
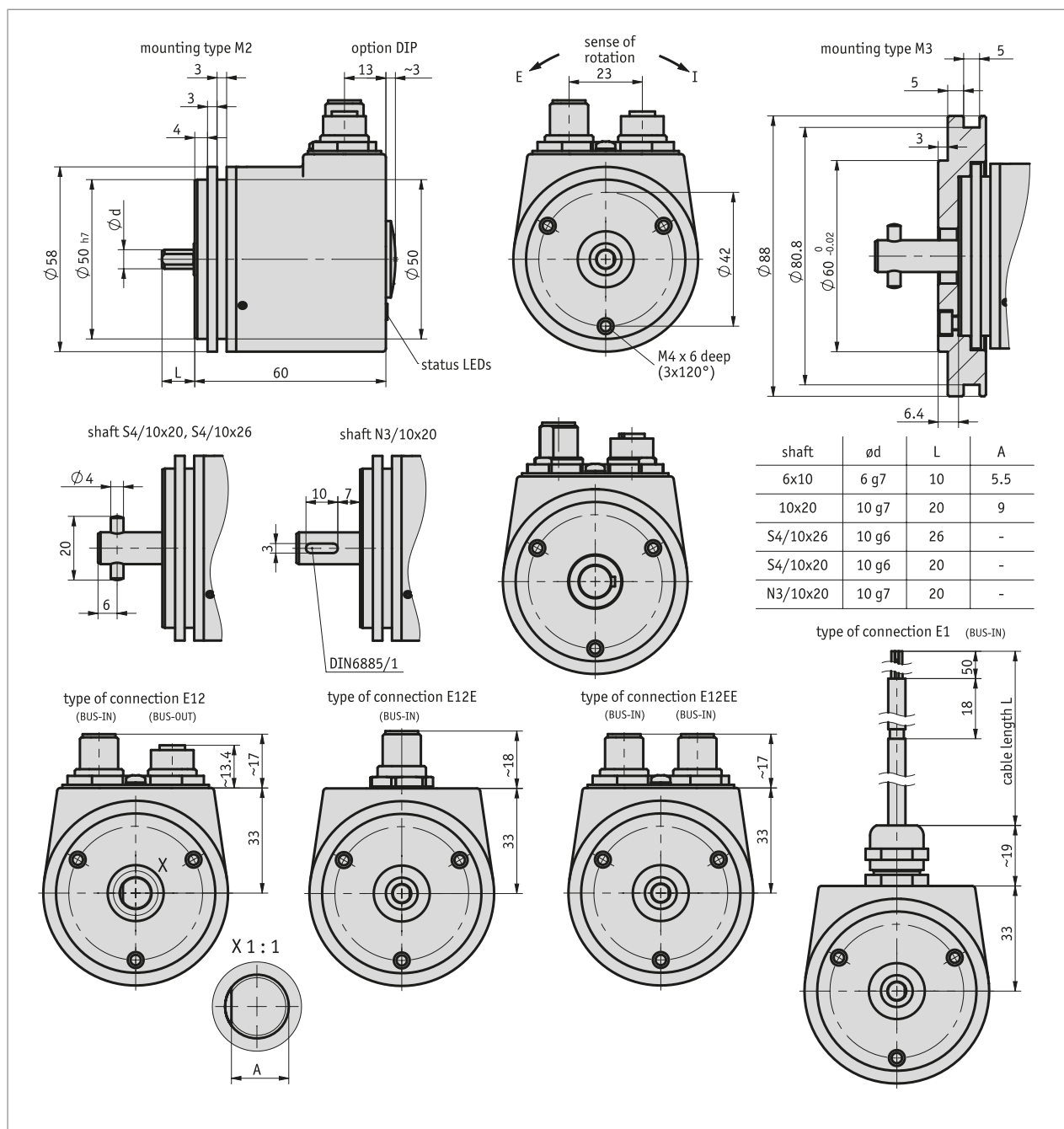


Profile

- absolute redundant safety encoders
- CANopen Safety or CANopen redundant interface
- Can be used in applications up to performance level PLd
- Salt spray tested housing available
- with PURE.MOBILE technology

 Voltage drop should be envisaged with increasing cable length. This should be taken into account for the electrical design.



Mechanical data

Feature	Technical data	Additional information
shaft	aluminum	radial
	rustproof stainless steel	E1 connection type
	rustproof stainless steel	
	Test display value MD	
	Test value addition MD	
	1 bar, 2, 3 at 0 ... 70 °C 15x cable diameter	
	Test display value MD, Test display value MD, Test display value MD at 20 mA, "Wertergänzung" sinnloser sprachneutraler Testeintrag mit vorangestelltem Komma	
	Test display value MD, Test display value MD, "bei" sinnloser sprachneutraler Testeintrag mit vorangestelltem Komma, "Wertergänzung" sinnloser sprachneutraler Testeintrag mit vorangestelltem Komma	
Flange	aluminum	
Housing	aluminum die-cast	CDP-coated
Speed	≤3000 min ⁻¹	IP67
	≤6000 min ⁻¹	IP65
Moment of inertia	≤8 gcm ²	
Starting torque	≤2 Ncm at 20 °C [68 °F]	
Shaft load rating	≤80 N	radial
	≤40 N	axial
Cable length	0.1 ... 0.9 m, orange, RAL 2004	
	1, 2, 3 m	only for cable sheath PVC
	5, 10 m	only for cable sheath PVC
Cable sheath	PVC	E1 connection type
Cable bending radius	>25 mm	E1 connection type, static
Mounting type	servo-flange	

■ Calculation of the measurement angle

Feature	Technical data	Additional information
shaft	aluminum	
Shaft load rating	≤40 N	axial
	≤80 N	radial

■ Circumferential speed

Feature	Technical data	Additional information
shaft	aluminum die-cast	
Speed	≤6000 min ⁻¹	IP65
	≤3000 min ⁻¹	IP67

■ Rotational speed, Moment of inertia, Weight

"Pole number"	70	86	102	128	158	224	396
Rotational speed	10500 min ⁻¹	8800 min ⁻¹	7400 min ⁻¹	5800 min ⁻¹	4700 min ⁻¹	3300 min ⁻¹	1900 min ⁻¹
Moment of inertia	≥85 gcm ²	≥178 gcm ²	≥326 gcm ²	≥752 gcm ²	≥1525 gcm ²	≥5056 gcm ²	≥38040 gcm ²
Weight	25 g	33 g	41 g	58 g	74 g	116 g	266 g

■ Dimensions

	Hub	øD	ødv	ødx	ød1	ød2	ød3	a	b	c	e	f	h	Suitable for
HG5	plastic	63		6 ... 12 ^{H9}	13	21	58	49	28.9	14.3	19.2	17.2	14.3	S50/1
	metal	63	5.8	6 ... 14 ^{H7}	18	26	58	52	28.9	13.3	22.2	14.3	17.3	S50/1
HG10	plastic	98		6 ... 16 ^{H9}	16	30	93	56	31.5	18.7	22.8	20.7	18.7	S80/1; SZ80/1
	metal	98	5.8	6 ... 16 ^{H7}	25.5	35	93	59	31.5	18.2	25.8	18	21.7	S80/1; SZ80/1

ødv = d pre-drilled

■ Dimensions

Hub	øD	ødv	ødx	ød1	ød2	ød3	a	b	c	e	f	h	Suitable for
plastic	63		6 ... 12 ^{H9}	13	21	58	49	28.9	14.3	19.2	17.2	14.3	S50/1
metal	63	5.8	6 ... 14 ^{H7}	18	26	58	52	28.9	13.3	22.2	14.3	17.3	S50/1

ødv = d pre-drilled

■ Dimensions

code size	Measurement A [mm]	Measurement B [mm]	Measurement øC [mm]	Measurement angle a [°]	Measurement length l [mm]
7 Bit	11.1	35	≥384	<190 *	≤640
8 Bit	8.6	40	≥501	<290 *	≤1280
9 Bit	6.1	45	≥634		≤2560
10 Bit	3.6	50	≥782		≤5120
11 Bit	1.1	55	≥946		≤10240

* For smallest dimension øC

Calculation of the "required tape length b" see order

■ special processing

Handwheel type	HG10			
Bore dH7	6 ... 8	9, 10	11, 12	13 ... 16
Groove width with keyway JS9		3	4	5
Pin hole	3.8/10	3.8/10	3.8/10	4.8/10
Hub thread without keyway JS9	M4/10	M4/10	M4/10	M6/10
Hub thread with keyway JS9		M3/10	M3/10	M4/10

* Only possible with a metal hub; highlights in orange are order features.

Highlights in orange are order features.

■ special processing

Handwheel type	HG5			
Bore dH7	6, 8	9, 10	12	14*
Groove width with keyway JS9		3	4	5
Pin hole	3.8/10	3.8/10	3.8/10	4.8/10*
Hub thread without keyway JS9	M4/10	M4/10	M4/10*	M6/10*
Hub thread with keyway JS9	M3/10	M3/10	M3/10	

* Only possible with a metal hub; highlights in orange are order features.

Highlights in orange are order features.

■ Travel/circumferential speed

Resolution/ Scaling factor	Travel/circumferential speed Vmax [m/s]										
	0.001/1	4.00	3.20	1.60	0.80	0.32	0.20	0.10	0.05	0.03	0.01
0.005/2	20.00	16.00	8.00	4.00	1.60	1.00	0.50	0.25	0.13	0.06	
0.01/1	25.00	25.00	16.00	8.00	3.20	2.00	1.00	0.50	0.25	0.12	
0.025/2	25.00	25.00	25.00	20.00	8.00	5.00	2.50	1.25	0.63	0.30	
0.05/2	25.00	25.00	25.00	25.00	16.00	10.00	5.00	2.50	1.25	0.61	
0.1/12	25.00	25.00	25.00	25.00	25.00	20.00	10.00	5.00	2.50	1.21	
Pulse interval [µs]	0.20	0.25	0.50	1.00	2.50	4.00	8.00	16.00	32.00	66.00	
Counting frequency [kHz]	1250.00	1000.00	500.00	250.00	100.00	62.50	31.25	15.63	7.81	3.79	

■ max. speed

Display (after 1st revolution)	max. speed [rpm]
0010	500 (1500)
0015	500 (1000)
0020	500 (750)
0025	500 (600)
0030	500
0040	375
0050	300
0060	275
0080	180
0100	150



Speeds >500 rpm must only be run for short periods.

Formula:

$$\text{max. speed} = \frac{15000}{\text{indication after 1st revolution}}$$

	RH01	RH02	RH03	RH04	RH05	RH07	RH08	RH09
compatible with display	DA05/1 DA08 DA09S DE10***	DA10* DA10R/1* DE10**** DE10P	DA10** DA10R/1**	DA04 DE04	KP09P	DA02 DK05	DK01 DK02	AP05 AP10*** AP20*** GS04
ØH7 steel, burnished	6, 6.35, 8, 10, 12, 12.7, 14, 15, 15.875, 16, 17, 18	10, 12, 12.7, 14, 15, 16, 18, 19.05, 20, 22, 24, 25, 25.4, 26, 28	18, 20, 22	4, 5, 6, 6.35, 8, 9.525, 10, 12	12, 14, 15, 16, 20	6, 6.35, 7, 8	5, 6, 6.35, 8, 9, 9.525, 10, 12	
ØH7 stainless steel	VA8, VA9.525, VA10, VA12, VA12.7, VA14, VA15, VA15.875, VA16, VA19.05	VA12.7, VA20, VA24, VA25, VA25.4		VA6.35, VA8, VA9.525, VA10, VA12, VA12.7, VA13		VA8		VA8, VA9.525, VA10, VA12, VA12.7, VA14, VA15, VA15.875, VA16, VA18, VA19.05

* only with shaft WK; ** only with shaft WL; *** only with shaft 20; **** only with shaft 30
Note: Highlights in orange are order features.

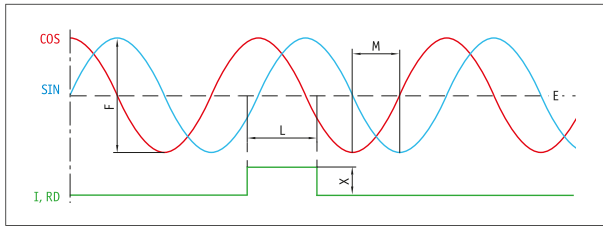
Electrical data

Feature	Technical data	Additional information
Operating voltage	24 V DC ±10% 8 ... 36 V DC	reverse polarity protection
Current consumption	20 mA at 36 V, per encoder 28 mA at 24 V, per encoder 76 mA at 8 V, per encoder	reverse polarity protection
Power input	≤800 mW without load, per encoder	
Parameter storage	10 ⁵ cycles	also applies to calibration operations
Status display	2x tricolor LEDs (red/green/yellow)	device status/CAN status
Power rating	±60 V	CAN interface
Interface	according to ISO 11898-1, not electrically isolated according to ISO 11898-1, not electrically isolated	CANopen Safety, CiA 301, CiA 303, CiA 305, CiA 406, EN 50325-5 CANopen, CiA 301, CiA 303, CiA 305, CiA 406
Address	1 ... 127	Node ID, via SDO or Layer Setting Service (LSS)
Cycle time	1.5 ms	typical
Starting time	<150 ms	
Type of connection	1x M12-plug connector (A-coded) 2x M12 plug connectors (A-coded) 2x M12 plug connectors (A-coded) open cable end	5-pole, 1x pin (E12E connection type), encoder internally connected 5-pole, 1x pin; 1x socket (E12 connection type), encoder internally connected 5-pole, 2x pin (E12EE connection type), encoder not internally connected

■ Subheading 1 Test

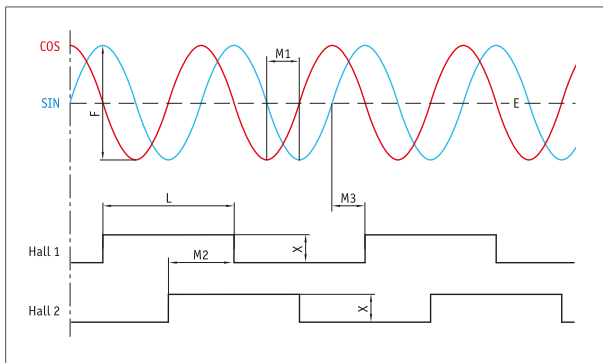
Feature	Technical data	Additional information
Operating voltage	8 ... 36 V DC	reverse polarity protection

■ Signal pattern, Sin/Cos output



E: reference voltage 2.5 V
 F: $1 V_{SS} \pm 10\%$
 L: $180^\circ \pm 40\%$
 M: $90^\circ \pm 1.0^\circ / \pm 3^\circ$ (25 kHz)
 X: $1 V_{SS}$

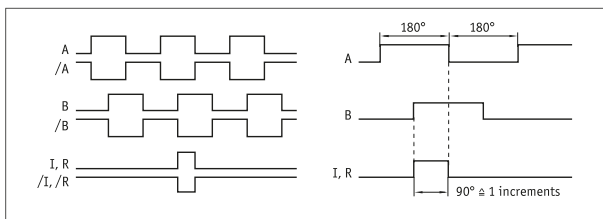
■ Signal image



E:	1.65 V (reference voltage)
F:	$2.5 V_{SS}$
L:	360°
M1:	90°
M2:	180°
M3*:	$355^\circ \pm 15^\circ$ (ELP25)
	$90^\circ \pm 15^\circ$ (ELP50)
	$85^\circ \pm 15^\circ$ (ELP100)
X:	+UB

* Hall 1 to Sin
 Note: $360^\circ =$ Pole length

■ Signal pattern, LD output circuit



⚠ The logic status of signals A and B is not defined regarding the reference signal RD or R. It may deviate from the signal pattern.

⚠ Reference or index signal with 4 increments (360°) signal length is only valid from the 5th counting step onwards. A corresponding delay should be taken into consideration after switching on the operating voltage.

System data

Feature	Technical data	Additional information
Scanning	magnetic	
Resolution	14 bit	
Measuring range	1 rotation(s)	singleturn
	4096 rotation(s)	
MTBF	206.1 Year(s) at 40°C [104°F]	SN29500
PFH	196 FIT at 60°C [140°F]	1 FIT= $1.0 \text{ E-}09$ 1/h

■ pulses/revolution

"Pole number"	460	540	720	1120
Period	460	540	720	1120

Table applies to the combination MBR100 with LE100/1

■ pulses/revolution

"Pole number"	50	64	100	230
Scaling factor of sensor	20	1000	1280	2000
	16	800	1024	1600
	10	500	640	1000
	8	400	512	800
	5	250	320	500
	4	200	256	400
	1	50	64	100

Table applies to the combination MBR200 with MSK210

Ambient conditions

Feature	Technical data	Additional information
Ambient temperature	-40 ... 85 °C	
Storage temperature	-40 ... 85 °C	
Relative humidity	100 %	condensation admissible
EMC	EN 61000-6-2 EN 61000-6-4	interference resistance / immission emitted interference / emission
Shock resistance	500 m/s ² , 11 ms	EN 60068-2-27, half-sine, 3 axes (+/-), each 3 shocks
Vibration resistance	100 m/s ² , 10 ... 2000 Hz	EN 60068-2-6, 3 axes, each 10 cycles

Rotary encoders that can be combined with this wire-actuated encoder

You can find suitable rotary encoders on our website www.siko-global.com. They are suitable ...

- for analog outputs such as current or voltage: AV3650M, AV58M
- for incremental outputs: IV5800
- for absolute outputs: WV58MR, WV5800M, WV5850, WV3650M, WV36M/CAN

SIKO rotary encoders have the following interfaces, among others: incremental, SSI, CANopen, CANopen Safety, SAE J1939, various fieldbus protocols

The technical specifications for these devices can be found in the respective data sheets. In addition, numerous encoder variants from different manufacturers can be used.

Rotary encoders that can be combined with this wire-actuated encoder

TESTEXTELEMENT

The AG05 actuator is the most compact in its class and ensures convenient handling with its integrated display and button operation. A quick and simple changeover from manual adjustment is possible via the hollow shaft.

LEERZEILE(n)

Aufzählung

- brown
- green
- red

Option, PURE.MOBILE sensor module

■ Inclinomometer

Feature	Technical data	Additional information
Resolution	0.01°	
Measuring range	360°	1 axis
	±180°	1 axis
Accuracy	±0.1° at 20 °C	
	±0.8°	over the entire temperature and max. measuring range
Zero point accuracy drift max.	±0.02 °/K	
Zero point accuracy drift typical	±0.008 °/K	
Cut-off frequency	10 Hz	

System resolution MRAC501 with MSAC501

■ System resolution* absolute and incremental [bit]

		Total bits/revolution
Scaling MSAC501 magnetic sensor	7 bit	15
	8 bit	16
	9 bit	17
	10 bit	18
Number of poles of MRAC501 magnetic ring		256 (8 bit)

■ System resolution* absolute [steps/revolution]

Bits/revolution	steps per revolution	Resolution
15	32768	0.011° (39.6")
16	65536	0.0055° (19.8")
17	131072	0.0027° (9.9")
18	262144	0.0014° (4.9")

■ System resolution incremental [steps/revolution]

Bits/revolution	Steps per revolution**	Resolution**
15	131072	0.0027° (9.9")
16	262144	0.0014° (4.9")
17	524288	0.0007° (2.5")
18	1048576	0.0003° (1.2")

* System resolution = sensor scaling + ring code size

**After 4-fold evaluation of the incremental signals

Rotational speed of MRAC501 with MSAC501

■ incremental, code size 8 bits, 256 poles

Incremental scaling MSAC501 magnetic sensor	7 bit	Speed [rpm]								
		1172	732	366	146	92	46	23	11.4	5.6
	8 bit	916	366	183	73	46	23	11.4	5.7	2.8
	9 bit	458	183	92	37	23	11.4	5.7	2.9	1.39
	10 bit	229	92	46	18.3	11.4	5.7	2.9	1.43	0.69
Pulse interval [µs]		0.2	0.5	1	2.5	4	8	16	32	66
Counting frequency [kHz]		1250	500	250	100	62.5	31.25	15.63	7.81	3.79

■ Absolute

code size	Speed [rpm]
8 bit	234

pin assignment

■ E12, E12E, E12EE

Signal	PIN
CAN_GND	1
+UB	2
GND	3
CAN_H	4
CAN_L	5

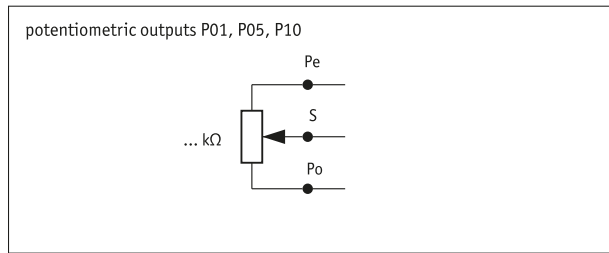
■ E1

Signal	Cable color E1
CAN_GND	white
+UB	brown
GND	green
CAN_H	yellow
CAN_L	gray

pin assignment

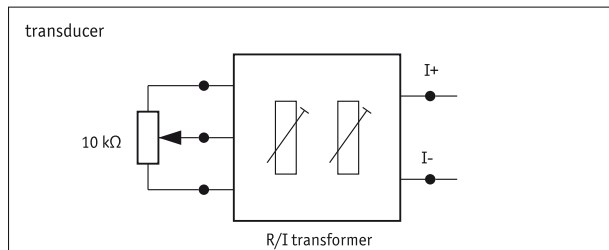
■ Potentiometric outputs P01, P05, P10

Signal	Terminal
Po	11
Pe	13
S	12



■ MMW transducer

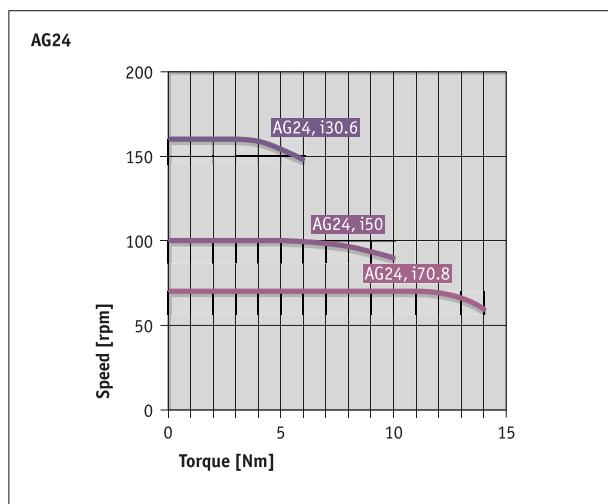
Signal	Terminal
I+	12
I-	11
nc	13



■ Cam

Assignment	Switch cam A Terminal	Switching cam B terminal	Switching cam C terminal
	3	4	7
	2	5	8
	1	6	9

Performance curve



Industry 4.0

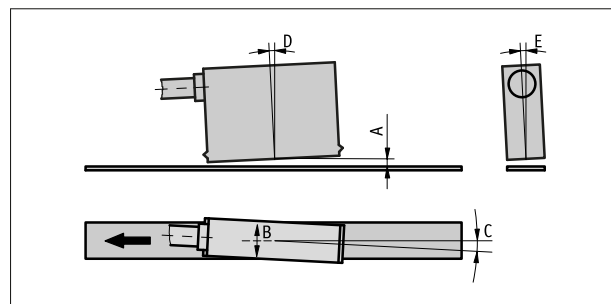
In most cases, data exchange with the actuators is limited to the exchange of process data. In addition to the process data, intelligent drives provide additional information that can be evaluated for condition monitoring up to predictive maintenance:

Process data	Smart Value	Smart Function
Actual position	Temperature	Overload, ambient temperature
"Target position"	current	Torque, overload
Speed	Volatage load Voltage control	Voltage drop, line break
	On/Off time	Operating time
	Battery voltage	Battery change planning

Hint for mounting

When installing the sensor and magnetic tape, always ensure that both system components are correctly aligned. When mounting, the arrow mark on the tape must point to the same direction as the cable outlet.

A, Sensor/tape reading distance	≤0.4 mm
B, Lateral offset	±0.5 mm
C, Alignment error	±1°
D, Longitudinal inclination	±1°
E, Lateral inclination	±2°

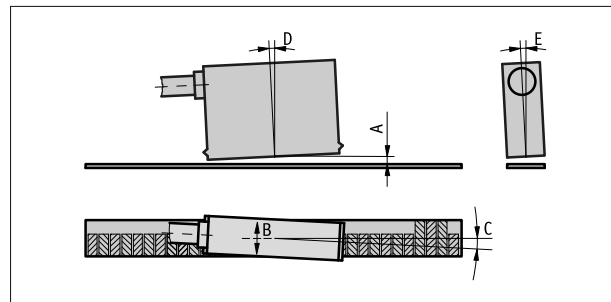


Symbolic representation

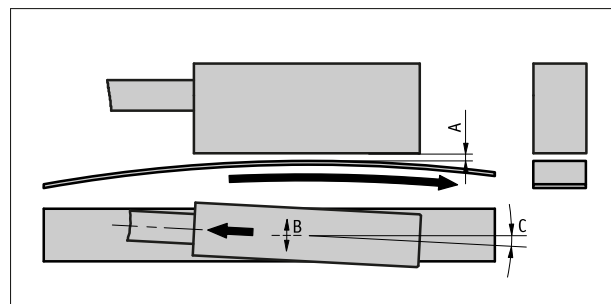
Hint for mounting

For systems with reference points on the magnetic tape please take care that sensor and strip are correctly aligned (see picture).

Reference signal	O, I	R	FR
A, Sensor/tape reading distance	≤2 mm	≤1.5 mm	0.4 ... 1.0 mm
B, Lateral offset	±2 mm	±0.5 mm	±0.5 mm
C, Alignment error	±3°	±3°	±3°
D, Longitudinal inclination	±1°	±1°	±1°
E, Lateral inclination	±3°	±3°	±3°



Symbolic representation



Symbolic representation

Data Matrix Code

■ Itemization

17 characters

[Item number (5-digit)]

[Comma]

[Year/calender week YY/WW (5-digit)]

[Comma]

[Consecutive numbering (5-digit)]

Example:

Item number 88870, Production year 2017 / -week 21,

Consecutive number 12345

88870,17/21,12345

Error correction according to ECC200

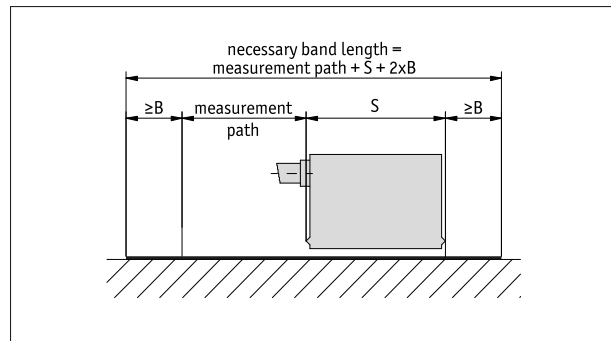
Order

■ Ordering information

The necessary tape length is calculated from:

Measured distance + sensor length "S" + (2 x forerun or overrun "B", resp.).

S	see the drawing of the sensor used
B	10 mm (forerun and overrun)



Symbolic representation

■ Ordering information

Display	Mounting position				Counting direction
	 02	 04	 06	 07	 e i

Note: Highlights in orange are order features.

■ Overview of orders

Order key	Photo	Type	PIN	Designation	ø Cable	øD	l	b	h	a
71364+71365	5	D-SUB	9	pin+shell	≤8.5		35	31	15.5	
71366+71365	5	D-SUB	9	socket+shell	≤8.5		35	31	15.5	
73947+73946	5	D-SUB	15	socket+shell	≤8.5		42	40	15.2	
76141	1	M16	7	bushing	4 ... 6	18.5	61			
76572	1	M16	12	bushing	6 ... 8	18.5	62			
77087	1	M16	7	bushing	6 ... 8	18.5	62			
78088	4	M16	7	"angle socket"	4 ... 6	20	38	54		
79665	4	M16	7	"angle socket"	6 ... 8	20	38	54		
79666	4	M16	12	"angle socket"	6 ... 8	20	38	54		
81351	1	M9	8	bushing	3.5 ... 5	14	38			
81363	4	M16	3	"angle socket"	4 ... 6	20	38	54		
81487	1	M9	3	bushing	3.5 ... 5	14	38			
81935	1	M23	12	bushing	≤8.5	26	51.1			
82182	1	M16	3	bushing	4 ... 6	18.5	61			
82247	4	M9	4	"angle socket"	3.5 ... 5	14	30	30.5		
82366	4	M9	3	"angle socket"	3.5 ... 5	14	30	30.5		
82804	7	M12 B-Cod.	5	"angle socket"	4 ... 8	19	48	41		100°
82805	6	M12 B-Cod.	5	"angular pin"	4 ... 8	19	50	41		100°
82815	2	M12 A-Cod.	5	bus terminating plug (CAN)		14.5	55			
82816	2	M12 B-Cod.	5	bus terminating plug (PB)		14.2	44			
83006	7	M12 A-Cod.	5	"angle socket"	4 ... 8	19	48	41		100°
83007	6	M12 A-Cod.	5	"angular pin"	4 ... 8	19	50	41		100°
83091	7	M12 A-Cod.	4	"angle socket"	4 ... 8	19	48	41		100°
83419	1	M12 A-Cod.	4	bushing	4 ... 6	20	54			
83447	1	M9	4	bushing	3.5 ... 5	14	38			
83525	1	M12 A-Cod.	8	bushing	6 ... 8	20	57			
83526	1	M12 A-Cod.	4	bushing	6 ... 8	20	57			
83527	2	M12 A-Cod.	8	pin	6 ... 8	20	62			
83991	1	M12 B-Cod.	5	bushing	6 ... 8	20	57			
83992	2	M12 B-Cod.	5	pin	6 ... 8	20	62			
84109	1	M12 A-Cod.	5	bushing	6 ... 8	20	57			
84209	1	M8	4	bushing	3.5 ... 5	12	43			
84210	2	M8	4	pin	3.5 ... 5	12	50			
84732	2	M12 A-Cod.	5	pin	6 ... 8	20	62			
85057	1	M16	3	bushing	6 ... 8	18.5	62			
85058	4	M16	3	"angle socket"	6 ... 8	20	38	54		
85277	1	M12 A-Cod.	12	bushing	6 ... 8	20	57			
85278	4	M12 A-Cod.	12	"angle socket"	6 ... 8	20	38	54		
87599	7	M12 A-Cod.	8	"angle socket"	4 ... 8	19	48	41		100°
87600	3	M12 D-Cod.	4	"angular pin"	6 ... 8	20	42	54		
87601	2	M12 D-Cod.	4	pin	6 ... 8	20	63			
89115	1	M12 T-Cod.	4	bushing	5 ... 8	20	65			
BAS-0005	2	M8	4	bus terminating plug		12	45			

■ Ordering information

One or more system components are required:

Magnetic tape MB200/1
Magnetic ring MR200
Magnetic band ring MBR200

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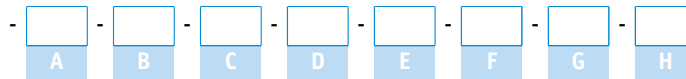
■ Ordering table

Feature	Ordering data	Spezifikation	Additional information
Operating voltage	A 10 11	6.5 ... 30 V DC 4.75 ... 6 V DC	A voltage drop is to be expected with increasing cable length. This must be taken into account in the electrical design.
design	B K M ZM	plastic housing metal housing with status LEDs metal housing without status LEDs	
Type of connection	C E1 E6X E8X	open cable end bullet connector without mating connector D-SUB 9-pole without mating connector extension cables on request	
Cable length	D ...	01.0 ... 20 m, in intervals of 1 m others on request	
Output circuit	E PP LD	push-pull LineDriver	

Feature	Ordering data	Spezifikation	Additional information	
reference signal	F	0	without	
		I	periodic index	index signal every 5 mm
		R	fixed reference	
		FR	flexible reference	only for ZM design and MB500/1 magnetic tape
linear resolution/ radial scaling factor	G	...	0.001/1250, 0.005/250, 0.010/125, 0.025/50, 0.050/25, 0.1/12.5 in µs	
			others on request	
Pulse interval	H	...	0.2, 0.25, 0.5, 2.5, 4, 8, 16, 32, 64	

Order key

WV58MR-Testprodukt



Scope of delivery:

WV58MR-Testprodukt, Quick Start Guide



Accessories you can find:

Cable extension KV05S0

Extension board DIP

Extension board IK1

Extension board IK1R

Overview, Mating connector

Mating connector, CANopen, 5-pole, angle socket

Mating connector, Bus IN, 5-pole, socket

Mating connector, Operating voltage, 4-pole, socket

Bus terminating connector, encoder/digital inputs, 5-pole, pin

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