YASKAWA

VIPA HMI

TP-smart | H41-71A41-0 | Manual

HB160 | TP-smart | H41-71A41-0 | en | 20-50

smartPanel - TP304-SM

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H41-71A41-0_000_TP304-SM,4,EN - © 2020

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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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1.2 About this manual

Objective and contents

This manual describes the VIPA smartPanel H41-71A41-0. It contains a description of the structure, project engineering and deployment.

Product	Order number	as of state:		
		HW	FW	OS
TP 304-SM	H41-71A41-0	01	V1.0.2	Windows® Embedded Compact 7

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.

1.3 Safety information

Applications conforming with specifications

The system is constructed and produced for:

- communication and process control
- general control and automation tasks
- industrial applications
- operation within the environmental conditions specified in the technical data
- installation into a cubicle

DANGER!
This device is not certified for applications in

– in explosive environments (EX-zone)

Documentation

The manual must be available to all personnel in the

- project design department
- installation department
- commissioning
- operation

CAUTION!
The following conditions must be met before using or commissioning the components described in this manual:

– Hardware modifications to the process control system should only be carried out when the system has been disconnected from power!
– Installation and hardware modifications only by properly trained personnel.
– The national rules and regulations of the respective country must be satisfied (installation, safety, EMC ...)

Disposal

National rules and regulations apply to the disposal of the unit!

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.

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.

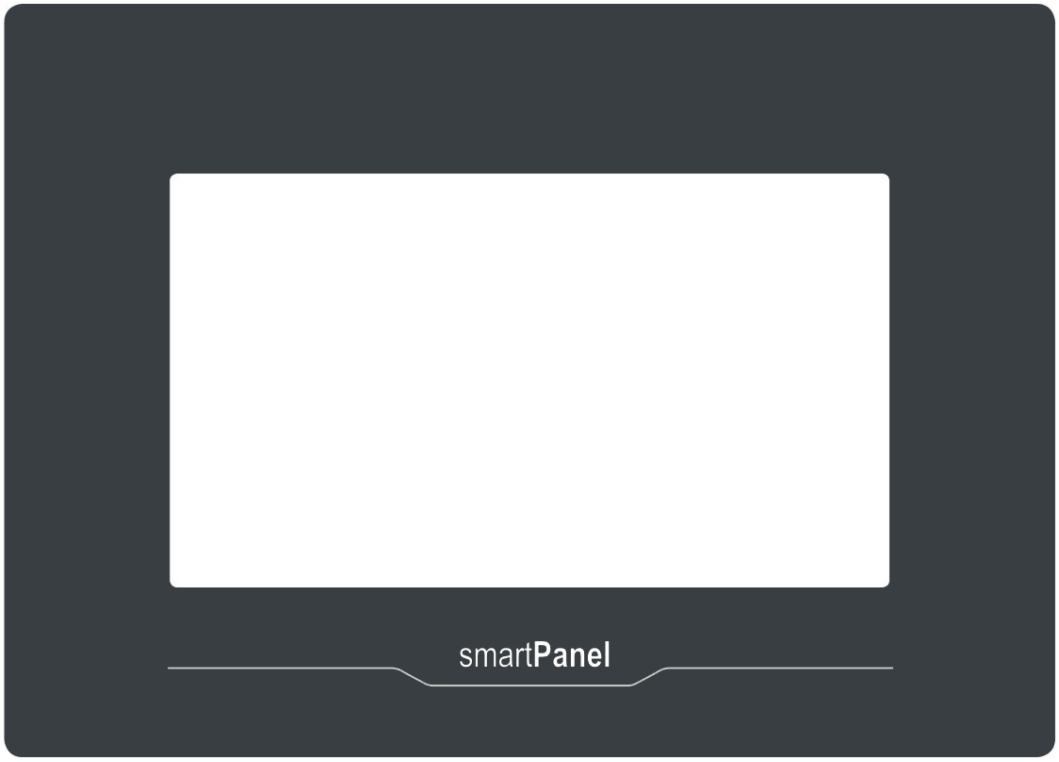
Modifying electrostatic sensitive modules you should only use soldering irons with grounded tips.

CAUTION!
Personnel and instruments should be grounded when working on electrostatic sensitive modules.

2.2 Properties

General

The VIPA smartPanel allows you to visualize and alter operating states and recent process values of a connected PLC. The smartPanel is a compact and modular embedded PC based on Windows® EC 7. Besides the extensive Windows® CE functions the smartPanel offers varied communication possibilities. Here the smartPanel can simply be configured, controlled and remoted. By including a selectable HMI/SCADA runtime the smartPanel is particularly suitable for monitoring and controlling of process cycles.



- Windows® Embedded Compact 7
- Movicon 11 CE Standard (4096 I/O Bytes)
- Processor ARM Cortex A8 1GHz
- Flash memory 4GB, RAM 512MB DDR
- RS232/RS422/RS485, USB-A- and Ethernet interface
- Robust plastic case
- Display resolution 272 x 480 / 480 x 272, 64K colors
- Clock back up (Goldcap)
- Resistive analog touch screen
- Easy mounting via mounting clips
- Protection class IP66, Type 2 and 4X (Front) / IP20 (Back)

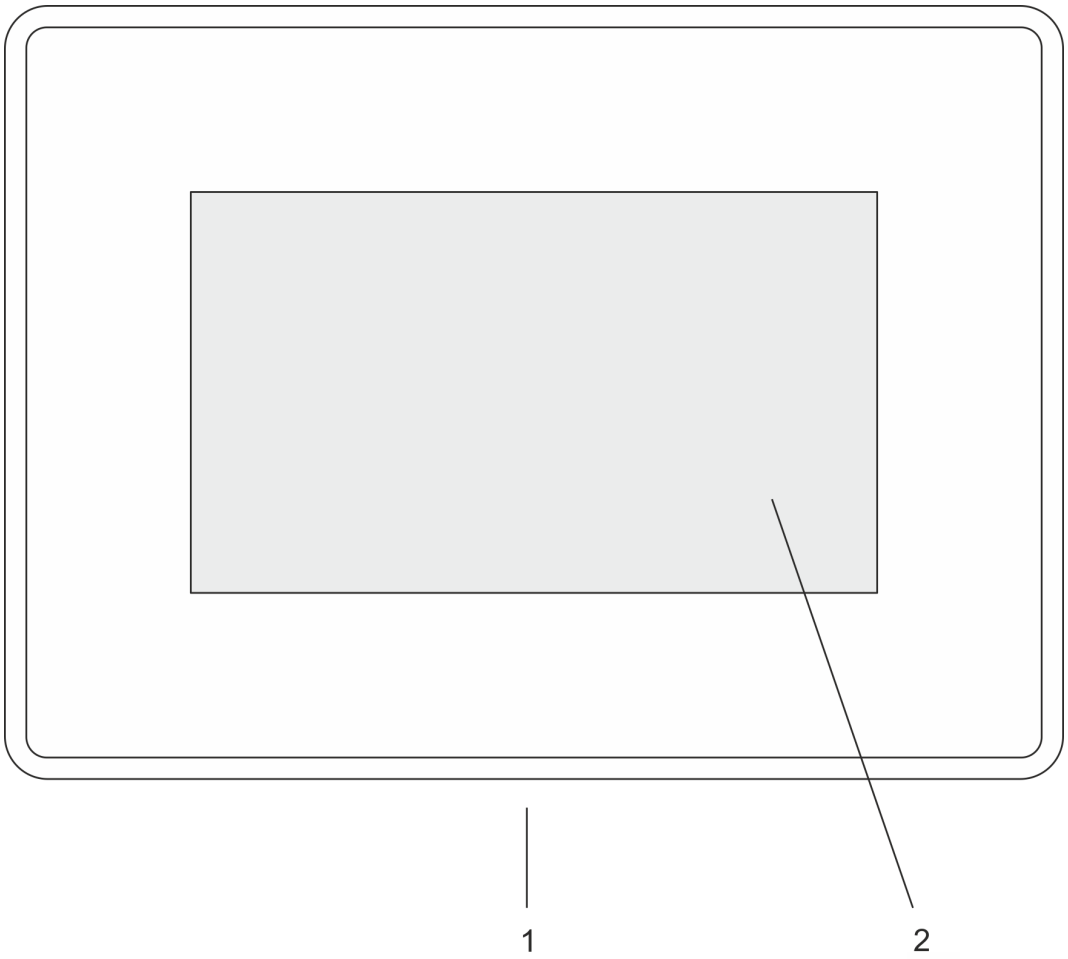
Order data

Type	Order number	Description
TP 304-SM	H41-71A41-0	4.3" TFT color, RS232/RS422/RS485, USB-A, Ethernet RJ45

2.3 Structure

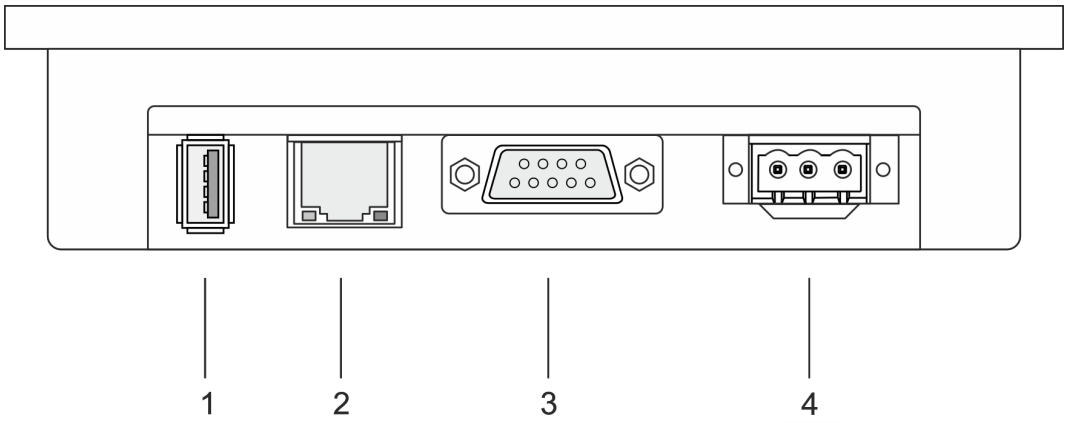
2.3.1 Overview

Front view



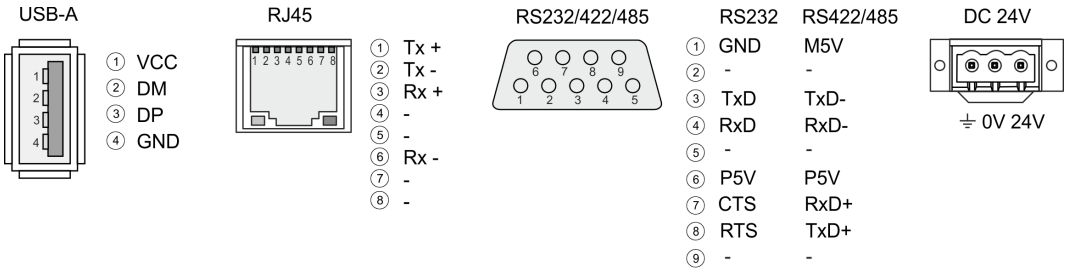
1 Interfaces
2 Display with touch sensitive area (Touch-Screen)

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.

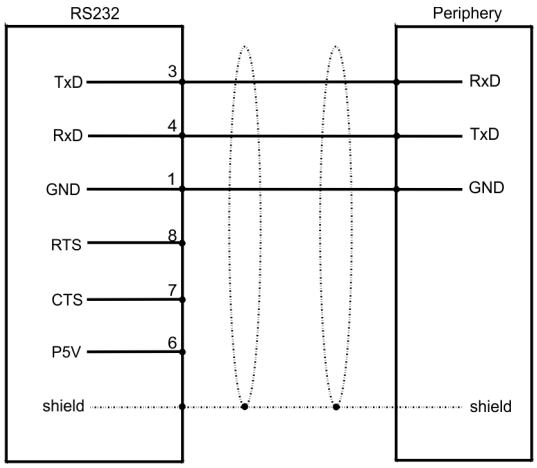
LEDs

green	yellow	Description
on	off	no link
blinks	on	100Mbit/s link
blinks	off	10Mbit/s link

RS232 interface

9 pin SubD plug

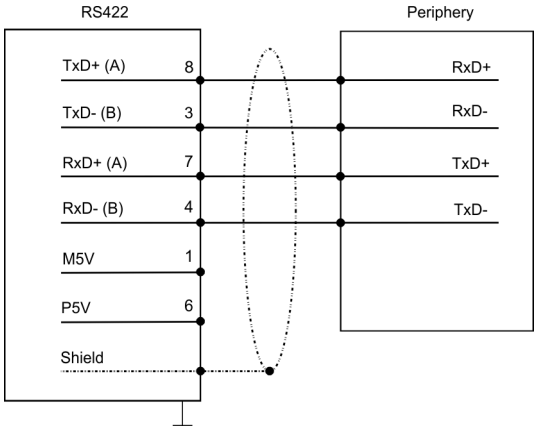
- Interface is compatible to the COM interface of a PC
- Logical signals as voltage levels
- Point-to-point links with serial full-duplex transfer in two-wire technology up to 15m distance
- Data transfer rate up to 115.2kbit/s



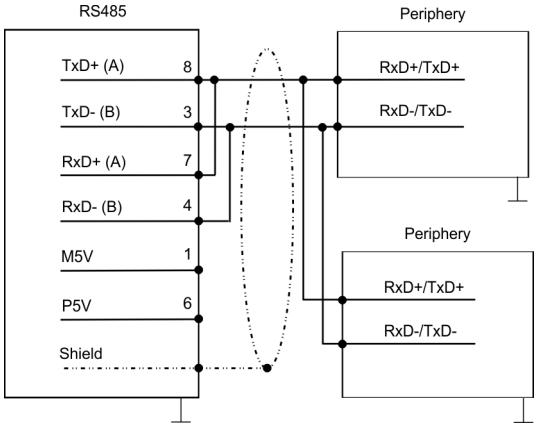
RS422/485 interface

9 pin SubD jack

- 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



- Serial bus connection in 2-wire technology using half duplex mode



Power supply

The smartPanel 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' page 17*.

2.3.3 Memory management

Overview

The following memory systems are available for the smartPanel:

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

Work memory (RAM)

Every Touch Panel has a work memory with a size of 512MB. The work memory is not buffered and is deleted after shut down. Please regard that also registry entries are stored in the work memory that are set back to default settings after the next re-boot.

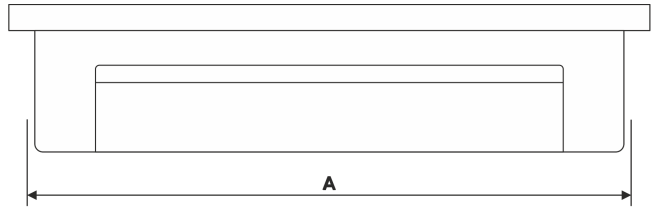
User memory (Flash)

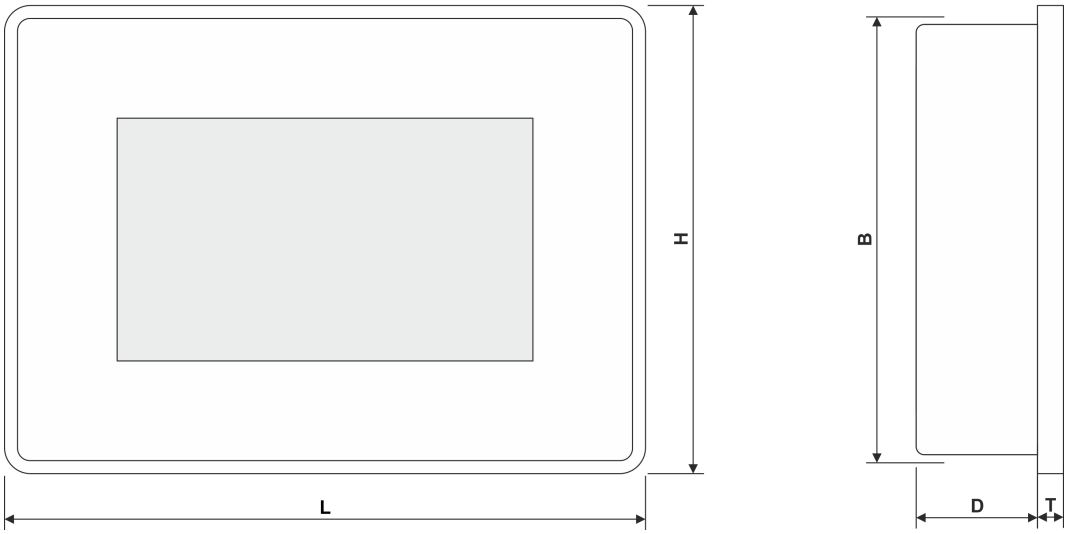
As internal permanent storage medium every smartPanel has a flash disk with a size of 4GB. 2GB of this is available to the user. After the start of Windows® this memory is listed as *Flashdisk* under *My Device*.

USB storage media (USB 2.0)

The connection of USB sticks and USB drives by use of the "Host"-USB-A interface is supported by the smartPanel. After connection the storage media is listed as *USB Hard Disk* under *My Device*.

2.4 Dimensions





Installation dimensions

Front panel (L x H)	147 x 107 mm
Depth (D+T)	26 + 5 mm
Installation cutting (A x B)	136 x 96 mm

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		
Conformity		
CE	2014/30/EU	EMC directive
Approval		
UL		Refer to Technical data
others		
RoHS	2011/65/EU	Restriction of the use of certain hazardous substances in electrical and electronic equipment

Protection of persons and device protection		
Type of protection	-	Rear: IP20; Front: IP66, NEMA Type 2 and Type 4x
Electrical isolation		
to the field bus	-	electrically isolated
to the process level	-	electrically isolated
Insulation resistance		-
Insulation voltage to reference earth		
Inputs / outputs	-	AC / DC 50V, test voltage AC 500V
Protective measures	-	against short circuit

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

Mounting conditions		
Mounting place	-	In the control cabinet
Mounting position	-	Horizontal and vertical

EMC	Standard		Comment
Emitted interference	EN 61000-6-4		Class A (Industrial area)
Noise immunity zone B	EN 61000-6-2		Industrial area
		EN 61000-4-2	ESD 8kV at air discharge (degree of severity 3), 4kV at contact discharge (degree of severity 2)
		EN 61000-4-3	HF field immunity (casing) 80MHz … 1000MHz, 10V/m, 80% AM (1kHz) 1.4GHz ... 2.0GHz, 3V/m, 80% AM (1kHz) 2GHz ... 2.7GHz, 1V/m, 80% AM (1kHz)
		EN 61000-4-6	HF conducted 150kHz … 80MHz, 10V, 80% AM (1kHz)
		EN 61000-4-4	Burst, degree of severity 3
		EN 61000-4-5	Surge, degree of severity 3 *

*) Due to the high-energetic single pulses with Surge an appropriate external protective circuit with lightning protection elements like conductors for lightning and overvoltage is necessary.

2.6 Technical data

Order no.	H41-71A41-0
Type	smartPanel TP304-SM
Display	
Display size (diagonal)	4.3 "
Display size (width)	95 mm
Display size (height)	54 mm
Resolution	272 x 480 / 480 x 272
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	Windows embedded Compact 7
User software	Movicon 11 CE Standard
Work memory	512 MB
User memory	4 GB
Available memory (user data)	2 GB
SD/MMC Slot	-
CF Card Slot Typ II	-

Order no.	H41-71A41-0
CFast Slot	-
Time	
Real-time clock buffered	✓
Clock buffered period (min.)	2 w
Type of buffering	Goldcap
Load time for 50% buffering period	5 h
Load time for 100% buffering period	10 h
Accuracy (max. deviation per day)	8 s
Operating controls	
Touchscreen	resistive
Touch function	Single Touch
Keyboard	external via USB
Mouse	external via USB
Interfaces	
MPI, PROFIBUS-DP	-
MPI, PROFIBUS-DP connector	-
Serial, COM1	RS232 / RS422 / RS485
COM1 connector	Sub-D, 9-pin, male
Serial, COM2	-
COM2 connector	-
Number of USB-A interfaces	1
USB-A connector	USB-A (host)
Number of USB-B interfaces	-
USB-B connector	-
Number of ethernet interfaces	1
Ethernet	Ethernet 10/100 MBit
Ethernet connector	RJ45
Integrated ethernet switch	-
Video connectors	-
Audio connections	-
Technical data power supply	
Power supply (rated value)	DC 24 V
Power supply (permitted range)	18 - 32 VDC
Reverse polarity protection	✓
Current consumption (no-load operation)	0.1 A
Current consumption (rated value)	0.25 A

Order no.	H41-71A41-0
Inrush current	38 A
I²t	0.33 A²s
Power loss	6 W
Status information, alarms, diagnostics	
Supply voltage display	none
Mechanical data	
Housing / Protection class	
Material	PC + ABS
Mounting	mounting clips
Protection class IP front side	IP 66
Protection class IP back side	IP 20
Protection class NEMA front side	Type 2, 4X
Protection class NEMA back side	-
Dimensions	
Front panel	147 mm x 107 mm x 5 mm
Rear panel	133 mm x 93 mm x 29 mm
Installation cut-out	
Width	136 mm
Height	96 mm
Minimum	1.5 mm
Maximum front panel thickness	6 mm
Net weight	291 g
Weight including accessories	422 g
Gross weight	658 g
Environmental conditions	
Operating temperature	0 °C to 50 °C
Storage temperature	-20 °C to 70 °C
Certifications	
UL certification	yes
KC certification	-

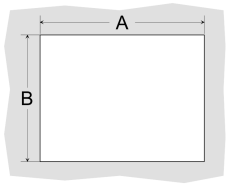
3 Deployment

3.1 Installation

Overview

The smartPanel is suitable for the installation in operating tables and control cabinet fronts. The installation happens via the backside. The smartPanel 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



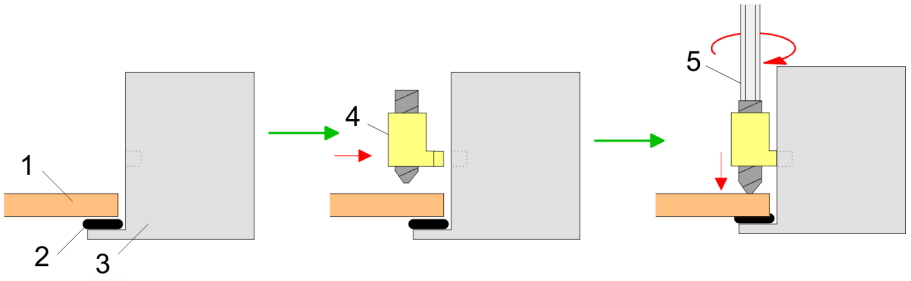
For the installation into a operating tableau and control cabinet fronts, the smartPanel requires the following front plate cutting:

smartPanel	A x B in mm
H41-71A41-0	136 x 96 mm

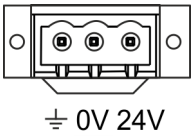
Installation

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

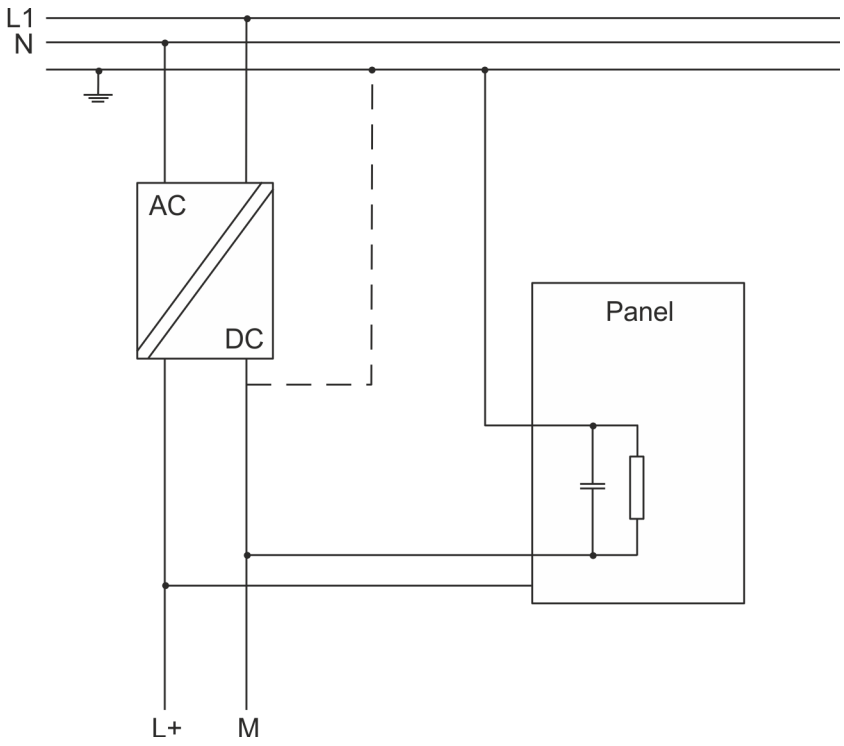
1. Push the smartPanel [3] from the front side into the front panel cutting [1] until it touches the panel with the seal [2].
2. Put the mounting clips [4] on all four sides of the smartPanel into the openings. The screws should point in the direction of the front panel.
3. Screw the screws from the 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 smartPanel.
- The smartPanel must always be grounded to earth. Grounding helps limit the effects of noise due to electromagnetic interference.
- Use the power supply terminal marked with ⏚ 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 smartPanel 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 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*.

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

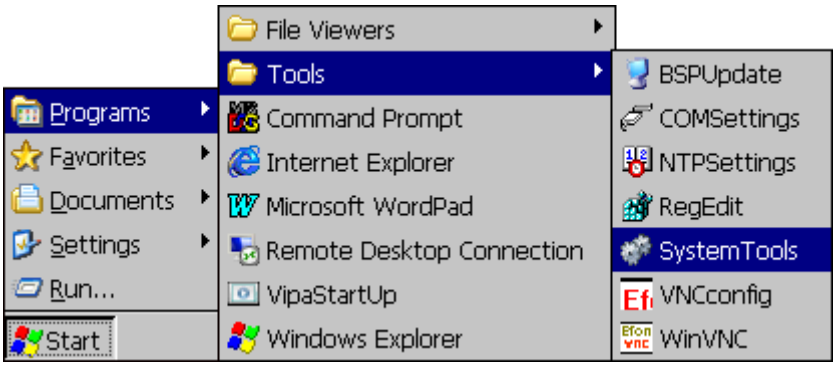
Please regard that the version of the update firmware has to be different from the existing firmware otherwise no update is executed.

Load firmware on USB stick

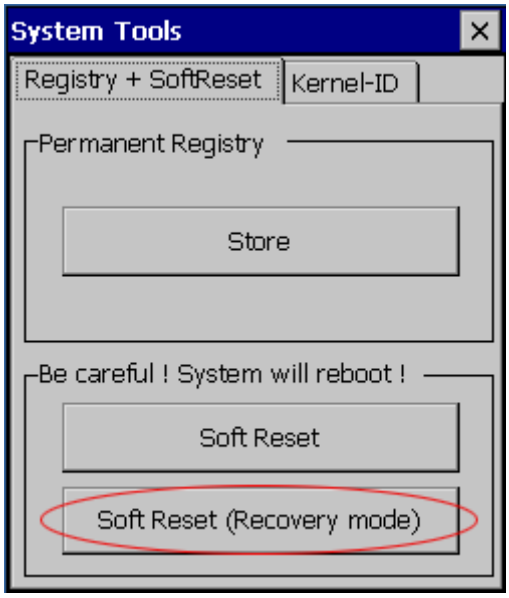
1. Go to *www.vipa.com*.
2. Click on *'Service / Support ➔ Downloads ➔ Firmware'*.
3. Via *'HMI'* navigate to your smartPanel, download the ZIP file for the update process and unzip the content in the root directory of the USB stick.

Prepare the smartPanel

1. Connect the smartPanel to the power supply.
   ⇨ The smartPanel starts with the *Startup-Manager*.
2. There is a button on the *initial screen* with a counter, which counts backwards. If you click on [Main] within this time, you will get to the *selection menu*.
   ⇨ You are now on the Windows® screen.
3. Open "System Tools" via *'Start ➔ Programs ➔ Tools'*.

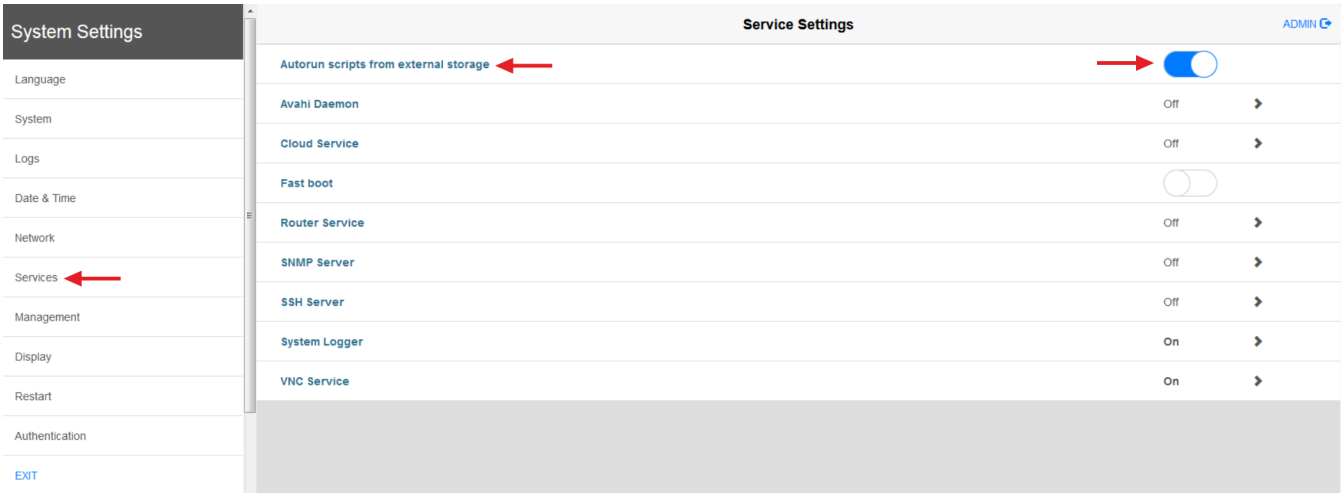


4. Click on [Soft Reset (Recovery mode)].



⇨ The smartPanel reboots. The "System Settings" interface opens.

5. Activate *'Autorun scripts from external storage'* under *'Services'* by moving the button to the right.



Transfer firmware from USB stick into smartPanel

1. Insert the prepared USB stick into the USB port of the smartPanel.

⇨ The update process starts automatically and can take several minutes.

After successful update the message "Process completed successfully" appears.

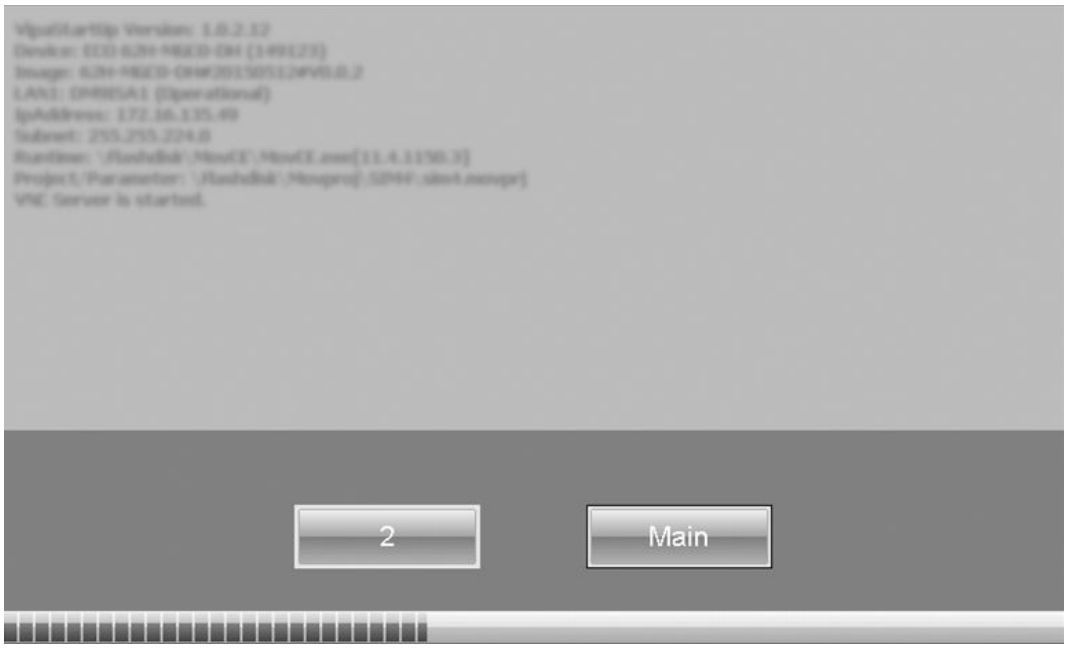
A log file "lastupdate.log" is generated and saved in the root directory of the USB stick.

2. Remove the USB-Stick and reboot the smartPanel.

3.2.2 Startup-Manager

Start screen

As soon as the smartPanel is provided by power supply, the *Startup-Manager* will be loaded. At the first startup of the *Startup-Manager* the following *start screen* appears.



- There is a button on the *initial screen* with a counter, which counts backwards. If you click on this button within this time, the project will start. If the time expires, the project will start automatically. With the button *'Main'* you get to the *'selection menu'*.
- A delay time of 5 seconds is default. In the *selection menu* under "Autostart" you can adjust this time.

Selection menu

There are following buttons in the *selection menu*:

- Settings
- Info/Update
- Autostart
- Backup
- Exit
- Back

Settings

- In [Settings] under *Change Settings* you can set a password for the Startup-Manager. The password will be requested when interrupting the start countdown or before closing the Startup-Managers by "Exit". By default, no password is defined.
- In *Control Panel* [Open...] the system settings like brightness of the display can be preset or the display can be re-calibrated. Further you get here the smartPanel information: product number, serial number and licenses.

Info/Update

- With [Create Screenshot] you can make a screen shot of the panel information and select a destination for its storage.

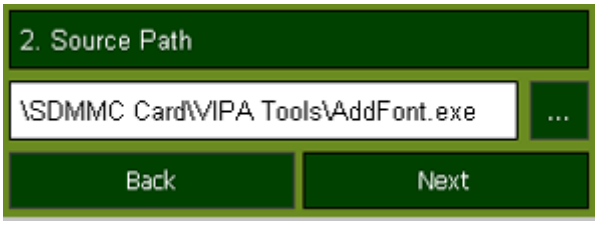
Autostart

With [Autostart] you define which runtime and which project will be started automatically together with the smartPanel startup.

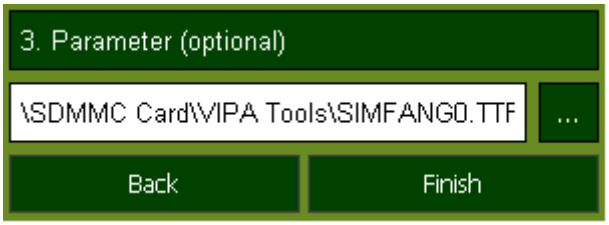
- With [...] under "Runtime path" res. "Project path" all existing runtimes res. projects on the smartPanel and the storage media are listed.
- Under "Delay Time" you can adjust a delay time > 0 by using the buttons [+] and [-]. 5 seconds are default.
- Via "Rotation" the orientation of the panel can be changed.

Via "Program start" with [+] you can add programmes, which have to start automatically.

1. Select "start" and assign a name for the program.



2. Upload your program with [...].



3. You can optionally set parameters.
4. Exit with [Finish].

- With "Copy" [...] you can copy Windows® files on the smartPanel from a source path to a destination path.
- With "Autostart" you can select the automatic startup of the VNC server, the Movicon-TCP upload server resp. the *Startup-Manager*. With [Back] you get back to the *select menu*.

Backup

By default, the configuration of the *Startup-Manager*, the registry settings for the back-light, the local settings and the LAN settings will be saved by [Backup] in *'Flashdisk ➔ Backup'*. The name of the backup file is "backup.bkv". Which settings will be saved and the storage location are defined in the file "ToDoList.xml" under *'Flashdisk ➔ VipaStartup'*. These can be adjusted accordingly.

Exit

The *Startup-Manager* will be closed by [Exit] and the system returns to the Windows® screen.

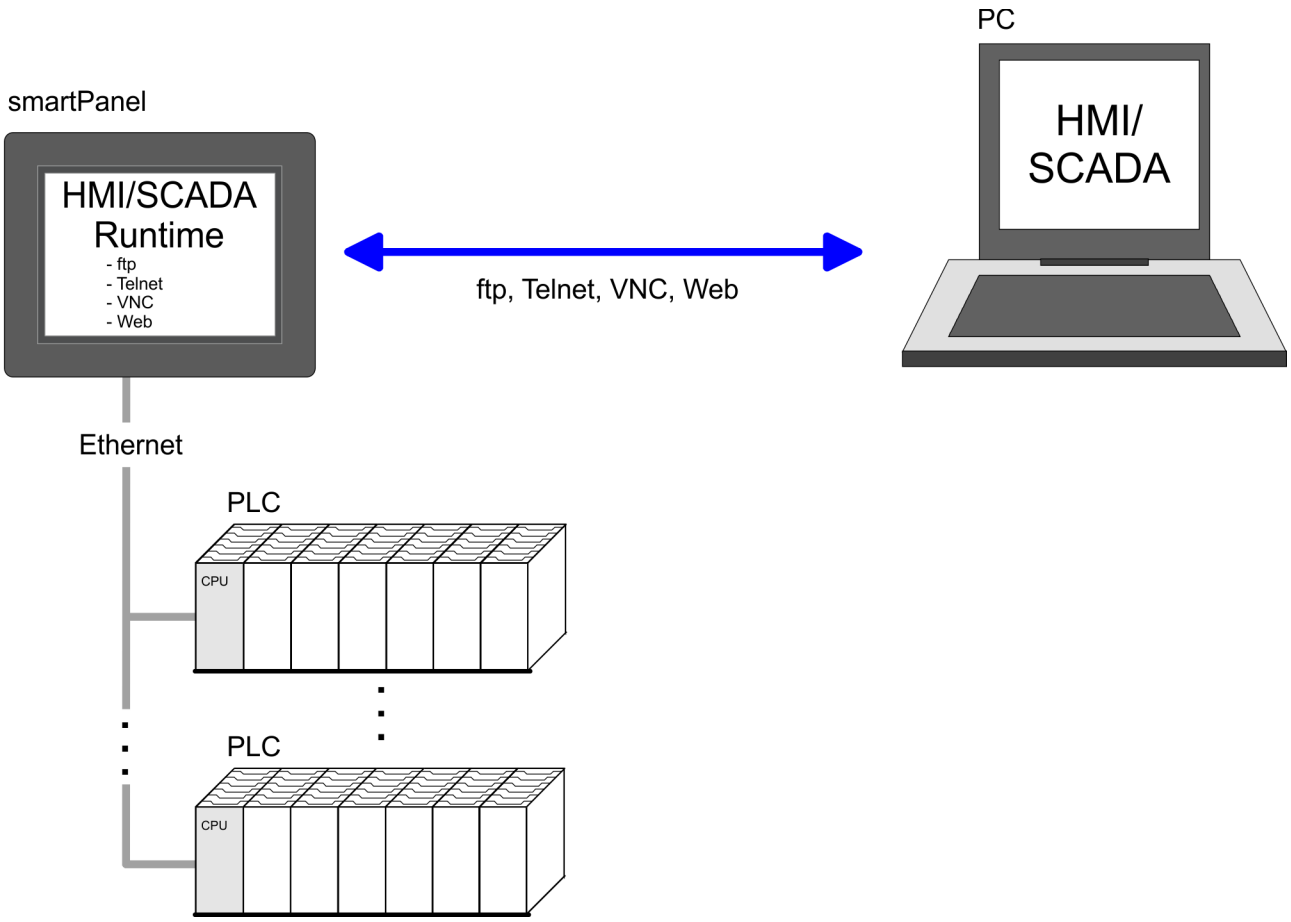
Back

With [Back] you get back to the start screen of the *Startup-Manager*.

3.3 Connection to a PLC system

Overview

- For the inclusion into your PLC system several HMI/SCADA project-engineering platforms are at your disposal that has to be installed at an external PC. Here you may create your project, where appropriate simulate it and transfer it to the smartPanel via a connection that you've entered before. Via the at the smartPanel pre-installed runtime version of the HMI/SCADA project engineering platforms your project is run able.
- By using the according communication driver, the smartPanel supports connecting options to the PLC via field bus and Ethernet.
- 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.



3.4 Operating system Windows Embedded Compact 7

3.4.1 General

Features

- File viewer for Word, Excel, PowerPoint and PDF
- ftp, Telnet, VNC and Web server
- RDP (Remote Desktop Protocol)
- Internet Explorer
- Registry Editor
- WordPad
- USB keyboard driver
- Startup-Manager

Differences to the standard Windows® operation

Please regard that for the deployment of WEC7 a thorough knowledge of operating Windows® are assumed. Here are only shown the differences to a "standard" Windows® operating system.

Pen entry

You're operating the smartPanel by means of a pencil for capacitive touch screen res. with the finger. The following types of entry are differentiated:

- *Double click*
  A double click has to be executed like mouse operation by touching the area on the screen twice. A double click on an object opens res. executes this.
- *Drag*
  By tapping on an object and then dragging you can move the object on the screen. If no object is selected, a frame is created by the dragging that selects the touched objects.

Navigation within the dialog window

The windows can be moved via the head bar. Here you can also find the *[OK]* button to confirm entries and the *[X]* button for exiting the dialog.

Exit WEC7 (shut down)

You can not exit WEC7. By switching the power supply off and on again you can restart WEC7. Before a reboot you should always save your data res. close all running applications to avoid data loss.

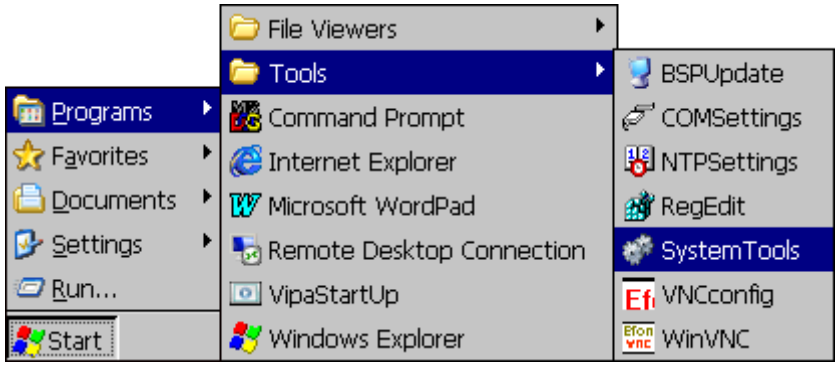
Manual storage

For manual storage please use the "Store" tool via *'Start ➔ Programs ➔ Tools ➔ System Tools'* [Store].

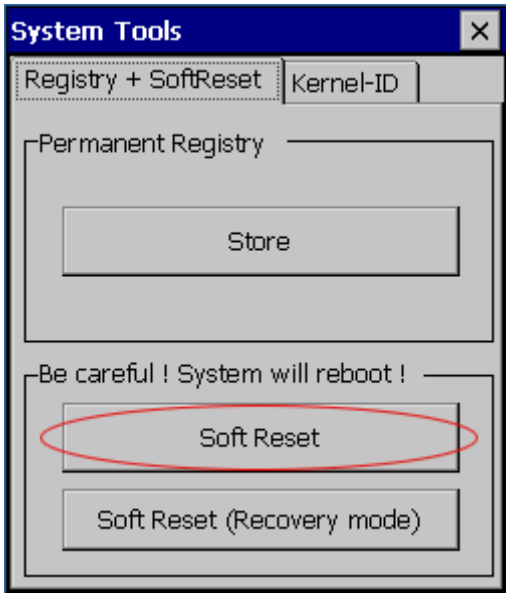
Soft reset

To reboot the operating system (soft reset) please use the "Soft-Reset" tool.

1. Open "System Tools" via *'Start ➔ Programs ➔ Tools'*.



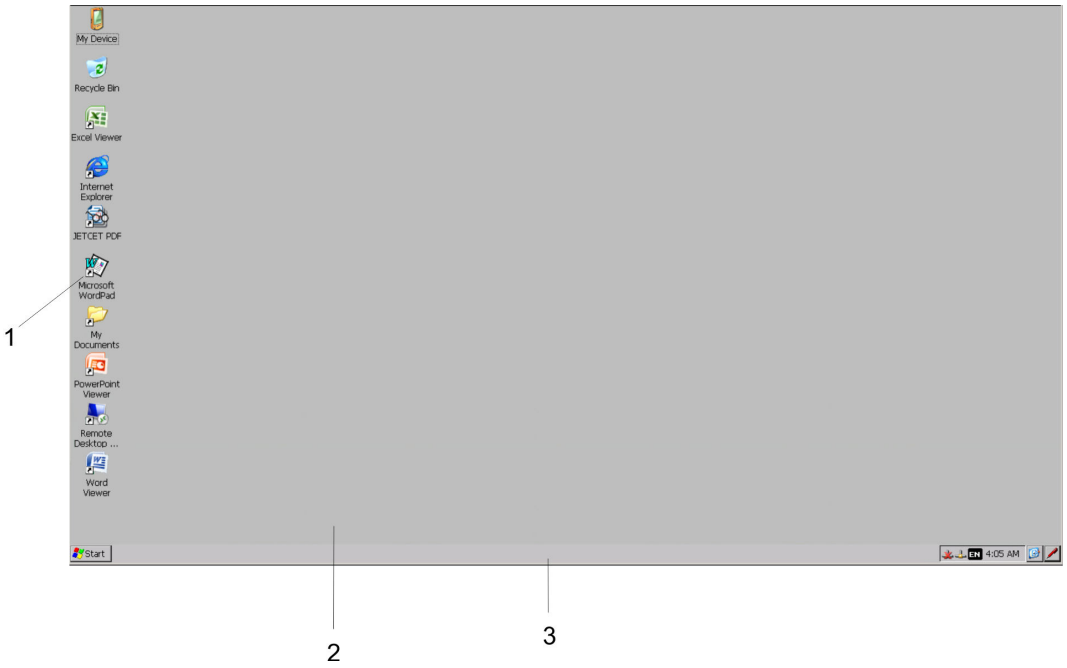
2. Click on [Soft Reset].



⇨ The smartPanel reboots.

Please use the "Store" tool via 'Start ➔ Programs ➔ Tools ➔ System Tools' [Store] for manual storage.

3.4.2 Structure



1	*Icon*	Via icons on the desktop you gain direct access to the application related to the icon.
2	*Desktop*	The desktop is the screen that is shown after login to Windows ®. It contains e.g. links to the mostly used applications res. system components.
3	*Task bar*	The task bar is part of the desktop. When opening an application, a document or a window, every running object is displayed as button on the task bar. Via this buttons you can easily change between the open windows.

Task bar

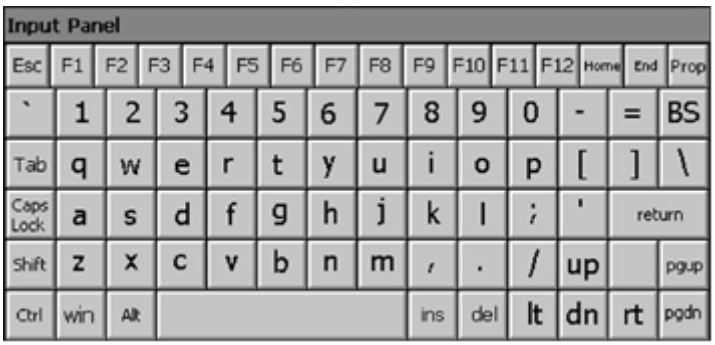
Basically the taskbar has the following structure:

1	*Start button*	This button offers you access to all components of your smartPanel such as applications, system settings, file browser etc.
2	*Open applications*	For every open application a button can be found in the task bar. There is no button for minimizing. The switch between the applications is performed via this buttons.
3	*Network connection*	As soon as your smartPanel is connected via Ethernet you can see here the Ethernet address. If there is no connection via Ethernet, the symbol is displayed crossed out.
4	*Keyboard layout*	If you've connected a keyboard you can choose the requested language layout via this button.
5	*Time*	This area shows the time that you can change via double click.
6	*Show desktop*	All windows are minimized and the desktop is shown.
7	*Software keyboard*	This button displays a keyboard at the screen. "Hide Input Panel" hides the keyboard again.

Software keyboard

The button allows you to select one of the available software keyboards. At the moment the following standard keyboards are implemented:

Large Keyboard



At pushed Shift key:

Home	Position 1
End	End
BS	Backspace
up	↑
dn	↓
lt	←
rt	→
pgup	Page↑
pgdn	Page ↓
ins	Insert
del	Delete
Tab	Tabulator
Shift	
Caps/Lock	

Hide keyboard

The software keyboard allows you to enter key entries without connecting an external keyboard. As soon as an entry is required the software keyboard is automatically shown. *Hide Input Panel* hides the keyboard again.

System setting (Control Panel)

As many components of the *Control Panel* conform with the *System Control* of Windows®, most of the description is not necessary. The description of the control panel components relevant for operating the smartPanel can be found in the following:

- *Set Display*
  Via *'Start ➔ Settings ➔ Control Panel ➔ Display'* the dialog windows for the display properties opens. Here you can change the settings for the monitor options.
- *Set Ethernet Parameters*
  The dialog field for pre-setting an Ethernet address can be found in *'Start ➔ Settings ➔ Network and Dial-up Connections'*. The default setting is address assignment via DHCP.
- *System Properties (System)*
  Via *'Start ➔ Settings ➔ Control Panel ➔ System'* you receive information about the version of the current Windows® operating system, the memory load and sharing (alterations here are not accepted into the registry) and the copyright. The register *'Device Name'* allows you to change the device name that is shown during Ethernet communication for instance.

Please use the "Store" tool via 'Start ➔ Programs ➔ Tools ➔ System Tools' [Store] for manual storage.

3.5 Integrated server

3.5.1 General

Login data

The smartPanel has several integrated server that enable a remote maintenance within a network. Some servers only allow access by means of entering *User name* and *Password*. The following login data are used standardly:

User name: **wince**

Password:**vipatp**

Overview

Per default the following server are integrated:

- ftp server (activated)
- Telnet (activated)
- VNC (not activated)
- Web server (activated)

Phrases

Phrases that are used in the description of the server:

Client

A client is an application that uses the service of a server within a network. For example, a web browser is a client because at every call of a website it sends a request to a web server and receives an answer.

Server

A server is an application that waits for the contact request of a client application and exchanges messages with it after contact start. This communication type is called Client-Server communication.

Host

Computer within a network where at least one server is running.

Download

Data transfer Server → Client

Upload

Data transfer Client → Server

3.5.2 ftp server

By means of a ftp server data between client and server can be exchanged. Here you can copy, delete or create files and directories.

Conditions for ftp access

Depending on the ftp client your PC must have the following conditions for a ftp connection. If there are still problems with the ftp access please ask your system administrator.

Internet Explorer

- ftp access possible with version 5.5 or higher
- activate directory view for ftp sites

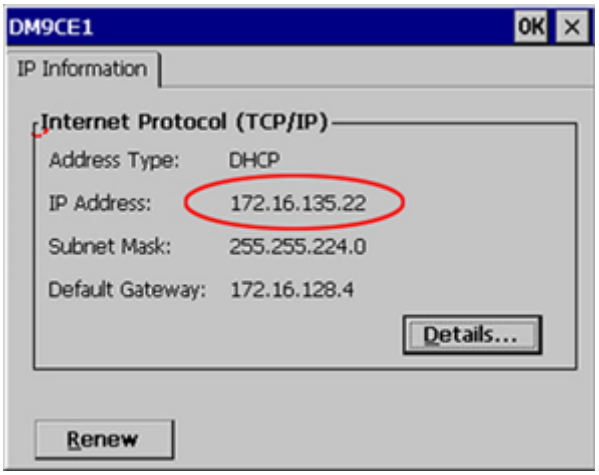
For the adjustment choose in the Internet Explorer *'Options ➔ Internet options'*, register "extended" in the area "Browsing" and set the following settings:

1. activate: "activate directory view for ftp sites"
2. Restart the Internet Explorer.
   ⇨ The settings are saved.

Establishing a ftp connection

Below is explained, how to establish of a ftp connection between a Windows® based PC with Windows Explorer as ftp client and your smartPanel.

1. Connect your smartPanel with the network where your PC is a member via an Ethernet cable.
2. Switch on your smartPanel.
3. As soon as your smartPanel is connected via Ethernet, you can monitor the IP address data via in the taskbar.



4. After you've confirmed the pre-settings, start your ftp client (e.g. Windows Explorer) and enter the following text into the "address bar":

   ```
   ftp://wince:vipatp@IP-Adresse
   ```

   ⇨ In the appearing explorer window you can execute the requested file operations.

3.5.3 Telnet server

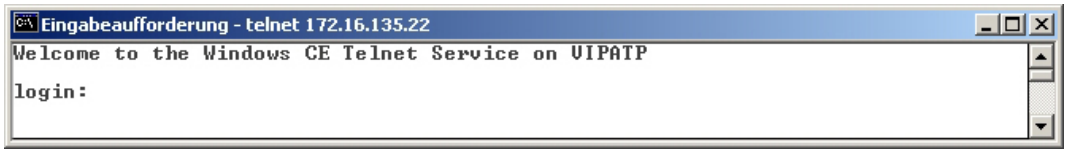
Telnet is a text based client-server protocol on TCP level. Using of a Telnet client like e.g. the "MS-DOS console" in your Windows® operating system you may execute text based all file remote functions at your smartPanel like copy, delete and create files and directories. You can also start applications. Terminating an application is not possible.

Establishing a Telnet connection

The establishing of a Telnet connection is password protected and has the following approach:

1. Start a Telnet client like for example "MS-DOS console" at your PC and enter the following into the address bar: `telnet IP address`.

   ⇨ When the connection is established, the smartPanel asks for the user name and the password.

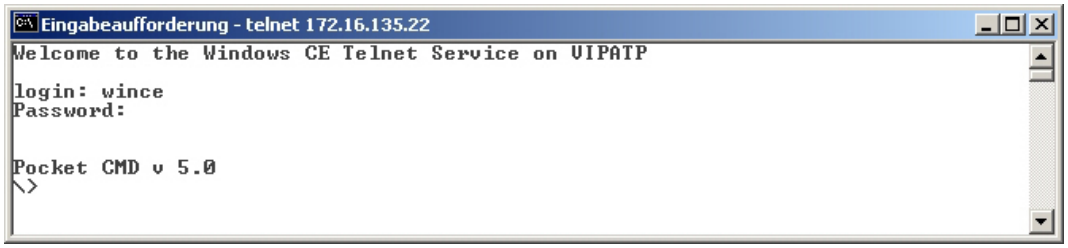


2. Enter the following:

   Login: **wince**

   Password: **vipatp** (entry is hidden)

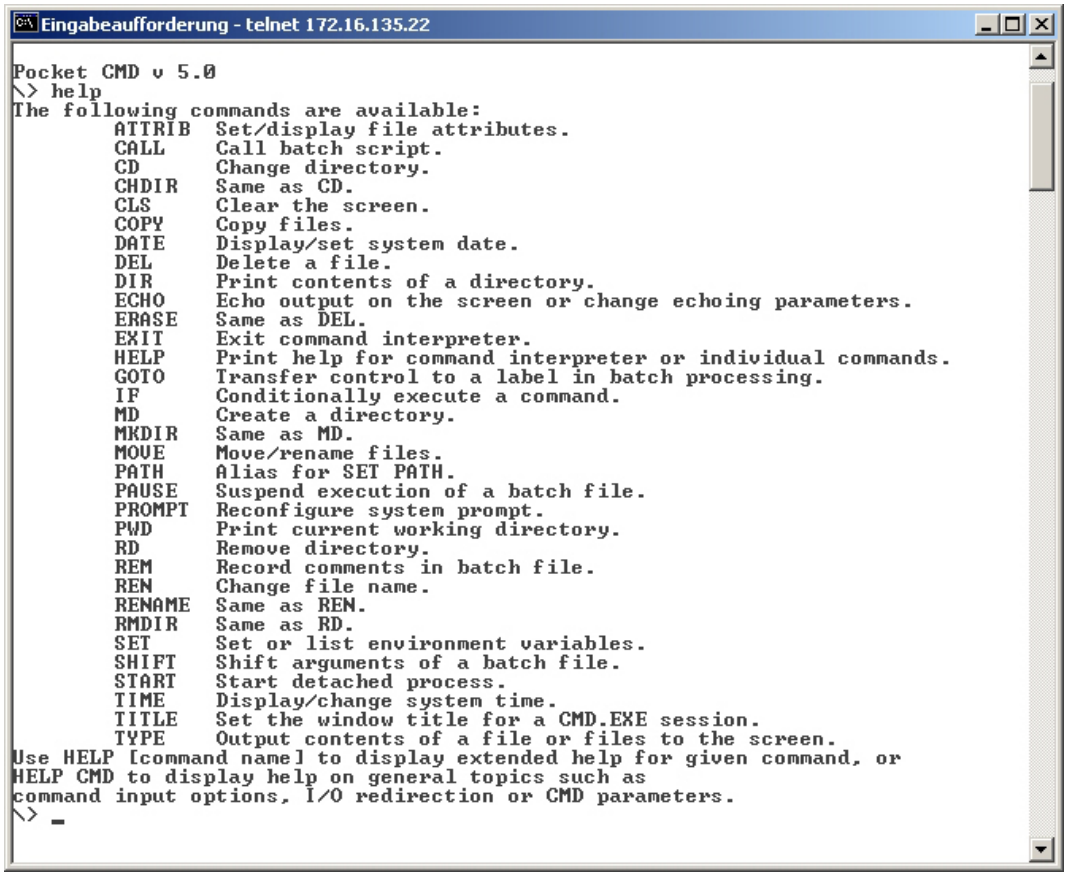
   ⇨ After entering valid user data a command line for entries appears:



By entering `Exit` res. closing the window you can terminate the Telnet connection at any time.

Commands

After establishment of a Telnet connection the smartPanel provides you with commands. A list of possible commands with a short description is available via the command help. By beginning with "help" before a command you receive help to this command.



3.5.4 VNC server

The smartPanel has an integrated VNC server (virtual network control) that allows the total control of the smartPanel with a PC via network. For this, a window displays the current smartPanel content for remote control. Operation is performed via PC keyboard and mouse. Condition for the VNC communication is, that the VNC server is started on the smartPanel and a VNC client on the PC. You can download a VNC client as freeware from internet.

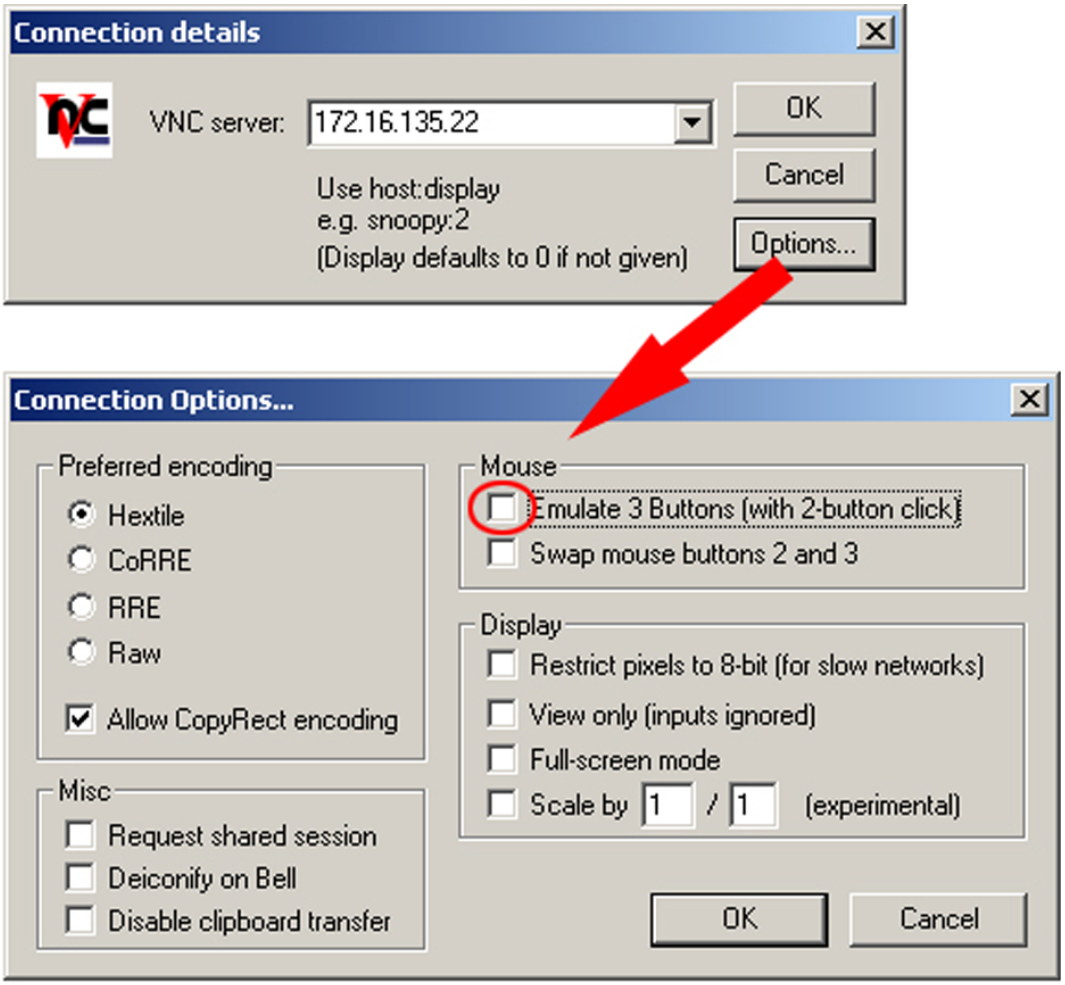
Because you can deactivate all safety attitudes with the VNC server, you should use these exclusively for start-up! For this reason the VNC server is on delivery deactivated.

Due to software reasons YASKAWA does not support the VNC server function!

Establishing a VNC connection

The VNC connection establishment has the following approach:

1. Start the VNC server via *'Start ➔ Programs ➔ Tools ➔ winvnc'* or activate the VNC server in the *Startup-Manager* under "Autostart".
   ⇨ To show the server has been started, the symbol `Efon vnc` appears in the task bar.
2. Now start the VNC client vncviewer.exe on your PC.



3. Click on [Options] and deactivate the field "Emulate 3 Buttons..." like shown at Mouse.
4. Enter the IP address of the smartPanel at VNC server. Click on [OK] and enter the password vipatp. You can change the password over the configuration file, for this execute vncconfig.exe. Now a VNC connection is established and the screen content of the smartPanel is monitored within a window.

Closing the VNC window terminates the VNC connection, the server keeps running.

3.5.5 Web server

The smartPanel has an integrated web server that allows depending on the access the administration of the smartPanel res. of websites in the smartPanel. The administrative access to the http server happens via Ethernet from the PC by setting the IP address of the smartPanel with attached "Admin" type.

Using the websites you may e.g. publish online documentations for a connected PC or go online with applications on the PC.

Web admin

As web admin you have access to all functions that are required for uploading and administrating of websites on the smartPanel. Additionally you may set the access rights for user and create user groups. More detailed information about creating and administrating of websites on the smartPanel are available in the online documentation of the web servers.

The login as web admin requires the following steps:

1. Start the web browser at your PC and enter the following into the address bar: `IP address/webadmin`
2. Enter the following into the authentification:
   - User name: **wince**
   - Password: **vipatp**

3.6 Access to the network resources

Overview

- The smartPanel allows you to access shared resources in a Microsoft network like drives and printer. Here you may assign existing public directories or printer in the network to local directories or printer in the smartPanel.
- Condition for this is that you are logged in to the network with your user name and password. The assignment of a network resource is performed in the smartPanel via the command console "Command Prompt". Start the command console with *'START ➔ Programs ➔ Command Prompt'*.
- The access to the network resource is performed with the commands *Net view* and *Net use*.

List released resources

- Shared resources of a network PC can be listed by the command: \> `net view PC-Name`
- For example `net view testserver` lists all shared resources of the network PC "test server". To test the physical connection a PING to the IP address of the network PC may be executed if there are problems while contacting the network PC.

```
\> net view testserver
Shared resources on  \\testserver:

Share name      Type     Used as       Comment
------------------------------------------------------------
Archiv          Disc     (null)        Process data
KyoEDV          Print    (null)        Kyocera FS-680 Printer
Command completed successfully
\>
```

Connect net drive

The connection of a local name at the smartPanel with a shared drive of the network PC happens with the following approach:

1. Enter the following in the command prompt: \> `net use local_name \\network drive /user:User name`
2. Enter *user name, password* and where app. *user group*.
   ⇨ After successful login the following message appears: *'Successfully mapped to network name'*.

   The connected network drive is then available on the smartPanel with the *local_name* via *My Device* at *Network*.

Example:

Local_Name: `data`, network drive: `testserver\archive`, Username:`guest`

Input: `\> net use data \\testserver\archiv /user:guest`

The connected network drive is then available via \network\data at the smartPanel.

Configure network printer

The configuration of a network printer happens with the following approach:

1. Enter this command into the command prompt: \> net use printer name network printer

   Example:

   Printer name: Printer, network printer: \\testserver\printer

   Entry: \> `net use printer \\testserver\printer`

2. Enter *user name*, *password* and if necessary *user group*.

   ⇨ After the successful login the following message appears

   `Successfully mapped to network printer`

   The printer may now be accessed as "network\printer".

Test print

For example you can print the content of the current directory using \> `dir > network \printer`.

List network connections

The listing command for all network connections of your smartPanel is \> `net use`

```
\> net use
Connected resources:

Status          Local Name            Remote Name
-------------------------------------------------------------------------------
Connected       data                  \\testserver\archiv
Connected       printer               \\testserver\printer
Command completed successfully
\>
```

Terminate network connections

You can terminate already assigned network resources via

\> `net use local_name /d`

Example: \> `net use data /d` deletes the network connection to the drive "archive" of "test server".

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 VIPA components 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

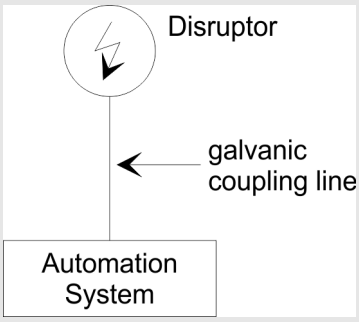
Depending on the spreading medium (lead bound or lead free) and the distance to the interference cause, interferences to your control occur by means of different coupling mechanisms.

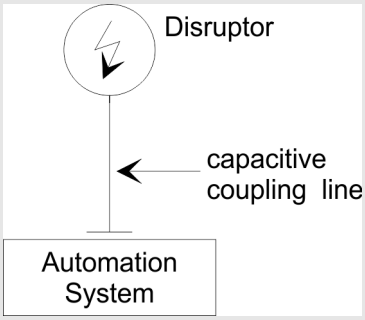
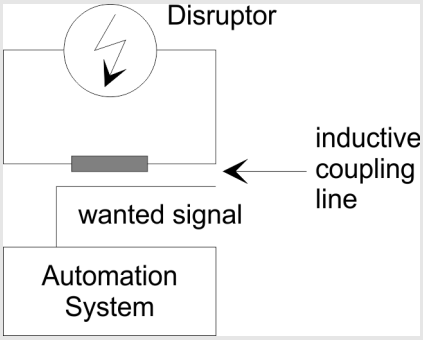
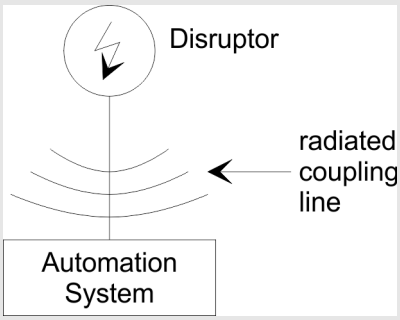
There are:

- 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.

Coupling mechanism	Cause	Typical source
Galvanic coupling 	Galvanic or metallic coupling always occurs, when two current circuits have a common line.	■ Pulsed devices (Net influence from transducers and foreign net devices) ■ Starting motors ■ Different potential of component cubicles with common current supply ■ Static discharges

Coupling mechanism	Cause	Typical source
Capacitate coupling 	Capacitate or electric coupling occurs between conductors with different potential. The coupling is proportionate to the temporal change of the voltage.	■ Interference through parallel signal lines ■ Static discharge of the personnel ■ Contactors
Inductive coupling 	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 	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:

	Group A	Group B	Group C	Group D
Group A	[1]	[2]	[3]	[4]
Group B	[2]	[1]	[3]	[4]
Group C	[3]	[3]	[1]	[4]
Group D	[4]	[4]	[4]	[1]

[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 YASKAWA Europe 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:
  - 16mm^2 Cu for equipotential bonding conductors up to 200m
  - 25mm^2 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.

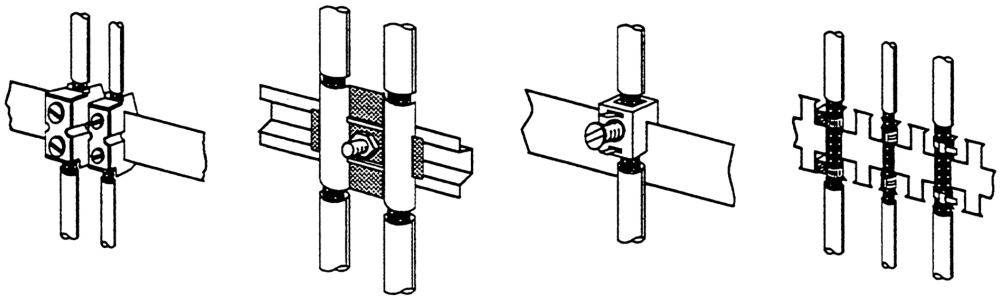
You should always use metallic or metallised covers for serial data lines. Connect the screen of the data line to the cover. Do **not** connect the screen to PIN 1 of the connector! In case of stationary operations it is recommended that the remove the insulation from the screened cable without cutting 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

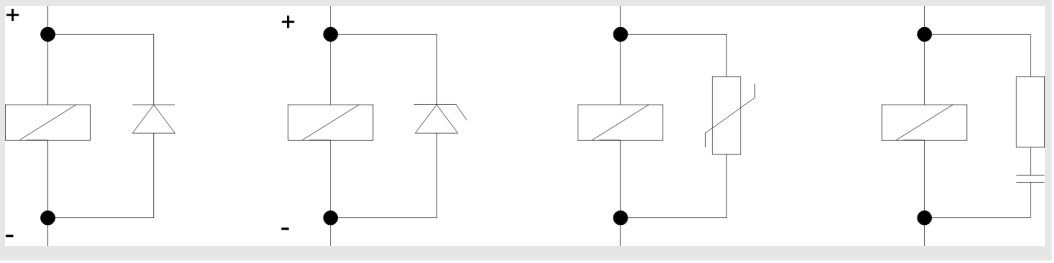
Inductors require snubber networks

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.

Connections of DC-activated inductors		Connections of AC-activated inductors	
using a diode	using a Z-diode	using a varistor	using RC-network



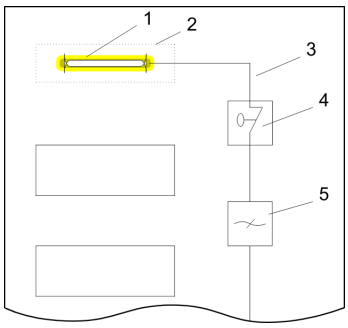
Power outlet for PGs

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

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

Appendix

Content

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A History of changes

Rev.	Changes
18-04	The manual was created.
18-35	■ The orientation of the panel via Autostart > Rotation was added to the description of the Startup-Manager. ■ The description *'Soft-Reset'* was expanded.
20-20	CI adjustment was done.
20-50	The description of the *'Control Panel'* under *'Settings'* was changed in the Startup Manager.