# Table of contents

1 General.......................................................................................................................... 4  
1.1 Copyright © VIPA GmbH .......................................................................................... 4  
1.2 About this manual.................................................................................................... 5  
2 Hardware description.................................................................................................... 7  
2.1 Safety information for users.................................................................................... 7  
2.2 Properties.................................................................................................................. 8  
2.3 Structure .................................................................................................................. 9  
2.3.1 Overview ........................................................................................................... 9  
2.3.2 Interfaces ......................................................................................................... 10  
2.3.3 Memory management ....................................................................................... 11  
2.4 Dimensions............................................................................................................. 12  
2.5 General data .......................................................................................................... 13  
2.6 Technical data ....................................................................................................... 14  
3 Deployment.................................................................................................................. 17  
3.1 Installation .............................................................................................................. 17  
3.2 Commissioning ...................................................................................................... 18  
3.2.1 Web browser ................................................................................................... 18  
3.2.2 System Settings ............................................................................................... 21  
3.2.3 Firmware update ............................................................................................. 29  
3.3 Connection to a PLC system .................................................................................. 30  
4 Installation Guidelines................................................................................................. 31  
4.1 Basic rules for the EMC-equitable assembly of installations............................... 31  
4.2 EMC-equitable assembly ...................................................................................... 34  
4.3 EMC-equitable cabling ......................................................................................... 35  
4.4 Special precautions providing high noise immunity ............................................. 38  
4.5 Checklist for the EMC-compliant installation of controllers................................. 39
1 General

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This customer document describes all the hardware units and functions known at the present time. Descriptions may be included for units which are not present at the customer site. The exact scope of delivery is described in the respective purchase contract.

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EMail: support@vipa.de

1.2 About this manual

Objective and contents
This manual describes the cloudPanel HA1-L1A41-0 from VIPA. It contains a description of the structure, project engineering and deployment.

<table>
<thead>
<tr>
<th>Product</th>
<th>Order number</th>
<th>as of state:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>HW</td>
</tr>
<tr>
<td>TP 110-CL</td>
<td>HA1-L1A41-0</td>
<td>01</td>
</tr>
</tbody>
</table>

Target audience
The manual is targeted at users who have a background in automation technology.

Structure of the manual
The manual consists of chapters. Every chapter provides a self-contained description of a specific topic.

Guide to the document
The following guides are available in the manual:
- An overall table of contents at the beginning of the manual
- References with page numbers

Availability
The manual is available in:
- printed form, on paper
- in electronic form as PDF-file (Adobe Acrobat Reader)

Icons Headings
Important passages in the text are highlighted by following icons and headings:

- **DANGER!**
  Immediate or likely danger. Personal injury is possible.

- **CAUTION!**
  Damages to property is likely if these warnings are not heeded.
Supplementary information and useful tips.
2 Hardware description

2.1 Safety information for users

**Handling of electrostatic sensitive modules**

VIPA modules make use of highly integrated components in MOS-Technology. These components are extremely sensitive to over-voltages that can occur during electrostatic discharges. The following symbol is attached to modules that can be destroyed by electrostatic discharges.

![Symbol]

The Symbol is located on the module, the module rack or on packing material and it indicates the presence of electrostatic sensitive equipment. It is possible that electrostatic sensitive equipment is destroyed by energies and voltages that are far less than the human threshold of perception. These voltages can occur where persons do not discharge themselves before handling electrostatic sensitive modules and they can damage components thereby, causing the module to become inoperable or unusable. Modules that have been damaged by electrostatic discharges can fail after a temperature change, mechanical shock or changes in the electrical load. Only the consequent implementation of protection devices and meticulous attention to the applicable rules and regulations for handling the respective equipment can prevent failures of electrostatic sensitive modules.

**Shipping of modules**

Modules must be shipped in the original packing material.

**Measurements and alterations on electrostatic sensitive modules**

When you are conducting measurements on electrostatic sensitive modules you should take the following precautions:

- Floating instruments must be discharged before use.
- Instruments must be grounded.

Modifying electrostatic sensitive modules you should only use soldering irons with grounded tips.

![CAUTION!]

Personnel and instruments should be grounded when working on electrostatic sensitive modules.
2.2 Properties

General

The VIPA cloudPanel allows you to visualize and alter operating states and recent process values of a connected PLC. The cloudPanel is a compact and modular embedded PC based on Linux®. WEB-based projects are displayed via a WEB browser. Here the cloudPanel can simply be configured, controlled and remoted.

- Operating system Linux® 3.12
- Processor ARM Cortex A8 1GHz
- Flash memory 4GB, RAM 512MB DDR
- RS232/RS422/RS485 interface (not available for WebVisu projects), USB-A and Ethernet interface
- Robust plastic case
- Display resolution 600 x 1024 / 1024 x 600, 64K colors
- Battery backed clock
- Resistive analog touch screen
- Easy mounting via mounting clips
- Protection class IP66, Type 2 and 4X (Front) / IP20 (Back)

Order data

<table>
<thead>
<tr>
<th>Type</th>
<th>Order number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TP 110-CL</td>
<td>HA1-L1A41-0</td>
<td>10'' TFT color, RS232/RS422/RS485, USB-A, Ethernet RJ45</td>
</tr>
</tbody>
</table>
2.3 Structure
2.3.1 Overview

Front view

1 Interfaces
2 Display with touch sensitive area (Touch-Screen)

Bottom view

1 USB-A interface USB 2.0
2 RJ45 jack for Ethernet communication LAN
3 RS232/RS422/RS485 interface COM
4 Slot for DC 24V voltage supply
2.3.2 Interfaces

"Host"-USB-A
Using the "Host"-USB-A interface USB mouse, keyboard, stick or USB hard discs can be connected.

Ethernet connection
The RJ45 jack provides the interface to the twisted pair cable, required for Ethernet. The Ethernet interface has got two LEDs for status display.

LEDs

<table>
<thead>
<tr>
<th>green</th>
<th>yellow</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>on</td>
<td>off</td>
<td>no link</td>
</tr>
<tr>
<td>blinks</td>
<td>on</td>
<td>100Mbit/s link</td>
</tr>
<tr>
<td>blinks</td>
<td>off</td>
<td>10Mbit/s link</td>
</tr>
</tbody>
</table>

RS232 interface

9 pin SubD plug
- Interface is compatible to the COM interface of a PC
- Logical signals as voltage levels
- Point-to-point links with serial full-duplex transfer in two-wire technology up to 15m distance
- Data transfer rate up to 115.2kbit/s
**RS422/485 interface**

- Logical states represented by voltage differences between the 4 cores
- Serial bus connection in 4-wire technology using full duplex mode
- Data communications up to a max. distance of 500m
- Data communication rate up to 115.2kBaud

**Power supply**

The cloudPanel has got an integrated power supply. The power supply has to be provided with DC 24V (18 … 32 VDC). For this you find an according DC 24V slot at the bottom ‘Connect power supply’ on page 17.

### 2.3.3 Memory management

#### Overview

The following memory systems are available for the cloudPanel:

- 512MB work memory (RAM)
- 4GB user memory (Flash)
- USB storage media using "Host"-USB-A interface

#### Work memory (RAM)

Every cloudPanel has a DDR work memory with a size of 512MB.

#### User memory (Flash)

As internal permanent storage medium every cloudPanel has a user memory with a size of 4GB. 700MB of this is available to the user.
The connection of USB sticks and USB drives by use of the "Host"-USB-A interface is supported by the cloudPanel.

### USB storage media (USB 2.0)

2.4 Dimensions

<table>
<thead>
<tr>
<th>Installation dimensions</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Front panel (L x H)</td>
<td>282 x 197 mm</td>
</tr>
<tr>
<td>Depth (D+T)</td>
<td>29 + 6 mm</td>
</tr>
<tr>
<td>Installation cutting (A x B)</td>
<td>271 x 186 mm</td>
</tr>
</tbody>
</table>

The degrees of protection are only guaranteed when the following is observed:

- Material thickness at the mounting cut-out: 1.5 ... 6mm
- The deviation from the plane for the panel cut-out is ≤ 0.5mm. This condition must be fulfilled for the mounted HMI device.
- Permissible surface roughness in the area of the seal: ≤ 120µm (friction coefficient 120)
## 2.5 General data

### Conformity and approval

<table>
<thead>
<tr>
<th>Conformity</th>
<th>Approval</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 2014/30/EU</td>
<td>UL</td>
<td>Refer to Technical data</td>
</tr>
<tr>
<td>2011/65/EU</td>
<td></td>
<td>Restriction of the use of certain hazardous substances in electrical and electronic equipment</td>
</tr>
</tbody>
</table>

### Protection of persons and device protection

<table>
<thead>
<tr>
<th>Type of protection</th>
<th>Rear: IP20; Front: IP66, NEMA Type 2 and Type 4x</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical isolation</td>
<td>electrically isolated</td>
</tr>
<tr>
<td>to the field bus</td>
<td>electrically isolated</td>
</tr>
<tr>
<td>to the process level</td>
<td>electrically isolated</td>
</tr>
<tr>
<td>Insulation resistance</td>
<td>electrically isolated</td>
</tr>
<tr>
<td>Insulation resistance to reference earth</td>
<td>AC / DC 50V, test voltage AC 500V</td>
</tr>
<tr>
<td>Protective measures</td>
<td>against short circuit</td>
</tr>
</tbody>
</table>

### Environmental conditions to EN 61131-2

<table>
<thead>
<tr>
<th>Climatic</th>
<th>EN 60068-2-14</th>
<th>-20…+70°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage / transport</td>
<td>EN 61131-2</td>
<td>0…+40°C</td>
</tr>
<tr>
<td>Operation</td>
<td>EN 61131-2</td>
<td>0…+50°C</td>
</tr>
<tr>
<td>Horizontal installation</td>
<td>EN 60068-2-30</td>
<td>RH1 (without condensation, rel. humidity 5…85%)</td>
</tr>
<tr>
<td>Vertical installation</td>
<td>EN 61131-2</td>
<td>Degree of pollution 2</td>
</tr>
<tr>
<td>Air humidity</td>
<td>EN 61131-2</td>
<td>Degree of pollution 2</td>
</tr>
<tr>
<td>Pollution</td>
<td>EN 60068-2-27</td>
<td>15g, 11ms</td>
</tr>
<tr>
<td>Mechnical</td>
<td>EN 60068-2-6</td>
<td>1g, 9Hz ... 150Hz</td>
</tr>
<tr>
<td>Oscillation</td>
<td>EN 60068-2-27</td>
<td>1g, 9Hz ... 150Hz</td>
</tr>
<tr>
<td>Shock</td>
<td>EN 60068-2-27</td>
<td>15g, 11ms</td>
</tr>
</tbody>
</table>

### Mounting conditions

| Mounting place | - In the control cabinet |
| Mounting position | - Horizontal and vertical |
2.6 Technical data

**Order no.** | **HA1-L1A41-0**
--- | ---
**Type** | cloudPanel TP110-CL

**Display**
- **Display size (diagonal)**: 10.1"
- **Display size (width)**: 224 mm
- **Display size (height)**: 128 mm
- **Resolution**: 1024 x 600 / 600 x 1024
- **Aspect ratio**: 16:9
- **Type of display**: TFT color (64K colors)
- **MTBF Backlights (25°C)**: 20000 h

**System properties**
- **Processor**: Cortex-A8 1000 MHz
- **Operating system**: Linux 3.12
- **User software**: Webkit Browser
- **Work memory**: 512 MB
- **User memory**: 4 GB
- **Available memory (user data)**: 700 MB
- **SD/MMC Slot**: -
- **CF Card Slot Typ II**: -
<table>
<thead>
<tr>
<th><strong>Order no.</strong></th>
<th>HA1-L1A41-0</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFast Slot</td>
<td>-</td>
</tr>
<tr>
<td><strong>Time</strong></td>
<td></td>
</tr>
<tr>
<td>Real-time clock buffered</td>
<td>✓</td>
</tr>
<tr>
<td>Clock buffered period (min.)</td>
<td>2 w</td>
</tr>
<tr>
<td>Type of buffering</td>
<td>Goldcap</td>
</tr>
<tr>
<td>Load time for 50% buffering period</td>
<td>5 h</td>
</tr>
<tr>
<td>Load time for 100% buffering period</td>
<td>10 h</td>
</tr>
<tr>
<td>Accuracy (max. deviation per day)</td>
<td>8 s</td>
</tr>
<tr>
<td><strong>Operating controls</strong></td>
<td></td>
</tr>
<tr>
<td>Touchscreen</td>
<td>resistive</td>
</tr>
<tr>
<td>Touch function</td>
<td>Single Touch</td>
</tr>
<tr>
<td>Keyboard</td>
<td>external via USB</td>
</tr>
<tr>
<td>Mouse</td>
<td>external via USB</td>
</tr>
<tr>
<td><strong>Interfaces</strong></td>
<td></td>
</tr>
<tr>
<td>MPI, PROFIBUS-DP</td>
<td>-</td>
</tr>
<tr>
<td>MPI, PROFIBUS-DP connector</td>
<td>-</td>
</tr>
<tr>
<td>Serial, COM1</td>
<td>RS232 / RS422 / RS485</td>
</tr>
<tr>
<td>COM1 connector</td>
<td>Sub-D, 9-pin, male</td>
</tr>
<tr>
<td>Serial, COM2</td>
<td>-</td>
</tr>
<tr>
<td>COM2 connector</td>
<td>-</td>
</tr>
<tr>
<td>Number of USB-A interfaces</td>
<td>1</td>
</tr>
<tr>
<td>USB-A connector</td>
<td>USB-A (host)</td>
</tr>
<tr>
<td>Number of USB-B interfaces</td>
<td>-</td>
</tr>
<tr>
<td>USB-B connector</td>
<td>-</td>
</tr>
<tr>
<td>Number of ethernet interfaces</td>
<td>1</td>
</tr>
<tr>
<td>Ethernet</td>
<td>Ethernet 10/100 MBit</td>
</tr>
<tr>
<td>Ethernet connector</td>
<td>RJ45</td>
</tr>
<tr>
<td>Integrated ethernet switch</td>
<td>-</td>
</tr>
<tr>
<td>Video connectors</td>
<td>-</td>
</tr>
<tr>
<td>Audio connections</td>
<td>-</td>
</tr>
<tr>
<td><strong>Technical data power supply</strong></td>
<td></td>
</tr>
<tr>
<td>Power supply (rated value)</td>
<td>DC 24 V</td>
</tr>
<tr>
<td>Power supply (permitted range)</td>
<td>18 - 32 VDC</td>
</tr>
<tr>
<td>Reverse polarity protection</td>
<td>✓</td>
</tr>
<tr>
<td>Current consumption (no-load operation)</td>
<td>0.1 A</td>
</tr>
<tr>
<td>Current consumption (rated value)</td>
<td>0.25 A</td>
</tr>
</tbody>
</table>
## Technical data

<table>
<thead>
<tr>
<th>Order no.</th>
<th>HA1-L1A41-0</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inrush current</strong></td>
<td>38 A</td>
</tr>
<tr>
<td><strong>$I^2t$</strong></td>
<td>0.33 A²s</td>
</tr>
<tr>
<td><strong>Power loss</strong></td>
<td>6 W</td>
</tr>
</tbody>
</table>

### Status information, alarms, diagnostics
- **Supply voltage display**: none

### Mechanical data

#### Housing / Protection type
- **Material**: PC + ABS
- **Mounting**: mounting clips
- **Protect type front side**: IP 66
- **Protect type back side**: IP 20

#### Dimensions
- **Front panel**: 282 mm x 197 mm x 6 mm
- **Rear panel**: 268 mm x 183 mm x 29 mm

#### Installation cut-out
- **Width**: 271 mm
- **Height**: 186 mm
- **Minimum**: 1.5 mm
- **Maximum front panel thickness**: 6 mm
- **Net weight**: 840 g
- **Weight including accessories**: 971 g
- **Gross weight**: 1434 g

### Environmental conditions
- **Operating temperature**: 0 °C to 50 °C
- **Storage temperature**: -20 °C to 70 °C

### Certifications
- **UL certification**: yes
- **KC certification**: -
3 Deployment
3.1 Installation

Overview
The cloudPanel is suitable for the installation in operating tables and control cabinet fronts. The installation happens via the backside. The cloudPanel is provided with a fixing technique that allows an easy connection with a crosstip screwdriver. A fast and easy device change is possible.

Installation cutting
For the installation into a operating tableau and control cabinet fronts, the cloudPanel requires the following front plate cutting:

<table>
<thead>
<tr>
<th>cloudPanel</th>
<th>A x B in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>HA1-L1A41-0</td>
<td>271 x 186 mm</td>
</tr>
</tbody>
</table>

Installation
To fix the cloudPanel mounting clips are included. For the installation a small crosstip screwdriver is required.

1. Push the cloudPanel [3] from the front side into the front panel cutting [1] until it touches the panel with the seal [2].
2. Put the mounting clips [4] on all four sides of the cloudPanel into the openings. The screws should point in the direction of the front panel.
3. Screw the screws from the other side with the crosstip screwdriver [5].

Connect power supply
- For the cabling of the DC 24V power supply (18 ... 32 VDC) a black plug is included. The connector is a plug with screw contacts. The associated label is located on the back of the cloudPanel.
- The cloudPanel must always be grounded to earth. Grounding helps limit the effects of noise due to electromagnetic interference.
- Use the power supply terminal marked with $\ominus$ for grounding.
- The power supply circuit may be floating or grounded. In the latter case, connect to the ground the power supply as shown in figure with a dashed line.
- When using the floating power scheme, note that the cloudPanel internally connects the power to the ground with a 1MΩ resistor in parallel with a 4.7nF capacitor.
3.2 Commissioning

CAUTION!

- Before commissioning the device must be brought to room temperature.
- At condensation the device must be absolutely dry before connected to power.
- To avoid overheat during operation the device must not be laid open to direct sun light.
- After opening the control cabinet or desk, there are parts with possible dangerous voltage available.
- For all signal connections only screened cables are permitted.
- Signal cables must not be let within the same cable shaft as high voltage cables.

3.2.1 Web browser

Splash screen

As soon as the cloudPanel is provided by power supply, the VIPA splash screen of the implemented Web browser will be loaded.
www.vipa.com - With active internet connection, this button opens the VIPA homepage [www.vipa.com].

Settings - Use the [Settings] button to open the "System Settings" interface of the cloudPanel.

Service & Support - With active internet connection, this button takes you directly to VIPA "Service & Support".

### Browser settings

Use the button in the upper right corner of the browser window to open the browser settings.

- **Toolbar visibility**
  - Visible
  - Hidden
  - Auto

- **Toolbar controls**
  - Show navigation controls
  - Show loading controls
  - Show location
  - Show settings button
  - Touch navigation
  - Show zoom controls
  - Zoom to fit contents
  - Fallback to default URL
  - Hide scrollbars

- **Default URL**: `file:///mnt/data/WWW/index.html`

- **Last visited page**: [Last visited page]

- **Browser identification**: `WebkiBrowse`

- **Lock settings**

- **Close**
Deployment

Commissioning > Web browser

‘Toolbar visibility’

- Toolbar visible
- Toolbar hidden

‘Toolbar controls’

- Display of the buttons
- Display of the button
- Display of the button
- Display of the button
- Display of the button
- Display of the button
- Display of the buttons
- Fallback to default URL

‘Default URL’

- Setting the address of the homepage (default: VIPA splash screen: file:///mnt/data/WWW/index.html)
- Activate / deactivate the display of the last visited page when restart the cloudPanel (default: activate)
- Set a password for the browser settings

Additional setting under
[Hidden] / [Auto]

- Setting the time that must be pressed and held on the touch screen for the browser settings window to appear (default 2 seconds).

To show this dialog touch the screen and hold

Hold time (seconds) 2

‘Hold time (seconds)’

- Setting the time that must be pressed and held on the touch screen for the browser settings window to appear (default 2 seconds).
3.2.2 System Settings

3.2.2.1 Interface

The cloudPanel has a "System Settings" interface to allow configuration of system options. The "System Settings" are accessible locally on cloudPanel or in remote using a current Web browser on port 443 ([https://IP/machine_config](https://IP/machine_config)).

- Username: admin
- Password: admin

3.2.2.2 Menu

Use navigation menu on the left side of the screen to browse through the available options. With the following menu items:

**Language**

Here you can select a language for the "System Settings" menu. The following languages are available:

- English (default)
- Italiano
- German
- Chinese
- French

**System**

See System for information about the operating system, serial and article number and available memory (RAM) of the cloudPanel.
Here you can enable the persistent log for BSP and have the possibility to export it under [Save].

Date & Time

Here you can change the date and time of the cloudPanel including the time zone and the NTP server. Go to [Edit].

Network

Configure the network settings of the cloudPanel here such as IP address of the Ethernet interface, Network mask and gateway. You have to disable DHCP. Go to [Edit].

In the cloudPanel you have to set an IP address that is in the same IP range as the web server.

Services

Here you can activate / deactivate the following services:

In order to perform a firmware update ‘Autorun scripts from external storage’ has to be activated!
Management

Under Management the update of BSP components (Main OS, Config OS, Bootloader, XLoader) and the splash screen takes place. You will also receive information about the use and size of stored data here.

The update of Main OS is available only in System Mode, the update of Config OS is only in User Mode.

The complete firmware update of cloudPanel can be found in Chapter Firmware update. ↪ Chapter 3.2.3 'Firmware update' on page 29

Display

Here you can use a slider to adjust the brightness of the display, set the time of the automatic backlight timeout and select panel orientation (90°, 180°, 270° and 360°). You can also calibrate the Touch Display here.

Restart

- Here you can restart the cloudPanel in User Mode or in System Mode.
- Main OS option restarts as per default in User Mode.
- Config OS option restart cloudPanel directly into "System Settings" in System Mode.

Authentication

Change here the password for administrator (admin) and configure the password for the standard user (user). The Administrator has full access to "System Settings". The standard user has some limitations.
3.2.2.3 Operation modes

The "System Settings" have different operating modes:

- **User Mode (Main OS Mode)**
  - The cloudPanel is in factory default status, the Web browser is installed.
  - The **User Mode** allows to configure system parameters and update **Config OS area**.

- **System Mode (Config OS Mode)**
  - The cloudPanel has a software failure or the Web browser is not installed.
  - **System Mode** includes all options available in **User Mode** and offers in additions commands dedicated to system upgrade and recovery not available when running in **User Mode**.

- **Default Mode**
  - The **Default Mode** allows Restore Factory Settings.

- **Calibration Mode**
  - The **Calibration Mode** allows to calibrate the touch screen.

**User Mode (Main OS Mode)**

- **Web browser is not running**

  - ![System Settings](image)
  - ![Startup sequence](image)

  To enter the "System Settings" in **User Mode** of cloudPanel, click [System Settings] on the black settings screen.
Web browser is running

Click [Settings] on the blue splash screen, then enter the user name "admin" and the password "admin".

The “System Settings” in User Mode is accessible remotely via web browser of the PC, enter https://<HMI_IP_address>.
System Mode (Config OS Mode)

- **Normal operation - Web browser is not running**

  1. Click on [System Settings] on the black settings screen to enter in "System Settings" in User Mode.

  2. Select ‘Restart ➔ Config OS’ to reboot in System Mode.

- **Normal operation - Web-Browser is running**

  1. Click on [Settings] on the blue splash screen to start "System Settings" in User Mode.

  2. Select ‘Restart ➔ Config OS’ to reboot in System Mode.
Recovery operation

The "System Settings" are available in System Mode via a "Tap-Tap procedure" and can be accessed also when cloudPanel is facing a software failure. "Tap-Tap" consists in a sequence of several touch activations by simple means of the finger tapping the touch screen performed during the power-up phase and started immediately after the cloudPanel is powered on.

When TAP-TAP DETECTED message appears on the top of the screen, touch and hold few seconds and select RESTART: CONFIG OS.

⇒ The cloudPanel starts with the "System Settings" in System Mode.

Default mode

"System Settings" in Default mode allows Restore Factory Settings, this mode is available via "Tap-Tap sequence" and can be accessed also when cloudPanel is facing a software failure. "Tap-Tap" consists in a sequence of several touch activations by simple means of the finger tapping the touch screen performed during the power-up phase and started immediately after the cloudPanel is powered on.

1. When TAP-TAP DETECTED message appears on the top of the screen, wait for 5 seconds (without touching the screen) to enter SYSTEM SETTINGS.

2. Wait for 5 more seconds (without touching the screen) to enter Default Mode.

Uninstall the Web browser

1. To uninstall the Web browser in Default mode select [Startup Sequence].
2. Select the Web browser and click [Uninstall].
   ⇒ Uninstall process will be performed.

Calibration mode

Calibration mode allows to calibrate touch screen, can be accessed by "Tap-Tap" procedure. "Tap-Tap" consists in a sequence of several touch activations by simple means of the finger tapping the touch screen performed during the power-up phase and started immediately after the cloudPanel is powered on.

1. When TAP-TAP DETECTED message appears on the top of the screen, wait for 5 seconds (without touching the screen) to enter SYSTEM SETTINGS.

2. Press on touch screen, TOUCHSCREEN CALIBRATION will be highlighted in yellow, hold pressed for few seconds until touchscreen calibration procedure starts.

3. Follow the instructions on screen to complete the calibration procedure, system will prompt to touch specific points to calibrate the touchscreen device.

"Tap-Tap" summary

Perform "Tap-Tap" sequence, then:
- touch and hold for 5 seconds > Go to System mode (Config OS mode)
- or wait (without touching) for 5 seconds then:
  - touch and hold for 5 seconds > Go to Calibration mode
  - wait without touching for 5 seconds > Go to Default mode
3.2.3 Firmware update

**Requirement**
To execute the firmware update an empty USB stick (at least 1GB) in FAT32 format is necessary.

**Current firmware on www.vipa.com**
The latest firmware versions can be found in the service area at [www.vipa.com](http://www.vipa.com).

---

**CAUTION!**
When installing a new firmware you have to be extremely careful. Under certain circumstances you can destroy the cloudPanel, for example if the voltage supply is interrupted during transfer or if the firmware file is defective. In this case, please call our hotline!

Please regard that the version of the update firmware has to be different from the existing firmware otherwise no update is executed.

---

**Load firmware on USB stick**
2. Click on ‘Service / Support ➔ Downloads ➔ Firmware’.
3. Via ‘HMI’ navigate to your cloudPanel, download the ZIP file for the update process and unzip the content in the root directory of the USB stick.

**Prepare the cloudPanel**
1. Connect the cloudPanel to the power supply.
   ➞ The cloudPanel starts with the VIPA splash screen.
2. Open the "System Settings" interface of the cloudPanel via the [Settings] button.
3. Activate ‘Autorun scripts from external storage’ under ‘Services’ by moving the button to the right.

**Transfer firmware from USB stick into cloudPanel**
1. Insert the prepared USB stick into the USB port of the cloudPanel.
   ➞ The update process starts automatically and can take several minutes.
   After successful update the message "Process completed successfully" appears.
   A log file "lastupdate.log" is generated and saved in the root directory of the USB stick.
2. Remove the USB-Stick and reboot the cloudPanel.
3.3 Connection to a PLC system

Overview

- It is assumed that a WebVisu project has been created for your PLC. The feature for creating a WebVisu is integrated in the VIPA SPEED7 Studio.

For more information on the VIPA SPEED7 Studio and how to create a web visualization, refer to the manual of your CPU or the online help of the SPEED7 Studio.

- The web visualization runs on the Web server within the respective PLC and is called up via a Web browser in cloudPanel. Access is via the previously configured IP address of the Ethernet channel and is called by entering this IP address in the address bar of the Web browser. Per default, port 8080 is used for http: 
  http://<IP address PLC>:8080.

- The cloudPanel is connected to your PLC via Ethernet. In the cloudPanel you have to set an IP address that is in the same IP range as the Web server.

- During operation your operating device communicates with the according PLC and reacts to the application courses in the PLC according to the configured processes. Via dialogues configured before, process values may be monitored graphically, altered and evaluated.
4 Installation Guidelines

4.1 Basic rules for the EMC-equitable assembly of installations

General

The installation guidelines contain information about the interference free deployment of a PLC system. There is the description of the ways, interference may occur in your PLC, how you can make sure the electromagnetic compatibility (EMC), and how you manage the isolation.

What does EMC mean?

Electromagnetic compatibility (EMC) means the ability of an electrical device, to function error free in an electromagnetic environment without being interfered respectively without interfering the environment.

The components of VIPA are developed for the deployment in industrial environments and meets high demands on the EMC. Nevertheless you should project an EMC planning before installing the components and take conceivable interference causes into account.

Possible interference causes

Electromagnetic interferences may interfere your control via different ways:

- Electromagnetic fields (RF coupling)
- Magnetic fields with power frequency
- Bus system
- Power supply
- Protected earth conductor

Depending on the spreading medium (lead bound or lead free) and the distance to the interference cause, interferences to your control occur by means of different coupling mechanisms.

There are:

- galvanic coupling
- capacitive coupling
- inductive coupling
- radiant coupling

Coupling mechanisms and interference sources

The following table shows the four different coupling mechanisms, their causes and possible interference sources.

<table>
<thead>
<tr>
<th>Coupling mechanism</th>
<th>Cause</th>
<th>Typical source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Galvanic coupling</td>
<td>Galvanic or metallic coupling always occurs, when two current circuits have a common line.</td>
<td>Pulsed devices (Net influence from transducers and foreign net devices)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Starting motors</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Different potential of component cubicles with common current supply</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Static discharges</td>
</tr>
</tbody>
</table>
### Coupling mechanism

<table>
<thead>
<tr>
<th>Capacitive coupling</th>
<th>Cause</th>
<th>Typical source</th>
</tr>
</thead>
</table>
| Capacitance or electric coupling occurs between conductors with different potential. The coupling is proportional to the temporal change of the voltage. | - Interference through parallel signal lines  
- Static discharge of the personnel lines  
- Contactors |

### Inductive coupling

<table>
<thead>
<tr>
<th>Inductive coupling</th>
<th>Cause</th>
<th>Typical source</th>
</tr>
</thead>
</table>
| Inductive or magnetic coupling occurs between two current active line loops. The magnetic flows associated with the currents induct interference voltages. The coupling is proportional to the time related change of the current. | - Transducers, motors, electric welding devices  
- Parallel net cables  
- Cables with toggled currents  
- Signal cable with high frequency  
- Unused coils |

### Radiate power coupling

<table>
<thead>
<tr>
<th>Radiate power coupling</th>
<th>Cause</th>
<th>Typical source</th>
</tr>
</thead>
</table>
| One talks of radiate power coupling, when an electromagnetic wave meets a line circuit. The hit of the wave inducts currents and voltages. | - Sender in the neighbourhood (e.g. walkie-talkie)  
- Sparking lines (sparking plugs, collector of electric motors, welding devices) |

### Basic rules for EMC

In the most times it is enough to take care of some elementary rules to guarantee the EMC. Please regard the following basic rules when installing your PLC.

- Take care of a correct area-wide grounding of the inactive metal parts when installing your components.
  - Install a central connection between the ground and the protected earth conductor system.
  - Connect all inactive metal extensive and impedance-low.
  - Please try not to use aluminium parts. Aluminium is easily oxidizing and is therefore less suitable for grounding.
- When cabling, take care of the correct line routing.
  - Organize your cabling in line groups (high voltage, current supply, signal and data lines).
  - Always lay your high voltage lines and signal respectively data lines in separate channels or bundles.
  - Route the signal and data lines as near as possible beside ground areas (e.g. suspension bars, metal rails, tin cabinet).
Proof the correct fixing of the lead isolation.
- Data lines must be laid isolated.
- Analog lines must be laid isolated. When transmitting signals with small amplitudes the one sided laying of the isolation may be favourable.
- Lay the line isolation extensively on an isolation/protected earth conductor rail directly after the cabinet entry and fix the isolation with cable clamps.
- Make sure that the isolation/protected earth conductor rail is connected impedance-low with the cabinet.
- Use metallic or metallised plug cases for isolated data lines.

In special use cases you should appoint special EMC actions.
- Consider to wire all inductivities with erase links.
- Please consider luminescent lamps can influence signal lines.

Create a homogeneous reference potential and ground all electrical operating supplies when possible.
- Please take care for the targeted employment of the grounding actions. The grounding of the PLC serves for protection and functionality activity.
- Connect installation parts and cabinets with your PLC in star topology with the isolation/protected earth conductor system. So you avoid ground loops.
- If there are potential differences between installation parts and cabinets, lay sufficiently dimensioned potential compensation lines.
4.2 EMC-equitable assembly

Mostly, measures for suppressing interference voltages are only taken, when the control is already in commission and the perfect receive of a wanted signal is disturbed. Causes for such interference's are in the most cases inadequate reference potentials, coming from mistakes at the device assembly and installation.

Guidelines for assembling and grounding of inactive metal parts

When assembling the devices, you have to ensure the large-surface grounding of the inactive metal parts. A correctly done grounding supports an unambiguous reference potential for the control and reduces the impact of coupled interferences.

Grounding means the conducting connection of all inactive metal parts. The sum of all interconnected inactive parts is called ground.

Inactive parts are all conductive parts electrically separated from all active parts by means of a basic isolation and that may only get voltage in case of an error.

The ground must not adopt dangerous contact voltage even in case of an error. Thus you have to connect the ground with the protected earth conductor. To avoid ground loops, local distant ground constructions (cubicles, construction and machine parts) have to be connected with the protected earth conductor system in star-topology.

Please regard at grounding:

- Connect the inactive metal parts as carefully as the active ones.
- Take care of impedance-low metal-metal-connections, e.g. with large-surface and well conductive contacts.
- If you include coated or anodized metal parts in the grounding, you have to come through the isolating protection layers. For this you may use special contact washers or remove the isolation layer.
- Protect the connection points from corrosion, e.g. with grease.
- Moveable grounding parts (e.g. cubicle doors) have to be connected via flexible ground strips. The ground strips should be short and have a large surface, because the surface is decisive for the diversion of high frequency interferences.
4.3 EMC-equitable cabling

**Line routing**

Content of this section is the line routing of bus, signal and supply lines. Object of the line routing is to suppress the "slurring" at parallel lines.

**Line routing inside and outside of cubicles**

For an EMC-equitable routing of the lines it is convenient to divide the cables in different groups and install each group itself:

*Group A*
- screened bus and data lines
- screened analog lines
- unshielded lines for direct voltage ≤60V
- unshielded lines for alternating voltage ≤25V
- Coaxial cables for monitors

*Group B*
- unshielded lines for direct voltage >60V and ≤400V
- unshielded lines for alternating voltage >25V and ≤400V

*Group C*
- unshielded lines for direct and alternating voltage >400V

*Group D*
- Lines for H1 respectively TCP/IP

**Combination of groups**

Following the table you may see the conditions for the cabling of the line groups by combining the single groups:

<table>
<thead>
<tr>
<th></th>
<th>Group A</th>
<th>Group B</th>
<th>Group C</th>
<th>Group D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group C</td>
<td>[3]</td>
<td>[3]</td>
<td>[1]</td>
<td>[4]</td>
</tr>
</tbody>
</table>

[1] The lines may be installed in common bundles or cable trusses.

[2] The lines have to be installed in different bundles or cable trusses (without min. distance).

[3] The lines have to be installed in different bundles or cable trusses inside of cubicles and outside of the cubicle but inside the building in separated cable trusses with a min. distance of 10cm.

[4] The lines have to be installed in different bundles or cable trusses with a min. distance of 50cm.

**Line routing outside of buildings**

Wherever possible, exterior cabling should be installed on metallic cable trays. A galvanic connection must be provided for joints between cable trays. You must abide by the applicable lightning protection and grounding regulations when installing exterior cables.
Lightning protection

**CAUTION!**
Where cables and signal lines for PLC equipment are installed outside of buildings, the conditions for internal and external lightning protection must be satisfied.

- Exterior lines should either be installed in metallic conduit pipes that is grounded on both ends or in steel-reinforced concrete cable trunks with continuously connected reinforcing.
- Signal lines should be protected against overvoltage by varistors or by lightning arrester filled with rare gas.
- Install these protective elements at the location where the cables enter the building.

Any lightning protection system must be based on an individual assessment of the entire plant. For questions please contact VIPA GmbH.

Equipotential bonding

Potential differences can occur between different sections when controllers and peripheral equipment are connected by means of non-isolated connections or the screens of screened cables are connected at both ends and grounded on different sections of the plant. One reason for a potential difference can be that different sections of the plant are powered from different power sources. These potential differences must be reduced by means of equipotential bonding conductors to ensure that the electronic equipment employed on the plant operates properly.

**Rules for equipotential bonding**

- The lower the impedance of the equipotential bonding conductor, the higher the effectiveness of potential equalization.
- The impedance of the equipotential bonding conductor must not exceed 10% of the impedance of the screen where screened signal lines are connected between the different sections of the plant and the screening is connected to ground/neutral on both sides.
- The cross-sectional area of the equipotential bonding conductor must be calculated to carry the maximum equalization current. The following cross-sections have been successfully employed:
  - 16mm² Cu for equipotential bonding conductors up to 200m
  - 25mm² Cu equipotential bonding conductors exceeding 200m.
- Use copper or galvanized steel for equipotential bonding conductors. These must be connected to ground/neutral by means of large-surface connections that are protected from corrosion.
- The equipotential bonding conductor should be installed in such a manner that it includes the smallest surface between the bonding conductor and the signal lines.

Screening of lines and cables

Screening is one method commonly used to reduce (attenuate) the interference pick-up from magnetic, electrical or electromagnetic fields.

- Interference on screens is conducted to ground by the conductive connection between the screen and the screening rain/enclosure. To avoid interference from these currents it is very important that the neutral connection is a low-impedance connection.
- You should only use cables that are provided with a braided screen. The degree of screening should be more than 80%.
Avoid cables with foil-type screens as the foil can be easily damaged by tension and pressure at the point of attachment; this can result in reduced effectiveness of the screening action.

As a rule you should always ground the screens of cables on both ends. This is the only way in which you can ensure that high frequency interference is attenuated properly.

One-sided grounding of screens

In exceptional cases it may be necessary to ground the screen on one side only. However, this will only attenuate the lowest frequencies. The one-sided grounding of screens may provide advantages when:

- It is not possible to install an equipotential bonding conductor
- Analogue signals (a few mV or mA) must be transmitted
- Foil-type screening (static screening) is employed.

You should always use metallic or metallised covers for serial data lines. Connect the screen of the data line to the cover. Do not connect the screen to PIN 1 of the connector!

In case of stationary operations it is recommended that the remove the insulation from the screened cable without cutting the screen and to attach this point to the screening/neutral rail.

Potential differences can give rise to an equalization current via the screen connected between the two ground connections. In this case you must install an additional equipotential bonding conductor.

Connecting the screen

Please observe the following points when you handle the screens:

- Use only metallic cable clamps when connecting the screening of cables. These clamps must provide a good electrical contact and a large-surface connection to the screen.
- Attach the screens to the screening rail directly at the point where the cables enter the enclosure. The screening conductor must be continued to the module without interruption, however, it must not be connected to the module!
4.4 Special precautions providing high noise immunity

**Inductors require snubber networks**

Inductors controlled by your programmable controller (e.g. contactors and relays) do not normally require additional snubber networks or suppressors as the respective modules have been provided with the required components.

**Equipotential bonding**

Snubber networks must only be connected to inductors when output circuits can be disabled by means of additional contacts (e.g. relay contacts). In this case the integrated suppressors on the module are also disabled. You can connect diodes to suppress back-emc, varistors or RC-networks to the inductors.

<table>
<thead>
<tr>
<th>Connections of DC-activated inductors</th>
<th>Connections of AC-activated inductors</th>
</tr>
</thead>
<tbody>
<tr>
<td>using a diode</td>
<td>using a Z-diode</td>
</tr>
<tr>
<td><img src="image1.png" alt="Diagram" /></td>
<td><img src="image2.png" alt="Diagram" /></td>
</tr>
<tr>
<td>using a varistor</td>
<td>using RC-network</td>
</tr>
<tr>
<td><img src="image3.png" alt="Diagram" /></td>
<td><img src="image4.png" alt="Diagram" /></td>
</tr>
</tbody>
</table>

**Power outlet for PGs**

Every cubicle must be provided with a power outlet for the PU. These outlets must be wired to the distribution system, which is also used to connect the neutral conductor for the cubicle.

**Cubicle illumination**

The cubicle illumination should consist of incandescent lights, e.g. LINESTRA-lamps. Avoid using fluorescent lamps as these lamps can cause interference. If you can not avoid using fluorescent lamps you should implement the steps outlined in the following figure.

**Suppression of fluorescent lamps in cubicles**

1. Fluorescent lamp
2. Screen above the lamp
3. Screened cable
4. Switch with metallic cover
5. Line filter or screened power cable
4.5 Checklist for the EMC-compliant installation of controllers

<table>
<thead>
<tr>
<th>EMC-measures</th>
<th>Space for Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Connection of the inactive parts</strong></td>
<td></td>
</tr>
<tr>
<td>You should take special care to check the connections of:</td>
<td></td>
</tr>
<tr>
<td>■ Module racks</td>
<td></td>
</tr>
<tr>
<td>■ Frames</td>
<td></td>
</tr>
<tr>
<td>■ Screen and protected earth conductor</td>
<td></td>
</tr>
<tr>
<td>Are all the inactive metal parts interconnected by means of large-surface and low-impedance connections?</td>
<td></td>
</tr>
<tr>
<td>Has a proper connection been installed with respect to the ground/protected earth conductor system?</td>
<td></td>
</tr>
<tr>
<td>Has the isolation been removed from varnished and anodized surfaces or have these connections been fitted with special contact washer?</td>
<td></td>
</tr>
<tr>
<td>Have the connection been protected from corrosion, e.g. by means of grease?</td>
<td></td>
</tr>
<tr>
<td>Have doors been grounded by means of grounding straps connected to the body of the cubicle?</td>
<td></td>
</tr>
<tr>
<td><strong>Cable routing</strong></td>
<td></td>
</tr>
<tr>
<td>Cabling divided into groups?</td>
<td></td>
</tr>
<tr>
<td>Power cables (230 ... 400V) and signal lines installed in separate channels or bunches?</td>
<td></td>
</tr>
<tr>
<td><strong>Potential compensating</strong></td>
<td></td>
</tr>
<tr>
<td>When installing the equipment at separate locations, check the installation of the potential compensating line.</td>
<td></td>
</tr>
<tr>
<td><strong>Cable screen</strong></td>
<td></td>
</tr>
<tr>
<td>All covers of plugs are metallic?</td>
<td></td>
</tr>
<tr>
<td>All analog and data lines installed screened?</td>
<td></td>
</tr>
<tr>
<td>Line screens attached to the screening or the protected earth conductor?</td>
<td></td>
</tr>
<tr>
<td>Have the screens been connected by means of large-surface and low-impedance cable clamps?</td>
<td></td>
</tr>
<tr>
<td>Cable screens grounded both-sided where possible?</td>
<td></td>
</tr>
<tr>
<td><strong>Inductors</strong></td>
<td></td>
</tr>
<tr>
<td>Have the coils of contactors controlled by means of contacts been connected to snubber networks?</td>
<td></td>
</tr>
</tbody>
</table>