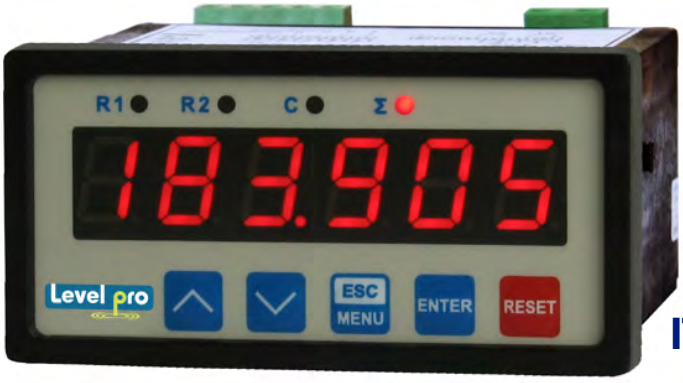
Quick Start Manual

ITC 450 - ITC 470 Series
Operating Instructions

ITC 450



ITC 470

Read the user's manual carefully before starting to use the unit or software.
Producer reserves the right to implement changes without prior notice.

Explanation of symbols used in the manual:

This symbol denotes especially important guidelines concerning the installation and operation of the device. Not complying with the guidelines denoted by this symbol may cause an accident, damage or equipment destruction.

IF THE DEVICE IS NOT USED ACCORDING TO THE MANUAL THE USER IS RESPONSIBLE FOR POSSIBLE DAMAGES.

This symbol denotes especially important characteristics of the unit. Read any information regarding this symbol carefully.

1. BASIC REQUIREMENTS AND USER SAFETY

- The manufacturer is not responsible for any damages caused by inappropriate installation, not maintaining the proper environmental conditions and using the unit contrary to its assignment.
- Installation should be conducted by qualified personnel . During installation all available safety requirements should be considered. The fitter is responsible for executing the installation according to this manual, local safety and EMC regulations.
- If the device is equipped with PE connector, it should be connected to PE wire. Otherwise PE wire should be connected to GND connector.
- The unit must be properly set-up, according to the application. Incorrect configuration can cause defective operation, which can lead to unit damage or an accident.
- If in the case of a unit malfunction there is a risk of a serious threat to the safety of people or property additional, independent systems and solutions to prevent such a threat must be used.
- The unit uses dangerous voltage that can cause a lethal accident. The unit must be switched off and disconnected from the power supply prior to starting installation of troubleshooting (in the case of malfunction).
- Neighbouring and connected equipment must meet the appropriate standards and regulations concerning safety and be equipped with adequate overvoltage and interference filters.
- Do not attempt to disassemble, repair or modify the unit yourself. The unit has no user serviceable parts. Defective units must be disconnected and submitted for repairs at an authorized service centre.

- In order to minimize fire or electric shock hazard, the unit must be protected against atmospheric precipitation and excessive humidity.
- Do not use the unit in areas threatened with excessive shocks, vibrations, dust, humidity, corrosive gasses and oils.
- Do not use the unit in areas where there is risk of explosions.
- Do not use the unit in areas with significant temperature variations, exposure to condensation or ice.
- Do not use the unit in areas exposed to direct sunlight.
- Make sure that the ambient temperature (e.g. inside the control box) does not exceed the recommended values. In such cases forced cooling of the unit must be considered (e.g. by using a ventilator).

The unit is designed for operation in an industrial environment and must not be used in a household environment or similar.

2. GENERAL CHARACTERISTICS

The **ITC 450/470** meter is equipped with one current input (0-20mA), two voltage inputs (0-10V and 0-150 mV), one RTD input (Pt 100/500/1000) and one TC input (thermocouple: K, S, J, T, N, R, B, E). Temperature of cold ends is compensated automatically. RTD and TC inputs are fully linearised. It is allowed to use only one input at the same time. Input ranges are described in the next chapter. Result is showed on 4-digit LED display.
The device can be equipped with two or four relay (or OC type) outputs. Optionally **ITC 450/470** with two relays (or OC type) outputs can be equipped with active current output, passive isolated current output or active voltage output. Device **ITC 450/470** is equipped with RS-485 / Modbus RTU communication interface and sensor supply output. The meter can be ordered in two power supply versions.

ITC 450/470 can be used for controlling and regulation of processes need proportional and threshold control like: temperature processes (heating or cooling), valves controlling or other.

3. TECHNICAL DATA

Power supply voltage (depending on version)	85...230...260V AC/DC; 50 ÷ 60 Hz (separated) or 19...24...50V DC and 16...24...35V AC (separated)
External fuse (required)	T - type, max. 2 A
Power consumption	max. 6.5 VA @ 85 ÷ 260V AC/DC max. 6.5 VA @ 16V ÷ 35V AC max. 6.5 W @ 19V ÷ 50V DC
Current input (20 mA)	0÷20 mA, 4÷20 mA overload protected, input current is limited to 50 mA (typically)
Current measurement accuracy	± 0.1% @ 25°C; ± one digit (for 0÷20 mA range)
Current input resistance	< 65 Ù (typical 30 Ù)
Accepted prolonged input overload	20%
Voltage input (10V range)	0÷5 V, 1÷5 V, 0÷10 V, 2÷10 V
Voltage measurement accuracy	± 0.1% @ 25°C; ± one digit (for 0÷10 V range)
Voltage input resistance	> 100 kW (while maintaining correct polarization)
Accepted prolonged input overload	20%
Voltage input (150mV range)	0÷60 mV, 0÷75 mV, 0÷100 mV, 0÷150 mV
Voltage measurement accuracy	± 0.1% @ 25°C; ± one digit (for 0÷150 mV range)
Voltage input resistance	> 1,5 MÙ
Accepted prolonged input overload	20%

RTD input (resistive)	Pt 100, Pt 500,Pt 1000
Measurement range	-100°C ÷ +600°C
Measurement accuracy	± 0,1% @ 25°C; ± one digit
Measurement wires resistance	max. 20Ω (every wire)
Thermocouple input	K, S, J, T, N, R, B, E
Thermocouple input range	K: -200°C ÷ +1370¢ªC S: -50°C ÷ +1768¢ªC J: -210°C ÷ +1200¢ªC T: -200°C ÷ +400¢ªC N: -200°C ÷ +1300¢ªC R: -50°C ÷ +1768¢ªC B: +250°C ÷ +1820¢ªC E: -200°C ÷ +1000¢ªC
Measurement accuracy	K, J, E : ± 0.1% @ 25°C; ± one digit N : ± 0.2% @ 25°C; ± one digit S, T, R, B : ± 0.5% @ 25°C; ± one digit
Accuracy of cold ends temperature compensation	± 1°C
Sensor power supply output	24V +5%, -10% / max. 100 mA, stabilized
Relay output	0, 2 or 4 NO, 5A/250V AC (cos Ø = 1)
OC-type output	0, 2 or 4; 30mA / 30VDC / 100mW
Active current output (optional, for two relays or two OC-type output version only)	range max. 0 ÷ 24 mA
Load resistance max.	700Ω
Passive isolated current output (optional, for two relays or two OC-type output version only)	range max. 2.8 ÷ 24 mA
Supply voltage	Us = 9.5 ÷ 36V
Load resistance max.	(Us – 9.5V) / 24mA [kΩ]
Active voltage output (optional, for two relays or two OC-type output version only)	range max. 0 ÷ 11V
Load resistance min.	2000Ω

Temperature stability	50 ppm / °C
Temperature stability	-999 ÷ 9999, plus decimal point
Communication interface	RS-485, 8N1 and 8N2, Modbus RTU, not separated
Baud rate	1200 bit/s ÷ 115200 bit/s
ITC 450 Display (depending on version)	LED, 4 digit, 20mm height, red or LED, 4 digit, 20mm height, green
ITC 470 Display (depending on version)	LED, 6 digit, 13mm height, red or LED, 6 digit, 13mm height, green
Data memory	non-volatile memory, EEPROM type
Front panel protection	IP 65 optional version with panel cut-out sealing available
Terminals protection	IP 20
Housing type	panel
Housing material	NORYL - GFN2S E1
Housing dimensions	96 x 48 x 100 mm
Mounting hole	90.5 x 43 mm
Assembly depth	102 mm
Panel thickness	max. 5 mm
Operating temperature (depending on version)	-40°C to +60°C
Storage temperature (depending on version)	-40°C to +70°C
Humidity	5 to 90% no condensation
Altitude	up to 2000 meters above sea level
Screws tightening max. torque	0,5 Nm
Max. connection leads cross section	2,5 mm^2

Safety requirements	according to: PN-EN 61010-1 installation category: II pollution degree: 2 voltage in relation to ground: 300V AC insulation resistance: >20MΩ insulation strength between power supply and input/output terminal: 1min. @ 2300V insulation strength between relays terminal: 1min. @ 1350V
EMC	according to: PN-EN 61326-1

This is a class A unit. In a residential or a similar area it can cause radio frequency interference. In such cases the user can be requested to use appropriate preventive measures.

4. DEVICE INSTALLATION

The unit has been designed and manufactured in a way assuring a high level of user safety and resistance to interference occurring in a typical industrial environment. In order to take full advantage of these characteristics installation of the unit must be conducted correctly and according to the local regulations.

- Read the basic safety requirements on page 3 prior to starting the installation.
- Ensure that the power supply network voltage corresponds to the nominal voltage stated on the unit's identification label.
- The load must correspond to the requirements listed in the technical data.
- All installation works must be conducted with a disconnected power supply.
- Protecting the power supply connections against unauthorized persons must be taken into consideration.

4.1. UNPACKING

After removing the unit from the protective packaging, check for transportation damage. Any transportation damage must be immediately reported to the carrier. Also, write down the unit serial number located on the housing and report the damage to the manufacturer.

Attached with the unit please find:

- User's manual,
- Warranty,
- Assembly brackets - 2 pieces.

ASSEMBLY

- The unit is designed for mounting inside housings (control panel, switchboard) insuring appropriate protection against surges and interference. Metal housings must be connected to ground in a way that complies with the governing regulations.
- Disconnect the power supply prior to starting assembly.
- Check the connections are wired correctly prior to switching the unit on.

In order to install the unit, a 90.5 x 43 mm mounting hole (Figure 4.1, 4.2) must be prepared. The thickness of the material of which the panel is made must not exceed 5mm. When preparing the mounting hole take the grooves for catches located on both sides of the housing into consideration (Figure 4.1, 4.2). Place the unit in the mounting hole inserting it from the front side of the panel, and then fix it using the brackets (Figure 4.3). The minimum distances between the centre points of multiple
units - due to the thermal and mechanical conditions of operation - are 115 mm x 67mm (Figure 4.4).

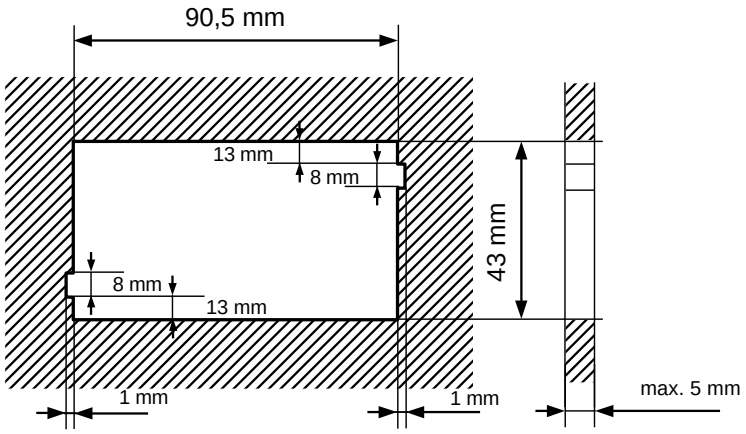


Figure 4.1. Recommended mounting hole dimensions

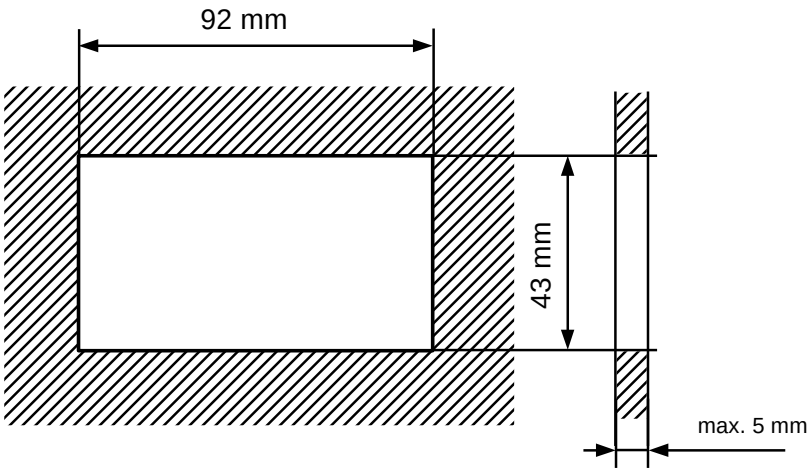


Figure 4.2. Allowable mounting hole dimensions

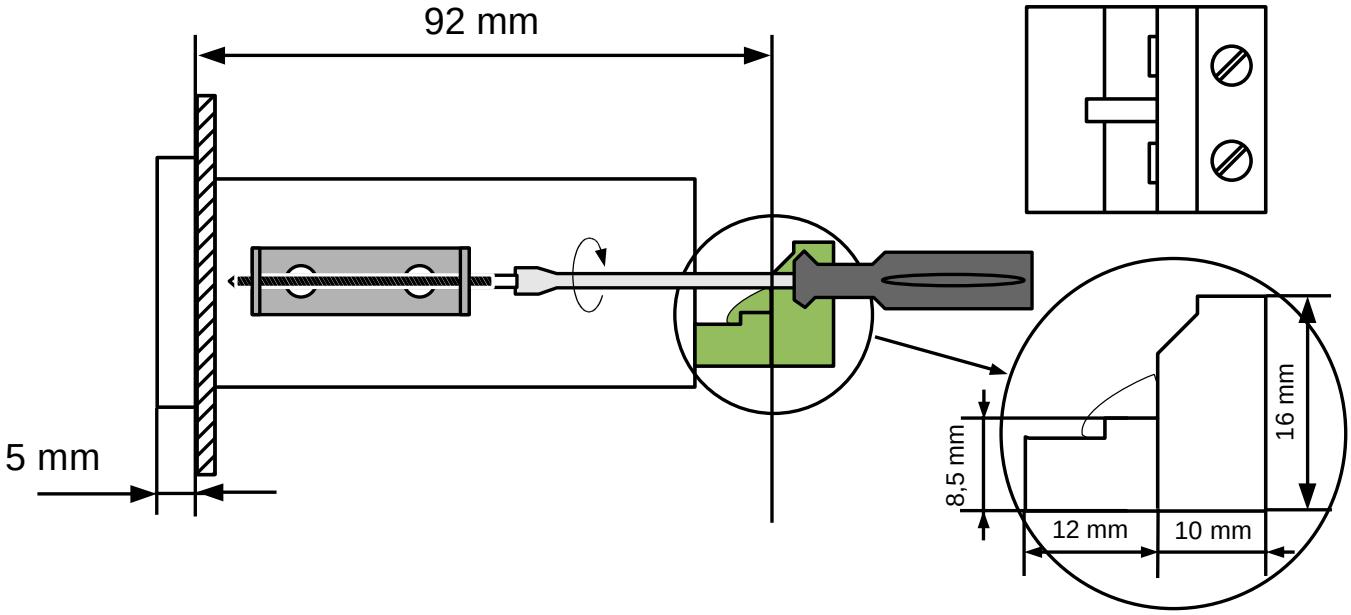


Figure 4.3. Installing of brackets, and dimensions of connectors

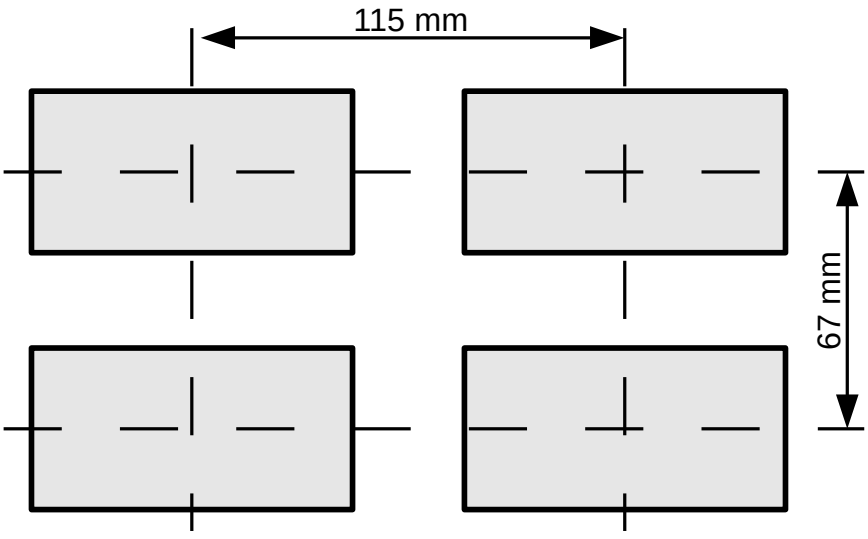


Figure 4.4. Minimum distances when assembly of a number of units

4.3. CONNECTION METHOD

- Installation should be conducted by qualified personnel . During installation all available safety requirements should be considered. The fitter is responsible for executing the installation according to this manual, local safety and EMC regulations.
- The unit is not equipped with an internal fuse or power supply circuit breaker. Because of this an external time-delay cut-out fuse with a small nominal current value must be used (recommended bipolar, max. 2A) and a power supply circuitbreaker located near the unit. In the case of using a monopolar fuse it must be mounted on the phase cable (L).
- The power supply network cable diameter must be selected in such a way that in the case of a short circuit of the cable from the side of the unit the cable shall be protected against destruction with an electrical installation fuse.
- Wiring must meet appropriate standards and local regulations and laws.
- In order to secure against accidental short circuit the connection cables must be terminated with appropriate insulated cable tips.

- Tighten the clamping screws. The recommended tightening torque is 0.5 Nm. Loose screws can cause fire or defective operation. Over tightening can lead to damaging the connections inside the units and breaking the thread.
- In the case of the unit being fitted with separable clamps they should be inserted into appropriate connectors in the unit, even if they are not used for any connections.
- Unused terminals (marked as n.c.) must not be used for connecting any connecting cables (e.g. as bridges), because this can cause damage to the equipment or electric shock.
- If the unit is equipped with housing, covers and sealing to, protecting against water intrusion, pay special attention to their correct tightening or clamping. In the case of any doubt consider using additional preventive measures (covers, roofing, seals, etc.). Carelessly executed assembly can increase the risk of electric shock.
- After the installation is completed do not touch the unit's connections when it is switched on, because it carries the risk of electrical shock.

Due to possible significant interference in industrial installations appropriate measures assuring correct operation of the unit must be applied. To avoid the unit of improper indications keep recommendations listed below.

- Avoid running signal cables and transmission cables together with power supply cables and cables controlling inductive loads (e.g. contactors). Such cables should cross at a right angle.
- Contactor coils and inductive loads should be equipped with interference protection systems, e.g. RC-type.
- Use of screened signal cables is recommended. Signal cable screens should be connected to the earthing only at one of the ends of the screened cable.
- In the case of magnetically induced interference the use of twisted pair of signal cables is recommended. Twisted pair (best if shielded) must be used with RS-485 serial transmission connections.
- In the case of measurement or control signals are longer than 30m or go outside of the building then additional safety circuits are required.
- In the case of interference from the power supply side the use of appropriate interference filters is recommended. Bear in mind that the connection between the filter and the unit should be as short as possible and the metal housing of the filter must be connected to the earth with the largest possible surface. The cables connected to the filter output must not be run with cables with interference (e.g. circuits controlling relays or contactors).

Connections of power supply voltage and measurement signals are executed using the screw connections on the back of the unit's housing.

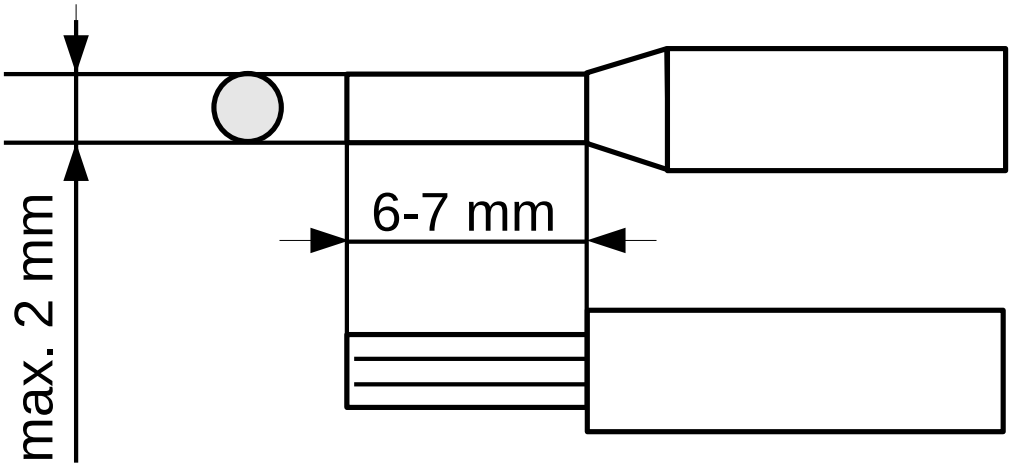


Figure 4.5. Method of cable insulation replacing and cable terminals

All connections must be made while power supply is disconnected !

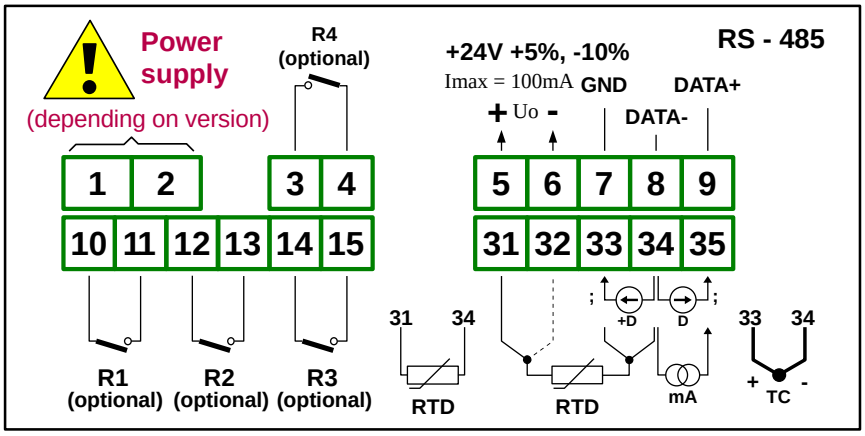


Figure 4.6. Terminals description (relay outputs)

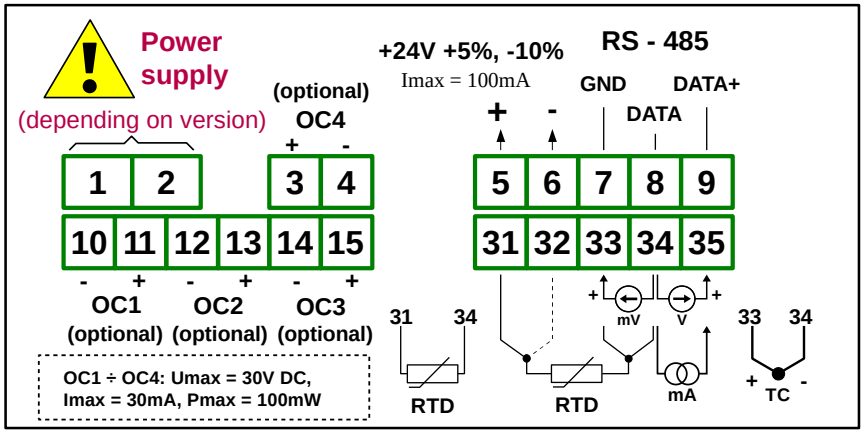


Figure 4.7. Terminals description (OC-type outputs)

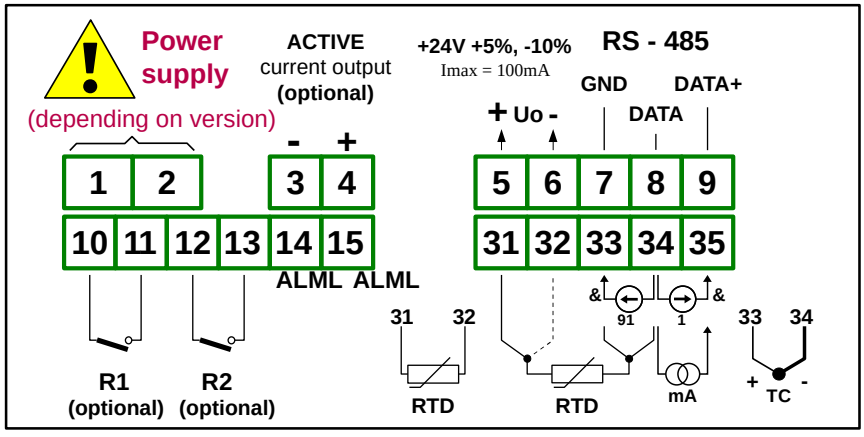


Figure 4.8. Terminals description (relay and active current outputs)

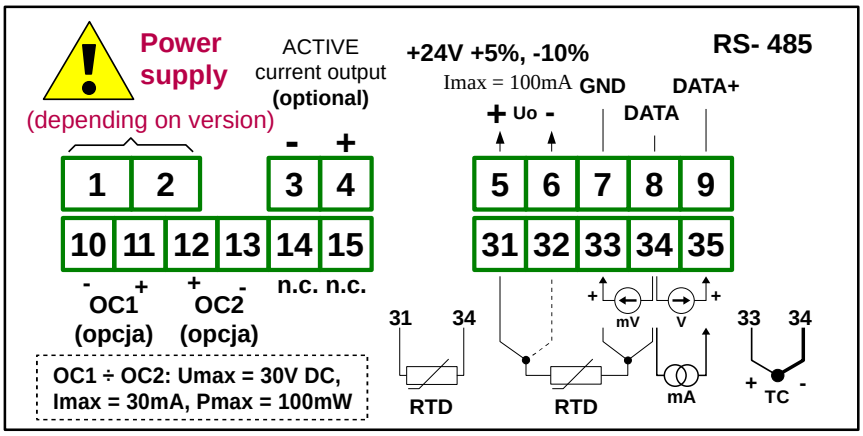


Figure 4.9. Terminals description (OC-type and active current outputs)

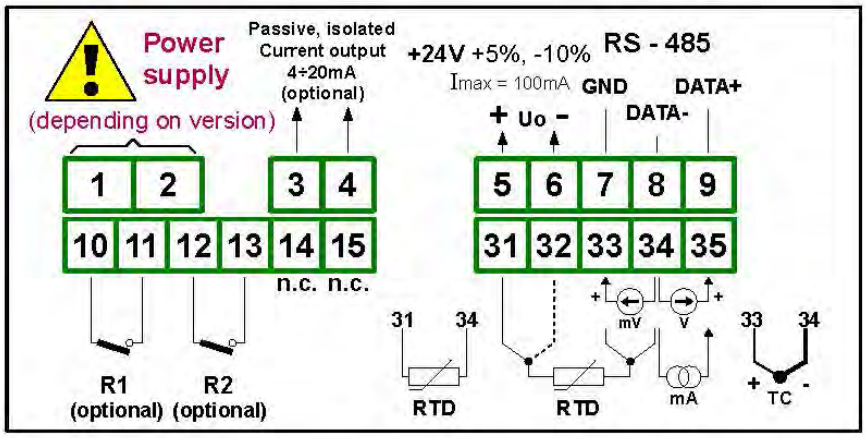


Figure 4.10. Terminals description (relay and passive current outputs)

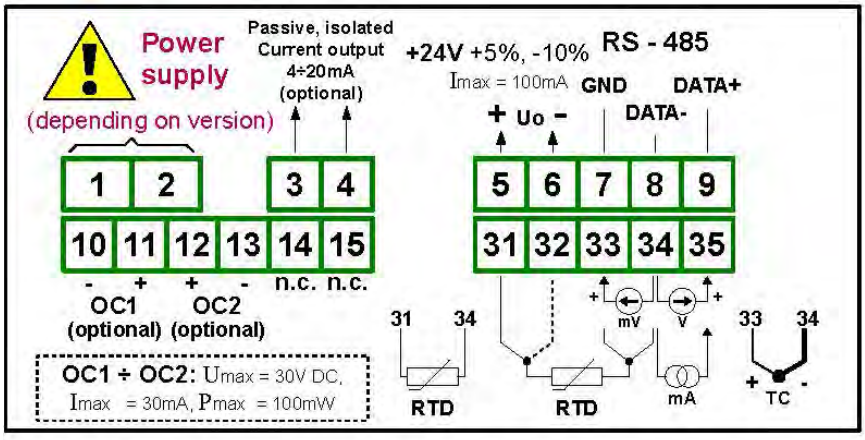


Figure 4.11. Terminals description (OC-type and passive current outputs

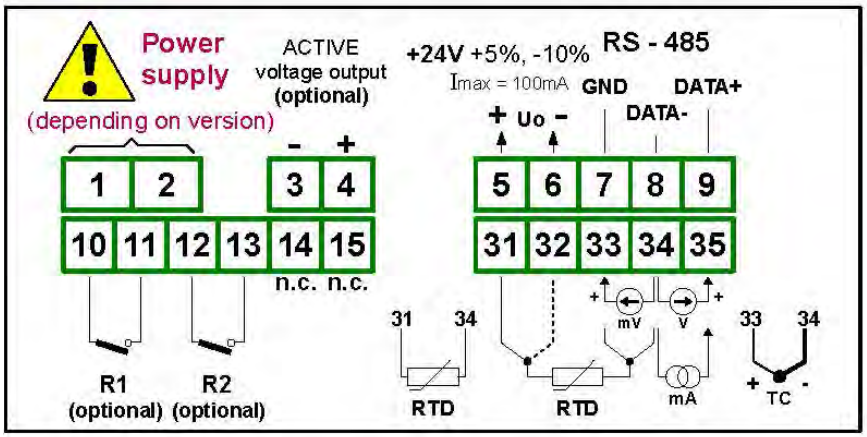


Figure 4.12. Terminals description (relay and active voltage outputs)

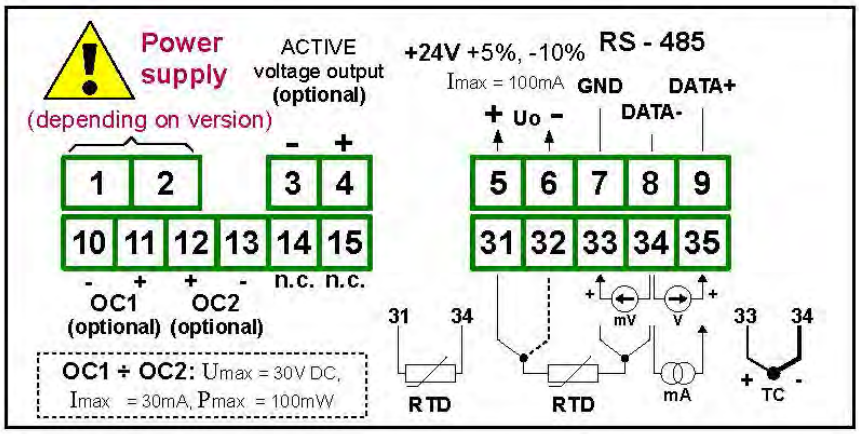


Figure 4.13. Terminals description (OC-type and active voltage outputs)

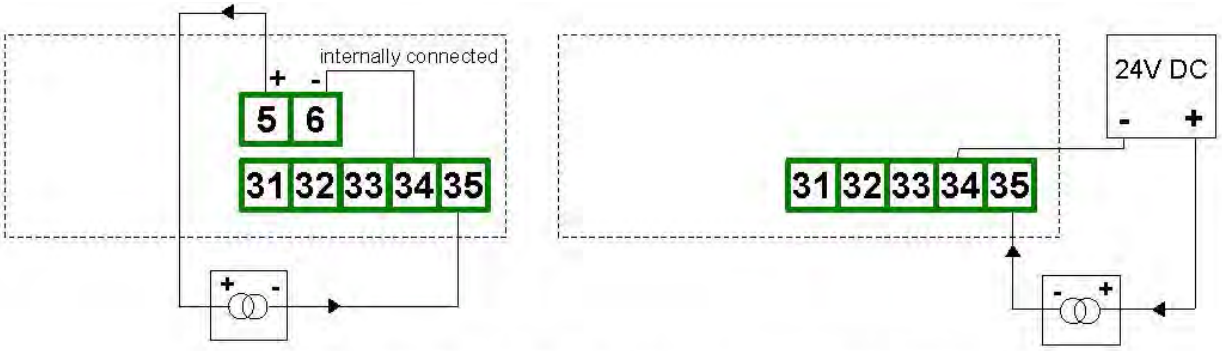


Figure 4.14. Connection of 2-wire current converters

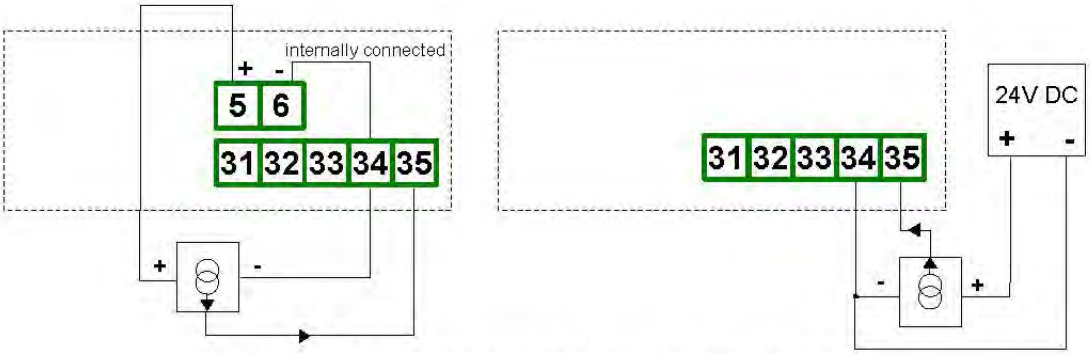


Figure 4.15. Connection of 3-wire current converters

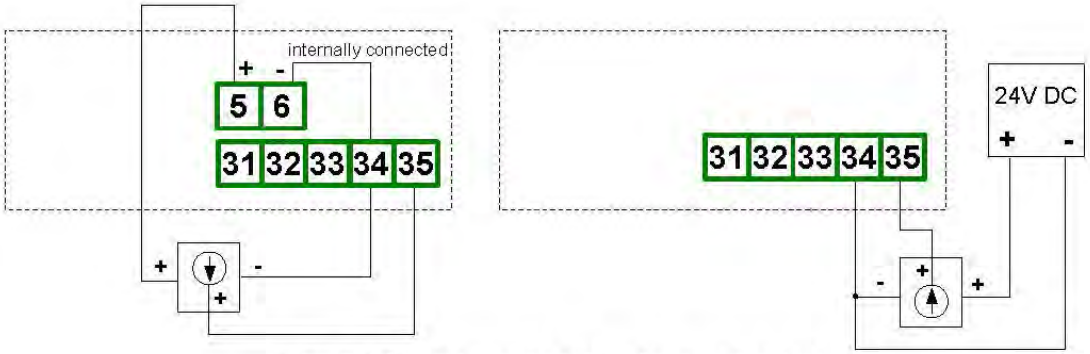


Figure 4.16. Connection of voltage converters

Temperature sensor can be connected to the device in typical 4-wire circuit (Figure 4.17a) or 3-wire circuit (Figure 4.17b). Due to precision of measurement 4-wire circuit is recommended.

If 2 wire circuit is used, the resistance of wires should be as small as possible, to avoid of measurement errors. Measured value can be corrected (constant correction) using „toFS" parameter from menu „inPt". Due to low precision 2-wire connection is not recommended.

When 4-wires or 2-wires connection is used, the resistance of particular wires (Ra ÷ Rd) CAN BE DIFFERENT. When 3-wires connection is used, the resistance of particular wires (Ra ÷ Rd) MUST BE IDENTICAL to enable proper compensation of it's resistance. The resistance of particular wire should not be greater than 20Ω.

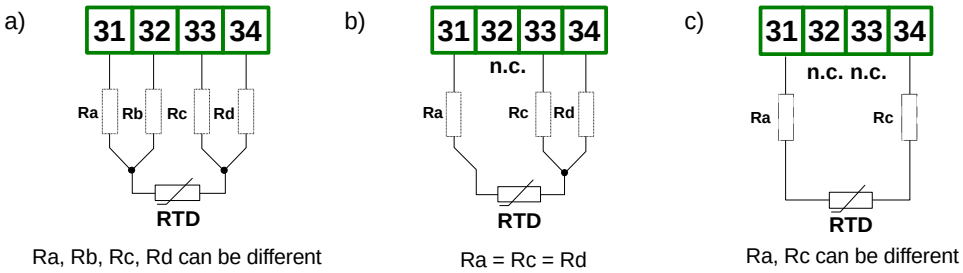


Figure 4.17. Connection of RTD sensors:
a) 4-wires circuit; b) 3-wires circuit; c) 2-wires circuit

The connection circuit should not be changed while unit is powered. While using TC, RTD or voltage inputs (0-150mV) the device is able to detect wire breaks. Wire breaks are detected within about 2 seconds. For connectors number 32 and 33 of RTD input it may take up to about 7 seconds. During detection measurements will be incorrect. If wire break is detected "S.Err" (sensor error) message is displayed.

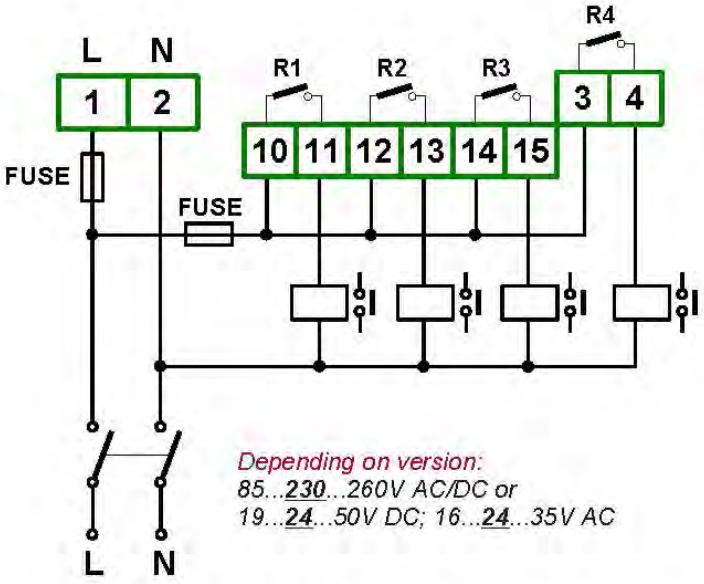


Figure 4.18. Connection of power supply and relays

Contacts of relay outputs are not equipped with spark suppressors. While use the relay outputs for switching of inductive loads (coils, contactors, power relays, electromagnets, motors etc.) it is required to use additional suppression circuit (typically capacitor 47nF/ min. 250VAC in series with 100R/5W resistor), connected in parallel to relay terminals or (better) directly on the load. In consequence of using the suppression circuit, the level of generated electromagnetic disturbances is lower, and the life of relay contacts rises.

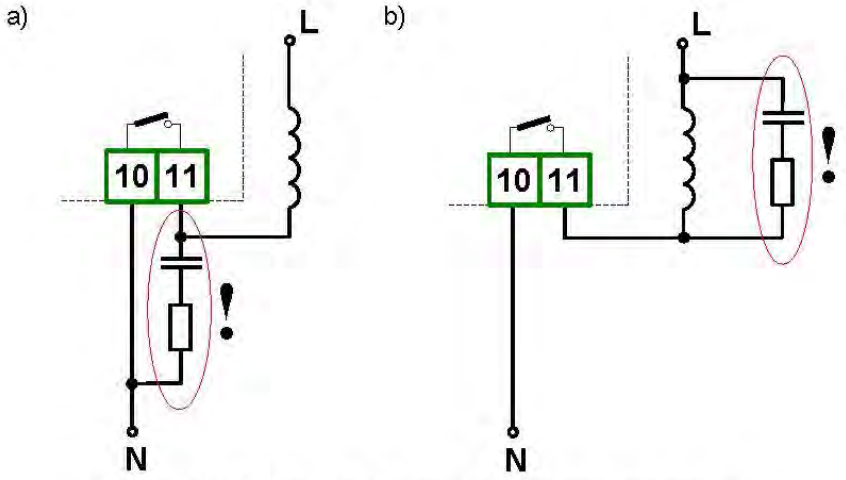


Figure 4.19. Examples of suppression circuit connection:
a) to relay terminals; b) to the inductive load

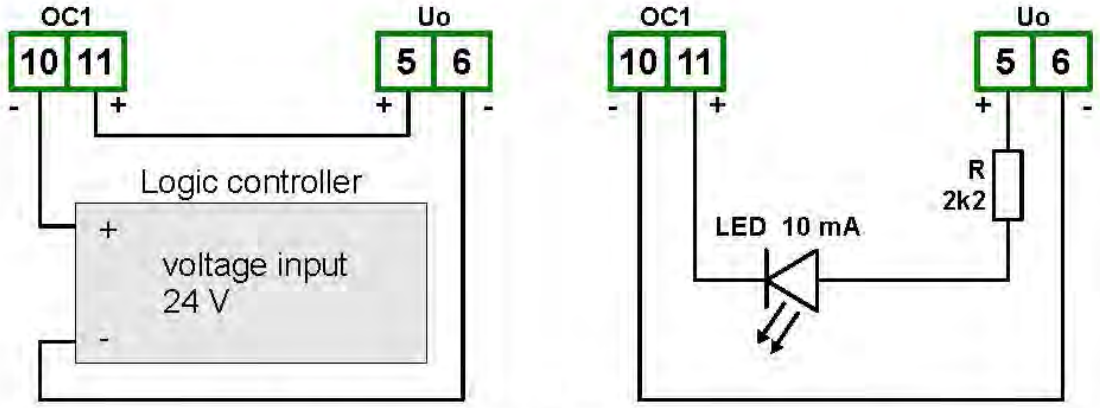


Figure 4.20. Example of OC-type outputs connection

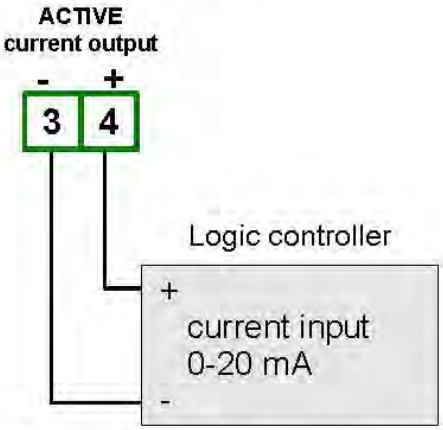


Figure 4.21. Example of active current outputs connection
(for device with active current output only)

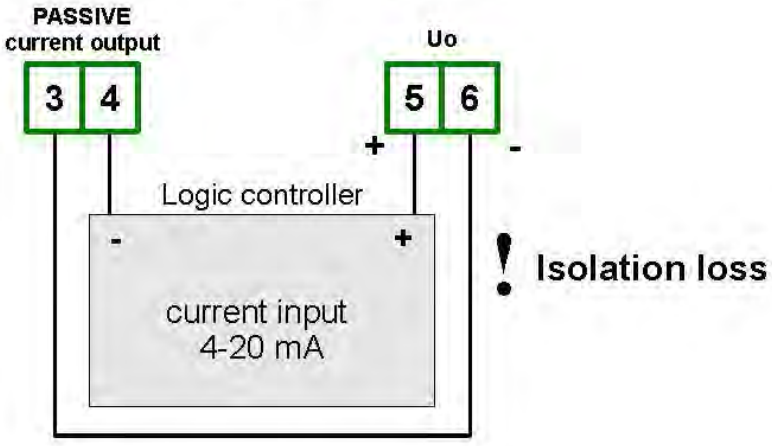


Figure 4.22. Example of passive current outputs connection
(for device with passive current output only)

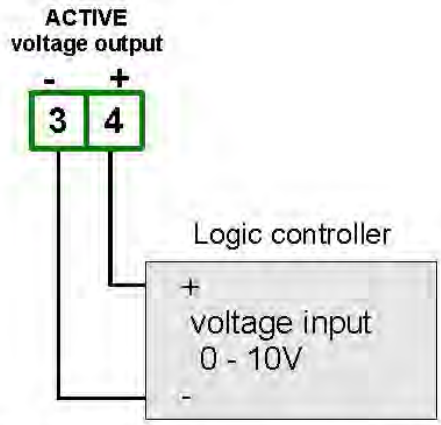


Figure 4.23. Example of active voltage outputs connection (for device with active voltage output only)

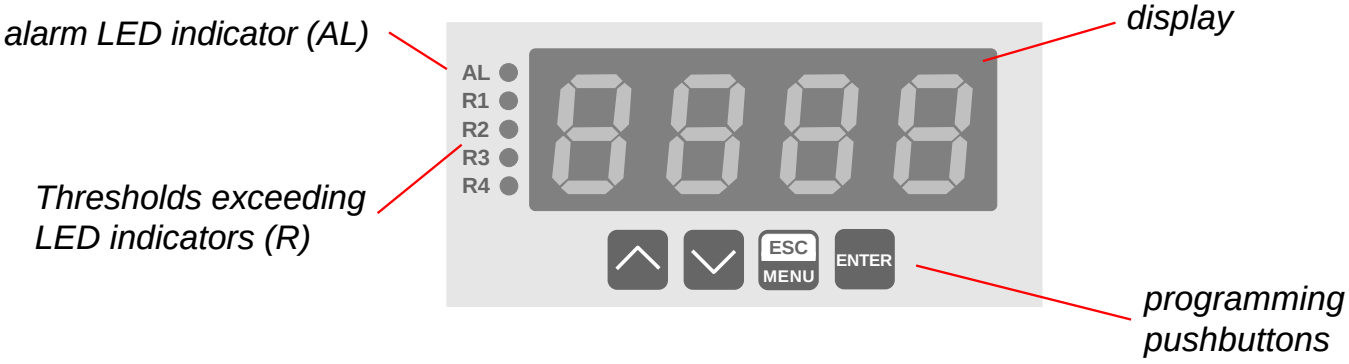
4.4. MAINTENANCE

The unit does not have any internal replaceable or adjustable components available to the user. Pay attention to the ambient temperature in the room where the unit is operating. Excessively high temperatures cause faster ageing of the internal components and shorten the fault-free time of the unit's operation.
In cases where the unit gets dirty do not clean with solvents. For cleaning use warm water with small amount of detergent or in the case of more significant contamination ethyl or isopropyl alcohol.

Using any other agents can cause permanent damage to the housing.

Product marked with this symbol should not be placed in municipal waste. Please check local regulations for disposal and electronic products.

5. FRONT PANEL DESCRIPTION



ITC 450/470 Series Quick Start Manual (Step by Step)

PROGAMMING RELAYS

- Press **ESC/MENU** Button for **3 Seconds** (Enter Security Code if Required)
- Press **DOWN** Arrow (**Relay 1** Appears on Display)
- Press **ENTER** Button (**SETP** Appears on Display
- Press **ENTER** Button (Relay Set-Point Number Appears on Display)
- Press **UP** Or **DOWN** Arrow To Increase Or Decrease Number To Desired Setpoint
- (When Desired Number Appears Press & Hold **ENTER** (2 Sec)
- Press **DOWN** Arrow To Select Relay Parameters (ON-OFF, HYSTERISIS, Mode, Time, Unit, Alarm)
- Press **Enter** & Hold
- (**SETP** Appears on Display) Repeat Steps to Set-UP # 2-3-4 Relay if Required

PROGRAMING 4-20mA INPUT

- Press **ESC/MENU** Button for 3 Seconds (Enter Security Code if Required)
- Press **DOWN** Arrow (**inPT** Appears on Display)
- Press **ENTER** Button (**tyPE** Appears on Display)
- Press **DOWN** Arrow (4X) (**Lo C** Appears on Display)
- Press **ENTER** Button –(4Ma) (ALL ZERO's (**0000**)-This is Standard = 4mA Set-Point)
- Press **ESC/MENU** Button
- Press **DOWN** Arrow (**Hi C** Will Appear on Display)
- Press **ENTER** Button—(20Ma) ---> This Will be the MAX Valve. (Numbers will Appear-Change Using Up/Down Arrows to Set Desired 20mA Set-Point)
- Press **ENTER**—**(Hold 3 Sec)** SET? Appears Press ENTER Again
- Press **ESC/MENU** to Return to Main Menu

Remember 4mA = 0, 20mA = MAX Level