

Proportional Solenoid for Hydraulic Applications ATEX + IECEX

4



Product group

F MM E + F HT P

Function

- Armature space pressure tight, nominal operating pressure up to 250 bar
- Magnetic force vs stroke graph horizontal within proportional control range
- To a large extent proportional behaviour between force and current
- Small hysteresis through precise armature bearing
- Quick response times
- Push type

Construction

- Electrical connection via robust terminal made of metal
- Construction size: 35mm, 45mm, 60mm
- Protection class according to DIN VDE 0470/DIN EN 60529 when properly installed: IP 65
- Integrated circuit with TVS diode
- Explosion protection:  II 2G Ex eb mb IIC T6 / T4 Gb
 II 2D Ex tb IIC T80°C / T130°C Db
- Mounting via central thread
- Simple exchange of the solenoid body without opening the hydraulic circuit
- Manual override

Application examples

- Hydraulic applications in explosive atmospheres (Gas: Zone 1 resp. EPL Gb, Dust: Zone 21 resp. EPL Db) e.g. in chemical companies, refineries and refueling facilities

Options and accessories on request

- Protection class IP 67
- Other ambient temperatures
- In the framework of our platform for valve solenoids there is a variety of variation possibilities for customer specific requirements. We are pleased to work out your individual solution in a personal meeting.

Standards and approvals

- Design and testing according to DIN VDE 0580
- Quality management to ISO 9001, DIN EN ISO/IEC 80079-34
- ATEX, IECEX



Fig. 1: Solenoid body type F MM E with complete tube F HT P

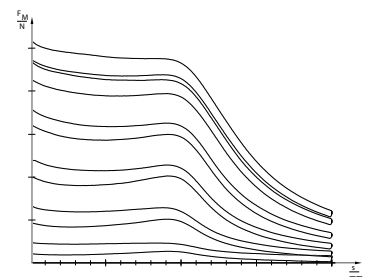


Fig. 2: Magnetic force vs. stroke characteristic

Technical Data

Size		035	045	060
Operating mode		S1 (100 %)		
Reference temperature $\vartheta_{11}^{1)}$	(°C)	50		
Ambient temperature $T_a^{1)}$	(°C)	-30 ... +50		
Temperature class		T4		
Total stroke s	(mm)	4 +0,5	6 +1	8 +1
Working stroke s_W	(mm)	2	3	4
The specified working stroke s_W is a guide value. Due to the occurring tolerances we recommend you a stable operating range between	(mm)	0,5 - 1,5	0,5 - 2,5	0,5 - 3,5
Idle stroke s_L	(mm)	2	3	4
Nominal operating pressure (dynamic)	(bar)	250	210	
Rated magnetic force F_{MN}	(N)	39	55	120
Rated force hysteresis H_{FN} dynamic	(N)	≈ 4		≈ 6
Measured with measuring speed	(mm/min)	40		
Rated current hysteresis H_{IN}	(N)	< 3		< 4
Rated linearity deviation L_N	(%)	≈ 2		
Armature weight m_A	(kg)	0,04	0,05	0,16
Solenoid weight m_M	(kg)	0,42	0,71	1,85
Rated voltage U_N	(V)	24		
Rated resistance R_{20}	(Ω)	22	20	8,1
Rated current I_N	(A)	0,64	0,75	1,57
Limit current I_G	(A)	0,70	0,83	1,73
Linearity current I_L	(A)	≈ 0,15		≈ 0,31
Response current I_A	(A)	≈ 0,04		≈ 0,08
Rated power $P_N = I_N^2 \cdot R_{20}$	(W)	8,9	11,3	20,0
Peak performance $P_G = I_G^2 \cdot R_{20}$	(W)	16,1	20,5	36,9
The peak performance is based on the assembly on a hydraulic valve with base plate and the minimum dimensions	hydraulic valve	(mm)		46 x 76 x 66
	material			67 x 67 x 82 + 105x32x116
		iron or material with the same or better heat conduction		
Linearity performance $P_L = I_L^2 \cdot R_{20}$	(W)	0,47	0,45	0,71
Response performance $P_A = I_A^2 \cdot R_{20}$	(W)	0,03		0,05

¹⁾ The reference temperature resp. ambient temperature may also not been exceeded by a heat input via an operating medium (e.g. oil).

Table 1

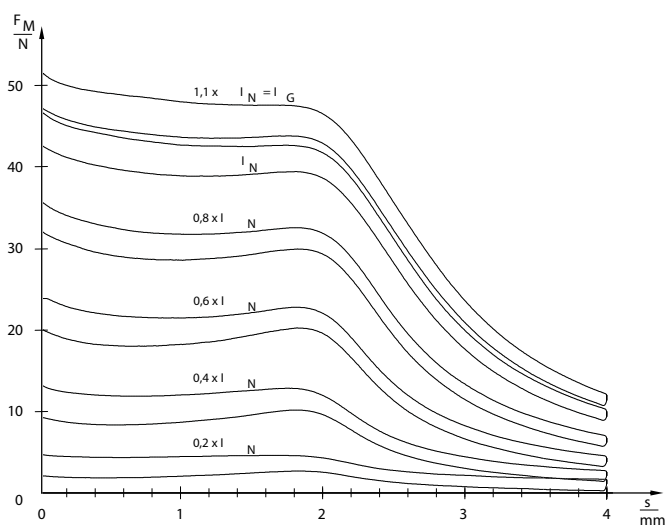


Fig. 2: Magnetic force vs. stroke characteristic size 035

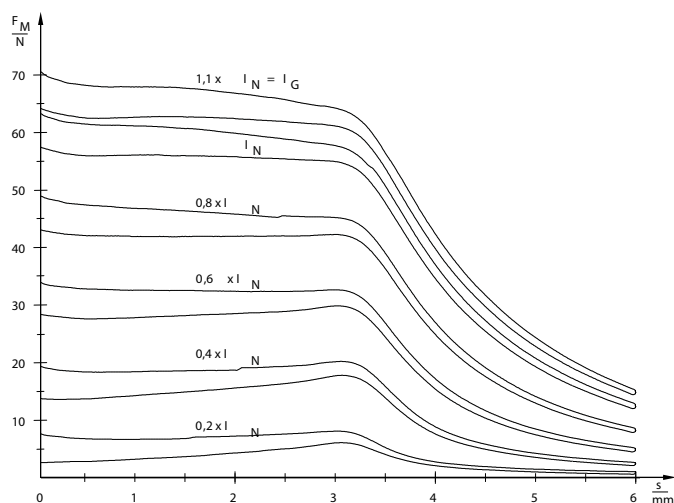


Fig. 3: Magnetic force vs. stroke characteristic size 045

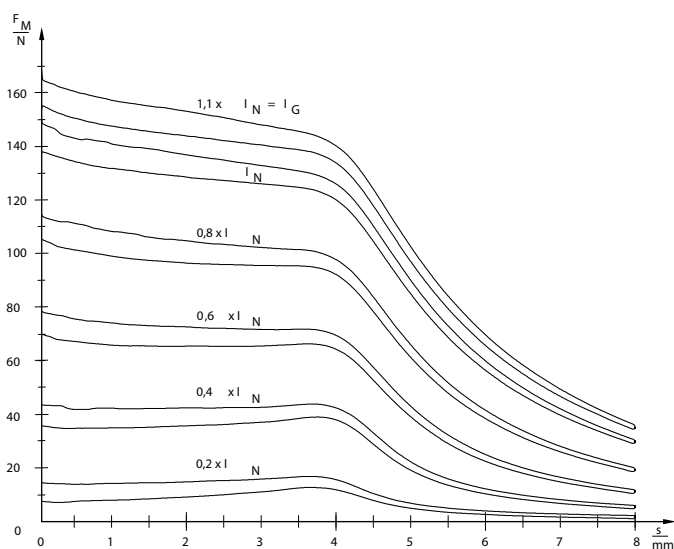


Fig. 4: Magnetic force vs. stroke characteristic size 060

It must be ensured by suitable measures that the specified limit values, particularly the control current range, won't be exceeded.

An adaptation of the exciter coil to other current and resistance values is possible on request.

Further temperature classes and ambient temperature ranges see part list F MM E.

Due to natural dispersion the magnetic force values may deviate by about $\pm 5\%$ from the table values.

The interior of the solenoid and the armature bearing are resistant against all neutral liquids normally used in hydraulics. Please contact us when using other operating media.

Protection class, protective conductor connection

The devices correspond to protection class I.

Due to their construction devices with renewable solenoid body do not have a continuous proper protective conductor connection between the protective conductor connector of the solenoid body and the tube.

A proper protective conductor connection of the tube resp. of the connected valve is to be ensured by the user.

Information and remarks concerning European directives can be taken from the correspondent information sheet which is available under Produktinfo.Magnet-Schultz.com.

Please note the respective operating manual delivered with each device. An EC conformity declaration of the manufacturer is attached to every delivery one time.

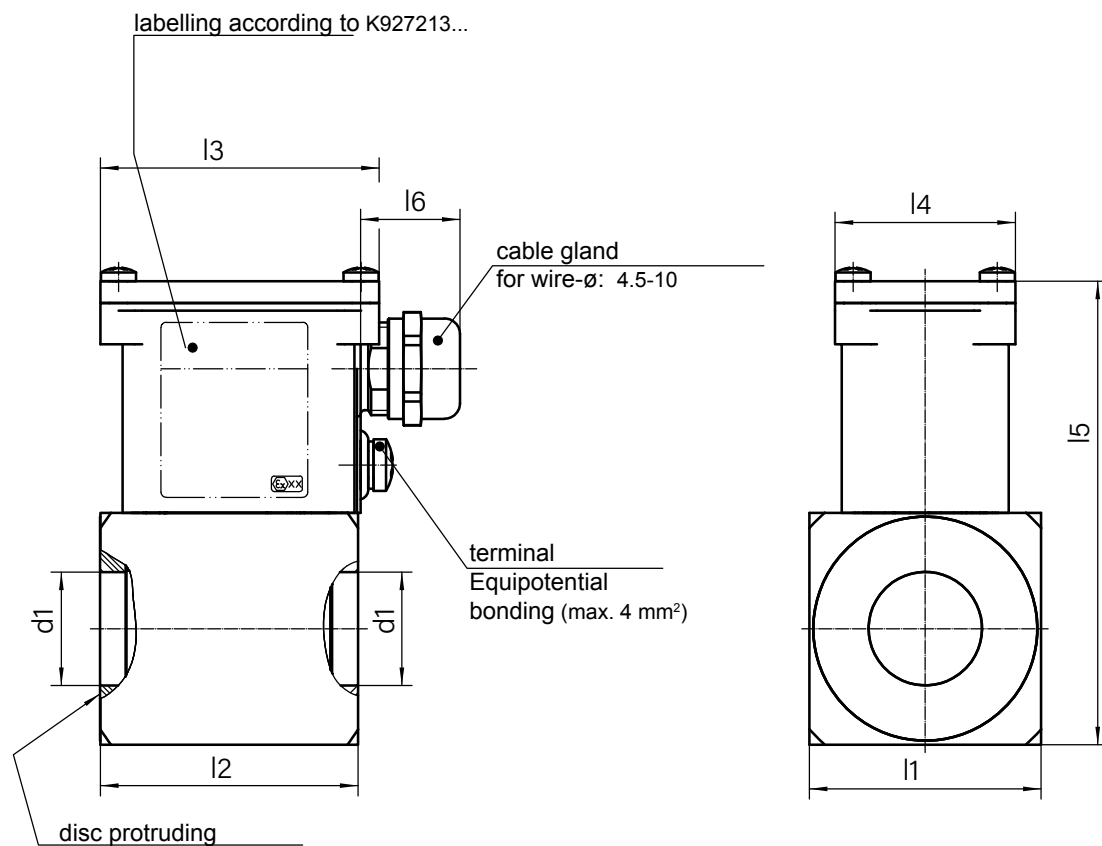
Please make sure that the described devices are suitable for your application. Our offers for these devices are based on the assumption of maximal 8 in an FMEA severity table, i. e. in case of malfunction of the device model as offered, there is, amongst others, no jeopardy of life or limb.

For this application please note DIN EN 60079-14.

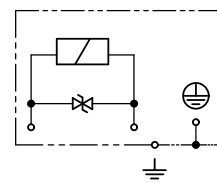
This part list is a document for technically qualified personnel.

The present publication is for informational purposes only and shall not be construed as mandatory illustration of the products unless otherwise confirmed expressly.

Solenoid body



Circuit diagram

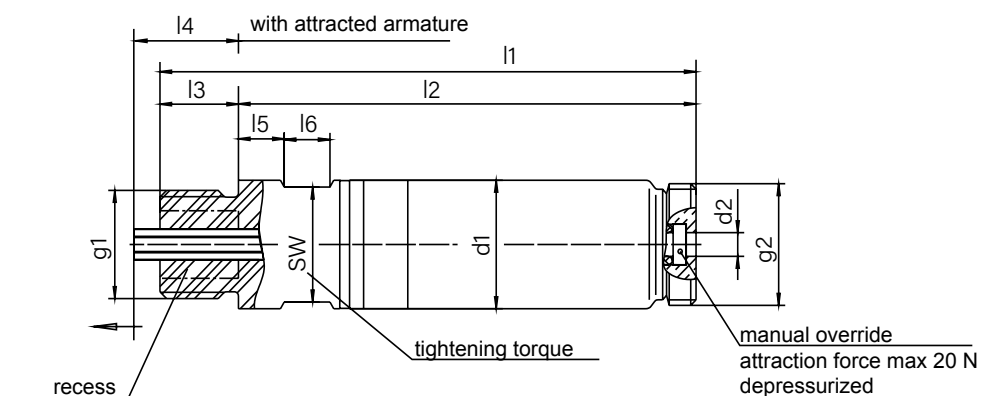


Size	035	045	060
Material-no.	927213	927214	927215
Dimensions in mm / electrical data see table 1			
d1	Ø 19	Ø 22 *	Ø 31
l1	□35	□45	□60
l2	50	50	72
l3	54	54	54
l4	35	35	35
l5	80	90	105
l6	max.22,5	max.22,5	max.22,5

* Variants with ø19 mm and ø23 mm on request

Table 2

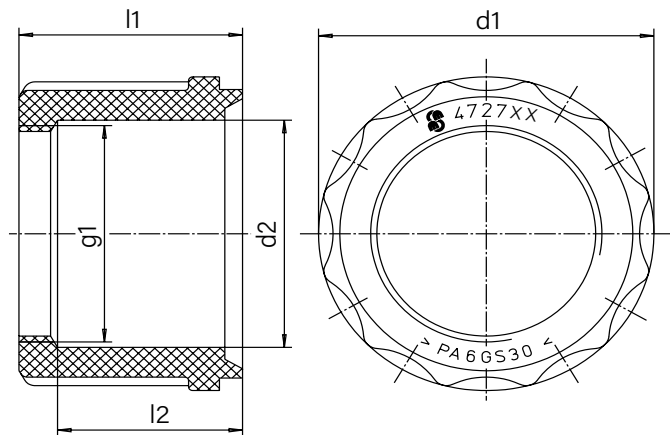
Tube



Size	035 / 037	045	060 / 063
Material no.	926098	923681	923683
d1	Ø 19	Ø 22	Ø 31
d2	Ø 3.5	Ø 3.5	Ø 4.5
l1	82	83	113
l2	70	71	101
l3	12 ±0,1	12 ±0,1	12 ±0,1
l4	20 ±0,15	20 ±0,15	25 ±0,15
l5	7	7	8
l6	7	7	10,5
Stroke	4 +0,5	6 +1	8 +1
SW	SW17	SW19	SW27
Tightening torque (Nm)	12 to 14	22 to 24	50 to 55
g1	M16x1,5	M18x1,5	M27x1,5
g2	M18x1,5	M22x1,5	M30x1,5
Admissible recess	max. Ø 10 - 12 deep	max. Ø 11 - 12 deep	max. Ø 18 - 12 deep

Table 3

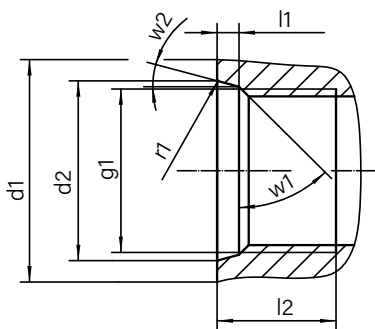
Fastening nut



Size	035 / 037	045	060 / 063
Material no.	472793	472778	472794
Dimensions in mm			
d1	Ø 30 ±0.3	Ø 35	Ø 43,5
d2	Ø 19.5 ±0.2	Ø 23.3 ±0.1	Ø 31.5
l1	20	21	29
l2	15	15	24
g1	M18x1.5	M22x1.5	M30x1.5

Table 4

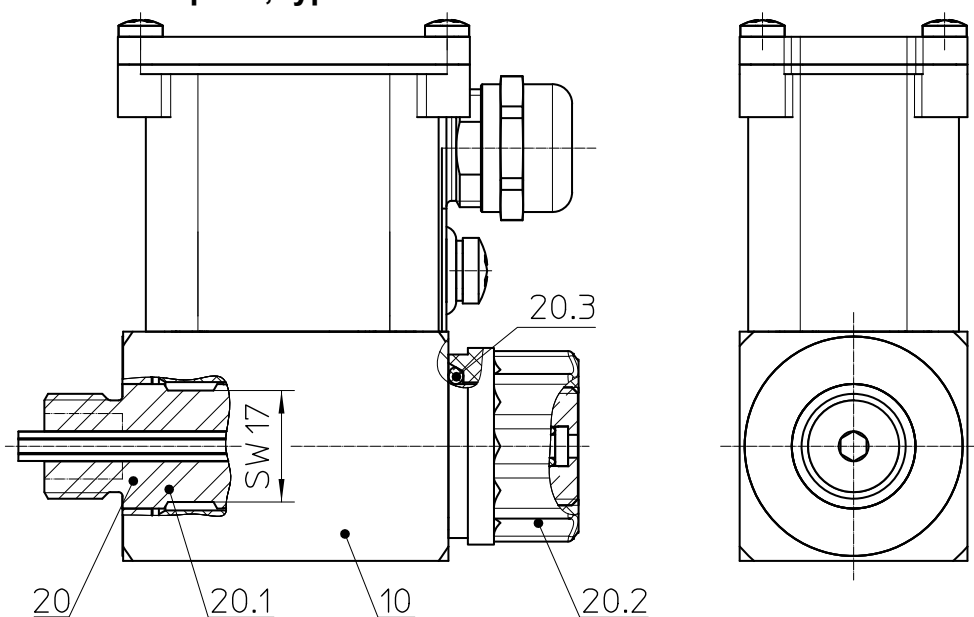
Connection geometry



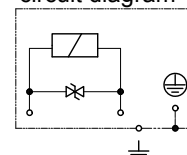
Size	035 / 037	045	060 / 063
Dimensions in mm			
d1	Ø 22.5	Ø 24.5	Ø 33.5
d2	Ø 17.8 +0.1	Ø 19.8 +0.1	Ø 28.8 +0.1
l1	2.4 +0.4	2.4 +0.4	2.4 +0.4
l2	min.13	min.13	min.13
r1	R0.2 ±0.1	R0.2 ±0.1	R0.2 ±0.1
w1	45° ±5°	45° ±5°	45° ±5°
w2	15° ±1°	15° ±1°	15° ±1°
g1	M16x1.5	M18x1.5	M27x1.5
Suitable o-ring	13.3x2.2	15.3x2.2	23.3x2.4

Table 5

Proportional solenoid complete, type code



circuit diagram



Size	Pos.	Designation	Material no.	Designation 2	Remark
035	10	Solenoid body F MM E 035 K01 A01	927213 003	24VDC, T4, -30°C ... +50°C assembly on valve body	Order description for complete unit please order pos. 10 + 20
	20	Tube complete	902311	bagged	
	20.1	Tube FHTS037	926098		Supplied as tube compl. (in- cluded in Pos. 20)
	20.2	Fastening nut	472793	Suitable socket wrench SW26 (12 kt DIN 3124) Tightening torque 5+1 Nm	
	20.3	O-ring	781754	19x2,5 70 Sh-A NBR	
045	10	Solenoid body F MM E 045 K01 A01	927214 003	24VDC, T4, -30°C ... +50°C assembly on valve body	Order description for complete unit please order pos. 10 + 20
	20	Tube complete	902313	bagged	
	20.1	Tube FHTS045	923681		Supplied as tube compl. (in- cluded in Pos. 20)
	20.2	Fastening nut	472778	Suitable socket wrench SW30 (12 kt DIN 3124) Tightening torque 6 ⁺¹ Nm	
	20.3	O-ring	781744	22x2,5 70 Sh-A NBR	
060	10	Solenoid body F MM E 060 K01 A01	927215 003	24VDC, T4, -30°C ... +50°C assembly on valve body	Order description for complete unit please order pos. 10 + 20
	20	Tube complete	902315	bagged	
	20.1	Tube FHTS063	923683		Supplied as tube compl. (in- cluded in Pos. 20)
	20.2	Fastening nut	472794	Suitable socket wrench SW38 (12 kt DIN 3124) Tightening torque 6 ⁺¹ Nm	
	20.3	O-ring	781755	31x2,5 70 Sh-A NBR	


Table 6

Example

Please note that for a functional unit always a combination of solenoid body and tube must be ordered.

Solenoid body	Designation:	Solenoid body F MM E 035 K01 A01
	Material no.:	927213 003
	Rated voltage:	24VDC
	Ambient temperature range:	-30°C + 50°C
	Temperature class:	T4
Tube	Designation:	Tube F HT P 037
	Material no.:	902311

Specials designs

Please do not hesitate to ask for our assistance with the solution of your application-oriented task. In order to find rapidly a reliable solution we need complete details about your application conditions. The details should be specified as precisely as possible in accordance with the relevant  -Technical Explanations.

If necessary, please request the support of our corresponding technical office.