MODEL · I4E

ELECTRICAL AC & DC SIGNALS

Vac	Vdc	Aac	Adc	Frequency

Signal converter for electrical signals, isolated, for DIN rail mount.

Isolated signal converter for electrical signals. Configurable to measure AC/DC voltages (ranges from 50 mVac/dc up to 600 Vac/dc), AC/DC currents (ranges from 5 mAac/dc up to 5 Aac/dc) and frequency signals (up to 100 Hz). Unipolar and bipolar signal ranges accepted for DC voltages and DC currents. Output signal configurable for 4/20 mA (active and passive) and 0/10 Vdc. Universal power supply from 18 to 265 Vac/dc. 3 way isolation between input, output and power circuits. Plug-in screw terminal connections.

Two configuration modes: (1) easy and fast using predefined configuration codes, and (2) advanced configuration trough the '*configuration menu*' to customize input and output signal ranges. Configuration through front push-button keypad and front display. Configurable display information (input signal value, output signal value, configured label, signal percentage and process value). Manual '*force*' functions to generate low and high output signals, to validate remote instrumentation during installation. '*Password*' function to block non-authorized access to configuration menu. '*SOS*' mode to help on critical maintenance and repairs without affecting the manufacturing process. Designed for industrial use, with potential integration into a wide range of applications, excellent quality and optional customization.

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1. TECHNICAL SPECIFICATIONS

Input signal ranges Vac
ranges	from 0/50 mVac up to 0/600 Vac
type of measure	True RMS
connections accepted	phase-to-neutral
	phase-to-phase
category of measure	CAT-II up to 300 Vac

* for a list of preconfigured signal ranges, see section 7

Input signal ranges Vdc
unipolar ranges	from 0/50 mVdc up to 0/600 Vdc
bipolar ranges	from ±50 mVdc up to ±600 Vdc

* for a list of preconfigured signal ranges, see section 7

Input signal ranges Aac
ranges	from 0/5 mAac up to 0/5 Aac
type of measure	True RMS
connections accepted	phase-to-neutral
	phase-to-phase

* for a list of preconfigured signal ranges, see section 7

Input signal ranges Adc
unipolar ranges	from 0/5 mAdc up to 0/5 Adc
bipolar ranges	from ±5 mAdc up to ±5 Adc

* for a list of preconfigured signal ranges, see section 7

Frequency AC
ranges	up to 100 Hz
measured from	measured from existing Vac and Aac signal ranges

* for a list of preconfigured signal ranges, see section 7

Accuracy at 25 ºC	see section 7 for each type of signal
Thermal stability	150 ppm/ºC (F.S.)

Step response
AC signals	<350 mSec. typ. (0 % to 99 % signal)
DC signals	<90 mSec. typ. (0 % to 99 % signal) '*no filter*'
	<175 mSec. typ. (0 % to 99 % signal) '*50 Hz filter*' or '*60 Hz filter*'
	<350 mSec. typ. (0 % to 99 % signal) '*50 and 60 Hz filter*"

Output signal ranges
active current output	4/20 mA active, max. <22 mA, min. 0 mA, load < 400 Ohm
passive current output	4/20 mA passive, max. 30 Vdc on terminals
voltage output	0/10 Vdc, max. <11 Vdc, min. -0.05 Vdc (typ.), load > 10 KOhm

* custom input and output ranges through the 'configuration menu' (for example : 4/12 mA, 0/5 Vdc, 20/4 mA, etc)

Configuration system
key pad + display	accessible at the front of the instrument
configuration modes	(1) through preconfigured codes, (2) through 'configuration menu'

Power supply
voltage range	18 to 265 Vac/dc isolated (20 to 240 Vac/dc ±10%)
AC frequency	45 to 65 Hz
consumption	<1.5 W
power wires	1 mm² to 2.5 mm² (AWG17 to AWG14)
overvoltage category	2

2. HOW TO ORDER

I4E	Signal converter for AC and DC signals
I4E.1442	Signal converter for AC and DC signals with custom features

3. DIMENSIONS

108 mm (4.25")
106 mm (4.17")
22.5 mm (0.89")
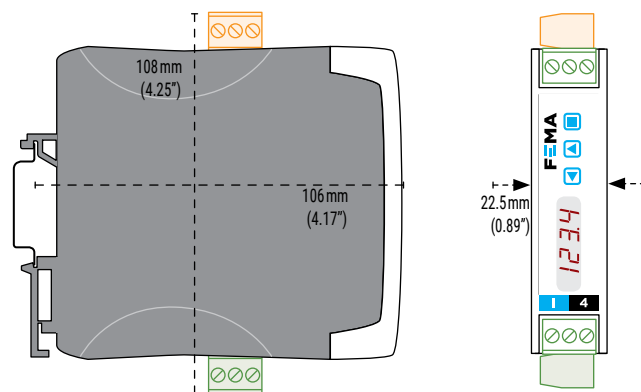
Isolation
input - output	3000 Veff (60 seconds)
power - input	3000 Veff (60 seconds)
power - output	3000 Veff (60 seconds)

Environmental
IP protection	IP30
impact protection	IK06
operation temperature	from 0 to +50 ºC
storage temperature	from -20 to +70 ºC
'*warm-up*' time	15 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 terminals (pitch 5.08 mm)
housing material	polyamide V0
weight	<150 grams
packaging	120 x 115 x 30 mm, cardboard

4. CONFIGURATION SYSTEM

The instrument allows for 2 configuration modes: [1] easy and fast using predefined configuration codes, and [2] advanced configuration through the '*configuration menu*'. Configuration is applied through the 3 push button keypad and the 4 red digit led display at the front of the instrument.

Key '**SQ**' (■)
Key '**UP**' (▲)
Key '**LE**' (◀)

Display
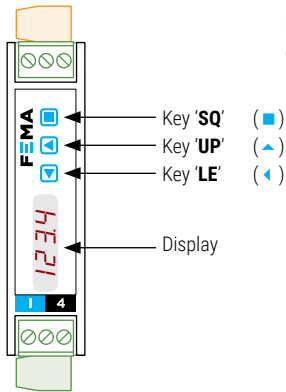
5. FUNCTIONS INCLUDED

'**Force**' functions . . . . temporarily forces the signal output to the minimum ('**Force Low**'), to the maximum ('**Force High**') or to a selectable value ('**Force Set**'), to validate the function of the remote elements connected to the output during installation.

'**Label**' function . . . . configure an alphanumerical label to be shown on display, and easily identify each unit.

'**SOS**' mode . . . . manually set the output to a fixed value, to apply critical maintenance or repairs to the input signal section without affecting the manufacturing process.

'**Messages**' function . . . . . configure information to display at your request at front key '**LE**' (◀). See real time values for input signal, output signal, input percentage, process value or configured label.

'**On error**' function . . . . configure the output response in case of error at the input.

'**Password**' function. . . . . . prevents access from unauthorized operators to '*configuration menu*'.
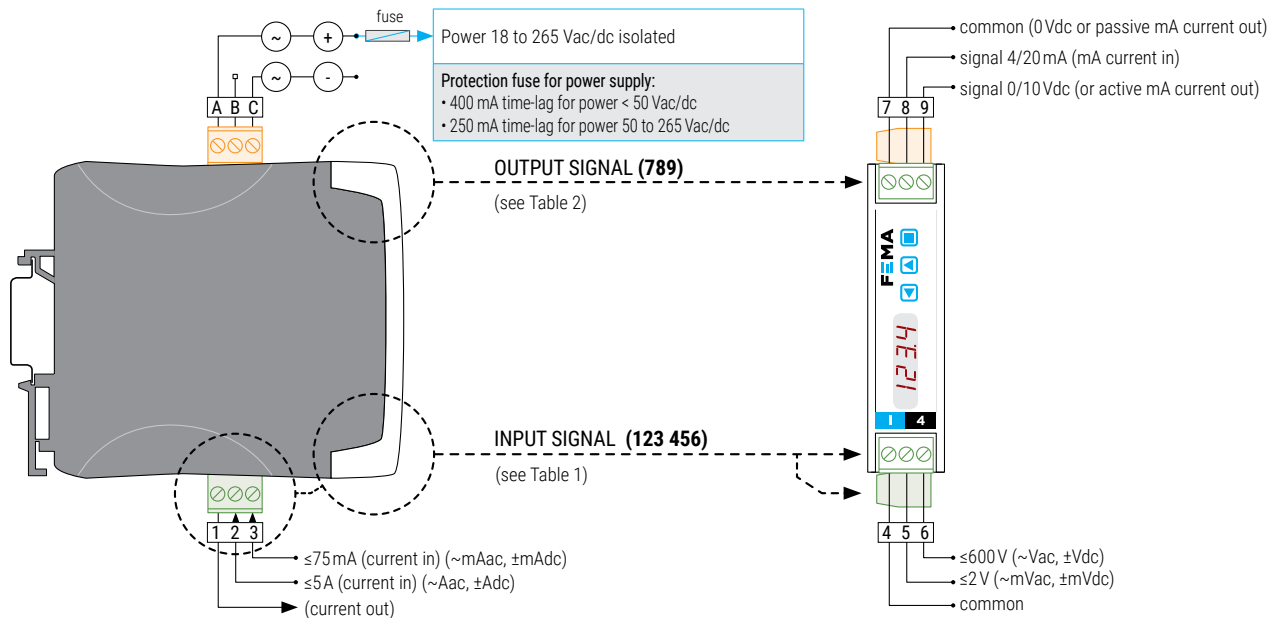
6. CONNECTIONS: INPUT & OUTPUT

fuse

Power 18 to 265 Vac/dc isolated

Protection fuse for power supply:
• 400 mA time-lag for power < 50 Vac/dc
• 250 mA time-lag for power 50 to 265 Vac/dc

A B C

common (0 Vdc or passive mA current out)
signal 4/20 mA (mA current in)
signal 0/10 Vdc (or active mA current out)

7 8 9

OUTPUT SIGNAL **(789)**
(see Table 2)

INPUT SIGNAL **(123 456)**
(see Table 1)

1 2 3
≤75 mA (current in) (~mAac, ±mAdc)
≤5 A (current in) (~Aac, ±Adc)
(current out)

4 5 6
≤600 V (~Vac, ±Vdc)
≤2 V (~mVac, ±mVdc)
common

Table 1 | **INPUT signal connections**

Input signal	Input terminals					
	1	2	3	4	5	6
≤600 Vac				~Vac		~Vac
≤600 Vdc				comm.		±Vdc
≤2 Vac				~mVac	~mVac	
≤2 Vdc				comm.	±mVdc	
≤5 Aac	~Aac	~Aac				
≤5 Adc	-Adc (out)	+Adc (in)				
≤75 mAac	~mAac		~mAac			
≤75 mAdc	-mAdc (out)		+mAdc (in)			
Frequency	Connect to the Aac, mAac, Vac or mVac terminals, according to the signal measured (AC voltage or AC current)					

Table 2 | **OUTPUT signal connections**

Output signal	Output terminals			Connections
	7	8	9	
4/20 mA active output		mA- (in)	mA+ (out)	mA- / mA+ 7 8 9
4/20 mA passive output* (*external loop power needed).	mA+ (out)	mA- (in)		mA+ / mA- 7 8 9
0/10 Vdc	common		+Vdc	common / +Vdc 7 8 9

7. PRECONFIGURED SIGNAL RANGES AND TYPICAL APPLICATIONS

The instrument has 2 different configuration modes: [1] easy and fast using predefined configuration codes, and [2] advanced configuration through the '*configuration menu*'.

The tables below provide a list of preconfigured input signal ranges, together with technical specifications for each range, and the associated preconfiguration codes. The '*configuration menu*' allows to configure custom ranges for both the input and the output ranges, and bipolar ranges for DC voltage and DC current signals. For additional information see the '*User's Manual*' (see section 8).

Typical applications

- current shunts of 50 mV, 60 mV, 100 mV, 150 mV, ...
- signals from DC batteries of 12 Vdc, 24 Vdc, 48 Vdc, ...
- signals from tachometric dynamos of ±60 Vdc
- power lines of 230 Vac, 115 Vac, 48 Vac, 24 Vdc

- AC current leaks of down to 5 mAac and below
- 50 and 60 Hz frequency signals from AC power lines
- signals from X/5 and X/1 current transformers

Table 3 | **Input ranges and technical specifications for AC frequency signals**

Input range	Code for 4/20 mA output	Code for 0/10 Vdc output	Accuracy (% FS)
0/100 Hz (Vac)	089	189	<0.20 %
45/55 Hz (Vac)	090	190	<0.20 %
55/65 Hz (Vac)	091	191	<0.20 %
0/100 Hz (Aac)	092	192	<0.20 %
45/55 Hz (Aac)	093	193	<0.20 %
55/65 Hz (Aac)	094	194	<0.20 %

Table 4 | **Input ranges and technical specifications for AC voltage signals**

Input range	Code for 4/20 mA output	Code for 0/10 Vdc output	Accuracy (% FS)	Max. oversignal	Zin
0/600 Vac	010	110	<0.30 %		
0/450 Vac	011	111	<0.30 %		
0/300 Vac	012	112	<0.30 %		
0/150 Vac	013	113	<0.30 %		
0/100 Vac	014	114	<0.30 %	800 Vac	13 MOhm
0/60 Vac	015	115	<0.30 %		
0/30 Vac	016	116	<0.30 %		
0/15 Vac	017	117	<0.30 %		
0/10 Vac	018	118	<0.30 %		
0/2 Vac	019	119	<0.30 %		
0/1 Vac	020	120	<0.30 %		
0/500 mVac	021	121	<0.30 %		
0/300 mVac	022	122	<0.30 %		
0/200 mVac	023	123	<0.30 %		
0/150 mVac	024	124	<0.30 %	50 Vac	81 KOhm
0/100 mVac	025	125	<0.30 %		
0/75 mVac	026	126	<0.30 %		
0/60 mVac	027	127	<0.30 %		
0/50 mVac	028	128	<0.30 %		

Table 5 | **Input ranges and technical specifications for DC voltage signals**

Input range	Code for 4/20 mA output	Code for 0/10 Vdc output	Accuracy (% FS)	Max. oversignal	Zin
0/600 Vdc	032	132	<0.20 %		
0/450 Vdc	033	133	<0.20 %		
0/300 Vdc	034	134	<0.20 %		
0/150 Vdc	035	135	<0.20 %		
0/100 Vdc	036	136	<0.20 %	800 Vdc	13 MOhm
0/60 Vdc	037	137	<0.20 %		
0/30 Vdc	038	138	<0.20 %		
0/15 Vdc	039	139	<0.20 %		
0/10 Vdc	040	140	<0.20 %		
0/2 Vdc	041	141	<0.20 %		
0/1 Vdc	042	142	<0.20 %		
0/500 mVdc	043	143	<0.20 %		
0/300 mVdc	044	144	<0.20 %		
0/200 mVdc	045	145	<0.20 %		
0/150 mVdc	046	146	<0.20 %	50 Vdc	81 KOhm
0/100 mVdc	047	147	<0.20 %		
0/75 mVdc	048	148	<0.20 %		
0/60 mVdc	049	149	<0.20 %		
0/50 mVdc	050	150	<0.20 %		

Table 6 | **Input ranges and technical specifications for AC current signals**

| Input range	Code for 4/20 mA output	Code for 0/10 Vdc output	Accuracy (% FS)	Max. oversignal	Zin
0/5 Aac	055	155	<0.30 %		
0/4 Aac	056	156	<0.30 %		
0/3 Aac	057	157	<0.30 %		
0/2 Aac	058	158	<0.30 %	7 Aac (max. 7 sec.)	20 mOhm
0/1 Aac	059	159	<0.30 %		
0/500 mAac	060	160	<0.30 %		
0/300 mAac	061	161	<0.30 %		
0/75 mAac	062	162	<0.30 %		
0/50 mAac	063	163	<0.30 %		
0/20 mAac	064	164	<0.30 %	150 mAac	3.33 Ohm
0/10 mAac	065	165	<0.30 %		
0/5 mAac	066	166	<0.30 %		

Table 7 | **Input ranges and technical specifications for DC current signals**

Input range	Code for 4/20 mA output	Code for 0/10 Vdc output	Accuracy (% FS)	Max. oversignal	Zin
0/5 Adc	072	172	<0.20 %		
0/4 Adc	073	173	<0.20 %		
0/3 Adc	074	174	<0.20 %		
0/2 Adc	075	175	<0.20 %	7 Adc (max. 7 sec.)	20 mOhm
0/1 Adc	076	176	<0.20 %		
0/500 mAdc	077	177	<0.20 %		
0/300 mAdc	078	178	<0.20 %		
0/75 mAdc	079	179	<0.20 %		
0/50 mAdc	080	180	<0.20 %		
0/20 mAdc	081	181	<0.20 %	150 mAdc	3.33 Ohm
0/10 mAdc	082	182	<0.20 %		
0/5 mAdc	083	183	<0.20 %		

8. ADDITIONAL DOCUMENTATION

User's manual   www.fema.es/docs/5082_I4E_manual_en.pdf
Datasheet   www.fema.es/docs/5089_I4E_datasheet_en.pdf
Quick installation guide www.fema.es/docs/5091_I4E_installation_en.pdf
Web   www.fema.es/docs/Series_I4

9. OTHER SIGNAL CONVERTERS ... AND MORE
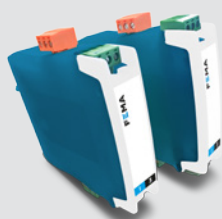
SERIES I3
Section OEM

output signal . . . . 4/20 mA, 0/10 Vdc
configuration . . . . by codes (inside)
isolation . . . . 3 ways

SERIES I4
FULLY CONFIGURABLE

output signal . . . . 4/20 mA, 0/10 Vdc, ...
configuration . . . . menu (front keypad)
isolation . . . . 3 ways

SERIES I5
FIELD BUS

output signal . . . . Modbus RTU, CANbus, ...
configuration . . . . by menu (front keypad)
isolation . . . . 3 ways

SERIES B
LARGE FORMAT DISPLAYS

digit . . . . 60 and 100 mm
reading . . . . 25 and 50 meters
mounting . . . . wall, panel, hanging
housing . . . . metallic IP65

50 YEARS 1969-2019
Q ISO 9001 Certified Quality
CE EN-61010-1 Security
CE EN-61326-1 Electromagnetic C.
5 YEARS Extended Warranty

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Process	Temperature Pt	Counter 160ºc	Weight Kg	Flow	Time
Frequency Hz	Temperature tc	Speed	Vac	Aac	Integrators
Potentiometer	Temperature NTC PTC	Period	Adc	Vdc	Resistances
Digital Modbus RTU	Digital RS-485 RS-232	Digital BCD Parallel	Digital BCD Multiplex	Custom	