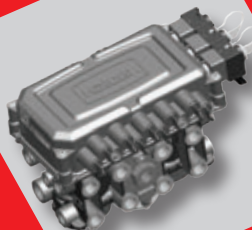
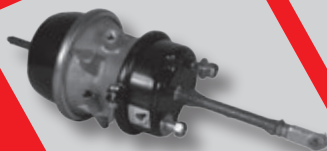
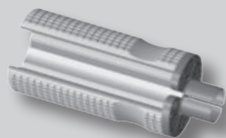


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Your contact:

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Brake cylinders	page 1
Fork heads	page 2
Control valves	page 2
ABS Modular	page 4
ABS Modal	page 5
EBS	page 7
Coupling heads and filters	page 10
Air suspension valves	page 11
Other valves	page 12
Brake kits	page 13
Screw sets	page 14
ABC system	page 17
ABC system / combination possibilities	page 18
ABC system installation information	page 20
ABC™ screw connections and plug connectors	page 26
BRK system / P5	page 30
BRK system / combination possibilities	page 31
BRK System / P5 Installation Information	page 32
BRK™ screw connections and plug connectors	page 37
Hose clips / mounting clips	page 44
Pipes and hoses	page 47
Compressed air reservoir	page 48
Parking brakes	page 50
Brake calculations	page 51
Service - Air Brake Systems	page II
Index	page IV
Index of article numbers	page 54
General Terms and Conditions (Sales)	page 59

3/2-Way valve 3, 12
 4-Way-Block 28

A

ABC-System 17, 20
 ABS Kits Modular 4
 ABS Modal Control Units 5

ABS Relay Valve (Modulator) 6
 Adapter 28
 Adjustment valve 3, 13
 Air Coil 48
 Air Suspension Valves 11
 Air Tank Strips 49
 Angle 14, 27, 39, 40
 Angle Block 40
 Assembly of the ABC Modular System 23
 Assembly of Plastic Pipes 22, 34

B

Bend 42
 Brake Calculation 51
 Brake Cylinders 1, 13
 Brake Cylinder Membrane 1
 Braking Force Regulator 2, 3, 13
 Brake Hoses 47
 Brake Kits 13
 Brake Valve 2, 9
 BRK 30, 31
 BRK-System 30, 32
 Bulkhead Nozzle 14, 15, 18, 20, 26, 27, 32, 38-40

C

Cabling EBS 8
 Chamber Piston Brake Cylinder 1
 Check Valve 12
 COLAS 4, 8, 12
 Combi Brake Cylinder 1
 Combination possibilities 18, 31
 Compressed Air Reservoirs 13, 48, 49
 Compressed air brake systems II, 46, 48, 49
 Conical Threads 21, 33
 Connection Adapter 26
 Control Valves 2
 Coupling heads 10
 Crosspiece 28, 41

D

Dismantling Tool 29
 Double Socket 40
 Drain Valves 43
 Dummy Coupling 10, 13
 Duomatic Couplings 10

E

EBS II, 2-9, 15

F

Filter 10
 Fork Head 1, 2
 F-Pipe 41

H

Handling the ABC dismantling tool 25
 Height Sensor 8, 9
 Hoses 47
 Hose Clips 44, 46
 Hose Connection 42, 43
 Hose Nozzle 14, 15, 28, 42, 43

I

ILAS 8, 11

J

Joint 28, 39

L

Lift Axle Valve 11
 Lifting and Lowering Valves 12
 Linkage 3, 11
 Linkage set 9, 11
 Lock Nuts 20, 32, 43
 L-Bulkhead Nozzle 14, 15, 39
 L-Pipe 27, 31, 41

M

Mecanyl-Pipes 47
 Modal-Sensor Extension Cable 5
 Modal Control Units 5
 Modal-Valve Cable 5
 Modal-Supply Cable 6
 Modular 4, 6
 Modular-Cable Harnesses 4
 Modular-Supply Cable 4
 Modulator Cable 5
 Mounting Clips 44, 45

N

New Line 26

O

Overflow Valves 12

P

Parking Brakes 50
 Parking Socket 5, 6
 Pipes 22, 34, 45, 47, 57
 Pipe Clips 45
 Pipe Coupling 38
 Plastic Pipes 47

Plug 14-16, 29, 44
 Plug Connector 14-16, 27, 28, 32-38
 Pressure test connection 13-16, 28, 42

Pressure Valves 3
 Push-In-Plug Connector 27

Q

Quick-Connector Nozzle P5 37
 Quick-Release Valve 3, 8, 11

R

Reducer 14, 28, 42
 Relaisventil 12
 Release Valves 3
 Repair information for the P5 system 36
 RotoLock 18, 23, 24, 29

S

Screw Connections 17, 26, 30, 36, 7
 Screw Connection Kits 14
 Sensor 4, 6, 7, 9
 Sensor Extension Cable 5, 9
 Service II
 Shut-Off Valve 12
 Spring-mechanism brake cylinder 1
 Steel Pipes 47
 Straight Threads 20, 32
 Support Sleeves 44
 Supply Cable 4, 6, 8

T

T-Bulkhead Nozzle 39
 T-Pipe 14, 15, 27, 31, 41
 T-Plug Connector 38
 Threaded Sleeves 42
 Trailer Brake Valve 2, 9
 Trailer-Control-Modul 2
 TRCM 2, 3, 15
 Tristop-Cylinder 1
 Two-way valve 3, 8

U

Union Nuts 43

V

Valve Units 8
 Valve Cable 5



Figure: 240541023

Single-chamber Piston Brake Cylinder

Loose, in accordance with DIN 74282, Form A, operating pressure up to $p_e = 10$ bar.

Designation	Piston- η	Piston hub Piston rod*	Force on the	Hub volumes from Haldex	Weight	Comparison number	
[mm]	[mm]	[N]	[l]	[kg]			
GL 100	65	105	1800	0.30	2.1	340 029 001	240541022
GL 101	80	100	2700	0.55	2.3	340 026 001	240541023
GL 102	100	135	4200	1.10	3.8	340 005 001	240541024
GL 103	125	135	6700	1.72	4.8	340 008 001	240541025
GL 105	150	155	9700	2.82	7.7	340 013 001	240541027

* Original Haldex part



Console for Piston Cylinder

240541380



Figure: 240541196

Brake Cylinder Membrane

Types 9/12/36 standard version with bellows and 2 connections (middle closed), types 16/20/24/30 long-hub version (80 mm hub) with 2 connection threads M 16 x 1.5 mm, installation dimension for all types 227 mm, please order fork head separately, operating pressure up to $p_e = 10$ bar.

Version	Connections	Piston rod thread	Hub [mm]	Piston rod seals	Haldex comparison number	
Type 9	M 16 x 1.5	M 16 x 1.5	56	Bellows	123 090 001*	240541248
Type 12	M 16 x 1.5	M 16 x 1.5	55	Bellows	345 125 110	240542200
Type 12	M 16 x 1.5	M 16 x 1.5	55	Bellows	123 120 002*	240542079
Type 16	M 16 x 1.5	M 16 x 1.5	80	Bellows	123 160 002*	240542196
Type 16	M 16 x 1.5	M 16 x 1.5	80	Bellows	120 331 101	240541196
Type 16	M 16 x 1.5	M 16 x 1.5	80	Bellows	125 160 001*	240542152
Type 20	M 16 x 1.5	M 16 x 1.5	80	Bellows	120 341 101	240541197
Type 20	M 16 x 1.5	M 16 x 1.5	80	Bellows	123 200 002*	240542197
Type 24	M 16 x 1.5	M 16 x 1.5	80	Bellows	120 351 101	240541198
Type 24	M 16 x 1.5	M 16 x 1.5	80	Bellows	123 240 002*	240542198
Type 30	M 16 x 1.5	M 16 x 1.5	80	Bellows	120 361 101	240541199
Type 30	M 16 x 1.5	M 16 x 1.5	80	Bellows	123 300 002*	240542199

* Original Haldex part



Figure: 240542112

Combi Brake Cylinder

Membrane/membrane, hub 75/75 S-cam, without vent line.
(Tristop cylinder / spring-mechanism brake cylinder)

Version	Haldex comparison number	
Type 16/24	05.444.18.01.01 (BPW)	240542136
Type 16/24	135 1624 004*	240542153
Type 20/30	136 2030 001*	240542054
Type 24/30	136 2430 001*	240542112

* Original Haldex part

Fork Heads

Fork Head

Slot or round hole version

Version	Haldex comparison number	
Slot	003 033 609	240541344
Slot	003 033 609*	240542344
Round hole	003 616 409*	240541379
Round hole	003 561 409 D	240542379

* Original Haldex part



Figure: 240541344

Control Valves

Trailer Brake Valve

Version	Haldex comparison number	
With release valve	350 026 002*	230541201
Without release valve, with braking force regulator	350 027 202*	230541203
With braking force regulator and release valve	350 028 001*	230541205
Without release valve and braking force regulator	351 008 022*	230541375
For EBS	351 033 001*	230542116

* Original Haldex part



Figure: 230541201

Trailer Control Modules

Version	Haldex comparison number	
TRCM - trailer control module	352 067 101*	230542113
TRCM+ - trailer control module	352 067 601*	230542151

* Original Haldex part



Figure: 230542113

Braking Force Regulator

Version	Haldex comparison number	
Braking force regulator, manual, without release position	352 011 122*	230541391
Braking force regulator, manual, with release position	352 011 102*	230541377
Braking force regulator, mechanical, lever length 25-50 mm	601 002 021*	230541235
Braking force regulator, mechanical, lever length 50-130 mm	601 013 011*	230541236
Braking force regulator, mechanical, lever length 90-176 mm	601 002 001*	230541135
Braking force regulator, hydraul./pneumat.	475 714 600 0 (Wabco)	230542163
Braking force regulator, pneumatic	602 005 001*	230541238

* Original Haldex part



Figure: 230541377



Figure: 230542145

Braking Force Regulator Accessories

Designation	HalDEX comparison number	
Linkage for mech. ALB regulator	003 480 209*	230541237
Linkage for mech. ALB regulator, with cable, cable tie + spring, 120 mm spring	003 038 609*	230542145
Nameplate for mech. ALB regulator	028 027 909*	230542133

* Original HalDEX part



Figure: 230541130

Pressure Valves

Operating pressure up to $p_e = 10$ bar.

Designation	HalDEX comparison number	
Adjustment valve, 0-4 bar, 4 bar pressure setting	356 005 102*	230542058
Pressure relief valve	357 012 031*	230542080
Adjustment valve, 0-5.5 bar, 2 bar pressure setting, 0.5 bar opening pressure	356 009 011	230541207
Adjustment valve, 0-5.5 Bar, 3.5 bar pressure setting, with quick-release function	356 010 011*	230541130

* Original HalDEX part



Two-way Valve with Piston

230542053



Original HalDEX part

HalDEX comparison number: 333 001 101



Figure: 230542059

Quick-release valves

Operating pressure up to $p_e = 10$ bar.

Designation	HalDEX comparison number	
Quick-release valve, with 2 180° connections	356 006 011*	230541209
Quick-release valve, with 1 connection + reinforced membrane	356 001 011*	230542164
Quick-release valve, with 4 parallel connections	356 023 011*	230542059
Quick-release valve, with 2 parallel connections + integr. two-way valve	350 037 111*	230542117
Quick-release valve, with 4 parallel connections + integr. two-way valve	350 036 111*	230542107

* Original HalDEX part



Figure: 230542057

Release Valves

for triggering the hand brake

Version	HalDEX comparison number	
automatic	352 007 401*	230542056
automatic, for trailer control valve	352 012 001*	230541376
manual	352 018 011*	230541234
Double-release valve, manual	352 045 001*	230542082
TRCM trailer control module, with integrated overflow valve	352 067 101*	230542113
TRCM+ - trailer control module with integrated overflow valve & Safe Parking	352 067 601*	230542151
Control valve, manual	352 019 011*	230542057

* Original HalDEX part

ABS Kits Modular

Version	Haldex comparison number	
MODULAR 2 - 2S/2M+4S/2M	364 308 001*	230542061
MODULAR 1+ 2S/1M	364 328 001*	230542090

* Original Haldex part

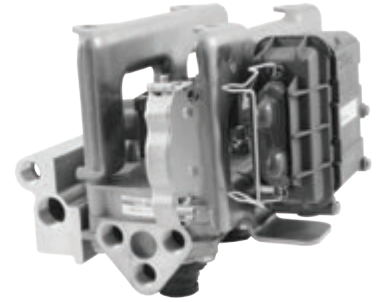


Figure: 230542061

Modular Cable Harnesses

Version	Haldex comparison number	
2S/1M (-without COLAS cable-)	364 349 001*	230542097
2S/1M (-with COLAS cable-)	364 347 001*	230542091
2S/2M (-without COLAS cable-)	364 345 001*	230542111
2S/2M (-with COLAS cable-)	364 344 001*	230542060
4S/1M (-with COLAS cable-)	364 341 011*	230542110
4S/2M (-with COLAS cable-)	364 340 011*	230542073

* Original Haldex part



Figure: 230542073

Modular Supply Cable

With connection in accordance with ISO 7638 (ABS/EBS), not compliant with the Hazardous Road Waste Directive (GGVS)

Version	Cable length [m]	Cable [Material]	Haldex comparison number	
Socket	12	PUR	364 357 021*	230542085
Socket	12	PVC	364 357 001*	230542074
Socket	9	PVC	364 357 011*	230542092
Plug	9	PVC	364 367 011*	230542062

* Original Haldex part



Figure: 230542092

Sensors

Version	Cable length [m]	Haldex comparison number	
angled	0.5	950 364 503*	230542142
straight, with clamp sleeve	0.5	950 364 506*	230542154
straight, without clamp sleeve	0.5	364 208 001*	230542147

* Original Haldex part

Sensor Clamp Sleeve

for ABS and EBS sensors

230542146



Original Haldex part

Haldex comparison number: 059 512 309



Figure: 230542154



Parking Socket

ABS / EBS

240542050



Original Haldex part

Haldex comparison number: 950 610 030

ABS Modal



Figure: **230542075**

ABS Modal Control Units

Version	Haldex comparison number	
with Colas control	364 256 001*	230542075
without Colas control	364 129 101*	230542064

* Original Haldex part



Modal Valve Cable / Modulator Cable

Version	Cable length [m]	Haldex comparison number	
blue	6	364 122 041*	230542067
yellow	6	364 122 051*	230542068
red	6	364 122 031*	230542066
red	10	364 122 061*	230542094

* Original Haldex part



Figure: **230542162**

Modal Sensor Extension Cable

Version	Cable length [m]	Haldex comparison number	
Cable	1.8	449 712 018 0	230542162
Cable 2A/blue	3	364 119 031*	230542071
Cable 2B/yellow	3	364 119 041*	230542072
Cable 1A/red	6	364 120 001*	230542069
Cable 1B/red	6	364 120 011*	230542070
Cable 2A/blue	6	364 120 031*	230542088
Cable 2B/yellow	6	364 120 041*	230542089
Cable 1A/red	10	364 121 001*	230542095
Cable 1B/red	10	364 121 011*	230542096

* Original Haldex part

Modal Supply Cable

with plug, ADR, 9m cable length

230542065



Original Haldex part

Haldex comparison number: 364 375 011



Sensors

Version	Cable length [m]	Haldex comparison number	
angled	0.5	950 364 503*	230542142
straight, with clamp sleeve	0.5	950 364 506*	230542154
straight, without clamp sleeve	0.5	364 208 001*	230542147

* Original Haldex part



Figure: **230542154**

Sensor Clamp Sleeve

for ABS and EBS sensors

230542146



Original Haldex part

Haldex comparison number: 059 512 309

Parking Socket

ABS / EBS

240542050



Original Haldex part

Haldex comparison number: 950 610 030



ABS Relay Valve (Modulator)

Modular/Modal

230542063



Original Haldex part

Haldex comparison number: 364 105 021



Change from EBS Gen 2 to EBS Gen 3

Haldex EBS Gen 2 is replaced by the EBS Gen 3

Extended function of the EBS Gen 3:

- Operating voltage range between 8 and 32 volts
- Faster response time for over-long control lines
- Option to use multiple AUX CAN functions
- Super AUX with 2M stand function
- Introduction of Super AUX / brake light power supply with 3M
- Additional AUX functionality

What doesn't change:

- Installation location and size / housing design
- Static and dynamic brake power
- Anti-lock brake functionality
- Stability function (roll-over control function)

External changes:

- No changes to the assembly points on the modulator
- No change to the pneumatic connections (option: rear reservoir connection may be omitted)
- No change to the inner moving parts
- ECU is now manufactured as one-piece
- Sensor and AUX connections positioned laterally and staggered
- Individual diagnostics connection is omitted and is replaced by 2 laterally-positioned diagnostics connections
- Sensors are no longer cast, but sealed with a cover plate instead

Gen 2



Gen 3



EBS Valve Units

Version	Haldex comparison number	
EBS, GEN3 2S/2M, 8-32V with P-AUX + integr. quick-release valve & two-way valve, with stability	823 034 001*	230542000
EBS auxiliary modulator, GEN3 2S-4S/3M	810 023 001*	230542049
EBS, GEN2 2S-4S/2M with integrated quick-release valve and two-way valve, with stability, 5 AUX	820 008 001*	230542149
EBS, GEN2 2S-4S/3M Master & Slave Kit, with integrated quick-release valve & two-way valve, with stability, 5 AUX	820 028 001*	230542150
EBS, GEN1 2S/1M with integr. 2-way valve, 3 AUX	810 006 101*	230542140
EBS, GEN1 2S-4S/2M, 5 AUX	810 009 302*	230542118
EBS, GEN1 4S/3M consisting of: 1 x 810 010 001 (2M) 5 AUX for rear axle + 1 x 810 011 001 (1M) 1 AUX for front axle	810 014 002*	230542119

* Original Haldex part



Figure: 230542000

EBS Supply Cable

With connection in accordance with ISO 7638

Version	Cable length [m]	Cable [Material]	Haldex comparison number	
Emergency supply through ISO1185 54/31	6		814 002 222*	230542165
Socket	9	PVC	814 003 132*	230542141
Socket, ADR	12	PUR	814 003 101*	230542127
Plug, ADR	9	PUR	814 004 102*	230542126

* Original Haldex part



Figure: 230542141

EBS Cabling

Version	Cable length [m]	Haldex comparison number	
Connection cable for height sensor, electronic	4	814 012 261*	230542161
AUX connection cable bayonet, for COLAS/ILAS-E	5	950 800 261*	230542131
AUX connection cable bayonet, for COLAS/ILAS-E	7	950 800 481*	230542156
AUX connection cable for Canbus, PUR	7	950 800 431*	230542130
3M connecting cable Gen1 & Gen2	5	814 001 021*	230542129
3M connecting cable Gen1 & Gen2	8	814 001 051*	230542128
Diagnostics cable for external diagnostics, socket, connection R232		814 011 001*	230542100

* Original Haldex part



Figure: 230542156



Figure: 230542120

EBS Sensor Extension Cable

Version	Cable length [m]	Haldex comparison number	
Cable, PUR	3	814 004 401*	230542120
Cable, PUR	6	814 004 411*	230542121
Cable, PUR	10	814 004 431*	230542122

* Original Haldex part



Figure: 230542154

Sensors

Version	Cable length [m]	Haldex comparison number	
angled	0.5	950 364 503*	230542142
straight, with clamp sleeve	0.5	950 364 506*	230542154
straight, without clamp sleeve	0.5	364 208 001*	230542147

* Original Haldex part

Sensor Clamp Sleeve

for ABS and EBS sensors

230542146



Original Haldex part

Haldex comparison number: 059 512 309



EBS Height Sensor

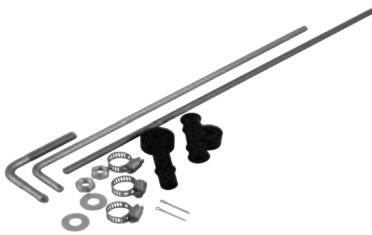
electronic

230542160



Original Haldex part

Haldex comparison number: 815 030 001



Linkage set

for air suspension valve, consisting of 1x 230542135, 1x 230542078 + 1x connecting rod

230542169



Original Haldex part

Haldex comparison number: 48 100 287



Trailer Brake Valve

for EBS

230542116



Original Haldex part

Haldex comparison number: 351 033 001



EBS Labels

Version	Haldex comparison number	
EBS/EB+ ALB sticker for laser printer	028 042 409*	230542134
EBS/EB+ Info label	028 526 209*	230542132

* Original Haldex part

Figure: 230542132

Coupling heads, yellow, brake system

Interchangeability in accordance with ISO 1728.

Version	Haldex comparison number	
M 16 x 1.5, with cover	334 054 201	240541347
M 16 x 1.5, with cover	334 054 201*	240542044
M 16 x 1.5, with filter	334 054 401*	240542102
M 16 x 1.5, automatic	334 064 001*	240542046
M 22 x 1.5, with cover	334 054 211*	240542124
M 22 x 1.5, with cover	334 054 211	240541124
M 22 x 1.5, automatic	334 072 001	240541254
M 22 x 1.5, automatic	334 072 001*	240542254

* Original Haldex part



Figure: 240541124

Coupling heads, red, stock

Interchangeability in accordance with ISO 1728.

Version	Haldex comparison number	
M 16 x 1.5, with cover	334 055 201	240541348
M 16 x 1.5, with cover	334 055 201*	240542045
M 16 x 1.5, automatic	334 063 001*	240542047
M 16 x 1.5, with filter	334 055 401*	240542103
M 22 x 1.5, with cover	334 055 211*	240542125
M 22 x 1.5, with cover	334 055 211	240541125
M 22 x 1.5, automatic	334 071 001	240541253
M 22 x 1.5, automatic	334 071 001*	240542253

* Original Haldex part

Dummy Coupling

240541126



Original Haldex part

Haldex comparison number: 334 028 001



Duomatic Couplings

Version	Haldex comparison number	
M 16 x 1.5, Duomatic	(Wabco) 452 804 012 0	230542166
M 16 x 1.5, Duomatic	(Wabco) 452 804 009 0	230542167

* Original Haldex part



Figure: 230542167

Filter

Version	Haldex comparison number	
Pipe filter	310 005 011	240541041
Pipe filter	310 005 011*	240542051
Ventilation filter	031 000 909*	240541146

* Original Haldex part



Figure: 240542051



Quick-Release Valve

with 1 connection and reinforced membrane, for fast ventilation for dumper trucks

230542164



Original Haldex part

Haldex comparison number: 356 001 011



Air Suspension Valves

Version	Haldex comparison number	
with heigh limit	612 032 001*	230542077
without height limit, type 4, made of plastic	612 035 031*	230542086
without height limit, type 3, made of plastic	612 035 021*	230542115

* Original Haldex part

Figure: **230542086**

Linkage

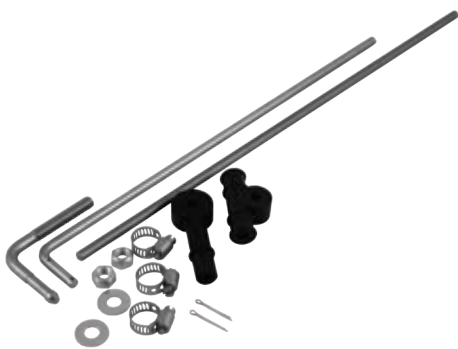
for air suspension valve

230542135



Original Haldex part

Haldex comparison number: 003 575 709



Axle Shaft Linkage

M8 connection

230542078



Original Haldex part

Haldex comparison number: 612 025 001

Figure: **230542169**

Linkage set

for air suspension valve, consisting of 1x 230542135, 1x 230542078 + 1x connecting rod

230542169



Original Haldex part

Haldex comparison number: 48 100 287



Lift Axle Valve

ILAS-E (DIN bayonet)

230542114



Original Haldex part

Haldex comparison number: 352 061 111

COLAS Lifting and Lowering Valves

Version	Haldex comparison number	
with flat plug and dead man's handle	338 051 101*	230542055
with bayonet and dead man's handle	338 051 121*	230542139

* Original Haldex part

Throttle for COLAS Valve

8 mm, with height limit

230542155

➔ Original Haldex part
Haldex comparison number: 027 066 509

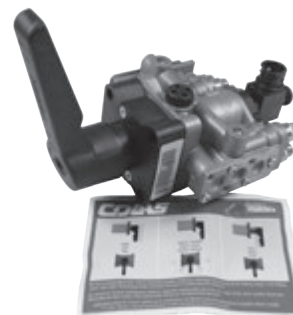


Figure: **230542139**

Other Valves

Overflow Valves

Version	Haldex comparison number	
without backflow	314 012 004*	230541210
with limited backflow, 6.2 bar	314 014 003*	230541247

* Original Haldex part



Figure: **230541247**

Shut-Off Valve

GL 133

240541040

➔ Original Haldex part
Haldex comparison number: 334 047 001



Check Valve

230541211

➔ Original Haldex part
Haldex comparison number: 314 001 001



Relay Valves

Version	Haldex comparison number	
Single-circuit controlled	355 018 011*	230541202
3/2-way solenoid valve	360 009 141*	230542108
3/2-way valve with piston actuation	551 018 001*	230542105

* Original Haldex part



Figure: **230542108**



Basic "Brakes" Kit LOF 40 km/h

for centre axle trailer

231549001

Consisting of:

- 1x 542124 Coupling head, yellow, brake - M 22 x 1.5
- 1x 542125 Coupling head, red, stock- M 22 x 1.5
- 2x 541126 Dummy coupling
- 2x 541041 Air filter GL 652 B
- 1x 541203 Trailer control valve, without release valve, with manual regulator



Basic "Brakes" Kit LOF 40 km/h

for turnable drawbar trailer

231549002

Consisting of:

- 1x 542124 Coupling head, yellow, brake - M 22 x 1.5
- 1x 542125 Coupling head, red, stock- M 22 x 1.5
- 2x 541126 Dummy coupling
- 2x 541041 Air filter GL 652 B
- 1x 542058 Adjustment valve 0-4 bar, 4 bar pressure setting
- 1x 541205 Trailer control valve, with release valve and manual regulator



Basic "Brakes" Kit LOF up to 60 km/h

for centre axle trailer

231549003

Consisting of:

- 1x 542124 Coupling head, yellow, brake - M 22 x 1.5
- 1x 542125 Coupling head, red, stock- M 22 x 1.5
- 2x 541126 Dummy coupling
- 2x 541041 Air filter GL 652 B
- 1x 541233 Trailer control valve, without release valve and without manual regulator
- 1x 541234 Manual release valve
- 1x 541236 Mechanical braking force regulator, 50-130mm lever length, without shock absorber
- 2x 541214 Screw-on pressure test connection



Basic "Brakes" Kit LOF up to 60 km/h

for turnable drawbar trailer

231549004

Consisting of:

- 1x 542124 Coupling head, yellow, brake - M 22 x 1.5
- 1x 542125 Coupling head, red, stock- M 22 x 1.5
- 2x 541126 Dummy coupling
- 2x 541041 Air filter GL 652 B
- 1x 541201 Trailer control valve, without release valve and without manual regulator
- 1x 542058 Adjustment valve 0-4.0 bar, 4 bar pressure setting
- 1x 541236 Mechanical braking force regulator, 50-130mm lever length, without shock absorber
- 2x 541214 Screw-on pressure test connection



ATTENTION

Compressed air reservoir
and brake cylinder must be ordered
separately for all brake kits!

Connection Set for Basic "Brakes" Kit

LOF up to 40 km/h

235549104

Consisting of:

- 4x 541537 Hose nozzle DIN 11 / M22 x 1.5
- 2x 541476 Bulkhead nozzle M22 x 1.5 / M16 x 1.5
- 5x 541486 Locknut with O-ring M22 x 1.5
- 3x 541508 90° angled bulkhead nozzle M22 x 1.5 / M16 x 1.5 / M16 x 1.5
- 5x 541439 GE plug connector M12 x 1.5 / M22 x 1.5
- 5x 541438 GE plug connector M12 x 1.5 / M16 x 1.5
- 2x 541466 Reducer M22 x 1.5 / M16 x 1.5
- 1x 541496 Pressure test connection M22 x 1.5
- 1x 541038 Drain valve with ring M22 x 1.5



Connection Set for Basic "Brakes" Kit

LOF up to 60 km/h

235549105

Consisting of:

- 4x 541537 Hose nozzle DIN 11 / M22 x 1.5
- 2x 541476 Bulkhead nozzle M22 x 1.5 / M16 x 1.5
- 5x 541486 Locknut with O-ring M22 x 1.5
- 3x 541508 90° angled bulkhead nozzle M22 x 1.5 / M16 x 1.5 / M16 x 1.5
- 8x 541439 GE plug connector - 12 x 1.5 / M22 x 1.5
- 8x 541438 GE plug connector - 12 x 1.5 / M16 x 1.5
- 1x 541496 Pressure test connection M22 x 1.5
- 1x 541038 Drain valve with ring M22 x 1.5
- 2x 541463 Plug M22 x 1.5
- 3x 541718 L-bulkhead nozzle M22 x 1.5 / M16 x 1.5
- 3x 541495 Pressure test connection M16 x 1.5



Connection Set for Basic "Brakes" Kit

for 1 piston cylinder

235549101

Consisting of:

- 2x 541438 GE plug connector - 12 x 1.5 / M16 x 1.5
- 1x 541526 T-pipe with mounting bracket 3 x M16 x 1.5
- 1x 541534 Hose nozzle - DIN 11 / M16 x 1.5
- 1x 541537 Hose nozzle - DIN 11 / M22 x 1.5
- 1x 541495 Pressure test connection M16 x 1.5





Connection Set for Basic "Brakes" Kit

for 1 axle with membrane cylinder

235549102

Consisting of:

- 4x 541438 GE plug connector - 12 x 1.5 / M16 x 1.5
- 2x 541526 T-pipe with mounting bracket 3 x M16 x 1.5
- 4x 541534 Hose nozzle - DIN 11 / M16 x 1.5
- 1x 541462 Plug M16 x 1.5
- 1x 541495 Pressure test connection M16 x 1.5



Connection Set for Basic "Brakes" Kit

for 2nd air connection

235549103

Consisting of:

- 2x 541718 L-bulkhead nozzle M22 x 1.5 / M16 x 1.5
- 4x 541438 GE plug connector - 12 x 1.5 / M16 x 1.5
- 2x 541476 Bulkhead nozzle M22 x 1.5 / M16 x 1.5
- 4x 541486 Locknut with O-ring M22 x 1.5
- 1x 542254 Coupling head, automatic / M 22 x 1.5 - yellow - brake
- 1x 542253 Coupling head, automatic / M 22 x 1.5 - red - stock



Connection set

for EBS valve unit 230.542149

235549106

Consisting of:

- 2x 541723 ABC plug connector 8x1.0 / M16x1.5
- 6x 541726 ABC plug connector 12x1.5 / M16x1.5
- 1x 541727 ABC plug connector 12x1.5 / M22x1.5
- 1x 541449 GE plug connector 18x2.0 / M22x1.5
- 2x 541461 Plug M12x1.5
- 7x 541462 Plug M16x1.5
- 1x 541463 Plug M22x1.5



Connection Set

for TRCM 230.542113 & 230.542151

235549107

Consisting of:

- 2x 541723 ABC plug connector 8x1.0 / M16x1.5
- 1x 541726 ABC plug connector 12x1.5 / M16x1.5
- 3x 541727 ABC plug connector 12x1.5 / M22x1.5
- 2x 541461 Plug M12x1.5
- 1x 541462 Plug M16x1.5

Connection Set

for trailer control valve 230.541233 (352 022 001)

235549108

Consisting of:

- 1x 541724 ABC plug connector 8x1.0 / M22x1.5
- 4x 541726 ABC plug connector 12x1.5 / M16x1.5
- 4x 541727 ABC plug connector 12x1.5 / M22x1.5
- 4x 541462 Plug M16x1.5



Connection Set

for trailer control valves 230.541201 / 541203 / 541205 / 541375

235549109

Consisting of:

- 1x 541723 ABC plug connector 8x1.0 / M16x1.5
- 1x 541724 ABC plug connector 8x1.0 / M22x1.5
- 4x 541727 ABC plug connector 12x1.5 / M22x1.5
- 1x 541463 Plug M22x1.5



Connection Set

for trailer control valve 230.542116

235549110

Consisting of:

- 1x 541723 ABC plug connector 8x1.0 / M16x1.5
- 1x 541724 ABC plug connector 8x1.0 / M22x1.5
- 2x 541727 ABC plug connector 12x1.5 / M22x1.5
- 1x 541463 Plug M22x1.5
- 1x 541495 Pressure test connection M16x1.5

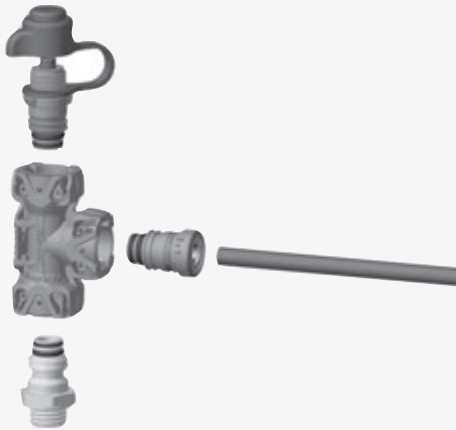


ABC System

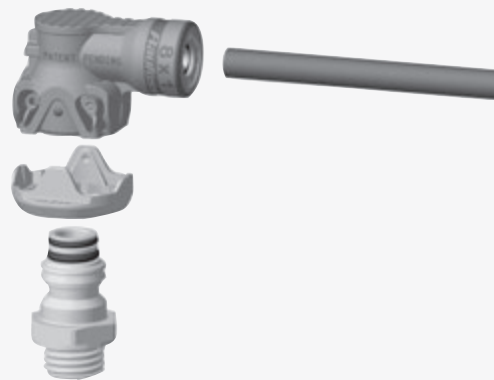
Screw connections and plug connectors



Connection with L-screw connection



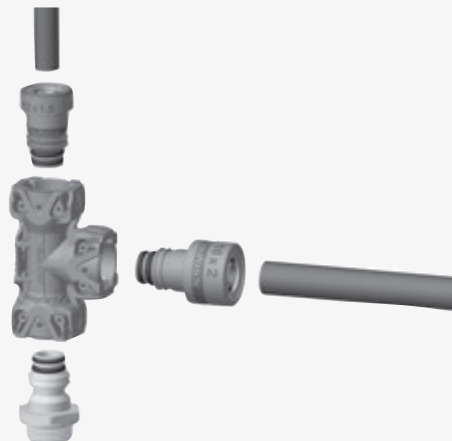
Connection with Rotolock



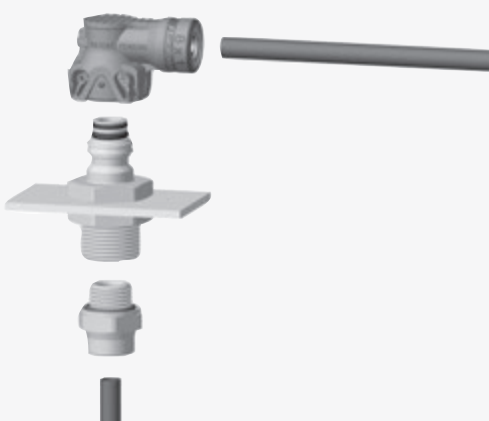
Connection with T-screw connection



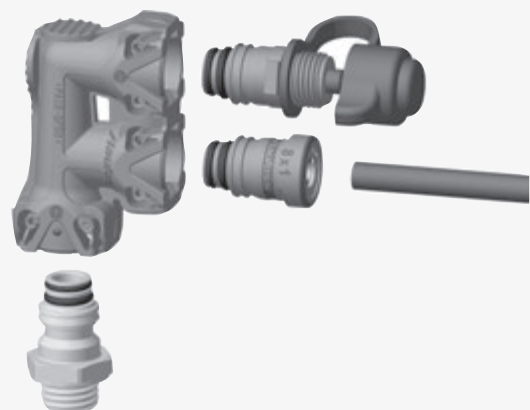
Connection with L-screw connection



Bulkhead nozzle with push-in plug connector 90°



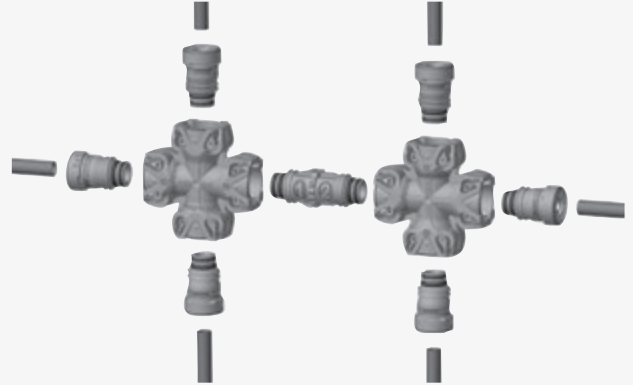
Connection with F-screw connection



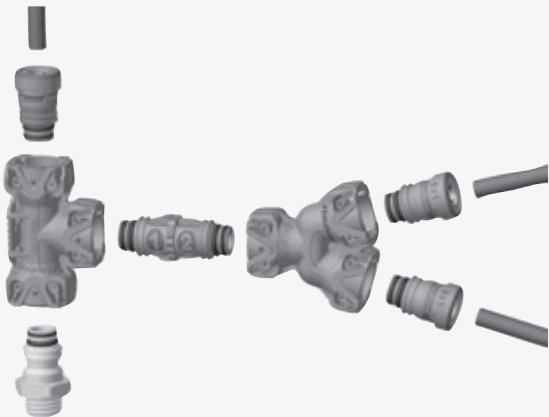
Double plug connector



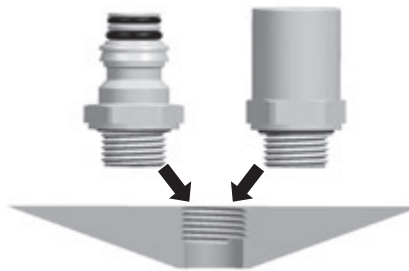
Example with 4-way blocks



Combination example with L-screw connection



Straight Threads



The straight plug connectors, ABC connections, lock nuts etc. are screwed into the mating thread without further preparation (DIN 3852, ISO 6149, ISO 4039-1, ISO 4039-2, Voss geometry).

The tightening torques can be found in Table 2a:

	Thread	Recommended tightening torque ^{1) 2)}	Max. tightening torque ²⁾
TABLE 2A	G 1/8"	15 NM	18 NM
	G 1/4"	24 NM	28 NM
	M 10 X 1.0	15 NM	18 NM
	M 12 X 1.5	20 NM	24 NM
	M 14 X 1.5	24 NM	28 NM
	M 16 X 1.5	30 NM	35 NM
	M 22 X 1.5	34 NM	40 NM
	M 26 X 1.5	43 NM	50 NM

TABLE 2A



When plug connectors and ABC connections in Raufoss Couplings™ - bulkhead nozzles are used, the following reduced torques listed in accordance with Table 2b apply:

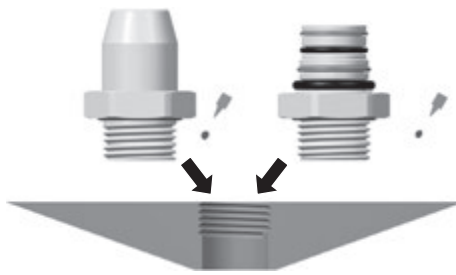
	Thread	Recommended tightening torque ^{1) 2)}	Max. tightening torque ²⁾
TABLE 2B	M 10 X 1.0	10 NM	12 NM
	M 12 X 1.5	14 NM	16 NM
	M 16 X 1.5	20 NM	24 NM

TABLE 2B

¹⁾The recommended tightening torques apply to non pre-treated thread. They apply to aluminium, brass or steel thread. The use of a torque spanner is recommended.

²⁾Please observe the maximum permissible tightening torque of the valve, air reservoir, etc.

Conical Threads



A sealant should be used for straight plug connectors and ABC connections with "NPFT" and "R" threads. The tightening torques can be found in Table 2c:

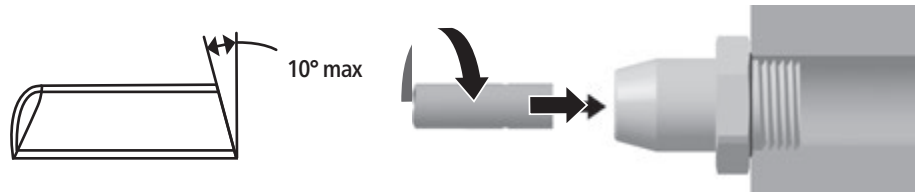
Thread	Recommended tightening torque ^{1) 2)}	Max. tightening torque ²⁾
1/8 - 27 NPTF	15 NM	18 NM
1/4 - 18 NPTF	24 NM	28 NM
3/8 - 18 NPTF	32 NM	38NM
1/2 - 18 NPTF	36 NM	42NM
R 1/4"	24 NM	28 NM
R 3/8"	32 NM	38 NM
R 1/2"	36 NM	42 NM
R 5/8"	43 NM	50 NM

¹⁾The recommended tightening torques apply to non pre-treated thread. They apply to aluminium, brass or steel thread. The use of a torque spanner is recommended.

²⁾Please observe the maximum permissible tightening torque of the valve, air reservoir, etc.

Assembly of plastic pipes

The pipe are trimmed square with a pipe cutter. A max. deviation of 10° is permissible.



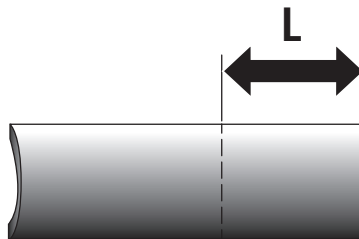
The pipes are simply inserted into the plug connector by hand as far as they will go. Pushing and turning at the same time makes the pipes easier to insert. The insertion follows two clear stages:

Stage 1: Passing through the clamping ring

Stage 2: Passing through the O-ring and reaching the insertion end point. Clear assembly sensation when passing through the clamping ring and triggering the

“Feed Back Signal”

The max. insertion forces are listed in Table 3. Approx. 2/3 of the forces indicated are the series standard.



For visual control, the insertion lengths in accordance with Table 3 can be marked on the pipes. If the pipe is not properly inserted, you hear a sound and you can measure a controlled leakage. It can be re-inserted with pressure depending on the pipe dimension.

The use of pipe dimensions $\leq 12 \times 1.5$ is recommended for frame - axle connections.

External pipe \varnothing	Insertion length	Level of the Raufoss insertion force (average) ¹⁾
4 MM	17.2 MM	70 N
6 MM	19.5 MM	80 N
8 MM	20.5 MM	90 N
10 MM	24.0 MM	100 N
12 MM	25.0 MM	110 N
15 MM	27.0 MM	125 N
16 MM	27.0 MM	130 N

¹⁾ Pipe diameter, tolerances, quality and cutting quality can impact the insertion force.

Assembly of the ABC Modular System

The ABC modular system may not be combined with similar systems of other manufacturers!



The nozzle is screwed in with the necessary torque (see Plug Connector Table). The protective cover must only be removed directly before assembling the counter-part.



The ABC modular system has a two-stage connection. The parts are assembled by hand. The connection and modular part joint can be turned to the exact position.

If only the first locking stage (safety stage) is reached, a controlled, slightly audible leakage will occur, which can be easily rectified by pushing the joint again.



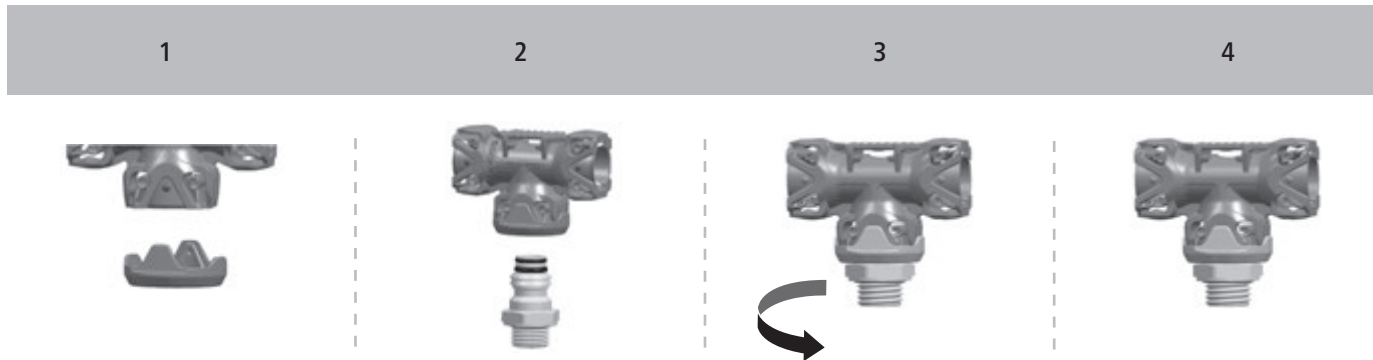
ATTENTION

In all cases,
(Connection between motor vehicle and trailer vehicle
- e.g. brake hose / spiral cable), as well as between axle and chassis
frame - e.g. through brake hose)

- the pipe must have a fixed alignment!
Use the Rotolock in conjunction with the ABC
modular system

Assembly of the Rotolock

The ABC modular system may not be combined with similar systems of other manufacturers!



- 1) Assemble Rotolock + ABC modular part
- 2) Insert this combination into the connection (first safety position)
- 3) Alignment
- 4) Push the ABC construction part into the second position, the closed position

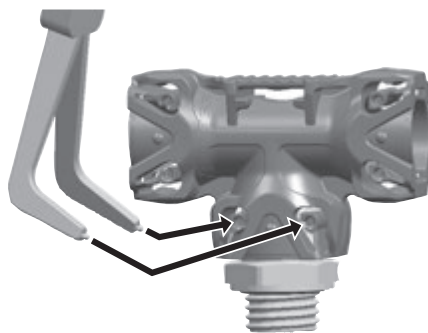
Repair Information

Valves, air reservoirs and cushion-type pneumatic springs can be easily interchanged when using the Raufoss ABC System.

Proceed as follows:

- fully bleed the compressor unit in order to unscrew the pipe from the screw connection
- remove the cable tie near the screw connection (must be as accessible as possible)
- clean the push-in area around the pipe and seal area of the modular part (the pipe must be free of dirt and dust)

Information for dismantling the modular system



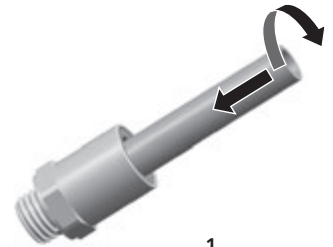
The ABC modular parts can be dismantled with a pair of standard snap ring pliers¹⁾. The parts are re-usable.

¹⁾ Snap ring pliers e.g. Knipex 46 21 A2 or 46 11 A2.

Handling the ABC dismantling tool

Information for dismantling the pipe

1. Push the pipe into the screw connection as far as it will go and turn to loosen the clamping ring.
 2. Check that the extraction tool is not damaged, replace if necessary.
 3. Place the extraction tool around the pipe.
 4. Ensure close contact between the extraction tool and pipe.
 5. Push the extraction tool into the screw connection, right up to the edge. Do not use excess force! Silicon spray can be used to make it easier to insert the extraction tool.
 6. Hold the extraction tool firmly in the screw connection and pull the pipe out of the screw connection whilst turning.
 7. Remove the extraction tool.
 8. Check that the pipe is clean and undamaged. If not, trim the end of the pipe.
 9. Clean the screw connection (in the pipe area), for example, with compressed air, to remove any contamination. Ensure that the valve is not contaminated!
 10. Insert the clean pipe.
- ➔ Kongsberg Automotive recommends a maximum service life of 5 months for the screw connections before dismantling!



1



2



2



3 / 4 / 5



6 / 7

If the ABC Release Tool is not available, the screw connection can be screwed to the pipe from the connection port.

The screw connection turns around the pipe.



Straight plug connectors ABC New Line

Dim. t (pipe) [mm]	Dim. d [mm]	Dim. l [mm]	
8 x 1	M 12 x 1.5	26	235541721
8 x 1	M 14 x 1.5	25	235541722
12 x 1.5	M 12 x 1.5	31	235541725
12 x 1.5	M 16 x 1.5	30	235541726
15 x 1.5	M 22 x 1.5	31	235541729

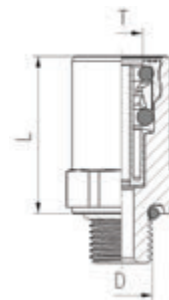


Figure: 235541721

ABC New Line Straight Connectors

Dim. t (pipe) [mm]	Dim. d [mm]	Dim. l [mm]	
8 x 1	M 16 x 1.5	17	235541723
8 x 1	M 22 x 1.5	13	235541724
12 x 1.5	M 22 x 1.5	19	235541727
15 x 1.5	M 16 x 1.5		235541728

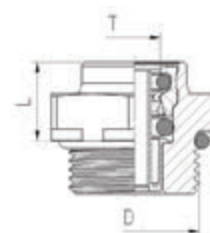


Figure: 235541723

ABC Connection Adapter

CAP	Dim. d [mm]	Dim. s	
grey	M12 x 1.5	small	235541730
grey	M16 x 1.5	small	235541731
green	M16 x 1.5	regular	235541732
green	M22 x 1.5	regular	235541733
blue	M22 x 1.5	heavy duty	235541734



Figure: 235541730

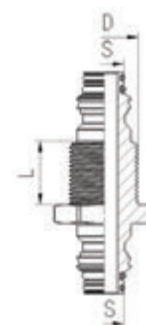
ABC Connection Bulkhead Nozzle

Dim. d1 [mm]	Dim. d2 [mm]	Dim. s	Dim. l [mm]	CAP	
M22 x 1.5	M16 x 1.5	regular	23	green	235541735



ABC double-connection bulkhead nozzle

Dim. d [mm]	Dim. s	Dim. l [mm]	CAP	
M22 x 1.5	regular	20	green	235541736



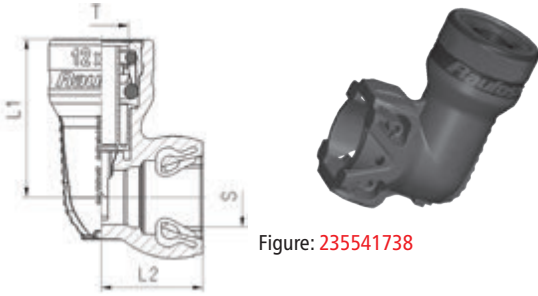
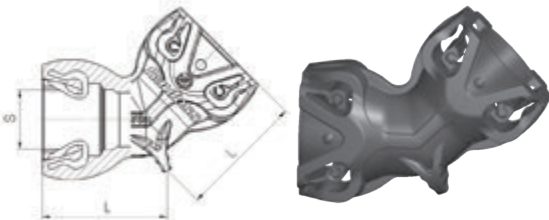


Figure: 235541738

ABC 90° Push-In Plug Connector

Dim. d [mm]	Dim. s	Dim. l 1 [mm]	Dim. l 2 [mm]	
8 x 1.0	small	34	18	235541738
12 x 1.5	regular	37	24	235541739
15 x 1.5	heavy duty	46	24	235541740



ABC 45° Angle

Dim. s [2x]	Dim. l [mm]	
regular	25	235541741

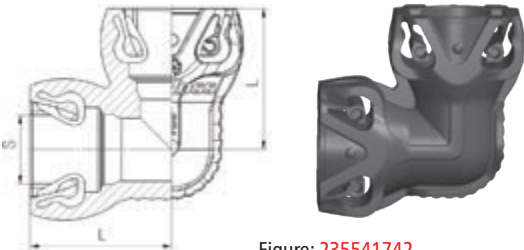
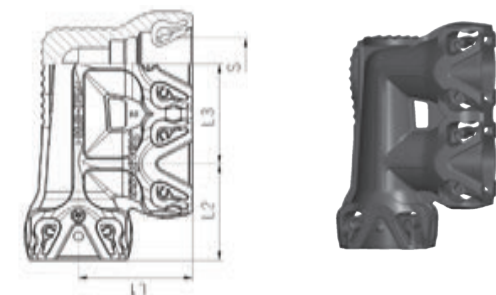


Figure: 235541742

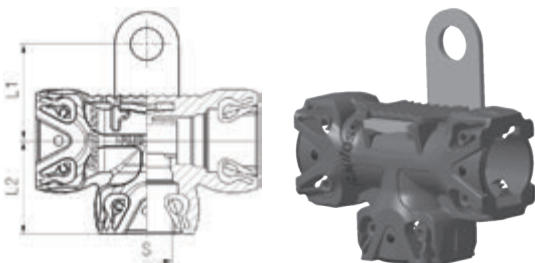
ABC 90° Angle

Dim. s [2x]	Dim. l [mm]	
regular	29	235541742
heavy duty	34	235541743



ABC Double-Connection Bulkhead Nozzle

Dim. s [3x] [mm]	Dim. l 1 [mm]	Dim. l 2 [mm]	Dim. l 3	
regular	31	26	27	235541744



T-pipe with ABC Flap

Dim. s [3x]	Dim. l 1 [mm]	Dim. l 2 [mm]	
regular	27	26	235541748

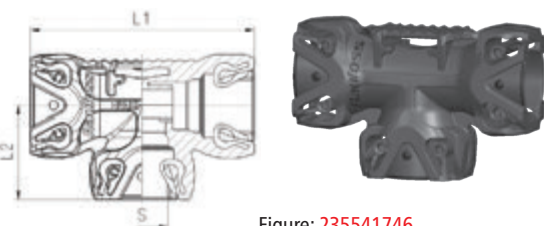


Figure: 235541746

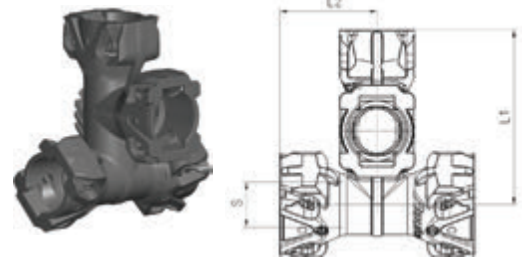
ABC T-/L-Pipe

Dim. s [3x]	Dim. l 1 [mm]	Dim. l 2 [mm]	
small	53	22	235541746
regular	62	26	235541747

ABC 4-Way Block

Dim. s [4x]
regular

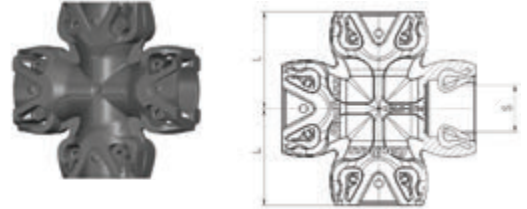
235541767



ABC 4-Fold Crosspiece

Dim. s [4x]
regular

235541768



ABC pressure test connection

Dim. s
regular

Standard
ISO 3583

235541749



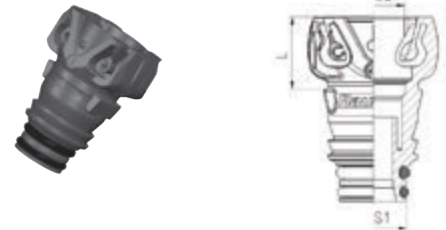
ABC Reducer

Dim. s 1
heavy duty

Dim. s 2
regular

Dim. l [mm]
26

235541750



ABC Threadless Plug Connector

Dim. t
8x1.0
8x1.0
12x1.5
15x1.5

Dim. s 2
small
regular
regular
heavy duty

Dim. l [mm]
10
8
18
21

235541764
235541765
235541766
235541763

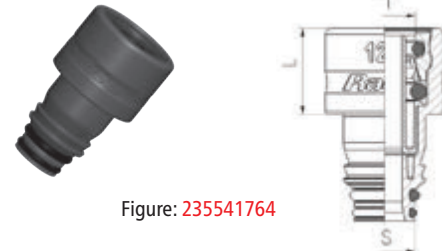


Figure: 235541764

ABC Threadless Connector

Dim. s 1
small
regular
heavy duty

Dim. s 2
small
regular
heavy duty

235541751
235541752
235541753



Figure: 235541751

ABC Hose Nozzle Adapter

Dim. t
12x1.5

Dim. Hose [mm]
11

235541769



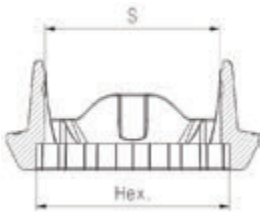


Figure: 235541754

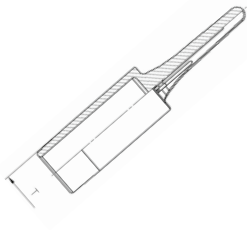
ABC Rotolock

Dim. s	Hex [mm]	Color Code	
small	22	light grey	235541754
regular	22	light grey	235541755
regular	28	dark grey	235541756



Connection with ABC Internal Thread

Dim. s [mm]	Dim. d [spanner width]	SW	
regular	M 16 x 1.5	22	235541759



Plug for ABC Plug Connector

Dim. t	
12 x 1.5	235541757



ABC Threadless Plug

Dim. s	
regular	235541758

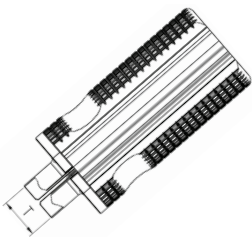


Figure: 235541760

ABC Metal Dismantling Tool

Dim. t [mm]	
8 x 1.0	235541760
12 x 1.5	235541761
15 x 1.5	235541762

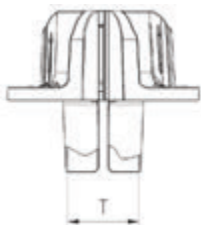


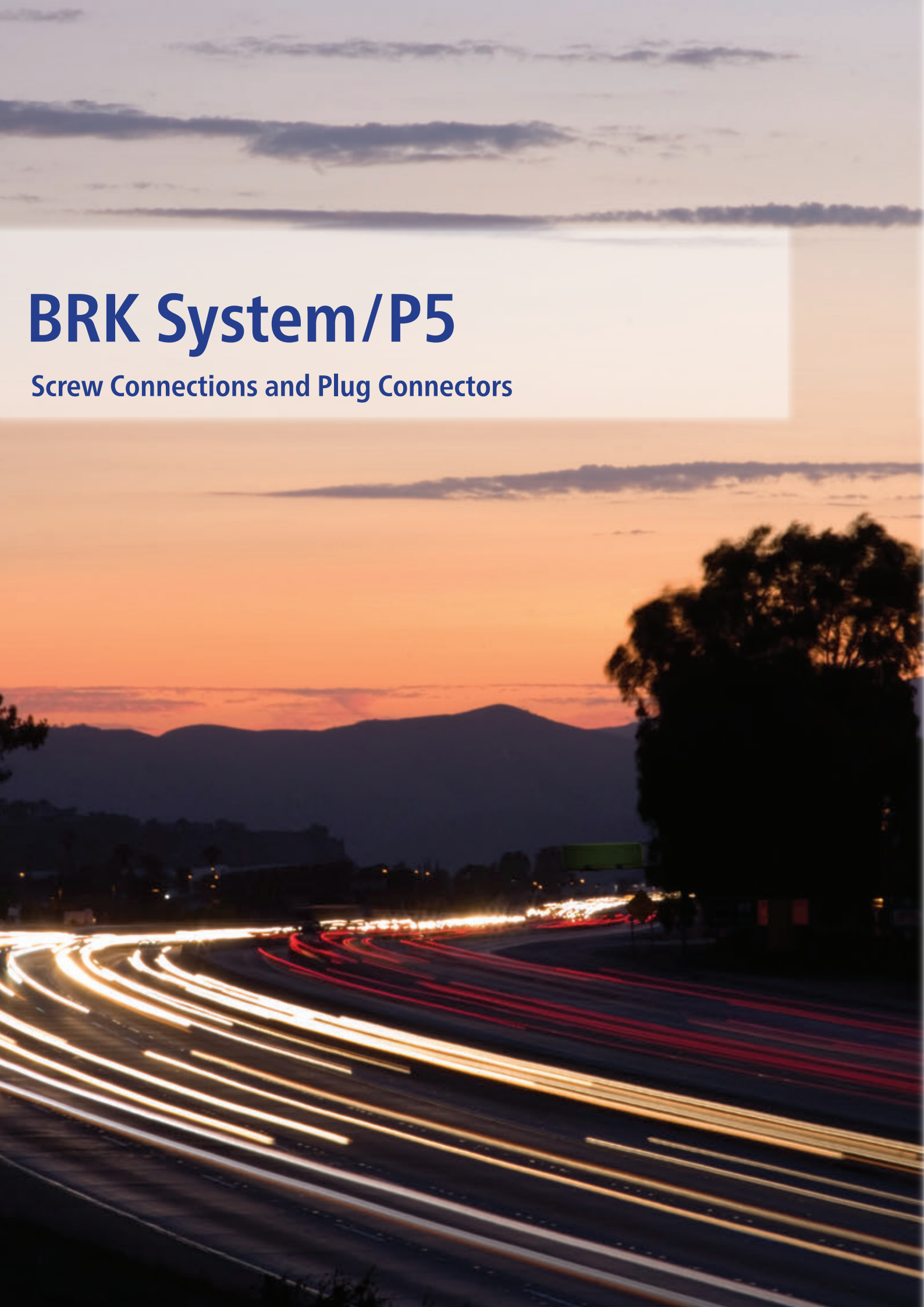
Figure: 235541770

ABC Plastic Dismantling Tool

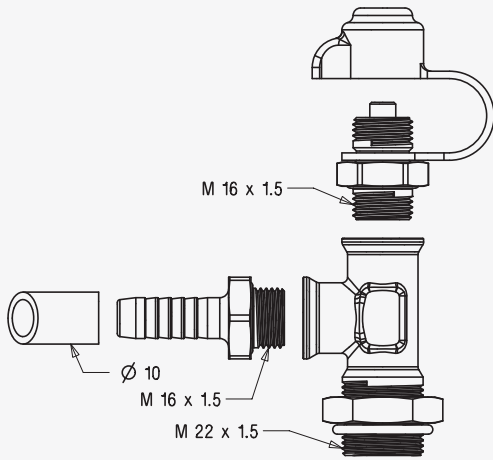
Dim. t [mm]	
8 x 1.0	235541770
12 x 1.5	235541771

BRK System/P5

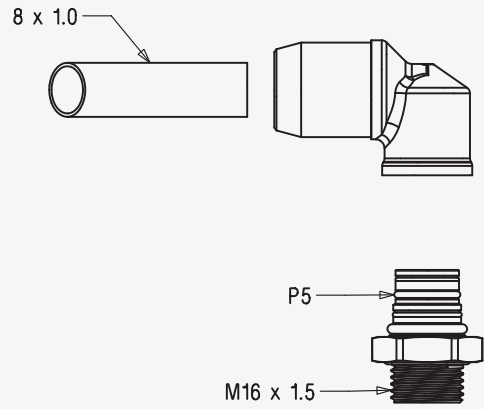
Screw Connections and Plug Connectors



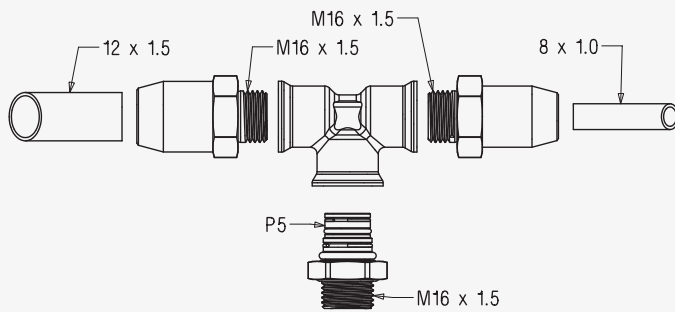
P5 with connection for brake hose



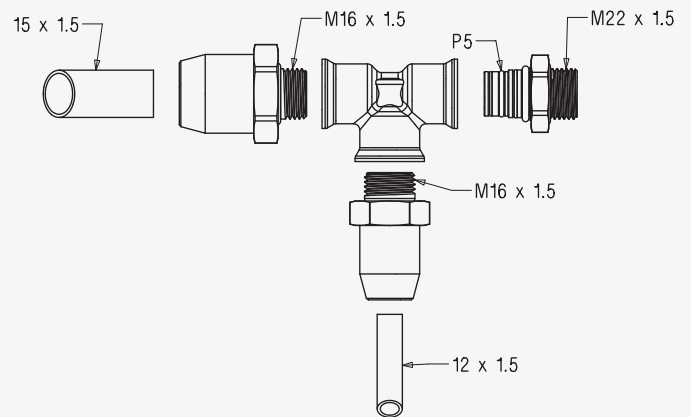
P5 with elbow joint



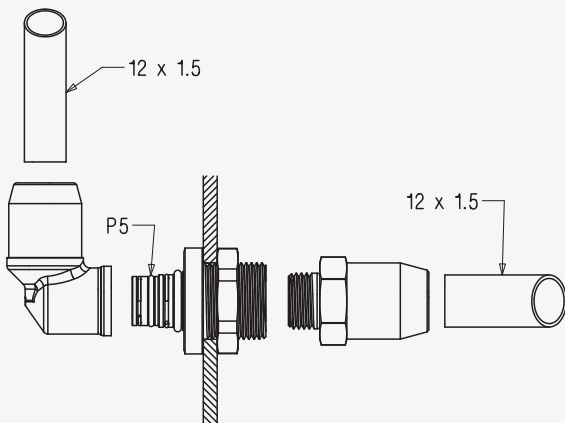
P5 with T-pipe



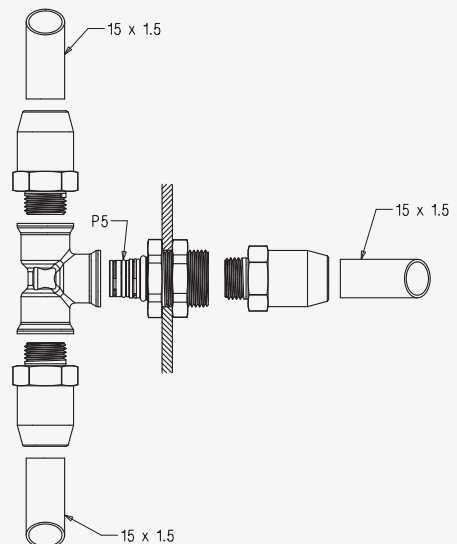
P5 with L-pipe



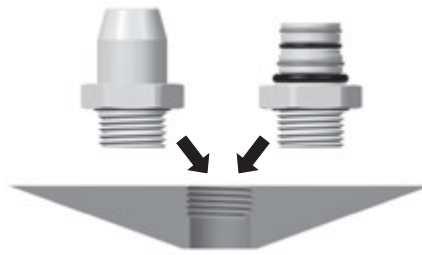
P5 as bulkhead screw connection with elbow joint



P5 as bulkhead screw connection with T-screw connection



Straight Threads



The P5 metric plug connectors, connections, lock nuts etc. are screwed into the mating thread without further preparation (in accordance with DIN 3852, ISO 6149, ISO 4039-2, Voss). The tightening torques can be found in Table 1a:

	Thread	Recommended tightening torque ¹⁾	Max. tightening torque ²⁾
TABLE 1A	G 1/8"	15 NM	18 NM
	G 1/4"	24 NM	28 NM
	M10X1.0	15 NM	18 NM
	M12X1.5	20 NM	24 NM
	M14 X1.5	24 NM	28 NM
	M16X1.5	30 NM	35 NM
	M22X1.5	34 NM	40 NM
	M26X1.5	43 NM	50 NM

TABLE 1A



When plug connectors and P5 quick-connectors in Raufoss Couplings™ - bulkhead nozzles are used, the following reduced torques listed in accordance with Table 1b apply:

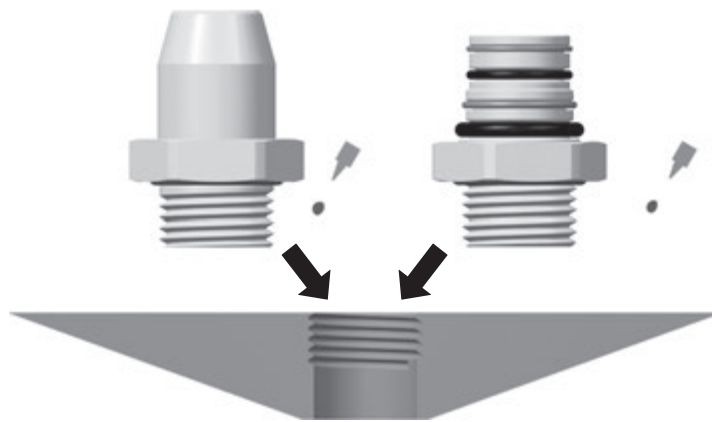
	Thread	Recommended tightening torque ¹⁾	Max. Tightening torque
TABLE 1B	M10X1.0	10 NM	12 NM
	M12X1.5	14 NM	16 NM
	M16X1.5	20 NM	24 NM

TABLE 1B

¹⁾ The recommended tightening torques apply to non pre-treated thread. They apply to aluminium, brass or steel connections. The use of an adjustable torque spanner is recommended.

²⁾ Please observe the maximum tightening torque of the valve, air reservoir, etc.

Conical Threads



The plug connector and P5 quick-connector with "NPTF" - "R" thread are fitted with a seal and screwed into the mating thread. The tightening torques can be found in Table 1c:

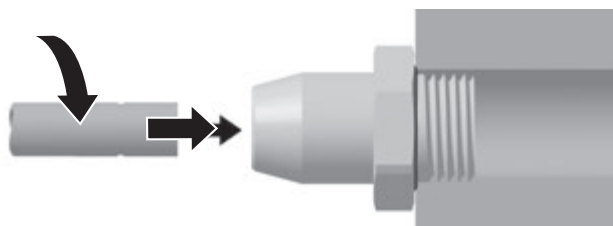
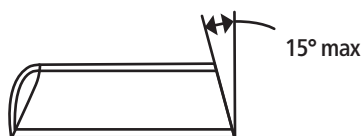
Thread	Recommended tightening torque ¹⁾	Max. tightening torque ²⁾
1/8-27 NPTF	15 NM	18 NM
1/4-18 NPTF	24 NM	28 NM
3/8-18 NPTF	32 NM	38 NM
1/2-18 NPTF	36 NM	42 NM
R1/4"	24 NM	28 NM
R3/8"	32 NM	38 NM
R1/2"	36 NM	42 NM
R5/8"	43 NM	50 NM

¹⁾ The recommended tightening torques apply to non pre-treated thread. They apply to aluminium, brass or steel connections. The use of an adjustable torque spanner is recommended.

²⁾ Please observe the maximum tightening torque of the valve, air reservoir, etc.

Assembly of Plastic Pipes

The pipes should be cut square.
A maximum deviation of 15° is permissible.

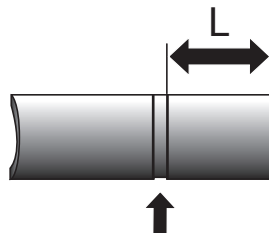


The pipes are simply inserted into the plug connector by hand as far as they will go. Pushing and turning at the same time makes the pipes easier to insert. The insertion follows two clear stages:

- Stage 1: Passing through the clamping ring.
- Stage 2: Reaching the noticeable fixed stop on the base of the plug connector.

Please observe the maximum insertion forces in Table 2. The normal forces correspond to approx. 2/3 of the values indicated.

For visual control, we recommend marking the insertion lengths in accordance with Table 2 on the pipes.



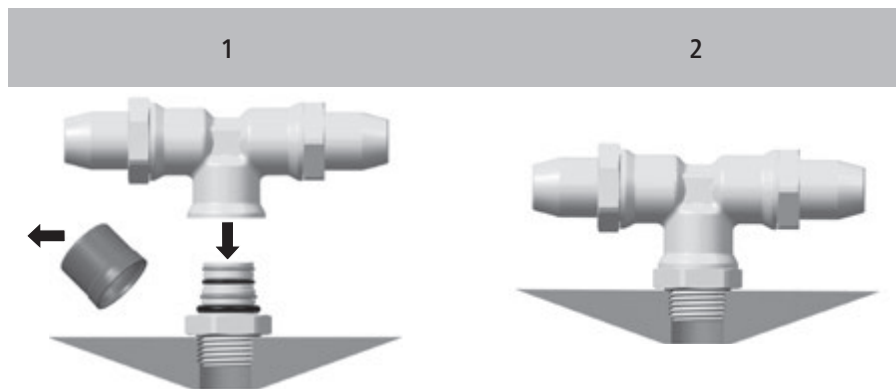
External pipe Ø	Insertion length	Max. insertion force
4 MM	17.2 MM	70 N
6 MM	19.5 MM	80 N
8 MM	20.5 MM	90 N
9 MM	22.1 MM	95 N
10 MM	24.0 MM	100 N
11 MM	23.0 MM	105 N
12 MM	25.0 MM	110 N
15 MM	27.0 MM	125 N
16 MM	27.0 MM	130 N
18 MM	27.0 MM	130 N
25 MM	29.0 MM	150 N
1/8"	19.5 MM	80 N
3/8"	23.5 MM	100 N
1/2"	25.5 MM	110 N
5/8"	27.5 MM	130 N

TABLE 2

TABLE 2

Assembly of the P5 System

The P5 system may not be combined with similar systems of other manufacturers!



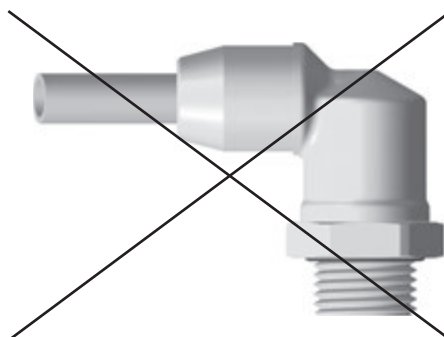
When connected, the connection and moulded part form a permanent unit that can still be turned for positioning after assembly.

Both pieces are assembled by hand.

The nozzle is screwed in with the necessary torque. The protective cover must only be removed directly before fixing the counter-part.

If only the first locking stage is reached, a controlled, slightly audible leakage will occur, which can be easily rectified by pushing the connection again.

Between frame and axle



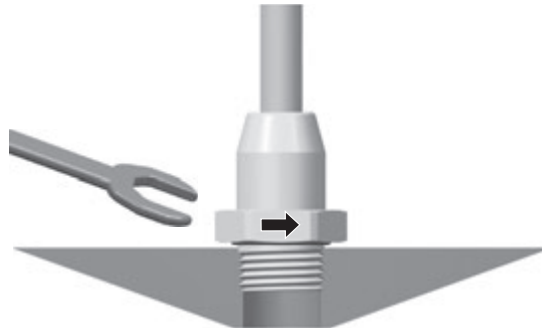
ATTENTION

The P5 connector may not be used as:

- Part of the connection between motor vehicle and trailer vehicle (e.g. brake hose / spiral cable)
- Between axle and chassis frame (e.g. brake hose)

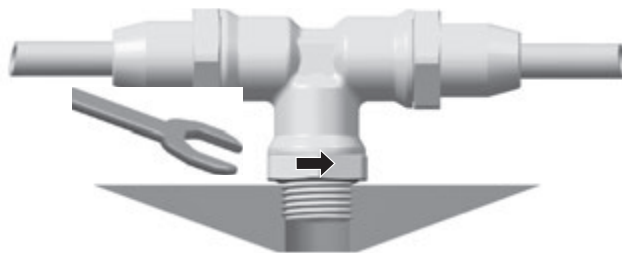
Repair information for the P5 system

Valves, air reservoirs and cushion-type pneumatic springs can be easily interchanged when using the Raufoss Couplings™ System. Contrary to the cutting ring connections, with the Raufoss Couplings™ System, the screw connections can be screwed to the pipe from the connection port.



The plug connector turns on the pipe.

- Before assembly, please check the fit of the O-ring on the thread seal and replace if necessary.



The P5 nozzle turns in the moulded part.

- Before assembly, please check the fit of the O-ring on the thread seal and replace if necessary.

If, for example, emergency repairs are necessary in order to use the plug connector again, proceed as follows:

1. trim the PA pipe 1cm from the plug connector
2. screw the plug connector together with pipe wrench and spanner
3. carefully slide the pipe forward through the nut
4. screw both parts together again with the same torque
5. insert a new PA pipe.



Figure: 235541449



GE plug connector

Dim. t (pipe) [mm]	Dim. d [mm]	
6 x 1	M 12 x 1.5	235541405
6 x 1	M 16 x 1.5	235541407
6 x 1	M 22 x 1.5	235541408
8 x 1	M 12 x 1.5	235541412
8 x 1	M 14 x 1.5	235541413
8 x 1	M 16 x 1.5	235541414
8 x 1	M 22 x 1.5	235541415
10 x 1	M 10 x 1.0	235541416
10 x 1	M 12 x 1.5	235541417
10 x 1	M 16 x 1.5	235541420
10 x 1	M 22 x 1.5	235541421
10 x 1.5	M 14 x 1.5	235541430
10 x 1.5	M 16 x 1.5	235541431
10 x 1.5	M 22 x 1.5	235541432
12 x 1.5	M 10 x 1.5	235541435
12 x 1.5	M 12 x 1.5	235541436
12 x 1.5	M 14 x 1.5	235541437
12 x 1.5	M 16 x 1.5	235541438
12 x 1.5	M 22 x 1.5	235541439
15 x 1.5	M 16 x 1.5	235541442
15 x 1.5	M 22 x 1.5	235541443
16 x 2	M 16 x 1.5	235541446
18 x 2	M 16 x 1.5	235541448
18 x 2	M 22 x 1.5	235541449



Figure: 235541543

O-Rings

for P 5 connector and nozzle

Version	
M 16 x 1.5	235541544
M 22 x 1.5	235541543



Figure: 235541634



P5 Quick-Connector Nozzle

Connection s	Dim. d [mm]	
P 5	M 10 x 1.0	235541630
P 5	M 12 x 1.5	235541631
P 5	M 14 x 1.5	235541632
P 5	M 16 x 1.5	235541633
P 5	M 22 x 1.5	235541634
P 5	1/8", 27 NPTF	235541635
P 5	1/4", 18 NPTF	235541636
P 5	3/8"	235541637

O-Rings

for GE plug connector + P 5 nozzle

Version	
M 16 x 1.5	235541544
M 22 x 1.5	235541543



Figure: 235541543

T-Plug Connector

3 x pipe connection 8 x 1.0mm (similar to Raufoss)

235542158



90° Plug Connector

with P5 quick-connector

Dim. t (pipe) [mm]	Connection s [mm]	
6 x 1.0	P 5	235541615
8 x 1.0	P 5	235541617
10 x 1.0	P 5	235541628
10 x 1.5	P 5	235541616
12 x 1.5	P 5	235541622
15 x 1.5	P 5	235541629
16 x 2.0	P 5	235541626

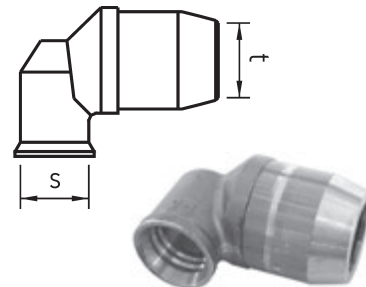


Figure: **235541626**

Pipe Coupling

Dim. t [mm]	
6 x 1.0	235541402
8 x 1.0	235541409
9 x 1.5	235541719
10 x 1.0	235541419
10 x 1.5	235541427
11 x 1.5	235541720
12 x 1.5	235541433
15 x 1.5	235541441
16 x 2.0	235541672

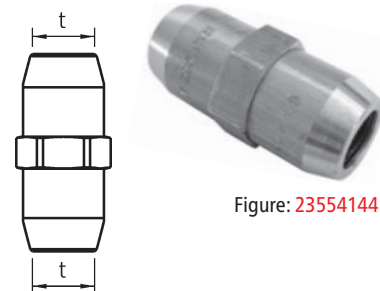
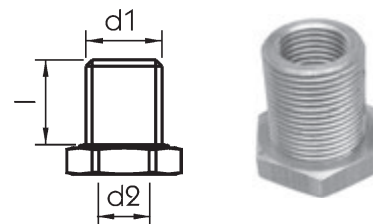


Figure: **235541441**

Bulkhead Nozzle

Dim. d1 [mm]	Dim. d2 [mm]	Dim. l [mm]	
M22 x 1.5	M16 x 1.5	24	235541476



Bulkhead Nozzle

Dim. d1 [mm]	Dim. d2 [mm]	Dim. d3 [mm]	Dim. l [mm]	
M22 x 1.5	M16 x 1.5	M16 x 1.5	24	235541478
M22 x 1.5	M16 x 1.5	M16 x 1.5	40	235541587
M22 x 1.5	M16 x 1.5	M22 x 1.5	24	235541477

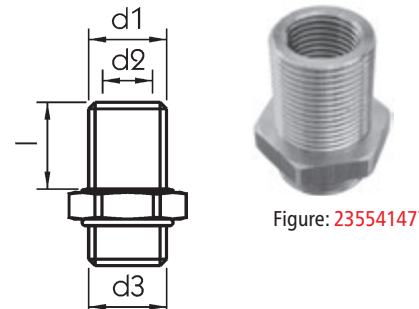
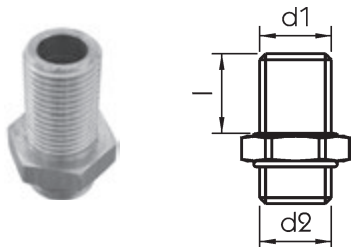
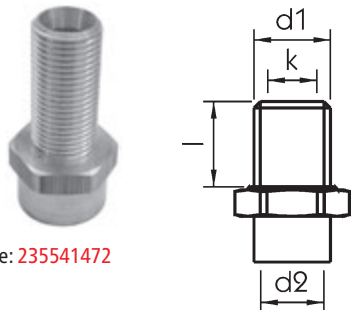


Figure: **235541477**



Bulkhead Nozzle

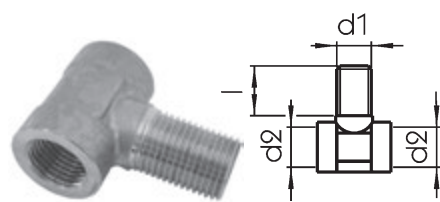
Dim. d1 [mm]	Dim. d2 [mm]	Dim. l [mm]	
M16 x 1.5	M16 x 1.5	24	235541470



Bulkhead Nozzle with Cone

Dim. d1 [mm]	Dim. d2 [mm]	Dim. k [mm]	Dim. l [SW]	SW	
M16 x 1.5	M16 x 1.5	K24 degree- 10	34	22	235541690
M16 x 1.5	M16 x 1.5	K24 degree- 10	34	24	235541472
M18 x 1.5	M16 x 1.5	K24 degree- 12	34	24	235541533

Figure: **235541472**

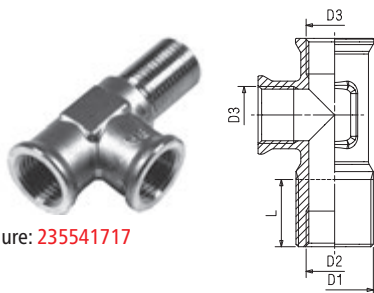


T-Bulkhead Nozzle

Dim. d1 [mm]	Dim. d2 [mm]	Dim. l [mm]	
M 16x1.5	M 16x1.5	21	235541551
M 22x1.5	M 22x1.5		235542159

3x external thread

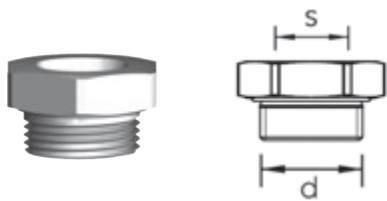
Figure: **235541551**



L-Bulkhead Nozzle

Dim. d1 [mm]	Dim. d2 [mm]	Dim. d3 [mm]	Dim. l [mm]	
M 16x1.5		M 16x1.5	20	235541717
M 22x1.5	M 16x1.5	M 16x1.5	20	235541718

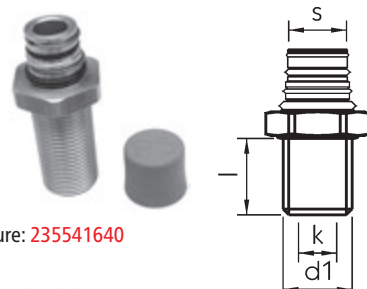
Figure: **235541717**



Joint for Quick-Connector

M 22x1.5 (Dim. d) / P 5 (Dim. s)

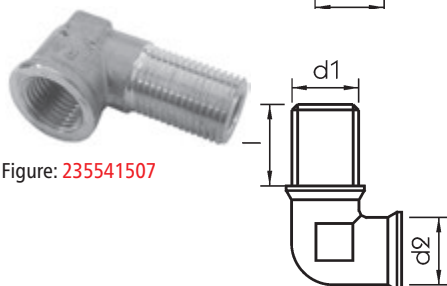
235541645



P5 Quick-Connector with Bulkhead Nozzle

Connection s	Dim. d1 [mm]	Dim. l [mm]	Dim. k	
P 5	M22 x 1.5	24	M16 x 1.5	235541639
P 5 with cone	M18 x 1.5	34	K24 degree-12	235541640

Figure: **235541640**



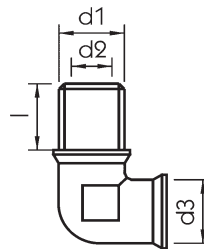
90° Angled Bulkhead Nozzle

Dim. d1 [mm]	Dim. d2 [mm]	Dim. l	
M12 x 1.5	M12 x 1.5	18	235541506
M16 x 1.5	M16 x 1.5	22	235541507

Figure: **235541507**

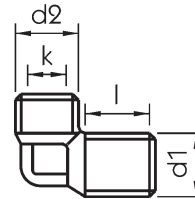
90° Angled Bulkhead Nozzle

Dim. d1 [mm]	Dim. d2 [mm]	Dim. d3 [mm]	Dim. l [mm]	
M22 x 1.5	M16 x 1.5	M16 x 1.5	20	235541508



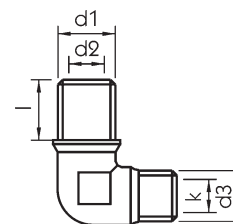
Angled bulkhead Nozzle with 90° Cone

Dim. d1 [mm]	Dim. d2 [mm]	Dim. k	Dim. l [mm]	
M16 x 1.5	M18 x 1.5	K 24° -12	17	235541511



Angled Bulkhead Nozzle with 90° Cone

Dim. d1 [mm]	Dim. d2 [mm]	Dim. d3 [mm]	Dim. k	Dim. l [mm]	
M22 x 1.5	M16 x 1.5	M18 x 1.5	K 24° -12	17	235541528



Screw-In Double Socket

Version	Haldex comparison number	
straight, 2x M2	032 016 909*	235541055
E 1 / NW 10/10, steel		123531118
		* Original Haldex part

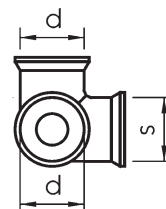


Figure: 235541055

3-Way Angle Block

with P5 quick-connector

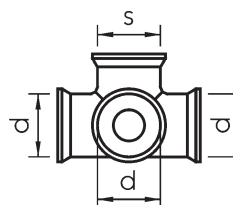
Connection s	Dim. d	
P 5	M16 x 1.5	235541627



4-Way Angle Block, T-shape

with P5 quick-connector

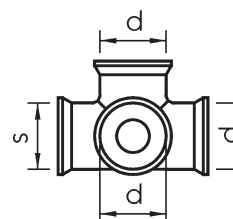
Connection s	Dim. d	
P 5	M16 x 1.5	235541623

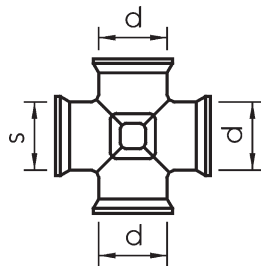


4-Way Angle Block, L-shape

with P5 quick-connector

Connection s	Dim. d	
P 5	M16 x 1.5	235541625



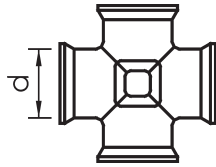


Crosspiece with P 5 Quick-Connector

Connection s
P 5

Dim. d [mm]
M 16x1.5

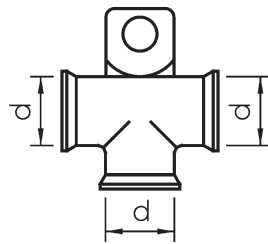
235541624



Crosspiece

4x thread M16 x 1.5

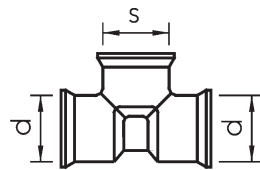
235541516



T-Screw Connection / T-Pipe

with mounting bracket, 3 x thread M 16x1.5

235541526



T-Screw Connection / T-Pipe

with P5 quick-connector

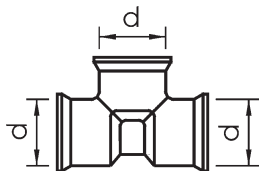
Connection s
P 5
P 5

Dim. d
M 12x1.5
M 16x1.5

235541613

235541621

Figure: 235541621



T-Screw Connection / T-Pipe

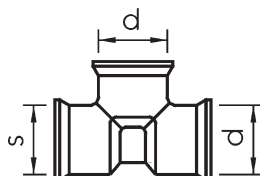
Dim. d
M 12x1.5
M 16x1.5
M 22x1.5

235541513

235541527

235541530

Figure: 235541527



L-Screw Connection / L-Pipe

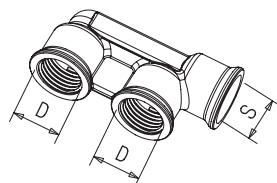
Connection s
with P5 quick-connector
with P5 quick-connector

Dim. d [mm]
M 12x1.5
M 16x1.5

235541612

235541620

Figure: 235541620



T-Screw Connection / F-Pipe

Dim. s
P 5

Dim. d [mm]
M 16x1.5

235541716

90° bend

Dim. s	Dim. d	Dim. d1	
P5 quick-connector	M 12x1.5	-	235541611
P5 quick-connector	M 16x1.5	-	235541619
-	M 16x1.5	M 16x1.5	235541525
-	M 22x1.5	M 22x1.5	235541529

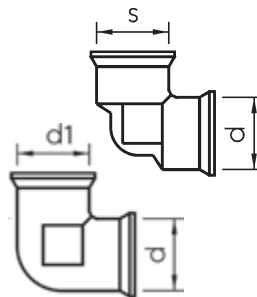


Figure: 235541529

45° Bend with Quick-Connector

P 5 / M 16x1.5

235541618



Pressure Test Connection

Version	Haldex comparison number	
M 16 x 1.5	318 044 001*	235541212
M 22 x 1.5	318 040 001	235541213
M 16 x 1.5, D= 10mm	318 057 001	235541392
M 16 x 1.5	318 078 001	235541495
M 22 x 1.5	Replacement for 318 040 001	235541496

* Original Haldex part

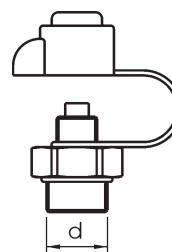


Figure: 235541213

Reducer

Dim. d1	Dim. d2	
M 16x1.5	M 12x1.5	235541464
M 22x1.5	M 16x1.5	235541466

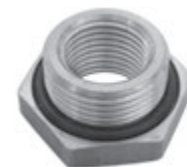
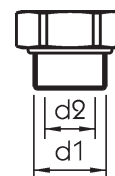


Figure: 235541466

Threaded Sleeves

Dim. d	
M 16x1.5	235541482
M 22x1.5	235541483

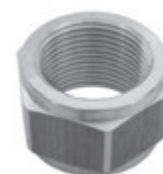
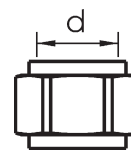


Figure: 235541483

Hose Nozzle / Hose Connection

In accordance with DIN.

Dim. h [mm] [h hose]	Dim. d	Dim. l [mm]	
11	M 16 x 1.5	40	235541534
11	M 22 x 1.5	40	235541537
13	M 16 x 1.5	40	235541535
13	M 22 x 1.5	40	235541536

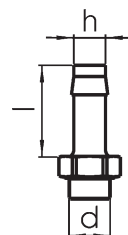
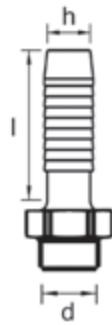


Figure: 235541536

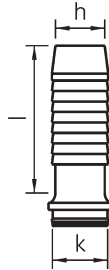


Hose Nozzle / Hose Connection

in accordance with Raufoss Couplings™ System standard

Dim. h (h hose) [mm]	Dim. d [mm]	Dim. l [mm]
10	M 22 x 1.5	30

235541595



Hose Nozzle with Cone and O-ring

Dim. h (h hose) [mm]	Dim. k	Dim. l [mm]
11	K 24° -12	40

235541541



Figure: 240541038

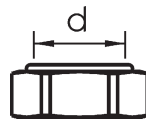
Drain Valves

Version	Haldex comparison number	
M 22 x 1.5, with ring	315 019 031*	240541038
M 22 x 1.5, without ring	315 019 021*	240542052
automatic, pressure difference 0.2 bar automatically removes the condensate accumulated in the compressed air reservoir	315 016 021*	240541252

* Original Haldex part



Figure: 235541486



Lock Nuts

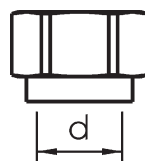
Version	Dim. d	
with O-ring	M 12x1.5	235541484
with O-ring	M 14x1.5	235541588
with O-ring	M 16x1.5	235541485
with O-ring	M 22x1.5	235541486
without O-ring	M 16x1.5	235541487
without O-ring	M 18x1.5	235541494
without O-ring	M 22x1.5	235541488

O-Ring for Lock Nut

M 16x1.5
235541599



Figure: 235541609



Union Nuts

Dim. d	
M 16x1.5	235541479
M 18x1.5	235541609

Plug

Dim. d

M 12x1.5	235541461
M 14x1.5	235541576
M 16x1.5	235541462
M 22x1.5	235541463

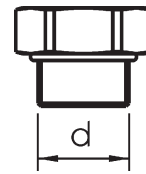


Figure: 235541463

Thrust Collars

Version

with O-ring- M 12x1.5	235541707
with O-ring- M 14x1.5	235541708
with O-ring- M 16x1.5	235541709
with O-ring- M 22x1.5	235541710



Figure: 235541709

Support Sleeves for Plastic Pipe

drawn, brass version

Dim. d [mm]	Dim. l [mm]	
6x1.0	10	235541215
8x1.0	15	235541216
8x1.5	15	235541217
10x1.0	15	235541218
10x1.5	15	235541219
12x1.5	15	235541220
15x1.5	15	235541221
15x2.0	15	235541222
18x2.0	15	235541224

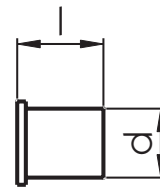


Figure: 235541221

Hose Clips / Mounting Clips

Hose Clips

galvanised, DIN 74306



Designation [mm]	Strip width [unit]	
S 12/12 SZ	12	245541273
S 18/12 SZ	12	245541381
S 20/12 SZ	12	245541274
S 25/15 SZ	15	245541092
S 28/15 SZ	15	245541093
S 30/15 SZ	15	245541094
S 35/15 SZ	15	245541095



Figure: 245541274



Figure: 245541096

Pipe Clips with Rubber Profile

galvanised, DIN 74306



for pipe [mm]	Strip width [mm]	
6	12	245541096
8	12	245541097
10	12	245541098
12	12	245541343
15	15	245541099
15	15	245541100
18	15	245541101
18	15	245541102



Figure: 245541103

Mounting Clips for Pipes and Cables

galvanised, with one-sided mounting



Diameter d [mm]	Breadth b [mm]	Strength s [mm]	for screws η a [mm]	Length o [mm]	Length l [mm]	
6	10	1	4		10	245541103
8	10	1	5	26	13	245541360
8	20	2	6	26	16.5	245541104
10	20	2	6	26.5	17	245541105
12	20	2	6	28	18	245541106
15	25	3	6	40.5	25.5	245541107
18	25	3	8	42	28	245541108
10	10	1	5	30	14	245541361
12	10	1.5	5	30	15	245541362

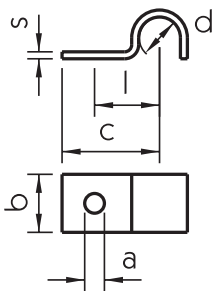


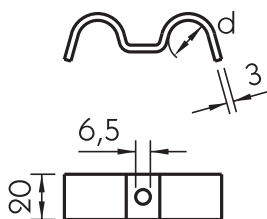
Figure: 245541109

Mounting Clips for 2 leads / pipes

galvanised



for pipe η d [mm]	
15	245541109
18	245541110



Hose Clips with Worm Thread

In accordance with DIN 3017, stainless steel belt and housing, X6Cr17 quality (material no.: 1.4016), yellow-chromated Cq15 steel screw

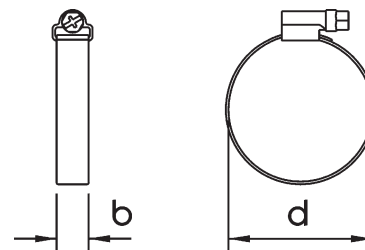
Dim. d [mm]	Strip width b [mm]	Packaging unit [unit]	
8- 12	9	50	245543001
10- 16	9	50	245543002
12- 20 (TORRO)*	9	25	245541168
12- 22	9	50	245543004
16- 25	9	50	245543005
16- 27	9	50	245543006
20- 32	9	50	245543007
20- 32 (TORRO)*	9	25	245541170
20- 32 (TORRO)*	9	25	245541181
25- 40	9	50	245543009
32- 50	9	25	245543011
32- 50 (TORRO)*	9	100	245543049
40- 60	9	25	245543012
40- 60 (TORRO)*	9	25	245541175
50- 70	9	25	245543013
50- 70 (TORRO)*	9	25	245541185
60- 80	9	25	245543014
70- 90 (TORRO)*	9	25	245541178
80- 100	9	25	245543015
90- 110	9	25	245543016
100- 120	9	25	245543017
100- 120 (TORRO)**	9	25	245541190
120- 140	9	25	245543019
16- 25	12	50	245543027
16- 27	12	50	245543028
20- 32	12	50	245543029
23- 35	12	50	245543030
25- 40	12	50	245543031
32- 50	12	50	245543032
40- 60	12	25	245543033
50- 70	12	25	245543034
60- 80	12	25	245543035
70- 90	12	25	245543036
80- 100	12	25	245543037
90- 110	12	25	245543038
100- 120	12	25	245543039
110- 130	12	25	245543040
120- 140	12	25	245543041
150- 170	12	25	245543044

*TORRO: 9C72

**TORRO: 12



Figure: 245543001



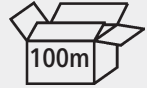
➔ ATTENTION
 Not permitted for hose connections in compressed air brake systems!



Figure: 241541242

Plastic Pipes

Mecanyl pipe PA 12 PHL-Y in accordance with DIN 74324, black



External- η x wall strength [mm]	Standard	
6x1.0	PA 12 PHL-Y	241541399
8x1.0	PA 12 PHL-Y	241541397
9x1.0	PA 12 PHL-Y	241541805
10x1.0	PA 12 PHL-Y	241541800
12x1.5	PA 12 PHL-Y	241541801
15x1.5	PA 12 PHL-Y	241541802
16x2.0	PA 12 PHL-Y	241541803
16x2.0	PA 11 PHL-Y	241541387



Figure: 241541090

Steel Pipes

In accordance with DIN 2391, for compressor and hydraulic units



External- η x wall strength [mm]	Version	
6x1.0	bonderised	241541079
6x1.0	galvanised*	241541270
8x1.0	bonderised	241541080
8x1.0	galvanised*	241541271
10x1.0	bonderised	241541081
10x1.0	galvanised*	241541272
12x1.5	bonderised	241541082
12x1.5	galvanised*	241541114
15x1.5	bonderised	241541083
15x1.5	galvanised*	241541084
15x2.0	bonderised	241541085
16x1.5	bonderised	241541349
16x2.0	bonderised	241541086
16x2.5	galvanised*	241541345
18x1.5	galvanised*	241541087
18x2.5	bonderised	241541088
20x2.0	galvanised*	241541346
20x3.0	bonderised	241541089
20x3.0	galvanised*	241541804
22x3.0	bonderised	241541358
25x3.0	bonderised	241541090

* galvanised internally and externally.



Figure: 240541091

Brake Hoses

In accordance with DIN 74310, roll length 40 m



Internal- η x wall thickness [mm]	
11 x 3.5	240541165
13 x 6.0	240541091

Air Coil

galvanised, DIN 74306

Version [mm]	Length [unit]	Number of coils	Screw connection	
yellow	4500	16	2 x M18x1.5 / M22x1.5	107511056
black	4500	16	1 x M16x1.5 IG / 1 x M16x1.5 AG	107511137
red	4500	16	2 x M18x1.5 / M22x1.5	107511055
yellow	5000	18	2 x M18x1.5 / M16x1.5	240511474
red	5000	18	2 x M18x1.5 / M16x1.5	240511473
red	5000	22	2 x M18x1.5 / M16x1.5	240511469



Figure: 240511474

Compressed Air Reservoirs

Sheet steel compressed air reservoir

For compressed air brake systems in accordance with Council Directive 87/404/EEC, permitted for operating temperatures of -40° up to +100° C

Volumes Excess pressure [bar]	Max. permissible Operating [mm]	Diameter [mm]	Overall length	
4.5	10	206	185	310542001
10	10	206	355	310542002
15	10	206	520	310542003
20	10	206	660	310542004
20	10	246	500	310542005
25	10	246	585	310542006
30	10	246	700	310542007
30	10	276	600	310542008
37	10	246	850	310542009
40	10	246	915	310542010
40	10	276	745	310542011
40	10	310	600	310542012
60	10	246	1350	310542014
60	10	276	1100	310542015
60	10	310	880	310542016
60	10	396	565	310542017
80	10	396	730	310542020
85	10	276	1500	310542021
100	10	396	900	310542022
120	10	396	1089	310542093



Figure: 310542001



Figure: 310542026

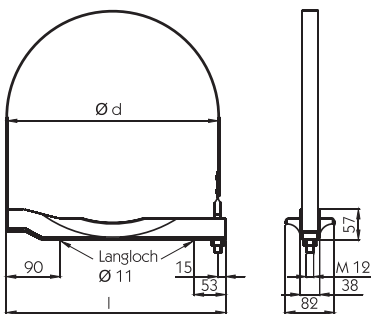
Aluminium Compressed Air Reservoir

For compressed air brake systems in accordance with EN 286-2, permitted for operating temperatures of -40° bis +65° C

Volumes Excess pressure [bar]	Max. permissible Operating [mm]	Diameter [mm]	Overall length	
10	12.5	206	375	310542026
15	12.5	206	535	310542027
20	12.5	206	695	310542028
20	12.5	246	505	310542029
20	12.5	276	415	310542030
30	12.5	246	724	310542031
30	12.5	276	590	310542032
40	12.5	246	945	310542034
40	12.5	276	766	310542035
40	10	310	620	310542036
60	12.5	276	1115	310542038
60	10	310	900	310542039
60	10	396	585	310542040
80	10	396	755	310542041
100	10	396	920	310542042



Figure: 310541811



Air Tank Strips

Version [mm]	Dim. d [mm]	Dim. l [Strip / Console]	Surface	
1-part	206	-	primed	310541016
1-part	246	-	primed	136541806
1-part	310	-	V 2 A	310541373
1-part	396	-	V 2 A	310541840
2-part	206	225	sendzimir-galvanised	310541810
2-part	206	225	sendzimir-galv./untreated	310541830
2-part	246	265	sendzimir-galvanised	310541811
2-part	246	265	sendzimir-galv./untreated	310541831
2-part	276	295	sendzimir-galvanised	310541812
2-part	276	295	sendzimir-galv./untreated	310541832
2-part	310	330	sendzimir-galvanised	310541813
2-part	310	330	untreated	310541823
2-part	310	330	sendzimir-galv./untreated	310541833
2-part	396	410	sendzimir-galvanised	310541814
2-part	396	410	sendzimir-galv./untreated	310541834

Rubber Profile for Air Tank Strips

240541334

➔ VPE = 50m

Parking Brake 1631

With rigid crank, crank radius 200 mm, becket η 15 mm, box size 40 x 60 x 250 mm, trapezoidal thread 25 x 5 mm, overall length 450 mm, primed black.

250131268

➔ The parking brake 1631 is only suitable for export vehicles!

Parking Brake 1632

with lowerable crank, crank radius 200mm, primed black.

Version [mm]	Box size [mm]	Trapezoidal thread [mm]	Overall length	
with becket η 15mm	40 x 60 x 250	25 x 5	375/470	250131269
with becket η 60mm	40 x 60 x 250	25 x 5	405/510	250131340

crank

incl. spring, washer and coiled spring pin. Crank η 15mm, all parts untreated steel

250131270

Parking Brake 1633

With lowerable crank handle, crank radius 195mm, becket η 15 mm, box size 40 x 60 x 250 mm, trapezoidal thread 25 x 5 mm, overall length 400/500 mm, primed black.

250131271

Hinged Handle

Handle with crank, crank η 15mm, incl. plastic end plugs, untreated steel

250131272

Hinged Handle

Handle without crank, connection η 16.5mm incl. plastic end plugs, untreated steel

250131273

Parking Brake 1632

With pivoting crank, single-start 26 x 5 mm trapezoidal thread, 5 mm pitch, 200 mm hub, C 45 spindle nut, forged.

Version [mm]	Crank radius [mm]	Overall length	
with pulley η 80 mm	300	440	250131551
with pulley η 80 mm	185	440	250131552



Figure: 250131340



Figure: 250131551

To:
Suer Nutzfahrzeugtechnik
GmbH & Co. KG
Handelsstraße 5
42929 Wermelskirchen

Telephone
0 21 96/9 46 - 209
Mr Schifferl
Fax
0 21 96/9 46 - 25 209

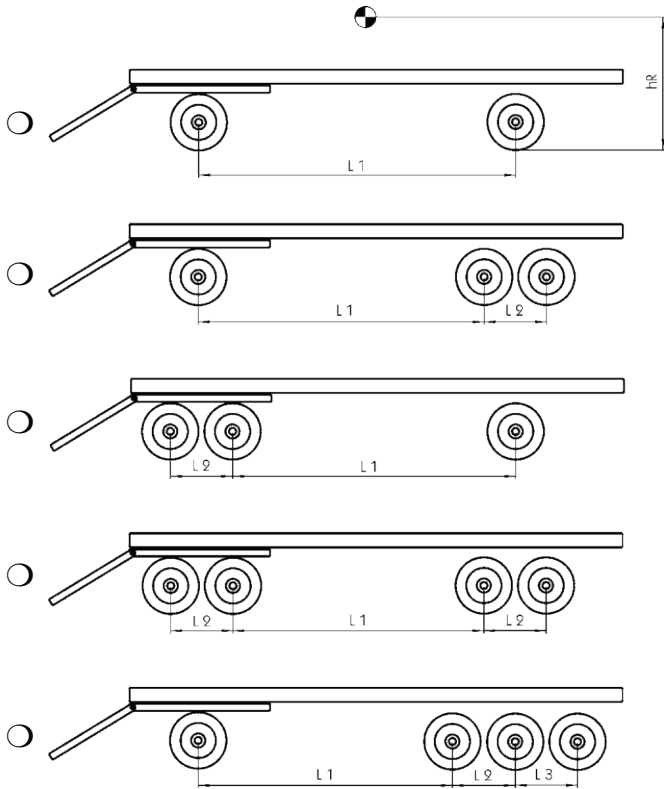
StVZO/EC Road Traffic Act for Fifth-Wheel Trailers

Vehicle type: _____

Country of registration: _____

Manufacturer: _____

Individual or partial permit: _____



Technical data:

		Loaded	Unloaded
Total weight P	[kg]		
Axle load PR1	[kg]		
Axle load PR2	[kg]		
Axle load PR3	[kg]		
Axle load PR4	[kg]		
Centre of gravity hR	[mm]		
Wheel base L1 min.	[mm]		
Wheel base L1 max.	[mm]		
Wheel base L2 (2. • 3. axle)	[mm]		
Wheel base L3 (3. • 4. axle)	[mm]		

Speed Vmax. [km/h] _____

Suspension:

Mechanical, with braking load compensation: Yes / No

(VB or W/GW etc.) _____
Manufacturer/Type _____

Air suspension
Manufacturer/Type _____
 Axle lift on axle(s) _____

Tyre size max/min. [mm] _____

Operational brake system:

- with ABS or
- without ABS
- without ALB
- with EBS: Type ___ S/ ___ M
- with ALB
- with EPV*

*EPV = similar brake valve + electronic ALB regulator

Parking brake system:

Parking brake Spring mechanism

Manufacturer: _____
Type: _____
Quantity: _____

Axle/wheel brakes:

Axle manufacturer:
Axle type/TDB no.:
Wheel brake manufacturer:
Type of brakes and FE/KB no.:
Number of brake cylinders:

	Axle 1	Axle 2	Axle 3	Axle 4	Notes
Axle manufacturer:					
Axle type/TDB no.:					
Wheel brake manufacturer:					
Type of brakes and FE/KB no.:					
Number of brake cylinders:					

Comments: _____

Signature/Division: _____ Date: _____ Telephone: _____

To:
Suer Nutzfahrzeugtechnik
GmbH & Co. KG
Handelsstraße 5
42929 Wermelskirchen

Telephone
0 21 96/9 46 - 209
Mr Schiffer
Fax
0 21 96/9 46 - 25 209

StVZO/EC Road Traffic Act for Semi-Trailers

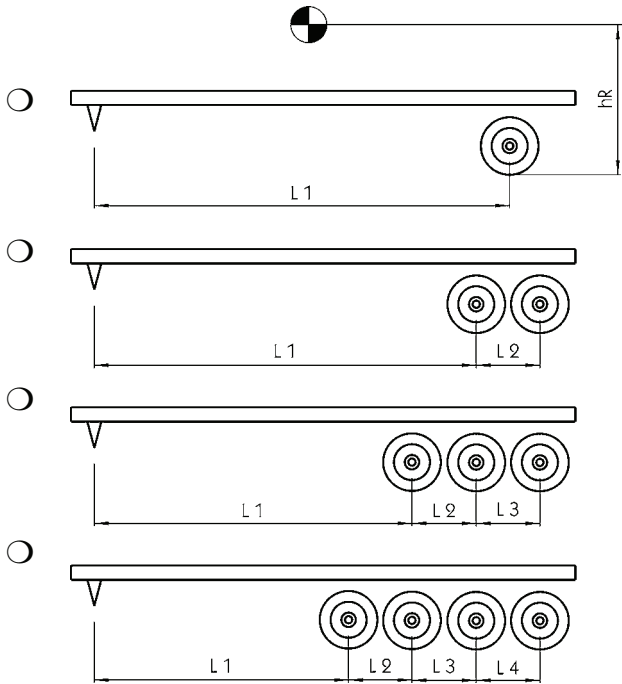
Vehicle type: _____

Country of registration: _____

Manufacturer: _____

Individual or partial

permit: _____



Technical data:

	Loaded	Unloaded
Total weight P	[kg] _____	_____
Axle load PR1	[kg] _____	_____
Axle load PR2	[kg] _____	_____
Axle load PR3	[kg] _____	_____
Axle load PR4	[kg] _____	_____
Centre of gravity hR	[mm] _____	_____
Dimension L1 min.	[mm] _____	_____
Dimension L1 max.	[mm] _____	_____
Wheel base L2 (1. • 2. axle)	[mm] _____	_____
Wheel base L3 (2. • 3. axle)	[mm] _____	_____
Wheel base L4 (3. • 4. axle)	[mm] _____	_____
Speed Vmax.	[km/h] _____	_____

Suspension:

- Mechanical, with braking load compensation: Yes/ No (VB or W/GW etc.) _____
- Manufacturer/Type _____
- Air suspension
- Manufacturer/Type _____
- Axle lift on axle(s) _____

Operational brake system:

- with ABS or with EBS: Type _____ S/ _____ M
- without ABS with ALB
- without ALB with EPV*

*EPV = similar brake valve + electronic ALB regulator

Tyre size max/min. [mm] _____

Parking brake system:

- Parking brake Spring mechanism
- Manufacturer: _____
- Type: _____
- Quantity: _____

Axle/wheel brakes:

Axle manufacturer:
Axle type/TDB no.:
Wheel brake manufacturer:
Type of brakes and FE/KB no.:
Number of brake cylinders:

Axle 1	Axle 2	Axle 3	Axle 4	Notes

Comments:

Signature/Division: _____ Date: _____ Telephone: _____

To:
 Suer Nutzfahrzeugtechnik
 GmbH & Co. KG
 Handelsstraße 5
 42929 Wermelskirchen

Telephone
 0 21 96/9 46 - 209
 Mr Schiffler
 Fax
 0 21 96/9 46 - 25 209

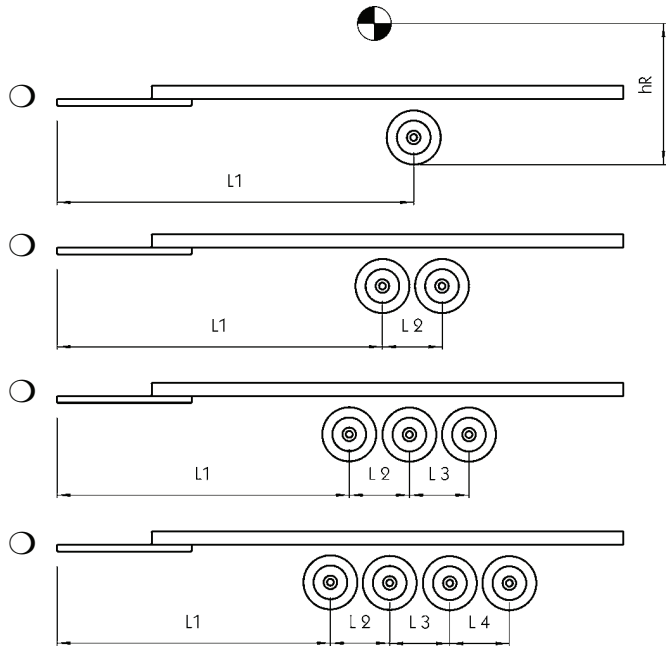
**StVZO/EC Road Traffic Act
 for Central-Axle Trailers**

Vehicle type: _____

Manufacturer: _____

Country of registration: _____

Individual or
 partial permit: _____



Technical data:		Loaded	Unloaded
Total weight P	[kg]		
Axle load PR1	[kg]		
Axle load PR2	[kg]		
Axle load PR3	[kg]		
Axle load PR4	[kg]		
Centre of gravity hR	[mm]		

Dimension L1 min. [mm] _____
 Dimension L1 max. [mm] _____

Wheel base L2 (1. • 2. axle) [mm] _____
 Wheel base L3 (2. • 3. axle) [mm] _____
 Wheel base L4 (3. • 4. axle) [mm] _____

Speed Vmax. [km/h] _____

Suspension:

Mechanical, with braking load compensation: Yes/ No
 (VB or W/GW etc.)
 Manufacturer/Type _____

Air suspension
 Manufacturer/Type _____

Axle lift on axle(s) _____

Tyre size max./min. [mm] _____

Parking brake system:

Parking brake
 Manufacturer: _____
 Type: _____
 Quantity: _____

Spring mechanism

Operational brake system:

- with ABS or with EBS: Type _____ S/ _____ M
- without ABS with ALB
- without ALB with EPV*

*EPV = similar brake valve + electronic ALB regulator

Axle/wheel brakes:

	Axle 1	Axle 2	Axle 3	Axle 3	Notes
Axle manufacturer:					
Axle type/TDB no.:					
Wheel brake manufacturer:					
Type of brakes and FE/KB no.:					
Number of brake cylinders:					

Comments: _____

Signature/Division: _____ Date: _____ Telephone: _____

Index of article numbers

107511055	48	230542074	4	230542149	8
107511056	48	230542075	5	230542150	8
107511137	48	230542077	11	230542151	2, 3
		230542078	9, 11	230542154	4, 6, 9
123531118	40	230542080	3	230542155	12
		230542082	3	230542156	8
136541806	49	230542085	4	230542160	9
		230542086	11	230542161	8
230541130	3	230542088	5	230542162	5
230541135	2	230542089	5	230542163	2
230541201	2	230542090	4	230542164	3, 11
230541202	12	230542091	4	230542165	8
230541203	2	230542092	4	230542166	10
230541205	2	230542094	5	230542167	10
230541207	3	230542095	5	230542169	9, 11
230541209	3	230542096	5		
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230541211	12	230542100	8	231549002	13
230541234	3	230542105	12	231549003	13
230541235	2	230542107	3	231549004	13
230541236	2	230542108	12		
230541237	3	230542110	4	235541055	40
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310541833	49		
310541834	49		
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310542001	48		
310542002	48		
310542003	48		
310542004	48		
310542005	48		
310542006	48		
310542007	48		
310542008	48		

I. General

1. All deliveries, services and offers effected by SUER Nutzfahrzeugtechnik GmbH & Co. KG - hereinafter referred to as "SUER" - are exclusively subject to these Terms and Conditions, as a result of which all future business relationships will also be subject to them, even if they are not expressly agreed upon again. These Terms and Conditions will be regarded as having been accepted at latest on receipt of the goods or service(s) in question. Counterconfirmation on the part of the Customer in which attention is drawn to the Customer's own terms and conditions is herewith opposed.

2. Any exceptions to these Terms and Conditions require SUER's written acknowledgement in order to be legally valid.

II. Submission of offers, Conclusion of contract

1. Offers submitted by SUER are non-binding and subject to alteration, and are understood as being on ex warehouse basis. Orders and declarations of acceptance require acknowledgement in written form or by fax in order to be legally binding. This also applies to supplements, amendments or ancillary agreements to the same.

2. Details of dimensions and weights are subject to tolerances that are customary in the trade. Weights are calculated on the basis of the values given in the catalogue. These are regarded as being known.

Aluminium profiles are subject to the following standards:
a) DIN 17615 Section 3 (dimension) tolerances of profiles of AlMgSi 0.5

b) DIN 1748 Section 2 Technical terms and conditions of delivery

c) DIN 1748 Section 4 Admissible deviations

III. Prices

Agreed prices are understood as net without any deduction and applicable to the manufacture and handing over of the goods in question. These prices do not include the respective statutory value added tax, nor carriage, dispatch and packaging costs nor any other attendant costs. The prices quoted in the order acknowledgement shall in all cases be decisive.

IV. Time of delivery, Time of performance

1. The agreement of delivery periods or deadlines that can be agreed on a binding or non-binding basis must be effected in writing in order to be legally valid. Delivery periods or deadlines that are merely agreed as "approximate" or which are not agreed in writing as "fixed" or "binding" shall be regarded as being merely approximate. Delivery periods commence as from the day on which the respective order has been definitively acknowledged, however not until all relevant details have been fully clarified in respect of design and not until the receipt of all documentation that is necessary to enable fulfilment of the order.

2. The delivery period will be deemed to have been adhered to on issue of notice of readiness for dispatch.

3. Even in the case of binding periods and deadlines, the Supplier shall not be liable for delays in delivery and/or provision of performance due to force majeure or to occurrences (such as, in particular, strikes, lockouts, official measures, etc., even if it is SUER's suppliers or their sub-suppliers that are subject to these occurrences) that essentially hamper or render delivery impossible. Moreover, such occurrences shall entitle SUER to postpone the delivery or service for the duration of the hindrance plus a reasonable re-start period. Should the hindrance last for more than three months (this period to be adjusted according to requirement) SUER may then partially or completely withdraw from the contract in respect of the unfulfilled part thereof.

4. If no binding date for delivery has been agreed in writing then any right to withdraw from the contract on the basis of non-provision of performance or performance that is not in accordance with the contract shall be excluded for a period of three months as from the non-binding delivery date. Such withdrawal will only be admissible following the fixing of a reasonable period of grace of no less than three weeks. Should the delivery period be extended or should SUER be released from its obligation, the Customer may not derive any claims for damages therefrom. The Company shall without delay notify the Customer in the event of any occurrences or circumstances which might cause any delay of performance

5. Partial deliveries and partial performance of services on the part of SUER shall be admissible at any time. In particular finished goods are to be accepted by the Customer regardless of the agreed time of delivery. Additional delivery going back to deviations that are customary in the trade shall be admissible.

V. Transfer of risk

1. Risk shall pass to the Customer as soon as the consignment in question has been handed over to the person responsible for its shipment or has left SUER's warehouse or plant for the purposes of dispatch. This also applies to carriage-paid deliveries. Should the dispatch of goods in question be impossible for reasons for which SUER is not responsible then the risk already passes to the Customer on notification of readiness to deliver.

2. Insurance against damage and loss in transit will only be taken out at the specific request and at the expense of the Customer. Goods in respect of which notice of readiness to deliver has been issued at the agreed time are to be called off without delay. If this is not done, SUER shall at its own discretion be entitled to store such goods and invoice them as having been delivered ex works or ex warehouse; the Customer shall assume the costs and risks involved in such instance. In the event of any call-off delay on the part of the Customer SUER may then fix a period of grace; the Customer's failure to meet this final deadline shall entitle SUER to withdraw from the contract or demand compensation for non-performance. In the event that the Customer expressly refuses to take delivery SUER shall not need to fix

a grace period.

VI. Guarantee and liability

1. Technical data, analysis details, pictures, drawings, dimensions, weights or other performance data contained in brochures, advertising material or similar documents merely serve general descriptive purposes. They do not constitute quality descriptions or guarantees unless specifically described as such, and shall only be regarded as binding if this has been specifically agreed in writing.

2. Product characteristics or features shall only be deemed to have been agreed upon if specifically referred to as "agreed characteristics" on the order form or on the order acknowledgement. SUER's sales personnel are not authorised to conclude verbal ancillary agreements or give verbal guarantees which go over and beyond the content of written contracts.

3. SUER guarantees the faultlessness of the supplied goods in line with the corresponding state of the art. The duration of this guarantee shall be one year as from delivery of the goods in question. The stipulation contained in Article 479 Paragraph 2 of the German Civil Code (BGB) shall apply notwithstanding the above. Reduction of the limitation period shall not apply in those cases in which SUER has unrestricted liability in accordance with these Terms and Conditions.

4. If the Customer fails to comply with operating or maintenance instructions, or carries out alterations to the products, or replaces parts or uses materials that do not correspond to the original specifications then the guarantee will no longer apply unless the Customer is able to successfully disprove the correspondingly substantiated allegation that the fault resulted from any of the above circumstances.

5. The Customer shall notify SUER in writing of any obvious defect within 24 hours, or immediately on discovery in the case of other defects, however no later than one week after receipt of the delivery item. Defects that do not come to light within this period despite thorough inspection shall be notified in writing to SUER immediately on discovery. Complaints relating to defects that first come to light during processing can only be taken account of provided that the processing of the defective object is terminated immediately and SUER is given the opportunity to view said object at its request.

6. Should it delivery defective goods, SUER will be entitled to use its discretion as to whether it will meet its guarantee commitment by way of remedying the fault involved, replacing the defective goods with orderly ones, reimbursing the shortfall in value, or via cancellation of the relevant contract of sale. The pursuance of guarantee commitments at any locations other than those places of fulfilment contractually specified will entitle SUER to demand reimbursement by the Customer for the additional work involved and for any additional travel expenses that might be incurred.

7. The assignment to third parties of any guarantee claims to which the Customer is entitled is not admissible

8. Claims for damages asserted by the Customer in respect of material defects shall be subject to the restrictions defined in Section VII.

VII. Limitation of liability

Irrespective of their legal basis, claims for damages asserted by the Customer shall be excluded. This exclusion of liability shall not apply if the damage sustained has arisen from intent or gross negligence on the part of SUER or people acting for or on behalf of SUER. In the case of negligent violation of essential contractual obligations SUER shall only be liable for typically foreseeable damage or loss. Nor shall exclusion of liability and limitation of liability apply in the case of damage or loss incurred through death, physical injury or harm to health as a result of willful or negligent violation of obligations on the part of SUER or of willful or negligent violation of obligations on the part of any legal representative of SUER or persons acting for or on behalf of SUER. Nor shall exclusion of liability apply if the damage or loss involved has arisen from a lack of warranted characteristics or features or if SUER has fraudulently concealed any defect or nonconformity in the goods concerned. Claims in accordance with product liability law shall apply notwithstanding the above.

VIII. Reservation of ownership

1. SUER reserves the ownership of any and all delivered goods until all its claims vis-à-vis the Customer have been settled, including claims arising in the future even from contracts concluded simultaneously or later than the contract in question. This shall similarly apply in the event that individual or all claims on the part of SUER have been included in a current account and the account has been made up and acknowledged.

2. The Customer shall only then be entitled to resell reserved goods within the framework of regular business activities provided that it herewith and now assigns all rights and receivables vis-à-vis the arising to it vis-à-vis the purchaser or third party as a result of the resale. If reserved goods are resold in unprocessed or processed state or in conjunction with items that are the exclusive property of the Customer, the Customer herewith and now assigns to SUER any and all receivables to their full extent arising from the resale. If reserved goods are resold in processed state or in conjunction with items that are not the property of the Customer, the Customer herewith and now assigns to SUER any and all receivables arising from the resale to the amount of the value of the reserved goods with all ancillary rights and priority over the rest. SUER herewith accepts said assignment. Even after such assignment the Customer shall remain entitled to collect the respective receivables. SUER's entitlement to collect such receivables itself shall remain unaffected; however, SUER undertakes to refrain from collecting such receivables provided that the Customer fulfils its payment obligations and other commitments in due form. If necessary, SUER may demand that the Customer discloses to it the assigned claims and the related debtors,

provides all details required to enable collection, and hands over the relevant documentation and notifies the debtors of this assignment.

3. Any processing of reserved goods by the Customer for SUER shall not make the latter subject to any obligations. If reserved goods are processed, combined, mixed or mingled with other goods that are not the property of SUER then SUER shall be entitled to co-ownership of the new item according to the proportion of the invoice value of the reserved goods to that of the other processed goods at the time of said processing, combination, mixing or mingling. In the event that the Customer acquires sole ownership of the new item, the parties agree that the Customer will grant SUER co-ownership of the new item according to the proportion of the processed, combined, mixed or mingled reserved goods contained in the new item, and will store the new item for SUER free of charge.

4. If the payment of the purchase price by the Customer is effected by way of a bill of exchange then the reservation of ownership and the claim relating to the supply of goods on which said reservation of ownership is based will not expire until the bill of exchange has been honoured by the Customer as drawee.

5. In the event of seizure of reserved goods by third parties the Customer shall draw attention the fact that it is the property SUER, and the third parties are to be informed accordingly without delay. The Customer shall bear all costs incurred in reversing the seizure and recovering the contractual item.

6. Should the Customer act in breach of contract - in particular by falling into arrears with payments - SUER shall be entitled to repossess the reserved goods or demand assignment of the rights to the recovery thereof vis-à-vis third parties. Unless subject to the regulations on financial assistance between entrepreneurs and consumers (Articles 499 ff., German Civil Code/BGB), the taking back or seizure of reserved goods shall not constitute withdrawal from the contract. In the event of repossession SUER shall, having given due warning and fixed a final deadline which the Customer has failed to meet, be entitled to sell the goods in question for the best possible price and charge up the proceeds to the purchase price.

7. If the value of the existing collateral exceeds the collateralized claims by more than 20 per cent, SUER shall then be obliged to release the corresponding proportion of collateral if the Customer so demands.

IX. Payment

1. Unless otherwise agreed, amounts invoiced by SUER fall due without discount on receipt of the respective invoice. The Customer shall be deemed to have fallen into arrears if the payment in question has not been received within 14 days, and prior reminder is not necessary to this end. Despite the Customer's provisions to the contrary, SUER shall be entitled to charge up the payments in question to the Customer's older debts, and will inform the Customer accordingly. In the event that expenses and interest have already arisen, SUER shall be entitled to charge up the defaulted payment in question to the expenses and then to the interest and finally to the primary obligations.

2. Should the Customer fall into arrears, SUER shall be entitled to charge interest at the statutory rate - or at a higher rate at which SUER itself has been charged and for which substantiation must be provided - as from the date on which the Customer has fallen into arrears.

3. Should circumstances come to SUER's notice which cast doubt on the creditworthiness of the Customer, SUER shall be entitled to make the entire remaining debt due and payable. In such instance SUER may demand the Customer to make advance payments or furnish security.

4. The Customer shall not be entitled to offsetting, retention or reduction - even in the case of complaints or counterclaims being asserted - unless such counterclaims have become legally effective or are beyond dispute.

X. Observance of secrecy

Unless specifically otherwise agreed in writing, information passed on to SUER in connection with the Customer's orders will not be regarded as being confidential.

XI. Concluding provisions

1. These Terms and Conditions are governed by the law of the Federal Republic of Germany, and the application of standard international law on sales is excluded.

2. Insofar as the Customer is a merchant within the meaning of the German Commercial Code (HGB), a legal entity under public law or a special public asset, the exclusive place of jurisdiction for all disputes arising from and in connection with the contractual relationship between SUER and Customer shall be Remscheid/Germany to the extent that this can be permissibly agreed.

3. Should one of the above provisions be or become invalid or unenforceable, the validity of the remaining clauses hereof shall in no way be affected. In such instance the parties hereto shall endeavour to replace the invalid or unenforceable clause with one that comes as close as possible to the sense and purpose of this agreement.

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