Assembly and Operating Manual

ECM

Controller for SCHUNK gripper

Firmware 3.x

Original Operating Manual

Hand in hand for tomorrow

Imprint

Technical changes:
We reserve the right to make alterations for the purpose of technical improvement.

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Dear Customer,

Thank you for trusting our products and our family-owned company, the leading technology supplier of robots and production machines.

Our team is always available to answer any questions on this product and other solutions. Ask us questions and challenge us. We will find a solution!

Best regards,

Your SCHUNK team

Customer Management
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cmg@de.schunk.com

Please read the operating manual in full and keep it close to the product.

Table of Contents

1 General

1.1 About this manual

This manual contains important information for a safe and appropriate use of the product.

This manual is an integral part of the product and must be kept accessible for the personnel at all times.

Before starting work, the personnel must have read and understood this operating manual. Prerequisite for safe working is the observance of all safety instructions in this manual.

In addition to these instructions, the documents listed under ▸ 1.1.4 [🗋 6] are applicable.

NOTE: The illustrations in this manual are intended to provide a basic understanding and may deviate from the actual version.

1.1.1 Presentation of Warning Labels

To make risks clear, the following signal words and symbols are used for safety notes.

⚠ DANGER

Dangers for persons!

Non-observance will inevitably cause irreversible injury or death.

⚠ WARNING

Dangers for persons!

Non-observance can lead to irreversible injury and even death.

⚠ CAUTION

Dangers for persons!

Non-observance can cause minor injuries.

CAUTION

Material damage!

Information about avoiding material damage.

1.1.2 Symbol definition

The following symbols are used in this manual:

■ Prerequisite for an action

1. Action 1
2. Action 2
   ⇨ Intermediate results

⇨ Final results

▸ 1.1.2 [🗋 6]: chapter number and [page number] in hyperlinks

1.1.3 Definition of Terms

The term "product" replaces the product name on the title page in this manual.

1.1.4 Applicable documents

- General terms of business *
- Catalog data sheet of the purchased product *
- Assembly and operating manuals of the accessories *
- "SCHUNK Motion Tool (MTS)" software manual *
- "SCHUNK Motion Protocol (SMP)" software manual *
- "SCHUNK Drive Protocol (SDP)" software manual *

The documents labeled with an asterisk (*) can be downloaded from **schunk.com**.

1.1.5 Variants

This operating manual applies to the following variations:

- ECM with PROFIBUS
- ECM with PROFINET
- ECM with PROFIBUS or PROFINET and digital inputs and outputs

1.2 Warranty

If the product is used as intended, the warranty is valid for 24 months from the ex-works delivery date under the following conditions:

- Observe the ambient conditions and operating conditions, ▸ 2.5 [🗋 9]

1.3 The scope of delivery includes

The scope of delivery includes

- Controller for SCHUNK gripper ECM in the version ordered
- USB 2.0 cable with a type A and a USB mini connection
- QR slip for downloading the commissioning software
- Mounting material

1.4 Accessories

The following accessories are required for the regulator and must be ordered separately:

- A termination resistor, if the regulator is the last device in the bus system.

2 Basic safety notes

2.1 Appropriate use

The product is used to control and regulate the EGN and EZN grippers.

- The product is designed to be built into a control cabinet. The applicable guidelines must be observed and complied with.
- The product may only be used within the scope of its technical data, ▶ 3 [🗋 19].
- The product is intended for industrial use.
- Appropriate use of the product includes compliance with all instructions in this manual.

2.2 Inappropriate use

It is considered improper use if the product is used to actuate or control products that are not from SCHUNK GmbH & Co. KG.

- Any utilization that exceeds or differs from the appropriate use is regarded as misuse.

2.3 Constructional changes

Implementation of structural changes

Modifications, changes or reworking, e.g. additional threads, holes, or safety devices, can damage the product or impair its functionality or safety.

- Structural changes should only be made with the written approval of SCHUNK.

2.4 Spare parts

Use of unauthorized spare parts

Using unauthorized spare parts can endanger personnel and damage the product or cause it to malfunction.

- Use only original spare parts or spares authorized by SCHUNK.

2.5 Ambient conditions and operating conditions

Required ambient conditions and operating conditions

Incorrect ambient and operating conditions can make the product unsafe, leading to the risk of serious injuries, considerable material damage and/or a significant reduction to the product's life span.

- Make sure that the product is used only in the context of its defined application parameters, ▸ 3 [🗋 19].

2.5.1 Electromagnetic compatibility

The product meets the requirements of the EMC act of the inner-European market, among other requirements. The product has passed the EMC test as per the following standards:

Standard	Title
EN 61000-6-2 (2006)	EMC: Generic standard – Immunity for industrial environments
EN 61000-6-3 (2011)	EMC: Generic standard – Emission standard for residential and light-industrial environments
EN 61800-3 (2012)	EMV: Product standard – Adjustable speed power drive systems
EN 55011 (2009)	EMV: Generic standard – Emission

The product must be installed using interference-free cables and in a way that meets EMC requirements in order to ensure interference-free operation.

Interference variables:

The electromagnetic compability with pulse-shaped inference variables has been verified and confirmed according to the following standards:

Standard	Title
EN 61000-4-2 (2008)	Test and measurement procedures - Testing the interference immunity to discharging of static electricity
EN 61000-4-4 (2008)	Test and measurements procedures - Testing the interference immunity to fast transient electric interference variables/burst
EN 61000-4-5 (2014)	Test and measurement procedures - Testing the interference immunity to surge voltages

Sinusoidal interference variables:

The electromagnetic compability with sinusoidal interference variables has been verified and confirmed according to the following standards:

Standard	Title
EN 61000-4-3 (2011)	Test and measurement procedures – Testing the interference immunity to electromagnetic high frequency fields
EN 61000-4-6 (2014)	Test and measurement procedures – interference immunity to conducted interference variables induced by high frequency fields

Emission of radio interference

The emission of radio interference has been verified and confirmed according to the following standards:

Standard	Title
EN 61000-6-3 (2011)	EMC: Generic standards – emitted interference for living area, business and commercial areas and small businesses

The emitted interference of electromagnetic fields (limit class A, group 1, measured with 10 m distance) has been tested according to the following standards:

Standard	Title
EN 55011 (2009)	Industrial, scientifical and medical devices – radio interference – limits and measurement procedures

2.6 Personnel qualification

Inadequate qualifications of the personnel

If the personnel working with the product is not sufficiently qualified, the result may be serious injuries and significant property damage.

- All work may only be performed by qualified personnel.
- Before working with the product, the personnel must have read and understood the complete assembly and operating manual.
- Observe the national safety regulations and rules and general safety instructions.

The following personal qualifications are necessary for the various activities related to the product:

Trained electrician	Due to their technical training, knowledge and experience, trained electricians are able to work on electrical systems, recognize and avoid possible dangers and know the relevant standards and regulations.
Qualified personnel	Due to its technical training, knowledge and experience, qualified personnel is able to perform the delegated tasks, recognize and avoid possible dangers and knows the relevant standards and regulations.
Instructed person	Instructed persons were instructed by the operator about the delegated tasks and possible dangers due to improper behaviour.
Service personnel of the manufacturer	Due to its technical training, knowledge and experience, service personnel of the manufacturer is able to perform the delegated tasks and to recognize and avoid possible dangers.

2.7 Personal protective equipment

Use of personal protective equipment

Personal protective equipment serves to protect staff against danger which may interfere with their health or safety at work.

- When working on and with the product, observe the occupational health and safety regulations and wear the required personal protective equipment.
- Observe the valid safety and accident prevention regulations.
- Wear protective gloves to guard against sharp edges and corners or rough surfaces.
- Wear heat-resistant protective gloves when handling hot surfaces.
- Wear protective gloves and safety goggles when handling hazardous substances.
- Wear close-fitting protective clothing and also wear long hair in a hairnet when dealing with moving components.

2.8 Notes on safe operation

Incorrect handling of the personnel

Incorrect handling and assembly may impair the product's safety and cause serious injuries and considerable material damage.

- Avoid any manner of working that may interfere with the function and operational safety of the product.
- Use the product as intended.
- Observe the safety notes and assembly instructions.
- Do not expose the product to any corrosive media. This does not apply to products that are designed for special environments.
- Eliminate any malfunction immediately.
- Observe the care and maintenance instructions.
- Observe the current safety, accident prevention and environmental protection regulations regarding the product's application field.

2.9 Transport

Handling during transport

Incorrect handling during transport may impair the product's safety and cause serious injuries and considerable material damage.

- When handling heavy weights, use lifting equipment to lift the product and transport it by appropriate means.
- Secure the product against falling during transportation and handling.
- Stand clear of suspended loads.

2.10 Malfunctions

Behavior in case of malfunctions

- Immediately remove the product from operation and report the malfunction to the responsible departments/persons.
- Order appropriately trained personnel to rectify the malfunction.
- Do not recommission the product until the malfunction has been rectified.
- Test the product after a malfunction to establish whether it still functions properly and no increased risks have arisen.

2.11 Disposal

Handling of disposal

The incorrect handling of disposal may impair the product's safety and cause serious injuries as well as considerable material and environmental harm.

- Follow local regulations on dispatching product components for recycling or proper disposal.

2.12 Fundamental dangers

General

- Observe safety distances.
- Never deactivate safety devices.
- Before commissioning the product, take appropriate protective measures to secure the danger zone.
- Disconnect power sources before installation, modification, maintenance, or calibration. Ensure that no residual energy remains in the system.
- If the energy supply is connected, do not move any parts by hand.
- Do not reach into the open mechanism or movement area of the product during operation.

2.12.1 Protection during handling and assembly

Incorrect handling and assembly

Incorrect handling and assembly may impair the product's safety and cause serious injuries and considerable material damage.

- Have all work carried out by appropriately qualified personnel.
- For all work, secure the product against accidental operation.
- Observe the relevant accident prevention rules.
- Use suitable assembly and transport equipment and take precautions to prevent jamming and crushing.

Incorrect lifting of loads

Falling loads may cause serious injuries and even death.

- Stand clear of suspended loads and do not step into their swiveling range.
- Never move loads without supervision.
- Do not leave suspended loads unattended.

2.12.2 Protection during commissioning and operation

Falling or violently ejected components

Falling and violently ejected components can cause serious injuries and even death.

- Take appropriate protective measures to secure the danger zone.
- Never step into the danger zone during operation.

2.12.3 Protection against dangerous movements

Unexpected movements

Residual energy in the system may cause serious injuries while working with the product.

- Switch off the energy supply, ensure that no residual energy remains and secure against inadvertent reactivation.
- The faulty actuation of conected drives may cause dangerous movements.
- Operating mistakes, faulty parameterization during commissioning or software errors may trigger dangerous movements.
- Never rely solely on the response of the monitoring function to avert danger. Until the installed monitors become effective, it must be assumed that the drive movement is faulty, with its action being dependent on the control unit and the current operating condition of the drive. Perform maintenance work, modifications, and attachments outside the danger zone defined by the movement range.
- To avoid accidents and/or material damage, human access to the movement range of the machine must be restricted. Limit/prevent accidental access for people in this area due through technical safety measures. The protective cover and protective fence must be rigid enough to withstand the maximum possible movement energy. EMERGENCY STOP switches must be easily and quickly accessible. Before starting up the machine or automated system, check that the EMERGENCY STOP system is working. Prevent operation of the machine if this protective equipment does not function correctly.

2.12.4 Protection against electric shock

Work on electrical equipment

Touching live parts may result in death.

- Work on the electrical equipment may only be carried out by qualified electricians in accordance with the electrical engineering regulations.
- Lay electrical cables properly, e. g. in a cable duct or a cable bridge. Observe standards.
- Before connecting or disconnecting electrical cables, switch off the power supply and check that the cables are free of voltage. Secure the power supply against being switched on again.
- Before switching on the product, check that the protective earth conductor is correctly attached to all electrical components according to the wiring diagram.
- Check whether covers and protective devices are fitted to prevent contact with live components.
- Do not touch the product's terminals when the power supply is switched on.

Possible electrostatic energy

Components or assembly groups may become electrostatically charged. When the electrostatic charge is touched, the discharge may trigger a shock reaction leading to injuries.

- The operator must ensure that all components and assembly groups are included in the local potential equalisation in accordance with the applicable regulations.
- While paying attention to the actual conditions of the working environment, the potential equalisation must be implemented by a specialist electrician according to the applicable regulations.
- The effectiveness of the potential equalisation must be verified by executing regular safety measurements.

2.12.5 Protection against magnetic and electromagnetic fields

Work in areas with magnetic and electromagnetic fields

Magnetic and electromagnetic fields can lead to serious injuries.

- Persons with pace-makers, metal implants, metal shards, or hearing aids require the consent of a physician before entering areas in which components of the electric drive and control systems are mounted, started up, and operated.
- Persons with pace-makers, metal implants, metal shards, or hearing aids require the consent of a physician before entering areas in which magnetic grippers or motor parts with permanent magnets are stored, repaired, or assembled.
- Do not operate high-frequency or radio devices in the proximity of electric components of the drive system and their feed lines.

  If the use of such devices is necessary:

  When starting up the electric drive and control system, check the machine or automated system for possible failures when such systems are used at different intervals and in different states of the control system. A special additional EMC test may be necessary if the system has a high risk potential.

2.13 Notes on particular risks

⚠ DANGER

Danger from electric voltage!

Touching live parts may result in death.

- Switch off the power supply before any assembly, adjustment or maintenance work and secure against being switched on again.
- Only qualified electricians may perform electrical installations.
- Check if de-energized, ground it and hot-wire.
- Cover live parts.

⚠ DANGER

Risk of fatal injury from suspended loads!

Falling loads can cause serious injuries and even death.

- Stand clear of suspended loads and do not step within their swiveling range.
- Never move loads without supervision.
- Do not leave suspended loads unattended.
- Wear suitable protective equipment.

⚠ WARNING

Risk of injury from sharp edges and corners!

Sharp edges and corners can cause cuts.

- Use suitable protective equipment.

⚠ WARNING

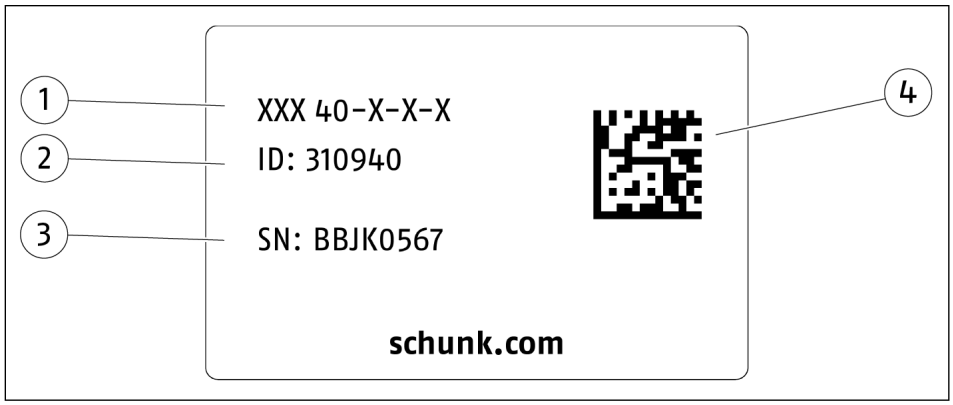
Risk of burns through contact with hot surfaces!

Surfaces of components can heat up severely during operation. Skin contact with hot surfaces causes severe burns to the skin.

- For all work in the vicinity of hot surfaces, wear safety gloves.
- Before carrying out any work, make sure that all surfaces have cooled down to the ambient temperature.

3 Technical data

3.1 Name plate



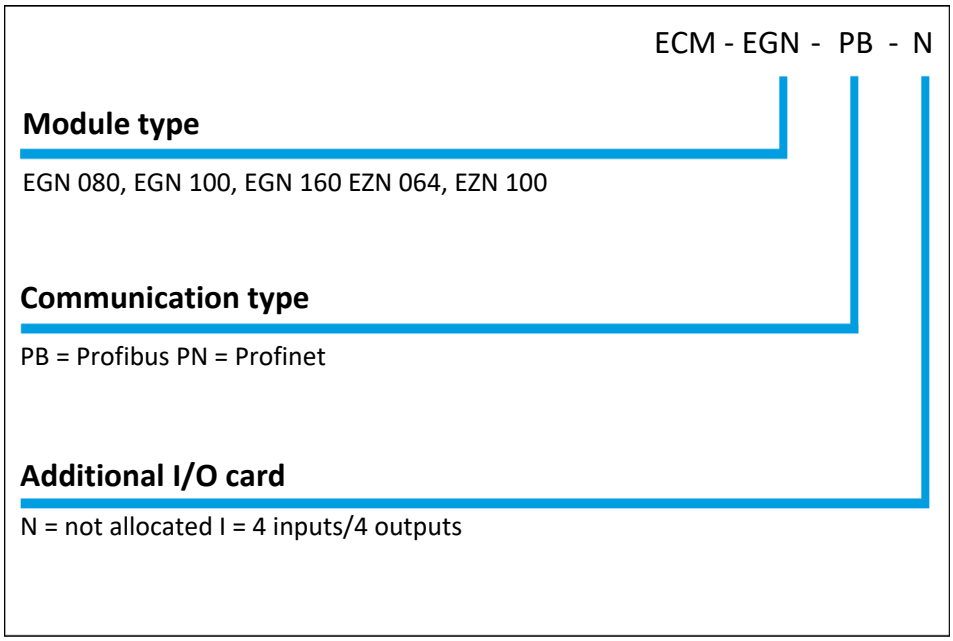
1	Product designation
2	ID
3	Serial number
4	Data matrix code

Scan code or enter serial number on the web and get all the product information: operating manuals, spare parts packages, software updates and much more.

For further information, visit **schunk.com/serialisierung**

A separate app may be required for scanning with a mobile phone.

3.2 Type key



Type key

3.3 Basic data

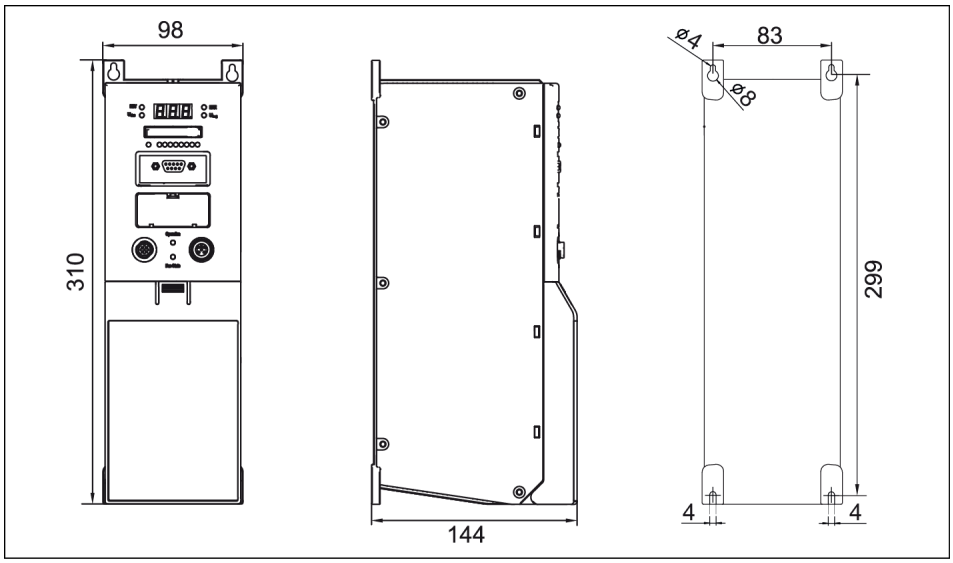
Designation	Value
Measurements (without option cards) [g]	1800
height x width x depth [mm]	310 x 98 x 144
Ambient temperature [°C]	+ 5 up to + 55
Rel. air humidity	5 – 85 %, non condensing
IP rating	20
Logic voltage [VDC] (stabilized and smoothed, internal reverse polarity protection)	24 ± 10 %
Max. logic current input [mA]	500
Supply power [VDC]	24 ± 10 %
Max. power output	
Block commutation [VA]	324 ± 10 %
Sine commutation [VA]	286 ± 10 %
Max. output voltage	
Block commutation [V]	17 ± 10 %
Sine commutation [V]	15 ± 10 %
Max. output current [A]	11
Max. motor current input	See the Assembly and Operating Manual for the relevant module.
Max. apparent power	none
Interfaces *	
PROFIBUS (12 MBit/s)	X
PROFINET (100 Mbit/s)	X
USB	X
Digital inputs and outputs (optional)	X
Supported encoder systems	
Resolver	X
Encoder	X
Brake connection (brakes engage when energized)	
Nominal power current [A]	0.5
Peak current [A]	0.6

* The controller is supplied with either PROFIBUS or PROFINET, PROFIBUS and PROFINET cannot be combined. The USB interface is always available and additional digital inputs and outputs can be chosen as an option.

3.4 Digital input and output variants

Designation	Value
Supply voltage V_{in}[VDC]	+24 ±10%
Cable length max. [m]	30
Output	
Current per output max. [mA]	250
Max. switching frequency [Hz]	500
Output voltage [VDC]	V_{in} −0.3 V
Short-circuit-proof	Yes
Reverse polarity protection	Yes
Input	
Max. input voltage	V_{in} +10%
Input resistance [kOhm]	8
Max. frequency [kHz]	1
Turn-on threshold at 20°C [V]	17.3 ±0.3 V
Turn-off threshold at 20°C [V]	5.6 ±0.3 V
Reverse polarity protection	Yes
Overcurrent protection	Yes
Surge protection up to max. [V]	48

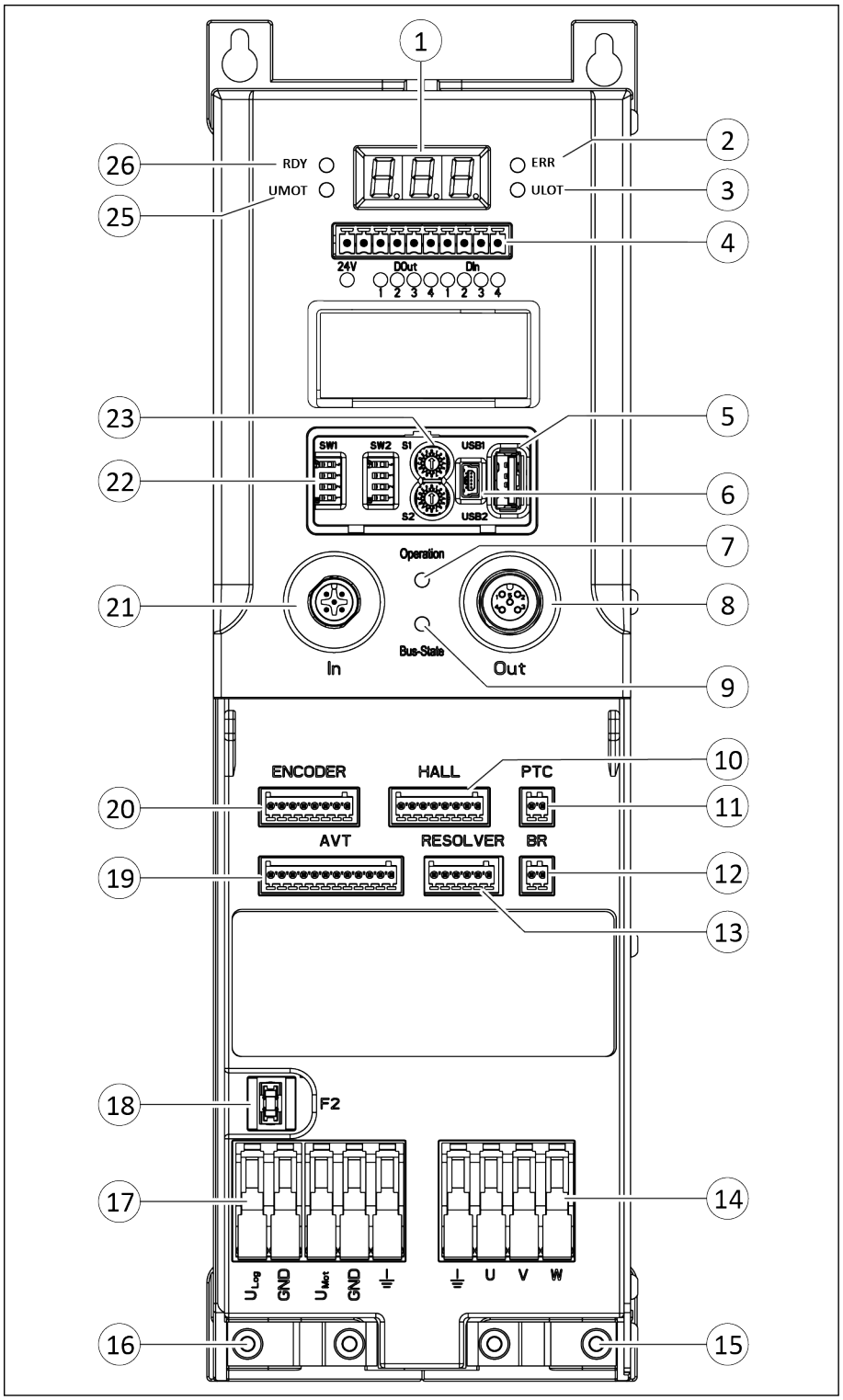
3.5 Housing dimensions



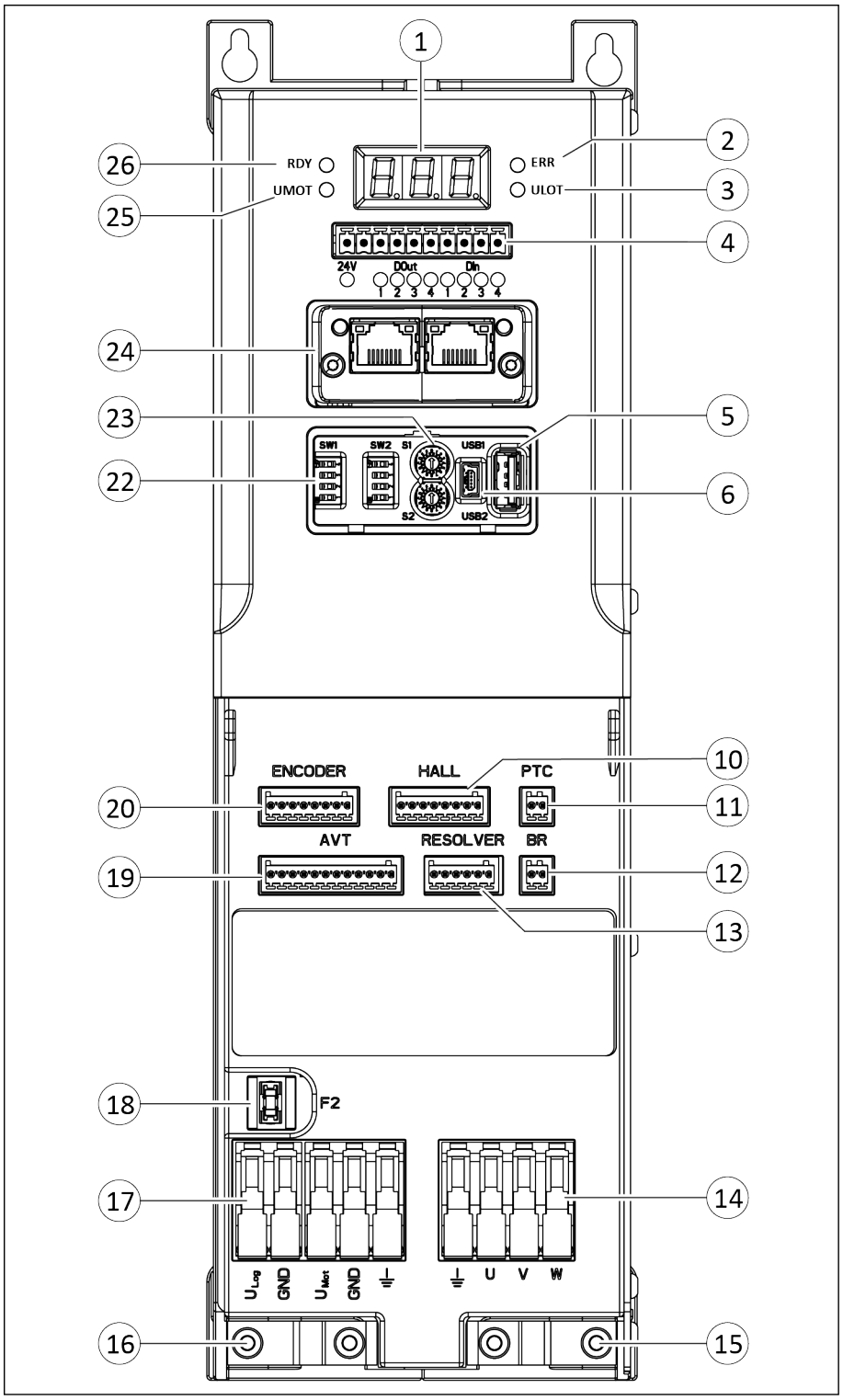
Housing dimensions (mm)

4 Design and description

4.1 Design



Design with interface PROFIBUS



Design with interface PROFINET

Item	Designation	Function
1	Seven-segment display	Status and error display in HEX format, see software manual ""SCHUNK Motion Protocol (SMP)" software manual" or ""SCHUNK Drive Protocol (SDP)" software manual"
2	LED "ERR"	Malfunction display
3	LED "ULOG"	Lights up green when logic voltage is connected at +24V
4	Digital inputs/outputs	Digital I/O interface (optional)
5	USB2	USB HOST interface for the following tasks: • Load firmware update from a storage medium (USB stick) • Write EEPROM parameters (onto ECM from USB stick) • Read EEPROM parameters (onto USB stick from ECM)
6	USB1	USB device interface for the following tasks: • Load firmware update from a PC • Write EEPROM parameters (onto ECM from a PC) • Read EEPROM parameters (onto a PC from ECM)
7	LED "Operation"	Operating display
8	PROFIBUS Output	Connection for bus output cable or for termination resistor
9	LED "Bus state"	Bus status display
10	HALL terminal strip	Hall-effect sensor connection
11	PTC terminal strip	Connection for motor temperature monitoring
12	BR terminal strip	Connection for motor brake
13	RESOLVER terminal strip	Resolver connection
14	Motor terminal strip	Connection for motor cable (see Assembly and Operating Manual for the selected module)
15	Cable clamp for tension relief and shield connection	Fastening of the motor cable and connection of the motor cable shield (large surface). Connecting the encoder cable shield (large surface).
16	Cable clamp for tension relief and shield connection	Mounting feed line and sensor cable. Connecting the encoder cable shield (large surface).
17	Supply voltage terminal strip	Logic voltage connection and motor voltage
18	Fuse F2	Logic voltage fuse
19	AVT terminal strip	Connection for absolute encoder
20	ENCODER terminal strip	Encoder connection
21	PROFIBUS Input	Connection for bus input line

Item	Designation	Function
22	DIP switch	For start-up function and firmware update
23	Rotary encoder switch	Setting the bus address
24	PROFINET	Interface PROFINET
25	LED "UMOT"	Display for motor voltage
26	LED "RDY"	Ready for operation display

4.2 Description

This product is an electric controller for actuating and regulating the EGN and EZN grippers.

Depending on the version, the product is equipped with an interface for PROFIBUS or PROFINET.

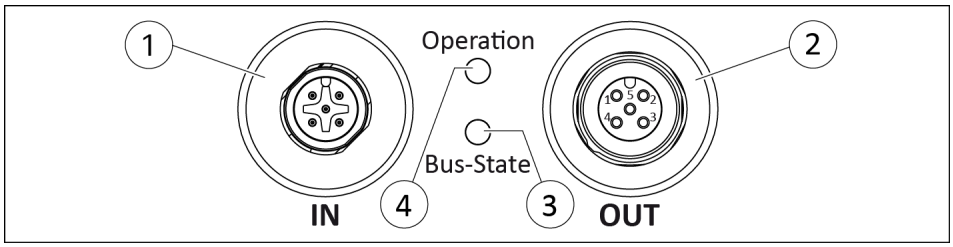
Depending on the bus system, various address ranges and communication protocols are available:

	Address range	Communication protocol
PROFINET	is assigned by SPS	SDP
PROFIBUS	0–127	SDP* / SMP

*) recommended by SCHUNK

4.3 Interfaces

4.3.1 PROFIBUS



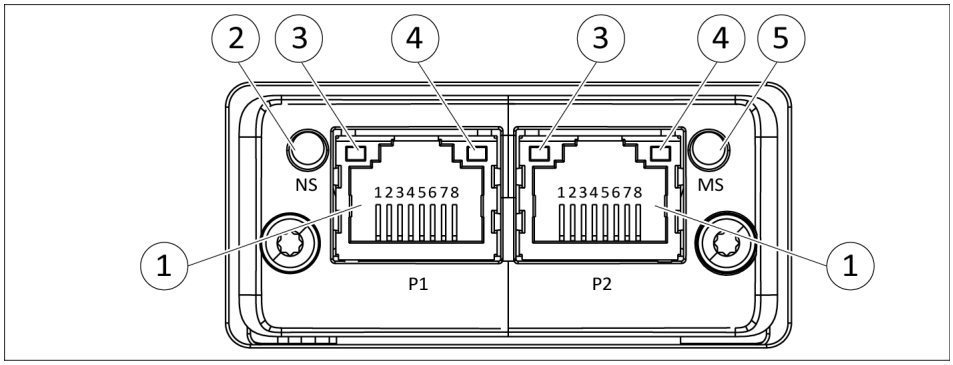
Interface PROFIBUS

1	M12 input connector	3	LED "Bus state"
2	M12 output connector	4	LED "Operation"

LED	Color	Function
Operation	Yellow	Indicates whether there is communication.
Bus State	Green	Displays the existing connection.

Tab.: LED

4.3.2 PROFINET



PROFINET interface

1	RJ45 Ethernet connector	4	"Activity" LED
2	"Network Status" LED	5	"Module Status" LED
3	"Link" LED		

LED	Color	Function
Link	Green	Displays the existing connection.
Activity	Yellow	Displays the data traffic.
Network status	Green /Red	Displays the current network status.
		• **Does not light up** if no power supply is connected to the product. • **Does not light up** if there is no connection to the PROFINET control.
		• **Lights up green** if there is a connection to a PROFINET control system and it is in "Run" mode. • **Flashes green once and goes out** if there is a connection to a PROFINET control system and it is in "Stop" mode. • **Flashes green once and goes out** if the IRT synchronization is not yet finished. • **Flashes green** if the product is in identification mode.
		• **Flashes red** if there is a serious network error. • **Flashes red once and goes out** if the station name is unknown.

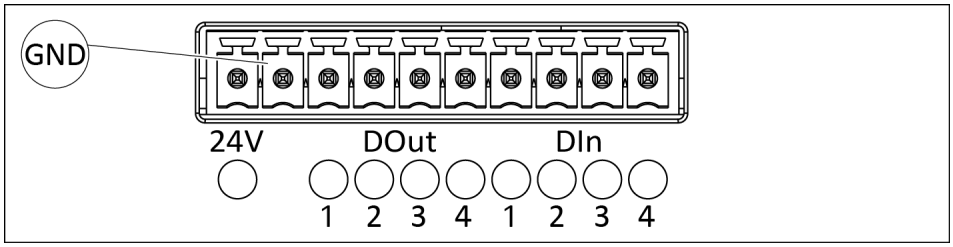
LED	Color	Function
		• **Flashes red twice and goes out** if the IP address is unknown. • **Flashes red three times and goes out** if there are configuration errors.
Module status	Green /Red	Displays the current status of the product.
		• **Does not light up** if no power supply is connected to the product. • **Does not light up** if the product is in setup mode or in the NW Init-status.
		• **Lights up green** if the product is in normal operating mode. • **Flashes green once and goes out** if diagnosis data is being processed.
		• **Flashes red** if there is a serious fault with the product. • **Flashes red** if the product is not ready for operation.
		• **Flashes green/red alternately** if a firmware update is being carried out.

Tab.: LED

4.3.3 Digital inputs and outputs

SCHUNK recommends the following connectors from the company Phoenix Contact for the customer connection:

- Screw connection
  - MC 1.5/10-STZ4-3.81
    plug part, 8A, 160V, 10 pole, green, with pull tab
  - MC1.5/10-ST-3.81
    plug part, 8A, 160V, 10 pole, green
  - FRONT-MC1.5/10-ST-3.81
    plug part, 8A, 160V, 10 pole, green
- Crimp connection
  - MCC1/10-STZ-3.81
    plug part, 8A, 160V, 10 pole, green

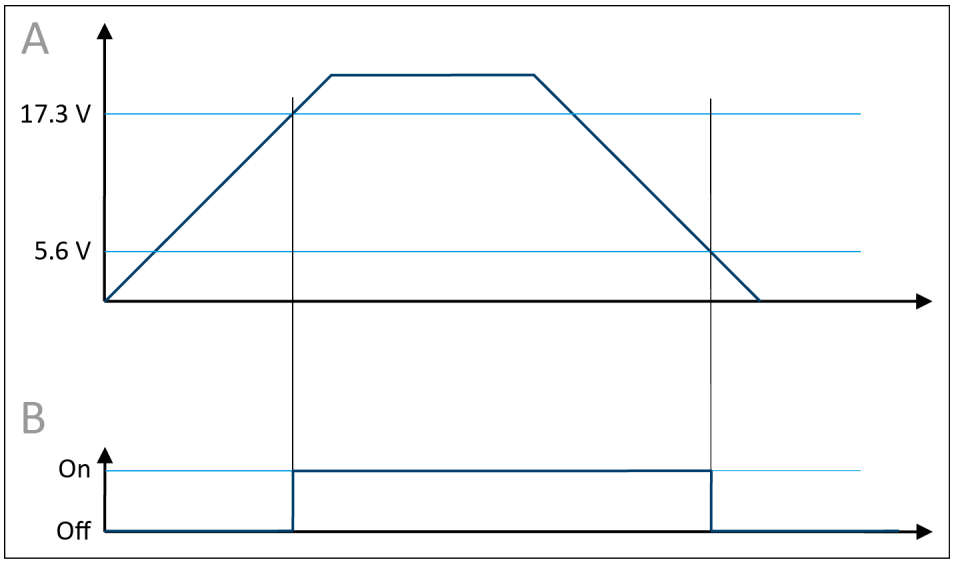


Digital inputs and outputs

LED	Function
24V	**Lights up**, when the option card is supplied with power.
DOUT	**Lights up**, when the outlet emits a signal. **IMPORTANT! When 24 V is placed at the output externally, the LED also lights up and can potentially cause confusion with an input.**
DIN	**Lights up**, when the input voltage is detected as On or Off.

Switching threshold

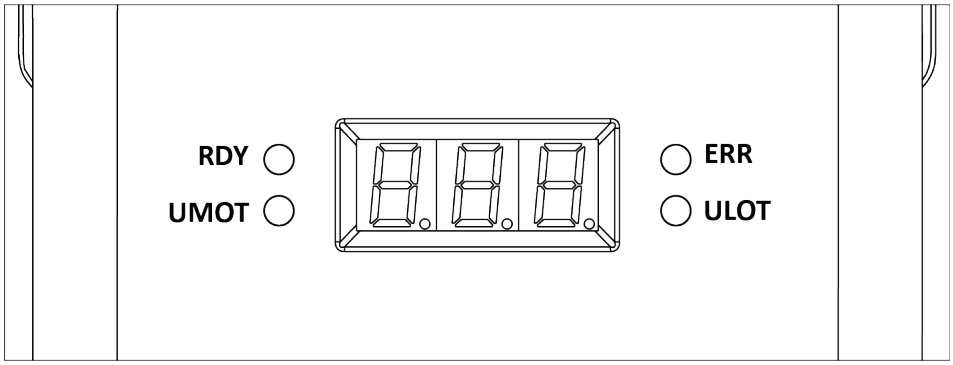
The following diagram shows the switching threshold in relation to the input voltage of a digital input.



Switching threshold diagram

A	Input voltage	B	Status of the input

4.4 LED display



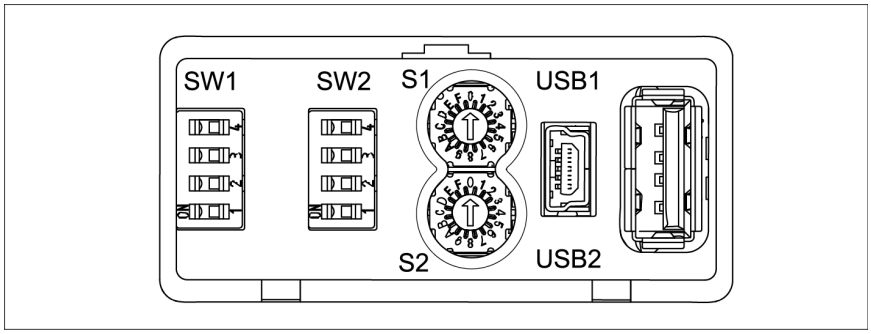
LED "RDY" and LED "ERR"

The LED "RDY" and the LED "ERR" light up for various events in different operating modes. The meaning of the LEDs are given in the following table.

Operating Mode	Event	LED "RDY"	LED "ERR"
Control mode	Ready for operation	On	Off
	Error	Off	On
	Warning	Off	Flashing (approx. 1 Hz)
	Info message pending	On	Flashes briefly (approx. 5 times on/off in 1-Hz cycle)
Firmware update	Ready for data reception	On	On
	Data is being transmitted	On	Flashing in cycle of data transmission
	Data transmission complete	On	Off
Miscellaneous	Hardware is not recognized	Flashing alternately with LED "ERR" (on, when LED "ERR" is off)	Flashing alternately with LED "RDY" (on, when LED "RDY" is off)
	Software in undefined condition	Flashing alternately with LED "ERR" (on, when LED "ERR" is off)	Flashing alternately with LED "RDY" (on, when LED "RDY" is off)

Tab.: LED "RDY" and LED "ERR"

4.5 DIP switch



DIP switch

The SW1 and SW2 DIP switches are used to perform adjustments and software transmissions on the regulator. The following table shows the functions and their switch positions.

DIP switch	Switch	Function	Note
SW1	1	Setting the regulator to factory settings	▶ 5.5 [🗋 52]
		PROFINET Reset interface	▶ 5.6 [🗋 52]
	2	PTA6.x flash mode	For SCHUNK service personnel
	3	If the logic voltage supply is switched on when setting the switch and switch 3 is also set on SW2 DIP switch: – HOST enable	▶ 5.4 [🗋 50]
		Only when the logic voltage is switched on after setting the switch: – Flash mode ARM	For SCHUNK service personnel
	4	–	For SCHUNK service personnel
SW2	1	–	For SCHUNK service personnel
	2	–	For SCHUNK service personnel
	3	Quick test	see following table
		When HOST enable is active (SW1 switch 3 set): Flash mode complete	▶ 5.4 [🗋 50]
	4	Quick test	see following table

Tab.: DIP switch

Quick test

DIP switch	Switch 3	Switch 4	Function	Note
SW2	0	0	Complete quick test	–
	1	0	CMD ACK	see "Schunk Motion Tool" software manual
	0	1	Relative movement	see "Schunk Motion Tool" software manual
	1	1	CMD REFERENCE	see "Schunk Motion Tool" software manual

5 Assembly and settings

5.1 Installing and connecting

⚠ DANGER

Risk of fatal injury due to electric current!

Touching live parts possess an immediate risk of fatal injury by electrocution.

- Prior to commencing work, restore the regulator to a de-energized state.
  - ⇨ Disconnect the logic and motor voltages.
- Wait until the intermediate circuit voltage has dropped to a residual voltage of less than 10 V.
  - ⇨ LED "UMOT" goes out.
  - ⇨ Check "supply voltage" between U_{Mot} and GND on the terminal strip.

⚠ DANGER

Risk of fatal injury due to electric current!

Touching live parts poses an immediate risk of fatal injury by electrocution.

- Only allow a qualified electrician to perform work on electrical components.
- Prior to commencing work on electric components, restore to a de-energized state.
- In case of damage to the insulation, switch off the power supply immediately and arrange for a repair.
- Keep humidity away from live parts.

1. Ensure that the C rail is grounded.
2. Mount the regulator vertically in the control cabinet on the C rail, ▸ 5.2.1 [🗋 34].
3. Connect all electric cables, ▸ 5.2.2 [🗋 35].
   - ⇨ Power supply cable
   - ⇨ Logic voltage cable
   - ⇨ Motor cable
   - ⇨ Sensor cable
   - ⇨ Brake cable if necessary
   - ⇨ Temperature sensor cable if necessary
4. Secure external power circuit, ▸ 5.2.2.2 [🗋 35].

5. Connect connector for fieldbus.
6. With PROFIBUS: When the controller is the last device in the bus system, insert termination resistor.

5.2 Connections

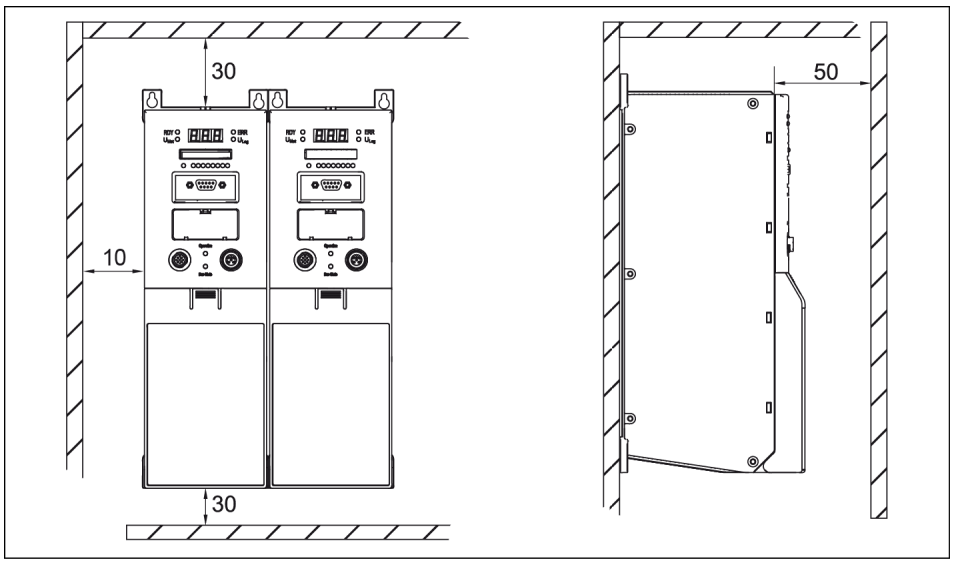
5.2.1 Mechanical assembly

CAUTION

Material damage due to improper assembly!

Splash water, vapors, contamination, overheating and EMC impact may cause damage to the product.

- Install the product in a control cabinet (protection class IP54 or higher).
- Mount the product horizontally.
- Protect the product from foreign objects.
- Observe assembly distances.
- Keep ventilation slits unobstructed.



Assembly distances in the control cabinet (mm)

5.2.2 Electrical connection

⚠ WARNING

Danger due to incorrect connection!

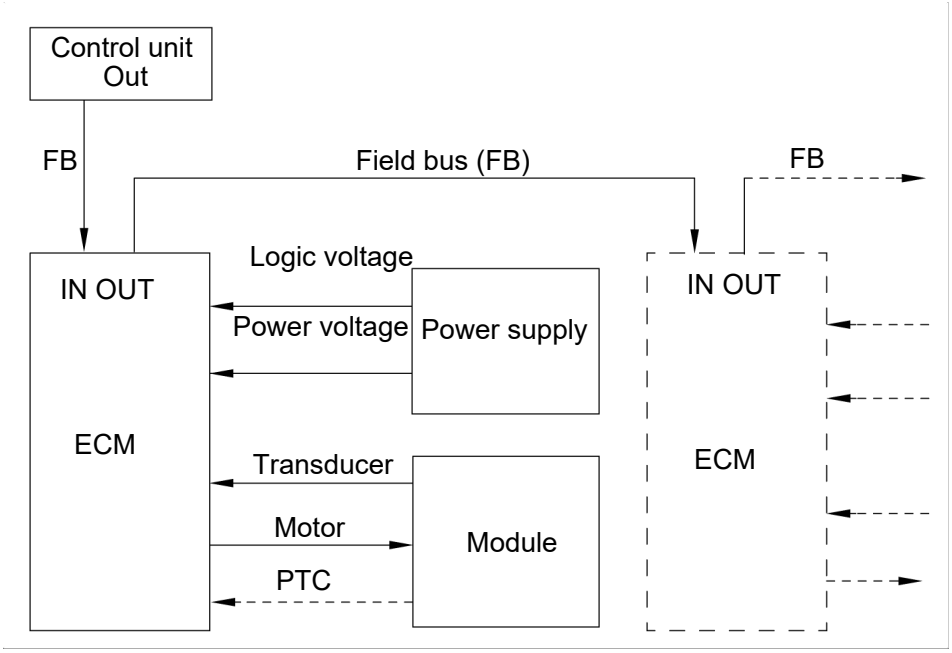
A "PELV" type network must be incorporated for the power and logic supply network.

- Observe the pin assignment of the connecting terminals.
- Make sure that all components are grounded correctly.

NOTE

Observe the cable dimensions for the cables, sensors and transducers of the connected product. The required information can be found in the Assembly and Operating Manual for the product in question.

5.2.2.1 Connection diagram



Connection diagram

5.2.2.2 External fusing

The power circuit of the ECM must be protected by the customer.

The trip value is to be determined from the relavent Assembly and Operating Manual of the ECM product connected.

5.2.2.3 Supply voltage

NOTE

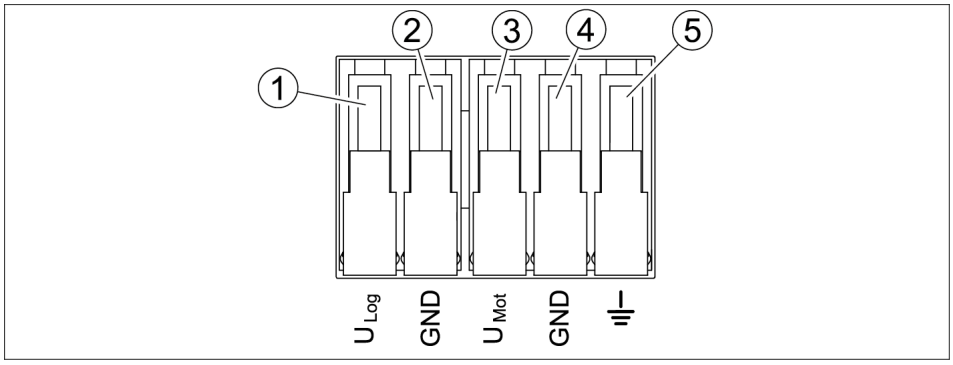
The terminals can be opened and closed manually, without the use of tools.

Stripped length: 12 mm

Conductor cross-section: 1,5 to 6 mm^2

Connection of the external component is shown in the circuit diagram.

Connect the cable for the power supply on the supply voltage terminal strip



Supply voltage terminal strip

Terminal	Function
U_{Log}	Logic voltage +24V
GND	Logic voltage and motor voltage GND
U_{Mot}	Supply voltage +24 V
GND	Logic voltage and supply voltage GND
⏚	Functional ground

Tab.: Connection assignment

5.2.2.4 Motor

NOTE

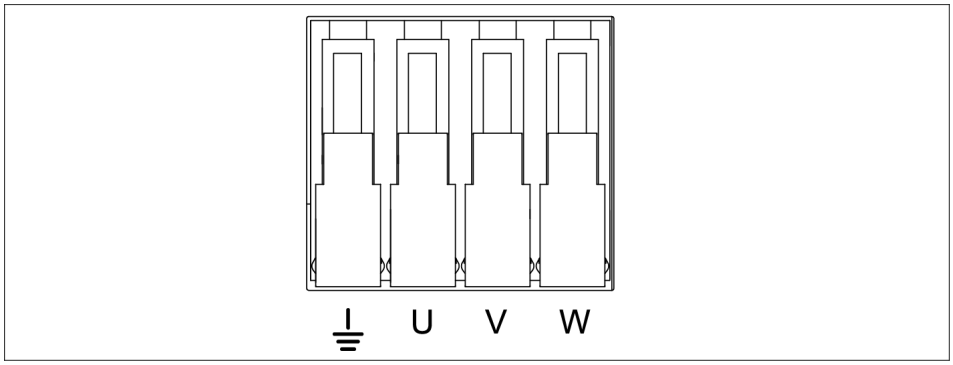
The terminals can be opened and closed manually, without the use of tools.

Stripped length: 12 mm

Conductor cross-section: 1,5 to 6 mm^2

Connection of the external component is shown in the circuit diagram.

Attach the motor cable to the motor terminal strip.

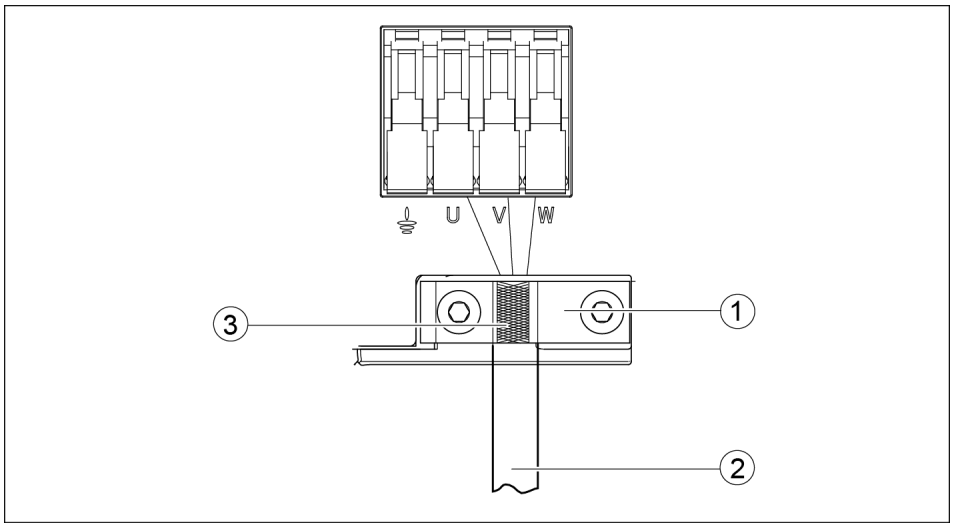


Motor terminal strip

Terminal	Cable color (EGN/EZN gripper)	Function
⏚		Functional ground
U	Black	Motor phase U
V	Red	Motor phase V
W	White	Motor phase W

Tab.: Connection assignment

Motor cable shield connection is achieved via the cable clamp below the motor terminal strip.



Cable clamp

1	Cable clamp	3	Motor cable shield
2	Motor cable		

5.2.2.5 Transducer

NOTE

Connect the encoder to the respective transducer terminal, depending on the connected module.

Encoder

Encoders are connected to terminal ENCODER.

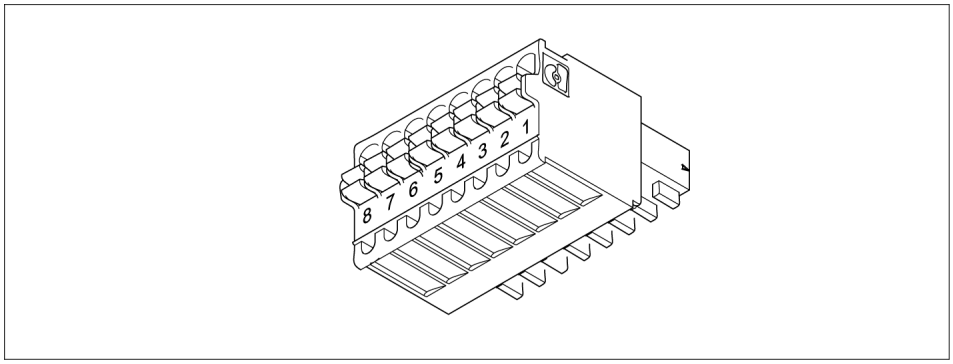
NOTE

Required tool: preferably micro screw driver, slotted, size 0.4 x 2.0 x 60 mm

Stripped length: 8 mm

Conductor cross-section: 0.14 to 0.5 mm^2

Connection of the external component is shown in the circuit diagram.



ENCODER terminal strip

Pin	Function	Color
1	CHADiff	Green
2	XCHADiff	Yellow
3	CHBDiff	Brown
4	XCHBDiff	White
5	CHCDiff	Red
6	XCHCDiff	Blue
7	+5 V (UB)	Pink
8	GND	Grey

Tab.: Connection assignment

Hall-effect sensor

Hall-effect sensors are connected to HALL terminal strip

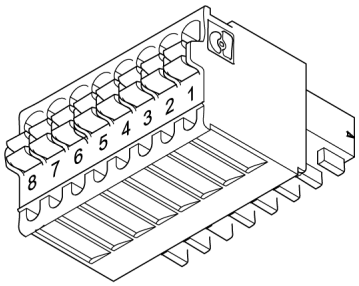
NOTE

Required tool: preferably micro screw driver, slotted, size 0.4 x 2.0 x 60 mm

Stripped length: 8 mm

Conductor cross-section: 0.14 to 0.5 mm²

Connection of the external component is shown in the circuit diagram.



HALL terminal strip

Pin	Function
1	+5 V
2	GND
3	HALL1
4	XHALL1
5	HALL2
6	XHALL2
7	HALL3
8	XHALL3

Tab.: Connection assignment

NOTE

For future extension. The inputs of the connection plug are currently not needed for the connection of a SCHUNK product.

Absolute measuring system

An absolute-value transducer is connected to AVT terminal strip.

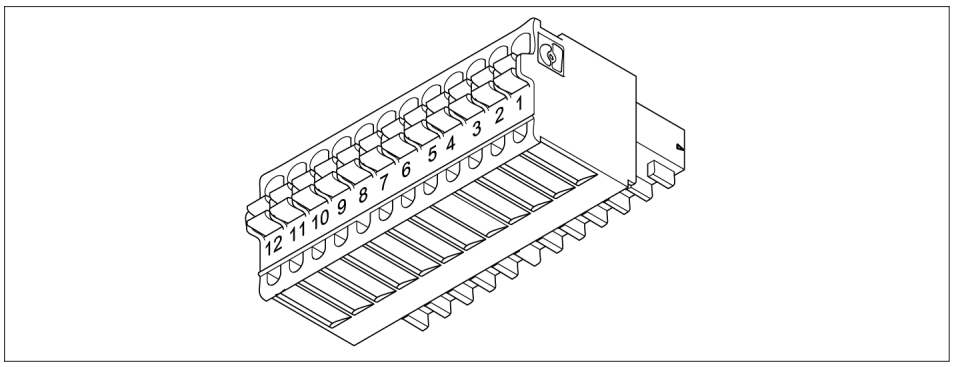
NOTE

Required tool: preferably micro screw driver, slotted, size 0.4 x 2.0 x 60 mm

Stripped length: 8 mm

Conductor cross-section: 0.14 to 0.5 mm^2

Connection of the external component is shown in the circuit diagram.



AVT terminal strip

Pin	Function
1	CHA
2	XCHA
3	CHB
4	XCHB
5	CLK
6	XCLK
7	Data
8	XData
9	+5V Enable (for activating the absolute-value transducer)
10	Enable (bridges between Pin9 and Pin10 activate the absolute-value transducer)
11	+5V (UB) supply voltage for the connected encoder)
12	GND

Tab.: Connection assignment

NOTE

For future extension. The inputs of the connection plug are currently not needed for the connection of a SCHUNK product.

Resolver

A resolver is connected to a RESOLVER terminal strip.

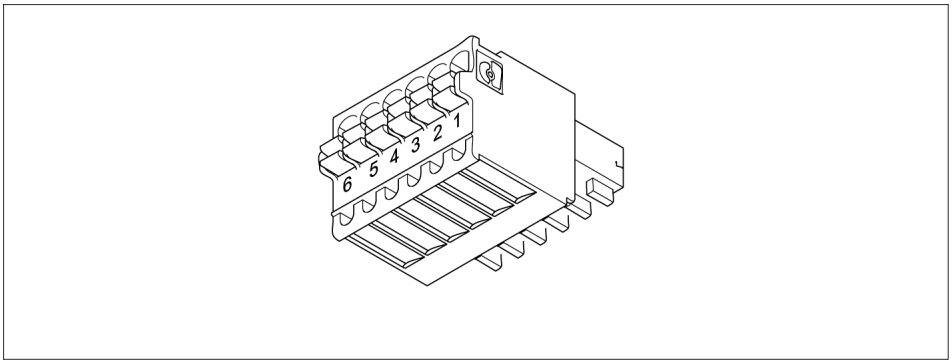
NOTE

Required tool: preferably micro screw driver, slotted, size 0.4 x 2.0 x 60 mm

Stripped length: 8 mm

Conductor cross-section: 0.14 to 0.5 mm²

Connection of the external component is shown in the circuit diagram.



RESOLVER terminal strip

Pin	Function	Color
1	Sin+	Yellow
2	Sin-	Blue
3	Cos+	Black
4	Cos-	Red
5	Osz+	White/Red
6	GND	White/ Yellow

Tab.: Connection assignment

NOTE

For functional shielding, connect the shield of the resolver on the cable clamp with shield connection over a large surface.

5.2.2.6 Brake

If the module has a brake, it has to be connected to terminal strip BR.

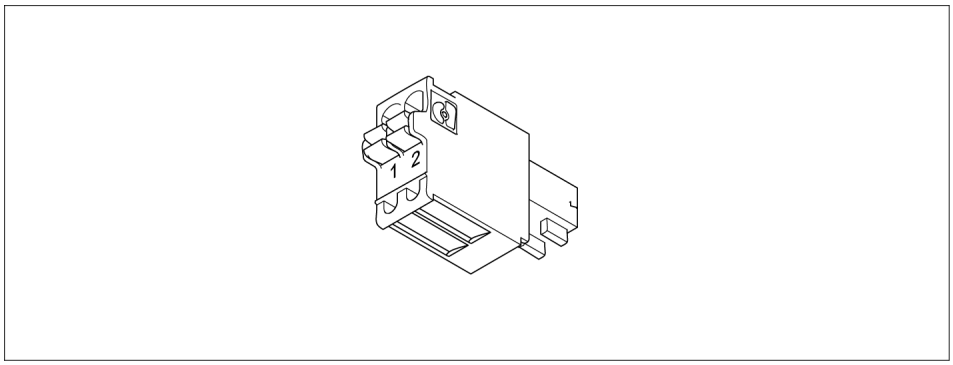
NOTE

Required tool: preferably micro screw driver, slotted, size 0.4 x 2.0 x 60 mm

Stripped length: 8 mm

Conductor cross-section: 0.14 to 0.5 mm^2

Connection of the external component is shown in the circuit diagram.



Terminal strip BR

Pin	Function
1	Brake (+)
2	Brake (–)

Tab.: Connection assignment

5.2.2.7 Temperature sensor

If the module has a temperature sensor, it has to be connected to terminal strip PTC.

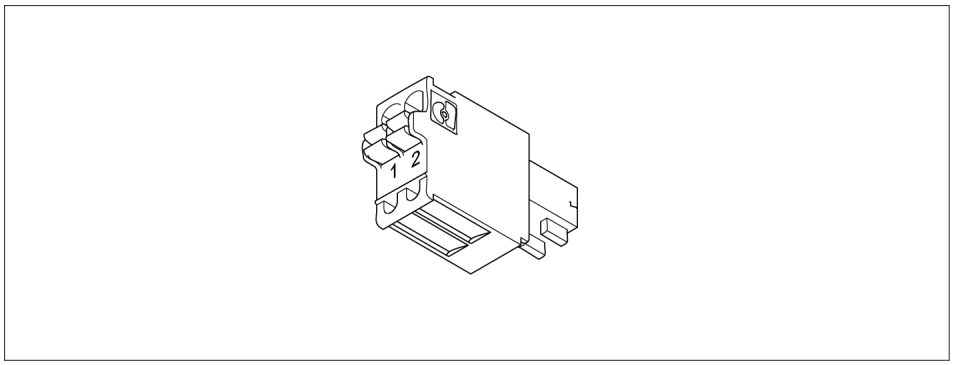
NOTE

Required tool: preferably micro screw driver, slotted, size 0.4 x 2.0 x 60 mm

Stripped length: 8 mm

Conductor cross-section: 0.14 to 0.5 mm^2

Connection of the external component is shown in the circuit diagram.



Terminal strip PTC

Pin	Function	Color
1	T1	Red
2	T2	Blue

Tab.: Connection assignment

NOTE

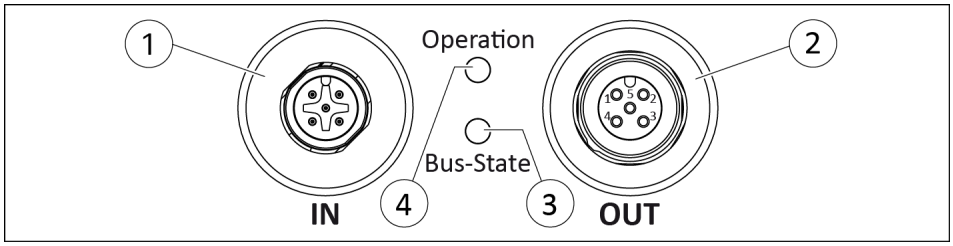
Not all modules have an motor temperature sensor.

Short circuit or cable break of the temperature sensor is not monitored.

5.2.2.8 Fieldbus

The controller is available with an interface for PROFIBUS or PROFINET depending on the version.

Interface PROFIBUS



Fieldbus connections

1	Fieldbus supply M12 input socket
2	Fieldbus rerouting or fieldbus termination resistor, M12 output connector

1. Connect the fieldbus feed lines to fieldbus M12 input plug (1).
2. Fieldbus rerouting or fieldbus termination resistor, connect to fieldbus M12 (2) output connector

Interface PROFIBUS

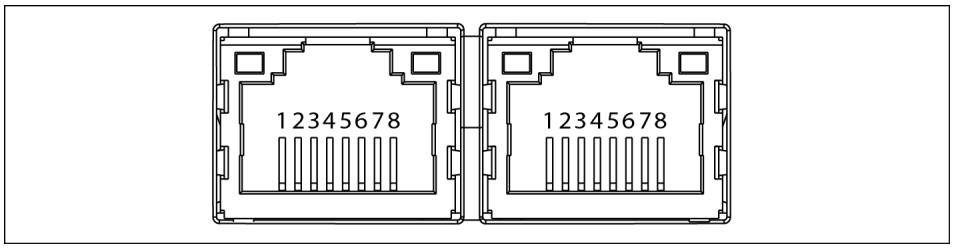
Pin	Signal	Function
1	PP	+5 V feeding for bus termination
2	RxD/TxD-N	Data line Minus (A-conductor)
3	DGND	Data mass
4	RxD/TxD-P	Data line Plus (B-conductor)
5	--	Not assigned
Thread	Shield	FE connection

Tab.: Connection assignment

NOTE

A termination resistor must be connected to the last bus device (150 Ω for PROFIBUS).

Interface PROFINET

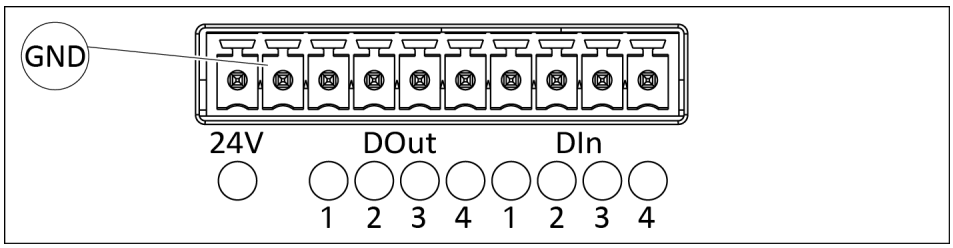


Interface PROFINET

Pin	Signal	Function
1, 2, 4, 5	GND	
3	RD–	Receive minus
6	RD–	Receive plus
7	TD	Transmit minus
8	TD	Transmit plus

Tab.: Connection assignment

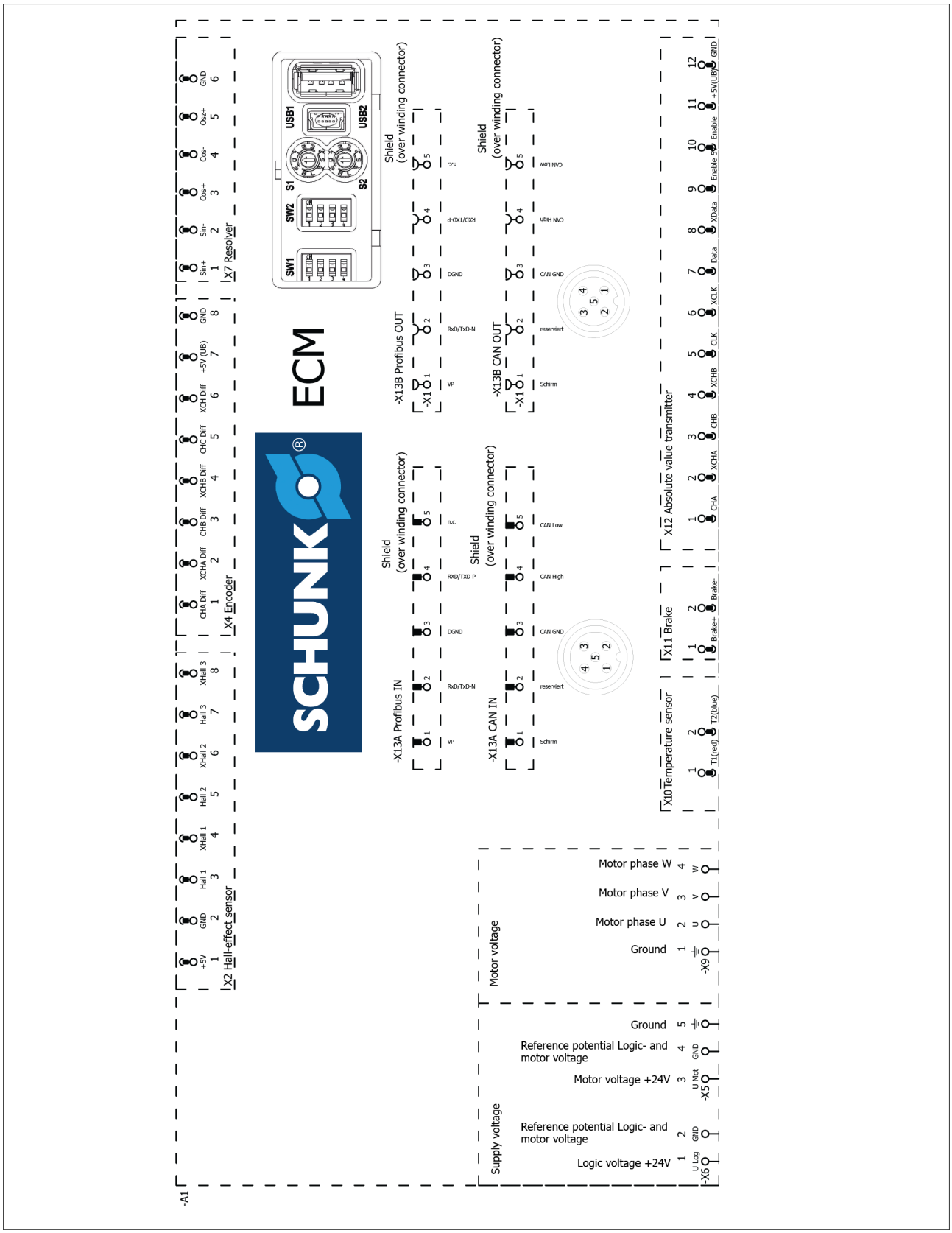
5.2.2.9 Digital input and output variants



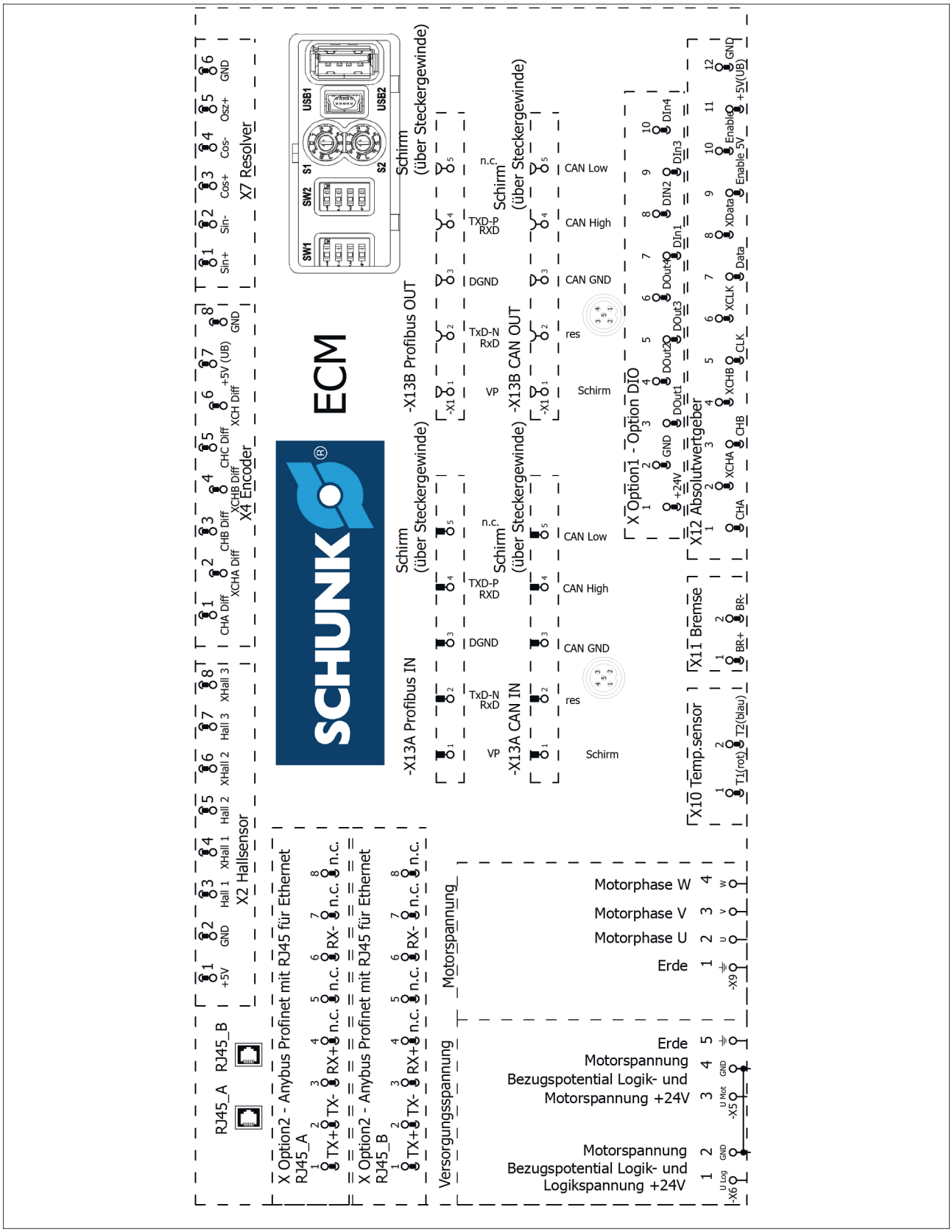
Digital inputs and outputs

PIN	Signal	Description
1	+24 V	Power supply
2	GND	
3	$D_{out}1$	Digital outputs
4	$D_{out}2$	
5	$D_{out}3$	
6	$D_{out}4$	
7	$D_{in}1$	Digital Inputs
8	$D_{in}2$	
9	$D_{in}3$	
10	$D_{in}4$	

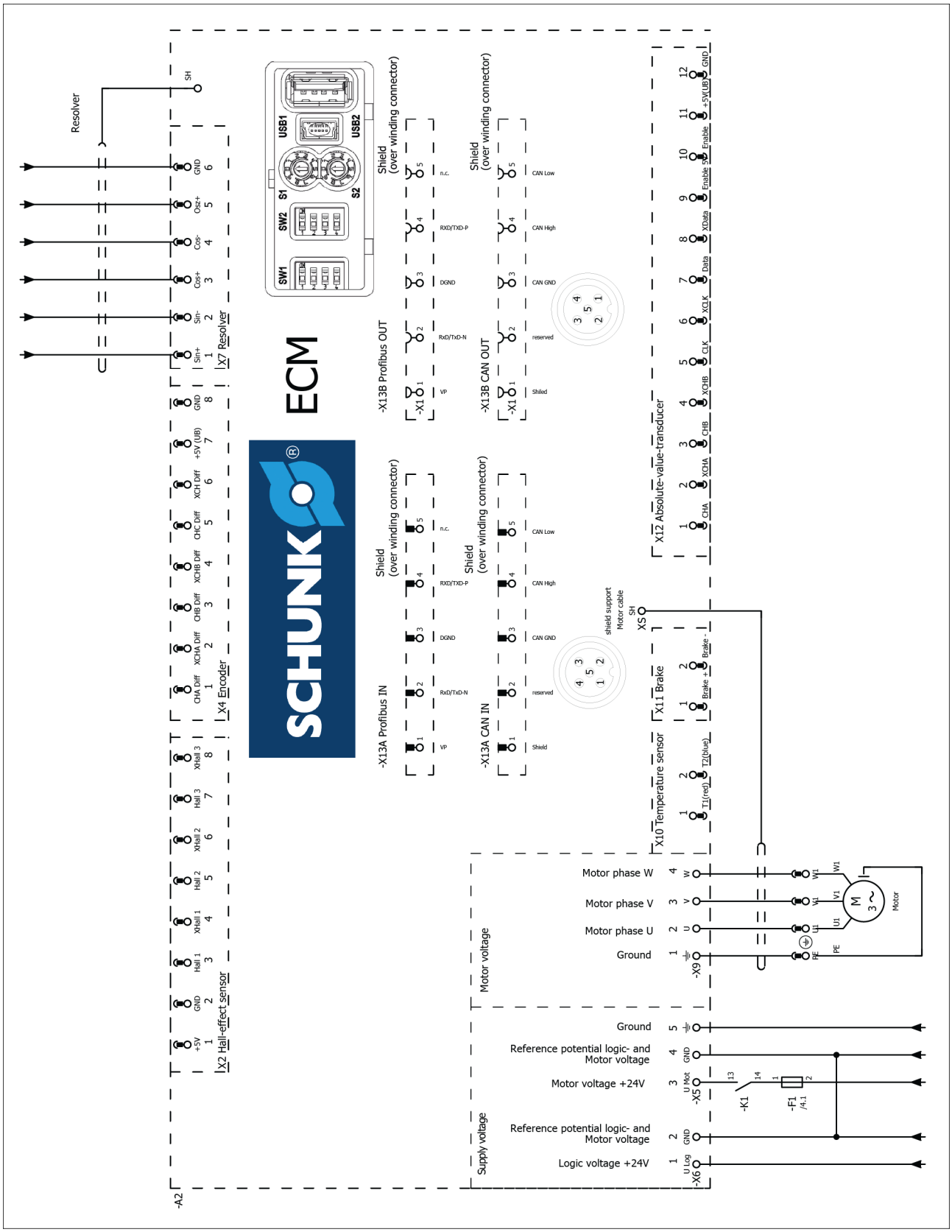
5.2.2.10 Wiring diagram



ECM wiring diagram – Overview

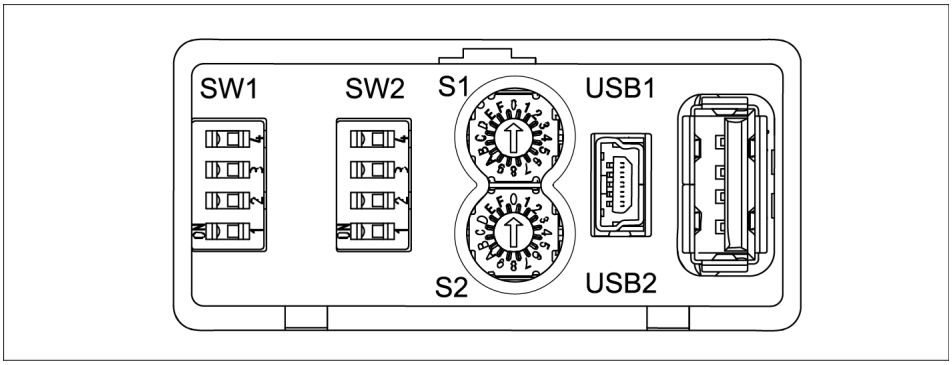


ECM wiring diagram – with PROFINET and digital input/outputs



ECM wiring diagram with EGN / EZN

5.3 Setting the fieldbus address



Adjusting the fieldbus address

1. Switch off the logic voltage.
2. Set the desired fieldbus address by turning the S1 and S2 rotary encoder switches. When doing so, ensure that the rotary encoding switch engages into the desired position.
3. The fieldbus address that has been set can be read off on the seven-segment display (decimal notation) when the regulator is operating.

NOTE

The fieldbus address is set in the hexadecimal code. S1 is used to set the first byte, and S2 to set the second byte.

Rotary encoder switch S1	Rotary encoder switch S2	Decimal address
0	0	0
1	0	1
...	0	...
F	0	15
0	1	16
...	1	...
F	1	31
0	2	32
...	...	...
F	F	255

Tab.: Setting fieldbus address

Example: When S1 is set to "F" and S2 to "1", this corresponds to the bus address "31" (decimal).

When the regulator is operating, the fieldbus address that has been set can be read off on the seven-segment display.

Fieldbus	Decimal address range	Hexadecimal address range
PROFIBUS	0–125	7D

Tab.: Fieldbus address range

5.4 Updating firmware

NOTE

- Update the firmware only after consultation with SCHUNK service via the USB Mini AB (device) or the USB AB (host).
- The firmware has the file extension *.bin.

5.4.1 Update via USB Mini AB (device)

The firmware can be updated via a Windows computer using the "Firmware Updater" tool:

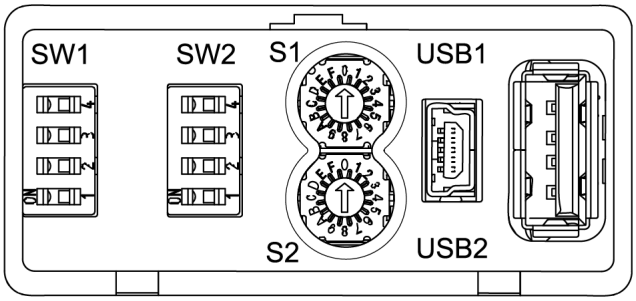
1. Download the commissioning software via the QR code slip from schunk.com.
2. Open the "FirmwareUpdater.exe" file and follow the instructions.

5.4.2 Update via USB (host)

NOTE

Updating the firmware from **2.**x to **3.**x with the USB stick is **not** allowed.

Updating the firmware with the "Firmware Updater" tool, ▶ 5.4.1 [🗋 50].



Input firmware update

NOTE

The data for a firmware update is entered using a USB stick.

The USB stick must be formatted in the FAT16 or FAT32 file systems.

Prepare data transmission

1. Insert USB stick into USB host (USB2) interface with an applied logic voltage supply.
2. When logic voltage supply is provided, turn switch 3 to "ON" on the SW1 DIP switch (HOST enable).
   ⇨ The seven-segment display briefly indicates "GET" and then "HOS". The EEPROM record is automatically saved on the USB stick.

Start data transmission

- When the USB stick has been inserted and logic voltage supply is provided, turn switch 3 to "ON" on the SW2 DIP switch.
  ⇨ The seven-segment display briefly indicates "FLA" and then "UPD". After 20 to 30 seconds, data transmission is complete. If the firmware was successfully transmitted, the seven-segment display indicates "END".

Complete data transmission

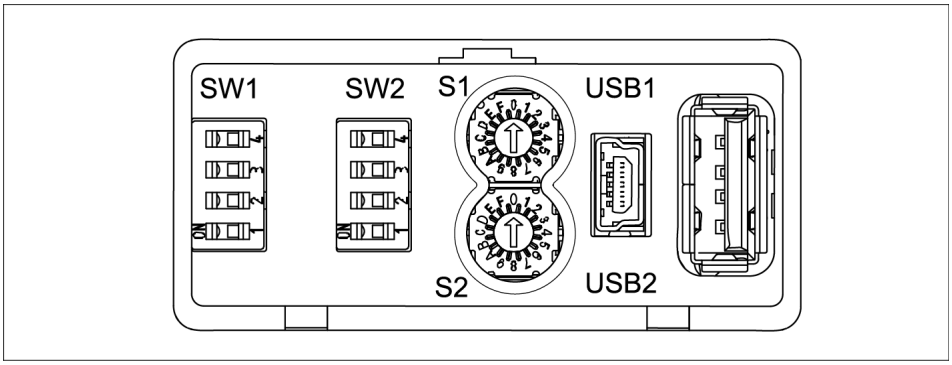
1. Remove USB stick.
2. On the SW2 DIP switch, turn switch 3 to "OFF".
3. On the SW1 DIP switch, turn switch 3 to "OFF".
4. Restart the regulator. To do so, switch off logic voltage, wait approx. 20 second and then switch it back on again.

NOTE

The following information is indicated successively on the seven-segment display:

- Bus type
- Address of the controller
- Baud rate

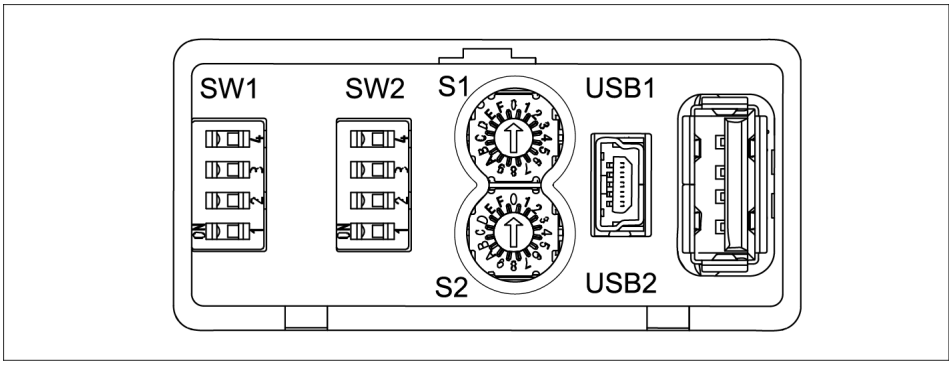
5.5 Establishing the factory settings



Establish factory settings

1. Switch off the logic voltage.
2. On the SW1 DIP switch, turn switch 1 to "ON".
3. Switch on the logic voltage.
4. On the SW1 DIP switch, turn switch 1 to "OFF".

5.6 Resetting the PROFINET interface



Resetting the PROFINET interface

NOTE

The power supply must be remain switched on in order to reset the PROFINET interface.

1. On the SW1 DIP switch, turn switch 1 to "ON".
2. Remove the connection plug, both ports must be idle.
   ⇨ The PROFINET interface is reset.
3. Insert the connection plug
4. On the SW1 DIP switch, turn switch 1 to "OFF".

6 Start-up

⚠ WARNING

Risk of injury due to unexpected movement of the machine/ system!

- Ensure that the danger zone is enclosed by protective fencing during operation.
- Wear suitable protective clothing.

NOTE

The regulator is parameterized for the module that is to be connected upon delivery.

For more information about parameterization, see the following software manuals:

- SCHUNK Drive Protocol (SDP)
- SCHUNK Motion Protocol (SMP)
- Motion Tool SCHUNK (MTS)

6.1 Commissioning with PROFIBUS

1. Set the baud rate, Link Baudrate.
2. Set the fieldbus address ▸ 5.3 [🗋 49].
3. Switch on the logic voltage.
4. Check if the logic voltage is present.
   ⇨ LED "ULOG" lights up green.
5. Switch on the motor voltage.
6. Check if the motor voltage is present.
   ⇨ LED "UMOT" lights up green.
7. Check if an error message is present.
   ⇨ LED "ERR" does not flash and no error message is indicated in HEX format on the seven-segment display. The regulator is ready for operation.
   ⇨ LED "ERR" flashes and the information for the bus system and the Baud rate is displayed first followed by the error message in HEX format on the seven-segment display. An error message is pending and the regulator is not ready for operation.
8. If an error message is pending, eliminate the error: ▸ 7 [🗋 64].

9. Check if the bus system and Baud rate are correctly displayed on the seven-segment display. The values are displayed alternately.
   ⇨ Bus system "Pb" for PROFIBUS is displayed.
   ⇨ Set baud rate displayed if communication has successfully been established with a master. Otherwise, dashes ("--") are displayed in the seven-segment display.

6.2 PROFINET

6.2.1 Types of communication of PROFINET

The product supports the communication types:

- **TCP/IP:**
  Open Ethernet TCP/IP communication without real time requirements
- **RT (Real Time):**
  IO data exchange between automation devices in real time (>1 ms).
- **IRT (Isochronous Real Time):**
  - Smallest supported network cycle time 0.25ms = 250µs
  - Synchronization of the application not possible

The product is incorporated into the PROFINET network as an IO device.

6.2.2 Regulator operating behaviour with a connected module

If a module is connected to the regulator, the following operating behavior is displayed:

- **Behavior when switching on the voltage supply on the regulator**
  - After switching on the voltage supply, the module connected to the regulator does not perform any movement.
    The connected module will only perform movements if the regulator is driven by the superordinate control.
- **Behavior when the connection between the superordinate control and the regulator is lost**
  - If the connection is lost, the regulator performs a fast stop and the connected module does not perform any movement.
    An error is displayed on the seven-segment display of the regulator.

- **Behavior with IOPS=BAD**
  - In the cyclic data sent from the superordinate control to the regulator, a data qualifier is located at the end of the data frame, which provides information on the validity of the output data.
    If this data qualifier is set to "BAD", the regulator performs a fast stop and the connected module does not perform any movement.

6.2.3 Commissioning with PROFINET interface

1. Configure the hardware.
2. Assign an IP address and device name.
3. Configure the software.
4. Switch on the logic voltage.
5. Check if the logic voltage is present.
   ⇨ LED "ULOG" lights up green.
6. Switch on the motor voltage.
7. Check if the motor voltage is present.
   ⇨ LED "UMOT" lights up green.
8. Check if an error message is present.
   ⇨ LED "ERR" does not flash and no error message is indicated on the seven-segment display. The regulator is ready for operation.
   ⇨ LED "ERR" flashes and the information for the bus system and the baud rate is displayed first followed by the error message on the seven-segment display. An error message is pending and the regulator is not ready for operation.
9. If an error message is pending, eliminate the error: ▸ 7 [🗋 64].
10. Check if the IP address, baud rate and fieldbus address are correctly displayed on the seven-segment display. The values are displayed alternating in the following order.
    ⇨ Set IP address (only the last byte is displayed)
    ⇨ Set baud rate (if communication has successfully been established with a master, otherwise dashes ("- -") are displayed on the seven-segment display for PROFINET)
    ⇨ Bus system (for PROFINET, "IrT" is displayed)
11. Project the regulator, ▸ 6.2 [🗋 54].

6.2.4 Projecting of the regulator

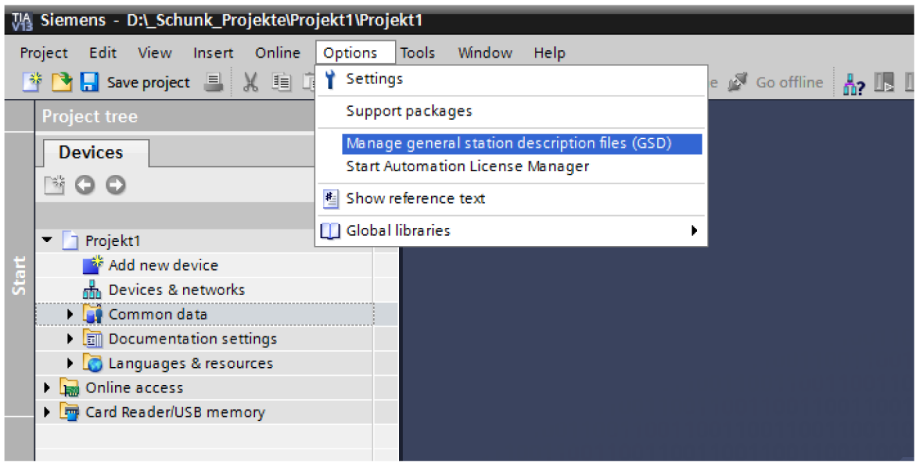
NOTE

Projecting of the product is described with the projecting software *Siemens TIA-Portal V13*, for example.

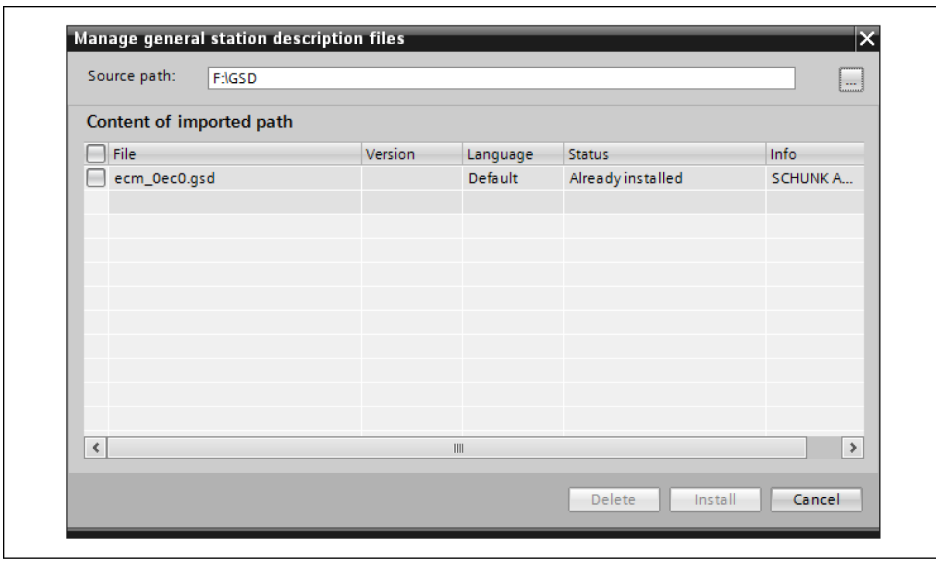
The following illustrations may differ from the actual design.

6.2.4.1 Installing GSDML file

- The current GSDML file is available (software download via the QR code slip from schunk.com).
- The project engineering software Siemens TIA-Portal is started.



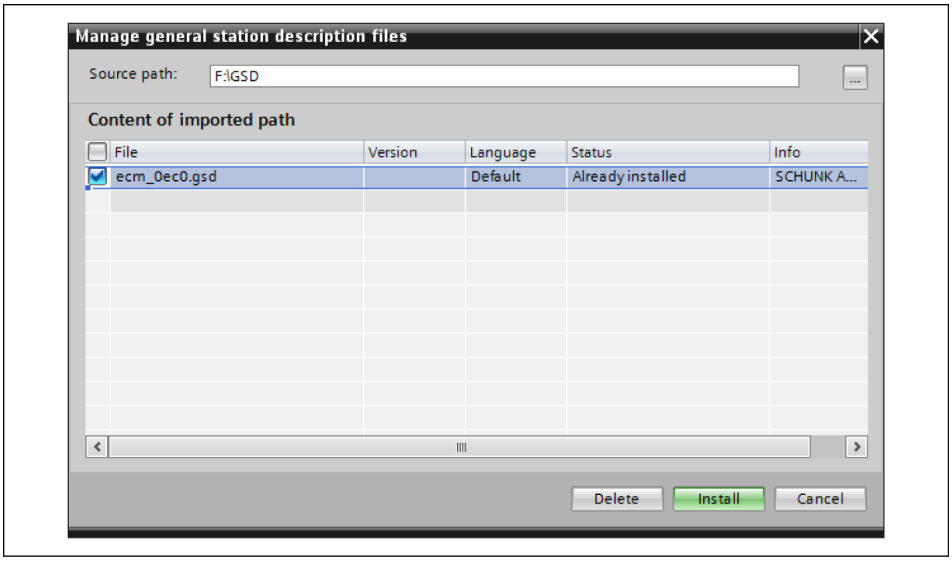
1. Choose option *Extras > Manage device description file (GSD)*.
   ⇨ The *Manage device description file* window will be displayed.



2. Under *Source path*, select the storage location of the current GSDML file.

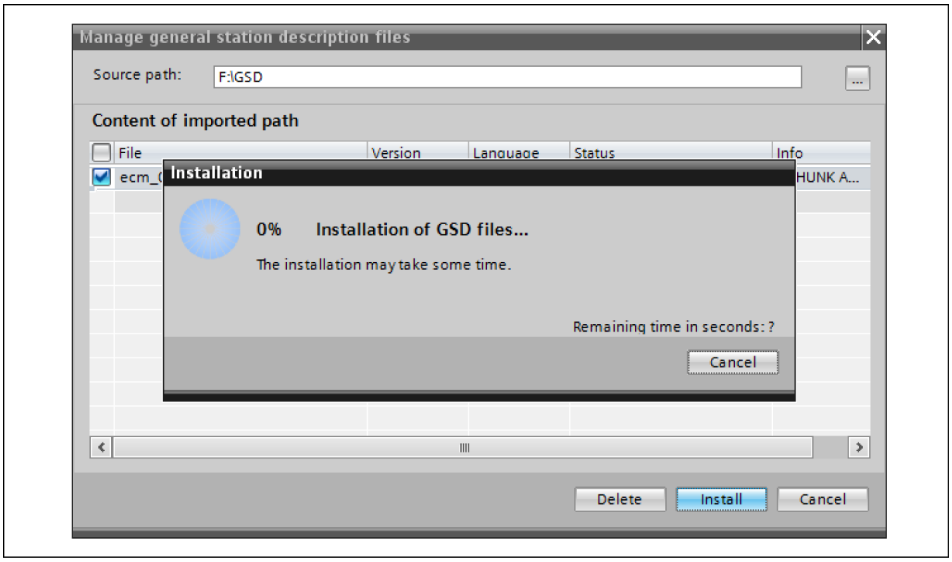
⇨ The available GSD files will be displayed.

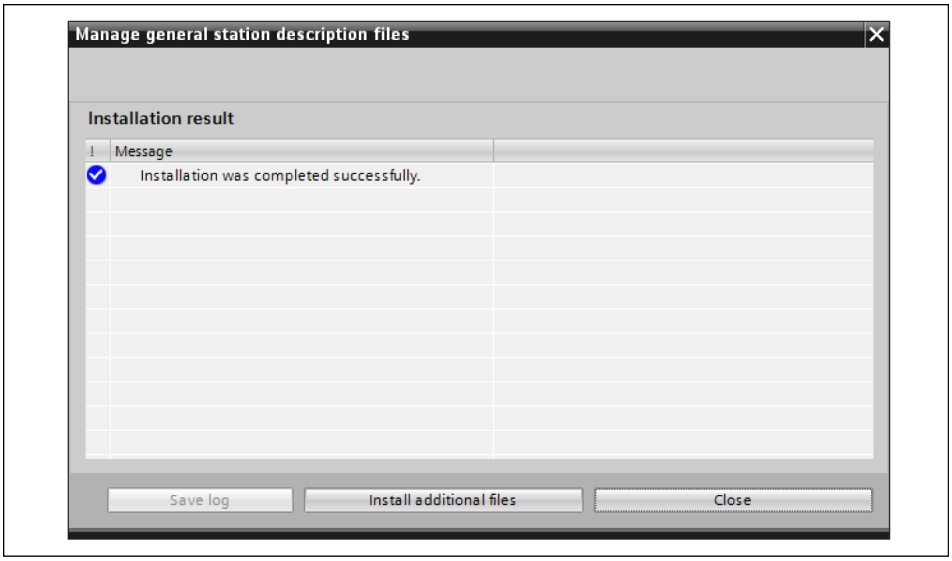
3. Highlight the current GSDML file of the product by checking the box.



4. Start the import of the highlighted GSDML file with *Install*.

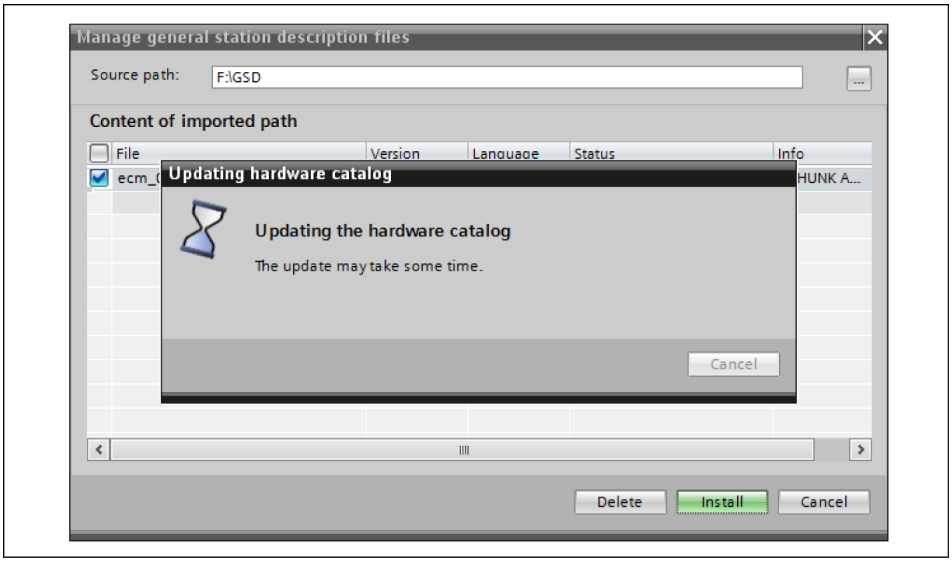
⇨ The *Installation* window displays the installation steps.





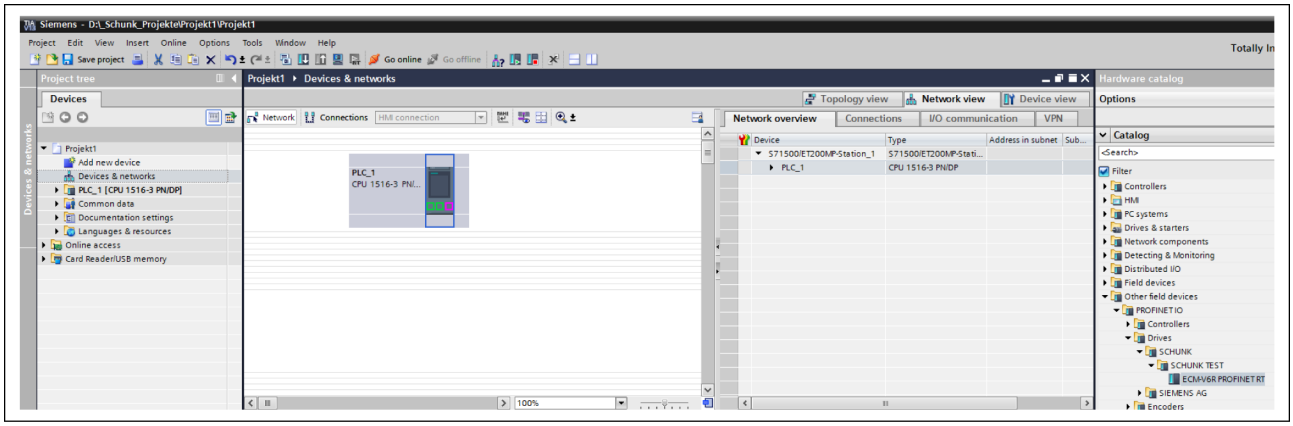
5. Confirm the successful completion of the installation with *Close*.

The product will then be automatically made available in the catalog of available hardware:

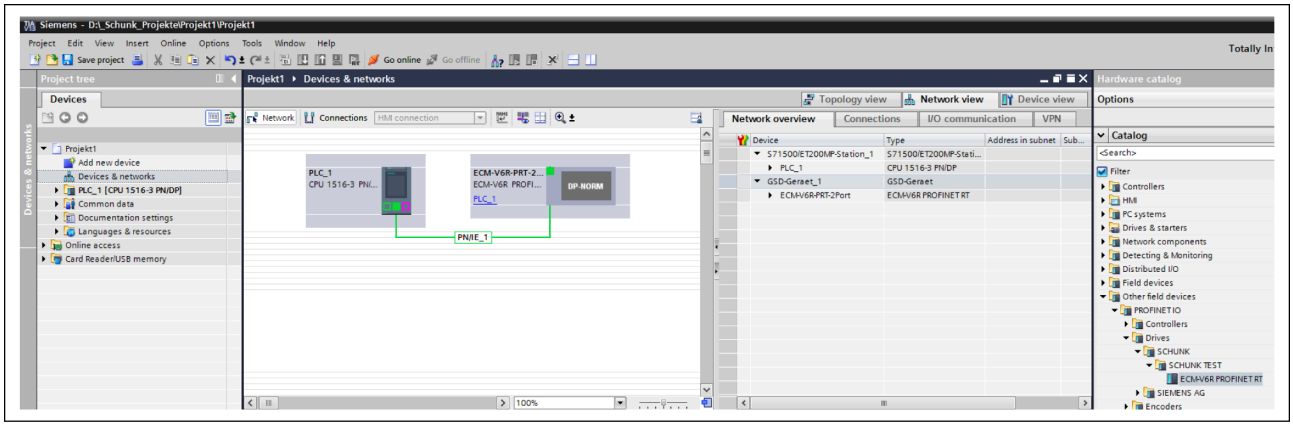


6.2.4.2 Projecting the hardware

- The current GSDML file is installed.

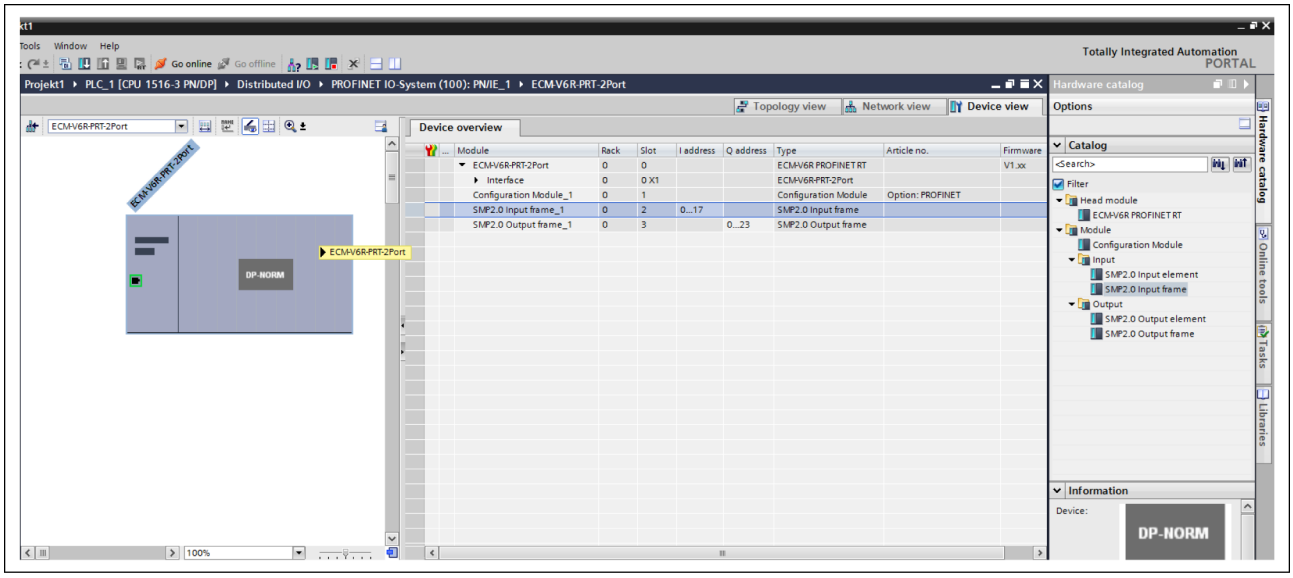


1. In the *Devices & Networks* area, select the *Network View* tab.
   - ⇨ Insert the CPU for the higher-level control from the hardware catalog
   - ⇨ Insert product from the hardware catalog
   - ⇨ Carry out networking. To do this, connect the "Product" connection point to the "CPU of the higher-level control" connection point.

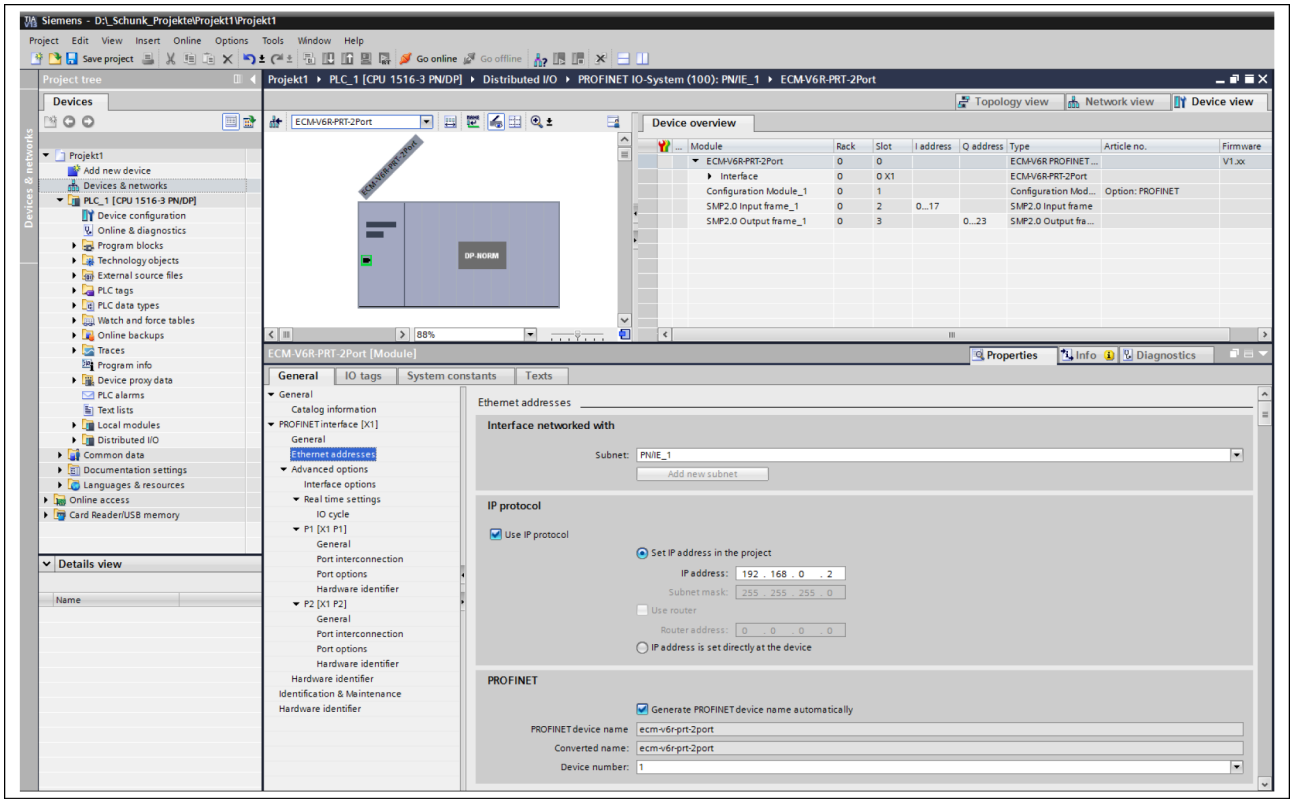


2. Highlight the product and select the *Device View* tab.

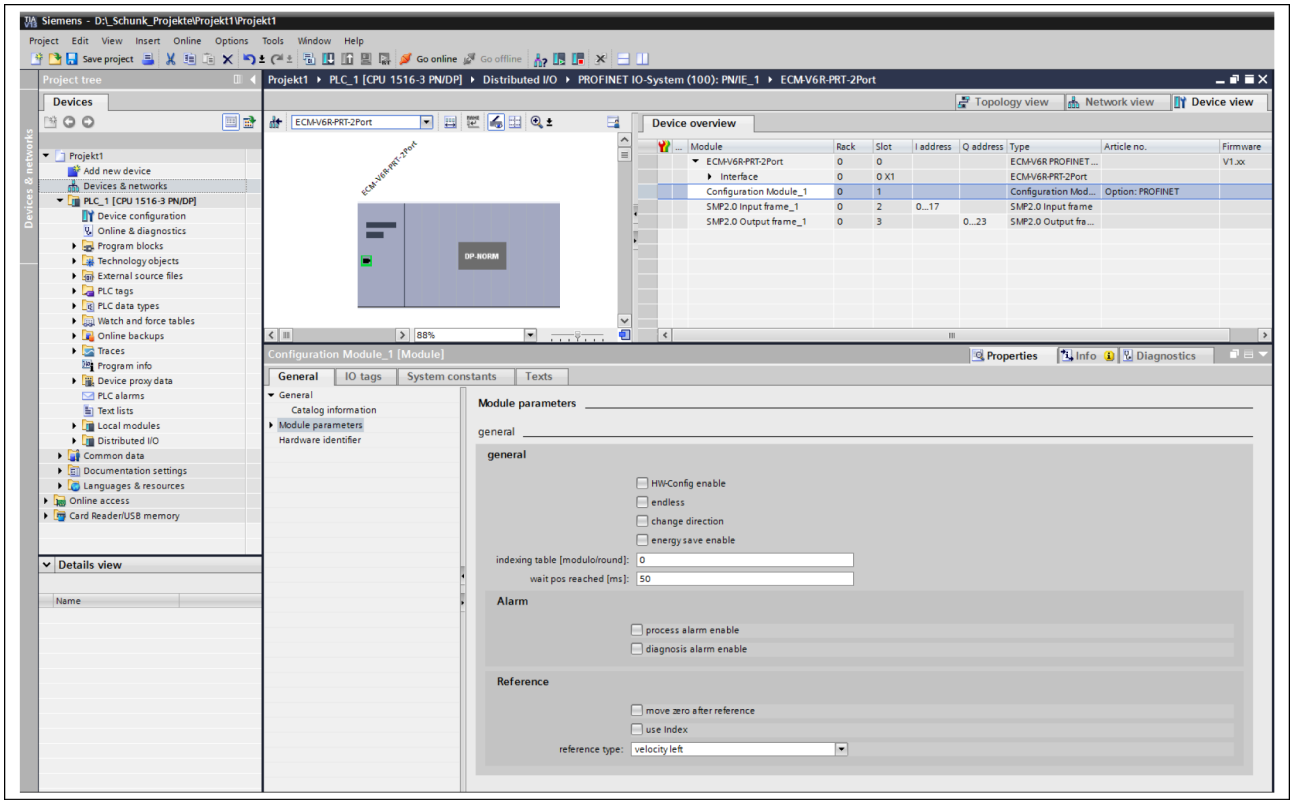
3. Specify the addresses of the inputs and outputs with the *Input/Output Frame* option or the *Input/Output Element* option.



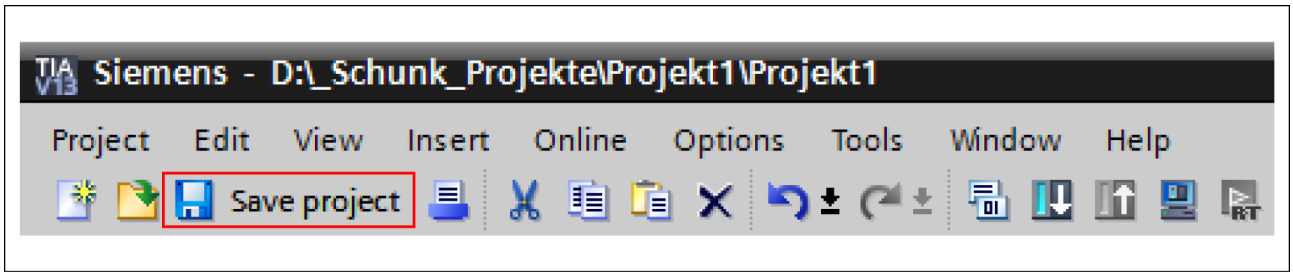
4. If necessary, adjust the product name in the *Properties – General* tab.



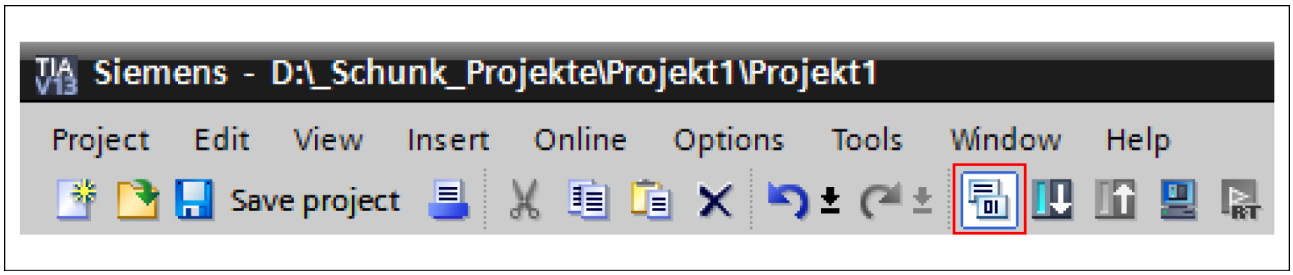
5. If necessary, adjust the IP addresses in the *Properties – PROFINET interface [X1] – Ethernet Addresses* tab.



6. If necessary, select the *Configuration Module* in *Device view* tab, and adjust the parameters in the *Properties – Module parameters* tab.

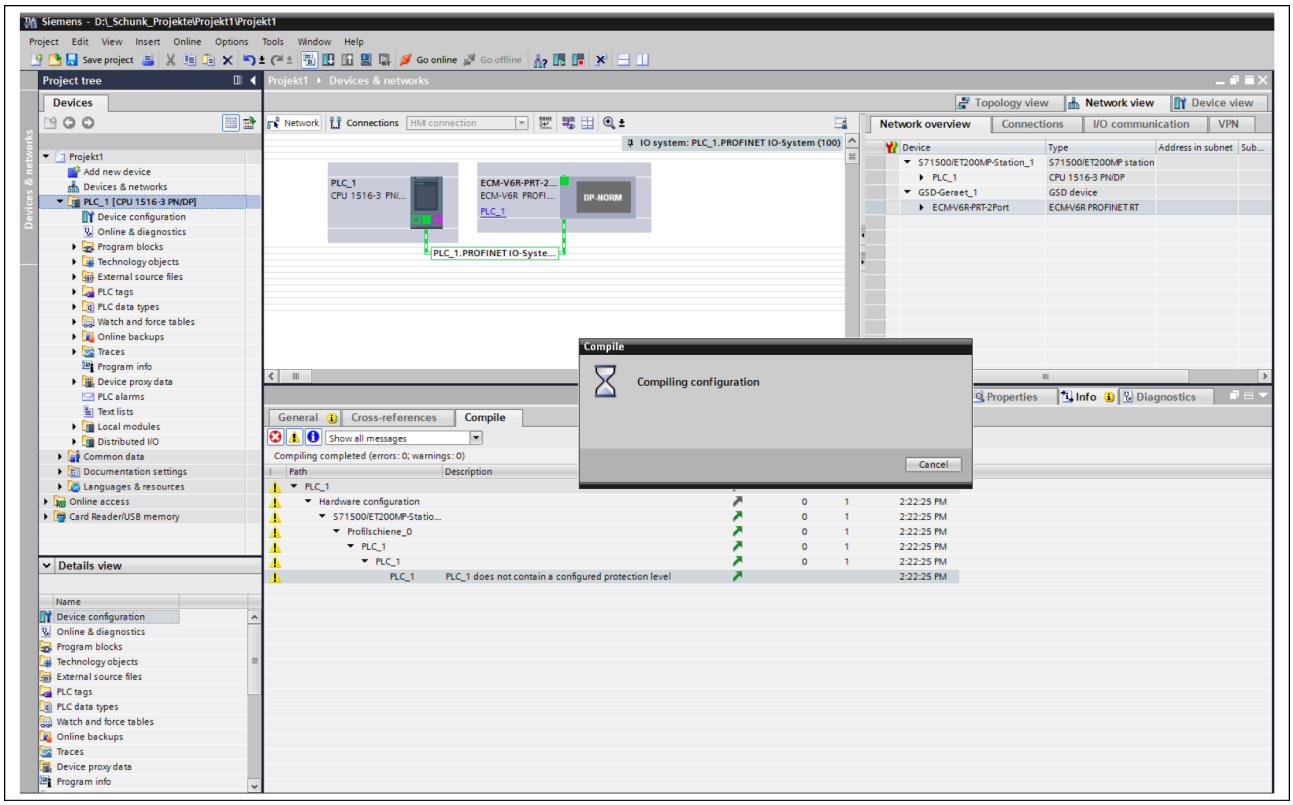


7. Press the *Save project* button to save the properties.

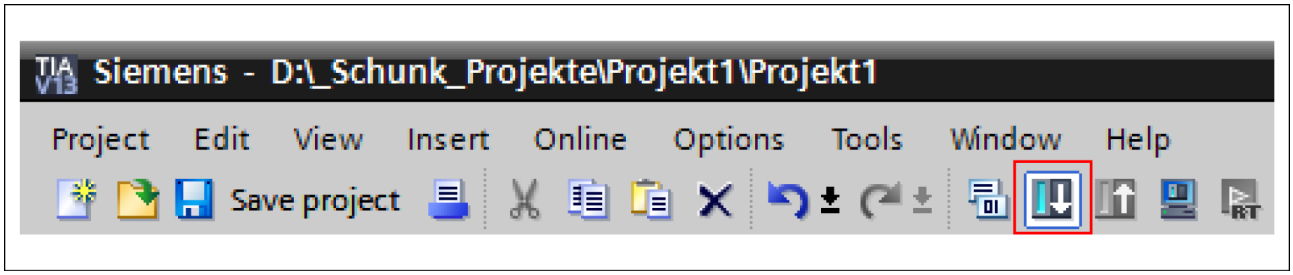


8. Press the *Translate* button to check the accuracy of the projecting. If an error or a warning is displayed, remove it and press the *Translate* button again.

   ⇨ The *Translate* button is displayed.

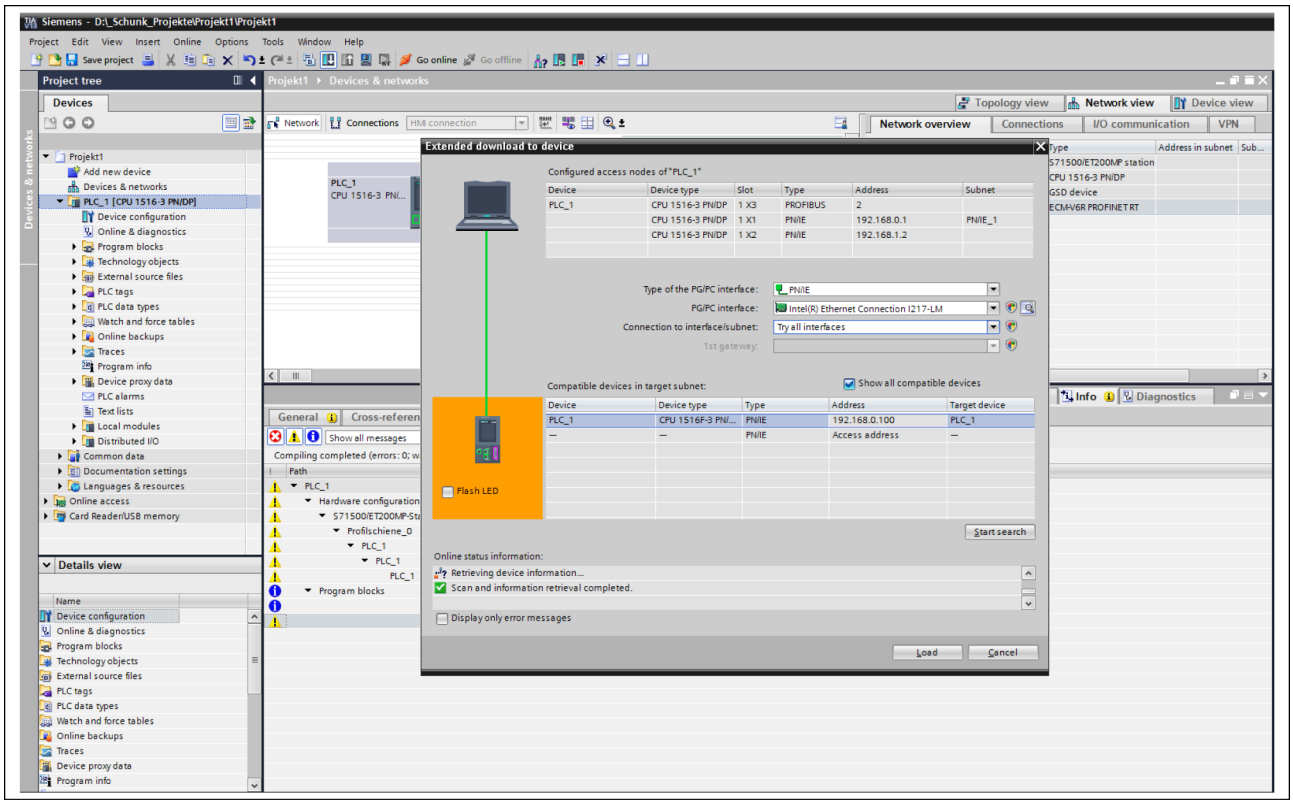


⇨ After a successful check, the *Translate* window will close automatically.



9. Highlight the CPU of the higher-level control in the project and press the *Load in Device* button.

   ⇨ The *Enhanced Load* window is shown.



10. Apply the following settings:
    - ⇨ Fieldbus interface
    - ⇨ PC interface
    - ⇨ Higher-level control interface
    - ⇨ Place a check mark at *Display all compatible devices*
11. Click the *Start search* button.
    - ⇨ In the results list *Compatible devices in the destination subnet*, the CPU of the higher-level control is displayed.
12. Select the CPU of the higher-level control and press the *Load* button.

⇨ The data will be transferred.

7 Troubleshooting

Identified errors are shown as hexadecimal code on the seven-segment display.

For information on the error codes, see the *Schunk Drive Protocol (SDP)* or *Schunk Motion Protocol (SMP)* software manuals.

8 EU-Declaration of Conformity

Manufacturer/ Distributor	SCHUNK SE & Co. KG Toolholding and Workholding | Gripping Technology | Automation Technology Bahnhofstr. 106 – 134 D-74348 Lauffen/Neckar
Product designation:	Controller for SCHUNK gripper ECM
ID number	according to the enclosed list

We hereby declare on our sole authority that the product meets the requirements of the following directives at the time of the declaration.
The declaration is rendered invalid if modifications are made to the product.

- **EMC Directive 2014/30/EU**
  Directive of the European Parliament and the Council of February 26, 2014 on the harmonization of the laws of the Member States relating to electromagnetic compatibility

Applied harmonized standards, especially:

EN IEC 61000-6-2:2019	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards – Immunity standard for industrial environments
EN IEC 61000-6-4:2019	Electromagnetic compatibility (EMC) – Part 6-4: Generic standards – Emission standard for industrial environments

Signed for and on behalf of: SCHUNK SE & Co. KG

Signature: see original declaration

Dr.-Ing. Manuel Baumeister,
Technology & Innovation

Lauffen/Neckar, January 2024

9 UKCA declaration of Conformity

Manufacturer/ Distributor	SCHUNK Intec Limited Clamping and gripping technology 3 Drakes Mews, Crownhill MK8 0ER Milton Keynes

We hereby declare on our sole authority that the product meets the requirements of the following directives at the time of the declaration.
The declaration is rendered invalid if modifications are made to the product.

Product designation:	Controller for SCHUNK gripper ECM
ID number	according to the enclosed list

- **Electromagnetic Compatibility Regulations 2016**

Applied harmonized standards, especially:

EN IEC 61000-6-2:2019	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments
EN IEC 61000-6-4:2019	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

Person authorized to compile the technical documentation:
Marcel Machado, address: refer to manufacturer's address

Signed for and on behalf of: SCHUNK SE & Co. KG

Lauffen/Neckar, January 2024

Dr.-Ing. Manuel Baumeister,
Head of Systems Engineering,
Technology & Innovation

10 Annex to Declaration of Conformity

Product designation	Controller for SCHUNK gripper
Type designation	ECM

Tab.: Firmware 3.x

Ident number	Designation	Ident number	Designation
0315015	ECM-EGN080-PB-I	0315091	ECM-EGN080-PN-I
0315016	ECM-EGN100-PB-I	0315092	ECM-EGN100-PN-I
0315017	ECM-EGN160-PB-I	0315093	ECM-EGN160-PN-I
0315018	ECM-EZN064-PB-I	0315094	ECM-EZN064-PN-I
0315019	ECM-EZN100-PB-I	0315095	ECM-EZN100-PN-I
0315083	ECM-EGN080-PN-N	1325323	ECM-EGN080-PB-N
0315084	ECM-EGN100-PN-N	1325327	ECM-EGN100-PB-N
0315085	ECM-EGN160-PN-N	1325329	ECM-EGN160-PB-N
0315086	ECM-EZN064-PN-N	1325331	ECM-EZN064-PB-N
0315087	ECM-EZN100-PN-N	1325334	ECM-EZN100-PB-N

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