INSTALLATION DOCUMENT PACKAGE

Installation Instructions

SIEMENS SIMATIC S7

6ES7512-1CK00-0AB0

CPU 1512C COMPACT CONTROLLER

Applicable product family: SIMATIC S7-1500 automation systems

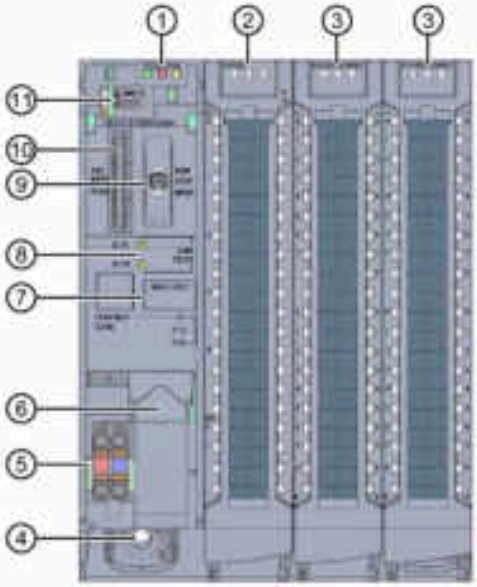
OFFICIAL SOURCE

6ES7512-1CK00-0AB0.pdf

The following pages are selected from the supplied manufacturer document and retain their original page content.

2.3.2 Front view without front panel on the CPU

The following figure shows the operator control and connection elements of the CPU 1512C-1 PN with the front cover of the CPU open.

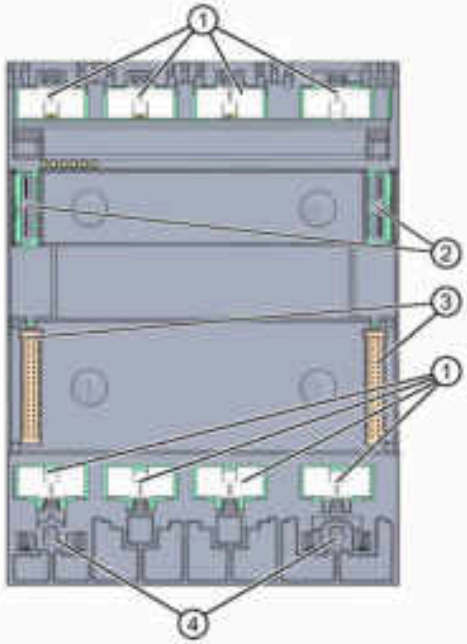


① LEDs for the current operating mode and diagnostics status of the CPU
② Status and error displays RUN/ERROR of the analog on-board I/O
③ Status and error displays RUN/ERROR of the digital on-board I/O
④ Fastening screw
⑤ Connection for supply voltage
⑥ PROFINET interface (X1) with 2 ports (X1 P1 and X1 P2)
⑦ MAC address
⑧ LEDs for the 2 ports (X1 P1 and X1 P2) of the PROFINET interface X1
⑨ Mode selector
⑩ Slot for the SIMATIC memory card
⑪ Display connection

Figure 2-6 View of the CPU 1512C-1 PN without front panel on the CPU (front)

2.3.3 Rear view

The following figure shows the connection elements on the rear of the CPU 1512C-1 PN.



① Shield contact surfaces
② Plug-in connection for power supply
③ Plug-in connection for backplane bus
④ Fastening screws

Figure 2-7 View of the CPU 1512C-1 PN - rear

2.4 Mode selector

You use the mode selector to set the operating mode of the CPU.

The following table shows the position of the selector and the corresponding meaning:

Position of the mode selector

Position	Meaning	Explanation
RUN	RUN mode	The CPU executes the user program.
STOP	STOP mode	The user program is not executed.
MRES	Memory reset	Position for CPU memory reset.

Wiring

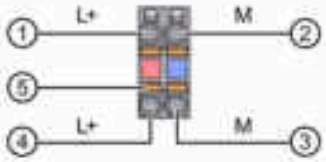
4

4.1 Supply voltage

24 V DC supply voltage (X80)

The connecting plug for the supply voltage is plugged in when the CPU ships from the factory.

The following table shows the terminal assignment for a 24 V DC power supply.



① +24 V DC of the supply voltage
② Ground of the supply voltage
③ Ground of the supply voltage for loop-through (maximum of 10 A permitted)
④ +24 V DC of the supply voltage for loop-through (maximum of 10 A permitted)
⑤ Spring-loaded NC contact (one spring-loaded NC contact per terminal)

Bridged internally:
① and ④
② and ③

Figure 4-1 Connection for supply voltage

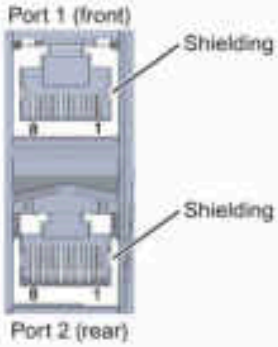
If the CPU is supplied by a system power supply, it is not necessary to connect the 24 V supply.

4.2 PROFINET interfaces

PROFINET interface X1 with 2-port switch (X1 P1 R and X1 P2 R)

The following table shows the terminal assignment for the PROFINET interface with 2-port switch. The assignment corresponds to the Ethernet standard for an RJ45 plug.

Table 4- 1 Terminal assignment of the PROFINET interface with 2-port switch

View	Signal name		Pin assignment
	1	TD	Transmit Data +
	2	TD_N	Transmit Data -
	3	RD	Receive Data +
	4	--	Unassigned
	5	--	Unassigned
	6	RD_N	Receive Data -
	7	--	Unassigned
	8	--	Unassigned

Reference

For more information on "Wiring the CPU" and "Accessories/spare parts", refer to the S7-1500, ET 200MP system manual (http://support.automation.siemens.com/WW/view/en/59191792).

Assignment of the MAC addresses

The CPU 1512C-1 PN has a PROFINET interface with two ports. The PROFINET interface itself has a MAC address, and each of the two PROFINET ports has its own MAC address. The CPU 1512C-1 PN therefore has three MAC addresses in total.

The MAC addresses of the PROFINET ports are needed for the LLDP protocol, for example for the neighborhood discovery function.

The number range of the MAC addresses is continuous. The first and last MAC address are lasered on the rating plate on the right side of each CPU 1512C-1 PN.

The table below shows how the MAC addresses are assigned.

Table 4- 2 Assignment of the MAC addresses

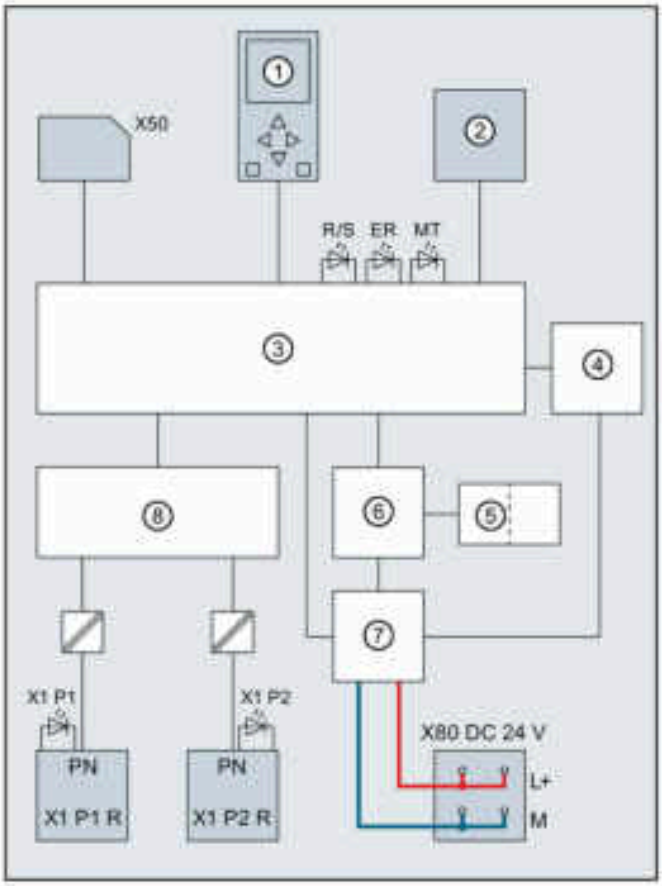
	Assignment	Labeling
MAC address 1	PROFINET interface X1 (visible in STEP 7 for accessible devices)	• Front, lasered • Right side, lasered (start of number range)
MAC address 2	Port X1 P1 R (required for LLDP, for example)	• Front and right side, not lasered
MAC address 3	Port X1 P2 R (required for LLDP, for example)	• Front, not lasered • Right side, lasered (end of number range)

4.3 Terminal and block diagrams

4.3.1 Block diagram of the CPU part

Block diagram

The following figure shows the block diagram of the CPU part.



①	Display	X80 24 V DC	Infeed of supply voltage
②	RUN/STOP/MRES mode selector	PN X1 P1 R	PROFINET interface X1 port 1
③	Electronics	PN X1 P2 R	PROFINET interface X1 port 2
④	Interface to on-board I/O	L+	24 V DC supply voltage
⑤	Interfaces to the backplane bus	M	Ground
⑥	Backplane bus interface	R/S	RUN/STOP LED (yellow/green)
⑦	Internal supply voltage	ER	ERROR LED (red)
⑧	PROFINET switch	MT	MAINT LED (yellow)
X50	SIMATIC Memory Card	X1 P1, X1 P2	Link TX/RX LED

Figure 4-2 Block diagram of the CPU part

4.3.2 Terminal and block diagram of the analog on-board I/O

This section contains the block diagram of the analog on-board I/O (X10) and various wiring options.

For information on wiring the front connector, establishing the cable shield, etc., refer to the S7-1500, ET 200MP (http://support.automation.siemens.com/WW/view/en/59191792) system manual.

Note

You can use and combine the different wiring options for all channels. Note, however, that unneeded terminals of an analog input channel must not be connected.

Definition

U_n+/U_n-	Voltage input channel n (voltage only)
M_n+/M_n-	Measuring input channel n
I_n+/I_n-	Current input channel n (current only)
$I_{c\,n}+/I_{c\,n}-$	Current output for RTD, channel n
QV_n	Voltage output channel
QI_n	Current output channel
M_{ANA}	Reference potential of the analog circuit
CHx	Channel or display of the channel status

Infeed element

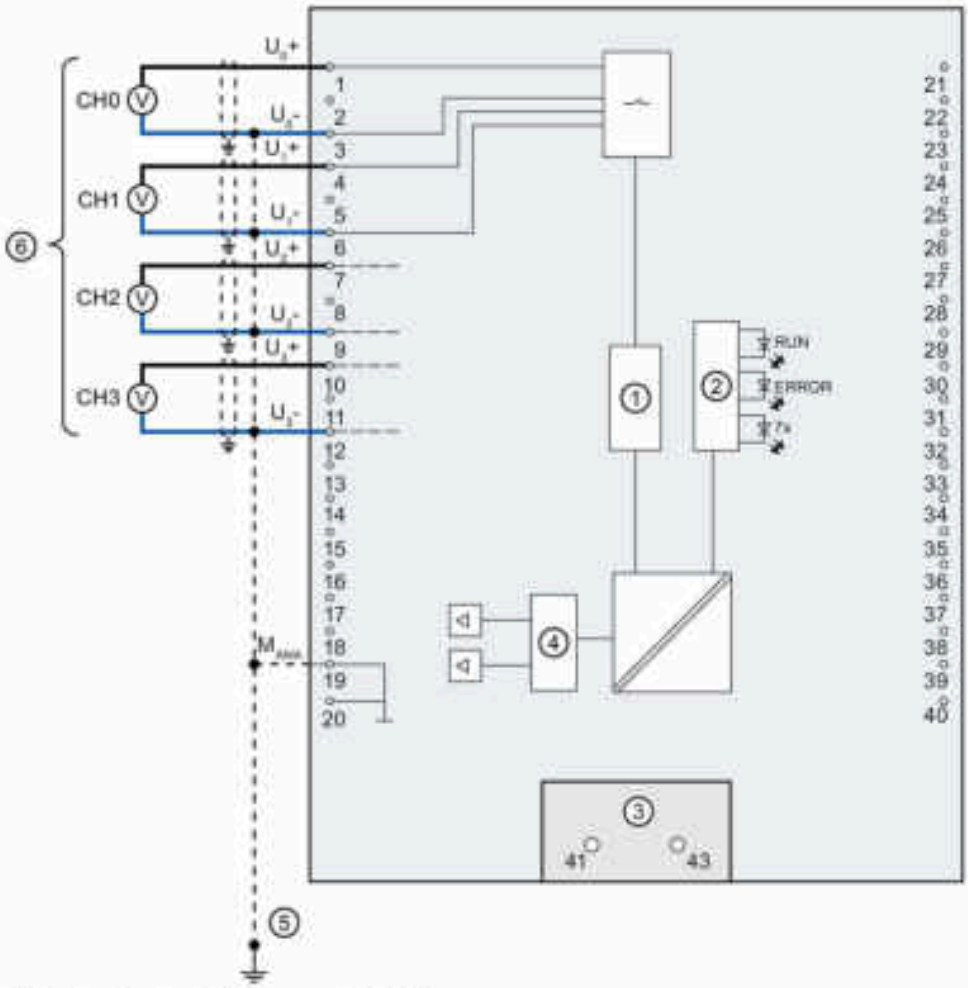
The infeed element is inserted on the front connector and serves to shield the analog on-board I/O.

Note

The analog on-board I/O does not require power to be supplied by the infeed element. The infeed element is, however, necessary for shielding.

Wiring: Voltage measurement

The following figure shows the terminal assignment for voltage measurement at the channels available for this measurement type (channels 0 to 3).

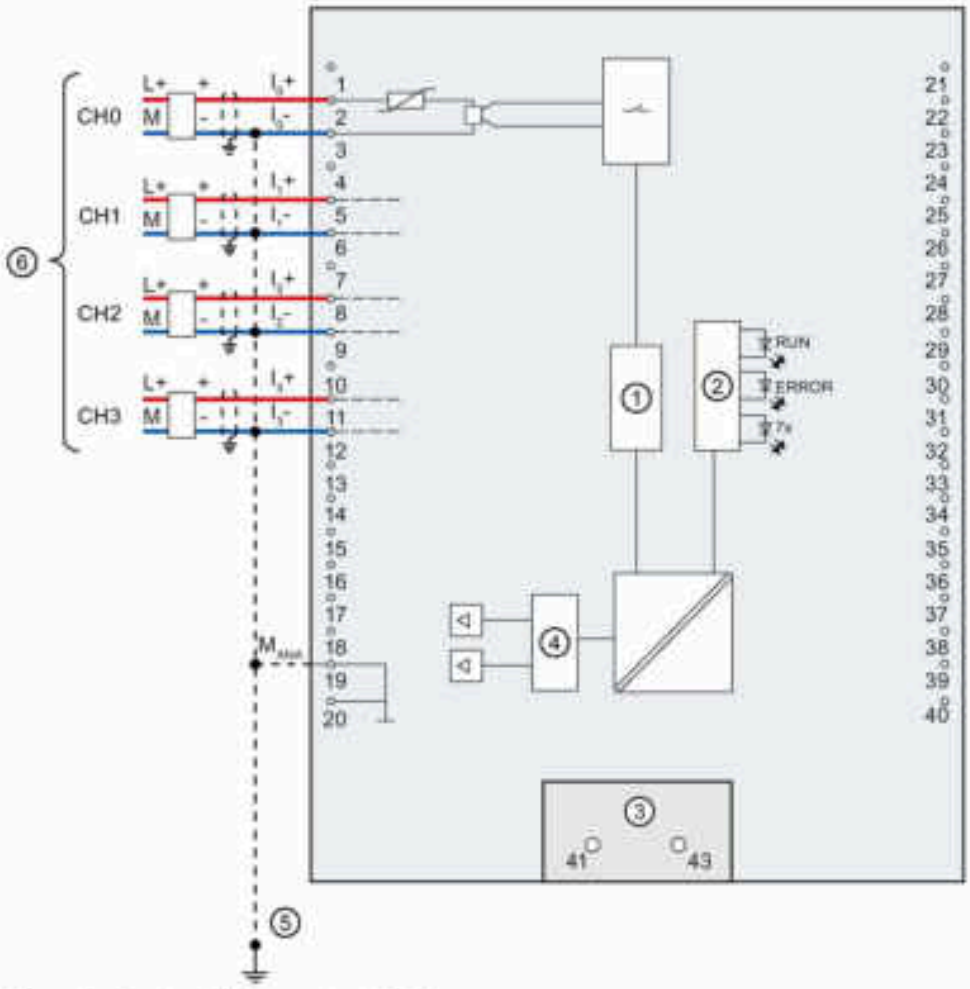


① Analog-to-digital converter (ADC)
② LED interface
③ Infeed element (for shielding only)
④ Digital-to-analog converter (DAC)
⑤ Equipotential bonding cable (optional)
⑥ Voltage measurement

Figure 4-3 Block diagram and terminal assignment for voltage measurement

Wiring: 4-wire measuring transducer for current measurement

The following figure shows the terminal assignment for current measurement with 4-wire measuring transducer at the channels available for this measurement type (channels 0 to 3).

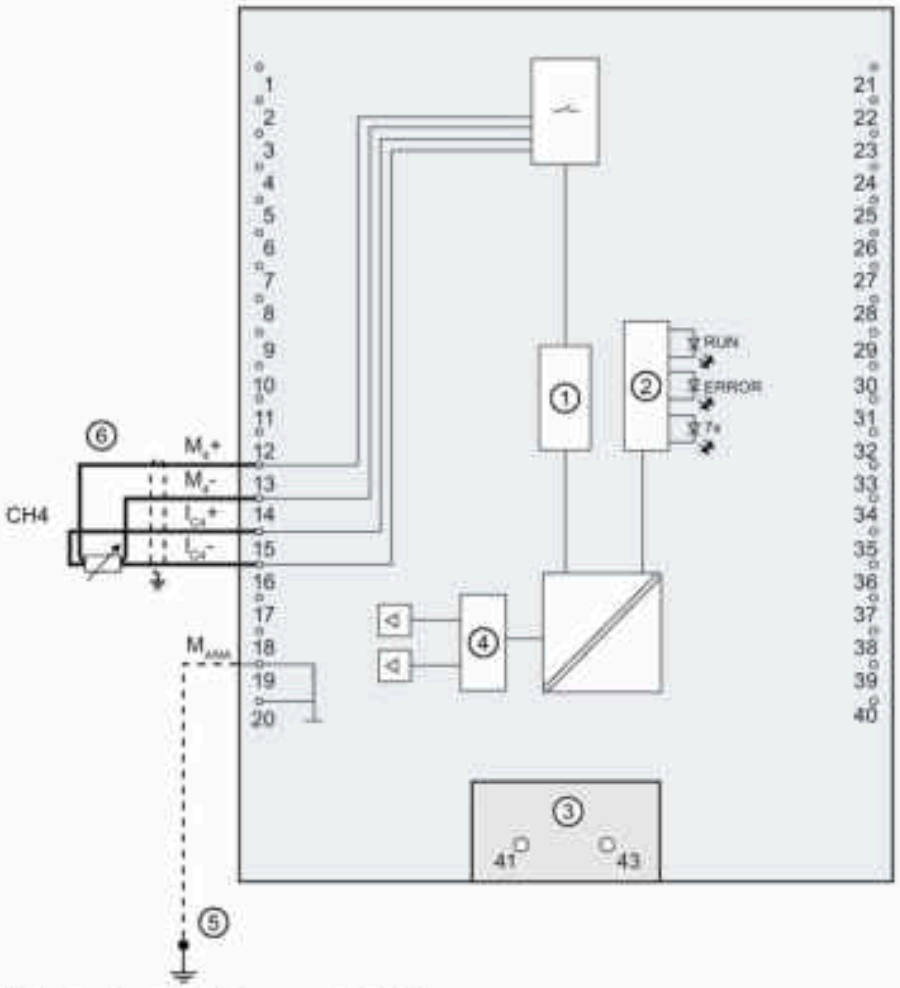


① Analog-to-digital converter (ADC)
② LED interface
③ Infeed element (for shielding only)
④ Digital-to-analog converter (DAC)
⑤ Equipotential bonding cable (optional)
⑥ Connector 4-wire measuring transducer

Figure 4-4 Block diagram and terminal assignment for current measurement with 4-wire measuring transducer

Wiring: 4-wire connection of resistance-type sensors or thermal resistors (RTD)

The following figure shows the terminal assignment for 4-wire connection of resistance-type sensors or thermal resistors at the channel available for this (channel 4).



① Analog-to-digital converter (ADC)
② LED interface
③ Infeed element (for shielding only)
④ Digital-to-analog converter (DAC)
⑤ Equipotential bonding cable (optional)
⑥ 4-wire connection

Figure 4-5 Block diagram and terminal assignment for 4-wire connection

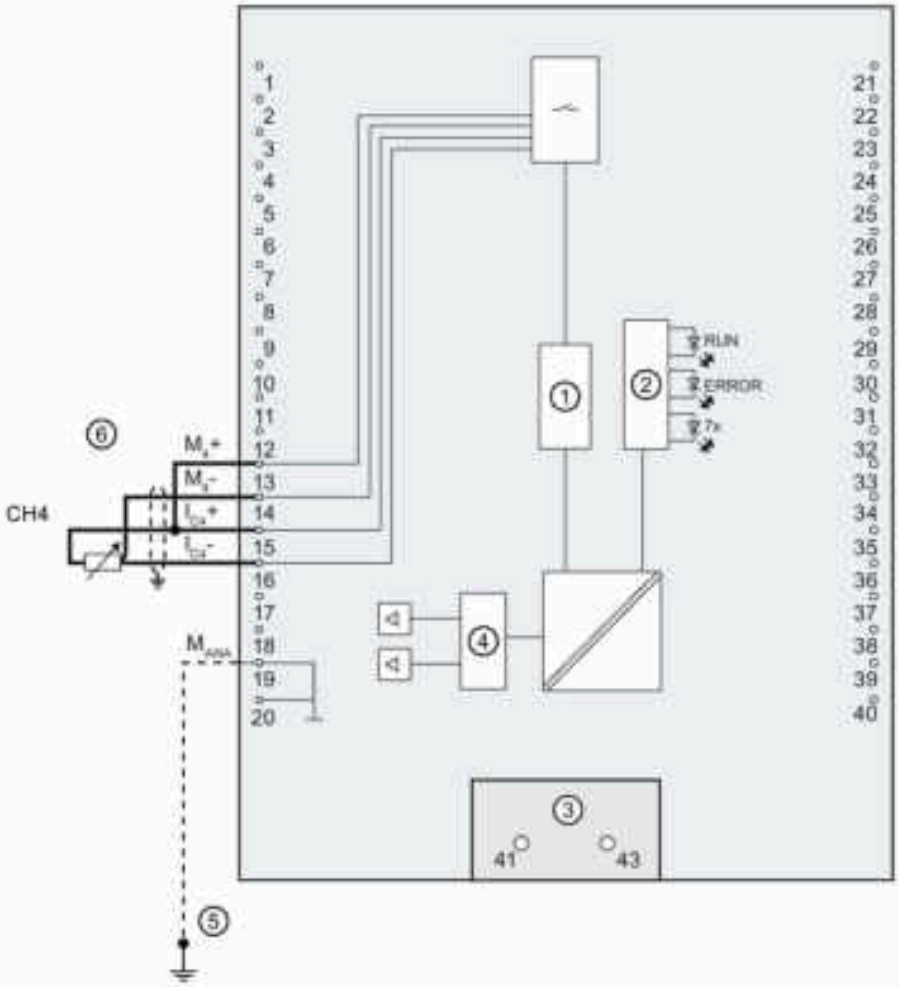
Wiring: 3-wire connection of resistance-type sensors or thermal resistors (RTD)

The following figure shows the terminal assignment for 3-wire connection of resistance-type sensors or thermal resistors at the channel available for this (channel 4).

Note

Parameter assignment of 3-wire connections

Note that line resistances are not compensated with a 3-wire connection.



① Analog-to-digital converter (ADC)
② LED interface
③ Infeed element (for shielding only)
④ Digital-to-analog converter (DAC)
⑤ Equipotential bonding cable (optional)
⑥ 3-wire connection

Figure 4-6 Block diagram and terminal assignment for 3-wire connection

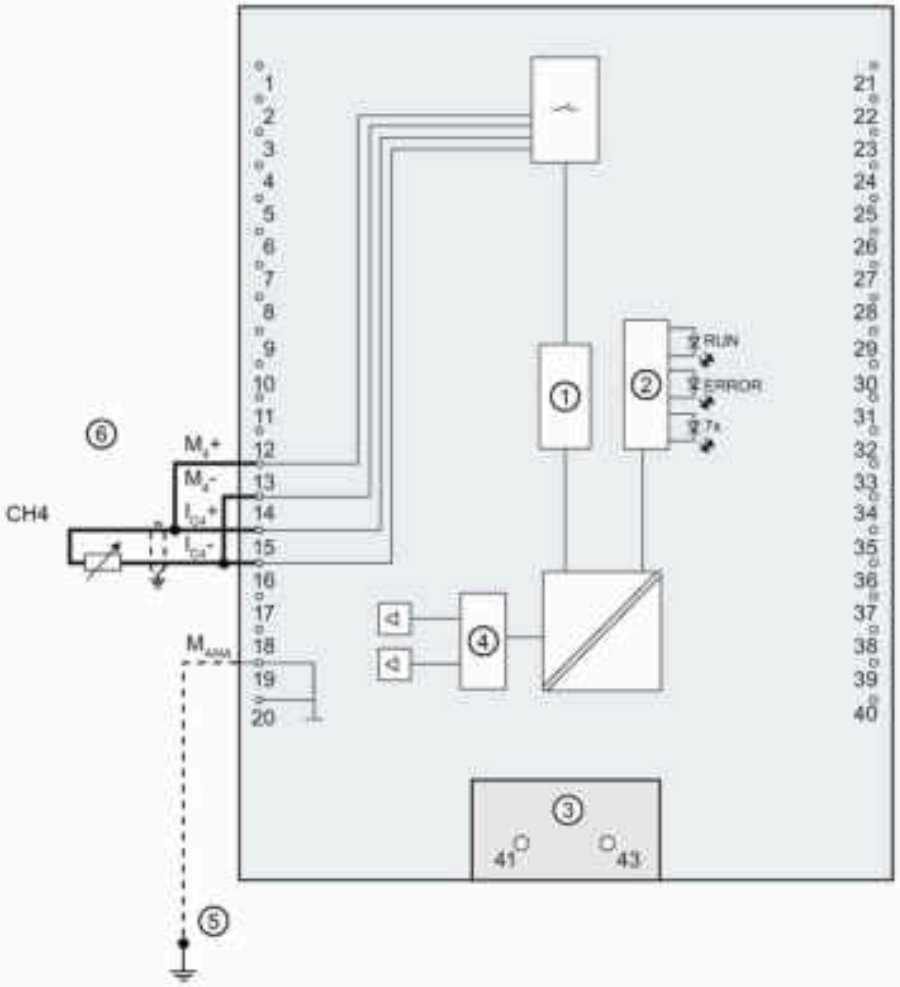
Wiring: 2-wire connection of resistance-type sensors or thermal resistors (RTD)

The following figure shows the terminal assignment for 2-wire connection of resistance-type sensors or thermal resistors at the channel available for this (channel 4).

Note

Parameter assignment of 2-wire connections

Note that line resistances are not compensated with a 2-wire connection.



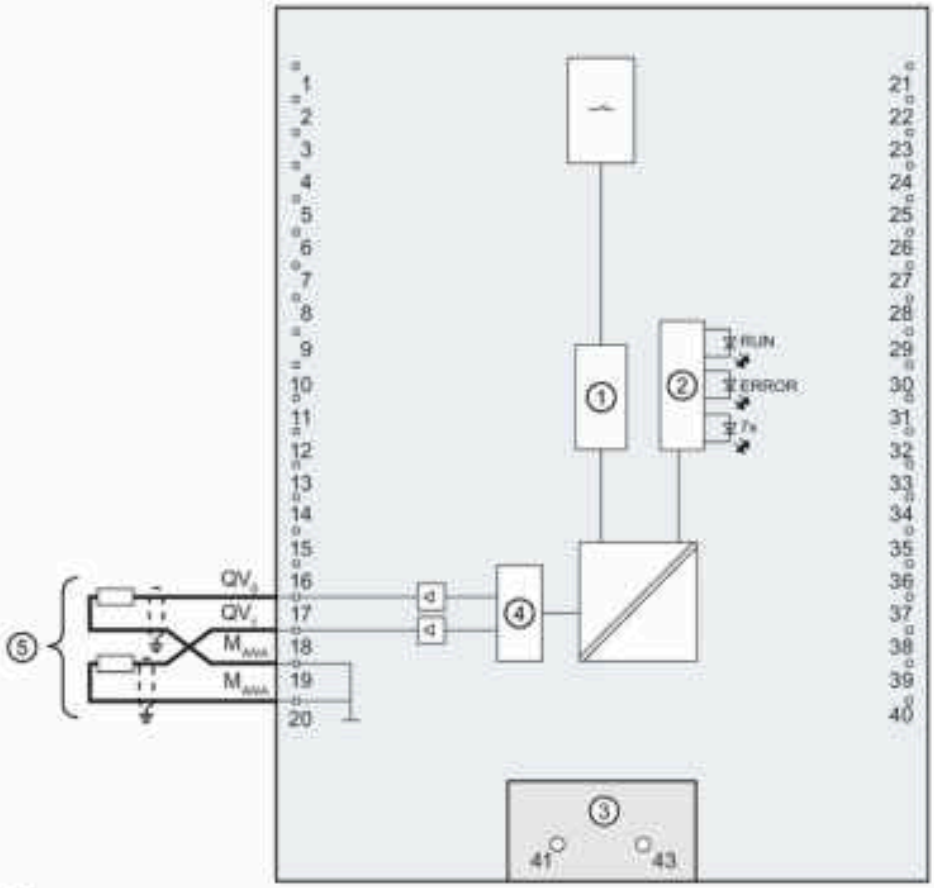
① Analog-to-digital converter (ADC)
② LED interface
③ Infeed element (for shielding only)
④ Digital-to-analog converter (DAC)
⑤ Equipotential bonding cable (optional)
⑥ 2-wire connection

Figure 4-7 Block diagram and terminal assignment for 2-wire connection

Wiring: Voltage output

The figure below shows the terminal assignment for the wiring of the voltage outputs with:

- 2-wire connection, no compensation for line resistances.

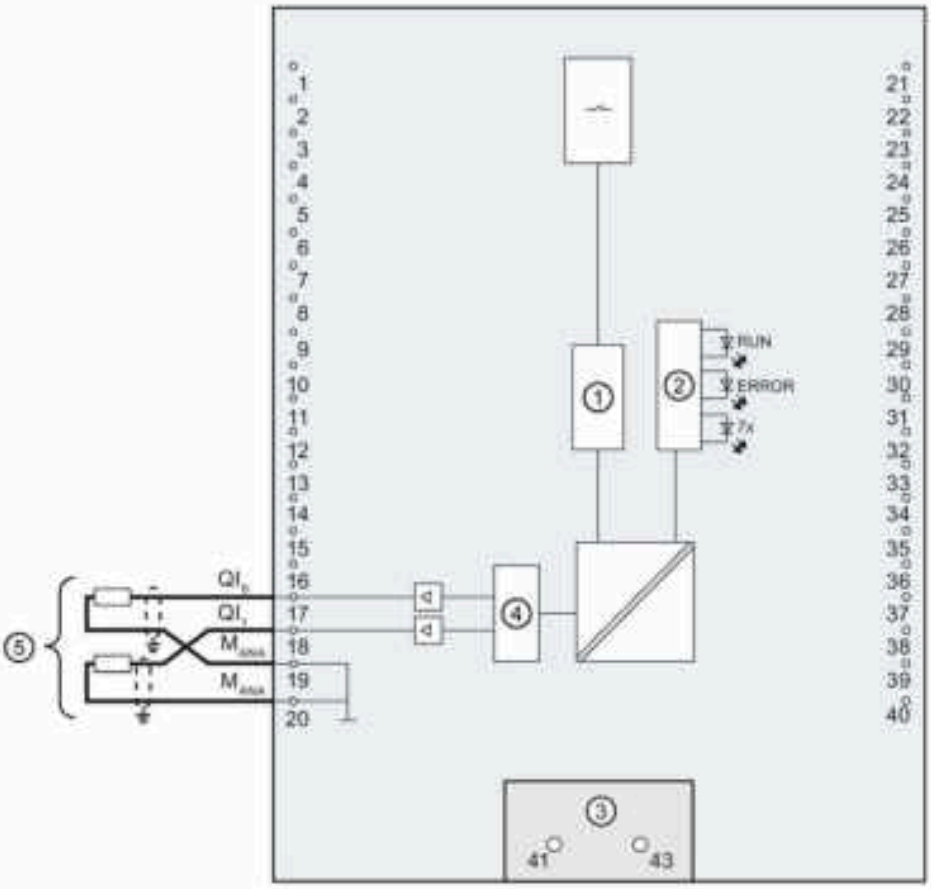


① Analog-to-digital converter (ADC)
② LED interface
③ Infeed element (for shielding only)
④ Digital-to-analog converter (DAC)
⑤ 2-wire connection CH0 and CH1

Figure 4-8 Block diagram and terminal assignment for voltage output

Wiring: Current output

The following figure shows an example of the terminal assignment for wiring current outputs.



① Analog-to-digital converter (ADC)
② LED interface
③ Infeed element (for shielding only)
④ Digital-to-analog converter (DAC)
⑤ Current output CH0 and CH1

Figure 4-9 Block diagram and terminal assignment for current output

4.3.3 Terminal and block diagram of the digital on-board I/O

This section contains the block diagram of the digital on-board I/O (X11 and X12) with standard inputs and outputs and the encoder supply, as well as the rules for the correct wiring of the ground connections.

For information on wiring the front connector, establishing the cable shield, etc., refer to the S7-1500, ET 200MP (http://support.automation.siemens.com/WW/view/en/59191792) system manual.

Infeed element

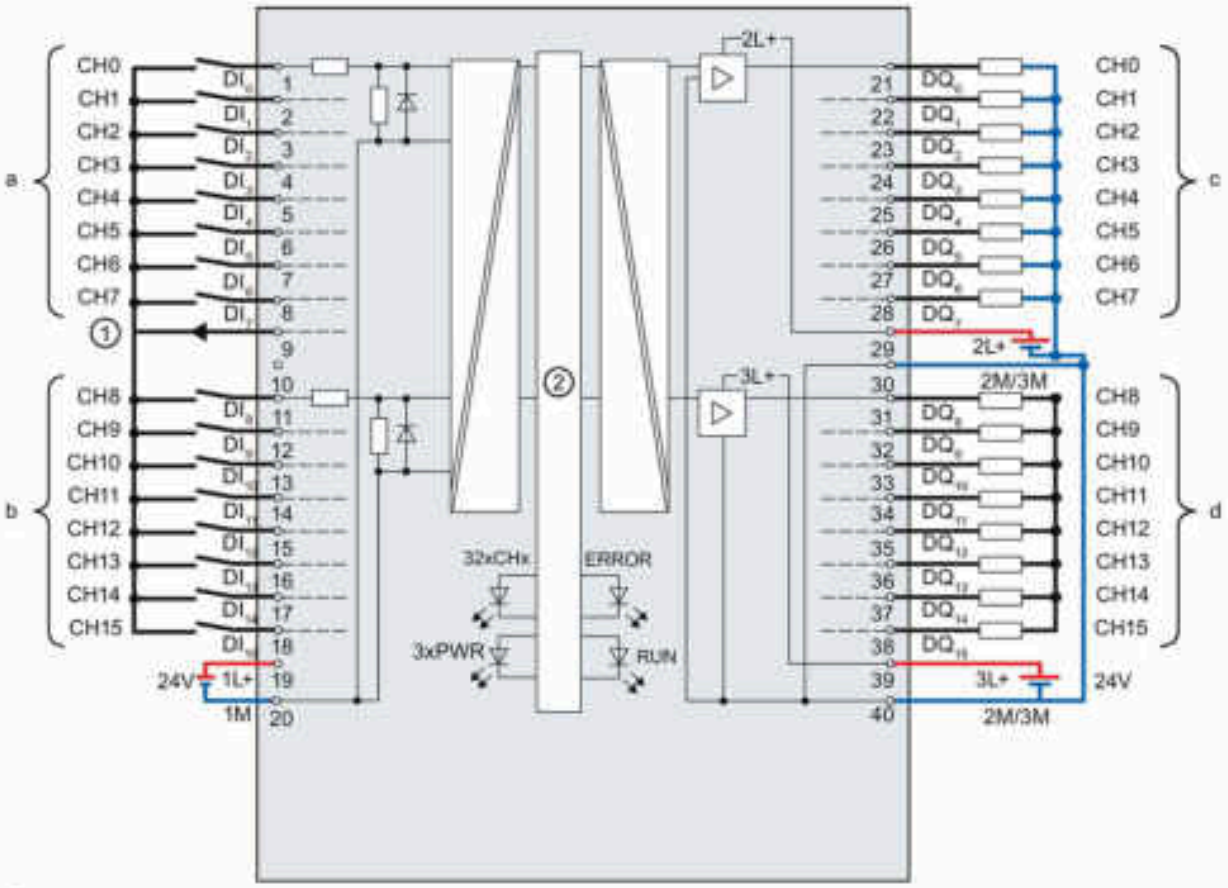
The infeed element is inserted on the front connector and serves to shield the digital on-board I/O.

Note

The digital on-board I/O is supplied via the front connector terminals and therefore does not require power to be supplied by the infeed element. The infeed element is, however, necessary for shielding.

Block diagram and terminal assignment X11

The figure below shows you how to connect the digital on-board I/O X11 and the assignment of the channels to the addresses (input byte a and b, output byte c and d).

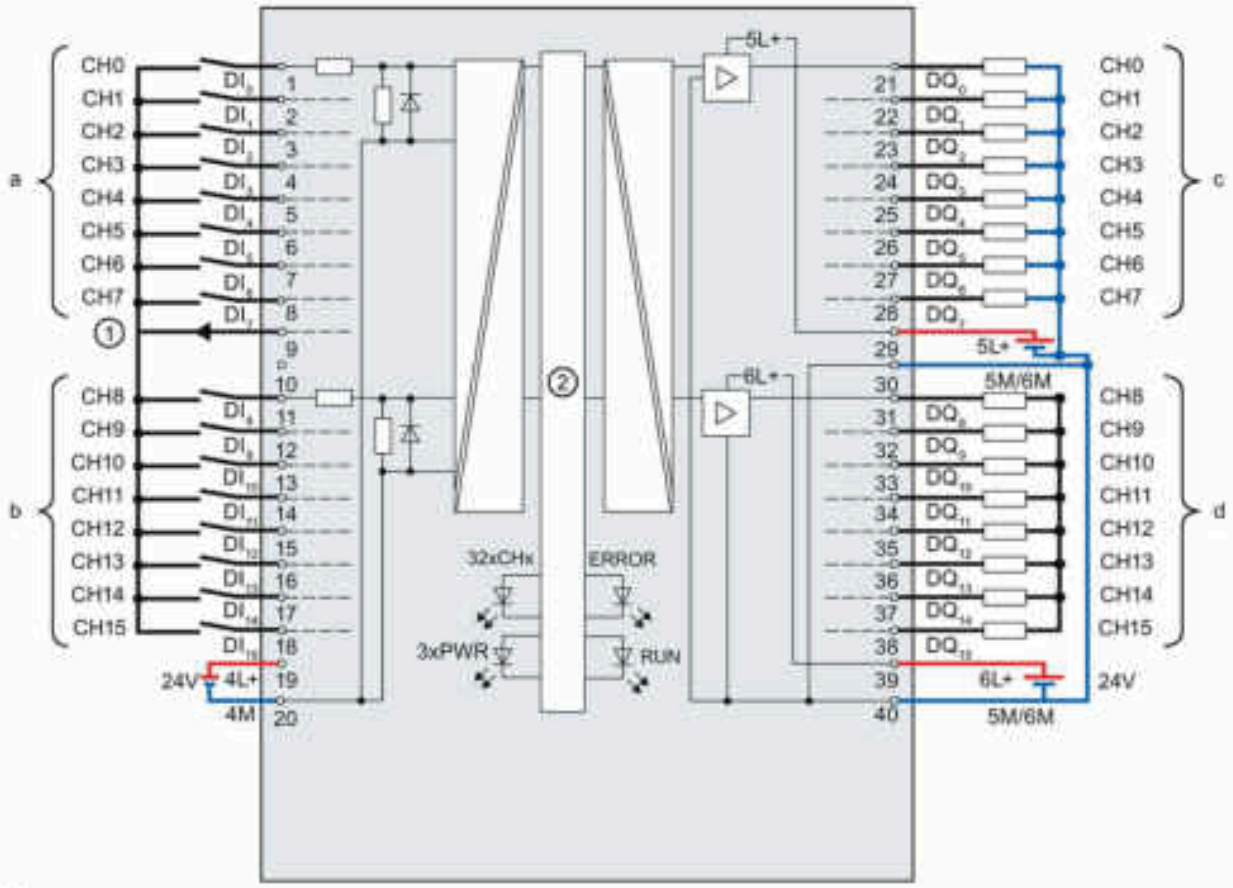


①	Encoder supply for the digital inputs
②	CPU interface
xL+	Connection for 24 V DC supply voltage
xM	Connection for ground
CHx	Channel or channel status LED (green)
RUN	Status display LED (green)
ERROR	Error display LED (red)
PWR	POWER supply voltage LED (green)

Figure 4-10 Block diagram and terminal assignment of the digital on-board I/O X11

Block diagram and terminal assignment X12

The figure below shows you how to connect the digital on-board I/O X12 and the assignment of the channels to the addresses (input byte a and b, output byte c and d).



①	Encoder supply for the digital inputs
②	CPU interface
xL+	Connection for 24 V DC supply voltage
xM	Connection for ground
CHx	Channel or channel status LED (green)
RUN	Status display LED (green)
ERROR	Error display LED (red)
PWR	POWER supply voltage LED (green)

Figure 4-11 Block diagram and terminal assignment of the digital on-board I/O X12

Supply voltage using the digital on-board I/O X11 as an example

The inputs and outputs of the digital on-board I/O are divided into two load groups, which are supplied with 24 V DC.

The digital inputs DI0 to DI15 form a load group and are supplied via the connections 1L+ (terminal 19) and 1M (terminal 20).

The digital outputs DQ0 to DQ7 are supplied via the connection 2L+ (terminal 29). The digital outputs DQ8 to DQ15 are supplied via the connection 3L+ (terminal 39). Please note that the digital outputs DQ0 to DQ15 only have a common ground. In each case, they are led through to the two terminals 30 and 40 (2M/3M) and bridged in the module. The digital outputs form a common load group.

Note

Polarity reversal of the supply voltage

An internal protective circuit protects the digital on-board I/O against destruction if the polarity of the supply voltage is reversed. In the case of polarity reversal of the supply voltage, however, unexpected states can occur at the digital outputs.

Response of the digital outputs to a wire break at ground connection of the outputs

Due to the characteristics of the output driver used in the module, approx. 25 mA supply current flows out through the outputs via a parasitic diode in the event of a ground wire break. This behavior can lead to non-set outputs also carrying high levels and emitting up to 25 mA output current. Depending on the type of load, 25 mA can be sufficient to control the load with high level. To prevent unintended switching of the digital outputs in the event of a ground wire break, follow these steps:

Wire to ground twice

Connect ground to terminal 30 and to terminal 40.

1. Route the first ground connection from terminal 30 to the central ground connection of the plant.

2. Route the second ground connection from terminal 40 to the central ground connection of the plant.

If terminal 30 or 40 are interrupted by a ground wire break, the outputs will continue to be supplied via the second, intact ground connection.

⚠ WARNING

Wire break at ground connection

Never bridge from terminal 30 to terminal 40 in the front connector and **never** lead only one wire to the central ground connection.

Connect terminal 30 and terminal 40 to a common ground point.