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mA/BCD Converter

Model MFC-300 mA/BCD

1 Definition

The MFC-300 mA/BCD Converter is a device designed to convert a DC current signal into BCD (8421) signals.

2 Operating Principle

An electronic circuit senses a current loop and generates an output consisting of two BCD (8421) digits (using 6 relays), proportional to the measured current.

The current input can be from 0 to 20 mA. The current scale is set during the calibration process. The lowest current set during calibration corresponds to the first position, and the highest, to the last position.

The number of positions can be configured using the MFC-300's keypad.

The MFC-300's circuit provides pairwise isolation between the outputs, the current input and the power supply, preventing transients from being transmitted through the mA/BCD converter. This awards great robustness to this product and to the system which will process the current signal.

3 Calibration

Before commissioning, the device must be calibrated for the current input scale. The procedure to do so follows:

1. Power on the device while pressing ↑ or ↓.
2. The message **Min. Input** will be displayed along with a value proportional to the measured current. Input the minimum current in the scale.

   When the value stabilizes, press the **P** key.
3. The message **Max. Input** will be displayed along with a value proportional to the measured current. Input the maximum current in the scale.

   When the value stabilizes, press the **P** key.

This calibration guarantees precise measurements and versatile configuration of the current input scale.

4 Configuration

The device features 4 keys to access its functions. The procedure to configure any parameter follows:

1. Press the **P** key to enter the configuration menu.
2. Using the ↑ and ↓ keys, choose the desired parameter.
3. Press **P** to confirm the parameter's selection.
4. Choose the desired value with the ↑ and ↓ keys.
5. Confirm by pressing **P**.

The configuration sequence can be canceled at any time by pressing **C**.

This device can be reset to factory settings. This procedure also resets its password to AAAA. To do so, power up the device while pressing **C**.

5 Programmable Parameters

5.1 General Configuration

Parameter: Number of Positions

Options: 2 to 99.

Description: selects the number of BCD positions, from 1 to the configured value.

5.2 MODBUS Protocol

Parameter: Baud Rate

Options: 9600, 19200, 38400, 57600, 115200 bps.

Description: baud rate for the RS485 link.

Parameter: Format

Options: 8N1, 8E1, 8O1, 8N2.

Description: symbol transmission format, where:

- 8N1: 8 data bits, no parity, 1 stop bit.
- 8E1: 8 data bits, even parity, 1 stop bit.
- 8O1: 8 data bits, odd parity, 1 stop bit.
- 8N2: 8 data bits, no parity, 2 stop bits.

Parameter: Address

Options: 1 to 247.

Description: MODBUS address for the device.

6 Error Condition

6.1 Position Error

Position errors are characterized by readings which shift considerably from their ideal value (20%). Despite not being large enough to be interpreted as another position altogether, they suggest failure or imminent failure of the position transducer element, either due to calibration, tap changer failure or connection problem.

Possible causes:

- EMI (electro-magnetic interference) due to faulty or lack of cable shielding.
- EMI due to failure to ground the cables' shielding.
- Contact problem.

7 Electrical Characteristics

Power supply	80 – 265 V_{cc}/V_{ca}
Power supply / other terminals isolation	2500 V, 50/60 Hz, 1 min.
Input signals / other terminals isolation	2500 V, 50/60 Hz, 1 min.
Terminals / ground isolation	2500 V, 50/60 Hz, 1 min.
Power consumption	≤ 8 W
Operating temperature	-10 to +70°C (LCD display) -40 to +70°C (VFD display)
Operating humidity	10 to 90% without condensation

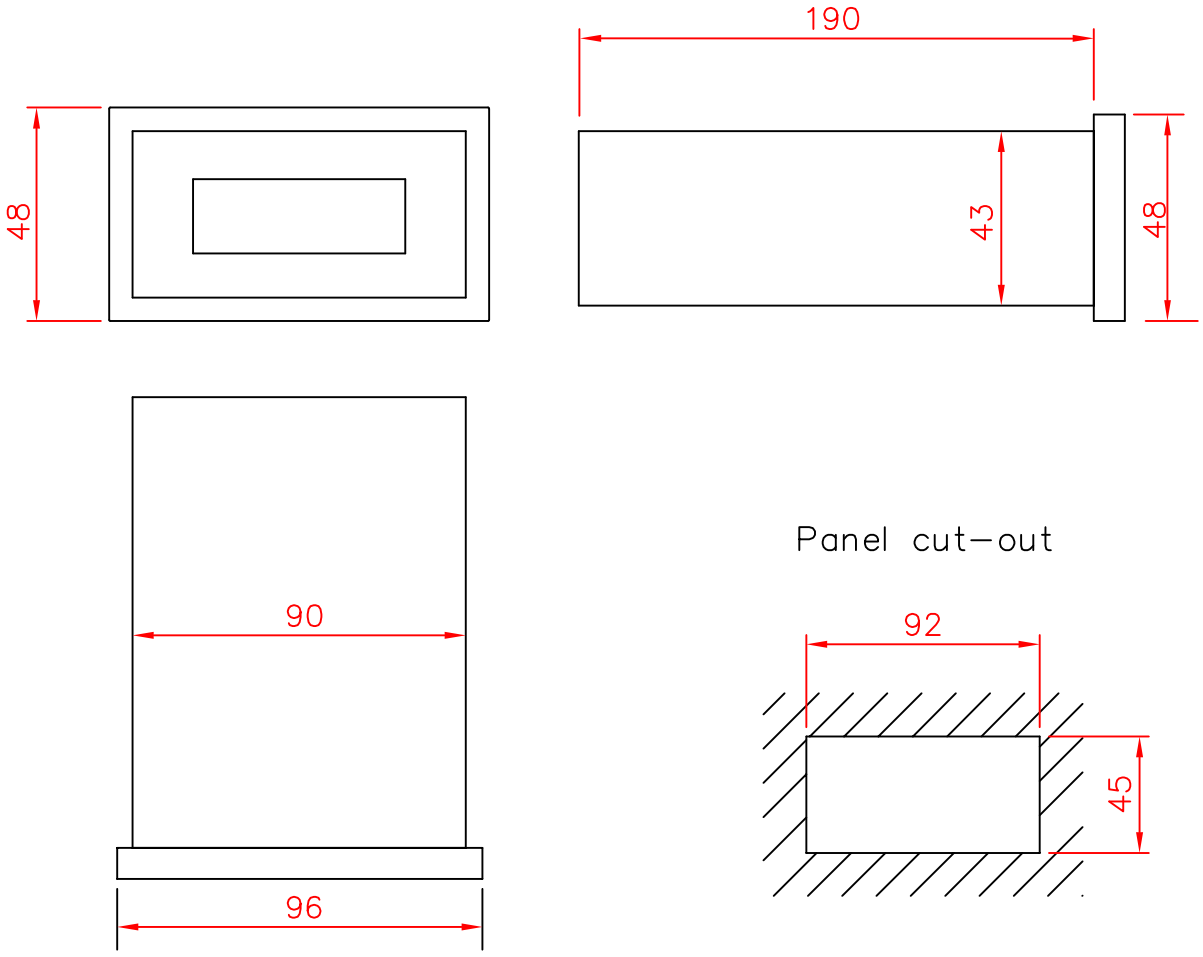
8 MODBUS Registers

Holding Register	Description	Values	Multiplier
1 (read-only)	Output Position	1 – 99	1
21	Current Loop – Output Scale	0: 0-1 mA 1: 0-5 mA 2: 0-10 mA 3: 0-20 mA 4: 4-20 mA	1
201	Number of Positions	2 – 99	1

9 Product Photograph

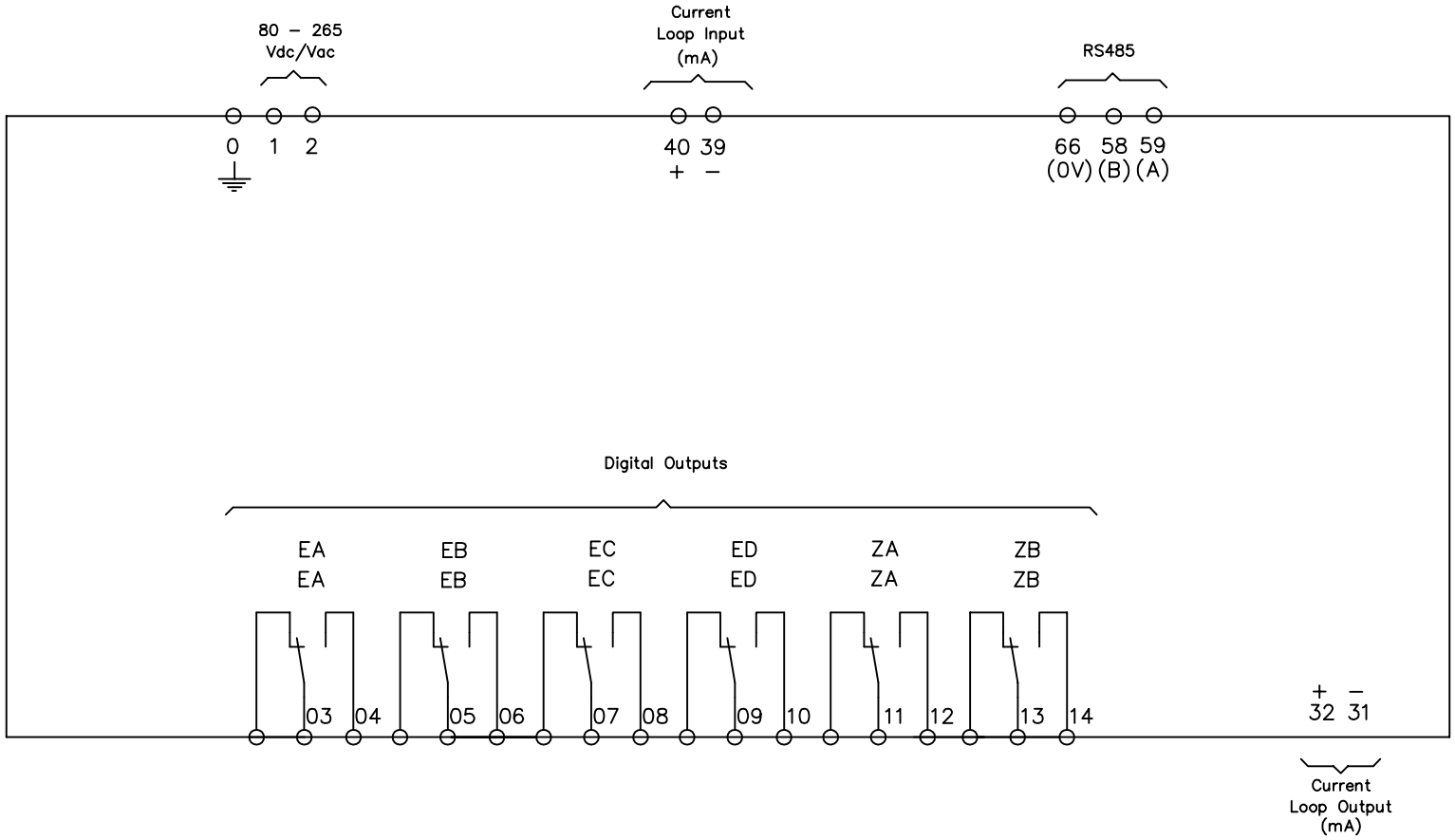
MULTIFUNCTION CONTROLLER
MOD MFC-300

Dimensions in mm



Aceito Cont. Qualid.	Aceito Produção:	MULTI FUNCTION CONTROLLER MOD. MFC-300 96 x 48	Escala Ref.	
Projeto Conf.	Des. Por. A.A.L.			
Des. Conf.	Emit. Depto Data. 20/07/07		Alt. Num.	Folha 2/2
Licht Eletro Eletrônica		Dwg. MFC-300 20072007 Rev.0		

mA/BCD CONVERTER
MODEL MFC–300 mA/BCD



Example for 4-20 mA scale and 33 positions

Tap Changer Position	Closed Relays								I in (mA)
	Tens				Units				
	ZA	ZB	ZC	ZD	EA	EB	EC	ED	
1					▨				4.000
2						▨			4.500
3					▨	▨			5.000
4							▨		5.500
5					▨		▨		6.000
6						▨	▨		6.500
7					▨	▨	▨		7.000
8								▨	7.500
9					▨			▨	8.000
10	▨								8.500
11	▨				▨				9.000
12	▨					▨			9.500
13	▨				▨	▨			10.000
14	▨						▨		10.500
15	▨				▨		▨		11.000
16	▨					▨	▨		11.500
17	▨				▨	▨	▨		12.000
18	▨							▨	12.500
19	▨				▨			▨	13.000
20		▨							13.500
21		▨			▨				14.000
22		▨				▨			14.500
23		▨			▨	▨			15.000
24		▨					▨		15.500
25		▨			▨		▨		16.000
26		▨				▨	▨		16.500
27		▨			▨	▨	▨		17.000
28		▨						▨	17.500
29		▨			▨			▨	18.000
30	▨	▨							18.500
31	▨	▨			▨				19.000
32	▨	▨				▨			19.500
33	▨	▨			▨	▨			20.000

▨ HIGH OUTPUT LEVEL

□ LOW OUTPUT LEVEL