

Termoregolatori Digitali FHT ...

Manuale d'uso



User Manual Digital Heat Regulators



Vemer
SPA

Table of contents

■ Safety instructions	Page	30
■ Technical specifications	Page	30
■ Device description	Page	32
■ Wiring	Page	33
■ Glossary	Page	33
■ Operation	Page	38
■ Setting regulation parameters	Page	38
■ Parameter menu	Page	40
■ Error messages	Page	50
■ Serial communication	Page	50
■ Reference standards	Page	51
■ Dimensions and wiring diagrams 33x75 mm	Page	52-53
■ Dimensions and wiring diagrams 4-DIN	Page	54-55

SAFETY INSTRUCTIONS

■ During the installation and operation of the device observe the following instructions:

- 1) Device must be installed by a qualified person
- 2) To install device, carefully respect wiring diagrams
- 3) Do not power or connect the device if any part of it is damaged
- 4) Before making contact with terminals, ensure that conductors to be connected to the device are not live
- 5) Connection wires must be able to resist maximum operating temperature (T_{max}), calculated by adding maximum ambient temperature (T_a) estimated + 20° C ($T_{max} = T_a + 20^{\circ}\text{C}$)
- 6) The device guarantees an isolation factor between low-voltage sections (250 V) and very low-voltage sections
- 7) If any external switches are connected to the device, minimum isolation of 250 V AC at operating temperature must be guaranteed or they must be protected with isolation of equal value
- 8) Contacts: all type 1C (EN 60730-1 and variations)
- 9) The device does not require maintenance

TECHNICAL SPECIFICATIONS

- This series of digital temperature thermoregulators satisfies the basic requirements of thermoregulation.
They may be used as heating or cooling controllers or as maximum/minimum alarms.
- Two models designed for probe input:
- **PTC temperature probes** (Positive Temperature Coefficient)-Ni100, Pt100 **FHT**
 - **TC Thermocouples** – J, K, L, R, S, T, E, N **FHT**
 - **Linear probes** **FHT**
 - **NTC temperature probes** (Negative Temperature Coefficient) **FHT NTC**
- For each individual model, probe input can be configured by keyboard
 - Models FHT NTC have two probe inputs so that the measuring of two temperatures can be displayed alternately by opening and closing an outside source connected to the device
 - Available in versions with 1 or 2 changeover contact relays
 - Thermoregulators with 3 seven-segment digits plus decimal point led display
 - Relay-on signalling LED
 - T2-reading warning LED (only models FHT NTC-2DA)
 - Display Range: $-99 \div +999^{\circ}\text{C}$

- Display resolution: 0,1 °C (-9,9 ÷ +99,9 °C) and 1 °C (< -9,9 °C and > +99,9 °C)
- Accuracy: ± 0,5 % of scale limit value ±1 digit (at ambient temperature 23 °C)
- Sampling time: 0,5 s
- Digital configuration of parameters:
 - Set-point
 - Differential
 - Dead band
 - Timing of output activation
 - Digital-input operation and delay
 - Alarm/Buzzer start delay
 - Probe calibration OFFSET
 - Reading Resolution
 - Temperature measurement unit
 - Measurement display filter (update speed)
 - Type of probe input
 - Password
 - Operation mode (regulation):
 - ON/OFF Direct and/or Reverse action with or without Dead Band
 - PWM, Direct, Reverse and Dead Band action
 - ALARM
 - Cooling Mode
 - Special Mode
- 2 independent set-points
- Outputs: 1 or 2 changeover contact relays 8A/250 V AC1
- Analog output (excluding model FHT NTC): 0 ÷ 10 V (applicable for power supply ≥ 15 V AC/DC), 4 ÷ 20 mA
- Optoisolated serial communication output RS 485 (MODBUS communication protocol)
- Digital input: 1 with configurable-function external consent external alarm, ON/OFF regulation, selection of probe to be displayed, set-point switching, Direct/Reverse switching,...)
- Acoustic and visual alarm system for: external alarm (from digital input), probe alarm (malfunction), minimum or maximum alarm
- Infrared receiver with RC-5 protocol (excluding model FHT NTC-2DA) for remote-control (accessory available separately for remote programming)
- Available for models with: backboard mounting 33x75mm and 4 DIN modular mounting
- Power supply: See table on next page
- Nominal power: 3VA for 33x75 backboard-mounting models 4,5 VA for 4 DIN modular-mounting models
- Max. power input: 100 mA at 12 V; 50 mA at 24 V (1 channel)
- Operating Temperature: 0 ÷ +50 °C
- Operating humidity: <80%
- Storage Temperature: -10 ÷ +70 °C (<80% RH)
- Protection degree: front IP54 (IP40 for 4 DIN model)
terminals IP20

Backpanel 33x75 mm

Code	Model	Power (*)	Relay n°	Analog output	Digital input	Infrared receiver
VM666500	FHT 1P3D	12÷24V AC/DC	1	YES	YES	YES
VM667300	FHT 2P3D	12÷24V AC/DC	2	YES	YES	YES
VM668100	FHT NTC-2P3D	12÷24V AC/DC	2	NO	YES	YES

4-DIN version

Code	Model	Power (*)	Relay n°	Analog output	Digital input	Infrared receiver
VM669900	FHT 1DA	24/230V AC	1	YES	YES	YES
VM670700	FHT 2DA	24/230V AC	2	YES	YES	YES
VM671500	FHT NTC-2DA	24/230V AC	2	NO	YES	NO

(*) AC powered; frequency 50/60 Hz, power tolerance AC/DC $\pm 10\%$

DEVICE DESCRIPTION**Display**

- 3-digit with decimal point LED display.
Reading range for all models is:
- minimum reading: -99 °C or -9,9 °C
- maximum reading: 999 °C or 99,9 °C

Note: reading resolution is:

0,1°C in -9,9 ÷ 99,9°C range and 1°C in -99 ÷ -10°C and 10 ÷ 99°C

Relay-on signalling LED

- **Out 1:**
LED remains off if relay one is OFF and on if relay one is ON, flashing if relay one in OFF position is about to turn ON because of set timing.
- **Out 2:**
LED remains off if relay two is OFF and on if relay two is ON, flashing if relay two in OFF position is about to turn ON because of set timing.

Keys

- Parameters are configured using three keys:



To confirm parameters set/viewed.



To increase parameter or move on to next parameter.



To decrease parameter or exit menu.

WIRING

- Carefully follow all the information in the Safety instructions and Wiring diagrams sections.

GLOSSARY

Set-point

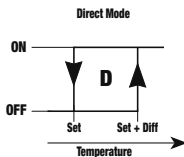
- The set-point is the reference value where the device cuts in to keep the parameter controlled at the desired value.

Differential (or hysteresis)

- The differential is the maximum allowable parameter deviation from the set-point before the device cuts in.
It is usually set in a way as to avoid rapid changes around the set-point which could cause the device, or the equipment it is connected to, to turn on and off frequently.

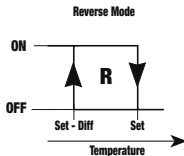
Direct action

- When a regulator restricts parameter increase, it operates in a **direct** way.
As in a refrigerating system for example: as temperature increases, the heat extraction rate produced also increases in order to lower the temperature



"Reverse" action

- When a regulator tends to restrict parameter decrease, it operates in **reverse**.
For example a decrease in temperature in a heating system corresponds to an increase of heat production.



Neutral zone or Dead band

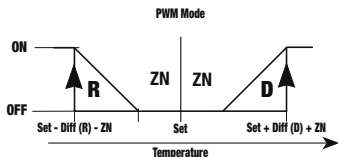
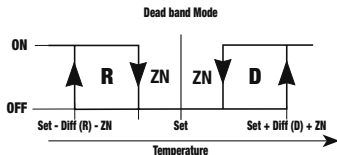
- Indicates an interval of values spanning above and below the set-point, in which the parameter regulated can change without having to activate any output.
It is usually used in devices which, due to substantial system inertia, the set-point can be exceeded even after the equipment is switched off, or to avoid the overlapping of heating and cooling actions.

No output is activated within the dead band; outside the dead band the device operates by **direct** action if the parameter controlled increases and by **reverse** action if it decreases.

PWM operating mode (time-controlled proportionate)

- Dead-band operation featuring relays activated periodically by impulse (settable timing, see Output menu).
The PWM mode modulates the power based on the position of the parameter within the differential (power increases as deviation from set-point increases).

Warning: Not recommended for use with compressors, as this would cause short start/stop periods.



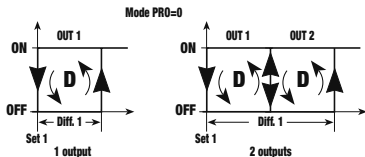
Direct operating mode [PRO=0]

- When in this mode, all outputs operate in **direct**.

Set-point 1 [ST1] and differential 1 [DF1] must be assigned values. Hysteresis is to the right of the set-point.

If both outputs are used, the hysteresis of each output is equal to half of the differential.

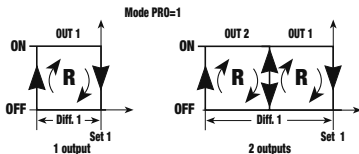
In this case output 1 will turn on when the parameter measured reaches value [ST1]+[DF1]/2; output 2 will turn off on reaching this value.



Reverse operating mode [PRO=1]

- When in this mode, all outputs operate in **reverse**.

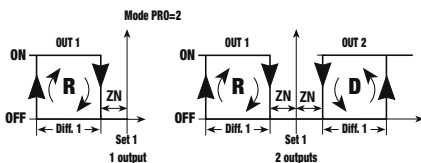
Set-point 1 [ST1] and differential 1 [DF1] must be assigned values. Hysteresis is to the left of the set-point.



If both outputs are used, the hysteresis of each output is equal to half of the differential. In this case output 1 will turn on when the parameter measured reaches the value $[\text{ST1}] - [\text{DF1}] / 2$; output 2 will turn off on reaching this value.

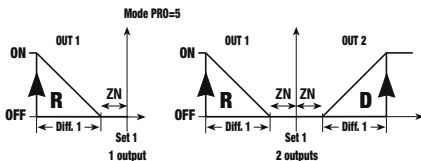
Dead-band operation mode [PRO=2]

- When in this mode output 1 operates in **reverse** and output 2 in **direct**. It is necessary to configure parameters set-point 1 $[\text{ST1}]$, differential 1 $[\text{DF1}]$ and dead band $[\text{DBN}]$, which typify both outputs. The regulator will tend to keep the parameter within the dead band. Outside the dead band output 2 will turn on if the parameter tends to increase; conversely output 1 will turn on if the parameter tends to decrease. If only one output is present, it will operate in **reverse**, with the hysteresis to the left of the value $[\text{DBN}]$.



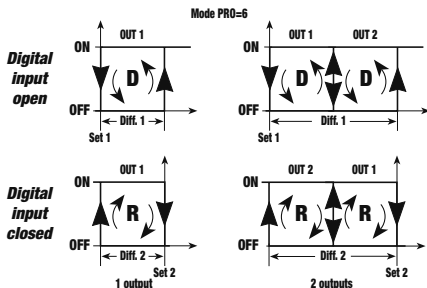
PWM operating mode [PRO=5]

- The regulation logic of this operating mode is the same as that of the dead band operating mode. It is therefore necessary to configure parameters set-point 1 $[\text{ST1}]$, differential 1 $[\text{DF1}]$ and dead band $[\text{DBN}]$, which typify both outputs. When in this operating mode, relays are activated by impulses with the timing given by value $[\text{TCL}]$ (see output menu). During that period the relay remains on for a variable length of time that is proportionate to parameter deviation from the set-point (considering the dead band when present). Beyond the differential value, the relay remains active 100% of the time.



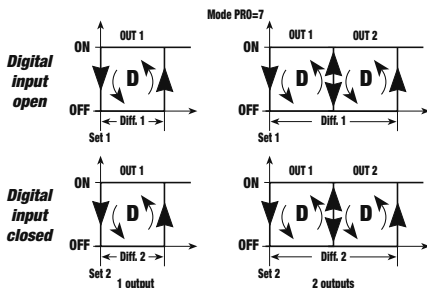
Operating mode with Direct/Reverse change-over from digital input [PRO=6]

- When in this mode both outputs operate in **direct** (with set-point 1 and differential 1) or both in **reverse** (with set-point 2 and differential 2) depending on digital input status.. More precisely, in **direct** if the digital output is open and in **reverse** if it is closed. Operating functions are the same as in modes 0 and 1. Therefore both set-points [ST1] and [ST2] and both differentials [DF1] and [DF2] must be configured.



Direct operating mode with set-point and differential change-over from digital input [PRO=7]

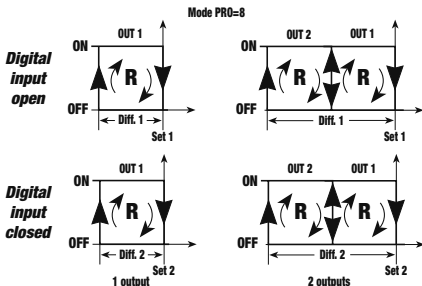
- When in this mode both outputs operate in **direct**, with set-point 1 /differential 1 or set-point 2/differential 2) depending on digital input status. More precisely, with set-point 1/differential 1 if the digital input is open and set-point 2/differential 2 if it is closed. Operating functions are the same as in mode 0. Both set-points [ST1] and [ST2] and both differentials [DF1] and [DF2] must be configured.



Reverse operating mode with set-point and differential change-over from digital input [PRO=8]

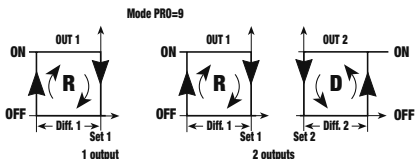
- When in this mode both outputs operate in **reverse**, with set-point 1 /differential 1 or set-point 2/differential 2, depending on the status of the digital input. More precisely, with set-point 1/differential 1 if the digital input is open and set-point 2/differential 2 if it is closed.

Operating functions are the same as in mode 1. Therefore both set-points [ST1] and [ST2] and both differentials [DF1] and [DF2] must be configured.



Operating mode with outputs 1 and 2 respectively in reverse with set-point 1 and diff.1 and direct with set-point 2 and diff. 2 [PRO=9]

- When in this mode output 1 operates in **reverse** and output 2 in **direct**. It is necessary to configure set-points 1 [ST1] and differential 1 [DF1] for output 1, and set-point 2 [ST2] and differential 2 [DF2] for output 2. Operating functions are the same as in modes 0 and 1. If only one output is present it will operate in reverse.

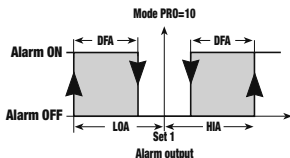


Alarm operating mode [PRO=10]

- When in this mode output 1 operates in **reverse** (with dead band) whilst output 2 is reserved for the alarm.. It is necessary to configure set-point 1 [ST1], differential 1

[DF1] and dead band **[DB1]** for output 1, and all parameters on the alarm menu for output 2. The maximum alarm trips when the value **[ST1]+[HIA]** is reached and is disengaged on reaching value **[ST1]+[HIA]-[DFA]**. The minimum alarm trips when the value **[ST1]-[LOA]** is reached and is disengaged on reaching value **[ST1]-[LOA]+[DFA]**.

When only one output is provided, it will be reserved for the alarm with the same functions.



OPERATION

Normal operation

Operation when parameters are not being programmed/configured.

When in this status, the device effects regulation based on the temperature measured and the parameters set. The information displayed is:

- Temperature measured by the sensor
- Status of output OUT1 and, in devices with two outputs, OUT 2

SETTING REGULATION PARAMETERS

There are two types of programming for regulation parameters:

- Simple programming
- Advanced programming

Note: to restore default factory-set values, turn on the device while pressing the "OK" key.

Simple programming

To change parameters in the Regulation menu [REG] only. This programming is accessed by pressing the "OK" key.

Depending on the selected operating mode, the following parameters can be configured (see System menu [SYS]):

- set, differential, regulation ON/OFF, minimum sensor reading, maximum sensor reading

Parameter labels can be scanned in a circular motion by using the "up" (▲) key. To exit the menu and return to normal operation, press the "down" (▼) key at any time

(which occurs automatically if no key is pressed for at least 40 s). To switch from parameter label reading to the reading of the relevant numeric value, press the “OK” key.

To change a parameter:

- from label or value reading, hold the “OK” key pressed for at least three seconds.
- the display will begin to flash the parameter value.
- use the “up” (▲) and “down” (▼) keys respectively to increase or decrease said value.
- press the “OK” key to confirm the change and exit (the display will stop flashing).

Note: if no key is pressed within 40 seconds, the device will quit parameter configuration and no changes will be stored.

During the display and change of parameters the device will continue operating with the previous settings.

If “password 1” is enabled (access password for the protection of settings - **see system menu**), the display will read “- - -” when the “OK” key is pressed from normal status.

To proceed with parameter configuration, enter the previously set password (a numeric value from 0 to 255) using the “up” (▲) and “down” (▼) keys and then press “OK” to confirm.

If the password entered is correct the regulation menu will appear; otherwise normal status will return.

Advanced programming

To enter advanced programming from normal status, press the “up” (▲) and “down” (▼) keys simultaneously for at least 3 seconds.

Note: to restore factory-set default values, turn on the device while pressing the “OK” key.

These parameters are classified by type into nine menus:

- 1) Regulation** (indicated by label **[REG]**): set-point, differential, dead band
- 2) Output** (indicated by label **[OUT]**): timing of output activation, timing of PWM cycle
- 3) Digital input** (indicated by the label **[ING]**): function, delay time
- 4) Alarm** (indicated by label **[ALR]**): probe alarm output status, minimum/maximum shift, differential, delay time, buzzer on/off
- 5) Display** (indicated by label **[DSP]**): set-point limits, probe offset, resolution, measurement unit, reading filter
- 6) Sensor** (indicated by label **[SNS]**): sensor type, sensor parameters
- 7) System** (indicated by label **[SYS]**): password, change enabling, operating mode

- 8) Analog output** (indicated by label **[ANG]**): type of analog output
9) Advanced (indicated by label **[ADD]**): dependency, type, insertion, differential/logic

All the parameters within the nine menus and their corresponding values, are listed in the following section.

- To scan the nine menus in sequence use the **“up”** (▲) key
- To enter the selected menu press the **“OK”** key
- **Configurable parameter labels** can be scanned within each menu by pressing the **“up”** (▲) key; to view a parameter value press **“OK”** (to view parameter label again press the **“OK”** key one more time).
- To change the **parameter value**, hold the **“OK”** key pressed for at least three seconds.
- The parameter value will begin flashing: increase/decrease using the **“up”** (▲) and **“down”** (▼) keys respectively.
- To confirm the change press **“OK”**.
The parameter will stop flashing and the new value will be displayed
- It is possible to return to normal operation at any time by pressing the **“down”** (▼) key (or not pressing any key for at least 40 seconds)

Note: if when configuring parameters no key is pressed within 40 seconds , the parameter label will be displayed again and none of the changes entered will be saved.

Note: During the display and change of parameters the device will continue operating with the previous settings.

If “password 2” has been enabled (access password for the protection of settings - **see system menu**), the display will read “- - -” when the **“up”** (▲) and **“down”** (▼) keys are simultaneously pressed for three seconds from normal status. To proceed with parameter configuration, enter the password previously set (a numeric value from 0 to 255) using the **“up”** (▲) and **“down”** (▼) keys and press **“OK”** to confirm.

If the password is correct the first menu label will appear, otherwise normal status will return.

PARAMETER MENU

To simplify device programming, parameters have been classified into the following various menus:

- **[REG]** regulation menu
- **[OUT]** output menu

- **[ING]** external input menu
- **[ALR]** alarm menu
- **[DSP]** view menu
- **[SNS]** sensor menu
- **[SYS]** system menu
- **[ANG]** analog output menu
- **[ADD]** special parameter setting me

Parameter description

The tables show parameter labels in the same order in which they appear in the various menus of the device.

[REG] regulation menu

Configurable parameter labels	Description	unit	Parameter value		default	notes
			min	max		
ST1	set-point 1	degrees	L01	H11	20.0	(1)
DF1	set-point 1 differential	degrees	0.1	100	2.0	
ST2	set-point 2	degrees	L02	H12	30.0	(2)
DF2	set-point 2 differential	degrees	0.1	100	2.0	(2)
DBN	neutral zone (dead band)	degrees	0	100	2.0	(2)
I-O	regulation on/off	-			on	(3)
H10	maximum value measured by sensor 0	degrees			---	(4)
L00	minimum value measured by sensor 0	degrees			---	(4)
H11	maximum value measured by sensor 1	degrees			---	(4)
L01	minimum value measured by sensor 1	degrees			---	(4)

Note:

- (1) for values L01/2 and H11/2 see display menu [DSP]
- (2) parameter is active only if it applies to the operating mode
- (3) turns regulation on/off from keypad if ON there is normal operation if OFF:
 - display reads "OFF"
 - relays 1 and 2 take on status as established by parameter [SUI], menu [ING], respecting the timing of menu [OUT]
- (4) Maximum/minimum value read by sensors 0 and 1 is stored in these parameters. The value can be reset by pressing the OK key for about 3 seconds (which starts a new parameter updating control)

[OUT] output menu

Configurable parameter labels	Description	unit	Parameter value		default	notes
			min	max		
ETR	relay time-control activation	-	0	0	3	(5)
DON	minimum time between 2 starts of same relay	min	0	200	0	(6)
TOF	minimum ON time of relay	min	0	200	0	(7)
TON	minimum OFF time of relay	min	0	200	0	(8)
INI	initial delay from device start	min	0	200	0	(9)
TCL	PWM cycle time	sec	1	200	200	(10)

Note:

- (5) *this parameter enables the control of times set in DON, TOF, and TON for each output as follows:*
0 timing **disabled** for both relay outputs
1 timing enabled only for relay 1 output
2 timing enabled only for relay 2 output
3 timing enabled for both relay 1 and 2 outputs
- (6) *this parameter restricts the number of starts per hour for the equipment connected to the device (parameter frequently used e.g. for compressors)*
- (7) *minimum time in which output must remain ON*
- (8) *minimum time in which output must remain OFF*
- (9) *output activation delay time from reset of the device*
- (10) *the period that can be set for PWM regulation. This reading is displayed only if the operating mode selected is PRO=5 (see system menu).*

[ING] outside input menu

Configurable parameter labels	Description	unit	Parameter value		default	notes
			min	max		
TID	digital input function	-	0	4	0	(11)
DID	digital input delay	min	0	200	0	(12)
SUI	output status with dig. input enabled (open)	-	0	3	0	(13)

Note:

- (11) *Configurable values are: 0 disabled*

1 external alarm (with open contact) with “DID” delay time and automatic reset after alarm goes off. Output status then turns to “SUI”

2 manual-reset external alarm (with open contact).

3 input acts as switch: device is on when contact is closed and off when contact is open

4 input acts as display change-over between probes S0 and S1 (open contact - S0 probe, closed contact - S1 probe)

Digital input function is excluded when one of the following operating modes is selected in the system menu [SYS]: mode=6, mode=7 and mode=8

(12) the delay after which the device responds to a signal received from the digital input
 (13) when the digital input is active and “DID” time has elapsed, the output may take on the following status:

0 both relays OFF

1 relay 1 ON and relay 2 OFF

2 relay 1 OFF and relay 2 ON

3 both relays ON

[ALR] alarm menu

Configurable parameter labels	Description	unit	Parameter value		default	notes
			min	max		
SUA	output status in probe alarm condition	-	0	3	0	(14)
LOA	minimum alarm shift	degrees	0.1	100	50	(15)
HIA	maximum alarm shift	degrees	0.1	100	50	(15)
DFA	alarm differential	degrees	0.1	100	2	
TRA	alarm activation delay time	min	0	200	0	
SUO	buzzer activation	-	no	yes	no	(16)
EAC	timed alarm message activation	-	no	yes	no	(17)
RAR	automatic relay reset and min/max alarm message reset on alarm end	-	no	yes	yes	(18)
RAA	automatic min/max alarm message reset on alarm end	-	no	yes	yes	(19)
TRP	min/max alarm generation delay from power-on	hours	0	15	0	(20)

Note:

(14) output status when in probe alarm condition (see note n°13)

(15) value to be added or subtracted to the established set-point, respectively for maximum or minimum alarm

- (16) if “yes” both key beep and alarm-condition buzzer are enabled. If “no” both are disabled
- (17) If “yes” the type of alarm is displayed even during timing of the same, if “no” the type of alarm is displayed only after the timing
- (18) if “yes”, at the end of a min/max alarm it will be necessary to dismiss alarm type reading and reset the relay manually
- (19) if “yes”, at the end of a min/max alarm it will be necessary to dismiss alarm type reading manually (the relay will automatically reset instead)
- (20) blocks the generation of max/min alarms for a period

[DSP] view menu

Configurable parameter labels	Description	unit	Parameter value		default	notes
			min	max		
L01	lower limit of set-point 1	degrees	-99	HI1	-99	
HI1	upper limit of set-point 1	degrees	L01	999	999	
L02	lower limit of set-point 2	degrees	-99	HI2	-99	(21)
HI2	upper limit of set-point 2	degrees	L02	999	999	(21)
SOF	probe 1 calibration offset	degrees	-50	+50	0.0	(22)
SIF	probe 2 calibration offset	degrees	-50	+50	0.0	(22)
RIS	reading resolution	-	HI	LO	HI	(23)
UNI	temperature measurement unit	-	C	F	C	(24)
FIL	measurement filter	-	no	yes	yes	(25)

Note:

- (21) parameter is active only if it applies to the operating mode
- (22) value added to the measure to compensate for an inaccuracy of the same
- (23) reading resolution:
0.1 if “HI” or 1.0 if “LO”
- (24) Attention: when unit of measurement is changed, parameter settings are not converted automatically and must be recalibrated.
- (25) if the parameter is set to “yes” a moving average of 8 measurement values (i.e. of about 4 seconds) is calculated, if “no” the average is not calculated

[SNS] sensor menu

Configurable parameter labels	Description	unit	Parameter		
			value min	max	default notes
TY0	sensor type 0	-	0	16	(26)
TY1	sensor type 1	-	12	16	(27)
S01	display of sensor 1 or 2	-	S0	S1	S0 (27)

Note:

(26) default parameter and sensor values depend on device model. All sensors available are listed as follows:

Temperature probes NiPt

sensor type	display reading
Pt100 (*)	PtE (*)
Ni100	nl

* Device default setting

Thermocouples JK

sensor type	display reading
J	J
K	C
L	L
T	t
E	E
N	n
R	r
S	s

Linear probes

sensor type	display reading
0-20mA	020
4-20mA	420
0-1V	0-1

Temperature probes NTC

sensor type	display reading
(**)	nt0
(**)	nt1
type 4	nt2 (*)
(**)	Cst

- * Device default setting, which corresponds to the use of temperature probe NTC code VN870200 (see “Red line” in catalogue under the section Thermoregulation - temperature probes)
- ** When using sensors other than “type 4” as noted above (see note *), it is possible to select one of the three items “nt0, nt1, Cst” corresponding to probes with different temperature/resistance ratios. In these cases, in order to identify the type of sensor to be selected, we recommend contacting the Technical Assistance Service Department directly.

(27) parameter displayed only on models NTC

[SYS] system menu

Configurable parameter labels	Description	unit	Parameter			
			value min	value max	default	notes
PS1	password 1	-	0	255	0	(28)
PS2	password 2	-	0	255	0	(28)
NEN	enables parameter changing	-	yes	no	no	(29)
PRO	operating mode	-	0	12	0	(30)
ADR	serial address	-	1	247	1	
COM	serial communication parameters	-	0	11	0	(31)

Note:

(28) password is enabled if setting is other than 000

(29) if setting is “yes” all other parameters can be viewed but not changed

(30) the following operating modes are possible:

0 relay output 1 and 2 in direct with set-point 1 and differential 1 (hysteresis to the right of the set-point)

1 relay output 1 and 2 in reverse with set-point 1 and differential 1 (hysteresis to the left of the set-point)

2 dead band with relay output 1 in reverse and relay output 2 in direct, set-point 1 and differential 1

3 same as in mode 0 but with differential centered on set-point

4 same as in mode 1 but with differential centered on set-point

- 5 PWM regulation** with relay output 1 in reverse and relay output 2 in direct, set-point 1 and differential 1 plus dead band if applicable
- 6** change-over between outputs in direct (with set-point 1 and differential 1) and outputs in reverse (with set-point 2 and differential 2) from digital input
- 7** outputs in direct with change-over between set-point 1/differential 1 and set-point 2/differential 2 from digital input
- 8** outputs in reverse with change-over between set-point 1/differential 1 and set-point 2/differential 2 from digital input
- 9 relay output 1 in reverse** with set-point 1 and differential 1 and output relay 2 in direct with set-point 2 and differential 2
- 10** if one relay output: **alarm function** if two output relays: **relay output 1 in reverse** (with set-point 1, differential 1 and dead band) and **relay output 2 in alarm**
- 11 – (not available)**
- 12 special mode**

(31)

Parameter	value	serial parameter
0	960	9600 baud ODD parity 1 stop
1	480	4800 baud ODD parity 1 stop
2	240	2400 baud ODD parity 1 stop
3	120	1200 baud ODD parity 1 stop
4	96E	9600 baud EVEN parity 1 stop
5	48E	4800 baud EVEN parity 1 stop
6	24E	2400 baud EVEN parity 1 stop
7	12E	1200 baud EVEN parity 1 stop
8	96N	9600 baud EVEN parity 2 stop
9	48N	4800 baud EVEN parity 2 stop
10	24N	2400 baud EVEN parity 2 stop
11	12N	1200 baud EVEN parity 2 stop

In order to make internet connections easier, the following meaning applies to status information found in the COM menu for OUT1 and OUT2 output:

- OUT1: if lit it indicates accurate reception of bus frame with the parameters set
- OUT2: if lit it indicates serial transmission is in process

[ANG] analog output menu

Configurable parameter labels	Description	unit	Parameter value		default	notes
			min	max		
ANT	type of analog output	-	0	2	0	(32)
ALO	value corresponding to lower limit	degrees	-99	999	00.0	(33)
AHI	value corresponding to upper limit	degrees	-99	999	100	(33)

Note:

(32)

Analog output	display reading
voltage 0-10 V	0-1
amperage 0-20 mA	020
amperage 4-20 mA	420

(33) it is possible to set an output range with AHI less than ALO to allow the output to decrease with the increase of the measured parameter

[ADD] special parameters menu

Configurable parameter labels	Description	unit	Parameter value		default	notes
			min	max		
DPO	output 1 dependency	-	0	10		(34)
TIO	on/off type or PWM 1	-	0	1		(35)
DB0	dead band 1	-	0	1		(36)
INO	cut-in 1	%	-100	+100		(37)
DF0	logic 1 differential	%	-100	+100		(38)
DP1	output 2 dependency	-	0	10		(34)
TI1	on/off type or PWM 2	-	0	1		(35)
DB1	dead band 2	-	0	1		(36)
IN1	cut-in 2	%	-100	+100		(37)
DF1	logic 2 differential	%	-100	+100		(38)

Note:

(34) the parameter establishes in what way an output depends on a set-point or alarm function. The values take on the following meanings:

0 output not active

1 output relative to set-point 1

2 output relative to set-point 2

3 change-over between output in direct (with set-point 1 and differential 1) and output in reverse (with set-point 2 and differential 2) by means of digital input (open - direct, closed - reverse).

- 4** change-over between set-point 1/differential 1 and set-point 2/differential 2 by means of digital input (open – set 1, closed set 2)
- 5** output related to set-point 2 maximum alarm
- 6** output related to set-point 2 minimum alarm
- 7** output related to set-point 1 maximum alarm
- 8** output related to set-point 1 minimum alarm
- 9** output related to set-point 1 maximum/minimum alarm
- 10** output related to set-point 2 maximum/minimum alarm
- (35) establishes whether the type of regulation is ON/OFF (value 0) or PWM (value 1)
- (36) indicates if dead band is present (value 1) or not (value 0)
- (37) indicates change-over point ON of relay compared to set-point set by “dependency” parameter: the change-over point is calculated adding an “INO” percentage of the differential (from -100% to +100%) to the set-point.
- (38) indicates change-over point OFF of relay compared to the point where ON change-over took place: the change-over point OFF is calculated adding a “DFO” percentage of the differential (from -100% to +100%) to the ON-point.

Note: default values of these parameters depend on the operating mode and number of channels, as indicated in the tables below:

1 Channel

Parametro	Operating mode										
	0	1	2	3	4	5	6	7	8	9	10
INO	100	-100	-100	50	-50	-100	*	100	-100	-100	0
DFO	-100	100	100	-100	100	100	*	-100	100	100	100
IN1	100	-100	100	50	-50	100	*	100	-100	100	0
DF1	-50	50	-100	-50	50	-100	*	-50	50	-100	100

2 Cannel

Parametro	Operating mode										
	0	1	2	3	4	5	6	7	8	9	10
INO	50	-50	-100	0	0	-100	*	50	-50	-100	-100
DFO	-50	50	100	-50	50	100	*	-50	50	100	100
IN1	100	-100	100	50	-50	100	*	100	-100	100	0
DF1	-50	50	-100	-50	50	-100	*	-50	50	-100	100

- * Default values for mode 6 are the same as in modes 0 and 1 based on direct or reverse functioning of outputs.

ERROR MESSAGES

- In case of alarm or malfunction, measure reading and alarm type reading may be displayed alternately.
Operating alarm/error messages are described in the following table.

Message	Type of error	Output status
ER0	Sensor 1 disconnected or short-circuted	Same as in parameter (SUA)
ER1	Sensor 2 disconnected or short-circuted	Same as in parameter (SUA)
ALL	Minimum alarm	Depending on operation mode
ALH	Maximum alarm	Depending on operation mode
ALE	External input alarm	Same as in parameter (SUA)
OFF	Regulation blocked by external input	Same as in parameter (SUA)

Note:

The "OFF" message does not switch to the measure reading, but remains fixed on the display

SERIAL COMMUNICATION

- The device is fitted with an isolated serial output RS-485
- The data communication system is based on MODBUS protocol and can be connected to a Master system (PC/PLC...) on a multipoint line RS-485:
 - up to 32 FHT's (slaves) without signal amplifiers, from a maximum distance of 1000m
 - up to 247 FHT's (slaves) in groups of 32 separated by proper signal amplifiers
- Communication occurs in half duplex and only the Master (PC/PLC...) can initiate Query/Response type transaction with the Slaves (only one slave with address) or directing the message to all the slaves (address 0) without receiving an answer
- The MODBUS protocol specifications are:
 - Coding system: RTU (Remote Terminal Unit)
 - Transmission speed (Baud Rate): 9600, 4800, 2400, 1200 bps (can be selected by user)
 - Byte format: 1 start bit, 8 data bits, 1 parity bit (can be selected): none, odd or even, 1 stop bit
- Contact TAS (Technical Assistance Service dept.) to request documents regarding MODBUS functions and use of registers.

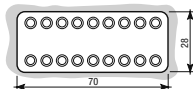
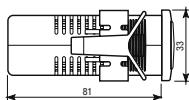
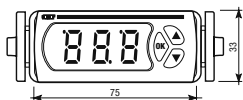
REFERENCE STANDARDS

- For safety: **EN 60730-2-9**
- For electromagnetic compatibility:
 - EN 55014-1**
 - EN 55014-2**
 - EN 61000-6-2**
 - EN 61000-6-3**

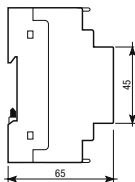
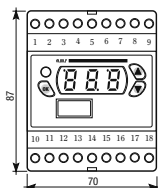
DIMENSIONS OF BACKBOARD MODEL 33x75 mm



FHT-1P3D
FHT-2P3D
FHT NTC-2P3D



DIMENSIONS OF 4 DIN MODULAR MODEL



FHT-1DA
FHT-2DA
FHT NTC-2DA



Vemer S.p.A.

I - 32032 Feltre (BL)

Via Camp Lonc, 16

Tel +39 0439 80638

Fax +39 0439 80619

e-mail: info@vemer.it - web site: www.vemer.it