

## Proportional Rotary Solenoid

# 6

Product group

## G DR

- **Proportional Rotary Solenoid**
- According to VDE 0580 (conform with article 10 of directions 73/23/EEC-according to CENELEC memorandum no.3 of March 1987)
- Horizontal torque vs angle of rotation characteristic
- Constant torque in work area
- Proportional relationship between output torque and input current
- Short regulating time through pre-magnetized system
- Clock- and counterclockwise rotation by switching the current polarity
- Armature guided in ball bearings
- Coil with insulation to class B
- Electrical connection and protection classification with proper assembly
  - Connection by free leads protection classification – DIN VDE 0470/EN 60529 – IP 20
- Mounting by threaded holes on the flat surfaces
- Possibility to attach a spring return
- **Rotation Angle Position Sensor**
- Flux measuring by means of a Hall sensor with integrated electronics
- Critical frequency of Hall sensor: Typically 23 kHz
- Measuring range up to 110°
- Stable sensor housing made of aluminium
- Flange mounting via centring pin and two screws
- Electrical connection and protection class with proper assembly:
  - Free, flexible leads
  - Protection classification according to DIN VDE 0470/EN 60529 – IP 20
- **Application examples:**  
Drive for industrial control units, control technology, rotary slide valves and flap valves in fluid technology. The combination proportional rotary solenoids with rotation angle position sensor allow the use of the rotary solenoid for closed loop position control applications.

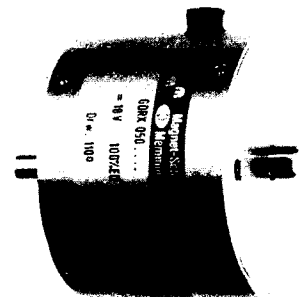


Fig. 1  
Type G DR X 050 X 20 A 01  
without rotation angle position sensor

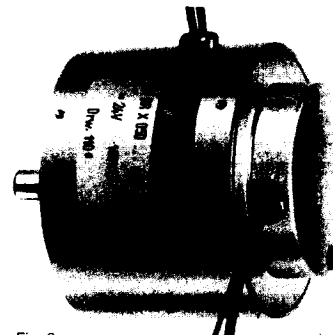


Fig. 2  
Type G DR X 050 X 20 A 61  
with rotation angle position sensor

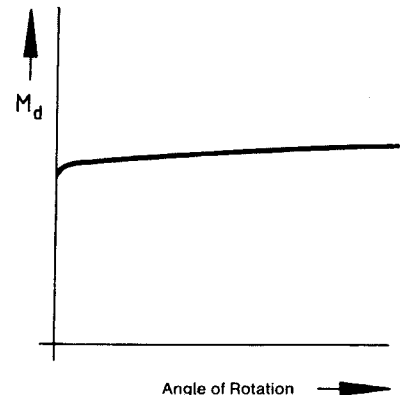


Fig. 3  
Torque characteristic  
MSM-Fo 0804.1698

### Technical Data Proportional Rotary Solenoid Type G DR

G DR X		035					050					075				
Rated voltage $U_N$	(V)	= 24														
Duty rating ED	(%)	100	40	25	15	5	100	40	25	15	5	100	40	25	15	5
Power consumption	(W)	6.9	15.6	24.6	37	80	11	21	40	65	144	25	50	82	146	331
Torque $M_d$	(Ncm)	2.1	3.3	4.1	5.1	7.2	6	8.6	11.6	16	23	24	35	48	61	85
Reference temperature $\delta_{11}$	(°C)	35														
Angle of rotation $\gamma$	(°)	110														
Mass m	(kg)	0.156					0.425					1.42				
Moment of inertia armature J	(kgm <sup>2</sup> )	$1.9 \cdot 10^{-6}$					$1.1 \cdot 10^{-5}$					$1.1 \cdot 10^{-4}$				

### Technical Data Rotation Angle Position Sensor

**Technical Data Rotation Angle Position Sensor on Proportional Rotary Solenoid**  
**G DR X 035 X 20 A 61**  
**G DR X 050 X 20 A 61**  
**G DR X 075 X 20 A 61**

Measuring range	( $\pm$ °)	$\pm 55$	
Supply voltage	(V)	4.5...6	
Current input	(mA)	<14	
Output voltage	(V)	1.8...3.1	e.g. at $U_{supply} = 5V$
in middle position	(V)	$2.5 \pm 0.25$	
Sensitivity	(mV/1°)	typical $11 \pm 1$	
Linearity tolerance	(%)	$\pm 3$	
Critical frequency (-3 dB)	(kHz)	typical 23	
Reference temperature range	(°C)	0...50	
Temperature drift	(%/°C)	typical 0.05	
Output resistance	( $\Omega$ )	50	

#### Sensitivity

The sensitivity is the output-signal change relating to the distance that is to be measured (indicated in mV/1°).

#### Linearity Fault

The linearity fault indicates the proportional deviation of the output signal from the ideal line.

#### Temperature Drift

The temperature drift indicates the proportional deviation of the output signal per degree of temperature change (indicated in %/°C).

#### Critical Frequency

relating to the Hall sensor

#### Listed values

The torques indicated in the table refer to 90% of the rated voltage = 24 V and hot condition.

Torque may deviate with other voltages.

The value of torque may deviate of approx.

$\pm 10\%$  from the table value due to natural dispersion.

Rated voltage = 24 V, other voltages on request.

The hot condition is based on:

- mounting on a heat insulating base
- rated voltage = 24 V
- rel. duty rating 5-100% according to technical explanation G XX paragraph 4
- reference temperature 35° C

Further information see -Technical Explanation and VDE 0580.

1) For extended operating life it is recommended not to drive the unit to the internal end stops, but to work within the 110° arc. In particular, for on/off and double-acting applications, soft external end-stops should be used to prevent mechanical shock to the internal parts.

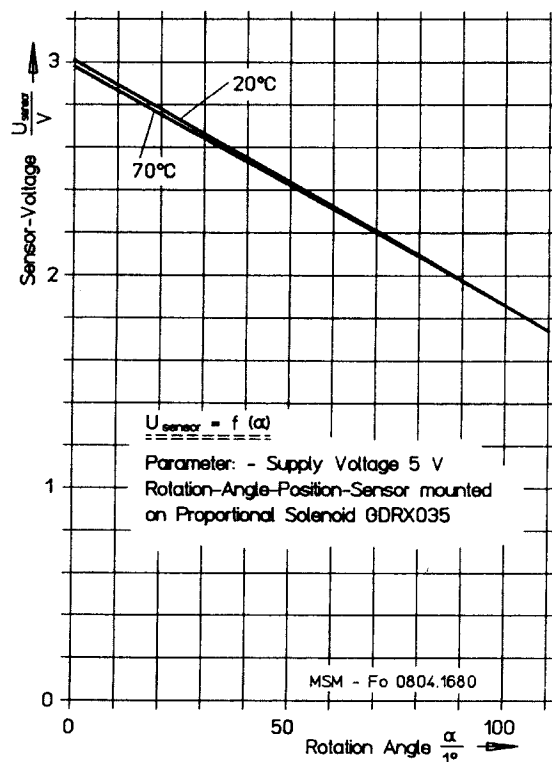


Fig. 4  
Voltage vs rotation angle diagram of rotation angle position sensor

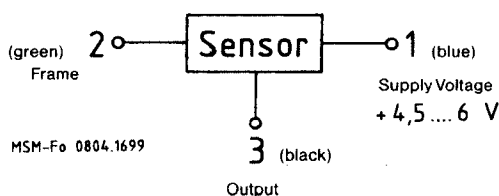


Fig. 5  
Block diagram

### Type G DR X 035

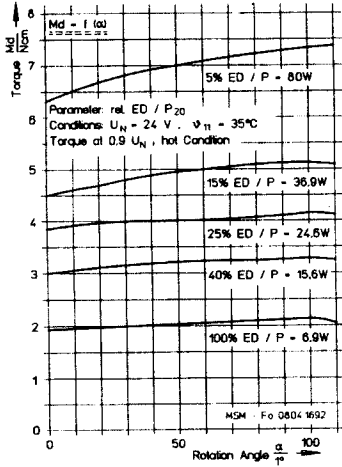


Fig. 6  
Characteristics  $M_d = f(\alpha)$   
Type G DR X 035

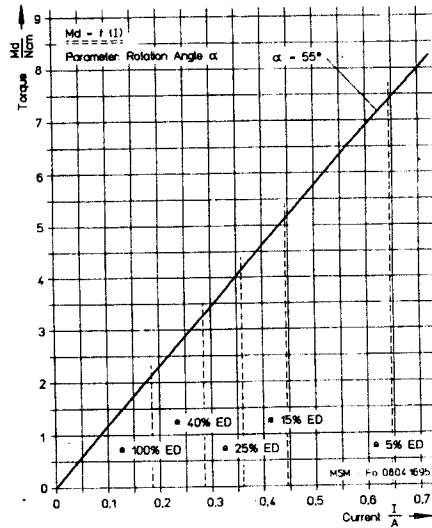


Fig. 7  
Characteristics  $M_d = f(I)$   
Type G DR X 035

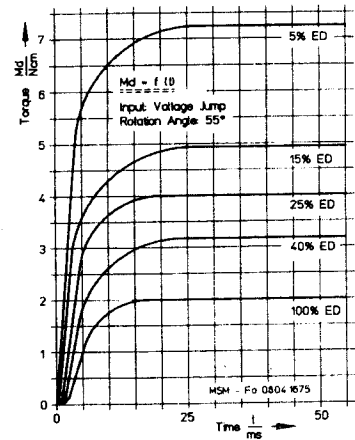


Fig. 8  
Characteristics  $M_d = f(t)$   
Type G DR X 035

### Type G DR X 050

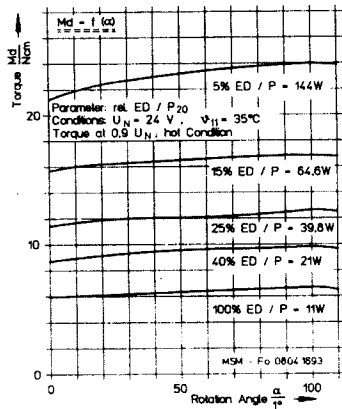


Fig. 9  
Characteristics  $M_d = f(\alpha)$   
Type G DR X 050

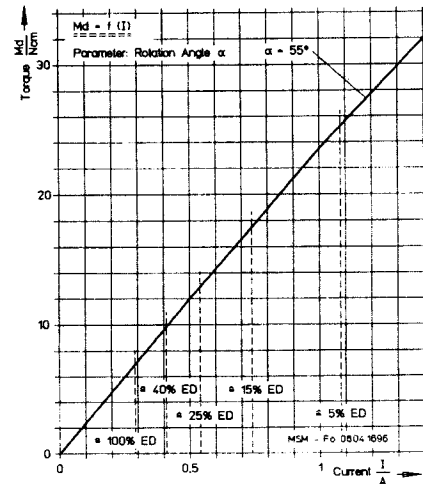


Fig. 10  
Characteristics  $M_d = f(I)$   
Type G DR X 050

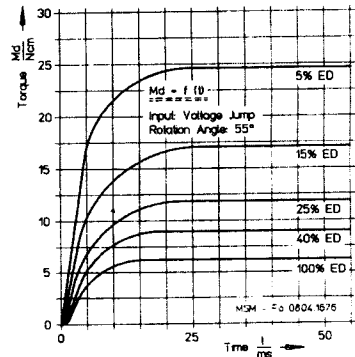


Fig. 11  
Characteristics  $M_d = f(t)$   
Type G DR X 050

### Type G DR X 075

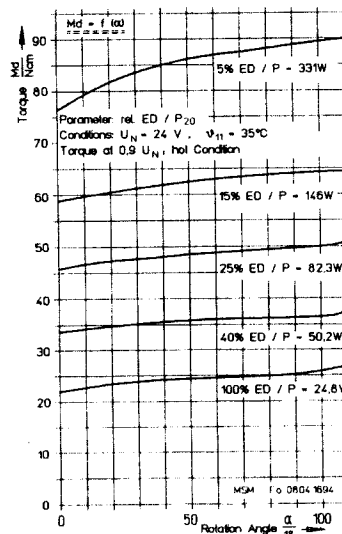


Fig. 12  
Characteristics  $M_d = f(\alpha)$   
Type G DR X 075

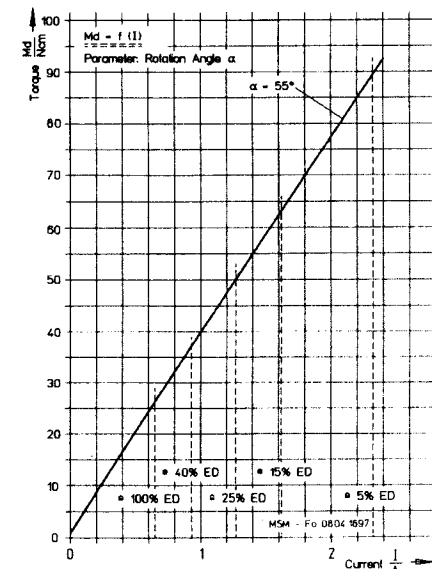


Fig. 13  
Characteristics  $M_d = f(I)$   
Type G DR X 075

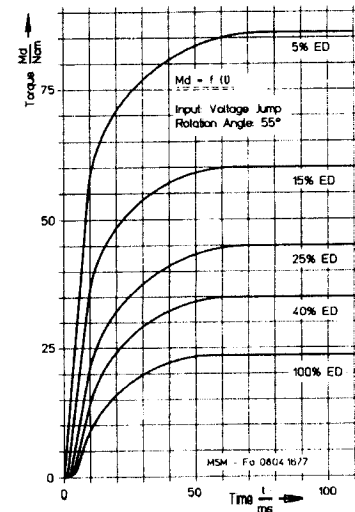


Fig. 14  
Characteristics  $M_d = f(t)$   
Type G DR X 075

Dimension Tables Type G DR

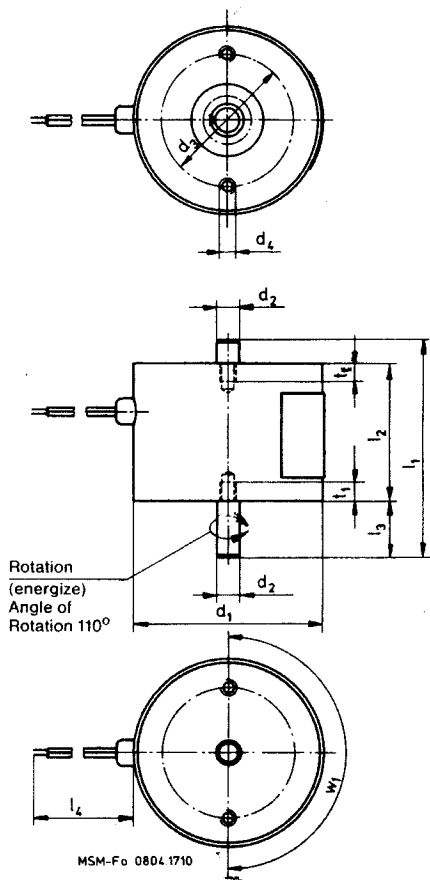


Fig. 15  
Dimensions  
Type G DR X 035 X 20 A 01  
to G DR X 075 X 20 A 01

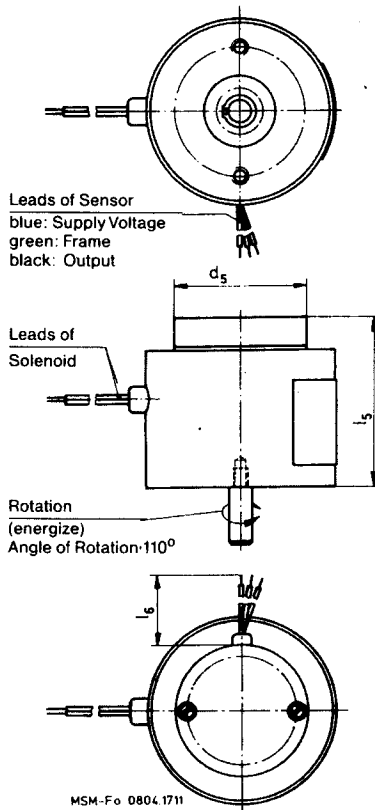
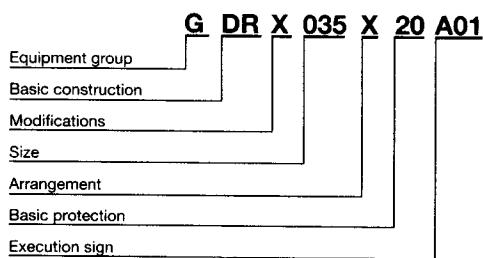


Fig. 16  
Dimensions  
Type G DR X 035 X 20 A 61  
to G DR X 075 X 20 A 61  
with rotation angle position sensor  
(all other details as fig. 15)

Size	035	050	075
Dim.	Dimensions in mm		
d <sub>1</sub>	35	50	75
d <sub>2</sub>	4 <sub>h8</sub>	6 <sub>h8</sub>	10 <sub>h8</sub>
d <sub>3</sub>	25	35	50
d <sub>4</sub>	M 3	M 4	M 5
d <sub>5</sub>	35	35	35
l <sub>1</sub>	44	58	86
l <sub>2</sub>	30	37	56
l <sub>3</sub>	10	15	20
l <sub>4</sub>	100	150	200
l <sub>5</sub>	38.5	45.5	64.5
l <sub>6</sub>	200	200	200
t <sub>1</sub>	3.5	5	8
W <sub>1</sub>	2 x 180°	2 x 180°	3 x 120°

Type code



Order Example

Type                    **G DR X 035 X 20 A 01**  
Voltage                **== 24 V**  
Duty rating            **100%**

Specials

Special designs and modifications on request; please then provide exact details of the conditions of application, in accordance with our -Technical Explanation.