



## MU-35CL

**Current Loop Panel Meter  
3 1/2 Digit 0.3" LED  
in a 1/32 DIN Case**

**A Multi-range, Easily-scaled, 4 to 20mA Current Loop Meter.**

### General Features

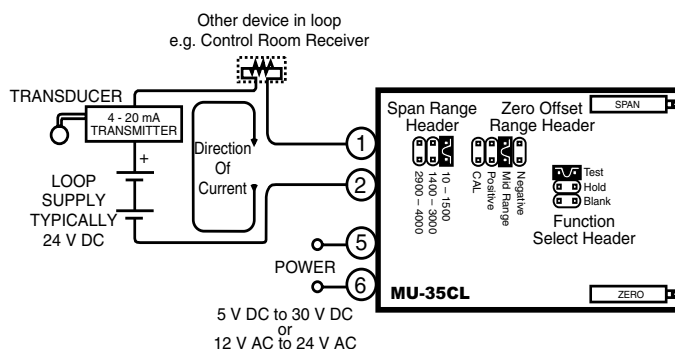
The MU-35CL is a miniature, streamlined 4 to 20 mA current loop meter. It is specifically designed to be easily user-scaled and calibrated to almost any conceivable engineering unit, such as temperature, pressure, viscosity or flow rates, etc., without requiring component changes.

On site scaling and recalibration is facilitated by multiturn potentiometers that provide continuous adjustment within each of three header-programmable full scale ranges for span and zero offset. Display Hold, Display Blank and Display Test functions are also provided. The standard meters have a high efficiency red LED display. Green displays may also be specified. (See ordering information for available choices).

The MU-35CL interconnects by means of a push-on screw terminal that is provided with the meter. A high quality, internally isolated, wide range, switching supply is built into every MU-35CL meter. This allows the meter to operate from a wide range of AC or DC voltages. (See specifications.) The isolation ensures that ground loop currents do not affect the meter stability.

### Typical Application Connections

#### 4 to 20mA Loop Connection



Several devices may be connected in one current signal loop. Each device will have a voltage drop and the sum total of all voltage drops on the loop must not exceed the total loop power supply. The MU-35CL has a maximum voltage drop of 1.4 V at 20mA.

### Compatibility

The MU-Series have a matching DIN case style that is complementary to the Lynx, Leopard and Tiger family of meters. MU-Meters are the OEM's choice for economical switchboard and process indication. For economy, each model is dedicated to a specific application and designed for quick and easy installation.



### Specifications

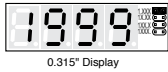
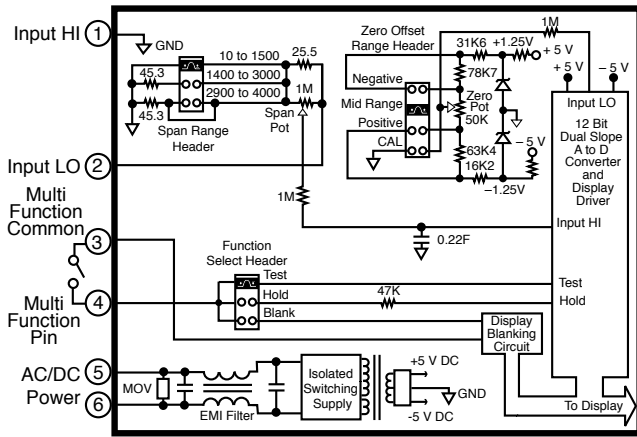
- Input Configuration:**.....Series connection to 4-20 mA DC current loop
- Input Impedance:**.....1M minimum
- Full Scale Ranges:** .....Standard meter is adjustable to any scaling between -1999 to +1999 without component changes
- A/D Converter:**.....12 Bit Dual Slope
- Accuracy:**.....±(0.05% of reading + 2 digits)
- Temperature Coefficient:** ....100ppm/°C (Typical)
- Warm up Time:**.....One minute to specified accuracy
- Conversion Rate:**.....3 readings per second
- Display:**.....0.3" High Efficiency LED, optional non-functional right hand side dummy zero available
- Decimal Selection:** .....User programmable to 3 positions
- Over-range Indication:**.....If input exceeds full scale on any range being used, most significant "1" digit & polarity symbol display; all other digits blank.
- Power Supply:** .....5V DC to 30V DC or 12V AC to 24V AC  
Approximately 1.5 watts
- Operating Temperature:**...0°C to +50°C
- Storage Temperature:** .....-20°C to +70°C
- Relative Humidity:** .....95% (non-condensing)
- Case Dimensions:** .....1/32 DIN (Bezel 48Wx24Hmm)  
Depth behind bezel (3.19") 81mm Plus  
(0.38") 9.5mm for connector
- Weight:** .....312 gms (11 oz)  
397 gms (14 oz) when packed

**MU-Series, the OEMs choice for DC voltage measuring**

MU-35 . . . .3.5 digit, Iso., 2/20/200 VDC, 5-36VDC/12-24VAC Pwr

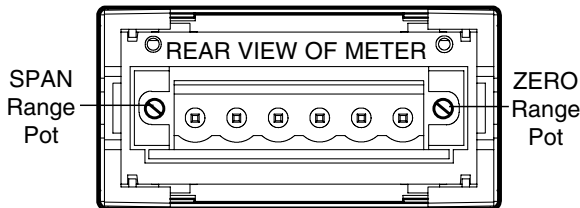
MU-35CL . . .3.5 digit, Iso., 4-20mA input, 5-36VDC/12-24VAC Pwr

## Functional Diagram



## Connector Pinouts

The Texmate model MU-35CL interconnects by means of screw terminals. The screw terminal connector is provided with the meter.



**Pin 1 - Signal Input High:** The 4 to 20 mA current signal enters the meter through this pin. can be selected on the Range Select Header.

**Pin 2 - Signal Input Low:** The 4 to 20 mA current signal exits the meter through this pin.

**Pin 3 - Hold/Test/ Blank:** Depending on the position of the internal jumper clip, connecting Pin 3 to Pin 4 will cause the display to hold, blank or test segments. (See component layout on page 13.) If display hold is selected on the internal header and Pin 3 is connected to the H/T/B Common Pin 4, the meter display will be latched. A/D conversions will continue but the display will not be updated until Pin 3 is disconnected from the H/T/B Common Pin 4.

If Display Test is selected on the internal header and Pin 3 is connected to the H/T/B Common Pin 4, all numeric segments of the display will light up and -1888 will be displayed. This function is used to check for defective segments.

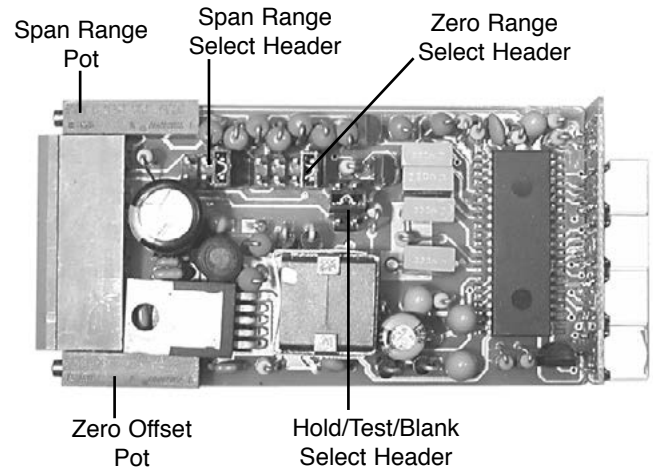
If Display Blank is selected on the internal header and Pin 3 is connected to the H/T/B Common Pin 4, the display will blank out. A/D conversions will continue, so that the display will show the true value of the input as soon as Pin 3 is disconnected from Pin 4.

**Pin 4 - Hold/Test/ Blank Common:** Connect this pin to Pin 3 to activate Hold, Test or Blank as explained under Pin 3.

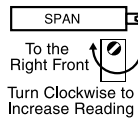
**Pin 5 - Power Input 1:** The MU-35CL operates from any voltage from 5 V DC to 30 V DC or 12 V AC to 24 V AC. This input is not polarity sensitive.

**Pin 6 - Power Input 2:** The MU-35CL operates from any voltage from 5 V DC to 30 V DC or 12 V AC to 24 V AC. This input is not polarity sensitive.

## Component Layout



## Signal Conditioning Components

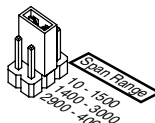


### SPAN Potentiometer (Pot)

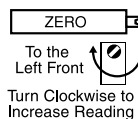
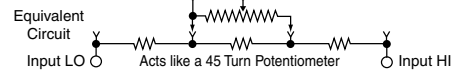
The 15 turn SPAN Pot is always on the right side (as viewed from the front of the meter). Typical adjustment is 37% of the input signal range.

### SPAN ADJUST Header

This three position header enables the SPAN Pot, in three equal overlapping 37% steps, to precisely scale down the input Signal Span, to provide any required Digital Display Span. Without any scaling or offset, a 4mA to 20mA input would produce a digital output of 1000 to 5000, which is a Digital Display Span of 4000 counts.



SPAN Adjust Header position	10 to 1500	1400 to 3000	2900 to 4000
SPAN Pot %	37%	37%	37%
Signal Span %	37%	75%	100%

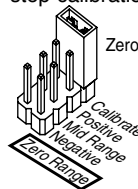


### ZERO Potentiometer (Pot)

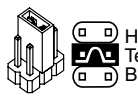
The ZERO Pot is to the left of the SPAN Pot. It enables the Digital Display Span to be offset 2000 to 2700 counts, depending on the Zero Offset Range Header position selected.

### ZERO OFFSET RANGE Header

This four position header enables the ZERO Pot to offset the Digital Display Span -3000 to +2000 counts with a user selectable Negative offset, Mid-range (- & + offset), Positive offset, and a Calibrate position (ZERO Pot disengaged). The Calibrate position facilitates a simple two step calibration with no interaction between Span and Offset.



Zero Offset Range Header	Calibrate position, Zero Pot Disengaged	Negative Offset Decreases Digital Reading	Mid Range	Positive Offset Increases Digital Reading
ZERO Pot Span	2700 Counts	2000 Counts	2300 Counts	
Offset Range	-3000 to -300	-1000 to +1000	-300 to +2000	



### HOLD/TEST/BLANK Header

Range values are marked on the PCB. Three positions are provided. After selecting a new range with the single jumper clip, recalibration is required.

## Calibration Procedure

The MU-35CL functions by measuring the voltage drop caused by the 4-20 mA signal loop current flowing through a sensing resistor located inside the meter. The voltage sensed is scaled by an adjustable potential divider network and converted to a digital reading in counts, shown by the LED display. Because the loop current does not go down below 4 mA, it is usually necessary to "Zero Offset" the meter reading. This enables zero or some other appropriate value to be displayed at 4 mA, even though the voltage across the sensing resistor is not zero. The Zero Offset may be disabled by putting the ZERO RANGE

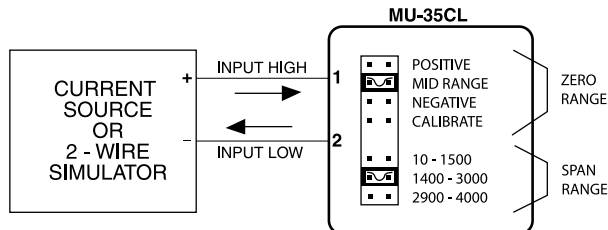
jumper clip into the CALIBRATE position.

### DEFINITION OF SPAN AND ZERO OFFSET

The SPAN is defined here as the total change in counts on the display when the signal loop current varies from 4 mA to 20 mA. Note that decimal points are descriptors, and so are excluded from the calculation. Example: If the required readings are +190.0 at 20 mA and -30.0 at 4 mA, then the SPAN is (+190) minus (-300), or 2200 counts. The ZERO OFFSET is simply defined here as the displayed counts at 4 mA. In the example above, the ZERO OFFSET is -300 counts.

### CALIBRATION

One header & potentiometer calibrate the span range (the change in meter reading between 4 mA and 20 mA). The second header & potentiometer calibrate the zero offset (the meter reading at 4 mA). To avoid interaction between the SPAN RANGE and ZERO RANGE potentiometers, the calibration is performed in the following sequence:



#### 1. Calibrate the SPAN

Place a jumper clip in the CALIBRATE position on the ZERO RANGE Select Header. This disables the ZERO RANGE potentiometer. Depending upon the calculated SPAN, place a jumper clip in the appropriate position on the SPAN RANGE header. In the above example, this would be the position marked 1400-3000. Apply an input of 4 mA to the meter. This input can be derived either from a Current Calibrator or from within a current loop, by varying the loop transmitter transducer appropriately. Adjust the SPAN RANGE potentiometer (R2) to make the meter display one quarter of the calculated SPAN. In the previous example, the meter would be adjusted to show  $2200 \div 4$ , i.e. 550 counts. Once calibrated, the display changes by 550 counts for a loop current change of 4 mA. Therefore when the input changes by 16 mA (i.e. from 4 to 20 mA), the display will change by  $550 \times 4 = 2200$  counts.

#### 2. Calibrate the ZERO OFFSET

Remove the ZERO RANGE jumper clip from the CALIBRATE position and replace it in the NEGATIVE, MID RANGE or POSITIVE position, depending on whether the required meter reading at 4 mA is a large negative, close to zero, or a large positive reading. In the previous example, place the jumper clip in the MID RANGE position. Adjust the ZERO RANGE potentiometer (R15) to make the meter display indicate the correct reading (-300 in the example).

#### 3. Check the Scaling

Apply loop currents of 4 mA and 20 mA. Verify that the meter indicates correctly at both currents. Slight adjustments to the SPAN RANGE and ZERO RANGE potentiometers may be required.

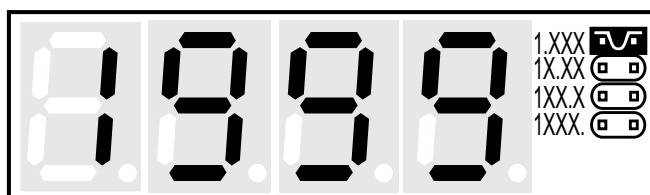
#### 4. Program Decimal Points

Program Decimal Points Refer to the "Decimal Point Selection" section on page 2 for decimal point programming.

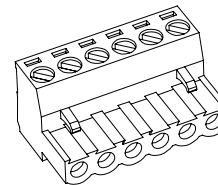
### Decimal Point Selection

#### For Standar Display

Decimal point position is selected on the Decimal Point Select Header on the Display Board.



### Connector



Input Power  
Screw Terminal Plug

Part Numbers:  
93-PLUG6P-ST....6 pins

### Front Bezel Descriptors

AC	kV	kVAR	m <sup>3</sup> /hr	Hz	RPM
V	mV	min	PF	°F	°C
DC	x10k	A	PSI	mS	kg/cm <sup>2</sup>
kW	W	kWh	pH	%	K
A	mbar	mA	MW	kA	RPS
MWh	m	kW/ft	l	l/s	cm
ORP	mm/s	1/mi	mm	kg/sec	lb/s
FT	bar	min <sup>1</sup>	m/mir	Mvar	V
					dB

To customize the front bezel, each DU-meter is supplied with a white printed clear adhesive label containing various popular descriptors. Choose the descriptors desired, peel off the adhesive backing and align the descriptors in the center right of the faceplate.

### Custom Face Plates



#### Texmate Produces Thousands of Custom OEM Face Plates

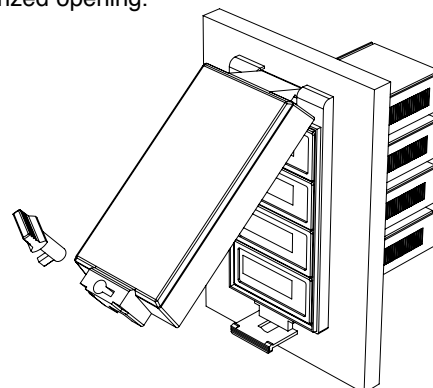
Have Texmate Design and Build a Custom Face Plate to Suit your Next project!

- Custom face plates have a non-recurring artwork charge. A serial number is then assigned to each artwork, to facilitate reordering.

- Small Run or One-Off custom face plates incur an installation charge, and are generally printed on a special plastic film, which is then laminated to custom faceplate blanks as required.
- Large Run (250 pieces min): custom face plates are production silk screened, issued a part number, and held in stock for free installation as required by customer orders.
- OEMs may also order Custom Meter Labels, Box Labels Custom Data Sheets and Instruction Manuals.

### Clear Lockable Water-proof Cover

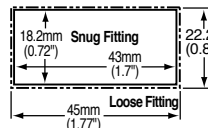
The clear lockable cover is designed to be dust and water proof to NEMA-4X, IP65 standards. The assembly consists of a base and cover with a cam hinge and key-lock fastening mechanism. An O-ring, or neoprene gasket forms a seal between the base and the panel. The cam hinge prevents the cover from closing when opened until pushed closed. The cover has a tapered recess that, when closed, forms a seal with a tapered spigot on the base. A key-lock employs a cam locking device to force the spigot into the recess, ensuring seal integrity. A safety catch keeps the cover closed even when the key is removed, and the keyhole can be used to attach a safety seal clip, preventing unauthorized opening.



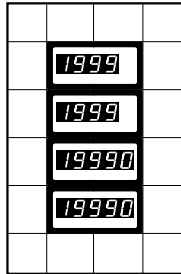
# MU Case Dimensions and Panel Cutouts

## PANEL CUTOUT

Case will mount in standard 1/32 DIN cutouts

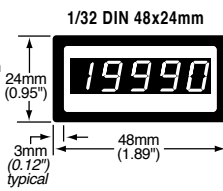


Panel adaptor plates are available to retrofit most existing panel cutouts.

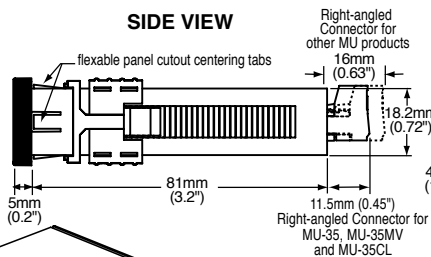


The 48x24mm case is particularly suitable for mounting in mosaic panels or insulative panels up to 2" thick. They can also stack mount, 2 up in existing cutouts for 1/16 DIN (48x48mm) or 4 up in 1/8 DIN (48x96mm).

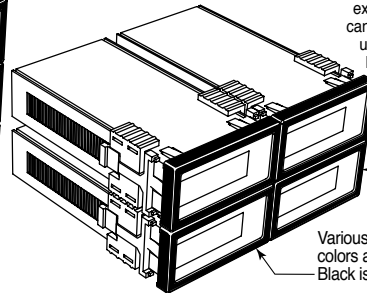
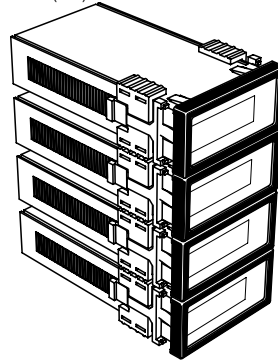
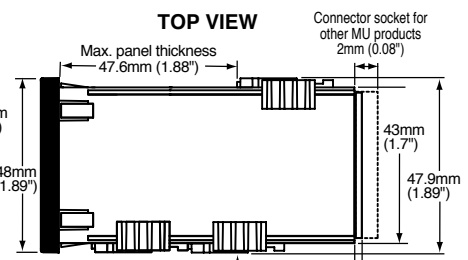
## FRONT VIEW



## SIDE VIEW



## TOP VIEW

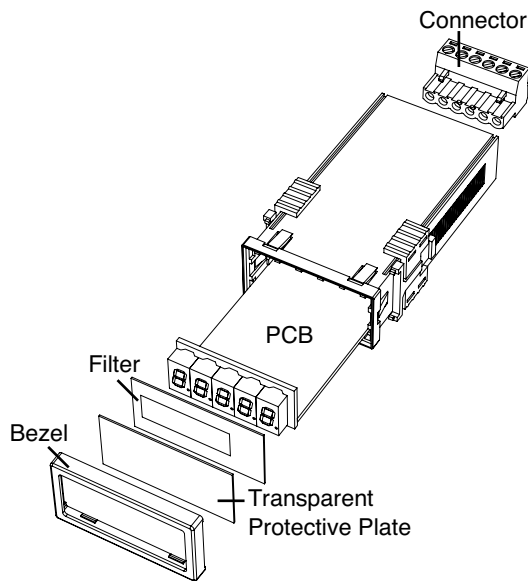


For additional strength, extra Mounting Slide Clips can be ordered and doubled up one behind the other. P/N: (75-MUMT BRKT)

Meter is removed from the front of the case after removing Bezel, Protective Plate and Filter.

Various bezel colors are available. Black is standard.

## Removing Meter From Case



## Ordering Information

### Standard Options for this Model Number

Part Number	Description	List
-------------	-------------	------

#### ► BASIC MODEL NUMBER

**MU-35CL** . . . .3.5 digit, Iso., 4-20mA input, 5-36VDC/12-24VAC Pwr . . . . .

#### ► DISPLAY

- MU-GREEN. . . Green LED Display . . . . .
- MU-RED4.5. . . Dummy zero option with RED Display. . . . .
- MU-GREEN . . 4.5Dummy zero option with GREEN Display. . . . .

### Special Options and Accessories

Part Number	Description	List
-------------	-------------	------

#### ► SPECIAL OPTIONS (Specify Inputs & Req. Reading)

- CB-FB-FS35 Non-Std Range and Scale Changes . . . . .
- HD-CHANGE Factory calibrated range change . . . . .

#### ► ACCESSORIES

- MU-CASE48X24 48x24mm Complete Case with Bezel . . . . .
- 75-MUBEZEL . . Black Bezel for 48x24mm Case . . . . .
- 75-MUMTBRKT. Mounting Slide Clips, extra set (48x24mm case size)

## WARRANTY

Texmate warrants that its products are free from defects in material and workmanship under normal use and service for a period of one year from date of shipment. Texmate's obligations under this warranty are limited to replacement or repair, at its option, at its factory, of any of the products which shall, within the applicable period after shipment, be returned to Texmate's facility, transportation charges pre-paid, and which are, after examination, disclosed to the satisfaction of Texmate to be thus defective. The warranty shall not apply to any equipment which shall have been repaired or altered, except by Texmate, or which shall have been subjected to misuse, negligence, or accident. In no case shall Texmate's liability exceed the original purchase price. The aforementioned provisions do not extend the original warranty period of any product which has been either repaired or replaced by Texmate.

## USER'S RESPONSIBILITY

We are pleased to offer suggestions on the use of our various products either by way of printed matter or through direct contact with our sales/application engineering staff. However, since we have no control over the use of our products once they are shipped, NO WARRANTY WHETHER OF MERCHANTABILITY, FITNESS FOR PURPOSE, OR OTHERWISE is made beyond the repair, replacement, or refund of purchase price at the sole discretion of Texmate. Users shall determine the suitability of the product for the intended application before using, and the users assume all risk and liability whatsoever in connection therewith, regardless of any of our suggestions or statements as to application or construction. In no event shall Texmate's liability, in law or otherwise, be in excess of the purchase price of the product.

Texmate cannot assume responsibility for any circuitry described. No circuit patent or software licenses are implied. Texmate reserves the right to change circuitry, operating software, specifications, and prices without notice at any time.



450 State Place • Escondido, CA 92029

Tel: 1-760-598-9899 • USA 1-800-839-6283 • That's 1-800-TEXMATE

Fax: 1-760-598-9828 • Email: orders@texmate.com • Web: www.texmate.com

For product details visit [www.texmate.com](http://www.texmate.com)

Local Distributor Address