

ESG16 EtherCAT[®] Strain Gauge Module

Cosworth's ESG16 module offers up to 16 differential, ratiometric strain gauge inputs with common excitation and sense lines in a compact and rugged IP67 aluminium housing. Alternatively, the module can be configured to provide up to 8 inputs with individual excitation and sense lines for each input.

Resolution is 24bits, with outstanding accuracy and repeatability. Sampling is simultaneous on all inputs and rates go up to 2kHz.

The interface to data acquisition systems, including Cosworth's Pi Diablo, is via EtherCAT. This is an open and widely used industrial standard offering high speed and excellent time synchronisation.



Input connectors are pin-compatible (*) with Mistral IJB Type B/C slots. Both the power and EtherCAT connections use industry standard M8 connectors.

Each of the two input connectors offers up to 4 x 5V excitation lines, 2 of which are replaced by PT100 2 wire inputs in the common excitation configuration.

Specifications

Electrical Data	
Operating voltage	8VDC to 32VDC
Current Consumption	160mA @ 24V plus excitations
Analogue Inputs	Process connectors: 2 x microD25P
	Differential and ratiometric mV inputs per connector:
	8 with common excitation / sense plus 2 x PT100 temp. inputs OR
	4 with individual excitation / sense
	Sensitivity ranges, configurable per input as build options in 5 steps:
	+/-0.24mV/V to 3.79mV/V
	Input Impedance: >1 GOhm
	Resolution: 24bits for voltage inputs; 16 bits for PT100 inputs
	Accuracy: +/-0.03% FS @ 25degC (*)
	Repeatability: 0.06% FS over one year and operating temp. range (**)
Acquisition rates 1 Hz to 2kHz, configurable per connector	
Filtering: sinc4 on ADCs at 0.23 FS	
Excitations	4 per connector (4 inputs) or 1 per connector (8 inputs + 2 PTC)
	Fixed 5V, configurable DC/chopped 500mA per excitation pair

Electrical Data	
Data ports	2 x EtherCAT
LEDs	2 x Link Activity, 1 x Run State
Internal Sensors	Supply Voltage Monitoring
	Internal Temperature
	Excitation Current Monitoring, all 1 to 5Hz, 16 bits resolution

Mechanical Data	
Size excluding connectors	126 x 60 x 22 mm
Weight	195 grams
Environmental	IP67
Operating Temperature	-25°C to +60°C
Storage Temperature	-40°C to +85°C
Case Material	Anodized Aluminium

Ordering Information

Part Number	
ESG16	01M-606078
Port options	4/4, 4/8, 8/8
Input ranges (per input)	+/-0.24 to 3.79mV/V

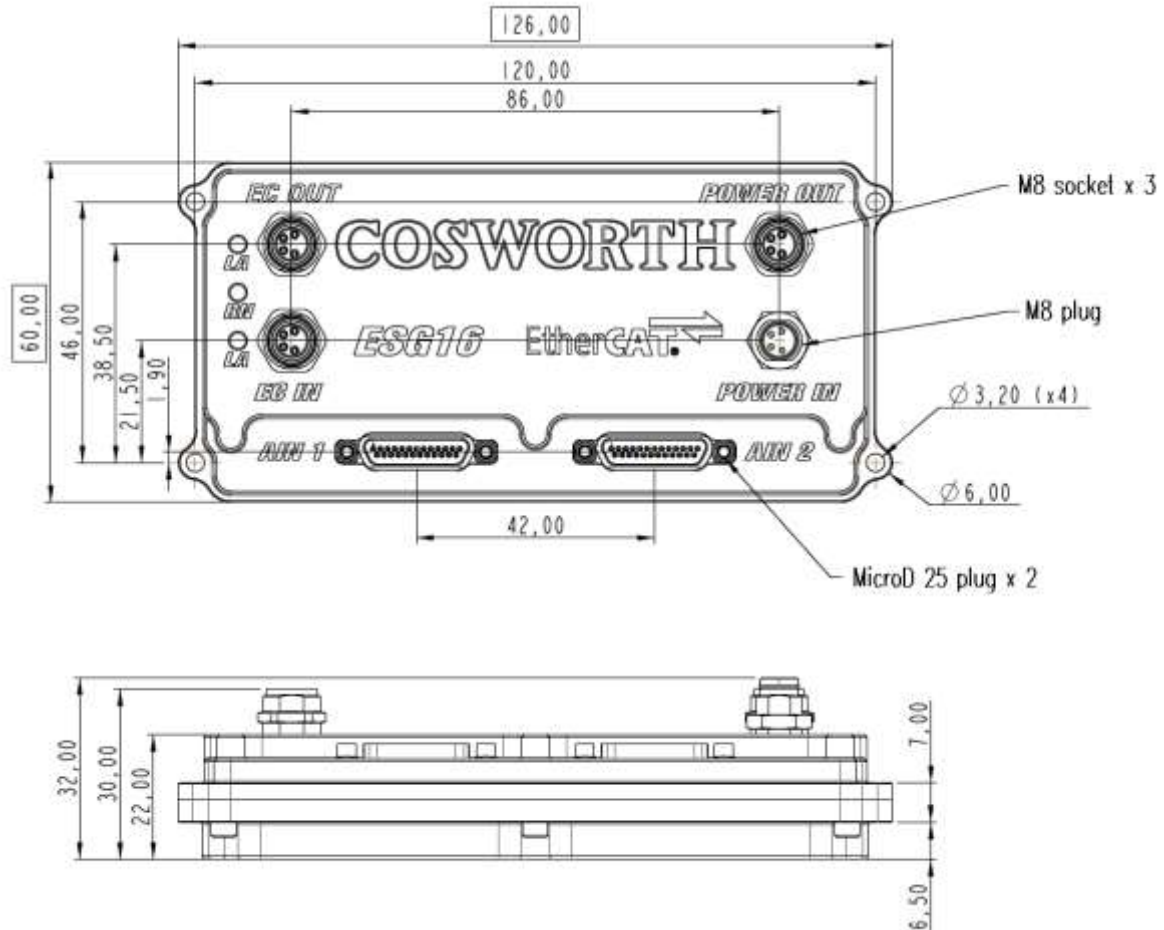
EtherCAT[®] is a registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

Notes

(*) Accuracy better than +/-0.03% (typically +/-0.01%) for sensitivity ranges +/-3.79 and +/-1.89 mV/V; accuracy better than +/-0.06% for sensitivity ranges +/-0.95, +/-0.47 and +/-0.24 mV/V.

(**) For sensitivity range +/-3.79mV/V

Dimensions



Installation

When installing the ESG16:

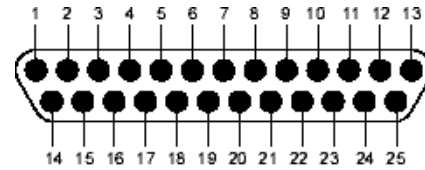
- Avoid exposing the unit to severe vibrations, if necessary use AV mounts.
- Ensure unit is positioned in an area with an ambient temperature of less than 60°C and with sufficient cooling air flow to prevent over-heating. Provision of heat-sinking is recommended where possible.
- Mount the unit away from sources of strong electrical interference and take care to route EtherCAT cable separately from high voltage power cables.
- Route analogue input cables away from strong electrical interference sources, such as motors and high voltage power cables.

Connector Information

All illustrations show device connectors.

AIN1 – Analogue Input Connector

Connector	Mating Connector
microD25 P	microD25 S



4 Input Configuration

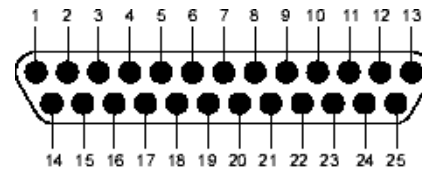
Pin	Function	Signal Description
1	N/C	Not connected (* case ground in IJB)
2	Input 1-	Differential input 1-
3	Input 2-	Differential input 2-
4	Excitation 1+	Excitation 1 5V DC or chopped DC
5	Input 3-	Differential input 3-
6	Input 4-	Differential input 4-
7	Excitation 1+	Excitation 1 5V DC or chopped DC
8	Sense 1-	Sense line 1-
9	Sense 2-	Sense line 2-
10	Excitation 2+	Excitation 2 5V DC or chopped DC
11	Sense 3-	Sense line 3-
12	Sense 4-	Sense line 4-
13	Excitation 2+	Excitation 2 5V DC or chopped DC
14	GND 1	Excitation1 ground / return
15	Input 1+	Differential input 1+
16	Input 2+	Differential input 2+
17	GND 1	Excitation 1 ground / return
18	Input 3+	Differential input 3+
19	Input 4+	Differential input 4+
20	GND 2	Excitation 2 ground / return
21	Sense 1+	Sense line 1+
22	Sense 2+	Sense line 2+
23	GND 2	Excitation 2 ground / return
24	Sense 3+	Sense line 3+
25	Sense 4+	Sense line 4+
Shell	Case GND	Case and shield

8 Input Configuration

Pin	Function	Signal Description
1	N/C	Not connected (* case ground in IJB)
2	Input 1-	Differential input 1-
3	Input 2-	Differential input 2-
4	Temp 1+	PT100 input 1+
5	Input 3-	Differential input 3-
6	Input 4-	Differential input 4-
7	Temp 2+	PT100 input 2+
8	Input 5-	Differential input 5-
9	Input 6-	Differential input 6-
10	Input 8+	Differential input 8+
11	Input 7-	Differential input 7-
12	Sense -	Sense line -
13	Excitation 2+	Excitation 2 5V DC or chopped DC
14	Temp 1-	PT100 input 1-
15	Input 1+	Differential input 1+
16	Input 2+	Differential input 2+
17	Temp 2-	PT100 input 2-
18	Input 3+	Differential input 3+
19	Input 4+	Differential input 4+
20	Input 8-	Differential input 8-
21	Input 5+	Differential input 5+
22	Input 6+	Differential input 6+
23	GND 2	Excitation 2 ground / return
24	Input 7+	Differential input 7+
25	Sense +	Sense line +
Shell	Case GND	Case and shield

AIN2 – Analogue Input Connector

Connector	Mating Connector
microD25 P	microD25 S



4 Input Configuration

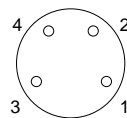
Pin	Function	Signal Description
1	N/C	Not connected (* case ground in IJB)
2	Input 9-	Differential input 9-
3	Input 10-	Differential input 10-
4	Excitation 3+	Excitation 3 5V DC or chopped DC
5	Input 11-	Differential input 11-
6	Input 12-	Differential input 12-
7	Excitation 3+	Excitation 3 5V DC or chopped DC
8	Sense 9-	Sense line 9-
9	Sense 10-	Sense line 10-
10	Excitation 4+	Excitation 4 5V DC or chopped DC
11	Sense 11-	Sense line 11-
12	Sense 12-	Sense line 12-
13	Excitation 4+	Excitation 4 5V DC or chopped DC
14	GND 3	Excitation 3 ground / return
15	Input 9+	Differential input 9+
16	Input 10+	Differential input 10+
17	GND 3	Excitation 3 ground / return
18	Input 11+	Differential input 11+
19	Input 12+	Differential input 12+
20	GND 4	Excitation 4 ground / return
21	Sense 9+	Sense line 9+
22	Sense 10+	Sense line 10+
23	GND 4	Excitation 4 ground / return
24	Sense 11+	Sense line 11+
25	Sense 12+	Sense line 12+
Shell	Case GND	Case and shield

8 Input Configuration

Pin	Function	Signal Description
1	N/C	Not connected (* case ground in IJB)
2	Input 9-	Differential input 9-
3	Input 10-	Differential input 10-
4	Temp 3+	PT100 input 3+
5	Input 11-	Differential input 11-
6	Input 12-	Differential input 12-
7	Temp 4+	PT100 input 4+
8	Input 13-	Differential input 13-
9	Input 14-	Differential input 14-
10	Input 16+	Differential input 16+
11	Input 15-	Differential input 15-
12	Sense -	Sense line -
13	Excitation 4+	Excitation 4 5V DC or chopped DC
14	Temp 3-	PT100 input 3-
15	Input 9+	Differential input 9+
16	Input 10+	Differential input 10+
17	Temp 4-	PT100 input 4-
18	Input 11+	Differential input 11+
19	Input 12+	Differential input 12+
20	Input 16-	Differential input 16-
21	Input 13+	Differential input 13+
22	Input 14+	Differential input 14+
23	GND 4	Excitation 4 ground / return
24	Input 15+	Differential input 15+
25	Sense +	Sense line +
Shell	Case GND	Case and shield

EC IN, EC OUT – EtherCAT In / Out Connectors

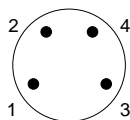
Connector	Mating Connector
M84 way S	M84 way P



Pin	Function	Signal Description
1	Tx +	EtherCAT transmit +
2	Rx +	EtherCAT receive+
3	Rx -	EtherCAT receive -
4	Tx -	EtherCAT transmit -

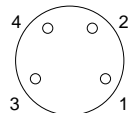
POWER IN

Connector	Mating Connector
M84 way P	M84 way S



POWER OUT

Connector	Mating Connector
M84 way S	M84 way P



Pin	Function	Signal Description
1	Vsupply+ Control	Main 9-30V supply for module electronics
2	Vsupply+ Aux	Auxiliary power, not used in this module
3	GND Control	Main supply ground
4	GND Aux	Auxiliary power, not connected in this module

Recycling and Environmental Protection

Cosworth Electronics is committed to conducting its business in an environmentally responsible manner and to strive for high environmental standards.

Manufacture

Cosworth products comply with the appropriate requirements of the Restriction of Hazardous Substances (RoHS) directive (where applicable).

Disposal

Electronic equipment should be disposed of in accordance with regulations in force and in particular in accordance with the Waste in Electrical and Electronic Equipment directive (WEEE).