

Interface modules (for SIMATIC TDC / FM 458-1DP)

Product Information

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens Aktiengesellschaft. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Preface

Purpose of this manual

This manual explains the basic use of the interface modules for SIMATIC TDC / FM458-1DP.

Basic knowledge required

This manual is intended for commissioning personnel. Comprehension of this manual requires general knowledge of automation engineering.

Data protection

Siemens respects the principles of data privacy, in particular the data minimization rules (privacy by design). For this SIMATIC product, this means: The product does not process or store any personal data, only technical function data (e.g. time stamps). If a user links this data with other data (e.g. shift schedules) or stores personal data on the same storage medium (e.g. hard disk), and thus establishes a link to a person or persons, then the user is responsible for ensuring compliance with the relevant data protection regulations.

Recycling and disposal

For environmentally friendly recycling and disposal of your old equipment, contact a certified electronic waste disposal company and dispose of the equipment according to the applicable regulations in your country.

Additional support

You can find the offer for technical documentation for the individual SIMATIC products and systems on the Internet (<http://www.siemens.com/simatic-tech-doku-portal>).

Siemens Industry Online Support

You can find current information on the following topics quickly and easily here:

- **Product support**

All the information and extensive know-how on your product, technical specifications, FAQs, certificates, downloads, and manuals.

- **Application examples**

Tools and examples to solve your automation tasks – as well as function blocks, performance information and videos.

- **Services**

Information about Industry Services, Field Services, Technical Support, spare parts and training offers.

- **Forums**

For answers and solutions concerning automation technology.

- **mySupport**

Your personal working area in Industry Online Support for messages, support queries, and configurable documents.

This information is provided by the Siemens Industry Online Support in the Internet (<https://support.industry.siemens.com>).

Industry Mall

The Industry Mall is the catalog and order system of Siemens AG for automation and drive solutions on the basis of Totally Integrated Automation (TIA) and Totally Integrated Power (TIP).

You can find catalogs for all automation and drive products on the Internet (<https://mall.industry.siemens.com>) and in the Information and Download Center (<https://www.siemens.com/automation/infocenter>).

Security information

Siemens provides products and solutions with industrial cybersecurity functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial cybersecurity concept. Products and solutions from Siemens form one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial cybersecurity measures that may be implemented, please visit (<http://www.siemens.com/cybersecurity-industry>).

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Cybersecurity RSS Feed here (<https://www.siemens.com/cert>).

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Installation and EMC guidelines

1.1 Overview

Note

These Operating Instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connection with installation, operation or maintenance.

If you need further information or encounter special problems that are not adequately treated in the operating instructions, you can obtain the necessary information from your local Siemens office.

Furthermore, the contents of these Operating Instructions shall not become a part of or modify any prior or existing agreement, commitment, or legal relationship. All obligations on the part of Siemens AG are contained in the respective sales contract which also contains the complete and solely applicable warranty conditions. These contractual guarantee provisions are neither broadened nor restricted by the text in these operating instructions.

1.2 Qualified personnel

in the context of the operating manual or of warning notices on the product itself are persons familiar with installation, assembly, commissioning and operation of the product and holding qualifications appropriate to their activity, such as:

1. Trained and authorized to power up, shut down, ground and tag electrical circuits and equipment in accordance with safety standards.
2. Trained in the proper care and use of protective equipment in accordance with safety standards.

1.3 Danger and warning information



WARNING

Danger, high voltage

During operation of electrical devices, certain parts of these devices are necessarily under dangerous voltage.

Ignorance of the safety instructions may result in severe injury or property damage.

Particularly the warning notes in the corresponding Operating Instructions must be strictly observed.

NOTICE

Electrostatic sensitive devices

The modules contain components that are sensitive to electrostatic charge. Always discharge your body before you touch an electronic module. This can be done quite simply by touching a conductive, grounded object immediately before you handle the component (e.g. bright metal parts of the control cabinet, grounding contact of socket outlet.)

NOTICE

Lifting and carrying heavy loads

Note the regulations/notes on lifting and carrying heavy loads.

NOTICE

Cleaning the devices

Use only a vacuum cleaner and dry cloths to clean the devices.

1.4 Introduction

What is EMC ?

Electromagnetic compatibility (EMC) is the ability of an electrical device to function, fault-free in a specified electromagnetic environment without influencing the environment in an inadmissible fashion.

This design and EMC Directive supplements the documentation on the individual components.

The control system SIMATIC TDC / FM458-1DP consists of individual components (e.g. racks, modules, interface modules, operator panels, position encoders). The components can be installed in the widest range of system configurations to suit individual requirements. In an environment that contains distributed components it is imperative not to neglect interference and to conform with special installation and EMC requirements of the plant.

EMC therefore represents a quality feature for

- **Intrinsic immunity to interference:** Resistance against internal electrical disturbance variables
- **Immunity to external interference:** Resistance of the system against external electromagnetic disturbance variables
- **Degree of interference emission:** Environmental effects caused by electromagnetic radiation

Operational reliability and immunity to interference

The manufacturer of the control system and users (including end customers) must take specific measures in order to achieve the maximum possible operational reliability and safety and interference immunity for a complete system (control and drive system).

Only if all these measures are adhered to, will the proper functioning of SIMATIC TDC / FM458-1DP be guaranteed and the legally prescribed requirements of 2014/30/EU be complied with.

1.5 Standards, approvals and safety instructions

Currently valid markings and approvals

Note

Information on the components of the SIMATIC TDC / FM458-1DP

The currently valid markings and approvals are printed on the components of the SIMATIC TDC / FM458-1DP.

Safety information

WARNING

Personal injury and damage to property may occur

In hazardous areas, personal injury and property damage may occur if plug connections are disconnected during operation of the SIMATIC TDC / FM458-1DP.

In hazardous areas, always de-energize the SIMATIC TDC / FM458-1DP before disconnecting plug connections.

WARNING

Explosion hazard

If you replace components, compliance with Class I, DIV 2 may become invalid.

WARNING

Deployment requirements

This device is only suitable for use in Class I, Div. 2, Group A, B, C, D, or in non-hazardous areas.

Safety of the plant or the system

NOTICE

Safety is the responsibility of the assembler

The safety of any plant or system incorporating the equipment is the responsibility of the assembler of the plant or system.



Our products meet the requirements and protection objectives of the EU Directives listed below and comply with Harmonized European Standards (EN) for programmable controllers that were published in the Official Journals of the European Union:

- 2014/35/EU "Electrical equipment designed for use within certain voltage limits" (Low-Voltage Directive)
- 2014/30/EU "Electromagnetic Compatibility" (EMC Directive)
- 2014/34/EU "Equipment and protective systems intended for use in potentially explosive atmospheres" (Explosion Protection Directive)
- 2011/65/EU "Restriction of the use of certain hazardous substances in electrical and electronic equipment" (RoHS Directive)

EU declarations of conformity for the respective authorities are available from:

Siemens AG
Digital Industries
Factory Automation
DI FA TI COS TT
P.O. Box 1963
D-92209 Amberg

The EU declarations of conformity are also available for download from the Siemens Industry Online Support website, under the keyword "Declaration of Conformity".

UK Conformity Assessed marking



The marked products comply with the designated British Standards (BS) for programmable logic controllers published in the official consolidated list of the British Government. They meet the requirements and protection targets of the following regulations and related amendments:

- Electrical Equipment (Safety) Regulations 2016 (Low-Voltage)
- Electromagnetic Compatibility Regulations 2016 (EMC)
- Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres Regulations 2016 (Explosion Protection)
- Regulations on the restriction of the use of certain hazardous substances in electrical and electronic equipment 2012 (RoHS).

UK Declarations of Conformity for the respective authorities are available from:

Siemens AG
Digital Industries
Factory Automation
DI FA TI COS TT
P.O. Box 1963
D-92209 Amberg

The UK Declaration of Conformity is also available for download from the Siemens Industry Online Support website under the keyword "Declaration of Conformity".

cULus approval



Underwriters Laboratories Inc. in accordance with

- UL 508 (Industrial Control Equipment)
- CAN/C22.2 No. 142 (Process Control Equipment)

OR

cULus HAZ. LOC. approval



Underwriters Laboratories Inc. in accordance with

- UL 508 (Industrial Control Equipment)
- CAN/CSA C22.2 No. 142 (Process Control Equipment)
- ANSI/ISA 12.12.01
- CAN/CSA C22.2 No. 213 (Hazardous Location)

APPROVED for use in

Class I, Division 2, Group A, B, C, D T4;

Class I, Zone 2, Group IIC T4

Installation Instructions for cULus haz.loc.

- WARNING – Explosion Hazard – Do not disconnect while circuit is live unless area is known to be non-hazardous.
- WARNING – Explosion Hazard – Substitution of components may impair suitability for Class I, Division 2 or Zone 2.
- This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D; Class I, Zone 2, Group IIC; or non-hazardous locations.

FM approval



Factory Mutual Research (FM) according to

- Approval Standard Class Number 3611, 3600, 3810

APPROVED for use in Class I, Division 2, Group A, B, C, D T4A;

Class I, Zone 2, Group IIC T4

Installation Instructions for FM

- WARNING – Explosion Hazard – Do not disconnect while circuit is live unless area is known to be non-hazardous.
- WARNING – Explosion Hazard – Substitution of components may impair suitability for Class I, Division 2 or Zone 2.
- This equipment is suitable for use in Class I, Division 2, Groups A, B, C, D; Class I, Zone 2, Group IIC; or non-hazardous locations.

ATEX approval

According to EN 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n") and EN IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General Requirements).

II 3 G Ex nA IIC T4 Gc
DEKRA 17ATEX0079 X

OR

According to EN IEC 60079-7 +A1 (Explosive atmospheres - Part 7: Equipment protection by increased safety "e") and EN IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements).

II 3 G Ex ec IIC T4 Gc
DEKRA 21ATEX0049 X

Special conditions in hazardous area:

1. The equipment shall only be used in an area of not more than degree of pollution 2, as defined in EN 60664-1.
2. The equipment shall be installed in a suitable enclosure providing a degree of protection not less than IP54 in accordance with EN IEC 60079-0. The ambient conditions must be taken into consideration for use.
3. Provisions shall be made to prevent the nominal voltage from being exceeded by transient disturbance voltages of more than 119 V.

UKEX approval

According to EN IEC 60079-7 +A1 (Explosive atmospheres - Part 7: Equipment protection by increased safety "e") and EN IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements).

II 3 G Ex ec IIC T4 Gc
DEKRA 21UKEX0012 X

Special conditions in explosive atmospheres:

1. The equipment shall only be used in an area of not more than degree of pollution 2, as defined in EN 60664-1.
2. The equipment shall be installed in a suitable enclosure providing a degree of protection not less than IP54 in accordance with EN IEC 60079-0. The ambient conditions must be taken into consideration for use.
3. Provisions shall be made to prevent the nominal voltage from being exceeded by transient disturbance voltages of more than 119 V.

IECEx approval



According to IEC 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n") and IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements).

Ex nA IIC T4 Gc
IECEx DEK 17.0039 X

OR

According to IEC 60079-7 (Explosive atmospheres - Part 7: Equipment protection by increased safety "e") and IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements).

Ex ec IIC T4 Gc
IECEx DEK 21.0031 X

Special conditions in hazardous areas:

1. The equipment shall only be used in an area of not more than degree of pollution 2, as defined in IEC 60664-1.
2. The device must be installed in a suitable enclosure providing a degree of protection not less than IP54 in accordance with IEC 60079-0. The ambient conditions must be taken into consideration for use.
3. Provisions shall be made to prevent the nominal voltage from being exceeded by transient disturbance voltages of more than 119 V.

CCCEx approval



In accordance with GB/T 3836.3 (Explosive atmospheres - Part 3: Equipment protection by increased safety "e") and GB/T 3836.1 (Explosive atmospheres - Part 1: Equipment - General requirements).

Ex ec IIC T4 Gc

Special conditions in hazardous areas:

- The equipment shall only be used in an area of not more than degree of pollution 2, as defined in GB/T 16935.1.
- The device must be installed in a suitable enclosure providing a degree of protection not less than IP54 in accordance with GB/T 3836.1. The ambient conditions must be taken into consideration for use.
- Provisions shall be made to prevent the nominal voltage from being exceeded by transient disturbance voltages of more than 119 V.

RCM Declaration of conformity for Australia/New Zealand



The marked products meet the requirements of IEC 61000-6-4.

1.6 EMC Directive

The marked products are designed for use in industrial environments.

Industrial environments

- Interference emission requirements to EN 61000-6-4: 2007 + A1:2011
- Immunity to interference requirements to EN 61000-6-2: 2005

1.7 Low-voltage directive

The products listed in the table below fulfill the requirements of EU directive 2014/35/EU, "Low-Voltage Directive". Compliance with this EC directive was tested in accordance with DIN 61131-2 (corresponds to IEC 61131-2).

For SIMATIC TDC / FM458-1DP, affected components include:

Name	Article number
UR5213	6DD1682-0CH0
PS5213	6DD1683-0CH0
UR5213	6DD1682-0CH2
UR6021	6DD1682-0CH3
SB 60	6DD1681-0AF4
SB 70	6DD1681-0AG2
Fan tray	6DD1683-0CH3

These components are compliant with requirements of the Low-voltage Directive.

1.8 Machinery directive

In accordance with the Machinery Directive 2006/42/EC, it must be ensured that a failure or malfunction of SIMATIC TDC / FM458-1DP will not trigger a hazardous state of the machine/plant. This must always be taken into account when configuring the machine/system.

The system may not be commissioned until it has been proven that the final product is in compliance with the directive.

Expert personnel

Only expert personnel may configure, install, commission, service and operate SIMATIC TDC / FM458-1DP.

Input of external voltages

If external voltages supplied from an external power supply are fed to the module inputs of SIMATIC TDC / FM458-1DP (e.g. pulse encoder), the external supply must also be shut down simultaneously on a shutdown or failure of the SIMATIC TDC / FM458-1DP power supply.

1.9 Installation

SIMATIC TDC / FM458-1DP components are considered open equipment that must be installed in a metallic enclosure with shielding bus and equipotential busbar that meets the requirements of IEC 61131-2 (11.1.2; mechanical strength, flame resistance, stability and touch protection are significant here).

1.10 Fire protection

Because the output power exceeds the limit for circuits with power limiting according to IEC 61010-1 / IEC 61131-2, malfunction of the SIMATIC TDC / FM458-1DP component may pose the risk of fire according to IEC 61010-1 / IEC 61131-2. In order to prevent spreading of fire, suitable measures must be taken to prevent ignition of adjacent parts or components as a result of burning parts that possibly drop out of a component.

1.11 Control cabinet

- All control cabinets must be equipped with a grounding/equipotential busbar that must be connected directly to the cabinet frame at both ends.
- It is not allowed to operate contactors without protective circuit in a control cabinet containing SIMATIC TDC / FM458-1DP components.
- If contactors without protective circuit are operated in a control cabinet next to the SIMATIC TDC / FM458-1DP cabinet, the cabinets must be partitioned by means of a sheet steel panel.
- All control cabinets in which SIMATIC TDC / FM458-1DP components are operated must be equipped with a shielding bus. that must be connected directly at both ends to the cabinet frame.
- It is not allowed to use gas discharge lamps in the cabinet.
- The cabinet must be designed to enable unobstructed air convection.

1.12 Equipotential bonding

In order to ensure disturbance-free operation, the networked components may not develop different potentials. For this reason, all components must be interconnected by means of equipotential bonding with a minimum cross-section of 16 mm².

Principle of the connection

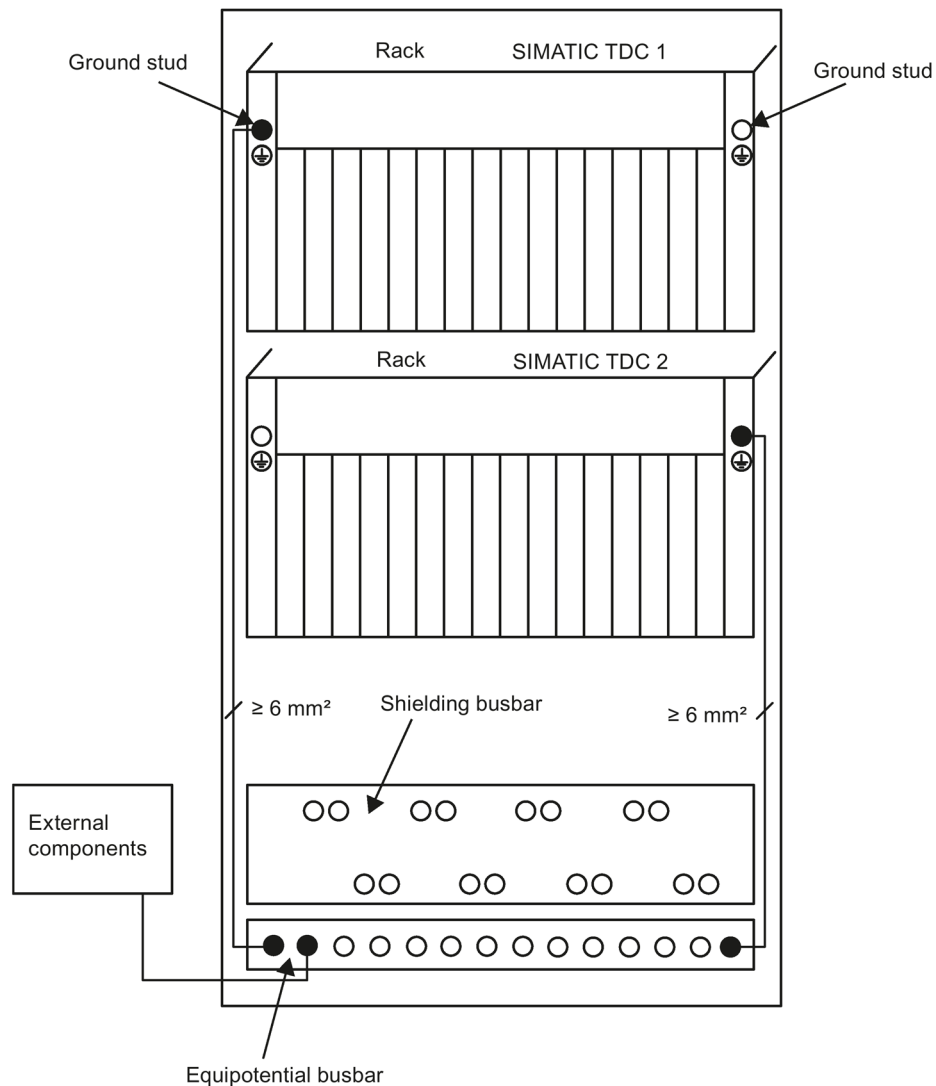
All components (racks, power supplies, etc.) that are connected by signal cables must also be interconnected by means of equipotential bonding (exception: components with fiber-optic connections).

Equipotential busbar

An equipotential busbar should be provided in each control cabinet to facilitate wiring.

All internal and external components must be interconnected with this equipotential busbar.

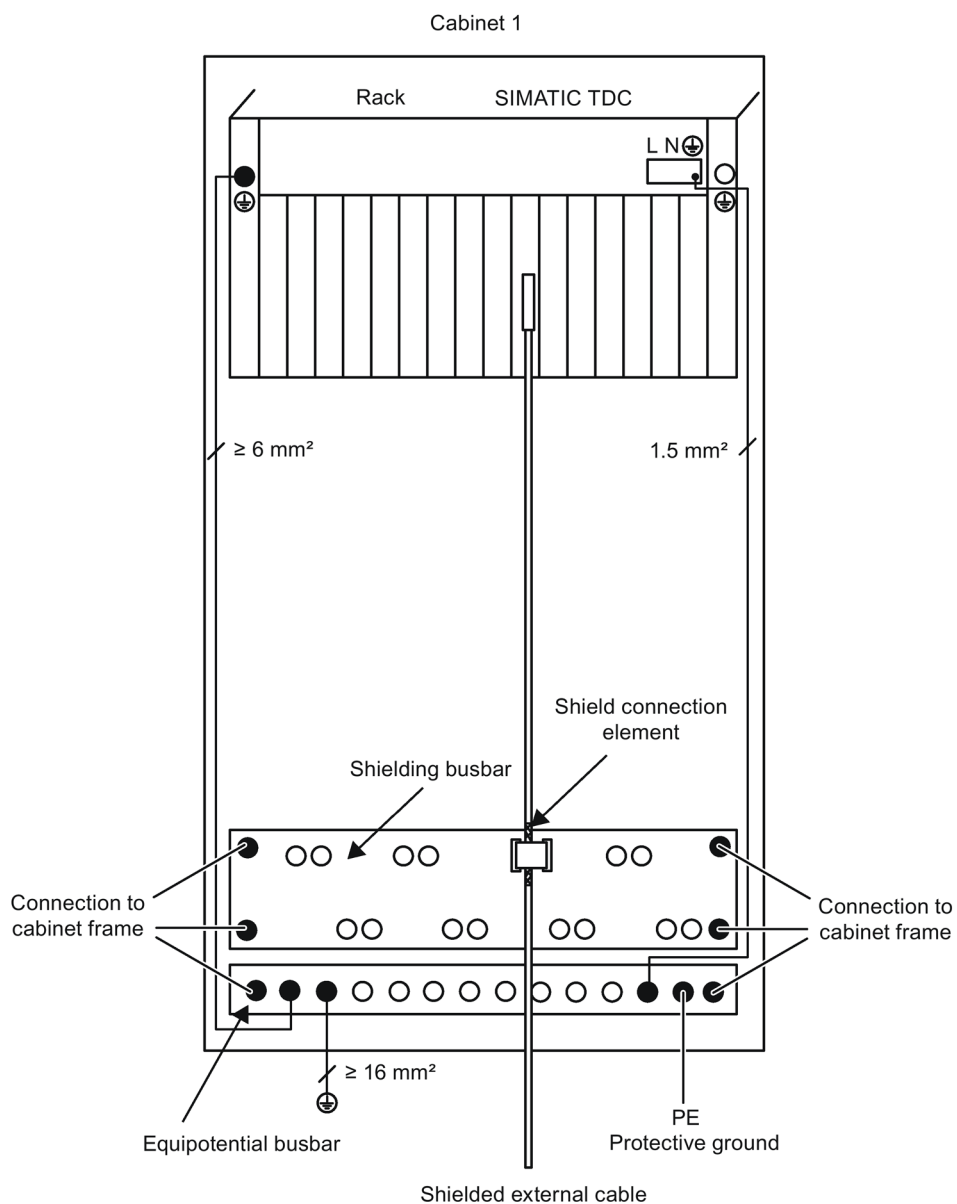
Schematic circuit diagram



Practical application examples

Termination of an external shielded cable

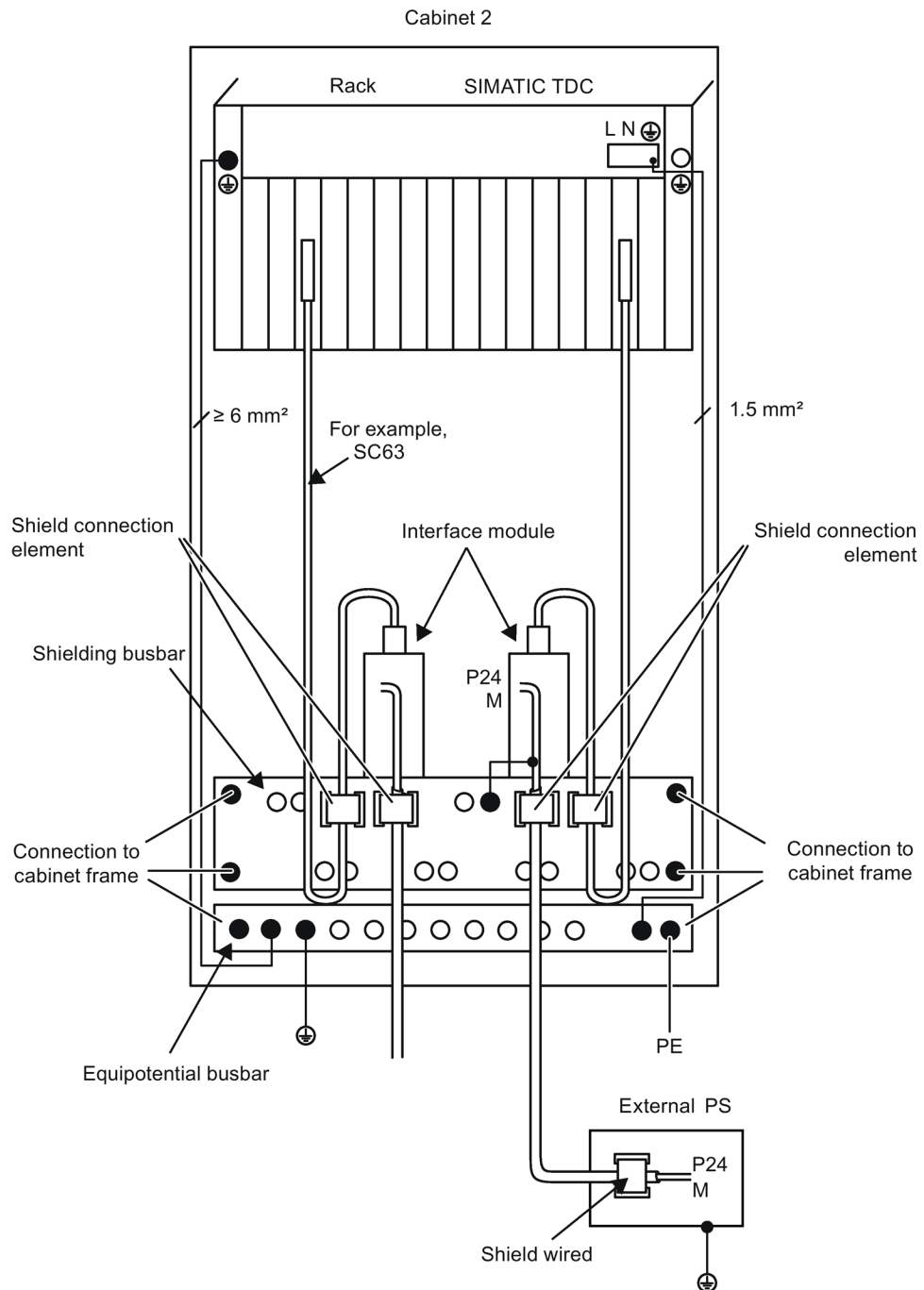
The shield must be connected to the shielding bus.



Termination of an external shielded cable with supply via interface module

The shield must be connected to the shielding bus.

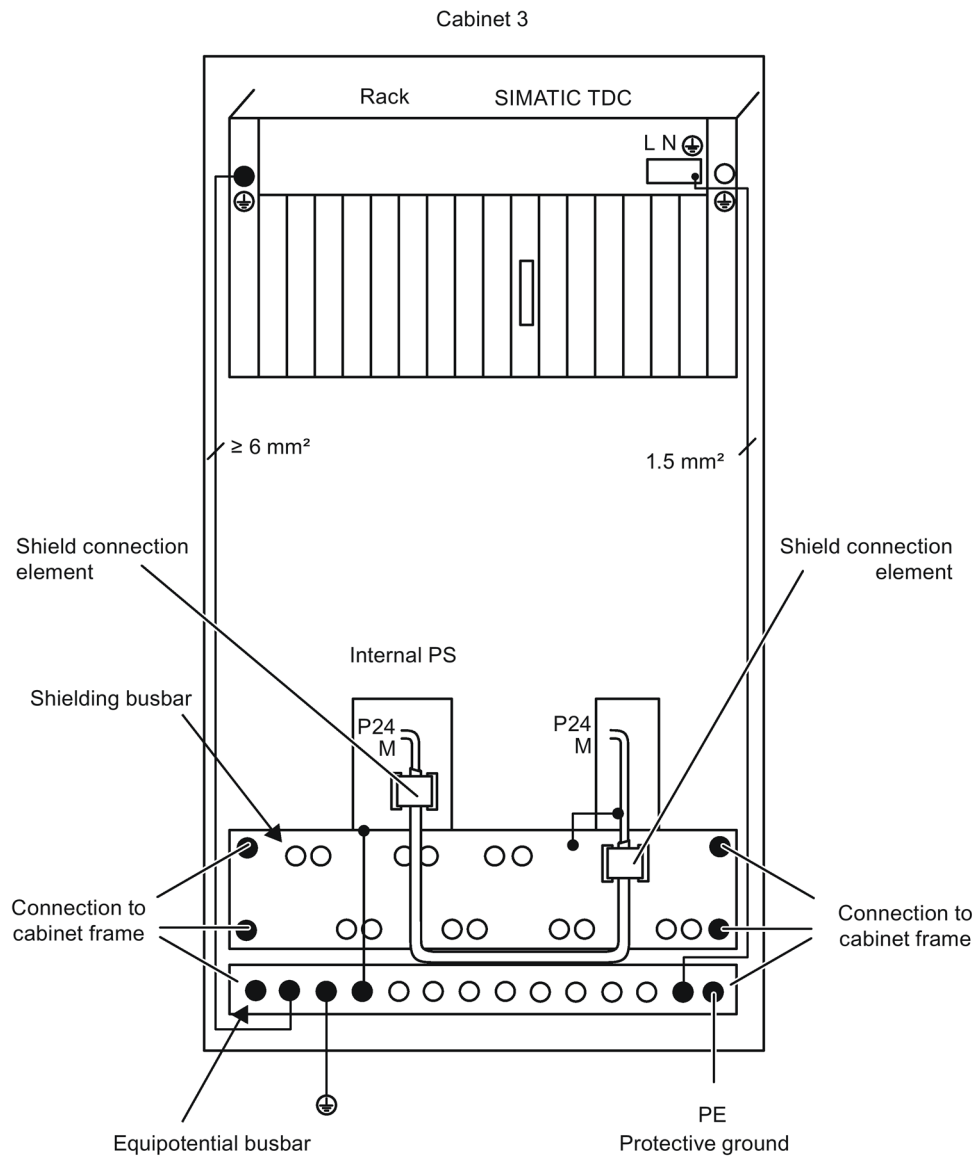
Ground of the external power supply must be wired to the shielding busbar, or to the equipotential busbar.



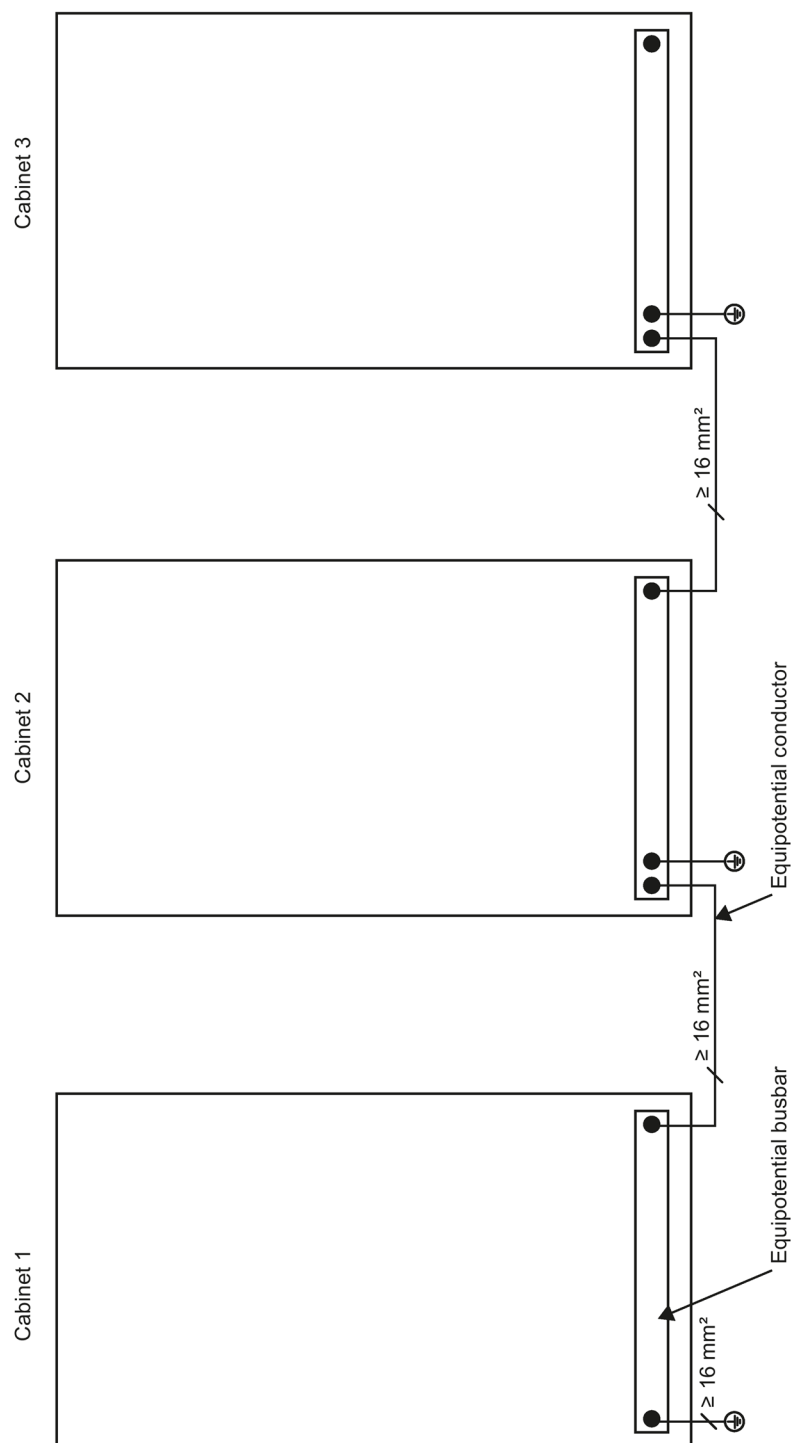
Termination of an internal power supply via interface module

The shield must be connected to the shielding bus.

Ground of the internal power supply must be connected to the shielding busbar, or to the equipotential busbar.



Example of grounding and potential equalization



1.13 Protective ground

Protective ground is bonded to the cabinets or components via PE conductor. This is required in SIMATIC TDC / FM458-1DP for safe operation and as an interference suppression measure.

The protective conductor must be routed and dimensioned in accordance with IEC 61131-2 (11.9).

1.14 Power supply

24 V power supply

To attenuate external interference, a line filter must be provided for the 24 V power supply of the digital inputs and outputs (e.g. SIFI-B line filter, Order No. B84112-B-.... of Epcos/NF 1-1 line filter of Phoenix Contact). This filter should be installed as close as possible to the terminal block. The shield connections of the line filter must be bonded to ground across the shortest possible distance.

The 24 V power supply must also be equipped with lightning/overvoltage protection.

For more information, refer to the installation manual "SIMATIC Automation Systems S7-400, Hardware and Installation (<http://support.automation.siemens.com/WW/view/en/1117849>)".

NOTICE

Network devices

Safe electrical separation according to IEC 61131-2 (11.1.2.1.3) must be ensured for all network devices used to supply power to SIMATIC TDC / FM458-1DP devices and modules.

1.15 Cables

- **All signal cables** you install must be shielded. All cables assembled by users must be wired with strain relief.
- **Serial signal lines** must be shielded. The shield must be bonded to a metalized connector housing, as well as to the shielding busbar. The cable shielding may not be wired to pin 1 of the connector.
- **Power supply cables** for safety extra low voltages (e.g. 24 V DC) must be shielded. A power supply cable that is routed via interface module must be bonded to the shielding busbar as specified in section "Connection via interface module".
- The **ground connection of external power supplies** must be connected to the equipotential busbar. See also section Equipotential bonding (Page 16).
- **Plant-side cables** and cables from the interface module to SIMATIC TDC / FM458-1DP should not be routed in the same cable duct.
- A minimum clearance of > 10 cm must be maintained **between signal lines and power cables** carrying voltages less than 500 V and > 30 cm to power cables carrying voltages of more than 1 kV.

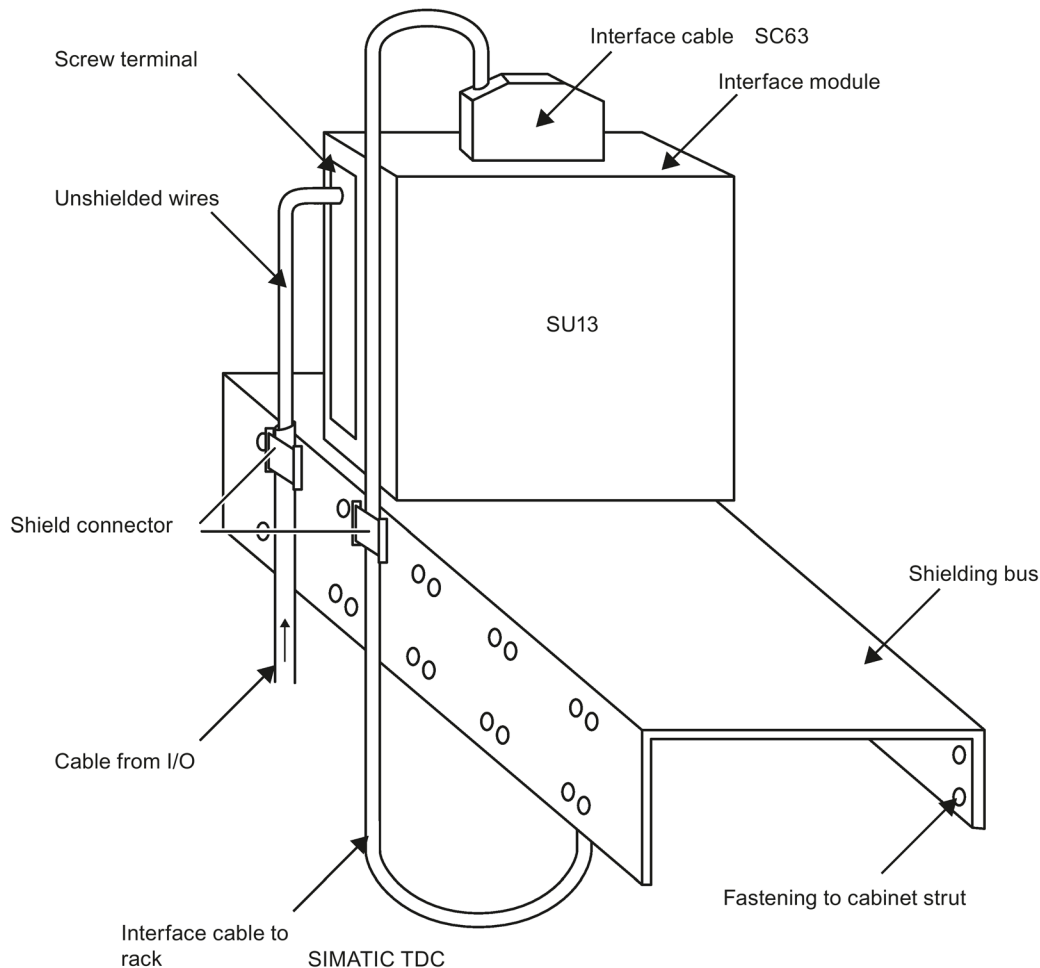
Design and temperature resistance

All cables must be made of copper and be able to resist temperatures of up to at least 90 °C.

Connection via interface module

If interface modules are used, the shields of the plant-side cables and cables from the interface module to SIMATIC TDC / FM458-1DP must be connected directly above or below the interface module. Unshielded conductors that are terminated to screw terminals should be kept as short as possible.

All lines should be kept as short as possible.



1.16 ESD Directives

Almost all of the SIMATIC TDC / FM458-1DP modules contain highly integrated circuits. Due to their technology, these circuits are highly sensitive to overvoltage and, therefore, to ESD.

ESD

The abbreviation stands for **e**lectrostatic **d**ischarge

Modules equipped with such components are identified by the following warning label on component side:



Electrostatic sensitive components can be destroyed by voltages and power levels far below human perception. Components or modules are possibly exposed to such voltages when touched by humans who have not been not electrostatically discharged. Following such voltage peaks, it is usually impossible to identify malfunction of the component immediately, as it needs an extended operating time before such malfunctions are disclosed.

Handling ESD modules

- As a matter of principle, you should never touch electronic modules unless this is unavoidable in the course of work to be carried out on the component.
- Do not touch components unless
 - you are continuously grounded by means of an ESD bracelet, or
 - or by wearing ESD shoes, or ESD shoe grounding strips.
- Always discharge your body before you touch an electronic module. This can be done quite simply by touching a conductive, grounded object immediately before you handle the component (e.g. bright metal parts of the control cabinet, water pipe etc.)
- Modules may not come into contact with highly insulating materials that are subject to electrostatic charge, e.g. plastic foils, insulating table plates, clothing made of artificial fiber.
- Modules must always be placed onto conductive surfaces (table with ESD mat, conductive ESD foam rubber, ESD packaging bags, ESD transport containers, cardboard or paper mats).
- Modules may not be brought close to data terminals, monitors, or television sets.

Measuring and modifying ESD modules

- Measurements may only be taken on the modules when
 - The measuring device is grounded (e.g. via PE conductor), or
 - The measuring head has been briefly discharged (e.g. by touching a bright metal part of the control enclosure) prior to measurement with an electrically isolated measuring device.

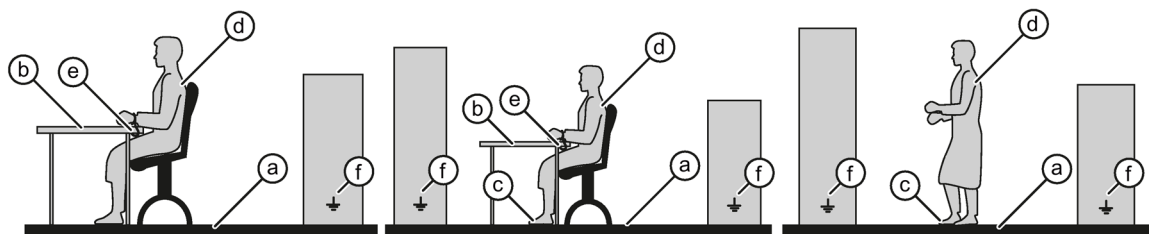
Always use ESD soldering irons for soldering work on modules, or at least grounded soldering tips.

Shipping modules

Modules and components must always be stored and shipped in conductive packing materials (e.g. metalized plastic boxes, metal containers).

If using non-conductive packaging, you must protect the modules with a wrapping of made of conductive material, e.g. conductive foam rubber, or household aluminum foil.

The following figure once again emphasizes the necessary ESD protective measures.



- a Conductive flooring
- d ESD coat
- b ESD tables = ESD chain
- c ESD shoes
- f Ground connection of the cabinets
- e ESD bracelet

General technical specifications

2.1 Climatic conditions

Table 2- 1

Storage and transport conditions	IEC 60721 Part 3-2 Class 2K1, without condensation
Storage temperature	-40 °C to +70 °C
Operating conditions	IEC 60721 Part 3-3 Class 3K3, stationary use, weather-protected
Operating temperatures (air intake temperature)	0 °C to +60 °C
Atmospheric pressure	
Storage	1080 to 660 hPa (corresponds to -1000 m to +3500 m)
Operation	1080 to 795 hPa (corresponds to -1000 m to +2000 m)
Pollutant stress	
Gases posing the risk of malfunction	ISA-71.04 severity level G3 SO ₂ 10 cm ³ /m ³ H ₂ S 1 cm ³ /m ³
Dust posing the risk of malfunction	Conditions of use according to IEC 60721, Part 3-3; Class 3S2 (without sand in air)

2.2 Electrical protection and safety requirements

Safety regulations	IEC 61131-2
Protection class	Protection class I (with PE/ground conductor)
Protection against the ingress of foreign particles and water	IP 20

2.3 External supply of the SIMATIC TDC / FM458 modules (digital outputs)

Safety extra low voltage (SELV/PELV circuit) to IEC 60364-4-41.

2.4 Mechanical requirements

The following table provides information on the type and scope of checks regarding mechanical ambient conditions.

Tested for	Test standard	Note
Vibrations	Vibration test according to IEC 60068-2-6 (sine)	Type of vibration: Frequency cycles with a rate of change of 1 octave/minute $10 \text{ Hz} \leq f \leq 58 \text{ Hz}$, constant amplitude 0.075 mm $58 \text{ Hz} \leq f \leq 150 \text{ Hz}$, constant acceleration 1 g Duration of vibration: 10 frequency cycles per axis in each of the 3 axes which are perpendicular to each other
Shock	Shock test according to IEC 60068-2-27	Type of shock: half-sine Strength of shock: 10 g peak value, 16 ms duration Shock direction: 3 shocks each in +/– direction in each of the three perpendicular axes

2.5 Electromagnetic requirements (industry)

Interference emission	EN 61000-6-4 : 2007 + A1:2011
Immunity to interference	EN 61000-6-2 : 2005

NOTICE

Using two-way radios and mobile telephones

If two-way radios and mobile phones are used in the direct vicinity of SIMATIC TDC / FM458-1DP, this can adversely affect its operating behavior.

Interface modules

3.1 Interface module SB10

Article number

6DD1681-0AE2

Description

The interface module passes digital signals from SIMATIC TDC / FM458-1DP components to the plant **or** receives digital signals from the plant and passes them to SIMATIC TDC / FM458-1DP components. The interface module is connected to SIMATIC TDC / FM458-1DP components via cables SC62 or SC66 and on the plant side via terminals. There is no electrical isolation between the SIMATIC TDC / FM458-1DP component side and the plant side.

Module design

- Enclosure for snap-on mounting to rails
- Ribbon cable connector (X1):
 - 8 pins for digital signals, 24 V DC
 - 2 pins for 1P, 1M supply voltages
- Connector (X2), 2x 8-pole:
 - 8 terminals for 24 V DC digital signals
 - 8 terminals for reference potentials (1M, 1P is also possible)
- 1 terminal pair X3: 1P and 1M
- Double test socket X5: 1P(+), 1M(G)
- LED displays for diagnostics

Voltage supply on SIMATIC side

The SIMATIC TDC / FM458-1DP-side voltage supply is fed to terminal X3:

Terminal X3	Voltage on SIMATIC TDC / FM458-1DP side
1P	+24 V
1M	0 V

The cables are connected with the SM11 parts kit "Power supply connector for interface modules" (article number: 6DD1680-0BB0).

The maximum conductor cross-section at terminal X3 is 2.5 mm².

Green LED

The SIMATIC TDC / FM458-1DP-side voltage supply is indicated by a green LED (P).

Red LED

The SIMATIC TDC / FM458-1DP-side voltage supply (1P, 1M) is short-circuited (fault).

Test socket

By means of the double test socket (G; +), the voltages 1P and 1M can be used to simulate an input signal for SIMATIC TDC / FM458-1DP.

Double test socket X5	Voltage
+ (1P of X3)	+24 V
G (1M of X3)	0 V

 WARNING
Explosion hazard It is not allowed to use the X5 test sockets in potentially explosive environments.

Note

For connection of the voltage supply, observe the information in section Installation and EMC guidelines (Page 7).

3.1.1 Signals

Yellow LED

The status of each of the 8 signals (1...8) is displayed by means of a yellow LED. Each signal is provided a screw terminal on the two terminal blocks X2:

- Terminals 1 to 8 for digital signals
- Terminals 51 to 58 for reference points

Reference potential of the signals

The reference points of the signals may be derived from 1M or 1P potential. The polarity is selected on the module by means of soldering bridge:

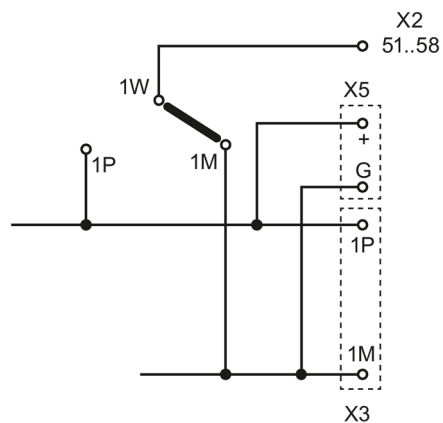


Figure 3-1 Soldering bridge for setting the signal reference points

Note

Bridge 1M-1W is inserted in the factory

3.1.2 Application notes

The interface module is suitable for vertical **and** horizontal mounting positions.

Other information

For more information on EMC and ambient conditions, refer to section General technical specifications (Page 26).

Example

The following figure shows a typical application:

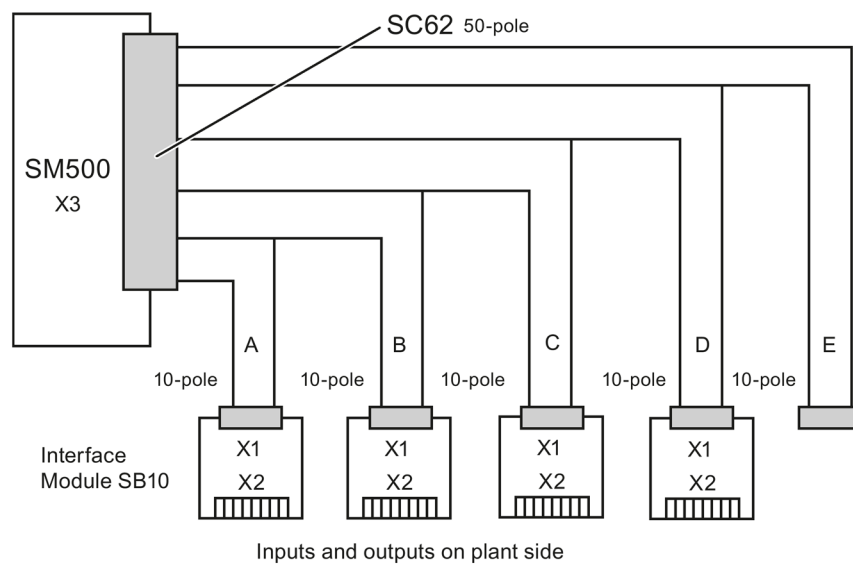


Figure 3-2 Application example of an SB10 interface module on the digital I/O module SM500

The plant-side digital signals are connected directly to the SIMATIC TDC / FM458-1DP modules via the interface module. A cable SC62 is used accordingly.

3.1.3 Technical specifications

General data

Mounting system	Suitable for snap-on mounting on rails
Dimensions W x H x D [mm]	45 x 129 x 160 mm
Weight	0.3 kg

Ambient temperatures

Ambient temperatures	max. 60 °C
----------------------	------------

Power supply

Description		SIMATIC TDC / FM458-1DP
Supply voltage (V _v) at rated value		DC 24 V
Valid range		20.4 V to 28.8 V DC
Briefly t<500 ms		1.5 x V _{rated}
Current consumption		
	At rated value ¹⁾	20 mA
	Maximum current per supply line	400 mA
¹⁾ LED intrinsic consumption without load on system modules		

The maximum current of 1 A may not be exceeded on connector X3 if the supply of several terminal blocks is routed via this connector.

Digital signals

Number	8
Rated voltage	DC 24 V
Maximum current per channel	30 mA

3.1.4 Pin assignment

Ribbon cable connector X1

The cables SC62 or SC66 are used to connect the interface modules to the SIMATIC TDC / FM458-1DP components.

Terminal block X2

Table 3- 1 Pin assignment of the digital I/O of interface module SB10

Terminal	Designation
1	Channel 1 (digital input/output 1)
2	Channel 2 (digital input/output 2)
3	Channel 3 (digital input/output 3)
4	Channel 4 (digital input/output 4)
5	Channel 5 (digital input/output 5)
6	Channel 6 (digital input/output 6)
7	Channel 7 (digital input/output 7)
8	Channel 8 (digital input/output 8)
51	Reference busbar, 1M (1P can be set)
52	Reference busbar, 1M (1P can be set)
53	Reference busbar, 1M (1P can be set)
54	Reference busbar, 1M (1P can be set)
55	Reference busbar, 1M (1P can be set)
56	Reference busbar, 1M (1P can be set)
57	Reference busbar, 1M (1P can be set)
58	Reference busbar, 1M (1P can be set)

Cable cross-section

The minimum conductor cross-section for the terminal block X1 is 0.2mm² and the maximum is 2.5 mm².

3.1.5 Block diagram

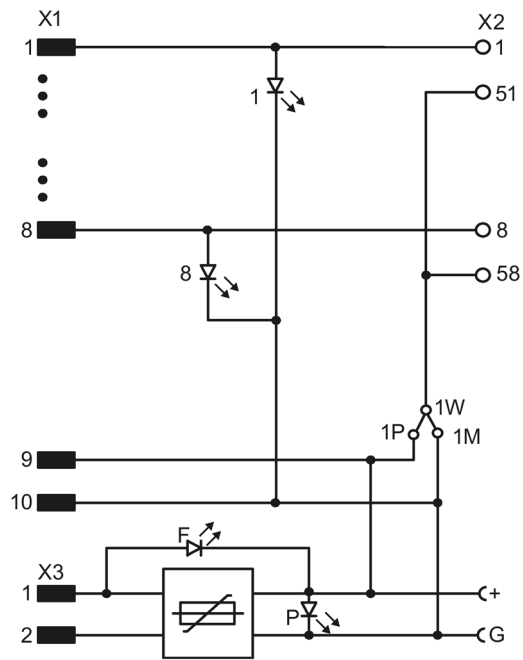


Figure 3-3 Block diagram of interface module SB10

3.2 Interface module SB60

Article number

6DD1681-0AF4

Description

Interface module SB60 is used to adapt 8 digital input signals with electrical isolation to the signal level of SIMATIC TDC / FM458-1DP by means of an optocoupler. The input signal voltage can amount to 120 V DC or AC.

Safe electrical separation exists between the eight digital inputs and the SIMATIC TDC / FM458-1DP rack. The eight digital inputs are electrically isolated with respect to one another.

The cables SC62 or SC66 are used to connect the interface modules to the SIMATIC TDC / FM458-1DP components.

Module design

- Enclosure for snap-on mounting to rails
- Ribbon cable connector (X1):
 - 8 pins for digital outputs
 - 2 pins for 1P, 1M
- Connector (X2), 2x 12-pole:
 - 8 terminals for 120 V digital inputs
 - 8 terminals for reference potentials
- 1 terminal pair X3:
 - 1P and 1M for the SIMATIC TDC / FM458-1DP-side voltage
- LED displays for diagnostics
- Optocoupler for electrical isolation between inputs and outputs

Voltage supply on SIMATIC side

The SIMATIC TDC / FM458-1DP-side voltage supply is fed to terminal X3:

Terminal X3	Voltage on SIMATIC TDC / FM458 side
1P	+24 V
1M	0 V

The cables are connected with the SM11 parts kit "Power supply connector for interface modules" (article number: 6DD1680-0BB0). The maximum conductor cross-section at terminal X3 is 2.5 mm².

Note

For connection of the voltage supply, observe the information in section Installation and EMC guidelines (Page 7).



WARNING

Safe electrical isolation is guaranteed only between the inputs and outputs

The system side (rack including 24V power supply) is safely isolated from dangerous voltages on plant side (8 output signals).

The input circuits are only galvanically isolated.

The input circuits on plant side are only isolated galvanically. Circuits consisting of combinations of safety extra-low voltage and hazardous voltages are not allowed.

Green LED

The SIMATIC TDC / FM458-1DP-side voltage supply (1P, 1M) is indicated by a green LED (P).

Red LED

The SIMATIC TDC / FM458-1DP-side voltage supply (1P, 1M) is short-circuited (fault).

3.2.1 Signals

Signals up to a maximum of 120 V (nominal value) DC or AC can be connected at the SB60 interface module.

Yellow LED

The state of the digital outputs of the interface module (digital inputs for SIMATIC TDC / FM458-1DP) is indicated by yellow LEDs (1...8).

Terminal block X2 provides two screw terminals for each signal:

- terminals 12, 22, ... up to 82 for binary signals 120 V
- terminals 11, 21, ... up to 81 for the reference point

Note

For connection of the signal voltage to the terminals, observe the information in section Installation and EMC guidelines (Page 7).

3.2.2 Application notes

The interface module is designed **only for vertical mounting positions** due to thermal losses to be dissipated.

Other information

For more information on EMC and ambient conditions, refer to section General technical specifications (Page 26).

3.2.3 Technical specifications

General data

Mounting system	Suitable for snap-on mounting on rails
Dimensions W x H x D [mm]	45 x 129 x 160 mm
Weight	0.3 kg

Ambient temperatures

Ambient temperatures	max. 60 °C
----------------------	------------

Power supply

Supply voltage (V _s)	
Rated value	24 V DC
Valid range	20.4 V to 28.8 V DC
Briefly t<500 ms	1.5 x V _{rated}
Rated current consumption	90 mA

The maximum current of 1 A may not be exceeded on connector X3 if the supply of several terminal blocks is routed via this connector.

Digital inputs

Number	8
Nominal input voltage	AC/DC 120 V
'1 signal'	98 V to 132 V
'0 signal'	0 V to 33 V ¹⁾
Input current ('1signal')	Max. 3 mA
Dielectric strength	Safety isolation guaranteed: - between inputs and outputs Electrical isolation guaranteed: - between input circuits Test voltage 1125 V AC
¹⁾ or open-circuit input	

3.2.4 Pin assignment

Flat connector X1

The cables SC62 or SC66 are used to connect the interface modules to the SIMATIC TDC / FM458-1DP components.

Digital inputs terminal block X2

Table 3- 2 Pin assignment of the digital inputs of interface module SB60

Terminal	120 V	Channel No.
11	Reference	Channel 1
21	Reference	Channel 2
31	Reference	Channel 3
41	Reference	Channel 4
51	Reference	Channel 5
61	Reference	Channel 6
71	Reference	Channel 7
81	Reference	Channel 8
12	120 V input	Channel 1
22	120 V input	Channel 2
32	120 V input	Channel 3
42	120 V input	Channel 4
52	120 V input	Channel 5
62	120 V input	Channel 6
72	120 V input	Channel 7
82	120 V input	Channel 8
14	n.c.	Channel 1
24	n.c.	Channel 2
34	n.c.	Channel 3
44	n.c.	Channel 4
54	n.c.	Channel 5
64	n.c.	Channel 6
74	n.c.	Channel 7
84	n.c.	Channel 8

Conductor cross-section

The minimum conductor cross-section for the terminal block X1 is 0.2mm² and the maximum is 2.5 mm².

3.2.5 Block diagram

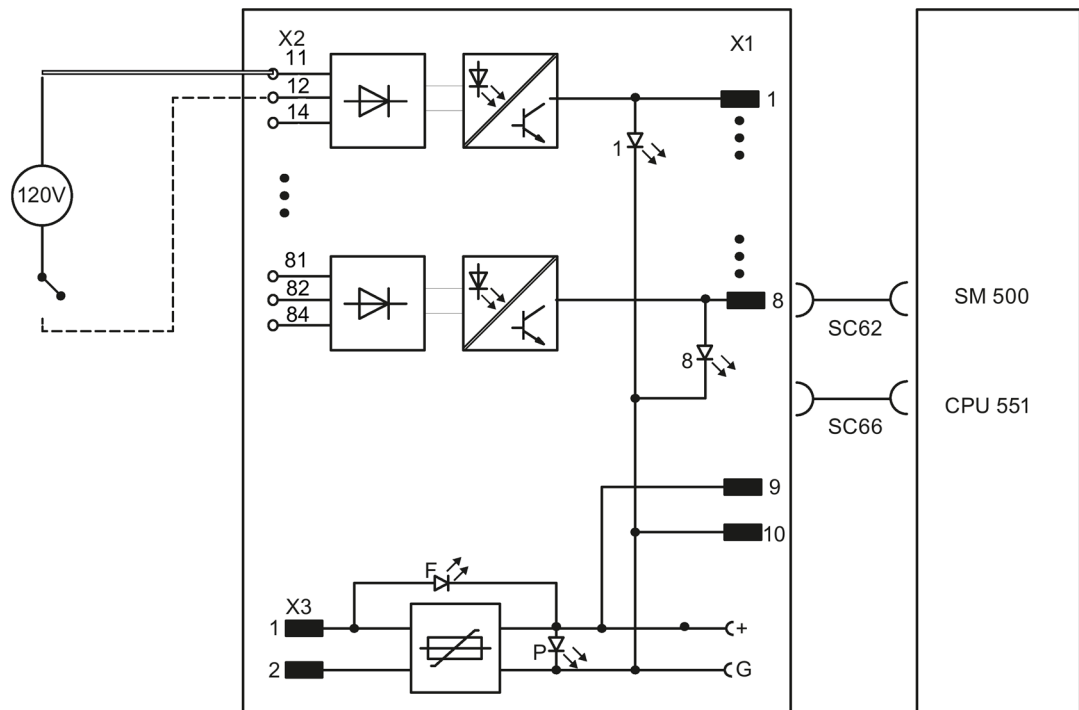


Figure 3-4 Block diagram of interface module SB60

3.3 Interface module SB61

Article number

6DD1681-0EB3

Description

Interface module SB61 is used to adapt 8 digital DC signals with electrical isolation to the signal level of SIMATIC TDC / FM458-1DP components.

The cables SC62 or SC66 are used to connect the interface modules to the SIMATIC TDC / FM458-1DP components.

Module design

- Enclosure for snap-on mounting to rails
- Ribbon cable connector (X1):
 - 8 pins for digital outputs
 - 2 pins for 1P, 1M
- Connector (X2), 2x 12-pole:
 - 8 terminals for 24 V digital inputs
 - 8 terminals for 48 V digital inputs
 - 8 terminals for reference potentials
- 1 terminal pair X3: 1P, 1M (SIMATIC TDC / FM458-1DP-side voltage supply)
- 1 terminal pair X4: 2P, 2M (voltage supply on plant side)
- Pin header for short-circuit plugs
- Double test socket X5: 2P (+), 2M (G)
- LED displays for diagnostics
- Optocoupler for electrical isolation between inputs and outputs

Voltage supply on SIMATIC side

The SIMATIC TDC / FM458-1DP-side voltage supply is fed to terminal X3:

Terminal X3	Voltage on SIMATIC TDC / FM458-1DP side
1P	+24 V
1M	0 V

The cables are connected with the SM11 parts kit "Power supply connector for interface modules" (article number: 6DD1680-0BB0).

The maximum conductor cross-section at terminal X3 is 2.5 mm².

Green LED

The SIMATIC TDC / FM458-1DP-side voltage supply (1P, 1M) is indicated by a green LED (P).

Red LED

The SIMATIC TDC / FM458-1DP-side voltage supply (1P, 1M) is short-circuited (fault).

3.3.1 Signals

Voltage supply on plant side

24/48 V DC is available for the system side signals at terminal block X4:

Terminal X4	Voltage on plant side
2P	+24/48 V
2M	0 V

The cables are connected with the SM11 parts kit "Power supply connector for interface modules" (article number: 6DD1680-0BB0).

The maximum conductor cross-section at terminal X4 is 2.5 mm².

Test socket

The power supply for the plant/system side is available at double test socket X5 (G; +):

Double test socket X5	Voltage on plant side
+(2P of X4)	+24/48 V
G(2M of X4)	0 V



WARNING

Explosion hazard

It is not allowed to use the X5 test sockets in potentially explosive environments.

Note

For connection of the voltage supply, observe the information in section Installation and EMC guidelines (Page 7).

Yellow LED

The status of each of the eight signals is displayed by a yellow LED (1...8).

Terminal block for digital signals

There are three screw connections on terminal strip X2 for each signal:

- terminals 1 to 8 for 24 V binary signals
- terminals 11 to 18 for 48 V binary signals
- Terminals 51 to 58 for reference potential

3.3.2 Application notes

Plant/system-side signal voltages of 48V or 24V DC can be processed using the interface module. The plant/system side of the module has 8 electrically isolated input channels. Using short-circuit connectors (X11), the connection of each channel can be electrically isolated from one another, or connected to a common reference point:

Inputs, electrically isolated

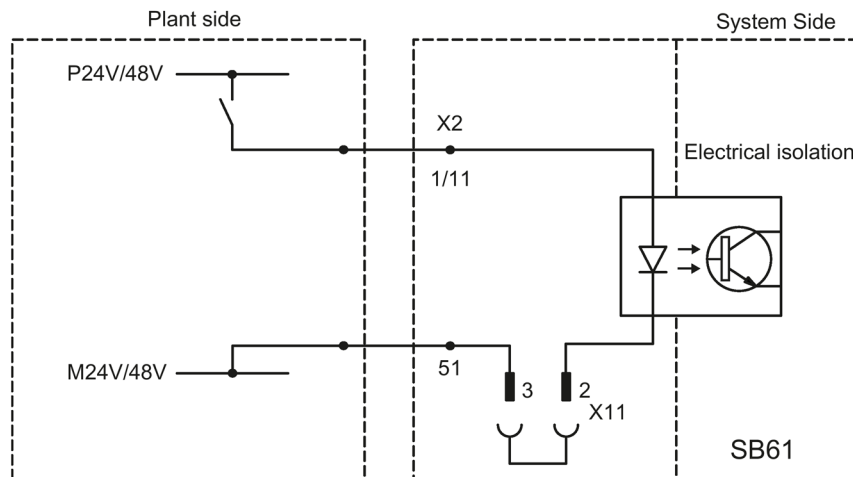


Figure 3-5 Position of the jumpers for electrically isolated inputs

Inputs with common reference potential

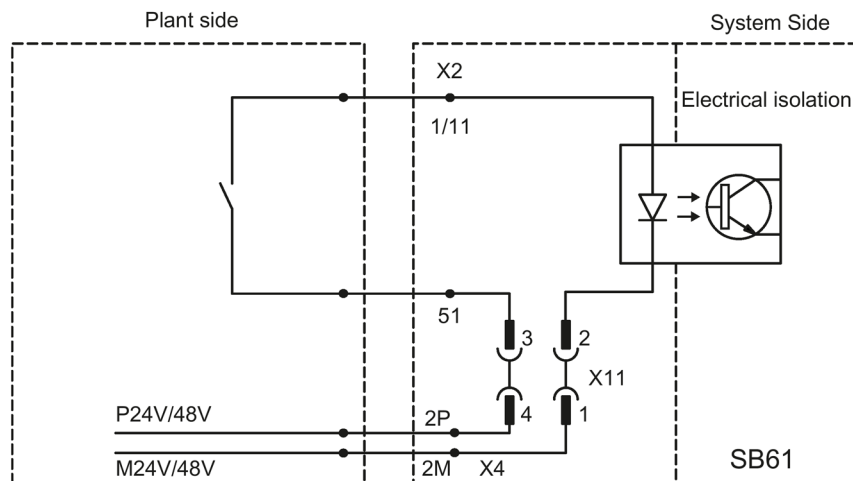


Figure 3-6 Position of the jumpers for inputs with common reference potential

! CAUTION

All outputs have a common reference potential in delivery state, i. e. each terminal pair X11 to X18 is equipped with two short-circuit plugs.

Position of the jumpers

The jumpers (short-circuit plugs) are located in enclosure behind the lid section facing away from the LEDs. These are **only accessible after the interface module has been removed**.

The potential assignment between the plant and system side is defined as follows:

Table 3- 3 Position of the short-circuit plug (jumper)

Reference potential of inputs	Position of the short-circuit plug (jumper)
The input circuits are additionally electrically isolated	Connector X1n ¹⁾ :2:3 inserted
Inputs with common reference potential	Connector X1n :1:2 and X1n :3:4 inserted
¹⁾ n = number of input 1 to 8	

Note

The **potential reference** can be set separately for each input.

The interface module is designed **only for vertical mounting positions** due to thermal losses to be dissipated.

Other information

For more information on EMC and environmental conditions, refer to section "General technical specifications (Page 26)"!

The following figure shows a typical application:

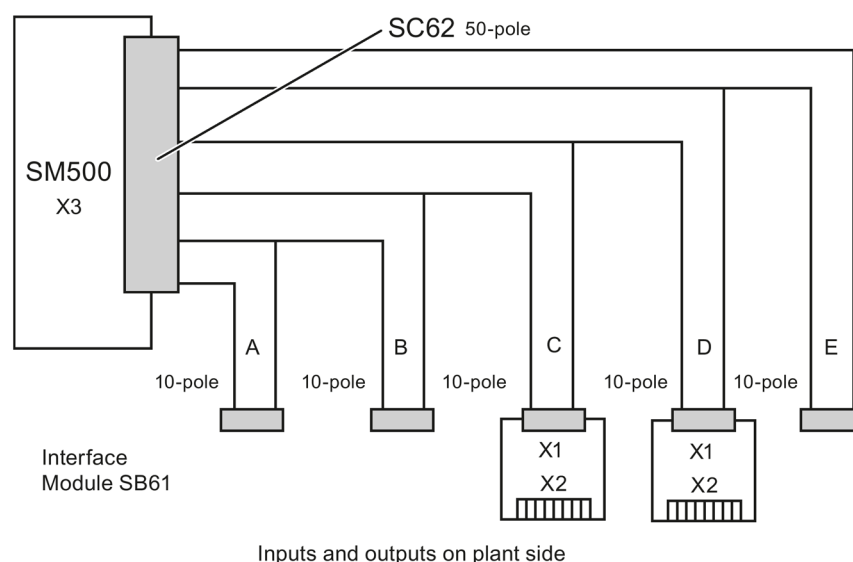


Figure 3-7 Application example of an SB61 interface module on digital I/O module SM500

3.3.3 Technical specifications

General data

Mounting system	The enclosure is suitable for snap-on mounting to rails
Dimensions W x H x D [mm]	45 x 129 x 160 mm
Weight	0.3 kg

Ambient temperatures

Ambient temperatures	max. 60 °C
----------------------	------------

Power supply

	SIMATIC TDC / FM458-1DP	Plant side 24 V DC	Plant side 48 V DC
Supply voltage (V _s)	DC 24 V	DC 24 V	DC 48 V
Valid range	20 V DC to 30 V DC	20 V DC to 30 V DC	40 V DC to 60 V DC
Briefly t<500 ms	1.5 x V _{rated}	1.5 x V _{rated}	1.5 x V _{rated}
Rated current consumption	90 mA	50 mA	50 mA

The maximum current of 1 A may not be exceeded on connector X3 if the supply of several terminal blocks is routed via this connector. The maximum current of 2 A may not be exceeded on connector X4 if the supply of several terminal blocks is routed via this connector.

Digital inputs

	Plant side 24 V DC	Plant side 48 V DC
Number	8	8
Input voltage for		
'1 signal'	13 V DC to 30 V DC	26 V DC to 60 V DC
'0 signal'	-3 V to +6 V ¹⁾	-3 V to +12 V ¹⁾
Input current ('1signal')	6 mA	6 mA
¹⁾ or open-circuit input		

3.3.4 Pin assignment

Flat connector X1

The cables SC62 and SC66 are used to connect the interface modules to the SIMATIC TDC / FM458-1DP components (for more information, refer to the SIMATIC TDC / FM458-1DP documentation).

Digital inputs, terminal block X2

Table 3- 4 Pin assignment of the digital inputs of interface module SB61

Terminal	Inputs, electrically isolated	Inputs with common reference potential	Channel No.
1	+24 V input		Channel 1
2	+24 V input		Channel 2
3	+24 V input		Channel 3
4	+24 V input		Channel 4
5	+24 V input		Channel 5
6	+24 V input		Channel 6
7	+24 V input		Channel 7
8	+24 V input		Channel 8
11	+48 V input		Channel 1
12	+48 V input		Channel 2
13	+48 V input		Channel 3
14	+48 V input		Channel 4
15	+48 V input		Channel 5
16	+48 V input		Channel 6
17	+48 V input		Channel 7
18	+48 V input		Channel 8
51	Input 24 V/48 V	2P(+24 V)	Channel 1
52	Input 24 V/48 V	2P(+24 V)	Channel 2
53	Input 24 V/48 V	2P(+24 V)	Channel 3
54	Input 24 V/48 V	2P(+24 V)	Channel 4
55	Input 24 V/48 V	2P(+24 V)	Channel 5
56	Input 24 V/48 V	2P(+24 V)	Channel 6
57	Input 24 V/48 V	2P(+24 V)	Channel 7
58	Input 24 V/48 V	2P(+24 V)	Channel 8

Conductor cross-section

The minimum conductor cross-section for the terminal block X1 is 0.2mm² and the maximum is 2.5 mm².

3.3.5 Block diagram

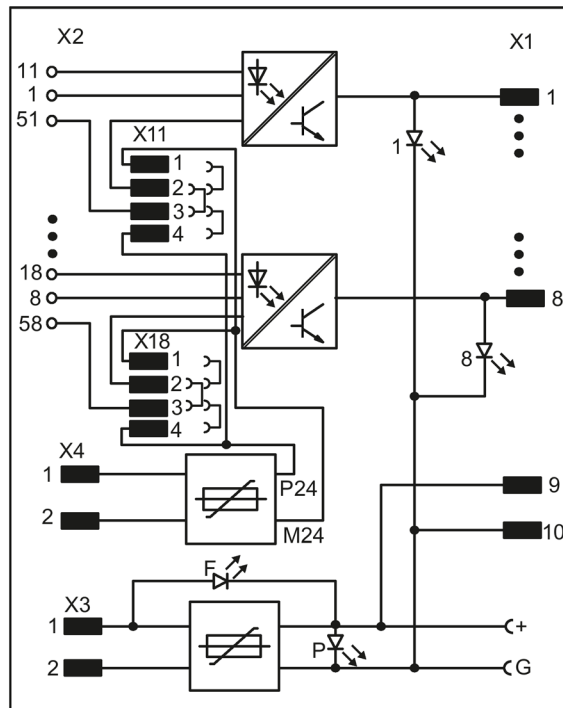


Figure 3-8 Block diagram of interface module SB61

3.4 Interface module SB70

Article number

6DD1681-0AG2

Description

Interface module SB70 is used to adapt 8 digital output signals from SIMATIC TDC / FM458-1DP with electrical isolation to the signal level of the plant by means of relays.

The voltage of the output signal may amount up to max. 120 V DC or AC.

The cable SC62 is used to connect the interface modules to the SIMATIC TDC / FM458-1DP components (for more information, refer to the SIMATIC TDC / FM458-1DP documentation).

Module design

- Enclosure for snap-on mounting to rails
- Ribbon cable connector (X1):
 - 8 pins for digital inputs
 - 2 pins for 1P, 1M
- Connector (X2), 2x 12-pole
 - 8 terminals for the NO contact
 - 8 terminals for the NC contact
 - 8 terminals for the center contact
- 1 terminal pair X3: 1P, 1M (SIMATIC TDC / FM458-1DP-side voltage)
- Double test socket X5: 1P(+), 1M(G)
- LED displays for diagnostics
- Relays for the electrical isolation of inputs and outputs
- PTC thermistor as line protection downstream of the SIMATIC TDC / FM458-1DP-side voltage supply

Voltage supply on SIMATIC side

The SIMATIC TDC voltage supply is fed to terminal X3:

Terminal X3	Voltage on SIMATIC TDC / FM458-1DP side
1P	+24 V
1M	0 V

The cables are connected with the SM11 parts kit "Power supply connector for interface modules" (article number: 6DD1680-0BB0).

The maximum conductor cross-section at terminal X3 is 2.5 mm².

Note

For connection of the voltage supply, observe the information in the user manual in section Installation and EMC guidelines (Page 7).

WARNING

Isolation

Safe electrical isolation is guaranteed only between the inputs and outputs

The system side (rack including 24 V power supply) is safely isolated from hazardous voltages on plant side (8 output signals).

The output circuits are only isolated galvanically.

The output circuits on plant side are only isolated galvanically. Circuits consisting of combinations of safety extra-low voltage and hazardous voltages are not allowed.

Green LED

The SIMATIC TDC / FM458-1DP-side voltage supply is indicated by a green LED (P).

Red LED

The SIMATIC TDC / FM458-1DP-side voltage supply (1P, 1M) is short-circuited (fault).

Test socket

The SIMATIC TDC / FM458-1DP-side supply voltage is applied at the double test socket X5 (G; +):

Double test socket X5	Voltage on SIMATIC TDC / FM458-1DP side
+ (1P of X3)	+24 V
G (1M of X3)	0 V

3.4.1 Signals

Yellow LED

The status of each of the 8 signals (1...8) is displayed by means of a yellow LED.

Terminal block for digital signals

Terminal block X2 provides three screw terminals for each signal to the plant side:

- Terminals 14, 24 ... to 84 for NO contacts
- Terminals 12, 22 ... up to 82 for NC contacts

Terminals 11, 21 ... to 81 as center contact. The corresponding relay contacts are determined as follows:

Idle state	Connections (screw terminals)
Contact closed (normally closed contact)	n2 - n1 ¹⁾
Contact open (normally open contact)	n4 - n1
¹⁾ n: 1...8, depending on the channel number	

Note

For connection of the signal voltage to the relay contacts, observe the information in section Installation and EMC guidelines (Page 7).

3.4.2 Application notes

The interface module is suitable for vertical and horizontal mounting positions

Other information

For more information on EMC and ambient conditions, refer to section General technical specifications (Page 26).

The following figure shows a typical application:

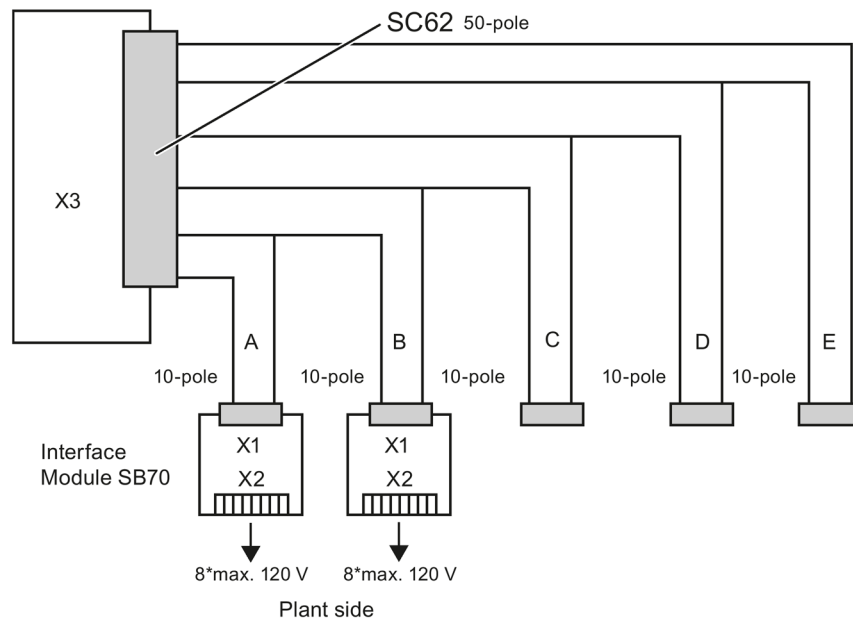


Figure 3-9 Application example of an SB70 interface module on digital I/O module SM500

The digital inputs of the interface module are connected to the outputs of SIMATIC TDC / FM458-1DP via the cable SC62.

3.4.3 Technical specifications

General data

Mounting system	Housing can be snapped onto mounting rails
Dimensions W x H x D [mm]	45 x 129 x 160 mm
Weight	0.3 kg

Ambient temperatures

Ambient temperatures	max. 60 °C
----------------------	------------

Power supply

Rated supply voltage (V _s)	24 V DC
Valid range	20.4 V to 28.8 V DC
Briefly t<500 ms	1.5 x V _{rated}
Rated current consumption	150 mA

The maximum current of 1 A may not be exceeded on connector X3 if the supply of several terminal blocks is routed via this connector.

Digital outputs

Number	8
Switching characteristics of the relay contacts	
AC 120 V	2 A
DC 120 V	0.4 A
DC 60 V	1 A
< DC 35 V	2 A
Switching frequency	Max. 20 Hz
Dielectric strength	Safety isolation guaranteed: - between inputs and outputs Electrical isolation guaranteed: - between input circuits 1125 V AC test voltage

3.4.4 Pin assignment

Flat connector X1

The cable SC62 is used to connect the interface modules to the SIMATIC TDC / FM458-1DP components (for more information, refer to the SIMATIC TDC / FM458-1DP documentation).

Digital inputs, terminal block X2

Table 3- 5 Pin assignment of the digital inputs of interface module SB70, terminal block X2

Terminal	120 V	Channel No.
11	Center contact	Channel 1
21	Center contact	Channel 2
31	Center contact	Channel 3
41	Center contact	Channel 4
51	Center contact	Channel 5
61	Center contact	Channel 6
71	Center contact	Channel 7
81	Center contact	Channel 8
12	NC contact	Channel 1
22	NC contact	Channel 2
32	NC contact	Channel 3
42	NC contact	Channel 4
52	NC contact	Channel 5
62	NC contact	Channel 6
72	NC contact	Channel 7
82	NC contact	Channel 8
14	NO contact	Channel 1
24	NO contact	Channel 2
34	NO contact	Channel 3
44	NO contact	Channel 4
54	NO contact	Channel 5
64	NO contact	Channel 6
74	NO contact	Channel 7
84	NO contact	Channel 8

Conductor cross-section

The minimum conductor cross-section for the terminal block X1 is 0.2mm² and the maximum is 2.5 mm².

3.4.5 Block diagram

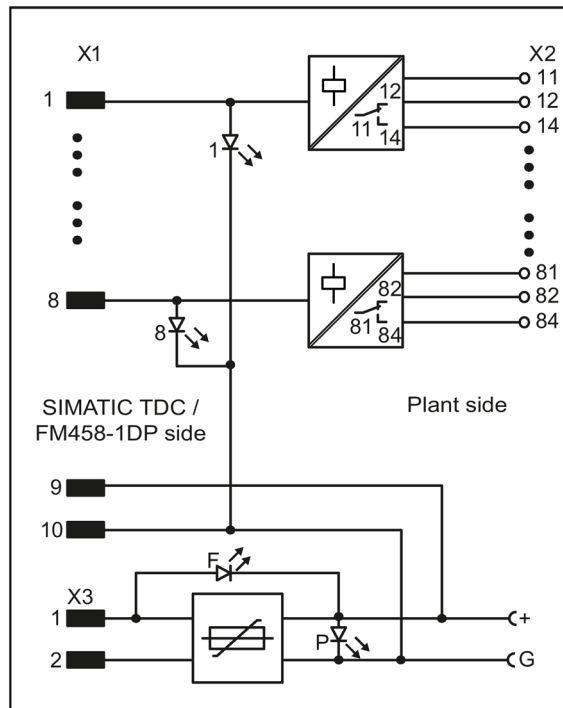


Figure 3-10 Block diagram of interface module SB70

3.5 Interface module SB71

Article number

6DD1681-0DH1

Description

Interface module SB71 is used to adapt 8 digital DC signals of the SIMATIC TDC / FM458-1DP system with electrical isolation to the signal level of the plant side.

The cable SC62 is used to connect the interface modules to the SIMATIC TDC / FM458-1DP components (for more information, refer to the SIMATIC TDC / FM458-1DP documentation).

Module design

- The enclosure is suitable for snap-on mounting to rails
- Ribbon cable connector (X1):
 - 8 pins for digital inputs
 - 2 pins for 1P, 1M
- Connector (X2), 2x 8-pole
 - 8 terminals for digital outputs, 24/48 V DC
 - 8 terminals for reference potentials
- 1 terminal pair X3: 1P and 1M (SIMATIC TDC / FM458-1DP-side voltage supply)
- 1 terminal pair X4: 2P, 2M (voltage supply on plant side)
- Double test socket X5: 1P(+), 1M(G)
- LED displays for diagnostics
- Optocoupler for electrical isolation between inputs and outputs

Voltage supply on SIMATIC side

The SIMATIC TDC / FM458-1DP-side voltage supply is fed to terminal X3:

Terminal X3	Voltage on SIMATIC TDC / FM458-1DP side
1P	+24 V
1M	0 V

The cables are connected with the SM11 parts kit "Power supply connector for interface modules" (article number: 6DD1680-0BB0).

The maximum conductor cross-section at terminal X3 is 2.5 mm².

Green LED

The SIMATIC TDC / FM458-1DP-side voltage supply is indicated by a green LED (P).

Red LED

The SIMATIC TDC / FM458-1DP-side voltage supply (1P, 1M) is short-circuited (fault).

Voltage supply on plant side

The 24/48 V DC power supply voltage for signals on plant side is wired to terminal block X4:

Terminal X4	Voltage on plant side
2P	+24/48 V
2M	0 V

The cables are connected with the SM11 parts kit "Power supply connector for interface modules" (article number: 6DD1680-0BB0).

The maximum conductor cross-section at terminal X4 is 2.5 mm².

Test socket

The SIMATIC TDC supply voltage is available on the double test socket X5 (G; +):

Double test socket X5	Voltage on SIMATIC TDC / FM458-1DP side
+ (1P of X3)	+24 V
G (1M of X3)	0 V

**WARNING****Explosion hazard**

It is not allowed to use the X5 test sockets in potentially explosive environments.

Note

For connection of the voltage supply, observe the information in the user manual in section Installation and EMC guidelines (Page 7).

3.5.1 Signals

Yellow LED

The status of each of the eight signals is displayed by a yellow LED (1...8).

Terminal block for digital signals

Terminal block X2 provides two screw terminals for each signal:

- Terminals 1 to 8 for digital outputs, 24/48 V DC
- Terminals 51 to 58 for reference potential

3.5.2 Application notes

The interface module is equipped with a ribbon cable connector X1 for connection of the output signals of the SIMATIC TDC / FM458-1DP system, as well as a terminal block X2 for connection of the plant signals.

The interface module is designed **only for vertical mounting positions** due to thermal losses to be dissipated.

Other information

For more information on EMC and ambient conditions, refer to section Installation and EMC guidelines (Page 7).



CAUTION

Maximum of three digital outputs simultaneously

Simultaneous operation of more than three digital outputs in short-circuit mode is not allowed due to the maximum permissible thermal losses per interface cubicle.

The following figure shows a typical application:

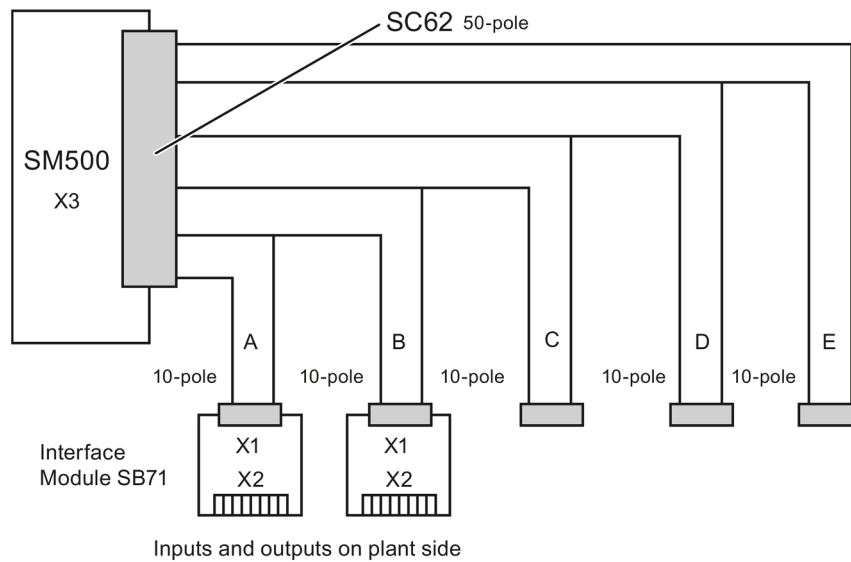


Figure 3-11 Application example of an SB71 interface module on digital I/O module SM500

3.5.3 Technical specifications

General data

Mounting system	The enclosure is suitable for snap-on mounting to rails
Dimensions W x H x D [mm]	45 x 129 x 160 mm
Weight	0.3 kg

Ambient temperatures

Ambient temperatures	max. 60 °C
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Power supply

	SIMATIC TDC / FM458-1DP	Plant side 24 V DC	Plant side 48 V DC
Supply voltage (V _s)	DC 24 V	DC 24 V	DC 48 V
Valid range	20.4 V to 28.8 V DC	18 V DC to 60 V DC	18 V DC to 60 V DC
Briefly t<500 ms	1.5 x V _{rated}	1.5 x V _{rated}	1.5 x V _{rated}
Rated current consumption	55 mA	300 mA	360 mA

The maximum current of 1 A may not be exceeded on connector X3 if the supply of several terminal blocks is routed via this connector. The maximum current of 2 A may not be exceeded on connector X4 if the supply of several terminal blocks is routed via this connector.

Digital outputs

	Plant side 24 V DC	Plant side 48 V DC
Number	8	8
Output voltage for '1 signal'		
at 0 mA output current	(V _s -0.6 V)	(V _s -1.2 V)
at 20 mA output current	(V _s -2.1 V)	(V _s -2.0 V)
at 30 mA output current	(V _s -2.7 V)	(V _s -2.9 V)
Output voltage for '0 signal'	0 V	0 V
Max. output current (for '1 signal')	30 mA	30 mA

The digital outputs are sustained short circuit-proof.

3.5.4 Pin assignment

Flat connector X1

The cable SC62 is used to connect the interface modules to the SIMATIC TDC / FM458-1DP components (for more information, refer to the SIMATIC TDC / FM458-1DP documentation).

Digital outputs, terminal strip X2

Table 3- 6 Pin assignment of the digital outputs of interface module SB71

Terminal	Designation
1	Digital output 1
2	Digital output 2
3	Digital output 3
4	Digital output 4
5	Digital output 5
6	Digital output 6
7	Digital output 7
8	Digital output 8
51	0 V, digital output 1
52	0 V, digital output 2
53	0 V, digital output 3
54	0 V, digital output 4
55	0 V, digital output 5
56	0 V, digital output 6
57	0 V, digital output 7
58	0 V, digital output 8

Conductor cross-section

The minimum conductor cross-section for the terminal block X1 is 0.2mm² and the maximum is 2.5 mm².

3.5.5 Block diagram

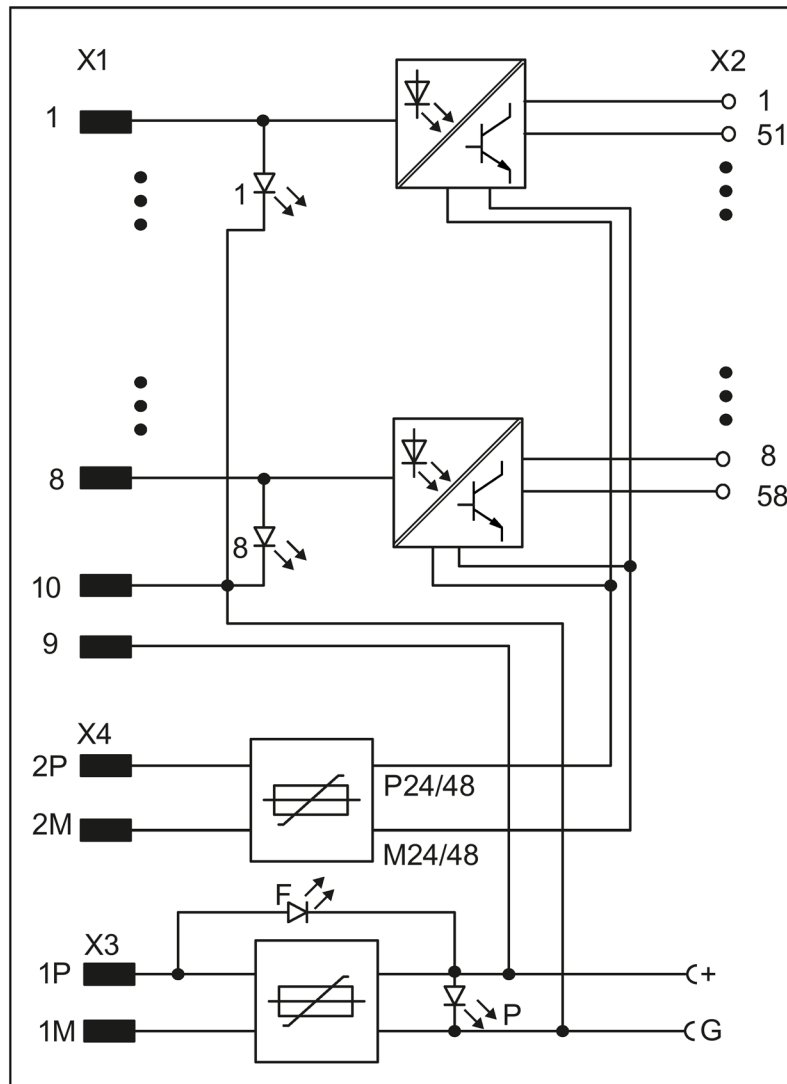


Figure 3-12 Block diagram of interface module SB71

3.6 Interface modules SU12 and SU13

Article number

SU12	6DD1681-0AJ1
SU13	6DD1681-0GK0

General

SU12	SU13
Interface module SU12 is a 10-pole terminal block that is used to wire the analog or digital signals of a 10-pole ribbon cable connector (SIMATIC TDC / FM458-1DP side) to spring-loaded terminals (plant side).	Interface module SU13 is a 50-pole terminal block that is used to wire 50 signals of a 50-pole connector (SIMATIC TDC / FM458-1DP side) to screw terminals (plant side).

Module design

SU12	16 spring-loaded terminals (X2) 10 spring-loaded terminals for analog or digital signals on plant side 6 unused spring-loaded terminals 10-pole connector X1.
SU13	50 screw terminals (X2) Connection of 50 signals 50-pole connector X1.

3.6.1 Function description

Through use of interface modules SU12 and SU13, a 1:1 connection is established from the SIMATIC TDC / FM458-1DP-side ribbon cable connector X1 to the plant-side terminals X2, with the exception of the following terminals.

The following signal lines are fused at the terminals (0.5 A slow-blow, internal resistance 0.25 Ω):

Interface module	Terminal block X2
SU12	Pin 1 – 8
SU13	Pin 8, 17 – 23, 26 – 33, 36 – 43, 46 – 48

The following terminals have a protective diode (Schottky diode type Vishay BAT46) for the 24 V supply voltage of digital outputs in the following signal lines:

Interface module	Terminal block X2
SU12	Pin 10
SU13	Pin 10

A PTC resistor (internal resistance: 0.9 Ω , e.g. type Epcos B59910-C120-A70) element is installed at the following terminals for short-circuit protection of the 24 V supply voltage of digital outputs in the signal line:

Interface module	Terminal block X2
SU12	Pin 9
SU13	Pin 9

Process signals

The concept of the interface modules support signal flow on both sides. The process signals are transferred without additional electrical isolation and signal preparation.

Table 3- 7 Maximum permissible voltage and current values for signal processing

Voltage range	The maximum permitted voltages of the modules to which the interface modules are connected must be maintained.
Current range	Max. 0.5 A

3.6.2 Additional components

Cables for:

The following cables are required to wire the interface modules to the modules:

SU12

Table 3- 8 Modules and signal cables as additional components for SU12

Cable	Modules	Connectors
SC62	SM500	X3
SC66	CPU551	X2

SU13

Table 3- 9 Modules and signal cables as additional components for SU13

Cable	Modules	Connectors
SC63	SM500	X1, X2, X3
	CP52M0	X6

3.6.3 Application notes

The interface modules are suitable for **vertical and horizontal** mounting positions. The modules must be installed on mounting rails.

Other information

For more information on EMC and ambient conditions, refer to section Installation and EMC guidelines (Page 7).

3.6.4 Pin/terminal assignment X1/X2

The screw terminal numbers of X2 are identical with the numbering of ribbon cable connector in accordance with the pin counting mode.

Conductor cross-sections

Interface module	Minimum conductor cross-section on terminal block X2	Maximum conductor cross section on terminal block X2
SU12	0.2 mm ²	2.5 mm ²
SU13	0.2 mm ²	1.5 mm ²

SU12

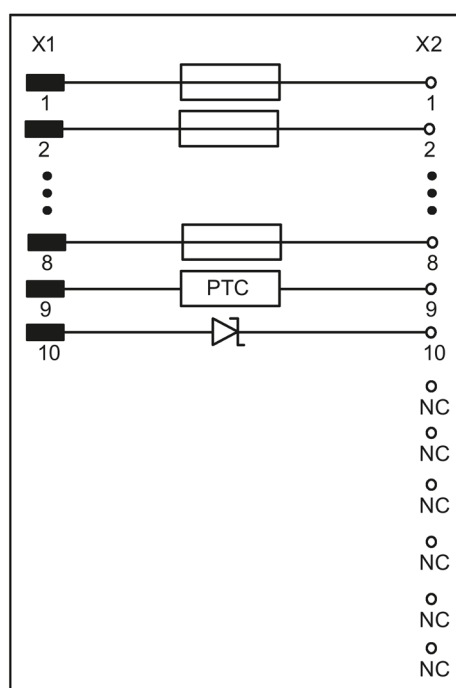


Figure 3-13 SU12 circuit diagram

The components are described in section Function description (Page 63).

SU13

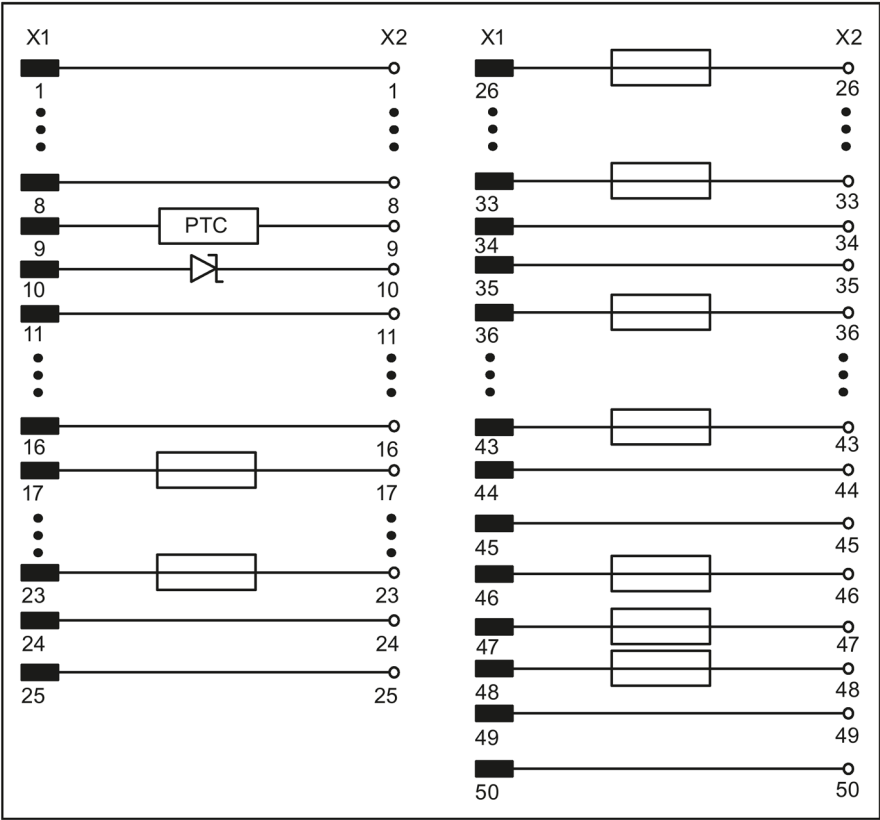


Figure 3-14 SU13 circuit diagram

The components are described in section Function description (Page 63).

3.6.5 Technical specifications

General data

Dimensions W x H x D [mm]	45 x 129 x 160 mm
Weight	0.3 kg

Ambient temperatures

Ambient temperatures	max. 60 °C
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