

Proportional Solenoids for Hydraulics

4

Product group

F H M G + F H T P

Replacement for G R C Y 037, 045, 063

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 various plugs
- Construction size: 35mm, 45mm, 60mm
- Protection class according to DIN VDE 470/DIN EN 60529, in case of proper assembly depending on plug type, from IP65 to IPX9K
- Mounting via central thread
- Simple exchange of the solenoid body without opening the hydraulic circuit
- Manual override

Application examples

- Actuation of hydraulic and special valves

Options and accessories

- Performance variants
- Deviant ambient and/or standard temperatures
- Other plug forms as well as variants with cable
- Variants according to ATEX/IECEX
- Integrated recovery diode
- Models with transducers
- 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



Fig. 1: Solenoid body type F H M G with complete tube F H T P

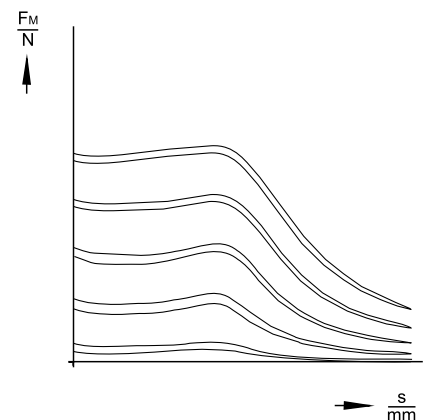



Fig. 2: Magnetic force-stroke characteristic

Technical data standard

Size		037	045	063
Operating mode		S1 (100 %)		
Reference temperature ϑ_{11}	(°C)	50		
Rated voltage U_N	(V DC)	24		
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
Nominal operating pressure (dynamic)	(bar)	250	210	
Rated magnetic force F_{MN}	(N)	47	53,5	112
Rated force hysteresis H_{FN} dynamic	(%)	≈ 4	≈ 4	≈ 5
Measured with measuring speed	(mm/min)	20	30	40
Rated current hysteresis H_{IN}	(%)	< 3	< 3	< 4
Rated linearity deviation L_N	(%)	≈ 2	≈ 2	≈ 2
Armature weight m_A	(kg)	0,04	0,05	0,16
Solenoid weight m_M	(kg)	0,41	0,57	1,57
Rated voltage U_N	(V)	24	24	24
Rated resistance R_{20}	(Ω)	13	14	7,38
Rated current I_N	(A)	0,94	0,96	1,7
Limit current I_G	(A)	0,94	0,96	1,7
Linearity current I_L	(A)	≈ 0,20	≈ 0,22	≈ 0,32
Response current I_A	(A)	≈ 0,04	≈ 0,034	≈ 0,12
Rated power $P_{N_{20}} = I_N \times R_{20}$	(W)	11,5	12,9	21,0
Peak performance $P_G = I_G \times R_{20}$	(W)	17,3	19,5	32,2
Frequency of operation	(1/h)	3.600		
Armature weight m_A	(kg)	0,04	0,05	0,16
Solenoid weight m_M	(kg)	0,41	0,57	1,57
The peak performance is based on the assembly on a hydraulic valve with base plate and the minimum dimensions	Hydraulic valve (mm)	46 x 46 x 66		67 x 67 x 82
	base plate (mm)	66 x 46 x 30		102 x 115 x 30
Linearity performance $P_L = I_L \times R_{20}$	(W)	0,5	0,7	0,76
Response performance $P_A = I_A \times R_{20}$	(W)	0,02	0,016	0,1

Table 1

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

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. Supplementary information concerning its proper installation can be taken also from the  –Technical Explanation, the effective DIN VDE0580 as well as the relevant specifications.

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 expressively.

Magnetic force-stroke characteristic standard

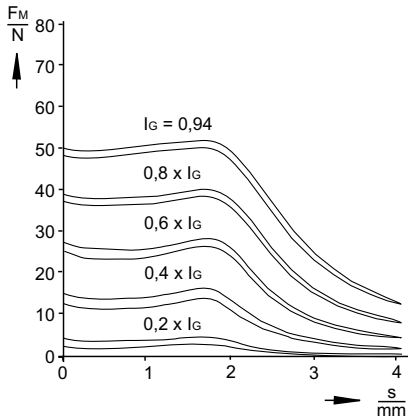


Fig. 3: Magnetic force-stroke characteristic size 035

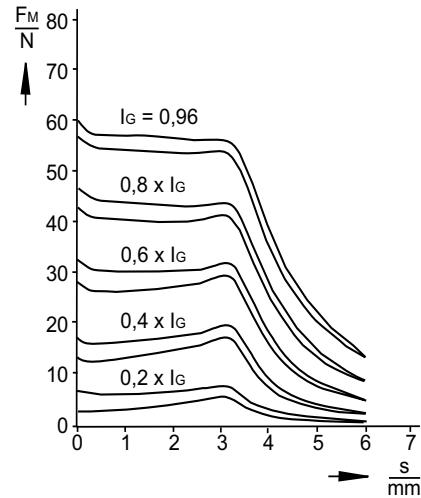


Fig. 4: Magnetic force-stroke characteristic size 045

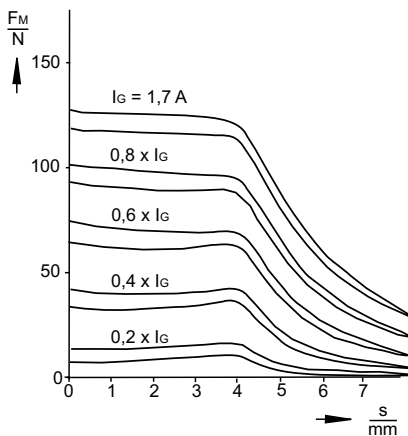


Fig. 5: Magnetic force-stroke characteristic size 063

Standard values for voltage and operating mode: 24V, S1 (100%). For deviations from the indicated operating conditions regarding reference temperature, operating mode, rated voltage and dimensions of hydraulic slide and base plate, adaptations of the exciter coil might be necessary which result in modifications of the magnetic force.

The indicated technical data refer to an A.C. power supply with bridge rectifier.

The coil winding can be adjusted to other current and resistance values on request.

Owing to natural dispersion magnetic-force values may deviate by $\pm 5\%$ from the listed values.

On request, armature space can be deaerated and pushrod can be adjusted.

Solenoid interior and armature bearing are resistant to all neutral fluids that are commonly used in hydraulics.

Please contact us if you intend to use other operating media.

Protection class

The protection class of the complete device depends on the plug connection of the solenoid body used. Please consider the notes in the data sheet of the solenoid body F HM G.

Proportional solenoids with transducer



Bild 6: Proportional solenoid with inductive transducer

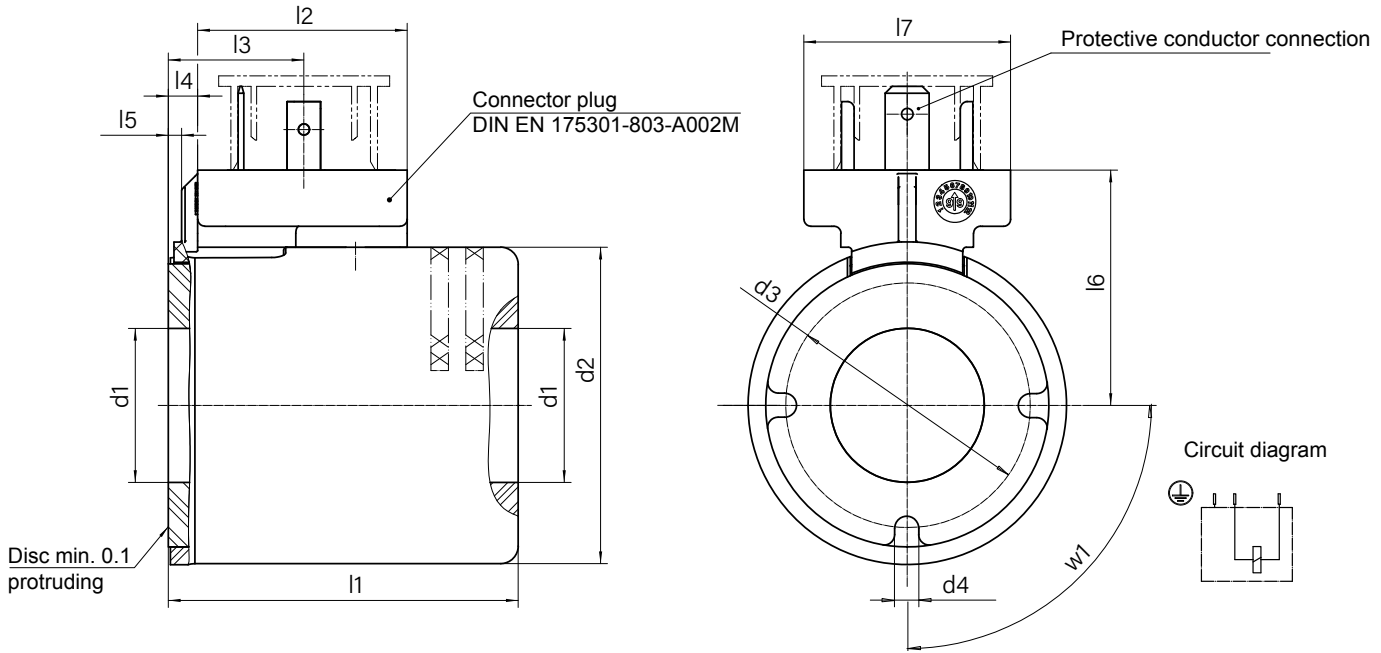
In addition to proportional solenoids, our product range also includes inductive transducers (LVDT) and transducers on the basis "hall sensor".

Tubes for proportional solenoids can, factory-made, be upgraded for the assembly of a transducer.

Example data for transducers can be found in the part list inductive transducers.

Please feel free to contact us, we will be pleased to assist with an adequate solution for your application within the framework of project-specific coordination.

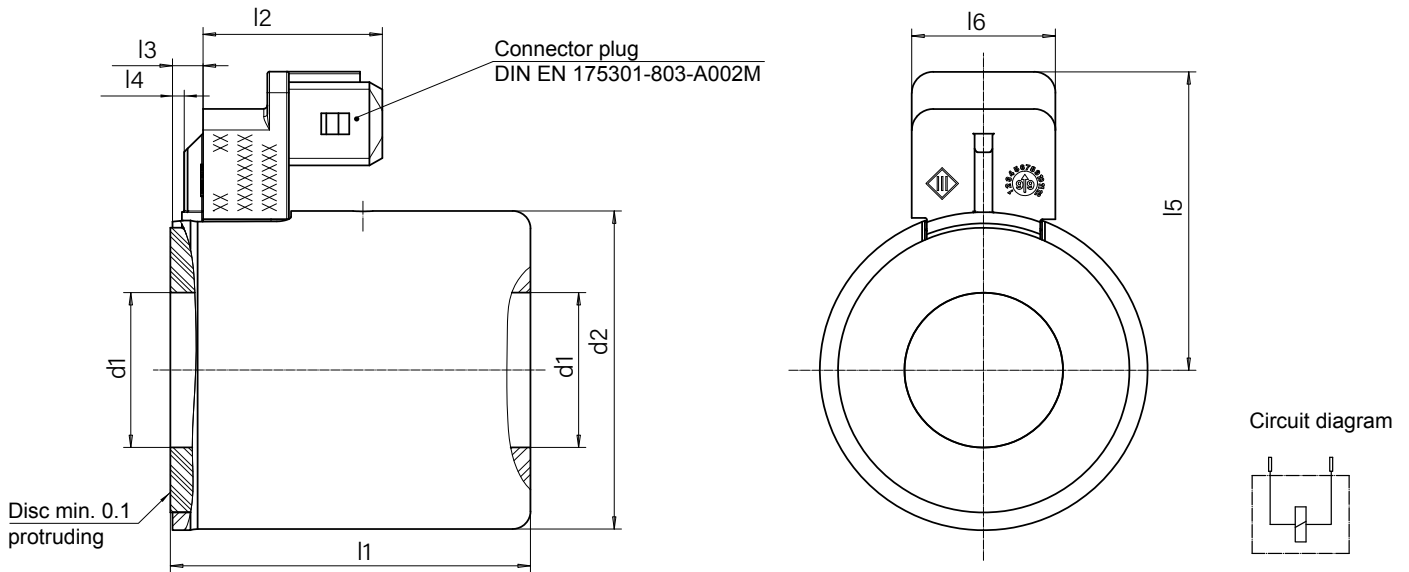
Solenoid body (connector: DIN)



Size	037	045	063
Material no.	925428	926433	924585
Dimensions in mm			
d1	Ø 19.03	Ø 22	Ø 31
d2	Ø 37.1	Ø 45	Ø 63
d3	-	-	Ø 50.9 ±0.2
d4	-	-	Ø 3.45 ±0.1
l1	50	50.1	72
l2	30	30 ±0.5	31
l3	18.35	19.4 ±1	22
l4	3.15 ±0.4	4.2	5.8
l5	0.85 ±0.4	1.9 +0.4/-0.3	-
l6	29.7	33.7 ±1	42.2
l7	29.6	29.6 ±0.5	29.6
w1	-	-	90° ±30°

Table 2

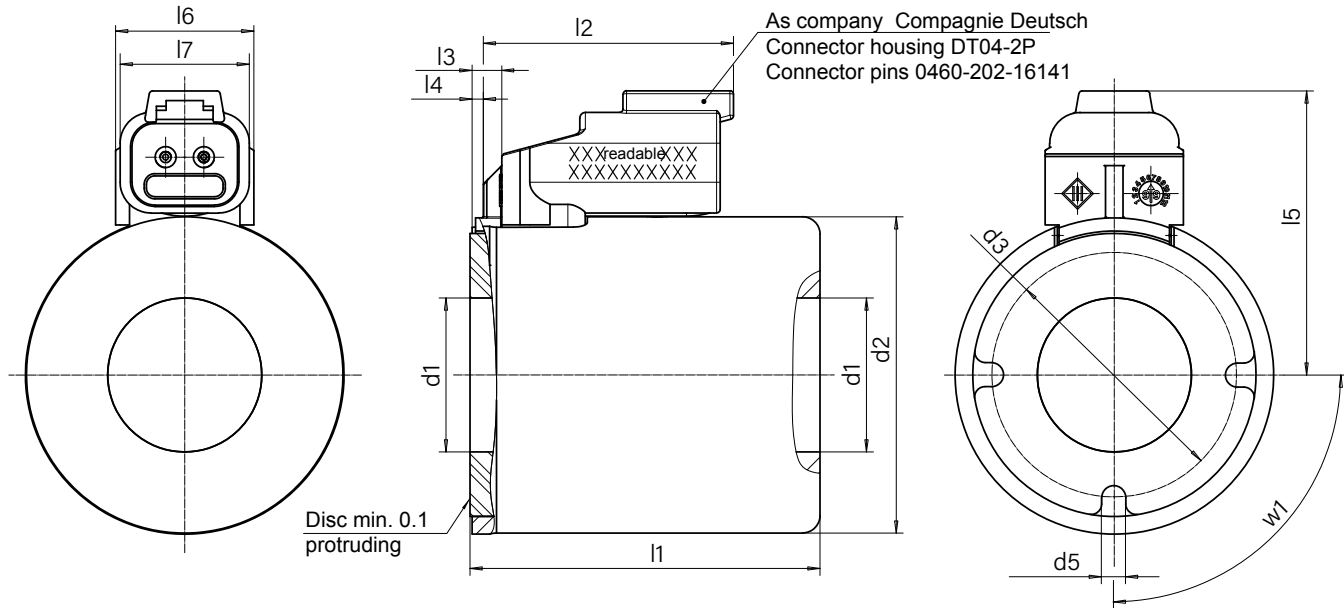
Solenoid body (connector: AMP-Junior-Timer 2-pole)



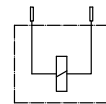
Size	037	045
Material no.	925123	925384
Dimensions in mm		
d1	Ø 19.03	Ø 22
d2	Ø 37.1	Ø 45
l1	50	50.1
l2	24.95 ±0.3	24.95
l3	3.5 ±0.2	4.25
l4	1.55 +0.3/-1	-
l5	38.5 ±0.5	42.5
l6	20 ±0.2	20

Table 3

Solenoid body (Deutsch-connector DT04-2P)



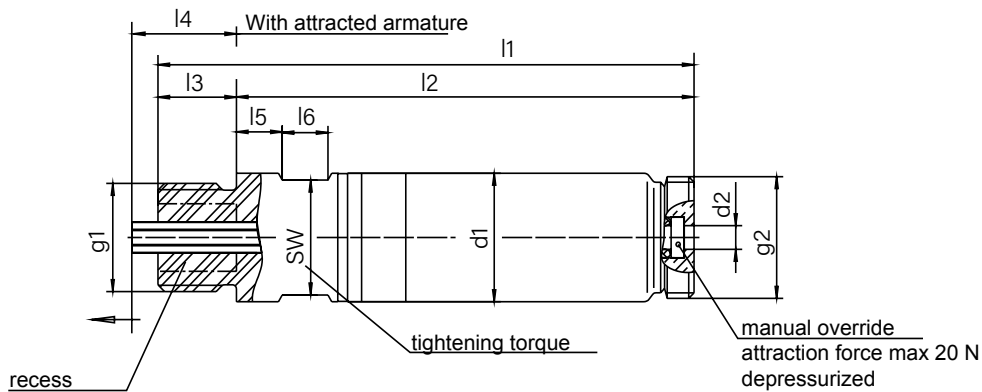
Circuit diagram



Size	037	045	063
Material no.	925770	926292	926296
Dimensions in mm			
d1	Ø 19.03	Ø 22	Ø 31
d2	Ø 37.1	Ø 45	Ø 63
d3	-	-	Ø 50.9 ±0.2
d4	-	-	Ø 3.45 ±0.1
l1	50	50.1	72
l2	33.2 ±0.3	36 ±1	40.6
l3	3.5 ±0.2	-	7 +0.5
l4	0.85 ±0.35	1.6 ±0.5	-
l5	36.7 ±0.5	40.7 ±1	49.2 ±1
l6	19.8 ±0.2	19.8 -0.2	19.9 ±0.5
l7	-	18.5 ±0.5	-
w1	-	-	90° ±30'

Table 5

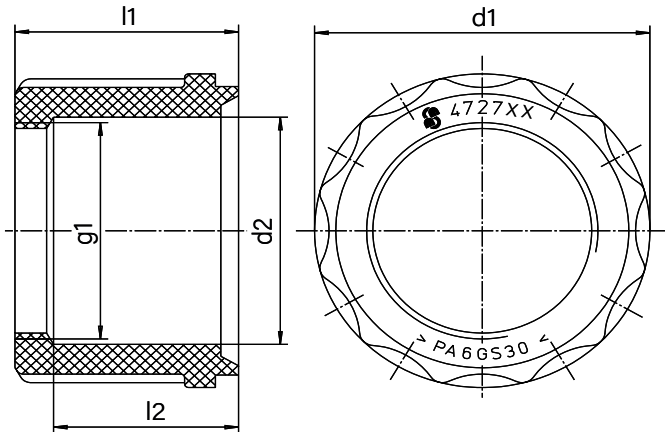
Tube Proportional solenoid



Size	037	045	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 bis 14	22 bis 24	50 bis 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 6

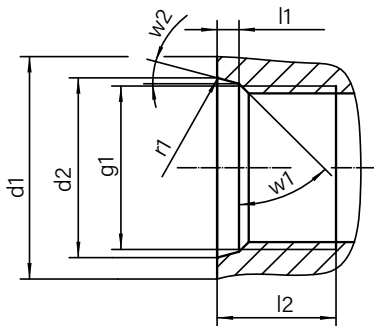
Fastening nut



Size	037	045	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

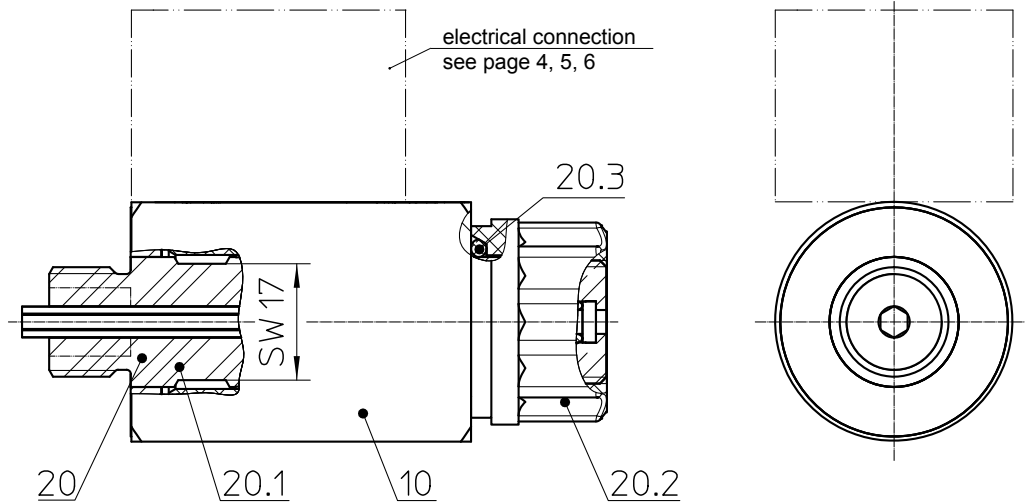
Table 7

Connection geometry



Size	037	045	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

Valve solenoid complete



Size	Pos.	Designation	Material no.	Designation 2	Connector	Remark
037	10	Solenoid body F HM G 037	925428 038	24VDC, 100% ED	DIN	Order description for complete unit please order pos. 10 + 20
	10		925123 009		AMP	Alternative
	10		925770 006		Deutsch	
	20	Tube complete FHTP037	902311	bagged		Order description for complete unit please order pos. 10 + 20
	20.1	Tube FHTS037	926098			Supplied as tube compl. (included 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 HM G 045	926433 003	24VDC, 100% ED	DIN	Order description for complete unit please order pos. 10 + 20
	10		925384 013		AMP	Alternative
	10		926292 006		Deutsch	
	20	Tube complete FHTP045	902313	bagged		Order description for complete unit please order pos. 10 + 20
	20.1	Tube FHTS045	923681			Supplied as tube compl. (included 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		
063	10	Solenoid body F HM G 063	924585 024	24VDC, 100% ED	DIN	Order description for complete unit please order pos. 10 + 20
	10		auf Anfrage		AMP	Alternative
	10		926296 005		Deutsch	
	20	Tube complete FHTP063	902315	bagged		Order description for complete unit please order pos. 10 + 20
	20.1	Tube FHTP063	923683			Supplied as tube compl. (included 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 9


Example

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

Solenoid body example DIN plug	Designation:	Solenoid body F HM G 037
	Material no.:	925428 038
	Rated voltage:	24 V DC
	Duty cycle:	100%
	Rated resistance:	13 Ohm

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.