

interface

FORCE MEASUREMENT SOLUTIONS®

Installation & User Manual

SI-USB4



SI-USB4 Installation & User Manual

Table of Contents

1	Important Notes	1
	1.1 General Information	1
	1.2 Intended Use	2
	1.3 General Hazards in the Event of non-compliance with the Safety Instructions	3
	1.4 Residual Hazards	3
2	Safety and Warning Notices	3
	2.1 Symbols	3
	2.2 Health Protection and Safety	4
	2.3 Conversions and Changes	4
3	Preamble	4
	3.1 Product Description	4
	3.2 Safe and correct Use	5
4	Housing Connection	6
	5.1 Front	6
	5.2 Back	6
5	Pin Assignment SI-USB4	7
	5.1 Low-pass Filter second Order	7
6	Application Example	8
	6.1 Displacement Sensor Potentiometric (supplied by SI-USB4)	8
	6.2 PT100 with Four-Wire Measuring	8
7	Debugging	9
8	Technical Data	10
9	Warranty	11

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-USB4 is a measuring amplifier with up to four independent input channels. Each input channel is displayed as a separate device on a PC (virtual serial interface). Each measuring channel can be individually set in the factory for a physical quantity or a sensor.

The following sensor signals are currently available:

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 current input:	0 ... 20 mA	(corresponds 0 ... 20000 digits)
Active signals with current input:	4 ... 20 mA	(corresponds 0 ... 20000 digits)
Active signals with current input:	10 ± 10 mA	(corresponds 0 ... 20000 digits)
Active signals with current input:	12 ± 8 mA	(corresponds 0 ... 20000 digits)
Linear potentiometer:	0 ... 5V	(corresponds 0 ... 25000 digits)
Temperature measurement:	- 200 ... 860 °	(corresponds - 6400 ... 27520 digits)
Quadrature encoder:	5V TTL	(corresponds ± 32511 digits)

The amplifier variant is indicated on the type label and in the documentation.



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 Interface USB drivers are required for the operation on a PC. They are available for download on our website.

For operation of the SI-USB4 we recommend the software VS3. It is available for download on our website.

Among others, this software provides following functions:

- Configuration possibilities for the VS3
- Storage of sensor-related scaling and adjustment data
- Display for the presentation of measured data (actual value, tare value, minimum value and maximum 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 with date and definable superscription
- 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.

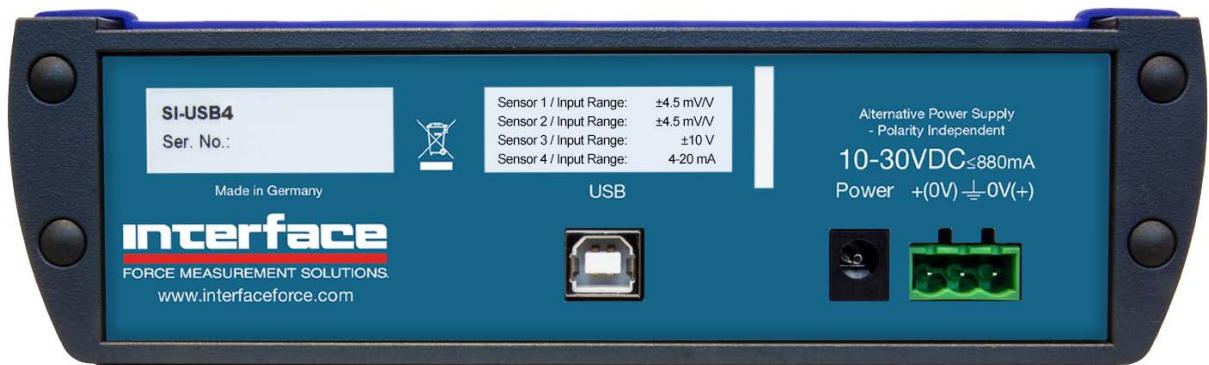
4 Housing Connection

4.1 Front



The four sensors are labeled Sensor 1 - 4. First the power supply must be connected. When a sensor is connected, the corresponding power LED is activated. The Link-LED is only activated when a PC/Laptop connection via the USB socket on the back exists. If the Link-LED is dark, check the SI-USB4 connection to the PC/Laptop. Temperature measurements are possible at sensor connection 1 and/or sensor connection 4.

4.2 Back



In addition to the serial number in the first field, the sensors and their associated connections are listed here in the second field.



It is important to ensure that there is no interchanging of the sensors, e. g. if a measuring chain exists.

The power is supplied either via the black power supply socket with a separately delivered power supply unit or via the green socket. Again, the polarity is independent for both power supply sockets. The middle PIN is the shield for the green socket.



Or



+

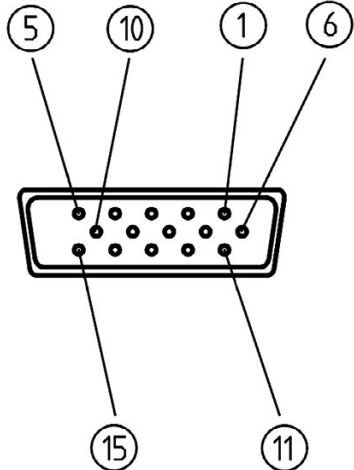
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5 Pin Assignment SI-USB4

15-pin	$\pm 4.5\text{mV/V}$, $\pm 5\text{V}$, $\pm 10\text{V}$, $0\text{-}20\text{mA}$, $4\text{-}20\text{mA}$, $10\pm 10\text{mA}$, $12\pm 8\text{mA}$, $0\text{-}5\text{V}$, PT100, 5VTTL	
Pin 1	Ground (supply 4V and 12V)	0V; 1-Wire GND
Pin 2	+12V (active supply)	12VDC
Pin 3	NC	-
Pin 4	Signal angle A	5V TTL
Pin 5	Signal angle B	5V TTL
Pin 6	Ground	0V
Pin 7	NC	-
Pin 8	Supply	4VDC
Pin 9	NC	-
Pin 10	Control signal or TEDS	L <2.0V; H >3.5V or 1-Wire DATA
Pin 11	Signal (+) (active or passive)	mV/V; $\pm 5\text{V}$; $\pm 10\text{V}$; 0/4 ... 20 mA
Pin 12	Signal (-) (when active connect to ground)	0V
Pin 13	Ground	0V
Pin 14	NC	-
Pin 15	+5V Reference voltage	5VDC



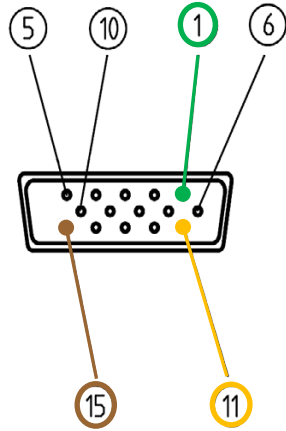
Top view

5.1 Low-pass Filter second Order

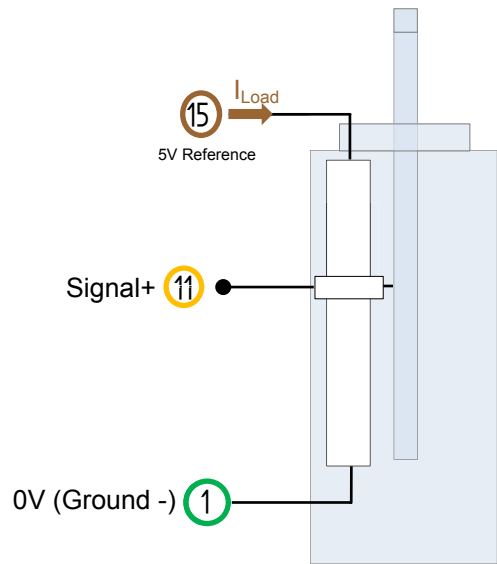
The settings for the cut-off frequencies of the low-pass filter can be found in the VS3 software manual.

6 Application Example

6.1 Displacement Sensor Potentiometric (supplied by SI-USB4)



Front View

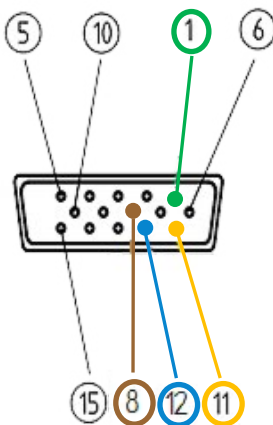


$$30 \Omega \leq R \leq 5000 \Omega$$

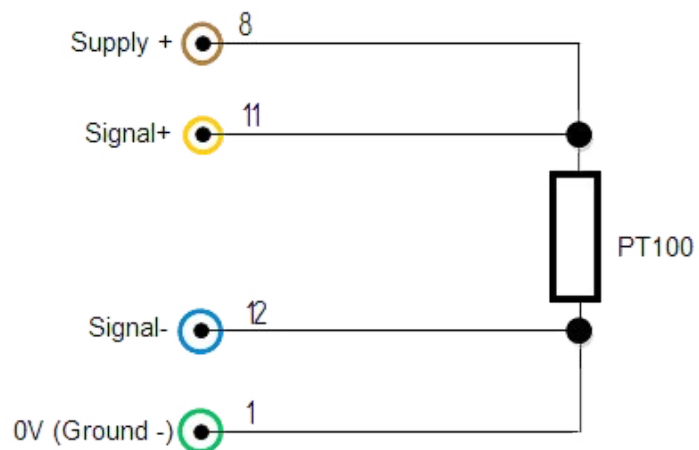
$$1 \text{ mA} \leq I_{Load} \leq \sim 170 \text{ mA}$$


Output 0 ... 25000 Digits

6.2 PT100 Industrial Temperature Sensor with Four-Wire Measuring



Front View



 Connect the Signal (+) and Signal (-) wires as close as possible to the PT100.

7 Debugging

This chart helps to find frequent errors and methods for debugging.

Error	Possible Cause	Debugging
A connection to the SI-USB4 is not possible	Driver incorrectly or not installed	<ul style="list-style-type: none"> • Install driver package • The first start-up of the SI-USB4 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-USB4. If the sensor requires higher current than available for the SI-USB4, this sensor cannot be used together with the SI-USB4
	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-USB4											
Input range	±4.5 mV/V	±5V	±10V	0 - 20 mA	4 - 20 mA	10 ±10 mA	12 ±8 mA	0 - 5V	-200 .. 860 °C	5V TTL	
Evaluation Side											
Zero point	0 digits										
Output format	16 Bit Signed Int.										
Input resistance	>1 MΩ (only for ±4.5mV/V / ±5V / ±10V / 0-5V)										
Rated burden	62 Ω (only for 0-20mA / 4-20mA / 10±10mA / 12±8mA)										
Low-pass filter 2nd order	30/300/1000/3000 Hz										
Measuring rate	max. 5000 meas./s										
Temperature drift	4 Bit/10 K										
Linearity error	±32 digits										
Accuracy	±32 digits										
Supply voltage of mains adapter	100 - 240VAC										
Output of mains adapter	24VDC, 1.25 A										
Supply voltage SI-USB4	10 - 30VDC ≤880 mA										
Sensor Side											
Sensor supply	4V ≤20 mA	12V ≤80 mA					5V ≤170 mA	4V ≤20 mA	5V ≤85 mA		
Cable length SI-USB4 - sensor	Variable										
Miscellaneous											
Electrical connection	Strain gages ±4.5mV/V / ±5V / ±10V / 0-20mA / 4-20mA / 10±10mA / 12±8mA / 0-5V / PT100 / 5V TTL: D-SUB-Socket, 15-pin USB: USB-B-Socket										
Cable length SI-USB4 - PC	3 m										
Rated temperature range	10 - 40 °C										
Operating temperature range	0 - 50 °C										
Storage temperature range	-10 - 70 °C										
Dimension (LxWxH) SI-USB4	130 x 190 x 60 mm										
Level of protection	IP20										
Material SI-USB4	Aluminum										
Weight SI-USB4	1.2 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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