

VIPA HMI

Text Display | TD 03 | Manual

HB116E_TD03 | Rev. 15/04

January 2015

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VIPA, Gesellschaft für Visualisierung und Prozessautomatisierung mbH
Ohmstraße 4, D-91074 Herzogenaurach, Germany
Tel.: +49 (91 32) 744 -0
Fax.: +49 9132 744 1864
EMail: info@vipa.de
<http://www.vipa.com>

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VIPA GmbH, Ohmstraße 4, 91074 Herzogenaurach, Germany

Telefax: +49 9132 744 1204
EMail: documentation@vipa.de

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Contact your local VIPA Customer Service Organization representative if you encounter problems with the product or have questions regarding the product. If you are unable to locate a customer service center, contact VIPA as follows:

VIPA GmbH, Ohmstraße 4, 91074 Herzogenaurach, Germany

Telephone: +49 9132 744 1150 (Hotline)
EMail: support@vipa.de

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About this Manual

This manual describes the structure, project engineering and the handling of the Text Display TD 03 from VIPA.

Overview

Chapter 1: Hardware description

In this chapter the hardware components of the TD 03 are described. Besides of a description of the single components, the dimensions that are required for the installation may also be found. The chapter closes with the technical data.

Please consider the safety hints at the beginning of the chapter.

Chapter 2: Deployment of the TD 03

This chapter explains the deployment and the project engineering of the text display TD 03.

After the fast introduction there are information about the installation and the configuration by the TD Wizard. This is followed by the description of commissioning and operation of the TD 03.

The chapter closes with a description of the firmware update.

Chapter 3: Installation guidelines

The chapter gives you information about the interference-free installation of Programmable Logic Controls (PLC) together with a TD 03.

Here we describe possible paths how interference can enter the controller, how you ensure the electromagnetic compatibility (EMC) and how to approach shielding and screening issues.

Objective and contents

This manual describes the Text Display from VIPA. The manual consists of chapters. Every chapter provides the description of one specific topic. It describes the installation, project engineering, usage and the technical data.

This manual is relevant for:

Product	Order number	ab Stand:	
		HW	FW
TD 03	VIPA 603-1TD03	03	1.0.5

Guide to the document

This manual provides the following guides:

- An overall table of contents at the beginning of the manual
- An overview of the topics for every chapter

Availability

The manual is available in:

- printed form, on paper
- in electronic form as PDF-file (Adobe Acrobat Reader)

Description conventions

- [Button]** Buttons are put in brackets e.g. [NEXT] or [OK].
- [Key]** Key entry are put in brackets e.g. [STRG]+[A].
- Display output** Display outputs are illustrated as Courier e.g. `\flashdisk>`
- Keyboard entry** Keyboard entries are illustrated as **Courier bold** e.g. `\flashdisk> Dir`
- Terms** Menus, Display elements, terms are *italics*.

Icons Headings

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



Danger!
 Immediate or likely danger.
 Personal injury is possible.



Attention!
 Damages to property is likely if these warnings are not heeded.



Note!
 Supplementary information and useful tips.

Safety information

Applications conforming with specifications

The Text Displays are constructed and manufactured for:

- VIPA CPUs 11x, 21x, 31x, 51x and S7-300/400 from Siemens
- communication and process control
- general control and automation applications
- 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



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

- Modification to the process control system should only be carried out when the system has been disconnected from power!
- Installation and 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!

Chapter 1 Hardware description

Overview

In this chapter the hardware components of the TD 03 are described. Besides of a description of the single components, the dimensions that are required for the installation may also be found. The chapter closes with the technical data.

Please consider the safety hints at the beginning of the chapter.

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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 may 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.



Attention!

- If your panel is to be supplied externally, you have to make sure that the communication cable does not have any power allocation. Otherwise the connected devices could be damaged.
- Before commissioning, the device has to be brought in environment temperature.
- With condensation you may only switch on the device after complete dryness.
- To prevent overheat during operation avoid direct sun contact of the device.
- After opening of the control cabinet or panel, parts of the system are available that may lead dangerous voltage.
- All signal connections require screened cables.
- Signal cores may not be lead within a cable shaft of high-voltage cores.
- Please take care for sufficient ground of the operating device. For this a ground screw is to be found at the backside of the device.

Shipping of electrostatic sensitive modules

Modules have to 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.

**Attention!**

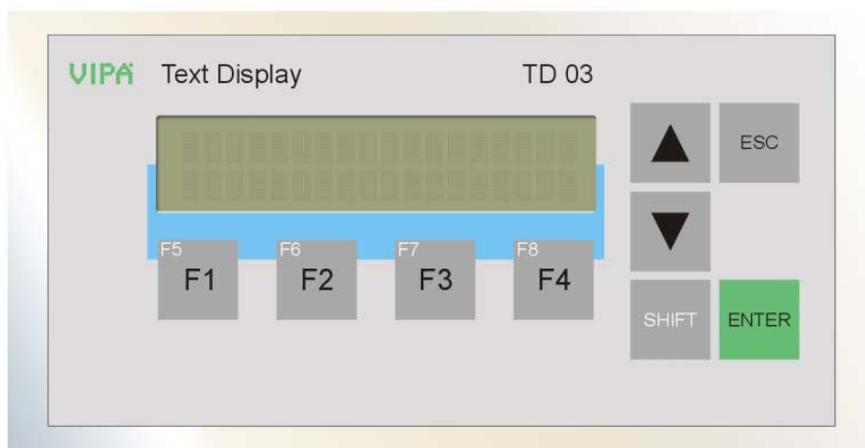
Personnel and instruments should be grounded when working on electrostatic sensitive modules.

Properties

General

The here shown operating device allows you to visualize and alter operating states and recent process values of a connected PLC. For the entry of values and navigation, the operating device is provided with an integrated keyboard and a 2x20 character display. The link-up to your PLC happens via MPI.

The project engineering happens in the projecting tool TD Wizard from VIPA. TD Wizard creates a data block containing your presetting that may be accessed by the CPU at need after the connection of the TD 03.



TD 03

603-1TD00

- Die-cast aluminum case
- Protection type: front side IP65, back side IP20
- Display with 2 x 20 characters
- Project engineering via TD-Wizard from VIPA
- MP²I interface for CPU link-up and firmware update
- Visualization of the connected CPU via MPI
- Menus and input requests in German and English language
- Read and alter process values
- Monitoring of messages
- Easy installation via non-losable rocker arms

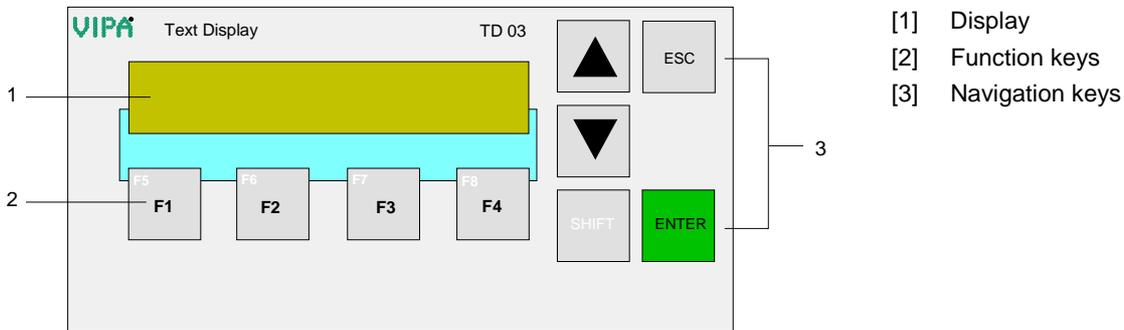
Order data

Type	Order number	Description
TD 03	VIPA 603-1TD00	2x20 characters, MP ² I, language: DE, EN
MPI cable	VIPA 670-0KB00	OP/AG cable 0°/90° with PU-/Diagnostic port, 2.5m

Structure

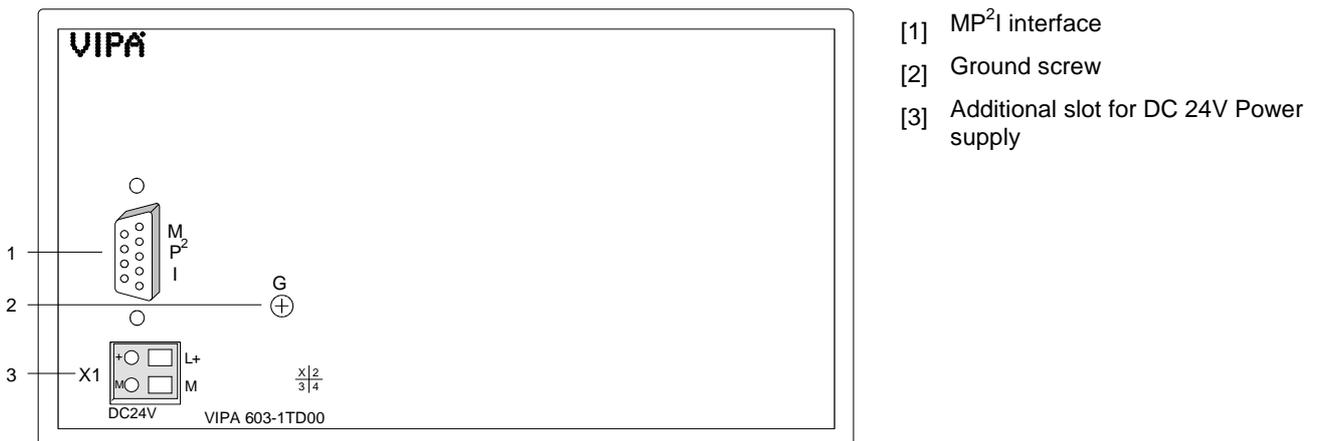
Front view

At the front side of the text display TD 03 is the foil keyboard and the display with 2x20 characters.



Back view

At the TD 03 the connectors are located at the backside.



Attention!

The simultaneous usage of external power supply and the delivered MPI cable 670-0KB00 is not allowed and damages the TD 03 and the CPU!

Components

LC-Display

The TD 03 monitors values and messages via a STN text display with LED back lighting. It displays 2 rows with max. 20 characters with a line height of 5mm.

Keyboard

At the front side is a foil keyboard with 9 short click keys. 5 keys are serving the navigation and 4 keys are function keys.

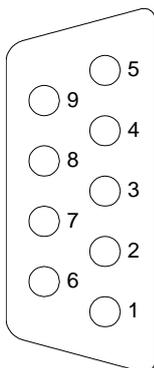
Pushing a function key, a bit is set in a bit memory byte of your CPU. By requesting the bit memory byte during your PLC application you may react to the entry.

MP²I

The TD 03 is provided with a MP²I (**M**ulti-**P**oint-**I**nterface) for connection to your CPU via a MPI network.

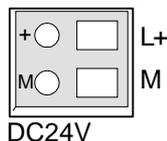
The MP²I jack has the following pin assignment:

9pin jack



Pin	Assignment
1	reserved (must not be occupied)
2	M24V
3	RxD/TxD-P (Line B)
4	RTS
5	M5V
6	P5V
7	P24V
8	RxD/TxD-N (Line A)
9	n.c.

Additional Power supply



Only if you use a MPI cable without power allocation instead of the delivered MPI cable 670-0KB00, the TD 03 may externally be supplied with DC 24V (20.4 ... 28.8V) using this addition power supply slot. The power supply is protected against inverse polarity and over-current.

The simultaneous usage of external power supply and the delivered MPI cable 670-0KB00 is not allowed and damages the TD 03!

Dimensions

Installation dimensions

For the installation of the TD 03, an installation cutting with the dimensions 156mm x 78mm is required.

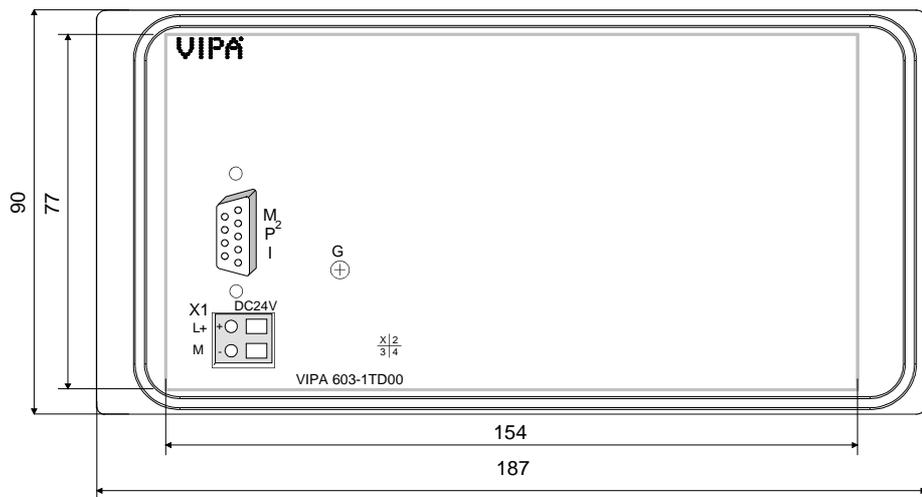
Installation values for control cabinets and desks:

Front panel width:	2.5 ... 6mm
Installation cutting (W x H):	156mm x 78mm
Installation depth plus cabling	34mm

Top view



Back view



Technical data

Order no.	603-1TD00
Type	TD 03, Text Display
Display	
Number of rows	2
Characters per row	20
Character height	5 mm
Type of display	STN with LED backlighting
OP functionality	
User memory	-
Number of variables	-
Language	DE/EN
Operating controls	
Touchscreen	-
Keyboard	Membran keyboard
Mouse	-
Number of system keys	5
Number of soft keys	4
Technical data power supply	
Power supply (rated value)	DC 24 V
Power supply (permitted range)	DC 20.4...28.8 V
Reverse polarity protection	✓
Current consumption (no-load operation)	80 mA
Current consumption (rated value)	500 mA
Inrush current	16 A
I^2t	0.11 A ² s
Time	
Real-time clock	-
Clock buffered period (min.)	-
Accuracy (max. deviation per day)	-
Functionality Sub-D interfaces	
Type	MP ² I
Type of interface	RS485
Connector	Sub-D, 9-pin, female
Electrically isolated	-
MPI	✓
MP ² I (MPI/RS232)	✓
Point-to-point interface	-
Mechanical data	
Housing / Protection type	
Material	die-cast aluminum
Mounting	via integrated pivoted lever
Protect type front side	IP 65
Protect type back side	IP 20
Dimensions	
Front panel	187 x 90 x 6 mm
Rear panel	154 x 77 x 44 mm
Installation cut-out	
Width	156 mm
Height	78 mm
Minimum	2.5 mm
Maximum front panel thickness	6 mm
Weight	610 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-20 °C to 70 °C
Certifications	
UL508 certification	yes

Chapter 2 Deployment TD 03

Overview

This chapter explains the deployment and the project engineering of the text display TD 03.

After the fast introduction there are information about the installation and the configuration by the TD Wizard. This is followed by the description of commissioning and operation of the TD 03.

The chapter closes with a description of the firmware update.

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Fast introduction

Installation Build the CPU system and install the TD 03. For the installation in operating tables and control cabinet fronts a front panel cutting of 156mmx78mm (LxW) is needed.

Configuration From the software side the connection to the CPU system happens by a data block. This may be produced by the configuration tool TD Wizard from VIPA.

Deployment
TD Wizard



- Start the TD-Wizard via double click on `TD_03_CFG.exe`.
- Type a file name for the DB into "Destination File". It is stored as STL file. Enter the data block number into "Data Block ID". Click on `Next >`.
- Set the language and character set. Click on `Next >`.
- If wanted, activate further menu options and the password protection. Click on `Next >`.
- Set the bit memory byte that is accessible for the function keys and the telegram polling rate. Click on `Next >`.
- Enter the standard size and the number of your messages. Click on `Next >`.
- In the appearing dialog window you can choose the areas where your data is stored in the DB. Here normally no changes are necessary. Click on `Next >`.
- Now you reach the input window for your messages. Enter the according message texts. If you want to include process data, click on `Embedded data...`. In the now following dialog window you can enter the data format of the process data and information about the storage path in the DB. Confirm with `OK` and return back to the message window.
- To enter more message texts, click on `Next message >`.
- Click on `Finish` to store the project at the preset path as STL file and close TD-Wizard.

Transfer STL into
the project

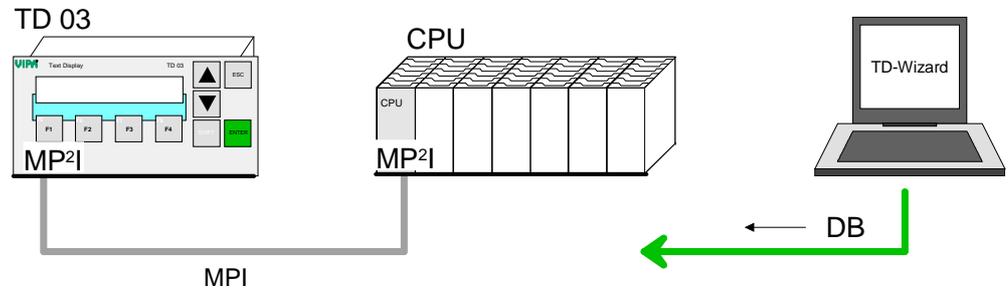
- Start the Siemens SIMATIC manager with your project.
- Select the folder "Sources" in the user program and select **Insert > External Source**.
- Navigate to the STL file and compile this with **Edit > Compile**. The corresponding DB may now be found in the folder "Blocks".

Commissioning

Switch on the power supply of your CPU.

Transfer your project including the DB to your CPU. More about the transfer methods may be found in the manual of your CPU.

Connect the CPU and the TD 03 by the delivered cable 670-0KB00. As soon as the TD 03 is connected to the CPU, it is automatically started up.

**Set communication parameters**

For communication with the CPU the following parameters are necessary, which may be set at the TD 03 by the *Menu mode* with *Terminal Setup*:

- MPI address of the TD 03
- MPI address of the CPU
- DB no. of the CPU
- Baud rate of the MPI net
- Highest station address in the MPI net

In the following the steps of the fast introduction are more near described.

Installation

Overview

The TD 03 is suitable for the installation in operating tables and control cabinet fronts. The installation happens via the back side. The TD 03 is provided with a patented integrated fixing technique that allows an easy connection with a simple screwdriver.

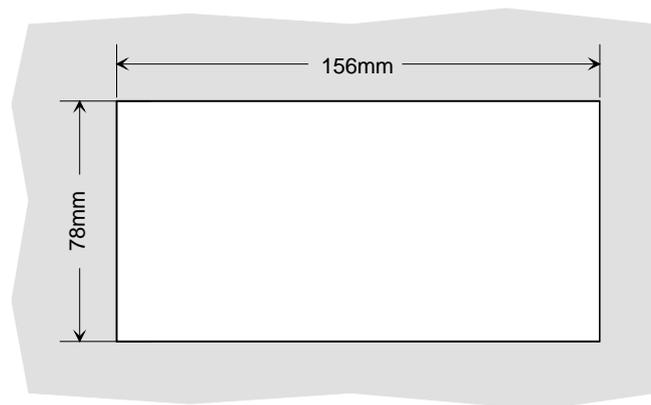


Note!

Please also consider at installation the "General installation guidelines" in this manual.

Installation cutting

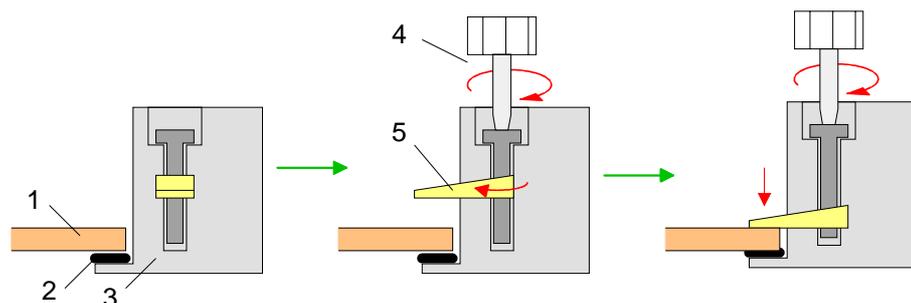
For the installation in operating tables and control cabinet fronts, you need the following front panel cutting:



Installation

The fixing technique is integrated in the casing of the TD 03 and accessible via the back side.

For the installation, a small slit screwdriver is required. Push the operator panel [3] from the front side into the front panel cutting [1] until it touches the panel with the seal [2]. Now bolt the lever [5] clockwise with the screwdriver [4] until it rotates to the outside. Further screwing bolts the lever to the front panel until it holds the TD 03 to the control cabinet front.



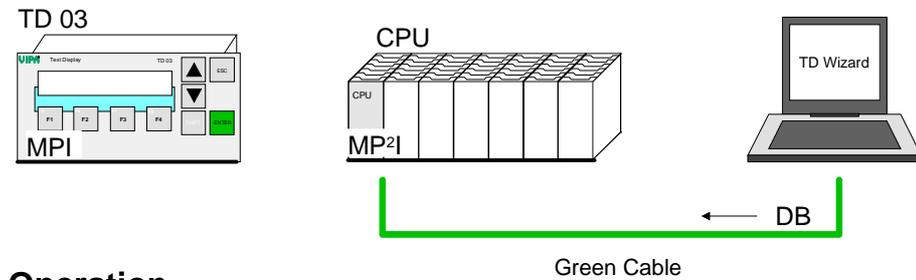
Project engineering - Overview

Overview

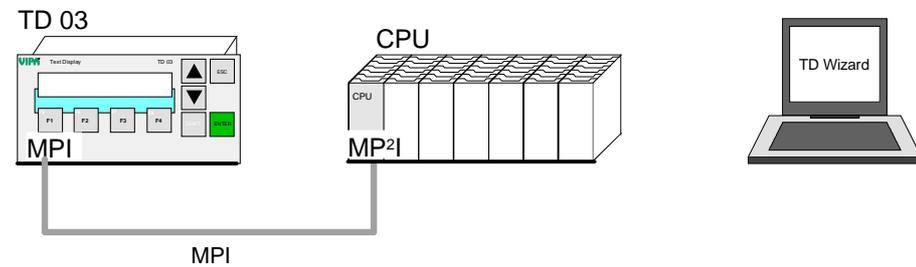
The text display TD 03 is projected with the TD-Wizard. This creates a data block that is accessed from the CPU after the TD 03 has been logged in. The data block contains all information required from the CPU like e.g. data areas and message texts that are necessary for the operation of the TD 03. Transfer the DB e.g. by means of the VIPA Green Cable into the CPU. More may be found at "Project transfer" at the CPU manual.

During operation, your operating device communicates with the concerning control and responds to the application processing of the PLC according to the engineered presetting. With concerning project engineering, you may monitor res. alter process values via the display and transfer them to the CPU.

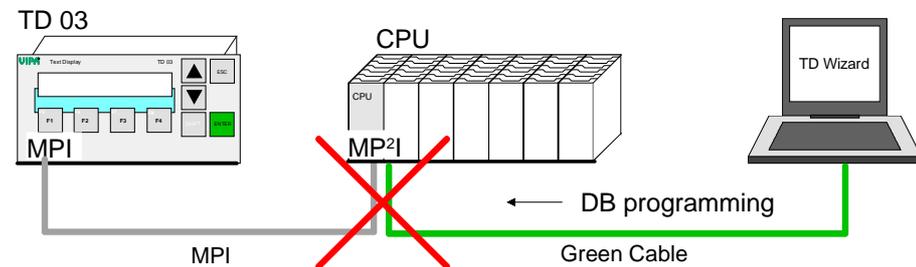
Project engineering



Operation



Not permitted!



Attention!

Please consider the simultaneous usage of the Green Cable from VIPA and the delivered MPI cable 670-0KB00 is not allowed and damages the TD 03 and CPU!

Project engineering - Deployment TD-Wizard

Overview

TD-Wizard is a project engineering tool for the operating device TD 03 from VIPA. The TD-Wizard allows you to create a data block that contains all parameters and messages for the TD 03.

You may import the data block in the SIMATIC Manager from Siemens into your project and load it to the CPU. After the link-up of the TD 03 with valid MPI parameters, the according DB contents are transferred from the CPU to the TD 03.

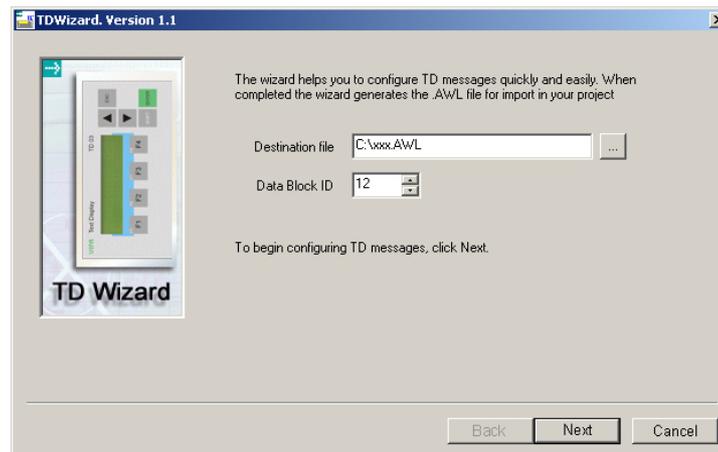
Create project



Start the TD-Wizard via double click on `TD_03_CFG.exe`.

Type a file name for your STL-file and choose a storage directory or search for an already existing STL-file!

Choose a data block number in Data Block ID.



Confirm your settings with `Next >`.

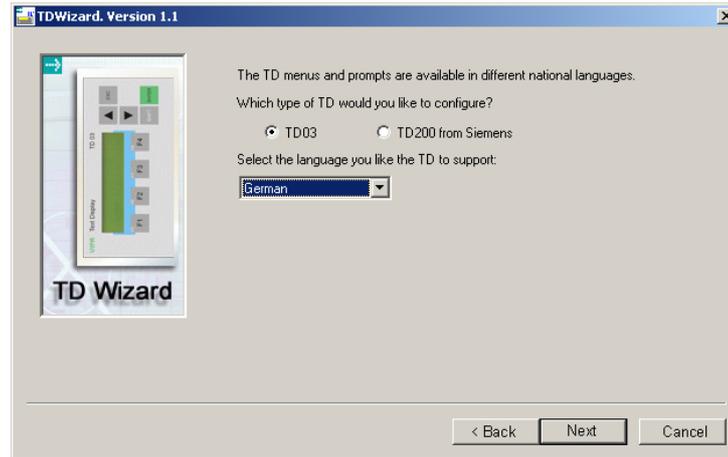
Language and character set

The TD 03 can monitor menu options and entry requests in a configurable language and the according character set. The here chosen language has no influence on the text of the user defined message texts that are displayed by the TD 03.

Languages

At the moment, the following languages are available:

- English
- German



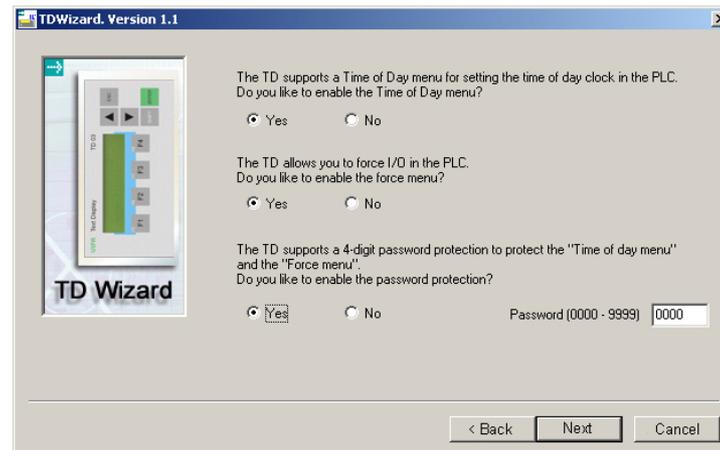
Confirm your settings with .

Release additional menu options

The project engineering allows you to add further menu options in the TD 03.

The following menu options can be activated:

- Set date and time
- Force variables in the CPU
- Activate password protection



Menu option Time of Day

Here you may set the date and the time of day in your CPU using the TD 03.

Menu option Force variables

If you activate this menu option you may force selected in- res. outputs via the TD 03, i.e. freeze them at a defined state. Forcing takes place at the beginning and at the end of a cycle. During the cycle, forcing is deactivated.

Password protection

If you activate the password protection, you have additionally to define a password with four characters length in the according field. This password is stored in the parameter block of the TD 03 and protects the alteration of variables that are embedded into one message.

Additionally, the access to the menu mode is password protected.

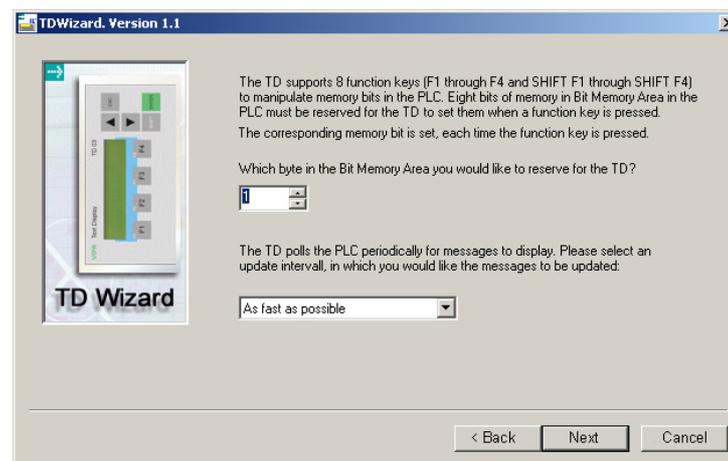
Function keys and refreshing rate

The TD 03 is provided with 8 function keys (F1 to F4 and SHIFT F1 to SHIFT F4) that allow you access to the bit memory area in the CPU. As soon as you push a function key, the according bit is set in the bit memory byte. Define the wanted bit memory byte in the shown dialog window. The according reaction to an alteration in this bit memory area has to be programmed in the user application.

The dialog window allows you to set the refreshing rate for your TD 03.

The refreshing rate defines, how often the TD 03 calls the CPU with a message request.

The setting of bit memory bytes with function keys is not influenced.



During operation the behavior of the function keys may be selected within the *Menu mode* by Terminal Setup > F-keys mode:

Normal: The corresponding flag of the CPU is set by pressing a function key. It may only be reset by the user program.

Auto: The corresponding flag of the CPU is set as long as the function key is pressed.



Attention!

You must always assign a bit memory byte for the function keys of the TD 03. Per default, the bit memory byte MB 0 is used. Please take also care for this in your user application.

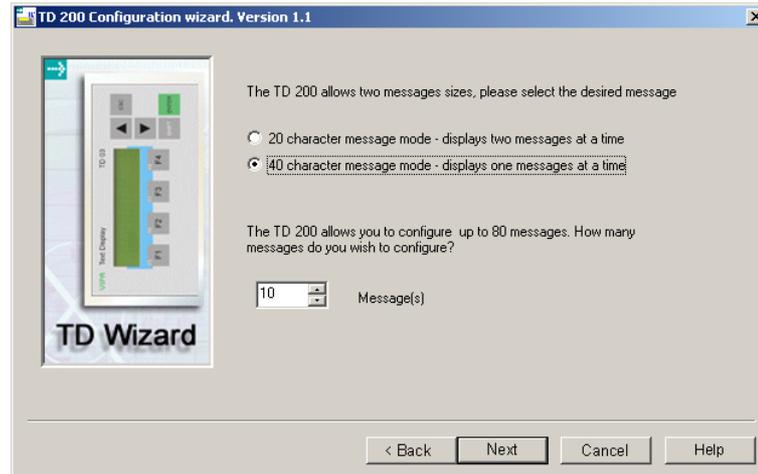
Always reserve a bit memory byte for your TD 03, although your application doesn't use function keys!

Size and number of messages

With the TD 03 you may display messages in one (20 characters) res. in two rows (40 characters). You may display up to two "one-row-messages" simultaneously.

A 20-character-message uses 20Byte in the data block of the CPU. Every message is shown in one row of the TD 03. That allows to display two messages at one time.

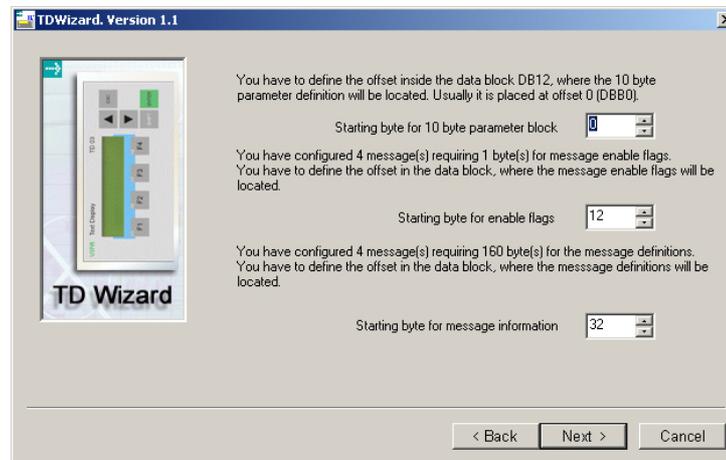
A 40-character-message uses 40Byte in the data block. Only one message can be displayed at a time.



Set the standard size and the number of your messages. You may create up to 80 messages.

Addresses for parameter block, release flag and messages

The following dialog window allows you to set the start addresses for the parameter bytes, the bytes for the message release and for the message texts.



Parameter block

Set the start address from where on the parameter block with the size 10Byte will be stored in the DB. Per default the setting DBB 0 is used.

"Enable flags" for messages

To display a message on your TD 03, your user application has to set an according release bit in your DB.

Here you define the start address from where on the release bytes are stored in your DB (default value:12).

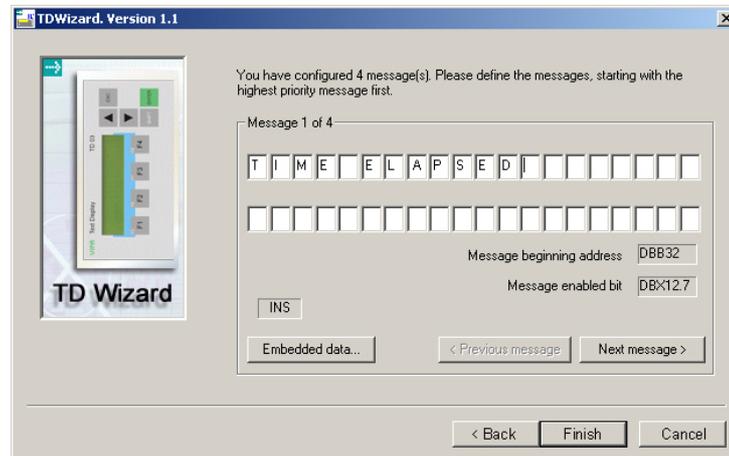
Messages

Set the start address the messages are stored in sequence. The default value is 32. The required number of bytes depends on the number of required characters and on the number of messages that you've set in the previous window. Every character used one byte. A message with 20 characters requires 20Byte in the data block, a message with 40 characters requires 40Byte.

Create messages

This dialog window allows you to enter the text for the messages. The content of the window depends on the number of characters that you've set as standard size (20 or 40 characters).

The window also shows you the DB start address of the message and the concerning message activation bit.

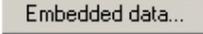


During the text entry you may switch between the insert and the overwrite mode by means of the PC key "Einfg/Ins".

The recent mode (INS res. OVR) is shown in the dialog window.

Via  you may enter the next message.

Include process data

For the inclusion of process data into a message, set the cursor at the according position in the message and click on . A dialog window appears where you enter the data format of the process data and get information about the storage path.



Please regard that the monitoring of a process time-of-day requires that the displayed addresses in the data block must be served by the user program.

Data format	<p>So that the data value may be displayed, place for the data value and the associated format should be reserved within the message.</p> <p>Start anchor for the data value is the most right character of the value. They are arranged right-justified to the point of anchor.</p> <p>More characters are sorted left of the anchor. If the data value has more characters than free space is available, it may overwrite the message texts. Please take care to leave enough free positions for the data value!</p> <p>The selection of the data format defines the size of the data value that is embedded into the message.</p> <ul style="list-style-type: none">• Select "none", if the message must be acknowledged but no process time-of-day is displayed.• Select "Word", if the data value is a word or an integer. This uses 2 characters in your message.• Choose "Double Word", if the data value is a double word or a real number. This uses 4 characters in your message.
Display format	Display the data value in the message as <i>signed</i> , <i>unsigned</i> or as <i>real</i> number with decimals (Real).
Digits to the right of the decimal	By choosing the positions right of the decimal sign, value of an integer can be scaled for the display. At a real number, you define the number of digits right of the decimal. The real number is rounded to the given digits.
User must acknowledge message	<p>This control button defines if the message must be acknowledge by the user. This causes that the message is shown until the operator pushes .</p> <p>After the acknowledgement of the message, the acknowledgement bit is set in the CPU and the enable bit for this message is reset. If you want a message to be acknowledged, this is only possible by including a data value without format at any position.</p>
User is allowed to edit this data	<p>The activation of this control button allows the user to edit the according data value.</p> <p>As soon as you alter a data value in the TD, the "edit notification bit" is set. By processing the bit in your user application, you may react to an entry.</p>
Password protection	If you've activated the password protection in one of the previous windows, you may protect the data value for alterations by using your password.

Structure of the Format-Word

The format word precedes the embedded data value and occupies 2 positions (Byte) in the DB:

Byte	Bit 7 ... Bit 0
0	Bit 0: (A) Acknowledgement 0 - No acknowledgement 1 - Acknowledgement required Bit 1: (AN) Acknowledgement message 0 - No acknowledgement 1 - Message was acknowledged Bit 2: (EN) Alteration message 0 - No alteration 1 - Message altered Bit 3: (P) Password protection 0 - Password protection deactivated 1 - Password protection activated Bit 4: (E) Alteration enabled 0 - Alteration not allowed 1 - Alteration allowed Bit 7 ... 5: 0
1	Bit 2 ... 0: (D) Position of the decimal sign 0 - No decimal sign 1 - one digit right of the decimal sign 2 to 7 - two to seven digits right of the decimal sign Bit 3: 0 Bit 6 ... 4: (S) Data size / Format 0 - no data value 1 - word value signed 2 - double word value signed 3 - word value unsigned 4 - double word value unsigned 5 - Real number value 6 - Reserved 7 - Reserved Bit 7: 0

Close entry and create DB

 stores your project at the preset location as STL-file and closes TD-Wizard.

Transfer STL into the project

Import with following proceeding your STL file into your project:

- Start the Siemens SIMATIC manager with your project.
- Select the folder "Sources" in the user program and select Insert > External Source.
- Navigate to the STL file and compile this with Edit > Compile. The corresponding DB may now be found in the folder "Blocks".
- Transfer the DB to your CPU. More about the transfer methods may be found in the manual of your CPU.

Commissioning

Preconditions

- CPU system is built
- The corresponding DB has been created by the TD-Wizard, imported to the project and transferred to the CPU.

Connection

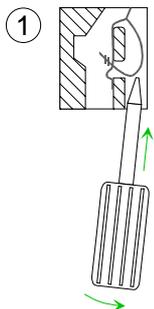
The connection to your CPU takes place using the delivered MPI cable 670-0KB00 via the MP²I jack. Here the panel may not be supplied additionally externally.

As soon as the power supply of the CPU is switched on, the TD 03 is supplied with DC 24V via MPI and starts automatically.

Power supply only at usage of a third-party cable

Only if you use a MPI cable without power allocation instead of the delivered MPI cable 670-0KB00, the TD 03 may externally be supplied with DC 24V (20.4 ... 28.8V) using this addition power supply slot. The power supply is protected against inverse polarity and overcurrent.

The simultaneous usage of external power supply and the delivered MPI cable 670-0KB00 is not allowed and damages the TD 03!



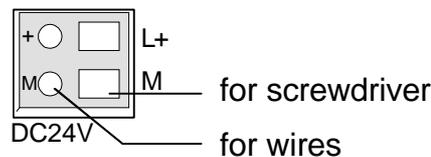
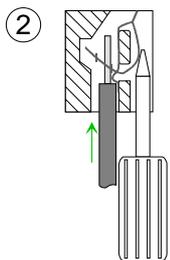
For the connection of an external power supply, the sticker with the safety information is to be removed before.

The wiring takes place with spring clamp technology.

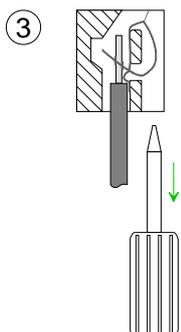
The cabling with spring clamp technique enables a fast and easy connection of your supply wires. In opposite to a screw connection, this connection is vibration secure.

You may connect cables with a cross-section of 0.08 mm² to 2.5 mm². You may use flexible cores without end case as well as stiff wires.

The wires are fixed at the spring clamp contacts as follows:



The illustration on the left side shows the steps of the cabling seen from top.



- To conduct a wire you plug a fitting screwdriver obliquely into the rectangular opening like shown in the picture.
- To open the contact spring you have to push the screwdriver in the opposite direction and hold it.
- Insert the de-isolated wire into the round opening. You may use wires with a cross-section from 0.08mm² to 2.5mm².
- By removing the screwdriver the wire is connected safely with the plug connector via a spring.

Proceeding of commissioning

- Switch on the power supply of your CPU.
- Transfer your project including the DB to your CPU. More about the transfer methods may be found in the manual of your CPU.
- Connect the CPU und the TD 03 via MPI interface by the delivered cable 670-0KB00. As soon as the TD 03 is connected to the CPU, it is automatically started up.
- To serve the TD 03 with the contents of the DB valid communication parameters like MPI address, baud rate, DB no. and so on are to be set in the *Menu mode*.

By pushing the key  in the *Display mode*, you reach the *Menu mode*.

Navigate at *Menu mode* with  to the entry *Terminal Setup* and confirm with .

Set with  respectively  the following parameters and confirm with .

- Terminal Address: wished MPI-Adresse for the TD 03
- CPU Address: MPI address of the connected CPU
- Parameter Block: DB number in the CPU created by the TD-Wizard. So more DBs may be stored in the CPU.
- Baudrate: Baud rate of the MPI net
- Highest Station: highest MPI address of your system

The TD 03 may be started again with  after the settings are completed. After restart the TD 03 works with its new parameter.

Operating the TD 03 - Overview

Turn on The TD 03 should be connected to the CPU with the delivered cable (order no.: 670-0KB00). As soon as the power supply of the CPU is switched on, the TD 03 is provided via MPI by DC 24V and starts automatically.

Operating modes The TD 03 has the following operating modes:

- Display mode
- Menu mode

Display mode After start, the TD 03 is in *display mode*. The *display mode* is the standard operating mode of the TD 03. Here you may switch between the activated messages respectively acknowledge them and alter process values.

Menu mode With  you can switch between *display mode* and *menu mode*.



Note!

So that incoming messages can be updated, the TD 03 must be switched to *display mode*.

With *display mode* the cursor is invisible.

It appears by pushing  res. .

Operation via keyboard

To navigate through the menu, the following keys are available:

 res.  jumps to the previous res. next menu entry.  opens the according menu entry. If this menu entry is a variable, you reach the changing mode with .

This is shown by the blinking of the variable. You can jump to the individual decimal position with  +  res.  + , change the value with  and  and confirm with  or reset the value to zero with  +  respectively cancel with .

Usage of the function keys

Pushing one of the function keys  ... , a bit is set into a bit memory byte in your CPU. By requesting the bit memory byte in your PLC program, you are able to react to the entry.

By evaluating the bit memory byte within the PLC program, it may be reacted to an input.

The behavior of the function keys may be selected by the parameter `F-keys mode` within the *Menu mode*.

Push  additionally to a function key to call F5 ... F8.

Operating the TD 03 - Menu mode

Start

Pushing **ESC** at the TD 03 in the *display mode* switches to the *menu mode*. So far as there is no DB in the CPU concerning the TD 03 the menu is displayed in English.



Note!

So that incoming messages can be updated, the TD 03 must be switched to *display mode*.

Operating via keyboard

For navigation use the following keys:

▲ res. **▼** jumps to the previous res. next menu option. Activate the according menu option with **ENTER**. If the menu item is a variable, **ENTER** brings you into the alteration mode. This is shown with a blinking of the variable. Now you may alter the value with **▲** and **▼** and confirm with **ENTER** or interrupt with **ESC**.

Functions

In the *menu mode*, the following options are available:

- View messages
- View CPU Status
- Terminal Setup

If activated in the TD-Wizard, the following menu options are also available:

- Set Date and Time
- Force I/O

Display messages

This function allows you access to all defined messages.

Choose the option View Messages and push **ENTER**. Flip between the messages with **▲** res. **▼**.

View CPU Status

This function shows you the recent operating state (RUN/STOP) of your CPU.

Call the entry `View CPU Status` and push . The TD 03 now displays the recent operating state of your CPU.

 switches back to the *display mode*.

Terminal SETUP

The SETUP allows you to enter parameters into the TD 03 like communication parameter (MPI addresses, baud rate, etc.), DB no., functionality of the function keys and contrast of the display.

Navigate to the option `Terminal Setup` and push .

Enter the wanted MPI address into `Terminal Addr.` Select the option, push , set the value with  res.  and confirm with .

Use  to reach `CPU Address` and set the MPI address of your CPU.

For the TD 03 receives its data from a CPU data block, you may store several data blocks in the CPU. Via the entry "Parameter Block" you define the wanted DB via its number.

Navigate on with  until you reach `Baudrate`, set the baud rate of your MPI network and at the entry `Highest Station` the highest MPI address in your system.

The behavior of the function keys may be selected within the `F-keys` mode. Here are the following possibilities:

Normal: The corresponding flag of the CPU is set by pressing a function key. It may only be reset by the user program.

Auto: The corresponding flag of the CPU is set as long as the function key is pressed.

As last option `Contrast`, you may alter the contrast of the TD 03.

 always allows you to switch back into the *display mode*. After the mode change, the TD 03 reboots.

Now the TD 03 is ready to receive data from your CPU via MPI.

**Set Date/
Time-of-Day
(activateable)**

This menu option must be activated via the TD-Wizard. Select the option `Set Date/Time` and push . Date and time-of-day are displayed.

Now you may navigate to the wanted value via  and alter it via  res. . After reaching the value for seconds, push  to transfer the values to the CPU. The TD 03 switches back to *display mode*.



Note!

The TD 03 does not proof the correctness of date and time. You may also enter invalid dates into the CPU.

**Force I/Os
(activateable)**

This menu option is only available if enabled in the TD-Wizard. You may also protect this function with a password. `Force I/O` allows you to set in-res. outputs to a fixed value. During the cycle, the values may be overwritten by your user application. As soon as forcing is active, this is shown via a Force-LED at the CPU front.

Choose the entry `Force I/O` and push .

Now you can force variables with `Force Vars` and deactivate the force state with "Unforce All I/O".

Select `Force Vars` and push  until the cursor is on `Not forced`.

Now the following variable types are available that can be chosen via .

Type	Variable = Value
OD/ID (Double word)	0 = 00000000
OW/IW (Word)	0 = 0
OB/IB (Byte)	0 = 0
O/I (Bit)	0.0 = 0

 navigates from *Type* to *Variable* and on to *Value* and  res. 

cause changes. Another  closes the entry.

If Force is active, the CPU shows this via the Force-LED.

**Danger!**

Due to the fact that the force function influences defined in-/outputs, which could cause unexpected reactions in your automation system, you should only use this function for test purposes!

Lock via password

The TD 03 allows you to lock the *menu mode* and the value setting via a password. The password is entered in the TD-Wizard. You activate the password request at value entering during the project engineering of your messages by opening the according dialog via .

If you've activated the password protection in the TD-Wizard, the *menu mode* is locked via your password. Every time the *menu mode* is requested via or if activated every time at value entry, a password request takes place. Jump with between the numbers and with res. to the wanted character. After the acknowledgement of your password with , you can edit messages and values without password request until you turn off the power supply or until you select the menu option `Lock Password` and push .

The TD 03 activates your password and switches back to *display mode*.

Firmware update

Overview

The TD 03 allows you to update the firmware via an update software and the Green Cable from VIPA.

The last recent firmware versions can be downloaded in the service area of www.vipa.com.



Attention!

Please be very careful with loading a new firmware. Under certain circumstances you may destroy the TD 03, for example if the voltage supply is interrupted during transfer or if the firmware file is defective.

In this case, please call the VIPA hotline!

Please also regard that the update version has to be different from the existing version, otherwise no update will happen.

Read firmware version

If you didn't execute a firmware update before, you may find the recent firmware version on the label on the backside of the TD 03.

To download the firmware file, order no. and version no. (HW) are required. These ID numbers mark the storage directory of the concerning firmware. For example: The firmware file of a TD 03 with the order no. 603-1TD00 and HW no. 1 is stored under the file name 603-1td00_a1.xxx (xxx is the according firmware version).

Proceeding

- Go to www.vipa.com.
- Click at Service / Support > Downloads > Firmware and navigate via "HMI" to the firmware for your TD.
- Extract the zip-file into the wanted directory on your PC.
- If you want to execute the update with the Green Cable, the VIPA "Updater" is required that you may download under "Firmware" in the download area. Start the "Updater" with `cpu_up.exe`.

Firmware update via Green Cable and cpu_up.exe

to 0. Connect the COM interface of the PC and the MP²I jack of your TD 03 via the Green Cable.

to 1. Type the COM interface (you should not alter the setup)

to 2. Turn off the power supply of your TD 03, push the **F1** key and turn on the power supply again.

Now the TD 03 is ready for the firmware update. Nothing is shown on the display.

to 3. Click on **connect** in the updater.

to 4. A connection to the TD 03 is established and shown via the message [connected].

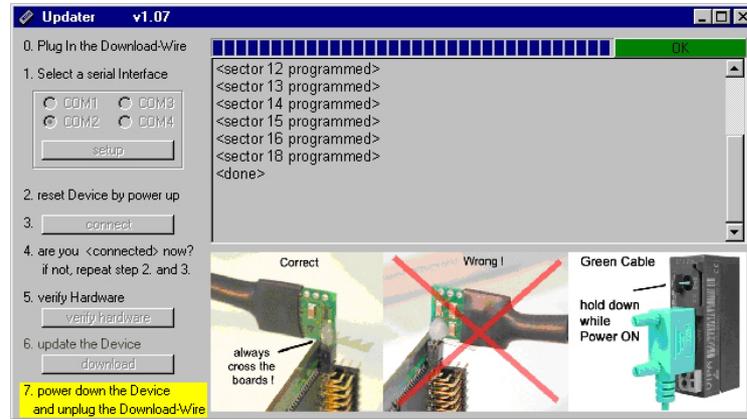
If an error message appears instead, repeat the steps above with another COM interface.

to 5. At error free connection click on **verify hardware**. Your TD 03 is now prepared for data transfer.

to 6. A click on **download** opens a file selection window. Choose the according firmware and start the download with **Open**.

If the error message "The selected file doesn't fit to your hardware" appears you may have been tried to download a firmware that is not compatible to your TD 03. With a valid firmware version, the update process starts. This process may last several minutes and is shown in a process bar.

After the download, the following window should appear:



to 7. Turn off the power supply of your TD 03, disconnect the Green Cable, connect the TD with the CPU and turn on the power supply again. Now the TD 03 is ready with the new firmware.

After the firmware update the contrast of the display could be out of tune. In this case you have to adjust the contrast in the *menu modus* again.

If your TD 03 does not start anymore, an error occurred during the firmware update. Please call in this case the VIPA hotline.

Chapter 3 Installation Guidelines

Overview

The chapter gives you information about the interference-free installation of Programmable Logic Controls (PLC) together with a TD 03.

Here we describe possible paths how interference can enter the controller, how you ensure the electromagnetic compatibility (EMC) and how to approach shielding and screening issues.

Content

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EMC-equitable assembly.....	3-6
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Checklist for the EMC-compliant installation of controllers	3-12

Basic rules for the EMC-equitable assembly of installations

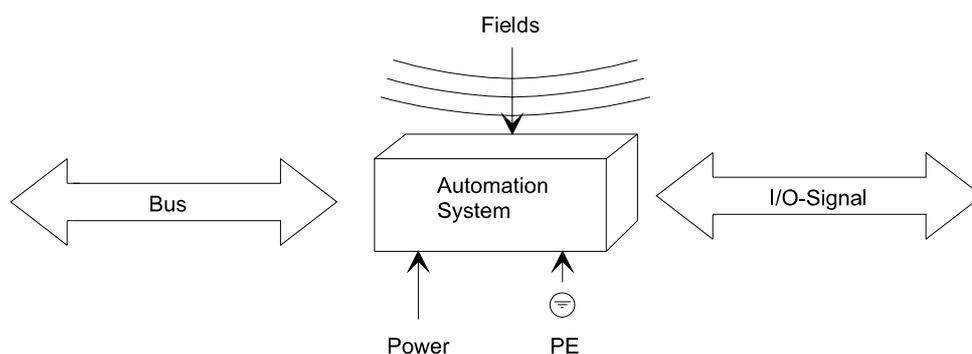
What is EMC?

The term electromagnetic compatibility (EMC) refers to the ability of an electrical device to operate properly in an electromagnetic environment without interference from the environment or without the device causing illegal interference to the environment.

The Operation Panels are developed for applications in harsh industrial environments and complies with EMC requirements to a large degree. In spite of this you should implement an EMC strategy before installing any components, which should include any possible source of interference.

Possible sources for disturbances

Electromagnetic interference can enter your system in many different ways:



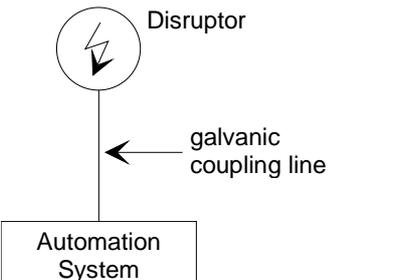
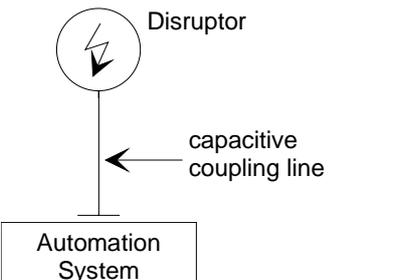
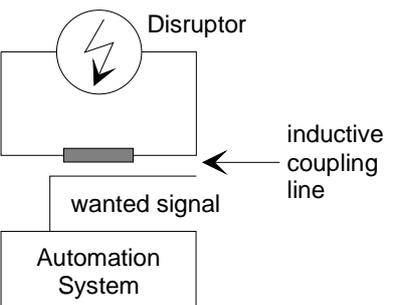
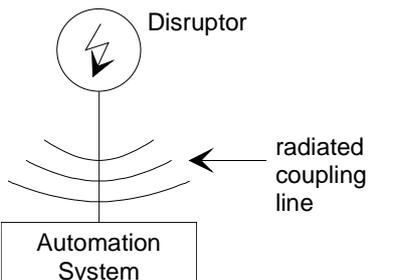
Interference is coupled into your system in different ways, depending in the propagation medium (conducted or not conducted) and the distance to the interference source.

We differentiate between:

- galvanic coupling
- capacitate coupling
- inductive coupling
- radiated power 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
<p>Galvanic coupling</p> 	<p>Galvanic or metallic coupling always occurs, when two current circuits have a common line.</p>	<ul style="list-style-type: none"> • Pulsed devices (Net influence from transducers and foreign net devices) • Starting motors • Different potential of component cubicles with common current supply • Static discharges
<p>Capacitate coupling</p> 	<p>Capacitate or electric coupling occurs between conductors with different potential. The coupling is proportionate to the temporal change of the voltage.</p>	<ul style="list-style-type: none"> • Interference through parallel signal lines • Static discharge of the personnel • Contactors
<p>Inductive coupling</p> 	<p>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.</p>	<ul style="list-style-type: none"> • Transducers, motors, electric welding devices • Parallel net cables • Cables with toggled currents • Signal cable with high frequency • Unused coils
<p>Radiate power coupling</p> 	<p>One talks of radiate power coupling, when an electromagnetic wave meets a line circuit. The hit of the wave inducts currents and voltages.</p>	<ul style="list-style-type: none"> • Sender in the neighborhood (e.g. walkie-talkie) • Sparking lines (sparking plugs, collector of electric motors, welding devices)

Basic rules for ensuring EMC

In many cases, the adherence to some very elementary rules is sufficient to ensure EMC. For this reason we wish to advise you to heed the following rules:

During the installation of your automation units you should ensure that any inactive metal components are grounded via a proper large-surface earth!

- Interconnect any inactive metal components via low-impedance conductors with a large cross-sectional area.
- Execute screw connections at coated and anodized metal parts either with special contact washer or remove the isolating protective film.
- Install a central connection between the chassis ground and the earthing/protection system.

Ensure that cabling is routed properly during installation!

- Divide the cabling into different cable groups (High voltage lines, power supply lines, signal lines, data lines).
- Always install high voltage lines and signal or data lines in separate channels or bundles.
- Install signal and data lines as close as possible to any metallic ground surfaces (e.g. frames, metal rails, sheet metal).

Ensure that the screening of lines is grounded properly!

- Data lines must be screened. The screen has to be laid both-sided.
- Analog lines must be screened. Where low-amplitude signals are transferred it may be advisable to connect the screen on one side of the cable only.
- Attach the screening of cables to the ground rail by means of large-surface connectors located as close as possible to the point of entry. Fix the cables mechanically by means of cable clamps. Route the connected screen to the modules without interruptions, but don't connect the screen again.
- Ensure that the ground rail has a low-impedance connection to the cabinet/cubicle.
- Use only metallic or metallic covers for the plugs of screened data lines.

In critical cases you should implement special EMC measures!

- Connect snubber networks to all inductive loads that are not controlled by special EMC modules.
- Use incandescent lamps for illumination purposes inside cabinets or cubicles, do not use of fluorescent lamps.

Create a single reference potential and ensure that all electrical equipment is grounded wherever possible!

- Ensure that grounding measures are implemented effectively. The controllers are earthed to provide protection and for functional reasons.
- Provide a star-shaped connection between the plant, cabinets/cubicles and the grounding/ protection system. In this way you can avoid ground loops.
- Where potential differences exist, you must install sufficiently large equipotent bonding conductors between the different parts of the plant.

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.

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 $\leq 60V$
- unshielded lines for alternating voltage $\leq 25V$
- Coaxial cables for monitors

Group B

- unshielded lines for direct voltage $>60V$ and $\leq 400V$
- unshielded lines for alternating voltage $>25V$ and $\leq 400V$

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



Attention!

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.



Note!

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 for 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 rail/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 μA) must be transmitted
- Foil-type screening (static screening) is employed.

You should always use metallic or metalized 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.



Note!

Potential differences can give rise to an equalization current via the screen connected between the two ground connections.

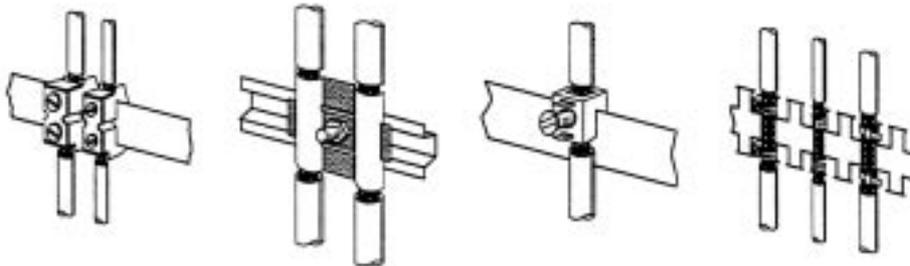
In this case you must install an additional equipotential bonding conductor.

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!



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.

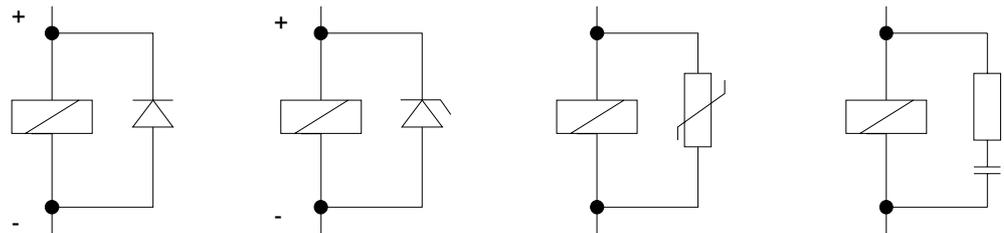
You can connect diodes to suppress back-emf, varistors or RC-networks to the inductors.

Connections of DC-activated inductors using a diode

using a Z-diode

Connections of AC-activated inductors

using a varistor using RC-network



Power outlet for PGs

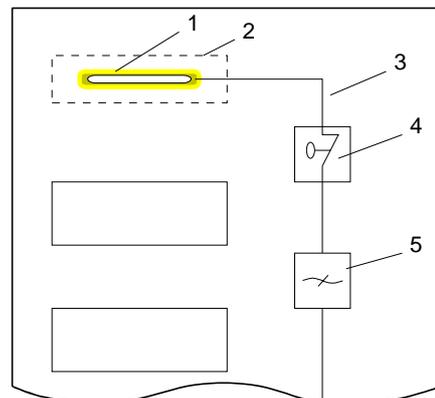
Every cubicle must be provided with a power outlet for the PU. These outlets must be wired to the distribution system, which is also used to connect the neutral conductor for the cubicle.

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

Checklist for the EMC-compliant installation of controllers

EMV-measures	Space for Notes
Connection of the inactive parts	
You should take special care to check the connections of: <ul style="list-style-type: none"> • 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?	