

Figure 1. METIRIO D1 housing variant

BENEFITS

The **METIRIO D1** is an easy-to-use housing variant for the **METIRIO Readhead**. The light and robust design made of aluminum is optimized for a compact integration to external systems. As shown in Figure 2 the mounting adapters and screws fit without increasing the footprint of the **METIRIO D1**. It is offered with standard D-Sub connector and various cable lengths up to 3 m. This eliminates the need for soldering on your part.

The housing of the **METIRIO D1** is optimized for space sensitive applications which results to the most compact encoder in its class. The electrical and optical specifications of this housing variant are the same as for the pure **METIRIO Readhead**.

FEATURES

- Compact size: 15 x 11.2 x 6.2 mm
- Light weight: 3.1 g¹
- Easy and compact mounting
- Cabling: UL AWM Style 20963

APPLICATIONS

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

¹Without cabling

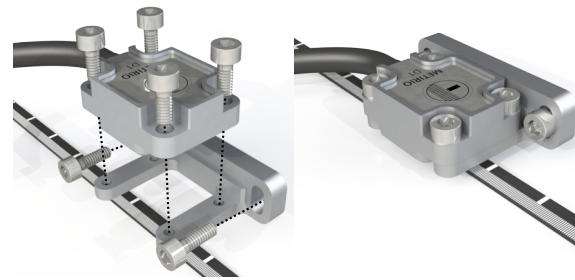


Figure 2. Mounting example

WORKING PRINCIPLE

The working principle for the **METIRIO D1** 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.

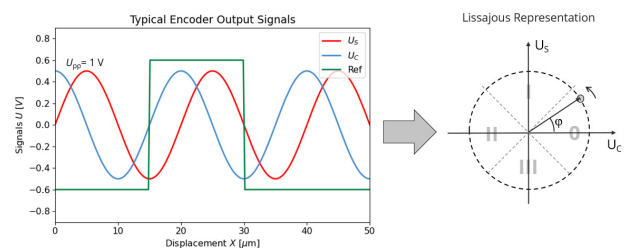


Figure 3. Typical output signals

TECHNICAL DATA

Table 1. Absolute maximum ratings

Parameter	Symbol	Condition	Value	Unit
Operating temperature	T_O	no dew condensation	0 to +80	$^{\circ}\text{C}$
Storage temperature	T_S	no dew condensation	-20 to +80	$^{\circ}\text{C}$
Shock		11 ms half sine (EN 60068-2-27)	1000	m s^{-2}
Vibration		10 - 2000 Hz sinusoidal (EN 60068-2-6)	500	m s^{-2}
Max. baking temperature	T_B	repeated > 1 h	80	$^{\circ}\text{C}$
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
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 Polyurethane (PUR) sheath. This variant is compatible with most SmarAct Modules, such as **ENCODER EVALUATION MODULE** and **ENCODER INTERFACE MODULE**. The cable fulfills the requirements of "UL AWM Style 20963" which allows the cable to be used in drag chain applications. The cable itself is flame retardant.

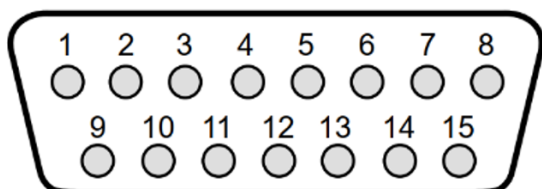


Figure 4. Pin assignment of the D-Sub 15 male connector of the METIRIO D1

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	n.c.	Housing	Shield

Open cable Alternatively, the **METIRIO D1** is available with the same cable but without connector. The available cable lengths are the same as for the **Standard Plug** version. To integrate cable to your application, please recognize the color scheme below.

Table 3. Color scheme of the **METIRIO D1** cable

Color	Description	Color	Description	Color	Description
Orange	SCL	Cyan	V _{DD}	Brown	U _{cos-}
Yellow	SDA	Green	GND	Gray	U _{cos+}
White	U _{Ref-}	Blue	U _{sin-}	Red	not used
Pink	U _{Ref+}	Purple	U _{sin+}	Black	not used

MECHANICAL DIMENSIONS

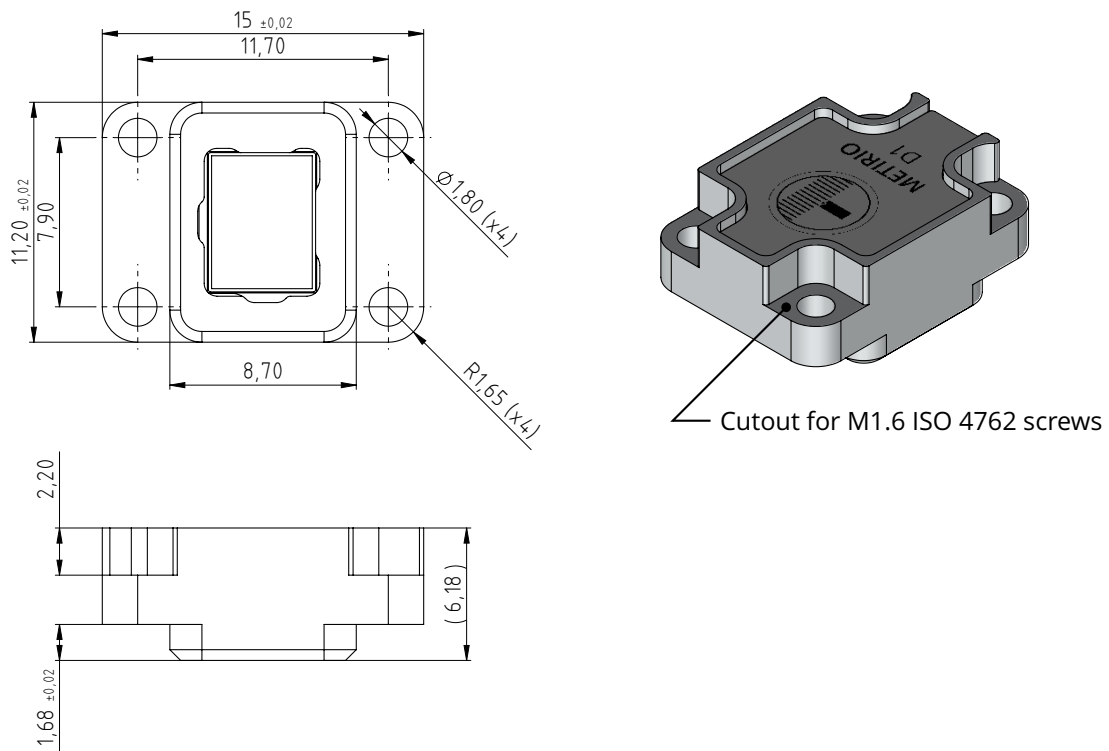


Figure 5. Dimensional outline **METIRIO D1**

Unless otherwise specified, the general tolerances of the **METIRIO D1** housing variant are defined according to ISO - 2768 - fH.

ALIGNMENT TO SCALES

The main component of the **METIRIO D1** is the basic flip-chip readhead. For this reason, all alignment instructions in the **METIRIO** user manual hold true also for the aluminum housing variant. However, the alignment tolerances might slightly be reduced due to the housing tolerances. The cover glass of the basic flip-chip readhead is slightly inserted to the outer aluminum housing to avoid damage to the cover glass. Hence the working distance with respect to the scale has a slightly smaller value as for the basic readhead. The center line of the readhead should coincide with the track separation line between the incremental track and the reference track.

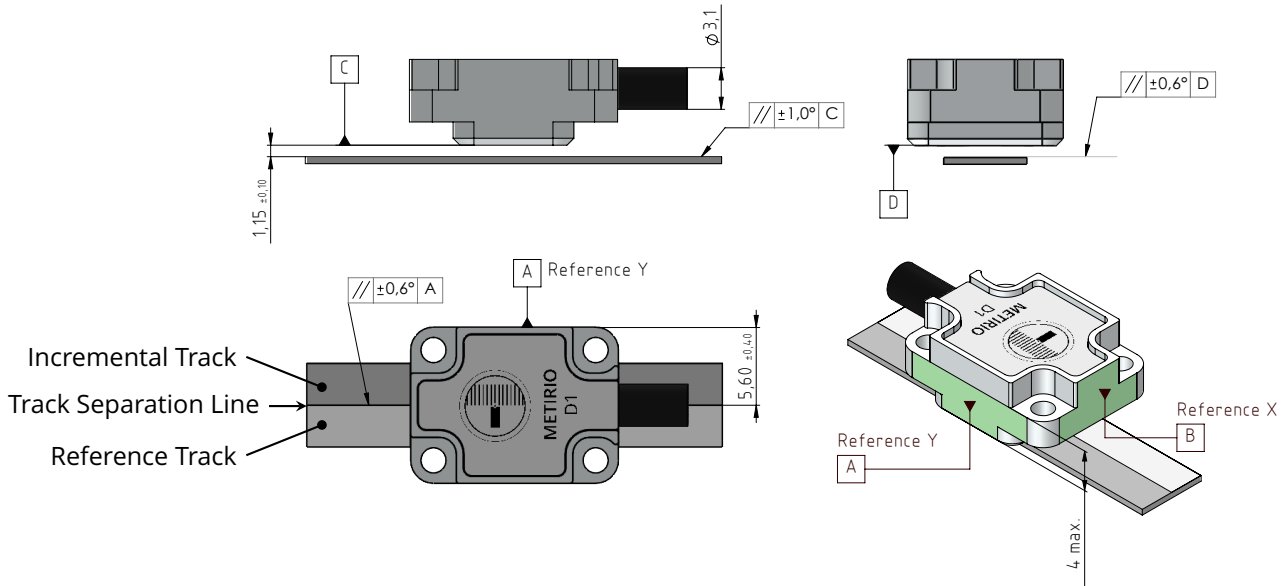


Figure 6. METIRIO D1 alignment to linear scales

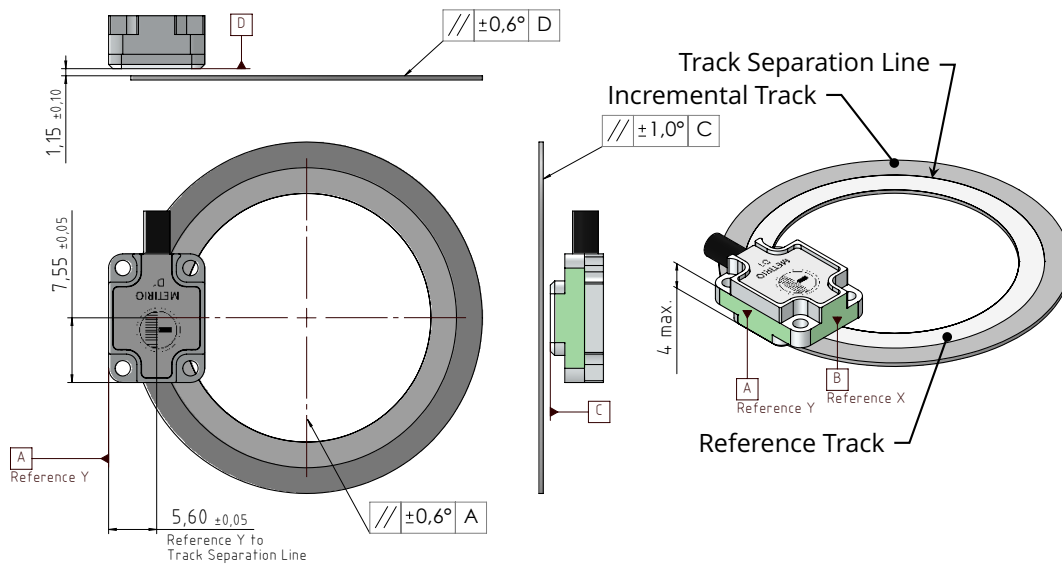


Figure 7. METIRIO D1 alignment to rotary scales

Please recognize that the Reference Plane Y is limited to a height of 4 mm in respect to the bottom plane of the **METIRIO D1**. Due to the production process, the upper section of this plane could have asperities. The reference plane of the mounting adapter should stay at least 0.3 mm apart from the

upper section of this plane (see Figure 8). For *Reference X* the whole plane is a valid reference plane.

For the alignment of the sensor to the scales, the distance between *Reference Y* and the *Track Separation Line* is of major importance. However, in real world applications the scales will be placed based on their outlines. Please read the Scale Catalogue (document "OE-UG00003") to get the distances between the *Track Separation Line* and the outlines of the scale.

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

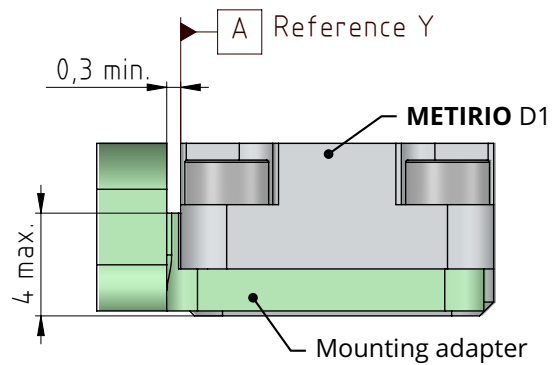


Figure 8. METIRIO D1 mounting adapter requirements

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