

# ESTM<sup>™</sup>

## TR-3

Load Cell Amplifier

**Isolation (3 way)**  
Isolation of power supply and load cell terminals : 1.8kV  
Isolation of power supply and output terminals : 1kV  
Isolation of load cell terminals and output terminals:500V

**Input**  
Load cell excitation : 10V DC  
Load cell drive capability : 45(1/8 x 350) Load cells

**Measurement ranges**  
: 1mV/V, 2mV/V, 5mV/V, 160mV/V  
**Sampling Frequency**  
: 50 Hz (standard models)  
**Permitted zero range**  
: < 50 % of full scale  
**Permitted calibration range**  
: > 5 % of full scale above zero set

**Outputs**  
Relay output : 2A @ 220V  
Current output (Internally supplied) : 0-20mA – 4-20mA  
Resistance on current output : <= 500 Ω  
Voltage output : 0-10V  
Resistance on voltage output : >= 5k Ω  
Transfer function : Output = (Gain x (Input - Zero) + Offset)

MDK-TR3EN-R02-0309

### TR-3 LOAD CELL AMPLIFIER

TR3 is a digital processing high accuracy Load Cell amplifier and transmitter formed in panel rail enclosure and has precision current and voltage outputs.

#### PRECAUTIONS

- 1- Do not exceed the maximum rated values.
- 2- Do not place the unit near switching panel components such as contactors, relays, energy busses those have high EMI influence.
- 3- Do not apply external power to any terminal except power supply inputs.
- 4- Do not connect highly inductive loads to relay terminals without a snubber component

#### SPECIFICATIONS

Storage temperature range : -20 C... 70C  
Operating temperature range : 0 C... 50C  
Accuracy : 0.05 % (Overall)  
Power requirement : 24V DC (18V...36 V), 5W Max.

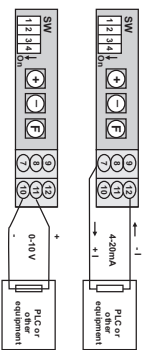


Figure 3 Current and voltage output connections

As illustrated in Figure 3, the current or voltage supplied internally from the transmitter and no external power connection is required and must not be externally supplied. Hence the output is isolated from other signals and the power input, the current output can be used for sink or source circuit independently from power supply connections.

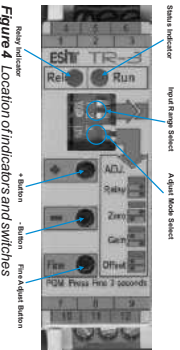


Figure 4 Location of indicators and switches

#### PROGRAMMING THE DEVICE

There are 4 combinational DIP switches and 3 buttons on the front panel for optional selections and adjustments. The 2 switches of the DIP switch selects what value to adjust by the buttons and the other 2 switches select the input range. The "+", "-" and "0" buttons are used in conjunction with adjustment mode selection switches and are operational only when device is in program mode. In program mode, the "+" button increases the current output value while the "-" button decreases the value. User may press "Fine" button simultaneously with "+", "0" or "-" button to increase or decrease the value precisely. Pressing one of the "+", "-" or "0" buttons continuously repeatedly increases or decreases the set value. The device enters to program mode if "Fine" button is not for longer than 3 seconds. When in program mode the device returns to the run mode about 4 minutes after any key pressed or power down and up. The relay indicator is lit when the relay is energized. The status indicator blinks slowly when status is normal and blinks fast with equal on/off rate to display an error condition. The status indicator flashes shortly when

SW1-2	Input Range	SW2-4	Adjustment Mode
OFF	160 mV/V	OFF	Relay Set
ON	5 mV/V	ON	Gain Adj.
OFF	2 mV/V	OFF	Output Offset
ON	1 mV/V	ON	Relay Set

Figure 5 Switch positions

#### RETURNING TO FACTORY DEFAULTS

When the DIP switches are all in ON state and all "+", "-", and "Fine" buttons are pressed together, the status indicator turns OFF and after 3 seconds the memory is being erased and the factory defaults are reloaded. **DO NOT** do this if it is not on purpose.

#### Initial adjustments

Before the adjustments and powering the device on, be sure that input terminals are properly connected.

**Step 1 - Select input range:** After the connections are made, first select the input range using the DIP switches (See Figure 4 and Figure 5).

**Step 2 - Enter to the program mode:** Press "Fine" longer than 3 seconds and see the status indicator flashes quickly in long intervals. In next steps, if the device exits the program mode because of power interruption or time-out, re-enter to program mode during programming process. **DO NOT** power down the device or change DIP switch position unless 3 seconds has elapsed after "+", "0" or "-" press when programming since the level is being stored in memory after a 3 sec delay.

**Step 3 - Set zero level:** Change the mode switches to Zero set position (See Figure 5, Zero set position). Ensure the load is completely removed from the sensor and the status indicator does not indicate Error (The zero load must be less than 50% of full range). Hit either "+", "0" or "-" buttons to set the zero of input.

**Step 4 - Adjust the output offset:** Keep the sensor (or load) in zero position (followed by previous step). Change the mode switches to offset adjustment position (See Figure 5, Output offset position). See the output level using your indicating equipment which is following the TR3 output. Use "+", "0" or "-" buttons in conjunction with "Fine" button to adjust the level to zero which is displayed at the indicating equipment. Please note that offset is not the same as zero. Adjusting offset will shift all range regardless of the gain while the zero is based on the input level and affected by gain adjustment. See Specifications, Transfer function.

**Step 5 - Adjust the gain:** Change the mode switches to gain adjustment position (See Figure 5, Gain adjust).

Place the calibration load onto the sensor (The calibration load must not be less than 5% of the full range). Ensure that the status indicator does not indicate error. See the output level using your indicating equipment which is following the TR3 output. Use "+", "0" or "-" buttons in conjunction with "Fine" button in order to adjust the level to the load value which is displayed at the indicating equipment. Change the mode switches to Relay adjustment (Figure 5) after the adjustment. You may continue from step 5 if the output relay will be adjusted. Otherwise, "power off" and after 1-2 seconds "power on" the device to exit the program mode.

**Step 6 - Adjust the relay set point (if used):** Be sure that the mode switches is in relay adjustment position (See Figure 5, Relay adjustment). Ensure that the status indicator is not indicating error. In the relay adjustment mode the device output will temporarily set to the relay set point and return to normal after 3 seconds if "+", "0" or "-" buttons are not pressed. Use "+", "0" or "-" buttons in conjunction with "Fine" button to adjust the relay set point level which is displayed at the indicating equipment.

#### POSSIBLE ERRORS

The transmitter issues an error status by blinking faster in converter failure, input overflow or in following conditions during the program mode depending on mode switches:

Mode	Output overflow	Reason
Relay Adjust	Input overflow	Input Exceed 50% of Full range
Gain Adjust	Input Exceed 50% of Full range	
Output Offset	Output overflow	

#### Please check if you have a problem in first installation and program

- Measure the signal input terminals, that they required to be about 10 times of the strain gauge rate at rated load in voltage (i.e. 20mV at full load for 2mV/V strain gauge) since the excitation voltage is 10V. Change the load and check the input terminals (Terminal 2 and 3).
- If voltage output being used, disconnected the voltage output terminals of the device and check output with a voltmeter (output may be overloaded).
- If current output is being used, short the output by a milliammeter and see the current (load resistor may be too big).

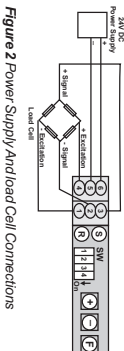


Figure 2 Power Supply and Load Cell Connectors