



The interface module is a compact 2-port I/O device that converts sine / cosine / reference signals, provided by the METIRIO encoder into a differential quadrature output (ABZ). It features a high-resolution data acquisition, low noise, and user preset compensation function for offset-, amplitude-, and phase errors.

## Features

- Converts differential Sin/Cos/Ref signals into a differential ABZ output
- Automatic input calibration using a single pushbutton
- Correction of offset-, amplitude-, and phase errors during operation
- LED indicator for flagging operational failure

## General

| Parameter                          | Specifications  | Unit |
|------------------------------------|-----------------|------|
| Housing Material Anodized Aluminum |                 |      |
| Input Connector                    | D-Sub 15 Female |      |
| Output Connector                   | D-Sub 15 Male   |      |
| Dimensions (without connectors)    | 50 x 41 x 16    | mm   |
| Operating Temperature              | 0 – +70         | °C   |

## Maximum Ratings

| Parameter     | Specifications | Unit            |
|---------------|----------------|-----------------|
| Input Voltage | 4.75 – 5.25    | V <sub>DC</sub> |
| Input Current | 40             | mA              |

## Input

| Parameter                            | Specifications | Unit             |
|--------------------------------------|----------------|------------------|
| Sine/Cosine (Differential)           | 0.35 – 2.2     | V                |
| Reference (Differential)             | 0 V – 3.3      | V                |
| Sine/Cosine Amplitude (Single-Ended) | 20 – 700       | mV <sub>pp</sub> |
| Differential                         | 40 – 1400      | mV <sub>pp</sub> |
| Sine/Cosine (common mode)            | 0.7 – 1.85     | V                |
| Max. Frequency (Sine/Cosine)         | 700            | kHz              |
| Correctable Offset Voltage           | ±25            | %                |
| Correctable Amplitude Mismatch       | ±25            | %                |
| Correctable Phase Error              | ±26            | deg              |

## Pinout

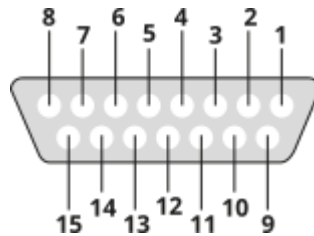


Figure 1: D-Sub 15 Female

Table 1: Pin Description Encoder Input

| D-Sub Female Pin Number | Signal Name | Direction | Comment  |
|-------------------------|-------------|-----------|--|
| 1                       | ---         | ---       | Not Connected (NC)                                     |
| 2                       | ---         | ---       | NC   |
| 3                       | ---         | ---       | NC   |
| 4                       | GND         | Power     | Connected to Ground                                    |
| 5                       | Sin+        | In        | Sin+ of an analog Sensor Signal                        |
| 6                       | Cos+        | In        | Cos+ of an analog Sensor Signal                        |
| 7                       | Ref+        | In        | Ref+ of a RS422 interface                              |
| 8                       | PD          | In        | Encoder Power Down; Set high to power down the Encoder |
| 9                       | ---         | ---       | NC   |
| 10                      | SCL         | In        | Encoder TWI Clock Signal                               |
| 11                      | SDA         | IO        | Encoder TWI Data Signal                                |
| 12                      | Sin-        | In        | Sin- of an analog Sensor Signal                        |
| 13                      | Cos-        | In        | Cos- of an analog Sensor Signal                        |
| 14                      | Ref-        | In        | Ref- of a RS422 interface                              |
| 15                      | Vsen        | Power     | Sensor Power Supply                                    |

## Output

| Parameter        | Specifications | Unit |
|------------------|----------------|------|
| Signal Type      | ABZ            |      |
| Signal Level     | 5              | V    |
| Current (max.)   | 95             | mA   |
| Frequency (max.) | 12.5           | MHz  |

## Pinout

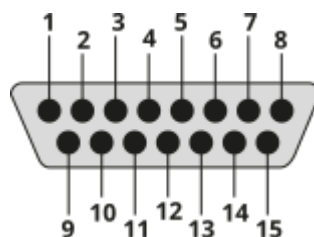


Figure 2: D-Sub 15 Male

**Table 2: PIN Description Output Connector**

| D-Sub Male Pin Number | Signal Name | Direction | Comment  |
|-----------------------|-------------|-----------|--|
| 1                     | ---         | ---       | Not Connected  |
| 2                     | IRQ         | Out       | Interrupt request output to external microcontroller. Additionally the output drives the fault LED                                       |
| 3                     | CALIB       | IO        | Device enters calibration mode on falling edge of CALIB. Can be triggered by the button or via an open collector signal on the connector |
| 4                     | EXT_GND     | Power     | Connected to Ground  |
| 5                     | A+          | Out       | A+ of a RS422 interface  |
| 6                     | B+          | Out       | B+ of a RS422 interface  |
| 7                     | Z+          | Out       | Z+ of a RS422 interface  |
| 8                     | PD          | In        | Encoder Power Down; Set high to power down the Encoder   |
| 9                     | ---         | ---       | Not Connected  |
| 10                    | SCL         | In        | TWI Clock Signal; connected to Encoder   |
| 11                    | SDA         | IO        | TWI Data Signal; connected to Encoder  |
| 12                    | A-          | Out       | A- of a RS422 interface  |
| 13                    | B-          | Out       | B- of a RS422 interface  |
| 14                    | Z-          | Out       | Z- of a RS422 interface  |
| 15                    | VIN         | Power     | External DC Supply Voltage of 5V   |

### Setup

The Encoder Interface Module is configurable to meet the output resolution as desired for the individual application. One of the following interpolation factors is to be defined prior to order placement:

| Index | Bit | $f_{input}$ [kHz] | Max V [m/s] | Resolution [nm] |
|-------|-----|-------------------|-------------|-----------------|
| 1     | 2   | 12500.00          | 250.00      | 5000.00         |
| 2     | 3   | 6250.00           | 125.00      | 2500.00         |
| 3     | 4   | 3125.00           | 62.50       | 1250.00         |
| 4     | 5   | 1562.50           | 31.25       | 625.00          |
| 5     | 6   | 781.25            | 15.63       | 312.50          |
| 6     | 7   | 390.63            | 7.81        | 156.25          |
| 7     | 8   | 195.31            | 3.91        | 78.13           |
| 8     | 9   | 97.66             | 1.95        | 39.06           |
| 9     | 10  | 48.83             | 0.98        | 19.53           |
| 10    | 11  | 24.41             | 0.49        | 9.77            |
| 11    | 12  | 12.21             | 0.24        | 4.88            |
| 12    | 13  | 6.10              | 0.12        | 2.44            |
| 13    | 14  | 3.05              | 0.06        | 1.22            |
| 14    | 15  | 1.53              | 0.03        | 0.61            |
| 15    | 16  | 0.76              | 0.02        | 0.31            |
| 16    | 17  | 0.38              | 0.01        | 0.15            |
| 17    | 18  | 0.19              | 0.00        | 0.08            |
| 18    | 19  | 0.10              | 0.00        | 0.04            |
| 19    | 20  | 0.05              | 0.00        | 0.02            |

### Auto Calibration

The Interface Module provides automatic calibration function for the sensor gain, offset, sine and cosine balance, as well as phase correction. The calibration is performed by means of the „Calib“-push-and-hold button, or by pulling the Calib-PIN low when operating in an open collector configuration. During the calibration, the Interface Module anticipates at least 10 Encoder input cycles to optimize the signal in terms of lowest error and jitter. The calibration is finished when releasing the button or the Calib signal. The correction values are stored in an internal EEPROM and can be applied continuously.

### Fault LED

The „Fault“ LED indicates that the Encoder signal is not calibrated. When the LED is on, it is recommended to start the auto calibration. The IRQ signal is wired to the LED and can additionally be used as an interrupter for interconnected controllers.

### Order Codes

Below table indicates the different models with the respective ordering scheme:

| Encoder Interface Module Order Codes |                   |          |                   |               |
|--------------------------------------|-------------------|----------|-------------------|---------------|
| EC (Encoder)                         |                   | Category | Interface Type    | Configuration |
| <b>Category</b>                      |                   | IM       | Interface Modules | ←             |
| IM                                   | Interface Modules |          |                   |               |
| <b>Version</b>                       |                   | V        | 1.0               | ←             |
| V                                    | 1.0               |          |                   |               |
| <b>Interface type</b>                |                   | ABZ      | ABZ               | ←             |
| ABZ                                  | ABZ               |          |                   |               |
| <b>Configuration</b>                 |                   | R02      | 2 bit Resolution  | ←             |
| R03                                  | 3 bit Resolution  |          |                   |               |
| R04                                  | 4 bit Resolution  |          |                   |               |
| R05                                  | 5 bit Resolution  |          |                   |               |
| R06                                  | 6 bit Resolution  |          |                   |               |
| R07                                  | 7 bit Resolution  |          |                   |               |
| R08                                  | 8 bit Resolution  |          |                   |               |
| R09                                  | 9 bit Resolution  |          |                   |               |
| R10                                  | 10 bit Resolution |          |                   |               |
| R11                                  | 11 bit Resolution |          |                   |               |
| R12                                  | 12 bit Resolution |          |                   |               |
| R13                                  | 13 bit Resolution |          |                   |               |
| R14                                  | 14 bit Resolution |          |                   |               |
| R15                                  | 15 bit Resolution |          |                   |               |
| R16                                  | 16 bit Resolution |          |                   |               |
| R17                                  | 17 bit Resolution |          |                   |               |
| R18                                  | 18 bit Resolution |          |                   |               |
| R19                                  | 19 bit Resolution |          |                   |               |
| R20                                  | 20 bit Resolution |          |                   |               |

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