



Description

The Model 85 is a 3 1/2 digit, modular digital panel meter, where input and output modules can be selected to suit multiple applications. User - friendly programming allows the user to program scaling and set points. The Model 85 includes peak/valley (min/max) and password protection as standard features. The housing is easy to mount and ensures a protection degree of IP 65. The Model 85 can be ordered with or without Program Lock.

Features

- Modular Panel Meter 3 1/2 digit
- Optional bright red or green display
- Multirange input modules reduce inventory
- Popular 1/8 DIN mounting
- Indicating or Controlling current, voltage, resistance, temperature, tachometer or frequency
- Easily programed
- Optional Password protection of programming parameters
- Data hold
- Peak/valley (min/max) function
- Programmable hysteresis and time delay (up to 2 set points)
- IP 65 front cover

Options

- Display color
- Output type
- Input voltage
- Value to display or control
- Program lock

Specifications

General Specifications

Display:	7-segment LED, 0.55" [14mm] high, (2 LED's for indication of relay ON). Min./Max. indication, -1999/1999
Over range indication:	EE (under range: -EE)
Accuracy:	See module specifications
Temperature drift:	See module specifications
Scaling:	
Electrical input range:	Program within whole range
Display range:	Program within whole range
Decimal point position:	Programmable
Module connection:	Screw terminals
Environment:	
Degree of protection:	IP 65 (front)
Operating Temperature:	+32°F to +122°F [0°C to +50°C]
Humidity:	R.H. <90% non-condensing
Storage Temperature:	+14°F to +140°F [-10°C to 60°C]
Humidity:	R.H. <90% non-condensing
Weight:	Approx. 12.4 oz [352g]
Housing:	
Dimensions:	1.9" x 3.9" x 3.5" [48.3 x 99.1 x 88.9mm]
Material:	
Housing:	ABS/Polycarbonate blend
Front:	Polycarbonate
Color:	Black Housing Red front with red display Gray front with green display
Approvals:	UL, cUL, CE Compliant

Power Supply Specification

Power Supply AC:	Over voltage cat.III (IEC 60664)
Rated operational voltage:	230 VAC ± 10% 115 VAC ± 10% 48 VAC ± 10% 24 VAC ± 10%
Frequency:	50/60 Hz ± 5 Hz
Voltage interruption:	≤ 20ms
Rated insulation voltage:	250 VAC basic rms
Rated impulse withstand voltage:	6kV (1.2/50 msec) IEC 60664-1
Power Supply DC:	
Rated operational voltage:	12 to 48 VDC ± 15%
Voltage interruption:	≤ 10 ms (voltage = 10 VDC)
Rated insulation voltage:	150 VDC basic
Rated impulse withstand voltage:	4.0 kV (1.2/50 msec) IEC 60664-1
Rated operational power:	< 7 VA
ECM:	Electromagnetic compatibility
Immunity:	Acc. to IEC 60801-4 Acc. to IEC 60801-5



Input Specifications - Modules

**Voltmeters DC (85KSVD/85KLVD)
AC (85KSVA/85KLVA)**

Measuring Range	Jumper position	Range Code		Resolution	Input Impedance	Max. Overload
		AC	DC			
199.9 mV	1-4	7	1	0.1 mV	100 KΩ	50 V
1.999 V	2-5	8	2	1 mV	100 KΩ	230 V
19.99	2-5	9	3	10 mV	1 MΩ	690 V
199.9 V	3-6	10	4	0.1 V	1 MΩ	690 V
600V*	5-6	12	6	1 V	1 MΩ	690 V

*Nominal voltage according to IEC 664-1. The measuring range includes 15% tolerance to 690 V.

Accuracy

AC voltmeter 0.3% of reading ± 3 dgt

DC voltmeter 0.2% of reading ± 2 dgt

Temperature drift

AC voltmeter ± 150 ppm/°F ± 0.2 dgt/°F

DC voltmeter ± 100 ppm/°F ± 0.05 dgt/°F

**Ammeters DC (85KSCD/85KLCD)
AC (85KSCA/85LCA)
AC/DC (85KSAD/85KLAD)**

Measuring Range	Jumper position	Range Code		Resolution	Max. Overload
		AC	DC		
199.9 μA	1-2	7	1	0.1 μA	20 mA
1999 μA	2-3	8	2	1 μA	100 mA
19.99 mA	4-5	9	3	10 μA	200 mA
199.9 mA	5-6	10	4	0.1 mA	500 mA
1999 mA	2-5	11	5	1 mA	4 A
5.00 A	2-5	12	6	10 mA	8 A
10 A DC	1-2(DC)		6	10 mA	10 A
10 A AC	2-3(AC)	12		10 mA	10 A

Accuracy

AC ammeter 0.3% of reading ± 3 dgt

AC ammeter (10 A) 0.5% of reading ± 3 dgt

DC ammeter 0.2% of reading ± 2 dgt

DC ammeter (10 A) 0.5% of reading ± 2 dgt

Temperature drift

AC ammeter ± 150 ppm/°F ± 0.5 dgt/°F

AC ammeter (2A,5A) ± 200 ppm/°F ± 0.1 dgt/°F

AC ammeter (10A) ± 200 ppm/°F ± 0.5 dgt/°F

DC ammeter ± 100 ppm/°F ± 0.05 dgt/°F

DC ammeter (2A,5A) ± 200 ppm/°F ± 0.5 dgt/°F

DC ammeter (10A) ± 200 ppm/°F ± 0.5 dgt/°F

Voltage drop

<200 mV (all ranges)

Ohmmeter (85KSIR/85KLIR)

Measuring Ranges	Jumper position	Range Code AC	Resolution
199.9 Ω	1-4	7	0.1 Ω
1999 Ω	2-5	8	1 Ω
19.99 kΩ	3-6	9	0.01 kΩ
199.9 kΩ	1-2	10	0.1 kΩ

Accuracy

0.2% of reading ± 2 dgt

Temperature drift

± 150 ppm/°F ± 0.1 dgt/°F

Tachometers (85KSTK/85KLTK)

Measuring	Jumper	Range	Resolution
199.9 RPM @ 30PPR*	J4, 1-2	7	0.1 RPM
199.9 RPM @ 60PPR*	J5, 1-2	8	0.1 RPM
199.9 RPM @ 100PPR*	J6, 1-2	9	0.1 RPM
1999 RPM @ 30PPR*	J4, 2-3	10	1 RPM
1999 RPM @ 60PPR*	J5, 2-3	11	1 RPM
1999 RPM @ 100PPR*	J6, 2-3	12	1 RPM

* Pulses per revolution

Input Selection

Namur J1

NPN, PNP, Contact J2

Accuracy 1% of reading ±5 dgt

Temperature drift ±200 ppm/°F

Input impedance

Namur 1 kΩ

NPN, PNP, Contact 5 kΩ

Time constant (tc) 1 sec.

Frequency Meters (85KSFQ/85KLFQ)

Measuring Ranges	Jumper Position	Range Code	Resolution
199.9 Hz	J7	7	0.1 Hz
1999 Hz	J8	8	1 Hz

Input Selection

Namur J1, J4 and J6

NPN, PNP, Contact J2 and J5

600 VAC J3

Accuracy 1% of reading ±5 dgt

Temperature drift ±200 ppm/°F

Input impedance

Namur 1 kΩ

NPN, PNP, Contact 5kΩ

600 VAC 600 kΩ

Time constant (tc) 1 sec.



Thermometers

Pt 100: RTD (85KSRT/85KLRT)

Range	Resolution	Accuracy	Temperature Drift
-100.0 to 199.9 °C	0.1 °C	±0.2% of reading ± 2dgt	± 150 ppm/°C ± 0.05 dgt/°C
-148 to 199.9 °F	0.2 °F	±0.2% of reading ± 4 dgt	± 180 ppm/°F ± 0.10 dgt/°F
-148 to 392 °F	1 °F	±0.2% of reading ± 4 dgt	± 180 ppm/°F ± 0.10 dgt/°F

Pt 100, 1562°F/850°C (85KSPT/85KLPT)

Range	Resolution	Accuracy	Temperature Drift
-100.0 to 850 °C	1 °C	±0.2% of reading ± 3 dgt	± 150 ppm/°C ± 0.05 dgt/°C
-148 to 1562 °F	2 °F	±0.4% of reading ± 6 dgt	± 180 ppm/°F ± 0.10 dgt/°F

Thermocouple type J (85KSJT/85KLJT)

Range	Resolution	Accuracy	Temperature Drift
-100.0 to 760 °C	1 °C	±0.1% of reading ± 4 dgt	± 100 ppm/°C ± 0.05 dgt/°C
-148 to 1400 °F	1 °F	±0.1% of reading ± 8 dgt	± 180 ppm/°F ± 0.10 dgt/°F

Thermocouple type K (85KSKT/85KLKT)

Range	Resolution	Accuracy	Temperature Drift
-100.0 to 1250 °C	1 °C	±3% of reading ± 3 dgt	± 100 ppm/°C ± 0.05 dgt/°C
-100 to -50 °C	1 °C	±1% of reading +5/-1 dgt	± 100 ppm/°C ± 0.05 dgt/°C
-50.0 to 780 °C	1 °C	±0.1% of reading ± 3 dgt	± 100 ppm/°C ± 0.05 dgt/°C
780 to 1250 °C	1 °C	±0.25% of reading +1/-3 dgt	± 100 ppm/°C ± 0.05 dgt/°C
-148.0 to 1999 °F	2 °F	±3% of reading ± 6 dgt	± 180 ppm/°F ± 0.10 dgt/°F
-148 to -58 °F	2 °F	±1% of reading +10/-2 dgt	± 180 ppm/°F ± 0.10 dgt/°F
-58.0 to 1436 °F	2 °F	±0.1% of reading ± 6 dgt	± 180 ppm/°F ± 0.10 dgt/°F
1436 to 1999 °F	2 °F	±0.25% of reading +2/-6 dgt	± 180 ppm/°F ± 0.10 dgt/°F

Output Specifications - Modules

Relay output 1 or 2 relays (85KSR1/85KSR2)

Power Supply Supplied by main unit
Output 1 or 2 SPDT relays
Rated insulation voltage 250 V basic RMS
Contact ratings (AgCdO)
 Resistive AC 1 5A, 250 VAC
 DC 1 5A, 24 VDC
 Small inductive AC 11 2A, 250 VAC
 loads DC 11 3A, 24 VDC
Mechanical life ≥ 40 x 10⁶ operations
Electrical life ≥ 10⁵ operations (at max load)
Operating frequency max. 10Hz (50% duty cycle)
Dielectric strength
 Dielectric voltage 2 kVAC (rms)
 Rated impulse withstand voltage 4 kV (1.2/50ms)

NPN output 2 transistor outputs (85KSNP)

NPN Open Collector: I_{SNK} = 100mA max. @ V_{OL} = 1.0 VDC max.
 V_{OHI} = 30 VDC max.
 12VDC/±15%, 40 mA,
 voltage output is provided

Excitation output (85KSDC)

Power supply Supplied by main unit
Output voltage
 12 VDC: jumper position 3-6 tolerance ±20%
 24 VDC: jumper position 1-4 tolerance ±20%
Output current
 12 VDC ≤ 35 mA DC
 24 VDC ≤ 20 mA DC
EMC Electromagnetic compatibility
 Immunity Acc. to IEC 60801-4
 Acc. to IEC 60801-5

Analog output (85KSAN)

Measuring Range	Load Resistance	Accuracy
0 to 20 mA	≤ 500 Ω	±1% of reading ±0.1 mA
4 to 20 mA	≤ 500 Ω	±1% of reading ±0.1 mA
0 to 10 V	≤ 1,000 Ω	±1% of reading ±0.05 V

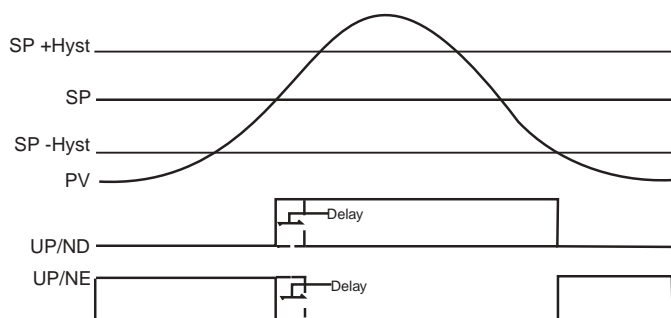
Temperature drift ±200 ppm/°C
Short-circuit protection yes
Analog output proportional to input signal.
 low input signal = low analog output
 high input signal = high analog output
Time Constant 1 sec.



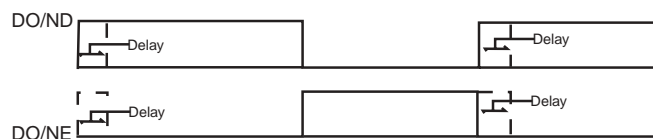
Operation Details

Operation Diagrams

Setpoint Operation

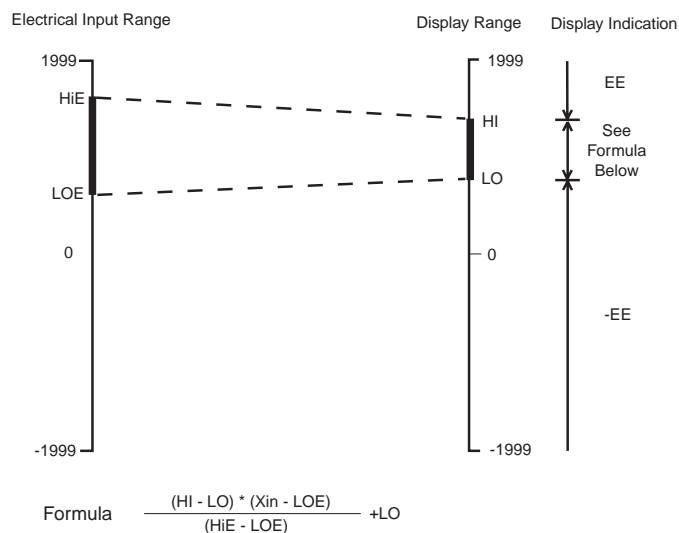


Output activates as input signal rises above setpoint (High Alarm)



Output activates as input signal drops below setpoint (Low Alarm)

Scaling Operation



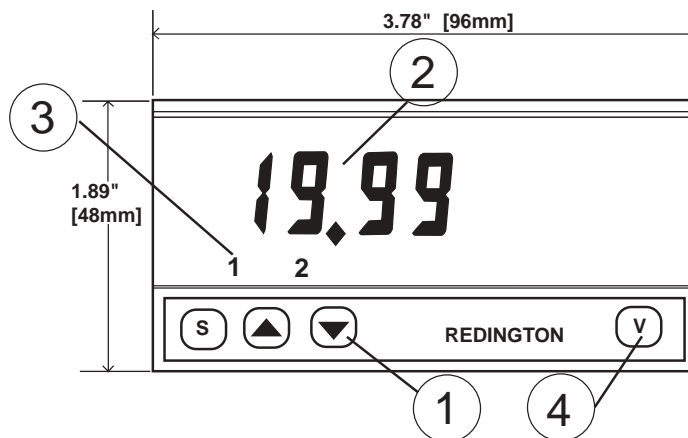
Mode of Operation

Depending upon the input modules used, it is possible to measure current, voltage, or resistance ...etc. The range is selected with a jumper on the input module and programming. Without an output module the Model 85 is an indicator - by inserting an output module the Model 85 is a controller.

The input range and the display range are fully programmable, and so are the setpoint(s) if a relay output module is inserted. A hold function is available for freezing a measured value. Passwords 0 to 99 are for overall programming with passwords 100 to 199 allow direct setpoint programming outside the password protection. See user manual for further details.

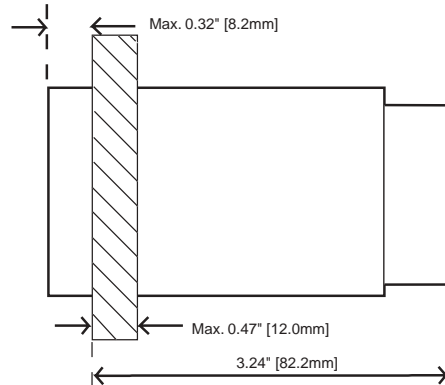
Overall Dimensions

Front View



Panel Cutout 1.77" [45mm] X 3.62" [92mm]
Cutouts can be up to .02" [0.5mm] larger

SideView





Front Panel Description

1. Keyboard

- “S” Set/Enter
- ▲ Up
- ▼ Down

Setup and programming procedures are easily controlled by the three buttons.

Set/Enter key:

- Entry of variables
- Selecting programming value

Up and Down key:

- Display control
- Increasing or decreasing programming value
- Selecting programming functions and instrument configuration together with the “S” key.

2. Display

3-1/2 digit (maximum readout 1999)

Alphanumeric indication by means of a 7-segment display for:

- Display of the measured value
- Indication of programming parameters

3. LED

“1” and “2” LED indicators for alarm conditions.

- Yellow LED's with green display
- Red LED's with red and high efficiency red display

4. Engineering unit

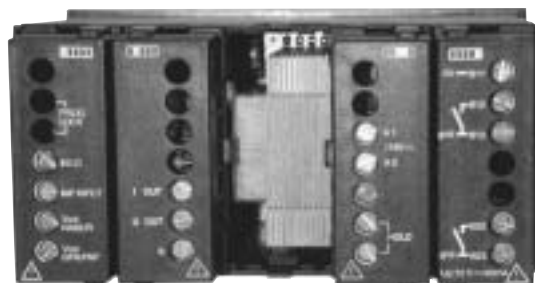
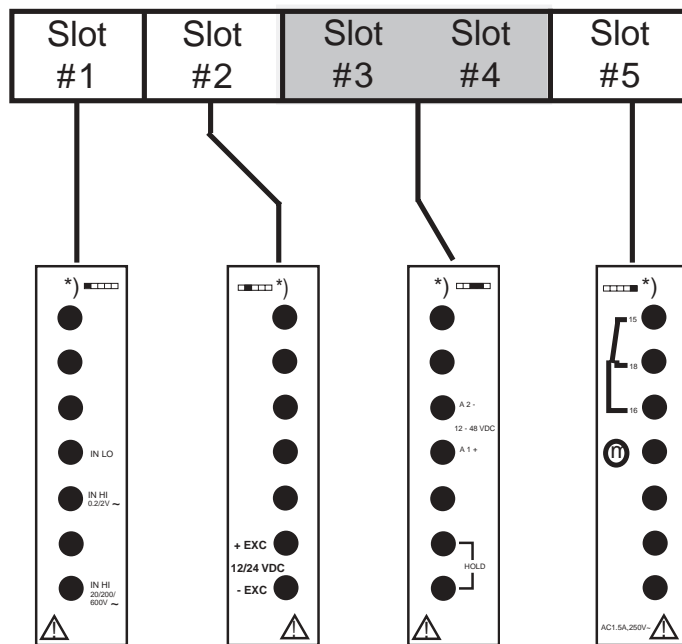
Clear window with rear access for insertion of interchangeable engineering unit label. The symbols listed below are available on the set of labels supplied with the Model 85 main unit. (Engineering unit label to be inserted by the customer, before the front bezel is snapped into place).

When ordering assembled units, enter the desired label number (#) as the last 2 digits of the order number. Refer to the “Part Number Selection- Assembled Unit(s)” page.

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



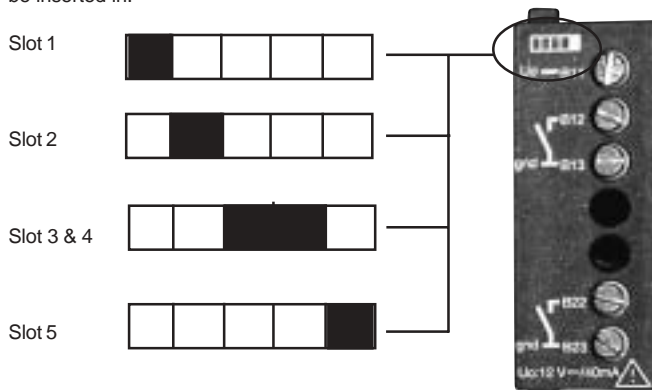
Rear view of main unit



Rear View Assembled Unit

Module Slot Identification:

Each module is clearly marked with a diagram showing which slot it should be inserted in.



Input Module:

- VAC
- VDC
- AAC
- ADC
- 10A AC/DC
- Ω
- PT 100
- J-type Thermocouple
- K-type Thermocouple
- Tachometer
- Frequency

Output Modules:

- 12 VDC Excitation
- 24 VDC Excitation
- or
- Analog output
- 0-20 mA
- 4 - 20 mA
- 0 - 10 VDC

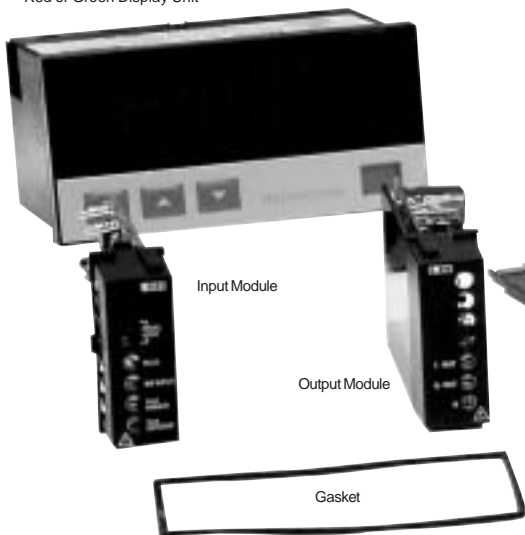
Power Supply Modules:

- (Requires 2 slots)
- 24 VAC
- 48 VAC
- 115 VAC
- 230 VAC
- 12 - 48 VDC

Relay Output Modules:

- 1 SPDT(Form C), 5A
- 2 SPDT(Form C), 5A
- 2 NPN

Red or Green Display Unit

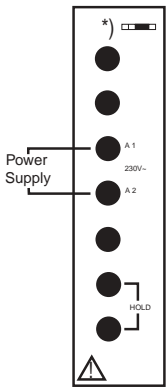


Interchangeable Engineering Unit Labels

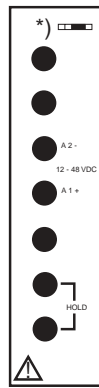
V	kV	A	mA	W	kW
k Ω	Hz	kHz	$^{\circ}$ C	$^{\circ}$ F	%
mbar	bar	psi	kg/cm ²	mm H ₂ O	mm Hg
m ³ /h	mm	cm	m	kg	kA
MW	Ω	M Ω	l/min	kg/min	mm/min
RPM	kvar	mmHg	ppm	cos ϕ	



Wiring Diagrams



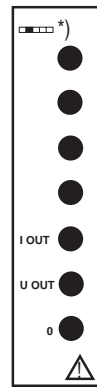
85KSP5



85KSP1



85KSDC



85KSAN



85KSR1



85KSR2



85KSVD



85KSVA



85KSCD



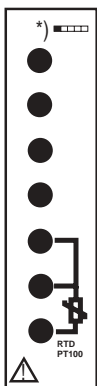
85KSCA



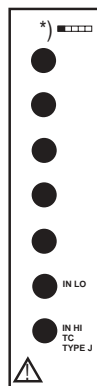
85KSAD



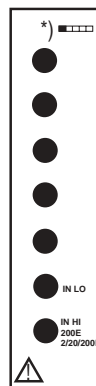
85KSIR



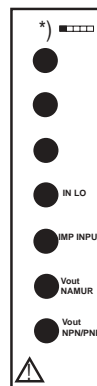
85KSRT



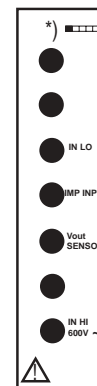
85KSJT



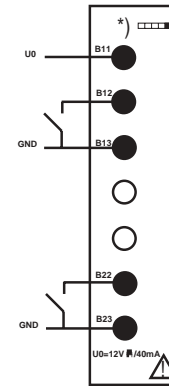
85KSKT



85KSTK



85KSKQ



85KSNP

Modules with type nos. "L" are equipped with Program Lock function.

* Module position (slot) in the base unit is indicated by a drawing on the plastic cover

Caution!

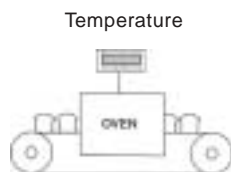
Since the input circuit is not galvanically isolated, the potential of the measured variable will be present on all connections to the unit (i.e. "Hold" input). This is of special importance when measuring line voltage and current.

Note.

By short-circuiting terminals marked "HOLD" (supply module), it is possible to hold the displayed value indefinitely (hold function). The comparison of the input variable with the alarm setpoint remains active. To reactivate the display, remove the jumper or switch.



Applications



Volts/Amps/Ohms



Speed Control



Ordering Information

Component Selection - Part Number

To order assembled (built-up) panel meters, see following "Part Number Selection" section.

To order components, select modules from each of the categories below to construct an Indicator or Controller. For additional guidance, consult the flowchart on the right.

Main Unit

- Red Display (standard red)
- Red Display (high efficiency red)
- Green Display

Ordering Number

- 85KSRD
- 85KSHR
- 85KSHG

w/Program Lock

Component Selection Flowchart

To build an indicator, choose display color, power supply, and input module. For a controller, also choose an analog/excitation output and/or output module.

Power Supply Modules

- 12 to 48 VDC
- 24 VAC
- 48 VAC
- 115 VAC
- 230 VAC

- 85KSP1
- 85KSP2
- 85KSP3
- 85KSP4
- 85KSP5

Input Modules

- DC Voltage
- AC Voltage
- DC Amperage
- AC Amperage
- AC/DC Amperage (10A)
- Resistance (Ohms)
- PT 100 RTD (can be scaled to °F)
- PT 100 RTD (up to 1562°F/850°C)
- J-Type Thermocouple (can be scaled to °F)
- K-Type Thermocouple (can be scaled to °F)
- Tachometer
- Frequency

- 85KSVD
- 85KSVA
- 85KSCD
- 85KSCA
- 85KSAD
- 85KSIR
- 85KSRT
- 85KSPT
- 85KSJT
- 85KSKT
- 85KSTK
- 85KSFQ

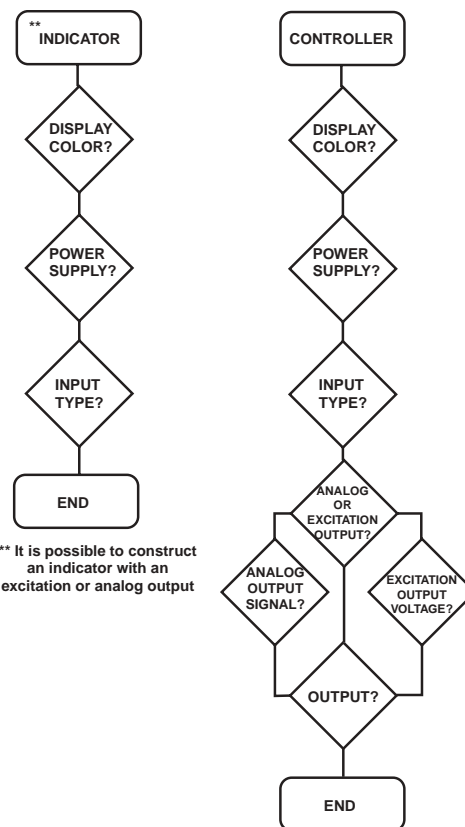
- 85KLVD
- 85KLVA
- 85KLCD
- 85KLCA
- 85KLAD
- 85KLIR
- 85KLRT
- 85KLPT
- 85KLJT
- 85KLKT
- 85KLTK
- 85KLFQ

Output Modules (optional)

- 1 Relay
- 2 Relays
- 2 NPN Transistors
- *12/24 VDC Excitation Output/for sensor supply
- *Analog Output

- 85KSR1
- 85KSR2
- 85KSNP
- 85KSDC
- 85KSAN

*Analog and excitation output modules occupy the same plug-in location, therefore only one selection is possible.



** It is possible to construct an indicator with an excitation or analog output



Part Number Selection - Assembled Unit(s)

Note: There is a 10 piece minimum of various assembled meters, not one specific part number.

Ordering Key

Model Number Model 85
Input Type and Range Code

85 x x x x x x x x x x

DC Ammeters

Table with 2 columns: Meter ID (CD1-CD7) and Range (e.g., -199.9 to +199.9 uA)

AC Ammeters

Table with 2 columns: Meter ID (CA1-CA7) and Range (e.g., 0 to 199.9 uA)

AC Voltmeters

Table with 2 columns: Meter ID (VA1-VA5) and Range (e.g., 0 to 199.9 mV)

* Nominal voltage according to IEC60-664-1. The measuring range includes 15% tolerance equal to 690 V.

DC Voltmeters

Table with 2 columns: Meter ID (VD1-VD5) and Range (e.g., -199.9 to +199.9 mV)

Ohmmeters

Table with 2 columns: Meter ID (RO1-RO4) and Range (e.g., 0 to 199.9 Ohm)

Tachometer

Table with 2 columns: Meter ID (TA1-TA6, TB1-TB6) and Range (e.g., 8.0 to 199.9 RPM @ 30PPR)

Frequency Meters

Table with 2 columns: Meter ID (FO1-FO2, FS1-FS2, F61-F62) and Range (e.g., 5.0 to 199.9 Hz)

Thermometers

Table with 2 columns: Meter ID (JC1, JF1, KC1, KF1, PC1-PF3) and Range (e.g., -100 to 760 C)

Power Supply

- 1) 12-48 VDC 2) 24 VAC 3) 48VAC 4) 115 VAC 5) 230 VAC

Relay Output

- N) None 1) One Relay 2) Two Relays 3) NPN

Output Modules

- N) None 1) 0-20mA 2) 4-20mA 3) 0-10 VDC 4) 12 VDC Excitation 5) 24 VDC Excitation

Display Color

- R) Red G) Green H) High Efficiency Red

Hardware Lock of Programming

- S) None L) Program Lock

Engineering Label

01 to 47 (see front panel description #4)