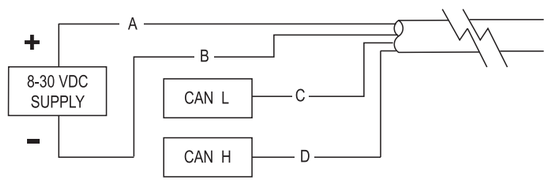
Technical Data

OPERATING PARAMETERS

Accuracy @ 20°C	-0.3° to +0.3°
Environmental Protection	Up to IP 69K
Materials	Housing: Zinc die-cast Housing Finish: Black powder coat
Number of Axis	Dual: 2
Angle Range	Both Axis -90° to +90°
Supply Current	30 mA Maximum
CAN Speed	250 kbps (default)
Startup Time	Vcc = 0V to VCC = 12V 1 sec.
Resolution	0.01°
Update Rate	100 Hz
Supply Voltage	8 to 30V
Temperature Drift	+/- 1° Maximum
Temperature Range	-40° to +85°C
Cable Type	PVC (PUR on request. Consult Factory)
Wire Gauge	24 AWG

Wiring

Dual Axis

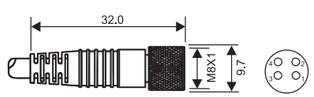


Wire Color Code

	Flying Leads	M8 / M12	GT Deutsch
A	Brown	Pin 1	Pin 1
B	Blue	Pin 3	Pin 2
C	Black	Pin 4	Pin 3
D	White	Pin 2	Pin 4

Optional Mating Cordsets and Pin Configuration

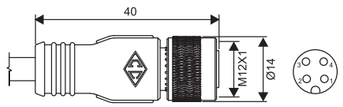
8mm female molded locking connector



Brown = Pin 1
White = Pin 2
Blue = Pin 3
Black = Pin 4

Order P/N:
RC08-AFM040-0120C10A (2m length)
RC08-AFM040-0150C10A (5m length)

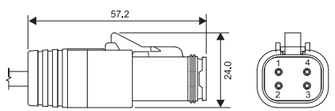
12mm female molded locking connector



Brown = Pin 1
White = Pin 2
Blue = Pin 3
Black = Pin 4

Order P/N:
RC12-AFM040-0120C10A (2m length)
RC12-AFM040-0150C10A (5m length)

GT Deutsch style locking plug



Brown = Pin 1
Blue = Pin 2
Black = Pin 3
Green = Pin 4

Order P/N:
GT0604-U000-1A (2m length)
GT0604-X000-1A (5m length)

canfield connector
8510 Foxwood Court
Youngstown, Ohio 44514
(330) 758-8299 Fax: (330) 758-8912
www.canfieldconnector.com

EiS SERIES
CANopen

INSTALLATION GUIDE
USER MANUAL

> > STOP! *Read this first.* < <

This inclinometer is not to be used in applications where personal safety depends on device function.
The product is not a safety device according to EC machinery directives.

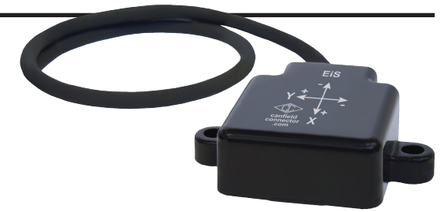
Canfield Connector Inclinometer products are miniaturized solid state electronic devices using mems electronic chips at their core. As such they are subject to proper installation and use in accordance with the technical information supplied for each product. When used to specification, standard warranties apply but, poor sources of electricity, over or under voltage conditions, voltage spikes beyond specification, unauthorized tapering, altering of the device, or uses beyond the published intended use of the product may cause the device to malfunction and void to warranty.

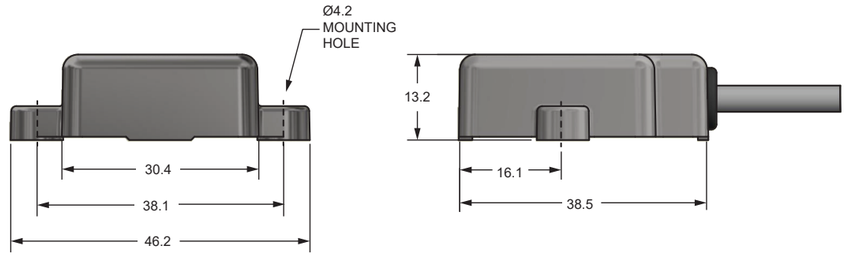
General Description

The Canfield Connector Electronic Inclinometer Sensor EiS is an instrument designed to measure angles of slope, tilt, or elevation of an object with respect to gravity based on an artificial horizon. Synonyms include tilt sensor, tilt switch, clinometer, slope sensor, slope gauge, level sensor, level meter, tiltmeter or pitch and roll sensor. The EiS Series is an all solid-state MEMs device designed to measure tilt while reporting the data within 0.3 degrees accuracy +/- 90° with CANopen output. The unit features a miniature metal housing and is epoxy encapsulated for vibration, water and dust resistance and is rated IP67 environmental rating. Available in 2 axis version, the unit boasts a temperature drift of +/- 1° maximum with a temperature range of -40 to 85°C. The EiS Series is precisely calibrated to remove non-linearity in the sensing range. Applications for inclinometers such as the EiS Series include platform leveling, motion sensing, filter vibrations, boom angle sensing, cameras, machine arm angle sensing as well as mobile security systems. The unit comes with PVC wire (PUR on request), 9ft. length with other lengths and quick connections available. The unit is installed in place by use of two 4.2mm holes.

Dimensional Data

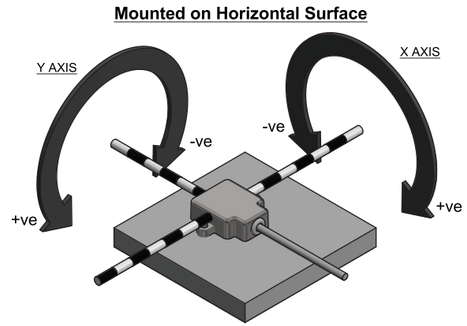
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED





Mounting / Sensing Orientation

Mounted on Horizontal Surface



Start up

The EiS starts up in pre-operational mode. It can be commanded into operational mode by sending:

Address	DB0
000h	01h

TPDO message

The EiS has one TPDO. It contains the current X and Y angle values. The data is displayed below:

DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7
X-angle value OR: 6010h		Y-angle value OR: 6020h		not used			

TPDO Transmission Types

Cyclic Operation Mode
The EiS can automatically send its TPDO when the 1800/05 index has a value greater than 0 stored. This value is the time interval in milliseconds. For correct operation the 1800/02 index needs to be set to value 254. These settings can be saved to non-volatile memory by sending "save" (65766173h) to index 1010.

Synchronized Send after SYNC message received
The EiS can respond to a SYNC message sent from the master, if the 1800/02 index has a value of 1 - 240 stored. The value stored is the SYNC count at which the EiS responds. After the EiS receives the "nth" SYNC message the EiS will respond with its TPDO. This setting can be saved to non-volatile memory by sending "save" (65766173h) to index 1010.

Manufacturer Specific Object Dictionary

Index	Sub-Index	Parameter	Data Type	Access	Default Value	Save
2000h	00	Node ID	UNS8	rw	01h	X
2001h	00	CAN bit rate	UNS16	rw	250	X
		20, 50, 125, 250, 500, 800, 1000 (kbits)				

Node ID and CAN bit rate
The change of the Node ID and CAN bit rate only become valid on a reset. So to make these changes you need to save these parameters to non-volatile memory by sending "save" (65766173h) to index 1010 before resetting the EiS. If you do not send the "save" command, the changes WILL NOT take place.

Profile Specific (per CiA DSP-410)

Index	Sub-Index	Parameter	Data Type	Access	Default Value	Save
6000h	00	Resolution (multiple of 0.001 °)	UNS16	ro	100	
6010h	00	X-Axis Value (hundredfold angle value in °)	INT16	ro	0	
6020h	00	Y-Axis Value (hundredfold angle value in °)	INT16	ro	0	

X and Y Angle data
The EiS angle data is stored at index 6010h and 6020h. The values are stored as a two's compliment hundredfold degree value. To calculate the actual angle you need to divide the value by 100.
Example: if value of 6010h = 5678 -> the actual angle is 5678 / 100 = 56.78 °

Heartbeat
The EiS is capable of send the heartbeat message when the value of index f1017 is greater than 0. This value is the transmission rate in milliseconds. The value can be stored to non-volatile memory by sending "save" (65766173h) to index 1010.

Object Dictionary (per CiA DS-301)

The EiS object dictionary can be accessed via the Standard SDO process. All parameter changes are immediate with the exception of the Node ID (2000h) and the CAN bit rate (2001h). The save column indicates which parameters can be saved to non-volatile memory by sending "save" (65766173h) to index 1010. If the "save" command is not sent and the EiS is reset, all previous values will be restored. With the Node ID and CAN bit rate, the "save" command needs to be sent before resetting the device to make the changes.

If the "load" command is sent to index 1011, all the values in the Default value column are restored. With the exception of the Node ID and CAN bit rate these will only update when accessing them directly.

Index	Sub-Index	Parameter	Data Type	Access	Default Value	Save
1000h	00	Device Type (device profile 410, two axis)	UNS32	const	2019Ah	
1001h	00	Error Register	UNS8	ro	0	
1003h		Pre-defined Error Field				
	00	Number of error entries	UNS32	rw	0	
	01-08	Error code (oldest error in highest index)	UNS32	ro	0	
1005h	00	COB ID SYNC message	UNS32	rw	80h	
1010h		Store Parameters				
	00	Highest Supported Sub-index	USN32	ro	1	
	01	Store All Parameters (signature: "save" - 65766173h)	USN32	rw	0	
1011h		Restore Default Parameters				
	00	Highest Supported Sub-index	USN32	ro	1	
	01	Restore Default Parameters (signature: "load" - 64616F6Ch)	USN32	rw	0	
1014h	00	COB ID EMCY message	USN32	ro	80h + NID	
1015h	0000	EMCY inhibit time (multiple of 100us)	USN16	rw	0	X
1017h	00	Heartbeat interval time(multiple of 1ms, 0 deactivated)	UNS16	rw	0	X
1018h		Identity				
	00	Highest Supported Sub-index	UNS8	ro	4	
	01	Vendor ID	UNS32	ro		
	02	Product Code	UNS32	ro		
	03	Revision No.	UNS32	ro		
	04	Serial No.	UNS32	ro		
1029h	00	Error Behavior	UNS8	ro	0	
1200h		SDO Parameters				
	00	Highest Supported Sub-index	UNS8	ro	2	
	01	COB ID Client > Server	UNS32	ro	600h + NID	
	02	COB ID Server > Client	UNS32	ro	580h + NID	
1800h		TPDO Parameters				
	00	Highest supported Sub-index	UNS8	ro	6	
	01	COB ID	UNS32	ro	180h + NID	
	02	Transmission Type	UNS8	rw	FEh	X
	03	TPDO Inhibit Time (multiple of 100us)	UNS16	rw	0	X
	04	Compatibility entry	UNS8	ro	0	
	05	TPDO Event Timer (multiple of 1ms, 0 deactivate)	UNS16	rw	0	X
1A00h		TPDO mapping				
	00	Highest Supported Sub-index	UNS8	ro	2	
	01	X-Axis Value (hundredfold angle value in °)	UNS32	ro	60100010h	
	02	Y-Axis Value (hundredfold angle value in °)	UNS32	ro	60200010h	
Manufacturer Specific Object Dictionary						
2000h	00	Node ID	UNS8	rw	01h	X
2001h	00	CAN bit rate	UNS16	rw	250	X
		20, 50, 125, 250, 500, 800, 1000 (kbits)				