

SIEMENS

Operating instructions

SINAMICS

G130

Terminal Module 150 (TM150)

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SINAMICS G130 Terminal Module 150 (TM150)

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.

 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

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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.

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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.




 WARNING
Electric shock due to equipment damage
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">• Ensure compliance with the limit values specified in the technical data during transport, storage and operation.• Do not use any damaged devices.




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



 WARNING
Electric shock if there is no ground connection
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">• Ground the device in compliance with the applicable regulations.



 WARNING
Arcing when a plug connection is opened during operation
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">• 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.

NOTICE
Property damage due to loose power connections
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">• Tighten all power connections to the prescribed torque.• Check all power connections at regular intervals, particularly after equipment has been transported.

 **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.

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

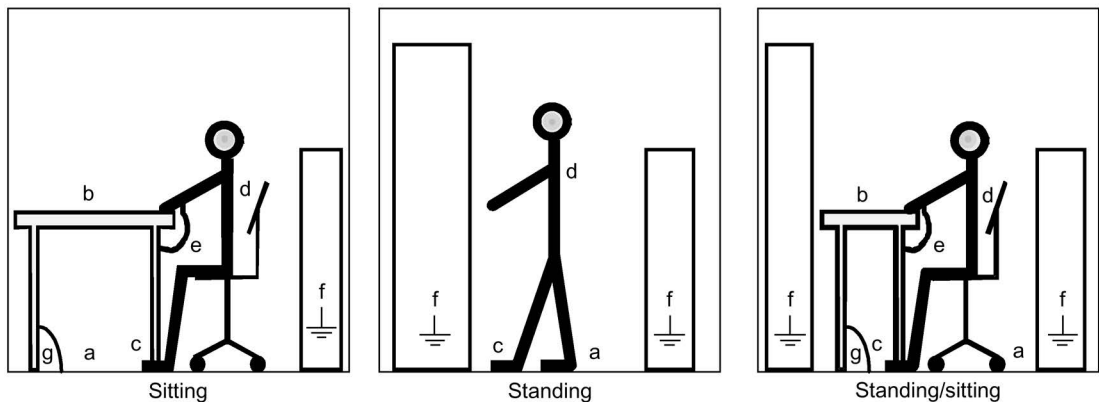


Figure 1-1 ESD protective measures

General information

The TM150 Terminal Module is a DRIVE-CLiQ component for temperature evaluation. The temperature is measured in a temperature range from -99° C to +250° C for the following temperature sensors:

- PT100 (with monitoring for wire breakage and short-circuit)
- PT1000 (with monitoring for wire breakage and short-circuit)
- KTY84 (with monitoring for wire breakage and short-circuit)
- PTC (with short-circuit monitoring)
- Bimetallic NC contact (without monitoring)

For the temperature sensor inputs, for each terminal block the evaluation can be parameterized for 1x2-wire, 2x2-wire, 3-wire or 4-wire. There is no galvanic isolation in the TM150.


The TM150 is mounted in the control cabinet and can be snapped on to a standard mounting rail (EN 60715).


The TM150 contains the following interfaces:

Table 2- 1 Overview of the TM150 interfaces

Type	Quantity
DRIVE-CLiQ interfaces	2
Temperature sensor inputs	6/12
Electronic power supply	1

2.1 Safety information

 WARNING
Non-observance of the fundamental safety instructions and residual risks
<p>The non-observance of the fundamental safety instructions and residual risks stated in Chapter 1 can result in accidents with severe injuries or death.</p> <ul style="list-style-type: none">• Adhere to the fundamental safety instructions.• When assessing the risk, take into account residual risks.

 WARNING
Fire through overheating due to insufficient ventilation clearances
<p>Insufficient ventilation clearances result in overheating with danger to persons as a result of smoke and fire. This can also result in more downtimes and reduced service lives of the Terminal Module.</p> <ul style="list-style-type: none">• For this reason, it is imperative that you maintain the 50 mm clearances above and below the Terminal Module.

NOTICE
Device failure as a result of unshielded or incorrectly routed cables to temperature sensors
<p>Unshielded or incorrectly routed cables to temperature sensors can result in interference being coupled into the signal processing electronics from the power side. This can result in significant disturbance of all signals (fault messages) up to failure of individual components (destruction of the devices).</p> <ul style="list-style-type: none">• Only use shielded cables as temperature sensor cables.• If temperature sensor cables are routed together with the motor cable, use separately shielded cables twisted in pairs.• Connect the cable shield to ground potential through a large surface area.

NOTICE
Damage caused by the use of incorrect DRIVE-CLiQ cables
<p>The use of incorrect or not released DRIVE-CLiQ cables can cause damage or functional faults to devices or the system.</p> <ul style="list-style-type: none">• Use only appropriate DRIVE-CLiQ cables that have been released by Siemens for the associated use case.

Note

Malfunctions due to polluted DRIVE-CLiQ interfaces

Malfunctions can occur in the system through the use of polluted DRIVE-CLiQ interfaces.

- Cover unused DRIVE-CLiQ interfaces with the supplied blanking covers.
-

Note

Function equipotential bonding for distributed DRIVE-CLiQ nodes

Integrate all of the components that are connected via DRIVE-CLiQ into the function equipotential bonding concept. The connection should be preferably established by mounting on metallic bare machine and plant components that are connected with one another using an equipotential bonding conductor.

Alternatively, you can establish equipotential bonding using a conductor (min. 6 mm²), which as far as possible, is routed in parallel to the DRIVE-CLiQ cable. This applies to all distributed DRIVE-CLiQ nodes such as DM20, SME2x, SME12x.

Mechanical installation

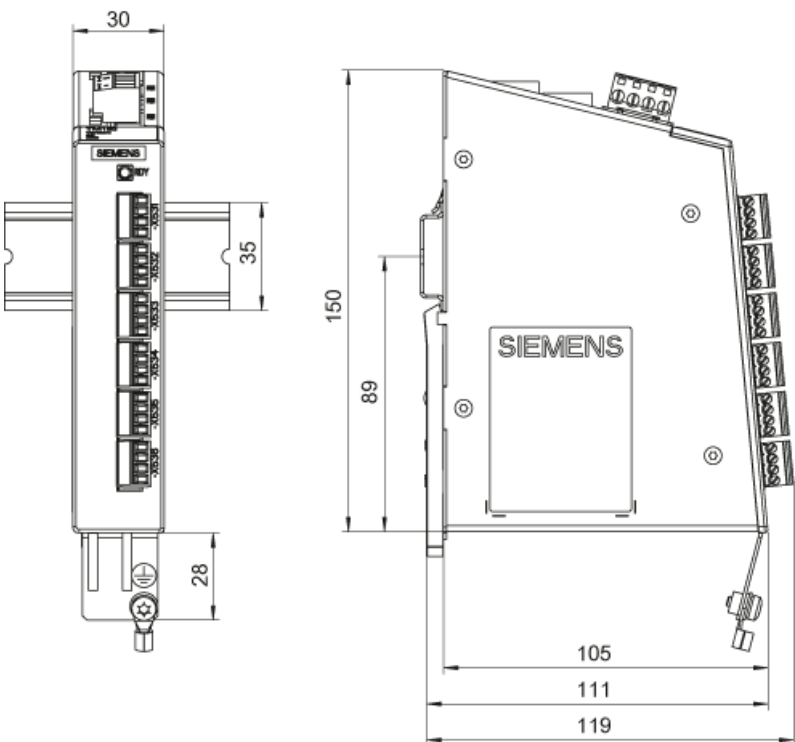


Figure 3-1 Dimension drawing Terminal Module 150 (TM150)

Note

Mounting space

The TM150 is installed near the Power Module on a mounting rail, which must be provided by the customer.

Electrical installation

4.1 Overview

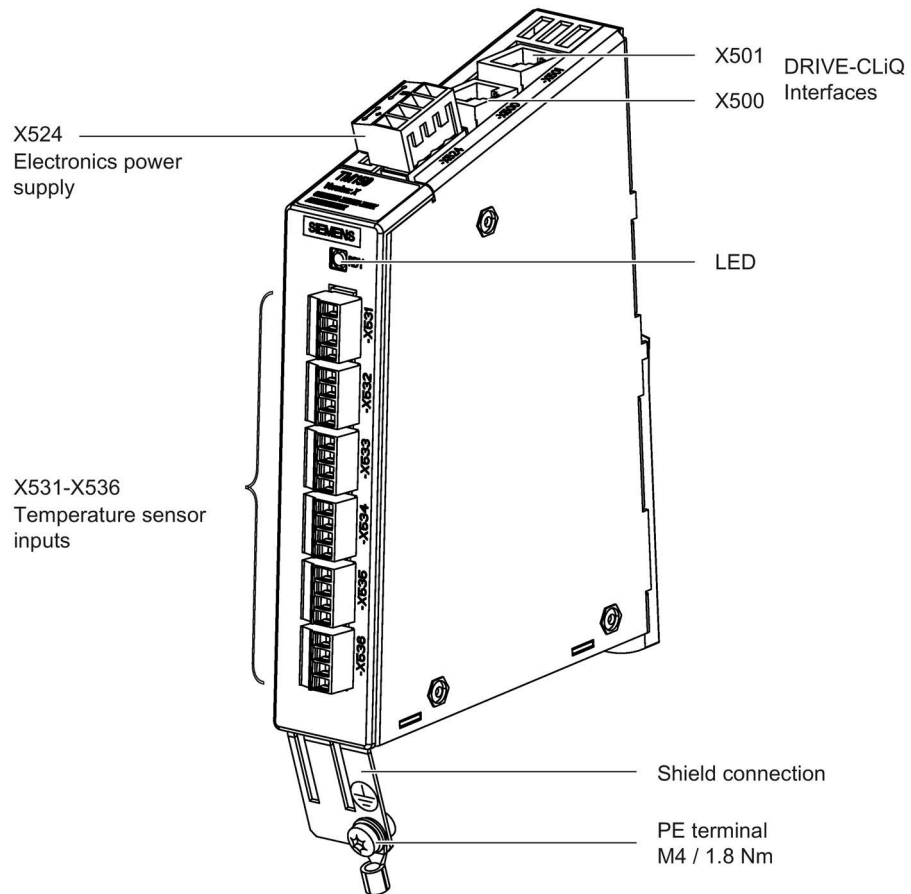
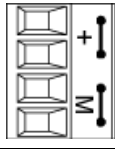


Figure 4-1 Terminal Module 150 (TM150)

4.2 Interface description

4.2.1 X524 electronics power supply

Table 4- 1 Terminal strip for the electronic power supply X524

	Terminal	Designation	Technical specifications
	+	Power supply	Voltage: 24 VDC (20.4 V – 28.8 V) Current consumption (max./typ.): 0.5 A / 0.1 A max. current through the jumper in the connector: 20 A (15 A according to UL/CSA)
	+	Power supply	
	M	Ground	
	M	Ground	
Max. connectable cross-section: 2.5 mm ²			

Note

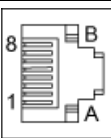
Looping through the supply voltage

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

The current consumption increases by the value for the DRIVE-CLiQ node.

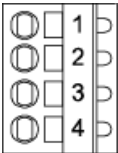
4.2.2 X500, X501 DRIVE-CLiQ interfaces

Table 4- 2 DRIVE-CLiQ interface X500, X501

	Pin	Signal name	Technical data
	1	TXP	Transmit data +
	2	TXN	Transmit data -
	3	RXP	Receive data +
	4	Reserved, do not use	
	5	Reserved, do not use	
	6	RXN	Receive data -
	7	Reserved, do not use	
	8	Reserved, do not use	
	A	+ (24 V)	Power supply
	B	M (0 V)	Electronics ground
Blanking plate for DRIVE-CLiQ interfaces (50 pcs.) Article number: 6SL3066-4CA00-0AA0			

4.2.3 X531-X536 temperature sensor inputs

Table 4- 3 X531-X536 temperature sensor inputs

	Terminal	Function 1x2-/2x2-wire	Function 3 and 4-wire	Technical data
	1	+Temp (channel x)	+ (Channel x)	Temperature sensor connection for sensors with 1x2 wires Connection of the 2nd measurement cable for sensors with 4 wires
	2	-Temp (channel x)	- (Channel x)	Temperature sensor connection for sensors with 1x2 wires Connection of the 1st measurement cable for sensors with 3 and 4 wires
	3	+Temp (channel y)	+ I _c (constant current, positive channel x)	Temperature sensor connection for sensors with 2x2, 3 and 4-wires
	4	-Temp (channel y)	- I _c (constant current, negative channel x)	
Max. connectable cross-section: 1.5 mm ²				

Measuring current via temperature sensor connection: approx. 0.83 mA

When connecting temperature sensors with 3 wires, a jumper must be inserted between X53x.2 and X53x.4.

Table 4- 4 Channel assignment

Terminal	Channel number [x] for 1x2, 3 and 4-wires	Channel number [y] for 2x2 wires
X531	0	6
X532	1	7
X533	2	8
X534	3	9
X535	4	10
X536	5	11



⚠ WARNING

Electric shock in the event of voltage flashovers at the temperature sensor

Voltage flashovers in the signal electronics can occur in motors without safe electrical separation of the temperature sensors.

- Use temperature sensors that fully comply with the specifications of the safety isolation.

NOTICE
Damage to motor in the event of incorrectly connected KTY temperature sensor
If a KTY temperature sensor is connected with incorrect polarity, it is not possible to detect when the motor overheats. Overheating can cause damage to the motor.
<ul style="list-style-type: none">• Connect a KTY temperature sensor with the correct polarity.

NOTICE
Overheating of the motor through jumpering the temperature sensor connections
Jumpering of the temperature sensor connections "+Temp" and "- Temp" results in incorrect measured results. Damage to the motor can result if the overheating is not detected.
<ul style="list-style-type: none">• When using several temperature sensors, separately connect the individual sensors to "+Temp" and "-Temp".

NOTICE
Device failure as a result of unshielded or incorrectly routed cables to temperature sensors
Unshielded or incorrectly routed cables to temperature sensors can result in interference being coupled into the signal processing electronics from the power side. This can result in significant disturbance of all signals (fault messages) up to failure of individual components (destruction of the devices).
<ul style="list-style-type: none">• Only use shielded cables as temperature sensor cables.• If temperature sensor cables are routed together with the motor cable, use separately shielded cables twisted in pairs.• Connect the cable shield to ground potential through a large surface area.

Note

Incorrect temperature measured values as a result of cables with an excessively high resistance

An excessively long cable length or an excessively small cable cross-section can falsify the temperature measurement (for a PT100, 10 Ω cable resistance can falsify the measurement result by 10%). As a consequence, excessively high measured values are output, which could lead to the motor being unnecessarily tripped prematurely.

- Use only cable lengths ≤ 300 m.
- For cable lengths >100 m, use cables with a cross-section of ≥1 mm².

4.2.4 Meaning of the LEDs on the Terminal Module TM150

Table 4- 5 Description of the LEDs on the TM150

LED	Color	State	Description
READY	-	OFF	The electronic power supply is missing or lies outside the permissible tolerance range.
	Green	Continuous light	The component is ready for operation and cyclic DRIVE-CLiQ communication is taking place.
	Orange	Continuous light	DRIVE-CLiQ communication is being established.
	Red	Continuous light	This component has at least one fault. Remark: The LED is activated irrespective of whether the corresponding messages have been reconfigured.
	Green/red	Flashing 0.5 Hz	Firmware is being downloaded.
		Flashing 2 Hz	Firmware download is complete. Waiting for POWER ON.
	Green/orange or red/orange	Flashing 2 Hz	Detection of the components via LED is activated (p0154). Remark: Both options depend on the LED status when module recognition is activated via p0154 = 1.

4.3 Connection examples

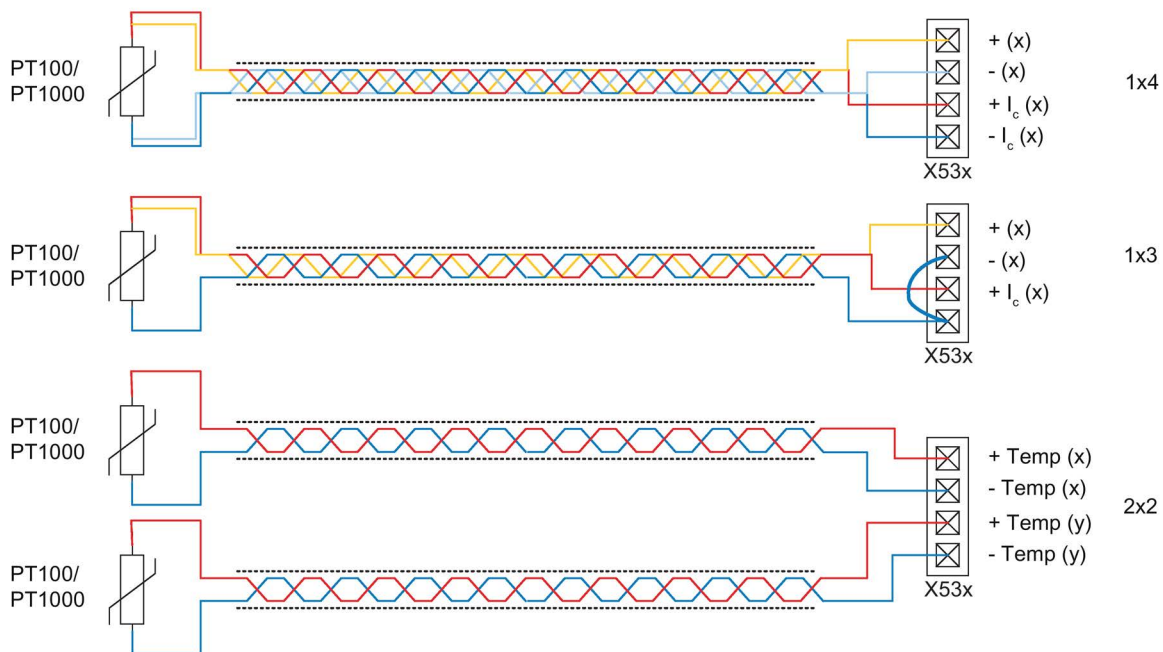


Figure 4-2 Connecting a PT100/PT1000 with 2x2, 3 and 4-wires to the temperature sensor inputs X53x of Terminal Module TM150

4.3 Connection examples

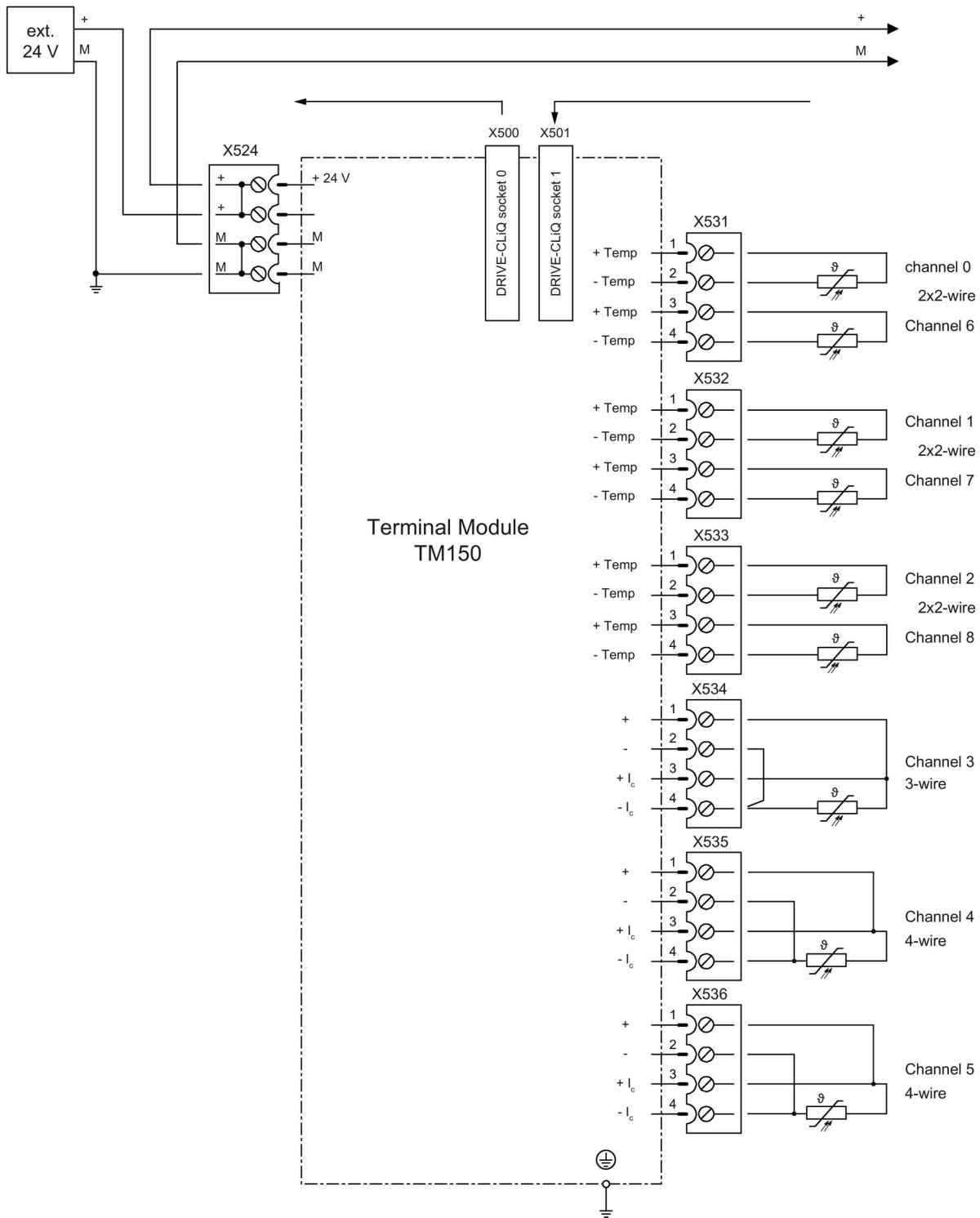
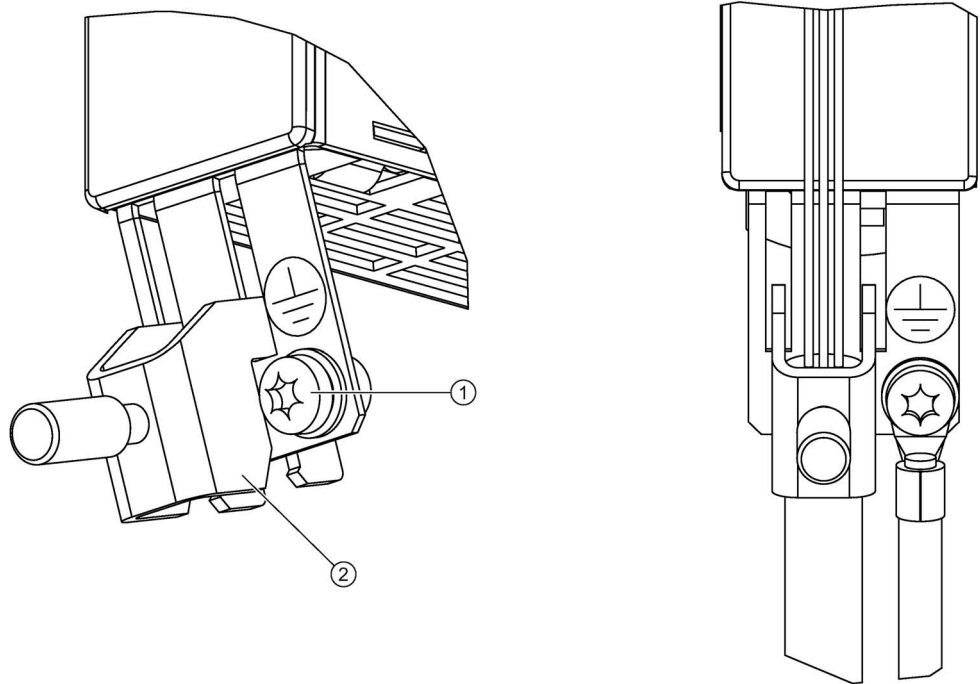


Figure 4-3 Connection example for a Terminal Module TM150

4.4 Protective conductor connection and shield support

The following diagram shows a typical Weidmüller shield connection clamp for the shield supports.



- ① Protective conductor connection M4/1.8 Nm
- ② Shield connection terminal, Weidmüller company, type: KLBÜ CO1, order number: 1753311001

Figure 4-4 Shield support and protective conductor connection of the TM150

NOTICE

Damage or faulty operation due to incorrect shielding or inadmissible cable lengths

If the correct shielding procedures or the permissible cable lengths are not observed, it can cause damage or the machine may malfunction.

- Only use shielded cables.
- Do not exceed the cable lengths stated in the technical specifications.

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

6SL3055-0AA00-3LA0	Unit	Value
Electronic power supply		
Voltage	V _{DC}	24 V DC (20.4 – 28.8)
Current (without DRIVE-CLiQ)	A _{DC}	0.07
Power loss	W	1.6
PE/ground connection	On housing with M4/1.8 Nm screw	
Weight	kg	0.4
Degree of protection	IP20	

Note

Screw plug correctly or latch

In order to guarantee the degree of protection, all of the connectors must be correctly screwed into place and appropriately locked.

Additional information

Siemens:
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Industry Online Support (service and support):
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