INSTALLATION, OPERATION, CONFIGURATION AND MAINTENANCE MANUAL
July/2019

VHC10-F

HART® 4-20 mA CONVERTER AND INDICATOR

field model

VIVACE™ Process Instruments

HART® COMMUNICATION FOUNDATION

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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.

1 EQUIPMENT DESCRIPTION

HART® 4-20 mA converter VHC10-F is a member of Vivace Process Instruments product family, projected to create an additional 4-20 mA current channel, helping analog monitoring on devices that do not have this characteristic (valve positioners, for example) or need this monitoring for more than one variable. It also provides up to three variables to be indicated on a 5-digit numerical and alphanumerical LCD display, including status icons and bargraph, proportional to the range configured by user.

The converter can be powered by a 12 to 45 Vdc power supply, generating a 4-20 mA current channel (according to NAMUR NE43 standard). Its main function is to monitor any HART device variables (independent of its version), configured by user and extern the main variable using the current channel.

The configuration uses HART® 7 (older versions are compatible) communication protocol, already established on the world of industrial automation for configuration, calibration, monitoring and diagnostics. This configuration occurs in the beginning of work cycle, when converter stays on "slave" mode, being finished by user with the changing of this mode to "master". Configurations can be accomplished by using any HART configurator, EDDL or FDT/DTM-based tools or local adjust using specific magnetic screwdriver, at any time.

Focusing on high performance and robustness, it was projected with the most recent electronic component and material technology, offering long-term reliability for every scale systems.

1.1. BLOCK DIAGRAM

Component modularization for converter is described on the following block diagram.

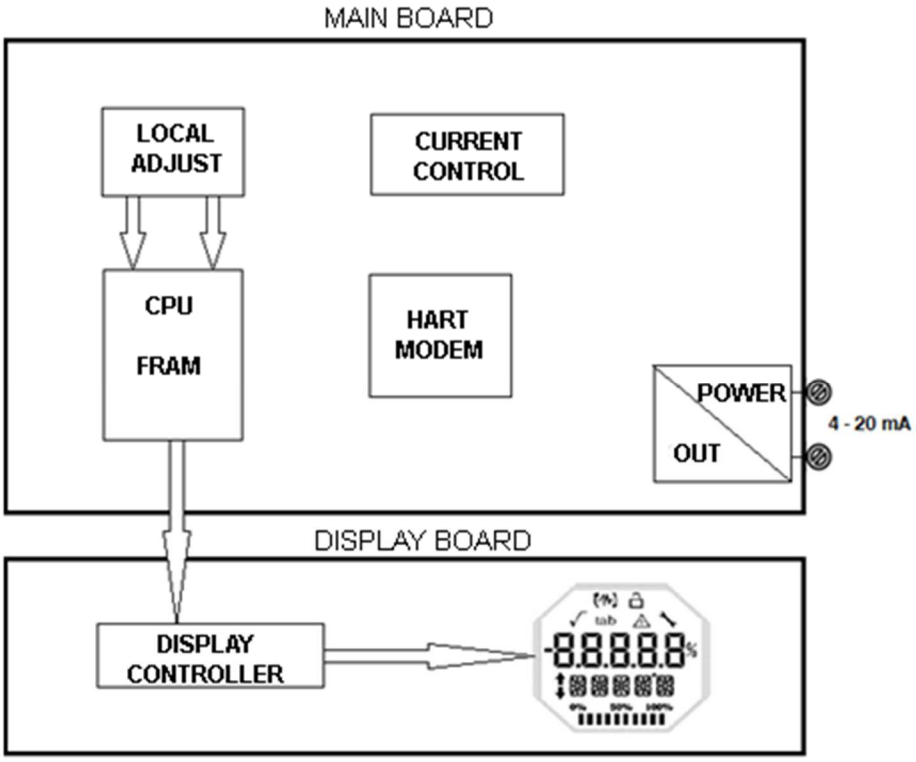

Figure 1.1 – Converter block diagram.

Input block (DC power supply) is responsible for the electric source of all circuits. Current control block is composed by a circuit to transform digital values generated by microcontroller into 4-20 mA electric current, proportional to monitored main variable value.

HART® channel and HART® modem blocks provide the interface between microcontroller signals and HART® bus connected to monitored devices. Local adjust block enables local configurations by user.

The display board has the controller block to interface LCD and CPU communication signals, adapting all the messages to be shown on display.

Finally, the CPU block can be seen as the converter brain, where all the activities happen, such as time control, switching between HART® slave and master machines, besides the common transmitter routines: configuration, calibration and generation of output current, proportional to the monitored variable.

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

VHC10-F converter was developed to be installed in the field, thus supporting exposition to several environment situations, keeping good performance through any temperature, humidity and vibration variations.

Converter housing is IP67 protected, being immune to water contact to electronic circuit and electrical connections, since cable gland or conduit for electrical connection is correctly assembled and sealed with non-hardening substance. Covers must also be tight to avoid humidity, since housing screws are not protected by painting.

The electronic circuit is protected by varnish but constant water or corrosion exposure may compromise this protection and damage the electronic components.

Figure 2.1 shows the dimensional drawing and mounting positions for VHC10-F.

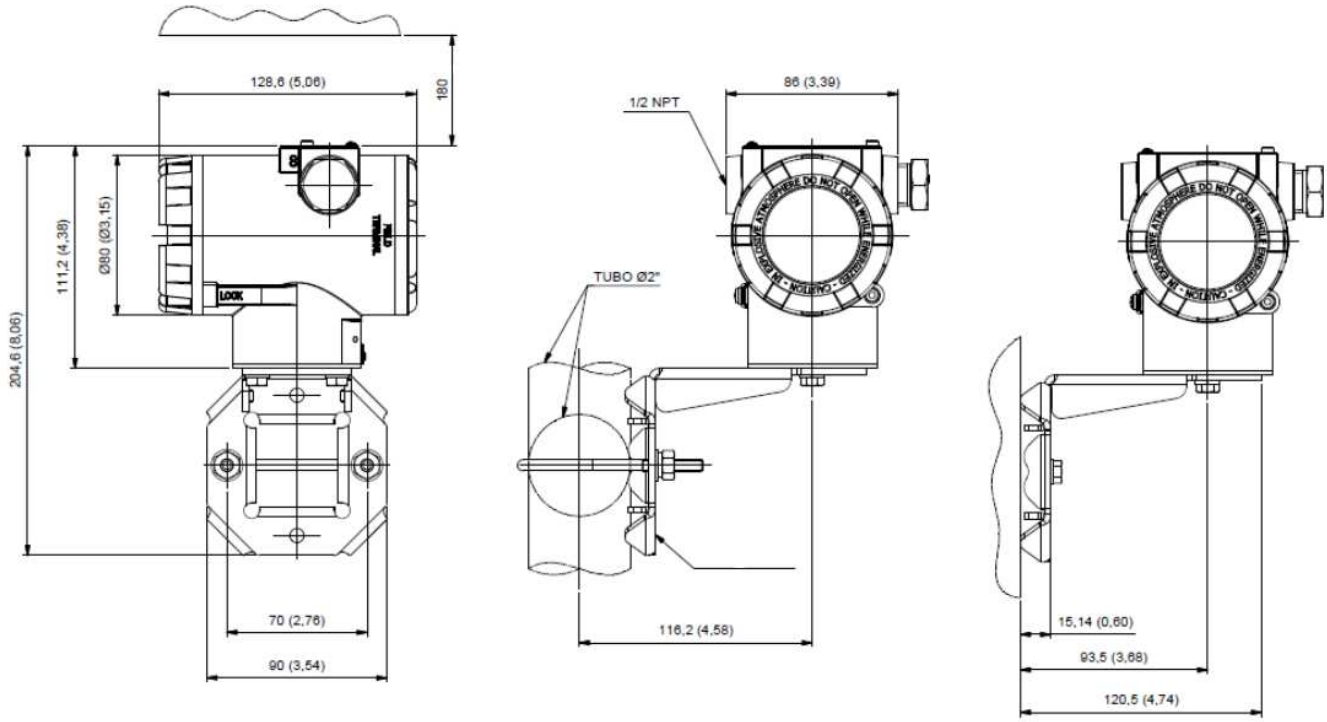

Figure 2.1 – Dimensional and mounting drawings for VHC10-F.

To avoid the risk of involuntary loss of VHC10-F covers due to vibration, for instance, it can be locked by screw, as shown on figure 2.2.

VHC10-F is a field device, so it can be installed through a mounting bracket on a 2” tube attached with a U clip. For best LCD positioning device enables its display to be rotated 4 x 90°, according to figure 2.3. The converter can also be attached with the same mounting bracket to a wall or panel.

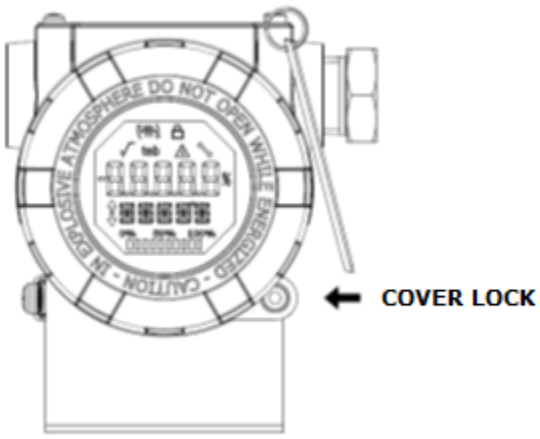

Figure 2.2 – Front cover lock.

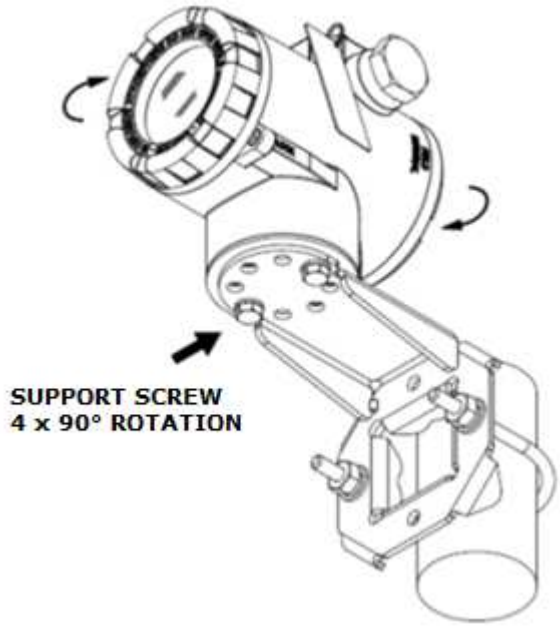

Figure 2.3 – Housing positioning.

VHC10-F liquid crystal display can be rotate 4 x 90° so indication will be adequate for user visualization.

Figure 2.4 illustrates rotation possibilities for VHC10-F LCD.

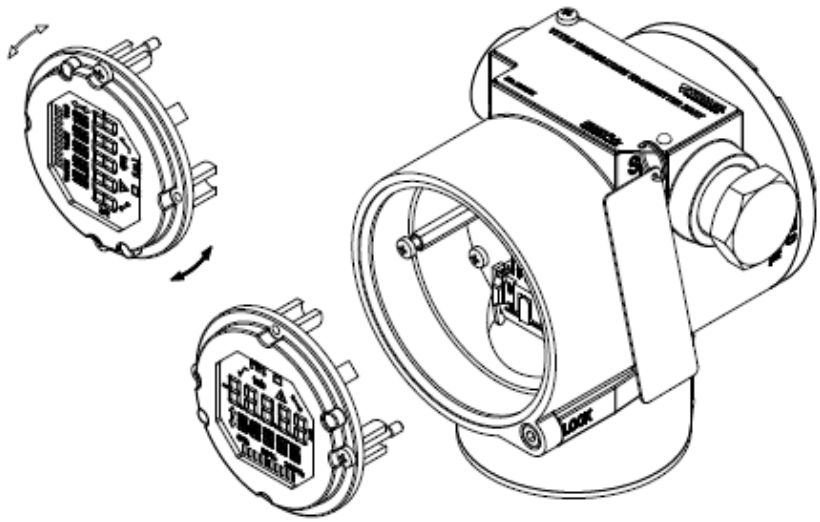

Figure 2.4 – 4 x 90° LCD rotation.

2.2. ELECTRICAL CONNECTION

To access the terminal block user must remove VHC10-F rear cover. First, loose cover lock screw (see figure 2.5) by turning it clockwise.

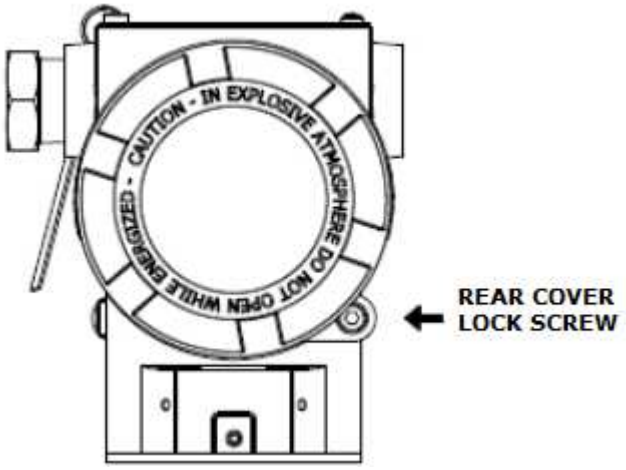

Figure 2.5 – Rear cover lock.

Figure 2.6 shows the terminals for power supply (PWR BUS) and the HART communication channel terminals which VHC10-F will be connected for monitoring. It also shows the grounding terminals (internal and external) and current test terminals for VHC10-F. To power the device, it is recommended to use a 22 AWG twisted pair cable.

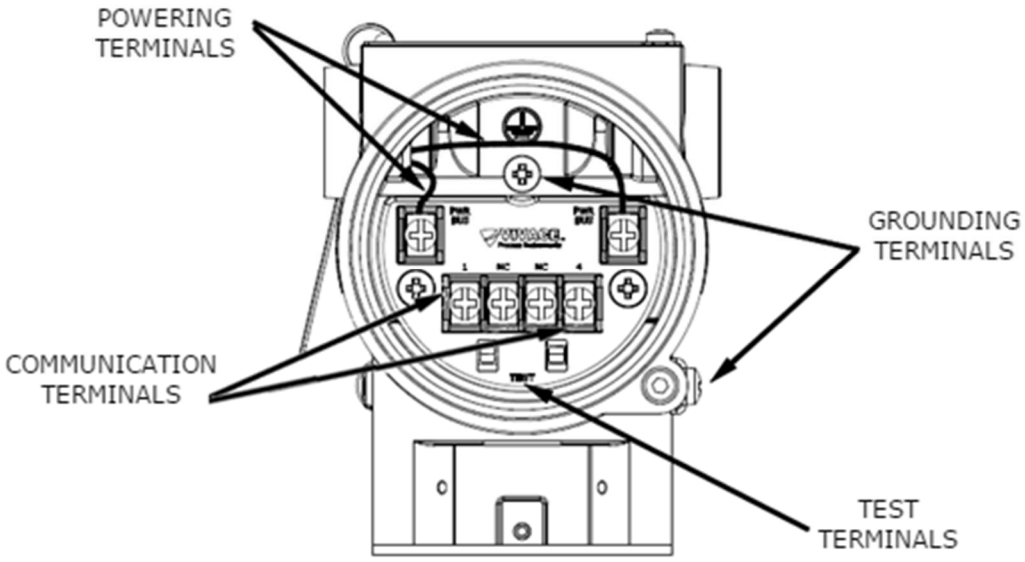

Figure 2.6 – Terminal connection and description.

Table 2.1 describes VHC10-F terminal functions.

Terminal Description
Power Terminals – PWR BUS - 24 Vdc not polarized
Grounding Terminals – 1 internal and 1 external
Test Terminals – TEST – current loop measurement (4-20 mA) without open circuit
Communication Terminals 1 and 4 – monitoring of slave devices via HART® channel

Table 2.1 – Terminal description.

NOTE

All cables used for connecting VHC10-F to HART® 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 the HART network.

Conduits used for power cables must be assembled 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 to avoid the entrance of water or any corrosive material that may cause damage to the device.

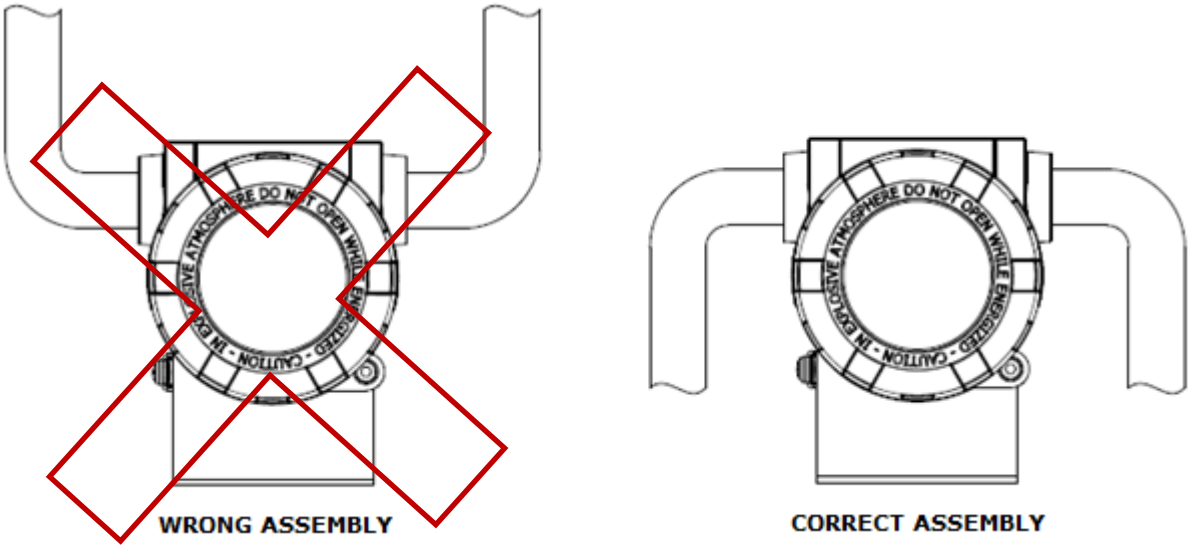

Figure 2.7 – Conduit installation.

VHC10-F can monitor any variable from voltage HART devices (transmitters) or current HART devices (valve positioners). The communication connections for those devices are represented, respectively on figures 2.8 and 2.9.

For transmitter monitoring (figure 2.8), a 250 ohm load, connected serially to the voltage supply, is necessary in order to enable HART signal modulation on electric current. User should use separated power supplies for transmitter and converter, since converter output current will correspond to the monitored variable from transmitter, as shown on the following figures. Communication terminals 1 and 4 must be connected over the 250 ohm load to get the electric current where the HART signal is modulated.

When monitoring a valve positioner (figure 2.9), the 250 ohm load is not necessary for communication, since the valve positioner is supplied with a 4-20 mA electric current input. Converter communication terminals 1 and 4 must be connected directly on valve positioner 4-20 mA electric current input.

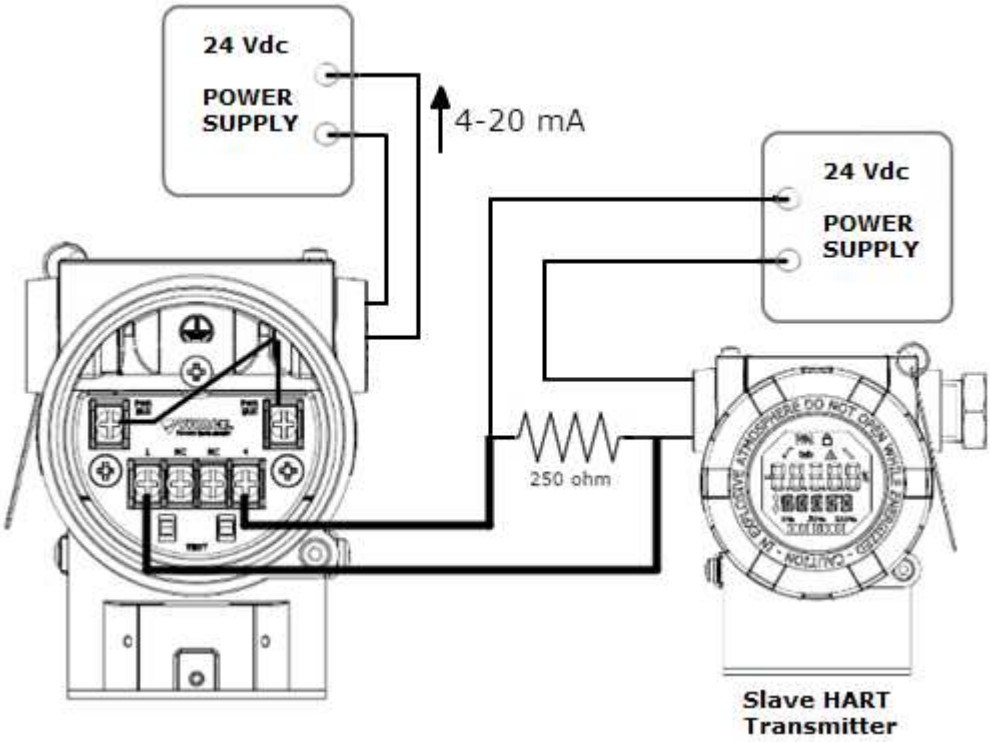

Figure 2.8 – Converter installation with a slave transmitter.

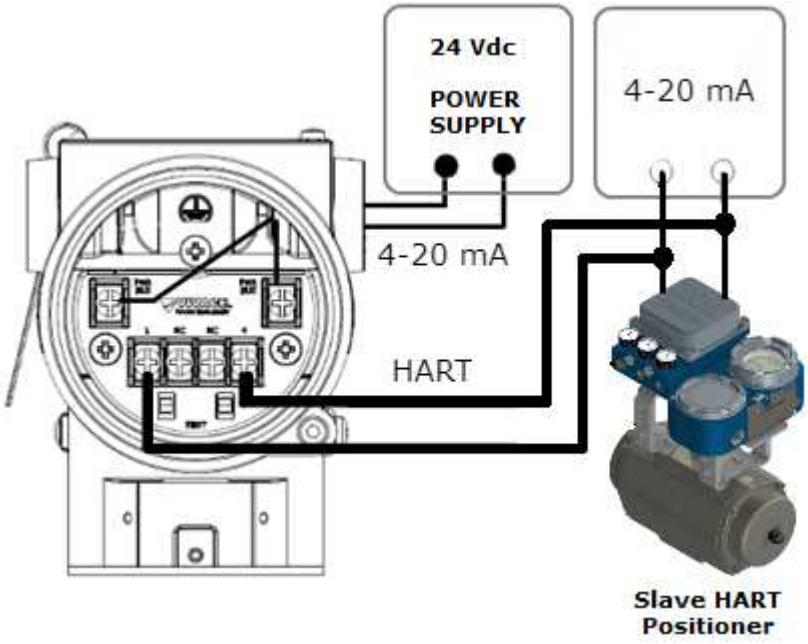

Figure 2.9 – Converter installation with a slave valve positioner.

Observe on previous figures that communication cables are connected outside of electric connection orifice, just for visualization convenience. When installing in the field, these cables must be passed through the electric connection orifice, like the power cables.

3 CONFIGURATION

The converter can be configured by any HART® compatible programmer. Vivace offers the interfaces VCI10-H (USB and Bluetooth) as a solution for configuring and monitoring any HART® device. VHC10-F can also be configured by local adjust using Vivace magnetic screwdriver (see item 3.7).

Figure 3.1 exemplifies the use of USB interface with a personal computer that has a HART® configurator installed, for communication with a valve positioner.

A 250Ω resistance must be serially connected to the power supply when the monitored device is a transmitter (voltage supply) and the power supply does not contain this load internally, to enable HART® communication over the 4-20 mA current. Vivace interfaces already provide this resistance internally.

Figure 3.1 – Converter installation for configuration.

3.1. CONFIGURATION PARAMETERS

The converter parameters are available for user configuration via HART® programmer. Additionally to inherent parameters of protocol, some basic parameters must be configured before initializing the converter: polling addresses of devices to be monitored, variable codes and TAGs to be monitored, work range and unit for main variable, to calculate the 4-20 mA output current.

The protocol inherent parameters are related to the converter itself, basically configuring its identification (Tag, Descriptor, Date, Polling Address) and output current calibration to be used as the output signal for monitored main variable.

Attention! As the VHC10-F converter is installed on the same HART® network as the devices monitored, its default polling address is one (1). So, when using the HART® configurator for the converter configuration this is the address to be inserted by user on *'Polling Address'* field.

3.2. CONFIGURATION WINDOW

VHC10-F works normally as a “master", so it can monitor the “slave” device and generate the current proportional to monitored variable. When working as master, converter will not accept or respond any HART® command from any other master, becoming impossible to be configured on this situation.

To configure the converter using HART® commands, user must execute the following procedure.

Attention! If converter enters monitoring mode and user wishes to change any configuration, the procedure must be restarted.

a. Reset VHC10-F converter

Converter will wait the reception of configuration commands. If no command is received after 30 seconds the “master” mode is enabled automatically.

b. Search converter

Through a HART® configurator, search for converter on default address one (1) – or the address changed by user.

c. Change mode for Configuration

On the menu "Configuration", change converter mode to "Configuration". From this moment on, user is enabled to change any parameter with no time restriction and converter will not return to “master” mode at all.

Attention! Vivace configuration tools, such as VMT-HART and converter DTM already send this command automatically. On these cases user can move to item d.

d. Configure addresses, variables and ranges

User must check if slave devices polling addresses, codes and TAGs for variables to be monitored, work range and unit for main variable are correct.

The variables to be monitored can be chosen among the dynamic variables (PV, SV, TV or QV) or by the specific variable index code (check the index codes available on the specific product manual).

e. Change mode for Monitoring

On the menu "Configuration", change converter mode to "Monitoring" (or “Enable Master Mode”, according to configuration tool). From this moment on, user cannot configure any parameter of converter anymore, as it will be working as a “master”, monitoring the configured variables.

3.3. IDENTIFYING SLAVE DEVICE

After installing the converter on HART® network, user should configure the **addresses of the devices** to be monitored (0 to 15, for HART®6 or previous; 0 to 63, for HART®7) plus **codes and TAGs for device variables** from these devices.

The converter can monitor up to three devices/variables simultaneously, with **only the main variable (variable 1) being converted to 4-20 mA output current**. Variables 2 and 3 will be monitored and shown on LCD when correctly configured.

If user wishes not to monitor any of the variables, just select its Sub-Device Address as "Not Used" and the converter will ignore that variable. Only variables 2 and 3 can be disabled.

Note: If variable 3 is enabled, variable 2 will be automatically disabled, since converter considers variable monitoring sequentially.

For the variables codes (Sub-Device Code), user can choose between the main dynamic variables (PV, SV, TV or QV) or manually insert the code for the desired variables, when it is not any of the previous ones.

Default configuration has only Variable 1 enabled (Sub-Device 1), with slave device on polling address zero (0) and Variable Code as PV, the same as its TAG.

Note: The codes for each variable must be informed by the manufacturer of each device.

When these configurations are done, user will be able to enable the **slave device monitoring** (*'Enable Master Mode'*) on "Configuration" menu, so converter can start identifying the devices on the configured addresses.

If there is success on this search, the configured variables will be monitored automatically, generating the 4-20 mA output current proportional to the configured values for the parameters of work range and current calibration (standard HART®) for variable 1, as shown below.

Configuration Example:

Converter: Address 1
Slave Device 1: Address 0

Monitored Variable 1: PV%
Variable Unit: %
Range: 0% to 100%

PV%	Output Current
0.0%	4.0 mA
25.0%	8.0 mA
50.0%	12.0 mA
75.0%	16.0 mA
100.0%	20.0 mA

Table 3.1 - Example of converter monitoring.

3.4. HART CONFIGURATOR PROGRAMMING TREE

The configuration tree is a structure tree-shaped with the menus for all software resources available, as shown on figure 3.2.

For online configuration, check converter is correctly installed, powered by the adequate voltage and with the minimum load of 250 Ω impedance on the line, necessary for communication with slave device (for voltage devices, such as transmitters, only).

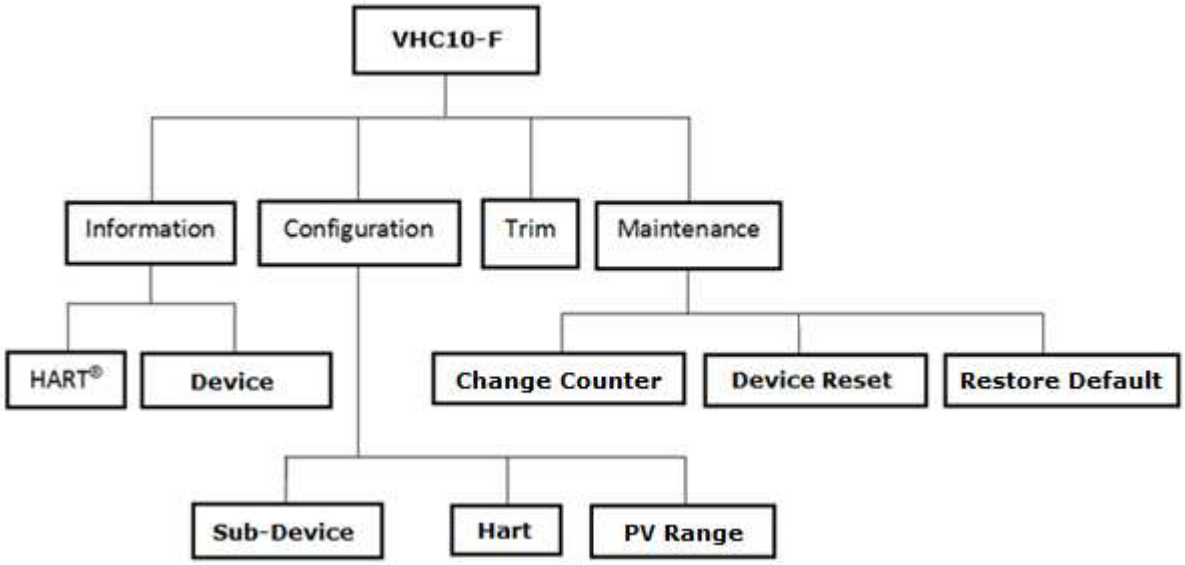

Figure 3.2 – VHC10-F programming tree.

Information – Main information about the converter can be accessed here.

- **HART® –** Main information about communication protocol are available here, such as: Manufacturer, Device Type, Device Profile, HART® Revision and Software Version.
- **Device –** Main information about the converter are available here, such as: Tag, Description, Message, Serial Number and Ordering Code.

Configuration – Configuration of converter mode as Master (monitoring) or Slave (configuration), plus the following configurations:

- **Sub-Device –** Device Addresses, Codes and TAGs for monitoring variables.
- **Range –** Work Range (inferior and superior points) and Unit for main variable to be monitored and converted in current.
- **Hart –** configures Loop Current Mode, Fail Safe, HART Master Mode, Write Protection and Communication Preambles.

Trim – Enables the adjustment for converter output current. Figure 3.3 shows the connection for current TRIM on VHC10-F.

Maintenance – This menu offer maintenance functions for converter, as described below.

- **Change Counter –** checks the number of changes executed in several parameters with the possibility of reset by user.
- **Device Reset –** resets converter by software.
- **Restore Default –** restores default factory values for converter configuration and calibration variables.

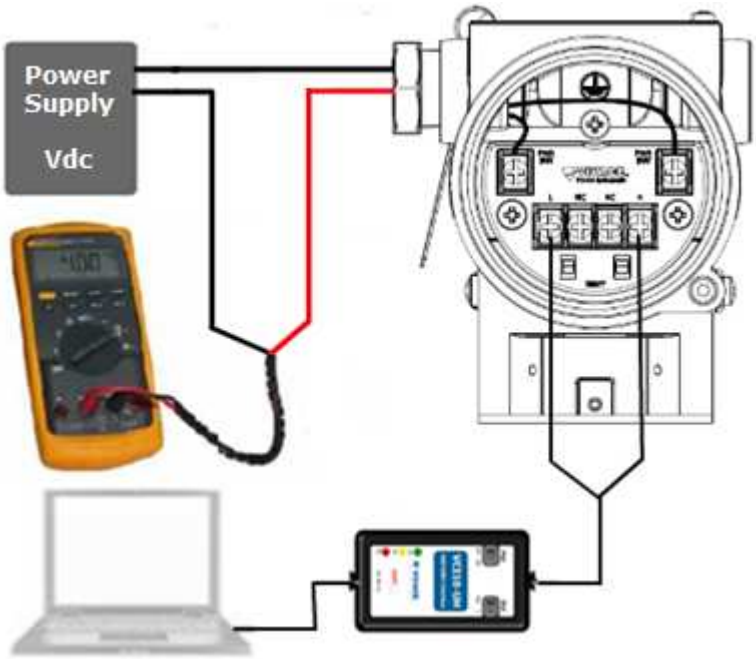

Figure 3.3 – VHC10-F current trim configuration.

3.5. JUMPERS FOR LOCAL ADJUST AND WRITE PROTECTION

VHC10-F has two *jumpers* on its main board (figure 3.4) to protect converter data writing (WP1) and enabling/disabling local adjust (ADJL1).

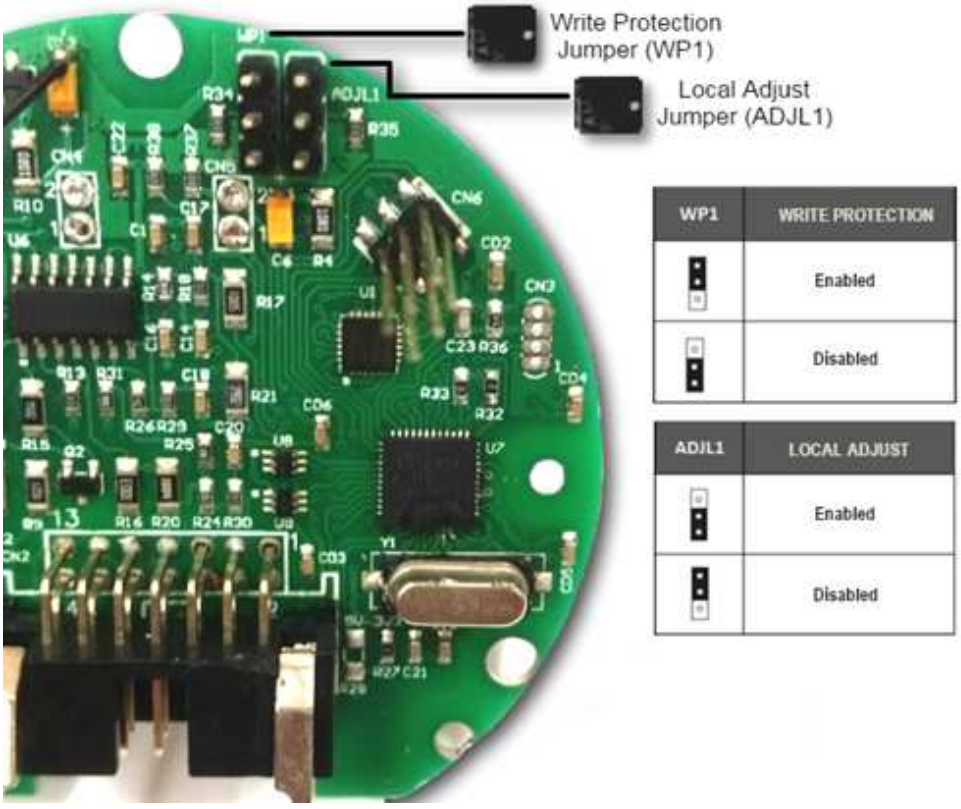

Figure 3.4 – Jumpers WP1 (write protection) and ADJL1 (local adjust) on VHC10-F main board.

Default selection for these jumpers is Write Protection **DISABLED** and Local Adjust **ENABLED.**

3.6. LIQUID CRYSTAL DISPLAY (LCD)

Main information related to converter are indicated on its liquid crystal display (LCD). Figure 3.5 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 auxiliar messages. Each indication icon use is described on table 3.2.

Figure 3.5 – 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.

3.7. LOCAL CONFIGURATION

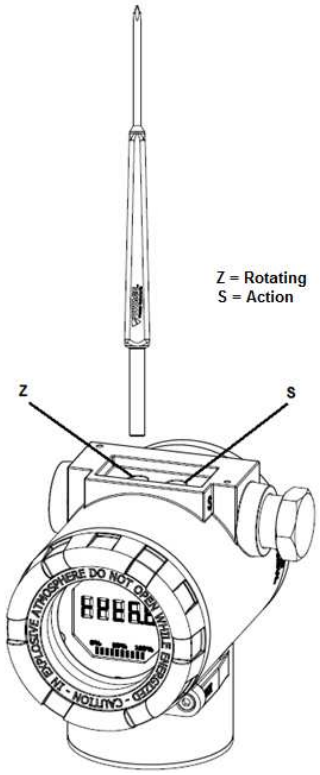

Figure 3.6 – Z and S orifices and magnetic screwdriver.

Converter local configuration is executed by using Vivace 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 3.6 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, then remove it for 3 seconds and insert the magnetic screwdriver into Z orifice again, so user can navigate through local adjust parameters.

Table 3.3 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 3.3 – 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).

In the case of a numeric parameter, this field will enter edit mode and the decimal point will begin to blink shifting to the left. When entering Z orifice, the least significant digit (on the right) will begin to blink, indicating it is ready for editing. When entering the key in S, user can increment this digit, varying from 0 to 9.

After editing the least significant digit, user must enter the key in Z so that the next digit (on the left) starts blinking, allowing its edition. User can edit each digit independently, until the most significant digit (5th digit left) is configured. After the 5th digit is edited, the numeric value signal can be edited with the key in S.

During each step, if the user removes the magnetic key from the local adjustment holes, editing will be completed and configured value will be saved to the device.

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.

3.8. SAFE OUTPUT

Converter has a specific configuration for setting output current to a safety value, according to user application. This configuration will be used every time main slave device stops responding to monitoring commands or whenever converter enters configuration mode, either via configuration tool or local adjust.

User can configure the safe output to one of the following options, according to NAMUR NE-43 standard:

- HIGH – configures safe output to 20.50 mA (103.125%);
- LOW – configures safe output to 3.8 mA (-1.25%);
- LAST VALUE – configures safe output to the last valid monitored value.

Converter will indicate output current proportional to monitored variable, as soon as the communication with main slave device is reestablished or when configuration mode is finished.

3.9. LOCAL ADJUST CONFIGURATION TREE

Figure 3.7 shows available fields for local configuration and the sequence they are presented by magnetic screwdriver actuation on Z and S orifices.

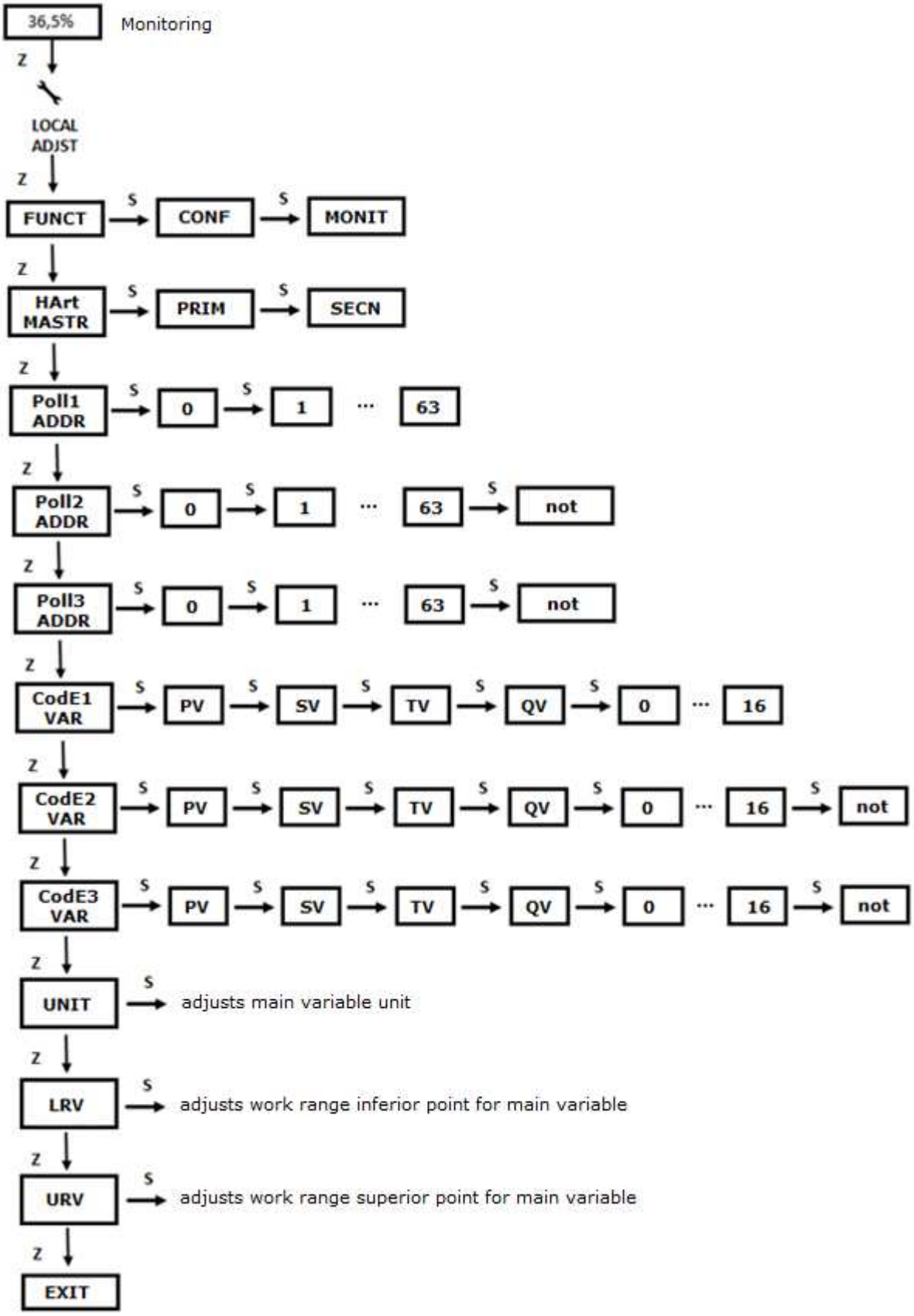

Figure 3.7 – Local adjust configuration tree.

4 MAINTENANCE

VHC10-F, as all Vivace devices, suffers several inspections before its shipping. However, some diagnostics are available in the case of malfunction to check problem cause (installation, configuration or on device itself).

4.1. HART PROGRAMMER DIAGNOSTICS

HART communication can indicate some diagnostics itself through “device status” byte.

- FIELD DEVICE MALFUNCTION – Informs that converter has a failure with main slave device communication. Figure 4.1 shows LCD indication on this failure.

- CONFIGURATION CHANGED – Informs a write command was executed.

- COLD START – Informs converted has been restarted.

- MORE STATUS AVAILABLE – Informs there is more information available on command 48.

- PRIMARY VARIABLE ANALOG OUTPUT FIXED – Informs analog current is in constant mode.

- PRIMARY VARIABLE ANALOG OUTPUT SATURATED – Informs output current is out of 4 to 20 mA range.

- NON-PRIMARY VARIABLE OUT OF LIMITS – Not used by converter.

- PRIMARY VARIABLE OUT OF LIMITS – Informs that main variable read by converter is out of configured work range.

Figure 4.1 – Error indication on VHC10-F monitoring.

4.2. ASSEMBLY AND DISASSEMBLY PROCEDURE

Figure 4.2 shows VHC10-F component details. Before disassembling the converter, make sure it is powered off. Maintenance on electronic boards must not be executed, under penalty of equipment warranty loss.

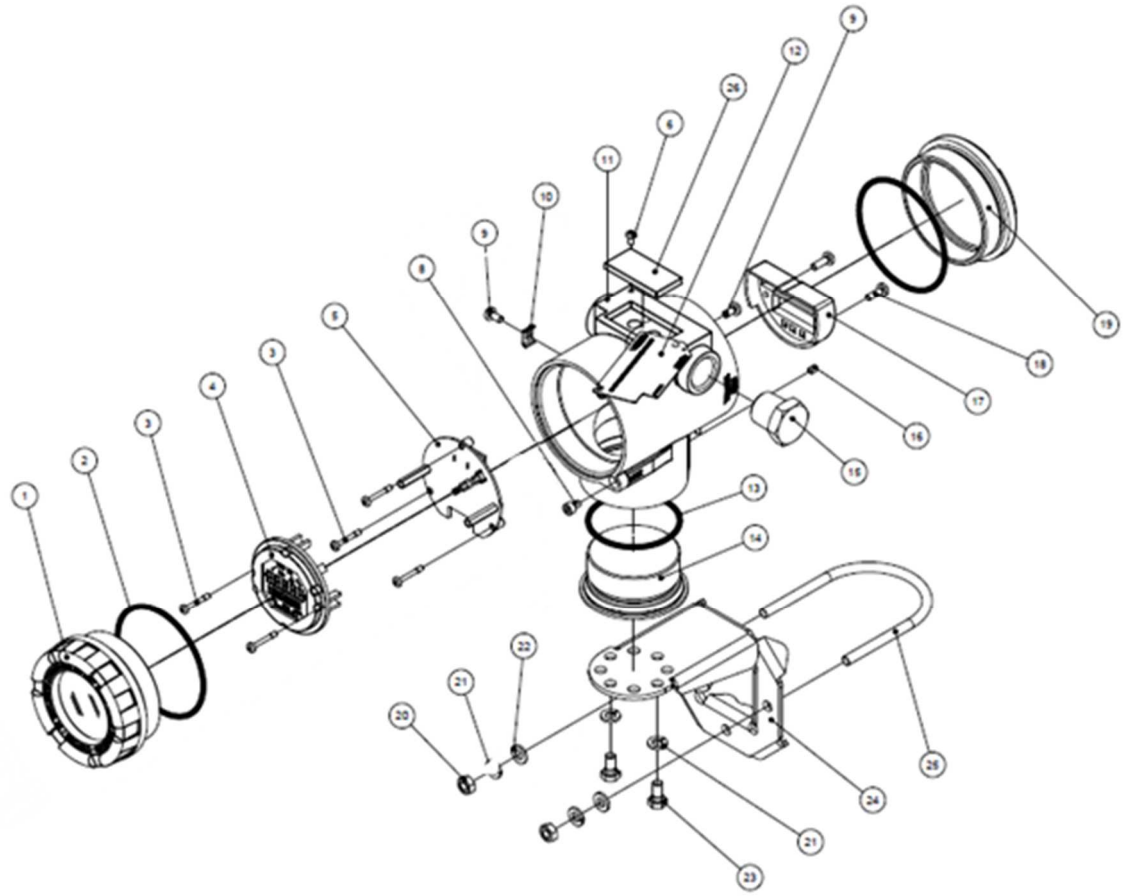

Figure 4.2 – VHC10-F exploded view.

4.3. SPARE PARTS

All the spare parts available for VHC10-F 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**
FRONT COVER (includes o´ring)	1	2-10002
REAR COVER (includes o´ring)	19	2-10003
O´RING (cover)	2	1-10001
HOUSING	11	2-10011
DISPLAY (includes screws)	4	2-10006
MAIN BOARD (includes screws and spacers)	5	2-10012
SCREWS FOR DISPLAY AND MAIN BOARD	3	1-10002
TERMINAL BLOCK (includes screws)	17	2-10014
SCREWS FOR TERMINAL BLOCK	18	1-10003
INFERIOR COVER (include o´ring)	14	2-10008
O´RING FOR INFERIOR COVER	13	1-10004
EXTERNAL GROUND (includes screws)	10	2-10010
HOUSING PLUG	15	1-10005
MOUNTING SUPPORT (includes U clip and screws)	24	2-10009
COVER LOCK SCREW	8	1-10006
Z/S PROTECTION COVER	26	2-10015
IDENTIFICATION PLATE SCREW	6	1-10007
HOUSING LOCK SCREW	16	1-10008

Table 4.1 – VHC10-F spare parts.

5 CERTIFICATION

VHC10-F was projected to attend national and international regulation for explosion proof and intrinsic safety.

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

6 TECHNICAL CHARACTERISTICS

6.1. IDENTIFICATION

VHC10-F has an identification plate fixed on the superior side of its housing, specifying model, manufacturer and serial number, as shown on figure 6.1.

Figure 6.1 – VHC10-F identification plate.

6.2. TECHNICAL SPECIFICATION

The following table shows the technical specifications for VHC10-F:

Accuracy	± 0.03% of Calibrated Span
Power Supply	2-wire, 12 to 45 Vdc (not polarized)
Output Current	4-20 mA accordiing to NAMUR NE43
Number of Monitored Variables	Up to 3 variables (multidrop)
Communication Protocol	HART® 7 and previous versions
Hazardous Area Certification	Explosion Proof and Intrinsically Safe
Environment Temperature Limits	- 40 to 85°C
Configuration	Local adjust, EDDL, FDT/DTM-based tools and Android plattforms.
Indication	5-digit, rotative, multifunctional LCD
Protection Degree	IP67
Housing Material	Aluminum
Approximated Weight	600 g

Table 6.1 – VHC10-F technical specifications.

In the case of malfunction, NAMUR NE43 guarantees output current to 3.6 or 21 mA, according to user configuration or to 3.8 or 20.5 mA when saturation occurs.

6.3. ORDERING CODE

VHC10-F *HART® 4-20 mA Field Converter*

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 BRACKET
	1	SS 304 BRACKET

Ordering Code Example:

VHC10-F	**-**	**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:			