**RE 29 583/07.03**

Replaces: 10.02

**Servo directional valve of 4-way design**

**Type 4WS.2E...**

Nominal size 10
Series 5X
Maximum operating pressures 315 bar
Maximum flow 180 L/min

**Overview of contents**

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<td>19</td>
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</tbody>
</table>

**Features**

- Valve control for closed loop position, force and speed control
- 2-stage servo valve with mechanical or mechanical and electrical feedback
- 1st stage as jet/flapper plate amplifier
- For subplate mounting,
  Porting pattern to DIN 24 340 form A10 with ports X and Y
  Subplates to catalogue sheet RE 45 054 (separate order)
- Dry torque motor, no contamination of the magnetic gap by the pressure fluid
- Can also be used as a 3-way version
- Wear-free spool return element
- Three control variants

- Control:
  - External electronics in Eurocard or modular format (separate order), see page 7
  - Or with the electronics integrated into the valve
  - Valve and integrated electronics are adjusted and tested
  - Pilot oil supply and drain, internal/external can be changed without dismantling the valve
  - Spool with flow force compensation
  - Pressure chambers in the control bush have gap seals, no O-ring wear
  - Filter for 1st stage is externally accessible
Electrically actuated 2-stage servo valve in a 4-way version

For external control electronics
With integrated control electronics

Mechanical feedback = M
Mechanical and electrical feedback (only available with integrated electronics)

Nominal size 10

Series 50 to 59 (50 to 59: unchanged installation and connection dimensions)

**Nominal flow**
With a valve pressure differential $\Delta p = 70\text{ bar}$

- $5 \text{ L/min} = 5$
- $10 \text{ L/min} = 10$
- $20 \text{ L/min} = 20$
- $30 \text{ L/min} = 30$
- $45 \text{ L/min} = 45$
- $60 \text{ L/min} = 60$
- $75 \text{ L/min} = 75$
- $90 \text{ L/min} = 90$

**Spool overlap**
$0$ to $0.5\%$ negative

**Electrical control data**

Valves for external control electronics: The control signal has to be generated by a current regulated output stage. For servo amplifiers see page 7.

Valves with integrated control electronics: For valves with integrated control electronics the command value can be a voltage (ordering code “9”) or where there is extensive cabling (> 25 m between the control and valve) as a current (ordering code “13”).

**Pilot oil**
Care should be taken to ensure that the pilot oil supply pressure is as constant as possible. It is therefore often advantageous to provide an external pilot control via port X. To positively influence the dynamics, the valve can be operated with a higher pressure at port X than at port P.

Ports X and Y are also pressurised with “internal” pilot oil supply.

**Inlet pressure range**
The system pressure should be held as constant as possible.

Pilot pressure range: 10 to 210 bar or 10 to 315 bar

With reference to the dynamics the frequency relationship within the permissible pressure range has to be taken into account.

**Seal materials**
If a different seal material is required please consult us!

**Further details in clear text**
Here special requirements should be stated in clear text. Following the receipt of an order these requirements will be checked at the factory and valve code supplemented with an additional number.
Test unit

Test unit (battery operated, optionally with a power supply) to catalogue sheet RE 29 681

Attention:
– Only for valves with external control electronics

Test unit for proportional and servo valves with integrated control electronics
Type VT-VET-1, series 1X to catalogue sheet RE 29 685.

The test unit is used for the control and for functional testing of proportional and servo valves with integrated electronics. It is suitable for testing valves with an operating voltage of ± 15 V or 24 V.

Preferred types (readily available)

Valves for external control electronics, mechanical feedback

<table>
<thead>
<tr>
<th>Material No.</th>
<th>Type 4WS2EM</th>
</tr>
</thead>
<tbody>
<tr>
<td>R90075537</td>
<td>4WS2EM 10-5X/5B11ET315K31EV</td>
</tr>
<tr>
<td>R900956128</td>
<td>4WS2EM 10-5X/10B11ET315K31EV</td>
</tr>
<tr>
<td>R90099227</td>
<td>4WS2EM 10-5X/20B11ET315K31EV</td>
</tr>
<tr>
<td>R900949285</td>
<td>4WS2EM 10-5X/30B11ET315K31EV</td>
</tr>
<tr>
<td>R90099297</td>
<td>4WS2EM 10-5X/45B11ET315K31EV</td>
</tr>
<tr>
<td>R900949286</td>
<td>4WS2EM 10-5X/60B11ET315K31EV</td>
</tr>
<tr>
<td>R90099291</td>
<td>4WS2EM 10-5X/75B11ET315K31EV</td>
</tr>
<tr>
<td>R900922801</td>
<td>4WS2EM 10-5X/90B11ET315K31EV</td>
</tr>
</tbody>
</table>

Valves with integrated control electronics, mechanical feedback

<table>
<thead>
<tr>
<th>Material No.</th>
<th>Type 4WSE2EM</th>
</tr>
</thead>
<tbody>
<tr>
<td>R90075537</td>
<td>4WSE2EM 10-5X/5B9ET315K31EV</td>
</tr>
<tr>
<td>R900956128</td>
<td>4WSE2EM 10-5X/10B9ET315K31EV</td>
</tr>
<tr>
<td>R90099227</td>
<td>4WSE2EM 10-5X/20B9ET315K31EV</td>
</tr>
<tr>
<td>R900949285</td>
<td>4WSE2EM 10-5X/30B9ET315K31EV</td>
</tr>
<tr>
<td>R90099297</td>
<td>4WSE2EM 10-5X/45B9ET315K31EV</td>
</tr>
<tr>
<td>R90099286</td>
<td>4WSE2EM 10-5X/60B9ET315K31EV</td>
</tr>
<tr>
<td>R90099291</td>
<td>4WSE2EM 10-5X/75B9ET315K31EV</td>
</tr>
<tr>
<td>R90099296</td>
<td>4WSE2EM 10-5X/90B9ET315K31EV</td>
</tr>
</tbody>
</table>

The following modes of operation are possible:
– External operation → passing on the operating voltage and command values from the control cabinet to the valve
– Internal/external operation → command value via the test unit; operating voltage from the control cabinet
– Internal operation → operating voltage via a separate power supply; command value via the test unit
– Command values via the BNC socket → optional operational voltage

Symbols

Preferred types and standard components are highlighted in the RPS (Standard Price list).

Preferred types and standard components are highlighted in the RPS (Standard Price list).

Valves for external control electronics

Simplified

Valves for external control electronics

Detailed

Mechanical feedback

Valves with integrated control electronics

Electrical and mechanical feedback

Preferred types and standard components are highlighted in the RPS (Standard Price list).
The valve types 4WS(E)2EM10-5X/... are electrically actuated, 2-stage servo directional valves with a porting pattern to DIN 24 340 form A10. They are primarily used for the closed loop control of position, force and velocity.

These valves comprise of an electro-mechanical converter (torque motor) (1), a hydraulic amplifier (flapper jet principle) (2) and a control spool (3) in a bush (2nd stage), that is connected to the torque motor via a mechanical feedback.

Via an electrical input signal at the coils (4) of the torque motor, a force is generated via a permanent magnet at the armature (5), that in conjunction with a torque tube (6) generates a torque. Due to this the flapper plate (7), which is connected with the torque tube (6) via a rod, is moved out of the central position between the control orifices (8) a pressure differential now results which acts on the front face of the control spool. This pressure differential causes the spool to move, whereby the pressure connection is connected to an actuator connection and at the same time the other actuator connection is connected to the return connection.

The control spool is connected via a feedback spring (mechanical feedback) (9) to the flapper plate and torque motor. The control spool continues to change position until the torque feedback, via the feedback spring and the electro-magnetic torque of the torque motor are balanced, and the pressure differential at the flapper jet system becomes zero.

The stroke of the control spool and thus the flow through the pilot control valve is closed loop controlled in proportion to the electrical input signal. It has, however to be taken into account that the flow is dependent on the valve pressure differential.

**4WSE2ED10-5X/...**

This type of valve has in addition to the mechanical control via a feedback spring an electrical spool position acquisition and closed loop control. The spool position is obtained via an inductive position transducer (11). The position transducer signal is compared with the command value via the integrated control electronics (10). Any possible control deviation is electrically amplified and then passed onto the torque motor as a control signal. With the additional electrical feedback it is possible to obtain higher dynamic values in the small signal range than the mechanical version due to the electrical closed loop amplification. The mechanical feedback ensures that, in the case of failure of the electrical power supply, the spool is positioned in the zero range.

The valve is only available with integrated control electronics. The valve zero point can be adjusted by an externally accessible potentiometer.
Section

Type 4WSE2EM 10…

Type 4WSE2ED 10…
**Technical data** (for applications outside these parameters, please consult us!)

### General

<table>
<thead>
<tr>
<th>Porting pattern</th>
<th>DIN 24 340 form A10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installation</td>
<td>Optional, it has to be ensured the pilot control is supplied with adequate pressure, (≥ 10 bar) when starting-up the system!</td>
</tr>
<tr>
<td>Storage temperature range</td>
<td>°C</td>
</tr>
<tr>
<td>Ambient temperature range</td>
<td>°C</td>
</tr>
<tr>
<td>Weight</td>
<td>kg</td>
</tr>
<tr>
<td>With mechanical feedback</td>
<td>3.56</td>
</tr>
<tr>
<td>With mechanical and electrical feedback</td>
<td>3.65</td>
</tr>
</tbody>
</table>

### Hydraulic (measured with HLP 32, θ\textsubscript{oil} = 40 °C ± 5 °C)

<table>
<thead>
<tr>
<th>Operating pressure: Pilot control stage, pilot oil supply</th>
<th>bar</th>
<th>10 to 210 or 10 to 315</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main valve, ports P, A, B</td>
<td>bar</td>
<td>Up to 315</td>
</tr>
<tr>
<td>Return pressure: Port T Internal pilot oil drain</td>
<td>bar</td>
<td>Permissible pressure peaks &lt; 100</td>
</tr>
<tr>
<td>External pilot oil drain</td>
<td>bar</td>
<td>Up to 315</td>
</tr>
<tr>
<td>Port Y</td>
<td>bar</td>
<td>Permissible pressure peaks &lt; 100, static &lt; 10</td>
</tr>
<tr>
<td>Pressure fluid</td>
<td>Mineral oil (HL, HLP) to DIN 51 524, other pressure fluids on request!</td>
<td></td>
</tr>
<tr>
<td>Pressure fluid temperature range</td>
<td>°C</td>
<td>–15 to +80; preferably +40 to +50</td>
</tr>
<tr>
<td>Viscosity range</td>
<td>mm(^2)/s</td>
<td>15 to 380; preferably 30 to 45</td>
</tr>
<tr>
<td>Cleanliness class to ISO codes</td>
<td>Maximum permissible degree of contamination of the pressure fluid is to ISO 4406 (C) class 18/16/13 (^1)</td>
<td></td>
</tr>
</tbody>
</table>

#### Zero flow \(q_{V,L}^{0}\) \(^2\)

<table>
<thead>
<tr>
<th>Measured without dither signal</th>
<th>L/min</th>
<th>(\frac{p}{V_{\text{bar}}^L} \frac{\text{bar}}{\text{min}})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal flow (q_{V,\text{nom}} \pm 10%) (^3) with a valve pressure differential (\Delta p = 70) bar (^5)</td>
<td>L/min</td>
<td>5</td>
</tr>
<tr>
<td>Control spool stroke</td>
<td>mm</td>
<td>0.29</td>
</tr>
<tr>
<td>Max. possible control spool stroke at mechanical end stop referring to the nominal stroke (in the case of a fault)</td>
<td>%</td>
<td>120 to 170</td>
</tr>
<tr>
<td>Feedback system</td>
<td>mechanical (M)</td>
<td>mech. and elektr. (D)</td>
</tr>
<tr>
<td>Hysteresis (dither optimised)</td>
<td>%</td>
<td>≤ 1.5</td>
</tr>
<tr>
<td>Reversal span (dither optimised)</td>
<td>%</td>
<td>≤ 0.3</td>
</tr>
<tr>
<td>Response sensitivity (dither optimised)</td>
<td>%</td>
<td>≤ 0.2</td>
</tr>
<tr>
<td>Pressure amplification 1 % spool stroke change (from the hydraulic zero point)</td>
<td>% of (p_{p})</td>
<td>≥ 30</td>
</tr>
<tr>
<td>Balance current over the entire operating pressure range</td>
<td>%</td>
<td>≤ 3, long term ≤ 5</td>
</tr>
<tr>
<td>Zero displacement with changes to:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pressure fluid temperature</td>
<td>%/20 °C</td>
<td>≤ 1</td>
</tr>
<tr>
<td>Ambient temperature</td>
<td>%/20 °C</td>
<td>≤ 1</td>
</tr>
<tr>
<td>Operating pressure 80 to 120 % of (p_{p})</td>
<td>%/100 bar</td>
<td>≤ 2</td>
</tr>
<tr>
<td>Return pressure 0 to 10 % of (p_{p})</td>
<td>%/bar</td>
<td>≤ 1</td>
</tr>
</tbody>
</table>

\(^1\) The cleanliness class stated for the components must be adhered too in hydraulic systems. Effective filtration prevents faults from occurring and at the same time increases the component service life.

For the selection of filters see catalogue sheets RE 50 070, RE 50 076 and RE 50 081.

\(^2\) \(q_{V,L}^{0}\) = Zero flow in L/min

\(^3\) \(q_{V,\text{nom}}\) = Nominal flow (entire valve) in L/min

\(^4\) \(p_{p}\) = Operating pressure in bar

\(^5\) \(\Delta p\) = Valve pressure differential in bar
Technical data (for applications outside these parameters, please consult us!)

### Electrical

<table>
<thead>
<tr>
<th>Feedback system</th>
<th>Mechanical „M”</th>
<th>Mechanical and electrical „D”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Valve protection to EN 60 529</td>
<td>IP 65 with mounted and fixed plug-in connector</td>
<td></td>
</tr>
</tbody>
</table>

#### Signal type

<table>
<thead>
<tr>
<th>Nominal current per coil</th>
<th>mA</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistance per coil</td>
<td>Ω</td>
<td>85</td>
</tr>
</tbody>
</table>

#### Inductivity at 60 Hz and 100% nom. current:

<table>
<thead>
<tr>
<th>Serial connection</th>
<th>H</th>
<th>1.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parallel connection</td>
<td>H</td>
<td>0.25</td>
</tr>
</tbody>
</table>

#### Recommended superimposed dither signal: $f = 400$ Hz

The amplitude is dependent on the hydraulic system: max. 5% of the nominal current

### Electrical, external control electronics (only version „M”)

<table>
<thead>
<tr>
<th>Amplifier</th>
<th>Eurocard format</th>
<th>Analogue</th>
<th>Type VT-SR2-1X/… to catalogue sheet RE 29 980</th>
</tr>
</thead>
<tbody>
<tr>
<td>(separate order)</td>
<td>Module format</td>
<td>Analogue</td>
<td>Type VT 11021 to catalogue sheet RE 29 743</td>
</tr>
</tbody>
</table>

#### Note:

For details regarding the **environmental simulation test** covering EMC (electro-magnetic compatibility), climate and mechanical loading see RE 29 583-U (Declaration regarding environmental compatibility).

### Plug-in connectors

Plug-in connector to DIN EN 175.201-804
Separate order under Material No. **R900223890** (metal version)

### Electrical connections, external control electronics

Type 4WS2EM 10-5X…

The electrical connections can be made in either series or parallel. Due to operational safety reasons and the low coil inductivity, we recommend the parallel connection.

The bridge E-F can be used for the electrical recognition that the plug is correctly connected or for cable break recognition.

#### Parallel connection:
In the plug-in connector connect contact A with B and C with D.

#### Serial connection:
In the plug-in connector connect contact B with C.

Electrical control from A (+) to D (–) causes a flow direction of P to A and B to T. By reversing the electrical control the direction of flow is P to B and A to T.

$E \rightarrow F = \text{Bridge}$
Electrical connections, integrated control electronics

Type 4WSE2EM 10-5X/…

Zero point adjustment

Current Voltage Plug-in connector allocation
Power supply Control “13” Control “9”
A + 15 V + 15 V
B − 15 V − 15 V
C ⊥ ⊥

Power supply: ± 15 V ± 3 %, residual ripple < 1 %

Command value:
Command value at plug-in connector connection D = positive against plug-in connector connection E causes a flow from P to A and B to T. Measurement output F has a positive signal against ⊥.
Command value at plug-in connector connection D = negative against plug-in connector connection E causes a flow from P to B and A to T. Measurement output F has a negative signal against ⊥.

Measurement output: The voltage signal is proportional to the control spool stroke.

Note: Electrical signals (e.g. actual value) obtained via the valve electronics must not be used to switch-off the machine safety functions!
(Also see European standard regulations "Safety requirements of fluid technology systems and components – hydraulics" EN 982!)
**Characteristic curves** (measured with HLP 32, \( \vartheta_{\text{oil}} = 40 ^\circ \text{C} \pm 5 ^\circ \text{C} \))

**Flow-load function** (tolerance ± 10 %)

<table>
<thead>
<tr>
<th>Nominal flow</th>
<th>Flow in L/min</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 L/min</td>
<td>30 L/min</td>
</tr>
<tr>
<td>10 L/min</td>
<td>45 L/min</td>
</tr>
<tr>
<td>20 L/min</td>
<td>60 L/min</td>
</tr>
</tbody>
</table>

at 100 % command value signal

\[ \Delta p = \text{Valve pressure differential (inlet pressure } p_P \text{ minus load pressure } p_L \text{ and minus return pressure } p_T) \]

**Tolerance field of the flow signal function**

at a constant valve pressure differential

![Flow-load function diagram](image)
Characteristic curves: types 4WS.2EM 10 and 4WSE2ED 10 (measured with HLP 32, \( \vartheta_{\text{oil}} = 40^\circ \text{C} \pm 5^\circ \text{C} \))

Transient functions with the 315 bar pressure stage, step response without flow

![Graph showing transient functions](image)

Frequency response with the 315 bar pressure stage, stroke frequency response without flow

![Graph showing frequency response](image)

The relationship of the frequency \( f \) at \(-90^\circ\) to the operating pressure \( p \) and the input amplitude

![Graph showing frequency relationship](image)
Characteristic curves: types 4WS.2EM 10 and 4WSE2ED 10 (measured with HLP 32, \( \vartheta_{\text{oil}} = 40 ^\circ \text{C} \pm 5 ^\circ \text{C} \))

Transient functions with the 315 bar pressure stage, step response without flow

![Graph showing transient functions with 315 bar pressure stage.]

Frequency response with the 315 bar pressure stage, stroke frequency response without flow

![Graph showing frequency response with 315 bar pressure stage.]

The relationship of the frequency \( f \) at \(-90^\circ\) to the operating pressure \( p \) and the input amplitude

![Graph showing the relationship of frequency to operating pressure and input amplitude.]

Note: Graphs and data tables are not included in this text format due to the nature of the content.
Characteristic curves: types 4WS.2EM 10 and 4WSE2ED 10 (measured with HLP 32, $\vartheta_{\text{oil}} = 40 ^\circ \text{C} \pm 5 ^\circ \text{C}$)

Transient functions with the 315 bar pressure stage, step response without flow

Frequency response with the 315 bar pressure stage, stroke frequency response without flow

The relationship of the frequency $f$ at $-90 ^\circ$ to the operating pressure $p$ and the input amplitude

---

RE 29 583/07.03 12/20
Characteristic curves: types 4WS.2EM 10 and 4WSE2ED 10 (measured with HLP 32, $\vartheta_{oil} = 40^\circ C \pm 5^\circ C$)

Transient functions with the 315 bar pressure stage, step response without flow

Frequency response with the 315 bar pressure stage, stroke frequency response without flow

The relationship of the frequency $f$ at $-90^\circ$ to the operating pressure $p$ and the input amplitude
Characteristic curves: types 4WS.2EM 10 and 4WSE2ED 10 (measured with HLP 32, $\vartheta_{oil} = 40 ^\circ C \pm 5 ^\circ C$)

Transient functions with the 315 bar pressure stage, step response without flow

Frequency response with the 315 bar pressure stage, stroke frequency response without flow

The relationship of the frequency $f$ at $-90 ^\circ$ to the operating pressure $p$ and the input amplitude
Characteristic curves: types 4WS.2EM 10 and 4WSE2ED 10 (measured with HLP 32, $\vartheta_{oil} = 40 \, ^\circ C \pm 5 \, ^\circ C$)

Transient functions with the 315 bar pressure stage, step response without flow

Frequency response with the 315 bar pressure stage, stroke frequency response without flow

The relationship of the frequency $f$ at $-90^\circ$ to the operating pressure $p$ and the input amplitude

![Graphs showing transient functions, frequency response, and amplitude relationship]
Unit dimensions: type 4WS2EM 10 (dimensions in mm)

Mechanical feedback / external control electronics,
Type 4WS2EM 10-5X/…

1. Cap
2. Plug-in connector
   (separate order, see page 7)
3. Space required to remove the plug-in connector,
   take connection cable into account!
4. Exchangeable filter element
   Material No.: R900306843 with FKM seal
   22A/F, $M_a = 30$ Nm
5. Profile seal for filter screw $16 \times 1.5$
   Material No.: R900012503 (FKM seal)
6. Name plate
7. Identical seal rings for ports A, B, P, TA and TB
8. Identical seal rings for ports X and Y
   Ports X and Y are also pressurised with the option
   "internal" pilot oil.
9. Machined valve contact area, position of ports to DIN 24 340
   form A10, ISO 4401 and CETOP-RP121H
10. Valve fixing screws
    4 off M6 x 70 DIN 912-10.9 NEL, $M_a = 16$ Nm
    (are included within the scope of supply)

Subplates to catalogue sheet RE 45 054 must be ordered separately.

G 66/01  (G 3/8)
G 67/01  (G 1/2)
G 535/01  (G 3/4)
G 535/02  (M 27 x 2)
G 536/01  (G 1)
G 536/02  (M 33 x 2)

With ports X and Y

Required surface finish
of the mating piece
Unit dimensions: type 4WSE2EM 10 (dimensions in mm)

Mechanical feedback / integrated control electronics

Type 4WSE2EM 10-5X/…

1. Cap with integrated control electronics
2. Electrical zero point adjustment:
   After removing the 2.5A/F plug, a correction, via a potentiometer, to the zero point is possible.
3. Plug-in connector
   (separate order, see page 7)
4. Space required to remove the plug-in connector, take connection cable into account!
5. Exchangeable filter element
   Material No.: R900306843 with FKM seal, 22 A/F, \( M_A = 30 \text{ Nm} \)
6. Profile seal for filter screw 16 x 1.5
   Material No.: R900306843 (FKM seal)
7. Name plate
8. Identical seal rings for ports A, B, P, TA and TB
9. Identical seal rings for ports X and Y
   Ports X and Y are also pressurised with the option “internal” pilot oil.
10. Machined valve contact area, position of ports to DIN 24 340 form A10, ISO 4401 and CETOP-RP121H
11. Valve fixing screws
    4 off M6 x 70 DIN 912-10.9 NEL, \( M_A = 16 \text{ Nm} \)
    (are included within the scope of supply)

Subplates to catalogue sheet RE 45 054 must be ordered separately.

G 66/01  (G 3/8)  
G 67/01  (G 1/2)  
G 535/01  (G 3/4)  
G 535/02  (M 27 x 2)  
G 536/01  (G 1)  
G 536/02  (M 33 x 2)  

With ports X and Y

Required surface finish of the mating piece
Unit dimensions: type 4WSE2ED 10 (dimensions in mm)

Electrical and mechanical feedback / integrated control electronics
Type 4WSE2ED 10-5X/…

1. Cap with integrated control electronics
2. Electrical zero point adjustment:
   After removing the 2.5A/F plug, a correction, via potentiometer, to the zero point is possible.
3. Plug-in connector
   (separate order, see page 7)
4. Space required to remove the plug-in connector,
   take connection cable into account!
5. Exchangeable filter element
   Material No.: R900306843 with FKM seal, 22A/F, $M_A = 30$ Nm
6. Profile seal for filter screw 16 x 1.5
   Material No.: R900012503 (FKM seal)
7. Name plate
8. Identical seal rings for ports A, B, P, TA and TB
9. Identical seal rings for ports X and Y
   ports X and Y are also pressurised with the option "internal" pilot oil.
10. Machined valve contact area, position of ports to DIN 24 340
    form A10, ISO 4401 and CETOP-RP121H
11. Valve fixing screws
    4 off M6 x 70 DIN 912-10.9 NEL, $M_A = 16$ Nm
    (are included within the scope of supply)

**Subplates** to catalogue sheet RE 45 054 must be ordered separately.

- G 66/01 (G 3/8)
- G 67/01 (G 1/2)
- G 535/01 (G 3/4)
- G 535/02 (M 27 x 2)
- G 536/01 (G 1)
- G 536/02 (M 33 x 2)
Pilot oil – conversion from internal/external

Pilot oil supply

External pilot oil supply
S.H.C.S. item 2 is fitted.

Internal pilot oil supply
S.H.C.S. item 2 is removed
1 Valve housing
2 S.H.C.S. M3 x 5 DIN 912-10.9, \( M_A = 1.4 \text{ Nm} \)

Pilot oil drain

External pilot oil drain
S.H.C.S. item 2 is fitted.

Internal pilot oil drain
S.H.C.S. item 2 is removed
1 Valve housing
2 S.H.C.S. M3 x 5 DIN 912-10.9, \( M_A = 1.4 \text{ Nm} \)
3 Plug M8 x 1 with seal, Material No. 00017829 \( M_A = 5 \text{ Nm} \)

Flush plate to DIN 24340 form A10 (dimensions in mm)

Symbol

With FKM seals,
Material No. R900912450, Weight: 2 kg

1 R-ring 13 x 1.6 x 2 (A, B, P, TA and TB)
2 R-ring 11,18 x 1.6 x 1.78 (X, Y)
3 4 off S.H.C.S. M6 x 50 DIN 912–10.9, \( M_1 = 16 \text{ Nm} \)
   (are included within the scope of supply)
4 Porting pattern to DIN 24340, form A10

In order to guarantee that the servo valves function correctly, it is absolutely necessary to flush the system before commissioning.

Cleanliness class to ISO code, see page 6.

The following is a guide to the flushing time necessary for the installation:

\[
t \geq \frac{V}{q_Y} \cdot 5
\]

\( t \) = Flushing time in hours
\( V \) = Tank contents in litres
\( q_Y \) = Pump flow in litres per minute

If the tank needs to be refilled with more than 10 % of its capacity it will be necessary to reflush the system.

A directional control valve with a porting pattern to DIN 24340 form A10 is more suitable than a flushing plate for the flushing operation, as the actuator lines can also be flushed. Also see catalogue sheet RE 07 700.
The data specified above only serves to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The details stated do not release you from the responsibility for carrying out your own assessment and verification. It must be remembered that our products are subject to a natural process of wear and ageing.