

MANUFACTURER DOCUMENT PACKAGE

Manufacturer's Manual

Reference package for procurement and maintenance review

EMERSON

EZ1000

EDDY CURRENT SENSOR CONVERTER

Used with the applicable AMS EZ 1000 configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: AMS EZ 1000 manufacturer technical reference

⚠ DANGER

[Hazardous location installation](#) and [Hazardous location installation – application notes](#) are only valid for the variants of the AMS EZ 1000 Converter labeled as an Ex ia or Ex ec device.

1.2 Symbols

Note

This symbol marks passages that contain important information.

⚠ CAUTION

This symbol marks operations that can lead to malfunctions, faulty measurements, or data loss, but will not damage the device.

⚠ DANGER

A danger indicates actions that can lead to property damage or personal injury.

	According to IEC 61010, this symbol means that this device must be operated with DC voltage.
	According to IEC 61010, this symbol means that the documentation of the device must completely be read and understood before installing and commissioning of the device. Observe all safety related instructions in this document.

1.3 Liability and guarantee

Emerson is not liable for damages that occur due to improper use. Proper use also includes the knowledge of, and compliance with, this document.

Customer changes to the device that have not been expressly approved by Emerson will result in the loss of guarantee.

Due to continuous research and further development, Emerson reserves the right to change technical specifications without notice.

1.4 Incoming goods inspection

Check the content of the shipment to ensure that it is complete; visibly inspect the goods to determine if the device has been damaged during transport. The following parts are included in the scope of delivery and must be contained in the shipment.

- AMS EZ 1000 Converter
- Quick Start Guide

Optional EZ 1000 Mounting Adapter DIN Rail for Horizontal Mount (MHM-9199-00142)

Contained in the shipment of the EZ 1000 Mounting Adapter DIN Rail for Horizontal Mount:

- Mounting rail adapter
- End clamp
- 4x Hexagon socket head cap screw M4x5
- 2x washer for M4 screws
- Base plate
- Mounting rail

If the contents is incomplete, or if you observe any defects, file a complaint with the carrier immediately. Inform the responsible Emerson sales organization so your device can be replaced. In this case, attach a tag with customer name and the observed defect.

1.5 Technical support

You may need to ship this product for return, replacement, or repair to an Emerson Product Service Center. Before shipping this product, contact Emerson Product Support to obtain a Return Materials Authorization (RMA) number and receive additional instructions.

Product Support

Emerson provides a variety of ways to reach your Product Support team to get the answers you need when you need them:

Phone	Toll free 1 800 833 8314 (U.S. and Canada) +1 512 832 3774 (Latin America) +63 2 8702 1111 (Asia Pacific, Europe, and Middle East)
Email	Guardian.GSC@Emerson.com
Web	http://www.emerson.com/en-us/contact-us

To search for documentation, visit <http://www.emerson.com>.

To view toll free numbers for specific countries, visit

<http://www.emerson.com/technicalsupport>.

Note

If the equipment has been exposed to a hazardous substance, a Material Safety Data Sheet (MSDS) must be included with the materials returned. An MSDS is required by law to be available to people exposed to specific hazardous substances.

1.6 Storage and transport

Store and transport the device only in its original packaging. Technical data specifies the environmental conditions for storage and transport.

1.10 Installation awareness

Note

When planning a measurement, follow these guidelines:

- Consider environmental conditions which might have an influence on the measurement such as temperature, humidity, substances aggressive to the sensor, pressure, and pollution.
 - Always use a stiff and vibration-free sensor holder.
 - Define a suitable measuring range, not larger than necessary, in consultation with the operator of the plant.
 - Define the trip limit in consultation with the operator of the plant.
 - Take measurement deviations into account when defining trip limits.
 - Use a sensor that meets the requirements of the defined measuring range.
 - Ensure an EMC-compatible installation including the use of proper cables.
 - Ensure proper function of the measurement before activating the measurement in the production environment.
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2 Safety instructions

To ensure safe operation, carefully follow all the instructions in this manual.

The correct and safe use of this device requires that both operating and service personnel understand and comply with general safety guidelines and observe the special safety comments listed in this manual. Where necessary, safety-sensitive points on the device are marked.

DANGER

Because the device is electrical equipment, only specially trained and authorized personnel may commission, service, and maintain this equipment.

2.1 Using the device

Install and use the device as specified in this manual.

If the device is used in a manner not specified by the manufacturer, the protection provided by the device may be impaired.

2.2 Owner's responsibility

If there is a reason to suspect that hazard-free operation, and thus, adequate machine protection is no longer possible, take the device out of operation and safeguard it from unintentional operation. This is the case:

- if the device shows visible damage.
- if the device no longer works.
- after any kind of overload that has exceeded the permissible limits (such as those detailed in chapter "Technical data," section "Environmental conditions").

DANGER

If device tests have to be completed during operation or if the device has to be replaced or decommissioned, it will impair the machine protection and may cause the machine to shut down. Make sure to place the machine into a safe state before deactivating machine protection and starting such work, and to validate the operation of the device prior to placing it back into operation and reactivating machine protection after work has been completed.

Related information

[Technical data](#)

11 Technical data

Only specifications with indicated tolerances or limit values are binding. Data without tolerances or without error limits are informative data and not guaranteed. Technology is under constant development, and specifications are subject to change without notice. If not otherwise specified, all data refer to a nominal supply voltage of -24 V, an environmental temperature of +23°C, an output load of 100 kΩ, material 42CrMo4, a standard measuring range, a 5 meter system cable length⁷, and no detuning.

All technical data is based on Emerson reference target material samples.

11.1 Input

Sensor connector for eddy current sensors	EZ105x and EZ108x
	PR 6424, PR 6425, and PR 6426
	Third party sensors which meet the technical requirements of the sensor input such as: Bently Nevada 3300 XL 8 mm Proximity Probes 33010x-xx-xx-yy ¹ -xx-xx
Connector	For plugs with or without cap nut.
Protection against short circuit	Yes

¹ yy: 10, 50, or 90

11.2 Supply

Overvoltage protection	Yes, maximal voltage -60 V DC
Reverse connect protection	Yes
Nominal supply voltage	-24 V
Permissible voltage range	-19 V to -31.2 V DC
Nominal supply current	12 mA
Load resistor	100 kΩ

11.3 Output

Short-circuit prove	Yes
Nominal output voltage range	-2 V to -18 V
Limit range	-1.1 V to -22.4 V
Nominal frequency range	0 to 20 kHz (-3 dB) without cable capacity

⁷ Sensor cable length or sensor cable length plus extension cable length.

Supply voltage influence on the output signal	<20 mV/10 V
Output voltage ripple	<10 mV rms
Output resistance	200 Ω
Signal switch-on time and converter warm-up-time	See Table 11-1

Table 11-1: Influence of the signal switch-on-time and the converter warm-up-time on the linearity

Signal switch-on-time ¹	Converter warm-up-time ²	Linearity error
60 seconds ³		<0.1%
	<10 minutes ⁴	<1.5%
	<60 minutes ⁴	<0.5%
	>60 minutes ⁴	<0.1%

¹ Valid for a restart after the AMS EZ 1000 measuring chain has been in operation for at least 60 minutes.

² Valid for the operation a complete measuring chain (converter + connected sensor)

³ Time until output signal change.

⁴ Signal change within this time.

11.4 Errors and tolerances

Note

For measurements that require a higher measuring accuracy, factory calibrated measuring chains are available.

The deviation from straight line (DSL) error is the maximum error (in mm) in the sensor gap reading at a given voltage compared to a straight line (see [Table 11-2](#)). DSL errors are associated with errors in axial position or sensor gap readings.

The incremental scale factor (ISF) error is the maximum amount the scale factor varies from a default scale factor (see [Table 11-2](#)) when measured at specified increments throughout the linear range. Measurements are taken at defined increments (see [Table 11-2](#)). The ISF error is associated with errors in radial vibration readings.

Table 11-2: DSL and ISF default values depending on sensor type and output sensitivity setting

Sensor type	Extended range factor	Straight line and default scale factor		ISF incremental steps	Recommended dynamic measuring range peak-peak
		ISO ¹	API ¹		
EZ105x	1.0	16.0 V/mm	15.74 V/mm	125 μm	$\leq 625 \mu\text{m}$
	1.5	10.67 V/mm	10.59 V/mm	---	---
	2.0	8.0 V/mm	7.87 V/mm	---	---

Table 11-2: DSL and ISF default values depending on sensor type and output sensitivity setting (continued)

Sensor type	Extended range factor	Straight line and default scale factor		ISF incremental steps	Recommended dynamic measuring range peak-peak
		ISO ¹	API ¹		
EZ108x	1.0	8.0 V/mm	7.87 V/mm	250 µm	≤1250 µm ≤2000 µm ²
	1.5	5.33 V/mm	5.25 V/mm	---	---
	2.0	4.0 V/mm	3.94 V/mm	---	---
PR 6424 PR 6425	1.0	4.0 V/mm	3.94 V/mm	500 µm	≤2500 µm
	2.0	2.0 V/mm	1.97 V/mm	---	---
	3.0	1.33 V/mm	1.31 V/mm	---	---
PR 6426	1.0	2.0 V/mm	1.97 V/mm	---	---
	2.0	1.0 V/mm	0.98 V/mm		
	3.0	0.67 V/mm	0.66 V/mm		

¹ See [Output sensitivity](#)

² Standard measuring chain according to API 670 consisting of EZ108x-xx-xx-010, EZ190x-040, and AMS EZ 1000

Converter with standard target material 42CrMo4.

AMS EZ 1000 Converter with AMS EZ 1000 Sensors

Basis of the data are measurements with:

- AMS EZ 1000 Converter and EZ190x at the temperature of the AMS EZ 1000 Converter.
- First meter of the AMS EZ 1000 Sensor cable at the temperature of the AMS EZ 1000 Sensor tip.
- No ambient temperature change of the AMS EZ 1000 Converter during 1 hour before the measurement. Power and sensor connected to the AMS EZ 1000 Converter for at least 10 minutes before measurement and calibration.
- Reference material 1.7224 (42CrMo4; AISI/SAE 4140), unless otherwise stated.

AMS EZ 1000 Converter with PR 642x sensors

Basis of the data are measurements with:

- PR 642x cable at the temperature of the AMS EZ 1000 Converter.
- First meter of the PR 642x cable at the temperature of the PR 642x tip.
- No ambient temperature change of the AMS EZ 1000 Converter during 1 hour before the measurement. Power and sensor connected to the AMS EZ 1000 Converter for at least 10 minutes before measurement and calibration.
- Reference material 1.7224 (42CrMo4; AISI/SAE 4140), unless otherwise stated.

11.4.1 EZ1900-ADAP-90 adapter

Table 11-3: Additional linearity error when using an EZ1900-ADAP-90 adapter to connect an EZ108x-xx-xx-xxx sensor

Manual calibration with compensation data (see Manual calibration – guided process)	<0.2 %
Automatic calibration	<0.1 %

11.4.2 AMS EZ 1000 Converter with EZ105x

Typical accuracy of the standard measuring chain following API 670 consisting of EZ105x-xx-xx-010, EZ190x-040, and AMS EZ 1000 Converter with standard target material 42CrMo4 and calibration methods **Manual**, **Automatic**, or **Multipoint**:

Table 11-4: Accuracy following API 670

Temperature range	DSL	ISF
0°C to 45°C (Test range)	See Table 11-5	± 7% (of nominal value in dynamic range)
EZ 1000 -35°C to 65°C (Operating range)	See Table 11-5 of MR	± 15% (of nominal value in dynamic range)
EZ 190x -35°C to 65°C (Operating range)		
EZ 105x -35°C to 120°C (Operating range)		

Accuracy of measuring chains different from the standard measuring chain

Add the measurement inaccuracies in [Table 11-5](#) to the values in [Table 11-4](#) to get the accuracy of measuring chains different from the standard measuring chain.

Table 11-5: Additional inaccuracies – DSL

Parameter	Additional Measurement Inaccuracy (DSL), Test range	Additional Measurement Inaccuracy (DSL), Operating range	Remarks
0°C to 45°C (Test range)		±4%	of nominal value, 5 m cable length
		±6%	of nominal value, other cable length
		±10%	of nominal value, 4 m cable length
Cable length 15m		±4%	at +23°C
		-7% to +8%	at -35°C to +85°C (operating range EZ 1000)
		-6% to +5%	at -35°C to +180°C (operating range EZ 108x)

Table 11-5: Additional inaccuracies – DSL (continued)

Parameter	Additional Measurement Inaccuracy (DSL), Test range	Additional Measurement Inaccuracy (DSL), Operating range	Remarks
Other target materials	2.25%	2.25%	Material selected from AMS Machine Studio material table
Extended measuring range: 1.5 mm (Extended range factor: 1.5)			
Manual calibration	1.75%	2.0%	
Automatic calibration	1.75%	2.0%	
Multipoint calibration	0.25%	0.5%	
Extended measuring range: 2.0 mm (Extended range factor: 2.0)			
Manual calibration	3.75%	4.0%	
Automatic calibration	3.75%	4.0%	
Multipoint calibration	0.5%	1.0%	
Detune frequency low activated active	0.75%	1.25%	Only possible with multipoint calibration
Converter temperature error at 5 m sensor cable		±2%	-35 to 85°C at 5 meter sensor cable
EZ105x temperature error at 5 m sensor cable		-10% to +6%	-35 to 180°C at 5 meter sensor cable
Converter temperature error at 10 m sensor cable		±1%	-35 to 85°C at 10 meter sensor cable
EZ105x temperature error at 10 m sensor cable		-5% to +1%	-35 to 180°C at 10 meter sensor cable

11.4.3 AMS EZ 1000 Converter with EZ108x

Accuracy of the standard measuring chain according to API 670 consisting of EZ108x-xx-xx-010, EZ190x-040, and AMS EZ 1000 Converter with standard target material 42CrMo4:

Table 11-6: Accuracy according to API 670

Temperature range	DSL	ISF
0°C to 45°C (Test range)	± 1.25% of MR ¹	± 5% (of nominal value in dynamic range)
EZ 1000 -35°C to 65°C (Operating range)	± 1.0% of MR ¹²	± 10% (of nominal value in dynamic range)