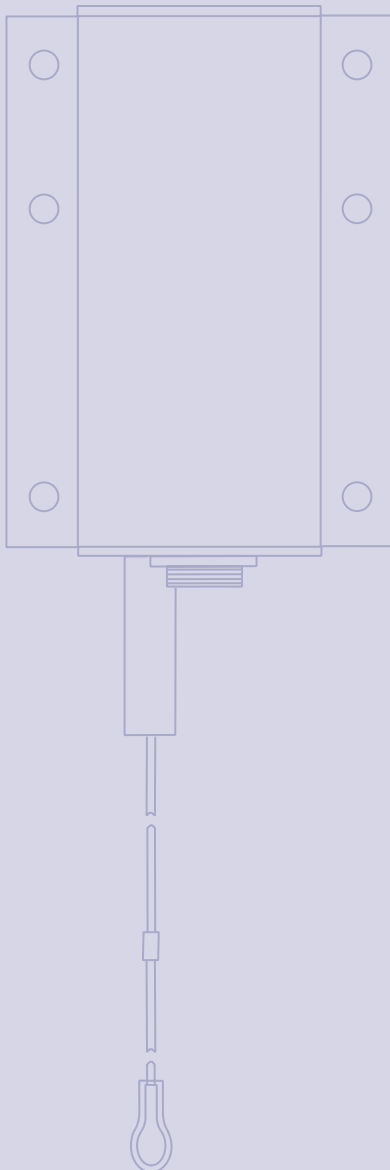
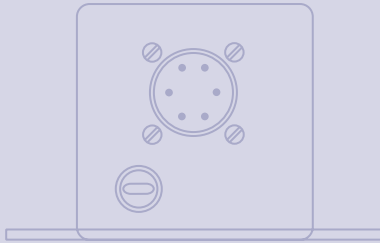




# MCX120 CAN String Potentiometer (Yo-Yo) Sensor

## Technical Information



## Revision History

### *Table of Revisions*

Date	Page	Changed	Rev
24 July 2013	4, 6	Feature and Options list and Dimension drawing	BA
12 July 2013			AA

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# MCX120 CAN String Potentiometer (Yo-Yo) Sensor

## Technical Information

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#### 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™ Compliant GUIDE function block available
- CAN 2.0 B compliant
- Supports J1939 and Sauer-Danfoss proprietary CAN message protocols
- Sensor parameters can be set via the PLUS+1 GUIDE 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 User Liability and Safety Responsibility

The OEM of a machine or vehicle in which PLUS+1™ compliant product is installed has the full responsibility for all consequences that might occur. Sauer-Danfoss has no responsibility for any consequences, direct or indirect, caused by failures or malfunctions.

- This product is not intended to be used as a stand-alone safety device in safety critical applications.
- Sauer-Danfoss has no responsibility for any accidents caused by incorrectly mounted or maintained equipment.
- Sauer-Danfoss does not assume any responsibility for 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, i.e. 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.

**Ordering Information***Reference*

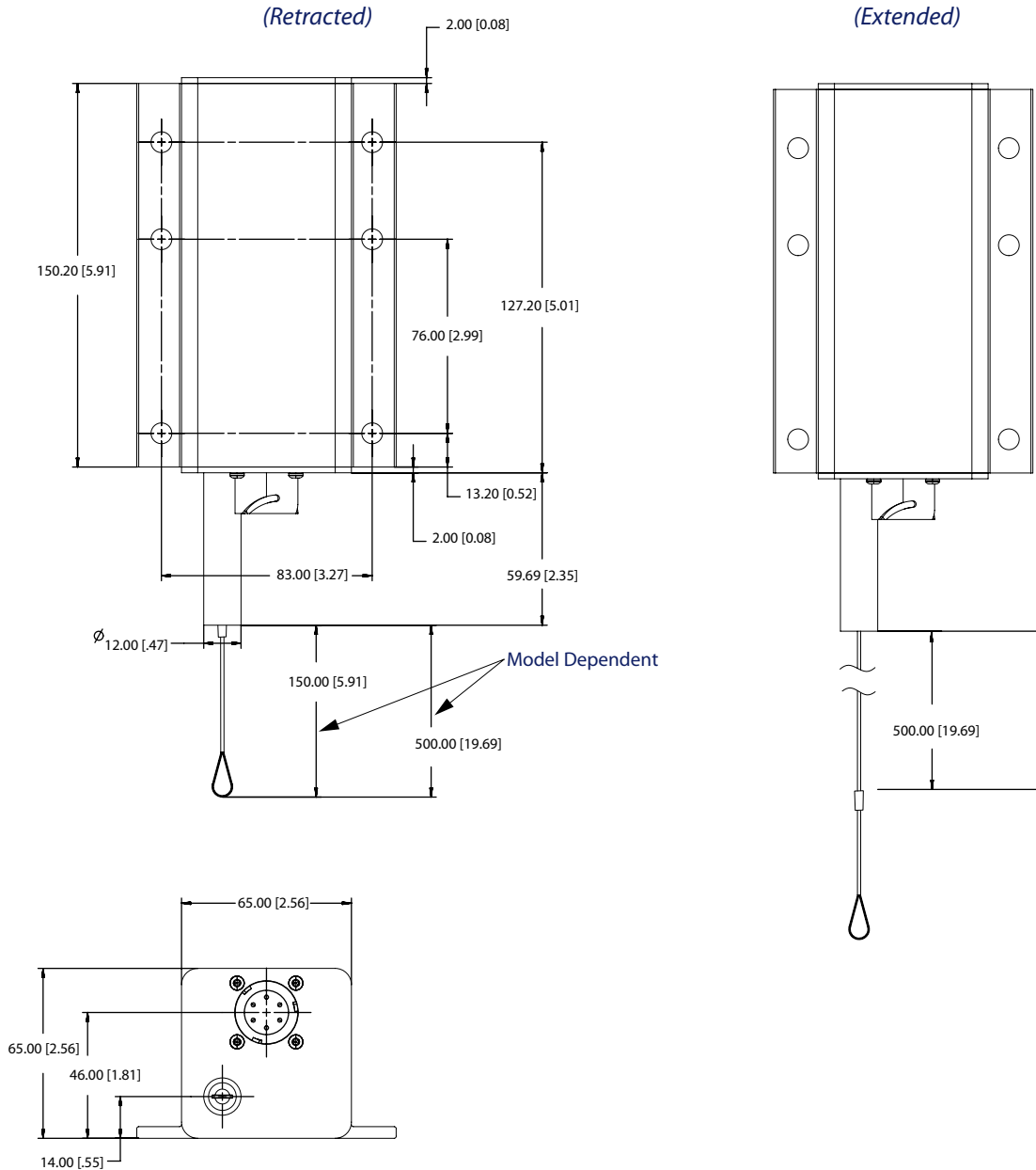
Part number	Cable length
11103070	Short, 150 mm (5.91 in)
11103071	Long, 500 mm (19.69 in)

Related product part number	Description
11031032	Mating connector ACA3106E145

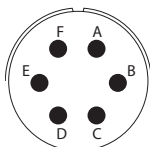
**Dimensions**

MCX120 CAN String Potentiometer (Yo-Yo) Sensor



**Connector Pin Assignments**

6 pin Connector



Pinout and Wiring Information

Pin	Controller 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.

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### 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. Power the analog sensors by the sensor power source from the module and ground returned to the sensor ground pin on the module.
- 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.
- Ground electronic modules to a dedicated conductor of sufficient size that is connected to the battery (-).

### Welding Procedures

The following procedures are recommended when welding on a machine equipped with modules:

1. Turn the engine off.
2. Disconnect the negative battery cable from the battery.
3. Do not use electrical components to ground the welder.
4. Clamp the ground cable for the welder to the component that will be welded as close as possible to the weld.

# MCX120 CAN String Potentiometer (Yo-Yo) Sensor

## Technical Information

### 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.

#### Using the Sensor's Configuration Input Pin

#### to Set the Source Address

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

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	11500
11	1270	27	14700
12	1430	28	19600
13	1650	29	28700
14	1870	30	51100
15	2150	No change	Open

SA is also configurable via CAN using the GUIDE Service Tool.



# MCX120 CAN String Potentiometer (Yo-Yo) Sensor

## Technical Information

### Parameter Set-Up

#### Using the PLUS+1 Service Tool

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.

The table below defines the allowable values for each of the sensor's parameters that can be modified using the PLUS+1 Service Tool.

PLUS+1 Service Tool signal (sensor parameter)	Allowable values	Comments
CANBaudRate	100000, 250000, 500000, 1000000	Default 250,000
CANID	0- 536870911(0x00-0x1FFFFFFF)	The 8 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 mode
SourceAddress	0-255	Factory default=128
UseJ1939AddressClaim	0,1	Factory default=1

# MCX120 CAN String Potentiometer (Yo-Yo) Sensor

## Technical Information

### 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

<b>Transmission rate</b>	20 ms
<b>Data length</b>	8
<b>Identifier</b>	0x04F032SA

#### CAN Message to 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 0XFE				
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	---	---



# MCX120 CAN String Potentiometer (Yo-Yo) Sensor

## Technical Information

### Specifications

#### Electrical

<b>Input voltage</b>	9 to 36 Vdc
<b>Range</b>	500 mm (19.69 in)
<b>Resolution</b>	.1 mm
<b>Current draw</b>	50 mA maximum

#### Environmental

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



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