# 2/2 Cartridge Seat Valve, Size 5

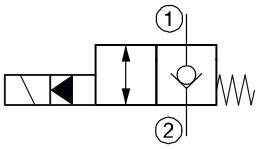
$Q_{max}$ = 40 l/min, $p_{max}$ = 350 bar
with solenoid operation, seat-valve shut-off, two stage
Series WR22G…/ WR22O…

- With seat-valve shut-off from 1 → 2
- Compact design for two different cavity types: AL – 3/4-16 UNF, ALM – M20x1,5
- High flow rates
- Low headloss
- Reliable switching, even after long dwell times
- Nominal power consumption 17 W – optionally 27 / 25 W
- 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

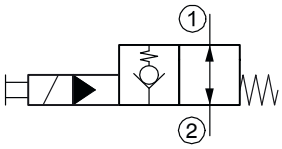
## 1 Description

These 2/2 solenoid-operated directional seat valves, series WR22G.../ WR22O…, are size 5, two stage, pressure balanced screw-in cartridges with an 3/4-16 UNF or M20x1.5 mounting thread. They are designed on the poppet/seat principle, and the 1 → 2 flow path is therefore virtually leak-free. "De-energised closed" and "de-energised open" functions are available. The switching times can be influenced by using solenoid coils with differing power ratings. The straightforward design delivers a good price/performance ratio and outstanding headloss/flow ratings. These 2/2 solenoid operated seat valves are used in mobile and industrial applications where leak-tight shut-off functions are crucially important. Examples are where loads, tensions, or clamping forces must be held without leakage. 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. The slip-on coils can be replaced without opening the hydraulic envelope and can be positioned at any angle through 360°. 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




WR22G…




WR22O…

## 3 Technical data

| General characteristics | Description, value, unit |
|---|---|
| Designation | 2/2 cartridge seat valve |
| Design | with solenoid operation, seat-valve shut-off, two stage |
| Mounting method | screw-in cartridge 3/4-16 UNF or M20x1.5 |
| Tightening torque | 50 Nm ± 10 % |

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| General characteristics | Description, value, unit |
|---|---|
| Size | NS 5, cavity type AL 3/4-16 UNF<br>cavity type ALM M20x1.5 |
| Weight | 0.40 kg |
| Mounting attitude | unrestricted |
| Ambient temperature range | -25 °C … +50 °C |

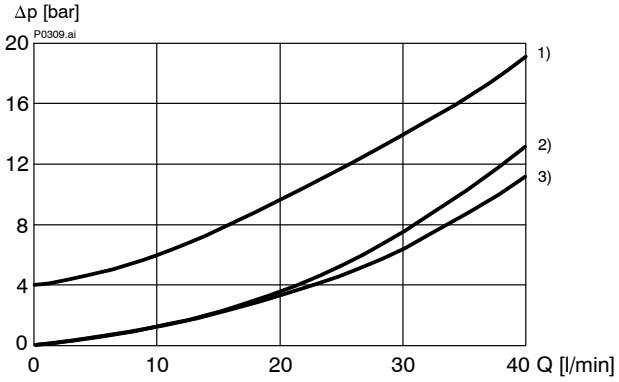
| Hydraulic characteristics | Description, value, unit |
|---|---|
| Maximum operating pressure (ports 1 and 2) | 350 bar |
| Maximum flow rate | 40 l/min |
| Flow direction | 1 → 2 / 2 → 1, see symbols<br>Switching safety achieved by flow and Δp. |
| Hydraulic fluid | HL and HLP mineral oil to DIN 51 524;<br>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<br>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 | - version **"E"**<br>- version **"N"** | V DC = 17 W / V AC = 17 W<br>V DC = 27 W / V AC = 25 W |
| Switching time | - version WR22GE…5 | 30 … 120 ms (energising)<br>75 … 220 ms (de-energising) |
| | - version WR22OE…5 | 35 … 105 ms (energising)<br>20 … 70 ms (de-energising) |
| | - version WR22GN…5 | 30 … 140 ms (energising)<br>35 … 95 ms (de-energising) |
| | - version WR22ON…5 | 25 … 135 ms (energising)<br>20 … 40 ms (de-energising) |
| | | Depending on pressure, flow rate and viscosity as well as dwell time under pressure, the switching times may vary from the the stated values. |
| Relative duty cycle | | 100 % |
| Protection class to ISO 20 653 / EN 60 529 | | IP 65 / IP 67 / IP 69K, see "Ordering code"<br>(with appropriate mating connector and<br>proper fitting and sealing) |
| Electrical connection | | DIN EN 175301-803, 3-pin 2 P+E (standard)<br>for other connectors, see "Ordering code" |

# 4 Performance graphs

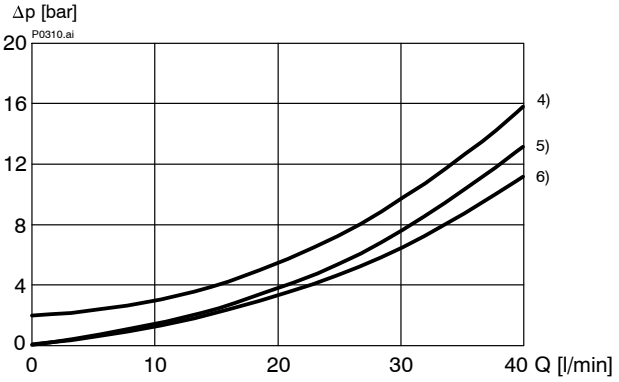
measured with oil viscosity 33 $mm^2/s$ (cSt), coil at steady-state temperature and 10 % undervoltage

Δp = f (Q) Pressure drop - Flow rate characteristic [WR22GN…]



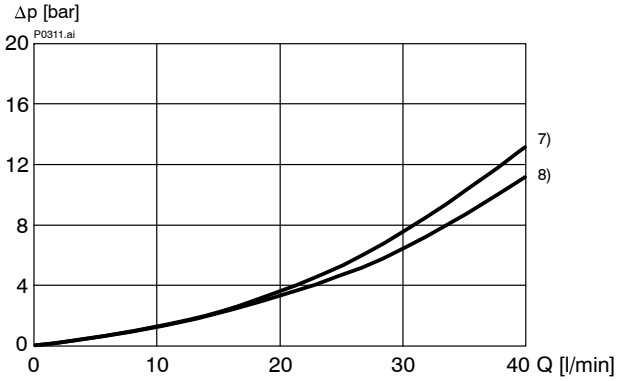

1) 2 → 1, solenoid de-energising
2) 1 → 2, solenoid energising
3) 2 → 1, solenoid energising

Δp = f (Q) Pressure drop - Flow rate characteristic [WR22GE…]



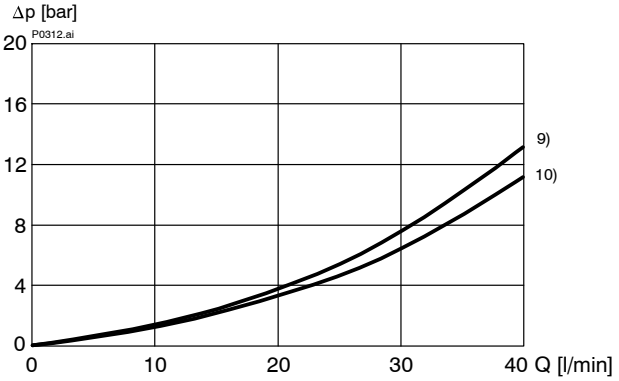

4) 2 → 1, solenoid de-energising
5) 1 → 2, solenoid energising
6) 2 → 1, solenoid energising

Δp = f (Q) Pressure drop - Flow rate characteristic [WR22ON…]



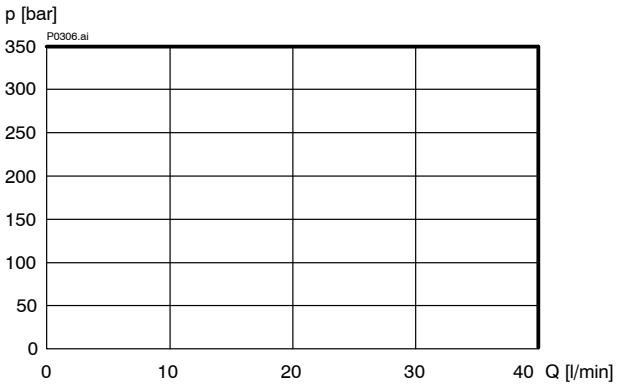

7) 2 → 1, solenoid de-energising
8) 1 → 2, solenoid de-energising

Δp = f (Q) Pressure drop - Flow rate characteristic [WR22OE…]




9) 2 → 1, solenoid de-energising
10) 1 → 2, solenoid de-energising

p = f (Q) Performance limits



# 5 Installation information

IMPORTANT!
When fitting the cartridges, 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.

3/4-16 UNF "A" – NBR seal kit no. DS-246-N [1)]

| Item | Qty. | Description |
|---|---|---|
| 1 | 1 | O-ring no. 017 ∅ 17.17 x 1.78 N90 |
| 2 | 1 | O-ring no. 014 ∅ 12.42 x 1.78 N90 |
| 3 | 2 | O-ring ∅ 16.00 x 2.00 Viton |
| 4 | 2 | Backup ring ∅ 10.70 x 1.45 x 1.00 FI0751 |

IMPORTANT!
[1)] Seal kit with FKM (Viton) seals, no. DS-246-V

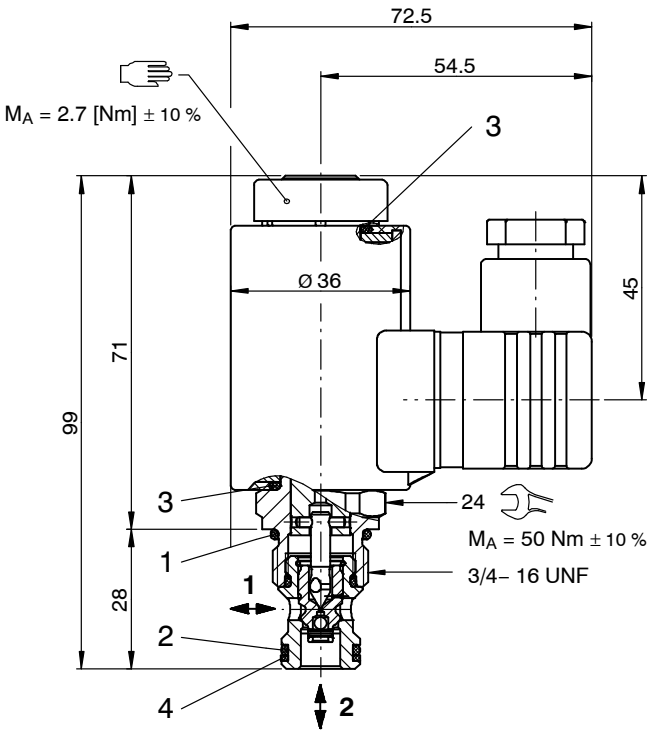
M20x1,5 "Z" – NBR seal kit no. DS-245-N [2)]

| Item | Qty. | Description |
|---|---|---|
| 1 | 1 | O-ring no. 017 ∅ 17.17 x 1.78 N90 |
| 2 | 1 | O-ring no. 013 ∅ 10.82 x 1.78 N90 |
| 3 | 2 | O-ring ∅ 16.00 x 2.00 Viton |
| 4 | 2 | Backup ring ∅ 9.90 x 1.45 x 1.40 FI0751 |

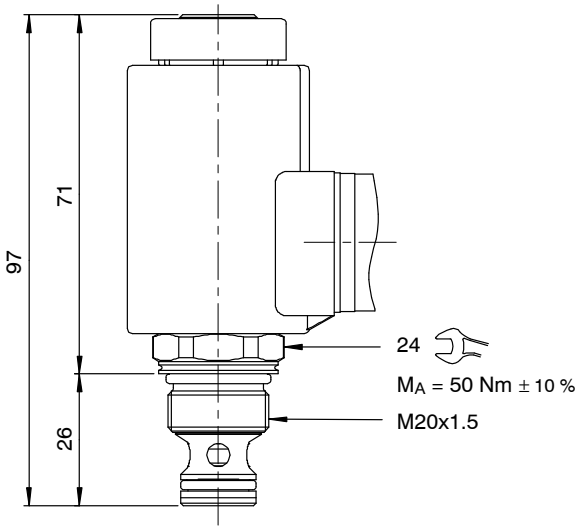
IMPORTANT!
[2)] Seal kit with FKM (Viton) seals, no. DS-245-V

# 6 Dimensions & sectional view

## 6.1 “Normally closed“ design WR22G…

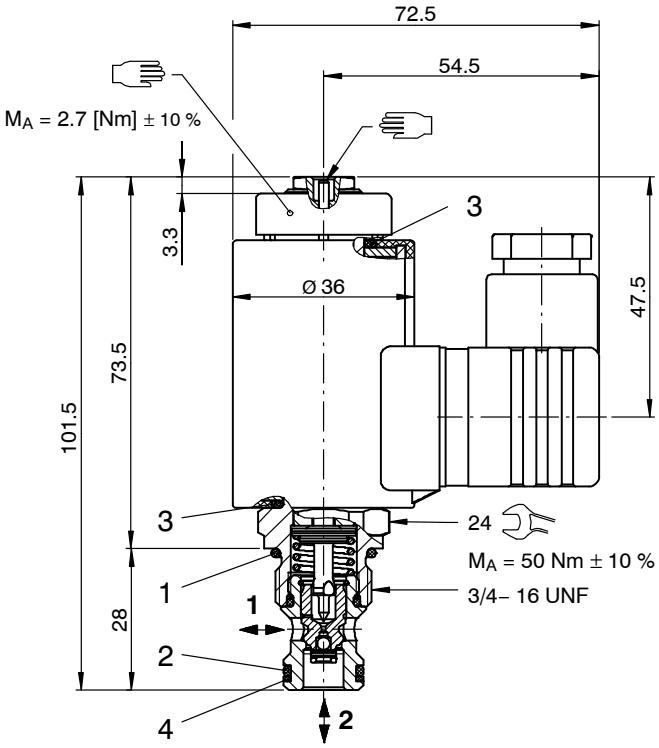



with thread 3/4-16 UNF – Cavity type AL

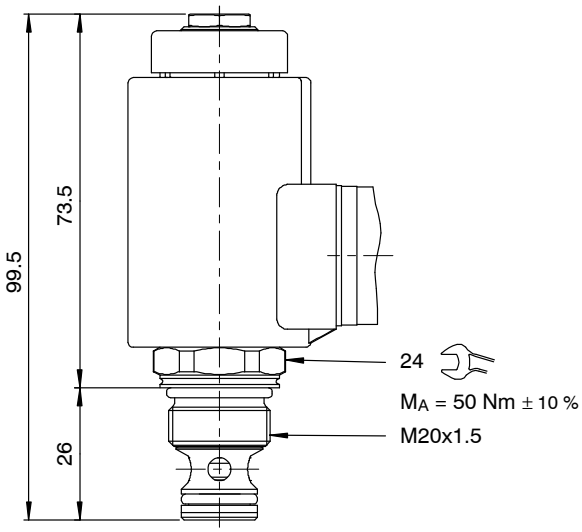



with thread M20x1,5 – Cavity type ALM

## 6.2 “Normally open“ design WR22O…




with thread 3/4-16 UNF – Cavity type AL




with thread M20x1,5 – Cavity type ALM

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# 7 Ordering code

Ex. W R 22G E A 5 _ - 5 24 D _

| | | |
|---|---|---|
| W | = | directional valve |
| R | = | check valve function, seated design, two stage |
| 22G | = | 2/2 function, de-energised closed |
| 22O | | 2/2 function, de-energised normally open |
| E | = | electrically operated, V DC = 17 W / V AC = 17 W (**standard**) |
| N | = | electrically operated, V DC = 27 W / V AC = 25 W |
| A | = | standard model - with thread 3/4 - UNF |
| Z | = | special features - with thread M20x1,5 |
| 5 | = | nominal size 5 |
| (blank) | = | NBR (Nitrile) seals (**standard**) |
| V | = | FKM (Viton) seals |
| | | (special seals - please contact BUCHER) |
| 1 ... 9 | = | design stage (omit when ordering new units) |
| ... | = | voltage e.g. **24** (24 V) |
| D | = | current DC |
| A | = | current AC |
| (blank) | = | DIN EN 175301-803 connection with mating plug (**standard, IP 65**) |
| M100 | = | DIN EN 175301-803 connection without mating plug |
| C | = | Kostal plug connection (IP 65) |
| JT | = | Junior Timer radial plug connection (with protection diode, IP65) |
| IT | = | Junior Timer axial plug connection (with protection diode, IP65) |
| D | = | Deutsch plug connection 45° DT04-2P (IP67/69K) |
| DT | = | Deutsch plug connection 45° DT04-2P (with protection diode, IP67/69K) |
| S | = | AMP Superseal 1.5 (IP67) / Metri-Pack 150 (IP65) plug connection |
| F | = | flying leads (500 mm) |

mating plug not supplied

# 8 Related data sheets

| Reference | (Old no.) | Description |
|---|---|---|
| 400-P-040011 | (i-32) | The form-tool hire programme |
| 400-P-040171 | (i-33.10) | Cavity type AL |
| 400-P-040201 | (i-33.13) | Cavity type ALM |
| 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-720101 | (G-4.10) | Line-mounting body, type GALA (G 3/8") |
| 400-P-720105 | (G-4.11) | Line-mounting body, type GALMA (G 3/8") |

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