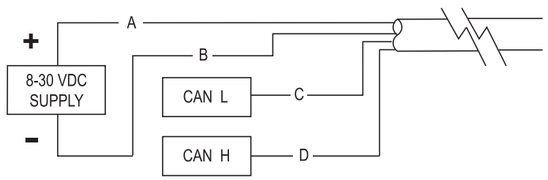
Technical Data

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
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

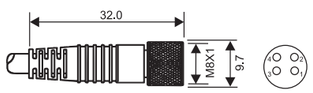


Wire Color Code

	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

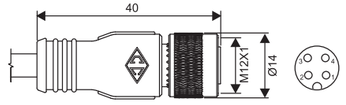
8mm female molded locking connector



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)

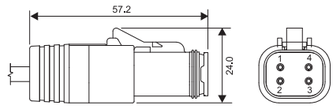
12mm female molded locking connector



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
SAE J1939 CAN 2.0B

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.

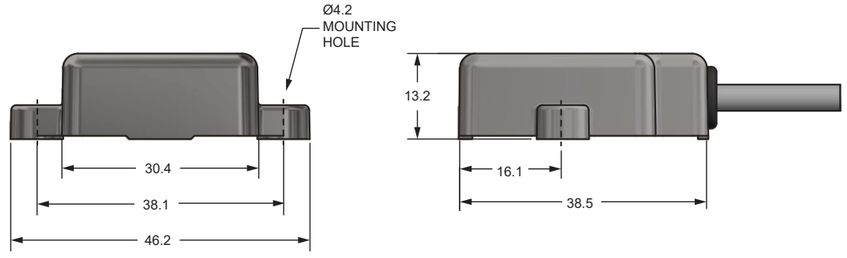
General Description

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 J1939 (CAN 2.0B) 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 a 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

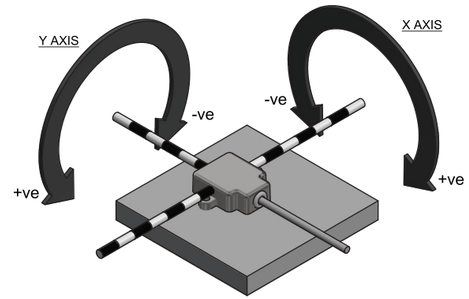
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE NOTED





Mounting / Sensing Orientation

Mounted on Horizontal Surface



EiS Address Claim Message

J1939 STANDARD PROCESS

Priority: 3
PGN: 0xEEFF
Source Address: 0x80 (default)
Transmit Rate: Once after 500 ms startup

Data Byte	Function
00	Serial Number, Bits 0 – 7
01	Serial Number, Bits 8 – 15
02	Serial Number, Bits 16 – 20, Manufacture Code, Bits 0 – 2
03	Manufacture Code, Bits 3 – 10
04	ECU Instance, Bits 0 – 2, Function Instance, Bits 3 – 7
05	Function
06	Vehicle System, Bits 1 – 7
07	Vehicle System Instance, Bits 0–3, Industry Group, Bits 4–6, Arbitrary Address, Bit 7

Manufacturing Code:	0x3D2 (Canfield Connector)
ECU Instance:	0x0
Function Instance:	0x0
Function:	0x88 (Slope Sensor)
Vehicle System:	0x0 (Non-Specific System)
Vehicle System Instance:	0x0
Industry Group:	0x3 (construction equipment)
Arbitrary Address:	0x0 (Not Arbitrary)

EiS Tilt Angle Message

Priority: 3
PGN: 0xFF8B
Source Address: 0x80 (default)
Transmit Rate: 250 ms (default)

Data Byte	Function
00	X-Angle (MSB)
01	X-Angle (LSB)
02	Y-Angle (MSB)
03	Y-Angle (LSB)
04	Z-Angle (MSB)
05	Z-Angle (LSB)
06	Sensitivity (0 = Most, 7 = Least, Default = 4)
07	Firmware Revision

Data Examples: X and Y angles are broadcast in hundredths of a degree.

X Angle
DB0 = 0xEE and DB1 = 0x6C -> combined 0xEE6C = -4500 -> the angle is -45.00

Y Angle
DB2 = 0x18 and DB3 = 0x73 -> combined 0x1873 = +6259 -> the angle is +62.59

EiS Master Command Message

Priority: 3
PGN: 0xFF8A
Source Address: MA (master's address)
Transmit Rate: On request

Data Byte	Function
00	Command Byte
01	As defined for command byte
02	As defined for command byte
03	As defined for command byte
04	As defined for command byte
05	As defined for command byte
06	As defined for command byte
07	As defined for command byte

EiS Master Commands

Request for EiS S/N
all Canfield Connector EiS's on the bus will respond

Data Byte	Function
00	0x00
01	not used
02	not used
03	not used
04	not used
05	not used
06	not used
07	not used

Request to change EiS Source Address
the EiS will perform an address claim on the new address

Data Byte	Function
00	0x01
01	New source address (0x80 to 0xF7) anything outside this range will be denied and the EiS will return to default 0x80
02	not used
03	not used
04	not used
05	EiS Serial Number (MSB)
06	EiS Serial Number
07	EiS Serial Number (LSB)

Request to stop transmitting
ask EiS to stop transmitting on bus

Data Byte	Function
00	0x02
01	not used
02	not used
03	not used
04	not used
05	EiS Serial Number (MSB)
06	EiS Serial Number
07	EiS Serial Number (LSB)

Request to start transmitting
ask EiS to start transmitting on bus at previous transmission rate

Data Byte	Function
00	0x03
01	not used
02	not used
03	not used
04	not used
05	EiS Serial Number (MSB)
06	EiS Serial Number
07	EiS Serial Number (LSB)

Request a single Tilt Angle Message
ask EiS to only transmit one Tilt message

Data Byte	Function
00	0x04
01	not used
02	not used
03	not used
04	not used
05	EiS Serial Number (MSB)
06	EiS Serial Number
07	EiS Serial Number (LSB)

EiS Master Commands Cont.

Request to change transmission rate (msec > 50)
ask EiS to change the transmission rate of the Tilt Angle Message

Data Byte	Function
00	0x05
01	Desired time (MSB)
02	Desired time (LSB)
03	not used
04	not used
05	EiS Serial Number (MSB)
06	EiS Serial Number
07	EiS Serial Number (LSB)

Request to return EiS back to factory Source Address
ask EiS to return to factory Source Address (0x80)

Data Byte	Function
00	0x06
01	Current EiS source address
02	not used
03	not used
04	not used
05	EiS Serial Number (MSB)
06	EiS Serial Number
07	EiS Serial Number (LSB)

Request EiS Manufacture Date
ask EiS to send its manufacture date

Data Byte	Function
00	0x07
01	Desired time (MSB)
02	Desired time (LSB)
03	not used
04	not used
05	EiS Serial Number (MSB)
06	EiS Serial Number
07	EiS Serial Number (LSB)

Request EiS to Zero/Calibrate Output
ask EiS to set current location to artificial horizon (zero)
* EiS will respond with calibration status message*

Data Byte	Function
00	0x08
01	not used
02	not used
03	not used
04	not used
05	EiS Serial Number (MSB)
06	EiS Serial Number
07	EiS Serial Number (LSB)

Request EiS to Reset "Zero" Position Back to Factory
ask EiS to set "Zero" back to factory location (horizon)
EiS will not respond but angles will reflect the change

Data Byte	Function
00	0x09
01	not used
02	not used
03	not used
04	not used
05	EiS Serial Number (MSB)
06	EiS Serial Number
07	EiS Serial Number (LSB)

EiS Master Commands Cont.

Request EiS to Change Sensitivity (0-7)
ask EiS to change the Sensitivity of the output response
0 = Most Sensitive, 7 = Least Sensitive, Default = 0

Data Byte	Function
00	0x0A
01	Sensitivity Setting (0x00 - 0x07)
02	not used
03	not used
04	not used
05	EiS Serial Number (MSB)
06	EiS Serial Number
07	EiS Serial Number (LSB)

EiS Responses to Master Commands

Serial Number Response (sends one message on bus)
Priority: 3
PGN: 0xFF8C
Source Address: 0x80 (default)
Transmit Rate: once

Data Byte	Function
00	EiS Serial Number (MSB)
01	EiS Serial Number
02	EiS Serial Number (LSB)
03	n/a
04	n/a
05	n/a
06	n/a
07	n/a

Manufacture Date Response (sends one message on the bus)
Priority: 3
PGN: 0xFF8D
Source Address: 0x80 (default)
Transmit Rate: once

Data Byte	Function
00	Month
01	Day
02	Year (MSB)
03	Year (LSB)
04	n/a
05	n/a
06	n/a
07	n/a

Zero/Calibrate Status Response
Priority: 3
PGN: 0xFF8E
Source Address: 0x80 (default)
Transmit Rate: once

Data Byte	Function
00	Calibration Status (0x00 = Calibration Done, 0x01 = Calibrating)
01	n/a
02	n/a
03	n/a
04	n/a
05	n/a
06	n/a
07	n/a