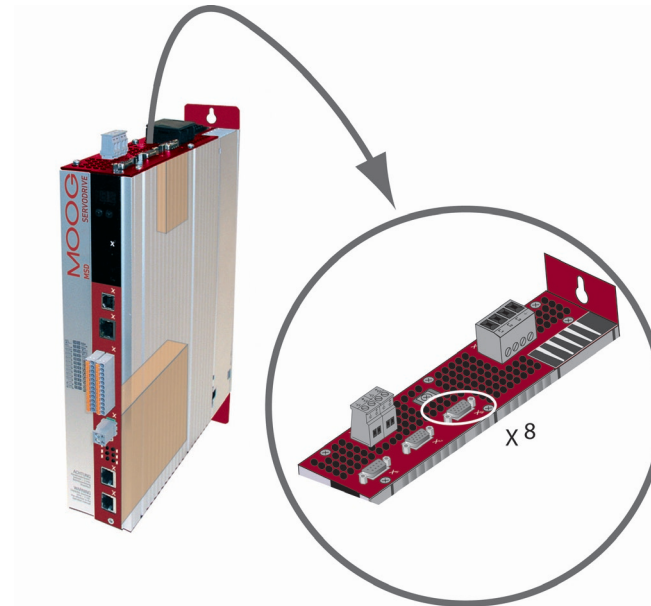


# MSD Servo Drive

GdYVZVWhcb

Option 2 - Technology

SUZ Tech Optiong






Specification Safe Tech Options

ID no.: 1106.27B.0-00

Date: 09/2016

This document applies to:

Product range	Model (with integrated safety control (FS))	Safe Tech option	Firmware version
ServoOne single-axis system 	S082.xxx.01xA/B/C S084.xxx.01xA/B/C	A = Second safe SinCos encoder B = Second safe SSI encoder C = Second safe axis monitor (SinCos)	From V1.10-40
ServoOne multi-axis system 	S084.xxx.11xA/B/C	A = Second safe SinCos encoder B = Second safe SSI encoder C = Second safe axis monitor (SinCos)	From V1.10-40
ServoOne junior 	Not available	--	--



**Note:**

This document does not replace the Operation Manual ServoOne. Please always follow the information given in "Measures for your safety", "Intended use" and "Responsibility" in the operation manual. You will find information on mounting, installation and commissioning as well as the assured technical characteristics of the ServoOne device series in the supplementary documents (operation manual, device help, specification ServoOne with integrated safety control FS, etc.).

Subject to technical change without notice.

The content of our documentation was compiled with the greatest care and attention, and is based on the latest information available to us.

We should nevertheless point out that this document cannot always be updated simultaneously with the on-going technical development of our products.

Information and specifications may be subject to change at any time. Please obtain information on the latest version at [www.lti-motion.com](http://www.lti-motion.com).

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# 1 Second safe SinCos encoder

Applies to SO 82.xxxx.01xA, SO 84.xxxx.01xA, SO 84.xxxx.11xA

This Tech option makes it possible to expand the encoder combinations on the ServoOne with integrated safety control (ServoOne FS). The additional encoder connection X8 makes it possible to evaluate the following encoder types as monitoring encoders in the integrated safe control.


Connection ServoOne FS	SinCos and TTL encoder types
<b>X8</b> 	SinCos encoder • e.g. Sick Stegmann SKS/SKM 36 TTL encoder • e.g. LENORD+BAUER MiniCODER Note: You will find the technical specifications for the encoder types in the documentation from the encoder manufacturer. It is possible to use any SinCos or TTL encoder types, as long as they comply with the technical specifications (see Table 1.3).

Table 1.1 Assignment of connection X8, SinCos/TTL encoder types

## 1.1 Combination on encoder selection

The following encoder variants can be combined on X7 and X8:

No.	Process encoder (enc. A)	Connection	Monitoring encoder (enc. B)	Connection	Max. SIL
1	SinCos	X7	TTL	X8	3
2	SinCos		SinCos		3
3	SSI		SinCos		3
4	SSI		TTL		3
5	TTL		TTL		2

Table 1.2 Combination on encoder selection

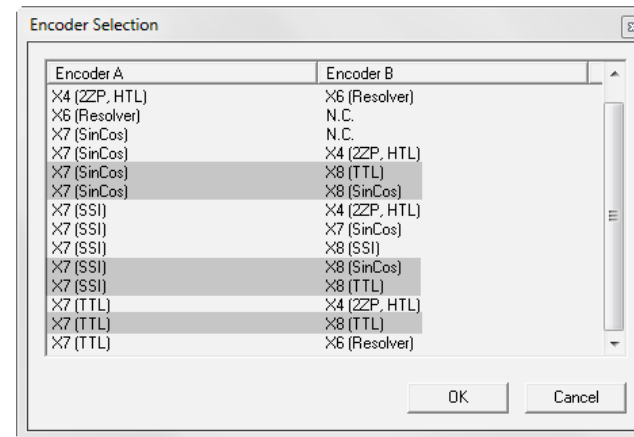


Figure 1.1 Encoder selection SafePLC S

## 1.2 Technical data, connection X8

ServoOne FS	TTL	SinCos
Connection X8	<ul style="list-style-type: none"> <li>• Model with differential voltage input (RS422-compatible)*</li> <li>• Cable length 15 m max.</li> <li>• Connector: 15-pin D-SUB, high density, socket</li> <li>• Wave terminating resistor integrated in the device: 120 Ω</li> </ul>	
Maximum signal frequency that can be evaluated	400 kHz	
Speed calculation method	Max. input frequency / resolution (pulses per revolution)	
Signal level	RS422 (digital signals)	1 V <sub>pp</sub> (analogue signals)

Table 1.3 Technical data, X8 for TTL/ SinCos

On the additional usage of a monitoring encoder in the form of redundancy for the process encoder, it is possible to increase the Performance Level (PL) or Safety Integrity Level (SIL) for the application. It is a prerequisite for this increase that both encoder systems act on the same axis.

## 1.2.1 Cable type and laying

The cable type is to be defined as per the information from the motor/encoder manufacturer. The following conditions are to be noted:

- Only use shielded cables
- Connect shield at both ends
- Connect the differential track signals A, B, R or DATA and CLK using twisted pair cable cores.
- Do not cut the encoder cable, for example to route the signals via terminals in the switch cabinet

## 1.2.2 Pin assignment, input (socket) X8


Connection	Pin	SinCos and TTL	Supply voltage > 5 V DC
	1	Track A -	After connecting pin 7 and pin 12, there is a voltage of 11.8 V on pin 3!
	2	Track A+	
	3	+ 5 V DC $\pm 5\%$ , $I_{OUT\ max} = 250\ mA$ , monitoring via sensor cable	
	4	-	
	5	-	
	6	Track B-	
	7	$U_s$ switch	
	8	GND	
	9	-	
	10	-	
	11	Track B+	
	12	+ Sense wire / $U_s$ switch	
	13	- Sense wire	
	14	-	
	15	-	

Table 1.4 Assignment of connection X8, SinCos/TTL encoder types



### NOTE:

A voltage drop in the encoder cable is counteracted by using the Sense wire. In this way it is ensured that the encoder is supplied with the correct voltage. The Sense wire must always be connected!

If the SinCos encoder or TTL encoder used does not provide Sense signals, pins 12 and 13 (+ / -Sense) are to be connected to pins 3 and 8 (+5 V / GND) at the encoder end of the cable.

## 2 Second safe SSI encoder

Applies to SO 82.xxxx.01xB, SO 84.xxxx.01xB, SO 84.xxxx.11xB

This Tech option makes it possible to connect a second SSI encoder to the ServoOne with integrated safety control (ServoOne FS). The additional encoder connection X8 makes it possible to evaluate the following encoder types as monitoring encoders in the integrated safe control.

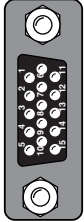
Connection ServoOne FS	SSI encoder type
<b>X8</b> 	<p>Note: It is possible to use any SSI encoder types, as long as they comply with the technical specifications (see Table 2.3).</p>

Table 2.1 Connection X8, SSI encoder

### 2.1 Combination on encoder selection

The following encoder variants can be combined on X7 and X8:

No.	Process encoder (enc. A)	Connection	Monitoring encoder (enc. B)	Connection	Max. SIL
1	SSi	X7	SSi	X8	3

Table 2.2 Combination on encoder selection

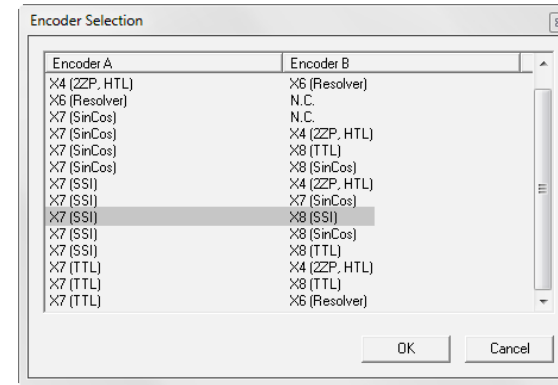


Figure 2.1 Encoder selection SafePLC S

### 2.2 Technical data

ServoOne FS	SSI		
Connection X8	<ul style="list-style-type: none"> <li>Model with differential voltage input (RS422-compatible)*</li> <li>Cable length 15 m max.</li> <li>Connector: 15-pin D-SUB, high density, socket</li> <li>Wave terminating resistor integrated in the device: 120 Ω</li> </ul>		
Code	Binary or Gray		
Resolution	<b>Total</b>	<b>Singleturn</b>	<b>Multiturn</b>
	24 bits	12 bits	12 bits
	24 bits	10 bits	14 bits
	25 bits	13 bits	12 bits
Power supply	4.75 V DC to 5 V DC 7 V DC to 12 V DC		
*Pay attention to voltage range!			

Table 2.3 Technical data, X8 for SSI encoder

## 2.2.1 Cable types and laying

The cable type is to be defined as per the information from the motor/encoder manufacturer. The following conditions are to be noted:

- Only use shielded cables
- Connect shield at both ends
- Connect the differential track signals A, B, R or DATA and CLK using twisted pair cable cores.
- Do not cut the encoder cable, for example to route the signals via terminals in the switch cabinet.

## 2.2.2 Pin assignment, input (socket) X8

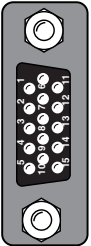
Connection	Pin	Function SSI encoder
	1	-
	2	-
	3	-
	4	Data +
	5	Data -
	6	-
	7	-
	8	GND
	9	-
	10	-
	11	-
	12	+ Sense wire
	13	- Sense wire
	14	CLK+
	15	CLK-

Table 2.4 Terminal assignment X8 for SSI encoder



**NOTE:**

The Tech option does **not** include a supply of power for the SSI encoder connected to X8. The power must be supplied externally (for example by means of the power supply from X7, using an appropriate encoder cable).

To establish a potential reference, it is nevertheless necessary to connect the GND (pin 8) on interface X8 to the GND for the power supply.

The supply voltage used is monitored and must be connected to the connections (Sense+/pin 12 and Sense-/pin 13) for this purpose.

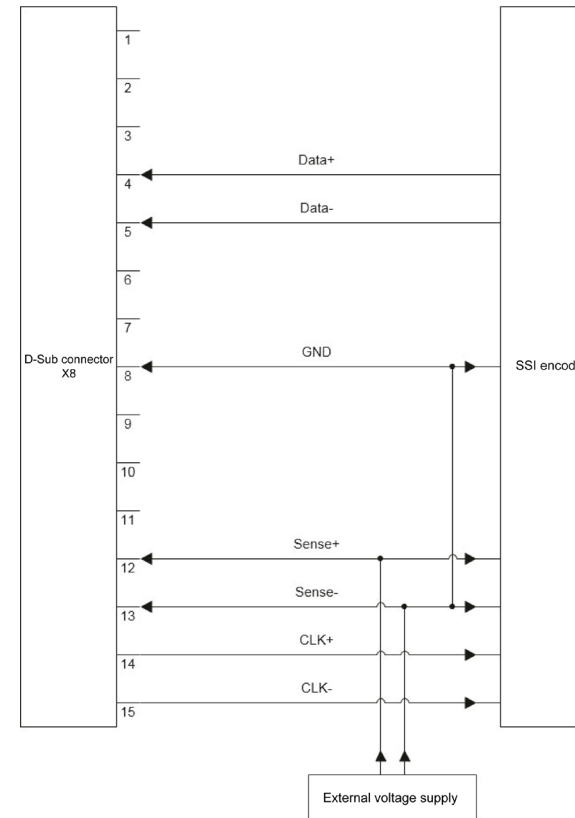


Figure 2.2 Example ext. power supply to SSI encoder



### 3 Second safe axis monitor

Applies to SO 82.xxxx.01xC, SO 84.xxxx.01xC, SO 84.xxxx.11xC

SinCos encoders are designed as optical encoders and meet the highest requirements on accuracy. They output 2 sinusoidal signals A and B offset by 90° that are sampled using analogue-digital converters. The signal periods are counted and the direction of rotation and counting direction are given by the phase position of the signals A and B.

Using this Tech option it is possible to monitor a second axis if this axis has a safe SinCos encoder. The additional encoder interface X8 therefore makes it possible to read a SinCos encoder on an external axis that is evaluated with the aid of the safety control implemented in the ServoOne FS.

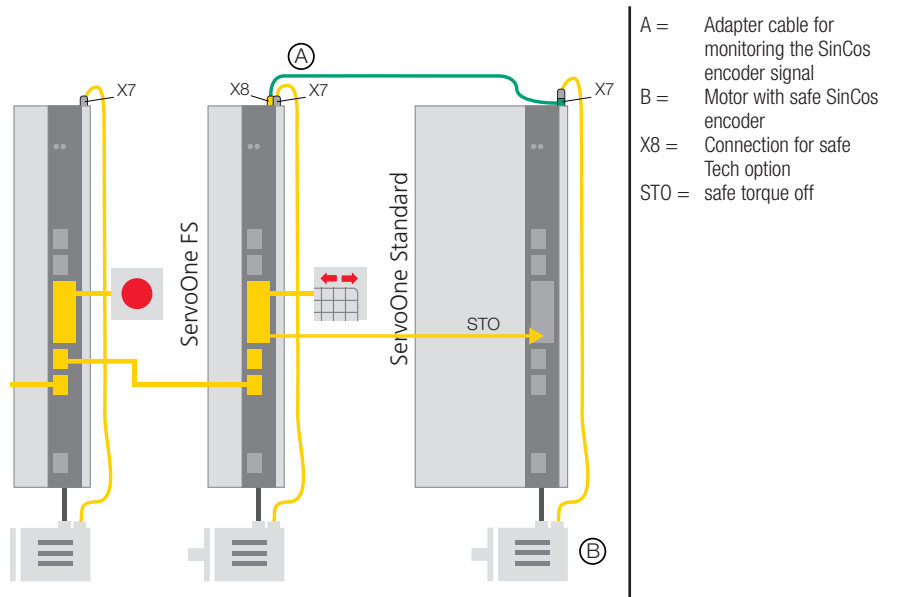


Figure 3.1 Example 2nd safe axis monitoring



**Note:**

The prerequisites for the safe monitoring of the second axis are that the axis has a SinCos encoder with safety-related approval and that is installed appropriately for safety.

#### 3.1 Encoder selection

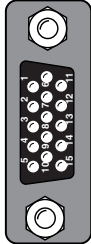
Connection ServoOne FS	SinCos encoder type
<b>X8</b> 	SinCos encoder • e.g. Sick Stegmann SKS/SKM 36 Note: You will find the technical specifications for the encoder types in the documentation from the encoder manufacturer.

Table 3.1 Assignment of connection X8, SinCos/TTL encoder types

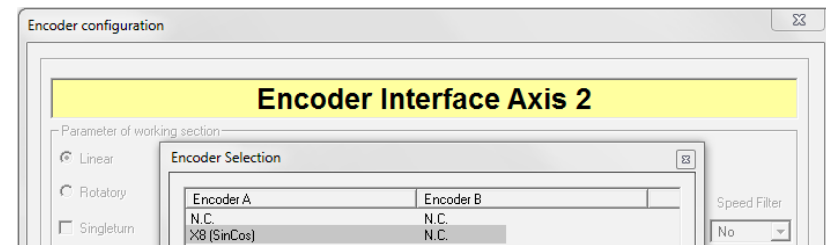


Figure 3.2 Encoder selection SafePLC S

## 3.2 Technical data, interface (X8)

ServoOne FS	SinCos
Interface X8	<ul style="list-style-type: none"> <li>Differential voltage input RS422-compatible*</li> <li>Max. cable length: 15 m (between the monitored drive axis and the option connection)</li> <li>Connector: 15-pin D-SUB, high density, socket</li> <li>Wave terminating resistor not integrated in the device!</li> </ul>
Maximum signal frequency that can be evaluated	400 kHz
Speed calculation method	Max. input frequency / resolution (pulses per revolution)
Signal level	1 V <sub>pp</sub> (analogue signals)
*Pay attention to voltage range!	

Table 3.2 SinCos encoder input on X8

### 3.2.1 Cable type and laying

The cable type is to be defined as per the information from the motor/encoder manufacturer. The following conditions are to be noted:

- Only use shielded cables
- Connect shield at both ends
- Connect the differential track signals A, B, R or DATA and CLK using twisted pair cable cores.
- Do not cut the encoder cable, for example to route the signals via terminals in the switch cabinet

### 3.2.2 Pin assignment, input (socket) X8

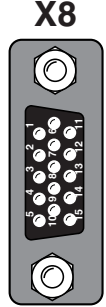
Connection	Pin	SinCos encoder function
	1	Track A-
	2	Track A+
	3	-
	4	-
	5	-
	6	Track B-
	7	-
	8	GND
	9	-
	10	-
	11	Track B+
	12	+ Sense wire
	13	- Sense wire
	14	-
	15	-

Table 3.3 Terminal assignment X8 for SinCos encoder



**NOTE:**

The Tech option does not include a power supply for the SinCos encoder connected to X8. The power must be supplied by the axis which is monitored. To establish a potential reference, it is nevertheless necessary to connect the GND (pin 8) on interface X8 to the GND for the power supply.

The supply voltage used is monitored and must be connected to the Sense contacts (Sense+/pin 12 and Sense-/pin 13) for this purpose.



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