RPCER1
DIRECT OPERATED
FLOW CONTROL VALVE
WITH ELECTRIC PROPORTIONAL
CONTROL AND POSITION
FEEDBACK
SERIES 52

MOUNTING INTERFACE
ISO 6263-03-03-0-97
(CETOP 4.5.2-2-03-250)

OPERATING PRINCIPLE
— RPCER1 is a pressure and temperature compensated
two-way flow control valve, with electric proportional
control and mounting interface in accordance with the
ISO 6263 standards.
— The position feedback of the flow rate controlling throttle
gives regulation conditions featuring highly reduced
hysteresis and high repeatability.
— It is normally used to control the flow rate into an arm of
the hydraulic circuit or the speed of the hydraulic
actuators.

PERFORMANCES
(obtained with mineral oil with viscosity of 36 cSt at 50°C and electronic control card)

<table>
<thead>
<tr>
<th>Maximum operating pressure</th>
<th>Minimum Δp between A and B port</th>
<th>bar</th>
<th>250</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum controlled flow</td>
<td>Max. controlled flow (1 and 4 l/min, reg.)</td>
<td>l/min</td>
<td>1,5 - 4 - 8 - 16 - 25</td>
</tr>
<tr>
<td>Maximum free-reverse flow</td>
<td></td>
<td>l/min</td>
<td>0,025 - 40</td>
</tr>
<tr>
<td>Step response</td>
<td></td>
<td>see paragraph 7</td>
<td></td>
</tr>
<tr>
<td>Hysteresis</td>
<td>% of Q max</td>
<td>&lt; 2,5%</td>
<td></td>
</tr>
<tr>
<td>Repeatability</td>
<td>% of Q max</td>
<td>&lt; ±1%</td>
<td></td>
</tr>
<tr>
<td>Electrical characteristic</td>
<td></td>
<td>see paragraph 6</td>
<td></td>
</tr>
<tr>
<td>Ambient temperature range</td>
<td>°C</td>
<td>-10 / +50</td>
<td></td>
</tr>
<tr>
<td>Fluid temperature range</td>
<td>°C</td>
<td>-20 / +80</td>
<td></td>
</tr>
<tr>
<td>Fluid viscosity range</td>
<td>cSt</td>
<td>10 ÷ 400</td>
<td></td>
</tr>
<tr>
<td>Fluid contamination degree</td>
<td>According to ISO 4406:1999</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>class 18/16/13</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(class 17/15/12 for flows &lt; 0,5 l/min)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Recommended viscosity</td>
<td>cSt</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Mass</td>
<td>kg</td>
<td>2,2</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: the RPCER1 mounting interface, with holes according to ISO 6263-03, must not have P and T ports

HYDRAULIC SYMBOLS
### 1 - IDENTIFICATION CODE

| R | P | C | E | R | 1 | - | / | C | / | 52 | - | 24 | / |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

- **Compensated flow control valve**
- **Electric proportional control**
- **Position feedback**
- **ISO 6263-03 size**
- **Maximum controlled flow:**
  - $1 = 1.5 \text{l/min}$
  - $4 = 4 \text{l/min}$
  - $8 = 8 \text{l/min}$
  - $16 = 16 \text{l/min}$
  - $25 = 25 \text{l/min}$

- **Built-in check valve**
- **Seal:** omit for mineral oils
  - $V = \text{FPM seals for special fluids}$
- **Nominal solenoid voltage:** 24 V DC
- **Series No. (from 50 to 59 sizes and mounting dimensions remain unchanged)**

### 2 - CHARACTERISTIC CURVES

(measured with viscosity of 36 cSt at 50°C and UEIK-11RSQ/52-24 card)

**FLOW CONTROL $Q = f(\text{ref})$**

![FLOW CONTROL Graph](image)

Typical curves for flow rate $A \rightarrow B$ according to the reference signal sent to the electronic control unit.

**PRESSURE DROP $\Delta p = f(Q)$**

![PRESSURE DROP Graph](image)

Pressure drop with free flow $B \rightarrow A$ through check valve.

### 3 - PRESSURE COMPENSATION

The valves are equipped with two restrictors in series. The first is an opening which can be adjusted by the proportional solenoid; the second, controlled by the pressure upstream and downstream of the first restrictor, ensures constant pressure drop across the adjustable restrictor. In these conditions, the set flow rate value is maintained constant within a tolerance limit of ±2% of the full scale flow rate for maximum pressure variation between the valve inlet and outlet chambers.

### 4 - THERMAL COMPENSATION

Thermal compensation of the valve is obtained by adopting the principle of restricted fluid passage, so that the fluid is not influenced significantly by variations in oil viscosity.

For controlled flow rates of lower than 0.5 l/min and with a temperature change of 30°C, flow rate varies by approx. 13% of the set value.

For higher flow rates and with the same temperature change the flow rate variation is <4% of the set flow rate.

### 5 - HYDRAULIC FLUIDS

Use mineral oil-based hydraulic fluids HL or HM type, according to ISO 6743-4.

For these fluids, use NBR seals. For fluids HFDR type (phosphate esters) use FPM seals (code V). For the use of other kinds of fluid such as HFA, HFB, HFC, please consult our technical department.

Using fluids at temperatures higher than 80 °C causes a faster degradation of the fluid and of the seals characteristics. The fluid must be preserved in its physical and chemical characteristics.
6 - ELECTRICAL CHARACTERISTICS

6.1 - Proportional solenoid
The proportional solenoid comprises two parts: tube and coil.

The tube, screwed to the valve body, contains the armature which is designed to reduce friction to a minimum thereby reducing hysteresis.

The armature connected to the LVDT transducer core sends the position status to the electronic control unit.

6.2 - Positional transducer
The feedback control version RPCER1 uses an LVDT type positional transducer with amplified signal to enable precise control of the restrictor and the set flow rate, thus improving repeatability and hysteresis characteristics.

The transducer is fitted coaxially on the proportional solenoid and the connector features 360° positioning.

Technical specifications and connections are indicated here beside.

The transducer is protected against polarity inversion on the power line.

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7 - STEP RESPONSE
(measured with mineral oil with viscosity of 36 cSt at 50°C with UEIK-11RSQ/52-24 card)

Step response is the time taken for the valve to reach 90% of the set pressure value following a step change of reference signal.

The table illustrates typical response times with valve flow rate of 16 l/min and with input pressure of 100 bar.

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8 - INSTALLATION
RPCER1 valves can be installed in any position without impairing correct operation.

Ensure that there is no air in the hydraulic circuit.

Valves are fixed by means of screws or tie rods on a flat surface with planarity and roughness equal to or better than those indicated in the relative symbols. If minimum values are not observed fluid can easily leak between the valve and mounting surface.
9 - OVERALL AND MOUNTING DIMENSIONS

dimensions in mm

1. Mounting surface with sealing rings:
   2 ORM-0140-20 (14x2)

2. Proportional solenoid

3. Position transducer

4. EN 175301-803 (ex DIN 43650) electrical connector for proportional solenoid

5. Electrical connector 4 pin M12 - IP67 PG7 for position transducer

6. Position transducer removal space

7. Connector removal space

8. 4 SHC screws M5x85 included in the supply. Torque: 5 Nm

10 - ELECTRONIC CONTROL UNIT

UEIK-11RSQ/52-24 Eurocard format see cat. 89 315

11 - SUBPLATES

(see cat. 51 000)

PMRPC1-AI3G rear ports

PMRPC1-AL3G side ports

Port dimensions 3/8" BSP