

Veeder-Root brand

MicromITE Series



7999F3-001 and 7999F3-002

Digital Panel Meters

Manual Number :702195-0001

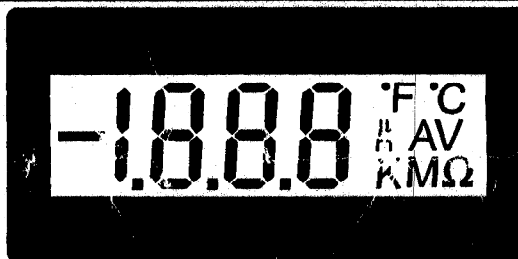
April 12, 1999 Rev: none

Introduction

These modules are low profile LCD digital panel meters conforming to DIN standard panel cut-outs. 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			M Ω

 **Danaher Controls**

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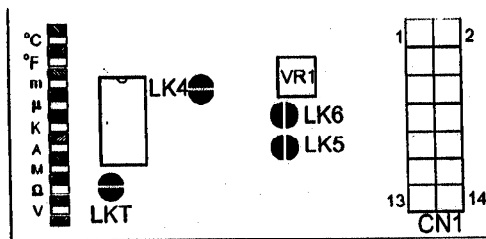
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Rear views showing connections and links

7999F3-002

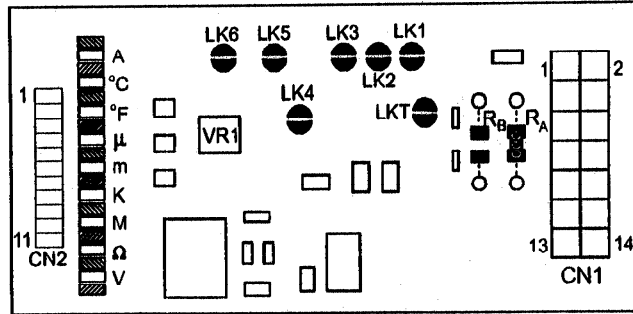
Annunciator Connectors
 De-select
 LEGEND
 Select



7999F3-001

Supplied with a 0Ω link in RA and RB open. See Scaling Config below.

(The block schematic shows how the links relate to the internal circuitry on the PCB)

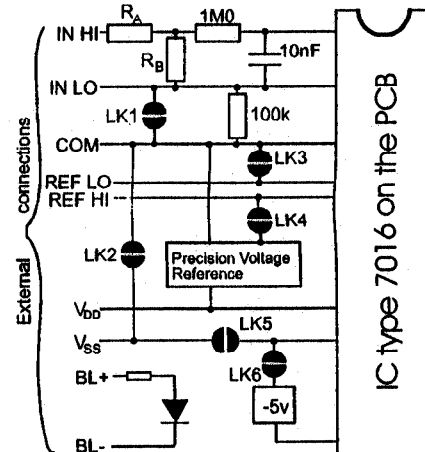


Connector CN1 - All models

Pin	Name	Function
1	IN HI	Positive measuring input
2	IN LO	Negative measuring input
3	V _{DD}	DC positive supply +5v or +9v
4	V _{SS}	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	REF LO	Negative reference voltage input
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 7999F3-002 Backlight = 68 Ω
 Resistor value for 7999F3-001 Backlight = 33 Ω

Block schematic diagram showing position of PCB links



Note: links LK1, LK2, LK3 are not present on 7999F3-002

Links and Mode Connections

Function	7999F3-002	7999F3-001
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

IN HI, IN LO, REF HI and REF LO 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 7999F3-002 and LK2 on 7999F3-001). 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 (7999F3-001) if fitted

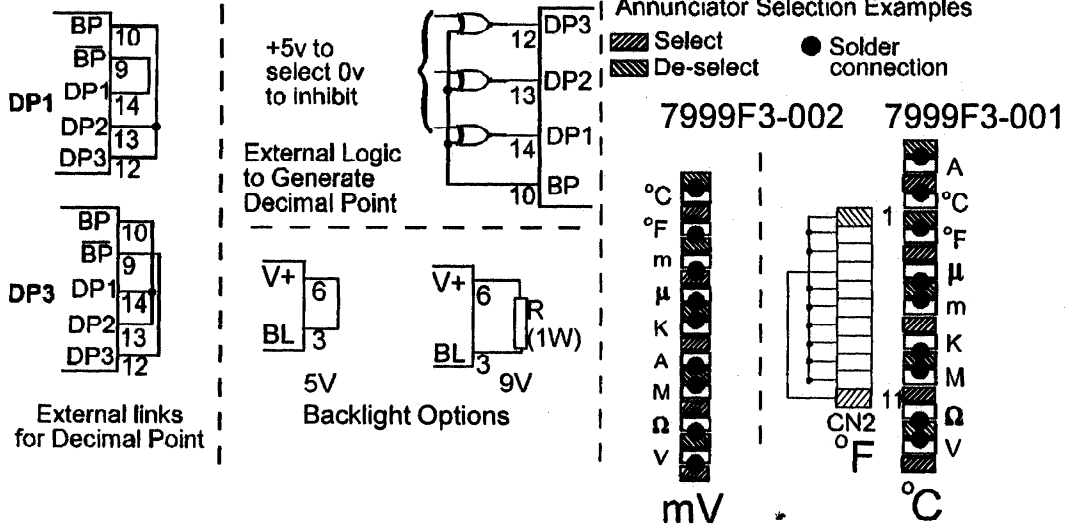
Pin	Annunciator	Function
1		SEGMENT NOT SELECTED(BP)
2	A	amps
3	°C	degrees Celsius
4	°F	degrees Fahrenheit
5	µ	micro
6	m	milli
7	K	kilo
8	M	mega
9	Ω	ohms
10	V	volts
11		SEGMENT SELECTED(BP)

Wiring Examples for options

NOTE:

In the application circuits,

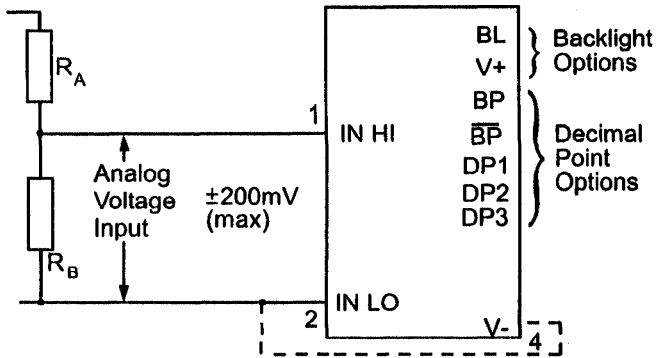
power is supplied on pins V+ and V-.



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

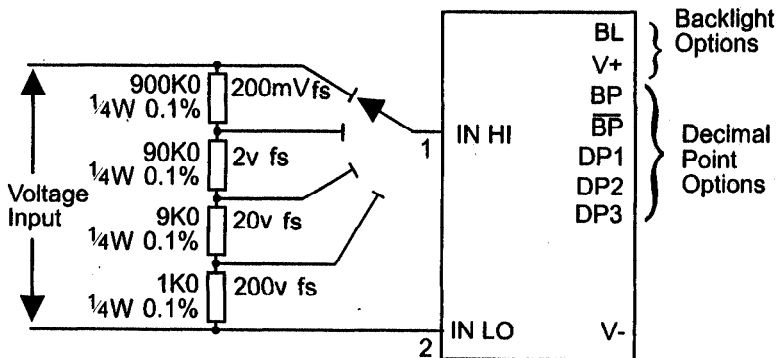
Scaling Configuration

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 0 Ω resistor fitted. (For switching between ranges see Multi-voltage below). On the 7999F3-002, RA and RB must be fitted externally.

*Applicable to Voltage and Multi Voltage configurations

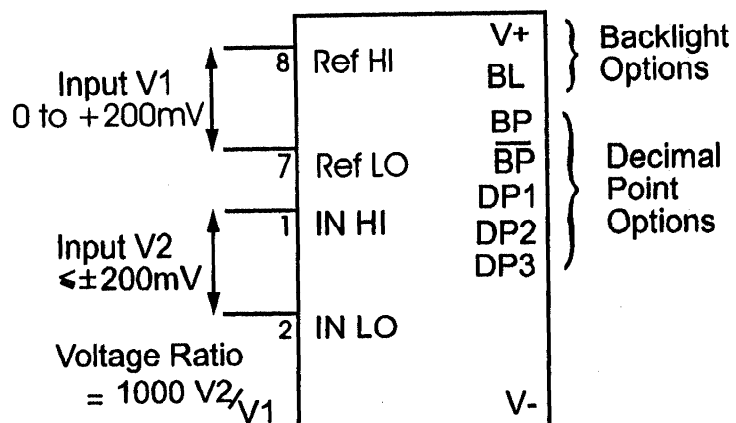
Link:	7999F3-001	7999F3-002
Floating I/P voltage (5V)	LK2, 3, 4 & 6	LK4 & 6 and connect CN1 pins 4, 5 & 7
Floating I/P voltage (9V)	LK3, 4 & 5	LK4 & 5 and connect CN1 pins 5 & 7
I/P common to 0V (5V)	LK1, 2, 3, 4 & 6	LK 4 & 6 and connect CN1 pins 2, 4, 5 & 7
I/P common to 0V (9V)	Not possible	Not possible

Multi-voltage



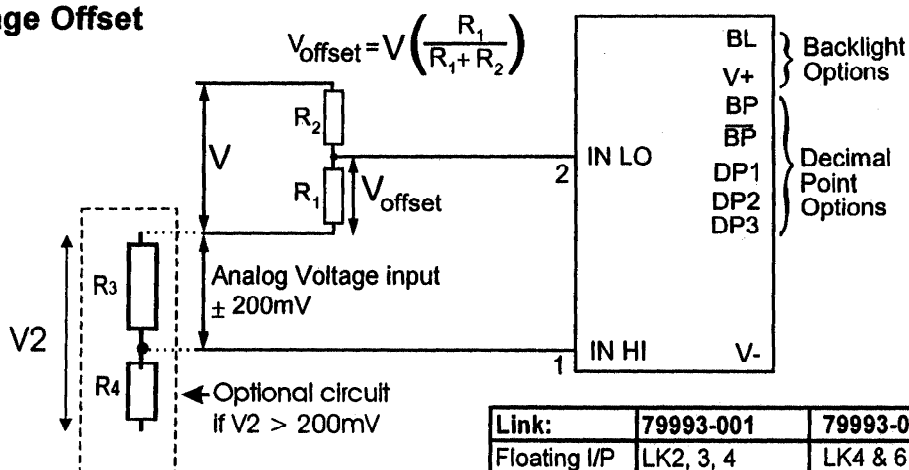
Note: 0.1% resistors are required to maintain an accuracy of 0.1%. This may be relaxed if an accuracy less than this is required.

Voltage Ratio Measurement



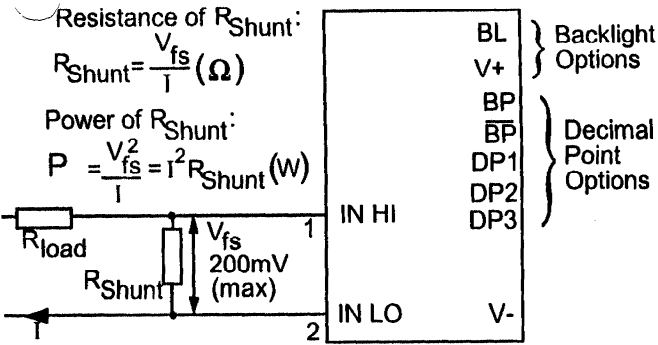
Link:	7999F3-001	7999F3-002
Floating I/P voltage (5V)	LK2 & 6	LK6 and connect CN1 pins 4 & 5
Floating I/P voltage (9V)	LK 5	LK5
I/P common to 0V (5V)	LK1, 2, 3 & 6	LK6 and connect CN1 pins 2, 4, 5 & 7
I/P common to 0V (9V)	Not possible	Not possible

Voltage Offset



Link:	79993-001	79993-002
Floating I/P voltage (5V)	LK2, 3, 4 & 6	LK4 & 6 and connect CN1 pins 4, 5 & 7
Floating I/P voltage (9V)	LK3, 4 & 5	LK4 & 5 and connect CN1 pins 5 & 7
I/P common to 0V (5V)	Not possible	Not possible
I/P common to 0V (9V)	Not possible	Not possible

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Worked Examples:

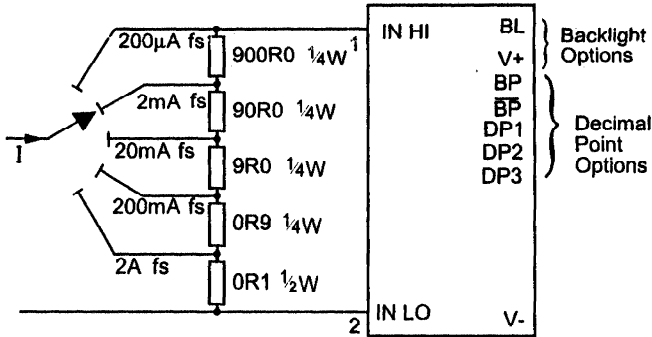
Current	R_{shunt} (Ω)	$P_{R(shunt)}$ (W)
200mA	1.0	0.04
2A	0.1	0.4
20A	0.01	4.0

***Applicable to Current and Multi current configurations**

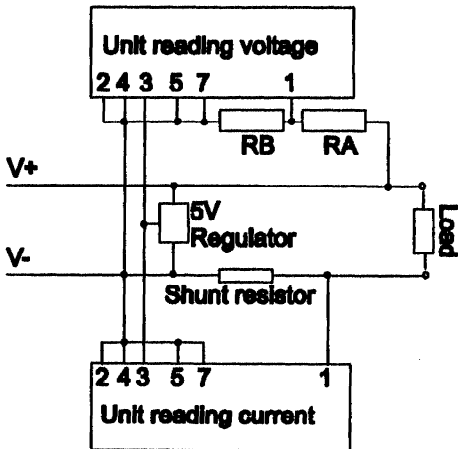
CAUTION:
 In 5v operation on both models, the shunt resistor must be between the load and 0v/ground or the module will be damaged.

Link:	7999F3-001	7999F3-002
Floating I/P voltage (5V)	LK2, 3, 4 & 6	LK4 & 6 and connect CN1 pins 4, 5 & 7
Floating I/P voltage (9V)	LK3, 4 & 5	LK4 & 5 and connect CN1 pins 5 & 7
I/P common to 0V (5V)	LK1, 2, 3, 4 & 6	LK 4 & 6 and connect CN1 pins 2, 4, 5 & 7
I/P common to 0V (9V)	Not possible	Not possible

Multi-current

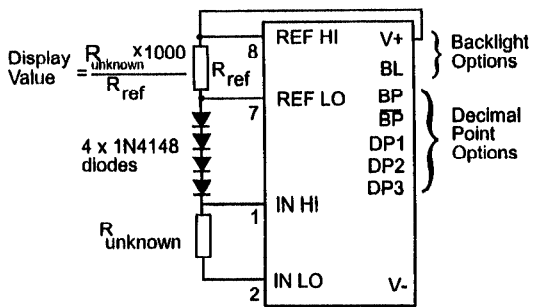


Two units measuring current and voltage from a common supply



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

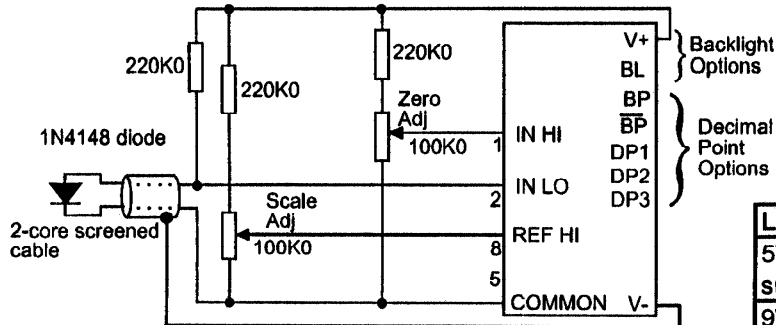
Resistance and Resistance Ratio Measurement



Link:	7999F3-001	7999F3-002
5V supply	LK 2 & 6	LK6 and connect CN1 pins 4 & 5
9V supply	LK 5	LK5

e.g $R_{\text{ref}} = 10\text{K}\Omega$ $R_{\text{unknown}} = 1\text{K}\Omega$
 Display value = 01.00 (1K Ω)
 (when configured for 2 Decimal Places)

Temperature

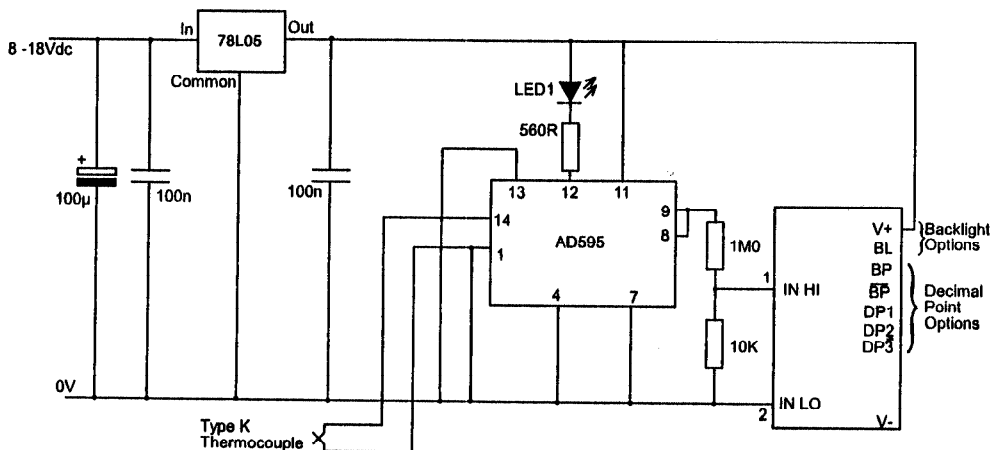


Link:	7999F3-001	7999F3-002
5V supply	LK2, 3 & 6	LK6 and connect CN1 pins 4, 5 & 7
9V supply	LK3 & 5	LK5 and connect CN1 pins 5 & 7

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).

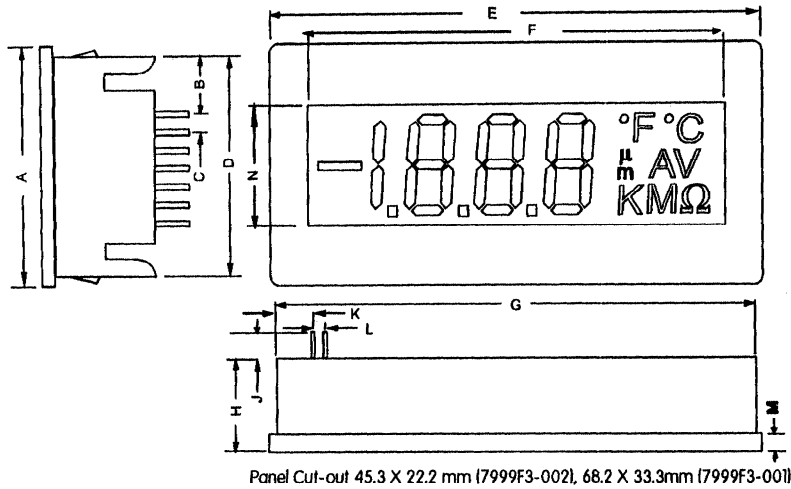
Temperature Measurement using a Thermocouple



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

Link:	7999F3-001	7999F3-002
	LK 1,2,3 & 4 & 6	LK 4,6 connect CN1 pins 2,4,5 & 7

Dimensions



	7999F3-002	7999F3-001
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")

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