SIEMENS

Industrial Controls

Monitoring and control devices 3RS2 temperature monitoring relay

Equipment Manual

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A5E42462552002A/RS-AB/002

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠ DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠ WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠ CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

⚠ WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Introduction 1

1.1 Required basic knowledge

Basic knowledge of low-voltage industrial controls is required to understand this manual.

⚠ WARNING
Qualified personnel required All work involved in connecting, commissioning, and maintenance must be performed by **qualified, responsible** personnel. Improper handling may result in serious **personal injury and considerable damage to property**.

1.2 Scope of the manual

Scope of the manual

The manual is valid for these monitoring relays. This manual contains a description of the devices that are valid at the time of publication.

1.3 Operating Instructions

To install and connect the monitoring relays, you require the operating instructions of the monitoring relays used. You can find the operating instructions under Operating instructions (https://www.siemens.com/sirius/manuals) in the Industry Online Support.

1.4 Siemens Industry Online Support

Information and service

At Siemens Industry Online Support you can obtain up-to-date information from our global support database:

- Product support
- Application examples
- Forum
- mySupport

Link: Siemens Industry Online Support (https://support.industry.siemens.com/cs/de/en)

Product support

You can find information and comprehensive know-how covering all aspects of your product here:

- **FAQs**
  Answers to frequently asked questions
- **Manuals/operating instructions**
  Read online or download, available as PDF or individually configurable.
- **Certificates**
  Clearly sorted according to approving authority, type and country.
- **Characteristics**
  For support in planning and configuring your system.
- **Product announcements**
  The latest information and news concerning our products.
- **Downloads**
  Here you will find updates, service packs, HSPs and much more for your product.
- **Application examples**
  Function blocks, background and system descriptions, performance statements, demonstration systems, and application examples, clearly explained and represented.
- **Technical data**
  Technical product data for support in planning and implementing your project

Link: Product support (https://support.industry.siemens.com/cs/ww/en/ps)

mySupport

The following functions are available in your personal work area "mySupport":

- **Support Request**
  Search for request number, product or subject
- **My filters**
  With filters, you limit the content of the online support to different focal points.
- **My favorites**
  With favorites you bookmark articles and products that you need frequently.
- **My notifications**
  Your personal mailbox for exchanging information and managing your contacts. You can compile your own individual newsletter in the "Notifications" section.
- **My products**
  With product lists you can virtually map your control cabinet, your system or your entire automation project.
- **My documentation**
  Configure your individual documentation from different manuals.

- **CAx data**
  Easy access to CAx data, e.g. 3D models, 2D dimension drawings, EPLAN macros, device circuit diagrams
- **My IBase registrations**
  Register your Siemens products, systems and software.

1.5 Siemens Industry Online Support app

Siemens Industry Online Support app

The Siemens Industry Online Support app provides you access to all the device-specific information available on the Siemens Industry Online Support portal for a particular article number, such as operating instructions, manuals, data sheets, FAQs etc.

The Siemens Industry Online Support app is available for Android and iOS:

Android

iOS

1.6 Support Request

After you have registered, you can use the Support Request form in the online support to send your question directly to Technical Support:

Support Request:	Internet (https://support.industry.siemens.com/My/ww/en/requests)

1.7 Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to

an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit
https://www.siemens.com/industrialsecurity.

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under
https://www.siemens.com/industrialsecurity.

1.8 Recycling and disposal

These devices can be recycled thanks to their low pollutant content.

Note

For environmentally friendly recycling and disposal of your old device, contact a company certified for the disposal of electronic waste and dispose of the device in accordance with the regulations in your country.

Safety instructions, standards

2

2.1 Product-specific safety instructions

2.1.1 Hazardous Voltage

Hazardous Voltage

⚠ WARNING

Hazardous Voltage.

Will cause death or serious injury.

Turn off and lock out all power supplying the system and device before working on the device.

⚠ WARNING

Commissioning by electrician required

The 3RS2 temperature monitoring relay has protection class II and must be commissioned only by an authorized electrician.

2.1.2 Intended use

Intended Use

⚠ WARNING

Can Cause Death, Serious Injury, or Property Damage.

The devices may only be used for the applications described in the catalog and the technical description, and only in conjunction with equipment or components from other manufacturers which have been approved or recommended by Siemens.

This product can function correctly and reliably only if it is transported, stored, assembled, and installed correctly, and operated and maintained as recommended.

Before you run any sample programs or programs that you have written yourself, make sure that running the plant cannot cause injury to anyone else or damage to the machine itself.

Note

Safe state

The basis of the safety function is the definition of the safe state.

In the case of temperature monitoring relays, this is the "OFF state", i.e. an open contact for sensors or shutdown of the actuators.

2.1.3 Radio interference

Radio interference

NOTICE
The 3RS2 devices, except digital devices with IO-Link 3RS2800, are certified as devices of classes A (industrial environment) and B (residential environment). The digital devices with IO-Link 3RS2800, are certified as class A devices. The use of these devices can lead to radio interference in residential areas!

2.2 Standards, approvals and certificates

Applicable standards

The temperature monitoring relays meet the requirements of the following standards:

Table 2-1 Standards - monitoring relays

Device standards	• IEC / EN 60947-1 "Low-voltage switchgear and controlgear: General rules" • IEC / EN 60947-5-1 "Control circuit devices and switching elements: Electromechanical control circuit devices"; VDE 0660 "Low-voltage switchgear" • DIN EN 50042 "Terminal marking"
EMC standard	• IEC / EN 61000-6-2 "Generic standard Immunity" • IEC / EN 61000-6-4 "Generic standard emission"
Resistance to extreme climates	• IEC 60721-3-3 "Classification of environmental conditions" The monitoring relays are climate-proof according to IEC 60721-3.

Touch protection	• IEC / EN 60529 "Degrees of protection provided by enclosures" Monitoring relays are safe to touch in accordance with IEC / EN 60529.
Safety standards	• IEC 61508: Functional safety of electrical/electronic/programmable electronic safety-related systems • IEC 62061: Safety of machinery – Functional safety of safety-related electrical, electronic and programmable electronic control systems • ISO 13849: Safety of machinery – Safety-related parts of control systems • IEC 14597: Temperature control devices and temperature limiters for heat generating systems • IEC 50495: Safety devices required for the safe functioning of equipment with respect to explosion risks • IEC 50156: Electrical equipment for furnaces and ancillary equipment

Approvals and certificates

SIRIUS components have been approved by various different bodies (e.g. shipbuilding). The current list of approvals is provided in Chapter 10 of the catalog Catalog IC 10 (https://support.industry.siemens.com/cs/ww/en/view/109747945). You can find more information and certificates for download at Internet (https://support.industry.siemens.com/cs/ww/en/ps/16027/cert).

ATEX

3

3.1 Safety and commissioning instructions for hazardous areas

Carefully observe the following information and standards where there is an increased level of danger in hazardous areas:

- EN 60079-14/VDE 0165-1 for electrical apparatus for explosive gas atmospheres
- EN 60079-17 Inspection and maintenance of electrical installations in hazardous areas
- EN 50495 Safety devices required for the safe functioning of equipment with respect to explosion risks

Types of protection:

- Dust:
  - Protection by enclosure "t", EN 60079-31
  - Pressurized enclosure "p", EN 60079-2
  - Protection by encapsulation "m", EN 60079-18
  - Control of ignition sources "b", EN 80079-37 Liquid immersion "k", EN 80079-37 Special protection "s", EN 60079-33
- Gas:
  - Flameproof enclosures "d", EN 60079-1
  - Increased safety "eb", EN 60079-7
  - Pressurized enclosure "p", EN 60079-2
  - Encapsulation "m", EN 60079-18
  - Powder filling "q", EN 60079-5
  - Oil immersion "o", EN 60079-6
  - Control of ignition sources "b", EN 80079-37 Liquid immersion "k", EN 80079-37 Special protection "s", EN 60079-33

⚠ DANGER

Operate these devices outside the ATEX zone only!

These devices do not have explosion protection type "i" (intrinsic safety). For this reason, they must only ever be used outside the hazardous (ATEX) zone.

Note

The intended use of the devices is permitted in systems for industrial applications in hazardous areas up to Zone 1 (gas, vapors, fog) or Zone 21 (dust).

ATEX marking:

- Dust: [b1] [Ex h] [pyb] [tb] [mb] [kb] [sb] III C Db
- Gas: [b1] [Ex h] [db] [eb] [pyb] [mb] [ob] [q] [kb] [sb] II C Gb

3.2 Use in areas subject to an explosion hazard due to gases or dust

Requirements for use in hazardous areas

The device is tested in accordance with the ATEX Directive 2014/34/EU and is also certified for use in accordance with DIN EN 50495 of the ATEX Directive. It monitors hazardous gas or dust atmospheres. In addition, the device meets the requirements of DIN EN 61508 and DIN EN 13849 (SIL 1 / PL c).

All components and their corresponding circuitry which belong to the critical sequence of the analog input 4 mA to 20 mA (exists on the sensor expansion module) have ATEX certification.

Note

This means you always need a sensor expansion module 3RS29 to use ATEX applications.

Analog devices

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4.1 Applications

The analog devices are used, for example, for shutdown in case specified limit temperatures are exceeded, for output of alarm messages or simply as a two-step controller.

They are used in the following applications and more:

- Protection of plants and the environment
- Exhaust temperature monitoring
- Temperature monitoring in control cabinets
- Frost monitoring
- Temperature limits for process variables
- Control of plants and machinery
- Motor monitoring
- Bearing monitoring
- Gear oil monitoring
- Monitoring of coolants
- Packaging industry
- Electroplating
- Air-conditioning systems
- Ventilation systems
- Solar collectors
- Heat pumps
- Hot water supply
- Panel building
- Rail
- Shipbuilding

4.2 General functions

The temperature monitoring relays record the temperature with the aid of temperature sensors immersed in the medium. The temperature is evaluated by the device and monitored for overshoot or undershoot of a limit.

The analog devices have an adjustable limit value. They are operated according to the closed-current principle.

The following settings can be made using a screwdriver on the front panel of the device:

- Tripping value
- Sensor type
- Measuring range
- Hysteresis
- Overshoot / undershoot

See Chapter Operator controls and display elements, settings, measuring ranges (Page 21).

Power supply:

The devices are operated with a control voltage of between 24 V AC/DC and 240 V AC/DC, depending on the version.

4.3 Performance characteristics

Table 4-1 Performance features of analog device 3RS2500

Adjustable	Yes
Connectable sensor type	• Thermocouple • Resistance sensor (two-wire and three-wire measurement)
Resistance sensors (see also Resistance sensors (Page 69))	Pt100
Thermocouples (see also Thermocouples (Page 67))	• Type J • Type K
Number of sensors that can be monitored	1
Adjustable hysteresis values	5%, 10%, 15%, 20%
Number of adjustable limit values	1
Adjustable trip delay	No
Adjustable monitoring	Overshoot / undershoot
Restart	Auto
Unit	°C

4.4 Connection systems

The devices can be supplied with the connection systems detailed below:

- Screw terminals
- Spring-type terminals (push-in)

4.5 Sensor types

The analogically adjustable temperature monitoring relays support the connection of the following types of sensor, depending on the version:

- Resistance sensors Pt100 (monitoring for overshoot and undershoot) For more detailed information, refer to Chapter "Resistance sensors (Page 69)".
- Thermocouples
  - Type J (monitoring for overshoot and undershoot)
  - Type K (monitoring for overshoot and undershoot)

  For more detailed information, refer to Chapter Thermocouples (Page 67).

4.6 Measuring ranges

Table 4-2 Measuring ranges of the analog devices

Measuring range	**Switch position of the potentiometer for setting the measured value ϑ1**										
	Min					**1/2**					**Max**
0 °C ... +100 °C	0 °C	10 °C	20 °C	30 °C	40 °C	50 °C	60 °C	70 °C	80 °C	90 °C	100 °C
0 °C ... +200 °C	0 °C	20 °C	40 °C	60 °C	80 °C	100 °C	120 °C	140 °C	160 °C	180 °C	200 °C
0 °C ... +600 °C	0 °C	60 °C	120 °C	180 °C	240 °C	300 °C	360 °C	420 °C	480 °C	540 °C	600 °C
+500 °C ... +1000 °C	500 °C	550 °C	600 °C	650 °C	700 °C	750 °C	800 °C	850 °C	900 °C	950 °C	1000 °C
-50 °C ... +50 °C	-50 °C	-40 °C	-30 °C	-20 °C	-10 °C	0 °C	10 °C	20 °C	30 °C	40 °C	50 °C

Measuring ranges of the sensors:

- Pt100 resistance sensors:
  - -50 °C ... +50 °C
  - 0 °C ... +100 °C
  - 0 °C ... +200 °C
- Thermocouples:
  - 0 °C ... +200 °C
  - 0 °C ... +600 °C
  - +500 °C ... +1000 °C

Changes in temperature over time can be found in the time diagrams (see Chapter Time diagrams (Page 22)).

4.7 Temperature monitoring

Temperature monitoring curve

If the temperature reaches the set limit ϑ1, the output relay K1 (change-over contact) will change its switching state.

The output relays return immediately to their original state once the temperature reaches the respective hysteresis value.

The limit ϑ1 is set for overshoot or undershoot to be monitored.

The cable length of the sensors can be compensated for with three-wire measurement up to a maximum cable resistance of ... ohm.

4.8 Operator control

4.8.1 Operator controls and display elements, settings, measuring ranges

The analog devices are equipped with the following operator control and display elements on the front:

3RS2500-1AA30
3RS2500-2AA30
3RS2500-1AW30
3RS2500-2AW30

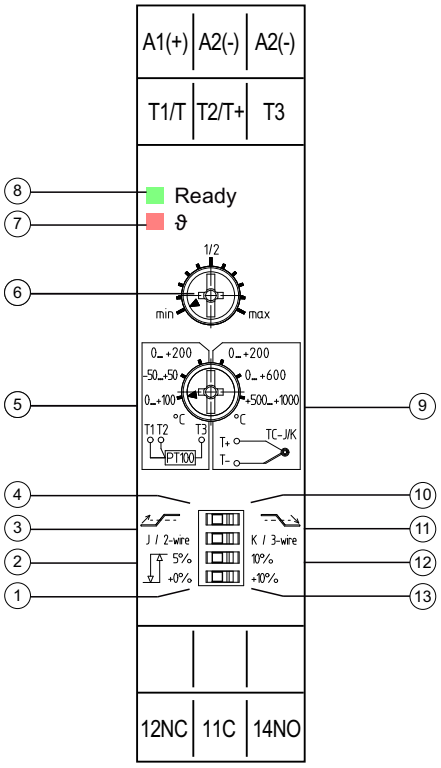


Figure 4-1 Operator controls and display elements of the analog devices

① Extended hysteresis (+0%)

② Basic hysteresis (5%)

③ Sensor type (resistance sensors Pt100, 2-wire thermocouples type J)

④ Overshoot

⑤ Selection of temperature range (resistance sensors Pt 100)

⑥ Setting of the measured value ϑ1 (see Measuring ranges (Page 19))

⑦ Red diagnostics LED "Theta"

⑧ Green diagnostics LED "Ready"

⑨ Selection of thermocouple temperature measuring range (see table)

⑩ Undershoot

⑪ Sensor type (resistance sensors Pt100, 3-wire thermocouples type K)

⑫ Basic hysteresis (10%)

⑬ Extended hysteresis (+10%)

Status display on analog devices:

Status	Green LED "Ready"	Red LED "Theta"
No supply voltage	OFF	OFF
Supply voltage + no overshoot/undershoot	ON	OFF
Supply voltage + overshoot/undershoot	ON	ON
Supply voltage + short-circuit	ON	flickers [1]
Supply voltage + wire break	ON	flashes [2]
Selected temperature measuring range is at the limit of two setting ranges	flickers [1]	[3]
Range overshoot or range undershoot	ON	Flashes

1) with a frequency of 8.0 Hz.

2) with a frequency of 0.5 Hz.

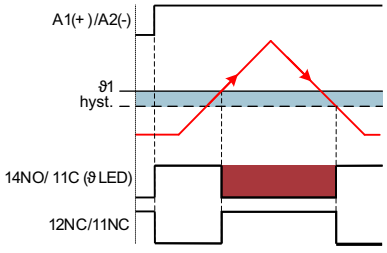
3) Status display depends on the sensor status

Note

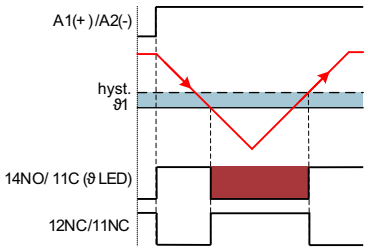
In the event of an error (e.g. wire break or short-circuit in a sensor cable), the device enters sleep mode (change-over contact 11/14 open, 11/12 closed)

4.9 Time diagrams

Monitoring of the upper limit value:



Monitoring of the lower limit value:



Digital devices

5

5.1 Applications

Digital devices are used for monitoring of set temperature limits, for example, and output of alarm messages.

In addition to temperature monitoring, digital devices also offer an effective option for two-step and three-step control. Two-step control allows the devices to be used as heating thermostats, for example. As three-step controllers, the devices switch over automatically, for example, between heating and air-conditioning, depending on the temperature.

Digital devices with up to three resistance temperature sensors are designed specifically to monitor motor windings and motor bearings, but can also be used in all applications requiring up to three sensors.

The devices are used in the following applications and more:

- Protection of plants and the environment
- Exhaust temperature monitoring
- Temperature monitoring in control cabinets
- Frost monitoring
- Temperature limits for process variables
- Control of plants and machinery
- Motor monitoring
- Bearing monitoring
- Gear oil monitoring
- Monitoring of coolants
- Packaging industry
- Electroplating
- Air-conditioning systems
- Ventilation systems
- Solar collectors
- Heat pumps
- Hot water supply
- Panel building
- Rail
- Shipbuilding

5.2 General functions

The temperature monitoring relays record the temperature with the aid of temperature sensors immersed in the medium. The temperature is evaluated by the device and monitored for overshoot or undershoot of a limit.

For digital devices, the temperature can also be monitored within an adjustable working range (window monitoring).

The digital device in "standalone" mode is designed for one sensor and can be adjusted by means of a display menu. In addition to temperature monitoring, this device also offers an effective option for two- and three-step control. The two-step control allows the devices to be used as heating thermostats, for example. As three-step controllers, the devices switch over automatically, for example, between heating and air-conditioning, depending on the temperature.

The digital device together with the sensor expansion module 3RS2900 (for up to three sensors with up to two limits) (see Sensor expansion module (Page 63)), is a digitally adjustable system that evaluates up to three resistance temperature sensors simultaneously. The devices were developed specifically for motor monitoring (motor windings, motor bearings), but are also very suitable for other applications with up to three sensors.

Digital devices for one sensor with up to two limits can be used as two-step or three-step temperature controllers as an alternative to temperature controllers in the low-end area.

Power supply:

The digital device 3RS2600 and the sensor expansion module 3RS2900 (see Sensor expansion module (Page 63)) are operated with a control voltage of 24 V AC/DC up to 240 V AC/DC, depending on the version.

The digital device with the IO-Link interface 3RS2800 (see Digital devices with IO-Link (Page 49)) is supplied directly by the IO-Link Master (L+/L-) or via an external 24 V DC voltage source. This basic unit can also be operated without IO-Link communication.

5.3 Standard function

Temperature monitoring curve

If the temperature reaches the set limit ϑ1, the output relay K1 will change its switching state. The output relay K2 correspondingly responds to reaching the lower limit value ϑ2. The delay time is adjustable.

The output relays return immediately to their original state once the temperature reaches the respective hysteresis value (automatic reset).

Each of the two limit values ϑ1 and ϑ2 is set for overshoot or undershoot to be monitored. This means that a limit value is used to output a warning indicating that a limit value is about to be overshot or undershot. The other limit value results in a disconnection. A two-step or three-step control can also be implemented with digital devices.

The following diagnostic states are displayed:

- Sensor wire break
- Sensor short-circuit (resistance sensors)
- Internal device fault

5.4 Special functions

5.4.1 Safety function

The 3RS2 device is designed as a temperature limiter (see Temperature limiter TB (Page 28)) and for the temperature monitoring as a temperature monitor (see Temperature monitor TW (Page 30)) according to EN 14597.

The mode of action is type 2.B, 2.K, 2.P, 2V (TB), 2.H (TB).

Only sensors tested in accordance with EN 14597 (EN 60730-2-9) may be used to set up a complete RS (control device) function in accordance with EN 14597.

The 3RS2 evaluation unit sets a reserve of 2 °C for resistance sensors and 3 °C for thermocouples, i.e. in the during limit violation monitoring, the device would react 2 °C / 3 °C earlier for safety reasons.

Note

The offset functionality allows calibration of the device.

The calibration of the entire measuring chain, including sensor, must be carried out by the user.

A warning limit value "Overshoot" / "Undershoot" is displayed on an integral LCD. At the same time the integrated safety-related output switches the system to a safe operating state.

The safety function of the digital device is based on the overshooting and undershooting of limits and corresponds with:

- SIL 1 (IEC 61508)
- PL c (ISO 13849)

On a digital device 3RS2600 and on digital device with IO-Link 3RS2800 a 3-digit code protects the "Parameter change" function.

The safety function is based on the quiescent current principle.

Note

Safe state

The basis of the safety function is the definition of the safe state.

In the case of temperature monitoring relays, this is the "OFF state", i.e. an open contact for sensors or shutdown of the actuators.

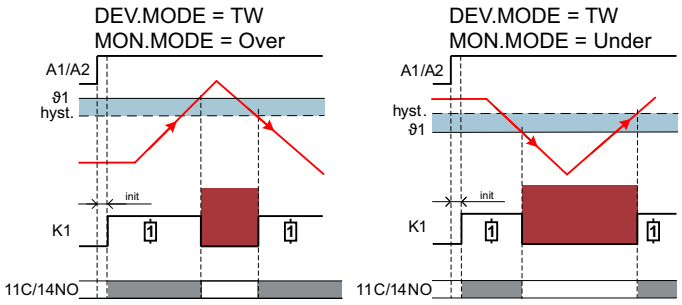


Figure 5-1 Safety function temperature monitor

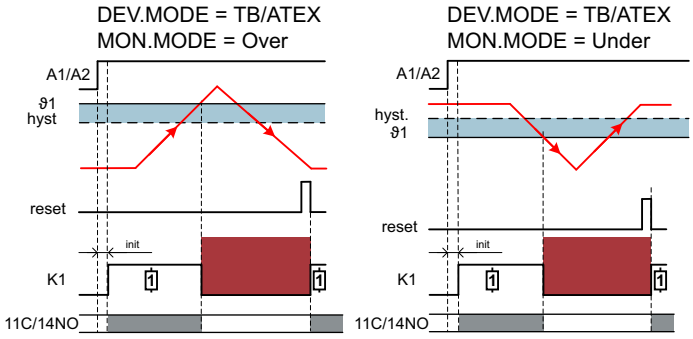


Figure 5-2 Temperature limiter safety function

5.4.2 Temperature limiter TB

The temperature limiter (TB) is a device function that locks the device continuously after tripping. If the sensor temperature overshoots or undershoots the limit by the amount of the hysteresis, a reset is possible.

This function is only available if at least two sensors are activated and the expansion module is therefore active. In this case the inputs for the TC sensors and the analog input 4 ... 20 mA are deactivated.

The following settings can be specified:

- Monitoring for overshoot
- Monitoring for undershoot
- Hysteresis

If the relay output (K1) between the terminals 11C and 14NO is switched off (quiescent current principle), the device is in the safe state. This status is maintained in the valid range of the device until manually unlocked.

A parameter change is prevented by a 3-digit code.

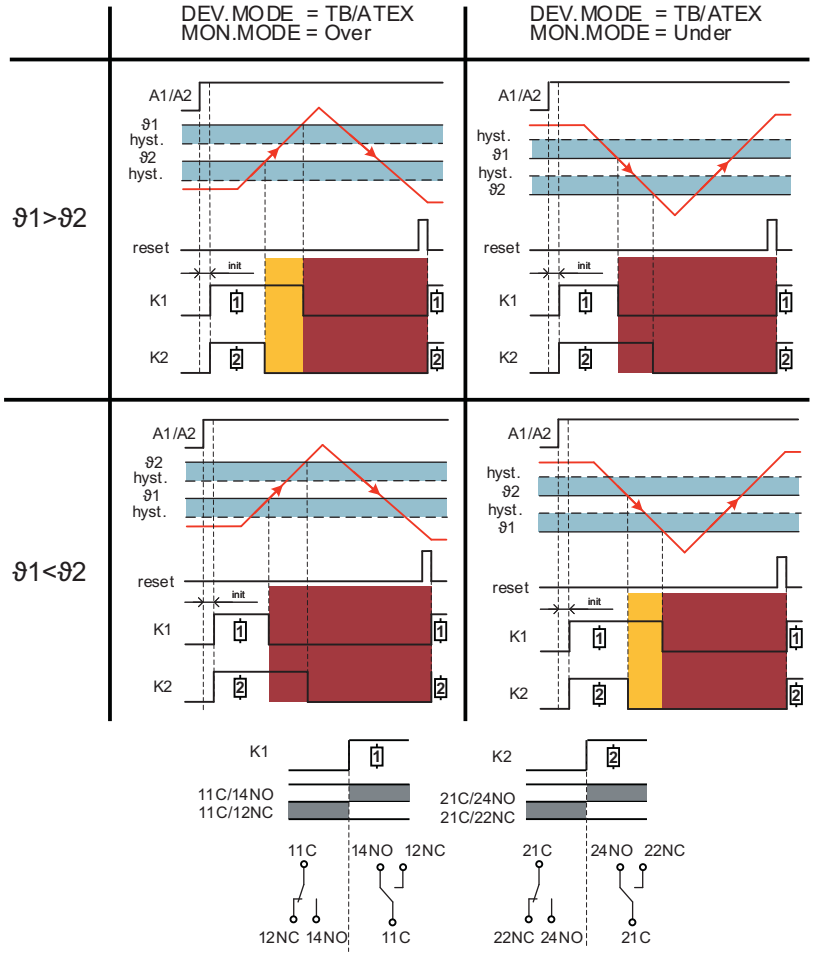


Figure 5-3 Temperature limiter time diagram

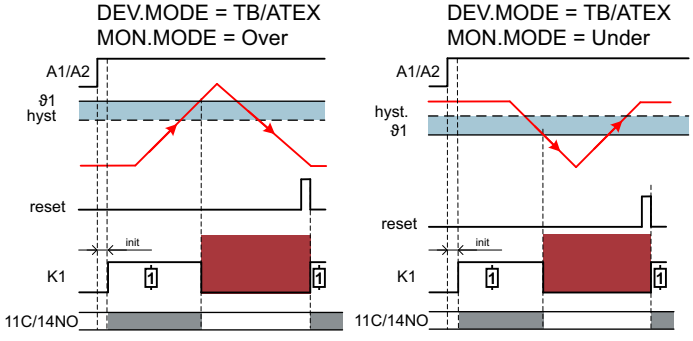


Figure 5-4 Temperature limiter safety function time diagram

5.4.3 Temperature monitor TW

The temperature monitor (TW) is a device function in which the device is automatically reset on activation, as soon as the sensor temperature has overshot or undershot the set limit by the hysteresis value.

The possible settings include the monitoring for limit value overshoot and undershoot, as well as the monitoring of the hysteresis. If the relay output (K1) between terminals 11C and 14NO (quiescent current principle) is switched off, the device is in the safe operating state.

A parameter change is prevented by a 3-digit code.

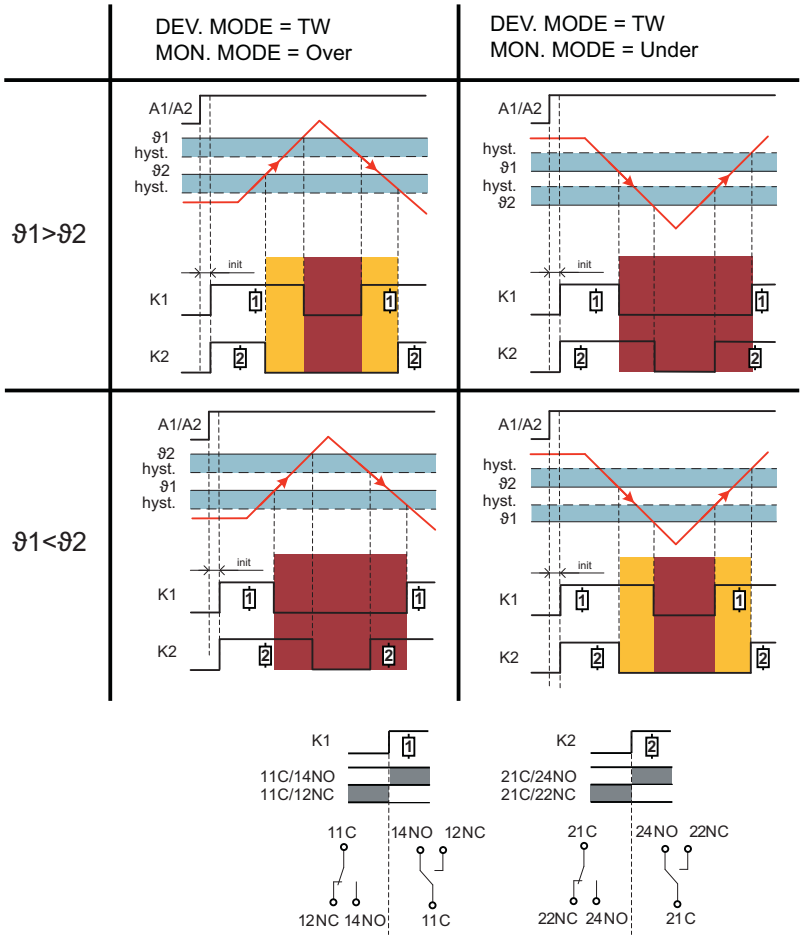


Figure 5-5 Temperature monitor time diagram

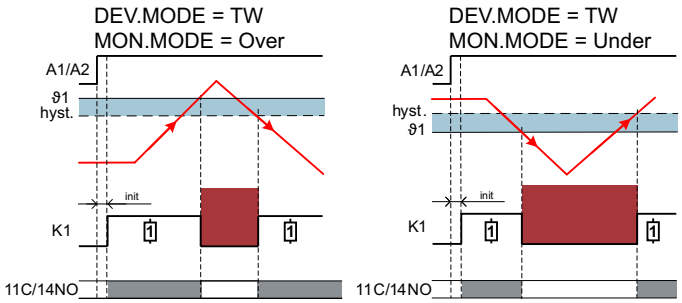


Figure 5-6 Temperature monitor safety function time diagram

5.4.4 Communication

The communication between the digital basic unit and the sensor expansion module is wireless by means of an infrared interface integrated in both devices.

5.5 Performance characteristics

- Digital basic unit: 3RS2600
- Digital basic unit with IO-Link: 3RS2800 (see Digital devices with IO-Link (Page 49))
- Sensor expansion module: 3RS2900

Table 5-1 Performance features of digital devices

Performance feature	3RS2600, 3RS2800	3RS2600 + 3RS2900, 3RS2800 + 3RS2900
Adjustable	Yes	Yes
Connectable sensor type	• Thermocouple • Resistance sensor (two-wire and three-wire measurement) • Thermistor	• Thermocouple • Resistance sensor (two-wire and three-wire measurement) • Thermistor • Analog input 4 mA ... 20 mA
Resistance sensor (see also Resistance sensors (Page 69))	• Pt100/PT1000 • KTY83/KTY84 • NTC [3)]	• Pt100/Pt1000 • KTY83/KTY84 • NTC [3)]
Thermocouple (see also Thermocouples (Page 67))	• Type J • Type K • Type T • Type E • Type N • Type S • Type R • Type B	• Type J • Type K • Type T • Type E • Type N • Type S • Type R • Type B

Performance feature	3RS2600, 3RS2800	3RS2600 + 3RS2900, 3RS2800 + 3RS2900
Number of sensors that can be monitored	1	≤ 3
Adjustable hysteresis values	1 ... 999 °C/°F	1 ... 999 °C/°F
Number of adjustable limit values	2	2
Adjustable trip delay time delay	Off; 0.1 ... 999 s	Off; 0.1 ... 999 s
Adjustable ON-delay time OnDelay	Off; 0.1 ... 999 s	Off; 0.1 ... 999 s
Adjustable monitoring	Overshoot / undershoot / window monitoring	Overshoot / undershoot / window monitoring
Reset [1)]	Auto / remote reset / manual reset	Auto / remote reset / manual reset
Unit	°C/°F	°C/°F/ (%, mA) [2)]

1) See Reset (Page 43)

2) %, mA - applies only to the universal analog input 4 mA ... 20 mA

3) NTC Type: B57227-K333-A1 (100 °C: 1.8 kΩ; 25 °C: 32.762 kΩ)

5.6 Connection systems

The devices can be supplied with the connection systems detailed below:

- Screw terminals
- Spring-type terminal (Push In)

5.7 Sensor types

The digitally adjustable temperature monitoring relays support the connection of the following types of sensor, depending on the version:

Resistance sensors

- Pt100
- Pt1000
- KTY83-110
- KTY84
- NTC [1)]

1) NTC type: B57227-K333-A1 (100 °C: 1.8 kΩ; 25 °C 32.762 kΩ)

Details are provided in Chapter Resistance sensors (Page 69).

Thermocouples

- Type J
- Type K
- Type T
- Type E
- Type N
- Type S
- Type R
- Type B

Details are provided in Chapter Thermocouples (Page 67).

5.8 Measuring ranges

Measuring range of resistance sensors

Sensor type	Short-circuit monitoring	Sensor wire break monitoring	Measuring range in °C	Measuring range in °F
Pt100	Yes	Yes	-50 ... +750	-58 ... +1382
Pt1000	Yes	Yes	-50 ... +500	-58 ... +932
KTY83-110	Yes	Yes	-50 ... +175	-58 ... +347
KTY84	Yes	Yes	-40 ... +300	-40 ... +572
NTC 1)	Yes	No	+80 ... +160	+176 ... +320

1) NTC type: B57227-K333-A1 (100 °C: 1.8 kΩ; 25 °C 32.762 kΩ).

Measuring ranges of thermocouples

Thermocouple type	Short-circuit monitoring	Sensor wire break monitoring	Measuring range in °C	Measuring range in °F
J	No	Yes	-99 ... +1200	-146.2 ... +2192
K	No	Yes	-99 ...+1350	-146.2 ... +2462
T	No	Yes	-99 ... +400	-146.2 ... +752
E	No	Yes	-99 ... +999	-146.2 ... +1830.2
N	No	Yes	-99 ... +1300	-146.2 ... +2372
S	No	Yes	0 ... +1750	+32 ... +3182
R	No	Yes	0 ... +1750	+32 ... +3182
B	No	Yes	+400 ... +1800	+752 ... +3272

5.9 Using sensors

- NTC sensors: The following types of NTC sensor are supported: B57227-K333-A1 (100 °C: 1.8 kΩ; 25 °C: 32.762 kΩ).
- Thermocouples: You can use the following types of thermocouple with the digital devices: E, J, K, R, S, T, B, N.
- Resistance sensors: When using the digital device together with the sensor expansion module, as many as three resistance sensors of types Pt100, Pt1000 or KTY can be monitored.

When using the digital device together with the sensor expansion module, the following sensors can be used:

- As many as three resistance sensors of types Pt100, Pt1000 or KTY.
- Up to three NTC sensors.

Note

Sensor type

A device can only be used to monitor sensors of the same type.

Note

Using the current input 4 ... 20 mA

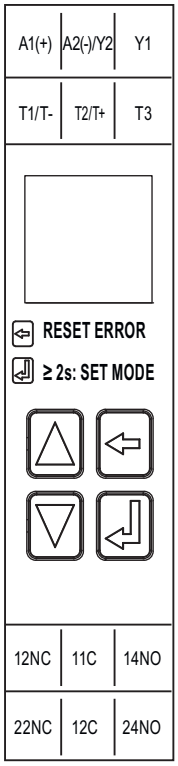
If you use the 4 ... 20 mA current input (selectable via the operating menu), all other sensor inputs are inactive.

5.10 Operator control

5.10.1 Operator controls and display elements

The digitally adjustable monitoring relays are equipped on the front with the following operator controls and display elements:

3RS2600-1BA30
3RS2600-2BA30
3RS2600-1BW30
3RS2600-2BW30



3RS2800-1BA40
3RS2800-2BA40

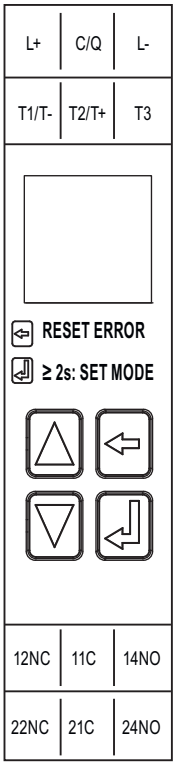


Figure 5-7 Operator controls and display elements of the digital devices

- The Up / Down keys are used
  - for menu navigation
  - for changing parameters.

  If there are a large number of menu options, further switchover between the values can be accelerated by holding down the Up / Down button.
- The backspace key is used (in conjunction with the enter key, see below)
  - for error reset
  - for canceling a selection and returning to the previous level.

  All changes remain in effect, unless they are saved or discarded when you exit the setting mode.
- The Enter key is used
  - for selecting a process
  - for confirming a process

  If the Enter key is held down for more than two seconds, there is a switch to the Set mode.

See also

Menu-based operation (Page 37)

5.10.2 Display

Functions

After 300 seconds, the digital device switches to an ECO mode. The ECO mode is necessary for saving energy. This means that the backlighting is dimmed (but not switched off completely). If no buttons are pressed, the ECO mode is activated after 300 seconds. To deactivate ECO mode, you must press one of the four buttons.

Status display

In the event of a theta 1/2 overshoot / undershoot or an error, the background light of the digital device changes. The following three states are possible.

Status	Display backlighting
OK	White (against a black background in normal operation)
Theta 2 overshoot / undershoot	Yellow
• Theta 1 overshoot / undershoot or • device error or • Error mode	Red

See also Menu-based operation (Page 37) for more information.

Exclamation mark

Exclamation mark in RUN MODE

If communication between the basic module and the expansion module is lost, an exclamation mark is displayed instead of the K3 relay symbol (top right). The backlit display changes to "red". If an activated T2/T3 input or T4 input is shown on the display, the message "IRDA ERR" appears.

Exclamation mark in SET MODE

Signals a parameter conflict.

In this case, parameters can only be stored if all parameters have a valid and non-contradictory value.

Example:

You select an NTC sensor.

As long as the default values ϑ1 are set to 80 °C and ϑ2 to 50 °C, "!" appears on the display, as the NTC measuring range is 80 °C ... 160 °C.

5.10.3 Menu-based operation

Operating menu of digital devices

The following device modes are available for the digital devices:

- ErrorMode
- ValueMode
- RunMode
- DeviceError
- SetMode

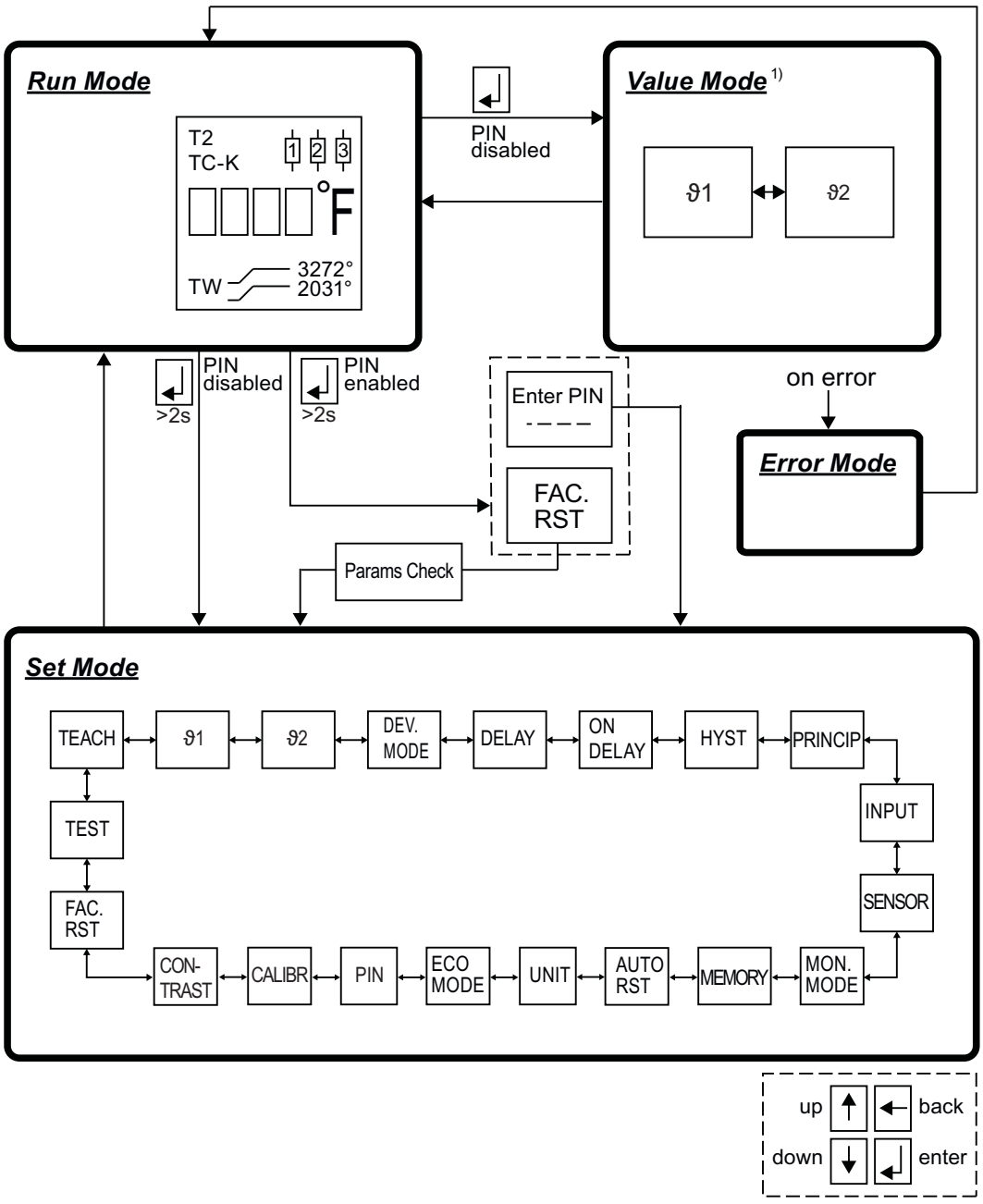


Figure 5-8 Operating menu of digital devices

1) Not for the safety-related operating modes (ATEX, TW, TB)

Setting options/modes of the digital devices

ValueMode

In Value mode, you set the temperature limits ϑ1 and ϑ2: See Measuring ranges (Page 33).

In this mode, the measurement and the evaluation run in the background. A parameter change has an immediate effect.

The Enter key is used to accept and save the new value.

The Back key is used to reset the changed value to the original value.

See also Operator controls and display elements (Page 34).

SetMode

Set Mode menu options:

Set Mode menu option (Description: see below)	Run mode			
	Temperature monitor	**Temperature limiter**	**ATEX-certified**	**Standard**
DEV.MODE	TW	TB	ATEX	Hour
DELAY	off	off	off	• off • 0.1 ... 999 s
ONDELAY	off	off	off	• off • 0.1 ... 999 s
HYST	1 °C ... 999 °C	1 °C ... 999 °C	0.1 ... 20.0 mA	1 °C ... 999 °C
PRINCIP	Quiescent current principle	Quiescent current principle	Quiescent current principle	• Open-circuit principle • Quiescent current principle
INPUT	• T1, T2, T3 • Analog input 4 mA ... 20 mA	• T1, T2, T3 • At least two sensors are active	Analog input 4 mA ... 20 mA	• T1, T2, T3 • Analog input 4 mA ... 20 mA
SENSOR	• J, K, T, R, S, E, B, N • Pt100, Pt1000 • NTC • KTY83, KTY84	• Pt100, Pt1000 • NTC • KTY83, KTY84	4 ... 20 mA	• J, K, T, R, S, E, B, N • Pt100, Pt1000 • NTC • KTY83, KTY84
MON.MODE	Monitoring mode: • Overshoot • Undershoot	Monitoring mode: • Overshoot • Undershoot	Monitoring mode: • Overshoot • Undershoot	Monitoring mode: • Overshoot • Undershoot • Window
MEMORY	on	on	on	on / off
AUTO RST	on	off	off	on / off
UNIT	°C / °F / mA / %	°C / °F	°C / °F / mA / %	°C / °F / mA / %
ECO MODE	on / off	on / off	on / off	on / off
PIN	on	on	on	on / off
CALIBR	Cold Junction: • Int./ Ext. (-25 °C ... +80 °C) • offset: -99 ... +99 °C	offset: -99 ... +99 °C	Cold Junction: • N/A • offset: -10 ... +10 °C	Cold Junction: • Int./ Ext. (-25 °C ... +80 °C) • offset: -99 ... +99 °C
CONTRAST	✓	✓	✓	✓
FAC.RST	✓	✓	✓	✓
TEST	✓	✓	✓	✓
TEACH	✓	✓	✓	✓

- **Selection measuring circuit 1 (ϑ1)**
- **Selection measuring circuit 2 (ϑ2)**
- **DEV.MODE:** Operating mode selection. You can select from the following operating modes:
  - Standard (default setting): Mode that enables you to configure the device with an unlimited combination of parameters and set values
  - ATEX (ATEX-certified mode)
  - TW (temperature monitor)
  - TB (temperature limiter)
- **DELAY:** Operating delay time: On overshooting/undershooting the set temperature, the trip delay time starts running. As soon as this time has elapsed, the output relay changes its status. This function is deactivated for TW, TB and ATEX.
  - off
  - 0.1 ... 999 s
- **ONDELAY:** ON-delay time: The device starts after restart and reset and after expiration of the selected ON-delay time.
  - off (default setting)
  - 0.1 ... 999 s
- **HYST:** Hysteresis: Setting of the temperature at which the output relay of the sensor switches to the original state, as soon as the temperature overshoots or undershoots the set hysteresis value.
  - Temperature: 1 °C ... 999 °C, temperature: 1 °F ... 999 °F
  - Measured current: 0.1 mA ... 20 mA
- **PRINCIP:**
  - Open:
    The device works according to the open-circuit principle.
  - Closed (default setting):
    The device works according to the quiescent current principle. The operating modes "ATEX", "TW" and "TB" operate exclusively on the quiescent current principle.

- **INPUT:** Temperature measuring input (active)
  - T1 (default setting)
  - EX.UNIT → on/off → ON = 1T. → 2T. → 3T. → 1T. + 2T. → 1T. + 3T. → 2T. + 3T. → 1T. + 2T. + 3T. → 4 ... 20 mA
  - T1 is the sensor input of the first temperature sensor on the 3RS26/28 with the terminal markings "T1/T-", "T2/T+" and "T3".
  - T2 is the sensor input of the second temperature sensor on the 3RS26/28 with the terminal markings "2T1", "2T2" and "2T3".
  - T3 is the sensor input of the second temperature sensor on the 3RS26/28 with the terminal markings "3T1", "3T2" und "3T3".
  - The active temperature measuring inputs T1, T2 and T3 can be activated/deactivated in any combination if the 4 mA ... 20 mA input is deactivated. If the 4 mA ... 20 mA input is activated, you cannot activate any other inputs. The ATEX mode supports only the 4 mA ... 20 mA temperature measuring input.
  - Ex.Unit: Activation/deactivation of the sensor expansion module
- **SENSOR:**
  Sensor type selection: Only sensors of the same type can be selected; for the sensor expansion module, these are resistance sensors.
  - Resistance sensors: Pt100 (default setting), Pt1000, NTC, KTY83, KTY84, each 2-wire / 3-wire
  - Thermocouples: Types J, K, T, R, S, E, B, N
  - Temperature measuring input 4 mA ... 20 mA
- **MON.MODE:** Monitoring mode
  - Over: Temperature overshoot (default setting)
  - Under: Temperature undershoot
  - Window: Temperature range monitoring / window monitoring ("Standard" operating mode only)
- **MEMORY:** The memory function saves the device status before the supply voltage fails. If the memory function is selected ("on"), the device returns to the state that is was in before the supply voltage was lost after the power is restored. With activated memory function, the setting option Autoreset (AutoRST) is deactivated. With deactivated memory function, the setting option Autoreset (AutoRST) is activated.
  - on (default setting)
  - off
- **AUTO RST:** The automatic reset function activates or deactivates automatic reset of the device when the selected temperature limit is overshot/undershot.
  - on
  - off (default setting)

- **UNIT:** Setting of the measurement unit
  - °C (default setting)
  - °F
  - mA (only when using the 4 ... 20 mA analog input on the sensor expansion module)
  - % (only when using the 4 ... 20 mA analog input on the sensor expansion module)
- **ECO MODE:** Activation/deactivation of the energy-saving mode: The display brightness is reduced after a certain time
  - on (default setting)
  - off
- **PIN:** Password protection to protect the device from unauthorized parameter changes (default value: 000); change this default value to achieve the protective effect
  - use (use password protection): on, off (default setting)
  - rst (password reset): oldPIN → newPIN
- **CALIBR:** Zero point calibration through input of an offset:
  - -99 °C ... +99 °C (default setting: 0 °C)
  - -99 °F ... +99 °F
  - -10 mA ... +10 mA

  The offset can be set separately for each active input
  When using thermocouples you can select an internal reference integrated in the device or an external reference.
  If the internal reference is selected, the comparison measurement of the cold end of the thermocouple ("cold junction") takes place in the device. When the external reference is selected, the cold junction of the thermocouple is assumed to be located outside the device. The comparison temperature can be set manually on the device in this case. It must be noted that a discrepancy between the actual temperature at the cold junction of the thermocouple and the manually selected reference temperature can impair the temperature measurement in this situation. This means the cold junction of the thermocouple must be at a constant temperature (e.g. in the laboratory or similar).
  - -25 °C ... +80 °C; -13 °F ... +176 °F (default setting: 0 °C)
- **CONTRAST:** Setting of the display contrast: -10 ... +10 (default setting: 0)
- **FAC.RST:** Resetting the device and the PIN to the factory default settings
  - Yes
  - No

- **TEST:** Device test in accordance with IEC 60079-17
  - Yes
  - No
- **TEACH:** Calibration of measuring circuits 1 and 2
  Enables the adaptation of the settings for the values of the overshoot and undershoot monitoring to the current values of the measured temperature. The setting ranges of the values depend on the types of sensor selected. You must not exceed the measurement ranges of the sensors in use.
  Hysteresis (relative in each case to the currently measured sensor temperature):
  - On temperature overshoot: ϑ2 = +5%; ϑ1 = +10%
  - On temperature undershoot: ϑ2 = -5%; ϑ1 = -10%
  - On temperature overshoot: ϑ1 = +10%; ϑ2 = -10 %

  The measured value of the temperature measuring inputs T1/T4 is adopted as a template. If the temperature measuring input T1 is inactive, the measured value of the temperature measuring input T2 is adopted. If T1 and T2 are inactive, the measured value of the temperature measuring input T3 is adopted.

5.10.4 Reset

Reset is only possible if the temperature does not exceed / fall below the set values including the set hysteresis.

- Automatic reset: The corresponding relays are automatically reset
- Manual reset: Press the Back button → confirm with "yes" or "no"
- Remote reset via IO-Link (3RS2800): The outputs are reset via IO-Link using the "Reset" control command (see Process image output (PIQ) and input (PII) (Page 102)).
- Remote reset via floating NO contact (Y1+) between Y1/Y2 (3RS2600)

⚠ **WARNING**
Hazardous Voltage The cables Y1/Y2 are connected directly to the supply voltage.

A reset is carried out when the contacts Y1 and Y2 are closed by a short pulse (300 ms ... 2000 ms) using a NO contact.
A short circuit that lasts > 5 minutes generates an error message. If RESET between Y1/Y2 is permanently closed, the error message 0xB703 is issued. The error can then only be remedied by disconnecting the voltage at the terminal.

5.11 Time diagrams

Temperature monitor TW

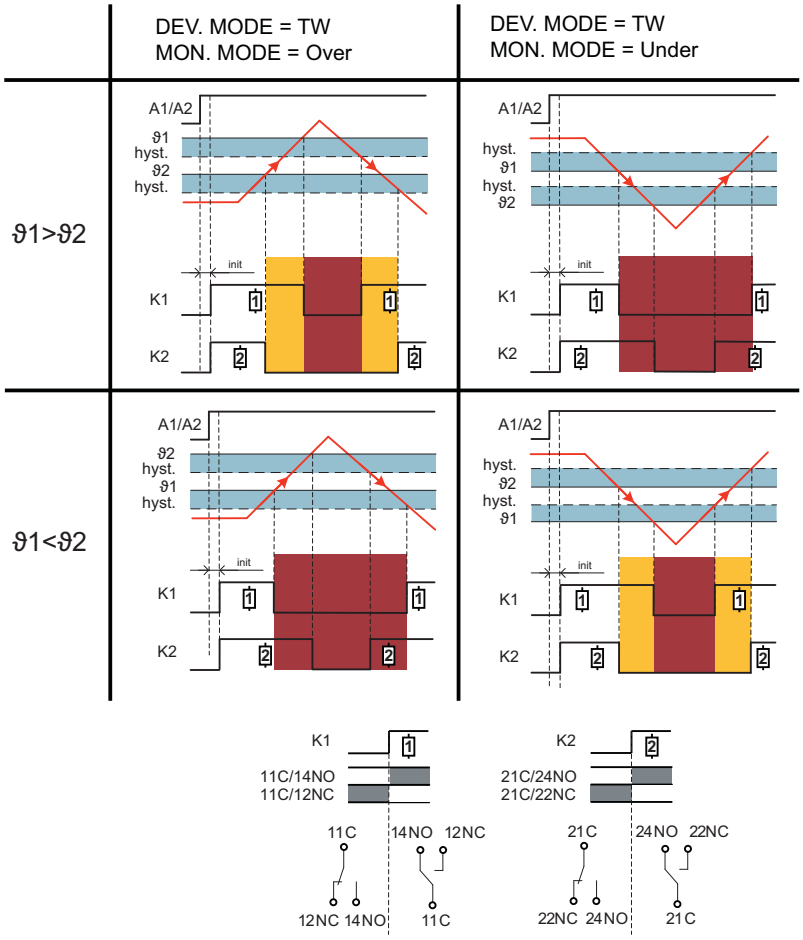


Figure 5-9 Temperature monitor time diagram TW

Temperature limiter TB + ATEX

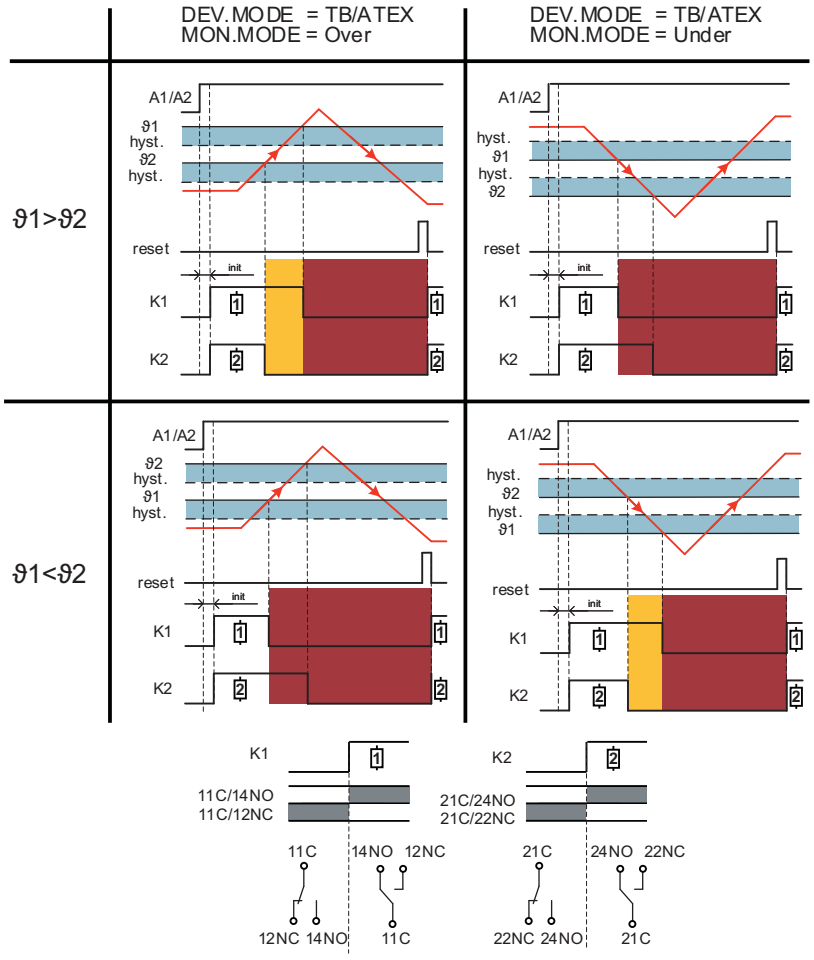
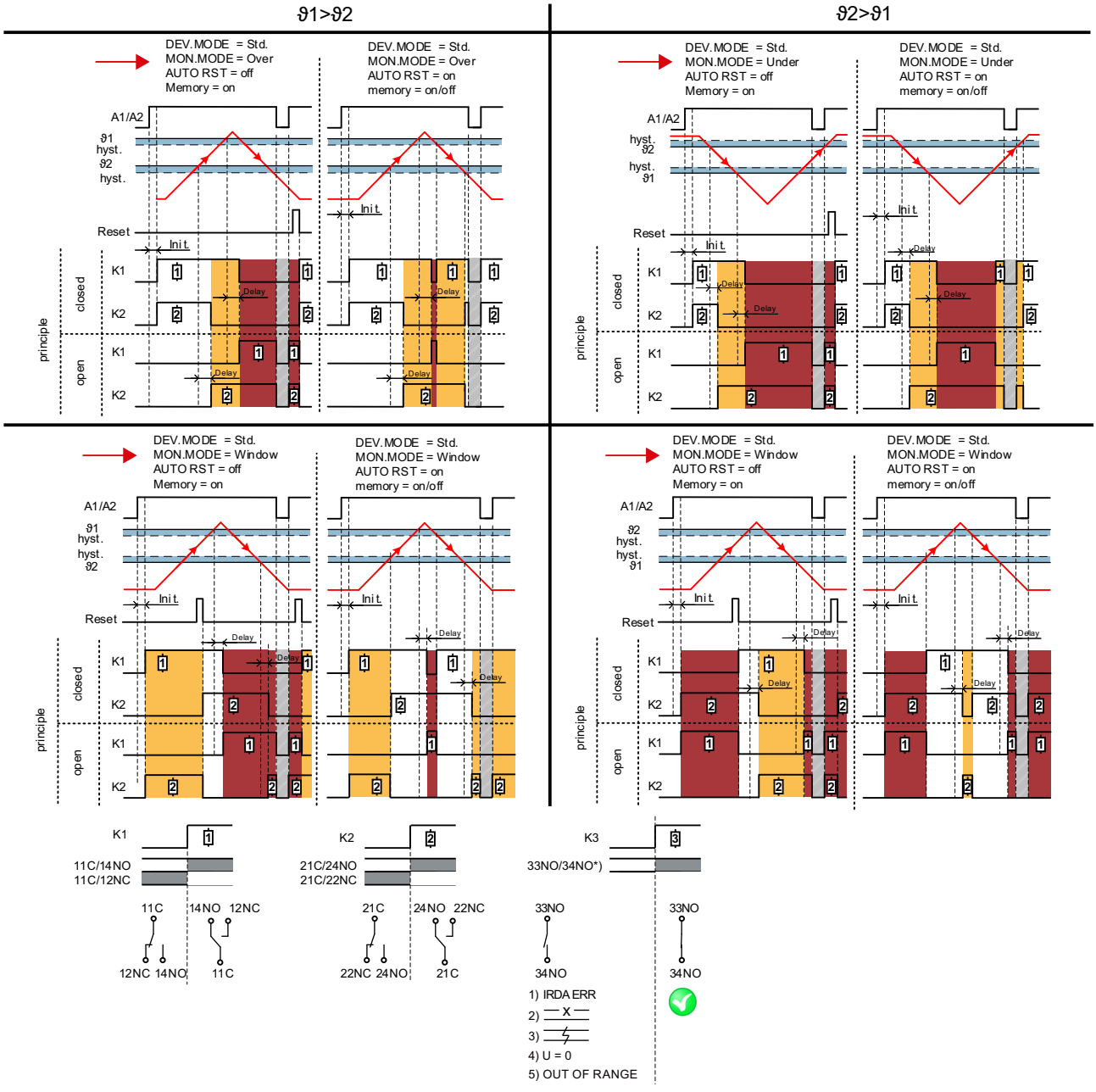


Figure 5-10 Temperature limiter time diagram TB + ATEX

Standard function



*) The 33NO/34NO relay output is located on the 3RS29 sensor expansion module

Figure 5-11 Standard function time diagram

ϑ1> ϑ2

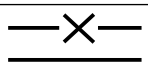
ϑ1 e.g. 20 °C

ϑ2 e.g. 30 °C

Example: K2 alarm value at 20 °C (+ delay time):

- In the closed-circuit principle, a cable break is detected if it occurs, and the output relay is deactivated; the display turns red
  - K1 (11/12) is closed
  - K2 (21/22) is closed and relay output 33/34 is open on the 3RS29
- In the open-circuit principle, a cable break is detected if it occurs, and the output relay is deactivated; the display turns red
  - K1 (11/14) is closed
  - K2 (21/24) is closed and relay output 33/34 is open on the 3RS29

5.12 Diagnostics

Error	Display	Icon on the display
Temperature limit overshoot/undershoot	Red display	-
Short-circuit in a sensor cable (for resistance sensors only)	Red display, the "short-circuit" icon appears	
Cable break in a sensor cable	Red display, the "cable break" icon appears	
Sensor outside of measuring range	Red display, the "out-of-range" icon appears	
Communication error between the basic unit and the sensor expansion module	Red display. "IRDA ERR" is indicated on the display and the "nil" symbol is replaced by "!".	-
Parameter error	After resetting to the factory setting or in the event of a parameter error, the device enters the safe state (no temperature monitoring). The user is prompted to check the parameters. Pressing the "Enter" button for longer than 2 seconds puts the device into "Set Mode".	-

Digital devices with IO-Link

6

6.1 Performance characteristics

The 3RS2800-.BA40 temperature monitoring relays for IO-Link offer the complete functionality of the 3RS2600 digital devices and many other performance features in addition to monitoring functions:

- Measured value transmission (including resolution and unit) to the higher-level control. Local display and transmission of the temperature unit (°C or °F) can be parameterized. The temperature measured value transferred from temperature monitoring relays with more than one resistance sensor can be adjusted. Some device versions allow you to set which value is transferred cyclically.
- Transmission of alarm flags to the higher-level control
- Comprehensive diagnostics capability by querying the precise cause of the error in the diagnostic data record
- Remote parameterization is also possible (instead of local parameter assignment)
- Fast parameterization of identical devices by duplicating the parameter assignment in the higher-level control
- Parameter transfer by means of Upload to the higher-level control via IO-Link call or by parameter server[1)] (only when using an IO-Link master as of IO-Link Communication Specification V1.1 or higher)
- Blocking of local parameterization via IO-Link possible
- To prevent automatic startup after a power failure and to avoid losing diagnostic data, errors can be configured so that they are saved to non-volatile memory.
- Linking to a higher-level control makes it possible to assign parameters to the monitoring relays via a display unit. The measured values can be displayed directly in a control room or at the machine/control cabinet.
- By means of IO-Link the devices can also be connected to the Siemens "MindSphere" open IoT operating system.

1) The parameter server provides an assurance of consistent central data management in the event of changes to parameters (made locally or via the control). The "Parameter server" function supports the automatic backup of parameter data (automatic re-assignment of parameter data if a device is replaced).

Up until now, using redundant sensors and/or analog signal converters to transfer measured values to a higher-level control incurred significant additional expense and wiring effort. Combining the autonomous monitoring relay with IO-Link communication reduces this wiring effort and lowers costs.

As the availability of up-to-date measured values means that the higher-level control can take care of the control tasks within the plant, the continued availability of the output relays on the monitoring relays increases the plant's operational reliability (e.g. by shutting down the plant if limits are exceeded that should not even be reached under normal operating conditions).

The monitoring relays continue to function autonomously in spite of the IO-Link connection. Parameters can be assigned locally at the device, independently of a higher-level control. As long as the 24 VDC supply voltage is available, the monitoring relays will function if the controller fails or is not yet available.

6.2 Communication

The communication between the digital basic unit with IO-Link and the sensor expansion module is wireless by means of an infrared interface integrated in both devices.

6.3 Connection options for IO-Link

The IO-Link device is connected to the IO-Link master via the removable terminal and supplied with 24 V DC via this connection.

⚠ DANGER

Hazardous voltage!

If voltages are too high, the IO-Link device can be damaged and electric shock can result.

Use only power supplies that comply with the requirements of protective extra-low voltage (PELV in accordance with IEC EN 50178).

⚠ DANGER

Hazardous voltage!

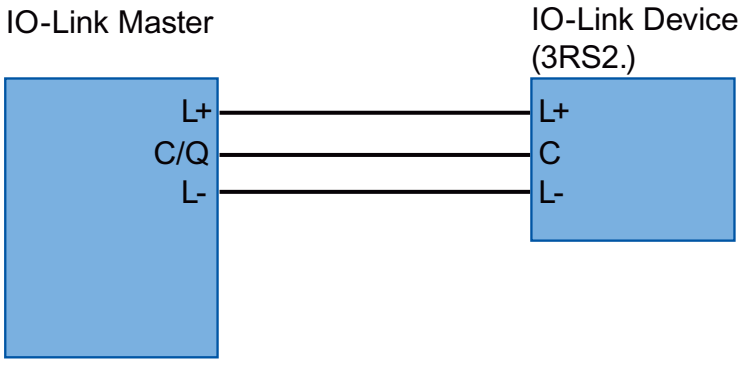
Will cause death or serious injury.

Turn off and lock out power before working on this equipment.

There are two options for supplying the monitoring relay with voltage via the control circuit:

Option 1: Connection to IO-Link master

Connect the IO-Link device to the master via the three cables L+, C, and L-. The IO-Link device is supplied with voltage via the 2 cables L+ and L-. The monitoring relay communicates with the master via cable C.

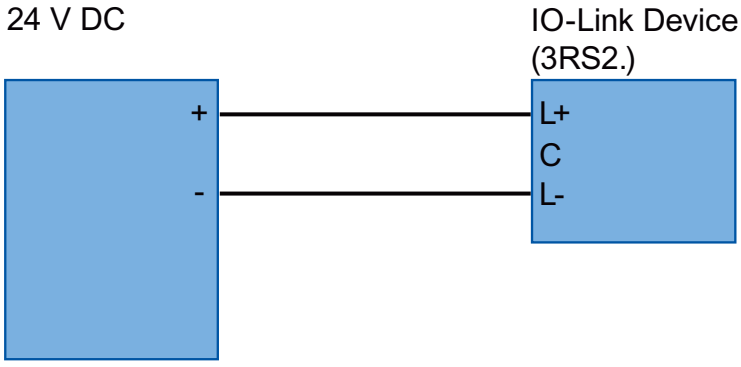


Option 2: Direct voltage supply with 24 V DC

If no master is available, you can operate the IO-Link device with a 24 V DC voltage source.

For this purpose, connect the IO-Link device with the voltage source via the two cables L+ and L-. Since cable C is not used in this case, communication via IO-Link is not possible.

The pin assignments of the available IO-Link devices are described in the relevant product chapters.



6.4 Time diagrams

Temperature monitor TW

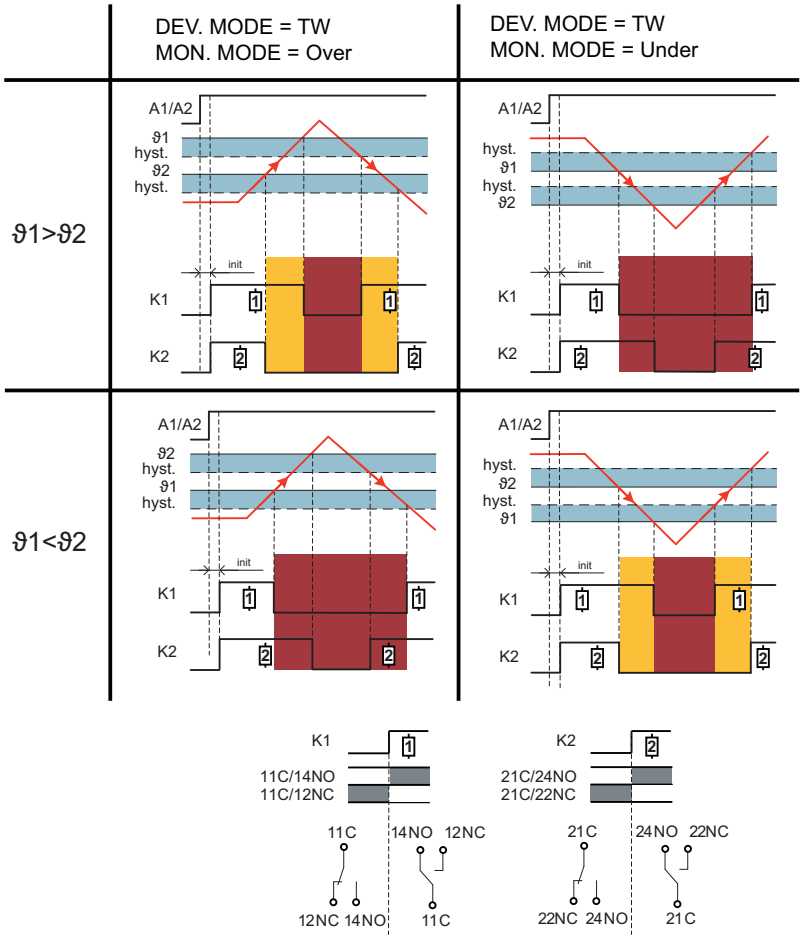


Figure 6-1 Temperature monitor time diagram TW

Temperature limiter TB + ATEX

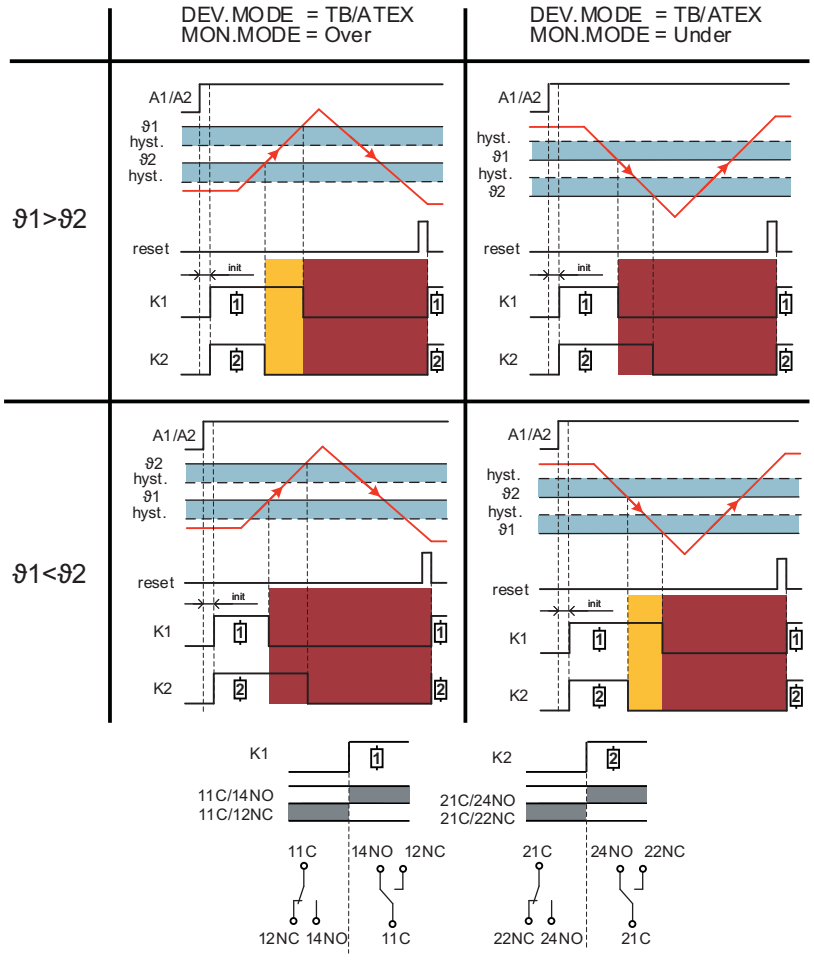
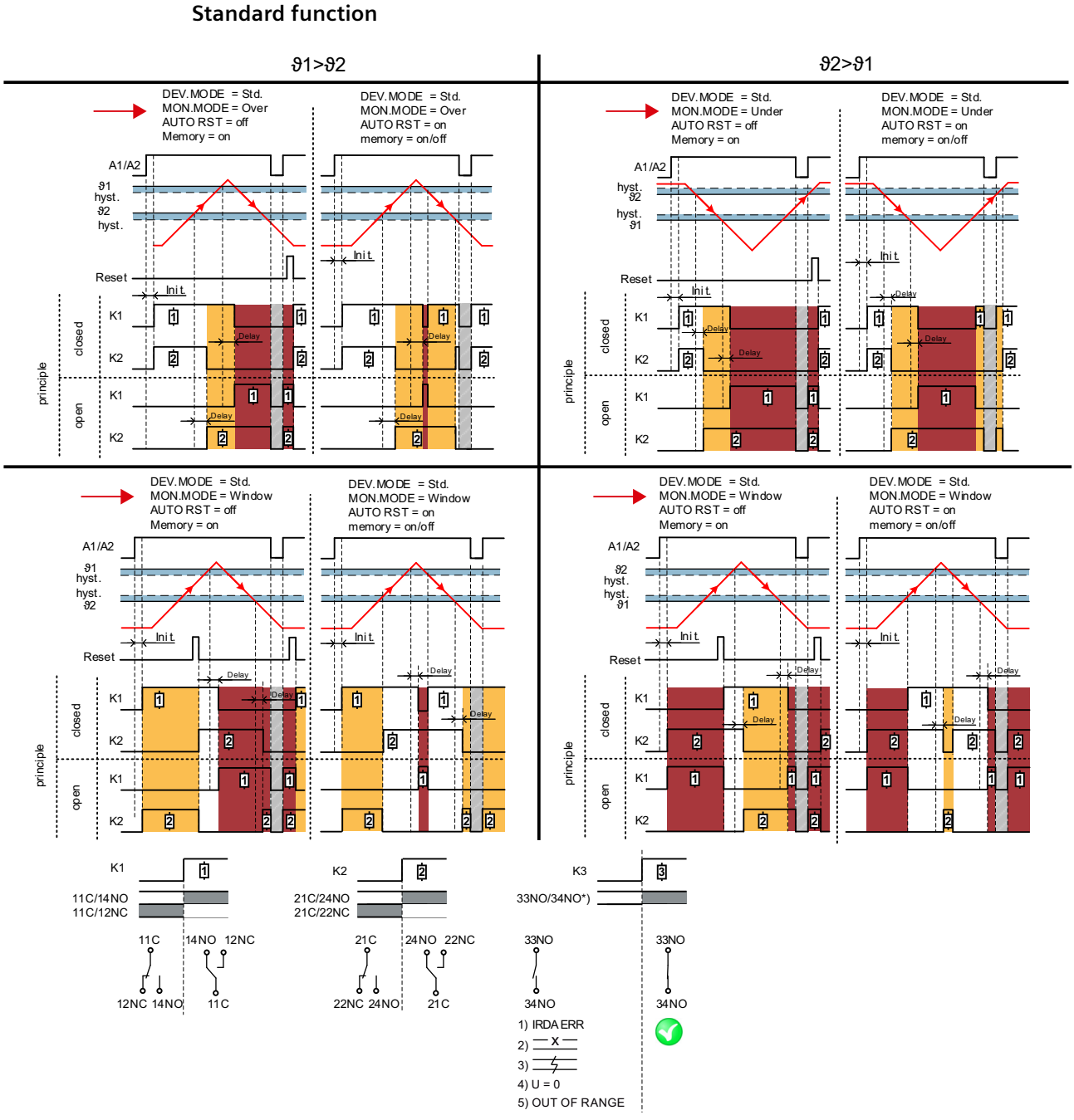


Figure 6-2 Temperature limiter time diagram TB + ATEX



*) The 33NO/34NO relay output is located on the 3RS29 sensor expansion module

Figure 6-3 Standard function time diagram

ϑ1> ϑ2

ϑ1 e.g. 20 °C

ϑ2 e.g. 30 °C

Example: K2 alarm value at 20 °C (+ delay time):

- In the closed-circuit principle, a cable break is detected if it occurs, and the output relay is deactivated; the display turns red
  - K1 (11/12) is closed
  - K2 (21/22) is closed and relay output 33/34 is open on the 3RS29
- In the open-circuit principle, a cable break is detected if it occurs, and the output relay is deactivated; the display turns red
  - K1 (11/14) is closed
  - K2 (21/24) is closed and relay output 33/34 is open on the 3RS29

6.5 Configuring with STEP 7

6.5.1 Configuring with STEP 7 - prerequisites

Procedure when configuring IO-Link master and IO-Link devices

Configuration takes place in two steps with STEP 7, V5.4 SP5 or higher:

1. In *HW Config*, configure the IO-Link master (with GSD if necessary), e.g. the 4SI SIRIUS electronics module or 4SI IO-Link (both require at least firmware version 1.0.1).
2. With the Port Configuration Tool S7-PCT (V2.0 or higher) you configure the connected monitoring relay for IO-Link (IO-Link Device).

Requirements

- STEP 7 V5.4 SP5 or higher
- The Port Configurator Tool S7-PCT (V2.0 or higher) is installed on the PG/PC. You can either install S7-PCT together with STEP 7 V5.4 SP5 or higher, or you can download it from Internet (https://support.automation.siemens.com/WW/view/en/33102519/133100).
- The associated IO-Link IODD file (IO Device Description) is installed in S7-PCT. You can download the IODD files for the SIRIUS Devices from Internet (https://support.automation.siemens.com/WW/view/en/29801139/133100).
- Optional: The GSD files are installed in HW Config. You can download the GSD files for the ET 200SP from Internet (http://www.siemens.com/comdec).
- Optional: Install the function block FB "IOL_CALL" for backing up/restoring IO-Link master parameters and IO-Link device parameters. You can download the function block from the Internet. You can find more information on the function block in Chapter Module replacement (Page 58).

6.5.2 Configuring with STEP 7 and S7-PCT

Configure IO device with SIMATIC Manager

1. Start the SIMATIC Manager and configure the project as described in the *STEP 7* online help.
2. In the hardware catalog of *HW Config*, select the IO-Link master (e.g. in the distributed I/O system ET 200SP or ET 200eco PN).
3. Drag-and-drop the IO-Link master (e.g. the 4SI SIRIUS electronics module) from the hardware catalog to the configuration table.
4. Select the IO-Link master in the configuration table.
5. Click the right mouse button and select "**Object Properties**" from the shortcut menu. **Result**: The "**Properties**" window of the IO-Link master opens.
6. On the "**Addresses**" tab, set the length of the inputs and the length of the outputs to 16 Bytes and confirm with "**OK**".
7. Parameterize the IO-Link master.

Configuring the I/O device with the Port Configurator tool

1. In the Configuration table, select the IO-Link master (e.g. the 4SI SIRIUS electronics module).
2. Right-click and select "**Launch IO-Link Configurator**" in the shortcut menu. **Result:** *S7-PCT* is started.
3. Select the SIRIUS IO-Link monitoring relay in the hardware catalog of S7-PCT.
4. Start by parameterizing the SIRIUS IO-Link monitoring relay (IO-Link device). Additional information is available in the *S7-PCT* online help.

6.5.3 Configuring with STEP 7 and S7-PCT /GSD variant)

Configuring the IO-Link master in HW Config with GSD

1. Start the SIMATIC Manager and configure the project as described in the *STEP 7* online help.
2. In the hardware catalog of *HW Config*, select the IO-Link master (e.g. in the distributed I/O system ET 200SP or ET 200eco PN).
3. Drag-and-drop the IO-Link master from the hardware catalog to the configuration table.
4. Parameterize the IO-Link master.

Configuring the I/O device with the Port Configurator tool

1. In the Configuration table, select the IO-Link master (e.g. the 4SI SIRIUS electronics module).
2. Right-click and select "**Start Device Tool**" in the shortcut menu. Click on "S7-PCT" in the submenu.
   Result:*S7-PCT* is started.

3. Select the SIRIUS IO-Link monitoring relay in the hardware catalog of the S7-PCT.
4. Start by parameterizing the SIRIUS IO-Link monitoring relay (IO-Link device). Additional information is available in the *S7-PCT* online help.

6.6 Configuring without STEP 7

6.6.1 Configuring without STEP 7 - prerequisites

Requirements

- The Port Configurator tool S7-PCT (V2.0 or higher) is installed on the PG/PC. You configure the connected monitoring relay (IO-Link device) with the Port Configurator tool S7-PCT (V2.0 or higher).
  You can either install S7-PCT together with STEP 7 V5.4 SP5 or higher, or you can download it from Internet (https://support.automation.siemens.com/WW/view/en/33102519/133100)
- The associated IO-Link IODD file (IO-Link Device Description) is installed in S7-PCT. You can download the IODD files for the SIRIUS devices from Internet (https://support.automation.siemens.com/WW/view/en/29801139/133100).

Note

Configuring with S7-PCT standalone

Configuring with S7-PCT standalone is not possible for the CPU versions of the ET 200.

6.6.2 Configuring without STEP 7

Configuring the I/O device with the Port Configuration tool

1. Start the S7-PCT Port Configurator Tool.
2. Create a new project or open an existing project as described in the online help.
3. Select an IO-Link master.
4. Select the SIRIUS IO-Link monitoring relay in the hardware catalog of the S7-PCT.

5. Load the configuration into the IO-Link master before parameterizing the monitoring relay.
6. Start by parameterizing the SIRIUS IO-Link monitoring relay (IO-Link device). Additional information is available in the S7-PCT online help.

Note

Online access to the IO-Link master or to an IO-Link device

To be able to access the IO-Link master or an IO-Link device online, communication between the ET 200 and the higher-level controller must be active (BF-LED on ET 200 interface module is off).

6.7 Module replacement

6.7.1 Module replacement (replacement of an IO-Link device)

Parameter data and configuration data specially optimized for a specific application are stored in an IO-Link Device. This data deviates in many cases from the default values stored in the IO-Link Device.

In the event of replacement of an IO-Link Device (referred to below as "module"), the optimized data must be transferred to the new module.

Data can be transferred via two channels:

- Module replacement with PG/PC
- Module replacement without PG/PC

6.7.2 Module replacement with PG/PC

In the event of a replacement, a PG/PC is available with the SIMATIC project of the plant.

With the data stored in the SIMATIC project, and the S7-PCT, you transfer the parameters belonging to the replaced Device to the new Device.

6.7.3 Module replacement without PG/PC

Requirements

Install the demo project "IOL-CALL". You can download the "IOL-CALL" and the description from the Internet (https://support.automation.siemens.com/WW/view/en/33102519/133100) .

- Copy the IO-Link Call function block FB1 (including data block DB10) to a STEP 7 project.
- Use the IO-Link Call function block FB1 as described in the demo project.

Procedure

On completion of commissioning, a PG/PC with the project is no longer available. For backing up and restoring the parameter data and configuration data from or to a module, the function block (FB) "IOL_Call" is available for the SIMATIC controllers of the S7-300 and S7-400 families.

With this function block, you back up all relevant data sets of a module after commissioning, in a data block (DB), for example. In the event of a replacement, you write the relevant data from the data block to the replaced module with the IOL_Call.

Refer to Chapter Process data and data sets (Page 101) for data sets to be backed up for a module.

Note

An IO-Link Device is a module that communicates with the IO-Link master via its communication connection. With the special cases "SIRIUS 3RA64/65 compact starter " and "SIRIUS 3RA2711 function modules", where group formations of up to four starters are possible, the above information refers to the replacement of the first load feeder. Replacement of load feeders 2 to 4 of a group of four does not require any supplementary measures.

Automatic saving of parameter data

If IO-Link masters meeting IO-Link Communication Specification V1.1 are available, the "Parameter server" function can be used to back up parameter data from the devices automatically on the server. When devices are replaced, this parameter data is written back to the new device automatically on system startup. The monitoring relay for IO-Link supports this functionality as standard.

6.8 Integration into the SIMATIC environment

Integration of the IO-Link device into the SIMATIC environment

Faceplates embedded in a demo project are offered for download for human machine interfacing and diagnostics for Siemens IO-Link Devices in conjunction with a SIMATIC and WinCC flexible 2008.

The faceplates can be transferred from the demo project to your own WinCC flexible 2008 project.

Faceplates are available for the process data and the diagnostics data.

6.9 Acyclic data exchange with the FB IOL_CALL

Tasks of the IO-Link Call function block FB1

For acyclic data exchange, the function block "IOL-CALL" is available as a download for controllers of the S7-1200 and S7-1500 families.

The block supports you in the following tasks:

- Parameter assignment of the monitoring relay for IO-Link during operation
- Executing IO-Link port functions
- Backing up/restoring IO-Link device parameters
- Backing up/restoring IO-Link master parameters

Use of the IO-Link Call function block FB1

- Install the demo project "IOL-CALL". You can obtain the demo project on the Internet (https://support.automation.siemens.com/WW/view/en/33102519/133100).
- Copy the IO-Link Call function block FB1 (including data block DB10) to a STEP 7 project.
- Use the IO-Link Call function block FB1 as described in the demo project.

6.10 Diagnostics via IO-Link

Temperature monitoring relays for IO-Link also support diagnostics via IO-Link in addition to diagnostics via LEDs and via the display.

The manufacturer-specific diagnostics listed in the table are reported via the diagnostic mechanism of IO-Link. The table below provides information on possible causes and remedial measures:

Table 6-1 Diagnostics via IO-Link - possible causes and remedial measures

Diagnostics and messages	Possible cause	Possible remedial measure
Invalid parameter	The set parameter is invalid.	Specify a parameter in accordance with the parameter table in Chapter ... .
Self-test error / internal error	Fault in internal test.	Return the device to the manufacturer.
Limit for overshoot exceeded	The temperature set is higher than the limit value set for overshoot.	• Reduce the temperature. • Set a higher limit.
Limit for undershoot violated	The temperature set is lower than the limit value set for undershoot.	• Increase the temperature. • Set a lower limit.
Temperature sensor 1, 2, or 3 - measuring range overshoot	The temperature is outside the permissible temperature range of the temperature sensor used.	Install and configure a suitable temperature sensor.
Temperature sensor 1, 2, or 3 - wire break	• The cable to the temperature sensor has a short-circuit. • The temperature sensor is defective.	• Check the connection to the temperature sensor. • Use a new temperature sensor.
Temperature sensor 1, 2, or 3 - short-circuit	• The connection to the temperature sensor has been interrupted. • The temperature sensor is defective.	• Check the connection to the temperature sensor. • Use a new temperature sensor.

The table below indicates how the manufacturer-specific diagnostics are reported:

Table 6-2 Diagnostics via IO-Link - Diagnostics and messages

Diagnostics and messages	**PII** [1]		**Data set 92**
	SF [2]	**SW** [3]	
Invalid parameter	x	—	x
Self-test error / internal error	x	—	x
Limit for overshoot exceeded	x	—	x
Limit for undershoot violated	x	—	x
Temperature sensor 1, 2, or 3 - measuring range overshoot	x	—	x
Temperature sensor 1, 2, or 3 - wire break	x	—	x
Temperature sensor 1, 2, or 3 - short-circuit	x	—	x

1) With the "process image input" (see Chapter "Process image output (PIQ) and input (PII) (Page 102)"), you can determine via the group error (SF) bit or group warning (SW) bit in the user program whether detailed information on diagnostics or messages is present in diagnostic data set 92. If bit (= 1) is set, you can obtain detailed information on what caused a "group error" or "group warning" by reading data set 92.

2) SF = group error: You can find detailed information in diagnostics data set 92 (see Chapter "Data set 92 - Diagnostics (Page 104)").

3) SW = group warning: You can find detailed information in diagnostics data set 92 (see Chapter "Data set 92 - Diagnostics (Page 104)").

x: Bit set

○: Not relevant

Sensor expansion module

7

7.1 Versions

The sensor expansion module is an optional module for expanding the input and output capacity of the system.

It provides two additional temperature inputs for resistance sensors, one relay output for output of the sensor status and an additional 4 mA ... 20 mA current input.

Note

If the current input 4 ... 20 mA is selected, the other inputs are inactive.

The power supply for the external temperature sensor with current output 4 ... 20 mA must be provided externally.

A maximum of two resistance sensors can be connected to the sensor expansion module. In connection with the digital device, up to three resistance sensors can then be connected.

The sensor expansion module is positioned directly to the right of the digital device. See Chapter Mounting position, installation width/overall depth, layout (Page 87).

7.2 Communication

The communication between the sensor expansion module and the digital basic unit is wireless by means of an infrared interface integrated in both devices.

7.3 Connection systems

The devices can be supplied with the connection systems detailed below:

- Screw terminals
- Spring-type terminals (push-in)

7.4 Sensor types

Resistance sensors

- Pt100 (monitoring for overshoot/undershoot)
- Pt1000 (monitoring for overshoot/undershoot)
- KTY83-110 (monitoring for overshoot/undershoot)

- KTY84 (monitoring for overshoot/undershoot)
- NTC [1] (monitoring for overshoot)

1) NTC type: B57227-K333-A1 (100 °C: 1.8 kΩ; 25 °C: 32.762 kΩ)

For more detailed information, refer to Chapter Resistance sensors (Page 69).

Note

Using the current input 4 ... 20 mA

If you use the 4 ... 20 mA current input (selectable via the operating menu), all other sensor inputs are inactive.

7.5 Operator control

7.5.1 LEDs

The following LEDs are mounted on the front of the sensor expansion modules:

3RS2900-1AA30
3RS2900-2AA30
3RS2900-1AW30
3RS2900-2AW30

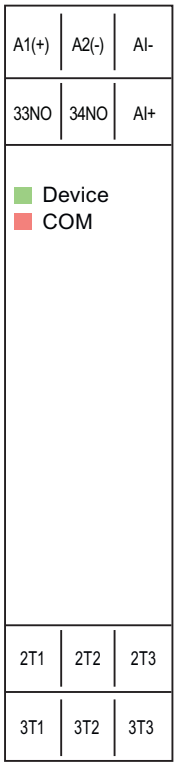


Figure 7-1 LEDs of the sensor expansion modules

7.5.2 Status display

Status	Green LED "Device"	Red LED "COM"
Device ready + communication set up	ON	OFF
Device ready + communication error	ON	Flickering
Device not ready / internal fault / no power supply	OFF	OFF

Thermocouples

8

8.1 Definition

A thermocouple is a sensor for electrical temperature monitoring. It is made from two different interconnected metals. A difference in temperature between the points where the two metals come into contact (measuring junction) and the evaluation unit produces a thermal e.m.f. that is directly dependent on this difference (Seebeck effect). As well as the difference in temperature, the types of metal used also determine the thermal e.m.f. Different types of metal can be combined to create thermocouples with different measuring ranges.

A typical example is the type K thermocouple, which is made from a nickel/chrome wire and a nickel/aluminum wire. The thermal e.m.f. is approx. 4 mV/100 K.

The main advantage of thermocouples is the wide temperature range they are able to cover.

8.2 Characteristic curves of thermocouples

The following characteristic curves show the temperature ranges of the thermocouples:

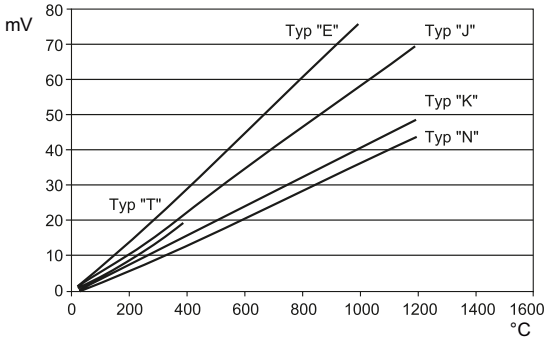


Figure 8-1 Thermocouples J, K, T, E, N

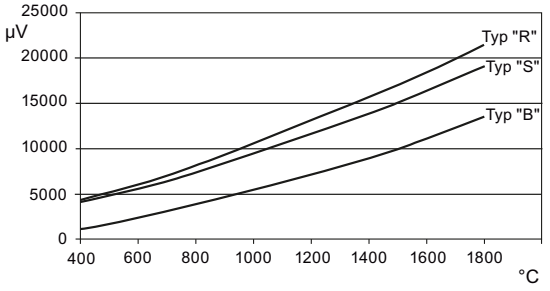


Figure 8-2 Thermocouples S, R, B

Resistance sensors

9

9.1 Definition

A resistance sensor is an electrical component which uses the temperature dependency of the electrical resistance of a conductor to measure temperature.

Different types of resistance sensors are available: PTC (positive temperature coefficient) and NTC (negative temperature coefficient).

PTC thermistors (e.g. Pt100/Pt1000 or KTY83/KTY84) are most commonly used in industrial temperature measurement applications.

The characteristic curve of KTY type resistance sensors is considerably less linear than that of Pt sensors. However, it exhibits a change in resistance in the event of temperature fluctuations that is approximately twice as high. KTY type resistance sensors are, therefore, highly sensitive but have a relatively small temperature measuring range.

9.2 Characteristic curves

The following characteristic curves show the temperature ranges of resistance sensors:

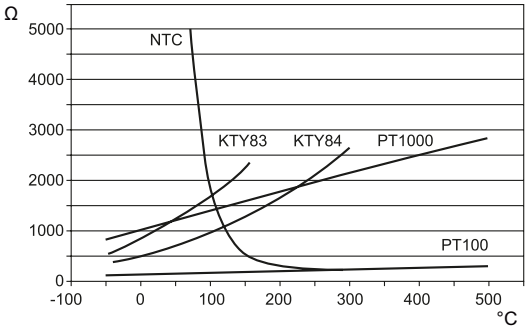


Figure 9-1 Temperature ranges of the resistance sensors

Circuit diagrams

10

10.1 Using the 3RS25 analog device to implement a simple 2-step controller

Example of wiring: Two-step heating control

The 3S25 analog device can be used to implement a simple two-step controller.

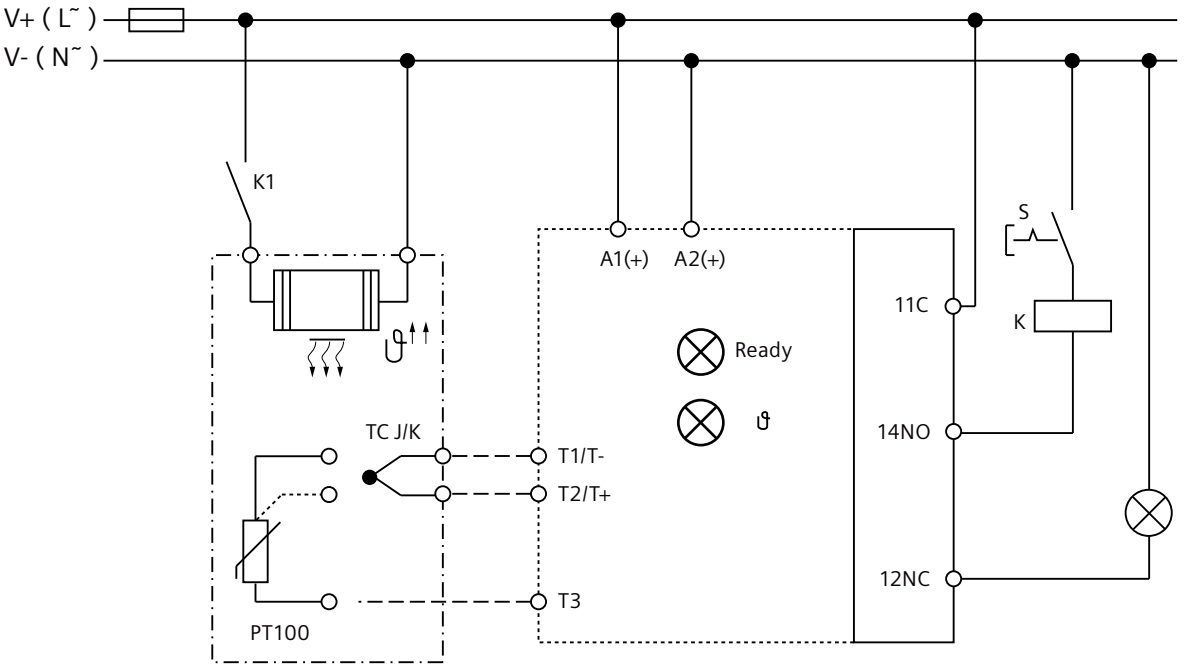


Figure 10-1 Simple two-step heating control

Terminals:

- Supply voltage: A1, A2
- Resistance sensors: T1, T2, T3
- Thermocouples: T+, T-
- Output/actuator: 14 N0, 11 C (change-over contact's NO contact)
- Signaling output: 12 NC, 11 C (change-over contact's NC contact)

Operating principle:

If the temperature set on the device is undershot, the output relay connects the heating.

10.2 Using the digital device to implement a simple 2-step controller with simultaneous output of an alarm value

Example of wiring: Simple two-step control

The digital device can be used to implement a simple two-step controller with simultaneous output of an alarm value.

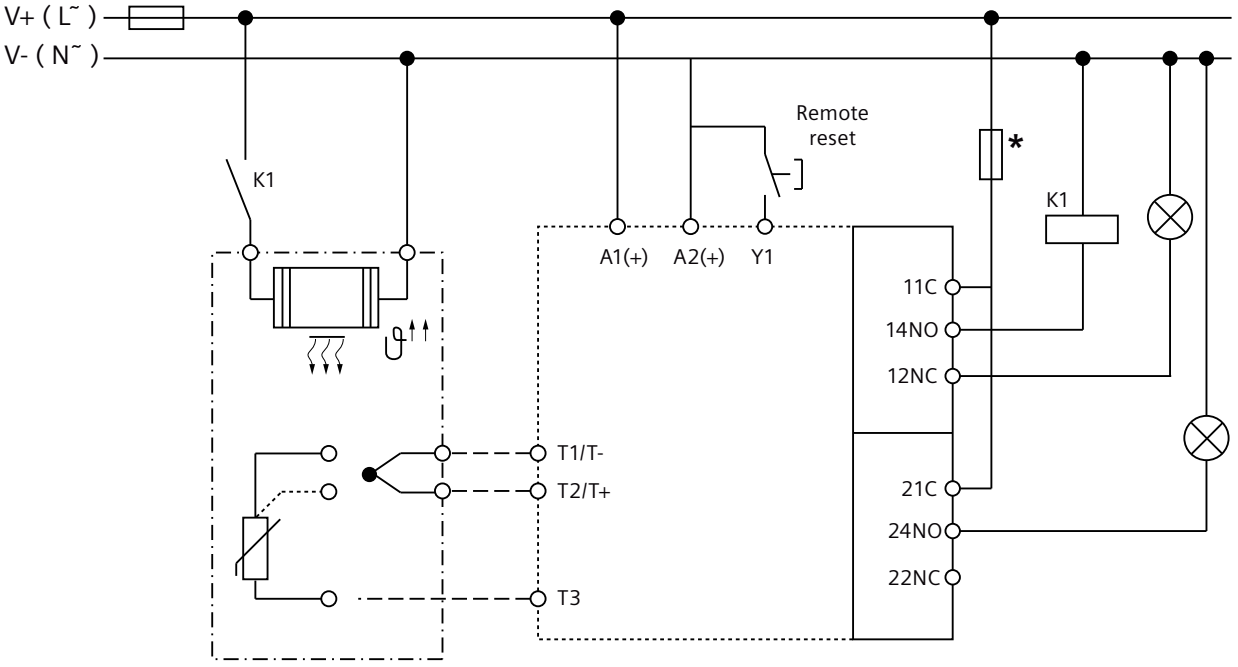


Figure 10-2 Two-step control (here with sensor expansion module)

Terminals:

- Supply voltage: A1, A2
- Manual reset: Push-button on Y1, A2 or on display
- Resistance sensors: T1, T2, T3
- Thermocouples: T+, T-
- Output/actuator: 14 N0, 11 C (change-over contact's NO contact)
- Signaling output: 12 NC, 11 C (change-over contact's NC contact)

Operating principle:

If the temperature set on the device is undershot, the output relay connects the heating.

10.3 Using the digital device to implement a simple 3-step controller with simultaneous output of an alarm value

Example of wiring: Simple three-step control (heating/cooling)

The digital device can also be used to implement a simple three-step control with simultaneous output of an alarm value.

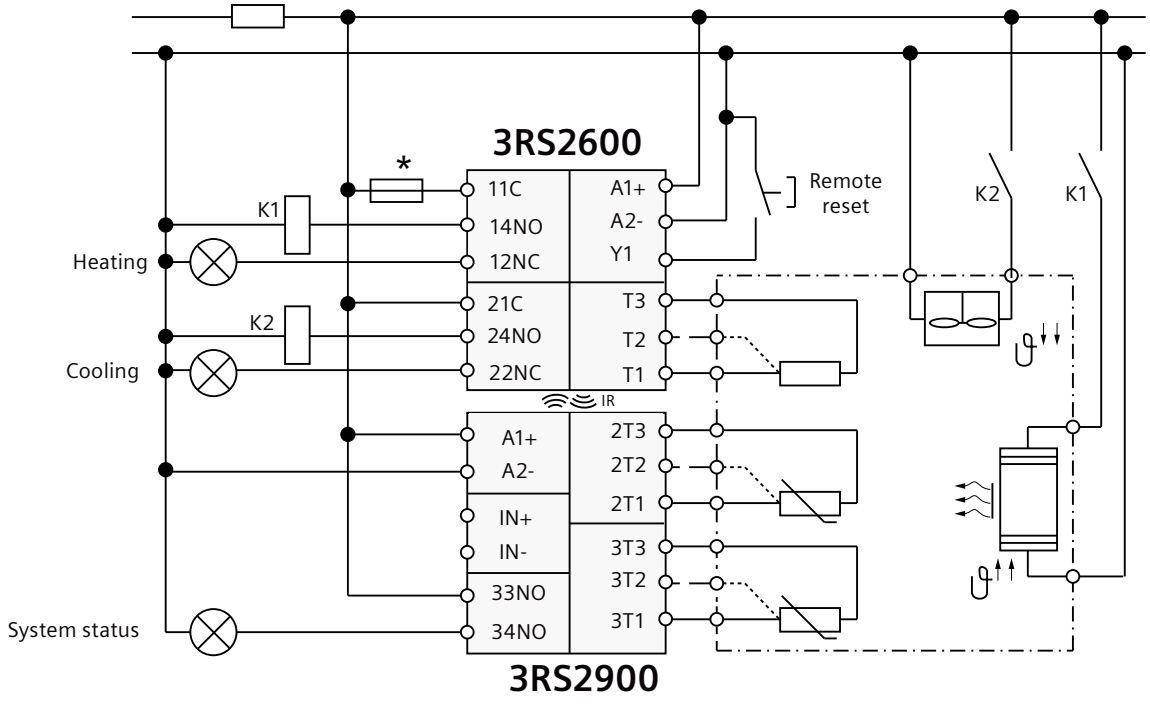


Figure 10-3 Three-step control (here with sensor expansion module)

Terminals:

- Supply voltage: A1, A2
- Manual reset: Push-button on Y1, A2 or on display
- Resistance sensors: T1, T2, T3
- Thermocouples: T+, T-
- Output/actuator: 14 N0, 11 C (change-over contact's NO contact)
- Signaling output: 12 NC, 11 C (change-over contact's NC contact)

Operating principle:

If the temperature set on the device is undershot, the output relay connects the heating. If the set temperature is exceeded, the cooling is connected.

Connection 11

11.1 Warning notices

⚠ WARNING

Hazardous voltage

Causes electric shock and burns when touched.

Turn off and lock out all power supplying the system and device before working on the device.

Note

The following figures are schematic representations

The figures below show a 22.5 mm enclosure. The overall width, overall depth, terminals (type and number of terminals) and accessories and mounted components are similar and may differ from the actual product.

11.2 General information

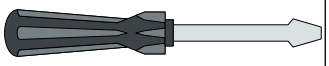
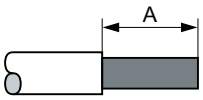
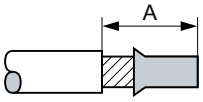
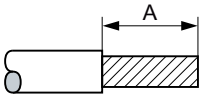
Special feature of the spring-type terminal:

Spring-type terminals are used for fast, vibration-proof wiring without the need for tools and with cable routing and terminal operation from the same direction.

Replacement of terminals:

Individual terminals can be replaced not only in the case of screw-type connections, but also in the case of spring-type connections (with push-in function). This process minimizes the wiring overhead – only the individual terminal concerned needs to be rewired, not the entire device.

11.3 Connection data for terminals

	Specification and value for removable terminals with screw terminals	**Specification and value for removable terminals with spring-type terminals (push-in terminals)**
Screwdriver 	Cross-tip screwdriver Size: PZ 1 x 80 (⌀ 4.5 mm) Torque: 0.6 ... 0.8 Nm (5.2 ... 7.0 lb/inch)	Flat-head screwdriver (3RA2908-1A) Size: 3 mm for operating the springs DIN 5264-A; 0.5 x 3
Rigid cable 	A = 10 mm 1 x 0.5 ... 4.0 mm^2 2 x 0.5 ... 2.5 mm^2	A = 10 mm 1 x 0.5 ... 4.0 mm^2
Flexible conductor with end sleeve 	A = 10 mm 1 x 0.5 ... 4.0 mm^2 2 x 0.5 ... 1.5 mm^2 1)	A = 10 mm 1 x 0.5 ... 2.5 mm^2 2 x 0.5 ... 1.5 mm^2 in shared ferrule 1)
Flexible cable 	Not permissible	A = 10 mm 1 x 0.5 ... 4.0 mm^2
AWG	1 x 20 ... 12 2 x 20 ... 14	1 x 20 ... 12

1) When 2 x 1.0 mm^2 end sleeves with a plastic sleeve are used, space problems may arise with the sleeves; as an alternative, you are advised to use end sleeves without plastic sleeves.

11.4 Terminal assignment

Location of the connections

The inside faces of the terminal covers are labeled with the designations of the relevant terminals. The position of the label corresponds to the position of the respective terminal.

NOTICE
Risk of property damage When using the terminals, you must observe the correct position of the terminals (see inside of cover).

Terminal cover

Note

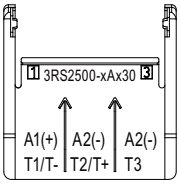
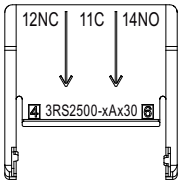
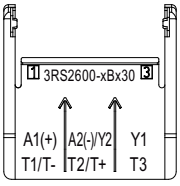
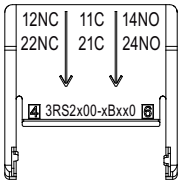
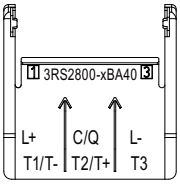
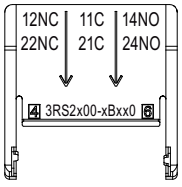
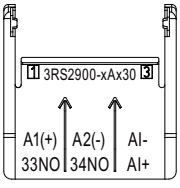
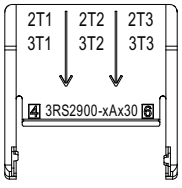
Terminal cover/article number

The complete article number is engraved on each terminal cover (upper and lower) via laser. The article numbers permit correct assignment of the terminal cover to the unit if you have removed the terminal cover. If a terminal cover is lost or damaged, you can simply print out the figures of the following table in their original size, and glue them into a neutral replacement terminal cover. You can obtain replacement terminal covers from Siemens Support.

You can use the terminal labels for modules with screw terminals and spring-type terminals.

Parts of the article numbers that are not necessary for assignment to the terminal functions are represented by periods as placeholders.

The following tables shows the terminal assignments in the terminal covers of the 3RS2 temperature monitoring relays:

Module version		Inscription of the terminal covers	
		Upper terminal cover	Lower terminal cover
Analog devices	3RS2500-1AA30 3RS2500-2AA30 3RS2500-1AW30 3RS2500-2AW30		
Digital devices	3RS2600-1BA30 3RS2600-2BA30 3RS2600-1BW30 3RS2600-2BW30		
Digital devices with IO-Link	3RS2800-1BA40 3RS2800-2BA40		
Sensor expansion module	3RS2900-1AA30 3RS2900-2AA30 3RS2900-1AW30 3RS2900-2AW30		

The table below contains an explanation of the terminal cover designations used:

Terminal designation	Explanation	
A1(+)	Power supply (+) Connection of 24V AC/DC or 24-240V AC/DC	
A2(-)	Power supply (-) Connection of 24V AC/DC or 24-240V AC/DC	
A2(-)/Y2	Power supply (-) Connection of 24V AC/DC or 24-240V AC/DC	Common terminal for power supply and reset input
Y1	Reset input Connection of floating NO contact between Y1 and Y2	
1T1/1T2/1T3	Sensor input 1 Connection of thermocouples	
2T1/2T2/2T3	Sensor input 2 Connection of thermocouples	
3T1/3T2/3T3	Sensor input 3 Connection of resistance sensors	
AI(+)	Analog input (+) Connection 4 mA ... 20 mA	
AI(-)	Analog input (-) Connection 4 mA ... 20 mA	
L+	Power supply IO-Link device (+)	
L-	Power supply IO-Link device (-)	
C/Q	Serial communication interface IO-Link interface	
11C/21C	Root of the change-over relay	
14NO/24NO	NO contacts of the change-over contacts	
12NC/22NC	NC contacts of the change-over contacts	
33NO/34NO	NO contacts relay 3	

11.5 Connection tool

The devices are equipped with either screw terminals or spring-type terminals.

The temperature monitoring relays can be adjusted with the following tool options:

Screw terminals

Screw terminals with ergonomic handling when using a standard screwdriver.

Spring-type terminals

Spring-type terminals for fast, vibration-proof wiring without the need for tools and with cable routing and terminal operation from the same direction.

11.6 Connecting the screw terminals

⚠ WARNING

Hazardous voltage
Can cause death, serious injury, or property damage.

Turn off and lock out all power supplying this device before working on this device.

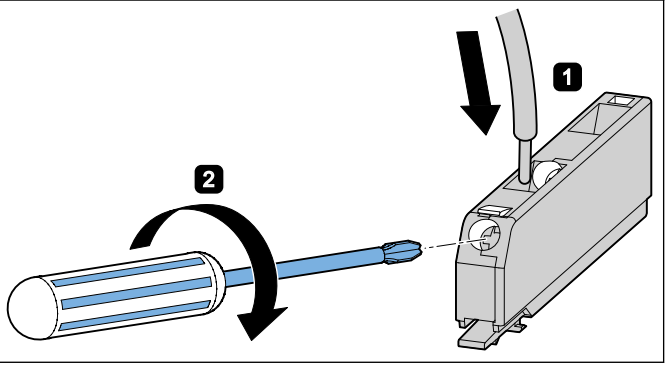
Tool

Cross-tip screwdriver size PZ 1 x 80

Requirements

For suitable connection cross-sections of the cables, see chapter Connection data for terminals (Page 76)

Connecting

Step	Instructions	Figure
1	Insert the relevant cable into the rectangular opening on the screw terminal until it engages. Hold the cable in the screw terminal.	
2	Tighten the screw with a torque of 0.6 to 0.8 N.	
3	Pull on the cable to ensure it is screwed tight.	

11.7 Disconnecting screw terminals

WARNING

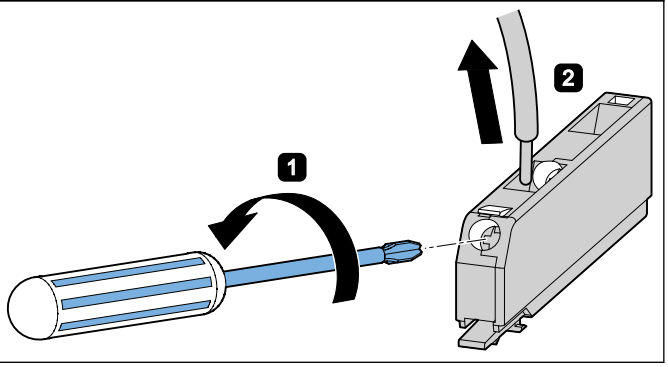
Hazardous voltage
Can cause death, serious injury, or property damage.

Turn off and lock out all power supplying this device before working on this device.

Tool

Cross-tip screwdriver size PZ 1 x 80

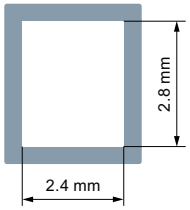
Disconnecting

Step	Instructions	Figure
1	Unscrew the screw of the screw terminal.	
2	Remove the cable from the unscrewed screw terminal.	

11.8 Wiring rules for spring-type terminals (with push-in technology)

Notes on handling spring-type terminals with push-in technology

The terminal space for the spring-type terminals is rectangular. The maximum overall dimensions of the conductor to be wired must not exceed 2.4 x 2.8 mm.



Take note of the orientation of the terminal space, which may require vertical fitting of rectangular-crimped conductors.

To make optimum use of available terminal space, you are advised to choose a form of crimping that creates a corresponding rectangular contour. Trapezoidal crimping is highly suitable in this case.

When a conductor is used that utilizes the full overall height, the terminal spring is deflected to the maximum. It may therefore be difficult to remove this conductor because it requires further deflection of the spring.

11.9 Connect the spring-type terminal (push-in)

⚠ WARNING
Hazardous voltage **Can cause death, serious injury, or property damage.** Turn off and lock out all power supplying this device before working on this device.

The spring-type (push-in) connections allow wiring without tools for rigid conductors or conductors equipped with end sleeves.

For wiring finely-stranded or stranded conductors without end sleeves on spring-type (push-in) terminals, a screwdriver is required to open the spring terminal.

Tool

DIN 5264 screwdriver with size 0.5 x 3 mm (for finely-stranded conductors only). (Article number of the screwdriver: 3RA2908-1A)

Requirements

For suitable connection cross-sections of the cables, see chapter Connection data for terminals (Page 76).

Connecting spring-loaded terminal

Table 11-1 Rigid conductors or conductors equipped with end sleeves

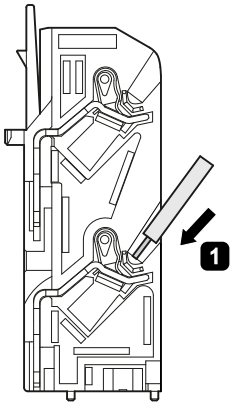
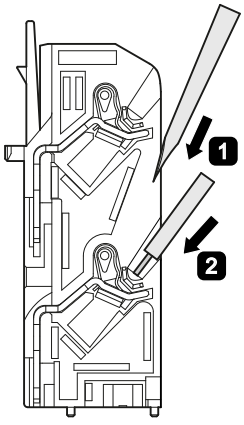
Step	Instructions	Figure
1	Insert the cable into the oval opening as far as it will go.	
2	Pull on the cable to ensure it is tight.	

Table 11-2 Finely stranded cables without end sleeve

Step	Instructions	Figure
1	Insert the screwdriver in the rectangular opening to open the terminal spring (oval opening).	
2	Insert the cable as far as it will go into the oval opening and remove the screwdriver.	
3	Pull on the cable to ensure it is tight.	

11.10 Disconnect the spring-type terminal (push-in)

⚠ WARNING

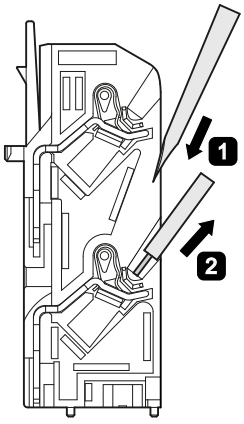
Hazardous voltage
Can cause death, serious injury, or property damage.

Turn off and lock out all power supplying this device before working on this device.

Tool

DIN 5264 screwdriver with size 0.5 x 3 mm (article number of the screwdriver: 3RA2908-1A)

Disconnecting spring-loaded terminal

Step	Instructions	Figure
1	Insert the screwdriver into the rectangular opening of the spring-type terminal until it engages.	
2	Remove the cable from the oval opening.	
3	Remove the screwdriver.	

11.11 Attaching the terminals

WARNING

Hazardous voltage
Can cause death, serious injury, or property damage.

Turn off and lock out all power supplying this device before working on this device.

Requirements

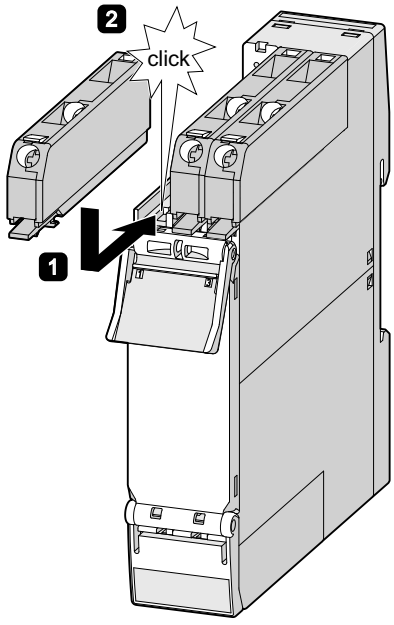
You must have removed the terminals, for the purpose of replacing a device, for example.

Attaching the terminals

Note

Screw terminals/push-in terminals

Screw and push-in terminals are inserted into the module using the same principle.

Step	Instructions	Figure
1	Insert the detachable terminals into the guide rail of the device.	
2	Slide the detachable terminals back until they audibly engage.	

11.12 Removing the terminals

⚠ WARNING

Hazardous voltage
Can cause death, serious injury, or property damage.

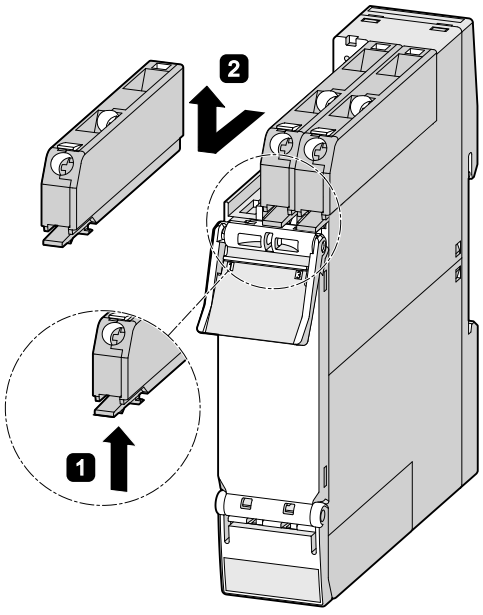
Turn off and lock out all power supplying this device before working on this device.

Removing the terminals

Note

Screw terminals/push-in terminals

Screw and push-in terminals are removed from the module on the same principle.

Step	Instructions	Figure
1	Press the clip of the terminals upwards.	
2	Pull the terminals out to the front.	
3	Lift the terminals out of the guide rail of the device.	

11.13 Connection of thermocouples and resistance sensors

NOTICE
Connection of thermocouples and resistance sensors
Connect the thermocouples and resistance sensors **before** switching on the device.

Selection of the temperature range and the sensor type

Analog variants

With an analog device, not only Pt100 sensors, but also thermocouples (J, K) can be used. Overshoot/undershoot, hysteresis and the measuring range are adjustable. Pt1000 sensors can only be used with the digital devices.

The maximum cable length for resistance sensors with a cable diameter of 1.5 mm^2 is 500 m.

Digital versions with display

Digital versions are suitable for all common resistance sensors and thermocouples (see Sensor types (Page 32)).

Sensor expansion module

Two additional resistance sensors can be connected with the sensor expansion module. This results in a total of three usable resistance sensors in combination with a 3RS26/3RS28 digital device.

Mounting 12

12.1 Warning notices

⚠ WARNING
Hazardous voltage
Causes electric shock and burns when touched.
Turn off and lock out all power supplying the system and device before working on the device.

Note

The following figures are schematic representations

The figures below show a 22.5 mm enclosure. The overall width, overall depth, terminals (type and number of terminals) and accessories and mounted components are similar and may differ from the actual product.

12.2 Mounting position, installation width/overall depth, layout

Mounting position

The devices are designed for the following mounting positions:

- Horizontal
- Vertical
- Horizontal.

Installation width/overall depth

The SIRIUS industrial enclosure has the following dimensions:

- Width of 22.5 mm
- Overall depth of 90 mm.

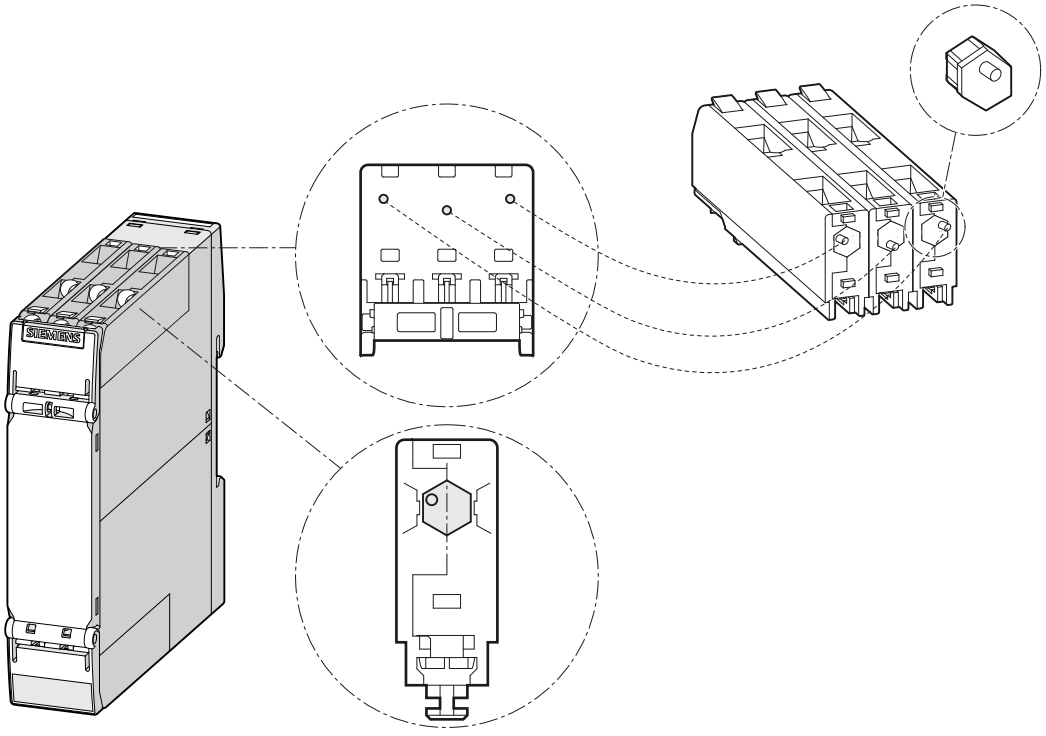
Arrangement of the modules

Position the sensor expansion module immediately to the right of the digital basic unit.

NOTICE
Visual contact necessary
Ensure that there is a visual contact between the sensor expansion module and the digital basic unit.

12.3 Terminal coding

You can provide the terminals with coding pins. This helps you to avoid errors when replacing the terminals.



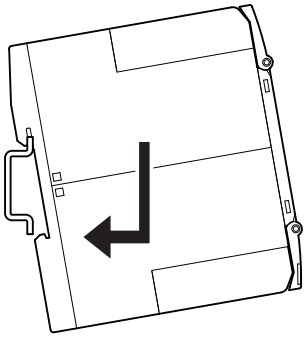
12.4 Mounting on a standard rail

⚠ WARNING
Hazardous Voltage
Can Cause Death, Serious Injury, or Property Damage.
Turn off and lock out all power supplying this device before working on this device.

Requirements

A horizontal 35-mm wide mounting rail in accordance with EN 60715 has been properly secured at the installation location.

Mounting on a standard rail

Step	Instructions	Figure
1	Place the back of the device onto the upper edge of the standard mounting rail.	
2	Press the lower half of the device against the standard mounting rail until the device engages.	

12.5 Disassembling from a standard mounting rail

⚠ WARNING

Hazardous Voltage

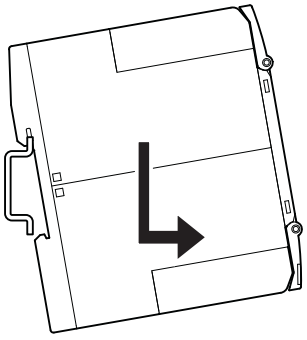
Can Cause Death, Serious Injury, or Property Damage.

Turn off and lock out all power supplying this device before working on this device.

Requirements

The terminals have been removed or disconnected.

Disassembling from a standard mounting rail

Step	Instructions	Figure
1	Press the device downwards.	
2	Pull the lower half of the device away from the standard mounting rail.	
3	Lift the device from the upper edge of the standard mounting rail.	

12.6 Mounting on a level surface

WARNING

Hazardous Voltage

Can Cause Death, Serious Injury, or Property Damage.

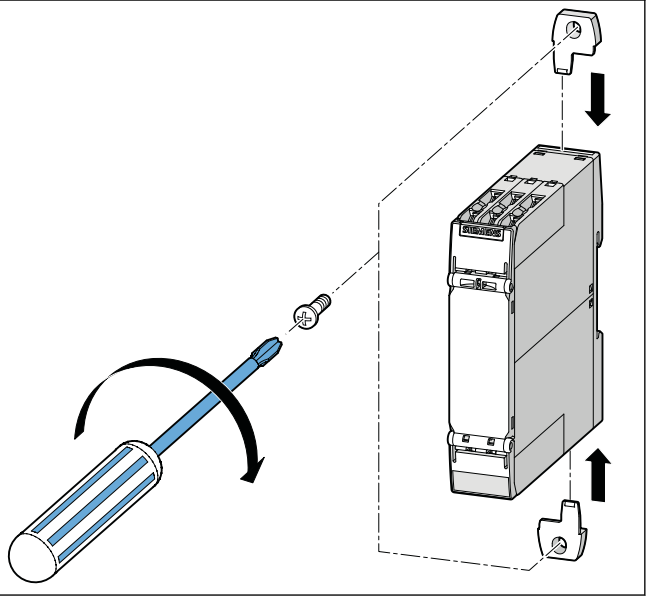
Turn off and lock out all power supplying this device before working on this device.

Requirements

Please note the following requirements for mounting on a level surface:

- A vertical mounting surface is recommended for the enclosure.
- Two correctly drilled holes, threaded or with plug on the level surface
  Refer to the dimension drawings in Chapter (see CAx data (Page 97)) for the distances between the drill holes.
- Two screws to fit the M4 x 12 holes in accordance with DIN 784.
- Two mounting lugs. You will find the article numbers in Chapter Spare parts/accessories (Page 99).

Mounting on a level surface

Step	Instructions	Figure
1	Insert the securing brackets into the openings provided on the device until they engage.	
2	Hold the device up to the level surface prepared for screw fastening.	
3	Insert the head screws through the corresponding elongated holes in the fixing lugs.	
4	Screw the device securely onto the level surface. Tightening torque: 1 Nm	

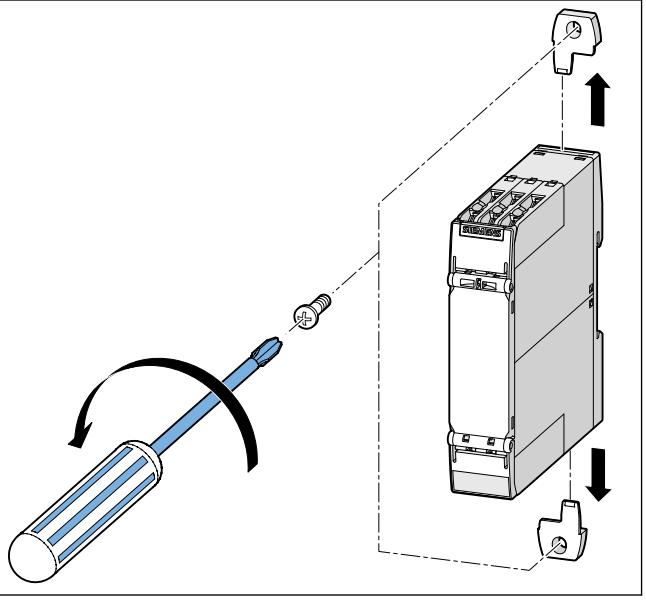
12.7 Disassembling from a level surface

⚠ WARNING
Hazardous Voltage
Can Cause Death, Serious Injury, or Property Damage.
Turn off and lock out all power supplying this device before working on this device.

Requirements

The terminals have been removed or disconnected.

Disassembling from a level surface

Step	Instructions	Figure
1	Hold the device firmly.	
2	Unscrew the cap screws.	
3	Lift the device from the level surface.	
4	Remove the securing brackets from the device.	

Technical data

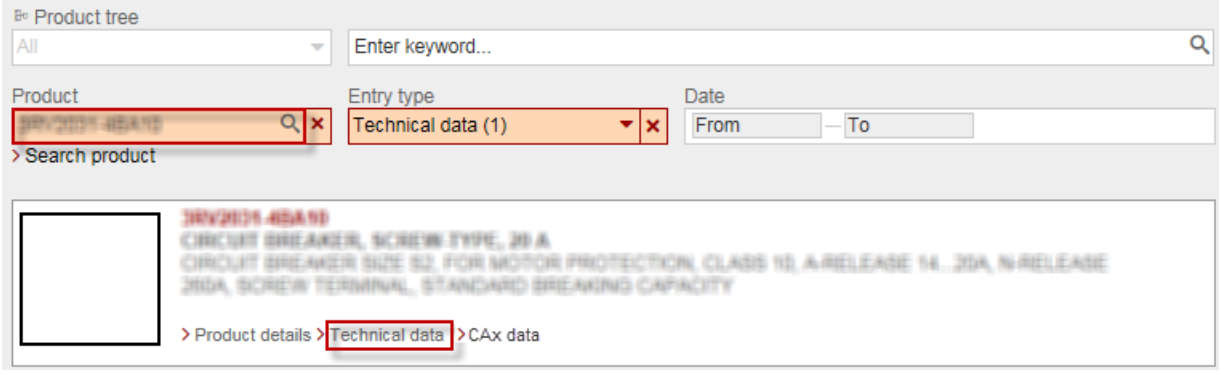
13

13.1 Technical data in Siemens Industry Online Support

Technical data sheet

You can also find the technical data of the product at Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/).

1. Enter the full article number of the desired device in the "Product" field, and confirm with the Enter key.
2. Click the "Technical data" link.



13.2 Insulation concept of the plant

WARNING

Design of the isolation concept

When designing the insulation concept, note the dielectric properties of the devices.

See the following circuit diagrams.

=: Reinforced insulation (3RS2800)

-: Basic insulation (all variants)

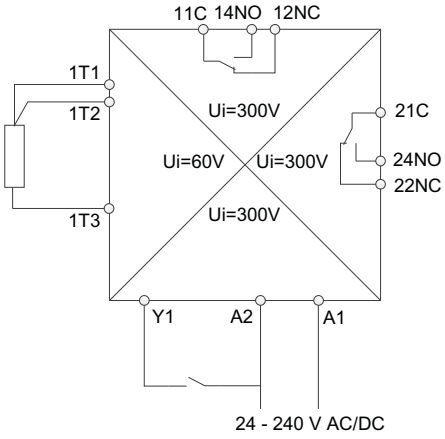


Figure 13-1 Isolation circuit diagram 3RS2600-.BW30

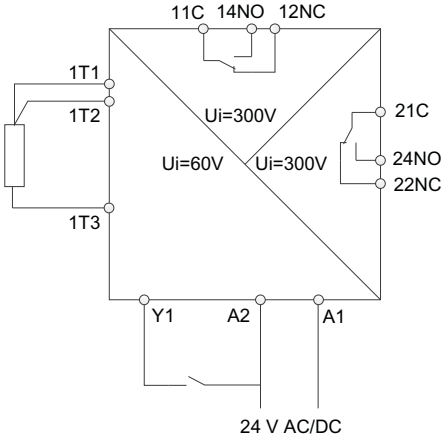


Figure 13-2 Isolation circuit diagram 3RS2600-.BA30

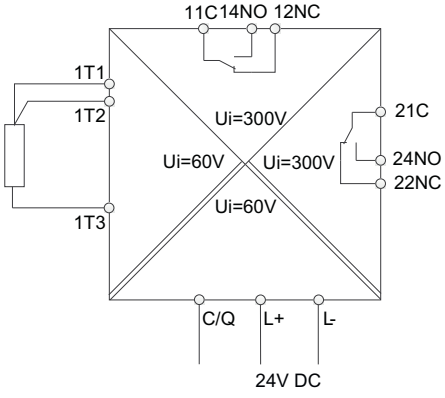


Figure 13-3 Isolation circuit diagram 3RS2800

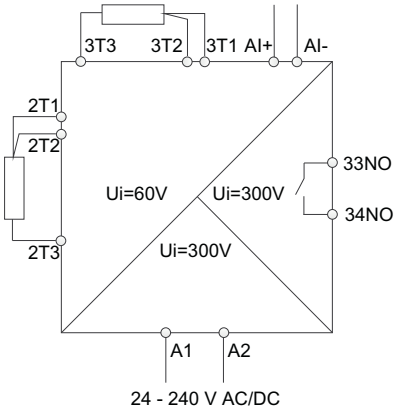


Figure 13-4 Isolation circuit diagram 3RS2900-.AW30

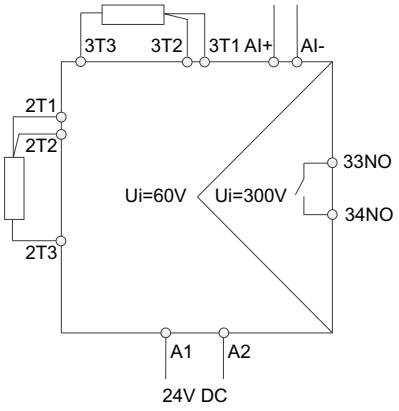


Figure 13-5 Isolation circuit diagram 3RS2900-.AA30

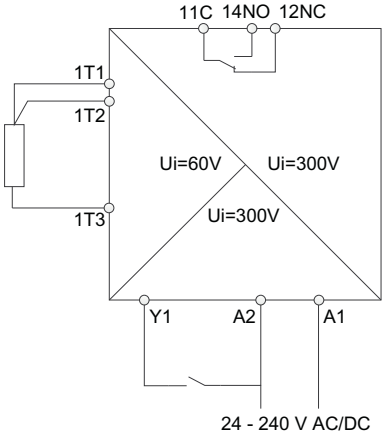


Figure 13-6 Isolation circuit diagram 3RS2500-..W..

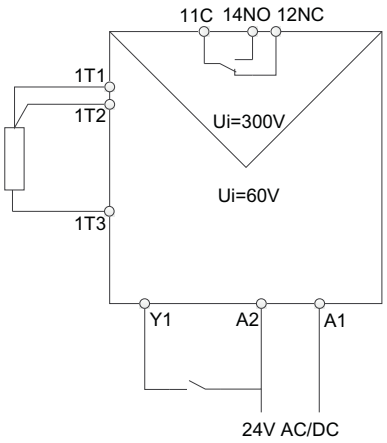


Figure 13-7 Isolation circuit diagram 3RS2500-..A..

CAx data

14

14.1 CAx data types

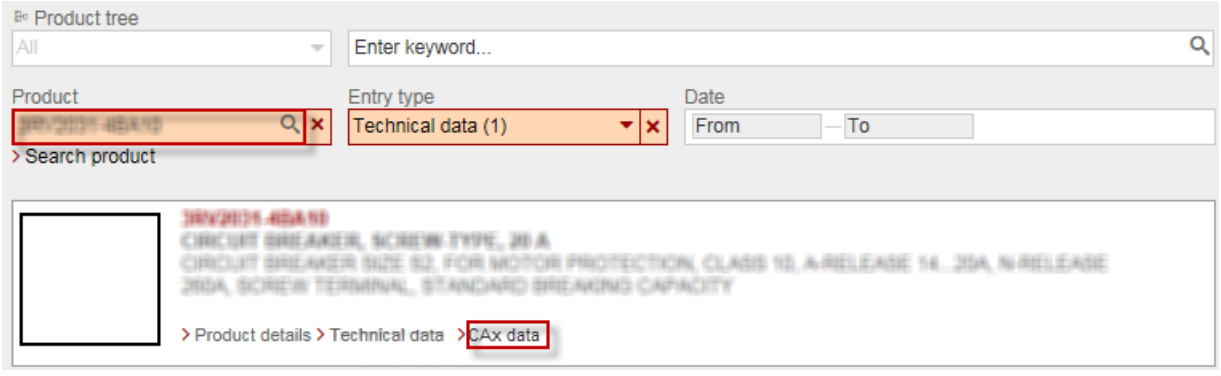
You can choose from the following information for products:

- Reduced 3D model
- 2D dimension drawing
- 3D rendering
- Connection diagram
- Wiring diagram
- EPLAN macro files
- Pro Panel macro files
- AutoCAD electrical data
- GSP in ANSI
- ecl@ss functional structure

14.2 CAx data

You can find the CAx data in the Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/).

1. Enter the full article number of the desired device in the "Product" field, and confirm with the Enter key.
2. Click the "CAx data link.



Spare parts/accessories

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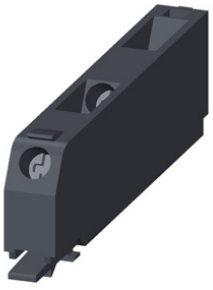
15.1 Overview

The table below shows the accessories available for the SIRIUS 3RS2 temperature monitoring relays:

Designation	Graphic	Article number
SIRIUS terminal 2-pin screw-type		3ZY1122-1BA00
SIRIUS terminal, 2-pole, push-in, 1 mm² x 4 mm²		3ZY1122-2BA00
SIRIUS push-in lugs for wall mounting (contents: 12 units)		3ZY1311-0AA00
Coding pins for SIRIUS terminals		3ZY1440-1AA00
Hinged lid: Replacement cover, without terminal labeling (22.5 mm wide)		3ZY1450-1AB00

15.2 Terminals

⚠ WARNING

Hazardous voltage
Can cause death, serious injury, or property damage.

Turn off and lock out all power supplying this device before working on this device.

In the SIRIUS industrial enclosure, individual terminals can be replaced. When replacing a terminal, it is only necessary to renew the wiring to this terminal.

You can assign the terminals on the basis of the labeled terminal covers.

See also Connection (Page 75).

15.3 Device fusing

The 3RS26/3RS28 digital devices can be protected by a PIN to protect the buttons against unauthorized or unintentional actuation.

Process data and data sets

16

16.1 Data sets - structure

Table 16-1 Device-independent data sets

Data set		Name	Access (r = readable, w = writable)	Value	Length (bytes)
Address (dec)	Subindex supported				
0x00 (0)	Yes	**Parameter Page 0**	r	—	16
0x10 (16)	No	Vendor Name	r	SIEMENS AG	11
0x11 (17)	No	Vendor Text	r	Vendor text (http://support.automation.siemens.com/WW/view/en/29801139/130000)	max. 64
0x12 (18)	No	Product Name	r	*Device name* [1] (e.g. SIRIUS Line Monitoring Relay for IO-Link)	max. 64
0x13 (19)	No	Product ID	r	*Article number* [1] (e.g. 3RS2800-1BA40)	14
0x17 (23)	No	Firmware Revision	r	*Firmware version* [1]	7
0x18 (24)	No	Application Specific Tag	r / w	—	max. 32

1) This value is different for each device

16.2 Data sets - Overview

- Process image output (PIQ) and input (PII) (Page 102)
- Identification data (Page 103)
- Data set 92 - Diagnostics (Page 104)
- Data set 94 - measured values (Page 106)
- Data set 95 - measured values (floating-point format) (Page 107)
- Data set 131 - parameters (Page 107)

16.3 Process image output (PIQ) and input (PII)

Process image output (PIQ)

The process image outputs contains the control commands for the temperature monitoring relays ...

Table 16-2 PIQ - Control commands

DO (2 bytes)	PIQ
DO0.0	1: Start ON-delay time
DO0.1	---
DO0.2	---
DO0.3	1: Reset
DO0.4	---
DO0.5	---
DO0.6	---
DO0.7	---
DO1.0 - DO1.7	---

Process image input (PII)

The process image input contains the most important status information of the temperature monitoring relay ....

Table 16-3 PII - status information

DI (4 bytes)	PII
DI0.0	Ready
DI0.1	---
DI0.2	1: Group error
DI0.3	1: General warning
DI0.4	Status output relay K1 • 1: 14NO / 11C closed and 12NC / 11C open • 0: 12NC / 11C closed and 14NO / 11C open
DI0.5	Status output relay K2 • 1: 24NO / 21C closed and 22NC / 21C open • 0: 22NC / 21C closed and 24NO / 21C open
DI0.6	Status output relay K3 • 1: 33NO / 34NO closed • 0: 33NO / 34NO open
DI0.7	---
DI1.0 - DI1.4	Analog value coding bits 0 to 4
DI1.5	---
DI1.6	---

DI (4 bytes)	PII
DI1.7	---
DI2.0 - DI3.7	Analog value[1)]

1) The analog value is a 16-bit integer value. The complete measured value is produced together with the analog value coding (DI1.0 - DI1.4), which defines the unit and resolution of the analog value.

16.4 Identification data

Identification data refers to data stored in a module that supports you in the following areas:

- When checking the system configuration
- When locating modified system hardware
- When troubleshooting a system.

Modules can be uniquely identified using the identification data.

Table 16-4 Identification data

DPP [1)] Index (dec)	Data set Index (dec)	Access	Parameter	Length (bytes)	Default setting
0x07 (7)	—	r	Vendor ID	2	0x00
0x08 (8)	—	r			0x2A
0x09 (9)	—	r	Device ID	3	0x09
0x0A (10)	—	r			0x07
0x0B (11)	—	r			0x30
—	0x10 (16)	r	Vendor Name	11	SIEMENS AG
—	0x11 (17)	r	Vendor Text	max. 64	Vendor text (http://support.automation.siemens.com/WW/view/en/29801139/130000)
—	0x12 (18)	r	Product Name	max. 64	SIRIUS temperature monitoring relays 3RS2800
—	0x13 (19)	r	Product ID	14	3RS2800-.BA40
—	0x17 (23)	r	Firmware Revision	7	Firmware Version [2)]
—	0x18 (24)	r / rw	Application Specific Tag	32 max.	—

1) Direct Parameter Page

2) Value varies for each temperature monitoring relay

16.5 Data set 92 - Diagnostics

Note

Bits that are not described in the tables below are reserved and should be ignored.

Note

Sub-indices are not supported.

Table 16-5 Data set 92 - Diagnostics

Byte.Bit	Description
Operating system functions 3RS2	
16.0	Ready
16.1	Group error
16.2	Group warning
16.3	*Reserved*
16.4	Sensor expansion module - communication error
16.5	Parameter assignment active
16.6	Invalid parameter
16.7	Self-test error / internal error
17.0	Parameter confirmation required
18.0 ... 19.7	Incorrect parameter number
Temperature monitoring	
26.0	ON-delay time running
26.1	Tripping delay time running (limit value ϑ1)
26.2	Tripping delay time running (limit value ϑ2)
27.0	Limiting value ϑ1 overshot/undershot
27.1	Limiting value ϑ2 overshot/undershot
27.2	Warning limit ϑ1 overshot/undershot
27.3	Warning limit ϑ2 overshot/undershot
27.4	*Reserved*
Temperature sensor 1	
28.0	Temperature sensor 1 - Measuring range overshoot
28.1	Temperature sensor 1 - Wire break
28.2	Temperature sensor 1 - Short-circuit
28.3	*Reserved*
29.0	Temperature sensor 1 - Measured value is above the two limit values (monitoring for overshoot)
29.1	Temperature sensor 1 - Measured value is above the first limit value (monitoring for overshoot)
29.2	Temperature sensor 1 - Measured value is within range of limit values
29.3	Temperature sensor 1 - Measured value is below the first limit value for overshoot (monitoring for undershoot)
29.4	Temperature sensor 1 - Measured value is below the two limit values (monitoring for undershoot)

Byte.Bit	Description
30.0	Temperature sensor 1 - Measured value is above the two warning limits (monitoring for overshoot)
30.1	Temperature sensor 1 - Measured value is above the first warning limit (monitoring for overshoot)
30.2	Temperature sensor 1 - Measured value is within range of warning limits
30.3	Temperature sensor 1 - Measured value is below the first warning limit for overshoot (monitoring for undershoot)
30.4	Temperature sensor 1 - Measured value is below the two warning limits (monitoring for undershoot)
Temperature sensor 2	
32.0	Temperature sensor 2 - Measuring range overshoot
32.1	Temperature sensor 2 - Wire break
32.2	Temperature sensor 2 - Short-circuit
32.3	*Reserved*
33.0	Temperature sensor 2 - Measured value is above the two limit values (monitoring for overshoot)
33.1	Temperature sensor 2 - Measured value is above the first limit value (monitoring for overshoot)
33.2	Temperature sensor 2 - Measured value is within range of limit values
33.3	Temperature sensor 2 - Measured value is below the first limit value for overshoot (monitoring for undershoot)
33.4	Temperature sensor 2 - Measured value is below the two limit values (monitoring for undershoot)
34.0	Temperature sensor 2 - Measured value is above the two warning limits (monitoring for overshoot)
34.1	Temperature sensor 2 - Measured value is above the first warning limit (monitoring for overshoot)
34.2	Temperature sensor 2 - Measured value is within range of warning limits
34.3	Temperature sensor 2 - Measured value is below the first warning limit for overshoot (monitoring for undershoot)
34.4	Temperature sensor 2 - Measured value is below the two warning limits (monitoring for undershoot)
Temperature sensor 3	
36.0	Temperature sensor 3 - Measuring range overshoot
36.1	Temperature sensor 3 - Wire break
36.2	Temperature sensor 3 - Short-circuit
36.3	*Reserved*
37.0	Temperature sensor 3 - Measured value is above the two limit values (monitoring for overshoot)
37.1	Temperature sensor 3 - Measured value is above the first limit value (monitoring for overshoot)
37.2	Temperature sensor 3 - Measured value is within range of limit values
37.3	Temperature sensor 3 - Measured value is below the first limit value for overshoot (monitoring for undershoot)
37.4	Temperature sensor 3 - Measured value is below the two limit values (monitoring for undershoot)
38.0	Temperature sensor 3 - Measured value is above the two warning limits (monitoring for overshoot)
38.1	Temperature sensor 3 - Measured value is above the first warning limit (monitoring for overshoot)
38.2	Temperature sensor 3 - Measured value is within range of warning limits
38.3	Temperature sensor 3 - Measured value is below the first warning limit for overshoot (monitoring for undershoot)
38.4	Temperature sensor 3 - Measured value is below the two warning limits (monitoring for undershoot)
Current input 4 ... 20 mA	
40.0	Current input - measuring range overstepping
40.1	*Reserved*

Byte.Bit	Description
40.2	*Reserved*
40.3	*Reserved*
41.0	Current input - Measured value is above the two limit values (monitoring for overshoot)
41.1	Current input - Measured value is above the first limit value (monitoring for overshoot)
41.2	Current input - Measured value is within range of limit values
41.3	Current input - Measured value is below the first limit value for overshoot (monitoring for undershoot)
41.4	Current input - Measured value is below the two limit values (monitoring for undershoot)
42.0	Current input - Measured value is above the two warning limits (monitoring for overshoot)
42.1	Current input - Measured value is above the first warning limit (monitoring for overshoot)
42.2	Current input - Measured value is within range of limit values
42.3	Current input - Measured value is below the first warning limit for overshoot (monitoring for undershoot)
42.4	Current input - Measured value is below the two warning limits (monitoring for undershoot)

16.6 Data set 94 - measured values

Note

Bits that are not described in the tables below are reserved and should be ignored.

Note

Sub-indices are not supported.

Table 16-6 Data set 94 - measured values

Byte.Bit	Description
Temperature monitoring	
16.0 ... 17.7	Temperature in °C (temperature sensor 1)
18.0 ... 19.7	Temperature in °F (temperature sensor 1)
20.0 ... 21.7	Temperature in °C (temperature sensor 2)
22.0 ... 23.7	Temperature in °F (temperature sensor 2)
24.0 ... 25.7	Temperature in °C (temperature sensor 3)
26.0 ... 27.7	Temperature in °F (temperature sensor 3)
28.0 ... 29.7	Temperature T_{min} in °C
30.0 ... 31.7	Temperature T_{min} in °F
32.0 ... 33.7	Temperature T_{max} in °C
34.0 ... 35.7	Temperature T_{max} in °F
36.0 ... 37.7	Temperature T_{avg} in °C
38.0 ... 39.7	Temperature T_{avg} in °F
40.0 ... 41.7	Current input

16.7 Data set 95 - measured values (floating-point format)

Table 16-7 Data set 95 - measured values (floating-point format)

Byte.Bit	Description
Temperature monitoring	
16.0 ... 19.7	Temperature in °C (temperature sensor 1)
20.0 ... 23.7	Temperature in °F (temperature sensor 1)
24.0 ... 27.7	Temperature in °C (temperature sensor 2)
28.0 ... 31.7	Temperature in °F (temperature sensor 2)
32.0 ... 35.7	Temperature in °C (temperature sensor 3)
36.0 ... 39.7	Temperature in °F (temperature sensor 3)
40.0 ... 43.7	Temperature T_{min} in °C
44.0 ... 47.7	Temperature T_{min} in °F
48.0 ... 51.7	Temperature T_{max} in °C
52.0 ... 55.7	Temperature T_{max} in °F
56.0 ... 59.7	Temperature T_{avg} in °C
60.0 ... 63.7	Temperature T_{avg} in °F
64.0 ... 47.7	Current input

16.8 Data set 131 - parameters

Note

Bits that are not described in the tables below are reserved and should be ignored.

Note

Sub-indices are not supported.

Table 16-8 Data set 131 - parameters

Byte.Bit	Description
Operating system functions	
16.0	Group diagnostics Default: [1] [0] disabled [1] enabled
16.1	Group error diagnostics Default: [1] [0] disabled [1] enabled
16.2	*Reserved*

Byte.Bit	Description
16.3	*Reserved*
16.4	Local limit change Default: [1] [0] disabled [1] enabled
16.5	Local parameter change Default: [1] [0] disabled [1] enabled
16.6	Local reset Default: [1] [0] disabled [1] enabled
16.7	Retentive error memory Default: [1] [0] disabled [1] enabled
17.0 ... 17.7	Analog value coding Type: BYTE Default: 5 Min: 1 Max: 160
Temperature monitoring	
24.0	Reset Default: [0] [0] manual [1] auto
24.1	*Reserved*
24.2 ... 24.4	Monitoring mode Default: [0] [0] Overshoot [1] Undershoot [2] Window monitoring
24.5 ... 24.7	Temperature unit Default: [0] [0] °C (degrees Celsius) [1] °F (degrees Fahrenheit) [2] mA [3] %
25.0	ON-delay time (at Power ON) Default: [0] [0] disabled [1] enabled

Byte.Bit	Description
25.1	*Reserved*
25.2	ON-delay time (at manual reset) Default: [0] [0] disabled [1] enabled
25.3 ... 25.7	*Reserved*
26.0 ... 27.7	Startup Delay Type: INT Resolution: 0.1 s = 1 Default: 0 Min: 1 or 0 (disabled) Max: 9999 * 0.1 s = 999.9 s
28.0 ... 29.7	Tripping delay time (if the temperature is overshot or undershot) Type: INT Resolution: 0.1 s = 1 Default: 0 Min: 1 or 0 (disabled) Max: 9999 * 0.1 s = 999.9 s
30.0 ... 31.7	*Reserved*
32.0	Sensor 1 enabled Default: [1] [0] disabled [1] enabled
32.1	Sensor 2 enabled Default: [0] [0] disabled [1] enabled
32.2	Sensor 3 enabled Default: [0] [0] disabled [1] enabled
32.3	Current input 4...20 mA enabled Default: [0] [0] disabled [1] enabled
32.4	Sensor expansion module / output relay K3 Default: [0] [0] disabled [1] enabled

Byte.Bit	Description	
33.0 ... 33.7	Sensor type Type: BYTE Default: 128	
	128 = Pt100 (2-wire)	1 = J
	129 = Pt1000 (2-wire)	2 = K
	130 = KTY83 (2-wire)	3 = T
	131 = KTY84 (2-wire)	4 = E
	132 = NTC (2-wire)	5 = N
	136 = Pt100 (3-wire)	6 = S
	137 = Pt1000 (3-wire)	7 = R
	138 = KTY83 (3-wire)	8 = B
	139 = KTY84 (3-wire)	160 = current input 4 ... 20 mA
	140 = NTC (3-wire)	
34.0 ... 35.7	Limit ϑ1 Type: INT Default: 80 Min: -50 °C (resistance sensors) / -99 °C (thermocouples) Max: 750 °C (resistance sensors)/1800 °C (thermocouples)	
36.0 ... 37.7	Limit ϑ2 Type: INT Default: 50 Min: -50 °C (resistance sensors) / -99 °C (thermocouples) Max: 750 °C (resistance sensors)/1800 °C (thermocouples)	
38.0 ... 39.7	Warning limit for ϑ1 Type: INT Default: 75 Min: -50 °C (resistance sensors) / -99 °C (thermocouples) Max: 750 °C (resistance sensors)/1800 °C (thermocouples)	
40.0 ... 41.7	Warning limit for ϑ2 Type: INT Default: 45 Min: -50 °C (resistance sensors) / -99 °C (thermocouples) Max: 750 °C (resistance sensors)/1800 °C (thermocouples)	
46.0 ... 47.7	Hysteresis Type: INT Default: 5 °C / 5 °F Min: 1 °C/1 °F Max: 999 °C / 999 °F	
48.0	Relay switching behavior Default: [0] [0] Quiescent current principle [1] Open-circuit principle	
49.0 ... 49.7	*Reserved*	

Byte.Bit	Description		
50.0 ... 51.7	Current input 4 ... 20 mA - minimum range [1)] Type: INT Default: 40		
	Selected unit	°C / °F	%
	Min:	-200	0
	Max:	9999	150
52.0 ... 53.7	Current input 4 ... 20 mA - maximum range [1)] Type: INT Default: 80		
	Selected unit	°C / °F	%
	Min:	-200	0
	Max:	9999	150
54.0 ... 55.7	Offset Sensor 1 Type: INT Default: 0 Min: -99 Max: 99		
56.0 ... 57.7	Offset Sensor 2 Type: INT Default: 0 Min: -99 Max: 99		
58.0 ... 59.7	Offset Sensor 3 Type: INT Default: 0 Min: -99 Max: 99		
60.0 ... 61.7	Offset current input 4 ... 20 mA Type: INT Default: 0 Min: -10.0 mA / - 99 °C / °F Max: 10.0 mA / 99 °C / °F Reading always returns 0		
62.0 ... 63.7	Comparison measuring point in °C / °F Type: INT Default: 0 Min: -25 °C / -13 °F Max: 80 °C / 176 °F Reading always returns 0		
64.0	Eco mode Default: [1] [0]: disabled [1]: enabled		

Byte.Bit	Description
64.1	PIN protection Default: [0] [0]: disabled [1]: enabled
64.2	External comparison measuring point Default: [0] [0]: disabled [1]: enabled
65.0 ... 65.7	*Reserved*
66.0 ... 67.7	PIN Type: UINT Default: 0 Min: 0 Max: 999 Reading always returns 0
68.0 ... 69.7	New PIN Type: UINT Default: 0 Min: 0 Max: 999 Reading always returns 0
70.0 ... 70.7	Device mode Type: BYTE Default: [0] [0] standard [1] ATEX [2] Temperature monitor TW [3] Temperature limiter TB
71.0 ... 71.7	*Reserved*

1) If the unit is mA, this parameter has no effect

Glossary

ECO mode

Energy-saving display mode. The display therefore goes dark after an idle time, thereby reducing the energy consumption.

Infrared communication

Wireless communication between individual devices for data transmission using light in the infrared waveband.

IO-Link

Point-to-point connection to conventional and intelligent sensors/actuators by unshielded standard cables using 3-wire technology.

Open-circuit principle

The mode of operation of electrically operated functional parts, whereby the function is guaranteed when current is flowing ("working current").

Output relay

Relay in the output (of the control circuit).

Quiescent current principle

The mode of operation of electrically operated functional parts, whereby the function is guaranteed not by the presence of a voltage, but by the absence of current ("quiescent current principle").

Resistance sensor

Sensor that contains a resistor for recording the measured variable.

Screw terminal

Device for the connection and/or coupling and subsequent release of one or more conductors, the connection being established either directly or indirectly by means of any types of screw or nut.

Screw-type connection system

Connection technology in which an electrical cable is clamped by a screw.

Sensor expansion module

Additional module for the digitally adjustable temperature monitoring relay. This has two additional inputs for the connection of temperature sensors of types Pt100, Pt1000, KTY83-110, KTY84 and NTC, as well as an analog value input (4 ... 20 mA) and an output relay for sensor monitoring.

SIRIUS industrial enclosure

Enclosure with certain standardized dimensions (e.g. width of 22.5 or 45 mm) for various devices intended for control cabinet installation.

Spring-type connection system

Screwless and vibration-resistant connection technology for single, multiple and finely stranded electrical connecting cables in which the electrical conductors are clamped by spring force.

Standard mounting rail

Mounting rail for snap-on installation, e.g. C-rail (35 mm), which is used preferentially for mounting components in the control cabinet. In addition to the function as a carrier of components, standard mounting rails are very often used as grounding bars.

Standard rail mounting

Fixing to a standard mounting rail provided for this purpose, which is designed in accordance with DIN EN 50022.

Temperature limiter

Device function that locks the device permanently after tripping. If the sensor temperature overshoots or undershoots the limit by the amount of the hysteresis, a reset is possible.

Temperature monitor

Device function in which the device is automatically reset on activation, as soon as the sensor temperature has overshot or undershot the set limit by the hysteresis value.

Temperature monitoring

Control function for detecting, evaluating, and reporting temperature deviations which trigger an intended response when a limit value is reached.

Temperature monitoring relay

Relay which, together with an evaluation unit, monitors a temperature and, if this temperature is exceeded, switches a setpoint value.

Terminal coding

Attachment of coding pins to the individual terminals, to prevent mistakes when replacing the terminals.

Terminal cover

Device for covering terminal strips in a control cabinet.

Thermistor connection

Connection for a PTC sensor (PTC = positive temperature coefficient).

Thermocouple

Temperature sensor, made of two different, but permanently joined materials (usually metal), at the shared interface of which a thermoelectric voltage arises that is evaluated to determine the temperature.

Three-step controller

Discrete controller in which the output quantity cannot assume any required setting, but only one of three switch positions.

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