# Veeder-Root brand
MicroMITE Series

CE

7999F3-003 and 7999F3-004
Digital Panel Meters
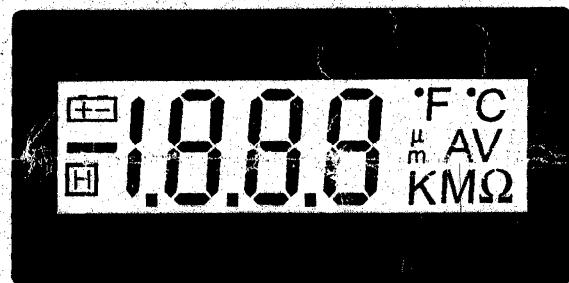
Manual Number :702196-0001
April 12, 1999 Rev: none

Introduction

These modules are low profile LCD digital panel meters conforming to DIN standard panel cutouts. They use advanced components and construction techniques to provide performance combined with elegant appearance at a cost previously unattainable. The LED backlight provides a clear, easy to read display under all lighting conditions. The very low power consumption makes either module ideally suited to battery powered applications.

- ♦ 5 or 9 volt d.c. operation (customer selectable)
- ♦ Low power consumption
- ♦ Annunciators for common engineering units
- ♦ Large character height, 10mm and 14mm available
- ♦ DIN standard housings, 48x24mm and 72x36mm available

Features include 200mV full scale reading, programmable annunciators and decimal point, auto-polarity and operation from 5v or 9v supplies. In 5v mode each module generates its own -5v supply which enables it to measure signals with the same common zero as the supply. Connections are brought out to enable the module to operate in various modes including single ended, ratio measurement and differential. Different modes are selected by linking PCB solder pads which are provided for the purpose.

Specification
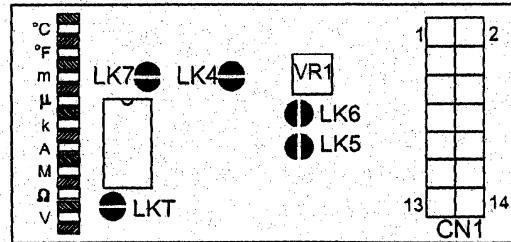
	Min	Typ	Max	Units
Accuracy (±1 Count)		0.1	0.1	%
Linearity			±1	count
Sample Rate		3		per sec
Temperature Stability		30		ppm/°C
Operating temp range	0		50	°C
Storage temp range	-20		70	°C
Supply voltage (5v mode)	3	5	7	V dc
Supply voltage (9v mode)	7	9	12	V dc
Supply current		2		mA
Backlight current (10mm display)			80	mA
Backlight current (14mm display)			160	mA
Input impedance	100			MΩ

Danaher Controls

## Rear views showing connections and links

7999F3-004
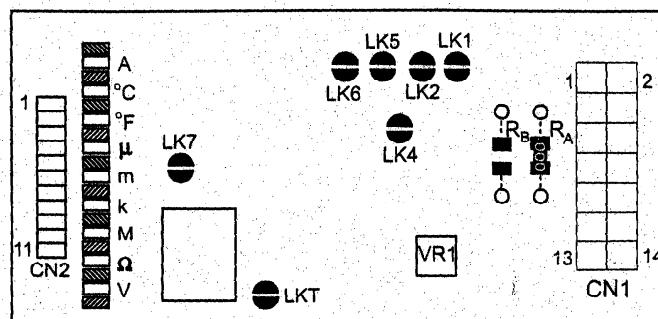
Annunciator Connectors
▨ De-select
▢ LEGEND
▨ Select

7999F3-003

Supplied with 0Ω link in R_A and R_B open. See Scaling Config below.

(The block schematic shows how the links relate to the internal circuitry on the PCB)
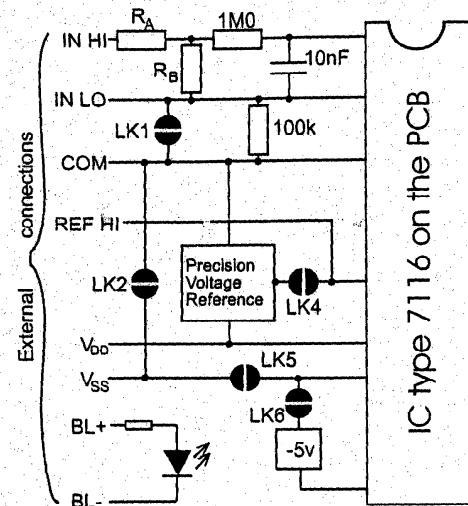
Connector CN1 - All models

Pin	Name	Function
1	IN HI	Positive measuring input
2	IN LO	Negative measuring input
3	VDD	DC positive supply +5v or +9v
4	VSS	DC negative supply 0v
5	COMMON	Analog common input
6	BACKLIGHT (+Ve)	Connect to +5V or with an external resistor for +9V supply (* See below)
7	HOLD	Connect to Vdd (pin3) to freeze display
8	REF HI	Positive reference voltage input
9	ANNUNCIATOR ON (BP)	Connect to pin 12, 13 or 14 to select decimal point position
10	ANNUNCIATOR OFF (BP)	Connect to all unused annunciators or decimal point inputs
11	BACKLIGHT (-ve)	Backlight 0V supply
12	DP3	Decimal point 1.999
13	DP2	Decimal point 19.99
14	DP1	Decimal point 199.9

*   Resistor value for 7999F3-004 Backlight = 68 Ω
    Resistor value for 7999F3-003 Backlight = 33 Ω

Block schematic diagram showing position of PCB links

Note: links LK1, LK2, LK3 are not present on 7999F3-004

Links and Mode Connections

Function	7999F3-004	7999F3-003
Links ANALOG COMMON to IN LO	Connect CN1 pins 2-5	Solder LK1
Links ANALOG COMMON to V ss	Connect CN1 pins 4-5	Solder LK2
Links ANALOG COMMON to REF LO	Connect CN1 pins 5-7	Solder LK3
Links REF HI to VR1 (remove link if using external reference voltage circuit)	Solder LK4	Solder LK4
Power supply voltage mode link (see Power Supply Mode Selection)	Solder LK5	Solder LK5
Power supply voltage mode link (see Power Supply Mode Selection)	Solder LK6	Solder LK6
TEST LINK. Forces display to 1888. Do not use for more than 2 seconds or damage to the display may occur	Briefly bridge LKT	Briefly bridge LKT

Analog Inputs

IN HI, IN LO, and REF HI and are all differential inputs. They respond to the voltage across them and not to the voltage with respect to the power supply. The only exception to this is in 5v mode where the analogue common and VSS have been connected together (using pins 4/5 on 7999F3-004 and LK2 on 7999F3-003 . There is a limit to the voltage which can be measured using a differential input and this is known as the common mode range. No input may be taken outside the range V+ minus 0.5v and V- plus 1.0v. If there is a danger that any input may be taken outside these limits, it is necessary to fit a resistor of suitable value to limit the current to 100µA in series with the input or damage to the unit may occur.

Power Supply Mode Selection

The following power supply mode connections apply to both models

| 5 volt mode	9 volt mode
LK5 Open	LK5 Shorted
LK6 Shorted	LK6 Open
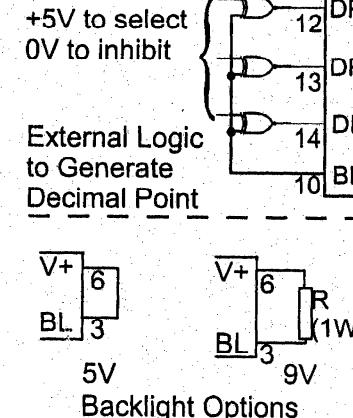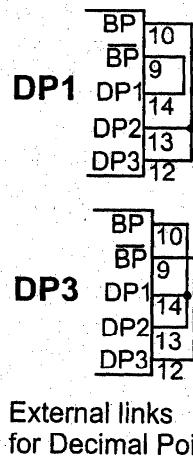
Annunciators

There are annunciator connections, each with its legend, provided on the PCB. Refer to the connections diagram. To display an annunciator, solder a connection between the required LEGEND solder pad and the adjacent SELECTED solder pad. For the annunciators that are not in use, solder a connection between the associated LEGEND and the adjacent NOT SELECTED solder pad to ensure that they do not appear.
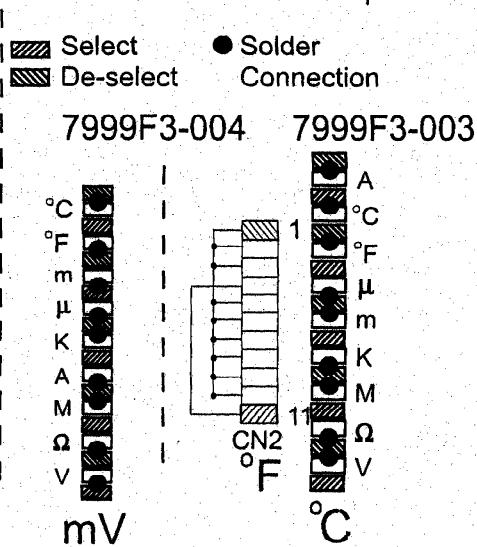
Connector CN2 (7999F3-003)
if fitted

Pin	Annunciator	Function
1		SEGMENT NOT SELECTED (BP)
2	A	amps
3	°C	degrees Celsius
4	°F	degrees Farenheit
5	µ	micro
6	m	milli
7	K	kilo
8	M	mega
9	Ω	ohms
10	V	volts
11		SEGMENT SELECTED (BP)

Wiring Examples for options

External links for Decimal Point

5V Backlight Options 9V

Annunciator Selection Examples

7999F3-004   7999F3-003
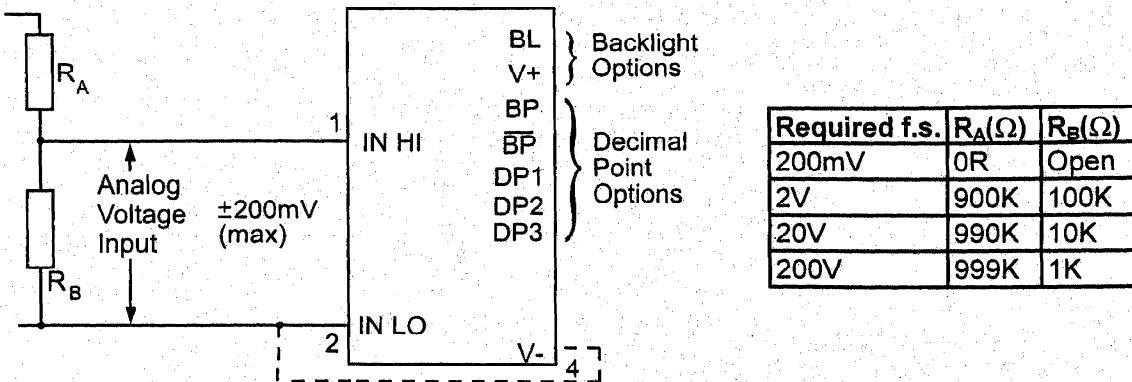
NOTE:

In the application circuits, power is supplied on pins V+ and V-.

CAUTION:

Where the measurement voltage is referenced to the supply voltage (in either current or voltage applications) the voltage in INHI or INLO must not exceed ±4.5v for 5v supply or ±3.5v for 9v supply.

Voltage

| Required f.s.	$R_A(\Omega)$	$R_B(\Omega)$
200mV	0R	Open
2V	900K	100K
20V	990K	10K
200V	999K	1K
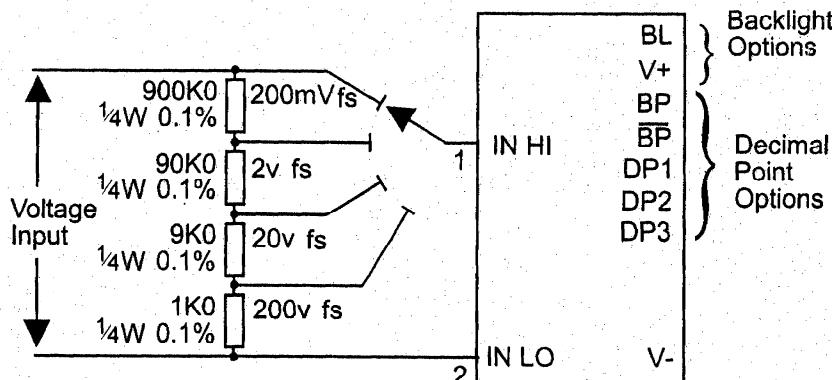
Scaling Configuration

You can configure the module (semi-permanently) for different voltage ranges by soldering resistors in the positions RA and RB. As supplied RA has a 0Ω resistor fitted. (For switching between ranges see Multi-voltage below). On the 7999F3-004, RA and RB must be fitted externally.

*Applicable to Voltage and Multi Voltage configurations		
Link:	**7999F3-003**	**7999F3-004**
Floating I/P voltage (5V)	LK 2, 4, 6 & 7	LK 4, 6 & 7 and connect CN1 pins 4 & 5
Floating I/P voltage (9V)	LK 4 & 5	LK 4 & 5
I/P common to 0V (5V)	LK 1, 2, 4, 6 & 7	LK 4, 6 & 7 and connect CN1 pins 2, 4 & 5
I/P common to 0V (9V)	Not possible	Not possible
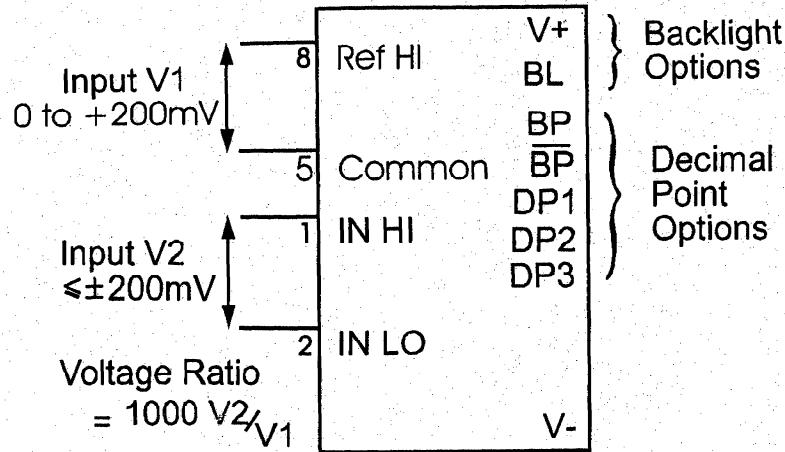
Multi-voltage

Note: 0.1% resistors are required to maintain an accuracy of 0.1%. This may be relaxed if an accuracy less than this is required.
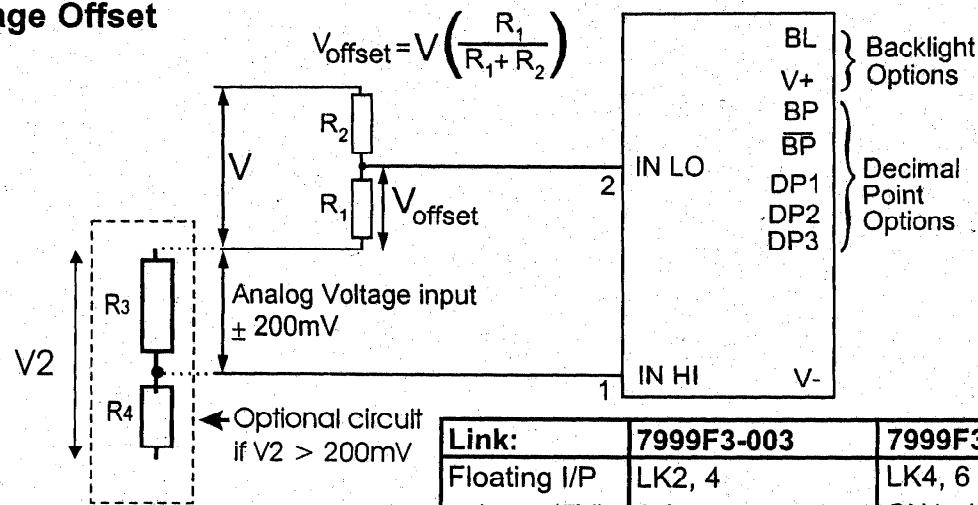
Voltage Ratio Measurement

Input V1
0 to +200mV

Input V2
$\leqslant \pm 200mV$

Voltage Ratio
$= 1000\ V2/V1$

Ref HI — 8
Common — 5
IN HI — 1
IN LO — 2

V+
BL } Backlight Options

BP
$\overline{BP}$
DP1
DP2
DP3 } Decimal Point Options

V-

* In 5V mode, the supply 0V and common (terminal 5) are linked together. V1 input is therefore not floating, V2 is floating.

Link:	7999F3-003	7999F3-004
Floating I/P voltage (5V) *	LK 2 & 6 & 7	LK 6 & 7 connect CN1 pins 4 & 5
Floating I/P voltage (9V)	LK5	LK 5
I/P common to 0V (5V)	LK1, 2 & 6 & 7	LK 6 & 7 connect CN1 pins 2, 4 & 5
I/P common to 0V (9V)	Not possible	Not possible

Voltage Offset
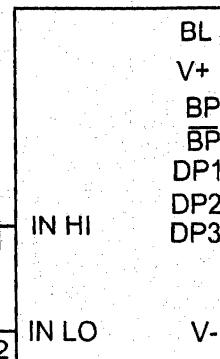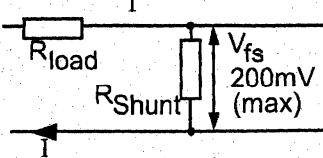
$$V_{offset} = V\left(\frac{R_1}{R_1 + R_2}\right)$$

BL
V+ } Backlight Options

BP
$\overline{BP}$
DP1
DP2
DP3 } Decimal Point Options

IN LO — 2
IN HI — 1
V-

R_2
R_1
V_{offset}
V

Analog Voltage input $\pm 200mV$

V2
R_3
R_4 ← Optional circuit if V2 > 200mV

Link:	7999F3-003	7999F3-004
Floating I/P voltage (5V)	LK2, 4 6 & 7	LK4, 6 & 7 and connect CN1 pins 4 & 5
Floating I/P voltage (9V)	LK 4 & 5	LK4 & 5
I/P common to 0V (5V)	Not possible	Not possible
I/P common to 0V (9V)	Not possible	Not possible

Resistance of R_{Shunt}:

$$R_{Shunt} = \frac{V_{fs}}{I} \, (\Omega)$$

Power of R_{Shunt}:

$$P = \frac{V_{fs}^2}{I} = I^2 R_{Shunt} \, (W)$$

| Worked Examples:		
Current	R_{Shunt} (Ω)	$P_{R(Shunt)}$ (W)
200mA	1.0	0.04
2A	0.1	0.4
20A	0.01	4.0
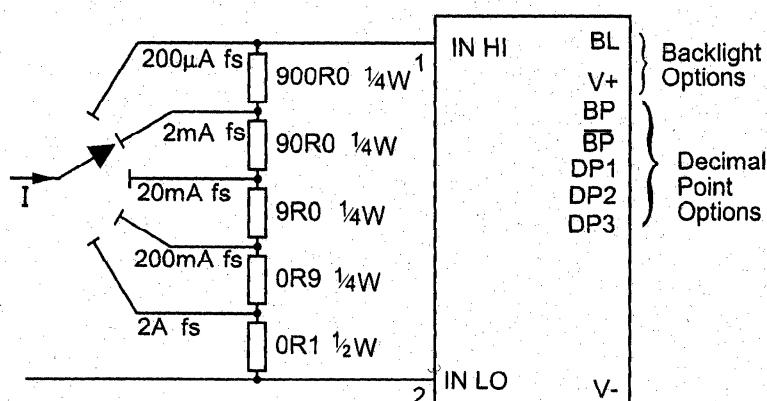
*Applicable to Current and Multi current configurations

CAUTION:
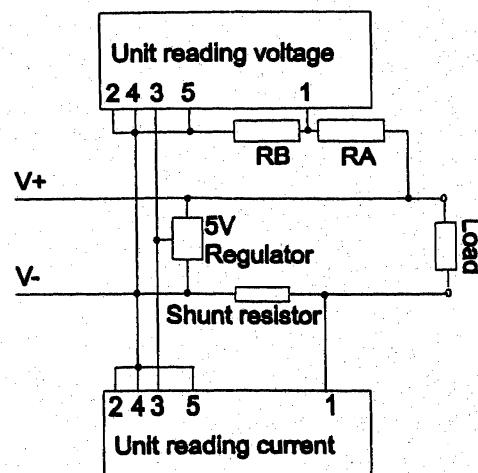
In 5v operation on both models, the shunt resistor must be between the load and 0v/ground or the module will be damaged.

| Link:	7999F3-003	7999F3-004
Floating I/P voltage (5V)	LK 2, 4, 6 & 7	LK 4, 6 & 7 and connect CN1 pins 4 & 5
Floating I/P voltage (9V)	LK, 4 & 5	LK4 & 5
I/P common to 0V (5V)	LK 1, 2, 4 6 & 7	LK 4, 6 & 7 and connect connect CN1 pins 2, 4 & 5
I/P common to 0V (9V)	Not possible	Not possible
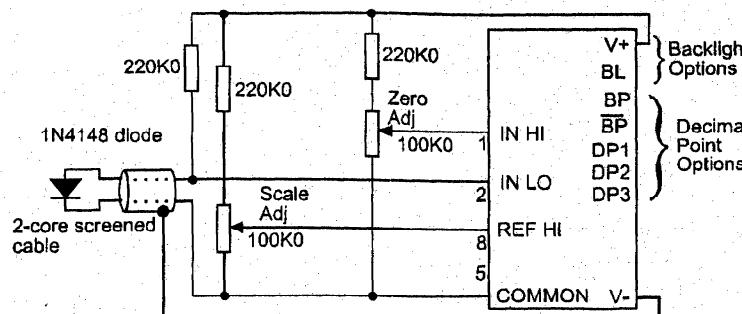
Multi-current

Two units measuring current and voltage from a common supply

The shunt resistor must be between the load and 0v/ground or the module will be damaged.
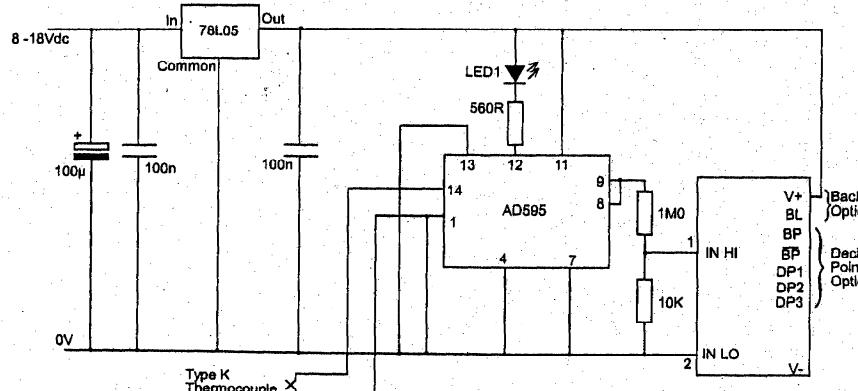
Temperature

Link:	7999F3-003	7999F3-004
5V supply	LK2,6 & 7	LK6 & 7, connect CN1 pins 4 & 5
9V supply	LK 5	LK5

Temperature Measurement Setup

1 Adjust the SCALE ADJ pot to read 100mV between REF HI (pin 8) and COM (pin 5).

2 With the temperature probe diode at 0°C adjust the ZERO ADJ pot to indicate 00.0 on the display.

3 Increase the temperature of the probe to a known value (x°C). When the display has stabilised, take a reading (y°C).

4 Calculate the new value for REF HI voltage as y°C/x°C x 100mV.

5 Adjust the SCALE ADJ pot to read the new REF HI value between REF HI (pin 8) and COM (pin 5).
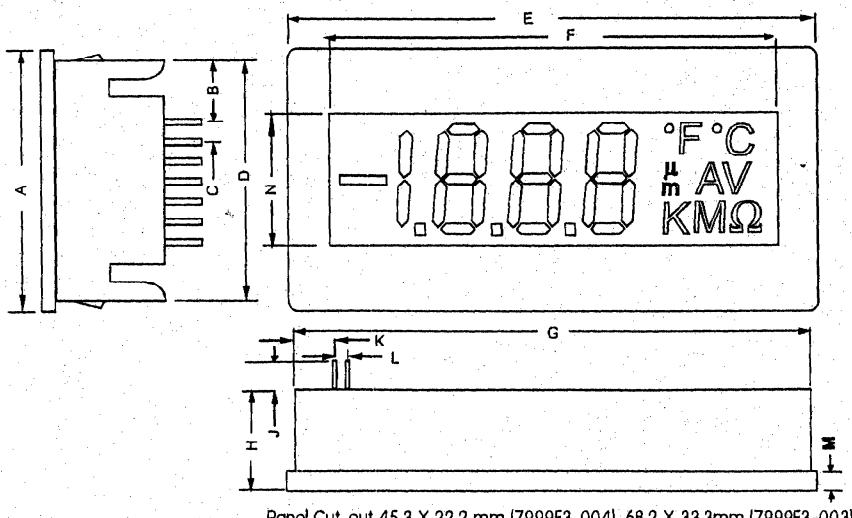
Temperature Measurement using a Thermocouple

Theoretical Range using 'K' Thermocouple: 0-2,000°C (Practical range depends on range of thermocouple used), LED1 provides indication of overload or themocouple open circuit.

Link:	7999F3-003	7999F3-004
	LK 1,2,4,6 & 7	LK 4,6 & 7, connect CN1 pins 2,4 & 5

Dimensions

Panel Cut-out 45.3 X 22.2 mm (7999F3-004), 68.2 X 33.3mm (7999F3-003)

	7999F3-004	7999F3-003
A	24mm (0.95")	36mm (1.42")
B	3.5mm (0.14")	9mm (0.35")
C	2.54mm (0.1")	2.54mm (0.1")
D	22mm (0.87")	33mm (1.3")
E	48mm (1.89")	72mm (2.83")
F	37mm (1.46")	61mm (2.4")
G	45mm 1.77"	68mm (2.68")
H	14mm (0.55")	14mm (0.55")
J	5mm (0.2")	6mm (0.24")
K	5mm (0.2")	6mm (0.24")
L	2.54mm (0.1")	2.54mm (0.1")
M	3mm (0.12")	3mm (0.12")
N	13mm (0.51")	18mm (0.71")

Warranty: Standard products manufactured by the Company are warranted to be free from defects in workmanship and material for a period of one year from the date of shipment, and products which are defective in workmanship or material will be repaired or replaced, at the option of the Company, at no charge to the Buyer. Final determination as to whether a product is actually defective rests with the Company. The obligation of the Company hereunder shall be limited solely to repair and replacement of products that fall within the foregoing limitations, and shall be conditioned upon receipt by the Company of written notice of any alleged defects or deficiency promptly after discovery within the warranty period and in the case of components or units purchased by the Company, the obligation of the Company shall not exceed the settlement that the Company is able to obtain from the supplier thereof. No products shall be returned to the Company without its prior consent. Products which the Company consents to have returned shall be shipped F.O.B. to the Company's factory. The Company cannot assume responsibility or accept invoices for unauthorized repairs to its components, even though defective. The life of the products of the Company depends, to a large extent, upon the type of usage thereof, and THE COMPANY MAKES NO WARRANTY AS TO THE FITNESS OF ITS PRODUCTS FOR SPECIFIC APPLICATIONS BY THE BUYER NOR AS TO PERIOD OF SERVICE UNLESS THE COMPANY SPECIFICALLY AGREES OTHERWISE IN WRITING AFTER THE PROPOSED USAGE HAS BEEN MADE KNOWN TO IT.
THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE.

Ν Danaher Controls

GEBER AC58/0013EK.42SGH	0 565 001	22-Nov-02	AC58/0013EK.42SGH
GEBER AC58/0013EK.42DPZ	0 565 002	22-Nov-02	AC58/0013EK.42DPZ
GEBER AC58/0013EK.42DPT	0 565 003	22-Nov-02	AC58/0013EK.42DPT
GEBER AC58/0013EK.42SBH	0 565 004	10-Dec-02	AC58/0013EK.42SBH
GEBER AC58/0014EK.42SGG	0 565 005	11-Dec-02	AC58/0014EK.42SGG
GEBER AC58/0014EK.42PBB	0 565 006	23-Jan-03	AC58/0014EK.42PBB
GEBER DC58/0010EQ.76VDS	0 565 007	10-Feb-03	AI250010 2B92F
GEBER DC58/0010EF.47PGY	0 565 008	13-Feb-03	AI250010 34127
GEBER DC58/0013EQ.72SGB	0 565 009	4-Mar-03	AI250013 2C221
GEBER DC58/0013EK.42DPT	0 565 010	4-Mar-03	AI250013 1262G
GEBER DC58/0013EQ.46PBB	0 565 011	4-Mar-03	AI250013 21021
GEBER DC58/0010ES.71DPT	0 565 012	11-Mar-03	AI250010 0A62G
GEBER DC58/0012EQ.46DPZ	0 565 013	11-Mar-03	AI250012 2162E
GEBER DC58/0010EF.42VDZ	0 565 014	20-Mar-03	AI250010 3692L
GEBER DC58/0013EK.42VDT	0 565 015	20-Mar-03	AI250013 1292G
GEBER DC58/0013EK.42SGG	0 565 016	20-Mar-03	AI250013 12224
GEBER AC58/0012EK.42DPZ	0 565 017	20-Mar-03	AC58/0012EK.42DPZ
GEBER DC58/0014EF.42VDZ	0 565 018	24-Mar-03	AI250014 3692L
GEBER DC58/0013EK.42BIG	0 565 019	25-Mar-03	AI250013 12A24
GEBER AC58/0012EK.72PGB	0 565 020	3-Apr-03	AC58/0012EK.72PGB
GEBER DC58/0014EQ.76VDS	0 565 021	7-Apr-03	AI250014 2B92F
GEBER AC58/0014EK.46OCB-A5	0 565 022	10-Apr-03	AC58/0014EK.46OCB-A5
GEBER DC58/0017AS.71SBB	0 565 023	11-Apr-03	AI250017 0A301
GEBER AC58/0017EK.42SGH	0 565 024	14-Apr-03	AC58/0017EK.42SGH
GEBER AC58/0013EF.47VDZ	0 565 025	15-Apr-03	AC58/0013EF.47VDZ
GEBER DC58/0012AQ.76PG9	0 565 026	15-Apr-03	AI250012 2B10J
GEBER DC58/0012EQ.46SB8	0 565 027	17-Apr-03	AI250012 2132D
GEBER AC58/0013EK.42PGB	0 565 028	23-Apr-03	AC58/0013EK.42PGB
GEBER AC58/0013EF.42VDZ	0 565 029	23-Apr-03	AC58/0013EF.42VDZ
GEBER DC58/0012AK.72PGB	0 565 030	24-Apr-03	AI250012 1C101
GEBER AC58/0013EK.42PGY	0 565 031	25-Apr-03	AC58/0013EK.42PGY
GEBER AC58/0013EK.42SGB	0 565 032	29-Apr-03	AC58/0013EK.42SGB
GEBER AC58/0010EK.42VDS	0 565 033	5-May-03	AC58/0010EK.42VDS
GEBER AC58/0014EK.42OLZ	0 565 034	5-May-03	AC58/0014EK.42OLZ
GEBER AC58/0010EK.42SBB	0 565 035	5-May-03	AC58/0010EK.42SBB
GEBER AC58/0012EF.47SGA	0 565 036	5-May-03	AC58/0012EF.47SGA
GEBER DC58/0014EF.46VDZ	0 565 037	8-May-03	AI250014 3392L
GEBER DC58/0013ES.71OCZ	0 565 038	13-May-03	AI250013 0A82E
GEBER AC58/0360ES.41PGB	0 565 039	13-May-03	AC58/0360ES.41PGB
GEBER AC58/0012EK.42SGB-E5:5573	0 565 899	8-May-03	AC58/0012EK.42SGB-E5:5573

GEBER AC58/1213EK.42SBH	0 566 001	9-Dec-02	AC58/1213EK.42SBH
GEBER AC58/1213EK.42DPT	0 566 002	9-Dec-02	AC58/1213EK.42DPT
GEBER AC58/1212EK.42DPZ	0 566 003	10-Dec-02	AC58/1212EK.42DPZ
GEBER AC58/1212EK.42SGG	0 566 004	11-Dec-02	AC58/1212EK.42SGG
GEBER AC58/1213ES.41DPZ	0 566 005	12-Dec-02	AC58/1213ES.41DPZ
GEBER AC58/1212EK.42PBA	0 566 006	23-Jan-03	AC58/1212EK.42PBA
GEBER AC58/1213EF.47DPT	0 566 007	10-Feb-03	AC58/1213EF.47DPT
GEBER AC58/1212ES.41DPZ	0 566 008	14-Feb-03	AC58/1212ES.41DPZ
GEBER DC58/1213EF.47VDT	0 566 009	25-Feb-03	AI251213 3492G
GEBER DC58/1212EQ.72VDS	0 566 010	25-Feb-03	AI251212 2C92F
GEBER DC58/1213EK.42VDT	0 566 011	26-Feb-03	AI251213 1292G
GEBER DC58/1212EK.42PBA	0 566 012	4-Mar-03	AI251212 12020
GEBER DC58/1212EQ.76VDS	0 566 013	4-Mar-03	AI251212 2B92F
GEBER DC58/1213EF.47DPT	0 566 014	4-Mar-03	AI251213 3462G
GEBER DC58/1213EK.42DPT	0 566 015	5-Mar-03	AI251213 1262G
GEBER AC58/1213EF.47DPZ	0 566 016	5-Mar-03	AC58/1213EF.47DPZ
GEBER AC58/1212EK.42SBB	0 566 017	5-Mar-03	AC58/1212EK.42SBB
GEBER AC58/1212ES.41SGB	0 566 018	6-Mar-03	AC58/1212ES.41SGB
GEBER AC58/1212EK.42SGH	0 566 019	13-Mar-03	AI251212 12225
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GEBER DC58/1213EK.42SGG	0 566 021	20-Mar-03	AI251213 12224
GEBER DC58/1212EQ.46VDS	0 566 022	24-Mar-03	AI251212 2192F
GEBER DC58/1212EK.42DPZ	0 566 023	24-Mar-03	AI251212 1262E
GEBER DC58/1213EK.42BIG	0 566 024	25-Mar-03	AI251213 12A24
GEBER AC58/1212EK.42PBB	0 566 025	26-Mar-03	AC58/1212EK.42PBB
GEBER AC58/1212EF.42DPI	0 566 026	26-Mar-03	AC58/1212EF.42DPI
GEBER AC58/1212EF.42DPZ	0 566 027	26-Mar-03	AC58/1212EF.42DPZ
GEBER AC58/1212EF.42VDZ	0 566 028	26-Mar-03	AC58/1212EF.42VDZ
GEBER DC58/1212AF.46BIB	0 566 029	1-Apr-03	AI251212 33A01
GEBER AC58/1212EK.42PGB-D0-F	0 566 030	1-Apr-03	AC58/1212EK.42PGB-D0-F
GEBER AC58/1212EF.47VDZ	0 566 031	3-Apr-03	AC58/1212EF.47VDZ
GEBER AC58/1214EK.42DPZ	0 566 032	3-Apr-03	AC58/1214EK.42DPZ
GEBER AC58/1212EF.47DPZ	0 566 033	3-Apr-03	AC58/1212EF.47DPZ
GEBER AC58/1212EF.47SGH	0 566 034	3-Apr-03	AC58/1212EF.47SGH
GEBER AC58/1213EK.72SGB-F0	0 566 035	3-Apr-03	AC58/1213EK.72SGB-F0
GEBER AC58/1212EK.42PGB-D0	0 566 036	3-Apr-03	AC58/1212EK.42PGB-D0
GEBER DC58/1213EK.42DPZ	0 566 037	9-Apr-03	AI251213 1262E
GEBER DC58/1212EF.46VDZ	0 566 038	12-Apr-03	AI251212 3392L
GEBER AC58/1213EF.47VDZ	0 566 039	15-Apr-03	AC58/1213EF.47VDZ
GEBER AC58/1213EF.42VDZ	0 566 040	23-Apr-03	AC58/1213EF.42VDZ
GEBER AC58/1212EK.72PGB	0 566 041	5-May-03	AC58/1212EK.72PGB
GEBER AC58/1212EF.47PGB	0 566 042	5-May-03	AC58/1212EF.47PGB
GEBER AC58/1212ES.41PGA	0 566 043	5-May-03	AC58/1212ES.41PGA
GEBER DC58/1212EK.72SGB	0 566 044	7-May-03	AI251212 1C221
GEBER AC58/1212EK.42OLB-K0	0 566 045	8-May-03	AC58/1212EK.42OLB-K0
GEBER AC58/1212EQ.72VDS	0 566 046	8-May-03	AC58/1212EQ.72VDS
GEBER AC58/1212EK.72PBB	0 566 047	8-May-03	AC58/1212EK.72PBB
GEBER AC58/1212EK.42VDZ	0 566 048	8-May-03	AC58/1212EK.42VDZ
GEBER AC58/1212ES.41SGH	0 566 049	9-May-03	AC58/1212ES.41SGH
GEBER AC58/1212EX.42SGH:5555	0 566 899	8-May-03	AC58/1212EX.42SGH:5555