



USER MANUAL IOT Gateway **HUB-GM200**

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1 Legal Notes

Warning concept

This manual contains information that you must observe for your personal safety and to prevent damage to property. Depending on the hazard level, the warnings are presented in decreasing order as follows:



DANGER

Indicates a direct hazard for humans. Irreversible injuries or death willl result if not observed.

WARNING

Indicates a recognizable hazard for humans. Irreversible injuries or death may result if not observed.



Indicates a recognizable hazard for humans or possible damage to property. Can lead to reversible injuries or damage to property if not observed.

ATTENTION

Note on possible damage to property. May cause damage to property if not observed.

NOTE: Under Note you will find tips, recommendations, and useful information on specific action steps and facts.

If several hazard levels occur, the warning for the highest level is always used. If the triangle warning against personal injury is used in a warning, then a warning against property damage can also be added to the same hazard hint.

Qualified personnel

The product associated with this documentation may only be handled by personnel who are qualified for the respective task. Furthermore, the product may only be handled in compliance with the associated documentation and the safety and warning instructions contained therein. Due to their training and experience, qualified personnel are equipped to recognize and avoid potential hazards when handling these products.

Required basic knowledge

Knowledge of personal computers, operating systems, and programming is required. General knowledge in the field of automation technology is recommended.

Safety information

Before commissioning the product, be sure to read this section carefully and observe the corresponding notes in the manual. Always keep the Instruction Manual within reach.

Intended use

in.hub products may only be used for the applications specified in the corresponding technical documentation.

If third-party products and components are used, they must be recommended or approved by in.hub.

Proper storage, installation, commissioning, and operation are essential for the correct and safe operation of the product.

The permissible environmental conditions must be complied with. Notes in the associated documentation must be observed.

Trademarks

All names marked with the protective note "®" are registered trademarks. Other names in this document may be trademarks whose use by third parties for their own purposes may infringe the rights of the owners.

Disclaimer

The content of this publication has been checked for conformity with the hardware described. Nevertheless, discrepancies cannot be ruled out, so we do not assume any liability for its completeness and correctness. The information in this publication is reviewed on a regular basis. Any corrections needed will be included in the following editions.

2 General information

This Instruction Manual contains information for commissioning and using the HUB-GM200 gateway.

The manual is intended for installers, programmers, and testers who commission the gateway and connect it to other units (automation systems, mobile terminals, personal computers, etc.), and for service technicians who install extension modules or perform error analyses.

2.1 Scope of delivery

1 x HUB-GM200

- 1 x SIINEOS system software
- 1 x Backplane bus connector
- 1 x HUB-GM200 Instruction Manual (PDF)
- 1 x SIINEOS User Manual (PDF)

2.2 General instructions for use

in.hub GmbH assumes no liability for malfunctions of the device resulting from improper handling, mechanical damage, incorrect application, and use other than for the intended purpose. Improper handling of the device can significantly reduce the service life of the product.

2.3 Intended use

The devices are intended exclusively for use in the industrial sector and are used to monitor and control machines, systems, and processes. With the help of the connection options provided, process data can be recorded, processed, controlled, and analyzed.

2.4 Safety requirements

The product should be handled in accordance with the following DIN standards:

- DIN EN 61340-5-1:2017-07 Electrostatics Part 5-1: Protection of electronic components against electrostatic phenomena General requirements
- DIN EN 61010-1:2020-03 Safety requirements for electrical equipment for measurement, control, and laboratory use Part 1: General requirements
- DIN EN 60664-1:2008-01 Insulation coordination for equipment within low-voltage systems Part 1: Principles, requirements, and tests

2.5 Network Security

Please keep in mind that the product does not communicate encrypted within the internal network. Therefore, protect your network against unauthorized access from outside! The integration into a network with Internet access must be carried out with special care. For this, urgently talk to your system administrator in advance.

2.6 Disposal



The device must be disposed of properly. It does not belong in the normal household waste.

2.7 Service and support

If you have any questions about specific use cases or about technical parameters, please contact us.

Email: <u>service@inhub.de</u>

Phone: +49 371 335 655 00 (Technical sales stuff)

These details will connect you with the appropriate contact.

3 Product information

The IoT gateway HUB-GM200 was specially designed for use in industrial environments. It has a variety of different interfaces that allow sensors and actuators to connect directly to the gateway.

The HUB-GM200 is primarily used on the sales floor to control and connect the field level and the control level with the operational-management level and the company level. It is also used for individual monitoring, specifically to monitor, manage, and control processes in a closed loop.

3.1 Use cases

The HUB-GM200 is ideal for:

- In-process parameter monitoring for
 - Preventive maintenance
 - Acquisition of machine data
 - \circ $\;$ Condition monitoring and yield monitoring on production lines
 - Monitoring of environmental influences on the process for compliance with standard guidelines and occupational health and safety regulations (including temperature, humidity, particle concentration, corrosion)
- Soft-SPS (soft programmable logic controller)
- Use as a process-control computer and traceability server
- Use as a remote access point on machines and systems for remote maintenance via VPN or VNC (cloud service)
- Process monitoring using machine learning / AI algorithms



3.2 Hardware - Structure and interfaces

Fig. 1: Side views and front view of the HUB-GM200

-	
1	Device-specific information is encoded in a barcode:
	HW: Hardware revision number
	S/N: in.hub-internal serial number
_	MAC: Hardware address of the Ethernet 1 and 2 network adapters
2	Backplane bus
3	Ethernet 2
4	Ethernet 1
5	CAN bus
6	RS485
7	LEDs for displaying the operating status
8	USB1 (Host) and USB2 (Device)
9	Protective cap
	Can be opened upwards.
10	USB3 (Host)

11	Input/Output 1
12	Input/Output 2
13	24V DC power supply
14	Clamping device for DIN-rail installation

3.3 LED display

The three LEDs on the front panel of the device indicate the following status:



Fig. 2: LED status display on the front of the HUB-GM200

1	Device status
2	Function freely configurable in SIINEOS
3	Function freely configurable in SIINEOS LED for device identification

3.3.1 LED device status (red-green)

LED behavior	Color	Meaning	
LED off		Device is out of service	
Flashing in heartbeat mode 2 Hz	Green	Module ready for operation	
Permanent glow	Green	Error in the boot process	
1 Hz flashing	Red	Device error	

3.4 SIINEOS - System Software

The HUB-GM200 uses the Linux-based operating system SIINEOS to run InCore & Docker Apps. SIINEOS is accessible via a management console (SMAC) and can be configured there. All network parameters are also set up here to enable communication with other components of the network.

4 Installation

The HUB-GM200 is intended for installation on a DIN rail compliant with DIN EN 60715:2017.

• Always switch the power supply off.



WARNING Electrical shock due to conductive contamination can cause physical injury!

- > Avoid conductive contamination.
- Only install devices in a control cabinet of the appropriate protection class.
- When inserting several modules, start on the left with a CPU / interface module, a system power supply, or main power supply.
- **RECOMMENDATION**: For ease of installation, maintain a minimum distance of 25 mm between cable channel and housing edge (top and bottom).

4.1 Mounting and dismounting the module at the DIN rail

- 1. Switch off the power supply.
- 2. Rotate the module so that the metal clamping device is facing downward.
- 3. Hold the module at an angle to the DIN rail.

The recess on the back of the module is located above the clamping device.

- 4. Push the module onto the DIN rail until the clamping device audibly clicks into place.
- 5. After installation, check that the device is firmly fixed and straight on the DIN rail.
- 6. To dismount, pull down the metal clamping device with a screwdriver and remove the module from the DIN rail.



Fig. 3: Disassembly of the module from the DIN rail (example)

4.2 Mounting add-on modules

The HUB-GM200 can be connected to various add-on modules via a backplane bus, e.g. the HUB-VM102 or the HUB-EN200. All in.hub add-on modules must be attached to the right of the HUB-GM200.

The backplane bus supplies the add-on modules with power and enables communication and configuration of the other devices. The add-on modules (max. 10 add-on modules + HUB-GM200) are plugged together with a backplane bus connector.

RECOMMENDATION: When you remove the HUB-GM200 from its original packaging, plug the backplane bus connector straight into the backplane bus, even if you do not need it immediately. If add-on modules are added later, they can be mounted quickly and easily.

- 1. Switch off the power supply.
- 2. Plug the backplane bus connector belonging to the add-on module to the backplane bus interface of your module.
- 3. Click the add-on module onto the DIN rail and push it up to the HUB-GM200 so that the pins of the two backplane bus connectors interlock.



Fig. 4: Individual backplane bus connectors on the DIN rail (example)



Fig. 5: Mounted and interconnected devices (example)

As soon as the HUB-GM200 is supplied with voltage and the boot process has been started successfully, the addressing and communication of the add-on module begins.

The device can then be selected in the software.

5 Commissioning

Observe the applicable safety and accident-prevention regulations for specific areas of application, such as the Machinery Directive.

5.1 Interfaces of the HUB-GM200

The following section gives an overview of the interfaces of the HUB-GM200 and provides information you need to connect these interfaces.

For the position of the interfaces at the module, please refer to the section *Hardware* - *Structure and interfaces, page 8.*

5.1.1 USB

- USB1
 - Micro USB connector (type B socket) for use in parameterization and short-term power supply of the module, not for permanent supply.

NOTE: Under certain circumstances, the power supply may not be sufficient, e.g. for power-hungry USB devices, high computing power and/or weak USB port of your connected device.

- Located on the front panel of the HUB-GM200
- \circ Maximum power consumption = 6.5 W (1.3 A)

May vary depending on the connected device and the power supply. With an active 24 V power supply, the power input is 0 W.

- USB2.0 supports full speed, high speed, and low speed (480, 12, and 1.5 Mbit/s)
- USB2 and USB3
 - Type A socket
 - \circ $\;$ Located on the front and bottom of the HUB-GM200 $\;$
 - Maximum power output = 2.5 W (500 mA)
 - USB2.0 supports full speed, high speed, and low speed (480, 12, and 1.5 Mbit/s)

NOTE: To reach the USB2 and USB3 ports, you have to lift up the protective flap on the front.

5.1.2 Power supply

- 24 V ± 10 %
- Maximum power consumption = 120 W

5.1.3 Ethernet 1 and Ethernet 2

• 10BASE-T/100BASE-TX according to IEEE 802.3u with HP Auto MDI/MDI-X

5.1.4 CAN

NOTE: By default, a termination is set for the CAN interface.

Therefore, attach the module at the end of a bus structure and switch over the devices, which formed the termination until then.

- Voltage output = 24 V / 0.7 A, protected against reverse polarity and overload
 NOTE: Pin 8 for the power supply must be activated in the user software.
- Maximum baud rate = 1 Mbit/s
- Bus termination: 120 Ω

Front



Fig. 6: Pin assignment of the CAN interface

Pins	Signal	Description	
1	CAN_H	CAN_H Bus line (dominant high)	
2	CAN_L	CAN_L Bus line (dominant low)	
3	CAN_GND	Ground / 0V / V-	
4	-	Not assigned	
5	-	Not assigned	
6	-	Not assigned	
7	GND	Ground / 0V / V-	
8	24 V	Power supply	

5.1.5 RS485

NOTE: By default, a termination is set for the RS485 interface.

Therefore, attach the module at the end of a bus structure and switch over the devices, which formed the termination until then.

- Voltage output = 24 V / 0.7 A, protected against reverse polarity and overload
 NOTE: Pin 7 for the power supply must be activated in the user software.
- Maximum baud rate = 2.5 Mbit/s
- Bus termination: 120 Ω

Front



Fig. 7: Pin assignment of the RS485 interface

Pins	Signal	Description	
1	-	Not assigned	
2	-	Not assigned	
3	-	Not assigned	
4	D1/B/B'	Transreceiver Terminal 1, V1 Voltage (V1 > V0 for binary 1 [OFF] status)	
5	D0/A/A'	Transreceiver Terminal 0, V0 Voltage (V0 > V1 for binary 0 [ON] status)	
6	-	Not assigned	
7	24 V	Power supply	
8	GND	Ground / 0 V / V-	

5.1.6 IO1 and IO2

The pins of the IO1 and IO2 interface can be configured in SIINEOS as digital input or digital output.



Fig. 8: Schematic drawing of the IO1 and the IO2 interface

Pins	Signal IO1	Signal IO2	Description
1	GND 1	GND 1	Ground / 0 V / V-
2	AD/IO1	AD/IO3	Configurable in:
3	AD/IO2	AD/IO4	Analog <u>or</u> digital input
			-or-
			Digital output
4	D/IO4	D/IO6	Digital input <u>or</u> output

Specification for configuration as digital input (IO1 to IO6)

- Voltage drop is max. 1 V to the 24 V operating voltage
- Maximum output current = 120 mA
- Reverse polarity protected and protection against reverse current

Specification for configuration as digital output (IO1 to IO6)

- Compliant with EN61131-2 Type1/3
- Switching threshold between 5 V and 11 V
- Pulldown current ~2 mA
- Bandwidth < 100 kHz
- Dielectric strength according to EN61131-2 30V

Specification for configuration as analog input (AD/IO1 to AD/IO4)

- Overload protection
- Reverse polarity protected
- Operating modes: voltage, current

Pins	Description
Measuring range = 0 to 11 V Measuring range = 0 to 24 mA	
Dielectric strength = 30 V Maximum input current = 30 mA	
Resolution = 12 bit	Resolution = 12 bit
Input resistance = 122 kΩ	Bandwidth = 1 kHz
Bandwidth = 1 kHz	

5.1.7 LED display

• 3 x LED (red/green) on the front panel

NOTE: The configuration of the LED lights and their status display is done in SIINEOS.

5.1.8 Backplane bus

- Voltage output is overload protected and switchable via SIINEOS
- Maximum number of add-on modules: 10
- Voltage of the backplane bus = 24 V

5.2 Connecting the HUB-GM200 to the power supply

Precondition: The module is mounted correctly on the DIN rail. See chapter *Mounting and dismounting the module at the DIN rail, page 10.*



WARNING An incorrect power supply can cause irreparable damage to property!

- > Make sure that the power supply meets the specification of 24 V \pm 10%.
- 1. For easier mounting, you can remove the connector with the terminal contacts from the 24V DC interface.
- 2. Clamp the power connection cable into the connector as shown in the following diagram:



Fig. 9: Schematic drawing of the power supply

If the correct operating voltage is connected, the status LEDs light up on the front of the module – depending on the configuration in the user software – indicating that SIINEOS is booting up.

6 First steps with SIINEOS

In this chapter you will find the first steps for working with SIINEOS.

Details on the configuration and settings of your device in SIINEOS are described in a separate user documentation, which is published with each new software version of SIINEOS. In this way, you constantly benefit from new functions and improvements of the SIINEOS software.

NOTE: As soon as a SIINEOS update is available, in.hub will provide it in download portal <u>https://download.inhub.de/siineos/</u>. There you will also find the SIINEOS user manual with many sample workflows and troubleshooting information.

6.1 Connecting the HUB-GM200 with your PC

1. Connect your PC to the **USB1** interface on the front of the HUB-GM200 using a micro-USB cable.

In most cases, the USB port provides sufficient power to operate the HUB-GM200 without having to connect an extra power supply. Under certain circumstances, however, the power supply may not be sufficient, e.g. with power-hungry USB devices, with high computing power and/or weak USB port of your connected device.

LED 1 indicates the status of the device. If the connection is working correctly, **LED 1** lights up and flashes after some time. SIINEOS is running on the module.

2. When you connect the HUB-GM200 for the first time, additional drivers are installed. Check in the Windows Device Manager whether a new device has been created:



Fig. 10: Windows device manager (example)

NOTE: If the LED display does not light up, no drivers are installed or no new device has been created, there is usually an insufficient power supply to the module. In this case, use an external power supply and observe the specifications in chapter *Power supply*, *page 12*.

6.2 Logging in to SIINEOS

NOTE: The latest versions of **Firefox, Edge** or **Chrome** browsers are recommended for SIINEOS. Using other or older browsers may cause compatibility issues.

NOTE: Make sure that the gateway is connected to the PC.

When you log in to SIINEOS for the first time

1. Enter the following address in your browser:

http://192.168.123.1/smac

2. Log in with the initial user data (hubadmin/hubadmin).

The SIINEOS management console opens.

SIINEOS MANAGEME	NT CONSOLE		
Overview	Welcome to SIINEOS		
 System Natworks 	Device	System	
C Networks	Name	SIINEOS version	2.7.4 (standard)
🐮 Firewall	Location	System clock	20 June 2023 11:27:42 UTC
📩 Users	Type HUB-GM100	Uptime	0 days, 3 hours, 37 minutes
I/O management	Hostname	IP addresses	192.168.123.1 (usb0)
E Licensing	System resources		
Apps	CPU	Memory	Storage
Monitoring	0 16 %	0 121 MB	397 MB
«	Dark mode	siineos	English 🗸

Fig. 11: SIINEOS Management Console start page (example)

On the start page you will now see information about your system, e.g., the current SIINEOS version, name of the device, location, type, system resources, etc.

3. Select the **Users** page and change the password of the **hubadmin** user.

This description can be found in the SIINEOS user manual.

If you have already set up SIINEOS

- 1. In your browser, enter the individual IP address you configured.
- 2. Log in with your user data and click **Log in**.

The SIINEOS management console opens.

6.3 Checking the SIINEOS version

1. Go to the SIINEOS start page by selecting the **Overview** page on the left.

SIINEOS MANAGEME	NT CONSOLE		≡
Overview	Welcome to SIINEOS		
System	Device	System	
Networks	Name	SIINEOS version	2.7.4 (standard)
Firewall	Location	System clock	20 June 2023 11:27:42 UTC
📩 Users	Type HUB-GM100	Uptime	0 days, 3 hours, 37 minutes
I/O management	Hostname	IP addresses	192.168.123.1 (USDU)
Ecensing	System resources		
Apps	CPU	Memory	Storage
Monitoring	0 16 %	121 MB	397 MB
«	Dark mode Off	siineos	English 👻

Fig. 12: "Overview" page with the SIINEOS version (example)

- 2. Check the **SIINEOS version** field to see which version is installed on your gateway.
- 3. Go to the https://download.inhub.de/siineos/ page and check if a new SIINEOS version is available.

If there is a new version, you can download and install it. See *Updating SIINEOS, page 20*.

6.4 Updating SIINEOS

1. Go to the https://download.inhub.de/siineos/ page and select the current SIINEOS package.

Two variants are available: the complete software package and a light variant with no Docker container and with a smaller file size.

2. When the download is complete, go to the **System** page in SIINEOS and select **Updates**.

System > Updates
Offline update
Update image file Click here to select a local file which to upload and install.
UPLOAD AND INSTALL

Fig. 13System > Updates

- 3. Click in the **Update image file** input field and select the software bundle from your local file store.
- 4. Click Upload and Install.

The installation runs automatically.

After successful installation, you will be asked if you want to restart the gateway.

- 5. Click Yes.
- 6. After restarting, check on the **Overview** page that the new version of SIINEOS is displayed.
- 7. If the version has not been updated, proceed as follows:
 - First, clear your browser cache and refresh the page in your browser.
 - \circ If that doesn't work:

Disconnect the gateway from the power supply and reconnect it after a few seconds.

• Start SIINEOS and check the version number.

NOTE: Continue from here with the SIINEOS user manual. The documentation for the version installed on your device can be found in the download portal:

https://download.inhub.de/siineos/

7 Technical data

Data	Values	
Voltage range of the power supply	24 V ± 10 % reverse polarity protected and overload protected	
Max. Power consumption (total device)	120 W	
Processor	Colibri IMX7D 1 GB 32-bit, 2 x ARM Cortex-A7 CPU ARM®, 1 x Cortex-M4 CPU Cores®, Cryptographic Acceleration and Assurance Module, Secure Real-Time Clock	
Memory	1 GBD DDR3L RAM, 4 GB eMMC	
Interfaces	2 x Ethernet, 2 x USB2.0 Host, 1 x USB2.0 Device, 1 x CAN, 1 x RS485, 2 x IO	
НМІ	Status LEDs, integrated web interface	
Operating system/software	IIoT operating system SIINEOS, Software Development Kit (developer tool for PC) optionally available	
Protocols	Modbus RTU, Modbus TCP/IP, CAN, MQTT, HTTP, Cloud of Things, OPC U/A, DB/SQL	
Temperature range	Operation: 0 °C to 50 °C	
	Storage: -40 °C to 85 °C	
Humidity	Operation: 20 % to 90 % RH non-condensing	
	Storage: 10% to 95% RH non-condensing	
Housing	Plastic (polyamide), black	
	UL 94 V0 flammability rating	
Protection class	IP20	
Dimensions (L x H x W)	139 mm x 100 mm x 25 mm	
Weight	181 g	

8 EU Declaration of Conformity





	with rated current ≤ 75 A and subject to conditional connection	
IEC 61000-3-12:2011	Electromagnetic compatibility (EMC) - Part 3-12: Limits - Limits for harmonic currents produced by equipment	EN 61000-3-12:2011
	connected to public low-voltage systems with input current > 16 A and ≤ 75 A per phase	
IEC 61000-4-2:2008	Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test	EN 61000-4-2:2009
IEC 61000-4-3:2006 +A1:2007 +A2:2010	Electromagnetic compatibility (EMC) - Part 4-3: Testing and measurement techniques - Radiated, radio-frequency, electromagnetic field immunity test	EN 61000-4-3:2006 +A1:2008 +A2:2010
IEC 61000-4-4:2004 +Cor. Juni:2007 +A1:2010	Electromagnetic compatibility (EMC) - Part 4-4: Testing and measurement techniques - Electrical fast transient/burst immunity test	EN 61000-4-4:2004 +A1:2010
IEC 61000-4-5:2005 + Cor. Oktober:2009	Electromagnetic compatibility (EMC) - Part 4-5: Testing and measurement techniques - Surge immunity test	EN 61000-4-5:2006
IEC 61000-4-6:2008	Electromagnetic compatibility (EMC) - Part 4-6: Testing and measurement techniques - Immunity to conducted disturbances, induced by radio-frequency fields	EN 61000-4-6:2009
IEC 61000-4-8:2009	Electromagnetic compatibility (EMC) - Part 4-8: Testing and measurement techniques - Power frequency magnetic field immunity test	EN 61000-4-8:2010
IEC 61000-4-11:2004	Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests	EN 61000-4-11:2004
CISPR 11 (mod.):2009 +A1:2010	Industrial, scientific and medical equipment - Radio- frequency disturbance characteristics - Limits and methods of measurement	EN 55011:2009 +A1:2010

Weitere Normen, Bemerkungen

additional standards, remarks

Das Produkt stimmt mit den Anforderungen der Richtlinie 2014/30/EU überein. Eine oder mehrere in der zugehörigen EG-Baumusterprüfbescheinigung genannten Normen wurden bereits durch neue Ausgaben ersetzt. Der Hersteller erklärt für das Produkt auch die Übereinstimmung mit den neuen Normenausgaben, da die veränderten Anforderungen der neuen Normenausgaben für dieses Produkt nicht relevant sind.

The product complies with the directive 2014/30/EU. One or more norms mentioned in the respective EC type examination certificate were already replaced by new ones. The manufacturer declares that the product complies with the new valid norms, as the changed requirements mentioned there are not relevant for the product.

Chemnitz, den 06.10.2020

Marco Neubert / Geschäftsführer Marco Neubert / Geschäftsführer

Ort und Datum der Ausstellung /

Place and date of issue

Name, Funktion und Unterschrift des Befugten / Name, function and signature of authorized person

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