

**SIEMENS**

Operating instructions

**SINAMICS**

**G130**

Terminal Board 30 (TB30)

Edition

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# SIEMENS

## SINAMICS

### SINAMICS G130 Terminal Board 30 (TB30)

#### Operating Instructions


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Firmware version V5.1


## 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.

 <b>DANGER</b>
indicates that death or severe personal injury <b>will</b> result if proper precautions are not taken.

 <b>WARNING</b>
indicates that death or severe personal injury <b>may</b> result if proper precautions are not taken.

 <b>CAUTION</b>
indicates that minor personal injury can result if proper precautions are not taken.

<b>NOTICE</b>
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:

 <b>WARNING</b>
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

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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.

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# Safety information

## 1.1 General safety instructions



### WARNING

#### Electric shock and danger to life due to other energy sources

Touching live components can result in death or serious injury.

- Only work on electrical equipment if you are appropriately qualified.
- Always observe the country-specific safety rules for all work.

Generally, the following steps apply when establishing safety:

1. Prepare for disconnection. Notify all those who will be affected by the procedure.
2. Isolate the drive system from the power supply and take measures to prevent it being switched back on again.
3. Wait until the discharge time specified on the warning labels has elapsed.
4. Check that there is no voltage between any of the power connections, and between any of the power connections and the protective conductor connection.
5. Check that every auxiliary circuit is de-energized.
6. Ensure that the motors cannot move.
7. Identify all other dangerous energy sources, e.g. compressed air, hydraulic systems or water. Switch the energy sources to a safe state.
8. Check that the correct drive system is completely locked.

After you have completed the work, restore the operational readiness by following the above steps in the reverse order.




### WARNING

#### Electric shock due to connection to an unsuitable power supply


When equipment is connected to an unsuitable power supply, exposed components may carry a hazardous voltage that might result in serious injury or death.

- Only use power supplies that provide SELV (Safety Extra Low Voltage) or PELV (Protective Extra Low Voltage) output voltages for all connections and terminals of the electronics modules.




 <b>WARNING</b>
<b>Electric shock due to equipment damage</b> Improper handling may cause damage to equipment. For damaged devices, hazardous voltages can be present at the enclosure or at exposed components; if touched, this can result in death or severe injury. <ul style="list-style-type: none"><li>• Ensure compliance with the limit values specified in the technical data during transport, storage and operation.</li><li>• Do not use any damaged devices.</li></ul>




 <b>WARNING</b>
<b>Electric shock due to unconnected cable shield</b> Hazardous touch voltages can occur through capacitive cross-coupling due to unconnected cable shields. <ul style="list-style-type: none"><li>• Connect cable shields and unused conductors of power cables (e.g. brake conductors) at least on one side to the grounded housing potential.</li></ul>



 <b>WARNING</b>
<b>Electric shock if there is no ground connection</b> For missing or incorrectly implemented protective conductor connection for devices with protection class I, high voltages can be present at open, exposed parts, which when touched, can result in death or severe injury. <ul style="list-style-type: none"><li>• Ground the device in compliance with the applicable regulations.</li></ul>



 <b>WARNING</b>
<b>Arcing when a plug connection is opened during operation</b> Opening a plug connection when a system is in operation can result in arcing that may cause serious injury or death. <ul style="list-style-type: none"><li>• Only open plug connections when the equipment is in a voltage-free state, unless it has been explicitly stated that they can be opened in operation.</li></ul>

<b>NOTICE</b>
<b>Property damage due to loose power connections</b> Insufficient tightening torques or vibration can result in loose power connections. This can result in damage due to fire, device defects or malfunctions. <ul style="list-style-type: none"><li>• Tighten all power connections to the prescribed torque.</li><li>• Check all power connections at regular intervals, particularly after equipment has been transported.</li></ul>



 **WARNING****Spread of fire from built-in devices**

In the event of fire outbreak, the enclosures of built-in devices cannot prevent the escape of fire and smoke. This can result in serious personal injury or property damage.

- Install built-in units in a suitable metal cabinet in such a way that personnel are protected against fire and smoke, or take other appropriate measures to protect personnel.
- Ensure that smoke can only escape via controlled and monitored paths.

 **WARNING****Failure of pacemakers or implant malfunctions due to electromagnetic fields**

Electromagnetic fields (EMF) are generated by the operation of electrical power equipment, such as transformers, converters, or motors. People with pacemakers or implants in the immediate vicinity of this equipment are at particular risk.

- If you have a heart pacemaker or implant, maintain a minimum distance of 2 m from electrical power equipment.

 **WARNING****Unexpected movement of machines caused by radio devices or mobile phones**

When radio devices or mobile phones with a transmission power  $> 1$  W are used in the immediate vicinity of components, they may cause the equipment to malfunction. Malfunctions may impair the functional safety of machines and can therefore put people in danger or lead to property damage.

- If you come closer than around 2 m to such components, switch off any radio devices or mobile phones.
- Use the "SIEMENS Industry Online Support App" only on equipment that has already been switched off.

 **WARNING****Motor fire in the event of insulation overload**

There is a greater load on the motor insulation as result of a ground fault in an IT system. If the insulation fails, it is possible that death or severe injury can occur as a result of smoke and fire.

- Use a monitoring device that signals an insulation fault.
- Correct the fault as quickly as possible so the motor insulation is not overloaded.

 **WARNING**

**Fire due to inadequate ventilation clearances**

Inadequate ventilation clearances can cause overheating of components with subsequent fire and smoke. This can cause severe injury or even death. This can also result in increased downtime and reduced service lives for devices/systems.

- Ensure compliance with the specified minimum clearance as ventilation clearance for the respective component.

 **WARNING**

**Unrecognized dangers due to missing or illegible warning labels**

Dangers might not be recognized if warning labels are missing or illegible. Unrecognized dangers may cause accidents resulting in serious injury or death.

- Check that the warning labels are complete based on the documentation.
- Attach any missing warning labels to the components, where necessary in the national language.
- Replace illegible warning labels.

**NOTICE**

**Device damage caused by incorrect voltage/insulation tests**

Incorrect voltage/insulation tests can damage the device.

- Before carrying out a voltage/insulation check of the system/machine, disconnect the devices as all converters and motors have been subject to a high-voltage test by the manufacturer, and therefore it is not necessary to perform an additional test within the system/machine.

 **WARNING**

**Unexpected movement of machines caused by inactive safety functions**

Inactive or non-adapted safety functions can trigger unexpected machine movements that may result in serious injury or death.

- Observe the information in the appropriate product documentation before commissioning.
- Carry out a safety inspection for functions relevant to safety on the entire system, including all safety-related components.
- Ensure that the safety functions used in your drives and automation tasks are adjusted and activated through appropriate parameterizing.
- Perform a function test.
- Only put your plant into live operation once you have absolutely guaranteed that the functions relevant to safety are operating correctly.

**Note**

**Important safety instructions for Safety Integrated functions**

If you want to use Safety Integrated functions, you must observe the safety instructions in the Safety Integrated manuals.

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## 1.2 Handling electrostatic sensitive devices (ESD)

Electrostatic sensitive devices (ESD) are individual components, integrated circuits, modules or devices that may be damaged by either electric fields or electrostatic discharge.



### NOTICE

#### Damage through electric fields or electrostatic discharge

Electric fields or electrostatic discharge can cause malfunctions through damaged individual components, integrated circuits, modules or devices.

- Only pack, store, transport and send electronic components, modules or devices in their original packaging or in other suitable materials, e.g. conductive foam rubber or aluminum foil.
- Only touch components, modules and devices when you are grounded by one of the following methods:
  - Wearing an ESD wrist strap
  - Wearing ESD shoes or ESD grounding straps in ESD areas with conductive flooring
- Only place electronic components, modules or devices on conductive surfaces (table with ESD surface, conductive ESD foam, ESD packaging, ESD transport container).

The necessary ESD protective measures are clearly illustrated in the following diagram:

- a = conductive floor surface
- b = ESD table
- c = ESD shoes
- d = ESD overall
- e = ESD wristband
- f = cabinet ground connection
- g = contact with conductive flooring

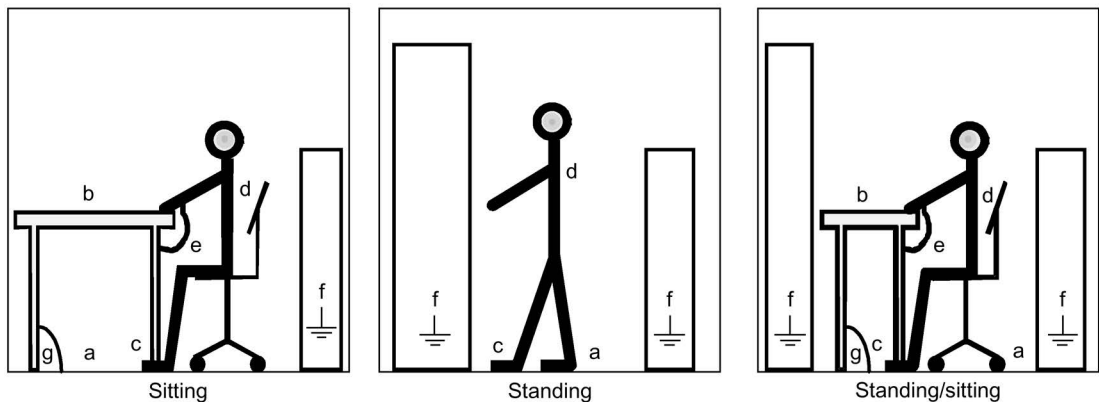


Figure 1-1 ESD protective measures

## General

### Description

The TB30 Terminal Board supports the addition of digital inputs/digital outputs and analog inputs/analog outputs to the Control Unit.

The following are located on the TB30 Terminal Board:

- Power supply for digital inputs/digital outputs
- 4 digital inputs
- 4 digital outputs
- 2 analog inputs
- 2 analog outputs

The TB30 Terminal Board plugs into the option slot on the Control Unit.

A shield connection for the signal cable shield is located on the Control Unit.

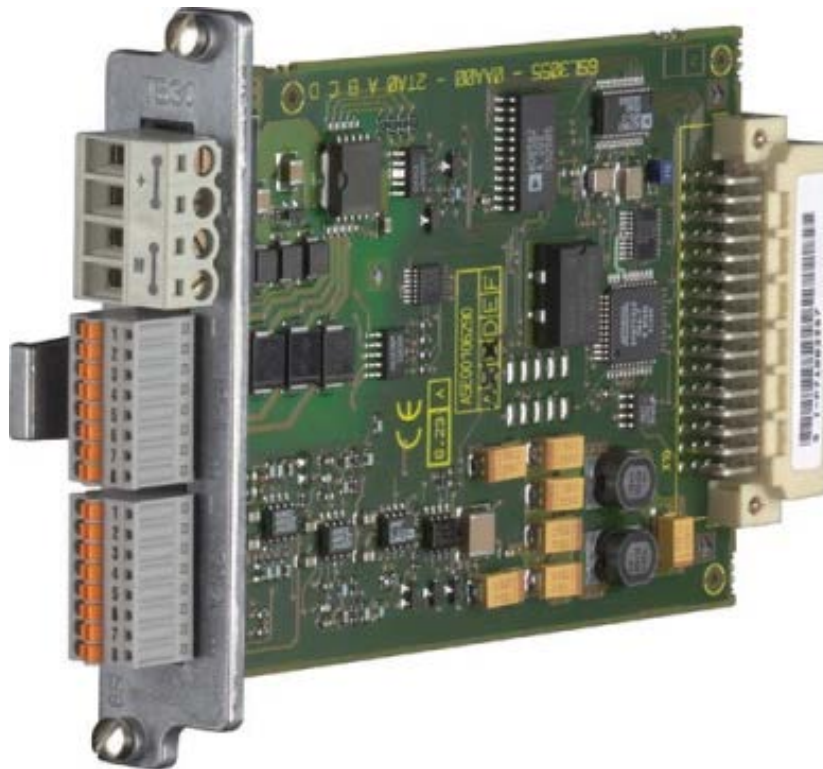


Figure 2-1 Terminal Board TB30



## Mechanical installation

### NOTICE

#### Damage or malfunctions to the Option Board by inserting and withdrawing in operation

Withdrawing and inserting Option Boards during operation can damage them or cause the Option Boards to malfunction.

- Only withdraw or insert Option Boards when the Control Unit is in a current-free state.

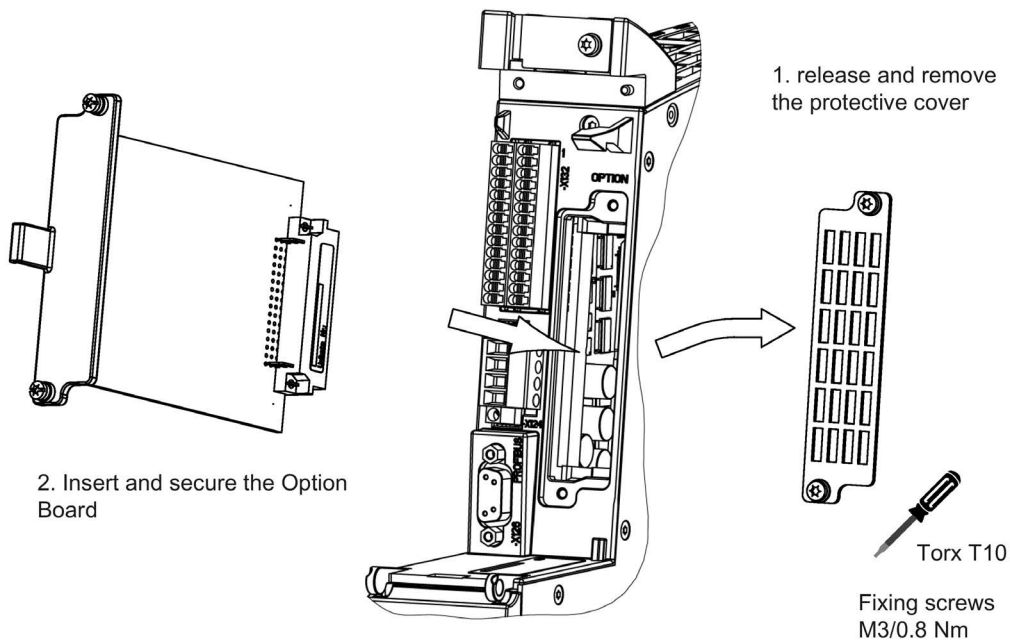


Figure 3-1 Installing an Option Board on a CU320-2 DP

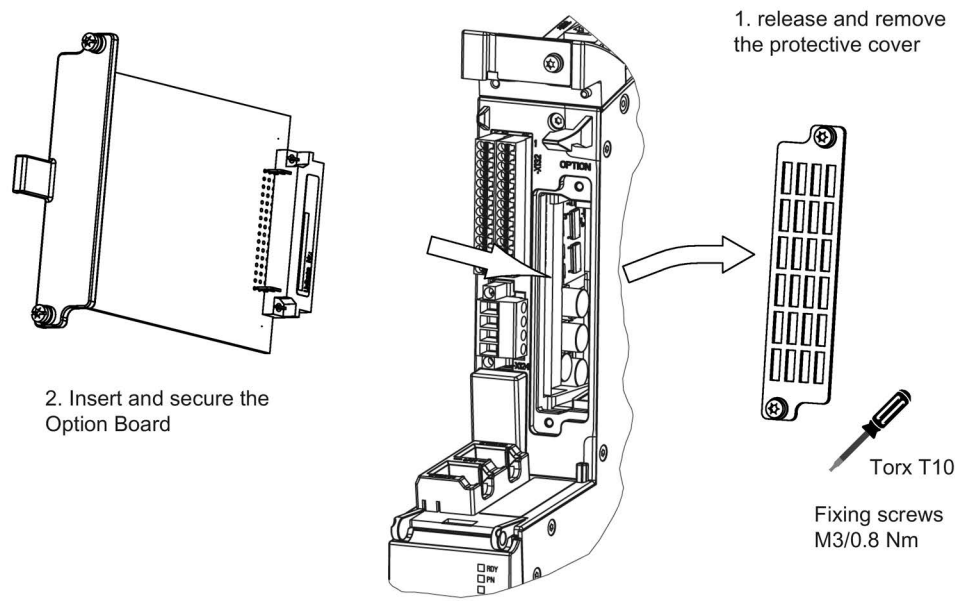


Figure 3-2 Installing an Option Board on a CU320-2 PN



## Electrical installation

### Interface overview

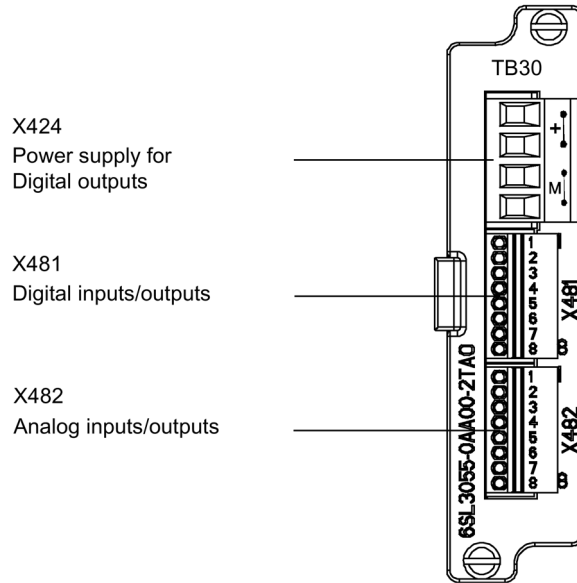


Figure 4-1 Interface description of the TB30

Connection overview

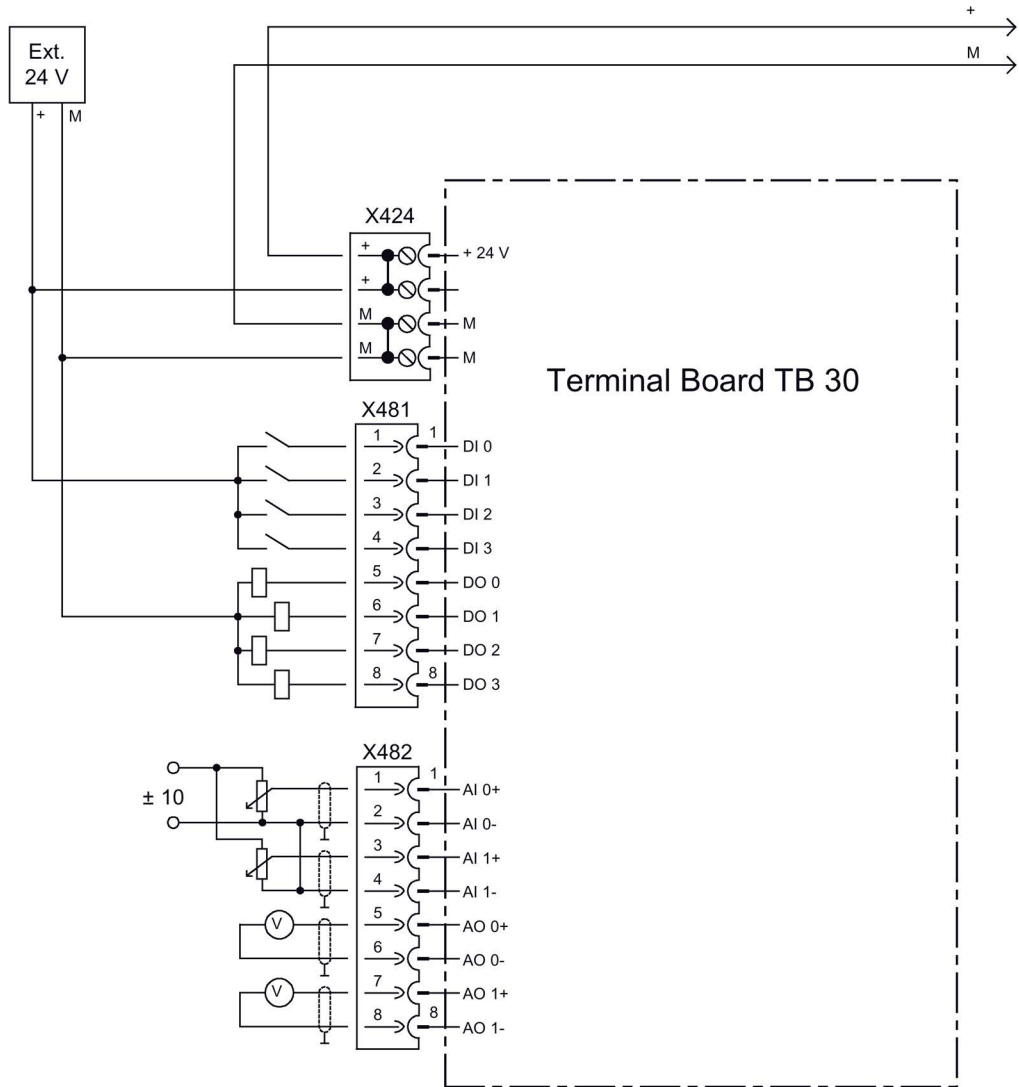
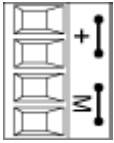


Figure 4-2 Connection overview TB30

## X424 power supply, digital outputs

Table 4- 1 Terminal block X424

	Terminal	Function	Technical specifications
	+	Power supply	Voltage: 24 VDC (20.4 V – 28.8 V) Current consumption: Max. 4 A (per digital output max. 0.5 A)
	+	Power supply	
	M	Ground	Max. current via jumper in connector: 20 A at 55° C
	M	Ground	
Max. connectable cross-section: 2.5 mm <sup>2</sup>			

### Note

The two "+" and "M" terminals are jumpered in the connector. This ensures that the supply voltage is looped through.

This power supply is required for the digital outputs only.

The electronics power supply and the power supply for the analog inputs/outputs are taken from the option slot of the Control Unit.

### Note

The power supply of the digital outputs and the electronics power supply of the Control Unit are optically isolated.

### Note

If a the 24 V supply is briefly interrupted, then the digital outputs are deactivated during this time.

Digital inputs/outputs X481

Table 4- 2 Terminal strip X481

	Terminal	Designation <sup>1)</sup>	Technical specifications
	1	DI 0	Voltage: - 3 ... 30 V Current consumption, typical: 10 mA at 24 VDC Ground reference: X424.M Input delay: - For "0" to "1": 20 µs - for "1" to "0": 100 µs Level (incl. ripple) - High level: 15 ... 30 V Low level: -3 ... 5 V
	2	DI 1	
	3	DI 2	
	4	DI 3	
	5	DO 0	Voltage: 24 V DC Max. load current per output: 500 mA Ground reference: X424.M Continued-short-circuit-proof Output delay: - for "0" to "1": Typ. 150 µs at 0.5 A resistive load - (500 µs maximum) - For "1" to "0": Typically 50 µs at 0.5 A resistive load Switching frequency: - For resistive load: Max. 100 Hz - For inductive load: Max. 0.5 Hz - For lamp load: Max. 10 Hz Maximum lamp load: 5 W
	6	DO 1	
	7	DO 2	
	8	DO 3	
Max. connectable cross-section: 0.5 mm <sup>2</sup>			

1) DI: digital input, DO: digital output

**Note**

An open input is interpreted as "low".

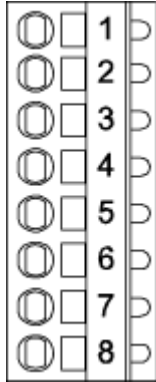
The power supply and the digital inputs/outputs are optically isolated from the Control Unit.

**Note**

If a the 24 V supply is briefly interrupted, then the digital outputs are deactivated during this time.

## Analog inputs/outputs X482

Table 4- 3 Terminal strip X482

	Terminal	Designation <sup>1)</sup>	Technical specifications
	1	AI 0+	Analog inputs (AI) <b>Voltage:</b> -10 ... +10 V; R: 65 kΩ <b>Common mode range:</b> ±30 V <b>Resolution:</b> 13 bits + sign
	2	AI 0-	
	3	AI 1+	
	4	AI 1-	
	5	AO 0+	Analog outputs (AO) <b>Voltage range:</b> -10 ... +10 V <b>Load current:</b> max. -3 ... +3 mA <b>Resolution:</b> 11 bits + sign Continuous short-circuit proof
	6	AO 0-	
	7	AO 1+	
	8	AO 1-	
Max. connectable cross-section: 0.5 mm <sup>2</sup>			

<sup>1)</sup> AI: Analog input, AO: Analog output

**Note****Permissible voltage values**

In order to avoid incorrect results of the analog-digital conversion, the analog differential voltage signals can have a maximum offset voltage of +/-30 V with respect to ground potential.

**Note**

An open input is interpreted as approximately "0 V".

The power supply of the analog inputs/outputs is taken from the option slot of the Control Unit and not from X424.

The shield is connected to the Control Unit.

## Shield connection of the TB30 on the Control Unit CU320

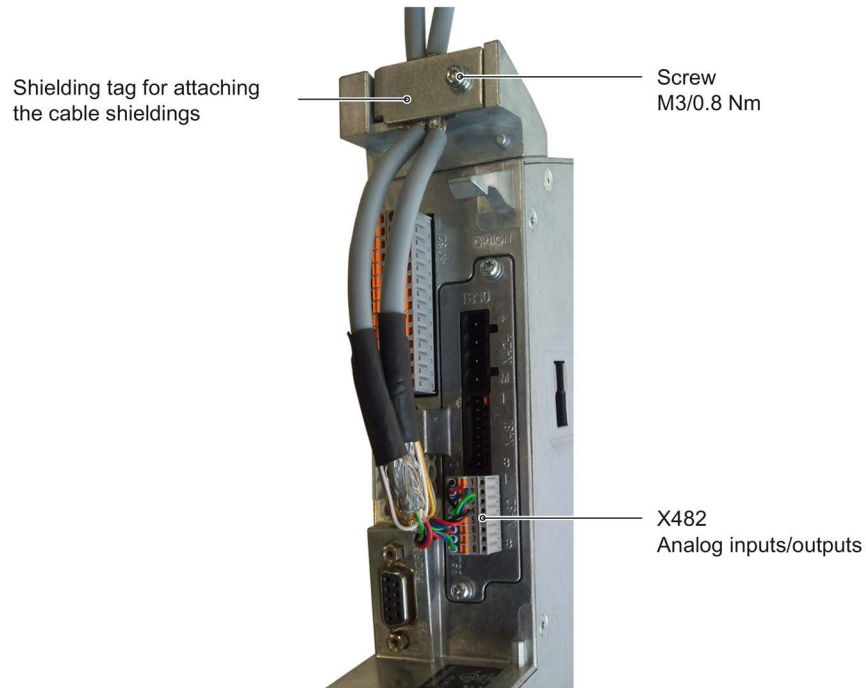


Figure 4-3 TB30 shield connection

The permissible bending radii for the cables must not be exceeded when the cables are being installed.

# Technical specifications

## General technical data

Table 5- 1 General technical data

Product standard	EN 61800-5-1
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## Technical data

Table 5- 2 Technical data

	Unit	Value
Electronic power supply		
Voltage	V <sub>DC</sub>	24 DC (20.4 – 28.8)
Current via the option slot of the CU (without digital outputs)	A <sub>DC</sub>	0.05
Power loss	W	<3
Response time	The reaction time of digital inputs/outputs and analog inputs/outputs depends on the evaluation on the Control Unit (see function diagrams FP 9100 - FP 9106) in the SINAMICS List Manual).	
Weight	kg	0.1

## Additional information

Siemens:  
[www.siemens.com](http://www.siemens.com)

Industry Online Support (service and support):  
[www.siemens.com/online-support](http://www.siemens.com/online-support)

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