



Technical Information

MCX120 CAN Sensor

String Potentiometer (Yo-Yo)



Revision history*Table of revisions*

Date	Changed	Rev
February 2016	Converted to Danfoss layout	0202
July 2013	Feature and Options list and Dimension drawing	BA
July 2013	First edition	AA

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General information

Product overview

The MCX120 CAN String Potentiometer (Yo-Yo) Sensor, designed for use as a feedback sensor uses a 10-turn potentiometer as the sensing element for length measurement. Typical use is for measuring depth of a cut on a planer. This sensor provides a CAN signal to the control system.

Features and options

- Rugged housing
- Easy to install
- Internal "Snap-Back" protection
- Quarter turn reverse bayonet connector
- Length measurement up to 500 mm (19.69 in)
- 150 mm or 500 mm versions are available
- Withstands vibration and shock
- PLUS+1® GUIDE function block available
- CAN 2.0 B compliant
- Supports J1939 and Danfoss proprietary CAN message protocols
- Sensor parameters can be set via the PLUS+1® Service Tool
- Input configuration pin for use of multiple sensors on a single CAN bus
- 9 to 36 Vdc power supply
- CE compliant

User liability and safety statements

OEM responsibility

The OEM of a machine or vehicle in which Danfoss products are installed has the full responsibility for all consequences that might occur. Danfoss has no responsibility for any consequences, direct or indirect, caused by failures or malfunctions.

- Danfoss has no responsibility for any accidents caused by incorrectly mounted or maintained equipment.
- Danfoss does not assume any responsibility for Danfoss products being incorrectly applied or the system being programmed in a manner that jeopardizes safety.
- All safety critical systems shall include an emergency stop to switch off the main supply voltage for the outputs of the electronic control system. All safety critical components shall be installed in such a way that the main supply voltage can be switched off at any time. The emergency stop must be easily accessible to the operator.

Theory of operation

The sensor is plugged into a control system. The housing is attached to the side of the machine. The cable is attached to a movable reference, for example, side gate on a cold planer. A set point value is set by the system and as the machine moves, the reference object moves up and down. As the reference object moves up and down the cable retracts or extends and returns a proportional CAN signal to the Grade Control System which uses the signal to raise or lower the machine to desired set point.

Technical Information **MCX120 CAN String Potentiometer (Yo-Yo) Sensor**

General information**Ordering information***Reference*

Part number	Cable length
11103070	Short, 150 mm (5.91 in)
11103071	Long, 500 mm (19.69 in)

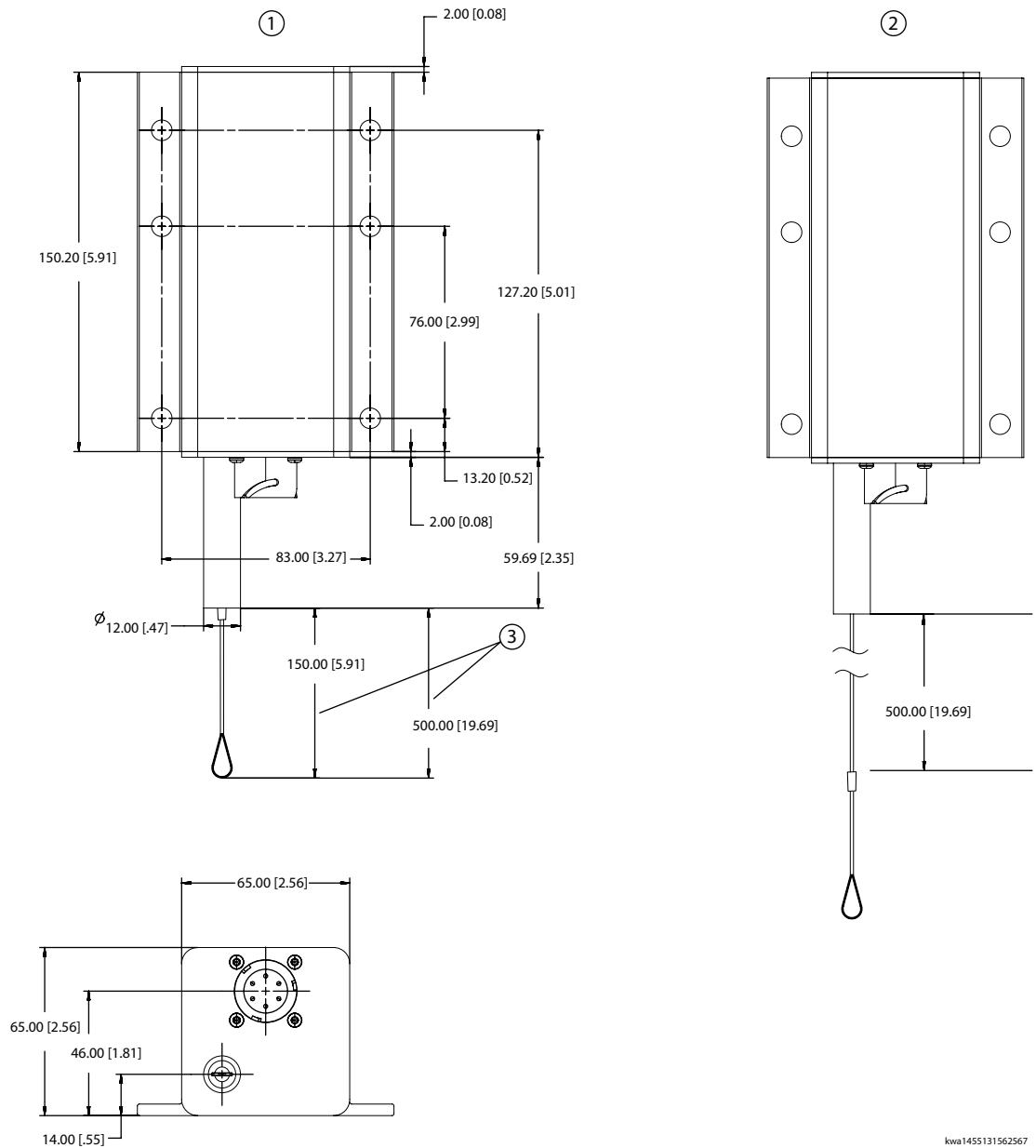
Related product

Part number	Description
11031032	Mating connector ACA3106E145

Product installation

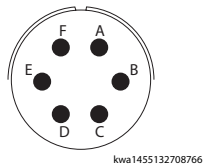
Dimensions

MCX120 CAN String Potentiometer (Yo-Yo) Sensor



- 1. Retracted
- 2. Extended
- 3. Model dependent

kwa1455131562567

Product installation
Connector pin assignments
Pin connector


Pin	Function
A	Power
B	Ground
C	CAN Hi
D	CAN Lo
E	Config
F	CANshield

Use care when wiring mating connector. Above pinouts are for device pins.

Machine wiring guidelines

- Protect wires from mechanical abuse, run wires in flexible metal or plastic conduits.
- Use 85° C (185° F) wire with abrasion resistant insulation and 105° C (221° F) wire should be considered near hot surfaces.
- Use a wire size that is appropriate for the module connector.
- Separate high current wires such as solenoids, lights, alternators or fuel pumps from sensor and other noise-sensitive input wires.
- Run wires along the inside of, or close to, metal machine surfaces where possible, this simulates a shield which will minimize the effects of EMI/RFI radiation.
- Do not run wires near sharp metal corners, consider running wires through a grommet when rounding a corner.
- Do not run wires near hot machine members.
- Provide strain relief for all wires.
- Avoid running wires near moving or vibrating components.
- Avoid long, unsupported wire spans.
- Ground electronic modules to a dedicated conductor of sufficient size that is connected to the battery (-).
- Power the sensors and valve drive circuits by their dedicated wired power sources and ground returns.
- Twist sensor lines about one turn every 10 cm (4 in).
- Use wire harness anchors that will allow wires to float with respect to the machine rather than rigid anchors.

! Caution

Unused pins on mating connectors may cause intermittent product performance or premature failure. Plug all pins on mating connectors.

⚠ Warning

Unintended movement of the machine or mechanism may cause injury to the technician or bystanders. Improperly protected power input lines against over current conditions may cause damage to the hardware. Properly protect all power input lines against over-current conditions.

Product installation**Machine welding guidelines**** Warning**

High voltage from power and signal cables may cause fire or electrical shock, and cause an explosion if flammable gasses or chemicals are present.

Disconnect all power and signal cables connected to the display before performing any electrical welding on a machine.

The following is recommended when welding on a machine equipped with electronic components:

- Turn the engine off.
- Remove electronic components from the machine before any arc welding.
- Disconnect the negative battery cable from the battery.
- Do not use electrical components to ground the welder.
- Clamp the ground cable for the welder to the component that will be welded as close as possible to the weld.

Parameter Set-Up

The sensor's source address may be configured in one of two ways: Configuration through the use of the configuration pin (C1-P6) or through the use of the PLUS+1[®] Service Tool. All other adjustable parameters are serviced only through the PLUS+1[®] Service Tool.

Source address

Set the source address using the sensor's configuration input pin

The sensor is capable of achieving 256 distinct source addresses, 31 of which may be selected through the use of the configuration pin. The pin can be connected directly to ground (source address 129), left floating (last programmed source address) or connected to ground through one of thirty different resistor values. The table below defines the allowable source addresses and the required resistor value to achieve each address.

The source addresses are checked by the sensor's microprocessor each time it is powered up. In order to change the source address via the configuration pin, the sensor must be powered up with the configuration input pin connected to the appropriate value resistor. Any changes made to the source address while the sensor is powered are ignored until power has been cycled.

If on power up, the source address configured by the resistor differ from the value currently stored in the sensor's non-volatile (NV) memory then the value in NV memory will be over written with the new source address, as long as the selected resistor value does not exceed 51,100 Ohms.

Configuration ID offset

Configuration ID offset

Source address	Resistor (Ohms)	Source address	Resistor (Ohms)
0	0	16	2430
1	76.8	17	2740
2	162	18	3160
3	249	19	3570
4	340	20	4120
5	442	21	4750
6	562	22	5490
7	665	23	6490
8	806	24	7680
9	931	25	9310
10	1100	26	11,500
11	1270	27	14,700
12	1430	28	19,600
13	1650	29	28,700
14	1870	30	51,100
15	2150	No change	Open

[Source address is also configurable via CAN using the PLUS+1[®] Service Tool.](#)

Parameters

All of the sensor's parameters can be set up using the PLUS+1[®] Service Tool. The source address can only be changed by the PLUS+1[®] Service Tool if the configuration pin is left open.

Parameter Set-Up
Allowable values for parameters

Allowable values for parameters

Service Tool signal (sensor parameter)	Allowable values	Comments
CANBaudRate	100000, 250000, 500000, 1000000	Factory default = 250K
CANID	0-536870911(0x00-0x1FFFFFFF)	The least Significant Bits are overwritten by the Source Address Value
UseExtendedID	0,1	0 = 11 bit mode, 1 = 29 bit mode Factory default = 29 bit
SourceAddress	0-255	Factory default = 128
UseJ1939AddressClaim	0,1	Factory default = 1

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CAN message protocols

Controller Area Network (CAN) message protocols

Sensor data and status

All communication for the MCX120 CAN sensor is through a J1939 protocol using an existing J1939 PGN.

PGN/ID summary

Sensor type	J1939 PGN (d)	J1939 ID (d)	J1939 ID (h)
Yo-Yo	61490	61490 + (0 – 255)	0x004F032SA

SA is the source address which can be selected by the PLUS+1® Service Tool or through a configuration resistor attached to the analog input.

Yo-Yo sensor

Transmission rate	20 ms
Data length	8
Identifier	0x04F032SA

Yo-Yo sensor

Byte	Bits	Description	Type	Data range	Units	Resolution
1 and 2	1 to 8	mm x 10	S16	0 x 0000 to 0 x FFFF	mm x 10	0.1 mm
3	1 to 8	FOM	U8	0 x FC or 0 x FE	— —	— —
		No error				
		0 x FC				
		Out of range				
4	1 to 8	0 x FF	U8	0 x FF	— —	— —
5	1 to 8	0 x FF	U8	0 x FF	— —	— —
6	1 to 8	0 x FF	U8	0 x FF	— —	— —
7	1 to 8	0 x FF	U8	0 x FF	— —	— —
8	1 to 8	0 x FF	U8	0 x FF	— —	— —

Technical Information **MCX120 CAN String Potentiometer (Yo-Yo) Sensor**

Specifications**Environmental***Environmental characteristics*

Operating temperature range	-40° C to 85° C [-40° F to 185° F]
Storage temperature range	-55° C to 105° C [-67° F to 221° F]
EMI/RFI rating	100 V/m
IP rating (with mating connector attached)	IP 67
Weight	0.34 kg (0.75 lbs)
Vibration	IEC 60068-2-64
Shock	IEC 60068-2-27 test Ea
Potentiometer sensor life	1,000,000 mechanical moves

Electrical*Electrical characteristics*

Input voltage	9 to 36 Vdc
Range	500 mm (19.69 in)
Resolution	0.1 mm
Current draw	50 mA maximum



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