METIRIO A1

***Figure 1. METIRIO** A1 housing variant*

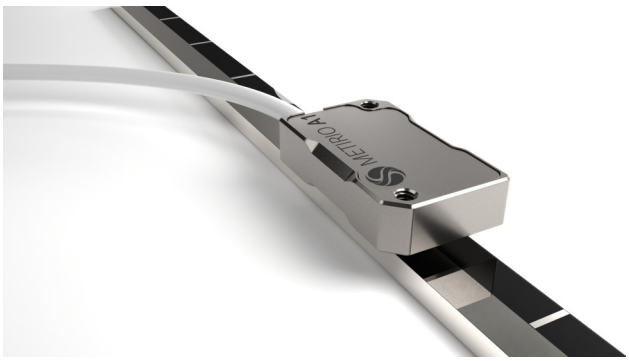

***Figure 2. METIRIO** A1 Encoder with linear scale*

BENEFITS

The **METIRIO** A1 is a easy-to-use housing variant for the **METIRIO** Readhead. The light and robust design made of aluminum with contact surfaces and internal threads enables quick installation in your machine. It is offered with two possible connector variants and various cable lengths up to 3 m. This eliminates the need for soldering on your part.
Despite the addition of an external housing, this readhead also remains one of the most compact in its class. The electrical and optical specifications of this housing variant are the same as for the pure **METIRIO** Readhead.

FEATURES

- Compact size: 17 x 10 x 4 mm
- Light weight: 1.1 g
- Easy and direct mounting
- Non magnetic materials
- Suitable for UHV environment

APPLICATIONS

- Rotary and linear encoders
- Robotics
- Semiconductor
- Microscopy and life science
- Precision stages
- Galvanometers

WORKING PRINCIPLE

The working principle for the **METIRIO** A1 is the same as for the **METIRIO** Readhead. A reflective scale and the readhead are mounted to the opposite moving parts of a motion system, so that either the scale or the readhead can move relative to the other part in one direction. Once the readhead is connected to the power supply, the integrated ASIC will start up with the predefined settings in the memory. The light source illuminates the scale, which will reflect the light back and in combination with the grating optics of the readhead will generate a special light pattern. The distribution of the light pattern will change depending on the relative displacement between the scale and the readhead.
The **differential output voltages** are a sinusoidal functions of the displacement with 1 V peak to peak amplitude and an offset of 0 V. From the phase of these signals the position can directly be calculated. Additional to the periodical incremental track, the scale can comprise a second track with reference marks. These marks will also reflect light to another light detecting array within the readhead. The readhead generates a RS-485 square wave reference signal every time it passes over a reference mark.

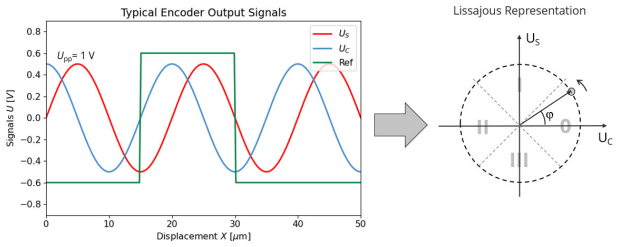

***Figure 3.** Typical output signals*

TECHNICAL DATA

Table 1. *Absolute maximum ratings*

Parameter	Symbol	Condition	Value	Unit
Operating temperature	T_O	no dew condensation	0 to +80	°C
Storage temperature	T_S	no dew condensation	-20 to +80	°C
Max. baking temperature	T_B	repeated > 1 h	150	°C
Supply voltage	V_{DD}	to GND	-0.3 to 5.5	V
Any in/out signal voltage	V_{IO}	to GND	-0.3 to V_{DD}+0.3	V
Max. power consumption	P_{el}	all outputs terminated	310	mW
Max. radiant output power	Φ_{max}	short circuit current I_F = 1000 mA	<360	mW
Ambient pressure	p	—	> 10^{-11}	mbar
ESD susceptibility	V_{ESD}	contact discharge (IEC 61000-4-2)	4000	V

Table 2. *General electro-optical characteristics*

Parameter	Symbol	Condition	Value	Unit
Supply voltage range	V_{DD}	-	3.0 to 5.5	V
Current consumption	I_{DD}	typical	20	mA
Differential analog output voltage	$U_{sin,cos}$	appropriate gain settings	1	V_{PP}
Analog output signal bandwidth	f_{3dB}	Typical 3 dB cutoff	500	kHz
Reference output	U_{ref}	-	RS485	Square wave
Central emission wavelength	λ_{pk}	-	850	nm
Radiant output power	Φ_e	typical	< 45	mW

Standard plug D-Sub 15 male connector with shielded AWG 36 cable with teflon coating. This variant is compatible with most SmarAct Modules, such as **ENCODER** EVALUATION **MODULE** and **ENCODER** INTERFACE **MODULE**.

Vacuum plug Circular 14-pin male connector with shielded AWG 36 cable without teflon coating. This variant is compatibile with typical vacuum chamber flanges.

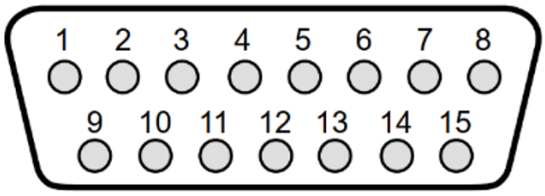

Figure 4. *Pin assignment of the D-Sub 15 male connector of the* ***METIRIO*** *A1*

Pin	Description	Pin	Description
1	n.c.	9	n.c.
2	n.c.	10	SCL
3	n.c.	11	SDA
4	GND	12	U_{sin-}
5	U_{sin+}	13	U_{cos-}
6	U_{cos+}	14	U_{Ref-}
7	U_{Ref+}	15	V_{DD}
8	PD	Housing	Shield

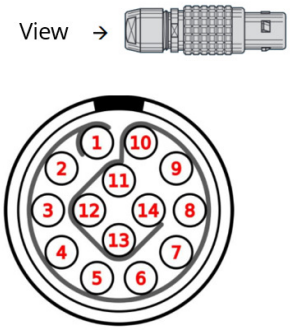

Figure 5. *Pin assignment of the circular 14-pin male connector of the* ***METIRIO*** *A1 UHV variant*

Pin	Description	Pin	Description
1	U_{Ref-}	9	n.c.
2	U_{Ref+}	10	V_{DD}
3	U_{cos-}	11	PD
4	U_{cos+}	12	n.c.
5	U_{sin-}	13	U_{sin+}
6	SDA	14	GND
7	SCL		
8	n.c.	Housing	Shield

MECHANICAL DIMENSIONS

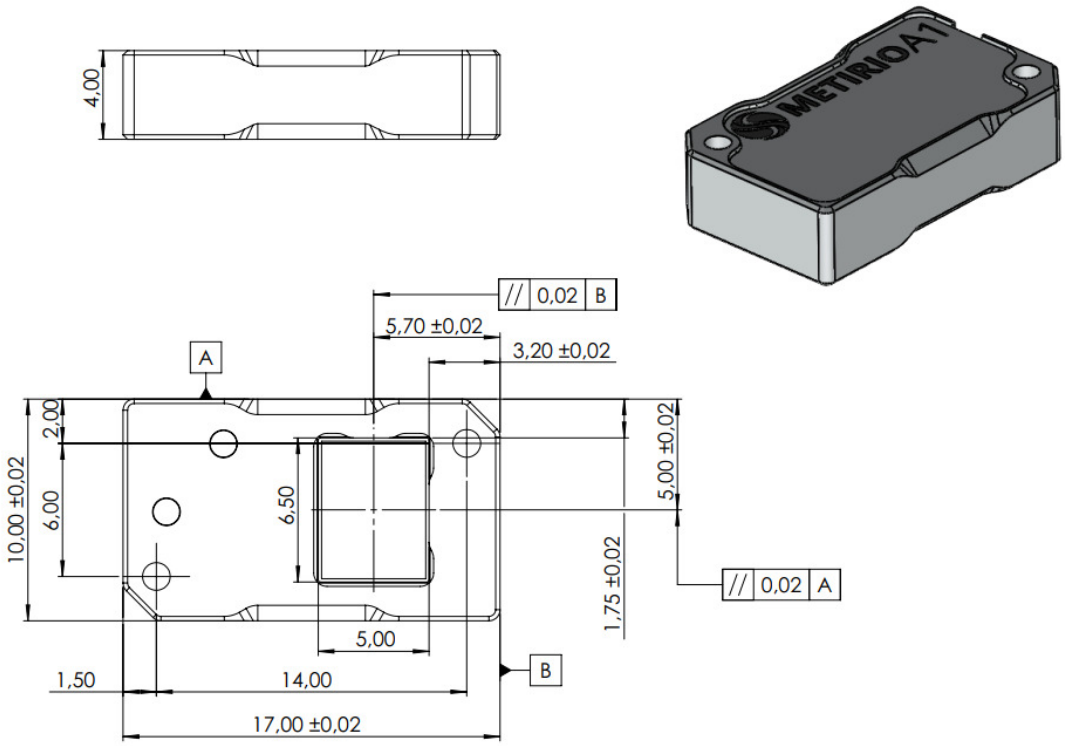

Figure 6. *Dimensional outline* ***METIRIO*** *A1*

Unless otherwise speicfied, the general tolerances of the **METIRIO** A1 housing variant are defined according to ISO - 2768 - fH.

ALIGNMENT TO SCALES

The main component of the **METIRIO** A1 is the basic flip-chip readhead. For this reason, all alignment instructions given **METIRIO** user manual hold true also for the aluminum housing variant. However, the alignment tolerances might slightly be reduced due to the hosing tolerances. The cover glass of the basic flip-chip readhead on the top is flush with the outer aluminum housing. Hence the working distance with respect to the scale has the same value as for the basic readhead. The center line of the readhead should coincide with the track separation line betwenn the invremental track A and the reference track B.

> The SmarAct logo on the back side of the external housing is opposite to the logo on the cover glass of the **METIRIO** readhead. This logo indicates the orientation of the readhead with respect to the scale. The SmarAct Logo shall be on the same side as the incremental track A.

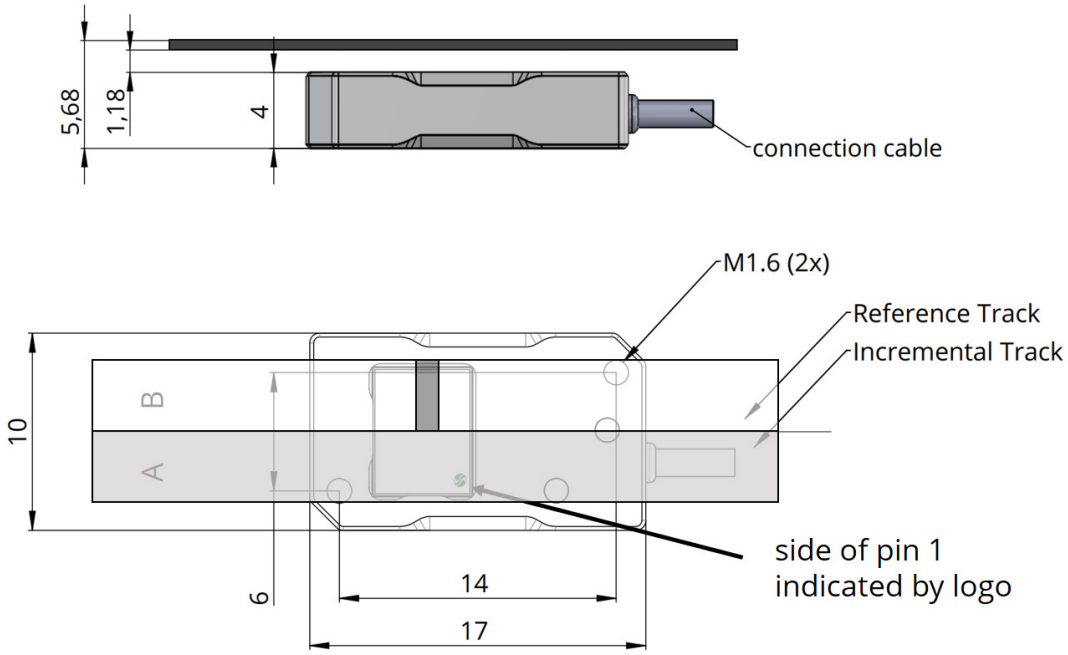

***Figure 7. METIRIO** A1 alignment to scales*

*For further instructions on how to install scales, please refer to the **METIRIO** user manual.*

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