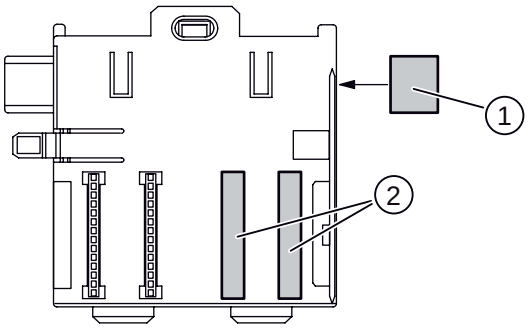
- Use the rails for "module change during operation" (only these can take the active bus modules).
- Close unused slots with the backplane bus cover. Close the last bus module with the bus module cover. The bus module cover is included with the bus module BM PS/IM or BM IM/IM. The backplane bus cover has to be ordered.



① Bus module cover

② Backplane bus cover

Figure 3-8 Example: Bus module 2 x 40 (…-7HB00-)

- To use the ET 200M in the intrinsically safe area, use the explosion-proof partition - preferably between the modules in the intrinsically safe area and the modules in the non-intrinsically safe area.

Greater number of modules with the IM 153-2BAx2 and IM 153-4AA0x

A maximum of 12 modules can be operated with the IM 153-2BAx2 and IM 153-4AA0x interface module, compared to 8 modules previously.

Restrictions

Use of the high-accuracy time stamp (1 ms accuracy) is only possible with 8 modules. In this case, a maximum of 8 input modules can be inserted after the IM 153-2BAx2 interface module in the ET 200M.

Supply voltage

The following table identifies requirements to be observed for the line voltage.

With ...	the ...
Stationary plants or systems without all-pole line voltage disconnect switch	There must be a supply isolating switch or a fuse in the building installation system
Load power supplies, power supply modules	The system voltage range set must correspond to the local system voltage
All ET 200M circuits	fluctuation / deviation of the input / load voltage from the rated value must lie within the permissible tolerances (refer to Technical Specifications of the S7-300 modules)

24 V DC supply

The following table identifies requirements to be observed for the 24 V supply.

With ...	you must ensure ...	
Buildings	Outdoor lightning protection	to provide lightening protection measures (e.g. lightening protection ductors)
24 V DC supply lines, signal lines	Indoor lightning protection	
24 V DC supply	Safe electrical isolation of safety extra-low voltage	

Protection against outside electrical influences

The following table identifies requirements you must observe to provide protection against electrical influences or faults.

With ...	you must ensure ...
All plants or systems in which the ET 200M is integrated	that the unit or the system is connected to the grounding wire in order to discharge electromagnetic interference.
Connection, signal and bus lines	The wiring routing and installation are correct.
Signal and bus lines	Any break of a line or conductor does not result in undefined states of the plant or system.

Rules on the Power Consumption and Power Loss of an ET 200M

For their operation, the S7-300 modules use the necessary power from the backplane bus as well as, if necessary, from an external load power supply.

- The current consumption of all signal modules from the backplane bus must **not** exceed the electrical output that the IM 153-x can supply to the backplane bus.
- The PS 307 power supply is dependent on the current consumption from the 24 V load power supply; this is the result of the total of the current consumption of the signal modules and all other connected loads.
- The power loss of **all** the components in a cabinet must not exceed the maximum thermal rating of the cabinet.

  Tip: When establishing the required dimensions of the cabinet, ensure that the temperature inside the cabinet does not exceed the permissible 60°C even where external temperatures are high

You will find the values for the power consumption and power loss of a module under the technical specifications of the relevant modules.

3.6.2 Operating the ET 200M with process I/O on a grounded supply

The following gives information on the overall configuration of an ET 200M to a grounded supply (TN-S-network). The topics covered here are:

- Switch-off organs, short-circuit and overload protection in accordance with DIN VDE 0100 and DIN VDE 0113
- Load power supplies and load circuits

Grounded supply

With grounded supplies the neutral line of the network is grounded. A simple contact to earth between a live cable and ground or a grounded part of the unit triggers the safety organs.

Components and safety measures

Different components and safety measures are prescribed for setting up a complete plant. The nature of the components and the degree of credibility of the safety measures depends on which DIN VDE directive applies to your unit configuration. The following table refers to the two following figures.

Table 3- 4 DIN VDE-directives for the configuration of a controller

Comparisons ...	Reference to figure	DIN VDE 0100	DIN VDE 0113
Switch-off organ for controllers, signal sensors and final control elements	(1)	… part 460: Main switch	… part 1: Separator
Short-circuit and overload protection: in groups for signal sensors and final control elements	(2)	… part 725: Single-pole protection of the circuit	… part 1: • with grounded secondary power circuit: **single-pole** protection • otherwise: **all-pole** protection
Load power supply for AC load circuits with more than five electromagnetic apparatus	(3)	metallic isolation with transformers **recommended**	metallic isolation with transformers **required**

Properties of load power supplies

The load power supply supplies input and output circuits (load circuits) as well as sensors and actuators. The following lists the properties of load power supplies that are required in special application cases.

Properties of load power supply	required for ...	Remarks
Safer (electrical) isolation	Modules that must be supplied with voltages ≤ DC 60 V or ≤ AC 25 V	The power supplies PS 307 as well as the Siemens load power supplies of the 6EP1 series have this property.
	24 V DC load power supply	
Tolerances of the output voltage:		In the case of considerable unevenness of the output voltage, we recommend using a supporting capacitor. Measurement: 200 µF per 1 A load current (with bridge rectification).
20.4 V to 28.8 V	24 V DC load power supply	
40.8 V to 57.6 V	48 V DC load power supply	
51 V to 72 V	60 V DC load power supply	

Rule: ground the load circuits

The load circuits should be grounded.

A perfect functioning security is given on account of the mutual reference potential (ground). On the load power supply (terminals L or M) or on the isolation transformer provide a disconnectable connection to the grounding wire (position ④ in the following figure). In the event of faults in the energy distribution, this measure makes it easier for you to localize contacts to earth.

ET 200M in the overall configuration

The following figure shows the position of the ET 200M in the overall configuration (load power supply and grounding concept) with a supply from a TN-S-network.

Note: The arrangement shown of the supply connections does not correspond to the actual arrangement; it has been chosen for reasons of clarity.

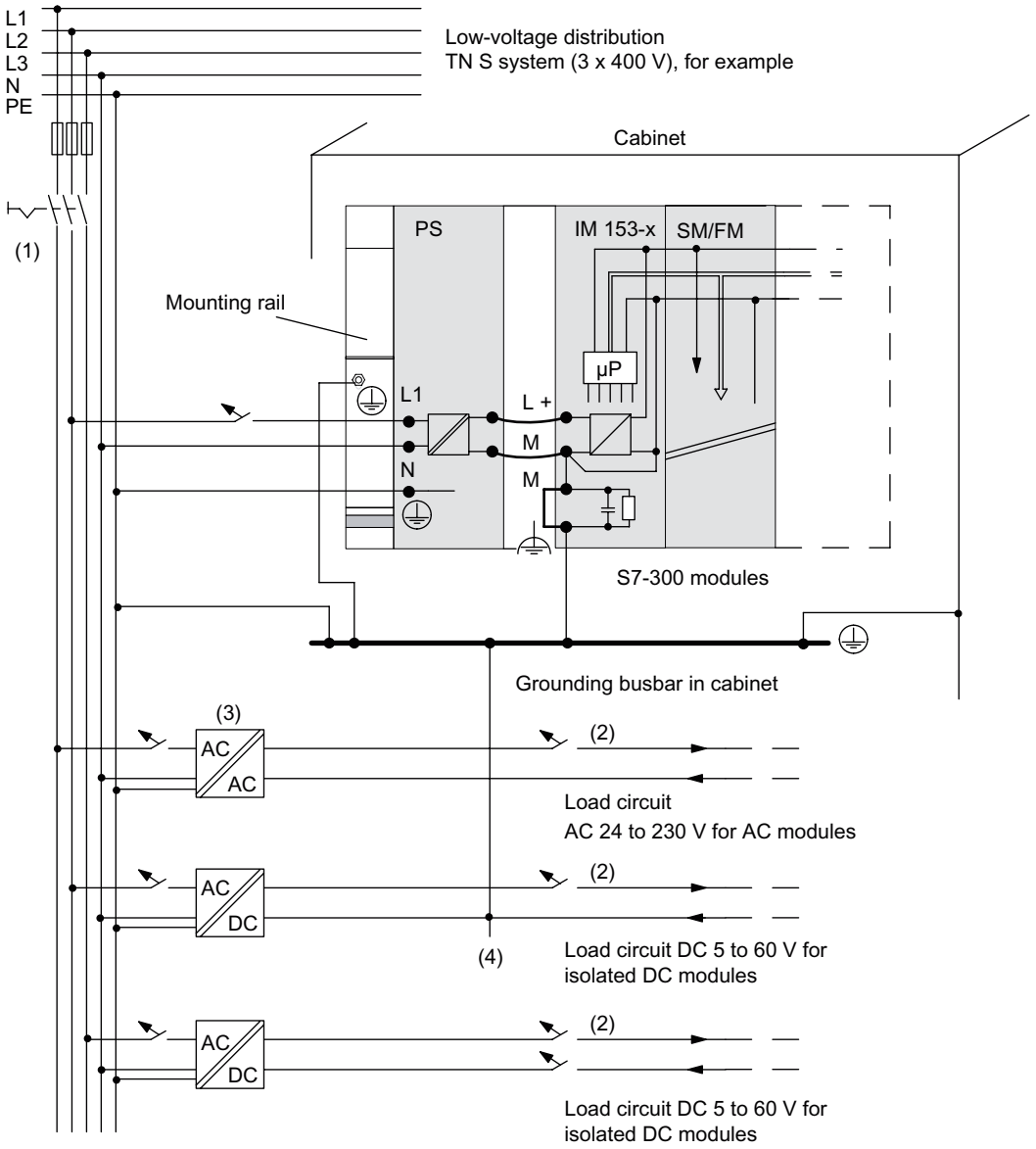


Figure 3-10 Operating S7-300 modules from grounded supply

ET 200M with load power supply from the PS 307

The following figure shows the position of the ET 200M in the overall configuration (load power supply and grounding concept) with a supply from a TN-S-network.

Alongside the IM 153-x, the PS 307 also supplies the load circuit for the 24 V DC modules.

Note: The arrangement shown of the supply connections does not correspond to the actual arrangement; it has been chosen for reasons of clarity.

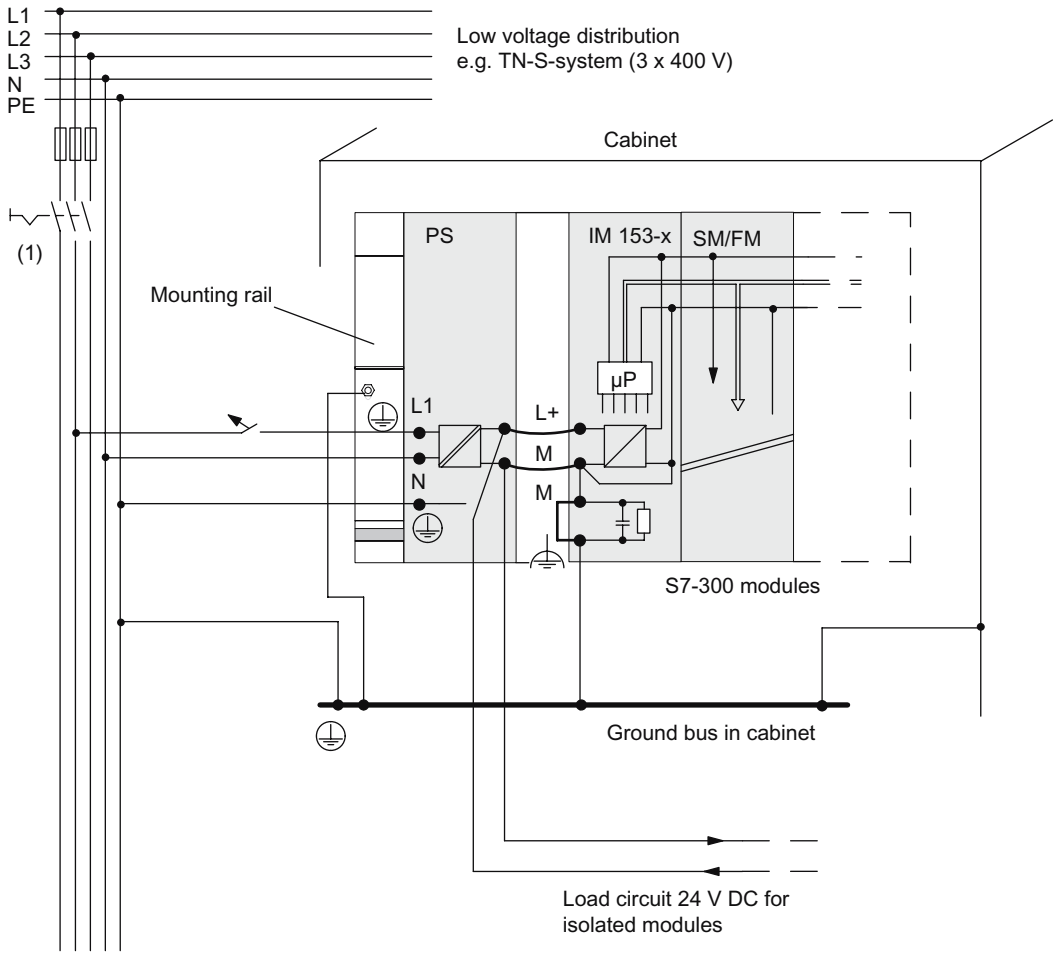


Figure 3-11 Operating S7-300 modules from the PS 307

3.6.3 Configuration of an ET 200M with ungrounded reference potential

In the configuration of the ET 200M with ungrounded reference potential, the occurring interference currents are deflected to the grounding wire via an RC network that is integrated in the IM 153-x (see following figure).

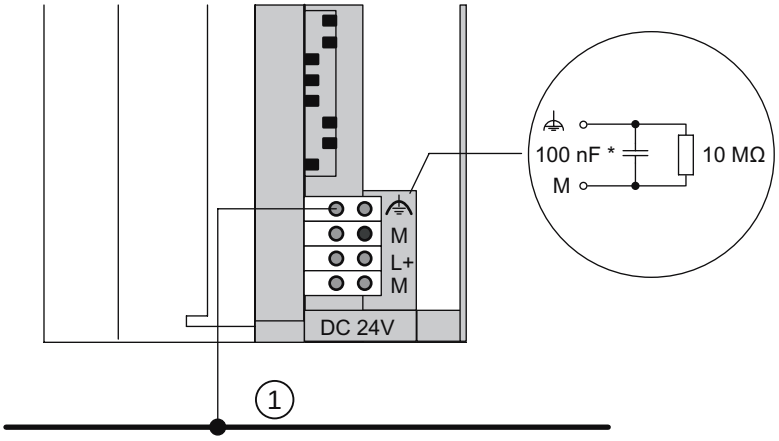
For information on older IM 153-x versions, refer to Appendix "RC network with 1 MΩ for a configuration with ungrounded reference potential (Page 246)".

Application

In extensive units it may be necessary, e.g. for the purposes of earth leakage monitoring, to configure the ET 200M with ungrounded reference potential. This is the case, for example, in the chemical industry or in power stations.

Connection diagram

The following figure shows the configuration of an ET 200M with IM 153-x and ungrounded reference potential. If you don´t want to ground the reference potential, then you must **remove the bridge on the IM 153-x between the terminals M and the functional earth**. If the bridge isn´t connected then the reference potential of the ET 200M is connected internally to the grounding wire via an RC combination and via the rail. This way, high-frequency interference currents are deflected and static charge avoided.



① Ground bus

* 22 nF in IM 153-1AAx3, IM 153-2AA02, IM 153-2BA00, IM 153-2AB01, IM 153-2BB00

Figure 3-12 Configuration of an ET 200M with ungrounded reference potential

Network devices

When using network devices, note that the secondary winding must not be connected with the grounding wire. We recommend you use the power supply module PS 307.

Technical Specifications	IM 153-1	IM 153-2	IM 153-2 FO
Time synchronization / time stamping	No	yes	
• Accuracy class	—	10 ms / 1 ms	
• Time resolution	—	466 ps	
• Number of digital input signals	—	Max. 32 per slot Max. 128	Max. 128
• Message buffer	—	15 message buffers with in each case max. 20 messages	
• Time interval for sending the message buffers when there is a message	—	1 s	
• Time stamping	—	• Per digital input • Per digital input module • total ET 200M	
• Time stamp in the case of	—	rising / falling edge as incoming or outgoing signal	
• Time format	—	RFC 1119 Internet (ISP)	
Voltages, currents, electrical potentials			
Rated voltage	DC 24 V (DC 20.4 to 28.8 V)		
Current consumption at 24 V	Max. 350 mA	Max. 550 mA max. 600 mA (for IM 153-2BAx2)	Max. 500 mA
Inrush current	2.5 A	2.5 A (for IM 153-2AA0x and IM 153-2BA00) 3.5 A (for IM 153-2BAx1) 3.0 A (for IM 153-2BAx2)	3.5 A
Power on the I/O bus (to supply the I/O modules)	—	max. 1.5 A	—
I^2t	0.1 A^2s		
Recommended external fusing for supply lines	In a configuration with grounded reference potential a fuse is required for redundant interface modules (recommendation: 2.5 A).		
Power dissipation, type	3 W	5 W (for IM 153-2AA0x and IM 153-2BA00) 4 W (for IM 153-2BAx1) 5.5 W (for IM 153-2BAx2)	4.5 W (for IM 153-2AB0x and IM 153-2BB00)

A.2 Compatibilities between the versions of IM 153-2 / -2 FO

The versions of the IM 153 2 / -2 FO

Functions / Properties	Interface module with order number 6ES7153-…								
	2AA..			2BA..			2AB.. (FO)		2BB.. (FO)
	00	01	02	00	01/81	02/82	00	01	00
RS 485 interface	x	x	x	x	x	x	–	–	–
Fiber-optic interface	–	–	–	–	–	–	x	x	x
12 modules can be operated after the interface module	–	–	–	–	–	x	–	–	–
SYNC, FREEZE	–	–	–	x	x	x	–	–	x
Module change during operation	x	x	x	x	x	x	x	x	x
Direct data exchange	–	–	x	x	x	x	–	x	x
Direct data exchange with F-modules	–	–	–	–	x	x	–	–	–
Enhanced diagnostics									
• 96-byte diagnostic frame	–	–	x as of E07	x	x	– [3]	–	x as of E06	x
• 130-byte diagnostic frame	–	–	–	–	–	x	–	–	–
Forwarding of parameter assignment data from the PG/PC (e.g. for HART modules)	–	x	x	x	x	x	x	x	x
Support for I/O modules with expanded input data	–	–	–	–	–	x	–	–	–
Support for 64-channel DI/DO	–	–	–	–	–	x	–	–	–
Configurable FM in an ET 200M	–	x	x	x	x	x	x	x	x
Time synchronization on the PROFIBUS DP	–	–	x	x	x	x	x	x	x
Time-of-day synchronization on the I/O bus	–	–	–	–	x	x	–	–	–
Time stamping of input signals	–	–	x	x	x	x	x	x	x
• In case of redundancy	–	–	as of E07	x	x	x	–	as of E06	x
• with 1 ms precision	–	–	–	–	x	x	–	–	–
• outside of S7-400	–	–	–	–	x	x	–	–	–
• For maximum of 32 DI per slot	–	–	–	–	–	x	–	–	–
Redundancy [1]	–	–	x	x	x	x	-	x	x
• Flying redundancy	–	–	–	–	x	x	–	–	–
System modification in RUN mode									
• In the redundant system	–	–	x	x	x	x	–	x	x
• In the non-redundant system	–	–	–	x	x	x	–	–	x
Clock synchronism [1]	–	–	–	x	x	x	–	–	x