FEMA

SERIES I3 · Model I3LP-102

LOOP POWERED
SIGNAL DUPLICATOR

Section OEM

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OEM APPLICATIONS

YOUR CONVERTER!

4/20mA Process

Double

LOOP POWERED ISOLATORS **I3LP**

Loop powered duplicator for mA loops, for industrial applications

I3LP-102 is a loop powered signal duplicator. Accepts a 4/20 mA signal and generates two 4/20 mA output loops, replicas of the input, while providing a high isolation between all circuits. The instrument is powered from the input loop. No configuration needed. No power needed. Connect and ready to work directly out of the box.

Circuit isolation prevents ground loops and transient propagation, protecting remote equipment and signal integrity.

Plug-in screw terminals for fast and easy installation. Standard DIN rail mount. Designed for industrial use, with potential integration into a wide range of applications, reduced cost, excellent quality and available customization.

USER'S MANUAL
INDEX

1. How to order

Reference	Description
I3LP-102	Isolated signal duplicator (1 input, 2 outputs)

2. Material included

The instrument is provided with the following elements:

- 1 x instrument **I3LP-102**
- 4 x plug-in screw terminals
- 1 x quick installation guide

3. Additional information

User's Manual	www.fema.es/docs/5807_I3LP102_manual_en.pdf
Datasheet	www.fema.es/docs/5813_I3LP102_datasheet_en.pdf
Quick installation guide	www.fema.es/docs/5819_I3LP102_installation_en.pdf
CE declaration	www.fema.es/docs/5643_CE-Declaration_I3_en.pdf
Warranty	www.fema.es/docs/4153_Warranty1_en.pdf
Web	www.fema.es/Series_I3

When the marks '*Attention*' or '*Risk of electrical shock*' appear, read the documentation for information about the nature of the risk.

4. Typical applications

To duplicate a single 4/20 mA signal and create two identical signals, replicas of the original, isolated between them, that can be directed to two different remote destinations (for example, first signal goes to a remote PLC and the second signal goes to a local meter).

5. Installation and start-up

If this is the first time you are installing the instrument, below are the steps to follow during a first installation. Read all the manual sections in order to have a full and clear view of the characteristics of the instrument. Do not forget to read the installation precautions at section 10.

1. Install the instrument at the DIN rail
2. Read the technical information provided (see section 8)
3. Connect the input and the output terminals (see section 6)

6. Connections

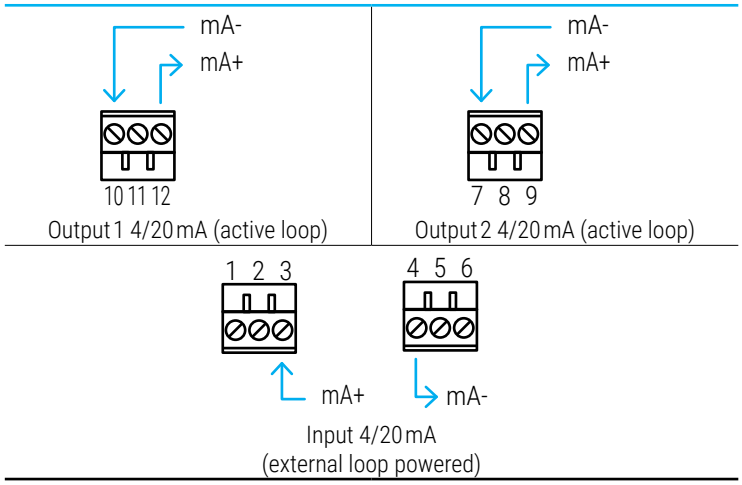
Table 2 | **I3LP-102 CONNECTIONS - INPUT SIGNAL**

	Input					
	1	2	3	4	5	6
	n.c.	n.c.	mA+ (in)	mA- (out)	n.c.	n.c.

Table 4 | **I3LP-102 CONNECTIONS - OUTPUT SIGNAL**

	Output 1			Output 2		
	7	8	9	10	11	12
	mA- (in)	n.c.	mA+ (out)	mA- (in)	n.c.	mA+ (out)

Table 3 | **I3LP-102 CONNECTIONS**



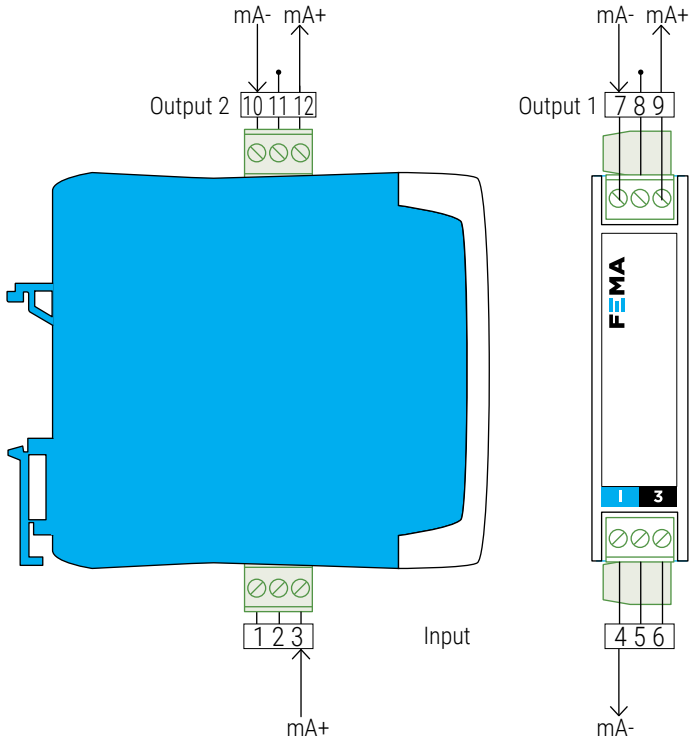
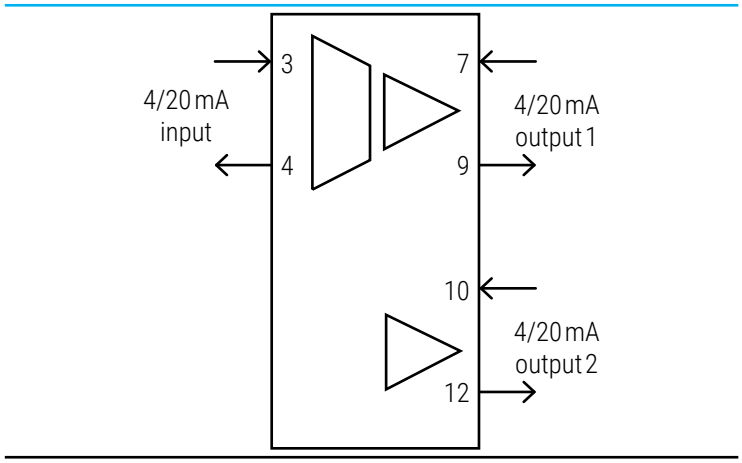
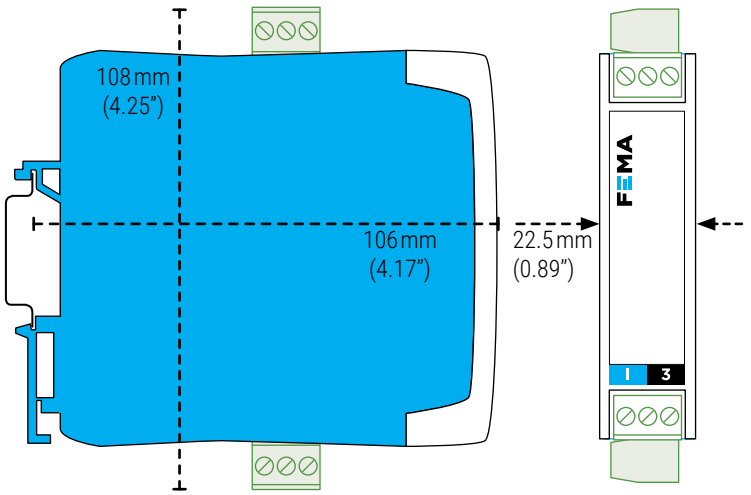


Table 1 | **I3LP-102 SCHEMATIC**



7. Dimensions (mm (*inch*))



Standard (35 mm) DIN rail mount

8. Technical information

INPUT - OUTPUT RELATION

The instruments accepts a 4/20 mA input signal loop and provides two independent and isolated 4/20 mA outputs. Both outputs are a replica of the input.

ACTIVE AND PASSIVE LOOPS

The instrument is powered from the input signal loop, therefor, the input signal loops must be '*active*', and powered from an external power supply.

The output signal loops are '*active*', therefor, no external power supply must be used to power the output loops. Connecting an external power supply to the output loops may damage the instrument. Each output loop is powered from the input loop.

Do not connect an external power supply to the output signal loop.

EXTENDED RANGE SIGNALS

The instrument will follow the input signal down to 0.5 mA, although the output may be out of accuracy specifications.

The instrument will follow the input signal up to 50 mA, although the output may be out of accuracy specifications.

MAXIMUM OVERSIGNAL AND PROTECTIONS

'*Maximum oversignal*' is the maximum signal accepted by the instrument. Higher signal values may damage the instrument. Lower signal values are non destructive but may be out of accuracy specifications.

PROTECTION AGAINST INVERTED CONNECTIONS

The instrument is not damaged when the input signal connection is inverted. The output signal loops will be open (0 mA) and the input signal loop will remain closed (current flows).

VOLTAGE DROP ON TERMINALS

The voltage drop, at the input terminal, is lower than 11.4 Vdc at 20 mA, for output loads Z_{L1} and Z_{L2} below 50 Ohm each. See 'Table 5' for calculated examples of the input impedance.

INPUT IMPEDANCE

The input impedance can be calculated with the following equation (where '**I**' is the current on the loop expressed in '*mA*', Z_{in} is the input impedance seen on input terminals, and Z_{L1} and Z_{L2} are the loads connected to the output loops, expressed in Ohm). See 'Table 6' for calculated examples of the input impedance.

$$Z_{in}=Z_{L1} + Z_{L2} +2*(2.73*\mathbf{I}^{\wedge 2} -98.8*\mathbf{I} +1159) \pm 10\%$$

ACCURACY

The typical accuracy is class <0.20 %, for an output load of 0 Ohm and class <0.35 % for an output load of 50 Ohm. Higher loads can be connected as long as the element powering the input signal loop can provide enough energy to power the system. When connecting higher loads, the error will increase. See 'Table 7' for accuracy data on different current values and output impedances.

OPEN OUTPUT LOOP PROTECTION

When an output loop opens, the current at the input loop continues flowing and the voltage on input terminals will increase up to 10 Vdc if one output loop is open, or 20 Vdc if both output loops are open.

SHORT-CIRCUIT OUTPUT LOOP PROTECTION

The instrument is not damaged when the output circuit loops are short-circuited.

ISOLATION

All circuits are isolated between them and tested for 2000 Veff (@50 Hz) between circuits, for 60 seconds. In particular :

• the isolation between input and output circuits is tested by applying 2000 Veff (@50 Hz) between input and output circuits, for 60 seconds.

• the isolation between output circuits is tested by applying 2000 Veff (@50 Hz) between output circuits, for 60 seconds.

Table 5 | **VOLTAGE DROP ON INPUT TERMINALS**

V_{in}	mA signal		
Load	4 mA	12 mA	20 mA
0 Ohm	6.5 Vdc	8.8 Vdc	11.0 Vdc
50 Ohm	6.6 Vdc	9.4 Vdc	12.0 Vdc

Table 6 | **INPUT IMPEDANCE TYPICAL (Z_{in}) VALUES (±10%)**

Z_{in}	mA signal		
Loads Z_{L1} - Z_{L2}	4 mA	12 mA	20 mA
0 - 0 Ohm	1614 Ohm	732 Ohm	550 Ohm
50 - 50 Ohm	1714 Ohm	832 Ohm	450 Ohm

Table 7 | **TYPICAL ACCURACY**

	Load		
	Load (0 Ohm)	Load (50 Ohm)	Load (100 Ohm)
Class	<0.2%	<0.35%	<0.5%

Table 8 | **STEP RESPONSE TIMES**

	Load		
	Load (0 Ohm)	Load (50 Ohm)	Load (100 Ohm)
Response time	<10 mSeg.	<15 mSeg.	<25 mSeg.

9. Technical specifications

INPUT SIGNALS	
signal	4 to 20 mA
max. oversignal	50 mA
voltage drop on terminals	12 Vdc (at 20 mA, load 50 Ohm) (see Table 5)
input impedance	$Z_{in}=Z_{L1}+Z_{L2}+2*(2.73*\mathbf{I}^{\wedge 2}-98.8*\mathbf{I}+1159)\ \pm 10\%$ *('I' expressed in mA, 'Z' expressed in Ohm)*
ACCURACY AT 25 ºC	
	Class <0.20 % (load 0 Ohm) (see Table 7)
THERMAL DRIFT	
	<25 ppm/ºC (F.S.)
STEP RESPONSE	
	<10 mSeconds (load 0 Ohm) (see Table 8) Typical response times to reach 99% of the output signal, as a response to a 100% step at the signal input
OUTPUT SIGNALS	
signals	4 to 20 mA
scaling	relation 1:1 between input and outputs
maximum load at outputs	from 0 up to 100 Ohm, for each output
protection	short-circuit protected open loop protected
CONFIGURATION SYSTEM	
	no configuration needed
POWER SUPPLY	
	loop powered from the input loop
ISOLATION	
input - outputs	2000 Vac, 50 Hz, (tested for 60 seconds)
between outputs	2000 Vac, 50 Hz, (tested for 60 seconds)
ENVIRONMENTAL	
IP protection	IP30
impact protection	IK06
operation temperature	from 0 to +50 ºC
storage temperature	from -20 to +70 ºC
'*warm-up*' time	5 minutes
humidity	0 to 95% non condensing
altitude	up to 2000 meters
MECHANICAL	
size	106 x 108 x 22.5 mm
mounting	standard DIN rail (35 x 7.5 mm)
connections	plug-in screw terminal (pitch 5.08 mm)
housing material	polyamide V0
weight	<150 grams
packaging	120 x 115 x 30 mm, cardboard

10. Precautions on installation

Check the documentation when you find this symbol, to know the nature of a potential danger and actions to prevent it.

Risk of electrical shock. Instrument terminals can be connected to dangerous voltage.

Instrument protected with double isolation. No earth connection required.

Instrument conforms to CE rules and regulations.

This instrument has been designed and verified conforming to the 61010-1 CE Security Regulation, for industrial applications. Installation of this instrument must be performed by qualified personnel only. This manual contains the appropriate information for the installation. Using the instrument in ways not specified by the manufacturer may lead to a reduction of the specified protection level. Disconnect the instrument from all external circuits before starting any maintenance and / or installation action.

The instrument is designed to be DIN rail mounted, inside a closed cabinet, protected from direct impacts. An appropriate ventilation of the instrument must be assured. Do not expose the instrument to excess of humidity. Maintain clean by using a humid rag and do NOT use abrasive products such as alcohols, solvents, etc. General recommendations for electrical installations apply, and for proper functionality we recommend: if possible, install the instrument far from electrical noise or magnetic field generators such as power relays, electrical motors, speed variators,... If possible, do not install along the same conduits power cables (power, motor controllers, electrovalves, ...) together with signal and/or control cables. The use of shielded cables is recommended to prevent the coupling of environmental electromagnetic noise, connected to earth only one cable end side. In case of fire, disconnect the instrument from the power line, fire alarm according to local rules, disconnect the air conditioning, attack fire with carbonic snow, never with water.

11. Warranty

This instrument is warranted against all manufacturing defects for a period of 36 months, as requested by the European legislation. This warranty does not apply in case of misuse or accident, and the scope of the warranty is limited to repair of the instrument, not being the manufacturer responsible for additional damages or additional costs. Within the warranty period and after examination by the manufacturer, the unit will be repaired or substituted when found to be defective.

Extended warranty available at (see section 3)

12. CE declaration of conformity

Manufacturer	FEMA ELECTRÓNICA, S.A. Altimira 14 - Pol. Ind. Santiga E08210 - Barberà del Vallès BARCELONA - SPAIN www.fema.es - info@fema.es
Products	**I3LP-102**

The manufacturer declares that the instruments indicated comply with the directives and rules indicated below.

Electromagnetic compatibility directive 2014/30/EU
Low voltage directive 2014/35/EU
ROHS directive 2015/863/EU
WEEE directive 2012/19/EU

Security rules EN-61010-1

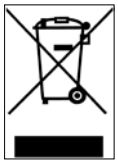
Instrument	Fixed, Permanently connected
Pollution degree	1 and 2 (without condensation)
Isolation	Double

Electromagnetic compatibility rules EN-61326-1

EM environment	Industrial
CISPR 11	Instrument Class A & Class B Group 1

For a detailed declaration see section 3.

Barberà del Vallès, March 2023
Xavier Juncà - Product Manager



According to directive 2012/19/EU, electronic equipment must be recycled in a selective and controlled way at the end of its useful life.

Notes

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INSTRUMENTATION FOR INDUSTRIAL AUTOMATION

PANEL METERS . SIGNAL CONVERTERS. LARGE FORMAT

DIGITAL PANEL METERS
Section Industrial

SIGNAL CONVERTERS
Section Industrial

LARGE DISPLAYS
Section Industrial

PANEL METERS . LOW COST
Section OEM

CONVERTERS . ISOLATORS
Section OEM

LARGE DISPLAYS
Section Special

SPECIAL INSTRUMENTS
Section Special

DATA ACQUISITION
Section Industrial

'CUSTOMIZED' INSTRUMENTS

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