Panel Meters and Controllers
Controller for AC/DC Current Measurements
Type MDI 40 A

CARLO GAVAZZI

- 3 3/4-dgt multi-range µP-based controller for AC/DC current measurements
- Ranges from 2 mA to 5 A
- All software functions selectable by key-pad
- Peak/valley function
- Password protection of programming parameters
- 2 independent alarm setpoints
- Alarm for over-range, up-alarm, down-alarm, down alarm with disabling at power-on, up/down-alarm with latch
- Degree of protection: IP 65
- Optional analogue output (20 mA/10 VDC)
- Optional serial RS 485 output
- MODBUS, JBUS protocol

Product Description

3 3/4-dgt multi-range µP-based controller for AC/DC current measurements. Scaling and setpoints are fully programmable by user-friendly key-pad. The MDI 40 A includes peak/valley function and password protection. The housing is easy to mount and ensures a protection degree of IP 65.

Ordering Key

MDI40A0BD2AXXIX

- Model
- Measurement
- Power supply
- Setpoints
- Signal Output
- Engineering unit
- Option

Type Selection

Measurements

A0B: Standard (40 - 400 Hz)
2 mA
20 mA
2 A
5 A
A4X: Std, input: 200 mA
A0T: TRMS (40 - 1000 Hz)
2 mA
20 mA
2 A
5 A

[1] On request

Power supply

A: 24 VAC, -15% +10%, 50/60 Hz [1]
B: 48 VAC, -15% +10%, 50/60 Hz [1]
C: 115 VAC, -15% +10%, 50/60 Hz [1]
D: 230 VAC, -15% +10%, 50/60 Hz (standard)
E: 120 VAC, -15% +10%, 50/60 Hz [1]
F: 240 VAC, -15% +10%, 50/60 Hz [1]
3: 9 to 32 VDC with galvanic insulation [1]
6: 40 to 150 VDC with galvanic insulation [1]

Signal output

X: None
A: Analogue: 0 to 20 mA/ 0 to 10 V
R: Serial: RS 485 unidirectional
S: Serial: RS 485 bidirectional
W: Analogue (A) + serial (R)
Y: Analogue (A) + serial (S)

Options

IX: Degree of protection IP 65 (standard)
01: Interactive setpoints + IP 65 [1]
XT: Tropicalization + IP 65 [1]

Input Specifications

Rated input	2 mA, 20 mA, 200 mA, 2 A, 5 A, 40-400 Hz
Accuracy	
DC	
DC current measurements, (@ 25°C ± 5°C)	± 0.1 % f.s., ± 1 dgt
AC Standard	
AC current measurements, (@ 25°C ± 5°C, 5-100% f.s.)	± 0.1 % f.s., ± 2 dgt
AC TRMS	
AC current measurements, (@ 25°C ± 5°C, 5-100% f.s.)	± 0.2 % f.s., ± 2 dgt
Temperature drift	
DC	± 150 ppm/°C
AC Standard and TRMS	± 200 ppm/°C

Sampling rate	4 times/second, dual slope 16 bits A/D converter
Display	7-segment LED, h 14.2 mm
Max. and min. indication	
DC	Max. 3999, min. -1999
AC Standard and TRMS	Max. 3999, min. 0
AC Measurements	
Standard	Measurement of the average value resulting from the sine half-wave rectification of the input voltage by rms calibration

CARLO GAVAZZI

Input Specifications (cont.)

Measurements (cont.)	
TRMS	True rms Coupling type : AC Crest factor: ≥ 3
Input ranges	
2 mA	-1.999 to 1.999 mADC 0 to 1.999 mAAC Input impedance: 50 Ω
20 mA	-19.99 to 19.99 mADC 0 to 19.99 mAAC Input impedance: 50 Ω
200 mA (on request)	-199.9 to 199.9 mADC 0 to 199.9 mAAC Input impedance: 1 Ω

Input ranges (cont.)	
2 A	-1.999 to 1.999 ADC 0 to 1.999 AAC Input impedance: 50 mΩ
5 A	-1.99 A to 5 ADC 0 A to 5 AAC Input impedance: 50 mΩ
Overload protection	
Continuous	1.2 x rated input
For 1s	2 x rated input
Keyboard	4 keys: "S" for menu selection; "UP" and "DOWN" for value programming/function selection; "F" for special functions

Output Specifications

Alarms	
Number of setpoints	2 independent (standard)
Alarm type	Over-range, up alarm, down alarm, down alarm with disabling at power-on, up alarm with latch, down alarm with latch
Special function	Interaction of the two setpoints (on request)
Setpoint adjustment	0 to 100% of the displayed range
Limits of setpoint adjustment	Programmable minimum and maximum values
Hysteresis	0 to 100% of the displayed range
On-time delay	0 to 255 s
Off-time delay	0 to 255 s
Relay status	Normally energized/de-energized
Output type	
Contact	2 x SPDT
Rating	5A, 250 VAC/VDC, 40 W / 1200 VA, 130.000 cycles
Min. response time	≤ 400 ms, filter excluded setpoint on-time delay: "0"
Insulation	2000 V_{rms} between output and measuring inputs, excitation output
Excitation output	
Voltage	15 VDC non-stabilized/ 40 mA max
Insulation	100 V_{rms} output to measuring input 4000 V_{rms} output to AC supply input 500 V_{rms} output to DC supply input
Analogue output (on request)	
Range	0 to 20 mADC, 0 to 10 VDC
Scaling factor	Programmable within the whole range of the signal output; it allows the management of all values from 0 to 20 mA / from 0 to 10 V

Analogue output (cont.)	
Accuracy/response time	± 0.3% f.s. (@ 25°C)/≤ 500 ms
Temperature drift	± 200 ppm/°C
Load: 20 mA output	≤ 500 Ω
10 V output	≥ 10 kΩ
Insulation	By means of optocouplers, 500 V_{rms} output to measuring input 4000 V_{rms} output to supply input
Serial output (on request)	
Type	RS485;
Multidrop	Uni-directional (std), bidirectional (on request)
Connections	2 or 4 wires, max. distance 1200m, termination and/or line biasing directly on the instrument
Adresses/protocol	255, selectable by key-pad/ MODBUS, JBUS
Data (uni-directional)	
Dynamic (reading only)	Measurement, data hold of minimum value, data hold of maximum value, alarm status
Static (reading only)	All programming data
Data (bidirectional, on request)	
Dynamic (reading only)	Measurement, data hold of minimum value, data hold of maximum value, alarm status.
Static (reading/writing)	All programming data, min./ max. data hold reset, reset of alarm set-points with latch
Data format	1-start bit, 8-data bit, no parity, 1 stop bit
Baud-rate	1200, 2400, 4800 and 9600 selectable bauds
Insulation	By means of optocouplers, 500 V_{rms} output to measuring inputs 4000 V_{rms} output to supply input

CARLO GAVAZZI

Software Functions

Peak and valley values	Automatic storage (RAM only) of the min. and max. value measured from the last reset
Password	Numeric code of max. 3 digits; 3 protection levels of the programming data
1st level	Password "0", no protection
2nd level	Password from 1 to 127, all data are protected
3rd level	Password for 128 to 255, all data protected except for the alarm setpoints
Measurement selection	AC/DC current
Scaling factor	
Operating mode	Electrical scale compression, compression/expansion of the displayed scale (max. 2 without filter, > 2 with filter).
Scaling factor (cont.)	
Electrical scale	Programmable within the whole measuring range
Decimal point position	Programmable within the displaying range
Displayed scale	Programmable within the whole displaying range
Diagnostics	The display flashes when the limits of the displayed range are exceeded, the data are updated up to the maximum read-out
Over range	EEE indication (AC/DC)
Under range	-EE indication (DC)
Filter	
Filter operating range	From 0 to 3999
Filtering coefficient	From 1 to 255

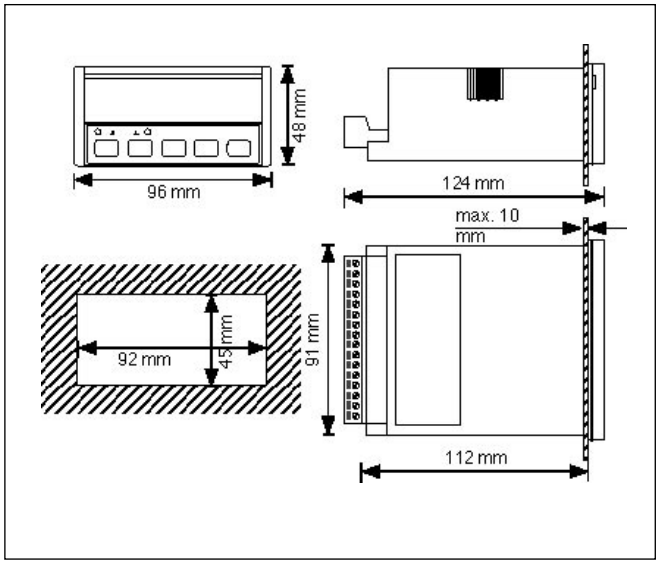
Supply Specifications

AC voltage	230 VAC -15%+10% 50/60 Hz, (standard) 24 VAC, 48 VAC, 115 VAC, 120 VAC, 240 VAC, -15%+10% 50/60 Hz (on request)
Insulation	4000 V_{rms} supply input to all the other inputs/outputs
DC supply	9 to 32 VDC, galvanic insulation, max. inrush current: ≤ 1.2 A/200 ms (on request) 40 to 150 VDC, galvanic insulation, max. inrush current: ≤ 0.6 A/200 ms (on request)
Insulation	500 V_{rms} supply input to all other inputs/outputs
Power consumption	5 VA (basic instrument), 7 VA max. with signal output

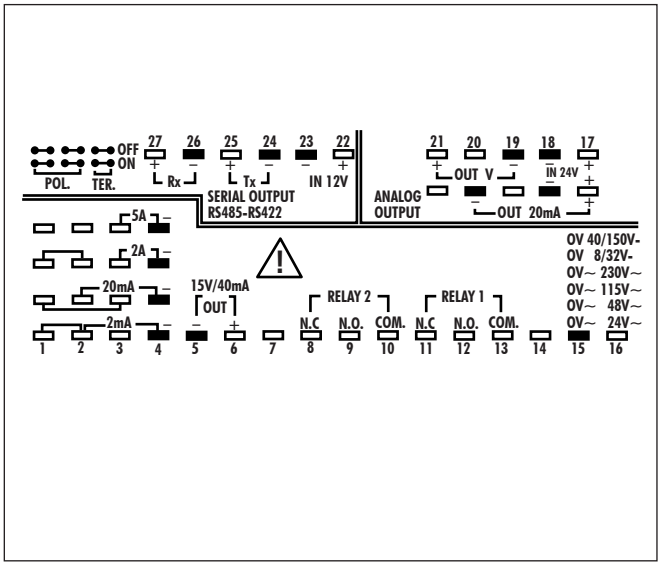
General Specifications

Operating temperature	0° to +50°C, 32° to 122°F (R.H. < 90% non-condensing)
Storage temperature	-10° to +60°C, 14° to 140°F (R.H. < 90% non-condensing)
Insulation reference voltage	300 V_{rms} to ground
Dielectric strength	4000 V_{rms} for 1 minute
Noise rejection	
NMRR	40 dB, 40 to 60 Hz.
CMRR	100 dB, 40 to 60 Hz
EMC	IEC 60801-2, IEC 60801-3, IEC 60801-4 (level 3), EN 50081-1, EN 50082-1
Safety standards	EN 61 010-1, IEC 61010-1, VDE 0411
Connector	Screw-type, detachable
Housing	
Dimensions	1/8 DIN, 48 x 96 x 124 mm
Material	ABS, self-extinguishing: UL 94 V-0
Degree of protection	IP 65 (standard)
Weight	Approx 520 g (signal output and packing included)
Approvals	UL,CSA, CE

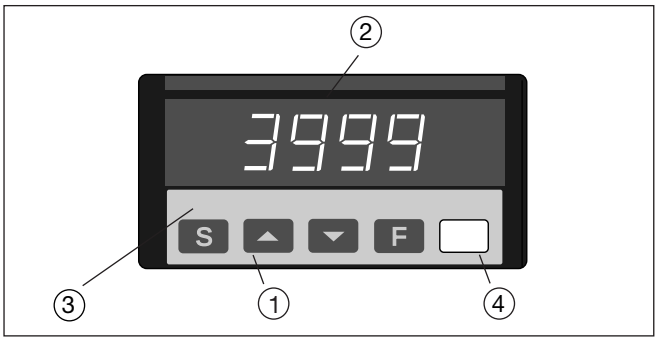
Dimensions



Terminal Board



Front Panel Description



1. **Key-pad**
   Set-up and programming procedures are easily controlled by the 4 pushbuttons.

   "S"
   - Selection key to select programming function (instrument configuration) or measurement and alarm detection.

   " ▲ " and " ▼ "
   - Up and down keys for increasing or decreasing programming values.
   - Selecting programming functions and instrument configuration together with the "S" key.

   "F"
   - Special function key for interaction between the two set-points and for alarm latch reset.

2. **Display**
   3 3/4-digit (maximum read-out 3999).

   Alphanumeric indication by means of 7-segment display for:
   - Displaying of the measured value, over-range and programming indications.
   - Indication of programming parameters.

3. **LED**
   - "1" and "2" LED indicators for alarm conditions

4. **Engineering unit**
   Screen for interchangeable unit label.The symbols in the shaded areas are those available on the set of engineering unit labels supplied with the MDI (engineering unit label to be inserted by customer).

	W = 08	MΩ = 16	% = 24	mm HG = 32	cm = 40
mV = 01	kW = 09	Hz = 17	mbar = 25	l/min = 33	m = 41
V = 02	MW = 10	kHz = 18	bar = 26	l/h = 34	kg = 42
kV = 03	var = 11	RPM = 19	psi = 27	kg/min = 35	ppm = 43
µA = 04	kvar = 12	m/s = 20	ata = 28	ton/h = 36	kA = 44
mA = 05	Mvar = 13	m/min = 21	ate = 29	m^3/min = 37	cos ϕ = 45
A = 06	Ω = 14	°C = 22	kg/cm^2 = 30	m^3/h = 38	m^3 = 46
mW = 07	kΩ = 15	°F = 23	mm H_2O = 31	mm = 39	µs = 47