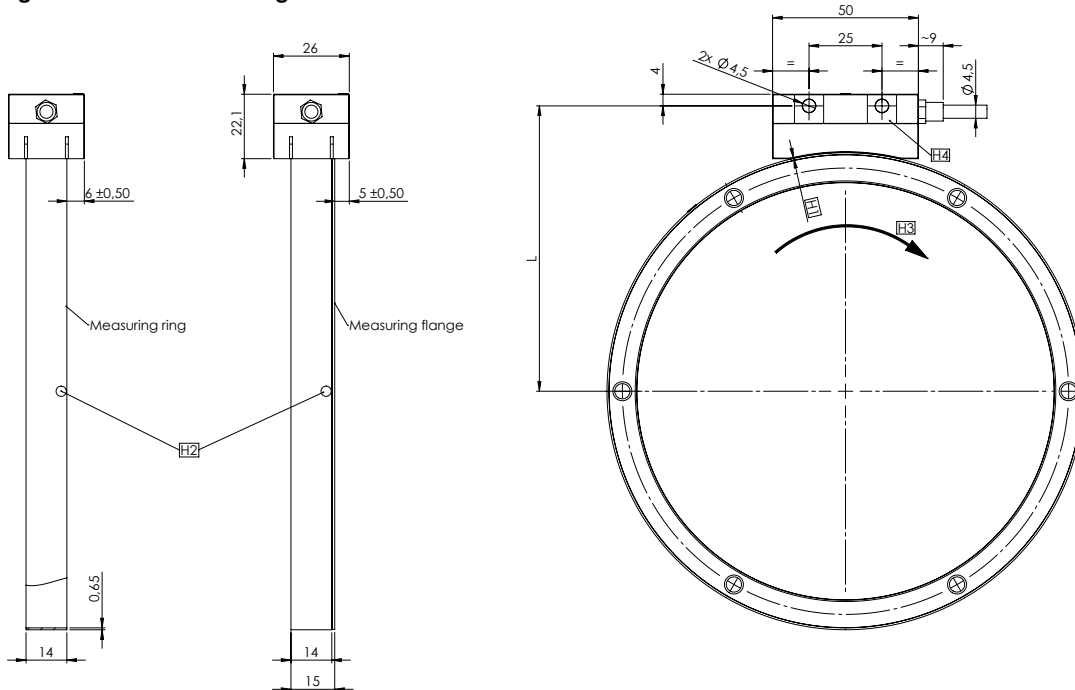


WMKA 2010 series

- Composed of WMKA 2010 and scale tape ring on flange or measuring ring
- Grating period 1000µm
- Scanning head with integrated electronics

Design 20 - Outside scanning

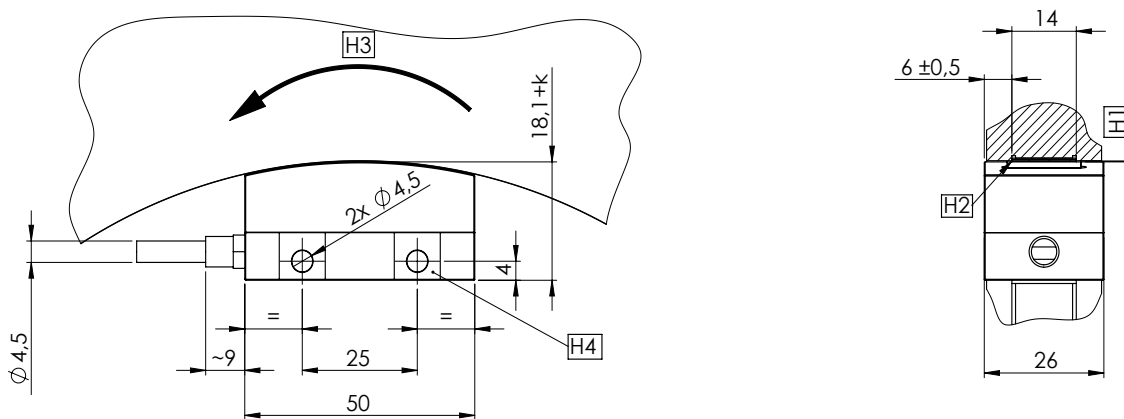


Line count	L [mm]
256	56,74
360	73,29
512	97,82
720	131,64
900	160,39
1024	180,33
1440	246,74
1800	304,25
2048	343,84

WMKA 2110 series

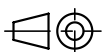
- Composed of WMKA 2110 and scale tape ring
- Grating period 1000µm
- Scanning head with integrated electronics

Design 20 - Inside scanning



Line count	L [mm]
1024	142,53
1440	209,28
1800	266,84
2048	306,44

Tolerance principle in accordance with SO8015
 General tolerances in accordance with ISO 2768-fH
 All dimensions in mm



H1 = Air gap 0,15 ± 0,10mm, set with spacer foil
 H2 = Reference track marking
 H3 = Direction of shaft rotation for positive counting
 H4 = weight plane (both sides))

Technical data

Scanning headWMKA 2010 / WMKA 2110									
Interface	EnDat 2.2		Fanuc α	Mitsubishi (full duplex)		Mitsubishi (duplex)		BiSS/C	SSI + 1Vss
Designation	EnDat 22		Fanuc02	MitA1-2		MitA1-4		BiSS	SSI - 1V pp
Clock frequency	≤ 16 MHz		-	5Mbps		5Mbps		≤ 2,5 MHz	≤ 1 MHz
Interpolation factor digital	Performance Standard: 10bit or 12bit Performance High Accuracy: 14bit								Performance Standard: 10bit or 12bit
Cable length on the encoder	0,5m to 6m								
Electrical connection	Cable with M12 coupling, 8pin male								Cable with M23 coupling
Voltage supply	DC 3,6V to 14V								
Power consumption	≤ 1,5W at 5V								
Typical current consupction	300mA at 5V								
Shock	< 2000m/s² for 6m/s								
Vibration	< 200m/s² 55Hz - 2000Hz								
Operating temperature	-10°C to 85°C								
Storage temperature	-20°C to 85°C								
Protection	IP67								
Weight	40g								
Line count	256 ²⁾	360 ²⁾	512 ²⁾	720 ²⁾	900 ²⁾	1024	1440	1800	2048
Max. Position/Rotation ³⁾	22bit		23bit			24bit			25bit
Position error per grating period ¹⁾									
Standard	±11,0"	±7,5"	±5,5"	±4,0"	±3,0"	±3,0"	±2,0"	±2,0"	±1,5"
High Accuracy	±3,0"	±2,0"	±1,5"	±1,0"	±1,0"	±1,0"	± 0,5"	±0,5"	± 0,5"
Electrical max. speed [min ⁻¹]	≤ 4680	≤ 3330	≤ 2340	≤ 1660	≤ 1330	≤ 1170	≤ 830	≤ 660	≤ 580

¹⁾ The position error per grating period and the accuracy of the grating result together in the encoder specific error; additional deviations caused by mounting and bearing are not considered in this error.

²⁾ not for inside scanning

³⁾ for all pure serial interfaces

- **WMKA - Scanning head for absolute angle encoder**
- **Grating period 1000 μ m**

WMKA 2

10									- 20 -											
----	--	--	--	--	--	--	--	--	--------	--	--	--	--	--	--	--	--	--	--	--

Scanning

0 = Outside scanning
1 = Inside scanning

Performance

S = Standard
HA = High Accuracy

Interface

01 = EnDat 2.2
02 = Fanuc Serial Interface - α Interface
15 = SSI, with additional incremental signals 1Vpp
16 = BiSS/C
21 = Mitsubishi High Speed Serial Interface (full duplex)
22= Mitsubishi High Speed Serial Interface (duplex)

Interpolationsfaktor digital

10 = 10 Bit
12 = 12 Bit
14 = 14 Bit³⁾

Functional safety

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

Line count

- 256¹⁾
- 360¹⁾
- 512¹⁾
- 720¹⁾
- 900¹⁾
- 1024
- 1440
- 1800
- 2048

Multiplication 1Vpp (only for SSI)

	1-fold	x
01		
25	25-fold	x
32	32-fold	x
NN	Without Incremental signals	

Pin configuration

C4 = 1SS08
IS = 03S17, 01

Electrical connection

01 = free cable end
1SS08 = M12 8pin coupling male
03S17 = M23 17polig Kupplung Stift

Cable length

- 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

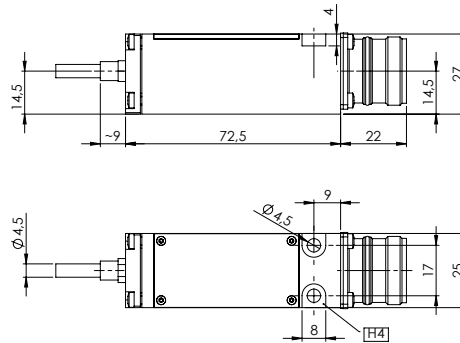
¹⁾ Not for inside scanning
²⁾ Option „FA“ only for SSI and 1Vss Interface with the Multiplication „01.“
³⁾ Not for SSI-Interface.

External electronics

- General information
- Dimensions

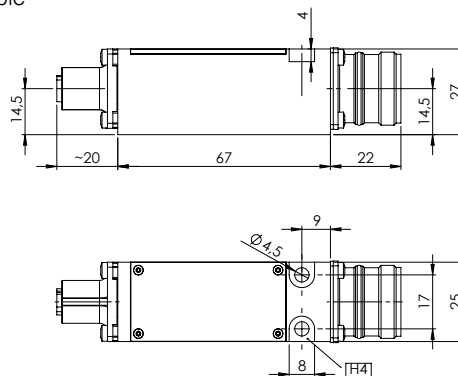
Design 10

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



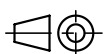
Design 12

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



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

H4= Mounting surface



Interfaces

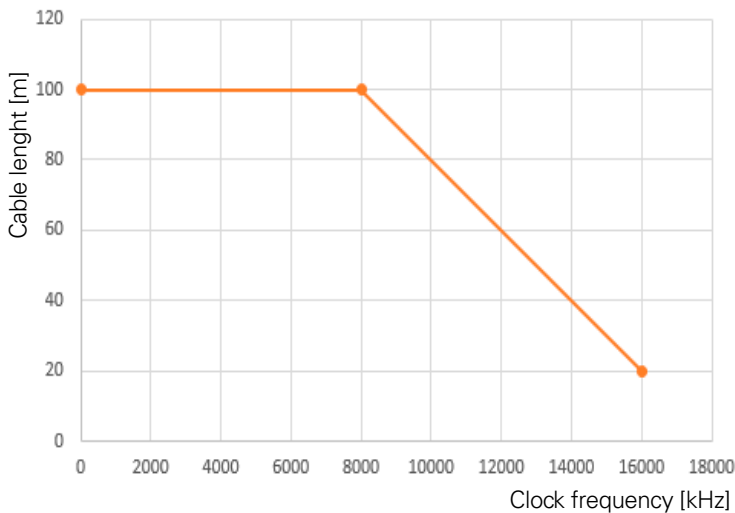
Position values

The EnDat-Interface is a digital, bi-directional Interface for measuring systems. With this interface you can read 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 data transfer four signal wires are enough. The data DATA gets transferred synchronously 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.



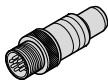


The clock frequency is variable - depending on the cable length (max. 100m). With propagation electronics, either clock frequencies up to 16MHz are possible or cable length up to 100m. For EnDat encoders the maximum clock frequency is stored in the encoder memory. Propagation-delay compensation is provided for EnDat22.

Transmission frequencies up to 16MHz in combination with large cable length place high technological demands in the cable. Greater cable lengths 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 <div></div>								
	Power supply				Absolute position values			
	8	2	5	1	3	4	7	6
	U_P	Sensor U_P	0V	Sensor 0V	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 high speed,
two-pair transmission.

BiSS/C

AMO measuring systems with BiSS/C[®] Interface are for connection to controls which have the BiSS/C Interface implemented.

BiSS/C bidirectional protocol

Order code: BiSS
The Standard Encoder Profile - 32bit will be in use.



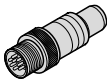


Mitsubishi

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

Mitsubishi high speed interface

Order code: MitA1-2 (full duplex) \rightarrow one pair transmission
Order code: MitA1-4 (duplex) \rightarrow two pair transmission

Pin configuration

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

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

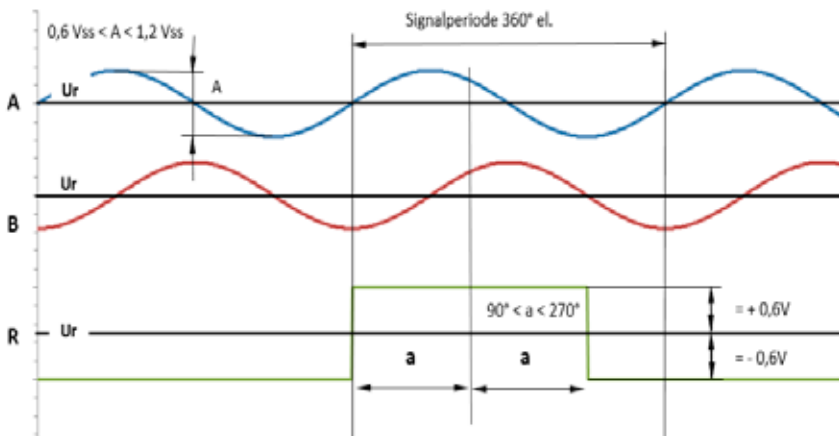
Interface

Incremental signals $\sim 1 V_{pp}$


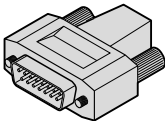
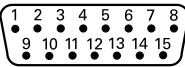

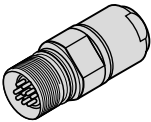
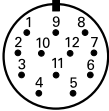

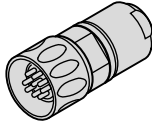
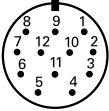



AMO-Measuring systems with $\sim 1 V_{pp}$ -Interface are outputing signals which can be highly interpolated.

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 as-ignment 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.

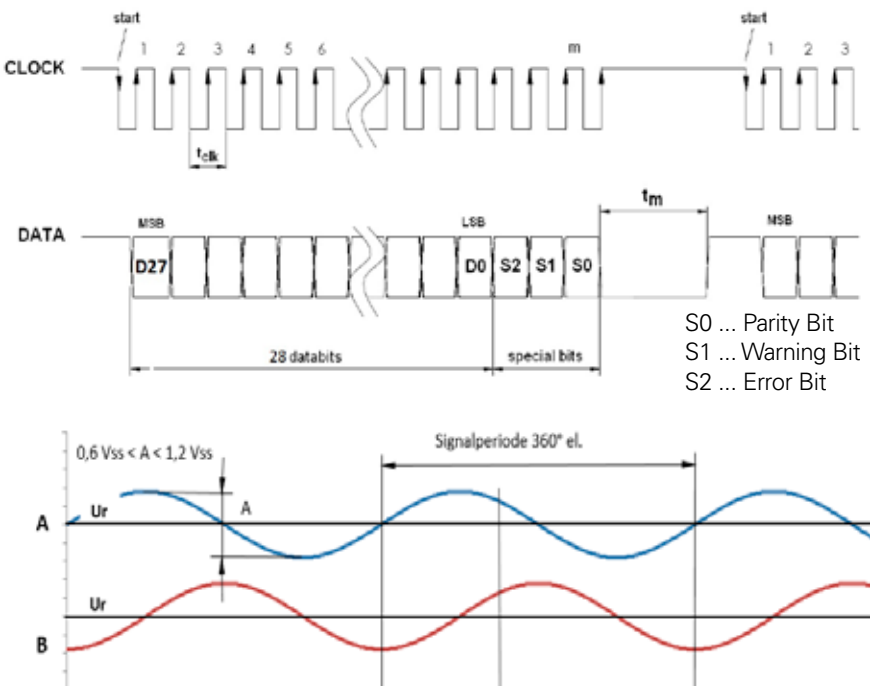
Interfaces

SSI + $\sim 1V_{pp}$

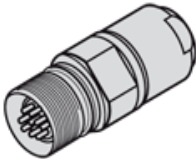

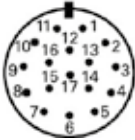


SSI Interface is an unidirectional Interface which can output position values.
 The Data DAATA gets transferred synchronously to the from the subsequent electro- nic given Clock frequency CLOCK.
 Additionally three special bits (Error, War- ning and Parity) will be transferred

AMO-Measuring systems with $\sim 1 V_{pp}$ - 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.




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	0V	Sensor 0V	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 corresponding power supply.
 Non-used pins or wires must not be assigned!

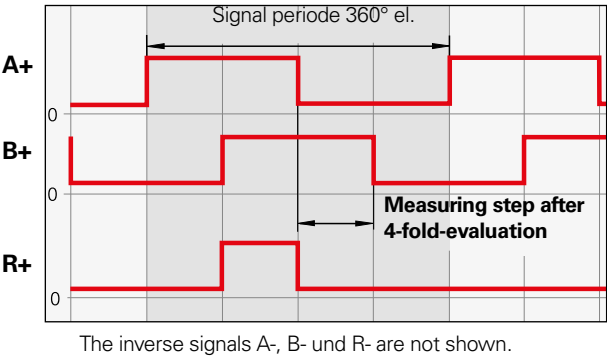
Interface

Incremental signals TTL

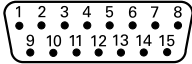
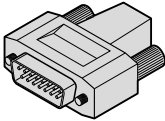

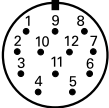
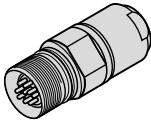

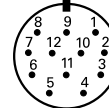
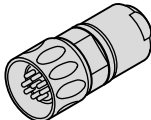




AMO-measuring with  TTL Interface contain electronic, which form the since-form signals - with or without- Interpolation into digital signals.

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 si-gnals:
The integrated electronic additionally crea-tes the inverse signals A-, B- and R- for a safe transmission.
The showed sequence of the outputed sig-nals - B after A - is valid for the in the con-nection drawing stated movement direc-tion.

The measuring step results throught the di-stance between two flanks frim the incre-mental signals A+ and B+ throught 1-fold, 2-fold or 4-fold evaluation.



Pin configuration

Electrical connection: 16S15 15-pin Sub-D-connector <div></div>													
Electrical connection: 03S12 12-pin coupling M23 <div></div>							Electrical connection: 02S12 12-pin connector M23 <div></div>						
	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
	Up	Sensor Up	0V	Sensor 0V	A+	A-	B+	B-	R+	R-	Free	Diag+	Diag-
	brown/ green	blue	white/ green	white	brown	green	grey	pink	red	black	/	violet	yellow

Cable Shield is connected with the housing; **Up** = 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	6x2x0,09mm ²	1x(4*0,09mm ²) + 4x0,14mm ²
Bending radius	≥ 10mm for single bending	
	≥ 50mm for continuous bending	
Max. length	6m	
Resistance according to	UL according to Style 20963 80°C 30V	