



User's Guide

CE



An OMEGA Technologies Company

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CCT-22, CCT-23, CCT-24, CCT-25, CCT-26, CCT-27

Thermocouple Input Signal Conditioners

M2203/1201

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One Omega Drive, Box 4047
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Tel: (203) 359-1660
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FAX: (203) 359-7700

Canada:

976 Bergar
Laval (Quebec) H7L 5A1
Tel: (514) 856-6928
e-mail: canada@omega.com

FAX: (514) 856-6886

For immediate technical or application assistance:

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Tel: (31) 20 6418405 FAX: (31) 20 6434643
Toll Free in Benelux: 06 0993344
e-mail: nl@omega.com

Czech Republic:

Ostravska 767, 733 01 Karvina
Tel: 42 (69) 6311899 FAX: 42 (69) 6311114
e-mail: czech@omega.com

France:

9, rue Denis Papin, 78190 Trappes
Tel: (33) 130-621-400 FAX: (33) 130-699-120
Toll Free in France: 0800-4-06342
e-mail: france@omega.com

Germany/Austria:

Daimlerstrasse 26, D-75392 Deckenpfronn, Germany
Tel: 49 (07056) 3017 FAX: 49 (07056) 8540
Toll Free in Germany: 0130 11 21 66
e-mail: germany@omega.com

United Kingdom:

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25 Swannington Road, P.O. Box 7, Omega Drive,
Broughton Astley, Leicestershire, Irlam, Manchester,
LE9 6TU, England M44 5EX, England
Tel: 44 (1455) 285520 Tel: 44 (161) 777-6611
FAX: 44 (1455) 283912 FAX: 44 (161) 777-6622

Toll Free in England: 0800-488-488
e-mail: uk@omega.com

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The information contained in this document is believed to be correct but OMEGA Engineering, Inc. accepts no liability for any errors it contains, and reserves the right to alter specifications without notice.

WARNING: These products are not designed for use in, and should not be used for, patient connected applications.

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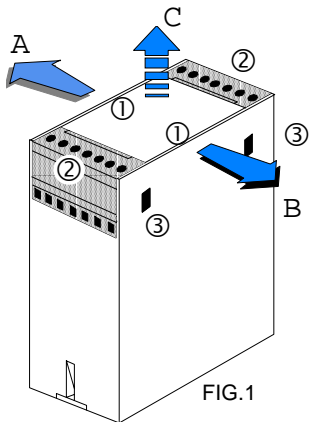
OPEN THE HOUSING

PROCEDURE

1. Insert a screwdriver or similar tool in the points marked ①.
2. Turn the screwdriver until the case walls begin to separate towards **A** and **B**, so that the two side lugs ③, are free.
3. Grab the signal conditioner body, at the points marked ②, and pull it towards **C**, until the two side lugs ③ are out of their housing and the internal circuits are visible. See the sketch below for the disassembly of the circuits boards.
4. Before reinserting the signal conditioner body into the case, the following must be checked :

-The front label (blue color) must be in its correct position, with terminals 1 and 7 (power supply) separated from the other terminals.

-The three internal modules must be inserted correctly in their internal case guides.



INTERNAL OVERVIEW

- A. "MET" Input module.
- B. "MS" Output module.
- C. "MA" Power supply module.

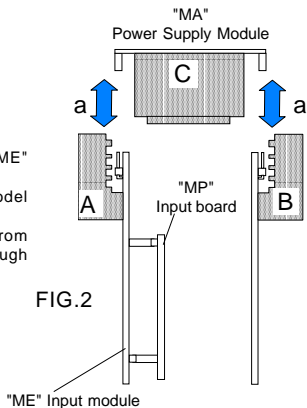
The "MET" input module, is composed of the "ME" Input module and the "MP" input board.

There is a different "MP" input board for each model of thermocouple.

The "MP" input board must not be disassembled from the "ME" input module because both are linked through the Cold Junction compensation.

PROCEDURE FOR DISASSEMBLY

1. Pull out the "MET" input module towards "a".
2. Pull out the "MS" output module towards "a".
3. To assemble reverse the procedure.



POWER SUPPLY

RECOMENDED WIRING

The power supply must be connected to terminals 1 and 7. The characteristics of the power supply are shown on the side label.

WARNING.- If the power supply is dc voltage, be careful with the polarity indicated for each terminal.

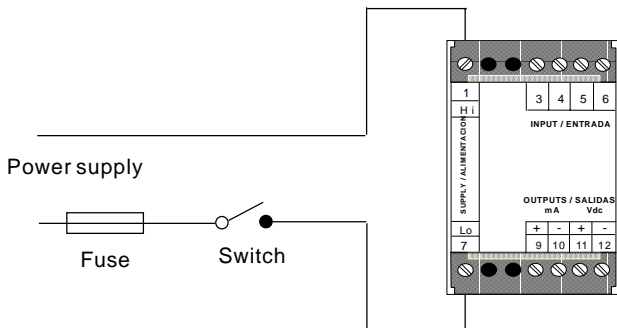


FIG. 3

PRECAUTIONS

The installation must incorporate safety devices to protect the operator and the process when using the Transmitter to control a machine or process where injury to personnel or damage to equipment or process, may occur as a result of failure of the Transmitter.

PROTECTIONS

See on table 1 the recommended value of the fuse for the different power supply availables.

Power supply	Fuse value
230 Vac	50 mA
115 Vac	100 mA
48 Vac	150 mA
24 Vac	300 mA
24 Vdc	300 mA

TABLE 1

CHANGING THE POWER SUPPLY

The unit is not provided with a system to change the power supply. Therefore if the power supply must be modified to other value, please replace the module MA for another one appropriate to the new characteristics. Contact your local distributor for instructions.

SIGNAL OUTPUT module MS

The signal conditioner provides two different analog output signals, both proportional to the signal input.

Output in Current: 4 to 20 mA, terminals 9 - 10

Output in Voltage: 0 to 10 Vdc, terminals 11 - 12

Do not use both outputs simultaneously. Only one selection can be made.

The side label shows which one is selected.

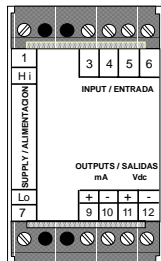


FIG.5

CHANGING THE SIGNAL OUTPUT

All signal conditioners are delivered as a standard version, with the analog output selected as 4 to 20 mA, unless specified otherwise. To select a 0 to 10 V output, remove jumpers E and F as shown in Figure 6. Other non-standard output voltage and current ranges may be obtained by adding and/or replacing resistors given in Tables 2 and 3.

NON STANDARD OUTPUT VOLTAGES

TABLE 2

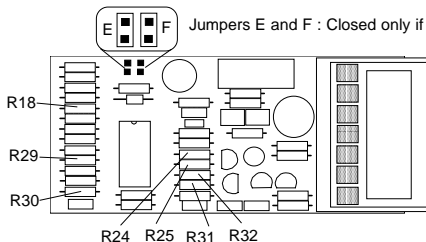
Output in V.	Value in K Ω for :			
	R29	R30	R31	R32
± 10	49.9	----	200	----
0 to 1	----	----	11	100
0 to 5	----	----	100	100
1 to 5	----	100	66.5	100

NON STANDARD OUTPUT CURRENTS

TABLE 3

Output in mA.	Value in Ω for :		
	R18	R24	R25
0 to 5	----	100	----
0 to 10	----	49.9	----
1 to 5	100 K	124	----
0 to 20	----	-----	24.9

"----" means "Resistor must not be installed"



Jumpers E and F : Closed only if the output is 4 to 20 mA.

Replace or add the indicated resistors with the values shown in Tables 2 and 3 for the desired output.

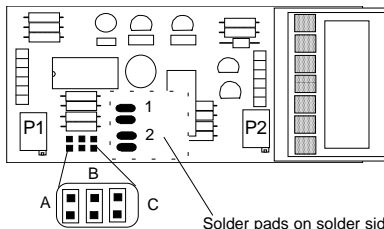
FIG.6

SIGNAL INPUT, module ME

OVERVIEW

This module together with the "MP" input board, comprises the "MET" input module (see Fig. 2). This module contains the trimmers and jumpers for the amplifier gain and the low level output. The thermocouple connection are made at Terminals 4 and 5.

FIG.7



P1 : Output zero adjustment.
P2 : Gain amplifier adjustment.

OFFSET ADJUST

- Solder pad 1 if closed** : Adjust the low range level of the output (Offset positive coarse).
- Solder pad 2 if closed** : Adjust the low range level of the output (Offset negative coarse).
- Jumper A if closed** : Adjust the low range level of the output (Offset negative fine).

AMPLIFIER GAIN

- Jumper B if closed** : Gain at maximum level
- Jumper C if closed** : Gain at medium level.
- Jumpers B and C opened** : Gain at minimum level.

ELECTRICAL FEATURES

All the electrical characteristics specified are for thermocouples according DIN 43732, DIN 43710 and IPTS 68.

Each model contains a circuit for linearizing the thermocouple signal over seven segments. The output signal is proportional to the real temperature in °C, not to the signal generated by the thermocouple.

INPUT

COLD JUNCTION COMPENSATION

Thermocouples J, K, T, and E 0.05 °C/ °C (@ 20°C)

Thermocouples S and R 0.1 C/ °C

OVERVOLTAGE 75 Vdc maximum

LINEARITY Over 7 segments

OUTPUT

0 to 20 mA or 4 to 20 mA

$R_L < 600 \Omega$ max. 22 mA $\pm 3\%$

0 to 10 Vdc

$R_L > 1000 \Omega$ max. 11 V $\pm 3\%$

ACCURACY

$\leq 0.3\%$ FS

RESPONSE TIME

≤ 250 mS

GALVANIC ISOLATION

Input, Output and Power Supply are all isolated to 2 kVeff. 50 Hz/1 m.

SENSOR-BREAK AND

OPEN-CIRCUIT DETECTION

Selectable for upscale or downscale burnout

GENERAL SPECIFICATIONS

RIPPLE $\leq 0.5\%$

BAND PASS 1.5 Hz (-3 dB)

STORAGE TEMPERATURE -30° to +80°C

OPERATING TEMPERATURE -10° to +60°C

TEMPERATURE COEFFICIENT $\leq 0.015\%/^{\circ}\text{C}$

STANDARD POWER SUPPLY 115 Vac ($\pm 10\%$) 50/60 Hz

POWER CONSUMPTION ≤ 1.5 VA

TEST VOLTAGE 4 kVeff. 50 Hz/1m.

STANDARD TEMPERATURE RANGES

Table 4 indicates all the standard ranges that can be obtained for each thermocouple model.

Table 4

Range °C	Model and thermocouple					
	22 J	23 K	24 T	25 E	26 S	27 R
0 to 200			x			
0 to 300		x	x			
0 to 400	x	x	x			
0 to 500	x	x				
0 to 600	x	x				
0 to 700	x	x				
0 to 800		x		x		
0 to 900		x				
0 to 1000		x				
0 to 1200		x				
600 to 1600					x	
850 to 1700						x

If your range requirements are not in the table above, contact the technical sales department for assistance.

The electrical features specified on page 10 are only available for the temperature ranges indicated on table 4. If the transmitter is delivered with a different range of the indicates, then the electrical features could be different.

CHANGING THE TEMPERATURE RANGE

Some models indicated in Table 4, allow the user the choice of different input temperature ranges, by selecting the position of the solder pad J1, located on the solder side of the "MP" Input Board, (see Fig. 8, left) and/or the Jumper C, placed on the components side of the "ME" Input Module, (see Fig. 8, right).

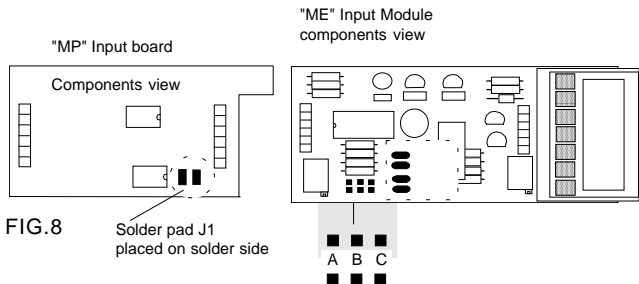


FIG.8

Solder pad J1
placed on solder side

CCT-22, Thermocouple Type "J"

Temperature ranges selection
State of the Jumpers J1 and C

Temperature ranges	Solder pad J1 Board MP	Jumper C Module ME
0 to 400°C	closed	opened
0 to 500°C	opened	opened
0 to 600°C	opened	opened
0 to 700°C	opened	opened

TABLE 5-A

To change the temperature input range, see the Adjustment and Calibration Section.

CCT-23, Thermocouple Type "K"

Table 5-B shows standard temperature ranges and status of the solder pad J1 located on the "MP" input board (on solder side) and the Jumper C located on the "ME" Input module (on components side). See Fig.8.

STANDARD RANGES SELECTABLES	Solder pad J1 Input board MP	Jumper C Input Module ME
0 to 300°C	closed	closed
0 to 400°C	closed	opened
0 to 500°C	closed	opened
0 to 600°C	closed	opened
0 to 700°C	closed	opened
0 to 800°C	opened	opened
0 to 900°C	opened	opened
0 to 1000°C	opened	opened
0 to 1200°C	opened	opened

TABLE 5-B

To change the temperature input range, see the Adjustment and Calibration Section.

CCT-24, Thermocouple Type "T"

Table 5-C shows standard temperature ranges. Keep solder pad J1 and Jumper C in their original positions, both closed. See Fig.8.

STANDARD RANGES SELECTABLES
0 to 200°C
0 to 300°C
0 to 400°C

To change the temperature input range, see the Adjustment and Calibration Section.

TABLE 5-C

CCT-25, Thermocouple Type "E"

As indicated in Table 4, the CCT-25 is only available for the temperature range from 0 to 800°C, as a standard version. Therefore, it is not necessary to change the jumpers. If it is necessary to recalibrate the signal conditioner for a different input range or to change the analog output range or type, follow the procedure in the Adjustment and Calibration Section. Solder pad "J1" opened and Jumper "C" opened.

CCT-26, Thermocouple Type "S"

As indicated in Table 4, the CCT-26 is only available for the temperature range from 600 to 1600°C, as a standard version. Therefore, it is not necessary to change the jumpers. If it is necessary to recalibrate the signal conditioner for a different input range or to change the analog output range or type, follow the procedure in the Adjustment and Calibration Section. Solder pad "J1" opened and Jumper "C" closed.

CCT-27, Thermocouple Type "R"

As indicated in Table 4, the CCT-27 is only available for the temperature range from 850 to 1700°C, as a standard version. Therefore, it is not necessary to change the jumpers. If it is necessary to recalibrate the signal conditioner for a different input range or to change the analog output range or type, follow the procedure in the Adjustment and Calibration Section. Solder pad "J1" opened and Jumper "C" closed.

SENSOR BREAK DETECTION

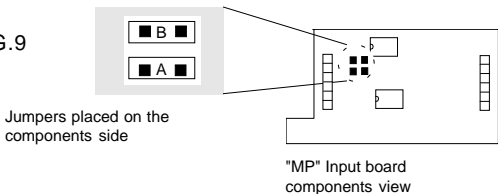
All the linearizing circuits are provided with an special control, to detect when the sensor is broken or when the circuit sensor is opened.

This control provides 2 methods of detection :

Closing jumper A : The signal output goes up over 20 mA.

Closing jumper B : The signal output goes down below 4 mA.

FIG.9

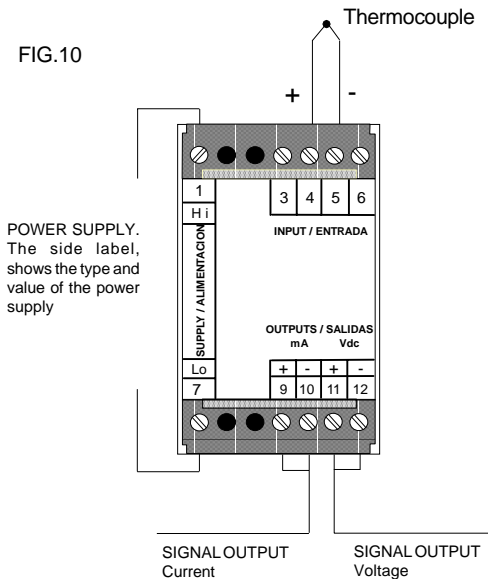


ADJUSTMENT AND CALIBRATION PROCEDURE FOR ALL THERMOCOUPLE MODELS

1. Open the signal conditioner (see Fig. 2).
2. Check on the "MA" module, if the selected power supply is correct. (Table 1).
3. Select :
On the "MP" Input Board which output type is selected and the "Sensor break" configuration, using jumpers "A" or "B". (Fig. 9).
The temperature range by solder pad J1, on the solder side of the "MP" Input Board, and Jumper C on the components side of the "ME" Input module. The setting of each jumper is indicated for each thermocouple model in the Changing the Temperature Range section (see pages 9,10 and 11).
Remove jumpers "A" and "B" on the "ME" input module.
4. Select the desired output on the "MS" output module, voltage or current, using the jumpers "E" and "F". (see Fig. 6).
5. Connect a thermocouple simulator to the conditioner terminals: 4 and 5. (Fig. 10).
6. Connect a digital multimeter to the signal output terminals : 11 and 12 for Voltage output.
: 9 and 10 for Current output.
7. Power up the conditioner with the correct power supply.
8. Adjust the thermocouple simulator, until it generates the low signal level, +3°C.
9. Turn the "ZERO" trimmer (P1), on the "ME" input module, until the multimeter shows the desired low signal output level. (For example: 4 mA)
10. Adjust the thermocouple simulator, until it generates a high signal level, +3°C.
11. Turn the "GAIN" trimmer (P2), on the "ME" input module, until the multimeter shows the desired high signal output level. (For example: 20 mA)
12. Repeat steps 8 to 11, until the two values are correct.

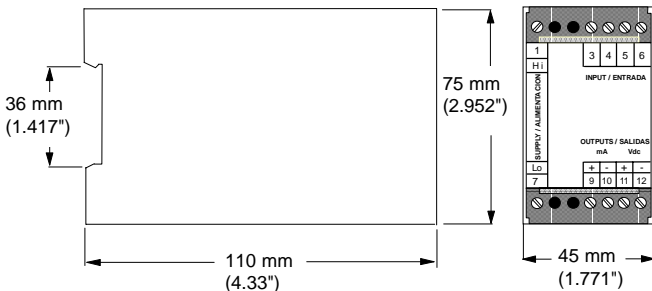
CONNECTIONS for all thermocouples

FIG.10



MECHANICAL

DIMENSIONS



TECHNICAL DATA

WEIGHT 270 g.

HOUSING BASE Polycarbonate, RAL 7032, UL 94 V-1 light grey, IP-40

TERMINAL HOUSING, COVER

AND BLIND PLUGS Polycarbonate, UL 94 V-2 dark grey, IP-20

WIRE CROSS SECTION : 4 mm²

Provided with a snap fastener for attaching to DIN 46277 and DIN EN 50022 (35 x 7.5 mm) assembly rails.

NOTES



WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of 13 months from date of purchase. OMEGA Warranty adds an additional one (1) month grace period to the normal one (1) year product warranty to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit should malfunction, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of being damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

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RETURN REQUESTS / INQUIRIES

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA'S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR WARRANTY RETURNS, please have the following information available BEFORE contacting OMEGA:

1. P.O. number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR NON-WARRANTY REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. P.O. number to cover the COST of the repair,
2. Model and serial number of product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA's policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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