VIPA System 200V

VIPA

A YASKAWA COMPANY

Note

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Contents

About this manual

This manual describes the System 200V SSI module FM 250S from VIPA. Here you may find every information for commissioning and operation.

Overview   **Chapter 1:   Basics and Assembly**

The focus of this chapter is on the introduction of the VIPA System 200V. Here you will find the information required to assemble and wire a controller system consisting of System 200V components.

Besides the dimensions the general technical data of System 200V will be found.

Chapter 2:   Hardware description

Here the hardware components of the FM 250-1BS00 are described.

The technical data are at the end of the chapter.

Chapter 3:   Deployment

This chapter contains every information on the deployment and the configuration of the SSI module FM 250S.

Objective and contents

This manual describes the System 200V SSI module FM 250S from VIPA. It contains a description of the construction, project implementation and usage.

This manual is part of the documentation package with order number HB97E_FM and relevant for:

Product	Order number	as of state: HW
FM 250S	VIPA 250-1BS00	02

Target audience

The manual is targeted at users who have a background in automation technology.

Structure of the manual

The manual consists of chapters. Every chapter provides a self-contained description of a specific topic.

Guide to the document

The following guides are available in the manual:

- an overall table of contents at the beginning of the manual
- an overview of the topics for every chapter

Availability

The manual is available in:

- printed form, on paper
- in electronic form as PDF-file (Adobe Acrobat Reader)

Icons Headings

Important passages in the text are highlighted by following icons and headings:

Danger!
Immediate or likely danger.
Personal injury is possible.

Attention!
Damages to property is likely if these warnings are not heeded.

Note!
Supplementary information and useful tips.

Safety information

Applications conforming with specifications

The FM 250S is constructed and produced for:
- all VIPA System 200V components
- communication and process control
- general control and automation applications
- industrial applications
- operation within the environmental conditions specified in the technical data
- installation into a cubicle

Danger!
This device is not certified for applications in
- in explosive environments (EX-zone)

Documentation

The manual must be available to all personnel in the
- project design department
- installation department
- commissioning
- operation

The following conditions must be met before using or commissioning the components described in this manual:

- Hardware modifications to the process control system should only be carried out when the system has been disconnected from power!

- Installation and hardware modification only by properly trained personnel.

- The national rules and regulations of the respective country must be satisfied (installation, safety, EMC ...)

Disposal   **National rules and regulations apply to the disposal of the unit!**

Chapter 1   Basics and Assembly

Overview

The focus of this chapter is on the introduction of the VIPA System 200V. Here you will find the information required to assemble and wire a controller system consisting of System 200V components.

Besides the dimensions the general technical data of System 200V will be found.

Contents

Safety Information for Users

Handling of electrostatic sensitive modules
VIPA modules make use of highly integrated components in MOS-Technology. These components are extremely sensitive to over-voltages that can occur during electrostatic discharges.

The following symbol is attached to modules that can be destroyed by electrostatic discharges.

The Symbol is located on the module, the module rack or on packing material and it indicates the presence of electrostatic sensitive equipment.

It is possible that electrostatic sensitive equipment is destroyed by energies and voltages that are far less than the human threshold of perception. These voltages can occur where persons do not discharge themselves before handling electrostatic sensitive modules and they can damage components thereby, causing the module to become inoperable or unusable.

Modules that have been damaged by electrostatic discharges can fail after a temperature change, mechanical shock or changes in the electrical load.

Only the consequent implementation of protection devices and meticulous attention to the applicable rules and regulations for handling the respective equipment can prevent failures of electrostatic sensitive modules.

Shipping of electrostatic sensitive modules
Modules must be shipped in the original packing material.

Measurements and alterations on electrostatic sensitive modules
When you are conducting measurements on electrostatic sensitive modules you should take the following precautions:

- Floating instruments must be discharged before use.
- Instruments must be grounded.

Modifying electrostatic sensitive modules you should only use soldering irons with grounded tips.
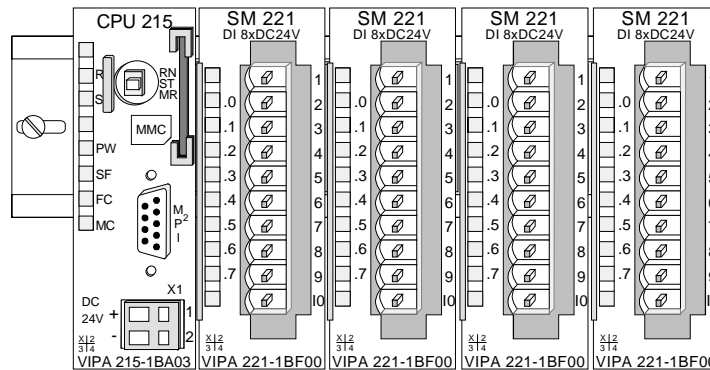

Attention!
Personnel and instruments should be grounded when working on electrostatic sensitive modules.

System conception

Overview   The System 200V is a modular automation system for assembly on a 35mm profile rail. By means of the peripheral modules with 4, 8 and 16 channels this system may properly be adapted matching to your automation tasks.
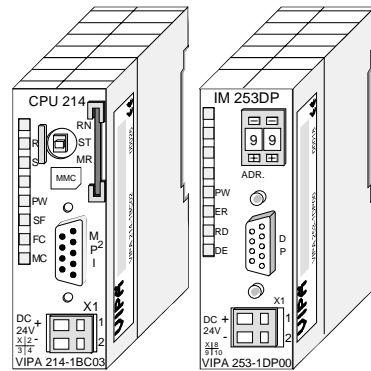

Components   The System 200V consists of the following components:

- *Head modules* like CPU and bus coupler
- *Periphery modules* like I/O, function und communication modules
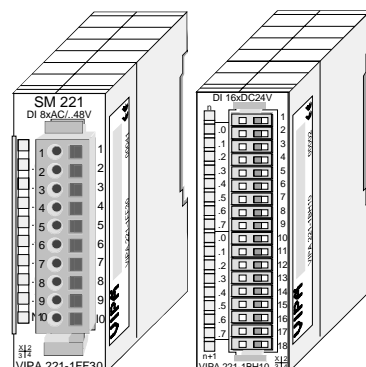- *Power supplies*
- *Extension modules*

Head modules

With a head module CPU respectively bus interface and DC 24V power supply are integrated to one casing.

Via the integrated power supply the CPU respectively bus interface is power supplied as well as the electronic of the connected periphery modules.

Periphery modules

The modules are direct installed on a 35mm profile rail and connected to the head module by a bus connector, which was mounted on the profile rail before.

Most of the periphery modules are equipped with a 10pin respectively 18pin connector. This connector provides the electrical interface for the signaling and supplies lines of the modules.
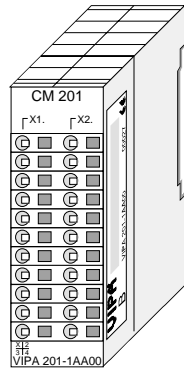
Power supplies
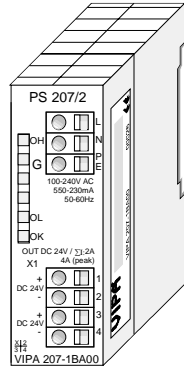
With the System 200V the DC 24V power supply can take place either externally or via a particularly for this developed power supply.

The power supply may be mounted on the profile rail together with the System 200V modules. It has no connector to the backplane bus.

Expansion modules

The expansion modules are complementary modules providing 2- or 3wire connection facilities.

The modules are not connected to the backplane bus.

Structure/ dimensions

- Profile rail 35mm
- Dimensions of the basic enclosure:
    1tier width: (HxWxD) in mm: 76x25.4x74 in inches: 3x1x3
    2tier width: (HxWxD) in mm: 76x50.8x74 in inches: 3x2x3

Installation

Please note that you can only install head modules, like the CPU, the PC and couplers at slot 1 or 1 and 2 (for double width modules).
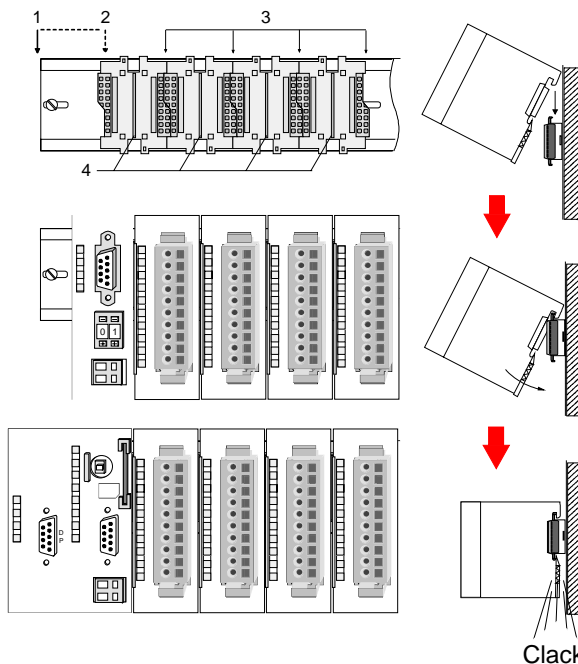
[1]	Head module (double width)
[2]	Head module (single width)
[3]	Periphery module
[4]	Guide rails

Note

Information about the max. number of pluggable modules and the max. current at the backplane bus can be found in the "Technical Data" of the according head module.

Please install modules with a high current consumption directly beside the head module.

Clack

Dimensions
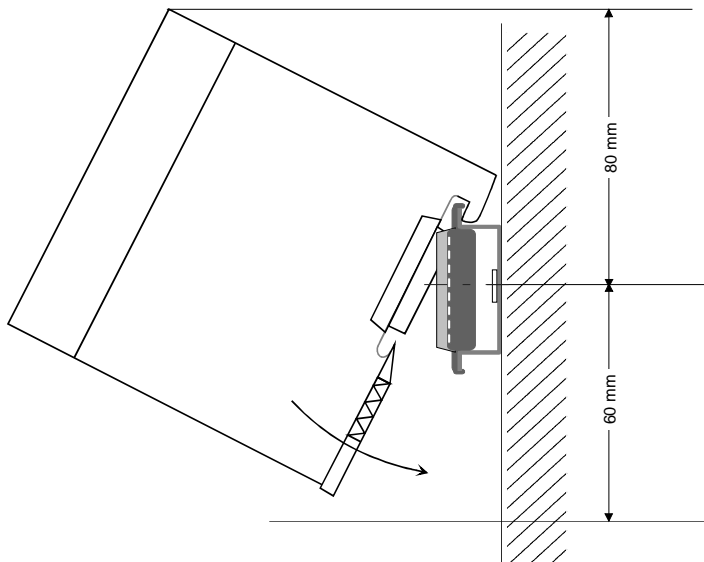
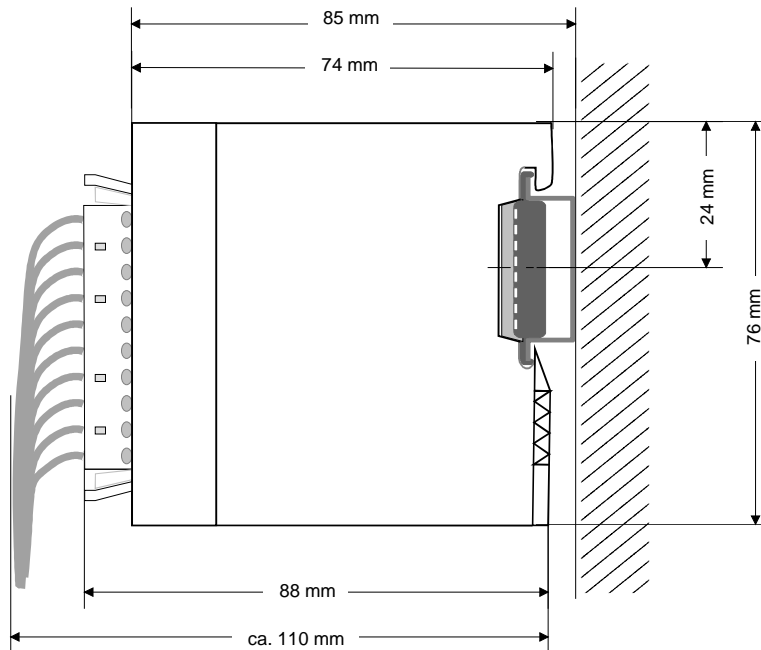|	
Dimensions **Basic enclosure**	1tier width (HxWxD) in mm: 76 x 25.4 x 74
	2tier width (HxWxD) in mm: 76 x 50.8 x 74

Installation
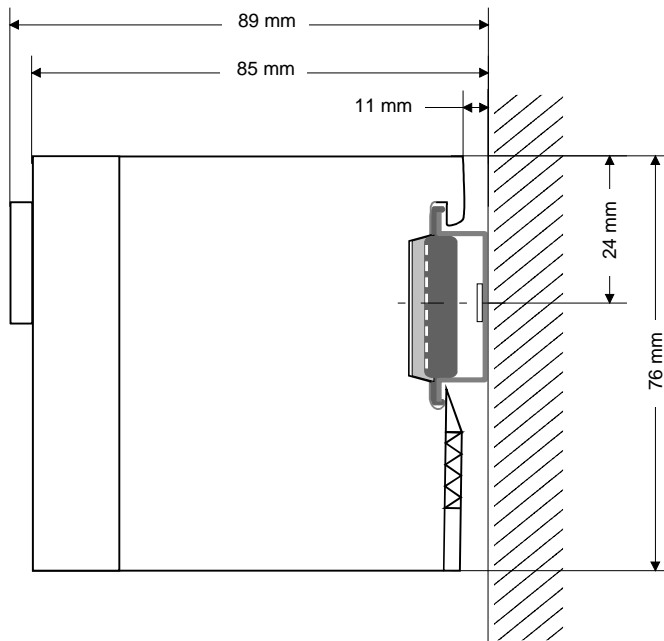**dimensions**

Installed and wired
dimensions

In- / Output
modules

Function modules/
Extension modules

CPUs (here with
EasyConn from
VIPA)
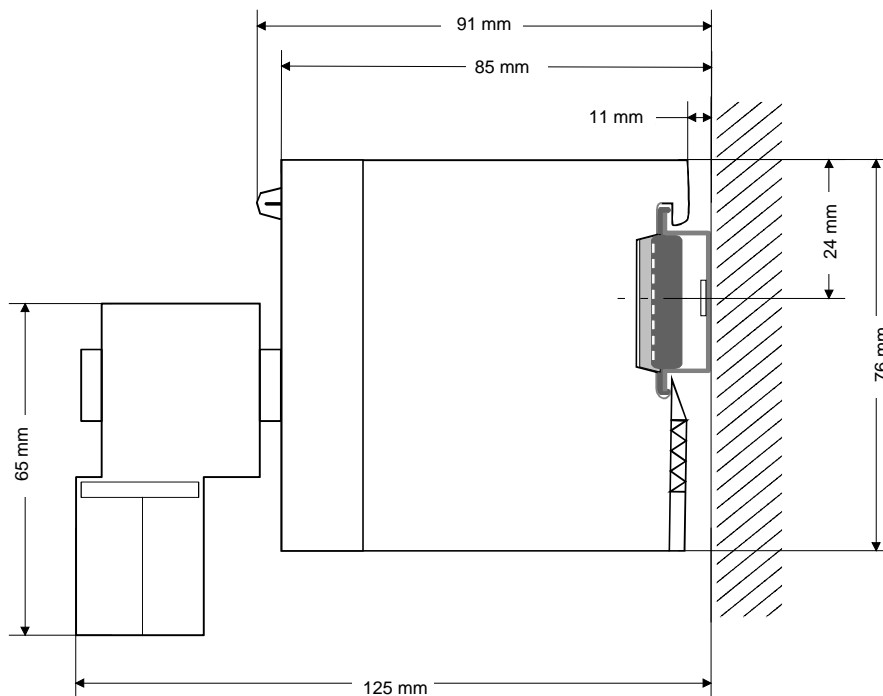
Installation

General

The modules are each installed on a 35mm profile rail and connected via a bus connector. Before installing the module the bus connector is to be placed on the profile rail before.

Profile rail

For installation the following 35mm profile rails may be used:
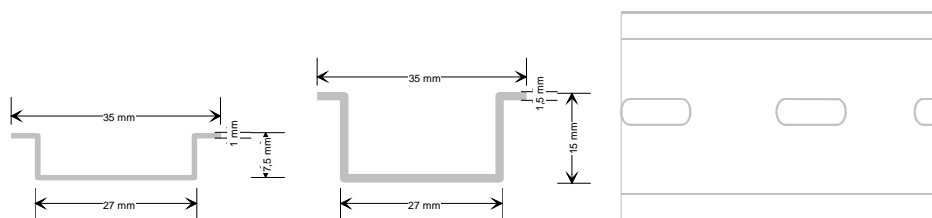
Order number	Label	Description
290-1AF00	35mm profile rail	Length 2000mm, height 15mm
290-1AF30	35mm profile rail	Length 530mm, height 15mm

Bus connector

System 200V modules communicate via a backplane bus connector. The backplane bus connector is isolated and available from VIPA in of 1-, 2-, 4- or 8tier width.

The following figure shows a 1tier connector and a 4tier connector bus:
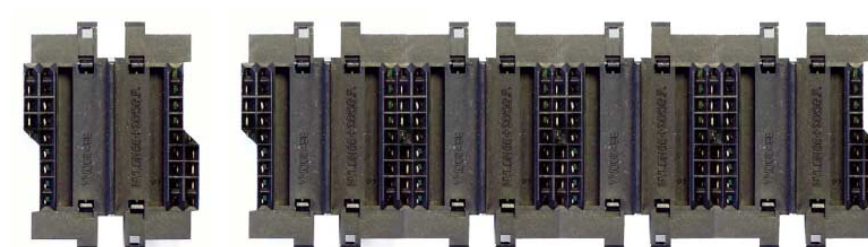
The bus connector is to be placed on the profile rail until it clips in its place and the bus connections look out from the profile rail.

Order number	Label	Description
290-0AA10	Bus connector	1tier
290-0AA20	Bus connector	2tier
290-0AA40	Bus connector	4tier
290-0AA80	Bus connector	8tier

Installation on a profile rail

The following figure shows the installation of a 4tier width bus connector in a profile rail and the slots for the modules.

The different slots are defined by guide rails.
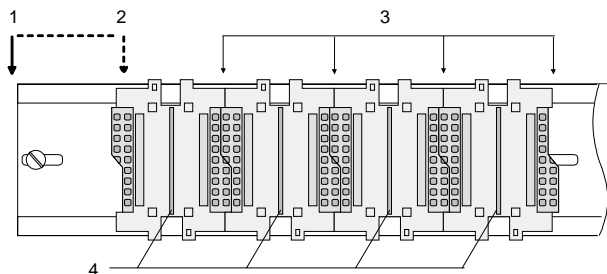
[1]   Head module (double width)
[2]   Head module (single width)
[3]   Peripheral module
[4]   Guide rails
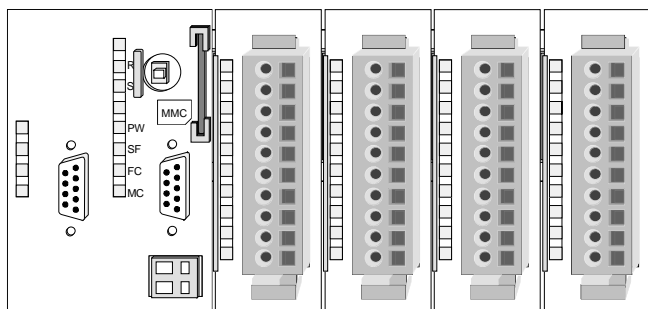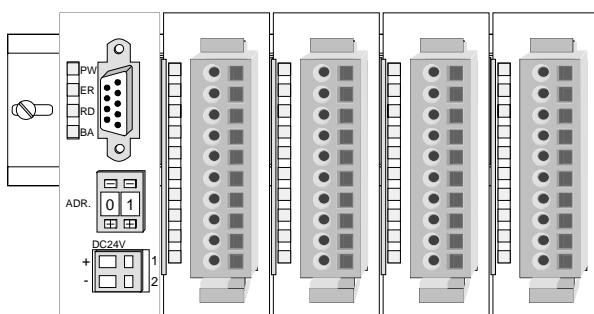
Assembly regarding the current consumption

- Use bus connectors as long as possible.
- Sort the modules with a high current consumption right beside the head module. In the service area of www.vipa.com a list of current consumption of every System 200V module can be found.

Assembly possibilities

hoizontal assembly
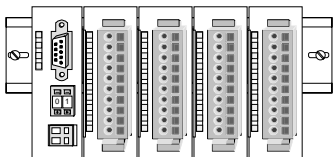
vertical assembly
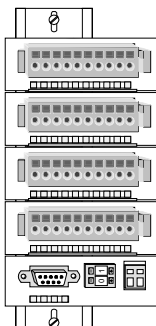
lying assembly
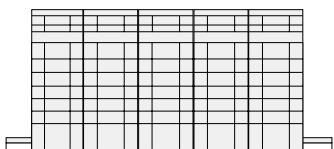
Please regard the allowed environmental temperatures:

- horizontal assembly: from 0 to 60°C
- vertical assembly: from 0 to 40°C
- lying assembly: from 0 to 40°C

The horizontal assembly always starts at the left side with a head module, then you install the peripheral modules beside to the right.

You may install up to 32 peripheral modules.
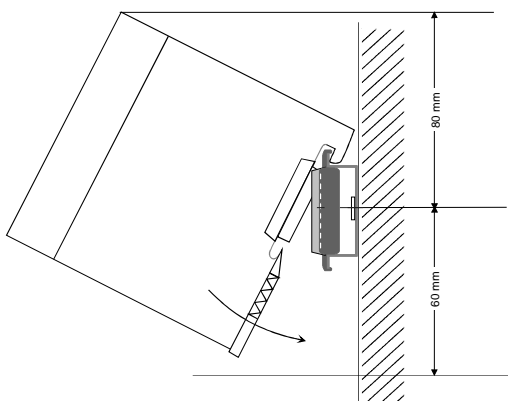
Please follow these rules during the assembly!

- Turn off the power supply before you install or remove any modules!
- Make sure that a clearance of at least 60mm exists above and 80mm below the middle of the profile rail.
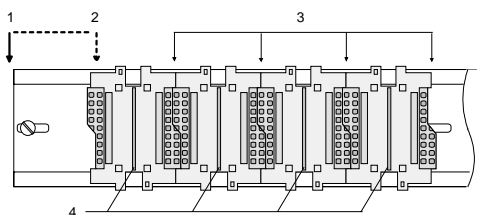
- Every row must be completed from left to right and it has to start with a head module.

  [1]   Head module (double width)
  [2]   Head module (single width)
  [3]   Peripheral modules
  [4]   Guide rails

- Modules are to be installed side by side. Gaps are not permitted between the modules since this would interrupt the backplane bus.
- A module is only installed properly and connected electrically when it has clicked into place with an audible click.
- Slots after the last module may remain unoccupied.

Note!

Information about the max. number of pluggable modules and the max. current at the backplane bus can be found in the "Technical Data" of the according head module.

Please install modules with a high current consumption directly beside the head module.

Assembly procedure
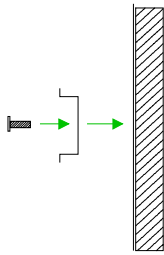
- Install the profile rail. Make sure that a clearance of at least 60mm exists above and 80mm below the middle of the profile rail.
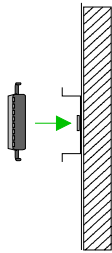
- Press the bus connector into the profile rail until it clips securely into place and the bus-connectors look out from the profile rail. This provides the basis for the installation of your modules.
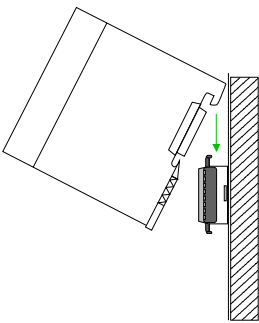
- Start at the outer left location with the installation of your head module and install the peripheral modules to the right of this.
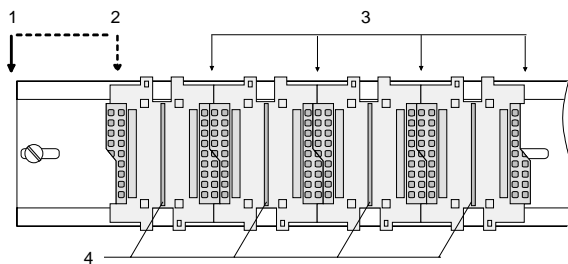
[1]	Head module (double width)
[2]	Head module (single width)
[3]	Peripheral module
[4]	Guide rails
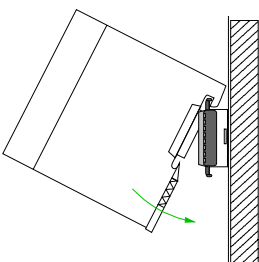
- Insert the module that you are installing into the profile rail at an angle of 45 degrees from the top and rotate the module into place until it clicks into the profile rail with an audible click. The proper connection to the backplane bus can only be guaranteed when the module has properly clicked into place.

Attention!
Power must be turned off before modules are installed or removed!
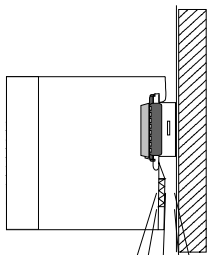
Clack

Demounting and module exchange
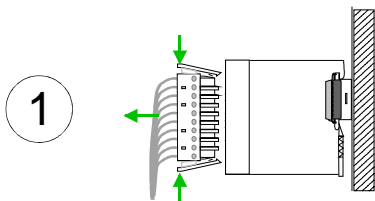
(1) • Remove if exists the wiring to the module, by pressing both locking lever on the connector and pulling the connector.
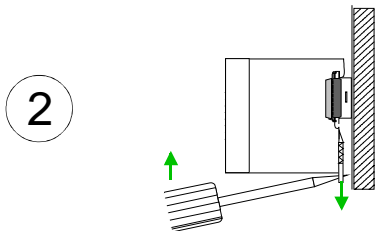
(2) • The casing of the module has a spring loaded clip at the bottom by which the module can be removed.
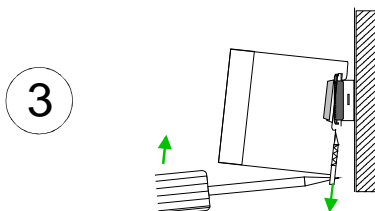
(3) • The clip is unlocked by pressing the screwdriver in an upward direction.
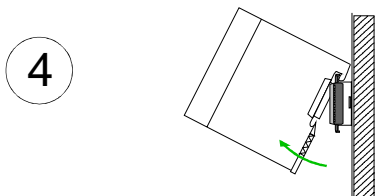
(4) • Withdraw the module with a slight rotation to the top.

(5)
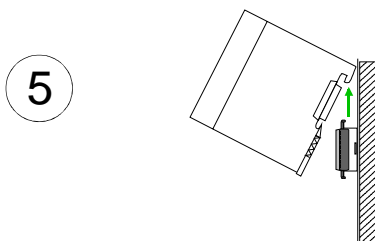
Attention!

Power must be turned off before modules are installed or removed!

Please regard that the backplane bus is interrupted at the point where the module was removed!

Wiring

Overview

Most peripheral modules are equipped with a 10pole or a 18pole connector. This connector provides the electrical interface for the signaling and supply lines of the modules.

The modules carry spring-clip connectors for interconnections and wiring.

The spring-clip connector technology simplifies the wiring requirements for signaling and power cables.

In contrast to screw terminal connections, spring-clip wiring is vibration proof. The assignment of the terminals is contained in the description of the respective modules.

You may connect conductors with a diameter from 0.08mm^2 up to 2.5mm^2 (max. 1.5mm^2 for 18pole connectors).

The following figure shows a module with a 10pole connector.

[1]   Locking lever
[2]   Pin no. at the module
[3]   Pin no. at the connector
[4]   Wiring port
[5]   Opening for screwdriver
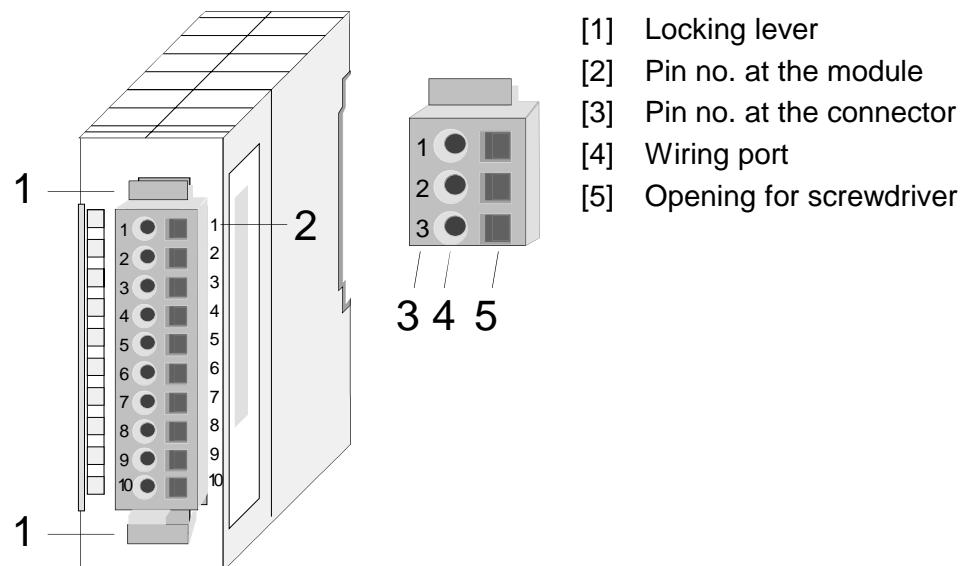
Note!

The spring-clip is destroyed if you push the screwdriver into the wire port!

Make sure that you only insert the screwdriver into the square hole of the connector!

Wiring procedure
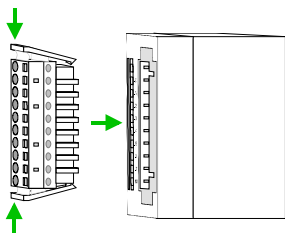
- Install the connector on the module until it locks with an audible click. For this purpose you press the two clips together as shown.

  The connector is now in a permanent position and can easily be wired.

  The following section shows the wiring procedure from top view.
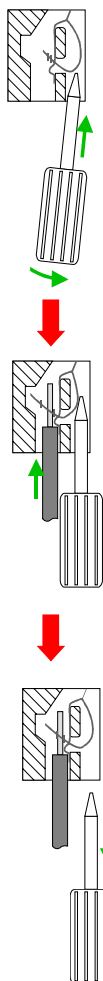
- Insert a screwdriver at an angel into the square opening as shown.
- Press and hold the screwdriver in the opposite direction to open the contact spring.

- Insert the stripped end of the wire into the round opening. You can use wires with a diameter of 0.08mm^2 to 2.5mm^2 (1.5mm^2 for 18pole connectors).

- By removing the screwdriver the wire is connected safely with the plug connector via a spring.

Note!

Wire the power supply connections first followed by the signal cables (inputs and outputs).

Installation guidelines

General

The installation guidelines contain information about the interference free deployment of System 200V systems. There is the description of the ways, interference may occur in your control, how you can make sure the electromagnetic digestibility (EMC), and how you manage the isolation.

What means EMC?

Electromagnetic digestibility (EMC) means the ability of an electrical device, to function error free in an electromagnetic environment without being interferenced res. without interferencing the environment.

All System 200V components are developed for the deployment in hard industrial environments and fulfill high demands on the EMC. Nevertheless you should project an EMC planning before installing the components and take conceivable interference causes into account.

Possible interference causes

Electromagnetic interferences may interfere your control via different ways:

- Fields
- I/O signal conductors
- Bus system
- Current supply
- Protected earth conductor

Depending on the spreading medium (lead bound or lead free) and the distance to the interference cause, interferences to your control occur by means of different coupling mechanisms.

One differs:

- galvanic coupling
- capacitive coupling
- inductive coupling
- radiant coupling

Basic rules for EMC

In the most times it is enough to take care of some elementary rules to guarantee the EMC. Please regard the following basic rules when installing your PLC.

- Take care of a correct area-wide grounding of the inactive metal parts when installing your components.
  - Install a central connection between the ground and the protected earth conductor system.
  - Connect all inactive metal extensive and impedance-low.
  - Please try not to use aluminum parts. Aluminum is easily oxidizing and is therefore less suitable for grounding.
- When cabling, take care of the correct line routing.
  - Organize your cabling in line groups (high voltage, current supply, signal and data lines).
  - Always lay your high voltage lines and signal res. data lines in separate channels or bundles.
  - Route the signal and data lines as near as possible beside ground areas (e.g. suspension bars, metal rails, tin cabinet).
- Proof the correct fixing of the lead isolation.
  - Data lines must be laid isolated.
  - Analog lines must be laid isolated. When transmitting signals with small amplitudes the one sided laying of the isolation may be favorable.
  - Lay the line isolation extensively on an isolation/protected earth con- ductor rail directly after the cabinet entry and fix the isolation with cable clamps.
  - Make sure that the isolation/protected earth conductor rail is connected impedance-low with the cabinet.
  - Use metallic or metalized plug cases for isolated data lines.
- In special use cases you should appoint special EMC actions.
  - Wire all inductivities with erase links.
  - Please consider luminescent lamps can influence signal lines.
- Create a homogeneous reference potential and ground all electrical operating supplies when possible.
  - Please take care for the targeted employment of the grounding actions. The grounding of the PLC is a protection and functionality activity.
  - Connect installation parts and cabinets with the System 200V in star topology with the isolation/protected earth conductor system. So you avoid ground loops.
  - If potential differences between installation parts and cabinets occur, lay sufficiently dimensioned potential compensation lines.

Isolation of conductors

Electrical, magnetically and electromagnetic interference fields are weakened by means of an isolation, one talks of absorption.

Via the isolation rail, that is connected conductive with the rack, interference currents are shunt via cable isolation to the ground. Hereby you have to make sure, that the connection to the protected earth conductor is impedance-low, because otherwise the interference currents may appear as interference cause.

When isolating cables you have to regard the following:

- If possible, use only cables with isolation tangle.
- The hiding power of the isolation should be higher than 80%.
- Normally you should always lay the isolation of cables on both sides. Only by means of the both-sided connection of the isolation you achieve high quality interference suppression in the higher frequency area.

  Only as exception you may also lay the isolation one-sided. Then you only achieve the absorption of the lower frequencies. A one-sided isolation connection may be convenient, if:

  - the conduction of a potential compensating line is not possible
  - analog signals (some mV res. µA) are transferred
  - foil isolations (static isolations) are used.

- With data lines always use metallic or metalized plugs for serial couplings. Fix the isolation of the data line at the plug rack. Do not lay the isolation on the PIN 1 of the plug bar!
- At stationary operation it is convenient to strip the insulated cable interruption free and lay it on the isolation/protected earth conductor line.
- To fix the isolation tangles use cable clamps out of metal. The clamps must clasp the isolation extensively and have well contact.
- Lay the isolation on an isolation rail directly after the entry of the cable in the cabinet. Lead the isolation further on to the System 200V module and **don't** lay it on there again!

Please regard at installation!

At potential differences between the grounding points, there may be a compensation current via the isolation connected at both sides.

Remedy: Potential compensation line.

General data

Structure/   • Profile rail 35mm
dimensions
                        • Peripheral modules with recessed labelling

                        • Dimensions of the basic enclosure:
                          1tier width: (HxWxD) in mm: 76x25.4x74 in inches: 3x1x3
                          2tier width: (HxWxD) in mm: 76x50.8x74 in inches: 3x2x3

Reliability   • Wiring by means of spring pressure connections (CageClamps) at the
                          front-facing connector, core cross-section 0.08 ... 2.5mm^2 or 1.5mm^2
                          (18pole plug)

                        • Complete isolation of the wiring when modules are exchanged

                        • Every module is isolated from the backplane bus

General data

Conformity and approval		
Conformity		
CE	2006/95/EC	Low-voltage directive
	2004/108/EC	EMC directive
Approval		
UL	UL 508	Approval for USA and Canada
others		
RoHS	2011/65/EU	Product is lead-free; Restriction of the use of certain hazardous substances in electrical and electronic equipment

Protection of persons and device protection		
Type of protection	-	IP20
Electrical isolation		
to the field bus	-	electrically isolated
to the process level	-	electrically isolated
Insulation resistance	EN 61131-2	-
Insulation voltage to reference earth		
Inputs / outputs	-	AC / DC 50V, test voltage AC 500V
Protective measures	-	against short circuit

Environmental conditions to EN 61131-2		
Climatic		
Storage / transport	EN 60068-2-14	-25…+70°C
Operation		
Horizontal installation	EN 61131-2	0…+60°C
Vertical installation	EN 61131-2	0…+60°C
Air humidity	EN 60068-2-30	RH1 (without condensation, rel. humidity 10…95%)
Pollution	EN 61131-2	Degree of pollution 2
Mechanical		
Oscillation	EN 60068-2-6	1g, 9Hz ... 150Hz
Shock	EN 60068-2-27	15g, 11ms

Mounting conditions		
Mounting place	-	In the control cabinet
Mounting position	-	Horizontal and vertical

EMC	Standard		Comment
Emitted interference	EN 61000-6-4		Class A (Industrial area)
Noise immunity zone B	EN 61000-6-2		Industrial area
		EN 61000-4-2	ESD 8kV at air discharge (degree of severity 3), 4kV at contact discharge (degree of severity 2)
		EN 61000-4-3	HF field immunity (casing) 80MHz … 1000MHz, 10V/m, 80% AM (1kHz) 1.4GHz ... 2.0GHz, 3V/m, 80% AM (1kHz) 2GHz ... 2.7GHz, 1V/m, 80% AM (1kHz)
		EN 61000-4-6	HF conducted 150kHz … 80MHz, 10V, 80% AM (1kHz)
		EN 61000-4-4	Burst, degree of severity 3
		EN 61000-4-5	Surge, installation class 3 [*]

[*]   Due to the high-energetic single pulses with Surge an appropriate external protective circuit with lightning protection elements like conductors for lightning and overvoltage is necessary.

Chapter 2   Hardware description

Overview   Here the hardware components of the FM 250-1BS00 are described.
                        The technical data are at the end of the chapter.

Contents   **Topic**   **Page**

Properties

FM 250S
250-1BS00

- Wiring does not depend on the length of the data word. The interface always uses 4 wires.

- Maximum security due to the use of symmetrical clock and data signals.

- Secure data acquisition die to the use of single-step gray code (configurable).

- Galvanic isolation of receiver and encoder by means of optocouplers

- 1 SSI channel

- Direct power supply to the SSI transducer via front-facing connector

- DC 24V power supply

- Baud rate selection 100kBaud / 300kBaud

- 2 configurable digital outputs, one may be used as hold input to freeze the current SSI transducer value

- Measured value available in gray or in binary code

- 6Byte of parameter data

- 4Byte of input data

- 4Byte of output data

- Configuration by means of control byte
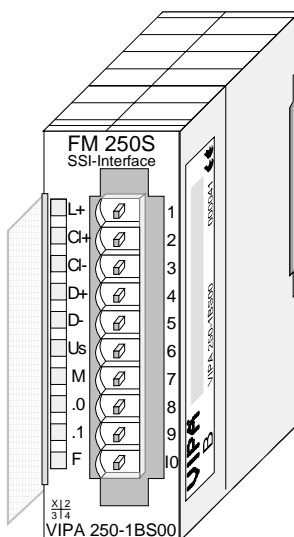
Order data

Type	Order number	Description
FM 250S	VIPA 250-1BS00	SSI module

Structure

Functionality   SSI is the abbreviation for **S**ynchronous **S**erial **I**nterface. The SSI module provides the connection for transducers with absolute coding and a SSI module.

The module converts the serial information of the transducer into parallel information for the controller. Data can be transferred in gray or in binary code.

Configurable outputs   The interface has connections for the SSI signals clock, data and the transducer supply voltage as well as two additional outputs that may be set or reset when a limit value is exceeded.

Output 0 can also be programmed as hold input. This causes the SSI transducer value to be frozen when a 24V high level is applied to output 0. A low level will cause the transducer to transmit the actual SSI values.

You can also configure the outputs that they will remain set if the BASP signal is active.

Status indicator pin assignment

LED	Description		Pin	Assignment
L+	LED (yellow) Supply voltage available		1	Supply voltage DC +24V
Ci+	LED (green) Clock output		2	CLK+ (Output)
			3	CLK- (Output)
D+	LED (green) Transducer data input		4	Data+ (Input)
			5	Data- (Input)
.0	LED (green) Input/Output 0		6	DC 24V SSI transducer supply voltage
			7	Common SSI transducer supply
.1	LED (green) Output 1		8	Input/Output .0 and hold input
			9	Output .1
F	LED (red) Error /overload		10	Common of supply voltage

FM 250S
SSI-Interface

L+ 1
Ci+ 2
Ci- 3
D+ 4
D- 5
Us 6
M   7
.0 8
.1 9
F   I0

X 2
3 4
VIPA 250-1BS00
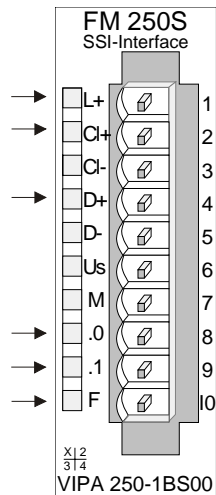
LEDs

The SSI module has a number of LEDs.
The following table explains the significance of these LEDs:

Name	Color	Description
L+	yellow	Indicates that 24V power is available
C+	green	ON when clock pulses are transmitted OFF when hold function has been activated and 24V at I/O .0
D+	green	ON when data is received from the transducer (wiring test)
.0	green	ON when 24V power is available at I/O .0
.1	green	ON when 24V power is available at O .1
F	red	ON when short circuit or overload is detected on one of the I/O .0 / O .1

Line distances

The baudrate depends on the length of the communication line and on the SSI transducer. Wiring has to consist of screened twisted pair cables. The specifications below are only intended as a guideline.

< 400m: → 100kBaud

< 100m: → 300kBaud

Wiring diagram schematic diagramm

The SSI module has an internal power supply. This power supply requires a voltage of DC 24V via L+ and M.

The supply voltage provides power to the interface electronics as well as the SSI transducer connected with DC 24V to pin 6 and 7.
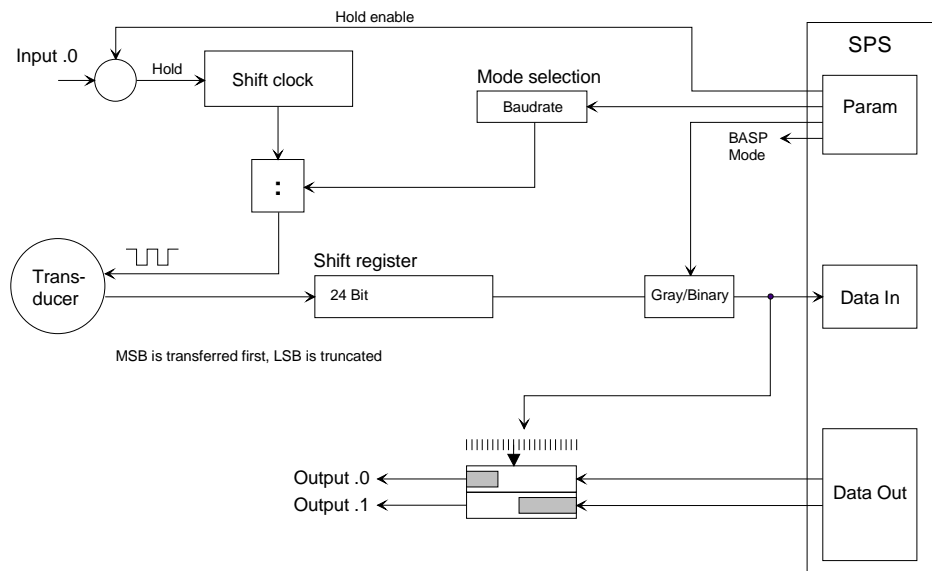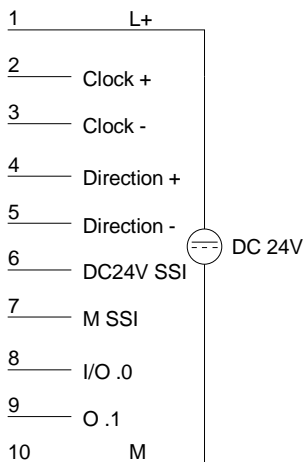
Technical data

Order no.	250-1BS00
Type	FM 250S
Current consumption/power loss	
Current consumption from backplane bus	120 mA
Power loss	1 W
Technical data digital inputs	
Number of inputs	1
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 24 V
Reverse polarity protection of rated load voltage	✓
Current consumption from load voltage L+ (without load)	-
Rated value	-
Input voltage for signal "0"	Differential signal RS422
Input voltage for signal "1"	Differential signal RS422
Input voltage hysteresis	-
Frequency range	-
Input resistance	-
Input current for signal "1"	-
Connection of Two-Wire-BEROs possible	-
Max. permissible BERO quiescent current	-
Input delay of "0" to "1"	-
Input delay of "1" to "0"	-
Number of simultaneously utilizable inputs horizontal configuration	-
Number of simultaneously utilizable inputs vertical configuration	-
Input characteristic curve	-
Initial data size	4 Byte
Technical data digital outputs	
Number of outputs	2
Cable length, shielded	1000 m
Cable length, unshielded	600 m
Rated load voltage	DC 24 V
Reverse polarity protection of rated load voltage	✓
Current consumption from load voltage L+ (without load)	5 mA
Total current per group, horizontal configuration, 40°C	2 A
Total current per group, horizontal configuration, 60°C	2 A
Total current per group, vertical configuration	2 A
Output voltage signal "1" at min. current	L+ (-0.8 V)
Output voltage signal "1" at max. current	L+ (-125 mV)
Output current at signal "1", rated value	1 A
Output current, permitted range to 40°C	-
Output current, permitted range to 60°C	-
Output current at signal "0" max. (residual current)	-
Output delay of "0" to "1"	max. 100 µs
Output delay of "1" to "0"	max. 350 µs
Minimum load current	-
Lamp load	5 W
Parallel switching of outputs for redundant control	not possible

Order no.	250-1BS00
of a load	
Parallel switching of outputs for increased power	not possible
Actuation of digital input	-
Switching frequency with resistive load	max. 1000 Hz
Switching frequency with inductive load	max. 0.5 Hz
Switching frequency on lamp load	max. 10 Hz
Internal limitation of inductive shut-off voltage	L+ (-52 V)
Short-circuit protection of output	yes, electronic
Trigger level	1.8 A
Number of operating cycle of relay outputs	-
Switching capacity of contacts	-
Output data size	4 Byte
Status information, alarms, diagnostics	
Status display	yes
Interrupts	no
Process alarm	no
Diagnostic interrupt	no
Diagnostic functions	no
Diagnostics information read-out	none
Supply voltage display	yes
Group error display	yes
Channel error display	none
Isolation	
Between channels	-
Between channels of groups to	-
Between channels and backplane bus	✓
Between channels and power supply	-
Max. potential difference between circuits	-
Max. potential difference between inputs (Ucm)	-
Max. potential difference between Mana and Mintern (Uiso)	-
Max. potential difference between inputs and Mana (Ucm)	-
Max. potential difference between inputs and Mintern (Uiso)	-
Max. potential difference between Mintern and outputs	-
Insulation tested with	DC 500 V
Datasizes	
Input bytes	4
Output bytes	4
Parameter bytes	6
Diagnostic bytes	0
Housing	
Material	PPE / PA 6.6
Mounting	Profile rail 35 mm
Mechanical data	
Dimensions (WxHxD)	25.4 x 76 x 78 mm
Weight	100 g
Environmental conditions	
Operating temperature	0 °C to 60 °C
Storage temperature	-25 °C to 70 °C
Certifications	
UL508 certification	yes

**Additional
Technical Data**

Technical data SSI	VIPA 250-1BS00
SSI module	Transducer supply voltage
Signal cable	RS422, isolated
Clock	RS422, isolated
Baudrate	configurable:
	100 / 300kBaud (default: 300kBaud)
Signal voltage "0"	-5 ... 7V
Signal voltage "1"	13 ... 36V
Output stage	24V DC high side switch 1A

Chapter 3   Deployment

Overview   This chapter contains every information on the deployment and the configuration of the SSI module FM 250S.

Contents   **Topic**   **Page**

Functionality

Overview

SSI is the abbreviation for **S**ynchronous **S**erial **I**nterface. The SSI module provides the connection for transducers with absolute coding and a SSI module.

The module converts the serial information of the transducer into parallel information for the controller. Data can be transferred in gray or in binary code.

Configurable outputs

The interface has connections for the SSI signals clock, data and the transducer supply voltage as well as two additional outputs that may be set or reset when a limit value is exceeded.

Output 0 can also be programmed as hold input. This causes the SSI transducer value to be frozen when a 24V high level is applied to output 0. A low level will cause the transducer to transmit the actual SSI values.

You can also configure the outputs that they will remain set if the BASP signal is active.

Access to the SSI module

Input data (Data In)

The input data from the SSI transducer has a length of 4Byte. Byte 0 can be used as an Input/Output status indicator for the. Data is supplied in binary or in gray code, depending on the selected mode.

Byte	Data In
0	Bit 0: Status Input/Output .0
	Bit 1: Status Output .1
	Bit 7 ... 2: reserved
1	SSI transducer value: HB
2	SSI transducer value: MB
3	SSI transducer value: LB

Output data (Data Out)

Data Out provides the option of controlling the 2 Output ports on the SSI module depending on the value of a transducer input. Output data consists of 4Byte.

The SSI transducer stores 8Byte of output data, i.e. you may define two comparative values along with the respective control byte.

In the control byte you are able to specify how the reference value should affect which output. The status of the I/Os is signaled via the input bytes.

The following table shows the assignment of these output bytes.

Byte	Data Out
0	Bit 1 ... 0: set point value
	00: no set point value
	01: for Output 0
	10: for Output 1
	11: for both Outputs
	Bit 2: reserved
	Bit 3: set conditions for Output
	0: when actual value exceeds comparison value
	1: when actual value is less than comparison value
	Bit 7 ... 4: reserved
1	Comparison value: HB
2	Comparison value: MB
3	Comparison value: LB

Configuration

Configuration data

4Byte of configuration data are transferred. In these bytes you define the baud rate, the coding and the analysis of the combined I/O .0 as well as the BASP signal.

The structure of the configuration data is as follows:

Byte	Bit 7 ... 0
0	Bit 7 ... 0: reserved
1	Bit 7 ... 0: reserved
2	Baud rate 0: 300kBaud (default) 1: 100kBaud 2: 300kBaud 3 ... 255: reserved
3	Bit 0: Coding 0: Binary code (default) 1: Gray code Bit 2: SSI format 0: Multi turn (24 bit) 1: reserved Bit 4: Hold function 0: deactivate 1: activate Bit 7: BASP signal 0: ignore 1: analyze

Baud rate

The transducer connected to the SSI channel transmits serial data. It requires a clock pulse from the SSI module. The baud rate defines this clock. You may choose a value of 100 or 300kBaud.
The default setting is 300kBaud.

Coding   The gray code is a different form of binary code. The principle of the gray code is that two neighboring gray numbers will differ in exactly one single bit.

When the gray code is used, transmission errors can be detected easily as neighboring characters may only be different in a single location.

Table of rules for the gray code:

Decimal	Gray Code
0	0 0 0 0
1	0 0 0 1
2	0 0 1 1
3	0 0 1 0
4	0 1 1 0
5	0 1 1 1
6	0 1 0 1
7	0 1 0 0
8	1 1 0 0
9	1 1 0 1
10	1 1 1 1
11	1 1 1 0
12	1 0 1 0
13	1 0 1 1
14	1 0 0 1
15	1 0 0 0

I.e. the last digit of the number results from the vertical repetition of the sequence "0 11 0", the penultimate digit results from the repetition "00 1111 00", the third-last number from the repetition of 4x"0", 8x"1" and again 4x"0", etc. (see columns in the table!).

Hold function   Here you define that I/O .0 should be used as hold input. When you have activated this function, the current transducer value will be stored when I/O .0 is connected to 24V. The transducer value is only updated when the 24V level is removed from I/O .0.

In this case you have to be aware that I/O .0 operates only in input mode.

BASP signal   BASP is a German abbreviation for command output inhibited, i.e. all outputs are reset and inhibited as long as the BASP signal is applied via the backplane bus. You may disable the evaluation of the BASP signals by setting this bit. This means that the outputs will remain set.