rexroth
A Bosch Company

CDV Valve with Spool position monitoring

RE 18300-31
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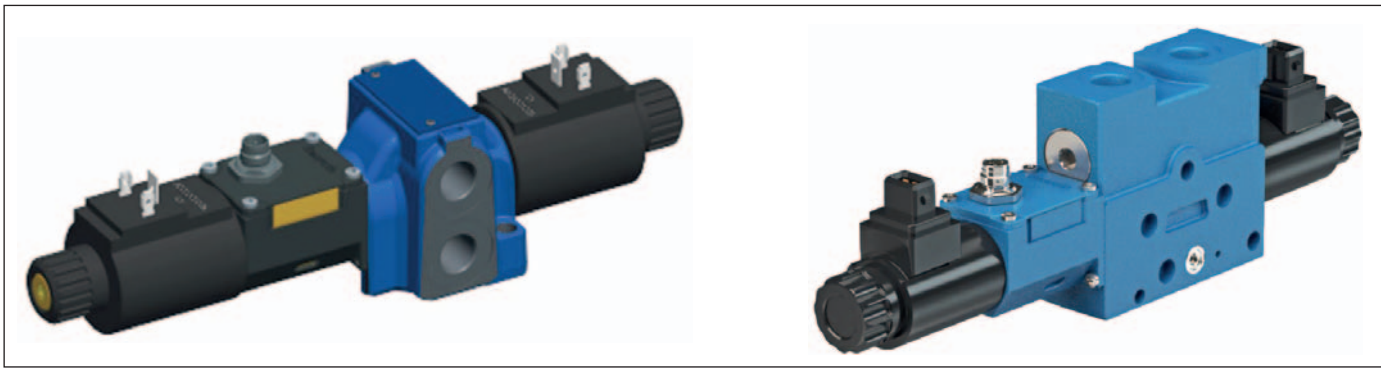
Technical Information Manual



Contents

1. About this manual

This technical user manual is made up of the following parts: All CDV valves with spool position sensor.

1.1 Acronyms used

Acronyms	Description
SPM	Spool Position Sensor
CDV	Compact Directional Valve
ECU	Electronic Control Unit
FMEA	Failure Mode Effect Analysis
PLC	Programmable Logical Circuit
PWM	Pulse Width Modulation
UDC	Power supply Direct Current; also called Vbat for battery voltage
US	Steering voltage for the PVE control; also called VS

1.2 Standards used

- International Organization for Standardization:
  - ISO 13766-1/2 Earth moving machinery, Electromagnetic compatibility
  - ISO 14892 Forest and agriculture
  - ISO 13849 Safety of Machinery
  - ISO 25119-1 Tractors and machinery for agriculture and forestry — Safety-related parts of control systems
- European Standard:
  - EN 280 Working Arial platform
  - EN 12999 Loader cranes
  - EN 13309 Construction machinery
- EU Directive: EMC directive 2014/30/EC
- Conformity with ROhs and REACH directives

2. General information

The valves with spool position sensor has been developed to give a position signal of the spool, due to a voltage range between 0.5V to 4.5 Voltage. Central position is 2.5V for 2 position valves. The valve must be ordered with spool sensor since beginning because each single unit must be set with special dedicated tool.

The main applications are in control blocks with spool feedback requirements, e.g.:

- Loader cranes
- Telehandlers
- Aerial working platform
- Earth moving machinery
- Construction machinery
- Forestry and Agricultural

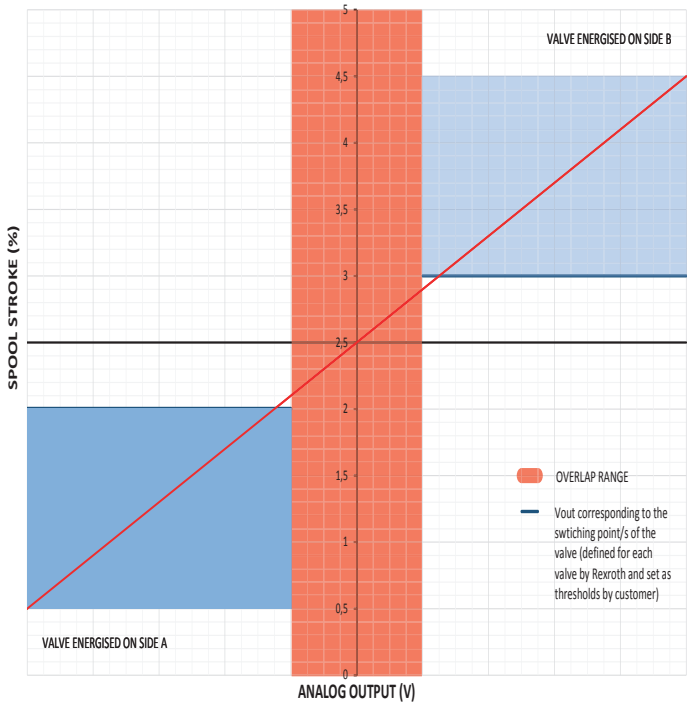
2.1 General Specifications

Universal device suitable for compact directional valves entire portfolio.
Contact-free detection of the control spool position via Hall effect sensor

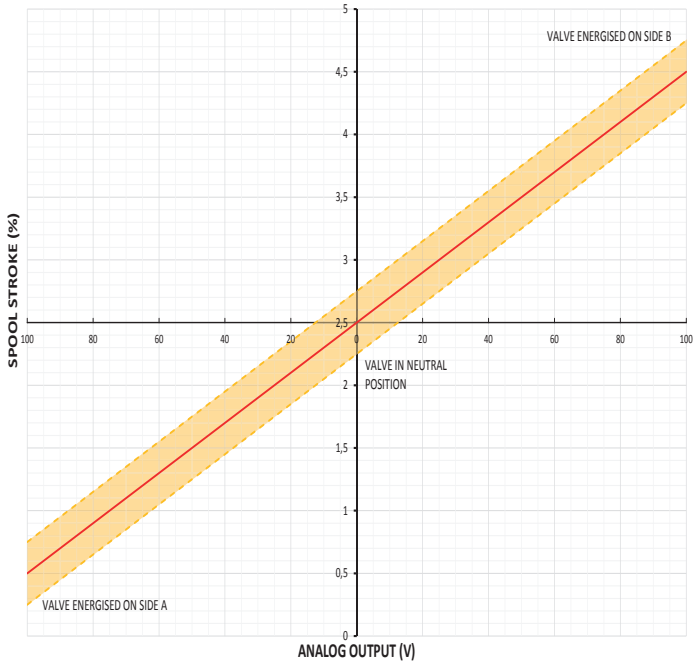
2.2 Functional description

The spool position sensor monitors the position of the control spool in directional CDV valves. The position of the control spool is detected and monitored by a contact- free Hall Effect sensor by reading the movement of the permanent magnet mechanically connected with the spool and is converted by the electronic board into an analog voltage signal through a calculation. When one coil is energized, it pushes the control spool and the "permanent magnet" changes position as well as the magnetic field. The Hall sensor reads the magnetic field translation and modifies electrical feedback. The electronic board is housed in a non-magnetic plastic box attached by two screws to the valve body. A metallic shield wraps the plastic box to protect the spool position sensor from electromagnetic disturbances. The anti-rotation device ensures repeatability of the readings.
The connector is a Molex Ultralock M12 5 PIN male.

2.3 Generic output graph for 3 position On-Off valves



2.4 Generic output graph for 3 position proportional valves



3. Technical data

General		
Additional weight over assembled	kg (lbs)	0.255 (0.56)
Mounting position		On machine's chassis (grounded connected)
Ambient temperature range	°C (°F)	–30....+90 (-22....+194)
Oil temperature	°C (°F)	–30....+100 (-22....+212)
Storage temperature range	°C (°F)	–40....+115 (-104....+239)
Noise test (random) IEC 60068-2-36	Hz	g^2/Hz 0.05 20 to 2000 (10 gRMS duration per axis 24h)
Sinus vibration test DIN EN 60068-2-6	Hz	10 to 57; 1,5mm (PP); 57 to 2000; 10g; n°20 sweeps
Shock resistance DIN EN 60068-2-27	G	30 (11ms; half sine; 3x pos./ 3x neg.)
Shock resistance IEC 60068-2-29	G	25 (6ms; half sine; 1000x pos./ 1000x neg.)
Safety values		MTTFd available on request
Electronic		
Supply voltage Ud	Vdc	8 to 32, according to ISO 16750-2
Output signal Ua	Vdc	Ratiometric 0.5 - 4.5 For detailed graph behaviour please refer to valve datasheet
Max current	mA	20
Output signal response	ms	≤20
Reverse polarity protection		According to ISO 16750-2 to 32 Volt
Accuracy		+/- 5% f.s.
Pin assignment on the connector		See page 2
Type of protection according to ISO 20563		IP67, IP69K
Connection cable		Shielded Lmax< 30mt*
Broadcast Noise ISO 11452	V/m	100
CE mark according to machine directive		Conformity according to EMC directives above mentioned

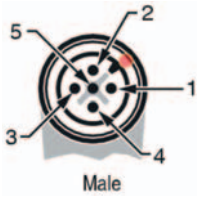
* Industrial application cable <10mt

Note
If the unit is used out of specification, please consult factory.
This sensor is NOT a safety device by itself.

4. Spool sensor working mode

The board starts to send information on pin 1 and pin 2 about the spool about 200ms after the power on.
The correct value is between 0.5V and 4.5V in dual position valve or 2.5V to 4.5V (2.5V to 0.5V) in single direction valve.

5. Connector on sensor



M12 5 PIN male connector (sensor view)

PIN1 = Reverse analog output (Vout-r)*
PIN2 = Analog output (Vout)
PIN3 = Supply voltage (U+) PIN4 = Ground (GND-)
PIN5 = Not to be used

* Vout + Vout-r = Vtot =Constant (used to check the Vout)

6. Accessories

Cables available from factory IP67
Shielded cable with connector M12 4 PIN female.

Cable dimensions

M12x1, straight, 4PM12 and 4PZ24

R900773031 L=2.000 (78.74)
R900064381 L=3.000 (118.11)
R900779489 L=5.000 (196.85)

M12x1, angled, 4PM12

R900779504 L=2.000 (78.74)
R900779503 L=5.000 (196.85)

PIN1 = brown
PIN2 = white
PIN3 = blue
PIN4 = black

IP69K guaranteed from factory only using the following code
R901526925 L=10.000 (393.70)

7. Error description and solution

Problems:

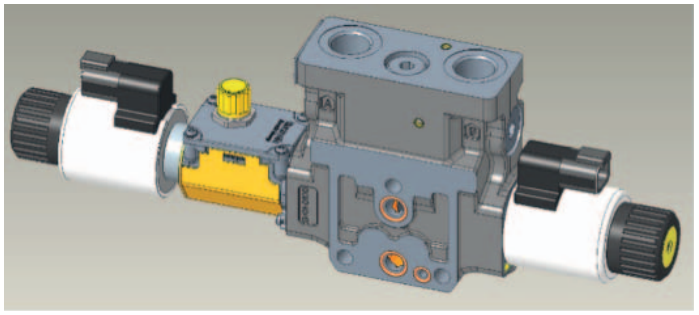
- If the value of pin 1 and pin 2 is between 0 and 0.2V or 4.8 to 5V the board is sending an error.
- No output on pin 1 and 2

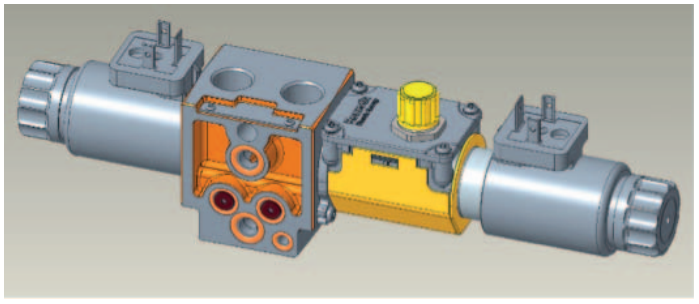
Possible solution:

- Power off, disconnect the cable, check the connections and plugin and power ON. If the problem is still present, there is a fault.
  In case of failure, the valve must be returned to the company, any recalibration or resetting is only made by factory.

8. End of life disposal

The valve and spool sensor has to be disposal as industrial product and must applied local disposal for industrial products.





9. Required and supplementary documentation

- Only commission the product if the documentation marked with the book symbol is available to you and you have understood and observed it.

Table 1: Required and supplementary documentation

	Title	Document number	Document type
	CDV catalogue Contains the necessary basic information for installation and dimensions	RE 18300-30	Standard usage

Note
Related documents can be found in the manuals listed above and obtained where necessary via
www.boschrexroth.com/mobile-hydraulics-catalog

WARNING:
Not applying to the Operational Conditions can compromise safety.
All uses outside this manual and related documents is not allowed.
Depending on CDV variant, age and software there are variations in communication and control. Read this technical information before implementing new CDV with spool sensor in applications.
A CDV with SPM can only perform according to the present descriptions if conditions in this Technical Information are met.
In particularly environmental exposed applications with SPM, protection in the form of a shield is recommended.
Deviation from recommended torque when mounting parts can harm performance and module.
All brands and all types of directional control valves – including proportional valves – can fail and cause serious damage. It is therefore important to analyze all aspects of the application. Because the proportional valves are used in many different operation conditions and applications, the machine builder/ system integrator alone is responsible for making the final selection of the products – and assuring that all performance, safety and warning requirements of the application are met.
When replacing CDV with SPM, the electrical and the hydraulic systems must be turned off and the oil pressure released.
Protect persons and environment against oil spill. Hydraulic oil can cause both environmental damage and personal injuries.
Valve with SPM replacement can introduce contamination and errors to the system. It is important to keep the work area clean and components should be handled with care.
The SPM is not designed for use with voltage outside nominal for more than 5 minutes per hour and maximum 10% of operating time.
When the SPM is in a value of fault, it’s user responsibility to arrive in a safety condition in the sorter time.

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