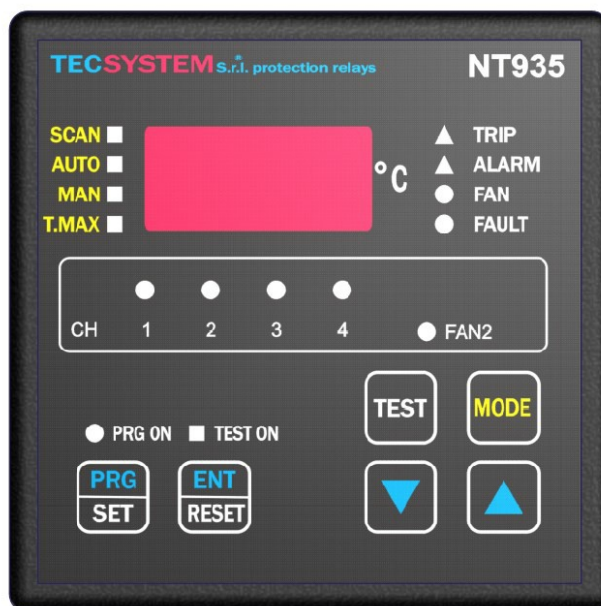


INSTRUCTION MANUAL

NT935 SERIES



1MN0035 REV. 0



operates with ISO9001:2008 certified quality system

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R. 1.0 01/08/13

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 VALID AND COMPLETE FOR THE STANDARD, MODBUS INSIDE, ANALOG INSIDE AND AD VERSIONS OF THE NT935 SERIES.

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SAFETY REQUIREMENTS



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 may cause electric shock. Contact with 110-240 Volts AC can be fatal. To reduce the risk of electric shock, do not dismantle the back of the device for any reason. **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 intervention on the equipment must be entrusted to a qualified repair engineer. Moreover its opening would void the warranty.

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

POWER SUPPLY

The NT935 series has UNIVERSAL power supply, i.e. it can be supplied by 24 to 240 Vac-Vdc, irrespectively of polarity in Vdc. Before using it, make sure the power cable is not damaged, kinked or pinched. Do not tamper with the power cable. Never disconnect the unit by pulling the cable, avoid touching the pins. Do not carry out any 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 technical service.

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 humid hands during storms. If any liquid penetrates the control unit, disconnect it immediately and contact technical service.

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 totally unsuitable to be used by non-qualified personnel. Any intervention must be carried out by a specialist engineer.

ACCESSORIES

The use of non-original accessories or spare parts might 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 sun rays. Do not place near heat sources exceeding the parameters stated in this manual. Position on a stable surface, far from any possible vibrations. Position the unit as far 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 INFORMATION

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

ACCESSORIES

The following objects are present inside the box:

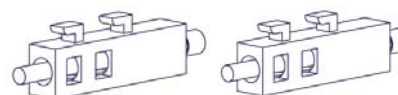
Control unit



Instruction manual CD



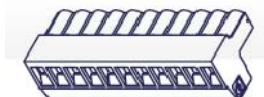
2 blocks for panel mounting



1 supply terminal 3 poles pitch 5 Code: 2PL0367



1 relay terminal 11 poles pitch 5
Code: 2PL0359



1 sensor terminal 12 poles pitch 5
Code: 2PL0361



1 Terminal 2 poles pitch 5 for 4.20mA output or FAN2 *
Code: 2PL0364 or 2PL0363



1 RS485 terminal 3 poles pitch 3.81 *
Code: 2PL0366



1 Tecsybus terminal 4 poles pitch 3.81
Code: 2PL0368



* The above terminals are optional according to the configuration purchased.

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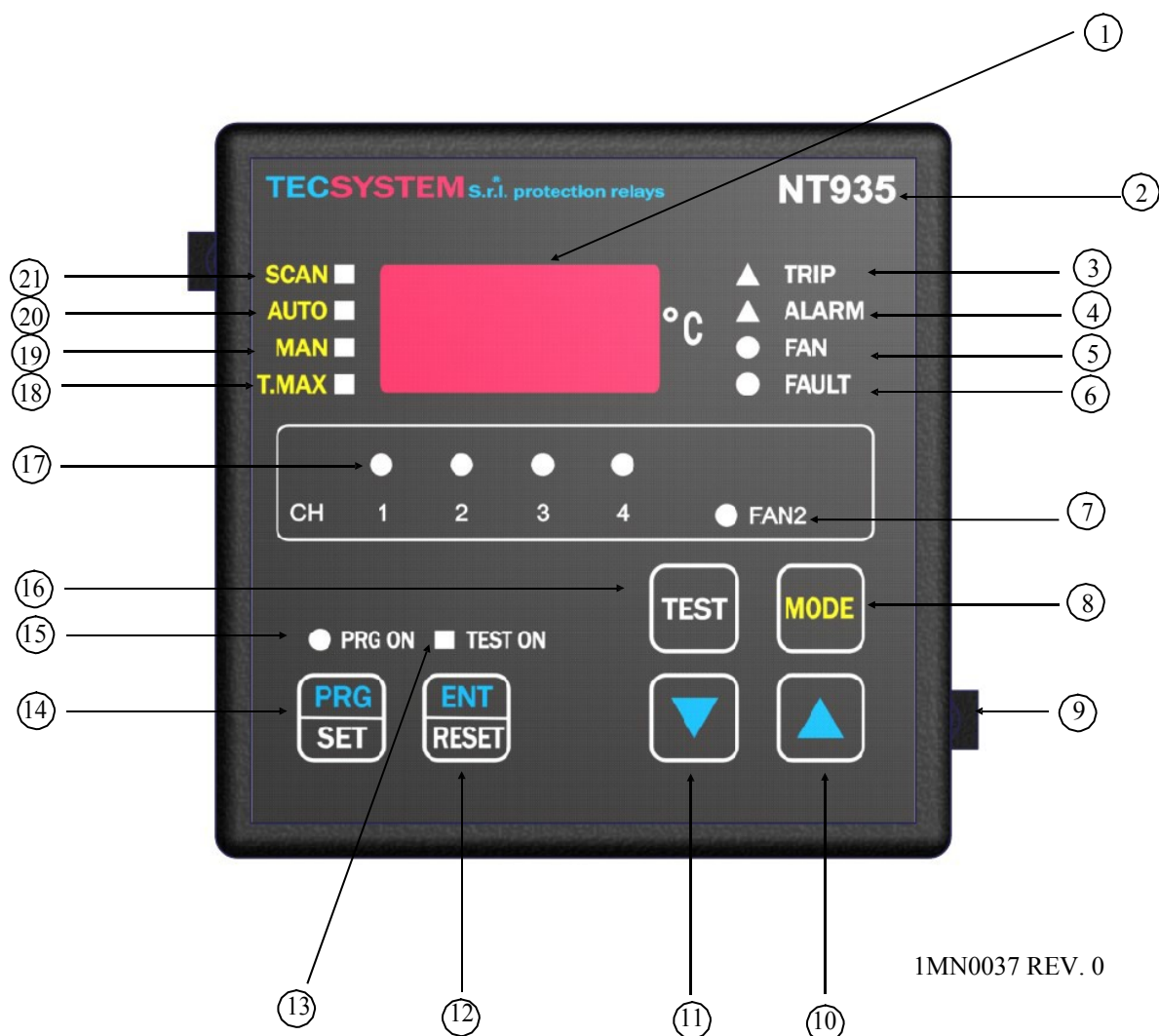
ATTENTION: always install the device using the terminals included in the pack. The use of terminals other than those included with the control unit might cause malfunctions.

TECHNICAL SPECIFICATIONS	NT935	NT935 MODBUS INSIDE	NT935 4.20mA ANALOG INSIDE	NT935 AD
POWER SUPPLY				
Supply rated values	24-240 Vac-Vdc (50/60Hz)	24-240 Vac-Vdc (50/60Hz)	24-240 Vac-Vdc (50/60Hz)	24-240 Vac-Vdc (50/60Hz)
Supply min/max values	20-270 Vac-Vdc (50/60Hz)	20-270 Vac-Vdc (50/60Hz)	20-270 Vac-Vdc (50/60Hz)	20-270 Vac-Vdc (50/60Hz)
Vdc with reversible polarities	●	●	●	●
INPUTS				
4 inputs for RTD sensors, Pt100 type with 3 wires	●	●	●	●
Ni100 or Ni120 sensors on request	Option	Option	Option	Option
Connections on extractable terminal blocks	●	●	●	●
Input channels protected against electromagnetic interference	●	●	●	●
Compensation of cables for thermistors	500 m (1 mm ²)	500 m (1 mm ²)	500 m (1 mm ²)	500 m (1 mm ²)
OUTPUTS				
2 alarm relays (ALARM AND TRIP) SPDT	●	●	●	●
1 fault sensor or operating failure (FAULT) relay SPDT	●	●	●	●
Output relay with 5A-250Vac-res COS Φ =1 contacts.	●	●	●	●
Ventilation management relay SPST	FAN 1 and FAN 2	FAN 1	FAN 1	FAN 1
COMMUNICATION (OPTIONAL)				
Tecsybus serial output	●	NO	NO	NO
RS485 Modbus RTU / ASCII serial output	Option	●	NO	●
4-20mA output for selected channel (with synchronization signal)	Option	NO	●	●
DIMENSIONS				
100x100 mm– din43700-depth 131mm (terminal block included)	Hole 92 x 92 mm	Hole 92 x 92 mm	Hole 92 x 92 mm	Hole 92 x 92 mm
READING RANGE OPTIONS				
Versions with -40°C ÷ 200°C reading range available.	Option	Option	Option	Option

NOTE: The standard version has the Tecsybus output through which it is possible to connect:
 BUSMOD 8A (external module for RS485 Modbus digital output).
 CONV 4/420-A (external module 4 outputs 4-20mA).
 MOD RL4/A (external module with 4 separate alarm and trip relays for each individual channel)

TECHNICAL SPECIFICATIONS	NT935	NT935 MODBUS INSIDE	NT935 4.20mA ANALOG INSIDE	NT935 AD
TEST AND PERFORMANCE				
Construction in compliance with CE regulations	•	•	•	•
CURus certificate	•	•	•	•
Rina certificate	Option	Option	Option	NO
Protection from electrical interference EN 61000-4-4	•	•	•	•
Dielectric strength 1500 Vac for a min. between output relays and sensors, relays and power supply, power supply and	•	•	•	•
Accuracy ±1% full scale value, ±1 digit	•	•	•	•
Ambient operating temperature from -20°C to +60°C	•	•	•	•
Humidity 90% non-condensing	•	•	•	•
Housing NORYL 94 _V0	•	•	•	•
Absorption 4VA	•	•	•	•
Data storage: 10 years minimum	•	•	•	•
Digital linearity of sensor signal	•	•	•	•
Self-diagnostic circuit	•	•	•	•
Electronic protection only on customer's request	Option	Option	Option	Option
Vibration test IEC 68-2-6 Amplitude ±1 mm from 2Hz to 13.2Hz Acceleration ±0.7G from 13.2 Hz to 100 Hz	•	•	•	•
(*) Seismic test according to IEEE 344-1.987	•	•	•	•
DISPLAY AND DATA MANAGEMENT				
1 display 13 mm high with 3 digits to display temperatures and messages	•	•	•	•
4 LEDs to show the selected channel	•	•	•	•
4 LEDs to show the alarm status of the selected channel	•	•	•	•
Alarm management from 0°C ÷ 240°C or 0°C ÷ 200°C (for versions with range -40°C ÷ 200°C).	•	•	•	•
2 alarm thresholds for channels 1-2-3	•	•	•	•
2 alarm thresholds for channel 4	•	•	•	•
2 ON-OFF thresholds for FAN control	•	•	•	•
2 ON-OFF thresholds for FAN 2 control	•	NO	NO	NO
Sensor diagnostics (Fcc-Foc-FCd)	•	•	•	•
Data storage diagnostics (Ech)	•	•	•	•
Access to programming through front keyboard	•	•	•	•
Automatic exit from programming after 1 minute's inactivity	•	•	•	•
Incorrect programming warning	•	•	•	•
Selection of automatic channel scanning, hottest channel or manual scanning	•	•	•	•
Storage of maximum temperatures reached by channels and alarm status	•	•	•	•
Front alarm reset button	•	•	•	•
(*) Cross reference T154 for constructive analogy				

FRONT PANEL



1MN0037 REV. 0

1)	3-digit display	12)	Enter/Reset button
2)	Control unit series	13)	Relay ON test (yellow) LED
3)	TRIP warning (red) LED	14)	Programming/Confirmation button
4)	ALARM warning (yellow) LED	15)	PRG ON (yellow) LED
5)	FAN warning (yellow) LED	16)	LED/relay test button
6)	FAULT warning (red) LED	17)	CH1-CH2-CH3-CH4 selected channel (green) LED
7)	FAN 2 warning (yellow) LED (RS for ModBus, Analog 4.20mA, AD versions)	18)	T-max mode selection (red) LED
8)	Scanning mode selection button	19)	Man mode selection (yellow) LED
9)	Fixing block	20)	Auto mode selection (green) LED
10)	UP button	21)	Scan mode selection (yellow) LED
11)	DOWN button		

DISPLAY

Pressing the MODE button, the display viewing modes are set:

- **SCAN:** the unit displays all the enabled channels scanned (every 2 seconds)
- **AUTO:** the unit automatically displays the hottest channel
- **MAN:** manual reading of the channel temperature using the up/down keys
- **T.MAX:** the unit displays the maximum temperature reached by the sensors and the possible alarms or faults that have occurred after the last reset.

Select the channels with ▲▼, zero the values with RESET.

CHECKING THE WORK PROGRAM

To check the set protection levels, press the PRG button briefly. Vis appears for 2 seconds, confirming you have entered viewing mode.

By pressing the PRG button repeatedly, all the previously set values are scrolled through in sequence. After 1 minute's keyboard inactivity, the programming viewing procedure is automatically abandoned.

To end viewing, press the ENT button.

LED TEST

We recommend the unit LEDs are tested regularly.

For this operation press the TEST button briefly, all the displays light up 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 carrying out a test of the relay operation without having to use supplementary equipment.

To start the test procedure, keep the TEST button pressed for about 5 seconds: TST appears for 2 seconds, confirming you have entered the Relay Test mode.

The flashing LED shows the relay to be tested, select the desired LED with the sliders.

Press the SET and RESET buttons to energise and de-energise the relay to be tested, ON-OFF appears on the display. After 1 minute's keyboard inactivity, the RELAY TEST procedure is automatically abandoned.

To end the RELAY TEST procedure, press the TEST button.

Alternatively, you can use the PT100 simulator model: SIM PT100.

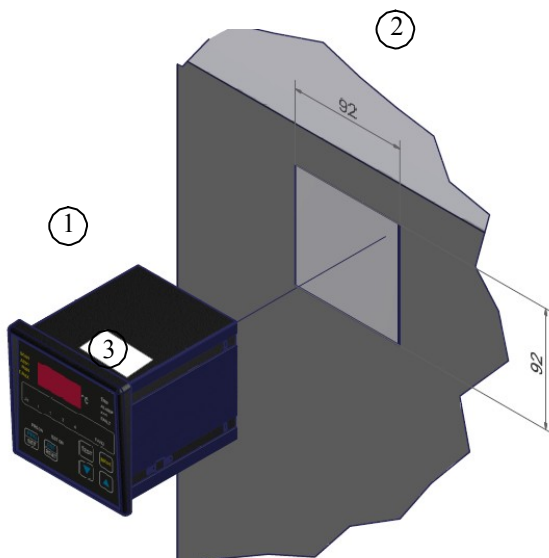
ALARM RELAY SILENCING

If you wish to silence the ALARM, press the RESET button: the relay is de-energised and the ALARM LED, that was ON, starts flashing.

Silencing is automatically disabled when the temperature goes below the ALARM threshold.

MOUNTING

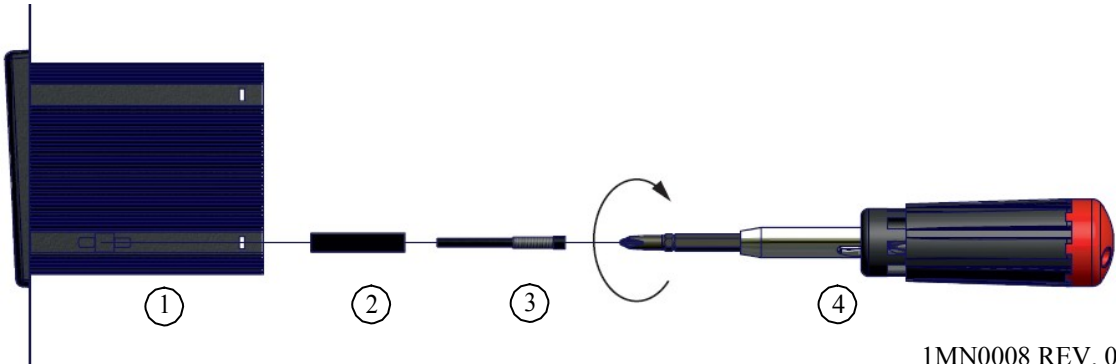
Drill a 92 x 92 mm hole in the panel sheet.



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

1MN0007 REV. 0

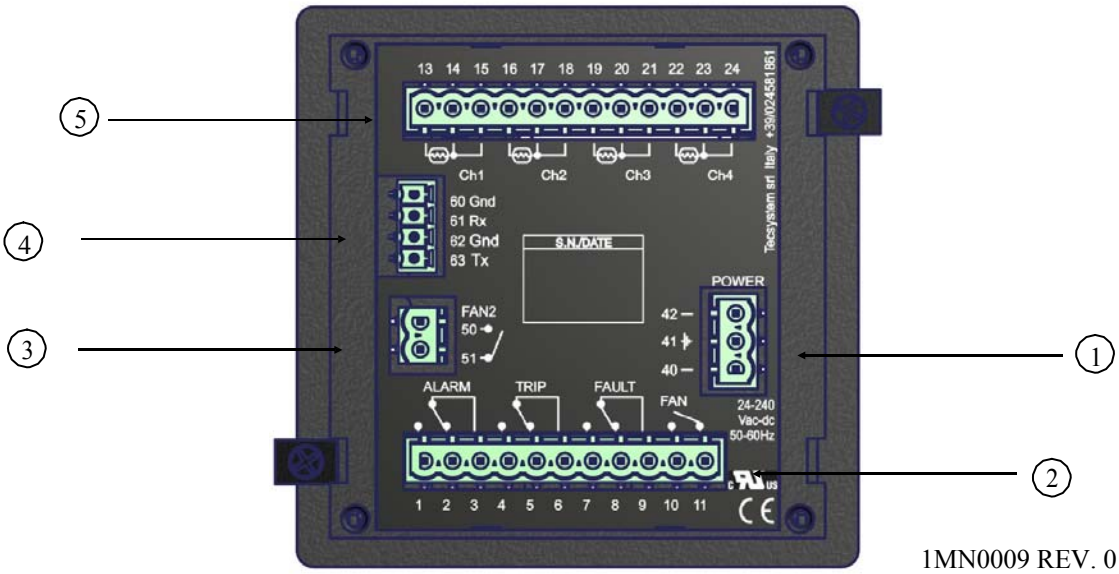
Fix the unit securely with the blocks supplied.



1)	Control unit	3)	Fixing screw
2)	Fixing block	4)	Crosshead screwdriver #1X100mm

ELECTRICAL CONNECTIONS

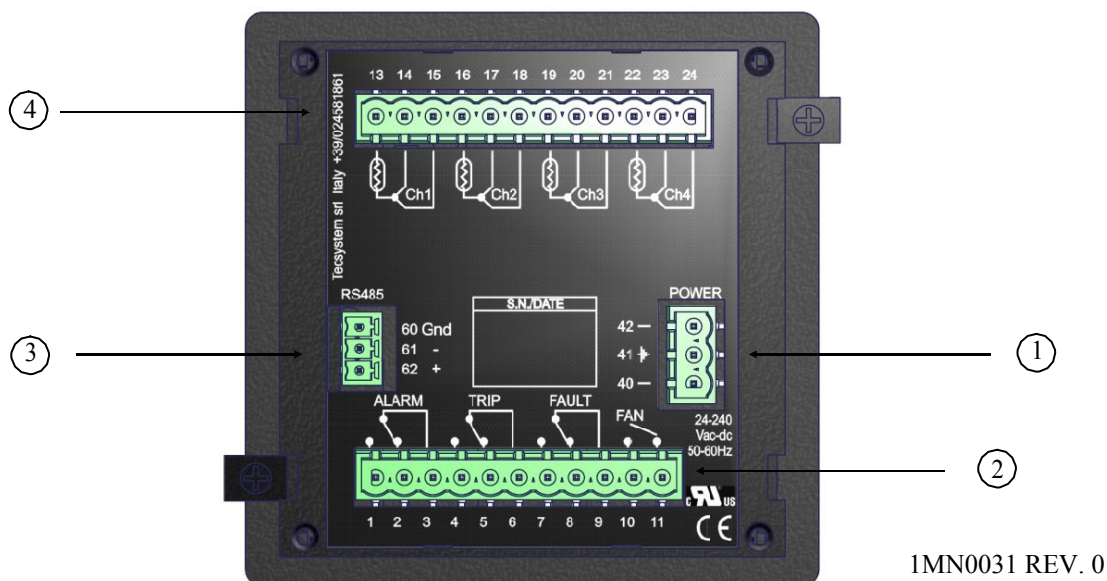
NT935 STANDARD



Note: with the power to the unit ON, the FAULT relay switches, contacts 8-9 open (NO) and 7-9 closed (NC), read paragraph ALARMS AND VENTILATION page 13

1)	Power supply	4)	Tecsibus connection
2)	Relays (ALARM-TRIP-FAULT-FAN)	5)	Pt100 sensors (white-red-red) Optional Ni100 or Ni120
3)	FAN 2		

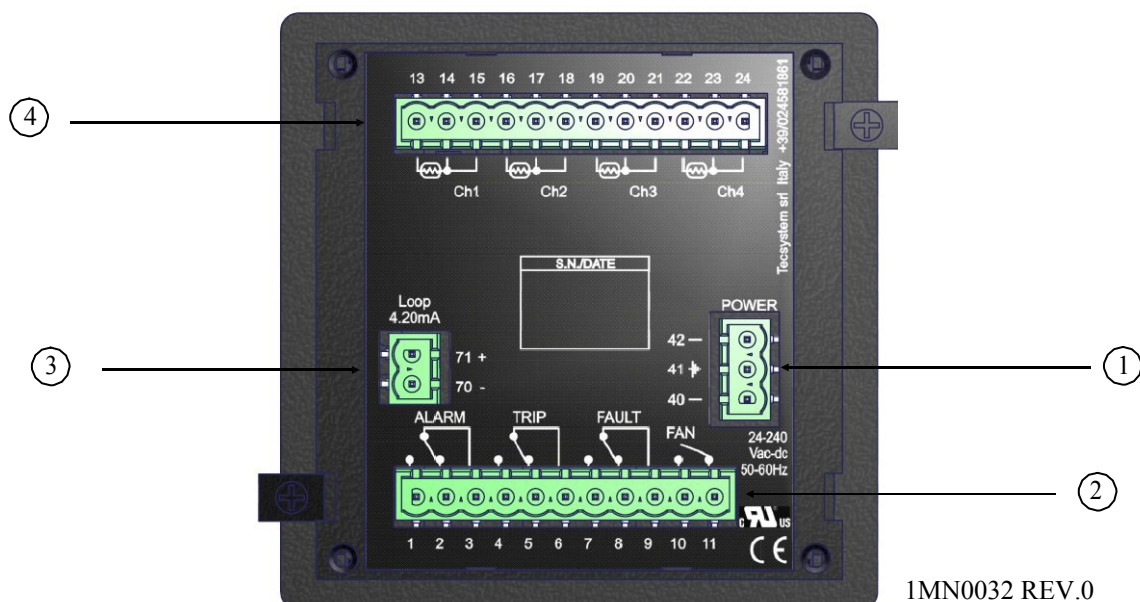
NT935 MODBUS INSIDE



Note: with the power to the unit ON, the FAULT relay switches, contacts 8-9 open (NO) and 7-9 closed (NC), read paragraph **ALARMS AND VENTILATION** page 13

1)	Power supply	3)	RS485 Output
2)	Relays (ALARM-TRIP-FAULT-FAN)	4)	Pt100 sensors (white-red-red) Optional Ni100 or Ni120

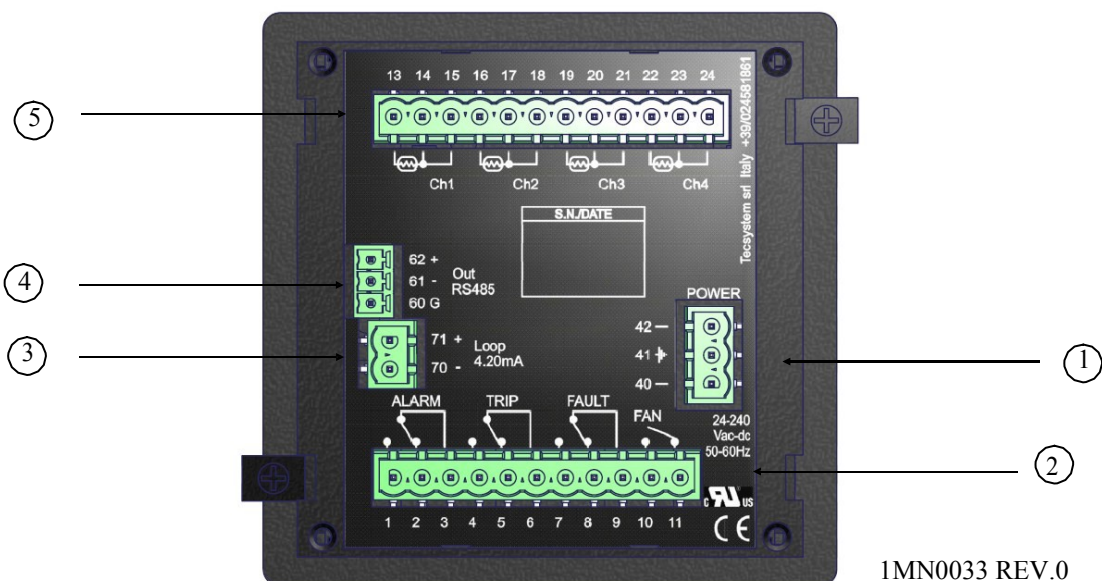
NT935 4.20mA ANALOG INSIDE



Note: with the power to the unit ON, the FAULT relay switches, contacts 8-9 open (NO) and 7-9 closed (NC), read paragraph **ALARMS AND VENTILATION** page 13

1)	Power supply	3)	4.20mA Output
2)	Relays (ALARM-TRIP-FAULT-FAN)	4)	Pt100 sensors (white-red-red) Optional Ni100 or Ni120

NT935 AD

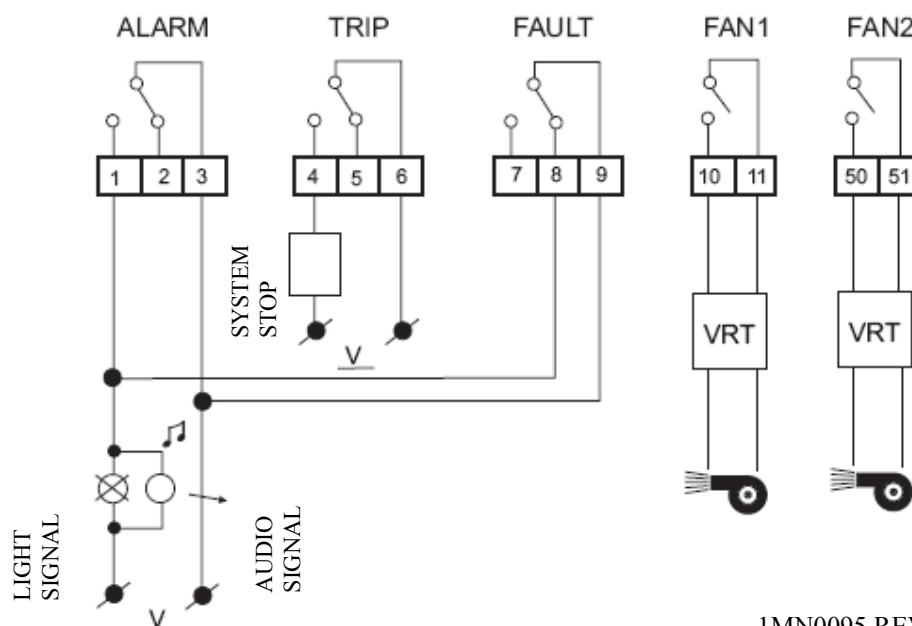


1MN0033 REV.0

Note: with the power to the unit ON, the FAULT relay switches, contacts 8-9 open (NO) and 7-9 closed (NC), read paragraph **ALARMS AND VENTILATION** page 13

1)	Power supply	4)	RS485 Output
2)	Relays (ALARM-TRIP-FAULT-FAN)	5)	Pt100 sensors (white-red-red) Optional Ni100 or Ni120
3)	4.20mA Output		

RELAY CONNECTION EXAMPLE



1MN0095 REV. 0

Output relay with 5A-250Vac-res COS Φ =1 contacts.

POWER SUPPLY

The NT935 control unit has UNIVERSAL power supply, i.e. it can be supplied by 24 to 240 Vac-Vdc, (50/60 Hz) irrespectively of polarity in Vdc (terminals 40-42).

This is obtained thanks to the use of a tested power supply unit, newly designed and manufactured, that frees installers from worrying about the correct Vac and Vdc supply.

Earth must always be connected to terminal 41.

When the unit is supplied directly by the secondary of the transformer to be protected, it can be burnt out by strong overvoltages.

This happens if the main switch is closed and the transformer has no load (blank test). The above is much more obvious when the voltage of 220 Vac is taken directly from the bars of the transformer secondary and there is a fixed bank of capacitors to correct the power factor of the transformer itself.

*To protect the control unit from line overvoltages, we recommend using the electronic PT-73-220 surge limiter, designed by TECSYSTEM S.r.l. specifically for this purpose.
Alternatively we recommend to adopt 24 Vac or, even better, 24 Vdc supply voltages.*

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

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 mentioned below, it does not monitor the temperature and the relays are all blocked.

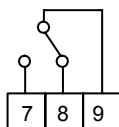
- Vis. programming display
- PRG Programming.
- Relay test.

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

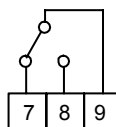
The FAULT relay switches when the unit is powered, contacts 7-9 closed (NC) and 8-9 open (NO), and holds till one of the following events takes place:

- Data storage fault (Ech message).
- Failure of the Pt100, Ni100 or Ni120 sensors (FCC short-circuited sensor, FOC open sensor or Fcd quick temperature increase).
- Insufficient supply voltage.
- During the power on reset after programming (PRG) of the control unit (local or via Modbus).

NOTE: do not connect the FAULT relay to the transformer tripping circuit to avoid unwanted system interruptions.



FAULT 8-9 NC: ALARM FAULT OR POWER OFF



FAULT 7-9: NC POWER ON

The FAN contact can be used to control the cooling fans or it can be inserted into the air conditioning system of the room where the transformer is located.

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

THERMOMETRIC SENSOR CONNECTION



Each Pt100 (Ni100 or Ni120 optional) thermometric sensor has one white and two red connectors (IEC 75.8 regulations). The CH2 channel must be always referred to the central column of the transformer.

The CH4 channel must be always referred either to the core of the transformer or to the Pt100 ambient sensor if you wish to thermo-regulate the transformer room using the NT935 control unit.

PROGRAMMING

NT935 / MODBUS INSIDE / 4.20mA ANALOG INSIDE

STEP	PRESS	EFFECT	PRESS	NOTES
1		Keep the PRG button pressed till the PRG-ON LED lights up. After PRG the ALARM threshold for CH 1-2-3 is displayed		
2		Set the desired threshold	 	Default 90°C
3		The TRIP threshold for CH 1-2-3 is displayed		
4		Set the desired threshold	 	Default 119°C
5		The CH 4 LED flashes		CH 4 enabling
6		Set YES or NO	 	with YES CH 4 is ON, with NO CH 4 is OFF
7		The ALARM threshold for CH 4 is displayed		If CH 4=NO go to step 11, Default NO
8		Set the desired threshold	 	Default 120°C
9		The TRIP threshold for CH 4 is displayed		
10		Set the desired threshold	 	Default 140°C
11		D flashes and the channel LEDs ventilation refers to light up		Default Ch1-Ch2-Ch3
12		Select NO, CH 1-2-3 or CH 4 (if CH 4 YES)	 	NO: fan disabled, go to step 30
13		ON is displayed		FAN switching on
14		The ON threshold of the FANS is displayed		
15		Set the desired threshold	 	Default 70°C
16		OFF is displayed		FAN switching off
17		The OFF threshold of the FANS is displayed		
18		Set the desired threshold	 	Default 60°C

19		The Fan2 LED flashes and the channel LEDs ventilation refers to light up Only for NT935 standard.		No: Fan2 disabled, go to step 27
20		Select NO, CH 1-2-3 or CH 4 (if CH 4 YES) Only for NT935 standard.	 	Default CH 1-2-3
21		ON is displayed Only for NT935 standard		FAN2 switching on
22		The FAN2 ON threshold is displayed Only for NT935 standard		Default 90°C
23		Set the desired threshold Only for NT935 standard	 	
24		OFF is displayed Only for NT935 standard		FAN2 switching off
25		The FAN2 OFF threshold is displayed Only for NT935 standard		
26		Set the desired threshold Only for NT935 standard	 	Default 80C
27		HFN is displayed		Cyclical test of the fans for 5 minutes every "n" hours
28		Display 000		
29		Set the desired number of hours		default 000 disabled function
30		FCD <> "datum" is displayed		Fault due to quick temperature increase (°C/sec)
31		Set the desired value (see page 30)	 	Default "no" (function excluded)
32		END is displayed		End of programming
33		Storing the settings and exiting programming		Err: incorrect programming of the LED values (note 2)
34		Return to step 1		

- 1) It is possible to go back to the previous step by pressing the **MODE** button.
- 2) If, when pressing **ENT**, "Err" is displayed, it means that one of the following errors have been made:
ALARM ≥ TRIP or FAN-OFF ≥ FAN-ON. Press **PRG** to go back to step 1 and correct the data.
- 3) After 1 minute's keyboard inactivity programming is abandoned without saving the data.
- 4) At the end of programming the **FAULT** relay is disabled till the control unit is restarted.
- 5) During programming the control unit does not control/protect the monitored machine.












ATTENTION:























We recommend you check the control unit before starting the device.

The default parameters set by **TECSYSTEM** might not suit your requirements.

Programming the device is the end user's responsibility: the set alarm thresholds and the enabled functions described in this manual must be checked (by a specialized technician) referring them to the application and system characteristics on which the control unit is installed.

NT935 AD

STEP	PRESS	EFFECT	PRESS	NOTES
1		Keep the PRG button pressed until the PRG-ON LED lights up. After PRG the ALARM threshold for CH 1-2-3 is displayed.		
2		Set the desired threshold	 	Default 90°C
3		The TRIP threshold for CH 1-2-3 is displayed		
4		Set the desired threshold	 	Default 119°C
5		The CH 4 LED flashes		CH 4 enabling
6		Set YES or NO	 	with YES CH 4 is connected with NO CH 4 is disconnected
7		The ALARM threshold for CH 4 is displayed		If CH 4=NO go to step 11, Default NO
8		Set the desired threshold	 	Default 120°C
9		The TRIP threshold for CH 4 is displayed		
10		Set the desired threshold	 	Default 140°C
11		The Fan LED flashes and the channel LEDs ventilation refers to light up		Default Ch1-Ch2-Ch3
12		Select NO, CH 1-2-3 or CH 4 (if CH 4 YES)	 	NO: fan disabled, go to step 22
13		ON is displayed		FAN switching on
14		The ON threshold of the FANS is displayed		Default 70°C
15		Set the desired threshold	 	
16		OFF is displayed		FAN switching off
17		The OFF threshold of the FANS is displayed		Default 60°C
18		Set the desired threshold	 	

19		HFN is displayed			Fan cyclic test for 5 min. every "n" hours
20		Display 000			
21		Set the desired number of hours	 		Default function disabled
22		FCD <> "datum" is displayed			Fault for quick temperature increase (°C/sec), Default NO
23		Set the desired value (see page 30)	 		From "no" (function excluded) to 30°C/sec
24		ADR <> "datum" is displayed			Modbus address Default 001
25		Set the desired address	 		From 1 to 255
26		BDR <> "datum" is displayed			Modbus transmission speed Default 9.6 Kb/s
27		Set the desired speed	 		From 2.4 Kb/s to 38.4 Kb/s
28		PAR <> "datum" is displayed			Parity bit selection Default NO
29		Set the desired parity bit	 		None (No), Even (EVE), Odd (ODD)
30		420 <> "datum" is displayed			4.20 mA output programming
31		Select the desired 4.20 mA output	 		1-2-3-4; fixed channel SCA: scan HOT: hottest channel Default SCA
32		END is displayed			End of programming
33		Storing the settings and exiting programming			Err: incorrect programming of the LED values (note 2)
34		Return to step 1			

- 1) It is possible to go back to the previous step by pressing the MODE button.
- 2) If, when pressing ENT, "Err" is displayed, it means that one of the following errors have been made:
ALARM ≥ TRIP or FAN-OFF ≥ FAN-ON. Press PRG to go back to step 1 and correct the data.
- 3) After 1 minute's keyboard inactivity programming is abandoned without saving the data.
- 4) At the end of programming the FAULT relay is disabled till the control unit is restarted.
- 5) During programming the control unit does not control/protect the monitored machine.



ATTENTION:

We recommend you check the control unit before starting the device.

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

Programming the device is the end user's responsibility: the set alarm thresholds and the enabled functions described in this manual must be checked (by a specialized technician) referring them to the application and system characteristics on which the control unit is installed.

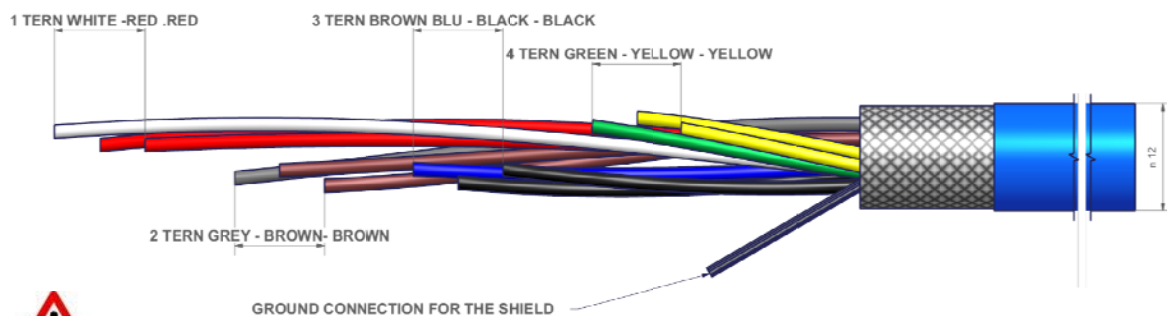
MEASUREMENT SIGNAL TRANSFER

All the cables transferring the Pt100 measurement signals (Ni100 or Ni120 option) must:

- be separated from the power cables
- be shielded cables with twisted conductors
- have at least 0.5 mm² section
- be twisted with a 60mm pitch maximum
- be firmly fixed inside the terminal boxes
- have tinned or silvered conductors

NOTE: to install the sensors and signal transferring cable correctly, read the sensor and SCS installation note manual.

TECSYSTEM S.r.l. has designed its own special cable to transfer the measurement signals, CEI-compliant, with all the protection requirements provided for: **model CT-ES**



NOTE: the use of cables not complying with the above might cause reading anomalies. It is always important to take into account that any interference on the signal lines might cause anomalies on the Pt100 inputs (CH1-CH2-CH3-CH4...) or on the sensors themselves.

All "NT" series control units have linearity of the sensor signal, with a maximum error of 1% of full scale value.

TEMPERATURE SENSOR DIAGNOSTICS

In case of failure or exceeded full scale value of one of the thermometric sensors installed on the machine to be protected, the FAULT relay switches immediately with the relative warning of faulty sensor on the corresponding channel.

Fcc highlights that the sensor is short-circuited or that the minimum full scale value of the unit -10°C for the 0°C + 240°C version and -50°C for the -40°C + 200°C version has been exceeded.

Foc highlights that the sensor is open or that the maximum full scale value of the unit 245°C for the 0°C + 240°C version and 205°C for the -40°C + 200°C version has been exceeded.

To eliminate the message and reset FAULT switching, it is necessary to check the Pt100 (Ni100 or Ni120 optional) connections and replace the faulty sensor (if any). If the minimum/maximum full scale value has been reached, check that the ambient conditions match the control unit reading.

Note: exceeding the minimum/maximum full scale value can be caused by interference on the sensor lines; in this case we recommend that you check:

the correct installation of the sensors and above all of the extension cable (as stated in the paragraph MEASUREMENT SIGNAL TRANSFER)

the activation of the FCD function of the control unit (as stated in the FCD FUNCTION NOTES on page 30).

PROGRAMMED DATA DIAGNOSTICS

In case of failure of the internal memory or alteration of the programmed data, at start-up **Ech** is displayed with the relative warning of the Fault contact.

In this case, for safety reasons, the default parameters are loaded automatically (see the programming table from page 14 to 17 according to the model purchased).

Eliminate the **Ech** message by pressing RESET and 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 repair).

TEMPERATURE DIAGNOSTICS

When one of the temperature sensors senses a temperature 1°C higher than the alarm threshold, 5 seconds later the **ALARM** relay switches and the **ALARM** LED of the interested channel (CH n) switches on.

When the trip temperature threshold is exceeded, the **TRIP** relay switches and the **TRIP** LED of the interested channel (CH n) lights up.

As soon as the temperature goes back to values equal to or lower than the threshold set for the **ALARM** and **TRIP** relays, these relays deenergise and the relative LEDs switch off.

The **ALARM** and **TRIP** values are stored in the internal memory: they can be recalled by entering the Vis modes (programmed parameter display) and modified in PRG (programming) mode.

COOLING FAN CONTROL

If properly programmed, the NT935 unit can control the fans switching ON and OFF to cool the transformer according to preset temperatures.

The fans on board the machine can be controlled two ways:

- Using the temperatures sensed by the sensors on the three columns

CHF 1.2.3
(ex. ON at 80°C - OFF at 70°C)

- With an extra sensor (**CH4/YES**) dedicated to the ambient temperature inside the transformer room.

CHF 4
(ex. ON at 40°C - OFF at 30°C)

The ON and OFF values are programmable according to the device range.

FAN TEST

By programming (**HFn**), it is possible to have the fans operating 5 minutes every "xxx" hours, regardless of the column or ambient temperature values (i.e.: with HFn=001 the fans are activated for 5 minutes every hour).

This function aims at verifying the fan operation and their control apparatus periodically.

Setting **000** as a value inhibits the function.



IMPORTANT WARNING

Before carrying out the insulation test of the electrical panel the control unit is installed on, disconnect it from the power supply to prevent it from being seriously damaged.

MODBUS RS485 OUTPUT OPTION

INTRODUCTION TO THE MODBUS INSIDE MODULE

The MODBUS INSIDE expansion module is embedded in the control unit and allows transferring data on an RS485 network with MODBUS RTU protocol.

OPERATING NOTES

For the module to work correctly, the set-up parameters of the RS485 network must be set: address, baud rate, parity bits.

See programming steps 24 to 29 as shown in the table on pages 16/17 for the AD version or the note network parameter programming from page 27 to page 29 for the ModBus inside version.

The serial communication of the temperature control unit is active only when the NT935 is in temperature control mode in one of the modes provided (Scan, Man and T.Max).

When other functions such as programming, programming display and relay test are activated, the ModBus communication is temporarily disabled.

DATA TRANSMISSION ON MODBUS NETWORK

The MODBUS INSIDE internal module allows connecting the NT935 control unit to an RS485 network with ModBus RTU protocol in order to read the data shown in the ModBus table on page 20 and write those shown in the paragraph notes for remote programming; the module is always in slave mode.

The NT935 control unit communicates with the network only when it is in temperature reading mode, while it is inactive when it is in the following modes: display, programming and relay test.

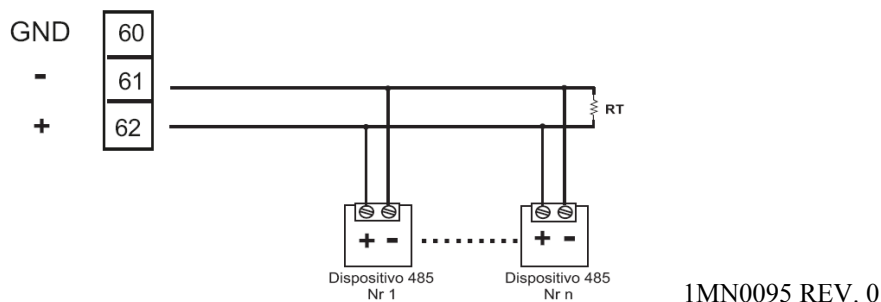
RS485 ELECTRICAL CONNECTIONS

As to the signal cable to use in order to guarantee correct network operation, follow standard EIA RS485 that recommends the use of a 24AWG pair.

The pair that connects all the units in RS485 might require a 120 ohm terminating resistor on the last unit of the series.

Connect the pair taking polarities into account and lay the network avoiding to create tight bends or ring windings so as not to change the line impedance.

If necessary, the terminal for the GND earth connection is available.



1MN0095 REV. 0

DATA FRAME

The frame in asynchronous transmission consists of: 1 start bit, 8 data bits, 1 parity bit (even or odd if parity has been set) and 1 stop bit.

The allowed Baud rates are: 2400, 4800, 9600, 19200 (38400 b/s only AD version).

Where unspecified, the length of the words (DATA) is 16 bits.

DATA PACKET

A complete sequence of request/answer consists of the following: Master

request:

SLAVE ADDRESS	- 1 byte
FUNCTION CODE	- 1 byte
DATA	- variable, depends on the function code
CRC	- 2 bytes

Slave request:

SLAVE ADDRESS	- 1 byte
FUNCTION CODE	- 1 byte
DATA	- variable, depends on the function code
CRC	- 2 bytes

FUNCTION CODE

The ModBus module supports the following function codes:

3₍₁₀₎: - holding register reading

16₍₁₀₎: - multiple register writing

If ModBus receives a message and the presence of a CRC error is confirmed, 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.

Answer:

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.

Answer:

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

The writable registers contain the following data: Alarm, Trip, Fan-on, Fan-off.

So the possible starting addresses are: **00-17** for the alarm thresholds, **00-25** for the Trip thresholds, **00-33** for the Fan-On thresholds, **00-41** for the Fan-Off thresholds and **00-73** for optional variables that might be present on special models.

The Number of Point LO parameter can be set between 1 and 8 (max).

If a writing request is sent to an address other than the above, ModBus shall answer with an error code 02 (incorrect data address).

If a writing request is sent for more than 8 registers (Number of point LO), ModBus will not be able to accept the request and will not answer, so the request will time out.

NOTES FOR REMOTE PROGRAMMING

If you wish to program an NT935 unit, keep in mind that the Alarm settings of Channels 1-2-3 (registers 00-17, 00-18, 00-19) must have the same values since the unit manages them as channels with common thresholds. The same must be remembered for the Trip thresholds (registers 00-25, 00-26, 00-27).

The Fan-on thresholds (registers 00-33, 00-34, 00-35, 00-36) must all be set with the same value. The Fan-off thresholds (registers 00-41, 00-42, 00-43, 00-44) must all be set with the same value.

Also in the remote programming stage via ModBus it is necessary to consider 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.

If an attempt is made to set these thresholds incorrectly, the NT935 control unit will not set and store the data, so the data of the previous programming will not be changed.

After sending a writing request the control unit will take about 1" to store the data in eeprom; while storing the ModBus module will not be able to process any other requests.

If the programming request is successful, the control unit resets automatically and loads the new values.

ERROR CODES (exception code)

If the request is incorrect, ModBus will answer with modified codes and codified errors as follows: 1:

- Unsupported function code
- 2: - Incorrect data address
- 3: - Incorrect data (i.e. length)

POLLING FREQUENCY

A polling frequency greater than or equal to 1 second is recommended.
More frequent polling may overload the system, without bringing any benefit.

MODBUS MAPPING TABLE

Address HI ₍₁₀₎	Address LO ₍₁₀₎	Data HI	Data LO	Primary tables	Note
00	01	00	Ch1 temperature	Holding register	Range 0-240° Offset 10 ₍₁₀₎ 10=0°C 11=1°C 12=2°C Range -40+200° Offset 50 ₍₁₀₎
00	02	00	Ch2 temperature	Holding register	
00	03	00	Ch3 temperature	Holding register	
00	04	00	Ch4 temperature	Holding register	
00	05	00	Not used	Holding register	only for 8 channel versions, also for the followin variable "status"
00	06	00	Not used	Holding register	
00	07	00	Not used	Holding register	
00	08	00	Not used	Holding register	
00	09	00	Ch1 status	Holding register	Bit 7: Trip Flag
00	10	00	Ch2 status	Holding register	Bit 7: Alarm Flag
00	11	00	Ch3 status	Holding register	Bit 7: Fan Flag

Address HI ₍₁₀₎	Address LO ₍₁₀₎	Data HI	Data LO	Primary tables	Notes
00	12	00	CH4 Status	Holding register	Bit 4: Not used
00	13	00	Not used	Holding register	Bit 3: Foc Flag
00	14	00	Not used	Holding register	Bit 2: Fcc Flag
00	15	00	Not used	Holding register	Bit 1: Fan Flag function enabled
00	16	00	Not used	Holding register	Bit 0:Flag channel enabled
00	17	00	Alarm Set-point Ch1	Holding register	
00	18	00	Alarm Set-point Ch2	Holding register	
00	19	00	Alarm Set-point Ch3	Holding register	
00	20	00	Alarm Set-point Ch4	Holding register	
00	21	00	Not used	Holding register	only for 8 channel versions
00	22	00	Not used	Holding register	
00	23	00	Not used	Holding register	
00	24	00	Not used	Holding register	
00	25	00	Trip Set-point Ch1	Holding register	
00	26	00	Trip Set-point Ch2	Holding register	
00	27	00	Trip Set-point Ch3	Holding register	
00	28	00	Trip Set-point Ch4	Holding register	
00	29	00	Not used	Holding register	only for 8 channel versions
00	30	00	Not used	Holding register	
00	31	00	Not used	Holding register	
00	32	00	Not used	Holding register	

Address HI ₍₁₀₎	Address LO ₍₁₀₎	Data HI	Data LO	Primary tables	Notes
00	33	00	Fan-On Set-point Ch1	Holding register	
00	34	00	Fan-On Set-point Ch2	Holding register	
00	35	00	Fan-On Set-point Ch3	Holding register	
00	36	00	Fan-On Set-point Ch4	Holding register	
00	37	00	Not used	Holding register	only for 8 channel versions
00	38	00	Not used	Holding register	
00	39	00	Not used	Holding register	
00	40	00	Not used	Holding register	
00	41	00	Fan-Off Set-point Ch1	Holding register	
00	42	00	Fan-Off Set-point Ch2	Holding register	
00	43	00	Fan-Off Set-point Ch3	Holding register	
00	44	00	Fan-Off Set-point Ch4	Holding register	
00	45	00	Not used	Holding register	only for 8 channel versions
00	46	00	Not used	Holding register	
00	47	00	Not used	Holding register	
00	48	00	Not used	Holding register	
00	49	00	T. max Ch1	Holding register	Range 0-240° Offset 10 ₍₁₀₎ 10=0°C 11=1°C 12=2°C Range -40+200° Offset 50 ₍₁₀₎
00	50	00	T. max Ch2	Holding register	
00	51	00	T. max Ch3	Holding register	
00	52	00	T. max Ch4	Holding register	

Address HI ₍₁₀₎	Address LO ₍₁₀₎	Data HI	Data LO	Primary tables	Notes
00	53	00	Not used	Holding register	only for 8 channel versions, also for the following variable "Mem_All"
00	54	00	Not used	Holding register	
00	55	00	Not used	Holding register	
00	56	00	Not used	Holding register	
00	57	00	Mem. All Ch1	Holding register	Bit 7: Trip memory flag
00	58	00	Mem. All Ch2	Holding register	Bit 6: Alarm memory flag
00	59	00	Mem. All Ch3	Holding register	Bit 5: Fan memory Flag
00	60	00	Mem. All Ch4	Holding register	Bit 4: not used
00	61	00	Not used	Holding register	Bit 3: Foc memory flag
00	62	00	Not used	Holding register	Bit 2: Fcc memory flag
00	63	00	Not used	Holding register	Bit 1: not used
00	64	00	Not used	Holding register	Bit 0: not used
00	65	00	General Flag	Holding register	B0:sign -, B1:reset_all, B2:fan cycle
00	66	00	(system datum)	Holding register	(system datum)
00	67	00	Num_Ch (-1)	Holding register	Number of enabled channels
00	68	00	(system datum)	Holding register	(system datum)
00	69	00	Prg_Hfan	Holding register	Hours x fan test cycle

Address HI ⁽¹⁰⁾	Address LO ⁽¹⁰⁾	Data HI	Data LO	Primary tables	Notes
00	70	00	Byte Special Function	Holding register	Bit 7: not used Bit 6: not used Bit 5: not used Bit 4: not used Bit 3: not used Bit 2: Fan2 enable (Only NT935) Bit 1: Trip Failsafe Flag (N.C) Bit 0: Alarm Failsafe Flag (N.C) Alarm
00	71	00	SET_FCD	Holding register	000=disable
00	72	00	FAULT FCD	Holding register	Bit7= Ch8 Bit0= Ch1
00	73	00	Fan2-ON Ch1	Holding register	Only x NT935
00	74	00	Fan2-ON Ch2	Holding register	Only x NT935
00	75	00	Fan2-ON Ch3	Holding register	Only x NT935
00	76	00	Fan2-ON Ch4	Holding register	Only x NT935
00	77	00	Fan2-OFF Ch1	Holding register	Only x NT935
00	78	00	Fan2-OFF Ch2	Holding register	Only x NT935
00	79	00	Fan2-OFF Ch3	Holding register	Only x NT935
00	80	00	Fan2-OFF Ch4	Holding register	Only x NT935

CRC CALCULATION

This protocol includes 2 CRC-16 bytes in each transmission. The characteristic polynomial (11000000000000101B) is used for the calculation and the result is "hung" at the end of the packet. The polynomial is used in reverse order with the most significant bit suppressed because useless for the purpose of the calculation.

PARAMETER DESCRIPTION

A - 16bit registers
AL – A low part
AH – A high part
i,j, METERS
(+) - EXCLUSIVE OR
Di - Datum of the «i»th frame of the packet
N - number of bytes in the packet excluding the 2 of the CRC
G - Polynomial: 1010-0000-0000-0001
shr - shift to the right

ALGORITHM

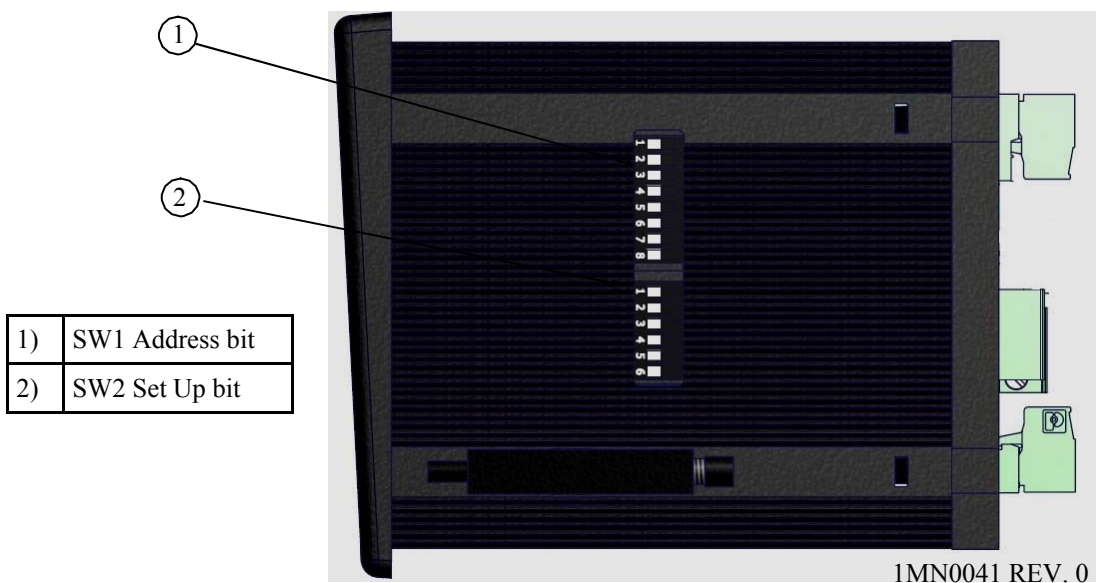
- 1) 0xFFFF -> A
- 2) 0 -> i
- 3) 0 -> j
- 4) Di (+) AL -> AL
- 5) j +1 -> j
- 6) shr A
- 7) if carry then G (+) A -> A
- 8) if NOT j=8 then go to 5
- 9) i +1 -> i
- 10) if NOT i = N then go to 3
- 11) A -> in CRC (the result is in order L,H)

NETWORK PARAMETER PROGRAMMING (ONLY FOR MODBUS INSIDE VERSION)

In order to configure the connection with the RS485 ModBus-RTU network it is necessary to set some parameters using the settings of the SW1 and SW2 dip switches.

- A) Activate the programming mode positioning DIP-5 of SW2 on 1 (ON)
- B) Select the address (from 1 to 32) of the unit using the SW1 dip switches and in compliance with the combinations shown in the table on page 28.
- C) Select the requested baud rate (2400-4800-9600-19200) with DIP-1 and DIP-2 of SW2 as shown in the table on page 29.
- D) Select the desired settings for the Parity bit (none-even-odd) using the combinations of DIP-3 and DIP-4 of SW2.
- E) If necessary enable the 120 ohm termination by activating DIP-6 of SW2.
- F) Finally reposition on 0 (OFF) DIP-5 of SW2 to confirm the settings. The modulo returns to "run" mode.

DIP SWITCH CONNECTIONS AND SETTINGS



SWITCH NT935 MODBUS
(ONLY FOR MODBUS INSIDE VERSION)

SW1: ADDRESS BIT



1 2 3 4 5 6 7 8

1: Bit 7

2: Bit 6

3: Bit 5

4: Bit 4

5: Bit 3

6: Bit 2

7: Bit 1

8: Bit 0

Address	1: B7	2: B6	3: B5	4: B4	5: B3	6: B2	7: B1	8: B0
1	0	0	0	0	0	0	0	1
2	0	0	0	0	0	0	1	0
3	0	0	0	0	0	0	1	1
4	0	0	0	0	0	1	0	0
5	0	0	0	0	0	1	0	1
6	0	0	0	0	0	1	1	0
7	0	0	0	0	0	1	1	1
8	0	0	0	0	1	0	0	0
9	0	0	0	0	1	0	0	1
10	0	0	0	0	1	0	1	0
11	0	0	0	0	1	0	1	1
12	0	0	0	0	1	1	0	0
13	0	0	0	0	1	1	0	1
14	0	0	0	0	1	1	1	0
15	0	0	0	0	1	1	1	1
16	0	0	0	1	0	0	0	0
17	0	0	0	1	0	0	0	1
18	0	0	0	1	0	0	1	0
19	0	0	0	1	0	0	1	1
20	0	0	0	1	0	1	0	0
21	0	0	0	1	0	1	0	1
22	0	0	0	1	0	1	1	0
23	0	0	0	1	0	1	1	1
24	0	0	0	1	1	0	0	0
25	0	0	0	1	1	0	0	1
26	0	0	0	1	1	0	1	0
27	0	0	0	1	1	0	1	1
28	0	0	0	1	1	1	0	0
29	0	0	0	1	1	1	0	1
30	0	0	0	1	1	1	1	0
31	0	0	0	1	1	1	1	1
32	0	0	1	0	0	0	0	0

SW2: SETUP BIT



1 2 3 4 5 6

- | | |
|------------------|--------------------|
| 1: Baud rate | 4: Parity Even/Odd |
| 2: Baud rate | 5: On=Prg, Off=Run |
| 3: Parity enable | 6: Term. 120 ohm |

Baud Rate (bit/sec)	Dip-1	Dip-2
2400	0	0
4800	0	1
9600	1	0
19200	1	1

Parity	Dip-3	Dip-4
None	0	0 / 1
Even	1	1
Odd	1	0

Term. 120Ω	Dip-6
Disable	0
Enable	1

4.20mA OUTPUT OPTION

4.20 mA OUTPUT

It is possible to connect a display or acquisition device to the 4.20 mA output. The load impedance allowed for each output goes **from 0 to 500 ohm**.

The loop is optoisolated to guarantee maximum protection from interference.

The 4-20 mA signal refers to the 0-240°C range with a 1% precision with regards to the full scale value.

In the **NT935 Analog inside** version the output refers to the channel displayed, according to the selected display mode **SCAN-AUTO-MAN**, moreover it is possible to request special calibration with reference:

- 0°C + 150 °C
- 0°C + 200 °C
- -40°C + 200 °C

In the **NT935 AD** version the output can be programmed in the following modes:

- 1-2-3-4:** the 4.20 mA output refers to the fixed channel that has been set.
SCAN: the 4.20 mA output automatically scans the active channels every 2 seconds (default setting)
HOT: the 4.20mA output automatically refers to the hottest of the active channels

See steps 30 – 31 of the table on page 17.

The current temperature ratio varies according to the temperature range of the device:

For the range 0°C + 240°C the ratio is: $I_{out} = (T/15)+4$ (T=temperature in °C)

For the range 0°C + 150°C the ratio is: $I_{out} = (T/9.375)+4$ (T=temperature in °C)

For the range 0°C + 200°C the ratio is: $I_{out} = (T/12.5)+4$ (T=temperature in °C)

For the range -40°C + 200°C the ratio is: $I_{out} = (T/15)+6.7$ (T=temperature in °C)

Example of the range 0°C + 240°C:

If T=100°C $I_{out} = 100/15+4 = 10.67 \text{ mA } (\pm 0.2 \text{ mA})$

TECHNICAL SPECIFICATIONS OF THE EXTENSION CABLE FOR Pt100

(Optional Ni100 or Ni120)

1. Cable 20 x AWG 20/19 Cu/Sn
2. Section 0.55 mm²
3. Flame retardant insulation PVC 105
4. CEI 20.35 IEC 332.1 regulations
5. Maximum operating temperature: 90°C
6. Conformation: 4 sets of three twisted and coloured conductors
7. Shield in Cu/Sn
8. Flame retardant PVC sheath
9. External diameter 12mm
10. Standard conformation in 100m coils

FCD FUNCTION

The NT series equipment boasts an innovative control function combined with the dynamic status of the Pt100 sensor (Optional Ni100 or Ni120).

Activating FCD, the control unit analyses the increase in temperature ΔT (*) recorded in a second (°C/sec).

Enabling the function, the user can select the value (ΔT) from a minimum of 1°C/sec to a maximum of 30°C/ sec. If the value sensed is higher than the value set by the user, the control unit inhibits the possible activation of the ALARM and TRIP alarms and switches the FAULT relay (7-8-9), displaying the message "Fcd fault".

Example: if we set the function to 5°C, FAULT for FCD will switch only if the control unit senses an increase in ΔT of over 5°C in a second on the monitored system.

Setting "no" disables the FCD function.

When a channel is in FAULT for FCD, the Alarm and Trip warnings are inhibited; therefore only the quick temperature increase is highlighted.

Press Reset to delete the FCD warnings on all channels and reset the FAULT relay.

Possible FCD applications

Identification of a possible induced disturbance on the Pt100 sensor line (optional Ni100 or Ni120)

If the installation instructions are not complied with (see page 18), any disturbance on the Pt100 (optional Ni100 or Ni120) sensor line can cause false readings or anomalous alarms.

Setting the FCD function in a temperature range of between 1°C and 10°C (5°C recommended), the effects caused by false readings can be suppressed and the alarm relay activation can be prevented, as shown above.

Corrective actions: check the installation of the sensor extension cable is in line with the instructions given in the paragraph on the measurement signal transfer on page 18.

Identification of a sensor fault or faulty connection

In case of a faulty connection or sensor fault, a quick positive or negative variation in temperature might occur, leading to the system tripping or the alarms of the monitored system to be triggered.

In this specific case we recommend the FCD function to be set in a temperature range of between 10°C and 20°C.

Corrective actions: check the terminals the sensor is connected to are tightened and replace the faulty sensor, if required.

Identification of the electrical motor rotor block

In case of temperature control of the electrical motors, the quick temperature increase might be due to a blocked rotor.

In this specific case we recommend the FCD function to be set in a temperature range of between 20°C and 30°C. This setting is recommended in order to prevent the FCD function from activating during motor startup, or where the ΔT /sec. increase varies quickly.

(*) The ΔT value shows the temperature range for each second.

WARRANTY REGULATIONS

The purchased product is covered by manufacturer's or seller's warranty as per the "Tecsystem s.r.l.'s General Conditions of Sale" available at www.tecsystem.it and/or the purchase agreement drawn up.

Said Warranty is valid only when the Product fails due to reasons attributable to TECSYSTEM srl, such as manufacturing faults or faulty components.

The Warranty is invalid when the product is tampered with / modified, connected incorrectly, causing voltages outside the permitted limits, non-compliant with the use and installation technical specifications, as described in this instruction manual.

The Warranty is always ex our Corsico works, 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 correctly inserted into its housing, the wires are tightened, there is no evidence of burning on the connectors. Disconnect the power supply, carry out the above and reconnect.
CH4 is in FAULT because of FOC (only the 3 Pt100 sensors are connected)	Programming error of the CH4 / YES control unit. <i>Check and repeat programming as per page 14-15 or 16-17, select CH4 / NO.</i>
One of the three/four channels is in FAULT due to FOC/FCC	Check the connections of the Pt100 sensors, check the instructions given in the paragraphs: <i>measurement signal transfer and temperature sensor diagnostics on page 18.</i>
On startup "ECH" is displayed	Strong disturbance has damaged the data in the memory. See the paragraph Programmed data diagnostics on page 19.
All the PT100 sensors are in FCC.	Incorrect sensor connection, the terminal block has been inserted upside down. <i>Check both connections and terminal block.</i>
The temperature shown by one or more channels is incorrect.	Contact the <i>TECSYSTEM Technical Department.</i>
The main switch is tripped unexpectedly. The temperature is within range. One channel has caused the switch to trip.	Check the temperatures recorded in T-MAX, check the instructions given in the paragraphs: <i>measurement signal transfer and temperature sensor diagnostics on page 18. Activate the FCD function.</i>
FCD warning	See the FCD function on page 30.

Contact *TECSYSTEM Technical Department* if the problem persists.

EQUIPMENT DISPOSAL

European directives 2012/19/EC (WEEE) and 2011/65/EC (RoHS) have been approved to reduce electrical and electronic waste and promote the recycling and reuse of the materials and components of this equipment, cutting down on the disposal of the residues and harmful components of electrical and electronic materials.



All the electrical and electronic equipment supplied after 13 August 2005 is marked with this symbol, pursuant to the European directive 2002/96/EEC 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 used electrical devices: contact TECSYSTEM or the TECSYSTEM agent for information on the correct disposal of the devices.

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: ufficiotecnico@tecsystem.it

COMMERCIAL INFORMATION: info@tecsystem.it

[PRODUCT INFORMATION \(CATALOGUES\)](#)

[DOWNLOAD CONTROL UNIT MANUALS](#)

[ACCESSORIES](#)

UL RATINGS

INPUT SUPPLY	24 – 240 Vac / Vdc, 50/60 Hz, 12 VA max
ALARM OUTPUTS RELAYS	Vac , 5 A with resistive load, 30'000 cycles , maximum three provided
FAN OUTPUTS RELAY	250 Vac , 1/3 hp , 30'000 cycles , one provided
AMBIENT TEMPERATURE	60 °C