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PROCESS INDICATOR (TRIP ALARM UNIT)

TI08

OPERATION MANUAL



Please read this Operation Manual before mounting and operating!
Save the Manual for future references!

TI08 is an economical 4-digit programmable process indicator / trip alarm unit with an input for linear current, voltage, or resistive signals. The device can be ordered with up to 2 relay outputs and for mains or low-voltage AC/DC supply.

Mounting

- ◆ Place TI08 into an appropriate panel cut-out.
- ◆ Tighten it into place using the enclosed mounting bracket(s).

Electro-Magnetic Interference (EMI) Issues

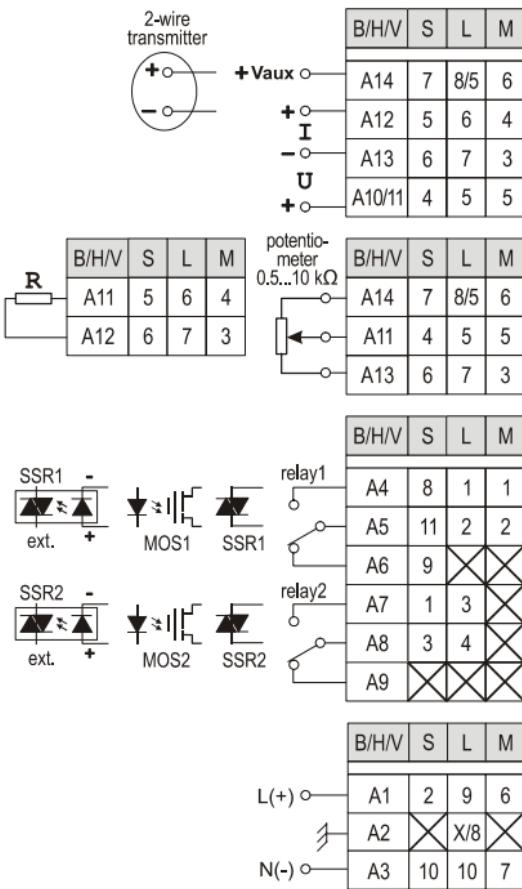


Important note:

*A built-in RC noise suppression circuit may be connected in parallel with relay contacts.
Full AC voltage isolation may NOT be provided when relay contacts are open.
Small AC current ($\approx 1.5\text{ mA}$ at 230 VAC) may still flow through the RC circuit!*

- ◆ All signal wires must be shielded. They must not be packaged together with power cables!
- ◆ Never lay the signal wires close to inductive or capacitive noise sources, such as relays, contactors, motors, etc.!
- ◆ All shields have to be grounded ONLY at one end, as closer as possible to the indicator terminals!
- ◆ Avoid sharing supply lines with powerful consumers, especially with inductive loads, switched on and off.
- ◆ To stop unwelcome interference signals entering through the power supply lines, use shielded 1:1 isolation transformer!
- ◆ Shunt all switched (not only those switched by the indicator) inductive consumers with special suppression networks: RC group and varistor - for AC loads, or diode - for DC loads.
- ◆ If the indicator operates in a very powerful EMI area, it has to be mounted inside a grounded metal shielding box!

Wiring



Input signal wiring

Connect the input with regard to its type through the respective and depending on the case type (see '**Specifications**') terminals on the device back.



Voltage transmitters should be powered ONLY by external source!

Output wiring

Connect the outputs with regard to their types (see '**Specifications**') via the respective terminals.

Power supply wiring

Connect the right power supply voltage for your device (see '**Specifications**') through the respective terminals.



Important notes:

- ◆ Power supply must be turned off during mounting and wiring!
- ◆ With cases 'B', 'H', and 'V', use terminal A10 for range 0...10 V, and A11 – for other.
- ◆ In case of a TI08-L with 90...250 V power supply, use terminal 8 for grounding, and 5 – for input wiring, and adjust the jumper as shown on the device label.
- ◆ Connecting a potentiometer requires excitation voltage of 5 V, 10 mA (see '**Specifications**').



More detailed wiring schematics are available at comecogroup.com under 'Support' tab.

Parameter	Symbol	Description
Parameters of Level L3		
Input Type	<i>i_np</i>	Type of the input signal in case of programmable input
Point Position	<i>Pnt</i>	Display decimal point position
Input Low	<i>Lo</i>	Display value at low limit of the input range
Input High	<i>hi</i>	Display value at high limit of the input range
Input Correction	<i>cor</i>	Constant to be added to the measured input value
Gradient	<i>Grd</i>	Maximum admissible input change for 120 ms sampling period
Filter Time	<i>Ft</i>	Relative time constant of the input filter
Filter Band	<i>Fb</i>	Zone around the measured value, within which the filter is active
SP Limit Low	<i>SPL</i>	Set-point low limit
SP Limit High	<i>SPH</i>	Set-point high limit

Parameters of Level L2

Direction 1	<i>d_r.i</i>	Control action direction of output OUT1
+Differential 1	<i>Pd.i</i>	Relay switching differential over set point for output OUT1
-Differential 1	<i>nd.i</i>	Relay switching differential under set point for output OUT1
Time On 1	<i>t_n.i</i>	ON duration of pulsed output OUT1
Time Off 1	<i>t_F.i</i>	OFF duration of pulsed output OUT1
Hold On 1	<i>h_n.i</i>	Holds the output OUT1 reaction when being activated
Hold Off 1	<i>h_F.i</i>	Holds the output OUT1 reaction when being deactivated

The same 7 parameters, but with index 2 – for output OUT2

Parameters of Level L1

Set Point 1	<i>SP.i</i>	Set-point value of output OUT1
Set Point 2	<i>SP2</i>	Set-point value of output OUT2

Access-Control Parameter (parameter of Hidden level)

Access Control Level	<i>Acl</i>	Controls the access to device parameters
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* With potentiometric input, after wiring the device and setting desired values to Input Low and Input High, Input High value differ, to adjust the device to display PV correctly, set new Input High value as calculated
 $\text{Input High}_{\text{new}} = \text{Input Low} + (\text{Input High} - \text{Input Low})^2 / (\text{PV}(100\%) - \text{Input Low})$

Table 1

Value	Unit	Notes
, 0.10 , , 0.5 , , 0.20 , , 4.20	-	, 0.10 (0...10 V), , 0.5 (0...5 V; potentiometer 0.5...10 kΩ), , 0.20 (0...20 mA), , 4.20 (4...20 mA)
0, 0.0, 0.00, 0.000	-	when indicating values with the input-signal measurement unit (ISU)
-1999 ... 9999	ISU	
-1999 ... 9999	ISU	*
-1999 ... 9999	ISU	display offset value
0 ... 9999	ISU	used for input peak filtration; value '0' cancels the filtration
0 ... 999	-	This parameter and the following one define a low-pass input filter.
0 ... M	ISU	M = 25% of input range
-1999 ... 9999	ISU	These parameters keep the set points in safe limits, preserving them from random changes.
<hr/>		
cool,heat	-	'cooling' - activates over set point, 'heating' - activates under set point
0 ... 9999	ISU	less than (high range limit - Set Point 1)
0 ... 9999	ISU	less than (Set Point 1 - low range limit)
0 ... 9999	sec.	pulse duration; value '0' disables pulse mode
0 ... 9999	sec.	pause duration; value '0' disables pulse mode
0 ... 9999	sec.	Value '0' disables hold mode.
<hr/>		
-1999 ... 9999	ISU	within operating range limits Input Low ... Input High , considering SP Limit Low(High) , Input Correction , and +/-Differential 1(2)
FULL,L1,no	-	FULL (full access), L1 (access only to parameters of level L1), no (no access)

check the PV(100%) value when potentiometer slide is positioned at 100%. If PV(100%) value and by the formula:



*Some parameters
are accessible only
when the respective
functionality is installed.
(see 'Specifications').*

* - *Changing
Point Position value
reflects on the real value
of all parameters
with ISU!*

*E.g.: changing
Point Position value
from (0) to (0.0)
would change
a set-point value
of 100 to 10.0!!!*

Device parameters

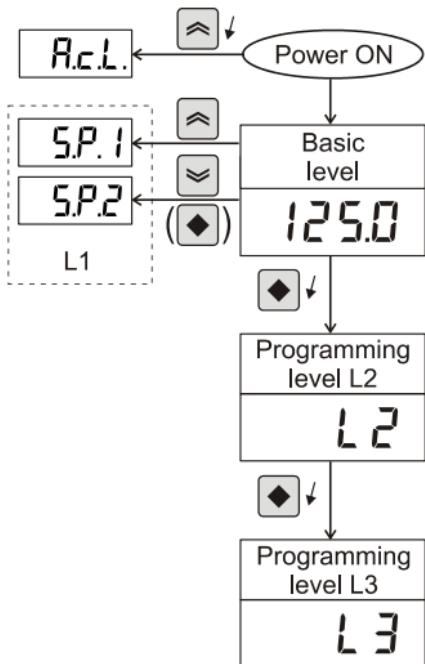
TI08 is a programmable device whose service behavior is determined by a set of parameters. All the parameters, along with their names, symbols, and value ranges, are given in Table 1.

Setting numerical parameter value

- ◆ Enter parameter value adjustment mode (see 'Program Levels').
- ◆ The whole part of the value together with the left zeroes appears on the display, and the rightmost digit blinks.
- ◆ To select another digit, press
- ◆ The 3 rightmost digits can accept values from **0** to **9**, and the leftmost digit can also accept the values **-** and **.**
- ◆ To increase or decrease the blinking digit value, use respectively or .
- ◆ Confirm the adjusted value by pressing simultaneously + or + .
- ◆ If the new value has not been confirmed and no key has been pressed for a certain period of time, value adjustment automatically ceases, and the parameter retains its initial value.

Setting symbolic parameter value

- ◆ Enter parameter value adjustment mode (see 'Program Levels').
- ◆ Read the blinking parameter value.
- ◆ To change the value, use or , and to confirm, press + or + .
- ◆ If the new value has not been confirmed and no key has been pressed for a certain period of time, value adjustment automatically ceases, and the parameter retains its initial value.



Programming order

- ◆ Set full access to device parameters.
- ◆ Adjust the parameters.
- ◆ If needed, restrict the access again by adjusting the **Access Control Level** parameter.

Access control (Hidden level)

- ◆ Hold depressed while turning the power supply on and until **A.c.L.** appears.
- ◆ Set access level according to Table 1.

Basic level

At power-on, TI08 enters Basic level.

At this level, the device indicates the measured input value (PV) with a resolution, according to the **Point Position** parameter.

- ◆ If the whole part of PV cannot be entirely displayed, the unit generates a blinking 'overflow' message (α_L or $-\alpha_L$, depending on PV sign).
- ◆ If PV is out of the device physical operating range, it displays blinking symbolic message: L_{--} (under-range) or R_{--} (over-range).
- ◆ Upon entering Basic level, TI08 may display the $\text{no } 5$ message, indicating that some time is necessary for filter initialization.
- ◆ The $\text{no } 5$ message may appear as a result of the peak filter operation (see '**Input filtration**').

Set-point adjustment (Level L1)

- ◆ To enter Set Point 1 adjustment mode, press and hold until **SP.1** appears on the display. Release the key to view the set-point value.
- ◆ To enter Set Point 2 adjustment mode, follow the same procedure, but start with the key.

Programming (Levels L2 and L3)

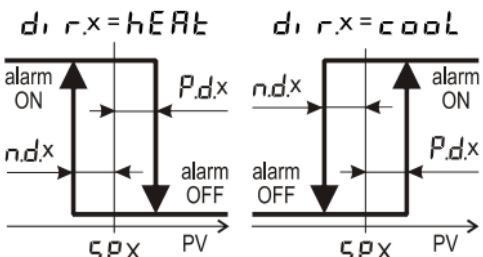
- ◆ Enter from Basic level by pressing and holding .
- ◆ To access and adjust the parameters from level L2, release the key while  is displayed. To enter level L3, release the key when  appears on the display.
- ◆ Choose a parameter using  or .
- ◆ To enter parameter value adjustment mode, press .
- ◆ If no key has been pressed for a while, the device automatically returns to Basic level, storing all confirmed changes.
- ◆ For quick exiting and saving, use key combination  + ,  + , or  + .

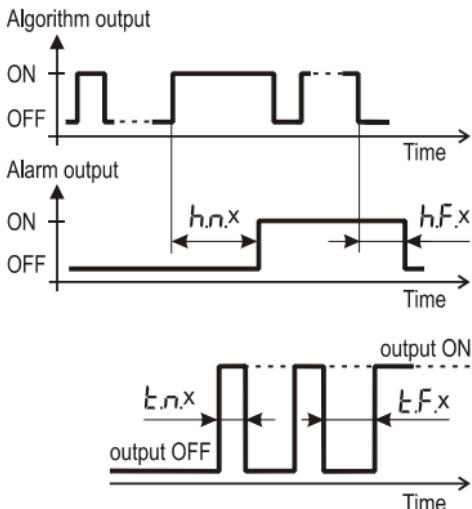
Output Control**Alarm output operation**

- ◆ The alarm outputs operate according to the control algorithm parameters.
- ◆ When an error is detected (see '**Error messaging**'), the outputs deactivate and restore after all discrepancies have been resolved and programming exited.

ON/OFF control algorithm

The static characteristic of an alarm relay controlled by an ON/OFF algorithm is shown on the left drawing.





Output hold

For eliminating undesirable output switches, additional parameters (**Hold On** and **Hold Off**) are assigned to hold the output reaction for certain period of time.

Output pulse mode

When an output is activated by the control algorithm, it can either stay ON or pulse depending on **Time On** and **Time Off** parameter values.

Error Messaging

Message	Parameters	Error type
<i>Fr, L</i>	all	incorrect memory
<i>Er, 1</i>	<i>GrAd</i>	out of range
<i>Er, 2, Er, 3</i>	<i>Ft, Fb</i>	out of range
<i>Er, 4, Er, 5</i>	<i>SPL, SPH</i>	out of input range *
<i>Er, 6</i>	<i>SPL, SPH</i>	<i>SPL > SPH</i>
<i>Er, 11, Er, 21</i>	<i>t.on, 1, t.on, 2</i>	out of range
<i>Er, 12, Er, 22</i>	<i>t.F, 1, t.F, 2</i>	out of range
<i>Er, 13, Er, 23</i>	<i>h.on, 1, h.on, 2</i>	out of range
<i>Er, 14, Er, 24</i>	<i>h.F, 1, h.F, 2</i>	out of range
<i>Er, 15, Er, 25</i>	<i>P.d, 1, P.d, 2</i>	out of range
<i>Er, 16, Er, 26</i>	<i>n.d, 1, n.d, 2</i>	out of range
<i>Er, 17, Er, 27</i>	<i>SP, 1, SP, 2</i>	outside <i>SPL ... SPH</i>
<i>Er, 18, Er, 28</i>	<i>SP, x - n, dx</i>	under input range *
<i>Er, 19, Er, 29</i>	<i>SP, x + P, dx</i>	over input range *

- In some cases, T108 finds discrepancies in parameter values that must be resolved before operating at Basic level.
- The device indicates such kind of problems by displaying error messages as given on the left.
- If *Fr, L* appears on the display, try debugging by turning the power off/on.
- If the problem persists, press and hold to restore the default (factory) settings.

* device physical operating range considering Input Correction

Peak filter

This filter is intended for eliminating pulse spikes (peaks), which can appear in the input signal, in the following way:

- ◆ TI08 measures the input signal value every 120 ms (sample time).
- ◆ The measured values are compared subsequently. The filter checks the difference between the last 2 samples. If it does not exceed **Gradient** value, the device accepts the signal as *normal*.
- ◆ If the last measured value differs from the previous one by more than the **Gradient** value, the filter output is held until the device determines a presence of a *normal* signal. It is possible only if the input signal has not been changed with more than the **Gradient** value for 4 subsequent samples.
- ◆ If the device has not determined a *normal* signal for 20 subsequent samples, **no**, **5** appears on the display (see 'Basic level').

Low-pass filter

This first-order filter acts ONLY within a certain band around filter output value. This has been designed to cut periodic noises outside the communication signal spectrum.

- ◆ Filter operation is defined by two parameters:
Filter Time (defines filter time constant) and
Filter Band (defines filter active band around filter output value).
- ◆ If the newly measured value differs from the filter output by more than **Filter Band**, the filter resets with a new initial output value (newly measured value).



The undersigned hereby declares, on behalf of COMECO Inc., that this process indicator (trip alarm unit) model TI08 has been manufactured in compliance with standards EN 61010-1 and EN 61326-1, and meets the requirements of Directives 2004/108/EC and 2006/95/EC.

Krasimir Darakchiev, CEO
COMECO Inc.

Waste Disposal



Do not dispose of electronic devices together with household waste material!

If disposed of within European Union, this product should be treated and recycled in accordance with the laws of your jurisdiction implementing Directive 2012/19/EU on waste electrical and electronic equipment (WEEE).

Case	<input type="checkbox"/> 'B', <input type="checkbox"/> 'H', <input type="checkbox"/> 'V', <input type="checkbox"/> 'S', <input type="checkbox"/> 'L', <input type="checkbox"/> 'M'
Input	<input type="checkbox"/> programmable, <input type="checkbox"/> fixed,
Outputs:	up to 2
Electromechanical relay	<input type="checkbox"/> 5A/250VAC with NO/NC or NO contact, <input type="checkbox"/> 3A/250VAC with NO contact
SSR	<input type="checkbox"/> 1A/250VAC, <input type="checkbox"/> 0.2A/250VAC
MOS gate	0.1A/60V, optically isolated
Output for external SSR	5...24 VDC, 30 mA
- OUT1	<input type="checkbox"/> relay, <input type="checkbox"/> SSR, <input type="checkbox"/> MOS gate, <input type="checkbox"/> for ext. SSR
- OUT2	<input type="checkbox"/> relay, <input type="checkbox"/> SSR, <input type="checkbox"/> MOS gate, <input type="checkbox"/> for ext. SSR
Power Supply	<input type="checkbox"/> 230 VAC, <input type="checkbox"/> 90...250 V, <input type="checkbox"/> 24 VDC, <input type="checkbox"/> 12...24 V, <input type="checkbox"/>
Excitation Voltage (Vaux)	<input type="checkbox"/> 10...30 V, 30 mA, <input type="checkbox"/> 5 VDC, 10 mA, stabilized, <input type="checkbox"/>
Consumption	less than 1.5 VA
Measurement Error	≤ ± 0.3% from span
Temperature Drift	≤ ± 0.02% from span for 1 °C
Ambient Temperature / Humidity	-10...65 °C / 0...85% RH, non-condensing
Protection Class: front / terminals	<input type="checkbox"/> IP65, <input type="checkbox"/> IP54, <input type="checkbox"/> IP44 / IP20

Warranty and Support

.....
article number

serial number

manufacturing date

 QC check mark(passed)
(stamp)

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QD-8.2.4-WC

Warranty

COMEKO warrants this product to be free from defects in materials and workmanship for 2 years. If your unit is found to be defective within that time, we will promptly repair or replace it. This warranty does not cover accidental damage, wear or tear, or consequential or incidental loss. This warranty does not cover any defects caused by wrong transportation, storage, installation, or operating (see '**Specifications**').

Technical support

In the unlikely event that you encounter a problem with your COMECO device, please call your local dealer or contact directly our support team.