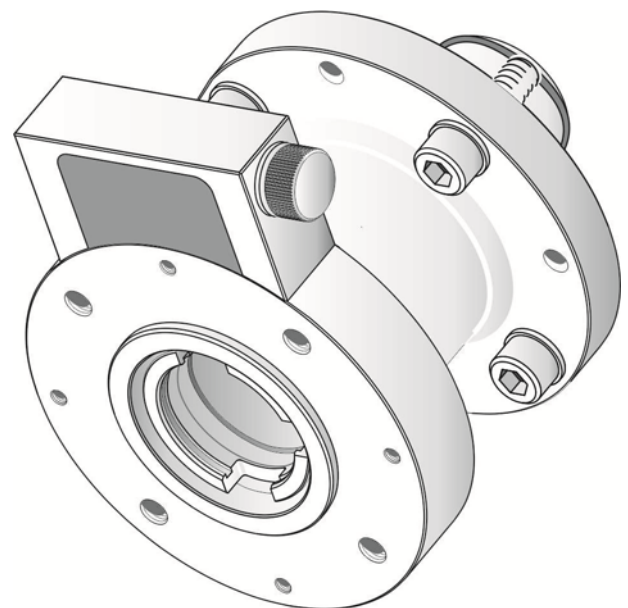


# Operation instructions

## **DMF**

Torque measurement flange  
2SX7100-6....

for SEVEN actuators



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# 1 General information

## 1.1 Safety information

### General

The devices referred to in this document are components of installations conceived for industrial applications. They are designed in accordance with the recognized engineering rules.

All work involved in transport, assembly, installation, commissioning has to be performed by qualified personnel.

Qualified personnel within the meaning of the relevant safety instructions of this documentation are all persons authorized to perform the required tasks according to the standards of safety technology and who may recognize and avoid potential hazards. They must be thoroughly familiar with the safety instructions of these operation instructions.

Correct transport, proper storage, mounting, as well as careful commissioning are essential to ensure trouble-free and safe operation.

## 1.2 Transport and storage

- The device must be supplied in sturdy packaging.
- Store in well-ventilated, dry room.
- Seal electrical connection with cap.

## 1.3 Disposal and recycling

- The packaging of our products consists of environmentally friendly materials which can easily be separated. For the disposal of the packaging material, we recommend recycling and collection centers.
- Arrange for controlled waste disposal of the disassembled torque measurement flange or for separate recycling according to materials.
- Observe the national/local regulations for waste disposal.

## 1.4 Notes to the operation instructions

The following symbol is used to mark safety information within the operation instructions:



**Notice** marks activities which have major influence on the correct operation. Non-observance of these notes may lead to consequential damage.

For the sake of clarity, not all details are described in these operation instructions, nor can they cover all conceivable cases regarding installation, operation and maintenance. For this reason, the operation instructions only contain instructions for qualified personnel that are necessary when the equipment is used for the purpose for which it is intended or in industrial applications.



This manual is complete only in combination with the operation instructions of the respective actuator.  
The safety information contained in the operation instructions must be heeded at all times when working with the actuators!

## 2 General

### 2.1 Functional principle

The torque measurement flange (DMF) was specially developed for precise torque measurement for actuators.

The DMF has a compact design, no bearings and is virtually wear-free.

Static as well as dynamic torques are measured with the DMF, both while the output shaft rotates or is at standstill.

The torque provided by the actuator also acts on the DMF.

The torsion occurring between the flanges of the DMF is recorded and transformed into an analog high-precision output signal via a measurement amplifier.



A precise comparison with formerly recorded torques can be used to assess whether a valve has become sluggish. However, this is only possible if similar actuator and valve settings at identical ambient conditions were present during measurement!

### 2.2 Scope of supply

The scope of supply of the torque measurement flange generally includes:

- Torque measurement flange (DMF) with adapter shaft for mounting to actuator, mounting elements (4 screws with washers) and operation instructions; refer to fig. 1.

Order no.:

- 2SX7100-6A... ( ± 120 Nm, flanges F10)
- 2SX7100-6B... ( ± 500 Nm, flanges F14)
- 2SX7100-6C... ( ± 1,000 Nm, flanges F16)

and

- Connecting cable (cable diameter: 5.6 mm) with bayonet coupling to the DMF (coupling M12x1) and open wires with wire end sleeves for customer connection; refer to fig. 2.



Fig. 1: DMF with adapter shaft



Fig. 2: Connecting cable

## 2.3 Technical data

The sensor within the torque measurement flange records the torque acting upon the flange.

The signal proportional to this torque is amplified by means of the analog measurement amplifier integrated within the torque measurement flange to the required output signal ranges of  $12 \pm 6$  mA.

Torque measurement flanges are calibrated. The inside is made of compound material to protect them against environmental impacts.

Readjustment is neither necessary nor possible.

### Technical data of the sensor

Measuring range	DMF		
	$\pm 120$ Nm	$\pm 500$ Nm	$> 1,000$ Nm
Accuracy	$\pm 2$ % of the measuring range end value (120, 500 or 1,000 Nm)		
Insulation resistance	$> 2$ G $\Omega$		
Temperature coefficient of rated value (measuring range end value)	0.2 % / $^{\circ}\text{C}$		
Temperature coefficient of zero point (no torque)	0.2 % / $^{\circ}\text{C}$		
Reference temperature	20 $^{\circ}\text{C}$		
Storage temperature	-40 $^{\circ}\text{C}$ to +105 $^{\circ}\text{C}$		
Ambient temperature	-40 $^{\circ}\text{C}$ to +80 $^{\circ}\text{C}$		
Maximum usage torque	1-fold nominal torque		
Limit torque	2-fold nominal torque		
Breaking torque	4-fold nominal torque		
Version/material	Aluminum (anodized)		
Enclosure protection	IP67		
Dimensions	$\varnothing 125 \times 102$ (157 x 125 x 102)	$\varnothing 175 \times 144$ (207 x 175 x 144)	$\varnothing 210 \times 165$ (242 x 210 x 165)

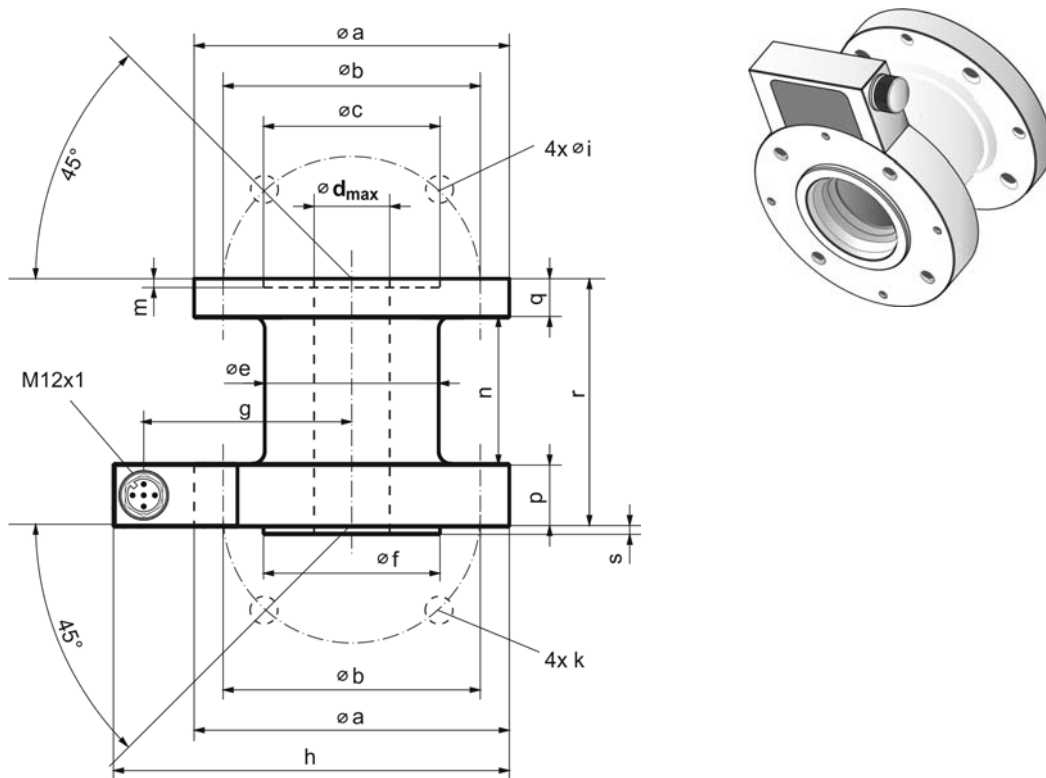
### Technical data of integral amplifier

Power supply ( $U_B$ )	10 – 30 V DC, typically 24 V DC
Limit frequency (at -3 dB)	1,000 Hz
Output signal	$12 \pm 6$ mA,;3-wire
Load	$(U_B - 6 \text{ V})/0.0205 \text{ A}$ up to max. 500 $\Omega$
Connection	M12x1 5-pole connector
Assignment	1 = +10 – 30 V, 3 = ground, 4 = current signal, 2 and 5 are not connected



The torque measurement flange is designed for continuous duty!

## 2.4 Dimension sheet



Dimensions	Torque measurement flange		
	± 120 Nm	± 500 Nm	± 1,000 Nm
ø a	125	175	210
ø b	102	140	165
ø c	70 <sup>H8</sup>	100 <sup>H8</sup>	130 <sup>H8</sup>
ø d <sub>max</sub> (max. stem ø)	<b>30</b>	<b>46</b>	<b>60</b>
ø e	69	100	122
ø f	70 <sub>f8</sub>	100 <sub>f8</sub>	130 <sub>f8</sub>
g	88	108	125
h	157	207	242
ø i	11	17.5	22
k	M10	M16	M20
m	4	5	6
n	58	90	100
p	25	25	30
q	16	25	30
r	99	140	160
s	3	4	5

### 3 Assembly and connection

Ensure that torque measurement flange is installed with care:

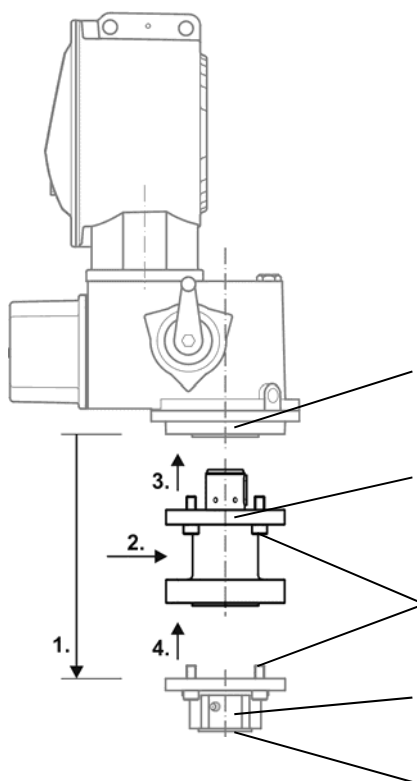


- Flange surfaces must be even and free from contamination!
- The specified tightening torque for fastening the DMF must be imperatively heeded.  
Fasten screws crosswise!
- Avoid mechanic pressure on the compound material inside the torque measurement flange!
- Uneven heating of the torque measurement flange must be avoided!
- Protect connection coupling M12x1 against contamination.  
Always use protection cap when not connected!

#### 3.1 Mounting to actuator

The torque measurement flange is mounted directly on the actuator gear case.

Prior to mounting the torque measurement flange, an output shaft different from the B1 output shaft, a reducing flange, an A stage, a thrust unit or a part-turn unit have to be dismantled and mounted again once the torque measurement flange has been fitted.



Actuator			
Flange	F10	F14	F16
Output shaft	B1		

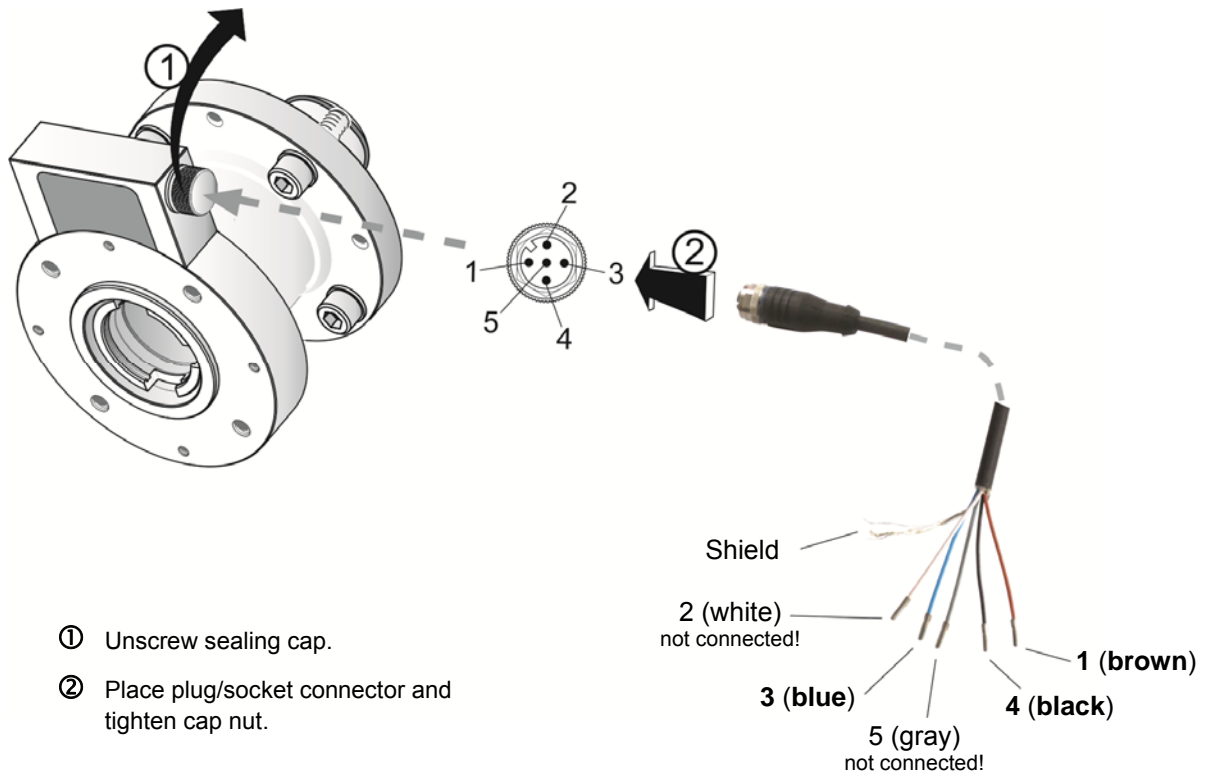
<b>DMF (incl. adapter shaft)</b>			
2SX7100- ± Nm	6A... 120	6B... 500	6C... 1000
Flanges	F10	F14	F16
Output shaft	B1		
<b>Tightening torque [Nm]</b>	<b>41</b>	<b>175</b>	<b>341</b>

Reducing flange and/or different output shaft type, A stage, thrust unit or part-turn unit.

	± 120 Nm		± 500 Nm		± 1,000 Nm		
Flange	F07	F10	F10 G0	F12	F14 G1/2	F14 G1/2	F16 G3
Output shaft	in accordance with ISO 5210						in accordance with DIN 3210
	-----						

### 3.2 Electrical connection

The connecting cable to the torque measurement flange is shielded and very robust, ideally suited for industrial applications, protected against polarity reversal, also designed in enclosure protection IP67 and is equipped with an M12x1 coupling for connection.



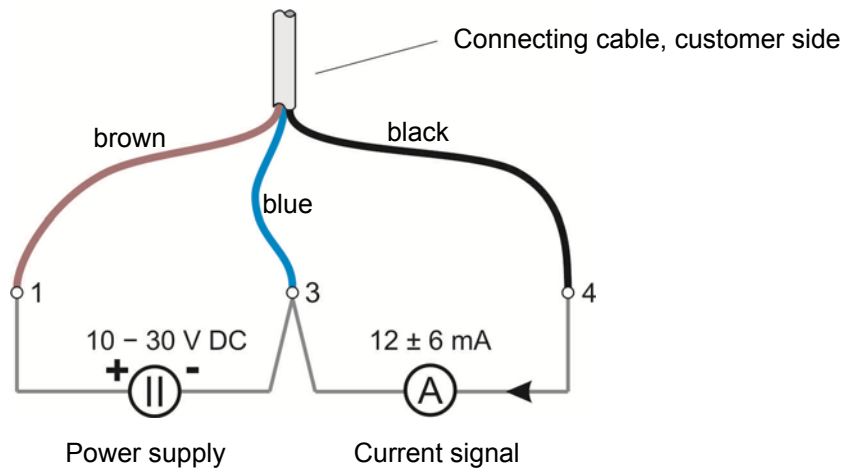
#### Assignment

Pin 1 (brown)	Power supply connection (10 - 30 V DC)
Pin 3 (blue)	Ground connection (-)
Pin 4 (black)	Current signal connection (12 ±6 mA)
Shield	Connect to ground or to pin 3 (blue) resp. when connecting to the actuator, to the shield of the metal cable gland.



### 3.2.1 Power supply and current signal output

The torque measurement flange has to be supplied with DC voltage between 10 V and 30 V:



The torque measurement flange can be directly supplied with 24 V DC from the actuator:

Actuator round plug	+ P24	→ pin 1 or 15
	ground G24	→ pin 6 or 18

### 3.2.2 Connection to the actuator

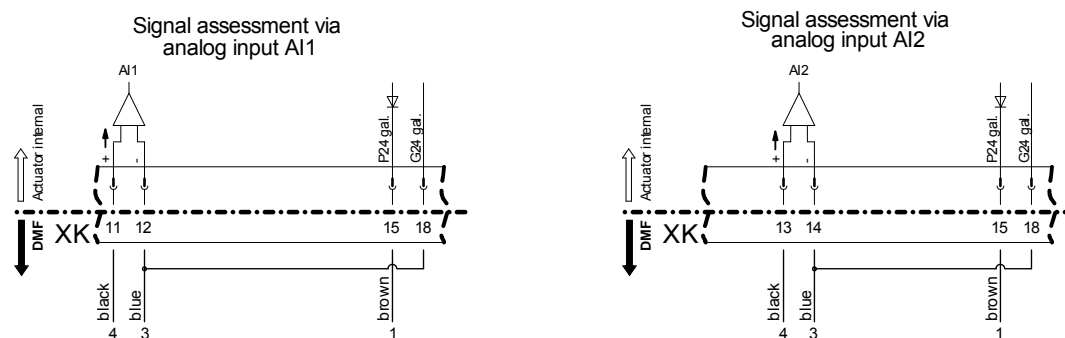
If the torque measurement flange (DMF) is connected to the customer connection of a PROFITRON or HiMod actuator, the following functions are available:

- Zero adjustment for mounting condition or temperature dependent zero point shift under no load conditions. The corrected value is additionally shown as Offset [Nm].
- Indication of the torque currently measured by the DMF in the “Observe” menu.
- Recording of the torque characteristics from CLOSED to OPEN and from OPEN to CLOSED. The torque curve can be viewed via the COM-SIPOS PC parameterization program.



For details on DMF parameterization, refer to operation instructions Y070.302/.. “PROFITRON/HiMod”!

The DMF current signal can be connected to analog input AI1 or AI2 (if available), refer to connection options below:



## 4 Signal assignment and visualization

Signal assignment and, if required, visualization must be implemented by the user!

There are individual options, such as:

- Signal processing (including zero adjustment) with indication of the current torque or recording of the torque characteristics from CLOSED to OPEN and OPEN to CLOSED (torque curve) via the actuator, see chapter 3.2.2.
- Signal processing and, if applicable, visualization must be implemented by own controls.
- Measuring card and "LabVIEW" software.

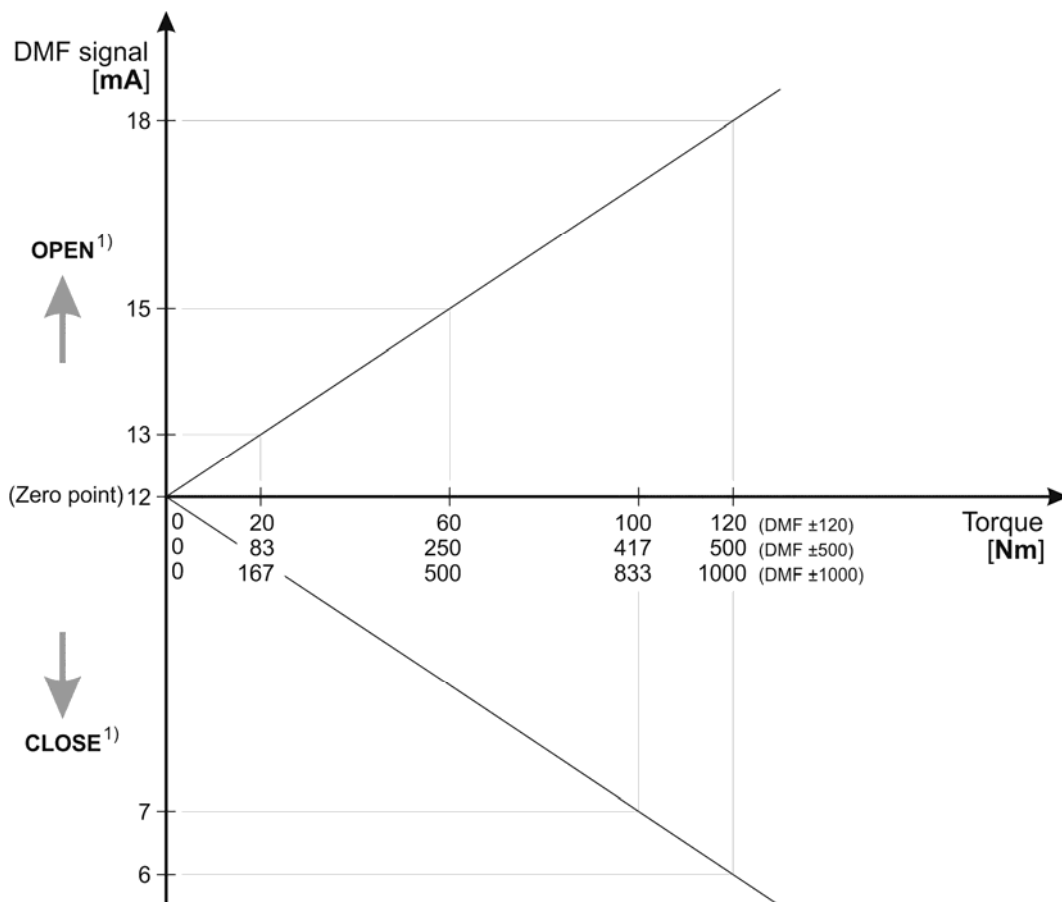
The measurement amplifier integrated into the torque measurement flange provides an analog current signal proportional to the torque and depending on the direction of rotation within the ranges  $12 \pm 6$  mA:

- from 6 to 12 mA → [- ... Nm] and
- from 12 to 18 mA → [+ ... Nm].

Under no-load conditions, i.e. if no torque is present, 12 mA are provided.



Depending on both mounting conditions and temperature, zero point shift under no-load conditions might occur (deviation from 12.000 mA) and must be considered for further assessment/measurements!



1) illustrated for clockwise closing.

For counterclockwise closing direction, end position assignment OPEN and CLOSED will change:

→  $CLOSED_{max} = 18$  mA and  $OPEN_{max} = 6$  mA.

## 5 Maintenance

The torque measurement flange is maintenance-free.

