

interface

FORCE MEASUREMENT SOLUTIONS.

Installation & User Manual

SI-USB



SI-USB Installation & User Manual

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1 Important Notes

Before installing and commissioning the device, these operating instructions, and in particular the corresponding safety instructions, must be read. The device may only be used as described in this manual to prevent injury or damage.

1.1 General Information

These operating instructions are intended for technically qualified personnel who have appropriate knowledge in the field of measurement and control technology. Qualified personnel are persons who are familiar with the installation, operation, maintenance and repair of the device and have the appropriate qualifications. The personnel must have knowledge of the legal and safety regulations and be able to apply them.

The device may only be used by qualified personnel in accordance with the technical data in connection with the safety regulations and rules set out below. During operation, the legal and safety regulations required for the respective application must also be observed. This also applies analogously to the use of accessories.

The exact information about all safety instructions and warnings contained in these operating instructions as well as their correct technical implementation are prerequisites for the safe installation, commissioning, safe operation and maintenance of Interface devices. All measures must only be carried out by qualified personnel. All persons involved in the project planning, installation and operation of Interface devices must be familiar with the safety concepts in automation technology and be qualified in the above-mentioned sense.

For reasons of clarity, these operating instructions cannot cover all details and information for all applications or conceivable types of installation, operation and maintenance that must be taken into account.

If further information is desired or required, or if special problems occur which are not described in detail in these operating instructions, please contact Interface.

Interface devices may only be operated in accordance with the applications described in these operating instructions. Built-in devices may only be operated if they are properly installed.

By connecting and commissioning the device, the purchaser accepts the General Terms and Conditions of Sale and Delivery of Interface. Furthermore, the buyer accepts the possible incompleteness of this operating manual and that the information contained therein may not be complete and information is provided without guarantee. Errors, misprints and changes excepted.

What is Intended Use, What is not intended Use

A device from Interface is used for display, processing and control of processes. It must not be used as the sole means of averting dangerous conditions on machines and systems. Machines and systems must be designed in such a way that faulty states cannot lead to a dangerous situation for the operating personnel (e. g. through independent limit value-switches or mechanical interlocks). In particular, it must be ensured that a the malfunction or failure of the device does not lead to damage to property or loss that could endanger people. It is also important to ensure that safety precautions are not being circumvented for the safety of a plant. Emergency stop devices must remain effective at all times.

Installation Instructions

Devices from Interface must be installed and connected in compliance with the relevant DIN and VDE standards. They must be installed in such a way that unintentional operation is sufficiently excluded. To prevent an interruption of the supply and signal lines from leading to an undefined or dangerous state, appropriate hardware and software safety precautions must be observed. Supply and signal lines must be installed in such a way that they do not interfere with the function of the Interface device (such as inductive or capacitive interferences).

Notes on Malfunctions, Maintenance and Repair

The device does not contain any parts that can be serviced by the user. Repairs may only be carried out by Interface. If it can be assumed that safe operation of the device is no longer possible, it must be put out of operation immediately and secured against unintentional operation. This applies in particular if:

- The device is visibly damaged
- The device is no longer functional
- Parts of the appliance are loose
- The connecting lines are visibly damaged

In addition, we would like to point out that all obligations of Interface arise exclusively from the respective purchase contract in which the warranty is conclusively stated.

1.2 Intended Use

Devices from Interface are to be used exclusively for measuring tasks and the directly associated control tasks. Any use beyond this is considered to be improper. Legal and safety regulations must be observed during measurement. The instrument is not a safety component in the sense of its intended use and must be transported and stored properly. Installation and commissioning, as well as operation and disassembly must be carried out professionally.

1.3 General Hazards in the Event of non-compliance with the Safety Instructions

The device is in compliance with current safety requirements. Residual dangers can emanate from the device if it is improperly used and operated by untrained personnel. Any person entrusted with the installation, operation, maintenance and repair of the device must read and understand the operating instructions and, in particular, the safety instructions.

Incorrect use (e. g. by untrained personnel) may result in residual hazards. The operating instructions must be read and understood by all persons involved in the installation, commissioning, maintenance, repair, operation and dismantling of the device. The device must not be used if damage is visible.

1.4 Residual Hazards

The system planner, equipment supplier and operator must plan, implement and be responsible for the safety of the equipment. Other hazards must be minimized. The residual dangers of measurement technology must be pointed out and human error must be taken into account. The design of the system must be suitable for avoiding hazards - a hazard analysis must be carried out for the system.

2 Safety and Warning Notices

2.1 Symbols



Warning: There is a risk of injury to persons. Damage to the machine is possible. The accident prevention regulations of the employer's liability insurance association must be observed.



Note: Important points to be observed. A note that indicates a possible danger of damage to the product, process, person or the environment.



Additional information or reference to other important detailed information.

2.2 Health Protection and Safety

To ensure that our products are safe and do not pose a health hazard, the following points must be observed:

1. Read all relevant sections of this manual carefully before starting work.
2. All warning signs on containers and packaging must be observed.
3. Installation, operation, maintenance and repair work may only be carried out by suitably trained personnel and in accordance with the instructions given. If one of these instructions is not followed, the user of the product bears full responsibility for any consequences that may occur.
4. Disconnect the appliance from any power supply before opening it.
5. The safety instructions must be strictly observed in order to avoid damage to property and bodily injury - possibly even fatal ones.

2.3 Conversions and Changes

The device may not be modified in terms of design or safety without the express consent of Interface. Any modification excludes any liability on our part for damages resulting therefrom. Repairs and modifications are prohibited.

3 Preamble

3.1 Product Description

The SI-USB is an amplifier which processes analog signals and converts these signals into digital measured values. This measured data can be retrieved by the PC by means of the USB-Interface. The current supply occurs via a separate power supply which is included in delivery.

Required output voltage: 12 ... 30V
Required power supply: 600 mA

The SI-USB is suitable for the connection and simultaneous acquisition of two sensors. Depending on the SI-USB model, respectively four different types of sensor signals can be captured (for specifications see data sheet):

| | | |
|------------------------------------|----------------|----------------------------------|
| Strain gauge signals: | ± 4.5 mV/V | (corresponds ± 30000 digits) |
| Active signals with voltage input: | ± 5 V | (corresponds ± 25000 digits) |
| Active signals with voltage input: | ± 10 V | (corresponds ± 25000 digits) |
| Active signals with voltage input: | 0 ... 20 mA | (corresponds 0 ... 20000 digits) |
| Active signals with voltage input: | 4 ... 20 mA | (corresponds 0 ... 20000 digits) |

The amplifier type and resolution are stated on the type label, a type change is only possible by the manufacture. Hence, only the corresponding sensor type can be connected.



Warning: Please pay attention to the signal type of the sensor when connecting the sensor. Connecting the sensor with the wrong signal type can damage the amplifier and the sensor.

The measured values are issued in digits (16 bit signed integer format) with leading signs (see above in brackets).

If the SI-USB is adjusted to a specific sensor, the output value will be stated on the test certificate. If the SI-USB is not adjusted to a specific sensor, the output values are adjusted as described above. In this case, the output values are adjusted with a high-precise reference.

The evaluation occurs by the VS3 software which contains the following functions:

- Configuration possibilities for the VS3
- Storage of sensor-related scaling and adjustment data (actual value, tare value, minimal value and maximal value)
- Presentation of the measured data in a diagram
- Storage of measured data in CSV-format (output configurable)
- Storage of the diagram in BMP-format (output size adjustable)
- Print-out of the diagram (output size defined)
- Presentation of the sensor information

3.2 Safe and Correct Use



Warning: Observe the correct sensor adjustment.



Consider the correct VS3 configuration.



Choose a significant file identification/prefix when storing measured data.



Fasten housing, ground, connect power supply, protect from splash water and do not pull the cable.

4 Technical Details

4.1 Configuration of the Connections

There is no maintainable connection inside the SI-USB housing. The connection of the power supply unit occurs on the side of the housing. The sensors and the digital interface can be connected through sockets as well.

4.2 Adjustment of the Second-Order Low-Pass Filter for each Sensor Channel

4.2.1 Changing via VS3

If a SI-USB was connected, the software offers this option in the tab for measurement adjustments.

4.2.2 Changing via INF-USB-VS

In the advanced mode, the software offers tabs for configuration. The filter frequencies can be adjusted in configuration block STATOR_OPERATION.

4.2.3 Changing via self-programmed (own) Software

The adjustment for channel A is stored in bytes 13 and 14 of the configuration block "STATOR_OPERATION". The value for channel B is stored in bytes 15 and 16. Each byte represents a 16-bit value and corresponds to the cutoff-frequency according to the following chart:

| Range of values (decimal) | Value (hexadecimal) | Adjusted cutoff-frequency |
|---------------------------|---------------------|---------------------------|
| $0 \leq X \leq 30$ | 0x001E | 30 Hz |
| $31 \leq X \leq 300$ | 0x012C | 300 Hz |
| $301 \leq X \leq 1000$ | 0x03E8 | 1000 Hz |
| $1001 \leq X \leq 65536$ | 0x0BB8 | 3000 Hz |

Please consider that currently adjusted cutoff-frequency will be active after rebooting, only.

5 Pin Assignments

5.1 Pin Assignment for Strain Gauge Sensors with mV Signal

| Description | Pin (6 pin socket) | Remark |
|----------------|--------------------|---|
| 0V / GND | 1 | Ground reference for 5V excitation |
| 5V | 2 | Excitation for 5V strain gauge sensors |
| Shield | 3 | Do not connect shield with sensor housing |
| Signal + | 4 | Positive signal input |
| Signal - | 5 | Negative signal input |
| Control signal | 6 | If available in sensor |

5.2 Pin Assignment for Active Sensors with $\pm 5V$ or with $\pm 10V$ Signal

| Description | Pin (12 pin socket) | Remark |
|----------------|---------------------|--|
| 0V / GND | E | Ground reference for 12V supply |
| 12V | F | Supply for 12V active sensors |
| Signal + | C | Signal input |
| Signal - | D | Relating to signal input (internally 0V / GND) |
| Control signal | K | If available in sensor |
| Shield | M | Do not connect shield with sensor housing |

5.3 Pin Assignment for Active Current Sensors with mA Signal

| Description | Pin (12 pin socket) | Remark |
|----------------|---------------------|--|
| 0V / GND | E | Ground reference for 12V supply |
| 12V | F | Supply for 12V active sensors |
| Signal + | C | Signal input |
| Signal - | D | Relating to signal input (internally 0V / GND) |
| Control signal | K | If available in sensor |
| Shield | M | Do not connect shield with sensor housing |

5.4 Pin Assignment for Displacement Sensor Potentiometric

| Description | Pin (4 pin socket) | Remark |
|-------------|--------------------|---|
| 0V / GND | 1 | Ground reference for 5V and 12V supply |
| 12V | 2 | Supply for 12V active sensors |
| Shield | 3 | Do not connect shield with sensor housing |
| Signal + | 4 | Signal input |

5.5 Connection Assignment for the USB-Interface

The Connection Assignment of the USB-Interface corresponds to the DIN IEC 61076-3-108 Standard (Mini-B).

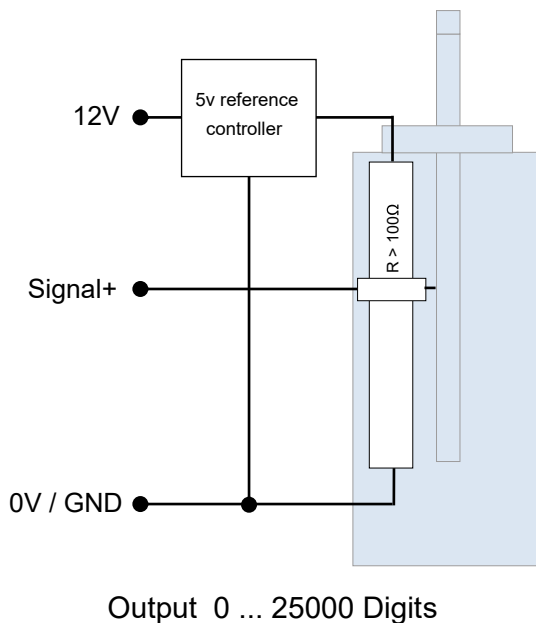
6 Other Application Examples

6.1 Multi-Component Sensor AT102 Force and Torque (strain gauge / strain gauge)



The multi-component sensor AT102 is directly connected to the SI-USB/DMS/DMS with both outputs. The system allows simultaneous recording of force-torque-courses which chronologically refer to each other.

6.2 Displacement Sensor Potentiometric (supplied from the SI-USB)



A SI-USB with minimum U5-input is suitable. The accuracy of the displacement measurement is depending on the quality of the reference voltage.

With this set-up, arbitrary measuring variables, depending on displacement measurements, can be recorded and referred to each other.

7 Debugging

This chart helps to find frequent errors and the measures for debugging.

| Error | Possible Cause | Debugging |
|---|--|--|
| A connection to the SI-USB is not possible | Driver incorrectly or not installed | <ul style="list-style-type: none"> • Install driver package • The first start-up of the SI-USB must be carried out with administrator rights |
| | Supply voltage is overloaded | <ul style="list-style-type: none"> • Check whether the connected sensor corresponds to the specifications of the SI-USB. If the sensor requires higher current than available for the SI-USB, this sensor cannot be used together with the SI-USB |
| | Power supply not connected | <ul style="list-style-type: none"> • Connect power supply |
| | Supply voltage is shortened | <ul style="list-style-type: none"> • Fix the short circuit |
| Output signal is at the upper or lower modulation limit | Active sensor is connected to the strain gauge input | <ul style="list-style-type: none"> • Check on type label for which input type has been configured for the applied sensor connection |
| | Supply voltage connected to sensor input | <ul style="list-style-type: none"> • Check/correct the pin assignment |
| Output signal fluctuates (strain gauge) | Open sensor input | <ul style="list-style-type: none"> • Connect sensor |
| | Cut-off frequency adjustment not correctly set | <ul style="list-style-type: none"> • Set the right cut-off frequency |

8 Technical Data

| USB-Sensor-Interface SI-USB | | | | | |
|---------------------------------|--|--|---------------------------------------|---|--|
| Type | SI-USB/DMS/DMS | SI-USB/U5/U5 | SI-USB/U10/U10 | SI-USB/I20/I20 | SI-USB/DMS/U5 |
| Article-No. | 111963 | 111964 | 113022 | 111966 | 111973 |
| Input range | 2 x ±4.5 mV/V | 2 x ±5V | 2 x ±10V | 2 x 0/4 ... 20 mA | ±4.5 mV/V; ±5V |
| Measured values | ±30000 digits | ±25000 digits | ±25000 digits | 0 ... 20000 digits | ±30000 digits; ±25000 digits |
| Resolution | 1 mV/V ± 10000 digits | 1V ± 5000 digits | 1V ± 2500 digits | 1 mA ± 1000 digits | 1 mV/V ± 10000 digits; 1V ± 5000 digits |
| Type | SI-USB/DMS/U10 | SI-USB/DMS/I20 | SI-USB/U5/U10 | SI-USB/U5/I20 | SI-USB/U10/I20 |
| Article-No. | 113021 | 111974 | 113023 | 111975 | 113024 |
| Input range | ±4.5 mV/V; ±10V | ±4.5 mV/V; 0/4 ... 20 mA | ±5V; ±10V | ±5V; 0/4 ... 20 mA | ±10V; 0/4 ... 20 mA |
| Measured values | ±30000 digits; ±25000 digits | ±30000 digits; 0 ... 20000 digits | ±25000 digits | ±25000 digits; 0 ... 20000 digits | ±25000 digits; 0 ... 20000 digits |
| Resolution | 1 mV/V ± 10000 digits; 1V ± 2500 digits | 1 mV/V ± 10000 digits; 1 mA ± 1000 digits | 1V ± 5000 digits; 1V ± 2500 digits | 1V ± 5000 digits; 1 mA ± 1000 digits | 1V ± 2500 digits; 1 mA ± 1000 digits |
| Evaluation Side | | | | | |
| Zero point | 0 digits | | | | |
| Output format | 16 bit signed int. | | | | |
| Input resistance | >1 MΩ (only for DMS/U5/U10) | | | | |
| Rated burden | 62 Ω (only for I20) | | | | |
| Second-order low-pass filter | 30/300/1000/3000 Hz | | | | |
| Measuring rate | max. 2500 meas./s | | | | |
| Temperature drift | 4 bit/10 K | | | | |
| Linearity error | ±32 digits | | | | |
| Accuracy | ±32 digits | | | | |
| Supply voltage of mains adapter | 100 ... 240VAC | | | | |
| Output mains adapter | 24VDC, 1.25 A | | | | |
| Supply voltage SI-USB | 12 ... 30VDC ≤600 mA | | | | |
| Sensor Side | | | | | |
| Sensor supply | Strain gauge (DMS): 5V ≤20 mA U5/U10/I20: 12V ≤200 mA | | | | |
| Miscellaneous | | | | | |
| Electrical connection | Strain gauge (DMS): Female socket 6-pin U5/U10/I20: Female socket 12-pin USB ² : PX0446 IP68 B Mini USB | | | | |
| Rated temperature range | 10 ... 40 °C | | | | |
| Operating temperature range | 0 ... 50 °C | | | | |
| Storage temperature range | -10 ... 70 °C | | | | |
| Dimension (L x W x H) | 125 x 80 x 57 mm | | | | |
| Level of protection | IP40 | | | | |
| Weight | 0.5 kg | | | | |

9 Warranty

Warranty

All instruments from Interface Inc., ('Interface') are warranted against defective material and workmanship for a period of (1) one year from the date of dispatch. If the 'Interface' product you purchase appears to have a defect in material or workmanship or fails during normal use within the period, please contact your Distributor, who will assist you in resolving the problem. If it is necessary to return the product to 'Interface' please include a note stating name, company, address, phone number and a detailed description of the problem. Also, please indicate if it is a warranty repair. The sender is responsible for shipping charges, freight insurance and proper packaging to prevent breakage in transit. 'Interface' warranty does not apply to defects resulting from action of the buyer such as mishandling, improper interfacing, operation outside of design limits, improper repair or unauthorised modification. No other warranties are expressed or implied. 'Interface' specifically disclaims any implied warranties of merchantability or fitness for a specific purpose. The remedies outlined above are the buyer's only remedies. 'Interface' will not be liable for direct, indirect, special, incidental or consequential damages whether based on the contract, tort or other legal theory. Any corrective maintenance required after the warranty period should be performed by 'Interface' approved personnel only

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