

MANUFACTURER DOCUMENT PACKAGE

# Manufacturer's Manual

Reference package for procurement and maintenance review

SIEMENS

## 3RK1207-3CE00-2AA2

FOUR CHANNEL RTD INPUT MODULE

Used with the applicable AS-Interface SlimLine Compact SC22.5 configuration.

REFERENCE PACKAGE

OFFICIAL DOCUMENT

Selected official manufacturer pages follow this cover.

Source: Siemens AS-Interface SlimLine Compact, A5E33414181002A/RS-AE/005, 08/2021; RTD sections 9.4.5 and applicable SC22.5 drawing

## AS-Interface

I/O modules for use in the control cabinet

### AS-Interface SlimLine Compact Modules

Equipment Manual

|                                |           |
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# Analog modules

## 9.1 Module overview

### Overview / terminal assignment

|                    |                    |                    |  |
|--------------------|--------------------|--------------------|--|
|                    |                    |                    |  |
| 3RK1207-0C.00-2AA2 | 3RK1207-3C.00-2AA2 | 3RK1107-0B.00-2AA2 |  |

### Table of article numbers

| Article number     | Type of connection     | Inputs                        | Outputs | Sensor supply     | Slave profile | Slave type | Width in mm |
|--------------------|------------------------|-------------------------------|---------|-------------------|---------------|------------|-------------|
| 3RK1207-0CE00-2AA2 | Screw terminal         | 4 analog<br>Current / voltage | ---     | AS-i<br>AUX POWER | 7.3.E         | Standard   | 22.5        |
| 3RK1207-0CG00-2AA2 | Spring-loaded terminal |                               |         |                   |               |            |             |
| 3RK1207-3CE00-2AA2 | Screw terminal         | 4 analog<br>PT 100            | ---     | AS-i              | 7.3.E         | Standard   | 22.5        |
| 3RK1207-3CG00-2AA2 | Spring-loaded terminal |                               |         |                   |               |            |             |

## Updating of the measured values

The measured values of the analog modules are read out cyclically.

## Resolution

The resolution of the A / D converter is 15 bits + sign.

## Smoothing of measured values

The individual measured values are smoothed using digital filtering.

This is a digital 1st order low-pass filter.

Smoothing can be switched on and off via a parameter.

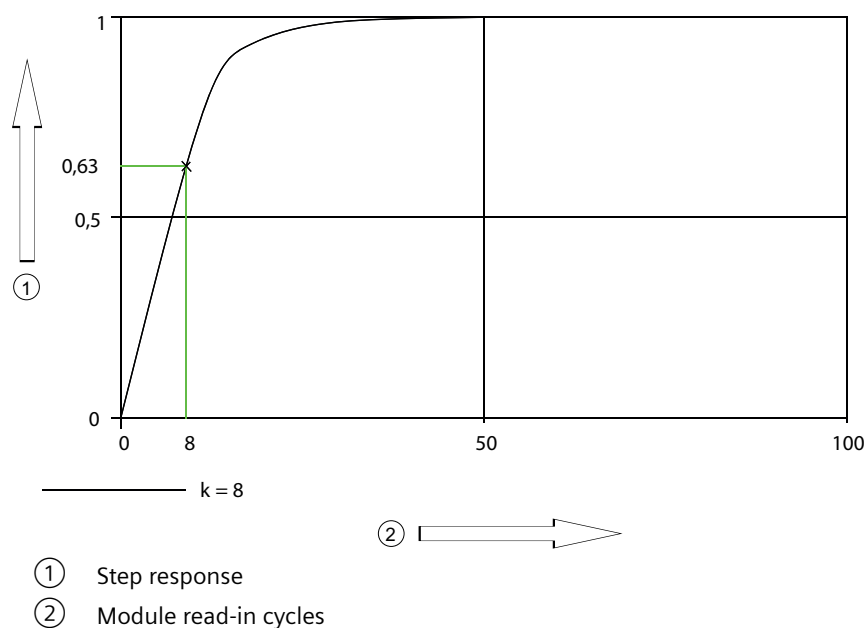
- Parameter bit P3 = 1: without smoothing,  $k = 1$  module read-in cycle
- Parameter bit P3 = 0: with smoothing,  $k = 8$  module read-in cycles

The time response can be calculated according to the following formula for any jump of the measured value  $x$  and the smoothing factor used  $k$  :

$$y_n = x_n + (k-1)y_{n-1} / k$$

$y_n$  = Transfer value to the system in the current cycle  $n$

The figure below shows the step response at a smoothing factor of  $k = 8$  depending on the number of module read-in cycles.



A module read-in cycle is approximately 130 ms for 2 inputs and 50 Hz interference frequency suppression (see also the preceding figure).

### Analog / digital converter

The analog / digital converter used in the modules works according to the sigma-delta principle.

- $t_c$  = Number of active channels \* 20 ms (50 Hz)
- $t_c$  = Number of active channels \* 16.6 ms (60 Hz)

### Transmission time analog value

The transmission time  $t_{\text{transmission}}$  for a new analog value from the analog module to the AS-i master is dependent on the number of active channels.

The transmission time can be calculated as follows:

$$t_{\text{transmission}} \leq (7 * \text{number of active channels} + 7) * t_{\text{AS-i}} + t_{\text{PLC}}$$

Where:

- $t_{\text{AS-i}}$  = max. 5 ms
- $t_{\text{PLC}}$  = Transmission time between PLC and master.

The 4 inputs are transmitted with multiplexing (alternately).

### Total execution time

The total execution time  $t_{\text{total}}$  for full transmission comprises:

- Conversion time  $t_c$
- Transmission time  $t_{\text{transmission}}$

The following maximum total transmission time is thus calculated:

- $t_{\text{Total}} = t_c + t_{\text{transmission}}$

### Adjustable parameters

The parameters are set together for the inputs, and they are sent automatically from the AS-i master to the analog module following power failure.

It is possible to change the parameters.

The parameters printed in **bold** are assigned by the AS-i master if the configured slave parameters in the AS-i master have not been changed (delivery state of the AS-i master).

---

#### Note

If an impermissible parameter assignment is sent to the module, the parameter assignment shown in **bold** is set.

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## 9.4.5 Resistance/thermal resistance measurement

### Parameter settings

The following parameters can be set:

| Adjustable parameters                               |                 | Parameter bit<br>P3 ... P0 | Setting options                            |
|-----------------------------------------------------|-----------------|----------------------------|--------------------------------------------|
| Filter                                              |                 | 1 X X X<br>0 X X X         | 50 Hz<br>60 Hz                             |
| Smoothing                                           |                 | X 1 X X<br>X 0 X X         | <b>Without</b> smoothing<br>With smoothing |
| Measuring ranges                                    |                 |                            |                                            |
| • Pt100 thermal resistance<br>4-wire <sup>1)</sup>  | linear standard | X X 1 1                    | -200 ... +850 °C                           |
|                                                     | linear climatic | X X 0 1                    | -120 ... +130 °C                           |
| • Thermal resistance Ni 100<br>4-wire <sup>1)</sup> | linear standard | X X 0 0                    | -60 ... +250 °C                            |
| • Resistance measurement<br>4-wire <sup>1)</sup>    |                 | X X 1 0                    | 0 ... 600 Ω                                |

<sup>1)</sup> 2- and 3-wire simulated by 4-wire

### Important technical data

| Data of the (thermal) resistance measurement        | Value    |
|-----------------------------------------------------|----------|
| Input resistance                                    | 2 MΩ     |
| Max. input voltage to GND (destruction limit)       | ±10 V    |
| Max. input voltage differential (destruction limit) | ±20 V    |
| Measured current                                    | 1.667 mA |
| Type of connection                                  | floating |

### Pt100 thermal resistance

Standard range linear -200 ... +850 °C

(Parameter setting XX11)

| Range<br>-200 ... +850 °C | Units |      | Range     |
|---------------------------|-------|------|-----------|
|                           | dec   | hex  |           |
| > 1000 °C                 | 32767 | 7FFF | Overflow  |
| 1000 °C <sup>1)</sup>     | 8501  | 2135 | Overrange |

| Range<br>-200 ... +850 °C | Units              |                | Range                                   |
|---------------------------|--------------------|----------------|-----------------------------------------|
|                           | dec                | hex            |                                         |
| 850 °C                    | 8500               | 2134           | Rated range                             |
| ...                       |                    |                |                                         |
| 0.1 °C                    | 1                  | 0001           |                                         |
| 0 °C                      | 0                  | 0000           |                                         |
| -0.1 °C                   | -1                 | FFFF           |                                         |
| ...                       |                    |                |                                         |
| -200 °C                   | -2000              | F830           | Underrange                              |
| -243 °C <sup>1)</sup>     | -2001              | F82F           |                                         |
| < -243 °C                 | -32768<br>(+32767) | 8000<br>(7FFF) | Underflow<br>(for certain AS-i masters) |

<sup>1)</sup> In the overrange/underrange, the gradient of the characteristic is maintained when the linearized nominal range is exited.

### Climate range linear -120 ... +130 °C

(Parameter setting XX01)

| Range<br>-120 ... +130 °C | Units              |                | Range                                   |
|---------------------------|--------------------|----------------|-----------------------------------------|
|                           | dec                | hex            |                                         |
| > 155 °C                  | 32767              | 7FFF           | Overflow                                |
| 155 °C <sup>1)</sup>      | 13001              | 32C9           | Overrange                               |
| 130 °C                    | 13000              | 32C8           |                                         |
| ...                       |                    |                |                                         |
| 0.01 °C                   | 1                  | 0001           |                                         |
| 0 °C                      | 0                  | 0000           |                                         |
| -0.01 °C                  | -1                 | FFFF           |                                         |
| ...                       |                    |                | Rated range                             |
| -120 °C                   | -12000             | D120           |                                         |
|                           | -12001             | D11F           | Underrange                              |
| -145 °C <sup>1)</sup>     |                    |                |                                         |
| < -145 °C                 | -32768<br>(+32767) | 8000<br>(7FFF) | Underflow<br>(for certain AS-i masters) |

<sup>1)</sup> In the overrange/underrange, the gradient of the characteristic is maintained when the linearized nominal range is exited.

## Thermal resistance Ni 100

### Standard range linear -60 ... +250 °C

(Parameter setting XX00)

| Range<br>-60 ... +250 °C | Units              |                | Range                                   |
|--------------------------|--------------------|----------------|-----------------------------------------|
|                          | dec                | hex            |                                         |
| > 295 °C                 | 32767              | 7FFF           | Overflow                                |
| 295 °C <sup>1)</sup>     | 2501               | 9C5            | Overrange                               |
| 250 °C                   | 2500               | 9C4            | Rated range                             |
| ...                      |                    |                |                                         |
| 0.1 °C                   | 1                  | 0001           |                                         |
| 0 °C                     | 0                  | 0000           |                                         |
| -0.1 °C                  | -1                 | FFFF           |                                         |
| ...                      |                    |                |                                         |
| -60 °C                   | -600               | FDA8           | Underrange                              |
| -105 °C <sup>1)</sup>    | -601               | FDA7           |                                         |
| < -105 °C                | -32768<br>(+32767) | 8000<br>(7FFF) | Underflow<br>(for certain AS-i masters) |

<sup>1)</sup> In the overrange/underrange, the gradient of the characteristic is maintained when the linearized nominal range is exited.

## Resistance measurement

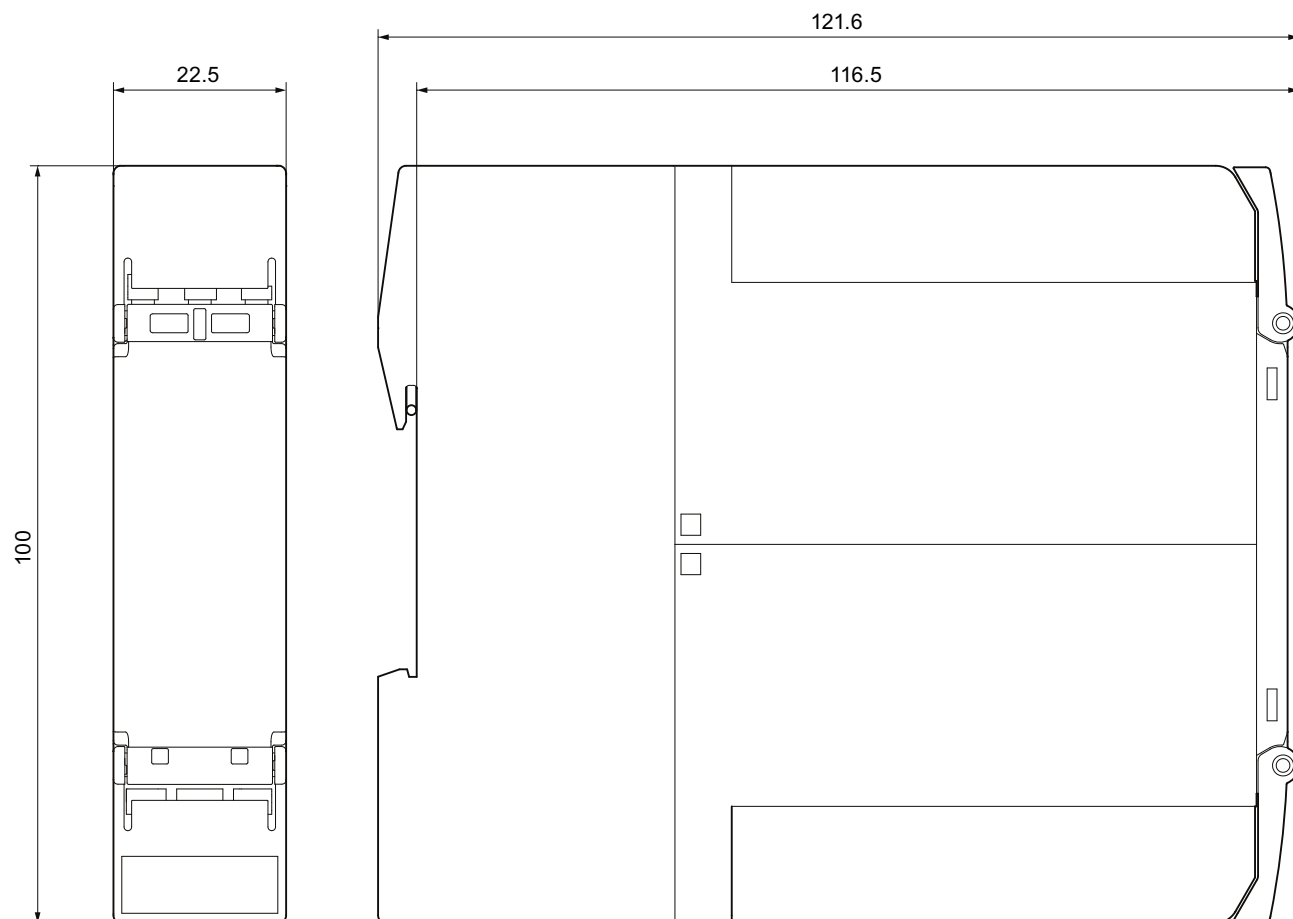
### Range 0 ... 600 Ω

(Parameter setting XX10)

Table 9-1 Resistance measurement

| Range       |          | Units              |                | Range                                   |
|-------------|----------|--------------------|----------------|-----------------------------------------|
| 0 ... 600 Ω | in %     | dec                | hex            |                                         |
| > 705.53 Ω  | >117.589 | 32767              | 7FFF           | Overflow                                |
| 705.53 Ω    | 117.589  | 32511<br>27649     | 7EFF<br>6C01   | Overrange                               |
| 600 Ω       | 100      | 27648              | 6C00           | Rated range                             |
| ...         |          |                    |                |                                         |
| 21.7 MΩ     | 0.003617 | 1                  | 0001           |                                         |
| 0 Ω         | 0        | 0                  | 0000           |                                         |
|             | <0       | -32768<br>(+32767) | 8000<br>(7FFF) | Underflow<br>(for certain AS-i masters) |

**Enclosure 22.5 mm for AS-i modules**



- 3RK2200-2C.00-2AA2
- 3RK2402-2C.00-2AA2
- 3RK2402-2M.00-2AA2
- 3RK2100-1C.00-2AA2
- 3RK1400-2C.00-2AA2
- 3RK2400-2C.00-2AA2
- 3RK1207-0C.00-2AA2
- 3RK1207-3C.00-2AA2
- 3RK1107-0B.00-2AA2