



LEOPARD FAMILY

TL-RPM

Leopard Series RPM Transmitter and Controller



An economically smart programmable RPM transmitter and controller

General Features

- This transmitter has been designed specifically for RPM measurements. Just enter the pulses per revolution and the TL-RPM transmitter will calculate the RPM reading.
- Three ranges with resolutions of 0.1 RPM, 1 RPM and 10 RPM (99.99 X 1000 RPM max.).
- Isolated 16 bit analog output. User or factory scalable to 4 to 20 mA, 0 to 20 mA or 0 to 10 V across any desired digital span from one count to the full scale range of 9999.
- Auto-sensing AC/DC power supply. For voltages between **85-265 V AC / 95-300 V DC (PS1)** or 15-48 V AC / 10-72 V DC (PS2).
- 24 V DC excitation is available to power external transmitters.
- Optional relays. Two 9 Amp Form C
- Remote Display Option only.

Software Features

- Three-button programming from the optional remote display (UP, DOWN and PROGRAM buttons).
- Front panel selectable four-level brightness control of digital display, and setpoint LEDs when display is used.
- Two programmable setpoints.
- Relay activation can be selected to occur above (HI) or below (LO) each setpoint.
- Hysteresis, Delay on make and delay on break for both setpoints.
- Peak and Valley. View and Reset.(only when display is used)

Input Module Compatibility

There is 1 Plug-in Modular Input Signal Conditioner, IF05, for this specialized RPM only member of the Leopard Family.



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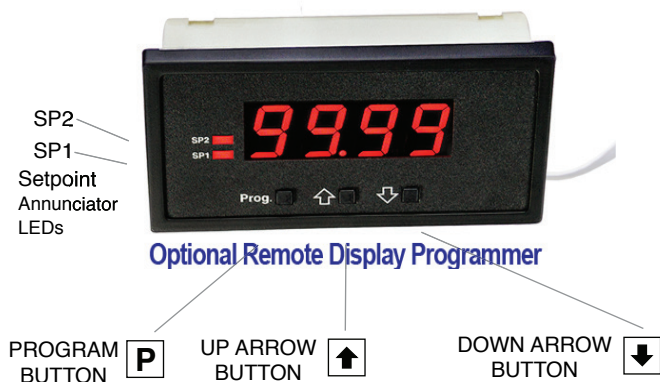
Specifications

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)
Remote Display: **4 digit 0.56" Red LED Remote display. (Optional)**
 Range –1999 to 9999 counts.
Polarity:Assumed positive. Displays – negative
Decimal Selection:Front panel button selectable, X•X•X•X•
Positive Overage: ..Top segments of digital display flash
Negative Overage: ..Bottom segments of digital display flash
Relay Output:Two 9 Amp Form C 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 50-400Hz / 95-300 VDC @ 3.5W**
PS215-48 VAC 50-400Hz / 10-72 VDC @ 3.5W
Operating Temp.:0 to 50 °C
Storage Temp.:–20 °C to 70 °C.
Relative Humidity:95% (non condensing)
Case Dimensions:DIN Rail Mount
 22.5mm x 102.4mm x 128.7mm
 (Width x Height x Depth)
 Plus 11.8 mm (0.47") for Right-angled connectors.
Weight:7.5 oz., 9.0 oz when packed

Index

Case Dimensions8	Glossary of Prog. Symbols2	Puls Per Revolution, Range and Brightness Selection4	Specifications1
Connector Pinouts7	Input Module Compatibility1	Select Input Range and Analog output9	Two Point Analog Output Range Setting and Calibration4
Controls and Indicators2	Installation Guidelines9	Setpoint Setting & Relay	
Digital Span Selection for Analog Range Output5	I-Series Input Signal Conditioning Modules8	Software Features1	
Functional Diagram7	Ordering Information 10	Software Logic Tree3	
General Features1			

Optional Remote Display for Field Programming and Setup is needed



Front Panel 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**.

Up Button

When in the operational display, pressing the **↑** button alone, allows you to view and reset the 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.

Down Button

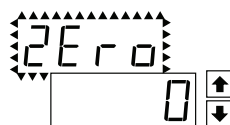
When in the operational display, pressing the **↓** button alone, allows you to view, but not change, the setting of setpoint 1&2.

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

Glossary of Programming Symbols

To explain software programming procedures, logic diagrams are used to visually assist in following the programming steps. The following symbols are used to represent various functions and associated display elements of the meter:

Symbol	Explanation
	This symbol represents the OPERATIONAL DISPLAY.
	This is the PROGRAM button.
	This is the UP button.
	This is the DOWN button.
	When a button is shown, press and release it to go onto the next step in the direction indicated by the arrow. When two or more buttons are shown, each with an arrow, this indicates that there is a number of programming choices.
	When two buttons are shown side by side and enclosed by a dotted line, they must be pressed at the same time then released to go onto the next programming step.
	If the display is shown with XXXX it means the value displayed will be the previously set value. When a number is shown it indicates the initial factory default setting or a specific "example number".



When two displays are shown together with bursts, this indicates that the display is toggling (flashing) between the name of the function and the value.

[Span]
[10000]

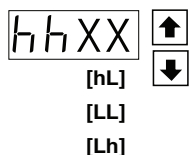
Text or numbers shown between square brackets in a procedure indicate the programming code name of the function or the value displayed on the meter display.



When the **↑** and **↓** buttons are shown together, the display value can be increased by pressing and releasing the **↑** button or decreased by pressing and releasing the **↓** button.



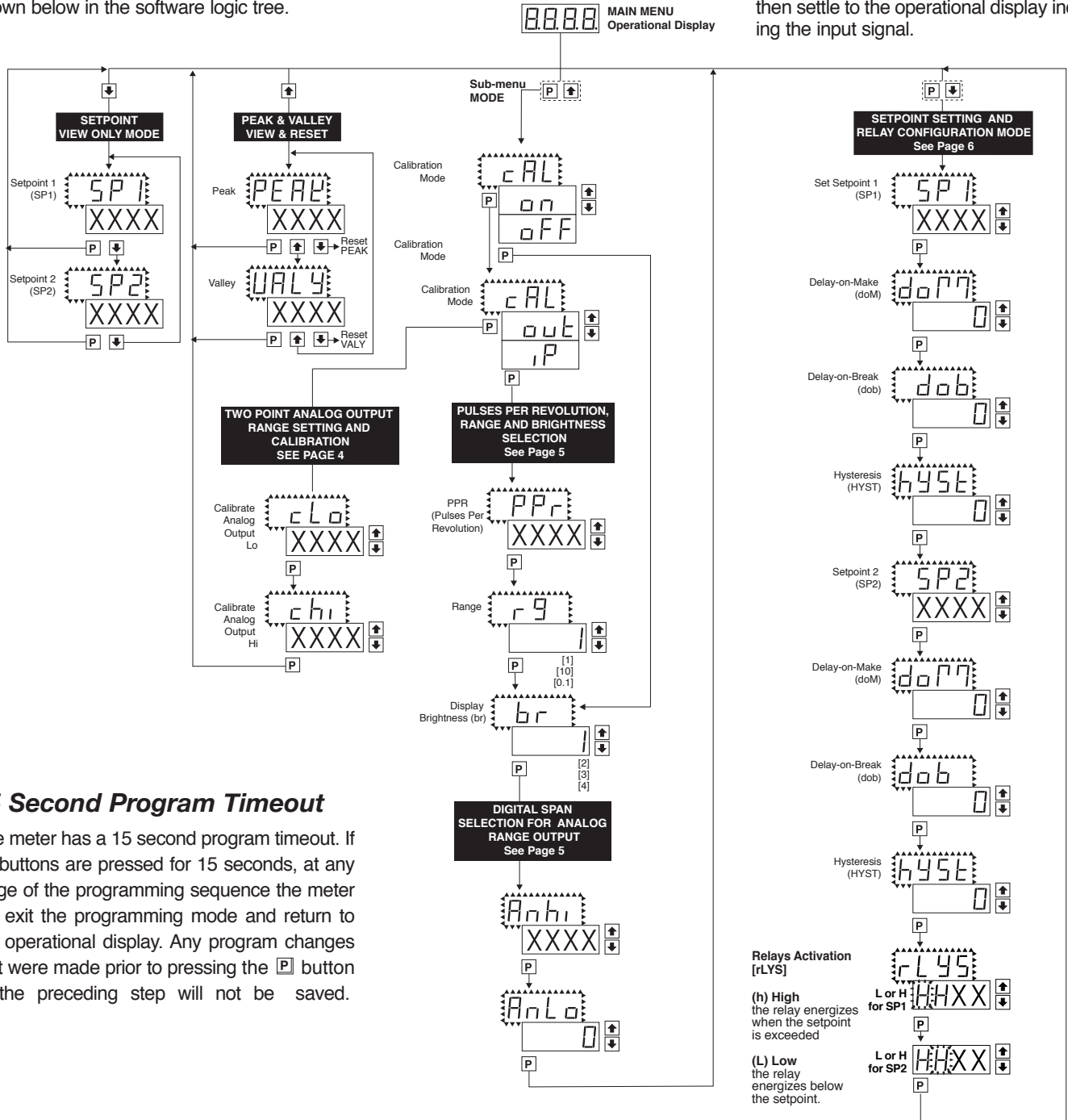
When the **↑** and **↓** buttons are shown with two displays, either display can be selected by pressing and releasing the **↑** or **↓** buttons.



When there are more than two display selections they are shown in brackets below the first display and are also selectable by pressing and releasing the **↑** or **↓** buttons.

The TL is an intelligent transmitter 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.



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.

Two Point Analog Output Range Setting and Calibration

STEP A Enter the [cAL] 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 Pulses Per Revolution and Two Point Analog Output

- 1) Press the **[P]** button. Display toggles between [cLo] and an internal scale factor.

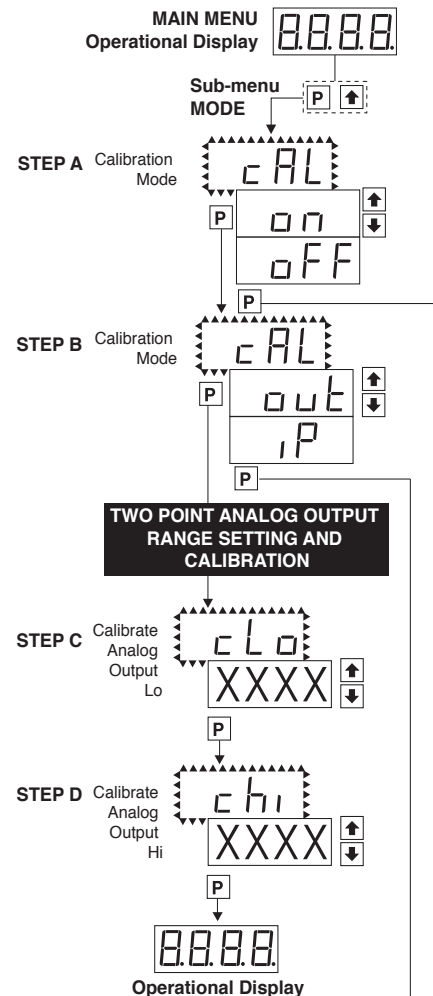
STEP C Calibrate the [cLo] Low Analog Output

- 1) Select the voltage or current 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 Calibrate the [chi] High Analog Output

- 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 display points between which the analog output will occur. (See STEP I and STEP J on Page 5).



Pulses Per Revolution, Range and Brightness Selection

STEP E Enter the Range Selection Mode Through the Sub Menu [cAL] [iP]

- 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]
- 4) Using the **[↑]** and **[↓]** buttons. Display changes from [out] to [iP].
- 5) Press the **[P]** button. Display toggles between [PPr] and previous pulses per revolution setting.

STEP F Enter the Pulses per revolution (PPR)

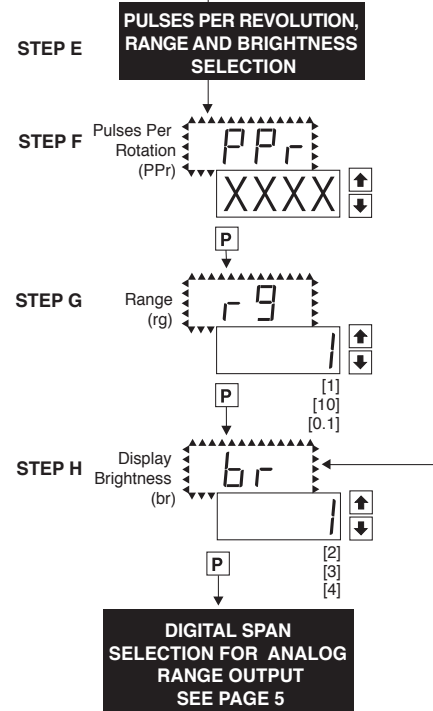
- 1) Press the **[↑]** or **[↓]** button, enter the number of pulses per revolution. Any number between 1 and 9999 may be entered.
- 2) Press the **[P]** button. Display toggles between [rG] and the previous range setting.

STEP G Select the Range

- 1) Using the **[↑]** and **[↓]** buttons, select the required range. There are three ranges with resolutions of 0.1 (max. 999.9 RPM), 1 (max. 9999 RPM) and 10 RPM (max. 99.99 X 1000 RPM).
- 2) Press the **[P]** button. Display toggles between [br] and the previous brightness setting.




STEP H 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, if the Analog Output Option is installed.






Digital Span Selection for Analog Range Output

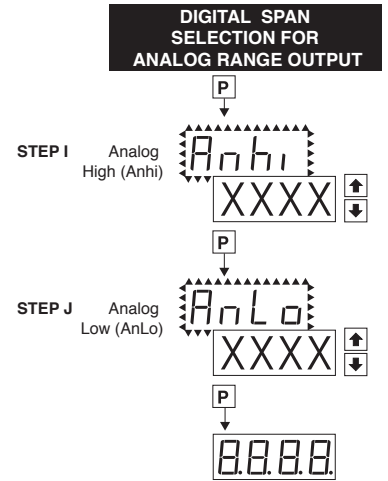
STEP I Set the Display Corresponding to the Analog High Output

- 1) Using the  and  buttons, adjust the display to the desired value at which the selected analog high output will occur.
- 2) Press the  button. Display toggles between [AnLo] and previous [AnLo] setting.

STEP J Set the Display Corresponding to the Analog Low Output

- 1) Using the  and  buttons, adjust the display to the value at which the selected analog low output range will occur.
- 2) Press the  button. The display exits the calibration mode and returns to the operational display.

Note: Any two points from 0 to 9999 can be selected for which the specified analog output occurs. The display values for analog high and analog low can be reversed for reversed 20-4 mA output. The difference between the two display points can be as small as two counts however small spans cause the 16 bit D to A to increment in staircase steps.



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, J and K 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 [rLYs] and the previous relay setting.

STEP J Set Relay Activation mode [rLYS] for SP1

(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.

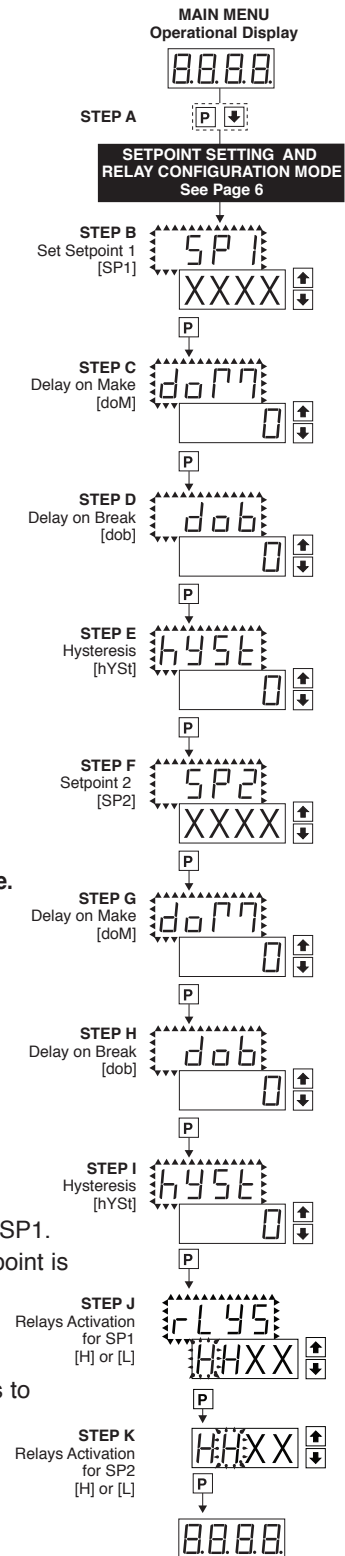
- 1) Using the **↑** and **↓** buttons, select(L) or (H) for the first digit, which corresponds to SP1.
- 2) Press the **P** button. The SP2 Relay Activation digit begins to flash, and its decimal point is lit.

STEP J Set Relay Activation mode [rLYS] for SP1

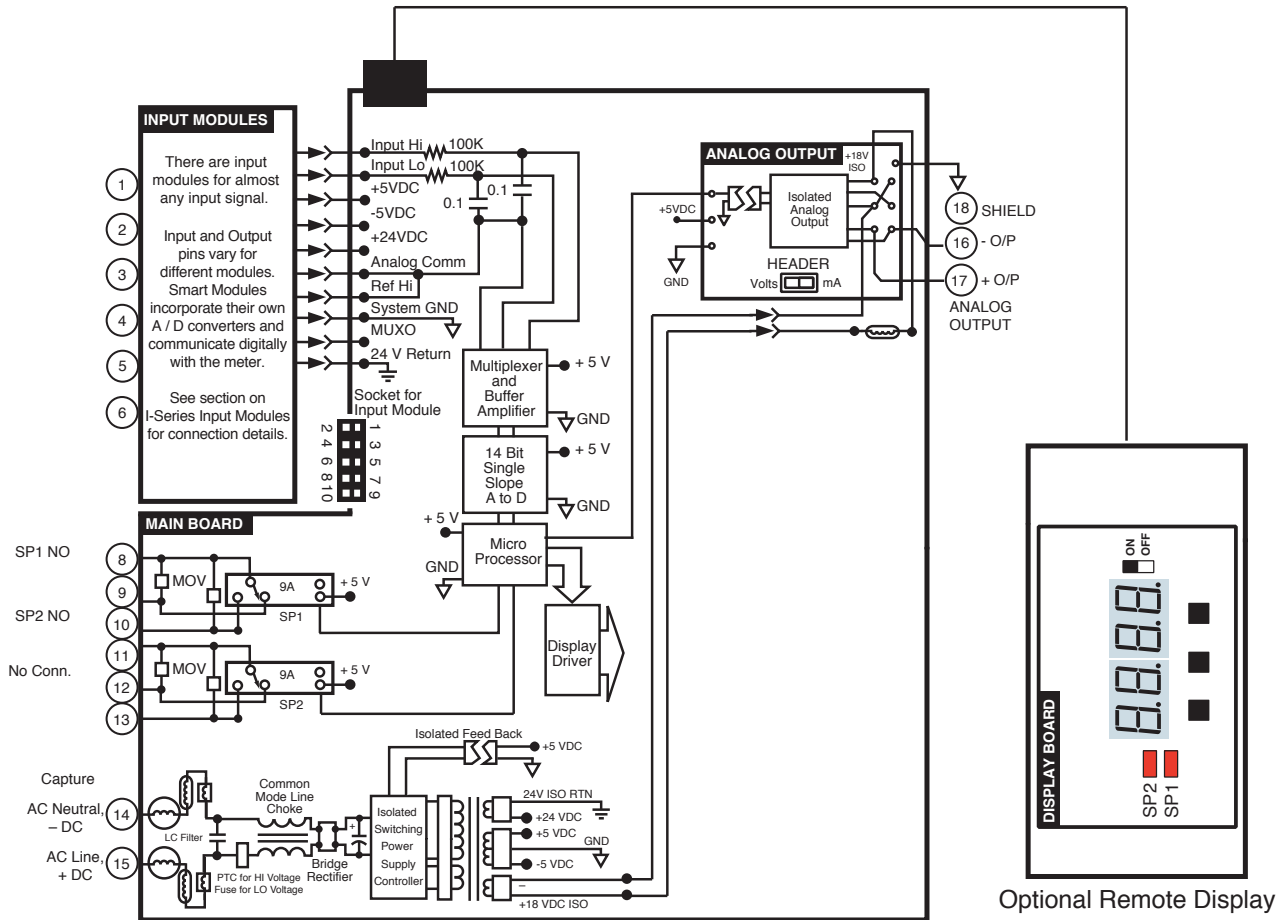
- 1) Using the **↑** and **↓** buttons, select(L) or (H) for the second digit, which corresponds to SP2.
- 2) Press the **P** button.

The meter exits the setpoint mode and returns to the operational display.

The Setpoint Relay programming mode is now complete.



Functional Diagram



Connector Pinouts

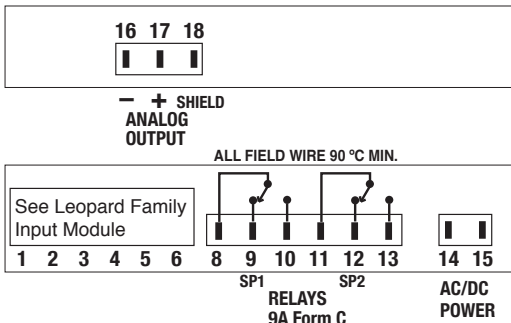
Pinout Diagram

The Rear View of the Meter diagram shows the meter with the relay configuration: dual 10 Amp Form C and dual 5 Amp Form A relays. An analog output module is also shown as installed.

The TL Series Transmitter uses plug-in type screw terminal connectors for all input and output connections. The power supply connections (pins 14 and 15) have a unique plug and socket outline to prevent cross connection. The main board and input signal conditioner use right-angled connectors as standard. The output module uses straight-thru connectors as standard.

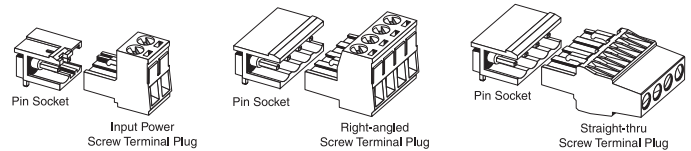


WARNING: AC and DC input signals and power supply voltages can be hazardous. Do Not connect live wires to screw terminal plugs, and do not insert, remove or handle screw terminal plugs with live wires connected.



Auto-sensing AC/DC power supply. For voltages between 85-265 V AC / 95-300 V DC (PS1) or 15-48 V AC / 10-72 V DC (PS2).

Standard plug-in screw terminal connectors provided by Texmate:



Input Signal – Pins 1 to 6

Pins 1 to 6 are reserved for the input signal conditioner. See the data sheet for the selected input signal conditioner.

Relay Output Pins- Pins 8 to 13

Pin 8-10 SP1 Normally Open
Pin 8-9 SP1 Normally Close
Pin 11-13 SP2 Normally Open
Pin 11-12 SP2 Normally Close

AC/DC Power Input- Pins 14 and 15

Auto-sensing AC/DC power supply. For voltages between 85-265 V AC/95-300 V DC (PS1) or 15-48 V AC/10-72 V DC (PS2).

Pin 14 AC/DC Neutral. Neutral power supply line.

Pin 15 AC/DC line. Live power supply line.

Analog Output- Pins 16 and 18

Pins 16 and 17 are the analog output pins on the optional output module. Their pin definitions are:

Pin 16 Negative (-) analog output.
Pin 17 Positive (+) analog output.
Pin 18 Shield.

Installation Guidelines

Installation

1. Install and wire transmitter per local applicable codes/regulations, the particular application, and good installation practices.
2. Install transmitter in a location that does not exceed the maximum operating temperature and that provides good air circulation.
3. Separate input/output leads from power lines to protect the transmitter from external noise. Input/output leads should be routed as far away as possible from contactors, control relays, transformers and other noisy components. Shielding cables for input/output leads is recommended with shield connection to earth ground near the meter preferred.

4. A circuit breaker or disconnect switch is required to disconnect power to the meter. The breaker/switch should be in close proximity to the meter and marked as the disconnecting device for the meter or meter circuit. The circuit breaker or wall switch must be rated for the applied voltage (e.g., 120VAC or 240VAC) and current appropriate for the electrical application (e.g., 15A or 20A).

5. See *Connector Pinouts* section for wiring.

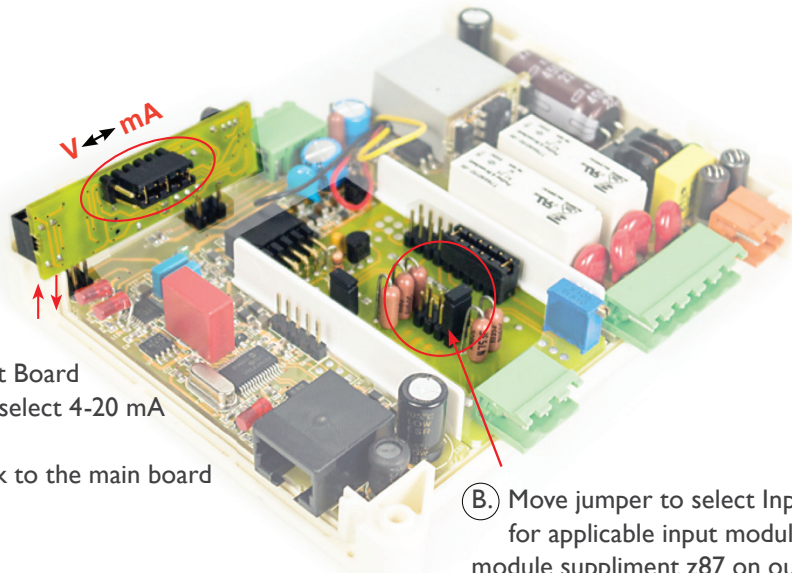
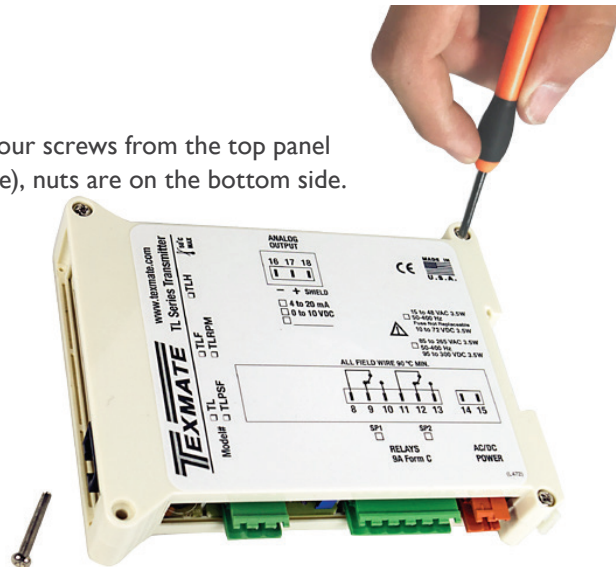
6. Use 28-12 AWG wiring, minimum 90°C (HH) temperature rating. Strip wire approximately 0.3 in. (7-8 mm).

7. Recommended torque on all terminal plug screws is 4.5 lb-in (0.51 N-m).



Select Input Range and Analog Output

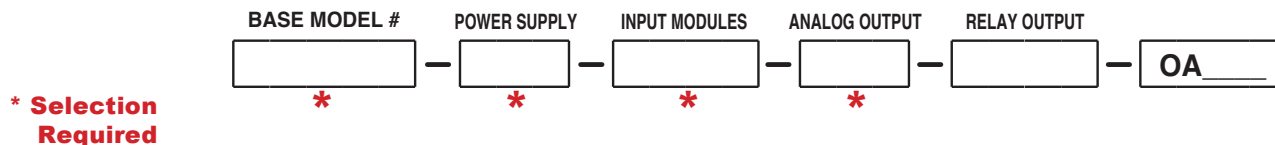
- (A.) Remove the four screws from the top panel (the label side), nuts are on the bottom side.



- (C.)
1. Lift up Analog Output Board
 2. Move the jumper to select 4-20 mA or 0 to 10 V
 3. Insert the board back to the main board

- (B.) Move jumper to select Input Range for applicable input modules (see Input module supplement z87 on our website.)

Ordering Information



▶ BASE MODEL NUMBER

TL-RPM .. RPM (Input only)

▶ POWER SUPPLY

PS1 **85-265VAC/95-300VDC**

PS2 15-48VAC/10-72VDC

▶ INPUT MODULES

IF05. . . Universal Frequency / RPM

▶ ANALOG OUTPUT

OIC . . . Isolated 16 Bit Current Output, 4-20mA

OIV . . . Isolated 16 Bit Voltage Output, 0-10VDC

▶ RELAY OUTPUT

R11 . . . Single 9A Form C Relay

R12 . . . Dual 9A Form C Relays

▶ SPECIAL OPTION

▶ SPECIAL OPTIONS

Range Change and Custom Scaling

Customer must specify the input signal range or digital span and the desired display range, or output signal range. Multiple inputs or multiple displays require a separate range change or custom scaling part number and a specified channel for each input or display.

Range Change and calibration to another header selectable standard range
CR-CHANGE . . . Range Change from Standard Range shown in **BOLD** type . .

Output - Custom Scaling within standard ranges of analog output.
COA-3/3.5/4 . . . Custom scaling of analog output

Short Depth 96x48 Remote Display/Programmer

OP-TL/RDISP . . Remote Display/Programmer w/Cable

and Belt Clip Carrying Case

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

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