CE

DU-45CL
4-20mA Process Loop
4 1/2 Digit with 0.56″ LEDs
in a 1/8 DIN Case

Easily user scaled, this high resolution meter is ideal for 4-20mA process loop measurement and indication in any engineering unit of measure.

General Features

The DU-45CL is an economical high resolution 4 to 20mA process loop measuring meter. It is easily user adjustable to any reading between -19999 and +19999 without component changes. The 15 turn infinitely adjustable Span and Zero Pot facilitate easy scaling in engineering units.
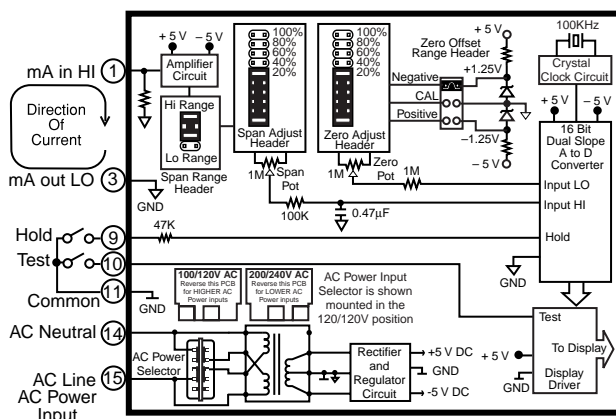
The standard meters have a high efficiency red LED display and user selectable AC power inputs of 100V AC to 120V AC or 200V AC to 240V AC are provided. An Optional 24V AC or an auto sensing isolated AC/DC 24V switching power supply can be ordered. (See ordering information)

Typical Application Connections

4 to 20mA Process Loop Measurement
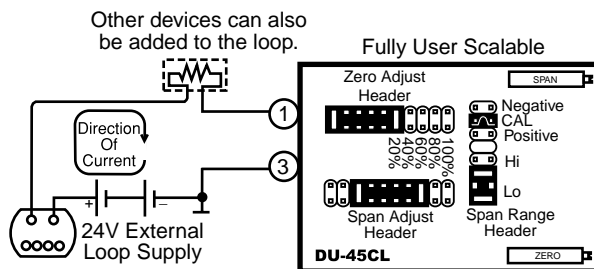
Functional Diagram

Compatibility

The DU-Series have a matching DIN case style that is complementary to the Lynx, Leopard and Tiger family of meters. DU-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.

INTERNATIONAL
DIN
CASES
1/32
1/32 **1/8**

Specifications

Input Configuration: ....Series connection to 4-20mA process loop.

Full Scale Ranges: ....User adjustable to any scaling between -19999 to +19999.

Input Impedance: ....70Ω. Maximum 1.4V drop

A/D Converter: ....16 Bit Dual Slope

Accuracy: ....± (0.05% of reading + 3 digits)

Temperature Coefficient: 100ppm/˚C (Typical)

Warm Up Time: ....One minute to specified accuracy

Conversion Rate: ....3 readings per second

Display: ....0.56" hi efficiency Red or optional Green LEDs. Display Hold & Display Test are provided.

Polarity: ....Bipolar. Assumed positive, displays negative

Decimal Selection: ....Header under face plate, X•X•X•X•

Over-range Indication: ...The display flashes "0000"

Power Supply (std): ....120/240V AC, 50/60 Hz. approx 2.5W.

  (Optn) VO-DC/ISO ....Isolated Switcher. 9 to 36V DC/12 to 24V AC

  (Optn) VO-24V ....Isolated Transformer 24V AC ±10%

  (Optn) VO-5V DC............Non-isolated 5V DC ±10%

Operating Temperature: ..–10 to 50 °C

Storage Temperature: ......–20 to 70 °C

Relative Humidity: ....95% (non-condensing)

Case Dimensions: ....1/8 DIN, Bezel: 96x48mm (3.78"x1.89") Depth behind bezel 117 mm (4.61") plus 11.8mm (0.47") for Right-angled Connector or 20mm (0.79") for Straight-through Connectors.

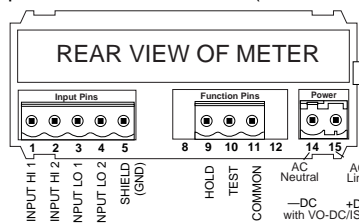**Weight:**...............................11 oz., 14 oz when packed

DU-Series, the OEMs choice for switchboard and process indication

DU-35ACI1/5 ....AC amps, Scaled RMS. (**1 or 5 Amp** Internal shunt), 3.5 digit
DU-35ACIRMS1/5 ..AC amps, True RMS. (1 or 5 Amp Internal shunt), 3.5 digit
DU-40ACI1-5 ....AC amps, Scaled RMS. (1 or 5 Amp Internal shunt), 4 digit
DU-35AC ....AC volts, Scaled RMS. 199.9/700V AC Header Selectable Ranges, 3.5 digit
DU-35ACRMS ....AC volts, True RMS 199.9/700V AC Header Selectable Ranges, 3.5 digit
DU-40AC ....AC volts, Scaled RMS. **700.0V AC** full scale, 4 digit
DU-35HZ ....**15.0Hz** to **199.9Hz** or 15/500Hz. Up to 700V AC input, 3.5 digit
DU-35 ....DC volts ±2V/±20V/±200V Header Selectable Ranges, 3.5 digit
DU-35MV........................DC mV **±50mV**, ±100mV, ±200mV Header Selectable Ranges, 3.5 digit

DU-45 ....DC volts **±2V**/±20V/±200V Header Selectable Ranges, 4.5 digit
DU-45MV........................DC mV **±50mV**/±100mV/±200mV Header Selectable Ranges, 4.5 digit
DU-35CL ....Process 4 to 20mA **(100.0)**, easily user scalable, 3.5 digit
DU-35CLE ....Process 4 to 20mA **(100.0)** with 24V DC excitation, scalable, 3.5 digit
DU-45CL ....Process 4 to 20mA **(100.00)**, easily user scalable, 4.5 digit
DU-35P......................Pressure, strain gage and load cell, 4 and 6 wire, 5V DC excitation, Header Selectable Sensitivity 2mV/V, 5mV/v, 10mV/V, **20mV/V**, 3.5 digit
DU-35J/K..................Order **J** or **K** Thermocouple and **°C** or **°F**, 3.5 digit
DU-35RTD.....................100Ω platinum RTD, 3 or 4 wire, order **°C** or **°F** and **0.1°** or **1°**, 3.5 digit

Connector Pinouts

This meter is supplied with plug-in type screw terminal connectors. The power supply pins (14 & 15) have a unique plug and socket outline to prevent cross connection. (see DU Connectors)

REAR VIEW OF METER

Input Pins | Function Pins | Power

1 2 3 4 5 | 8 9 10 11 12 | 14 15

INPUT HI 1
INPUT HI 2
INPUT LO 1
INPUT LO 2
SHIELD (GND)
HOLD
TEST
COMMON
AC Neutral —DC with VO-DC/ISO
AC Line +DC

⚠ WARNING: AC and DC input signals and power supply voltages can be hazardous. Do Not connect live wires to screw terminal plugs, and do not insert, remove or handle screw terminal plugs or internal jumper clips with live wires connected to the meter.

Pin 1 - Signal Input High: Signal high input for the meter. The 4-20mA current enters on this pin.

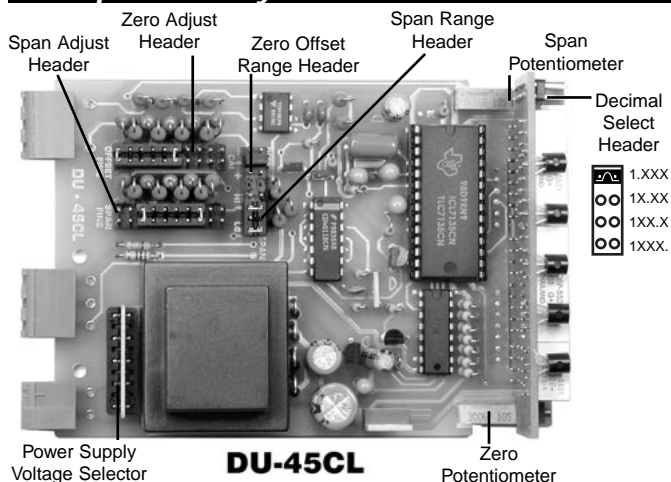**Pin 3 - Signal Input Low:** Signal low input for the meter.

Pin 9 - Hold Reading: If this Pin is left unconnected, the meter will operate in a free-running mode. When this pin is connected to the Hold/Test Common Pin 11, the meter will latch up. A/D conversions will continue, but the display will not be updated until Pin 9 is disconnected from the Hold/Test Common pin 11.

Pin 10 - Display Test: All numeric display segments will light up when this pin is connected to the Hold/Test Common Pin 11.

Pin 11 - Hold/Test Common: The Hold and Display Test Pins have to be connected to this pin to activate their respective functions.

Pins 14 & 15 - AC Power Input: These pins are the Power Input pins for the meter. All DU-Series meters sold in North America are pre-configured at the factory for 100/120V AC operation. To re-configure for 200/240V AC operation, simply pull out the AC Power Voltage Selector located directly behind the transformer, turn it around and reinsert it into the socket so that "200/240V AC" is visible. Various other AC/DC power options are available.
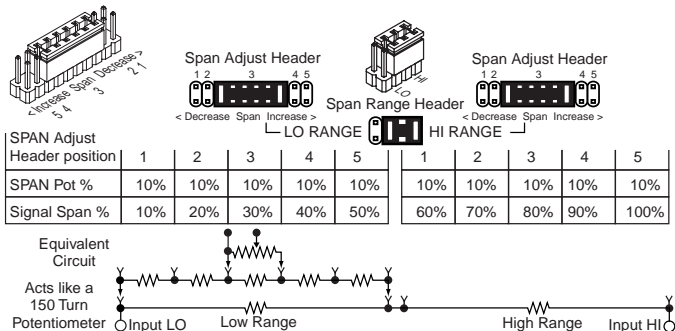
Component Layout

Span Adjust Header
Zero Adjust Header
Zero Offset Range Header
Span Range Header
Span Potentiometer
Decimal Select Header

1.XXX
1X.XX
1XX.X
1XXX.

Power Supply Voltage Selector

DU-45CL

Zero Potentiometer

Signal Conditioning Components

SPAN
To the Right Front
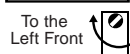Turn Clockwise to Increase Reading

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 10% of the input Signal Span.

SPAN ADJUST Header and SPAN RANGE Header

The 5 position SPAN ADJUST Header, in conjunction with the 2 position SPAN RANGE Header provides 10 over-lapping 10% steps. The SPAN Pot can then, precisely scale down the input Signal Span, to any required Digital Display Span. A 4mA to 20mA input, without scaling or offset, produces 10000 to 50000 counts, which is a Digital Display Span of 40000 counts.

Span Adjust Header
< Increase Span Decrease >

Span Range Header — LO RANGE / HI RANGE

Span Adjust Header
< Decrease Span Increase >

SPAN Adjust Header position	1	2	3	4	5	1	2	3	4	5
SPAN Pot %	10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Signal Span %	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%

Equivalent Circuit
Acts like a 150 Turn Potentiometer
Input LO — Low Range — High Range — Input HI
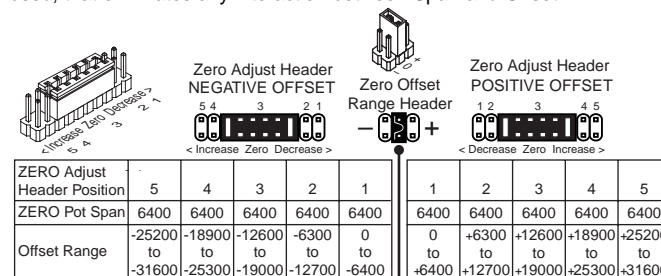

ZERO
To the Left Front
Turn Clockwise to Increase Reading

ZERO Potentiometer (Pot)

The ZERO pot is to the left of the SPAN pot. It enables the Digital Display Span to be offset by 6400 counts.

ZERO ADJUST Header and ZERO OFFSET RANGE Header

The ZERO ADJUST Header, in 5 selectable 6400 count steps, enables the ZERO Pot to offset the Digital Display Span by 31800 counts. The ZERO OFFSET RANGE Header selects this offset to be either Negative, or Positive, or Disengaged. This enables a simple two step calibration procedure to be used, that eliminates any interaction between Span and Offset.

< Increase Zero Decrease >
Zero Adjust Header NEGATIVE OFFSET
< Increase Zero Decrease >
Zero Offset Range Header − | | +
Zero Adjust Header POSITIVE OFFSET
< Decrease Zero Increase >

ZERO Adjust Header Position	5	4	3	2	1	1	2	3	4	5
ZERO Pot Span	6400	6400	6400	6400	6400	6400	6400	6400	6400	6400
Offset Range	-25200 to -31600	-18900 to -25300	-12600 to -19000	-6300 to -12700	0 to -6400	0 to +6400	+6300 to +12700	+12600 to +19000	+18900 to +25300	+25200 to +31600

CALIBRATE position, Zero Pot disengaged (no offset applied)

Calibration Procedure

Our unique set of Signal Conditioning Components enables the use of a simple two step scaling and calibration procedure that eliminates any back and forth interaction between zero and span settings. Calibration can be accomplished with just a single precision 4mA signal source.

The first step is to disengage the ZERO Pot, by selecting the Calibrate position on the ZERO OFFSET Range Header. Then using the SPAN RANGE and SPAN ADJUST Headers, select an approximate percentage of Signal Span reduction, that will enable the SPAN Pot to precisely scale down the **Signal Span** to the desired **Digital Display Span**.

Signal Span is defined as the total change in an input signal that is specified for a specific change in the Digital Display. The largest Signal Span that can be specified with a 4 to 20mA input is 16mA. However, a Signal Span of 4mA can be proportionally scaled to a smaller Digital Display Span, and still meet full scale display accuracy.

Digital Display Span is defined as the exact total in counts, that the display is specified to change, for a specific Signal Span. The largest Digital Display Span that can be displayed is -19999 to +19999 (40000 counts). Obviously, a 16mA Signal Span can not be scaled to display +40000, however the same result can be achieved by proportionately scaling 4mA (25% of 16mA) to display +10000.

The second step is to re-engage the ZERO Pot by selecting a ZERO OFFSET Range and a ZERO ADJUST Header position which will provide sufficient counts of offset so the ZERO Pot can offset the Digital Display Span to display the desired reading for a 4 to 20mA input.

Maximum offset is -31800 to +31800 counts. A 16mA Signal Span with a Digital Display Span of 40000 counts would require an offset of -30000 to display -19999 to +19999 for a 4 to 20mA input.

For example: A 4 to 20mA input to read -400.0°F to +1700.0°F
Signal Span = 16mA, Digital Display Span = 21000 counts.

1. Remove the meter from its case and set the Zero Offset Range Header to the Calibrate position. The required 21000 count Digital Display Span is between 50% and 60% of the 40000 count full scale Digital Display Span, so select the Hi Range position on the SPAN RANGE Header, the 60% position on the SPAN ADJUST Header and slide the meter back into the case.

2. Connect power to the meter and apply 4mA (25% of 16mA). Adjust the SPAN Pot until the display reads +5250 (25% of 21000). The meter is now scaled for a Signal Span of 16mA and a Digital Display Span of 21000 counts. In this example 4mA should read -4000, therefore the Digital Display Span needs to be offset by -9250 counts.

3. Disconnect power and remove the meter from the case. Select the Negative offset position on the ZERO OFFSET RANGE Header, the -6500 to -12900 offset range position on the ZERO ADJUST Header and slide the meter back into the case.

4. Connect power to the meter, apply 4mA and adjust the ZERO Pot until the display reads -4000. With the Digital Display Span now offset by -4000 counts, the meter will read -4000 for a 4mA input, and read +17000 for a 20mA input. Select decimal point 1XXX•X to display -400.0 to +1700.0. Then apply the self adhesive °F symbol (from the Face Plate Descriptor sheet provided) to complete the calibration.

Decimal Point Selection
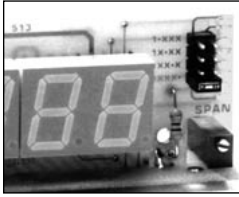
Decimal selection is made on the front of the display board by moving the jumper to the indicated position on the header for the decimal required.

Rear Selection of Decimal Points

An optional output board is available that provides access to all decimal points via a rear PCB edge connector.

Opening Back Panel

To open back panel, insert a flat screwdriver or similar instrument in both slots on the top of the case and pry open. The DU-Series meters slide out from the rear of the case as a complete assembly.
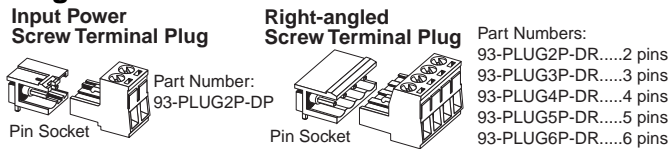
Selecting Power Supply Voltage

This unique voltage selector PCB displays the operating voltage selected. To change the voltage, disconnect power to the meter. Remove the selector, reverse the selector and fully re-insert it in the socket. This selector is not required for optional power supplies.

DU-Series Connector Options

Plug-in Screw Terminal Connectors are Provided

Input Power Screw Terminal Plug

Part Number: 93-PLUG2P-DP

Pin Socket

Right-angled Screw Terminal Plug

Pin Socket

Part Numbers:
93-PLUG2P-DR.....2 pins
93-PLUG3P-DR.....3 pins
93-PLUG4P-DR.....4 pins
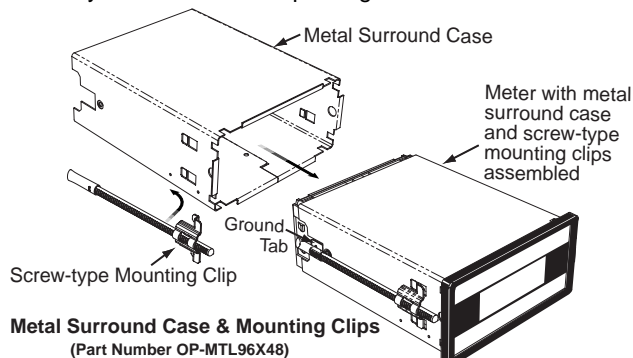93-PLUG5P-DR.....5 pins
93-PLUG6P-DR.....6 pins

Spade Lug pinouts and insulated quick disconnects may still be ordered as an option. P/N.:CN-SPADE.
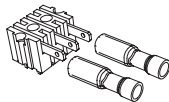
Metal Surround Case Option

The meter's plastic case is made from fire retardant polycarbonate. A metal surround case can be ordered to enhance the meter's fire retardant capabilities and also provide shielding against electromagnetic interference (EMI). The metal case slides over the polycarbonate case and is held firmly in place by spring-type non-return clips. The Metal Surround Case must be factory installed on the polycarbonate case and once installed, it cannot be removed in the field.

With the metal case in place, the meter's standard ratchet-type mounting clips can not be used. Instead a pair of screw-type DIN standard mounting clips are provided, which clip into holes on the side of the metal case and tighten against the rear of the panel. A ground tab on the metal case enables the metal case to be easily connected to the panel ground.

Metal Surround Case

Meter with metal surround case and screw-type mounting clips assembled

Ground Tab

Screw-type Mounting Clip

Metal Surround Case & Mounting Clips
(Part Number OP-MTL96X48)

Face Plate Descriptors

AC	Ω	kV	kVAR	m³/hr	Hz	RPM
V	mV	min	PF	°F	°C	CosØ
DC	x10kN	µA	PSIG	mS	kg/cm²	psi
kW	W	kWH	pH	%	K	kPa
A	mbar	mA	MW	kA	RPS	MWH
mWs	µm	kW/s	l	l/sec	ml	cm
ORP	mm/s	1/min	mm	kg/sec	lbs	kg/hr
FT	bars	min¹	m/min	Mvars	µV	dB

To customize the face plate, each DU-meter is supplied with a white printed clear adhesive label containing various popular descriptors. Choose the descriptor desired, peel off the adhesive backing and align the descriptor 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 re-ordering.

• 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.

Optional Display Styles
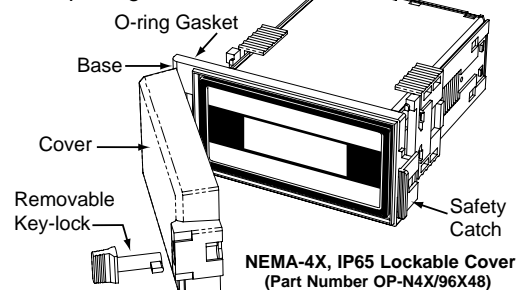
DU Series Above-Center Display Option

0.8" LED Options available in Lynx Family

To match all display styles, DU-Meters have an optional display and faceplate with the digits positioned above center. (see Display Options)
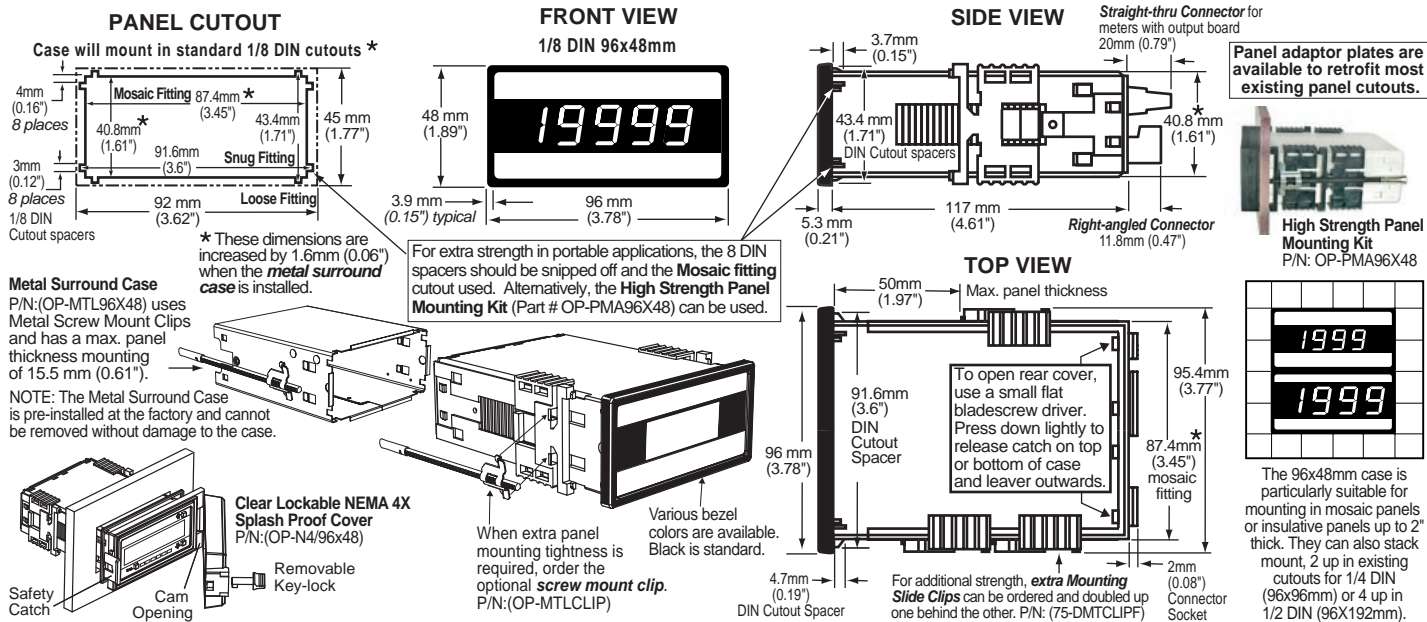
For 0.8" LEDs in 1/8 DIN cases order Lynx family DX-35 and DX-40 w/ LR or LG displays and input modules that match DU-Series inputs.

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.

O-ring Gasket

Base

Cover

Removable Key-lock

Safety Catch

NEMA-4X, IP65 Lockable Cover
(Part Number OP-N4X/96X48)

DU Case Dimensions and Panel Cutouts

PANEL CUTOUT
Case will mount in standard 1/8 DIN cutouts ✱

4mm (0.16") 8 places
Mosaic Fitting 87.4mm ✱ (3.45")
40.8mm ✱ (1.61")
43.4mm (1.71")
45 mm (1.77")
3mm (0.12") 8 places
91.6mm (3.6")
Snug Fitting
Loose Fitting
92 mm (3.62")
1/8 DIN Cutout spacers

✱ These dimensions are increased by 1.6mm (0.06") when the **metal surround case** is installed.

FRONT VIEW
1/8 DIN 96x48mm

48 mm (1.89")

19999

3.9 mm (0.15") typical
96 mm (3.78")

For extra strength in portable applications, the 8 DIN spacers should be snipped off and the **Mosaic fitting** cutout used. Alternatively, the **High Strength Panel Mounting Kit** (Part # OP-PMA96X48) can be used.

SIDE VIEW
3.7mm (0.15")
43.4mm (1.71") DIN Cutout spacers
40.8mm (1.61")
5.3 mm (0.21")
117 mm (4.61")

Straight-thru Connector for meters with output board 20mm (0.79")

Right-angled Connector 11.8mm (0.47")

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

High Strength Panel Mounting Kit P/N: OP-PMA96X48

TOP VIEW
50mm (1.97")
Max. panel thickness
95.4mm (3.77")
91.6mm (3.6") DIN Cutout Spacer
87.4mm (3.45") mosaic fitting
96 mm (3.78")
4.7mm (0.19") DIN Cutout Spacer
2mm (0.08") Connector Socket

To open rear cover, use a small flat bladescrew driver. Press down lightly to release catch on top or bottom of case and leaver outwards.

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

1999

1999

The 96x48mm 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 1/4 DIN (96X96mm) or 4 up in 1/2 DIN (96X192mm).

Metal Surround Case
P/N:(OP-MTL96X48) uses Metal Screw Mount Clips and has a max. panel thickness mounting of 15.5 mm (0.61").
NOTE: The Metal Surround Case is pre-installed at the factory and cannot be removed without damage to the case.

Clear Lockable NEMA 4X Splash Proof Cover
P/N:(OP-N4/96x48)
Removable Key-lock
Safety Catch
Cam Opening

When extra panel mounting tightness is required, order the optional **screw mount clip**. P/N:(OP-MTLCLIP)

Various bezel colors are available. Black is standard.

Ordering Information

Standard Options for this Model Number

Part Number	Description

▶ **BASIC MODEL NUMBER** Includes plug in type screw terminals, standard display and standard power supply unless optional versions are ordered.
DU-40CL ....DPM, Process 4 to 20mA **(100.00)**, easily user scalable

▶ **DISPLAY**

STANDARD.......Red LEDs, 0.56 inch high
DU-BRIGHT . . . . . . .Super bright Red LEDs, 0.56 inch high
DU-GREEN . . . . . . .Green LEDs, 0.56 inch high
DU-GREEN 4.5D . . .Dummy Zero Display Option w/ Green LEDs
DU-RED4.5D . . . . . .Dummy Zero Display Option w/ Green LEDs
DU-35HI/BRT . . . . . .Above center position, .56 inch, Bright Red LED
DU-35HI/GRN . . . . .Above center position, .56 inch, Green LED
DU-35HI/RED . . . . .Above center position, .56 inch, Red LED

▶ **POWER SUPPLY**

STANDARD.......100/120 or 200/240VAC User selectable
V0-DC/ISO . . . . . . .Isolated auto-sensing AC/DC 9 to 36 VDC/12 to 24 VAC
V0-24V . . . . .Isolated transformer 12 VAC or 24 VAC user selectable

▶ **SPECIAL OPTIONS (Specify Inputs or Outputs & Req. Reading)**

HD-CHANGE . . . . .Range change from the standard input as shown in **BOLD** type
CB-FS45 . . . . .Non-Std Range and Scale Changes for all DU-45 series

Special Options and Accessories

Part Number	Description

▶ **ACCESSORIES (Specify Serial # for Custom Artwork Installation)**

75-DBBZ9648F . . . .Black Bezel for 96x48mm Case
75-DMTCLIPF . . . . .Side Slide Brackets (2 pc) - extra set, extra strength
76-DU45G . . . . .Replacement DU Series grey lens for Green LEDs
76-DU45R . . . . .Replacement DU Series red lens for Red LEDs
76-DUPP/N . . . . . . .Anti-glare protective front lens plate for DU Series
93-PLUG2P-DP . . . .Extra Screw Terminal Conn., 2 Pin Power Plug
93-PLUG3P-DR . . . .Extra Screw Terminal Conn., 3 Pin Plug
CN-SPADE . . . . .Spade Lug pinouts and Insulated quick disconnects
DN-CAS96X48A . . .Complete 96x48mm Case with bezel
OP-DUEXTDP . . . . .Option for External Decimal Point
OP-MCLP96X48 . . .Screw Mounting Clips (2 pc) to screw tighten slide brackets
OP-MTL96X48 . . . . .Metal Surround Case includes metal mounting clips
OP-N4X/96X48 . . . .Clear Lockable Water-proof cover, Nema 4X, IP65
QD-KIT-1 . . . . .Replacement Crimp-on Quick Disconnects (7 per Set)
ART-FS-S/D . . . . . .NRC for Artwork & set-up Custom Faceplate and or Descriptor
ART-FS-S/D/C . . . . .NRC for Artwork & set-up Custom Faceplate and Custom Logo
ART-FS-001 . . . . .Produce & Install Custom Faceplate per meter - 1 color no-min
ART-FS-002 . . . . .Produce & Install Custom Faceplate per meter - 2 color no-min
ART-FS-003 . . . . .Produce & Install Custom Faceplate per meter - 3 color no-min
ART-FL-001 . . . . .Custom Faceplate, 250 piece Min. - 1 color
ART-FL-002 . . . . .Custom Faceplate, 250 piece Min. - 2 color
ART-FL-003 . . . . .Custom Faceplate, 250 piece Min. - 3 color
Many other options and accessories are available. See full price list for more details. Prices subject to change without notice.

TEXMATE INC

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Texmate has facilities in Japan, New Zealand, Taiwan, and Thailand. We also have authorized distributors throughout the USA and in 28 other countries.

For product details visit www.texmate.com
Local Distributor Address