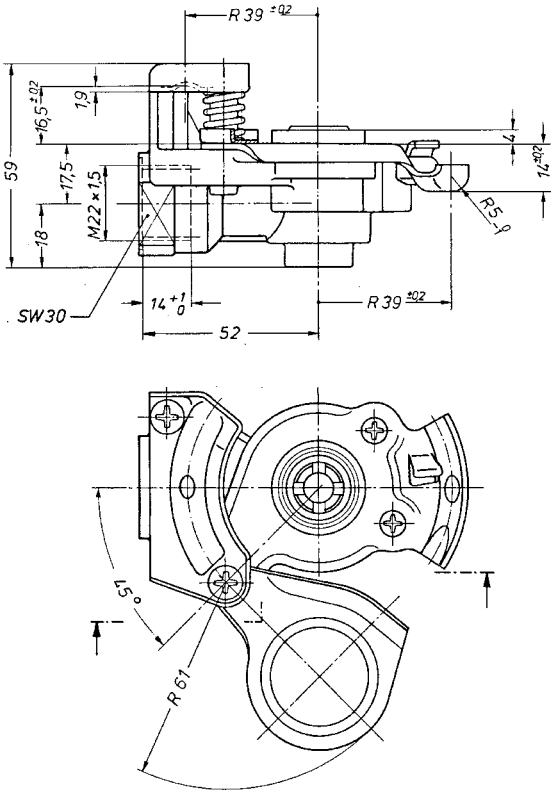


334 055 401

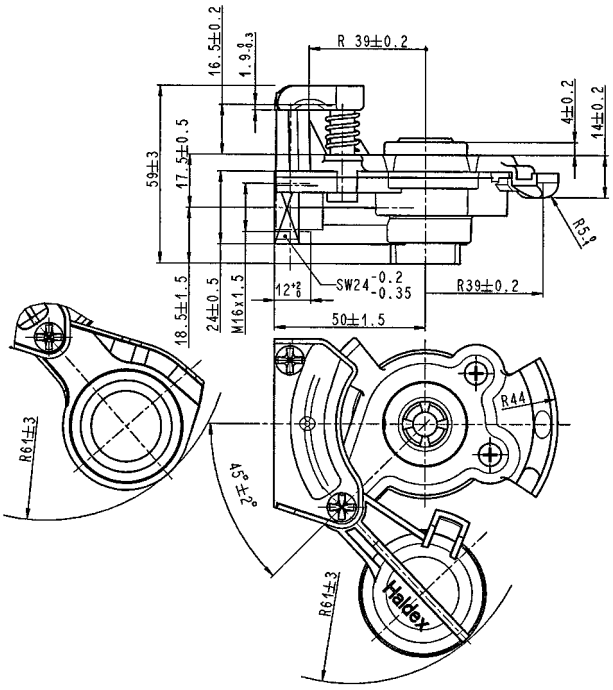


*) Part Number. 950 334 004

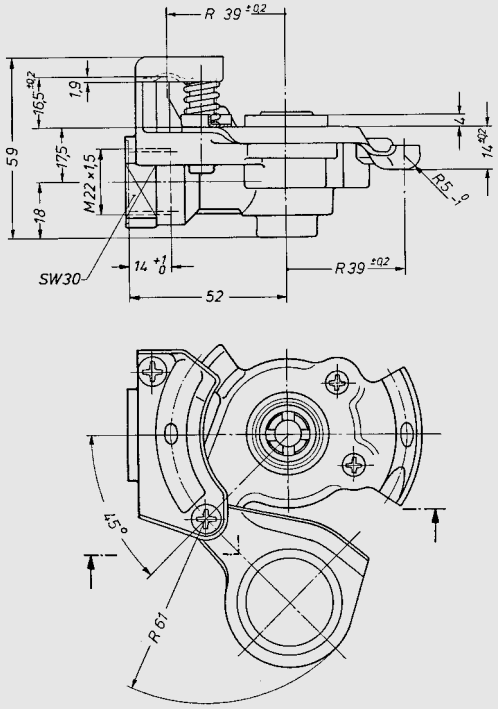
334 064 001



334 071 001



334 072 001



Versions

Part-No	Colour	2-Line	Port	Operating Pressure	Remark	Nut and washer
334 054 201	Yellow	Service	M16x1.5	10.0bar	Plastic cover	w/o
334 054 211	Yellow	Service	M22x1.5	10.0bar	Plastic cover	w/o
334 054 401	Yellow	Service	M16x1.5	10.0bar	with filter, plastic cover	with
334 054 411	Yellow	Service	M16x1.5	10.0bar	with filter, plastic cover	w/o
334 054 441	Yellow	Service	M16x1.5	10.0bar	with filter + test point, plastic cover	with
334 055 201	Red	Emergency	M16x1.5	10.0bar	Plastic cover	w/o
334 055 211	Red	Emergency	M22x1.5	10.0bar	Plastic cover	w/o
334 055 401	Red	Emergency	M16x1.5	10.0bar	with filter, plastic cover	with
334 055 411	Red	Emergency	M16x1.5	10.0bar	with filter, plastic cover	w/o
334 063 001	Red	Emergency	M16x1.5	10.0bar	autom. shut, metal cover	w/o
334 063 011	Red	Emergency	M16x1.5	10.0bar	autom. shut, plastic cover	w/o
334 064 001	Yellow	Service	M16x1.5	10.0bar	autom. shut, metal cover	w/o
334 064 011	Yellow	Service	M16x1.5	10.0bar	autom. shut, plastic cover	w/o
334 071 001	Red	Emergency	M22x1.5	10.0bar	autom. shut, metal cover	w/o
334 072 001	Yellow	Service	M22x1.5	10.0bar	autom. shut, metal cover	w/o

Seal ring (except automatic): 025 0482 09

Nut and washer for 334 054 401/441 and 334 055 401:
950 334 004

Use

British-version coupling heads differ externally in shape and connection.

The "supply" C coupling has an outside thread;

The "service" C connector has an inside thread.

These are fitted to connect the supply and service line between trucks and semi-trailer tractor units, and trailers. They cannot be mistaken for each other.

Method of operation

The couplings and connectors are plugged into each other.

Installation instructions

The "Supply" coupling is fitted on the right of the direction of travel, and the "service" coupling on the left.

Testing

Test for operation and leaks

Technical data

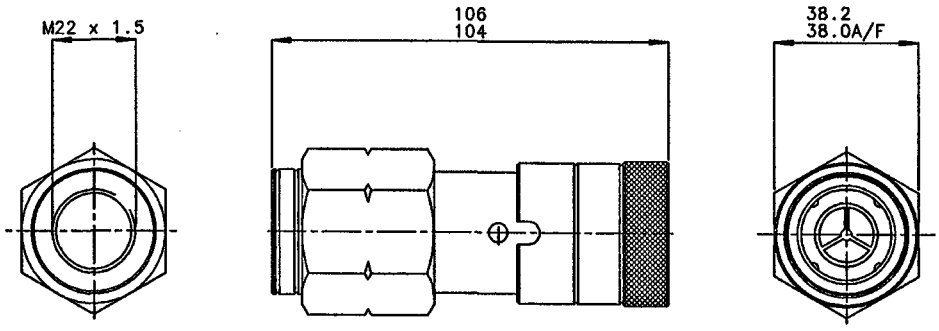
Medium: air

Service pressure:	see the table of versions
Service temperature:	-40°C to +80°C
Standard:	BSAU138b

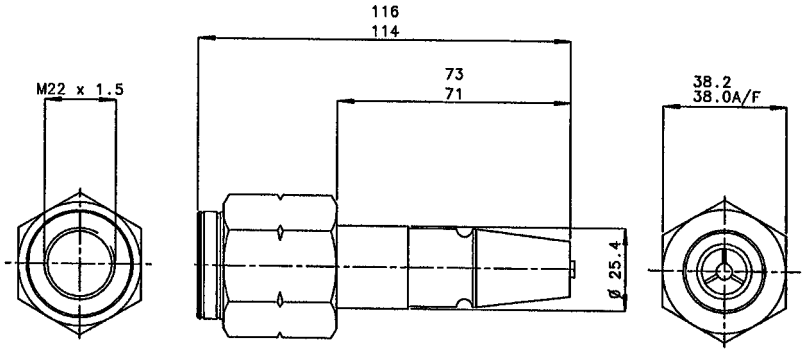
Versions

Part No	Colour	Line	Type of vehicle	Port	Pressure	Remark
339 018 001	Red	Emergency	Truck	M22x1.5	10.0bar	C-Coupling Female
339 019 001	Yellow	Service	Truck	M22x1.5	10.0bar	C-Coupling, Male
339 020 001	Red	Emergency	Truck	M16x1.5	10.0bar	C-Coupling Female
339 021 001	Yellow	Service	Truck	M16x1.5	10.0bar	C-Coupling, Male
339 022 001	Red	Emergency	Trailer	M22x1.5	10.0bar	C-Coupling, Male
339 023 001	Yellow	Service	Trailer	M22x1.5	10.0bar	C-Coupling, Female with pin

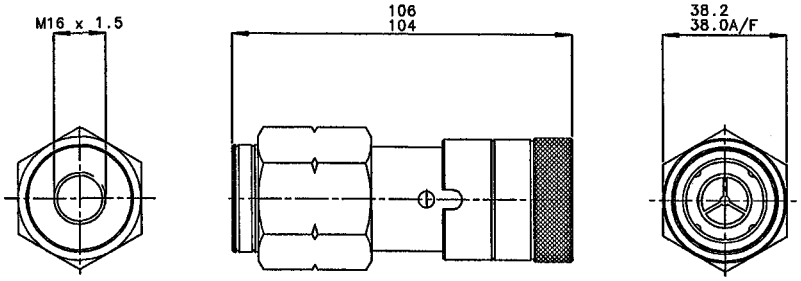
339 018 001



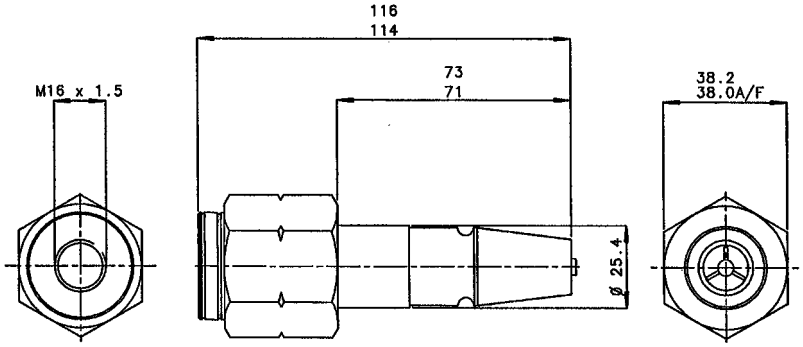
339 019 001



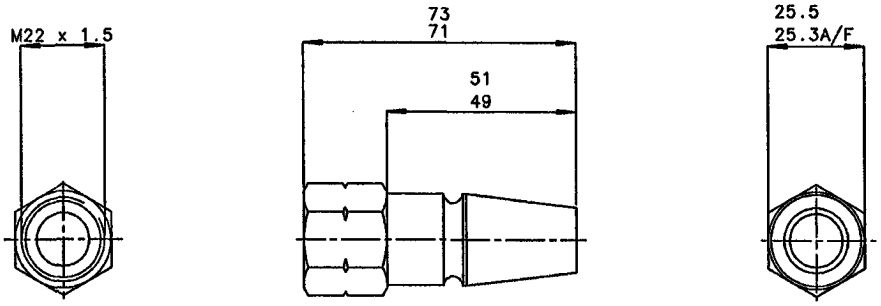
339 020 001



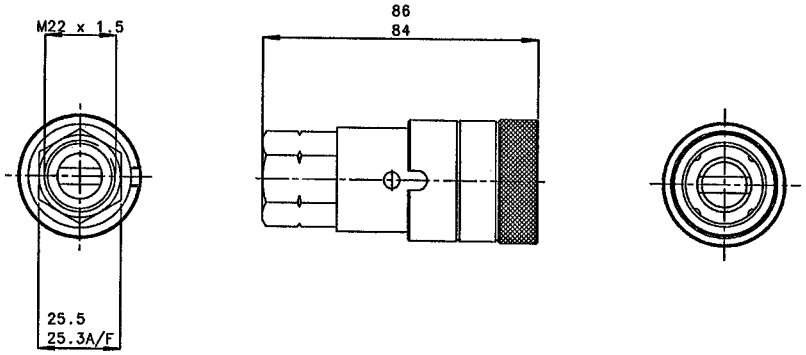
339 021 001



339 022 001



339 023 001



Use

The R.E.V. controls the dual-circuit air brake system of the trailer. The valve complies with the requirements of EC regulations regarding brake systems. Versions with a predominance device can adapt the braking effect between the towing and towed vehicle.

Function

As long as there is a pressure difference between ports 1 and 2-1, the supply air flows through power inlet 1 past the overflow seal to port 2-1 and from here to the air tank of the trailer. At the same time, the supply air passes through the hole in the valve spindle and is applied in the chamber between the control piston and valve spindle piston. When released, the inlet is closed and the outlet opened. Air is allowed to escape from ports 2 via the opened outlet. Air is allowed to escape from the control port 4 via the actuation valve (trailer control valve).If the vehicle brake system is actuated, pressure is applied to port 4 of the emergency relay valve via the brake line. The control piston moves downwards together with the valve spindle. The outlet is closed and the inlet opened. The compressed air flows from port 2-1 to the ports 2 and from here into the brake chamber of the trailer. The pressure in ports 2 is also applied to the control piston from below. The inlet closes and the outlet remains closed when the pressure forces acting on the control piston have equalized. This provides a partial braking position. Any change in pressure at port 4 results in a corresponding change in pressure at the ports 2.

In the full braking position, the piston spindle moves downwards to such an extent that the outlet remains closed and the inlet fully opened.

Air is allowed to escape from port 1 out to atmosphere by uncoupling the coupling head "Emergency" or by disconnecting the supply line.

Since air is also allowed to escape from the chamber between the control piston and the valve spindle piston, the spring forces the valve spindle downwards, the outlet is closed and the inlet opened. The full pressure from port 2-1 is directed to the ports 2.

Predominance Device

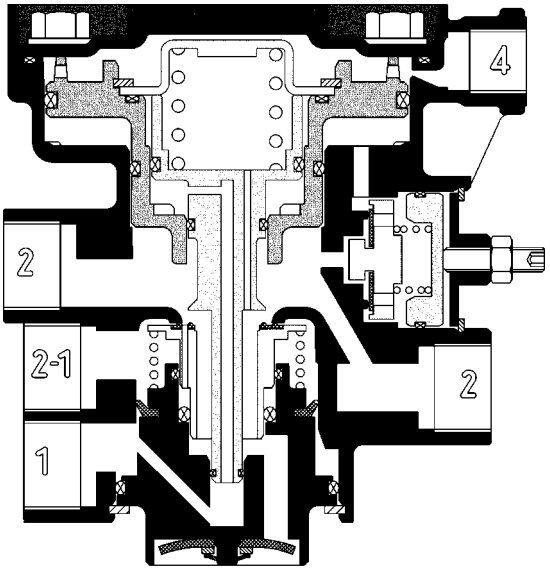
Emergency relay valves with a predominance device can be set in such a way that the pressure at the ports 2 is increased with respect to port 4 in the partial braking range from p_e = 0... 1.2 bars.

Depending on the set spring force on the predominance device, the compressed air in the ports 2 is directed via a hole under the entire surface beneath the control piston after an increased pressure in ports 2 has been reached and after the valve plate of the predominance device has been raised. Only now can the final position, i.e. closed inlet and outlet be obtained.

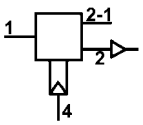
If the trailer vehicle is to be manoeuvred in an uncoupled condition, then the automatic release valve (if fitted) flange mounted on the R.E.V. must be actuated.

The port is opened between port 2-1 and the valve spindle piston by depressing the pushbutton in the release valve. Compressed air flows from the air tank under the valve spindle piston and presses it upwards against the force of the spring. As a result, the inlet is closed, the outlet opened and air is allowed to escape

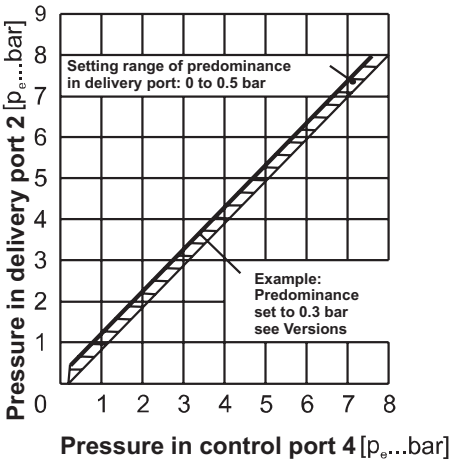
351 008 ... Release position



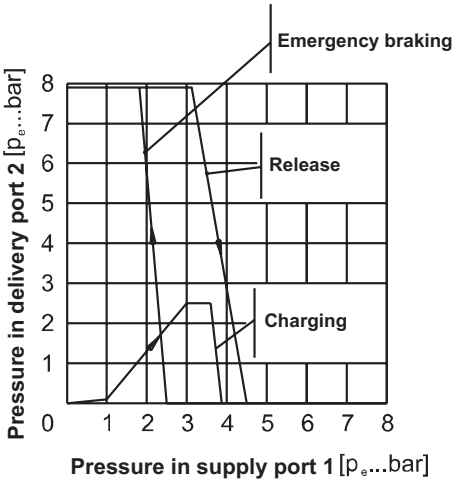
Symbol



Functional diagram (with predominance)



Functional diagram (Emergency brake)



from the wheel brake cylinders via the vent. A so-called "safety pressure" has been reached if the pressure in the air tank is no longer adequate to force the valve spindle piston upwards against the force of the spring. The brake can now no longer be released with the release valve. The trailer vehicle must once again receive a supply of compressed air by connecting the red supply line, only now can the trailer brake be released once again using the release valve.

The release valve automatically returns to the operating position when the red supply line is connected. The brake can now be applied in the trailer vehicle.

Relay Emergency Valve with Release Valve

The relay emergency valve combined with the automatic release valve is mainly used on trailer.

Vehicles with brake systems equipped with automatic load sensing valves.

Relay Emergency Valve with Manual Load Valve

The emergency combination relay valve with manual load valve does not comply with EC requirement. An automatic release valve is not required if this manual load valve is equipped with a release setting.

Installation

The relay emergency valve should be installed with the vent facing downwards and with its mounting flange secured by two bolts on the vehicle frame.

The automatic release valve, Part No. 352 012 001 is flange mounted on the relay emergency valve by means of two socket head cap screws M 8 x 20, Part No. 051 0109 09. An O-ring, Part No. 024 0331 09 and a sealing ring, Par No. 025 0021 09 must be used for sealing the flange port. (Refer to types for part numbers of combinations).

Care must be taken in the case of combined versions to ensure that the actuation devices are easily accessible.

Maintenance

The relay emergency valve, together with its combinations must be maintained as part of legal regulations.

Checking

Ensure the function of the relay emergency valve meets the corresponding functional diagrams.

The functionality of the automatic release valve must also be checked, in addition to the above check for leaks

With the vehicle stationary, and the brake system ready for operation, the supply line to the trailer vehicle is uncoupled. The piston rods of the brake chambers on the trailer must extend quickly.

The brake must be released when the push button of the automatic release valve is depressed against the stop.

The push button must return to its initial position when it is in the position for manoeuvring and air is once again allowed to enter the supply line of the trailer.

Checking and Adjusting the Predominance Device

In order to check the predominance device, apply p_e 4 = 3.5 bar at port 4 and measure the modulated pressure pe 2 at outlet port 2. In order to adjust the predominance, allow air to escape at port 4 to atmosphere. Using a 10 mm open-ended wrench, loosen the locknut on the adjusting screw of the predominance device and turn the adjusting screw with an 8 mm open-ended wrench.

Turning in clockwise direction = Increasing the predominance setting
Turning counter clockwise = decreasing the predominance setting

Note the specifications of the vehicle or brake manufacturer when adjusting the predominance.

Technical Data

Operating pressure:	p_e = 10 bar
Operating temperature:	- 40°C - + 80°C
Medium:	Air
Ports:	1, 4: M 16 x 1.5
	1-2, 2: M 22 x 1.5
Port description:	1 = Supply
	2 = Delivery
	4 = Control
	2-1 = Delivery/Supply

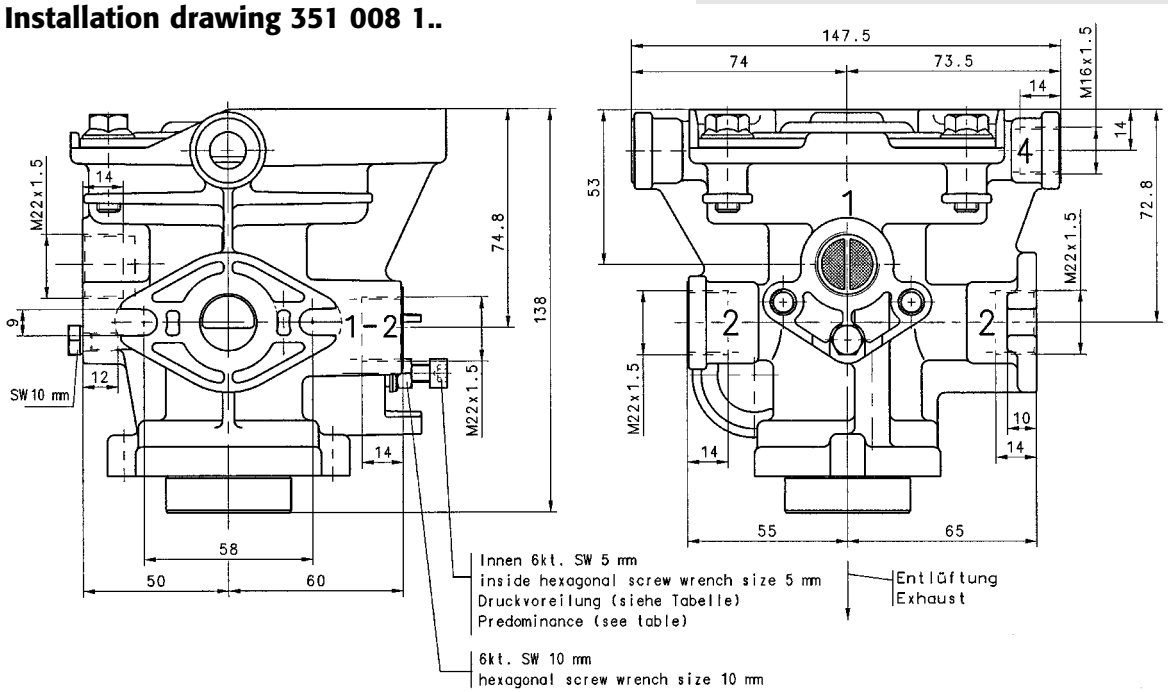
Versions

Part number	Version	Flange for shunt valve	Predominance set (bar)	Available
351 008 111	A	yes	0.5	on request
351 008 112	A	yes	0	on request
351 008 113	A	yes	0.2	on request
351 008 121	B	yes, but closed	0.5	on request
351 008 122	B	yes, but closed	0	yes
351 008 123	B	yes, but closed	0.2	on request
351 008 124	B	yes, but closed	0.3	on request
351 009 121	B	yes, but closed	w/o	yes
351 033 001	for EB+	no	w/o	yes

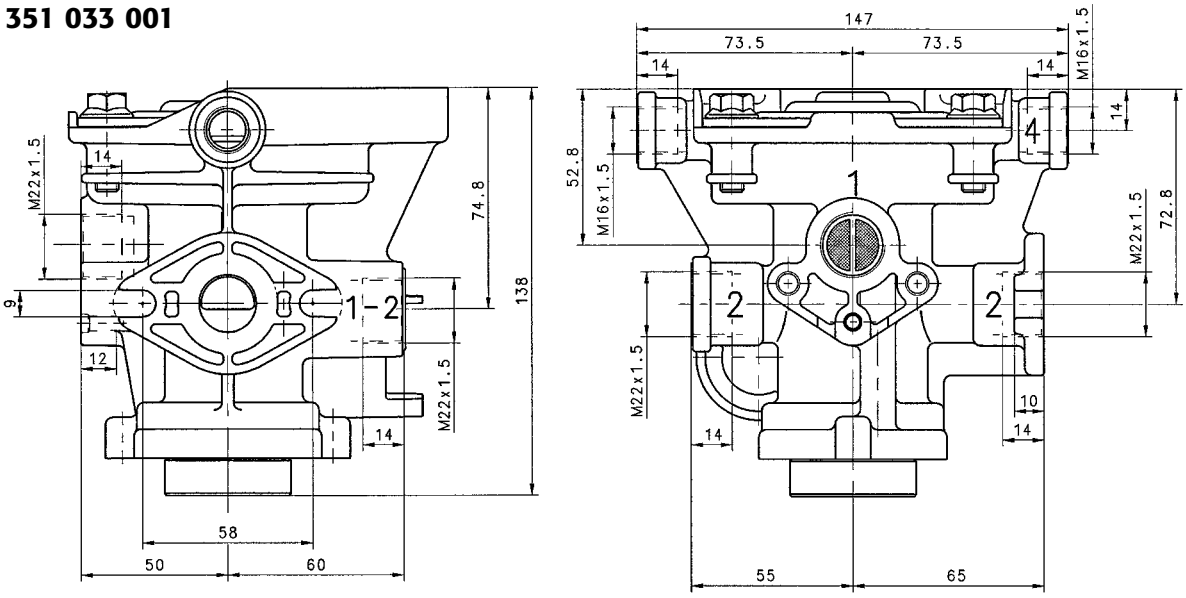
Combinations

		Consists of:		
Consists of:	REV	Shunt valve	M.L.V.	Available
350 026 102	351 008 122	352 012 001		yes
350 027 202	351 008 122		352 011 102	yes
350 028 101	351 008 122	354 012 001	352 011 122	yes

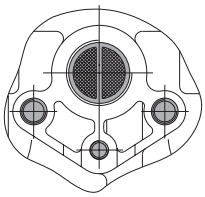
Installation drawing 351 008 1..



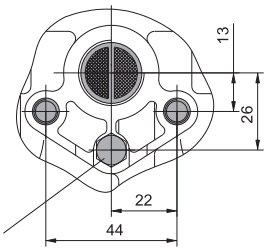
351 033 001



Version A

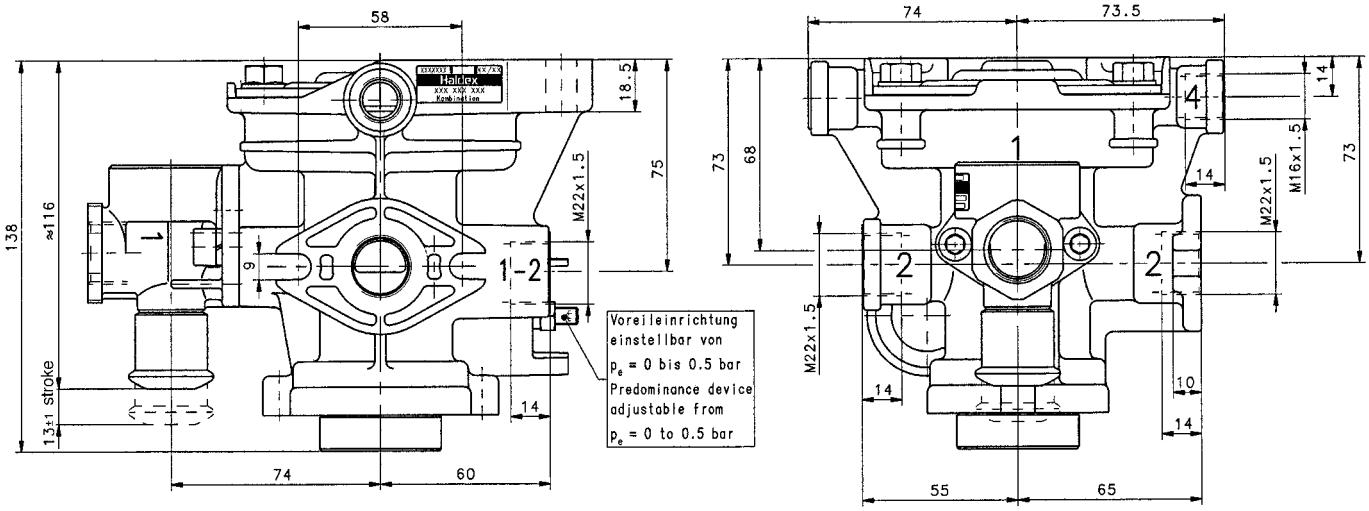


Version B

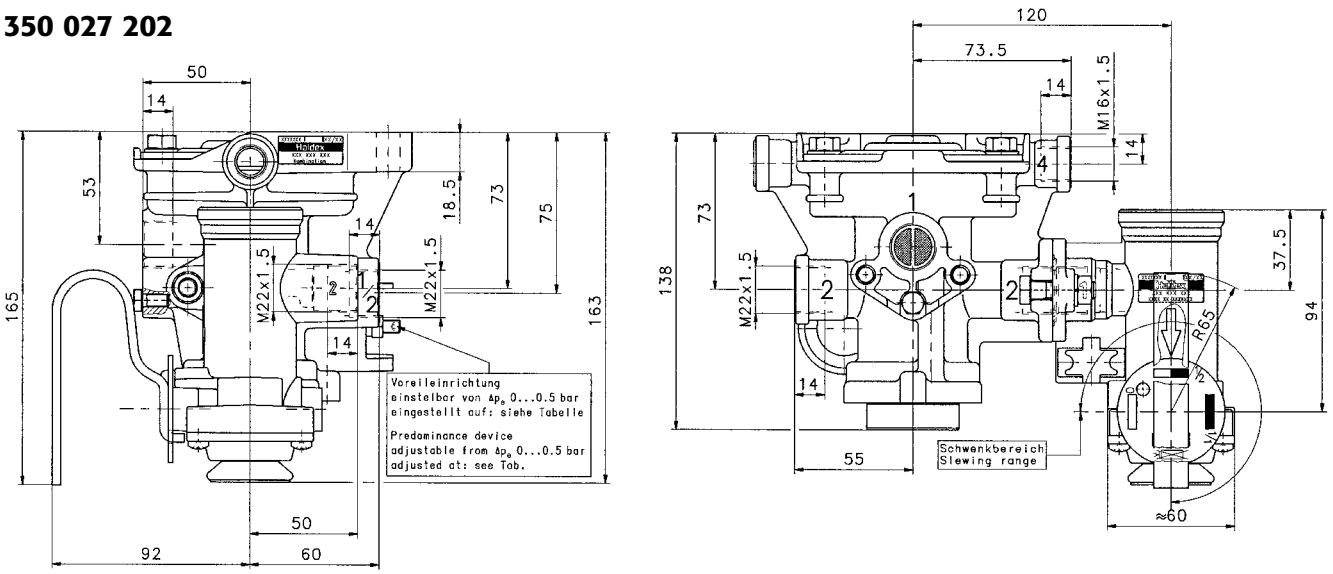


Remove at shunt valve assembling

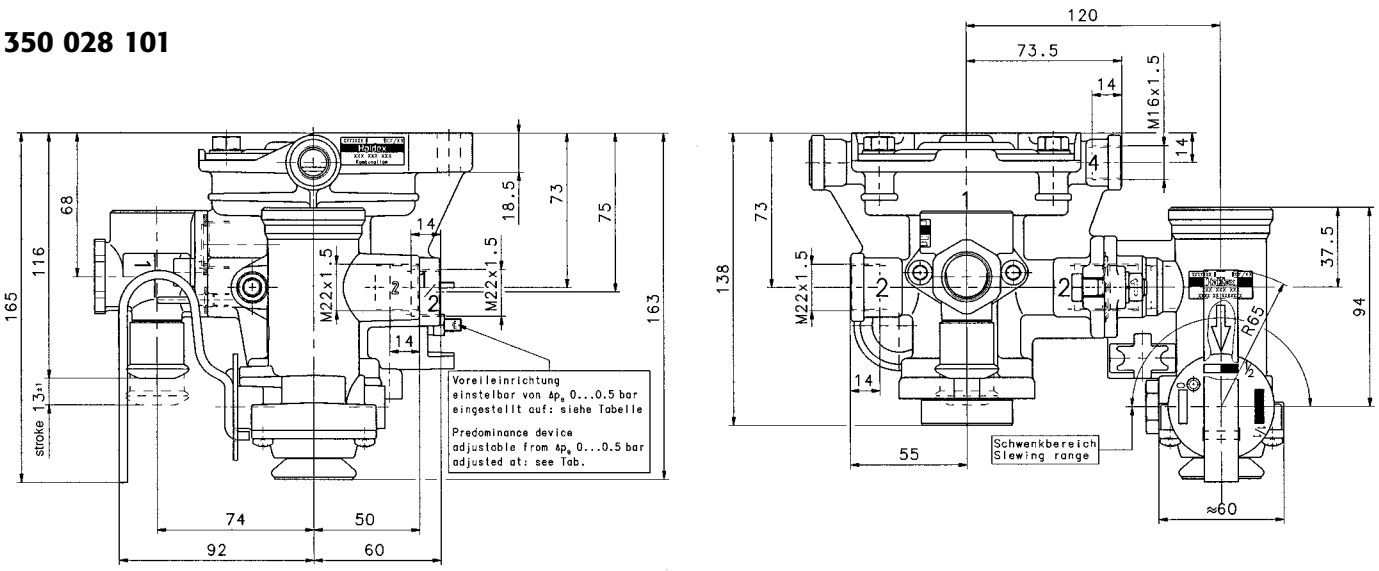
Combinations 350 026 102

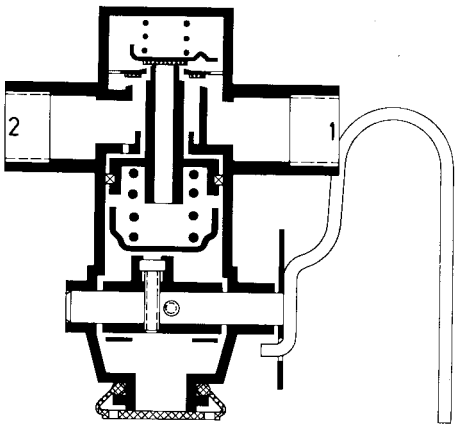


350 027 202



350 028 101





Application

The M.L.V. limits the pressure in the brake chambers of the trailer depending on the load status.

Function

The lever of the M.L.V. must be set manually corresponding to the load status of the trailer. Depending on the type, the settings "no-load", "half load", "full load", and in some cases "1/4 load", "3/4 load" and "release" are provided.

When the service brake system of the trailer is actuated, the compressed air from the relay emergency valve flows into inlet port 1 of the M.L.V. and then through the open outlet port 2 and onto the brake chambers.

At the same time, the pressure in outlet port 2 is also applied via a hole to the control piston. When a pressure corresponding to the lever setting has been reached in the brake cylinders, the control piston is shifted downwards against the force of the spring until both inlets close. The outlet remains closed. Further increase of pressure in the brake cylinders is not possible. A drop in pressure in outlet port 2 (e.g. as a result of a leak between the M.L.V. and brake cylinder) is immediately compensated by the control piston moving upwards and opening the upper inlet.

The spring under the control piston is preloaded corresponding to the lever position by means of the cam arranged on the lever shaft.

In the lever position "full load", the control piston is prevented from moving downwards so that the inlet remains open and during full braking, the brake cylinders receive the full operating pressure.

The lever must be moved into the position "release" (if provided) in order to manoeuvre the uncoupled trailer vehicle with the brakes applied. In this way, the spring under the control piston is completely relieved, the inlet closed, the outlet opened and the compressed air escapes from the brake cylinders into the atmosphere via the vent holes in the protective cap.

In the case of versions without the "release" setting, a release valve flange-mounted on the relay emergency valve must be actuated for releasing the brake system for manoeuvring purposes.

Installation

The M.L.V. can be installed either directly flanged on the relay emergency valve (using a sealing ring Part No, 025 0021 09) or installed in the line between the relay emergency valve and brake cylinder.

Care must be taken to ensure the lever is adequately accessible. The vent must face downwards.

It is recommended to install a M.L.V. for each axle or axle pair if the front and rear axle(s) of the trailer are subjected to different loads during operation. Each M.L.V. then limits the brake pressure in the corresponding axle independent of the other. The allocation of the M.L.V. should be indicated by means of an information plate.

Symbol

Checking

Check pressure setting in the individual lever positions (note specifications of vehicle manufacturer). For reference values, refer to types or information on carrying out special brake inspections. Check release position (if available). The brakes must be free in the "release" position. Check dust cap.

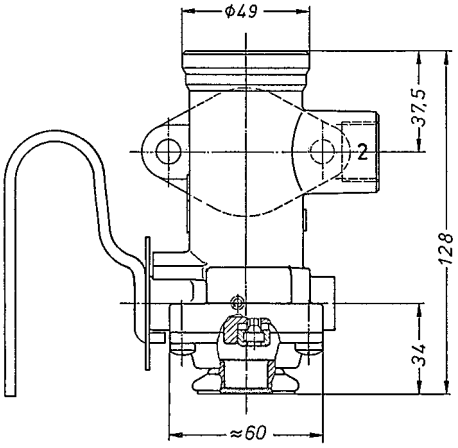
Maintenance

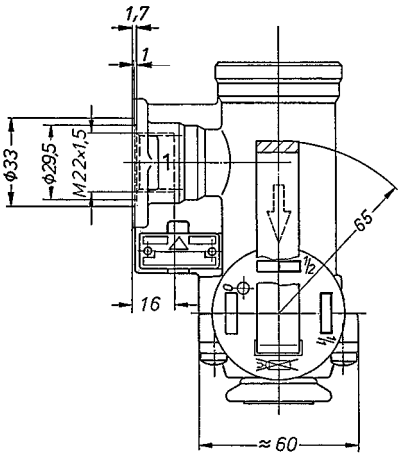
The M.L.V. must be maintained as part of the legal regulations.
Renew damaged dust caps.
Pressure Setting of Manual Load Valve

Depending on the version, the pressure setting of the M.L.V. can be adjusted for the settings "no load", "1/4 load" or "1/2 load" by turning the adjusting screws. It is not possible to adjust the pressure for the "full load" setting. A screwdriver DIN 911-4 (key for socket head cap screws 4 mm) is required for adjustment work.

The lever position for adjusting the pressure in "no load", "1/2 load", "1/4 load" and "3/4 load" setting is specified in the following.

Turning the adjusting screw in a clockwise direction = pressure reduction
Turning the adjusting screw in a counter clockwise direction = pressure increase
The pressure value to be adjusted depends on the specifications of the vehicle manufacturer.
Reference values are specified in the guidelines for the special brake inspection 29 Appendix VIII StVZO.



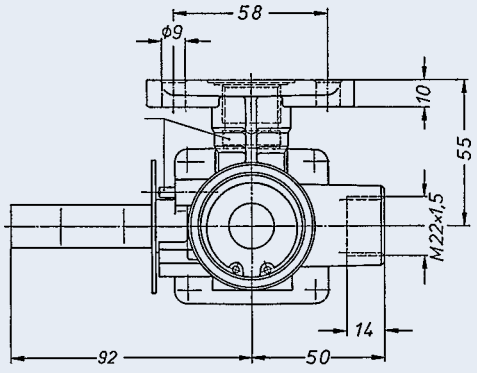


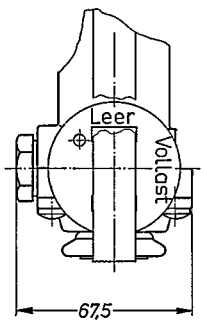
Technical Data

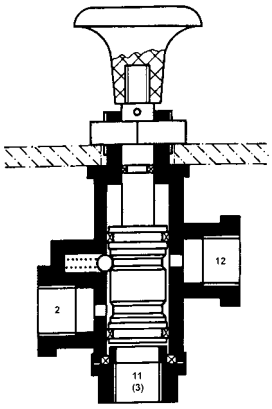
Operating pressure:	up to 10 bar
Operating temperature:	-40°C to +80°C
Ports:	M 22 x 1.5
Port description:	1 = Supply
	2 = Delivery

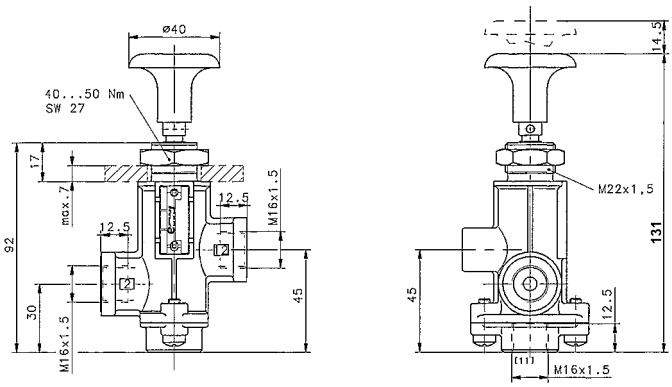
Versions

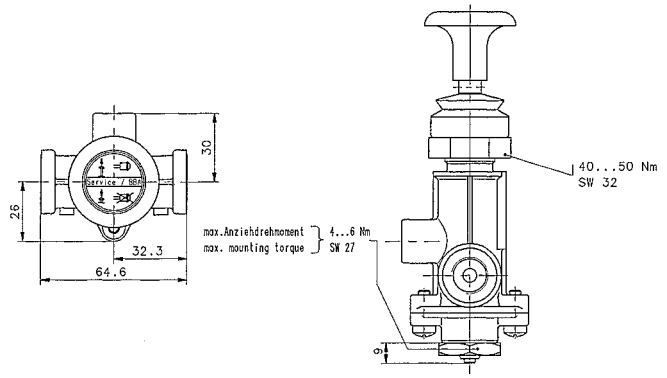
			Setted at position (p_e in bar)						Possible Pressure setting (p_e in bar)		
Part-No.	Brake system	Op. Pressure pe in bar	Release	Empty	1/4	1/2	3/4	Laden	Empty	1/4	1/2
352 011 101	Single line	5.3	with	1.5 - 1.9	-	3.0 - 3.5	-	tank pressure	1.0 - 2.0	-	3.0 - 4.5
352 011 102	dual line	7.35	with	2.0 - 2.5	-	4.0 - 4.5	-	tank pressure	1.3 - 2.5	-	3.0 - 4.5
352 011 121	Single line	5.3	w/o	1.5 - 1.9	-	3.0 - 3.5	-	tank pressure	1.0 - 2.0	-	3.0 - 4.5
352 011 122	dual line	7.35	w/o	2.0 - 2.5	-	4.0 - 4.5	-	tank pressure	1.3 - 2.5	-	3.0 - 4.5
352 011 141	dual line	7.35	w/o	0.8 - 1.2	1.2 - 2.2	3.2 - 4.0	4.0 - 4.8	tank pressure	0.8 - 2.0	1.2 - 3.0	-
352 011 171	dual line	7.35	w/o	1.0	2.0	3.0	4.0	tank pressure	0.8 - 2.0	1.2 - 3.0	-











Use

The automatic shunt valve, also known as the release valve, is used to release the trailer brake when unhitched if there is no shunt valve flanged to the Relay Emergency Valve.

Method of operation

When the supply line is coupled, supply air flows through port 11 and if the valve has been previously actuated, presses the piston with the switching knob screwed on to it into its top end position. The supply air can then flow from port 11 to port 2 and from there to the trailer brake control valve, which releases the brake. The compressed air flows from the tank to port 12 through a connecting line.

If the brake has to be released after unhitching the trailer for manoeuvring purposes, the actuator knob must be pressed into the body.

If the brake needs to be re-actuated after manoeuvring, the actuator knob must be pulled out of the body as far as it will go.

Port 2 is then exhausted again through port 11 and the coupling head supply, and the Relay Emergency Valve initiates braking again.

Installation instructions

Mounted with SW 27 or 32 union nuts in a hole for M 22 x 1.5. Tightening torque: 40 - 50 Nm. When removing/mounting the actuator knob, secure the actuator rod with a suitable arbor.

Make sure that the actuator knob can move freely.

Testing

Test the valve for operation and leaks.

When the supply line is connected, the valve must automatically switch to the filling position (at p_e 2.5 bar).

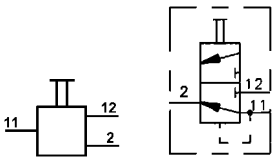
Technical data

Service pressure:	p_e 8 bar
Service temperature:	-40 °C to +80°C
Medium:	air
Switching pressure:	p_e 2.5 bar
Ports:	M 16 x 1.5
Port designation:	11 = 1. supply port 12 = 2. supply port 2 = delivery port

Versions

Part No	Boot	Exhaust valve	Plate	Colour of knob	Nut
352 018 001	w/o	w/o	with	blue	A/F 27
352 018 011	with	w/o	with	blue	A/F 32
352 018 021	with	w/o	w/o	black	A/F 33
352 018 031	with	with	w/o	black	A/F 34

Symbol



Use

The parking brake valve is fitted as a pneumatic release valve for spring brake systems.

Method of operation

In the service position, port 2 is filled with air via port 12 and the spring brake actuator is charged - the parking brake is released.

The push-button must be pressed in to actuate the parking brake. This exhausts port 2 via port 3 and therefore the spring brake actuator as well - the parking brake is applied.

Installation instructions

Mounted with SW 27 or 32 union nuts in a hole for M 22 x 1.5. Tightening torque: 40 - 50 Nm. When removing/mounting the actuator knob, secure the actuator rod with a suitable arbor.

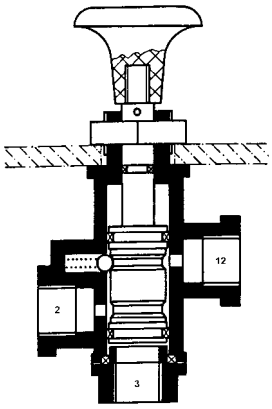
Make sure that the actuator knob can move freely.

Testing

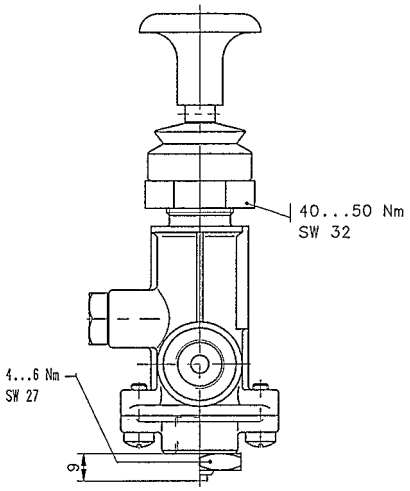
Test the valve for operation and leaks.

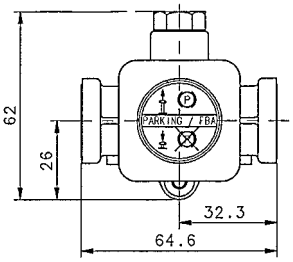
Technical data

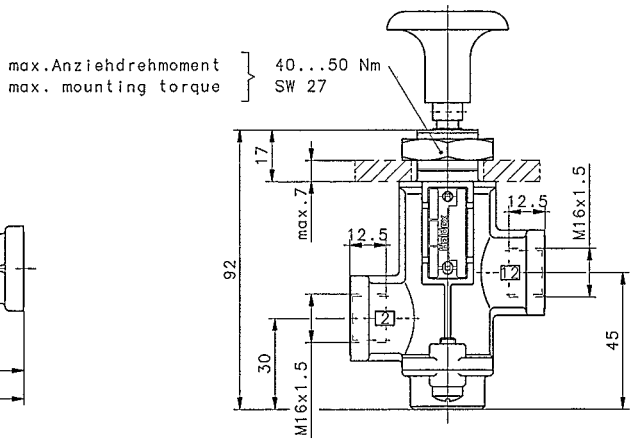
Service pressure:	8.5 bar
Service temperature:	-40°C to +80°C
Ports:	M 16 x 1.5
Port designation:	12 = 2. supply port 2 = delivery port 3 = exhaust

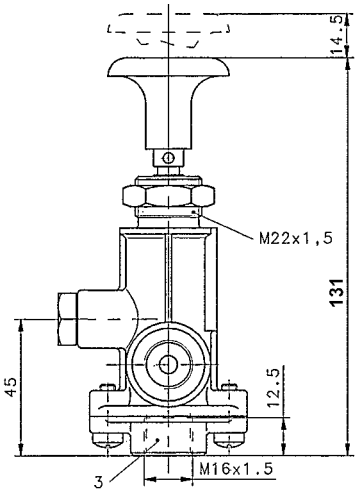


352 019 011





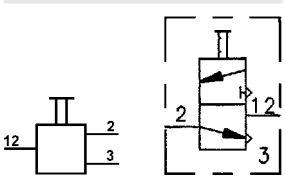


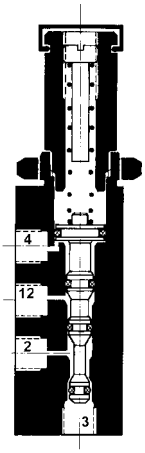


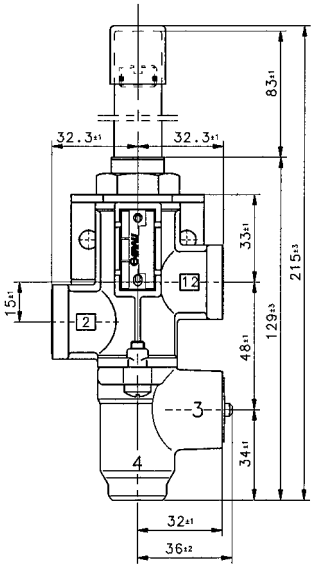
Versions

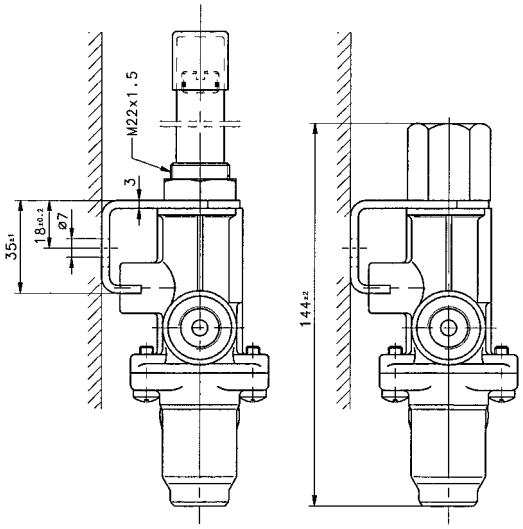
Part No	Boot	Exhaust valve	Plate	Knop	Nut
352 019 001	w/o	w/o	with	square/red	M 27
352 019 011	with	w/o	with	square/red	M 32
352 019 031	with	with	with	square/red	M 32
352 019 041	with	w/o	w/o	round/red	M 32

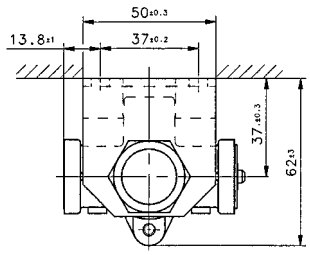
Symbol











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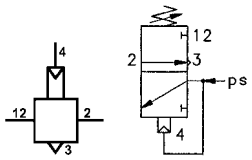


Use

As an automatic pilot valve for a wide variety of different applications, in which other systems or equipment units need to be switched automatically when a specific pressure is reached, e.g. lift axles, interlocks, etc.

Method of operation

In the rest position, port 2 is connected to atmosphere via port 3. System pressure is present at port 12. If pressure is applied at port 4, this pressure acts on the spring-loaded switching piston. If this pressure exceeds the set value (e.g. 2.5 bar with 352 022 001), the switching piston is pushed against the spring force. This then separates port 2 from port 3 before connecting port 12 with port 2. The system pressure present at port 12 can now flow via port 2 and control or operate downstream equipment units.

If the pressure applied at port 4 is decreased by 1.5 bar to below the switching pressure, the spring presses the switching piston back into its starting position. Port 2 is exhausted via port 3.

Installation instructions

Installation site must be protected against splash water. Mounted by means of its incorporated bracket. Installation position vertical, with port 4 pointing downwards.

Adjustment (only 352 022 011)

Remove the cover. The switching pressure can be changed by turning the adjuster screw with a screwdriver.

Rotation to the right = switching pressure increased

Rotation to the left = switching pressure decreased

Testing

Test for operation and leaks.

Technical data

Service pressure:	8.5 bar
Service temperature:	-40°C to +80°C
Ports:	2, 4, 12: M 16 x 1.5
	3: M 22 x 1.5
Port designation:	12 = 2. supply port
	2 = delivery port
	3 = exhaust
	4 = control port

Versions

Part No	Control pressure (bar)	Setting range (bar)	switching pressure difference (bar)
352 022 001	2.5	not setable	1.5
352 022 011	3.0	3.0 to 5.0	1.5

Use

Manual push-pull valve with pneumatic re-set for a wide variety of different applications, e.g. lift axles.

Method of operation

Knob pressed in: port 12 is connected with port 2. Compressed air flows from port 12 to port 2 and operates the downstream equipment units, e.g. the lift axle lifts.

When air between 0.6 and 1.5 bar is applied to port 4 (depending on the version), the switching piston is displaced, the switching knob pressed out and port 2 connected to atmosphere via port 3. Equipment connected to port 2 is exhausted, i.e. the lift axle is lowered.

Installation instructions

Installation site must be protected against splash water. Mounted by means of its incorporated bracket. Installation position vertical, with port 4 pointing downwards.

Testing

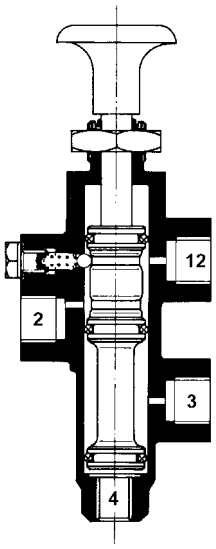
Test for operation and leaks.

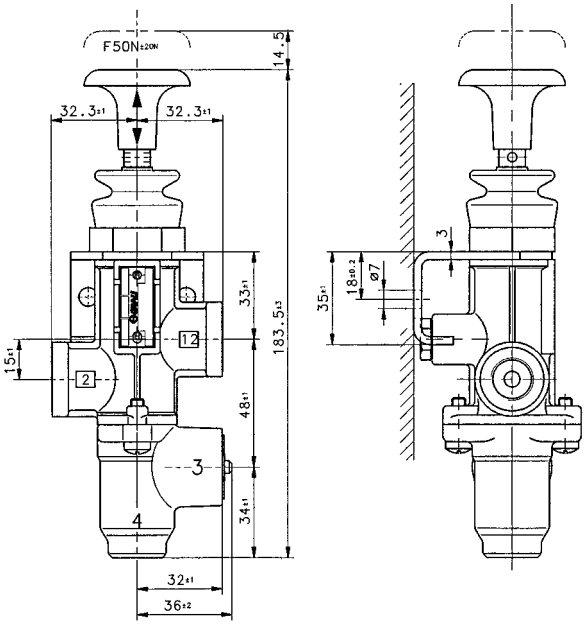
Technical data

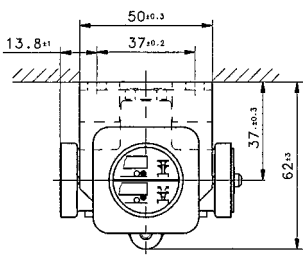
Service pressure:	8.5 bar
Service temperature:	-40°C to +80°C
Ports:	2, 4, 12: M 16 x 1.5
	3: M 22 x 1.5
Port designation:	12 = 2. supply port
	2 = delivery port
	3 = exhaust
	4 = control port

Versions

Part No	Control pressure (bar)
352 042 001	1.5
352 042 011	0.6







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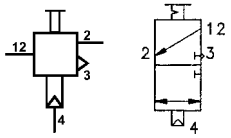
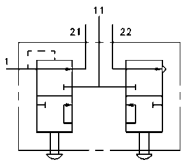
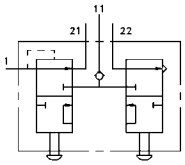


Function diagrams

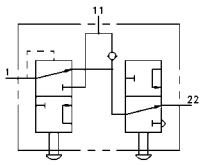
352 044



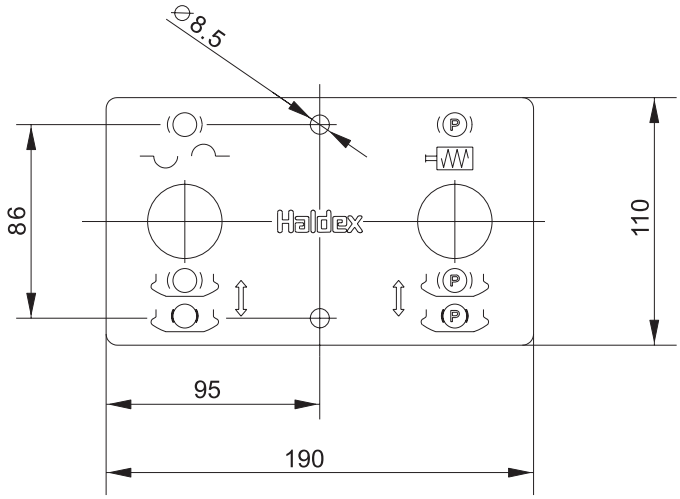
352 045



352 046



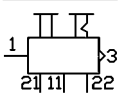
028 0383 09 Information sign



Versions

Part No	Check valve	Integrated Emergency function	Plate 028 0383 09
352 044 001	w/o	No, REV necessary	with
352 044 011	w/o	No, REV necessary	w/o
352 045 001	In port 11	No, REV necessary	with
352 045 011	In port 12	No, REV necessary	w/o
352 046 001	in front of parking valve	Yes, via Spring brakes	with

Symbol



Use

The park and shunt valve is used to actuate and release the service brake, and also the spring brakes on unhitched trailers.

Method of operation

352 044/045 ...

Vehicle unhitched, black knob pulled out, red knob pressed in. System pressure is present at port 11. Port 21 is exhausted via the supply coupling head. The service brake has been put into the emergency braking position by the Relay Emergency Valve/emergency brake valve. Port 22 is charged with air (spring brakes released).

When the shunt valve (black knob) is pushed in, port 11 is connected to port 21 (service brake released). The service brake is actuated again by pulling out the shunt valve (black knob).

When the parking valve is pulled out (red knob), port 22 is exhausted. The spring brake is not exhausted (immobilised) until the two-way valve in the system reverses.

352 046 ... (emergency braking using the spring brakes)

Vehicle unhitched, black knob pulled out, red knob pressed in. System pressure is present at port 11. Port 22 is exhausted via the supply coupling head (spring brakes immobilised). When the shunt valve (black knob) is pushed in, port 11 is connected to port 22 (spring brakes released).

Installation instructions

The combined park and shunt valve should be mounted on the vehicle frame with its mounting flange, using two M8 bolts.

Actuator knobs between horizontal and 90° upwards. When painting, protect against the ingress of paint.

Testing

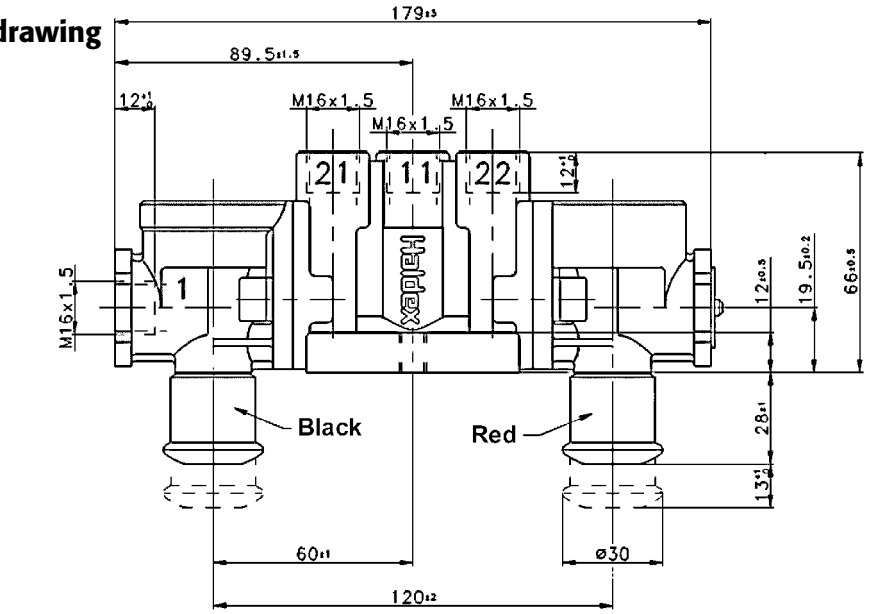
Check the combined park and shunt valve for operation and leaks.

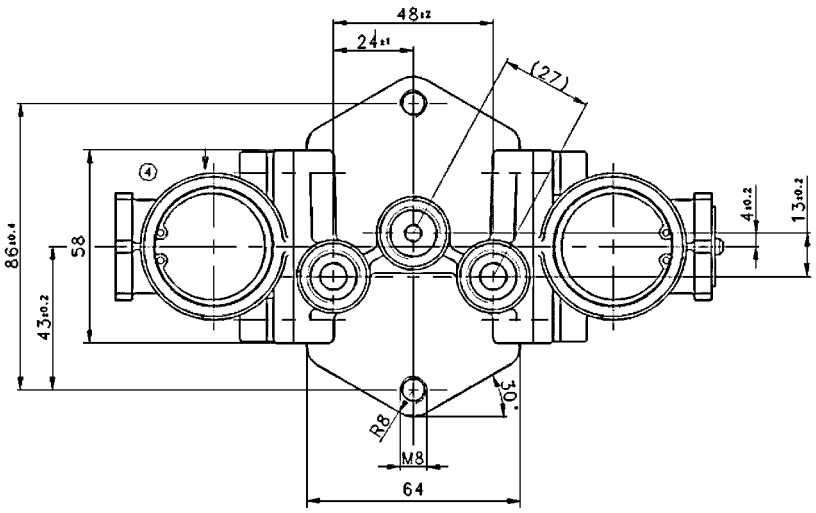
Technical data

Service pressure:	p_e = 8.5 bar
Service temperature:	-40°C to +80°C
Tightening torque:	34 Nm
Medium:	air
Ports:	1, 11, 21, 22: M 16 x 1.5
Port designation:	2 = supply port
	11 = 1. supply port
	21 = 1. delivery port
	22 = 2. delivery port

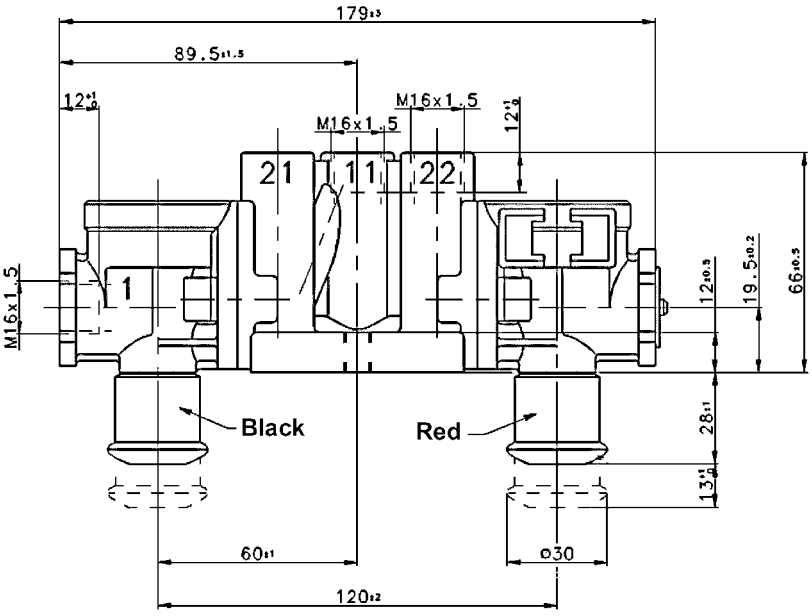
Installation drawing

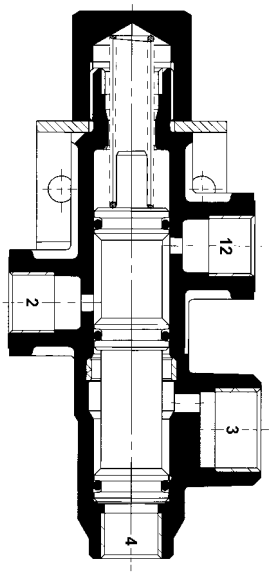
352 044/045

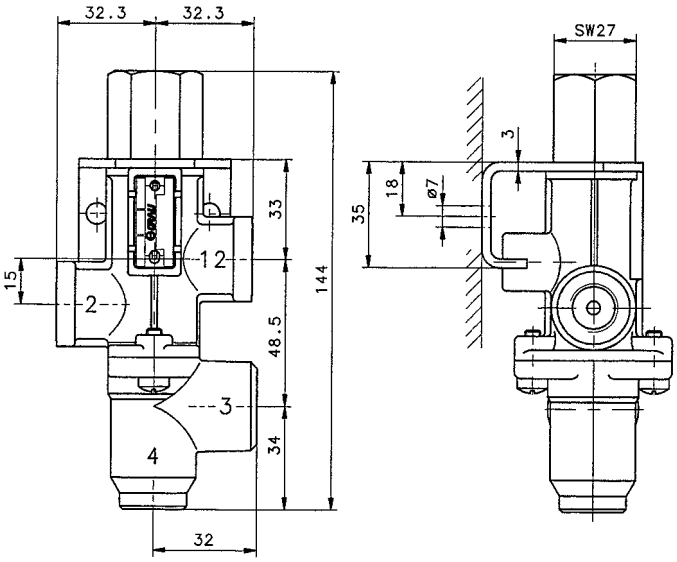


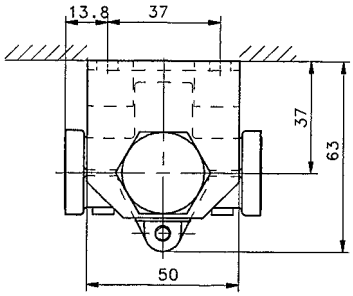


352 046









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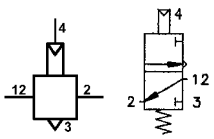


Use

As an automatic push-pull valve for a wide variety of different applications, in which other systems or equipment units need to be switched automatically when a specific pressure is reached, e.g. lift axles, interlocks, etc.

Method of operation

In the rest position, port 2 is connected with port 12. The system pressure present at port 12 can flow to port 2 and operate downstream equipment units. If pressure is applied at port 4, this pressure acts on the spring-loaded switching piston. If this pressure exceeds the set value the switching piston is pushed against the spring force. This then separates port 2 from port 12 before connecting port 2 with port 3. Port 2 is now exhausted via port 3.

If the pressure applied at port 4 is decreased to below the switching pressure, the spring presses the switching piston back into its starting position. Air is now applied to port 2 again via port 12.

Installation instructions

Installation site must be protected against splash water. Mounted by means of its incorporated bracket. Installation position vertical, with port 4 pointing downwards.

Testing

Test for operation and leaks.

Technical data

Service pressure:	8.5 bar
Service temperature:	-40°C to +80°C
Nominal diameter:	DN 3
Switching pressure:	2 bar
Ports:	2, 4, 12: M 16 x 1.5
	3: M 22 x 1.5
Port designation:	12 = 2. supply port
	2 = delivery port
	3 = exhaust
	4 = control port

Versions

352 053 001

Use

The Trailer Control Module is a trailer brake valve with emergency brake device, combined with double push-pull valve (shunt and parking valve) as well as a pressure protection valve. The shunt valve allows the cancellation of the "emergency braking" function by pushing the black knob (with the supply line disconnected). Actuation of the parking brake valve by pulling / pushing the red knob applies or releases the spring braking system. The pressure protection valve without backflow integrated in the valve assures the priority compressed air supply of the braking system and prevents any inadmissible initial pressure influence between braking system and auxiliary equipment (e.g. air suspension). The provisions of 71/320/EEC and ECE RB/09 and § 41 StVZO are fulfilled see Fed. Report No.:250.0E

Operation

Supply line connected:

With the supply line connected the supply pressure provided by the towing vehicle is available in the braking system without limitation. When it exceeds the overflow pressure supply pressure is also available to the additional circuits.

Control line connected:

With pressure input through the brake coupling head pressure is passed on unrestricted to control port 21 via port 4 (no relay function).

Actuation of Parking brake:

The spring braking system port 22 is connected with the exhaust port 3 by pulling the red control knob. In this way the pressure in the spring braking system is exhausted and the parking braking system is applied.

The spring braking system (port 22) is connected with the air reservoir (port 1-2) by pushing the red control knob. In this way the pressure in the spring braking system is increased and the parking braking system is released.

Release device service braking system:

The shunt valve allows the cancellation of the automatic braking ("emergency braking"), triggered by disconnecting the supply line (see EC Directive, annex I, paragraph 2.2.2.11 or ECE-R13, paragraph 5.2.2.11)

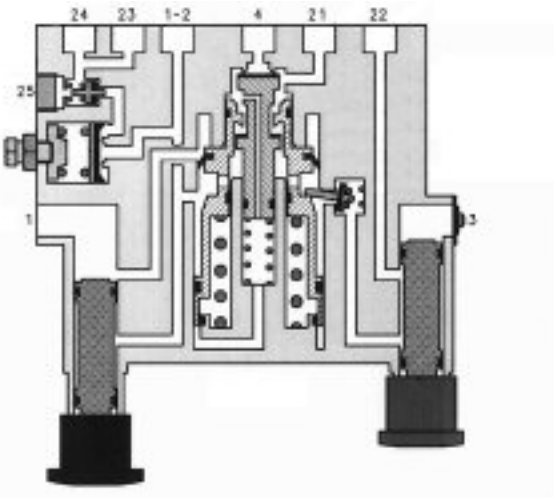
The automatic braking is cancelled by pushing the black control knob (with the supply line disconnected). This is achieved by disconnecting port 21 from port 12 and connecting port 4 to port 21.

When the supply line is reconnected and compressed air is made available the shunt valve returns automatically into normal position.

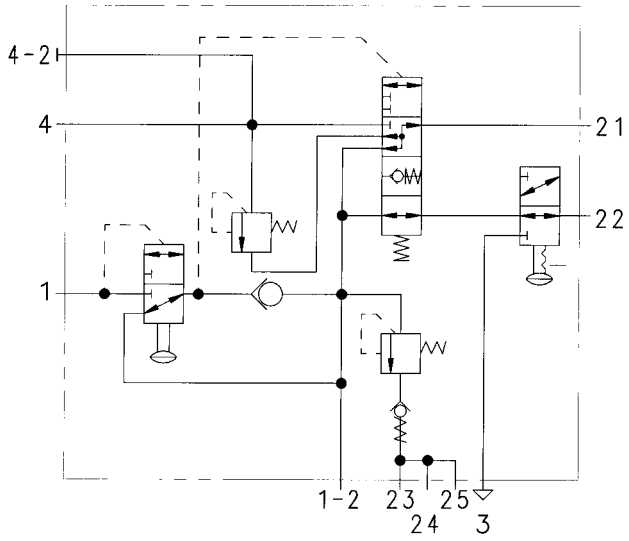
Pressure loss in the supply line.

Effect on the service braking system:

If the pressure in the supply line falls by at least 1 bar per second, the trailer is automatically braked before the pressure in the supply line has fallen to 2 bar. In addition a direct connection is made between the air reservoir (port 1-2) and port 21.This assures that the automatic braking is provided by the service braking system and hence is ABS-con-trolled.



Symbol DIN ISO 1219



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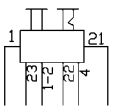
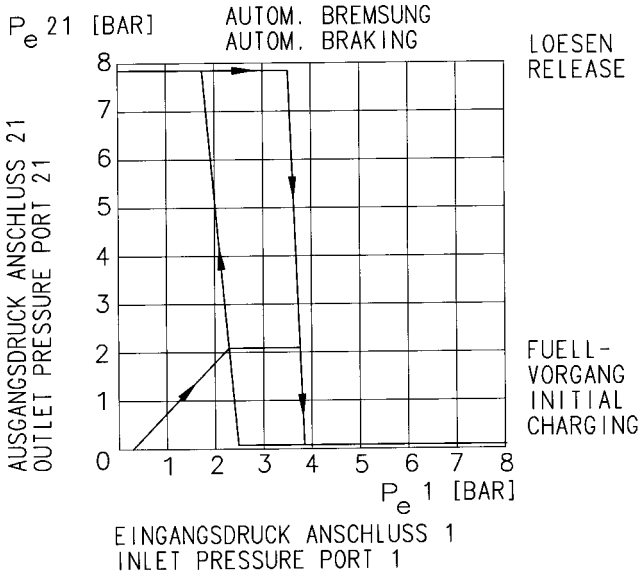
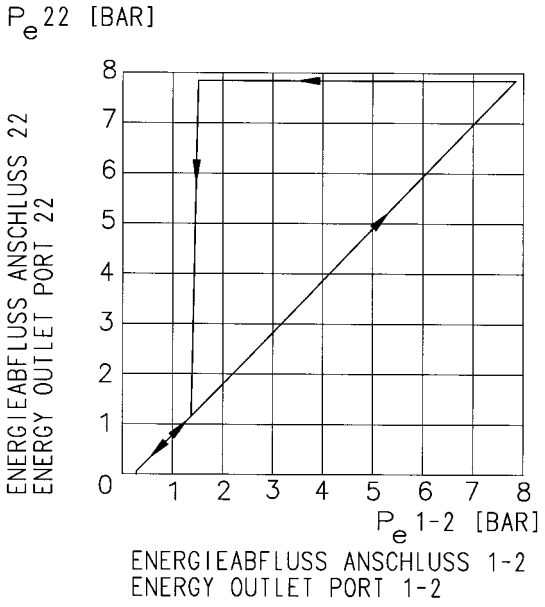


Functional diagram



Functional diagram



Effect on the service braking system, Air reservoir and auxiliary equipment:

If the supply line (read coupling head) breaks off, integrated non-return valves prevent the supply air from escaping out of the air reservoir of the trailer braking system and –if any- of the auxiliary equipment.

Effect on the parking braking system:

With the parking braking system released (red control knob pushed) the pressure in the spring braking system is maintained by an integrated pressure protection valve until the automatic braking starts; the non-return valve is disabled once the automatic braking is initiated. In this way the same pressure level is established at ports 21, 22, 1-2. With further pressure reduction in the brake air reservoir port 21 and 22 are vented simultaneously, which automatically activates the spring braking system and hence prevents the trailer from rolling away.

Pressure loss in the auxiliary equipment.

Effect on the service braking system:

The pressure loss in an accessory has no direct effect on the service braking system. The braking pressure is guaranteed up to the above-mentioned protection pressure of the pressure protection valve.

Pressure input through the “brake” coupling head, Supply line not connected:

In the case of pressure input through the coupling head (e.g. with applied parking braking system of the towing vehicle) the brake air reservoir and hence as well the auxiliary equipment with a pressure reduced by the overflow loss are filled.

Filling of the auxiliary equipment depends on the pressure protection valve. As a result, an empty/partially filled braking system is already filled before the coupling head of the supply line is connected.

Installation Guidelines

The Trailer Control Module is fixed to the vehicle chassis with two/three M 8 bolts. The control knobs must be easily accessible. Unused ports must be plugged. For painting/coating all open ports must be protected to avoid penetration of the paint/coat. For fittings/push-in fittings refer to the instructions of the respective manufacturer.

Technical data

Operating pressure:	p_e = 10 bar
Operating temperature:	- 40°C - + 70°C
Medium:	Air
Weight:	ca. 1.8 kg
Pneum. Port:	6 x M 16 x 1.5
	1 x M 22 x 1.5 / 1 x M 12 x 1.5
Pressure protection valve	DIN 74279- C 6-22
Opening pressure:	p_e = appr. 6.2 bar
Closing pressure:	p_e = appr. 5.6 bar

Port description:

1	= inlet port (coupling head, supply line)
1-2	= inlet/delivery port (reservoir)
3	= exhaust (spring-brake actuator)
4	= control port (coupling head, control line)
21	= delivery port (EBS/ABS)
22	= delivery port (spring- brake actuator)
23, 24,25	= delivery port (Pres. Protection Valve)

For more techn. informations see:
TÜV Rep. Nr.: KO 250.0 E

The Trailer Control Module must be checked for tightness and functions as prescribed (trailer must be locked against unexpected run-away)

1. **None pressurised system**
   Shunt valve (black knob) and parting valve (red knob) must be pushed in.
2. **Initial charging (black knob pushed in)**
   With compressed air at port 1 the shunt valve (black knob) must return automatically out to normal operating position.
3. **Automatic emergency braking**
   Exhaust pressure at port 1 to 0 bars then the emergency braking must react by delivering pressure from the trailer reservoir to port 21.
4. **Pressure protection valve**
   Refer to the instructions part no: 000 314 012.
5. **Parking valve (red knob)**
   With the compressed air at port 1 pull the parking valve (red knob) port 22 must exhaust (via port 3) the spring braking system.

Maintenance

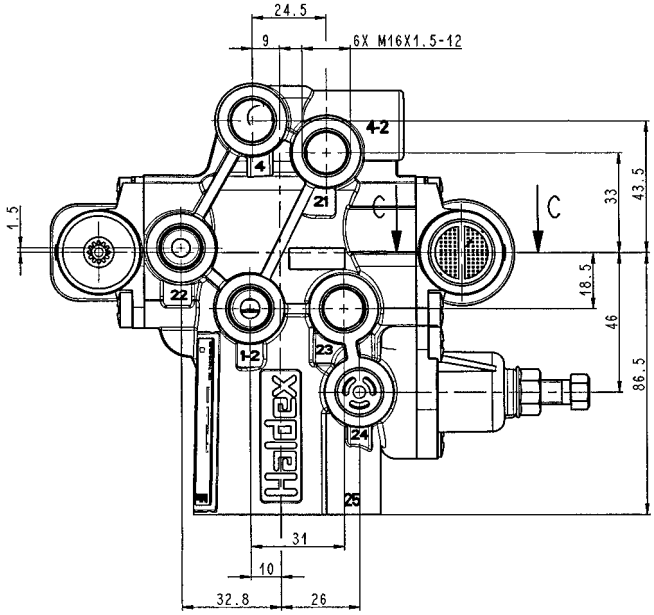
According to legal requirements or the European guideline. If there are braking problems or defects are observed while underway, then the valve should be examined internally or replaced.

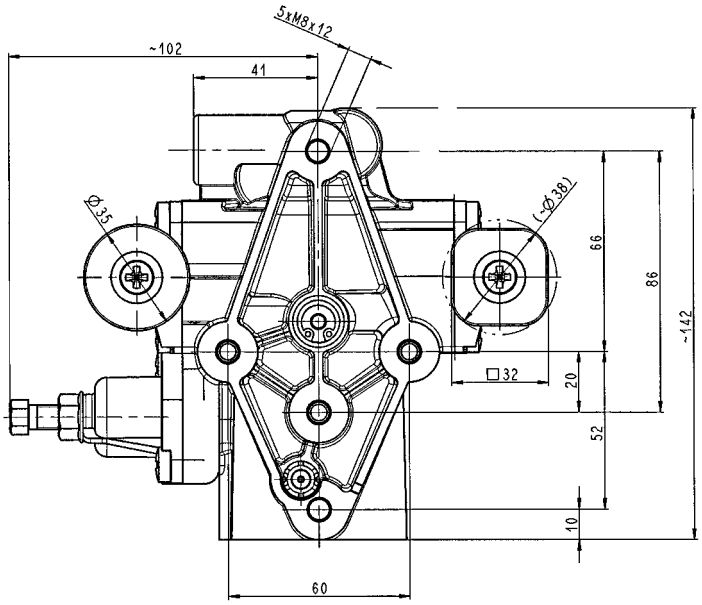
The cage filter 029 0004 09 in port 1 has to be replaced if contaminated or damaged.

Versions

352 067 001 Instruction label included
352 067 011 without Instruction label
028 0443 09 Instruction label

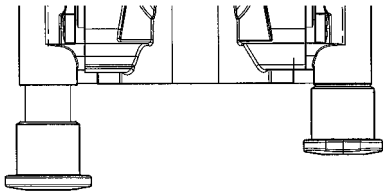
Installation drawing 352 067 000 2

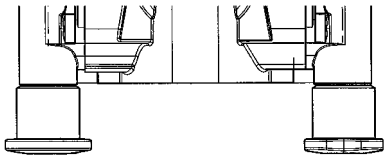


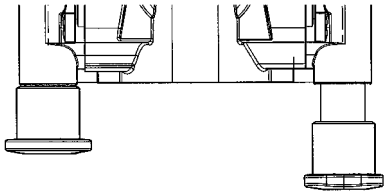


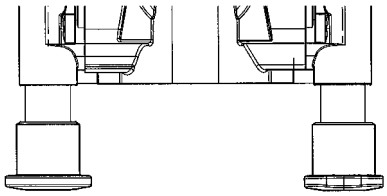
Trailer Control Modul – Operation-Condititon – Table (part no. 352 067 ...)

see also : Techn. Report KO 250.0E (RWTÜV)









BLACK **RED**

Shunt-Valve (Black Knob)	Park-Valve (Red Knob)	Trailer Coupled	Operation Conditions	Service Braking System	Parkingbraking/ Springbraking System
Pulled out	Pushed	Yes	Drive	Released	Released
Pulled out	Pushed	No	Trailer uncoupled/breakage	Emergency function 1. engaged 2. released	Safety function 1. released 2. engaged
Pushed	Pushed	No	Shunting	Released	Released
Pushed	Pulled out	No	Parking (uncoupled)	Released	Engaged
Pulled out	Pulled out	Yes	Parking (coupled)	Released	Engaged
Pulled out	Pulled out	No	Trailer uncoupled/breakage	Engaged	Released

Application

By installing a relay valve, air can enter and escape in large volumes fast and adjustable steps. It therefore serves the purpose of shortening the response and threshold times in air brake Systems.

Function

If compressed air is applied at Control Port 4, the control piston moves downwards, the outlet is closed, the inlet opened and the Reservoir pressure at Port 1 is directed to the Delivery Port 2 corresponding to the control pressure.

The inlet is closed and the outlet remains closed when the pressure at the Port 2 (this pressure is also applied to the underside of control piston) is equal to the pressure at Port 4. A termination setting is provided. Each change in pressure at Port 4 results in a change in pressure at Port 2.

If air is allowed to escape at Port 4, then the inlet is closed, the outlet opened and air escapes from Port 2 via Exhaust Port 3.

Installation

The stud bolts provided are used for mounting the valve.

The vent must face downwards.

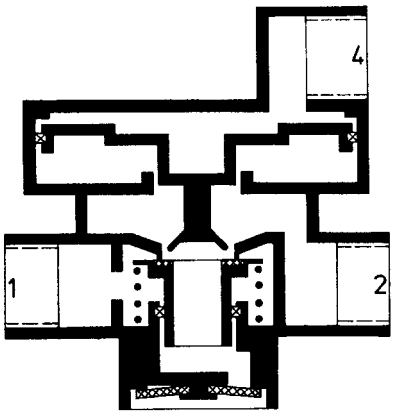
Maintenance

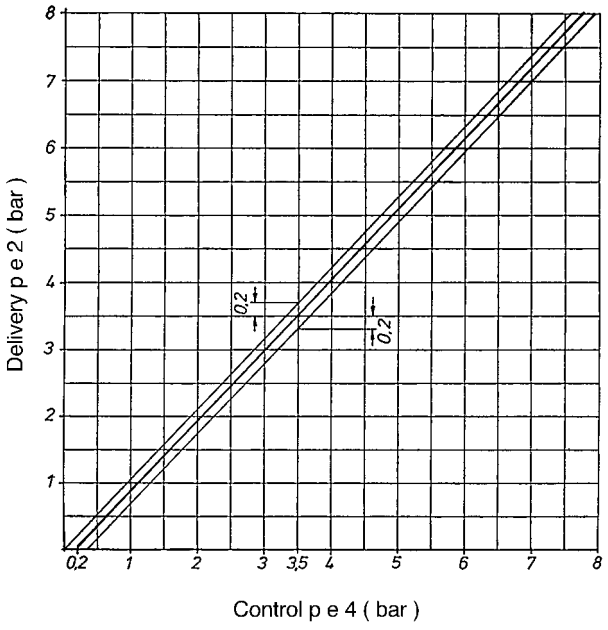
If defects are found during brake tests, brake inspections or when driving, the relay valve must be thoroughly inspected and replaced if necessary.

Checking Check function and for leaks.

Technical Data

Operating pressure:	p_e max 10 bar
Operating temperature:	- 40°C to + 80°C
Ports:	see Versions
Port description:	1 = Supply
	2 = Delivery
	4 (41/42) = Control

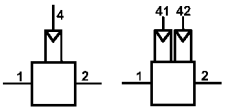




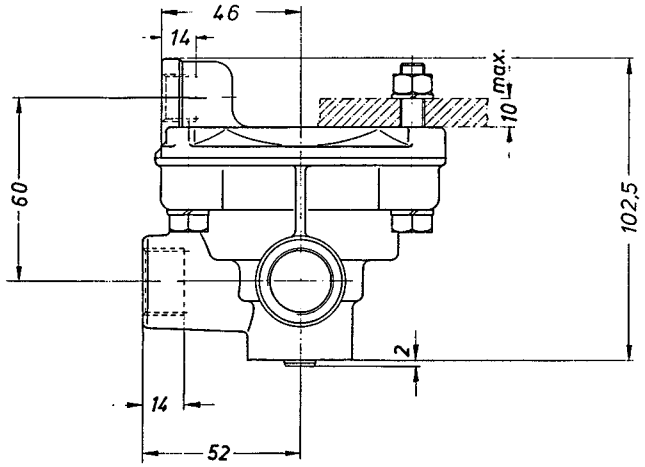
Versions

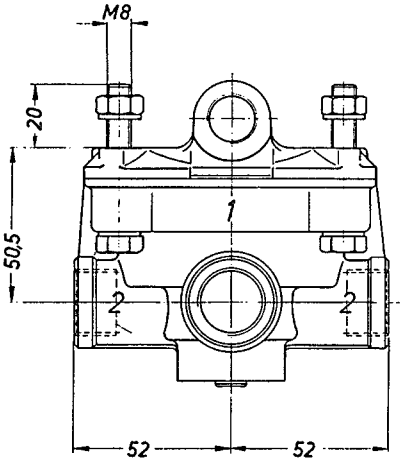
	Threads on ports			
Part number	**1**	**2**	**4**	**Mounting**
355 018 001	M 22 x 1.5	M 22 x 1.5	M 16 x 1.5	2 Bolts with nuts and spring lock washer
355 018 011	M 22 x 1.5	M 22 x 1.5	M 22 x 1.5	4 Bolts w/o nuts and spring lock washer
355 018 071	M 22 x 1.5	M 16 x 1.5	M 16 x 1.5	4 Bolts w/o nuts and spring lock washer
355 023 011	M 22 x 1.5	M 22 x 1.5	M 22 x 1.5	4 Bolts w/o nuts and spring lock washer
355 023 021	M 22 x 1.5	M 16 x 1.5	M 16 x 1.5	2 Bolts with nuts and spring lock washer
355 023 071	M 22 x 1.5	M 16 x 1.5	M 16 x 1.5	4 Bolts w/o nuts and spring lock washer
355 093 001	M 22 x 1.5	M 22 x 1.5	M 22 x 1.5	4 Bolts w/o nuts and spring lock washer

Symbol

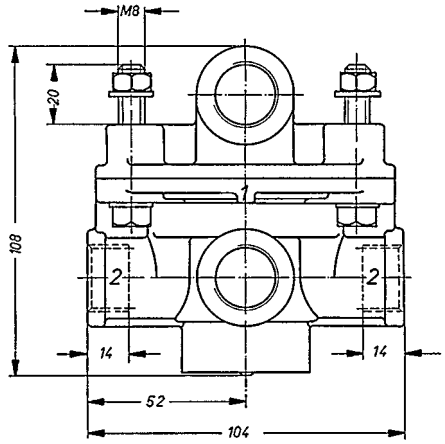


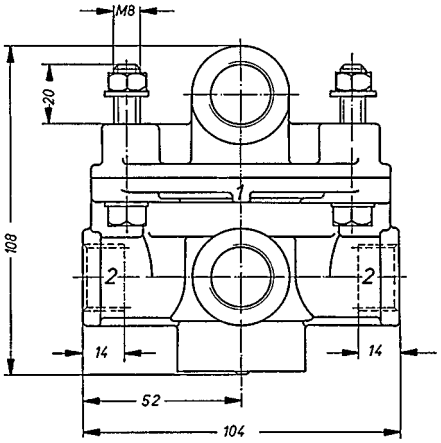
355 018 ...

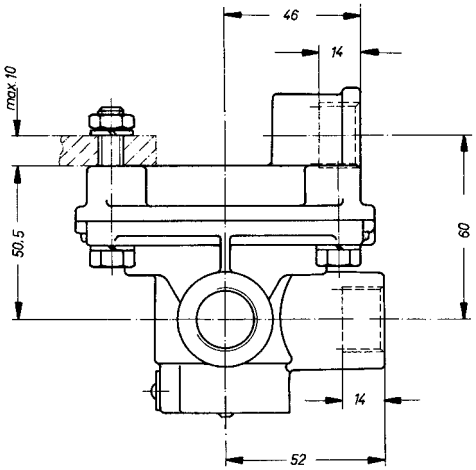




355 023 ...







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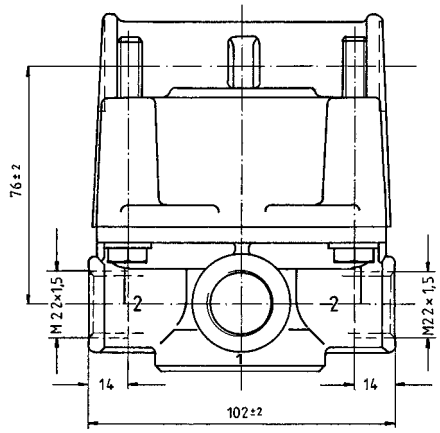
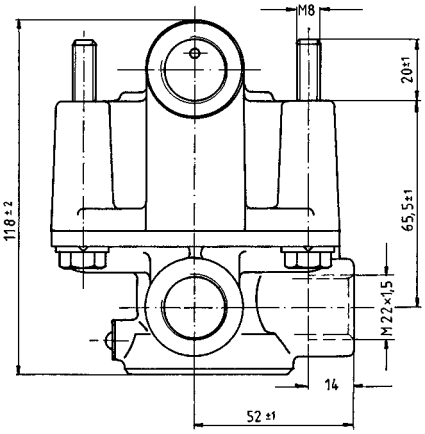
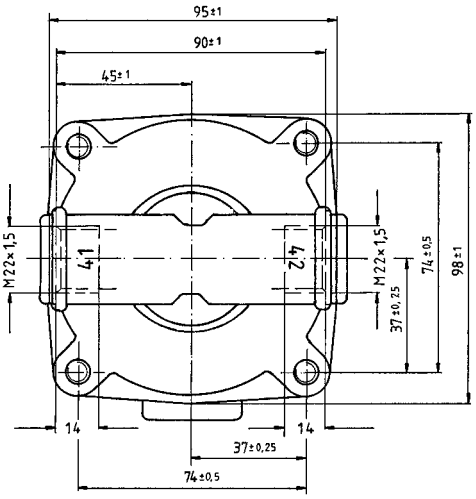






Use

Air can be quickly exhausted by fitting a quick release valve.

The top port is connected to the actuator valve, and the side ports to the brake chambers.

Another typical application is to use as a dump valve in air suspension systems, e.g. with tipper vehicles (only 356 001 011).

Method of operation

When air is applied to the top port, the outer edge of the diaphragm folds over and compressed air flows to the side ports. If the application of air through the top port is interrupted by the actuator valve, the volume from the actuator valve to above the diaphragm is exhausted via the actuator valve. The compressed air from the brake chambers passes through the side ports and pushes the outer edge of the diaphragm against the seat and lifts the inner seat. The volume from the brake chambers to under the diaphragm is exhausted via the quick-release valve.

Installation instructions

The quick-release valve should be installed directly in the piping near the brake chamber, with the exhaust port pointing downwards. A filter, or in the case of vehicles with a fording capability, a snorkel can be screwed into the exhaust port if desired.

A bracket with two M10 holes is provided on the quick-release valve for mounting it on the vehicle.

Note that on 350 036/037 the holes in the two-way valve must not be used for mounting.

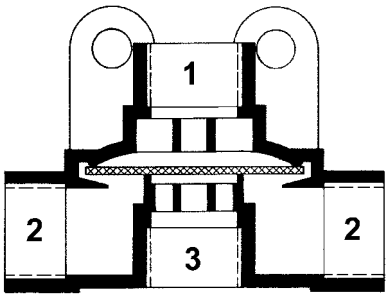
Testing

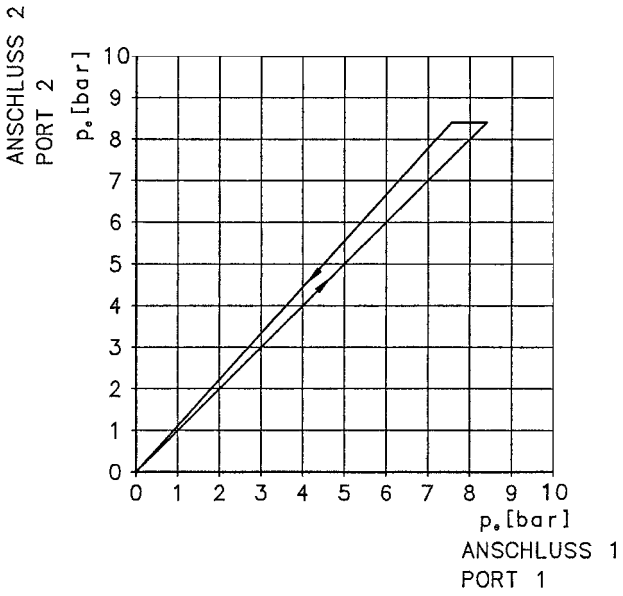
Check that the stepped variability of the actuator valve is not adversely affected when the quick-release valve is actuated.

Test the operation of the quick-release valve.

Technical data

Service pressure:	10.5 bar
Service temperature:	-40°C to +80°C
Ports:	see the table of versions
Port designation:	2 = supply port
	11 = 1. supply port
	12 = 2. supply port
	2 = delivery port
	3 = exhaust





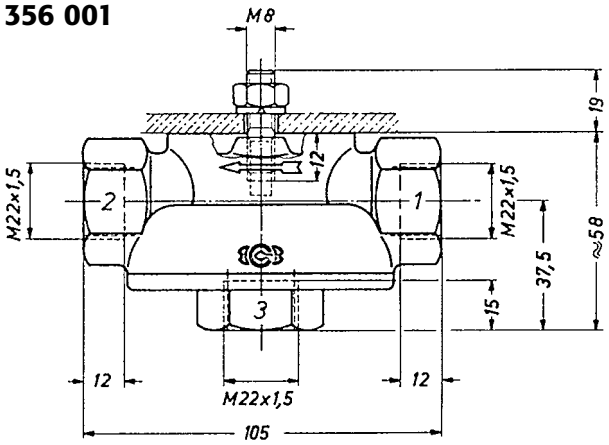
Combinations of quick release valve and two-way valve

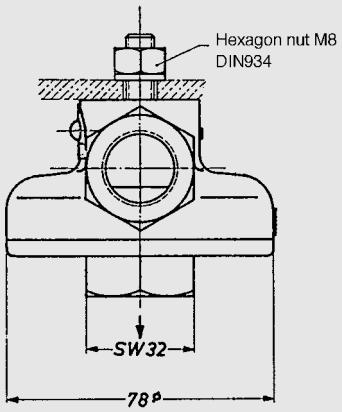
	Threads on ports		
Part No	11 + 12	2	3
350 036 101	M 16 x 1.5	4 x M 16 x 1.5	w/o thread
350 036 111	M 16 x 1.5	4 x M 16 x 1.5	M 22 x 1.5
350 037 101	M 22 x 1.5	2 x M 16 x 1.5	w/o thread
350 037 111	M 22 x 1.5	2 x M 16 x 1.5	M 22 x 1.5

Versions

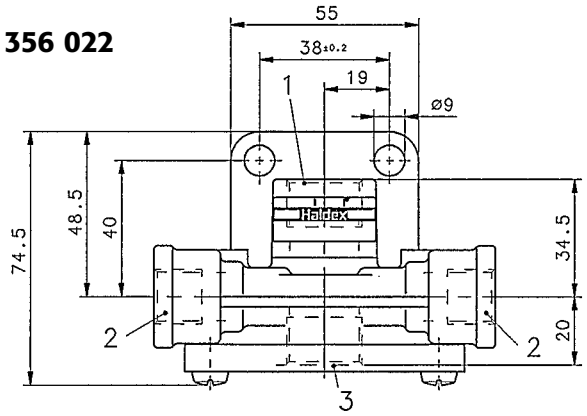
	Threads on ports			
Part No	1	2	3	Remark
356 001 001	M 22 x 1.5	M 22 x 1.5	M 22 x 1.5	-
356 001 011	M 22 x 1.5	M 22 x 1.5	M 22 x 1.5	with reinforced diaphragm
356 022 001	M 22 x 1.5	4 x M 16 x 1.5	w/o thread	-
356 022 011	M 22 x 1.5	4 x M 16 x 1.5	M 22 x 1.5	-
356 022 021	1/2" -14NPTF	4 x 1/4" -18 NPTF	w/o thread	-
356 022 031	M 22 x 1.5	4 x M 16 x 1.5	M 22 x 1.5	-
356 023 001	M 22 x 1.5	2 x M 16 x 1.5	w/o thread	-
356 023 011	M 22 x 1.5	2 x M 16 x 1.5	M 22 x 1.5	-
356 023 021	1/2" -14NPTF	2 x 1/4" -18 NPTF	w/o thread	-
356 023 031	M 22 x 1.5	2 x M 16 x 1.5	M 22 x 1.5	-

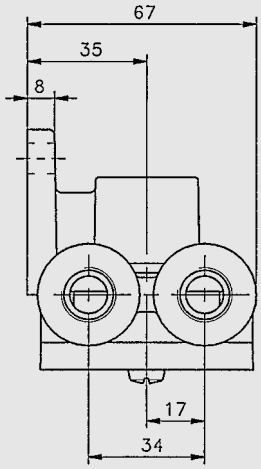
356 001



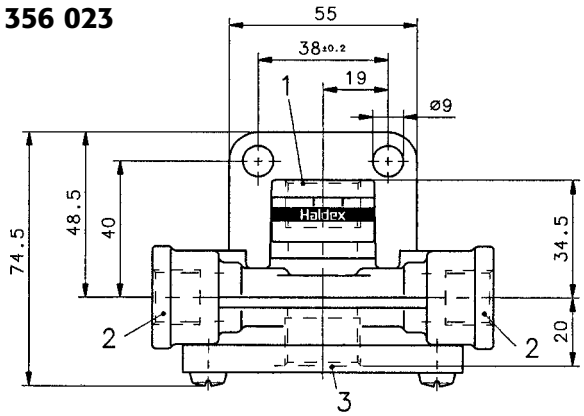


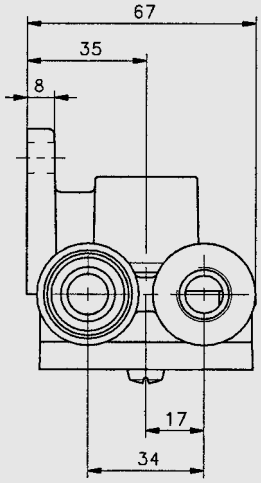
356 022



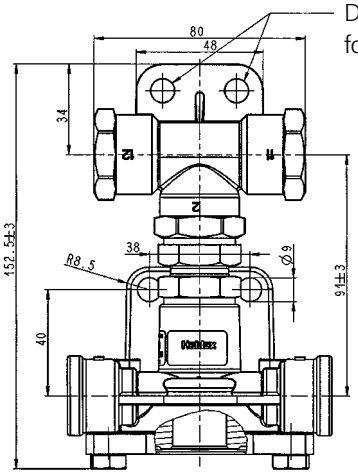


356 023

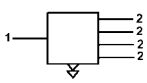




350 036



Symbol



Application

During the braking procedure, a dynamic axle load displacement occurs, i.e. the rear axle is relieved, and the front axle is additionally loaded. For this reason, larger air brake chambers are generally installed on the front axle. In the partial braking range, i.e. at low dynamic axle load displacement, a built-in pressure regulating valve (with kinked characteristic curve) reduces the pressure in the large air brake chambers enabling in this way, matching of the brake forces between the individual axles of the vehicle. A quick release effect is also provided.

The pressure regulating valve has a 1:1 pressure advance control up to approx. 0.5 bars in order to facilitate overcoming the response stages of the brakes and of any subsequently connected valves. The pressure is reduced from applied pressures 0.5 bar onwards.

Function

Port 1 is connected to the actuation valve, the ports 2 are linked to the brake chamber. When air is allowed to enter port 1, initially the compressed air flows in unreduced through ports 2 to the brake chambers. The balance piston moves upwards when a pressure $p_e2 > 0.5$ is reached on the underside of the piston. The inlet seat is closed as soon as the ratio of an applied to modulated pressure corresponds to the area ratio (underside/top side) of the balance piston. The pressure at port 2 is therefore reduced corresponding to the surface area ratio of the balance piston (phase 1 in functional diagram). The piston is raised from its seat against the force of the spring when the applied pressure p_e 1 has reached the value of the "kink" in the functional diagram. Compressed air can now be applied to the upper annular surface of the balance piston via the bore holes. This means that the pressure-loaded areas an the upper and lower side of the balance piston are equal. As a result, the rate of pressure reduction is reduced and completely stopped at an applied pressure p_el = 3.0 ± 0.2 bar (356 005 101) or 4.0 ± 0.2 bar (356 005 102), (p_{End}). (Phase II in functional diagram).

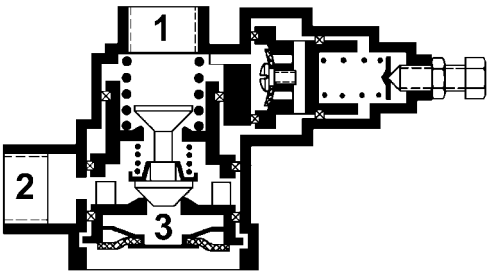
If the pressure drops at port 1, the balance piston is pressed upwards, the inlet seat is closed, the outlet seat opened and air is allowed to escape from the brake chambers connected to ports 2.

Adjusting the pressure adaptation (p_{End})

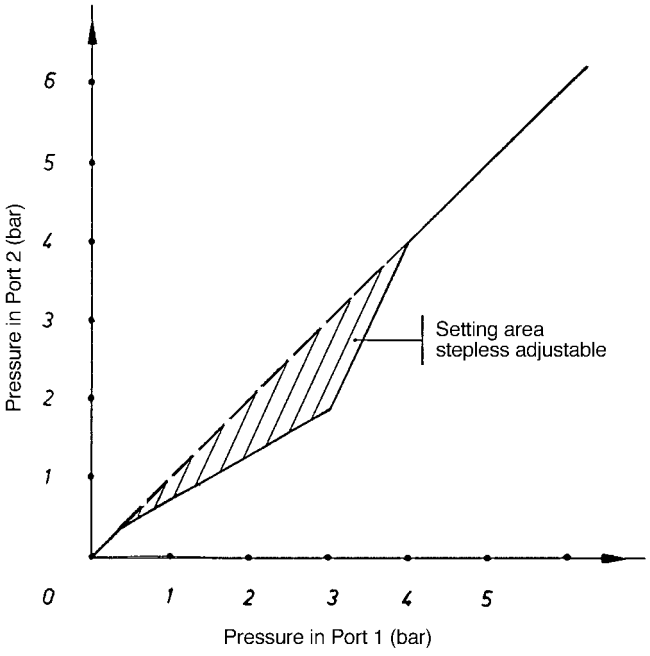
The adjusting screw can be turned after releasing the counter nut

a) in clockwise direction - retarded pressure matching (p_{End})

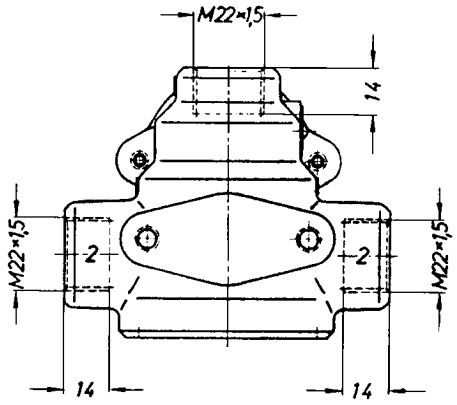
b) in anti-clockwise direction - advanced pressure matching (p_{End}).

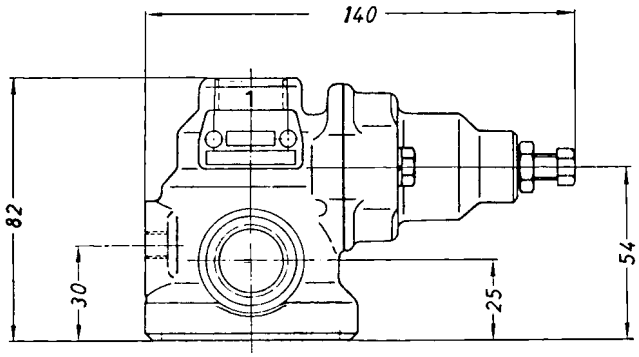


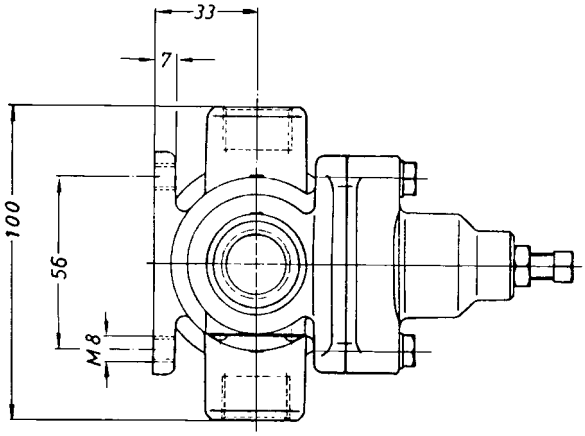
Functional diagram



Symbol







Installation

Normally, the pressure regulating valve is installed before the large brake chambers.

The vent must face downwards and the screw for adjusting the pressure balance must be well accessible.

The valve is mounted by means of two M8 screws in the threaded holes M8.

Maintenance

The pressure regulating valve must be maintained as part of the legal regulations.

If defects are found during normal brake tests or when driving, the pressure regulating valve must be thoroughly inspected and replaced if necessary.

The rubber disk on the vent or the dust cap on the test connection if fitted must be renewed if missing or damaged.

Checking

Visual and functional check.

Technical Data

Operating pressure:	max 8 bar
Operating temperature:	- 40°C to + 80°C
Adaptation pressure p_{Ende}:	0 – 4.0 bar
Ports:	1, 2: M 22 X 1.5
Port description:	1 = Supply
	2 = Delivery

Versions

Order number	Pressure adaptation at ...bar
356 005 101	3.0
356 005 102	4.0
356 005 103	2.5
356 005 104	3.5

Application

During the braking procedure, a dynamic axle load displacement occurs, i.e. the rear axle is relieved, and the front axle is additionally loaded. For this reason, large brake chambers are normally installed on the front axle.

In the partial braking range, i.e. at low dynamic axle load displacement, a built-in pressure regulating valve (with straight characteristic curve) reduces the pressure in the large brake chambers, thereby making it possible to adapt the brake forces between the individual axles of the vehicle. The valve also features a quick release effect.

Function

Port 1 is connected to the actuating valve; port 2 is linked to the brake chambers.

When air is allowed to enter at port 1, the diaphragm and the piston are pressed downwards against the force of the preloaded compression spring when a set opening pressure has been reached.

The outlet seat is closed and the inlet seat opened. The compressed air flows through port 2 to the brake chambers.

The applied pressure pe1 ($p_e1 = p_e2$) is no longer reduced when the set adaptation pressure (p_{End}) is reached.

Checking

Visual and function check.

Adjusting the Adaptation Pressure (p_{End})

After loosening the counter nut, the adaptation pressure p_{End} can be Set from 0 to approx. 5.5 bar by turning the adjusting screw.

Screwing in the adjusting screw:

Increase the adaptation pressure and the pressure reduction; p_{End} max approx. 5.5 bar

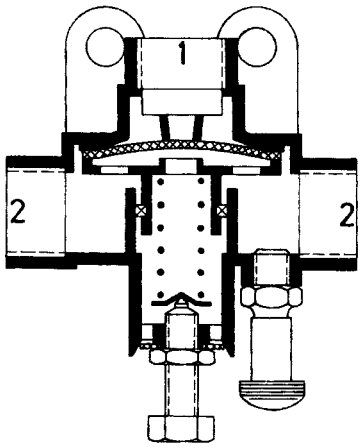
Screwing out the adjusting screw:

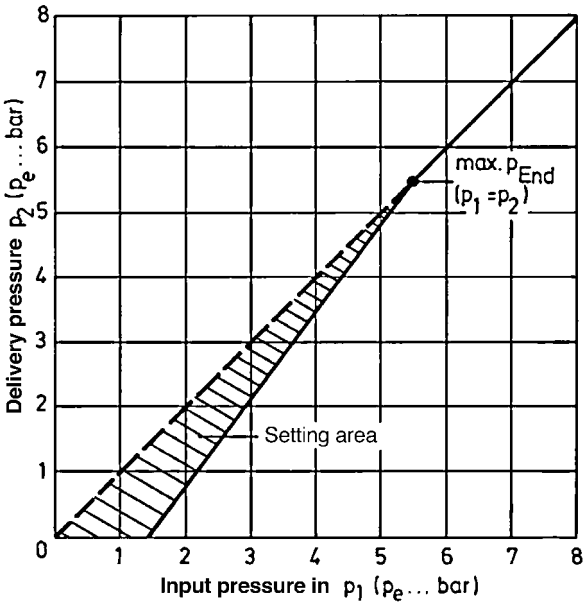
Reduces the adaptation pressure and the pressure reduction: p_{End} min. 0 bar

Under no circumstances must the adjusting screw be screwed in to the stop since this can totally cut off the flow from port 1 to port 2.

There are two additional screws M 8 on the bracket provided depending on version; they must be used particularly where flexible lines are connected to ports 2.

When paint spraying the vehicle, the vent must not be covered with paint.





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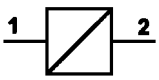
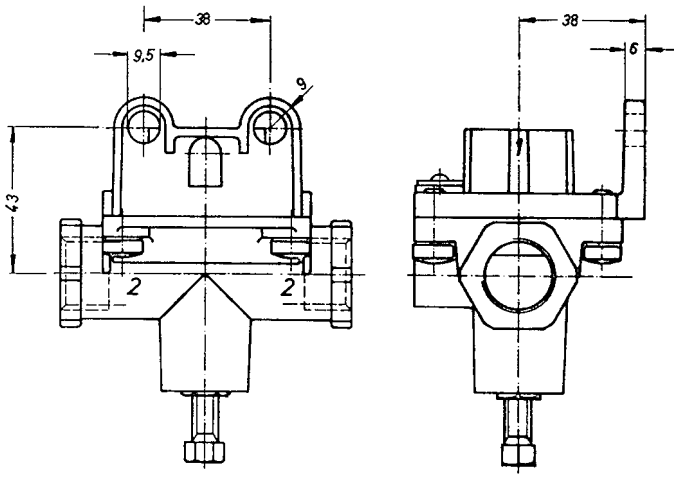
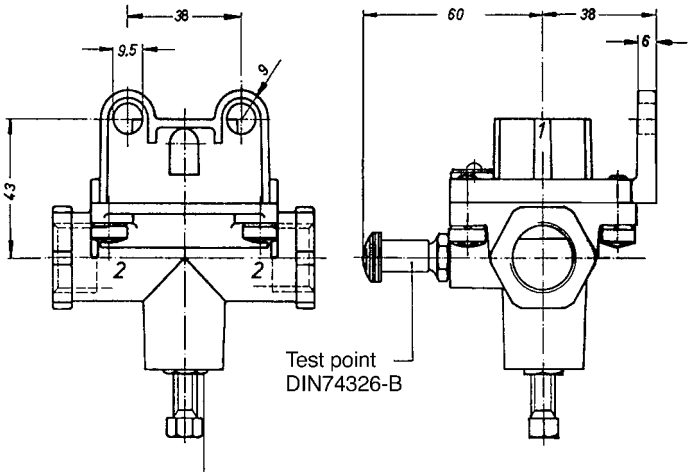


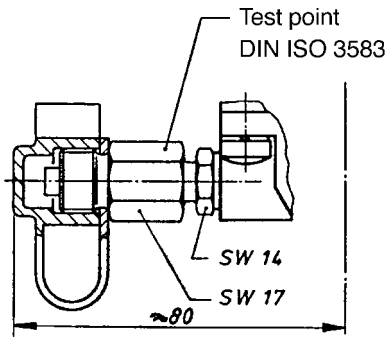
Version A



Version B



Version C



Maintenance

The rubber disk on the vent or dust cap on the test port if fitted must be renewed if missing or damaged.

The regulating valve must be maintained as part of the legal regulations.

If defects are found during normal brake tests or when driving, the pressure reducing valve must be thoroughly inspected and replaced if necessary.

Technical Data

Operating pressure:	$p_e < 8$ bar
Adjustment range for p_{End}:	0 to approx. 5.5 bar
Medium:	air
Thermal range of application:	-40° C to +80° C
	1 = Input
	2 = Output

Versions

Part Number	Version	Opening pressure (bar)	Adaptation at ...bar	Bracket	Test Point
356 009 011	A	0.5	2.0	yes	no
356 009 012	A	0.3	1.3	yes	no
356 010 011	B	0.8	3.5	yes	yes
356 010 031	B/C	0.8	3.5	yes	yes

Use

In compressed air systems to limit the output pressure, but also for changed but increased input pressure.

Method of operation

The compressed air entering at port 1 flows over the open valve seat to port 2, where it also acts on the spring-loaded diaphragm.

If the set spring force is reached by the compressed air acting on the diaphragm, the valve inlet closes so that no more compressed air can flow to port 2. Pressure losses due to leaks on the outlet side are automatically compensated by the pressure limiting valve.

If the pressure are port 2 rises above the set value, the surplus compressed air is discharged to atmosphere through the valve outlet.

When exhausting the inlet side (port 1), the pressure opens the outlet side (port 2) of the valve inlet. The pressure relief allows the diaphragm to return to its initial position. Port 2 is exhausted to port 2 via the open valve inlet.

Installation instructions

A stub with an M 10 thread is provided for mounting. The valve can also be installed in the piping without any particular mounting bracket. The attitude must be selected so that the adjuster screw points downwards.

Adjustment

The pressure can be adjusted with the adjusting screw within certain limits after undoing the lock nut (see the table of versions).

Rotation to the right = pressure increase
Rotation to the left = pressure decrease

Testing

Check that the pressure setting is correct (observe the vehicle manufacturer's data).

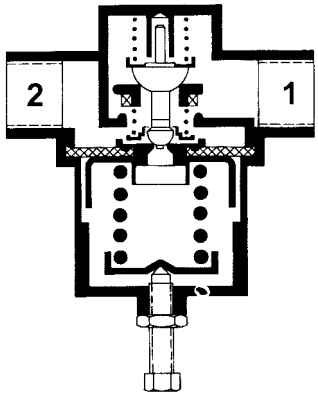
Technical data

Service pressure:	see the table of versions
Service temperature:	-40°C to +80°C
Ports:	M 22 x 1.5
Port designation:	2 = supply port
	2 = delivery port

357 001

357 004

357 012

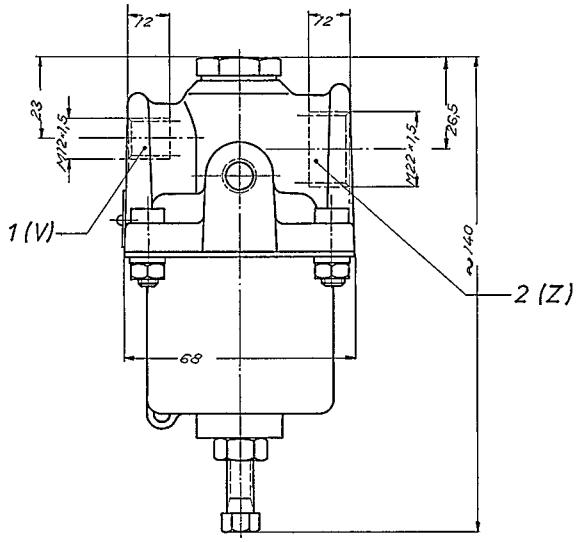


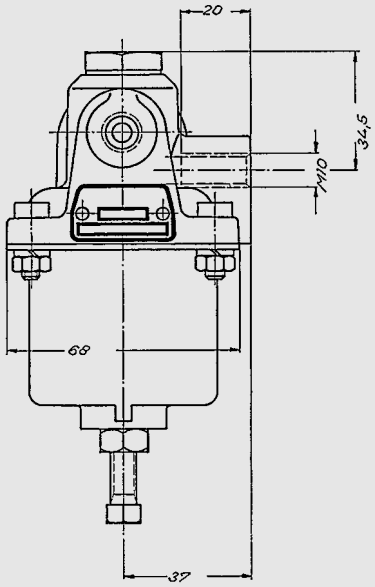
Versions

Part No	setable pressure (bar)	setted pressure (bar)	Operating pressure (bar)
357 001 002	0 - 1.6	0.5	8
357 001 004	0 - 1.6	0.2	8
357 004 021	0 - 7.5	6	10
357 004 022	0 - 7.5	2	10
357 004 024	0 - 7.5	3.5	10
357 004 025	0 - 7.5	4.5	10
357 004 051	5 - 10	5	10
357 012 021	6.5 - 8.5	7.3	12
357 012 022	6.5 - 8.5	7,5	12
357 012 031	0 - 8.5	5	12
357 012 032	0 - 8.5	6	12

Symbol

357 001





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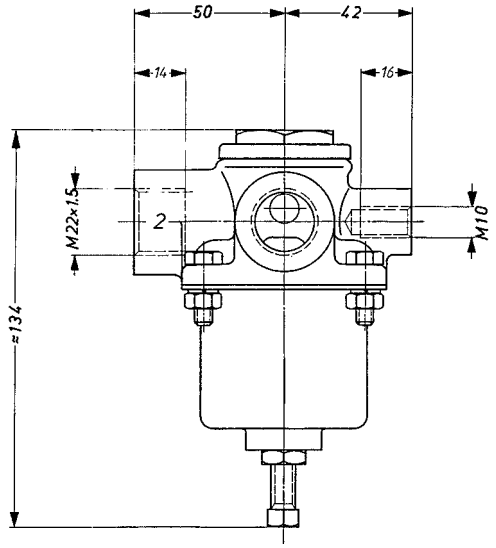
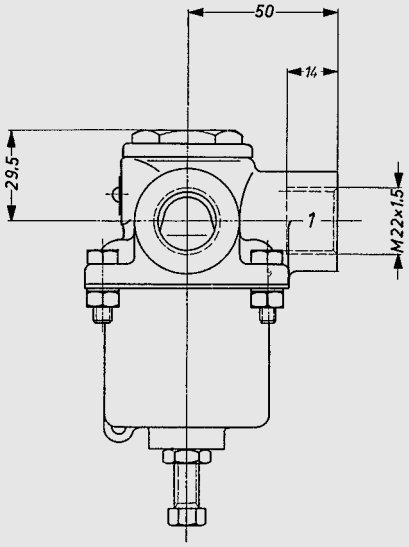
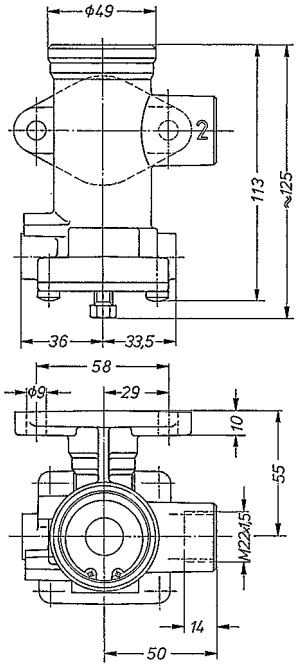
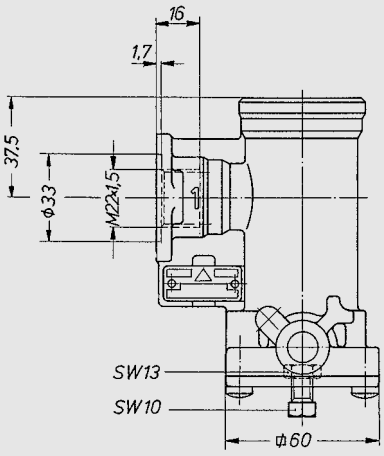




357 012





Electric Solenoid Valve
360 014/015/016/017/018 ...

Use

The 3/2-way solenoid valve is used to charge single-acting cylinders or to control other air-activated consumers.

Method of operation

Compressed air from the storage tank is applied at port 1, before the closed inlet. Port 2 is connected via the open outlet and port 3, or the exhaust filter, to atmosphere.

When the electric circuit is made, the solenoid plunger opens the inlet. Compressed air pushes the differential piston downwards. The outlet is closed by the double valve cone. The inlet opens and compressed air flows through port 2 to the consumer.

If the electric circuit is open, the inlet is closed. The differential piston returns to its initial position. The consumer is exhausted via the outlet and port 3, or the exhaust filter.

Installation instructions

Install vertically with the solenoid at the top. Installation site must be protected against splash water. Mount using bolts and nuts in the holes in the body.

360 015/016/017/018 001 can be mounted as a block, in which case replace the bolt and seal ring with gasket 025 0264 09 (ordered separately).

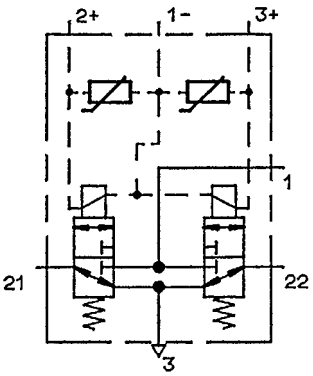
Testing

Test for operation and leaks.

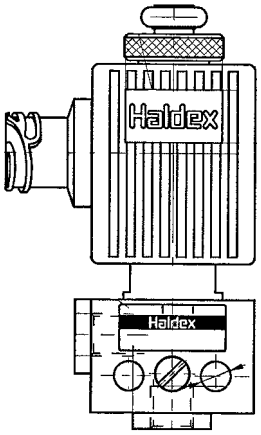
Technical data

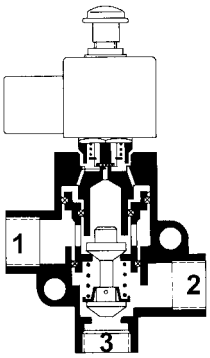
Service pressure:	see the table of versions
Service temperature:	-40°C to +80°C
Ports:	M 12 x 1.5
on 360 014 001:	port 1: 8 mm plug connection ports 21/22: 6 mm plug connection
Port designation:	2 = supply port 2 = delivery port 3 = exhaust

360 014 001



360 015/016/017/018



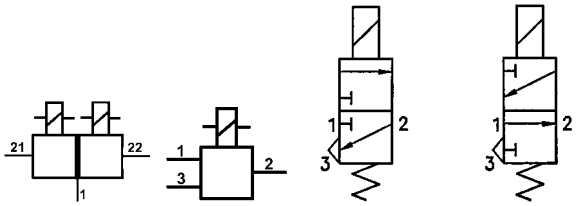


Versions

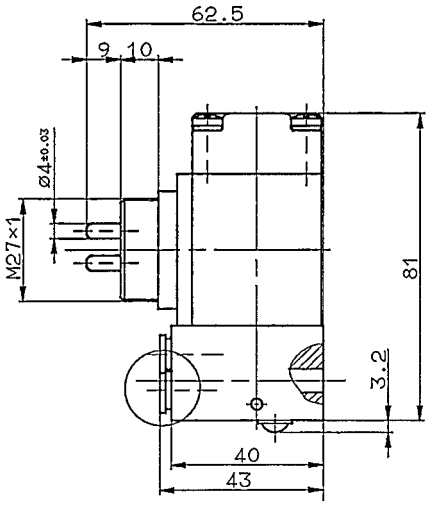
Part No	Version	Function	Voltage (Volt)	Current (A)	Performance (W)	Degree of protection	Operating pressure (bar)	Nominal diameter (mm)	Usable cable
360 014 001	Double coil	2 x charging	24	0.25	5.9		13	1.4	950 364 411
360 015 001	single coil	charging	12	1.1	13	IP 67	10	2.5	003 0602 09
360 016 001	single coil	discharging	12	1.1	13	IP 67	10	2.5	003 0602 09
360 017 001	single coil	charging	24	0.5	11	IP 67	10	2.5	003 0602 09
360 018 001	single coil	discharging	24	0.5	11	IP 67	10	2.5	003 0602 09

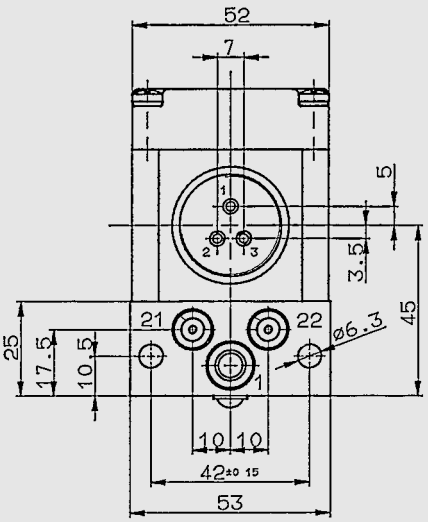
Symbol

360 015/017 **360 016/018**

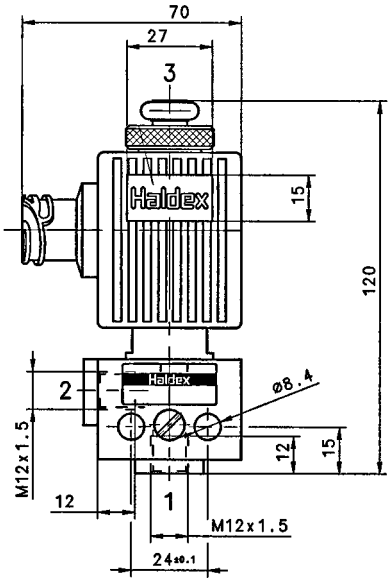


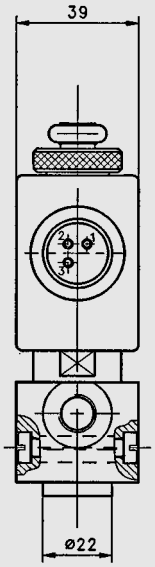
360 014 001



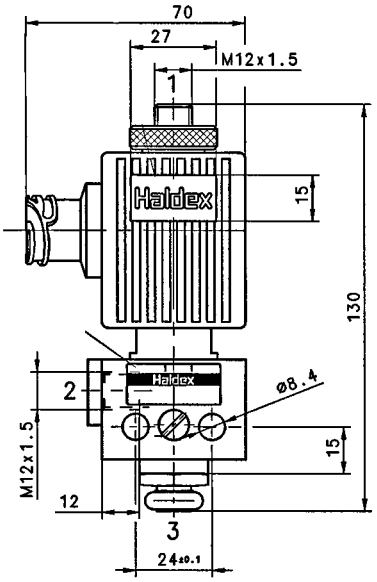


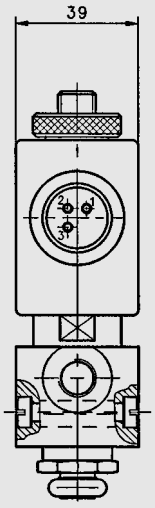
360 017





360 018





Application

This product switches electrical equipment in air or hydraulic systems. It is the generator for electrical pulses for switching visual or acoustic signalling devices.

Other applications on request.

Function

The Power circuit is closed (on switch) or open (off switch) at a certain pressure increase (see types).

Installation

The switch should be installed in the delivery lines as near to the vertical as possible. Electrical cables with a cross-section area of 1.5 mm2 are recommended. Inductive loads must have transient (spike) suppression fitted.

ON switches have a green colour marking; OFF switches have a red colour marking on the adjusting screw.

Technical Data

Protection class IP 65, terminals IP 00 DIN 40 050, switching capacity 100 VA, permissible voltage 42 V, temperature range: 243 K (-30° C) ... 393 K (120° C). Switching frequency 300 min/1, overpressure proof up to pe = 300 bar. Medium: compressed air and mineral oil.

Maintenance

Defective pressure switches must be changed.

Checking

In addition to checking for Leaks, the function of the pressure switches must be checked during brake inspections.

Technical Data

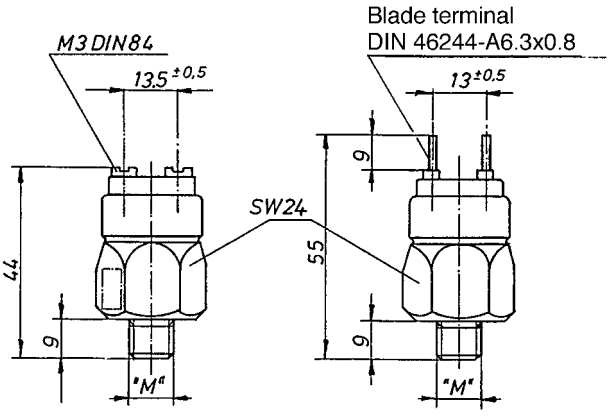
Operating temperature:	-30° C to +120° C
Degree of protection:	IP 65, Pins IP 00 DIN 40 050
Switching performance:	100 VA
Permissible Voltage:	42V
Switching frequency:	200/min
Overpressure safety:	up to p_e = 300 bar.
Medium:	Air and Mineral oil.

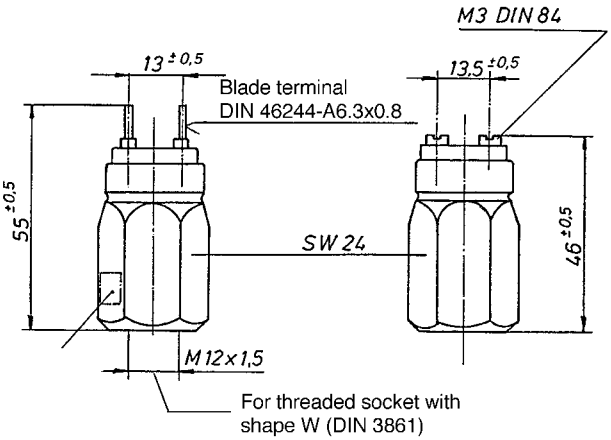
361 006 102

361 006 201

361 007 001

361 007 201





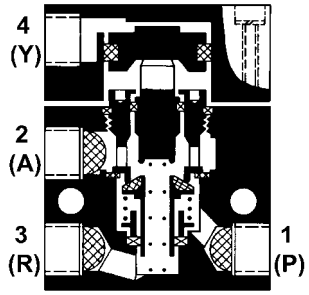
Versions

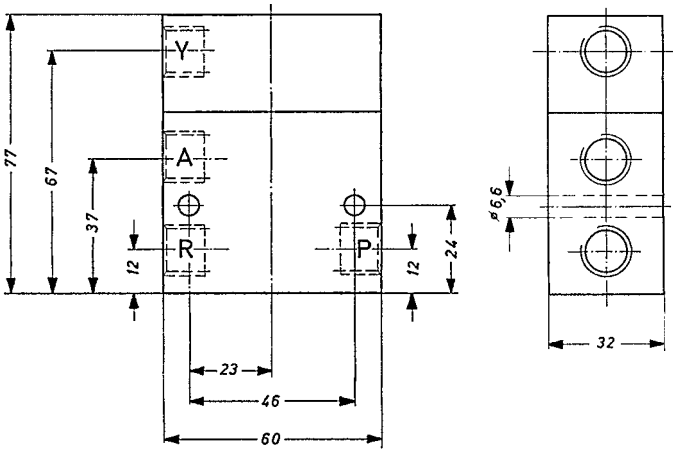
	Switch point (bar)			
Part number	**Cut-in**	**Cut-out**	**electric connection**	**ThreadM 12 x 1.5**
361 006 102	-	0.7 ± 0.18	screwed	male
361 006 201	0.5 ± 0.15	-	push-in	male
361 006 302	-	5.5 ± 0.55	push-in	male
361 006 305	-	4.5 ± 0.45	push-in	male
361 006 306	-	2.5 ± 0.25	push-in	male
361 007 001	0.5 ± 0.15	-	screwed	female
361 007 103	-	3.0 ± 0.3	screwed	female
361 007 104	-	5.0 ± 0.5	screwed	female
361 007 201	0.5 ± 0.15	-	push-in	female
361 007 301	-	4.5 ± 0.45	push-in	female
361 007 302	-	5.0 ± 0.5	push-in	female
361 007 305	-	5.5 ± 0.55	push-in	female

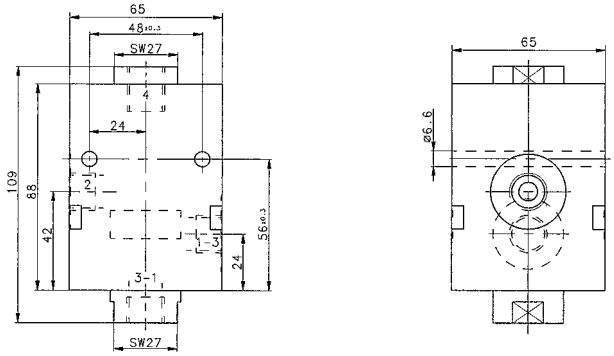
Symbol

554 005 001

554 020 001







Use

The 3-2-way valve can be used as a charging or exhausting valve.

Actuation is by application of pneumatic pressure.

Method of operation

a) as a charging valve

The switching piston is held in its initial position by spring force acting through the valve lifter. The outlet is open, the inlet closed. The passage from 1 (P) to 2 (A) is blocked. Port 2(A) is exhausted through the hollow valve cone and port 3 (R).

When port 4 (Y) is exhausted, the switching piston and valve lifter are pushed downwards. This causes the outlet to close and the inlet to open, in that order.

The passage from 1 (P) to port 2 (A) is open.

b) as exhaust valve

In the initial position, as described under a), port 3 (R) is connected to the open inlet and port 2 (A) via the hollow valve cone.

When port 4 (Y) is exhausted, the switching piston and valve lifter are pushed downwards. This causes the inlet to close and the outlet to open, in that order. The passage from 3 (R) to 2 (A) is blocked, and port 2 (A) exhausted via port 1 (P).

Installation instructions

The valve must be installed vertically. It is mounted by two M 6 bolts.

Testing

Test for operation and leaks.

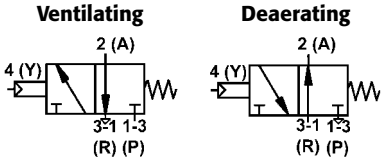
Technical data

Service pressure:	p_e = 8 bar
Service temperature:	-30°C to +80°C
Ports:	see the table of versions
Port designation:	1 (P) = supply port
	2 (A) = delivery port
	3 (R) = exhaust
	4 (Y) = control port

Versions

	Control pressure (4/Y) (bar)					
	Function charging		Function discharging			
Part No	charging	discharging	charging	discharging	Nominal diameter (mm)	Thread
554 005 001	2.7	0.9 - 0.15			6	M 14 x 1.5
554 020 001	1.4 - 1.6	1.0 - 0.5	3.3	2.5	8	M 16 x 1.5

Symbol



Application

The load sensing valve (L.S.V.) serves the purpose of automatically adapting the brake pressure and therefore the brake force to the load of the vehicle.

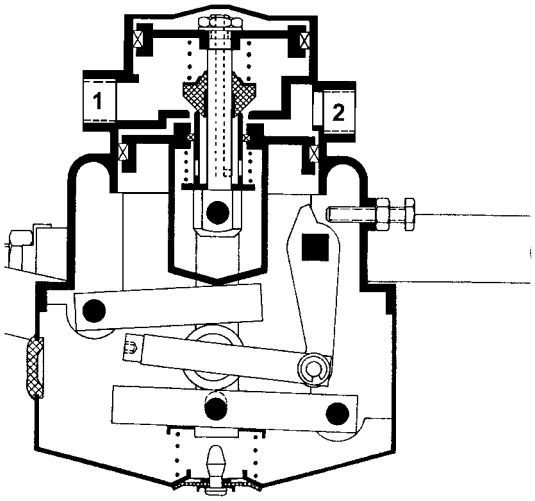
Automatic load-dependent brake force regulation is compulsory for semi trailer tractors with a permissible total weight of more than 7.5 t and semi-trailers with the sum of the permissible axle loads greater than 7.5 t when the vehicle was registered for the first time from 1st January 1963.

EC regulations (RKEG 74/132 EWG) as well as the ECE stipulation No. 13 specify automatic brake force regulation for all motor vehicles and trailers with a total weight exceeding 3.5 t provided brake force regulation is necessary.

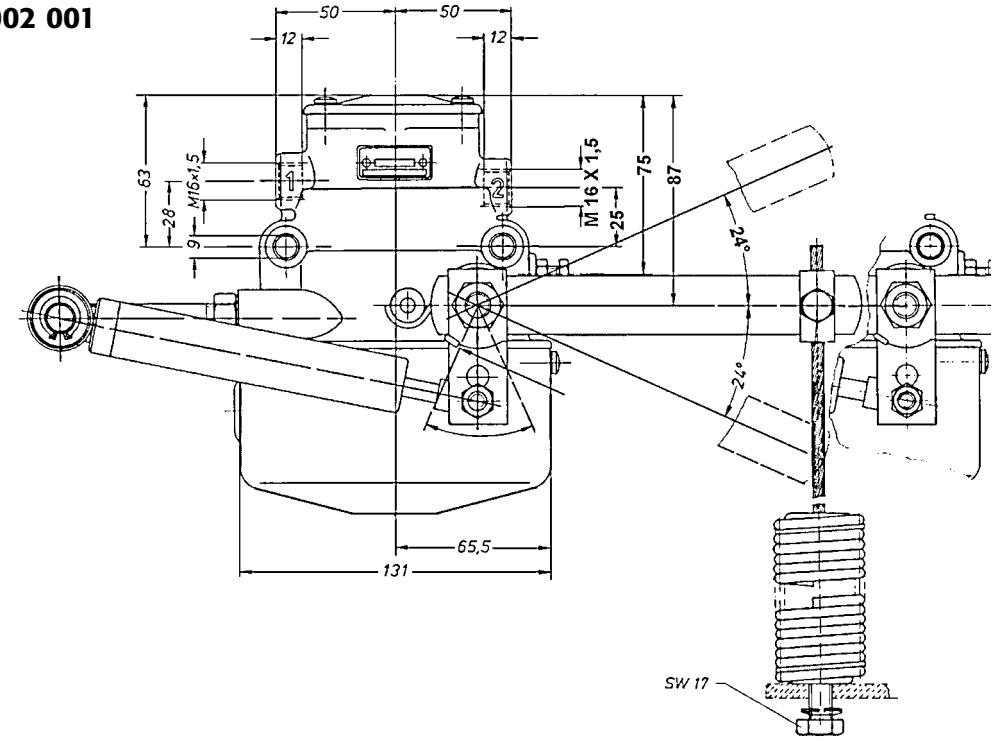
Function

If the load of the vehicle is changed, then as a result, the bend in the vehicle springs also changes. While loading the vehicle, the vehicle body approaches the axles, when unloading the distance between the vehicle body and the axle becomes greater. The travel of the vehicle body can be used for controlling the load sensing valve. The load sensing valve is mounted to the chassis of the vehicle, the control cable together with the spring is mounted an a bracket bolted or welded to the axle.

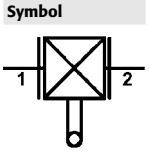
The control cable is secured to the control lever of the load sensing valve by means of a clamp. When unloading the vehicle, the tension spring pulls the control lever downwards over the cable. When the vehicle is loaded, the control lever is raised by a spiral spring until the control cable is tensioned. The shock absorber mounted on the control lever, together with the tension spring, takes up the dynamic impact caused by unevenness in the road. The load sensing valve operates statically, i.e. changes in the spring path which occur during braking do not change the control ratio. The load sensing valve is slightly locked during braking.



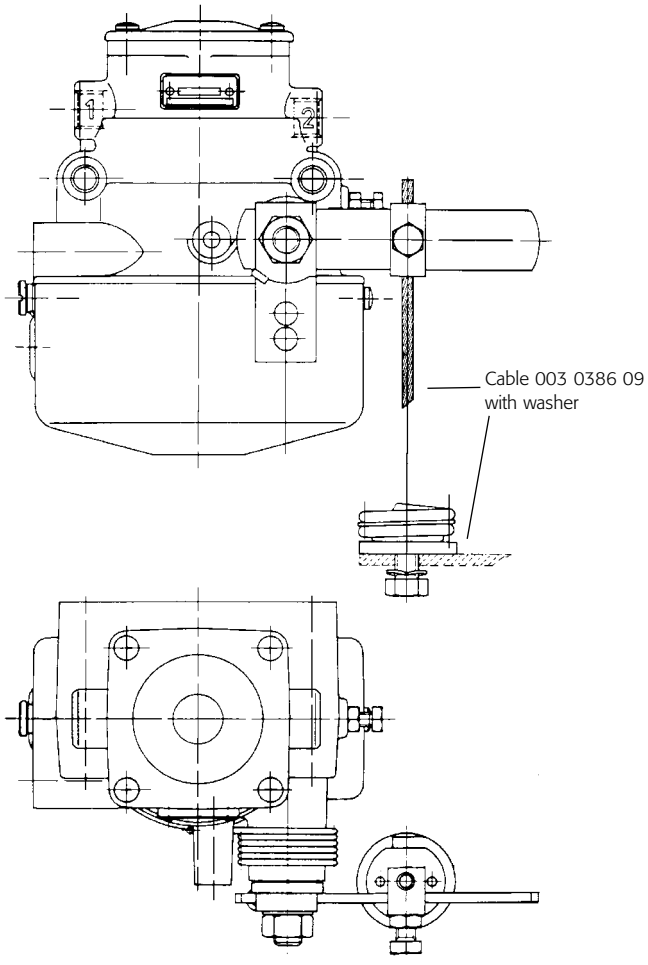
601 002 001

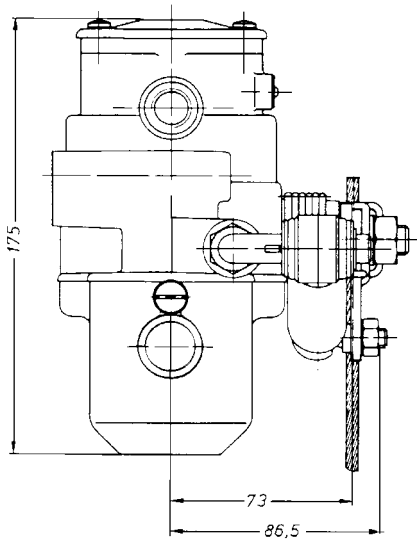


Symbol



601 002 021





Release Position, Half Load

The brake piston moving in the upper part of the housing is connected to the valve sleeve by means of the piston rod on which the double valve cone is mounted in a floating arrangement. The valve sleeve guides the balance spring. The locating pin supported by a compression spring on the housing is connected to the thrust piece by means of the balance lever and the variable slide piece.

A change in movement downwards or upwards executed by the control lever results in the slide piece being shifted and therefore changes the effective transmission ratio between the brake piston and balance piston.

The ratio of the pistons and balance lever is set in such a way that, in setting "load", the pressure applied at port 1 is modulated at port 2 uncontrolled, i.e. control ratio $p_e1/p_e2 = 1:1$. In the position "no-load", the applied pressure P_e1 can be reduced in a control ratio of 6:1 with respect to the modulated pressure p_e2. Each control ratio between "no-load" and "load" is continuously variable. In the release position, the double valve cone closes the inlet seat; port 2 is connected to atmosphere via the open outlet seat.

Brake Setting, Half Load

When the brake is actuated, compressed air flows through port 1 and presses the brake piston upwards while the valve sleeve is pressed against the double valve cone. The outlet seat is now closed, the inlet seat opened. The compressed air now flows to port 2 and is applied to the balance piston. The force acting on the balance piston is transmitted via the thrust piece and the balance levers to the brake piston thereby moving it downwards. The inlet seat is closed, the outlet seat remains closed. A so-called partial braking setting is obtained.

Each change in pressure at port 1 results in a change in pressure at port 2 corresponding to the set control ratio.

The brake piston moves back into its initial position if air is allowed to escape at port 1. Air escapes via port 2 via the now open outlet seat and the vent valve on the housing.

The load sensing valve has a proportional characteristic equipped with a pressure advance control of $p_e = 0.3$ ... 0.4 bar for overcoming in the response stages of subsequently connected brake devices.

In the event of the control cable breaking, the control lever is raised to the position "load" by the shock absorber or spiral spring. The pressure applied at port 1 is directed to port 2 uncontrolled.

Checking

Check whether an information plate is provided, with clear and complete information.

Check that the mechanical linkage moves smoothly as well as the lever length, brake pressure unladen and brake pressure laden (valve opened by the amount of spring travel "fs") in accordance with information plate.

In order to check the settings for the laden vehicle, it is sufficient to check the load sensing valve with the linkage detached and at the corresponding spring travel.

If modifications have been made to the body of the vehicle or the springs have been repaired, check the setting of the load sensing valve and, if necessary, change the specifications on the information plate correspondingly.

Maintenance

The device must be maintained corresponding to legal regulations.

If defects are found during normal brake tests or when driving, the load sensing valve must be inspected and replaced if necessary.

Lubricate at lubricating nipple during general service or when carrying out special brake inspections.

Example

Control ratio i R = 3:1
Control path fs = 50 mm
Derived from nomogram: lever length L = 90 mm

3. The unladen braking pressure must be adjusted after installing the load sensing valve on the vehicle.

The adjustment procedure is described in the following:

a) Press control lever downwards as far as it will go.

b) Apply a pressure p_e1 = 6.0 bar to port 1, measure the modulated pressure p_e2 from port 2.

   Raise the control lever in stages - after venting P_e1 each time - until the required unladen braking pressure p_e2 is obtained for p_e1 = 6.0 bar.

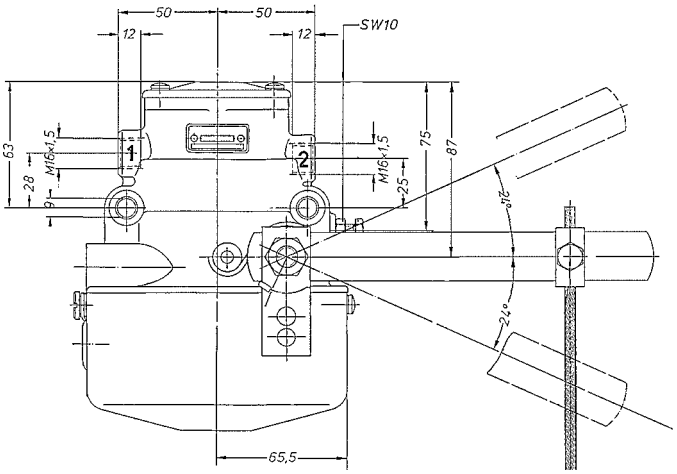
c) Hold control, lever in this position, screw in stop screw (M 6, 10 mm) until a resistance can be felt and tighten counter nut.

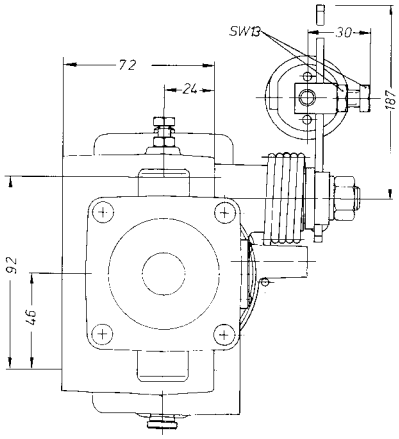
4. Mounting the control cable:

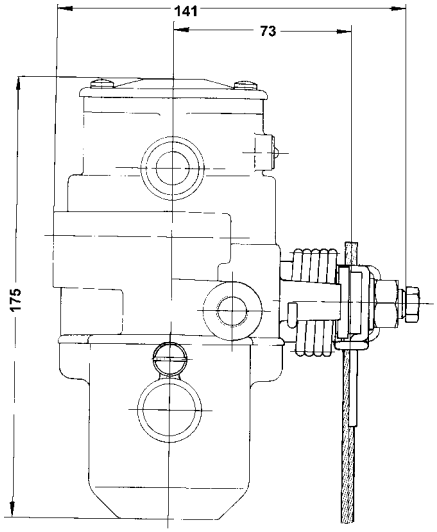
The spring of the control cable is secured by means of a hexagon bolt M 12 to the bracket mounted on the axle. The minimum thickness of the bracket should be 8 mm. If the bracket is welded, then permission must be obtained from the axle manufacturer for this purpose. The weld seams must always be in the neutral zone. With the control lever in unladen position, move the control cable together with the clip into the position (see 3.) at a determined distance (lever length) from the pivot point of the control lever (tightening torque of clamping screw 6 Nm).

Installation drawings

601 013 001 - 011







A 5 mm thick washer is provided under the tension spring of the control cable in order to balance out the setting of the vehicle springs. This washer is removed when the vehicle spring has set by approx. 5 mm. Further readjustment is possible by moving the control cable in the clamp.

This cable and spring arrangement makes it possible to measure the spring path of one axle even in the case of double axle units.

In order to avoid damage or excessive wear of the link parts, the following points must be observed when installing the cable link:

a) The control cable must be as long as possible.

b) The control cable must be located within the moving plane of the lever.

c) Ensure all parts move freely.

d) Arrange control cable on the bracket as close to the vertical as possible with respect to the control lever.

5. Checking the modulated brake pressure in the control lever position "load":

Remove hexagon screw M 12 (for holding the control cable to the bracket).

The control lever or control cable moves upwards by the amount of the spring travel.

Apply 6.0 bars at port 1 and you should see 6.0 bars at port 2.

6. The technical data information is stamped on the separately supplied information plate, part No. 028 0216 09.

7. The information plate must be arranged securely and clearly visible in the vicinity of the vehicle chassis I.D. plate, i.e. on the front left of the vehicle viewed in the direction of travel.

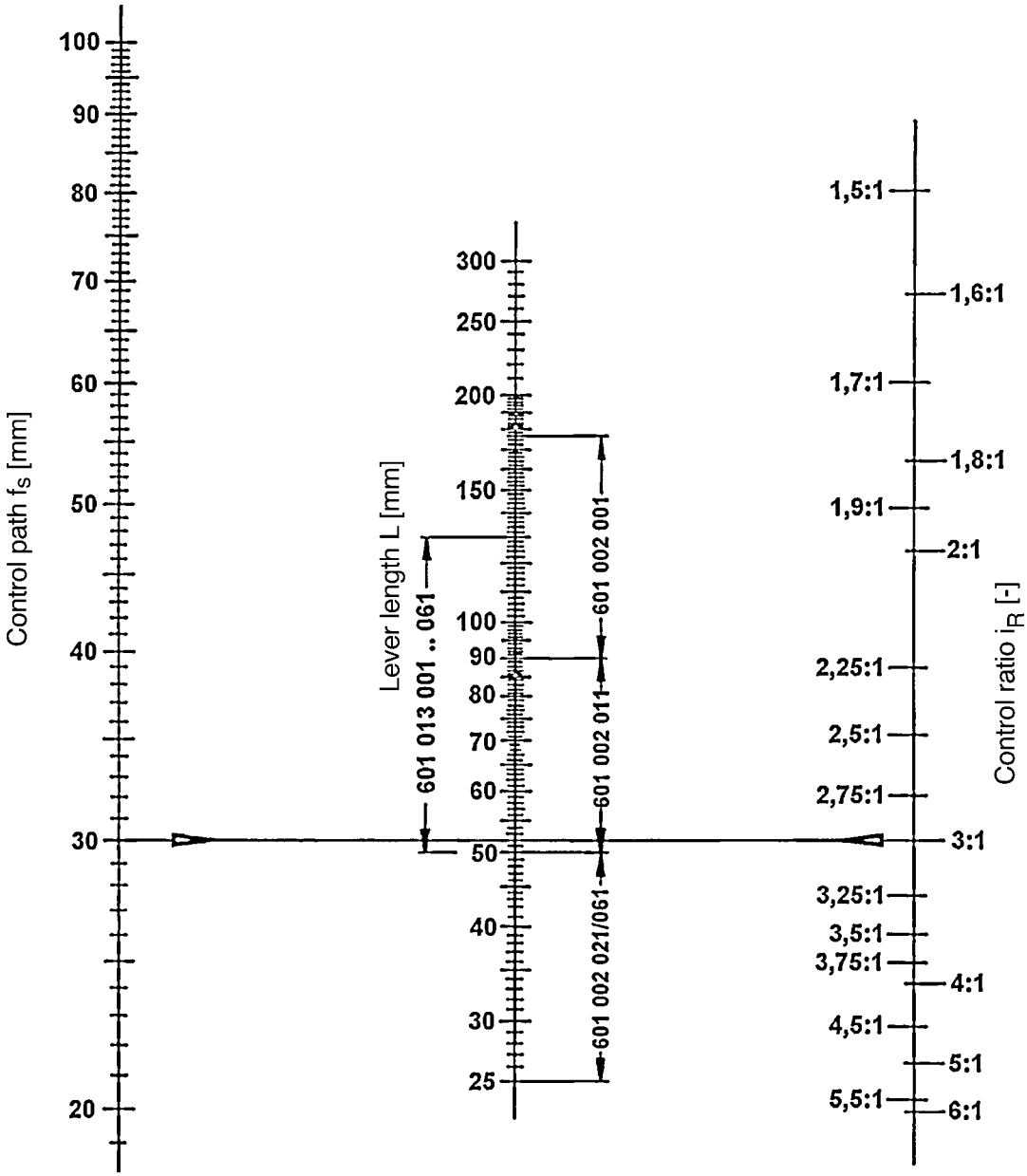
Basic adjustment necessary when the values specified in point 3 and point 5 are not obtained.

The load sensing valve is adjusted at the manufacturer so that

Nomogramm for ALB

601 002 ...

601 013 ...



At 6.0 bar input pressure at port 1 and with the control lever in the laden position

a) 6.0 bar output pressure is obtained at port 2 (control ratio $p_e1/p_e2 = 1:1$)

b) At 6.0 bar input pressure at port 1 and the control lever in the unladen position a 1.0 bar = + 0.3 bar pressure is obtained at port 2 (control ratio $p_e1/P_e2 = 6:1$).

This adjustment must not be changed.

However, basic adjustment is necessary if this setting has been changed.

Basic Adjustment of the Load Sensing Valve

a) The control lever must be in the laden position as the result of the automatic return.

b) Remove the rubber cap on the housing.

c) Using screwdriver DIN 911-5 turn the screw for fine adjustment (on slide piece) as far as it will go in a clockwise direction.

d) Apply a pressure of 6.0 bar at port 1 and measure the modulated pressure at port 2. If the basic adjustment is correct, p_e2 must be equal to P_e1. If this is not the case, the difference between P_e1 and p_e2 must be adjusted until equal.

e) Allow air to escape at port 1 and turn fine adjustment screw in an anticlockwise direction.

The number of turns equals the difference determined in (d) multiplied by 10.

Example

$P_e1 = 6.0$ bar
$p_e2 = 5.7$ bar
(d) $= P_e1 - P_e2 = 6.0$ bar - 5.7 bar = 0.3 bar
0.3 bars x 10 = 3 turn.

f) Attach rubber cap to housing.

g) Apply 6.0 bars at port 1, measure pressure at port 2.

it should now equal Port 1

h) Vent port 1, press control lever downwards as far as it will go.

i) Apply 6.0 bar at port 1, the pressure at port 2 must equal 1.0 + 0.3 bar,

If the value at port 2 is not obtained, release the counter nut of the stop screw and vary the screw-in depth of the stop screw so that at a pressure of 6.0 bar applied at port 1 and with the control lever in the unladen position, a pressure of 1.0 bar + 0.3 bar is obtained at port 2.

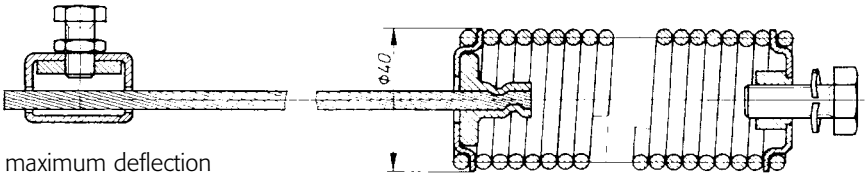
Technical Data

Operating pressure:	max 10 bar
Operating temperature:	-40°C to +80°C
Ports 1, 2:	M 16 X 1.5
Port description:	1 = Supply In
	2 = Delivery Out

Versions

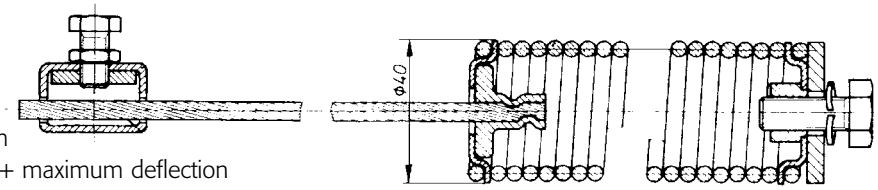
						Mounting height	
Part number	Shock absorber	Cable	Washer	poss. Lever length	max. spring defl. of the spring	smallest + max. deflection	maximum
601 002 001	yes	003 0380 09	no	90 - 176 mm	135 mm	140 mm	1045 mm
601 002 021	no	003 0386 09	yes	25 - 50 mm	108 mm	120 mm	1025 mm
601 013 001	no	003 0386 09	yes	50 - 130 mm	108 mm	120 mm	1025 mm
601 013 011	no	003 0386 09	yes	50 - 130 mm	108 mm	120 mm	1025 mm

003 038 009

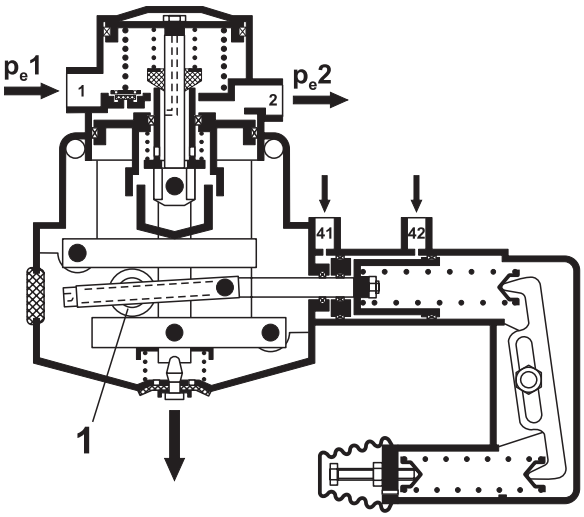


Maximum mounting length: 1045mm
Minimum mounting length: 140 mm + maximum deflection

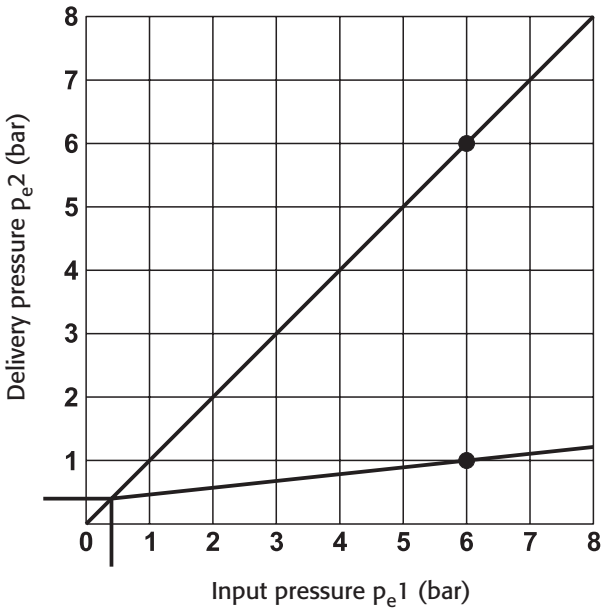
003 038 609



Maximum mounting length: 1025mm
Minimum mounting length: 120mm + maximum deflection



Functional diagram



Use

The automatic load sensing valve (LSV) – pneumatically controlled, is installed in vehicles (motor vehicles, trailers and articulated trailers) with pneumatic braking systems and pneumatic suspensions. The braking pressure in the pneumatic braking system, and with that the braking force, is controlled to correspond to the static load condition of the particular vehicle.

When the static load changes, the pressure in the suspension bellows changes continuously via the pneumatic suspension valve. This pressure is used to simultaneously control the connections 41, 42 of the LSV.

The effective, easily reconstructed in the workshop, pressure ratio iR = p_e1: p_e2 is the practical reference point for the adjustments.

Mode of Operation

The connectors 41, 42 of the actuating cylinder are attached to the connecting lines of the pneumatic suspension valves/bellows on the right and left sides of the vehicle.

The pistons in the actuating cylinder are held in the end position when the vehicle is empty (suspension pressure empty connections 41, 42).

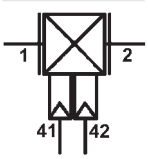
When the vehicle is loaded and the pressure rises at the connections 41, 42, the control pistons and the slider (1) attached to them by the connecting rod are shifted to the right which results in a change in the effective movement translation ratio.

The translation movement between the pistons and balance arm is so adjusted that with suspension pressure empty the control inlet brake pressure pe1at connection 1 is transferred to the outlet control pressure at connection 2 but reduced by the pressure ratio iR. The system is normally designed so that in the loaded position the controlled inlet pressure in connection 1 remains unchanged, i.e. the controlled outlet pressure at connection 2 is in the ratio 1:1 to it.

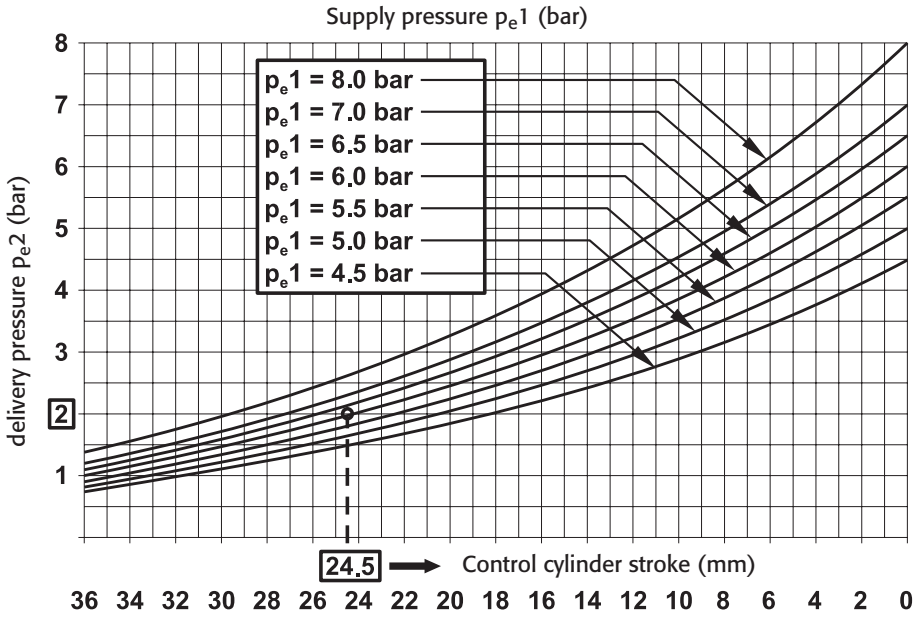
The LSV is fitted with a proportional control characteristic that has a start pressure control (pD) of approx. 0.4 bar in the uncontrolled range to overcome the start force (valves, wheel brakes)

The LSV works “statically”, i.e. a change in the pressure ratio, e.g. from a change in suspension pressure following a change in axle loading, is suppressed during braking.

Symbol



Diagram



Formula for intermediate value

=

(Bagpressure laden - Bagpressure unladen) x 36

Control cylinder stroke

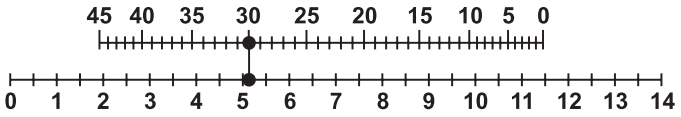
Example

(5 - 1,5) x 36

24,5

interm. value = 5.14

Scale for pivot point



Pivot point = 30

Setting Instructions

The LSV is not set up in the factory with any particular suspension or brake pressures so these must be set by the vehicle manufacturer to the necessary values (LSV instruction plate).

The setting (diagram or LSV setting program) is made in a mechanical part and a pneumatic part.

Mechanical Part

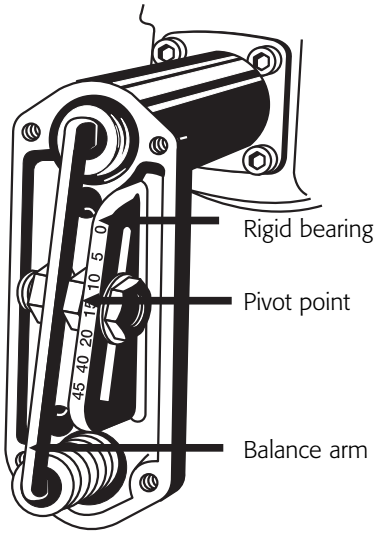
Setting the pivot point (X)

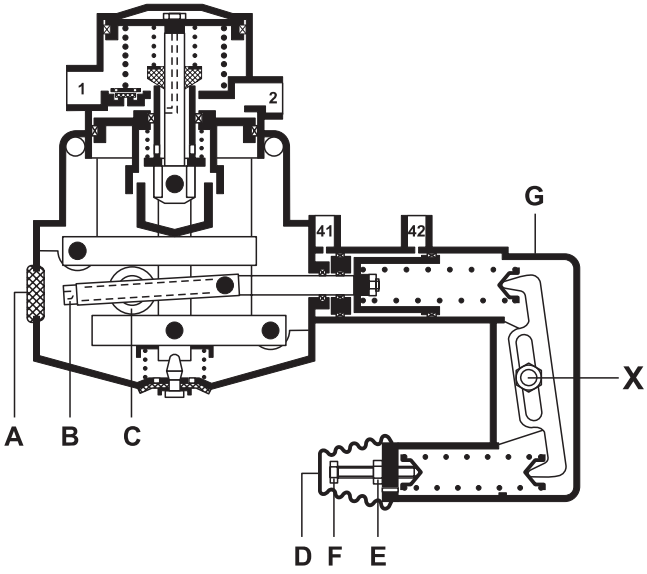
1. Determine the actuating cylinder travel with the help of the diagram
2. Calculate the intermediate value with the formula
3. Determine pivot position (X) for the balance arm from the pivot scale :

Example:

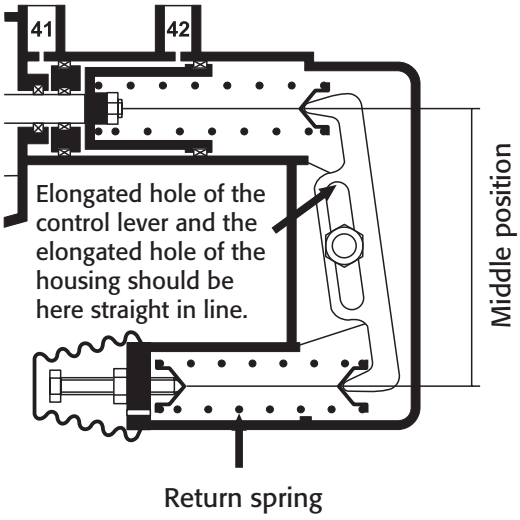
1. P_e1 = 6.0 bar p_e2 empty = 2.0 bar. With curve p_e1 = 6.0 bar, the intersection point with p_e2 = 2.0 bar is formed, connect the intersection point with the actuating cylinder scale, giving

   24.5 mm actuating cylinder travel
2. Suspension pressure loaded $p_e41, 42$ = 5.0 bar, suspension pressure empty $p_e41, 42$ = 1.5 bar, gives 5.14 intermediate value
3. Vertically above the value of the calculated intermediate point, the pivot position (X) can be read off the pivot scale for the balance arm, giving 30 mm pivot point.





Balance level correct in the Fix the middle position



4. Set the pivot point (X) corresponding to the value determined:

   Remove cover G, hold both of the nuts between the balance lever and the frame with the hexagonal spanner 14 mm, loosen the locknuts on the balance lever and fixed bearing with the hexagonal spanner 17 mm and set the pivot position to the calculated value X. First tighten the nuts on the fixed bearing, set up the balance arm (centrally between the return springs for the 90° - position to the long axis of the LSV; if necessary, remove any pre-tensioning in the return springs by turning the adjustment screw F to the left), tighten the nuts 17 mm on the balance lever with about 12-13 Nm torque.

   Pneumatic Part

   Setting the outlet pressure p_e2 empty:

- Vent connections 1, 41, 42 to $p_e = 0$ bar.
- Remove the rubber cap A.
- Place the hexagonal key 5 mm into screw B, shift the slider C against the force of the spring and see whether the automatic return takes place. If it does not return: remove bellows D, loosen locknut E, pre-tension the springs using screw F till the slider C returns to the starting position.
- Turn the screw B so that when controlling the inlet brake pressure p_e1 at Port 1, the desired outlet pressure p_e2 empty is controlled at Port 2. Port 1 has to be vented to $p_e1 = 0$ bar before the screw B is adjusted.

  TURN TO THE LEFT at B raises p_e2

  TURN TO THE RIGHT at B lowers p_e2

- Vent Port 1 to $p_e1 = 0$ bar. Control suspension pressure to p_e41, 42 empty in actuating cylinder.
- Control brake pressure p_e1 at Port 1, the outlet pressure p_e2 empty must correspond to the previously set value. If the outlet pressure p_e2 empty is greater; again tension the return spring in the actuating cylinder using screw F till, when controlling p_e1, the desired outlet pressure p_e2 empty is achieved (do not tension too much).
- Vent Port 1 to $p_e1 = 0$ bar, raise suspension pressure p_e41, 42 empty by approx. 0.7 bar, control brake pressure p_e1 at Port 1, the pressure controlled at Port 2 must now be very slightly greater than p_e2 empty. If a higher pressure is not achieved then the pretension of the return spring is too great. To correct this, loosen the adjustment screw F till the desired change in outlet pressure is obtained (do not lower the spring tension too much, examine p_e2 empty again as a check), tighten locknut E.
- Replace rubber cap A and bellows D as well as protective cover G.

  Check outlet pressure p_e2 loaded:

- Control the suspension pressure in the actuator cylinder to pe41, 42 loaded, control the brake pressure p_e1 at Port 1, the outlet pressure p_e2 must correspond to the value on the LSV instruction plate, the brake calculation or the value given by the vehicle or axle manufacturer, usually $p_e1 = p_e2$.

Installation Guidelines

The LSV is fixed to the vehicle chassis with two M 8 bolts. The vent must point downwards. The pneumatic lines have to be connected according to the Port markings 1, 2, 41, 42.

The values of the settings have to be stamped on the accompanying LSV information plate Part. No. 028 0280 09. The information plate must not be capable of getting lost and must be attached to the vehicle where it is easily visible (German road traffic licensing regulation: StVZO - SP - Rili. - 2.5).

Maintenance

According to the legal requirements or the European guideline. If there are braking problems or defects are observed whilst driving then the LSV should be examined and replaced if necessary.

Testing

- Function and leak test
- Check that p_e2 empty and pe1 loaded correspond to the data on the LSV instruction plate.
- It is mandatory that the LSV be so mounted that it is in a vertical position and the vent point downwards during examination and adjustment Simulation connection
- Variable installation (good access)
- Makes it possible to test to EG/ECE as well as the German

  § 29 StVZO
  11 = Air IN (bellows)
  12 = Air IN (filling connection)
  2 = Air OUT (LSV 41/42)

Technical Data

Operating pressure:	p_e max 10 bar
Operating temperature range:	- 40°C to + 80°C
Ports:	1, 2: M 16 x 1.5
41, 42:	M 12 x 1.5
Port markings:	
	1 = Service Brake Air IN
	2 = Service Brake Air OUT
	41 = Air Suspension Control connection 1
	42 = Air Suspension Control connection 2

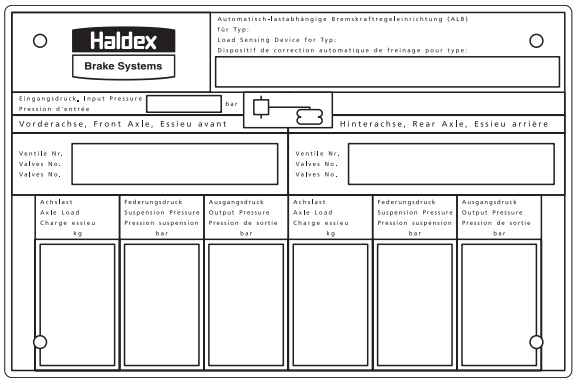
Versions

602 005 001	Load Sensing Valve

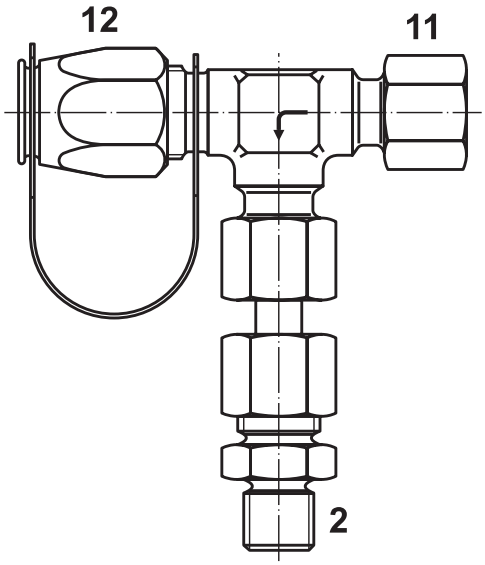
Accessories

028 0280 09	Data plate
318 072 001	Simulation connection
000	Diskette, LSV adjustment program

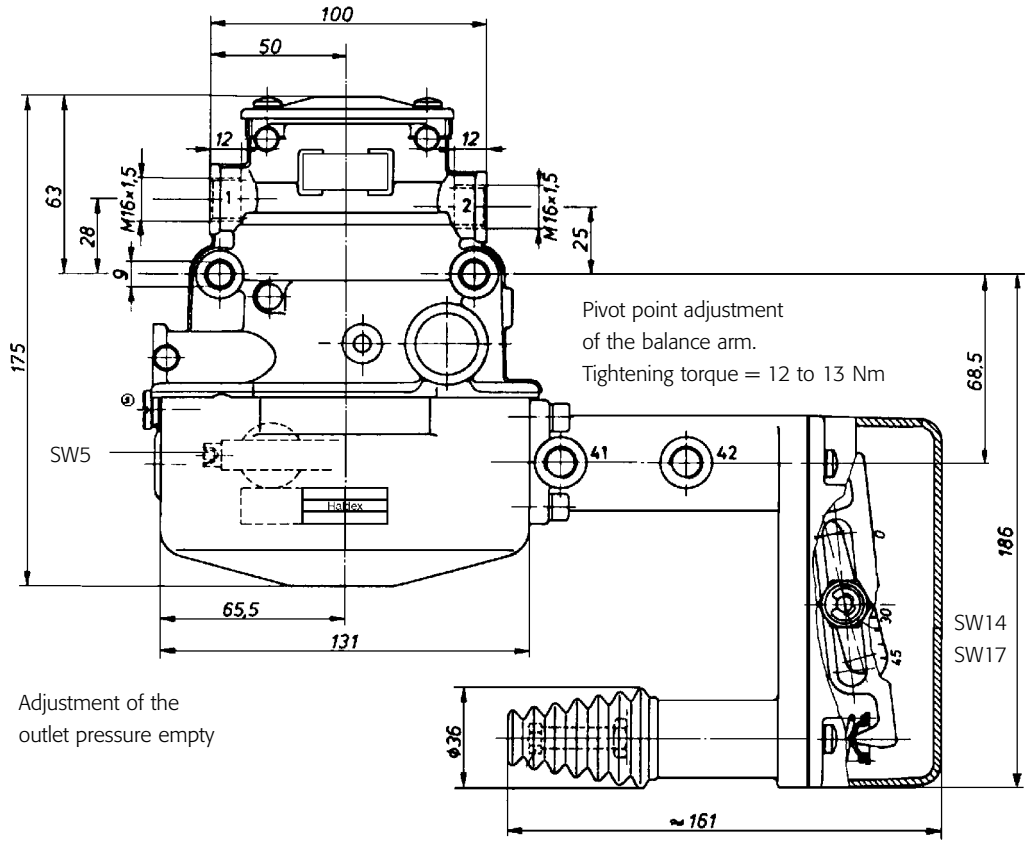
028 0280 09 LSV- Data plate



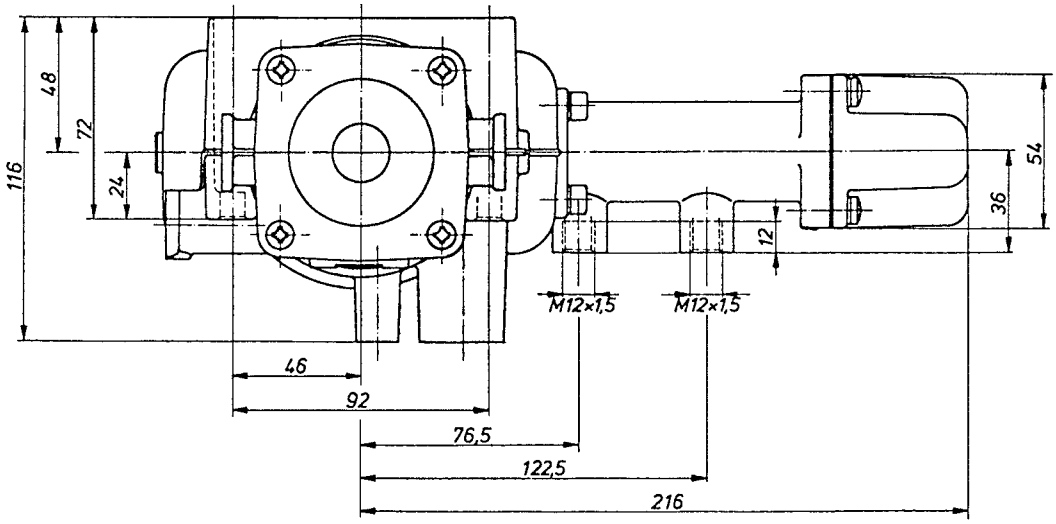
318 072 001 Simulating connection



Installation drawing 602 005 001



Installation drawing 602 005 001



Use

The valve can be used where a specific travel dependent pressure ratio is required. It is used mainly for automatically adapting the control pressure to the load condition of the axle being controlled in the tractor or trailer, e.g. to control the EB+, but can also be employed to control the stabilising cylinder on steering axles.

Method of operation

The coiled torsion spring and connected cam bring the thrust tappet into a specific position, depending on the load condition, which governs the load sensing. Dynamic shocks occurring during driving are absorbed by the coiled torsion spring and do not affect the pressure setting. The compressed air entering at port 1 acts on the rocker piston, pushing it downwards against the force of the rocker spring until the top end of the thrust tappet closes the outlet and opens the inlet. Compressed air flows through the inlet into space A and through port 2 to the consumer.

Load sensing is effected by the neutral position, when the inlet and outlet are closed. The force of the rocker spring acting upwards is compounded by the force of the compressed air that has entered space A. These two forces maintain an equilibrium against the force of the compressed air acting on the rocker piston. If the trust tappet moves up or down as a result of a change in the load condition, either the inlet or outlet will open. This will either increase or decrease the pressure in space A.

In the fully-loaded position, the rocker piston goes to its end position and the thrust tappet keeps the inlet open.

Installation instructions

The valve is to be mounted as near to vertical as possible on the vehicle frame. The angle joint on the coiled torsion spring is to be attached within the ascertained level length. The attachment to the angle joint on the axle is effected by a connecting rod. The attachment point should be as near to the middle of the axis as possible, and in the case of tandem axles, at the neutral point (centre of the axle unit), and at half spring travel must stand vertically under the attachment point of the coiled torsion spring.

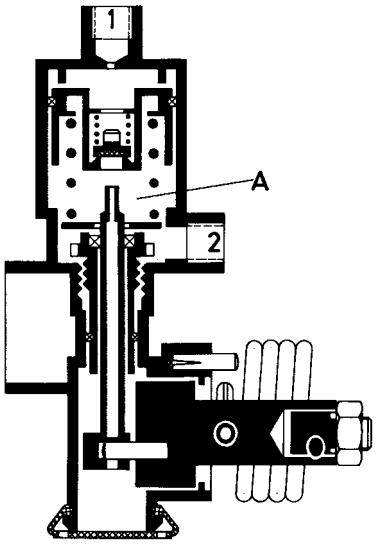
Make sure that all parts move freely. The attachment must be arranged so that it does not contract any other parts during all possible axle movements.

Make sure that there is sufficient space for the coiled torsion spring deflection.

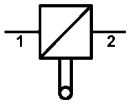
Adjustment

The lever length and excursion for the corresponding control pressures can be found on the “Control Range” graph.

The stroke limitation for the control pressure when empty is adjustable by +15° (see the graph).



Symbol



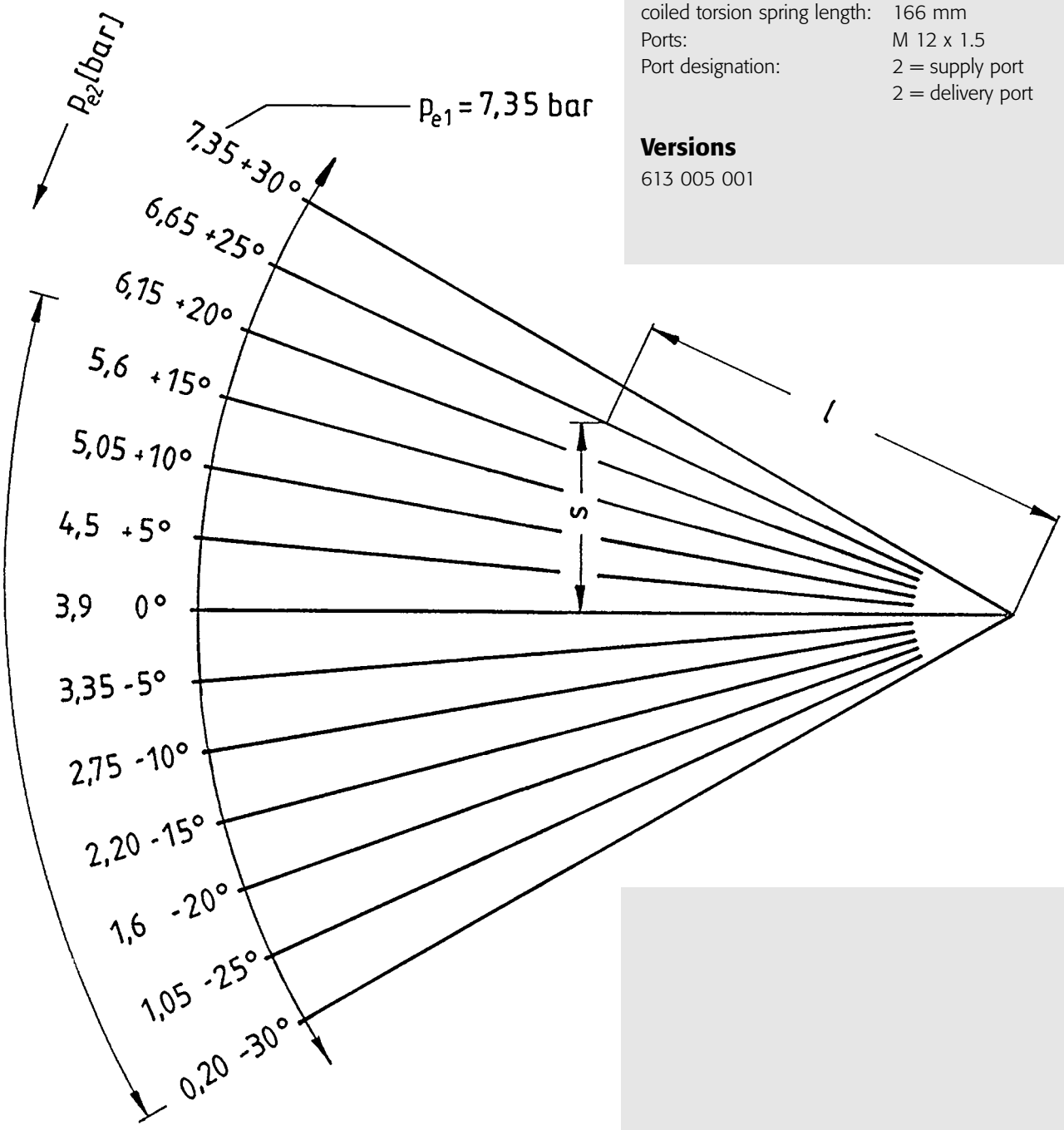
Control range (scale 1:1)
The following example will act as an explanation:
Given values:
spring travel f = 30 mm
desired control pressure on initiation: empty = 3.9 bar,
loaded = 6.6 bar
Values determined from the graph:
Lever excursion: + 25°
Lever length: 71 mm

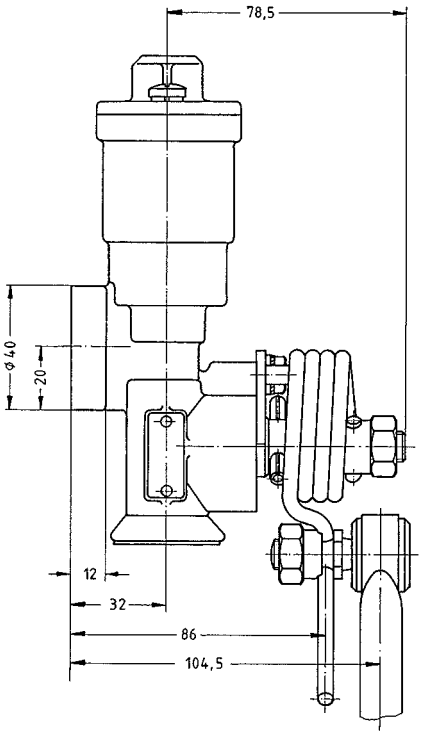
Technical data

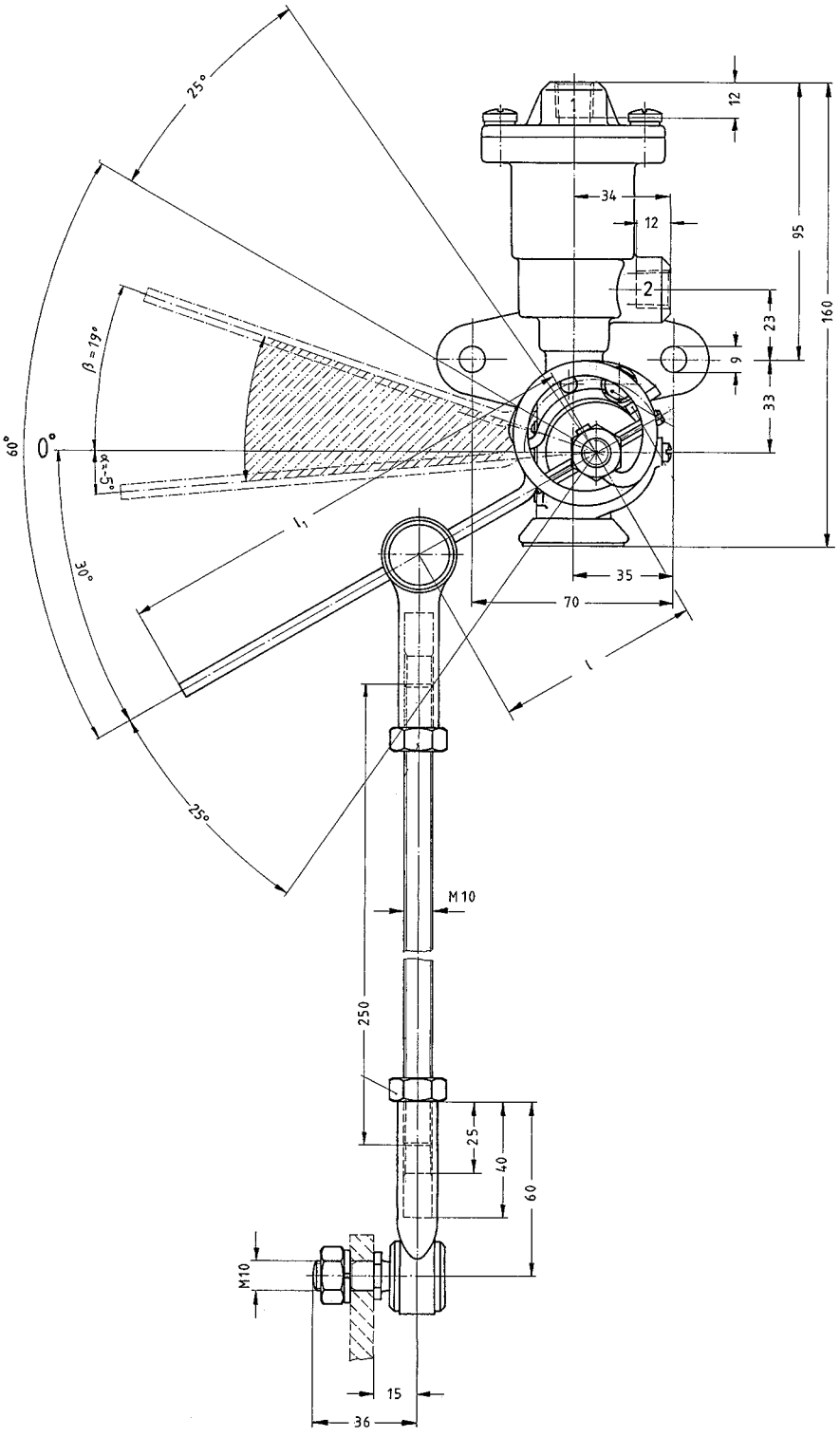
Service pressure:	max. 10 bar.
Service temperature:	-40°C to +80°C
Swivel range:	-30° to +30°
coiled torsion spring length:	166 mm
Ports:	M 12 x 1.5
Port designation:	2 = supply port 2 = delivery port

Versions

613 005 001




78,5
ø 40
20
12
32
86
104,5


25°
60°
0°
30°
25°
β = 19°
α = 5°
l1
l
12
34
12
95
160
2
23
9
33
35
70
M10
250
25
40
60
M10
15
36

Use

The brake chamber is installed to generate the actuation force for mechanically-operated wheel brakes.

Long-stroke brake chambers have a larger actuation stroke and consequently the advantage that in conjunction with automatic brake adjusters, they cover the larger stroke requirement for the adjustment cycle (or in the case of manual brake adjusters, the time intervals for adjustment can be made longer).

Method of operation

The two housing halves are sealed against each other by the diaphragm and clamped together by a retaining strap.

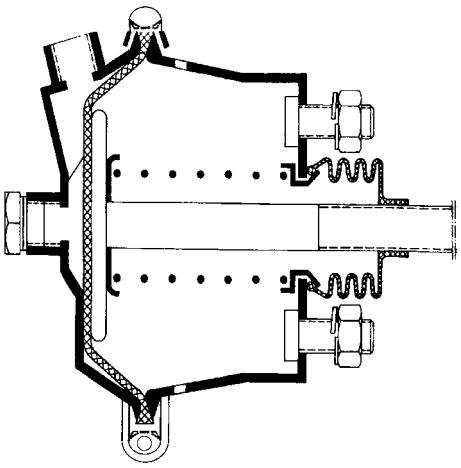
When air is admitted to the compression space, the diaphragm pushes the piston and push rod out of the cylinder, against the spring force. The yoke mounted on the piston rod transfers the force to the brake adjuster. The piston space is connected to atmosphere through a port.

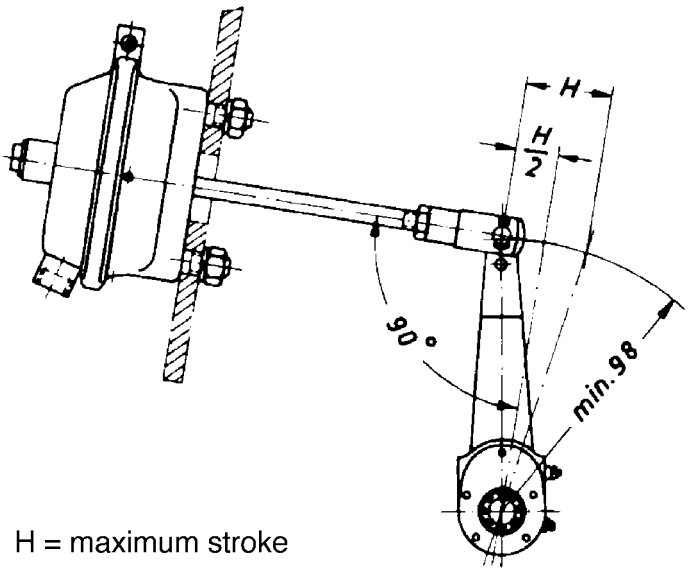
When the brake is released, the air in the pressure space is dumped. The brake arm, supported by the spring, pushes the piston rod, piston and diaphragm back to the floor of the housing.

Installation instructions

The brake chamber is mounted on a carrier plate fitted to the axle, or the vehicle frame. The installation location must be chosen so that water cannot enter the chamber (ice formation). The lowest of the four pressure equalisation ports drilled around the circumference must not be blanked off.

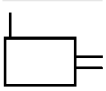
In order to obtain good mechanical efficiency, the piston rod must be at right angles to the brake arm when at half-stroke. When the brake is correctly adjusted, the piston stroke should be no more than $^1/_3$ to $^1/_2$ of the total stroke at full braking. In the released position, the piston rod with the piston must rest against the diaphragm, which in turn should rest against the cylinder end. If the mechanical parking brake is connected to the slack adjuster, elongated-hole yokes, e.g. 003 0336 09, should be used. This avoids the piston rod being pulled out of the cylinder when the parking brake is applied. Installation dimensions are given on the installation drawings.



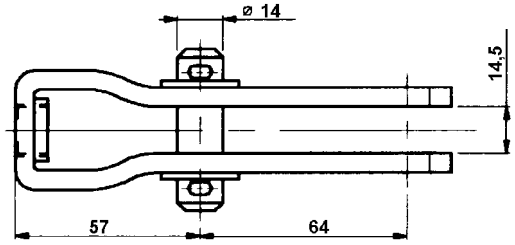


H = maximum stroke

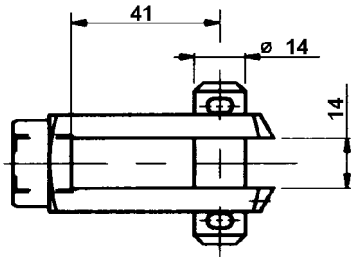
Symbol



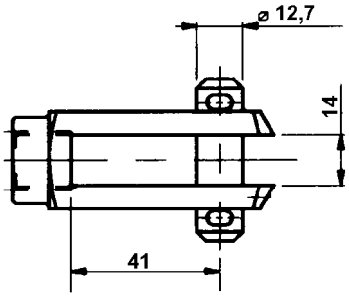
003 033 609



003 561 409



003 568 509



Versions

Part no. for cylinder 120 .. ...

Position

1	2	3	4	5	6	7	8	9
1	2	0	3	_	_	_	_	_

			5 = With				
			4 = Without				
			3 = With				
			2 = Without	2 = seal disc			
			1 = With	1 = Bellows	9 = 90°	1 = 185	
120	3 = Long stroke	See *	0 = Without	0 = Without	0 = 0°	0 = 150	
Main number	Version	Type	Thread / Screw plug	Seal	Installation position connection piece	Piston rod length L in mm	
1-3	4	5	6	7	8	9	

(6: 5 = With, 4 = Without: 1/4" NPTF; 3 = With, 2 = Without: M 22X1,5; 1 = With, 0 = Without: M 16X1,5)

Example: 120 351 201 = 24"; thread M 16 x 15; with screw plug; sealed with seal disc; connection piece installation position 0°; piston rod length 185 mm.

Testing

1. Check the bellows (if fitted) for damage and replace as necessary.
2. Check the brake chamber response pressure: max. P_e = 0.5 bar max.
3. Check the stroke is correctly set: The piston stroke at full braking should be some $^1/_3$ to $^1/_2$ of the total stroke.

   If the stroke at full braking is longer than $^1/_2$ of the possible stroke, the brake must be adjusted (this does not apply to automatic slack adjusters; however, these must be checked for operation and their basic setting).
4. After releasing check the brake to see whether the piston rod has returned completely.

Technical data

Service temperature:	-40°C to +80°C
Service pressure:	p_e max. 10 bar
Certificate for drum brake cylinders	
Type 12 to type 36:	KO 134.4
Certificate for disc brake cylinders	
Type 16:	BZ 169.0
Type 20:	BZ 175.0
Type 24:	BZ 109.0

Swivel range for plunger rod is 3° all round.

The diaphragm is guaranteed to return to its initial position within the stated temperature range.

* 5th position = model designation

1 = Type 9
2 = Type 12
3 = Type 16
4 = Type 20
5 = Type 24
6 = Type 30
7 = Type 36
8 = Type 27

S-cam brake versions

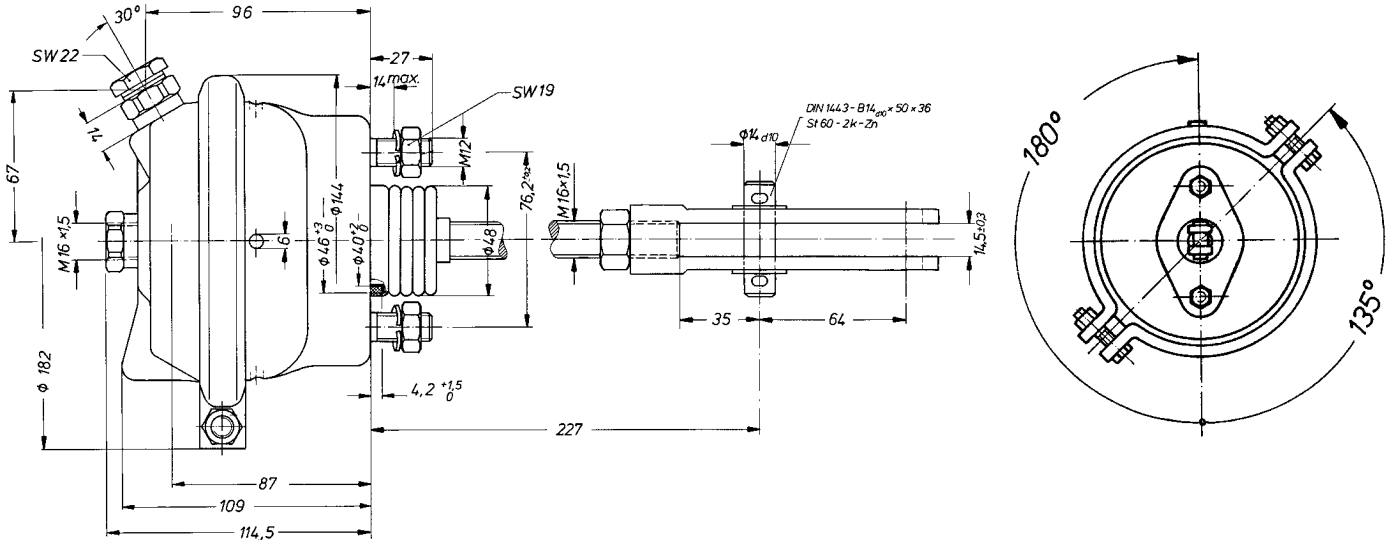
Order number	Type	Stroke	Piston rod Length	Piston rod Thread	Seal	Central fork head	Side port	Port	Vent plug	Operating pressure	Lock nut
345 100 168	12	55	227 mm	M 16 x 1.5	Air bellows	With (long)	M 16 x 1.5	M 16 x 1.5	with	8 bar	with
345 125 110	12	55	186 mm	M 16 x 1.5	Air bellows	Without	M 16 x 1.5	M 16 x 1.5	with	8 bar	with
345 228 158	16	80	135 mm	M 16 x 1.5	Air bellows	With (short)	M 16 x 1.5	M 16 x 1.5	with	8 bar	with

Disc brake versions

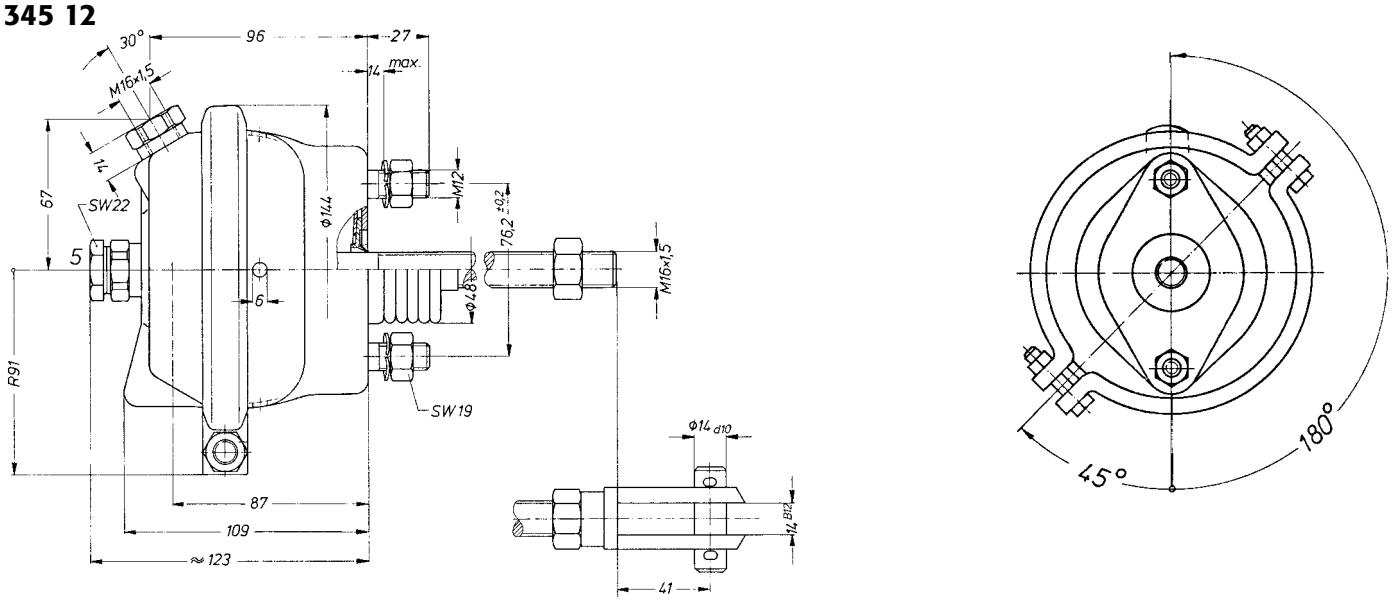
Order number	Type	Stroke	Internal seal	Central port	Side port	Vent plug	Operating pressure	C Lock nut	G Thread protecting cap	J	S* Tension band	T* Port
125 160 001	16	57	Air bellows	M 16 x 1.5	M 16 x 1.5	Yes	10 bar	With	Yes	15 mm	315°	0°
125 160 002	16	57	Air bellows	M 16 x 1.5	Without	Yes	10 bar	Without	Yes	15 mm	90°	-
125 160 003	16	57	Air bellows	ohne	M 16 x 1.5	Yes	10 bar	Without	Yes	15 mm	315°	90°
125 160 004	16	57	Air bellows	ohne	M 16 x 1.5	Yes	10 bar	Without	Yes	15 mm	270°	0°
125 160 010	16	57	Air bellows	M 16 x 1.5	Without	Without	10.2 bar	Without	Yes	15 mm	0°	-
125 200 001	20	57	Air bellows	M 16 x 1.5	M 16 x 1.5	Yes	10 bar	With	Yes	15 mm	315°	0°
125 200 002	20	57	Air bellows	M 16 x 1.5	Without	Yes	10 bar	Without	Yes	15 mm	90°	-
125 200 003	20	57	Air bellows	ohne	M 16 x 1.5	Yes	10 bar	Without	Yes	15 mm	90°	0°
125 240 001	24	57	Air bellows	M 16 x 1.5	M 16 x 1.5	Without	10 bar	With	Without	15 mm	315°	0°
125 240 002	24	57	Air bellows	M 16 x 1.5	Without	Without	10 bar	Without	Without	15 mm	90°	-

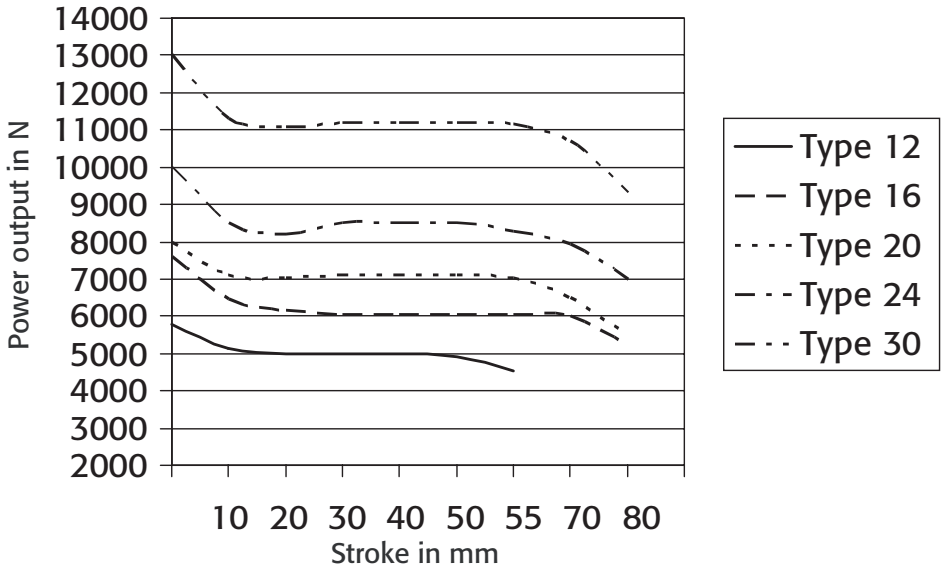
* = In relation to respective installation drawing

345 100

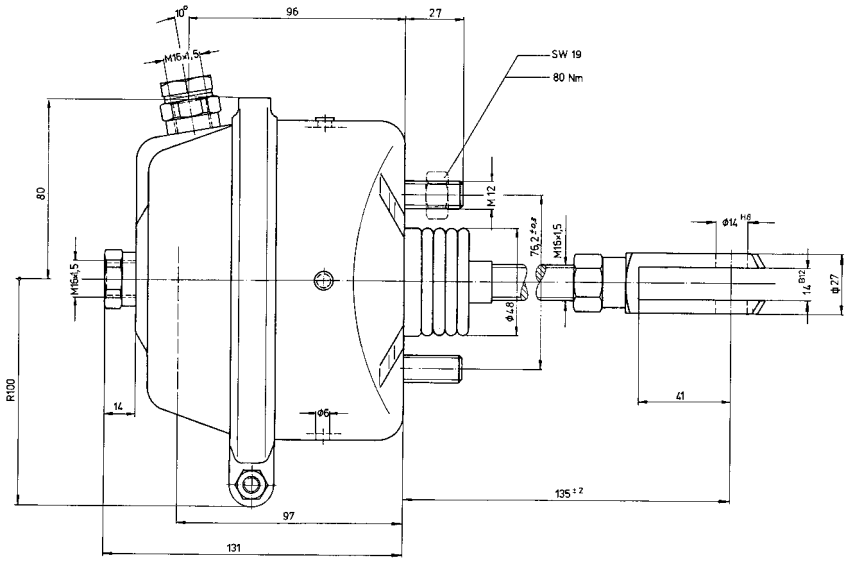


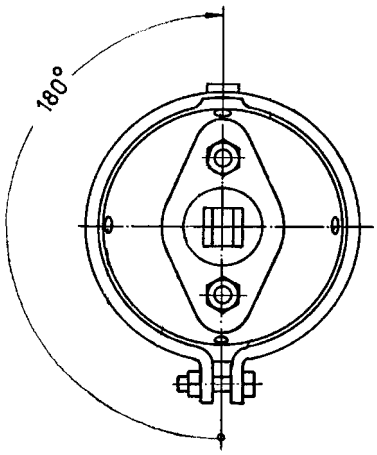
345 12



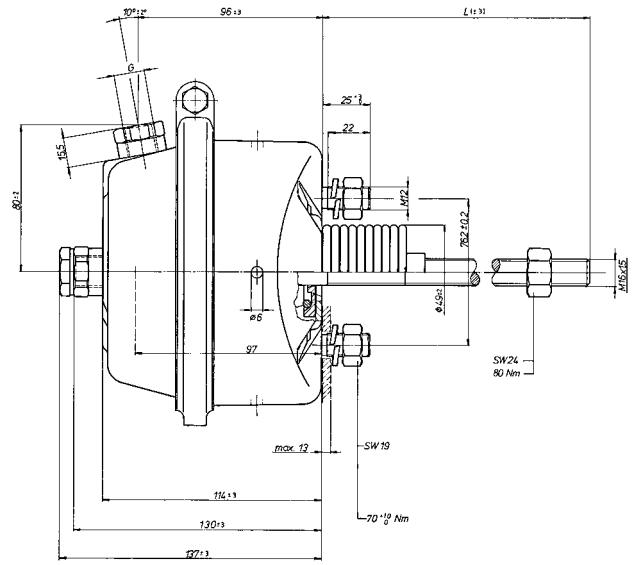


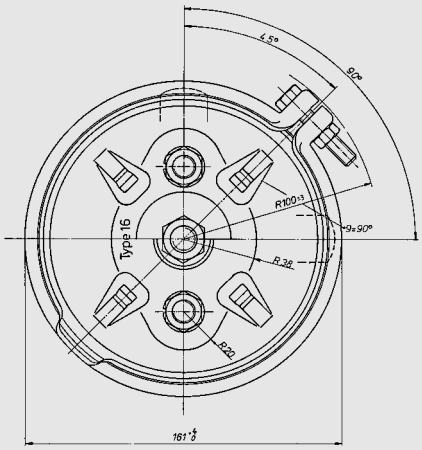
345 228



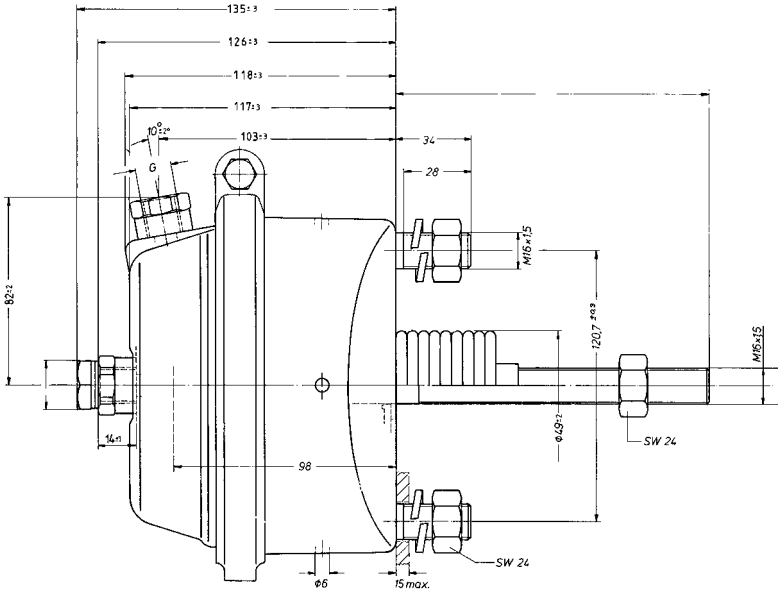


120 330

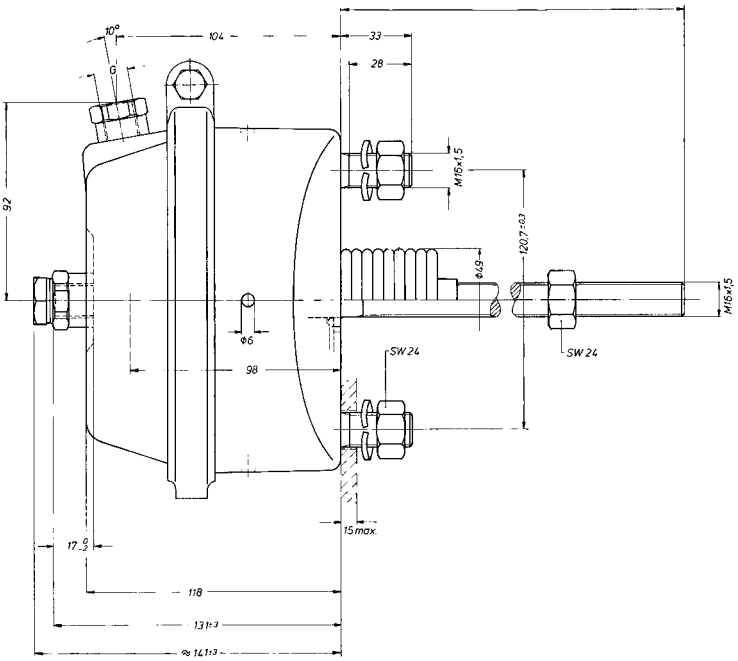




120 340



120 350



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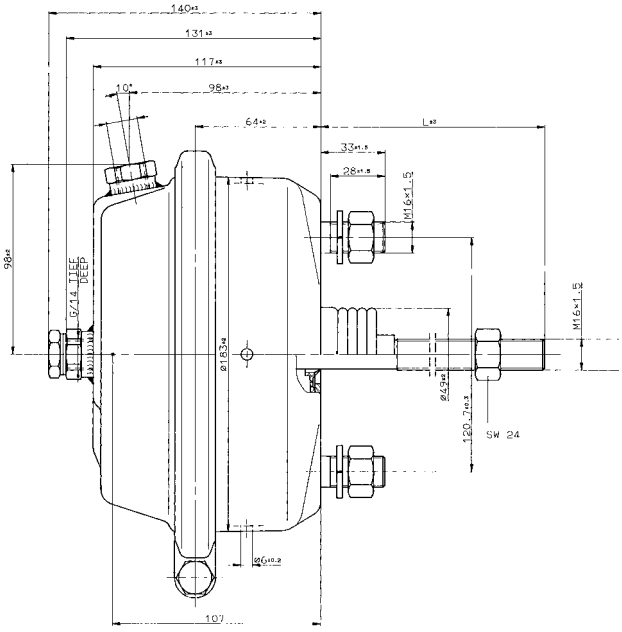
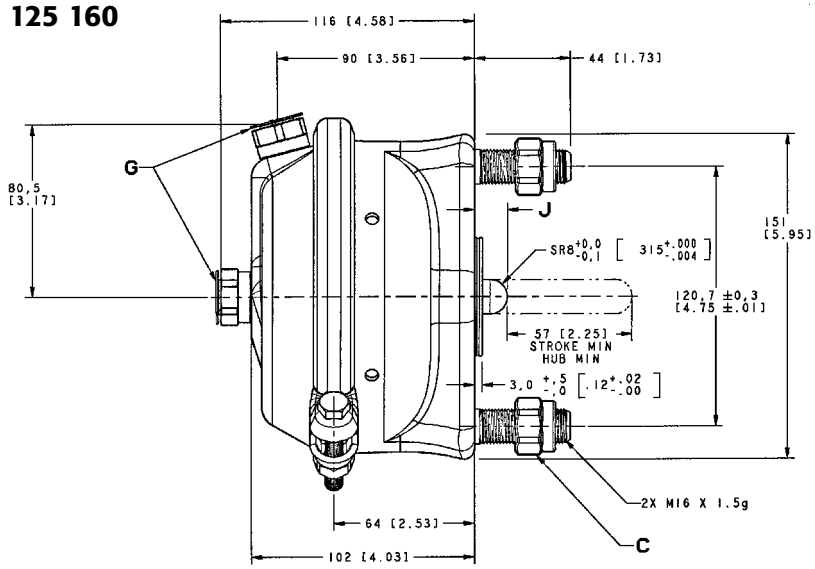
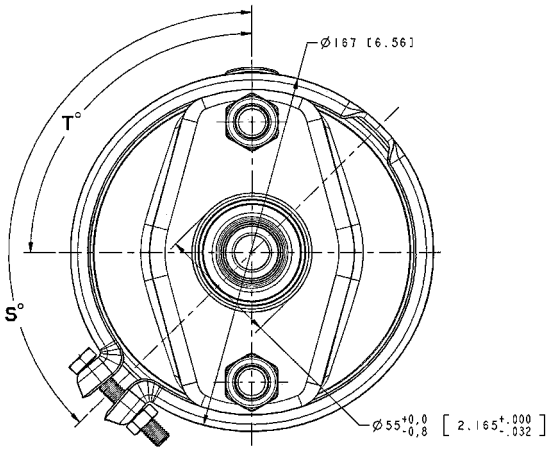
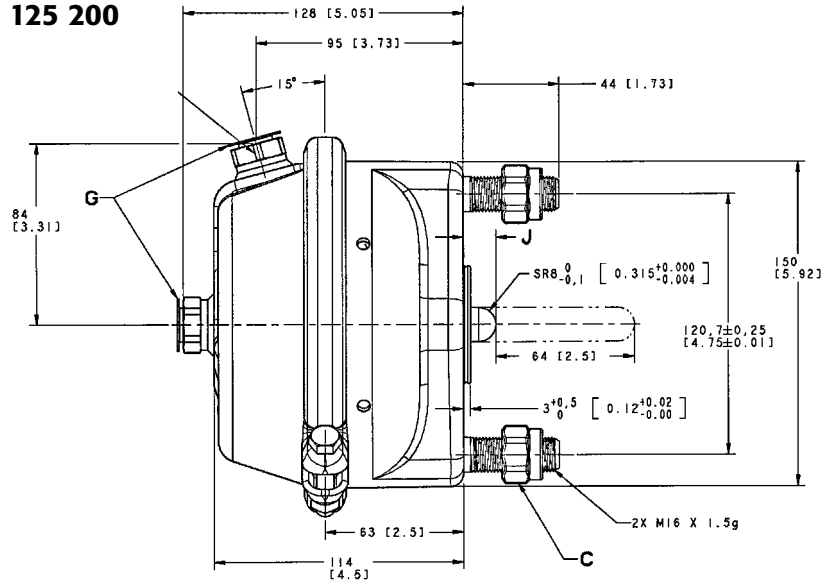


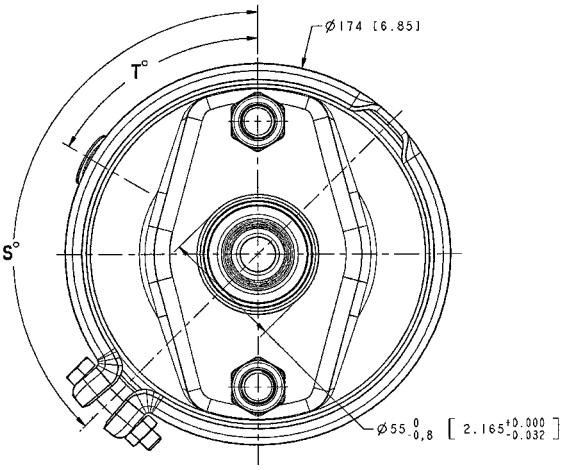
125 160



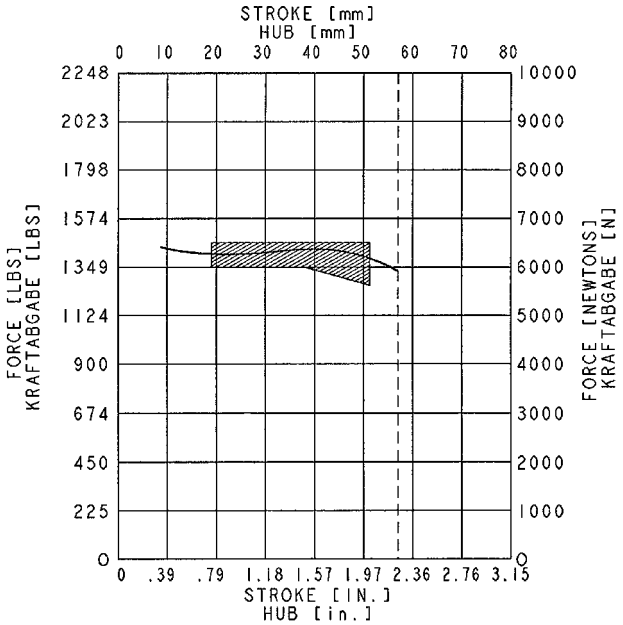


125 200

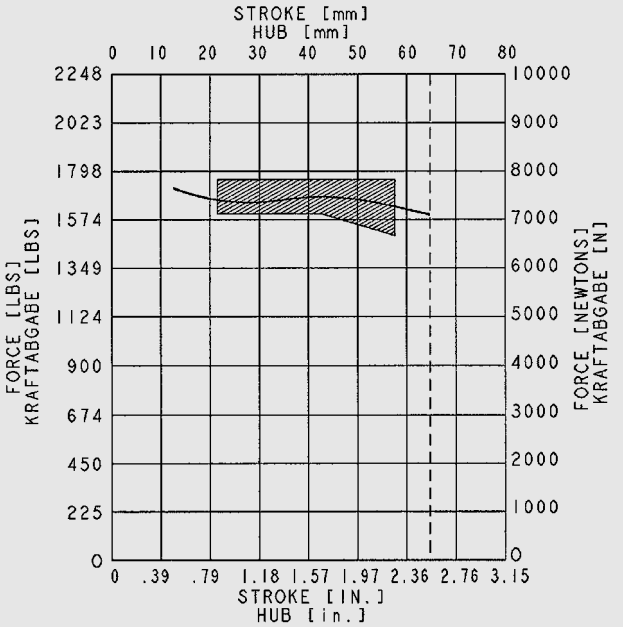




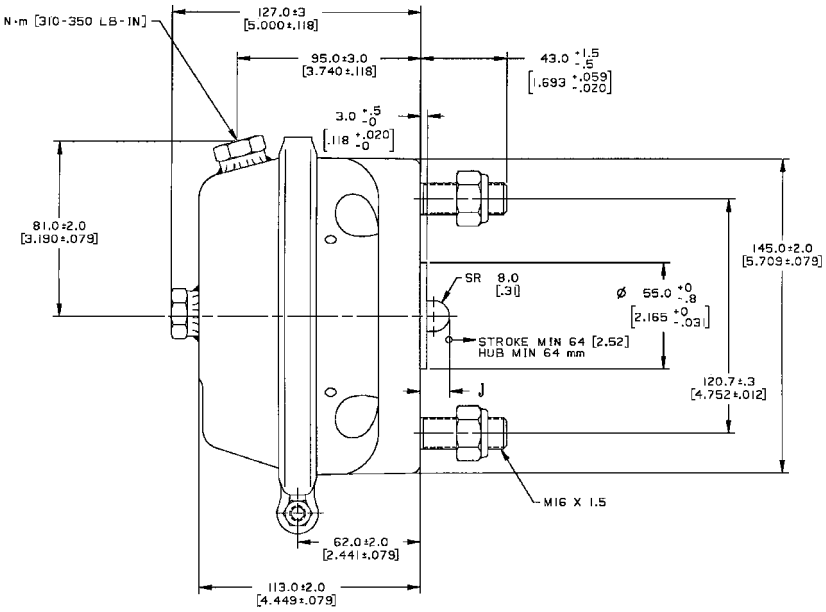
OUTPUT PERFORMANCE T-16
KRAFTABGABE TYP 16

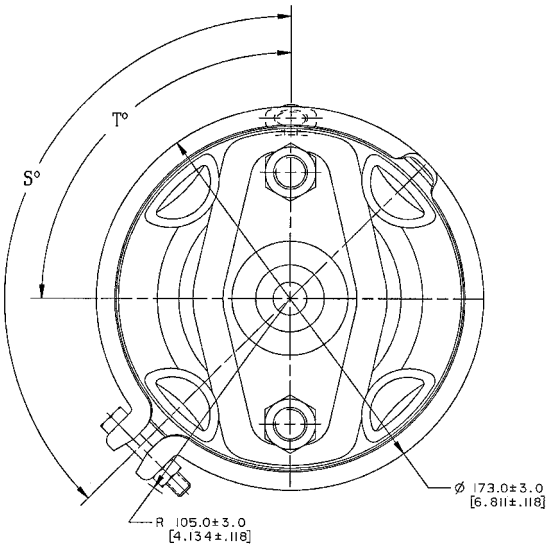


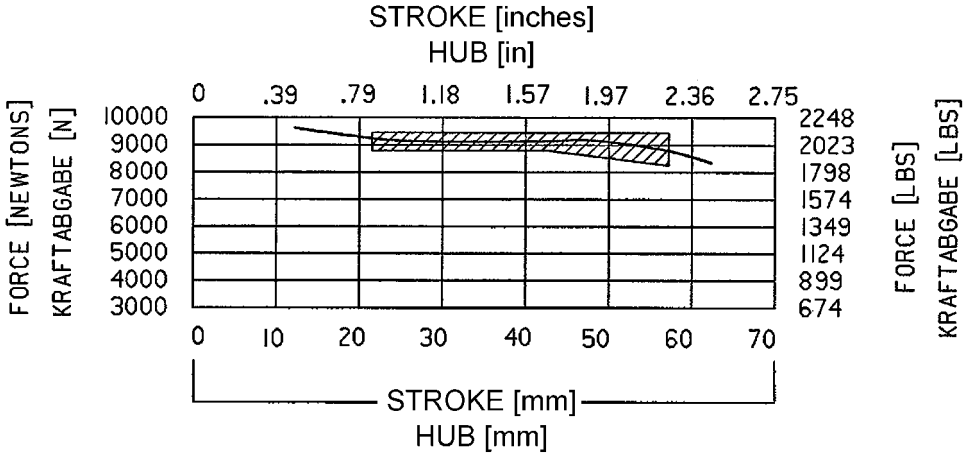
OUTPUT PERFORMANCE T-20
KRAFTABGABE TYP 20

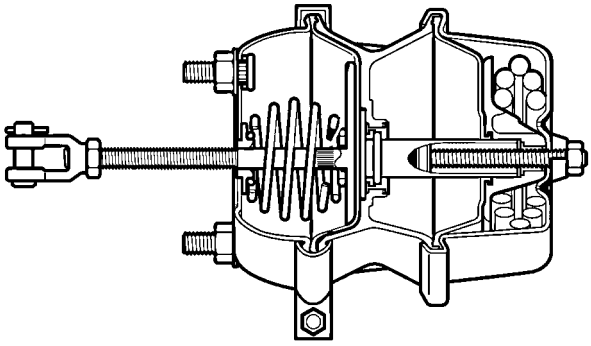


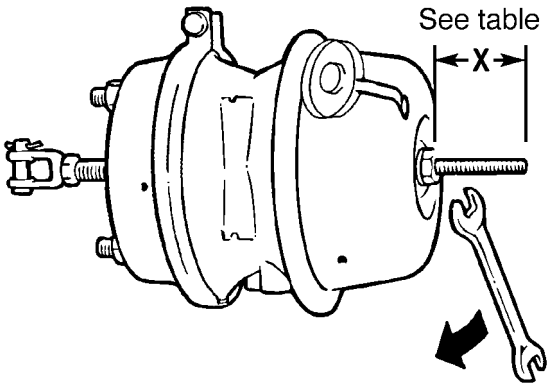
125 240


N·m [310-350 LB-IN]
127.0±3 [5.000±.118]
95.0±3.0 [3.740±.118]
43.0 +1.5 -.5 [1.693 +.059 -.020]
3.0 +.5 -0 [.118 +.020 -0]
81.0±2.0 [3.190±.079]
145.0±2.0 [5.709±.079]
SR 8.0 [.31]
Ø 55.0 +0 -.8 [2.165 +0 -.031]
STROKE MIN 64 [2.52] HUB MIN 64 mm
120.7±.3 [4.752±.012]
J
M16 X 1.5
62.0±2.0 [2.441±.079]
113.0±2.0 [4.449±.079]


T°
S°
Ø 173.0±3.0 [6.811±.118]
R 105.0±3.0 [4.134±.118]


STROKE [inches]
HUB [in]
0 .39 .79 1.18 1.57 1.97 2.36 2.75
FORCE [NEWTONS]
KRAFTABGABE [N]
10000 9000 8000 7000 6000 5000 4000 3000
2248 2023 1798 1574 1349 1124 899 674
FORCE [LBS]
KRAFTABGABE [LBS]
0 10 20 30 40 50 60 70
STROKE [mm]
HUB [mm]

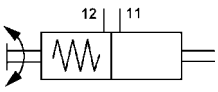




Table

Version	Type	Stroke (mm)	X-Minimum (mm)
Disc brake	16/24	57	74
Disc brake	16/24	57	74
Drum brake	20/30	76	86
Drum brake	24/30	76	86
Drum brake	30/30	76	86

Symbol



Use

Double diaphragm brake chambers consist of one diaphragm unit for the service brake, and one diaphragm spring unit for the parking brake. These chambers are used for mechanically-operated S-cam/disc brakes.

Method of operation

Diaphragm unit for the service brake

The two housing halves are sealed against each other by the diaphragm and clamped together by a retaining strap. When air is admitted to the compression space via port 11 (service), the diaphragm pushes the piston and push rod out of the cylinder, against the spring force. The yoke mounted on the piston rod transfers the force to the wheel brake, via the slack adjuster. The piston space is connected to atmosphere through a port. When the service brake is released, the air in the pressure space is dumped. The brake arm, supported by the spring, pushes the piston rod, piston and diaphragm back to the floor of the housing. The two diaphragm units operate independently of each other.

Diaphragm spring unit for the parking brake

When the air is dumped from the compression space via port 12, the spring pushes the piston rod of the spring actuator unit, via the diaphragm, against the piston rod of the service brake unit. The yoke mounted on the piston rod transfers the force to the wheel brake, via the slack adjuster. When the brake is released, air is admitted to the connection again.

Mechanical release device

The double-diaphragm combined brake cylinder has a mechanical release device. If there is a compressed air loss, the spring can be preloaded mechanically using the release tool mounted on the cylinder in order to release the wheel brake.

Installation instructions

Please observe the following instructions for safe and permanent mounting:

The mounting bracket for the spring brake actuator must be flat and adequately dimensioned as regards material thickness and size. The actuator must not overhang.

The mounting surface of the bracket must not have been given the final paint coat before the actuator is mounted.

No intermediate plates, plain washers, spring washers etc. should be fitted between the bracket mounting surface and the service brake unit. Make sure the actuator is mounting directly. The maximum excursion of the piston rod in all directions is 3'.

The lowest of the drilled pressure equalisation ports must not be blanked off

The piston rod length has been correctly selected if the piston rests against the diaphragm in the rest position and when in the working position, forms a right angle with slack adjuster at half stroke.

Observe the tightening torques for the mounting nuts.

Tighten the nuts alternately and in stages.

Before taking the vehicle into operation, the release tool must be removed and stowed in place provided. Close off the port with the dust protection cap.

Directions and approvals by the axle and vehicle manufacturer must be observed.

Please note: Spring brake actuator housing parts must not be dismantled (danger of injury).

Testing

Test the cylinder/connections for operation and leaks.

Technical data

Medium: air
Service pressure: max. 10.2 bar.
Thermal application range: -40°C to +80°C
Ports: M16 x 1.5
Mounting studs: M 16 x 1.5

Certificate for drum brake cylinders

Type 20/30: BZ 166.0
Type 24/30: BZ 167.0
Type 30/30: BZ 168.0

Certificate for disc brake cylinders

Type 16/24: BZ 165.1
Type 20/24: BZ 176.0

Drum brake cylinder versions

Order number	Type	Stroke	Weight	Seal	C Lock nut	D Plain washer	E released with tool	G Thread protective cap	J	K	S* Tension band	T* Port
136 2030 001	20/30	76/76	8.7 kg	Sealing washer	With	Yes	Yes	Yes	208 mm	246 mm	315°	90°
136 2430 001	24/30	76/76	8.7 kg	Sealing washer	With	Yes	Yes	Yes	208 mm	246 mm	315°	90°
136 2430 002	24/30	76/76	8.7 kg	Sealing washer	Without	Without	Yes	Yes	188 mm	227 mm	45°	90°
136 3030 001	30/30	76/76	9.7 kg	Sealing washer	With	Yes	Yes	Yes	208 mm	246 mm	315°	90°

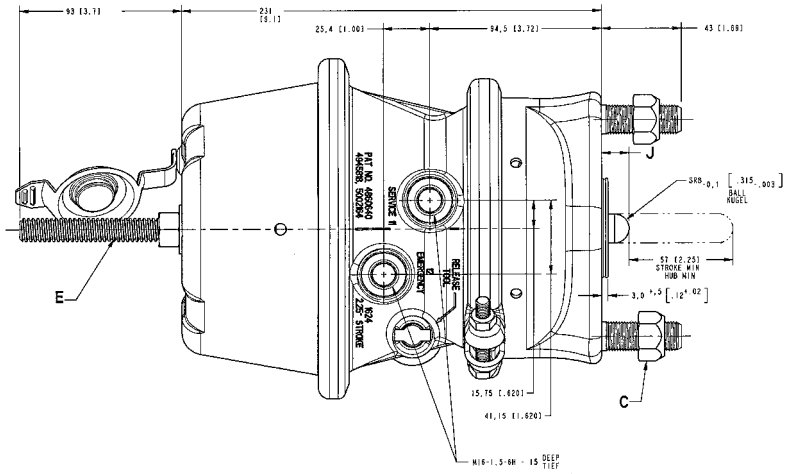
* = In relation to respective installation drawing

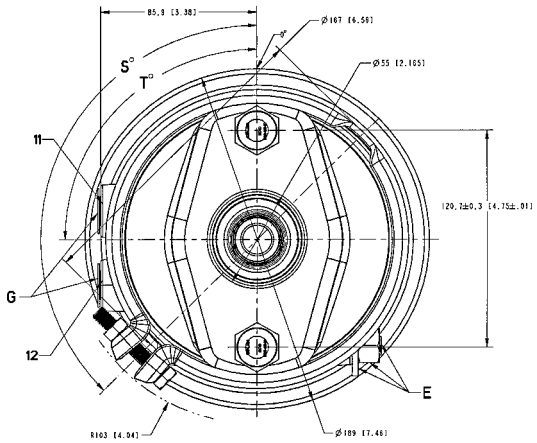
Disc brake cylinder versions

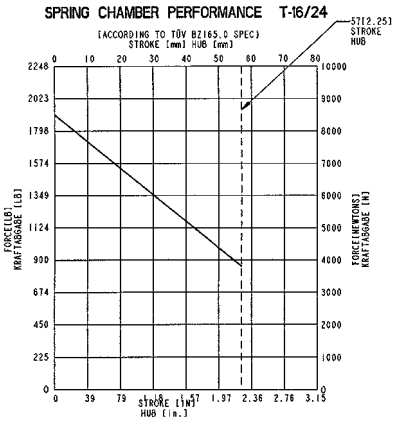
Order number	Typee	Stroke	Weight	Seal	C Lock nut	E released with tool	G Thread protective cap	J	S* Tension band	T* Port
135 1624 002	16/24	57/57	6.9 kg	Internal bellows	Without	Yes	Yes	15 mm	0°	0°
135 1624 003	16/24	57/57	6.9 kg	Internal bellows	Without	Yes	Yes	15 mm	90°	270°
135 1624 004	16/24	57/57	6.9 kg	Internal bellows	With	Yes	Yes	15 mm	45°	90°
135 1624 005	16/24	57/57	6.9 kg	Internal bellows	Without	Yes	Yes	15 mm	135°	315°
135 1624 006	16/24	57/57	6.9 kg	Internal bellows	Without	Yes	Yes	15 mm	225°	45°
135 1624 007	16/24	57/57	6.9 kg	Internal bellows	Without	Yes	Yes	15 mm	135°	315°
135 1624 008	16/24	57/57	6.9 kg	Internal bellows	Without	Yes	Yes	15 mm	225°	45°
135 2024 001	20/24	57/57	6.9 kg	Internal bellows	Without	Yes	Yes	15 mm	45°	135°
135 2024 002	20/24	57/57	6.9 kg	Internal bellows	Without	Yes	Yes	15 mm	0°	0°
135 2024 003	20/24	57/57	6.9 kg	Internal bellows	Without	Yes	Yes	15 mm	90°	270°
135 2024 004	20/24	57/57	6.9 kg	Internal bellows	Without	Yes	Yes	15 mm	315°	90°
135 2024 005	20/24	57/57	6.9 kg	Internal bellows	Without	Yes	Yes	15 mm	135°	315°
135 2024 006	20/24	57/57	6.9 kg	Internal bellows	Without	Yes	Yes	15 mm	225°	45°
135 2024 010	20/24	57/57	6.9 kg	Internal bellows	Without	Yes	Yes	15 mm	135°	315°
135 2024 011	20/24	57/57	6.9 kg	Internal bellows	Without	Yes	Yes	15 mm	225°	45°

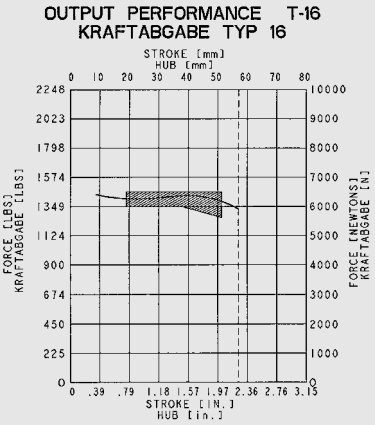
* = In relation to respective installation drawing

135 1624









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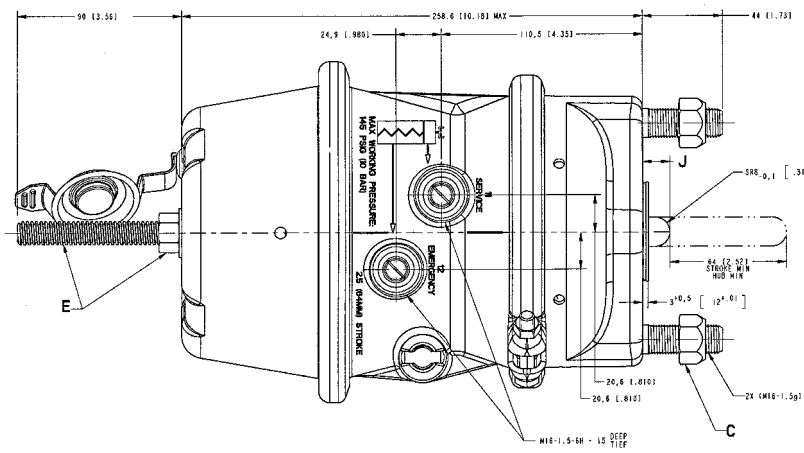

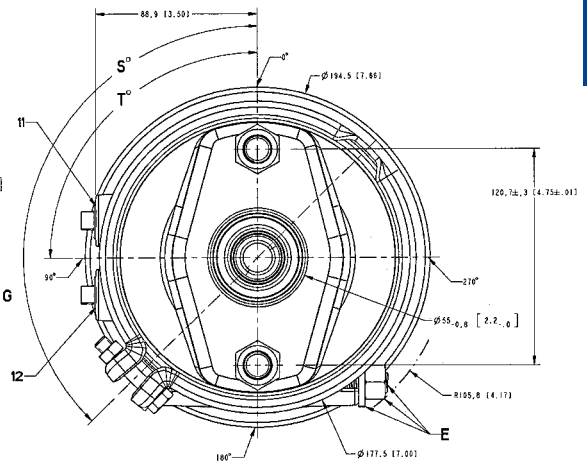

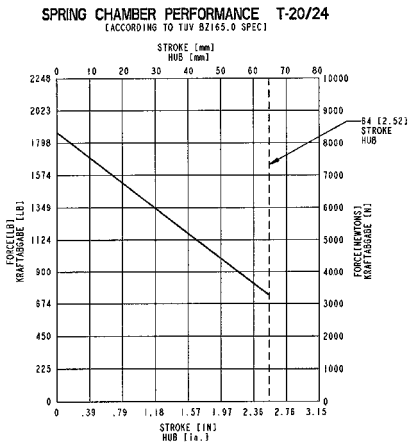

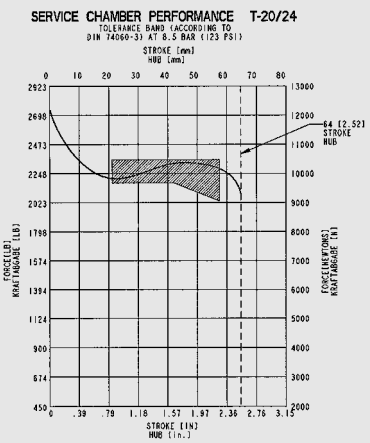

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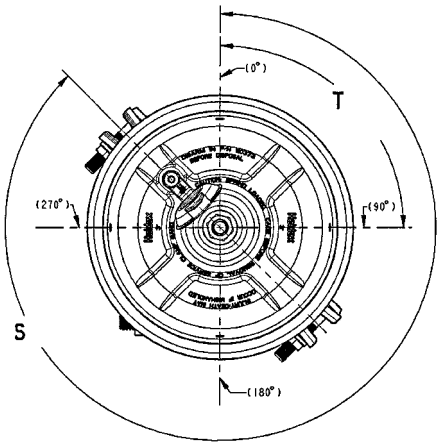
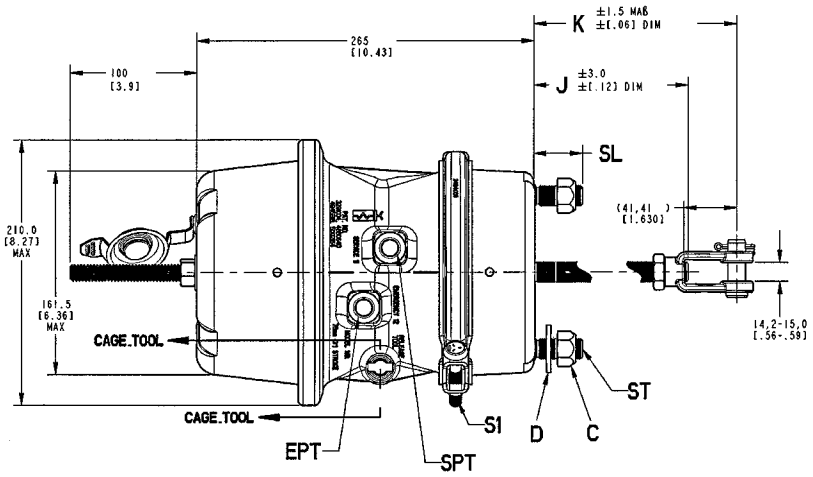
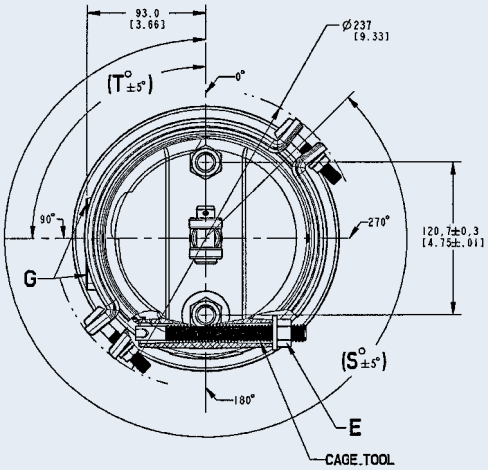
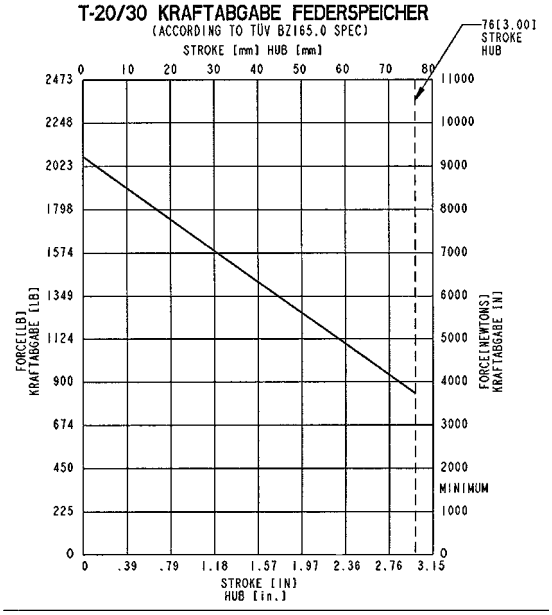


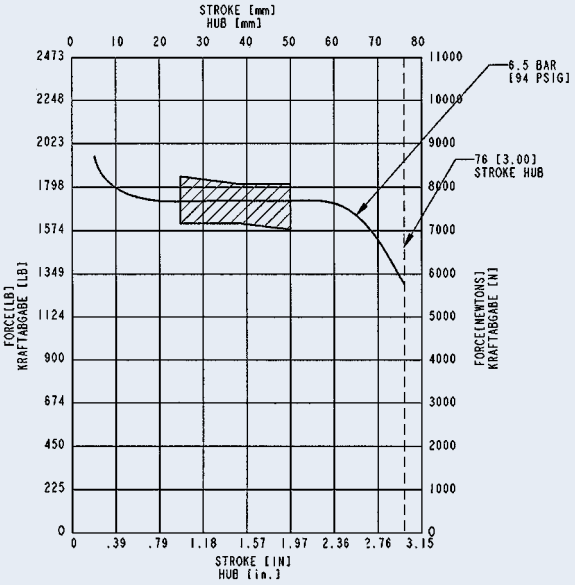




SPRING CHAMBER PERFORMANCE
T-20/30 KRAFTABGABE FEDERSPEICHER
(ACCORDING TO TÜV BZ165.0 SPEC)



SERVICE CHAMBER PERFORMANCE T-20/30
KRAFTABGABE BETRIEBSBREMSE
TOLERANCE BAND (ACCORDING TO DIN 74060-1 AT 6.5 BAR (94 PSI)
TOLERANZBAND NACH DIN 74060-1 BEI 6.5 BAR



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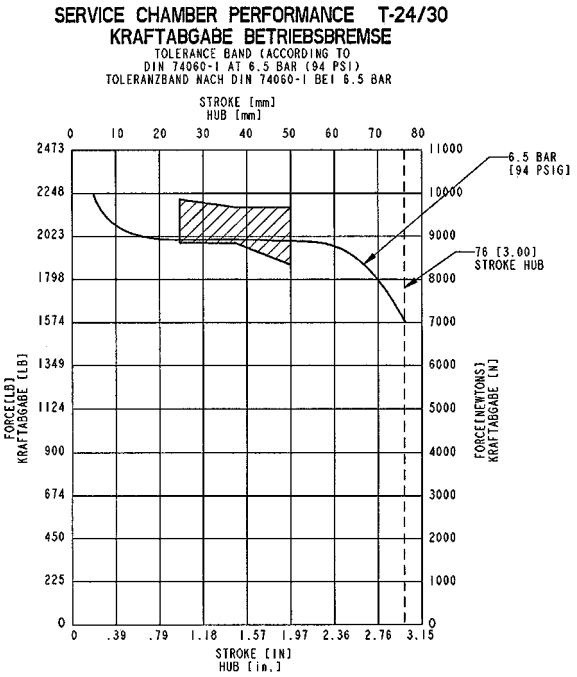
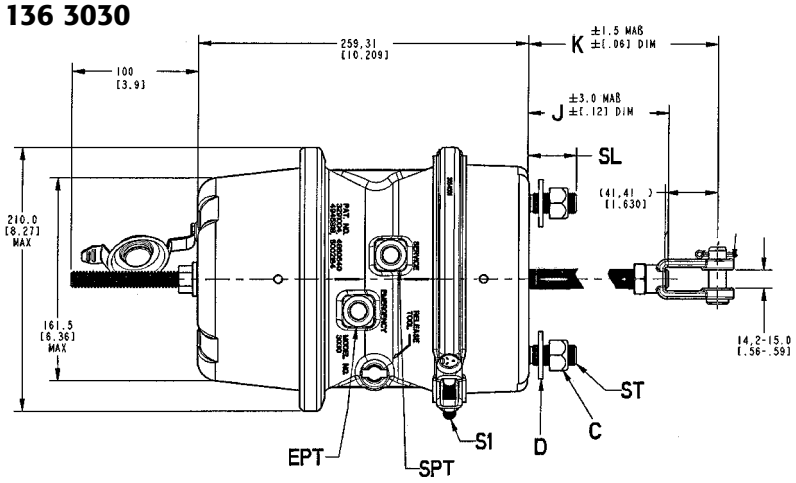
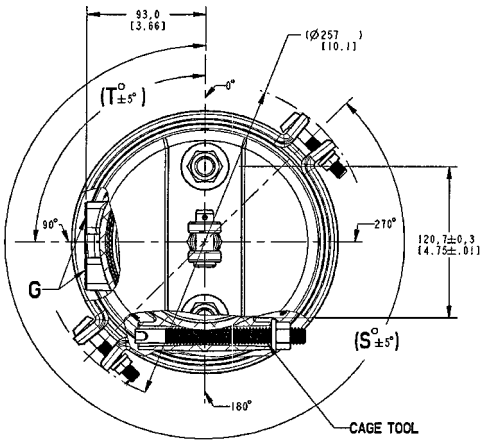
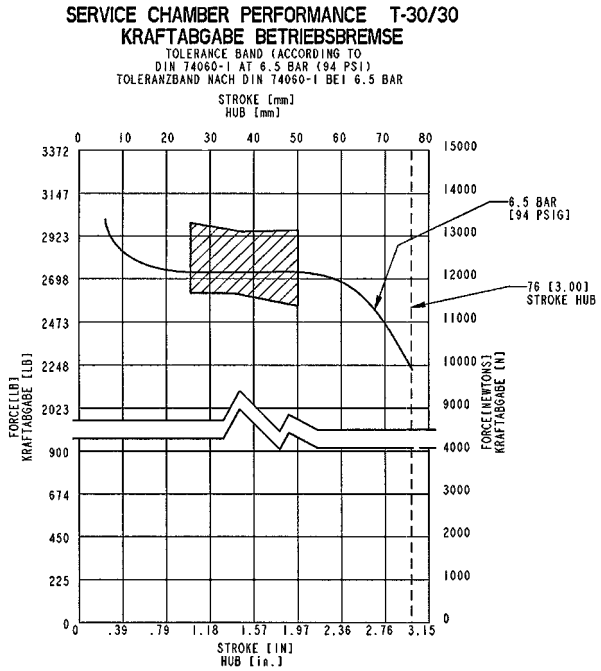


136 3030







Use

The piston cylinder can be fitted in all air brake systems to actuate mechanically-operated wheel brakes.

It can also be used as a control cylinder to actuate other kinds of equipment.

Method of operation

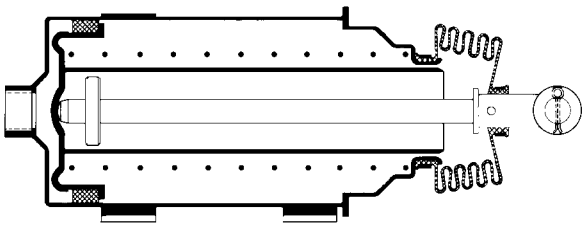
When compressed air is admitted to the piston cylinder, it pushes the piston and push rod out of the cylinder. The push rod, which runs in a loose guide ring in the guide tube, transfers the generated braking force to the brake arm through its yoke. In its released position, the spring pushes the guide tube into its end position. The bellows protects the cylinder interior against dust and splash water. Small flaps in the bellows connect the spaces before the piston with atmosphere.

Installation instructions

The cylinder is mounted on a carrier plate fitted to the axle, or the vehicle frame, with four mounting bolts. Make sure when doing this that the cylinder is tilted towards the yoke in order to prevent the ingress of water. When the brake is correctly adjusted, the piston stroke should be no more than $^1/_3$ to $^1/_2$ of the total stroke. The brake arm and piston rod should form a right angle so as to maximise the efficiency of the force transmission. When determining the length of the brake arm, pay attention to the maximum permissible deflection of the swivelling piston rod. In the released position, the piston rod must rest against the end of the piston.

340 005

340 029



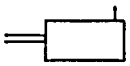
Versions

Order number	Diameter (mm)	Stroke (mm)	Average force at 6 bar	L*	C*	X*	Y*	Z*	Bracket	Tension band	Note
340 005 001	100	135	4200N	300	140	14	14	28	With	With	
340 008 001	125	135	6700N	335	170	14	14	28	With	With	
340 011 001	140	155	8400N	355	170	14	14	-	With	With	A140 DIN74282
340 011 021	140	155	8400N	355	170	14	14	-	With	With	Special version
340 013 001	150	155	9700N	355	157	14	14	-	With	With	
340 029 001	65	105	1800N	253	128	12	12	24	With	-	
340 029 011	65	105	1800N	265	137	14	14	28	With	-	
340 029 031	65	105	1800N	253	128	12	12	24	With	-	Without piston return spring
340 029 041	65	105	1800N	253	128	12	12	24	With	-	Special version

* = See installation drawing

Other versions upon request

Symbol



Testing

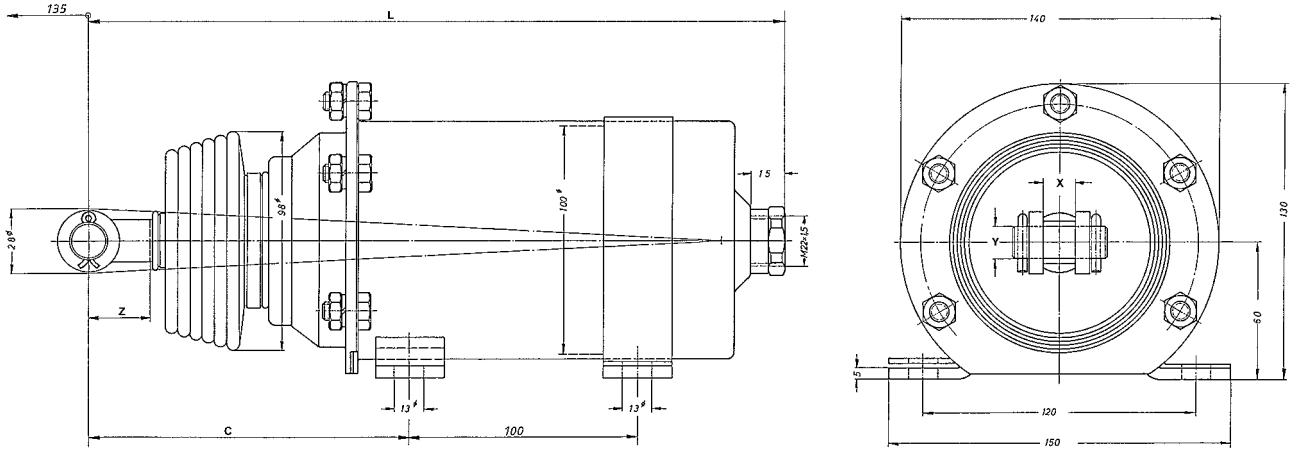
1. Test the bellows.
2. Check the cylinder response pressure: max. 0.5 bar.
3. Check the piston cylinder stroke is correctly set:

   Full braking should be approx. $^1/_3$ to $^1/_2$ of the total stroke, anything over this needs adjusting. Release the brake and check that the cylinder piston returns completely.

Technical data

Service pressure: max. 8 bar.

340 005



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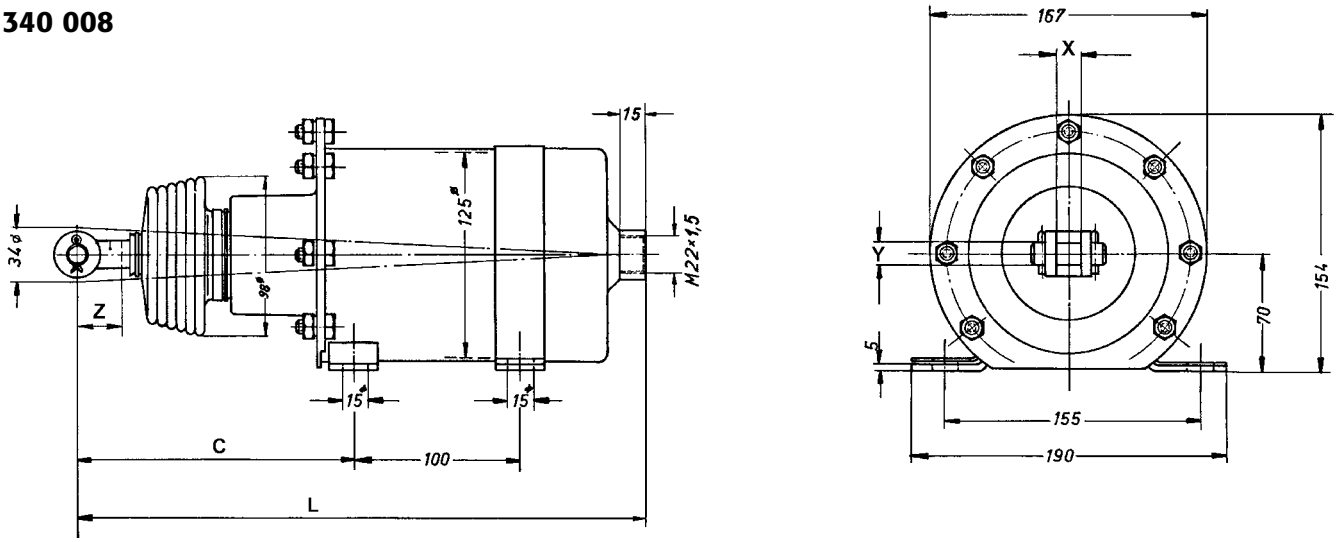
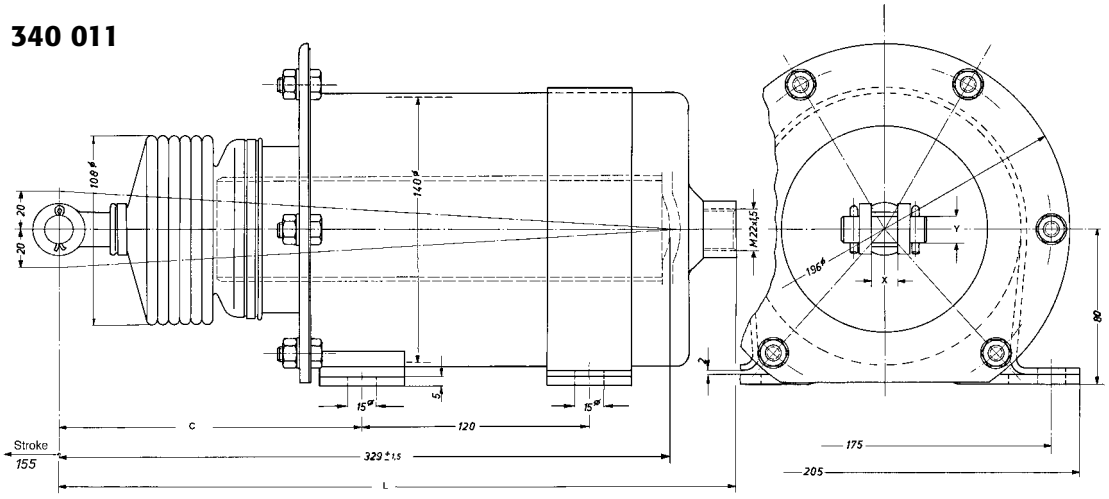


340 011



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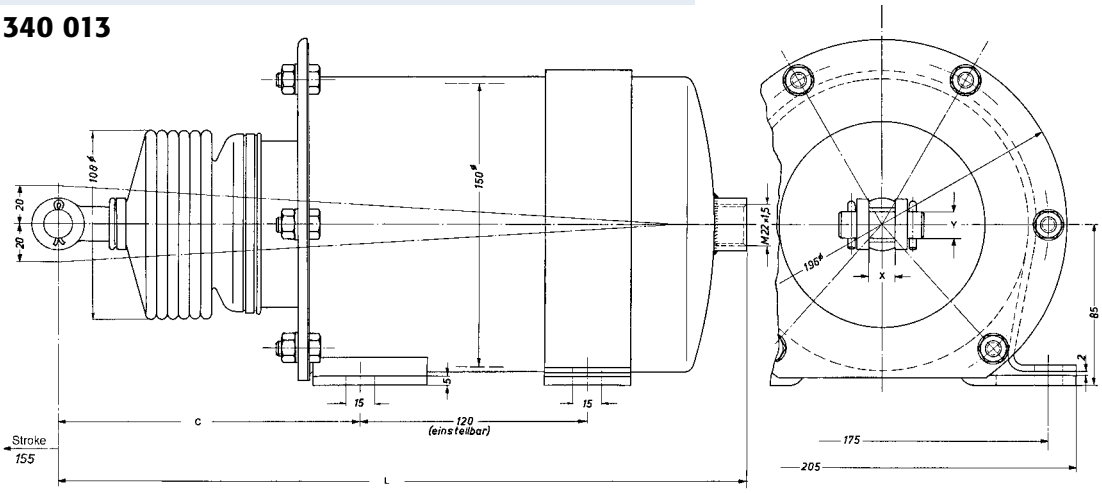
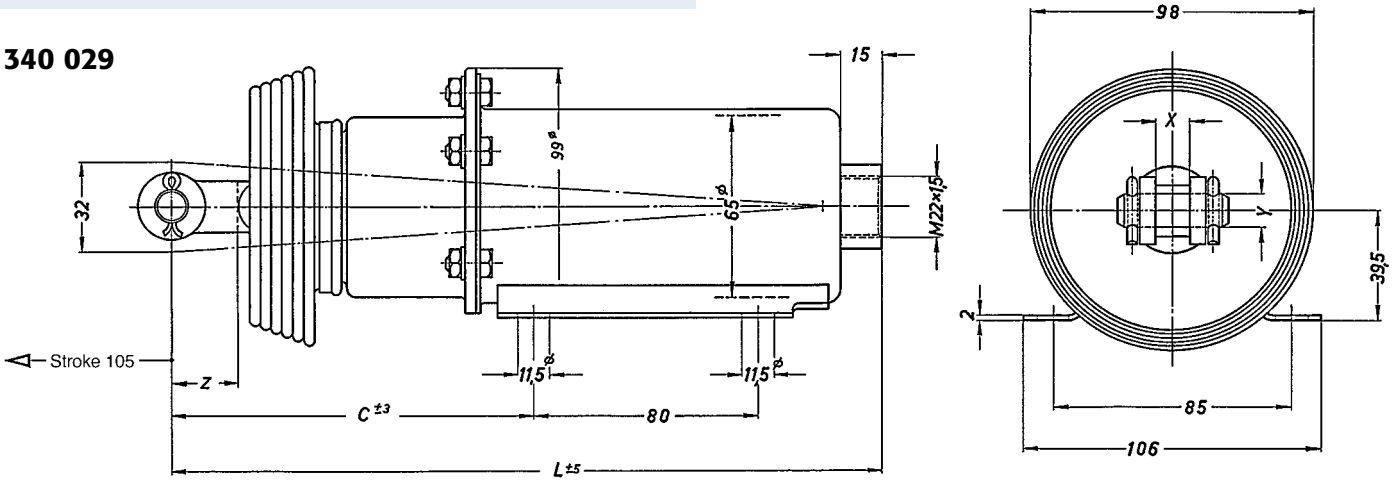


340 029

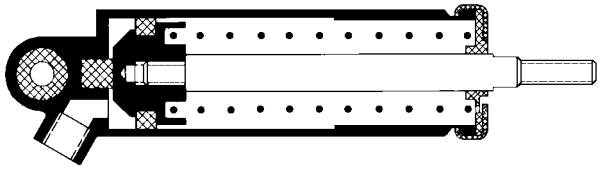


341 004

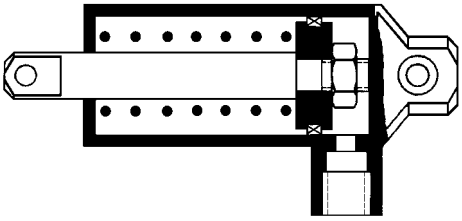
341 011

341 032

341 004 011



341 032 011



Use

Actuator cylinders/control cylinders are used for various switching operations, as blocking, opening or closing cylinders, or to increase the ride height with lift axes.

Method of operation

In the released position, the piston is held in its initial position by spring force.

Compressed air is admitted to the cylinder and the piston moved against the spring force.

When the cylinder is exhausted, the return spring pushes the piston back into its initial position.

Installation instructions

The cylinder must be mounted in the mounting eye with a pin so that it can move to and fro. The piston rod may be connected directly to the actuation linkage, depending on the application.

The compressed air supply must be provided by a flexible connection.

Testing

Check that the piston returns completely when in the released position.

Damaged rubber bellows must be replaced.

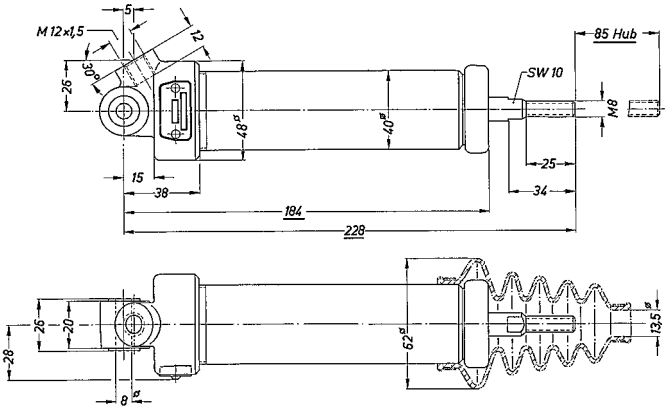
Technical data

Medium:	air
Service pressure:	see the table of versions
Service temperature:	-40°C to +80°C
Port:	M 12 x 1.5

Versions:

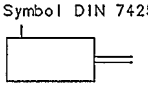
Order No.	Piston Ø mm	Stroke mm	Length mm	Initial force at 6.0 bar (N)	End force at 6.0 bar (N)	Port	Protective bellows	Operating pressure bar
341 004 011	35	85	228	410	220	M12x1.5	with	8
341 011 021	35	50	193	340	240	M12x1.5	without	8
341 032 011	35	35	132	287	284	M12x1.5	with	10

341 004

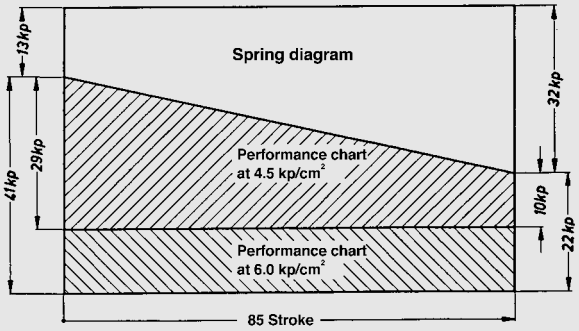


Symbol

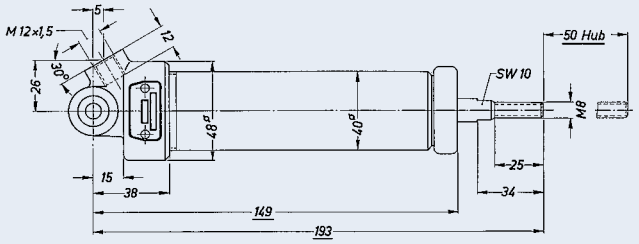
Symbol DIN 74253



341 004



341 011



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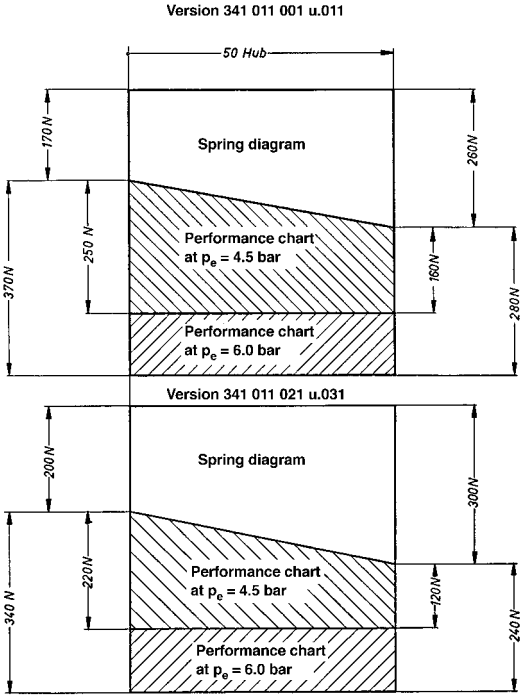

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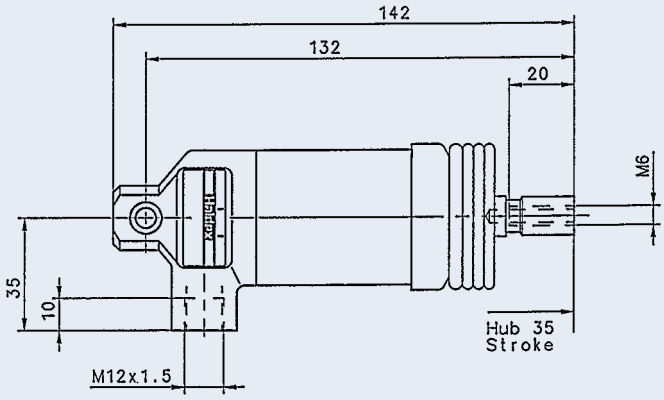

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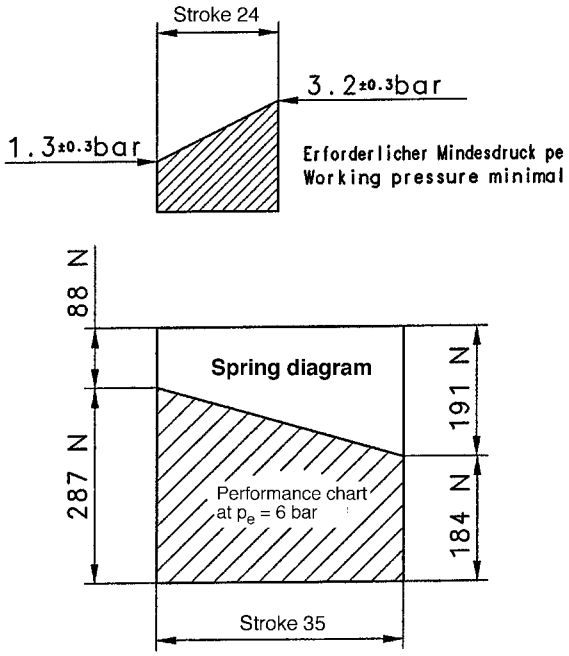
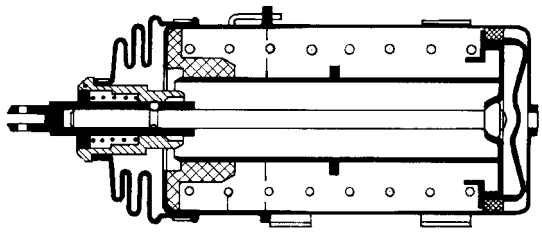


344 008 ...

344 028 ...

KSMR ...



Use

Spring brake actuators are used in trailers preferably in parking brakes and as locking cylinders.

Operation

Released position

Compressed air is applied to the piston via port 1 and moves it against the force of the spring, together with the piston rod. This cancels the braking or locking force.

Release pressure:

The release pressure of a spring brake actuator is the pressure at which the piston or piston rod abuts against the inner stop, i.e. the piston has reached its maximum stroke.

Braking/locking setting:

When the air is dumped through port 1, the piston and piston rod are pressed into their end position by the spring force. The spring force arising at the respective piston position, multiplied by the efficiency of a piston cylinder, gives the tensile or compressive force at the yoke.

Load-displacement curve

The force at the yoke of a specified spring brake actuator can be taken from the applicable load-displacement curve for it.

Installation instructions

The actuator is fastened with nuts to the mounting studs on the housing. Make sure when doing this that the cylinder is tilted towards the yoke in order to prevent the ingress of water. After half a stroke, the brake arm and piston rod should form a right angle so as to maximise the efficiency of the force transmission. When determining the length of the brake arm, pay attention to the maximum permissible deflection of the swivelling piston rod.

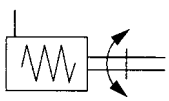
Testing

1. Test the bellows.
2. Check the cylinder release pressure (see "Versions").
3. Check the cylinder stroke is correctly set:

Technical data

Service pressure: max. 8.5 bar.

Symbol



Versions

Order number	Diameter (mm)	Stroke (mm)	Average force at zero stroke	Average force at max. stroke	A*	B*	C*	G*	Release pressure (bar)	Effect	Bellows	Stroke volume (Litre)
344 008 201	100	80	2000N	3000N	366	204	38	M 16 x 1.5	3.6	Pulling	With	0.63
344 008 221	100	80	2000N	3000N	484	322	-	M 12	3.6	Pulling	With	0.63
344 008 231	100	80	2750N	4100N	484	322	-	M 12	5.3	Pulling	With	0.63
344 008 251	100	80	2750N	4100N	366	204	38	M 16 x 1.5	5.3	Pulling	With	0.63
344 008 261	100	80	2500N	3300N	366	204	38	M 16 x 1.5	4.4	Pulling	With	0.63
344 008 361	100	80	880N	1270N	366	204	38	M 16 x 1.5	1.9	Pulling	With	0.63
344 028 001	137	57	4700N	7200N	-	-	-	-	5.6	Pushing	Without	0.9
344 028 011	137	57	2300N	3400N	-	-	-	-	2.7	Pushing	Without	0.9
344 028 021	137	57	4700N	7200N	-	-	-	-	5.6	Pushing	Without	0.9
344 028 031	137	57	2300N	3400N	-	-	-	-	2.7	Pushing	Without	0.9

* = See installation drawing

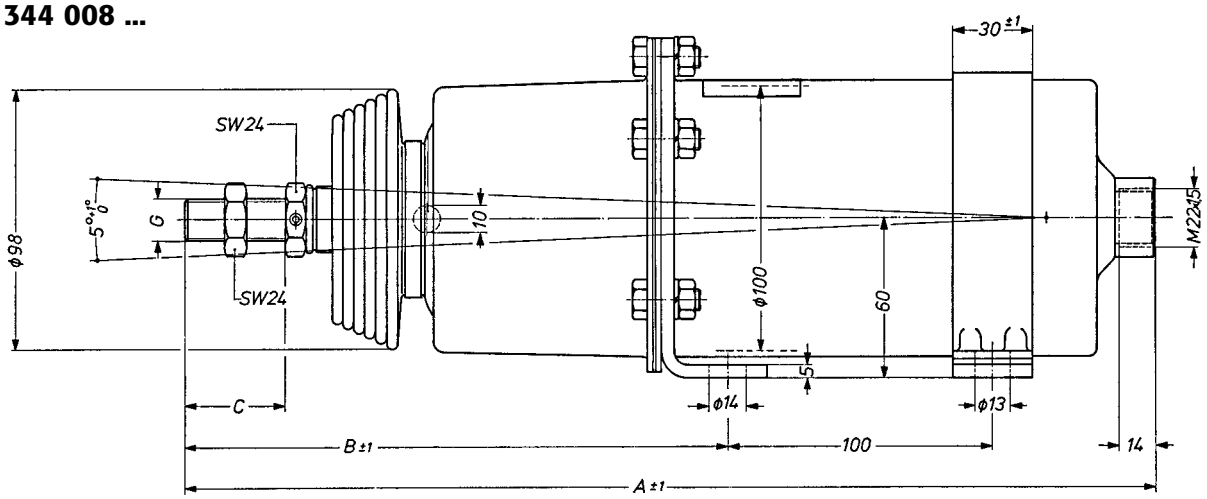
Other versions available upon request

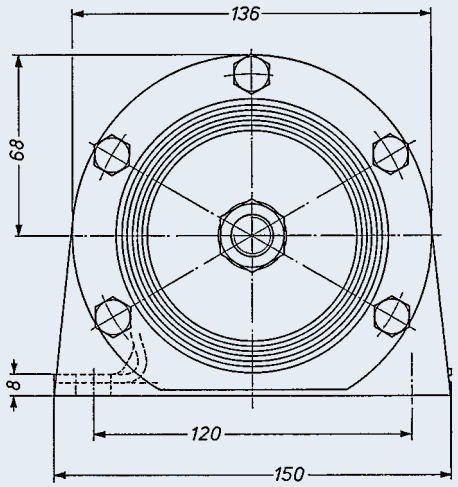
Order number	Diameter (mm)	Stroke (mm)	Average force at zero stroke	Average force at max. stroke	E*	J*	K*	V*	Release pressure (bar)	Effect	Bellows	Fork head	Stroke volume (Litre)
KSMR3PH50-800NN	165	75	2669	6005	montiert	203	-	95.5	3.7	Pushing	Without	Without	1.6
KSMR3PH75-800NN	165	75	4226	9296	montiert	203	-	95.5	6.0	Pushing	Without	Without	1.6
KSMR3PT60-800NN	165	75	5115	7784	montiert	203	-	95.5	4.8	Pulling	Without	Without	1.6

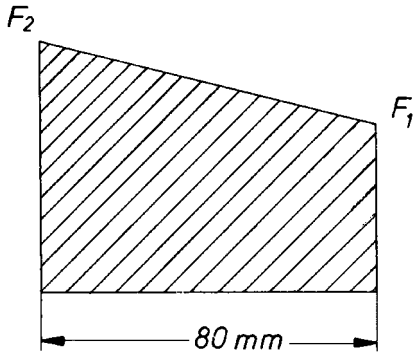
* = See installation drawing

Other versions available upon request

344 008 ...







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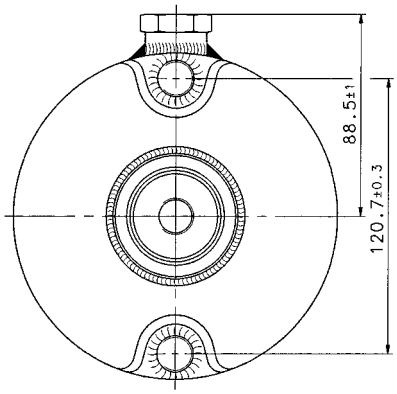
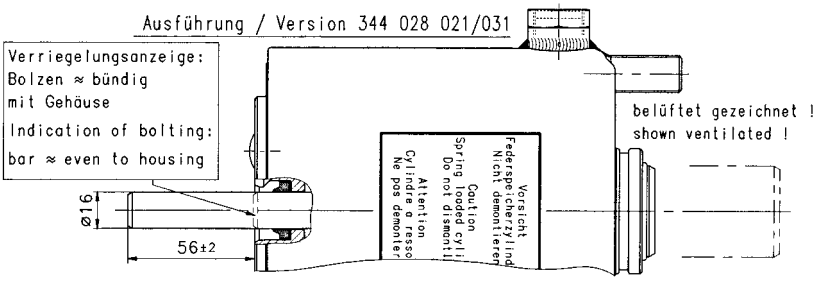
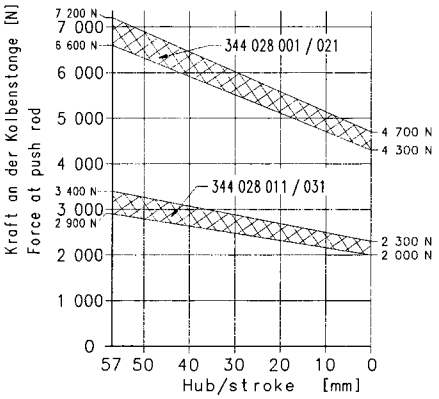
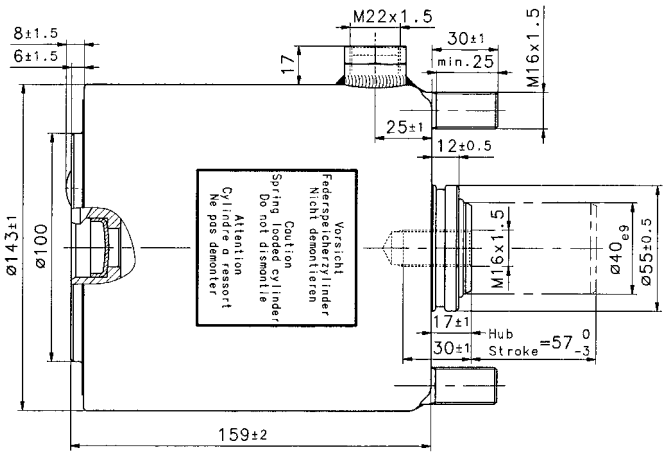
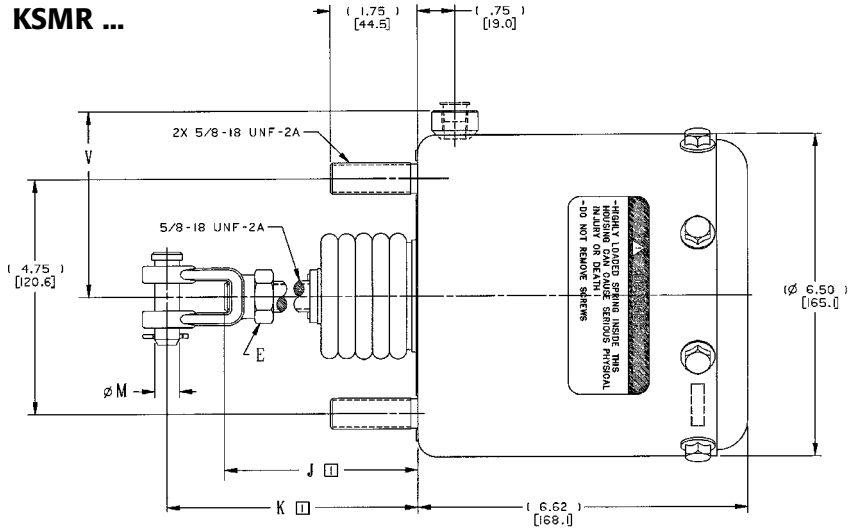

88.5±1
120.7±0.3

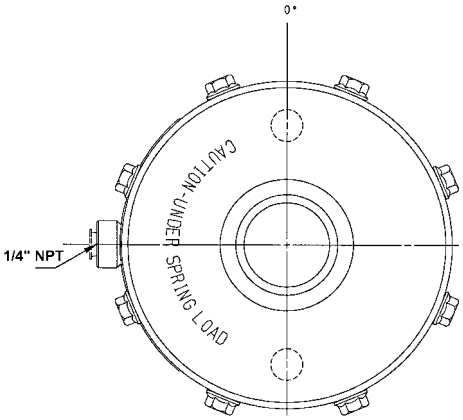

Ausführung / Version 344 028 021/031
Verriegelungsanzeige:
Bolzen ≈ bündig
mit Gehäuse
Indication of bolting:
bar ≈ even to housing
belüftet gezeichnet !
shown ventilated !
Ø16
56±2
Vorsicht
Federspeicherzylind
Nicht demontieren
Caution
Spring loaded cyli
Do not dismantl
Attention
Cylindre a ressc
Ne pas demonter

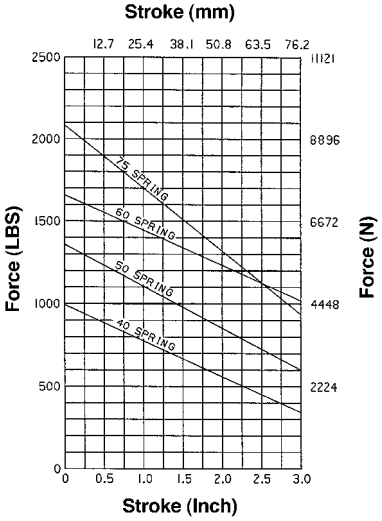

Kraft an der Kolbenstange [N]
Force at push rod
7 200 N
7 000
6 600 N
6 000
5 000
4 000
3 400 N
3 000
2 900 N
2 000
1 000
0
344 028 001 / 021
4 700 N
4 300 N
344 028 011 / 031
2 300 N
2 000 N
57 50 40 30 20 10 0
Hub/stroke [mm]


M22x1.5
8±1.5
6±1.5
17
30±1
min.25
M16x1.5
25±1
12±0.5
Ø143±1
Ø100
Vorsicht
Federspeicherzylinder
Nicht demontieren
Caution
Spring loaded cylinder
Do not dismantle
Attention
Cylindre a ressort
Ne pas demonter
M16x1.5
Ø40e9
Ø55±0.5
17±1
30±1
Hub
Stroke
=57 0 -3
159±2

KSMR ...


(1.75)
[44.5]
(.75)
[19.0]
2X 5/8-18 UNF-2A
V
5/8-18 UNF-2A
(4.75)
[120.6]
E
øM
J
K
(6.62)
[168.1]
(Ø 6.50)
[165.1]
HIGHLY LOADED SPRING INSIDE THIS HOUSING CAN CAUSE SERIOUS PHYSICAL INJURY OR DEATH
DO NOT REMOVE SCREWS


0°
1/4" NPT
CAUTION-UNDER SPRING LOAD


Stroke (mm)
12.7 25.4 38.1 50.8 63.5 76.2
2500
2000
1500
1000
500
0
11121
8896
6672
4448
2224
Force (LBS)
Force (N)
75 SPRING
60 SPRING
50 SPRING
40 SPRING
0 0.5 1.0 1.5 2.0 2.5 3.0
Stroke (Inch)

1. Air suspension in general

The number of vehicles with air suspension will increase in the next few years. According to conservative estimates, some 85% of trucks, 100% of heavy buses and 60% of fifth-wheel trailers and 95% of semi-trailers are equipped with air suspension. The number of vehicles with air suspension will continue to increase in the next few years, because this system has considerable advantages. We will look at the general theoretical principles of air suspension, design and function of the components and additional control possibilities, e.g. swap-body systems, lift axle controls and special systems to increase ease of operation and safety.

2. Advantages of air suspension

1. A constant ground clearance between the road surface and the vehicle body gives an unchanging height for boarding and loading.
2. The headlamp settings remain constant, irrespective of the load condition.
3. Higher riding comfort. This gives smoother transport of the goods being transported, no jumping with an empty trailer, and less wear on the road surface.
4. Stable driving characteristics due to firm contact between tyres and road surface.
5. Stable cornering.
6. Accurate control of load-dependent control (LSV load sensing, EPV electronic proportioning valve, EBS).
7. Buses can be lowered on one side (kneeling).
8. Swap-body systems possible for adapting to loading platforms (WL, WLS)
9. Electronic control possible, e.g. memory functions, different ride heights can be stored.
10. Lift axle control is possible.
11. Increased ease of use. Quick hitching and unhitching of articulated trailers.
12. Less mechanical wear on components.
13. Easy to repair and maintain, leading to cost savings.

3. Theoretical principles

Definition of air suspension:

A suspension system is regarded as air suspension if at least 75% of the spring action is provided by pneumatic devices.

Task

The task of a vehicle suspension is to damp the shocks caused during driving by bumps in the road surface when transmitting them to the vehicle body. This task can be conveniently fulfilled by air suspension. All kinds of air springs are employed as the load-bearing springs for the body load in motor vehicles and trailers. A distinction is made between primary and secondary suspension. The primary suspension carries the weight of the vehicle body permanently, while the secondary suspension only comes into effect in the event of extremely hard road shocks or failure of the primary suspension. The primary and secondary suspension must be well tuned to each other, with priority being given to ride comfort in passenger vehicles and to handling (lifting and lowering the vehicle) in goods vehicles. Secondary suspension usually consists of rubber, hollow rubber or plastic springs. Since air suspension possesses almost no intrinsic damping, dampers with higher forces in the tension and compression stages than those for leaf-sprung axles are required.

Furthermore, the air spring bellows can only absorb lateral forces to a limited extent. Consequently, the sprung wheels or axles must be held by links, arms, anti-roll bars and the like.

Spring rates - general

A spring characteristic curve can be linear, progressive or degressive, in which latter case an instable spring would result. Fig. 1 shows the static and dynamic working range of a spring together with its work capacity, which is shown as the area bounded by the spring characteristic curve, the limits (3) and (4), and the X-axis. The dynamic working range overlaps the static, depending on the available dynamic spring travel (paths 1 - 3 and 2- 4).

Important: The total spring deflection therefore consist of the static spring travel, which occurs when the vehicle is loaded while at rest, and the dynamic spring travel, which is the same as the bottoming travel. The smaller the spring rate and the larger the (vehicle) mass, the smaller the (body) acceleration and the better the ride comfort is.

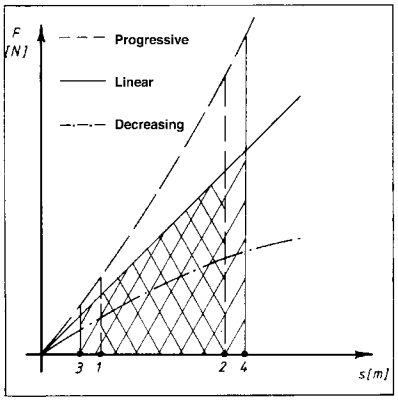


Figure 1: Spring characteristic curve-main diagram

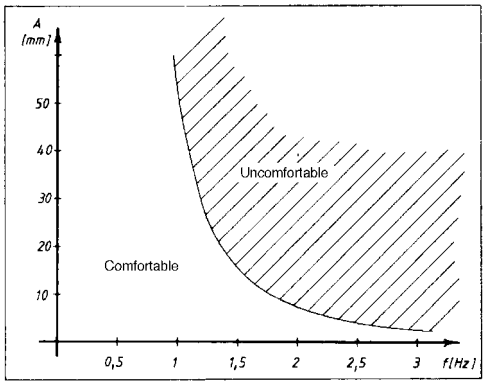


Figure 2: Comfort range in accordance with "JANEWAY"

Ride comfort (Fig. 2)

The following conclusions can now be drawn:

- to obtain a high degree of ride comfort at all times, the ratio of axle spring constant to body weight must remain the same.
- The natural frequency of the body must be as small as possible if good ride comfort is to be achieved.
- The natural frequency can be influenced by both the spring rate and the body mass.

The natural frequency has a very great effect on ride comfort. Since ride comfort is very difficult to represent objectively, subjective perceptions must be employed to describe the comfort mathematically or graphically. It can be seen clearly that the zone experienced by people as comfortable not only presupposes a relatively very small natural frequency, but also depends on the vibration amplitude.

- If the natural frequency is to be kept as constant as possible under varying loads, the spring rate must be changed in such a way that the ratio of spring rate to weight remains constant.

The increasing importance of lightweight construction and the associated large difference in weight between an empty and a loaded vehicle make the need for a controllable spring ever more urgent.

Compressed air generation and storage

For safety reasons, the compressed air for the braking system must be kept separate and isolated from that of the air suspension. Circuit 1 and 2 (connections 21 and 22 on the quadruple-circuit protection valve) is always allocated to the SB.

On air suspension systems for trailers or semi-trailers, the pressure level corresponds to that of the braking system, since the air suspension system is supplied from the braking system supply line.

Various systems can be differentiated in tractor units:

- pressure in the air suspension system = pressure in the braking system (corresponds to trailer/semi-trailer).
- pressure in the air suspension system is greater or smaller than the pressure in the braking system (trucks and buses).

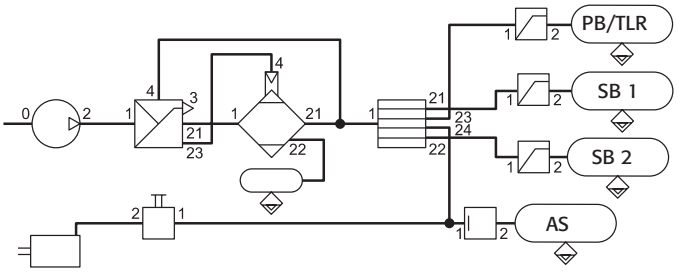
In the first instance, the compressed air for the air suspension its taken from the ancillary consumer circuit (connection 23 or 24 on the quadruple-circuit protection valve) after the quadruple-circuit protection valve, in which case the quadruple-circuit protection valve must be designed to give priority to filling brake circuits 21 and 22 (a legal requirements as from 1st October 1994). In most instances, the air suspension system is provided with a higher pressure than the braking system. Here, the compressed air is taken between the governor valve and the quadruple-circuit protection valve, and fed to the air suspension air tank through a pressure protection valve with limited backflow (or no backflow at all) set to a higher pressure than the quadruple-circuit protection valve. This kind of design has the advantage that smaller air spring support bellows and air tanks can be installed. It also allows shorter filling and exhausting times, since the pressure difference between the storage tank and the air spring support bellows is greater.

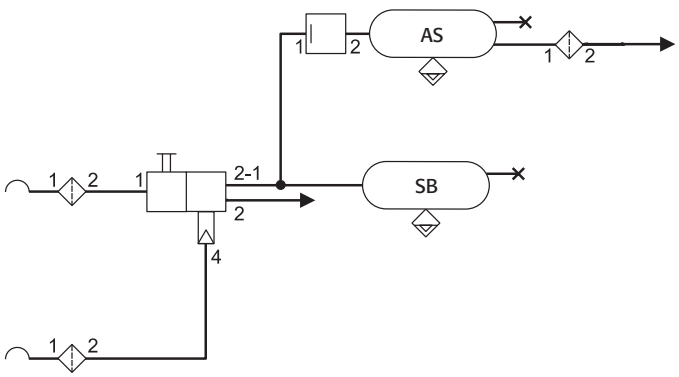
On trailer vehicles, the supply for the air suspension is taken from the service brake supply. Both circuits must be isolated from each other by a pressure protection valve (with or without limited backflow). The opening pressure is about 6 bar, since the isolating pressure is laid down by law as at least 5.2 bar.

LSV load sensing/EBS control

One major advantage of air suspension is that the bellows pressure, which depends on the load condition at any given instant, can be used to control the automatic load-dependent load sensing valve/EBS. A function of this kind shows when using a twin-circuit automatically-controlled load sensing valve, the intact bellows still ensures load-dependent control of the braking pressure, even in the even of a line breakage.

Depending on the design, an adequate braking effect can still be obtained in vehicles with full or partial air suspension in the event of faults in the air suspension system.





PB = Park brake
TLR = Trailer
SB = Service brake
AS = Air suspension system

Use

The shut-off cock is used for filling and exhausting compressed air lines, e.g. lift axle valves or combined chambers.

Pay attention to the flow direction, which is marked with an arrow.

Method of operation

In the shut position, the handle is at right-angles to the flow direction (transverse to the line) and the passage is blocked. If the handle is turn $^1/_4$ of a turn (parallel to the line), the passage is clear and compressed air can flow through it.

Installation instructions

There must be enough room to operate the handle manually.

Service

Grease the shut-off cock with a mineral oil grease if it becomes stiff.

Technical data

Medium: air

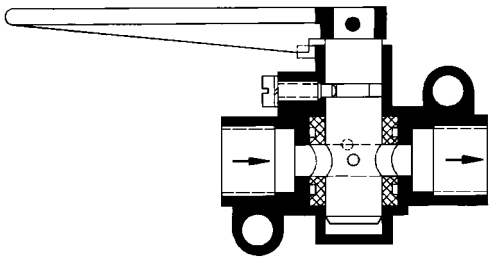
Service pressure:	max. 10 bar (at 334 077 ... max. 8 bar)
Service temperature:	-40°C to +80°C

Versions:

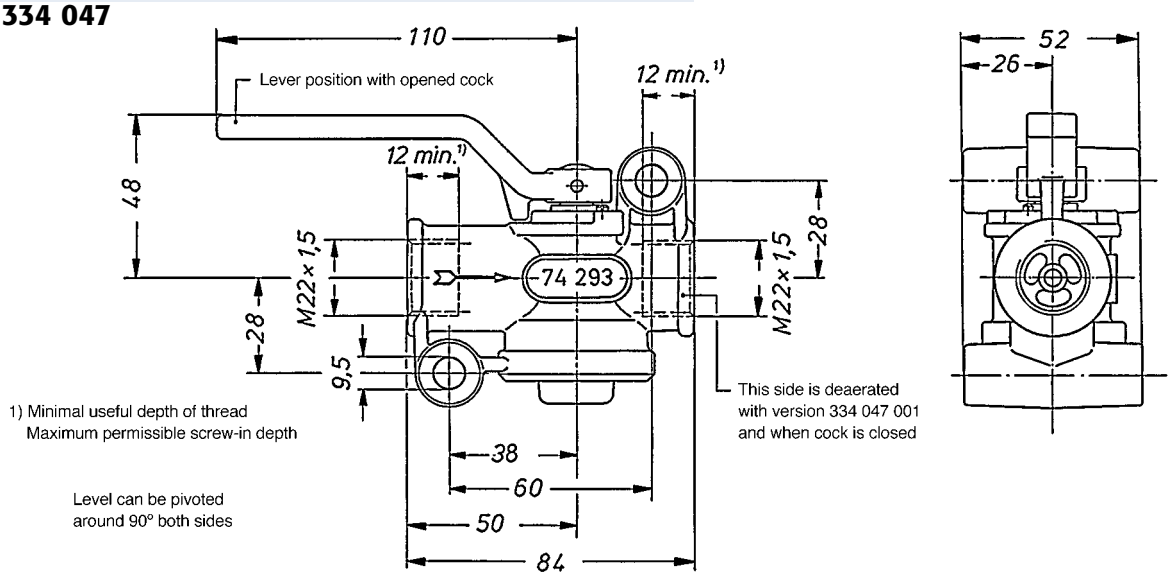
Part No	Port	Exhaust	Handle
334 047 001	M 22 x 1.5	with	Steel
334 077 001	M 22 x 1.5	with	Aluminium

334 047 001

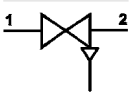
334 077 001



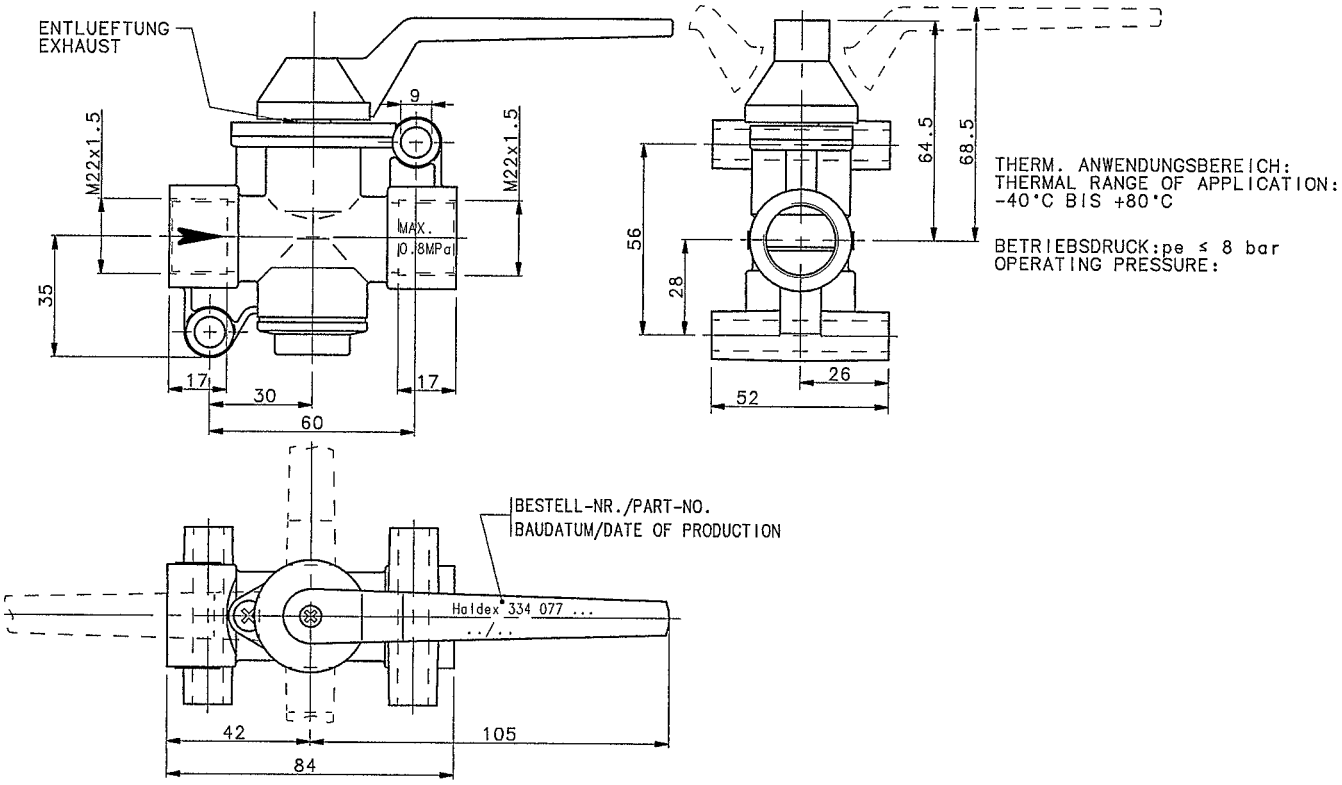
334 047



Symbol



334 077


ENTLUEFTUNG
EXHAUST
9
M22x1.5
M22x1.5
MAX.
(0.8MPa)
35
17
30
60
17
64.5
68.5
56
28
26
52
THERM. ANWENDUNGSBEREICH:
THERMAL RANGE OF APPLICATION:
-40°C BIS +80°C
BETRIEBSDRUCK:pe ≤ 8 bar
OPERATING PRESSURE:
BESTELL-NR./PART-NO.
BAUDATUM/DATE OF PRODUCTION
Haldex 334 077 ...
../..
42
105
84

Introduction

The manual Raise/Lower valve with dead man's function, is used for raising and lowering the deck height of commercial vehicles and trailers. When electrically connected to the ABS via a solenoid valve, the system provides automatic reset to ride.

Operation

Position "drive"

When the lever is in the central position it may be pulled out and locked to prevent unintentional operation. Port 11 is linked with Port 21 and Port 12 is linked with Port 22 providing a direct connection between the height control valve and the air bellows.

Position "Stop"

When the lever is in the central position and pushed in, Ports 11 and 12 are isolated from Ports 21 and 22.

Position "raising"

When the lever is operated from the 'stop' position in an anticlockwise direction approx. 45° Ports 21, 22 are linked with Port 1 and the air bellows are inflated.

On release, the lever automatically returns to the central 'stop' position and isolates Ports 21, 22 from Port 1 preventing further bellow inflation.

(Note that the dead man function is not available on 338 053/055...).

Position "lowering"

When the levers is operated approx 45° in a clockwise direction from the "Stop" position, Ports 21, 22 are linked with Port 3 and the air bellows are deflated.

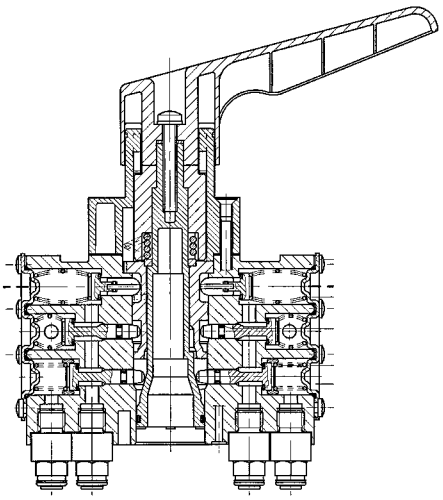
On release the lever automatically returns to the central position and isolates Ports 21, 22 from Port 3 preventing further deflation of the bellows.

(Note that the dead man function is not available on 338 053/055...).

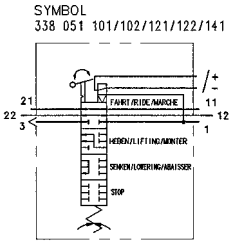
Reset from "Stop" position to "Drive" position

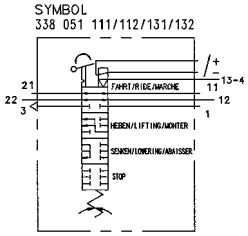
When the lever is in the central position it may be locked by pulling it out so that unintentional operation is prevented.

Only 338 051/054...: if the solenoid valve on the underside of the unit (UB= 24 VDC +2.5 - 3.5) of the Haldex-ABS is controlled with a pulse (when vehicle speed>15km/h) then reset of the lever from the 'stop' position to the 'drive' position is automatic.

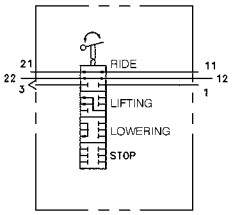


338 051

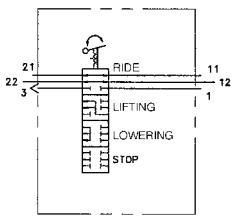




338 052



338 053



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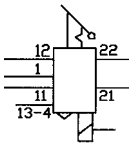
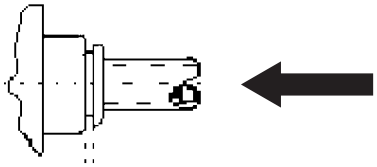
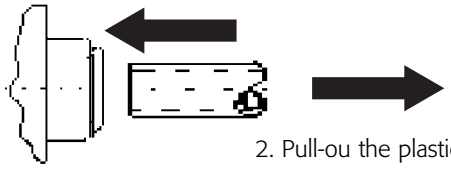


Assembling of the plastic tube



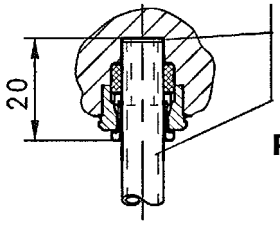
Disassembling of the plastic tube

1. Push-in the clamp-ring

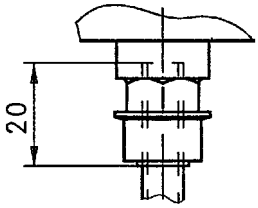


2. Pull-ou the plastic tube

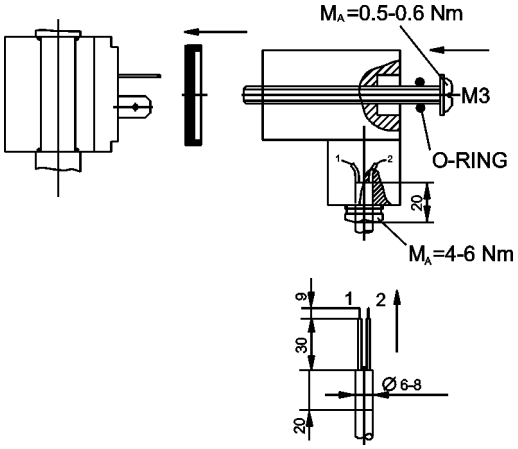
Port 13-4



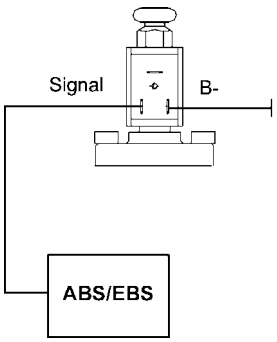
Ports 1, 11, 12, 21, 22



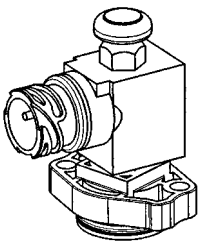
Socket



Wiring socket



Bayonet DIN 72585



Assembly Guidelines

The assembly is mounted by a minimum of 2xM8 bolts via holes provided on the housing** (see fig). The installation location should be selected, clear of direct spray or splash and with some protection from high pressure cleaners.

The operating lever should be easily accessible. Care should be taken to ensure the lever does not protrude from the edge of the vehicle when pulled out. If required protection against unintentional operation should be provided by the vehicle manufactures. Pneumatic connection should be in accordance with assembly diagrams.

The exhaust port "3" should be protected against contamination by fitting a silencer 059 0460 09, or by means of an elbow and a short length of tube of minimum inside diameter 9mm (e.g. Tube 12x1.5).

For 338 051/054...: When COLAS is used in conjunction with a HEIGHT LIMITATION valve, a throttle is provided which is fitted in the "T" piece and is required in order to bypass the height limiting device (see fig).

If no height limitation is used, the throttle is not required.

Plastic tubing in accordance with DIN 74324-O 8x1or 10X1 should be used for pneumatic lines. When assembling pneumatic lines care should be taken to ensure that the tubes are cut square and free from burrs.

Before inserting the tubes in the push in connections, insert must be fitted in the tube ends in accordance with Haldex number 032 0490 09 (8mm) or 032 0491 09 (10 mm).

Tube penetration should be at least 23mm deep in the push in fittings*.

Tubes should exit the valve straight (Min 100 mm) before securing together. So that the permissible height is not exceeded when raising the deck height, it is advisable to use the equipment in conjunction with a height limitation devise (e.g. Haldex height control valve with height limitation). All open plug and socket connections and exhausts should be protected against contamination during painting. After painting, the protective devices should be removed again. Reference plate 028 0410 09 should be fixed in the vicinity of the COLAS valve.

338 051/054...: An electrical connection to the solenoid valve is only permissible by means of a Haldex ABS ECU which delivers a signal 'reset-to-ride height'. Haldex does not accept any liability for other types of control**.

* After removing the protective cap, the plastic tube can be removed again by pressing down the clamping ring with the flat face of an open ended spanner. (e.g. 8mm spanner, 8mm tube when changing).

** For other controls please note: Fixing with 4 bolts.

Port Designation

1	= Supply
11, 12	= from height control valve
21, 22	= to the air bellows
3	= Exhaust (at least DN 9)

Ports 1,11,12,21 and 22 accepts o 8x1
Nylon pipe DIN 74324
338 054 /056 ...: Nylon pipe 10 mm

Technical Data

Operating pressure:	p_e max.8.5 bar
Operating temperature:	- 40° C to + 80° C
Solenoid valve (only 338 051/054...)	
Permissible duty:	10 seconds
Voltage:	UB = 24 VDC + 2.5 - 3.5
Current/power:	Io = 250 mA/Po=6W
Type of protection:	DIN 40050-Ip 65 A

Accessories

Insert (8mm) 032 0490 09 5x
Insert (10 mm) 032 0491 09 5X
Option: Silencer 059 0460 09 1x
Kit for throttle (8mm) 003 6206 09 1x
Double nipple (10 mm) 032 0716 09 1X
T-piece (10 mm) 032 0715 09 1X

Maintenance

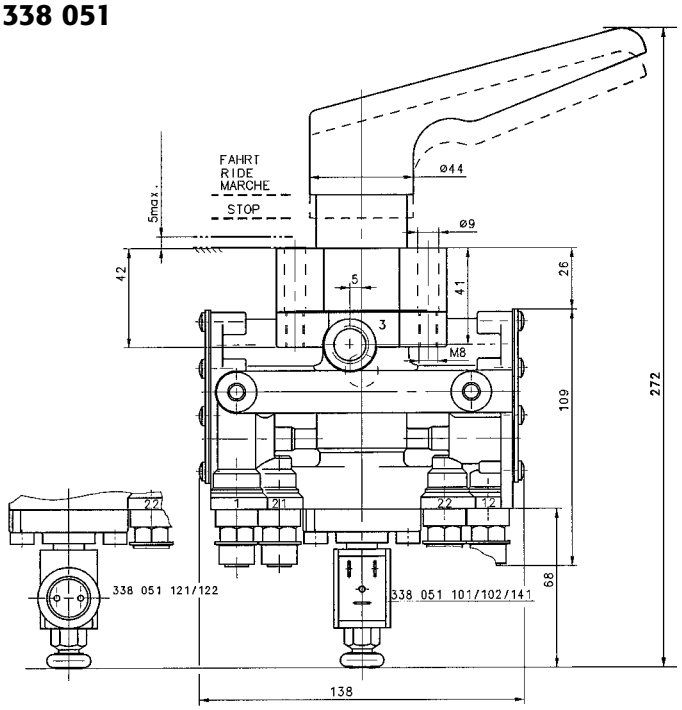
COLAS is effectively maintenance free and only needs to be changed if the functionality is compromised or leakage is detected during normal servicing.

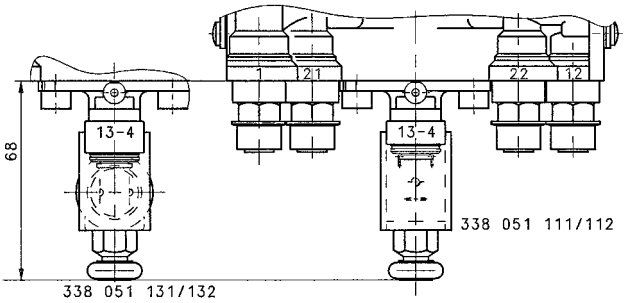
NOTE: With high pressure cleaners a safe distance of a least 50 cm from the COLAS should be observed.

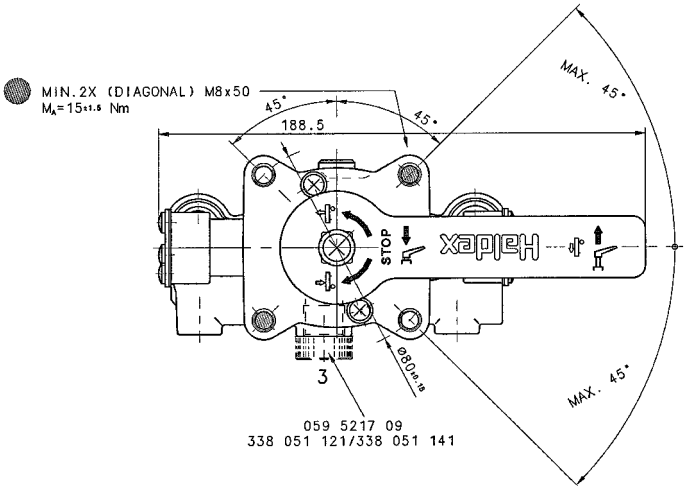
Testing

- check function and leak-tightness of equipment
- correct assembly position
- instruction label in position

338 051



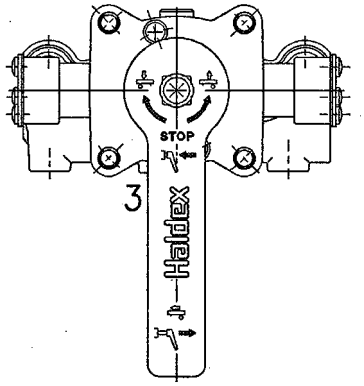




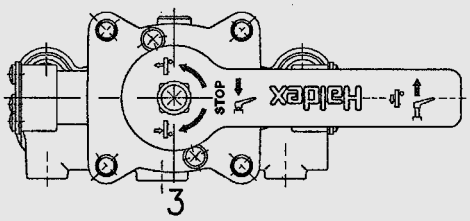
Versions

				Solenoid			Nominal diameter	
Part Number	Port 13-4	Mounting position	Dead man handle	Socket	Bayonet	Exhaust protection	Ports 1, 11, 12, 21, 22	Port 3
338 051 101	no	1	with	yes	-	no	DN 6	DN 9
338 051 102	no	2	with	yes	-	no	DN 6	DN 9
338 051 111	yes	1	with	yes	-	no	DN 6	DN 9
338 051 112	yes	2	with	yes	-	no	DN 6	DN 9
338 051 121	no	1	with	-	yes	059 5217 09	DN 6	DN 9
338 051 122	no	2	with	-	yes	no	DN 6	DN 9
338 051 131	yes	1	with	-	yes	no	DN 6	DN 9
338 051 132	yes	2	with	-	yes	no	DN 6	DN 9
338 051 141	no	1	with	yes	-	059 5217 09	DN 6	DN 9
338 052 101	no	1	with	w/o	w/o	no	DN 6	DN 10
338 052 102	no	2	with	w/o	w/o	no	DN 6	DN 10
338 053 101	no	1	w/o	w/o	w/o	no	DN 6	DN 10
338 053 102	no	2	w/o	w/o	w/o	no	DN 6	DN 10
338 053 111	no	1	w/o	w/o	w/o	059 5217 09	DN 6	DN 10

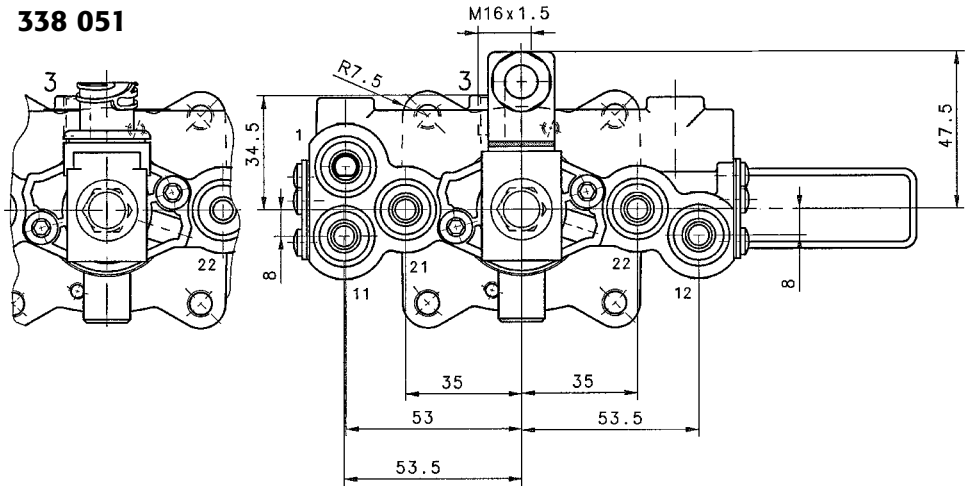
Mounting position 1



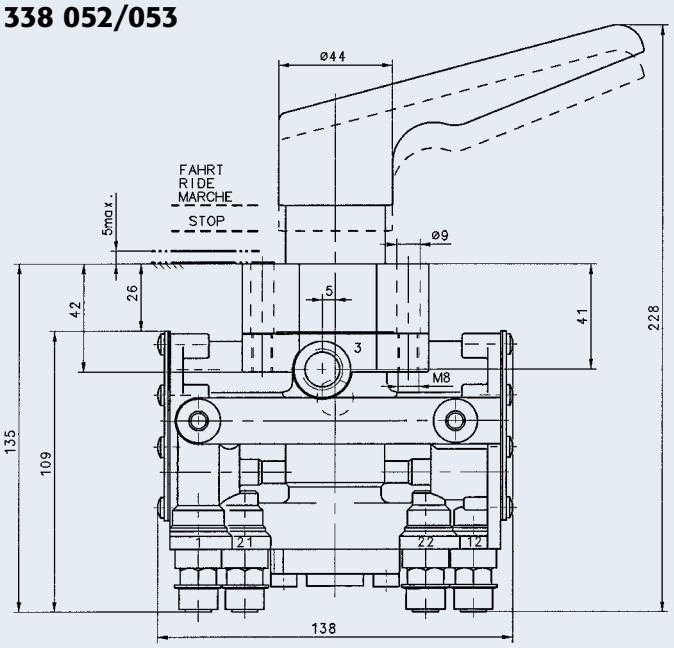
Mounting position 2

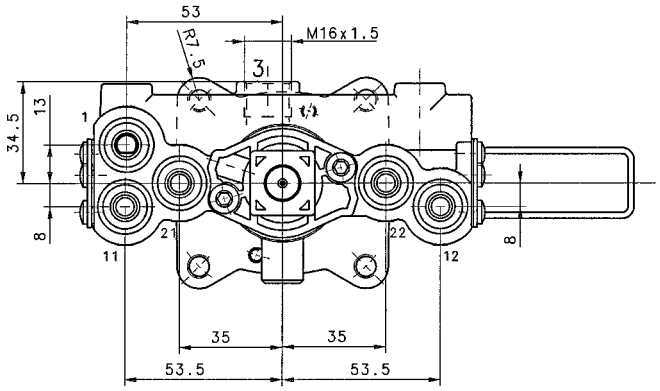


338 051



338 052/053





Operating instructions

The lever position "raise" or "lower" can only be operated from the "STOP" position since the lever is locked in the "DRIVE" position. If an attempt is made to turn the lever to the "DRIVE" position with more than 35 Nm, this will break the lever. The "STOP" position is reached by pushing the lever out of the "DRIVE" position.

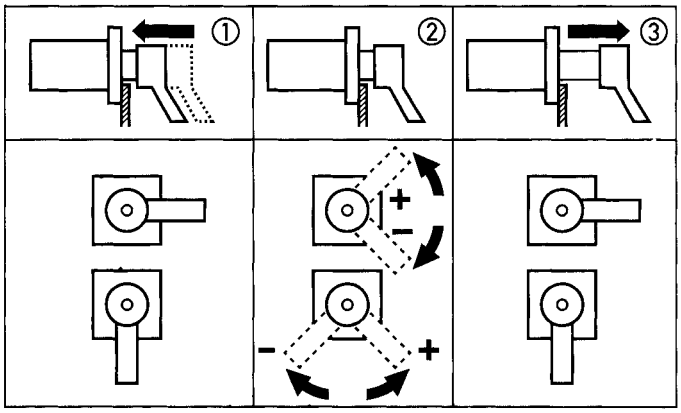
COLAS®

Haldex

STOP

(+) HEBEN / SENKEN (–)
RAISE / LOWER
MONTER / BAISSER
LEVANTAR / BAJAR
PODNOSZENIE / OPUSZCZANIE

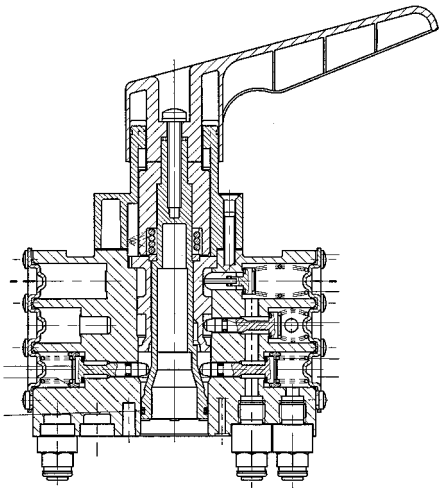
FAHRT
DRIVE
ROUTE
MARCHA
JAZDA



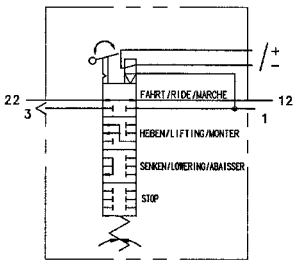
V > 15 km/h, erfolgt automatische Rückstellung aus Stellung "Stop" in Stellung "Fahrt" durch selbsttätiges Herausdrücken des Hebels. Beim Hebe-/ Absenkvorgang dürfen sich keine Personen im Gefahrenbereich aufhalten.

When vehicle speed>15km/h then reset of the lever from the 'stop' position to the 'drive' position is automatic. No one should be standing in the danger area when raising and lowering.

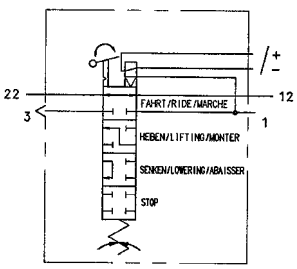
028041019 TS 11 / 10.04



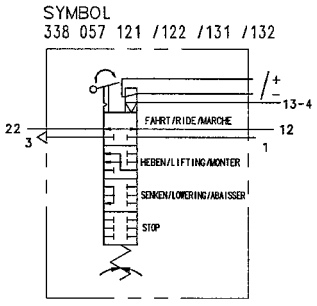
SYMBOL
338 057 101 /102 / 111 /112



SYMBOL
338 058 101/102



SYMBOL
338 057 121 /122 /131 /132



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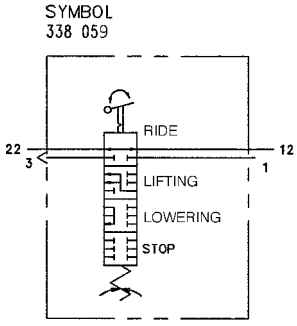
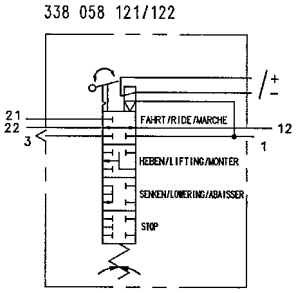
338 059



SYMBOL
338 058 121/122



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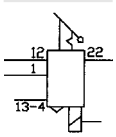


Introduction

The manual Raise/Lower valve with dead man's function, is used for raising and lowering the deck height of commercial vehicles and trailers. When electrically connected to the ABS via a solenoid valve, the system provides automatic reset to ride.

Operation

Position "drive"

When the lever is in the central position it may be pulled out and locked to prevent unintentional operation. Port 12 is linked with Port 22 providing a direct connection between the height control valve and the air bellows.

Position "Stop"

When the lever is in the central position and pushed in, Port 12 is isolated from Port 22.

Position "raising"

When the lever is operated from the 'stop' position in an anticlockwise direction approx. 45° Port 22 is linked with Port 1 and the air bellows are inflated.

On release, the lever automatically returns to the central 'stop' position and isolates Port 22 from Port 1 preventing further bellow inflation. (So called dead man function)

Position "lowering"

When the levers is operated approx 45° in a clockwise direction from the 'Stop' position, Port 22 is linked with Port 3 and the air bellows are deflated.

On release the lever automatically returns to the central position and isolates Port 22 from Port 3 preventing further deflation of the bellows.

(So called dead man function)

Reset from "Stop" position to "Drive" position

When the lever is in the central position it may be locked by pulling it out so that unintentional operation is prevented.

If the solenoid valve on the underside of the unit (UB= 24 VDC +2.5 - 3.5) of the Haldex-ABS is controlled with a pulse (when vehicle speed >15km/h) then reset of the lever from the ‚stop' position to the ‚drive' position is automatic (Not for 338 059).

Assembly Guidelines

The assembly is mounted by a minimum of 2xM8 bolts via holes provided on the housing**(see fig). The installation location should be selected, clear of direct spray or splash and with some protection from high pressure cleaners.

The operating lever should be easily accessible. Care should be taken to ensure the lever does not protrude from the edge of the vehicle when pulled out. If required protection against unintentional operation should be provided by the vehicle manufactures. Pneumatic connection should be in accordance with assembly diagrams.

The exhaust port "3" should be protected against contamination by fitting a silencer 059 0460 09, or by means of an elbow and a short length of tube of minimum inside diameter 9mm (e.g. Tube 12x1.5).

When COLAS is used in conjunction with a HEIGHT LIMITATION valve, a throttle is provided which is fitted in the "T" piece and is required in order to bypass the height limiting device (see fig).

If no height limitation is used, the throttle is not required.

Plastic tubing in accordance with DIN 74324-O 8x1or 10x1 should be used for pneumatic lines. When assembling pneumatic lines care should be taken to ensure that the tubes are cut square and free from burrs.

Before inserting the tubes in the push in connections, insert must be fitted in the tube ends in accordance with Haldex number 032 0490 09 (8mm) or 032 0491 09 (10 mm).

Tube penetration should be at least 23mm deep in the push in fittings*.

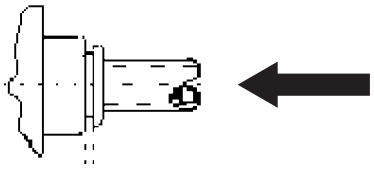
Tubes should exit the valve straight (Min 100 mm) before securing together. So that the permissible height is not exceeded when raising the deck height, it is advisable to use the equipment in conjunction with a height limitation devise (e.g. Haldex height control valve with height limitation). All open plug and socket connections and exhausts should be protected against contamination during painting. After painting, the protective devices should be removed again. Reference plate 028 0410 09 should be fixed in the vicinity of the COLAS valve.

338 057/058...: An electrical connection to the solenoid valve is only permissible by means of a Haldex ABS ECU which delivers a signal ‚reset-to-ride height'. Haldex does not accept any liability for other types of control**.

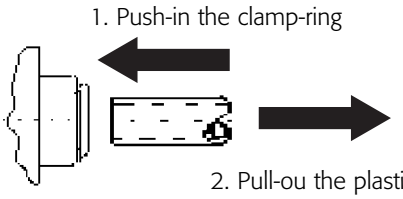
* After removing the protective cap, the plastic tube can be removed again by pressing down the clamping ring with the flat face of an open ended spanner. (e.g. 8mm spanner, 8mm tube when changing).

** For other controls please note: Fixing with 4 bolts.

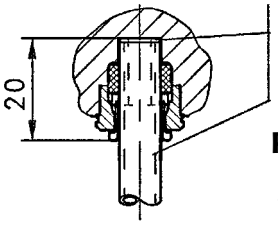
Assembling of the plastic tube



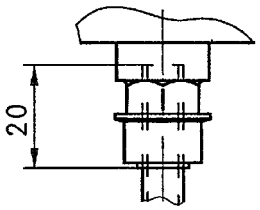
Disassembling of the plastic tube



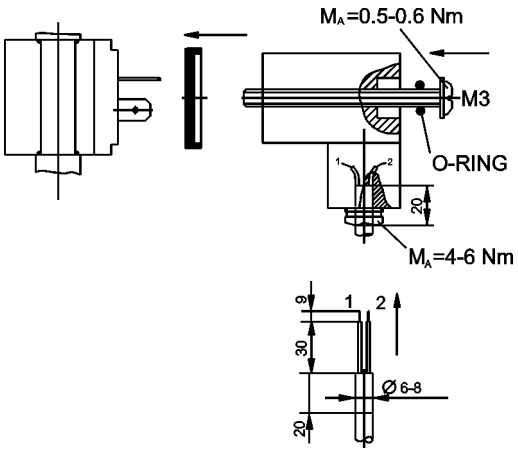
Port 13-4



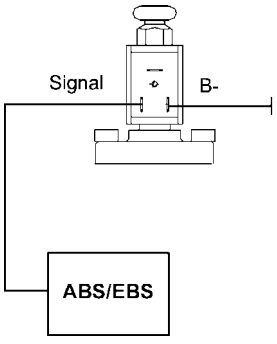
Ports 1, 11, 12, 21, 22



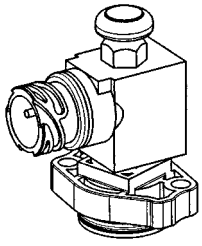
Socket



Wiring socket



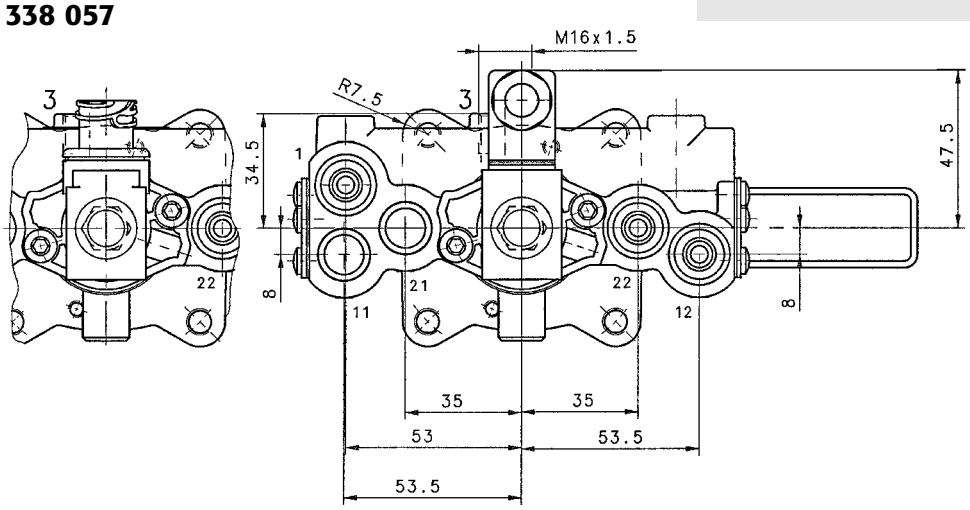
Bayonet DIN 72585

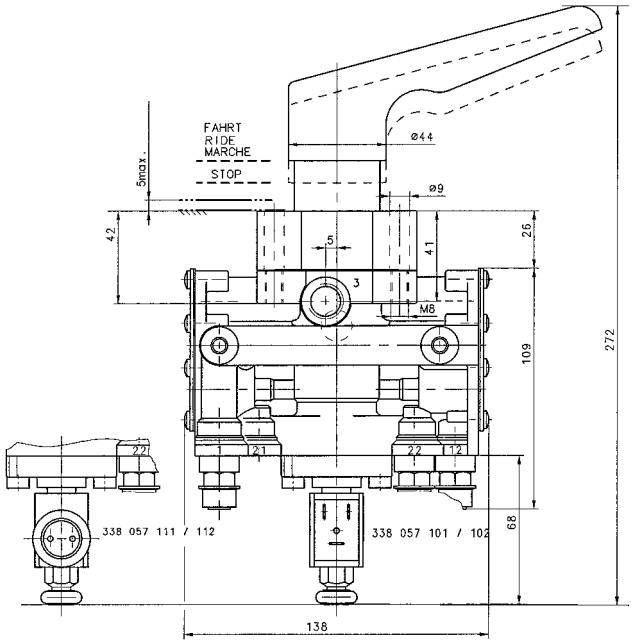


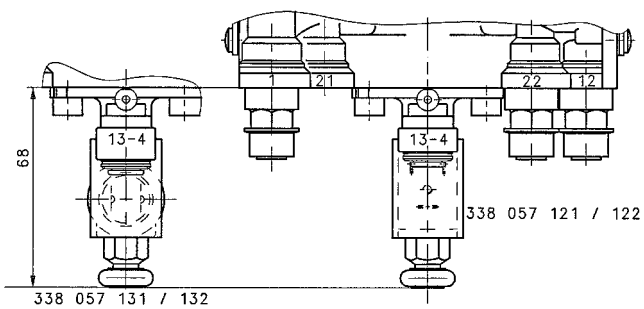
Port Designation

1 = Supply
12 = from height control valve
21, 22 = to the air bellows
3 = Exhaust (at least DN 9)
Ports 1, 12, 21 and 22 accepts o 8x1
Nylon pipe DIN 74324

338 057







Technical Data

Operating pressure:	p_e max.8.5 bar
Operating temperature:	- 40° C to + 80° C
Solenoid valve (only 338 057/058...)	
Permissible duty:	10 seconds
Voltage:	UB= 24 VDC + 2.5 - 3.5
Current/power:	Io = 250 mA/Po=6W
Type of protection:	DIN 40050-Ip 65 A

Accessories

Insert (8mm) 032 0490 09 5x
Option: Silencer 059 0460 09 1x
Kit for throttle (8mm) 003 6206 09 1x
Double nipple (10 mm) 032 0716 09 1X
T-piece (10 mm) 032 0715 09 1X

Maintenance

COLAS is effectively maintenance free and only needs to be changed if the functionality is compromised or leakage is detected during normal servicing.

NOTE: With high pressure cleaners a safe distance of a least 50 cm from the COLAS should be observed.

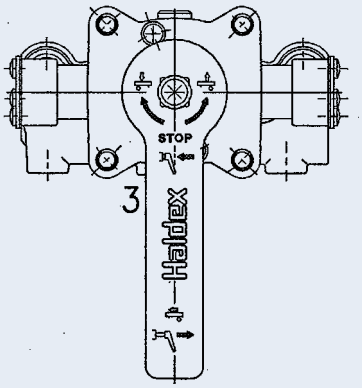
Testing

- check function and leak-tightness of equipment
- correct assembly position
- instruction Label in position

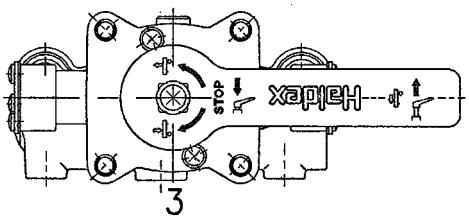
Versions

				Solenoid			Nominal diameter	
Part Number	Port 13-4	Mounting position	Dead man handle	Socket	Bayonet	Exhaust protection	Ports 1, 11, 12, 21, 22	Port 3
338 057 101	no	1	with	yes	-	no	DN 6	DN 9
338 057 102	no	2	with	yes	-	no	DN 6	DN 9
338 057 111	no	1	with	-	yes	no	DN 6	DN 9
338 057 112	no	2	with	-	yes	no	DN 6	DN 9
338 057 121	yes	1	with	yes	-	no	DN 6	DN 9
338 057 122	yes	2	with	yes	-	no	DN 6	DN 9
338 057 131	yes	1	with	-	yes	no	DN 6	DN 9
338 057 132	yes	2	with	-	yes	no	DN 6	DN 9
338 058 101	no	1	with	-	yes	no	DN 6	DN 9
338 058 102	no	2	with	-	yes	no	DN 6	DN 9
338 058 121	no	1	with	-	yes	no	DN 6	DN 9
338 058 122	no	2	with	-	yes	no	DN 6	DN 9
338 059 101	no	1	with	w/o	w/o	no	DN 6	DN 10
338 059 102	no	2	with	w/o	w/o	no	DN 6	DN 10

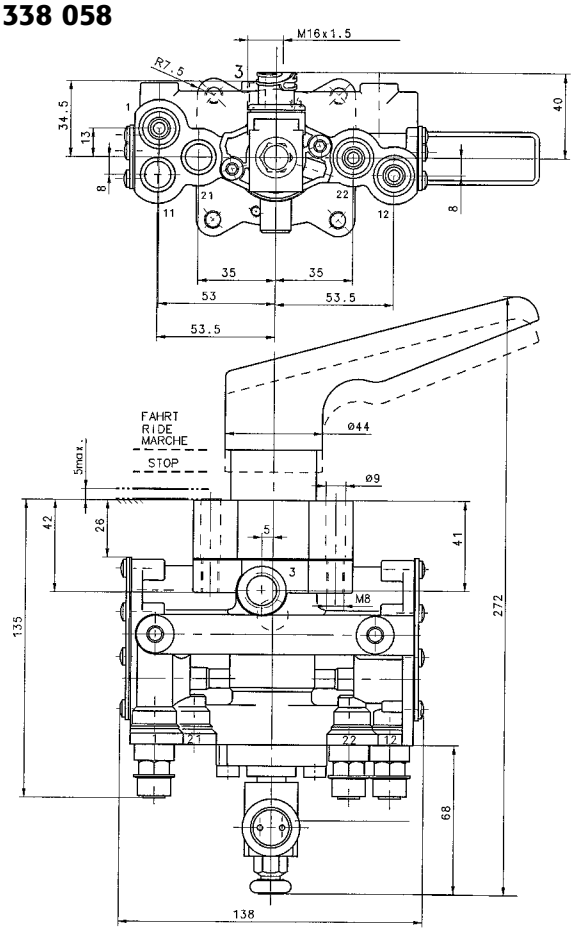
Mounting position 1



Mounting position 2



338 058



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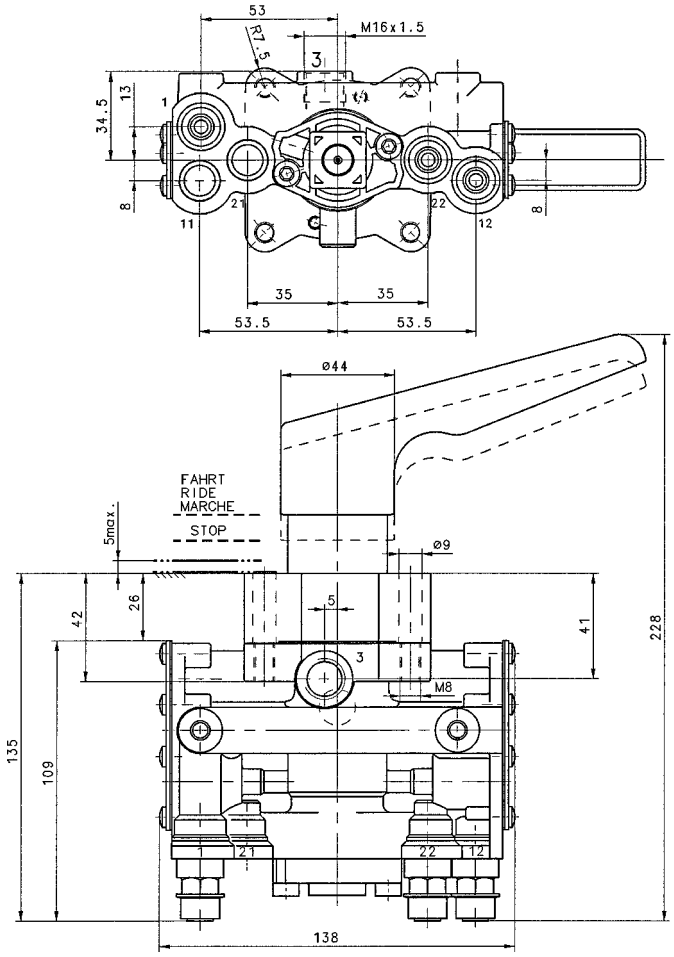


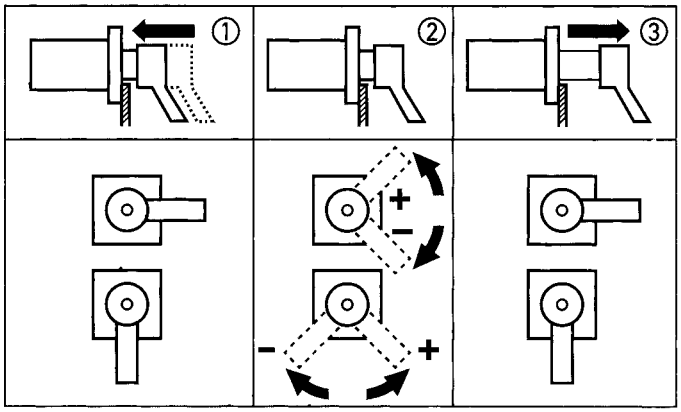
Operating instructions

The lever position "raise" or "lower" can only be operated from the "STOP" position since the lever is locked in the "DRIVE" position. If an attempt is made to turn the lever to the "DRIVE" position with more than 35 Nm, this will break the lever. The "STOP" position is reached by pushing the lever out of the "DRIVE" position.

COLAS®

Haldex

STOP	(+) HEBEN / SENKEN (–) RAISE / LOWER MONTER / BAISSER LEVANTAR / BAJAR PODNOSZENIE / OPUSZCZANIE	FAHRT DRIVE ROUTE MARCHA JAZDA



V > 15 km/h, erfolgt automatische Rückstellung aus Stellung "Stop" in Stellung "Fahrt" durch selbsttätiges Herausdrücken des Hebels. Beim Hebe-/ Absenkvorgang dürfen sich keine Personen im Gefahrenbereich aufhalten.

When vehicle speed>15km/h then reset of the lever from the 'stop' position to the 'drive' position is automatic. No one should be standing in the danger area when raising and lowering.

0280410 19 TS 11 / 10.04

Use

for controlled load-dependent lowering and lifting of one or more lift axles, depending on the version.

Method of operation

352 028 … :

Lifting or lowering the lift axle(s) by means of a manually-operated reversing valve when empty.

Automatic lowering of the lifted lift axle(s) when the specified control pressure (bellows) set at the control valve by spring force is reached after loading (overload protection).

352 032 … :

Lifting or lowering the lift axle(s) by means of a manually-operated reversing valve when empty.

Auto-drop of the lifted lift axle(s) when the specified control pressure (bellows) set at the control valve by spring force is reached after loading (overload protection).

Additional traction support function

Lifting the axle electrically/pneumatically when ps>ps1, e.g. as traction support (Paragraph 34 StVZO, and the EU directive must be followed).

352 035/054 … :

Automatic load-dependent lifting and lowering of the lift axle(s) after the respective allocated control pressure ps1 or . ps2 has been reached (see the table of versions).

352 037 … :

Lifting or lowering the lift axle(s) by means of a manually-operated reversing valve when empty and UB = 0 volts.

Automatic load-dependent lifting and lowering of the lift axle(s) after the respective allocated control pressure ps1 or . ps2 has been reached (see the table of versions).

Electric/pneumatic lowering of lifted axle(s) when ps<= ps2.

Additional traction support function

Lifting the axle electrically/pneumatically when ps>ps1, e.g. as traction support (Paragraph 34 StVZO, and the EU directive must be followed).

Installation instructions

Install with the silencer downwards. Installation positions deviating from this with the silencer horizontal are only permissible if they are in areas affected by splashed or hosed water, and the silencer is protected against high-pressure cleaners. The actuator knob (if fitted) should be easily accessible. Make sure that the actuator knob does not project beyond the outer vehicle boundary when pulled. The vehicle manufacturer must provide appropriate protection against unauthorised operation.

A nylon pipe to DIN 74 324 - 8 x 1 is to be used as the pneumatic line.

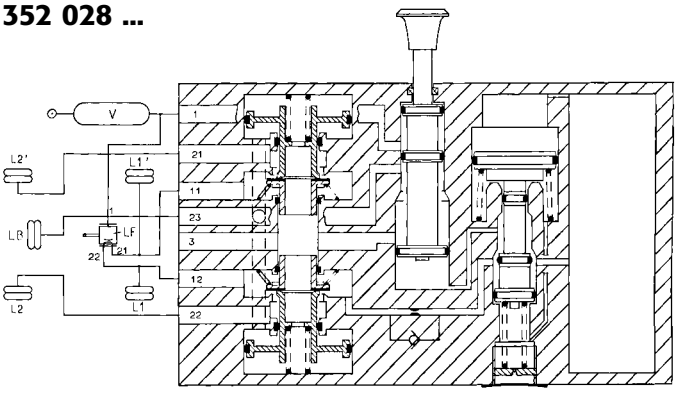
352 028

352 032

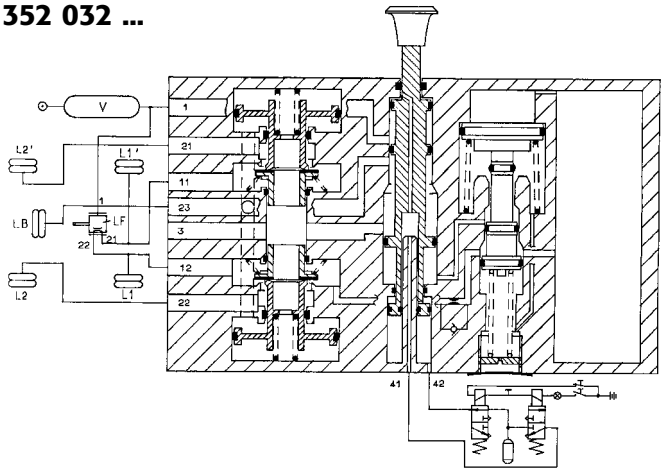
352 035/054

352 037

352 028 …

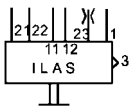


352 032 …

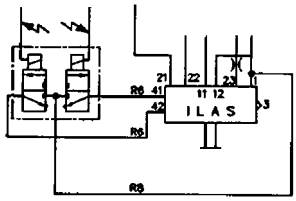


Symbol

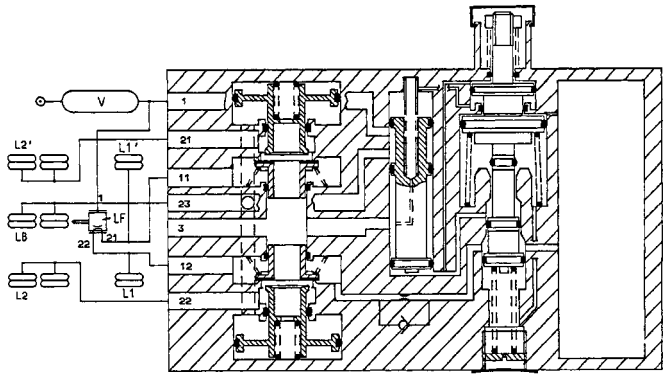
352 028



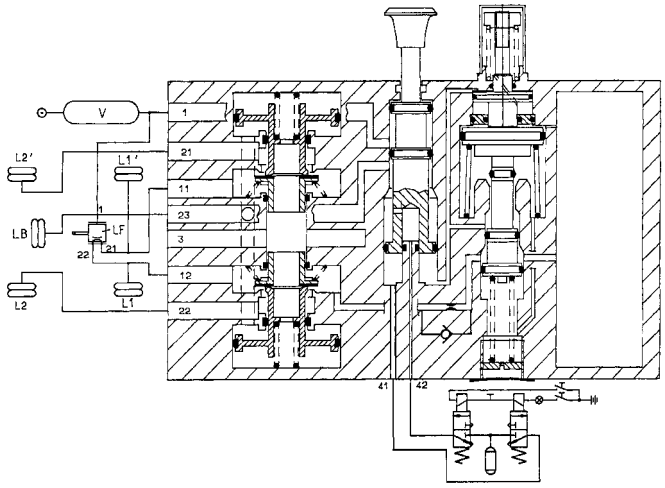
352 032



352 035/054 ...



352 037 ...



When fitting the pneumatic lines, make sure that that the pipes are cut to the required lengths at right angles and without any burrs.

Before inserting the pipes into the push-in fittings, sleeves, e.g. Haldex part no. 032 0490 09, must be pressed into the ends of the pipes. Press the pipe at least 20 mm into the push-in fitting**. After fitting the pipes, fit a circlip 056 0289 09 if necessary. (Sleeves and circlips must be ordered separately).

When painting, all open push-in fittings, the breather and silencer must be protected by suitable methods against the ingress of paint.

Note for version 352 037 .. :

1. If the lift axle is to be lifted automatically when the vehicle is empty, the electrical circuit should be connected as shown in circuit diagram 1.

2. If the lift axle is to be lifted automatically when the vehicle is empty and traction support* is desired, the electrical circuit should be connected as shown in circuit diagram 2.

*: Time signal for national application only, since for EU approval a speed signal and load signal are necessary for switching off the lift axle.

Setting control pressure ps1 - lowering

(for part no. 352 028 011 - 015/352 032/035/037/054)

When setting this with the vehicle empty, installation of a simulation port before connection 12, e.g. 318 072 001, is recommended.

The control pressure resulting in automatic lowering of a lifted lift axle (version-dependent) is set as follows, using an adjusting key (part no. 904 053 001).

- actuator knob pressed in
- connect pressure gauge to test point
- remove the yellow cap from the pipe
- slowly increase the pressure at the simulation port up to the switching pressure to lower the axle has been reached, and the switching noise can be heard. The actuation knob will be pushed out. If the switching pressure is not reached, the nut in the pipe can still be adjusted using the adjusting key if necessary.

Rotate to the right = higher control pressure ps1
Rotate to the left = lower control pressure ps1

The setting procedure should be carried out in one go, otherwise the vehicle will lift up on one side.

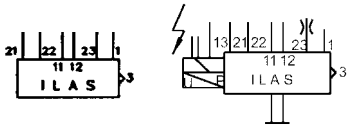
- Check control pressure ps1 again.
- Stamp the control pressure ps1 on plate 028 0355 09 supplied and affix this so that is visible near the lift axle.
- Push the yellow cap loosely on the pipe, make sure it latches.
- Remove the pressure gauge from the test point and push on the protective cap.

See the table of versions for the possible settings.

Setting control pressure ps2 - lifting (035/037/054)

Symbol

352 035/054 352 037



When setting this with the vehicle empty, install a simulation port before connection 12, e.g. 318 072 001.

The control pressure ps2 for lifting the lift axle automatically - see the drawing - is set as follows:

- connect pressure gauge to test point
- remove the red cap to expose the nut ring.
- Reduce the pressure at port 12 (simulation connection) slowly down to control pressure ps2 until the switching noise is heard or the lift axle is lifted.

If the switching pressure is not reached, rotate the nut ring as necessary.

Rotation to the right = higher control pressure ps2
Rotation to the left = lower control pressure ps2

- Check control pressure ps2 again.
- Stamp the control pressure ps2 on plate 028 0355 09 supplied and affix this so that is visible near the lift axle.
- Push on the red cap until it clicks and secure with a cable clamp.
- Remove the pressure gauge from the test point and push on the protective cap.

Testing

Test the unit for operation and leaks.

Check the control pressures ps comply with the vehicle manufacturer's information.

A shut-off cock with exhaust (e.g. 334 077 001) for switching off the lift facility can be fitted in the supply line to the ILAS (only with 352 035/054 ...) to make maintenance work easier.

Technical data

Service pressure:	pe max. 8.5 bar
Service temperature:	-40°C to +80°C
Switching pressure differential:	see the table of versions

Ports 1, 11, 12, 13, 21, 22 and 23:
Push-in fitting for pipe DIN 74324-8 x 1

Ports 41, 42: (only 352 032 ..)
Push-in fitting for pipe DIN 74324-6 x 1

Port designation:
1, 13 = supply
11, 12 = air spring bellows
21, 22 = air spring bellows (lift axle)
23 = lift bellows
3 = exhaust

352 032 … only:

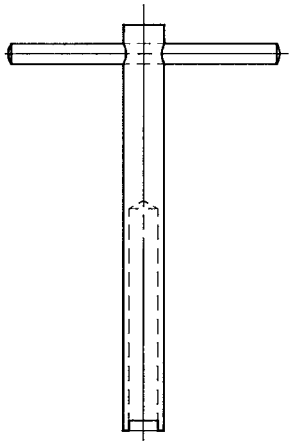
41 = traction support, lift axle (remote control)
42 = lower axle (remote control)

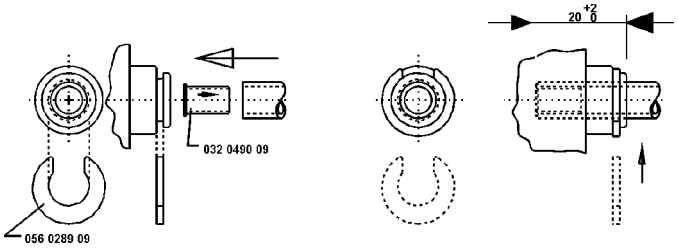
**) The nylon pipe can be removed again (e.g. for replacement) by pressing down the protruding clamp ring (e.g. with an open-ended spanner).

003 6145 09

003 6033 09

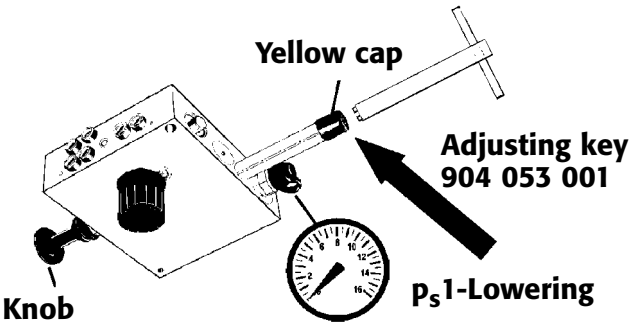
Adjusting key 904 053 001



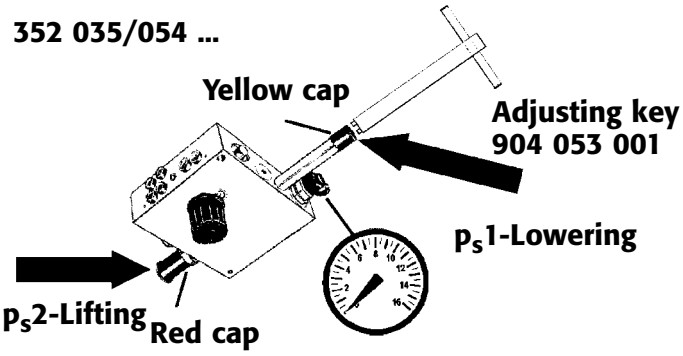


Order assembly kit for plug-in connections 003 6033 09 separately

352 028 ...



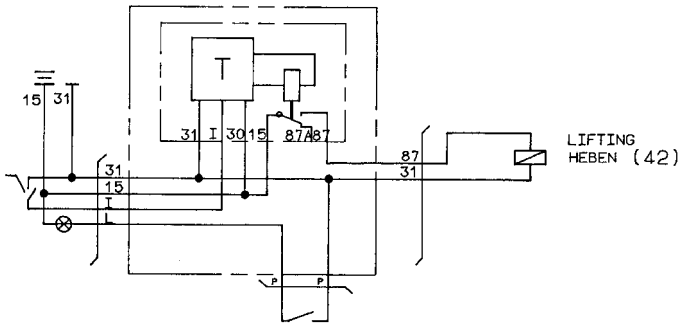
352 035/054 ...



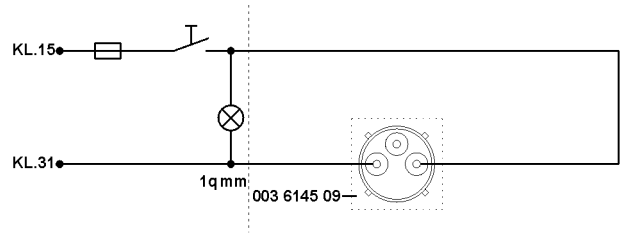
003 6076 19

003 6079 09

Circuit diagram 352 032



Circuit diagram 1 for 352 037 … (without starter)



Circuit diagram 2 for 352 037 … (with starter)

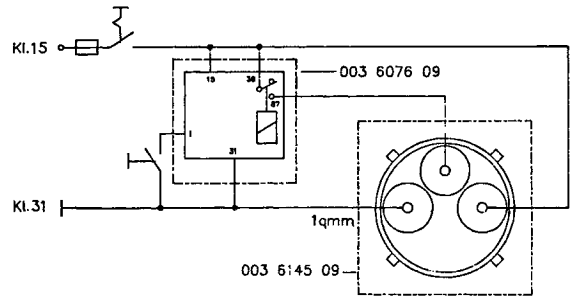
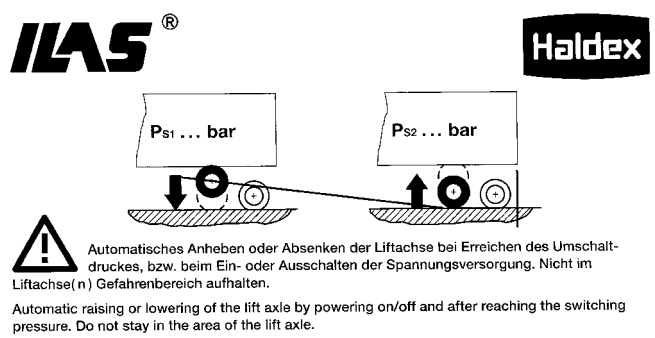


PLate 028 0355 19



Mounting kit (supplied) for ILAS 352 037 ..: 003 6145 09

consisting of:

Fitting instructions 028 0380 09	1 x
Sleeve 032 0490	1 x
Union nut	1 x
Gasket	1 x
Bush housing	1 x
Bush contact	3 x
Circlip	1 x

Mounting kit (order separately) for ILAS 352 032 ..: 003 6070 09 consisting of:

Circlip, 8 mm, 056 0289 09	6 x
Sleeve, 8 mm, 032 0490 09	6 x
Sleeve, 6 mm, 032 0490 09	2 x
Plate 028 0355 09	1 x
Cable clamp 056 0219 09	1 x

To be ordered separately:

Control pressure adjusting key	904 053 001
Twin solenoid valve for moving-off assistance:	360 014 001
Pressure switch for moving off assistance:	361 007 002
Simulation connection:	318 072 001
Shut-off cock with exhaust:	334 047 001
Mounting kit for push-in fittings:	003 6033 09

Relay for moving-off assistance: 003 6076 19*

consisting of:

Time-delay relay	1 x
Plug	1 x
Receptacle, 6.3 mm	6 x
Circuit diagram 911 017 001	1 x
Bag	1 x

Accessories for twin solenoid valve: 003 6079 09

consisting of:

Plug, M27 x 1	1 x
Gasket, 3-hole	1 x
Bushes	3 x
Gasket insert, 5-7 mm	1 x
Plate 028 0352 09	1 x
Circlip, 6 mm, 056 0290 09	2 x
Circlip, 8 mm, 056 0289 09	1 x
Sleeve, 6 mm, 032 0489 09	2 x
Sleeve, 8 mm, 032 0490 09	1 x
Bag	1 x

Cable for twin-solenoid valve is also required, e.g.:

950 364 412	4 m
950 364 413	6 m
950 364 411	8 m
950 364 050	10 m

*: Time signal for national application only, since for EU approval a speed signal and load signal are necessary for switching off the lift axle.

Versions

Part No	Lowering (bar)	Lifting (bar)	Setable area Lowering (bar)	Setable area Lifting (bar)	Switching pressure Difference (bar)
352 028 001	2.5	-	not setable	-	1.5
352 028 011	3.0	-	3.0 - 5.0	-	1.5
352 028 012	3.5	-	3.0 - 5.0	-	1.5
352 028 013	4.0	-	3.0 - 5.0	-	1.5
352 028 014	4.,5	-	3.0 - 5.0	-	1.5
352 028 015	5.0	-	3.0 - 5.0	-	1.5
352 032 030	3.,0	-	3.0 - 5.0	-	1.5
352 032 035	3.5	-	3.0 - 5.0	-	1.5
352 032 045	4.5	-	3.0 - 5.0	-	1.5
352 035 A35	3.5	0.7	3.0 - 5.3	0.7 - 3.1	min 1.4
352 035 C42	4.2	0.9	2.1 - 2.9	0.9 - 1.9	min 1.4
352 035 H30	3.0	1.4	3.0 - 5.3	0.7 - 3.1	min 1.4
352 035 P36	3.6	2.2	3.6 - 6.0	1.5 - 3.2	min 1.4
352 037 I32	3.2	1.5	not setable	0.7 - 2.2	min 1.4
352 037 V51	5.1	2.8	3.6 - 6.0	0.7 - 3.2	min 1.4
352 037 Z51	5.1	3.2	3.6 - 6.0	0.7 - 3.2	min 1.4
352 054 E35	3.5	1.1	3.0 - 5.3	0.7 - 3.1	min 1.4
352 054 I33	3.3	1.5	3.0 - 5.3	0.7 - 3.1	min 1.4
352 054 X53	5.3	3.0	2.5 - 6.0	0.8 - 3.5	min 1.4

Diagram 352 035

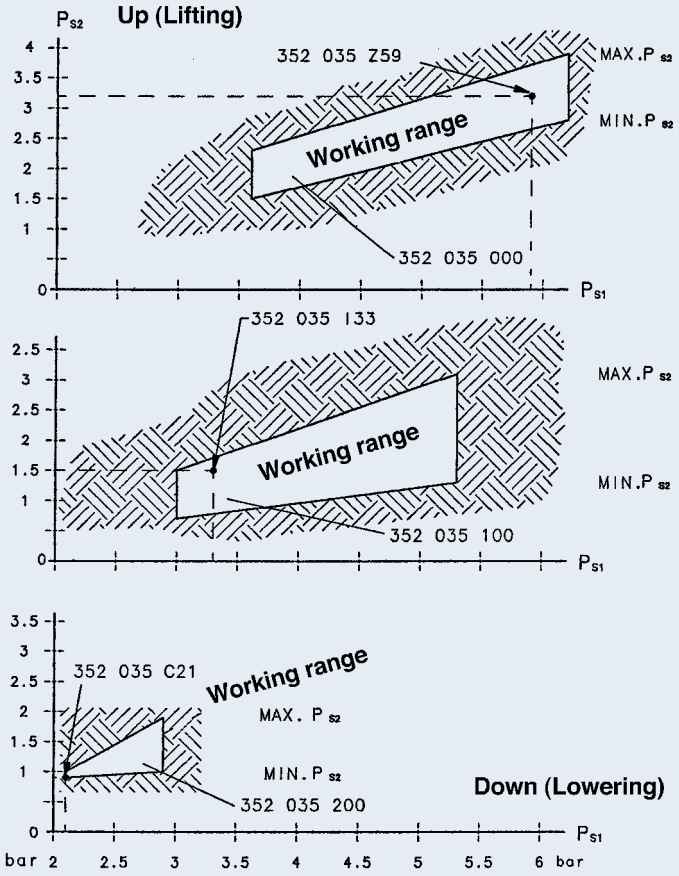
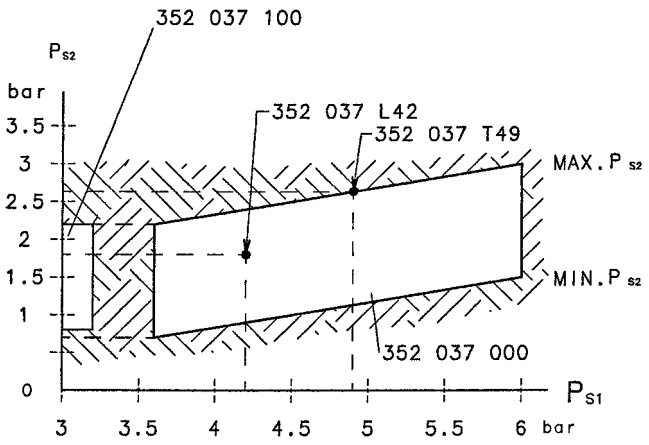


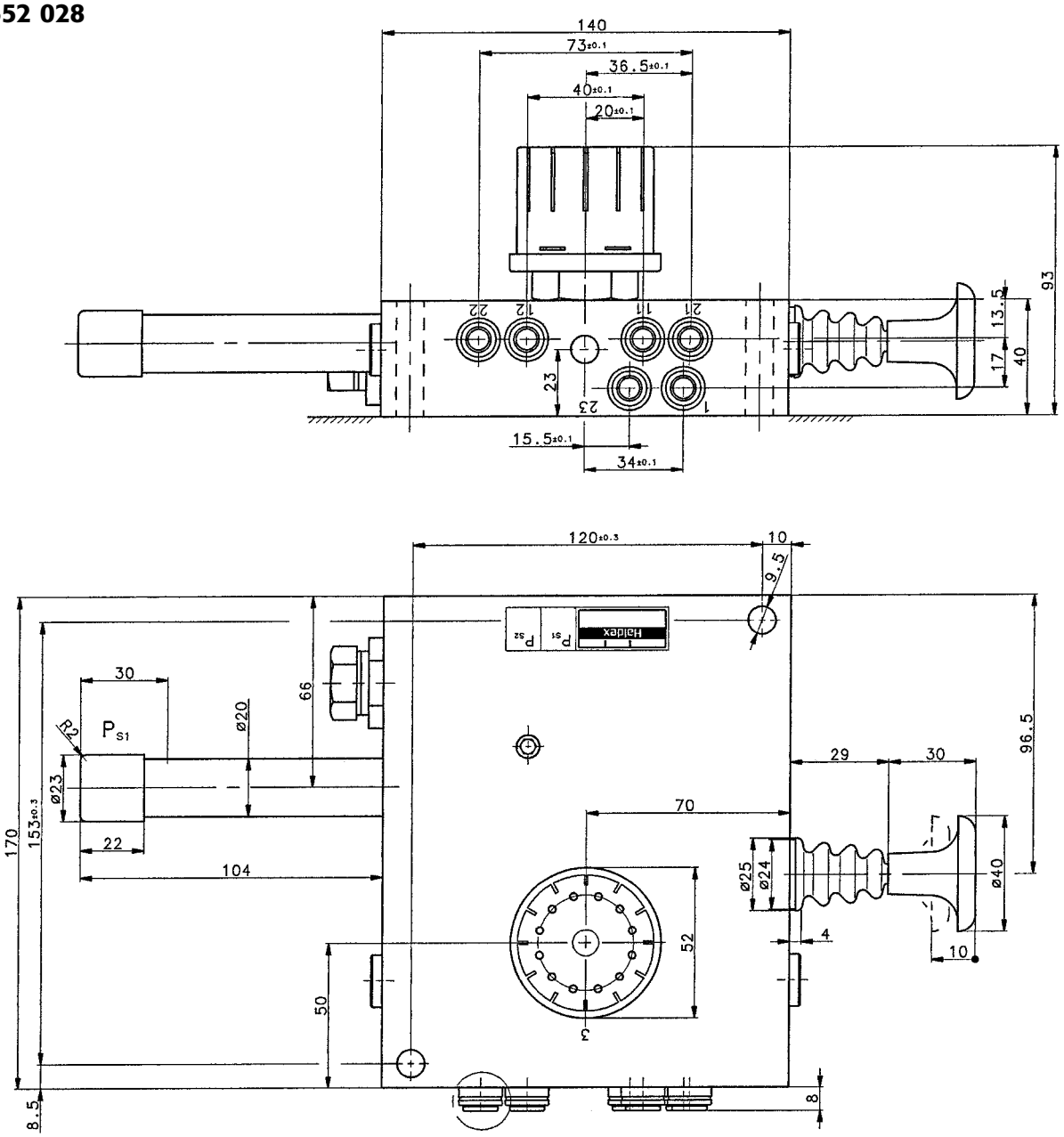
Chart for p_S2 Lifting (bar)

A = 0.7	P = 2.2
B = 0.8	Q = 2.3
C = 0.9	R = 2.4
D = 1.0	S = 2.5
E = 1.1	T = 2.6
F = 1.2	U = 2.7
G = 1.3	V = 2.8
H = 1.4	W= 2.9
I = 1.5	X = 3.0
J = 1.6	Y = 3.1
K = 1.7	Z = 3.2
L = 1.8	Ä = 3.4
M = 1.9	Ö = 3.6
N = 2.0	Ü = 3.8
O = 2.1	

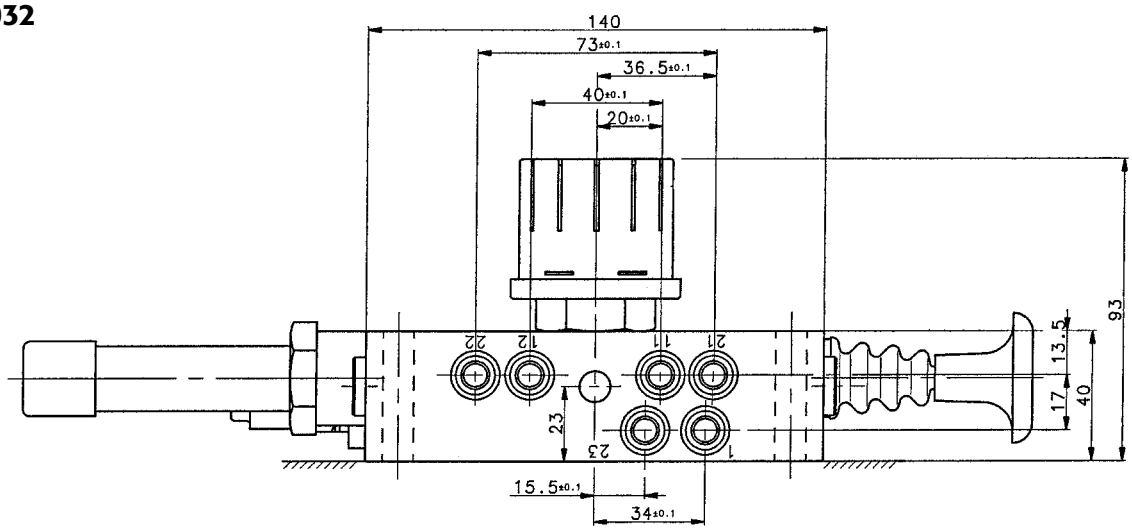
Diagram 352 037

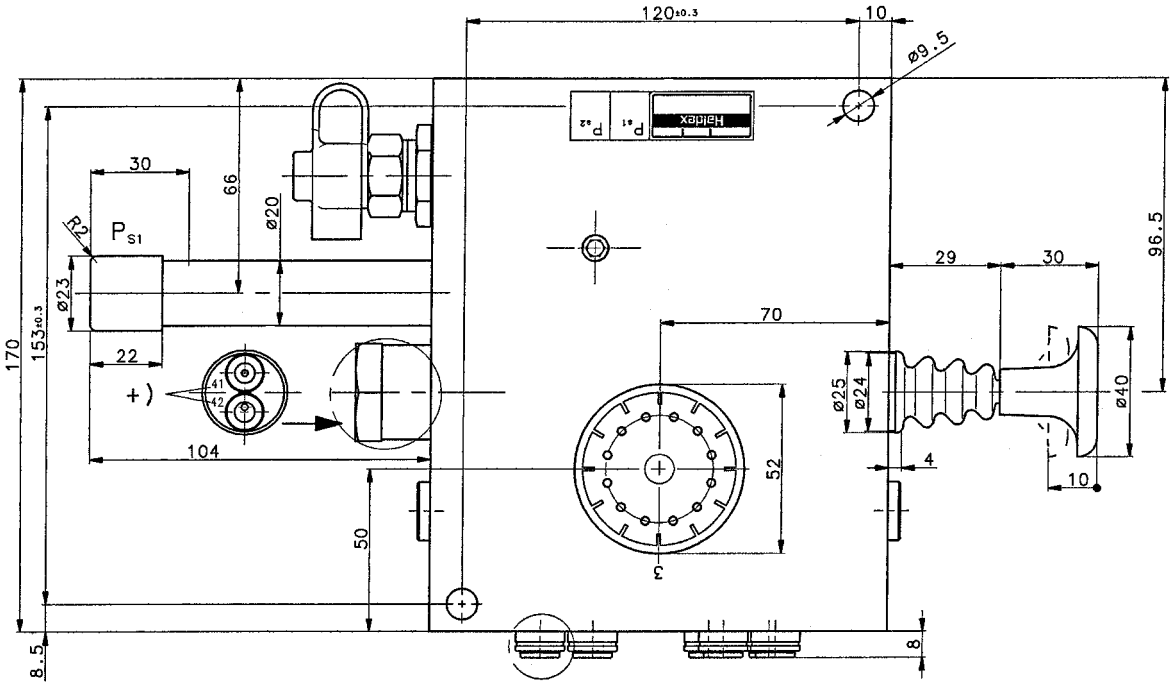


352 028

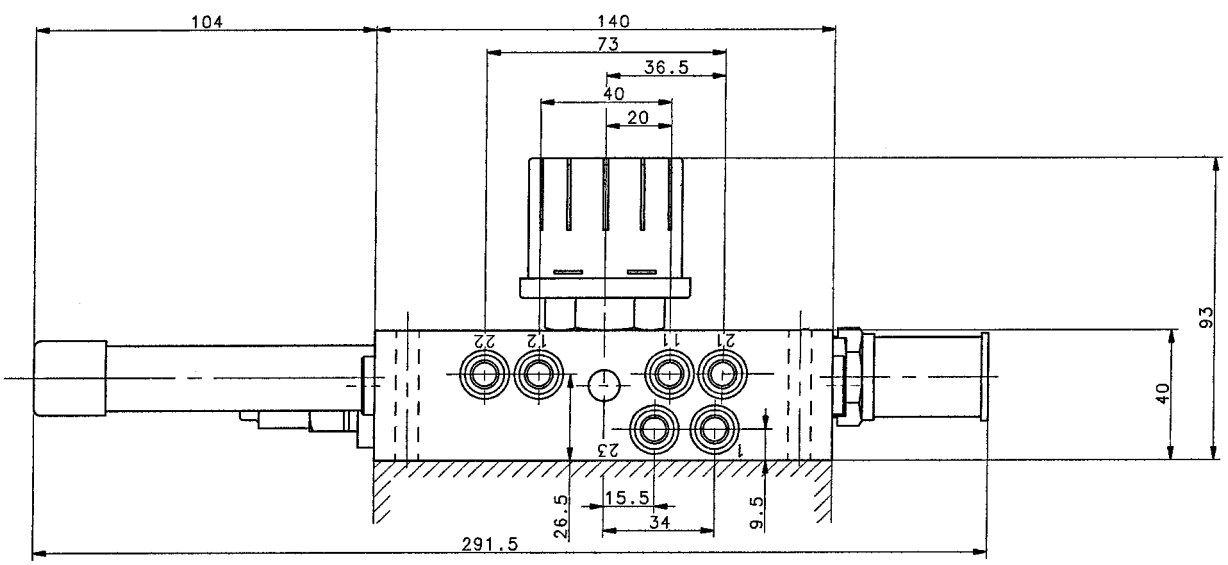

140
73±0.1
36.5±0.1
40±0.1
20±0.1
93
13.5
17
40
22
12
11
21
23
23
1
15.5±0.1
34±0.1
120±0.3
10
9.5
Haldex
Ps1
Ps2
30
R3
Ps1
ø20
66
ø23
153±0.3
170
22
104
70
29
30
96.5
ø25
ø24
ø40
4
10
52
50
3
8.5
8

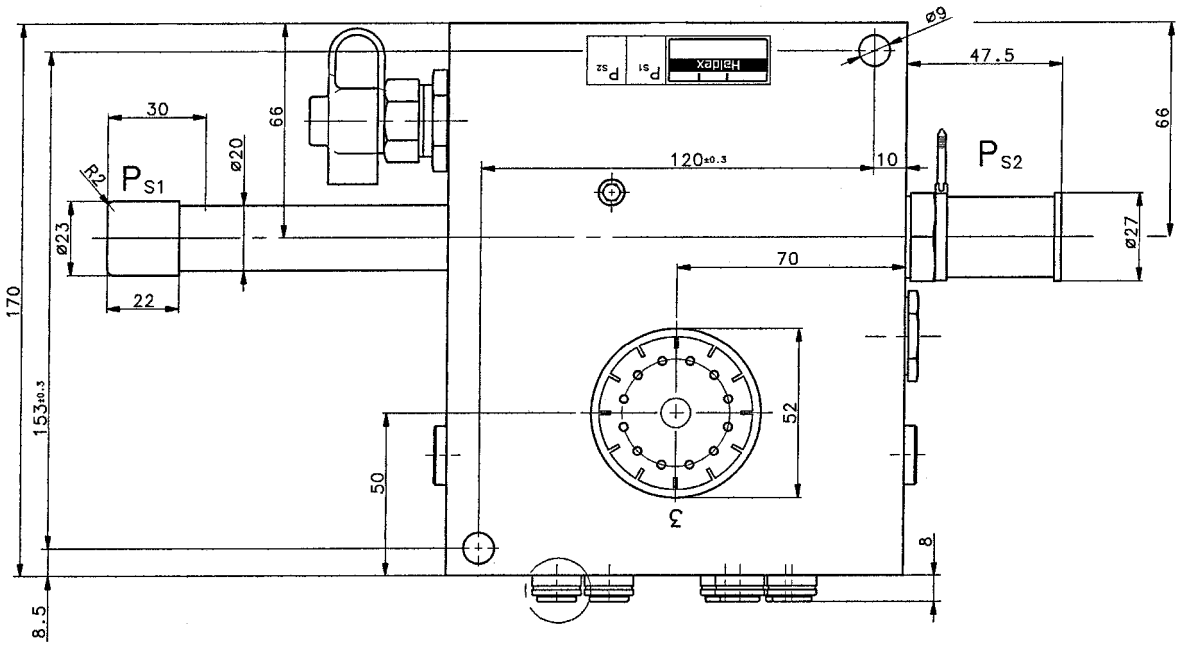
352 032


140
73±0.1
36.5±0.1
40±0.1
20±0.1
93
13.5
17
40
23
23
15.5±0.1
34±0.1

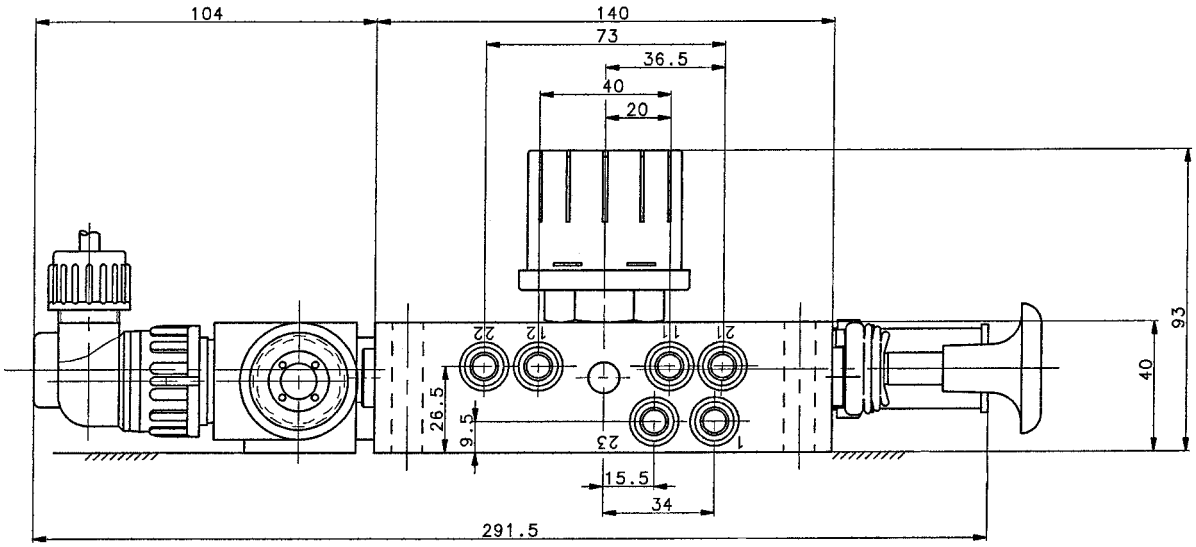

120±0.3
10
ø9.5
30
66
ø20
Ps1
ø23
22
170
153±0.3
104
50
70
29
30
96.5
ø25
ø24
ø40
4
10
52
8.5
8

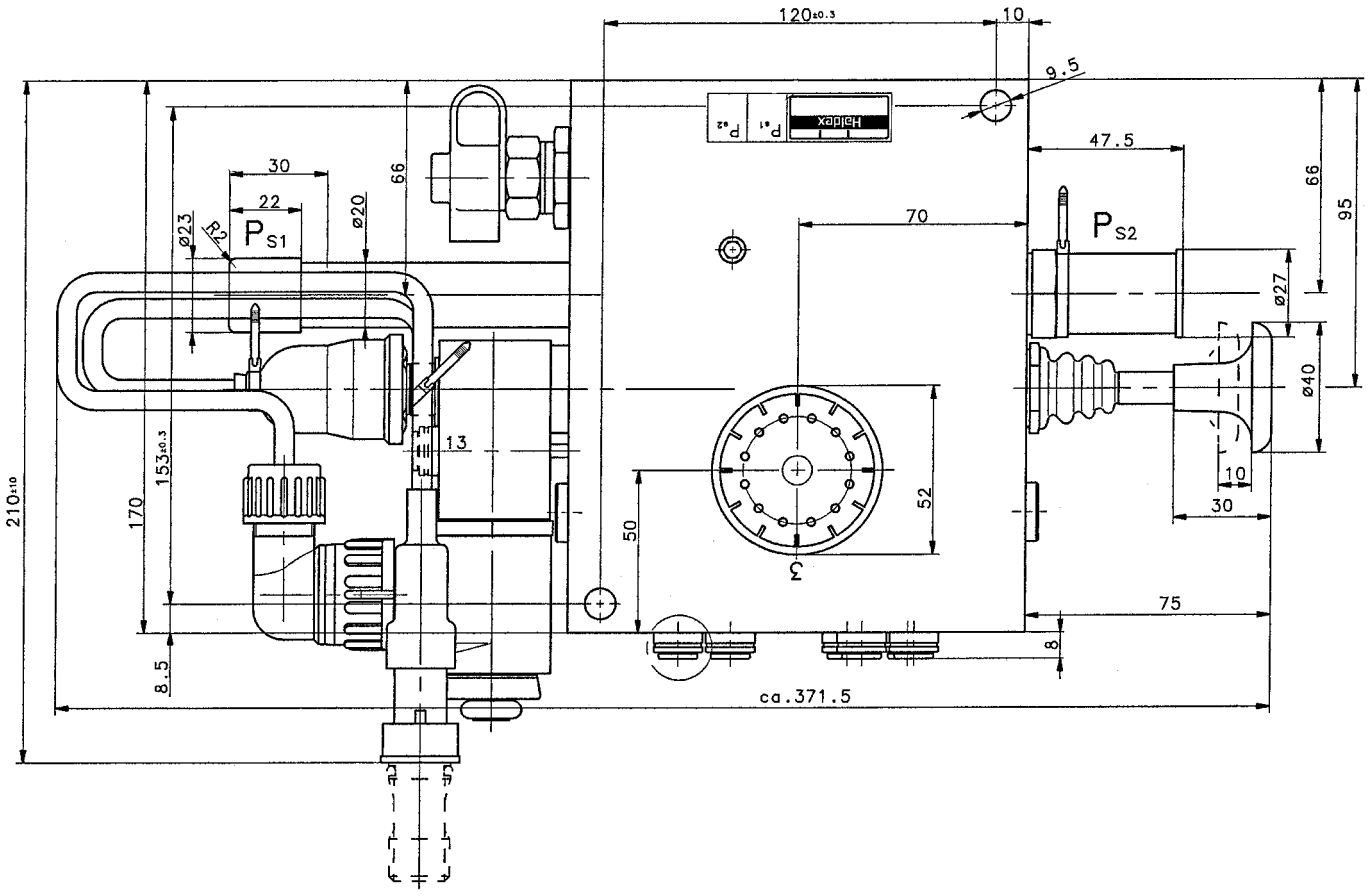
352 035/054


104
140
73
36.5
40
20
93
40
22
12
11
21
23
26.5
15.5
34
9.5
291.5


Haldex
Ps1
Ps2
ø9
47.5
66
30
66
ø20
R3
Ps1
120±0.3
10
Ps2
ø23
ø27
22
70
170
153±0.3
52
50
8
8.5

352 037

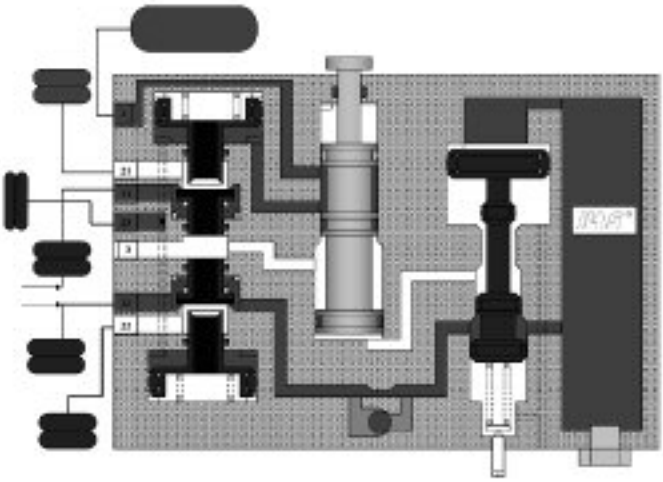

104
140
73
36.5
40
20
93
40
26.5
9.5
22
12
11
21
23
1
15.5
34
291.5


120±0.3
10
9.5
47.5
66
95
30
22
ø23
R2
ø20
66
P S1
P S2
70
ø27
ø40
13
153±0.3
170
210±10
52
50
10
30
75
8
8.5
ca.371.5

352 047

352 049

352 051



Application

Depending on the type, ILAS III is used for controlled lowering and lifting of one or several lift axles depending on the load.

Operation

Type: 352 047 ... and 352 049 ... :

Lifting or lowering the lift(s) axle by means of a control button with no load.

Automatic lowering of the raised lift axle(s) after reaching the predefined control pressure p_s 1 (bellow pressure) set on the control valve via spring force after the loading process (overload). Control pressures-see types

Type 352 051 ... :

Automatic load-dependent lifting and lowering of the lift axle(s) after reaching the control pressure p_s1 and p_s2 (see table examples of assembly).

Assembly guidelines

Install assemble using the holes provided. The mounting position for ILAS III should not be in a spray or splash water area and is protected against high pressure cleaning. The control button (if available) must be easily accessible. It should be noted that when pulled out this does not project outside the edge of the vehicle. Protection should be provided by the vehicle manufacturer against unintentional activation.

The pneumatic connections are to be in accordance with the diagrams. Nylon tube in accordance with DIN 74 324- 8x1 should be used for the versions with push-in fittings. When assembling the pneumatic pipes, care should be taken to ensure that the pipes are cut square, to the required length and are free from burrs.

Before inserting the pipes in the push-in fittings support sleeves, e.g. in accordance with HALDEX order number 032 0490 09 in the ends of the pipes. Pipes are to be inserted at least 23 mm deep in the connections.*

In the event of paint/coating work all open connections, ventilation holes and exhaust are to be protected by suitable means to avoid penetration of the paint/coating. After successful assembly the control pressures p_s1 (lowering) and p_s2 (lifting) are to be checked and entered on the enclosed plate 028 0355 09. This plate is to be fixed so that it is visible in the area of the lift(s) axle.

*) After removal of the retaining ring it should now be possible to remove the plastic pipe by pushing the clamp ring in.

Setting the control pressure ps1-lowering

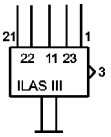
For setting with an empty vehicle it is recommended to install a gauge and regulator into port 11 e.g. 318 072 001.

The control pressure ps1 for automatic lowering of a lifted axle is set as follows by using an adjusting wrench (HALDEX order number 904 053 001):

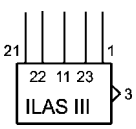
- control button pressed in
- connect test connection with pressure gauge
- remove yellow cap on the tube

Symbol

352 047/049



352 051



- slowly increase pressure on the gauge/regulator until the switching pressure –lower axle – is reached and switching noises can be heard. In this process, the control button is pushed outwards. If the switching pressure is not reached then adjust the nut in the tube by means of the adjusting wrench:

Turning to the right = higher control pressure p_s1

Turning to the left = lower control pressure p_s1

- check the control pressure p_s1 again
- enter the control pressure value p_s1 in the enclosed plate 028 0355 09 and fix this in the area of the lift axle so that this is visible.
- press the yellow cap loosely on the tube and make sure this engages.
- remove the pressure gauge from the test connection and replace the protective cap.

Setting the control pressure p_s2 – lifting

For setting on an empty vehicle a gauge and regulator is to be installed into port 11 e.g. 318 072 001.

The control pressure p_s2 -see pressure diagram for automatic lifting of the lift axle is set as follows:

- connect test connection with pressure gauge
- remove red cap in order to uncover the knurled nut.
- slowly reduce the pressure on port 11(simulator connection) to control pressure p_s2 (desired) until switching noises can be heard and the lift axle is raised. If the switching pressure is not reached, then twist the knurled nut:

Turning to the right = higher control pressure p_s2
Turning to the left = lower control pressure p_s2

- check control pressure p_s2 once again.
- enter control pressure p_s2 in the enclosed plate 028 0355 09 and visibly fix this in the area of the lift axle.
- push in red cap until it stops and secure with cable tie.
- remove pressure gauge from the test connection and replace protective cap.

Types and settings

The types and settings can be taken from the diagram- Examples of assemblies. It should be noted that the pressure values p_s1 (lowering) and p_s2 (lifting) must be within the "adjustable area" for the respective unit. Units only can be set within these tolerance limits.

Examples of assembly

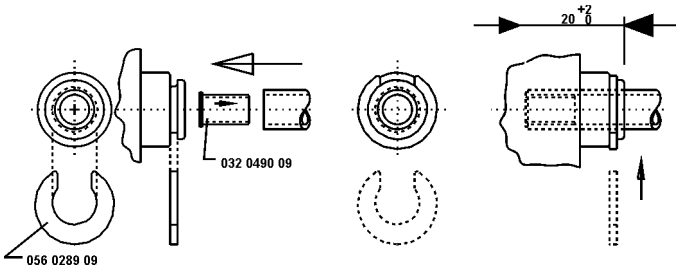
Every version can be set within the adjustable area. The last 3 digits of the part number shows the pressure settings of the valve. The letter is the indicator of the pressure p_s2 "Lift". The numbers indicate the pressure p_s1 "Lower".

Accessories (supplied with this)

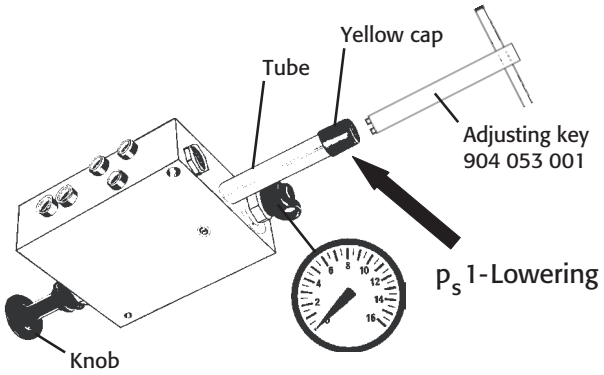
Plate: 028 0355 09 1x

To be ordered separately:

Key for control pressure:	904 053 001
Simulating connection:	318 072 001
Pressure protection valve:	314 013 ...
Pressure limiting valve:	357 ... ...



Version 352 047 ...



Version 352 051 ...

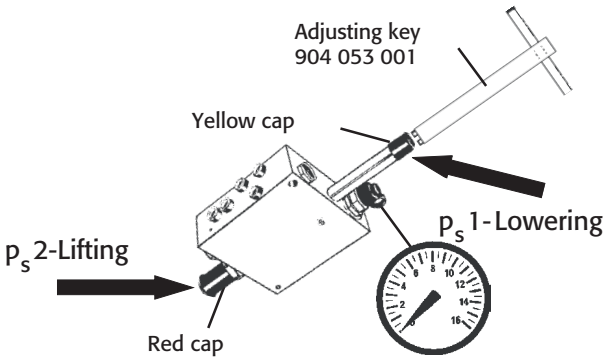
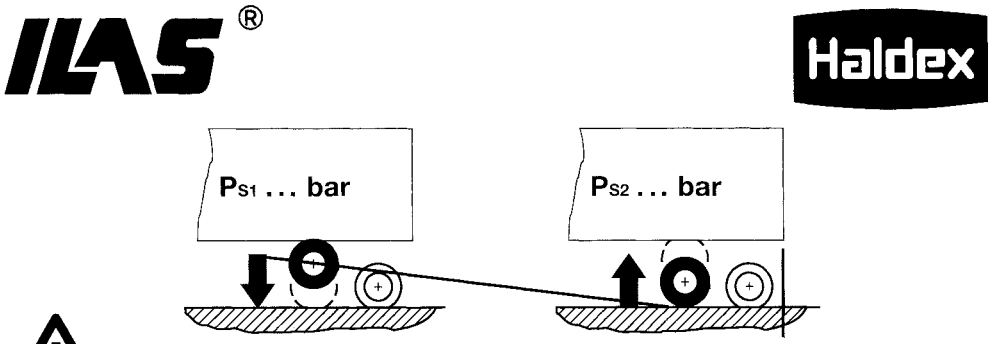


Plate 028 0355 09



Automatisches Anheben oder Absenken der Liftachse bei Erreichen des Umschaltdruckes, bzw. beim Ein- oder Ausschalten der Spannungsversorgung. Nicht im Liftachse(n) Gefahrenbereich aufhalten.

Automatic raising or lowering of the lift axle by powering on/off and after reaching the switching pressure. Do not stay in the area of the lift axle.

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Maintenance

In Order to simplify service work a shut off cock (e.g. 334 077 001) can be fitted. Then it is possible to turn off the lift device. In addition you can fit a simulation point to port 11 to the ILAS (e.g. 318 048 001).

If defects are noted during vehicle examinations or when driving, then the unit should be exchanged. When working with high pressure cleaners a distance of at least 50 cm should be observed.

Testing

Check function and leak-tightness of the unit.

Check the control pressure ps in accordance with details of the vehicle manufacturer.

Technical data

Operating pressure: p_e max 8.5 bar
Operating temperature: -40°C to +80°C
Pressure difference: Dps at +22°C
352 047/049 015 ... 029 1.1 ± 0.3 bar
352 047/049 030 ... 060 1.5 ± 0.3 bar
Port description:

1	= Supply
11	= Air bellows
21, 22	= Air bellows (Lift axle)
23	= Lift bellow
3	= Exhaust

Ports 1, 11, 21, 22, 23 :
352 047/051 ... : Push-in-fittings for tube DIN 74324-8x1
352 049 ... : M 12 x 1.5

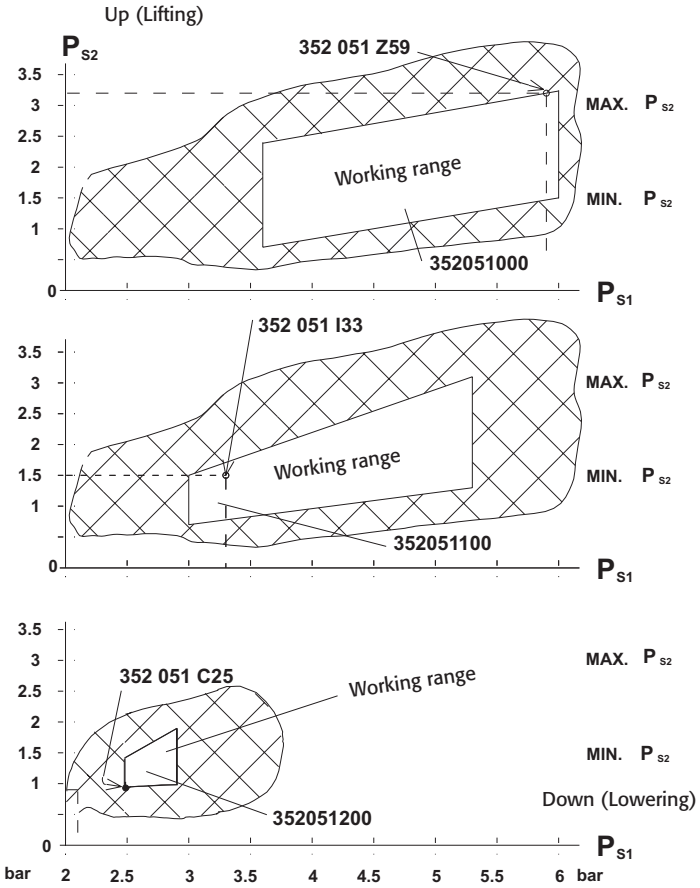
Versions

			Setting range: adjustable		
Part number	Lowering (bar)	Lifting (bar)	Lowering (bar)	Lifting (bar)	Switching pressure Difference (bar)
352 047 025	2.5	-	1.5 - 2.9	-	1.1
352 047 030	3.0	-	3.0 - 5.3	-	1.5
352 047 032	3.2	-	3.0 - 5.3	-	1.5
352 047 035	3.5	-	3.0 - 5.3	-	1.5
352 047 040	4.0	-	3.6 - 6.0	-	1.5
352 047 045	4.5	-	3.6 - 6.0	-	1.5
352 047 048	4.8	-	3.6 - 6.0	-	1.5
352 047 100	-	-	3.0 - 5.3	-	1.5
352 047 200	-	-	1.5 - 2.9	-	1.1
352 049 000	-	-	3.6 - 6.0	-	1.5
352 049 100	-	-	3.0 - 5.3	-	1.5
352 049 200	-	-	1.5 - 2.9	-	1.1
352 051 I40	4.0	1.5	3.0 - 5.3	0.7 - 3.1	min 1.4
352 051 000	-	-	3.6 - 6.0	1.5 - 3.2	min 1.4
352 051 100	-	-	3.0 - 5.3	0.7 - 3.1	min 1.4
352 051 200	-	-	2.5 - 2.9	0.9 - 1.9	min 1.4

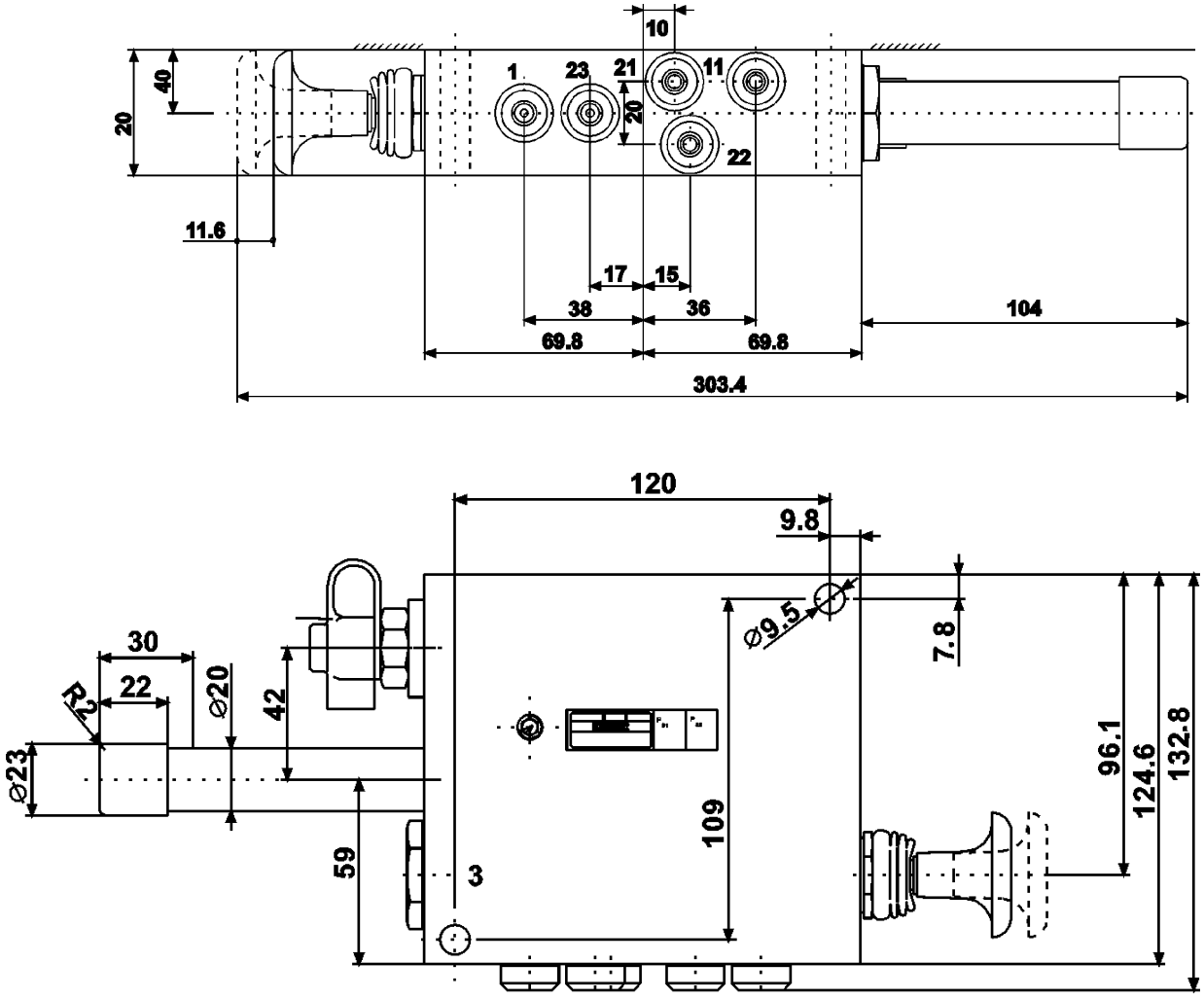
Chart for p_s2 Lifting (bar)

A = 0.7	P = 2.2
B = 0.8	Q = 2.3
C = 0.9	R = 2.4
D = 1.0	S = 2.5
E = 1.1	T = 2.6
F = 1.2	U = 2.7
G = 1.3	V = 2.8
H = 1.4	W= 2.9
I = 1.5	X = 3.0
J = 1.6	Y = 3.1
K = 1.7	Z = 3.2
L = 1.8	Ä = 3.4
M = 1.9	Ö = 3.6
N = 2.0	Ü = 3.8
O = 2.1	

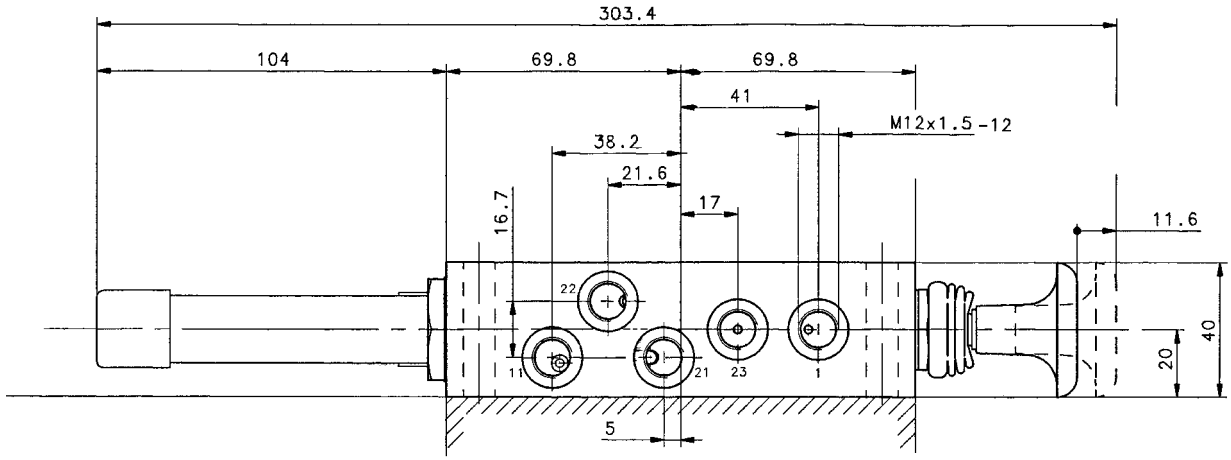
Diagram 352 051



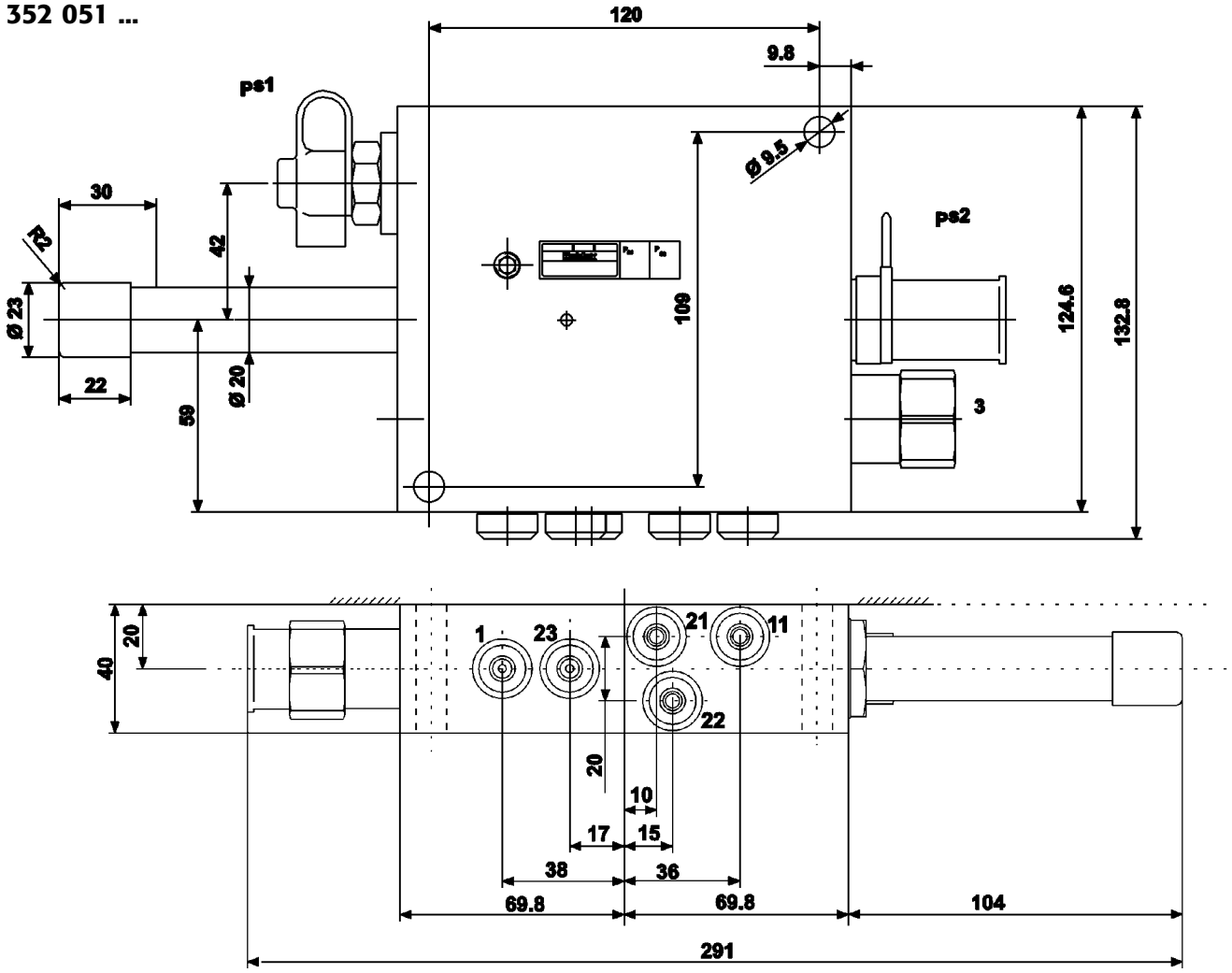
352 047 …

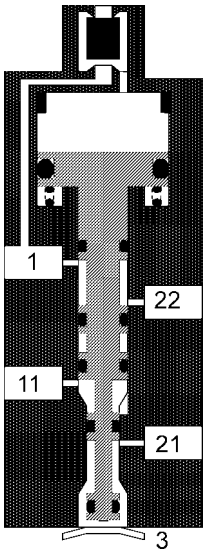


352 049 …



352 051 ...


120
9.8
ps1
Ø 9.5
30
42
Ø 23
22
Ø 20
59
109
ps2
124.6
132.8
3
40
20
1
23
21
11
22
20
10
17
15
38
36
69.8
69.8
104
291



Application

ILAS- E is used for electrically controlled lifting and lowering of one or several lift - axles with conventional air suspension systems.

With electronically controlled air brake systems, e.g. EBS or EPV, ILAS- E are controlled by the load depended output signal.

With standard installations it is possible to control ILAS- E by a separate specialized pressure switch with two independent setting pressures.

Operation

Electrically actuated lift axle control device for lifting and lowering of lift axle(s).

With electric power on: Axle is up

With electric power off: Axle is down

Traction control: By using a traction control device you have to follow the regulations for lift devices (97/29/EG).

Set-up

- 5/2-Way valve, electro-pneumatic controlled
- 352 061 001: Threaded ports M 16 x 1.5
- 352 062 001: Push-in fittings for nylon pipe ø = 8 mm

Assembly instructions

Mechanical Installation

The ILAS-E should be mounted using the holes which are provided. It should not be located in an area where there is excessive water spray / splash and should be protected from high pressure washing equipment.

Additional protection should be provided by the vehicle manufacturer against unintentional activation.

The valve should be piped in accordance with the system diagram.

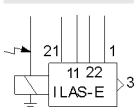
Pneumatic

A nylon pipe in accordance with DIN 74 324-8x1 should be used for the versions with push-in fittings. When assembling the air pipes, care should be taken to ensure that the pipes are cut square, to the required length and are free from burrs.

Before inserting the pipes in the push-in fittings support sleeves, e.g. in accordance with HALDEX order number 032 0490 09 should be installed in the ends of the pipes. Pipes are to be inserted at least 23 mm deep in the connections.*

In the event of paint/coating work all open connections, the ventilation hole and the exhaust port are to be protected by suitable means to avoid penetration of the paint/coating. After painting/coating remove this protecting material.

Symbol



*) After removal of the retaining ring it is possible to remove the plastic pipe by pushing the clamp ring in.

Electric

Strip the insulation off the PUR cable as per the diagram.

After wiring tighten the PUR cable with the PG- screw (4-6 Nm).

Fix the sealed connector cover with the screw (M3) (0.5-0.6 Nm) and seal up the screw with the O-ring ø 3 x 1.5 (within the assembling kit) . Cable should run up to connector-cover.

Wire in accordance to wiring diagram.

Bayonet: To connect to EB+ use cable 814 012 ...

For common installations use cable 003 0600 09.

Accessories

Assembling kit (supplied with this) 003 6243 09 consist of:

- O-ring 024 0604 09 1 x
- Installation info 028 0418 09 1 x
- Sealing 042 0259 09 1 x
- Screw 042 0260 09 1 x

Cable, switches and yellow warning lamp in accordance to regulation 97/20/EG to be supplied by the vehicle manufacturer.

Maintenance

To lower the lift axle, e.g. for servicing the electric power must be switched off. Alternatively a shut off cock with exhaust (e.g. 334 077 001) can be fitted to port 1 to switch off the lifting device (axle down).

Porous rubber parts must be replaced.

If defects are noted during vehicle examinations or when driving, then the unit should be tested and replaced if necessary. When working with high pressure cleaners a distance of at least 50 cm should be observed.

Testing

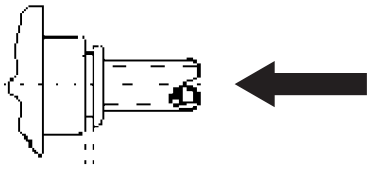
Check function of unit and security.

- Check for air leaks using spray part number 905 002 001
- Function: With electric power on: Axle is up
  With electric power off: Axle is down

Technical data

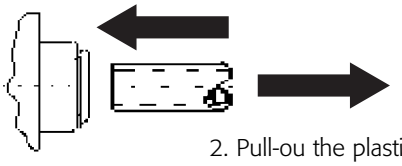
Medium:	Air
Operating pressure:	max 8.5 bar
Operating temperature:	-40°C +80°C
Required switch pressure:	> 2..5 bar
Voltage:	24V DC
Current Power consumption at 20°C:	IO = 250 mA / P0 = 6W
Permissible duty:	100%
Type of protection:	DIN 40050 - IP 67 A
4 ports:	M 16 x 1.5 or push-in fittings for nylon tube 8x1

Assembling of the plastic tube



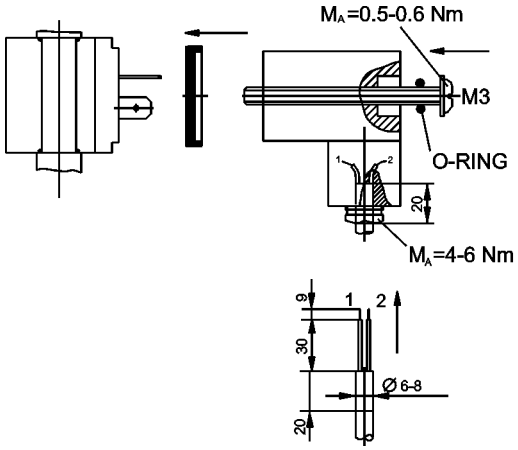
Disassembling of the plastic tube

1. Push-in the clamp-ring

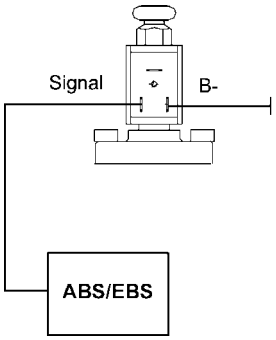


2. Pull-ou the plastic tube

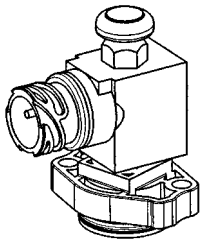
Socket



Wiring socket



Bayonet DIN 72585



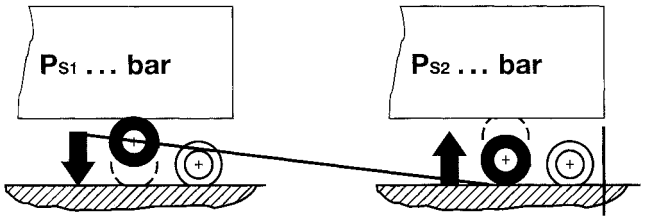
Versions

		Versions					
Part number	Ports	Socket	Bayonet	Voltage (V)	Current (mA)	Power (W)	Assembling kit
352 061 001	M 16 x 1.5	yes	-	24	250	6	003 6243 09
352 061 011	M 16 x 1.5	-	yes	24	250	6	w/o
352 062 001	Push-in 8 x 1	yes	-	24	250	6	003 6243 09
352 062 011	Push-in 8 x 1	-	yes	24	250	6	w/o
352 064 001	1/4"-18NPTF	yes	-	12	500	6	003 6243 09
352 064 011	1/4"-18NPTF	-	yes	12	500	6	w/o
352 065 001	w/o thread	yes	-	12	500	6	003 6243 09
352 065 011	w/o thread	-	yes	12	500	6	w/o

Plate 028 0355 19

ILAS®

Haldex



Automatisches Anheben oder Absenken der Liftachse bei Erreichen des Umschaltdruckes, bzw. beim Ein- oder Ausschalten der Spannungsversorgung. Nicht im Liftachse(n) Gefahrenbereich aufhalten.

Automatic raising or lowering of the lift axle by powering on/off and after reaching the switching pressure. Do not stay in the area of the lift axle.

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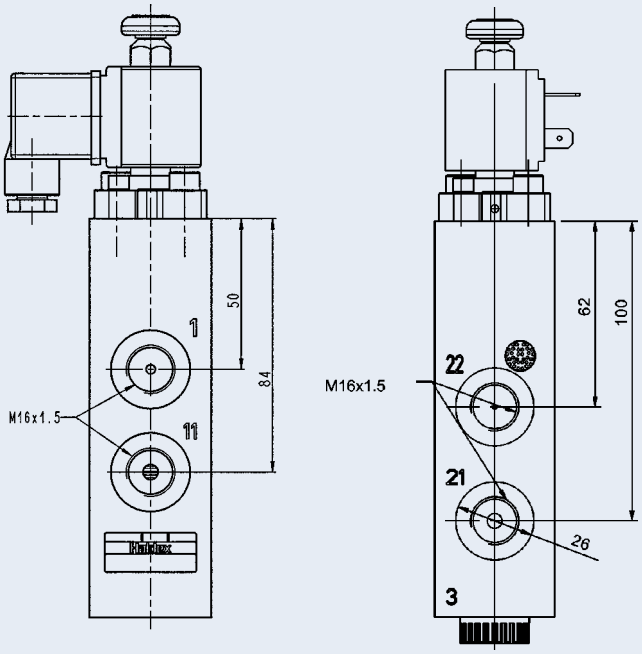
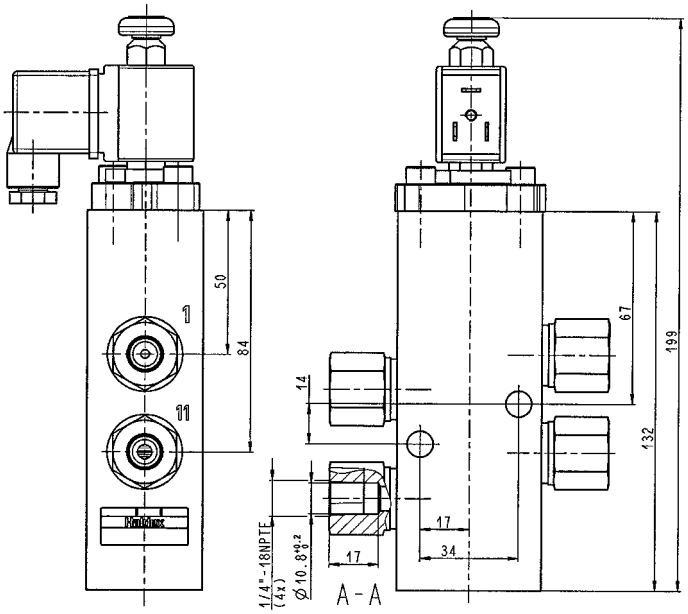
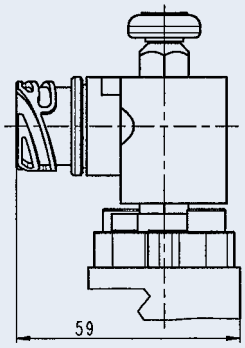
352 061 001



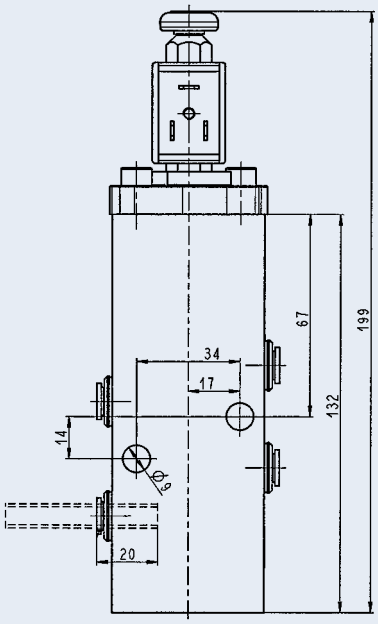
352 064 001



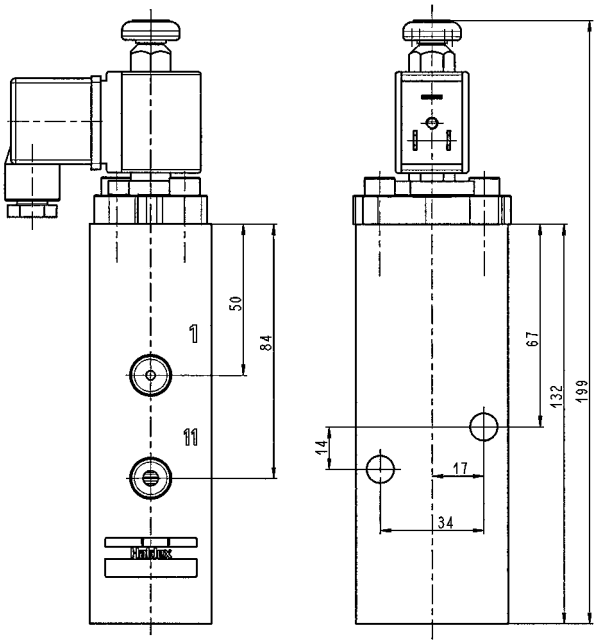
Versions with ending 011

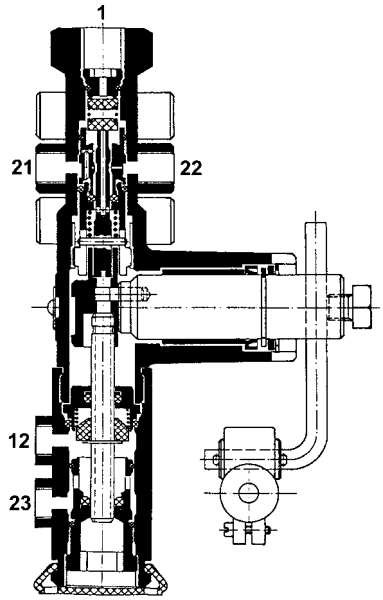


352 062 001

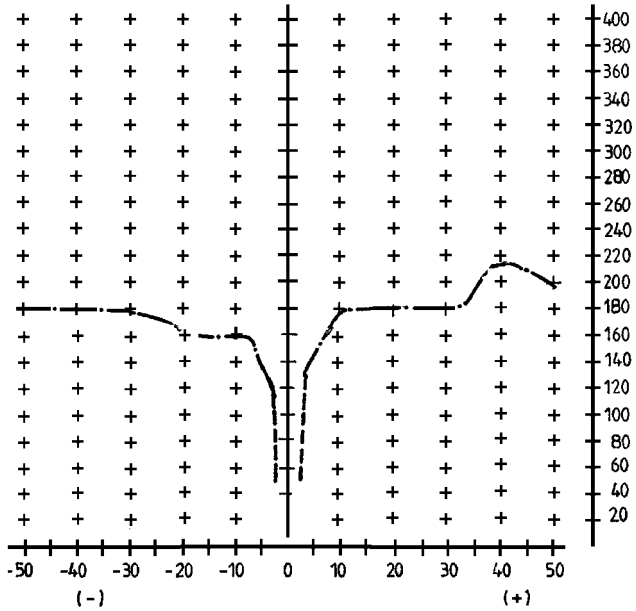


352 065 001

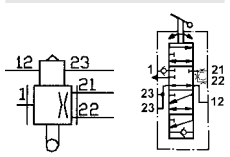




Flow diagram



Symbol



Use

The levelling valve with height limitation controls the pressure in the support bellows on vehicles with air suspension, and together with a Raise/Lower valve (COLAS) restricts the lifting action when a maximum permissible body height is reached.

Operation of the levelling valve

see 612 035 ..

Operation of the height limitation function

The raise/lower valve is fed via the levelling valve from port 12 to port 23.

If maximum body height is reached during the lifting action, the twisting of the shaft and the associated downward motion of the pipe cause the valve plate to sit on the valve seat, which interrupts the supply from port 12 to port 23 and so ends the lifting action.

Levelling valve with cross-restriction

see 612 035 ..

Installation instructions

see 612 035 ..

Setting the height limitation

The height limitation can be set over a range of a = 15° to 40°.

If the factory-set height limitation of a = 45° ±2° needs to be changed, the dump valve must be removed (using SW 13) and the adjuster screw turned with a suitable tool (904 054 001).

Clockwise rotation: a < 45°
Anticlockwise rotation: a > 45°

The angle here refers to the downwards excursion “a” of the control lever from the horizontal, in degrees.

Then refit the dump valve.

Testing

Test for operation and leaks.

The pressure should neither rise nor fall at the delivery ports in the neutral position.

Check the linkage moves freely and is good condition, replace if bent.

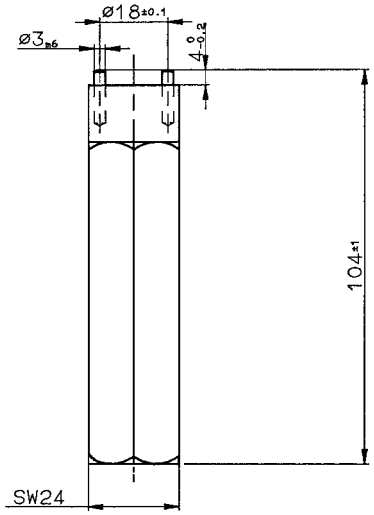
Technical data

Service pressure, dynamic:	p_e max. 13 bar	
Max. permissible bellows pressure:	p_e max. 20 bar	
Service temperature:	-40°C to +80°C	
Working range (charging and exhaust)	45°	
Nominal diameter/type:	1.3	
Actuation side:	left and right	
Dead angle at 7-8 bar:	2°	
Ports:	1, 21, 22	= M 21 x 1.5
	12, 23	= M 16 x 1.5
Tightening torque for ports	1, 21, 22	= 12 to 15 Nm
Tightening torque for ports	12, 23	= 20 to 25 Nm
Port designation:	1/12	= /2. Supply port
	21/22/23	= 1./2./3. Delivery port
	3	= exhaust

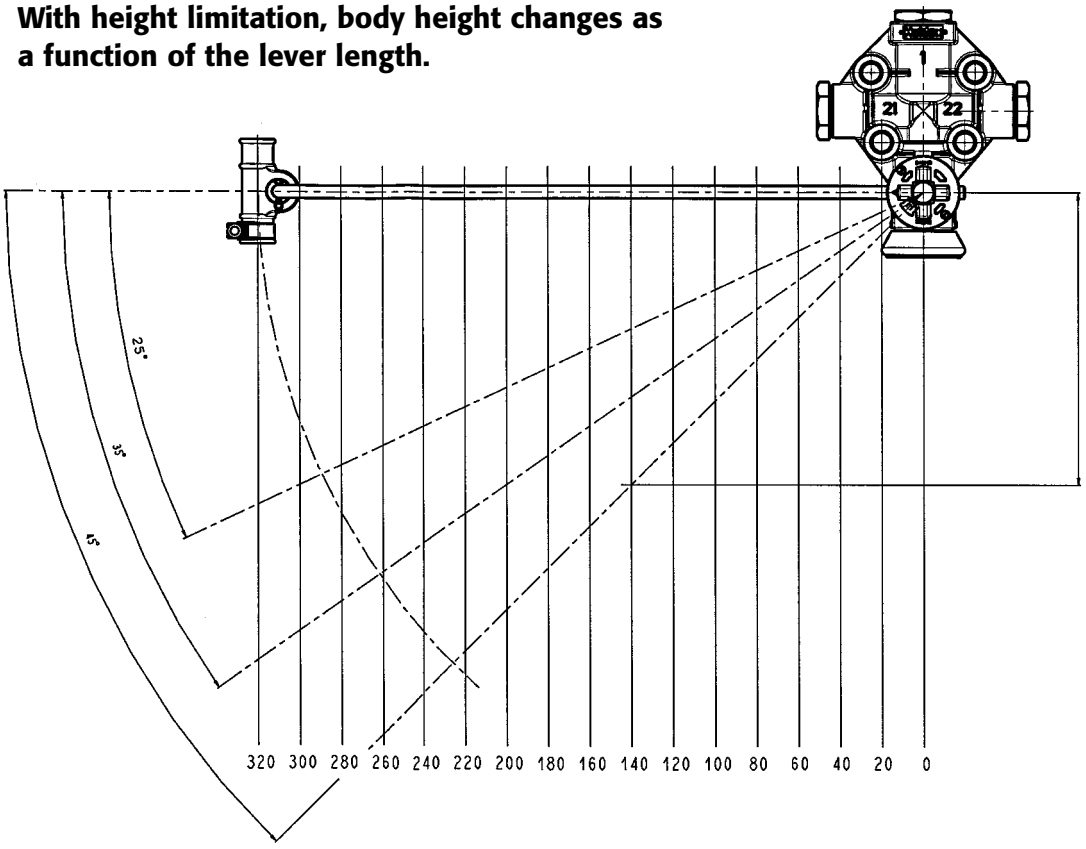
Versions

612 032 001

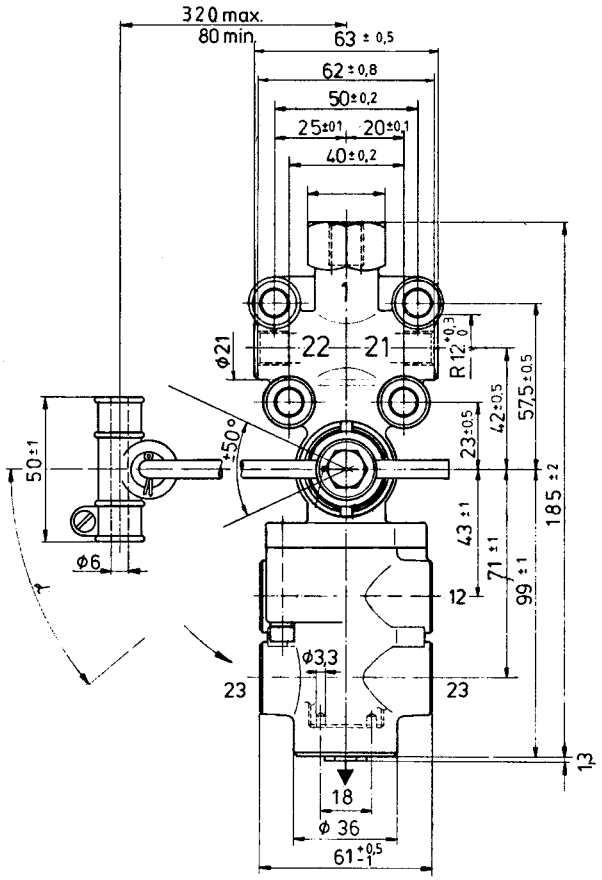
Adjusting key 904 054 001

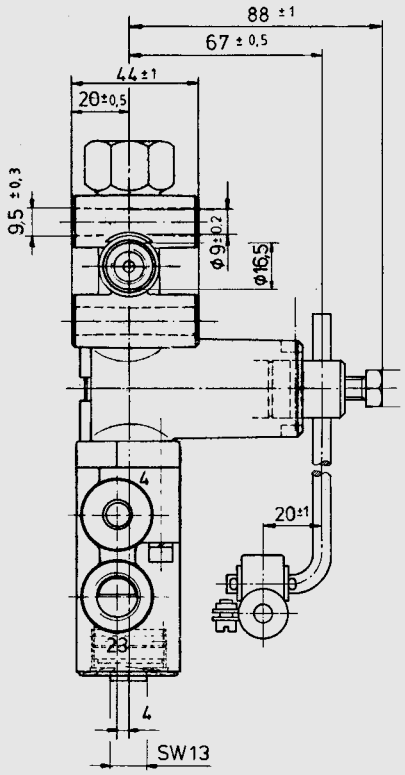


With height limitation, body height changes as a function of the lever length.



	Linkage distance														
Deflection	60	80	100	120	140	160	180	200	220	240	260	280	300	320	
45°	60.0	80.0	100.0	120.0	140.0	160.0	180.0	200.0	220.0	240.0	260.0	280.0	300.0	320.0	height changing


320 max.
80 min.
63 ± 0,5
62 ± 0,8
50 ± 0,2
25±0,1
20±0,1
40 ± 0,2
1
22
21
ø21
R12 +0,3 0
50±1
±50°
ø6
23±0,5
42±0,5
57,5±0,5
185 ±2
43 ±1
71 ±1
99 ±1
12
23
23
ø3,3
13
18
ø 36
61 -0,5 -1

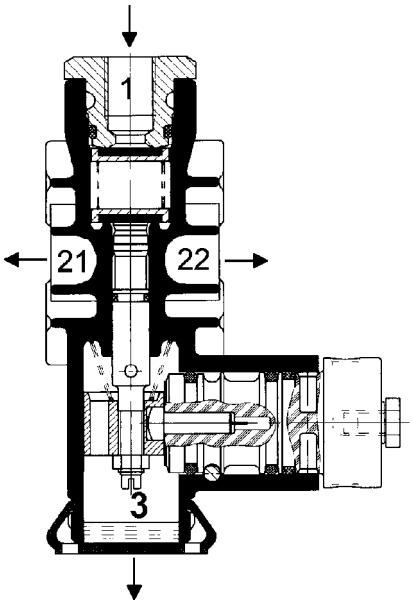

88 ±1
67 ± 0,5
44 ±1
20±0,5
9,5 ±0,3
ø9±0,2
ø16,5
4
20±1
23
4
SW13

Application

The levelling valve is installed as a level control valve for load depended control using the air bellows of vehicles with air suspension. Depending on the version, additional functions, such as 2. drive height, through a lap position control are possible.

Operation

Levelling valves are fixed to the vehicle chassis and connected to the axle via. a control lever and linkage. With the vehicle or trailer stationary the valve is in a state of rest in the so called lap position, i.e. both inlet as well as outlet is closed. By loading the vehicle the chassis (frame) moves down toward the axle, this way the linkage and the control lever are lifted and the inlet port is opened. Supply air at port 1 now flows via the check valve, over the opened inlet, through the area between piston and inlet ports via connection 21 and 22 to the air bellows. The chassis (frame) is now raised until the control lever is horizontally again, and therefore in the lap position.



By unloading the vehicle the chassis is raised because of the higher bellows pressure. By means of the linkage the control lever moves down. The movement of the control lever transfers air from ports 21 and 22 to the piston, which opens on the downward trend and opens the outlet. Through the open outlet air now flows from the air bellows out to atmosphere, whereby the chassis (frame) again is lowered to the drive position, (levelling valve control lever horizontal). On vehicles with only one levelling valve per axle (bogie), the air bellows of the left and right side will be supplied with air from this one levelling valve. To avoid instability on cornering valves are fitted with a cross restriction. Through a particular design the inlet valve part will provide a delayed pressurization between connection 21 and 22 on the left and right side of the vehicle (when exchanging valves use only the same Part No).

On versions with a lap position control a 2nd drive height is available. With it a so-called kneeling (one sided lowering of the chassis) is possible e.g. on buses or vehicles with lift axles. This levelling valve is controlled over an external control port and shifts the lap position. Therefore it is possible to raise or lower the chassis around a certain value. On lifted axles the wheels do not touch the ground when passing over uneven ground i.e. speed bumps, therefore reduced tyre wear. A further use is the adjustment at different saddle heights.

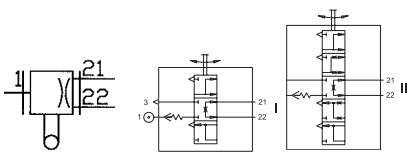
Assembly instructions

Mechanical

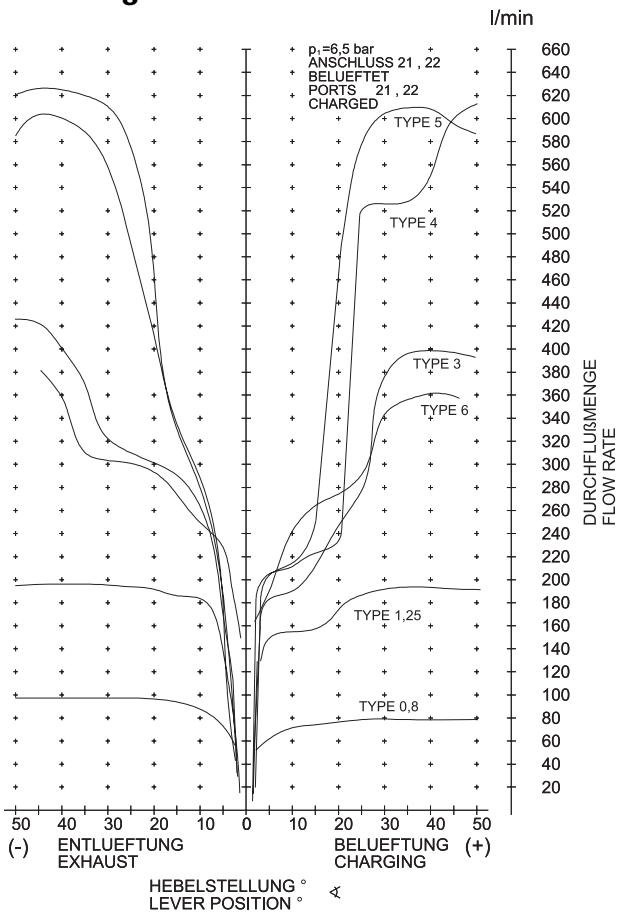
The levelling valve has to be installed vertically with exhaust port at bottom. For fixing use at least two M8 screws. Where only one valve per bogie is used the valve must be located in the area of the middle of the axle.

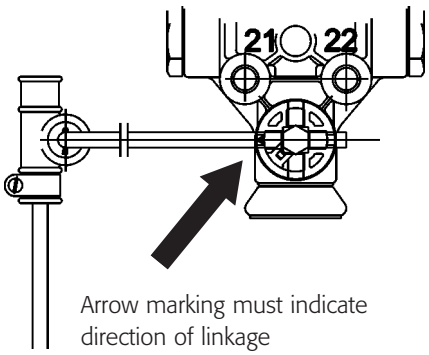
The freedom of movement of the centre axle is to be checked. The linkages are to be installed distortion free.

Symbol



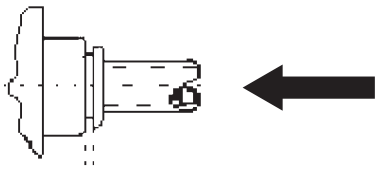
Flow Diagram



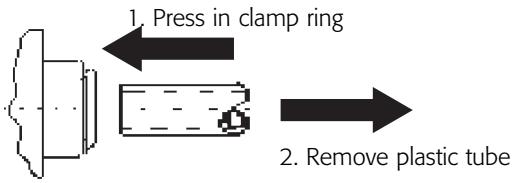


Arrow marking must indicate direction of linkage

Assembly of plastic tube



Dismantling plastic tube



Pneumatic

On valves with push-in fittings use only nylon pipes 8x1 in accordance with DIN 74 324 or $^1/_4$" x 0,04 in accordance with SAE J844. When assembling the nylon pipes, care should be taken to ensure that the pipes are cut square, to the required length and are free from burrs. Before inserting the pipes in the push-in fittings support sleeves, e.g. in accordance with HALDEX order number 032 0490 09 should be installed in the ends of the pipes. Pipes are to be inserted at least 22 mm deep in the connections.*

In the event of paint/coating work all open connections including the exhaust port should be protected by suitable means to avoid penetration of the paint/coating. After painting/coating remove this protecting material.

In the supply coming from the air reservoir a line filter should be installed (to guard against pollutants).

Setting

After installation of the valve and connecting the pipe fittings the length of the connecting rod must be determined between axle and valve, after the vehicle chassis has been set at the desired height (vehicle manufacturer- specification). The raising of the frame or chassis to this desired height is reached by lifting the control lever in position "charging". At this process the air bellows are inflated with air.

At reaching the desired height the control lever must be positioned immediately in the lap position, which can be the horizontal position (depend to version), and fix it with a locking pin (d=4h8) on housing and on bore of the spindle. The actual length of the connecting rod between the linkage to axle and the linkage at the control lever can now be determined, and the connecting rod can be fastened. The connecting rod is to be connected using the rubber linkages and fastened with the hose clamps supplied

LAST OF ALL: (REMOVE LOCKING PIN)

After removal of the retaining ring it is possible to remove the plastic pipe by pushing the clamp ring in. (e.g. to replace valve).

Ex factory the lap position is set horizontal to the control lever (excluding versions 612 036 001 / 051 001 / 011. If not in the lap position it can be adjusted to the horizontal position by the following method:

To lock the lap position, use pin d = 4h8 x 20 DIN 7 fix spindle as well as linkage (d = 6 mm) in horizontal position. Remove the rubber boot and filter pad. With a screwdriver turn the valve tappet so far, that neither a rise nor drop in pressure occurs. As an alternative an adjustment at the linkage to axle 612 025 001 is possible: loosen counter nut and shift angles at the axle bracket accordingly. Tighten counter nut again.

Maintenance

If defects are noted during vehicle examinations or when driving, then the unit should be exchanged. When working with high pressure cleaners a distance of at least 50 cm should be observed. Missing exhaust caps are to be renewed.

Testing

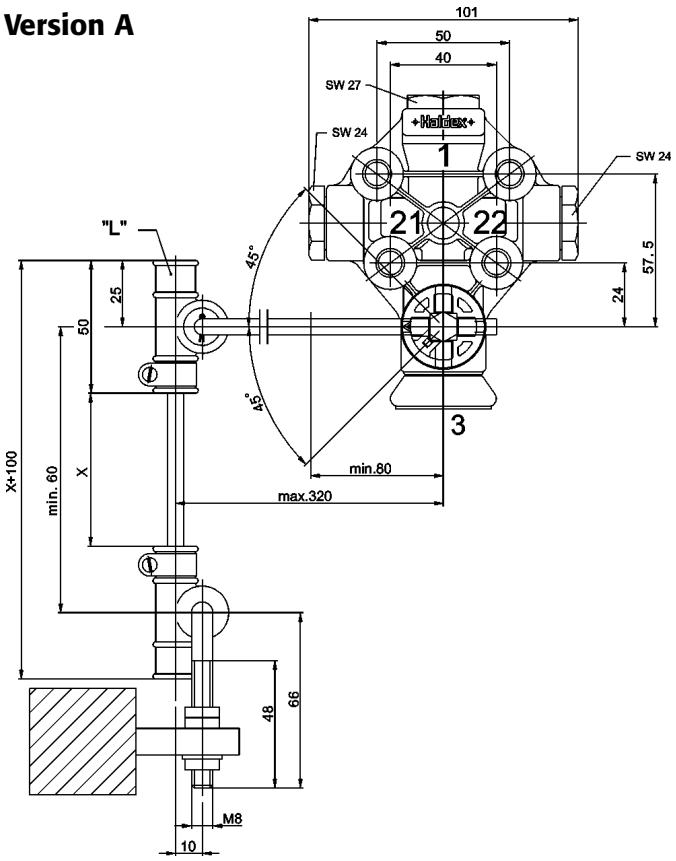
Check function and leak - tightness of the unit. In the lap position at the delivery ports 21, 22 neither rise of pressure nor drop of pressure may result. Free movement and condition of the linkage is to be checked, bent or welded linkages are to be exchanged. Brittle or hardened rubber pieces are to be renewed.

Technical data

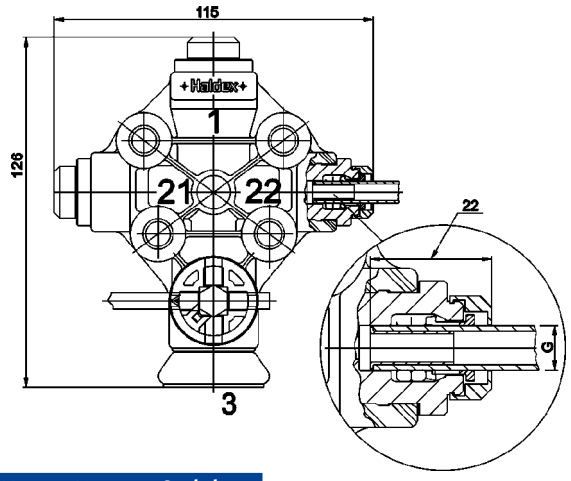
Operating pressure, dyn.:	p_e max. 13 bar
permitted dyn.bellow pressure:	p_e max. 20 bar
Operating temperature:	- 45°C to + 85°C
Operating range (charging - and exhausting):	45°
Side of control:	on the left and on the right
Dead angle at 7 - 8 bars:	2°
Port description:	1 = inlet port 2 = delivery port 3 = exhaust

Twisting the control levers around 180° equal function is reached like in drawn position within a tolerance.

Version A



Version B

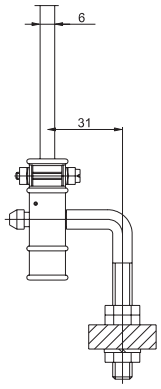


Versions

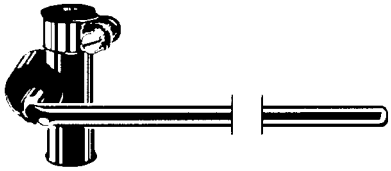
Order number	Version	Ports	Nominal width/type	Linkage 003 5757 09	Symbol
612 035 001	A	M 12 x 1.5	1.25	Without	I
612 035 011	A	M 12 x 1.5	1.25	Supplied loose	I
612 035 021	A	M 12 x 1.5	3	Supplied loose	I
612 035 031	A	M 12 x 1.5	4	Supplied loose	II
612 025 041	B	Push-in 8x1	1.25	Supplied loose	I
612 035 051	B	Push-in 8x1	3	Supplied loose	I
612 035 061	B	Push-in 8x1	4	Supplied loose	II
612 035 071	B	Push-in 8x1	5	Supplied loose	II

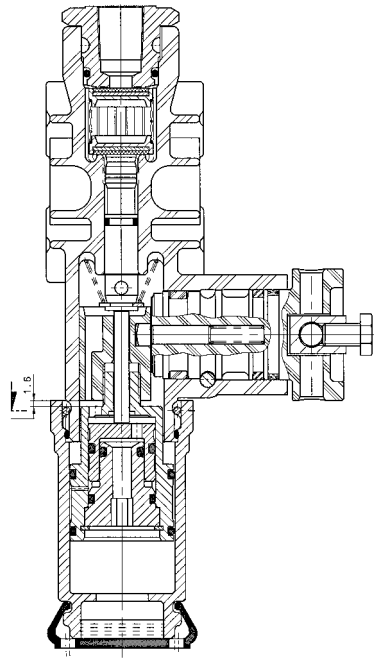
Other versions upon request

Linkage on axle: 612 025 001

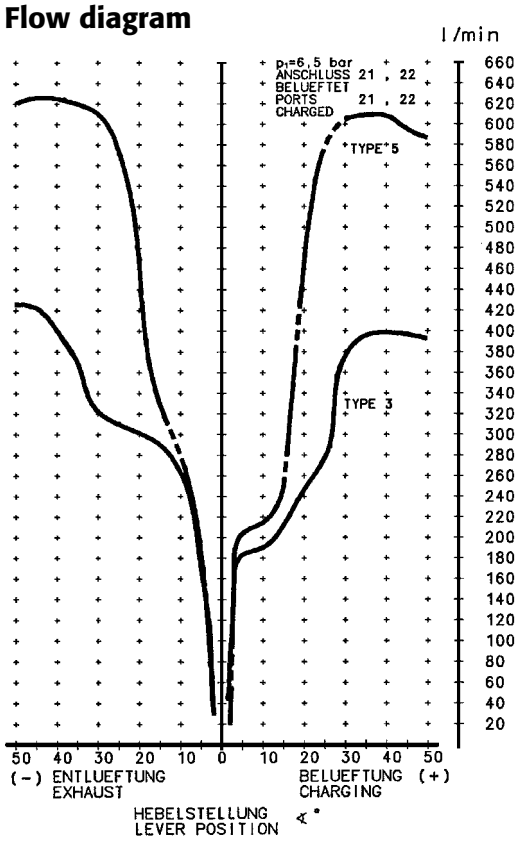


Linkage on valve: 003 5757 09

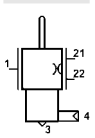




Flow diagram



Symbol



Use

The levelling valve is fitted as a level control valve for load-dependent control of the air spring bellows volume in vehicles with air suspension. This version provides a second ride height by means of a zero point adjustment.

Method of operation

see 612 035 ..

Operation of the zero point adjustment

When pressure is applied to port 4, the zero point in the valve is set to the value shown in the table by means of a tappet. This opens the inlet and the body is lifted in order to reach the neutral position.

The integrated construction of the zero point adjustment has the following advantages:

- "kneeling" with buses (lowering the body on one side) for more comfortable boarding and alighting by passengers
- a 2nd ride height on vehicles with lift axles, so that when the axle is lifted, the wheel does not contact the road surface when passing over unevenness in the ground, thus preventing increased tyre wear.
- can be matched to various trailer heights, thereby facilitating operations for the fleet operator.

Levelling valves with cross-restriction

see 612 035 ..

Installation instructions

see 612 035 ..

Adjusting the valves

see 612 035 ..

Testing

Test for operation and leaks.

The pressure should neither rise nor fall at the delivery ports 21, 22 in the neutral position.

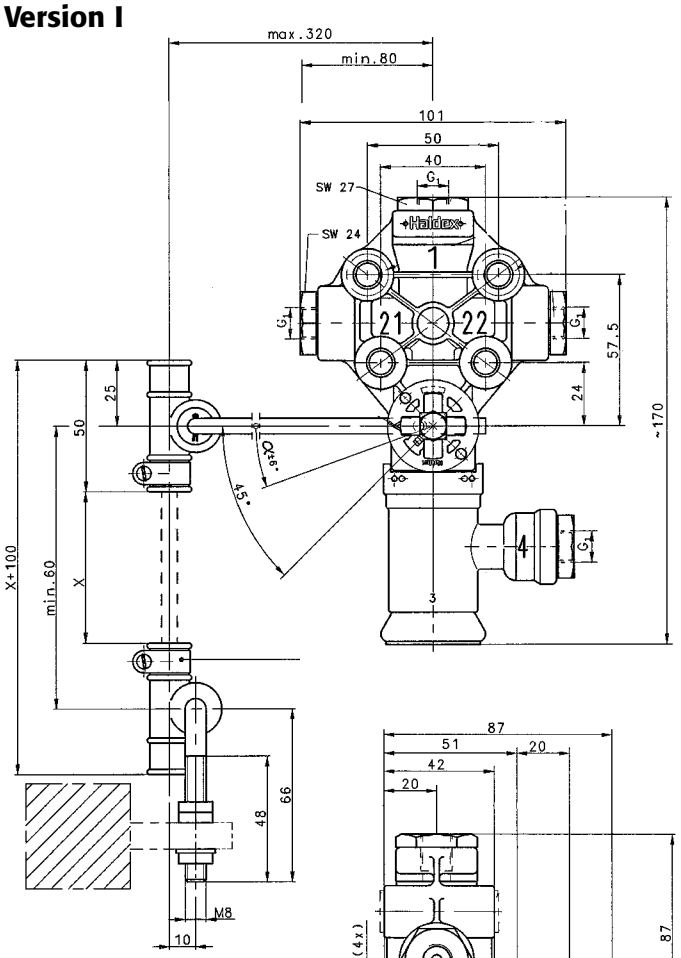
Check the linkage moves freely and is in good condition, replace if bent or welded. Replace hardened or brittle rubber parts.

Technical data

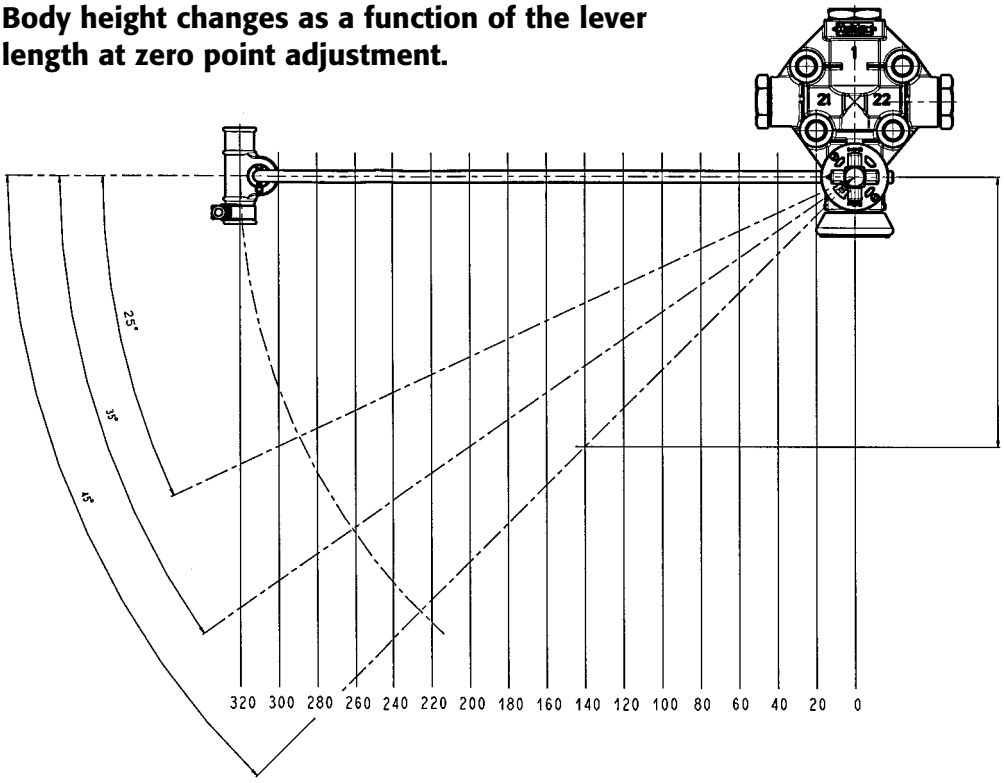
Service pressure, dynamic:	p_e max. 13 bar
Max. permissible bellows pressure:	p_e max. 20 bar
Service temperature:	-40°C to +80°C
Working range (charging and exhaust):	45°
Actuation side:	left and right
1st ride height dead angle at 7-8 bar:	2°
2nd ride height dead angle at 7-8 bar:	6°
Zero point adjustment:	see the table of versions
Necessary switching pressure:	6.5 bar
Port designation:	1 = supply port 21/22 = 1./2. Delivery port 3 = exhaust 4 = control port

If the actuator lever is twisted through 180°, the same function is obtained with a tolerance range of 3.5° for the first ride height and 6° for the second ride height, as for the setting shown in the drawing.

Version I



Body height changes as a function of the lever length at zero point adjustment.

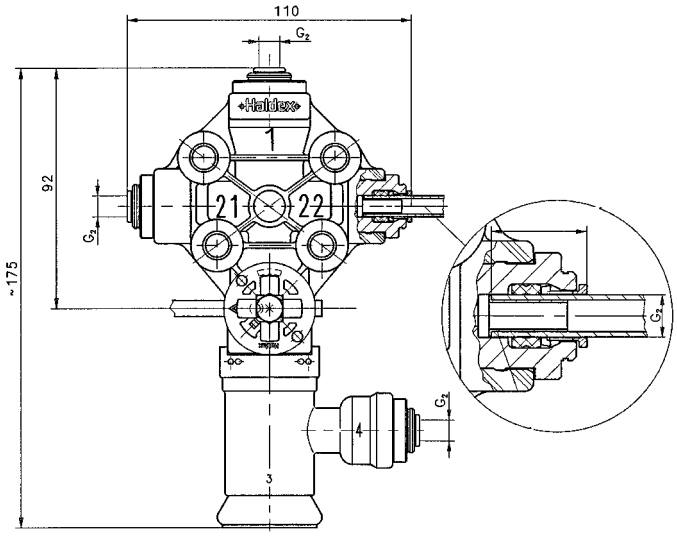


	Linkage distance														
Deflection	60	80	100	120	140	160	180	200	220	240	260	280	300	320	
25°	28.0	37.3	46.7	56.0	65.3	74.6	84.0	93.3	102.6	112.0	121.3	130.6	140.0	149.3	height changing
35°	42.0	56.0	70.0	84.0	98.0	112.0	126.0	140.0	154.0	168.0	182.0				height changing

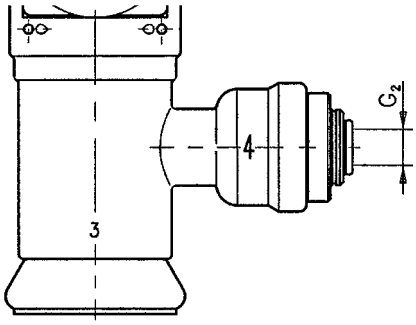
Versions

Part No	Version	Version: At "b" Port 4 turnt by 180°	Adjustment	Ports G1 Thread	Ports G2 Push-in for nylon pipe	Type	Linkage 003 5757 09
612 046 111	II	a	20°	-	8mm oder 5/16"	3	Fitted
612 046 112	II	b	20°	-	8mm oder 5/16"	3	Fitted
612 046 121	I	a	35°	1/4"-18NPTF	-	5	w/o
612 046 122	I	b	35°	1/4"-18NPTF	-	5	w/o
612 046 131	II	a	35°	-	8mm oder 5/16"	3	Fitted
612 046 132	II	b	35°	-	8mm oder 5/16"	3	Fitted
612 046 141	I	a	20°	1/4"-18NPTF	-	3	w/o
612 046 142	I	b	20°	1/4"-18NPTF	-	3	w/o
612 046 151	I	a	20°	M 12 x 1.5	-	3	w/o
612 046 152	I	b	20°	M 12 x 1.6	-	3	w/o

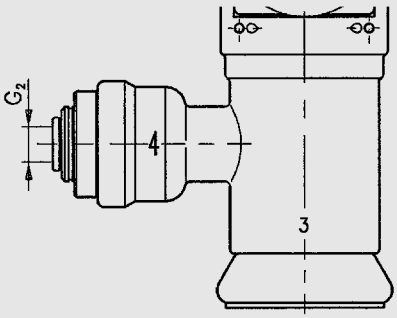
Version II



Version a



Version b



EB+ Function

The EB+ system features are a modular integrated construction, an encapsulated Electronic Control Unit (ECU) and Electro pneumatic relay valve/s (EPRV), over-moulded connectors, integrated pressure transducers and a flash upgradeable programmable memory.

Onset of braking is denoted by either the presence of a demand on ISO11992 data link (CAN) via ISO7638 connector.

Driver demand pressure is then determined electronically either by the data link or control line pressure transducer within the EPRV's assembly.

The demand pressure is then modified using data from the air suspension (Electronic Load Sensing), and may be further modified when a wheel speed sensor detects imminent locking of the sensed wheels.

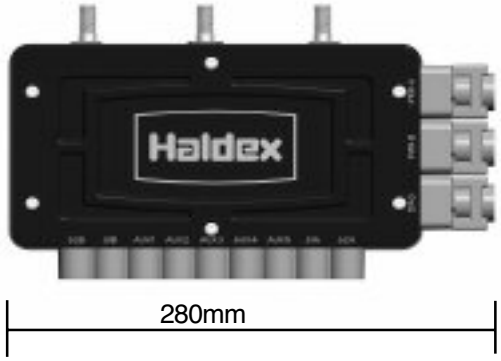
The output to the brakes exercised by the ECU control off the EPRV's. This provides drivers with a more accurate and controlled braking efficiency with reduced brake pad wear and lower operating costs to the trailer.

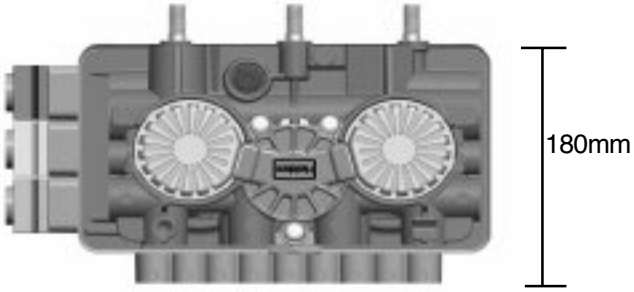
EB+ Installation

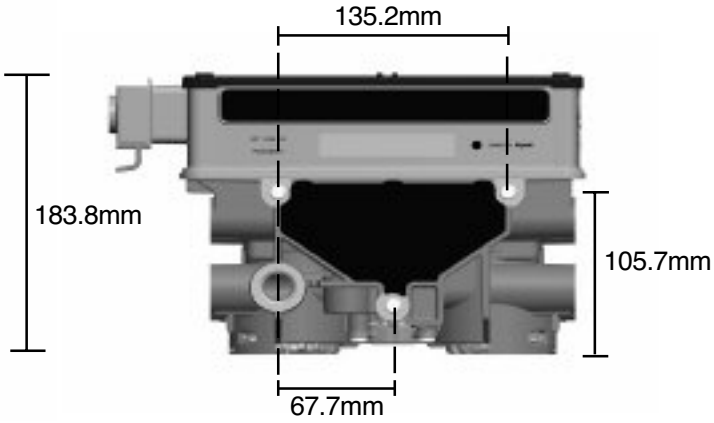
The first generation of EB+ can be configured either axle by axle or side by side. The pages that follow this section, display how to pipe EB+ depending on the trailer.

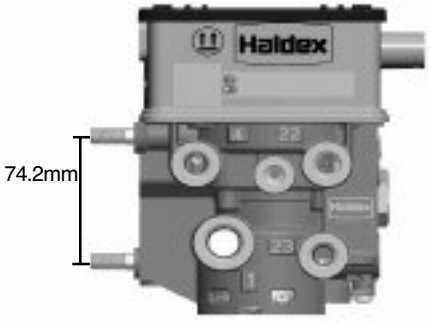
ABS + ELS + CAN unit with a dual modulator valve
Working pressure: Air 0 - 8.5 bar (9.5 bar max)
Operating voltage: 24Volts DC (19V Min. to 32V Max.)
Current consumption: 3.2 Amps peak.
Operating temperature: -40°C to +70°C
Operating Medium: Air
Exciter: 60 to 120 teeth

EB+ Generation 2 (5 Aux stability, with integrated QRV, DCV).





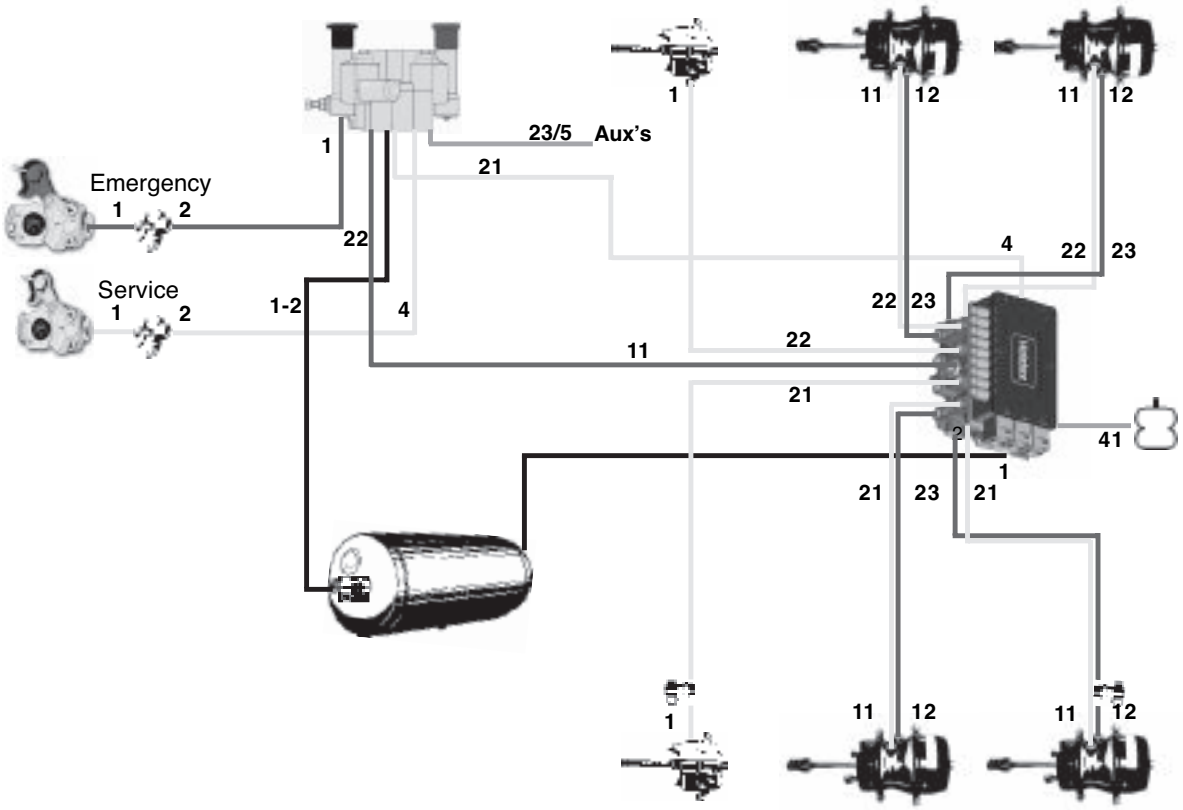




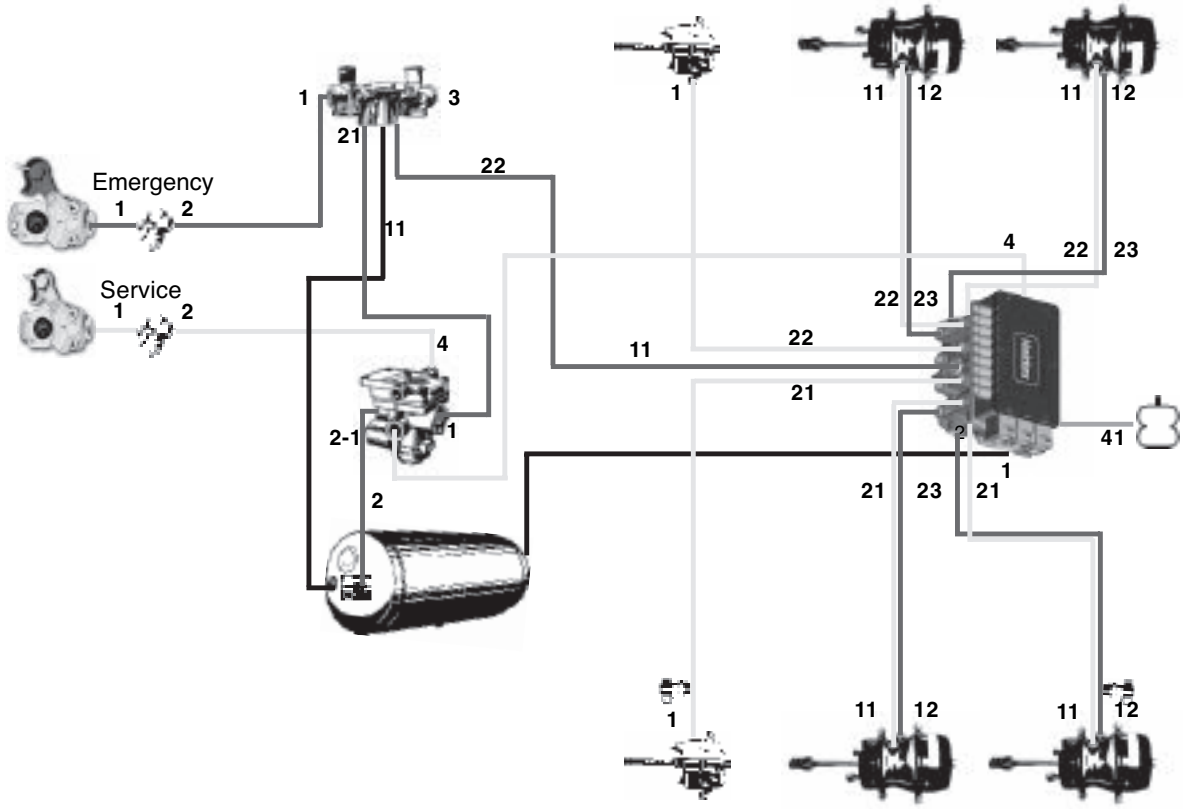
Part No	Description
820 005 001	2M 3 Aux stability, integrated QRV - anti compound
820 017 001	2M 3 Aux, integrated QRV - anti compound
820 007 001	2M 5 Aux stability, integrated QRV - anti compound
820 008 001	2M 5 Aux stability with super aux, integrated QRV - anti compound
820 019 001	2M 5 Aux, integrated QRV - anti compound
820 020 001	2M 5 Aux with super aux, integrated QRV - anti compound

Other variants available on request

3 axle Semi Trailer, 2 line air brake system, Spring brake chambers, Trailer Control Module



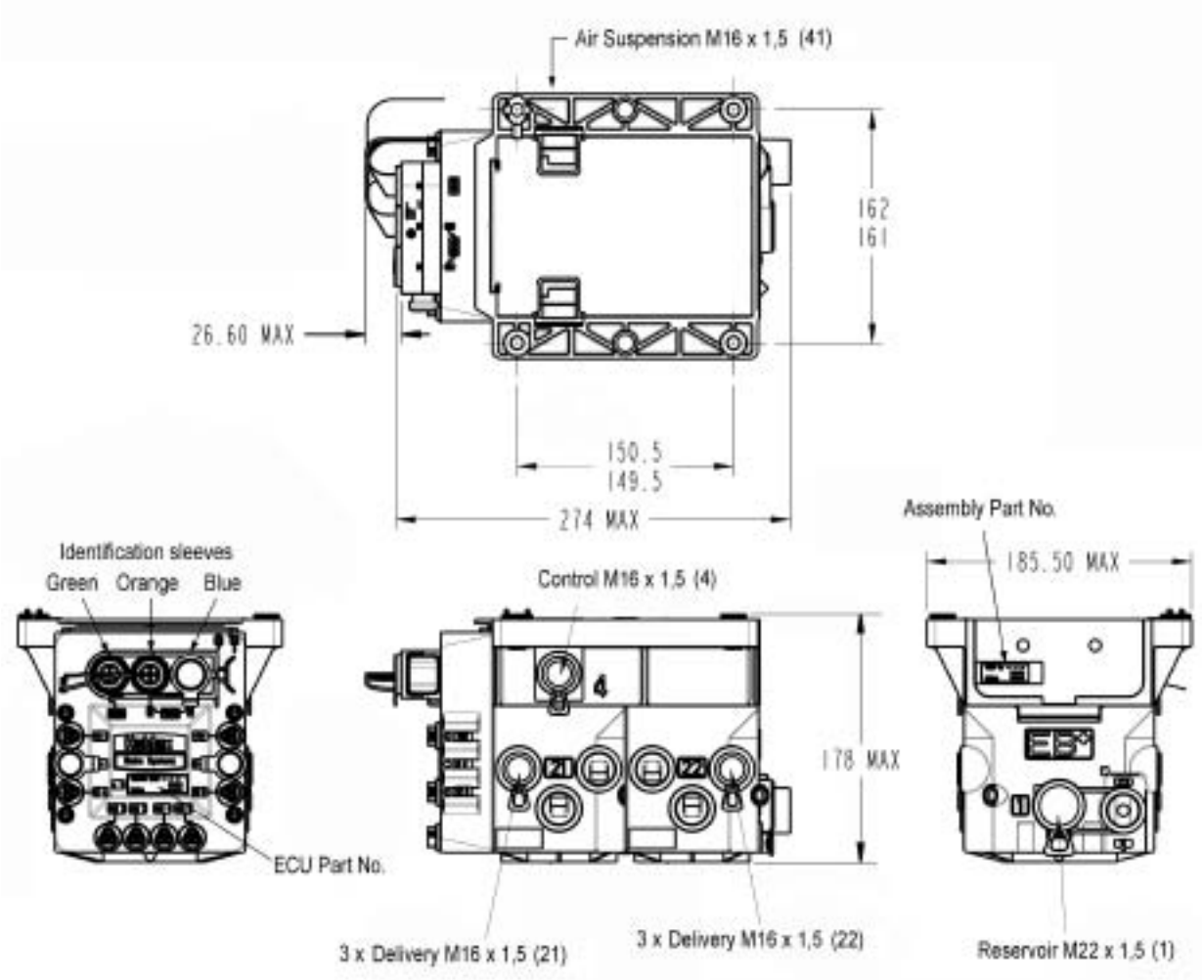
3 axle Semi Trailer, 2 line air brake system, Spring brake chambers, Combined Park & Shunt with REV



Semi / Centre AxleTrailers - 2M VALVE / ECU ASSEMBLY

ABS + ELS + CAN unit with a dual modulator valve

Material:	Plastic
Mass of assembly:	4.2Kg
Working pressure:	Air 0 - 8.5 bar (9.5 bar max)
Operating voltage:	24Volts DC (19V Min. to 32V Max.)
Current consumption:	2.2 Amps peak, 0.4 Amp nominal as brakes applied
Operating temperature:	-40°C to +70°C
Installation attitude:	±15°
Recommended fixing screws:	M8 x 1.25-6H, T 15Nm

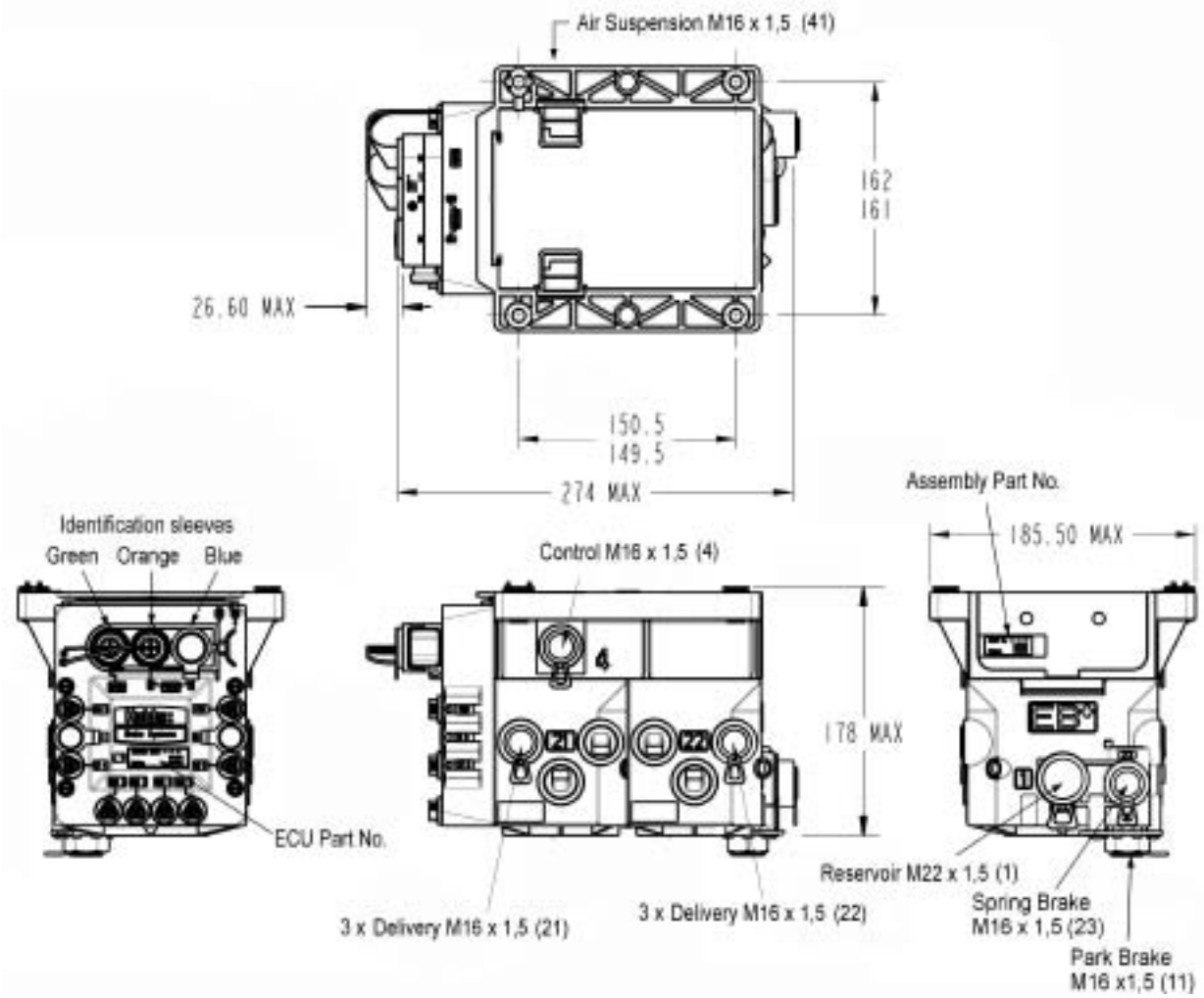


System	OE part number	AM part number	Note
4S/2M (5 AUX)	810 001 303	-	Replaces 810 001 301/302
4S/2M (5 AUX)	810 006 301	-	With Internal Accelerometer
2S/2M (3 AUX)	810 005 301	-	Replaces 810 012 001
2S/2M (3 AUX)	810 007 301	-	With Internal Accelerometer
2M ECU		950 800 201	
2M ECU		950 800 204	With Internal Accelerometer
2M Modulator		950 800 302	

Semi / Centre AxleTrailers - 2M VALVE / DCV / ECU ASSEMBLY

ABS + ELS + CAN unit with a dual modulator valve and Double Check Valve

Material:	Plastic
Mass of assembly:	5.35Kg
Working pressure:	Air 0 - 8.5 bar (9.5 bar max)
Operating voltage:	24Volts DC (19V Min. to 32V Max.)
Current consumption:	2.2 Amps peak, 0.4 Amp nominal as brakes applied
Operating temperature:	-40°C to +70°C
Installation attitude:	±15°
Recommended fixing screws:	M8 x 1.25-6H, T 15Nm

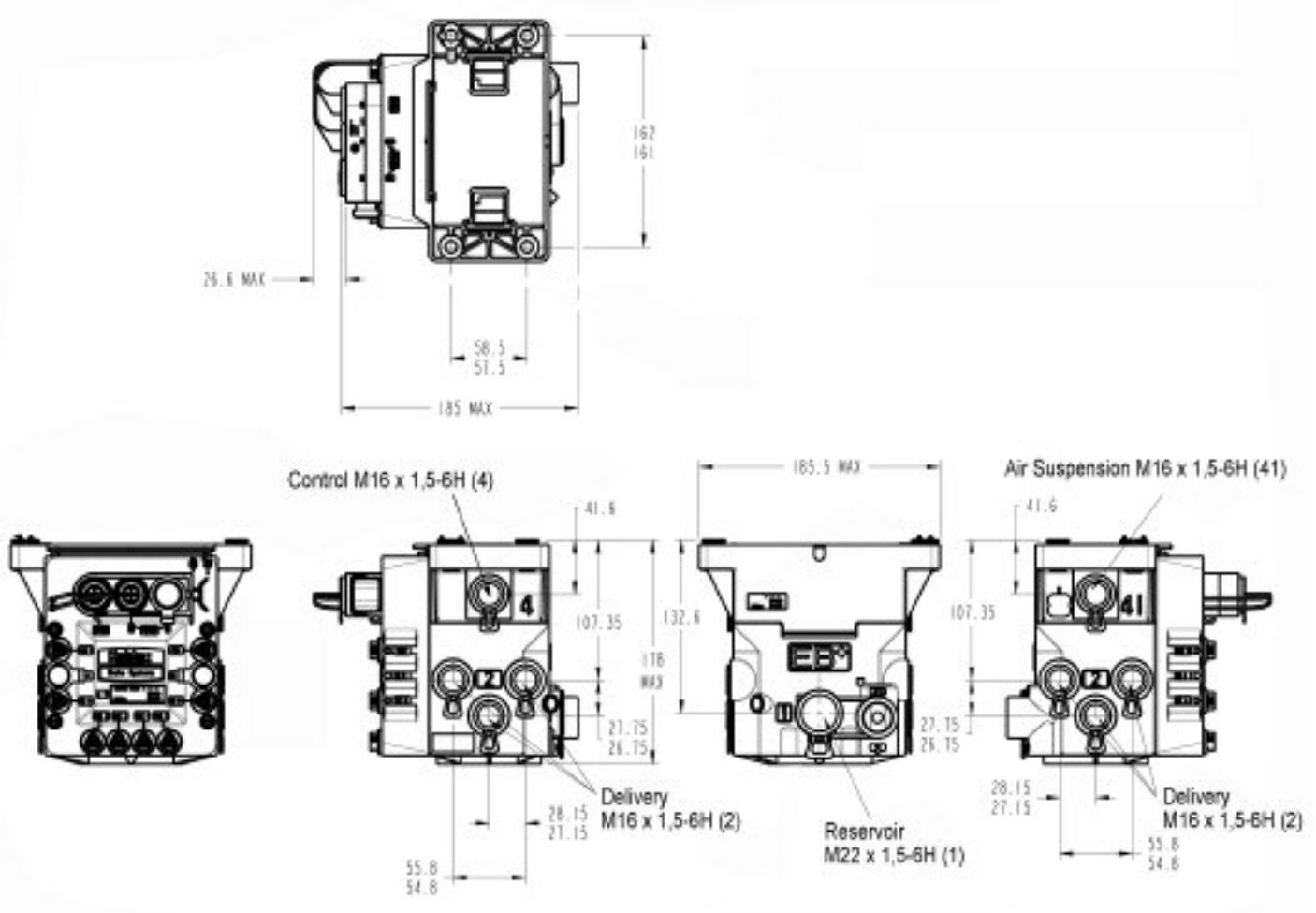


System	OE part number	AM part number	Note
4S/2M (5 AUX)	810 009 302	-	
4S/2M (5 AUX)	810 009 301	-	With Internal Accelerometer
2S/2M (3 AUX)	810 008 302	-	
2S/2M (3 AUX)	810 008 301	-	With Internal Accelerometer
2M ECU		950 800 201	
2M ECU		950 800 204	With Internal Accelerometer
2M Valve		950 800 305	With Integrated DCV
DCV		950 800 501	

Semi / Centre AxleTrailers - 1M VALVE / ECU ASSEMBLY

ABS + ELS + CAN unit with a single modulator valve

Material:	Plastic
Mass of assembly:	3.2Kg
Working pressure:	Air 0 - 8.5 bar (9.5 bar max)
Operating voltage:	24Volts DC (19V Min. to 32V Max.)
Current consumption:	1.6 Amps peak, 0.4 Amp nominal as brakes applied
Operating temperature:	-40°C to +70°C
Installation attitude:	±15°
Recommended fixing screws:	M8 x 1.25-6H, T 15Nm

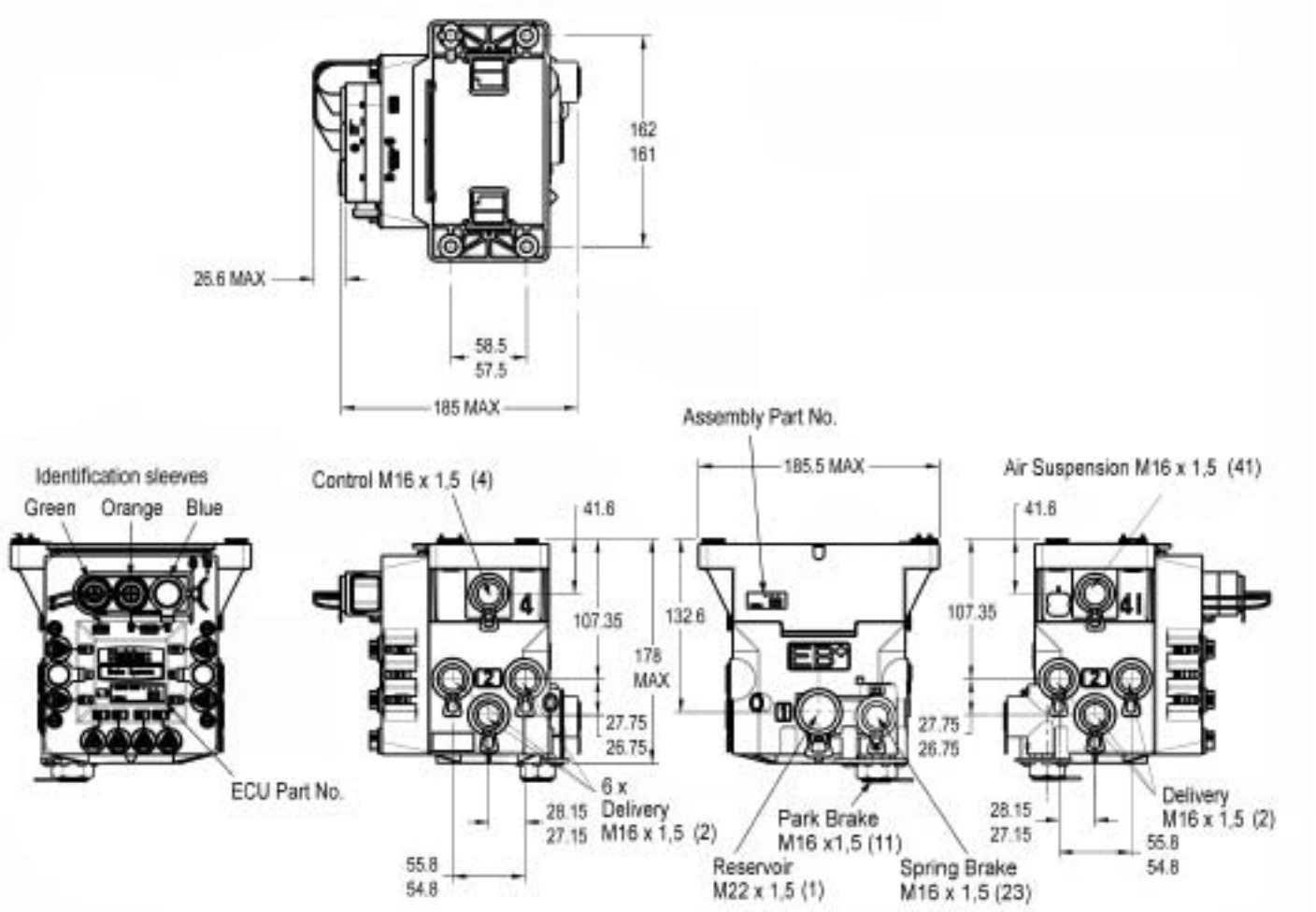


System	OE part number	AM part number	note
2S/1M (5 AUX)	810 001 102	-	Replaces 810 001 101
2S/1M (3 AUX)	810 004 101	-	Replaces 810 013 101
2S/1M (1 AUX)	810 003 101	-	Replaces 810 013 001
1M ECU		950 800 201	
1M Valve		950 800 303	

Semi / Centre AxleTrailers - 1M VALVE / DCV / ECU ASSEMBLY

ABS + ELS + CAN unit with a single modulator valve and Double Check Valve

Material:	Plastic
Mass of assembly:	3.65Kg
Working pressure:	Air 0 - 8.5 bar (9.5 bar max)
Operating voltage:	24Volts DC (19V Min. to 32V Max.)
Current consumption:	1.6 Amps peak, 0.4 Amp nominal as brakes applied
Operating temperature:	-40°C to +70°C
Installation attitude:	±15°
Recommended fixing screws:	M8 x 1.25-6H, T 15Nm



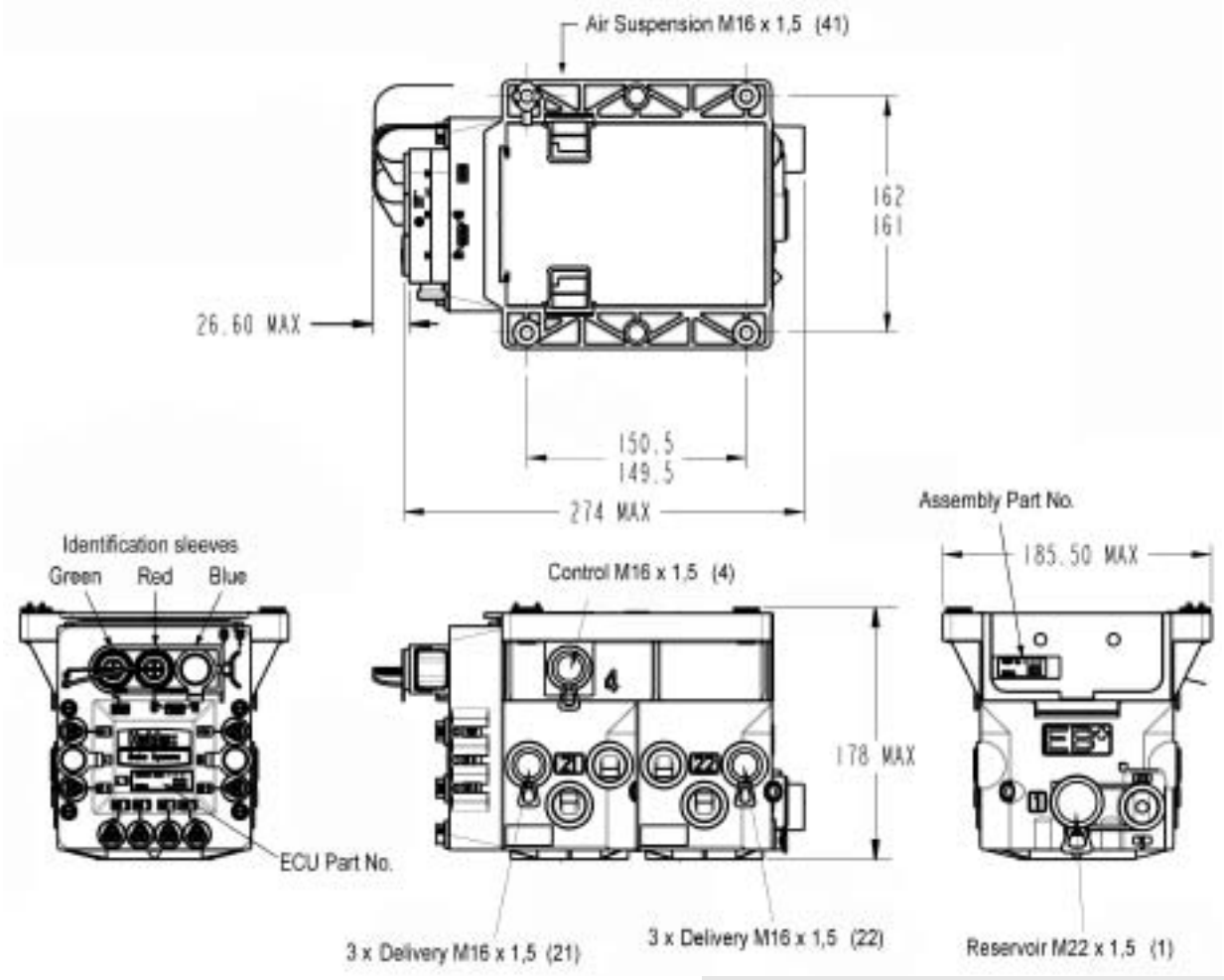
System	OE part number	AM part number	note
2S/1M (5 AUX)	810 007 101	-	
2S/1M (3 AUX)	810 006 101	-	
2S/1M (1 AUX)	810 005 101	-	
1M ECU		950 800 201	
1M Valve		950 800 306	with integrated DCV
DCV		950 800 501	

Full Trailers - 2M VALVE / ECU MASTER ASSEMBLY

2M

ABS + ELS + CAN unit with a dual modulator valve

Material:	Plastic
Mass of assembly:	4.2Kg
Working pressure:	Air 0 - 8.5 bar (9.5 bar max)
Operating voltage:	24Volts DC nominal (19V Min. to 32V Max.)
Current consumption:	3.8 Amps peak, 0.8 Amp nominal as brakes applied.
Operating temperature:	-40°C to +70°C
Installation attitude:	±15°
Recommended fixing screws:	M8 x 1.25-6H, T 15Nm

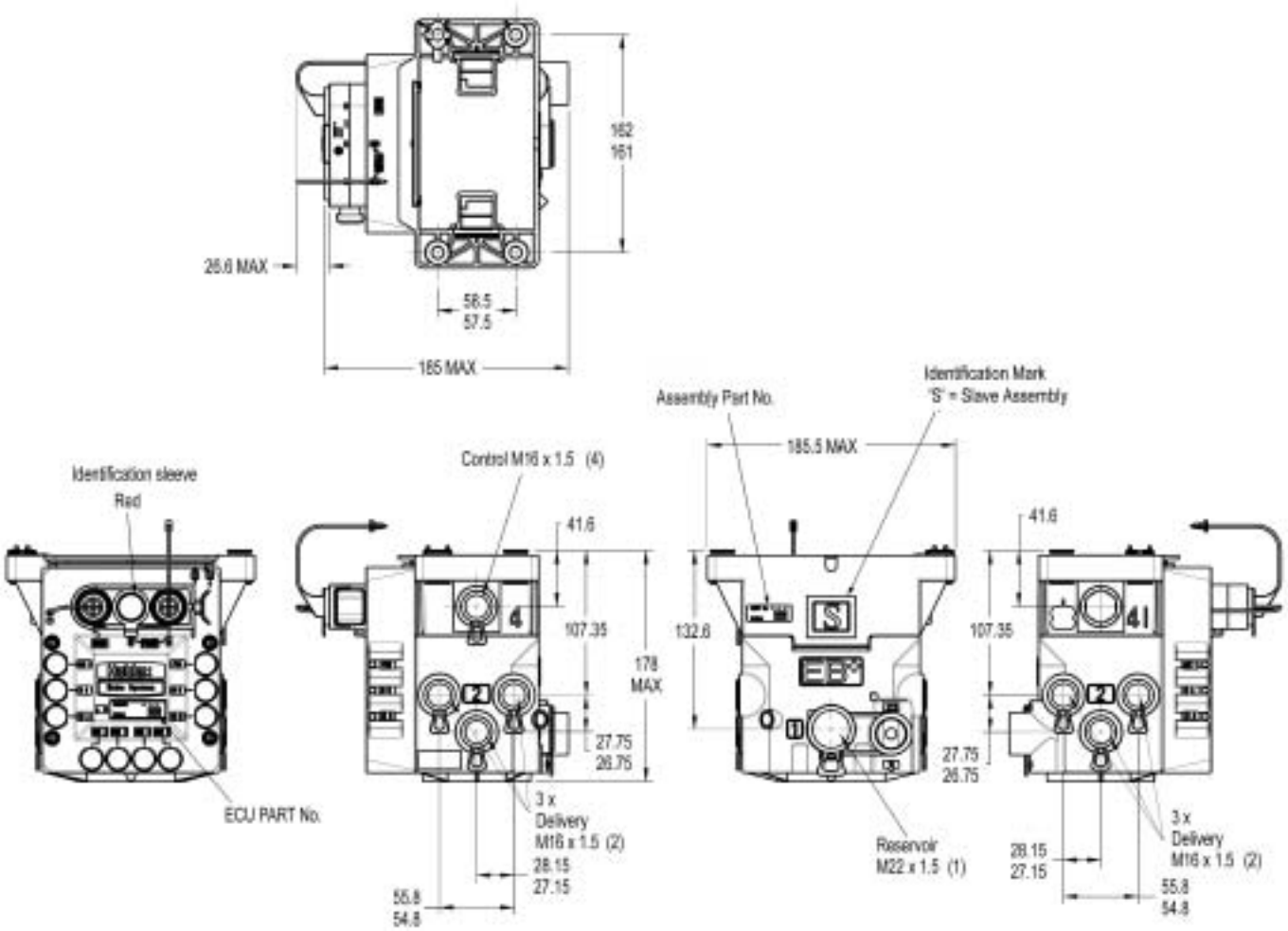


System	OE part number	AM part number	note
Master Assy.	810 010 002	-	Replaces 810 010 001
Master ECU		950 800 202	Used on 3M systems
Master Valve (2M)		950 800 302	Used on 3M systems

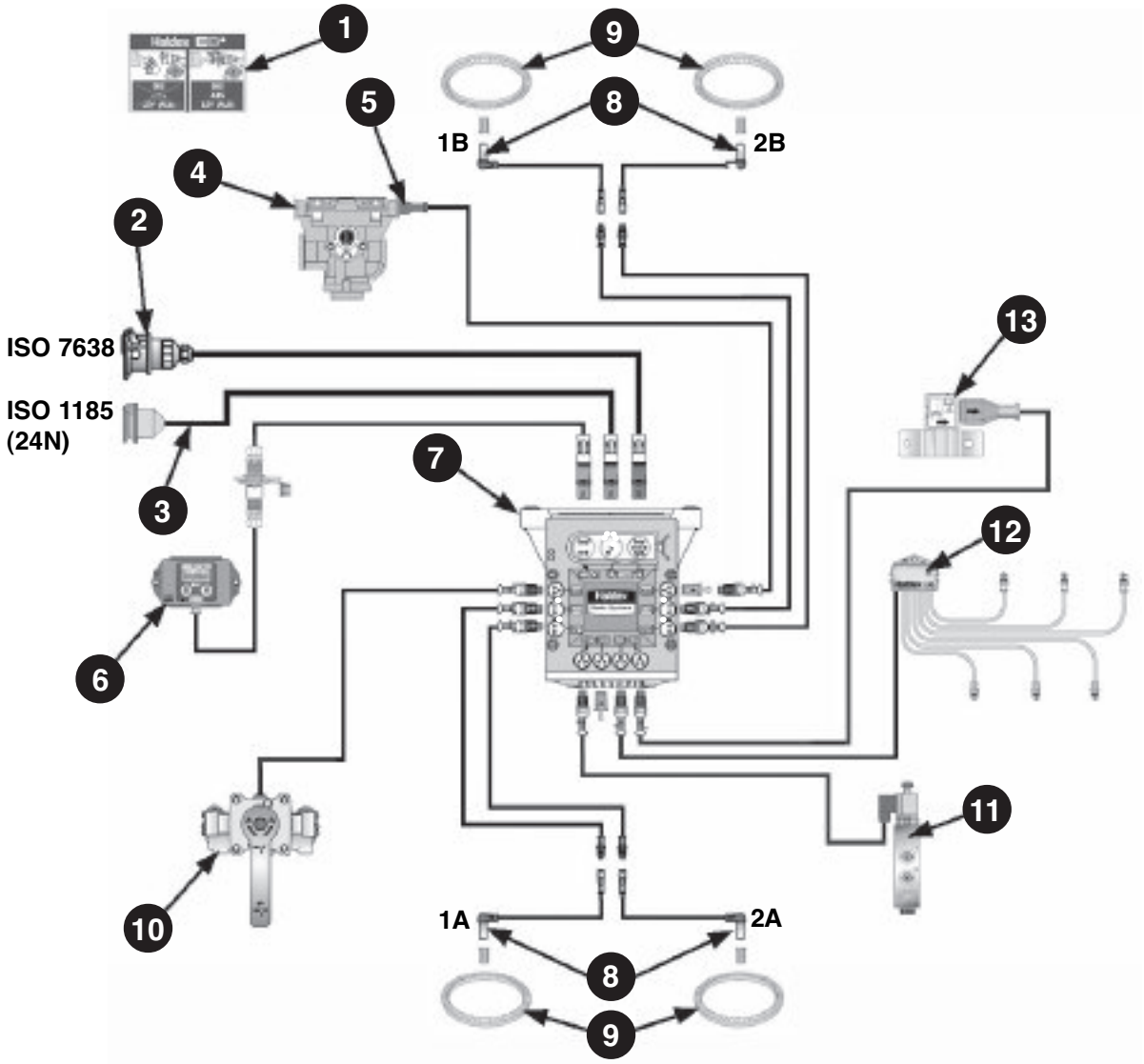
Full Trailers - 1M VALVE / ECU SLAVE ASSEMBLY

ABS + ELS + CAN unit with a single modulator valve

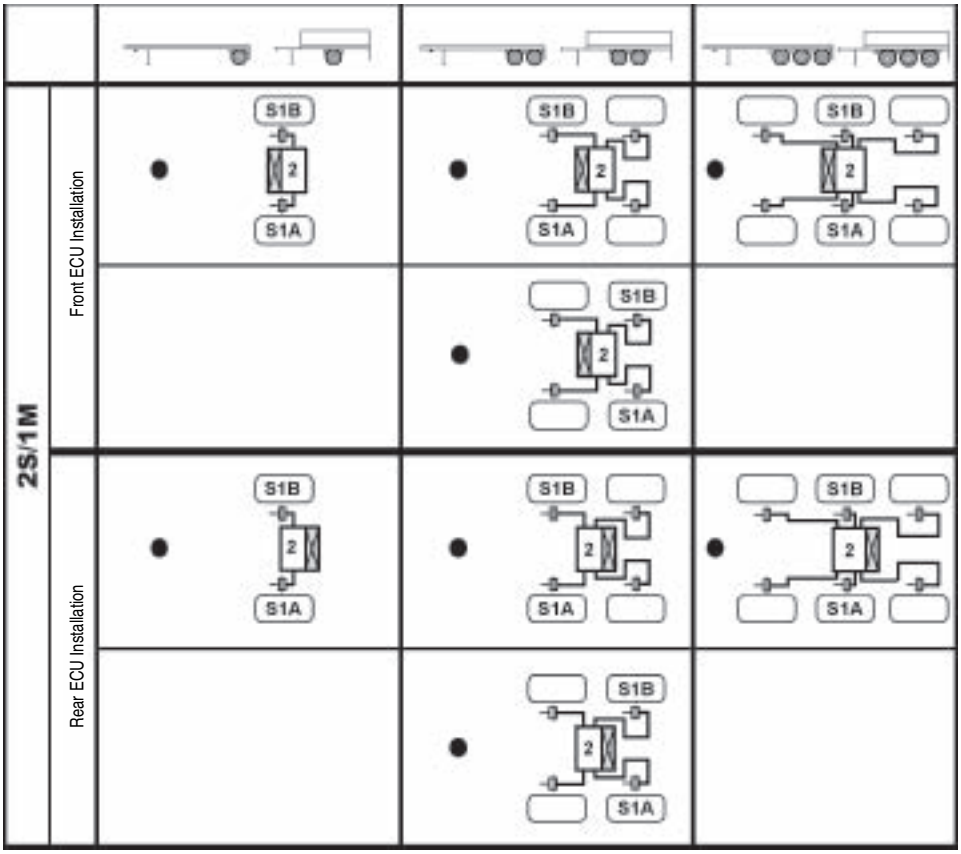
Material:	Plastic
Mass of assembly:	3.2 Kg
Working pressure:	Air 0 - 8.5 bar (9.5 bar max)
Operating voltage:	24Volts DC nominal (19V Min. to 32V Max.)
Current consumption:	Refer to 2M MASTER assembly
Operating temperature:	-40°C to +70°C
Installation attitude:	±15°
Recommended fixing screws:	M8 x 1.25-6H, T 15Nm



System	OE part number	AM part number	note
Slave Assy.	810 011 001	-	
Slave ECU		950 800 203	Used on 3M systems
Slave Valve (1M)		950 800 304	Used on 3M systems

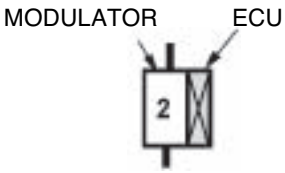


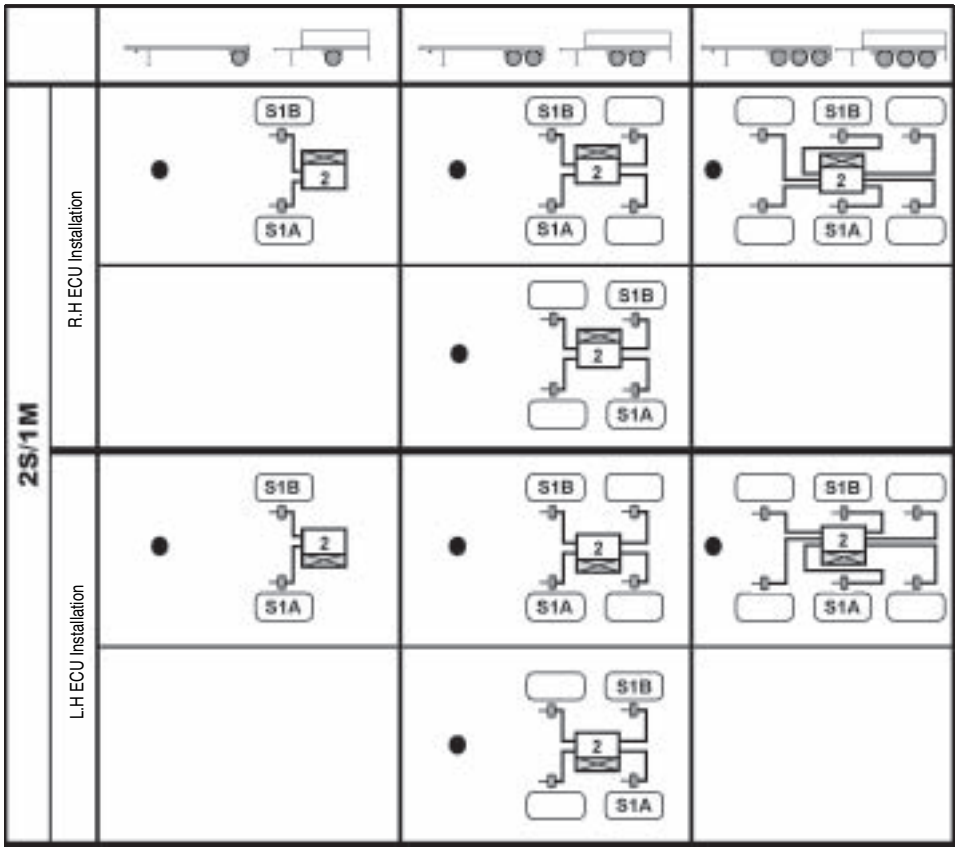
Item	Description
1	EB+ Label
2	ISO 7638 - 7 Pin Socket assembly
3	Saftey backup cable - ISO 1185 (24N)
4	Relay Emergency Valve
5	Pressure switch
6	EB+ INFO CENTRE (side of vehicle connection)
7	EB+ ECU and EPRV's assembly
8	Sensor assembly
9	Exciter
10	COLAS®
11	ILAS®-E
12	Lining Wear Sensing (LWS)
13	EB+ Stability



- Any axle without directly controlled wheels may be a lift axle
- Any axle may be a steered axle

Key

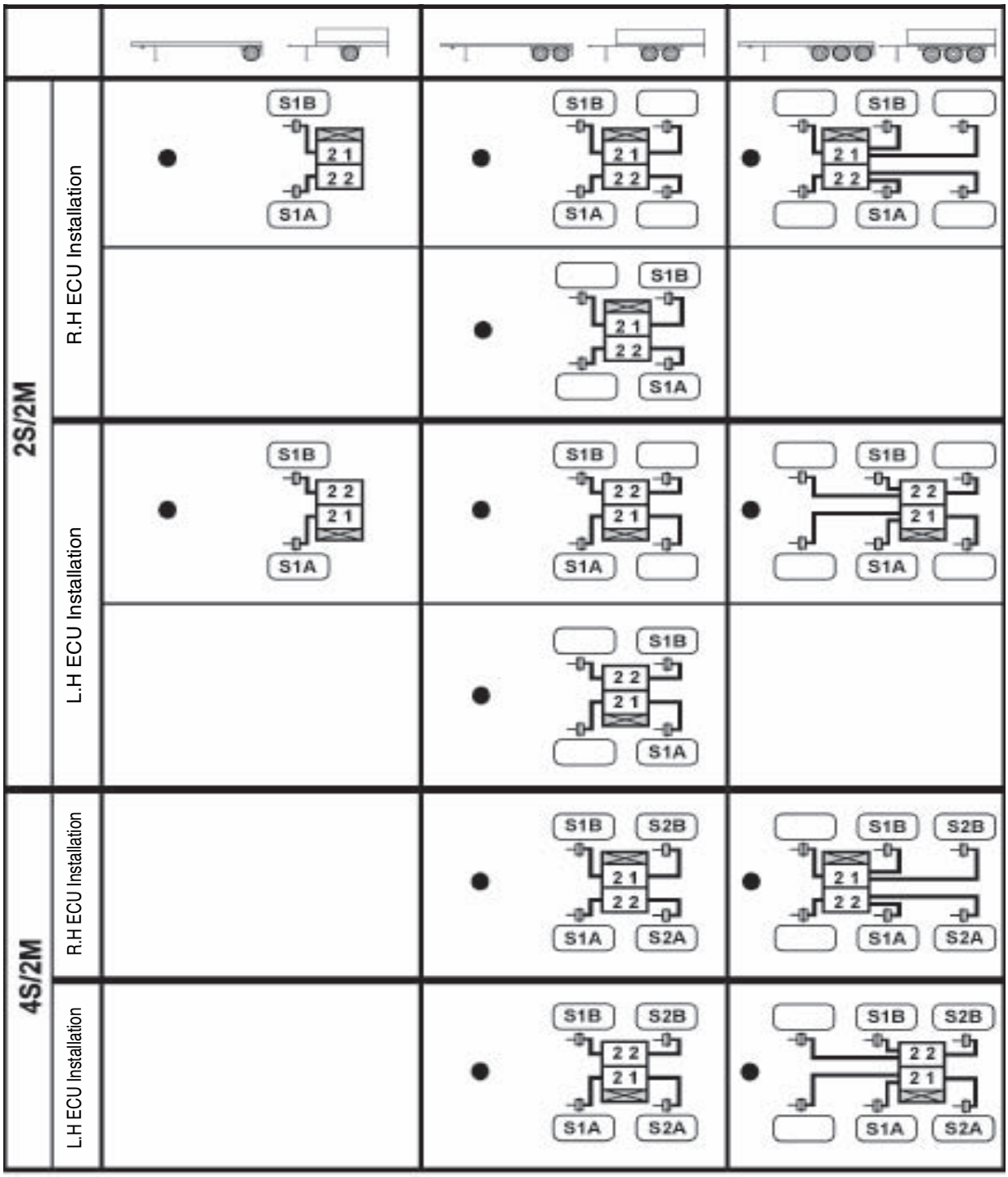




- Any axle without directly controlled wheels may be a lift axle
- Any axle may be a steered axle

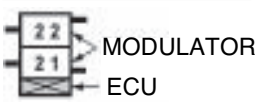
Key

Side by Side

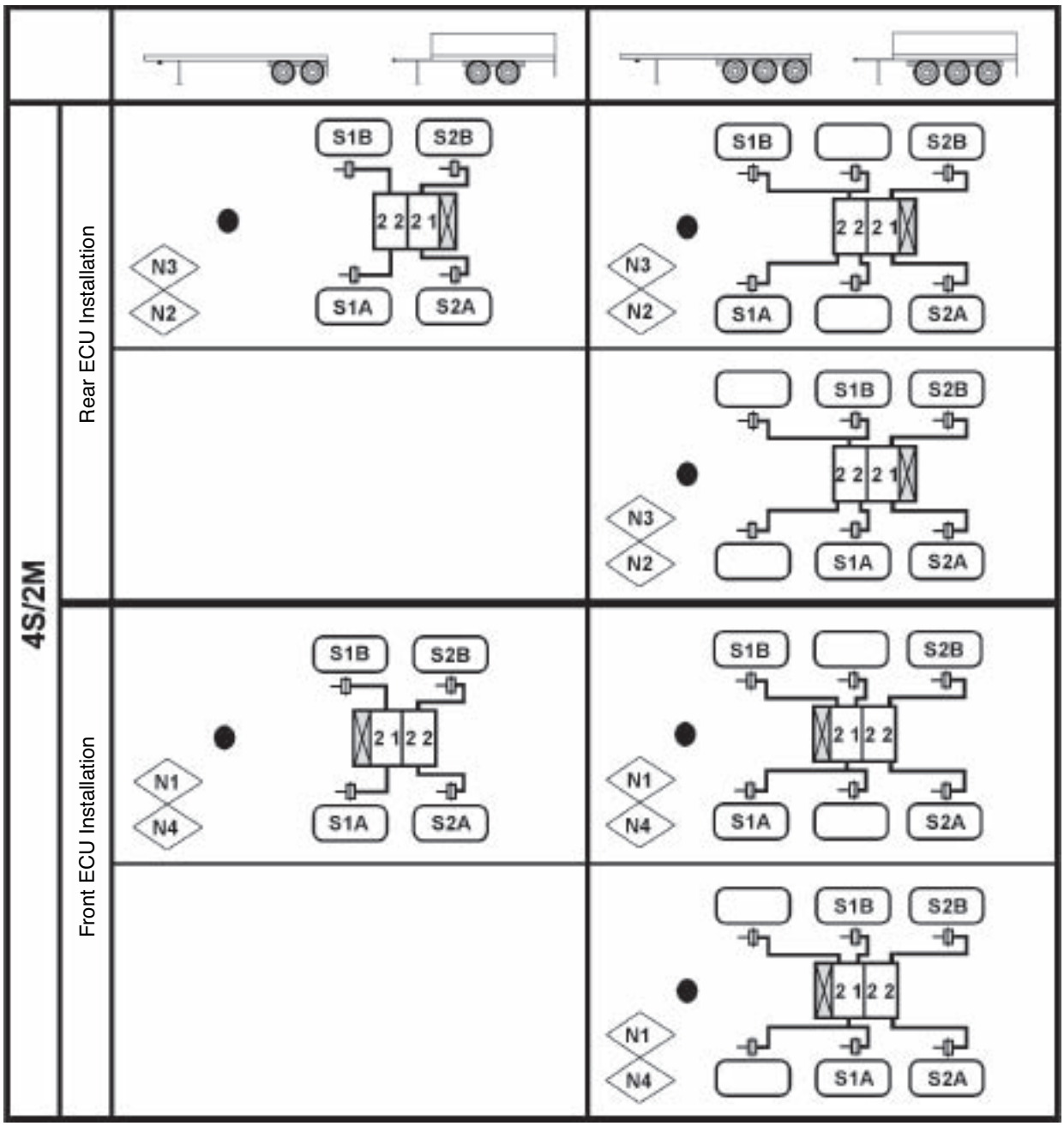


- Either (but only one) directly controlled azxle may be lifted
- Any axle without directly controlled wheels may be a lift axle
- Any axle may be a steered axle

Key



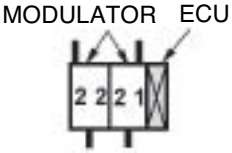
Axle by Axle - ASC Front, SL Rear



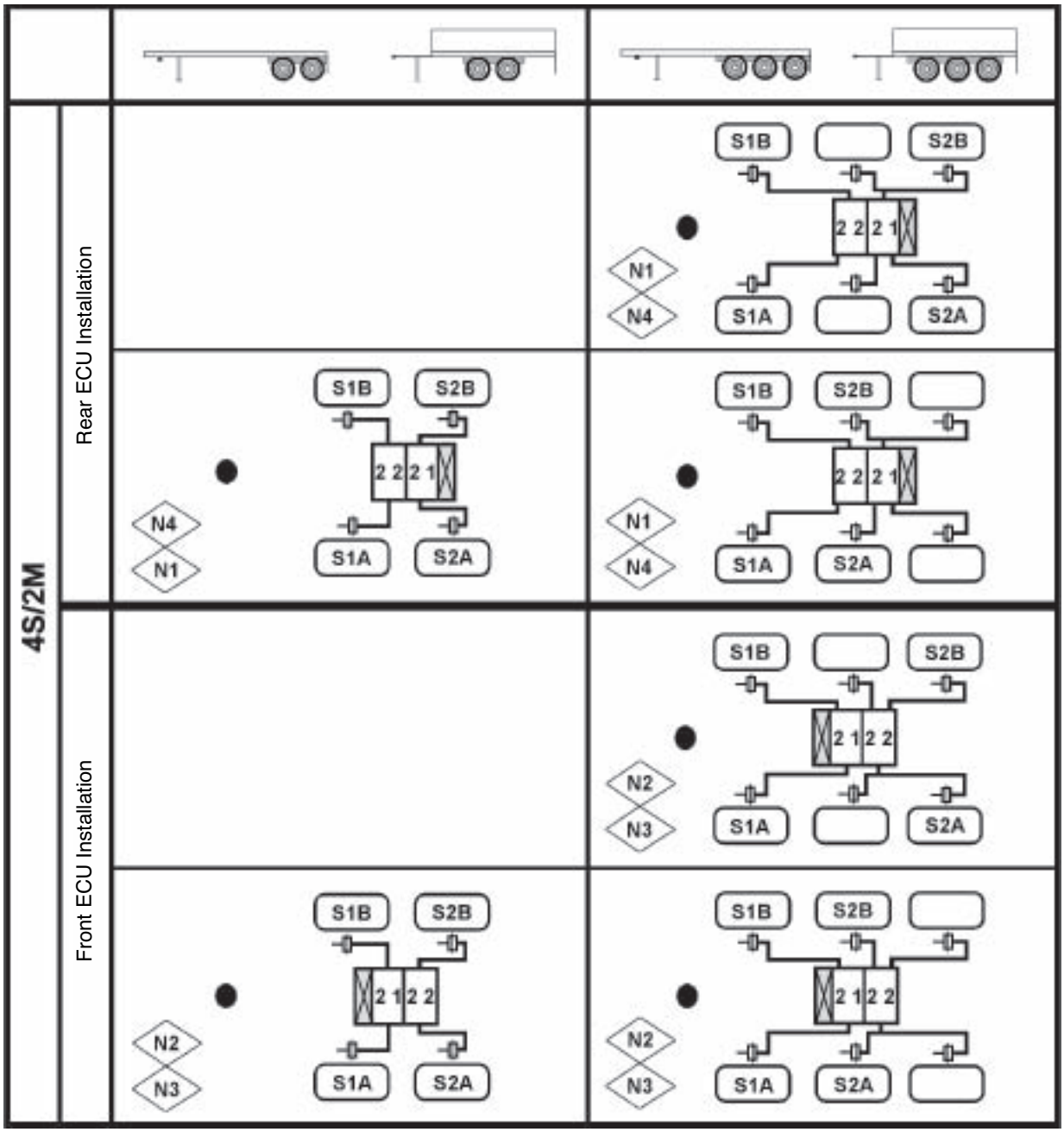
- **Sensed axles cannot be lifted**
- Any axle without directly controlled wheels (un-sensed) may be a lift axle.
- Any axle may be a steered axle.

N1-N4 Selectable options set by Haldex or Vehicle Manufacturer
N1 Adaptive surface control 21
N2 Select Low 21
N3 Adaptive surface control 22
N4 Select Low 22

Key



Axle by Axle - ASC Front, SL Rear

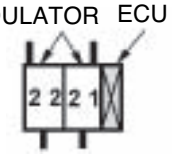


- **Sensed axles cannot be lifted.**
- Any axle without directly controlled wheels (un-sensed) may be a lift axle.
- Any axle may be a steered axle.

N1-N4 Selectable options set by Haldex or Vehicle Manufacturer
N1 Adaptive surface control 21
N2 Select Low 21
N3 Adaptive surface control 22
N4 Select Low 22

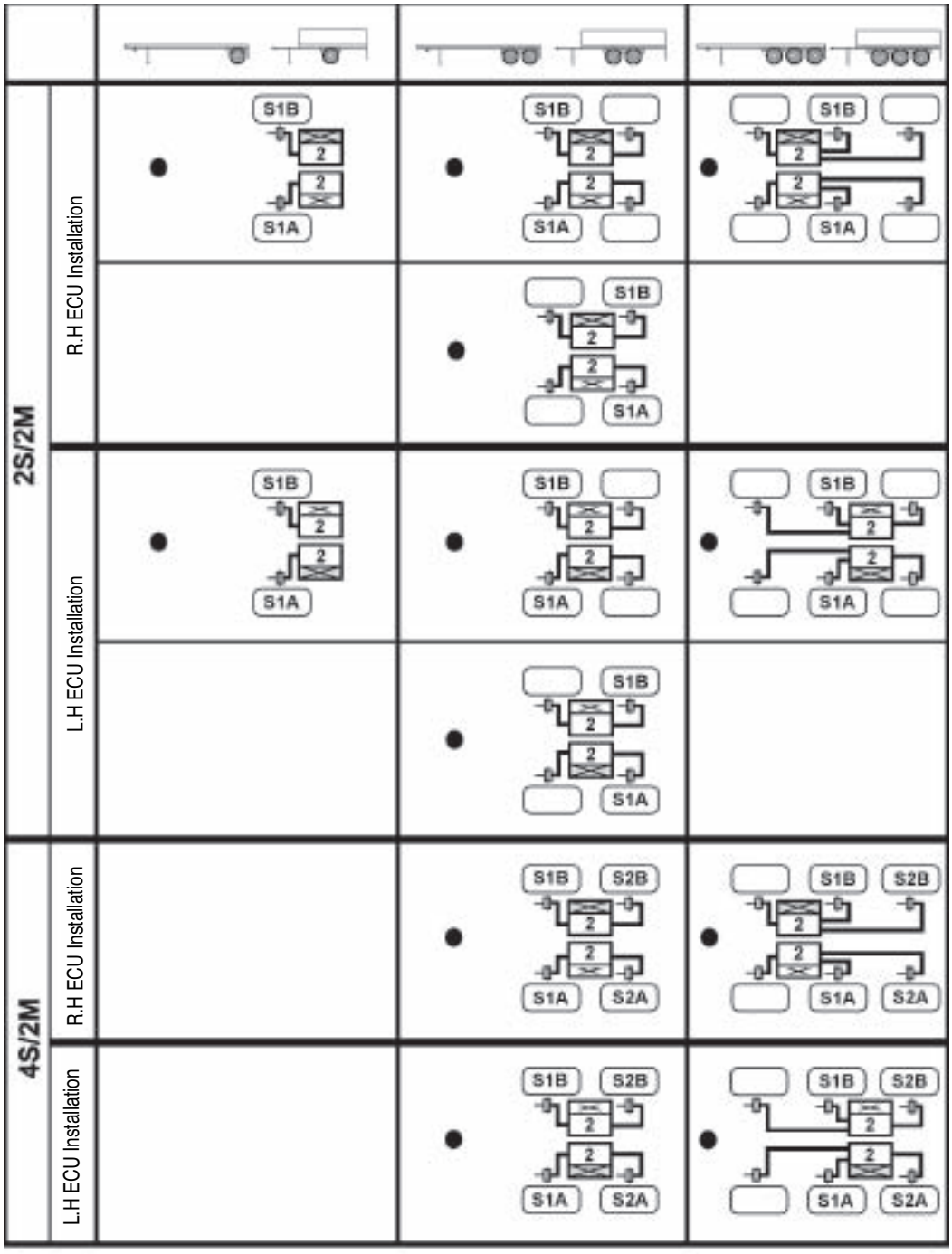
Key

MODULATOR ECU



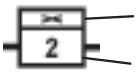
EB+

2S-4S/2M Non Integrated - Side by Side

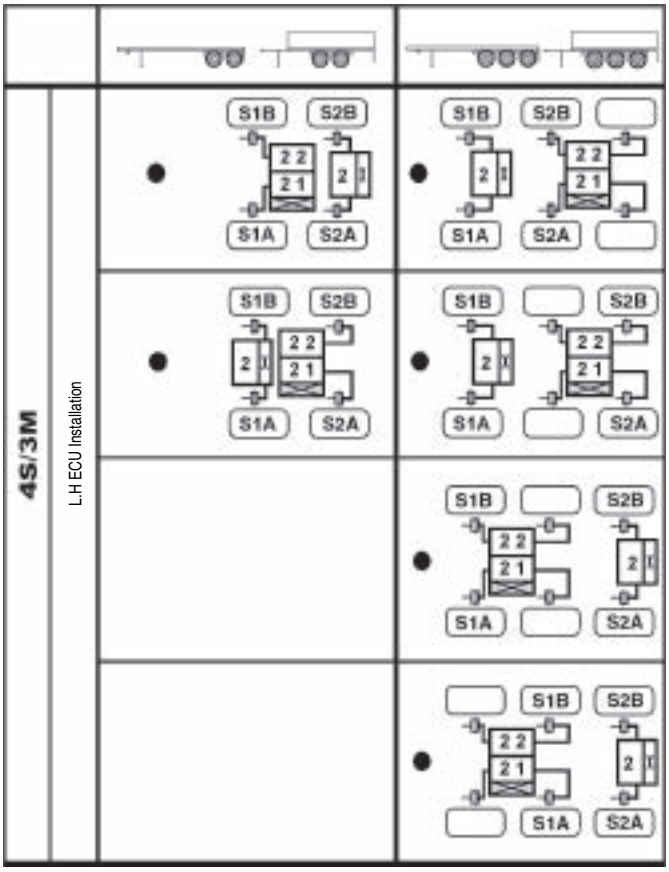


N1 – All sensors must be connected to Master ECU.

Key



EB+



4S/3M - Side by Side

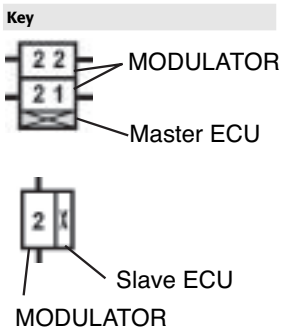
N1 – – Master ECU is mounted to EPRV's 21/22. All sensors must be connected to this Master ECU.

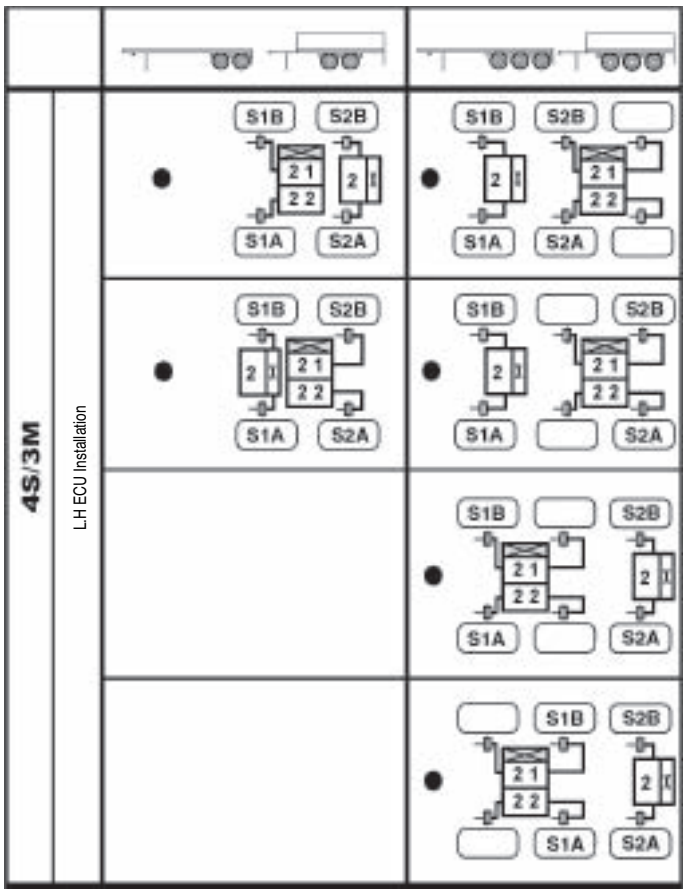
N2 – Directly controlled wheels connected pneumatically to EPRV's 21/22 cannot be lifted.

N3 – Slave ECU is mounted to EPRV 2 and is controlled by Master ECU.
Slave ECU/EPRV 2 is shown facing rear but can also be installed facing forward, left or right, as EPRV 2 is always select low control.

N4 – Sensed wheel connected pneumatically to EPRV 2 can be lifted.

Any axle without directly controlled wheels may be lifted.
Any axle may be a steered axle.





4S/3M - Side by Side

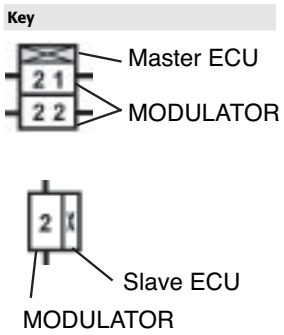
N1 – Master ECU is mounted to EPRV's 21/22. All sensors must be connected to this Master ECU.

N2 – Directly controlled wheels connected pneumatically to EPRV's 21/22 cannot be lifted.

N3 – Slave ECU is mounted to EPRV 2 and is controlled by Master ECU.
Slave ECU/EPRV 2 is shown facing rear but can also be installed facing forward, left or right, as EPRV 2 is always select low control.

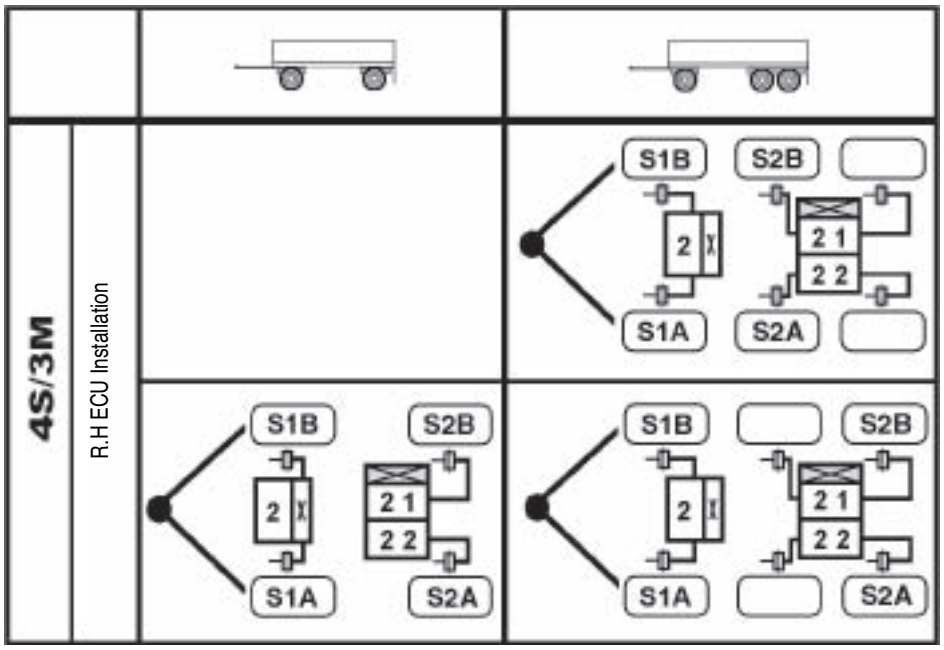
N4 – Sensed wheel connected pneumatically to EPRV 2 can be lifted.

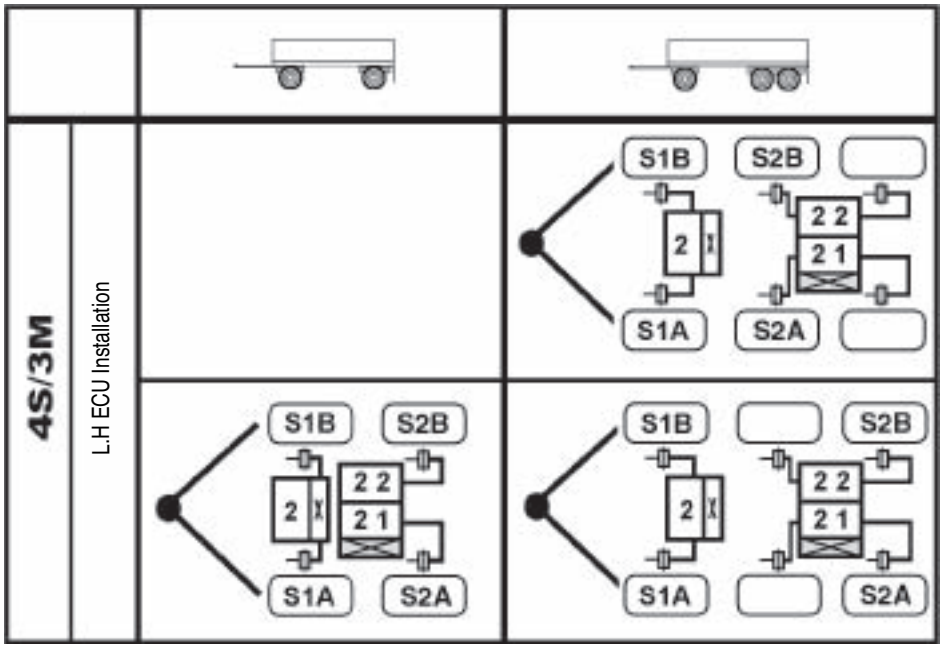
Any axle without directly controlled wheels may be lifted.
Any axle may be a steered axle.



EB+

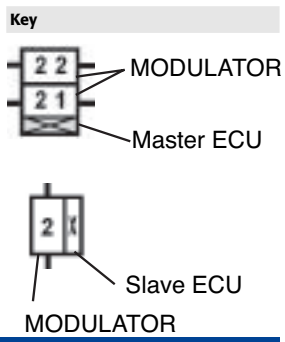
Side by Side





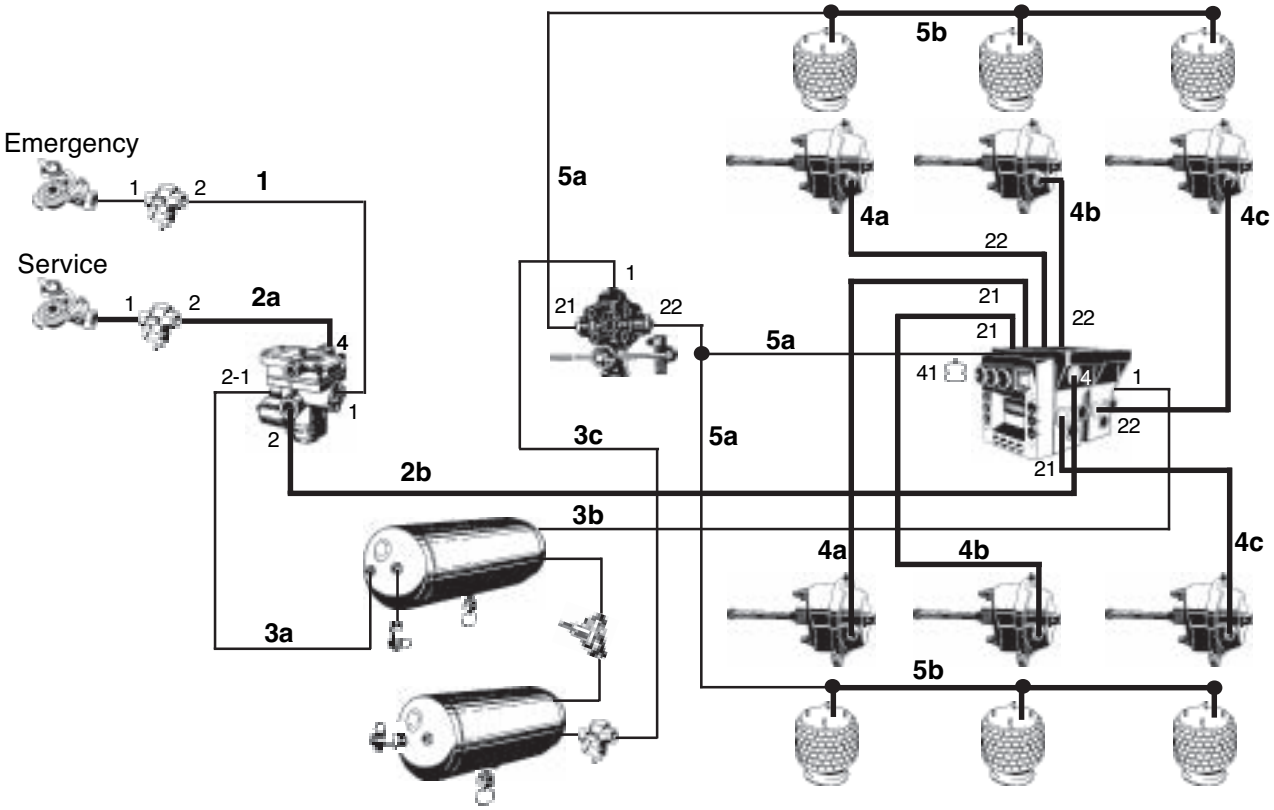
N1 – Master ECU is mounted to EPRV's 21/22. All sensors must be connected to this Master ECU.
N2 – Slave ECU is mounted to EPRV 2 and is controlled by Master ECU.
Slave ECU/EPRV 2 is shown facing rear but can also be installed facing forward, left or right, as EPRV 2 is always select low control.

Sensed axles cannot be lifted.
Any axle without directly controlled wheels may be lifted.



EBS SYSTEM

2M system, Side by Side configuration, 3 axle Semi-Trailer - 2 line air brake system - S/D brake chambers



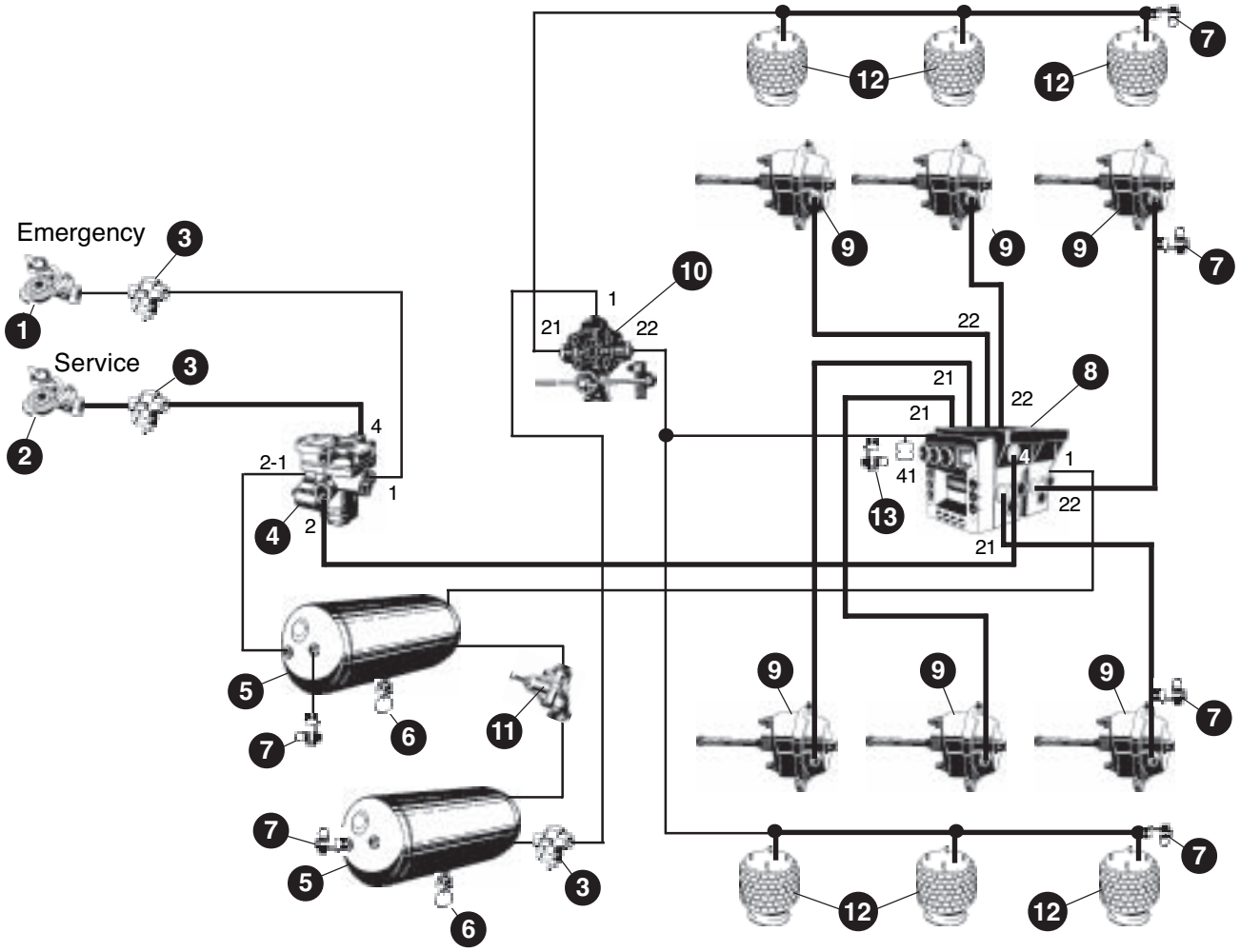
Item	Description	Material	Size	Remark
1	Emergency pipe	Nylon	8 X 1 10 X 1 / 1.25 12 X 1.5	
2a	Service pipe	Nylon	8 X 1 Preferred 10 X 1 Alternative 10 X 1.25 Alternative	2a to be 1/3 total trailer length
2b	Service pipe	Nylon	12 X 1.5 Preferred 10 X 1 Alternative 10 X 1.25 Alternative	
3a	Reservoir pipe		12 X 1.5 Preferred 15 X 1.5 Alternative	
3b	Reservoir pipe	Nylon	15 X 1.5 18 X 2	Short as possible 1.0m Max. Short as possible 4.0m Max.
3c	Reservoir pipe	Nylon	10 X 1.25	
4a 4b	Brake pipe	Nylon	12 X 1.5 or	4a and 4c to be similar in length, 4b to be as short as possible.
4c		Rubber hose	I.D. 11.0/13.0	
5a	Suspension pipe	Nylon	8 X 1 Preferred	
5b	Suspension bellows	Nylon	12 X 1.5 Preferred	

All pipe and rubber hose to comply with recognised international standards. Nylon pipe to DIN 73378 or DIN 74324-1, Rubber hose to SAE 1402. The above pipie sizes are defined as guide lines only.

Actual sizes need to be optimised for a given trailer to meet system response time requirements.

It is the vehicle manufacturers ultimate responsibility to ensure their systems comply with applicable regulations.

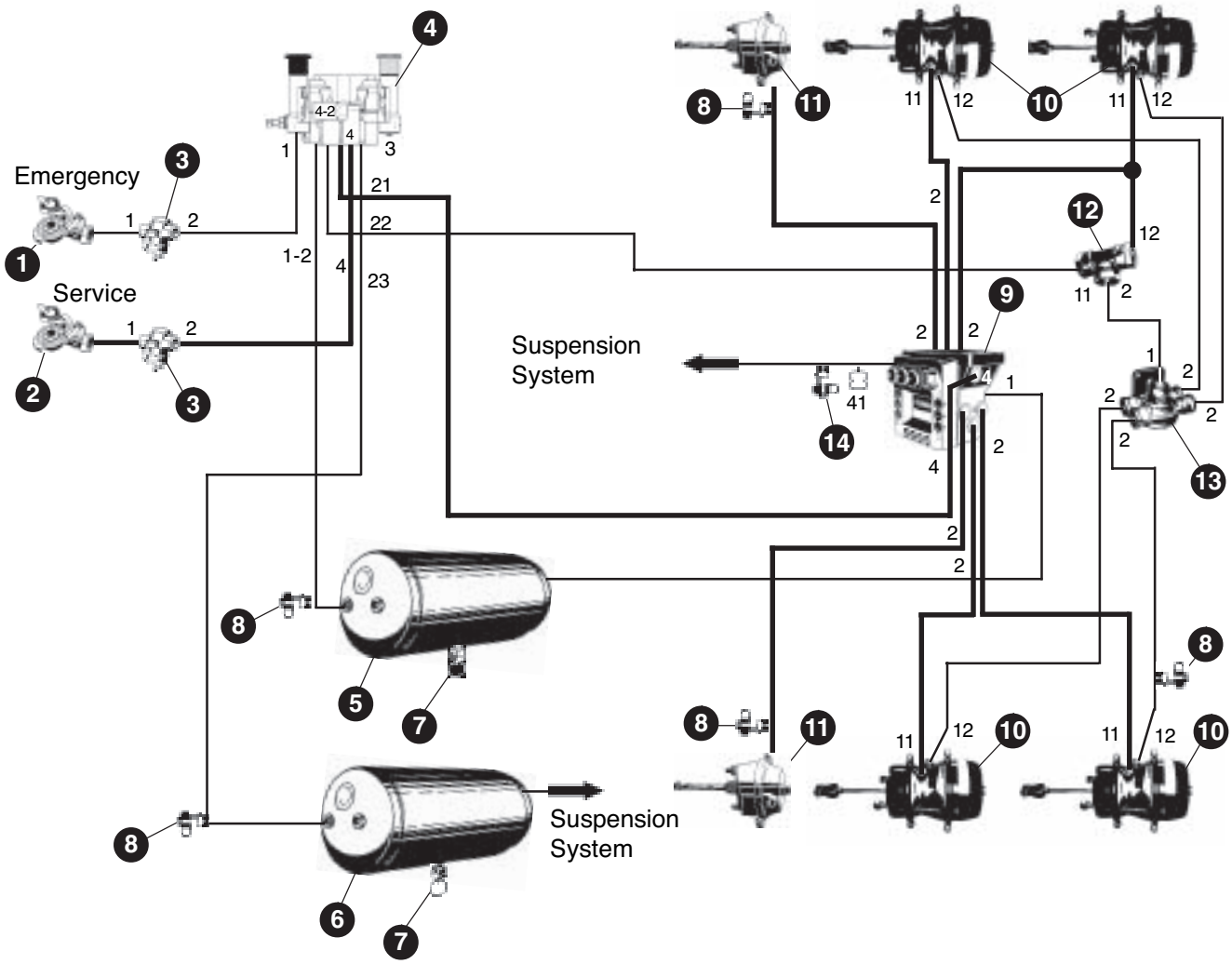
2M system, Side by Side configuration, 3 axle Semi-Trailer - 2 line air brake system - S/D brake chambers



Item	Description
1	Emergency coupling
2	Service coupling
3	Pipe filter
4	Relay Emergency Valve
5	Air reservoir
6	Drain valve
7	Test point
8	EB+ Assembly
9	Brake chamber
10	Levelling valve
11	Pressure protection valve
12	Suspension bellows
13	Test point simulator

Side by Side Configuration

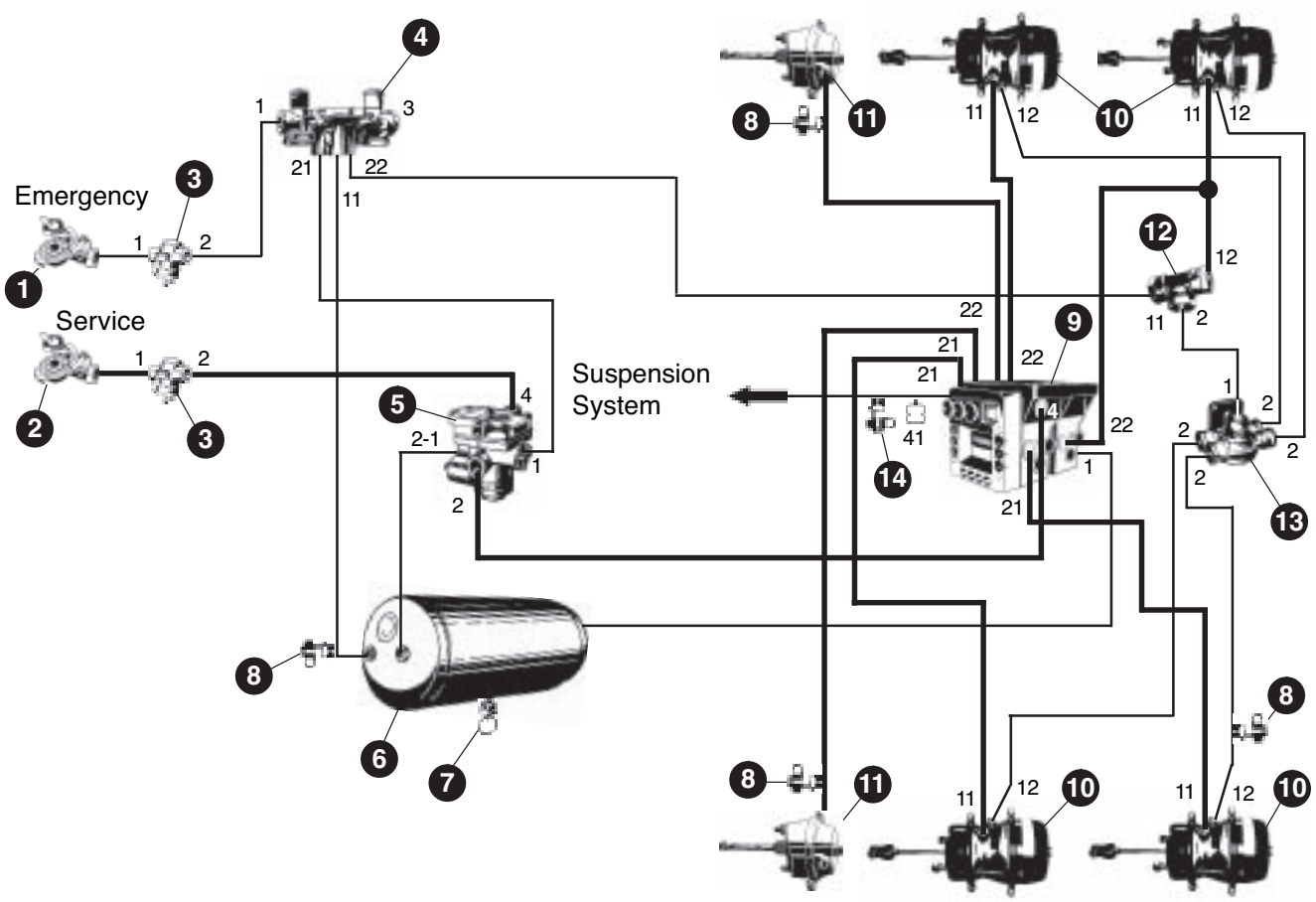
3 axle Semi-Trailer - 2 line air brake system withTrailer Control Module - Spring brake chambers



Pos.	Benennung
1	Emergency coupling
2	Service coupling
3	Pipe filter
4	Trailer Control Module (TCM)
5	Air reservoir - Service
6	Air reservoir - Suspension
7	Drain valve
8	Test point
9	EB+ Assembly
10	Spring Brake chamber
11	Single Diaphgram Brake chamber
12	Double check valve
13	Quick release valve
14	Test point simulator

Side by Side Configuration

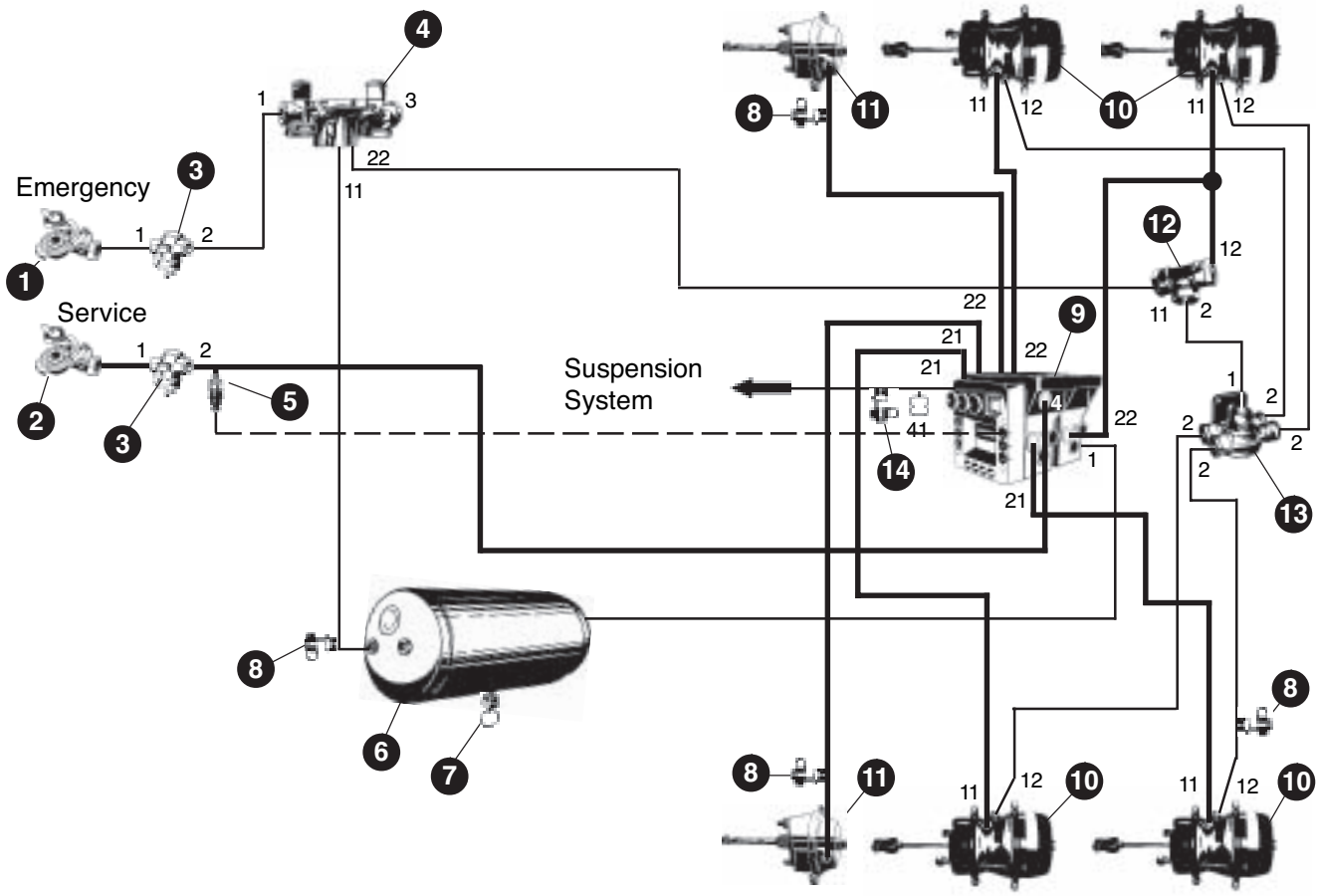
3 axle Semi-Trailer - 2 line air brake system - Spring brake chambers



Item	Description
1	Emergency coupling
2	Service coupling
3	Pipe filter
4	Combined Park and Shunt valve
5	Relay Emergency Valve
6	Air reservoir
7	Drain valve
8	Test point
9	EB+ Assembly
10	Spring Brake chamber
11	Single Diaphgram Brake chamber
12	Double check valve
13	Quick release valve
14	Test point simulator

Side by Side Configuration

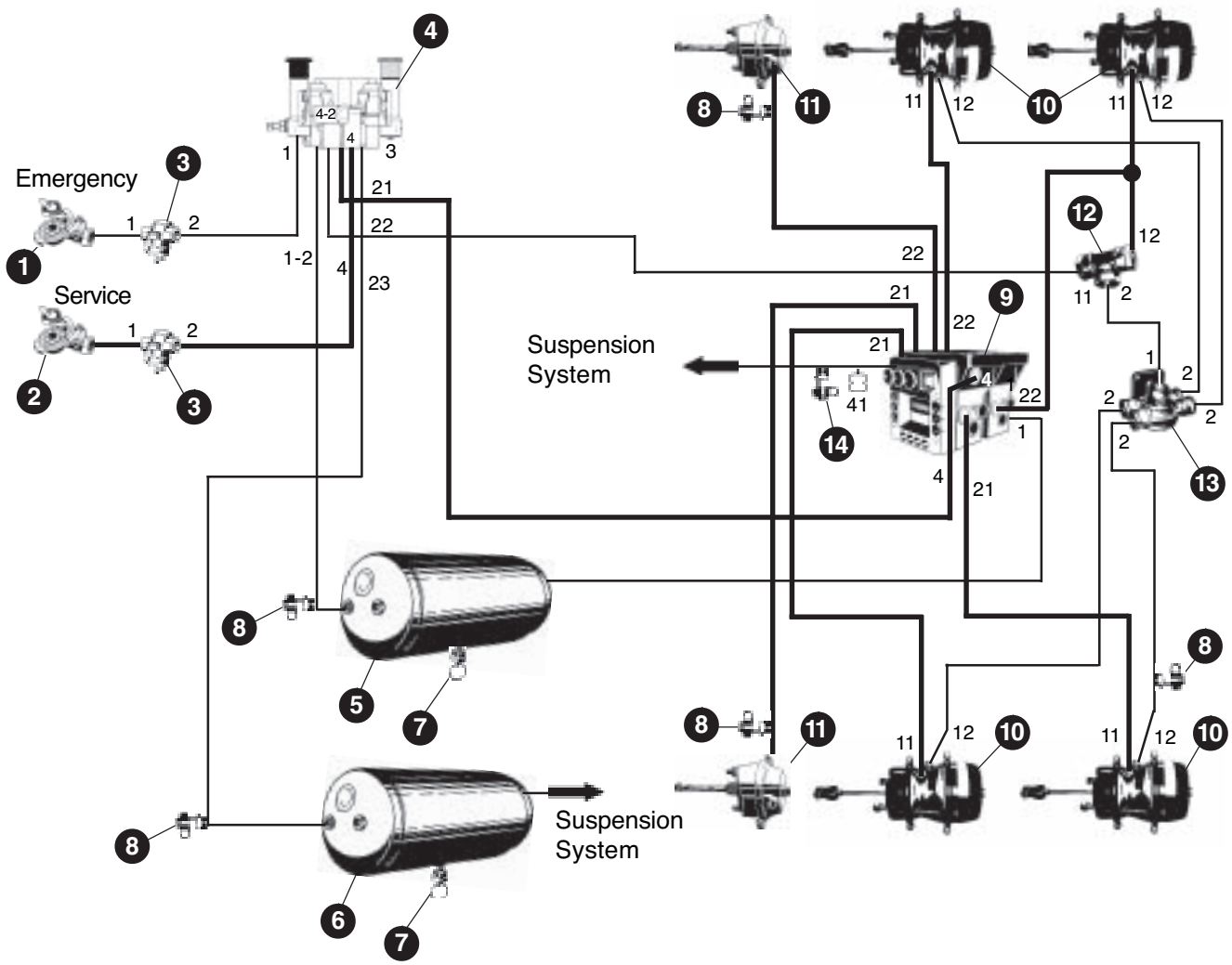
3 axle Semi-Trailer - 2 line air brake system - w/o Relay Emergency Valve



Item	Description
1	Emergency coupling
2	Service coupling
3	Pipe filter
4	Combined Park and Shunt valve
5	External Pressure Switch
6	Air reservoir
7	Drain valve
8	Test point
9	EB+ Assembly
10	Spring Brake chamber
11	Single Diaphgram Brake chamber
12	Double check valve
13	Quick release valve
14	Test point simulator

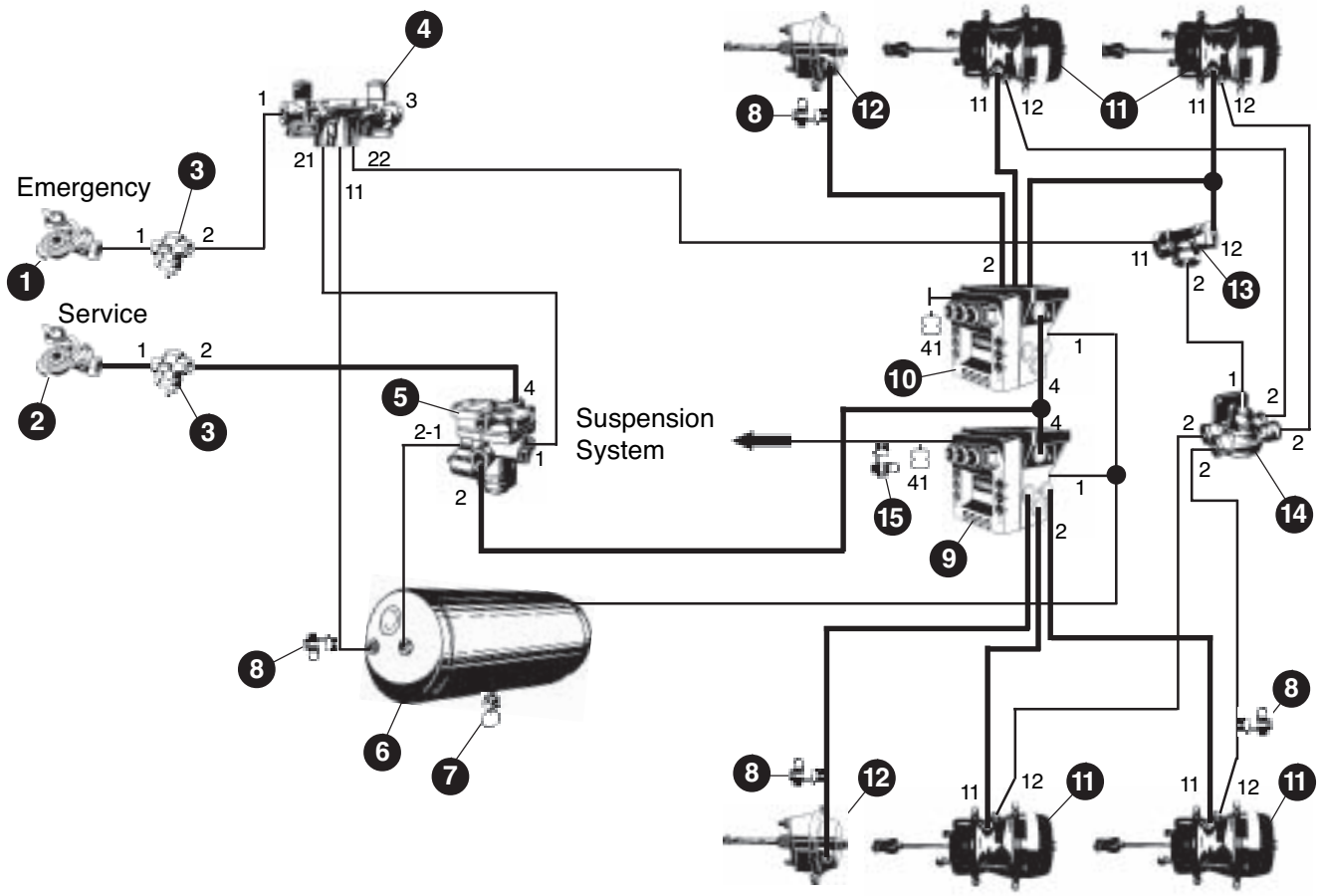
Side by Side Configuration

3 axle Semi-Trailer - 2 line air brake system with Trailer Control Manual - Spring brake chambers



Item	Description
1	Emergency coupling
2	Service coupling
3	Pipe filter
4	Trailer Control Module (TCM)
5	Air reservoir - Service
6	Air reservoir - Suspension
7	Drain valve
8	Test point
9	EB+ Assembly
10	Spring Brake chamber
11	Single Diaphgram Brake chamber
12	Double check valve
13	Quick release valve
14	Test point simulator

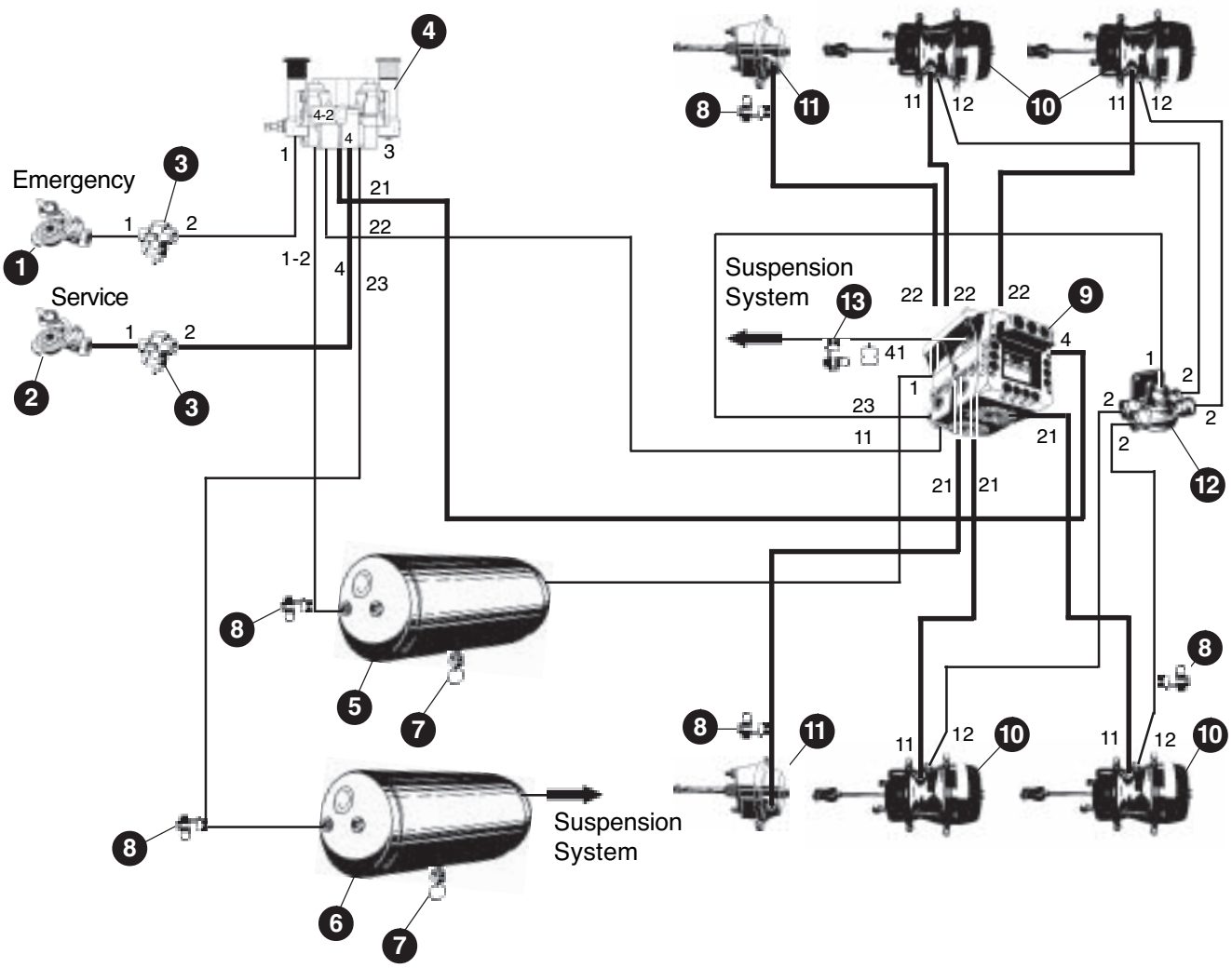
3 axle Semi-Trailer, 2 line air brake system, Spring brake chambers, Combined Park and shunt valve



Item	Description
1	Emergency coupling
2	Service coupling
3	Pipe filter
4	Combined Park and Shunt valve
5	Relay Emergency Valve
6	Air reservoir
7	Drain valve
8	Test point
9	EB+ Assembly - Master ECU
10	EB+ Assembly - Slave ECU
11	Spring Brake chamber
12	Single Diaphgram Brake chamber
13	Double check valve
14	Quick release valve
15	Test point simulator

Side by Side Configuration

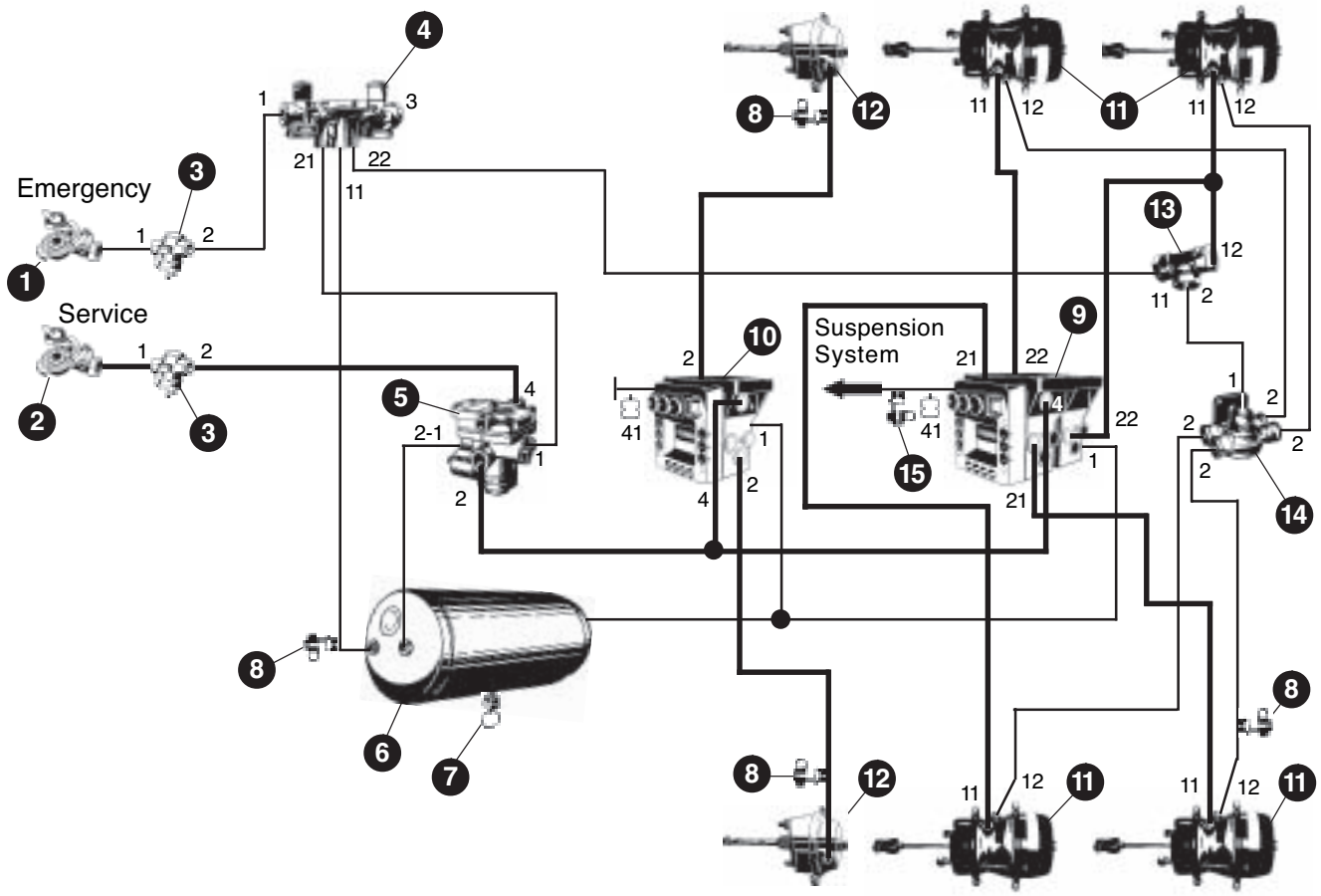
3 axle Semi-Trailer - 2 line air brake system with Trailer Control Module - Spring brake chambers



Item	Description
1	Emergency coupling
2	Service coupling
3	Pipe filter
4	Trailer Control Module (TCM)
5	Air reservoir - Service
6	Air reservoir - Suspension
7	Drain valve
8	Test point
9	EB+ Assembly
10	Spring Brake chamber
11	Single Diaphgram Brake chamber
12	Quick release valve
13	Test point simulator

Side by Side Configuration

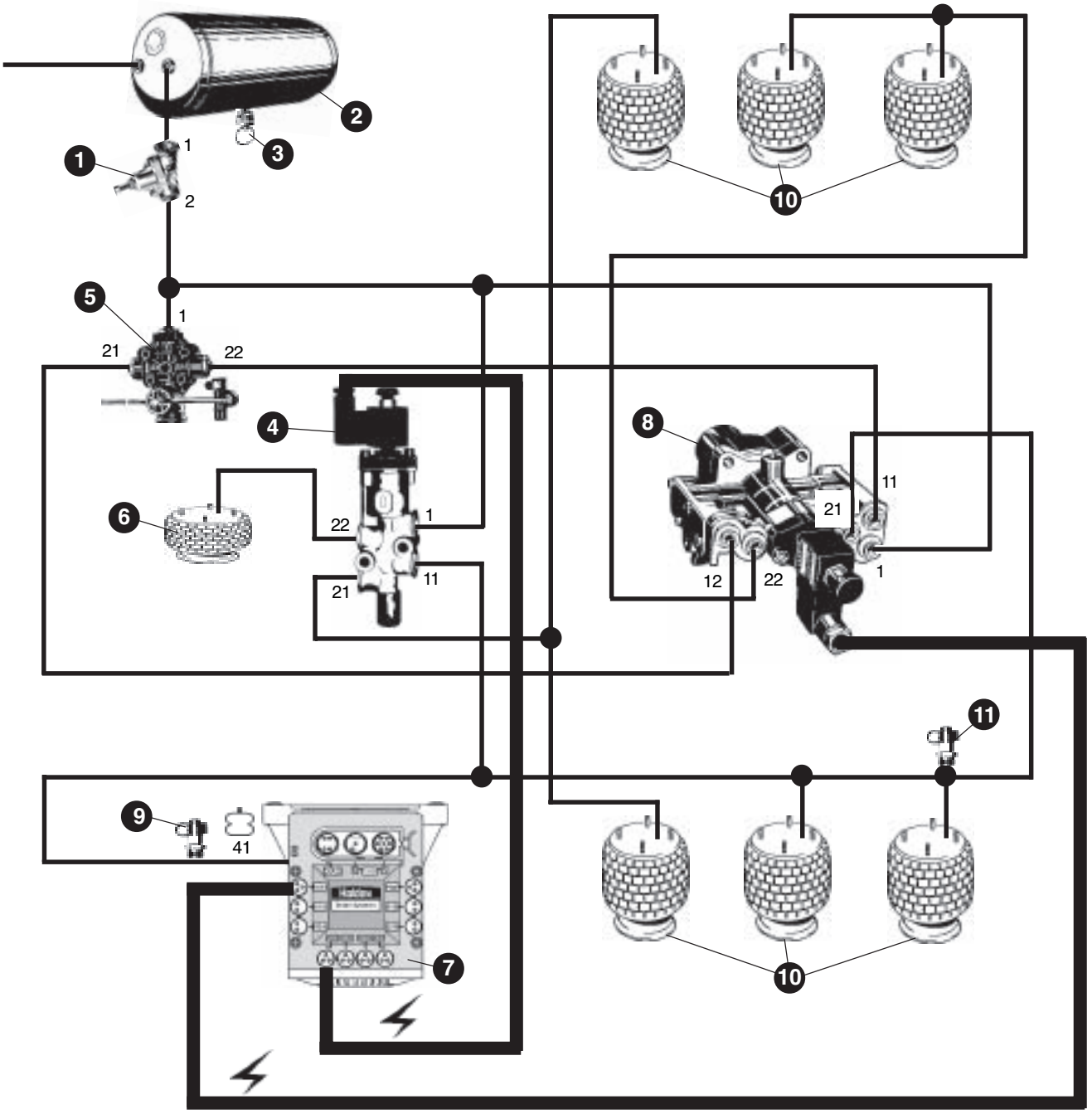
3 axle Semi-Trailer - 2 line air brake system - Spring brake chambers - Combined Park and Shunt valve



Item	Description
1	Emergency coupling
2	Service coupling
3	Pipe filter
4	Combined Park and Shunt valve
5	Relay Emergency Valve
6	Air reservoir
7	Drain valve
8	Test point
9	EB+ Assembly - Master ECU
10	EB+ Assembly - Slave ECU
11	Spring Brake chamber
12	Single Diaphgram Brake chamber
13	Double check valve
14	Quick release valve
15	Test point simulator

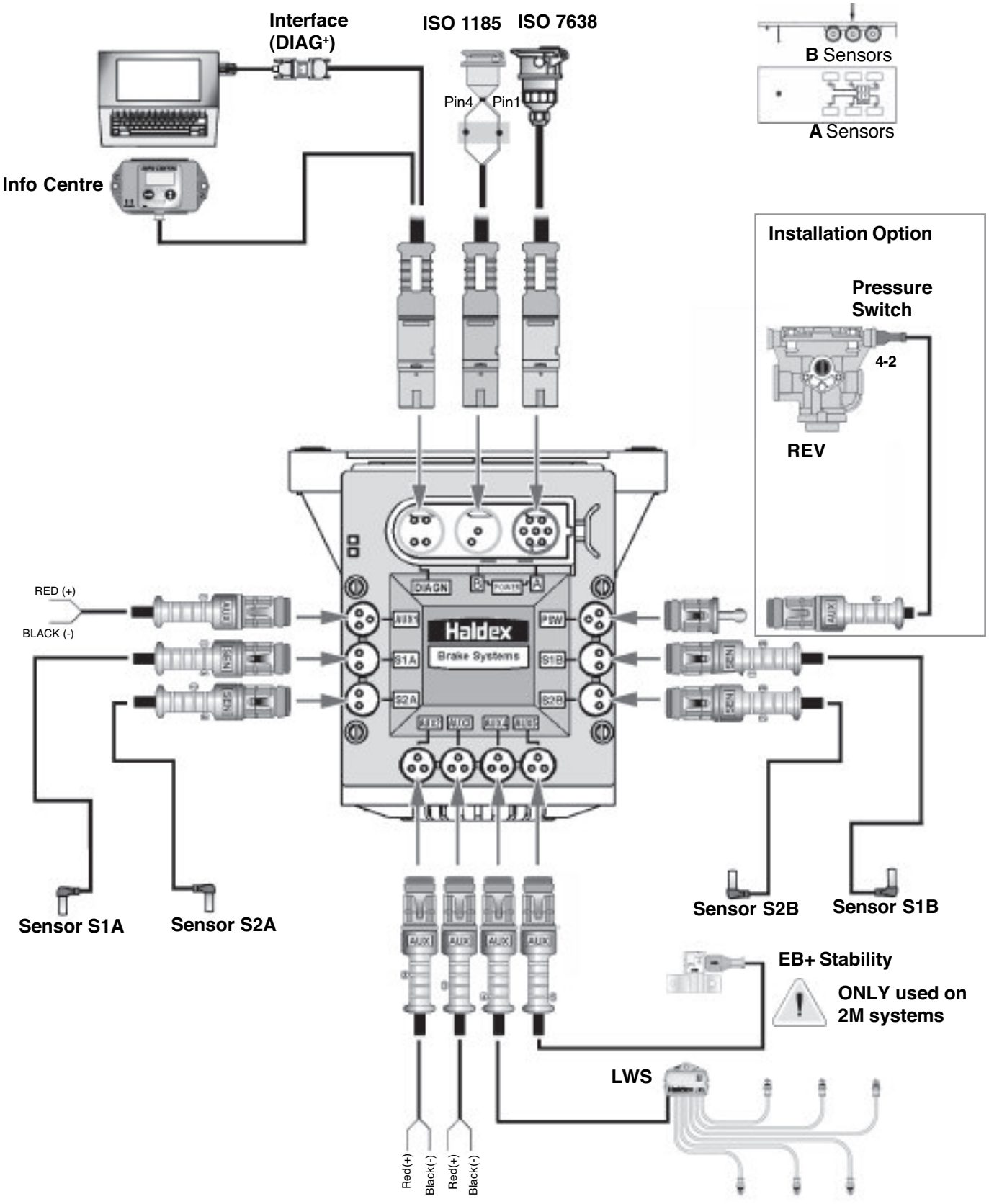
Suspension System Piping Layout

3 axle Semi-Trailer, Colas® with auto reset to ride, ILAS®-E, Levelling valve



Item	Description
1	Pressure protection valve
2	Air reservoir
3	Drain valve
4	ILAS®-E
5	Levelling valve
6	Air bellows
7	EB+ Assembly
8	COLAS®
9	Test Point simulator
10	Suspension bellows
11	Test point

ISO7638	ISO1185	DIAG	S1A	S1B	S2A	S2B	AUX 1	AUX 2	AUX 3	AUX 4	AUX 5	PSW
✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	REV



EB+

Function

The Haldex INFO CENTRE is a side mounted diagnostic unit used for readout of odometer and diagnostic codes, plus other information as available in the EB+ Electronic Control Unit.

The INFO CENTRE is connected permanently into the ECU diagnostic 'DIAG' port. While the ECU is powered from its normal source (ISO 7638) information is transferred to the INFO CENTRE's memory.

The Haldex INFO CENTRE has an internal battery to allow readout of information when the trailer is uncoupled and has no power source.

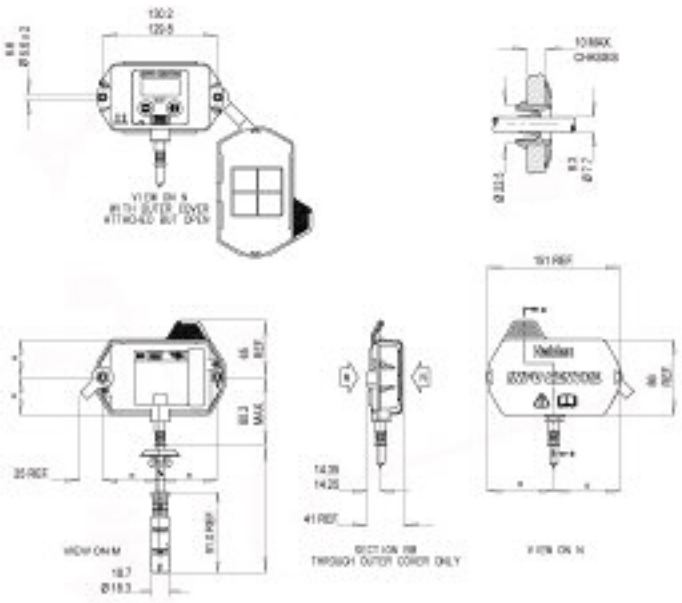
Typical information that can be obtained from the INFO CENTRE:

INFO MENU	Read Diagnostic Trouble Codes (DTC) Configuration ECU Serial No Vehicle Identification Number (VIN)
DISTANCE MENU	Odometer Trip Distance Service Distance Clock (time and date)
CHANGES MENU	Service Due Service Interval (Distance or Days) Lining Wear Indication Password
TESTS	Load Pressure Wheels (sensor/cable check) Plate Auxiliaries Brake Test Lining Wear Indication

Operation

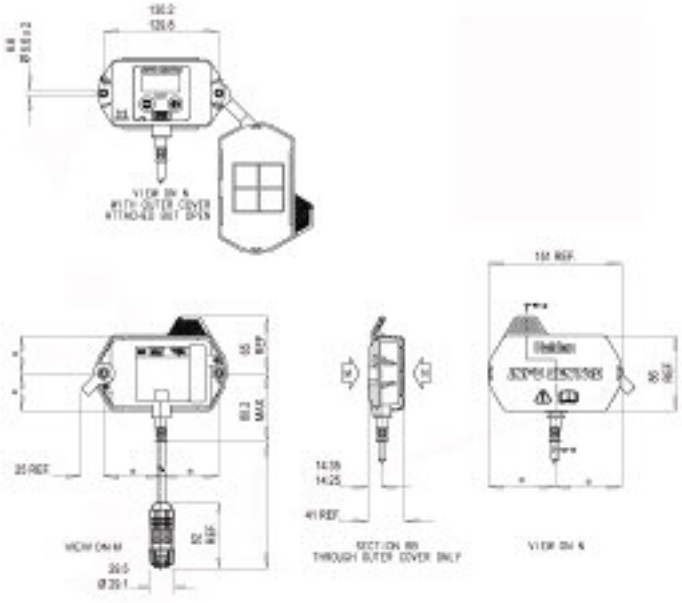
INFO CENTRE comprises of a LCD (Liquid Crystal Display) and two buttons marked up/down and right pointing arrows.

The left hand button (Shows a right pointing arrow), means select or confirm, whilst the right hand button (shows up and down) means change or next to allow movement between the menus



Information / Diagnostic / Test Unit
Operating voltage: 24Volts DC
Operating temperature: -40°C to +70°C
Installation: Outside chassis member connected directly to the ECU
Recommended fixing screws: 2 x M6 x 1.00-6H, T 12/13Nm

Length L (m)	OE part number	AM part number	Note
6.5	815 001 101	Use OE No.	
6.5	815 013 001	Use OE No.	ADR (w/o internal battery)
8	815 001 121	Use OE No.	
24	815 001 111	Use OE No.	



Information / Diagnostic / Test Unit
Operating voltage: 24Volts DC
Operating temperature: -40°C to +70°C
Installation: Outside chassis member connected to the side of vehicle connection from the ECU
Recommended fixing screws: M6 x 1.00-6H, T 12/13Nm

Length L (m)	OE part number	AM part number	Note
0.5	815 010 001	Use OE No.	Side of vehicle (SOV) connection
0.5	815 014 001	Use OE No.	ADR (w/o int.battery) - SOV connection

Function

Haldex DIAG + uses a standard Windows system computer to read and delete trouble codes, program vehicle parameters and an End of Line Test.

The intelligence comes from the PC Interface which communicates between the EB+ ECU and the PC.

Connection to the PC is done through a 9 to 25 way cable connecting the RS232 port on the computer and an additional cable connecting the diagnostic interface to the PC.

The vehicle parameter data is stored inside the EB+ ECU and will remain intact even after power is removed from the EB+ system.

Minimum System Specification

The minimum PC or Laptop specification to run the

DIAG+ package is as follows:

- Processor - 486 or above
  RAM - 8 Megabytes (16 recommended)
  Hard Drive - 20 Megabytes
  Monitor - 640 x 480 VGA Minimum
- MS Windows 95, 98, ME, XP, NT and 2000

  In addition to the above, a CD drive is required for software installation and COM serial port required to connect to the PC interface.

Installation

The DIAG+ Interface kit id comprised of the PC Interface pod, together with its connecting cables and a transit case.

The pod is provided with a multi function LED to confirm correct function of the unit as follows:

Red: To indicate that 24V power is connected to the EB+ ECU.

Green: To indicate data is being transmitted.

NB: During connection the Red nd Green alternate.

Installation Option 1

Gently push the plug '1' into the COM port socket on the back of your PC or Laptop and tighten the screws. Push the GREEN plug '2' into the EB+ ECU socket marked 'DIAG'.

Installation Option 2

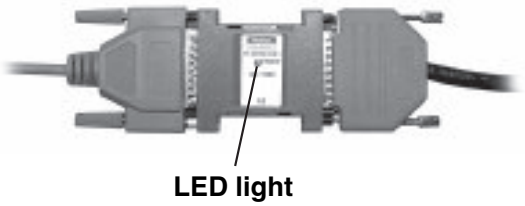
Gently push the plug '1' into the COM port socket on the back of your PC or Laptop and tighten the screws. Push plug '2' into the EB+ Diagnostic socket located on the chassis.

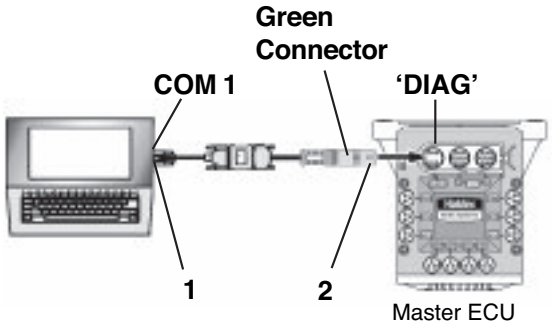
Power the EB+ system from an external 24V supply and the LED light on the interface pod should now be on, coloured red. If it is not, please check your connections and try again.

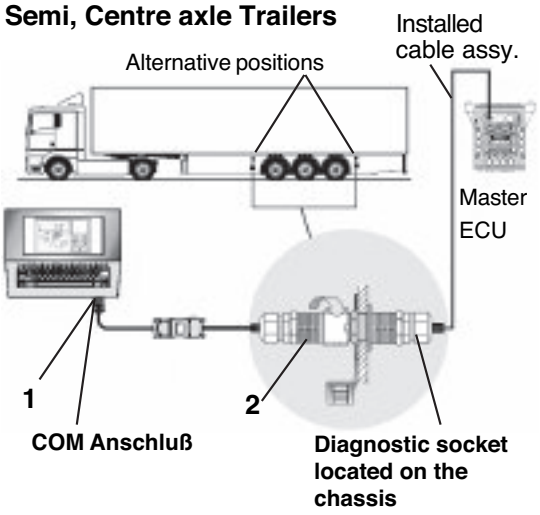
Software

NB: It is possible to install the software without connecting the DIAG hardware although no data will be available.

Switch on your machine and enter into the desktop mode of your PC. Insert the DIAG CD into your PC. Follow the on screen instructions to install the program in the relevant language.







NB: For DIAG to work, your EB+ system MUST be connected and powered by an ISO7838 power supply.

The files are installed in the PC folder:

C:\Programme Files\Haldex\Diag+

Also Sub foldersd are installed as follows:

C:\Programme Files\Haldex\Diag+\DTC Reports

C:\Programme Files\Haldex\Diag+\ECU Setup files

C:\Programme Files\Haldex\Diag+\EOL Reports

Please keep your installation software in a safe place in case you need to reinstall at any point.

Dimensions

A - ECU connection

B - Side of vehicle connection

Diagnostic, ECU Programing and End of line Test (DIAG+) package for PC use

Connection: COM Serial RS232 port or via a USB to serial converter (Rec. type RS 450-3238)

PC specification:

Processor:	486 or above
RAM:	8Mb (16Mb recommended)
Hard Drive:	20Mb
Monitor:	640 x 480 VGA min.
Op.System:	MS Windows 95, 98, ME, XP, NT and 2000

Options

Type	OEM part number	AM part number	Note
A+B	815 001 001	Use OE No.	ECU and Side of vehicle connection Kit

Cable - ECU connector to Interface

Length L (m)	OE part number	AM part number
6.5	814 001 601	Use OE No.
15	814 001 611	Use OE No.
20	814 001 621	Use OE No.

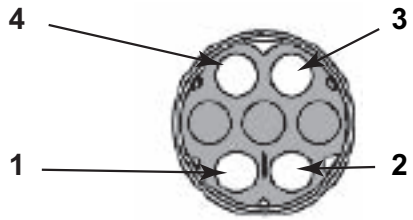
Cable - Side of Vehicle connector to Interface

Length L (m)	OE part number	AM part number
6.5	814 011 001	Use OE No.
15	814 011 011	Use OE No.

Interface (Dongle)

OE part number	AM part number
815 001 401	Use OE No

Connector Details



Side if vehicle cable

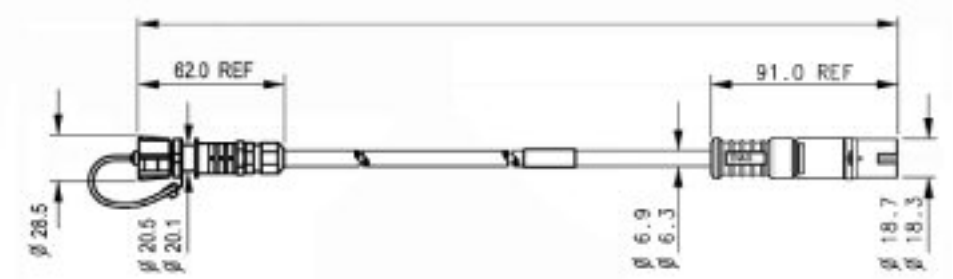
Diagnostic connection installed on the outside of the vehicle
Conforms to IP67 (BS EN 60529) when mated with EB+ ECU

Cable material:	PUR
ECU Connector:	Green
Operating output:	24V, 1.5 Amp
Operating temperature:	-40°C to +70°C

Options

Length L (m)	OE part number	AM part number
2.5	814 010 011	950 800 462
5	814 010 021	950 800 463
6.5	814 010 001	950 800 461
15	814 010 031	950 800 464

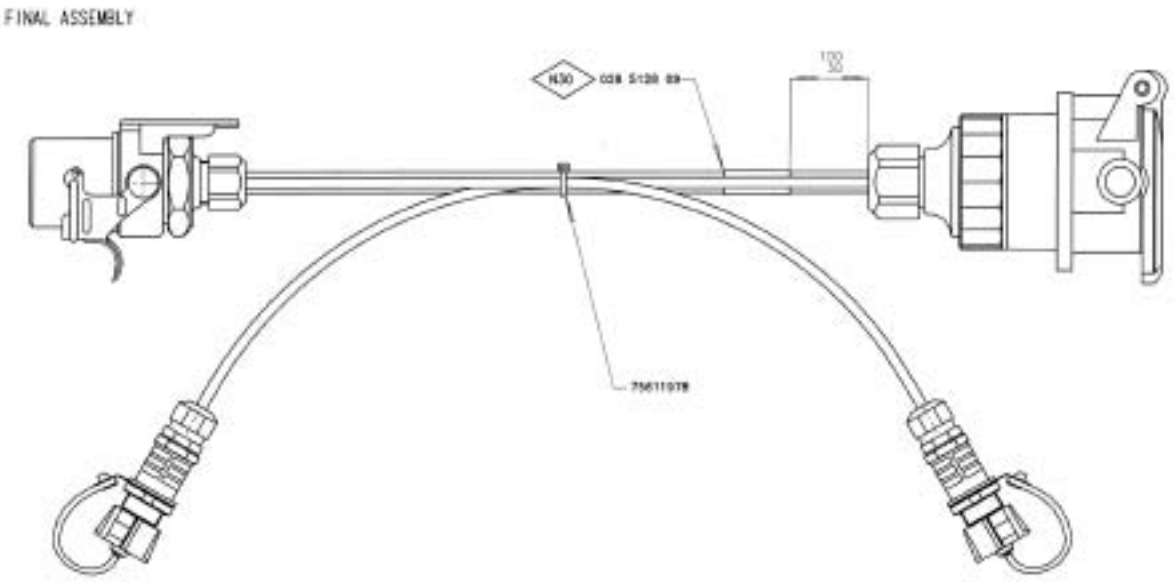
Dimensions



DIAG +

Introduction

Diagnostics can be carried out by using the ISO 7638 connection cable. This provides a usefulalternative if a side of vehicle connection is not fitted.



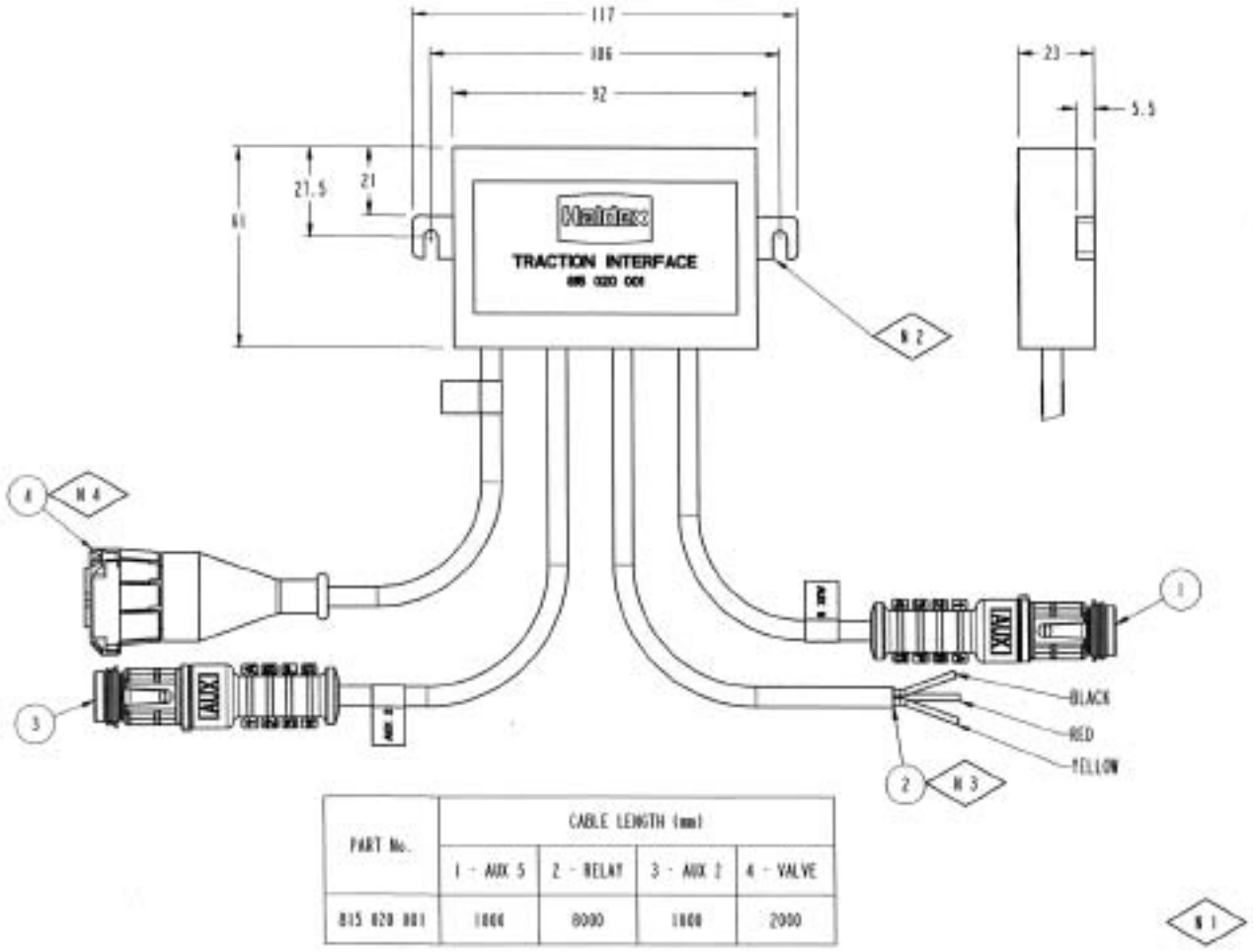
Options

OE part number	AM part number
815 018 001	Use OE number

Introduction

The traction support facility raises the front lift axle when laden to increase the load on the kingpin.

Axle speed and overload restrictions apply when this system is installed, this can be controlled via Diag +.



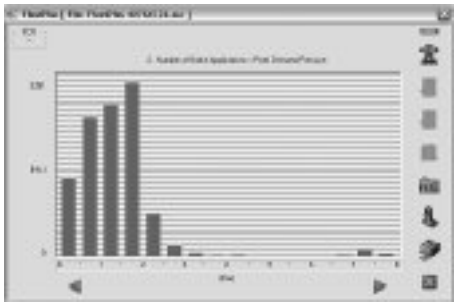
PART No.	CABLE LENGTH (mm)			
	1 - AUX 5	2 - RELAY	3 - AUX 2	4 - VALVE
815 020 001	1000	8000	1000	2000

Options

OE part number	AM part number
815 020 001	Use OE number

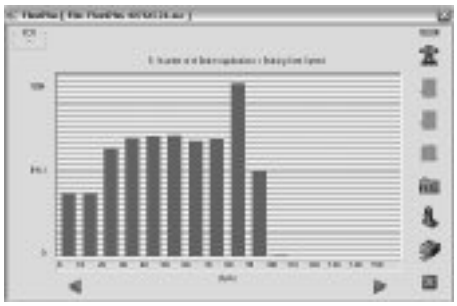
Function

FLEET+ has replaced Fleet Log; this feature will enable operators to view the information directly in a graphical format without using an external spreadsheet program. There is also access to more detailed historical information. Knowing (for example) how much braking the trailer has done, how much load it has carried or when the Roll Stability function has activated can be very useful if the only report is 'poor braking' or 'linings worn out quickly'.



Installation

With Fleet+ you can use a standard personal computer to read EB+ Fleet log data . The PC Interface pod is the hardware to allow communications between a standard PC and a number of diagnostic interfaces. Connections to the PC interface are done through a 9 to 25 way cable connecting to the RS232 port on the computer and a additional cable connecting the diagnostic interface pod to the ECU. A USB to Serial converter can be used - recommended type 'Roline' (RS 450-3238). The vehicle data is stored inside the EB+ ECU. It will remain intact even after electrical power is removed from the EB+ system

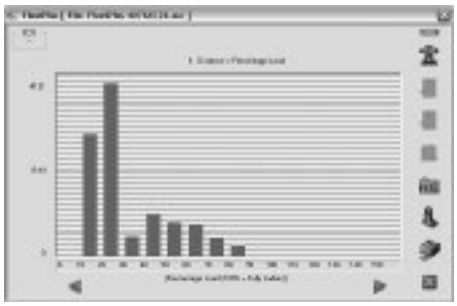


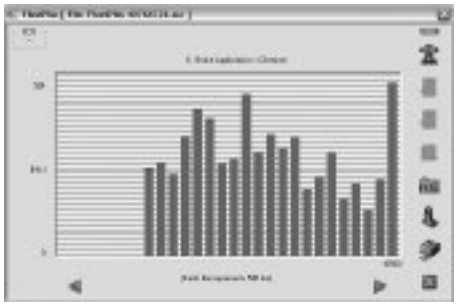
Minimum System Specification

The minimum PC or Laptop specification to run the DIAG+ package is as follows:

- Processor - 486 or above
- RAM - 8 Megabytes (16 recommended)
- Hard Drive - 20 Megabytes
- Monitor - 640 x 480 VGA Minimum
- MS Windows 95, 98, ME, XP, NT and 2000

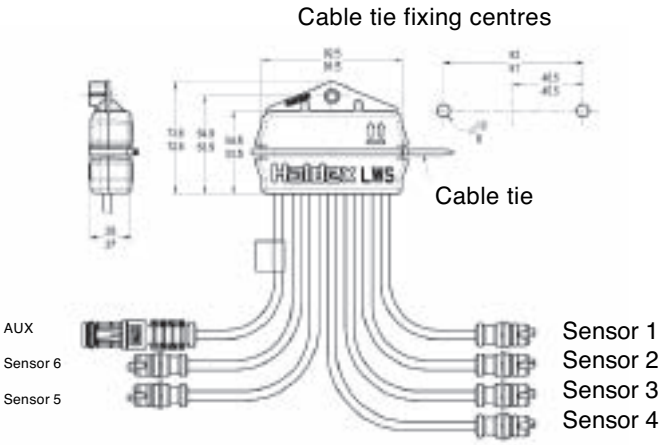
In addition to the above, a CD drive is required for software installation and COM serial port required to connect to the PC interface.





Options

OE part number	AM part number
815 019 001	Use OE number



Lining Wear System – Standard

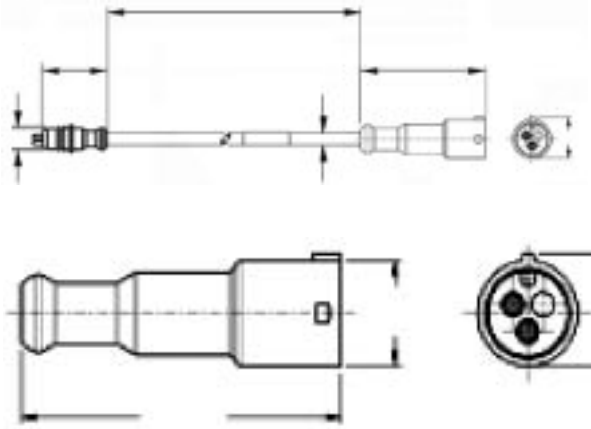
Brake pads information module indicates end of recommended pad life.

Conforms to IP67 (BS EN 60529) when mated with EB+ ECU and meets ADR classes 2 to 9 requirements.

Cable material:	PUR
ECU Connector:	Blue
Operating temperature:	-40°C to +70°C
Recommended fixing:	Bolt M6 x 1.00-6H, T 12/13Nm or Cable Tie

Options

Cable Lengths (m)								
Sensor 1	Sensor 2	Sensor 3	Sensor 4	Sensor 5	Sensor 6	Aux	OE Part Number	AM part number
2.5	3.5	4.5	4.5	3.5	2.5	2.0	815 015 001	Use OE No

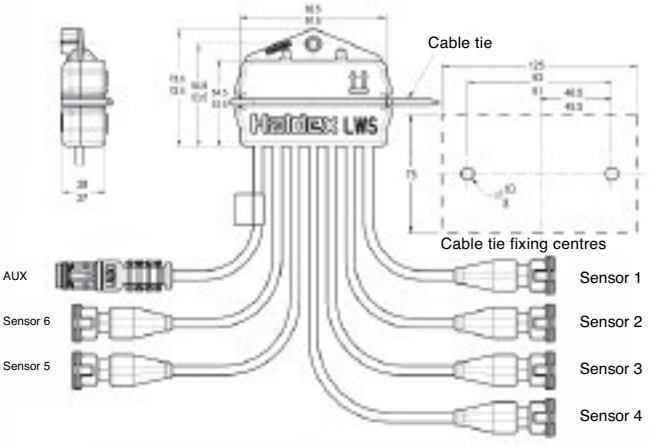


Sensor Extension Cable

Length L (m)	OE part number	AM part number
3	814 007 101	950 800 491
5	814 007 111	950 800 492

Blanking Plug

OE Part Number	AM part number
027 5260 09	Use OE No



Lining Wear System – Meritor

Brake pads information module indicates end of recommended pad life.

Conforms to IP67 (BS EN 60529) when mated with EB+ ECU and meets ADR classes 2 to 9 requirements.

Cable material:	PUR
ECU Connector:	Blue
Operating temperature:	-40°C to +70°C
Recommended fixing:	Bolt M6 x 1.00-6H, T 12/13Nm or Cable Tie

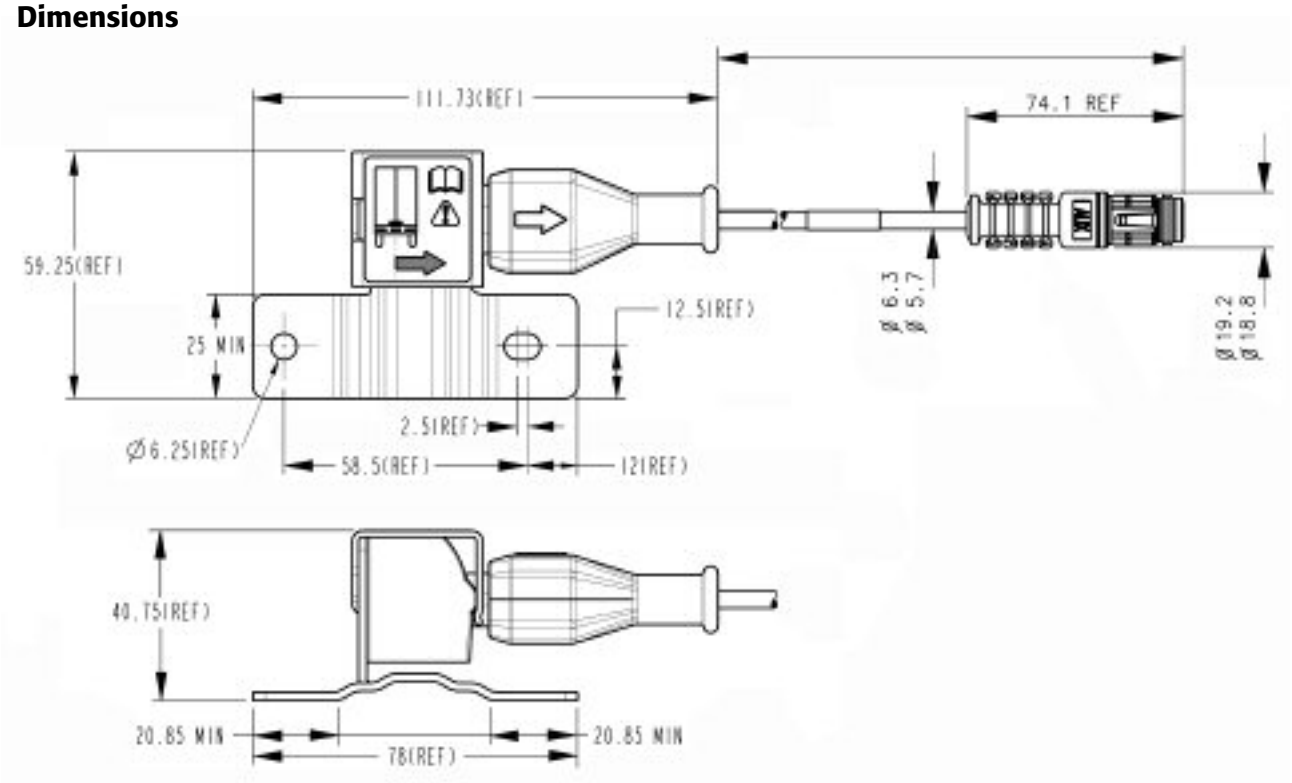
Connect into AUX 4 Only

Cable Lengths (m)								
Sensor 1	Sensor 2	Sensor 3	Sensor 4	Sensor 5	Sensor 6	Aux	OE Part number	AM part number
2.5	3.5	4.5	4.5	3.5	2.5	2.0	815 016 001	Use OE No.

Retrofit accelerometer for addition of Stability to an EB+ trailer
Conforms to IP67 (BS EN 60529) when mated with EB+ ECU

Cable material:	PUR
ECU Connector:	Blue
Operating temperature:	-40°C to +70°C
Recommended fixing:	Bolts 2 x M6 x 1.00-6H, T 12/13Nm to a mounting plate 3mm minimum thickness

Dimensions

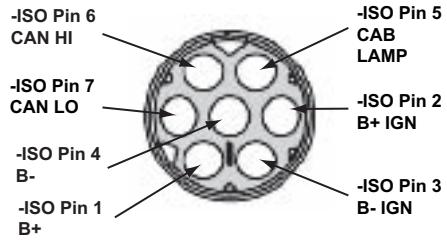


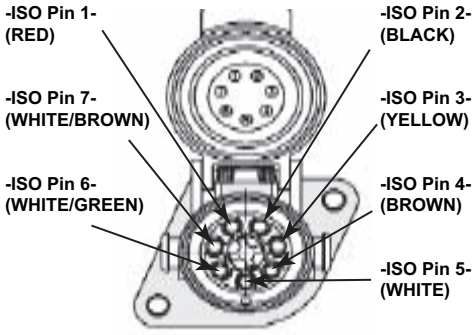
Connect into AUX 5 Only
Used on 2M Semi Trailers Only

Options

Length L (m)	OE part number	AM part number
2.5	815 012 001	Use OE No.

Connector Details





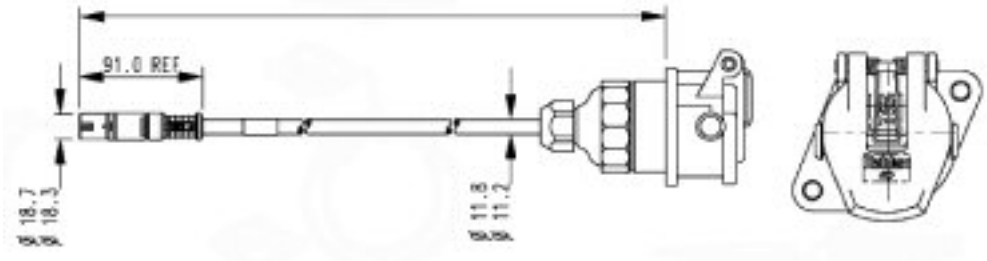
Power supply cable with Socket according to ISO7638 + CAN
Conforms to IP67 (BS EN 60529) when mated with EB+ ECU

Cable material:	PUR
ISO Socket Cover:	Black
ECU Connector:	Blue
Operating voltage:	24V
Operating temperature:	-40°C to +70°C

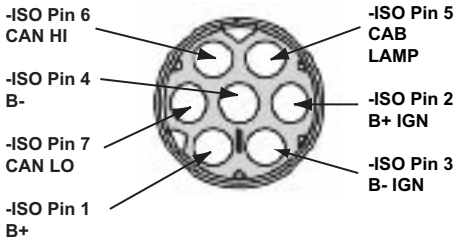
Options

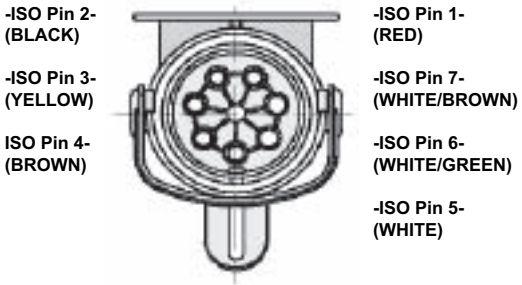
Length L (m)	OE part number	AM part number
6	814 003 151	950 800 406
9	814 003 131	950 800 404
12	814 003 101	950 800 401
14	814 003 141	950 800 405
16	814 003 111	950 800 402
18	814 003 121	950 800 403

Dimensions



Connector Details





ISO7638 Plug And Cable Assembly

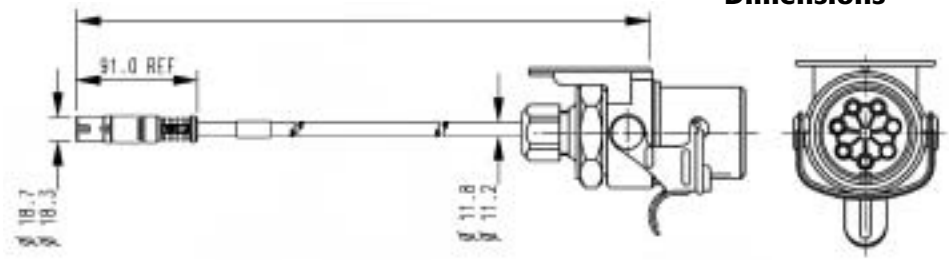
Power supply cable with Plug according to ISO7638 + CAN
Conforms to IP67 (BS EN 60529) when mated with EB+ ECU

Cable material:	PUR
ISO Plug Cover:	Black
ECU Connector:	Blue
Operating voltage:	24V
Operating temperature:	-40°C to +70°C

Options

Length L (m)	OE part number	AM part number
9	814 004 101	950 800 411
12	814 004 111	950 800 412

Dimensions



Back Up Power Cable (ISO1185 (24N))

Backup Power supply cable connecting into stoplamps circuit or ISO1185 (24N) Socket
Conforms to IP67 (BS EN 60529) when mated with EB+ ECU

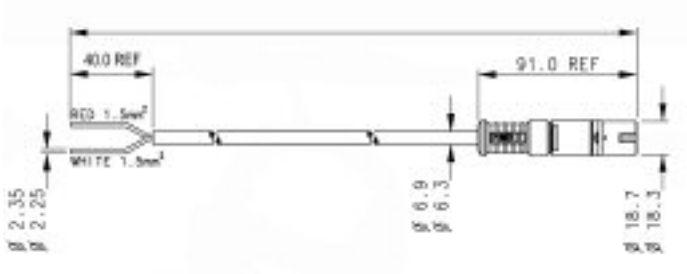
Cable material:	PUR
ECU Connector:	Orange
Operating voltage:	24V
Operating temperature:	-40°C to +70°C

Options

Length L (m)	OE part number	AM part number
4	814 002 231	950 800 424
6	814 002 221	950 800 422
9	814 002 241	950 800 425
12	814 002 201	950 800 421
16	814 002 211	950 800 423

Connector Details

Dimensions



3M Link Cable

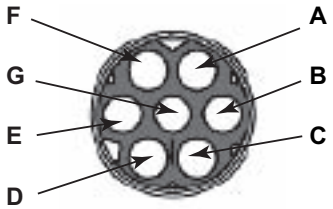
Innterconnecting cable between Master and Slave ECU on a 3M system
Conforms to IP67 (BS EN 60529) when mated with EB+ ECU

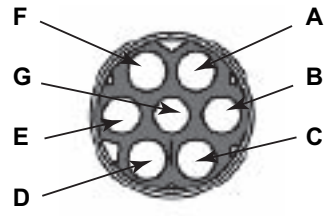
Cable material:	PUR
ECU Connector:	Red
Operating voltage:	24V
Operating temperature:	-40°C to +70°C

Options

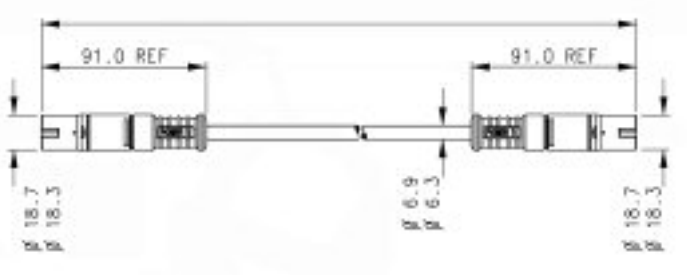
Length L (m)	OE part number	AM part number
2	814 001 011	950 800 472
5	814 001 021	950 800 473
8	814 001 051	950 800 476
10	814 001 041	950 800 475
12	814 001 001	950 800 471
14	814 001 031	950 800 474

Connector Details

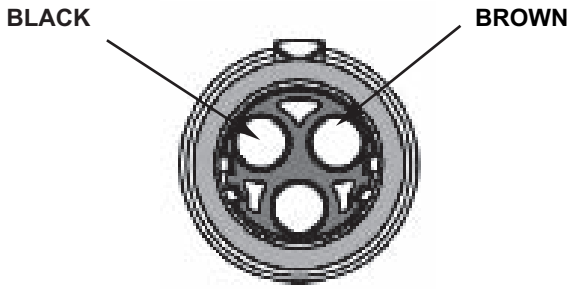




Dimensions



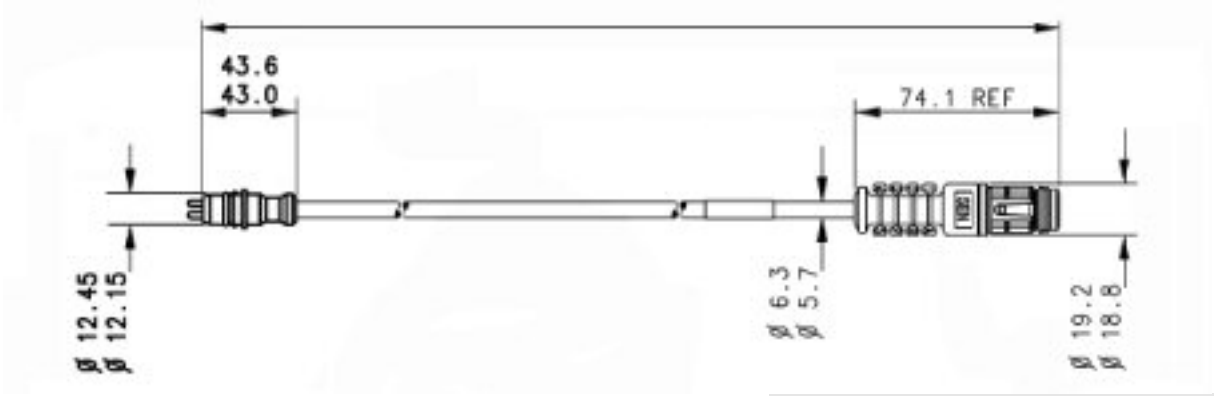
Connector Details



Wheel speed sensor extension cable
Conforms to IP67 (BS EN 60529) when mated with EB+ ECU

Cable material:	PUR
ECU Connector:	Black
Operating temperature:	-40°C to +70°C

Dimensions



Options

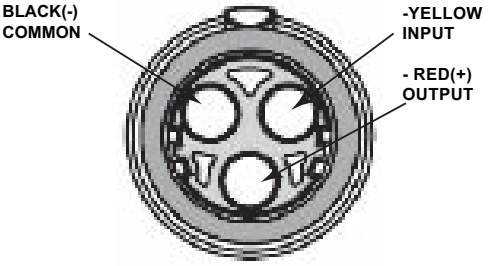
Length L (m)	OE part number	AM part number
2	814 004 421	950 800 442
3	814 004 401	950 800 441
6	814 004 411	950 800 443
8	814 004 451	950 800 446
10	814 004 431	950 800 444
12	814 004 461	950 800 447
14	814 004 441	950 800 445

Auxiliary equipment cable
Conforms to IP67 (BS EN 60529) when mated with EB+ ECU
Cable material: PUR
ECU Connector: Blue
Outputs: AUX 1, 2 & 3 = 24V, 1.25 Amp,
AUX 4 & 5 = 5V, 0.025 Amp
Operating temperature: -40°C to +70°C

Options

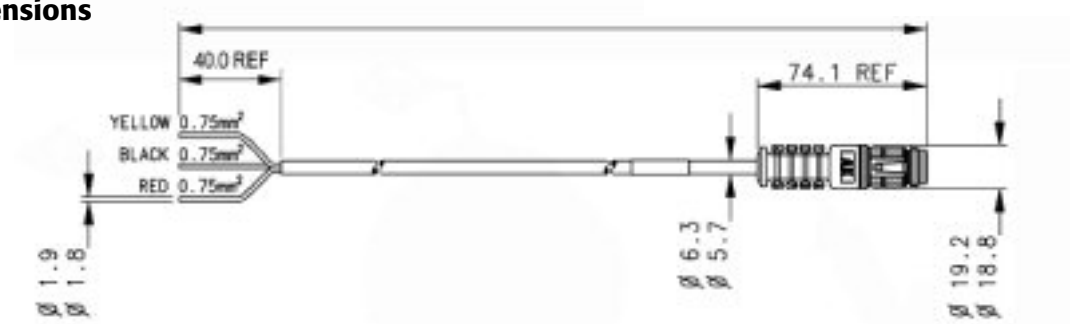
Length L (m)	OE part number	AM part number
1	814 001 341	950 800 435
2	814 001 321	950 800 433
4	814 001 331	950 800 434
7	814 001 301	950 800 431
18	814 001 311	950 800 432

Connector Details



OUTPUTS:
AUX 1, 2 & 3 = 24V
AUX 4 & 5 = 5V

Dimensions



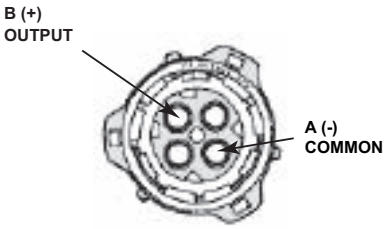
Auxiliary Cable (c/w DIN 72585 Connector)

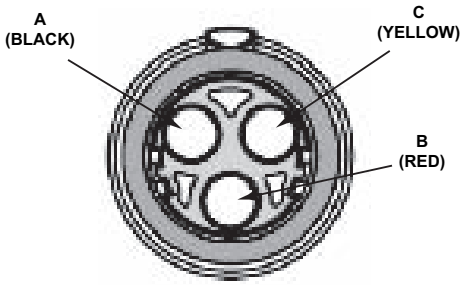
Auxiliary equipment cable
Conforms to IP67 (BS EN 60529) when mated with EB+ ECU
Cable material: PUR
ECU Connector: Blue
Operating outputs: AUX 1, 2 & 3 = 24V, 1.25 Amp,
AUX 4 & 5 = 5V, 0.025 Amp
Operating temperature: -40°C to +70°C

Options

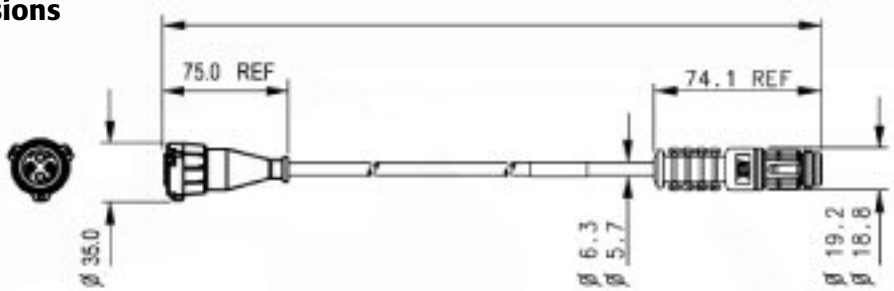
Length L (m)	OE part number	AM part number
1	814 012 021	950 800 483
2	814 012 031	950 800 484
5	814 012 041	950 800 485
7	814 012 001	950 800 481
18	814 012 011	950 800 482

Connector Details





Dimensions



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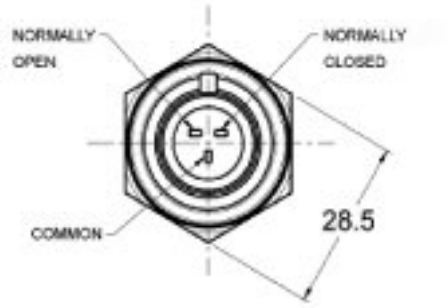
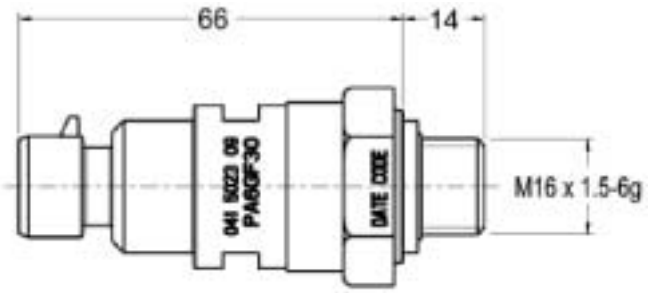




Pressure Switch

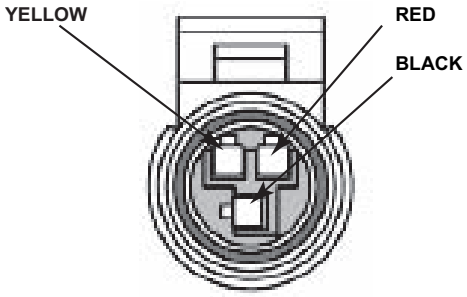
Switches at 0.1 - 0.2 bar control line pressure

Mass of assembly:	112 grm
Working pressure:	10 bar max (air)
Operating temperature:	-40°C to +70°C
Installation:	Where REV fitted the switch is on input (tractor) side (port 4-2)
Tightening Torque:	32/35Nm

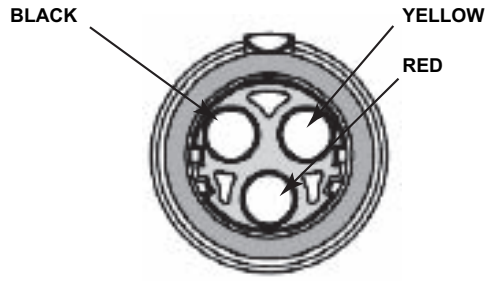
Options

OEM part	AM part number	Note
041 5023 09	950 800 903	c/w 'O' ring and backing washer

Connector Details



Connected to powered ECU:
BLACK & YELLOW ~ 11V
BLACK & RED ~ 11V



Pressure Switch connected:
No Air : BLACK & YELLOW closed
BLACK & RED open

With Air : BLACK & YELLOW open
BLACK & RED closed

Pressure Switch Cable

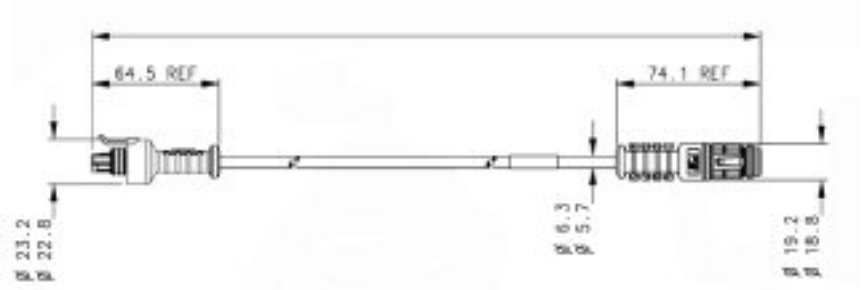
Connecting to an external installed Pressure switch
Conforms to IP67 (BS EN 60529) when mated with EB+ ECU

Cable material:	PUR
ECU Connector:	Blue
Operating temperature:	-40°C to +70°C

Options

Length L (m)	OE part number	AM part number
0.75	814 001 521	950 800 453
2	814 001 511	950 800 452
3	814 001 531	950 800 454
5	814 001 541	950 800 455
8	814 001 551	950 800 456
10	814 001 501	950 800 451

Dimensions



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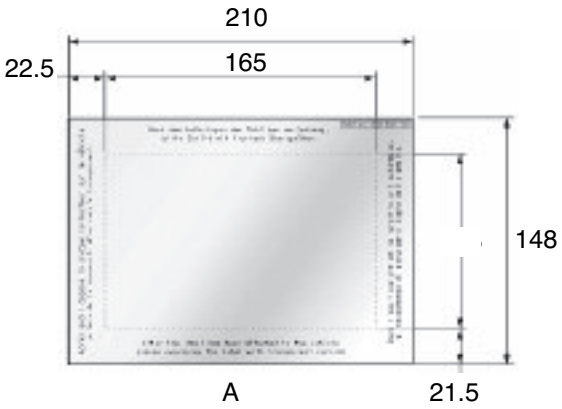
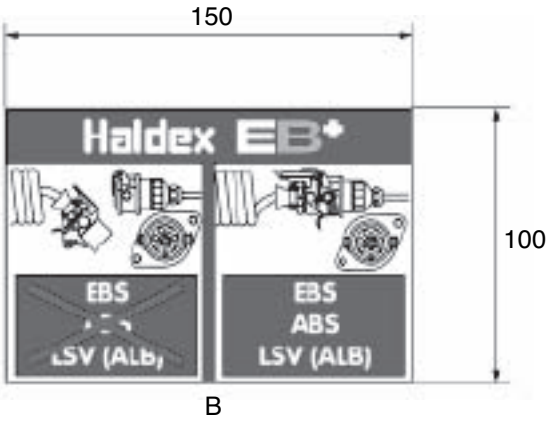
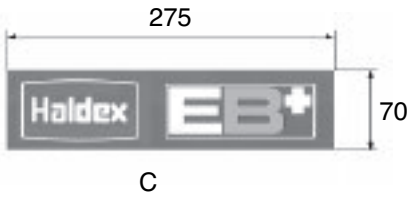
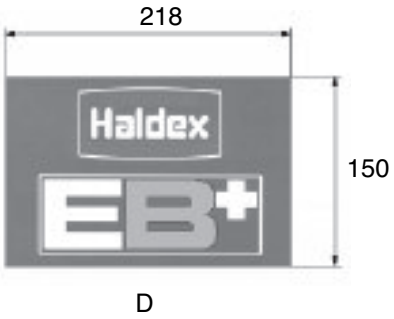








Options

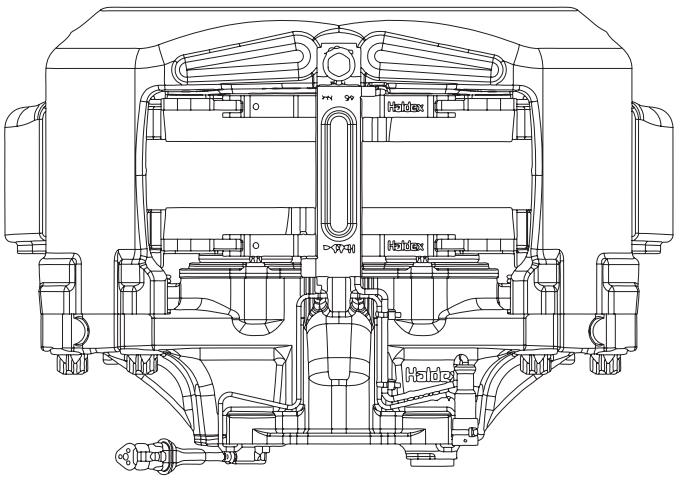
Type	OE part number	AM part number	Note
A	028 5301 09	Use OE No.	Load plate pressure data label
B	028 5262 09	Use OE No	Trailer headboard infomation label
C	028 5276 09	Use OE No.	Side of Vehicle
D	028 577 09	Use OE No.	Side of Vehicle

The Haldex ModulX Disc Brake is based on a modular design, enabling Haldex to provide a wide range of unhanded variants. For the sliding caliper program, this is achieved by using a two piece caliper and four sliding pins.

The two-piece caliper consists of an application unit and a caliper bridge. The self-contained brake mechanism is the same for multiple brake sizes and is assembled into the application unit housing. Likewise, the superior four pin sliding function uses the same parts in multiple brake sizes. The major benefits of this modular concept are improved serviceability and the ability to provide new variants by only changing one module of the assembly.

The ModulX Disc Brake is unhanded, thanks to the four pin sliding design. Unhanded in the sense that the same brake is fitted on both left and right hand side.* This means less parts in stock and fewer part numbers to manage. The sliding function is supported by stainless steel sliding pins and Teflon slide bearings, resulting in corrosion resistance and a well proven sliding function.

* Except when the cylinder face is angled sideways



Installation and function

The Haldex ModulX Disc Brake is designed to provide high performance coupled with low weight, durability and a minimum number of parts prone to wear and tear parts. Brake pad wear is compensated for by an automatic clearance sensing adjustment mechanism, which is actuated by the brake chamber. It presses the inner brake pad against the brake disc, which then causes the caliper to move (slide) laterally, so that the outer brake pad gets in contact with the brake disc. The caliper moves on the slide pins. The Haldex ModulX Disc Brake can also serve as a parking brake when the mechanism is actuated by a spring brake chamber.

Two different options are available to electronically monitor the pad wear, the Pad Wear Indicator (PWI) is a wear indicator with electrical interface for EBS or a separate PWI system. A Pad Wear Sensor (PWS) is a wear sensor fitted as one single push-in unit for easy servicing without calibration. The sensor specification according to costumer demand.

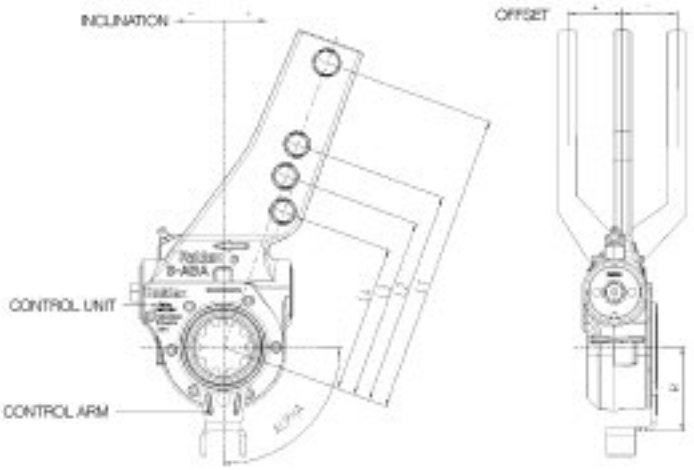
Technical Specification

		DB17	DB19	DB22 LT	DB22
For wheel size	[inch]	17.5	19.5	22.5	22.5
Max calculated service brake torque(μ = 0.375)	[kNm]	13	22	22	30
Calculated available parking brake torque (μ = 0.375)	[kNm]	9	14	16	19
Nominal ratio	[-]	10	15.8	15.8	15.8
Efficiency	[%]	> 93%	> 93%	> 93%	> 93%
Effective radius	[mm]	131	151	173	173
Hysteresis	[%]	< 8%	< 8%	< 8%	< 8%
Pad surface area per pad	[cm^2]	114	152	160	198
Nominal Running clearance	[mm]	0.7	0.7	0.7	0.7
Weight of complete Disc Brake unit, including pads	[kg]	24	35	35	44

In addition to the basic specification above, preferred actuator angles, pad thicknesses, disc diameters and disc thicknesses are examples on were customer adaptations is possible.

Haldex S-ABA has transformed the installation procedure on trailer axles, making it faster and easier than ever before.

The innovative self-setting design of the Haldex S-ABA enables unrivalled ease of installation. Conventional brake adjusters have a predesignated position for the control arm, but the S-ABA operates perfectly whatever the angle of its control arm. This flexibility means installation is faster – there are no time-consuming adjustments of the controlarm to achieve correct clearance. And, because you can choose the angle of the controlarm, the problem of faulty installations can be eliminated – it is virtually impossible to install the S-ABA incorrectly.



Haldex S-ABA

- Self-setting for faster, easier installation
- Functions correctly, regardless of control arm position
- Replaces fixed controlarm adjusters enabling lower stock levels
- Allows axles to be delivered with adjusters already installed
- Works with Haldex AA1 brake adjusters on the same vehicle axle
- Adjusts gradually to reduce the risk of over-adjustment during extreme braking
- Integrates with the Haldex Electronic Lining Wear Sensor

Description

TTM CAN+ is the vehicle equipment that is required to use Haldex TTM web based trailer management system found on www.haldex-ttm.com.

TTM CAN+ is connected to Haldex EB+ for transmission of diagnostic information. TTM can easily be retro fitted. To use the system a monthly subscription cost for GSM traffic will be charged.

Function

TTM default setting is to send an automatic report to the TTM web system every 24 hours. The interval can be changed by the user. The report includes geographical positions, technical information, usage information and odo meter reading. TTM also has connections to monitor door openings or other events.

A built in back-up battery secure functionality even when trailer is parked for long periods.

Installation

Installation instructions can be downloaded at **www.haldex-ttm.com**

Technical Data

GSM

Siemens dual or triple band
EGSM900 and GSM1800 (GSM1900)
Compliant to GSM 2/2+

GPS

12-Channel GPS receiver
WAAS/EGNOS compatible
Sensitivity:

- Acquisition - 139 dbm
- Tracking - 152 dbm
- Navigation - 150 dbm

Power supply

External 24 V
Back-up battery 12 volt 7.2 Ah

Dimensions, enclosure

233 x 180 x 117 mm

Weight

Ex battery	1.5 kgs
Battery	2.5 kgs
Total	4.0 kgs

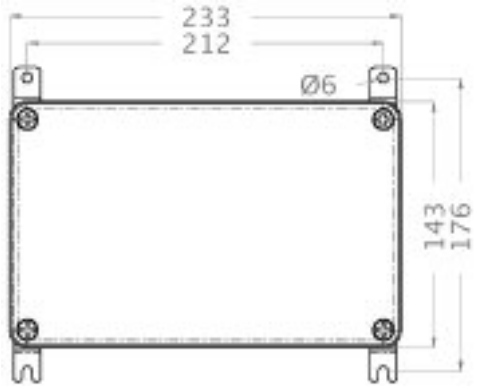
Temperature

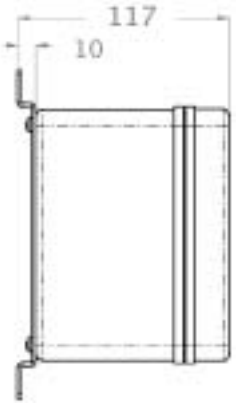
Normal operation
-20°C to +55°C
Restricted operation
-25°C to -20°C and +55°C to +70°C

Kit contents

- TTM CAN+ vehicle unit
- Haldex 3 V GPS antenna
- GPS antenna cable, 10 mtr
- EB+ connection cable, 6,5 mtr

Alternative cable lengths available





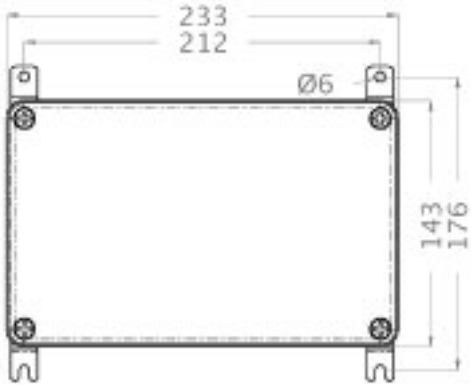
RoHS Compliant

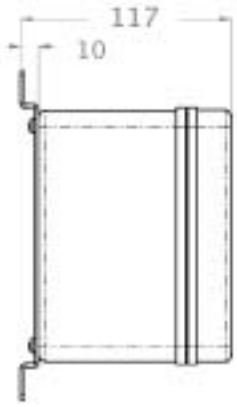
TTM UNI, Telematic Trailer Kit

Kit contents

- TTM UNI vehicle unit
- Haldex 3 V GPS antenna
- GPS antenna cable, 10 mtr

Alternative cable lengths available





Description

TTM UNI is the vehicle equipment that is required to use Haldex TTM web based trailer management system found on www.haldex-ttm.com.

TTM can easily be retro fitted. To use the system a monthly subscription cost for GSM traffic will be charged.

Function

TTM default setting is to send an automatic report to the TTM web system every 24 hours. The interval can be changed by the user. The report includes geographical positions. TTM also has connections to monitor door openings or other events.

A built in back-up battery secure functionality even when trailer is parked for long periods.

Installation

Installation instructions can be downloaded at **www.haldex-ttm.com**

Technical Data

GSM

Siemens dual or triple band
EGSM900 and GSM1800 (GSM1900)
Compliant to GSM 2/2+

GPS

12-Channel GPS receiver
WAAS/EGNOS compatible
Sensitivity:

- Acquisition - 139 dbm
- Tracking - 152 dbm
- Navigation - 150 dbm

Power supply

External 24 V
Back-up battery 12 volt 7.2 Ah

Dimensions, enclosure

233 x 180 x 117 mm

Weight

Ex battery	1.5 kgs
Battery	2.5 kgs
Total	4.0 kgs

Temperature

Normal operation
-20°C to +55°C
Restricted operation
-25°C to -20°C and +55°C to +70°C

RoHS Compliant

Description

TTM 12/48 is the vehicle equipment that is required to use Haldex TTM web based trailer management system found on www.haldex-ttm.com.

TTM 12/48 can be used on cars, trucks or trailers. TTM can easily be retro fitted.

To use the system a monthly subscription cost for GSM traffic will be charged.

Function

TTM default setting is to send an automatic report to the TTM web system every 24 hours. The interval can be changed by the user. The report includes geographical positions. TTM also has connections to monitor door openings or other events.

A built in back-up battery secure functionality even when vehicle is parked.

Installation

Installation instructions can be downloaded at www.haldex-ttm.com

Technical Data

GSM

Siemens dual or triple band
EGSM900 and GSM1800 (GSM1900)
Compliant to GSM 2/2+

GPS

12-Channel GPS receiver
WAAS/EGNOS compatible
Sensitivity:

- Acquisition - 139 dbm
- Tracking - 152 dbm
- Navigation - 150 dbm

Power supply

External 12 - 48 V
Back-up battery 3.7 volt 2.2 Ah

Dimensions, enclosure

130 x 130 x 35 mm

Weight

0.2 kgs

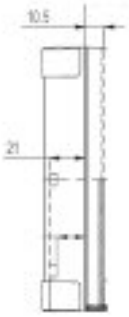
Temperature

Normal operation
-20°C to +55°C
Restricted operation
-25°C to -20°C and +55°C to +70°C

Kit contents

- TTM 12/48 vehicle unit
- Haldex 3 V GPS antenna
- GPS antenna cable, 3,5 mtr

Alternative cable lengths available



RoHS Compliant

3 V GPS antenna with FME connector

White Part no: TTM 400 001

GPS antenna holder

Blue	Part no: TTM 500 001
Yellow	Part no: TTM 500 002
White	Part no: TTM 500 003

GPS antenna cable

Length	FME Connector	90° FME Connector
10 m	TTM 200 014	TTM 200 004
7 m	TTM 200 013	TTM 200 003
5 m	TTM 200 012	TTM 200 002
3.5 m	TTM 200 011	TTM 200 001

EB+ connection cable

10 mtr	Part no: TTM 300 002
6.5 mtr	Part no: TTM 300 001

TTM Door sensor kit with 20 mtr cable

Aluminum Part No: TTM 700 001

TTM Cable protection tube for GPS cable

Black, 5 mtr Part No: TTM 600 0011

TTM battery, 12 V, 7,2 Ah

Weight 2,5 kgs Part No: TTM 900 002

RoHS Compliant

YES!

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Haldex is listed on the Stockholm Stock Exchange and has annual sales of nearly 8 billion SEK with 4,600 employees.

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