# MAGNET SCHULTZ

### SPECIALISTS IN ELECTROMAGNETIC DEVICES

**QUALITY SINCE 1912**

# 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.
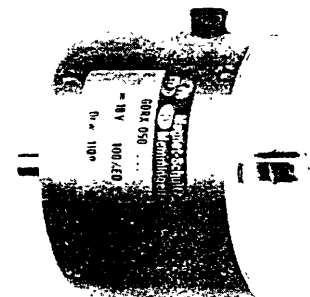


Fig. 1
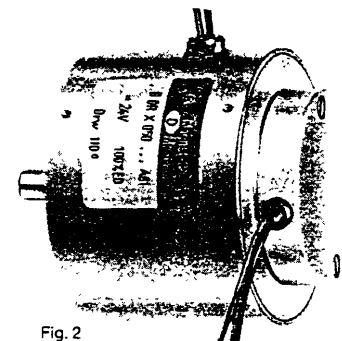Type G DR X 050 X 20 A 01
**without rotation angle position sensor**



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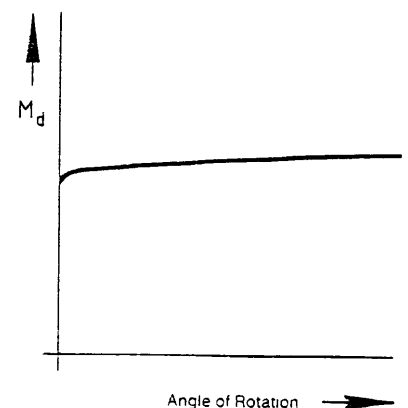**with rotation angle position sensor**



$M_d$

Angle of Rotation

MSM-Fo 0804 1698

Fig 3
Torque characteristic

| G DR X | | | 035 | | | | 050 | | | | | 075 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Rated voltage $U_N$ (V) | | | | $=$ 24 | | | | $=$ 24 | | | | | | $=$ 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 | | | | 35 | | | | | | 35 | | | |
| Angle of rotation (°) | | | | 110 | | | | 110 | | | | | | 110 | | | |
| Mass m (kg) | | | | 0,156 | | | | 0.425 | | | | | | 1,42 | | | |
| Moment of inertia armature J (kgm²) | | | | $1,9 \cdot 10^{-6}$ | | | | $1.1 \cdot 10^{-5}$ | | | | | | $1,1 \cdot 10^{-4}$ | | | |

## 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 ($\sphericalangle$°) | $\pm 55$ | |
| Supply voltage (V) | 4,5 ... 6 | |
| Current input (mA) | < 14 | |
| Output voltage (V) | 1,8 .. 3,1 | e g at $U_{supply}$ = 5 V |
| in middle position (V) | $2,5 \pm 0,25$ | |
| Sensitivity (mV/1°) | typical $11 \pm 1$ | |
| Linearity tolerance (%) | $= 1$ | |
| 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



Fig 4
Voltage vs rotation angle diagram of rotation angle position 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:

a) mounting on a heat insulating base

b) rated voltage $=$ 24 V

c) rel. duty rating 5 – 100 % according to technical explanation G XX paragraph 4

d) reference temperature 35° C

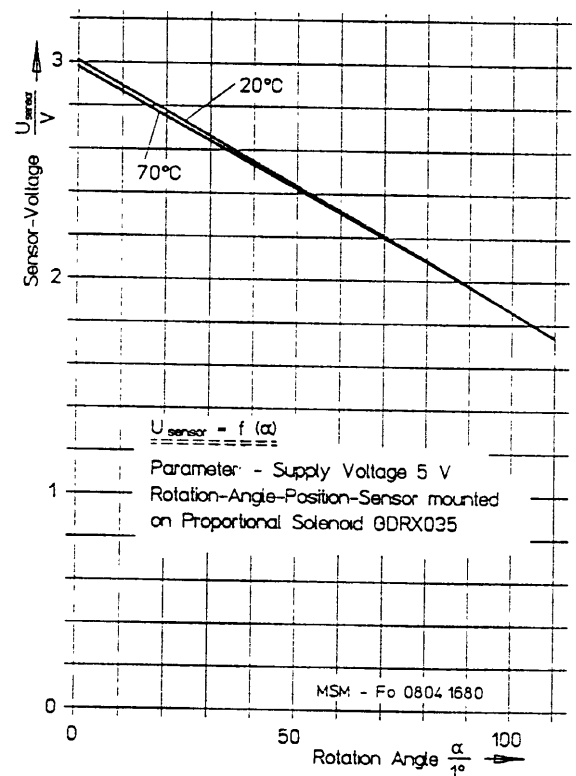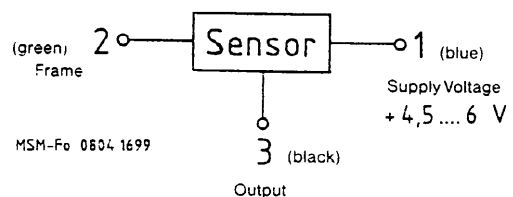**Further information see ⋅ⁿ-Technical Explanation and VDE 0580.**



Fig 5
Block diagram

# Type G DR X 035
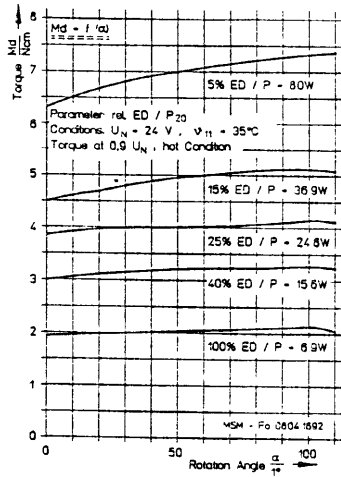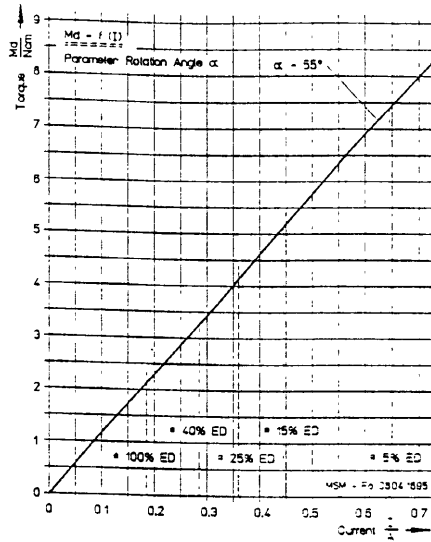


Fig. 6
Characteristics Md = f (α)
Type G DR X 035
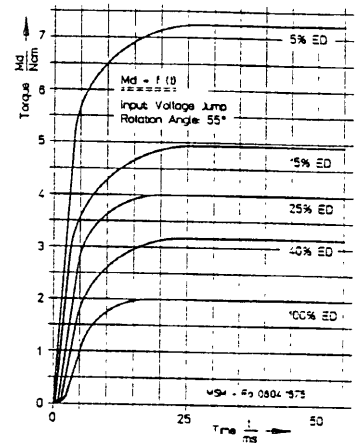


Fig. 7
Characteristics Md = f ( I )
Type G DR X 035



Fig 8
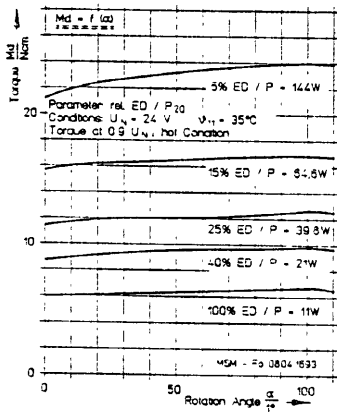Characteristics Md = f (t)
Type G DR X 035

# Type G DR X 050
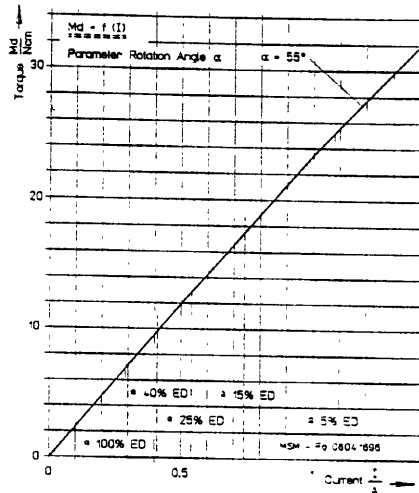


Fig. 9
Characteristics Md = f (α)
Type G DR X 050
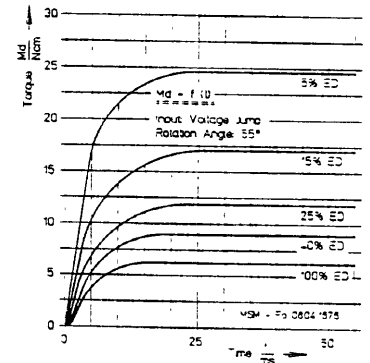


Fig 10
Characteristics Md = f ( I )
Type G DR X 050



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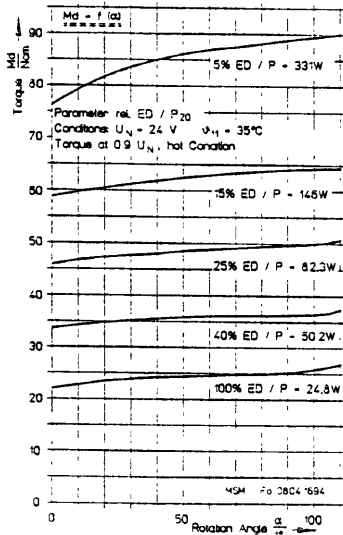Characteristics Md = f (t)
Type G DR X 050

# Type G DR X 075
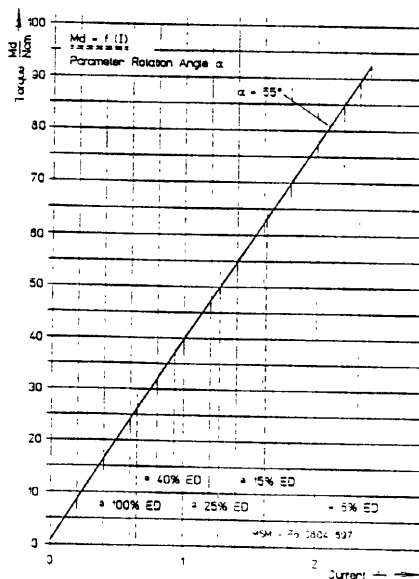


Fig 12
Characteristics Md = f (α)
Type G DR X 075
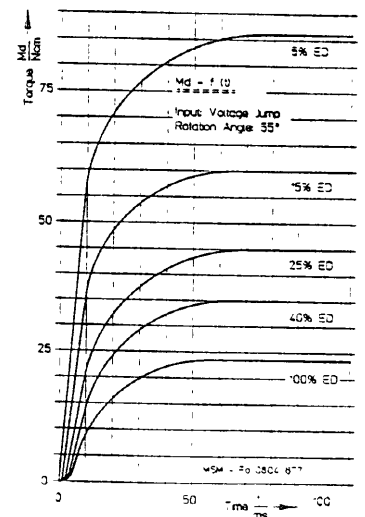


Fig 13
Characteristics Md = f ( I )
Type G DR X 075



Fig 14
Characteristics Md = f (t)
Type G DR X 075

Dimensions without guarantee – Modifications reserved

3

# Dimension Tables Type G DR



Leads of Sensor
blue  Supply Voltage
green  Frame
black  Output

Leads of
Solenoid

Rotation
(energize)
Angle of Rotation·110°

Rotation
(energize)
Angle of
Rotation 110°

MSM-Fo 0804 1710

MSM-Fo 0804 1711

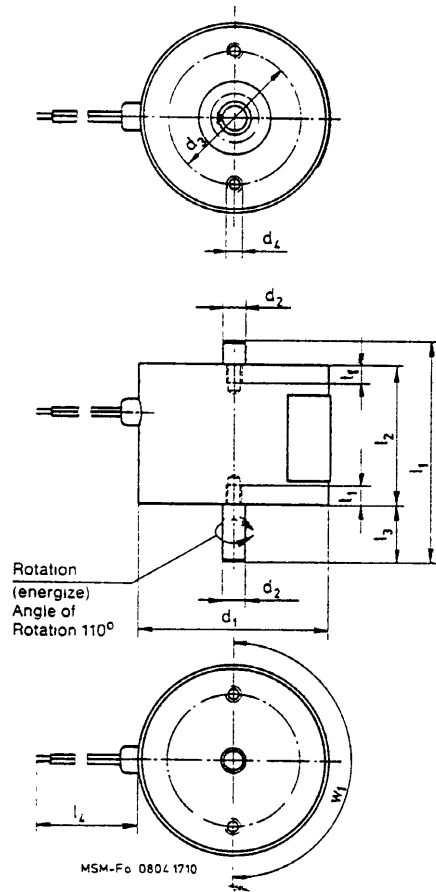| Size | 035 | 050 | 075 |
|------|-----|-----|-----|
| Dim. | Dimensions in mm | | |
| $d_1$ | 35 | 50 | 75 |
| $d_2$ | $4_{h8}$ | $6_{h8}$ | $10_{h8}$ |
| $d_3$ | 25 | 35 | 50 |
| $d_4$ | M 3 | M 4 | M 5 |
| $d_5$ | 35 | 35 | 35 |
| $l_1$ | 44 | 58 | 86 |
| $l_2$ | 28 | 37 | 56 |
| $l_3$ | 10 | 15 | 20 |
| $l_4$ | 100 | 150 | 200 |
| $l_5$ | 36,5 | 45,5 | 64,5 |
| $l_6$ | 200 | 200 | 200 |
| $t_1$ | 3,5 | 5 | 8 |
| $w_1$ | 2 x 180° | 2 x 180° | 3 x 120° |

Fig 15
Dimensions
Type G DR X 035 X 20 A 01
to    G DR X 075 X 20 A 01
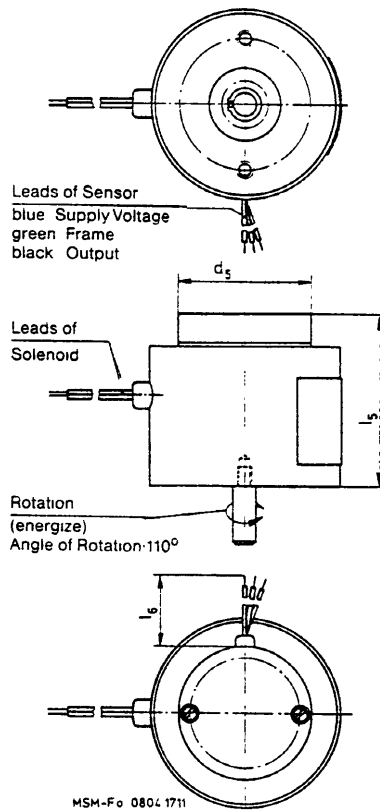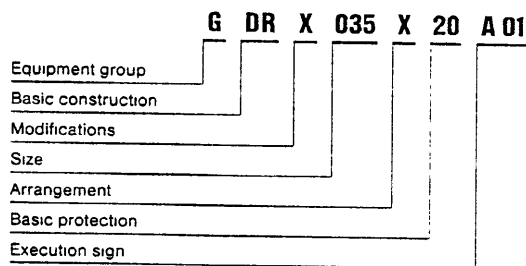
Fig 16
Dimensions
Type G DR X 035 X 20 A 61
to    G DR X 075 X 20 A 61
with rotation angle position sensor
(all other details as fig 15)

## Type code

G  DR  X  035  X  20  A 01

Equipment group
Basic construction
Modifications
Size
Arrangement
Basic protection
Execution sign

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

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

Subject to our standard conditions.

VL 0610 a

QUALITY
SINCE 1912

# Optional Return Spring for GDR Rotary Solenoid
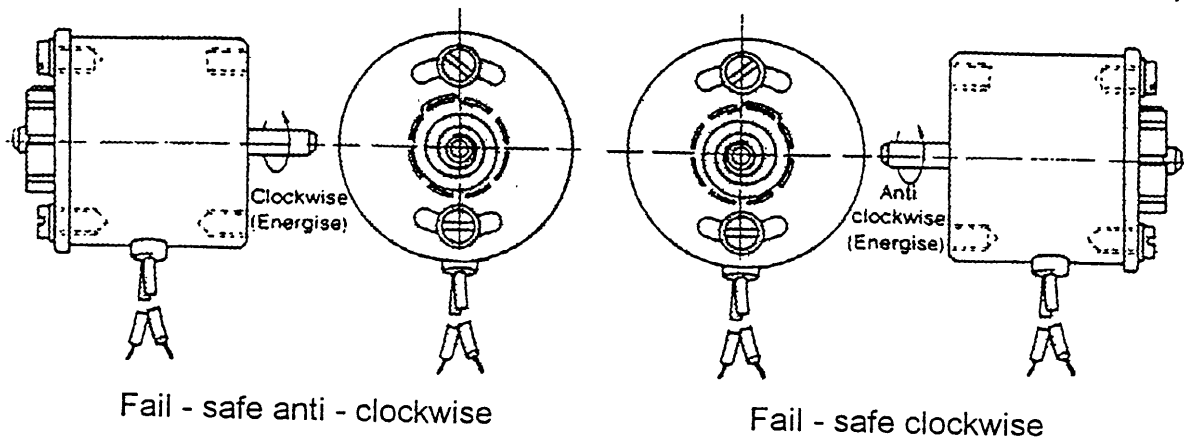
**6**

Product group

**February 1997**

Type **GDR**
Farnell supplement

## Fitting of Optional Spring for Fail - Safe Operation

To be read in conjunction with datsheet GDR (Proportional Rotary Solenoid)



Clockwise (Energise)

Anti clockwise (Energise)

Fail - safe anti - clockwise

Fail - safe clockwise

The spring assembly can only be fitted to the shaft which has a machined flat and the direction of the spring spiral controls the fail safe direction (see above)

Slide the spring down into the bore of the plastic cage with the spiral winding in the appropriate direction and engage the outer end of the spring in an adjacent castellation.

Position the spring and cage assembly on the end of the solenoid with the shaft appearing through the middle of the spring. Whilst holding the spring in place in the cage, push the spring down over the shaft end until the inner end engages in the slot in the shaft. Rotate the cage to tension the spring to give the required torque, fit and tighten the screws and washers.

Fine adjustments can be made by slackening the screws and rotating the cage before retightening. Coarse adjustments can be made by lifting the outer end of the spring from the castellation and re-engaging it in an alternative position

## WARNING

DO NOT FIT OVERLENGTH SCREWS

DO NOT OVER TENSION SPRING (solenoid will fail to operate)

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