INSTALLATION, OPERATION, CONFIGURATION AND MAINTENANCE MANUAL
April/2022

VTT10-FP

PROFIBUS PA TEMPERATURE TRANSMITTER

field model

VIVACE™ Process Instruments

PROFIBUS®

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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.

DATA SAVING

Whenever static data is changed via configuration, LCD will display ⚠ icon, which will be blinking until the save process is complete.

If user wishes to shut down the equipment, he must wait for the process to be finished.

If the equipment is shut down during saving process, a default will be performed, setting default values in device parameters and the user must subsequently check and configure those parameters according to his needs.

ERROR ON SAVING DATA

If a data execution or saving operation was incorrectly performed, message "BlkEr" will be displayed when the equipment is powered up.

In this case, user must perform factory initialization using two magnetic tool units as described below. Application-specific settings should be performed again after this procedure (except for the physical address and the "GSD Identifier Number Selector" parameter).

- With the equipment off, access "Z" and "S" holes of local adjustment, located under the equipment nameplate;
- Insert one of the tools inside "Z" hole and the other inside "S" hole;
- Energize the equipment and keep both magnetic tool units until icon ⚠ is displayed;
- Do not turn off power while icon ⚠ is displayed. If this happens, restart the procedure.

SIMATIC PDM CONFIGURATION

When using SIMATIC PDM tool for configuration/parameterization of this equipment, do not use "Download to Device" option. This function could incorrectly configure the equipment.

It is recommended for user to use "Download to PG/PC" option, to read the equipment parameters and then access the "Menu Device" option, where one can find specific menus for transducers, functional and LCD blocks, plus calibration, maintenance, factory etc. According to each menu, user will then be able to change the parameter or function as desired, in a fast and direct form.

1 EQUIPMENT DESCRIPTION

VTT10-FP, Profibus-PA Field Temperature Transmitter, is a member of Vivace Process Instruments family of temperature transmitters, designed for field installation, either directly on the sensor or with Ø 2" tubing, panel or wall mount. It serves several types of sensors, such as thermocouples and RTDs, plus resistance, mV signals and 4-20 mA inputs.

The transmitter is connected to the Profibus-PA network via a DP/PA coupler using a pair of twisted and shielded wires. The Profibus-PA technology allows the interconnection of several equipment in a network, allowing the implementation of large control systems. VTT10-FP works with the concept of functional blocks, such as Analog Input (AI) and Transducer (TRD).

Using a Profibus-PA configurator or tools based on EDDL or FDT/DTM, user can configure the sensor type, measuring scales, work units and calibration, and monitor the measurement variables and check the equipment status. In addition, it is possible to configure via local adjustment using a magnetic key.

Prioritizing high performance and robustness, it was designed with the latest electronics and materials technologies, ensuring long-term reliability for systems of any scale.

1.1. BLOCK DIAGRAM

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

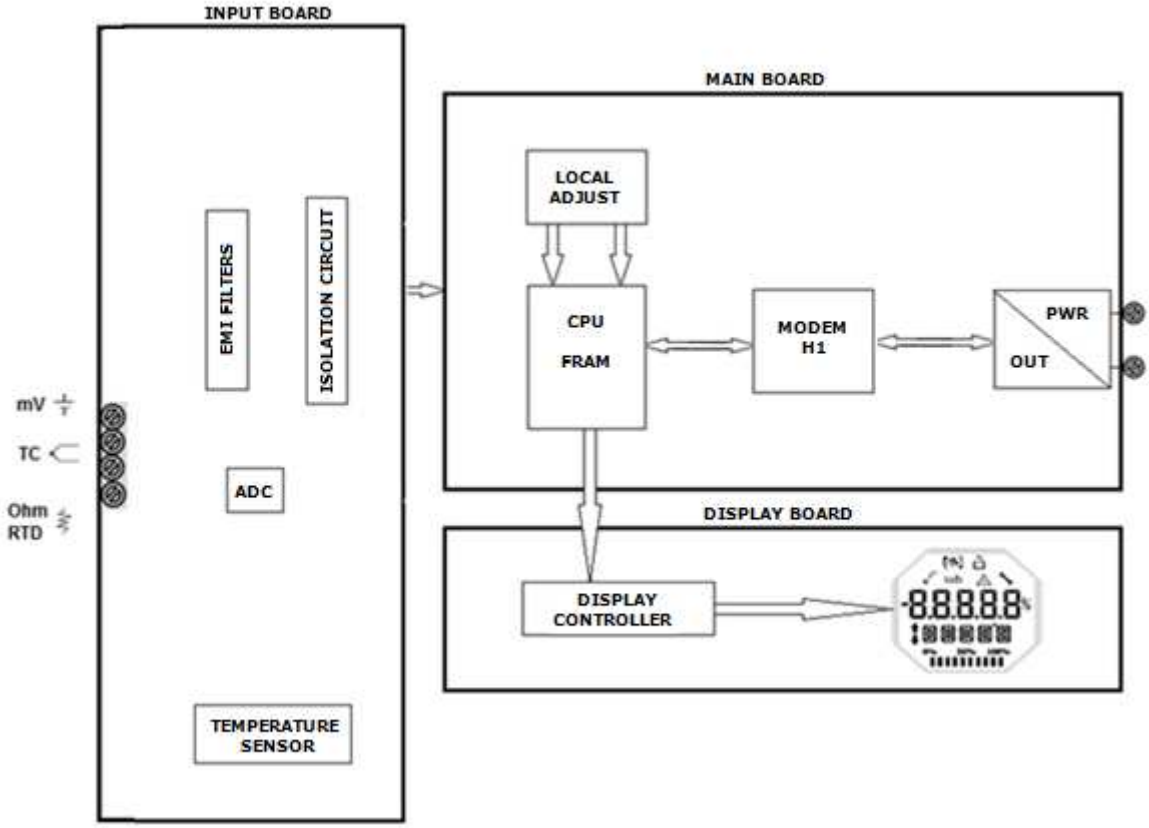

Figure 1.1 – Block diagram for VTT10-FP.

The signals from sensors pass through the RF filter and follow to ADC converter, where they are converted into digital values. These values are converted to temperature according to the selected sensor. The sensor signal is galvanically isolated from the output signal by avoiding ground loop.

The Modem H1 block interfaces the microcontroller signals with the Profibus-PA network to which the transmitter connects.

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

Finally, the microcontroller block can be related to the brain of the transmitter, where all the time controls, Profibus-PA communication machine, and routines common to the transmitters, such as configuration, calibration and acquisition of monitored variables.

2 INSTALLATION

RECOMMENDATION

When taking the equipment to the installation location, transfer it in the original packaging. Unpack the equipment at the installation location to avoid damage during transportation.

RECOMMENDATION

Model and specification of equipment are indicated on identification plate, located at the top of the housing. Check if supplied specification and model correspond to application requirements.

STORAGE

The following precautions should be observed when storing the equipment, especially for a long period:

1) Select a storage area that meets the following conditions:
   a) No direct exposition to rain, water, snow or sunlight.
   b) No exposition to vibration and shocks.
   c) Normal temperature and humidity (around 20°C / 70°F, 65% RH).

However, it can also be stored under the following temperature and humidity intervals:

- Ambient Temperature: -40°C to 85°C (without LCD)* or -30°C to 80°C (with LCD)
- Relative Humidity: 5% to 98% RH (@ 40°C)

(2) For equipment storage, use original factory package (or similar).

(3) If storing an already used Vivace equipment, dry every moist part and clean all connections that was in contact with the process. Keep covers and connections closed and properly protected for its specific application and requirements.

** Only for general use. For explosion proof version, follow product certification requirements.*

2.1. MECHANICAL ASSEMBLY

VTT10-FP Temperature Transmitter is designed for field installation and thus supports weather exposure, having good performance with variations in temperature, humidity and vibration.

The housing of the VTT10-FP has an IP67 degree of protection and therefore is immune to water entering its electronic circuit and terminal, as long as the cable gland (or electrical conduit) is correctly assembled and sealed with non- hardenable. The covers should also be tightly closed to prevent moisture from entering, as the threads of the housing are not protected by paint.

The electronic circuit is coated with a moisture-proof lacquer, 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 of the VTT10-FP.

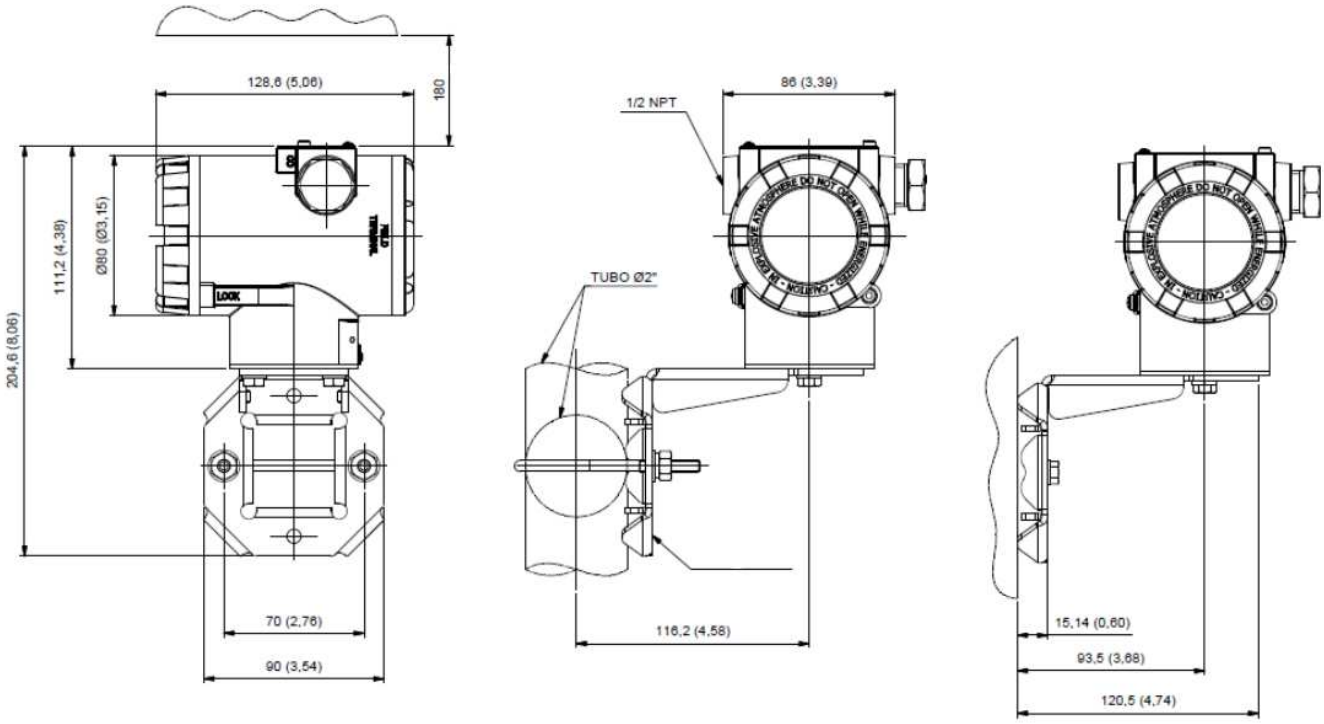

Figure 2.1 – Dimensional drawing and assembly scheme for VTT10-FP.

To avoid the risk of involuntary loss of VTT10-FP covers due to vibration, for instance, it can be locked by screw, as shown on figure 2.2.

VTT10-FP is a field device, so it can be installed through a mounting bracket on a 2” tube attached with a U clip. The transmitter can also be attached with the same mounting bracket to a wall or panel.

For best LCD positioning device enables 4 x 90° housing rotation, as shown on figure 2.3.

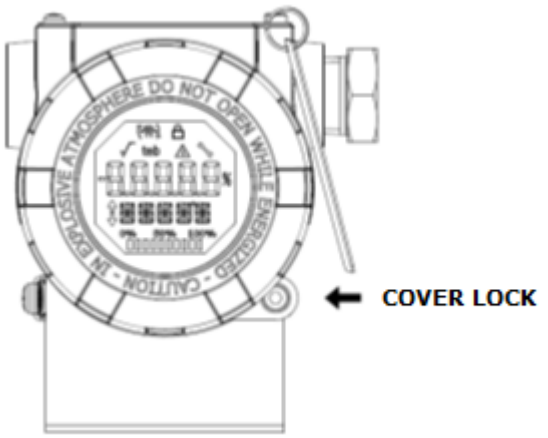

Figure 2.2 – Front cover lock.

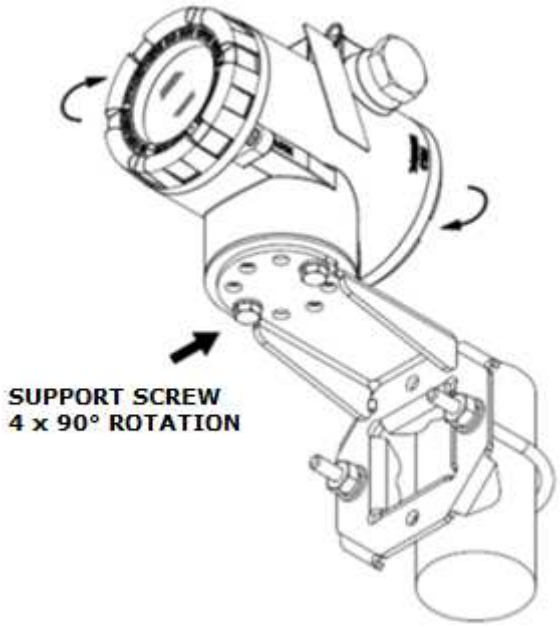

Figure 2.3 – Housing positioning.

VTT10-FP liquid crystal display can be rotate 4 x 90° so indication will be adequate for user visualization.

Figure 2.4 illustrates rotation possibilities for VTT10-FP LCD.

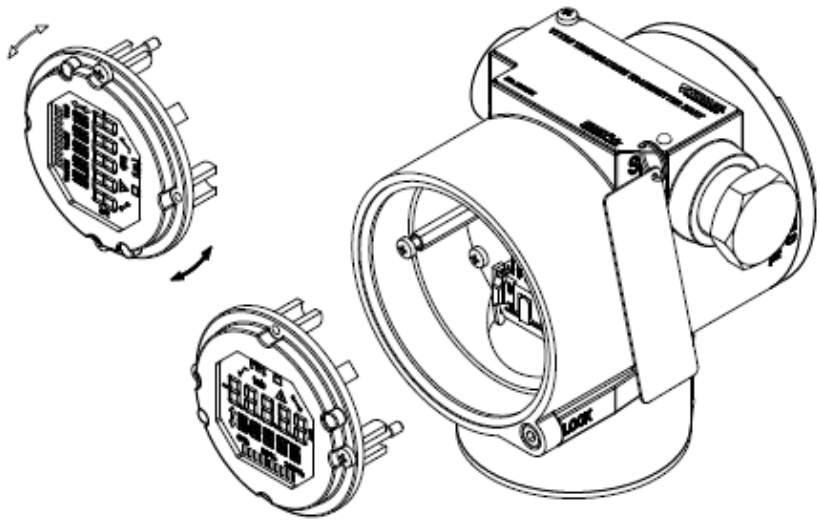

Figure 2.4 –4 x 90° LCD rotation.

2.2. ELECTRICAL CONNECTION

In order to access the terminal block user must remove VTT10-FP rear cover. First, loose cover lock screw (see figure 2.5) by turning it clockwise.

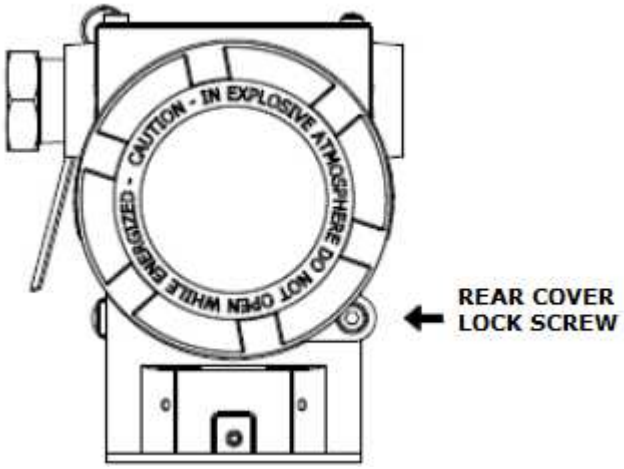

Figure 2.5 – Rear cover lock.

Figure 2.6 shows the power terminals (PWR BUS), the sensor connection terminals, grounding terminals (one internal and one external), in addition to communication terminals. To power the equipment it is recommended to use Profibus-PA type AWG18 certified cables with shield (capacitance < 30 pF). The ungrounded terminal shall be insulated.

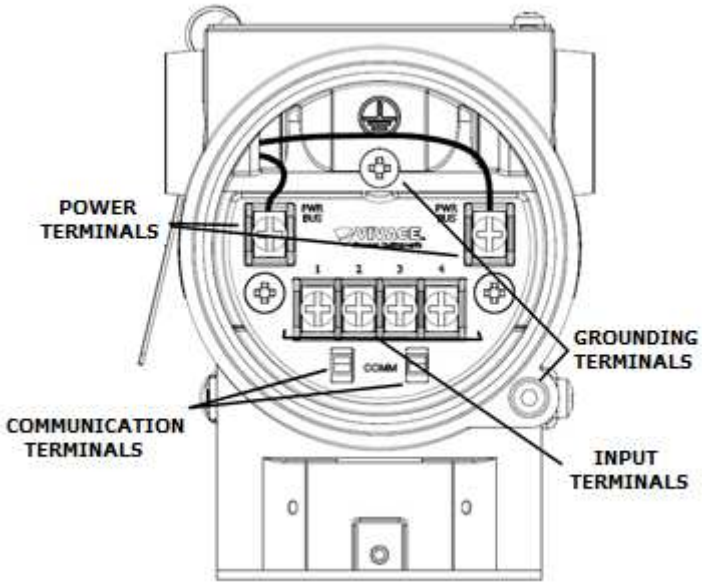

Figure 2.6 – Connections and terminal description for VTT10-FP.

Table 2.1 shows terminal description for VTT10-FP.

Terminal Description
Power Terminals - PWR BUS 9-32 Vdc not polarized
Grounding Terminals - 1 internal and 1 external
Communication Terminals – PROFIBUS-PA communication with configurator
Temperature Sensor – Terminals 1 to 4

Table 2.1 – Terminal description for VTT10-FP.

NOTE
All cables used for connecting VTT10-FP with PROFIBUS-PA network must be shielded to avoid interference or noise.

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

Conduits used for power cables must be assembled in order to avoid water entrance in the device terminal block. Conduit screws must be sealed according to specific area required standards.

Non-used electrical connection must be sealed with appropriate cover.

Figure 2.7 shows the correct installation for conduit, in order to avoid the entrance of water or any corrosive material that may cause damage to the device.

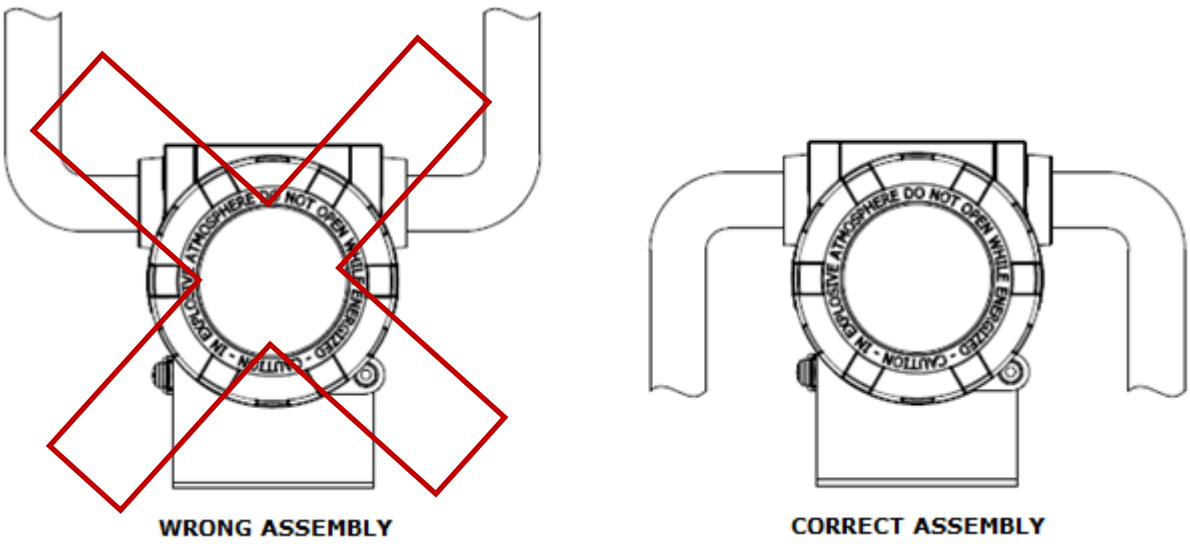

Figure 2.7 – Conduit assembly.

2.3. PROCESS CONNECTION

Following are the VTT10-FP connections with different sensor types:

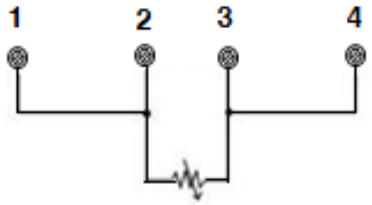

Figure 2.8 - RTD connection or 2-wire resistive.

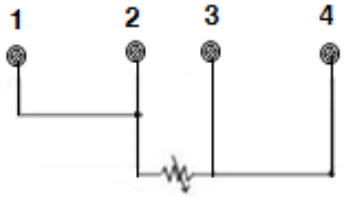

Figure 2.9 - RTD connection or 3-wire resistive.

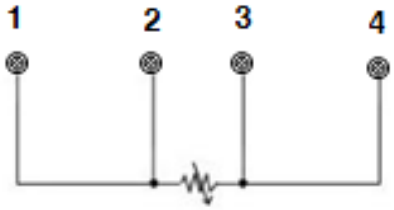

Figure 2.10 – RTD connection or 4-wire resistive.

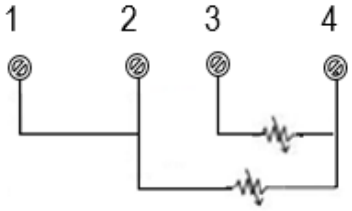

Figure 2.11 – RTD connection or double resistive, for differencial and backup measures.

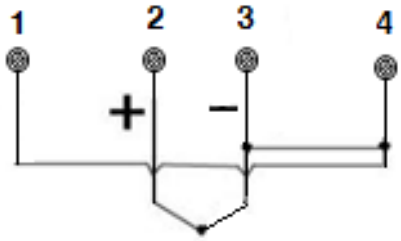

Figure 2.12 - Termocouple or mV connection.

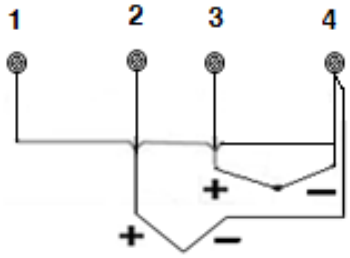

Figure 2.13 - Termopar or mV double connection, for differencial and backup measures.

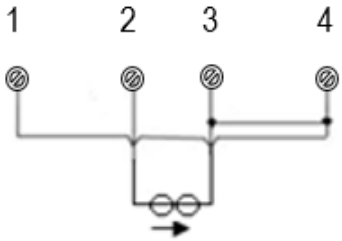

Figure 2.14 - 4-20 mA current reading connection.

2.4. PROFIBUS-PA NETWORK CONNECTION

Figure 2.15 illustrates the installation of a number of Profibus network elements and the connection of Profibus-PA devices to the Profibus network.

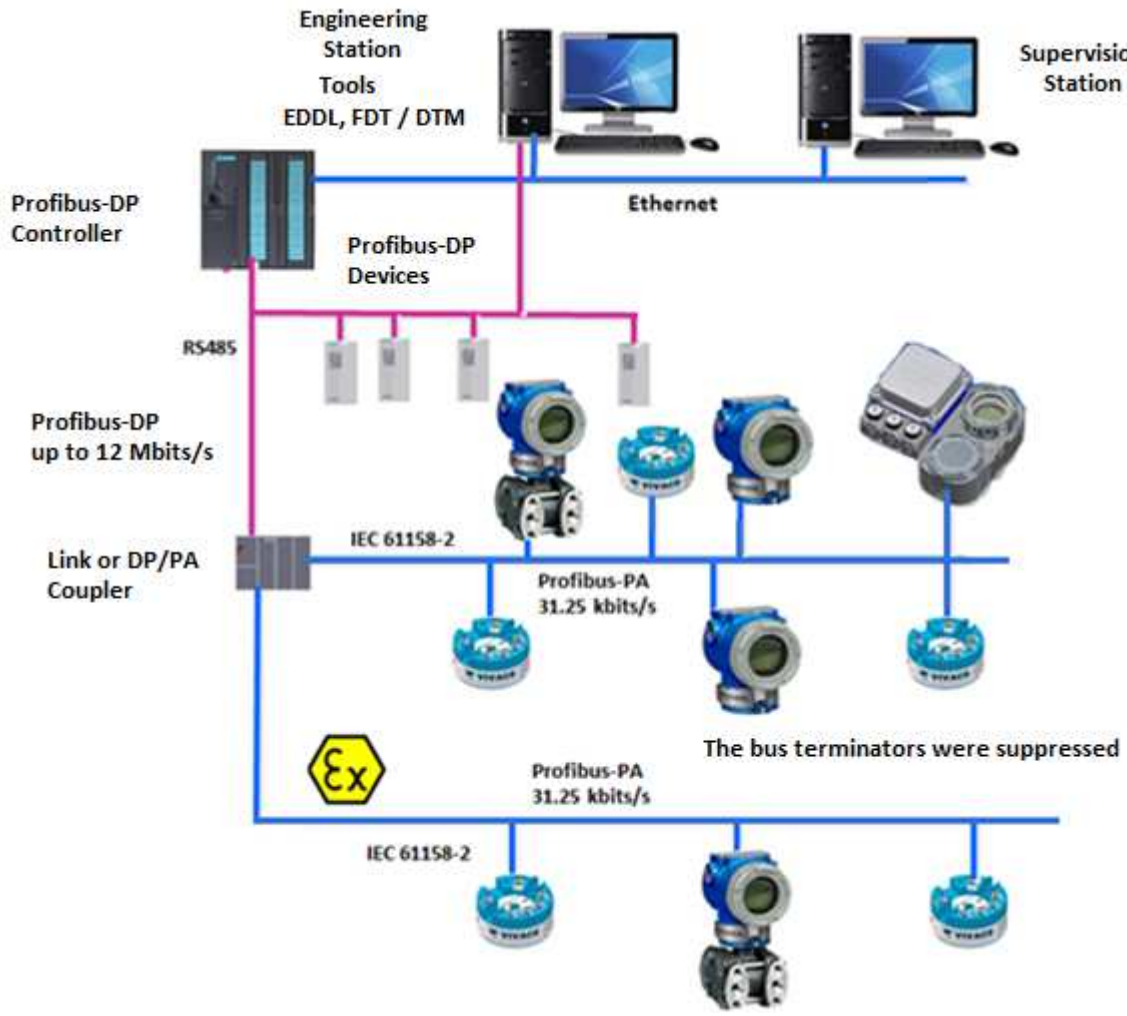

Figure 2.15 – Connecting a Profibus-PA device to the bus.

3 CONFIGURATION

The configuration of VTT10-FP can be done through a programmer compatible with Profibus-PA technology. Vivace offers the interfaces of VCI10-P line (USB,and Bluetooth) as a solution for configuration and monitoring of the Profibus-PA line equipment. User can also configure the VTT10-FP by local adjustment using a Vivace magnetic key.

3.1. LOCAL CONFIGURATION

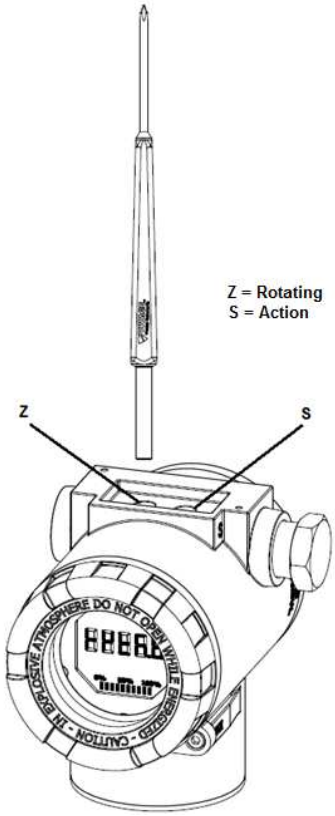

Figure 3.1 – Z and S orifices and magnetic screwdriver.

Equipment's local configuration is executed by using Vivace's magnetic screwdriver on Z and S orifices, located at housing superior side, under identification plate. Orifice Z starts local configuration and changes the field to be configured. Orifice S is responsible for changing and saving the new value on the selected field. Saving after LCD value changing is automatic.

Figure 3.1 shows orifices Z and S for local configuration, stamped on device housing, and their functions on magnetic screwdriver actuation.

Insert the magnetic screwdriver on *Zero* orifice (Z). icon appears to indicate that device has recognized the screwdriver action. Keep the magnetic screwdriver inside until "LOCAL ADJST" message is shown on display, and then remove it for 3 seconds. Insert the magnetic screwdriver into Z orifice again, so user can navigate through local adjust parameters.

Table 3.1 indicates actions executed by magnetic screwdriver when inserted on Z and S orifices.

ORIFICE	ACTION
Z	Select configuration tree function
S	Act on selected function

Table 3.1 – Z and S orifices actions.

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

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 S, the least significant digit (in the right) starts blinking, indicating it is ready for edition. By inserting the magnetic screwdriver into S, user is enabled to increase the digit value, from 0 to 9.

After the least significant digit edition, user should remove magnetic screwdriver from S 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 S orifice.

During each step of edition, user is able to return to the previous digit (to the right) by inserting the magnetic screwdriver into Z orifice, 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 orifices, 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

VTT10-FP has two jumpers on its main board to protect data writing (WP1) and enabling/disabling local adjust (ADJL1). Figure 3.2 presents those jumpers.

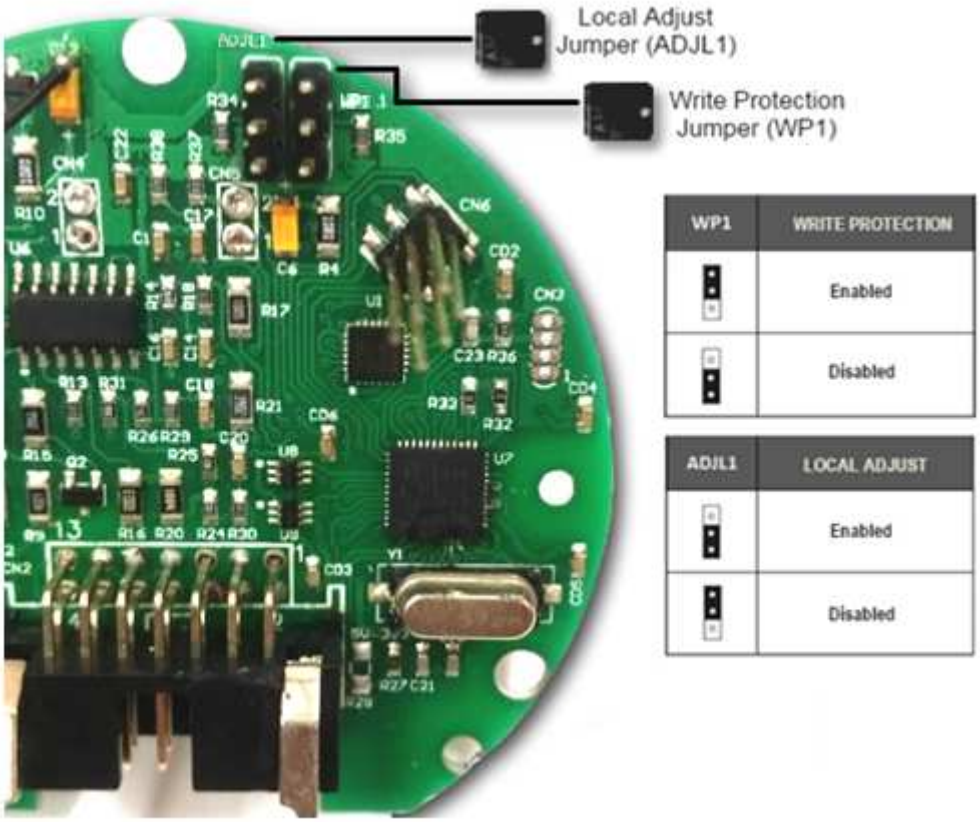

Figure 3.2 – Jumpers WP1 (write protection) and ADJL1 (local adjust) on VTT10-FP main board.

Default selection for these jumpers 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 orifices.

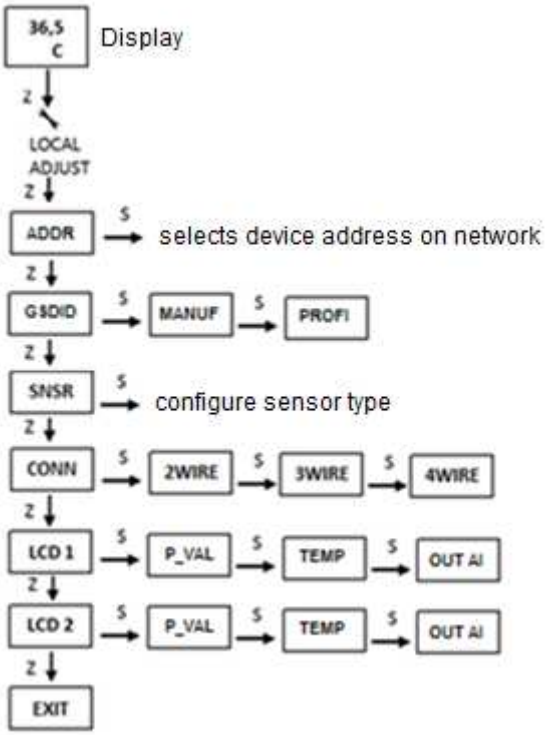

Figure 3.4 – Local adjustment programming tree for VTT10-FP.

3.5. PROFIBUS PROGRAMMER

The configuration of the equipment can be done using a Profibus-PA compatible programmer. Vivace offers the interfaces of VCI10-P (USB and Bluetooth) line as a solution for identification, configuration and monitoring of Profibus-PA line equipment.

Figure 3.5 shows the wiring diagram for configuring VTT10-FP using Vivace VCI10-UP USB interface, which feeds the device in local mode, with a personal computer that has PACTware configurator software.

Figure 3.5 – Configuration diagram of VTT10-FP with VCI10-UP.

3.6. PROFIBUS-PA CONFIGURATOR PROGRAMMING TREE

The programming tree is a tree-shaped structure with a menu of all available software features, as shown in Figure 3.6

To configure transmitter online make sure that it is properly installed, with the proper power supply voltage, required for communication.

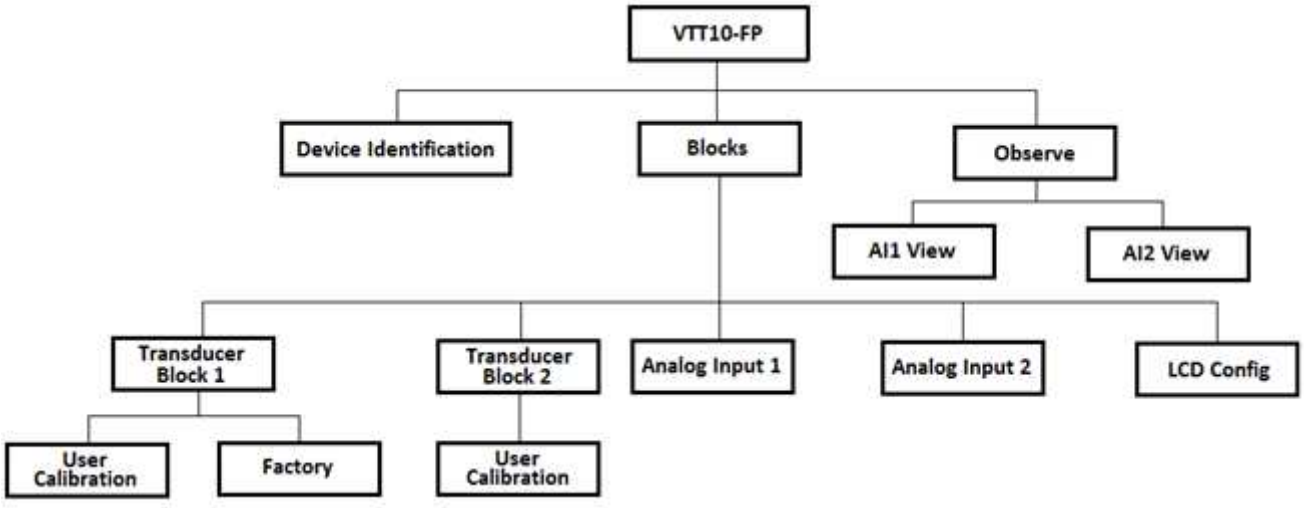

Figure 3.6 – Programming tree for VTT10-FP.

Device Identification - The main transmitter information can be accessed here, such as: Tag, Manufacturer ID, Device ID, Order Code and Firmware Version.

Transducer Block 1/2 - Here transducer block 1 or 2 is configured, respectively.

- **Basic Settings -** In this menu the following basic settings are configured: Measurement Type, Sensor Transducer Channel, Sensor Type, Sensor Connection Type, and enable or disable the second variable.
- **Scales/Bias -** Here the output scale (EU0% and EU100%), the unit of measurement and the offset between channels 1 and 2 are set.
- **Compensation -** This enables or disables the cold joint compensation and the 2-wire compensation.
    - **User Calibration -** In this menu the lower and upper PV settings are executed.
    - **Factory -** In this menu user can perform the backup/restore, select the GSD file identification or perform the factory reset.

Analog Input 1/2 - Here the parameters of the analog input block 1 or 2 are set, respectively.

- **Basic Settings -** In this menu you configure the Operation Mode, Output Scale (EU0% and EU100%), Unit, Channel and Damping.

Damping is an electronic filter for the PV that changes transmitter response time to smooth the output readings variations caused by rapid input variations. The damping value can be set between 0 and 60 seconds, and its appropriate value must be adjusted based on process response time, output signal stability and other system requirements. The default damping value is 0 seconds.

The value chosen for damping affects transmitter response time. When the value is set to zero, damping function is disabled and transmitter output will react immediately to changes in the transmitter input, 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.

- **Alarm/Warning -** The upper and lower Warning and Alarms Limits are set in this menu. The Hysteresis limit is also set. The measuring unit selected in the "Basic Settings" is indicated in this menu, as well as checking the current alarm status. The standard graphic of the process variable boundaries is also shown.
- **Fail Safe -** In this menu the fault safety type and fault safety value are set and the unit of measurement selected in the "Basic Settings" is displayed.
- **Simulate -** This menu enables or disables the Simulation function, sets the temperature value, shows the unit selected in the "Basic Settings" and the status.
- **Mode Block -** This menu shows the Target Operation Mode (manual, automatic or out of service) and Real, the value of the output variable in the unit selected in "Basic Settings" and the status is set. The current alarm status is also checked.

LCD Config - Here the LCD display is configured for up to 3 variables: Monit 1, Monit 2 and Monit 3.

- **Monit x -** Function Block (Physical, Transducer 1, Transducer 2, Analog Input 1 or Analog Input 2), Relative Index (Out or User Index), Structure Element, Mnemonic, decimal place number (1 , 2, 3 or 4) and enable or disable the alphanumeric field.

3.7. FDT/DTM CONFIGURATION

FDT/DTM-based tool (Ex. PACTware®, FieldCare®) can be used for device information, configuration, monitoring, calibration and diagnosis with Profibus-PA 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 exemplify DTM configuration screens for VTT10-FP using Vivace's VCI10-UP interface and PACTware®.

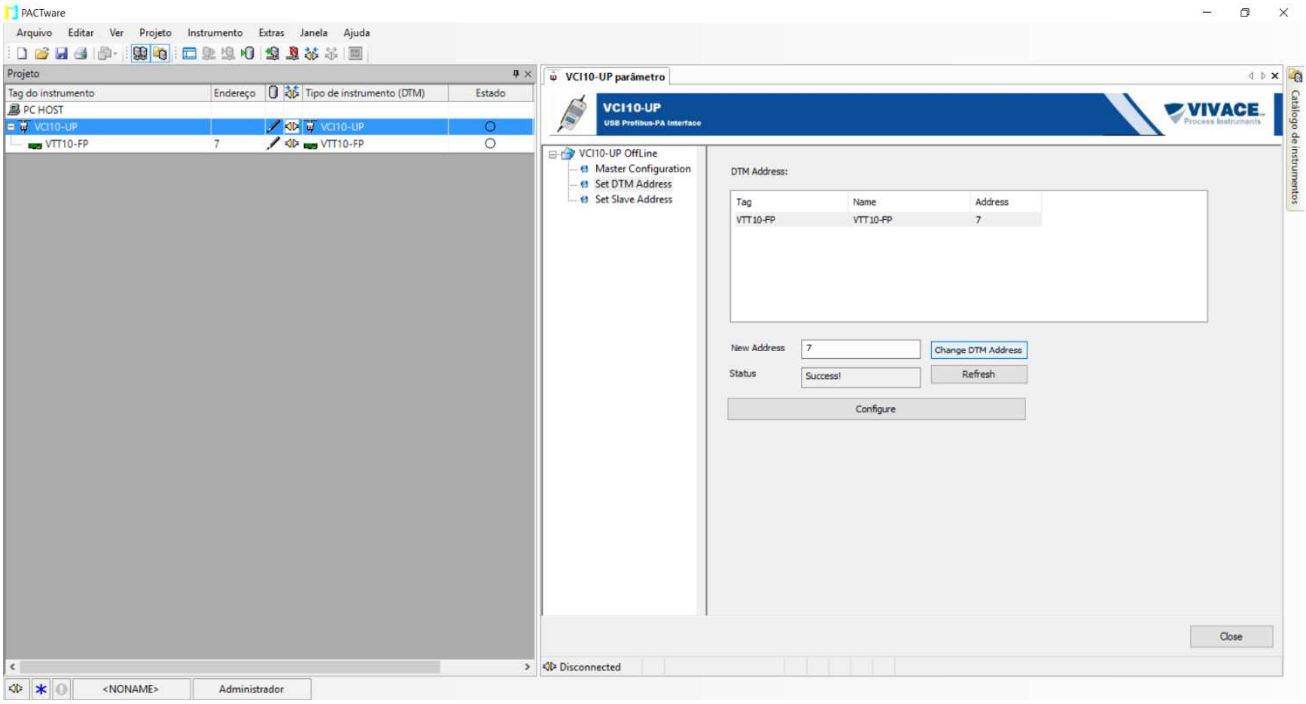

Figure 3.7 – Communication interface configuration screen on PACTware.

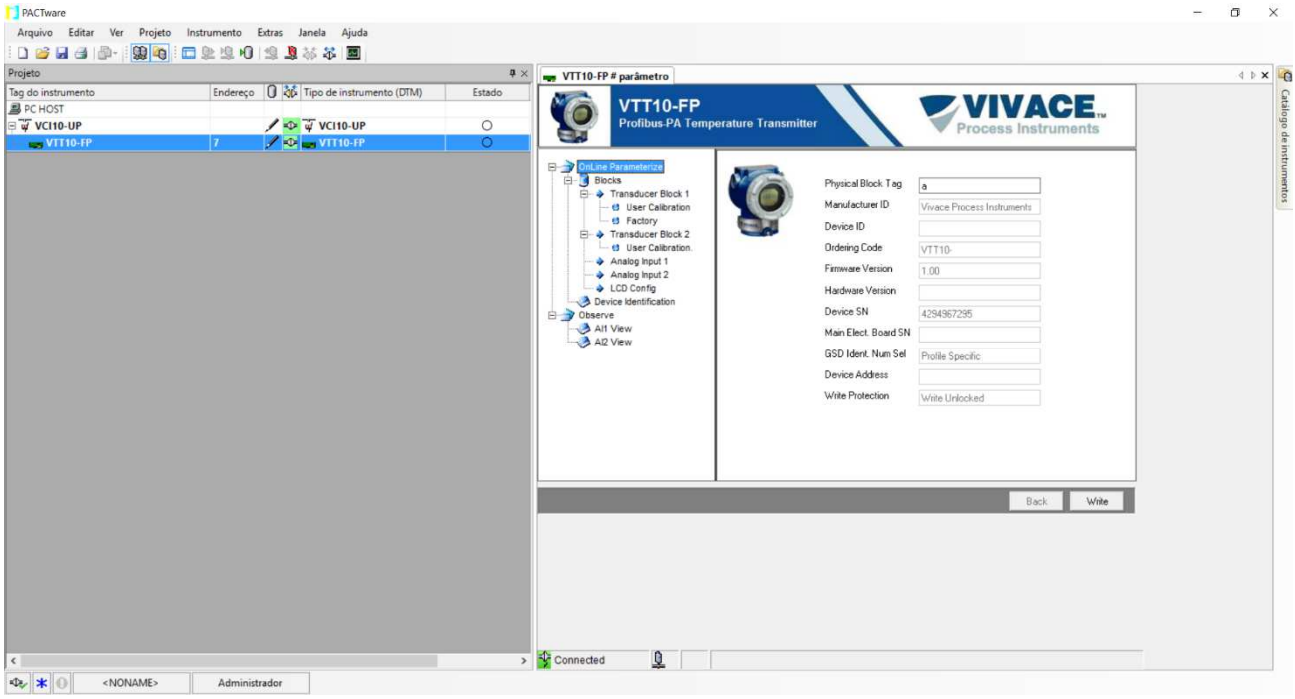

Figure 3.8 – VTT10-FP information screen on PACTware.

DOUBLE SENSOR CONFIGURATION

VTT10-FP is capable of working simultaneously with two sensors. In the case of Single, Differential or Backup measurement, there is only one Transducer block and one AI block. In the case of Dual measurement there are two Transducer blocks and two AI blocks. The connection of each sensor is detailed in the item "2.3 - Process Connection".

To work with Differential or Backup measurement, set "Measured Type" parameter of Transducer Block 1 to "Backup or Differential". The "Sensor Connection" parameter should always be set to "Two wires".

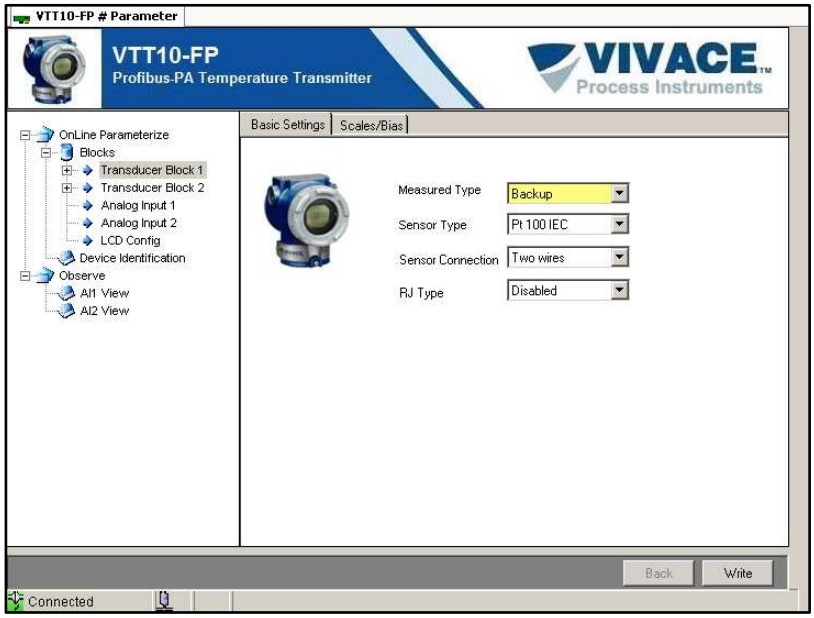

Figure 3.9 – Double sensor configuration on “Backup” mode for VTT10-FP on PACTware.

To work with double measurement, set "Sensor Connection" parameter of Transducer Block 1 to "Two wires dual" and then set sensor type in Transducer 1 and 2 blocks.

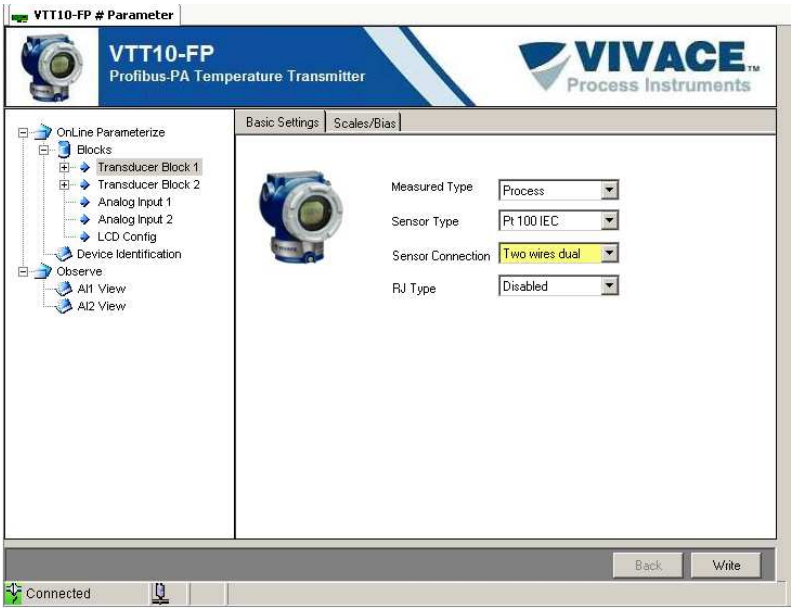

Figure 3.10 – Double sensor configuration for VTT10-FP on PACTware.

Transducer Block 1 sensor is the one connected between terminals 3 and 4. Transducer Block 2 sensor is the one connected between terminals 2 and 4.

3.8. CYCLIC CONFIGURATION

VTT10-FP has 02 functional blocks of analog input (02 AI - Analog Input Block). It also has the empty module (Empty Module) for applications where user wishes to configure only one block.

User can work with the following measurement types:

- Simple Measurement;
- Double Measurement;
- Differential Measurement;
- Backup measurement.

Depending on the type of measurement, the appropriate cyclic configuration must be performed.

VTT10-FP allows simple temperature measurement (AI + Empty_Module), differential measurement (AI + Empty_Module), double measurement (AI + AI) and simple measurement with a backup sensor (AI + Empty_Module). The following cyclic order of blocks must be respected: AI1 and AI2.

Most Profibus configurators use two directories where the GSD and BITMAP files from various manufacturers are located. The GSD and BITMAPS for Vivace equipment are available on the Vivace website.

Follow the procedure below to integrate the VTT10-FP into a Profibus system (these steps apply to all Profibus-PA Vivace line devices).

- Copy the GSD file from VTT10-FP to the directory where all the GSD files of the Profibus configurator are located, usually called "GSD";
- Copy the BITMAP file from VTT10-FP to the directory where all the BMP files of the Profibus configurator equipment are located, usually called "BMP";
- After choosing the PROFIBUS-DP master, set the communication rate. Do not forget that DP / PA couplers can have the following communication rates: 45.45 kbits / s (Siemens), 93.75 kbits (s) and 12 Mbit / s , SK3). The IM157 device link can have up to 12 Mbits / s;
- Add the VTT10-FP and specify its address on the bus;
- Choose the cyclic configuration via parameterization, according to the GSD file, which depends on the application, as seen previously. For each AI block, the VTT10-FP provides the master with the value of the process variable in 5 bytes, the first four in the floating point format (IEEE-754) and the fifth byte forming the status that brings the quality information of this measurement.
- Some devices support the cyclic modules in the "long" and "short" formats. If there is a failure in the cyclic communication, check if by changing the chosen format, the communication is established successfully.
- If necessary activate the watchdog condition, which causes the equipment to assume a safe fault condition when it detects a loss of communication between the slave device and the Profibus-DP master.

Check byte swap condition (MSB with LSB inversion and, in some cases, nibble inversion), as for some systems it will be necessary on handling cyclic data.

VTT10-FP has the GSD identifier number equal to 0x0FB5 (Manufacturer Specific) and can still work with the value 0x9701 (Profile Specific). When user initializes VTT10-FP, it will show on LCD display (after the address) whether in Manufacturer Specific or Profile Specific.

VTT10-FP DDL, DTM and GSD files can be found on the website: www.vivaceinstruments.com.br

For more information on Profibus-PA technology, refer to the installation, operation and configuration manual - Profibus-PA - blocks, parameters and structure, on the Vivace web page.

Link DP/PA

In a Profibus-DP network it is common to have Link Devices DP/PA to increase the communication rate up to 12 Mbit/s and to increase the addressing capacity, since these devices are slaves in the Profibus-DP network and Profibus-PA network. Each Link Device may have connected several DP/PA couplers.

Siemens has a Link device DP/PA which is the IM157 model. This device works with DP/PA coupler at a communication rate of 31.25 kbits/s and in the Profibus-DP network from 9.6 kbits/s to 12 Mbits/s. The IM157 and each coupler must be supplied with 24 Vdc. The maximum number of field devices per link is limited to 30 or 64 devices, but this depends on the model and the number of bytes exchanged cyclically.

When using the Link Device it is necessary to verify that the cyclic modules for Vivace Process Instruments equipment are included in your GSD file.

If they are not, they should be included. To do so, access the Siemens website and download the GSD tool. This is a tool that allows you to extend the GSD file from Siemens links devices (IM157, IM53) by adding the modules of new Profibus-PA devices that are not in the GSD file. You must have the GSD of the link device and the Vivace device in the directory where the GSD Tool was installed and when running, choose the option to extend the GSD file of the link device, choose the link model and GSD of the device and run. After execution, note that a section has been created for the Vivace equipment with its cyclic modules.

4 MAINTENANCE

The VTT10-FP Temperature Transmitter, like all Vivace products, is rigorously evaluated and inspected before being shipped to the customer. However, in case of a malfunction, a diagnosis can be made to check whether the problem is located in the sensor installation, the equipment configuration or if it is a transmitter problem.

4.1. ASSEMBLY AND DISASSEMBLY PROCEDURES

Figure 4.1 shows in detail all components of the VTT10-FP. Before disassembling the equipment, make sure it is switched off. Maintenance should not be carried out on the electronic boards under penalty of loss of warranty of the equipment.

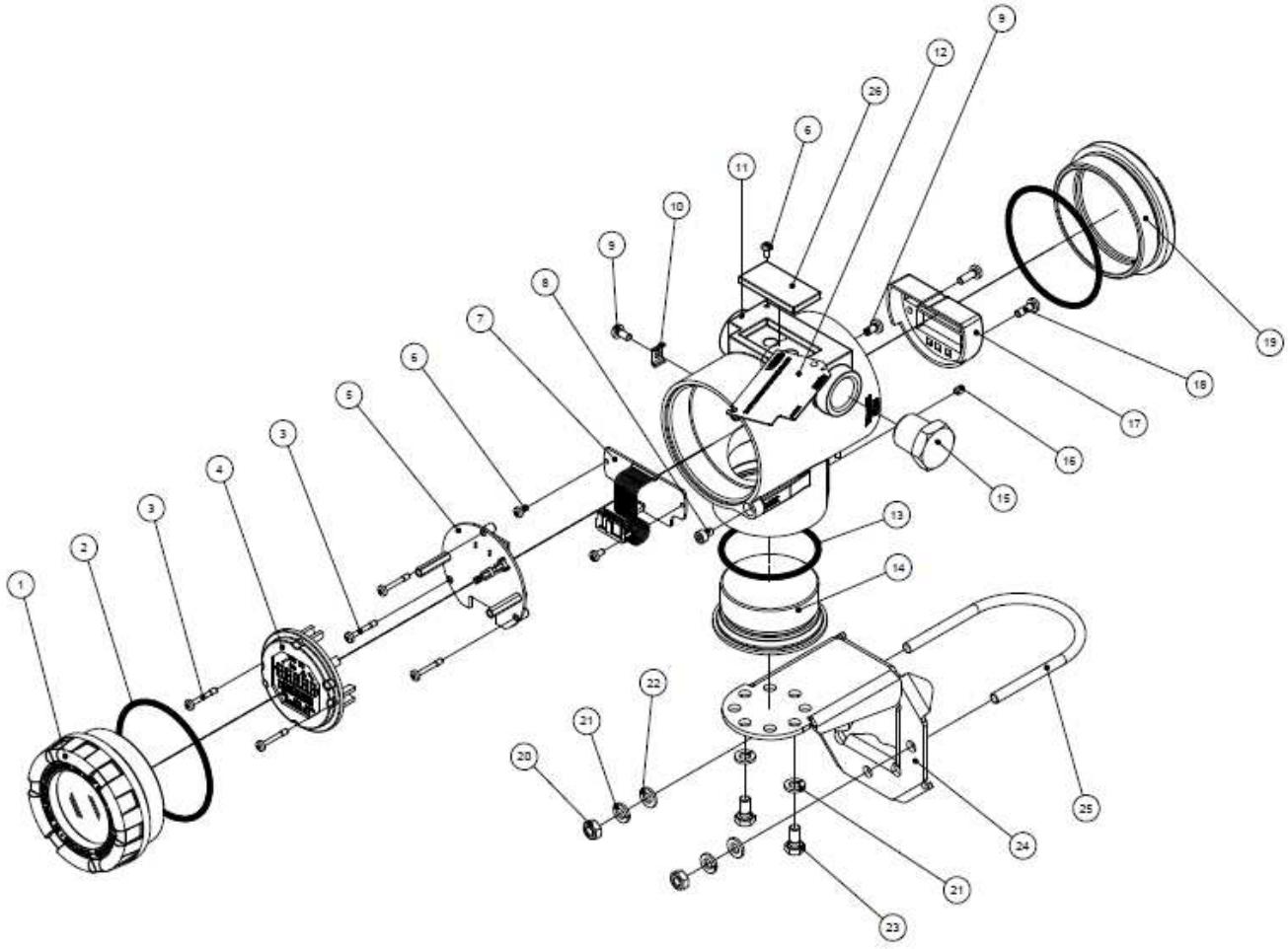

Figure 4.1 – Exploded view for VTT10-FP.

4.2. SPARE PARTS

The list of spare parts of the VTT10-MP that can be purchased directly from Vivace Process Instruments are listed in Table 4.1.

VTT10-FP – SPARE PARTS		
DESCRIPTION	**REFERENCE FIG.4.1**	**CODE**
FRONT COVER (includes o'ring)	1	2-10002
REAR COVER (includes o'ring)	19	2-10003
O'RING (cover)	2	1-10001
HOUSING WITH TERMINAL BLOCK	11	2-10011
DISPLAY (includes screws)	4	2-10006
MAIN BOARD (includes screws and spacers)	5	2-10026
ANALOG BOARD (includes screws)	7	2-10013
TERMINAL BLOCK COVER (includes screws)	17	2-10014
HOUSING INFERIOR COVER (includes o'ring)	14	2-10008
INFERIOR COVER O'RING	13	1-10004
MOUNTING SUPPORT (includes U clip and screws)	24	2-10009
HOUSING PLUG	15	1-10005
EXTERNAL GROUND (includes screws)	10	2-10010
COVER LOCK SCREW	8	1-10006
IDENTIFICATION PLATE AND ANALOG BOARD SCREW	6	1-10007
HOUSING LOCK SCREW	16	1-10008
TERMINAL BLOCK COVER SCREW	18	1-10003
DISPLAY AND MAIN BOARD SCREW	3	1-10002
MAGNETIC TOOL	-	3-10001

Table 4.2 – Spare parts list for VTT10-FP.

5 CERTIFICATION

VTT10-FP is designed to meet national and international standards for explosion proof and intrinsic safety.

The transmitter is certified by INMETRO for intrinsic safety and explosion proof – dust ignition (Ex tb) and flame (Ex db).

6 TECHNICAL CHARACTERISTICS

6.1. IDENTIFICATION

VTT10-FP has an identification plate affixed to the top of the housing, specifying the model and serial number, as shown in Figure 6.1.

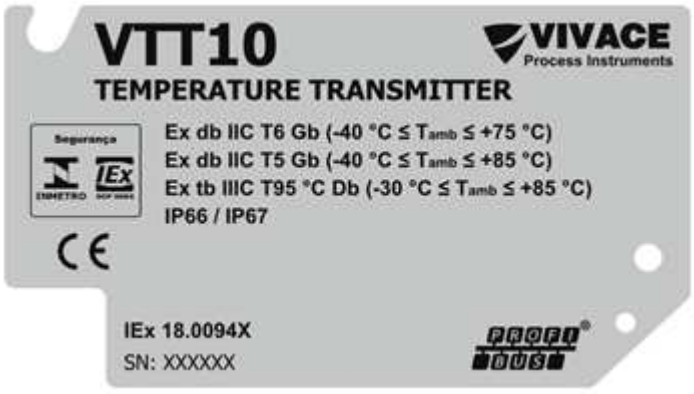

Figure 6.1 – Identificação plate for VTT10-FP.

6.2. TECHNICAL SPECIFICATION

In the table below are the technical specifications of VTT10-FP:

Accuracy	As tables 6.2, 6.3 and 6.4
Power Supply / Quiescent Current	9 to 32 Vdc, no polarity / 12 mA
Communication Protocol	Profibus PA, According to IEC 61158-2(H1), Voltage Mode 31,25 Kbits/s with Bus Power
Functional Blocks	2 Analog Input Blocks (AI)
Hazardous Area Certifications	Explosion Proof and Intrinsically Safe
Ambient Temperature Effects	For variation of 1 °C: - Resistive Sensors: ± 0.0052% of reading in Ohm - Millivoltage Sensors: ± 0.001% of reading in mV
Reading Stability	±0.1% of reading or 0.1°C (0.18°F) - whichever is greater. RTD: 3 years; Thermocouples: 2 years
Ambient Temperature Limits	- 40 to 85°C
Configuration	Remote configuration through EDDL and FDT/DTM tools, besides Android platform. Local configuration through magnetic tool.
Assembly	In field, directly on the sensor, through a bracket on a 2” pipe or fixed on a wall or panel
Protection Degree	IP67
Electrical Isolation	Galvanic Isolation, 1.5 kVac
Housing Material	Aluminum
Approximate Weight with Bracket	1700 g

Table 6.1 – Technical specifications for VTT10-FP.

6.3. COMPATIBLE SENSORS

The following tables list the types of sensors and their proper working ranges, plus the minimum range for correct operation and accuracy.

RTD - Temperature sensor based on resistance with 2, 3 or 4 wires connection.

SENSOR OPTION	REFERENCE	INPUT RANGE (°C)	MINIMUM 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 Winding #15	-50 to 250	10	1.00
Pt50 (α=0,00391)	GOST 6651-94	-200 to 850	10	0.20
Pt100 (α=0,00391)	GOST 6651-94	-200 to 850	10	0.12
Cu50 (α=0.00426)	GOST 6651-94	-50 to 200	10	0.34
Cu50 (α=0.00428)	GOST 6651-94	-185 to 200	10	0.34
Cu100 (α=0.00426)	GOST 6651-94	-50 to 200	10	0.17
Cu100 (α=0.00428)	GOST 6651-94	-185 to 200	10	0.17

Table 6.2 – RTD technical characteristics.

TC - Temperature sensor based on mV with 2 wires connection

SENSOR OPTION	REFERENCE	INPUT RANGES (°C)	MINIMUM SPAN(°C)	ACCURACY (°C)
Thermocouple B	IEC584	100 to 1820	25	0.75
Thermocouple E	IEC584	-50 to 1000	25	0.20
Thermocouple J	IEC584	-180 to 760	25	0.25
Thermocouple K	IEC584	-180 to 1372	25	0.25
Thermocouple N	IEC584	-200 to 1300	25	0.40
Thermocouple R	IEC584	0 to 1768	25	0.60
Thermocouple S	IEC584	0 to 1768	25	0.50
Thermocouple T	IEC584	-200 to 450	25	1.00
Thermocouple L	DIN43710	-200 to 900	25	0.35
Thermocouple U	DIN43710	-200 to 600	25	0.35
Thermocouple W3	ASTM E988-96	0 to 2000	25	0.70
Thermocouple W5	ASTM E988-96	0 to 2000	25	0.70
Thermocouple L	GOST R 8.585	-200 to 800	25	0.45

Table 6.3 – TC technical characteristics.

Ohm or mV - Linear resistive sensor or mV with 2, 3 or 4 wires

SENSOR OPTION	INPUT RANGES	ACCURACY
mV Input	-10 mV to 100 mV	0.015 mV
Ohm Input	0 Ohm to 2000 Ohm	0.45 Ohm

Table 6.4 – Resistive and milivoltage technical characteristics.

6.4. ORDERING CODE

VTT10-F *Temperature Transmitter - Field*

Communication Protocol	**H**	HART
	P	PROFIBUS
Certification Type	**0**	NO CERTIFICATION
	1	INTRINSICALLY SAFE
	2	EXPLOSION PROOF
Certification Body	**0**	NO CERTIFICATION
	1	INMETRO
Housing Material	**A**	ALUMINUM
Electrical Connection	**1**	½ – 14 NPT
Painting	**1**	BLUE – RAL 5005
Mounting Bracket	**0**	NO MOUNTING BRACKET
	1	SS 304 MOUNTING BRACKET

Ordering Code Example:

VTT10-F	**P**	**-**	**0**	**0**	**A**	**1**	**1**	**0**

**Explosion Proof Certification Ex tb (dust ignition) and Ex db (flame)*

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: