

Transmitters for Angular Position TGE 5, TGE 5-Ex, TGM 5, TGM 5-Ex, TGU 5, TGU 5-Ex



- Conversion of the angular position of the shafts of mechanical primary detectors into a load-independent direct current signal
- High precision: Non-linearity < 1 %
- Simple conversion from 2, 3 or 4-wire operation with the same device (only 2-wire circuit in the case of devices with explosion protection)
- Options
 - Electrical isolation between output and power supply
 - Marine version with German Lloyd approval
 - Intrinsically safe version, Code EEx ib IIC T4/T6 for operation in Zone 1
 - Limitation of superimposed interference voltage peaks
 - Plug connection Han 7 D
- Version TGE 5, TGE 5-Ex for attachment to
 - pressure gauges (with mounting hardware)
 - scales etc.
- Version TGM 5, TGM 5-Ex for attachment to shafts
 - in heavy machinery
 - on ships etc.
- Version TGU 5, TGU 5-Ex for installation in
 - pressure gauges
 - rotameters
- Installation in systems with very high mechanical and climatic stress
- The customer's specific adjustments are effected at the factory, but can be changed subsequently

Technical data

Input (see Ordering information for measuring range)
Zero: Approx. ± 5 % adjustable (referred to the output span)
Shaft: can be freely rotated

Output and power supply

Non-linearity
< 1 % (referred to the output span)
TGE 5, TGM 5 (measuring range < 90 °):
< 0.5 % (referred to the output span)
Response time: < 50 ms (jump 0...100 %)
Long-term influence: < 0.2 % / year
Residual ripple (peak-peak)
Output signal < 1 %
Power supply < 1.5 V

General and safety data

Environmental capabilities

See Table 2 for application class
Ambient temperature: -25...+80 °C
Transportation and storage temperature: -40...+80 °C
Relative atmospheric humidity
TGE 5: < 75 % annual average, condensing permitted, occasional
TGM 5: < 90 % annual average, condensing permitted
TGU 5: < 75 % annual average, condensing permitted, occasional

Mechanical stress capabilities

Tested to DIN IEC 68-2-27 and 68-2-6
Impact: 50 g / 11 ms
Vibration: 5 g / ±10 mm / 5...150 Hz

TGU 5

Interference proof acc. to NAMUR Recommendation for industrial standard in 2-wire circuit

TGE 5, TGM 5

Interference immunity acc. to NAMUR Recommendation for industrial standard (surge 1.2/50 1.5 kV). Devices with explosion protection (Ex devices) are only operated in 2-wire circuit.

Connection, case, mounting and safety
TGE 5, TGE 5-Ex, TGM 5, TGM 5-Ex

Electrical connections
Screw terminals for 2.5 mm²
or plug connection Han 7 D (not for Ex)

TGU 5, TGU 5-Ex
4-conductor ribbon cable 150 mm long

Mounting orientation: any

Test voltage to: DIN VDE 0411; 0.5 kV

Material of case
Salt-water-proof cast aluminium
Surface anodized
TGE 5 and TGE 5-Ex: plastic cover

Weight
TGE 5 approx. 0.5 kg
TGM 5 approx. 2.6 kg
TGU 5 approx. 0.2 kg

Version	Degree of protection of case to DIN 40050	Application class to DIN 40040	Max. shaft load permitted		required torque
			radial	axial	
TGU 5	IP 30/IP 00 ²⁾	HQE			Approx. 0.15 Ncm (15 cmp)
TGU 5-Ex		HSE			
TGE 5	IP 54/IP 50 ¹⁾	HQR			Approx. 0.3 Ncm (30 cmp)
TGM 5					
with friction bearings + sealing ring	IP 66	HQR	300 N (30 kp)	900 N (90 kp)	Approx. 8 Ncm (800 cmp)
with friction bearings w. sealing ring	IP 66/ IP 50 ¹⁾	HQR	300 N (30 kp)	900 N (90 kp)	Approx. 2 Ncm (200 cmp)
with ball bearing	IP 56/ IP 50 ¹⁾	HQR	200 N (20 kp)	150 N (15 kp)	Approx. 0,6Ncm (60 cmp)

1) On the shaft seal; seal for higher degree of protection
2) At cable end

Electrical isolation	Power supply U _s	Max. current supply	Max. load consumption	2-wire connection	3-wire connection	4-wire connection	Jumper Br3
No (only Ex)	12...20 V DC	24 mA	$\frac{U_s - 12 V}{I_A}$	4...20 mA	–	–	Open
No	13.2...36 V DC	24 mA	$\frac{U_s - 13,2 V}{I_A}$	–	0... 5 mA	0... 5 mA	Closed
				–	0...10 mA	0...10 mA	Closed
				–	0...20 mA	0...20 mA	Closed
				4...20 mA	4...20 mA	4...20 mA	Open
No	13.2...26.4 V AC	24 mA	$\frac{U_s - 13,2 V}{I_A} \cdot 1,4$	–	–	0... 5 mA	Closed
				–	–	0...10 mA	Closed
				–	–	0...20 mA	Closed
				–	–	4...20 mA	Open
With	13.2...36 V DC	100 mA	600 Ω	–	–	0... 5 mA	Closed
				–	–	0...10 mA	Closed
				–	–	0...20 mA	Closed
				–	–	4...20 mA	Open
With	13,2...26,4 V AC	100 mA	600 Ω	–	–	0... 5 mA	Closed
				–	–	0...10 mA	Closed
				–	–	0...20 mA	Closed
				–	–	4...20 mA	Open

Technical data

Explosion protection

Only with 2-wire connection

TGU 5-Ex, TGE 5-Ex, TGM 5-Ex

Manufacturer's code
 49/14-09 Ex

Certificate of Conformity
 PTB No. Ex-89.C.2148

Type of protection
 Intrinsic safety "I"

Code
 EEx ib IIC T4/T6

Hazardous area
 Zone 1 or 2

Protection group
 T6 at max. 40 °C ambient temperature
 T4 at max. 70 °C ambient temperature
 Transmitter TGx 5-Ex must be powered from an intrinsically safer certified current source, suitable for connection to the transmitter's power supply circuit.
 In the case of a 2-wire connection, the output signal is shown as a change of the current consumption.

Power supply circuit
 With type of protection "intrinsic safety"
 EEx ib IIC

Rated values
 Voltage 12...20 V DC

Current
 With 2-wire connection up to 20 mA

For connection to an intrinsically safe certified circuit with the following max. values:
 Open-circuit voltage to 20 V
 Short-circuit current to 35 mA
 Power to 0.7 W

Effective internal inductance between the terminals and case (earth) ≤ 6 nF.

Effective internal inductance is negligible.

Output circuit

With type of protection "Intrinsic safety"
 EEx ib IIC

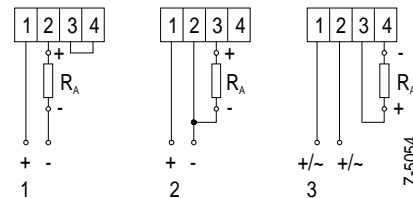
The power supply circuit and output circuit are identical for the 2-wire connection. In the event of a fault, the maximum values of the power supply circuit will also occur in the output circuit.

If active, intrinsically safe circuits are connected to the output circuit, the sum total of the maximum values of the active, intrinsically safe circuits, connected to the output circuit, including the maximum values of the power supply circuit may not exceed the following values:

Voltage	to 20 V
Current	to 35 mA
Power	to 0.7 W

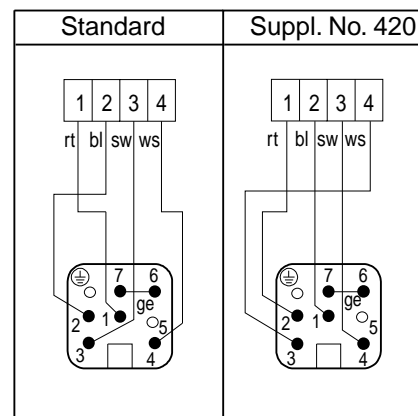
Connection diagrams

Terminal connection TGE 5, TGM 5



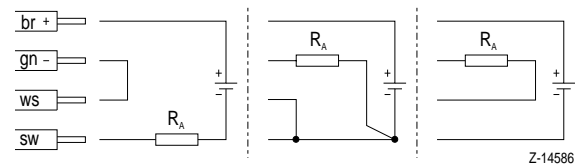
- 1 = Two-wire connection
- 2 = Three-wire connection
- 3 = Four-wire connection

Plug connection TGE 5, TGM 5



Z-13890 EN

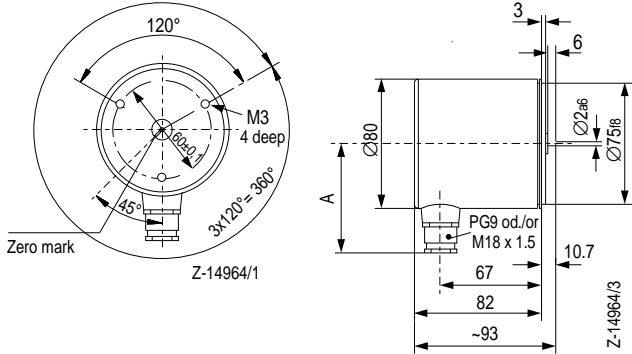
TGU 5



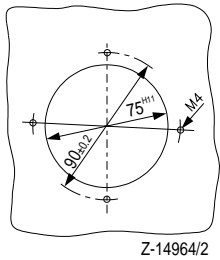
Two-wire connection Three-wire connection Four-wire connection

Dimensional drawings (Dimensions in mm)

TGE 5, TGE 5-Ex

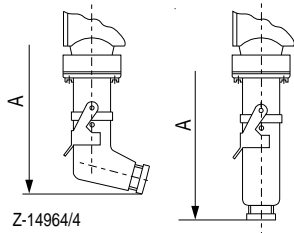


Drilling diagram for clamps



Z-14964/2

Version with plug connection

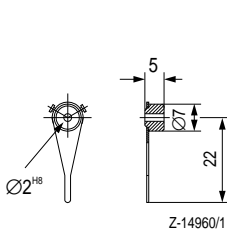


Z-14964/4

	Cable entry		Plug connection	
	D46320-C4-Pg9-7-7	D89280-KM18x1,5-Z10	angled	straight
A	62	97	132	146

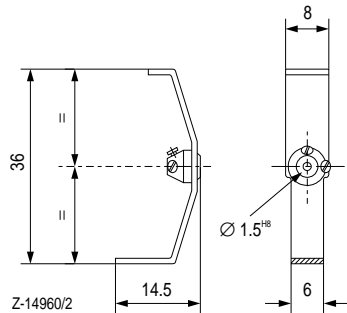
Mounting hardware

Lever complete



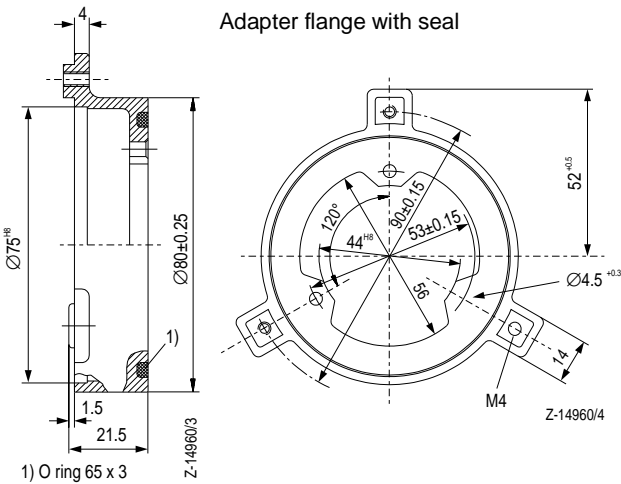
Z-14960/1

Driver complete



Z-14960/2

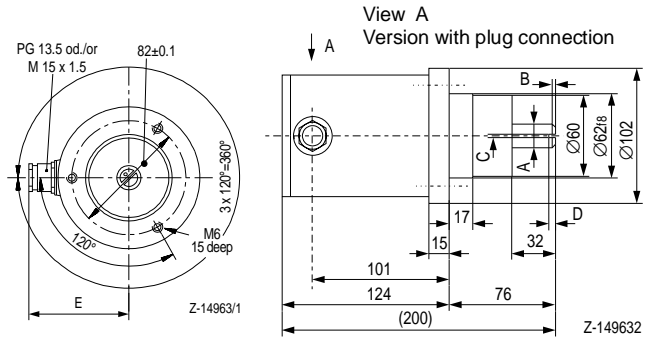
Adapter flange with seal



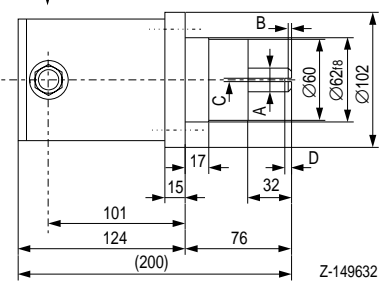
Z-14960/3

1) O ring 65 x 3

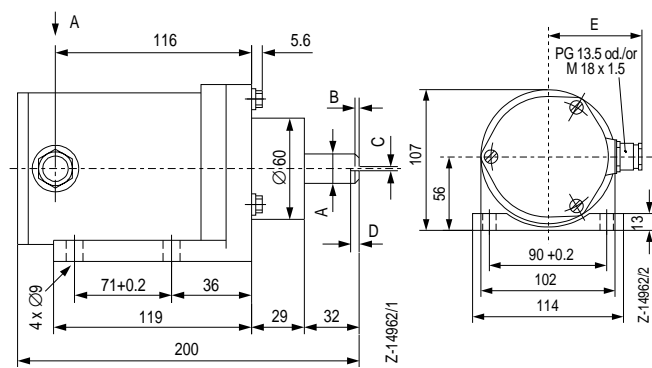
TGM 5



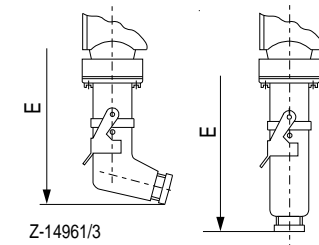
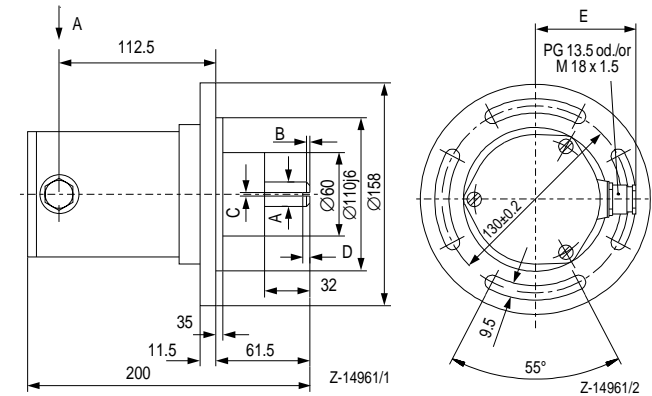
View A Version with plug connection



TGM 5 base-mounted



TGM 5 flange-mounted



Z-14961/3

	TGM 5	
	friction bearing	ball bearing
A	Ø 19 _{h8}	Ø 10 _{h8}
B	1 × 45°	0.5 × 45°
C	3 ± 0.1	—
D	3.5 ± 0.1	—

	Cable entry		Plug connection	
	Pg13.5	M 18 × 1.5	angled	straight
E	71.5	90.5	≈ 143	≈ 157

Stock versions

Transmitter TGE 5/TGE 5-Ex

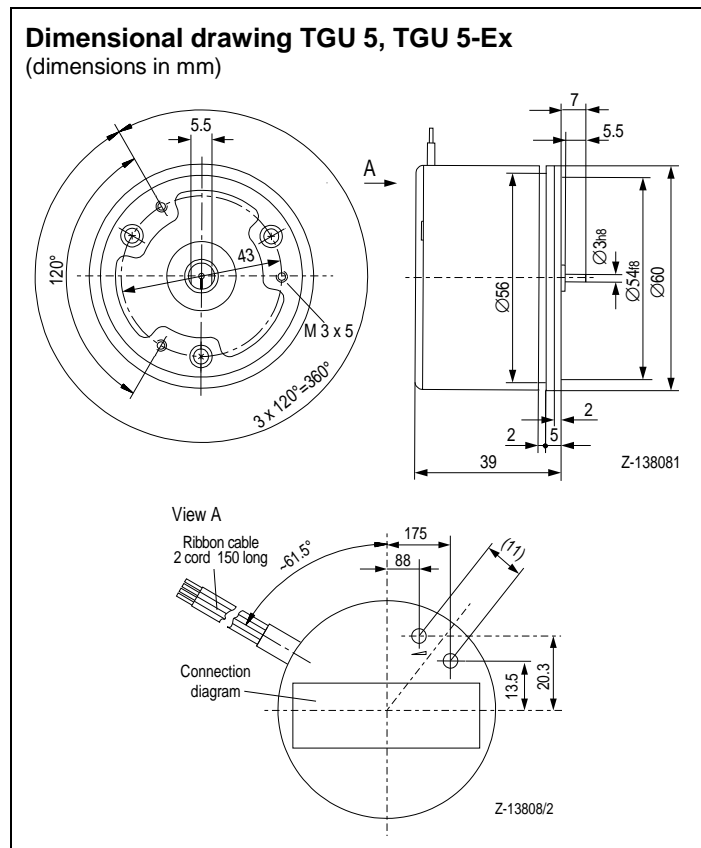
Standard	0...270°	24 V UC	–	14432-1712300
	0... 90°	24 V UC	–	14432-1512300
Intrinsically safe	0...270°	24 V DC	–	14432-5711300

Transmitter TGM 5

Standard	0... 30°	24 V UC	friction bearing with sealing	14436-1312110
Standard	0... 60°	24 V UC	friction bearing without sealing	14436-1412120
Standard	0... 90°	24 V UC	friction bearing without sealing	14436-1512110
Standard	0... 90°	24 V UC	friction bearing without sealing	14436-1512120
Standard	0...270°	24 V UC	friction bearing without sealing	14436-1712110
Standard	0...270°	24 V UC	friction bearing without sealing	14436-1712120

Transmitter TGU 5/TGU 5-Ex

Standard	0...270°	–	–	14437-1710000
	0...180°	–	–	14437-1610000
Intrinsically safe	0...270°	–	–	14437-5710000



Transmitters for Angular Position TGU 5

Data Sheet
14-1.23 EN

Ordering information

Transmitter TGU 5

Catalog No.

-

Design

Standard	1
Intrinsically safe EEx ib	5

Measuring range

0... 10°, can be set to 0... 9/ 11°	1
0... 30°, can be set to 0... 27/ 33°	3
0... 60°, can be set to 0... 54/ 66°	4
0... 90°, can be set to 0... 81/ 99°	5
0...180°, can be set to 0...162/198°	6
0...270°, can be set to 0...224/280°	7
0...310°	8
Other measuring ranges acc. to Suppl. Nos. 302...306	0

Output

0/4...20 mA	1
0...10 mA	3
0... 5 mA	5
4...20 mA 4-wire circuit ¹⁾	7

Catalog No.

-

If necessary, append the Suppl. Nos. to the Catalog Numbers.

¹⁾ Not for Ex-version

Additional optional ordering information		Suppl. No.
Other measuring ranges		
Upper value setting	0...7.5°/ 17°	302 <input type="text"/>
range as from	0...15°/ 75°	303 <input type="text"/>
	0...60°/165°	304 <input type="text"/>
	0...150°/280°	305 <input type="text"/>
	0...220°/310°	306 <input type="text"/>
Output signal increases when shaft turns towards the left		
		310
Additional ordering information		
Licence No. OTOA7.AX		493
 <input type="text"/> Add clear text		

Ordering information

Transmitter TGM 5	Catalog No.	1 4 4 3 6 -	
Design			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 0
Standard			1
Marine GL Certificate			3
Intrinsically safe EEx ib			5
Measuring range			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 0
0... 10°, can be set to 0... 9/ 11°			1
0... 30°, can be set to 0... 27/ 33°			3
0... 60°, can be set to 0... 54/ 66°			4
0... 90°, can be set to 0... 81/ 99°			5
0...180°, can be set to 0...162/198°			6
0...270°, can be set to 0...224/280°			7
0...310°			8
Other measuring ranges acc. to Suppl. Nos. 302...306			0
Output			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 0
0/4...20 mA			1
0...10 mA			3
0... 5 mA			5
4...20 mA 4-wire circuit ¹⁾			7
Power supply			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 0
Direct voltage			1
Universal current with TAZ suppressor diode ¹⁾²⁾			2
Universal current with electrical isolation and TAZ suppressor diode ¹⁾ (only 4-wire circuit)			3
Cable entry			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 0
Cable connector PG 13.5			1
Cable connector M 18 × 1.5			2
Plug connection (see Suppl. Nos. 415...418) ¹⁾			5
Shaft bearings			<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> 0
Friction bearing with sealing ring			1
Friction bearing without sealing ring			2
Ball bearing			3

Catalog No. **1 4 4 3 6** - **0**

If necessary, append the Suppl. Nos. to the Catalog Numbers.

Additional opt. ordering information	Suppl. No.	
Other measuring ranges		
Upper value setting	0...7.5°/ 17°	302
range as from	0...15°/ 75°	303
	0...60°/165°	304
	0...150°/280°	305 <input type="checkbox"/>
	0...220°/310°	306 <input type="checkbox"/>
Output signal increases when shaft turns towards the left		310 <input type="checkbox"/>
Additional ordering information		
Plug connection		
Sleeve case ¹⁾		
Straight, pin on TGM 5		415
Angled, pin on TGM 5		416
<input type="checkbox"/> Add clear text		

1) not for Ex-version
2) only 4-wire circuit, with the exception of 2-wire circuit with power supply direct voltage

Transmitters for Angular Position TGE 5

Data Sheet
14-1.23 EN

Ordering informations

Transmitter TGE 5 Catalog No. **1 4 4 3 2** -

Design		
Standard	1	<input type="checkbox"/>
Intrinsically safe EEx ib	5	<input type="checkbox"/>

Measuring range		
0... 10°, can be set to 0... 9/ 11°	1	<input type="checkbox"/>
0... 30°, can be set to 0... 27/ 33°	3	<input type="checkbox"/>
0... 60°, can be set to 0... 54/ 66°	4	<input type="checkbox"/>
0... 90°, can be set to 0... 81/ 99°	5	<input type="checkbox"/>
0...180°, can be set to 0...162/198°	6	<input type="checkbox"/>
0...270°, can be set to 0...224/280°	7	<input type="checkbox"/>
0...310°	8	<input type="checkbox"/>
Other measuring ranges acc. to Suppl. Nos. 302...306	0	<input type="checkbox"/>

Output		
0/4...20 mA	1	<input type="checkbox"/>
0...10 mA	3	<input type="checkbox"/>
0... 5 mA	5	<input type="checkbox"/>
4...20 mA 4-wire circuit ¹⁾	7	<input type="checkbox"/>

Power supply		
Direct voltage	1	<input type="checkbox"/>
Universal current with TAZ suppressor diode ¹⁾	2	<input type="checkbox"/>
Universal current with electrical isolation and TAZ suppressor diode ¹⁾ (only 4-wire circuit)	3	<input type="checkbox"/>

Cable entry		
Cable connector PG 9	3	<input type="checkbox"/>
No cable connector ¹⁾²⁾	4	<input type="checkbox"/>
Plug connection (see Suppl. Nos. 415...418) ¹⁾	5	<input type="checkbox"/>

Catalog No. **1 4 4 3 2** -

If necessary, append the Suppl. Nos. to the Catalog Numbers.

Additional opt. ordering information		Suppl. No.
Other measuring ranges		
Upper value setting	0...7.5°/ 17°	302
range as from	0...15°/ 75°	303
	0...60°/165°	304
	0...150°/280°	305 <input type="checkbox"/>
	0...220°/310°	306 <input type="checkbox"/>
Output signal increases		<input type="checkbox"/>
when shaft turns towards the left		310 <input type="checkbox"/>
		<input type="checkbox"/>
Additional ordering information		
Plug connection		
Sleeve case ¹⁾		
Straight, pin on TGE 5		415
Angled, pin on TGE 5		416
Straight, socket on TGE 5		417
Angled, socket on TGE 5		418
Pinout		
Acc. to TGS 40 connection diagram		420
Standard (connection diagram TGE 5 version)		421
<input type="checkbox"/> Add clear text		

1) Not for Ex version
2) only 4-wire circuit, with the exception of 2-wire circuit with power supply direct voltage

Accessories

Mounting accessories for TGE 5 (see dimensional drawings)		Catalog No.
Set of mounting hardware for pressure gauge	1 Intermediate flange 1 Lever 1 Driver 1 Sealing ring	14497-0373318
Set of mounting hardware for drive unit		14497-0381236
Gear adapter with transmission ratio 1:1		14491-8008357
Gear adapter with transmission ratio 2:1		14491-8008358
Gear adapter with transmission ratio 4:1		14491-8008359
Gear adapter with transmission ratio 8:1		14491-8008360
Gear adapter with transmission ratio 16:1		14491-8008361
Gear adapter with transmission ratio 32:1		14491-8008362
Gear adapter with transmission ratio 64:1		14491-8008363
Mounting accessories for TGM 5 (see dimensional drawings)		
Mounting base		14497-0381225
Mounting flange		14497-0381226