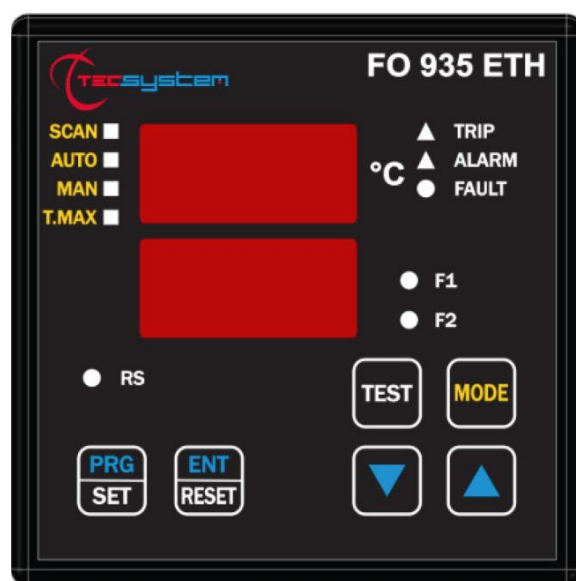


INSTRUCTION MANUAL

FO 935 ETH



1MN0257 REV.0



operates with ISO9001 certified quality system

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R. 1.3 04/06/26

ENGLISH

"Translations of the original instructions"

INTRODUCTION

First of all we wish to thank you for choosing to use a **TECSYSTEM** product and recommend you read this instruction manual carefully: You will understand the use of the equipment and therefore be able to take advantage of all its functions.

ATTENTION! THIS MANUAL IS ONLY VALID FOR THE VERSION FO 935 ETH.

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SAFETY REGULATIONS



ATTENTION:

Read the manual carefully before starting to use the control unit. Keep the instructions for future reference.



Do not open the device. Touching any internal components can cause electric shock. Contact with a voltage over 50 Volts can be fatal. To reduce the risk of electric shock, do not dismantle the back of the device for any reason. Moreover its opening would void the warranty.

Before connecting the device to the power supply, make sure that all the connections are correct. Always disconnect the unit from the supply before any cabling modification.



Any work on the equipment must be entrusted to a qualified engineer.

Failure to comply with these instructions can cause damage, fires or electric shock, and possible serious injuries!

POWER SUPPLY

The FO 935 ETH control unit can be supplied by 85 to 260 Vac-Vdc, irrespective of the polarity in Vdc. Before using it, make sure the power cable is not damaged, knotted or pinched. Do not tamper with the power cable. Never disconnect the unit by pulling the cable and avoid touching the pins. Do not carry out any operations of connecting/disconnecting with wet hands. To disconnect the device, do not use objects such as levers. Immediately disconnect the device if you smell burning or see any smoke: contact assistance.

LIQUIDS

Do not expose the equipment to splashes or drops, do not position it in places with humidity exceeding 90% and never touch with wet or damp hands. If any liquid penetrates the control unit, disconnect it immediately and contact technical assistance.

CLEANING

Disconnect the power cable before cleaning the control unit, use a dry cloth to dust it, without any solvent or detergents, and compressed air.

OBJECTS

Never insert any objects into the cracks of the control unit. If this happens, disconnect the control unit and contact an engineer.

USE RESERVED TO QUALIFIED PERSONNEL

The purchased goods are a sophisticated electronic device that is completely unsuitable to be used by non-qualified personnel. Any work must be carried out by a specialist engineer.

ACCESSORIES

The use of non-original accessories or spare parts can damage the unit and endanger users' safety. In the event of faults, contact technical service.

LOCATION

Install the control unit indoors, in a place protected from water splashes and from the sun's rays. Do not place near heat sources exceeding the parameters stated in this manual. Position on a stable surface, far away from any possible vibrations. Position the unit as far away as possible from any intense magnetic fields.

REPAIRS

Do not open the control unit. For any fault, always use qualified personnel. The opening of the control unit and/or the removal of the series identifying label entails the automatic forfeiture of the warranty. The Warranty seal is applied to all devices, any attempt to open the unit would break the seal and cause the consequent automatic forfeiture of the warranty.

TECHNICAL OR REPORTING INFORMATION

Mail: support@tecsystem.it — tel:02/4581861

ACCESSORIES

The FO system boxes contain are the following objects:

FO 935 ETH control unit

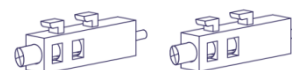
FO 935 ETH control unit



Start guide and QR code



2 blocks for panel fixing
Screw tightening torque 0.29Nm



1 Terminal 3 pitch poles 5 supply
Screw tightening torque 0.5Nm



1 terminal 12 pitch poles 5 relays
Screw tightening torque 0.5Nm

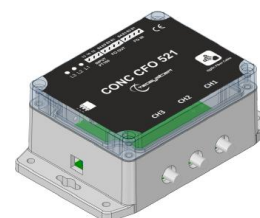


1 Terminal 4 pitch poles 3.81 connection CFO 521
Screws tightening torque 0.25Nm



CFO 521 Concentrator

CFO 521 Concentrator



Start guide and QR code



2 Terminals 4 pitch poles 3.81 connection FO 935 e CFO 521
Screws tightening torque 0.25Nm



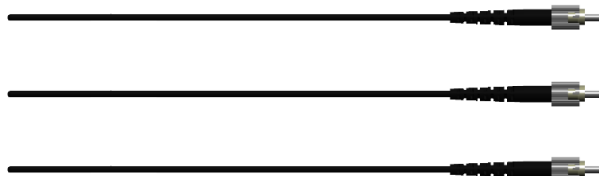
1 Terminal 3 poles pitch 3.81 Pt100 CH4
Screws tightening torque 0.25Nm



**ATTENTION: always install the device using the terminals included in the pack.
The use of terminals other than those included with the control unit could cause malfunctions.**

FO SENSORS

3 temperature sensors in optical fibre 2.5mt / 5mt



Start guide and QR code



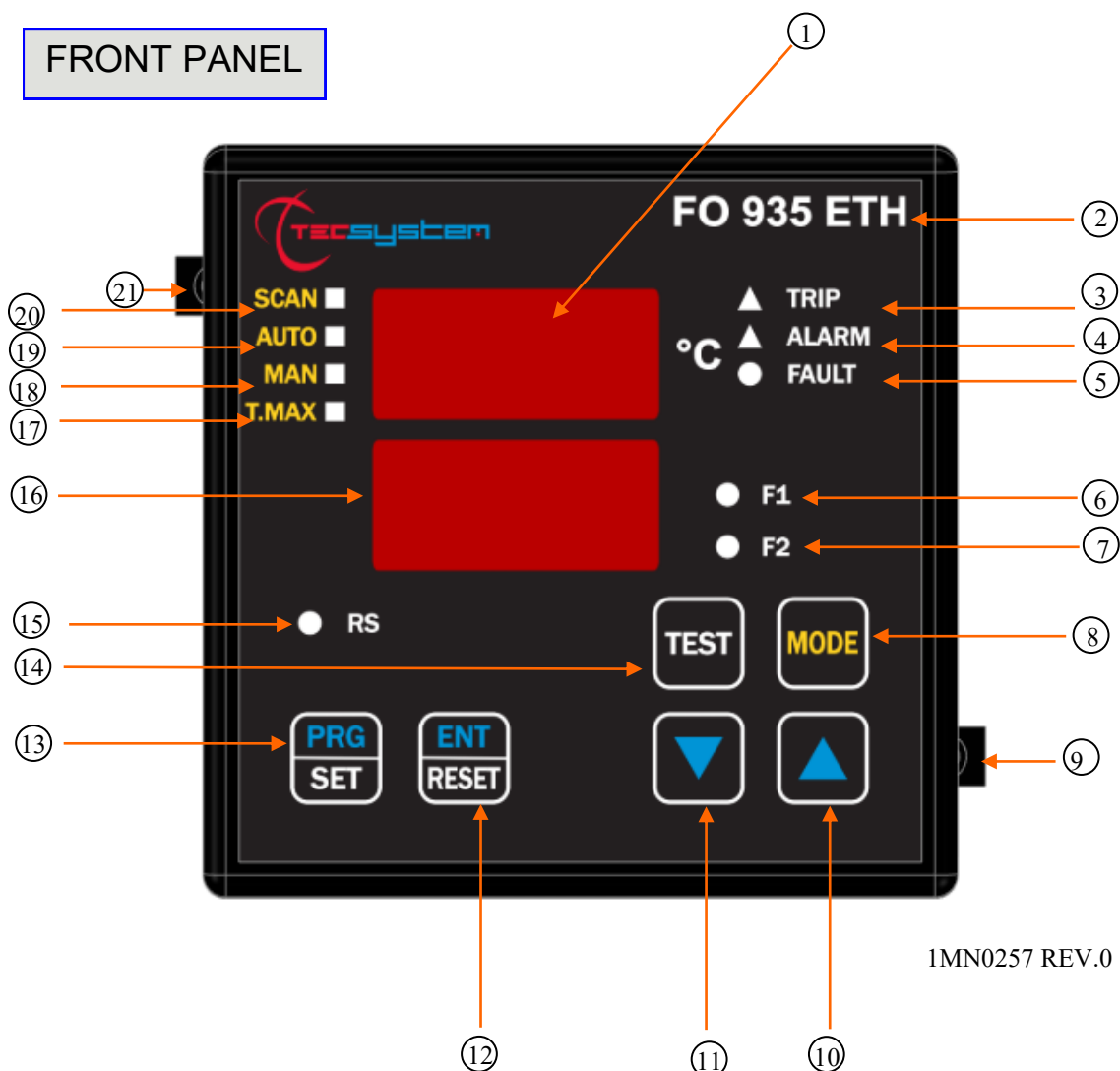
TECHNICAL SPECIFICATIONS	FO 935 ETH
POWER SUPPLY	
Supply rated values	85-260 Vac-Vcc 50/60HZ
Vdc with invertible polarities	•
INPUTS	
1 digital input (FO IN) CONC connection.CFO 521	•
Connections on removable terminal boards	•
OUTPUTS	
2 alarm relays (ALARM AND TRIP) SPDT	•
1 relay for faulty probes or operating anomaly (FAULT) SPST	•
2 ventilation management relays SPST FAN 1 and FAN 2	•
Output relays with 10A-250Vca-res COSΦ=1 contacts	•
Ethernet output 10Base T / 100Base-TX Modbus TCP slave	•
DIMENSIONS	
100x100 mm– din43700-depth 131mm (including terminal block)	Hole 92 x 92 mm

TECHNICAL SPECIFICATIONS	
	FO 935 ETH
TESTS AND PERFORMANCE	•
Construction in compliance with the EC regulations	•
Protection from electrical interferences EN 61000-4-4	•
Dielectric strength 1500 VAC for 1 min. between output relay and FO IN input, relay and power supply, and FO IN input and power supply	•
Reading range:-35°C to +195°C	•
Interface precision1% vfs, ±1 digit	•
Ambient operating temperature from –20°C to +60°C	•
Permitted humidity 90% without condensate	•
Polycarbonate frontal film IP65	•
Housing UL94V0	•
Absorption 12VA	•
Self-diagnostic circuit	•
Electronic part protective treatment	Optional
DISPLAY AND DATA MANAGEMENT	
2 x 13 mm displays with 3 digits to display temperatures, messages and channels	•
3 LEDs to display the state of the alarms of the selected channel (ALARM-TRIP-FAULT)	•
4 LEDS selection of display mode (SCAN-AUTO-MAN-T.MAX)	•
2 LEDs to display the state of FAN1 and FAN2	•
Temperature control from 1°C to 190°C (alarms)	•
2 alarm thresholds for channels 1-2-3	•
2 alarm channels for channel 4	•
2 ON-OFF thresholds FAN 1 and FAN 2 ventilation	•
FO sensor diagnostics (FCC-FOC-FLT)	•
Data memory diagnostics (Ech)	•
Communication diagnostics FO 935 to CFO 521 (TEC)	•
Access to programming through front keyboard	•
Automatic exit from programming, display and relay test after 1 minute of inactivity	•
Incorrect programming warning	•
Selection between channels automatic scanning, hottest channel or manual scanning (SCAN-AUTO-MAN)	•
Storage of maximum temperatures reached by channels and alarm status (TMAX)	•
Front key to reset the alarms	•

TECHNICAL SPECIFICATIONS	CONC.CFO 521
INPUTS	
1 FO 935 digital BUS input	FO IN
3 fibre optic FO sensor inputs (ST connectors)	CH1-CH2-CH3
1 2/3-wires Pt100 probe input	CH4
OUTPUTS	
1 digital BUS output	FO OUT
TESTS AND PERFORMANCE	
3 signalling LEDs L1-L2-L3	•
Work environment temperature	From -25°C to +60°C
Permitted humidity 90% without condensate	•
Degree of protection IP00	•
PC UL 94 HB container	•
Electronic part protective treatment	Optional
DIMENSIONS	
145x106.7x55mm	•
CONC concentrator fixing bracket CFO 521	Included

TECHNICAL SPECIFICATIONS	TEMPERATURE SENSOR FO (FIBRE OPTIC)
TESTS AND PERFORMANCE	
Reading range	-35°C to +195°C
Interface precision	±1.0°C
Permitted humidity 90% without condensate	•
External protection	FEP
Working voltage	38 KV
AC withstand test	80 kVrms for 60 sec.
Lightning impulse withstand tests in air	150 kVpeak.
DIMENSIONS	
Length	2.5mt / 5mt
Tip probe diameter	2.3mm
Fibre connector model	ST

FRONT PANEL



1MN0257 REV.0

1)	3-digit temperature display	12)	Enter/Reset button
2)	Control unit series	13)	Programming/Setting key
3)	TRIP signalling (red) LED	14)	Led/relay test key
4)	ALARM signalling (yellow) LED	15)	Modbus communication RS (green) LED
5)	FAULT signalling (red) LED	16)	3-digit channel display
6)	FAN 1 (yellow) LED	17)	T-max mode selection (red) LED
7)	FAN 2 (yellow) LED	18)	Man mode selection (yellow) LED
8)	Display mode selection key	19)	Auto mode selection (green) LED
9)	Fixing blocks	20)	Scan mode selection (yellow) LED
10)	UP key	21)	Fixing blocks
11)	DOWN key		

DISPLAY

The first display is dedicated to temperatures.

The second display to the monitored channel.

When the device is switched on or after a reset, the model of the control unit, the type of sensors, VER "00" (firmware version) and the temperature range of the device and the identification abbreviation are always shown on the display.

Pressing the MODE key, the display modes can be set:

- **SCAN**: the control unit shows in scanning (every 2 seconds) all the enabled (°C) and disabled (NO) channels.
- **AUTO**: the control unit displays the hottest channel automatically.
- **MAN**: manual reading of the channel temperature using the up/down keys ▲▼
- **T.MAX**: the display shows the maximum temperature of the channel selected with the cursor keys. In the event of a fault, the Tmax value is replaced with the type of fault stored (fcc-foc). Turning on the Trip Alarm-Fault LED warns of any events that have occurred. The recordings are always successive to the moment in which the T.Max is reset (by pressing RESET).

OPERATING PROGRAM CONTROL

To control the protection levels programmed, press the PRG key twice to access the **VIS** programme. Repeatedly pressing the PRG key, you can scroll through all the previously loaded values in sequence. After 1 minute's keyboard inactivity, the programming display procedure is automatically abandoned.

To stop the display, press the ENT key.

NOTES ON SCAN AND MAN FUNCTIONS

During the SCAN and MAN modes, the operation of the FO 935 can be displayed.

1) RUN CPU:

This message appears upon ignition of the device.

2) Ech Err:

This message appears when damage in the EEPROM memory is detected.

Pressing Reset will cancel the message and restore the original default parameters, listed in the programming paragraph on pages 19-20. Return the control unit to TECSYSTEM for repairs.

3) **TEC err**: this message appears when a loss of communication is detected between the thermometric control unit and the CFO 521 concentrator. The temperatures shown on the display all appear at 0°C.

4) **FO Err** : this message appears when it is detected that one or more FO sensors are not working correctly **FCC, FOC and FLT**, signals, see sensor diagnostics on page 17.

In case of **Err** the FAULT relay will be de-energised.

The above messages will be displayed following the 1-2-3-4 priority stated.

LED TEST

We suggest carrying out the control unit LED test regularly.

For this operation, press the TEST key briefly; all the displays turn on for 2 seconds.

If one of the LEDS does not work, please return the control unit to TECSYSTEM for repair.

ALARM RELAY TEST

This function allows you to carry out a test of the relays operation without having to use further devices. To start the test procedure, press and hold the TEST button for approximately 5 seconds: the TST indication appears for 2 seconds confirming entry into the Relays Test mode.

The lit LED indicates the relays to be tested, use the cursors ▲▼ to select the desired relay.

Press the SET and RESET keys to energise and de-energise the relay to be tested; the display will show ON-OFF.

After 1 minute's keyboard inactivity, the RELAY TEST procedure will be automatically abandoned.

To stop the RELAY TEST procedure, press the TEST key.

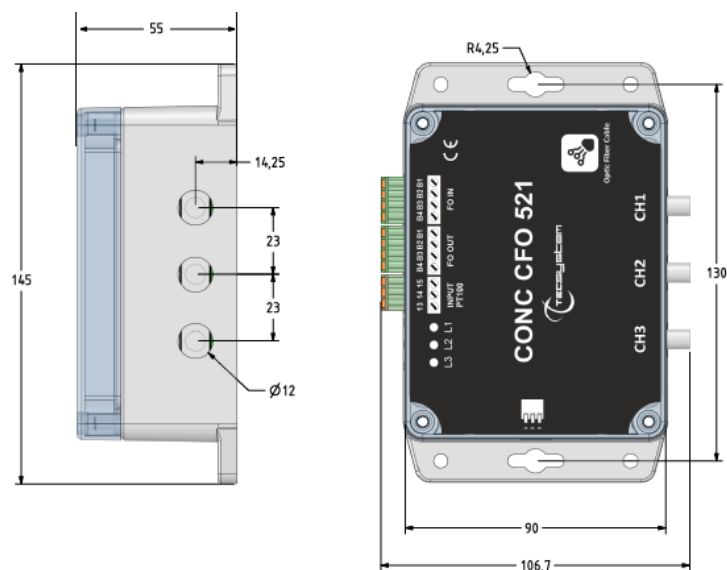
ATTENTION: Entering the relay test mode will temporarily disable the fail-safe function, relays with enabled function switch (ALARM-TRIP-FAULT).

ALARM RELAY SILENCING

To silence the ALARM signal, press the RESET key: the relay will de-energise and the ALARM LED, which is on steady, will start to flash. Silencing is automatically disabled when the temperature goes below the ALARM threshold.

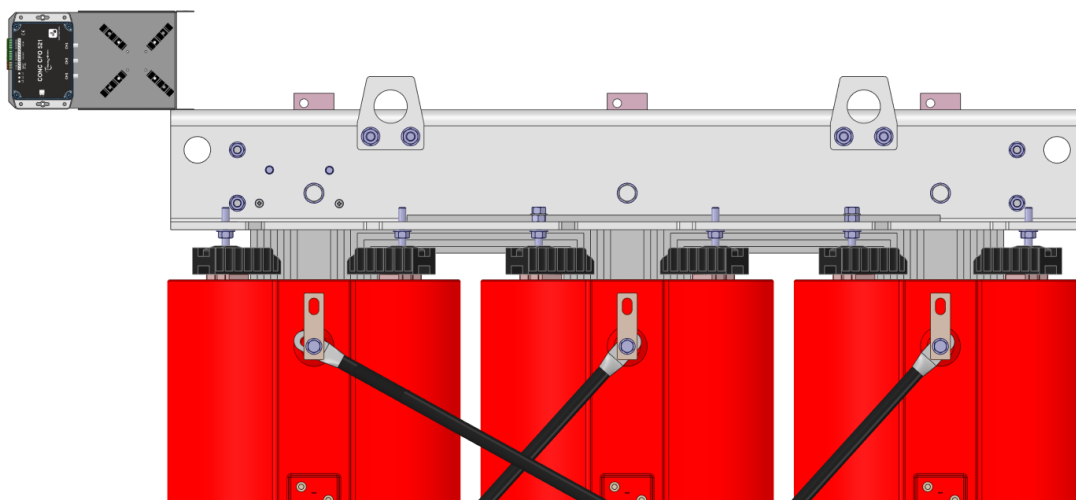
CONC.CFO 521 / FO SENSORS

DIMENSIONS / INSTALLATION CONC. CFO 521



1MN0226 REV.0

The CFO 521 concentrator must be mounted on one side of the transformer, as shown in the image below:



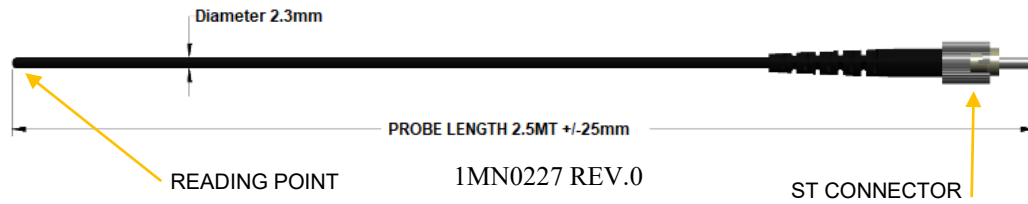
1MN0228 REV.0

During installation, the following indications must always be observed:

Do not place the concentrator near the hot air flow from the windings or from the core. The operating temperature of the concentrator ranges from -25°C to 60°C, therefore ensure there is adequate space between the concentrator and the transformer. Maximum humidity 90% (non-condensing).

The CFO 521 support bracket could facilitate this operation. Always respect the safety distance, suggested by the transformer manufacturer, from the transformer windings. Fix the bracket, on one of the sides of the transformer, using the 8mm hole with an M8 pin with nut and washer.

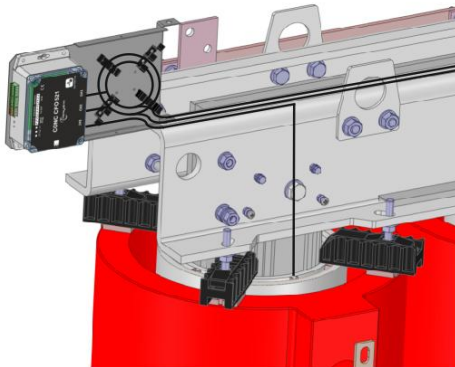
FO (OPTICAL FIBRE) TEMPERATURE SENSOR DIMENSIONS/INSTALLATION



1MN0227 REV.0

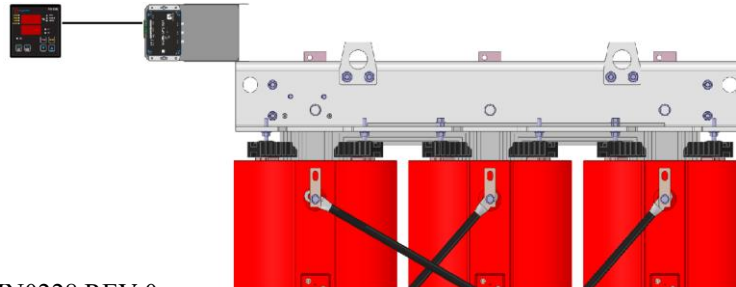
The FO sensors must be inserted inside the secondary winding of the transformer always respecting the following indications:

- each U-V-W sensor must be inserted inside the secondary winding of the transformer, the sensor connected to CH2 must be positioned in the central column;
- insertion of the probe must not find any restrictions or occlusions of any kind;
- avoid twisting, straining or jerking. The fibre sensors could be damaged;
- the connection of the sensors to the CFO 521 concentrator must be laid linearly, with a maximum radius of curvature of 8mm, not less than 90°;
- the connection of the sensors to the CFO 521 concentrator must be made with the original ST connector supplied with the sensor;
- any excess of the probes must be wound with a minimum diameter of 50mm, using the winder located on the mounting bracket;
- once the probes have been installed, apply the protection bracket using the M4 screws supplied.



1MN0228 REV.0

CONNECTION OF THE CONC.CFO 521 / TO THE FO 935 CONTROL UNIT



1MN0228 REV.0

Connect the FO IN input of the CFO521 concentrator to the FO IN input of the FO 935 control unit, respecting the numbering **B1-B2-B3-B4**.

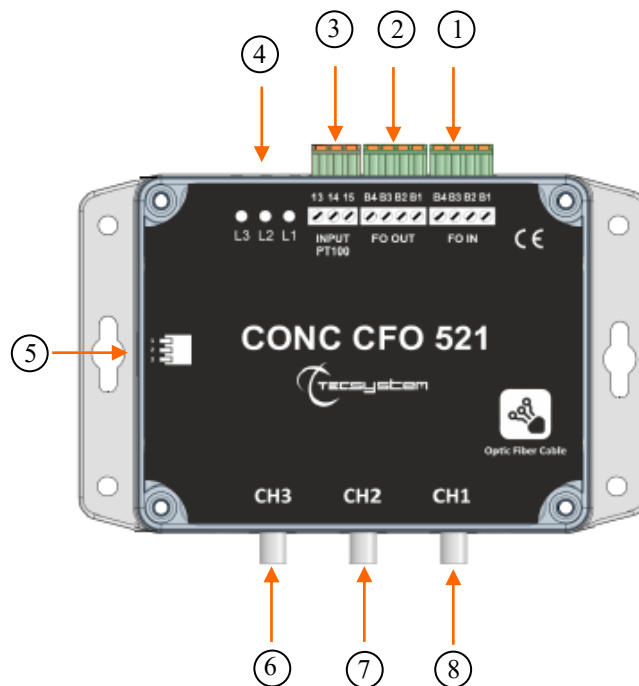
The FO OUT output is not used (provision for future development).

The CFO 521 concentrator is powered by the FO 935 control unit, through the FO IN B1-B2-B3-B4 connection bus, therefore it does not require an external power supply.

For correct connection of the CFO 521 concentrator to the thermometric control unit, the following rules must be strictly observed:

Note: All the signal transportation cables must strictly:

- be separated from those of power
- be created with shielded cable with twisted conductors
- have a section of at least 0.25 mm²
- the shield must be earthed on one side only
- be firmly fixed in the terminal blocks
- have tin-plated or silver-plated conductors



1MN0226 REV.0

1)	FO IN Input	5)	Dip-switches (not used)
2)	FO OUT output not used (provision for future developments)	6)	CH3 fibre optic input
3)	CH4 2/3-wires Pt100 input	7)	CH2 fibre optic input
4)	L1-L2-L3 LED	8)	CH1 fibre optic input

CFO 521 CONCENTRATOR OPERATION

The CFO 521 device electronically acquires and converts the temperatures detected by the FO sensors CH1-CH2-CH3 and CH4 (Pt100) and sends the detected data to the FO 935 monitoring unit via the TEC digital communication bus.

The FO (optical fibre) temperature sensors must be connected to the CH1-CH2-CH3 inputs arranged in the three phases of the UVW transformer. For a correct interpretation of the measured values it is advisable to combine the CH2 probe with the central phase V.

The CFO 521 concentrator has a Pt100 input, RTD class A 3-wire probe, for the possible connection of a probe on the core of the transformer or application of an ambient probe (CH4).

The connection of the Pt100 probe must be 13- White - 14 Red - 15 Red.

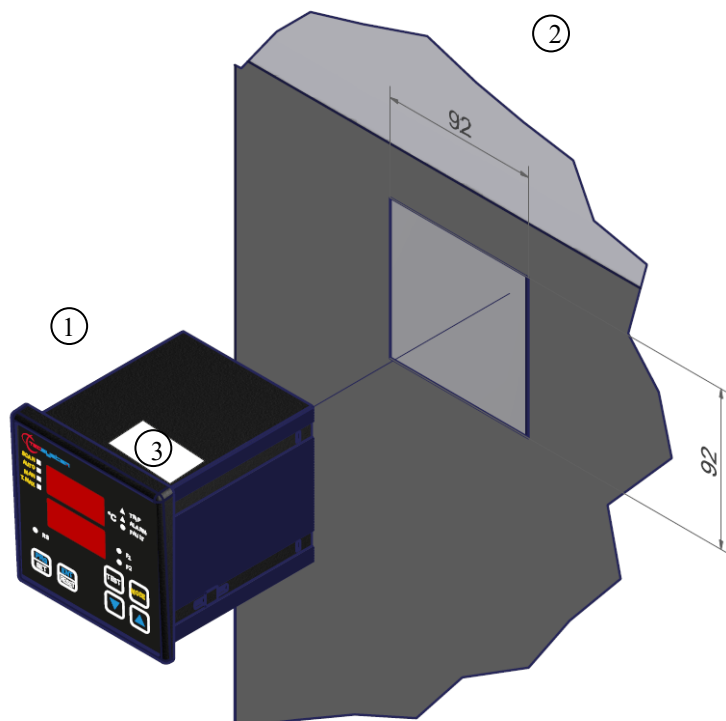
The dip-switches setting is always 000 (do not modify)

The LEDs indicate the operating status of the concentrator and of the connected optical fibres.

- Off LEDs signal the absence of power supply on the CFO 521 device.
- Single or multiple LED flashing: L1-L2-L3, single flash every 2 seconds, indicates correct functioning of the CH1-CH2-CH3 channel.
- Single or multiple flashing LED: L1-L2-L3, double flashing every 2 seconds, indicates the incorrect operation of the reference channel of the channel CH1-CH2-CH3.

FO 935 ASSEMBLY

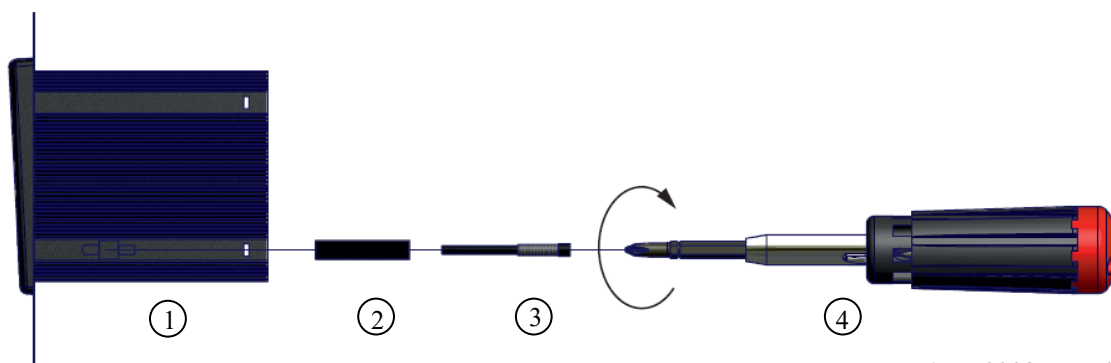
Drill a hole in the panel sheet with dimensions of 92 x 92 mm.



1MN0007 REV.0

1)	Control unit	2)	Panel hole dimensions (+0.8 mm tolerance)
3)	Identification label		

Secure the appliance firmly by means of the supplied fixing blocks.

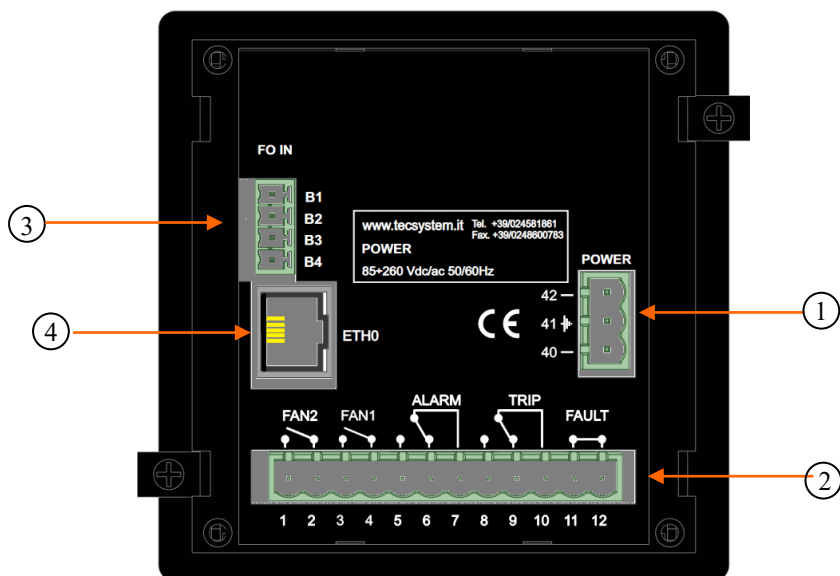


1MN0008 REV.0

1)	Control unit	3)	Fixing screws
2)	Fixing blocks	4)	Cross-head screwdriver #1X100mm

ELECTRICAL CONNECTIONS

FO 935 ETH

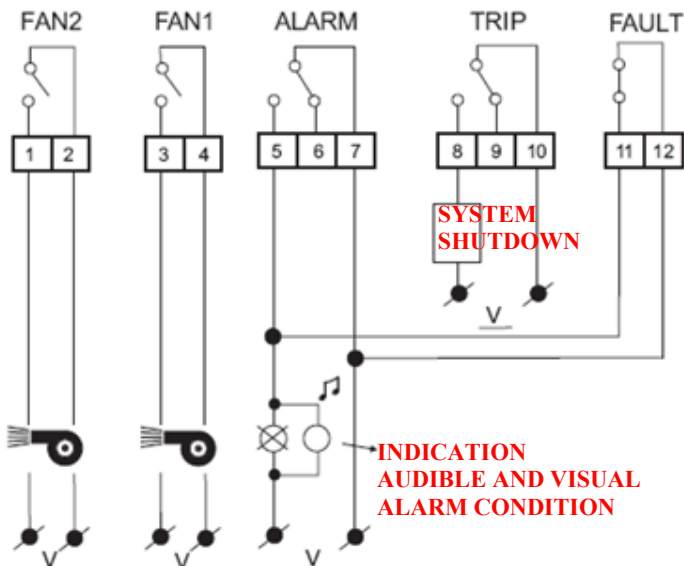


1MN0257 REV.0

1)	Power supply 85-260Vac-dc 50/60Hz	3)	FO IN bus input for connection to the CFO 521
2)	Relay (ALARM-TRIP-FAULT-FAN1-FAN2)	4)	RJ45 Ethernet output, Link-Activity led, see indication on page 33.

Note: image relay contacts in non-alarm condition, except for the FAULT relay which switches: contacts 10-11 closed (NO) contacts 9-11 open (NO) fault condition identification. Read paragraph Alarms and Ventilation p. 17 and see image of fault contact switching.

RELAY CONNECTION EXAMPLE



Output relays with 10A-250Vca-res COS Φ =1 contacts

1MN0095 REV.0



ATTENTION: Before carrying out any electrical test on the transformer or on the panel, e.g. dielectric strength etc., it is advisable to disconnect all the components of the FO system. Any noise or voltage peaks on the inputs or on the power supply could cause the failure of: sensors, concentrator or control unit.

POWER SUPPLY

The FO 935 ETH can be supplied by 85 to 260 Vac-Vdc, 50/60 Hz irrespectively of polarity in Vdc (terminals 40 - 42).

This particularity is obtained thanks to the use of a tested power supply, of new conception and realisation, which frees the installer from any uncertainty regarding the correct Vac or Vdc power supply.

The earthing cable must always be connected to terminal 41.

When the control unit is powered directly by the secondary of the transformer to be protected, it can be burnt out by high intensity overvoltages.

These problems occur if the main switch is closed and the transformer does not have the load (no load test).

The above is much more evident when the 220 Vac voltage is taken directly from the bars of the secondary of the transformer and there is a fixed capacitor battery for power factor correction of the transformer itself.

To protect the control unit against line overvoltages, the PT-73-220 electronic arrester, designed by TECSYSTEM S.r.l. for this specific purpose, is recommended. Alternatively, it is advisable to use 110 V AC supply voltages or, even better, 110 VDC.

ALARMS AND VENTILATION

Carry out the electrical connections on the removable terminal blocks only after disconnecting them from the unit.

When the control unit is in one of the modes indicated below it does not perform any thermal monitoring, moreover the relays will all be disabled. The fault contact switches and the fault LED flashes.

- Programming viewing display.
- PRG programming.
- Relay test.

The ALARM and TRIP relays only switch when the set temperature thresholds are exceeded.

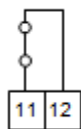
The FAULT (fault) contact, programmed in active failsafe mode (default YES), opens (11-12) when the appliance is powered, only if during the access phase the control unit does not detect anomalies, and keeps the switching until when one of the following events occurs:

- Data memory fault (Ech message).
- FO sensor fault (FCC-FOC-FLT)
- CFO 521 concentrator disconnected (TEC)
- Insufficient supply voltage.
- During the power on reset after programming (PRG), displaying of the data (VIS) and relay test.

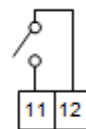
The FAULT failsafe mode can be disabled FAULT failsafe "NO" see programming step 30-31 page 20.

NOTE: in order to avoid unwanted system outages, do not connect the FAULT relay to the transformer tripping circuit.

FAULT CONTACT OPERATION (failsafe active)



FAULT 11-12 NC: ALARM FAULT OR POWER OFF



FAULT 11-12: NO POWER ON OR NO FAULT

The FAN1 and FAN2 contacts can be used to control the cooling fans, or they can be inserted in the conditioning system of the transformer room, see paragraph cooling fan control on page 18.

NOTE: always disconnect the unit before performing any electrical connections.

FAULT AND RESET MESSAGE SEQUENCE

Find below the sequence of fault messages and RESET function condition.

1) ECH	EEPROM fault	erasable message
2) TEC	concentrator communication bus fault	non-resettable condition
3) FO FCC	min. temperature full scale exceeded	non-resettable condition
4) FO FOC	max. temperature full scale exceeded	non-resettable condition
5) FO FLT	broken or disconnected fibre optic sensor	non-resettable condition

If an existing control unit must be replaced with a new one, to guarantee its correct and safe operation, the connecting terminals must be replaced with the new terminals supplied.

FO SENSOR DIAGNOSTICS

In case of breakage or exceeding of the minimum/maximum full scale value of one of the FO sensors installed on the machine to be protected, the FAULT relay is instantaneously switched, with the relative sensor failure indication on the corresponding channel

Display message **FCC**: exceeding of the minimum full scale value = measured temperature $\leq -35^{\circ}\text{C}$

Display message **FOC**: exceeding of the maximum full scale value = detected temperature $\geq 195^{\circ}\text{C}$

ATTENTION: the FLT indication appears on the display when the concentrator identifies a faulty or disconnected FO sensor.

To eliminate the message and to restore the Fault switching, check the connections of the FO sensors and replace the faulty sensor if necessary. In case the minimum/maximum full scale value has been reached, make sure that the environmental conditions correspond to what is indicated by the control unit.

Note: exceeding of the minimum/maximum full scale can also be caused by possible disturbances on the communication lines or by strong magnetic fields; in this case, the following is recommended:

Check the correct installation of the sensors and especially of the extension cable between the CFO 521 concentrators and the FO 935 control unit.

PROGRAMMED DATA DIAGNOSTICS

In case of failure of the internal memory or corruption of programmed data, just after switching on, **Ech** appears with the relevant Fault contact signal.

In this case, for safety reasons, the default parameters are loaded automatically (see programming table on pages 19-20).

Eliminate the **Ech** indication by pressing RESET and run programming to enter the desired values.

Finally switch the unit off and back on to check the memory works correctly, if it is damaged **Ech** will be displayed again (send the control unit to TECSYSTEM srl for repairs).

TEMPERATURE DIAGNOSTICS

When one of the sensors detects a temperature higher than 1°C with respect to the pre-set value as the alarm limit, after approximately 5 seconds the **ALARM** relay switches and the channel **ALARM** LED (CHn) switches on.

When the trip temperature limit is exceeded, after approximately 5 seconds the **TRIP** relay switches and the channel **TRIP** LED (CHn) switches on.

As soon as the recorded temperature returns to values equal to or lower than the limit set for the **ALARM** and **TRIP** relays switching, these relays de-energise and the corresponding LEDs switch off.

The values of **ALARM** and **TRIP** are kept in the internal memories: they can be recalled by entering the Vis modes (displaying programmed parameters) and modifiable in the PRG mode (programming).

COOLING FAN CONTROL

The FO 935 control unit is fitted with two FAN contacts (FAN1 and FAN2) and, if programmed correctly, can control the fans switching ON and OFF to cool the transformer.

The FAN1 and FAN2 contacts can manage cooling the transformer and the room where it is installed.

By connecting FAN1 to the tangential ventilation system (the two bars located on the transformer) and FAN2 to the extractor will improve the air flow in the cabin; furthermore, the cabin temperature will no longer need to be managed by a thermostat that is external to the system.

The fans can be controlled in two different ways:

- Using the temperatures sensed by the sensors on the three columns
CHF 1.2.3 (e.g. ON at 70°C - OFF at 60°C)
- Through an additional sensor (**CH4/YES**) dedicated to the ambient temperature inside the transformer room.

CHF 4 (e.g. ON at 40°C - OFF at 30°C)

The ON and OFF values are programmable according to the device range. The FAN ON must always be at least 1°C higher than FAN OFF (recommended ΔT FAN ON_OFF $+10^{\circ}\text{C}$).

The FAN 1/ 2 LED lights up when the temperature exceeds 1°C the FAN ON threshold, the corresponding relay switches, and turns off when the temperature goes below 1°C the FAN OFF threshold, the corresponding relay switches.

FAN TEST

It is possible, by programming (**HF_n**), to make sure that the fans are operated for 5 minutes every xxx" hours, regardless of the temperature values of the columns or the environment (e.g.: with HF_n = 001 the fans are activated for 5 minutes every hour).

This function is designed to periodically check the operation of the fans and of their control equipment.

Setting **NO**, this function is inhibited.

To enable the HF_n function, read the programming section on pages 19-20.

FAIL-SAFE FUNCTION

The FO 935 control unit has the selection n.o (normally open contact) / n.c (normally closed contact) for the ALARM, TRIP and FAULT relays, programming steps from 26 to 31 page 20. Selecting the YES/NO setting introduces the Fail Safe and No Fail Safe functions.

ALARM AND TRIP

By setting NO (NO Fail safe) the normally open contacts are in positions 5-7 Alarm and 8-10 Trip, they switch only when the pre-set temperature limits are reached.

By setting YES (Fail safe), the normally closed contacts are in positions 5-7 Alarm and 8-10 Trip, they switch only when the pre-set temperature limits are reached or as a result of no voltage on the device.

FAULT

By setting YES (Fail safe), contact 11-12 is positioned as normally open, switches (closed) when a fault condition is identified; see paragraph on alarms and ventilation on page 17.

Setting NO (NO Fail safe) the contact 11-12 is positioned as normally closed, switches (open) when a fault condition is identified; see paragraph on alarms and ventilation on page 17.

If the fail safe function is disabled on the fault contact, the control unit will no longer be able to signal the fault due to power failure. In this case it is advisable to enable the Fail safe on the ALARM contact for the afore-mentioned indication.

NOTE: NOTE: when the control unit is in one of the modes indicated below, it does not perform any thermal monitoring, moreover the relays will all be disabled the FAULT LED will flash.

- Vis. display programming.
- PRG programming.
- Test of the relays.

The FAIL SAFE function is temporarily disabled and the FAULT relay switches.

ATTENTION: Entering the relay test mode will temporarily disable the fail-safe function, relays with enabled function switch (ALARM-TRIP-FAULT).

PROGRAMMING

FO 935 ETH

STEP	PRESS	EFFECT	PRESS	NOTES
1		Press and hold the PRG button until the display shows SET PRG		
2		Select PRG SET to proceed with programming or PRG 1 to load the default values	 	PRG 1 default data
3		The ALARM threshold for (CH 1-2-3) is displayed. Set the desired threshold, the Alarm LED flashes	 	Default 90°C
4		The TRIP threshold for (CH 1-2-3) appears and the Trip LED flashes.		
5		Set the desired threshold	 	Default 119°C
6		CH 1-2-3 is displayed The Fan1 LED flashes		Default YES
7		Select YES/NO	 	
8		The display shows (CH4) Enabling CH4		
9		Select YES or NO	 	with YES the CH4 is enabled with NO the CH4 is disabled
10		The ALARM threshold for (CH4) appears and the Alarm LED flashes.		If CH4=NO jump to step 16, Default NO
11		Set the desired threshold	 	Default 120°C
12		The TRIP threshold for (CH4) is displayed. The TRIP led flashes		
13		Set the desired threshold	 	Default 140°C
14		The display shows FAN 2 for (CH4)		Default Yes
15		Select YES/NO	 	
16		The display shows ON (CH 1-2-3), the FAN1 LED flashes		Default 70°C
17		Set the desired threshold FAN1 ON	 	If FAN1 NO is selected skip to step 21
18		The display shows OFF (CH 1-2-3), the FAN1 LED flashes		Default 60°C
19		Set the desired threshold FAN1 OFF	 	

20		The display shows ON (CH4), the FAN 2 LED flashes		Default 45°C
21		Set the desired threshold FAN2 ON	 	If FAN2 NO is selected skip to step 24
22		The display shows OFF (CH4) the FAN2 LED flashes		Default 35°C
23		Set the desired threshold FAN2 OFF	 	
24		HFN (NO) is displayed The FAN1-FAN2 LEDs flash		Fan cyclic test for 5 min. every "n" hours
25		Set the desired number of hours	 	Default NO = function disabled
26		FLS (ALARM) is displayed Blinking ALARM LED (FAIL SAFE info on page 21)		
27		Select YES or NO	 	Default NO
28		FLS (TRIP) is displayed Blinking TRIP LED		
29		Select YES or NO	 	Default NO
30		FLS (FAULT) is displayed Blinking FAULT LED		
31		Select YES or NO	 	Default YES
32		END is displayed		End of programming
33		Press ENT to save the set data and exit programming		incorrect programming of the LED values indicated (note 6)
34		Return to step 1		See programming notes p. 21



ATTENTION:

We recommend you check the device's programming before starting the device.

The default parameters set by TECSYSTEM might not match your requirements.

Programming the device is the end user's responsibility. The settings of the alarm thresholds and enabling of the functions described in this manual must be checked (by a specialist engineer) according to the application and features of the system the control unit is installed on.

PROGRAMMING NOTES

- 1) The MODE key allows reversing the programming steps according to the sequence 28-8-3.
- 2) The TEST key allows exiting programming without saving the modified data.
- 3) After 1 minute's keyboard inactivity programming is abandoned without saving the data.
- 4) During programming the control unit does not control/protect the monitored machine.
- 5) At the end of programming the control unit is restarted and the FAULT relay is disabled until the unit is fully restarted.
- 6) If pressing ENT, "Err" appears, it means that one of the following mistakes has been made:

ERR ALL. = ALARM $\geq$ TRIP

ERR FAN = FAN-OFF $\geq$ FAN-ON.(FAN1 OR FAN2)

The device automatically prepares itself for the programming step of the error committed

NOTE: EVERY TIME THE CONTROL UNIT PROGRAMMING, WITH CONFIRMATION OF DATA SAVING, THE VALUES STORED IN T-MAX ARE RESET AT THE TIME OF STORING.

OUTPUT ETHERNET MODBUS TCP

INTRODUCTION TO THE ETHERNET MODULE

The Ethernet connectivity of the new FO 935 ETH is used to implement the functions of the Tecsystem control units directly into your Modbus TCP maximum 8 node monitoring system.
The integrated module includes all the essential network features, among which a 10Base T/100Base-TX Ethernet connection, TCP/IP full stack suitable to work as Modbus TCP slave.
The unit can be used for remote configuration, monitoring in real time or problem solving.
The Windows-based Telnet system allows configuring the FO 935 ETH easily into a sub-network with specific IP addresses.

OPERATING NOTES

The communication of the temperature control monitoring unit is active only when the FO 935 ETH is in temperature control mode (Scan, Auto, Man and T.Max).
When other functions such as programming, programming display and relay test are activated, the ModBus communication is temporarily deactivated.

DATA TRANSMISSION

The Ethernet module allows you to connect to the control unit via Modbus TCP slave allowing you to: read the data indicated in the modbus table p. 20 and to be able to write those indicated in the paragraph notes for remote programming.
The ETH module is always in slave mode.
The FO 935 ETH control unit is in communication with the network only when it is in temperature reading mode, while it is inactive when in the following modes: display, programming and test relays.

NOTES ON ETHERNET ELECTRICAL CONNECTIONS

As to the signal cable to use in order to guarantee correct operation, it is necessary to use a CAT 7 Ethernet cable with RJ45 connector with the following specifications:

- 4 twisted pairs 23AWG
- Tinned copper braid with an 80% cover.
- Always position the Ethernet cable far away from power cables.

FUNCTION CODE

The ModBus module supports the following function codes:

- 3₍₁₀₎:** holding register reading
16₍₁₀₎: - multiple registers writing

If ModBus receives a message and a CRC error is detected, no answer is given.

CODE 3₍₁₀₎.

Request:

Slave address, code 3₍₁₀₎, Starting address HI, Starting address LO, Number of Point HI, Number of Point LO, Crc LO, Crc HI.

Response:

Slave address, code 3₍₁₀₎, Byte count, Data HI, Data LO....., Crc LO, Crc HI.

CODE 16₍₁₀₎.

Request:

Slave address, code 16₍₁₀₎, Starting address HI, Starting address LO, Number of Point HI, Number of Point LO, Byte count, Data HI, Data LO....., Crc LO, Crc HI.

Response:

Slave address, code 16₍₁₀₎, Starting address HI, Starting address LO, Number of Register HI, Number of register LO, Crc LO, Crc HI.

NOTES FOR REMOTE PROGRAMMING

The writeable registers are shown in TABLE MODBUS MAPPING referred to as W or RW (**write or read/write**). max number of registers 72, see table page 20.

Channels 1÷3 cannot be disabled; in case of incorrect setting they are always forced as enabled channels.

In the case in which the channel 4 is not enabled and/or the information is not provided we have the following answers:

1. **Measured temperatures** = 0000 (0°C)
2. **Temperature AL./TRIP = Value written in E2PROM**
3. **Channel status** = 0000
4. **Channel setting** = %00000000; %xxxxxx0 (x=n.d.)

In the event that information is sent in writing to a register can't be written (only READ) data will be trashed without affecting the received message.

Also in the remote programming phase via ModBus it must be considered that the Alarm thresholds must be lower than the Trip thresholds and that the Fan-on thresholds must be higher than the Fan-off thresholds.

In case you try to set these thresholds incorrectly, the control unit FO 935 ETH will not proceed with the programming and storage of data, therefore in subsequent readings will read the data from the previous schedule.

After having sent a request for writing the control unit will take a time of about 1" to store the data in eeprom, during the step of storing the module ModBus will not be able to process additional requests.

If the demand for programming is successful, the unit automatically resets and loads the new settings.

The information "RELAY STATUS" indicates the state of excitation of the coils of the relays, so it will be subject to the commands of "FAIL SAFE".

At the end of the write command (Write) is carried out a check of compatibility data:

1. **If you have a non-compatibility "exception" for an answer and the data packet is rejected in its entirety. The code of the first erroneous data can be obtained by reading the log "Error received data".(NB: this code is lost during RESET or new power or writing data in E2PROM);**
2. **if the data are correct, they are transferred to the non-volatile memory (E2PROM), the historical data is reset (Tmax = 0°C) and a reset of the system is subsequently forced**
3. **If the WRITE command implies only writing "COMMANDS" it will be implemented autonomously and without RESET, i.e. without affecting the data of the control unit.**

ERROR CODES (exception codes)

In case of a wrong request, ModBus will answer with modified codes and codified errors according to the following:

1. - Unsupported function code
2. Wrong data address
3. - Wrong data (for instance length)

The memory area containing the HFN datum must undergo no forcing.

In the case in which all the fans are turned off (F1, F2) the test of the relay will not take place.

UNACCEPTABLE DATA

There are some programmings that are not acceptable as they are not foreseen by the FO935 ETH instrument; such data will be discarded without producing any error message (EXCEPTION CODE).

CH 1-2-3: → channels that cannot be disabled
CH 1-2-3: → FAN_2 cannot be enabled
CH 4: → FAN_1 cannot be enabled
CH 4: → FAN_INT cannot be enabled
CH 4: → FAN_2 cannot be enabled if CH 4 = no

ILLEGAL DATA

On the other hand, some combinations are programming errors because they are wrong settings; in this case the error code is ILLEGAL_DATA, This information is accessible to ModBus reading the register 7.

NO ERROR

CH_1 Trip ≤ Alarm

CH_4 Trip ≤ Alarm

FAN_1 ON ≤ OFF 0 FAN INT ≤ 10

FAN_2 ON ≤ OFF

Value HFN > max see table:SYSTEM - Setting and Status

Value FCD > max see table:SYSTEM - Setting and Status

Value 4.20 > max see table:SYSTEM - Setting and Status

Voting Value > max see table:SYSTEM - Setting and Status

Note. If the value of Voting is higher than the max value expected for the model in question, it will be set equal to "0", that is NO_VOTING.

CONTROL UNIT GENERAL NOTES

The models of the unit can be equipped with different options; to avoid disruption of production, their existence is defined by Fw indicated power, with messages dedicated on display LEDs.

This information can be accessed by reading the Modbus register 6 (options) with the following meaning:

LOW Byte

Bit_1 = Ethernet

HIGH Byte

Bit_0/1 = 00 - Range -35°C ÷ 195°C

In the case of the Ethernet option, the ModBus and 4.20 functions from the panel will be disabled while they will be readable from the centre.

Note; in case the values programmed from ModBus are out of range, a date "exception" error response will be generated.

MODBUS MAPPING TABLE

HEADER (information and commands):

Address LO ₍₁₀₎	Data HI	Data LO	W: write W:write W: read/write
1	Model – MSD (ASCII)	Model - 3rd Digit (ASCII)	R
2	Model - 2nd Digit (ASCII)	Model – LSD (ASCII)	R
3	Space (20H)	Vers.Fw – MSD(ASCII)	R
4	Vers.Fw - 2nd Digit (ASCII)	Vers.Fw – LSD(ASCII)	R
5	Qty channels (2*ASCII)		R
6	Options (see notes)	Options (see notes)	R
7	00	Incorrect datum received	R-see tab.
8	00	Info various causes	R-see tab.
9	00	Controls	W-see tab.

SYSTEM: Setting and Status

Address LO ⁽¹⁰⁾	Data HI	Data LO	Notes 1	Notes 2	W: write W:write W: read/write
10	00	HFN (Fan test)	0=No test	1+200h	RW
11	00	00	FREE	See Note	R
12	00	00	FREE	See Note	R
13	00	CPU Setting	See Notes		RW
14	00	CPU Error	See Notes		R
15	00	Status Relay	See Notes		R
16	00	00	FREE	See Note	R
17	00	Address	Modbus address	1+255	R
18	00	Bdr	Modbus baud rate	0=2400 1=4800 2=9600 3=19200 4=38400	R
19	00	Parity	Modbus parity bit	0=N-1 None+1Stop 1=Even 2=Odd 3=N-2 None+2Stop	R
20	00	FREE	See Note		R

TEMPERATURE FANS:

Address LO (10)	Data HI	Data LO	Notes 1	Notes 2	W: write W:write W: read/write
21	2'compl. sign	Fan_1 ON	1°C + 190°C		RW
22	2'compl. sign	Fan_1 OFF	1°C + 190°C		RW
23	2'compl. sign	Fan_2 ON	1°C + 190°C		RW
24	2'compl. sign	Fan_2 OFF	1°C + 190°C		RW

TEMPERATURES channels 1÷4:

Address LO (10)	Data HI	Data LO	Notes 1	Notes 2	W: write W:write W: read/write
25	2'compl. sign	2'compl.Ch1 temper.	-35°C + 195°C		R
26	2'compl. sign	2'compl.Ch1 max temperat.	0°C + 195°C		R
27	2'compl. sign	2'compl.Ch1 temper. alarm set point	1°C + 190°C	AL	RW
28	2'compl. sign	2'compl.Ch1 temper. trip set point	1°C + 190°C	TRP	RW
29	2'compl. sign	2'compl.Ch2 temper.	-35°C + 195°C		R
30	2'compl. sign	2'compl.Ch2 max temperat.	0°C + 195°C		R
31	2'compl. sign	2'compl.Ch2 temper. alarm set point	1°C + 190°C	As (AL)	R
32	2'compl. sign	2'compl.Ch2 temper. trip set point	1°C + 190°C	As (TRP)	R
33	2'compl. sign	2'compl.Ch3 temper.	-35°C + 195°C		R
34	2'compl. sign	2'compl.Ch3 max temperat.	0°C + 195°C		R

35	2'compl. sign	2'compl.Ch3 temper. alarm set point	1°C ÷ 190°C	As (AL)	R
36	2'compl. sign	2'compl.Ch3 temper. trip set point	1°C ÷ 190°C	As (TRP)	R
37	2'compl. sign	2'compl.Ch4 temper.	−35°C ÷ 195°C		R
38	2'compl. sign	2'compl.Ch4 max temperat.	0°C ÷ 195°C		R
39	2'compl. sign	2'compl.Ch4 temper. alarm set point	1°C ÷ 190°C	AL	RW
40	2'compl. sign	2'compl.Ch4 temper. trip set point	1°C ÷ 190°C	TRP	RW
41	00	00			R
42	00	00			R
43	00	00			R
44	00	00			R
45	00	00			R
46	00	00			R
47	00	00			R
48	00	00			R
49	00	00			R
50	00	00			R
51	00	00			R
52	00	00			R
53	00	00			R
54	00	00			R
55	00	00			R
56	00	00			R

CHANNELS 1÷4:Setting

Address LO (10)	Data HI	Data LO	Notes 1	Notes 2	W: write W:write W: read/write
57	00	Ch1 Setting	See Notes CHx		RW
58	00	Ch2 Setting	See Notes CHx		R
59	00	Ch3 Setting	See Notes CHx		R
60	00	Ch4 Setting	See Notes CHx		RW
61	00	00	--		R
62	00	00	--		R
63	00	00	--		R
64	00	00	--		R

CHANNELS 1÷4:Status

Address LO (10)	Data HI	Data LO	Notes 1	Notes 2	W: write W:write W: read/write
65	Ch1 story	Ch1 status	See Notes CHx		R
66	Ch2 story	Ch2 status	See Notes CHx		R
67	Ch3 story	Ch3 status	See Notes CHx		R
68	Ch4 story	Ch4 status	See Notes CHx		R
69	00	00	--		R
70	00	00	--		R
71	00	00	--		R
72	00	00	--		R

REGISTERS NOTES

INFO various causes (READ)

BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
--	--	--	-	-	-	-	(*) RESET (R) has taken place

COMMANDS (WRITE)

BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
--	--	--	-	-	Reset Reg.CPU_ERROR	(*) Reset historical data	(*) ResetBIT:RESET has taken place

CHn SETTING

BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
--	--	--	--	--	FAN2	FAN1	CAN_enabled

CHn STATUS

BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
--	TRIP	ALARM	FAN_2	FAN_1	FLT	FOC	FCC

CHn STORY

BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
--	TRIP	ALARM	--	--	FLT	FOC	FCC

RELAY STATUS (coil energising status)

BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
--	--	--	FAULT Relay 1=ON	TRIP Relay 1=ON	ALARM Relay 1=ON	FAN_2 Relay 1=ON	FAN_1 Relay 1=ON

CPU ERROR

BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
--	--	TEC ERR	--	FO ERR FLT	--	--	ECH

CPU SETTING

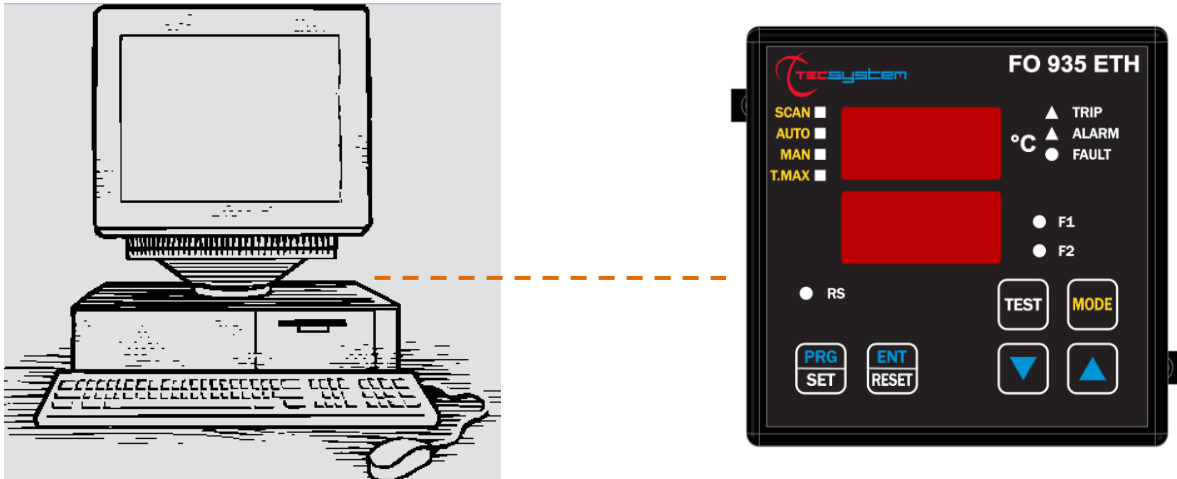
BIT 7	BIT 6	BIT 5	BIT 4	BIT 3	BIT 2	BIT 1	BIT 0
--	--	--	Failsafe fault	Failsafe trip	Failsafe alarm	--	--

ETHERNET MODULE PROGRAMMING PARAMETER

X Windows Vista, 7, 8.

ETH0 CONNECTIONS

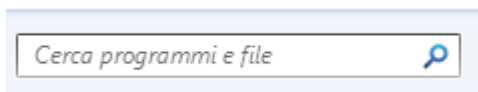
Using an Ethernet cable, connect the FO 935 ETH of the FO 935 ETH control unit to the Ethernet card of a PC.



TELNET ENABLING

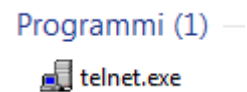
Use the Telnet program to set the Ethernet IP parameters.

1) START menu (Windows)



2) Start the search with the Telnet program
Entering telnet in SEARCH.

If already enabled, the program appears

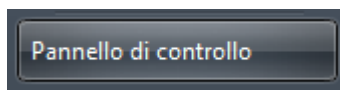


Press ENTER to launch the program.

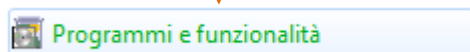
(Skip to step 12 page 30)

If instead the Telnet program is not enabled:

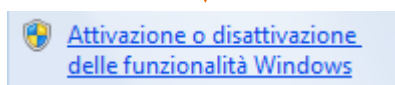
3) START menu (Windows):



4) Select control panel



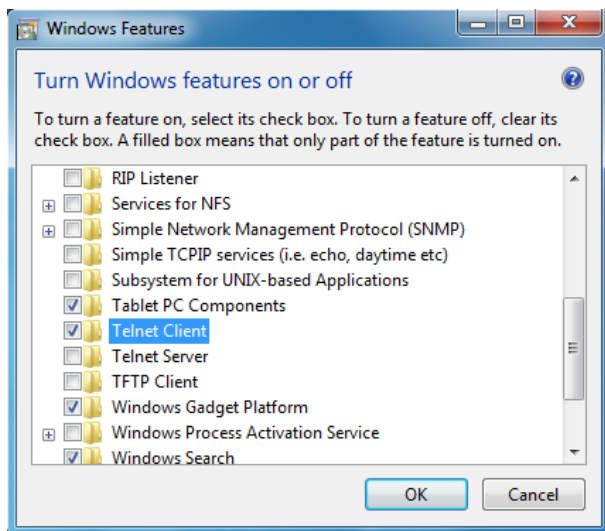
5) Select Programs and then Features or
Programs and Features



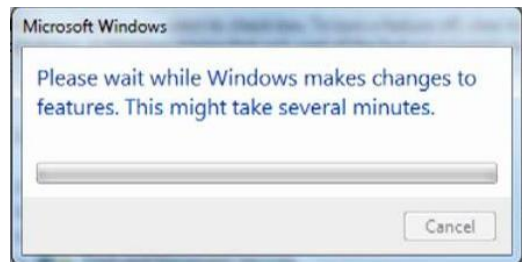
6) Select Windows features on or off

7) Enable Telnet Client and click "OK"

FO 935 ETH



The screen below will open.
Wait for the Telnet function to activate.



Programmi (1) —

telnet.exe

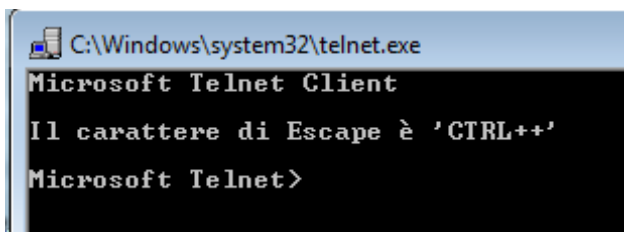
8) Close the open screens and restart the PC if required

9) START menu (Windows)

10) Search for the Telnet program

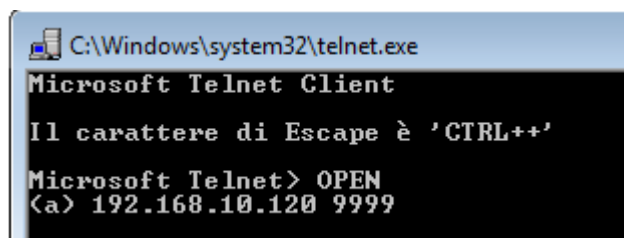
11) Press ENTER to launch the program

12) TELNET SCREEN



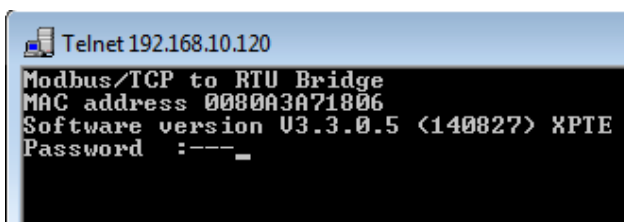
13) Enter: OPEN

14) Press ENTER



15) Enter: 192.168.10.120 9999

16) Press ENTER

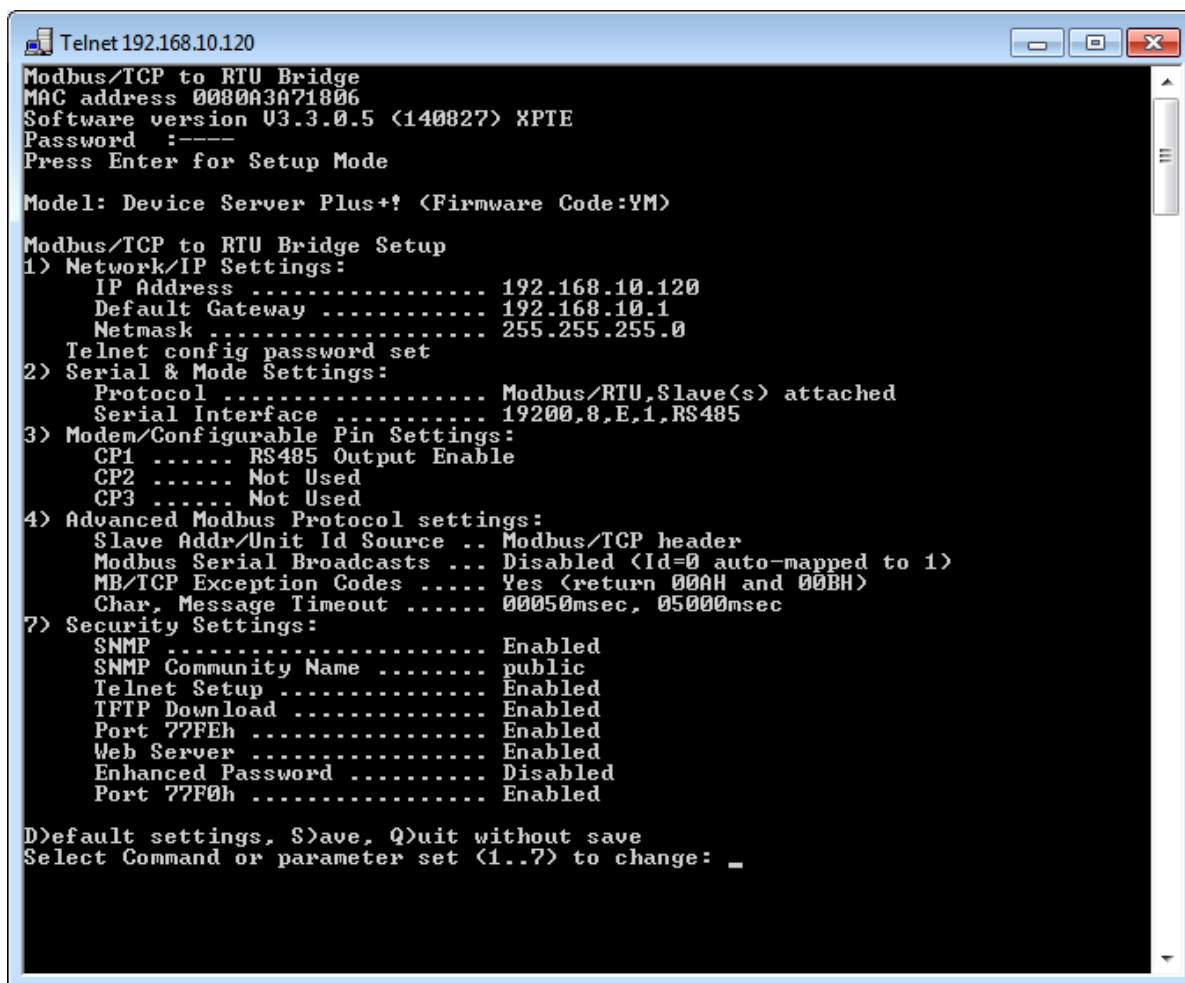


17) Enter the Password: TECS

18) Press ENTER

Note: In this screen we have the **MAC address** and the **software** version of the ETH port available.

19) IP PARAMETER PROGRAMMING MENU



```
Telnet 192.168.10.120
Modbus/TCP to RTU Bridge
MAC address 0080A3A71806
Software version V3.3.0.5 <140827> XPT
Password :----
Press Enter for Setup Mode

Model: Device Server Plus+! <Firmware Code:YM>

Modbus/TCP to RTU Bridge Setup
1) Network/IP Settings:
  IP Address ..... 192.168.10.120
  Default Gateway ..... 192.168.10.1
  Netmask ..... 255.255.255.0
  Telnet config password set
2) Serial & Mode Settings:
  Protocol ..... Modbus/RTU,Slave(s) attached
  Serial Interface ..... 19200,8,E,1,RS485
3) Modem/Configurable Pin Settings:
  CP1 ..... RS485 Output Enable
  CP2 ..... Not Used
  CP3 ..... Not Used
4) Advanced Modbus Protocol settings:
  Slave Addr/Unit Id Source .. Modbus/TCP header
  Modbus Serial Broadcasts ... Disabled <Id=0 auto-mapped to 1>
  MB/TCP Exception Codes ..... Yes <return 00AH and 00BH>
  Char. Message Timeout ..... 00050msec, 05000msec
7) Security Settings:
  SNMP ..... Enabled
  SNMP Community Name ..... public
  Telnet Setup ..... Enabled
  TFTP Download ..... Enabled
  Port 77FEh ..... Enabled
  Web Server ..... Enabled
  Enhanced Password ..... Disabled
  Port 77F0h ..... Enabled

D)default settings, S)ave, Q)uit without save
Select Command or parameter set <1..7> to change: _
```

IP PARAMETER PROGRAMMING MENU (TELNET)

The TELNET menu allows you to modify the configuration parameters of the Ethernet port.

The information available to you is:

Operator modifiable parameters.

- 1) Parameter modification (IP Address - Gateway- Netmask -Telnet password).

Parameters that cannot be modified by the operator

- 2) Communication parameters between the ETH0 port and the control unit.
- 3) Communication configuration between the ETH0 port and the control unit.
- 4) Communication advanced settings between the ETH0 port and the control unit.
- 7) Security settings between the ETH0 port and the control unit.



IMPORTANT INFORMATION

For a correct operation of the device it is advised not to access or modify menus 2-3-4-7. Changing the values contained in the indicated menus could lead to communication anomalies with loss of IP Ethernet communication.

MENU MODIFICATION PROCEDURE 1) IP parameters:

enter the command:1

```
IP Address: IP Address <192> 192.<168> 168.<010> .<120> 120_
```

1) Enter the desired new IP address, if you wish to keep the set address press ENTER 4 times.

- At the end of the operation, the system will ask if you wish to modify the Gateway IP:

```
IP Address <192> 192.<168> 168.<010> .<120> 120
Set Gateway IP Address <N> ?
```

Type in: **Y** to modify the Gateway IP.

N to not modify the Gateway IP and to go to the following step.

2) Enter the desired new Gateway IP address, press ENTER; if you wish to keep the set address press ENTER 4 times.

```
IP Address <192> 192.<168> 168.<010> .<120> 120
Set Gateway IP Address <N> ? Y
Gateway IP Address : <192> 192.<168> 168.<010> 10.<001> 001_
```

- At the end of the operation, the system will ask if you wish to modify Netmask:

```
IP Address <192> 192.<168> 168.<010> .<120> 120
Set Gateway IP Address <N> ? Y
Gateway IP Address : <192> 192.<168> 168.<010> 10.<001> 001
Set Netmask <N for default> <N> ?
```

Type in: **Y** to modify Netmask.

N to not modify Netmask and to go to the following step.

3) Enter the new Netmask, press ENTER; if you wish to keep the set address press ENTER 4 times.

```
IP Address <192> 192.<168> 168.<010> .<120> 120
Set Gateway IP Address <N> ? Y
Gateway IP Address : <192> 192.<168> 168.<010> 10.<001> 001
Set Netmask <N for default> <N> ? Y
<255> .<255> .<255> .<000> _
```

- At the end of the operation, the system will ask if you wish to modify the Telnet password:

```
IP Address <192> 192.<168> 168.<010> .<120> 120
Set Gateway IP Address <N> ? Y
Gateway IP Address : <192> 192.<168> 168.<010> 10.<001> 001
Set Netmask <N for default> <N> ? Y
<255> .<255> .<255> .<000>
Change telnet config password <N> ? _
```

Type in: **Y** to modify the Telnet Password.

N to not modify the Telnet Password and to go to the following step.

```

IP Address <192> 192.<168> 168.<010> .<120> 120
Set Gateway IP Address <N> ? Y
Gateway IP Address : <192> 192.<168> 168.<010> 10.<001> 001
Set Netmask <N for default> <N> ? Y
<255> .<255> .<255> .<000>
Change telnet config password <N> ? Y
Enter new Password:

```

4) Enter the new Telnet Password (4 digits max), press ENTER; if you wish to keep the set password, press ENTER.

```

D>default settings, S>ave, Q>uit without save
Select Command or parameter set <1..7> to change: _

```

Type in: S to save the modified data.

Q to exit Telnet without saving the data.

The following screen will appear:

```

D>default settings, S>ave, Q>uit without save
Select Command or parameter set <1..7> to change:
→ Parameters saved, Restarting ...

Connessione all'host perduta.
Premere un tasto per continuare..._

```

To check the programmed parameters or repeat programming, follow the TELNET SCREEN from step 12 to step 19, page 27.

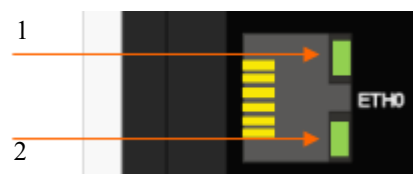
Indications of LEDs 1-2 of the Ethernet port:

LED 1:Link

- Off = No link
- Amber = 10 Mbps
- Green = 100 Mbps

LED 2:Activity

- Off = No Activity
- Amber = Half Duplex
- Green = Full Duplex



WARRANTY REGULATIONS

The purchased Product is covered by the manufacturer's or seller's warranty under the terms and conditions indicated in the "Tecsystem s.r.l. General Sales Conditions", which can be consulted on the website www.tecsystem.it and/or in the stipulated purchase contract.

The warranty is considered valid only when the product is damaged by causes attributable to TECSYSTEM srl, such as manufacturing or components defects.

The warranty is invalid if the Product proves to have been tampered with/modified or incorrectly connected and causing voltages outside the set limits and does not comply with the technical data for use and assembly, as described in this instruction manual.

The warranty is always ex Corsico as stated in the "General Conditions of Sale".

TROUBLESHOOTING	CAUSES AND SOLUTIONS
The control unit does not switch on and the supply to terminals 40-42 is correct.	Check that: the connector is firmly inserted in its place, the connection wires are tight and that there are no obvious signs of burns on the connectors. Turn off the power supply and carry out the above instructions, restore the voltage.
CH4 is in FAULT (FOC)	Programming error of the CH4 / YES control unit. Check and repeat the programming on page 19-20 select CH4 /NO.
One of the three/four channels is in FAULT (FOC-FCC-FLT)	Display message FCC : exceeding of the minimum full scale value = measured temperature < -35°C Display message FOC : exceeding of the maximum full scale value = detected temperature > 195°C Display message FLT : Sensor disconnected or faulty. Check the state of operation of the FO sensors
When turned on, the indication (ECH) appears	A strong disturbance has damaged the memory data. See the paragraph for programmed data diagnostics on page 18.
The indication FAULT (TEC) is displayed	CONC.521 is disconnected, it is advisable to check the connection between the CONC.521 and the control unit FO 935.
Contact the TECSYSTEM Technical Department if the problem persists.	

EQUIPMENT DISPOSAL

The European directive 2012/19/EU (WEEE) has been approved to reduce the waste of electrical and electronic appliances and to encourage the recycling and reuse of materials and components of these appliances, thereby reducing the disposal of harmful residues and compounds originating from electrical and electronic material.



All the electrical and electronic equipment supplied after 13 August 2005 is marked with this symbol, pursuant to European directive 2012/19/EU on electrical and electronic waste (WEEE). Any electrical or electronic equipment marked with this symbol must be disposed of separately from normal domestic waste.

Returning of used electrical appliances: contact TECSYSTEM or the TECSYSTEM agent to receive information on correct disposal of the appliances.

TECSYSTEM is aware of the impact its products have on the environment and asks its customers active support in the correct and environmentally-friendly disposal of its devices.

USEFUL CONTACTS

TECHNICAL INFORMATION: support@tecsystem.it

COMMERCIAL INFORMATION: info@tecsystem.it



UL SPECIFICATION AND RATINGS

CABLE SPECIFICATION	Dimension for main circuit 18AWG, working temperature over 105°C
MASS OF THE EQUIPMENT	0,43 Kg
INPUT SUPPLY	85-260 Vac-Vdc 50/60HZ, 12VA max
PROTECTION	External switch or circuit breaker
OUTPUTS RELAYS	5 output relays: 10A 250Vac-res COS=1
OPTIONAL	ETHERNET
Suitable for use on a flat surface, type 1 enclosure if rear panel is equipped with fixing screws, screw tightening torque: 0.29Nm	