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TABLE OF CONTENTS

SECTION 1 INTRODUCTION

1.1 Safety and Precautions 1
1.2 Cautions and IEC Symbols 1
1.3 Statement on CE Marking 2
1.4 Available Models 2
1.5. Communication 2
1.6 Reference Manuals 2

SECTION 2 UNPACKING

2.1 Inspection 3
2.2 Power Cords 4

SECTION 3 HARDWARE SETUP

3.1 MDS8PT Front Panel 5
3.1.1..10-Pin Connector 6
3.1.2..RTD Wiring Diagram Connector 7
3.1.3..Process Current Wiring Diagram 7
3.1.4..Universal Thermocouple Connector 8
3.2 MDS8PT Rear Panel 9
3.2.1.. Screw Terminals 10

SECTION 4 CONFIGURATION AND PROGRAMMING

4.1 Controls 11
4.2 Menu Structure 12
4.3 Selecting an Input 13
4.4 Alarm Configuration (PRoG > ALM. #) 14
4.4.1..Setting Alarm Type 14
4.4.2..Setting Alarm High/Low References 15
4.4.3..Setting the Alarm Color (PRoG > ALM.# > A.CLR) 15
4.4.4..Activating a Relay (PRog > dtR# > Mode) 15
4.5 Analog Output 16
4.5.1..Select an Output Type 16
4.5.2..Set Mode to Retransmission 16
4.5.3..Set Scaling 16

SECTION 5 SPECIFICATION

5.1 Approval Information 17

SECTION 6 MAINTENANCE 18

TABLE OF FIGURES

Figure 1. Accessories Packaged with MDS8PT Unit 3
Figure 2. MDS8PT Front Panel 5
Figure 3. 10-Pin Connector Input Pin Assignments 6
Figure 4. RTD Wiring Diagram 7
Figure 5. 4-20 mA Sensor Wiring Diagram 7
Figure 6. Mini/Standard Thermocouple 8
Figure 7. MDS8PT Rear Panel 9
Figure 8. Benchtop Meter Wiring Diagram 10
Figure 9. MDS8PT LED Display 11
Figure 10. Circular Flow of Menus 12
Figure 11. Alarm Range Option Diagram 14
Figure 12. Alarm Scaling Diagram 16

TABLE OF TABLES

TABLES

Table 1. IEC Symbols 1
Table 2. Model Features..... 2
Table 3. Supporting Documents 2
Table 4. Package Contents 3
Table 5. Optional Power Cords 4
Table 6. Front Panel Components List 5
Table 7. Sensor Inputs Assignments 6
Table 8. Rear Panel Component locations 9
Table 9. Configuration for Terminals 10
Table 10. Selecting an Input 13
Table 11. Benchtop Meter Specifications Summary 17
Table 12. Fuses 18

SECTION 1 INTRODUCTION

The MDS8PT Platinum Series Universal Benchtop Digital Meter (Benchtop Meter), is ideal for laboratory and other application uses requiring portable temperature or process measurement. It features a universal input configured for use with a thermocouple, RTD, Thermistor or Voltage/Current signal. The Benchtop Meter is factory configured and calibrated for use out of the box.

It is important to read and follow all precautions and instructions in this manual and other referenced manuals, before operating or commissioning this device, as it contains important information relating to safety and EMC.

1.1 Safety and Precautions

- Do not exceed the voltage rating.
- Always disconnect the power before changing the signal and power connections.
- Do not operate in flammable or explosive environments.
- Never operate with a power cord that is not properly rated for use with this unit.
- Remove and or disconnect main power cord before attempting any maintenance or fuse replacement.
- Do not connect and/or operate this unit to a non-grounded or non-polarized outlet or power source.

Note ☞ There are no user serviceable parts inside unit. Attempting to repair or service unit may void the warranty.

This product is not designed for medical applications.

1.2 Cautions and IEC Symbols

This device is marked with international safety and hazard symbols shown in **Table 1** below, in accordance with EN61010 3rd Edition 2012. It is important to read and follow all precautions and instructions in this manual before operating or commissioning this device as it contains important information relating to safety and EMC. Failure to follow all safety precautions may result in injury and/or damage to the meter. Use of this device in a manner not specified by the manufacturer may impair protection devices and safety features provided by the unit.

Table 1. IEC Symbols

IEC SYMBOLS	DESCRIPTION
	**CAUTION**, risk of electrical shock
	**CAUTION**, refer to accompanying documents

1.3 Statement on CE Marking

OMEGA policy is to comply with all worldwide safety and EMI/EMC regulations that apply to CE Certification standards, including EMC Directive 2014/30/EU LVD (Safety) Directive 2014/35/EU, and EEE RoHS II Directive 2011/65/EU. OMEGA is constantly pursuing certification of its products to the European New Approach Directives. OMEGA will add the CE marking to every applicable device upon verification of compliance.

1.4 Available Models

The Universal Benchtop Meter has two available models with features as listed in Table 2.

Table 2. Model Features

Model	Features
MDS8PT-330-C24-EIP	Benchtop Meter
-EIP	Ethernet
-C24	Isolated RS232 and RS485
-330	Dual Alarm Relays
-A	Isolated Analog Output
MDS8PT-330	Benchtop Meter
-330	Dual Alarm Relays (ONLY)

1.5. Communication

The Platinum Series Benchtop Meter uses a standard USB port compatible with the Omega Platinum configuration software, available from the Omega website; as well as Optional serial and Ethernet connectivity manuals. All communication options support both the Omega ASCII protocol, Modbus ASCII, Modbus RTU and Modbus TCP/IP. Refer to **Table 3** for supporting manuals.

1.6 Reference Manuals

Refer to these supporting documents for complete information about operation and configuration of the Benchtop Meter.

Table 3. Supporting Documentation

Number	Title
M5460	Platinum Series Temperature and Process Meters - User's Manual
M5461	Software Configuration - User's Manual
M5451	Platinum Series Temperature and Process Controllers - User's Manual
M5452	Serial Communication Protocol
M5458	Platinum Series User Manual - Modbus Interface

SECTION 2 UNPACKING

Read the packing list, it is important to verify all equipment shipped has been delivered as shown in **Figure 1** and **Table 4**. If there are any questions about the shipment please email or call the Customer Service Department listed in this manual.

2.1 Inspection

Inspect the shipment container and equipment for any signs of damage. Record any evidence of rough handling in transit and report any damage immediately to the shipping agent.

Note ☞ Save packaging material and carton in the event that returns are necessary. The carrier will not honor any damage claims unless all original shipping material is saved for inspection.

The main power cord is ordered separately.

Figure 1. MDS8PT Unit, manual, and separately ordered power cord.

Table 4. Benchtop meter and required materials.

Item	Name	Description
1	Unit	MDS8PT Universal Benchtop Digital Meter
2	Cord	AC Power Cord (Refer to **Table 5** on page 4)
3	Guide	MQS5576 (Quick Start Guide)

2.2 Power Cords

Electrical power is delivered to the Benchtop Meter by an AC power cord to plug into the IEC 60320 C-13 power socket located on the rear panel of the unit. Refer to **Section 3.2** **Figure 7** for detailed connections.

The input power is fused. Relay terminals must be limited to 30 VRMS and are fused on the common terminals.

The main power cord is ordered separately.

The Benchtop Meter operates from 90 to 240 VAC, 50-60 Hz, 4W. Main power cord is ordered separately. **Table 5** below, lists optional power cords.

Table 5. Optional Power Cords.

PWR Cord Type	Part Number	PWR Rating
United Kingdom, Ireland	Power Cord-UK	240V
Denmark	Power Cord-DM	230V, 16A
USA, Canada, Mexico	Power Cord-Molded	120V
Italy	Power Cord-IT	230V, 16A
Continental Europe	Power Cord E-10A	240V, 10A
Europe	Power Cord E-16A	240V, 16A

SECTION 3 HARDWARE SETUP

The hardware connections and configuration to operate the Universal Benchtop Digital Meter.

3.1 MDS8PT Front Panel

The controls, indicators and input connections of the Benchtop Meter are shown in **Figure 2**.

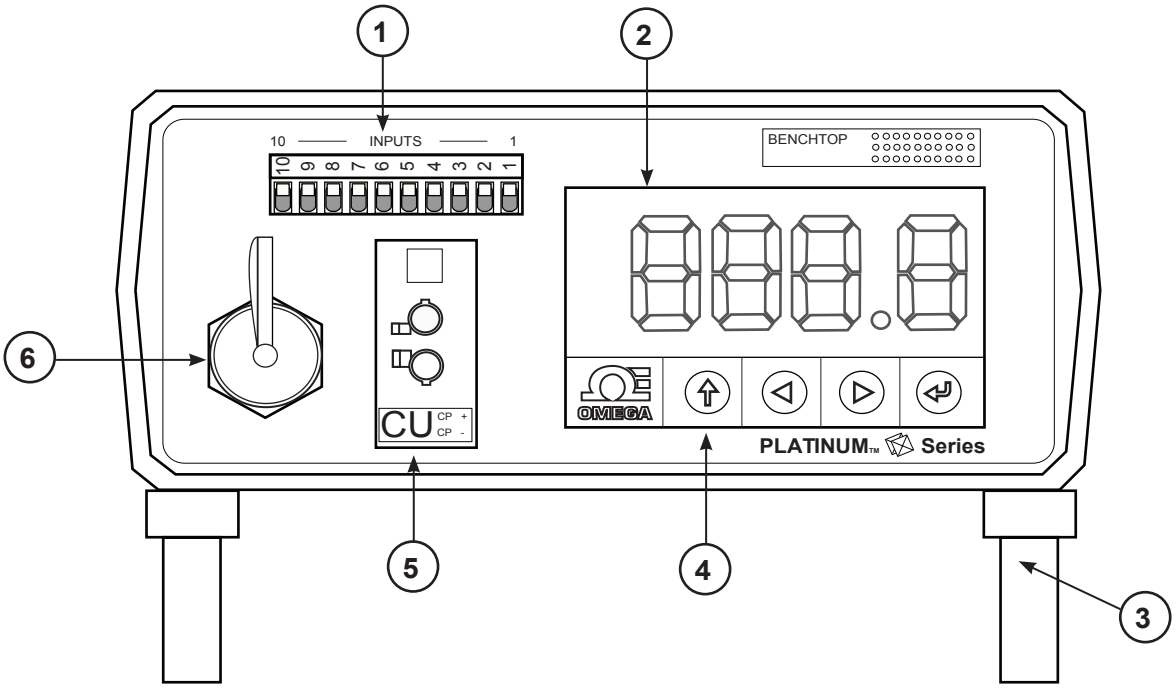

Figure 2. MDS8PT Front Panel. **(Not to scale)**

Table 6. Front Panel Compnents List.

Item	Name	Description
1	10-Pin Input Connector	Process RTD and Thermistor Inputs
2	Display - Meter/Alarm	Four-digit, three-color, LED Display
3	Adjustable Feet	Adjusts viewing angle.
4	Push Buttons	Menu navigation
5	Universal Panel Jack (UPJ)	Thermocouple Input
6	USB Port	USB Port, Type A Female

3.1.1 10-Pin Connector

Figure 3 shows the10-pin connector with corresponding input pin assignments. Sensor selection is firmware-controlled, and no jumper settings are required to switch between different sensor types.

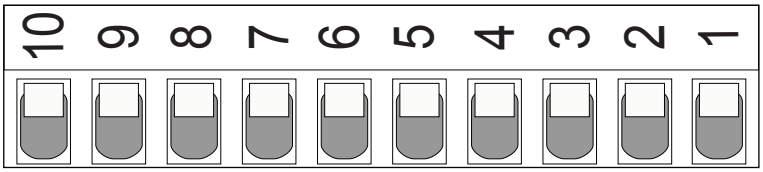

Figure 3. 10-Pin Connector Input Pin Assignments.

Pin No.	Code	Description
1	ARTN	Analog return signal (analog ground) for sensors.
2	AIN+	Analog positive input
3	AIN-	Analog negative input
4	APWR	Analog power (Only used for 4-wire RTDs)
5	- -	Not Used
6	EXCT	Excitation voltage output referenced to ISO GND
7	DIN	Digital input signal (latch reset), positive at > 2.5, Ref. to ISO GND
8	ISO GND	Isolated ground for serial communications, excitation, and digital input
9	RX/A	Serial communications receive
10	TX/B	Serial communications transmit

Table 7 summarizes the universal input pin assignments for different sensor inputs. Refer to **Section 5** - Configuration and Programming, for details to program the unit for desired sensor settings.

Table 7. Sensor Inputs Assignments.

Pin Number	Process Voltage	Process Current	2-Wire RTD	3-Wire RTD	4-Wire RTD	Thermistor
1	Rtn		**	RTD2-	RTD2+	
2	Vin +/-	I+	RTD1+	RTD1+	RTD1+	TH+
3		I-			RTD2-	TH-
4			RTD1-	RTD1-	RTD1-	

**** Requires external connections to Pin-4.**

3.1.2 RTD Wiring Diagram Connector

Figure 4 illustrates the wiring diagram for connecting a platinum RTD. A two-wire RTD requires an external jumper from Pin 1 to Pin 4.

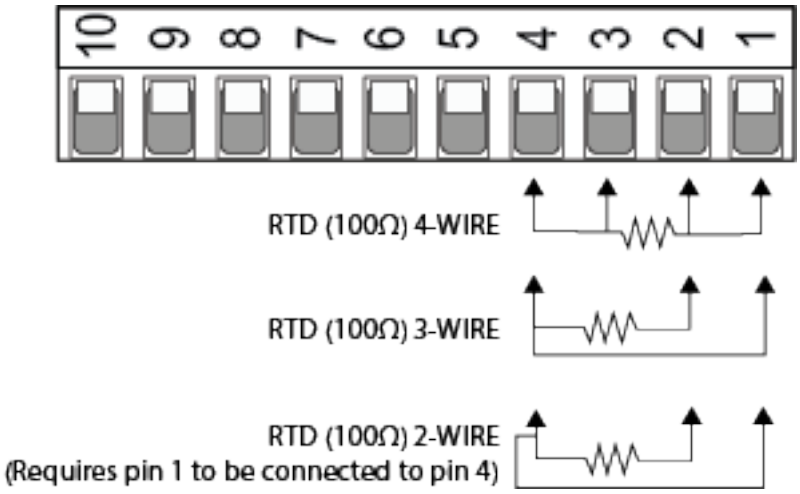

Figure 4. RTD Wiring Diagram.

3.1.3 Process Current Wiring Diagram

Figure 5 illustrates the wiring diagram for connecting 4-20mA Sensor using internal or external excitation. Refer to M5460 **Section 4** for details on setting up internal excitation.

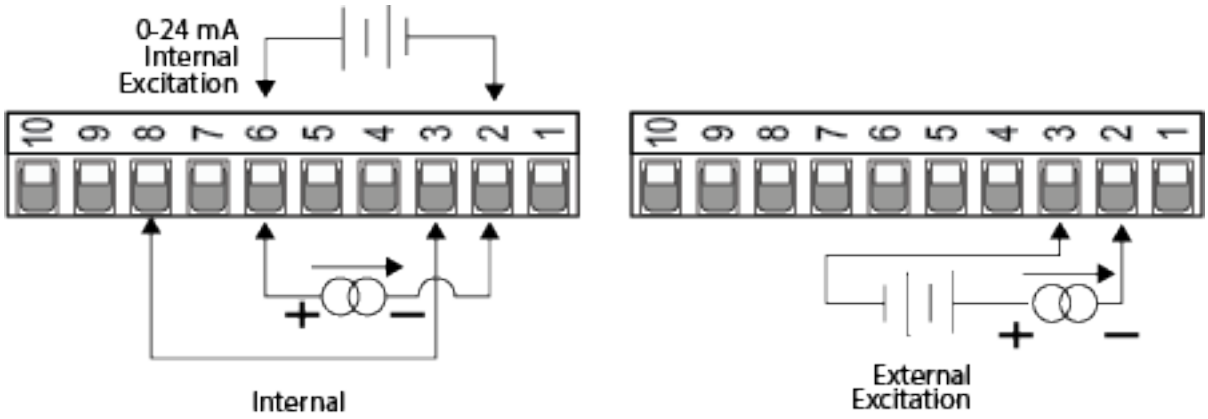

Figure 5. 4-20 mA Sensor Wiring Diagram.

3.1.4 Universal Thermocouple Connector

The Benchtop Meter accepts both Mini and Standard thermocouple connectors using the Universal Panel Jack shown in **Figure 6**. The Benchtop Meter has internal cold junction compensation and is compatible with thermocouples listed in **Table 7** on page 6.

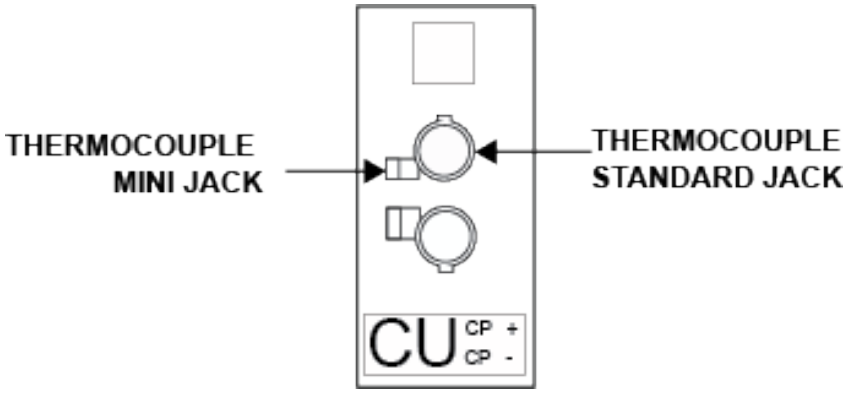

Figure 6. Mini/Standard Thermocouple.

3.2 MDS8PT Rear Panel

The Rear Panel connections for the Benchtop Meter are shown in **Figure 7 below.**

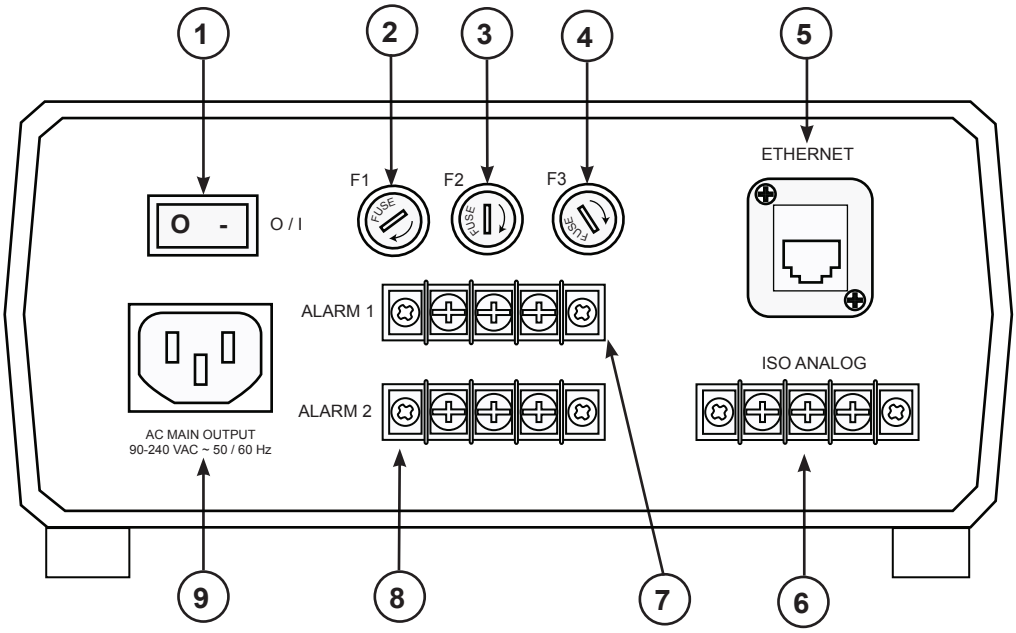

Figure 7. MDS8PT Rear Panel. **(Not to scale)**

Table 8. Rear Panel Component locations.

Item	Name	Description
1	ON/OFF Switch	Turns the unit on
2	F1 (Fuse)	Protects the AC power input
3	F2 (Fuse)	Protects Alarm 1
4	F3 (Fuse)	Protects Alarm 2
5	Ethernet Port (RJ45)	10/100Base-T
6	Isolated Analog Terminal	Analog Output
7	ALARM 1 Terminal	Alarm 1 Dual Throw Relay (Dry Contact)
8	ALARM 2 Terminal	Alarm 2 Dual Throw Relay (Dry Contact)
9	AC Main Input Plug	IEC60320 C13, Power Socket.

3.2.1 Screw Terminals

Figure 8 shows the wiring confdigurations of the rear terminals connections for Alarms and optional Isolated Analog terminals.

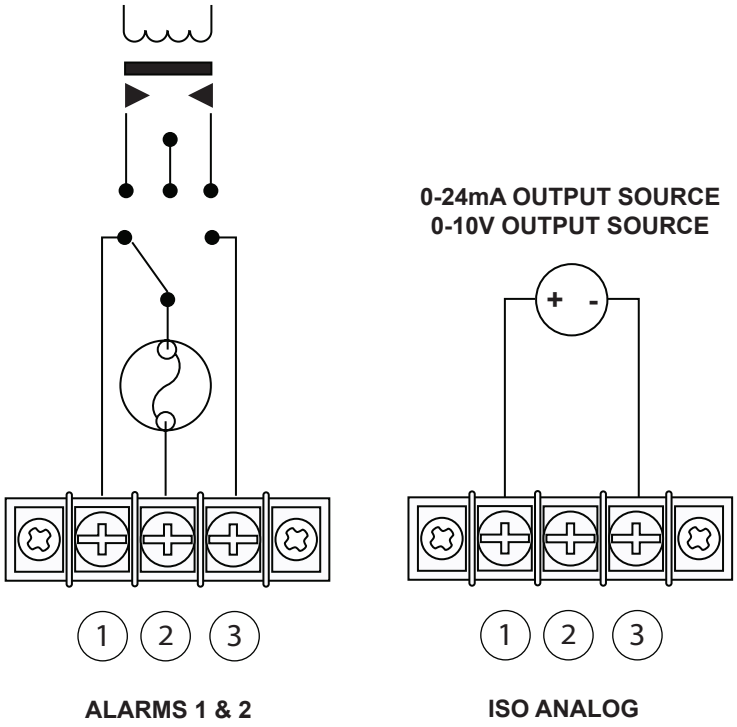

Figure 8. Benchtop Meter Wiring Diagram.

Table 9. Configuration for Terminals.

	Terminal Numbers		
Configuration	3	2	1
Alarms 1 and 2*	Normally Open	Relay Common	Normally Closed
ISO Analog	Analog Output	Not Connected	Analog Return

* 3A 30V Max Dry Contact

SECTION 4 CONFIGURATION AND PROGRAMMING

4.1 Controls

The **UP** Button moves up a level in the menu structure. Pressing and holding the **UP** Button navigates to the top level of any menu (**oPER**, **PRoG**, or **INIt**). This is a useful way of reorienting if you get lost in the menu structure.

The **LEFT** Button moves across a set of menu choices at a given level. When changing numerical settings, press the **LEFT** Button to make the next digit (one digit to the left) active.

The **RIGHT** Button moves across a set of menu choices at a given level. The **RIGHT** Button also increments numerical values. When incrementing a digit past “9” it returns to “0”.

The **ENTER** Button selects a menu item and goes down a level. It also enters a numerical value or parameter choice.

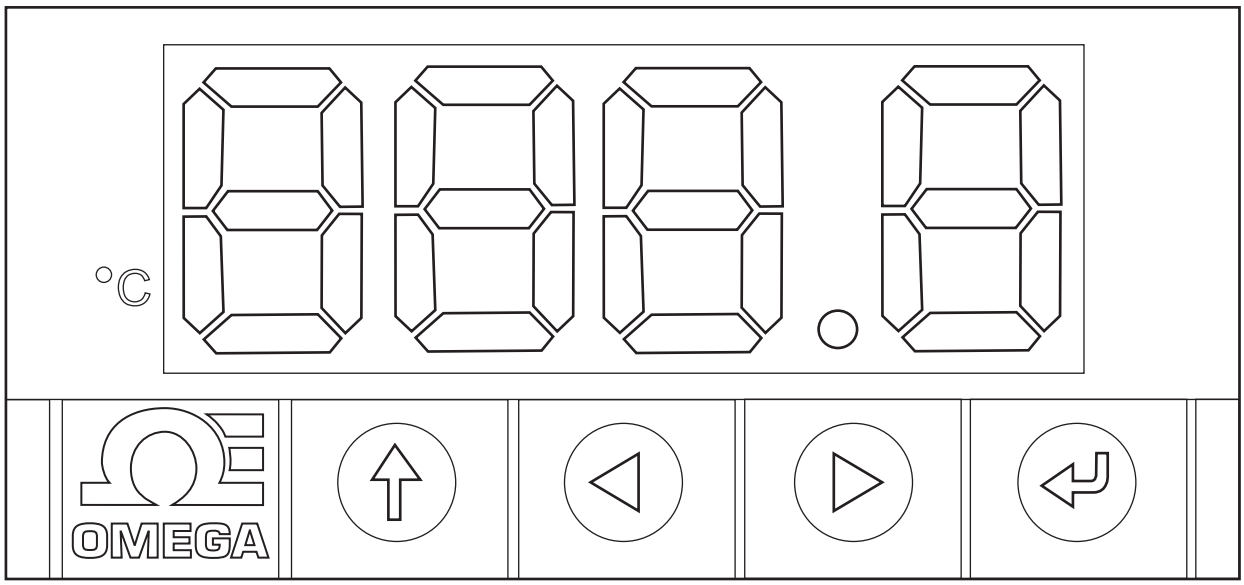

Figure 9. MDS8PT LED Display.

4.2 Menu Structure

The menu structure of the Platinum Series Display Meter is divided into three main Level-1 Modes: Initialization (**INIt**), Programming (**PRoG**) and Operations (**oPER**).

INIt Initialization Mode: These settings are rarely changed after initial set up. They include transducer types, calibration, etc. These settings can be password protected.

PRoG Programming Mode: These settings are frequently changed. They include set points, Control Modes, Alarms, etc. These settings can be password protected.

oPER Operating Modes: The setting of this mode allow users to switch between Run Mode, Standby Mode, and Manual Mode etc.

Note ☞ For a detail discussion of Levels 2 thru 8, refer to the Platinum Series Temperature and Process Meters- User's Manual (M5460).

Figure 10 illustrates how to use the **LEFT** and **RIGHT** Display Buttons to navigate around a menu selection.

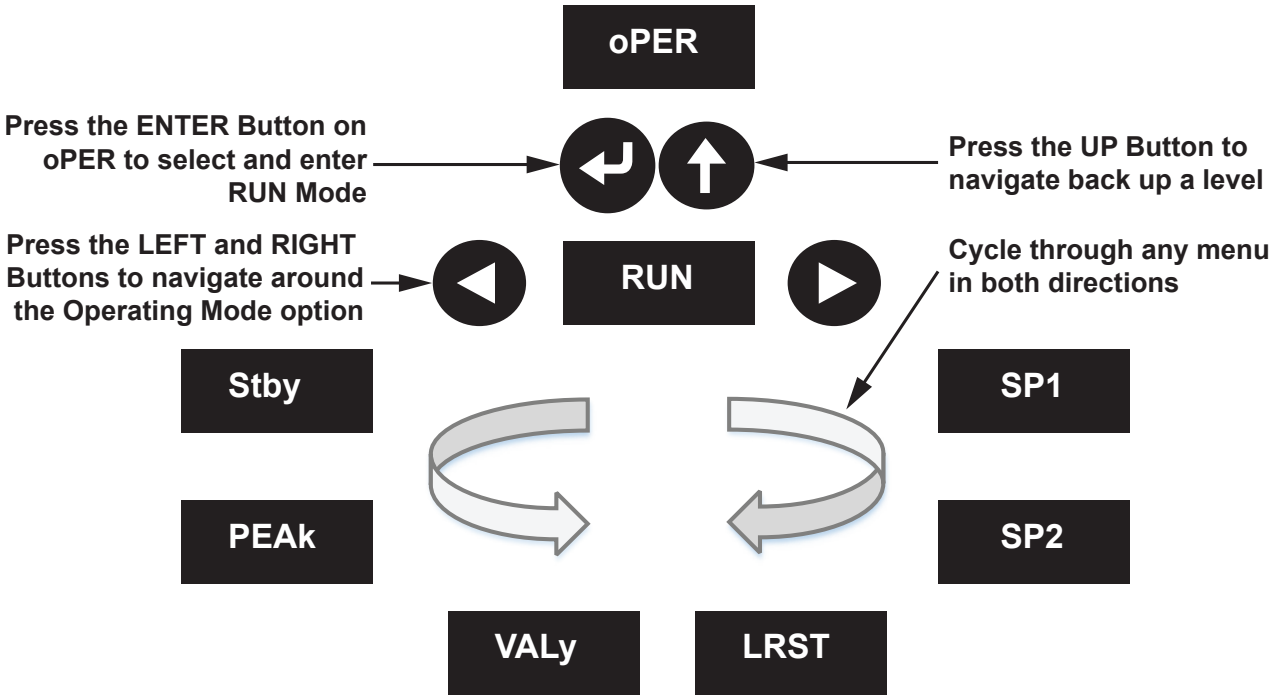

Figure 10. Circular Flow of Menus.

4.3 Selecting an Input

The Benchtop Meter features a User Programmable Universal Input. Select the input type using **TABLE 10.** Initialization Mode Menu, below. Refer to **Section 3.1.2 to 3.1.3** for Input Wiring Diagrams.

Level 1	Level 2	Level 3	Level 4	Level 5	Level 6	Level 7	Notes
INIT	INPt	t.C.	k				Type K thermocouple
			J				Type J thermocouple
			t				Type T thermocouple
			E				Type E thermocouple
			N				Type N thermocouple
			R				Type R thermocouple
			S				Type S thermocouple
			b				Type B thermocouple
			C				Type C thermocouple
		Rtd	N.wIR	3 wI			3-wire RTD
				4 wI			4-wire RTD
				2 wI			2-wire RTD
			A.CRV	385.1			385 calibration curve, 100 Ω
				385.5			385 calibration curve, 500 Ω
				385.t			385 calibration curve, 1000 Ω
				392			392 calibration curve, 100 Ω
				3916			391.6 calibration curve, 100 Ω
		tHRM	2.25k				2250 Ω thermistor
			5k				5000 Ω thermistor
			10k				10,000 Ω thermistor
		PRoC	4–20				Process input range: 4 to 20 mA
				Note: This Manual and Live Scaling submenu is the same for all **PRoC** ranges.			
				MANL	Rd.1	-----	Low display reading
					IN.1	-----	Manual input for Rd.1
					Rd.2	------	High display reading
					IN.2	-----	Manual input for Rd.2
				LIVE	Rd.1	-----	Low display reading
					IN.1	-----	Live Rd.1 input, ENTER for current
					Rd.2	-----	High display reading
					IN.2	-----	Live Rd.2 input, ENTER for current
			0–24				Process input range: 0 to 24 mA
			+-10				Process input range: -10 to +10 mA
			+-1				Process input range: -1 to +1 mA
			+-0.1				Process input range: -0.1 to +0.1 mA

Table 10. Selecting Inputs.

4.4 Alarm Configuration (PRoG > ALM. #)

The PLATINUM Series Benchtop Meter supports two Alarms. Each Alarm can be connected to an internal Single Pole Double Throw (SPDT) Mechanical Relay.

The Alarms are programmed using the Program Submenu. Alarm 1 and 2 have identical default settings and submenu for configuring the Alarm functions. A brief outline of Alarm settings is below.

Alarm Settings include:

Setting	Alarm Function
tyPE	Alarm type
ALR.H	Alarm High parameter, used for Alarm trigger calculations.
ALR.L	Alarm Low parameter, used for Alarm trigger calculations.
A.CLR	Alarm Color indication.

Note ☞ For a more detailed discussion of setting up and configuring the Alarm functions, refer to the Platinum Series Temperature and Process Meters - User's Manual (M5460).

4.4.1 Setting Alarm Type

Use the Alarm Type (tyPE) parameter to control the basic behavior of the selected alarm.

Types	Alarm Behavior
oFF	Alarm is off (factory default)
AboV	Alarm is triggered when the process value exceeds ALR.H.
bELo	Alarm is triggered when the process value is less than ALR.L.
HI.Lo	Alarm is triggered when the process value is outside the ALR.L–ALR.H.
bANd	Alarm is triggered when the process value is within the ALR.L–ALR.H.

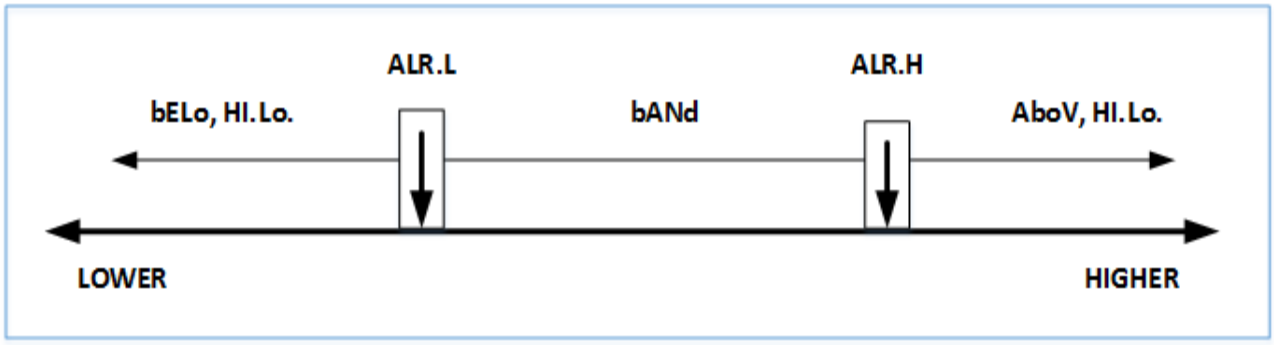

Figure 11. Alarm Range Option Diagram.

4.4.2 Setting Alarm High/Low References:

- Alarm High Reference (PRoG > ALM.#> ALR.H).
- Alarm Low Reference (PRoG > ALM.# > ALR.L).

1. Use the ◀ button to select a digit to change;
2. Then select the ▶ button to increment the digit;
3. Save the setting with the ↵ button.

4.4.3 Setting the Alarm Color (PRoG > ALM.# > A.CLR)

The Benchtop Meter can change color in the display when an alarm is triggered. The Alarm color options are listed below.

Setting	Description
REd	Alarm conditions are displayed in red. (Factory default)
AMbR	Alarm conditions are displayed in amber.
GRN	Alarms conditions are displayed in green.
dEFt	Alarms do not display color.

4.4.4 Activating a Relay (PRog > dtR# > Mode)

To activate a relay when an alarm is triggered, change the output type of the relay to the desired alarm. PRoG > DTR.# > Mode.

Setting	Function
oFF	Turn off the output channel. (Factory default)
ALM.1	Set the output to be an Alarm, activating when alarm conditions according to the ALM.1 configuration parameters are active.
ALM.2	Set the output to be an Alarm, activating when alarm conditions according to the ALM.2 configuration parameters are active.

4.5 Analog Output

The optional Analog Output can be configured to transmit a Voltage or current signal proportional to the Input. Select the output type in the PRog. > IAN.1 > RNGE menu.

For a more detailed discussion of setting up and configuring the Analog Output. Refer to the Platinum Series Temperature and Process Controllers - User's Manual (M5451).

4.5.1 Select an Output Type

The scaling of input readings to output voltage or current is fully user configurable.

Type	Description
0-10	0 to 10 Volts (factory default)
0-5	0 to 5 Volts
0-20	0 to 20 mA
4-20	4 to 20 mA
0-24	0 to 24 mA

4.5.2 Set Mode to Retransmission

Enable the output by setting the mode to Retransmission (PRog. > IAN.1 > Mode > RtRN)

4.5.3 Set Scaling

The retransmission signal is scaled using the following 4 parameters. The unit will display the first scaling parameter, **Rd1**, after **RtRN** is selected.

Setting	Parameters
Rd1	Process reading 1; the process reading that corresponds to the output signal **oUt1.**
oUt1	The output signal that corresponds to the process value **Rd1**.
Rd2	Process reading 2; the process reading that corresponds to the output signal **oUt2**.
oUt2	The output signal that corresponds to the process value **Rd2**.

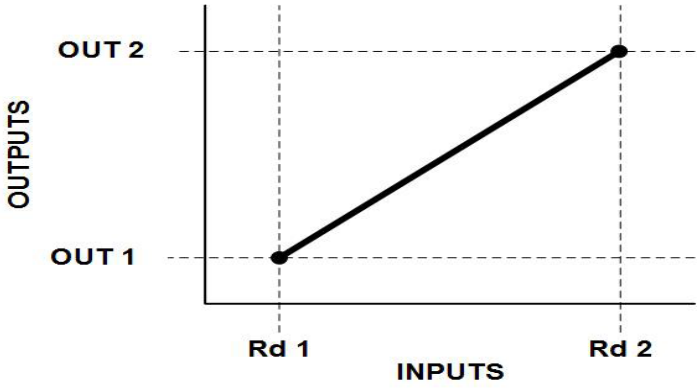

Figure 12. Alarm Scaling Diagram.

SECTION 5 SPECIFICATION

For a detail list of Specifications for the Platinum Meter, refer to the Temperature and Process Meters - User's Manual (M5460 - **Section 7**).

Table 11. Benchtop Meter Specifications Summary.

Model MDS8PT	
Sensor Input(s) Channel	Single-Channel, Universal Input
Power All Models: **Fused:**	90 to 240 VAC 50/60 Hz, 4W Time-Lag, 0.1A, 250 V
Alarm Output 1 and 2: **Fused:**	SPDT Relay, Class "C" 30 VRMS Max. Time-Lag, 3A, 250 V
Isolated Analog, **Output Option:**	1.5 kV Isolation, programmable for control or retransmission; Voltage Output 0-10 V output. 500 Ohms Min. Accuracy 0.1%; Current Output 0-20 mA output. 500 Ohms Max Accuracy is 0.1% ; Step response time 100 ms.
Enclosure: **Material:** **Size:**	Case - Plastic (ABS), Handle -Anodized Aluminum 20.95 W x 9.525 H x 20.32 cm D (8.25 W x 3.75 H x 8" D)
Weight: MDS Platinum Series	1.36 kg (3 lb)

5.1 Approval Information

EMC:
2014/30/EU (EMC Directive)

Electrical Safety: 2014/35/EU (Low Voltage Directive)
Safety requirements for electrical equipment for measurement, control, and laboratory.

Double Insulation; Pollution Degree 2
Dielectric withstand Test per 1 min
- Power to Input/Output: 2300 Vac (3250 Vdc)
- Ethernet to Inputs: 1500 Vac (2120 Vdc)
- Isolated RS232 to Inputs: 500 Vac (720 Vdc)
- Isolated Analog to Inputs: 500 Vac (720 Vdc)

Measurement Category I
Category I includes measurements performed on circuits not directly connected to the Mains Supply (power). Maximum Line-to-Neutral working voltage is 50Vac/dc. This unit should not be used in Measurement Categories II, III, and IV.

Transients Overvoltage Surge (1.2 / 50uS pulse)
- Input Power: 2500 V
- Input Power: 1500 V
- Ethernet: 1500 V
- Input/Output Signals: 500 V

ADDITIONAL INFORMATION:
FCC: This device complies with Part 15, Subpart B, Class B of the FCC rules, for option –EIP only.
RoHS II: The above product has been declared by the original supplier as Compliant. The manufacturer of this item declares that the product complies with the EEE RoHS II Directive 2011/65/EC.

UL File Number: E209855

1 I/O signal and control lines require shielded cables, and these cables must be located on conductive cable trays or in conduits. The length of these cables should not exceed 30 meters.

SECTION 6 MAINTENANCE

These are the maintenance procedures required to keep the Benchtop Meter in optimal performance.

6.1 Calibration

This unit is calibrated to give optimum performance over its full operating range. Additional user calibration is available with adjustable gain and offset as well as ice paint calibration. Refer to Temperature and Process Meters - User's Manual (M5460) for additional information on user calibration to adjust the meter to a specific application.

6.2 Cleaning

Lightly dampen a soft clean cloth with a mild cleaning solution and gently clean the Benchtop Meter.

Remove all electrical connections and power before attempting any cleaning.

Do not insert any foreign objects into the Benchtop Meter.

6.3 Fuse Replacement

The Benchtop Meter contains three (3) fuses to protect operation. Fuse F1 is used to provide AC Power protection. Fuse F2 is used to protect the Alarm 1 Relay. Fuse F3 is used to protect Alarm 2 relay. Refer to **Table 11** below for Fuse ratings.

Disconnect all power from source before attempting fuse replacement.

For continued protection against risk of fire, replace fuses with only the same size, type and rating with safety approvals indicated here and on the rear panel of the Benchtop Meter.

Table 12. Fuses

Fuse*	Type
Rear Panel Fuse (F1)	0.1A 250V, 5x20mm, Slow Blow
Rear Panel Fuse (F2, F3)	3.0A 250V, 5x20mm, Slow Blow

*For all Models: UL./CSA/VDE Approved.

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **61 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **five (5) year product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, 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 having been 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 in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by the company will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESSED OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.

CONDITIONS: Equipment sold by OMEGA is not intended to be used, nor shall it be used: (1) as a "Basic Component" under 10 CFR 21 (NRC), used in or with any nuclear installation or activity; or (2) in medical applications or used on humans. Should any Product(s) be used in or with any nuclear installation or activity, medical application, used on humans, or misused in any way, OMEGA assumes no responsibility as set forth in our basic WARRANTY/DISCLAIMER language, and, additionally, purchaser will indemnify OMEGA and hold OMEGA harmless from any liability or damage whatsoever arising out of the use of the Product(s) in such a manner.

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. Purchase Order 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. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the 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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