

Proportional 3/2 Throttle Cartridge, Size 5

$Q_{\max} = 40 \text{ l/min (10 gpm)}$, $p_{\max} = 250 \text{ bar (3600 psi)}$

Sliding-spool design, direct acting

Series MDT32...-5M...B...



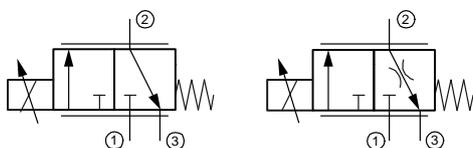
- De-energized closed 1 to 2
- Compact construction for cavity type AM – 3/4-16 UNF
- Operated by a proportional solenoid
- Optional with two emergency manual flow settings
- Reliable operation over the whole pressure and flow range (even with high pressure differentials)
- All exposed parts with zinc-nickel plating
- 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
- Can be fitted in a line-mounting body

1 Description

Series MDT32...-5M...B... direct acting proportional 3/2 throttle valves are size 5, high performance screw-in cartridges with a 3/4-16 UNF mounting thread. They are designed on the proven sliding-spool principle. The straightforward design delivers an outstanding price/performance ratio. In design "S", in the initial position (de-energized), port 1 is closed and ports 2 to 3 are connected with the full flow rating. In control mode, the flow through the connection 1 to 2 can be regulated proportionally to the control current, but not the closing of connection 2 to 3. Design "T", in the initial position (de-energized) is also closed at port 1, and ports 2 to 3 are connected, but are only used for unloading (see performance graphs). These cartridges are particu-

larly suitable for precise and controlled lifting and lowering movements, but they can also be used for reliable operation in mobile and industrial applications featuring large pressure differences. Optionally, the valves are available with a push-button emergency operation or an emergency manual flow setting via tool wrench. All external parts of the cartridge are zinc-nickel plated according to DIN EN ISO 19 598 and are thus suitable for use in the harshest operating environments. The slip-on coils can be replaced without opening the hydraulic envelope and can be positioned at any angle through 360°. For self-assembly, please refer to the section related data sheets.

2 Symbol



MDT32GS...-5...

MDT32GT...-5...

3 Technical data

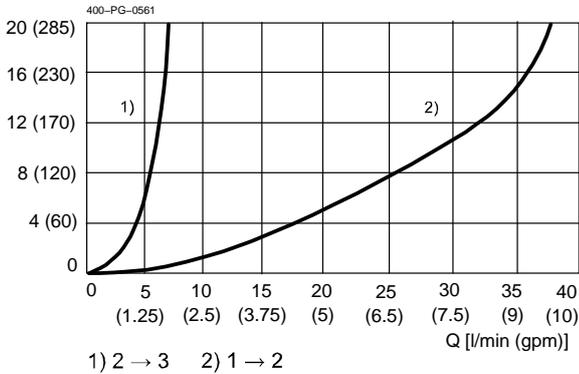
| General characteristics | Description, value, unit |
|-------------------------|-------------------------------------|
| Designation | proportional 3/2 throttle cartridge |
| Design | sliding-spool design, direct acting |
| Mounting method | screw-in cartridge 3/4-16 UNF |
| Tightening torque | 40 Nm ± 10 % (30 ft-lbs ± 10 %) |

| General characteristics | Description, value, unit |
|---|--|
| Size | nominal size 5, cavity type AM |
| Weight | 0.40 kg (0.9 lbs) |
| Mounting attitude | unrestricted (preferably vertical, coil down) |
| Ambient temperature range | -30 °C ... +60 °C (-22 °F ... +140 °F) |
| MTTF _D values | 150 years, see data sheet 400-P-010101-en |
| Hydraulic characteristics | Description, value, unit |
| Maximum operating pressure | 250 bar (3600 psi) |
| Maximum flow rate | $Q_N = 28$ l/min (10 gpm) $Q_N = 24$ l/min (7.5 gpm) $Q_N = 10$ l/min (5.5 gpm) |
| Nominal flow rate | $Q_N 1 \rightarrow 2$ 28 l/min (7 gpm) at $\Delta p = 10$ bar (140 psi) 24 l/min (6 gpm) at $\Delta p = 10$ bar (140 psi) 10 l/min (2.5 gpm) at $\Delta p = 10$ bar (140 psi) |
| Volume flow rate 2 → 3 | see symbols not proportionally controllable |
| Leakage flow rate | < 250 cm ³ /min (with p_N 250 bar) with oil viscosity 33 mm ² /s (cSt) |
| Flow direction | see performance graphs control possible only for connection 1 to 2 |
| Hydraulic fluid | HL and HLP mineral oil to DIN 51 524; for other fluids, please contact BUCHER |
| Hydraulic fluid temperature range | -30 °C ... +70 °C (-22 °F ... +158 °F) |
| Viscosity range | 15...380 mm ² /s (cSt), recommended 20...130 mm ² /s (cSt) |
| Minimum fluid cleanliness Cleanliness class to ISO 4406 : 1999 | class 18/16/13 |
| Electrical characteristics | Description, value, unit |
| Supply voltage | 12 V DC, 24 V DC |
| Control current | 12 V = 0...1600 mA, 24 V = 0...800 mA |
| Power consumption at max. control current | max. 17.5 W |
| Coil resistance R | - cold value at 20 °C: 12 V = 4.35 Ω / 24 V = 17.2 Ω - max. warm value: 12 V = 6.8 Ω / 24 V = 26.9 Ω |
| Recommended PWM frequency (dither) | 150 Hz |
| Hysteresis with PWM | 2...5 % I_N |
| Reversal error with PWM | 2...5 % I_N |
| Sensitivity with PWM | < 2 % I_N |
| Reproducibility with PWM | < 3 % p_N |
| 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)

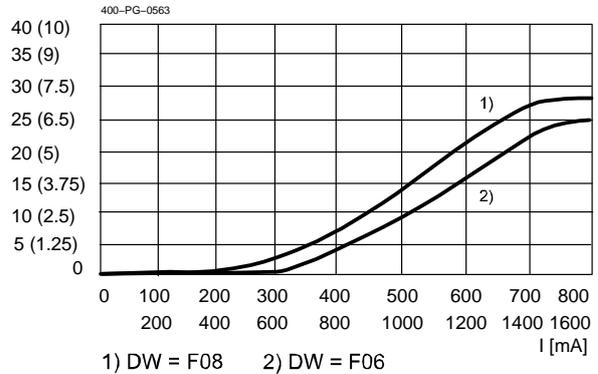
$\Delta p = f(Q)$ Pressure drop - Flow rate characteristic
[MDT32GT...-28]

$\Delta p = [\text{bar (psi)}]$



$Q = f(I; \Delta p)$ Flow rate adjustment characteristic
[MDT32GT...-28] - 1 → 2 with compensator ³⁾

$Q [\text{l/min (gpm)}]$

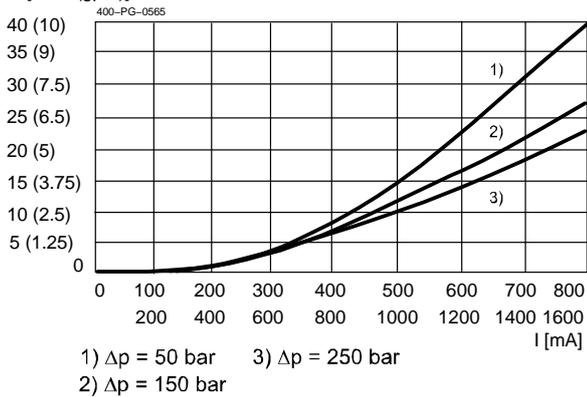


IMPORTANT!

³⁾ with compensator DWDPB-5D-10-F0_-1

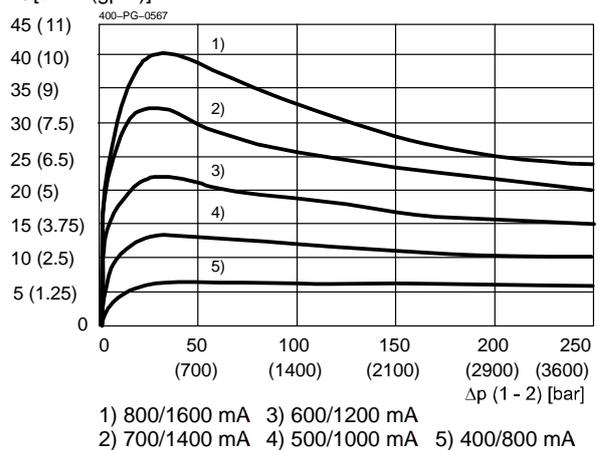
$Q = f(I; \Delta p)$ Flow rate adjustment characteristic
[MDT32GT...-28] - 1 → 2 with constant pressure drop

$Q [\text{l/min (gpm)}]$



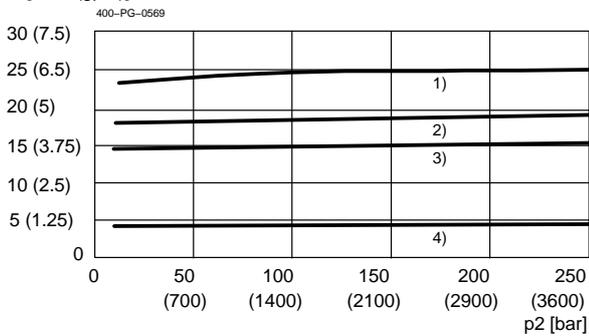
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[MDT32GT...-28] - 1 → 2 with compensator ⁵⁾

$Q [\text{l/min (gpm)}]$

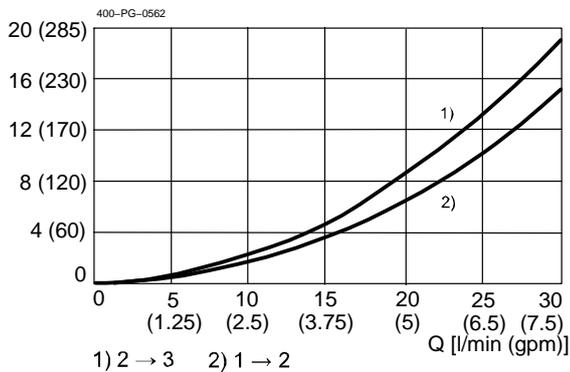


IMPORTANT!

⁵⁾ with compensator DWDPB-5D-10-F06

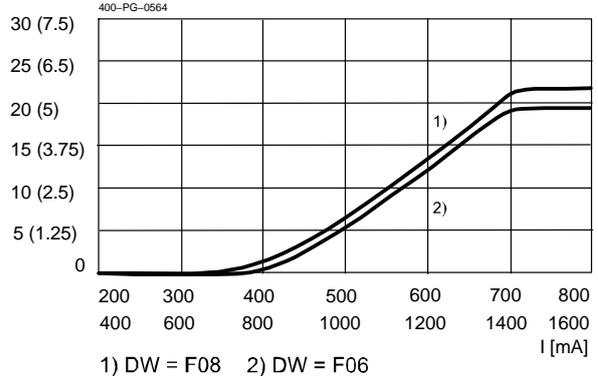
$\Delta p = f(Q)$ Pressure drop - Flow rate characteristic
[MDT32GS...-24]

$\Delta p = [\text{bar (psi)}]$



$Q = f(I; \Delta p)$ Flow rate adjustment characteristic
[MDT32GS...-24] - 1 → 2 with compensator ³⁾

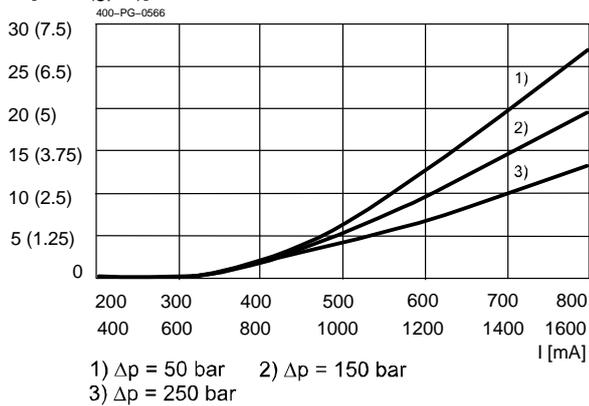
$Q [\text{l/min (gpm)}]$



IMPORTANT!

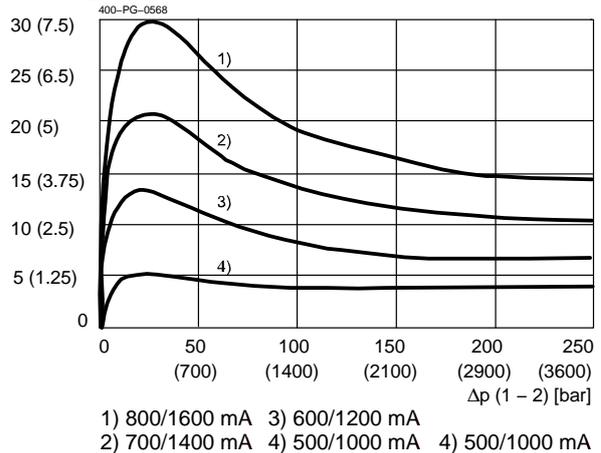
³⁾ with compensator DWDPB-5D-10-F0_-1

$Q = f(I; \Delta p)$ Flow rate adjustment characteristic
[MDT32GS...-24] - 1 → 2 with constant pressure drop
 $Q [\text{l/min (gpm)}]$



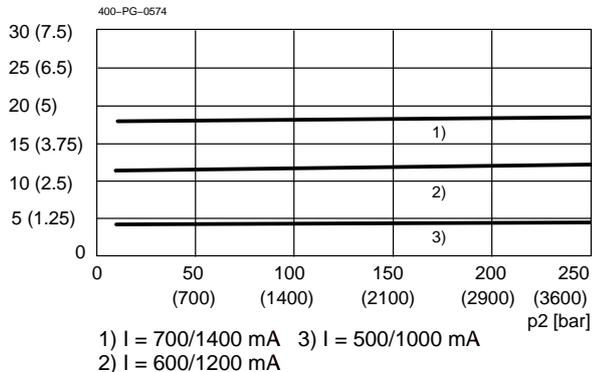
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[MDT32GS...-24]

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[MDT32GS...-24] - 1 → 2 with compensator ⁴⁾

$Q [\text{l/min (gpm)}]$

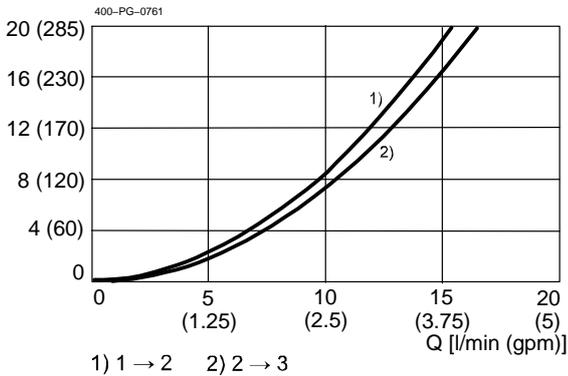


IMPORTANT!

⁴⁾ with compensator DWDPB-5D-10-F06

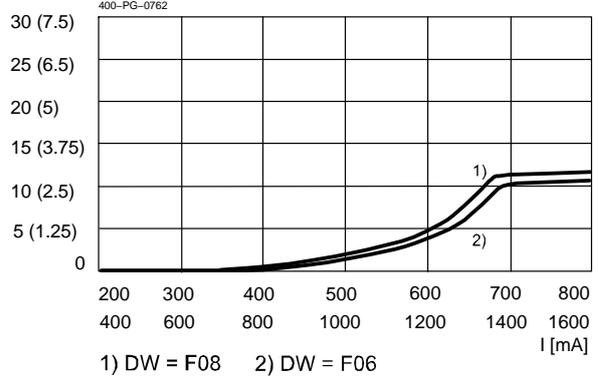
$\Delta p = f(Q)$ Pressure drop - Flow rate characteristic
[MDT32GS...-10]

$\Delta p = [\text{bar (psi)}]$



$Q = f(I; \Delta p)$ Flow rate adjustment characteristic
[MDT32GS...-10] – 1 → 2 with compensator ³⁾

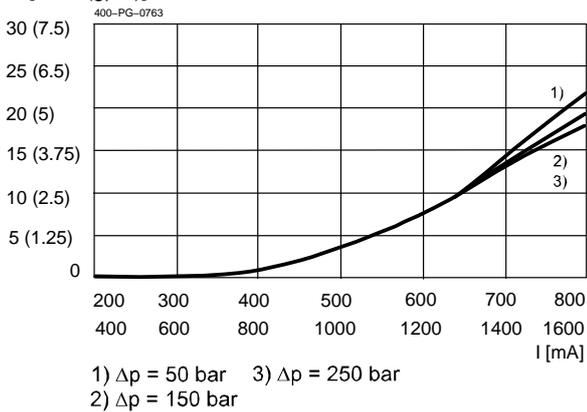
Q [l/min (gpm)]



IMPORTANT!

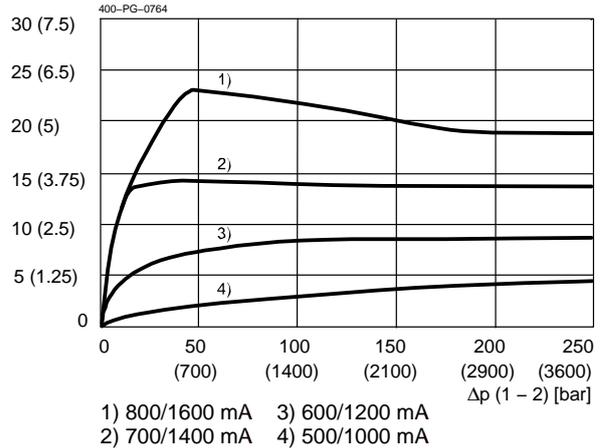
³⁾ with compensator DWDPB-5D-10-F0_-1

$Q = f(I; \Delta p)$ Flow rate adjustment characteristic
[MDT32GS...-10] – 1 → 2 with constant pressure drop
 Q [l/min (gpm)]



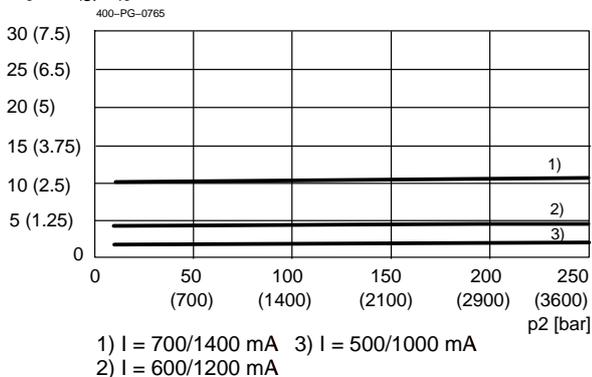
$Q = f(I; \Delta p)$ Flow rate adjustment characteristic
[MDT32GS...-10]

Q [l/min (gpm)]



$Q = f(I; \Delta p)$ Flow rate adjustment characteristic
[MDT32GS...-10] – 1 → 2 with compensator ⁴⁾

Q [l/min (gpm)]



IMPORTANT!

⁴⁾ with compensator DWDPB-5D-10-F06

5 Installation information



IMPORTANT!

To achieve the maximum performance rating, fit the solenoid coil as shown (with the plug pins at the bottom) and install the valve in a steel body. When fitting the cartridges, note the mounting attitude (preferably vertical, with coil down → automatic air bleed) and use the specified tightening torque. No adjustments are necessary, since the cartridges are set in the factory.

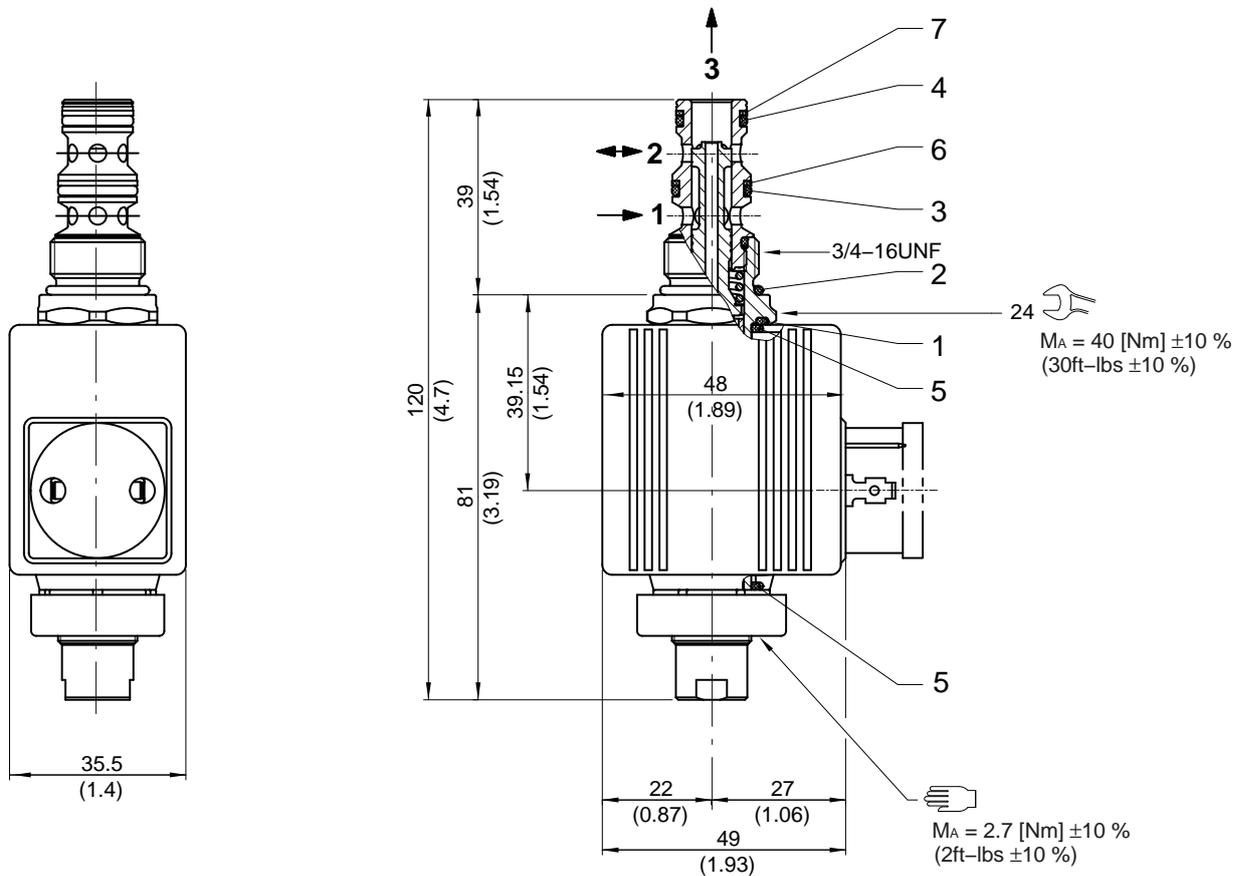


ATTENTION!

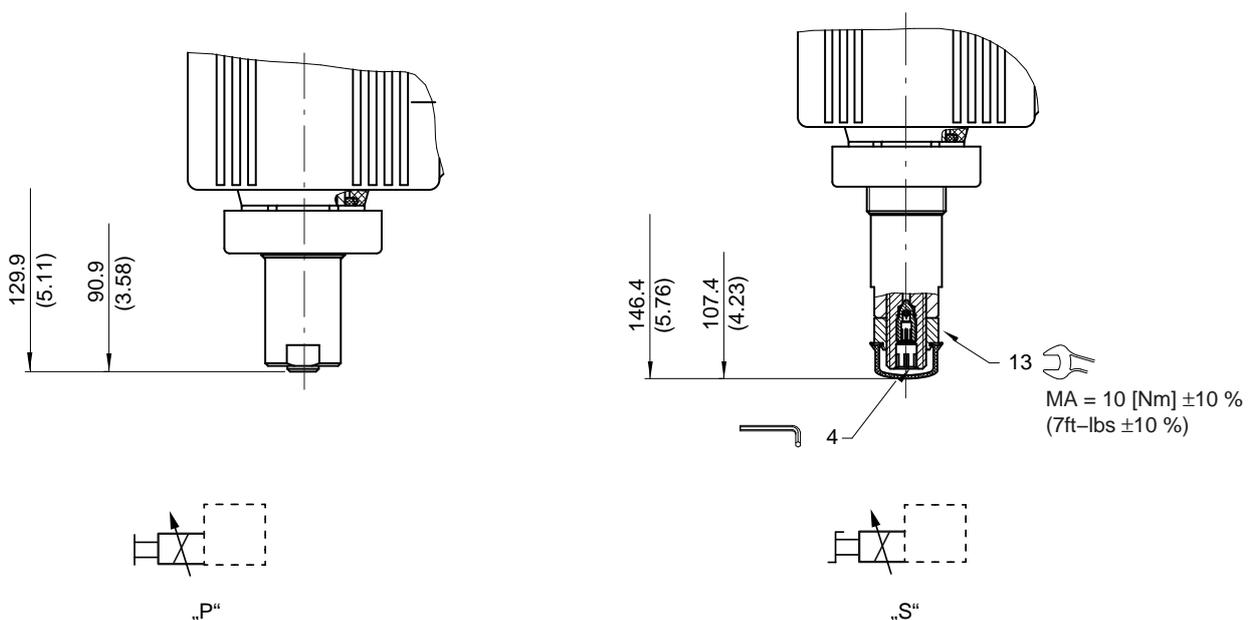
Only qualified personnel with mechanical skills may carry out any maintenance work. Generally, the only work that should ever be undertaken is to check, and possibly replace, the seals. When changing seals, oil or grease the new seals thoroughly before fitting them.

6 Dimensions & sectional view

6.1 Standard without emergency operation options "O" and "S"



6.2 Option with emergency override pin "P" and option with emergency override "S"



Seal kit NBR no. DS-247-N ³⁾

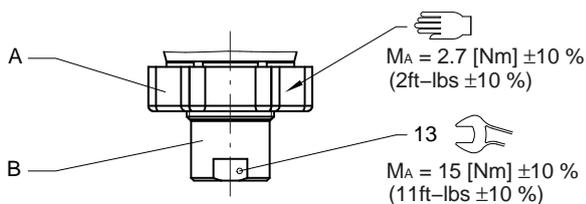
| Item | Qty. | Description |
|------|------|--|
| 1 | 1 | O-ring \varnothing 18,00 x 2,00 FKM |
| 2 | 1 | O-ring no. 017 \varnothing 17,17 x 1,78 N90 |
| 3 | 1 | O-ring no. 014 \varnothing 12,42 x 1,78 N90 |
| 4 | 1 | O-ring no. 013 \varnothing 10,82 x 1,78 N90 |
| 5 | 2 | O-ring \varnothing 16,00 x 2,00 FKM |
| 6 | 1 | Backup ring \varnothing 10.70 x 1.45 x 1.40 FI0751 |
| 7 | 1 | Backup ring \varnothing 09.40 x 1.45 x 1.00 FI0751 |



IMPORTANT!

³⁾ Seal kit with FKM (Viton) seals no. DS-247-V

Air-bleeding for option "O" and "P"



Air-bleeding

If necessary, air can be purged from these proportional throttle cartridges by using the cap nut (Item B). The procedure is as follows:

A Knurled nut

B Cap nut

Steps:

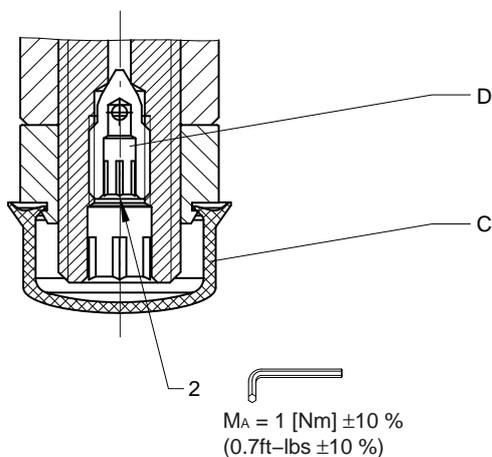
1. Reduce pressure in port 3.
2. Slacken and remove the knurled nut.
3. Slacken the cap nut approx. 1.5 turns.

Caution:

Slackening the cap nut allows oil to spray out!

4. Switch the proportional throttle cartridge ON/OFF several times until no more air bubbles escape.
5. Tighten the cap nut.
6. Refit the knurled nut and tighten it.

Air-bleeding for option "S"



Integral air-bleeding

If necessary, air can be purged from these proportional throttle cartridges by using the integral air-bleed screw (Item D). The procedure is as follows:

C Protective cap

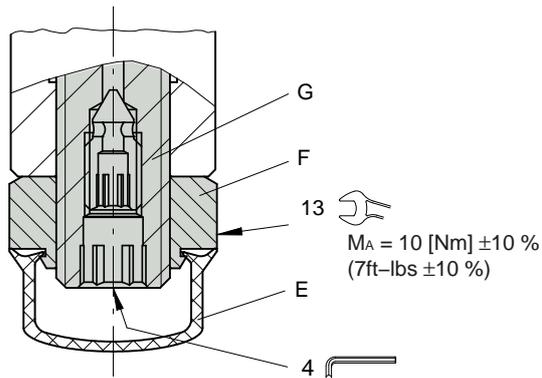
D Air-bleed screw

Steps:

1. Reduce pressure in port 3.
2. Remove the protective cap.
3. Slacken the air-bleed screw approx. 2 turns.
4. Switch the proportional throttle cartridge ON/OFF several times until no more air bubbles escape.
5. Tighten the air-bleed screw.
6. Fit the protective cap.

7 Emergency manual flow setting

Optionally, the proportional throttle cartridges can be supplied with an integral manual flow setting. If a proportional solenoid is faulty, for example, this manual flow setting enables the required flow rate to be set mechanically. This manual flow setting is not designed for adjusting the flow in a dynamic control mode.



- E Protective cap
- F Lock nut (13 A/F)
- G Adjusting spindle for volume setting

Setting the flow rate manually

Steps:

1. Remove the protective cap.
2. Slacken the lock nut (13 A/F).
3. Screw in (turn to right) the adjusting spindle (4 A/F) until the required flow rate is set.
4. Tighten the lock nut (13 A/F).
5. Fit the protective cap.

Restoring the factory settings

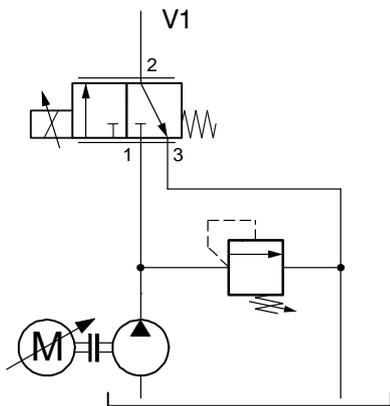
Steps:

1. Solenoid de-energised.
2. Remove the protective cap.
3. Slacken the lock nut (13 A/F).
4. Unscrew the adjusting spindle (4 A/F) to its end-stop, then screw it in 2 turns.
5. Tighten the lock nut (13 A/F).
6. Fit the protective cap.

8 Application examples

Symmetric option MDT32GS...-5

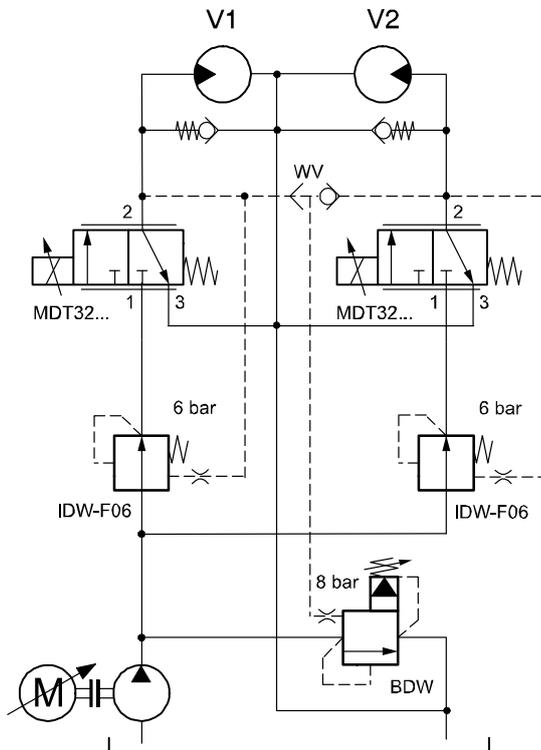
Use without compensator:



- Full-flow connection 2 → 3
- Control is only available with connection 1 → 2

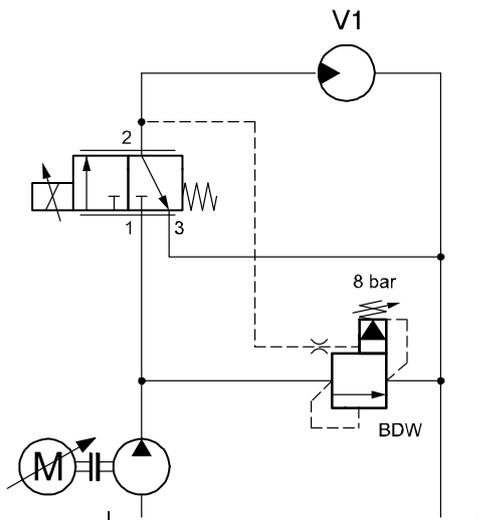
Symmetric option MDT32GS...-5

Use with compensator:



- Full-flow connection 2 → 3
- Control is only available with connection 1 → 2

Throttled option MDT32GT...-5



- Connection 2 → 3 is not full-flow (suitable for unloading)
- Control is only available with connection 1 → 2

9 Ordering code

Ex.

| | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|----|---|---|---|---|---|---|----|---|---|---|---|---|---|---|----|---|---|---|
| M | D | T | 32 | G | S | - | 5 | M | - | 28 | - | O | - | N | B | 1 | - | 24 | D | G | - |
|---|---|---|----|---|---|---|---|---|---|----|---|---|---|---|---|---|---|----|---|---|---|

M = flow-control valve
D = direct acting
T = COIL 36X48, 30 W (proportional)
32 = 3-way/2-position
G = spool de-energized closed
S = symmetrical opening cross-section
T = 2 to 3 throttled
5 = nominal size 5
M = cavity type AM
28 = Q_N 28 l/min, Δp 10 bar (only model «T», 2 to 3 throttled)
24 = Q_N 24 l/min, Δp 10 bar (only model «S», sym. opening cross-section)
10 = Q_N 10 l/min, Δp 10 bar (only model «S», sym. opening cross-section)
O = without manual override
P = with manual override (pin)
S = with manual override (screwable)
N = NBR (nitril-butadien-rubber / BUNA) seals (**standard**)
V = FKM (fluorocarbon rubber / VITON) seals (special seals on request)
B ... Q = standard model
Z ... R = special model (on request)
1 ... 9 = technical design no. (omit by ordering)
... = voltage e.g. 24 (24 V)
D = current DC
G = **standard** - plug connection according to DIN EN (3-pin 2 P+E, IP65)
J = Junior Timer radial plug connection (IP65)
JR = Junior-Timer radial plug connection (with protection diode, IP65)
U = Deutsch radial plug connection DT04-2P (IP67/69K)
UR = Deutsch radial plug connection DT04-2P (with protection diode, IP 67/69K)
(blank) = without mating plug
Q = with mating plug (only by connection type "G" possible)

10 Related data sheets

| Reference | (Old no.) | Description |
|--------------|-----------|---|
| 400-P-040011 | (i-32) | The form-tool hire programme |
| 400-P-040181 | (i-33.11) | Cavity type AM |
| 400-P-120212 | (W-2.141) | Coils for screw-in cartridge valves |
| 400-P-720111 | (G-4.20) | Line-mounting body, type GAMA (G 3/8") |
| 400-P-010101 | | MTTF _D values for hydraulic valves |

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Classification: 430.310.325.305.310.310