

VVP10-P

PROFIBUS PA VALVE POSITIONER



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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.

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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

1	<u>EQUIPMENT DESCRIPTION.....</u>	<u>7</u>
1.1.	BLOCK DIAGRAM	7
2	<u>INSTALLATION</u>	<u>9</u>
2.1.	INSTALLATION CONDITIONS	10
2.2.	MECHANICAL ASSEMBLY	10
2.3.	ELECTRICAL CONNECTION	14
2.4.	MAGNET SPECIFICATION	15
2.5.	REMOTE SENSOR.....	17
2.6.	BRACKETS.....	18
2.7.	USE OF COALESCING FILTER – PROTECTION AGAINST CONTAMINATED INSTRUMENT AIR.....	20
2.8.	PROFIBUS NETWORK CONNECTION.....	24
3	<u>CONFIGURATION</u>	<u>25</u>
3.1.	LOCAL CONFIGURATION	25
3.2.	JUMPER CONFIGURATION FOR LOCAL ADJUST AND WRITE PROTECTION.....	26
3.3.	LIQUID CRYSTAL DISPLAY (LCD)	27
3.4.	PROFIBUS PROGRAMMER.....	27
3.5.	LOCAL ADJUST CONFIGURATION TREE.....	28
3.6.	HART CONFIGURATOR PROGRAMMING TREE	29
3.7.	FDT/DTM CONFIGURATION	33
3.8.	CICLIC CONFIGURATION	34
	LINK DP/PA	37
4	<u>MAINTENANCE</u>	<u>38</u>
4.1.	ASSEMBLY AND DISASSEMBLY PROCEDURES.....	38
4.2.	SPARE PARTS	40
5	<u>CERTIFICATION.....</u>	<u>42</u>
6	<u>TECHNICAL CHARACTERISTICS.....</u>	<u>43</u>
6.1.	IDENTIFICATION.....	43
6.2.	ORDERING CODE.....	43
6.3.	TECHNICAL SPECIFICATION	44
7	<u>WARRANTY</u>	<u>45</u>
7.1.	GENERAL CONDITIONS.....	45
7.2.	WARRANTY PERIOD	45
	<u>APPENDIX</u>	<u>46</u>

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.*

SYMBOLOLOGY



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

VVP10-P positioner is part of the Vivace Process Instruments Profibus PA family of equipment, designed to work with linear or rotary valve actuators, providing precision and control with high availability and reliability. It allows easy installation and commissioning and is suitable for various types of valves, regardless of the action (single or double) and size.

VVP10-P has models with pressure sensors and end-of-stroke switches (digital input and output) for advanced diagnostics that help to efficiently predict maintenance needs. The positioner is powered by a voltage of 9 to 32 Vdc and consumes only 12 mA of quiescent current.

Through a Profibus PA configurator, user can configure positioner parameters, as well as perform Auto Position Calibration, Auto PID Tuning, check calibrations, diagnostics and monitoring. It is also possible to configure VVP10-P via local adjustment using a magnetic tool.

VVP10-P is connected to the Profibus PA network via DP/PA coupler, using a pair of twisted and shielded wires. The Profibus PA technology allows interconnection of several equipment in a single network, allowing the construction of large control systems. VVP10-P works with the concept of functional blocks, such as Analog Output and Transducer.

Prioritizing its high performance and robustness, VVP10-P was designed with the latest electronic components and materials technologies, ensuring long-term reliability for systems of any scale.

1.1. BLOCK DIAGRAM

The modularization of VVP10-P components is described in the block diagram of Figure 1.1.

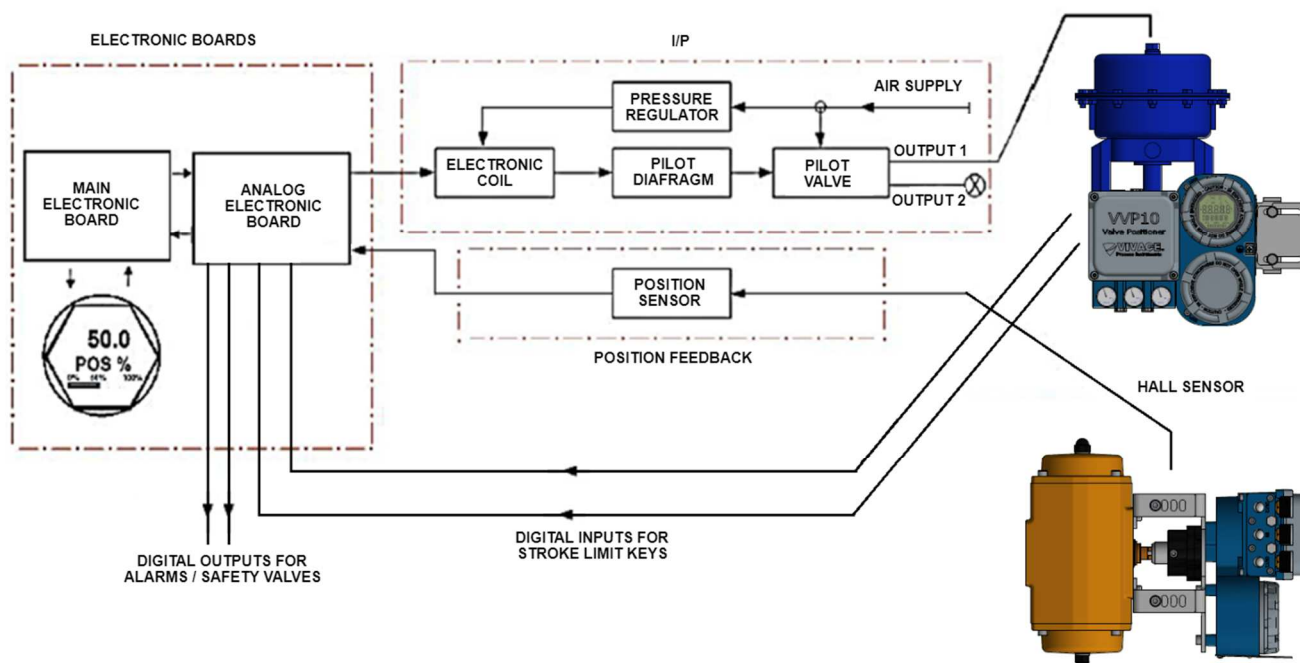


Figure 1.1 – Block diagram for VVP10-P.

ELECTRONIC BLOCK

The positioner receives a Setpoint signal (SP) from the Analog Output Block (AO) via Profibus DP through Profibus PA communication and executes a PID control algorithm using the Hall sensor position reading as input.

The magnetic sensor signal Hall follows the ADC converter located on the analog electronics board, where it is converted to a digital value and subsequently in position, according to the selected calibration range and unit.

The PID control generates an output for the analog board that will provide a current in the electromagnetic coil to actuate the I/P module (current/pressure) that will position the valve/actuator.

The main board also has a Profibus PA modem that interfaces the microcontroller signals with the Profibus PA network to which the positioner connects.

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

The CPU of the main board can be related to the brain of the positioner, where all the time controls, Profibus PA communication, PID control, diagnostics, besides routines common to the transmitters, such as configuration and calibration.

MECHANICAL BLOCK

The positioner is fed through the pneumatic inlet connection by a pressure already directed to the spool valve. The spool valve is nothing more than a 5-way directional valve (input, two outputs and two outlets for these outputs). When used as a single action, we simply close output 2, turning the valve into a 3-way system. See section 2.2 on assembly for single or double actions).

A portion of this input pressure is diverted to an internal regulator, which has the purpose of maintaining a fixed pressure in the I/P module (current/pressure), regardless of the supply pressure applied.

The regulated pressure passes through a restriction orifice, in order to decrease the flow that will reach the nozzle system (I/P module). The nozzle system consists of an electromagnetic coil that receives electric current and generates a magnetic field that attracts a blade. This blade approaches the nozzle when the electric current circulating in the coil has its value increased and moves away when the current value is decreased. This movement allows the pressure present at this point to be varied, since the blade away from the nozzle causes loss of pressure to the atmosphere, reducing the so-called pilot pressure.

The pilot pressure is directed to a diaphragm that acts directly on the spool valve, as opposed to the force of a spring. There is a balance of forces between the pilot pressure in the diaphragm area versus the spring force that positions the spool in different positions, directing the supply pressure to output 1, output 2 or to equilibrium condition (when control is achieved, that is, when it physically reaches the desired position).

There are also two external pressure switches for calibration of the internal regulator and the I/P module, which must remain closed during normal operation of the equipment. See section 2.2 for the item on this calibration.

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.

In the case of a valve/actuator mounted positioner, avoid transporting the assembly by holding the positioner.

RECOMMENDATION



Model and specification of equipment are indicated on identification plate, located at the side part 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.*

All installation procedures must be performed by qualified personnel, following the procedures required by safety regulations. It is recommended that the mechanical installation of the positioner is initially performed on the system to be measured, with the correct positioning of the magnet and support appropriate to the assembly. Then the electrical installation must be carried out, with the power connections and communication with the valve positioner.

2.1. INSTALLATION CONDITIONS

Ambient conditions must be taken into account when installing the positioner, as performance may be affected by poor temperature, vibration or humidity conditions. The temperature directly affects the behavior of some electronic components, so due care must be taken to locate the equipment in order to avoid overexposure to excessive heat.

As the operating principle of the position sensor of the VVP10-P is magnetic with no mechanical contact, light vibrations should not influence the correct operation of the positioner. However, it is important that there is no large variation of the magnetic field on the position sensor, which can happen if large vibrations in the positioner body are applied. For cases with considerable mechanical vibration, Vivace offers a remote sensor (see section 2.5), which separates positioner body from magnetic sensor, preventing vibrations from interfering with the measurement.

2.2. MECHANICAL ASSEMBLY

VVP10-P housing has an IP66 protection degree, being immune to water entering its electronic circuit and terminal block, as long as the cable gland (or conduit of the electrical connection) is correctly assembled and sealed with non-hardenable sealant.

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.

In order to avoid risk of VVP10-P covers being released unintentionally due to vibration, for example, they can be locked by means of a screw, as shown in figure 2.1.

Figure 2.1 shows the dimensional design of VVP10-P.

The dimensional drawings related to the magnets can be found in section 2.4.

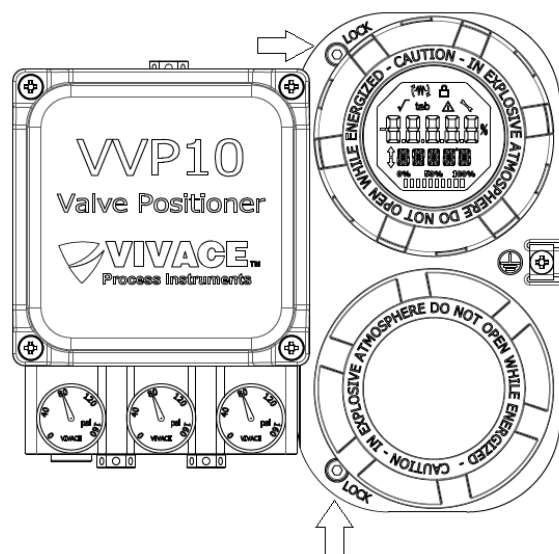


Figure 2.1 – Cover locks.

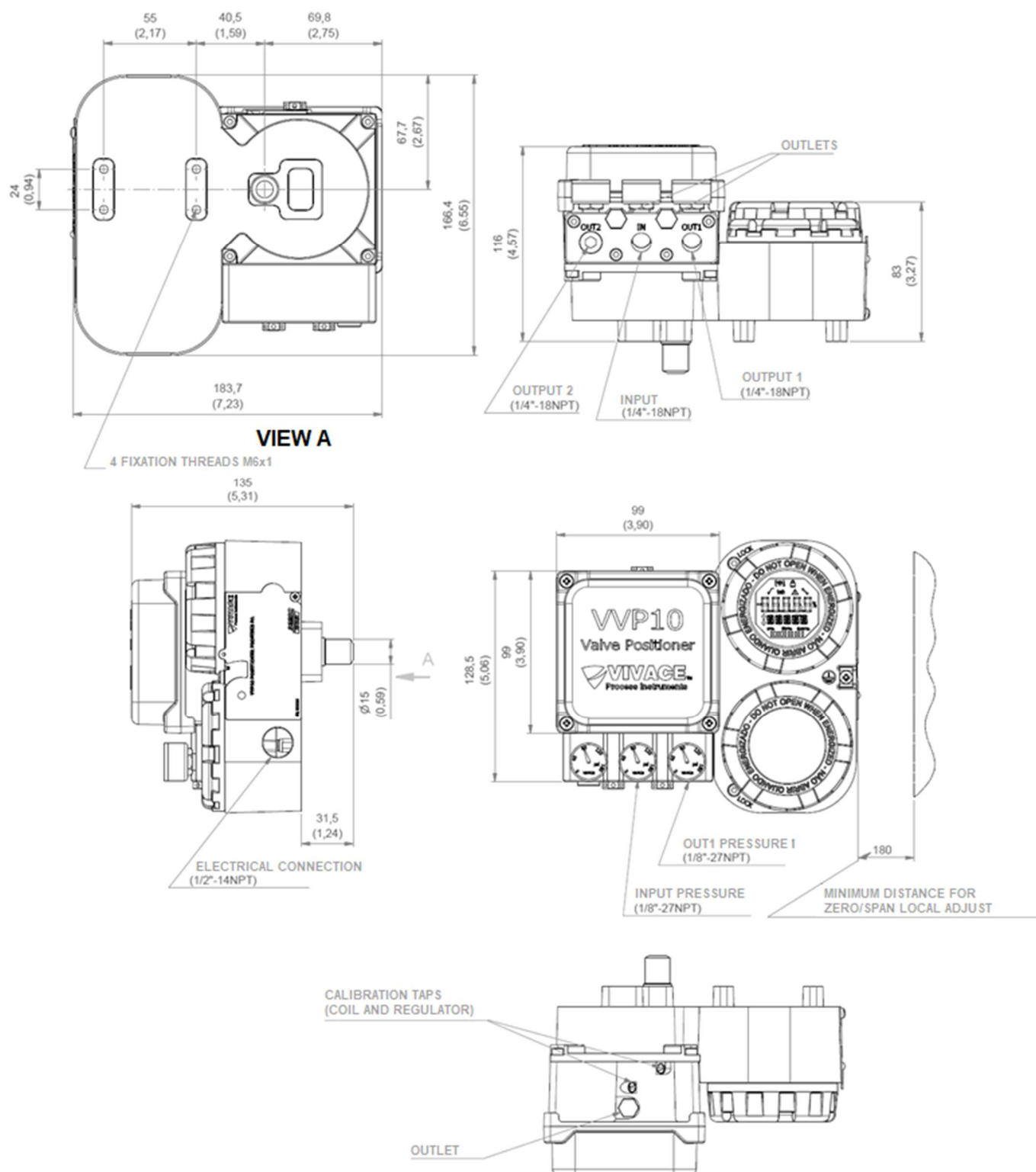


Figure 2.2 – Dimensional drawing for VVP10-P.

Figure 2.3 identifies the input and output connections for the supply air that will move the positioner. When the positioner is used in a single action set, simply close output 2 using the supplied plug (item 13 in figure 4.1), turning the valve into a 3-way system (figure 2.4).

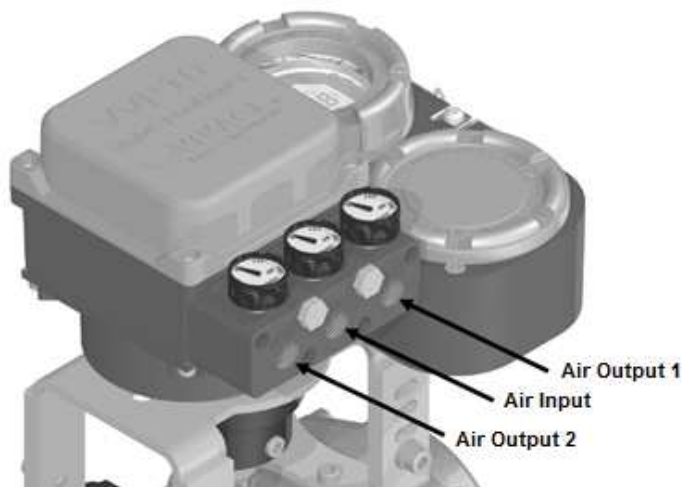


Figure 2.3 – Pneumatic connections for VVP10-P.

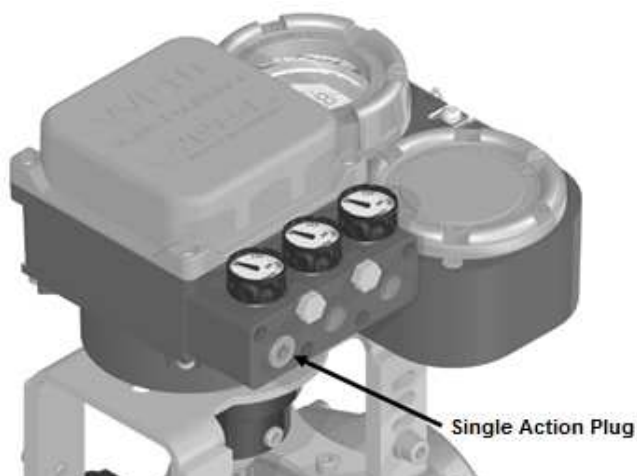


Figure 2.4 – Plug for single action.

In addition, the positioner has two pressure plugs on one side (see figure 2.5) to adjust the pilot pressure. Vivace provides the manometer and device specific for this calibration as optional items. For more information about this procedure, refer to the specific positioner maintenance manual available on the Vivace website.

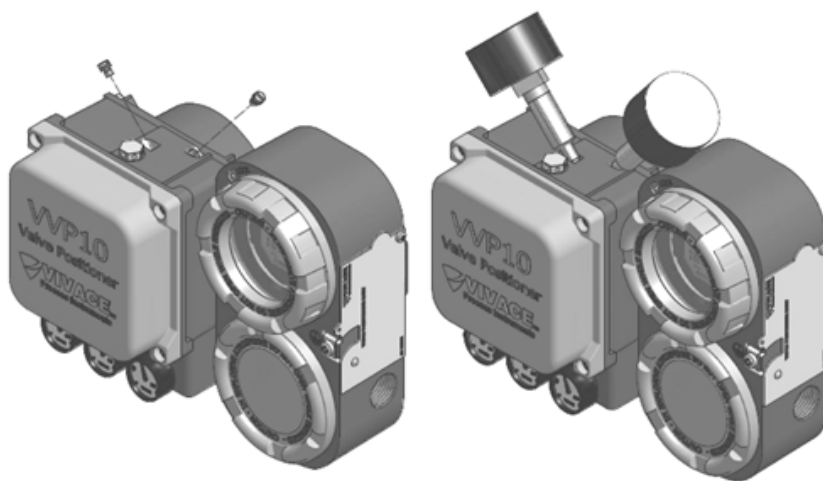


Figure 2.5 – Pneumatic calibration device for VVP10-P.

VVP10-P is a field device that can be installed by means of its own bracket in the actuator of the set to be used (linear or rotary). For details on available brackets, see section 2.6.

VVP10-P LCD liquid crystal display can be rotated 4 x 90° so that the display is as accurate as possible for easy viewing. Figure 2.6 illustrates the possible rotation of the LCD of the VVP10-P.

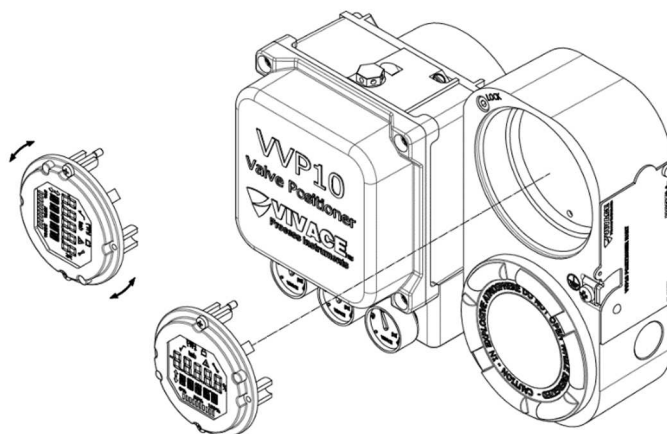


Figure 2.6 –Display LCD 4 x 90° rotation.

The installation of VVP10-P positioner reference magnet in the desired system should be done first by positioning the magnet in the system so as to allow the sensor to traverse all the useful extension to be measured and aligning the magnet arrow with the positioner arrow on central position (50% of the range) where the sensor will be located (arrow on the bottom of the positioner housing).

After magnet positioning, it must be bolted to the assembly to prevent it from moving out of its original position, causing measurement failure. Figure 2.7 exemplifies the installation of VVP10-P on a linear motion system magnet, while Figure 2.8 depicts the installation in a rotating motion assembly. Note that there is a necessary spacing to guarantee the performance of the sensor between the lower face of the positioner and the upper face of the magnet (between 2 mm and 4 mm).

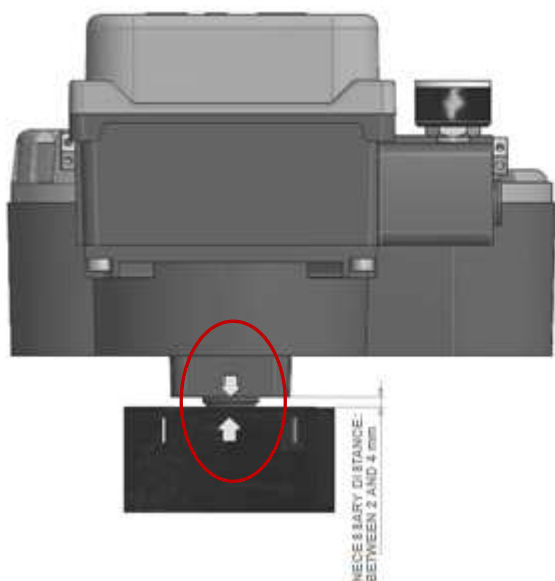


Figure 2.7 – VVP10-P with linear magnet.

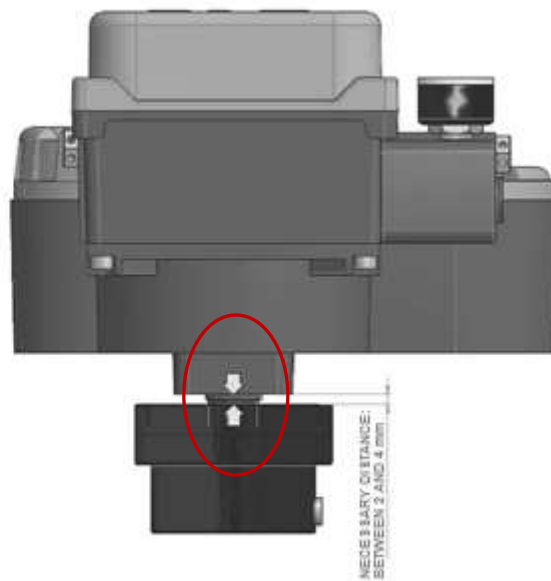


Figure 2.8 – VVP10-P with rotative magnet.

Figure 2.9 shows the positioner mounted on linear and rotative valve actuators, detailing the positioning of the magnets on the actuators. For details on the types of magnets and brackets, refer to sections 2.4 and 2.6, respectively.

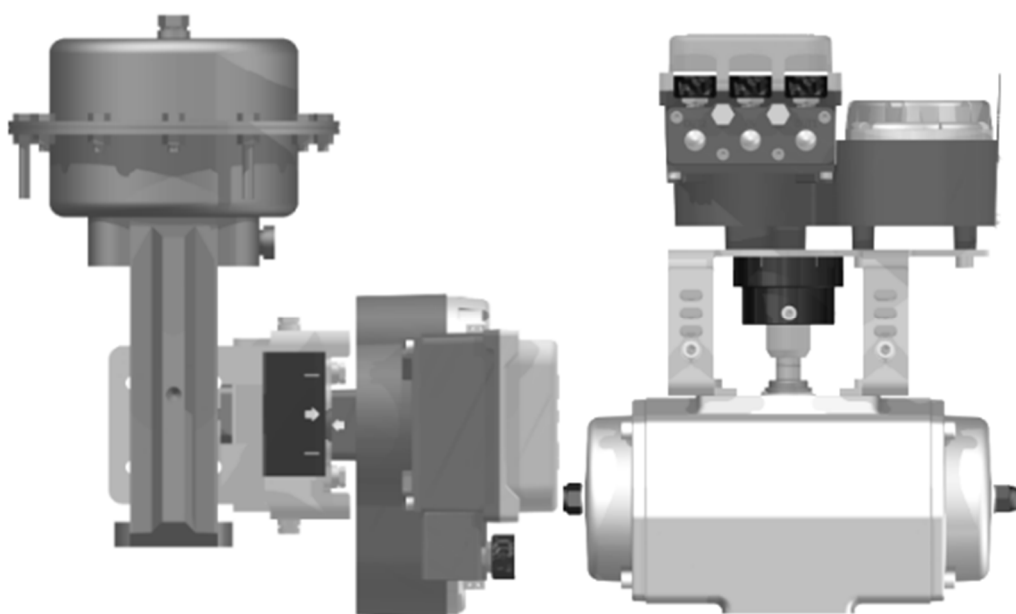


Figure 2.9 – VVP10-P on valve actuators with linear and rotative magnets.

2.3. ELECTRICAL CONNECTION

To access the terminal block, remove the blind cover (without display). To do so, loosen the cover locking screw (see figure 2.10) by turning it clockwise.

Figure 2.11 shows power terminals (PWR BUS), ground terminals (one internal and one external) and communication terminals for VVP10-P. To power the equipment it is recommended to use certified Profibus PA AWG18 shielded cables (capacitance < 30 pF).

Table 2.1 describes the functions for VVP10-P terminals.

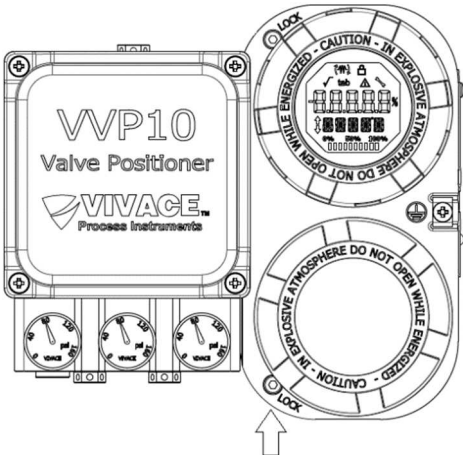


Figure 2.10 – Terminal block cover lock.

Terminal Description
Power Supply Terminals (PWR BUS) 9-32 Vcc (no polarity)
Grounding Terminals 1 internal and 1 external
Communication Terminals – COMM Profibus PA Configurator

Table 2.1 – Terminal description for VVP10-P.

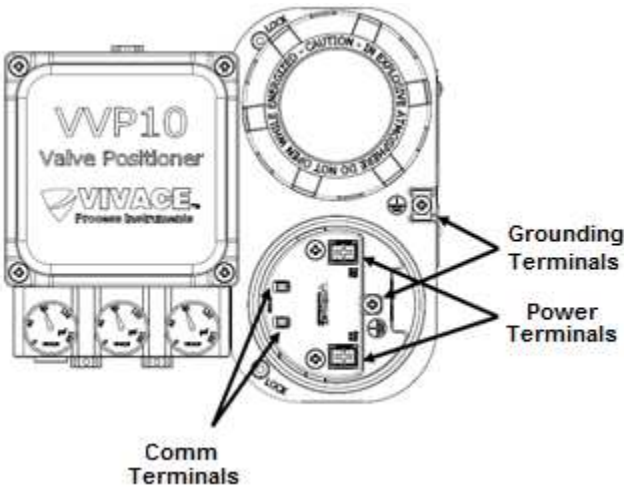


Figure 2.11 – Terminal identification for VVP10-P.

NOTE



All cables used to connect VVP10-P to the Profibus PA network must be shielded to avoid interference and noise.
It is extremely important to ground the equipment for complete eletromagnetic protection and also to ensure the correct performance on Profibus-PA network

The conduits through which the power cables of the equipment pass must be mounted in such a way as to prevent water from entering the equipment terminal block. The threads of the conduits must be sealed according to the standards required by the area.

The unused electrical connection must be sealed with a suitable plug and seal.

Figure 2.12 shows the correct way to install the conduit in order to prevent water or other product from entering that could cause damage to the equipment.

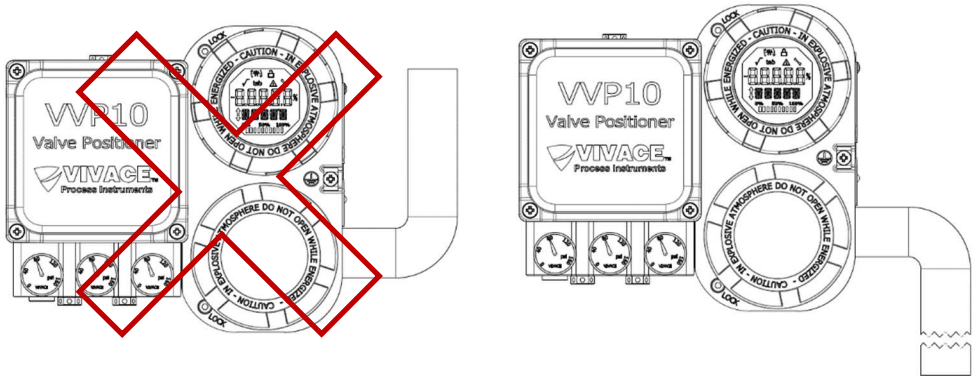


Figure 2.12 – Schematic of conduit installation.

2.4. MAGNET SPECIFICATION

Correct magnet dimensioning is a primordial for perfect performance of position measurement, allowing sensor to achieve all system length with the highest magnetic field variation possible.

User must consider installation environment, type of movement (rotative or linear) and amplitude (length), in addition to mounting bracket to be used, among other parameters.

Vivace offers the following magnet options for the valve positioner:

Rotative Option 0 on Ordering Code

Used on rotative systems, it has a standard diameter with measurement from 0° to 120° (minimum span of 5° between inferior and superior points).

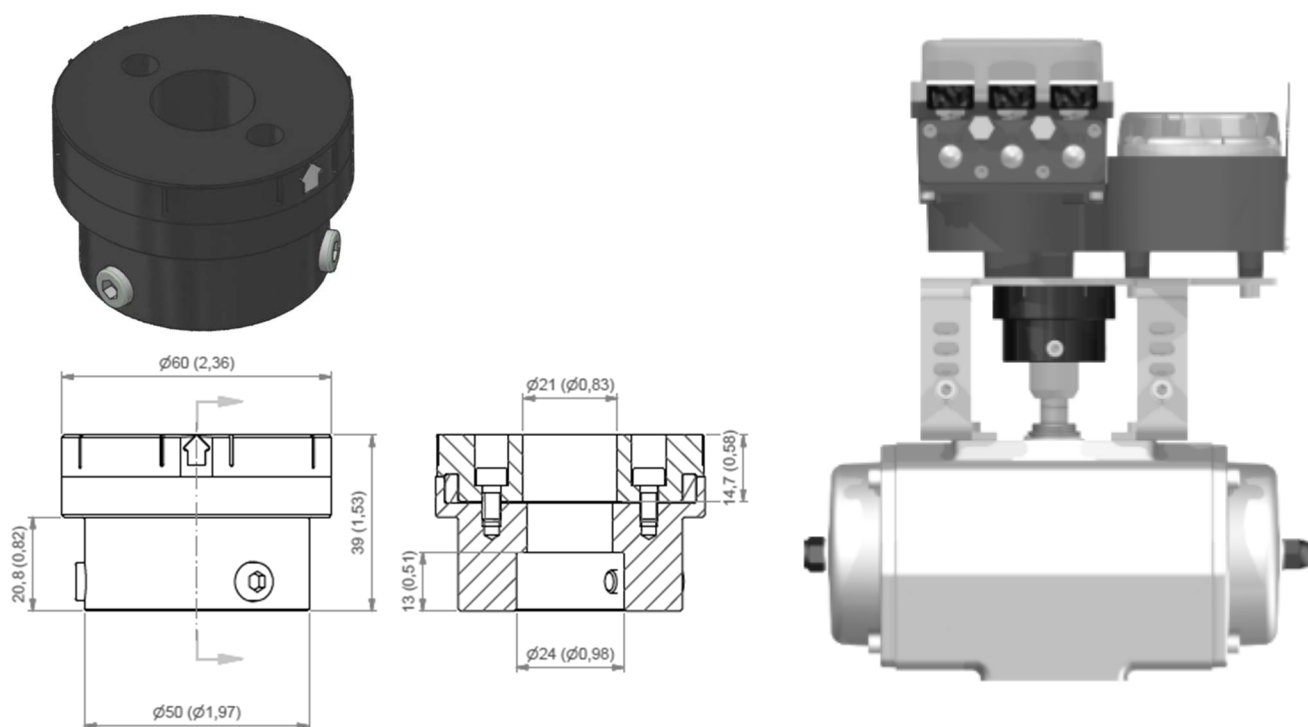


Figure 2.13 – Dimension and assembly of rotative magnet.

Linear 40 Option 1 on Ordering Code

Used on linear systems up to 40 mm, with measurement from 0 to 40 mm (minimum span of 10 mm between inferior and superior points).

Linear 70 Option 2 on Ordering Code

Used on linear systems of 40 mm to 70 mm, with measurement from 0 to 70 mm (minimum span of 40 mm between inferior and superior points).

Linear 100 Option 3 on Ordering Code

Used on linear systems of 70 mm to 100 mm, with measurement from 0 to 100 mm (minimum span of 70 mm between inferior and superior points).

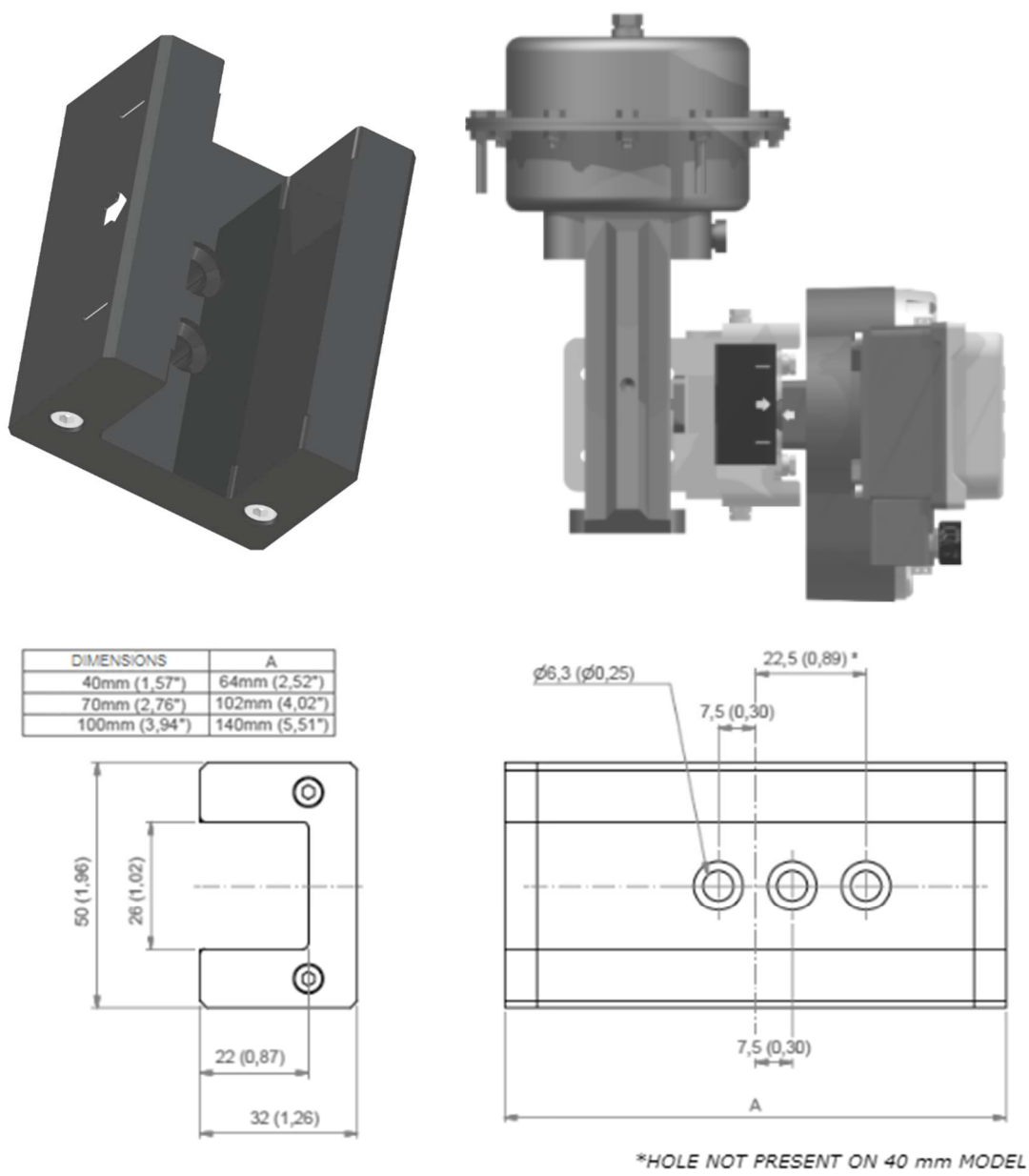


Figure 2.14 – Dimension and assembly of the three linear magnet models.

2.5. REMOTE SENSOR

For applications where excessive vibration or high temperatures (up to 100 °C) exists on the measuring system or when the positioner can not be installed due to its size, Vivace offers a remote sensor (optional) that works as an extension of the positioner sensor, connected by a cable which has three length options to best adjust device mounting to user process.

Figure 2.15 shows the dimensional drawing of VVP10-P remote sensor components. At the left we can see the positioner side that receives remote sensor signal, while on the right side we can find the opposite cable side, containing the magnetic sensor already adapted to a fixation support.

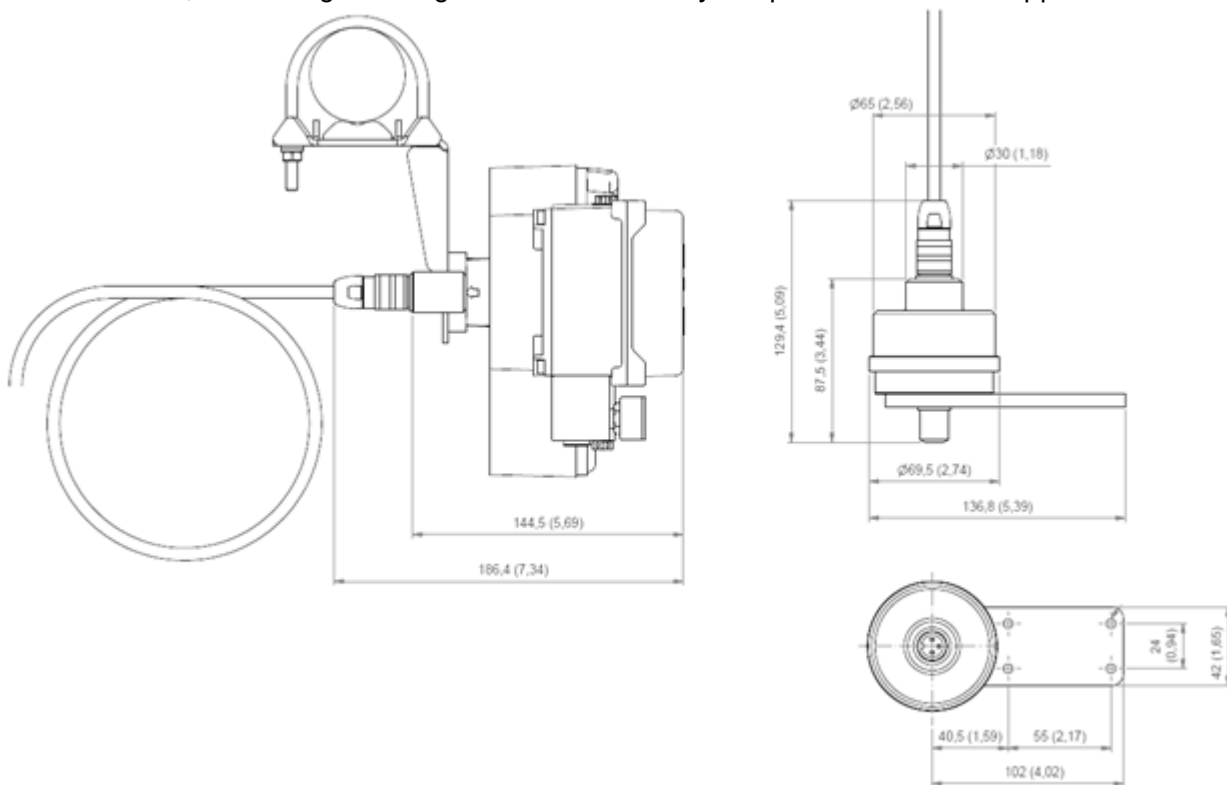


Figure 2.15 – Dimensional do sensor remoto.

The remote sensor set is composed by three parts:

- Sensor itself, responsible for receiving the magnetic signal and sending it to positioner as a millivoltage via sensor cable;
- Signal transmission cable from sensor to positioner input board;
- Positioner inferior base prepared for transmission cable connection.

An example of positioner mounting using the remote sensor for a rotative system measuring is shown on figure 2.16.



Figure 2.16 – Remote sensor mounting on VVP10-P.

2.6. BRACKETS

For applications with linear and rotative magnets in various actuators, Vivace provides compatible brackets, adjusting the positioner to the most diverse combinations.

The following figures detail the available brackets and the positioner installation using them.

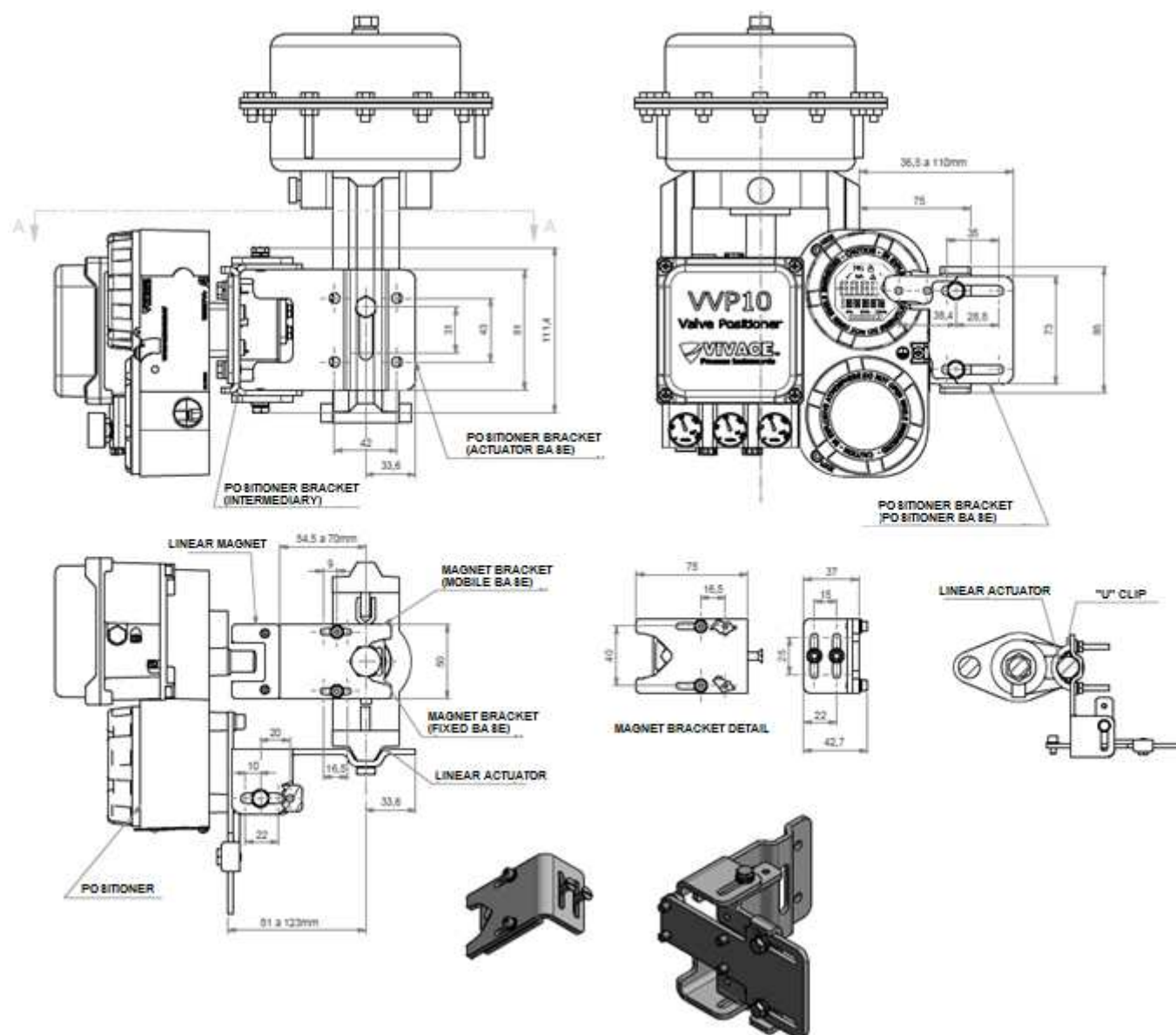
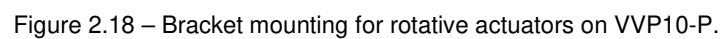


Figure 2.17 – Bracket mounting for linear actuators on VVP10-P.



2.7. USE OF COALESCING FILTER – PROTECTION AGAINST CONTAMINATED INSTRUMENT AIR

Smart valve positioners, such as VVP10 from Vivace Process Instruments, play a critical role in the precise control of linear or rotary actuators in industrial processes. The VVP10 uses electromagnetic coil technology (nozzle-flapper system) combined with a directional spool valve and an internal pressure regulator, converting the electrical signal (4-20 mA/HART or PROFIBUS PA) into modulated pneumatic pressure.

This equipment is supplied with instrument air in the range of 1.4 to 9.65 bar (20 to 140 psi). Although the VVP10 is highly robust under severe conditions, it is not immune to contaminants. Oil, water and particles in the supply air can clog restrictive orifices (such as the 0.3 mm orifice from the regulator to the coil), cause the regulator and I/P coil to drift out of calibration, make the spool valve stick, form varnish deposits or cause corrosion. Internal maintenance (replacement of filter elements and silencers) becomes more frequent under these conditions.

Installing coalescing filters upstream of the positioner provides an effective protective barrier by removing oil and water aerosols, thereby contributing to higher availability, accuracy and equipment service life.

INSTRUMENT AIR QUALITY CRITERIA AND APPLICABLE STANDARDS

Instrument air must be dry, oil-free and free of particles to ensure reliable performance of sensitive pneumatic devices, including positioners, controllers and transmitters.

The reference standard is ANSI/ISA-7.0.01-1996 (Quality Standard for Instrument Air). Its main criteria are:

- Pressure dew point: at least 10 °C below the lowest ambient temperature to which any part of the instrument-air system will be exposed. Under no circumstances shall the pressure dew point exceed 4 °C at line pressure.
- Particle size: a maximum of 40 µm is acceptable for most pneumatic devices. More sensitive equipment requires additional filtration.
- Lubricant (oil) content: as close to zero as possible and under no circumstances greater than 1 ppm (by weight/volume). Any residual lubricant must be evaluated for compatibility with end device components.
- Other contaminants: absence of corrosive, toxic or flammable vapors, with special attention to the location of the compressor intake.

The most widely used contemporary international standard is ISO 8573-1:2010 (Compressed air — Part 1: Contaminants and purity classes). It classifies compressed air into numerical classes for three main contaminants (particles, water, and oil). Lower classes represent higher purity.

For typical instrument air, the common interpretation of ANSI/ISA-7.0.01 corresponds approximately to ISO 8573-1 class [2 : <4 : 3] or better, depending on environmental conditions. For critical applications (high-accuracy positioners, low-temperature environments or sensitive processes), more stringent classes such as [1-2 : 1-2 : 1-2] are recommended, with a pressure dew point of -40 °C or lower and total oil content ≤ 0.1 mg/m³ (or ≤ 0.01 mg/m³ in extreme cases).

Removal of oil and water aerosols is essential to achieve these classes. High-efficiency coalescing filters are the primary technical means of doing so.

OPERATING PRINCIPLE OF COALESCING FILTERS

Coalescing filters are depth-filtration devices specifically designed to remove liquid aerosols (oil and water) and submicron solid particles. Air passes through the filter element (generally fiberglass or graded-porosity synthetic media), where tiny droplets collide, combine (coalesce) into larger droplets and are drained by gravity.

Typical efficiencies of high-performance filtration grades (e.g., grade 6 or equivalent) achieve >99.97% removal of particles and aerosols in the 0.3 to 0.6 µm range, with residual oil carryover on the order of 0.01 ppm or less. They also retain solid particles and protect downstream dryers and end-use equipment.

APPLICATION OF COALESCING FILTERS WITH THE VVP10

The VVP10 has internal 10 µm filter elements in the manifold, which must be replaced periodically according to air quality. However, these internal elements have limited capacity. Installing a point-of-use coalescing filter (or installing one in the distribution line near the positioner), preferably preceded by a particulate pre-filter and combined with a suitable dryer, provides superior protection.

Practical recommendations:

- Install the coalescing filter upstream of the pressure regulator and positioner.
- Prefer models with automatic or semi-automatic drain and a differential-pressure indicator.
- Size the filter for the positioner flow rate (typical VVP10 consumption: approximately 6 l/min at 2.8 bar and 9.5 l/min at 5.5 bar; flow capacity up to 283 l/min at 8 bar).
- Keep the supply pressure within the range specified for the actuator and positioner.

This configuration drastically reduces the contaminant load reaching the restrictive orifices, I/P coil, internal regulator and spool valve.

SPECIFIC BENEFITS FOR THE VVP10 POSITIONER

The use of high-efficiency coalescing filters provides the following benefits:

- Protection against oil and water: removes aerosols that cause varnish formation, sticking of moving components and corrosion, preserving regulator calibration (18–22 psi) and coil calibration (CWR control current ideally close to 50%).
- Reduced maintenance: decreases the frequency of cleaning/replacement of internal filter elements, silencers and the 0.3 mm restriction screw, while also preventing frequent mechanical calibration drift.
- Greater reliability and accuracy: preserves positioner linearity ($< \pm 0.1\%$ FS), repeatability and hysteresis, reducing control failures (undesired on-off behavior or difficulty reaching intermediate positions).
- Extended service life: protects optional pressure sensors, the I/P module and spool valve, contributing to greater control-loop availability.
- Standards compliance: facilitates compliance with ANSI/ISA-7.0.01-1996 limits and the desired ISO 8573-1 classes, especially regarding oil content and the absence of liquid water.
- More reliable diagnostics: in models with pressure sensors and advanced diagnostics (FST – Valve Signature and PST – Partial Stroke Test), stable air quality improves the consistency of predictive-monitoring data.

FINAL CONSIDERATIONS AND BEST PRACTICES

High-quality instrument air is a prerequisite for the performance of any pneumatic or electropneumatic positioner. For the VVP10 specifically, the combination of high-efficiency coalescing filters (with typical efficiency $>99.97\%$ for submicron aerosols), adequate drying and preventive maintenance of internal elements provides superior protection against oil and water. It is recommended to:

- Clearly specify instrument-air quality (with reference to ANSI/ISA-7.0.01-1996 and ISO 8573-1 classes).
- Install coalescing filtration at the point of use or at strategic points in the network.
- Monitor filter differential pressure and system dew point.
- Follow the maintenance instructions for cleaning and replacing the VVP10 manifold filter elements.

Consistent application of these practices results in greater operational robustness, lower maintenance costs and higher process-control reliability.

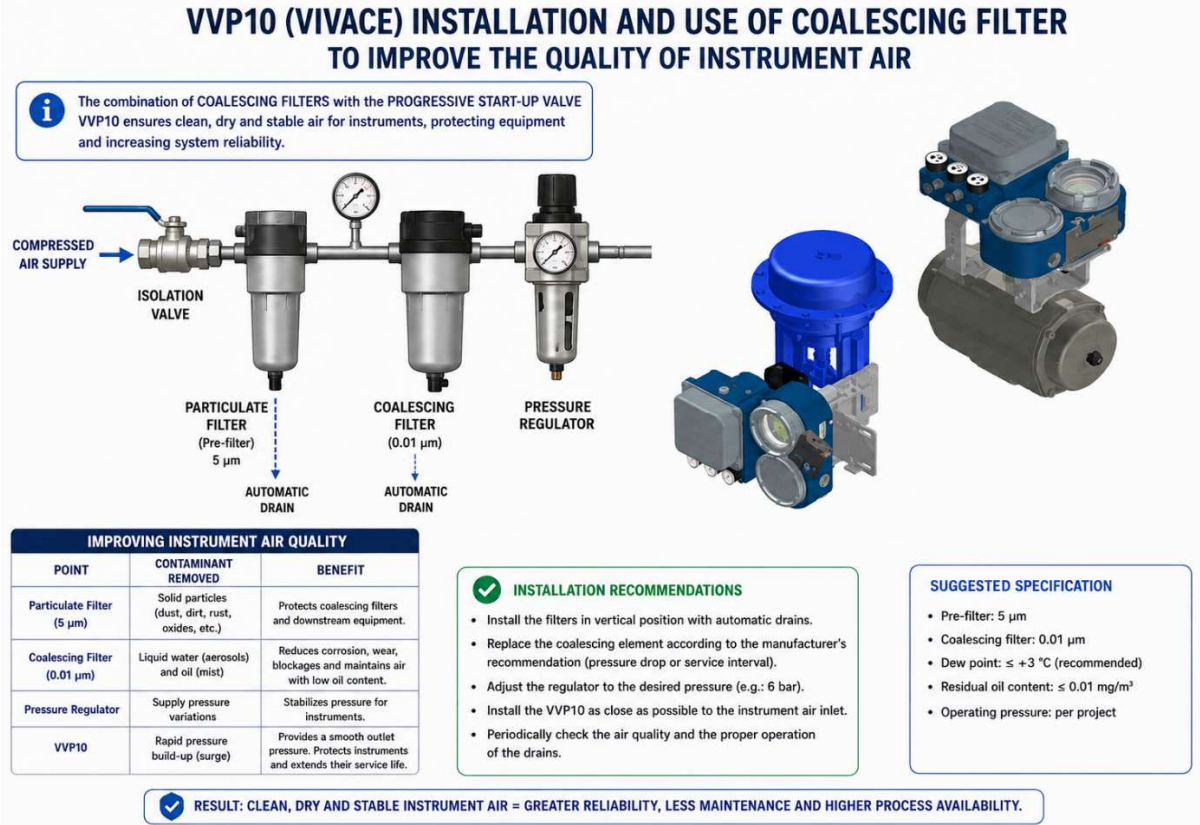


Figure 2.19 – Use of a coalescing filter to improve instrument air quality.

IMPORTANT NOTICE – WARRANTY AND INSTRUMENT AIR QUALITY

ATENÇÃO



*Problems, failures, calibration drift, blockages, premature wear or any damage to the VVP10 positioner (or to its internal components, such as the pressure regulator, I/P coil, spool valve, restrictive orifices, internal filter elements and pressure sensors) arising directly or indirectly from the use of poor-quality instrument air, including but not limited to the presence of oil, water, excessive moisture, solid particles or other contaminants that do not comply with ANSI/ISA-7.0.01-1996 specifications and/or the recommended ISO 8573-1 classes, **are not covered by the product warranty.***

It is the sole responsibility of the user/installer to ensure that the supply air meets the minimum quality requirements established by the standards cited in this document and by the equipment technical specifications. The use of high-efficiency coalescing filters, suitable dryers and periodic maintenance of the instrument air system are essential measures to preserve positioner performance and warranty coverage.

SUPPLY OPTIONS – INSTRUMENT AIR PREPARATION

The VVP10 can optionally be supplied with external accessories for instrument-air preparation and conditioning. The desired option must be specified at the time of equipment specification, quotation or order by adding the corresponding code to the VVP10 specification.

/F0 – Regulator Filter

G1/4 FILTER REGULATOR WITH PRESSURE GAUGE, MANUAL DRAIN, 40 μm FILTRATION RATING, PLASTIC BOWL WITH MOUNTING BRACKET

Represents the basic solution for VVP10 supply-air preparation. Option intended for general applications, providing:

- Solid-particle filtration;
- Supply-pressure regulation;
- Local pressure indication by pressure gauge;
- Manual condensate drain;
- Easy installation near the VVP10.

/F1 – Coalescing Filtration Assembly

G1/4 COALESCING FILTRATION ASSEMBLY WITH PRE-FILTER, 0.01 µm COALESCING FILTER, PRESSURE REGULATOR WITH PRESSURE GAUGE, DRAIN AND MOUNTING BRACKET

Recommended option for installations requiring higher instrument-air quality, especially where moisture, condensate, oil aerosols and fine particles from the compressed-air network may be present.

The assembly preferably consists of:

- Pre-filter for particle retention and protection of the coalescing element;
- High-efficiency coalescing filter;
- Recommended final filtration rating of 0.01 µm;
- Pressure regulator;
- Pressure gauge for outlet-pressure indication;
- Drain system;
- G1/4 pneumatic connections;
- Mounting bracket for the assembly.

Recommended Configuration

COMPRESSED AIR NETWORK → SHUT-OFF VALVE → PRE-FILTER → COALESCING FILTER → PRESSURE REGULATOR → VVP10 → PNEUMATIC / INSTRUMENTATION SYSTEM

The use of the /F1 assembly provides improved conditioning of the air used by the VVP10, helping reduce contamination, deposits and wear of internal pneumatic components.

As a result, greater operational reliability, reduced maintenance requirements and longer service life of the VVP10 and the system's other pneumatic components are achieved.

IMPORTANT



The use of external filters does not replace the instrument-air quality requirements established for the installation. The specification and sizing of the air-treatment system must take into account the air quality available at the plant, pressure, flow rate, temperature, dew point and existing contamination level, and are the user's responsibility.

2.8. PROFIBUS NETWORK CONNECTION

Figure 2.19 illustrates the installation of a number of Profibus network elements and the connection of Profibus PA devices to the Profibus network.

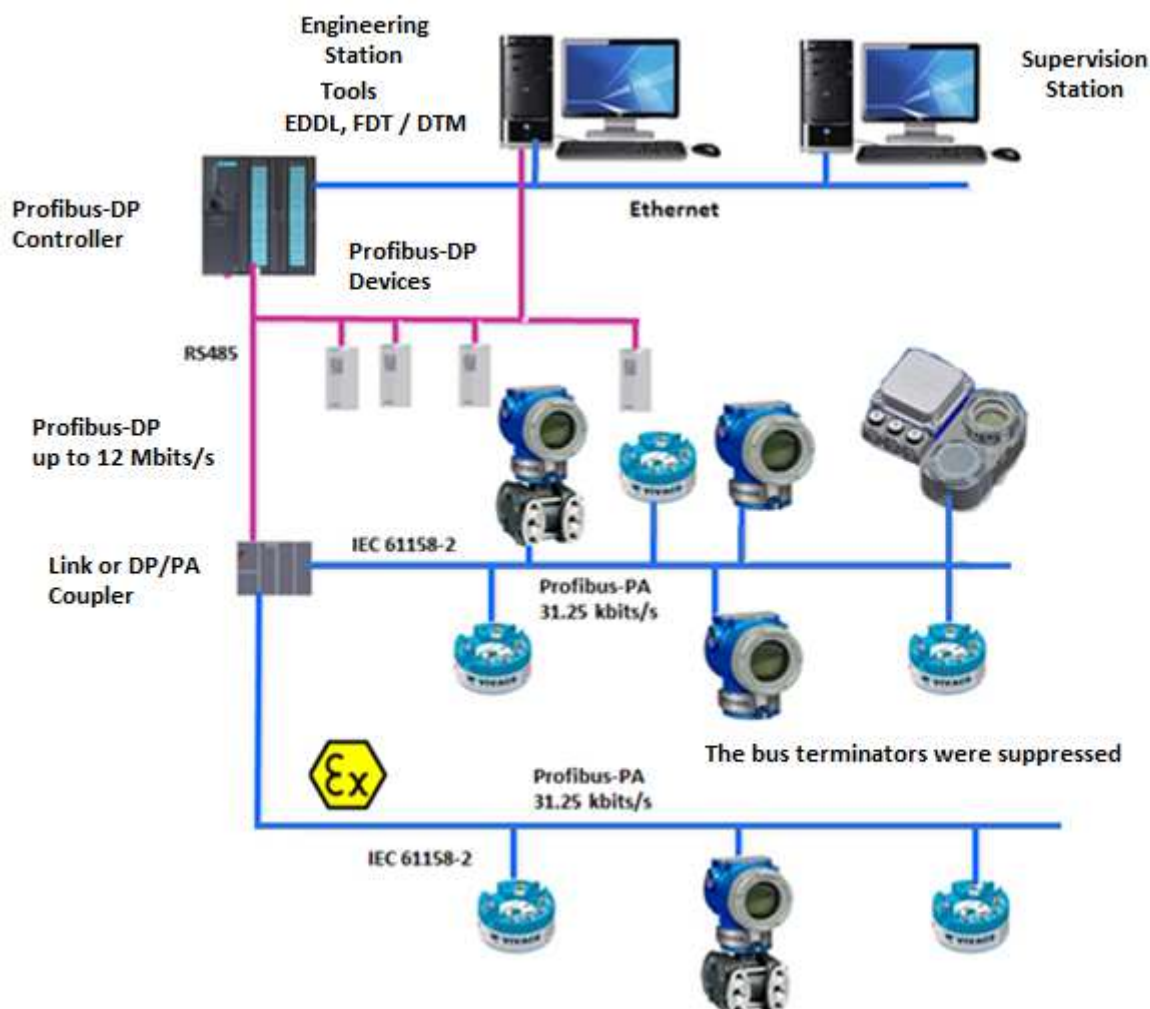
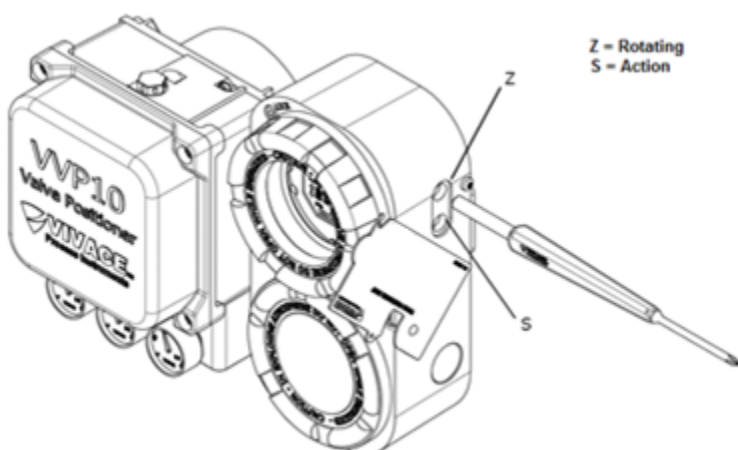


Figure 2.20 - Connecting a Profibus PA device to the bus.

3 CONFIGURATION

The configuration of VVP10-P valve positioner can be done with a programmer compatible with Profibus PA technology or with tools based on EDDL and FDT/DTM. Vivace offers the interfaces of the VCI10-P (USB and Bluetooth) line as a solution for configuration, calibration, monitoring and diagnostics of the Profibus PA line equipment. Another way to configure the VVP10-P is through local adjustment using a Vivace magnetic key.

3.1. LOCAL CONFIGURATION



The equipment 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.

Figure 3.1 – Z and S orifices and magnetic screwdriver.

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 ADJUST" message is shown on display, 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 alphanumeric 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

VVP10-P has two jumpers on its main board to protect data writing (WP1) and also enabling/disabling local adjust (ADJL1). Figure 3.2 presents those jumpers.

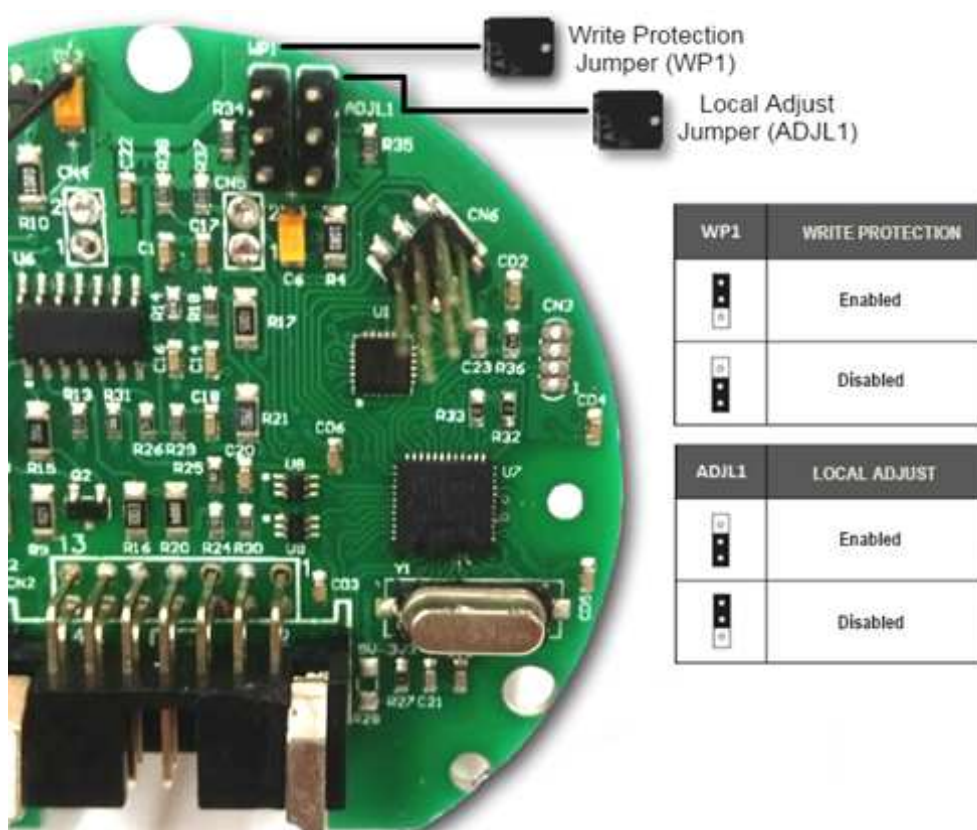


Figure 3.2 – Jumpers WP1 (write protection) and ADJL1 (local adjust) on VVP10-P main board.



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

3.3. LIQUID CRYSTAL DISPLAY (LCD)

Main information related to positioner 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
	Characterization table enabled
	Diagnostic occurrence
	Recommended maintenance
	Increment values in the local adjust
	Decrement values in the local adjust
	Degrees symbol for temperature units
	Bargraph to indicate the measured variable range

Table 3.2 – LCD icon description.

3.4. PROFIBUS PROGRAMMER

The equipment configuration can be carried out by means of a programmer compatible with Profibus PA technology. Vivace offers the VCI10-P (USB and Bluetooth) interfaces as a solution for identification, configuration and monitoring of Profibus PA line equipment.

Figure 3.4 illustrates the use of the USB VCI10-UP interface with a personal computer that has a Profibus PA configuration software installed. The interface feeds the positioner in local mode



Figure 3.4 - Wiring diagram of VCI10-UP interface to VVP10-P.

3.5. LOCAL ADJUST CONFIGURATION TREE

Figure 3.5 shows the fields available for local configuration of the positioner and the sequence in which they are provided by the actuation of the magnetic key in the hole Z.

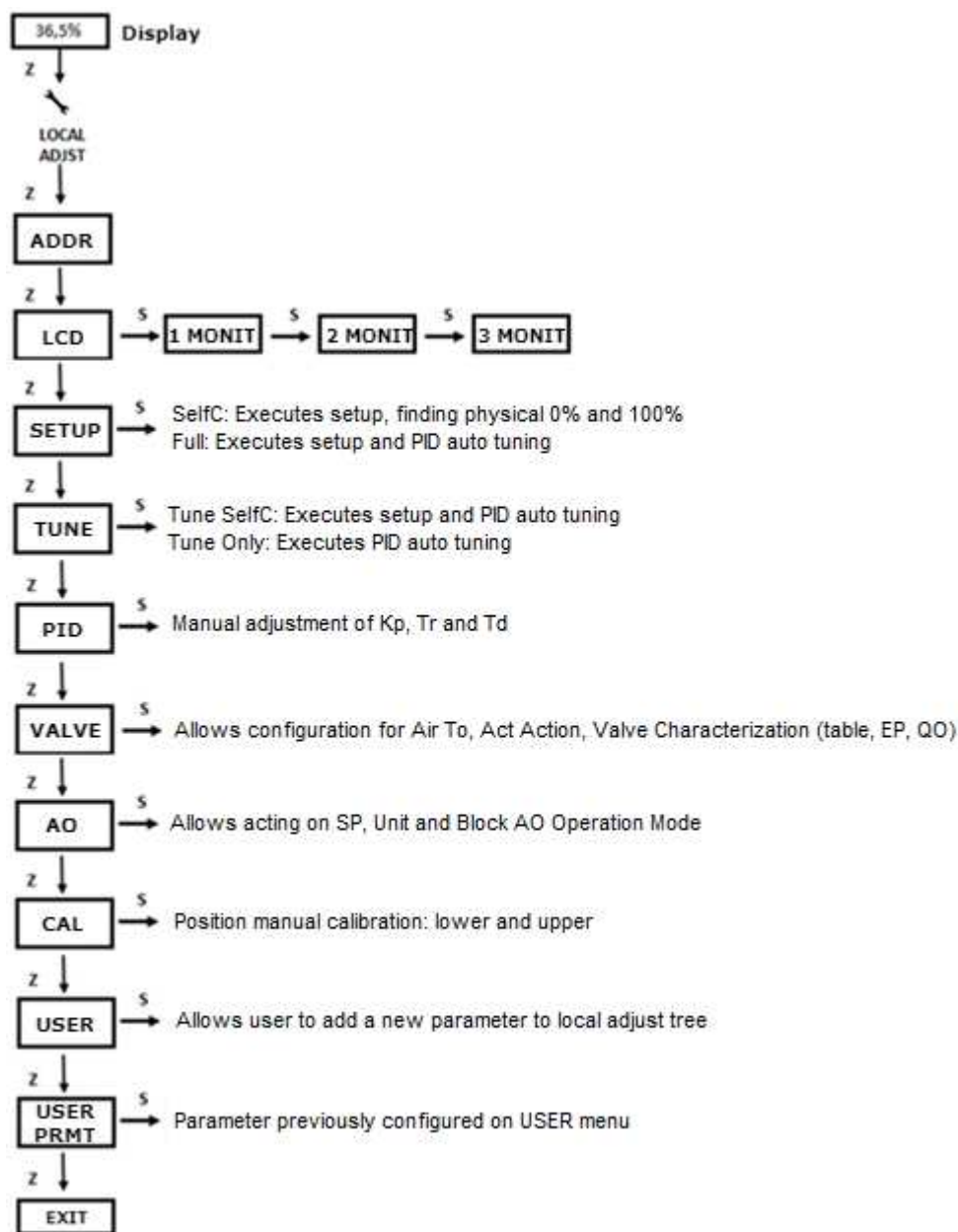


Figure 3.5 – Local adjust programming tree.

3.6. HART 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 the positioner online, make sure it is correctly installed with the correct voltage on power supply.

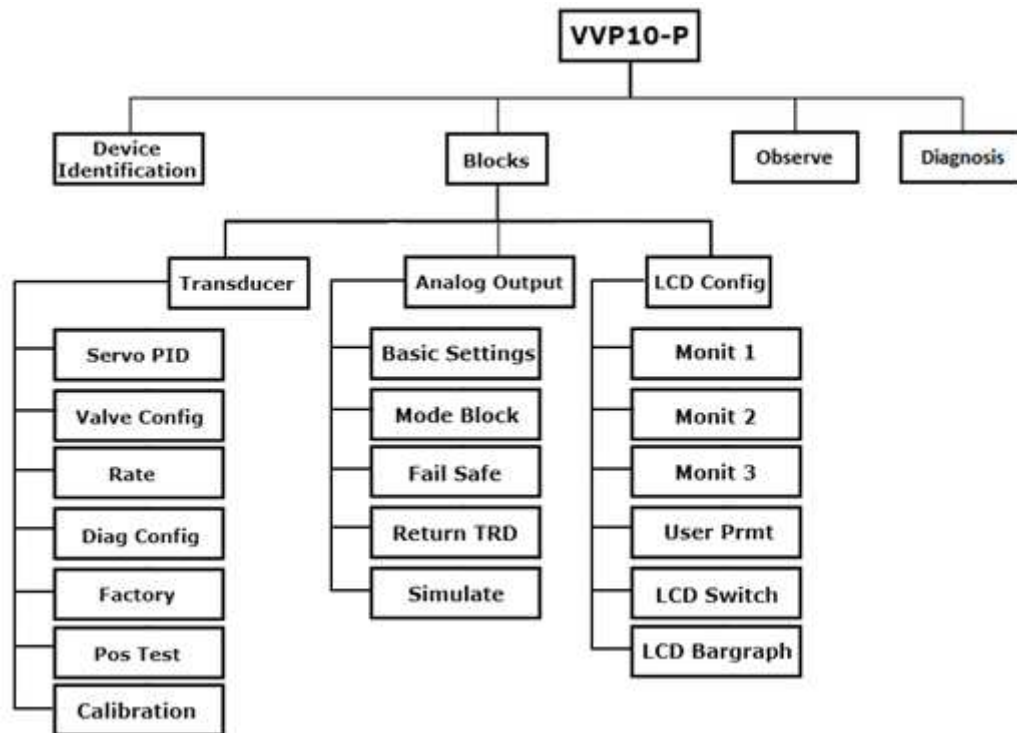


Figure 3.6 – Programming tree for VVP10-P.

Device Identification - In this menu (Physical Block) the main information about the equipment can be accessed, such as: Tag, Manufacturer ID, Device ID, Ordering Code and Firmware Version.

Transducer Block - Here the transducer block of the positioner is configured.

- **PID Servo** - In this menu user can configure the PID control parameters (Kp, Tr, Td, Enable/Disable and Deadband), as well as the Setpoint Limits (Cutoff) for actuation to 0% (Close) and 100% (Open).
- **Valve Config** - This menu configures parameters relevant to the valve and actuation, such as Valve Type (Linear or Rotary), Linearization, Air To and Action (Direct or Reverse).
- **Rate** - In this menu the desired time for opening and closing valve is set.
- **Diag Config** - In this menu user can configure the diagnostic parameters of the positioner.

Travel - Here the limits of the excursion (Lower/Upper Limit) and Total Valve Limit are set, as well as the course range (Max Range Value, default value 1), selected according to user's application. For example, a value of 100 will correspond to 100% or 100 mm. Reset Total Valve zeroes totalization, used as reference for maintenance on the valve, as if it were an odometer.

Reversal/Stroke - Here user can monitor the number of reversals of the Setpoint (Reversals) and the number of times valve hits the seat limits (physical limits, Strokes). User can set limits for the generation of alarms (Reversals Limit and Strokes Limit) and zero the count of these diagnostics, used as reference in maintenance programs.

Deviation - Here user can configure the Deviation parameters between Setpoint and Real Position of the positioner. The parameters are Enable/Disable, Deadband (acceptable error to be considered a deviation) and Time (acceptable time before generating an alarm in the CHECKBACK parameter of the AO Block).

- **Factory** - In this menu user can configure important parameters for the positioner, such as GSD ID (configure the GSD file to be used by the positioner when in Profile Specific or Manufacturer Specific), Write Protection, as well as Backup and Restore functions for saving and retrieving user settings and calibrations.

If user encounters a situation where you can communicate with the positioner with tools based on EDDL and FDT/DTM but can not establish cyclic communication with the Profibus-DP master, you should check the GSD ID parameter by changing it from Profile Specific to Specific Manufacturer, save it and restart the positioner.

- **Pos Test** - In this menu user can execute manual tests of Setpoint variations, just by placing the Target parameter in manual and setting the desired Setpoint. This area allows the user to easily check the tuning performance of the control.
- **Calibration** - In this menu user can perform the calibration procedures for position (Automatic or Manual), automatic tuning of the PID control, in addition to the temperature calibration. The execution of these procedures generates a result screen, indicating if there was any type of fault during the same. For more details, check “Calibration and PID Tuning”.

When executing the Auto Calibration procedures (position or tuning) the user will be warned that the process must be in manual (providing safe conditions so that such procedures do not endanger the control of the system) and that these methods affect the performance of the positioner.

Analog Output - Here user can configure the parameters of the analog output block of the positioner.

- **Basic Settings** - In this menu user can configure the Input Scale for the Setpoint (PV Scale: EU0% and EU100%), Input Unit, Output Scale (EU0% and EU100%) and Output Unit.
- **Mode Block** - In this menu the Setpoint is configured as follows:
 - **Man** - In this option the Target parameter must be set to Manual and the user sets the value of the Setpoint to the output (OUTPUT MAN).
 - **Setpoint** - In this option the Target menu should be set to Automatic and the user sets the Setpoint from Operator value.
 - **Remote** - In this option the Target menu must be in Rcas (Remote Cascade) and the Setpoint value will come from the remote controller.
- **Fail Safe** - This menu configures the Safe Position, Last Setpoint or Safe Value type, Fault Safety Value and Fault Safety Time.
- **Return from TRD** - This parameter monitors the return value of the transducer block, the position of the discrete control valve and the deviation value of the Setpoint.
- **Simulate** - This menu enables or disables the Simulation function. With the menu enabled it is possible to manually configure the transducer value and the status.

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

- **Monit x** - In these menus user can configure the functional block (Physical, Transducer, Analog Output), relative index (Target Mode, Primary Value or User Index), structure element, mnemonic and decimal place number. In addition, the alphanumeric field is enabled or disabled.
- **User Prmt** - In this menu the functional block (Physical, Transducer, Analog Output, Relative Index (User Index - select the relative index number corresponding to the parameter to be displayed in the local adjustment tree), structure element, mnemonic and decimal place number.
- **LCD Switch** - This selects how many parameters will be switched on the LCD (1, 2 or 3).
- **Bargraph LCD** - In this menu the bargraph of the display is enabled or disabled.

Observe - In this menu, the parameter values of the TRD blocks are monitored.

Diagnosis - This menu provides various diagnostic data for problem analysis and positioner performance (closing / opening times, total excursion, reversals, beats at the end of stroke and maximum and minimum temperatures). In addition, there is a valve closure / opening procedure to analyze the minimum execution times.

CALIBRATION AND PID TUNING

This directory (Calibration) has procedures for calibrating system positioning (automatic or manual), as well as automatic tuning of the PID control.

ATTENTION



During these procedures system will perform several opening and closing movements, so it is recommended that process is prepared for this behavior.

- **Self Calibration:** performs the automatic adjustment procedure of the 0% and 100% position sensor references.

It also calculates the opening times (0% to 100%) and closing (100% to 0%) with maximum actuator performance (according to applied pressure). Figure 3.7 indicates procedure steps.

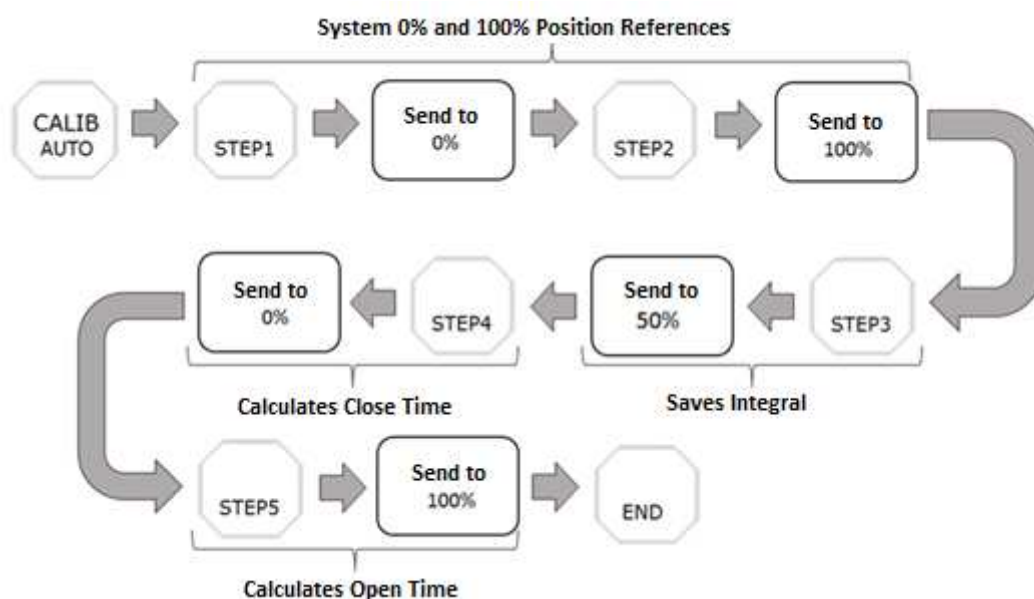


Figure 3.7 – Diagram for position automatic calibration.

- **Auto Tuning:** performs the automatic tuning procedure of PID control, calculating the optimized values of the parameters Proportional (K_p), Integral (T_r) and Derivative (T_d) through data collected in repeated oscillations of the system (according to the applied pressure). Figure 3.8 indicates procedure steps.

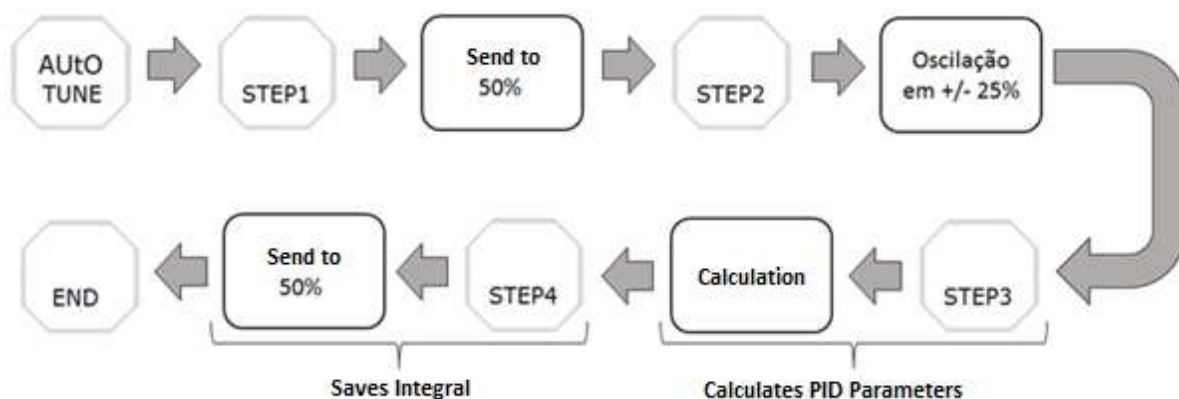


Figure 3.8 – Diagram for PID control tuning.

- **Calibration & Tuning:** performs the automatic position sensor calibration and PID control tuning procedures sequentially. For details on each of these procedures, see above items. Figure 3.9 indicates procedure steps.

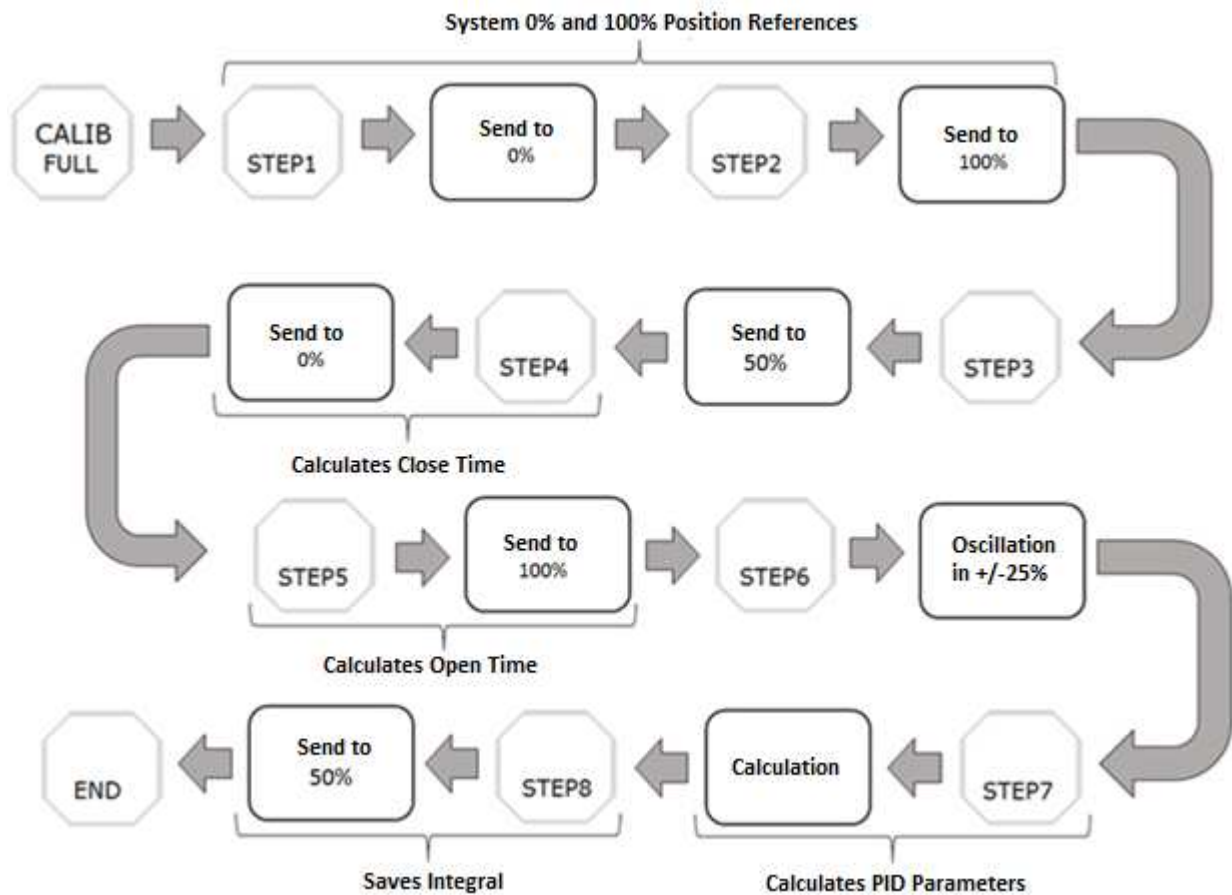


Figure 3.9 – Diagram for full calibration.

- **Manual Calibration:** performs the manual adjustment procedure of 0% and 100% position sensor references. Figure 3.10 shows procedure steps.



This procedure depends on the user's confirmation regarding the positioning of the system at the ends of the valve, ensuring that the calibration is performed successfully.

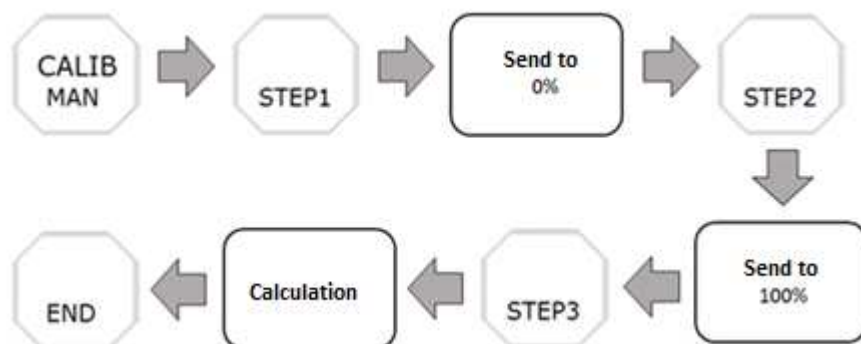


Figure 3.10 – Diagram for position manual calibration.

3.7. 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 exemplify DTM configuration screens for VVP10-P using Vivace's VCI10-UH interface and PACTware®.

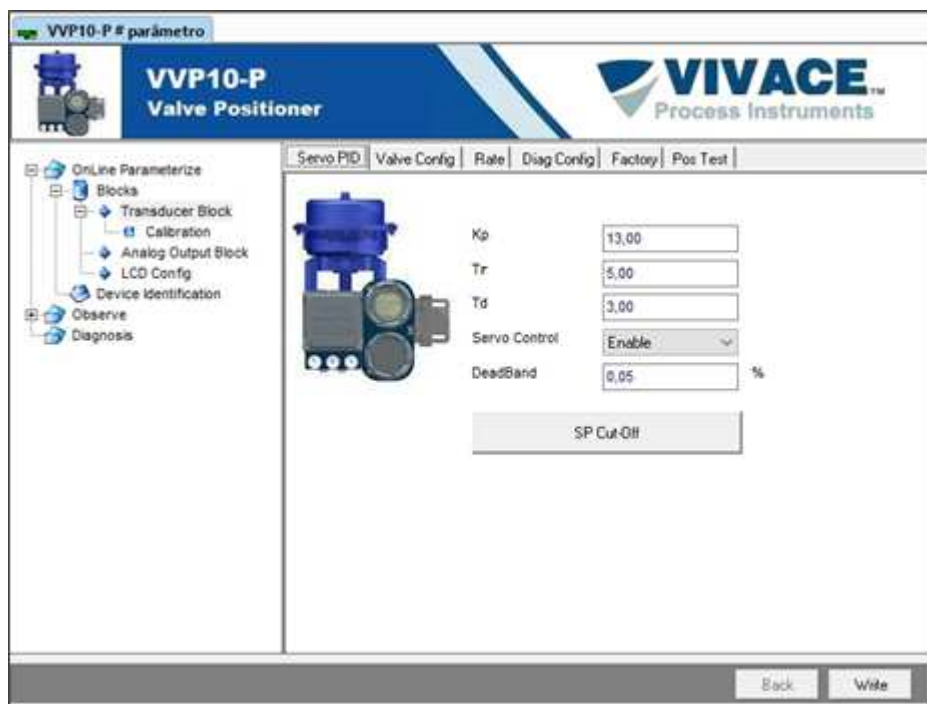


Figure 3.11 – Configuration screen for VVP10-P on PACTware.

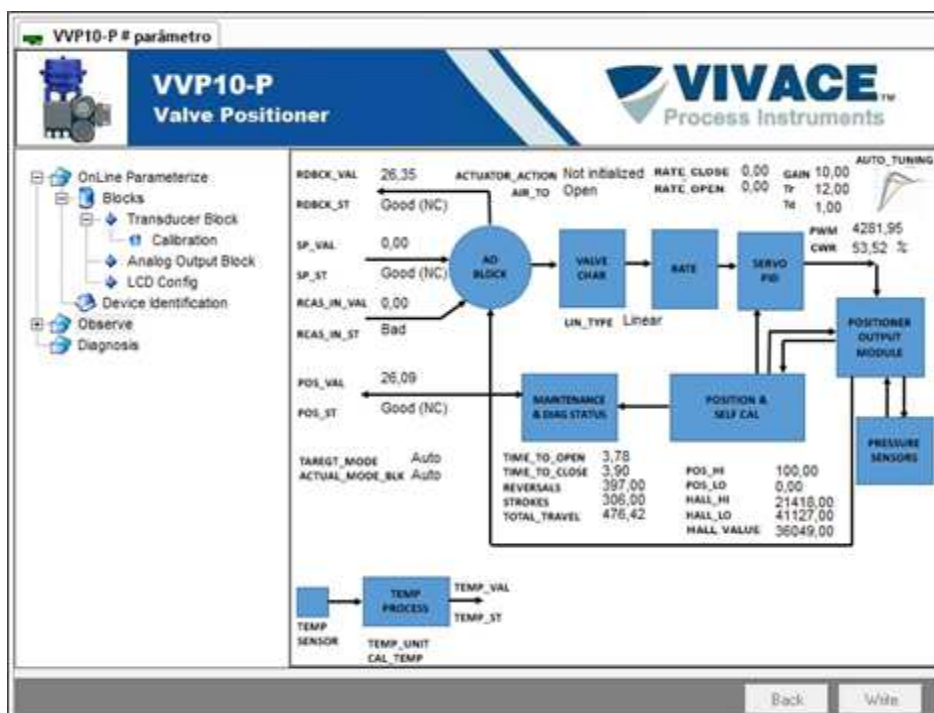


Figure 3.12 – Transducer monitoring screen for VVP10-P on PACTware.

3.8. CICLIC CONFIGURATION

Cyclic communication is based on the parameterization made using the GSD file. The GSD files of Profibus Vivace products are available on the website www.vivaceinstruments.com.br for each equipment, in the area of products, directory files.

CYCLE DATA EXCHANGE

VVP10-P can exchange cyclic data with the Profibus DP Class 1 master in 7 different ways, according to the modules described in the GSD file.

A. SP

(short) 0xA4

(extended format) 0x82, 0x84, 0x08, 0x05

With this setting, VVP10-P receives a Setpoint (SP) from the Profibus master as the desired position and returns nothing to the master. In this condition, the AO block must be in automatic (AUTO) and the SP status must be at least Good. In this mode, besides the Profibus master, the user can act in the SP, via acyclic communication.

This setpoint is a float in IEEE-754 format:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
SP (Valor, float IEEE)				Status SP

B. RCAS_IN+RCAS_OUT

(short) 0xB4

(extended format) 0xC4, 0x84, 0x84, 0x08, 0x05, 0x08, 0x05

With this configuration, VVP10-P receives a Setpoint (RCAS_IN) from the Profibus master as the desired position and returns the received value to the master via the RCAS_OUT parameter. In this condition, the status must equal IA-Initialization Acknowledge (0xC4). In this mode, only the Profibus master can operate via cyclic communication.

This RCAS_IN is a float in IEEE-754 format:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
RCAS_IN (Valor, float IEEE)				Status RCAS_IN

The return to master, RCAS_OUT, is also in IEEE-754 float format:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
RCAS_OUT (Valor, float IEEE)				Status RCAS_OUT

C. SP+READBACK+POS_D

(short) 0x96, 0xA4

(extended format) 0xC6, 0x84, 0x86, 0x08, 0x05, 0x08, 0x05, 0x05, 0x05

With this configuration, VVP10-P receives a Setpoint (SP) from the Profibus master as the desired position and returns the real position (READBACK) and the discrete position (POS_D) to the master. In this condition, the AO block must be in automatic (AUTO) and the SP status must be at least Good. In this mode, besides the Profibus master, the user can act in the SP, via acyclic communication.

This Setpoint is a float in IEEE-754 format:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
SP (Valor, float IEEE)				Status SP

The return to the Profibus master follows the format below. The READBACK is the analog return of the transducer, the actual position of the valve. POS_D is a discrete status: open, closed or intermediate position.

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7
READBACK (Valor, float IEEE)				Status READ-BACK	POS_D (Valor)	Status POS_D

D. SP+CHECKBACK

(short) 0x92, 0xA4

(extended format) 0xC3, 0x84, 0x82, 0x08, 0x05, 0x0A

With this configuration, the VVP10-P receives a Setpoint (SP) from the Profibus master as the desired position and returns the diagnostic condition (CHECKBACK) to the master. In this condition, the AO block must be in automatic (AUTO) and the SP status must be at least Good. In this mode, besides the Profibus master, the user can act in the SP, via acyclic communication.

This setpoint is a float in IEEE-754 format:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
SP (Valor, float IEEE)				Status SP

The return to the Profibus DP master, CHECKBACK, follows the:

Byte 1	Byte 2	Byte 3
CHECK BACK [0]	CHECK BACK [1]	CHECK BACK [2]

E. SP+READBACK+POS_D+CHECKBACK

(short) 0x99, 0xA4

(extended format) 0xC7, 0x84, 0x89, 0x08, 0x05, 0x08, 0x05, 0x05, 0x05, 0x0A

With this configuration, the VVP10-P receives a setpoint (SP) from the Profibus master as desired position and returns the diagnostic condition (CHECKBACK) and the discrete position to the master. In this condition, the AO block must be in automatic (AUTO) and the SP status must be at least Good. In this mode, besides the Profibus master, the user can act in the SP, via acyclic communication.

This setpoint is a float in IEEE-754 format:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
SP (Valor, float IEEE)				Status SP

The return to Profibus DP master, READBACK and CHECKBACK, follows the format:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10
READBACK (Valor, float IEEE)				Status READ-BACK	POS_D (Valor)	Status POS_D	CHECK BACK [0]	CHECK BACK [1]	CHECK BACK [2]

F. RCAS_IN+RCAS_OUT+CHECKBACK

(short) 0x97, 0xA4

(extended format) 0xC5, 0x84, 0x87, 0x08, 0x05, 0x08, 0x05, 0x0A

With this configuration, VVP10-P receives a Setpoint (RCAS_IN) from the Profibus master as the desired position and returns the received value to the master via the RCAS_OUT parameter and the diagnostic conditions in the CHECKBACK parameter. In this condition, the status must equal IA-Initialization Acknowledge (0xC4). In this mode, only the Profibus master can operate via cyclic communication.

This RCAS_IN is a float in IEEE-754 format:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5
RCAS_IN (Valor, float IEEE)				Status RCAS_IN

The return to master, RCAS_OUT and CHECKBACK, follows the format:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
RCAS_OUT (Valor, float IEEE)				Status RCAS_OUT	CHECK BACK [0]	CHECK BACK [1]	CHECK BACK [2]

G. SP+RB+RIN+ROUT+POS_D+CB

(short) 0x9E, 0xA9

(extended format) 0xCB, 0x89, 0x8E, 0x08, 0x05, 0x08, 0x05, 0x08, 0x05, 0x08, 0x05, 0x05, 0x05, 0x0A

This cyclic configuration is a complete combination of the above. The input values for the equipment are:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10
SP (Valor, float IEEE)				Status SP	RCAS_IN (Valor, float IEEE)				Status RCAS_IN

The return values to the master are:

Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8	Byte 9	Byte 10
READBACK (Valor, float IEEE)				Status READBACK	RCAS_OUT (Valor, float IEEE)				Status RCAS_OUT

Byte 11	Byte 12	Byte 13	Byte 14	Byte 15
POS_D (Valor)	Status POS_D	CHECK BACK [0]	CHECK BACK [1]	CHECK BACK [2]

Floating-point and status values are 5 bytes, the first four in floating-point format (IEEE-754) and the fifth byte forming the status that brings the quality information of this measurement.

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.

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

VVP10-P Valve Positioner, like all Vivace products, is rigorously evaluated and inspected before being shipped to the customer. However, in case of a malfunction, diagnosis can be made to verify that the problem is located in the sensor installation, in the configuration of the equipment or if it is a problem of the positioner.

4.1. ASSEMBLY AND DISASSEMBLY PROCEDURES

Figure 4.1 shows VVP10-P 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 4.2 shows remote sensor components.

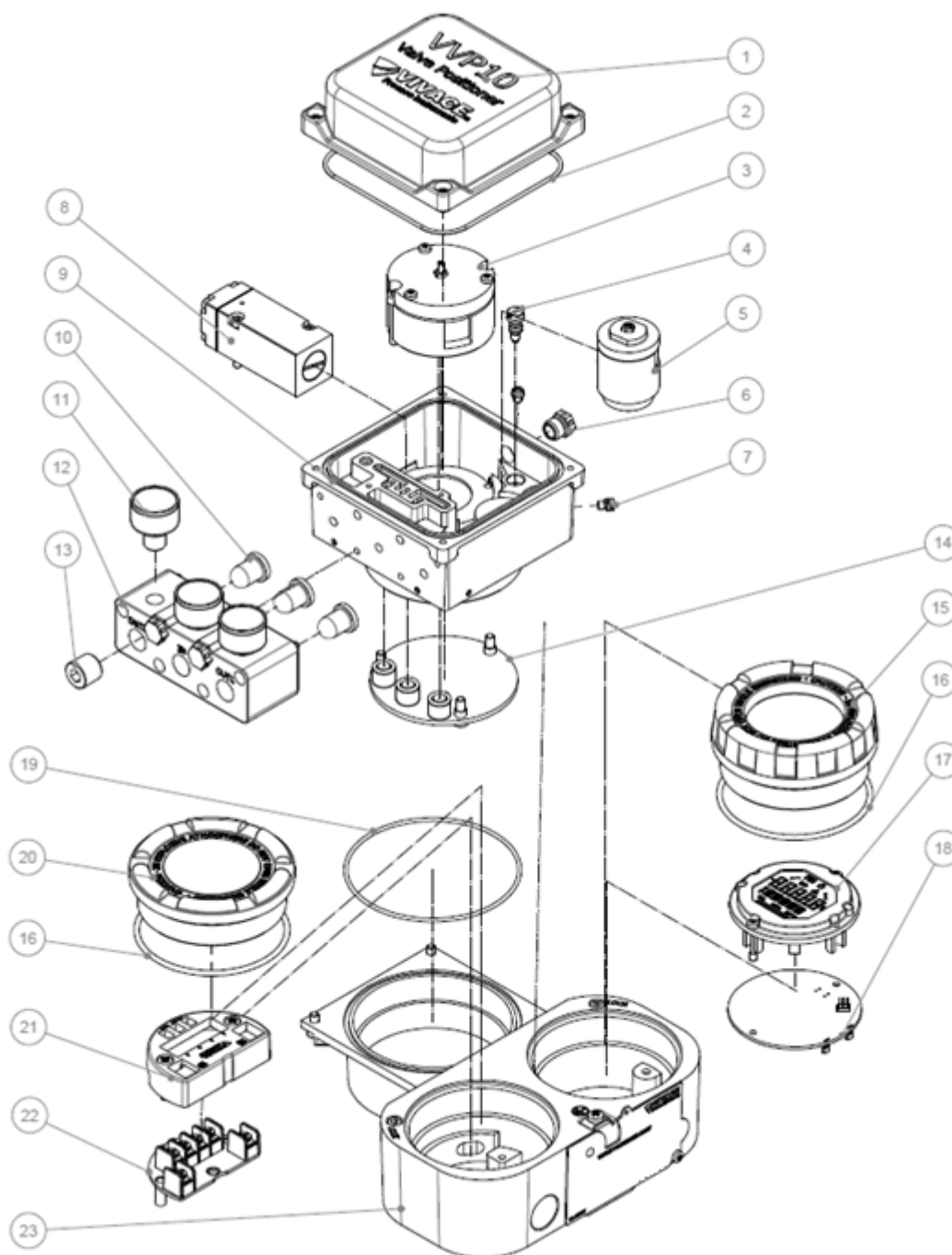


Figure 4.1 – VVP10-P exploded view.

Following are the steps for disassembling the positioner for maintenance and repair of the parts. The values in parentheses indicate the part identified in the exploded view (Figure 4.1). To assembly the positioner, simply follow the inverse sequence of the steps.

ACCESS TO TERMINAL BLOCK COMPARTMENT

- 1 Remove the blind cover (20) to access the positioner terminal block;
- 2 Take care of the cover locking screw. By turning it clockwise, the cover is released for opening, while in the opposite direction it is locked;
- 3 Remove the power supply, removing all the wiring by the electrical connection.

ACCESS TO DISPLAY COMPARTMENT

- 1 Remove the display cover (15) to access the display (17) and main board (18) of the positioner;
- 2 Take care of the cover locking screw. By turning it clockwise, the cover is released for opening, while in the opposite direction it is locked;
- 3 Unscrew the two screws on the display and the main board. Disconnect the signal connection cable and the power cable from the main board.

ACCESS TO FILTER AND SILENCER ELEMENTS

- 1 Remove the manifold (12) through the four allen screws. At the rear of the manifold are the three filter elements (10). Periodic exchanges are recommended, depending on the quality of the compressed air used;
- 2 Take care of the existence of 5 o-rings at the rear of the manifold, during removal;
- 3 In the manifold there are two exhaust vents (6) containing the mufflers, which are also recommended for periodic switching. There is also a third vent vent, located on the opposing face of the air casing, to provide exhaust of the I/P assembly.

ACCESS TO PNEUMATIC COMPARTMENT

- 1 Remove the top cover (1) through the four cross-head screws;
- 2 Remove the spool valve assembly (8) through the two allen screws, ensuring that there is an o-ring and gasket between this assembly and the pneumatic housing (9);
- 3 Remove the internal pressure regulator assembly (5) by simply unscrewing the complete assembly by the lateral "flats". Take care not to unscrew by the "flat" of the regulator cover, since there will be access to the regulator housings;
- 4 Also note the existence of two o-rings on the lower face of the regulator;
- 5 Remove the restriction screw (4) by unscrewing it and then pulling it with a pair of pliers. This restriction has a small diameter hole and is recommended to be cleaned periodically;
- 6 Remove the I/P - magnetic coil assembly (3) through the two larger allen screws. Do not remove by the three smaller screws, because, this way, there will be access to the reed and internal of the coil assembly;
- 7 If you need to calibrate the coil assembly and the regulator assembly, you can remove the calibration plugs (7) and attach an appropriate device that can be supplied by Vivace to monitor the pressures. Refer to the specific positioner maintenance manual on the Vivace website if you need to perform this procedure.

ACCESS TO ELECTRONIC COMPARTMENT

- 1 Remove the electronic housing (23) from the pneumatic housing (9) through the four allen screws. There is a cylindrical joint between the casings with little diametral clearance, due to the tolerances required by the certification standards in explosive atmospheres;
- 2 Remove the signal connection cable (from the display compartment), the Hall sensor power cable and the position return cable (from the terminal compartment) from the analog plate (14);
- 3 Remove the analog board (14) from the pneumatic housing through the three cross-slot screws;
- 4 Check for the existence of three insulating rings under the analog plate, in versions with pressure sensors. Each has two o-rings to seal the pressures around the sensors on the analog board.

Figure 4.2 shows optional remote sensor components.

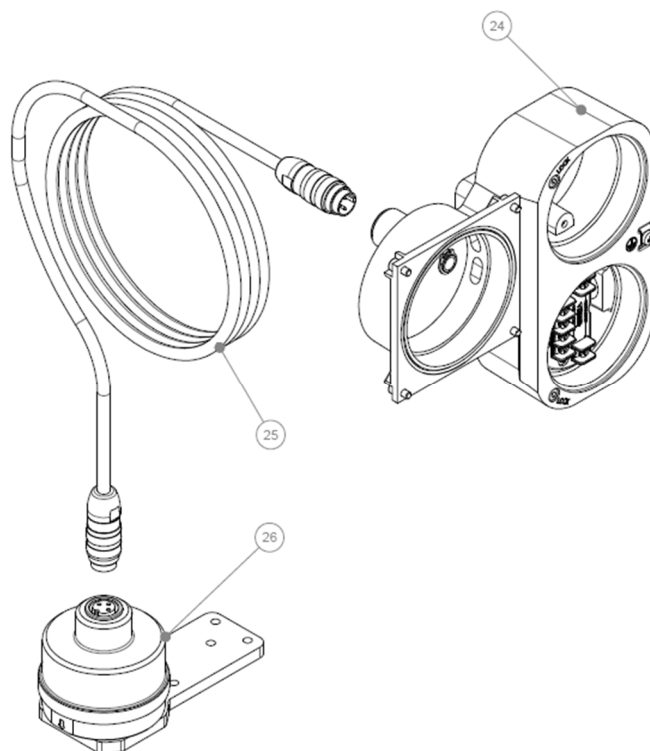


Figure 4.2 – Exploded view of VVP10-P remote sensor.

4.2. SPARE PARTS

All the spare parts available for VVP10-P can be bought directly from *Vivace Process Instruments*. Those parts are listed on table 4.1.

VVP10-P – SPARE PARTS LIST		
DESCRIPTION	REFERENCE FIG. 4.1	CODE
REMOTE SENSOR EXTENSION	26	2-10042
REMOTE SENSOR 5 METER CABLE	25	2-10039
REMOTE SENSOR 10 METER CABLE	25	2-10043
REMOTE SENSOR 20 METER CABLE	25	2-10041
ELECTRONIC HOUSING – REMOTE SENSOR	24	2-10034
ELECTRONIC HOUSING – STANDARD SENSOR	23	2-10035
TERMINAL BLOCK BOARD	22	2-10064
TERMINAL BLOCK COVER (includes screws)	21	2-10005
BLIND COVER (includes o-ring)	20	2-10003
ELECTRONIC HOUSING O-RING	19	1-10017
MAIN BOARD	18	2-10055
DISPLAY (includes screws)	17	2-10006
COVER O-RING	16	1-10001
DISPLAY COVER (includes o-ring)	15	2-10002
STANDARD ANALOG BOARD (includes screws)	14	2-10059
HOUSING PLUG	13	1-10015
MANIFOLD SET (includes o-rings, screws, filter elements and manometers)	12	2-10069
MANOMETER	11	1-10016
FILTER ELEMENT	10	1-10018
PNEUMATIC HOUSING (for no pressure sensor model)	9	2-10038
PNEUMATIC HOUSING (for pressure sensor model)	9	2-10073
REEL VALVE SET (includes screws, o-ring and sealing joint)	8	2-10074
PLUG FOR CALIBRATION SOCKET (includes o-ring)	7	2-10068
VENT SET (includes silencer)	6	1-10002
INTERNAL REGULATOR SET (includes o-rings)	5	2-10070
RESTRICTION (includes o-rings)	4	2-10071
COIL SET - I/P (includes o-rings and screws)	3	2-10075
SUPERIOR COVER O-RING	2	1-10021
SUPERIOR COVER (includes screws)	1	2-10076
MAGNETIC TOOL	-	3-10001
ROTATIVE MAGNET	-	2-10022
LINEAR 40 MAGNET	-	2-10023
LINEAR 70 MAGNET	-	2-10024
LINEAR 100 MAGNET	-	2-10025
UNIVERSAL ROTATIVE BRACKET	-	2-10077
UNIVERSAL LINEAR BRACKET	-	2-10078

Table 4.1 –VVP10-P spare parts.

5 CERTIFICATION

VVP10-P was projected to attend national and international regulation for explosion proof and intrinsic safety. Certificates are pending.

6 TECHNICAL CHARACTERISTICS

6.1. IDENTIFICATION

VVP10-P has an identification plate affixed to the top of the housing, specifying the model and serial number, as shown in figure 6.1.

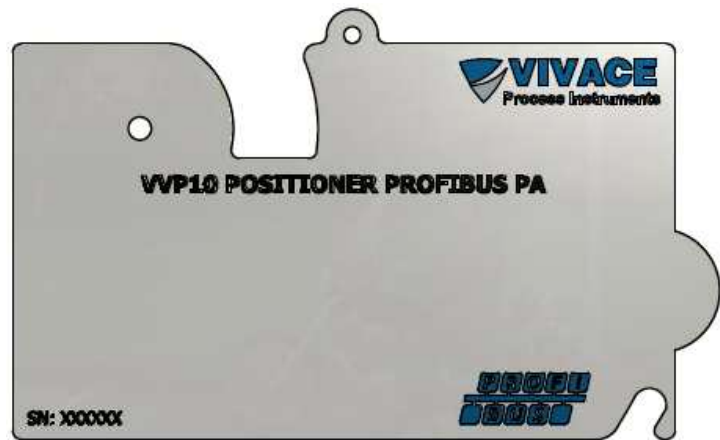


Figure 6.1 – Identification plate of VVP10-P.

6.2. ORDERING CODE

VVP10 *Intelligent Positioner*

Communication Protocol	H	HART
	P	PROFIBUS
Model	S	STANDARD
	P	PRESSURE SENSORS
	D	DISCRETE I/O
	C	COMPLETE
Sensor Type	0	STANDARD
	1	REMOTE 05 M
	2	REMOTE 10 M
	3	REMOTE 20 M
Magnet Type	0	ROTATIVE
	1	LINEAR 0 - 40 MM
	2	LINEAR 40 - 70 MM
	3	LINEAR 70 - 100 MM
	A	NO MAGNET
Pressure Gauges	0	NO
	1	YES
Certification Type	0	NO CERTIFICATION
	1	INTRINSICALLY SAFE
	2	EXPLOSION PROOF
Certification Body	0	NO CERTIFICATION
	1	CEPEL
	2	FM
	3	EXAM
Housing Material	A	ALUMINUM
Electrical Connection	1	½ - 14 NPT
Painting	1	BLUE - RAL 5005
Mounting Bracket	0	NO MOUNTING BRACKET
	1	UNIVERSAL LINEAR
	2	UNIVERSAL ROTATIVE

Ordering Code Example:

VVP10- P - S 0 0 0 0 0 A 1 1 0

6.3. TECHNICAL SPECIFICATION

The following table shows the technical specifications for VVP10-P:

Performance	Linearity: < $\pm 0.1\%$ Full Scale (using user table) Resolution: < 0.1% Full Scale Repeatability: < 0.1% Full Scale Hysteresis: < 0.1% Full Scale
Air Supply Effect	Negligible
Position Sensor	Sensor without contact, Hall effect, Local or Remote
Power Supply / Quiescent Current	9 to 32 Vdc, no polarity / 12 mA
Communication Protocol	Profibus PA
Function Blocks	01 Analog Output Block
Configuration	Remote (using EDDL or FDT/DTM tools) Local (using magnetic tool)
Classified Area Certification	Intrinsically Safe and Explosion Proof (pending)
Air Supply Pressure / Output Pressure Range	1.4 – 9.65 bar (20 -140 psi). Oil, dust and water free, according to ANSI/ISA S7.0.01-1996 standard. / 0 to 100% of Air Supply Input
Air Consumption	40 psi (2.8 bar): 6 l/min (0.21 cfm) 80 psi (5.5 bar): 9.5 l/min (0.34 cfm)
Flow Capacity	116 psi (8 bar): 283 l/min (10 cfm);
Setpoint Characterization	Linear, Equal Percentage, Quick Open and User Table (up to 16 points)
Environment Temperature Limits	Ambient: -40 to 85 °C (-40 to 185 °F) Storage: -40 to 90 °C (-40 to 194 °F) LCD: -10 to 80 °C (14 to 176 °F) operation. -40 to 85 °C (-40 to 185 °F) no damage. Remote Sensor Operation: -40 to 105 °C (-40 to 221 °F)
Humidity Limits	0 to 100% RH (Not-Condensable Relative Humidity)
Vibration Effects	$\pm 0.3\%$ g of span during the following conditions: 5-15 Hz for 4 mm constant movement. 15-150 Hz for 2g. 150-2000 Hz para 1g. Follows IEC60770-1.
Electromagnetic Interference Effects	According to IEC 61326:2002
LCD Display	5-digit, rotative, multi-function and bargraph
Stroke Movement	Linear: 3 to 100 mm Rotative: 30 to 120°
Action Type	Direct and Reverse, Single and Double, Air to Open or Air to Close
Self-Calibrations and Advanced Diagnostics	Position Self-Calibration and PID Self-Tuning FST (Valve Signature) and PST Diagnosis (with pressure sensors)
Mounting	Using universal brackets for linear and rotative actuators/valves
Pressure Sensors - Optional	For input, output 1 and output 2 pressure measurement.
Discrete Inputs (Stroke-Limits) - Optional	2 isolated dry contact inputs
Discrete Outputs (Safety Valves/Solenoid) - Optional	2 open-collector outputs, max. 400 mA, 24 Vdc
Electrical Connection	1/2 - 14 NPT
Pneumatic Connection	Input and Outputs: 1/4 -18 NPT. Pressure Gauges: 1/8 - 27 NPT
Housing Material	Aluminum / Plastic (only pneumatic block lid)
Approximated Weight	3 kg (without mounting bracket)
Pressure Gauges - Optional	Input and output pressures monitoring. 0-160psi scale. ABS housing, polycarbonate display, brass connection.

Table 6.1 – Technical specification for VVP10-P.

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

		FSAT Technical Analysis Solicitation Form	
Company:		Unit/Department:	
Standard Warranty: () Yes () No		Extended Warranty: () Yes () No	
		Shipping Invoice n°:	
		Buying Invoice n°:	
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 (°C)		Work Temperature (°C)	
Min:	Max:	Min:	Max:
Operation Time:		Fail Date:	
FAIL DESCRIPTION: Here user should describe in detail the observed behaviour of product, frequency of fail occurrence and repeatability. Also, should inform operational system version and a quick description of control system architecture where the equipment was installed.			
ADDITIONAL OBSERVATION:			

