



Hardware and Engineering

EM 4-101-TX2

Temperature Measuring Module

07/98 AWB 2700-1332 GB

1st published 1998, edition 07/98

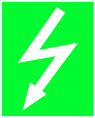
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Caution!

Dangerous electrical voltage!

Before commencing the installation

- Disconnect the power supply of the device.
- Ensure that the device cannot be accidentally restarted.
- Verify isolation from the supply.
- Earth and short circuit.
- Cover or enclose neighbouring units that are live.
- Follow the engineering instructions (AWA) of the device concerned.
- Only suitably qualified personnel may work on this device/system.
- Before installation and before touching the device ensure that you are free of electrostatic charge.
- Connecting cables and signal lines should be installed so that inductive or capacitive interference do not impair the automation functions.
- Install automation devices and related operating elements in such a way that they are well protected against unintentional operation.
- Suitable safety hardware and software measures should be implemented for the I/O interface so that a line or wire breakage on the signal side does not result in undefined states in the automation devices.
- Ensure a reliable electrical isolation of the low voltage for the 24 volt supply. Only use power supply units complying with IEC 60 364-4-41 or HD 384.4.41 S2.
- Deviations of the mains voltage from the rated value must not exceed the tolerance limits given in the specifications, otherwise this may cause malfunction and dangerous operation.
- Emergency stop devices complying with IEC/EN 60 204-1 must be effective in all operating modes of the automation devices. Unlatching the emergency-stop devices must not cause uncontrolled operation or restart.
- Devices that are designed for mounting in housings or control cabinets must only be operated and controlled after they have been installed with the housing closed. Desktop or portable units must only be operated and controlled in enclosed housings.
- Measures should be taken to ensure the proper restart of programs interrupted after a voltage dip or failure. This should not cause dangerous operating states even for a short time. If necessary, emergency-stop devices should be implemented.

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About This Manual

This manual is written for engineers and technicians with PLC experience.

It provides the special information required for connecting the module, as well as for configuring and programming it with Sucosoft S 40 programming software.

To use this manual, a knowledge of the following is required:

- the Suconet K fieldbus
- the master in use
- the Sucosoft S 40 programming software

You will find the required information in:

- the “Hardware and Engineering” manual of your master
- Sucosoft S 40 programming software manuals, AWB 2700-1305 GB, AWB 2700-1306 GB

The symbols used in this manual have the following meaning:



Attracts your attention to interesting tips and additional information.

- Indicates handling instructions.



Note

Warns you of damage to property; product, parts in its surrounding or data may be damaged.



Caution!

Warns you of severe damage to property.
Product, parts in its surrounding or data may be severely damaged

1 About The EM 4-101-TX2 Expansion Module

Application range

The EM 4-101-TX2 temperature sensor module is a remote expansion module which has been developed for both building and process automation. It has been designed to record sensor temperature measurement values which can, for example, be processed in HVAC systems.

Special features

The module is part of the PS 4/EM 4/LE 4 compact series and cannot be expanded locally. The module can be run in Suconet K networks.

It offers the following features:

six analog inputs for “J”, “K”, “L” thermocouples (see Table 1)

Representation of the converted values in binary format with a 12-bit resolution or in $1/10$ °C.

The module detects out-of-range values and wire breakages on the temperature sensor.

Table 1: Temperature range of thermocouples

Type “J”	Type “K”	Type “L”
0 to 1200 °C	0 to 1300 °C	0 to 900 °C

About The EM 4-101-TX2
Expansion Module

**Hardware and software
requirements**

Hardware

You can connect the module to all Suconet K master controllers.

Software

Sucosoft S 40 from version 3.0 is required for configuring the EM 4-101-TX2.

Setup of the module

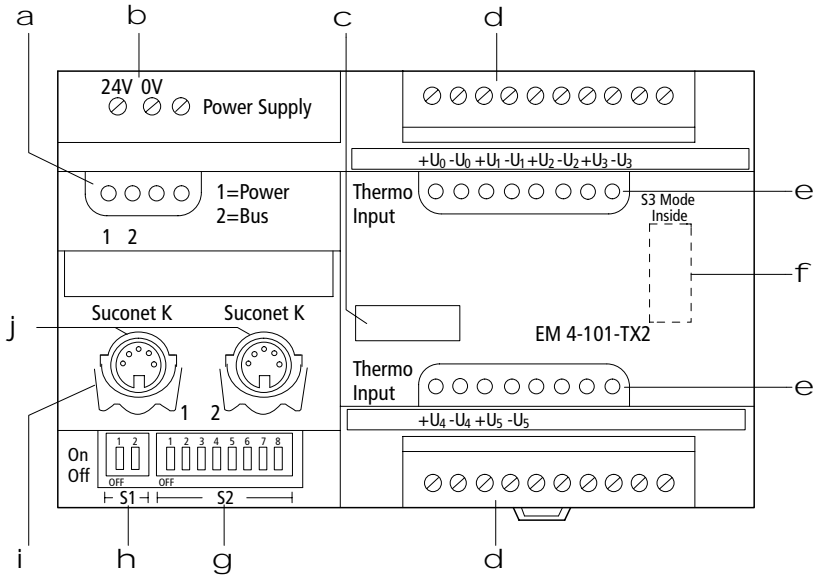


Figure 1: Setup of the module

- a Status LEDs
- b 24 V DC power supply
- c Device designation with HAEG 18 × 6.5
- d Plug-in screw terminal
- e Switch S3 for setting thermocouple parameters
- f Switch S2 for address coding/operating mode
- g Switch S1 for bus terminating resistors
- h Retaining clip for angle connector
- i Suconet K interface

2 Mounting

The module can be fixed on a top-hat rail or on a mounting plate via fixing feet.

The module is grounded via a contact plate on the bottom of the unit.

Ensure that the contact plate has a good contact with the top-hat rail or mounting plate.

Mounting on top-hat rail

- ▶ Hook the back of the device against the top edge of the top-hat rail.
- ▶ Use a screwdriver to slide the spring-loaded clip **a** out of the device **b**.
- ▶ Push the device against the top-hat rail **c**.
- ▶ Remove the screwdriver. The spring-loaded clip should snap back into position and hold the device securely.
- ▶ Check that the device is attached properly.

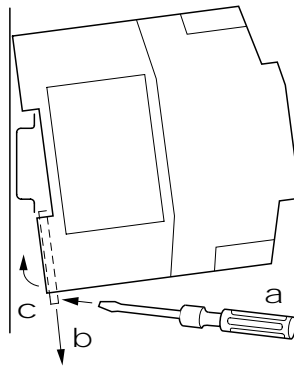


Figure 2: Mounting on top-hat rail

Mounting on mounting plate via fixing feet

- ▶ Turn over the module *a* . Here you will see the slots *b* provided for the fixing feet *c* on the back of the module.
- ▶ Push the fixing feet into the slots until the lugs *d* snap into position.
- ▶ Ensure that all fixing feet are snapped securely into position.
- ▶ Fasten each fixing foot to the mounting plate using an M4 screw.

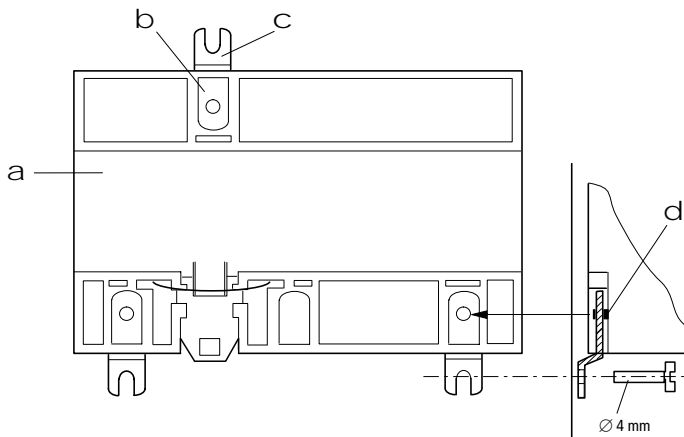


Figure 3: Mounting on mounting plate

Installing in the control cabinet

Proceed as described above when installing in a control cabinet, depending on whether you mount on top-hat rail or mounting plate.

- ▶ Fasten the expansion module horizontally or vertically in the control cabinet.

Proceed as follows to prevent electromagnetic interference from impairing the function of the electronic control section:

- ▶ Ensure a spacing between the cable duct **a** and the expansion module of at least 5 cm (2").
- ▶ Keep the control **c** and power sections **b** apart.

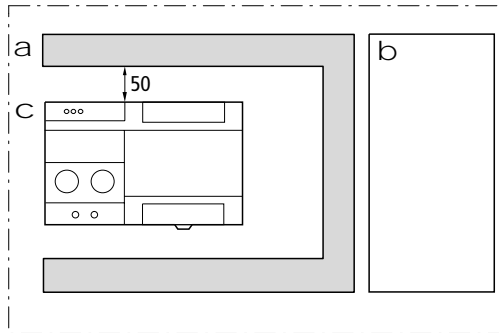


Figure 4: Arrangement in the control cabinet

Fitting/ removing the terminal strip



Caution!

Electrostatic charge can destroy the equipment. Make sure you are free of electrostatic charge before working on the input terminals.

If you wish to pre-wire a circuit or change a module, you can remove the plug-in screw terminal from the module.

- ▶ Open out fully the cover of the plug-in screw terminal.
- ▶ Remove the plug-in screw terminal at its cover.
- ▶ Use the same procedure for the other plug-in screw terminal.

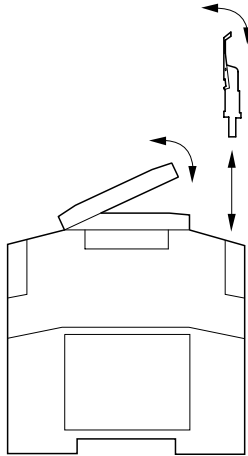


Figure 5: Fitting/removing the plug-in screw terminal

Proceed as follows to fit the plug-in screw terminal into the module:

- ▶ Open out fully the cover of the plug-in screw terminal.
- ▶ Fit the plug-in screw terminal into the slot and press it into position.

3 Engineering

Electromagnetic compatibility (EMC)

The following engineering measures must be observed in order to meet the requirements of the EMC regulations and comply with the following European EMC standards:

EN 50081-1 (Emission)

EN 50082-2 (Interference immunity)



Other engineering instructions are given in the manual “EMC Guidelines for Automation Systems”, AWB 27-1287-GB.

Connecting the screen for data cables (see Figure 6)

- ▶ Fit a contact clip on the bared part of the Suconet data cable and analog input cable.
- ▶ Make a low impedance connection between the contact clip and the ground potential, such as the terminal clip on the top-hat rail.
- ▶ Ensure that all connections are corrosion proof and that the paint is removed from the connection point of mounting plates.
- ▶ Pull back the screen at the ends of the analog input cables.
- ▶ Isolate the screen with suitable material such as heat shrinkable tubing.
- ▶ Ground the top-hat rail with a large contact area.
- ▶ Only screened cables should be used as equalisation lines.



Note

Electromagnetic interference
Interference and line-conducted interference according to EN 61 000-4-3 and EN 61 000-4-6 can corrupt measuring results by up to 20 %.
A faulty connection of the module may produce interference for other components.

Legend for Figure 6:

- A Screening for top-hat rail
- B Screening for mounting plate

- a Suconet data cable
- b Analog input cable
- c Heat shrinkable tubing
- d Contact clip with M4 screw*
- e Terminal clip*

* supplied with screen earth kit ZB 4-102-KS1.

Connecting the screen for data cables

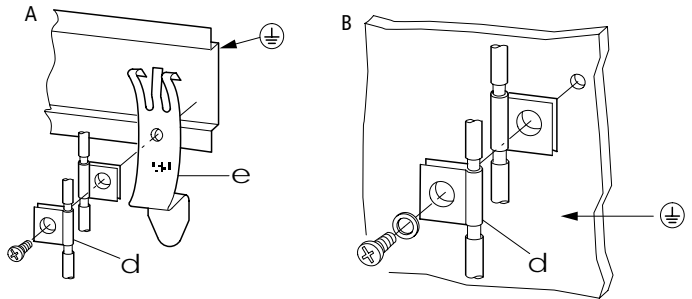
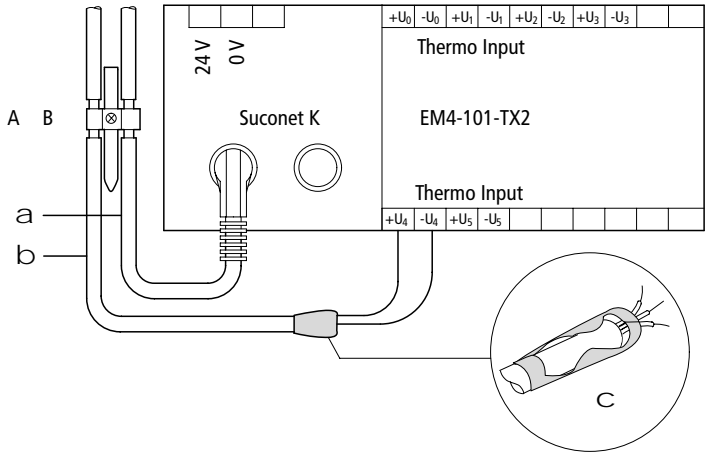


Figure 6: Grounding module, data cable and analog input cable

Connection assignment

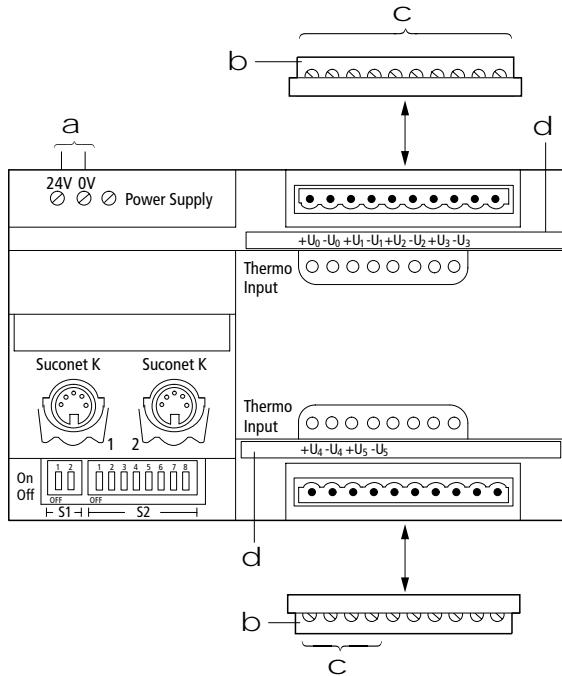


Figure 7: Connection assignment

- a Screw terminals
24 V DC Power supply connection, terminal cross-section
flexible with ferrule 0.22 to 2.5 mm² (AWG 23 to AWG 13)
solid 0.22 to 2.5 mm² (AWG 23 to AWG 13)
- b Plug-in screw terminal
- c Terminal cross-sections:
flexible with ferrule 0.22 to 1.5 mm² (AWG 23 to AWG 16)
solid 0.22 to 2.5 mm² (AWG 23 to AWG 13)
- d Designation strips

Bus interface (RS 485)

The Suconet K interfaces 1 and 3 are 5-pole DIN sockets based on the RS 485 interface.

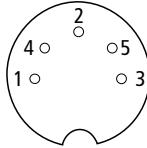


Figure 8: Pin assignment of the bus cable connector

Pin	Designation	Meaning
1	TB/RB	Send/receive data
3	SGND	0 V connection
4	TA/RA	Send/receive data

Lightning protection

You will find further information on this subject in the manual TB 02-022 GB “Electromagnetic Compatibility (EMC) of Automation Systems”.

Wiring

The following figure is a wiring example of the temperature measuring module.

Legend for Figure 9:

- a Main switch
- b Protective device for the control transformer
- c Supply unit with screen winding
- d Miniature circuit-breaker
- e With ungrounded control circuits use an insulation monitoring device.
- f Screening: Connect the screen of the analog input cables as described in chapter 3.
- g Suconet K1 interface

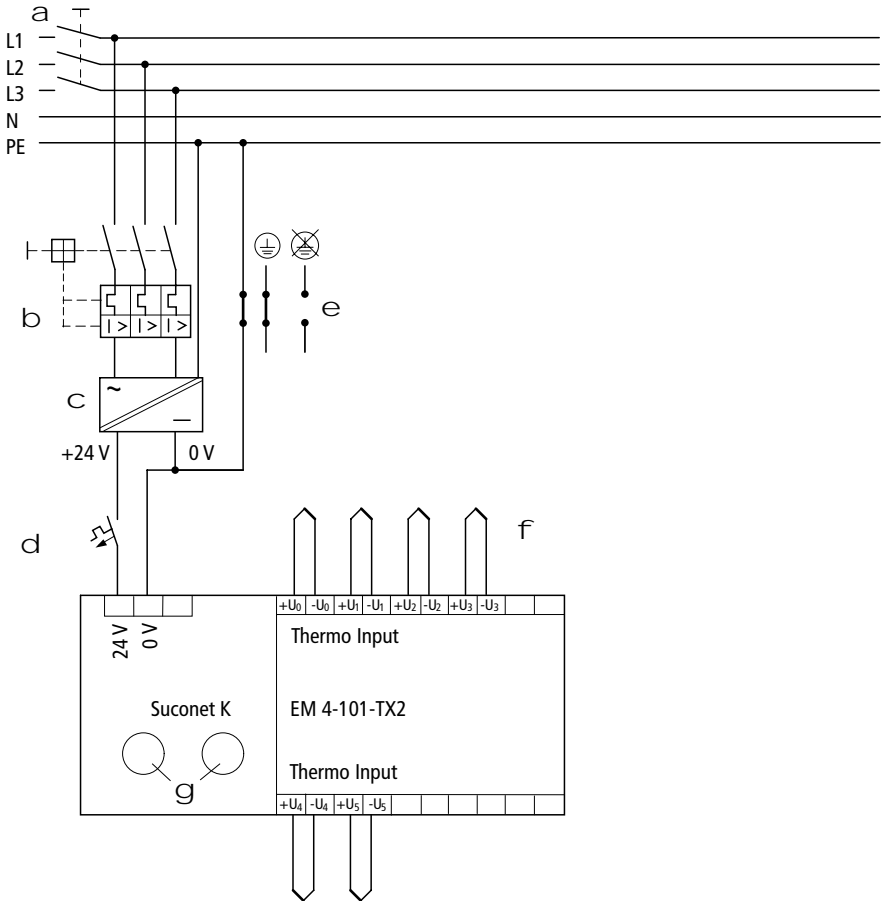


Figure 9: Wiring example

4 Hardware/Software Configuration

Hardware configuration

The hardware configuration is set via three switch blocks. The DIP switches of switch block S1 activate/deactivate the bus terminating resistors. The DIP switches of switch block S2 are used to address your module and to set the conversion time and data format. Use switch block S3 to set thermocouple parameters.

Activating/deactivating bus terminating resistors

The bus terminating resistors prevent signal interference caused by reflections at the end of the bus cables.

The bus terminating resistor must be activated if your module is located at the beginning or end of the line.

- Switch both DIP switches on switch block S1 to ON.

The module is shipped with activated bus terminating resistors.

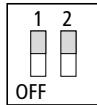


Figure 10: Factory setting of switch block S1

The bus terminating resistor of modules not located at the ends of the data line must be deactivated.

- ▶ Set both DIP switches of the switch block S1 to OFF.

Address setting/selecting conversion time and data format

The following figure shows the factory setting of the module DIP switches:

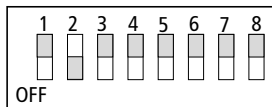


Figure 11: Factory setting of switch block S2

Set the address via the DIP switches 1 to 5. Use DIP switch 6 to select the conversion time and DIP switch 7 to select the data format. DIP switch 8 is not assigned.

Setting the address

Assign the module an address so that the master can recognise and scan the installed module.

- ▶ Switch off the power supply of the controller.
- ▶ Select a station address from Table 2 and set the address on the DIP switches of switch block S2.

Table 2: Switch block S2 – Address coding

Station	DIP switch				
	1	2	3	4	5
1	1	0	1	1	1
2	0	0	1	1	1
3	1	1	0	1	1
4	0	1	0	1	1
5	1	0	0	1	1
6	0	0	0	1	1
7	1	1	1	0	1
8	0	1	1	0	1
9	1	0	1	0	1
10	0	0	1	0	1
11	1	1	0	0	1
12	0	1	0	0	1
13	1	0	0	0	1
14	0	0	0	0	1
15	1	1	1	1	0
16	0	1	1	1	0
17	1	0	1	1	0
18	0	0	1	1	0
19	1	1	0	1	0
20	0	1	0	1	0
21	1	0	0	1	0
22	0	0	0	1	0
23	1	1	1	0	0
24	0	1	1	0	0
25	1	0	1	0	0
26	0	0	1	0	0
27	1	1	0	0	0
28	0	1	0	0	0
29	1	0	0	0	0
30	0	0	0	0	0

1 = ON, 0 = OFF

Selecting conversion time and data format

The setting applies to all channels.

Conversion time

S2 6: 0 = Conversion time 1 s

1 = Conversion time 250 ms

Data format

S2 7: 0 = Unformatted (0 to 4095)

1 = $1/10$ °C format,

e.g. for type “J” (0 to 1200 °C):

0 to 12000 Δ 0 to 1200.0 °C

Setting thermocouple parameters

The EM 4-101-TX2 is suitable for connecting to standard thermocouples. Several different types of thermocouples can be connected to the channels (inputs).

Thermocouples of the same type (J, K or L) can be connected to channels 0 and 1 or 2 and 3. The type concerned is set on DIP switches 1, 2, 3 or 4 of switch block S3.

Type “J”, “K”, or “L” thermocouples can be connected to channel 4 and 5. The setting is made via DIP switch 5/6 (channel 4) and 7/8 (channel 5) of switch block S3.



Deactivate unassigned inputs by setting the appropriate DIP switch to 0. The input values will then show a constant 0. Since channels 0 and 1, 2 and 3 respectively are coupled, this setting applies to each channel pair.



Setting a type on the DIP switches but leaving the inputs open will cause the value 0 and the "Wire break" error signal to be output. To prevent error messages, short circuit the input using a jumper. In this case the indicated value is the device temperature.

The type settings are shown in the following table:

Table 3: Thermocouple type setting

Switch S3								
1	2	3	4	5	6	7	8	
0	0							Deactivate, channel 0 and 1
1	0							Thermocouple K, channel 0 and 1
0	1							Thermocouple L, channel 0 and 1
1	1							Thermocouple J, channel 0 and 1
		0	0					Deactivate, channel 2 and 3
		1	0					Thermocouple K, channel 2 and 3
		0	1					Thermocouple L, channel 2 and 3
		1	1					Thermocouple J, channel 2 and 3
				0	0			Deactivate, channel 4
				1	0			Thermocouple K, channel 4
				0	1			Thermocouple L, channel 4
				1	1			Thermocouple J, channel 4
						0	0	Deactivate, channel 5
						1	0	Thermocouple K, channel 5
						0	1	Thermocouple L, channel 5
						1	1	Thermocouple J, channel 5

The DIP switches have the following factory setting:

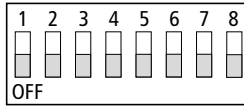


Figure 12: Factory setting of switch block S3

Software configuration

The EM 4-101-TX2 is configured in the Device Configurator of the Sucosoft S 40 programming software. Refer to the manual “S40 User Interface” (AWB 2700-1305 GB) for the relevant procedure.

5 Addressing

This chapter describes how to address the inputs of the EM 4-101-TX2 in your program. Each logical address on this module represents a temperature sensor connection, i.e. a pair of input terminals on the module. This is irrespective of the type of thermocouple involved.

Addressing the module in the Suconet K network

All six inputs can be addressed in the Suconet K network with a 12-bit or $1/10$ °C resolution.

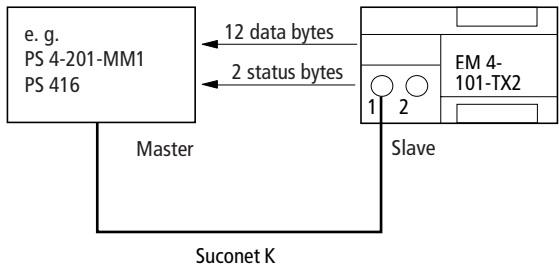


Figure 13: Data exchange between master and slave

Table 4: Operands of the analog inputs

Analog inputs	Input bytes
U0	IAW x.y.0.0
U1	IAW x.y.0.2
U2	IAW x.y.0.4
U3	IAW x.y.0.6
U4	IAW x.y.0.8
U5	IAW x.y.0.10

x = Network line, y = Station

This example shows the name of the operands if the module on line 1 is the first station.

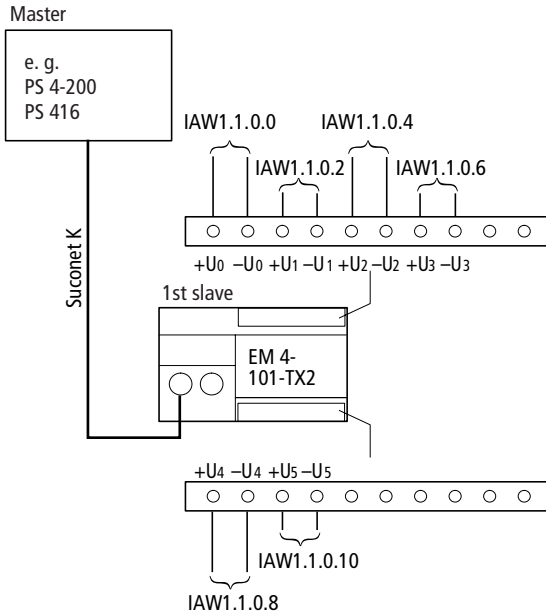


Figure 14: Addressing example

6 Test/Commissioning/Diagnostics

Status indication and Troubleshooting

The module always shows its current operating status and any possible data transfer errors. This is implemented with two status LEDs.

Power LED

The yellow LED is lit if the internal voltage of +5 V is reached and the module is ready for operation or in operation.

If the LED is not lit, the power supply is switched off or interrupted, and the module is switched off.

Bus LED

The Bus LED can indicate three different bus states.

Ready

The LED is not lit. The master is in HALT status. The bus connection, however, is error-free.

Run

If the LED is lit, the master is in active operating mode. The bus connection is error-free.

Error

A flashing LED indicates a data transfer error. The master cannot address the module. This may be due to errors in the software or hardware, such as a faulty bus connection, address not found.

Scanning the diagnostics bytes

The EM 4-101-TX2 sends the master two diagnostics bytes (word).

The first diagnostics byte shows general hardware and software errors such as

- wire break, overrange
- incorrect device type

Structure of the first diagnostics byte:

Bit	7	6	5	4	3	2	1	0
-----	---	---	---	---	---	---	---	---

Bit 0: Reserved

Bit 1: Halt

Bit 2: Reserved

Bit 3: Reserved

Bit 4: Reserved

Bit 5: Central indication for wire breakage, overrange, underrange

Bit 6: No connection

Bit 7: Incorrect device type

Scanning the first diagnostics byte:

Scan the diagnostics byte with the following syntax if the module on line 1 is the second station:

Variable declaration:

```
VAR  
EMSTAT1 AT %ISB1.2.0.0:Byte;  
DIAB1: Byte; (*Auxiliary byte*)  
END_VAR
```

Scanning in the user program:

```
LD EMSTAT1  
ST DIAB1
```


You can also scan individual bits such as:

```
LD %IS 1.2.0.0.1
```

The second diagnostics byte determines on which input the wire breakage or the out-of-range value has occurred.

Structure of the second diagnostics byte:

Input	-	-	U5	U4	U3	U2	U1	U0
Bit	7	6	5	4	3	2	1	0

Bit 0 to 5: Wire breakage
Overrange
Underrange

Bit 6 to 7: Not assigned

Scanning the second diagnostics byte:

Scan the diagnostics byte with the following syntax if the module on line 1 is the second station:

Variable declaration:

```
VAR
EMSTAT2 AT %ISB1.2.0.1:Byte;
DIAB2: Byte; (*Auxiliary byte*)
END_VAR
```

Scanning in the user program:

```
LD EMSTAT2
ST DIAB2
```

You can also scan individual bits such as:

```
LD %IS 1.2.0.1.2
```

The diagnostics word is scanned with the instruction
LD %ISW 1.2.0.0.

A bit is set in the ISB x.x.0.1 diagnostics byte if an out-of-range value occurs on an input. This indicates the presence of an error on one of these inputs. Look at the value of the input concerned to determine the type of error. The following applies:

	DEC value	Diagnostic bit
Wire breakage	0	1
Out-of-range value	Limit value	1



These errors are also indicated in the diagnostics status word of the master. Possible scanning options are given in the description of the master concerned.

Overrange Underrange

This error message is present if the value exceeds the maximum temperature limit value by 5 % or is below the minimum limit value (0) by 5 %.

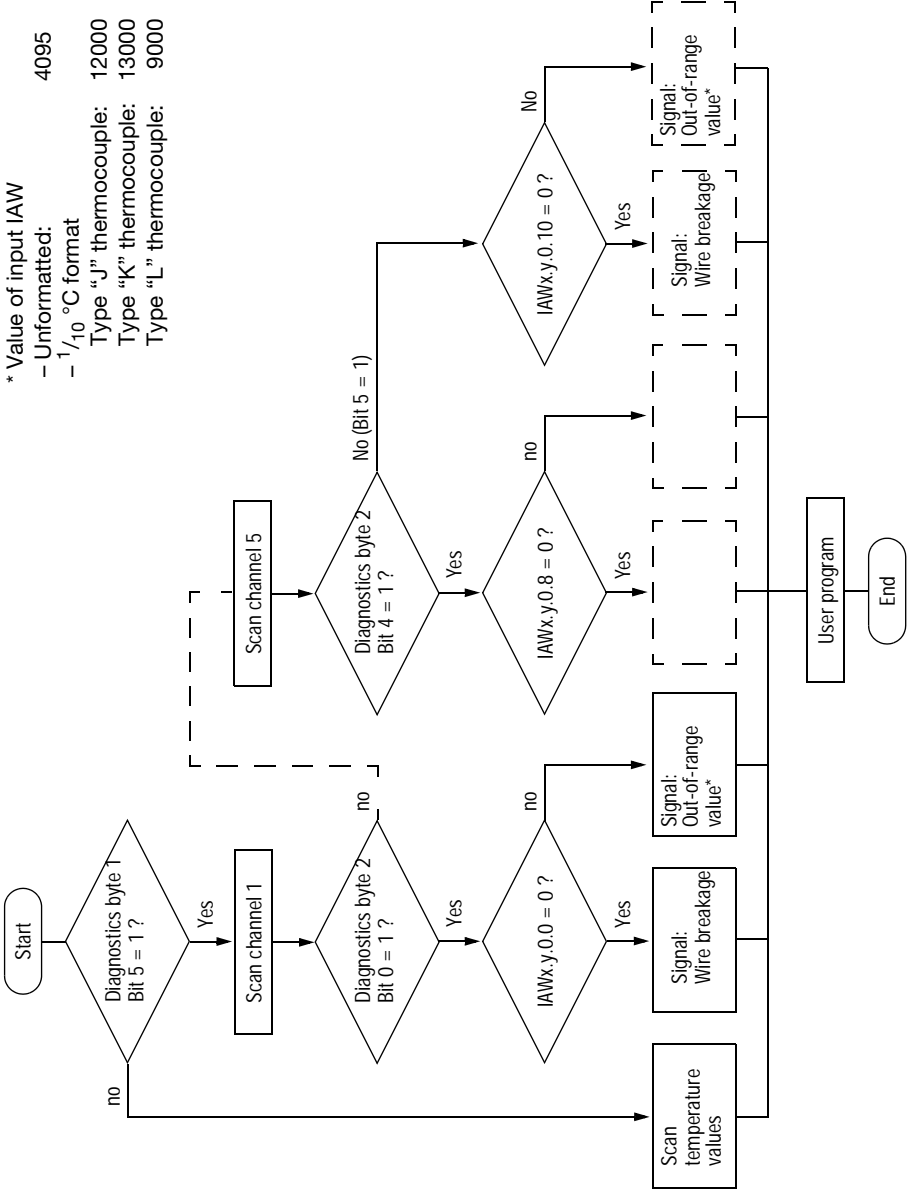
Example:

The maximum limit value of the type “J” thermocouple is set at 1200 °C. If the temperature increases to more than 5 % above maximum to 1260 °C, or drops to -60 °C, or more than 5 % below minimum, the out-of-range error signal will be output.

Diagnostics example

This example shows the scanning of the diagnostics bits for “wire breakage” and “out-of-range values”. The other diagnostics bits are not included here.

* Value of input IAW
 - Unformatted:
 - 1/10 °C format
 Type "J" thermocouple: 12000
 Type "K" thermocouple: 13000
 Type "L" thermocouple: 9000



7 Analog Value Processing

The EM 4 converts the voltage of the thermocouple to a digital value.

The setting of DIP switch S7 on switch block 2 determines whether the value scanned is unformatted (12 Bit) or in $1/10$ °C format.

S2, 7: 0 = Unformatted; 1 = $1/10$ °C format

The following diagram shows the relationship of the converted values to temperature values for Type “J” thermocouples.

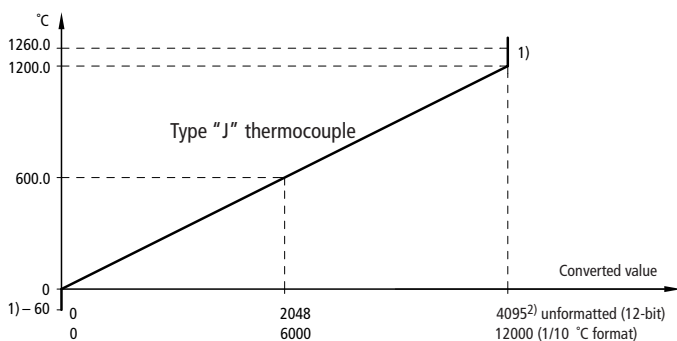


Figure 15: Temperature conversion for type “J” thermocouples

- 1) Overrange: Bit 5 in diagnostics byte 1 and one bit in diagnostics byte 2 are set to “1”. The limit value (1200) is present at the analog input concerned.
- 2) 4095 is the highest value. This corresponds to a temperature of 1199.7 (see Table 6).

The following tables show both options for each thermocouple. A table is provided for each value range.

Table 5: Analog value data format for Type “J” in range 0 to 1200 °C, $1/10$ °C format

Temperature value in °C	$1/10$ °C format		
	Binary	Hex	Dec ($1/10$ °C)
0.0	00 0000 0000 0000	0000	0
0.1	00 0000 0000 0001	0001	1
0.2	00 0000 0000 0010	0002	2
0.3	00 0000 0000 0011	0003	3
0.4	00 0000 0000 0100	0004	4
⋮	⋮	⋮	⋮
1199.7	10 1110 1101 1101	2EDD	11997
1199.8	10 1110 1101 1110	2EDE	11998
1199.9	10 1110 1101 1111	2EDF	11999
1200.0	10 1110 1110 0000	2EEO	12000

Table 6: Analog value format of Type “J” in the range 0 to 1200 °C, unformatted

Temperature value in °C	Unformatted		
	Binary	Hex	Dec
0.0	00 0000 0000 0000	0000	0
0.3	00 0000 0000 0001	0001	1
⋮	⋮	⋮	⋮
300.0	0 0100 0000 0000	0400	1024
⋮	⋮	⋮	⋮
600.0	0 1000 0000 0000	0800	2048
⋮	⋮	⋮	⋮
900.0	0 1100 0000 0000	0C00	3072
⋮	⋮	⋮	⋮
1199.7	0 1111 1111 1111	0FFF	4095

Table 7: Analog value format for Type "K" in the range 0 to 1300 °C, $1/10$ °C format

Temperature value in °C	$1/10$ °C format		
	Binary	Hex	Dec ($1/10$ °C)
0.0	00 0000 0000 0000	0000	0
0.1	00 0000 0000 0001	0001	1
0.2	00 0000 0000 0010	0002	2
0.3	00 0000 0000 0011	0003	3
0.4	00 0000 0000 0100	0004	4
⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮
1299.7	11 0010 1100 0101	32C5	12997
1299.8	11 0010 1100 0110	32C6	12998
1299.9	11 0010 1100 0111	32C7	12999
1300.0	11 0010 1100 1000	32C8	13000

Table 8: Analog value format of Type "K" in the range 0 to 1300 °C, unformatted

Temperature value in °C	Unformatted		
	Binary	Hex	Dec
0.0	00 0000 0000 0000	0000	0
0.3	00 0000 0000 0001	0001	1
⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮
325.0	0 0100 0000 0000	0400	1024
⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮
650.0	0 1000 0000 0000	0800	2048
⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮
975.0	0 1100 0000 0000	0C00	3072
⋮	⋮	⋮	⋮
⋮	⋮	⋮	⋮
1299.7	0 1111 1111 1111	0FFF	4095

Table 9: Analog value format for Type “L” in the range 0 to 900 °C, 1/10 °C format

Temperature value in °C	1/10 °C format		
	Binary	Hex	Dec (1/10 °C)
0.0	00 0000 0000 0000	0000	0
0.1	00 0000 0000 0001	0001	1
0.2	00 0000 0000 0010	0002	2
0.3	00 0000 0000 0011	0003	3
0.4	00 0000 0000 0100	0004	4
⋮	⋮	⋮	⋮
899.7	10 0011 0010 0101	2325	8997
899.8	10 0011 0010 0110	2326	8998
899.9	10 0011 0010 0111	2327	8999
900.0	10 0011 0010 1000	2328	9000

Table 10: Analog value format of Type “L” in the range 0 to 900 °C, unformatted

Temperature value in °C	Unformatted		
	Binary	Hex	Dec
0.0	00 0000 0000 0000	0000	0
0.2	00 0000 0000 0001	0001	1
⋮	⋮	⋮	⋮
225.0	0 0100 0000 0000	0400	1024
⋮	⋮	⋮	⋮
450.0	0 1000 0000 0000	0800	2048
⋮	⋮	⋮	⋮
675.0	0 1100 0000 0000	0C00	3072
⋮	⋮	⋮	⋮
899.8	0 1111 1111 1111	0FFF	4095

Appendix

Dimensions

All expansion modules have the same dimensions.
The following thus applies:

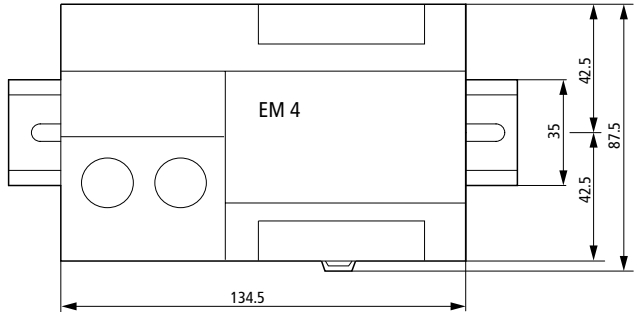


Figure 16: Front view

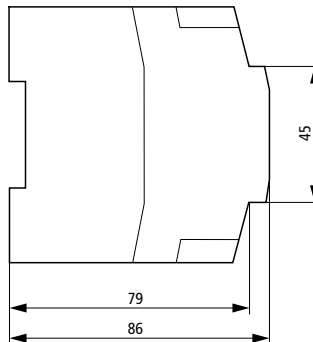


Figure 17: Side view

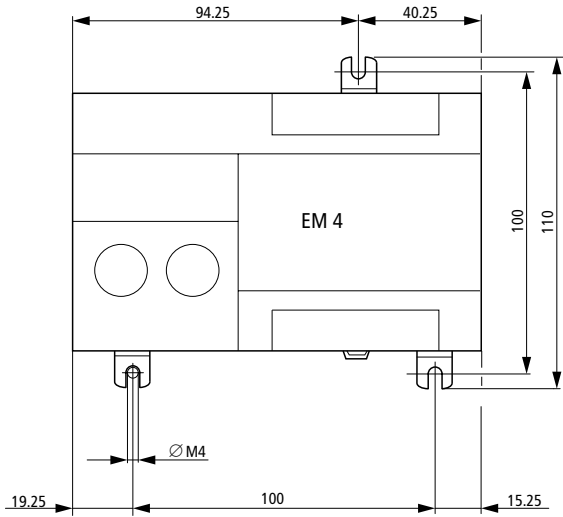


Figure 18: Front view, dimensions with fixing feet

Technical Data

General	
Standards, regulations	EN 61 131-2, EN 50178
Ambient temperature	0 to 55 °C
Storage temperature	-25 to 70 °C
Vibration resistance	Constant 1 g, f = 0 to 150 Hz
Shock resistance	15 g, 11 ms
EMC	See Seite 43
Degree of protection	IP 20
Rated insulation voltage U_i	600 V AC
Expandable (locally)	No
Weight	440 g
Power supply terminals	Screw terminals
Terminal cross-section	
Flexible with ferrule	0.22 to 2.5 mm ² (AWG 23 to 13)
solid	0.22 to 2.5 mm ² (AWG 23 to 13)
Terminals input/output	Plug-in screw terminal
Connection cross section	
Flexible with ferrule	0.22 to 1.5 mm ² (AWG 23 to 16)
Solid	0.22 to 2.5 mm ² (AWG 23 to 13)
Networking	
Bus	Suconet K
Transfer rate	187.5/375 kBit/s
Interface	RS 485
Addressing	With coding switch
Highest slave address	2 to 31
Power supply	
Rated voltage U_e	24 V DC
Permissible range	20.4 to 28.8 V DC

Residual ripple of input voltage	≤ 5 %
Reverse polarity protection	Yes
Rated current I_e	100 mA
Inrush current and duration	5 A/≤ 5 ms
Power consumption	
Power dissipation (entire device)	Approx. 3 W
Bridging of voltage dips	
Duration of dip	10 ms
Repetition rate	1 s
Protection class	1
Potential isolation between inputs and internal power supply	Yes
Thermocouple inputs	
Number	6
Thermocouple types	J: 0 to 1200 °C K: 0 to 1300 °C L: 0 to 900 °C
Equalisation line	screened e.g. LAPPKABEL KE5-022L-CY for types "L"- and "J" e.g. LAPPKABEL KN5-022L-CY for Type "K"
Resolution	12 Bit (4095 increments)/ $1/_{10}$ °C
Deviation	
Converter deviation	Max. 0.5 % of set limit value
Cold junction deviation	Max. 4 °C
Linearity factor	Max. 0.4 °C
Measuring type	Differential
Wire breakage detection	Yes
Over/underrange detection	Yes, > 5 % of limit value

General EMC specifications for automation equipment

Emission	EN 55 011/22 Class A		
Interference immunity			
ESD	EN 61 000-4-2	Contact discharge	4 kV
		Air discharge	8 kV
RFI	EN 61 000-4-3	AM/PM	10 V/m
Burst	EN 61 000-4-4	Mains/digital I/O	2 kV
		Analog I/O, fieldbus	1 kV
Surge	EN 61 000-4-5	Digital I/O, asymmetrical	0.5 kV
		Mains DC, asymmetrical	1 kV
		Mains DC, symmetrical	0.5 kV
		Mains AC, asymmetrical	2 kV
Mains AC, symmetrical	1 kV		
Immunity to line-conducted interference	EN 61 000-4-6	AM	10 V

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