

Plugs (in-line sockets) for solenoid actuated hydraulic valves

Plugs conforming DIN 43 650 model A (ISO 4400),
see sect. 2.1



Central plugs
(non-standard),
see sect. 2.3



Plugs (slim design) acc.
to industrial standard
with blade terminal width
11 mm, see sect. 2.2



1. General

The solenoid actuation of a hydraulic valve is indicated in the type coding via the abbreviated supply voltage for the specified solenoid coil (G = DC / WG = AC), see type coding key of the respective pamphlet of the valve. It is not detailed which plug is to be used, as they are scope of delivery for the specific valve. When the valve is desired without plug, this has to be indicated on the order coding, see sect. 4.

When a desired hydraulic valve should come with non-standard plugs with different inserts, this has to be specified in clear text added to the order coding.

Solenoid valves generate voltage peeks as well as electro-magnetic fields, when they are energized and deenergized when no interference suppressors are used. This can cause malfunctions of electronic equipment or appliances which are nearby. The term EMC, means that the solenoid valve is sufficiently screened to protect electronic installations nearby.

The cheapest and simplest method to shield solenoid valves is to install an interference suppressor in parallel with the coil. The plugs described in this data sheet were mainly selected because of their state-of-the-art EMC

Plugs equipped with a interference suppressor (clamp diode) guarantee the highest degree of EMC, but they considerably pro-long the cut-off time of the hydraulic valve.

A sufficient protection with only minimal increase in cut-off time can be achieved by using one of the following: a) two Z-diodes connected in series in opposite direction b) VDR resistor (varistor) c) suppressor diode.

2. Available versions, electrical characteristics

Air and creep paths conforming DIN VDE 0110, excess voltage class 2.
Housing material: self extinguishing plastic

2.1 Plugs conforming DIN 43 650, type A (ISO 4400)

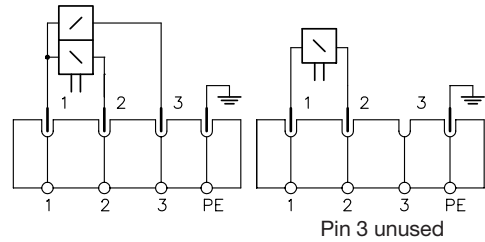
Protection class IP 65 conforming DIN EN 60529 or IEC 60529, when properly mounted and fixed

Type	Coding	Colour	No. of terminals	Operating Voltage U_B V	I_{max}	Max. cross section area mm^2	Pg	Cabel \varnothing mm	Interfer. suppr. (EMC)	Ambient temperature. C°	Notes to equipment ¹⁾
MSD 3-309 ⁴⁾	6217 0002	black	3+PE	250V DC/AC	5	1.5	9	6-8	no	-40..+100	
MSD 3-309 ⁴⁾	6217 0003	grey	3+PE	250V DC/AC	5	1.5	9	6-8	no	-40..+100	

Standard: Black housing (B-plugs) suited for all single and double acting, reverse acting and twin solenoids. When used for single acting solenoids, terminal 3 is unused.

Grey housing (A-plugs) only with 3/4-way directional spool valves type SW... according to D 7450 and D 7451 (also with lifting module acc. to D 7650 and clamping module acc. to D 7787.

Black plugs are also standard with prop. solenoids \varnothing 35 and \varnothing 45 when no amplifier plug acc. to D 7818 is ordered (see also 1.).



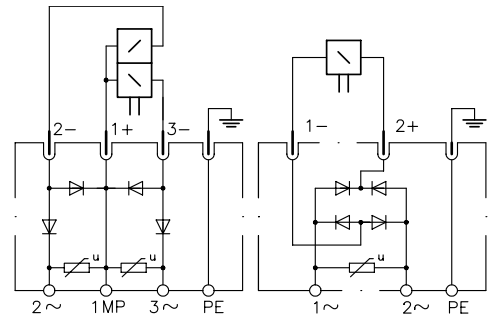
MSD 4-309 P22 ⁴⁾	6217 6001	black	3+PE	250V AC	1	1.5	9	6-8	yes	-40..+100	2x half bridge rectifiers
MSD 4-209 P10 ⁴⁾	6217 6002	black	2+PE	250V AC	1	1.5	9	6-8	yes	-40..+100	full bridge rectifiers

Rectifier plugs for DC solenoids when used with AC mains (50 and 60 Hz).
MSD 4-209 P10 with full bridge rectifier ²⁾ ³⁾ for single acting solenoids with coils 98V DC for mains 110V AC or coils 205V DC for mains 230 V_{AC}. $U_{DC} = 0.9 U_{AC} - 2 V$

MSD 4-309 P22 with two half bridge rectifiers and clamp diode ²⁾ ³⁾ for electric double and reverse acting solenoids as well as twin solenoids with 102 V DC coils for 230V AC mains or 48V DC coils for 110V AC mains. $U_{DC} = 0.45 U_{AC} - 1V$

MSD 4-309 P22

MSD 4-209 P10



MSD 3-209 C1	6236 5002	black	2+PE	250V DC	4	1.5	9	6-8	yes	-40..+100	D
MSD 4-309 C1+R	6217 0009	black	2+PE	24V DC	4	1.5	9	6-8	yes	-40..+100	D+R
MSD 4-309 C2	6217 6005	black	3+PE	250V DC	4	1.5	9	6-8	yes	-40..+100	2D

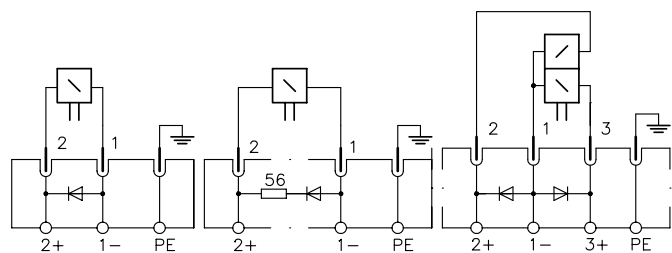
With clamp diodes ¹⁾ ²⁾ to suppress cut-off voltage spikes i.e. used in connection with electronic circuits and/or to achieve a longer fall (release) time.

Caution: Polarity sensitive - there is no reverse voltage protection! MSD 3-209 C1 for single acting solenoids. MSD 4-309 C1 +R for lift monitored 2/2-way directional valves according to Sk 7380 a to d and Sk 7380 E and F. MSD 4-309 C2 for DC for electric double and reverse acting solenoids as well as twin solenoids.

MSD 3-209 C1

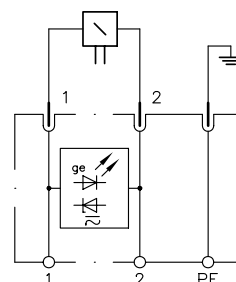
MSD 4-309 C1+R

MSD 4-309 C2



SVS 3129020	6217 8024	black	2+PE	24V DC/AC	4	1.5	9	5-10	yes	-30..+100	Z+LED yellow
SVS 296048	6217 8025	grey	2+PE	24V DC/AC	4	1.5	9	5-10	yes	-30..+100	Z+LED yellow

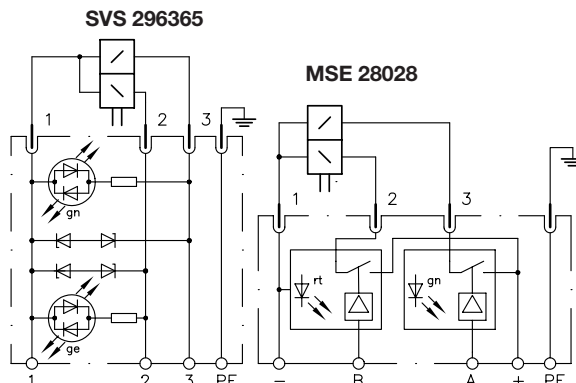
SVS 3129020 and SVS 296048 with yellow LED and interference protection via two Z-diodes. For 24V DC/AC not polarity sensitive, both covers are translucent. Larger housing as with type MSD 4-209 P34.



Type	Coding	Colour	No. of terminals	Operating Voltage U_B V	I_{max}	Max. cross section area mm^2	Pg	Cabel \varnothing mm	Interfer. suppr. (EMC)	Ambient temp. C°	Notes to equipment 1)
SVS 296365	6217 8134	black	3+PE	24V DC	4	1.5	9	5-10	yes	-30..+100	Z+LED ye/gr
MSE 28028	6217 8008	black	3+PE	24V DC	2	1.5	9	3.5-8	yes	-20..+60	Switch amplifier 2LED gr/red

LED indicator for twin, double acting and reverse acting solenoids. SVS 296365 with LED indication (green and yellow) and interference protection via two Z-diodes, use for 24V DC/AC, not polarity sensitive, translucent cover.

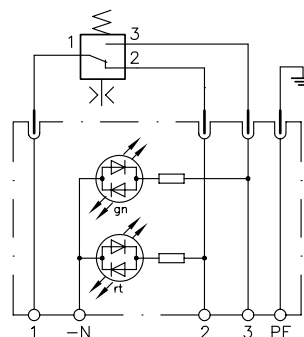
MSE 28028 with PLC capable amplifier and LED indication (green and red) Supply voltage 10 .. 35V DC, interference protection via two Z-diodes, control voltage from 10 .. 35V DC, control current 7 to 11 mA.



SVS 296100	6217 8026	black	3+PE	24V DC/AC	4	1.5	9	5-10	no	-30..+100	LED red/green
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Plug for 24 V. To indicate the status on pressure switch according to D 5440.

SVS 296100 for AC and DC with LED indication (green and red), translucent cover.



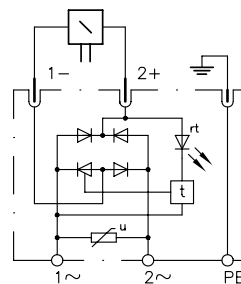
MSD 4 P53	6217 8006	transl.	2+PE	230V AC	1	1.5	9	6-8	yes	-10..+50	LED red
MSD 4 P63	6217 8007	transl.	2+PE	115V AC	1	1.5	9	6-8	yes	-10..+50	LED red

Time controlled rectifier, full/half bridge, as economy circuit for single acting solenoids, mains 230 and 110V AC 50...60 Hz.

MSD 4 P53 for WG 230 (230V AC, as in IEC 38).

MSD4 P63 for WG 110 (110-115V AC).

For more details, see D 7813.

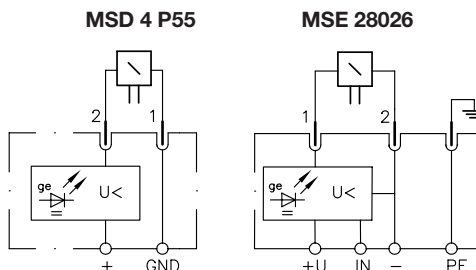


MSD 4 P55	6217 8023	transl.	2+PE	24V DC	1.5	0.75	9	6-8	yes	-20..+50	LED yellow
MSE 28026	6217 8016	black	2+PE	24V DC	4	1.5	9	3.5-8	yes	-20..+60	LED yellow

Plugs with built-in economy circuit for single acting solenoids 24V DC.

MSD 4 P55 with fixed switching time and reduced (economy) voltage. For more details, see D 7833

MSE 28026 with adjustable reduced (economy) voltage as well as PLC capable amplifier. For more details, see D 7832.



- 1) D = diode
 R = resistor
 Z = a series connection of two Z-diodes in opposition
 LED = light emitting diode
 rt = red, gn = green, ge = yellow
- 2) **Caution:** The diodes will increase the release time of the valve two to fivefold or more, depending on size of the solenoid and valve design

- 3) Diodes 1 N 4007, surge peak reverse voltage 1000 V, nominal current 1 A
- 4) Plug already included with order of solenoid operated hydraulic valve according to respective data sheet, a special or additional note is not required

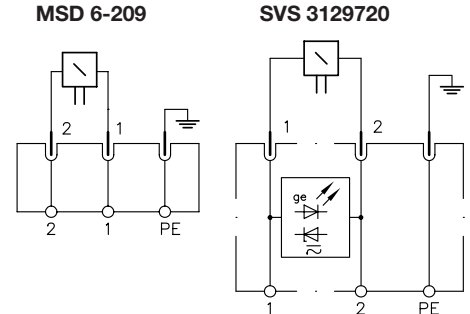
2.2 Plugs with slim design, acc. to industrial standard (blade terminal width 11 mm)

Protection class IP 65 conforming DIN EN 60529 or IEC 60529, when properly mounted and fixed

Type	Coding	Colour	No. of terminals	Operating Voltage U_B V	I_{max}	Max. crosssect. mm^2	Pg	Cabel \varnothing mm	Interfer. suppr. (EMC)	Ambient temp. C°	Notes to equipment 1)
MSD 6-209	6236 5004	black	2+PE	250V DC/AC	5	1.5	9	6-8	no	-40..+100	
SVS 3129720	6217 8027	black	2+PE	24V DC/AC	4	1.5	9	5-10	yes	-30..+100	Z+LED yellow

Type MSD 6-209 is standard for all single acting solenoids with plug 20 x 27 mm and blade terminals, e.g. size 0 valves with AC solenoids acc. to D 7300, but also standard with prop. solenoids \varnothing 25, when no amplifier plug acc. to D 7819 is ordered.

SVS 3129720 with LED indicator (yellow) and interference protection via two Z-diodes. For 24V DC/AC, not polarity sensitive, translucent cover.



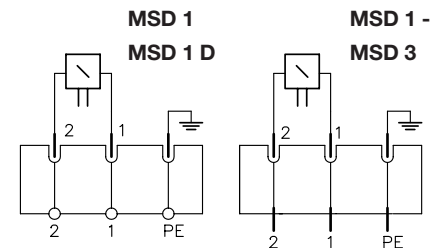
2.3 Central plugs (not standardized)

Protection class IP 54 conforming DIN 60529 or IEC 60529, when properly mounted and fixed

Type	Coding	Colour	No. of terminals	Operating Voltage U_B V	I_{max}	Max. crosssect. mm^2	Pg	Cabel \varnothing mm	Interfer. suppr. (EMC)	Ambient temp. C°	Notes to equipment 1)
MSD 1	6236 5001	black	2+PE	250V DC/AC	6	1.5	9	to 6	no	-40..+100	
MSD 1 D	6236 5006	black	2+PE	250V DC/AC	6	1.5	9	to 6	no	-40..+100	No emerg. actuat.
MSD 1-MSD 3	6217 6004	black	2+PE	250V DC/AC	6	-	-	-	no	-40..+100	Adapter for DIN 43 650 A

Type MSD 1 is standard for valves size 1 (acc. to D 7300). Emergency manual actuation by pressing down the cap (rubber cap is scope of delivery) MSD 1 D is without rubber cap and emergency hand actuation.

Adapter version type MSD 1-MSD 3 is to convert from MSD-1 to plug conforming DIN 43 650 A (see sect. 2.1). For order coding, see D 7300, sect. 2.2.3



MSD 2	6217 6003	black	2+PE	250V DC/AC	4	1.5	M12	to 6	no	-40..+100	
MSD 2 C1	6217 6006	black	2+PE	250V DC	4	1.5	M12	to 6	yes	-40..+100	D
MSD 2-MSD 3	6217 8034	black	2+PE	250V DC	4	-	-	-	no	-40..+100	
MSD 2-MSD 3 WG 4)	6217 8035	black	2+PE	250V DC/AC	1	-	-	-	yes	-40..+100	Full bridge rectifier

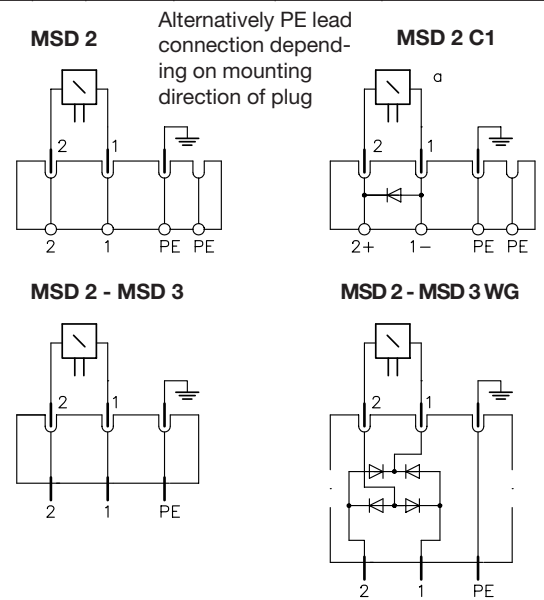
Type MSD 2 is standard for valves size 0 (acc. to D 7300). Emergency manual actuation by pressing down the cap (rubber cap is scope of delivery) MSD 1 D is without rubber cap and emergency hand actuation.

Type MSD 2 C1 is with clamp diodes 1) 2) to suppress cut-off voltage spikes i.e. in connection with electronic circuits and/or to achieve a longer fall (release) time.

Caution: Polarity sensitive - there is no reverse polarity protection!

Adapter version type MSD 2-MSD 3 is to convert from MSD-2 to plug conforming DIN 43 650 A (see sect. 2.1). For order coding, see D 7300, sect. 2.2.3

Adapter MSD 2-MSD 3 WG with additionally included full bridge rectifier 3) 3)



- 1) D = Diode;
- Z = Two Z-diodes connected in series in opposite direction
- LED = rt = red, gn = green, ge = yellow
- 2) **Caution:** The diodes will prolong the releasing time of the valve by 2 to 5 times depending on solenoid size and valve design
- 3) Diodes 1 N 4007, surge peak reverse voltage 1000 V, nominal current 1 A
- 4) Plug already included with order of solenoid operated hydraulic valve according to respective data sheet, a special or additional note is not required

3. Dimensions

(all dimensions in mm, subject to changes !)

3.1 Plugs conforming DIN 43 650 T. 1, type A (ISO 4400)

Type MSD 3-309 black
MSD 3-309 grey
MSD 3-209 C1
MSD 4-309 C2

MSD 4-309 C1+R
MSD 4-209 P10
MSD 4-309 P22
MSD 4-P53
MSD 4-P63
MSD 4-P55

Type SVS 3129020 black
SVS 296048 grey
SVS 296100
SVS 296107

Screw driver slot for easy dismantling of insert
Connector is not used with two terminal versions

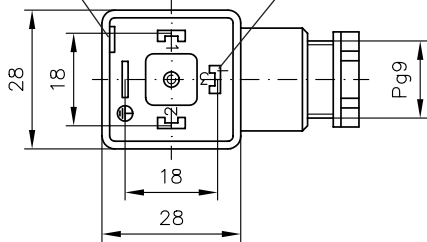


Illustration without seal
Housing 4 x 90° rotatable

Connector is not used with two terminal versions

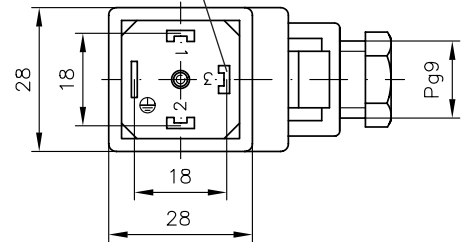
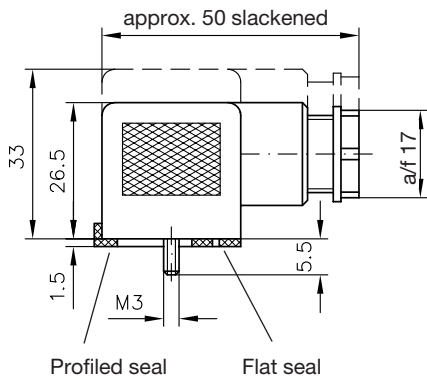
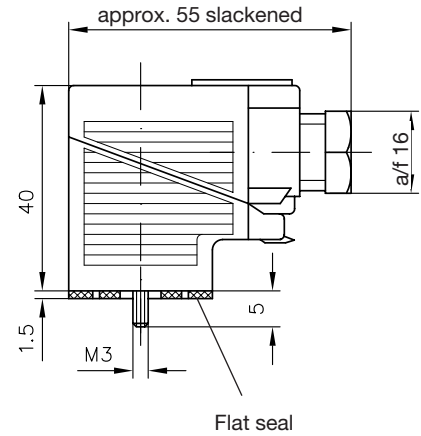


Illustration without seal
Housing 4 x 90° rotatable

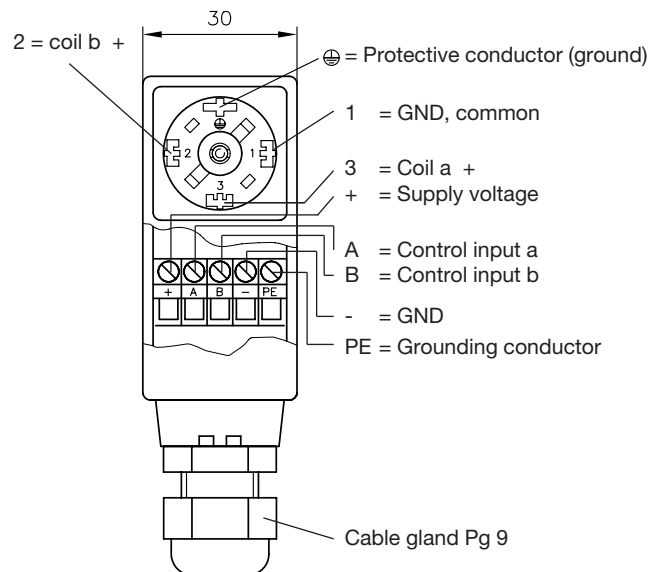
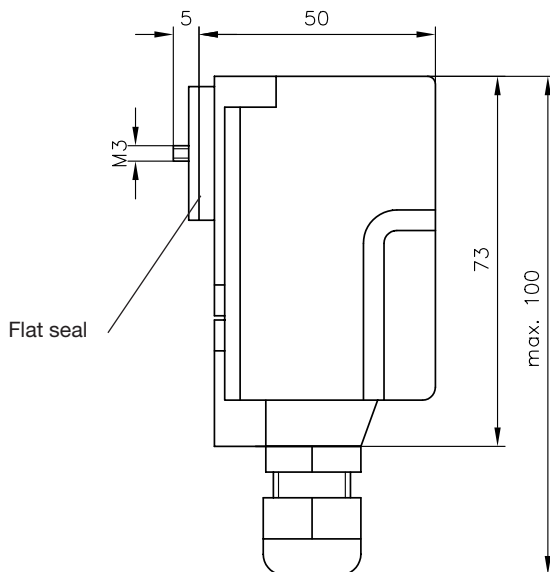


Profiled seal Flat seal



Flat seal

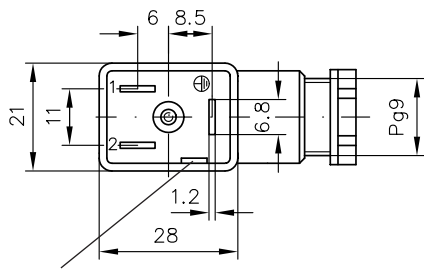
Type MSED 28028 (dimensions also apply to type MSE 28026)



Housing rotatable left hand side max. 90°, right hand side max. 180°

3.2 Plugs slim design

Type MSD6-209



Screw driver slot for easy dismantling of insert

Illustration without seal

Type SVS 3129720 black

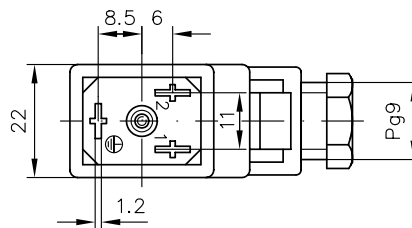
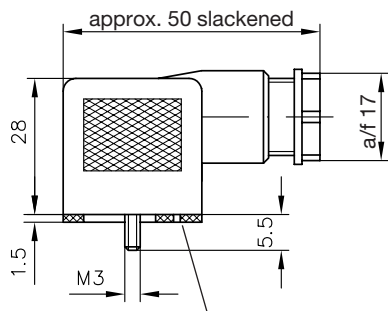


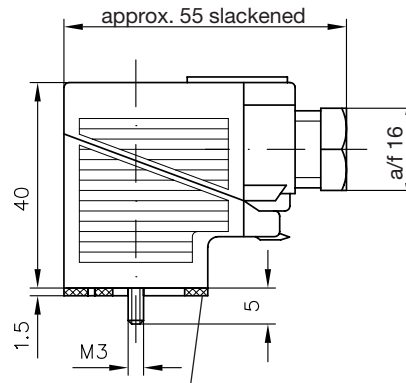
Illustration without seal

Housing 4 x 90° rotatable

Housing 4 x 90° rotatable



Flat seal



Flat seal

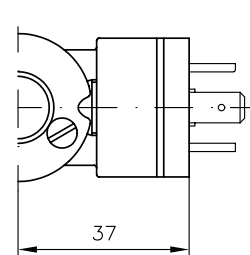
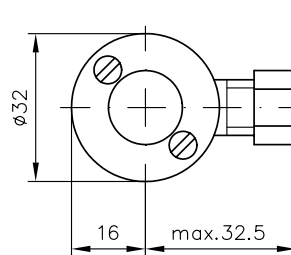
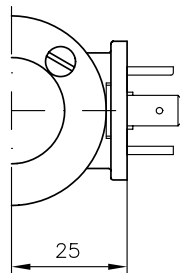
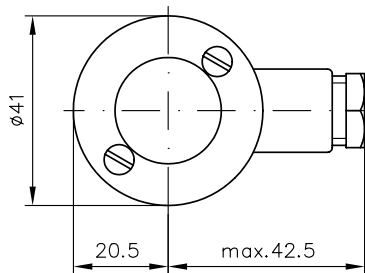
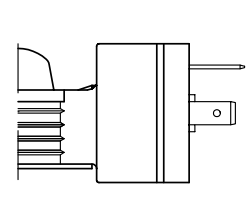
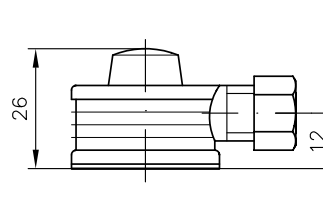
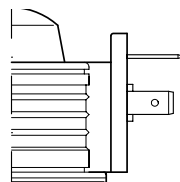
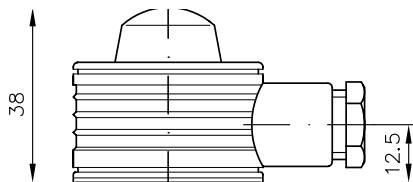
3.3 Central plugs

Type MSD 1

Type MSD 1-MSD 3

Type MSD 2
MSD 2 C1

Type MSD 2-MSD 3
MSD 2-MSD 3 WG



For additional dimensions, see type MSD 1!

For additional dimensions, see type MSD 1!

4. Devices delivered without plug

Should the customer wish to use his own plug the devices can be delivered without. The terminals of the solenoid are protected by a plastic cap.

Typical order coding for valve without plug 1)
 WN 1 S-**X24**, WH 1 H-**X196** 2) (D 7470 A)
 W 3 - 2 - **X 220** (D 7300)
 SG 3G - **MD 2/X 24** (D 5650)
 SG 1 L - **MD 8 X** (D 6400)

1) These codings are currently not listed in the respective data sheets, but they can be used for orders making a suffix in uncoded text superfluous.

2) For DC solenoids which are supplied from the AC mains via a bridge rectifier, the coil voltage $U_{DC} \approx 0.89 U_{AC}$ must be indicated. For DC solenoids which are supplied from the AC mains via a one-way rectifier the coil voltage $U_{DC} \approx 0.45 U_{AC}$ must be indicated.