KUNBUS
industrial communication

sercos
the automation bus

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1 General Information

1.1 Disclaimer

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1.2 Notes Regarding this User Manual

This user manual provides important technical information that can enable you as a user to integrate the Gateways into your applications and systems efficiently, safely and conveniently. It is intended for trained, qualified personnel, whose sound knowledge in the field of electronic circuits and expertise in SERCOS is assumed.

As an integral part of the module, the information provided here should be kept and made available to the user.

1.3 Validity

This document describes the application of the KUNBUS Gateway with the product number:

– PR100075, release 00

1.4 Limitation of Liability

Warranty and liability claims will lapse if:

– the product has been used incorrectly,

– damage is due to non-observance of the operating manual,

– damage is caused by inadequately qualified personnel,

– damage is caused by technical modification to the product (e.g. soldering).

1.5 Customer Service

If you have any questions or suggestions concerning this product, please do not hesitate to contact us:

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2 Safe Use

2.1 User

The Gateway may only be assembled, installed and put into operation by trained, qualified personnel. Before assembly, it is absolutely essential that this documentation has been read carefully and understood. Expertise in the following fields is assumed:

– electronic circuits,
– basic knowledge of SERCOS,
– work in electrostatic protected areas,
– locally applicable rules and regulations for occupational safety.

2.2 Symbols

The symbols used have the following meaning:

DANGER	**Danger**
	Always observe this information!
	There is a safety hazard that can lead to serious injuries and death.

CAUTION	**Caution**
	There is a safety hazard that can result in minor injuries and material damage.

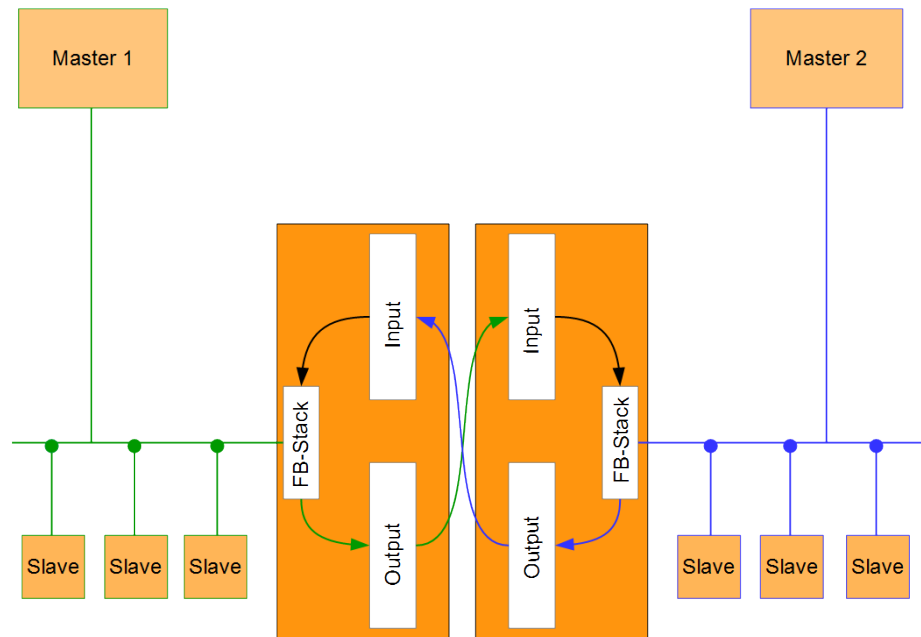| NOTICE	**Note**
	There is a safety hazard that can result in material damage.

3 Overview

3.1 Functionality

The KUNBUS Gateway is a protocol converter. It allows communication between networks with different protocols.

Illustration 1: Functionality

A Gateway consists of 2 gateway components that master one specific protocol each. You can combine these gateway components as you wish. This design offers you a high degree of flexibility, since you can exchange the individual gateway components at any time. The following gateway components are currently available as slaves:

– CANopen
– CC-Link
– DeviceNet
– EtherCAT
– EtherNet/IP
– Modbus RTU
– Modbus TCP
– POWERLINK
– PROFIBUS
– PROFINET
– Sercos III

Overview

3.2 Control Elements

Front view
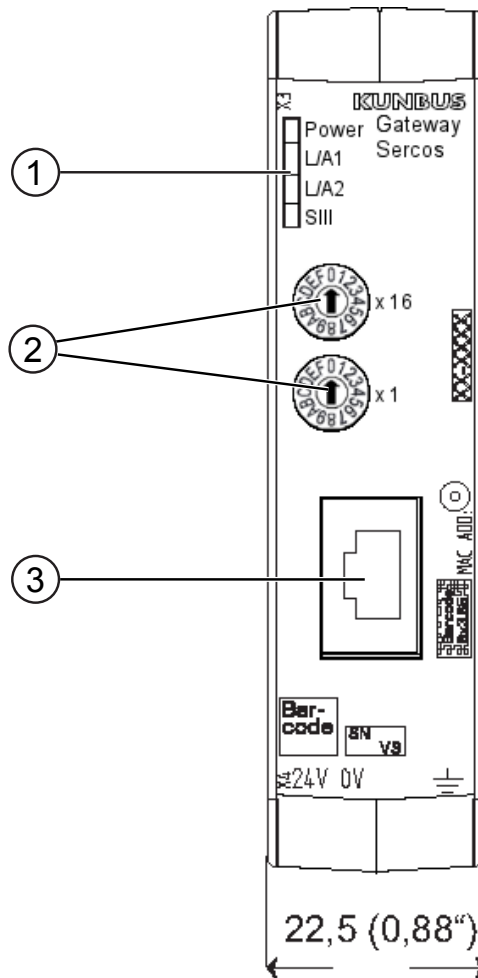
Illustration 2: Front view

1	Status LEDs for signal display.
2	2 rotary coding switches for setting the station number.
3	Fieldbus connection RJ45 socket for the connection to SERCOS and/or general LAN. Auto-Negotiation and Auto-MDI-X are supported. (2 pcs, s. figure top view)

Top
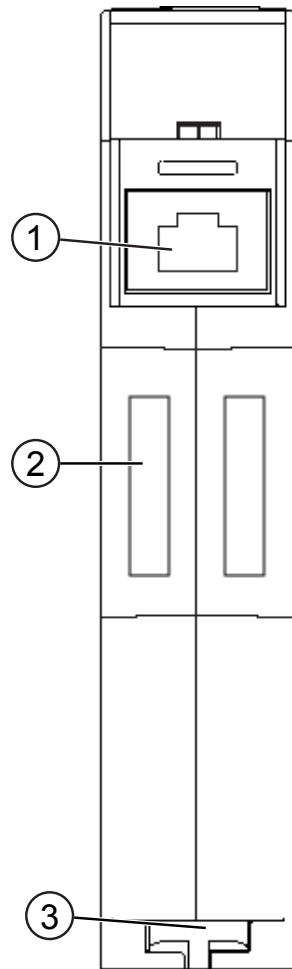
Illustration 3: Top

1	Fieldbus connection RJ45 socket for connection to the fieldbus (2 pcs, see figure front view).
2	Interconnect ports for interconnecting the gateway components.
3	Locking clamps for securely attaching the gateway component to the DIN rail.

Bottom

Illustration 4: Bottom

1	Mains connection with 24 V power supply
2	Locking clamps for securely attaching the gateway component to the DIN rail.

3.3 Status LEDs

The signals of the status LEDs for SERCOS have the following meaning:

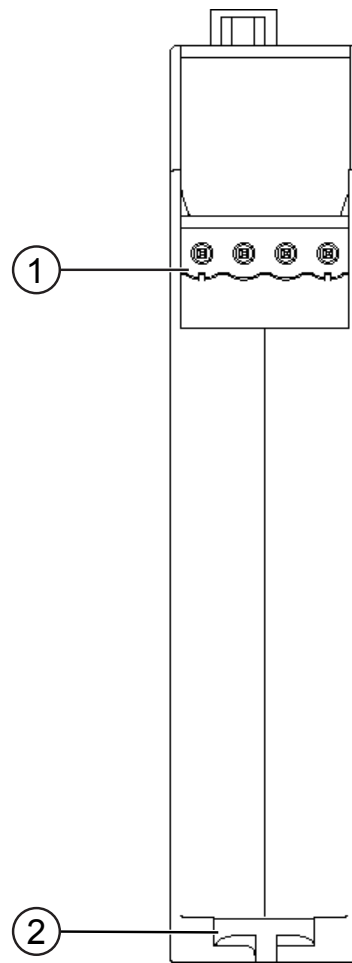| LED designation	Signal	Meaning
Power	off	Gateway not running
	flashes, green	Initialization phase not yet completed
	on, green	All system components are functioning perfectly
	flashes, red	Correctable error (e.g. second gateway component missing)
	Flashes, red and green	Factory reset is executed
	on, red	Serious error/defect in the gateway
L/A 1 + L/A 2	on, green	Connection to another device. No data exchange takes place.
	flashes, green	Connection established. Data exchange takes place.
	off	No connection.
SIII	Off	No communication with Sercos
	orange, on	Communication phase 0 active
	orange, flashes 1x green*	Communication phase 1 active
	orange, flashes 2x green*	Communication phase 2 active
	orange, flashes 3x green*	Communication phase 3 active
	green, on	Communication phase 4 active
	green/orange, flashes	Device is in the Hot Plug phase 0
	green, flashes 1x orange*	Device is in the Hot Plug phase 1
	green, flashes 2x orange*	Device is in the Hot Plug phase 2
	green, flashes	RT status changed from Fast-Forward to Loopback
	red/orange, flashes	Error in the application.
	red/green, flashes	Communication warning in the device status
	red, on	Communication error
	orange, flashes	Device is identified.
	red, flashes	Watchdog Error

*Interval: 3 sec

4 Installation

4.1 Preparations for Trouble-free Operation

In the following section we have compiled some general information for you that is important for trouble-free operation. If you are already acquainted with this topic, you can skip to the next section. There, you will learn about which conditions are necessary for installing the gateway.

Cable routing

Route your cables separately in cable groups. This will protect your gateway from any unintended electromagnetic interferences.

The following groups should be routed separately from each other:

Group	Line
A	Data and power supply lines for:
	DC voltage below 60 V
	AC voltage below 25 V
B	Data and power supply lines for:
	DC voltage between 60 V and 400 V
	AC voltage between 25 and 400 V
C	Power supply lines above 400 V

– You can route cables of the same group together in cable ducts or bundles.
– Cables of group A and B:
  – Route the groups in separate bundles or
  – in cable ducts at a minimum distance of 10 cm from each other.
– Cables of group C
  – Route the groups in separate bundles or
  – in cable ducts at a minimum distance of 50 cm from the other groups.

Shielding

Shield your cables. This will reduce any unintended electromagnetic interferences.

Potential equalization

Potential differences occur when devices are connected to different earths. These potential differences cause malfunctions.

To prevent malfunctions, you have to route an equipotential equalization conductor.

When doing so, bear in mind the following points:

– Select an equipotential equalization conductor with low impedance.
– Select the following as a reference value for the cross-section of the potential equalization cable:
    – 16 mm^2 for potential equalization cables of up to 200 m in length
    – 25 mm^2 for potential equalization cables of more than 200 m in length
– Use potential equalization cables made of copper or galvanized steel.
– Connect potential equalization cables extensively with the earth rail.
– The smallest surfaces possible should be sandwiched between potential equalization cables and signal cables.

If the devices of the control system are connected by shielded signal cables that are earthed on both sides, the impedance must be 10% of the shielding impedance.

4.2 Requirements

The Gateway was designed for use in a control cabinet.

✓ The protection class of the control cabinet must be equivalent to at least IP54.

✓ For installation in the control cabinet you need a DIN rail 35 x 7.5 mm (EN50022).

◦ Install the DIN rail horizontally in the control cabinet according to the manufacturers' specifications. When doing so, make sure that the Gateway is at a sufficient distance from other devices.

NOTICE	**Your gateway could be damaged if temperatures are too high.**

➔ Make sure that the ambient temperature in the control cabinet is less than 60 °C.

➔ Keep the ventilation slots unobstructed. These must not be covered by cables etc.

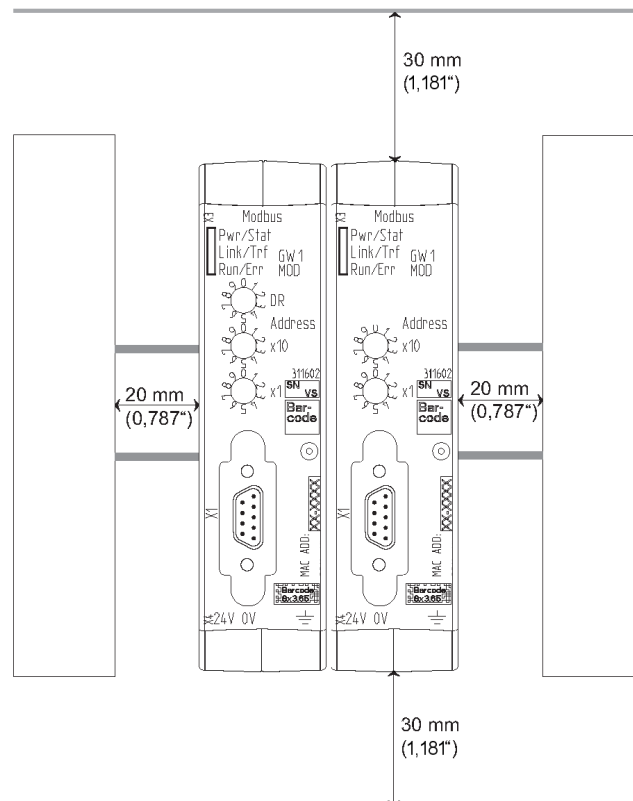➔ Maintain sufficient distance from other devices.

Illustration 5: Distances for installation

◦ Connect each gateway component individually to functional earth. When doing so, make sure that the power supplies of both gateway components have the same ground.

⇨ Your control cabinet now meets all requirements for installing the gateway.

4.3 Connecting Gateway Components

In order to attain a fully functional gateway, you have to interconnect both gateway components.

- Connect an interconnect port to each gateway component using the plug-in jumper (product number PR100204).
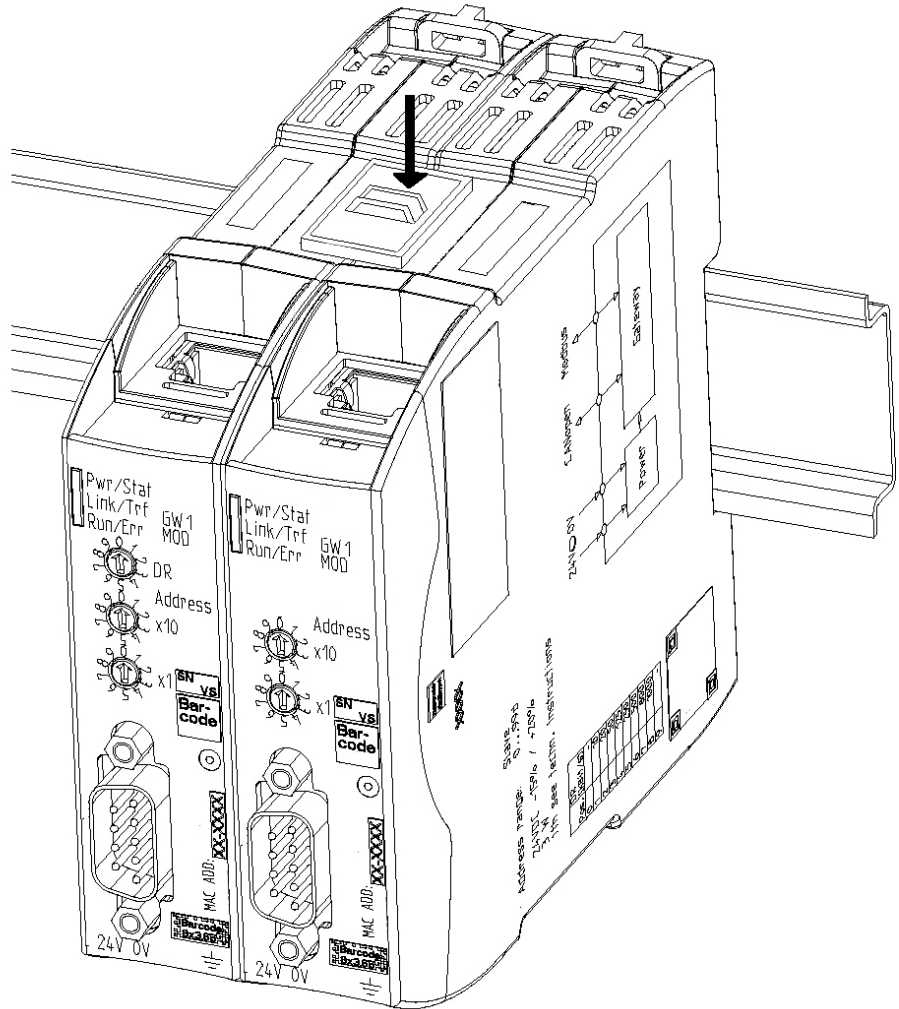

Illustration 6: Connecting gateway components

⇨ You can now install the gateway in the control cabinet.

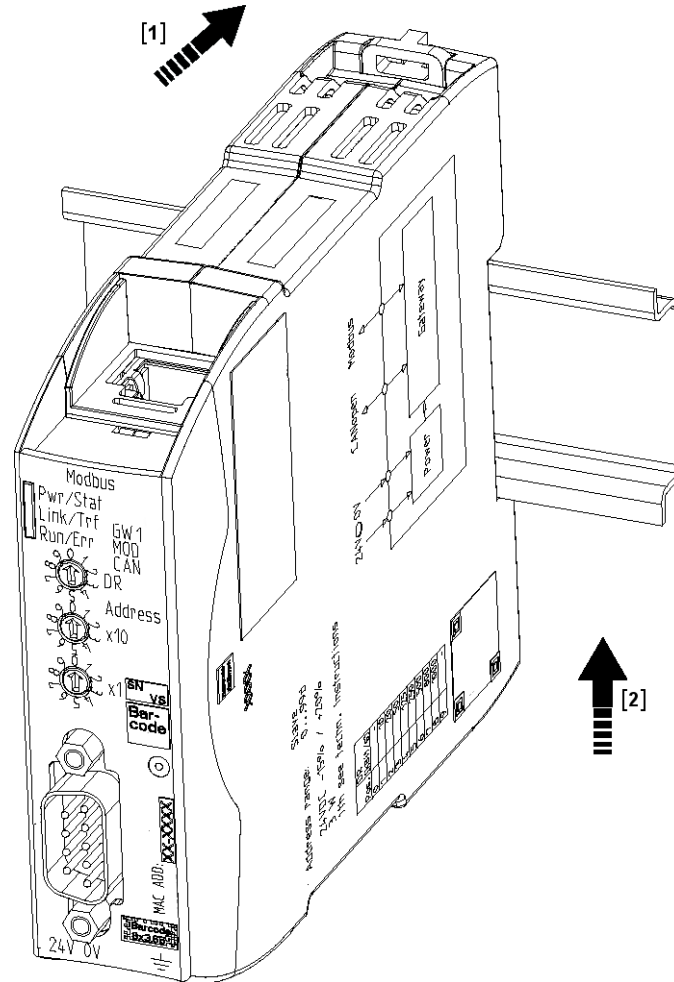| NOTICE	**Only ever interconnect 2 gateway components.**
	If you connect additional components, severe defects could result on all devices.

4.4 Installing a Gateway in the Control Cabinet

◦ Hold the raster element of the gateway on the DIN rail.

◦ Press down the locking elements towards the gateway.

◦ Make sure that the gateway is firmly attached to the DIN rail.

4.5 Connecting a Power Supply

To connect the gateway component to the power supply, you need a spring-loaded terminal (e.g. Metz-Connect SP995xxVBNC).

You have to connect each gateway component separately to a power supply. Never interconnect functional earth and GND, otherwise the galvanic isolation between gateway GND and fieldbus ground will be removed. Instead, connect the functional earth with low impedance to the potential equalization. You can then dispense with this connection if the shield of the fieldbus cable is connected to the potential equalization with lower impedance when entering the control cabinet.
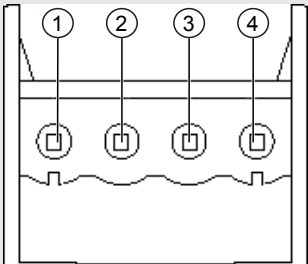
NOTICE	**Connect each of the two gateway components to the power supply**
	➔ Ensure in particular that no potential differences occur between the GND pins (2).

Pin assignment:

Pin	Assignment	
1	24 V for module supply	
2	GND	
3	Do not connect!	
4	Functional earth	

NOTICE	**Do not connect GND to PE**
	This connection could cause unintended malfunctions.

4.6 Connecting a Gateway to the Fieldbus

To connect the gateway component to SERCOS, you need one or two cat-5 cables with RJ45 connectors.

The pin assignment complies with the specifications of the Sercos specification.

5 Configuration

5.1 Supported Size of the Process Data

The gateway component for SERCOS supports process data up to a length of 250 bytes per direction.

Of these 250 bytes, 4 bytes of control data (for Connection Control and I/O-Control/status) are reserved.

NOTICE	Bear in mind that the maximum length of the process data is always determined by the fieldbus with the shorter data length.

Example:

Sercos supports 250 bytes je per direction incl. control data,

PROFIBUS supports 488 bytes

In conjunction with Sercos/ PROFIBUS this means that s 250 bytes are transmitted and updated cyclically.

5.2 Setting Sercos Address

You can set the Sercos Address for the gateway component using the two rotary switches.

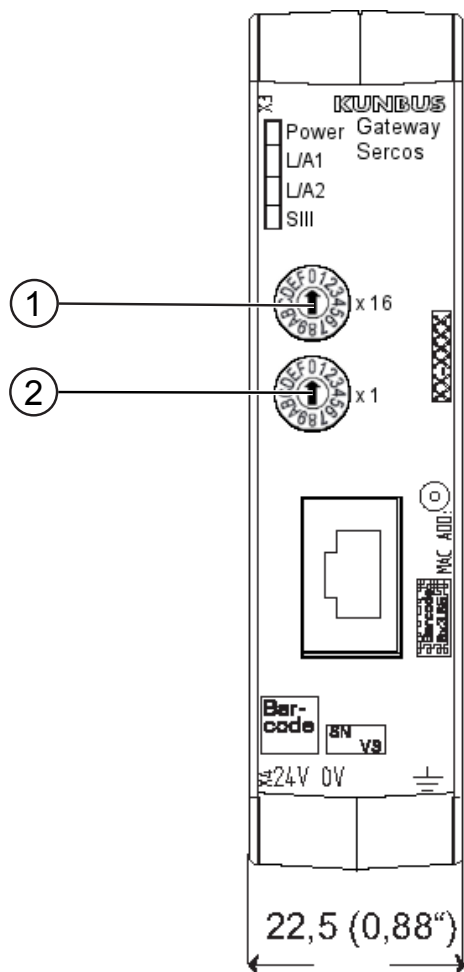| Value	
0	The Sercos Address from the webserver configuration is used (s. section"Configuration of Sercos [▷ 19]"). In this case, the Sercos Address can also be set by the Sercos Master (IDN S-0-1040). Tip!: You can use a Sercos Address from 1 tos 511 via the Webserver/Sercos-Master.
1-254	Sercos Address that can be set by the rotary switch.
255	When switching on, all configuration settings are reset to the factory settings. Then restart the device.

Illustration 7: Coding switch

The station address is set as a hexadecimal.

Example: Setting the station number 18.

Set switch x16 (1) to position "2".

Set switch x1 (2) to position "1".

The settings yield the hexadecimal value 0x12 and the decimal value 18.

5.3 Sercos Configuration

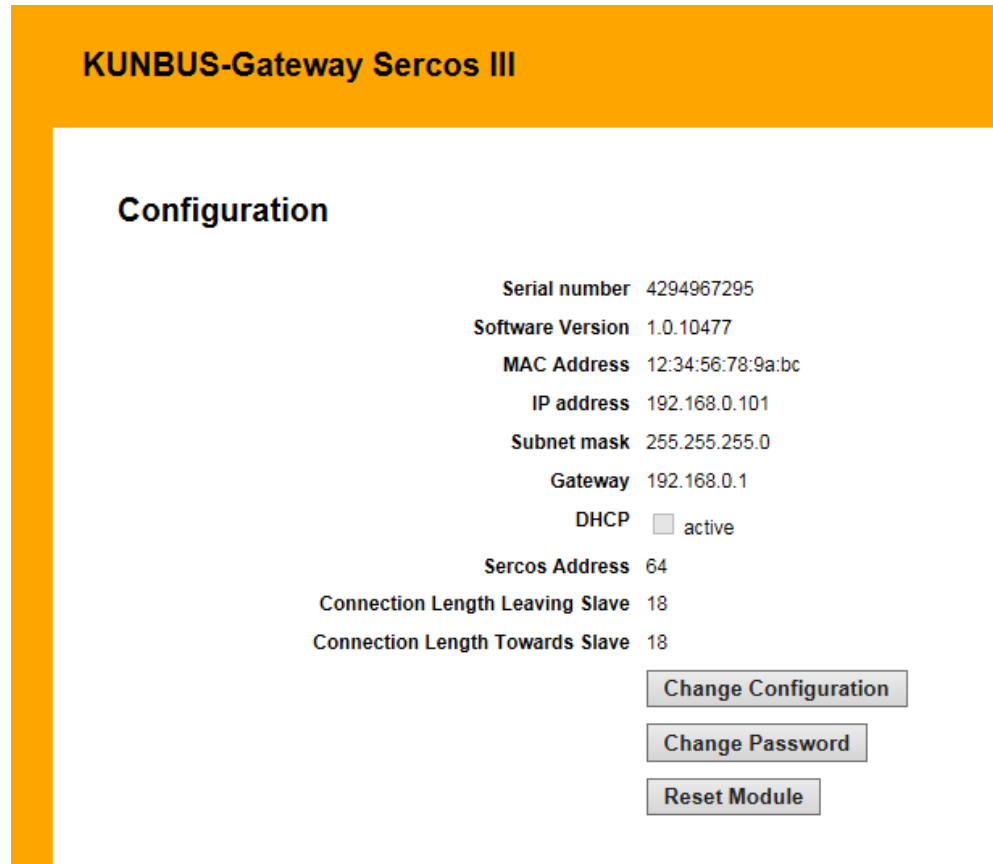**Prerequisite:** You are logged in as "Admin" on the webserver (s. section "Logging into Webserver").

KUNBUS-Gateway Sercos III

Configuration

Serial number	4294967295
Software Version	1.0.10477
MAC Address	12:34:56:78:9a:bc
IP address	192.168.0.101
Subnet mask	255.255.255.0
Gateway	192.168.0.1
DHCP	☐ active
Sercos Address	64
Connection Length Leaving Slave	18
Connection Length Towards Slave	18

Change Configuration

Change Password

Reset Module

Illustration 8: Settings for Sercos

You can make the following settings for Sercos:

Value	Default	Use
Sercos Address	64	Device address for the gateway component. You can set an address in a value range between 1 and 511.
Connection Length Leaving Slave	18	Determines the maximum lengths of the data transferred cyclically between the Sercos Master and gateway component.
Connection Length Towards Slave	18	This value containss 4 bytes of control data. **Note!:** If the input and output data of the partner gateway component is shorter than these values, then they will also be shortened accordingly on the Sercos Bus.

6 Server

6.1 Web Server

The gateway component contains an integrated web server. You can use this via Internet Explorer or Firefox.

With the web server you can configure the gateway component for Sercos.

6.2 FTP Server

The FTP server is necessary for updating HTML files of the web server and for transmitting firmware updates to the module.

As Admin, you can access the FTP server. For this purpose, the same logon data as for the web server is valid.

Web Server Files

You will find files for the web server in the "Web" subfolder.

6.3 TFTP Server

You can access the the gateway component via TFTP. TFTP supports the reading and writing of files. You can, for example, transfer a firmware update file to the gateway component via TFTP.

6.4 Logon data and access rights

You can logon to the webserver and FTP server with the following data:

Username	Password	Access rights
Admin	1701	– Changing configuration – Viewing current values
User	1111	– Viewing current values

Tip!: As Admin, you can change logon data in the web server.

7 Technical Data

7.1 Technical Data

Dimensions	
Width	22.5 mm
Height	96 mm
Depth	110.4 mm
Weight	90 g

Electrical data	
Power supply	24 V DC
Power consumption during operation (cyclical data exchange)	100 mA
Status display	LED

Environmental conditions	
Ambient temperature	0 – 60 °C
Storage temperature	- 25 – 60 °C
Humidity	93% (at 40 °C)
Condensing	Not allowed
Protection class	
Control cabinet	IP54
Housing	IP20
Terminal area	IP20

Assembly data	
DIN rail	35 x 7.5 mm
Height	96 mm
Depth	110.4 mm

Device data

You can find details on the following basic data in the device description file [SDDML].

|	
Device Name	KUNBUS Gateway Sercos3
Manufacturer Number	2000
Vendor Name	KUNBUS GmbH
Vendor Device ID	PR100075
Device type	Sercos III Slave Device
Sercos Protocol	V1.3.1
Sercos Communication Profiles	Classes SCP_FixCFG, SCP_TFTP, SCP_NRTPC, and SCP_SWC
	Connection length for input and output can be set individually (up to a max. of 250 bytes incl. Connection Control and I/O Control/Status).
Generic Device Profile	Class GDP_Basic
Function specific Profile IO	IO Bus coupler, Digital Input, Digital Output
Features supported	2 Connections (Input or Output)
Function Specific Profile	FSP IO
Sercos Cycle Time	250 µs – 65 ms
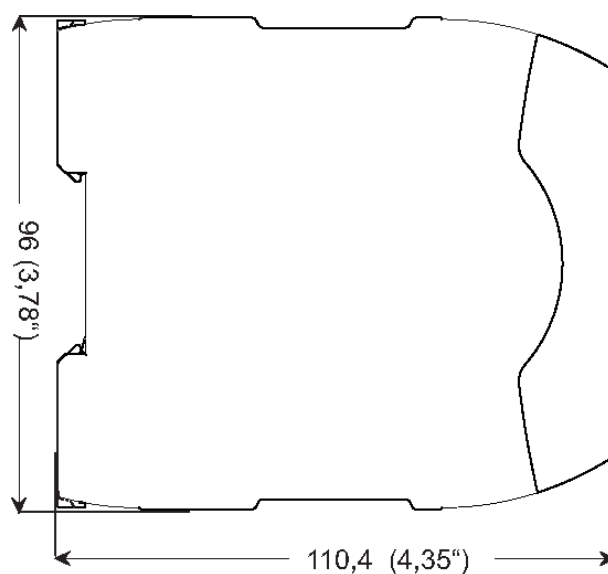
Illustration 9: Side dimensions
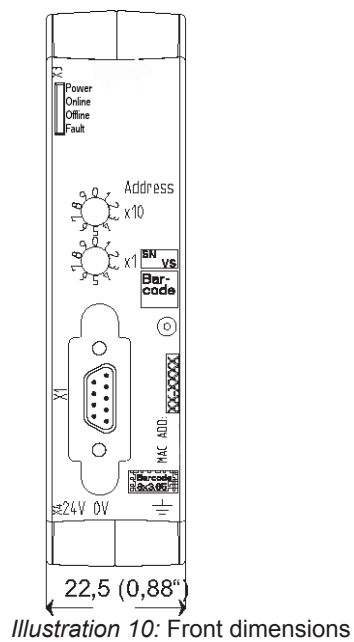
Illustration 10: Front dimensions