OM-501

Reads up to 12 thermocouple inputs of nine different calibrations. Also reads AC/DC voltage and resistance.

	Input Type	Measuring Range
Vdc	Voltage	±20mV, ±200mV, ±2V, ±20V, ±50V, 0 to 10 mV, 1 to 5 V and 0 to 10 V
J	Iron-Constantan	-328 to 1,652°F
K	Chromel-Alumel	-328 to 2,462°F
T	Copper-Constantan	-328 to 752°F
E	Chromel-Constantan	-328 to 1,472°F
R	Pt-Pt/13% Rh	32 to 2,912°F
S	Pt-Pt/10% Rh	32 to 2,912°F
B	Pt/6% Rh-Pt/30% Rh	752 to 3,092°F
N	Omegalloy™	-328 to 2,372°F
C	W/5% Re-W/26% Re	32 to 2,912°F

OM502

Reads up to 12 RTD (DIN) inputs as well as AC/DC voltage and resistance on DMM channel.

RTD	−328 to 1,022°F

OM503

Reads up to six thermocouple and six RTD inputs. AC/DC voltage and resistance can be read as well.

Vdc	Voltage	±20mV, ±200mV, ±2V, ±20V, ±50V, 0 to 10 mV, 1 to 5 V and 0 to 10 V
J	Iron-Constantan	-328 to 1,652°F
K	Chromel-Alumel	-328 to 2,462°F
T	Copper-Constantan	-328 to 752°F
E	Chromel-Constantan	-328 to 1,472°F
R	Pt-Pt/13% Rh	32 to 2,912°F
S	Pt-Pt/10% Rh	32 to 2,912°F
B	Pt/6% Rh-Pt/30% Rh	752 to 3,092°F
N	Omegalloy™	-328 to 2,372°F
C	W/5% Re-W/26% Re	32 to 2,912°F
RTD	100Ω Pt	-328 to 1,022°F

Front-panel (DMM) input for all models

Input Type	Measuring Range	Max. Sensitivity
Vdc	20 mV, 200 mV, 2 V, 20 V, 50 V,	5 μ V
Vac	2 V, 20 V, 200 V, 250 V	200 μ V
Ohms	200Ω, 2kΩ, 20kΩ, 200kΩ, 2MΩ	50mΩ

Omegalloy™, Type N, is generically known as Nicrosil-Nisil

4-2. Specifications.

Measuring range, number of display digits

Rear-panel inputs (CH1 to CH12):

Input type	Range code	Measuring range		Engineer-ing unit	Number of digits	Description
DC V	00	−20 to +20 mV		mV	□□.□□□	
	01	−200 to +200 mV			□□□.□□	
	02	−2 to +2 V		V	□.□□□□	
	03	−20 to +20 V			□□.□□□	
	04	−50 to +50 V			□□.□□	
	05	1 to 5 V		Blank	□□□□.□	Scaling Refer to Note 1
	06	0 to 10 mV				
	07	0 to 10 V				
Thermocouple	10	Type R	0 to 1600°C 32 to 2912°F	°C °F	□□□□.□ □□□□	
	11	Type S	0 to 1600°C 32 to 2912°F	°C °F	□□□□.□ □□□□	
	12	Type B	400 to 1700°C 752 to 3092°F	°C °F	□□□□.□ □□□□	
	13	Type K	−200 to 1350°C −328 to 2462°F	°C °F	□□□□.□ □□□□	
	14	Type E	−200 to 800°C −328 to 1472°F	°C °F	□□□.□ □□□□.□	
	15	Type J	−200 to 900°C −328 to 1652°F	°C °F	□□□.□ □□□□.□	
	16	Type T	−200 to 400°C −328 to 752°F	°C °F	□□□.□ □□□.□	
	17	Type N	−200 to 1300°C −328 to 2372°F	°C °F	□□□□.□ □□□□	
	18	Type W	0 to 1600°C 32 to 2912°F	°C °F	□□□□.□ □□□□	
Resistance temperature sensor	20	Pt 100Ω	−200 to 550°C −328 to 1022°F	°C °F	□□□.□ □□□□.□	Measured current 1 mA
	21	Pt 100Ω	−200 to 250°C −328 to 482°F	°C °F	□□□.□ □□□.□	Measured current 2 mA
	22	Pt 50Ω	−200 to 550°C −328 to 1022°F	°C °F	□□□.□ □□□□.□	Measured current 2 mA

Notes 1. Range codes 05 to 07 are fixed ranges, which can be arbitrarily set on conditions that range is within −2000.0 to +2000.0 and that the span is ≦ 2000.0.
       2. Only negative signs are displayed in the table (positive signs are omitted).

Front-panel inputs (CH13 or DMM):

Input type	Range code	Measuring range	Engineer-ing unit	Number of digits	Description
DC V	00	−20 to +20 mV	mV	☐☐.☐☐☐	
	01	−200 to +200 mV		☐☐☐.☐☐	
	02	−2 to +2 V	V	☐.☐☐☐☐	
	03	−20 to +20 V		☐☐.☐☐☐	
	04	−50 to +50 V		☐☐.☐☐	
AC V (Average value-rectified, effective value-calibrated)	30	0 to 2 V	V	☐.☐☐☐☐	Frequency is 40 Hz to 1 kHz.
	31	0 to 20 V		☐☐.☐☐☐	
	32	0 to 200 V		☐☐☐.☐☐	
	33	0 to 250 V		☐☐☐.☐	
Resistance	40	0 to 200Ω	Ω	☐☐☐.☐☐	Measured current 1 mA
	41	0 to 2kΩ	kΩ	☐.☐☐☐☐	Measured current 1 mA
	42	0 to 20kΩ		☐☐.☐☐☐	Measured current 10µA
	43	0 to 200kΩ		☐☐☐.☐☐	Measured current 10µA
	44	0 to 2MΩ	MΩ	☐.☐☐☐☐	Measured current 1µA

Notes 1. For DMM mode, the range is automatically set, and for TREND/LOGGING mode (CH13 is used), the range is manually set using the key board.

2. Only negative signs are displayed in the table (positive signs are omitted.)

3. On the OM-503 model, the first six channels are for RTD's only; channels 7-12 are for T/C's or Voltage inputs.

Standard Performances

Accuracy, resolving power

Input	Range	Measuring (Digital display, recording)		Recording (Analog trend)*	
		Accuracy	Resolution	Accuracy	Resolution
DC V	±20 mV	± (0.2% of rdg + 10 digits)	5 μV	±0.2% of span (excluding measuring accuracy)	0.1% of span
	±200 mV	± (0.2% of rdg + 5 digits)	20 μV		
	±2 V	± (0.1% of rdg + 5 digits)	200 μV		
	±20 V	± (0.3% of rdg + 5 digits)	2 mV		
	±50 V	± (0.3% of rdg + 5 digits)	20 mV		
	1 to 5 V	± (0.3% of rdg + 5 digits)	400 μV		
	0 to 10 mV	± (0.2% of rdg + 10 digits)	5 μV		
	0 to 10 V	± (0.3% of rdg + 5 digits)	2 mV		
Thermo-couple	R, S, B	± (0.05% of rdg + 0.5°C)	0.2°C		
	K, E, J T, N, W	R, S; {0 to 100°C: ±3.7°C {100 to 300°C: ±1.5°C B; 400 to 600°C: ±1°C	0.1°C		
Resistance temperature detector	Pt 100Ω Pt 50Ω	± (0.1% of rdg + 0.3°C)	0.1°C		
AC V	2 V	± (0.4% of rdg + 0.2% of range)	200 μV		
	20 V		2 mV		
	200 V		20 mV		
	250 V		200 mV		
Resistance	200 Ω	± (0.2% of rdg + 5 digits) When 200 Ω range is used, 10 digits equivalent to the measuring leadwire are added.	20 mΩ		
	2 kΩ		200 mΩ		
	20 kΩ		2 Ω		
	200 kΩ		20 Ω		
	2MΩ		200 Ω		

(*) The accuracy and resolution are measured when the setting span of each input is
more than the below and the range nearest to the setting span is used.
    DC V   : 3 mV
    Thermocouple : 100°C and 3 mV
    Resistance temperature detector: 20°C (40°C for Pt 50 Ω)
    AC V   : 200 mV
    Resistance   : 20 Ω

Thermocouple Reference Junction Compensation

Error: When the temperature at the input terminals is in equilibrium at the ambient temperature

5 to 40°C: Types R, S, B . . . ±1°C

Types K, J, E, T, N, W . . . ±0.5°C

Input Terminal Temperature Characteristic: When the temperature is in equilibrium, the temperature distribution at input terminal is within 0.3°C.

Scanning Interval: TREND mode,

FIX (5S); 5 seconds/13CH

AUTO; Scanning interval is automatically changed according to the programmed chart speed. Chart is fed 0.25 mm each scan. When the chart feed speed is faster than 180 mm/h, the period is 5 seconds.

(Example) When the chart feed speed is 50 mm/h,

$$60 \text{ minutes} \times 60 \text{ seconds}/\frac{50 \text{ mm}}{0.25 \text{ mm}}$$

$$= 18 \text{ seconds}$$

LOGGING mode,

	Scanning interval for measuring	Scanning interval for recording
FIX (5S)	5 seconds	1 minute to 24 hours (set by one minute)
AUTO	1 minute to 24 hours (set by one minute)	

Scanning Speed (Carriage Speed): Approx. 3 seconds/150 mm.

Chart Speed: 1 to 1200 mm/h. Set by 1 mm/h.

Input Resistance:

Rear-panel input

DC V input (mV range) }
Thermocouple input   } 10 MΩ or more

DC V input (V range) Approx. 1 MΩ

Front-panel input

DC V input { 20/200 mV/2 V range   10 MΩ or more
            { 20/50 V range   Approx. 5 MΩ

AC V input { 2 V range   10 MΩ or more
           { 20/200/250 V range   Approx. 1 MΩ

Input Bias Current: 10 nA or less

Approx. 10 nA (for 8 ms/one point) flows during checking burnout.

Insulation Resistance: At least 20 MΩ at 500 V DC between each terminal and case.

Dielectric Strength:

1500 V (50/60 Hz) for one minute between power terminals and case (leak current; 5 mA or less)

1000 V (50/60 Hz) for one minute between input terminals and case

1000 V (50/60 Hz) for one minute between input terminals

Power Consumption: 40 VA or less

Memory Backup: Three months or longer (red "BATTERY" LED flashes if the battery is worn out).

System Alarm: "FAIL" (red LED) lights if CPU fails.

Clock Accuracy: ±20 ppm (one second error might be caused whenever the power is ON and OFF).

Chart Feed Accuracy: ±0.1%

Chart End Detector: The red "CHART" LED lights when chart end is sensed. Recording stops when the chart is fed 60 mm after this indicators lights,

Burnout Protection: If a thermocouple is burnt (disconnected), the instrument detects a greater signal source resistance than 10 MΩ (burnout status).

Recorder

Printout Method: Raster scan, six-color wire dot printer.

Chart: Z-fold chart, whose total width is 210 mm, total length is 16 m, and analog recording width is 150 mm.

Recording Colors: Analog data

Channel Number	1, 7	2, 8	3, 9	4, 10	5, 11	6, 12
Color	Purple	Red	Green	Blue	Brown	Black

Digital data   LOGGING mode and program list (purple), alarm (red), channel identification numbering (the same colors as those of analog data), digital data in analog trend plus digital logging (black), analog and digital DMM data (purple).

Display: 7-segment red LED, character size is approx. 10 mm.

Normal Operating Conditions

Power Voltage: 100 V, 115 V, 200 V or 230 V AC ±10%.

Power Frequency: 50, 60 Hz ±2%.

Ambient Temperature: 5 to 40°C.

Ambient Humidity: 20 to 80% RH.

Vibration: 10 to 60 Hz, 0.02 G

Magnetic Field: 400 A/m or less (DC; 50/60 Hz).

Noise: Normal mode noise (50, 60 Hz)

DC V, thermocouple . . . One and half times the range or less (peak value including signal).

Resistance temperature detector. . . 50 mV or less (peak value)

Common mode noise (50, 60 Hz)

DC V, thermocouple . . . 100 V or less

Resistance temperature detector . . 100 V or less

Input Signal Source Resistance:

DC V, thermocouple . . . 2 kΩ or less

Resistance temperature detector . . . .

10 Ω or less/wire (Pt 100 Ω)

5 Ω or less/wire (Pt 50 Ω)

Mounting: Horizontal at both sides. The front panel may be tilted upward a maximum of 30°. Panel tilt forward cannot be allowed.

Effect of Operating Conditions

Effect of Power Source Variation: When the variation is 10% of the rated voltage, the effects are as follows:

- Display (measured value) ... ±(0.1% of rdg + 0.02% of range) or less
- Record ... ±0.1% or less of span (excluding the measured value variation)

When the variation is 2% of the rated frequency, there is no effect in both display and record.

Effect of Ambient Temperature: When the ambient temperature changes ±10°C, the effects are as follows:

- Display (measured value) ... ±(0.1% of rdg + 0.03% of range) or less
- Record ... ±0.1% or less of span (excluding measured value variation)

Thermocouple reference junction compensation errors are not included in the above values.

Effect of External Magnetic Field:

The effects against 400 A/m at both DC and AC (50/60 Hz) are:

- Display (measured value) ... ±(0.5% of rdg + 0.1% of range) or less
- Record ... ±0.2% or less of span (excluding measured value variation)

Effect of External Noise:

Normal mode noise

The effects on the normal operating conditions are:

- Display (measured value) ... NMRR 40 dB or more
- Record ... ±0.5% or less of the variation span

Common mode noise (signal resistance of DC V and thermocouple inputs are 500 Ω or less, and wire resistance of resistance temperature detector input is 2 Ω/wire or less).

The effects on the normal operating conditions are:

- Display (measured value) ... CMRR 120 dB or more
- Record ... ±0.5% or less of the variation span

Effect of External Resistance: When the signal resistance changes ±1 kΩ, the effects for both display and record are:

DC V input (excluding mV range code) and thermocouple input .... ±10 μV or less
DC V input (mV range code)....0.7% of the input decreases

When the resistance temperature detector changes 10 Ω/wire (5 Ω for Pt 50 Ω), the effects are as follows:

- Display (measured value) ... ±(0.1% of rdg + 0.05% of range) or less
- Record ... ±0.1% or less of span (excluding the measured variation)

Effect of Mounting Inclination: When the Model OM500 is inclined 30° upward, the effects are:

- Display (measured value) ... 0
- Record ... ±0.1% or less of span

There is no bad influenced on the recorder operation. However, the recorder must be placed horizontally at both sides.

Built-in Alarms

Setting Mode: One high and low limits of each channel can be set.

Setting Accuracy: Within ±1 digit of display.

Hysteresis:

TREND mode. . . Approx. 0.5% of recording span
LOGGING mode.... 0

Display: H (high limit) or L (low limit) at the head of the data (H is lit if both the alarms are on) and the red "ALARM" LED (common to all channels) light.

Record:

TREND mode

- Channel no., H/L and times when the H/L alarm is on are printed in red in the right margin (overlapping the analog recording area approx. 5%).
- H/L alarm is printed at the head of the digital data in the left margin (overlapping the analog recording area approx. 5%).

LOGGING mode

- H/L alarm is printed at the head of the data.

Output: Two relay transfer contact outputs.

- 14-pin connector is used to connect with the outside.
- Contact rating   100 V AC 0.3 A (resistive load)
                   24 V DC 0.5 A (resistive load)

Insulation Resistance: 20 MΩ or more (at 500 V DC).

Dielectric Strength: 1200 V AC at 50/60 Hz for one minute.

(Note) Alarm functions do not operate during DMM mode.

Construction

Case: Steel. Front bezel is aluminum die cast
338(W) x 210(H) x 315.5(D) mm (excluding rubber feet and door knob)

Finish: Light pale green (Munsell 2.0GY7.5/0.9 or equivalent)

Weight: Approx. 12 kg

Accessories Supplied at No Extra Cost

     Power cord . . . . 1 set
     Test cord . . . . 1 set
     Ink ribbon . . . . 1 pc.
     Battery (SUM-2) . . . . 3 pc.
     Fuse . . . . 2 pcs.

     Hex wrench . . . . 2 pcs.

     Lubricating oil . . . . 1 bottle
     Measuring leadwire . . . . 1 set
     Connector (for alarm output) . . . . 1 pc.

Option: IEEE-488 Communications Bus

            DC 12 V drive
            Vertical printing function

Standard Function List

Function	Description
Full-scale range setting	Programmable via keyboard for each channel, 6 or 12 channels as a group.
Skip	Printout skips for the group programmed (each channel, group of 6 or 12 channels)
Selectable Chart Speed	Selectable via keyboard from 1 to 1,200 mm/h
TREND/LOGGING modes (analog and digital data printout)	● TREND . . . . analog or analog plus digital printout (channel numbers and measured data are printed out in digital in the left margin of the chart at a chart speed of 10 to 500 mm/h) ● LOGGING . . . . digital (measured and computed data) printout (channels 1 to 12)
Program list printout	Contents of entire program memory such as each channel range, alarm, sensor type and chart speed can be listed on the chart.
Difference (ΔT) measurement	Digital printout of difference between valued of the reference channel No. 1 or group head channel (either channel No. 1 or No. 7) and each channel.
Digital printout of alarm	At the time of out-of-limit occurrence, alarm conditions are printed out digitally (in red) in the right margin of the chart.
Scaling	Scaling for data display on input ranges of 0 to 10 mV, 1 to 5 V, and 0 to 10 V (±2000.0, however, span is 2000.0 or less.)
Channel identification numbering	Channel identification number is marked along the right of each trace (at a chart speed of 1 to 500 mm/h).
DMM input and printout	A single DMM input channel (front panel) can be displayed and printed.
Manual printout mode	Digital data of 1st to 12th channels are printed out at a push of MAN PRINT key.
Digital display	Clock, measured data, range or setting values are displayed.
Chart END alarm	LED indicator (red) comes on before out-of-chart conditions.
Battery-backup memory	Three built-in 1.5 V batteries backup all programs when power is removed (the battery lifetime is approx. three months).
FAIL alarm	LED (red) on the front panel comes on when the CPU is in fail condition.

Available Models

Basic Code	Input Type	Temperature Range
OM501	DC V & TC	
OM502	RTD(DIN)	°F or °C
OM503	DC V, TC(ANSI) & RTD (6 points, DIN)	

Optional Features

Option Code	Description
IEEE-488	General purpose interface bus
/DC	AC line & external 12 V DC operation
/VPT	Specialized printing from (prints across chart in LOGGING mode)

Spares

Name	Part No.	Description
Six-color ribbon	B9541AT	1 pc.
Z-fold chart	B9541AR	6 charts (100 uniform divisions)