Bypass Compensator Cartridge, Size 10

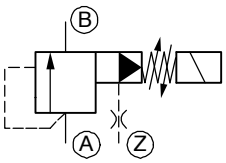
Q_{max} = 140 l/min, p_{max} = 350 bar
Electrically controlled, seated pilot stage, fixed compensator setting
Series WDWVPB-2…, WDWVPZ-2…

- Choice of 5 or 8 bar compensator spring
- Integral pressure-relief function is available in 3 different pressure ranges
- External remote-control port Z with integral damping orifice
- With internal pilot-oil drain to port B
- High flow rates
- Excellent stability over the whole pressure and flow range
- High pressure wet-armature solenoids
- The slip-on coil can be rotated, and it can be replaced without opening the hydraulic envelope
- Various plug-connector systems and voltages are available
- All exposed parts with zinc-nickel plating
- Can be fitted in a line-mounting body

1 Description

These two-stage bypass pressure-compensator (hydrostat) cartridges, series WDWVPB-2… / WDWVPZ-2… are size 10, electrically controlled, screw-in, cartridges with an M42x2 mounting thread. The cartridges have a seated pilot stage, and the main stage is designed on the sliding-spool principle. Three models can be supplied, with compensator spring settings of 8 bar (version "B") or 5 bar (version "Z"). Due to the fixed compensator-spring setting, the control pressure difference between inlet and outlet pressure in hydraulic circuits - for example, across a throttle (an orifice) - is maintained at a constant level. This means that the flow rate is independent of the load pressure at the actuator. The compensator cartridges are also provided with an integral pressure-relief function, available in 3 different pressure ranges. The A → B pressure-relief function requires a damping orifice before the port Z. A suitable orifice is already incorporated in the screw-in cartridge and is therefore not needed in the manifold block. Pilot oil is drained internally to port 2. This port should preferably be routed directly to tank, because any pressure surges in port 2 will affect the valve pressure setting by the same amount. By venting the port Z, the main flow can be vented through the pressure compensator from A → B. These screw-in cartridges are used in hydraulic circuits in mobile and industrial applications, predominantly in conjunction with a throttle cartridge. All external parts of the cartridge are zinc-nickel plated to DIN 50 979 and are thus suitable for use in the harshest operating environments. If you intend to manufacture your own cavities or are designing a line-mounting installation, please refer to the section "Related data sheets".

2 Symbol



3 Technical data

General characteristics	Description, value, unit
Designation	bypass pressure-compensator cartridge
Design	Electrically controlled, seated pilot stage, fixed compensator-spring setting, integral pressure-relief function, external remote-control port Z with integral damping orifice

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General characteristics	Description, value, unit
Mounting method	screw-in cartridge M42x2
Size	nominal size 10, cavity type DD to Bucher standard
Weight	0.52 kg
Mounting attitude	unrestricted
Ambient temperature range	-25 °C … +50 °C

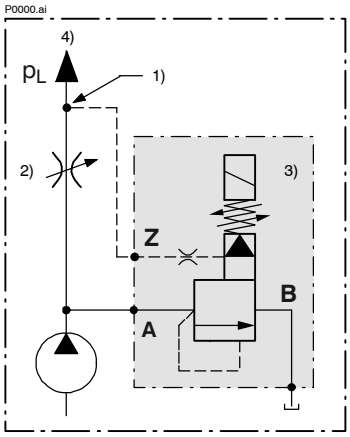
Hydraulic characteristics	Description, value, unit
Maximum operating pressure in port A and Z	350 bar
Maximum allowable pressure in port B (tank)	250 bar
Pressure adjustment range:	350 bar 250 bar 160 bar 100 bar 40 bar
Maximum flow rate	140 l/min
Maximum flow rate attainable at the actuator	55 l/min
Flow direction	A → B, see symbols
Hydraulic fluid	HL and HLP mineral oil to DIN 51 524; for other fluids, please contact BUCHER
Hydraulic fluid temperature range	-25 °C … +80 °C
Viscosity range	10…500 mm^2/s (cSt), recommended 15...250 mm^2/s (cSt)
Minimum fluid cleanliness Cleanliness class to ISO 4406 : 1999	class 20/18/15

Electrical characteristics	Description, value, unit
Supply voltage	12 V DC, 24 V DC / 115 V AC, 230 V AC (50 … 60 Hz)
Supply voltage tolerance	± 10 %
Nominal power consumption	V DC = 27 W V AC = 25 W
Relative duty cycle	100 %
Protection class to ISO 20 653 / EN 60 529	IP 65 / IP 67 / IP 69K, see “Ordering code” (with appropriate mating connector and proper fitting and sealing)
Electrical connection	DIN EN 175301-803, 3-pin 2 P+E (standard) for other connectors, see “Ordering code”

4 Performance graphs

measured with oil viscosity 33 mm²/s (cSt)
measured with oil viscosity 33 mm²/s (cSt)

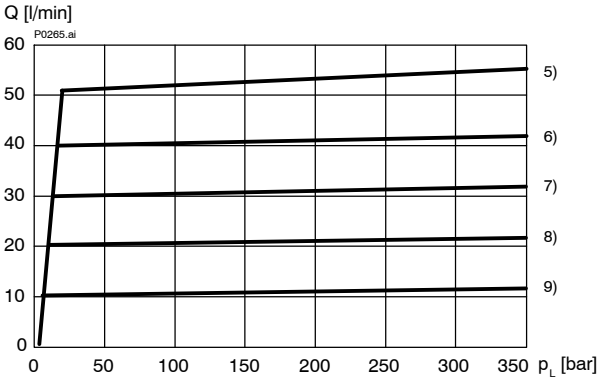
Test setup (for flow rate v. load pressure characteristic)



1) Load sensing immediately after orifice 2)
2) Throttle function (orifice size, see performance graphs)
3) Bypass pressure-compensator cartridge
4) Actuator port (p_L = load pressure)

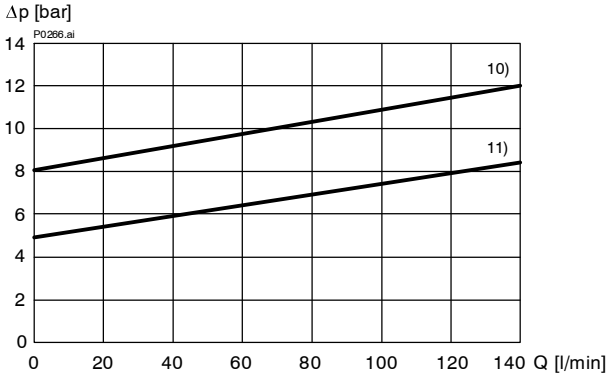
IMPORTANT!
The load sensing and compensator inlet (port 1) tapping points must be located **immediately after the throttle (orifice) and before it** respectively. This minimises the pressure drop and gives the best flow rate / load pressure values.

IMPORTANT!
All characteristics were recorded with a **surplus flow of 10…15 l/min**.



$Q = f(p_L)$ Flow rate v. load pressure characteristic

$\Delta p = f(Q)$ Pressure-drop characteristic (control Δp, A → B)
(port Z completely unloaded)



10) 8 bar control Δp (fixed)
11) 5 bar control Δp (fixed)

$Q = f(p_L)$ Pressure cut-off v. Load pressure characteristic
(only some examples are shown)

	Throttle / orifice diameters [mm]	
Graph	Δp = 5 bar	Δp = 8 bar
5)		∅ 5.5…6.0
6)	∅ 5.5…6.0	∅ 5.0…5.5
7)	∅ 4.5…5.0	∅ 4.0…4.5
8)	∅ 4.0…4.5	∅ 3.5…4.0
9)	∅ 3.5…4.0	∅ 2.5…3.0

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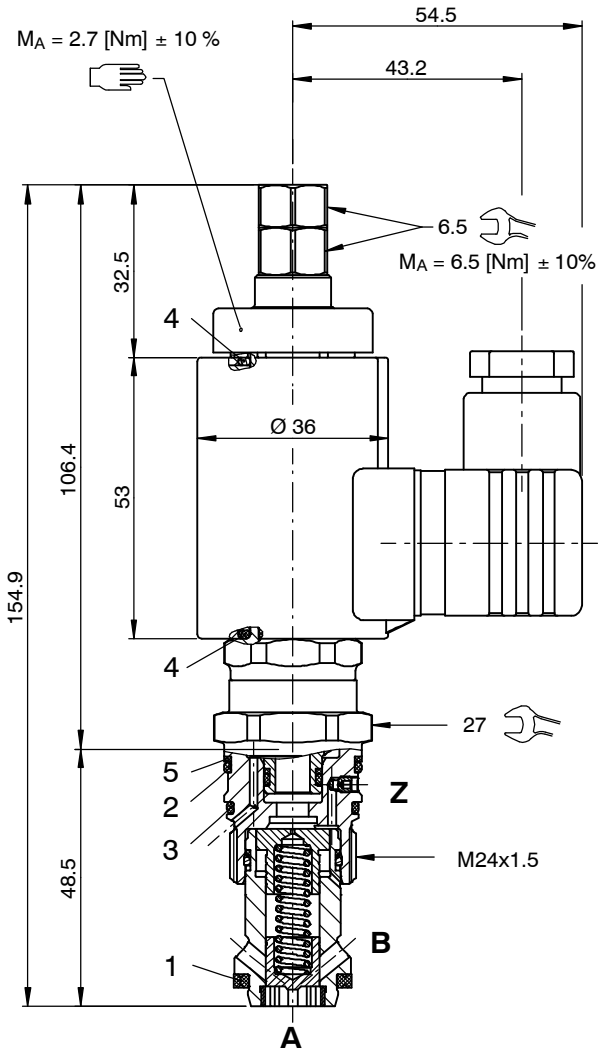
5 Dimensions & sectional view



Tightening torque M_A [16] ± 10 %

Cavity type	DD
When fitted in steel	65 [Nm]
When fitted in aluminium	50 [Nm]

Seal kit NBR no. DS-261-N [17]

Item	Qty.	Description		
1	1	Seal ring	∅ 22,10 / 16,50 x 2,50	
2	1	O-ring no. 020	∅ 21,95 x 1,78	N90
3	1	O-ring	23,00 x 1,00	N90
4	2	O-ring	16,00 x 2,00	V83
5	1	Backup ring	∅ 20.90 x 1.4 x 1.0	

IMPORTANT!

[17] Seal kit with FKM (Viton) seals, no. DS-261-V

6 Installation information

IMPORTANT!

When fitting the cartridges, use the specified tightening torque. The pressure that the pilot valve is required to open at (10…350 bar depending on pressure range) is set with the adjusting screw (s_1 4). After you have set the valve, lock the adjusting screw with the lock nut.

ATTENTION!

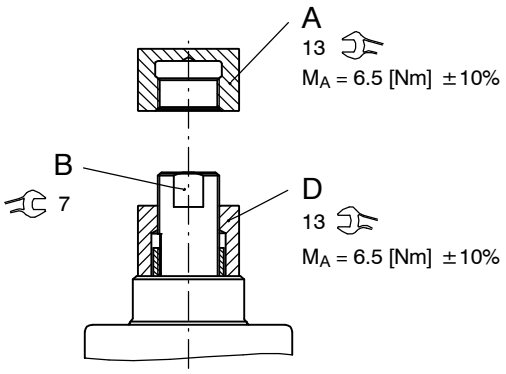
Only qualified personnel with mechanical skills may carry out any maintenance work. Generally, the only work that should ever be undertaken is to check, and possibly replace, the seals. When changing seals, oil or grease the new seals thoroughly before fitting them.

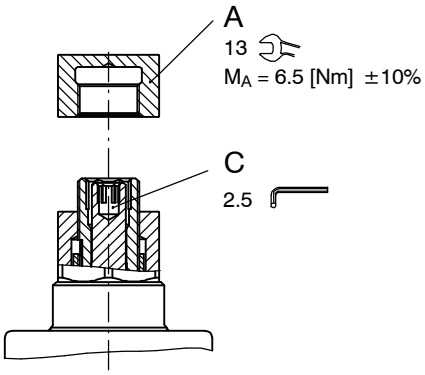
7 Pressure adjustment

(pressure p1 must be set first, followed by pressure p2)

Nr.	Setting the higher pressure p1 on series WDWVPB… / WDWVPZ… as the higher working pressure with solenoid energised:
1)	Slacken and remove cap nut item A (13 A/F).
2)	Slacken lock nut item D (13 A/F) approx. ½ turn.
3)	With pump running and with the solenoid energised, use the two flats (7 A/F) to turn adjusting screw item B until the required pressure is set in port A.
4)	Hold the adjusting screw item B using the 7 A/F flats while tightening the lock nut item D (13 A/F).
5)	Refit and tighten the cap nut item A.

Nr.	Setting the lower pressure p2 (emergency pressure setting) on series WDWVPB… / WDWVPZ… (a second pressure or alternatively, unload) with solenoid de-energised:
1)	Slacken and remove cap nut item A (13 A/F).
2)	With pump running and with the solenoid de-energised, use the adjusting screw item C (2.5 A/F hex. socket) to set the pressure p2 in port A.
3)	Refit and tighten the cap nut item A. (p2 min.: 2 … 15 bar for WDWVPB, dependent on flow). (p2 min.: 4 … 8 bar for WDWVPZ, dependent on flow).





ATTENTION!
When setting pressure p1, adjusting screw item B must not be overtightened as this can damage the shoulder which limits the maximum pressure setting. As soon as a definite end-stop can be felt, do not turn any further.

8 Application examples

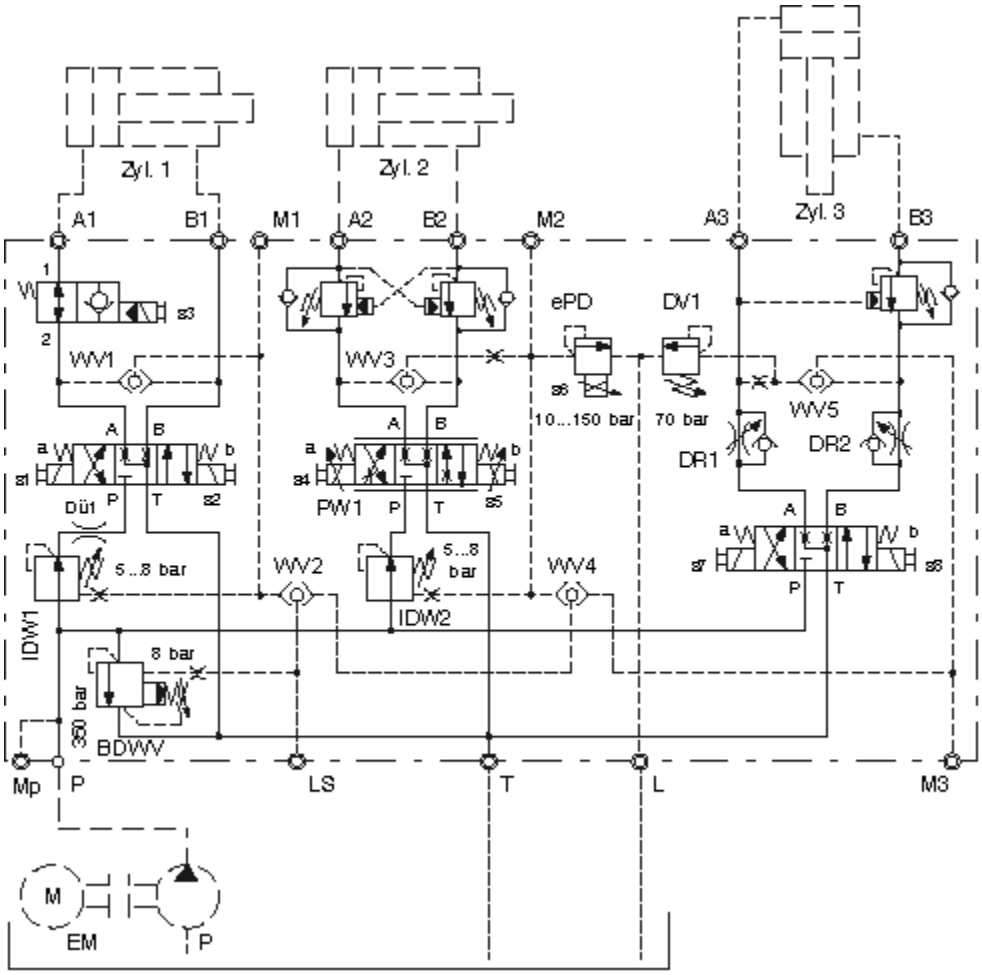
Typical manifold block for load-sensing circuit with fixed-displacement pump (OPEN CENTRE).
The two-stage bypass compensator (BDWV) takes on the following functions:

a. Limiting the maximum system pressure (350 bar).

b. The load-sensing function: the highest load pressure at any one time is signalled back through the shuttle valves WV1 to WV5, and the fixed-displacement pump works against this pressure only, plus a Δp (8 bar) from the main stage of the preessure compensator.

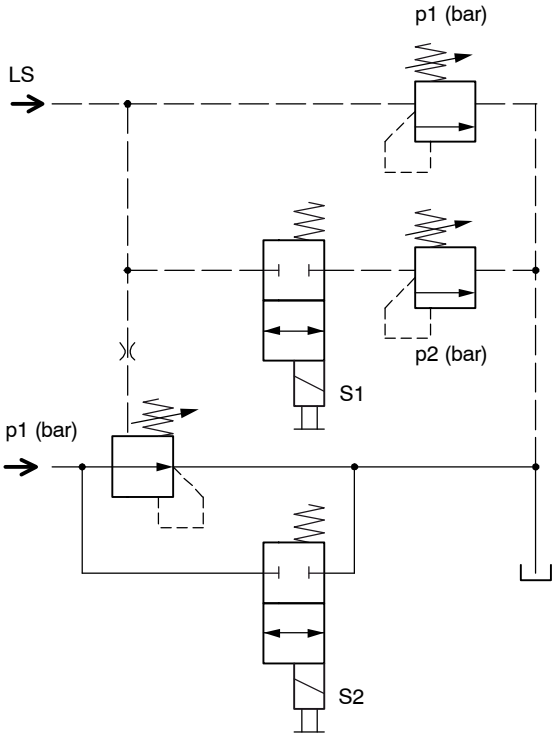
c. Vented bypass (approx. 8 bar)

Because the cylinders (Zyl. 1 and Zyl. 2) have to travel together and at constant speed in each case, the two inline compensators (IDW1 and IDW2) must be provided in the circuit. The Δp between the compensator and the measuring point can be set between 5…8 bar. The speed of cylinder 1 (Zyl. 1) is set with the orifice (Dü1). The maximum pressure for cylinder 1 (Zyl. 1) is set using the pilot stage of the bypass compensator (BDWV). The speed of cylinder 2 (Zyl.2) is determined by the 4/3 proportional directional valve. The pressure setting for cylinder 2 (Zyl. 2) is determined by the pilot valve (ePD) in the load-sensing line, which is a proportional pressure-relief valve. The inline compensator and the proportional pressure-relief pilot valve interact to provide a proportional 2-way pressure-reducing function. The lifting cylinder (Zyl. 3) travels on its own, and its speed must be independent of the load. This speed is set using the throttle check valves (DR1 and DR2). The cylinder rod must be protected against buckling when travelling downwards, and therefore pressure limiting (70 bar) is provided by the pressure-relief pilot valve (DV1).



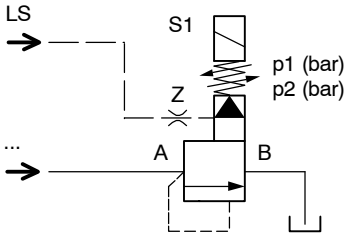
Conventional circuit

6 elements
6 cavities



Bucher hydraulics solution

1 element
1 cavitie



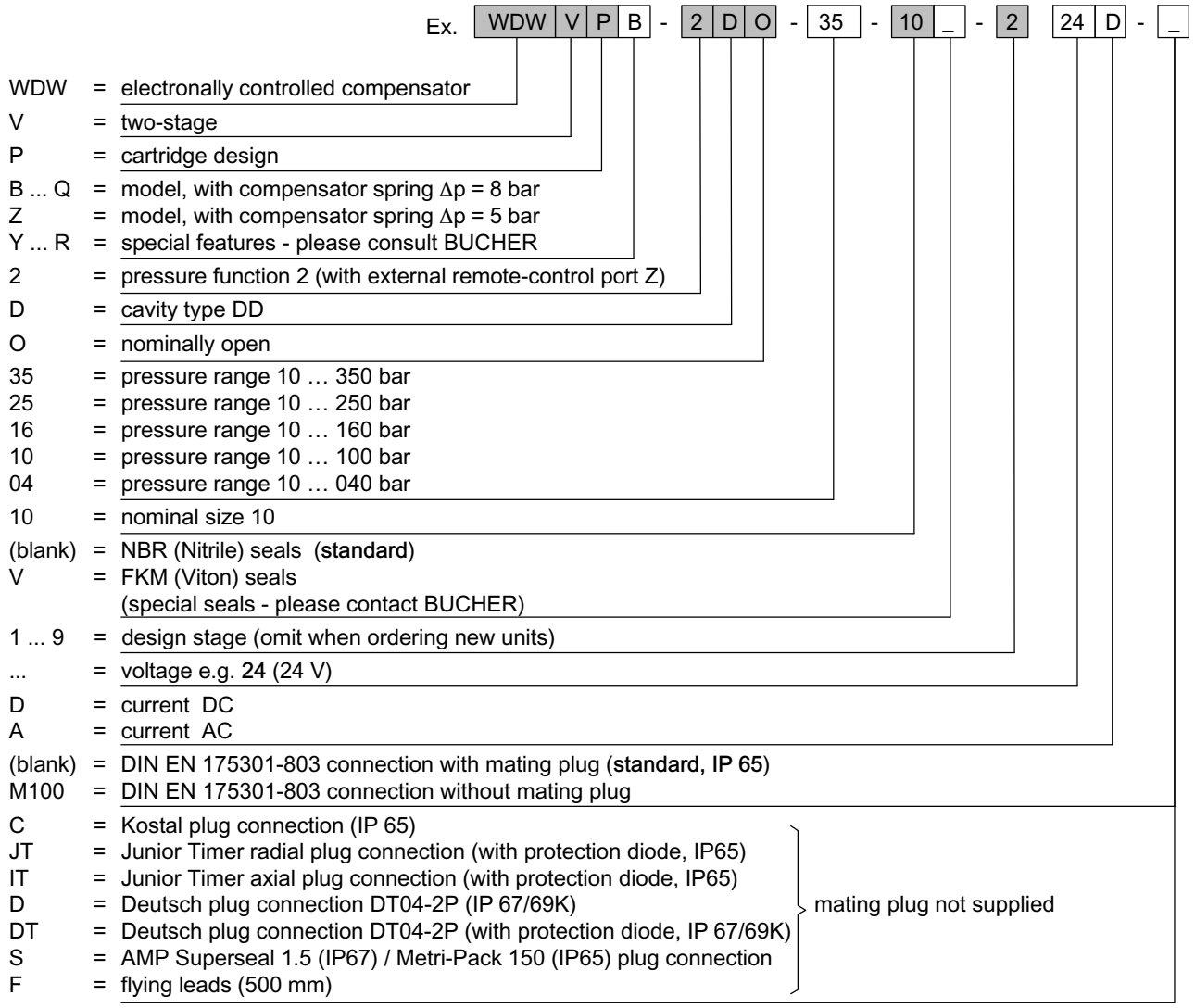
WDWVPB-2...-10...

- LS - control Δp = 8 bar
- Unlouded pressure (LS vented): Δp app. 6 bar at Q = 50 l/min
- S1 energised = pressure p1
- S1 deenergised = pressure p2

WDWVPZ-2...-10...

- LS - control Δp = 5 bar
- Unlouded pressure (LS vented): Δp app. 5 bar at Q = 50 l/min
- S1 energised = pressure p1
- S1 deenergised = pressure p2

9 Ordering code



10 Related data sheets

Reference	(Old no.)	Description
400-P-040011	(i-32)	The form-tool hire programme
400-P-060121	(i-45.2)	Cavity type DD
400-P-120100	(W-2.140)	Overview directional solenoid cartridge valve Size 1…5
400-P-120110	(W-2.141)	Coils for screw-in cartridge valves
400-P-740111	(G-24.21)	Line- and manifold-mounting body, type DDY-12 (G 1/2")
400-P-335201	(D-30.22)	Sandwich presssure-relief valve, size 10, type SDWDPB-2D…
400-P-336201	(D-31.22)	Sandwich presssure-relief valve, size 10, type SDWDPB-2D…

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