

**LIMIT CONTROLLER**  
**Model: TC10-L Quick Guide - IM 05C01E81-11EN**  
**4th edition - December 2021**



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**EU Declaration of conformity and Manual retrieval**  
 TC10-L is a panel mounting, Class II instrument. It has been designed with compliance to the European Directives. All information about the controller use can be found in the Engineering Manual: IM 05C01E81-12EN and the Communication Manual: IM 05C01E81-13EN and General Specification: GS 05C01E81-11EN.  
 The EU Declaration of Conformity and the manual of the controller can be downloaded (free of charge) from the web-site:  
[www.yokogawa.com/ns/tc10/im/](http://www.yokogawa.com/ns/tc10/im/)

In relation to **CE marking**, the authorized representative for this product in **EEA**:

**Yokogawa Europe B.V.**  
 Euroweg 2, 3825 HD Amersfoort, The Netherlands  
 and the importer for this product into the **EU/EEA** market via the **YOKOGAWA** sales channel is:

**Yokogawa Europe B.V.**  
 Euroweg 2, 3825HD Amersfoort, The Netherlands.  
 In relation to **UKCA marking**, the importer for this product into the **Great Britain** market via the **YOKOGAWA** sales channel is:  
**Yokogawa United Kingdom Limited**  
 Stuart Road Manor Park Runcorn, WA7 1TR, United Kingdom.

**Safety Precautions**  
 The following general safety precautions must be observed during all phases of operation, service and repair of this instrument. If this instrument is used in a manner not specified in this manual, the protection provided by this instrument may be impaired. Also, **YOKOGAWA Electric Corporation** assumes no liability for the customer's failure to comply with these requirements. The following symbol is used on the instrument.  
 This manual is an essential part of the product; keep it in a safe place for future reference. This manual is intended for the following personnel:  
 - Engineers responsible for installation, wiring, and maintenance of the equipment.  
 - Personnel responsible for normal daily operation of the equipment.

**WARNING**  
 Calls attention to actions or conditions that could cause serious or fatal injury to the user or damage to the instrument, and indicates precautions that should be taken to prevent such occurrences. The user must refer to the Engineering manual for special instructions.

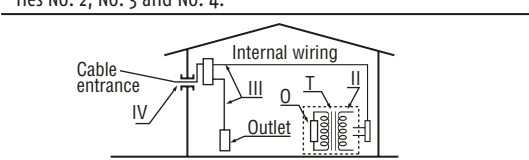
**AC**  
**AC/DC**  
 The equipment wholly protected by double insulation or reinforced insulation.

**WARNING**  
 - Whenever a failure or a malfunction of the device may cause dangerous situations for persons, things or animals, please remember that the plant must be equipped with additional devices which will guarantee safety.  
 - We warrant that the products will be free from defects in material and workmanship for 18 months from the date of manufacturing. Products and components that are subject to wear due to conditions of use, service life and misuse are not covered by this warranty.

**Safety, Protection and Modification of the Product**  
 - In order to protect the system controlled by this product and the product itself, and to ensure safe operation, observe the safety precautions described in the Engineering manual. Use of the instrument in a manner not prescribed herein may compromise the product's functions and the protection features inherent in the device. We assume no liability for safety, or responsibility for the product's quality, performance or functionality should users fail to observe these instructions when operating the product.  
 - Installation of protection and/or safety circuits with respect to a lightning protector; protective equipment for the system controlled by the product and the product itself; foolproof or failsafe design of a process or line using the system controlled by the product or

the product itself; and/or the design and installation of other protective and safety circuits are to be appropriately implemented as the customer deems necessary.  
 - This product is not designed or manufactured to be used in critical applications that directly affect or threaten human lives. Such applications include nuclear power equipment, devices using radioactivity, railway facilities, aviation equipment, air navigation facilities, aviation facilities, and medical equipment. If so used, it is the user's responsibility to include in the system additional equipment and devices that ensure personnel safety.  
 - Modification of the product is strictly prohibited.  
 - This product is intended to be handled by skilled/trained personnel for electric devices.  
 - Overvoltage category: II

**WARNING**  
 - This instrument is for Measurement Category No. 1. Do not use it for measurements in locations falling under Measurement Categories No. 2, No. 3 and No. 4.



No.	EN 61010-2-030	Description
No. 1	0 (Other)	For measurements performed on circuits not directly connected to MAINS.
No. 2	Measurement Category II	For measurements performed on circuits directly connected to the low-voltage installation.
No. 3	Measurement Category III	For measurements performed in the building installation.
No. 4	Measurement Category IV	For measurements performed at the source of the low-voltage installation.

**How to Connect Wires**

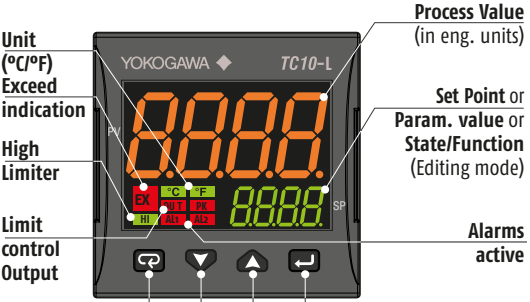
**WARNING**  
 - Wiring work must be carried out by a person with basic electrical knowledge and practical experience.  
 - Be sure to turn OFF the power supply to the controller before wiring to avoid an electric shock. Use a tester or similar device to ensure that no power is being supplied to a cable to be connected.  
 - As a safety measure, always install a circuit breaker (an IEC 60947 compatible product, 5 A, 100 V or 220 V AC) in an easily accessible location near the instrument. Moreover, provide indication that the switch is a device for turning off the power to the instrument.  
 - Install the power cable keeping a distance of more than 1 cm from other signal wires.  
 - The power cable is required to meet the IEC standards concerned or the requirements of the area in which the instrument is being installed.  
 - Wiring should be installed to conform to NEC (National Electrical Code: ANSI/NFPA-70) or the wiring construction standards in countries or regions where wiring will be installed.  
 - For control relay output, alarm relay output, and power terminal connections, use heat-resistant cables.  
 - Recommended tightening torque: 0.5 Nm.

**Model and suffix codes**

Model Code	Suffix codes	Description
TC10	L H C □ R □ D □ F /IGK	Temperature Controller
Fixed code	L	Always "L"
Power supply	H	100 to 240 VAC
Fixed code	C	Always "C"
Retransmission	N	None
	A	Measured value retransmission Out 4 to 20 mA
Limit control output	R	Limit control relay output
Alarm output 1,2	N	None
	R	Alarm output: 2 points (OP3 relay + OP4 SSR)
Fix code	D	Always "D"
Serial communication	N	None
	S	RS485 Modbus
Fixed code	F	Always "F"
Option Code	/IGK	Panel gasket for IP65

**Note about the Structure of this Document**  
 The usual installation sequence is the reverse of the operator sequence. During installation, the first step is the wiring procedure followed by the complete configuration. At this point you can set the operator parameter and then you can use the instrument.  
 This document follows this structure.

**DISPLAY AND KEYS**

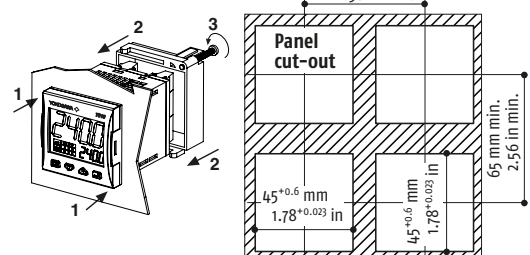


	Operator Mode	Editing Mode
	Access to: - Operator visualizations (PV, max./min., time) - Editing Parameters - Editing Configuration	Confirm and go to Next parameter
		Increase the displayed value/Selects the next element of the list
		Decrease the displayed value/Selects the previous element of the list
	Confirming operation (pressed when <b>OUT</b> LED is lit and <b>EX</b> LED is OFF)	Exit from Operator commands/Parameter setting/Configuration

**DIMENSIONS**

Overall dimensions (L x H x D): 48 x 48 x 73 mm  
 (1.89 x 1.89 x 2.87 in.)  
 Panel Cut-out: 45<sup>+0.6</sup> x 45<sup>+0.6</sup>  
 (1.078<sup>+0.023</sup> x 1.078<sup>+0.023</sup> in.)

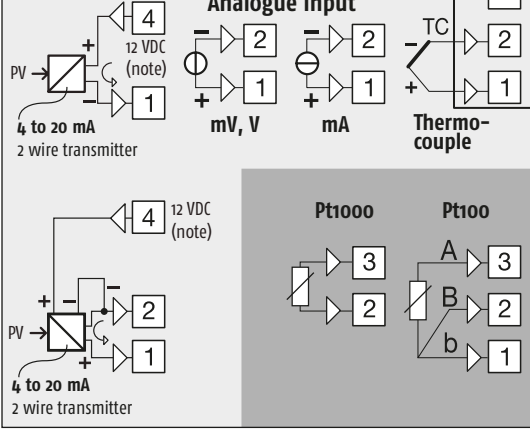
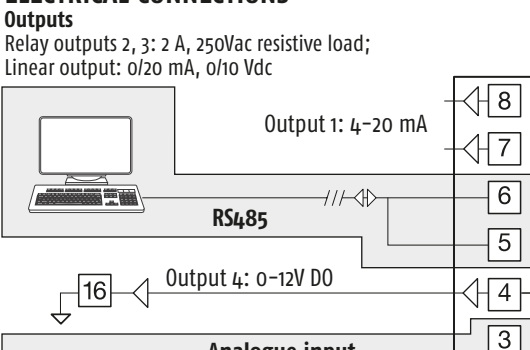
**MOUNTING**



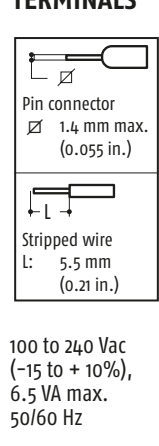
**Mounting requirements**

This instrument is intended for permanent installation, for indoor use only, in an electrical panel which encloses the rear housing, exposed terminals and wiring on the back.  
 Select a mounting location having the following characteristics:  
 1. It should be easily accessible;  
 2. There is minimum vibrations and no impact;  
 3. There are no corrosive gases;  
 4. There are no water or other fluids (i.e. condensation);  
 5. The ambient temperature is in accordance with the operative temperature (0 to 50°C);  
 6. The relative humidity is in accordance with the instrument specifications (20 to 90%);  
 7. Installation altitude: less than 2000 m;  
 8. Pollution category: 2.  
 The instrument can be mounted on panel with a maximum thickness of 8 mm.  
 When the maximum front protection (IP65) is desired, the optional gasket must be mounted. This is mandatory for FM approval.

**ELECTRICAL CONNECTIONS**

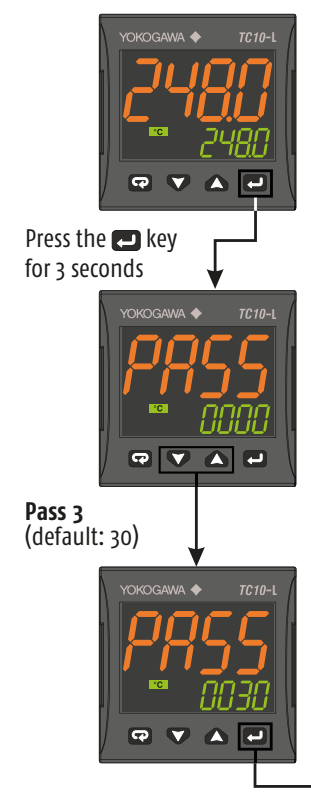


**TERMINALS**



**Note:** Terminal 4 can be programmed as:  
 - **0 to 12 V SSR Drive Output (OP4)** connecting the load between terminals 4 and 16;  
 - **12 Vdc (20 mA) transmitter power supply** connecting the 2 wire transmitter between terminals 4 and 1; for 3 wire transmitter connect terminal 4 to transmitter power supply input and terminal 1 and 2 to transmitter signal output.

**CONFIGURATION PARAMETERS SETTING**



**Access to parameters**

Press the key for 3 seconds

Pass 3 (default: 30)

**Parameters setting**

	Confirm and go to Next parameter
	Increase the displayed value or select the next element
	Decrease the displayed value or select the previous element
	Go to the groups
	Go to the next group

To exit the configuration parameter setting procedure press the key for more than 6 seconds

InP Group		Description	Range value or selection list elements	Decimal digits
No.	Param.			
1	SEnS	Measuring input	J = TC J cRAL = TC K, S = TC S, r = TC R t = TC T, n = TC N Pt1 = PT100, Pt10 = PT1000, 0.60 = 0 to 60 mV, 12.60 = 12 to 60 mV, 0.20 = 0 to 20 mA, 4.20 = 4 to 20 mA, 0.5 = 0 to 5 V, 1.5 = 1 to 5 V, 0.10 = 0 to 10 V, 2.10 = 2 to 10 V,	dP
2	dP	Decimal point figure <b>Note:</b> For TC and RTD inputs the Decimal digits must be 0 or 1 only.	0 to 3	dP
3	SSc	Initial scale readout <b>Note:</b> This parameter will be shown only when a linear input has been selected (mV, V or mA).	-1999 to 9999	dP
4	FSc	Full scale readout <b>Note:</b> This parameter will be shown only when a linear input has been selected (mV, V or mA).	-1999 to 9999 (E.U.)	dP
5	unit	Engineering unit <b>Note:</b> This parameter will be shown only when a TC or RTD input has been selected.	°C or °F	
6	FIL	Digital filter on the measured value. <b>Note:</b> This filter will affect the measured value but also the control action the analogue retransmission and the alarms behaviour.	0 (OFF) to 20.0 (s)	1
7	bS	PV input bias	-100 to 100 % of the input span	dP
8	di.A	Digital Input action	0 = Dh direct 1 = Dh reverse	

## OUT group

No.	Param.	Description	Range value or selection list elements	Decimal digits
9	o1.t	Out 1 type Note: this parameter will be shown only when Out 1 is present	0.20 = 0-20 mA 4.20 = 4-20 mA 0.10 = 0-10 Volt 2.10 = 2-10 Volt	0
10	o1F	Out 1 function	nonE = Out not used r.inP = Measure retransmission r.Err = Error retransmission r.SP = SP retransmission r.SEr = Retransmission of a value coming from serial link	
11	Ao1L	Retransmission - initial scale value	-1999 to Ao1H	dP
12	Ao1H	Retransmission - full scale value	Ao1L to 9999	dP
13	o3F	Out 3 function Available: when Out 3 is present.	nonE = Out not used AL = Alarm output or.bo = Over-range and burn-out P.FAL = Power failure bo.PF = Over-range, burn-out and power Fail	
14	o3AL	Alarms linked up with Out 3	from 0 to 15 +1 = Alarm 1 +2 = Alarm 2 +4 = Burn-out +8 = Overload of Out 4	0
15	o3Ac	Out 3 action	dir = Direct action rEU = Reverse action	
16	o4F	Out 4 function	nonE = Out not used AL = Alarm output or.bo = Over-range and burn-out P.FAL = Power failure bo.PF = Burn-out and power Fail On = Output ever ON (usable as auxiliary PWS for a transmitter).	
17	o4AL	Alarms linked up with Out 4	from 0 to 7 +1 = Alarm 1 +2 = Alarm 2 +4 = Burn-out	0
18	o4Ac	Out 4 action	dir = Direct action rEU = Reverse action	

## AL1 Group

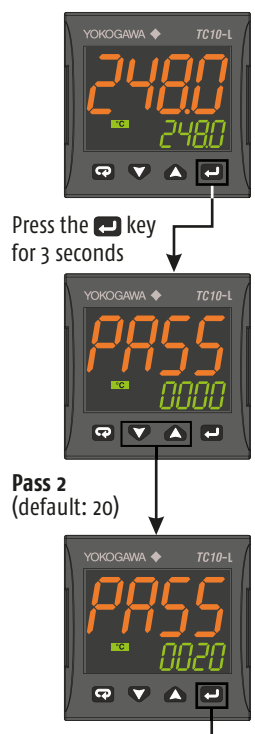
No.	Param.	Description	Range value or selection list elements	Decimal digits
19	ALt	Alarm 1 type	nonE = Alarm not used; LoAb = Absolute low alarm; HiAb = Absolute high alarm; LHAo = Absolute band alarm with alarm indication out of the band; LHAi = Absolute band alarm with alarm indication inside the band; SE.br = Sensor break; LodE = Deviation low alarm; HidE = Deviation high alarm; LHdo = Relative band alarm with alarm indication out of the band; LHdi = Relative band alarm with alarm indication inside the band.	
20	Ab1	Alarm 1 function	From 0 to 3 0 = no function +1 = not active at power up +2 = Relative alarm not active at set point change.	0
21	AL1L	- For High and low alarms AL1L is the low limit of AL1 threshold; - For band alarm AL1L is the low AL1 threshold	-1999 to AL1H (E.U.)	dP
22	AL1H	- For High and low alarms AL1H is the high limit of AL1 threshold; - For band alarm AL1H is the high AL1 threshold	AL1L to 9999 (E.U.)	dP
23	AL1	Alarm 1 threshold	AL1L to AL1H (E.U.)	dP
24	HAL1	Alarm 1 hysteresis	1 to .9999 (E.U.)	dP
25	AL1d	Alarm 1 delay	0 (OFF) to 9999 (s)	0

## AL2 Group

No.	Param.	Description	Range value or selection list elements	Decimal digits
26	AL2t	Alarm 2 type	nonE = Alarm not used; LoAb = Absolute low alarm; HiAb = Absolute high alarm; LHAo = Absolute band alarm with alarm indication out of the band; LHAi = Absolute band alarm with alarm indication inside the band; SE.br = Sensor break; LodE = Deviation low alarm; HidE = Deviation high alarm; LHdo = Relative band alarm with alarm indication out of the band; LHdi = Relative band alarm with alarm indication inside the band.	
27	Ab2	Alarm 2 function	0 = no function +1 = not active at power up +2 = Relative alarm not active at set point change.	0
28	AL2L	- For High and low alarms AL2L is the low limit of AL2 threshold; - For band alarm AL2L is the low AL2 threshold	-1999 to AL2H (E.U.)	dP
29	AL2H	- For High and low alarms AL2H is the high limit of AL2 threshold; - For band alarm AL2L is the high AL2 threshold	AL2L to 9999 (E.U.)	dP
30	AL2	Alarm 2 threshold	AL2L to AL2H (E.U.)	dP
31	HAL2	Alarm 2 hysteresis	1 to 9999 (E.U.)	dP
32	AL2d	Alarm 2 delay	0 (OFF) to 9999 (s)	0

## OPERATOR PARAMETERS

### PARAMETERS SETTING



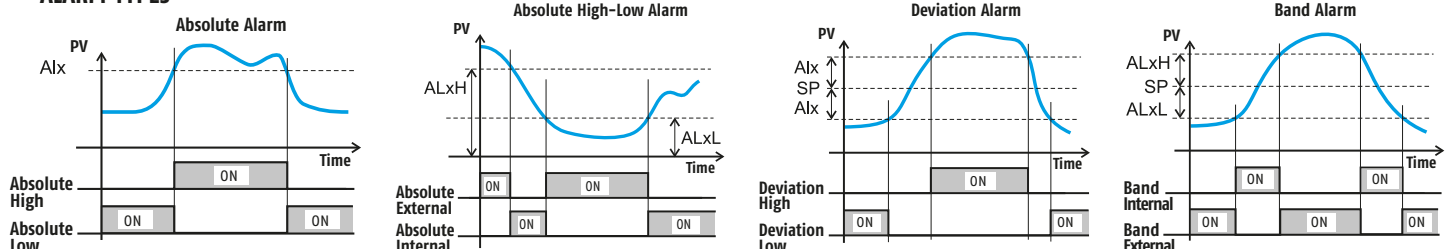
#### Access to parameters

Parameters setting	
	Confirm and go to Next parameter
	Increase the displayed value or select the next element
	Decrease the displayed value or select the previous element

To exit the parameter setting procedure press the key for (for 3 s) or wait until the timeout expiration (about 30 seconds)

Param.	Description	Range value or selection list elements	Decimal digits
SP	Set point (shutdown set point)	From SPLL to SPHL	dP
AL1L	- For High and low alarms AL1L is the low limit of AL1 threshold - For band alarm AL1L is the low AL1 threshold	From -1999 to AL1H E.U.	dP
AL1H	- For High and low alarms AL1H is the high limit of AL1 threshold - For band alarm AL1H is the high AL1 threshold	From AL1L to 9999	dP
AL1	Alarm 1 threshold	From AL1L to AL1H	dP
AL2L	- For High and low alarms AL2L is the low limit of AL2 threshold - For band alarm AL2L is the low AL2 threshold	From -1999 to AL2H E.U.	dP
AL2H	- For High and low alarms AL2H is the high limit of AL2 threshold - For band alarm AL2L is the high AL2 threshold	From AL2L to 9999	dP
AL2	Alarm 2 threshold	From AL2L to AL2H	dP
HyS	Hysteresis of the shutdown control (relay hysteresis for control output)	From 0 to high limit of the measured input range selected (MIRS)	dP
Fil	Digital filter on the measured value	From 0 (OFF) to 20.0 s	1
dS	PV input bias	From -100 to 100 % of the input span	

#### ALARM TYPES



## rEG group

No.	Param.	Description	Range value or selection list elements	Decimal digits
33	Hi.Lo	Limit control type	Hi = High limit. Lo = Low limit.	
34	r.md	Restart mode	0 = On > limit output is ON in any case (the instrument start in shutdown condition) 1 = oFF > limit output is OFF when, at power on, PV doesn't exceed SP.	
35	HyS	Hysteresis of the control output	From 0 to 100% of the input span	dP
36	oP.SL	Operative display selection	0 = PU.SP > PV and SP / SP only (lower display) 1 = SP > SP only (lower display)	
37	SPLL	Minimum set point value	-1999 to SPHL (E.U.)	dP
38	SPHL	Maximum set point value	SPLL to 9999 (E.U.)	dP
39	SP	Set point	SPLL to SPHL	dP
40	dis	The way to confirming operation	but = by keyboard (button) di = by digital input	
41	tim	Duration time when in exceeded (in shutdown)	00.00 to 99.59 (HH.mm)	0
42	Hi	Maximum measured value	In Engineering Units	dP
43	Lo	Minimum measured value	In Engineering Units	dP

## PAn Group

No.	Param.	Description	Range value or selection list elements	Decimal digits
44	PAS2	Password level 2	0 (OFF) to 200	0
45	PAS3	Password level 3	3 to 200	0
46	di.CL	Display color	0 = Bargraph (the display color is used to show the Exceeded condition). 1 = fixed red display 2 = fixed green display 3 = fixed amber display	0
47	diS.t	Display time-out	0 (OFF) to 99.59 (mm.ss)	2

## Ser group

No.	Param.	Description	Range value or selection list elements	Decimal digits
48	Add	Address	0 (OFF) to 254	0
49	bAud	Baud rate	1200 2400 9600 19.2 38.4	

## CAL group

No.	Param.	Description	Range value or selection list elements	Decimal digits
50	A.L.P	Adjust low Point	-1999 to AH.P-10 (E.U.)	dP
51	A.L.o	Adjust low Offset	-300 to 300 (E.U.)	dP
52	A.H.P	Adjust High Point	A.L.P +10 to 9999 (E.U.)	dP
53	A.H.o	Adjust High Offset	-300 to 300 (E.U.)	dP

# INSTRUMENT OPERATIVITY

## 1 Introduction

The TC10-L is an FM (both FM3545 and FM3810) approved limit controller that can be configured either as a high limit or as a low limit controller by a user.

The TC10-L features

- universal input,
- two alarm outputs,
- retransmission output,
- a timer to count the total time the Set Point has been exceeded,
- a register to retain the maximum (or the minimum) measure reached.
- The RS485 communication interface is available optionally.

## 2 Limiter function

The relay of the output 2 operates in fail-safe mode (relay de-energized during shutdown condition) and latching mode.

OUT 2 turns OFF (in this document this condition will be named shutdown) when:

The instrument is configured as a high limiter (Hi.Lo = Hi) and the measured value is greater than limiter threshold ["SP" parameter].

The instrument is configured as a low limiter (Hi.Lo = Lo) and the measured value is lower than limiter threshold.

Out 2 remains OFF until the condition which generated the shutdown, no longer exists and the Confirming action (rearm) has been performed.

During a shutdown (Out 2 is OFF) the upper display will be red.

Confirming action (rearm) can be performed in two different way:

- by pressing the key [when "dis" parameter is set to "but"] but it will be accepted only when the condition which generated the shutdown, no longer exists (EX lamp is OFF) and the set point is shown on the lower display (see "normal display" in "Navigation access")
- by momentarily closing the digital input (by an external dry contact) [when dis parameter is set to "di"] but it will be accepted only when the condition which generated the shutdown, no longer exists.

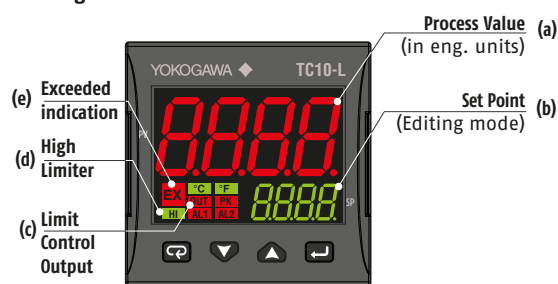
We define also that the time duration of the shutdown condition, stored by the instrument, will be the time from Out 2 goes OFF (shutdown start) and the condition that generate the shutdown no longer exists.

The confirmation action is not part of this time count.

The time duration of the shutdown condition and max/min measured values are stored in memory and available for viewing (see "navigation access") until the next shutdown condition occurs.

These informations are lost at power down.

## 2.1 High limit control



The HI lamp (d) is ON

When a measured value (a) is higher than the set point (b), "EX" lamp (e) lights, "OUT" lamp (b) turns ON and the limit output relay (Out 2) is de-energized.

EX lamp (e) turns off when PV goes into normal condition, while the "OUT" lamp (c) stays on as it is.

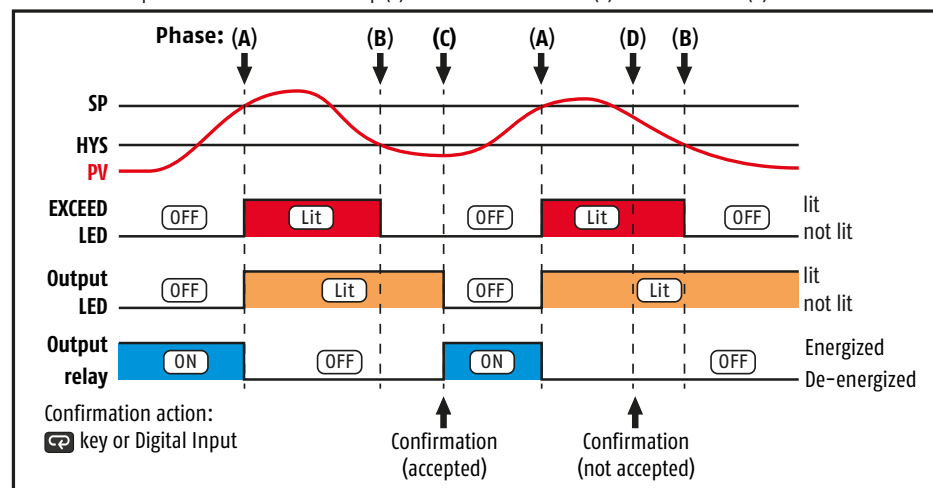
The out (c) lamp turns off only when the EX lamp (e) is off and a confirming operation (rearm) has been done by an operator.

The way to confirm are (according to the "dis" parameter):

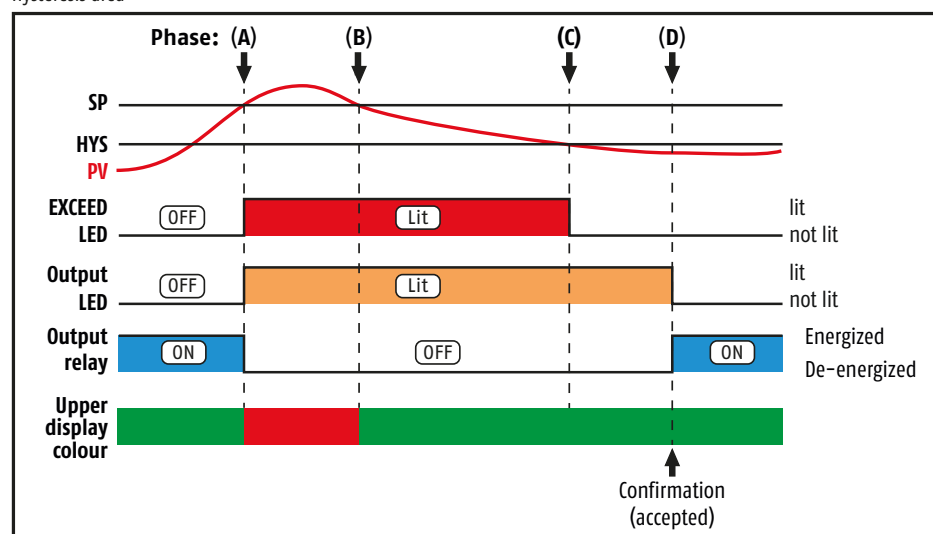
- pressing key for more than 3 seconds or
- by DI.

Output relay is de-energized whenever "OUT" lamp is on.

Check the "HYS" parameter value if the EX lamp (e) is not turn off when PV (a) is lower than SP (b).



When the EX lamp (e) is ON but PV (a) is lower than SP (b), the upper display will be in green colour and it shows that the PV is in the hysteresis area



## 2.2 Low limit control

The HI lamp (d) is OFF

When a measured value (a) is lower than the setpoint (b), "EX" lamp (e) lights, "OUT" lamp (c) turns ON and the limit output relay is de-energized then.

"EX" (e) lamp turns off when PV goes into normal condition, while the "OUT" lamp (c) lamp stays on as it is.

The out (c) lamp turns off only when the EX lamp (e) is off and a confirming operation (rearm) has been done by an operator.

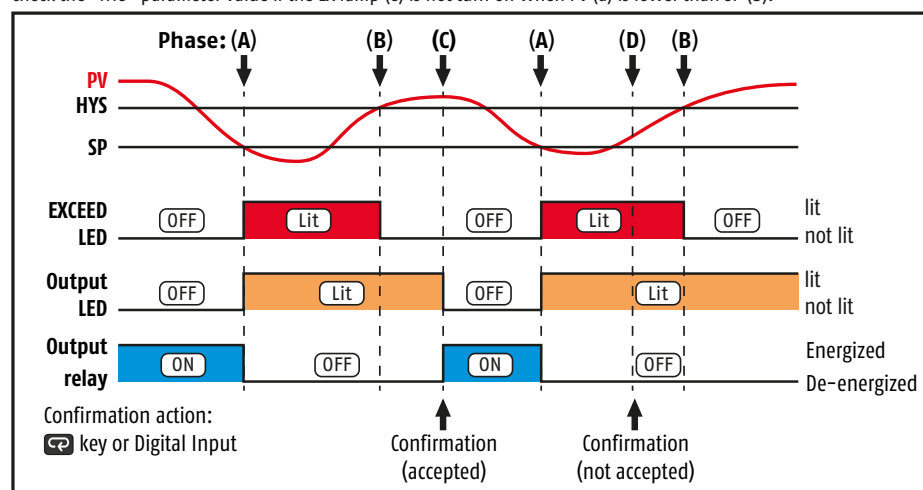
The way to confirm are (according to the "dis" parameter):

- pressing key for more than 3 seconds or
- by DI.

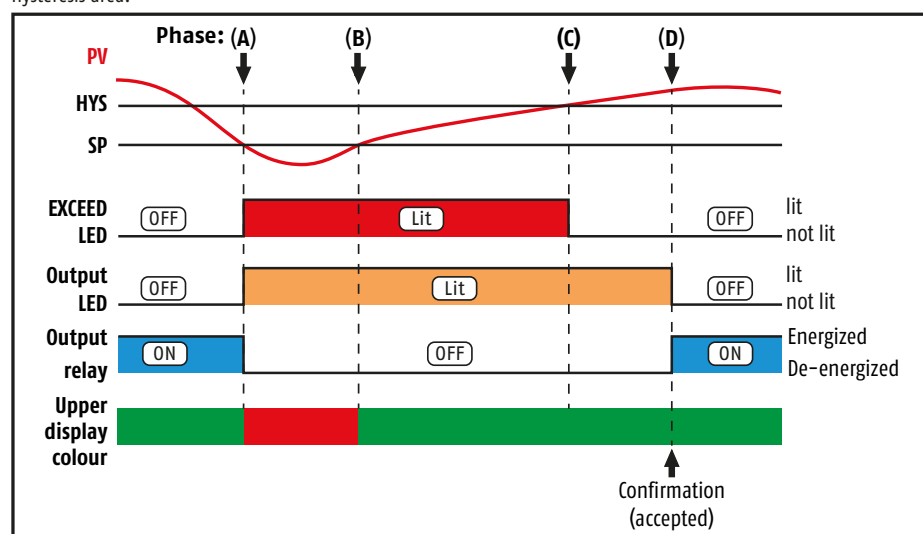
The confirming operation is not accepted during PV exceeds SP (D) (during EXCEEDED lamp lights\*). State of output relay is de-energized whenever "OUT" lamp is on.

Output relay is de-energized whenever "OUT" lamp is on.

Check the "HYS" parameter value if the EX lamp (e) is not turn off when PV (a) is lower than SP (b).



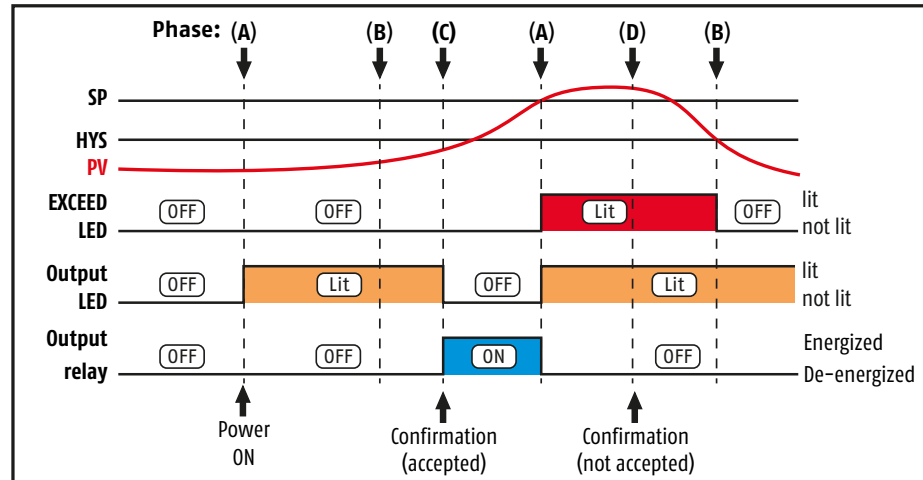
When the EX lamp (e) is ON but PV (a) is lower than SP (b), the upper display will be in green colour and it shows that the PV is in the hysteresis area.



## 2.3 Working at power on when r.nd is set to 0

(Limit output is de-energized at power on in any cases.)

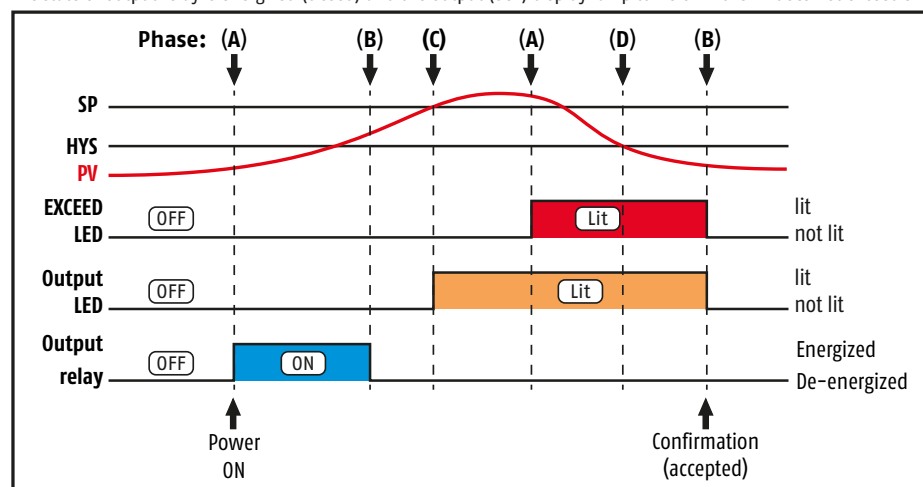
The output relay is always de-energized (opened) at power-on, even if PV does not exceed SP(A). The output (OUT) display lamp is lit. If the PV does not exceed SP, after the confirming operation, output relay will be energized (closed) and the output (OUT) display lamp turns off.



## 2.4 Working at power on when r.nd is set to 1

(Limit output is energized at power on when PV doesn't exceed SP)

The state of output relay is energized (closed) and the output (OUT) display lamp turns off if the PV does not exceed SP at power-on





## 2.5 Note about sensor failure (burnout)

Sensor failure shall result in process shutdown for a limit switch; an alarm or process shutdown for a supervisory switch.  
Upscale burnout is required for a high limit switch.  
Down scale burnout for a low limit switch.

## Navigation, access levels and keyboard management

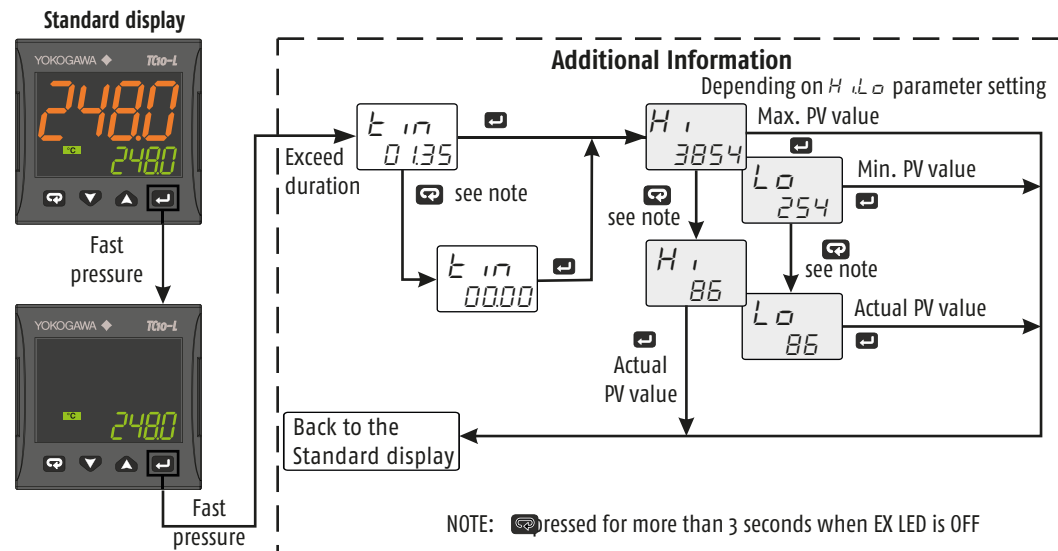
The TC10-L is equipped with 3 different levels:

### Level 1

At power up the instrument starts in "Operator Mode" (in this document O.M.)

When in O.M., the keyboard will operate as follows:

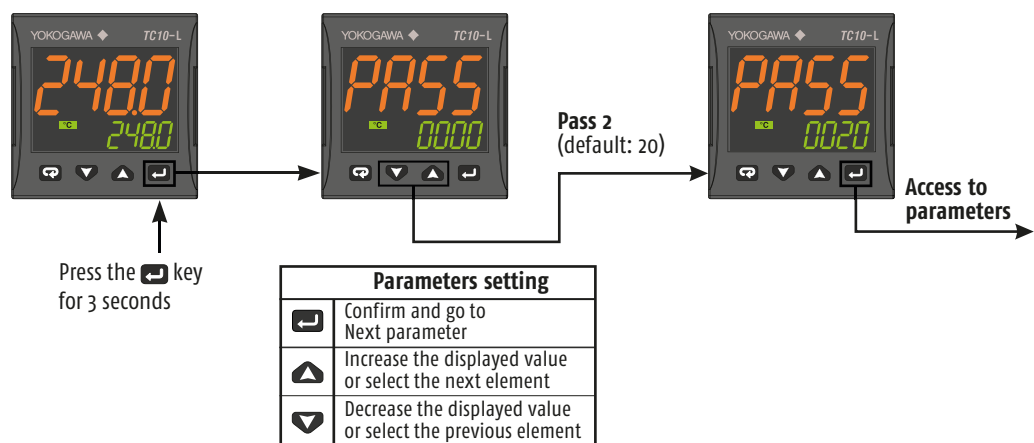
## CONTROLLER OPERATION



### Level 2

From O.M., pressing "Enter" for more than 3 second and setting Pass 20 the instrument starts the Operator Parameter Procedure  
When in OPP, the keyboard will operate as follows:

## OPERATOR PARAMETERS SETTING

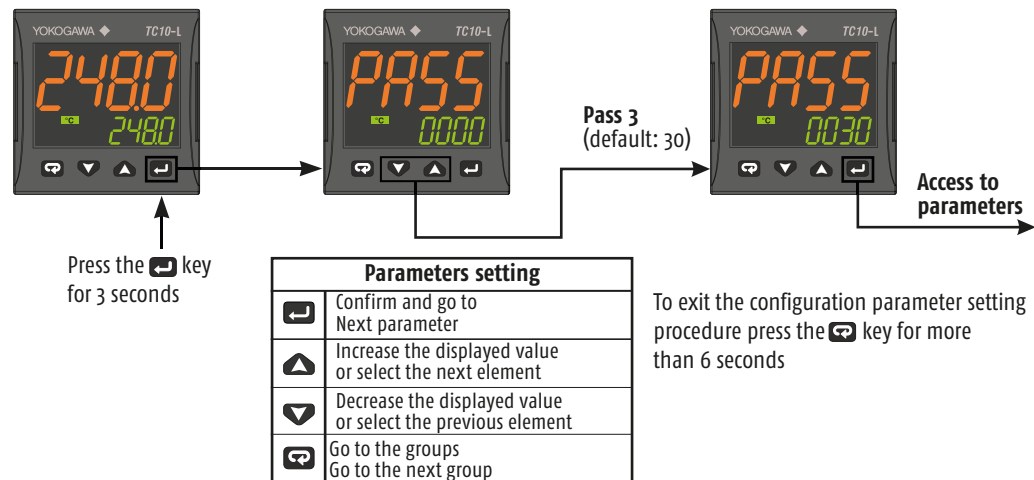


For the full list see "Parameter setting".

### Level 3

From O.M., pressing "Enter" for more than 3 second and setting Pass 30 the instrument starts the Configuration Parameter Procedure.

## CONFIGURATION PARAMETERS SETTING



For the full list see "Parameter setting".

## HARDWARE SPECIFICATIONS

### Measuring input

Thermocouples

Type: J, K, S, R, T, N programmable.

Continuity detection current: 250 nA.

Engineering Unit: °C or °F programmable.

Cold junction: Automatic compensation from 0 to +55 °C.

Cold junction temperature drift: 0.05 °C/°C @ 25 °C after a warm-up (instrument ON) equal to 20 minutes.

Burn-out: Full scale.

TC Type	Ranges			Calibration
J	-50 to 1000 °C	-50.0 to 999.9 °C	-58 to 1832 °F	EC 584-1 DIN 43710 - 1977
K	-50 to 1370 °C	-50.0 to 999.9 °C	-58 to 2498 °F	
S	-50 to 1760 °C	-50.0 to 999.9 °C	-58 to 3200 °F	
R	-50 to 1760 °C	-50.0 to 999.9 °C	-58 to 3200 °F	
T	-70 to 400 °C	-70.0 to 400.0 °C	-94 to 752 °F	
N	-50 to 1300 °C	-50.0 to 999.9 °C	-58 to 2372 °F	

### RTD (Resistive Temperature Detector)

Type: Pt 100 3 wires

Pt 1000 2 wires.

Current injection: 135 µA.

Line resistance: Automatic compensation (PT100 only) up to 20 Ohm/wire with maximum error <+0.1% input span.

Engineering unit: °C or °F programmable.

Burn-out: Full scale.

RTD type	Ranges		Calibration
Pt 100	-200 to 850 °C	-328 to 1562 °F	DIN 43760 EN 60751/A2.
	-200.0 to 850.0 °C	-328.0 to 999.9 °F	
PT 1000	-200 to 850 °C	-328 to 1562 °F	
	-200.0 to 850.0 °C	-328.0 to 999.9 °F	

### Linear inputs

Type: 0/12-60 mV, 0/4-20 mA, 0/1-5V, 0/2-10V.

Readout: programmable from -1999 to 9999.

Decimal point: programmable.

Input type	Input impedance
0/12 to 60 mV	> 1 MΩ
0/4 to 20 mA	53 Ω
0/1 to 5 V or 0/2 to 10 V	> 500 kΩ

### Digital input

Type: Contact free of voltage.

Max. contact resistance: 100 Ohm.

Contact rating: 10 V, 6 mA.

### Outputs

Out 1

Available: Optional.

Output action: Direct/reverse programmable.

Function: Retransmission.

Output type: 0-20 mA, 4-20 mA, 0-10 V or 2-10V programmable.

Isolation: Isolated output.

Out 2

Function: Limiter output.

Available: Always.

Output action: Reverse.

Output type: Relay.

Contact type: SPST (NO contact).

Contact rating: 2A / 250 V c.a. on resistive load,  
1 A / 250 V with  $\cos\phi = 0.4$ .

Out 3

Function: Alarm output

Available: Optional

Output type: Relay

Contact type: SPST (No contact)

Contact rating: 2A / 250 V c.a. on resistive load,  
1 A / 250 V with  $\cos\phi = 0.4$

Out 4 (when programmed)

Function: Alarm output.

Available: Always.

Output type: SSR drive.

Isolation: Not isolated.

Protection: Output protected from short circuit.

Logic level 1: 12 V, 20 mA max..

Logic level 0: <0.5 V.

Function: Auxiliary power supply for TX

Note: This output is obtained by forcing the out 4 to ON.

Isolation: Not isolated.

Protection: Output protected from short circuit.

Voltage: 12 VDC.

Current: 23 mA max..

### Serial interfaces

Type: TTL.

Available: Always.

Isolation: Not isolated.

Protocol: Modbus RTU.

Baud rate: from 1200 to 38400 baud.

Multiple reading: Max. 16 word.

Multiple writing: Max. 16 word.

Parity: None.

Data format: 8 bit.

Start Bit: 1.

Stop Bit: 1.

Type: RS 485 optional.

Available: On request.

Isolation: Isolated (50 V).

Protocol: Modbus RTU.

Baud rate: From 1200 to 38400 baud.

Multiple reading: Max. 16 word.

Multiple writing: Max. 16 word.

Parity: None.

Data format: 8 bit.

Start Bit: 1.

Stop Bit: 1.

## 关于产品污染防止管理

### Control of Pollution Caused by the Product

根据中华人民共和国电子信息产品的防污染管理办法，对本仪表进行说明。

This is an explanation for the product based on "Control of pollution caused by Electronic Information Products" in the People's Republic of China.

### 产品中有毒有害物质或元素的名称及含量

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞(Hg)	镉(Cd)	六价铬(Cr6+)	多溴联苯(PBB)	多溴二苯醚(PBDB)
框架 (塑料)	×	×	×	○	○	○
框架 (金属)	×	×	×	○	○	○
内部接线材料	×	×	×	○	○	○
电源	×	×	×	○	○	○

○: 表示该部件所有基材中所含的有毒有害物质含量均未超过GB/T26572标准中规定的限量要求。  
×: 表示该部件中至少有一种基材中所含的有毒有害物质含量超过GB/T26572标准所规定的限量要求。



该标志为环境保护使用期限，根据SJ/T11364，适用于在中国(台湾、香港、澳门除外)销售的电子电气产品。

只要遵守该产品的安全及使用注意事项，从产品生产之日起至该标志所示年限内，不会因为产品中的有害物质外泄或突变而导致环境污染或对人体产生重大影响。

注释) 该标志所示年限为“环境保护使用期限”，并非产品的保质期。另外，关于更换部件的推荐更换周期，请参阅使用说明书。



### Waste Electrical and Electronic Equipment (WEEE)

(Only valid in the EEA for EU WEEE Directive and in the UK for UK WEEE Regulation)  
This product complies with the WEEE marking requirement.

This marking indicates that you must not discard this electrical/electronic product in domestic household waste.

When disposing of products in the EEA or UK, contact your local Yokogawa office in the EEA or UK respectively.