

Steering mode selection valve with electromechanical detent LF1_1STR3... (SMV2.0)

RE 18305-10

Edition: 01.2023

Replaces: 11.2022



- ▶ Size 6
- ▶ Series 00
- ▶ Maximum operating pressure 210 bar (3046 psi)
- ▶ Maximum peak pressure 230 bar (3336 psi)
- ▶ Maximum flow 50 l/min (13.2 gpm)
- ▶ Ports G 3/8 - G 1/2 - SAE 8

General specifications

- ▶ 4/3 direct operated solenoid controlled directional valve with an electromagnetic mechanical detent on the control spool, specifically designed for steering mode selection.
- ▶ Zero power consumption during two wheel steering mode.
- ▶ Control spool with positive overlapping to reduce leakage and switching shocks.
- ▶ Stand-alone zinc plated valve housing with threaded ports and fixing holes for direct line mounting.
- ▶ Wet pin solenoid tubes for DC coils, with inherent push rod for mechanical override on the control spool; zinc plated.
- ▶ Standard coil connections available in DIN and DEUTSCH (additional connections on request).

Contents

Ordering details	2
Functional description	3
Operation logical sequence	4
Technical data	5
Characteristic curves	7
External dimensions and fittings	8
Electric connection	9

Ordering details

01	02	03	04	05	06	07	08	09
L	F	1	-	-	STR3	--	--	--

Family

01	Directional Valve	L
----	-------------------	---

Type

02	Directional valve 4/3	F
----	-----------------------	---

Size

03	6	1
----	---	---

Ports

04	G 3/8	3
	G 1/2	2
	3/4" - 16 UNF (SAE8)	C
	Special	-

Coil Type

05	C48 coil	1
	Specials	-

Spool variants

06	4/3 operated on both sides a and b	STR3
----	------------------------------------	------

Voltage supply¹⁾

		07	02	01	00	
07	Without coil	-	-	-	●	00
	12V DC	●	●	●	-	OB
	13V DC ²⁾	●	●	●	-	AD
	24V DC	●	●	●	-	OC
	27V DC ³⁾	●	●	●	-	AC

Electric connections

08	Without coil	00
	With coil, without mating connector DIN EN 175301-803	01
	With coils and with non-assembled connectors, type EN 175301-803	02
	With coils, with bi-directional diode, without mating connector DT04-2P	07
	Specials	--

Optional fittings

09	Standard	00
	Special	--

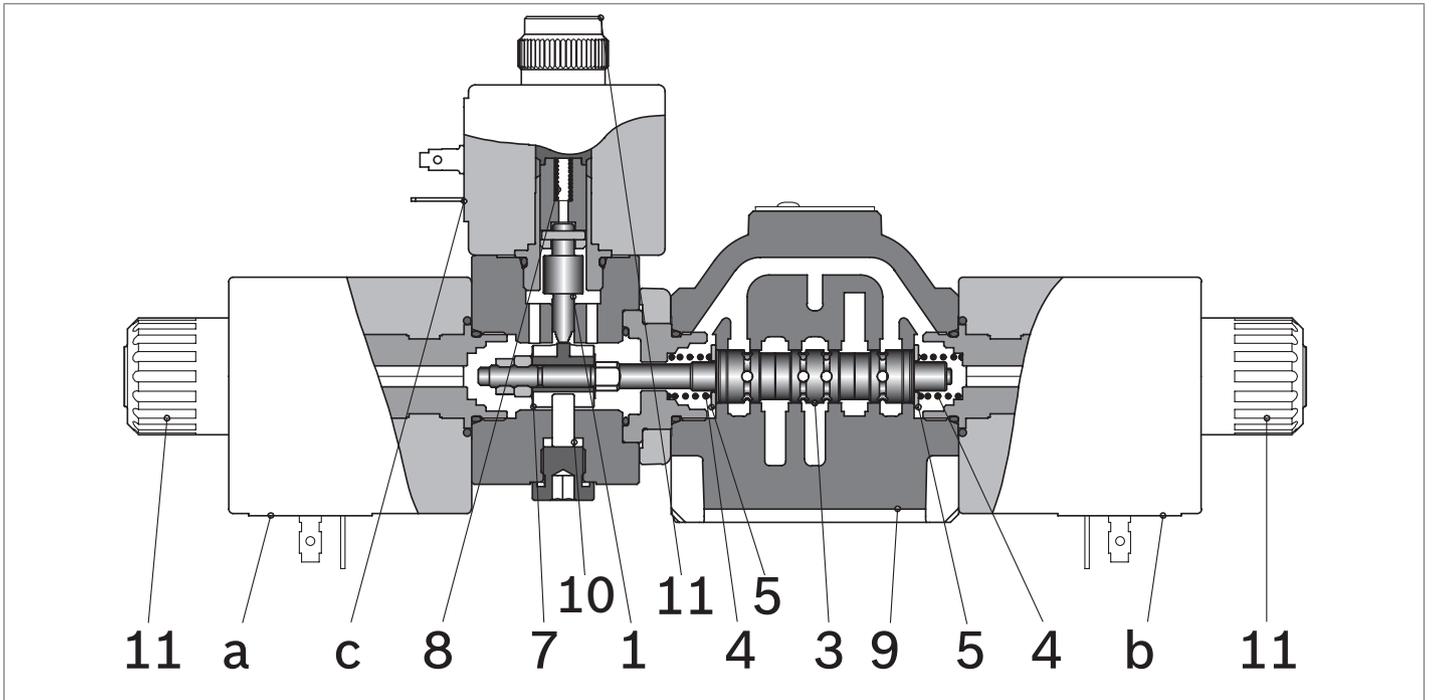
● = Available - = Not available

1) Choosing the nominal voltage of the coils "a" and "b" the nominal voltage of the coil "c" is automatically defined. For customization contact factory.

2) For "a" and "b" coils 13VDC coil "c"= 14VDC (see data sheet RE18325-90).

3) For "a" and "b" coils 27VDC coil "c"= 26VDC (see data sheet RE18325-90)

Functional description



The SMV2.0 directional control valves with electromagnetically actuated mechanical detent are used for selecting between three steering modes.

In the de-energized condition, the control spool (3) is held in the center position by return springs (4); the spring (8) pushes the detent pin(1) against the bushing (7). In this condition the valve is in the front steering configuration (2WS) as all of the coils are de-energized.

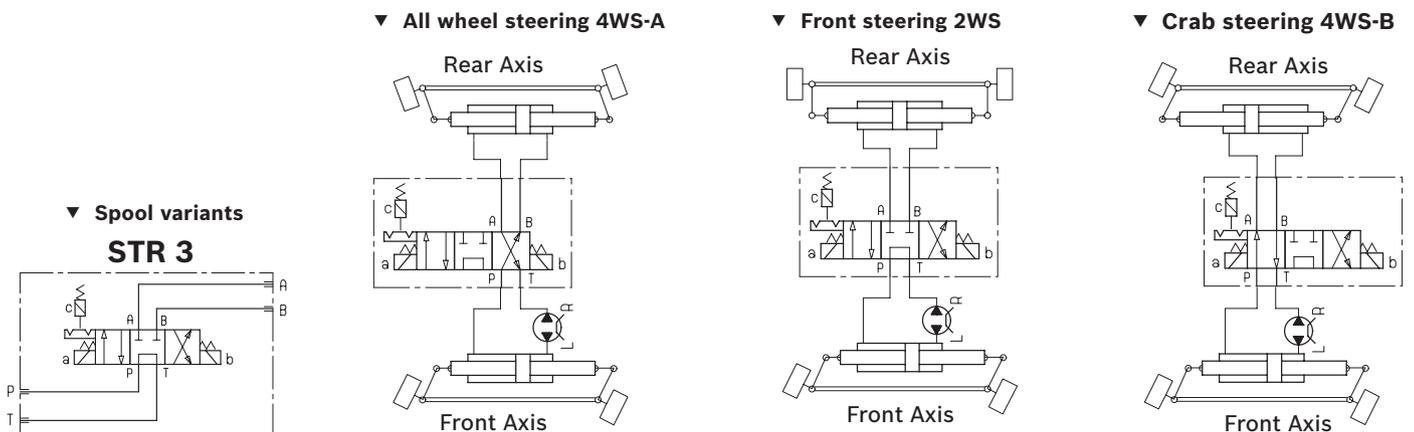
In order to switch the steering mode (see pictures below), it is necessary to first actuate the mechanical detent by energizing the coil "c" in order to allow the control spool to move.

Then, by energizing one of the coils "a" or "b", the control

spool switches from the center position (2WS) to a different steering mode, 4WS-A or 4WS-B.

When a 4WS mode is selected, the control spool coil, "a" or "b", must continue to be energized during machine operation; it is also necessary to de-energize the coil "c" to lock the mechanical detent into position. The mechanical interference between the bushing (7) and the detent pin(1) locks the control spool and prevents unwanted movements generated from external agents. (i.e. short circuit on the coils "a" or "b").

The return springs guarantee the return to the center position by pushing on the washer (5) that is against the control spool.



Logical sequence of Operation

The following shows the logical sequence of operation that guarantees the valve operates correctly.

Steering mode selection from 2WS to 4WS-A (locked)					
Time	Coil A	Coil B	Coil C	Steering mode	note:
Initial status 2WS	OFF	OFF	OFF	2WS	Current steering mode selection
t=0	OFF	OFF	ON	2WS	Coil C is energized to disengage mechanical detent.
t=50ms	ON	OFF	ON	transient 2WS -> 4WS-A	After 50ms, coil A can be energized (the reaction time of coil C).
t=150ms	ON	OFF	OFF	4WS-A (unlocked)	After 100ms, coil C can be de-energized (the reaction time of coil A).
t=200ms	ON	OFF	OFF	4WS-A (locked)	After 50ms the control spool is locked in position (the reaction time of the return spring of coil C).

To go from 2WS to 4WS-B, repeat operation above substituting A with B coil and B with A.

Steering mode selection from 4WS-A (locked) to 2WS					
Time	Coil A	Coil B	Coil C	Steering mode	note:
Initial status 4WS-A (locked)	ON	OFF	OFF	4WS-A (locked)	Current steering mode selection
t=0	ON	OFF	ON	4WS-A (unlocked)	Coil C is energized to disengage mechanical detent.
t=50ms	OFF	OFF	ON	transient 4WS-A -> 2WS	After 50ms, coil A can be de-energized (the reaction time of coil C).
t=200ms	OFF	OFF	OFF	2WS	After 150ms, coil C can be de-energized (the reaction time of the return spring of coil A).

To go from 4WS-B (locked) to 2WS, repeat operation above substituting A with B coil and B with A.

Steering mode selection from 4WS-A (locked) to 4WS-B (locked)					
Time	Coil A	Coil B	Coil C	Steering mode	note:
Initial status 4WS-A (locked)	ON	OFF	OFF	4WS-A (locked)	Current steering mode selection
t=0	ON	ON	ON	4WS-A (unlocked)	Selection of 4WS-B steering mode, and disengagement of the mechanical detent (both coil B and C are simultaneously energized).
t=50ms	OFF	ON	ON	transient 4WS-A -> 4WS-B	After 50ms coil A can be de-energised (coil B and centering spring shift the spool to the opposite side)
t=250ms	OFF	ON	OFF	4WS-B	After 200ms, coil C can be de-energized, initiating engagement of the detent.
t=300ms	OFF	ON	OFF	4WS-B	After 50ms, the control spool is locked in position (the reaction time of the return spring of coil C).

To go from 4WS-B (locked) to 4WS-A (locked), repeat operation above substituting A with B coil and B with A.

2WS: two wheel steering.

4WS-A: four wheel steering (turn).

4WS-B: four wheel steering (crab).

The switching times in the table above are measured on test benches at defined hydraulic conditions (ISO6403). The operating conditions can significantly affect switching times. For this reason it is suggested to increase them as necessary.

Technical data

General					
Valve element	kg (lbs)	2.23 (4.92)			
Mounting position		Unrestricted			
Ambient Temperature	°C (°F)	-20....+50 (-4....+122) (NBR seals)			
MTTF _d		150 years see RE 18350-51			
Hydraulic					
Maximum pressure at P, A and B ports	bar (psi)	230 (3336)			
Maximum peak pressure at P, A, B	bar (psi)	250 (3625)			
Maximum pressure at T	bar (psi)	210 (3046)			
Maximum peak pressure at T	bar (psi)	230 (3336)			
Maximum inlet flow	l/min (gpm)	50 (13.2)			
Hydraulic fluid		Mineral oil based hydraulic fluids HL (DIN 51524 part 1). Mineral oil based hydraulic fluids HLP (DIN 51524 part 2). For use of environmentally acceptable fluids (vegetable or polyglycol base) please consult us.			
General properties: it must have physical lubricating and chemical properties suitable for use in hydraulic systems such as, for example:					
Fluid Temperature	°C (°F)	-20....+80 (-4....+176) (NBR seals)			
Permissible degree of fluid contamination		ISO 4572: $\beta_{x \geq 75} X=12...15$ ISO 4406: class 20/18/15 NAS 1638: class 9			
Viscosity range	mm ² /s	5....420			
Electrical					
Voltage type		DC			
Voltage tolerance (nominal voltage)	%	-10 +10			
Duty		Continuous, with ambient temperature $\leq 50^{\circ}\text{C}$ (122°F)			
Coil wire temperature not to be exceeded	°C (°F)	150 (302)			
Response time	ms	See page before			
Insulation class		H			
Compliance with		Low Voltage Directive LVD 73/23/EC (2006/95/EC), 2004/108/EC			
Voltage	V	12	13	24	27
Voltage type		DC	DC	DC	DC
Power consumption	W	36	36	36	36
Current (nominal at 20 °C (68 °F))	A	3.0	2.77	1.53	1.32
Resistance (nominal at 20 °C (68 °F))	Ω	3.97	4.68	15.67	20.42

1) Nominal

2) $\pm 7\%$ at temperature 20°C (68°F)

Note

For applications with different specifications consult us.

6 **LF1_1STR3... (SMV2.0)** | Steering mode selection valve
 Technical data

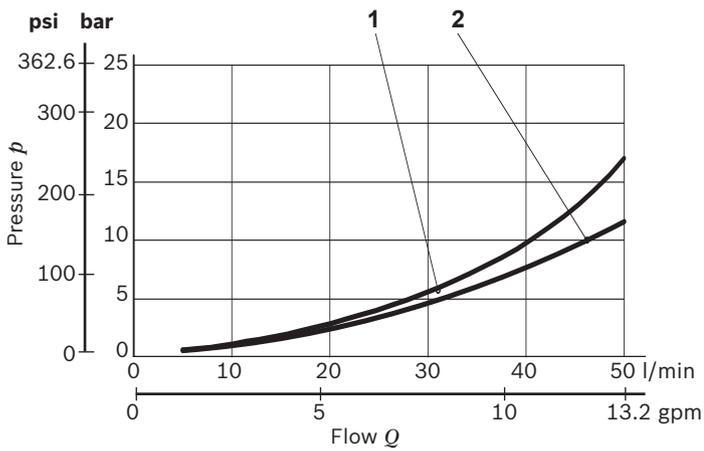
Code	Voltage [V]	Connector type	Coil description	Marking	Coil Mat no.
OB 01	12 DC	EN 175301-803 (Ex. DIN 43650)	C4801 12DC	12 DC	R933000063
OB 07	12 DC	DEUTSCH DT 04-2P	C4807 12DC	12 DC	R933000068
AD 01	13 DC	EN 175301-803 (Ex. DIN 43650)	C4801 13DC	13 DC	R933000069
AD 07	13 DC	DEUTSCH DT 04-2P	C4807 13DC	13 DC	R933000073
OC 01	24 DC	EN 175301-803 (Ex. DIN 43650)	C4801 24DC	24 DC	R933000076
OC 07	24 DC	DEUTSCH DT 04-2P	C4807 24DC	24 DC	R933000075
AC 01	27 DC	EN 175301-803 (Ex. DIN 43650)	C4801 27DC	27 DC	R933000077
AC 07	27 DC	DEUTSCH DT 04-2P	C4807 27DC	27 DC	R933000074

For further information on the coil "c", see data sheet RE18325-90 (coils S8-356 - CLASS H 20W). Coils with connector type DEUTSCH DT04-2P include, as standard, a bidirectional diode.

Below is a list of the standard coil "c" model codes:

Type	Material Number
OD02170130OB00	R901090821
OD02170130OG00	R901144215
OD02170130OC00	R901083065
OD02170130AC00	R901058832
OD02172230OB00	R901130433
OD02172230OG00	R934003033
OD02172230OC00	R901130401
OD02172230AC00	R934000426

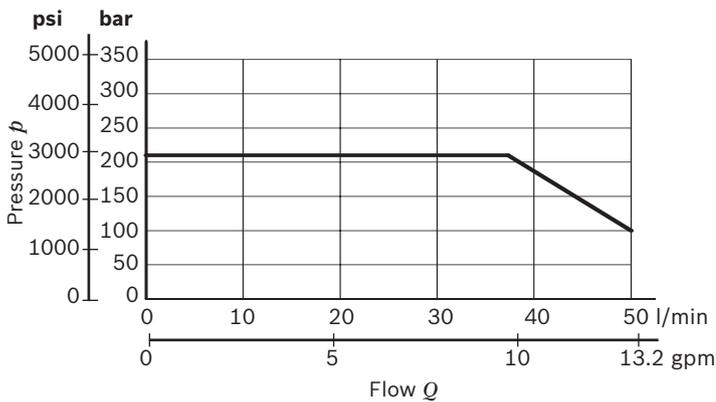
Characteristic curves



Curve Nr.				
P>T	P>A	P>B	A>T	B>T
1	2	2	2	2

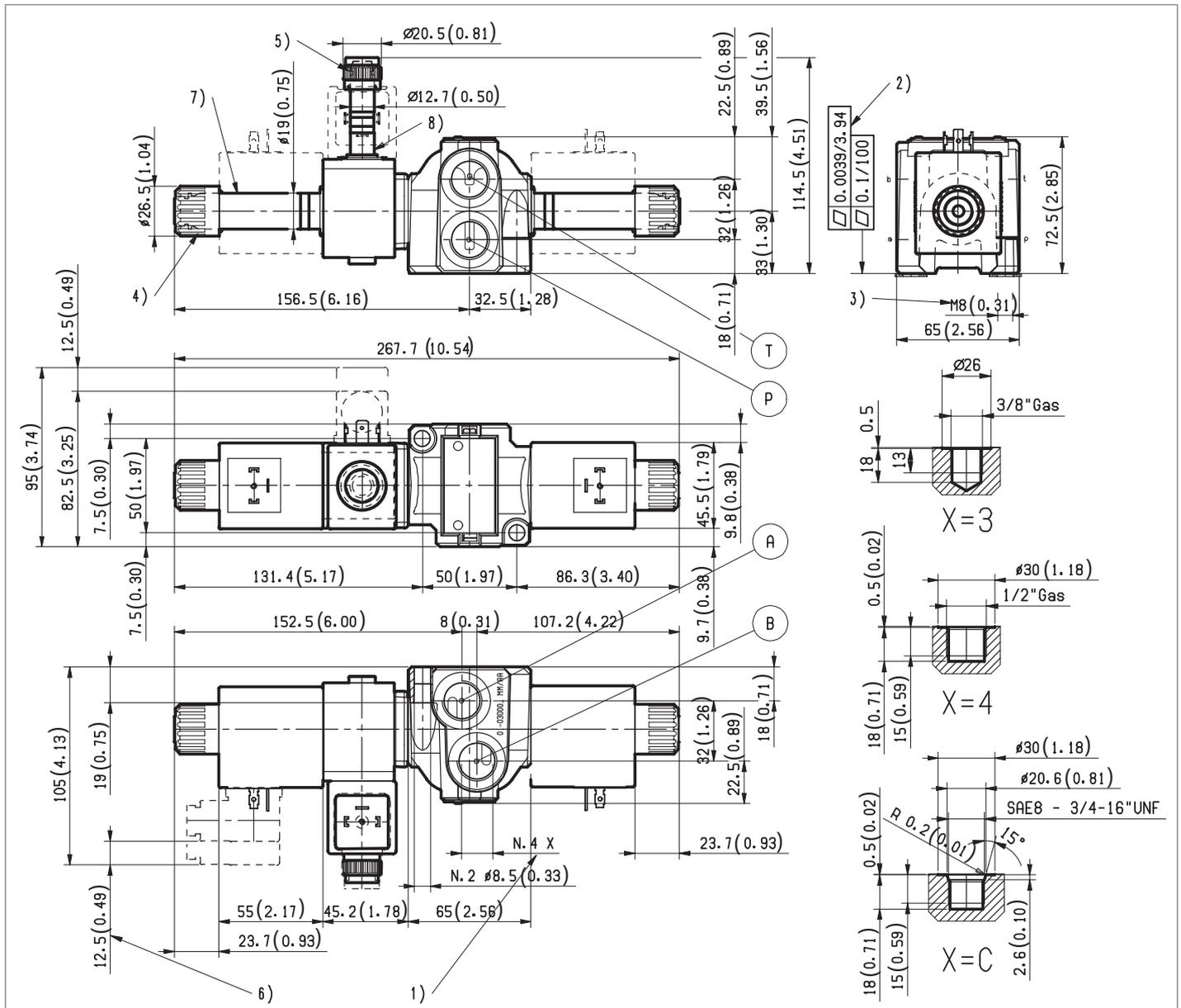
The graph is valid with either coil "a" or "b" energized.
 Measured with hydraulic fluid ISO-VG32 at $45^{\circ} \pm 5^{\circ} \text{C}$
 ($113^{\circ} \pm 9^{\circ} \text{F}$); ambient temperature 20°C (68°F).

Performance limits



The performance limits are the same for both $P > A$ or B ,
 and $T > A$ or B .

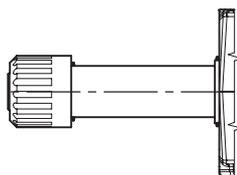
External dimensions and fittings



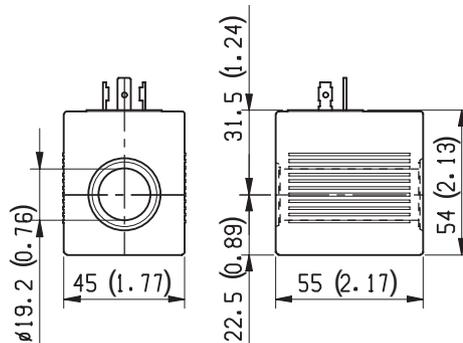
- 1 Ports P,T,A and B
- 2 Requested planarity of the fixing plane
- 3 N°2 fixing screws M8x30 DIN 912 class 8.8
torque 20-22Nm (14.7-16.2 ft-lb)
- 4 Coil nut for "a" and "b" coil (ø26.5mm)
torque 5-6Nm (3.7-4.2 ft-lb)
- 5 Coil nut for "c" coil (ø20.5) torque 3-4Nm (2.2-2.9 ft-lb)
- 6 Clearance needed for connector removal
- 7 Control spool solenoid tube ø19mm (0.75 inch)
torque 22-24Nm (16.2-17.7 ft-lb)
- 8 Detent solenoid tube ø12.7mm (0.5 inch)
torque 22-24Nm (16.2-17.7 ft-lb)

Electric connection

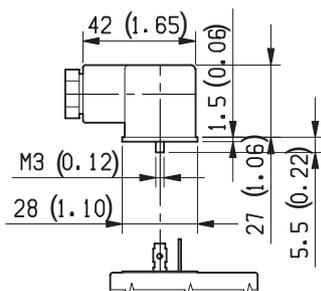
00 Without coils suggested for a flexible warehouse management.



01 With coils having plug-in pins DIN 43650 – ISO 4400, without connectors.
Protection class: IP 67 when connector with seal is properly screwed down.

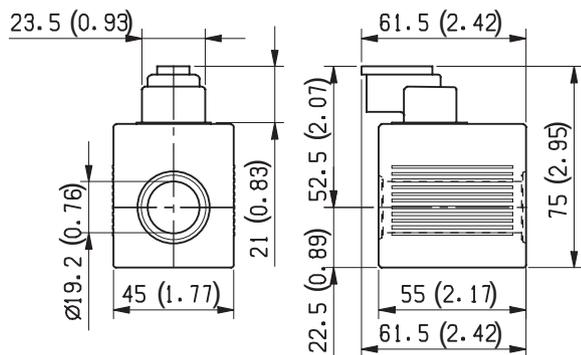


02 With coils and with connectors non-assembled, type EN 175301-803.
Protection class: IP 65 when connector with seal is properly screwed down.



Mat. No.	Description
R933002885	182-09 GRAY
R933002889	182-09 BLACK

07 With coils having DEUTSCH DT 04-2P connector.
Protection class: IP 69 K with female connector properly fitted (see drawing).



Bosch Rexroth Oil Control S.p.A.

Oleodinamica LC Division
Via Artigianale Sedrio, 12
42030 Vezzano sul Crostolo
Reggio Emilia - Italy
Tel. +39 0522 601 801
Fax +39 0522 606 226 / 601 802
compact-hydraulics-cdv@boschrexroth.com
www.boschrexroth.com/compacthydraulics

© This document, as well as the data, specifications and other information set forth in it, are the exclusive property of Bosch Rexroth Oil Control S.p.a.. It may not be reproduced or given to third parties without its consent. The data specified above only serve to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The information given does not release the user from the obligation of own judgment and verification. It must be remembered that our products are subject to a natural process of wear and aging.
Subject to change.