interface

ADVANCED FORCE MEASUREMENT

ISG

Isolated DIN Rail Mount Signal Conditioner

Issue: 15-193 Revision A

Technical User Manual

www.interfaceforce.com

1 Imprint

Manufacturer	*Interface Inc.*
Valid for...	*DIN Mounting Rail SG Measuring Amplifier ISG*
Copyright Note	*© 2012– 2014 Interface Inc.*
Interdiction of Reprint	*Reprint in whole or in part with written permission, only.*
Change Notice	*Technical changes are reserved.*

2 Notes

2.1 General Notes

This operation manual is intended for technically qualified personnel with appropriate skills in the field of measurement and automatic control techniques. The information regarding all safety precautions and warnings in this manual as well as their flawless technical implementation is prerequisite for the safe installation, the commissioning, the safe operation and maintenance of **Interface Inc.** devices. Therefore it is imperative that all measures are carried out by qualified personnel, only. All persons involved with project planning, installation and operation of **Interface Inc.** devices must be familiar with the safety concepts in automation and control technology and qualified in the above mentioned sense.
For the sake of clarity, this operation manual may not constitute a detailed use of **Interface Inc.** devices in all possible applications. Also, not all possible types of installation, operation and maintenance are considered. If further information is required or should particular problems arise, which are not or not sufficiently detailed represented in this manual, please request this information from **Interface Inc.**

The safety precautions must observed in order to prevent property damage, injuries and/or even death results.

Interface Inc. devices may only be operated in accordance with the applications prescribed in this manual. Built-in appliances may be used professional installations, only.

With the connection and commissioning of the device, the buyer accepts the General Terms of Sale and Delivery of **Interface Inc**. Furthermore, the buyer accepts possible incompleteness of the manual and that information described therein is subject to change. Errors and changes are reserved.

Provisions for Use

An **Interface Inc.** device is used for displaying, processing and controlling of processes. It may not be used as a sole instrument for the prevention of dangerous conditions of machines and plants. Machinery and equipment must be designed in a way that erroneous states do not lead to a dangerous situation for operators (e.g. by independent limit switches, mechanical interlocks). In particular, it must be ensured that an incorrect entry on the device, its malfunction or failure does not lead to property damage or cause hazard to persons. It is also important to prevent the evasion of the security provisions of a plant. Emergency stop equipment must always be active.

Installation Notes

Interface Inc. devices must be installed and connected in compliance with the relevant DIN and VDE Standards. They must be installed in a way that inadvertent operation is sufficiently excluded. In order to avoid an undefined or hazardous state caused by interruption of the supply and signal lines, the appropriate hardware and software-related safety precautions must be observed. Supply and signal lines must be installed in such way that impairment of function of **Interface Inc.** devices cannot be caused by interfering signals (such as inductive or capacitive interference).

Malfunction, Maintenance and Repair Notes

The devices do not contain parts which need or can be serviced by the user. Repairs may be carried out by **Interface Inc.**, exclusively. If assuming that safe operation of the device is no longer possible, it must be taken out of service and secured against inadvertent operation, immediately.
This applies in particular, if:

- the device shows visible damage
- the device is no longer functional
- parts of the device are loose
- the connection lines show visible damage

It is also pointed out that all obligations of **Interface Inc.** are exclusively arising from the respective sales contract in which the warranty is conclusively settled.

2.2 Intended Use

Interface Inc. devices may only be used for measurement tasks and the directly related control tasks. Any other use is considered improper.

2.3 General Dangers by not following the Safety Precautions

The device complies with the state of current safety requirements. Residual risks can occur, if the device is improperly used and operated by untrained personnel. Any person commissioned with the installation, operation and maintenance of the device must have read and understood the operation manual and the safety precautions, in particular.

2.4 Residual Dangers

The device only covers part of the scope of measurement technology.
Safeguarding interests of the measurement technology must be planned and realized by the plant designer/supplier in a way to minimize residual dangers. The valid rules regulations and laws must be observed. Residual risks in connection with measurement technology must be pointed out.

2.5 Safety and Caution Symbols

If residual risks occur while working with the device, the following symbols in this operation manual must be noted:

Warning:
Warns of a potential risk of serious life-threatening injuries. The accident prevention regulations of the employer's liability insurance association must be considered.

Caution:
Warns of a potential danger of damage for the device, process, persons, or environment.

Note:
Supplemental information.

Important / Tip:
Reference to more detailed technical information.

2.6 Health Protection and Safety

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

1. All relevant sections of this manual must be read attentively in prior to the operation.
2. All warning labels on containers and packages must be noted.
3. Installation, operation and maintenance work may only be carried out by accordingly trained personnel under observance of the given instructions. If one of these instructions is not considered, the user of the product bears the complete responsibility for all consequences, occurring from the failure to comply.
4. Before opening the device, it must be disconnected from any power supply.

2.7 Qualified Personnel

Qualified personnel are persons who are familiar with the installation, operation and the maintenance of the device and have appropriate qualifications. The device shall only be used by qualified personnel according to the technical data in connection with the following safety regulations and rules. During the operation, legal and safety rules for the respective application case must be noted. The same applies for the use of accessories.

2.8 Changes

The device may not be changed constructively or safety-related without the explicit permission of **Interface Inc**. Any modification shall exclude liability on our part for damages resulting from this. Repairs and changes to the circuit boards are prohibited.

3 Continuative Documents

Following documents contain reference information about the DIN Mounting Rail Measuring Amplifier ISG

4 Contents

5 Introduction

5.1 Product Description

The DIN Mounting Rail Measuring Amplifier ISG amplifies signals of strain gauge sensors to standard output signals. The slim housing shape allows space-saving installation in control cabinets on standard DIN mounting rails. The analog outputs of ±5V and ±10V enable direct signal processing with a PLC. The sensitivity of the sensor as well as preloads (tare) can be adjusted on site by DIP switches. Interference signals and transients of the measuring signal can be reduced by an input filter. A control signal connection is possible (if control signal available in the sensor). Thus, the adjustment and the subsequent evaluation can be checked at any time. All the controls are accessible behind a removable Plexiglas on the front panel.

5.2 Power Supply

Mains operation:

Power supply:	10-30V DC min. 300mA, safe from reverse polarity
Ripple:	< 10%
Fuse:	self-resettable fuse 500mA
Undershoot/overshoot:	can lead to erroneous measurements or defects.
Voltage peaks:	are being discharged by fast protection components.
Voltage dropouts:	voltage dropouts up to 10ms have no effect.

The supply voltage of 10-30V DC is electrically isolated from the measurement and output circuit

5.3 Safe and Proper Use

Caution:

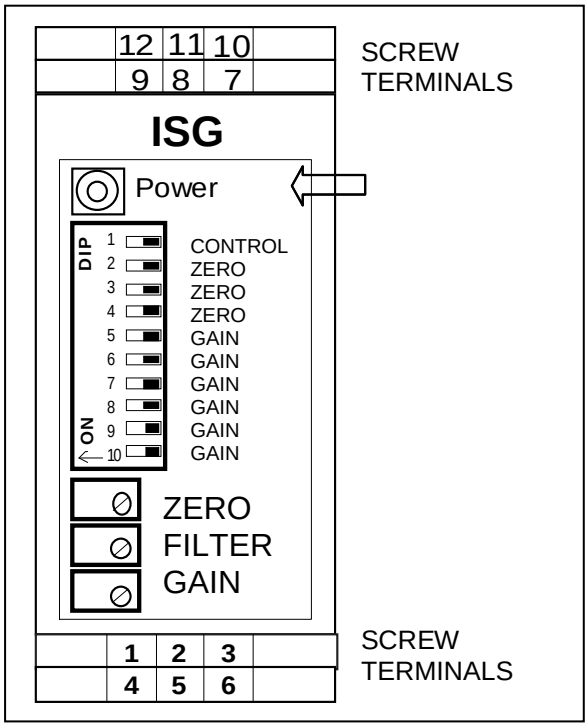
- Protect the device against moisture, condensation, rain, snow....
- Protect the device against direct solar radiation
- Protect the device against dust and pollution
- Protect the device against excessive ambient temperature
- Protect the device against excessive vibration

5.4 Dimensions – Weight

Device dimensions in mm: 23 x 111 x 76 Weight: 0.1 kg

6 Instruction / Description of the Operating Mode

6.1 Terminal assignment



Terminal Assignment:

1	V-voltage	Output
2	GND V/I	Output
3	I-Current	Output
4	10-30 VDC	Supply
5	GND	Supply
6	PE	Supply
7	Supply -	SG
8	Supply +	SG
9	Shield	SG
10	Signal +	SG
11	Signal -	SG
12	100% control sig.	SG

Potentiometer:

The fine adjustment for various functions is possible by following pots:

Zero point:	Fine adjustment of the zero point.
Filter:	Fine adjustment of the filter.
Gain:	Fine adjustment of gain.

6.2 Switching the Device on

The device is activated and ready to operate as soon as supply voltage is applied. The readiness for operation is signaled by the Power-LED.

6.3 Adjustments

6.3.1 Adjustment of the coding switches

			Option 1.5 mV/V	Option 4.5 mV/V
S1	On	Activation of 100% control signal		
S2	On	V-Out ±10V / Off V-Out ±5V		
S3-S5	Off	Zero point at ±10 % preload		
S3	On	Zero point at 10-30 % neg. preload		
S4	On	Zero point at 10-30 % pos. preload		
S5	On	Zero point at 30-50 % pos. preload		
S6-S10	Off	Input sensitivity 2.15 – 3.50 mV/V	0.97 – 1.50 mV/V	2.76 – 4.50 mV/V
S6	On	Input sensitivity 1.35 – 2.25 mV/V	0.62 – 1.07 mV/V	1.78 – 2.90 mV/V
S7	On	Input sensitivity 0.90 – 1.45 mV/V	0.40 – 0.69 mV/V	1.14 – 1.86 mV/V
S8	On	Input sensitivity 0.60 – 1.00 mV/V	0.27 – 0.46 mV/V	0.78 – 1.28 mV/V
S9	On	Input sensitivity 0.40 – 0.70 mV/V	0.20 – 0.34 mV/V	0.58 – 0.95 mV/V
S10	On	Input sensitivity 0.30 – 0.45 mV/V	0.14 – 0.23 mV/V	0.32 – 0.64 mV/V

6.3.2 Presetting of the sensitivity (gain)

The sensitivity of the sensor is indicated on the data sheet or type label. It is specified in mV/V. This sensitivity value is adjusted to an overlapping gain range via coding switch S6-S10.

6.3.3 Adjustment of the input filter

The cutoff frequency of the 3DB input filter is adjusted by pot “filter”.

Left Stop:	Right Stop:
Cutoff Frequency = 1kHz	Cutoff Frequency = 10Hz

The use of the filter is appropriate if interferences are on the measuring signal. This can occur if frequency converters or other power electronics are close by the measuring system, or if sensor cables in channels were laid parallel to power lines. However, the time constant should not be selected too large, otherwise the dynamic of the measurement system will be reduced

6.4 Adjustment Description

6.4.1 Zero point adjustment

Connect digital voltmeter (measuring range: 19,999V) to GND Out and U Out. Adjust output to 0,000V with pot zero point. If the pot adjustment range is not sufficient due to a larger preload, the zero point can be shifted via coding switch S3-S5.

6.4.2 Adjustment to 100% control signal (if available, see sensor data sheet)

1. Connect digital voltmeter (measuring range: 19,999V) to GND Out and U Out.
2. Apply operating voltage, sensor must be installed, but it must be unloaded!
3. Adjust output to 0,000V with zero point pot, for this, see zero point adjustment.
4. Activate 100% control signal with S1. Set output to +10,000V (+5,000V) with pot gain.
5. Switch off 100% control signal and check zero point – if necessary repeat the adjustment.

6.4.3 Adjustment by nominal load (weights, reference load, reference torque...)

1.) Connect digital voltmeter (measuring range: 19,999V) to GND Out and U Out.
2.) Adjust output to 0,000V with zero point pot, for this, see zero point adjustment.
3.) Apply 100% nominal load (weights, reference pressure…)
4.) Set output to +10,000V (+5,000V) with pot gain.
5.) Unload sensor and check zero point – if necessary repeat the adjustment.

6.4.4 Adjustment via reference - mV –voltage source

1.) Connect “Supply -“ with “Signal –“.
2.) Connect mV –voltage source to“Signal –“and“Signal +”.
3.) Connect digital voltmeter (measuring range: 19,999V) to GND Out and U Out.
4.) Set mV voltage source to 0,000mV. Set output to 0,000V with pot gain.
5.) Preset nominal input signal (e.g. 10,00mV/V) via mV voltage source. Set output to +10,000V (+5,000V) with pot gain.
6.) Disconnect mV voltage source and remove bridge “Supply –“ to“Signal –“.
7.) Connect sensor. If necessary correct zero point with pot zero point, for this see zero point adjustment.

6.4.5 Adjustment to current output 4-20 mA (option 0-20mA, 12-20mA, 10-20mA)

The adjustment with current output is the same procedure as the adjustment of the voltage output. However, the digital measuring device with current range of 20,0mA must be connected to terminals GND Out and I Out. For voltage values 0V and +10,000V (+5,000V), currents 4mA (and/or 0, 10 or 12mA) and 20mA are applied.

6.5 Interfaces and Connections

6.5.1 Connection for SG sensors

Supply via ISG:	10V/90mA (standard), 5V/60mA (option (factory-made adjustable)
Bridge resistance:	min. 350 Ohm, only full bridge, 4- or 6-wire
Sensitivity:	0.3mV/V – 3.5mV/V, other value on request
100% control signal:	is activated by the ISG via S1

The supply voltage should be as large as possible. However, it may not exceed the supply voltage which was specified for the sensor (see sensor data sheet).

6.5.2 Evaluation connection:

Voltage output:	±10V or ±5V (switchable by coding switch S2) max. 5mA output resistance< 1Ohm
Current output (option factory-made adjustment):	0-20mA, 4-20mA, 12±8mA, 10±10mA, impedance max. 400Ω

The exact device configuration is shown on the front side of the ISG. If an ISG is ordered in connection with a sensor and a SYS-CAL1 it will be adjusted to the sensor; only the zero point must be corrected.

Note:

The device must be disconnected from mains during any connection procedures. Note the safety precautions.

6.6 Terms Definition

Nominal Load: e.g. 100kN, 63Nm, ... is indicated on the sensor and on the test certificate. The nominal load is the upper limit of the measuring range.

Sensitivity: is the sensor signal at 100 % nominal load of a SG sensor. Indicated in mV/V. See sensor type label or test certificate.

6-Wire Connection: Some sensors have two additional sensing lines, which are connected to the respective SG supply.

100% Control Signal: by a control resistance, a signal is simulated in the sensor which produces the exact same value as at 100 % nominal load.
This value can be activated in the SI.

Nominal Impedance: max. resistance load at current measurement.

SG-Supply: The SG supply is the supply of a SG sensor and must be of highest quality.

Bridge Resistance: the bridge resistance is the ohmic resistance of the complete measure-ment bridge.

Output Signal: e.g.: ±5V / ±10V / 0-20mA / 4-20mA / 12±8mA / 10±10 mA
the first value (±5V) is the output signal for the unloaded sensor.
the second value (±5V) is the output signal for 100% loaded sensor.
the leading sign (±5V) indicates the possible signal direction.
The adjusted sensor direction (e.g. tension, see test certificate) results in a positive output signal.
Only one load direction is possible at 0-20mA and 4-20mA.

Filter:	At a high filter effect, interferences are better suppressed, however, a fast dynamic measurement is not possible. At a low filter effect, fast measurements are possible, but interferences must be reduced by other appropriate measures such as grounding, cable shielding etc.

6.7 Troubleshooting

No Output Signal available:
- No supply voltage _ Power LED must be on.
- Sensor not connected or open circuit in the sensor cable?

Voltage or current output in control limit:
- Signal input is not connected or wrongly connected?
- Open circuit in the sensor cable.
- Was the sensor overloaded?

Output signal does not go back to 0:
- Was the sensor overloaded?
- Was the sensor installed tensed?
- Control switch on “ON”?
- Was the sensor connected correctly?
- Open circuit in the sensor cable?

Current output is not linear:
- Nominal impedance of max. 500 Ohm was exceeded.

7 Product Phases

7.1 Transportation

Note:

Please pack the equipment suitable for transportation

The equipment may not be able to move back and forth in the package

Please protect the equipment against moisture

7.2 Commissioning and Installation

Safety measures before the installation:

Caution:

The device may not be connected to the power supply system, directly. The specifications of the supply voltage in chapter 5.2 must be considered.

Cable connections:

Caution:

Never connect voltage levels to unoccupied pins!

7.3 Standard Operation

EMC:

Caution:

The device may not be exposed to higher EMS transients than determined by the standard.

Cable:

Caution:

Never disconnect the connectors by pulling the cables. Always separate the connector at the plug, directly.

Storage

Note:

Store the device in dry and dust-free spaces, only.

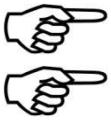
7.4 Maintenance and Cleaning

Cleaning:

Warning:

Please disconnect the device from the power supply before cleaning.

Caution:



Clean the housing with a soft and slightly moisturized cloth. Never use solvents, as they may damage the front panel labeling and the display panel.
While cleaning, ensure that no liquids enter the device or the connections

Preventive maintenance and inspection:

Note:

Check the plug connections.

Repair:

Note:

The device does not contain any parts which must or can be serviced by the user. Repairs may be carried out by **Interface Inc.**, exclusively. If assuming that safe operation of the device is no longer possible, it must be taken out of service and secured against inadvertent operation, immediately.
This applies in particular, if:

- the device shows visible damage
- the device is no longer functional
- parts of the device are loose
- the connection lines show visible damage

7.5 Safe Disposal

Equipment disposal:

Please dispose obsolete equipment in accordance with the applicable statutory provisions. By this, you meet the legal obligations and also contribute to the environmental protection!