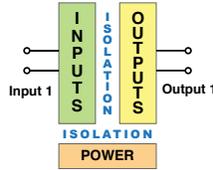# *First Industrial Plug and Play Transducer - TDL-40 Series*

▸ **First Industrial *Plug and Play* Wall Mount Transmitter/Transducer with or without digital display**

INPUTS **ISOLATION** **OUTPUTS**
Input 1   Output 1
ISOLATION
POWER

▸ **Triple Isolated:** Power to Inputs
       Power to Outputs
       Inputs to Outputs

▸ **Accepts most common input signals**
 • DC Volts, Amps, mV, mA
 • AC Volts, Amps, mV, mA, Line Frequency

▸ **5 Amp input has a built-in automatic current loop shorting connector to prevent open load when unplug from the base**

▸ **Active, isolated 16 bit analog output. 4-20mA or 0-10V**
 (Requires external 24V to power output)

▸ **Up to four relays - 2 x 10A From C and 2 x 5A Form A or 2 isolated 5A Form A with programmable Hysteresis, Delay on Make and Delay on Break.**

▸ **Plug and Play. Ordered unit is configured to meet your requirements.**

▸ **Auto sensing AC/DC power supply: 85-265 VAC / 95-300 VDC or optional 15-48 VAC / 10-72 VDC.**
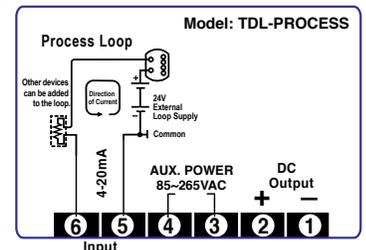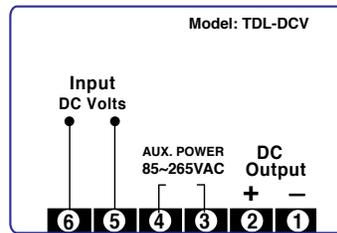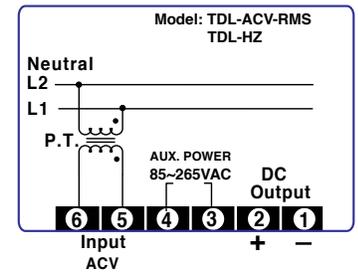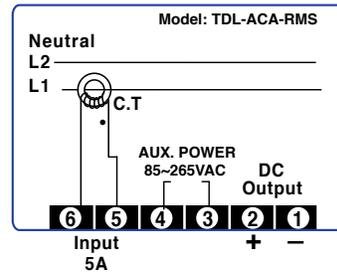
▸ **24 VDC excitation to power 4-20 mA loops.**

MADE IN THE USA **CE** **RoHS COMPLIANT**

NEW

Pin to Pin Compatible with Yokogawa mounting

Base Station only needs one-time wiring which eliminates re-wiring and resultant, costly mistakes.

Easy Calibration, Easy Routine Maintenance

Dimensions

TOP VIEW
133.0 mm (5.24")
120.65 mm (4.75")
110.0 mm (4.33")
(0.22") dia 5.5mm
30.55 mm (1.2")
38.1 mm (1.5")
48.0 mm
42.3 mm (1.89")
(1.66")
83.0 mm (3.27")
7.55 mm (0.3")
R4.5 mm (0.18")
TDL-40-PS1-IA05-AIC
AC CURRENT TRANSDUCER

FRONT VIEW
96 mm (3.78")
88.88mm (3.50")
103 mm (1.97")
48.50 mm (1.91")

Wiring Diagrams

Model: TDL-ACA-RMS
Neutral
L2
L1 — C.T
AUX. POWER 85~265VAC
DC Output
6 5 4 3 2 1
Input 5A   + −

Model: TDL-ACV-RMS TDL-HZ
Neutral
L2
L1
P.T
AUX. POWER 85~265VAC
DC Output
6 5 4 3 2 1
Input ACV   + −

Model: TDL-DCV
Input DC Volts
AUX. POWER 85~265VAC
DC Output
6 5 4 3 2 1
+ −

Model: TDL-PROCESS
Process Loop
Other devices can be added to the loop.
Direction of Current
24V External Loop Supply
Common
4-20mA
AUX. POWER 85~265VAC
DC Output
6 5 4 3 2 1
Input   + −

• For Product Details, Please Visit www.texmate.com

(d0104)

Controls, Indicators and Calibration Buttons

Annunciator
Setpoint
LEDs

SP4
SP3
SP2
SP1

PROGRAM BUTTON [P]

UP ARROW BUTTON [↑]

DOWN ARROW BUTTON [↓]
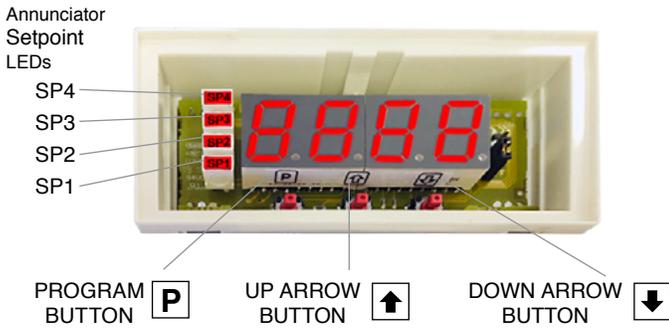
Up Button

When in the operational display, pressing the [↑] button alone, allows you to view Peak and Valley (Highest and Lowest Readings.)

When in the **calibration mode** or the **setpoint setting mode** the [↑] button is used to increase the value of the displayed parameter.

Top Calibration Buttons

Program Button

The [P] button is used to move from one program step to the next. When pressed at the same time as the [↑] button, it initiates the **calibration mode**. When pressed at the same time as the [↓] button, it initiates the **setpoint setting mode** for models with relays option.

Down Button

When in the operational display, pressing the [↓] button alone, allows you to view and reset Peak and Valley (Highest and Lowest Readings), but not change, the setting of setpoint 1,2,3 & 4 for models with relays option.

When in the **calibration mode** or the **setpoint setting mode** the [↓] button is used to decrease the value of the displayed parameter.

General Features

- Direct connection of a sensor output to a Texmate Plug-in Input signal conditioner, capable of receiving a variety of inputs such as:

  – AC Current

  – AC/DC Voltage

  – 4 to 20 mA

- Auto sensing AC/DC power supply. For voltages between **85-265 V AC / 95-370 V DC (PS1)** or 15-48 V AC / 10-72 V DC (PS2).

- 24 V DC excitation is available to power external sensors and transmitters.

- Standard red or optional green or super bright red 4-digit LED with display range –1999 to 9999 (12000 counts).

- Red or green 0.8" LED large display option

- Four annunciator LEDs provide front panel alarm status indication for up to four setpoints.

- Two 10 Amp Form C and two 5 Amp Form A relays, or optionally four 5 Amp Form A relays are available.

- Automatic intelligent averaging smooths noisy signals, while providing a fast display response to real input signal changes.

Specifications

Input Specs:	Depends on Input signal conditioner
A/D Converter:	14 bit single slope
Accuracy:	±(0.05% of reading + 2 counts)
Temp. Coeff.:	100 ppm/°C (Typical)
Warm up time:	2 minutes
Conversion Rate:	5 conversions per second (Typical)
Display:	**4 digit 0.56" Red LED display (std)**, 0.56" or 0.8" Red, Green or Super Bright Red (optn) Range –1999 to 9999 counts.
Polarity:	Assumed positive. Displays – negative
Decimal Selection:	Front panel button selectable, X•X•X•X•
Positive Overrange:	Top segments of digital display flash
Negative Overrange:	Bottom segments of digital display flash
Relay Output:	Two 5 Amp Form A relays and two 10 Amp Form C, or 5 Amp form A relays.
Analog Output:	Isolated 16 bit user scalable mA or V
AIC (mA out)	4-20 mA @ 0 to 500Ω max loop resistance
AIV (volts out)	0-10 V DC @ 500 Ω or higher resistance
Power Supply:	AC/DC Auto sensing wide range supply
PS1 (std)	**85-265 VAC / 95-370 VDC @ 2.5W max 3.5W**
PS2	15-48 VAC / 10-72 VDC @ 2.5W max 3.5W
Operating Temp.:	0 to 60 °C
Storage Temp:	–20 °C to 70 °C.
Relative Humidity:	95% (non condensing)
Weight:	6.5 oz., 8.5 oz when packed

Software Features

- Three-button programming from the front panel (UP, DOWN and PROGRAM buttons).

- Three front panel selectable ranges.

- Front panel selectable four-level brightness control of digital display, and setpoint LEDs.

- Four programmable setpoints.

- Relay activation can be selected to occur above (HI) or below (LO) each setpoint.

- Hysteresis setting for all four setpoints. Delay on make and delay on break for SP1 and SP2.

- Peak and Valley. View and Reset.

Application Example - AC Current Measurement with Load Control

The log feed motor speed is controlled by the 4-20 mA output scaled from the saw blade motor current. As the saw motor load increases above 90% load, the log feed motor slows. If the load increases above 120%, the **feed motor** stops. If the load increases to 150%, the **saw motor** stops.

APPLICATION VARIATIONS
- 4 relay setpoints can be individually programmed to activate above or below the setpoint.
- Setpoints can be programmed with delay-on-make and delay-on-break time delay settings.

LOAD CONTROL

INPUTS

AC Power Supply

AMPS AC

ANALOG OUTPUTS

RELAY OUTPUTS

oint setting.

Current Transformer

Saw Motor

5A AC Input

From ALARM Setpoint — Alarm

SP4 — ALARM/STOP — 150% Load

EXCESSIVE Current Zone

SP3 — 120% Load / 4 mA Output

ABOVE NORMAL Current Zone

SP2 — 90% Load / 20 mA Output

SP1 — NORMAL Current Zone — 50% Load

Feed Motor Stop at 4mA

Feed Motor Controller

Feed Motor Full Speed at 20 mA

4-20 mA Analog Output

TDL-40 Plug and Play Transducer with Relays

Instructions on how to perform Calibration with meter mounted in Calibration Station.

1-Remove power from transducer

2-Remove transducer from base installed in system.

3-Turn switch to ON position to activate display.

4-Install transducer into Calibration Station

5-Remove front plate from transducer.

6-Follow calibration steps on page 5, 6 and 7.

7-For Relay setting instructions please see page 8.

After calibration, reverse actions 5 to 1.
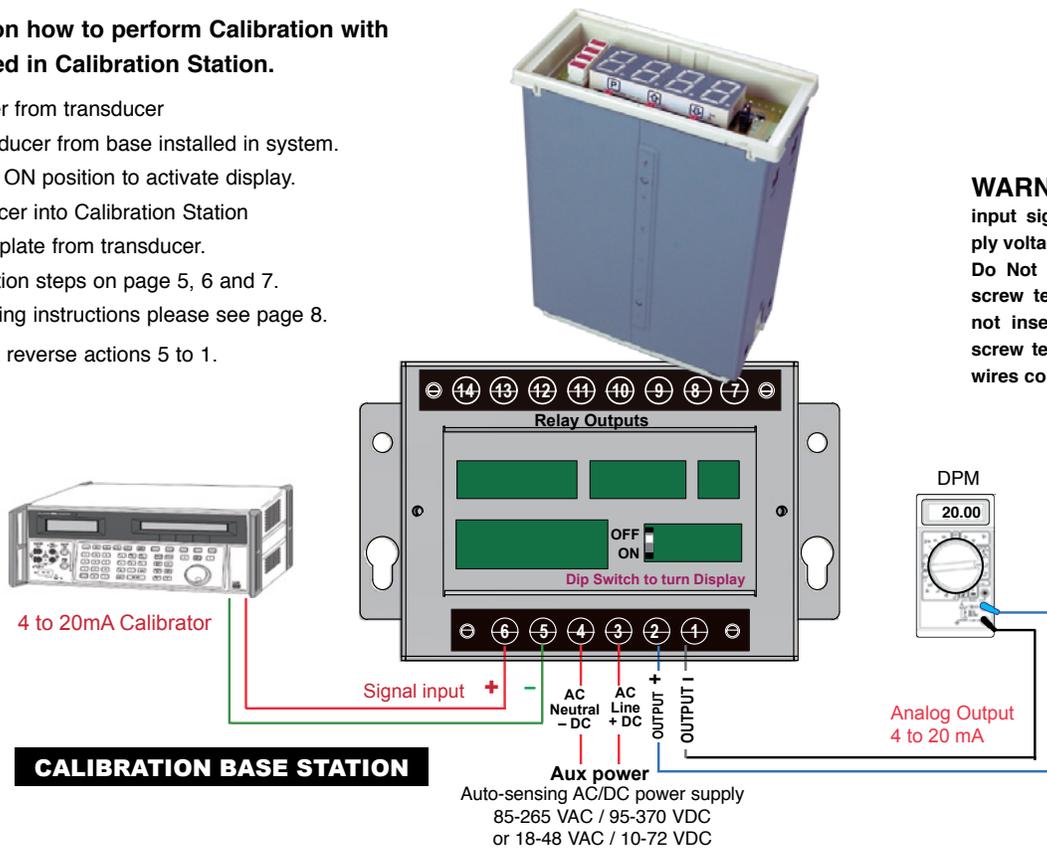
⚠️ **WARNING:** AC and DC input signals and power supply voltages can be hazardous. Do Not connect live wires to screw terminal plugs, and do not insert, remove or handle screw terminal plugs with live wires connected.

Relay Outputs

14 13 12 11 10 9 8 7

OFF / ON

Dip Switch to turn Display

DPM

20.00

4 to 20mA Calibrator

6 5 4 3 2 1

Signal input **+** **−**

AC Neutral − DC

AC Line + DC

OUTPUT +

OUTPUT I

Analog Output 4 to 20 mA

CALIBRATION BASE STATION

Aux power
Auto-sensing AC/DC power supply
85-265 VAC / 95-370 VDC
or 18-48 VAC / 10-72 VDC

Software Logic Tree

The TDL-40 is an intelligent meter with a hierarchical software structure designed for easy programming and operation, as shown below in the software logic tree.

After the meter has been powered up, the four digits light up for three seconds and then settle to the operational display indicating the input signal.

MAIN MENU
Operational Display

Sub-menu MODE

SETPOINT VIEW ONLY MODE

Setpoint 1 (SP1) — **SP1 / XXXX**

Setpoint 2 (SP2) — **SP2 / XXXX**

Setpoint 3 (SP3) — **SP3 / XXXX**

Setpoint 4 (SP4) — **SP4 / XXXX**

PEAK & VALLEY VIEW & RESET

Peak — **PEAK / XXXX** — Reset PEAK

Valley — **VALY / XXXX** — Reset VALY

TWO POINT ANALOG OUTPUT RANGE SETTING AND CALIBRATION SEE PAGE 5

Calibrate Analog Output Lo — **cLo / XXXX**

Calibrate Analog Output Hi — **cHi / XXXX**

Calibration Mode — **cAL / on / oFF**

Calibration Mode — **cAL / out / iP**

DIGITAL RESCALING MODE See Page 4

Offset — **oFFS / 0**

Scale Factor — **ScAL / 2000**

DECIMAL POINT AND BRIGHTNESS SELECTION See Page 5

Decimal Point (dp) — **.dP** [X•XXX] [XX•XX] [XXX•X] [XXXX•] [XXXX]

Display Brightness (br) — **br / 1** [2] [3] [4]

DIGITAL SPAN SELECTION FOR ANALOG RANGE OUTPUT See Page 5

Anhi / 2000

AnLo / 0

SETPOINT SETTING AND RELAY CONFIGURATION MODE See Page 6

Set Setpoint 1 (SP1) — **SP1 / XXXX**

Delay-on-Make (doM) — **doM / 0**

Delay-on-Break (dob) — **dob / 0**

Hysteresis (hYSt) — **hYSt / 0**

Setpoint 2 (SP2) — **SP2 / XXXX**

Delay-on-Make (doM) — **doM / 0**

Delay-on-Break (dob) — **dob / 0**

Hysteresis (hYSt) — **hYSt / 0**

Setpoint 3 (SP3) — **SP3 / XXXX**

Hysteresis (hYSt) — **hYSt / 0**

NOTE: [dob] [dom] Functions are only available for SP1 and SP2

Setpoint 4 (SP4) — **SP4 / XXXX**

Hysteresis (hYSt) — **hYSt / 0**

Relays Activation [rLYS]
(H) High the relay energizes when the setpoint is exceeded.
(L) Low the relay energizes below the setpoint. Setpoint are indicated from left to right SP1, SP2, SP3, SP4

rLYS / LLLL [LhLh] [hLhL] [hhhh]

15 Second Program Timeout

The meter has a 15 second program timeout. If no buttons are pressed for 15 seconds, at any stage of the programming sequence the meter will exit the programming mode and return to the operational display. Any program changes that were made prior to pressing the P button in the preceding step will not be saved.

Digital Rescaling

The TDL-40 meter may be rescaled without applying an external signal by changing the Offset and Scale factor.

Offset is the reading that the meter will display for a zero input. The Offset may be set to any value from -1999 to +9999. The default value of the Offset is 000

Scale factor is the gain of the meter. The displayed reading is directly proportional to the Scale factor. The default value of the scale factor is 2000, but it may be set to any value between -1999 and +9999.

For an input of 2V a calibrated meter will read 2000 with the default Scale factor of 2000, 3000 with a Scale factor of 3000 and 500 with a Scale factor of 500

If a linear scale is represented by mx + b, then the Scale Factor corresponds to the slope 'm' and the Offset corresponds to the intercept 'b'

The internal Signal Span is limited to 3 V DC between – 1 V DC to + 2 V DC. Outputs from an Input Signal Conditioning module that exceed these limits will cause the meter to indicate overrange.

Note: Most input signal conditioners have provisions for analog calibration and scaling. If the meter's digital Scale Factor is set to 2000 and Offset set to 0000 then, any pre-calibrated signal conditioner with an output that does not exceed – 1 V to + 2 V, will read correctly in the meter without any further calibration.

Digital Rescaling Procedure

STEP A   Enter the Calibration Mode
1) Press the [P] and [▲] buttons at the same time.
   Display toggles between [cAL] and [oFF].
2) Press the [▲] or [▼] button.
   Display changes from [oFF] to [on].
3) Press the [P] button. Display toggles between [cAL] and [out].

STEP B   Select Between Input or Output Calibration
1) Press the [▲] or [▼] button to select the display toggling from [cAL] to [iP].
2) Press the [P] button. Display toggles between [oFFS] and the previous offset setting.

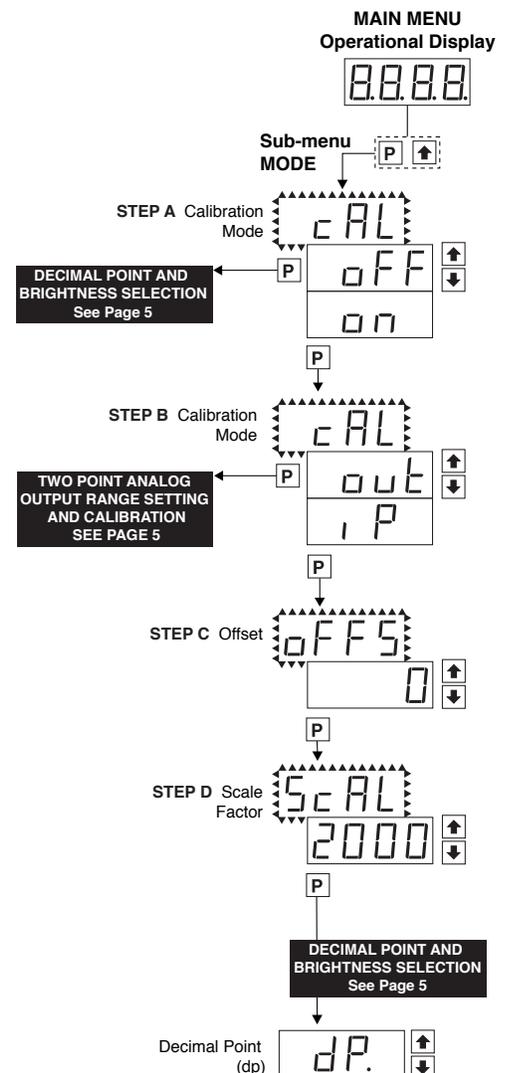**STEP C   Set the Offset on the Digital Display**
1) Using the [▲] and [▼] buttons, adjust the digital display to the desired offset. This is the reading that the meter will display for a zero input
2) Press the [P] button. Display toggles between [ScAL] and the previous Scale factor.

STEP D   Set the Scale factor on the Digital Display
1) Using the [▲] and [▼] buttons, adjust the meter display to the desired Scale factor. The default value is 2000, for which a 2V input will read 2000. If the scale factor is changed the display will change proportionately. Therefore if the Scale factor is changed to 1000 then for the same 2V input the display would read 1000.
3) Press the [P] button.

The Digital Calibration Procedure Mode is Now Complete.
   The menu branches to the DECIMAL POINT AND BRIGHTNESS SELECTION, (see page 5) and the display flashes [dP] and the previous decimal point selection.

MAIN MENU
Operational Display

Sub-menu
MODE

STEP A Calibration Mode
cAL
oFF
DECIMAL POINT AND BRIGHTNESS SELECTION See Page 5
on

STEP B Calibration Mode
cAL
out
TWO POINT ANALOG OUTPUT RANGE SETTING AND CALIBRATION SEE PAGE 5
iP

STEP C Offset
oFFS
0

STEP D Scale Factor
ScAL
2000

DECIMAL POINT AND BRIGHTNESS SELECTION See Page 5

Decimal Point (dp)
dP.

Two Point Analog Output Range Setting and Calibration

STEP A   Enter the Calibration Mode
1) Press the [P] and [↑] buttons at the same time.
Display toggles between [cAL] and [oFF].
2) Press the [↑] or [↓] button. Display changes from [oFF] to [on].
3) Press the [P] button. Display toggles between [cAL] and [out] input calibration.

Note: If at this point the display skips directly to toggle between [oFFS] and the previous [oFFS] setting, the software is detecting that the optional analog output hardware is NOT installed.

STEP B   Enter the Analog [oUT] Output Mode
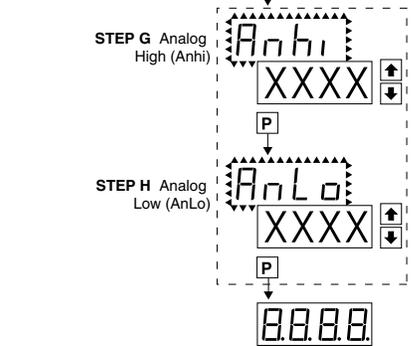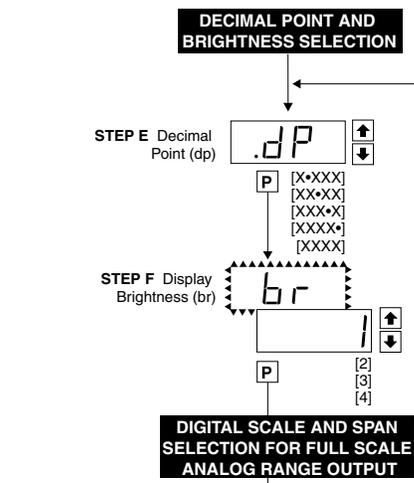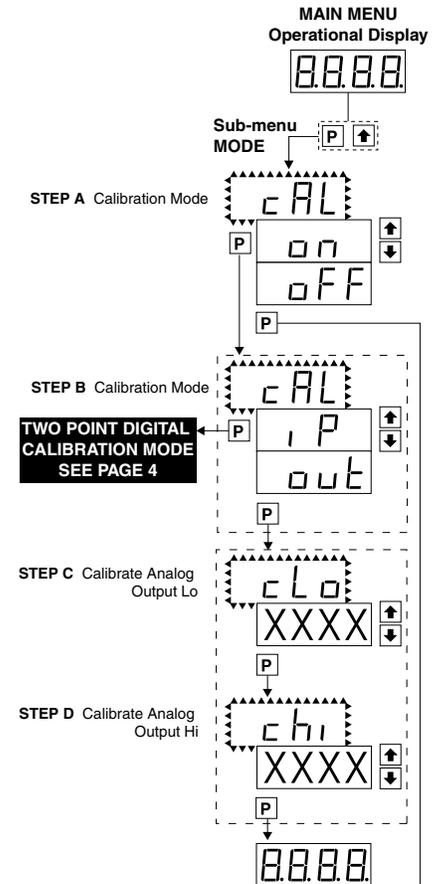1) Press the [P] button. Display toggles between [cLo] and an internal scale factor.

STEP C   Set or Calibrate the [cLo] Low Analog Output Range
1) Select the voltage or current loop output header position on the output module. (See Component Layout on page 9).
2) Connect a multimeter to pins 16 and 17 on the output module. (See Rear Panel Pinouts on page 8). Using the [↑] and [↓] buttons, adjust the analog output to the desired low value as shown on the multimeter display. cLo may be adjusted to any value from –0.3 mA to 17 mA (mA output selected) or from –0.6 V to 8 V (volt output selected)
3) Press the [P] button. Display toggles between [cHi] and an internal scale factor.

STEP D   Set or Calibrate the [cHi] High Analog Output Range
1) Using the [↑] and [↓] buttons, adjust the analog output to the desired high value as shown on the multimeter display. cHi may be adjusted to any value from 17 mA to 21 mA (mA output selected) or from 8 V to 10.3 V (volt output selected)
2) Press the [P] button. The display exits the calibration mode and returns to the operational display.

Note: Having established the Low and High range of the analog output, the digital span can now be selected which will set the two digital points between which the analog output will occur. (See Digital Span Selection below).

Decimal Point and Brightness Selection

STEP A   Enter the Decimal Point and Brightness Mode Through the Sub Menu [CAL] [oFF]
1) Press the [P] and [↑] buttons at the same time.
Display toggles between [cAL] and [oFF].
2) Press the [P] button. Display shows previous [dp] selection.

STEP E   Set the Decimal Point
1) Using the [↑] and [↓], adjust the display to the desired decimal point setting.
2) Press the [P] button. Display toggles between [Br] and the previous [Br] setting.

STEP F   Set the Display Brightness
1) Using the [↑] and [↓] buttons, adjust the display to the desired brightness setting (4 is the brightest setting).
2) Press the [P] button. Display brightness changes to new setting and display toggles between [Anhi] and the previous [Anhi] setting.

Digital Span Selection for Analog Range Output

STEP G   Setting the Digital Span Point for Analog High Output
1) Using the [↑] and [↓] buttons, adjust the display to the desired digital value which sets the point at which the selected analog high output range will occur.
2) Press the [P] button. Display toggles between [AnLo] and previous [AnLo] setting.

STEP H   Setting the Digital Span Point for Analog Low Output
1) Using the [↑] and [↓] buttons, adjust the display to the desired digital value which sets the point at which the selected analog low output range will occur.
2) Press the [P] button. The display exits the calibration mode and returns to the operational display.

Note: Any two digital scale points from –1999 to 9999 can be selected. The digital scale points for analog high and analog low can be reversed for reversed 20-4 mA output. The span of the digital scale can be as small as two counts however small spans cause the 16 bit D to A to increment in stair case steps.

MAIN MENU
Operational Display
8.8.8.8.

Sub-menu MODE   [P] [↑]

STEP A Calibration Mode
cAL
on
oFF

STEP B Calibration Mode
cAL
iP
out

TWO POINT DIGITAL CALIBRATION MODE SEE PAGE 4

STEP C Calibrate Analog Output Lo
cLo
XXXX

STEP D Calibrate Analog Output Hi
cHi
XXXX

8.8.8.8.

DECIMAL POINT AND BRIGHTNESS SELECTION

STEP E Decimal Point (dp)
.dP
[X•XXX]
[XX•XX]
[XXX•X]
[XXXX•]
[XXXX]

STEP F Display Brightness (br)
br
1
[2]
[3]
[4]

DIGITAL SCALE AND SPAN SELECTION FOR FULL SCALE ANALOG RANGE OUTPUT

STEP G Analog High (Anhi)
Anhi
XXXX

STEP H Analog Low (AnLo)
AnLo
XXXX

8.8.8.8.

Setpoint Setting and Relay Configuration Mode

The following programming steps are required to enter the setpoint values and configure the relay functions in a meter with four relays using four setpoints. Generally if less than four relays are installed the software auto detects missing relays and deletes reference to them from the menu. In some cases setpoints without relays are operational for display only purposes.

STEP A   Enter the Setpoint Mode
1) Press the P and ⬇ buttons at the same time.
   Display toggles between [SP1] and the previous [SP1] setting.

STEP B   Set Setpoint 1 (SP1)
1) Using the ⬆ and ⬇ buttons, adjust the display to the desired SP1 value.
2) Press the P button. Display toggles between [doM] and the previous [doM] setting.

STEP C   Set the SP1 Delay-on-Make (doM) Delay Time Setting
1) Using the ⬆ and ⬇ buttons, adjust the display to the desired [doM] value
   (0 to 9999 seconds). The reading must continuously remain in an alarm condition
   until this delay time has elapsed before the relay will make contact (energize).
2) Press the P button. Display toggles between [dob] and the previous [dob] setting.

STEP D   Set the SP1 Delay-on-Break (dob) Delay Time Setting
1) Using the ⬆ and ⬇ buttons, adjust the display to the desired [dob] value (0 to 9999
   seconds). The reading must continuously remain in an non-alarm condition until this
   delay time has elapsed before the relay will break contact (de-energize).
2) Press the P button. Display toggles between [hYSt] and the previous [hYSt] setting.

STEP E   Set the Hysteresis Setting for Setpoint 1
1) Using the ⬆ and ⬇ buttons, adjust the display to the desired hysteresis [hYSt] value.
2) Press the P button. Display toggles between [SP2] and the previous [SP2] setting.
   NOTE: Half of the Hysteresis value selected is applied above and below the setpoint.

NOTE: Steps F, G, H and J have functionally the same procedure as steps B, C, D, and E shown above.

STEP F   Set Setpoint 2 (SP2)
STEP G   Set the SP2 Delay-on-Make (doM) Delay Time Setting
STEP H   Set the SP2 Delay-on-Break (dob) Delay Time Setting
STEP I   Set the Hysteresis Setting for Setpoint 2
1) Using the ⬆ and ⬇ buttons, adjust the display to the desired hysteresis [hYSt] value.
2) Press the P button. Display toggles between [SP3] and the previous [SP4] setting.

STEP J   Set Setpoint 3 (SP3) (No [doM] or [dob])
1) Using the ⬆ and ⬇ buttons, adjust the display to the desired SP3 value.
2) Press the P button. Display toggles between [hYSt] and the previous [hYSt] setting.

STEP K   Set the Hysteresis Setting for Setpoint 3
1) Using the ⬆ and ⬇ buttons, adjust the display to the desired hysteresis [hYSt] value.
2) Press the P button. Display toggles between [SP4] and the previous [SP4] setting.

STEP L   Set Setpoint 4 (SP4) (No [doM] or [dob])
1) Using the ⬆ and ⬇ buttons, adjust the display to the desired SP4 value.
2) Press the P button. Display toggles between [hYSt] and 0.

STEP M   Set the Hysteresis Setting for Setpoint 4
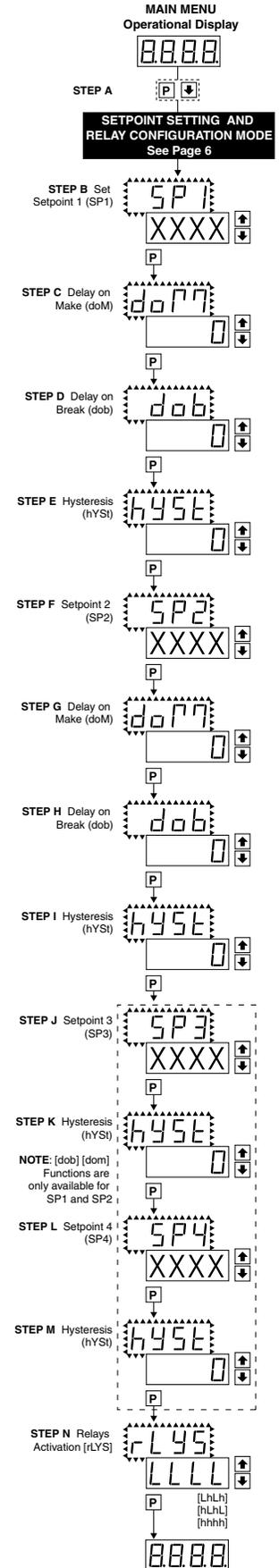1) Using the ⬆ and ⬇ buttons, adjust the display to the desired hysteresis [hYSt] value.
2) Press the P button. Display toggles between [rLYS] and the previous relay setting.

STEP N   Set Relay Activation mode [rLYS]
   (h) High the relay energizes when the setpoint is exceeded. (L) Low the relay energizes
   below the setpoint. The setpoint is indicated from left to right SP1, SP2, SP3, SP4.
1) Using the ⬆ and ⬇ buttons, adjust the reading on the display to the desired
   relay settings: [LLLL], [LhLh], [hLhL], [hhhh].
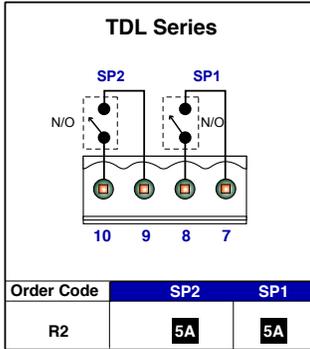   If only 2 relays installed [Lh--], [hL--], [hh--], [LL--].
2) Press the P button.
   The meter exits the setpoint mode and returns to the operational display.

The Setpoint Relay programming mode is now complete.

MAIN MENU
Operational Display

| 8.8.8.8. |

STEP A   P ⬇

SETPOINT SETTING AND RELAY CONFIGURATION MODE
See Page 6

STEP B Set Setpoint 1 (SP1)   `SP1`
   `XXXX`   P

STEP C Delay on Make (doM)   `doM`
   `0`   P

STEP D Delay on Break (dob)   `dob`
   `0`   P

STEP E Hysteresis (hYSt)   `hYSt`
   `0`   P

STEP F Setpoint 2 (SP2)   `SP2`
   `XXXX`   P

STEP G Delay on Make (doM)   `doM`
   `0`   P

STEP H Delay on Break (dob)   `dob`
   `0`   P

STEP I Hysteresis (hYSt)   `hYSt`
   `0`   P

STEP J Setpoint 3 (SP3)   `SP3`
   `XXXX`   P

STEP K Hysteresis (hYSt)   `hYSt`
   `0`   P

NOTE: [dob] [dom] Functions are only available for SP1 and SP2

STEP L Setpoint 4 (SP4)   `SP4`
   `XXXX`   P

STEP M Hysteresis (hYSt)   `hYSt`
   `0`   P

STEP N Relays Activation [rLYS]   `rLYS`
   `LLLL`
   P   [LhLh] [hLhL] [hhhh]

| 8.8.8.8. |

Relay Module with 2 Isolated 5A Form A Relays (R2)

TDL Series

SP2   SP1

N/O   N/O

10   9   8   7

Order Code	SP2	SP1
R2	5A	5A

This relay option is for ACA input only.

**Relay Modules with 2 Isolated 10A Form C Relays (R12),
or 2 Non-Isolated 10A Form C Relays and
2 Non-Isolated 5A Form A Relays (R14)**

TDL Series

SP2   SP4   SP1   SP3

N/C   N/O   N/C

14   13   12   11   10   9   8   7

Order Code	Options			
	SP2	SP4	SP1	SP3
OR12	10A	-	10A	-
OR14	10A	5A	10A	5A
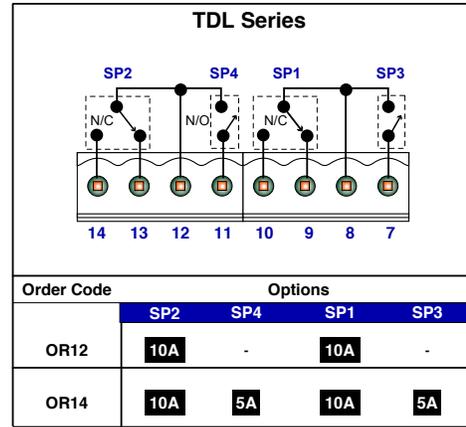
**These two relay options are for
ACV, DCV or DCmA input only.**