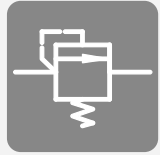


Connection blocks for single-circuit pumps types AB, AL

Product documentation



Operating pressure $p_{\max}$:

700 bar

Flow rate $Q_{\max}$:

24 l/min



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Table of Contents

1	Overview of connection blocks for single-circuit pumps types AB, AL.....	5
2	Available versions.....	6
2.1	Connection block type AB 1.....	9
2.1.1	Basic type.....	10
2.1.2	Additional option.....	10
2.1.3	Intermediate plate with idle circulation valve.....	11
2.1.4	Check valve in P.....	11
2.1.5	Return stop.....	12
2.1.6	Unit coding.....	12
2.1.7	Pressure range and pressure setting.....	12
2.1.8	Pressure-limiting valve adjustment (type MVE 4).....	13
2.1.9	Filter version.....	13
2.1.10	Filter monitoring.....	14
2.2	Connection block type AB 1 K.....	15
2.2.1	Basic type.....	15
2.2.2	Check valve in P.....	16
2.3	Intermediate plate type ZA for valve mounting for type AB 1 and AB 1 K.....	17
2.3.1	Intermediate plate with drain valve.....	17
2.3.2	Pressure switches.....	18
2.3.3	Pressure switch adjustment.....	18
2.3.4	Explosion-proof version.....	19
2.4	Connection block with shut-off valve type AL.....	20
2.4.1	Basic type.....	21
2.4.2	return line filter contamination indicators.....	21
2.4.3	Pressure range and pressure setting of the shut-off valve.....	21
2.5	Spacer plates and connection blocks for direct pipe connection.....	22
2.5.1	Spacer plates.....	22
2.5.2	Connection blocks for direct pipe connection.....	23
2.6	Hydraulic power pack.....	23
3	Parameters.....	24
3.1	General data.....	24
3.2	Weight.....	24
3.3	Versions with filter.....	26
3.3.1	Versions with return line filter.....	26
3.3.2	Versions with pressure filter.....	28

4	Dimensions.....	30
4.1	Connection block type AB 1.....	30
4.1.1	Connection block type AB 1 with proportional pressure-limiting valve type PMVP 4.....	31
4.1.2	Connection block type AB 1 with idle circulation valve type EM 21.....	31
4.1.3	Connection block type AB 1 with adapter plate P→A.....	32
4.1.4	Connection block type AB 1 with adapter plate JIS.....	32
4.1.5	Connection block type AB 1 with pressure switch.....	33
4.1.6	Connection block type AB 1 with pressure filter.....	34
4.1.7	Connection block type AB 1 with return line filter.....	36
4.1.8	Intermediate plate type U(V) with idle circulation valve type EM 21.....	38
4.2	Connection block type AB 1 K.....	40
4.3	Intermediate plate type ZA with pressure switches.....	41
4.4	Connection block with shut-off valve type AL.....	43
4.4.1	Type AL 11 and AL 12.....	43
4.4.2	Type AL 21 F (with return line filter).....	44
4.4.3	Type AL 21 D (with pressure filter).....	46
4.5	Spacer plates and connection blocks for direct pipe connection.....	49
4.5.1	Spacer plates.....	49
4.5.2	Connection blocks for direct pipe connection.....	49
5	Installation, operation and maintenance information.....	50
5.1	Intended use.....	50
5.2	Assembly information.....	50
5.2.1	Mounting individual sections.....	51
5.3	Operating instructions.....	53
5.4	Maintenance information.....	53
6	Other information.....	54
6.1	Accessories, spare and individual parts.....	54

1 Overview of connection blocks for single-circuit pumps types AB, AL

A connection block represents the connecting link between the hydraulic power pack and the hydraulic control. The connection blocks described here are suitable for combining with HAWE compact hydraulic power packs.

The connection blocks type AB and AL are suitable for single-circuit pumps. Type AB has a modular design. It comes as standard with a pressure-limiting valve that acts as a safety unit for a connected hydraulic accumulator. This may be designed with component accreditation (TÜV).

Valve banks with directional valves can be fitted directly to a connection block type AB or AL. This creates a compact hydraulic control unit for a wide variety of stationary and even mobile applications.

Features and advantages

- Flexible interface between the hydraulic power pack and valve controls
- Space-saving due to direct mounting on the hydraulic power pack
- Oil filter with visual or electric filter monitoring available in modular kit
- Simple to expand with idle circulation valve and proportional pressure-limiting valve from modular kit
- Integrated pressure-limiting valve

Compliant with the following regulations

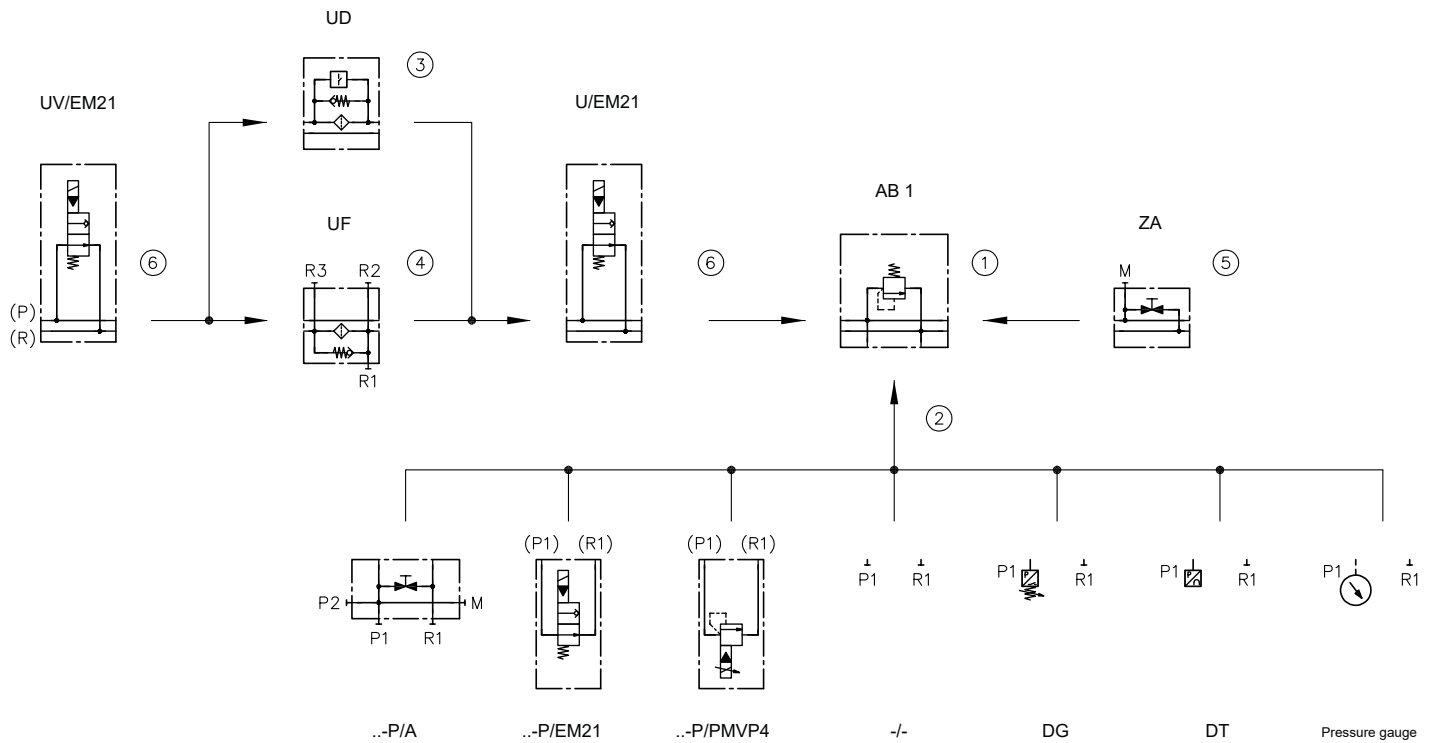
- Pressure Equipment Directive 2014/68/EU
- Industrial Safety Regulation dated 1.6.2015 / Use of Work Equipment Directive 2009/104/EG
- AD 2000 Code, data sheet A2, latest release



Connection blocks type AB

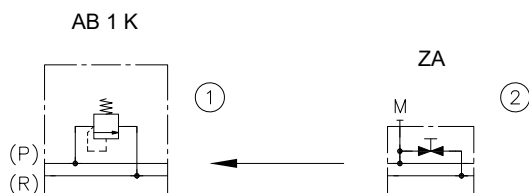
Combination option

AB 1 (Chapter 2.1, "Connection block type AB 1")



- 1 Connection block
- 2 Additional option
- 3 Intermediate plate with pressure filter
- 4 Intermediate plate with return line filter
- 5 Intermediate plate ZA 1 / ZA 2 with drain valve
- 6 Intermediate plate with idle circulation valve

AB 1 K ("Connection block type AB 1 K")



- 1 Connection block
- 2 Intermediate plate ZA 1 / ZA 2 with drain valve

Range overview

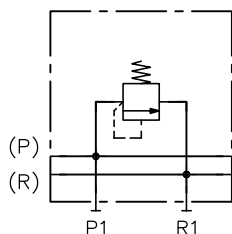
Type	Description	Circuit symbol
AB 1	Pressure-limiting valve optionally with/without unit coding Options: – Return stop at R – Check valve can be installed in P upstream or downstream of pressure-limiting valve – Further functions such as idle circulation valve, proportional pressure-limiting valve, pressure and return line filters can be added in modular style see Chapter 2.1, "Connection block type AB 1"	
AB 1 K	Pressure-limiting valve optionally with/without unit coding Options: – Return stop at R – Check valve can be installed in P upstream or downstream of pressure-limiting valve see Chapter 2.2, "Connection block type AB 1 K"	
AL 11	Options: – Connection block with shut-off valve type LV 10 according to D 7529 – Check valve in P see Chapter 2.4, "Connection block with shut-off valve type AL"	
AL 12	Options: – Connection block with shut-off valve type LV 10 according to D 7529 – Check valve in P see Chapter 2.4, "Connection block with shut-off valve type AL"	
AL 21 F	Pressure-limiting valve type CMVX 2 according to D 7710 TUV Options: – Connection block with shut-off valve type LV 20 according to D 7529 – Return line filter (see Chapter 2.1.9, "Filter version") – Drain valve see Chapter 2.4, "Connection block with shut-off valve type AL"	

Type	Description	Circuit symbol
AL 21 D 10	Pressure-limiting valve type CMVX 2 to D 7710 TUV Options: – Connection block with shut-off valve type LV 20 according to D 7529 – Pressure filter (see Chapter 2.1.9, "Filter version") – Drain valve see Chapter 2.4, "Connection block with shut-off valve type AL"	

2.1 Connection block type AB 1

A pressure-limiting valve is integrated in connection block AB 1 which may be executed as a component with component approval. Check valves may be integrated in the P and R lines. Intermediate and connection plates enable mounting of idle circulation and proportional pressure-limiting valves.

Circuit symbol



Ordering example

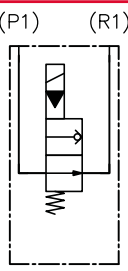
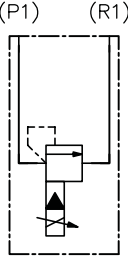
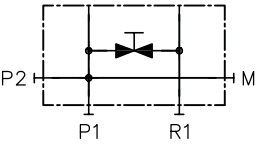
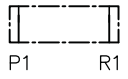
UV/EM21	/G 24	UF 1	G2	-AB 1 -AB 1	PV PV	R R	X X	C 180 C 280	V R	-EX	-P/EM 21	/G 24	-ZA 1/...	-KA 2 -KA 2
														2.6 "Hydraulic power pack"
														2.3.1 "Intermediate plate with drain valve"
														Actuating solenoid
														2.1.2 "Additional option"
														2.3.4 "Explosion-proof version"
														2.1.8 "Pressure-limiting valve adjustment (type MVE 4)"
														2.1.7 "Pressure range and pressure setting"
														2.1.6 "Unit coding"
														2.1.5 "Return stop"
														2.1.4 "Check valve in P"
														2.1.1 "Basic type"
														2.1.10 "Filter monitoring"
														2.1.9 "Filter version"
														Actuating solenoid
														2.1.3 "Intermediate plate with idle circulation valve"

2.1.1 Basic type

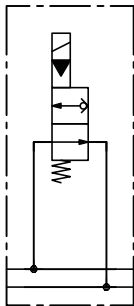
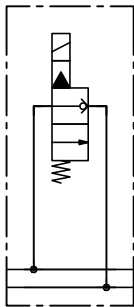
The permissible pump flow rates, as well as the pressure setting, are dependent on the selected filter version (2.1.9 "Filter version") and pressure stage (2.1.6 "Unit coding").

Type	Description	Connections P, P1, R, R1	Flow rate Q _{max} (l/min)	Pressure setting p _{max} (bar)
AB 1	Pressure-limiting valve without component approval Type MVE 4 according to D 7000/1	G 1/4	20	700
AB 1 ... X	Pressure-limiting valve with component approval Type MVEX 4 according to D 7000 TUV	G 1/4	24	400

2.1.2 Additional option

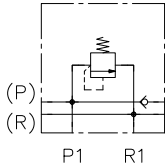
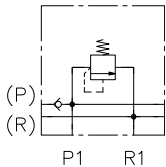
Coding	Description	Circuit symbol
- P/EM 21	Idle circulation valve type EM 21 according to D 7490/1 (p _{max} = 400 bar) Solenoid actuation according to D 7490/1 , Chapter 2.1.3	
- P/PMVP	Proportional pressure-limiting valve type PMVP 4 according to D 7485/1 The pressure-limiting valve setting depends on the proportional pressure-limiting valve used. The pressure-limiting valve pressure setting should be 10 % above the maximum pressure of the proportional pressure-limiting valve. For the pressure-limiting valve with component approval, only pressure ranges E, C and G to 2.1.7 "Pressure range and pressure setting" are available. For the pressure-limiting valve without component approval, only pressure ranges C, B and A to 2.1.7 "Pressure range and pressure setting" are available. For the solenoid voltage see D 7485/1 , Chapter 2.3 If the system employs the PMVP 4 on-flange plate, the PMVP should be restricted to only 90 % of the set system pressure. Exceeding this value can lead to instability in the system. Example: The pressure-limiting valve is set to 200 bar. The system employs a PMVP 45-43. The available maximum system pressure is up to 270 bar. Consequently it is permissible to set the PMVP 45-43 to a value up to 180 bar.	
- P/A	Adapter plate with drain valve and ports P1, P2, R1, M (G 1/4) (p _{max} = 400 bar)	
- P/JIS	Adapter plate with G 1/4 JIS connection	
- 3 ... 8 - 51 EA1 ... 51 EA6 - 51 EI1 ... 51 EI6 - 6 E(R)1 ... 6 E(R)4 - 7 E1 ... 7 E4	see Chapter 2.3.2, "Pressure switches" Connection in P1	

2.1.3 Intermediate plate with idle circulation valve

Type	Description	Circuit symbol
U/EM 21 . /...	Idle circulation valve type EM 21 according to D 7490/1 ($p_{\max} = 400 \text{ bar}$) Solenoid actuation according to D 7490/1, Chapter 2.1.3 Position: - for option with filter version downstream of the UD/UF manifold - for option with filter version upstream of basic type AB 1 (see "Combination option", page 6)	U(V)/EM 21 S 
UV/EM 21 . /...	Idle circulation valve type EM 21 according to D 7490/1 ($p_{\max} = 400 \text{ bar}$) Solenoid actuation according to D 7490/1, Chapter 2.1.3 Position: for option with filter version upstream of UD/UF manifold (see "Combination option", page 6)	U(V)/EM 21 V 

2.1.4 Check valve in P

A check valve in the P line prevents the oil from flowing back when the hydraulic power pack is switched off. This allows pressure to be maintained in leak-free systems.

Coding	Description	Circuit symbol
Without coding	No check valve in P	
P	Check valve in P connection downstream of pressure-limiting valve	
PV	Check valve in P connection upstream of pressure-limiting valve	

2.1.5 Return stop

Return stops prevent the vessel from leaking if the valve bank is removed from the connection block. They can be used to pre-tension the R line in the valve bank. The return stop can only be used with a directly mounted directional valve bank. Direct line connection is not possible.

Coding	Description	Circuit symbol
Without coding	No return stop in R	
R	With return stop in R (opening pressure approx 0.1 bar)	
R1	With return stop in R (opening pressure approx 0.9 bar)	

2.1.6 Unit coding

Coding	Description
Without coding	No unit coding (pressure-limiting valve type MVE 4)
X	With unit coding (pressure-limiting valve type MVEX 4)

2.1.7 Pressure range and pressure setting

(Pressure-limiting valve type MVE 4 / MVEX 4)

Pressure range	Pressure setting p _{min} to p _{max} (bar)	Flow rate Q _{max} (l/min)	Unit coding
No unit coding			
F	0 - 80	20	--
E	81 - 160	20	--
C	161 - 315	20	--
B	316 - 500	20	--
A	501 - 700	12	--
With unit coding			
H	80 - 90	22	D 7000 TUV
F	91 - 110		
E	111 - 180	24	D 7000 TUV
C	181 - 290		
G	291 - 320	20	D 7000 TUV
	321 - 350	22	D 7000 TUV
B	351 - 450		

2.1.8 Pressure-limiting valve adjustment (type MVE 4)

Adjustment is only possible for pressure-limiting valve type MVE 4 without unit coding. The variant with unit coding type MVEX 4 is fixed and sealed.

Coding	Description	Circuit symbol
Without coding	Fixed, tool adjustable	
R	Manually adjustable (Wing bolt + wing nut)	
V	Manually adjustable (Turning knob, self-locking)	

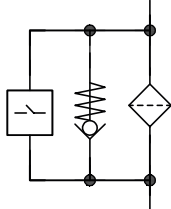
2.1.9 Filter version

The oil flowing back from the consumers through the valve bank is filtered in the return line filter. Continuous filtering improves the oil purity.

Coding	Description	Filter fineness	Flow rate $Q_{\max}$ (l/min)	Circuit symbol
UF 0	Return line filter with bypass check valve	30 μm abs.	7	
UF 1		12 μm abs.	15	
UF 2		$\beta_{12} \geq 200$	21	
UF 3			33	
UF 31	Return line filter without bypass check valve	12 μm abs. ($\beta_{12} \geq 200$)	7	
UD 5	Pressure filter with bypass check valve, opening pressure 2.5 bar $p_{\max} = 400$ bar	5 μm abs. ($\beta_5 \geq 200$)	24	
UD 10		10 μm abs. ($\beta_{10} \geq 200$)		
UD 51	Pressure filter without bypass check valve $p_{\max} = 400$ bar	5 μm abs. ($\beta_5 \geq 200$)		
UD 101		10 μm abs. ($\beta_{10} \geq 200$)		

2.1.10 Filter monitoring

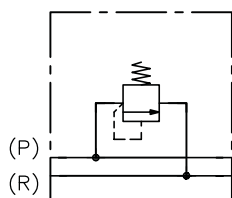
The components are installed in the connection MR of the UF plate according to [Chapter 2.1.9](#), if these are selected in the configuration.

Coding	Description	Circuit symbol
With return line filter		
Without coding	without	-
V1	Pressure switch, switching pressure 2 bar, electrical connection, plug connection	
VM1	Pressure switch, switching pressure 2 bar, electrical connection M12x1	
G1 G2 G3 G4	G1: Optical filter monitoring, angled fitting G2: Optical filter monitoring, straight fitting G3: Optical filter monitoring, straight, long + extension 31 mm G4: Optical filter monitoring, straight, long + extension 66 mm The optical contamination indicator type G1 and G2 are not recommended if other intermediate or spacer plates are used between the UF plate and hydraulic power pack. Using additional intermediate plates increases the dynamic pressure, in turn leading to false indicator readings.	
With pressure filter		
Without coding	without	-
VA1	Optical filter monitoring, automatic reset	
VV1	Optical filter monitoring, manual reset	
VE1	Pressure switch - Switching pressure 2 bar for filter coding D 5, D 10 - Switching pressure 5 bar for filter coding D 51, D 101 - Electrical connection EN 175 301-803 A	
VEM1	Pressure switch - Switching pressure 2 bar for filter coding D 5, D 10 - Switching pressure 5 bar for filter coding D 51, D 101 - Electrical connection M12x1	
VI02	Pressure switch with switch output and IO-Link - Switching points at 75% and 100% degree of pollution. - Switching points for filter coding D 5, D 10: 1.3 bar (75%) normally open contact and 2.0 bar (100%) normally closed contact - Switching points for filter coding D 51, D 101: 3.7 bar (75%) normally open contact and 5.0 bar (100%) normally closed contact - Electrical connection M12x1	

2.2 Connection block type AB 1 K

A pressure-limiting valve is integrated in connection block AB 1 K which may be executed with component approval. Check valves may be integrated in the P and R lines.

Circuit symbol



Ordering example

AB 1 K	P	R	X	C 180		V	-ZA 1/...	-KA 2
AB 1 K				C 280	-EX			-KA 2
								2.6 "Hydraulic power pack"
								2.3.1 "Intermediate plate with drain valve"
								2.1.8 "Pressure-limiting valve adjustment (type MVE 4)"
								2.3.4 "Explosion-proof version"
								2.1.7 "Pressure range and pressure setting"
								2.1.6 "Unit coding"
								2.1.5 "Return stop"
								2.2.2 "Check valve in P"
								2.2.1 "Basic type"

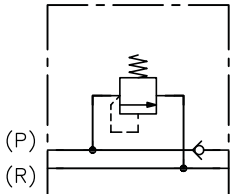
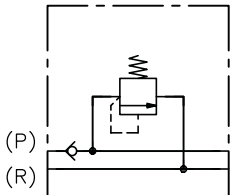
2.2.1 Basic type

The permissible pump flow rates, as well as the pressure setting, are dependent on the selected pressure stage (2.1.7 "Pressure range and pressure setting").

Type	Description	Connections P, R	Flow rate Q _{max} (l/min)	Pressure setting p _{max} (bar)
AB 1 K	Pressure-limiting valve without component approval	G 1/4	20	700
AB 1 K ... X	Pressure-limiting valve with component approval	G 1/4	24	450

2.2.2 Check valve in P

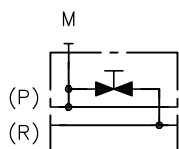
A check valve in the P line prevents the oil from flowing back when the hydraulic power pack is switched off. This allows pressure to be maintained in leak-free systems.

Coding	Description	Circuit symbol
Without coding	No check valve in P	
P	Check valve in P connection downstream of pressure-limiting valve  NOTICE The combination arrangement of a check valve with coding P in conjunction with a pipe connection or a BVH bank cannot be installed.	
PV	Check valve in P connection upstream of pressure-limiting valve	

2.3 Intermediate plate type ZA for valve mounting for type AB 1 and AB 1 K

The intermediate plate ZA contains a drain valve and a pressure gauge connection (G 1/4).

Circuit symbol



Ordering example

AB 1 K ...	-ZA 1	/3	R	/250
			Setting	Specifications only for types 3 - 8
			2.3.3 "Pressure switch adjustment"	
		2.3.2 "Pressure switches"		
	2.3.1 "Intermediate plate with drain valve"			

2.3.1 Intermediate plate with drain valve

Coding	Description
Without coding	No intermediate plate
ZA 1	Intermediate plate with drain valve and pressure gauge connection (G 1/4) for valve mounting type: BVH
ZA 2	Intermediate plate with drain valve and pressure gauge connection (G 1/4) for valve mounting type: - BA 2 - VB - BWH, BWN - BVZP - SWR, SWP - SWS



NOTICE

The intermediate plate of type ZA 1 can also be used for the direct pipe connection.

2.3.2 Pressure switches

Pressure switches are used to monitor or control the pressure generator. They can be mounted directly on the type AB connection blocks. If an adapter plate type /P/... is installed, a pressure switch cannot be mounted directly on the AB block. An intermediate plate of type ZA can be used for the purpose.

Coding	Pressure $p_{\max}$ (bar)	Pressure switch
without coding	--	Without - prepared for subsequent mounting
3/...	200 ... 700	DG 33
4/...	100 ... 400	DG 34
5/...	20 ... 450	DG 35
6/...	4 ... 12	DG 36
7/...	12 ... 170	DG 365
8/...	4 ... 50	DG 364
51 EA1 51 EA2 51 EA4 51 EA6 51 EI1 51 EI2 51 EI4 51 EI6	Pre-set	DG 51 E-A 100 DG 51 E-A 250 DG 51 E-A 400 DG 51 E-A 600 DG 51 I-A 100 DG 51 I-A 250 DG 51 I-A 400 DG 51 I-A 600
6 E1	0 ... 100	DG 61
6 ER1	0 ... 100	DG 61 R
6 E2	0 ... 250	DG 62
6 ER2	0 ... 250	DG 62 R
6 E4	0 ... 400	DG 64
6 ER4	0 ... 400	DG 64 R
7 E1	0 ... 100	DG 71
7 E2	0 ... 250	DG 72
7 E4	0 ... 400	DG 74

2.3.3 Pressure switch adjustment

Coding	Description
Without coding	Fixed
R	Adjustable by hand (wing bolt + wing nut)
V	Turn knob
H	Lockable turn knob

2.3.4 Explosion-proof version

Coding	Description
Without coding	Series
EX	Explosion-proof version (other applicable document to be noted: B ATEX)

INFORMATION

The explosion-proof version is only available in combination with explosion-proof components.

The following options are possible:

Check valve:	▪ None, series ▪ P ▪ PV
Return stop:	▪ None, series ▪ R ▪ R1
Additional options (only for AB 1):	▪ None, tapped plug ▪ -P/JIS ▪ -P/A
Adjustment:	▪ None, fixed ▪ R ▪ V
Intermediate plate:	▪ ZA 1 ▪ ZA 2

2.4 Connection block with shut-off valve type AL

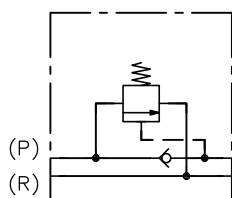
AL valves are mainly intended for control systems with hydraulic accumulators. They automatically switch the pump to circulation when the pre-set shut-off pressure is reached. This requires a minimum volume in the P line. An accumulator is ideal for this purpose; in exceptional cases a sufficiently dimensioned P line can also be used.

i INFORMATION

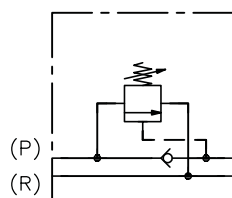
Type AL 21 is only suitable for mounting on compact hydraulic power packs of type HK(F) 4 according to [D 7600-4](#), type HK 3 according to [D 7600-3](#) and type HKL(W) according to [D 7600-3L](#).

Circuit symbol

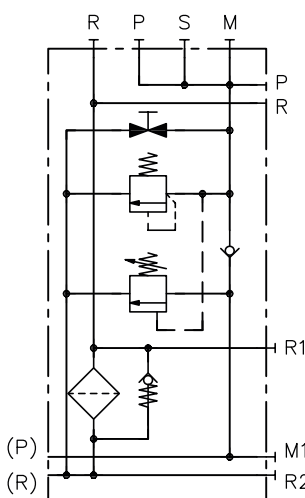
AL 11



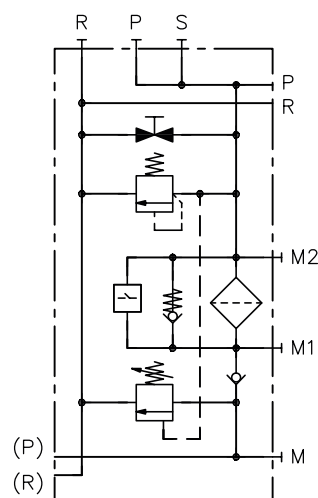
AL 12



AL 21 F



AL 21 D10(V)



Ordering example

AL 11		R	- C 250		
AL 21 F2	G1		- E 90	/100	- 7/80
AL 21 D10V			- F 50	/60	- 5/40

[2.3.2 "Pressure switches"](#)

Only type AL 21: Pressure setting with fixed pressure-limiting valve

[2.4.3 "Pressure range and pressure setting of the shut-off valve"](#)

[2.1.5 "Return stop"](#)

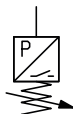
[2.4.2 "return line filter contamination indicators"](#)

[2.4.1 "Basic type"](#)

2.4.1 Basic type

Coding Shut-off valve		Ports (ISO 228-1) P, R	Max. recommended flow rate (l/min)	Note and p _{max}
Fixed	Adjustable			
AL 11	AL 12	G 1/4	12	p _{max} = 350 bar
AL 21 F 0 AL 21 F 1 AL 21 F 2 AL 21 F 3	--	G 1/4 and G 3/8 (S = G 1/2)	18	p _{max} = 350 bar, for return line filters and additional elements see 2.1.9 "Filter version" and 2.4.2 "return line filter contamination indicators"
AL 21 D 0 AL 21 D 5 AL 21 D 10 AL 21 D 51 AL 21 D 101	--	G 1/4 and G 3/8 (S = G 1/2)	18	p _{max} = 350 bar For pressure filters and additional elements see 2.1.9 "Filter version" and 2.1.10 "Filter monitoring"

2.4.2 return line filter contamination indicators

Coding	Description	Circuit symbol
Without coding	without	
G	Visual clogging indicator, straight fitting	
G1	Visual clogging indicator, angled fitting	
V	Pressure switch, switching pressure 2 bar, electrical connection, plug connection	
VM	Pressure switch, switching pressure 2 bar, electrical connection, M12x1	

2.4.3 Pressure range and pressure setting of the shut-off valve

Coding	Pressure p _{max} (bar)	
	AL 11(12)	AL 21
C	240 ... 350	200 to 350
D	130 ... 250	130 to 220
E	60 ... 140	80 ... 140
F	--	40 ... 80

2.5 Spacer plates and connection blocks for direct pipe connection

2.5.1 Spacer plates

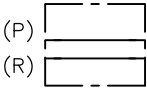
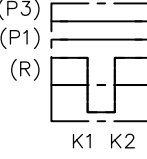
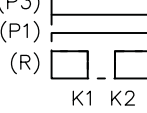
The spacer plates U increase the distance between the hydraulic power pack and the valve bank. Some of them integrate additional functions. Connection blocks to [Chapter 2.1](#) are mounted depending on the version.

Ordering example

U - AB 1 K P R X C180 R - ZA 1/...

Basic type

Basic type

Coding	Description	Ports (ISO 228-1)	Circuit symbol
		K1, K2	
U	40 mm spacer plate for mounting connection blocks to Chapter 2.1 Attachment to the hydraulic power pack by screws with M6- or M8 threads	--	
U1	60 mm spacer plate for mounting connection blocks to Chapter 2.1 Attachment to the hydraulic power pack by screws with M6- or M8 threads	--	
U3	80 mm spacer plate for mounting connection blocks to Chapter 2.1 Attachment to the hydraulic power pack by screws with M6- or M8 threads	--	
U5	40 mm spacer plate with connection option for an external cooler as well as a connecting plate for the cooler connections. Facility for mounting connection blocks to Chapter 2.1	G 1/2"	
U5X	as for U5 but without a connecting plate for the cooler connections	G 1/2"	

2.5.2 Connection blocks for direct pipe connection

If the connection blocks to [Chapter 2.1](#) are to be used for a piped connection, the piping connection blocks C15 or C16 can be used.

Ordering example

C16 - AB 1 K P R X C180 R - ZA 1/...

Basic type

Basic type

Coding	Description	Ports (ISO 228-1)	Circuit symbol
		P, R	
C15	Connection block for pipe connector	G 1/4"	
C16		G 3/8"	

2.6 Hydraulic power pack

Coding	Hydraulic power pack
-INKA 1	INKA to D 8132-1
-KA 2	KA 2 to D 8010
-KA 4	KA 4 to D 8010-4
-MPN	MPN to D 7207
-HK	HK 3 to D 7600-3 and HK 4 to D 7600-4
-HKL	HKL to D 7600-3L
-HC	HC to D 7900
-LP	LP to D 7280

i INFORMATION

Only for individual delivery without hydraulic power pack: Selection of the hydraulic power pack is necessary for suitable screw selection. Screw set not included in scope of delivery.

3 Parameters

3.1 General data

Designation	Connection block with/without pressure-limiting valve with component approval
Design	Valve combination
Model	Manifold mounting valve
Material	Surface electrogalvanised Zn/Ni
Installation position	Any
Hydraulic fluid	Hydraulic fluid, according to DIN 51524 Parts 1 to 3; ISO VG 10 to 68 according to DIN ISO 3448 Viscosity range: 4 - 1500 mm ² /s Optimal operating range: approx. 10 - 500 mm ² /s Also suitable for biologically degradable hydraulic fluids type HEPG (polyalkylene glycol) and HEES (synthetic ester) at operating temperatures up to approx. +70°C.
Cleanliness level	ISO 4406 21/18/15...19/17/13
Temperatures	Environment: approx. -40 to +80 °C, hydraulic fluid: -25 to +80 °C, pay attention to the viscosity range. Start temperature: down to -40 °C is permissible (take account of the start viscosities!), as long as the steady-state temperature is at least 20 K higher during subsequent operation. Biologically degradable hydraulic fluids: note manufacturer specifications. With consideration for the seal compatibility, not above +70°C.

3.2 Weight

Connection block	Type AB 1 = 1.3 kg AB 1 K = 0.75 kg
Connection block with shut-off valve	Type AL 11, AL 12, AL 21 = 1.7 kg AL .. with F 0, F 1, F 2 = 4.9 kg AL .. with F 3 = 5.2 kg AL .. with D 0 = 4.1 kg AL .. with D 10 = 6.2 kg
Intermediate plates	Coding ZA 1, ZA 2 = 0.4 kg

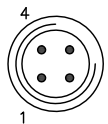
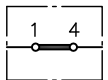
Connection blocks for pipe connection	Coding	
	C15, C16	= 0.2 kg
Spacer plates	Coding	
	U	= 0.65 kg
	U1	= 1.0 kg
	U3	= 0.15 kg
	U5	= 0.5 kg
	U5X	= 1.7 kg
	UF	= 2.5 kg
	UD	= 2.2 kg
Filter	Coding	
	F 1	= 0.4 kg
	F 2	= 0.4 kg
	F 3	= 0.7 kg
	D 5	= 2.2 kg
	D 10	= 2.2 kg
	D 51	= 2.2 kg
	D 101	= 2.2 kg

3.3 Versions with filter

3.3.1 Versions with return line filter

Attachment	Central thread 3/4-16 UNF	
Filter material	Impregnated paper	
Filter area (reference value)	Coding	Filter area (cm²)
	F 0	637
	F 1	1230
	F 2	1900
	F 3	3190
	F 31	2720

Return line filter monitoring

Coding	V1, VM1
Setting of the pressure switch	p = 2.1 bar
Electrical switch	N/C contact
Switching capacity	max. 100 W
Switching voltage	max. 42 V DC
Electrical connection	V1: VM1: Plug connection M12x1 ▪ V1: Plug connection ▪ VM1: M12x1
Protection class	IP 65 (with cap)
Housing	Electrogalvanised (Fe/Zn12cC)
Mechanical lifetime	10 ⁶ switching cycles
Switching frequency	200/min
Circuit diagrams	 

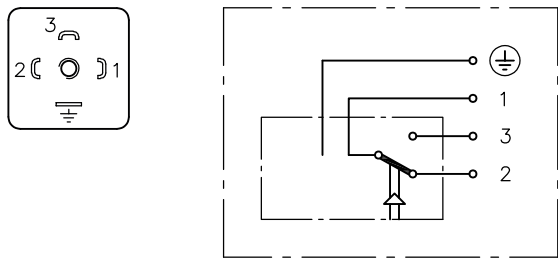
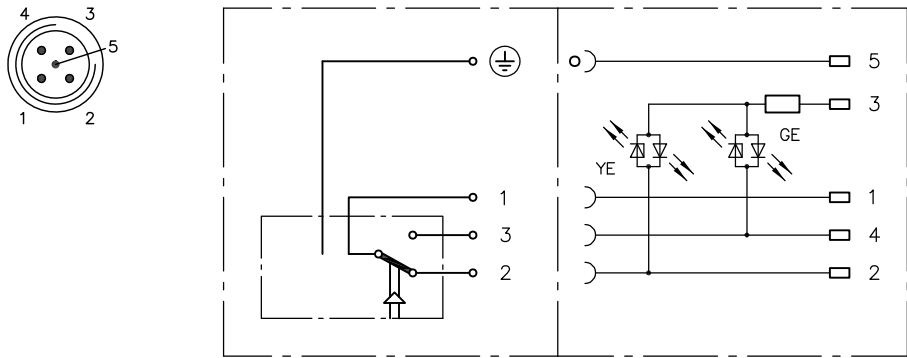
Optical filter monitoring of the return line filter

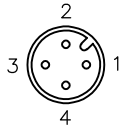
Coding	G1, G2
	During operation of the system, if the indicator moves into the red field, this signals maintenance of the filter element.
Display range	0 ... 6 bar
Display for filter maintenance	2 bar
Permissible pressure peaks	10 bar
Circuit diagrams	

3.3.2 Versions with pressure filter

Pressure filter monitoring

Coding	VA1, VV1
Differential pressure switch	p = 2 or 5 bar

Coding	VE1, VEM1
Differential pressure switch	p = 2 or 5 bar
Switching current (ohmic load)	max. 4 A
Switching voltage	24 V DC
Electrical connection	▪ VE1: EN 175 301-803 A ▪ VEM1: M12x1
Circuit diagrams	VE1  VEM1 

Coding	VI02
Differential pressure switch	1. Switching point at 75% of the display pressure (normally open contact) 2. Switching point at 100% of the display pressure (normally closed contact)
Switching voltage	18 – 30 V DC
Switching current	< 100 mA
Electrical connection	M12x1
Circuit diagrams	 PIN 1 +24 V DC PIN 2 Switch output 2 – 100% PIN 3 GND PIN 4 Switch output 1 – 75% and IO-Link

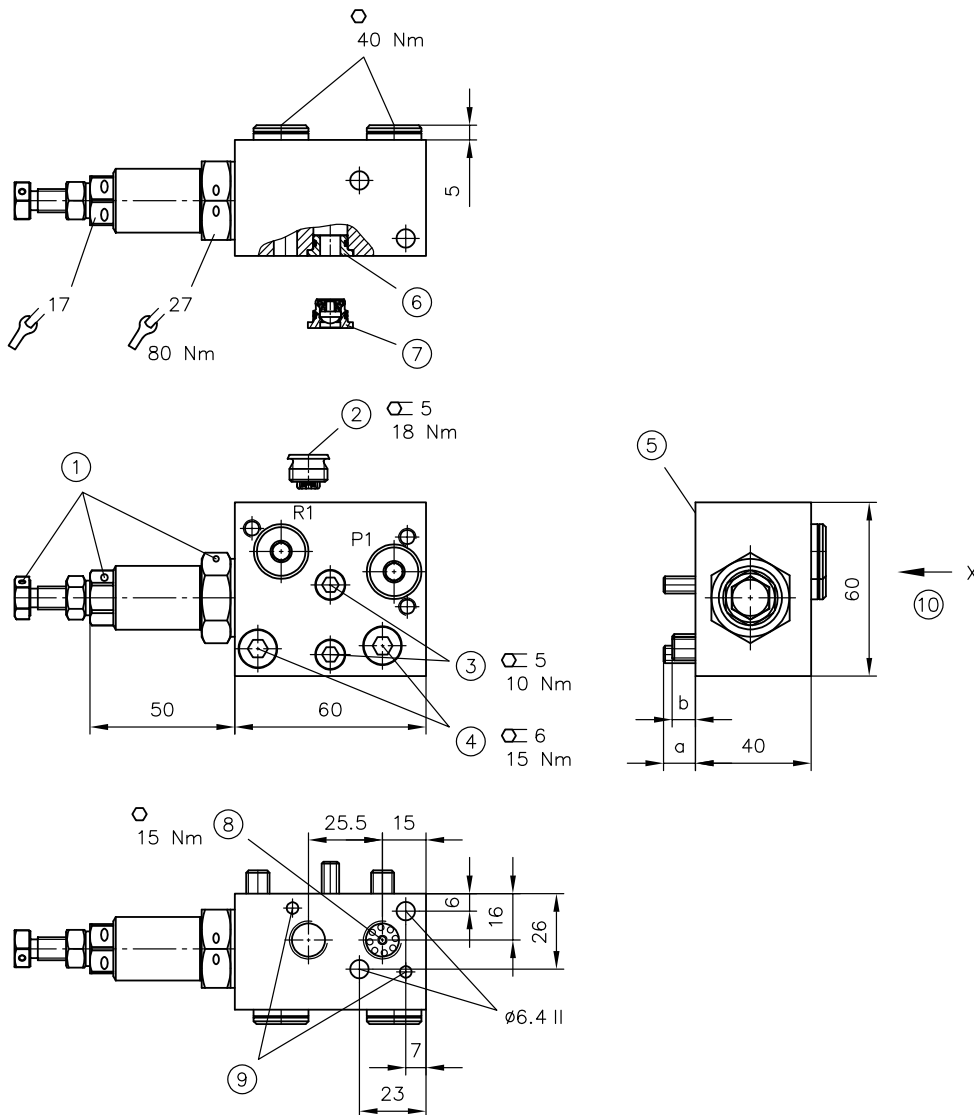
i INFORMATION

PIN 4 can be used as switch output or IO-Link.

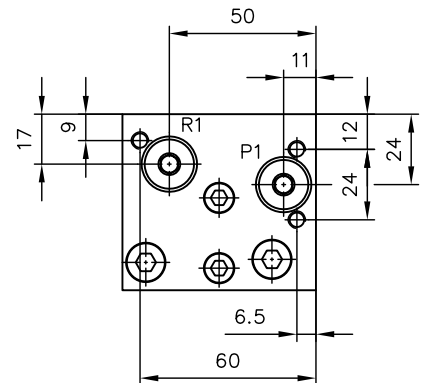
All dimensions in mm, subject to change.

The spacing of the connection base to which the connection blocks are screwed is important. This can be found in the respective publications on the compact hydraulic power packs.

4.1 Connection block type AB 1



View X



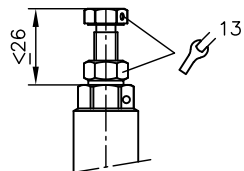
- 1 Sealing option
- 2 For type AB 1 R(R1) - return stop R
- 3 Cylinder screw M6x **c**-8.8-A2K (ISO 4762)
- 4 Cylinder screw M8x **d**-8.8-A2K (ISO 4762)
- 5 Flange surface for mounting on pump unit
- 6 For type AB 1 (standard) insert reducer complete
- 7 For type AB 1 PV - insert check valve, material number 3012 8035-00
- 8 For type AB 1 P - check valve type RK 1
- 9 Centring pin
- 10 See view X

Type	a	b	c	d
MP	6	--	40	--
C15, C16	11	--	45	--
HC, KA2	11	8	45	40
KA4	11	13	45	45
HK, MPN	16	13	50	45

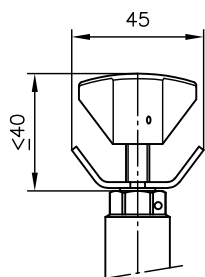
Ports (ISO 228-1)	
P1, R1	G 1/4

Adjustment

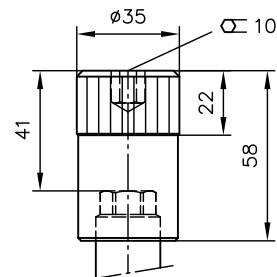
fixed



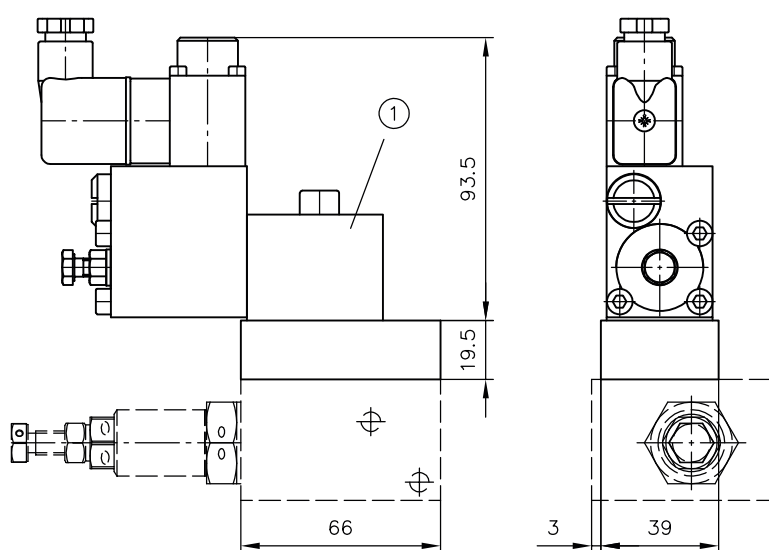
Coding R



Coding V

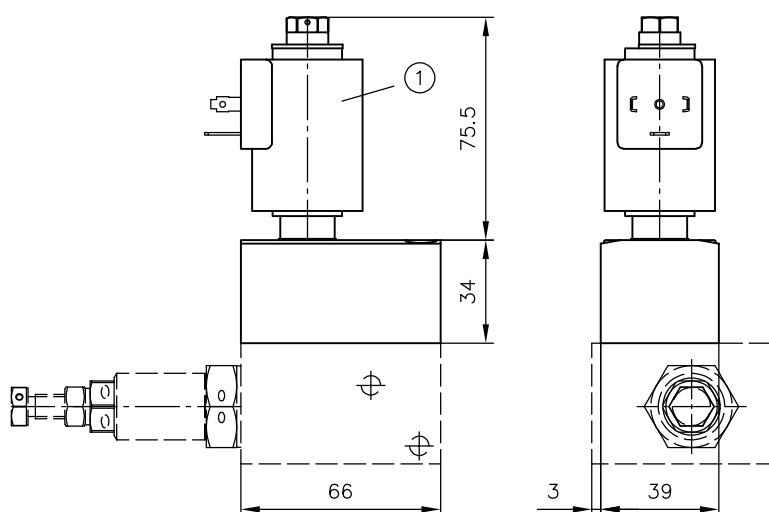


4.1.1 Connection block type AB 1 with proportional pressure-limiting valve type PMVP 4



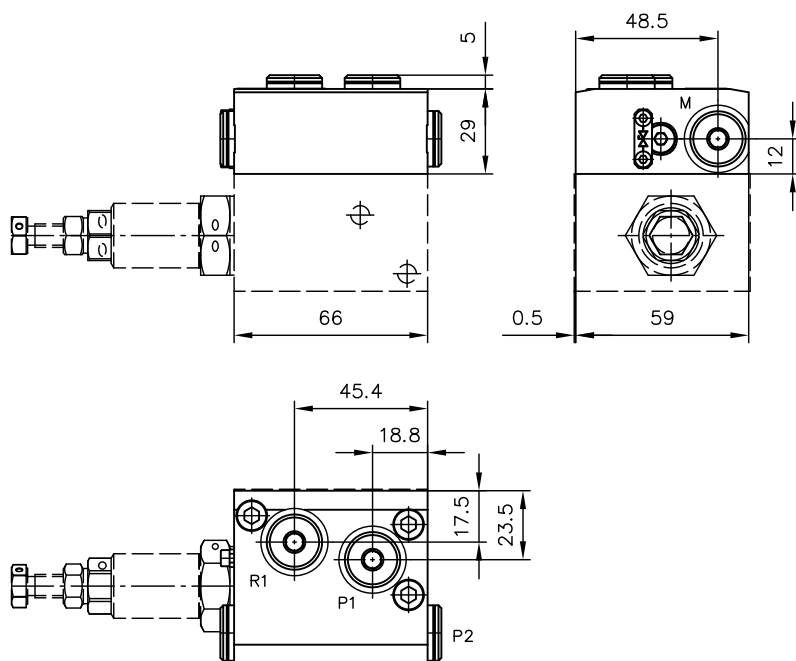
1 Proportional pressure-limiting valve type PMVP 4 according to [D 7485/1](#)

4.1.2 Connection block type AB 1 with idle circulation valve type EM 21

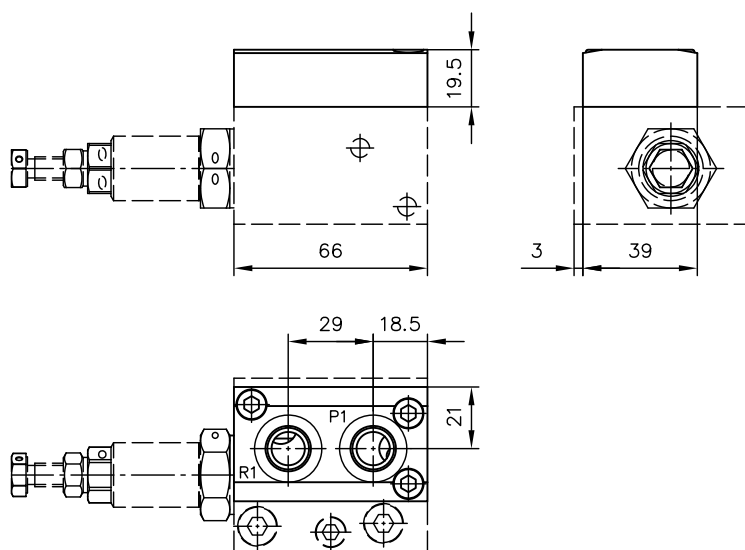


1 Directional seated valve according to [D 7490/1](#)

4.1.3 Connection block type AB 1 with adapter plate P→A

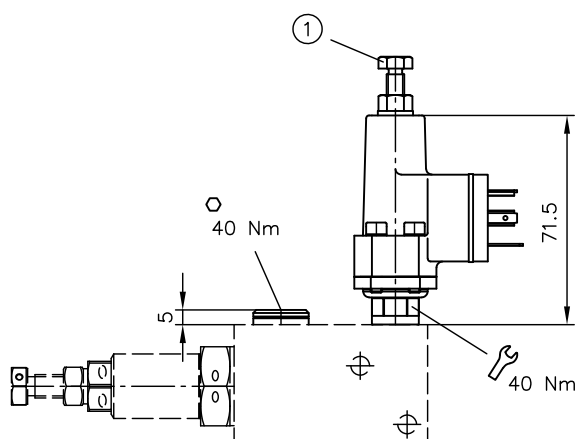


4.1.4 Connection block type AB 1 with adapter plate JIS



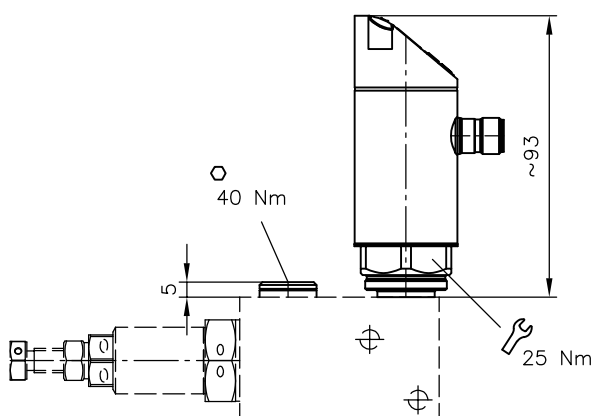
4.1.5 Connection block type AB 1 with pressure switch

Coding 3 ... 8

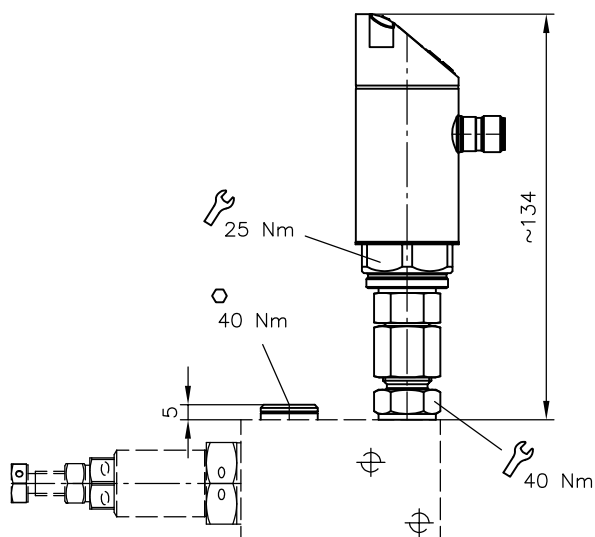


1 Pressure switch adjustment according to [D 5440](#)

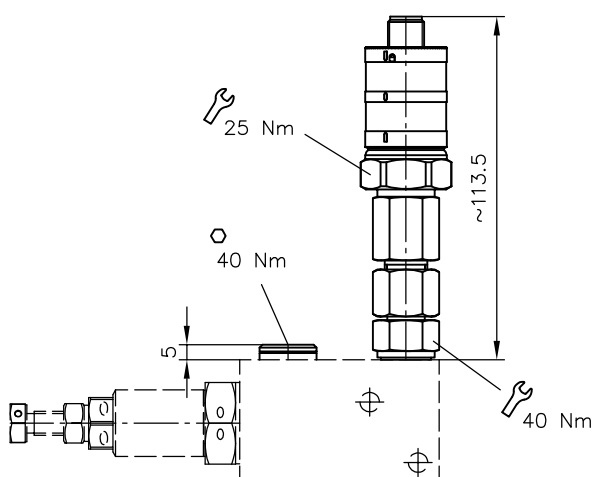
Coding 51 EA1 ... 51 EA6



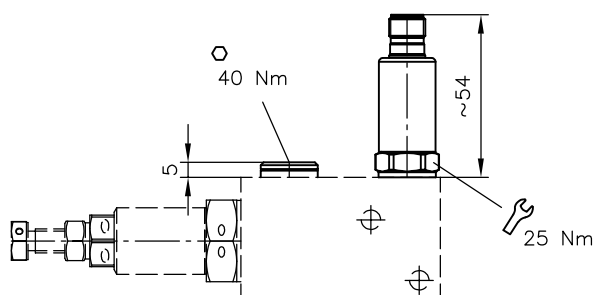
Coding 51 EI1 ... 51 EI6



Coding 6 E(R)1 ... 6 E(R)4

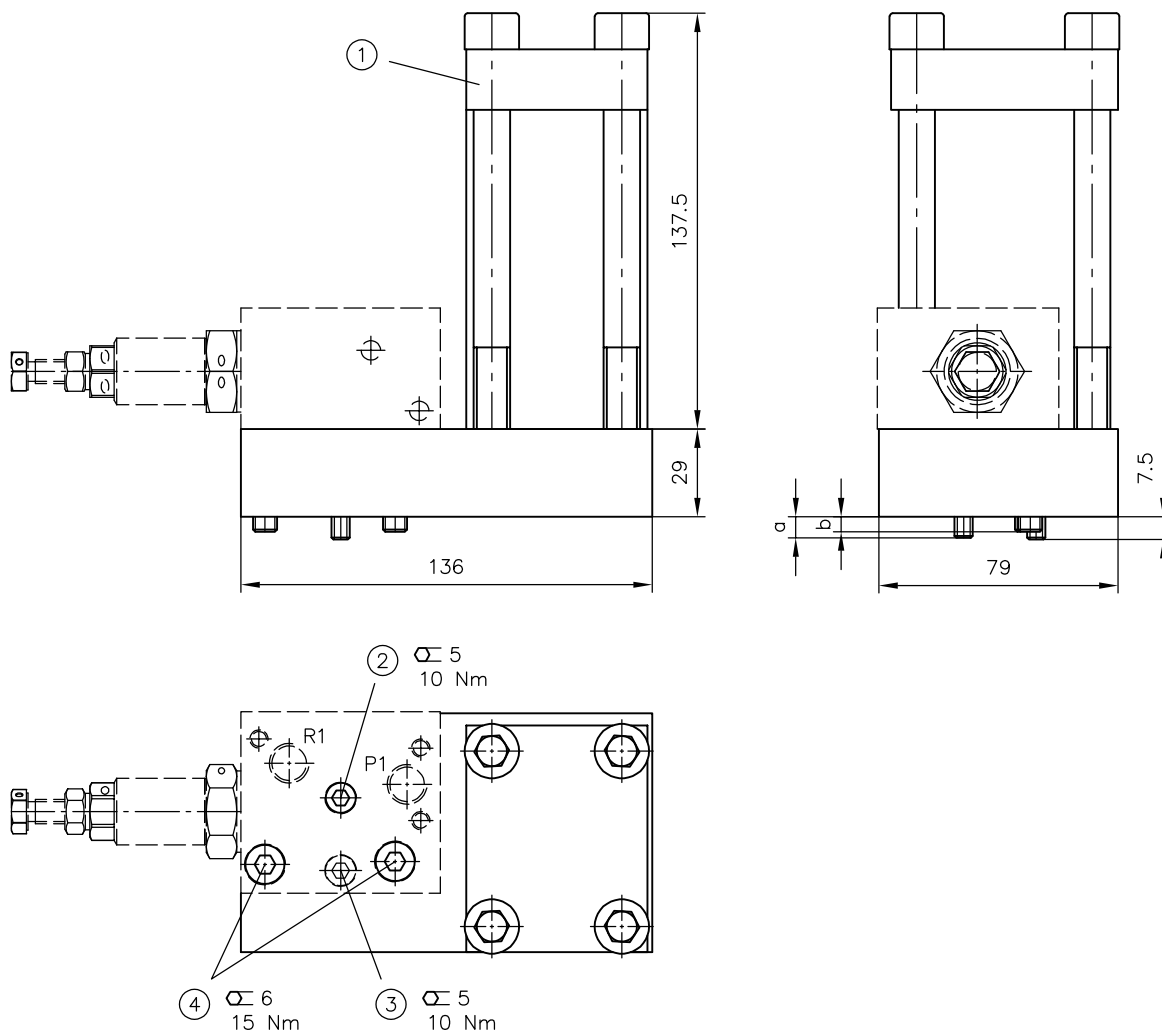


Coding 7 E1 ... 7 E4



4.1.6 Connection block type AB 1 with pressure filter

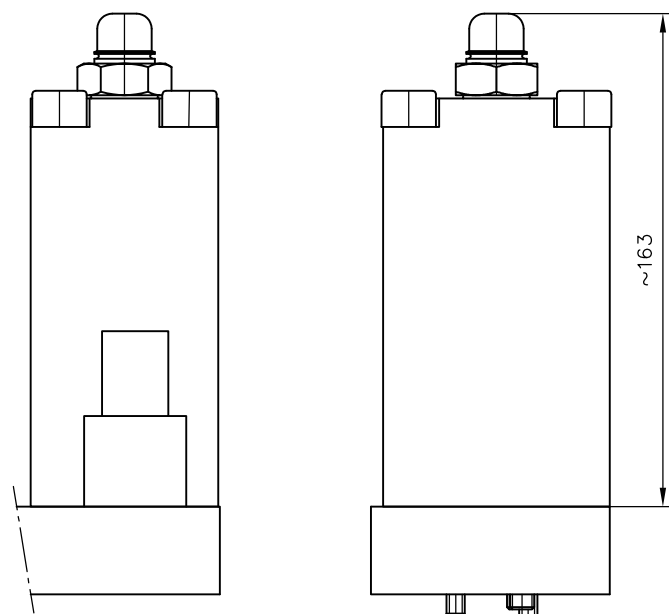
Intermediate plate with pressure filter UD



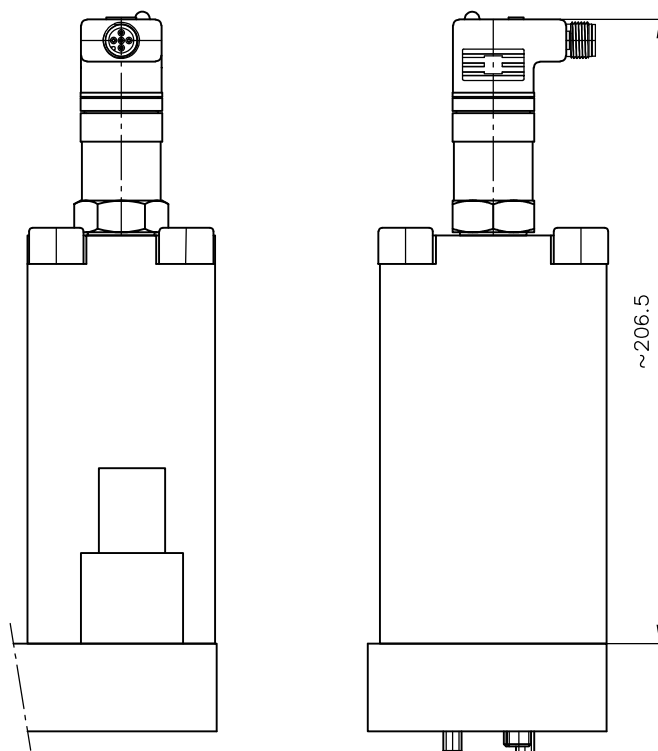
- 1 Pressure filter, without coding
- 2 Cylinder screw M6x c-8.8-A2K (ISO 4762)
- 3 Cylinder screw M6x30-8.8-A2K (ISO 4762)
- 4 Cylinder screw M8x d-8.8-A2K (ISO 4762)

Type	a	b	c	d
C15, C16	7	--	70	--
INKA, KA2	7	5	70	70
KA4, HK, MPN	12	10	75	75

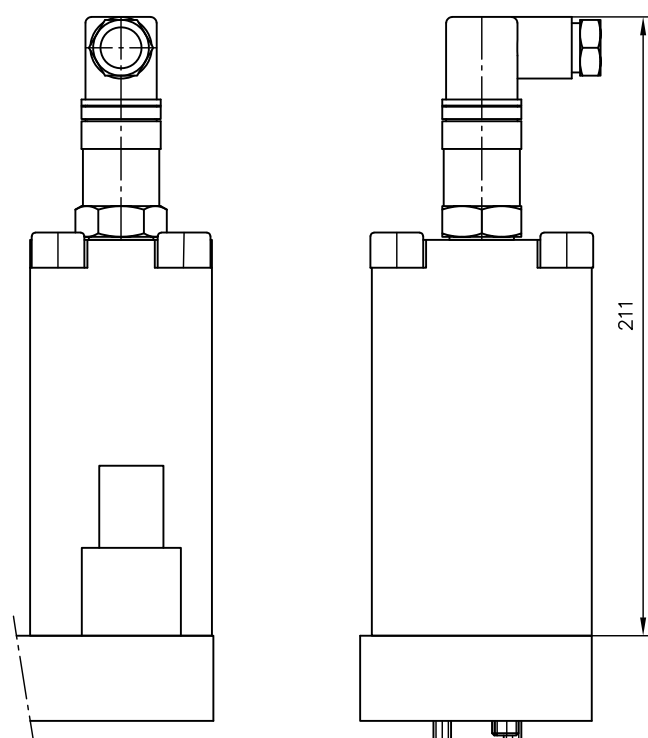
Coding **VA1 and VV1**



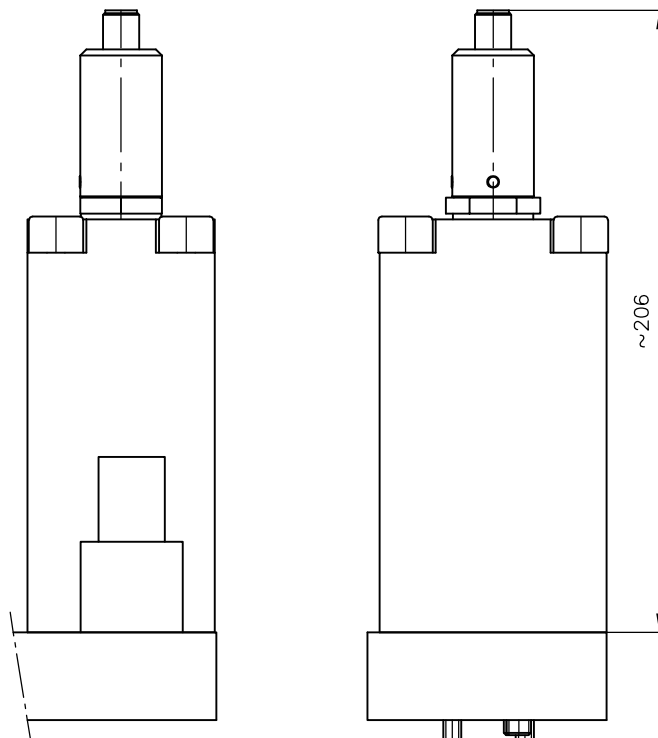
Coding **VEM1**



Coding **VE1**

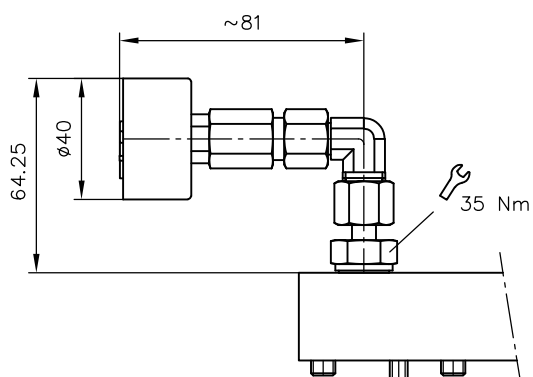


Coding **VI02**

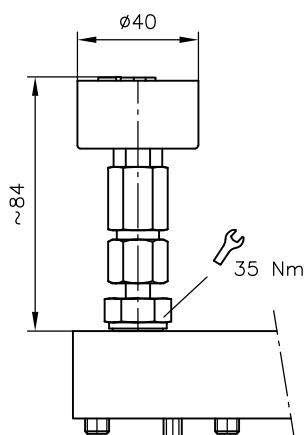


Visual clogging indicator

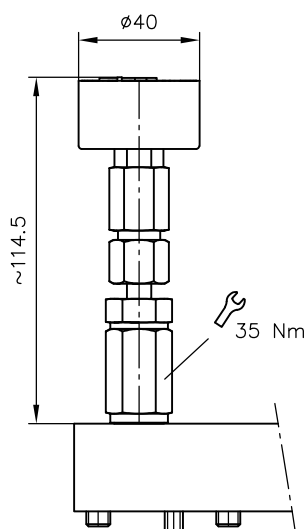
Coding **G1**



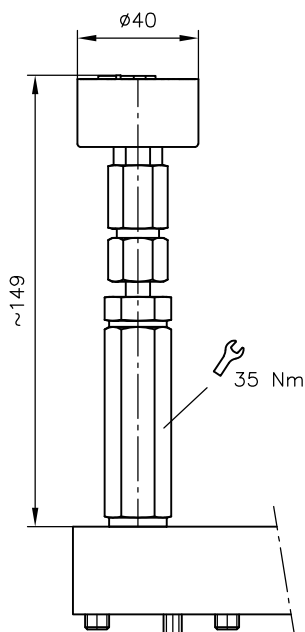
Coding **G2**



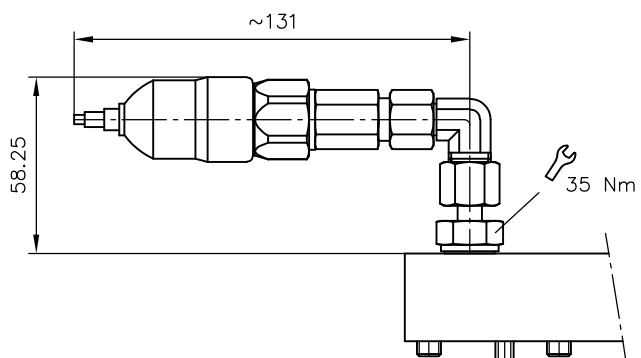
Coding **G3**



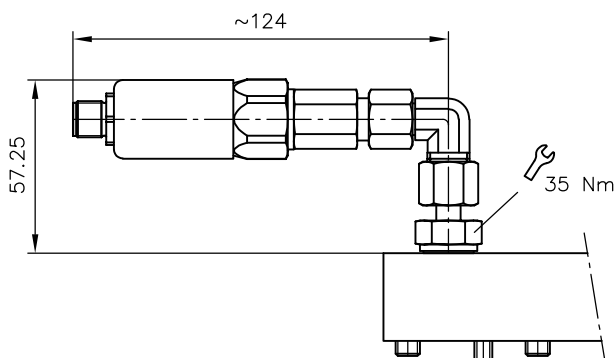
Coding **G4**



Coding **V1**

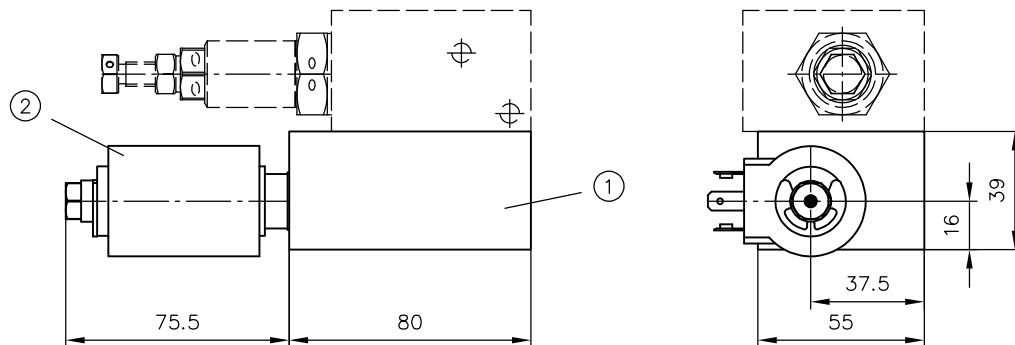


Coding **VM1**



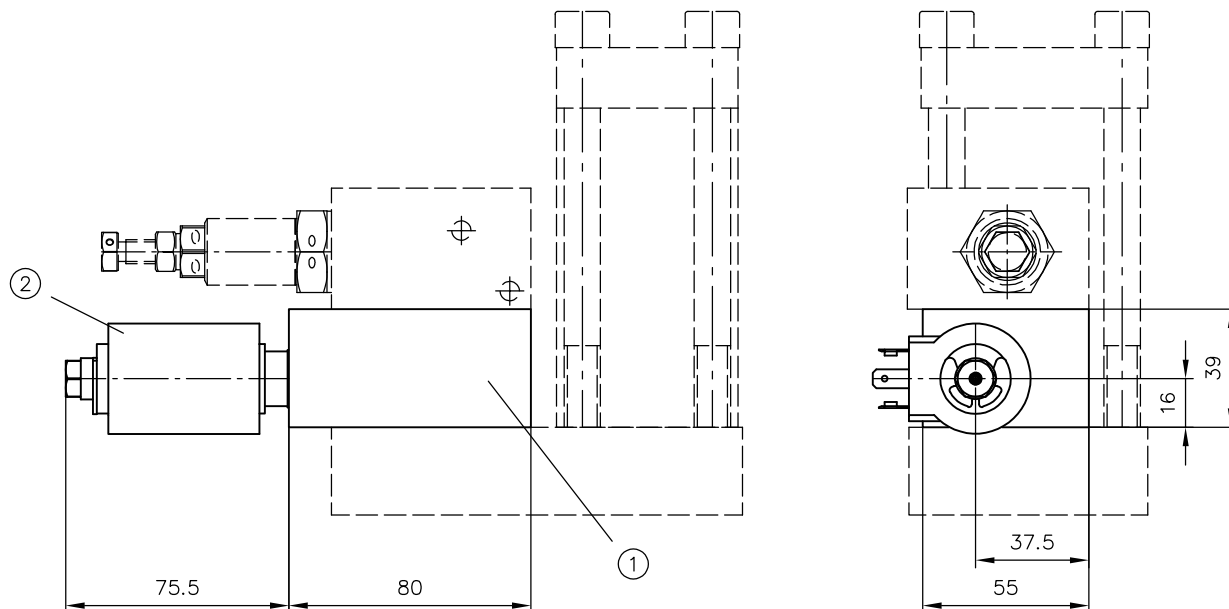
4.1.8 Intermediate plate type U(V) with idle circulation valve type EM 21

U/EM21 - AB 1



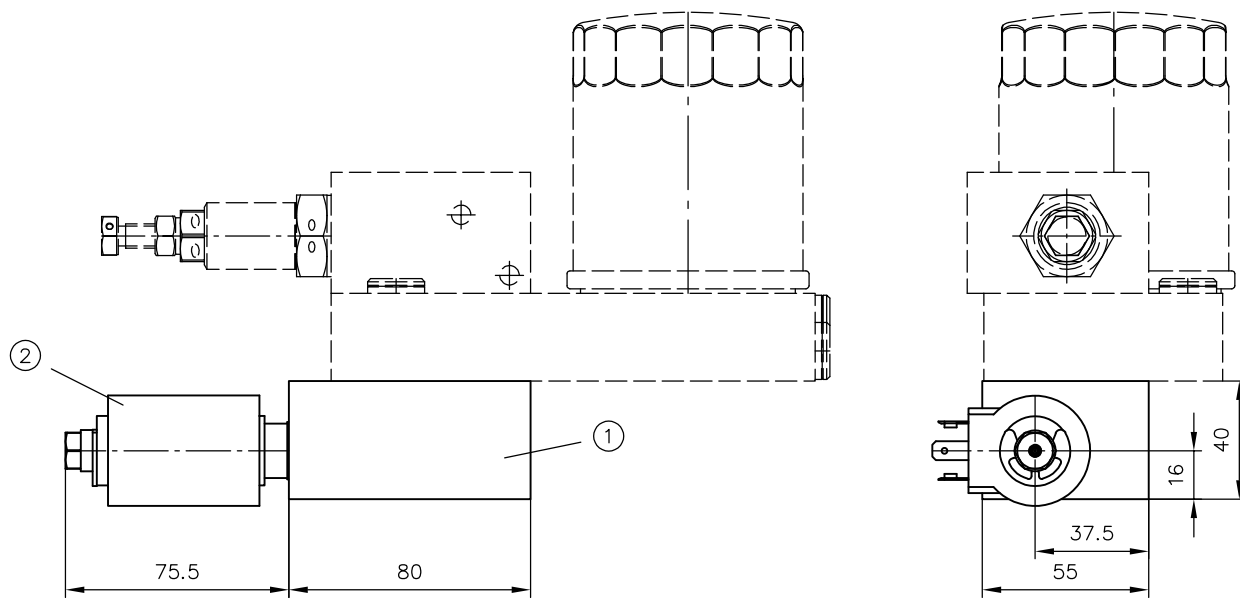
- 1 Intermediate plate U(V)/EM21
- 2 Directional seated valve according to [D 7490/1](#)

UD10 - U/EM21 - AB 1



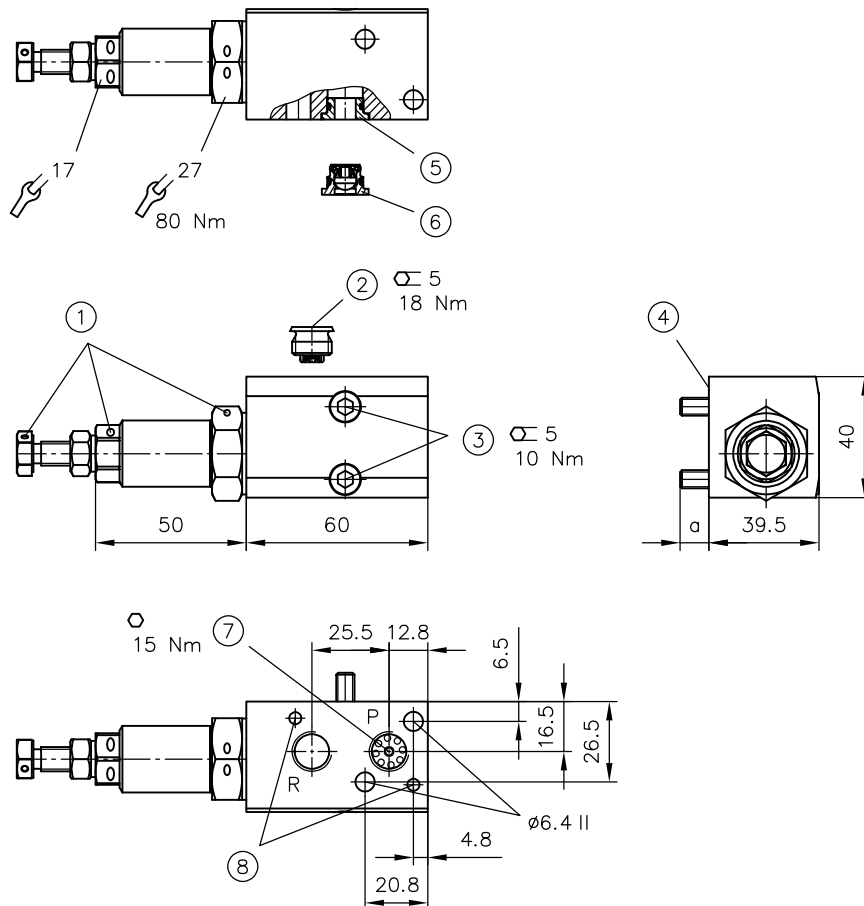
- 1 Intermediate plate U(V)/EM21
- 2 Directional seated valve according to [D 7490/1](#)

UV/EM21 - UF1 - AB 1



- 1 Intermediate plate U(V)/EM21
- 2 Directional seated valve according to [D 7490/1](#)

4.2 Connection block type AB 1 K

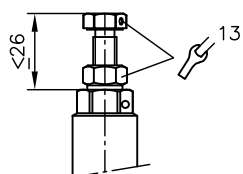


- 1 Sealing option
- 2 For type AB 1 K R(R1) - return stop R
- 3 Cylinder screw M6x b-8.8-A2K (ISO 4762)
- 4 Flange surface for mounting on pump unit
- 5 For type AB 1 K (standard) insert reducer complete
- 6 For type AB 1 K PV - insert check valve, material number 3012 8035-00
- 7 For type AB 1 K P - check valve
- 8 Centring pin

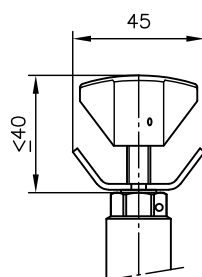
Type	a	b
INKA1, KA2, KA4, C15, C16	9,5	40
HK, MPN	14,5	45
Ports (ISO 228-1)		
P, R	G 1/4	

Adjustment

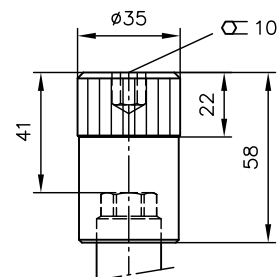
Fixed



Coding R

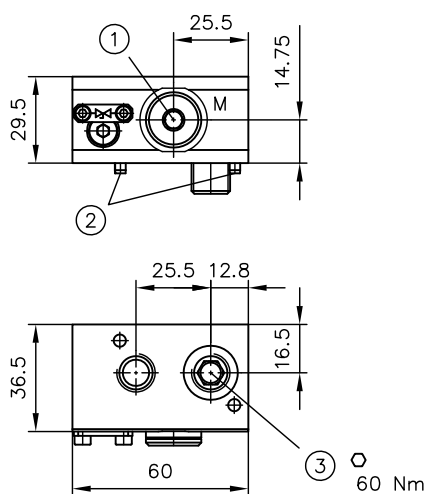


Coding V



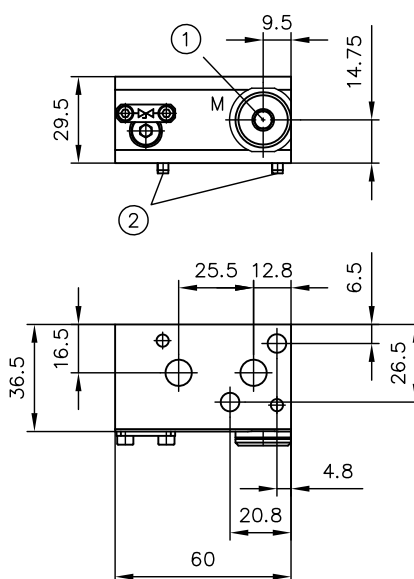
4.3 Intermediate plate type ZA with pressure switches

Coding **ZA1**



- 1 Tapped plug, without coding
- 2 Roll pin 4x8 (ISO 8748)
- 3 banjo bolt

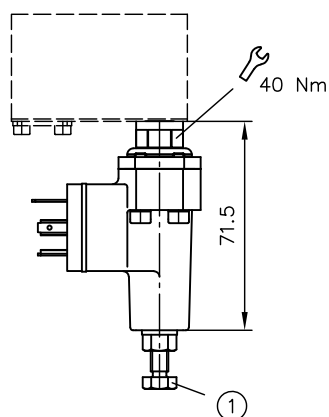
Coding **ZA2**



- 1 Tapped plug, without coding
- 2 Roll pin 4x8 (ISO 8748)

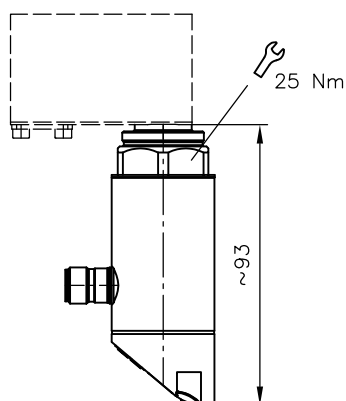
Pressure switches

Coding **3 ... 8**

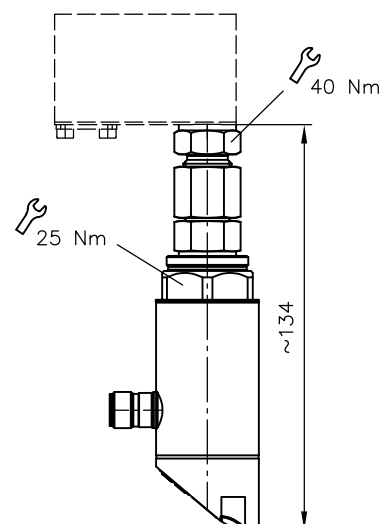


- 1 Pressure switch adjustment according to [D 5440](#)

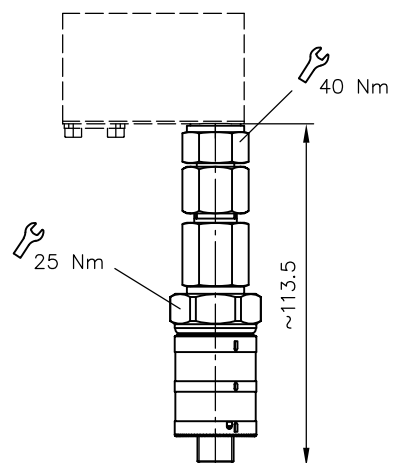
Coding **51 EA1 ... 51 EA6**



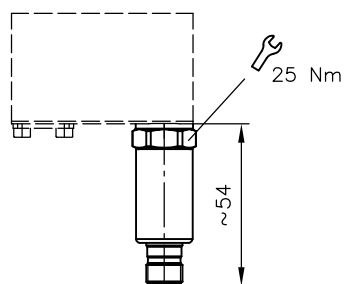
Coding **51 EI1 ... 51 EI6**



Coding 6 E(R)1 ... 6 E(R)4

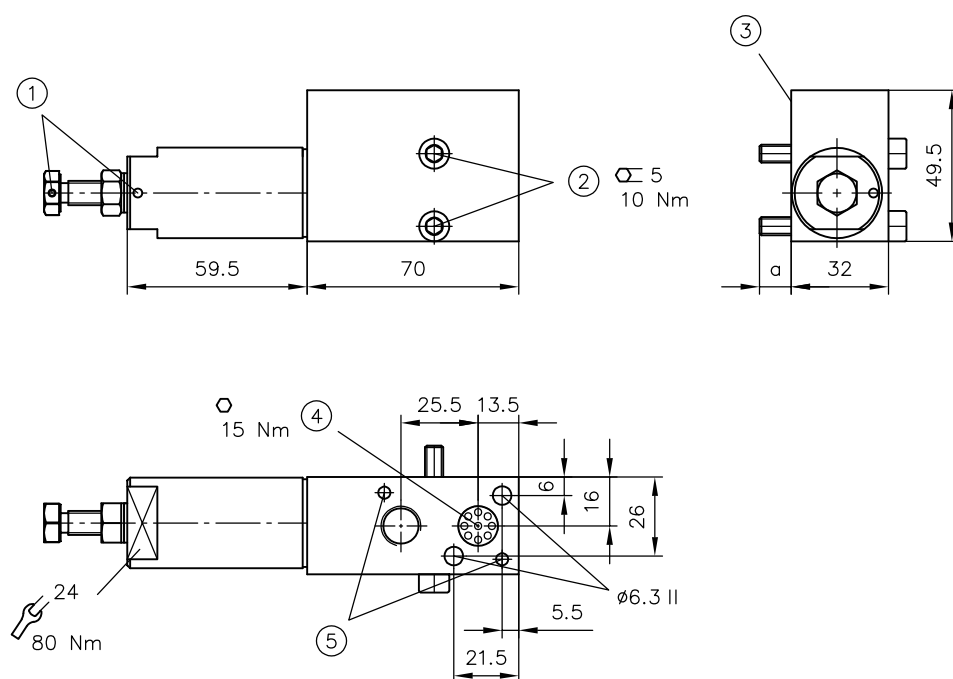


Coding 7 E1 ... 7 E4



4.4 Connection block with shut-off valve type AL

4.4.1 Type AL 11 and AL 12

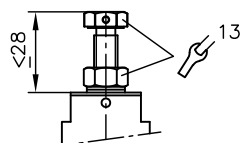


- 1 Sealing option
- 2 Cylinder screw M6x b-8.8-A2K (ISO 4762)
- 3 Flange surface for mounting on pump unit
- 4 Check valve type RK 1
- 5 Centring pin

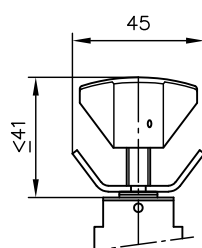
Type	a	b
INKA1, HK, KA, MPN	13	45

Adjustment

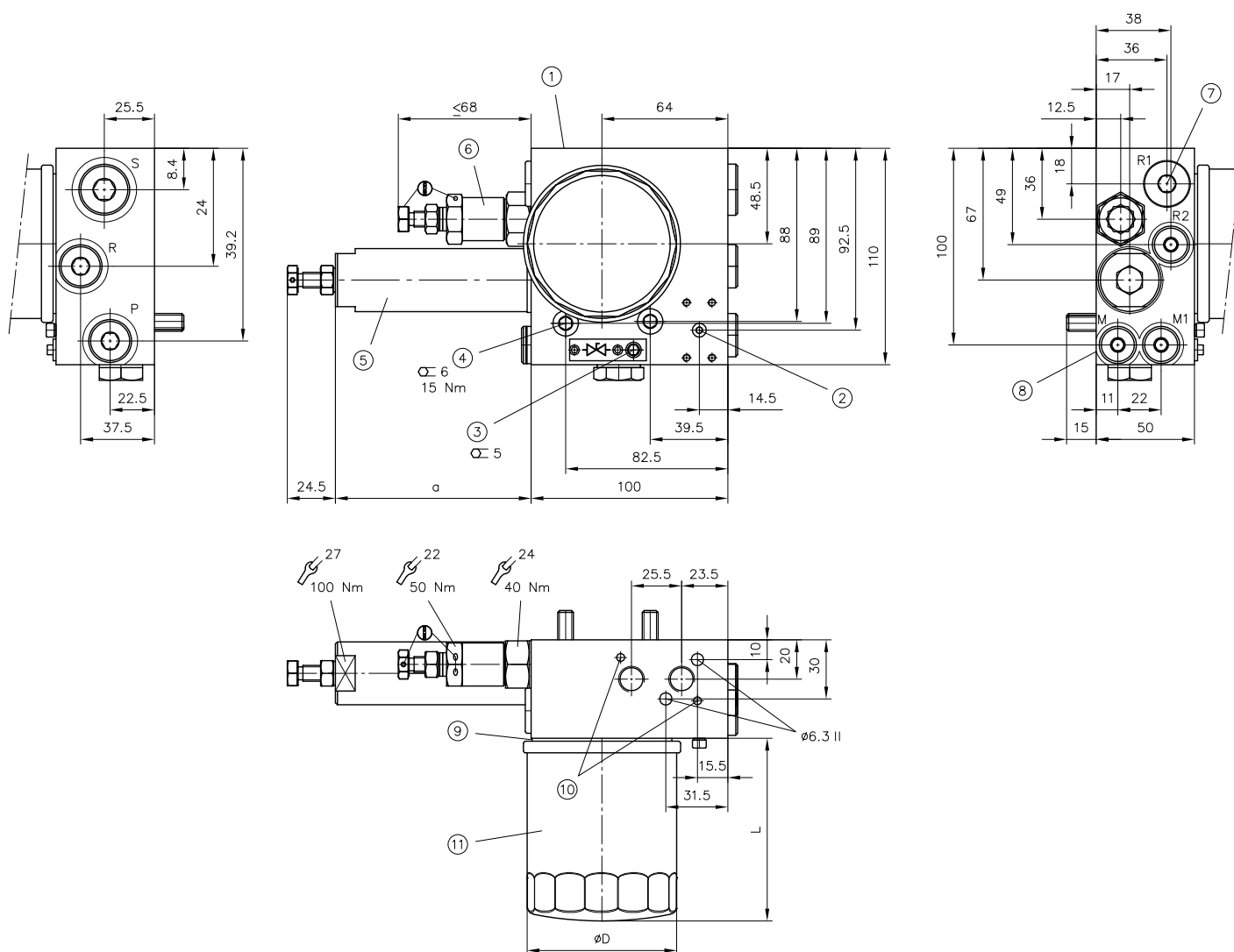
Fixed



Coding R



4.4.2 Type AL 21 F (with return line filter)



- 1 Mounting option for directional valve banks
- 2 Prepared for pressure switch
- 3 Drain valve
- 4 Cylinder screw M8x55-8.8-A2K (ISO 4762)
- 5 Shut-off valve
- 6 Pressure-limiting valve type CMVX 2 according to [D 7710 TUV](#)
- 7 Position for visual clogging indicator
- 8 Flange surface for mounting on pump unit
- 9 Lightly oil seal when changing filter
- 10 Centring pin
- 11 Return line filter F0 to F31

Return line filter

Coding	L	ØD
F 0	61	76
F 1	93	76
F 2	123	76
F 3	142	93
F 31	144	93

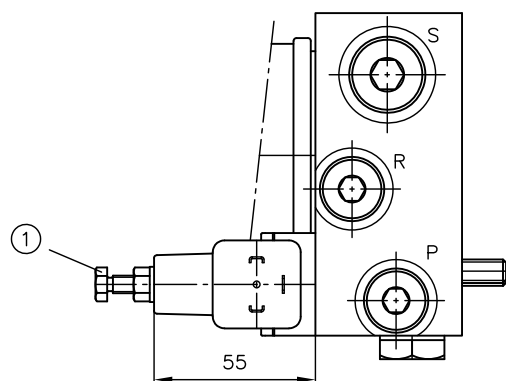
Pressure range

Coding	a
D, E, F	99,5
C	120,5

	Ports (ISO 228-1)
S	G 1/2
P, R	G 3/8
M, M1	G 1/4
R, R1	M18x1.5

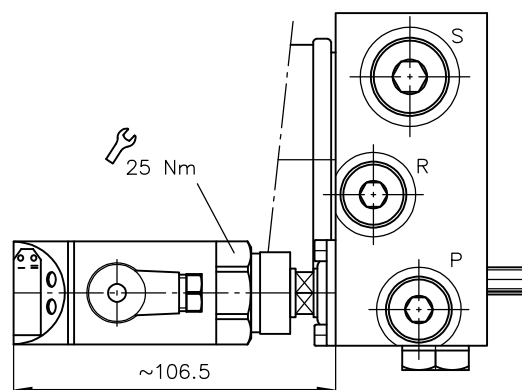
Pressure switches

Coding 3 ... 8



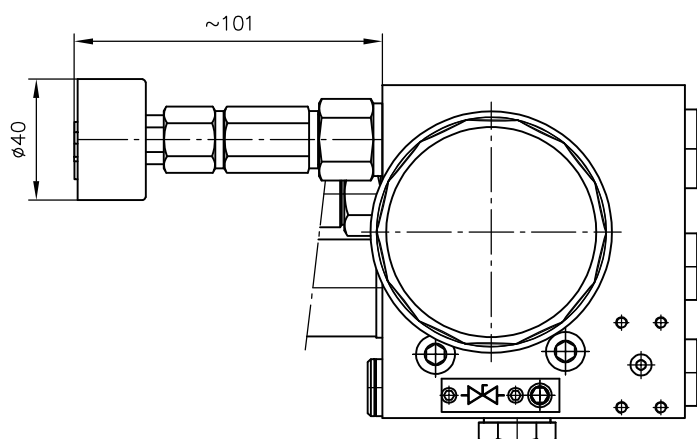
1 Pressure switch adjustment according to [D 5440](#)

Coding 5 E1 ... 5 E6

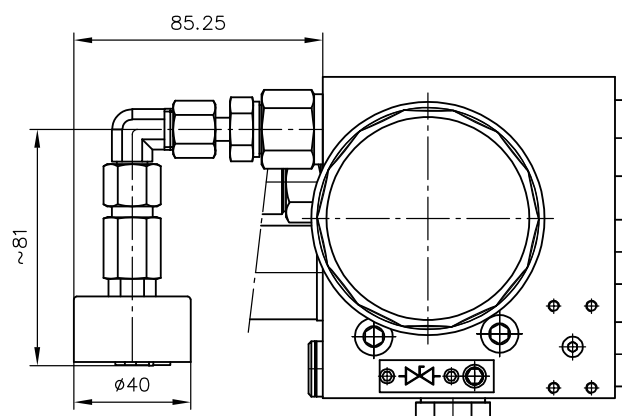


Visual clogging indicator

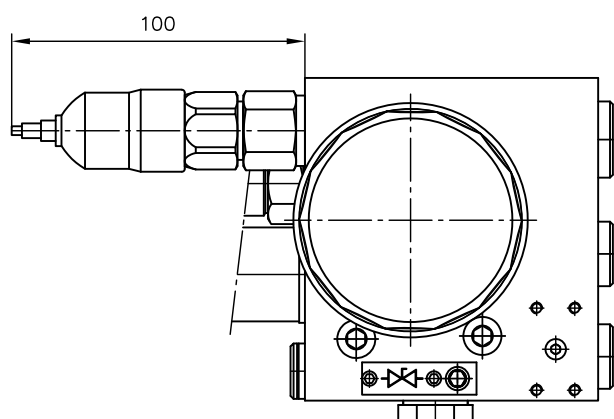
Coding G



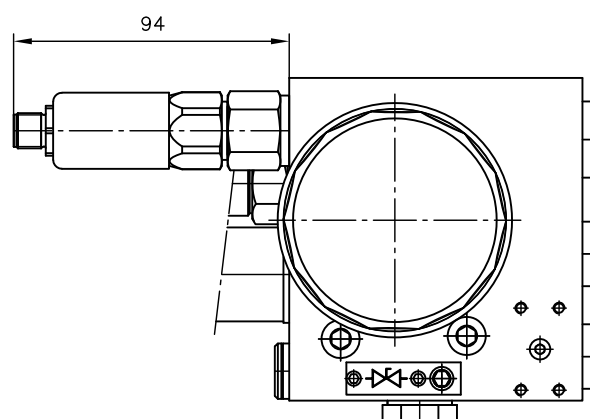
Coding G1



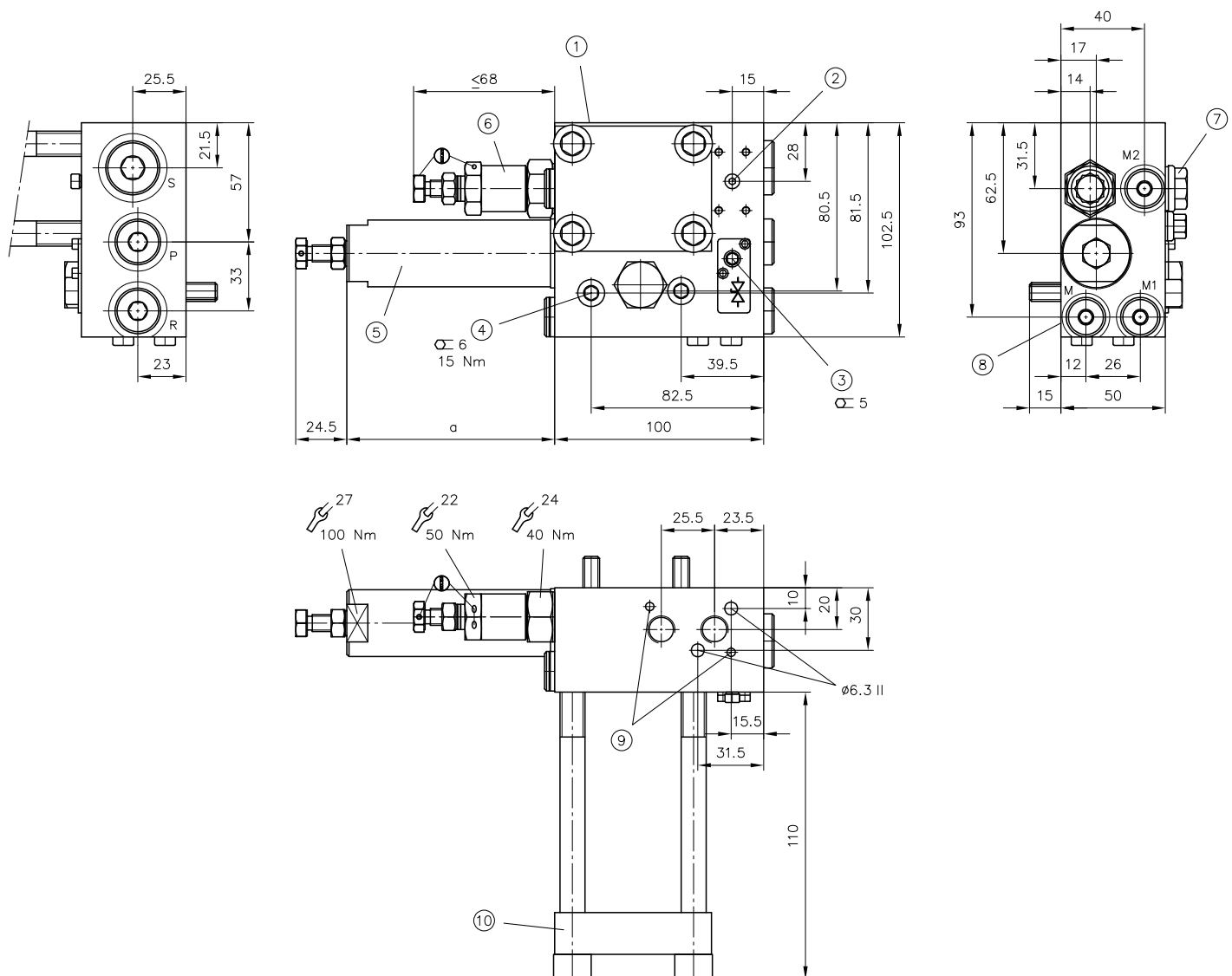
Coding V



Coding VM



4.4.3 Type AL 21 D (with pressure filter)



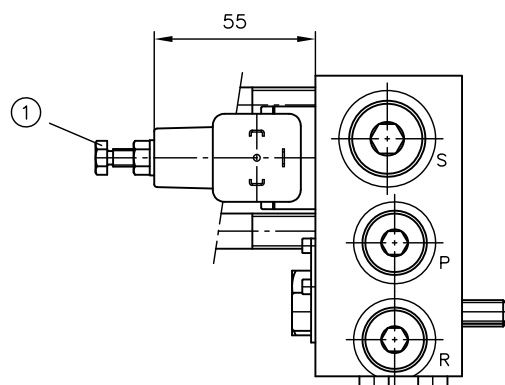
- 1 Mounting option for directional valve banks
- 2 Prepared for pressure switch
- 3 Drain valve
- 4 Cylinder screw M8x65-8.8-A2K (ISO 4762)
- 5 Shut-off valve
- 6 Pressure limitation type CMVX according to [D 7710 TUV](#)
- 7 Version without pressure filter (coding D0)
- 8 Flange surface for mounting on pump unit
- 9 Centring pin
- 10 Pressure filters

Pressure range

Coding	a
D, E, F	99,5
C	120,5

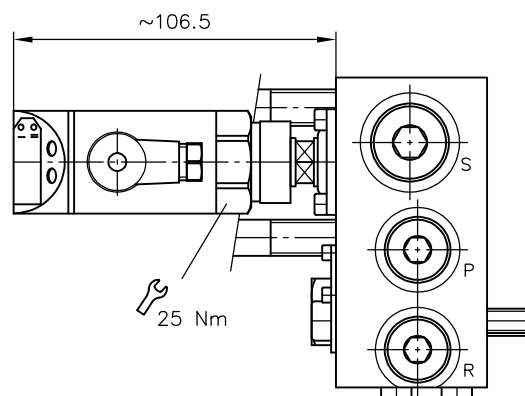
Pressure switches

Coding 3 ... 8



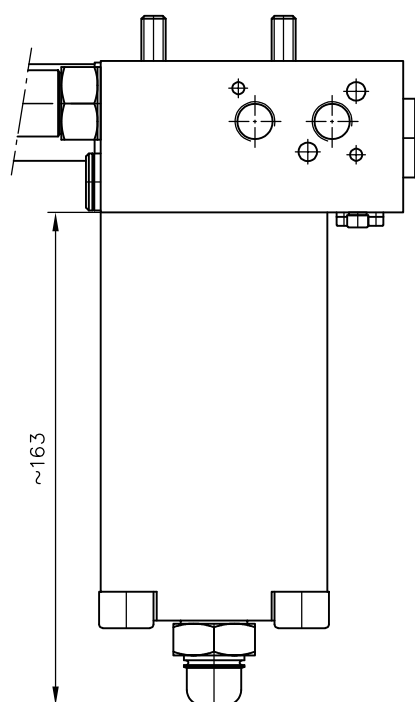
1 Pressure switch adjustment according to [D 5440](#)

Coding 51 EA1 ... 51 EA6

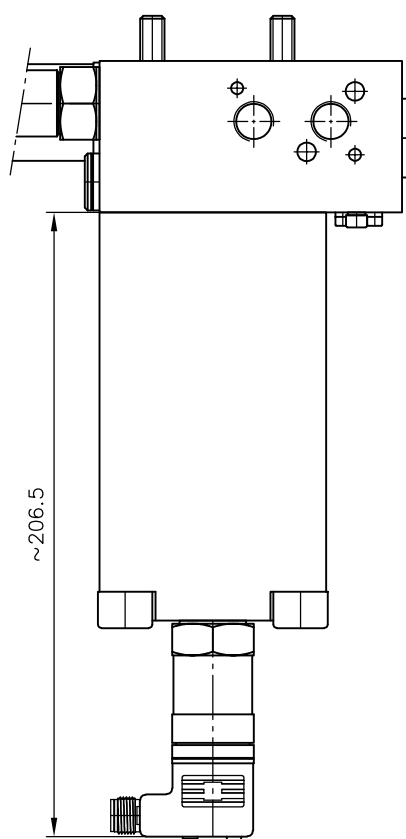


Pressure filters

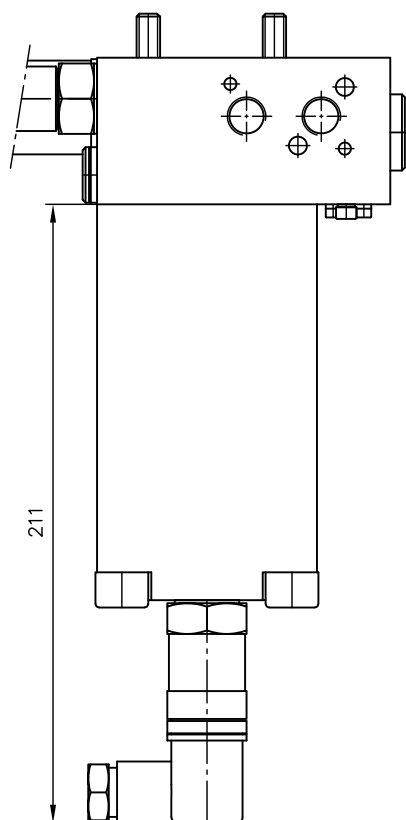
Coding VA1 and VV1



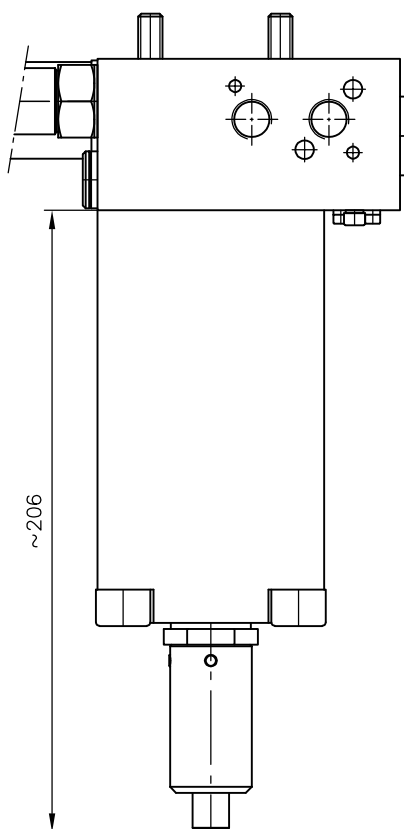
Coding VEM1



Coding **VE1**



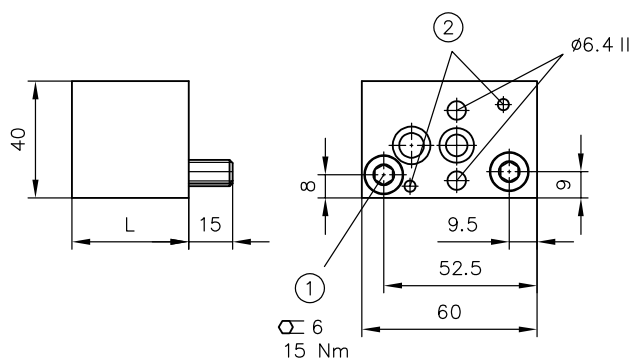
Coding **VI02**



4.5 Spacer plates and connection blocks for direct pipe connection

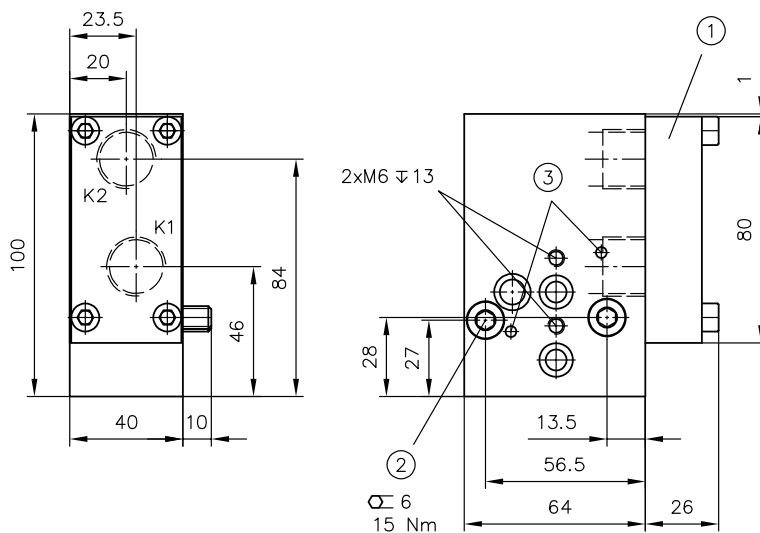
4.5.1 Spacer plates

Coding **U, U1, U3**



- 1 Cylinder screw ISO 4762-M8x a-8.8-A2K
- 2 Centring pin

Coding **U5, U5X**



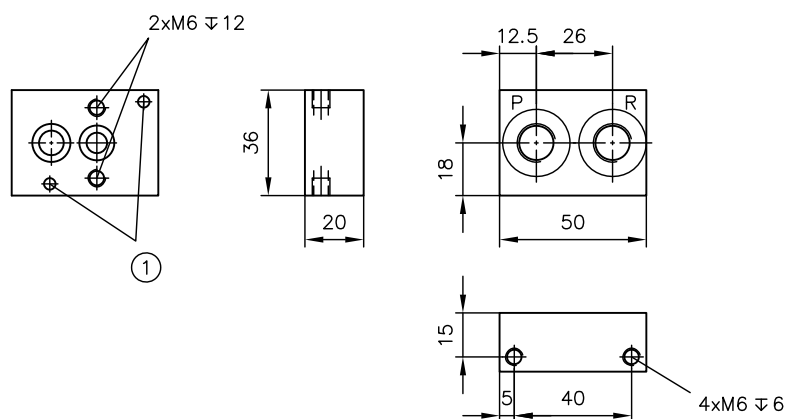
- 1 Not for type U5X
- 2 Cylinder screw ISO 4762-M8x45-8.8-A2K
- 3 Centring pin

Coding	L	a
U	40	45
U1	60	65
U3	80	85

Ports (ISO 228-1)
K1, K2
G 1/2

4.5.2 Connection blocks for direct pipe connection

Coding **C15 and C16**



- 1 Centring pin

Coding	Ports (ISO 228-1) P, R
C15	G 1/4
C16	G 3/8

5**Installation, operation and maintenance information**

Observe the document [B 5488](#) "General operating instructions for assembly, commissioning, and maintenance."

5.1 Intended use

This product is intended exclusively for hydraulic applications (fluid technology).

The user must observe the safety measures and warnings in this document.

Essential requirements for the product to function correctly and safely:

- ▶ All information in this documentation must be observed. This applies in particular to all safety measures and warnings.
- ▶ The product must only be assembled and put into operation by specialist personnel.
- ▶ The product must only be operated within the specified technical parameters described in detail in this document.
- ▶ All components must be suitable for the operating conditions when using an assembly.
- ▶ The operating instructions for the components, assemblies and the specific complete system must also always be observed.

If the product can no longer be operated safely:

1. Remove the product from operation and mark it accordingly.
 - ✓ It is then not permitted to continue using or operating the product.

5.2 Assembly information

The product must only be installed in the complete system with standard and compliant connection components (screw fittings, hoses, pipes, fixtures etc.).

The product must be shut down correctly prior to disassembly (in particular in combination with hydraulic accumulators).

**DANGER****Sudden movement of the hydraulic drives when disassembled incorrectly**

Risk of serious injury or death

- ▶ Depressurise the hydraulic system.
- ▶ Perform safety measures in preparation for maintenance.

see also Section 5 in [Miniature accumulator type AC: D 7571](#) or [Diaphragm accumulator type AC: D 7969](#)

5.2.1 Mounting individual sections

Connection blocks that are ordered without a hydraulic power pack must be installed by the purchaser. The following information is provided for those undertaking installation.

Installation position

- The individual sections are positioned in the order shown in the table – working outwards from the hydraulic power pack.
For an example see the next page.

	①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩		
Hydraulic power pack type	UNA	U U1 U3 U4(X) U5(X) U20	U5(X) U7 U51/52 C30 SS, SX VV, VX XV	U6	U1-DW10 U8-DW11	UV/EM	UF UD	U/EM	AB 1	AB 1 K	Attachment to the hydraulic power pack with	Additional information
KA HK(L) MPN INKA			•						•		2x M8	AB 1 is attached with 2x M6 to U5(X), U7, U51/52, C30, SS, SX, VV, VX, XV
			•							•	2x M8	AB 1 K is attached with 2x M6 to U5(X), U7, U51/52, C30, SS, SX, VV, VX, XV
			•				•		•		2x M8	1x M6 for attachment of ▪ UF, UD to U(X) ▪ AB 1 to U(X)
				•					•		2x M8	
					•					•	2x M6	
		•				•	•		•		2x M6 2x M8	
		•					•	•	•		1x M6 2x M8	1x M6 for attachment of UF, UD to U(X). See screws ④
					•	•	•		•		2x M6	
					•		•	•	•		2x M6	
							•	•	•		2x M6 2x M8	
							•		•		2x M6 2x M8	Of which 1x M6 is for attachment of UF, UD to the hydraulic power pack. See screws ④
		•								•	2x M6	
						•			•			
	•								•			
	•									•		
	•						•		•		1x M6 2x M8	1x M6 for attachment of UF, UD to UNA. See screws ④
LP											2x M6	Irrespective of the arrangement of the individual sections.

! NOTICE

Additional options of types P/A, P/EM, P/PMVP, P/JIS each bolted into the AB 1 with 3x M8 screws.

CAUTION
Non-compliance with the instructions or incorrect mounting of the connection block combinations can lead to malfunctions and leakage.

Ordering example for a KA

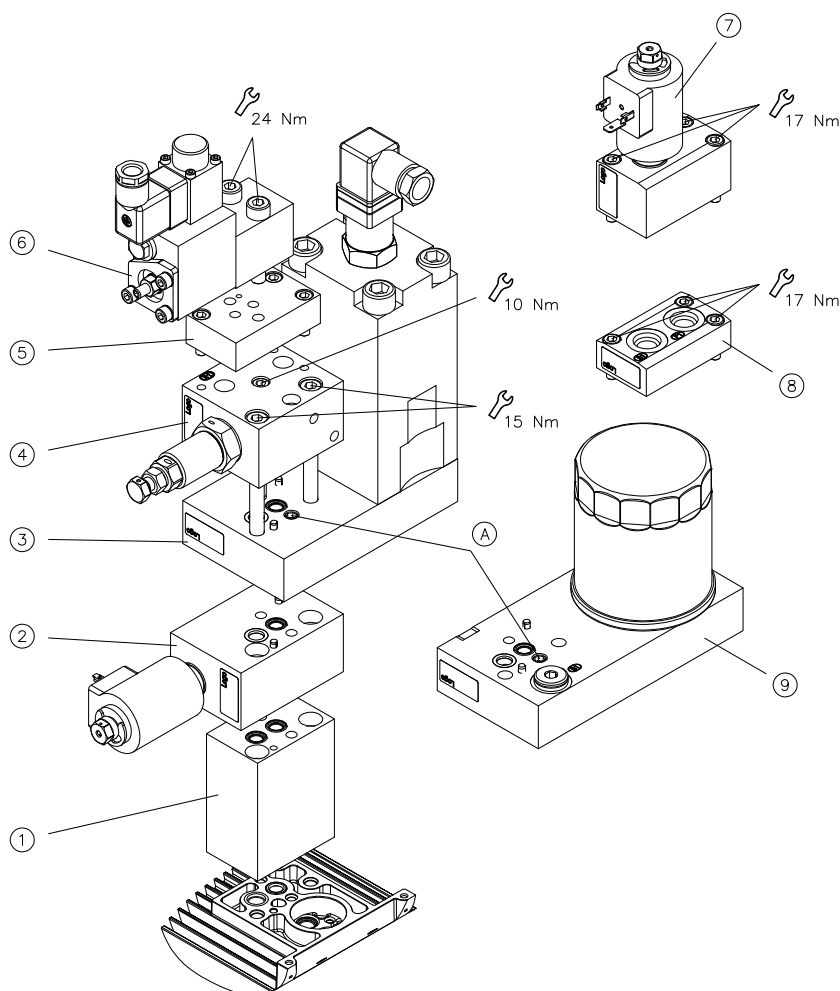
U3 -UV/EM 21 S-G 24 -UD 101 VE1 -AB 1 B -P/PMVP 4-41/G 24

For installation position ⑨ see notes on additional options

Installation position ⑦

Installation position ⑥

Installation position ②



- 1 Spacer plate type U3
- 2 Intermediate plate with EM type UV/EM
- 3 Intermediate plate with pressure filter type UD
- 4 Connection block type AB 1
- 5 Adapter plate for PMVP
- 6 Proportional valve type PMVP
- 7 Adapter plate for EM
e.g. UD101 VE1-AB 1/C300-P/EM
- 8 Adapter plate for G 1/4 JIS
e.g. UD101 VE1-AB 1/C300-P/JIS
- 9 Intermediate plate with return line filter type UF
e.g. UF1-AB 1/C300-P/PMVP

	Tightening torque (Nm)	
	M6	M8
Aluminium	10	15
Steel	17	24

Example of arrangement, U3-UV/EM 21 S-G 24-UD 101 VE1-AB 1 B -P/PMVP 4-41/G 24

5.3 Operating instructions

Observe product configuration and pressure/flow rate.

The statements and technical parameters in this document must be strictly observed.

The instructions for the complete technical system must also always be followed.

NOTICE

- Read the documentation carefully before usage.
- The documentation must be accessible to the operating and maintenance staff at all times.
- Keep documentation up to date after every addition or update.

CAUTION

Overloading components due to incorrect pressure settings.

Minor injuries. Flyaway or bursting parts and uncontrolled leakage of hydraulic fluid.

- Pay attention to the maximum operating pressure of the pump, valves and fittings.
- Always monitor the pressure gauge when setting and changing the pressure.

Purity and filtering of the hydraulic fluid

Fine contamination can significantly impair the function of the product. Contamination can cause irreparable damage.

Examples of fine contamination include:

- Swarf
- Rubber particles from hoses and seals
- Dirt due to assembly and maintenance
- Mechanical debris
- Chemical ageing of the hydraulic fluid

NOTICE

New hydraulic fluid from the manufacturer may not have the required purity.

Damage to the product is possible.

- Filter new hydraulic fluid to a high quality when filling.
- Do not mix hydraulic fluids. Always use hydraulic fluid that is from the same manufacturer, of the same type, and with the same viscosity properties.

For smooth operation, pay attention to the cleanliness level of the hydraulic fluid (cleanliness level [see Chapter 3, "Parameters"](#)).

Additionally applicable document: [D 5488/1](#) oil recommendations

5.4 Maintenance information

Check regularly (at least once a year) by visual inspection whether the hydraulic connections are damaged. If external leakages are found, shut down and repair the system.

Clean the surface of the device regularly (at least once a year) (dust deposits and dirt).

6

Other information

Further contamination control option

In addition to the options for contamination control via the pressure switches for return line filters (2.4.2 "return line filter contamination indicators"), the connection blocks AN with return line filters have two ports R1 and R2 by means of which a commercially available differential pressure indicator or switch can be connected externally, permitting continuous monitoring of contamination. Differential pressure switches are part of the delivery range of most well-known filter manufacturers.

The flow resistance of the filter when new will be in the range of approx. 0.2 to 0.3 bar. The bypass check valve opens at a differential pressure of approx. 2.5 bar.

Critical contamination should therefore be indicated at $\Delta p \approx 2$ bar at the latest.

Example: Differential pressure switch (maintenance indicator) with optical and electrical signalling (here normally open contact)

6.1 Accessories, spare and individual parts

Filter elements

Coding	Order coding
Return line filter	
F 0	W77/2
F 1	6905 117 F1
F 2	6905 117 F2
F 3	6905 117 F3
F 31	6905 117 F3
Pressure filters	
D 5	V3.0510-73 (material number 3027 5081-00)
D 51	V3.0510-13 (material number 3047 5023-00)
D 10	V3.0510-96 (material number 3047 5021-00)
D 101	V3.0510-16 (material number 3047 5035-00)
Return stop	
R	6905 050a
R1	6905 050b
Check valve in P	
AB 1 P	RK1
AB 1 K P	
AB 1 PV	7325 205
AB 1 K PV	7325 205

Proportional amplifiers

- Proportional amplifier type EV2S: D 7818/1
- Proportional amplifier type EV1M3: D 7831/2
- Proportional amplifier type EV1D: D 7831 D
- Proportional amplifier type EV22K5: D 7817/2

References

Additional versions

- Pressure-limiting valve, with unit approval type CMVX: D 7710 TUV
- Pressure-limiting valve, with unit approval type MV .X: D 7000 TUV
- Connection blocks type B for hydraulic power packs: D 6905 B
- Connection blocks type C: D 6905 C
- Compact hydraulic power pack type INKA 1: D 8132-1
- Compact hydraulic power pack type MPN and MPNW: D 7207
- Compact hydraulic power pack type HK 3: D 7600-3
- Compact hydraulic power pack type HKL and HKLW: D 7600-3L
- Compact hydraulic power pack type HK 4: D 7600-4
- Compact hydraulic power pack type KA and KAW size 2: D 8010
- Compact hydraulic power packs type KA size 4: D 8010-4

Mountable valve banks

- Valve bank (directional seated valve) type VB: D 7302
- Valve bank (directional seated valve) type BWN and BWH: D 7470 B/1
- Valve bank (directional seated valve) type BVH: D 7788 BV
- Valve bank (nominal size 6) type BA: D 7788

