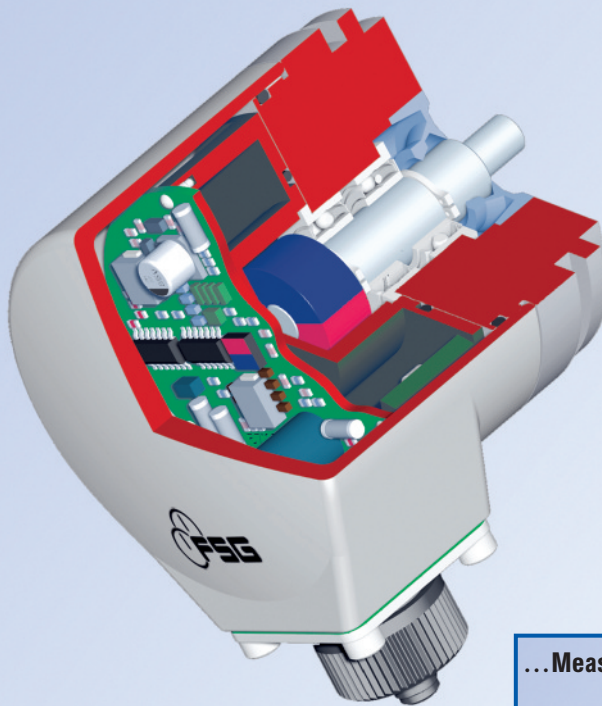


Angular Position Transducers

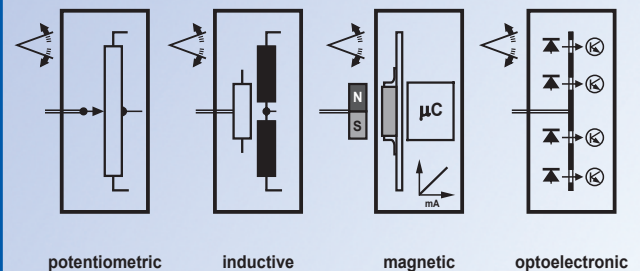


Angular Position Transducers

...Construction



...Measuring systems



For measuring angular positions and converting them into electrical signals for teletransmission purposes, either **potentiometric** (see data sheet „precision rotary potentiometer“), **inductive**, **magnetic**, **incrementally** or **absolutely coded** angular position transducers can be used according to the particular application.

Inductive angular position transducers of the non-contacting type are preferably used on measuring points, which are exposed to extreme vibration or shock or to aggressive atmospheres.

This applies mainly to measurement problems one is confronted with in energy industry and chemical plants, for instance while measuring the actual value of the position of variable speed drives, or of machines in paper-processing and textile industry, while measuring the position of dancer rollers and very frequently in pendulum systems for measuring tilt angles on cranes and excavators.

Optoelectronic angular position transducers possess code disks, whose tracks are digitally scanned.

They are high-resolution measuring systems with low temperature coefficient, available in a single- or multi-turn version, outputting analogue or digitally coded signals.

Single-turn transducers are used e. g. in the railway vehicle domain in connection with master controllers or on cranes as slewing ring transmitters.

Multi-turn transducers are preferably used together with rope length measuring systems on hauling plants, bearer cable winches of crane systems or in the field of machine tool engineering for sensing the tool position.

Magnetic angular position transducers are extremely robust measuring systems completely hermetically encapsulated of two-chamber design with a protection degree of IP 68.

In shaft exit design e. g. they are used to record the angular position of a permanent magnet mounted on the measuring object.

Transducers of this type are predominately used in commercial vehicles for sensing the position of steering type axles or the angle of the articulated arm of excavators.

Transducers with shaft exit also contain a hermetically encapsulated electronic unit. They are universally used in mechanical engineering exposed to extreme atmospheres in order to record angular positions.

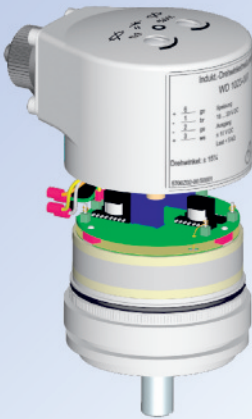
Signals of the single- or multi-turn version are output either analogue as current or voltage signals or digital as CAN open configuration.

Potentiometric angular position transducers contain a high-resolution resistance element of conductive plastic with a linearity of $\pm 0.1\%$.

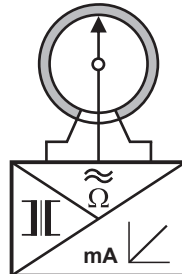
Signals are output either in form of a resistance, current or voltage variation.

...System versions

series WD and PK



differential inductor or resistance element



Inductive transducer systems (WD)

are available as models of synchro size 20 (series 620) and synchro size 23 (series 1023). They contain a differential inductor designed in form of a ring winding with a non-contact tapping. The electrical output signals representing zero and final value of the mechanical drive shaft angle are available within a broad range of limits via trimming potentiometers of the incorporated or separate electronics.

For use in explosive installations, transducer systems as well as electronic components are available with a degree of protection EEx and Exd with ATEX approval.



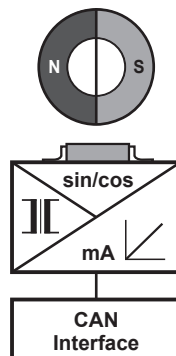
Potentiometric transducer systems (PK)

are also available in synchro sizes 20 and 23. They contain an incorporated signal converter with current or voltage signal output.

series MR and MH



permanent magnet



Magnetic transducer systems (MR and MH)

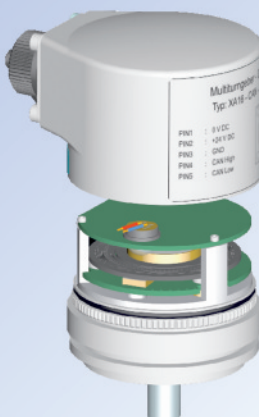
are available as models of synchro sizes 9, 13, 20 and 23. They are fully enclosed in an aluminium casing of two chamber design and contain a permanent magnet with a high-precision angular encoder.

Signals are output either analogue, e. g. with 4 - 20 mA, or digitally coded (CAN open standard).

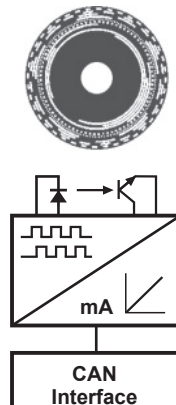
Output signal of transducers with analogue output can be programmed via rear keys of transducer to the respective measuring range.

For safety-relevant applications these systems are also available in redundant version according to IEC 61508 (SIL).

series Xi and XA



coded disk









Optoelectronic transducer systems (XI and XA)

are available as models of synchro size 23 in incremental or absolutely coded design.

Incremental systems convert the angle to be measured into a proportional number of pulses, appearing in two tracks A and B with an offset of 90° for identification of direction. Absolutely coded systems are available as single- or multi-turn encoders.




They contain a gray-coded rotating disk whose 12 concentric tracks are optically scanned by infrared diodes and phototransistors. Signals are output parallel via NPN or PNP transistors or analogue via a digital-to-analogue converter with current output 4 - 20 mA. All transducers can also be supplied with field bus interface CAN open standard and in user-specific data format respectively.

...Specifications

System versions	Magnetic systems								2-fold system	
Models										
Series	MH 609		MH 613		MH 620	MR 1023		MR 1023 ext	Xi / MR 1023	
Single-turn / multi-turn	single-turn	multi-turn	single-turn	multi-turn	single-turn	single-turn	multi-turn	single-turn	single-turn	
Synchro size	9		13		20	20		special size	23	
Casing - Ø	22.2 mm		36.5 mm		50.8 mm	60 mm		60 mm	60 mm	
Shaft - Ø	6 mm		6 mm		6 mm	6 / 10 mm		external magnet	6 / 10 mm	
Dimensional sketch page 6 / 7	1		2		5	7 and 8		6	7	
Angle of rotation max.	360°	1080°	360°	5760°	360°	360°	23040°	360°	360°	
Revolution max.	1	3	1	16	1	1	64	1	1	
Voltage output	0.5 - 4.5 V									
Current output			4 - 20 mA		1 x 4 - 20 mA	4 - 20 mA		4 - 20 mA		
Pulse output										
Bus output						CANopen				
Redundant electronics					2 x 4 - 20 mA				4 - 20 mA / 720 pulses	
Signal adjustment via	fixed alignment		keys		cable	keys or CAN-Bus		fixed alignment	fixed alignment	
Linearity	± 0.5 %	± 1 %	± 0.3 %		± 0.2 %	± 0.2 %		± 0.2 %	± 0.2 %	
Resolution	12 bit		12 bit	16 bit	12 bit	14 bit		14 bit	14 bit / 720 pulses	
Supply	5 V DC		24 V DC		1 x or 2 x 24 V DC	24 V DC		24 V DC	2 x 24 V DC	
Current consumption	< 80 mA		< 80 mA		< 80 mA	< 80 mA		< 80 mA	< 80 mA	
IP code of casing up to	IP 67		IP 65		IP 67	IP68		IP68	IP68	
Connection	stranded wire		solder-type terminals		cable	plug / cable		plug / cable	plug / cable	
Weight	100 g		100 g		200 g	400 g		400 g	500 g	
Approval								TÜV		
Root of FSG ident #	1130Z01	1140Z01	2740Z01	2750Z01	2845Z01	5750Z02	5755Z02	5850Z01	5770Z02	

General data

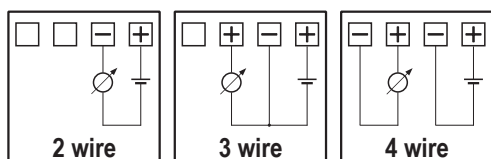
Casing material	alu, anodized, partly vanished, special version: saline-resistant coating HART-COAT
Shaft material	stainless steel
Shaft bearing	ball bearing
Temperature range	-30°C up to +70°C, other ranges on request
Test voltage	500 V, 50 Hz, 1 min
Immunity standard	EN 50 082-2
Emission standard	EN 50 081-1
Shock	50 g, 6 ms
Vibration	4 g Sinus 5 - 100 Hz
Current output	$R_L \leq 600 \Omega$ 3 wire system, 2 and 4 wire system on request
Voltage output	$R_L \geq 10 k\Omega$ 4 wire system
Supply voltage	18 - 33 V DC, other supply on request

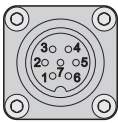
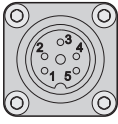
System versions	optoelectronic systems			inductive systems			potentiometric systems	
Models								
Series	XA 1023		Xi 1023	WD 620*		WD 1023*	PK 620	PK 1023
Single-turn / multi-turn	single-turn	multi-turn	incremental	single-turn		single-turn	single-turn	single-turn
Synchro size	23		23	20		23	20	23
Casing - Ø	60 mm		60 mm	50.8 mm		60 mm	50.8 mm	60 mm
Shaft - Ø	6 / 10 mm		6 / 10 mm	6 mm		6 / 10 mm	6 mm	6 / 10 mm
Dimensional sketch page 6 / 7	7 / 8		7	3	4	7	4	7
Angle of rotation max.	360°	23040°	n x 360°	360°		360°	355°	355°
Revolution max.	1	64	continuous	1		1	1	1
Voltage output				external electronics see page 8	0 - 10 V	0 - 10 V	0 - 10 V	0 - 10 V
Current output	4 - 20 mA				4 - 20 mA	4 - 20 mA	4 - 20 mA	4 - 20 mA
Pulse output			A, B and zero track					
Bus output	CANopen							
Redundant electronics								
Signal adjustment via	fixed alignment		fixed alignment	ext.electronic	trimmer	trimmer	trimmer	trimmer
Linearity	± 0,2 %			± 0.5 %		± 0.5 %	± 0.1 %	± 0.1 %
Resolution	12 bit	16 bit	1800 pulses / 360°	∞		∞	∞	∞
Supply	24 V DC		24 V DC	ext.electronic	24 V DC	24 V DC	24 V DC	24 V DC
Current consumption	< 80 mA		< 50 mA		< 60 mA	60 mA	60 mA	60 mA
IP code of casing up to	IP67		IP67	IP30		IP67	IP 30	IP 67
Connection	plug		plug	solder-type terminals		plug	solder-type terminals	plug
Weight	400 g		400 g	60g	120 g	400 g	120 g	400 g
Approval				Atex		Atex		
Root of FSG ident #	5740Z02	5730Z02	5760Z02	2810Z50	9252Z10	5700Z02	1572Z02	5710Z02

* series WD also available in intrinsically safe version, see page 8

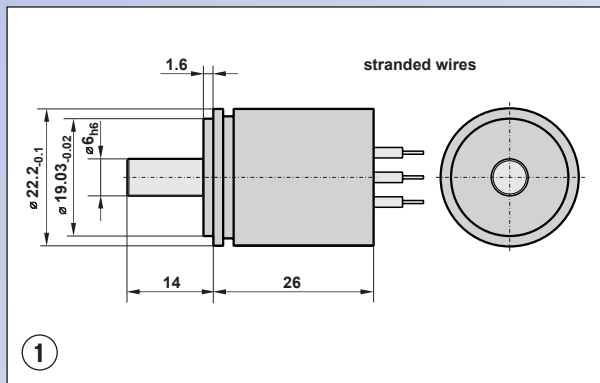


Switching version

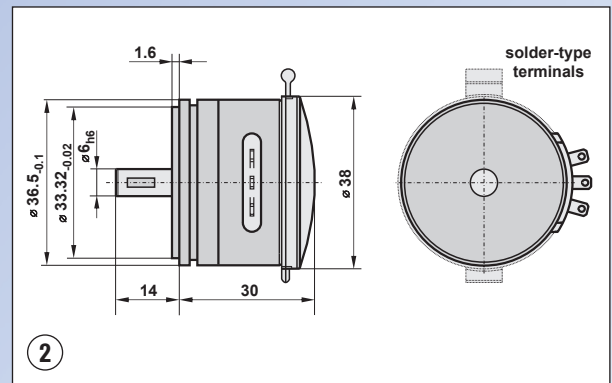


Terminal connecting plan				color of stranded wire or cable	solder-type terminals
cable / stranded wire	supply U_S	+		Green	5
		0 V		Brown	4
	V- or mA output	+		Yellow	25
		-		White	24
plug	supply U_S	+		6	
		0 V		1	
	V- or mA output	+		2	
		-		4	
plug	supply U_S	+		2	
		0 V		3	
	CAN output	Low		5	
		High		4	

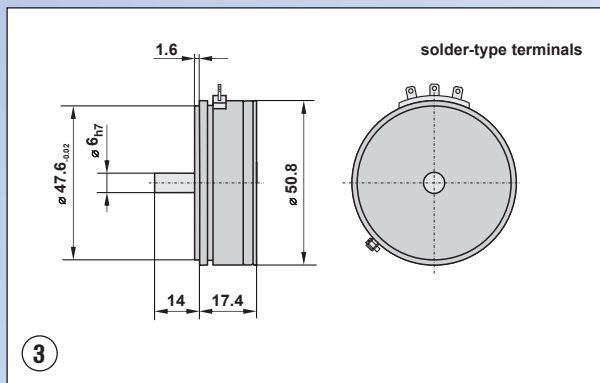
...Models



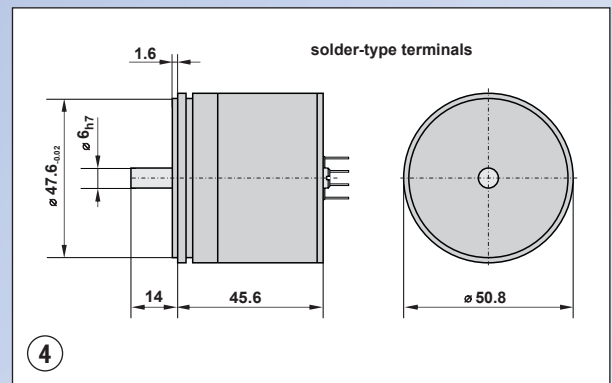
MH 609 - MU
MH 609 - 3 - MU



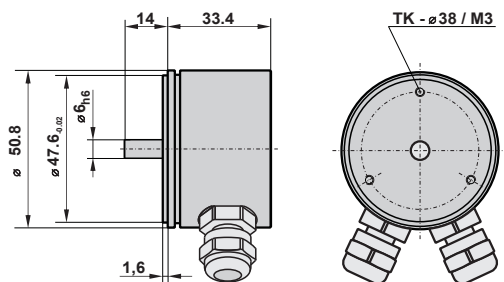
MH 613 - MU
MH 613 - 16 - MU



WD 620
WDG 620



WD 620 - MU
WDG 620 - MU
PK 620 - MU

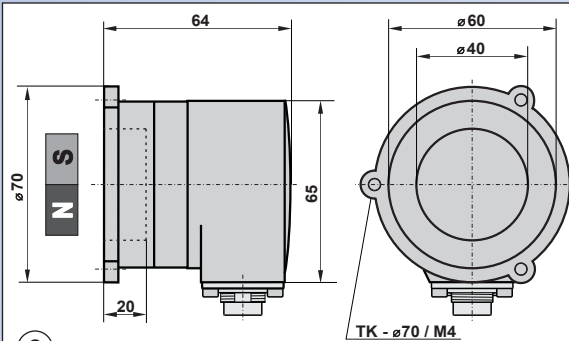


5

PG screwing with
cable outlet

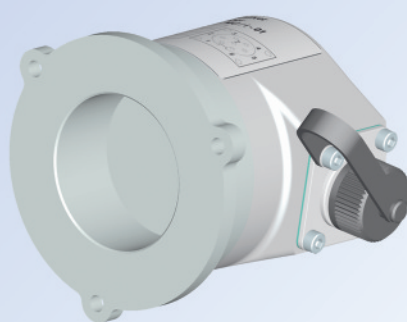


MH 620 - MU
MH 620 II - MU

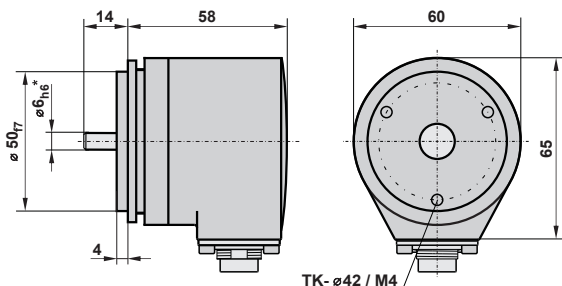


6

TK - ø70 / M4



MR 1023 - MU ext



7

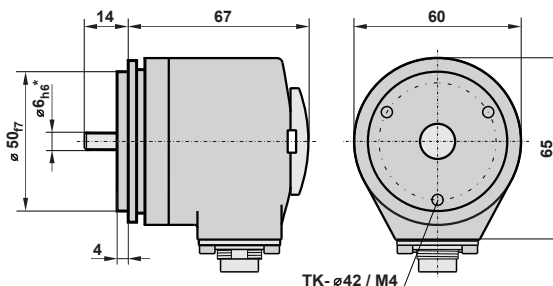
* also ø10_{h6}

TK - ø42 / M4



WD 1023
WDG 1023
PK 1023

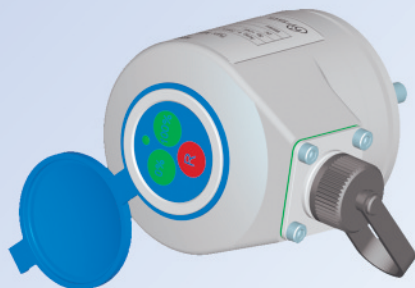
XA 12 - 1023 - CAN
XA 16 - 1023 - CAN
MR 1023 - CAN
MH 1023 - CAN
XI 1023
XI / MR 1023



8

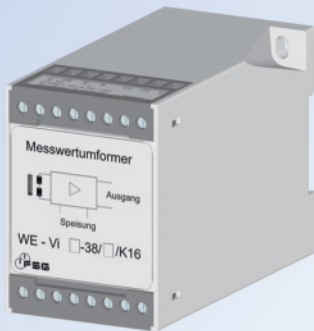
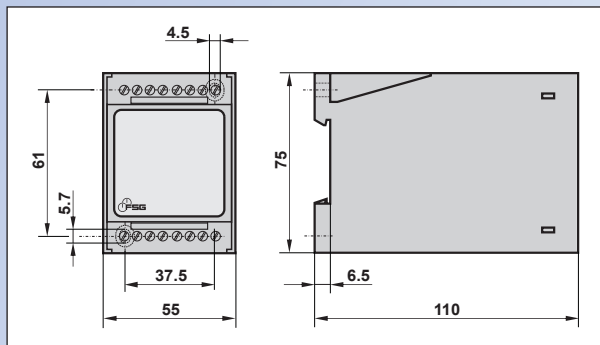
* also ø10_{h6}

TK - ø42 / M4



MR 1023 - MU
MH 1023 - 64 - MU
XA 12 - 1023 - MU
XA 16 - 1023 - MU

...Characteristics of separate components



Signal converter

Type WEVI ... / K16

Input: signal from transducer series WD
 Output: 0 or 4 - 20 mA, $R_L \leq 600 \Omega$
 Supply: 18 - 33 V DC or 230 V AC
 Weight: 300 g
 Root of FSG ident #: 9242Z03

Signal converter

Type WEVI ... EEX / K16

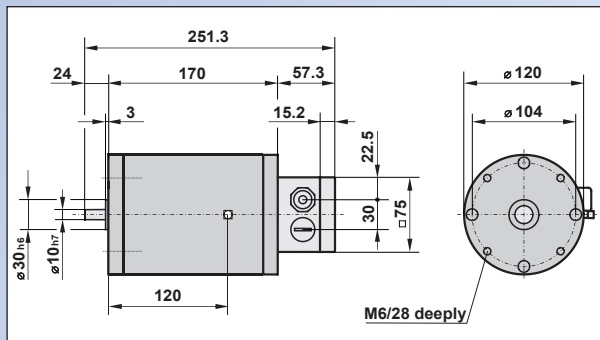
Input: signal from transducer series WD
 Output: 0 or 4 - 20 mA, $R_L \leq 600 \Omega$ intrinsically safe
 Supply: 18 - 24 V DC intrinsically safe from NBW
 Type of protection: CE0102 EXII(2)G[EExib]IIC; PTB-Nr. 04 ATEX 2061X
 Weight: 300 g
 Root of FSG ident #: 9249Z51



Power supply with signal isolator

Type NBW ... EEX / K16

Input: 4 - 20 mA intrinsically safe
 Output: 4 - 20 mA electrically isolated from input $R_L \leq 450 \Omega$
 Supply: 230 V AC
 Type of protection: CE0102 EXII(2)G[EExib]IIC; PTB-Nr. 04 ATEX 2050
 Weight: 300 g
 Root of FSG ident #: 8249Z02



Protective casing

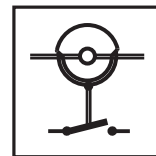
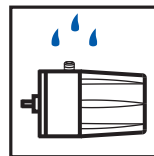
Pressure-tight protection for mounting of all angular position transducers

Type ... / GS120 EEX

IP code of casing: IP65
 Type of protection: EXII 2G EEX de IIc T5
 PTB-Nr. 03 ATEX 1062
 Weight: 5.000 g
 Root of FSG ident #: 1785Z02



Further protective casings are available which can partly be equipped with gearings and limit switches, degree of protection up to IP 68 for mounting in installations with increased mechanical and climatic stress (see data sheet "protective casings").



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