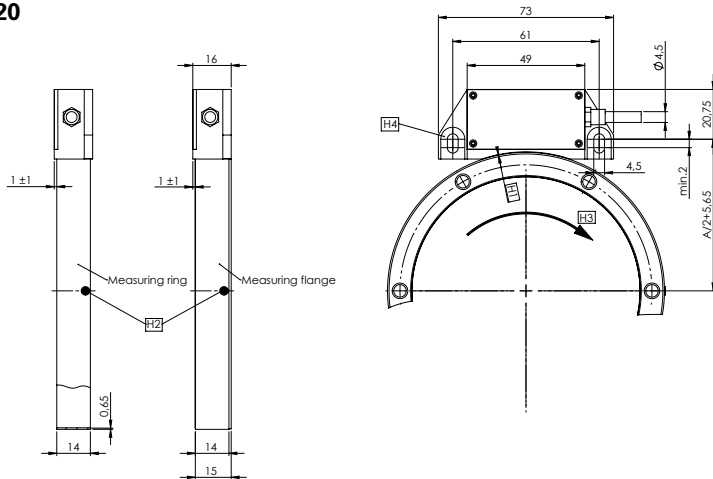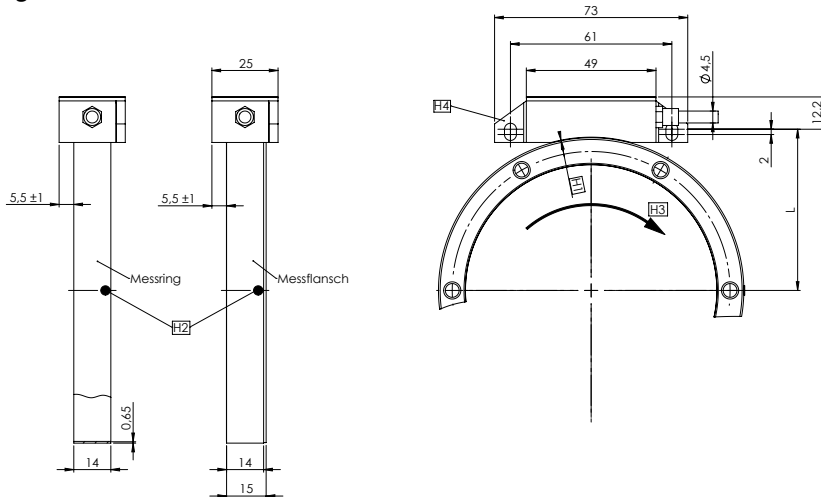# WMK 2030 series

- **Composed of WMK 2030 and scale tape ring on flange or scale tape ring**
- **Grating period 3000µm**
- **Scanning head with external electronic**
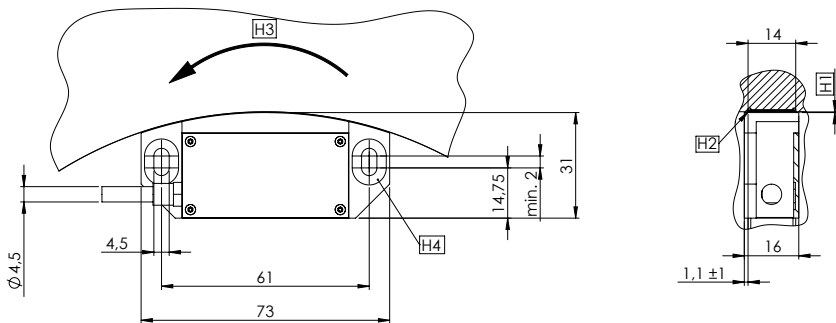
Design 20


Design 21

WMK 2130 series

- **Composed of WMK 2110 and scale tape ring**
- **Grating period 3000µm**
- **Scanning head with external electronic**

Design 20

Tolerance principle in accordance with ISO 8015
General tolerances in accordance with ISO 2768-fH
All dimensions in mm

H1 = Air gap 0,40 ± 0,20mm, set with spacer foil
H2 = Reference track marking
H3 = Direction of shaft rotation for positive counting
H4 = Ground plane
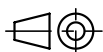
Technical data

Scanning head WMK 2030/ WMK 2130 3000 µm									
Performance	Standard								
Interface	1Vpp				TTL				
Max. Position error per grating period	± 4µm								
TTL - Interpolation/ 1Vpp signal period									
Signal period [1] / Interpolation	- / -				750µm to 3µm / 1 to 250				
Signal period / Dividing factor	3000µm to 93,75µm / 1 to 32				- / -				
Max. Output frequency	400KHz				5MHz				
Electrical connection	Cable with M23 coupling 12pin male								
Cable lenght on the scaning head	0,50m - 6,00m								
Voltage supply	DC 4,0V to 7,0V				DC 5,0V +/- 0,5V				
Power consumption	Design 20,21: ≤ 1300mW at 5V								
Typ. current consumption	Design 20,21: ≤ 220mA at 5V (without load)								
Vibration	< 200m/s² for 55 - 2000Hz								
Schock	< 2000 m/s² for 6ms								
Operating temperatur	-10°C to 100°C								
Storage temperatur	-20°C to 100°C								
Protection	IP67								
Weight	38g Design: 20, 21								
Line count	120[3]	170	240	256	300	341	360	480	512
Position error per grating period [2]									
Standard	± 15″	± 11″	±7,5″	± 7,0″	± 6,0″	± 5,5″	± 5″	± 4″	± 3,5″
Electrical speed[min^{-1}]									
Standard	≤ 50000	≤ 35290	≤ 25000	≤ 23430	≤ 20000	≤ 17590	≤ 16660	≤ 12500	≤ 11700

[1] after 4-edge-evaluation
[2] The position error per grating period and the accuracy of the grating result toghether in the encoder specific error; additional deviations caused by mounting and bearing are not considered in this error.
[3] not for inside scanning

Ordering code

- **WMK - Scanning head for incremental angle encoder**
- **Grating period 3000µm**

WMK 2 ☐ 30 S. ☐☐☐☐☐☐☐☐ **-** ☐☐ **-** ☐☐☐☐ **-** ☐**,**☐☐ **-** ☐☐☐☐ **-** ☐☐

Scanning
20 = AK with integrated elect ronics; outside scanning
21 = AK with integrated elect ronics; inside scanning

Interface
07 = TTL
08 = 1Vpp

Reference mark
RV = Rectangle pulse linked (90° el.)/ for TTL
RI = Rectangle pulse linked (360° el.)/ for 1Vpp

Functional safety
.. = No
FA = Analog signal (1Vpp) can be used for safety related equipment [1]

Line count
120, 170, 240, 256
300, 341, 360, 480, 512

Bauform Design of the scanning head
20 = Standard
21 = Standard, flat

Cable lenght
0,50 = 0,50 m
1,00 = 1,00 m
1,50 = 1,50 m
2,00 = 2,00 m
2,50 = 2,50 m
3,00 = 3,00 m
4,00 = 4,00 m
5,00 = 5,00 m
6,00 = 6,00 m

Pin configuration
UJ = 01, 02S12, 03S12, 27S12
J5 = 16S15

Interpolation/ Diving factor

		1Vpp	TTL
01	1-fold	×	×
04	4-fold	×	×
05	5-fold		×
08	8-fold	×	×
10	10-fold	×	×
16	16-fold	×	×
20	20-fold		×
25	25-fold	×	×
32	32-fold	×	×
50	50-fold		×
A3	250-fold		×

Elektrical connection
01 = free cable end
02S12 = M23-12pin connector male
03S12 = M23-12 pin coupling male
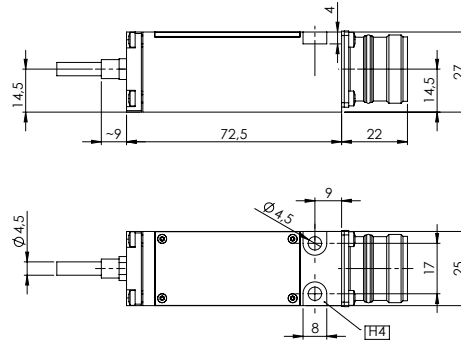16S15 = D-Sub-15pin 2-row male

1) Option „FA" only used for diving factor „01".

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External electronics

- **General information**
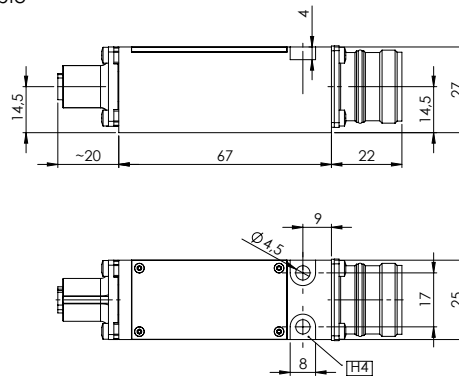- **Dimensions**

Design 10

- Miniaturized scanning head
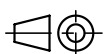- with external electronics on the cable
- Output: Flange socket M23

Design 12

- Miniaturized scanning head
- with external electronics, pluggable on cable
     via M12 connector
- Output:Flange socket M23

Tolerance priciple in accordance with ISO 8015
General tolerances in accordance with ISO 2768-fH
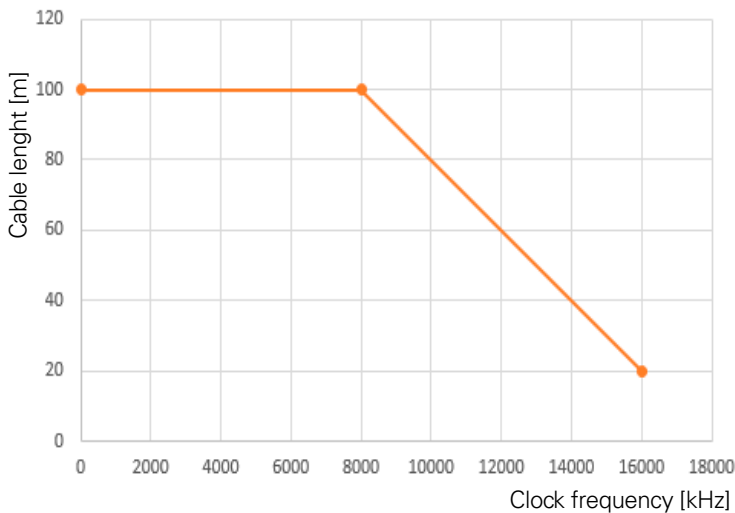All dimensions in mm

H4= Mounting surface

Interfaces
Position values EnDat

The EnDat-Interface is a digital, bi-directional Interface for measuring systems. With this interface you can reat out position values and in the measuring system saved informations. This value can also be updated or new values can be saved. Due to the serial dada transfer four signal wires are enought. The data DATA gets transferred synchroniously to the form the subsequent electronics given clock frequency CLOCK. The selection from the mode of transmission (position values, parameter, diagnostics,...) is done with mode-commands which are sent from the subsequent electronics to the measuring system.
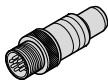
The clock frequency is variable - depending on the cable lenght (max. 100m).
With propagation electronics, either clock frequencies up to 16MHz are possible or cable lenght up to 100m.
For EnDat encoders the maximum clock frequency is sored in the encoder memory. Propagation-delay compensation is provided for EnDat22.

Transmission frequencies up to 16MHz in combination with large cable lenght place hight technological demands in the cable. Greater cable lenghts can be realized with an adapter cable no longer than 6m and an extension cable.
As a rule, the entire transmission path must be designed for the respective clock frequency.

Order code	Instruction set	Incremental signals
EnDat22	EnDat 2.2	Without

Pin configuration

Electrical connection: 1SS08 **8-pin coupling M12**							
	Power supply				Absolute position values		
	8	**2**	**5**	**1**	**3**	**4**	**7**	**6**
	U_P	Sensor U_P	**0 V**	Sensor 0 V	**DATA+**	**DATA-**	**CLOCK+**	**CLOCK-**
	brown/green	blue	white/green	white	grey	pink	violet	yellow

Cable Shield is connected with the housing; **U_P** = Power supply voltage
Sensor: The sensor wire is connected internally with the corresponding power supply.
Non-used pins or wires must not be assigned!

Interfaces
Pin layouts Fanuc, Mitsubishi and BiSS/C®

Fanuc

AMO measuring systems with Fanuc Interface are for connection to a Fanuc-Control.

Fanuc Serial Interface - α interface
Order code: Fanuc02
normal and hight speed,
two-pair transmission.

BiSS/C

AMO measuring systems with BiSS/C® Interface are for connection to controls which habe de ViSS/C Interface implemented.

BiSS/C bidirectional protocol
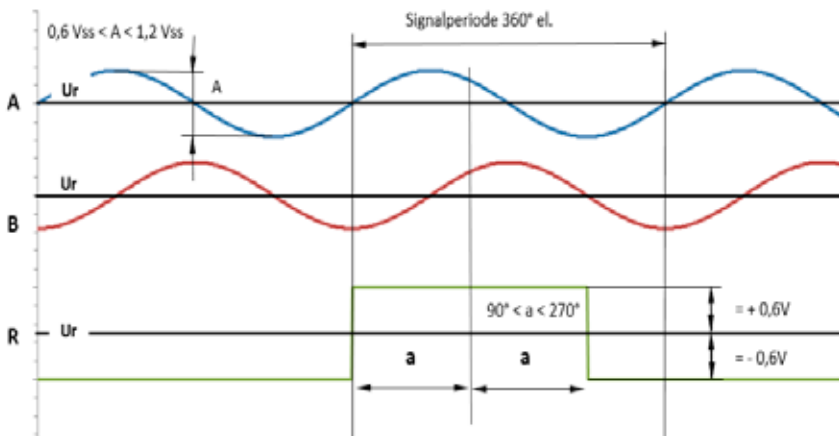Order code: BiSS
The Standard Encoder Profile - 32bit will be in use.
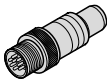
Mitsubishi

AMO measuring systems with Mitsubishi Interface are for connection to aM itsubishi-Control.

Mitsubishi high speed interface
Order code: MitA1-2 (full duplex) –> one pair transmission
Order code: MitA1-4 (duplex) –> two pair transmission

Pin configuration

Electrical connection: 1SS08 **8-pin coupling M12**							
	Power supply				Absolute position values		
▣	**8**	**2**	**5**	**1**	**3**	**4**	**7**	**6**
	U$_P$	**Sensor** U$_P$	**0 V**	**Sensor** 0 V	**DATA+**	**DATA-**	**CLOCK+**	**CLOCK-**
⟌	brown/green	blue	white/green	white	grey	pink	violet	yellow

Cable Shield is connected with the housing; **U$_P$** = Power supply voltage
Sensor: The sensor wire is connected internally with the corresponding power supply.
Non-used pins or wires must not be assigned!

Interface
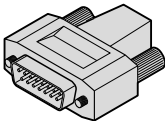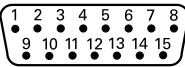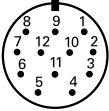## Incremental signals 〜 1 V$_{pp}$

AMO-Measuring systems with 〜 1 V$_{PP}$-Interface are outputing signals which can be highly interpolated.

The sine shaped incremental signals A and B are electrically 90° phase shifted and have a signal strenght from 1Vpp. The showed sequence of the outputet signals - B after A - is valid for the in the connection drawing stated movement direction.

The reference mark signal R has a clear assignment to the incremental signals.

Pin configuration

Electrical connection: 16S15
15-pin Sub-D-connector

Electrical connection: 03S12
12-pin coupling M23

Electrical connection: 02S12
12-pin connector M23

	Power supply				Incremental signals						Other signals		
	4	12	2	10	1	9	3	11	14	7	5/15	8	6
	12	2	10	11	5	6	8	1	3	4	/	7	9
	U$_P$	Sensor U$_P$	0 V	Sensor 0 V	A+	A–	B+	B–	R+	R–	frei	Diag+	Diag-
	brown/ green	blue	white/ green	white	brown	green	grey	pink	red	black	/	violet	yellow

Cable Shield is connected with the housing; **U$_P$** = Power supply voltage
Sensor: The sensor wire is connected internally with the corresponding power supply.
Non-used pins or wires must not be assigned!
DIAG-wires must not be assigned.
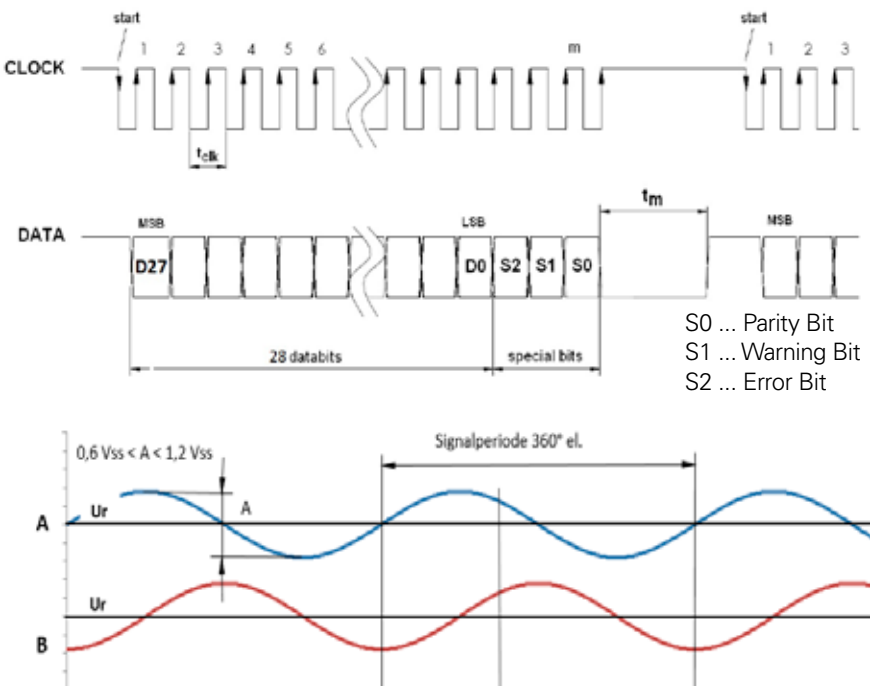DIAG-signals are for checking the encoder with AMO-STU-60.

Interfaces
SSI + 〜1V$_{pp}$

SSI Interface is an unidirectional Interface which can output position values.
The Data DAATA gets transferred synchroniously to the from the subsequent electronic given Clock freuqency CLOCK.
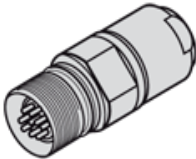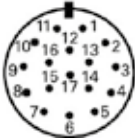Additionaly three special bits (Error, Warning and Parity) will be transferred

AMO-Measuring systems with 〜 1 V$_{pp}$-Interface are outputting signals which can be highly interpolated.

The sine shaped incremental signals A and B are electrically 90° phase shifted and have a signal - B after A - is valid for the in the connection drawing stated movement direction.

S0 ... Parity Bit
S1 ... Warning Bit
S2 ... Error Bit

Pin configuration

Electrical connection: 03S17
17-pin coupling M23

	Power supply				Increment signals				Absolut position value			
	7	**1**	**10**	**4**	**15**	**16**	**12**	**13**	**14**	**17**	**8**	**9**
	U$_P$	Sensor U$_P$	0 V	Sensor 0 V	A+	A−	B+	B−	DATA+	DATA-	CLOCK+	CLOCK-
	brown/ green	blue	white/ green	white	brown	green	grey	pink	red	black	violet	yellow

Cable Shield is connected with the housing; **U$_P$** = Power supply voltage
Sensor: The sensor wire is connected internally with the correspondending power supply.
Non-used pins or wires must not be assigned!

Interface
Incremental signals ⎍TTL

AMO-measuring with ⎍TTL Interface contain electronic, which form the since-form signals - with or without- Interpolation into digital signals.
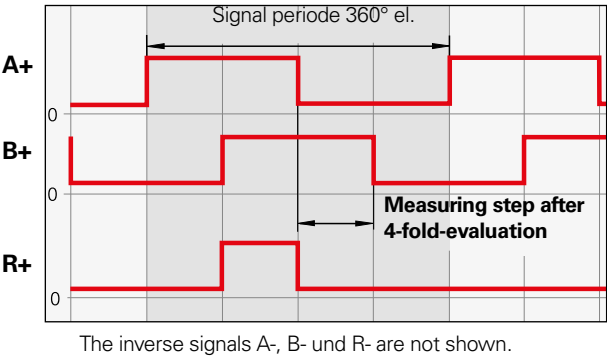
The incremental signals are outputed as rectangle pulses A+ and B + with 90° el. phase shifting.
The rectandle-mark-signal is composed from one or more reference impulses R+, which are assigned with the incremental signals:
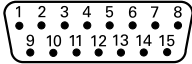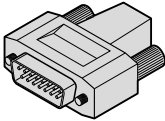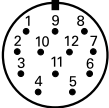The integrated electronic additionally creates the inverse signals A-, B- and R- for a safe transmission.
The showed sequence of the outputed signals - B after A - is valid for the in the connection drawing stated movement direction.
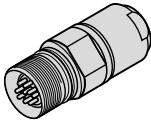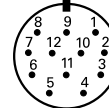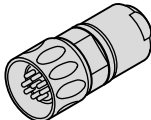
The measuring step results throught the distance between two flanks frim the incremental signals A+ and B+ throught 1-fold, 2-fold or 4-fold evaluation.

The inverse signals A-, B- und R- are not shown.

Pin configuration

Electrical connection: 16S15
15-pin Sub-D-connector

Electrical connection: 03S12
12-pin coupling M23

Electrical connection: 02S12
12-pin connector M23

	Power supply				Incremetal signals						Other signals		
Sub-D	4	12	2	10	1	9	3	11	14	7	5/15	8	6
M23	12	2	10	11	5	6	8	1	3	4	/	7	9
	U_P	Sensor U_P	0 V	Sensor 0 V	A+	A–	B+	B–	R+	R–	Free	Diag+	Diag-
cable	brown/ green	blue	white/ green	white	brown	green	grey	pink	red	black	/	violet	yellow

Cable Shield is connected with the housing; **U_P** = Power supply voltage
Sensor: The sensor wire is connected internally with the corresponding power supply.
Non-used pins or wires must not be assigned!
DIAG-wires must not me assigned!
DIAG-signals are for checking the encoder with AMO-STU-60

Cable

• **Technical Data**

	cable for incremental measuring systems and SSI+1Vpp	cable for measuring systems with pure serial interfaces
Jacket	PUR, high flexible, suitable for energy chains	
Diameter	4,5 +/-0,1mm	
Wires	6x2x0,09mm²	1x(4*0,09mm²) + 4x0,14mm²
Bending radius	≥ 10mm for single bending	
	≥ 50mm for continuous bending	
Max. length	6m	
Resistance according to	UL according to Style 20963 80°C 30V	