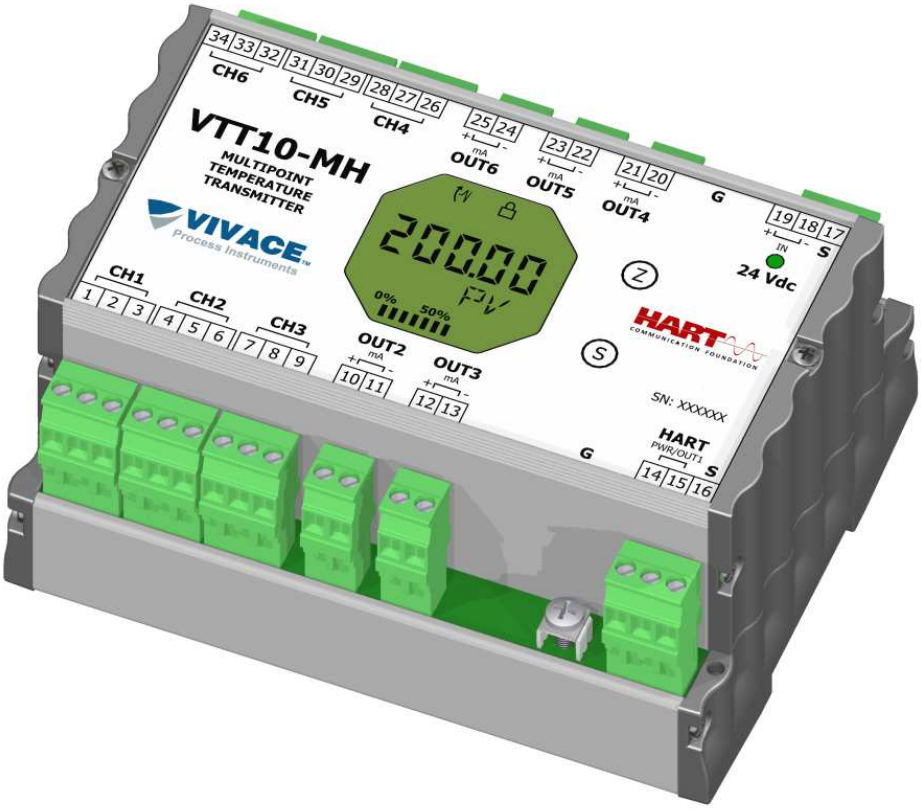
INSTALLATION, OPERATION, CONFIGURATION AND MAINTENANCE MANUAL

July/2019

VTT10-MH

HART® MULTIPOINT TRANSMITTER



VIVACE™ Process Instruments

HART® COMMUNICATION FOUNDATION

COPYRIGHT

NOTE

We have reviewed this manual with great care to maintain compliance with the hardware and software versions described herein. However, due to the dynamic development and version upgrades, the possibility of technical deviations cannot be ruled out. We cannot accept any responsibility for the full compliance of this material.

Vivace reserves the right to, without notice, make modifications and improvements of any kind in its products without incurring in any circumstances, the obligation to make those same modifications to products sold previously.

The information in this manual is frequently updated. Therefore, when using a new product, please check the latest version of the manual on the Internet through our website www.vivaceinstruments.com, where it can be downloaded.

You customer is very important for us. We will always be grateful for any suggestions for improvements as well as new ideas, which can be sent to the e-mail: contato@vivaceinstruments.com preferably with the title "Suggestions".

SUMMARY

WARNING

It is extremely important that all the safety instructions, installation and operation in this manual are followed faithfully. The manufacturer is not liable for damage or malfunction caused by improper use of this equipment.

It is recommended to strictly following the rules and good practice relating to installation, ensuring correct grounding, noise insulation and good quality cables and connections in order to provide the best performance and durability to the equipment.

Special attention must be considered in relation to installations in hazardous areas, where applicable.

SAFETY PROCEDURES

- *Appoint only skilled people, trained with process and equipment;*
- *Install equipment only in operation compatible areas, with the proper connections and protections;*
- *Use proper safety equipment for any handling device in field;*
- *Turn area power off before equipment installation.*

SYMBOLOGY

Caution - indicates risk or error source

Important Information

General or Specific Risk

Electric Shock Danger

GENERAL INFORMATION

Vivace Process Instruments ensures the operation of this equipment, according to the descriptions contained in its manual, as well as technical characteristics, not guaranteeing its full performance in particular applications.

The operator of this equipment is responsible for observing all aspects of safety and prevention of accidents applicable during the execution of the tasks in this manual.

Failures that might occur in the system, causing damage to property or injury to persons, shall additionally be prevented by external means to a safe outlet for the system.

This equipment must be used only for the purposes and methods proposed in this manual.

1 EQUIPMENT DESCRIPTION

VTT10-MH is a member of the Vivace Process Instruments Temperature Transmitters family, designed for DIN rail or field installation using appropriate housing. It accepts various types of sensors, such as thermocouples and RTDs, plus resistance and millivoltage signals.

The transmitter is powered by a voltage of 12 to 45 Vdc and has six inputs for two or three-wire temperature sensors, with individual 4-20 mA current outputs for each sensor, configured by the user.

Easy to install and initialize, the transmitter also features ambient temperature measurement, sensor average and backup, plus a number of alerts for sensor measurement and status limits. The configuration uses HART® 7 communication protocol, already recognized as the most used in the industrial automation world for configuration, calibration, monitoring and diagnostics, and can be performed by user with a HART® configurator or tools based in EDDL or FDT/DTM.

1.1. BLOCK DIAGRAM

The modularization of VTT10-MH components is described in the block diagram of Figure 1.1.

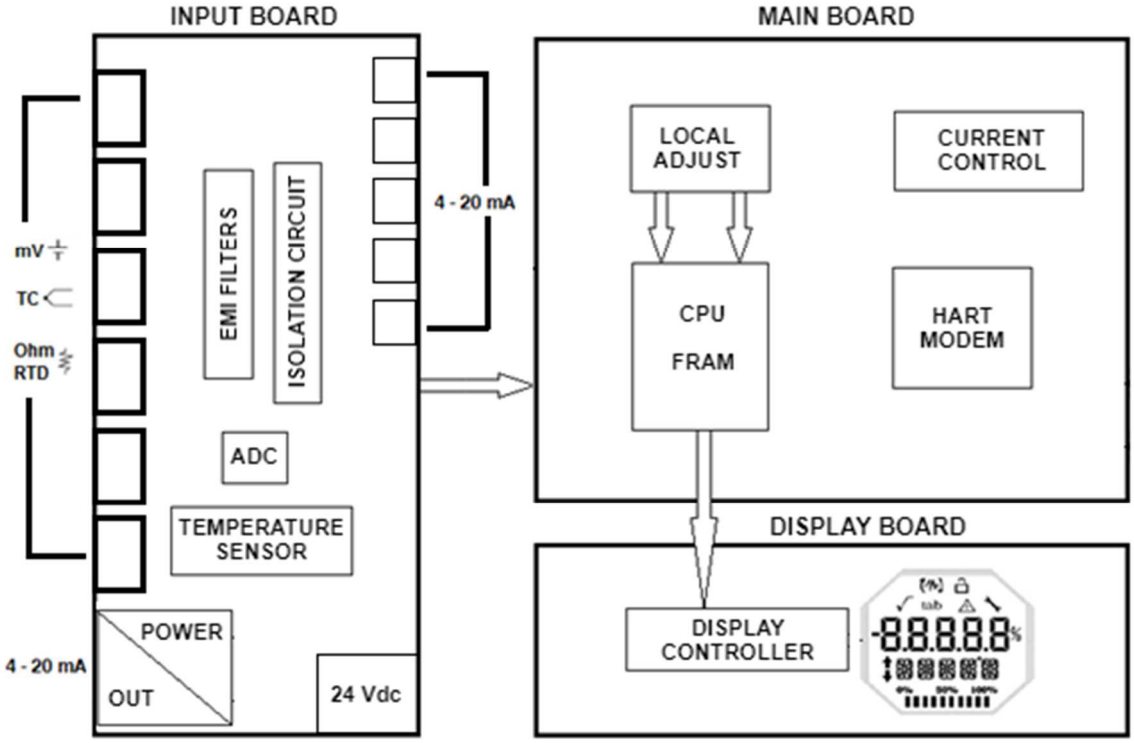


Figure 1.1 – Block diagram for VTT10-MH.

The input signals from the six sensors pass through RF filter and follow to the ADC converter, where they are converted into digital values. These values are converted (in temperature, resistance or millivoltage) according to the sensor types selected, being finally transformed into electrical currents, proportional to the calibrated ranges for each channel, by the CPU block.

The sensor signals have galvanic insulation from output signals, to avoid ground loop.

The input of main power supply (12 to 45 Vdc) generates the main channel current loop (OUT1), with 4-20 mA proportional to the PV. The other five analog output signals work in open-collector mode, powered by another source (24 Vdc) with common ground between the channels.

The HART® modem block interfaces the microcontroller signals with the HART® line to which the transmitter connects.

The display board has the controller block that interfaces LCD and CPU, adapting the messages to be displayed.

Finally, the microcontroller block can be related to the transmitter's brain, containing all the time controls, HART® state machine and routines common to the transmitters, such as configuration, calibration and generation of the digital output value for the currents, proportional to the monitored variables of the sensors.

NOTE

The sensor signals are galvanically insulated from the power supply, but are not insulated from each other. Therefore, insulated sensors must be used to prevent noise from one sensor to interfer on another.
There is also no insulation between the temperature channels and output current channels.

2 INSTALLATION

2.1. MECHANICAL ASSEMBLY

VTT10-MH Multipoint Transmitter is designed for panel mounting with DIN rail, but maintains good performance in temperature, humidity and vibration variations.

The electronic circuit is coated with a varnish, but constant exposures to moisture or corrosive media can compromise its protection and damage the electronic components.

Figure 2.1 shows the dimensional design and mounting forms for VTT10-MH.

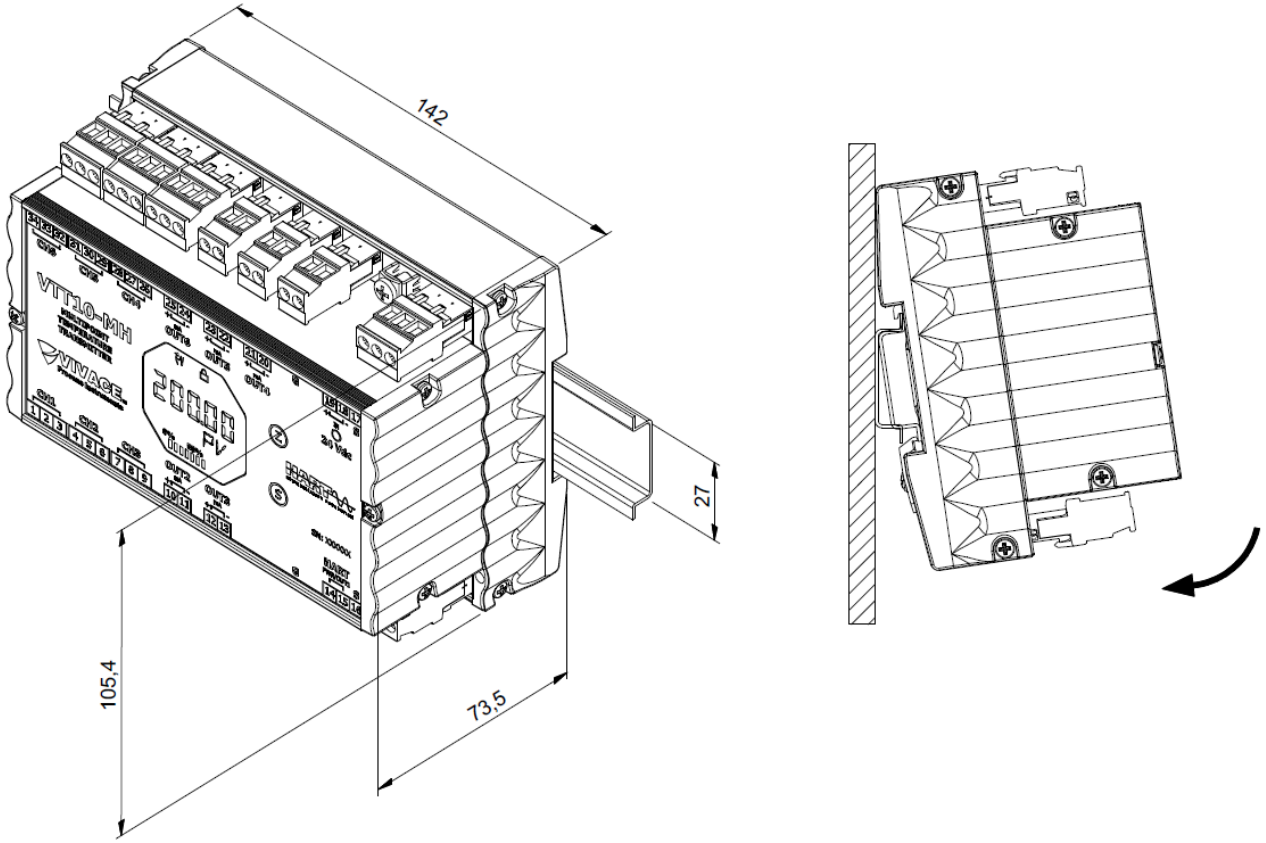


Figure 2.1 – Dimensional drawing and mounting for VTT10-MH.

For VTT10-MH mounting on DIN rail, its superior side must be attached on rail's bracket and then inferior side must be lightly pressed until it clicks, as show non the figure above.

For VTT10-MH removal from DIN rail, it must be pressed upwards and then its superior side must be leaned out of DIN rail.

2.2. ELECTRICAL CONNECTION

The electrical connection of VTT10-MH is made through the side connectors, reserved for the sensors, the output currents and the electrical power of the equipment.

The following figure identifies the connectors of the VTT10-MH.

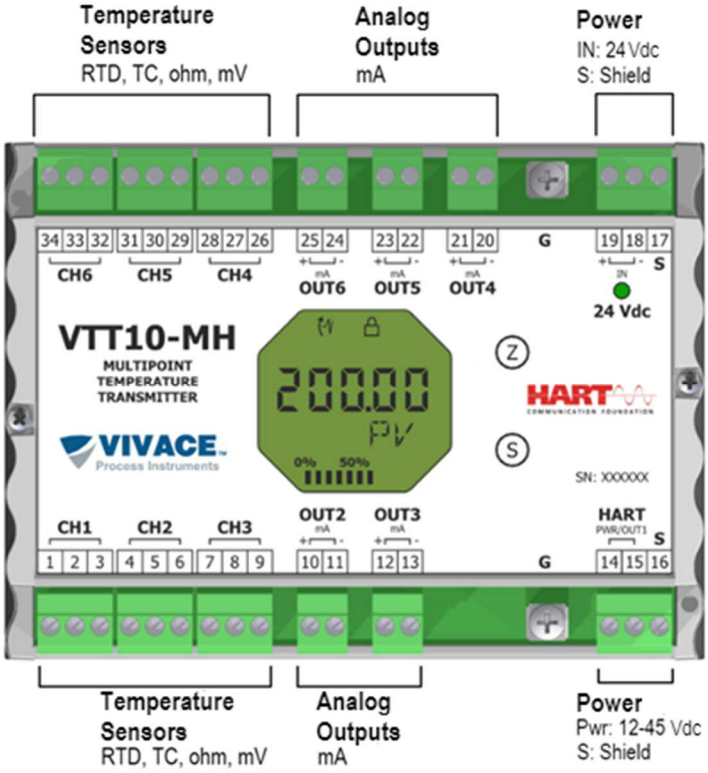


Figure 2.2 – VTT10-MH connection identification.

Connector Description
Main Power Supply Connector – PWR/OUT1 – 12 to 45 Vdc - no polarity
Power Supply Connector (OUT2 to OUT6) – IN – 24 Vdc polarized
Shield Terminals – S
Output Current 4–20 mA Connectors – OUT1 to OUT6
Sensor Connectors – temperature sensor connections, CH1 to CH6

Table 2.1 – VTT10-MH connection description.

NOTE

All cables used to connect the VTT10-MH to the sensors must be shielded to avoid interference and noise.
All temperature sensors shall be isolated from the process to avoid interference or noise between the channels.

NOTE

It is extremely important to ground the equipment for complete eletromagnetic protection and also to ensure the correct performance of transmitter on the HART network.

2.3. PROCESS CONNECTION

Following is the illustration of VTT10-MH connections to compatible sensor types.

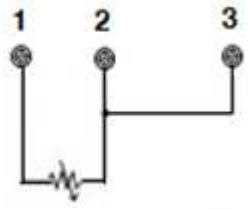


Figure 2.3 – 2-wire RTD or resistive connection.

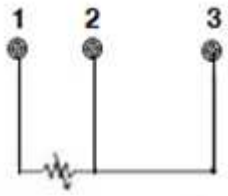


Figure 2.4 – 3-wire RTD or resistive connection.

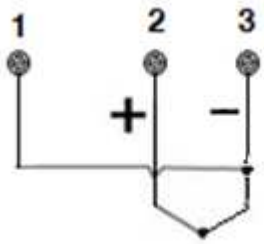


Figure 2.5 - TC or millivoltage connection.

NOTE
For non-resistive sensors, “Sensor Connection” parameter must be configured as 2-wire.

NOTE
The temperature sensor channels not used might be short-circuited to avoid noise induction. In this case, transmitter will not be able to indicate sensor failure (*burnout*) though.

For output control using 4–20 mA, the connection to external equipment must be done as follows.

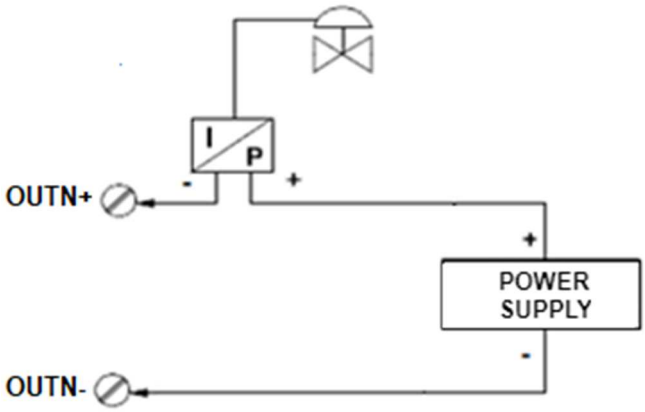


Figure 2.6 - 4 – 20 mA output connection to I/P equipment.

3 CONFIGURATION

The configuration of Multipoint Transmitter VTT10-MH can be done with any HART® programmer or tools based on EDDL or FDT/DTM technologies. Vivace offers the interfaces VCI10-H (USB, Android and Bluetooth) as a solution for configuring and monitoring any HART® device. VTT10-MH can also be configured by local adjust using Vivace magnetic screwdriver.

3.1. LOCAL CONFIGURATION

Figure 3.1 – Local adjust Z and S markings.

The local configuration of the equipment is done by the actuation of the magnetic screwdriver in the markings Z and S, located in the top of the enclosure. Z marking starts the local configuration and switches the LCD field to be configured. S marking is responsible for changing and saving the value of the selected field. Saving when changing values on the LCD is automatic.

Figure 3.1 shows Z and S markings for local configuration, engraved on the upper label. Following is the local adjustment procedure.

Enter the key in the Zero (Z) mark. Icon will appear, indicating that equipment has recognized the magnetic key. Remain with the key inserted until "LOCAL ADJST" is displayed and remove the key for 3 seconds. Re-enter the Z-key. User can then navigate through the local adjustment parameters.

Table 3.1 shows the actions performed by the magnetic key when inserted in the Z and S markings.

MARKING	ACTION
Z	Navigates between local adjust functions.
S	Actuates on selected function.

Table 3.1 – Z and S functions.

Some parameters show the icon to allow user configuration on it by inserting the magnetic screwdriver into *Span* marking (S). In case the parameter has pre-defined values, those will be rotate on display, while the magnetic screwdriver remains into *Span* marking (S).

For VTT10-MH, before configuring the selected menu, user must choose the sensor (among the six available) to be configured. This will be done by applying the magnetic key to Span (S), initiating the rotation of the available sensors. When the desired sensor is displayed, user must move the magnetic key to Zero (Z), starting the parameter configuration relative to the selected sensor. See configuration tree in figure 3.4

If the parameter is numerical, this field will enter on edition mode and decimal point will start blinking, and shifting to left. When user removes magnetic screwdriver from Z, the least significant digit (in the right) starts blinking, indicating it is ready for edition. By inserting the magnetic screwdriver into Z, user is enabled to increase the digit value, from 0 to 9.

After the least significant digit edition, user should remove magnetic screwdriver from Z in order to start the edition of the next digit (in the left). User will be able to edit each digit independently, until the most significant digit (5th digit on the left) is complete. After the 5th digit edition, user can also change the signal for the numerical value still on Z marking.

During each step of edition, user is able to return to the previous digit (to the right) by inserting the magnetic screwdriver into S marking, so corrections can be made. By removing the magnetic screwdriver at any time, user will see the digits blinking until the final step, where the edition mode will be finished, saving the numerical value configured by user.

If the configured value is not acceptable by that device parameter (invalid value), it will be returned to the last valid value before edition. Depending on the parameter, some values can be shown on numerical or alphanumerical fields, adjusting the best option view to user.

With the magnetic screwdriver out of Z and S, device will leave local adjust mode after some seconds and monitoring mode will be shown.

3.2. JUMPER CONFIGURATION FOR LOCAL ADJUST AND WRITE PROTECTION

Figure 3.2 shows the jumper positions on main board to enable/disable write protection and local adjust.

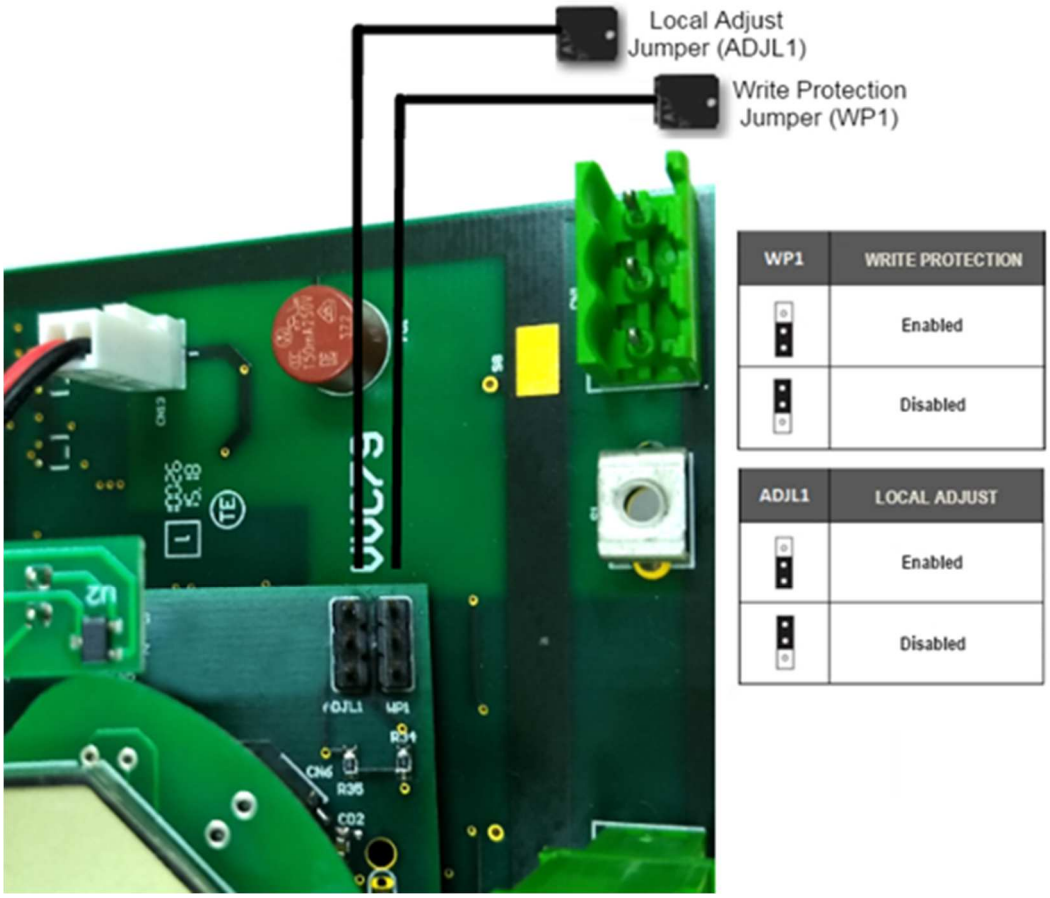


Figure 3.2 – Detail of main board with jumpers.

The default jumper position is Write Protection **DISABLED** and Local Adjust **ENABLED.**

3.3. LIQUID CRYSTAL DISPLAY (LCD)

Main information related to transmitter are indicated on its liquid crystal display (LCD). Figure 3.3 shows the LCD with all its indication fields. Numerical field has 5 digits and is used mainly for monitored variable indication. Alphanumerical field indicates which variable is being monitored, units or auxiliary messages. Each indication icon use is described on table 3.2.

Figure 3.3 – LCD fields and icons.

SYMBOL	DESCRIPTION
	Sending Communication
	Receiving communication
	Write protection enabled
√	Square root function enabled
tab	Characterization table enabled
⚠	Diagnostic occurence
	Recommended maintenance
	Increment values in the local adjust
	Decrement values in the local adjust
°	Degrees symbol for temperature units
0% 50% 100%	Bargraph to indicate the measured variable range

Table 3.2 – LCD icon description.

3.4. LOCAL ADJUST CONFIGURATION TREE

Figure 3.4 shows available fields for local configuration and the sequence they are presented by magnetic screwdriver actuation on Z and S marking.

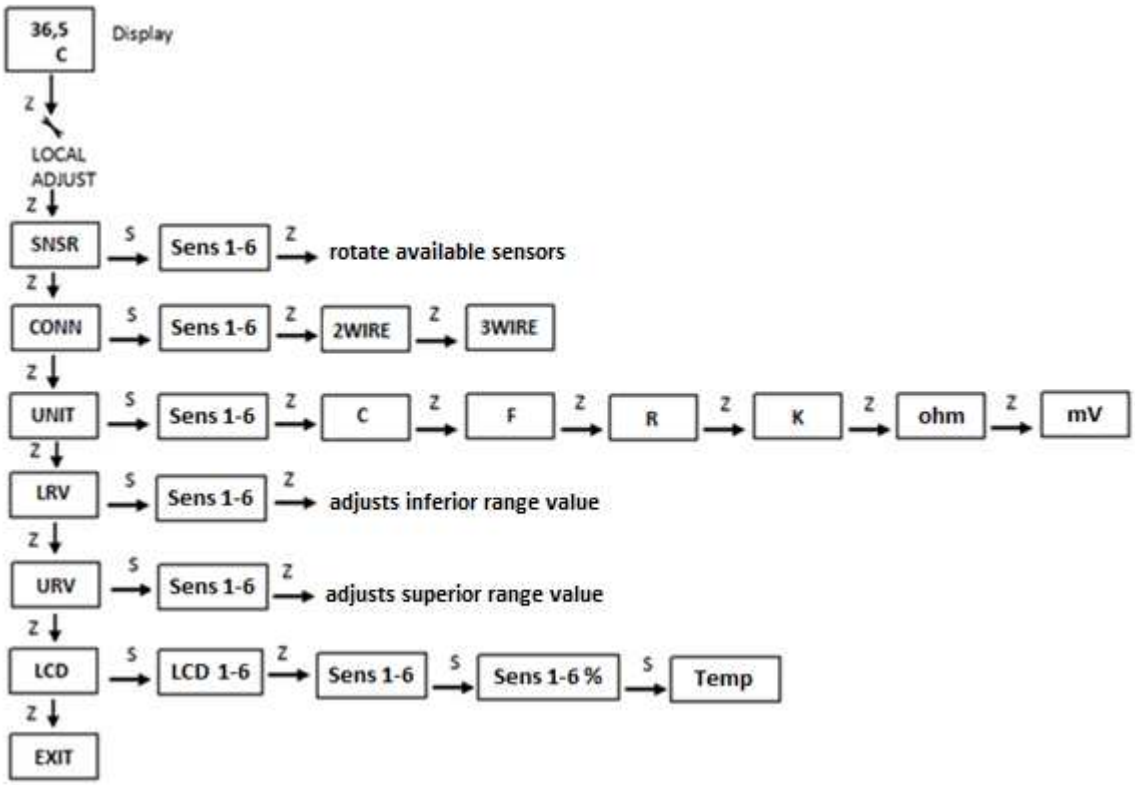


Figure 3.4 – Local adjust configuration tree.

3.5. HART® CONFIGURATOR

The configuration of the equipment can be done using a programmer compatible with HART® technology. Vivace offers the VCI10-H (USB or Bluetooth HART®) interfaces as a solution for identification, configuration and monitoring of HART® line equipment.

Figures 3.5 and 3.6 illustrate the use of the USB VCI10-UH interface with a personal computer that has HART configurator software installed. In Figure 3.5, the interface is installed in series with the power supply of the equipment. The interface requires a 250 Ω resistor to enable HART® communication over the 4-20 mA current when externally powered. In Figure 3.6, the interface is also used to power the transmitter, not requiring the communication resistor.

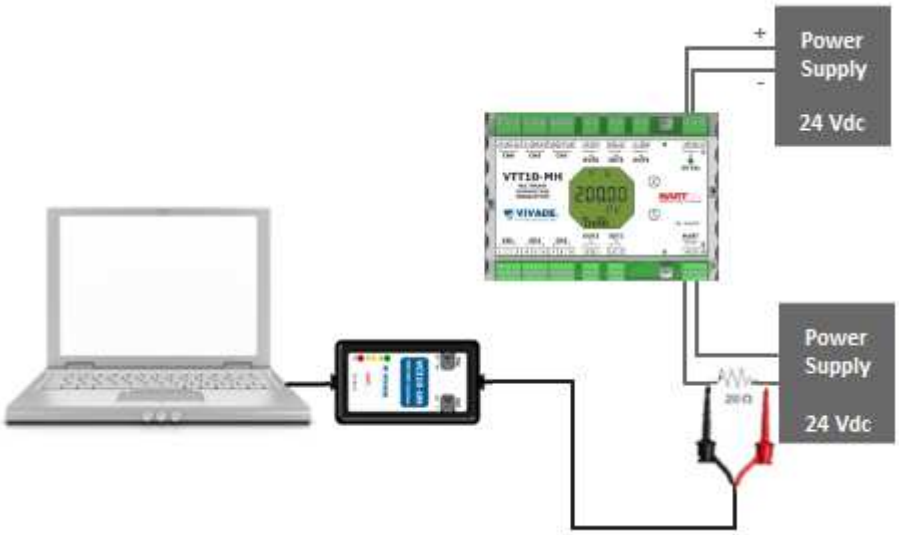


Figure 3.5 - Transmitter installation for configuration with external power supply and 250 ohms resistance.

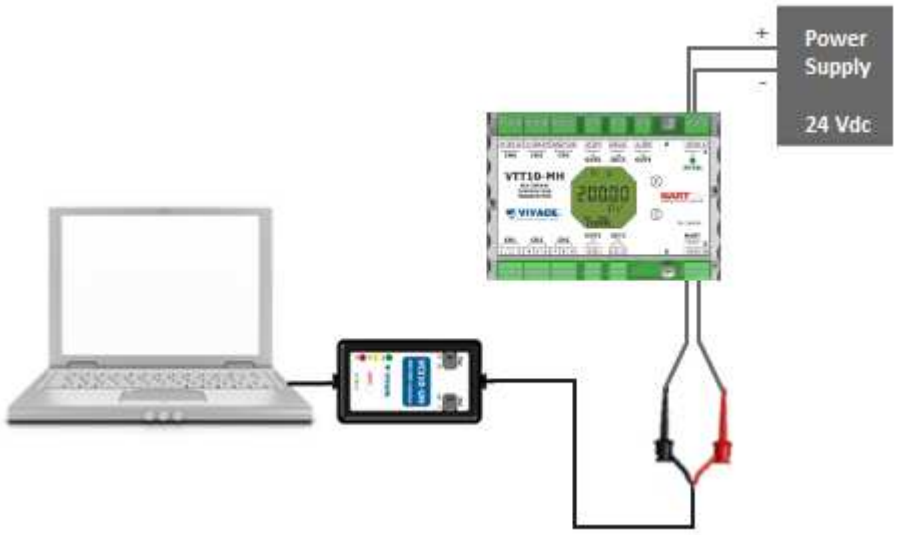


Figure 3.6 - Transmitter installation for configuration using VCI10-UH to power the device.

Figure 3.7 shows the assembly configuration of the transmitter called multidrop. For VTT10-MH, the main output current (OUT1) varies according to the temperature range and sensor type configured by the user on sensor 1, in order to control the final control element, such as a valve positioner for example, or just indicate its monitoring variable to a control center.

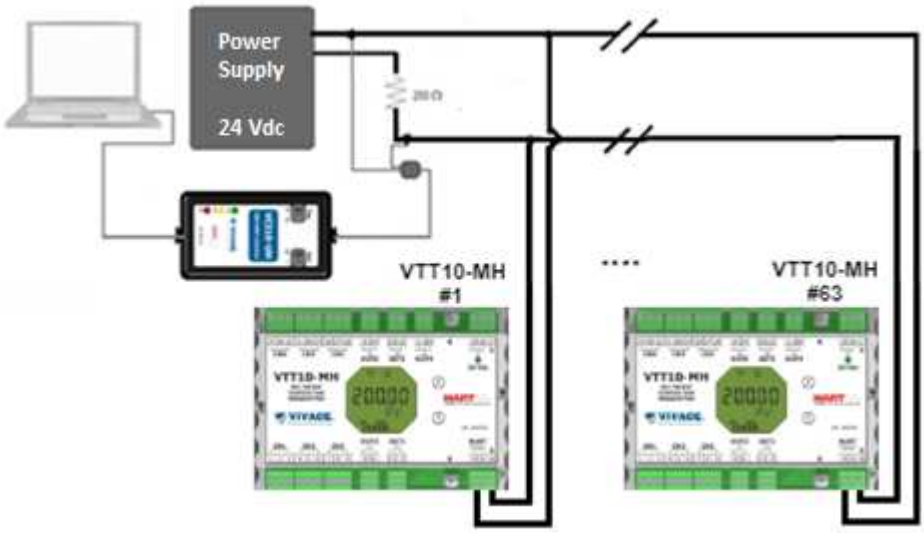


Figure 3.7 – VTT10-MH configuration for multidrop mode.

Note that up to 63 devices can be paralleled connected on the same line. Caution must be taken when many transmitters are connected on the same power line due to voltage drop on 250 ohm resistor and guarantee power supply voltage is enough (Figure 3.8).

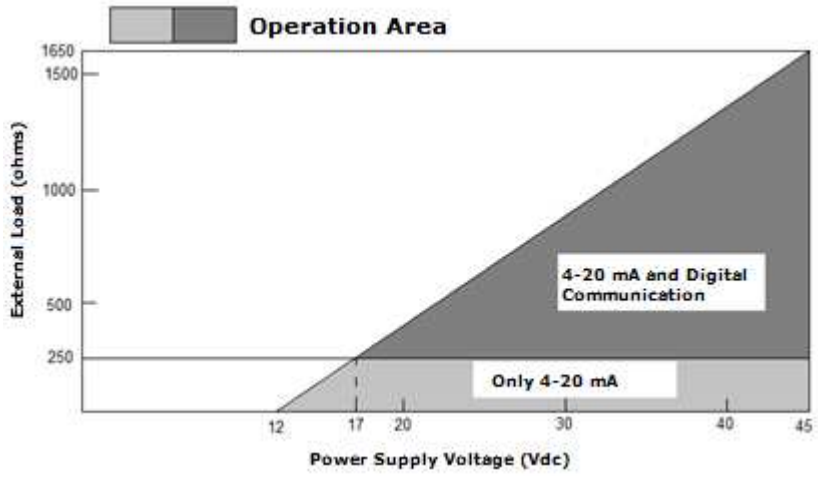


Figure 3.8 – Load curve for VTT10-MH.

3.6. HART CONFIGURATOR PROGRAMMING TREE

The configuration tree is a structure tree-shaped with the menus for all software resources available, as shown on figure 3.9.

For online configuration of the transmitter, check it is correctly installed, powered by the adequate voltage and with the minimum load of 250 Ω impedance on the line, necessary for communication.

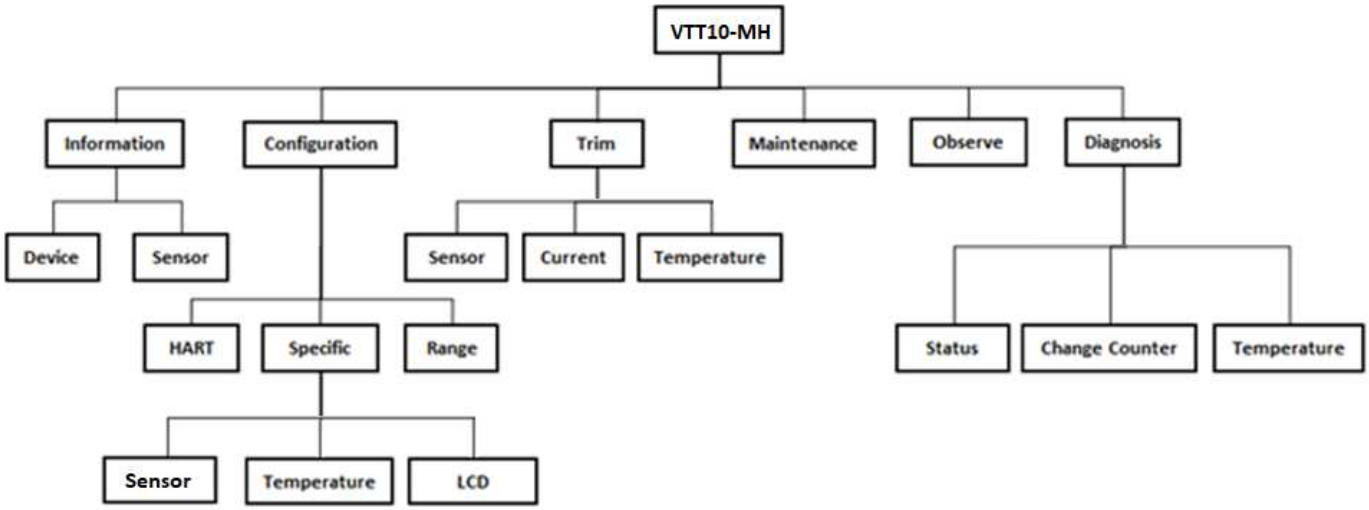


Figure 3.9 – VTT10-MH programming tree.

Information – Transmitter's main information can be accessed here, such as Tag, Description, Message, Serian No. and Ordering Code.

- **Device –** The main information related to communication protocol can be accessed here, such as Manufacturer, Device Type, Device Profile, HART® Revision and Software Version.
- **Sensor –** Sensor information is found here, such as Sensor Type, Sensor Connection, Cold Junction, Work Range, Sensor Limits and Unit.

Configuration – In this directory user can configure transmitter regarding to communication variables, sensors and local temperature.

- **HART –** Directory to configure HART® communication parameters, such as Polling Address, Loop Current Mode, Number of Preambles, Damping(1) and Write Protection.
- **Specific –** Directory to configure transmitter regarding to input sensors, local temperature unit and display variables. For a detailed description of parameters and functions, see sections 3.7 and 3.8.
- **Range –** Directory to configure Units and Work Ranges for all six input sensors, plus PV Fail Safe.

Trim – User can adjust input sensors with temperature, resistance or millivoltage references, plus local temperature sensor value and output currents (4 mA and 20 mA). Figure 3.10 shows the configuration for loop current trim of VTT10-MH (OUT1), while figure 3.11 shows the configuration for the trim of currents OUT2 to OUT6, using OUT6 channel as an example.

Maintenance – On this directory user can software reset teh transmitter or restore the factory configurations. Plus, a fixed OUT1 current test can be executed with the function "Loop Test".

Observe – Directory to monitor variables of Loop Current (OUT1), PV%, PV (Sensor 1), SV (Sensor 1 %) and TV (Local Temperature). Variable QV is not available for VTT10-MH.

Also, user can select several specific variables for monitoring, such as: Sensor 1, Sensor 2, Sensor 3, Sensor 4, Sensor 5, Sensor 6, Sensor 1 %, Sensor 2 %, Sensor 3 %, Sensor 4 %, Sensor 5 %, Sensor 6 % and Local Temperature.

Diagnosis – Directory to configure and monitor transmitter diagnosis. For more details on Diagnosis, see section 3.7.

- **General Status –** Informs the existence of any problem or alarm related to communication or general status of the sensors, such as Sensor Not Detected, Malfunction, Fixed Current, PV Out of Limits, Local Temperature Out of Limits, Loop Current Saturated, Temperature Limit Alarms or Backup Mode Active.

- **Change Counter –** Informs the change counters for each of the following parameters. User can also reset these counters on this directory.
  - *Sensor Work Range*
  - *Sensor Trim*
  - *Sensor Configuration (Type or Connection)*
  - *Sensor Unit*
  - *Sensor Damping*
  - *Sensor Cold Junction*
  - *Current Trim*
  - *Local Temperature Trim*
  - *Local Temperature Unit*
  - *Software Write Protection*
  - *LCD Display Variables*
  - *PV Fail Safe*
  - *HART Polling Address*
  - *Callendar Van Dusen Configuration*

- **Temperature –** Informs the values of maximum and minimum temperatures registered by the transmitter among the connected input sensors, according to user calibration. It also informs the maximum and minimum values for local temperature sensor. These diagnosis can be enabled, disabled or reset by user.

[(1)] *Damping* is an electronic filter for reading the sensors, which changes the response time of the transmitter to smooth the variations in the output readings caused by rapid variations in the input. It can be set between 0 and 60 seconds, with value appropriate to the process response time, stability of the output signal and other system requirements. The default *damping* value is 0 seconds.

The value chosen for *damping* affects the response time of the transmitter. When the value is set to zero, the function is disabled and the output of the transmitter will react immediately to changes in the transmitter sensors, so the response time will be as short as possible.

Increasing the *damping* value leads to an increase in the transmitter response time. At the time the damping time constant is set, the transmitter output will go to 63% of the input change and the transmitter will continue to approach the input value according to the *damping* equation.

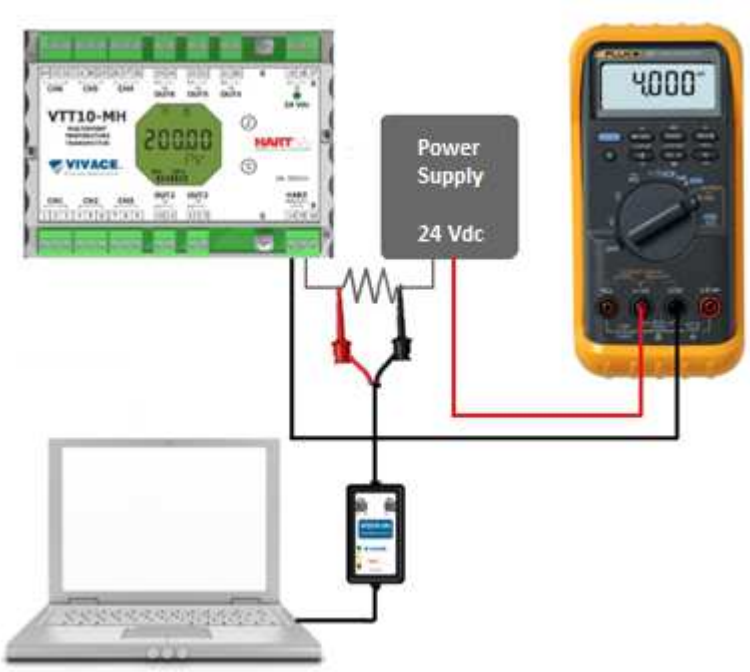


Figure 3.10 – Configuration for current trim of OUT1.

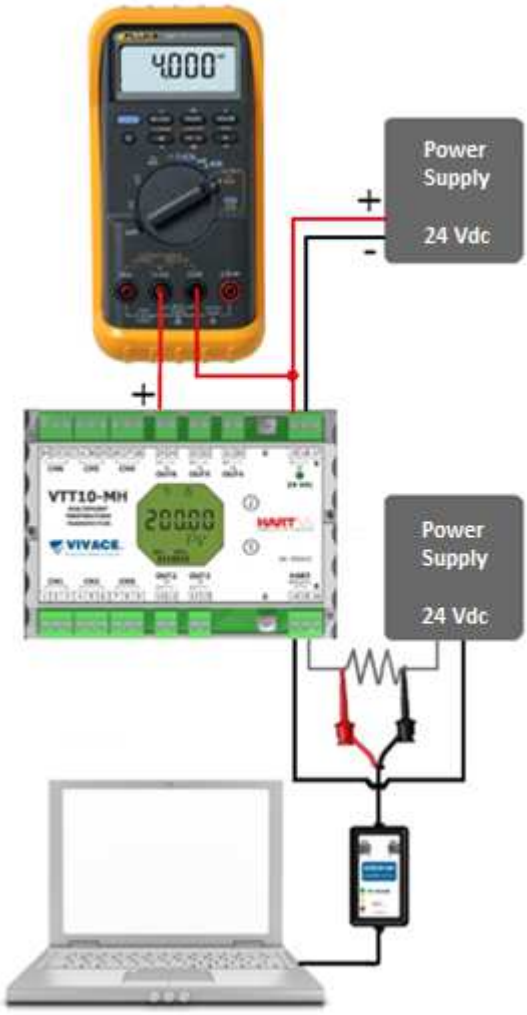


Figure 3.11 – Configuration for current trim of OUT6.

3.7. DIAGNOSIS

VTT10-MH has several diagnosis to help sensor and transmitter maintenance, when failures occur. These diagnosis are sent to user via HART® commands as *status*. For all of them, the alert icon will be displayed on LCD and the corresponding *status* will be activated.

HART® COMMON ALARMS

PV OUT OF LIMITS: primary variable value (sensor 1) is out of configured work limits.

NON-PV OUT OF LIMITS: a variable different from primary has its value out of work limits. For VTT10-MH this variable is the local temperature and its limits are -20°C and 70°C.

MORE STATUS AVAILABLE: indicates that specific alarms (see next) are active.

COLD START: a equipment reset has occurred.

CONFIGURATION CHANGED: some configuration parameter from transmitter has been changed.

DEVICE MALFUNCTION: some importante variable from transmitter is malfunctioning.

VTT10-MH SPECIFIC ALARMS

VTT10-MH specific alarms include status from external and local temperature sensors, plus alarms for temperature limits and ADC converter errors.

SENSOR 1 BAD: sensor 1, responsible for output current OUT1, is not sending data to ADC converter. It might indicate a broken sensor or connection problem.

SENSOR 2 BAD: sensor 2, responsible for output current OUT2, is not sending data to ADC converter. It might indicate a broken sensor or connection problem.

SENSOR 3 BAD: sensor 3, responsible for output current OUT3, is not sending data to ADC converter. It might indicate a broken sensor or connection problem.

SENSOR 4 BAD: sensor 4, responsible for output current OUT4, is not sending data to ADC converter. It might indicate a broken sensor or connection problem.

SENSOR 5 BAD: sensor 5, responsible for output current OUT5, is not sending data to ADC converter. It might indicate a broken sensor or connection problem.

SENSOR 6 BAD: sensor 6, responsible for output current OUT6, is not sending data to ADC converter. It might indicate a broken sensor or connection problem.

LOCAL TEMP SENSOR BAD: local temperature sensor is not sending data to ADC converter. It might indicate a broken sensor.

ADC CONVERTER ERROR: sensor data conversion has failed on ADC converter.

ANALOG BOARD ERROR: there is a connection problem between main board and analog board. Check the cable connecting them.

TEMPERATURE HIGH ALARM: the temperature from one of the sensors has exceeded the superior limit configured by user. The alarm will turn off when all valid temperatures (STATUS GOOD) are lower than parameter SENSOR TEMP HIGH LIMIT.

TEMPERATURE LOW ALARM: the temperature from one of the sensors has exceeded the inferior limit configured by user. The alarm will turn off when all valid temperatures (STATUS GOOD) are higher than parameter SENSOR TEMP LOW LIMIT.

SENSOR BACKUP ALARM: the redundancy mode is active, due to failure on Sensor 1. Its value will be replaced by the sensor configured on BACKUP SENSOR.

MALFUNCTION ALARMS

On the occurrence of transmitter malfunction alarms, maintenance and alert icons along with the error message will be displayed on the LCD as shown in Figure 3.12. The malfunction cases for VTT10-MH are described below.

SENSOR 1 BAD: since Sensor 1 is the main sensor, responsible for the loop current, failure on this sensor is treated as a serious problem, indicating malfunction.

ADC CONVERTER ERROR: sensor data conversion failure by ADC converter result in error for all sensor measurements, being considered a serious problem.

ANALOG BOARD ERROR: problem on connection between main board and analog board, causing error on sensor reading and being considered a serious problem.

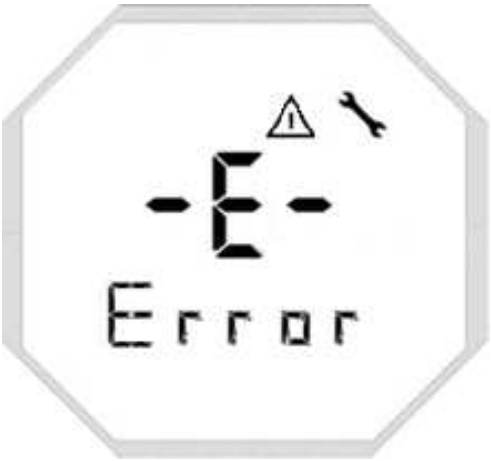


Figure 3.12 –Malfunction error.

TEMPERATURE LIMITS

User can configure the maximum and minimum limits for temperature measurements on VTT10-MH, so it can be alarmed in case one of the sensors exceeds those values. The temperature unit used for these parameters will be the local temperature unit, configured by user.

The configuration parameters for this feature are:

SENSOR TEMP HIGH LIMIT – configures the maximum value for temperatura range. Any temperature value higher than this parameter will activate TEMPERATURE HIGH ALARM, already mentioned.

SENSOR TEMP LOW LIMIT – configures the minimum value for temperatura range. Any temperature value lower than this parameter will activate TEMPERATURE LOW ALARM, already mentioned.

Note that this function compares only the values of the sensors installed and configured for temperature measurement, ignoring sensors configured for resistance measurement or millivoltage, for example.

If there are sensors with different temperature units, the transmitter will automatically convert the temperature units to the unit configured in the local temperature sensor, in order to maintain the reference of comparison of the maximum and minimum values.

3.8. SPECIAL FUNCTIONS

VTT10-MH offers two special functions for the measurement of the sensors, improving safety of the measurements and applications for the transmitter. BACKUP and AVERAGE functions are described below.

BACKUP FUNCTION

This function allows the use of a sensor in redundancy next to Sensor 1. In other words, if Sensor 1 fails, BACKUP function allows the transmitter to change the PV value and OUT1 output to the value measured in the redundancy sensor.

The sensor to be used in redundancy can be configured by user via BACKUP SENSOR parameter. After the configuration, user must connect a sensor of the same type as Sensor 1 to the redundancy sensor input and configure it with the same unit of Sensor 1. Then, it must enable BACKUP MODE function via configuration, so redundancy is consistent.

In the event of Sensor 1 failure and BACKUP mode activation, the alert icon will be displayed on the LCD and SENSOR BACKUP ALARM status will be activated. Figure 3.13 shows an example of configuration of Sensor 3 for BACKUP mode.

RTD1 = RTD2
BACKUP SENSOR INDEX = SENSOR 3
BACKUP MODE = ENABLED

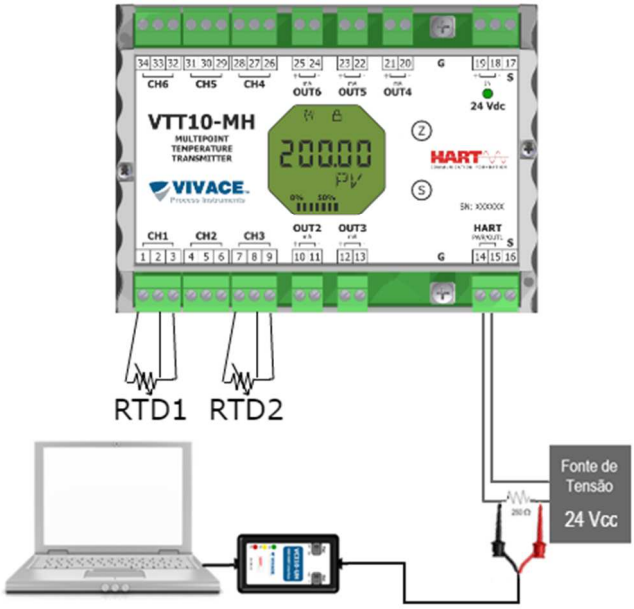


Figure 3.13 – Configuration of VTT10-MH for Backup mode.

AVERAGE FUNCTION

This function allows the use of transmitter's PV to measure the average temperature of all valid sensors (STATUS GOOD). Thus, even if a sensor is connected to the channel of Sensor 1, its measured value and loop current will be relative to the calculated average (the value of the sensor connected in channel 1 will be part of the calculated average).

To use the AVERAGE function, user must simply connect the desired sensors and enable the parameter AVERAGE MODE.

3.9. FDT/DTM CONFIGURATION

FDT/DTM-based tool (Ex. PACTware®, FieldCare®) can be used for device information, configuration, monitoring, calibration and diagnosis with HART® technology. Vivace offers the DTM files for all of its devices (HART® and Profibus PA).

PACTware® is property of PACTware Consortium and can be found on http://www.vega.com/en/home_br/Downloads

The following figures exemplifie DTM configuration screens for VTT10-MH using Vivace's VCI10-UH interface and PACTware®.

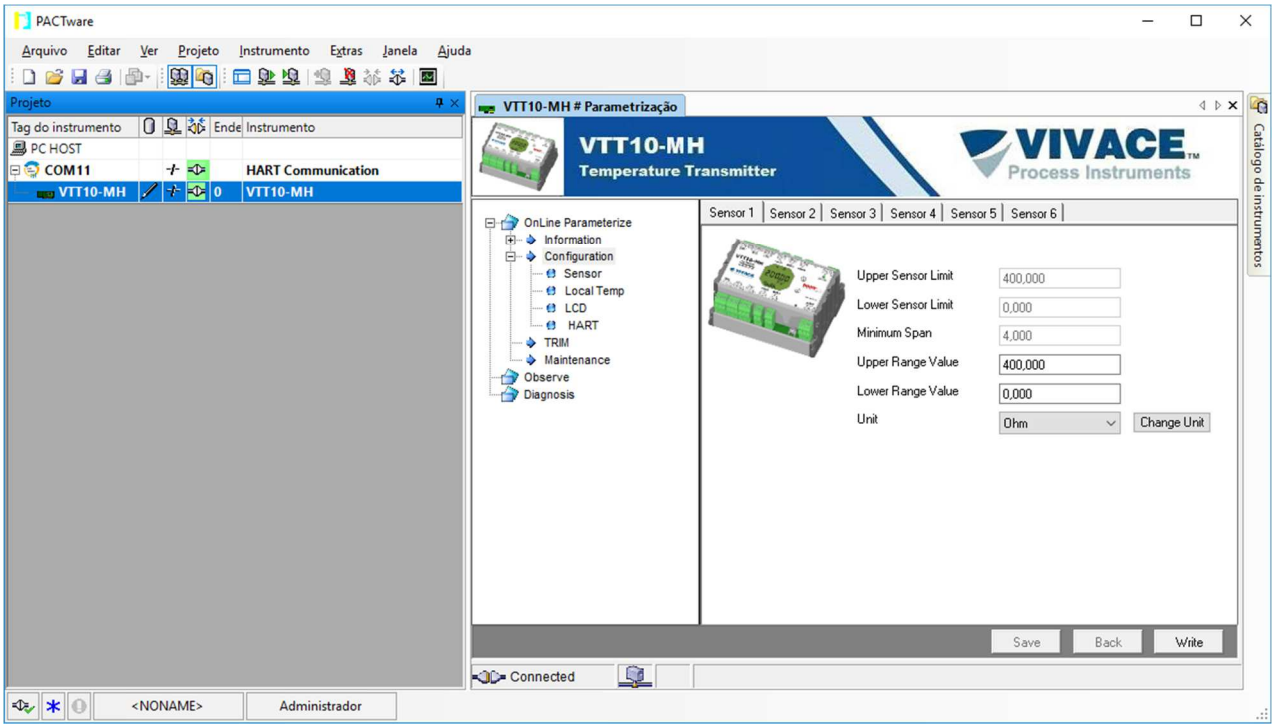


Figure 3.14 – DTM work range configuration screen for VTT10-MH.

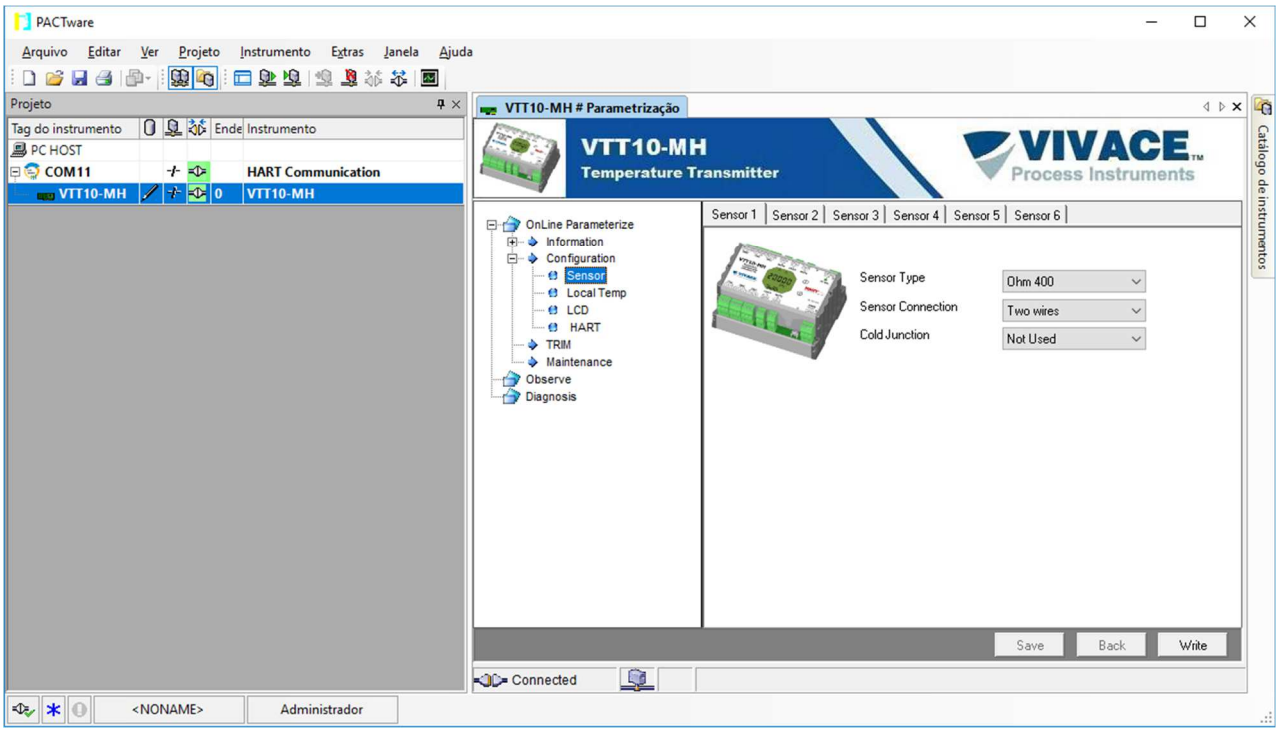


Figure 3.15 – DTM sensor type configuration screen for VTT10-MH.

4 MAINTENANCE

VTT10-MH like all Vivace products, is rigorously evaluated and inspected before shipping. However, in case of a malfunction, a diagnosis can be made to verify that the problem is located in the installation of the sensors, in the configuration of the equipment or if it is a problem of the transmitter.

4.1. ASSEMBLY AND DISASSEMBLY PROCEDURES

Figure 4.1 shows VTT10-MH component details. Before disassembling the device, make sure it is powered off. Maintenance on electronic boards must not be executed, under penalty of equipment warranty loss.

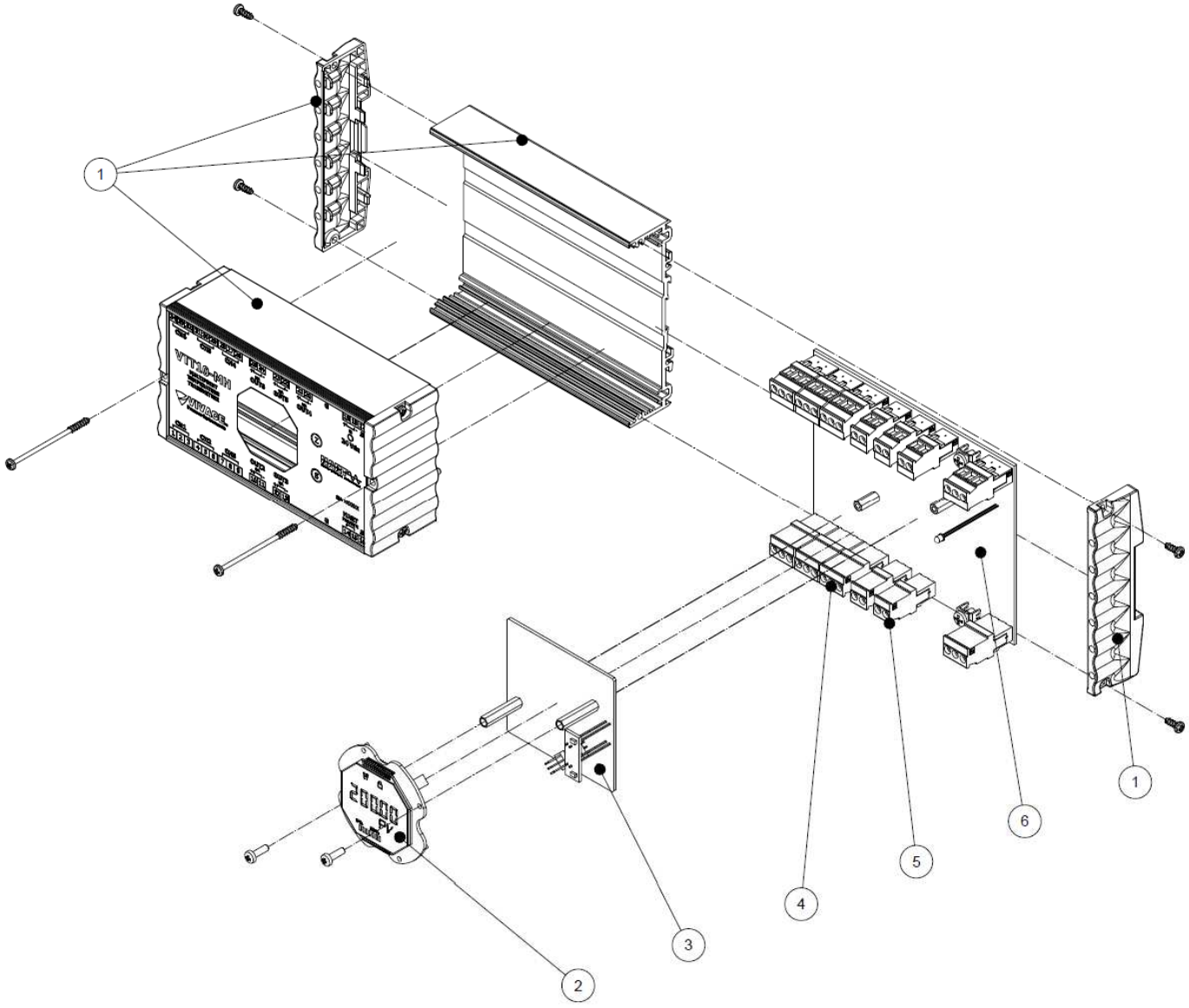


Figure 4.1 – VTT10-MH exploded view.

4.2. SPARE PARTS

All the spare parts available for VTT10-MH can be bought directly from *Vivace Process Instruments.* Those parts are listed on table 4.1.

SPARE PARTS LIST		
DESCRIPTION	**POSITION FIG. 4.1**	**CODE**
HOUSING (includes screws)	1	2-10046
DISPLAY (includes screws)	2	2-10047
MAIN BOARD (includes spacers)	3	2-10089
TERMINAL BLOCK PLUG 3 POSITIONS	4	1-10012
TERMINAL BLOCK PLUG 2 POSITIONS	5	1-10091
ANALOG BOARD (includes headers, spacers and grounding terminals)	6	2-10090

Table 4.1 – List of spare parts for VTT10-MH.

5 CERTIFICATION

VTT10-MH was designed to meet national and international intrinsic safety standards.

Certificates are pending.

6 TECHNICAL CHARACTERISTICS

6.1. IDENTIFICATION

VTT10-MH has a label that identifies the equipment connections, its model and serial number, as well as showing the Z and S positions where the magnetic switch must be positioned to carry out the local adjustment, as shown in figure 6.1.

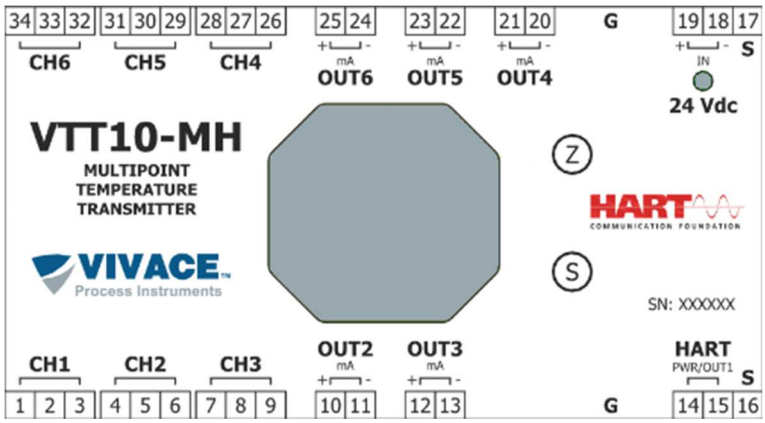


Figure 6.1 – Identification label of VTT10-MH.

6.2. TECHNICAL SPECIFICATION

The table below shows the technical specifications for VTT10-MH.

Accuracy	Temperature: According to Previous Tables 4-20 mA Outputs: ± 0.1% of Calibrated Span
HART Power Supply (PWR) Open-Collector Power Supply (IN)	12 to 45 Vdc / 4-20 mA according to NAMUR-NE43 24 Vdc ±5%
Communication Protocol	HART® 7
Classified Areas	Explosion Proof (with certified enclosure) and Intrinsically Safe (pending)
Ambient Temperature Limits	-20 to 70°C
Ambient Temperature Effects (for 1 °C variation)	- Resistive Sensors: ± 0.0052% of Ohm reading - Millivoltage Sensors: ± 0.001% of mV reading
Reading Stability	±0.1% of reading or 0.1°C – the highest value RTD: 3 years; Thermocouples: 2 years
Max. Update Time	650 ms (output current update for all 6 channels)
Configuration	Local, EDDL, FDT/DTM and Android® Tools
Mounting	DIN Rail or in the field with explosion proof enclosure
Protection Degree	IP20 or IP65 (with certified enclosure)
Indication	5-digit, rotative, multifunctional LCD display
Housing Material	Aluminum / Plastic
Approximated Weight	540 g (without certified enclosure)

Table 6.1 – Technical specification for VTT10-MH.

6.3. COMPATIBLE SENSORS

The following tables list the sensor types, work ranges, minimum span and accuracy for compatible sensors.

RTD – Temperature sensors based on resistance with 2 or 3-wire connection:

SENSOR OPTION	REFERENCE	INPUT RANGE (°C)	MIN. SPAN (°C)	ACCURACY (°C)
Pt100 (α=0.00385)	IEC751	-200 to 850	10	0.10
Pt200 (α=0.00385)	IEC751	-200 to 850	10	0.50
Pt500 (α=0.00385)	IEC751	-200 to 850	10	0.20
Pt1000 (α=0.00385)	IEC751	-200 to 300	10	0.20
Pt100 (α=0.003916)	JIS1604	-200 to 645	10	0.15
Pt200 (α=0.003916)	JIS1604	-200 to 645	10	0.70
Ni120	Edison Curve #7	-70 to 300	10	0.08
Cu10	Edison Copper #15	-50 to 250	10	1.00

Table 6.2 – RTD technical characteristics.

TC – Temperature sensors based on millivoltage with 2-wire connection:

SENSOR OPTION	REFERENCE	INPUT RANGE (°C)	MIN. SPAN (°C)	ACCURACY (°C)
TC B	IEC584	250 to 1820	25	0.75
TC E	IEC584	-200 to 1000	25	0.20
TC J	IEC584	-180 to 760	25	0.25
TC K	IEC584	-180 to 1372	25	0.25
TC N	IEC584	-200 to 1300	25	0.40
TC R	IEC584	0 to 1768	25	0.60
TC S	IEC584	0 to 1768	25	0.50
TC T	IEC584	-200 to 400	25	1.00
TC L	DIN43710	-200 to 900	25	0.35
TC U	DIN43710	-200 to 600	25	0.35
TC W3	ASTM E988-96	0 to 2000	25	0.70
TC W5	ASTM E988-96	0 to 2000	25	0.70
TC L	GOST R 8.585	-200 to 800	25	0.45

Table 6.3 – TC technical characteristics.

Ohm or mV – Resistive or millivoltage linear sensors with 2 or 3-wire connection:

SENSOR OPTION	INPUT RANGE	ACCURACY
mV	-50 to 500 mV	0.55 mV
Ohm	0 to 2000 ohm	0.45 ohm

Table 6.4 – Ohm and mV technical characteristics.

6.4. ORDERING CODE

VTT10-M *Multipoint Temperature Transmitter*

Communication Protocol	**H**	HART
	P	PROFIBUS

Certification Type	**0**	NO CERTIFICATION
	1	INTRINSICALLY SAFE
	2	EXPLOSION PROOF

Certification Body	**0**	NO CERTIFICATION
	1	CEPEL
	2	FM
	3	EXAM

Protection Enclosure	**0**	NO ENCLOSURE
	1	IP65 ENCLOSURE
	2	EX-D ENCLOSURE

Ordering Code Example:

VTT10-M	**H**	**-**	**0**	**0**	**0**

7 WARRANTY

7.1. GENERAL CONDITIONS

Vivace ensures its equipment from any defect on manufacturing or component quality. Problems caused by misuse, improper installation or exposure to extreme conditions are not covered by this warranty.

The user can repair some equipment by replacing spare parts, but it is strongly recommended to forward it to *Vivace* for diagnosis and maintenance in cases of doubt or impossibility of correction by the user.

For details about the product warranty, see the general term warranty on Vivace website: www.vivaceinstruments.com.br.

7.2. WARRANTY PERIOD

Vivace ensures the ideal operating conditions of their equipment by a period of two years, with full customer support regarding to installation, operation and maintenance for the best use of the equipment.

It is important to note that even after warranty period expires, *Vivace* assistance team is ready to assist customer with the best support service, offering the best solutions for the installed system.

APPENDIX

VIVACE Process Instruments	**FSAT** **Technical Analysis Solicitation Form**	
Company:	**Unit/Department:**	**Shipping Invoice nº:**
Standard Warranty: ( )Yes ( )No	**Extended Warranty: ( )Yes ( )No**	**Buying Invoice nº:**

COMMERCIAL CONTACT	
Complete Name:	**Position:**
Phone and Extension:	**Fax:**
e-mail:	

TECHNICAL CONTACT	
Complete Name:	**Position:**
Phone and Extension:	**Fax:**
e-mail:	

EQUIPMENT DATA	
Model:	**Serial Num.:**

PROCESS INFORMATION			
Environment Temperature (ºC)		**Work Temperature (ºC)**	
Min:	**Max:**	**Min:**	**Max:**
Operation Time:		**Fail Date:**	

FAIL DESCRIPTION: Here user should describe in detail the observed behaviour of product, frequency of fail occurence and repeatability. Also, should inform operational system version and a quick description of control system architecture where the equipment was installed.

ADDITIONAL OBSERVATION: