



General characteristics

VS46 converts a signal from a thermocouple to a voltage signal (V) or current signal (mA). In addition, a relay contact (normally open) can be programmed as an alarm value via a key on the front side.

Features/benefits:

- High accuracy
- Very narrow housing (6.2mm)
- Installation on 35mm DIN rail
- Power can be supplied via back plane bus
- Connection via spring cage terminal
- Galvanic 3-way isolation
- Configuration via DIP switch

Technical data

|                   |                                                                              |
|-------------------|------------------------------------------------------------------------------|
| Power supply      | 192 ... 30V DC                                                               |
| Power consumption | Max. 24mA at 24V DC                                                          |
| Input             | Thermocouples type: J, K, E, N, S, R, B, T according to EN 60 584-1 (ITS-90) |
| Measuring range   | Depends on the thermocouple (see table)                                      |
| Minimum span      | 100°C                                                                        |
| Impedance         | 10MΩ                                                                         |
| Sensor current    | < 50nA                                                                       |

| Input variables, measuring ranges |                  |                 |            |
|-----------------------------------|------------------|-----------------|------------|
| Thermocouple                      | Range            | Error           | Resolution |
| J                                 | −210...1200°C    | 0.025% + 0.29°C | 0.12°C     |
| K                                 | −200...1372°C    | 0.025% + 0.4°C  | 0.17°C     |
| E                                 | −200...1000°C    | 0.025% + 0.2°C  | 0.92°C     |
| N                                 | −200...1300°C    | 0.025% + 0.42°C | 0.19°C     |
| S                                 | − 50...1768°C    | 0.025% + 1.34°C | 0.66°C     |
| R                                 | − 50...1768°C    | 0.025% + 1.19°C | 0.59°C     |
| B                                 | 250...1820°C (*) | 0.025% + 1.87 C | 0.9°C      |
| T                                 | −200... 400°C    | 0.025% + 0.31°C | 0.13°C     |

(\*) Up to 250°C the output is considered zero in relation to temperature.

|                             |                                                                   |
|-----------------------------|-------------------------------------------------------------------|
| Voltage output              | 0...5V DC, 1...5V DC, 0...10V DC and 10...0V DC<br>Min. load 2 kΩ |
| Current output              | 0...20mA, 4...20mA, 20...0mA and 20...4mA<br>Max. load 500 Ω      |
| Max. voltage                | Approx. 12.5V                                                     |
| Max. current                | Approx. 25mA                                                      |
| Resolution                  | 1mV for voltage output, 2μA for current output                    |
| Relay output (AUX)          | Switching voltage maximum 24V AC, switching current maximum 60mA  |
| Response time<br>(10...90%) | < 2ms (without filter), < 55ms (with filter)                      |
| Test voltage                | 1.5kV (50Hz for 1 min.)                                           |
| Ingress protection          | IP20                                                              |

| Accuracy                         |                     |      |
|----------------------------------|---------------------|------|
| Reference conditions             | Ambient temperature | 25°C |
|                                  | Power supply        | 24V  |
|                                  | Reference value     | Span |
| Basic accuracy<br>(at reference) | ±0.1%               |      |
| Temperature impact               | 120 ppm/K           |      |
| Cold junction error              | Max. 1.5°C          |      |

| Ambient conditions                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Operating temperature                                                              | − 20...+ 65°C                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Storage temperature                                                                | − 40...+ 85°C                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Air humidity                                                                       | 10...90% at 40°C (non-condensing)                                                                                                                                                                                                                                                                                                                                                                                              |
| Scope of application                                                               | Indoors up to 2000m above sea level                                                                                                                                                                                                                                                                                                                                                                                            |
| LED                                                                                | Error, status of the switching output                                                                                                                                                                                                                                                                                                                                                                                          |
| Connections                                                                        | Spring cage terminal                                                                                                                                                                                                                                                                                                                                                                                                           |
| Conductor cross-section                                                            | 0.2 ... 2.5mm <sup>2</sup>                                                                                                                                                                                                                                                                                                                                                                                                     |
| Housing                                                                            | PBT (black)                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Dimensions, weight                                                                 | 6.2 x 93.1 x 102.5mm, 46g                                                                                                                                                                                                                                                                                                                                                                                                      |
| Das Instrument entspricht folgenden Standards:                                     | EN 61000-6-4/2002 (elektromagnetische Emission, industrielle Umgebung)<br>EN 61000-6-2/2005 (elektromagnetische Immunität, industrielle Umgebung)<br>EN 61010-1/2001 (Sicherheit)<br>Alle Schaltungen müssen mit doppelter Isolierung gegen Schaltungen mit gefährlicher Spannung isoliert werden. Der Speisungstransformator muss der Norm EN 60742: «Isolierungstransformatoren und Sicherheitstransformatoren» entsprechen. |
|  |                                                                                                                                                                                                                                                                                                                                                                                                                                |

RELAY OUTPUT (AUX)

**Description**  
SINEAX VS46 features a relay output which can be activated via a settable limit value.

Setting of the limit value requires a multimeter to measure the output (in V or mA) as well as a power supply.

Setting of the limit value

- Connect the signal converter to the power supply.
- Connect the multimeter to the output of the signal converter and set the selected measuring range (V or mA).

Limit values are set via the white button (below the front cover, see also image under power supply).

- Briefly pressing the button starts the setting operation of the limit value – the red LED flashes slowly.
- If the button is not pressed for 5 seconds, the signal converter returns to normal operation.
- Every time the button is pressed, the limit value increases or decreases by 0.2%. During setting, the limit value corresponds to the value at the output which is indicated on the multimeter.
- The direction of the adjustment (rising or descending) depends on the setting of the DIP switch SW2.7.
- The switching point is always exactly on the set value. Dropping back causes a hysteresis.
- Pressing the button for 2 seconds changes the limit value in 3% steps.
- The cycle restarts as a maximum or minimum value is reached.
- If the button is not pressed for more than 5 seconds, the set values are stored and the device returns to normal operation.

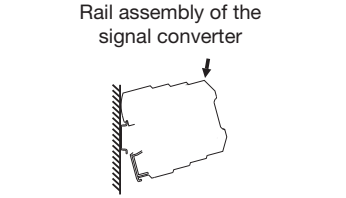
**Note:** If the power supply is not sufficient during setting or the inactive period (5s), the set value is not stored.

Details of DIP switch SW2.7

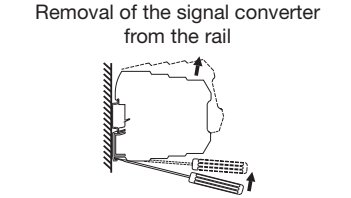
| SW2.7 | Switching direction | Relay status    |
|-------|---------------------|-----------------|
| OFF   | If exceeded         | Closed (LED ON) |
| ON    | If below the limit  | Open (LED OFF)  |

Installation instructions

The signal converter is designed for rail assembly according to DIN 46277.



Rail assembly of the signal converter



Removal of the signal converter from the rail

1. Place the signal converter in the upper part of the rail.  
2. Press the signal converter downwards.

1. Use a screw driver to apply leverage (as shown in the image)  
2. Turn the signal converter upwards.

To achieve improved ventilation, we recommend installing the signal converter in a vertical position. Avoid the installation of the signal converter above heat-generating devices. We recommend the installation in the lower part of the control cabinet.

Using the CB-Power-Bus



1 – Combine the CB-Power-Bus connections to obtain the required number of positions.

2 – Place the CB-Power-Bus in the rail by inserting it in the top part and pressing it downwards.

**IMPORTANT!** Ensure the position as shown in the image. Otherwise the signal converters are mounted upside down.



- Never connect the power supply directly on the CB-Power-Bus!
- Never tap the power supply directly via the terminal of the CB-Power-Bus!

DIP switch setting

Factory setting

The signal converter is delivered with all DIP switches in the OFF position.

The settings correspond to the following values:

|                                   |                                                                                                                                        |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Thermocouple                      | Type J                                                                                                                                 |
| Line-frequency rejection          | 50Hz                                                                                                                                   |
| Input filter                      | Active                                                                                                                                 |
| Measuring range                   | 0...1000°C                                                                                                                             |
| Output signal                     | 4...20mA                                                                                                                               |
| Output signal in case of an error | Rising                                                                                                                                 |
| Over-range                        | Active: Linear output indication up to 102.5% of the maximum value. In case of an error, the output moves to 105% of the maximum value |
| Switching output (AUX)            | Limit value 0%                                                                                                                         |

The settings stated above are only valid if all DIP switches are in the OFF position. If a DIP switch is changed, all other parameters must be set separately in accordance with the subsequent tables.

**ATTENTION PLEASE:** For all of the subsequent tables:

Set DIP switch only when it is not energised!

The symbol ● indicates that the DIP switch is in the ON position.

No indication means that the DIP switch is in the OFF position.

**Thermocouple Type**

|     |   |   |   |   |
|-----|---|---|---|---|
| SW1 | 1 | 2 | 3 |   |
|     |   |   |   | J |
|     | ● |   |   | K |
|     |   | ● |   | R |
|     | ● |   |   | S |
|     |   |   | ● | T |
|     | ● |   |   | B |
|     |   | ● |   | E |
|     | ● | ● |   | N |

**Mains ripple suppression**

|     |   |      |
|-----|---|------|
| SW1 | 4 |      |
|     | ● | 60Hz |
|     |   | 50Hz |

**Input filter (\*)**

|     |   |          |
|-----|---|----------|
| SW1 | 5 |          |
|     | ● | Active   |
|     |   | Inactive |

(\*) The filter stabilises the display by reducing the signal noise. Therefore, it is advisable to use the filter always, unless a minimum response time is required.

Measuring range minimum value

|     |   |   |   |            |        |        |        |        |        |        |        |
|-----|---|---|---|------------|--------|--------|--------|--------|--------|--------|--------|
| SW1 | 6 | 7 | 8 | Type J     | Type K | Type R | Type S | Type T | Type B | Type E | Type N |
|     |   |   |   | Stand. (*) | 0°C    | 0°C    | 0°C    | 0°C    | 0°C    | 0°C    | 0°C    |
|     | ● |   |   | 0°C        | 100°C  | 100°C  | 100°C  | 50°C   | 400°C  | 100°C  | 100°C  |
|     |   | ● |   | 100°C      | 200°C  | 200°C  | 200°C  | 100°C  | 500°C  | 200°C  | 200°C  |
|     | ● |   |   | 200°C      | 400°C  | 300°C  | 300°C  | 200°C  | 600°C  | 300°C  | 300°C  |
|     |   | ● |   | 300°C      | 600°C  | 400°C  | 400°C  | -50°C  | 800°C  | 400°C  | 500°C  |
|     | ● | ● |   | 500°C      | 800°C  | 600°C  | 600°C  | -150°C | 1000°C | 500°C  | 700°C  |
|     |   | ● |   | -100°C     | -100°C | 800°C  | 800°C  | -100°C | 1200°C | -100°C | -100°C |
|     | ● | ● |   | -200°C     | -200°C | 1000°C | 1000°C | -200°C | 1400°C | -200°C | -200°C |

(\*) Standard configuration

Measuring range maximum value

|     |   |   |   |        |        |        |        |        |        |        |        |
|-----|---|---|---|--------|--------|--------|--------|--------|--------|--------|--------|
| SW2 | 1 | 2 | 3 | Type J | Type K | Type R | Type S | Type T | Type B | Type E | Type N |
|     |   |   |   | 1200°C | 1350°C | 1750°C | 1750°C | 400°C  | 1800°C | 1000°C | 1300°C |
|     | ● |   |   | 1000°C | 1200°C | 1500°C | 1500°C | 350°C  | 1600°C | 800°C  | 1200°C |
|     |   | ● |   | 800°C  | 1000°C | 1300°C | 1300°C | 300°C  | 1500°C | 600°C  | 1000°C |
|     | ● |   |   | 600°C  | 800°C  | 1100°C | 1100°C | 250°C  | 1300°C | 500°C  | 800°C  |
|     |   | ● |   | 500°C  | 700°C  | 900°C  | 900°C  | 200°C  | 1100°C | 400°C  | 600°C  |
|     | ● | ● |   | 400°C  | 500°C  | 700°C  | 700°C  | 150°C  | 900°C  | 300°C  | 500°C  |
|     |   | ● |   | 300°C  | 300°C  | 500°C  | 500°C  | 100°C  | 700°C  | 200°C  | 400°C  |
|     | ● | ● |   | 200°C  | 200°C  | 300°C  | 300°C  | 50°C   | 500°C  | 100°C  | 200°C  |

| Output |   |   |          |
|--------|---|---|----------|
| SW2    | 4 | 5 | 6        |
|        |   |   | 4...20mA |
|        | ● |   | 0...20mA |
|        |   | ● | 20...4mA |

| Output signal in case of an error |              |
|-----------------------------------|--------------|
| SW2                               | 7            |
|                                   | ● Descending |
|                                   | Rising       |

Over-range (see table below for the respective values)

|     |                                                                                                                                                                                                                          |
|-----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| SW2 | 8                                                                                                                                                                                                                        |
|     | <b>Inactive:</b> The output covers only the set measuring range.                                                                                                                                                         |
|     | ● In case of an error, the output moves, depending on the SW2-7 setting, either 2.5 % below the minimum or 2.5 % above the maximum value of the measuring range.                                                         |
|     | <b>Active:</b> The output only covers the set measuring range. In case of an error, the output moves, depending on the SW2-7 setting, either 5 % below the minimum or 5% above the maximum value of the measuring range. |

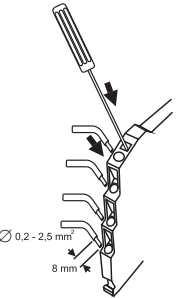
| Output signal | SW2-8 inactive                            | SW2-8 active                                   |
|---------------|-------------------------------------------|------------------------------------------------|
| 4...20mA      | Output: 4...20mA<br>Error: 3.5mA / 20.5mA | Output: 3.5mA...20.5mA<br>Error: 3mA / 21mA    |
| 0...20mA      | Output: 0...20mA<br>Error: 0mA / 20.5mA   | Output: 0mA...20.5 mA<br>Error: 0mA / 21mA     |
| 0...10V       | Output: 0...10V<br>Error: 0 / 10.25 V     | Output: 0mA...10.25mA<br>Error: 0V / 10.5V     |
| 0...5V        | Output: 0...5V<br>Error: 0V / 5.125V      | Output: 0...5.125V<br>Error: 0 V/ 5.25V        |
| 1...5V        | Output: 1...5V<br>Error: 0.875V / 5.125V  | Output: 0.875...5.125V<br>Error: 0.75V / 5.25V |

| LED            |                                    |              |
|----------------|------------------------------------|--------------|
| Red LED        | Meaning                            | Output error |
| Rapid flashing | Internal error                     | YES          |
| Slow flashing  | DIP switch setting error           | YES          |
|                | Limit setting is made              | NO (*)       |
| Steady light   | Sensor failure, input out of range | YES          |
|                | Limit of the output over-range     | NO           |

(\*) In this state, the output signal to the limit.

| Yellow LED |  | Meaning                              |
|------------|--|--------------------------------------|
| ON         |  | The switching output (AUX) is closed |
| OFF        |  | The switching output (AUX) is open   |

Electric connections



Ø 0.2 - 2.5 mm  
8 mm

The signal converter features spring cage terminals for electric connections. Please observe the following when realising the connections:

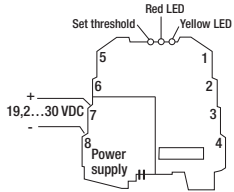
1. Strip 0.8cm of the insulation at the end of the cables.
2. Enter the screw driver into the square opening and press until the spring opens which blocks the cable.
3. Enter the cable into the round opening .
4. Pull the screwdriver out and check whether the cable is firmly fastened in the terminal.

Power supply

There are 3 options to supply power to the signal converters of the VS line:

1. Direct supply to signal converters:

Each individual signal converter is supplied with power via the 7 (+) and 8(-) terminals.



2. Using the CB-Power-Bus:

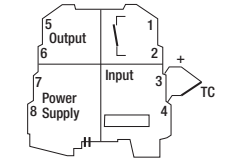
The CB-Power-Bus (Art.No. 162826) is a back plane bus for the VS signal converter line which is assembled directly on the top-hat rail. In this case only one signal converter has to be connected to the power supply. The power is transferred by the signal converter to the CB-Power-Bus. Up to 16 signal converters can be supplied in this way. The maximum current in the power circuit amounts to 400mA.

3. Using the CB-Power-Bus and the VS70 power supply module:

VS70 is a power supply module for the CB-Power-Bus and can supply power to a maximum of 75 devices of the VS signal converter line via the back plane bus. The maximum current in the power circuit amounts to 1.6A. If more than 75 devices are supposed to be supplied, a new CB-Power-Bus string must be installed which is not connected to the first string.

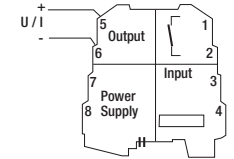
Input

The following sensor types can be connected to the transmitter: J, K, E, N, S, R, B, T. The use of shielded cables is recommended.



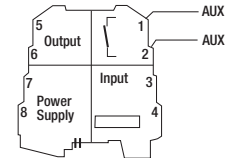
Output

Voltage or current. The use of shielded cables is recommended.



Switching output (AUX)

Relay output (normally open)





The instrument must be disposed of in a proper manner!