SIRIUS
Technical Reference Manual
Version: 1.4.0

Thank you!

Thank you very much for your investment in our unique data acquisition systems. These are top-quality instruments which are designed to provide you years of reliable service. This guide has been prepared to help you get the most from your investment, starting from the day you take it out of the box, and extending for years into the future.

www.dewesoft.com

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...推动测试创新 创造实在价值

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1 Notice

The information contained in this document is subject to change without notice.

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Warranty Information:

A copy of the specific warranty terms applicable to your Dewesoft product and replacement parts can be obtained from your local sales and service office.

To find a local dealer for your country, please visit this link: http://www.dewesoft.com/support and select `Find dealers` on the left navigation bar.

Calibration

Every instrument needs to be calibrated at regular intervals. The standard norm across nearly every industry is annual calibration. Before your Dewesoft data acquisition system is delivered, it is calibrated. Detailed calibration reports for your Dewesoft system can be requested. We retain them for at least one year, after system delivery.

Support

Dewesoft has a team of people ready to assist you if you have any questions or any technical difficulties regarding the system. For any support please contact your local distributor first or Dewesoft directly.

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Service/repairs

The team of Dewesoft also performs any kinds of repairs to your system to assure a safe and proper operation in the future. For information regarding service and repairs please contact your local distributor first or Dewesoft directly.

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1.1 Safety instructions

Your safety is our primary concern! Please be safe!

Safety symbols in the manual

WARNING 	Calls attention to a procedure, practice, or condition that could cause body injury or death.

CAUTION 	Calls attention to a procedure, practice, or condition that could possibly cause damage to equipment or permanent loss of data.

General Safety Instructions

WARNING 	The following general safety precautions must be observed during all phases of operation, service, and repair of this product. Failure to comply with these precautions or with specific warnings elsewhere in this manual violates safety standards of design, manufacture, and intended use of the product. Dewesoft GmbH assumes no liability for the customer's failure to comply with these requirements.

All accessories shown in this document are available as option and will not be shipped as standard parts.

Environmental Considerations

Information about the environmental impact of the product.

Product End-of-Life Handling

Observe the following guidelines when recycling a Dewesoft system:

System and Components Recycling

Production of these components required the extraction and use of natural resources. The substances contained in the system could be harmful to your health and to the environment if the system is improperly handled at it's end of life! Please recycle this product in an appropriate way to avoid an unnecessary pollution of the environment and to keep natural resources.

This symbol indicates that this system complies with the European Union's requirements according to Directive 2002/96/EC on waste electrical and electronic equipment (WEEE). Please find further information about recycling on the Dewesoft web site www.dewesoft.com

Restriction of Hazardous Substances

This product has been classified as Monitoring and Control equipment, and is outside the scope of the 2002/95/EC RoHS Directive. However we take care about our environment and the product is lead free.

General safety and hazard warnings for all Dewesoft systems

- Safety of the operator and the unit depend on following these rules
- Use this system under the terms of the specifications only to avoid any possible danger.
- Read your manual before operating the system.
- Observe local laws when using the instrument.
- DO NOT touch internal wiring!
- DO NOT use higher supply voltage than specified!
- Use only original plugs and cables for harnessing.
- You may not connect higher voltages than rated to any connectors.
- The power-cable and -connector serve as Power-Breaker. The cable must not exceed 3 meters, disconnect function must be possible without tools.
- Maintenance must be executed by qualified staff only.
- During the use of the system, it might be possible to access other parts of a more comprehensive system. Please read and follow the safety instructions provided in the manuals of all other components regarding warning and security advices for using the system.
- With this product, only use the power cable delivered or defined for the host country.
- DO NOT connect or disconnect sensors, probes or test leads, as these parts are connected to a voltage supply unit.
- Ground the equipment: For Safety Class 1 equipment (equipment having a protective earth terminal), a non interruptible safety earth ground must be provided from the mains power source to the product input wiring terminals.
- Please note the characteristics and indicators on the system to avoid fire or electric shocks. Before connecting the system, please read the corresponding specifications in the product manual carefully.

- The inputs must not, unless otherwise noted (CATx identification), be connected to the main circuit of category II, III and IV.
- The power cord separates the system from the power supply. Do not block the power cord, since it has to be accessible for the users.
- DO NOT use the system if equipment covers or shields are removed.
- If you assume the system is damaged, get it examined by authorised personnel only.
- Adverse environmental conditions are:
  - Moisture or high humidity
  - Dust, flammable gases, fumes or dissolver
  - Thunderstorm or thunderstorm conditions (except assembly PNA)
  - Electrostatic fields, et cetera.
- The measurement category can be adjusted depending on module configuration.
- Any other use than described above may damage your system and is attended with dangers like short-circuit, fire or electric shocks.
- The whole system must not be changed, rebuilt or opened
- DO NOT operate damaged equipment: Whenever it is possible that the safety protection features built into this product have been impaired, either through physical damage, excessive moisture, or any other reason, REMOVE POWER and do not use the product until safe operation can be verified by service-trained personnel. If necessary, return the product to Dewesoft sales and service office for service and repair to ensure that safety features are maintained.
- DO NOT service or adjust alone. Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.
- If you assume a more risk less use is not provided any more, the system has to be rendered inoperative and should be protected against inadvertent operation. It is assumed that a more risk less operation is not possible any more, if
  - the system is damaged obviously or causes strange noises.
  - the system does not work any more.
  - the system has been exposed to long storage in adverse environmental.
  - the system has been exposed to heavy shipment strain.
- DO NOT touch any exposed connectors or components if they are live wired. The use of metal bare wires is not allowed. There is a risk of short cut and fire hazard!
- Warranty void if damages caused by disregarding this manual. For consequential damages NO liability will be assumed!
- Warranty void if damages to property or persons caused by improper use or disregarding the safety instructions.
- Unauthorized changing or rebuilding the system is prohibited due to safety and permission reasons (CE).
- Be careful with voltages >25 VAC or >35 VDC! These voltages are already high enough in order to get a perilous electric shock by touching the wiring.
- The product heats during operation. Make sure there is adequate ventilation. Ventilation slots must not be covered!
- Only fuses of the specified type and nominal current may be used. The use of patched fuses is prohibited.
- Prevent using metal bare wires! Risk of short circuit and fire hazard!
- DO NOT use the system before, during or shortly after a thunderstorm (risk of lightning and high energy over-voltage). An advanced range of application under certain conditions is allowed with therefore designed products only. For details please refer to the specifications.
- Make sure that your hands, shoes, clothes, the floor, the system or measuring leads, integrated circuits and so on, are dry.
- DO NOT use the system in rooms with flammable gases, fumes or dust or in adverse environmental conditions.
- Avoid operation in the immediate vicinity of:
  - high magnetic or electromagnetic fields
  - transmitting antennas or high-frequency generators

- for exact values please refer to enclosed specifications.
- Use measurement leads or measurement accessories aligned to the specification of the system only. Fire hazard in case of overload!
- Do not switch on the system after transporting it from a cold into a warm room and vice versa. The thereby created condensation may damage your system. Acclimatise the system unpowered to room temperature.
- Do not disassemble the system! There is a high risk of getting a perilous electric shock. Capacitors still might be charged, even if the system has been removed from the power supply.
- The electrical installations and equipments in industrial facilities must be observed by the security regulations and insurance institutions.
- The use of the measuring system in schools and other training facilities must be observed by skilled personnel.
- The measuring systems are not designed for use at humans and animals.
- Please contact a professional if you have doubts about the method of operation, safety or the connection of the system.
- Please be careful with the product. Shocks, hits and dropping it from already lower level may damage your system.
- Please also consider the detailed technical reference manual as well as the security advices of the connected systems.

This product has left the factory in safety-related flawless and in proper condition.
In order to maintain this condition and guarantee safety use, the user has to consider the security advices and warnings in this manual.

EN 61326-3-1:2008

IEC 61326-1 applies to this part of IEC 61326 but is limited to systems and equipment for industrial applications intended to perform safety functions as defined in IEC 61508 with SIL 1-3.

The electromagnetic environments encompassed by this product family standard are industrial, both indoor and outdoor, as described for industrial locations in IEC 61000-6-2 or defined in 3.7 of IEC 61326-1.
Equipment and systems intended for use in other electromagnetic environments, for example, in the process industry or in environments with potentially explosive atmospheres, are excluded from the scope of this product family standard, IEC 61326-3-1.

Devices and systems according to IEC 61508 or IEC 61511 which are considered as “operationally well-tried”, are excluded from the scope of IEC 61326-3-1.

Fire-alarm and safety-alarm systems, intended for protection of buildings, are excluded from the scope of IEC 61326-3-1.

2 About this document

This is the Technical Reference Manual for SIRIUS Version 1.4.0.

The manual is divided into several chapters. You will find:

- A description of the system and the main combination and expansion options
- The description of the connection variants and the pin assignments on the inputs and outputs
- A comprehensive introduction to the configuration of the modules using DEWESoft®
- Technical data

The software that has been used must be:

- DEWESoft® Version X7.1-b108 or higher
- Firmware of the SIRIUS system/s must be: version 4.3.1.16. higher

2.1 Legend

The following symbols and formats will be used throughout the document.

IMPORTANT 	Gives you an important information about a subject. Please read carefully!

HINT 	Gives you a hint or provides additional information about a subject.

EXAMPLE 	Gives you an example to a specific subject.

Example	Meaning	Description
Cancel	Button	a button that you can click
File	Menu Item	a menu item, will open a sub menu or a dialogue
`Times New Roman`	List Item	an item in a list (or tree) that you can select
Events	Tab Sheet	a tab sheet that you can select
`C:\Program Files\OpenOffice.org 3\readme.txt`	File Path and Name	a file name or path
Windows Key	a term	any kind of term (maybe also compound)
SNR: 85dB	Preliminary info	Preliminary information: e.g. specifications that are not confirmed yet

Table 1: Layout formats used in the documentation

2.2 Online versions

2.2.1 SIRIUS technical reference manual

The most recent version of this manual can be downloaded from our homepage:

http://www.dewesoft.com/download

In the *HW Manuals* section click the download link for the *SIRIUS users manual*.

2.2.2 DEWESoft® tutorials

The DEWESoft® tutorials document, provides basics and additional information and examples for working with DEWESoft® and certain parts of the program.

The latest version of the DEWESoft® tutorials can be found here:
http://www.dewesoft.com/download

In the the *SW Manuals* section click the download link of the *DEWESoft 7 tutorials* entry.

3 Getting started

This chapter will help you to install the software, connect your SIRIUS system to the PC via USB and will show you how to configure DEWESoft®.

To follow these steps, you need the following items:

- your brand new SIRIUS system (included in the shipment)
- your SIRIUS USB stick (included in the shipment)
- your PC with Windows 7 or Windows-XP installed (Windows-Vista is not recommended, but may work)

3.1 Software installation

This chapter will explain how to correctly install all the required software for your SIRIUS system on your measurement PC.

The software installation procedures and screen-shots in chapter 3.1 Software installation refer to Windows® 7.

3.1.1 DEWESoft® installation

This chapter includes information about installing DEWESoft® on your computer in order to use your SIRIUS system.

IMPORTANT

Do not connect your SIRIUS system to the PC before the software installation is finished.

A general guideline of how to install DEWESoft® can be found here:
http://www.dewesoft.com/download?file=Dewesoft7_QuickStart.doc

SIRIUS is supported in DEWESoft® 7.1 or higher.

Attach the SIRIUS-USB stick to your computer and start the DEWESoft® installer by double clicking on the full installer executable file: at the time of writing it is called `DEWESoftX_FULL_7_1_0_Beta98.exe` (see Illustration 1).

HINT

In the future, there may be a newer version of the installer:
e.g. `DEWESoftX_FULL_7_1_0.exe`, `DEWESoftX_FULL_7_1_1.exe`, etc.

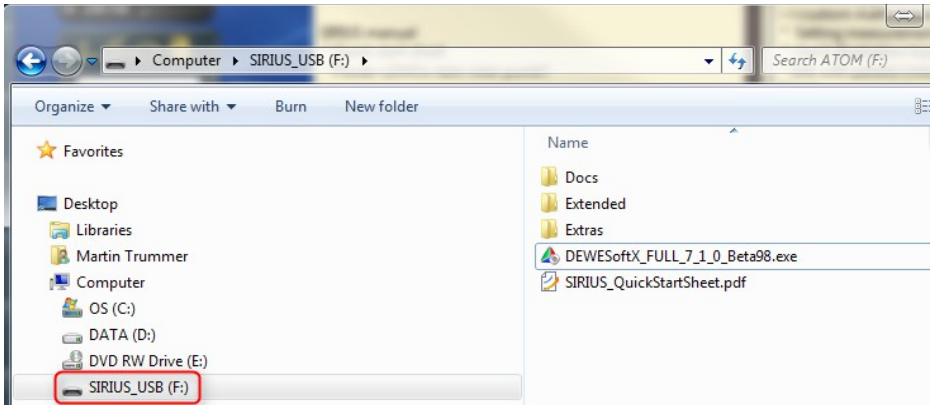


Illustration 1: DEWESoft® installer file

3.1.1.1 Uninstall previous version

If you already have an older incompatible version of DEWESoft® installed, the installer may show you this error dialogue:

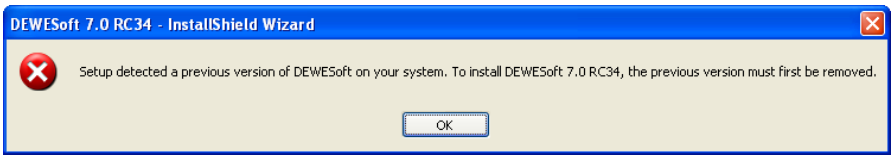


Illustration 2: Uninstall previous version message

DEWESoft® can be uninstalled like any other windows program:
Go to *Start* – *Control Panel* – `Uninstall program` then right-click on the item of your current DEWESoft® installation and select **Uninstall** from the pop-up menu and follow the instructions of the uninstall wizard.

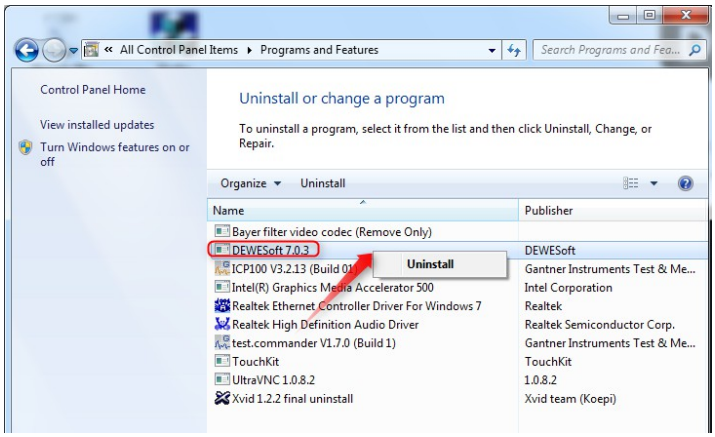


Illustration 3: Uninstall previous DEWESoft® version

3.1.1.2 Installing new DEWESoft® version

The first screen you see is the Welcome Screen:

click **Next >** to continue.

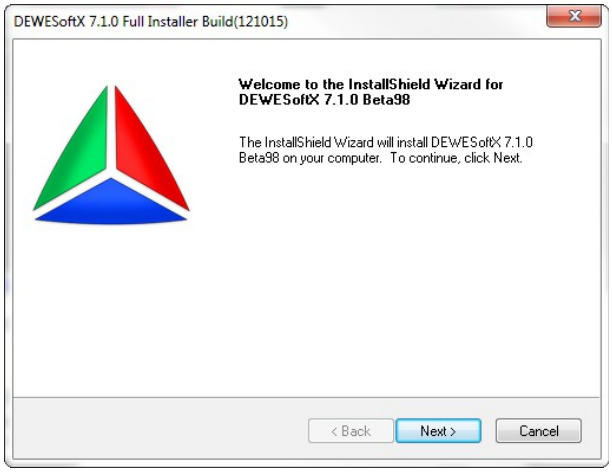


Illustration 4: Installer: Welcome Screen

In the *License Agreement* screen, read the license conditions carefully.

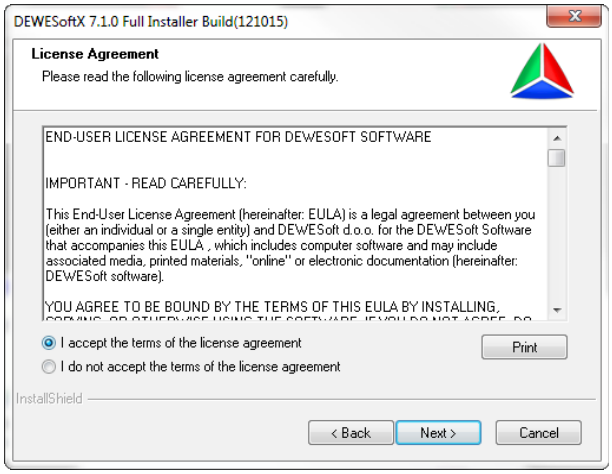


Illustration 5: Installer: License Agreement

If you agree, select the *I accept the terms of the license agreement* radio box and click **Next >** to continue.

In the *Setup Type* page, you must select the type of installation.

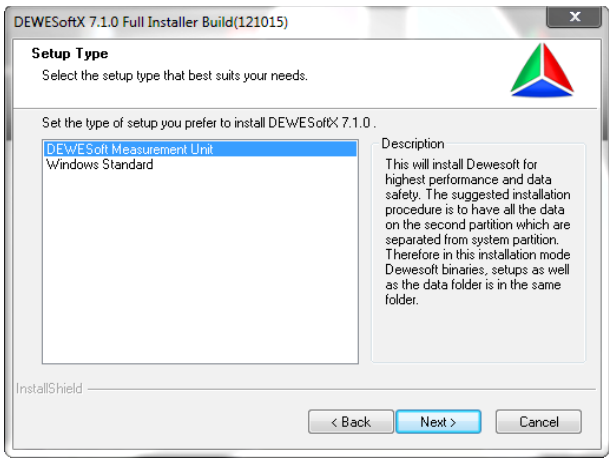


Illustration 6: Installer: Setup Type

The default and recommended setup type is *DEWESoft Measurement Unit*.

Note, that the path of the DEWESoft® installation may vary depending on the setup type that you chose and on the number of hard-disk-partitions that are available on your system:

In Illustration 7, you can see that two hard-disk-partitions `C:` and `D:` exist (`E:` is a DVD drive)	In Illustration 8, you can see that only one hard-disk-partition `C:` exist (`D:` is a DVD drive)

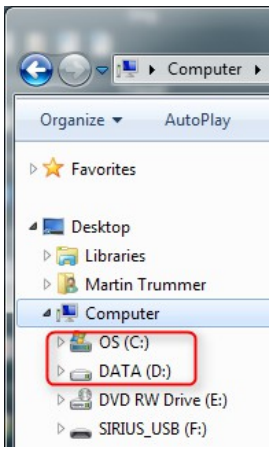
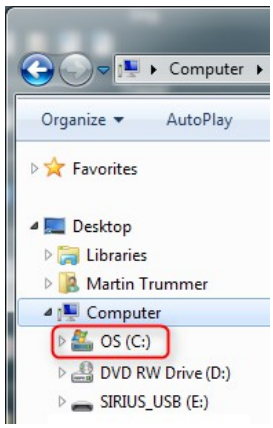

	

Illustration 7: Two partitions	*Illustration 8: One partition*

Table 2: Hard-disk-partitions

DEWESoft measurement unit

The setup type *DEWESoft Measurement Unit* will install DEWESoft® for highest performance and data safety.

If you have 2 or more hard-disk-partitions, then we recommend to to have all the data on the second partition (or even second hard disk or array of disks) which are separated from the system partition. The System partition gets fragmented over time and then the writing performance dramatically drops
Therefore in this installation mode DEWESoft® binaries, setups as well as the data folder will be installed in the same folder e.g. `D:/Dewesoft7`) on the second hard-drive-partition.
If you ever need to install a new operating system or need to reformat the system hard-drive-partition, the DEWESoft® installation can remain: just the device drivers need to be reinstalled.

Directory name	Explanation	Default path
Bin	contains DEWSoft.exe	D:\DEWESoft7\Bin\V7_1
Addons	.dll files for plugins must be copied into this directory	D:\DEWESoft7\Bin\V7_1\Addons
Data	this is where DEWESoft® will store your measurement data	D:\DEWESoft7\Data
Setups	this is where your DEWESoft® setup files will be stored	D:\DEWESoft7\Setups
System	this is where DEWESoft® project files are stored	D:\DEWESoft7\System\V7_1
Log	this is where DEWESoft® will store log files	D:\DEWESoft7\System\V7_1\Logs

Table 3: DEWESoft® directories (Measurement Unit Installation)

Windows standard

The setup type *Windows Standard* will install DEWESoft® binaries in the Windows *program files* folder and setups and data files in the *My documents* folder.

This installation fully complies with Windows installation policies and is recommended for installing DEWESoft® for viewing the data on corporate computers with strict IT policies.

Directory name	Default path
Bin	C:\Programme\DEWESoft7\Bin\V7_1
Addons	C:\Programme\DEWESoft7\Bin\V7_1\Addons
Data	user dependant directory: C:\Dokumente und Einstellungen\All Users\Dokumente\DEWESoft7\Data
Setups	user dependant directory: C:\Dokumente und Einstellungen\All Users\Dokumente\DEWESoft7\Setups
System	user dependant directory: C:\Dokumente und Einstellungen\All Users\Dokumente\DEWESoft7\System\V7_1
Log	user dependant directory: C:\Dokumente und Einstellungen\All Users\Dokumente\DEWESoft7\System\V7_1\Logs

Table 4: DEWESoft® directories (Windows Standard Installation)

click **Next >** to continue.

The installer now let's you choose the *Destination Location* for the installation:

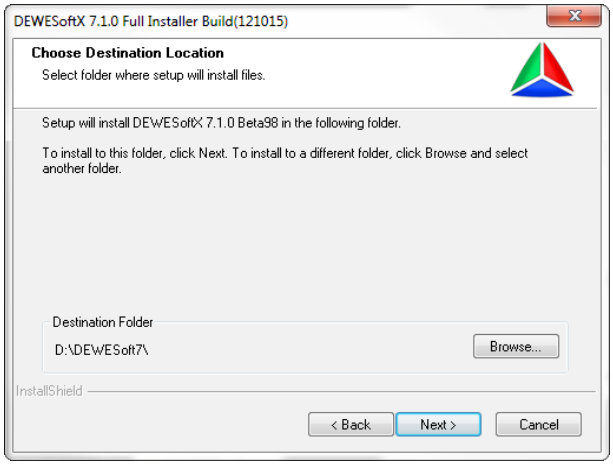


Illustration 9: Installer: Destination Location

Note that the path shown in the screen shot above is dependant on what setup type you have chosen.

IMPORTANT

Do not change the installation location!
This might cause problems with some plugins and features of DEWESoft®.

click **Next >** to continue.

Enter your customer information:

click **Next >** to continue.

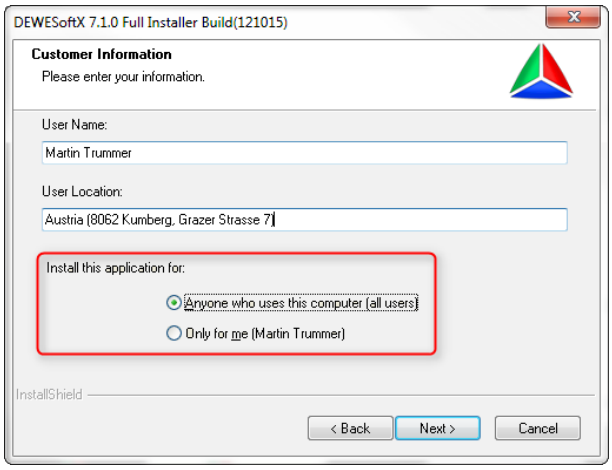


Illustration 10: Installer: Customer Info

Select the optional features that you want to install from the list.
On production PCs it is recommended to only install the features, that you really need.

click **Next >** to continue.

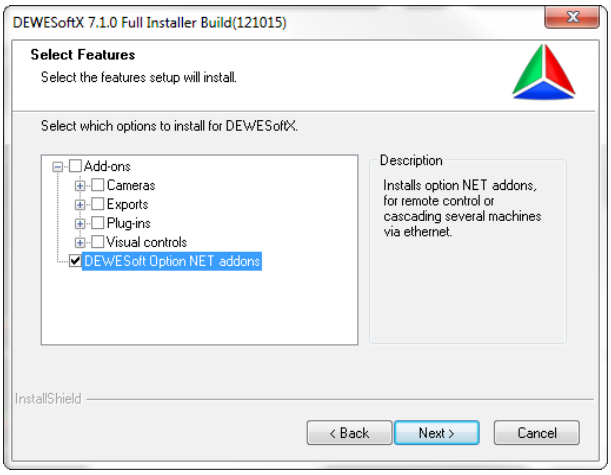


Illustration 11: Installer: Select Features

HINT

The information in the red rectangle of Illustration 10 is only available for setup type *Windows Standard*.

Select the language that you want to use in DEWESoft®:

Click **Next >** to continue.

Note: The language can be changed later in DEWESoft® at any time.

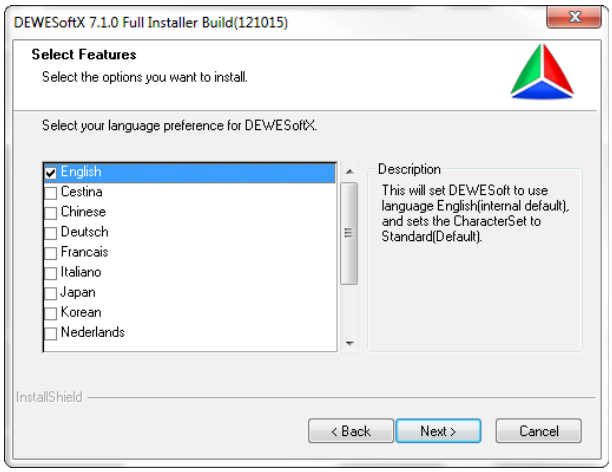


Illustration 12: Installer: Select Language

Now the installer has all the information that is required to start the installation:

Press **Install** to start the installation.

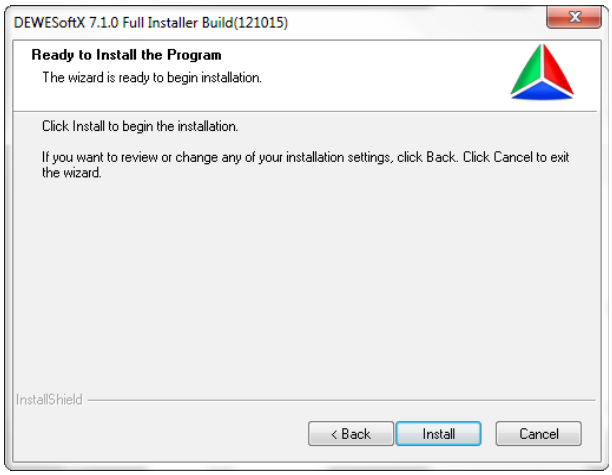


Illustration 13: Installer: Ready To Install

You may get a Windows Security warning (see Illustration 14). You can safely click on *'Install this driver software anyway'* and continue the installation.

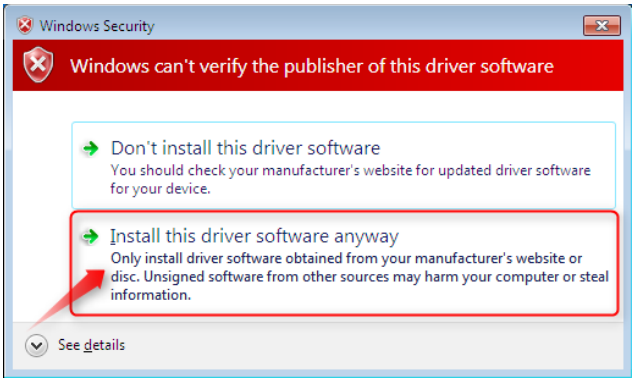


Illustration 14: Windows Security Warning

You may also get another Windows Security dialogue (see Illustration 15). You can check the *'Always trust software from "Dewesoft"'* check-box and click the **Install** button to continue the installation.

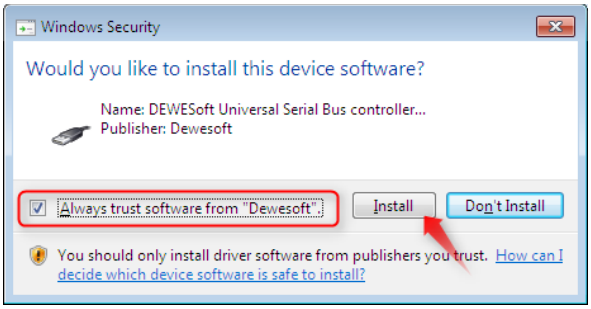


Illustration 15: Windows Security Dialogue

Before the installation of any drivers, you may see a warning like this:

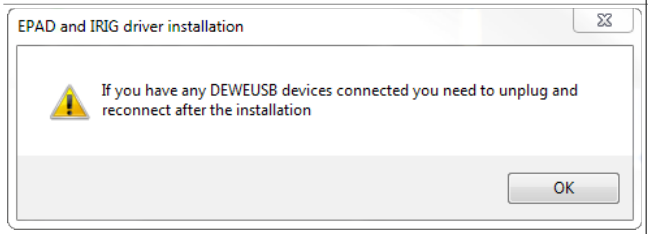


Illustration 16: Driver installation warning

After clicking **OK**, the driver will be installed:

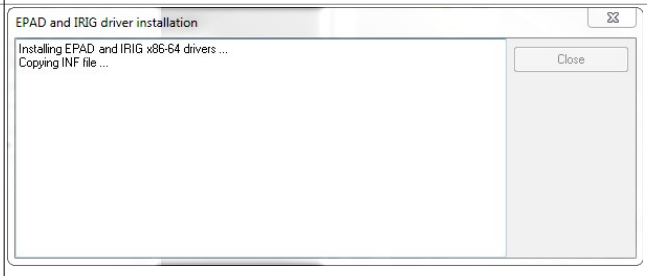


Illustration 17: Driver installation

When the DEWESoft® installation has completed successfully, you will see the final screen:

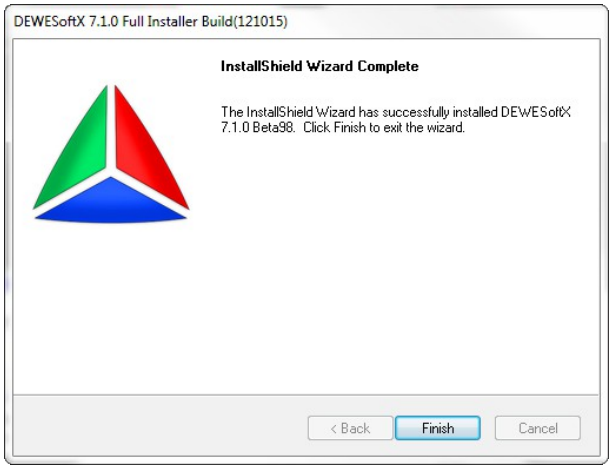


Illustration 18: Installer: Complete

Make sure to restart your PC after the installation:

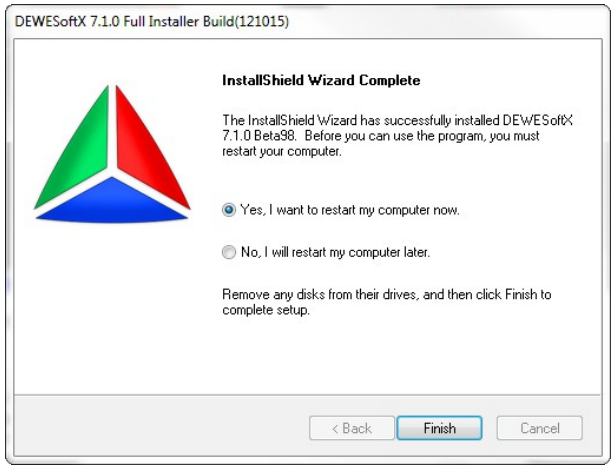
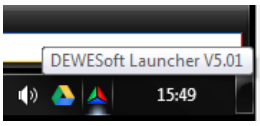


Illustration 19: Installer: Restart

After the restart you will notice that there is a new icon in the Windows task tray: it is the DEWESoft® launcher which will pop up the DEWESoft® launcher program when you connect a Dewesoft measurement device (e.g. SIRIUS, DEWE-43, ..).



3.2 Connecting a Single Slice

First connect the power supply to the connector named *POWER IN* (see Illustration 20 below) of your SIRIUS system/s (see 4.2.1.4 Power In on page 27).

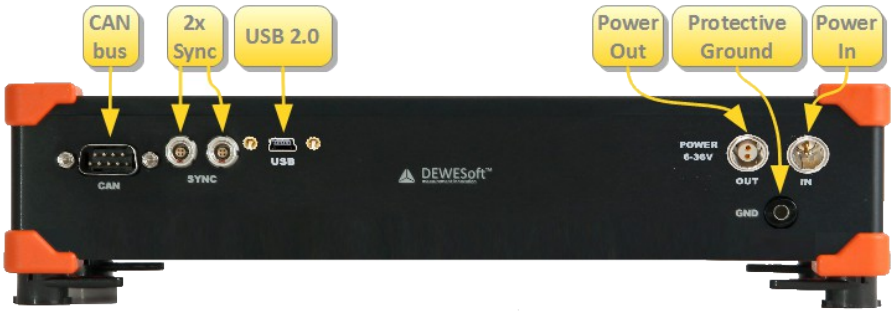


Illustration 20: SIRIUS chassis: connectors on the rear side

see also: 4.2 Connectors at the rear side on page 26

Illustration 21: USB cable

Then connect the USB cable (Illustration 21 above) to the rear-side of the SIRIUS system (see connector named *USB* in Illustration 20 above). Finally connect the other side of the USB cable to the USB port of your computer:

When you connect your Dewesoft USB device for the first time to the USB port, automatically install the Dewesoft USB driver:

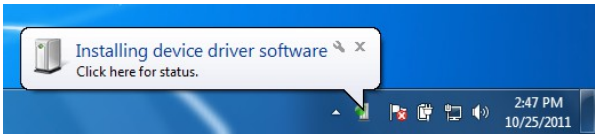


Illustration 22: Installing USB driver

When the driver installation is complete Windows will show a notification message:

Illustration 23: USB driver installation succeeded

When the driver installation is complete, Windows will show a notification Window:

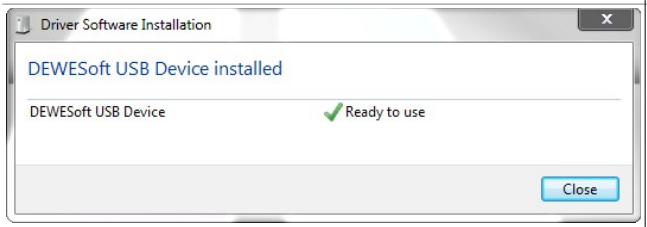


Illustration 24: USB Driver Notification

Then the Dewesoft launcher will pop up and show you a list of all connected devices and their status.
Finally click **Run Dewesoft…** to start DEWESoft®.

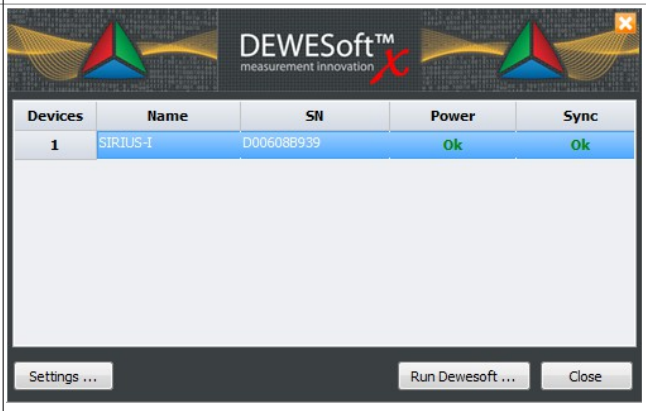


Illustration 25: Dewesoft Launcher

If you see the Power **Missing** status in the Dewesoft Launcher, then connected the power cable to the measurement slice. As soon as the power is available, the status will switch to **Ok**.

Illustration 26: Dewesoft Launcher: Power Missing

3.3 Connecting Multiple Slices

When you connect multiple slices to the same S-BOX or PC, you must also connect the slices with synchronization cables to the *SYNC* connectors (see Illustration 20 on page 15) on the rear side.

When everything is okay, the status will be **Ok** and you can click the **Run Dewesoft…** button to start DEWESoft®.

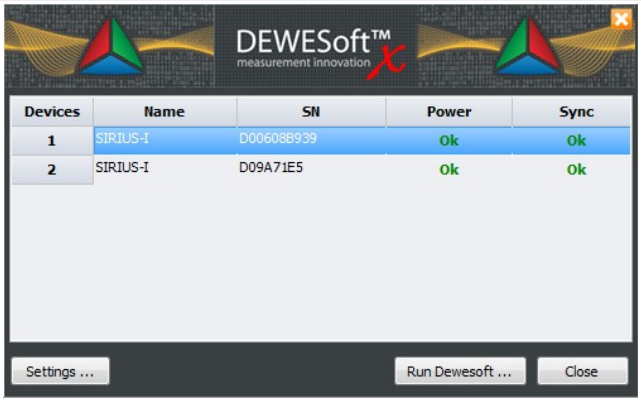


Illustration 27: Dewesoft Launcher: All Okay

If the Sync status is **Missing**, then you must connect a sync cable to the measurement slices. Then the Sync status of both devices will switch to **Ok**.

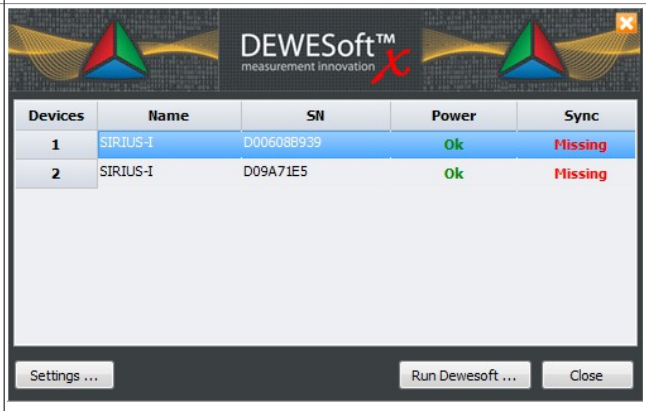


Illustration 28: Dewesoft Launcher: Sync Missing

3.4 Simple Measurement

This chapter describes measurement basics, how to configure SIRIUS and gives some details on the measurement setup.

3.4.1 Online Help

Note that this is just a quick start guide. For detailed information consult the online help. To open the online help you can press the F1 key or click on **Help** and then select `Manual` from the pop-up menu.

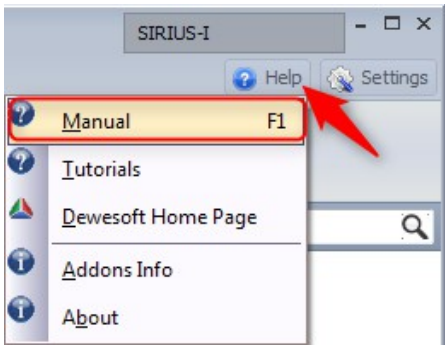


Illustration 29: Online Help

When DEWESoft® has started up, you will be in the *Acquisition* mode and see the *Setup files* list.

Click on *Ch.setup* (on the right of *Setup files*) to switch to the *Channel setup* mode.

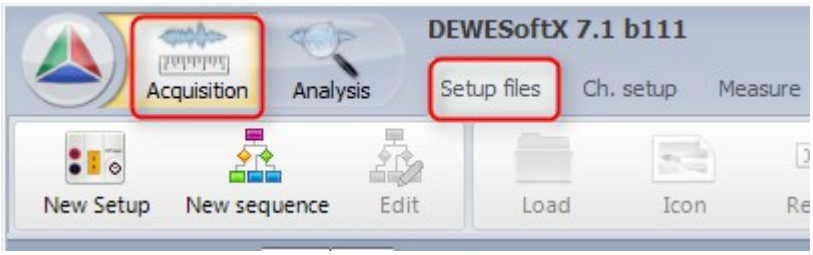


Illustration 30: Setup files

3.4.2 Analogue channel setup

In the analogue channel setup screen you can see all channels of your connected SIRIUS systems. Per default only the first channel will be set to *Used*.

Unused channels will not show up in measure mode and can thus not be used for display, calculations or storing: thus, we will also set the other 7 channels to used. You can left-click on the Used column of channel 2 (❶), hold the mouse button and move the mouse down to channel 8 (❷): then release the mouse button and all 7 channels will be selected – this is shown by the black rectangle around the buttons. Then you can click into the selected region to toggle *Used/Unused* for all 7 channels at once. The selected channels will also be highlighted in the small preview image of the device (❸).

When you press the **Setup** button of a channel (the column at the right edge of the channel table – not shown in this screen-shot), you can change all settings of the channel amplifier.

You can also change the sample rate of the SIRIUS slice (❹).

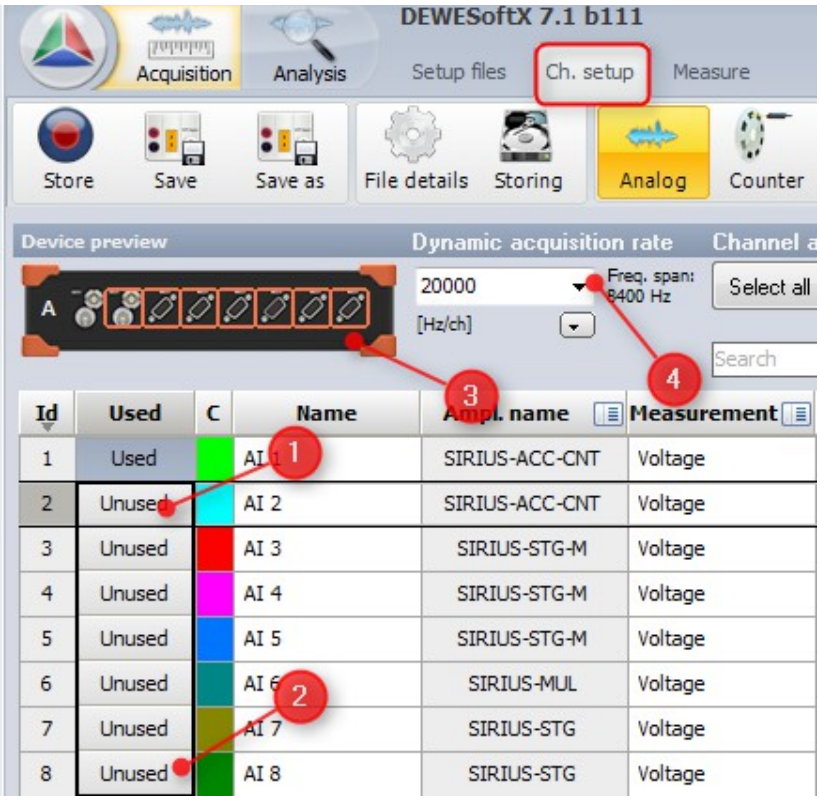


Illustration 31: Channel setup screen

3.4.2.1 Sample rate

One of the most important settings is the sample rate. The sample rate defines how many data points, SIRIUS will transfer to DEWESoft®. So a higher sample rate also means that more data needs to be transferred via USB to your computer.

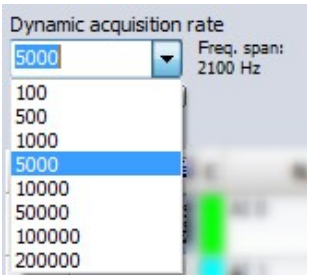


Illustration 32: Sample Rate

The sampling speed mainly depends on your application. To display your signal in time domain with a good time resolution, you should sample 10 to 20 times faster than the frequency of the signal that you want to measure. (for example 1 kS/s for a 50 Hz sinewave).

If you have a lot of high frequency components, it may be necessary to sample 100 times faster (e.g. 5 kS/s for the 50 Hz sinewave) or even more.

If you display only the frequency domain (FFT analysis), a 2.5 times faster sampling would be sufficient (125 S/s for the 50 Hz sinewave).

The higher the sampling rate, the better the time resolution. But also the file size will increase.

3.4.3 Measurement Mode

A click on *Measure* (at the right side of *Ch. Setup* in Illustration 31) will take you to the *Recorder* screen measure mode where you can already see live data (Note: the data will not be stored yet!):

Illustration 33: Measure mode

In measure mode you can have several measurement screens (❺). DEWESoft® will create 3 default screens: *Recorder*, *Scope* and *FFT*, but you can also create new screens or change the visual displays of the existing screens as you like. See the chapter *Displays design* in the online-help (see 3.4.1 Online Help on page 17) for more details.

The most important sections of the Measure mode are highlighted in screen-shot Illustration 33:

❶: show the live measurement data in different measurement instruments which are depending on the selected measurement screen. In this case we see a recorder instrument witch displays all your measurement channels. You can use the channel-selector list (❷) to assign measurement channels to the instruments. Each instrument has different settings. ❸ shows the settings of the currently selected recorder instrument.

To start storing the data to a file, press the **Store** button (❹). When you are done, press the **Stop** button to stop recording.

Now DEWESoft® has created a datafile with all the data that you have seen during the recording session. You can now click the **Analysis** button (on the left-top of the screen to the right of the **Acquisition** button) to go to *Analysis* mode.

3.4.4 Analysis Mode

When you have just stopped a measurement, DEWESoft® will automatically open the last recorded data file in *Review* mode, so that you can start the analysis right away:

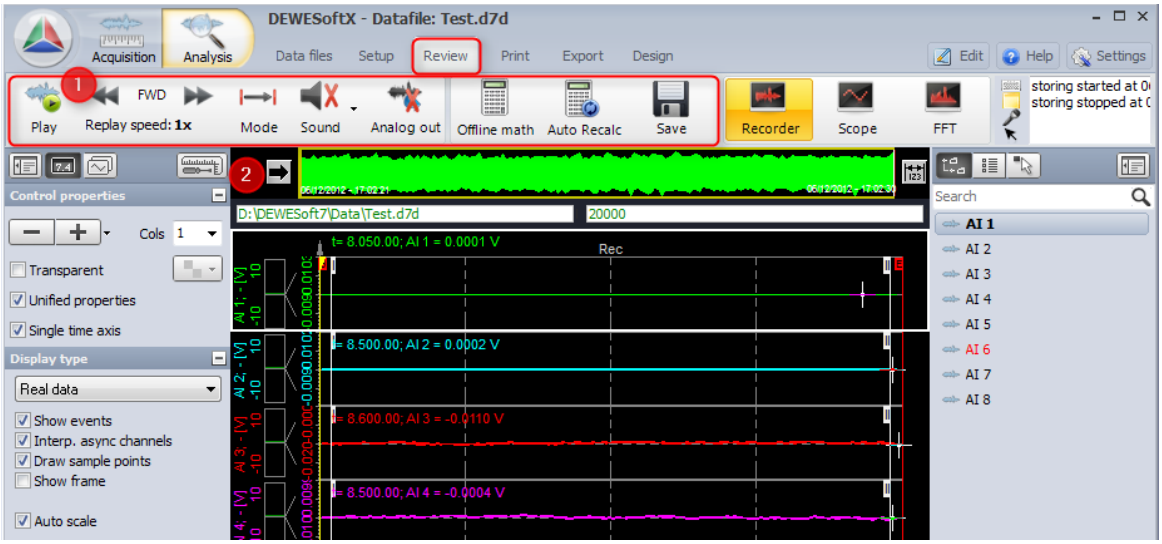


Illustration 34: Analysis Mode: Review

The Review mode is much like the Measurement Mode. You will see the same measurement screens, the channel-selector list and the properties of the currently selected instrument.

Differences are:

❶: you have additional tool-buttons

❷: there is a *Signal overview* window which will show you the whole data of one selected channel of the data file

Now you can use the cursors to analyse you data, zoom in and out of the data, click Offline math to add computations based on your data, etc. You can also change the design of your measurement screens, print reports based on your data and export the data to other file formats for further analysis.

Details about all these functions can be found in the *Analyse* chapter of the online-help (see 3.4.1 Online Help on page 17).

3.5 Advanced configuration

Note, that the DEWESoft® launcher has already done the hardware setup for you – you can check this by going to *Settings* – *Hardware setup...*:

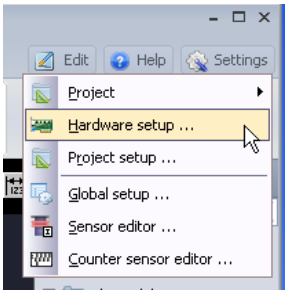


Illustration 35: DEWESoft®: Open Hardware setup

HINT

If *Hardware setup ...* is disabled, then click **Acquisition** and then **Ch. setup** (see Illustration 36):

Illustration 36: Channel Setup

Now that you are in channel *Channel Setup mode*, the *Hardware setup ...* option will be enabled.

In the Analog tab sheet, `DEWESoft USB` must be selected in order to user you SIRIUS device (see ❶ in the image below).

All SIRIUS devices will be shown in the device list (❷).

If you add a device while this screen is open (or if your device is not shown yet), you can press the Auto Detect button (❸) to scan for devices.

The *Registration status* (❹) will show the license that is stored inside of the SIRIUS device (see also 3.6 Licensing below).

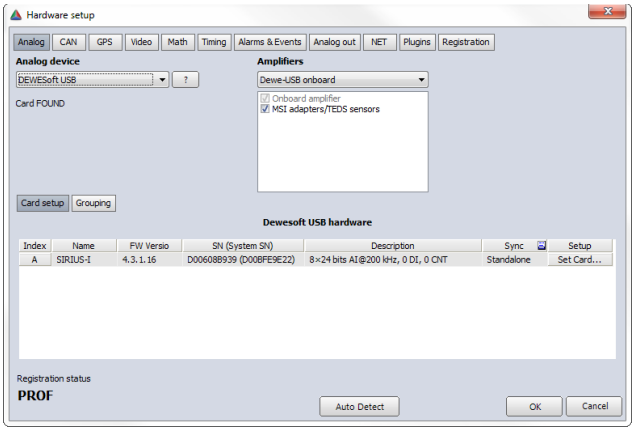


Illustration 37: DEWESoft®: Demo mode

On the *CAN* tab-sheet `DEWESoft USB` is also selected so that you can use the CAN ports of your SIRIUS device.

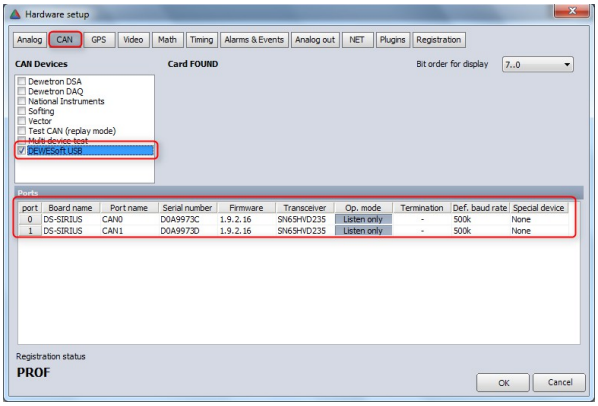


Illustration 38: SIRIUS CAN ports

3.5.1 Counters and CAN

The use of analogue inputs, CAN inputs and digital interface is the same as with all other DAQ devices, which are supported in DEWESoft®. Please consult the DEWESoft® online-help for more information (see 3.4.1 Online Help on page 17).

3.6 Licensing

As soon as you activate your SIRIUS system in the hardware setup (see 3.5 Advanced configuration above), DEWESoft® will be licensed and you are ready to go (the license information is stored in the SIRIUS device). No need for any online or offline licensing!

Note, that all licenses regarding SIRIUS will only work when the SIRIUS system is connected to your PC and the device has been activated in the hardware setup.

3.7 Troubleshooting

If your SIRIUS device is not found by DEWESoft®:

- If you did not restart Windows after the software installation, restart now
- Make sure, that you have started DEWESoft® version 7.1 or higher (7.0.x versions do not support SIRIUS)
- Make sure that the external power supply is connected and okay
- Disconnect the USB cable and reconnect it. If this does not work, try to connect the USB cable to another USB port of your PC
- Check if *DEWESoft USB device* shows up in the Windows *Device Manager (under the node called Universal Serial Bus controllers*)
- Try to restart DEWESoft®
- Try to restart the PC

4 Enclosure Overview

SIRIUS is a data acquisition device, which offers the highest flexibility for inputs like voltage, current, temperature, strain, vibration, pressure, counters, CAN and more. The data-transfer to the PC can be done via USB or EtherCAT®.

The SIRIUS system consists of *Slices* which contain up to 8 measurement *Modules*.

Each SIRIUS module has one analogue channel. Some modules are available with an additional counter channel - those modules have a plus sign + at the end: e.g. SIRIUS ACC+, SIRIUS STGM+

Optionally available is a version with 8 analogue outputs on the side of a Slice (see 4.2.4 Analogue out version on page 29).

Multiple Slices can be combined and synced together to get a multi-channel solution.

Illustration 39: SIRIUS hardware components

4.1 Enclosure types

You can choose from 2 types of enclosures for your SIRIUS systems: Either the flexible *Single slice* or the compact *Box* version.

4.1.1 Single Slice

A single SIRIUS slice can have up to 16 measurement modules (see 5 SIRIUS Measurement Modules no page 47).

Each measurement module has one analogue channel. Some modules also have an optional counter channel (e.g. ACC+).

Depending on the motherboard that you use the slice can also have analogue output connectors at the rear side (see 4.2 Connectors at the rear side on page 26).

We offer several standard chassis with predefined modules (see 5.4 SIRIUS Dual Core specifications on page 54), but you can also choose a customized slice with any combination of the SIRIUS measurement modules (see 5.3 SIRIUS Slice Configuration on page 52).

Illustration 40: Single SIRIUS slice

4.1.1.1 Click mechanism

You can use your SIRIUS slices independently or combine them to a single fully-synchronised[1] multi-channel measurement system with the clever click-mechanism.

Also the S-BOX (see 4.3 SIRIUS-SBOX2 on page 30) and the Battery Pack (see 6 Accessories on page 127) are fully compatible to this click-mechanism.

Illustration 41: Single SIRIUS slice

4.1.1.2 Power/USB LED

LED status	Description
Green	USB and power are connected – ready for measurement
Red	USB is connected, but power is missing. You must connect the *Power* plug – see Power In on page 27
Off	USB is not connected – SIRIUS is switched off. Note: Since SIRIUS will be switched on only via USB the LED even remain off when you have connected the *Power* plug – you MUST connect USB – see USB on page 27

4.1.2 Multi Slice

In a single box you can have 1, 2, 3 or 4 slices, plus an optional S-BOX (see 4.3 SIRIUS-SBOX2 on page 30) at the bottom.

Illustration 42: S-BOX with one slice

Illustration 43: 2-slices box

Illustration 44: 4-slices box

The main advantage over the single slice version is that all the cabling between the slices is done internally – no external USB or sync cables necessary.

In Illustration 45 you can see that the upper 3 slices only have a CAN connector. The USB and sync and power connectors are all wired internally to the bottom slice.

Thus you only need to connect one USB cable to your PC.

Note: of course you can also choose to use the click-mechanism to connect S-BOX (see 4.3 SIRIUS-SBOX2 on page 30) and a Battery Pack (see 6 Accessories no page 127) to the bottom of this 4-slice box.

Illustration 45: Rear side of a box with 4 slices

1 You need to connect sync-cables to the sync-connectors (at the back of the measurement slices): see 4.2.1.2 Sync connectors: Pin-out (LEMO 4pin) on page 26

4.1.3 Extended Height Enclosure

Some modules may require a higher enclosure, depending on the connector type: e.g. the STGM+ (see 5.12.2 STGM+ (Counter) L1B7f on page 78):

The higher enclosures are available for the *Single-* and for the *Multi Slice* version.

Illustration 46: Extended Height Enclosure

4.1.4 SIRIUS-R8

The complete SIRIUSν amplifier series is also available as modular rack system. All module combinations are possible (except for the Extended Height Enclosure modules): The Dual-Core series can be mixed with **HD** (*h*igh *d*ensity) and **HS** (*h*igh *s*peed) modules. You can even mix isolated and differential slices.

The analogue output option is available only for for the dual core series.

For more detailed information about the system please refer to 4.6 SIRIUS-R8 on page 36.

4.2 Connectors at the rear side

4.2.1 Single Slice Version USB

The SIRIUS USB chassis has following connectors at the rear side.

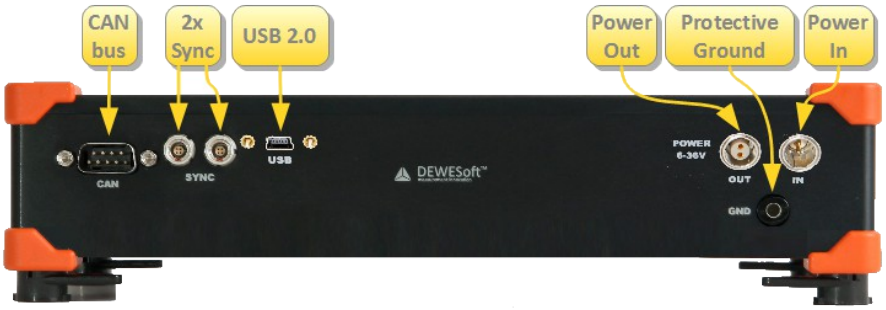


Illustration 47: SIRIUS chassis: connectors on the back side

4.2.1.1 CAN (DSUB-9)

See also connector *CAN* in Illustration 47 on page 26.

Pin	Name	Description
1	+5V	5V supply max. Power: 500mA
2	CAN_LOW	CAN low
3	DGND	Digital Ground
4	RES	Reserved
5	RES	Reserved
6	DGND	Digital Ground
7	CAN_HIGH	CAN high
8	RES	Reserved
9	+12V	12V supply max. Power: 200mA

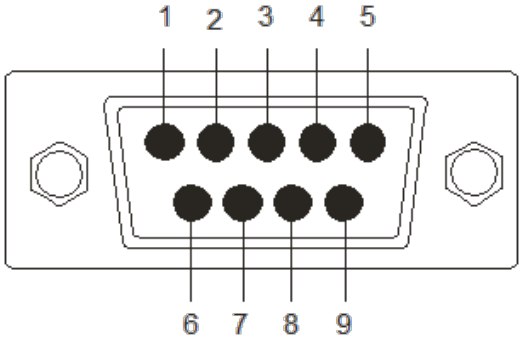


Illustration 48: SIRIUS-CAN: pin-out (DSUB-9)

CAN: Specifications

Interface type	CAN 2.0B, up to 1MBit/s
Special applications	OBDII, J1939, CAN output

Table 5: SIRIUS-CAN specifications

4.2.1.2 Sync connectors: Pin-out (LEMO 4pin)

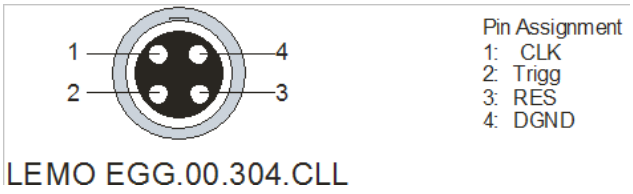


Illustration 49: SIRIUS Sync connector: pin-out (LEMO 4pin)

Mating connector: `FGG.00.302.CLAD27Z`

Since there are 2 connectors it's easy to chain several SIRIUS chassis (or DEWE-43, DS-CAN2, etc.) together.
Note that there is no distinction between IN and OUT – it does not matter which connector you use.

4.2.1.3 USB

The USB connector is used to transfer the measurement data from the SIRIUS device to the measurement PC.

4.2.1.4 Power In

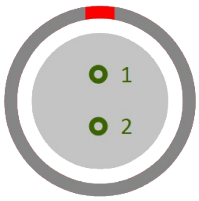


Illustration 50: Power In Connector 2pin

Pin	Name
1	V+
2	V-

For the power supply an unregulated DC voltage between 6 and 36 Volts is required, which is connected to LEMO 1B connector on the rear side of the chassis.

Power In connector (on the device): `EXJ.1B.302.CLA`
Mating connector (for the cable): `FGJ.1B.302.CLLD52Z`

4.2.1.5 Power Out

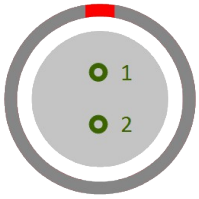


Illustration 51: Power Out Connector 2pin

Pin	Name
1	V+
2	V-

The Power Out power plug that can be used to chain several chassis together.

Power Out connector (on the device): `EXG.1B.302.CLL`
Mating connector (for the cable): `FGG.1B.302.CLAD52Z`

4.2.1.6 GND connector

See connector *GND* in Illustration 47 on page 26.

For correct measurements, it is highly recommended to ground the SIRIUS with GND banana plug on the rear side.

WARNING

It is mandatory to connect a ground cable to the *GND* connector of the SIRIUS when you are working with high voltages: e.g. when you are working with the HV modules (see 5.9 HV on page 63).

4.2.2 Single Slice Version EtherCAT®

This chapter describes the connectors on the rear side of the SIRIUS EtherCAT® slices (see also 5.1.2 EtherCAT® on page 47):

Illustration 52: Sirius EtherCAT® rear side connectors

4.2.2.1 EtherCAT® connector

The EtherCAT® connector can provide power and transfer the measurement data and synchronization in one single cable.

Pinout

Illustration 53: EtherCAT® pinout

Pin	Name	Colour
1	V+	Red
2	GND	Blue
3	RD-	Blue
4	RD+	White
5	TD-	Red
6	TD+	Yellow

Connectors (on the device):
EGG.1T.308.CLN LemoT 8pin FEMALE
EGJ.1T.308.CLD LemoT 8pin MALE

Mating connector (for the cable):
FGG.1T.308.CLA.1433 cable, MALE
FGJ.1T.308.CLL.1433 cable FEMALE

4.2.2.2 EtherCAT®: USB connector

The USB connector on the SIRIUS EtherCAT® slices is required to boost the data-throughput (see also 5.1.2 EtherCAT® on page 47): i.e. then the data can be transferred via EtherCAT® and USB at the same time.

Note: when you use multiple slices, then DEWESoft® must be the EtherCAT® master.

4.2.2.3 EtherCAT®: GND connector

See connector *GND* in Illustration 52 on page 27.

For correct measurements, it is highly recommended to ground the SIRIUS with GND banana plug on the rear side.

WARNING

It is mandatory to connect a ground cable to the *GND* connector of the SIRIUS when you are working with high voltages: e.g. when you are working with the HV modules (see 5.9 HV on page 63).

4.2.3 Multi Slice Version

In the Multi Slice Version, the bottom slice has the same connectors as the Single Slice Version.
All other Slices have only a CAN connector. All other wiring is done inside of the enclosure (Power, Ground, Sync, USB).

Illustration 54: Rear side of the Multi Slice Version

4.2.4 Analogue out version

The optional analogue output version has the same connectors, as the *Single Slice version* plus 8 BNC connectors for the analogue output channels (see also: 5.22 Analogue out OPTION on page 126):

Illustration 55: Rear side connectors of the Analogue-out version

4.3 SIRIUS-SBOX2

The SIRIUS-SBOX2 is an integrated powerful PC in a rugged SIRIUS chassis: with an Intel® Core™ i7 processor and a fast SSD drive. The SIRIUS-SBOX2 is available in the single slice version and also in the box version (see 4.1 Enclosure types on page 23).

- High speed CPU
  Intel® Core™ i7 is the most powerful processor of the Intel® Core™ processor family.
- High speed interfaces
  USB 3.0 (nearly 10 times faster than USB 2.0) and GLAN interfaces provide highest bandwidth for data-transfer from and to the S-BOX.
- Removable High speed SSD
  With 180 MB/s write rate to the Solid State Disk, there is enough capability not only for transient recording, but also for e.g. external high-speed video cameras.
- Flash option
  For even better performance and maximum safety and convenience, we recommend separating the operating system from the measurement data.
  With the S-BOX-FLASH120 option, the operating system is stored on an internal flash disk with 120 GB, while the measurement data is stored on the exchangeable SSD.
  This allows for a quick exchange of the SSD where your valuable data is stored on.
  This feature also allows to continue storing on a new media immediately.

Illustration 56: SIRIUS-SBOX2 with removable SSD

4.3.1 Specifications SBOX2

Physical Specifications	
Power Supply	9-36V_{DC}
Mower Consumption	Typ. 25 W, (max. 55W)
Physical Dimensions	265x150x75 [mm]
Humidity (@60°C)	95% RH non-condensing
USB	Front: 4x USB 3.0 Rear: 2x USB 2.0
Ethernet	GLAN, WLAN
Operating Temperature	0 to 50°C
Storage Temperature	-40 to 85°C

Technical Specifications	
Processor	Intel® Core™ i7 processor
CPU clock frequency	4 x 2 GHz
RAM	4 GB
Flash	S-BOX-FLASH120 option
SSD	240GB (960GB as option, others on request)
Chipset	Intel QM57
Optional GPS	10Hz, 20Hz, 100Hz, RTK

Humidity	95% RH non condensing @ 60°C
Shock & Vibration	VIBRATION SWEEP SINUS (EN 60068-2-6:2008) VIBRATION RANDOM (EN 60721-3-2: 1997 - Class 2M2) SHOCK (EN 60068-2-27:2009)

4.3.2 Front side

Illustration 57: SIRIUS-SBOX2: Connectors at the front side

4.3.3 Rear side

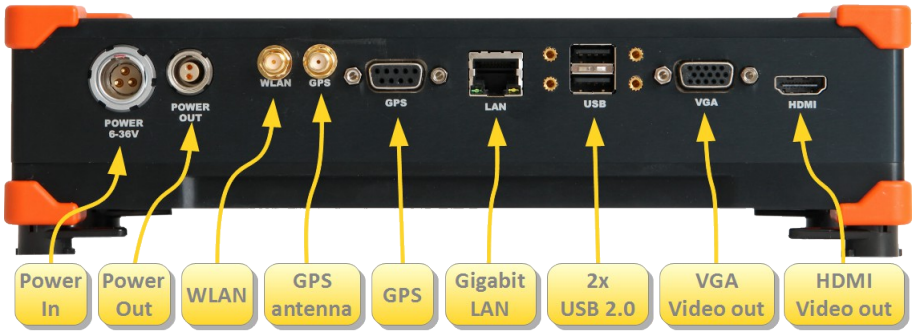


Illustration 58: SIRIUS-SBOX2: Connectors at the rear side

4.3.3.1 Power connector

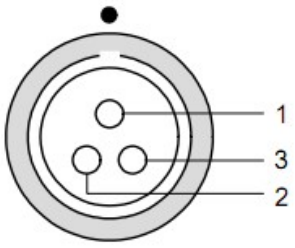


Illustration 59: Power Connector

Pin	Name
1	V+
2	GND
3	Remote-On[2]

L2B3f

Power connector (on the S-BOX): `ECG.2B.303.CLV`
Mating connector (for the cable): `FGJ.2B.303.CLAD92`

To power the system on, press the Power switch OR apply a voltage between 3 and 30V to Remote-On pin

To power off the system press the Power switch or reduce the voltage on Remote-On below 0.5V for more than one second.

2 If not available then use pin 6 of the GPS connector

4.3.3.2 Option: GPS connector

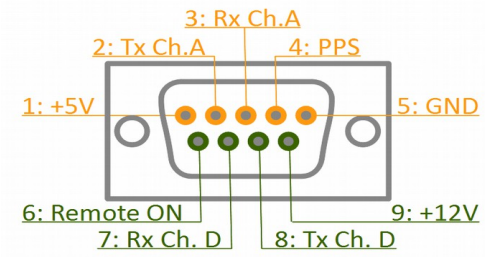


Illustration 60: GPS Connector

Pin	Name
1	+5V (max. 0.5A)
2	TXD GPS port A
3	RXD GPS port A
4	GPS PPS
5	GND
6	Remote-On[3]
7	RXD GPS port D
8	TXD GPS port D
9	+12V (max. 0.5A)

To power the system on, press the Power switch OR apply a voltage between 3 and 30V to Remote-On pin

To power off the system press the Power switch or reduce the voltage on Remote-On below 0.5V for more than one second.

GPS port A is used for GPS-Display or for the RF-modem when RTK option is in use.

GPS port D is reserved. Do not connect!

4.4 SIRIUS*f*-SBOX

The SIRIUS*f*-BOX is an integrated powerful PC in a rugged SIRIUS *f*anless chassis: with an Intel® Core™ i7 ULV processor and a fast SSD drive. The S-BOX is also available in a single slice version.

High speed CPU: Intel® Core™ i7 (3517UE) is the most powerful processor of the Intel® Core™ processor family for *f*anless operation.

- High speed CPU
  Intel® Core™ i7 is the most powerful processor of the Intel® Core™ processor family.
- High speed interfaces
  USB 3.0 (nearly 10 times faster than USB 2.0) and GLAN interfaces provide highest bandwidth for data-transfer from and to the S-BOX.
- Removable High speed SSD
  With 180 MB/s write rate to the Solid State Disk, there is enough capability not only for transient recording, but also for e.g. external high-speed video cameras.
- Flash option
  For even better performance and maximum safety and convenience, we recommend separating the operating system from the measurement data.
  With the S-BOX-FLASH120 option, the operating system is stored on an internal flash disk with 120 GB, while the measurement data is stored on the exchangeable SSD.
  This allows for a quick exchange of the SSD where your valuable data is stored on.
  This feature also allows to continue storing on a new media immediately.

*Illustration 61: SIRIUS*f*-SBOX with removable SSD*

3 Remote-On may not be available for units before Q1/2013

4.4.1 Specifications ƒ-SBOX

Physical Specifications	
Power Supply	9-36V_{DC}
Max. Power Consumption	30W
Physical Dimensions	265x150x75 [mm]
Humidity (@60°C)	95% RH non-condensing
USB	Front: 4x USB 3.0 Rear: 2x USB 2.0
Ethernet	GLAN, WLAN
Operating Temperature	-20 to 40°C
Storage Temperature	-40 to 85°C

Technical Specifications	
Processor	Intel® Core™ i7-3517UE
CPU clock frequency	2x1.7GHz
RAM	4 GB
Flash	S-BOX-FLASH120 option
SSD	240GB (960GB as option, others on request)
Chipset	Intel QM77
GPS	Optional: 10Hz, 20Hz, 100Hz, RTK

Humidity	95% RH non condensing @ 60°C
Shock & Vibration	VIBRATION SWEEP SINUS (EN 60068-2-6:2008) VIBRATION RANDOM (EN 60721-3-2: 1997 - Class 2M2) SHOCK (EN 60068-2-27:2009)

4.4.2 Front Side

Illustration 62: SIRIUSƒS-BOX Frontside

4.4.3 Rear Side

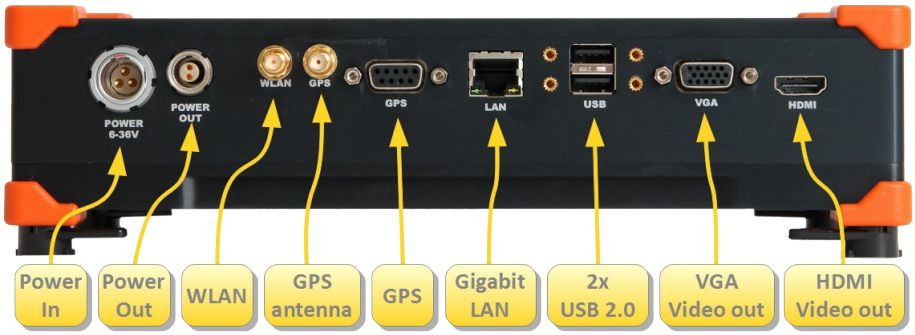


Illustration 63: SIRIUSƒS-BOX: Connectors at the rear side

4.4.3.1 Power connector

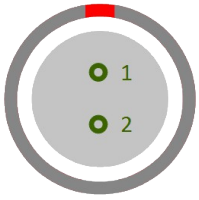


Illustration 64: Power Connector 2pin

Pin	Name
1	V+
2	GND

L2B2f

Power connector (on the S-BOX): *ECG.2B.302*

Mating connector (for the cable): *FGJ.2B.302*

4.4.3.2 Option: GPS connector

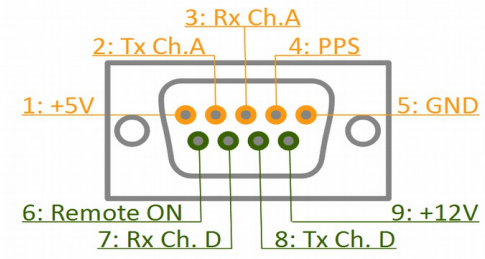


Illustration 65: GPS Connector

Pin	Name
1	+5V (max. 0.5A)
2	TXD GPS port A
3	RXD GPS port A
4	GPS PPS
5	GND
6	Remote-On[4]
7	RXD GPS port D
8	TXD GPS port D
9	+12V (max. 0.5A)

To power the system on, press the Power switch OR apply a voltage between 3 and 30V to Remote-On pin

To power off the system press the Power switch or reduce the voltage on Remote-On below 0.5V for more than one second.

GPS port A is used for GPS-Display or for the RF-modem when RTK option is in use.

GPS port D is reserved. Do not connect!

4.5 SIRIUS-R2D

The SIRIUS-R2D is a box that can have up to 2 SIRIUS *i*r/*r* slices (32 channels).

A Microsoft® Surface 2 Pro which must be mounted in the closable top cover and provides following features:

Technical Specifications	
Display	10.6“ Full-HD, Touch screen
Processor	Intel® Core™ i5
Operating System	Windows® 7 Ultimate Multi-language
USB	DEWESoft® X Professional

HINT

The Microsoft® Surface 2 Pro is not included, but can be ordered as an option.

4 Remote-On may not be available for units before Q1/2013

4.5.1 Frontside

4.5.1.1 USB

The internal USB hub is connected via a USB3 connection to the Surface device.

4.5.1.2 Power connector

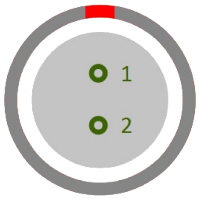


Illustration 66:
Power Connector 2pin

Pin	Name
1	V+
2	GND

L2B2f

Power connector (on the S-BOX): *ECG.2B.302*
Mating connector (for the cable): *FGJ.2B.302*

The supply voltage can be between 9 and 36V.

4.5.1.3 Option: GPS connector

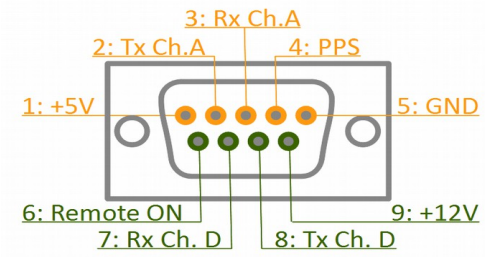


Illustration 67: GPS Connector

Pin	Name
1	+5V (max. 0.5A)
2	TXD GPS port A
3	RXD GPS port A
4	GPS PPS
5	GND
6	Remote-On[5]
7	RXD GPS port D
8	TXD GPS port D
9	+12V (max. 0.5A)

To power the system on, press the Power switch OR apply a voltage between 3 and 30V to Remote-On pin

To power off the system press the Power switch or reduce the voltage on Remote-On below 0.5V for more than one second.

GPS port A is used for GPS-Display or for the RF-modem when RTK option is in use.

GPS port D is reserved. Do not connect!

4.5.1.4 Sync connectors: Pin-out (LEMO 4pin)

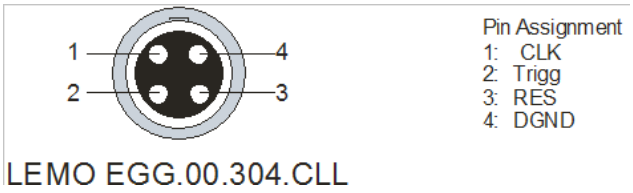


Illustration 68: SIRIUS Sync connector: pin-out (LEMO 4pin)

Mating connector: *FGG.00.302.CLAD27Z*

Since there are 2 connectors it's easy to chain several SIRIUS chassis (or DEWE-43, DS-CAN2, etc.) together. Note that there is no distinction between IN and OUT – it does not matter which connector you use.

4.6 SIRIUS-R8

The SIRIUS-R8 is a rugged chassis which provides 8 slots for SIRIUS measurement modules and has an integrated powerful PC: with an Intel® Core™ i7 processor and a fast SSD drive.

The SIRIUS-R8 has the highest possible data through-put, since each measurement module has a dedicated USB2 line to the CPU (no USB-hub).

5 Remote-On may not be available for units before Q1/2013

- High speed CPU
  Intel® Core™ i7 is the most powerful processor of the Intel® Core™ processor family.
- High speed interfaces
  USB 3.0 (nearly 10 times faster than USB 2.0) and GLAN interfaces provide highest bandwidth for data-transfer from and to the S-BOX.
- Removable High speed SSD
  With 180 MB/s write rate to the Solid State Disk, there is enough capability not only for transient recording, but also for e.g. external high-speed video cameras.
- Flash option
  For even better performance and maximum safety and convenience, we recommend separating the operating system from the measurement data.
  With the S-BOX-FLASH120 option, the operating system is stored on an internal flash disk with 120 GB, while the measurement data is stored on the exchangeable SSD.
  This allows for a quick exchange of the SSD where your valuable data is stored on.
  This feature also allows to continue storing on a new media immediately.

Illustration 69: SIRIUS-R8 front-side

4.6.1 Specifications R8

Physical Specifications	
Power Supply	12-36V_{DC}
Power Consumption	Typ. 25 W, (max. 55W)
Physical Dimensions	447x309x147 [mm]
Humidity (@60°C)	95% RH non-condensing
USB	Front: 4x USB 3.0
Ethernet	GLAN, WLAN
Operating Temperature	0 to 50°C
Storage Temperature	-40 to 85°C

Technical Specifications	
Processor	Intel® Core™ i7 processor
CPU clock frequency	4x2 GHz
RAM	4 GB
Flash	S-BOX-FLASH120 option
SSD	240GB (960GB as option, others on request)
Chipset	Intel QM57
Optional GPS	10Hz, 20Hz, 100Hz, RTK

Humidity	95% RH non condensing @ 60°C
Shock & Vibration	VIBRATION SWEEP SINUS (EN 60068-2-6:2008) VIBRATION RANDOM (EN 60721-3-2: 1997 - Class 2M2) SHOCK (EN 60068-2-27:2009)

4.6.2 Front Side

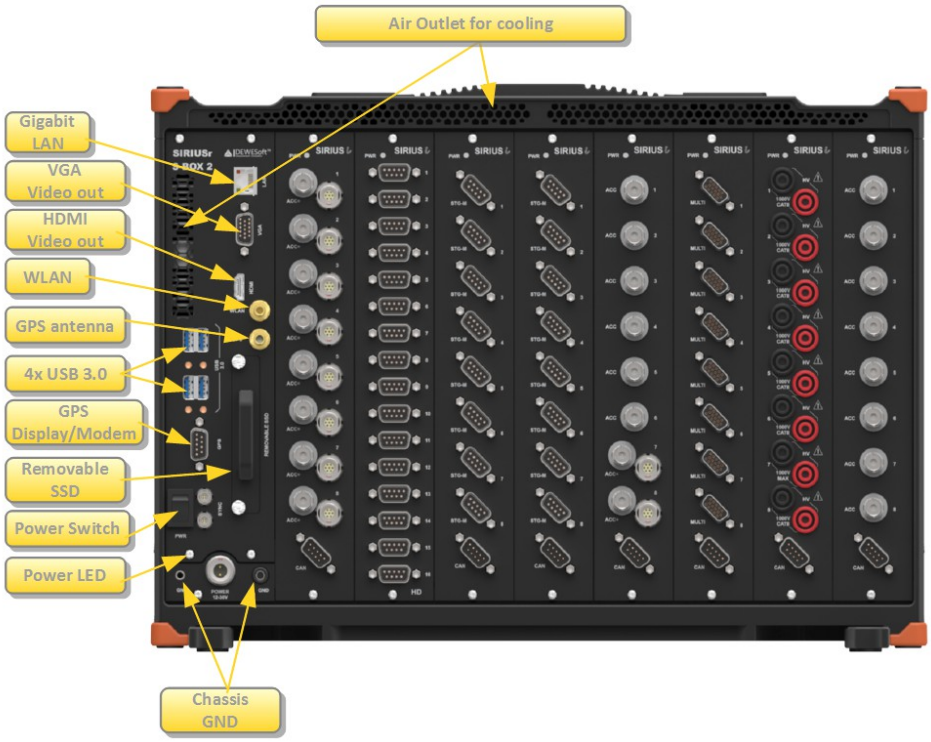


Illustration 70: SIRIUS-R8: Frontside

4.6.2.1 Power connector

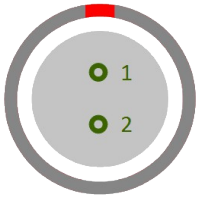


Illustration 71: Power Connector 2pin

Pin	Name
1	V+
2	GND

L2B2f

Power connector (on the S-BOX): `ECG.2B.302`

Mating connector (for the cable): `FGJ.2B.302`

4.6.2.2 Sync connectors: Pin-out (LEMO 4pin)

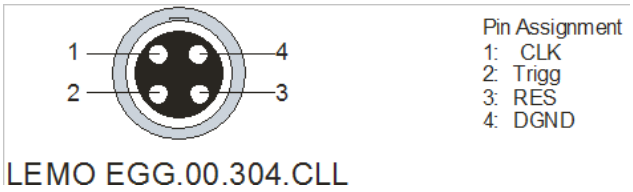


Illustration 72: SIRIUS Sync connector: pin-out (LEMO 4pin)

Mating connector: `FGG.00.302.CLAD27Z`

Since there are 2 connectors it's easy to chain several SIRIUS chassis (or DEWE-43, DS-CAN2, etc.) together.
Note that there is no distinction between IN and OUT – it does not matter which connector you use.

4.6.2.3 Option: GPS connector

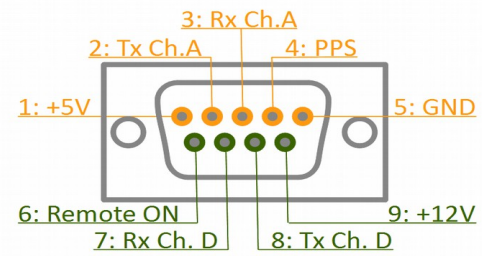


Illustration 73: GPS Connector

Pin	Name
1	+5V (max. 0.5A)
2	TXD GPS port A
3	RXD GPS port A
4	GPS PPS
5	GND
6	Remote-On[6]
7	RXD GPS port D
8	TXD GPS port D
9	+12V (max. 0.5A)

To power the system on, press the Power switch OR apply a voltage between 3 and 30V to Remote-On pin

To power off the system press the Power switch or reduce the voltage on Remote-On below 0.5V for more than one second.

GPS port A is used for GPS-Display or for the RF-modem when RTK option is in use.

GPS port D is reserved. Do not connect!

4.6.3 Rear Side

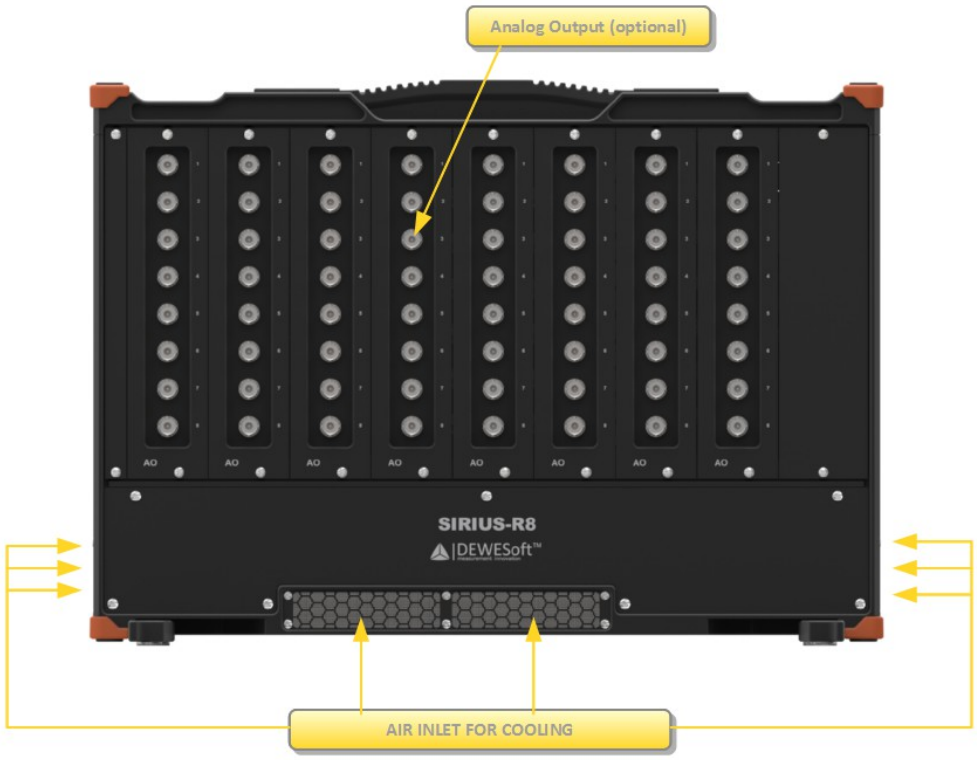


Illustration 74: SIRIUS-R8: Rearside

6 Remote-On may not be available for units before Q1/2013

4.7 SIRIUS-R8D

The SIRIUS-R8D is a rugged chassis which provides 8 slots for SIRIUS measurement modules and has an integrated powerful PC: with an Intel® Core™ i7 processor and a fast SSD drive.

The SIRIUS-R8D has the highest possible data through-put, since each measurement module has a dedicated USB2 line to the CPU (no USB-hub).

Illustration 75: SIRIUS-R8D (left: front-side, right: rear-side)

- High speed CPU
  Intel® Core™ i7 is the most powerful processor of the Intel® Core™ processor family.
- High speed interfaces
  USB 3.0 (nearly 10 times faster than USB 2.0) and GLAN interfaces provide highest bandwidth for data-transfer from and to the S-BOX.
- Removable High speed SSD
  With 180 MB/s write rate to the Solid State Disk, there is enough capability not only for transient recording, but also for e.g. external high-speed video cameras.
- Flash option
  For even better performance and maximum safety and convenience, we recommend separating the operating system from the measurement data.
  With the S-BOX-FLASH120 option, the operating system is stored on an internal flash disk with 120 GB, while the measurement data is stored on the exchangeable SSD.
  This allows for a quick exchange of the SSD where your valuable data is stored on.
  This feature also allows to continue storing on a new media immediately.

4.7.1 Specifications R8D

Physical Specifications	
Power Supply	12-36V_{DC}
Power Consumption	Typ. 35 W, (max. 65W)
Physical Dimensions	447x309x165 [mm]
Humidity (@60°C)	95% RH non-condensing
USB	Front: 3xUSB3, 1xUSB2 Rear: 2x USB 2.0
Ethernet	GLAN, WLAN
Operating Temperature	0 to 50°C
Storage Temperature	-40 to 85°C

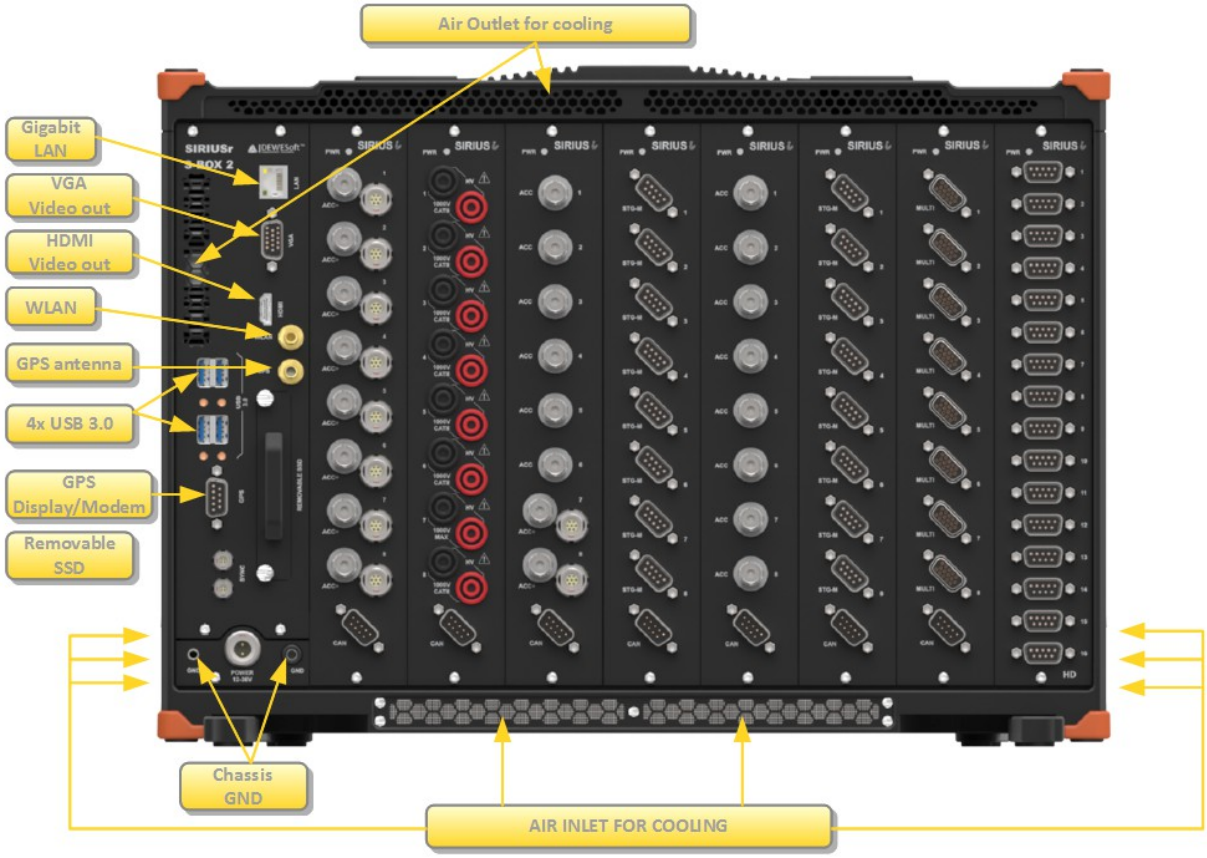
Technical Specifications	
Processor	Intel® Core™ i7 processor
CPU clock frequency	4 x 2 GHz
RAM	4 GB
Flash	S-BOX-FLASH120 option
SSD	240GB (960GB as option, others on request)
Chipset	Intel QM57
Optional GPS	10Hz, 20Hz, 100Hz, RTK

Humidity	95% RH non condensing @ 60°C
Shock & Vibration	VIBRATION SWEEP SINUS (EN 60068-2-6:2008) VIBRATION RANDOM (EN 60721-3-2: 1997 - Class 2M2) SHOCK (EN 60068-2-27:2009)

4.7.2 Front Side (Display)

Illustration 76: SIRIUS-R8D: Front-side

4.7.3 Rear Side



Illu*stration 77: SIRIUS-R8D: Rearside*

4.7.3.1 Power connector

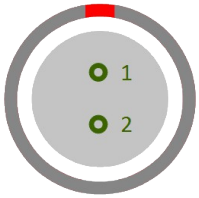


Illustration 78: Power Connector 2pin

Pin	Name
1	V+
2	GND

L2B2f

Power connector (on the S-BOX): *ECG.2B.302*

Mating connector (for the cable): *FGJ.2B.302*

4.7.3.2 Option: GPS connector

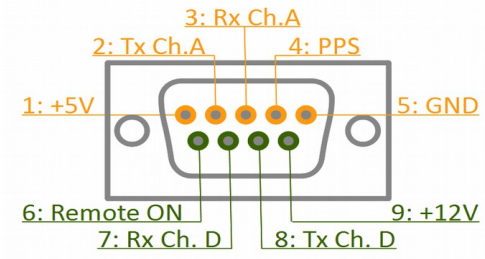


Illustration 79: GPS Connector

Pin	Name
1	+5V (max. 0.5A)
2	TXD GPS port A
3	RXD GPS port A
4	GPS PPS
5	GND
6	Remote-On[7]
7	RXD GPS port D
8	TXD GPS port D
9	+12V (max. 0.5A)

To power the system on, press the Power switch OR apply a voltage between 3 and 30V to Remote-On pin

To power off the system press the Power switch or reduce the voltage on Remote-On below 0.5V for more than one second.

GPS port A is used for GPS-Display or for the RF-modem when RTK option is in use.

GPS port D is reserved. Do not connect!

4.7.3.3 Sync connectors: Pin-out (LEMO 4pin)

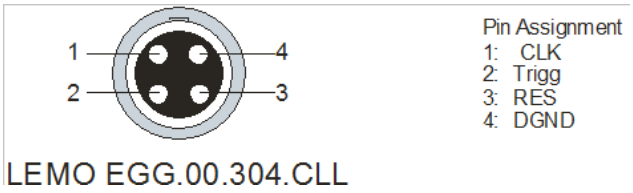


Illustration 80: SIRIUS Sync connector: pin-out (LEMO 4pin)

Mating connector: *FGG.00.302.CLAD27Z*

Since there are 2 connectors it's easy to chain several SIRIUS chassis (or DEWE-43, DS-CAN2, etc.) together. Note that there is no distinction between IN and OUT – it does not matter which connector you use.

7 Remote-On may not be available for units before Q1/2013

4.8 Dimensions

All versions (Single Slice, Multi Slice, S-BOX) have the same depth:

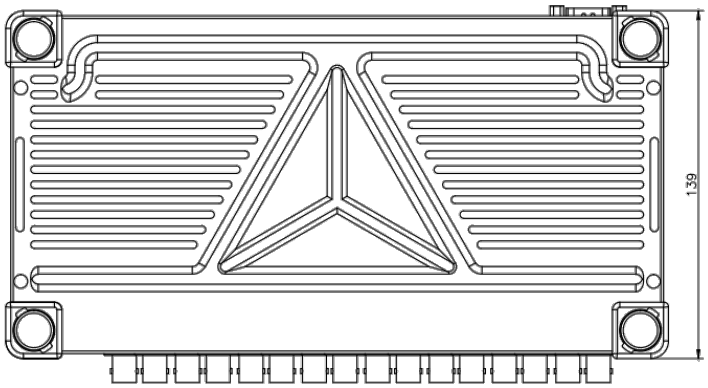


Illustration 81: Dimensions: Single Slice Version

4.8.1 Single Slice Version

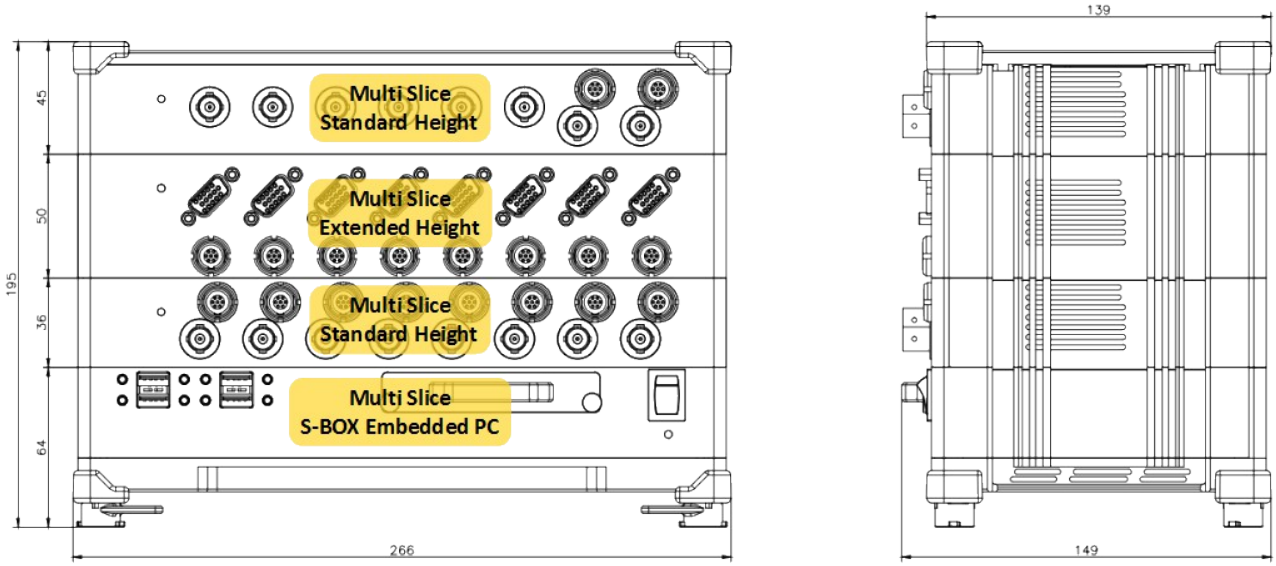


Illustration 82: Dimensions: Single Slice Version

4.8.2 Multi Slice Version

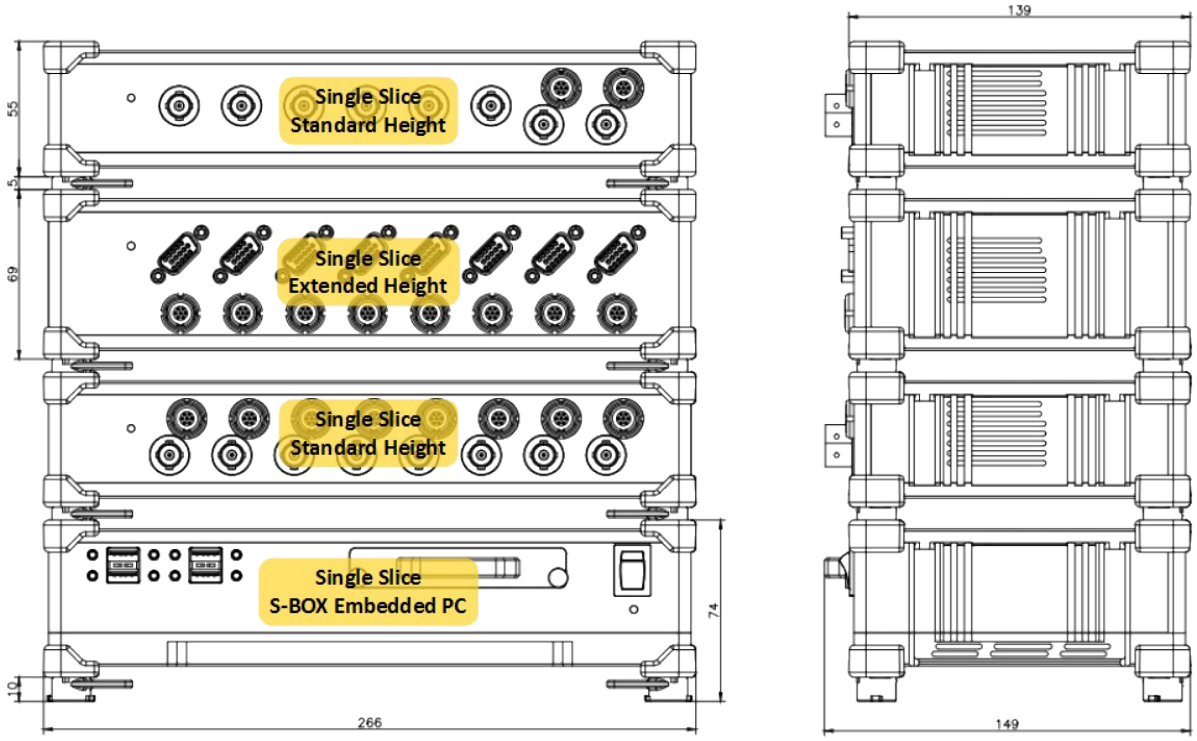


Illustration 83: Dimensions: MultiSlice Version

4.8.3 Sirius R2D

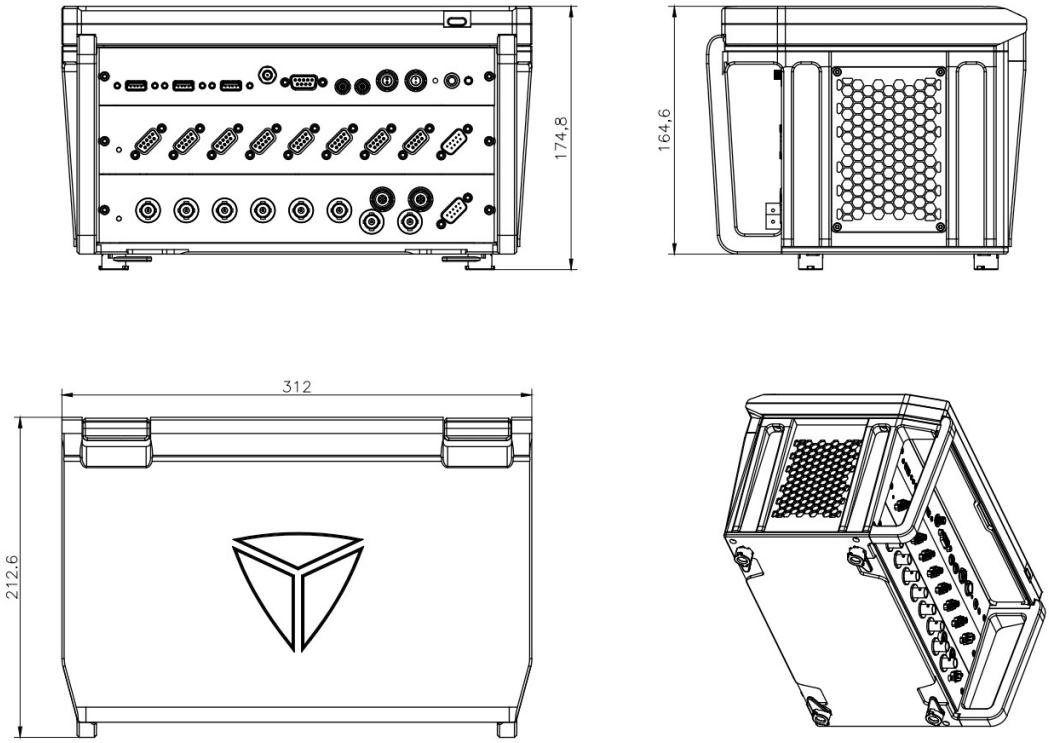


Illustration 84: Dimensions: R2D

4.8.4 Sirius R8D

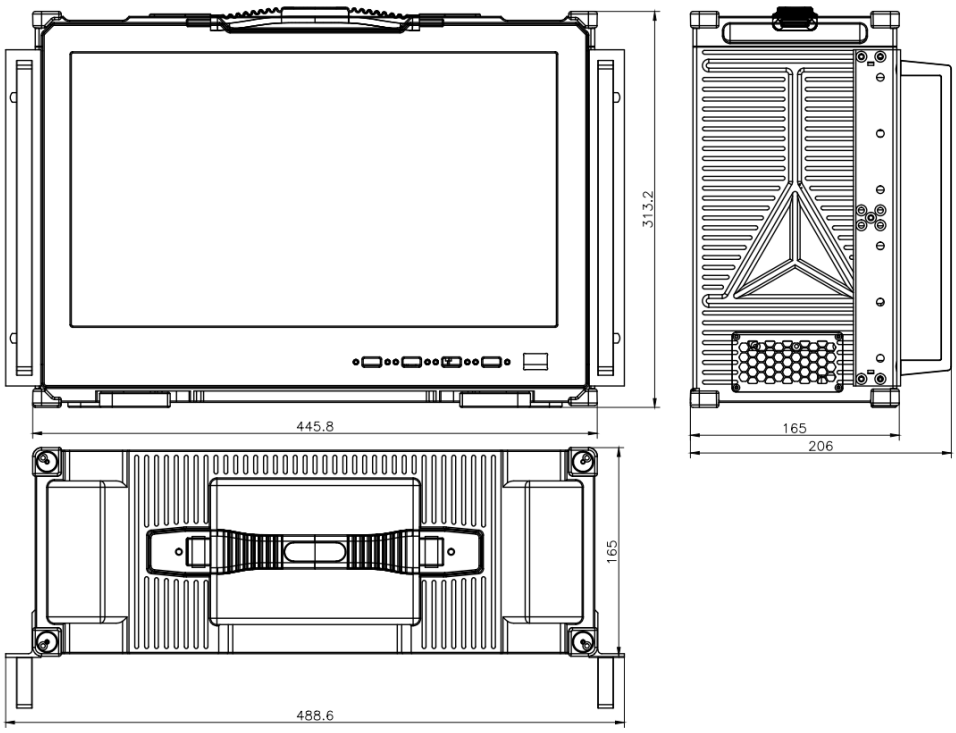


Illustration 85: Dimensions: R8D

4.8.5 Sirius R8

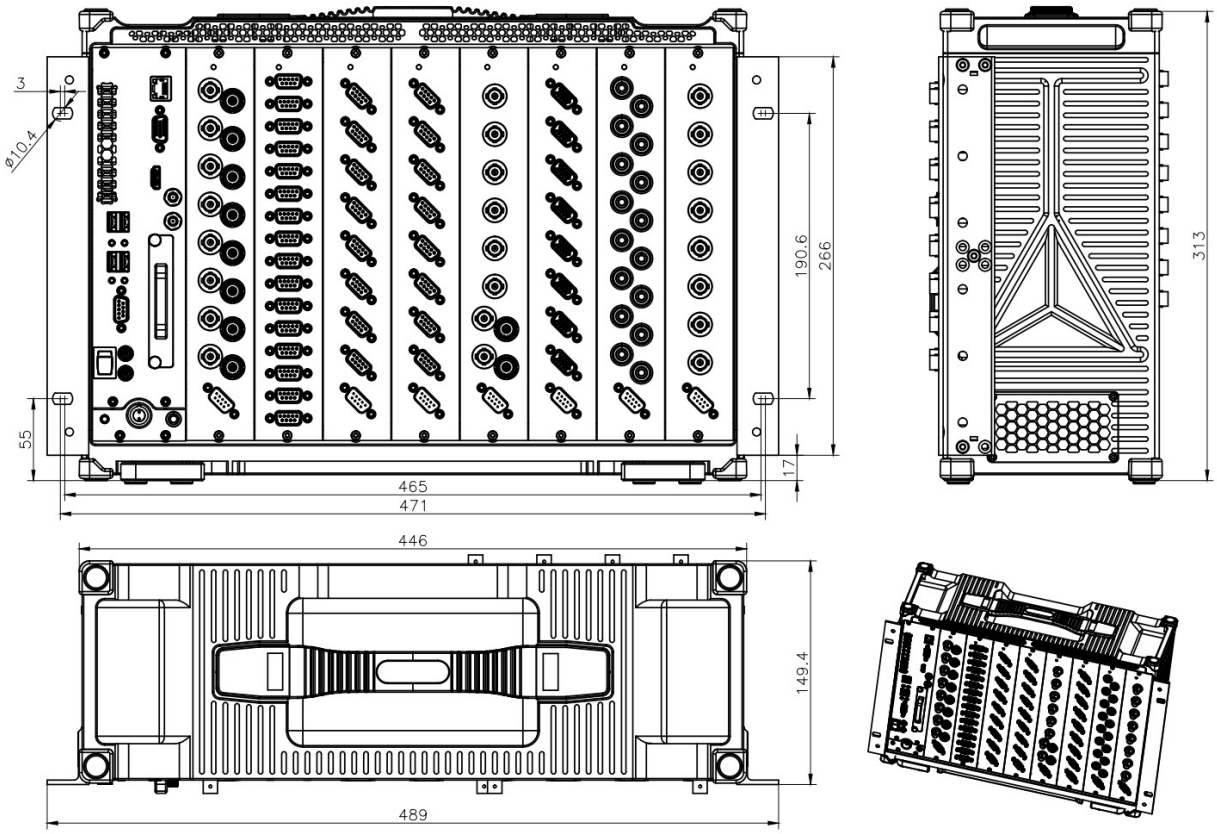


Illustration 86: SIRIUS Rack Dimensions

5 SIRIUS Measurement Modules

5.1 Data Transfer Overview

Dewesoft offers SIRIUS slices that can use different data-transfer technologies:

- USB
  - high data-throughput allows for high sampling rates (up to 1MS)
  - extra connectors for power and synchronization required
  - direct connection to USB ports on the PC
- Standard EtherCAT®
  - only one single cable needed for data, synchronization and power
  - data-throughput allows for sampling rates up to 20kS
  - direct connection to standard Ethernet port on the PC possible
- DS-EtherCAT+
  - this is a Dewesoft enhancement to the EtherCAT® standard, so that we can combine the cons of Standard Ethernet and USB data-transfer

5.1.1 USB

USB is a high speed data bus being able to transmit full speed data for all channels to the measurement PC.

The SIRIUS USB slices allow sampling rates of up to 1MHz (high-speed) and can be directly connected to USB port s on the measurement PC (or S-BOX).

If a USB hub is used, the USB bandwidth is shared by the connected USB devices (i.e. SIRIUS slices) and thus you may not be able to use the max. possible sampling rate. Note, that also the USB connectors on laptops are often internally connected to a USB hub!

Note, that this will for sure not happen when you use the SIRIUS-R8 (see 4.6 SIRIUS-R8 on page 36), because the internal wiring of the SIRIUS-R8 is designed with great care, so that none of the USB ports are shared and every single measurement slice can use the full maximum sampling rate: for all 64 (dual core) channels or 128 (high density) channels.

In comparison to the EtherCAT® version, the SIRIUS-USB slices need extra connectors for power supply and synchronisation.

5.1.2 EtherCAT®

EtherCAT® - Ethernet for Control Automation Technology - is a 100 Mbit Ethernet-based fieldbus system. The protocol is standardized in IEC 61158 and is suitable for both hard and soft real-time requirements. EtherCAT® can be used for applications that require short data update times with low communication jitter (for precise synchronization purposes).

5.1.2.1 Standard EtherCAT® features

Strong points of standard EtherCAT®:

- Point to point communication
- High distance between modules possible (75 m)
- Only a single cable for power, data and synchronisation
- 100x faster than CAN bus
- Real time performance
- Physically fully compatible to Ethernet: i.e. same connector, no Gate-modules or adapters required

Weak points of standard EtherCAT®:

- Master sends the empty message train
  i.e. when DEWESoft® is the master and does not send the empty message for some reason, there will be no data on the bus
- Real time performance required from computer
- No data-buffer on the devices
- Ethernet packet (no TCP/IP) is prone to data-loss
- Time synchronisation is mostly done based on master precision of sending messages

→ this makes standard EtherCAT® good for **real-time** application, but not good for **data-acquisition**.

Since the standard EtherCAT® is originally intended for real time, it lacks few very important elements. This is why DEWESoft® uses an enhanced DS-EtherCAT+ protocol:

5.1.2.2 DS-EtherCAT+

In comparison to standard EtherCAT® the DS-EtherCAT+ protocol has following benefits:

- *Buffering*: DEWESoft® EtherCAT® devices buffer the measurement data for some seconds, so that all data can still be accessed, even if the Master (i.e. DEWESoft® on Windows®) is a little late.
- *Synchronization*: DEWESoft® EtherCAT® devices can acquire the samples at an exact time stamp. The timestamp can be provided by an external timing source (e.g. GPS or IRIG)
- *Retransmit:* since EtherCAT® packets are below the TCP/IP level, the standard protocol does not handle lost packets. The enhanced DS-EtherCAT+ protocol will detect lost packets and retransmit them.

Notes:

- Since the SIRIUS devices are EtherCAT® slaves, an external EtherCAT® master is required
- EtherCAT® needs a dedicated network interface: i.e. you cannot mix EtherCAT® to your existing Intranet (LAN network) or Internet[8] (i.e. connect them to the same Ethernet-switch)
- In comparison to the SIRIUS-USB slices, the SIRIUS EtherCAT® modules do not have CAN and no analogue output

HINT 	The maximum number of samples per device using EtherCAT® bus is 160 kS/sec for all transmitted channels: i.e. for 8 channels the rate would be 20 kHz. The maximum speed per bus is limited to the 100 Mbit EtherCAT® bus speed. When DEWESoft® is the master, it can utilize approximatively half of this bandwidth, but other masters might be more efficient.

5.1.2.3 EtherCAT® specifications

Max. Sample Rate ADC Type[9]	20kS/sec (Dual Core), 10kS/sec (High Density) Note: High-speed modules are NOT supported.
Max. Throughput per slice	640 kByte/sec (=160kS/sec total rate)
Max. Throughput per chain	3200 kByte/sec (=800kS/sec total rate)
Max. distance between slices	75 meters[10]
Max. number of slices[11]	100 (additional power injectors required)
Connector type	Lemo 1B 8 pin (Data and power supply)

8 If your PC has only one Ethernet board, which is already used for the Intranet, then you can use e.g. an Ethernet-to-USB 3.0 converter, to get an additional board, where you can connect the EtherCAT® to.
9 The data rate decreases when you activate counter channels (8 Byte per counter channel)
10 The distance can easily be increased by using fiber optics instead of standard Ethernet cables
11 When the max. allowed current and supply voltage dropout is reached, you must add power injectors

5.1.3 Data Transfer Combinations

DEWESoft® can only acquire data from Dewesoft Hardware which uses the DS-EtherCAT+ protocol.
The SIRIUS EtherCAT® slices have 2 modes of operation:

- Buffered mode: for DEWESoft® software
- Standard EtherCAT® mode: for standard EtherCAT® masters

5.2 Technology overview

5.2.1 Sirius Dual Core series: High Dynamic (up to 160 dB)

This new technology solves the often faced problem that the signal is just much higher than expected and therefore clipped. Dewesoft DUAL CORE ADC technology always gives you the full possible measuring range, because the signal is measured with a high and a low gain at the same time.

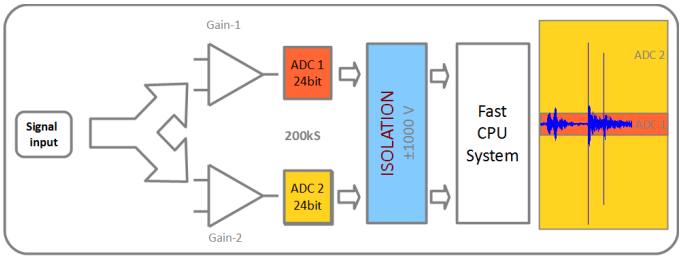


*Illustration 87: Dual Core ADC (**isolated**)*

5.2.2 Sirius-HD-series: High density (16 channel per slice)

For highest channel density this solution offers 24Bit resolution with up to 200 kS/sec sample rate.

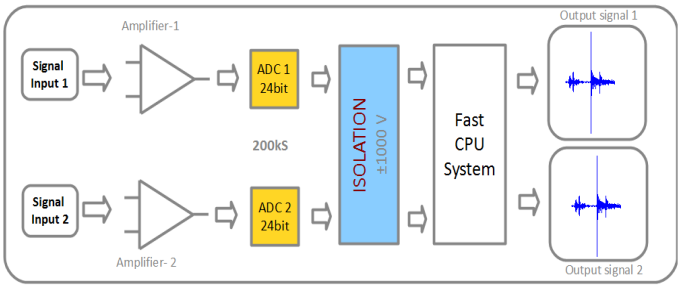


*Illustration 88: High Density (**isolated**)*

5.2.3 Sirius-HS series: High speed and bandwidth

This series combines high bandwidth with alias free acquisition with 16 Bit of up to 1 MS/sec acquisition rate.
The analogue anti-aliasing filter (100 kHz, 5th order, Bessel) is combined with a free programmable digital IIR filter block inside the FGPA.
For bandwidth requirement of up to 2 MHz the complete filter chain can be bypassed.

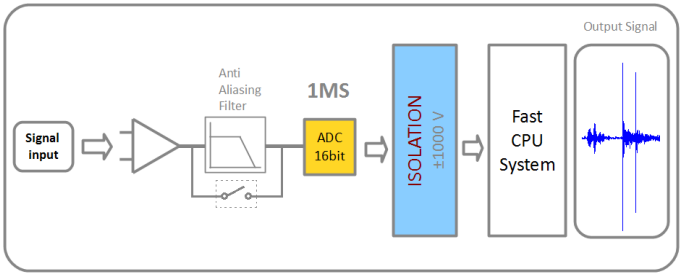


*Illustration 89: High Speed (**isolated**)*

5.2.4 Isolated version: USB

The (standard) SIRIUSi modules are **isolated** between themselves and the main board.

Some modules generate power for electronics and for external pins: this power supply is again **isolated** against other modules, the main board and the housing.

Inside of one module, the power supply pins, counter and analogue inputs are not isolated between themselves (they have the same ground) that is available on the GND connector pin (e.g. The analogue input and the counter of one ACC+ module share the same GND).

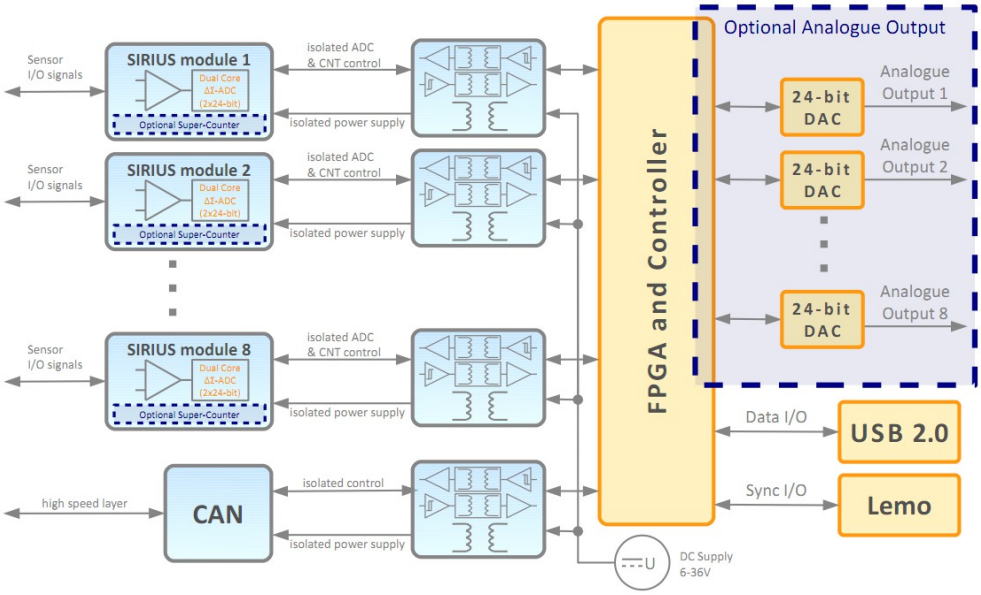


*Illustration 90: **Isolated** Motherboard*

5.2.5 Sirius differential version: USB

The basic concept is the same like on the isolated version but without galvanic isolation for the module power supply and the data interface.

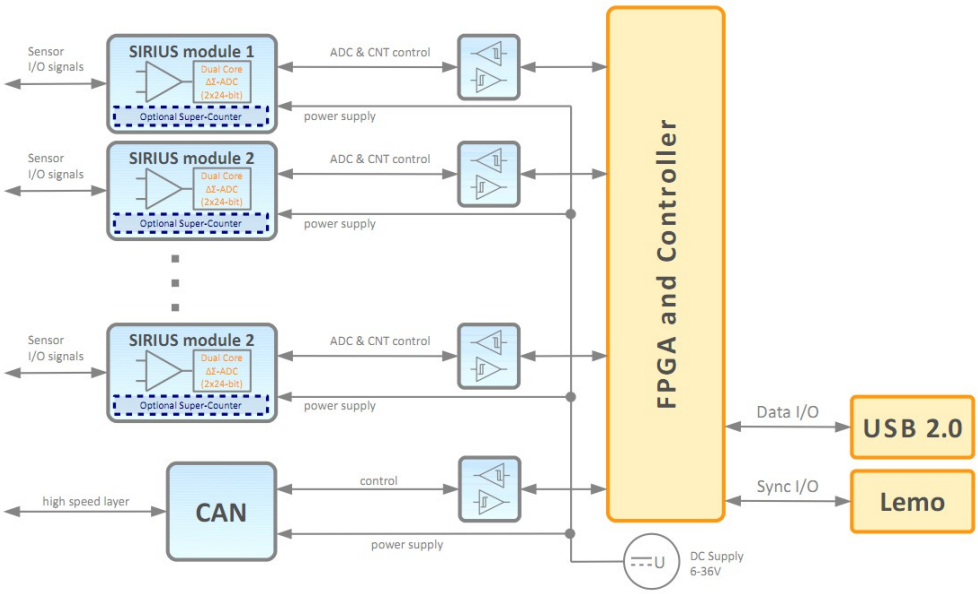


Illustration 91: Differential Motherboard

5.2.6 Isolated version: EtherCAT®

The basic concept is the same like on the isolated version but the EtherCAT® slices do not have CAN or analogue-output. They also do not have a separate sync-connector, since the synchronisation is done via the EtherCAT® protocol.

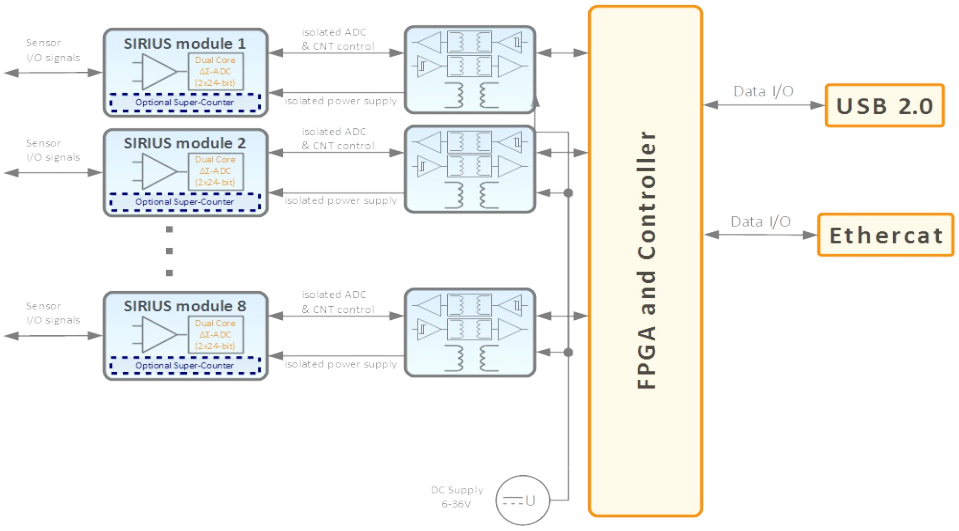


Illustration 92: EtherCAT® Motherboard

5.3 SIRIUS Slice Configuration

Standard Slice

SIRIUSi 8xACC

8 x ACC channels (see page 57)

SIRIUSi 6xACC, 2xACC+

6 x ACC, 2 x ACC+ channels (see page 57)

SIRIUSi 8xMULTI

8 x MULTI channels (see page 70)

SIRIUSi 8xSTGMv2

8xSTGMv2 channels (see page 77)

SIRIUSi 8xSTG

8 x STG modules (see page 88)

SIRIUSi 8xSTG-L2B10f

8xSTG-L2B10f channels (see page 92)

SIRIUSi HV

8 x HV channels (see page 63)

SIRIUSi-HS 8xHS-ACC

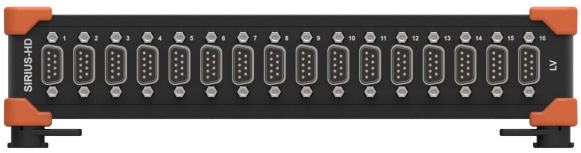
8xHS-ACC channels (see page 109)

SIRIUS-HD 16xHD-STGS

16 x HD-STGS channels (see page 104)

SIRIUS-HD 16xHD-LV

16 x HD-LV channels (see page 101)



Customized Slice

We can build a customised slice with exactly the modules that you want, in the order that you want.
Example:
2 x ACC, 2 x ACC+, 1x MULTI, 1x STG, 2x HV

5.4 SIRIUS Dual Core specifications

		High Dynamic: Dual Core with 2x24Bit						
Analogue modules		**ACC**	**CHG**	**HV**	**LV**	**MULTI**	**STG**	**STGM**
With counter and DIO		**ACC+**	**CHG+**	**-**	**LV+**	**-**	**STG+**	**STGM+ STGM-DB**
Isolated version *i*		■	■	■	■	■	■	■
EtherCAT® version		■	■	■	■	■	■	■
Differential version		■	■	-	■	■	■	■
Rack version *r*[13]		■	■	■	■	■	■	■
Fanless version *f*		■	-	■	■[14]	-	-	■
Analogue Inputs[15]								
Inputs per module		1	1	1	1	1	1	1
Data Rate per Channel [Hz]	**USB**	200k	200k	200k	200k	200k	200k	200k
	EtherCAT®	20k	20k	20k	20k	20k	20k	20k
Vertical Resolution		2 * 24bit	2 * 24bit	2 * 24bit	2 * 24bit	2 * 24bit	2 * 24bit	2 * 24bit
Bandwidth		75 kHz	75 kHz	75 kHz	75 kHz	75 kHz	75 kHz	75 kHz
Voltage		±10 V, ±500 mV	±10 V, ±500 mV	±1200 V, ±50 V	±200 V to ±100 mV	±10 V to ±50 mV	±50 V to ±100 mV	±10 V to ±10 mV
Input coupling		DC, AC 1 Hz (3,10Hz SW)	DC, AC 0.1, 1, 10, 100Hz	DC	DC, AC 1 Hz (3,10Hz)	DC	DC, AC 1 Hz (3,10Hz SW)	DC
Sensor Excitation		-	-	-	2-30V bipol. 0-24V unipol max.0.2A/2W	0-12 V (<44mA) and fixed 12 V, 5 V	0-20 V max.0.1A/0.8W 0-60 mA	0-12 V, max. 44mA
Bridge connections (internal completion)		-	-	-	Full	Full, Half, ¼ .120/350Ω 3-wire	Full, Half, ¼.120/350Ω 3 or 4-wire	Full, Half, ¼ 120/350Ω 3-wire
Programmable Shunt (default Values)		-	-	-	-	59.88kΩ	59.88kΩ, 175kΩ bipolar	100 kΩ, bipolar
IEPE/ICP Sensors		4 or 8mA	4, 8 or 12 mA	-	MSI	MSI	MSI	MSI
Resistance		-	-	-	MSI	MSI	■	MSI
Temp. (Pt100 to Pt2000)		-	-	-	MSI	MSI	■	MSI
Temp. Thermocouple		-	-	-	MSI	MSI	MSI	MSI
Potentiometer		-	-	-	-	■	■	■
Charge		-	100.000 pC, 10.000 pC	-	MSI	MSI	MSI	MSI
Current		ext. Shunt	ext. Shunt	-	ext. Shunt	ext. Shunt	ext. Shunt	ext. Shunt
TEDS interface		■	■	-	■	■	■	■
Advanced Functions		Sensor error detection, high dynamic range	Sensor error detection in IEPE and charge mode (injection)	High Voltage High Isolation	High sensor power and multi range	Analog and digital inputs, analog out	Supports all strain types and high input range	Low power, Sensor&Amp. balance, Bipolar shunt
Analogue input Connectors								
Connector type (Default)		**BNC**	**BNC**, TNC	**Banana**	**DB9**, BNC, Banana	**DB15**, L2B16f	**DB9**, L2B7f, L2B10f	**DB9**, L2B8f L2B16f
Digital types		only on + slices						
Counter (connector)		1 ch(L1B7f)	1 ch(L1B7f)	-	1 ch(L1B7f)	1 ch(DB15) 1 ch(L2B16f)	1 ch(L1B7f) 1ch(L2B10f)[12]	1 ch(L1B7f)
Digital Input (connector)		3 ch(L1B7f)	3 ch(L1B7f)	-	3 ch(L1B7f)	3 ch(DB15) 3 ch(L2B16f)	3 ch(L1B7f) 1ch(L2B10f)[12]	3 ch(L1B7f)
Digital Output (connector)		1 ch(L1B7f)	1 ch(L1B7f)	-	1 ch(L1B7f)	-	1 ch(L1B7f) 1ch(L2B10f[12]	1 ch(L1B7f)
Additional Information								
Isolation Voltage[17]		1000V	1000V	CAT II 1000V	1000V	1000V	1000V	1000V
Power Consumption/Max[18]		8W/15W	10W/18W	8W	10W/25W	15W/25W	15W/25W	11W/20W

Table 6: Dual Core Specifications

12 One digital IO per amplifier with Lemo 2B10f connector

5.5 SIRIUS HD and HS specifications

	High Density: 24Bit, 16ch. per slice			High Speed: 16 Bit with high bandwidth				
Analogue modules	**HD-ACC**	**HD-STGS**	**HD-LV**	**HS-ACC**	**HS-CHG**	**HS-HV**	**HS-LV**	**HS-STG**
With counter and DIO	-	-	-	**HS-ACC+**	**HS-CHG+**	-	**HS-LV+**	**HS-STG+**
Isolated version *i*	■	■	■	■	■	■	■	■
EtherCAT® version	■	■	■	-	-	-	-	-
Differential version	■	■	■	■	■	-	■	■
Rack version *r*[13]	■	■	■	■	■	■	■	■
Fanless version *f*	-	-	-	-	-	■	■[14]	-
Analogue Inputs[15]								
Inputs per module	2	2	2	1	1	1	1	1
Data Rate/ channel [Hz] **USB**	200k	200k	200k	500 k	1 M	500 k	1 M	1 M
Data Rate/ channel [Hz] **EtherCAT**	10k	10k	10k	-	-	-	-	-
Vertical Resolution	24 Bit	24 Bit	24 Bit	16 Bit	16 Bit	16 Bit	16 Bit	16 Bit
Bandwidth	75 kHz	75 kHz	75 kHz	500 kHz	500/200[16] kHz	2 MHz	1 MHz	1 MHz
Voltage	±10 Volt to ±200 mV	±10 Volt to ±10 mV	±100 V to ±100mV	±10 Volt to ±200 mV	±10 Volt to ±100 mV	±1600 Volt to ±20 V	±100 Volt to ±50 mV	±50 V to ±20mV
Input coupling	DC, AC 0.1,1Hz (3,10Hz SW)	DC	DC	DC, AC 1 Hz (3,10Hz SW)	DC, AC (0.1, 1, 10, 100Hz)	DC	DC, AC 1 Hz (3,10Hz SW)	DC, AC 1 Hz (3,10Hz SW)
Sensor Excitation	-	0 .. 12 Volt, max. 44mA	2..30V bipolar 0..24V unipol. max.0.2A/2W	-	-	-	2..30V bipolar 0..24V unipol. max.0.2A/2W	0 .. 20 V max. 0.1A/0.8W, 0 .. 60 mA
Bridge connections (internal completion)	-	Full, Half, ¼ 120/350Ω 3 wire	Full	-	-	-	Full	Full, Half, ¼ 120/350Ω 3 or 4-wire
Programmable Shunt (default Values)	-	100 kΩ	-	-	-	-	-	59.88kΩ, 175kΩ, bipol.
IEPE/ICP Sensors	4,8 or 12mA	MSI	MSI	4 or 8mA	4,8 or 12mA	-	MSI	MSI
Resistance	-	MSI	MSI	-	-	-	MSI	■
Temp. (Pt100 to Pt2000)	-	MSI	MSI	-	-	-	MSI	■
Temp. Thermocouple	-	MSI	MSI	-	-	-	-	■
Potentiometer	-	■	-	-	-	-	-	■
Charge	-	MSI	MSI	-	100 000 pC to 1000 pC	-	MSI	MSI
Current	ext. Shunt	ext. Shunt	ext. Shunt	ext. Shunt	ext. Shunt	-	ext. Shunt	ext. Shunt
TEDS interface	■	■	■	■	■	-	■	■
Advanced Functions	Sens. error detection	Low power, Sensor and Amplifier balance	Low power, high input range, high sensor supply	High speed, Sens. error detection,	Sensor error detection in IEPE and charge mode (injection)	High Voltage High Bandwidth	High sensor power and multi range	High speed, Support all strain types and high input range
Analog input Connectors								
Connector type (Default)	BNC	**DB9,** L1B10f	**DB9,** BNC	**BNC**	**BNC**	**Banana**	**DB9,** BNC, Banana	**DB9**
Digital types	only on + slices							
Counter (connector)	-	-	-	1 ch(L1B7f)	1 ch(L1B7f)	-	1 ch(L1B7f)	1 ch(L1B7f)
Digital Input (connector)	-	-	-	3 ch(L1B7f)	3 ch(L1B7f)	-	3 ch(L1B7f)	3 ch(L1B7f)
Digital Output (connector)	-	-	-	1 ch(L1B7f)	1 ch(L1B7f)	-	1 ch(L1B7f)	1 ch(L1B7f)
Additional Information								
Isolation Voltage[17]	500 V	500 V	500 V	1000 V	1000 V	CAT II 1000 V	1000 V	1000 V
Power Cons./Max[18]	10W/20W	11W/22W	11W/22W	15W/22W	10W/18W	8W	10W/25W	15W/25W

Table 7: HD and HS Specifications

13 Rack version modules not available with extended height (e.g. STG+).
14 Fanless operation only for BNC or Banana version (without excitation)
15 Pinout of analogue input connector may limit functionality. MSI-Option requires DB9 connector.
16 200kHz for Charge
17 Applies only to isolated SIRIUS version
18 One complete slice with same modules

5.6 General Specifications

Misc	
Power Supply	6-36V_{DC}
Operating Temperature	-10 to 50°C (40°C for fanless series[1])
Storage Temperature	-40 to 85°C
Humidity	95% RH non condensing @ 60°C
Shock & Vibration	Sweep sinus (EN 60068-2-6:2008) Random (EN 60721-3-2: 1997 - Class 2M2) Shock (EN 60068-2-27:2009)
EMC	EN 61326-1, EN 61000-3-2, EN61000-3-3
Counter	
Timebase	102.4MHz
Time base accuracy	Typical: 5 ppm, Max: 20 ppm
Max. Bandwidth	10MHz
Input Filter	500 ns, 1µs, 2µs, 4µs, 5µs and 7.5µs
Synchronisation	
Delay between slices	50 nsec
USB: Max. Sync-cable length	100 m (Master/Slave), 200 m (Irig)
EtherCAT®: Max. cable length	75m

Table 8: Sirius Modules: General Specifications

1 50°C with airflow of 3m/sec

5.7 ACC / ACC+

The ACC modules are perfect for sound and vibration IEPE channels.

5.7.1 ACC: Specifications

Inputs	Voltage, IEPE, current (ext. Shunt), ACC+ only: counter, discrete		
ADC Type	24bit delta-sigma dual core with anti-aliasing filter (5.2.1 Sirius Dual Core series: High Dynamic (up to 160 dB) page 49)		
Sampling Rate	Simultaneous 200kS/sec		
Ranges (Dual Core Low Range)	±10V (±500mV)	±500mV (NA)	
Input Accuracy (Dual Core)	±0.1% of reading ±10(1)mV	±0.1 of reading ±1(NA)mV	
Dynamic Range@10kS (Dual Core)	140 dB (160 dB)	135 dB (NA)	
Typ. SNR@50kS (Dual Core)	107 dB (125 dB)	100 dB (NA)	
Typ. CMR @ 50Hz (1kHz)	140 dB (120 dB)	140 dB (120 dB)	
Gain Drift	Typical 10 ppm/K, max. 30 ppm/K		
Offset Drift	Typical 2 µV/K + 10 ppm of range/K, max 2 µV/K + 20 ppm of range/K		
Gain Linearity	<0.02%		
Inter Channel Phase-mismatch	0.02° * f_{in} [kHz] + 0.1° (@ 200 kS/sec)		
Channel Cross talk	200 dB @ 50Hz; 165 dB @ 1kHz		
Input Coupling	DC, AC 1Hz (3 Hz, 10 Hz per SW)		
Input Impedance	1 MΩ in parallel with 0.4nF		
Overvoltage Protection	In+ to In-: 50 V continuous; 200V peak (10msec)		
Digital Filter (vs. Sample Rate)	1kS/s…50 kS/s	50kS/s…100kS/s	100kS/s…200kS/s
Bandwidth (-3 dB)	0.494 fs	0.49 fs	0.38 fs
Alias-free Bandwidth	DC to 0.42fs	DC to 0.32fs	DC to 0.22fs
Alias Rejection	-95dB	-92dB	-97dB
Delay through ADC	12/fs	9/fs	5/fs
Oversampling	256	128	64
IEPE mode			
Excitation	4 or 8mA		
Compliance voltage	25 Volt		
Output Impedance	>100 kΩ		
Sensor detection	Shortcut: <4Volt; Open: > 19Volt		
Counters (ACC+ type only)	1 counter/3 digital input, fully synchronized with analogue data		
Counter Modes	counting, waveform timing, encoder, tacho, gear-tooth sensor		
Input Level Compatibility	CMOS, LVTTL		
Input Protection	±25Volt continuous		
Alarm output	Open collector, max. 100mA/30Volt		
Sensor supply	5V/100mA;14V/50mA		
Additional Specifications			
Input connector	BNC		
TEDS support	IEPE mode only		

Table 9: SIRIUS-ACC8 specifications

5.7.2 ACC BNC

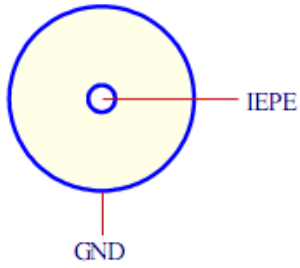


Illustration 93: SIRIUS-ACC: pin-out (BNC)

Illustration 94: SIRIUSi 8xACC

5.7.3 ACC+ (Counter) L1B7f

As an additional function to the ACC module, the ACC+ module also has a 7-pin Lemo connector for digital counters.

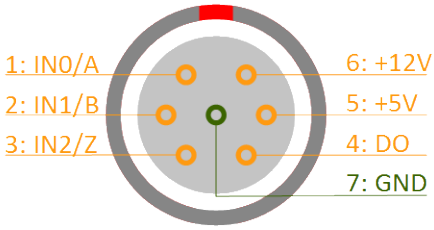


Illustration 95: CNT: counter pin-out (LEMO 7pin)

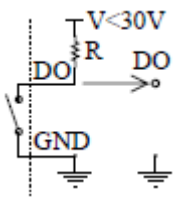
Illustration 96: SIRIUSi 6xACC, 2xACC+

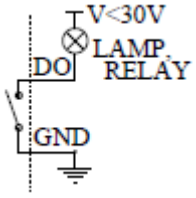
Connector type	L1B7f Connector on the module: `EGG.1B.307.CLL` Mating cable connector: `FGG.1B.307.CLAD52`

Table 10: ACC+ counter connector type

Digital Output Configuration

The “switch” of the open collector output is closed when active.





5.7.4 ACC: Voltage

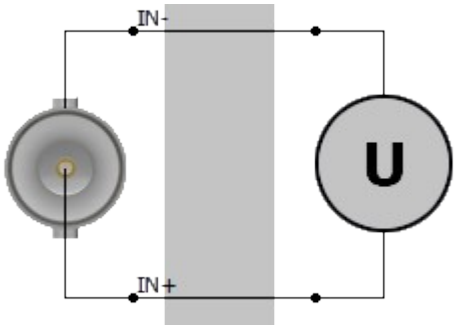


Illustration 97: ACC Voltage

5.7.5 ACC: IEPE

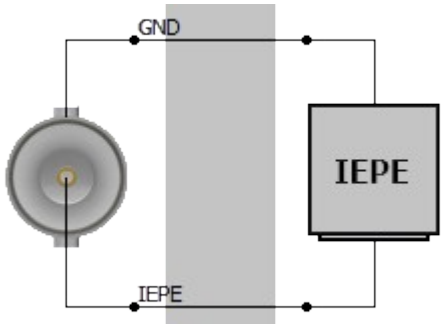


Illustration 98: ACC IEPE

5.8 CHG / CHG+

5.8.1 CHG: Specifications

Inputs	Voltage, IEPE, Charge, current (ext. Shunt),		
ADC Type	24bit delta-sigma dual core with 100/5 kHz analogue anti-aliasing filter		
Sampling Rate	Simultaneous 200kS/sec		
Ranges (Dual Core Low Range)	±10V (500mV)	±500mV (NA)	
Input Accuracy (Dual Core)	±0.05% of reading ±5 (0.5) mV	±0.05 of reading ±0.5 mV	
Typ. Dynamic Range@10kS (Dual Core)	140 dB (155 dB)	130 dB (NA)	
SNR@50kS (Dual Core)	107 dB (124 dB)	98 dB (NA)	
Typ. CMR @ 50Hz (1 kHz)	140 dB (120 dB)	140 dB (120 dB)	
Gain Drift	Typical 10 ppm/K, max. 30 ppm/K		
Offset Drift	Typical 1 µV/K + 5 ppm of range/K, max 5 µV/K + 10 ppm of range/K		
Gain Linearity	<0.02%		
Inter Channel Phase-mismatch	0.02° * f_{in} [kHz] + 0.1° (@ 200 kS/sec)		
Channel Cross talk	180 dB @ 50Hz; 160 dB @ 1kHz		
Input Coupling	DC, AC (0.1 Hz, 1 Hz, 10 Hz or 100 Hz)		
Input Impedance	1 MΩ in parallel with 100pF		
Overvoltage Protection	In+ to In-: 50 V continuous; 200V peak (10msec)		
Digital Filter (vs. Sample Rate)	1kS/s…50 kS/s	50kS/s…100kS/s	100kS/s…200kS/s
Bandwidth (-3 dB)	0.494 fs	0.49 fs	0.38 fs
Alias-free Bandwidth	DC to 0.42fs	DC to 0.32fs	DC to 0.22fs
Alias Rejection	-95dB	-92dB	-97dB
Delay through ADC	12/fs	9/fs	5/fs
Oversampling	256	128	64
IEPE mode			
Excitation	4, 8 or 12 mA		
Compliance voltage	25 Volt		
Output Impedance	>100 kΩ		
Sensor detection	Shortcut: <4 Volt; Open: > 19Volt		
Charge ranges (Low Range)	±100 000 pC (5000 pC)	±10 000 pC (500 pC)	
Input accuracy (HPF 0.1Hz)	±0.5% of reading ±20 pC	±0.5% of reading ±5 pC	
Dynamic Range@10kS (Dual Core)	130 dB (150 dB)	120 dB (140dB)	
SNR@50kS (Dual Core)	107 dB (120 dB)	105 dB (118 dB)	
Input coupling	0.01 Hz, 0.03 Hz, 0.1 Hz, 1 Hz, 10 Hz or 100 Hz		
Charge injection	1V_{rms}, 20 Hz, 0.5% accuracy		
Counters (only in CHG+ type)	1 counter/3 digital input, fully synchronized with analogue data		
Counter Modes	counting, waveform timing, encoder, tacho, geartooth sensor		
Input Level Compatibility	CMOS, LVTTL		
Input Protection	±25Volt continuous		
Alarm output	Open collector, max. 100mA/30Volt		
Sensor supply	5V/100mA;12V/50mA		
Additional Specifications			
Input connector	BNC or TNC (others on request)		
TEDS support	IEPE mode only		

Table 11: SIRIUS-CHG specifications

5.8.2 CHG BNC

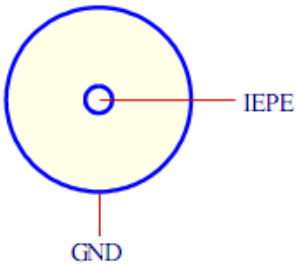


Illustration 99: SIRIUS-CHG: pin-out (BNC)

Illustration 100: SIRIUS𝒾8xCHG

5.8.3 CHG+ (Counter) L1B7f

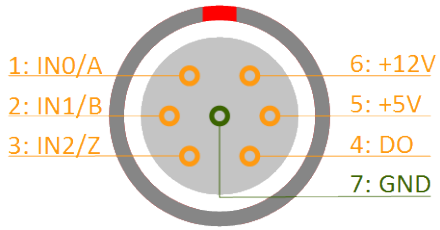


Illustration 101: CNT: counter pin-out (LEMO 7pin)

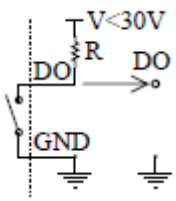
Illustration 102: SIRIUS𝒾6xCHG, 2xCHG+

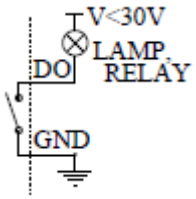
Connector type	L1B7f Connector on the module: `EGG.1B.307.CLL` Mating cable connector: `FGG.1B.307.CLAD52`

Table 12: CHG+ counter connector type

Digital Output Configuration

The “switch” of the open collector output is closed when active.





5.8.4 CHG: Voltage

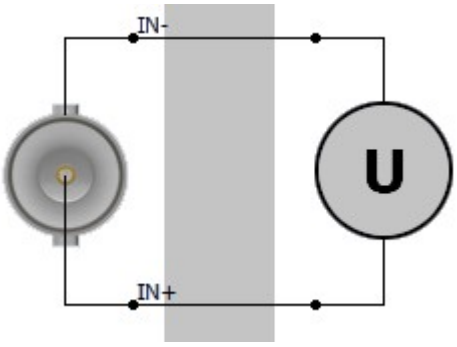


Illustration 103: CHG Voltage

5.8.5 CHG: IEPE

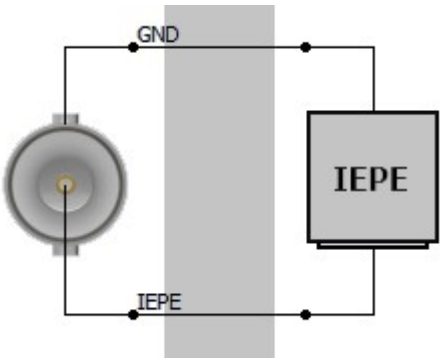


Illustration 104: CHG IEPE

5.8.6 CHG: Charge

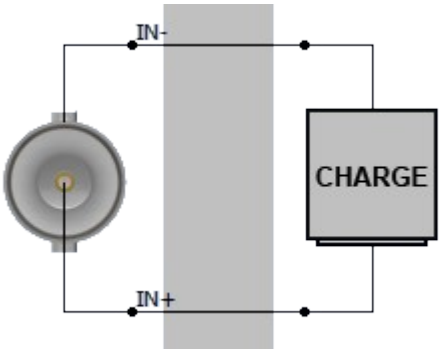


Illustration 105: CHG Charge

5.9 HV

The HV modules are perfect for high voltage measurements.

5.9.1 HVv2 Specifications

Inputs	Voltage		
ADC Type	24bit delta-sigma dual core with 100/5 kHz analogue anti-aliasing filter (5.2.1 Sirius Dual Core series: High Dynamic (up to 160 dB) page 49)		
Sampling Rate	Simultaneous 200kS/sec		
Ranges (Dual Core Low Range)	±1200V (±50V)	±50V (NA)	
Gain accuracy	±0.05% of reading		
Offset accuracy (Dual Core)	±100 (50) mV	±50 mV	
Typ. Dynamic Range@10kS (Dual Core)	142 dB (158 dB)	132 dB (NA)	
Typ. SNR@50kS (Dual Core)	107 dB (120 dB)	95 dB (NA)	
Typ. CMR @ 50Hz (1kHz)	85 dB (60 dB)	85 dB (60 dB)	
Gain Drift	Typical 5 ppm/K, max. 30 ppm/K		
Offset Drift	Typical 1 mV/K + 1 ppm of range/K, max 2 mV/K + 5 ppm of range/K		
Gain Linearity	<0.02%		
Inter Channel Phase-mismatch	0.04° * f_{in} [kHz] + 0.2° (@ 200 kS/sec)		
Channel Cross talk	115 dB @ 50Hz; 90 dB @ 1kHz		
Input Coupling	DC		
Input Impedance	10 MΩ		
Protection class	CAT III 600 V; CAT II 1000 V		
Overvoltage Protection	In+ to In-: 1.8 kV_{RMS}, Inx to GND: 1.4kV_{RMS})		
Digital Filter (vs. Sample Rate)	1kS/s…50 kS/s	50kS/s…100kS/s	100kS/s…200kS/s
Bandwidth (-3 dB)	0.494 fs	0.49 fs	0.38 fs
Alias-free Bandwidth	DC to 0.42fs	DC to 0.32fs	DC to 0.22fs
Alias Rejection	-95dB	-92dB	-97dB
Delay through ADC	12/fs	9/fs	5/fs
Oversampling	256	128	64
Additional Specifications			
Input connector	Banana		
TEDS support	NA		

Table 13: SIRIUS-HV specifications

5.9.2 HV: Banana

The HV modules are perfect for high voltage measurements.

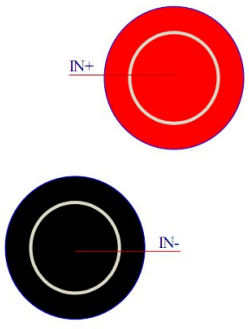


Illustration 106: SIRIUS-HV pin-out Banana plug

Illustration 107: SIRIUSi 8xHV-BAN

WARNING

It is mandatory to connect a ground cable to the *GND* connector of the SIRIUS when you are working with high voltages (see also 4.2.1.6 GND connector on page 27)

5.9.2.1 HV: Voltage

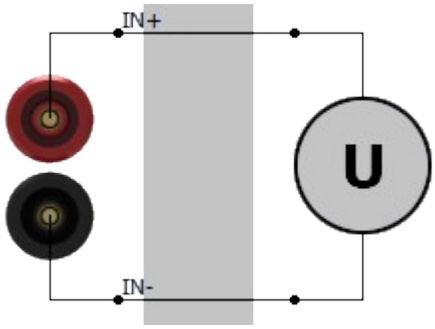


Illustration 108: SIRIUS-HV: Voltage

5.10 LV / LV+

5.10.1 LVv2 Specifications

Inputs	Voltage, full bridge strain, current (ext. Shunt)			
ADC Type	24bit delta-sigma dual core with 100/5 kHz analogue anti-aliasing filter (5.2.1 Sirius Dual Core series: High Dynamic (up to 160 dB) page 49)			
Sampling Rate	Simultaneous 200kS/sec			
Dual Core Ranges (Low Range)	±200V (10 V)	±10V (500 mV)	±1V (50 mV)	±100mV (5 mV)
Gain accuracy	±0.05% of reading			
Offset accuracy (Dual Core)	± 40 (20) mV	±2 (1) mV	± 0.2 (0.2) mV	± 0.1 (0.1) mV
Offset accuracy after Balance Amplifier	2mV	0.1mV	0.02mV	0.01mV
Typ. Dynamic Range@10kS (Dual Core)	136 dB (146 dB)	137 dB (152 dB)	137 dB (147 dB)	130 dB (132 dB)
Typ. SNR@10kS (Dual Core)	109 dB (118 dB)	109 dB (126 dB)	109 dB (116 dB)	97 dB (97 dB)
Typ. CMR @ 50 Hz/400 Hz/10 kHz	70 / 70 / 55 dB	95 / 95 / 84 dB	105 / 105 / 95 dB	115 / 112 / 102 dB
Gain Drift	Typical 10 ppm/K, max. 30 ppm/K			
Offset Drift	Typical 0.3 µV/K + 5ppm of range/K, max: 2 µV/k + 10 ppm of range/K			
Gain Linearity	<0.02%			
Inter Channel Phase-mismatch	0.02° * f_{in} [kHz] + 0.1° (@ 200 kS/sec and 10 V Range)			
Channel Cross talk	120 dB @ 10kHz (Range ≤ 10 V); 95 dB @ 10kHz (Range = 100V)			
Input Coupling[1]	DC, AC 1Hz (3 Hz, 10 Hz per SW)			
Input Impedance (200V/20V Range)	10 (1) MΩ between IN+ or IN- against GND			
Max. common mode voltage	200V and 20V Range: 200V; all other Ranges: 12 V			
Input Overvoltage Protection	200V and 20V Range: 300V; all other Ranges: 100V (250 V peak for 10msec)			
Digital Filter (vs. Sample Rate)	100S/s…50 kS/s	50kS/s…100kS/s	100kS/s…200kS/s	
Bandwidth (-3 dB)	0.494 fs	0.49 fs	0.38 fs	
Alias-free Bandwidth	DC to 0.42fs	DC to 0.32fs	DC to 0.22fs	
Alias Rejection	-95dB	-92dB	-97dB	
Delay through ADC	12/fs	9/fs	5/fs	
Oversampling	256	128	64	
Excitation Voltage	Unipolar or Bipolar Software selectable (programmable with 16 Bit DAC)			
Excitation Level unipolar	0 .. 24 Volt; Predefined levels: 1, 2.5, 5, 10, 12, 15, 20 and V_{DC}			
Excitation Level polar	2 .. 30 Volt; Predefined levels: 2.5, 5, 10, 12, 15, 24 and 30 V_{DC}			
Accuracy	±0.1 % ±5 mV			
Drift	±50 ppm/K ±100µV/K			
Stability 10% to 90% load (bipolar)	< 0.01%			
Current limit	200 mA (2 Watt max. per channel, 12 Watt max. per Slice)			
Protection	Continuous short to ground			
Bridge connection types	Full bridge			
Ranges @ 10 V_{exc}(low Range)	2mV/V…1000mV/V free programmable with Dual Core			
Input short, Sensor offset adjust	Software selectable			
Counters (only on LV+ type)	1 counter/3 digital input, fully synchronized and alarm output			
Counter modes	Counting, waveform timing, encoder, tacho, geartooth sensor			
Input level compatibility	CMOS, LVTTL			
Input protection	Up to ±25Volt			
Alarm output	Open collector, max. 100mA/30Volt			
Sensor supply	5V/100mA; 12V/50mA			
Additional Specifications				
Misc function	Excitation control monitoring, Amplifier Short, Single Ended/Differential			
Input connector	DSUB 9, BNC, Banana (others on request)			
TEDS support	Standard + MSI adapters			

Table 14: SIRIUS-LV specifications

1 In- must be within ±10V referred to GND(iso); for Ranges >10 V the DC value of In- is not rejected

5.10.2 LV+ (Counter) L1B7f

As an additional function to the ACC module, the ACC+ module also has a 7-pin Lemo connector for digital counters.

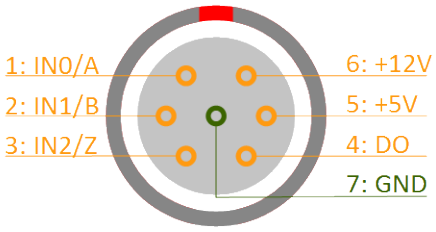


Illustration 109: CNT: counter pin-out (LEMO 7pin)

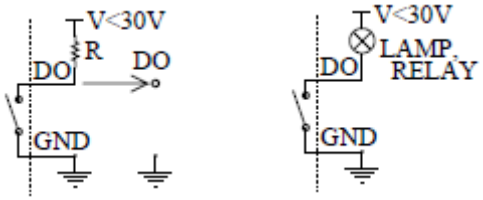
Illustration 110: SIRIUSi 8xLV+

Connector type	L1B7f Connector on the module: `EGG.1B.307.CLL` Mating cable connector: `FGG.1B.307.CLAD52`

Table 15: LV+ counter connector type

Digital Output Configuration

The “switch” of the open collector output is closed when active.



5.10.3 LV BAN

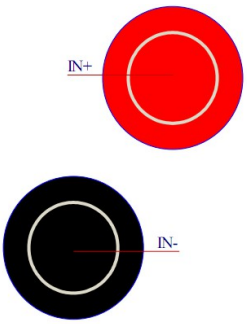


Illustration 111: SIRIUS-LV pin-out Banana plug

Illustration 112: SIRIUSi 8xLV-BAN

5.10.4 LV BNC

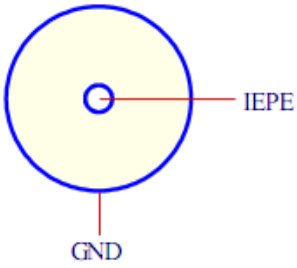


Illustration 113: SIRIUS-LV: pin-out (BNC)

Illustration 114: SIRIUSi 8xLV-BNC

5.10.5 LV DSUB-9

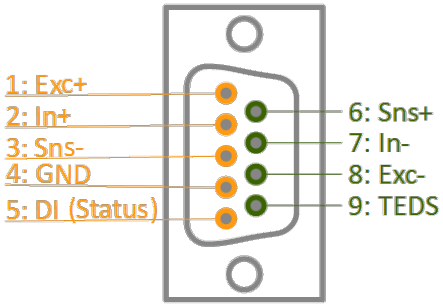


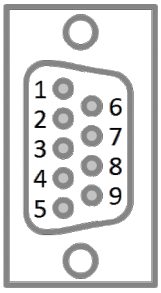
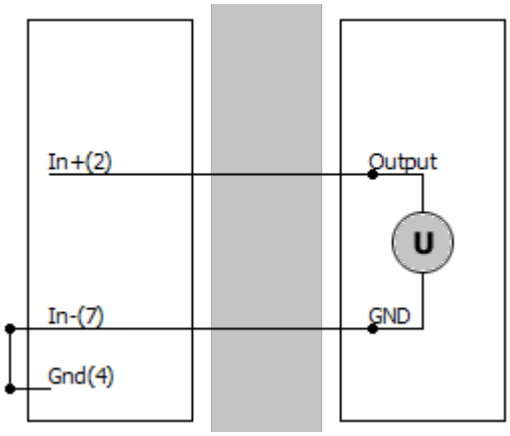
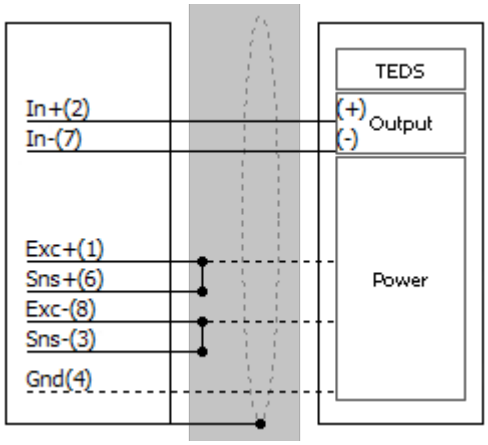
Illustration 115: SIRIUS-LV pin-out DSUB-9

Illustration 116: SIRIUSi 8xLV

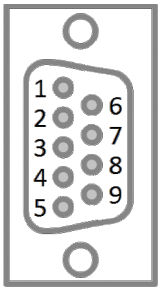
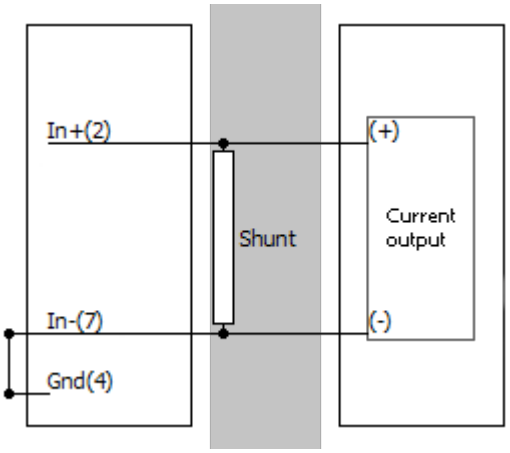
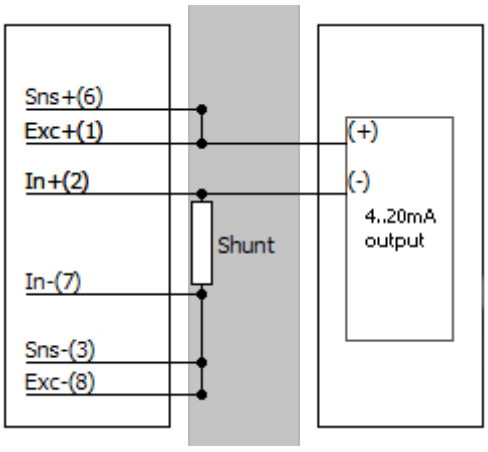
Digital Status Input

Pin 5 *DI (Status)* can be used for digital status input: i.e. show alarm status in DEWESoft® when a current clamp is open.

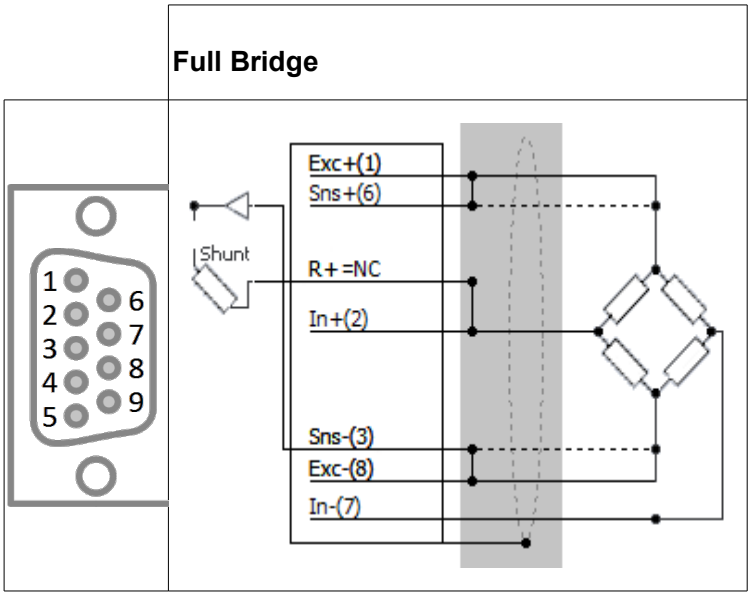
5.10.5.1 LV DSUB-9: Voltage

	Voltage - Single Ended	Voltage – Differential Use only when the sensor is powered by the excitation voltage of the module.
		

5.10.5.2 LV DSUB-9: Current

	External Direct Shunt	External Loop Powered Shunt
		

5.10.5.3 LV DSUB-9: Bridge



5.11 MULTI

The MULTI modules are perfect for multi-purpose analogue in/out and digital/counters.

5.11.1 MULTI: Specifications

Inputs	Voltage, full, ½, ¼ bridge (120Ω and 350Ω), current (ext. Shunt), counter, digital			
ADC Type	24bit delta-sigma dual core with 100/5 kHz analogue anti-aliasing filter (5.2.1 Sirius Dual Core series: High Dynamic (up to 160 dB) page 49)			
Sampling Rate	Simultaneous 200kS/sec			
Dual Core Ranges (Low)	±10V (±500mV)	±1V (50mV)	±100mV (±5mV)	±50mV (±2.5mV)
Input Accuracy	±0.05% of value ±10mV	±0.05% of value ±1mV	±0.05% of value ±0.2mV	±0.05% of value ±0.2mV
Typ. Dynamic Range@10kS (Dual Core)	137 dB (152 dB)	137 dB (147 dB)	135 dB (137 dB)	133 dB (133 dB)
Typ. SNR@10kS (Dual Core)	105 dB (121 dB)	104 dB (111 dB)	100 dB (101 dB)	95 dB (95 dB)
Typ. CMR @ 400Hz (1kHz)	86 dB (84 dB)	96 dB (95 dB)	112 dB (102 dB)	112 dB (102 dB)
Gain Drift	Typical 10 ppm/K, max. 40 ppm/K			
Offset Drift	Typical 0.3 µV/K + 5 ppm of range/K, max 2 µV/K + 10 ppm of range/K			
Gain Linearity	<0.02%			
Inter Channel Phase-mismatch	0.02° * f_{in} [kHz] + 0.1° (@ 200 kS/sec)			
Channel Cross talk	120 dB @ 10kHz			
Input Coupling/ Impedance	DC / 10 MΩ			
Overvoltage Protection	In+ to In-: 50 V continuous; 200V peak (10msec)			
Digital Filter (vs. Sample Rate)	1kS/s…50 kS/s	50kS/s…100kS/s	100kS/s…200kS/s	
Bandwidth (-3 dB)	0.494 fs	0.49 fs	0.38 fs	
Alias-free Bandwidth	DC to 0.42fs	DC to 0.32fs	DC to 0.22fs	
Alias Rejection	-95dB	-92dB	-97dB	
Delay through ADC	12/fs	9/fs	5/fs	
Oversampling	256	128	64	
Excitation Voltage	Free programmable (16 Bit DAC)			
Predefined levels	0, 1, 2.5, 5, 10 and 12 V_{DC}			
Accuracy	±0.1 % ±10 mV			
Drift	±50 ppm/K ±100 µV/K			
Stability 10% to 90% load	<0.01%			
Current limit	45mA (0.4W max. Power)			
Protection	Continuous short to ground			
Additional Fixed Excitations	12V (max. 50 mA); 5 V (max. 100 mA) Accuracy 5%			
Bridge Connection Types	Full bridge, ½ bridge, ¼ bridge (3-wire)			
Ranges	2mV/V…1000mV/V free programmable with Dual Core			
Internal Bridge Completion	½ bridge 1 kΩ and ¼ bridge 120Ω and 350Ω			
Typ. Bridge Completion Accuracy	0.05 %; TCR: 5 ppm/K (others on request)			
Internal Shunt Resistor	59.88 kΩ, software selectable (others on request)			
Typ. Shunt Resistor Accuracy	0.05 %; TCR: 10 ppm/K (others on request)			
Input Short, Sensor Offset Adjust	Software selectable			
Counters	**1 counter/3 digital input, fully synchronized with analogue data**			
Counter Modes	counting, waveform timing, encoder, tacho, gear-tooth sensor			
Input Level Compatibility	CMOS, LVTTL (protected up to ±25Volt continuous)			
FRONT Analogue Out[19]	1 channel, 24 bit sigma delta 200 kHz, ±10V			
Accuracy	±0.1% of reading ±0.02 V			
Temperature Drift	±50ppm/K of reading ± 200 µV/K			
Output Impedance	< 10 Ω			
Maximum Output Current / Load	20 mA / > 1000 Ω			
Output Protection	Continuous short to ground			
Additional Specifications				
Input connector	High Density DSUB-15, LEMO-2B 16pin (others on request)			
TEDS support	Standard + MSI adapters			

Table 16: SIRIUS-MULTI specifications

19 Not available when ordered with the Analogue-out OPTION (see 5.22 Analogue out OPTION on page 126)

5.11.2 MULTI DSUB-15

Illustration 117: SIRIUSi 8xMULTI

Pin	Name	Description
1	TEDS	TEDS
2	Exc-	Excitation -
3	Exc+	Excitation +
4	R+	¼ Bridge/Shunt
5	In+	Input +
6	Aout	Analogue output
7	Sns+	Sense +
8	Sns-	Sense -
9	GND	Ground
10	In-	Input -
11	+5V	+5V supply
12	+12V	+12V supply
13	IN0/A	Counter input IN0/A
14	IN1/B	Counter input IN1/B
15	IN2/Z	Counter input IN2/Z

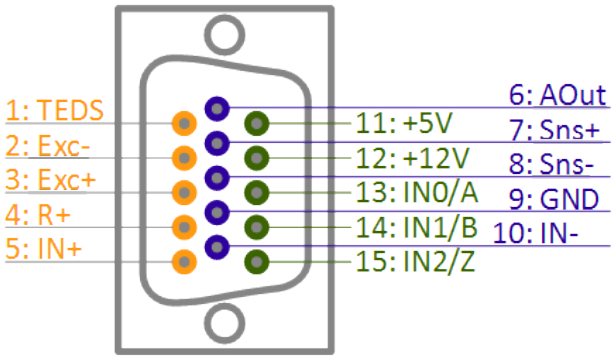
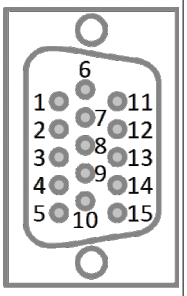
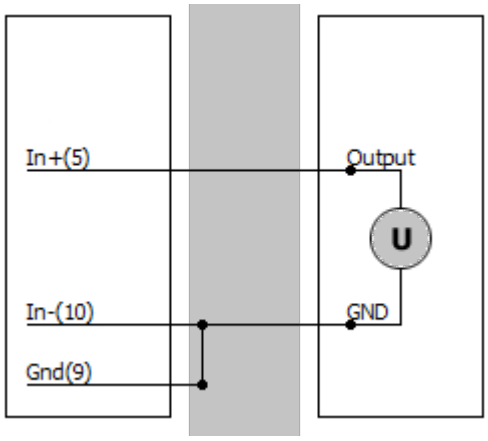
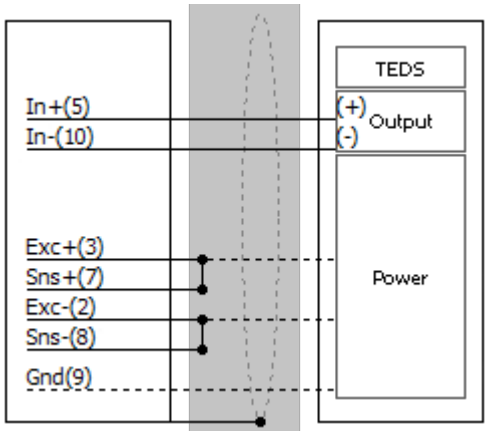


Illustration 118: SIRIUS-MULTI pin-out DSUB-15

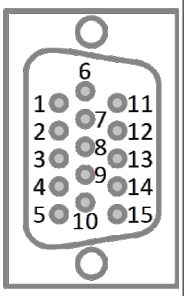
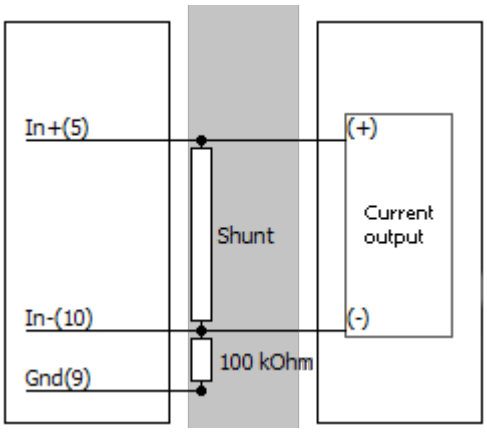
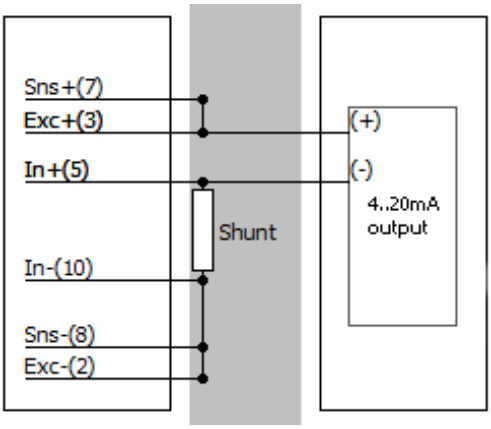
HINT

You can use the analogue input, analogue output and counters at the same time.

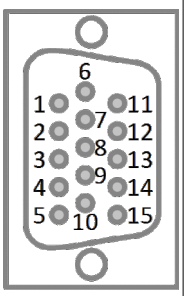
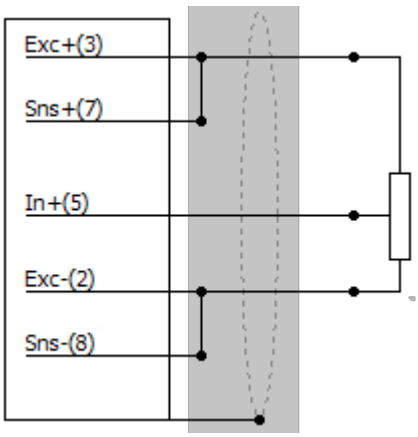
5.11.2.1 MULTI DSUB-15: Voltage

	Voltage - Single Ended	Voltage – Differential Use only when the sensor is powered by the excitation voltage of the module.
		

5.11.2.2 MULTI DSUB-15: Current

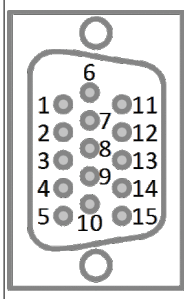
	External Direct Shunt	External Loop Powered Shunt
		

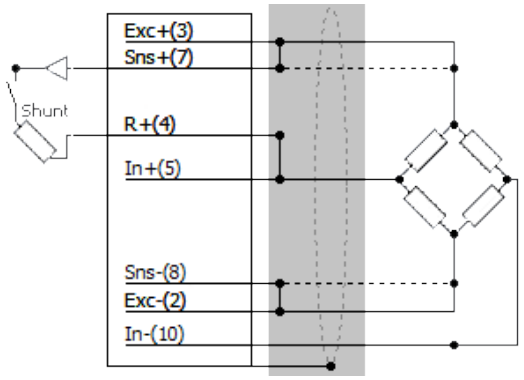
5.11.2.3 MULTI DSUB-15: Potentiometer

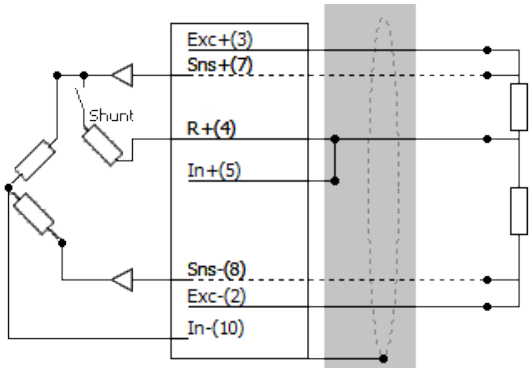
5.11.2.4 MULTI DSUB-15: Bridge

Full Bridge

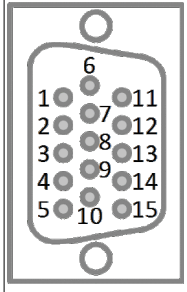


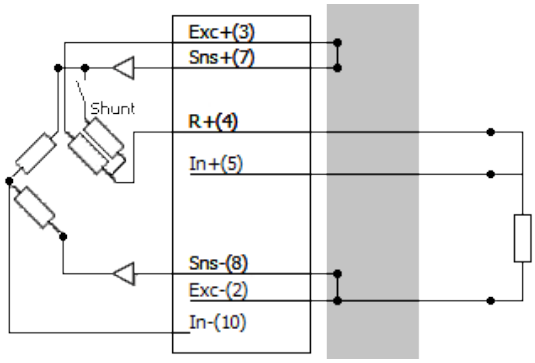


Half Bridge



Quarter Bridge – 3 wire





5.11.3 MULTI-L2B16f

Pin	Name	Description
1	TEDS	TEDS
2	Exc+	Excitation +
3	Exc-	Excitation -
4	R+	¼ Bridge/Shunt
5	In+	Input +
6	Aout	Analogue output
7	Sns+	Sense +
8	Sns-	Sense -
9	GND	Ground
10	In-	Input -
11	+5V	+5V (max. 100mA) supply
12	+14V5	+14.5V (max. 50mA) supply
13	IN0/A	Counter input IN0/A
14	IN1/B	Counter input IN1/B
15	IN2/Z	Counter input IN2/Z
16	-14V5	-14.5V (max. 50mA) supply

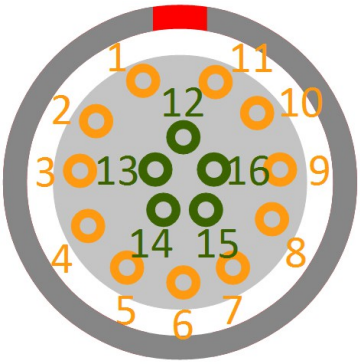
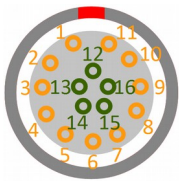
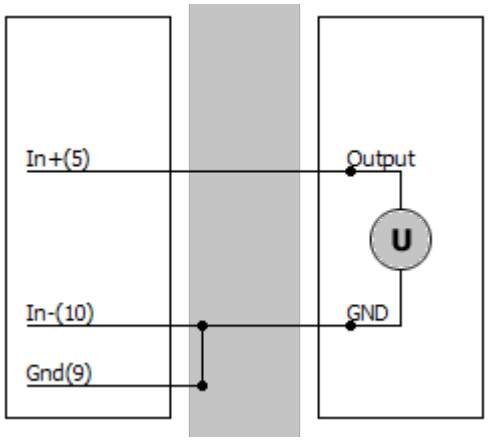
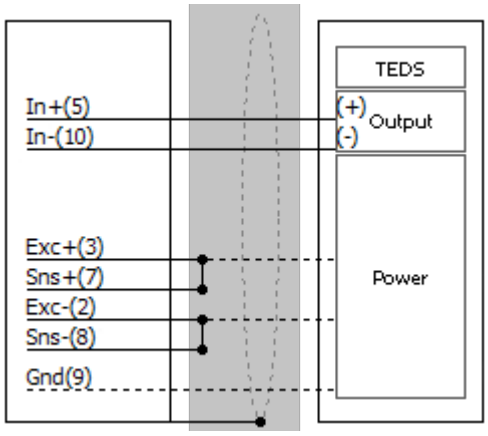


Illustration 119: SIRIUS-MULTI-L2B16F pin-out

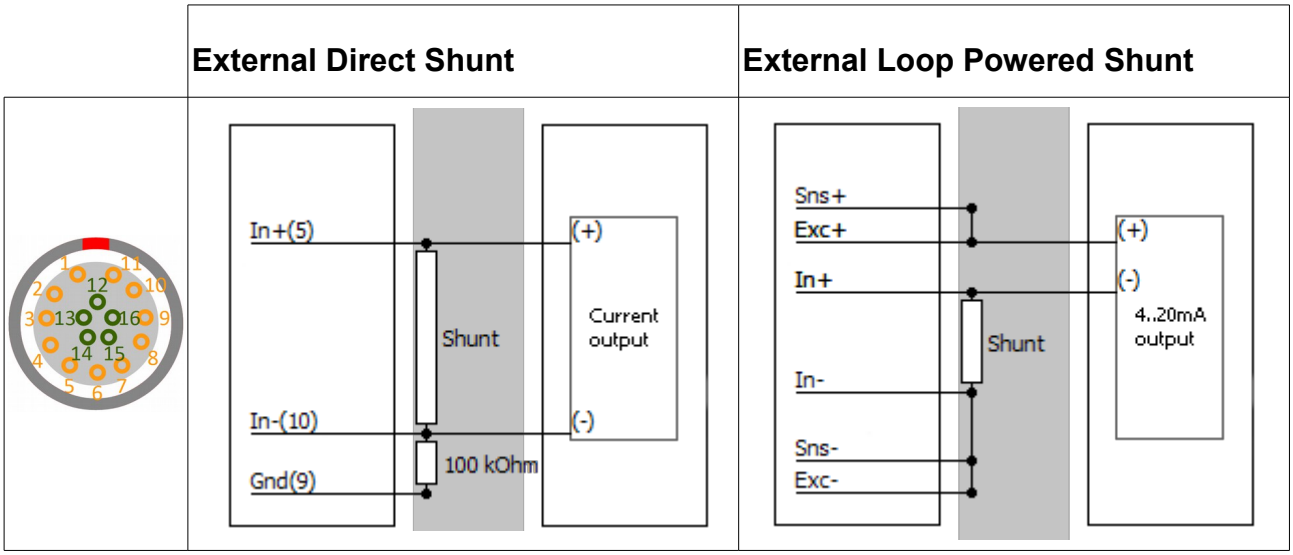
HINT

You can use the analogue input, analogue output and counters at the same time.

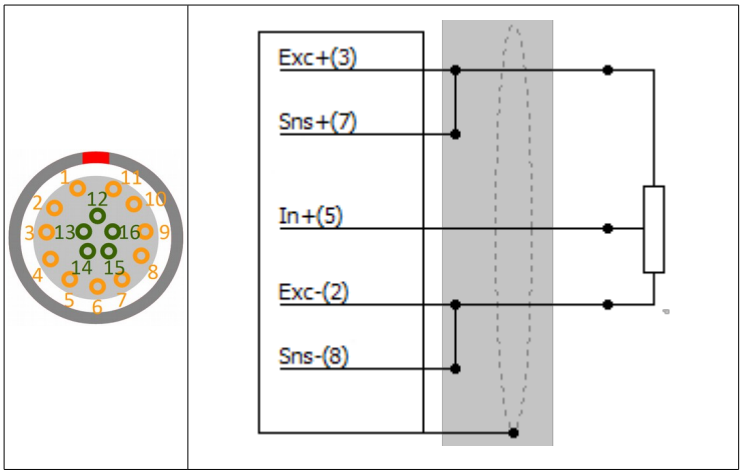
5.11.3.1 MULTI-L2B16f: Voltage

	Voltage - Single Ended	Voltage – Differential Use only when the sensor is powered by the excitation voltage of the module.
		

5.11.3.2 MULTI-L2B16f: Current

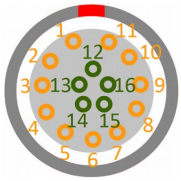


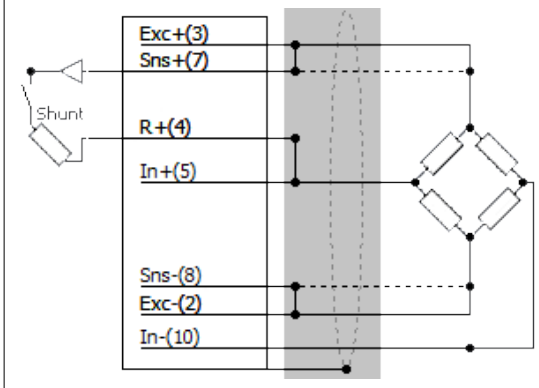
5.11.3.3 MULTI-L2B16f: Potentiometer



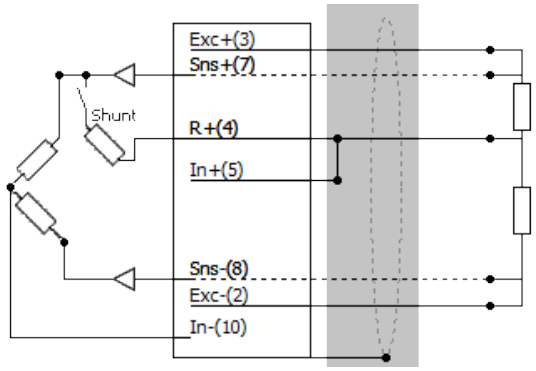
5.11.3.4 MULTI-L2B16f: Bridge

Full Bridge

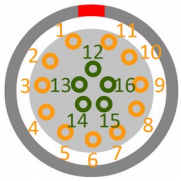


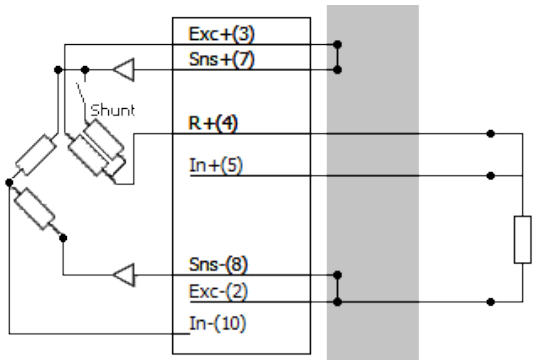


Half Bridge



Quarter Bridge – 3 wire





5.12 STGM / STGM+

The STG-M module is a universal amplifier perfectly fitting for strain gage and voltage measurements.

5.12.1 STGMv2: Specifications

Inputs	Voltage, full bridge strain, ½ bridge strain, ¼ bridge strain (120Ω and 350Ω), current (ext. Shunt)			
ADC Type	24bit delta-sigma dual core with 100/5 kHz analogue anti-aliasing filter (5.2.1 Sirius Dual Core series: High Dynamic (up to 160 dB) page 49)			
Sampling Rate	Simultaneous 200kS/sec			
Dual Core Ranges (Low)	±10V (±500mV)	±1V (50mV)	±100mV (±5mV)	±10mV (±0.5mV)
Gain accuracy	±0.05% of reading			
Offset accuracy (Dual Core)	±5 (2) mV	±0.5 (0.2) mV	±0.1 (0.1) mV	±0.1 (0.1) mV
Offset accuracy after Balance Amplifier	0.2mV	0.02mV	0.02mV	0.02mV
Typ. Dynamic Range@10kS (Dual Core)	137 dB (152 dB)	137 dB (147 dB)	130 dB (132 dB)	112 dB (112 dB)
Typ. SNR@10kS (Dual Core)	105 dB (121 dB)	104 dB (111 dB)	95 dB (95 dB)	75 dB (75 dB)
Typ. CMR @ 400Hz (1kHz)	86 dB (96 dB)	96 dB (95 dB)	110 dB (102 dB)	110 dB (102 dB)
Gain Drift	Typical 10 PPM/K, max. 40 PPM/K			
Offset Drift	Typical 0.3 µV/K + 5 ppm of range/K, max 2 µV/K + 10 ppm of range/K			
Gain Linearity	<0.02%			
Inter Channel Phase-mismatch	0.02° * f_{in} [kHz] + 0.1° (@ 200 kS/sec)			
Channel Cross talk	120 dB @ 10kHz			
Input Coupling	DC			
Input Impedance	10 MΩ			
Overvoltage Protection	In+ to In-: 50 V continuous; 200V peak (10msec)			
Digital Filter (vs. Sample Rate)	1kS/s…50 kS/s	50kS/s…100kS/s	100kS/s…200kS/s	
Bandwidth (-3 dB)	0.494 fs	0.49 fs	0.38 fs	
Alias-free Bandwidth	DC to 0.42fs	DC to 0.32fs	DC to 0.22fs	
Alias Rejection	-95dB	-92dB	-97dB	
Delay through ADC	12/fs	9/fs	5/fs	
Oversampling	256	128	64	
Excitation Voltage	Free programmable (16 Bit DAC)			
Predefined levels	0, 1, 2.5, 5, 10 and 12 V_{DC}			
Accuracy	±0.05 % ±2 mV			
Drift	±50 ppm/K ±100 µV/K			
Load stability: 0% to 100% load	<0.01%			
Noise @ 10V/350Ω	< 150 µVrms@10 kS			
Line regulation over 20Ω of change	< 0.005% @ 120Ω load			
Sense Impedance to Exc / to GND	100 kΩ / > 100 MΩ			
Current limit	45mA			
Protection	Continuous short to ground			
Bridge Connection Types	Full bridge, ½ bridge, ¼ bridge (3-wire)			
Ranges	2mV/V…1000mV/V free programmable with Dual Core			
Internal Bridge Completion	½ bridge 1 kΩ and ¼ bridge 120Ω and 350Ω			
Typ. Bridge Completion Accuracy	0.05 %; TCR: 5 ppm/K (others on request)			
Internal Shunt Resistor	59.88 kΩ, software selectable (others on request)			
Typ. Shunt Resistor Accuracy	0.05 %; TCR: 10 ppm/K (others on request)			
Input Short, Sensor Offset Adjust	Software selectable			
Counters (only on STGMv2+ type)	1counter / 3 digital input, fully synchronized and alarm outpu			
Counter Modes	counting, waveform timing, encoder, tacho, geartooth sensor			
Input Level Compatibility	CMOS, LVTTL			
Input Protection	±25Volt continuous			
Alarm output	Open collector, max. 100mA/30Volt			
Sensor supply	5V/100mA; 12V/50mA			
Additional Specifications				
Input connector	DSUB-9, Lemo2B 8pin, Lemo2B 16pin (others on request)			
TEDS support	Standard + MSI adapters			

Table 17: SIRIUS STG-M specifications

5.12.2 STGM+ (Counter) L1B7f

The STGM+ is the same as the STG-M but has an additional Lemo7 connector for the counter. Thus the enclosure is higher than the standard enclosure (see 4.1.3 Extended Height Enclosure on page 25).

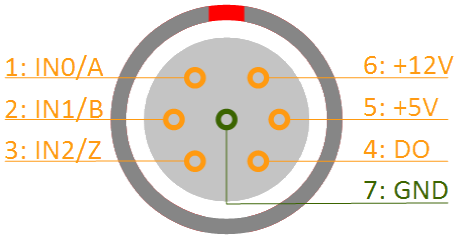


Illustration 120: CNT: counter pin-out (LEMO 7pin)

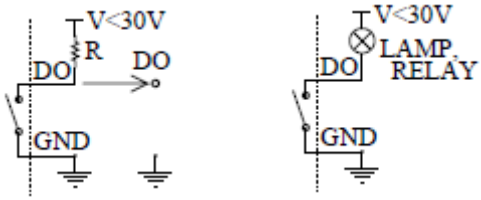
Illustration 121: SIRIUSi 8xSTGM+

Connector type	L1B7f Connector on the module: `EGG.1B.307.CLL` Mating cable connector: `FGG.1B.307.CLAD52`

Table 18: STGM+ Counter Specifications (per module)

Digital Output Configuration

The “switch” of the open collector output is closed when active.



5.12.3 STGM-DB

The STGM-DB is the same as the STG-M but has an additional DSUB-37 male connector for 8 counter or 24 digital inputs and an additional DSUB-25 female connector for 8 digital outputs.
Thus the enclosure is higher than the standard enclosure (see 4.1.3 Extended Height Enclosure on page 25).

Illustration 122: SIRIUS-STGM-DB (2 slices)

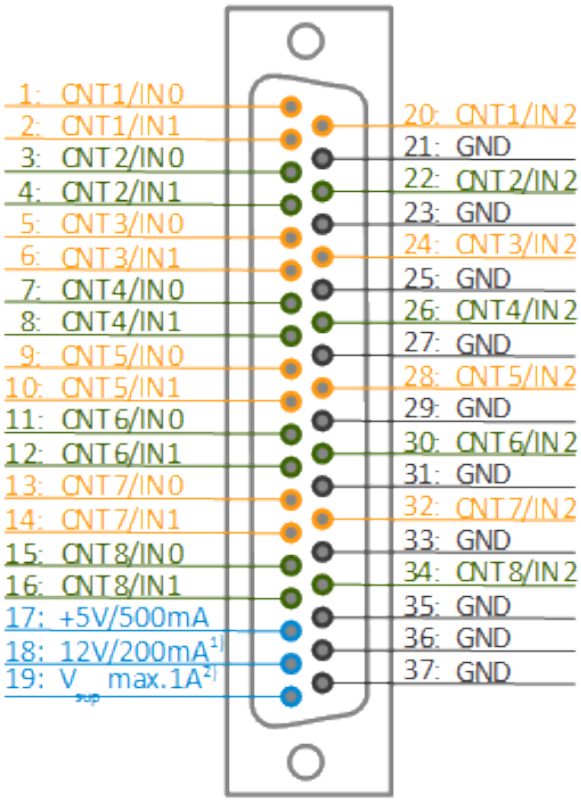


Illustration 123: DSUB 37 pins

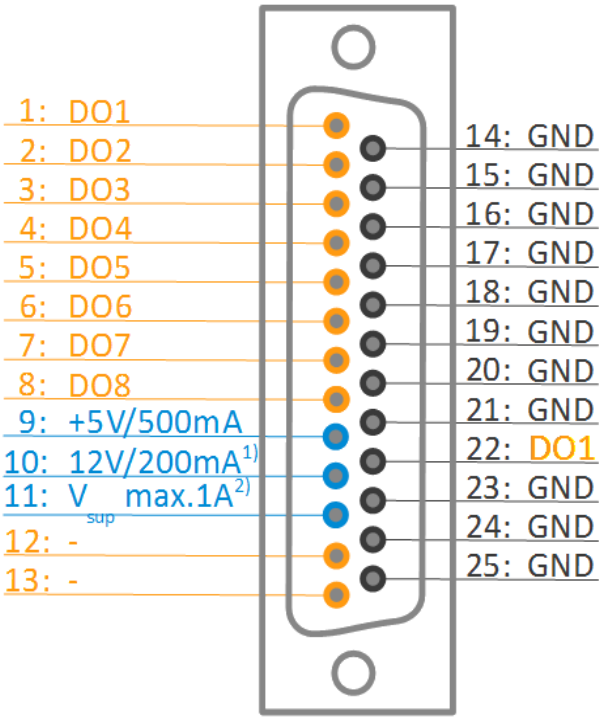


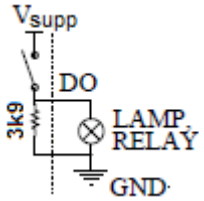
Illustration 124: DSUB 25 pins

1) this voltage is guaranteed to be <= 12V
When the supply voltage is <12V, then this voltage will be 2V lower than the supply voltage:
e.g. when the supply voltage is 10V, the voltage will be 8V
2) The supply voltage from the slice is routed to this pin.

Counters **Parallel use**	8 counter/24 digital inputs fully synchronized with analogue
Modes	counting, waveform timing, encoder, tacho, gear-tooth sensor
Digital Out	High side switch to supply voltage with internal 3.9 kΩ pull down, max. 150mA, short circuit protected.
Connector type	DSUB 37 male, DSUB 25 female

Table 19: STGM-DB Counter Specifications (per module)

Digital Output Configuration



5.12.4 STGM DSUB-9

Illustration 125: SIRIUSi 8xSTGM

Pin	Name	Description
1	Exc+	Excitation +
2	In+	Input +
3	Sns-	Sense -
4	GND	Ground
5	R+	¼ Bridge/Shunt
6	Sns+	Sense +
7	In-	Input -
8	Exc-	Excitation -
9	TEDS	TEDS

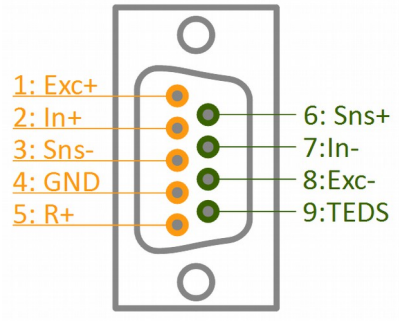
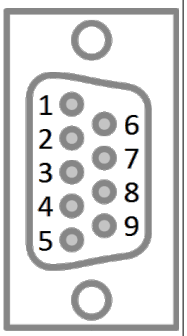
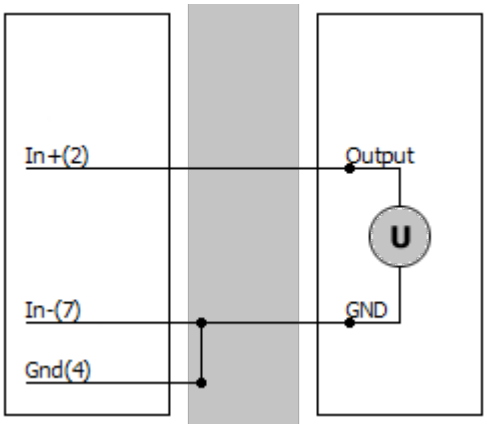
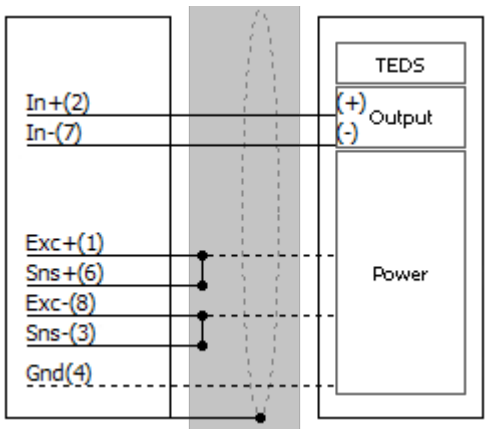
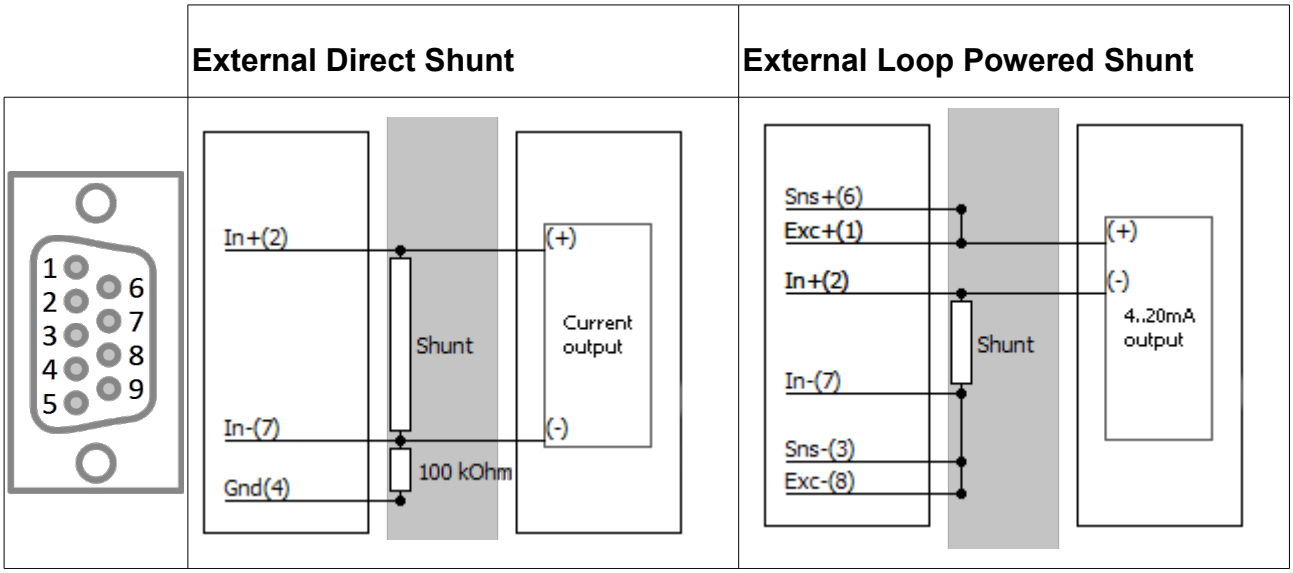


Illustration 126: SIRIUS-STGM pin-out DSUB-9

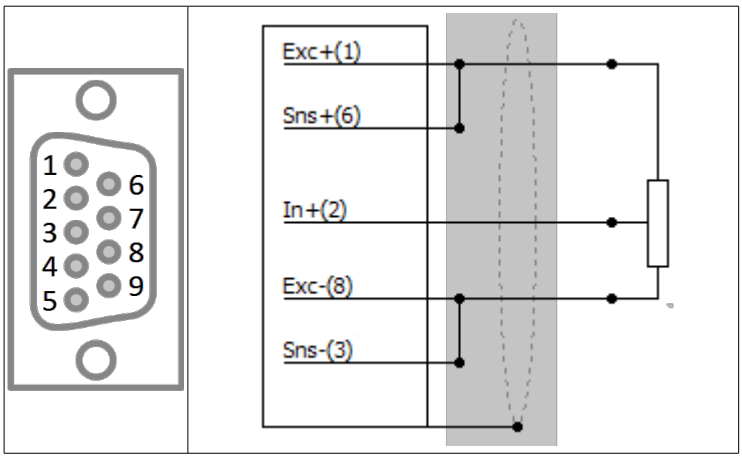
5.12.4.1 STGM DSUB-9: Voltage

	Voltage - Single Ended	**Voltage – Differential** Use only when the sensor is powered by the excitation voltage of the module.
		

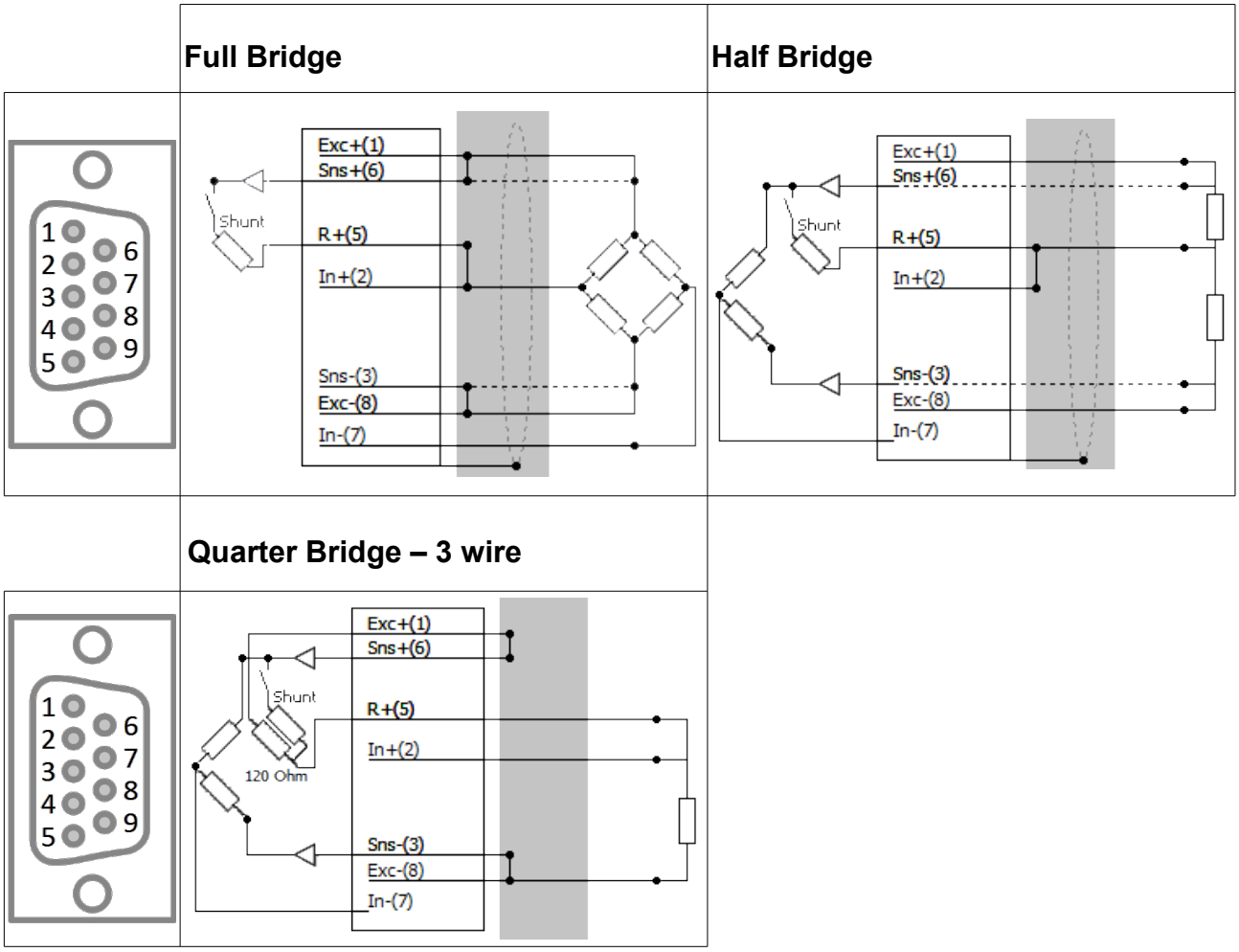
5.12.4.2 STGM DSUB-9: Current



5.12.4.3 STGM DSUB-9: Potentiometer



5.12.4.4 STGM DSUB-9: Bridge



5.12.5 STGM-L2B8f

Pin	Name	Description
1	Exc+	Excitation +
2	In-	Input -
3	In+	Input +
4	Exc-	Excitation -
5	SHD	Shield
6	Teds	Teds
7	GND	Ground
8	RES	Reserved

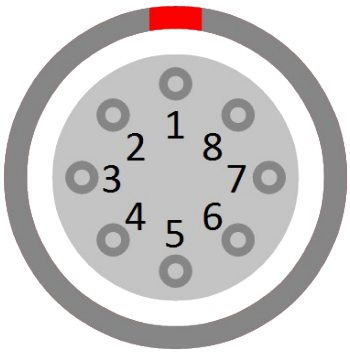
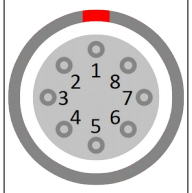
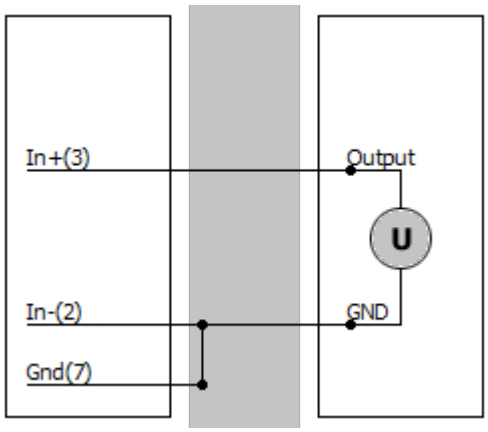
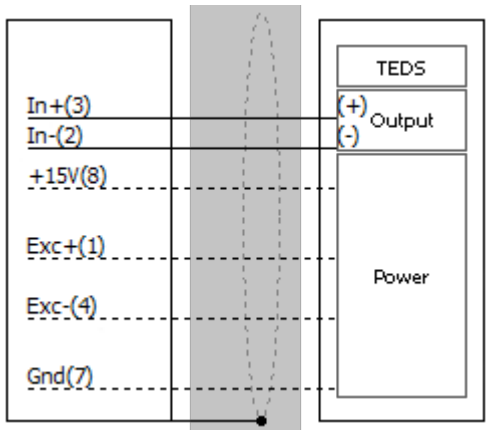
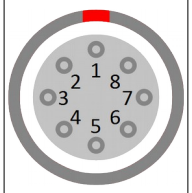
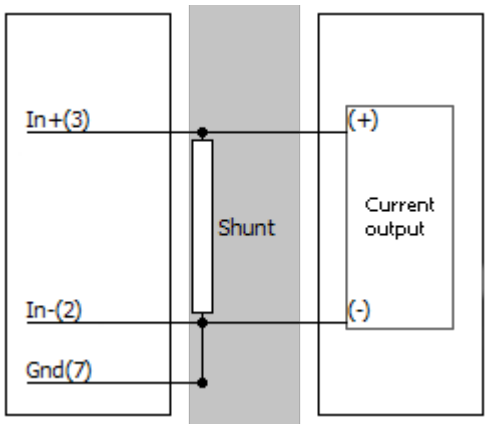
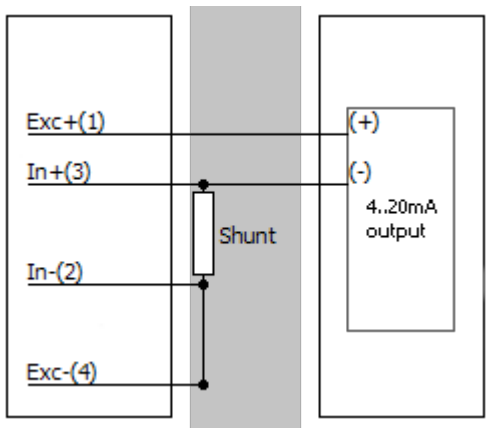


Illustration 127: SIRIUS-STG-M: pin-out Lemo 8-pin

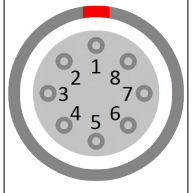
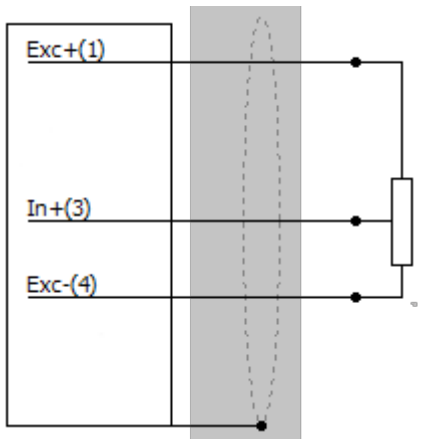
5.12.5.1 STGM-L2B8f: Voltage

	Voltage - Single Ended	Voltage – Differential Use only when the sensor is powered by the excitation voltage of the module.
		

5.12.5.2 STGM-L2B8f: Current

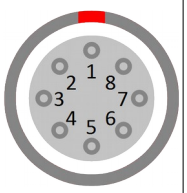
	External Direct Shunt	External Loop Powered Shunt
		

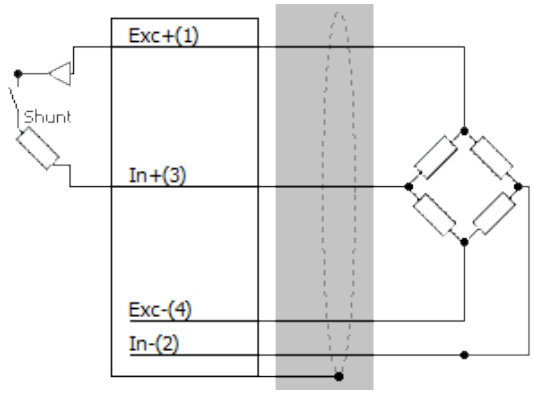
5.12.5.3 STGM-L2B8f: Potentiometer

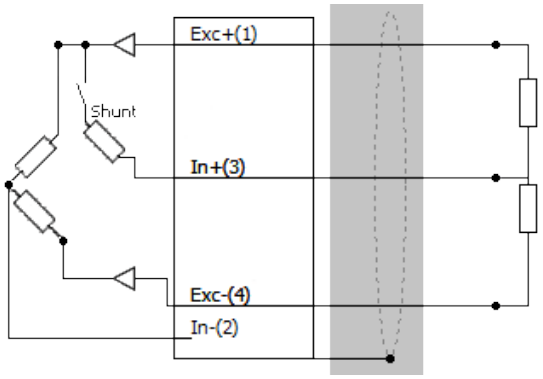
5.12.5.4 STGM-L2B8f: Bridge

Full Bridge

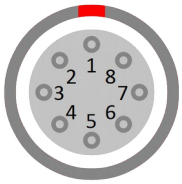


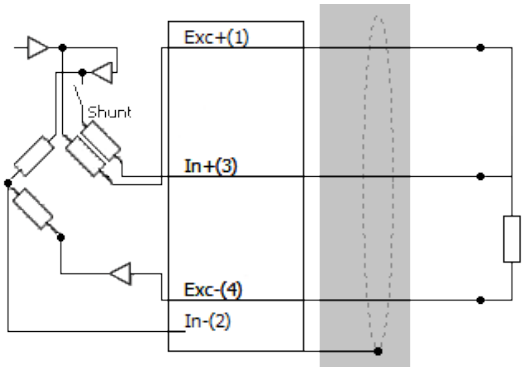


Half Bridge



Quarter Bridge – 3 wire





5.12.6 STGM-L2B16f

Pin	Name	Description
1	TEDS	TEDS
2	Exc+	Excitation +
3	Exc-	Excitation -
4	R+	¼ Bridge/Shunt
5	In+	Input +
6	nc	Not Connected
7	Sns+	Sense +
8	Sns-	Sense -
9	GND	Ground
10	In-	Input -
11	+5V	+5V (max. 100mA) supply
12	+14V5	+14.5V (max. 50mA) supply
13	IN0/A	Counter input IN0/A
14	IN1/B	Counter input IN1/B
15	IN2/Z	Counter input IN2/Z
16	-14V5	-14.5V (max. 50mA) supply

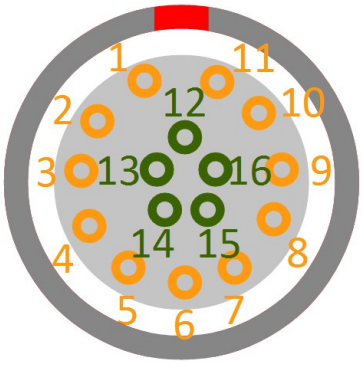
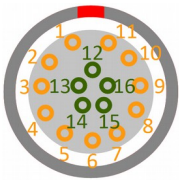
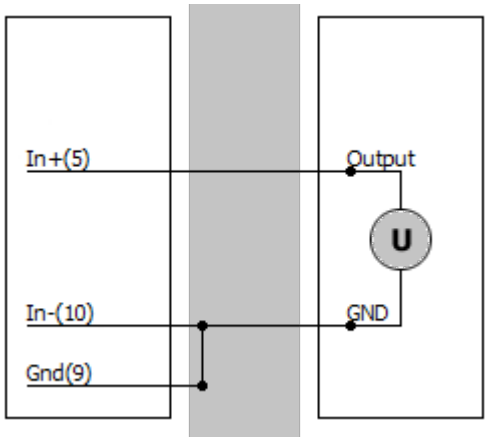
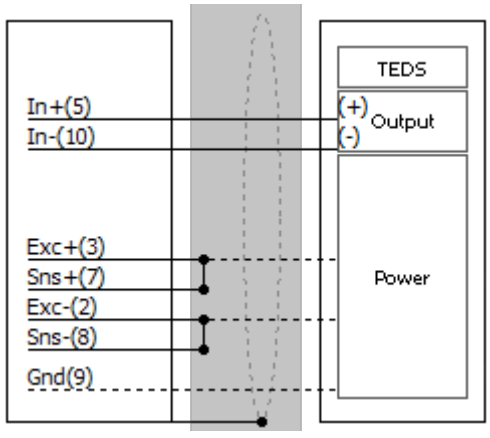


Illustration 128: SIRIUS-STGM-L2B16f pin-out

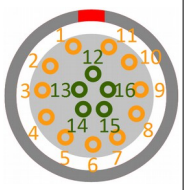
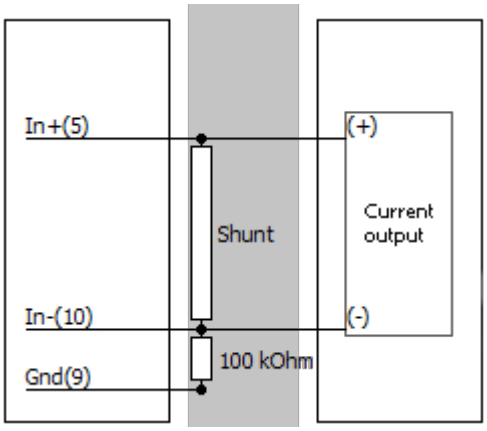
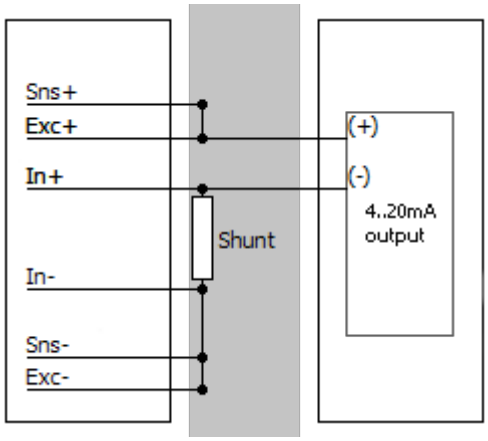
HINT

You can use the analogue input and counters at the same time.

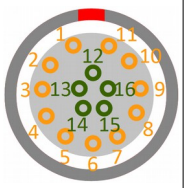
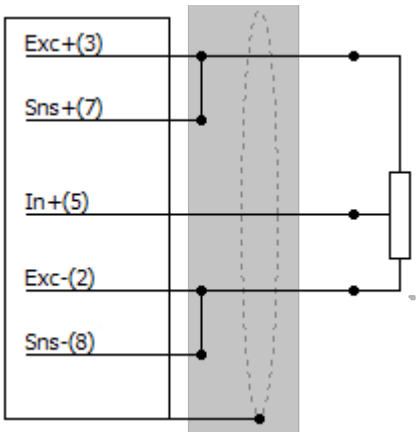
5.12.6.1 STGM-L2B16f: Voltage

	Voltage - Single Ended	Voltage – Differential Use only when the sensor is powered by the excitation voltage of the module.
		

5.12.6.2 STGM-L2B16f: Current

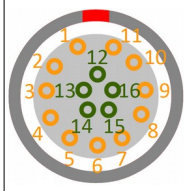
	External Direct Shunt	External Loop Powered Shunt
		

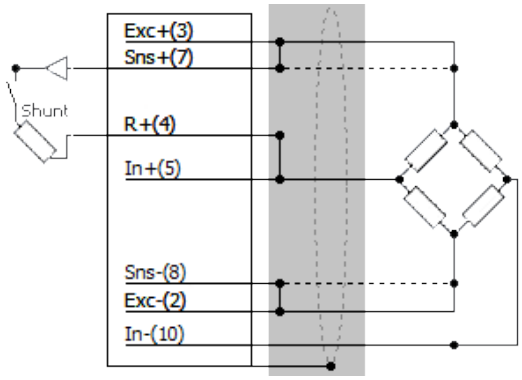
5.12.6.3 STGM-L2B16f: Potentiometer

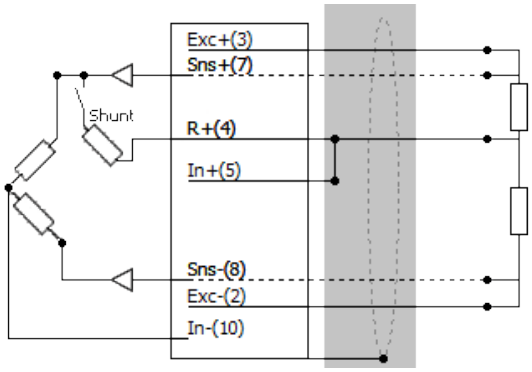
5.12.6.4 STGM-L2B16f: Bridge

Full Bridge

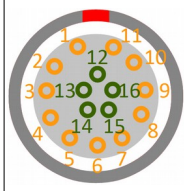


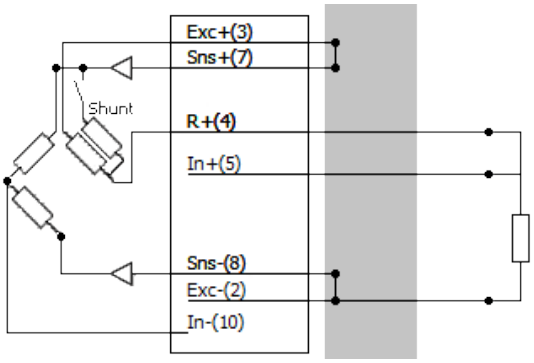


Half Bridge



Quarter Bridge – 3 wire





5.13 STG / STG+

5.13.1 STGv2: Specifications

Inputs	Voltage, full bridge strain, ½ bridge strain, ¼ bridge strain, potentiometer, RTD, Resistance			
ADC Type	24bit delta-sigma dual core with 100/5 kHz analogue anti-aliasing filter (5.2.1 Sirius Dual Core series: High Dynamic (up to 160 dB) page 49)			
Sampling Rate	Simultaneous 200kS/sec			
Dual Core Ranges (Low)	±50V (2.5 V)	±10V (500 mV)	±1V (50 mV)	±100mV (5 mV)
Gain Accuracy	±0.05% of reading			
Offset Accuracy (Dual Core)	±20(10)mV	±2(1)mV	±0.2(0.2)mV	±0.1(0.1)mV
Offset Accuracy after *Balance Amplifier*	±1mV	±0.1mV	±0.02mV	±0.01mV
Typ. Dynamic Range@10kS (Dual core)	137 dB (147 dB)	137 dB (152dB)	137 dB (147dB)	135dB (137 dB)
Typ. SNR@10kS (Dual Core)	108 dB (118 dB)	107 dB (125 dB)	107 dB (113 dB)	100 dB (100 dB)
Typ. CMR @ 50Hz/400Hz/1kHz	56 / 56 / 56 dB	88 / 86 / 84 dB	97 / 96 / 95 dB	115 / 112 / 102 dB
Gain Drift	Typical 10 ppm/K, max. 30 ppm/K			
Offset Drift	Typical 0.3 µV/K + 2 ppm of range/K, max 0.8µV/K + 10 ppm of range/K			
Gain Linearity	<0.02%			
Inter Channel Phase-mismatch	0.02° * f_{in} [kHz] + 0.1° (@ 200 kS/sec and 10V range)			
Channel Cross talk	120 dB @ 10kHz (Range ≤ 10V); 95 dB @ 10kHz (Range = 50V)			
Input Coupling[1]	DC, AC 1 Hz (3 Hz, 10 Hz per SW)			
Input Impedance	1 MΩ between IN+ and IN- for 50 V Range; all other Ranges > 1GΩ			
Input overvoltage protection	50 V Range: 300 V; all other Ranges: 50V (200 V peak for 10msec)			
Digital Filter (vs. Sample Rate)	1kS/s…50 kS/s	50kS/s…100kS/s	100kS/s…200kS/s	
Bandwidth (-3 dB)	0.494 fs	0.49 fs	0.38 fs	
Alias-free Bandwidth	DC to 0.42fs	DC to 0.32fs	DC to 0.22fs	
Alias Rejection	-95dB	-92dB	-97dB	
Delay through ADC	12/fs	9/fs	5/fs	
Oversampling	256	128	64	
Excitation Voltage	Free programmable (16 Bit DAC)			
Predefined levels	0, 1, 2.5, 5, 10, 15 and 20 V_{CD}			
Accuracy	±0.05 % ±2 mV			
Drift	±10 ppm/K ±100 µV/K			
Load stability: 0% to 100% load	< 0.01%			
Line regulation over 20 Ω of change	< 0.005% @ 120 Ω load			
Noise @ 10 Volt / 350 Ω	< 150 µVrms@10 kS			
Sense Impedance to Exc / to GND	100 kΩ / > 100 MΩ			
Current limit	100mA (max. 800mW)			
Protection	Continuous short to ground			
Excitation Current	Free programmable (16 Bit DAC)			
Predefined levels	0.1, 1, 2, 5, 10, 20 and 60 mA_{DC}			
Accuracy (> 10mA)	0.1% ±2µA [0.5% ±50 µA]			
Drift (> 10mA)	15 ppm/K [100 ppm/K]			
Compliance voltage	20 Volt, max. 500 mW			
Output Impedance	>1 MΩ			
Bridge connection types	full bridge, ½ bridge and ¼ bridge (3- or 4-wire)			
Ranges	2mV/V…1000mV/V free programmable with Dual Core			
Internal bridge completion	½ bridge and ¼ bridge 120Ω and 350Ω			
Bridge completion accuracy	0.05 %; TCR: 5 ppm/K (others on request)			
Internal Shunt resistor	59.88 kΩ and 175 kΩ, bipolar to Exc+ or Exc- (others on request)			
Short resistor accuracy	0.05 %; TCR: 10 ppm/K (others on request)			
Input short, Sensor offset adjust	Software selectable			

Table 20: SIRIUS-STG specifications I

1 In- must be within ±10V referred to GND(iso); for Ranges 100 V the DC value of In- is not rejected

Counters (only on STGv2+ type)	1counter / 3 digital input, fully synchronized and alarm outpu
Counter Modes	counting, waveform timing, encoder, tacho, gear-tooth sensor
Input Level Compatibility	CMOS, LVTTL
Input Protection	±25Volt continuous
Alarm output	Open collector, max. 100mA/30Volt
Sensor supply	5V/100mA; 12V/50mA
Additional Specifications	
Misc. function	Excitation level monitoring, self check function
Input Connector	DSUB-9, LEMO2B 7pin LEMO2B 10pin (others on request)
TEDS support	Standard + MSI adapters

Table 21: SIRIUS-STG specifications II

5.13.2 STG+ (Counter) L1B7f

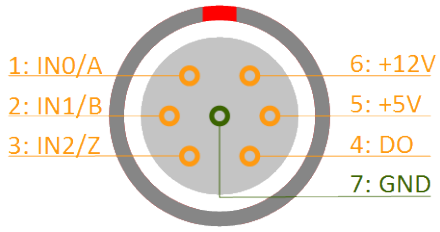


Illustration 129: CNT: counter pin-out (LEMO 7pin)

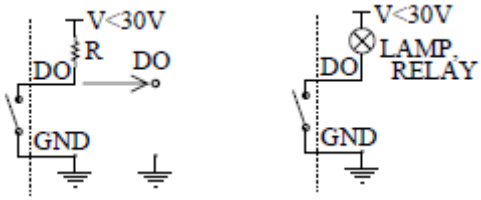
Illustration 130: SIRIUSi 8xSTG+

Connector type	L1B7f Connector on the module: *EGG.1B.307.CLL* Mating cable connector: *FGG.1B.307.CLAD52*

Table 22: STG+ counter connector type

Digital Output Configuration

The “switch” of the open collector output is closed when active.



5.13.3 STG-L2B7f

Illustration 131: STG8 with 7-pin Lemo connectors

Pin	Name	Description
1	Exc+	Excitation +
2	Sns+	Sense +
3	In+	Input +
4	Exc-	Excitation -
5	Sns-	Sense -
6	In-	Input -
7	R+	¼ Bridge/Shunt

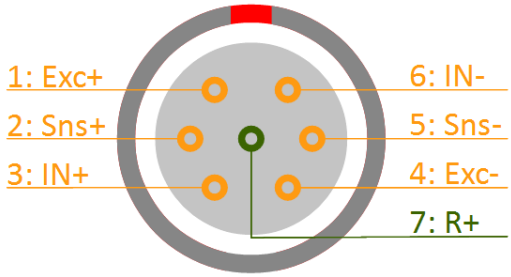
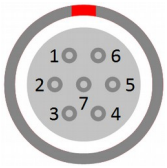
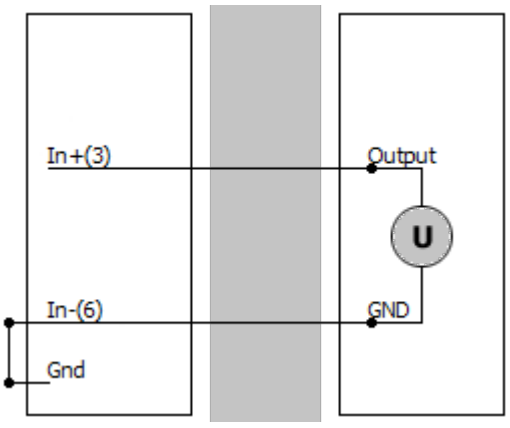
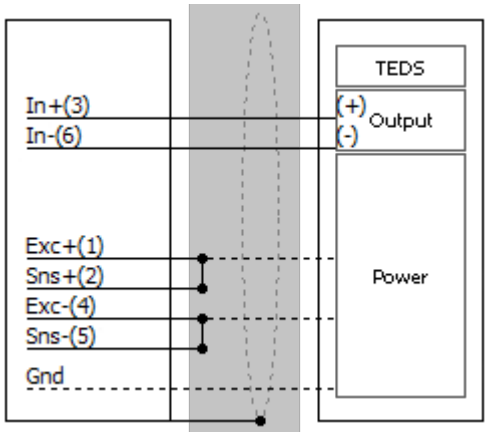
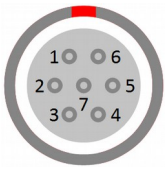
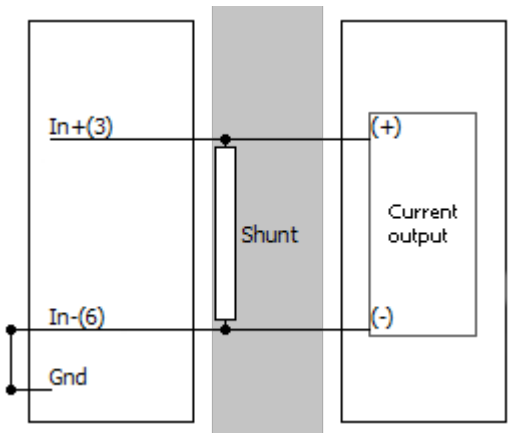
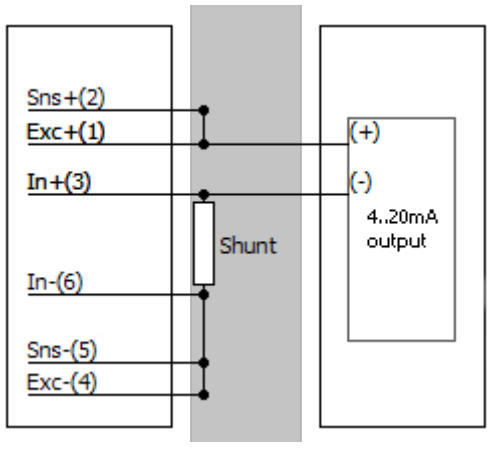


Illustration 132: SIRIUS-STG: pin-out Lemo 7-pin

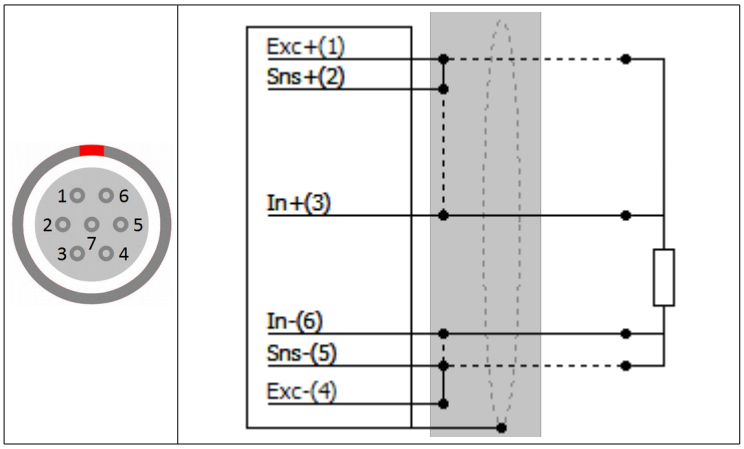
5.13.3.1 STG-L2B7f: Voltage

	Voltage - Single Ended	Voltage – Differential Use only when the sensor is powered by the excitation voltage of the module.
		

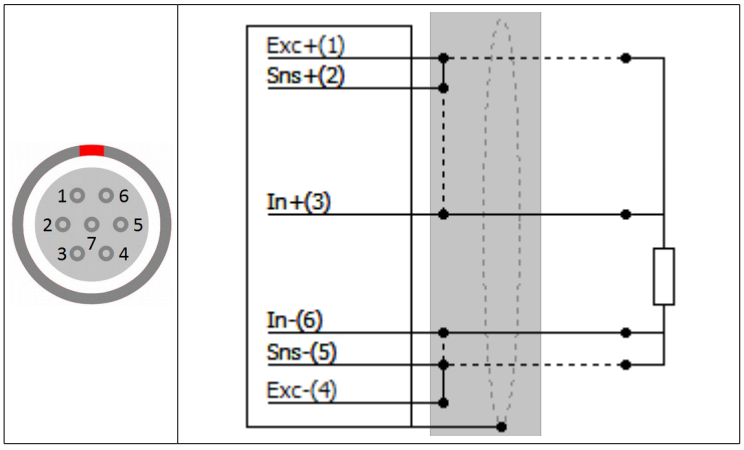
5.13.3.2 STG-L2B7f: Current

	External Direct Shunt	External Loop Powered Shunt
		

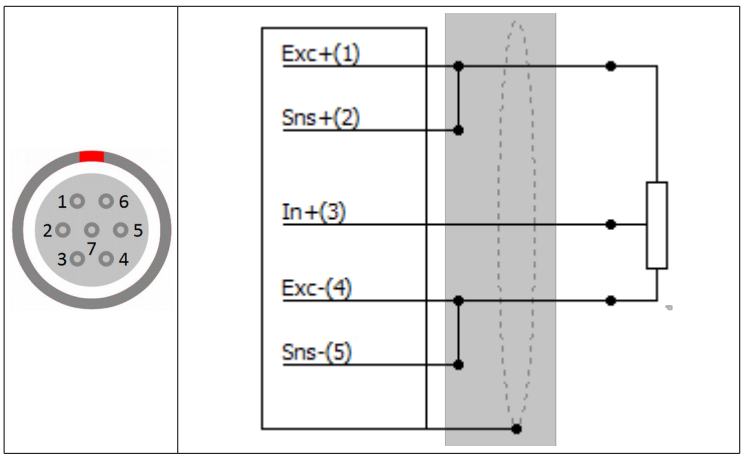
5.13.3.3 STG-L2B7f: Temperature



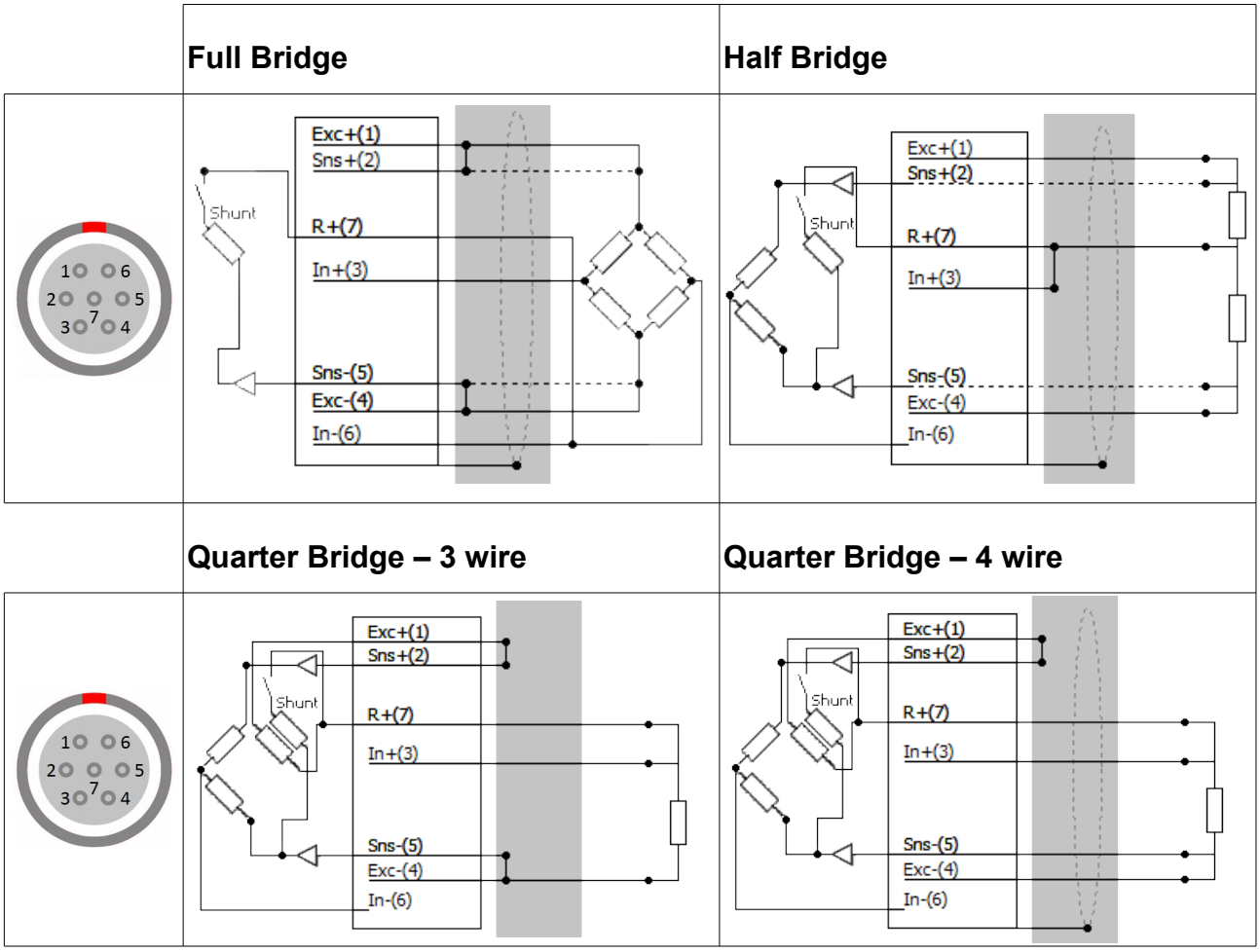
5.13.3.4 STG-L2B7f: Resistance



5.13.3.5 STG-L2B7f: Potentiometer



5.13.3.6 STG-L2B7f: Bridge



5.13.4 STG-L2B10f

Illustration 133: STG8 with 10-pin Lemo connectors

Pin	Name	Description
1	Exc+	Excitation +
2	Exc-	Excitation -
3	In+	Input +
4	In-	Input -
5	Sns+	Sense +
6	Sns-	Sense -
7	Di-Cnt	Digital I/O, Counter
8	TEDS	TEDs
9	R+/SHUNT	Resistance/SHUNT
10	GND	GND-iso

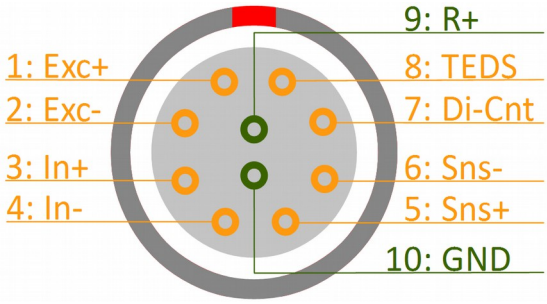
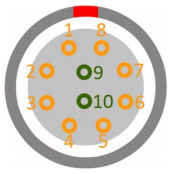
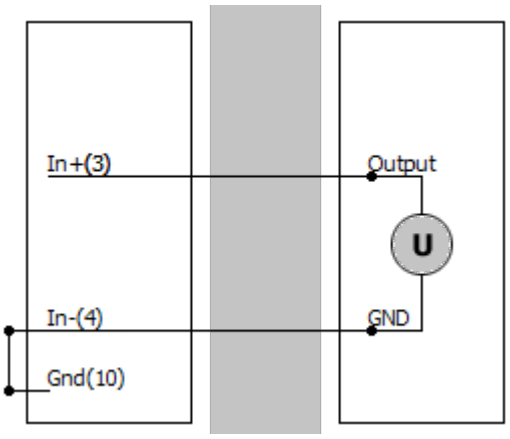
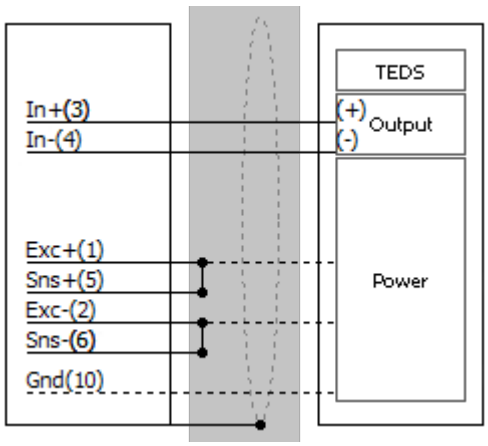
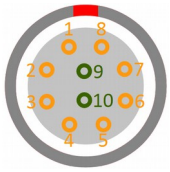
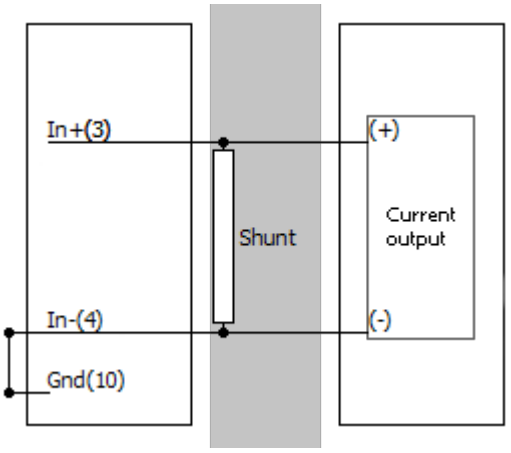
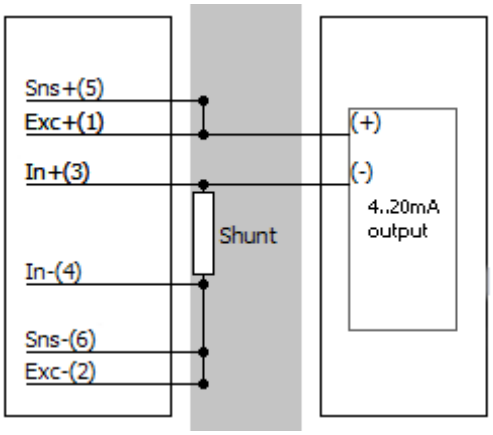


Illustration 134: SIRIUS-STG: pin-out Lemo 10-pin

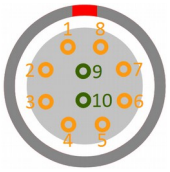
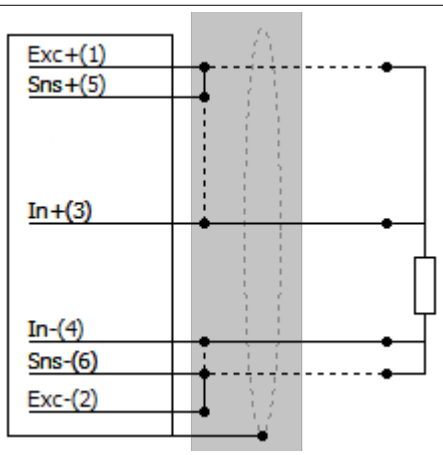
5.13.4.1 STG-L2B10f: Voltage

	Voltage - Single Ended	Voltage – Differential Use only when the sensor is powered by the excitation voltage of the module.
		

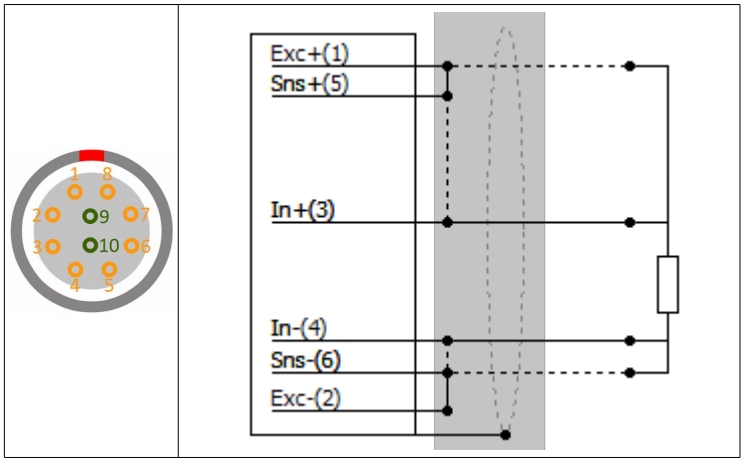
5.13.4.2 STG-L2B10f: Current

	External Direct Shunt	External Loop Powered Shunt
		

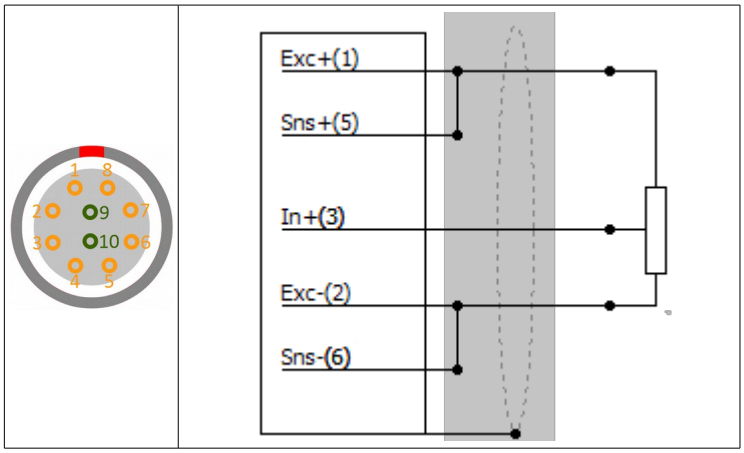
5.13.4.3 STG-L2B10f: Temperature

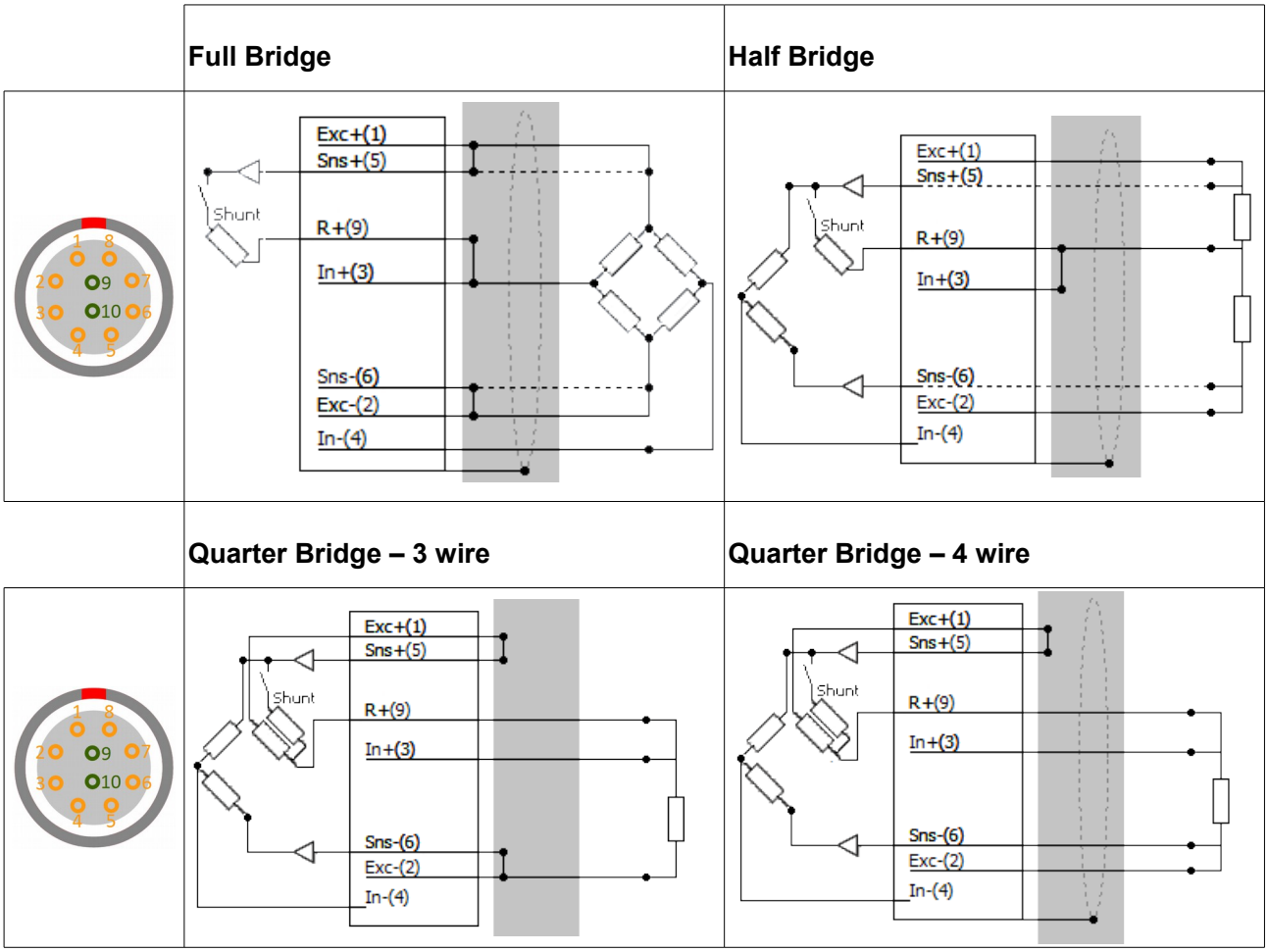
5.13.4.4 STG-L2B10f: Resistance



5.13.4.5 STG-L2B10f: Potentiometer



5.13.4.6 STG-L2B10f: Bridge



5.13.5 STG DSUB-9

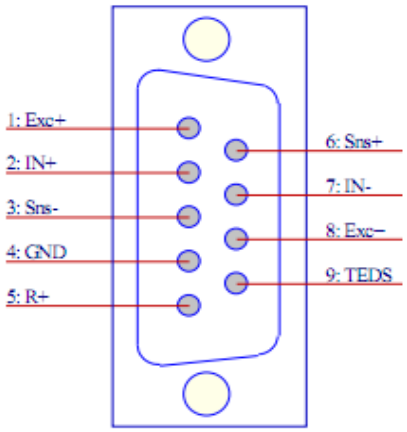
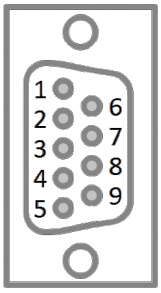
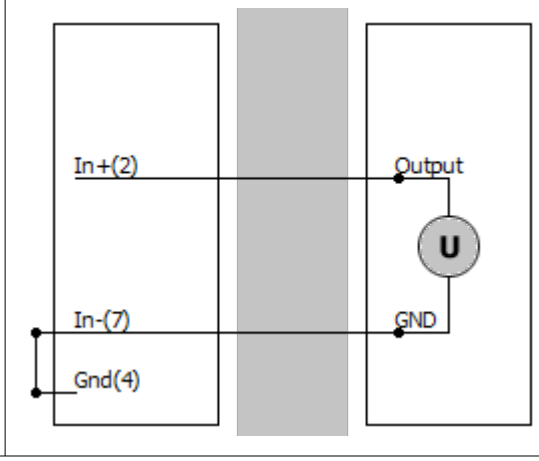
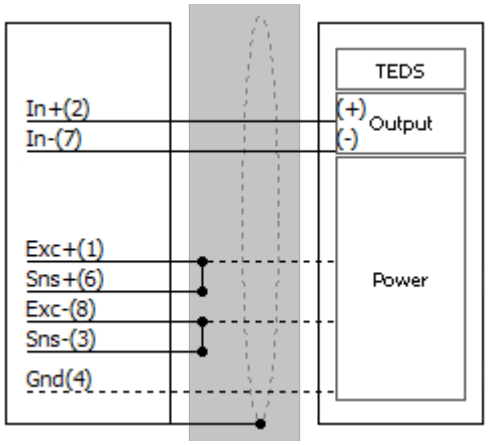


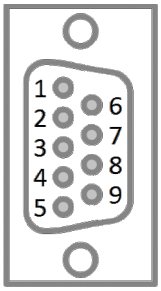
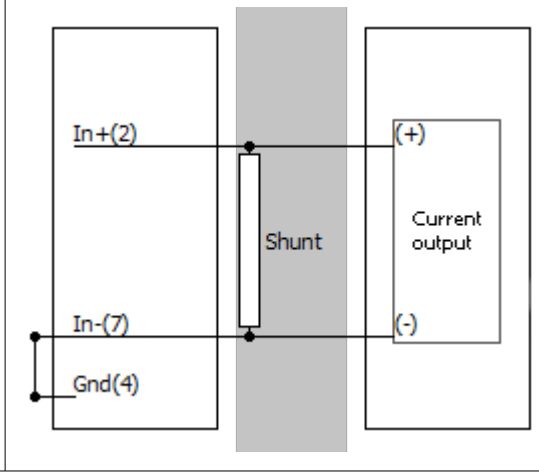
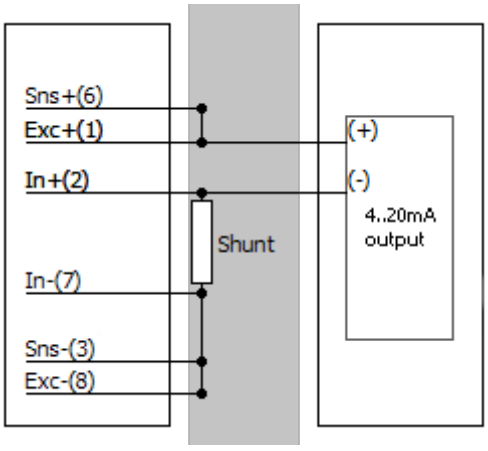
Illustration 135: SIRIUS-STG pin-out DSUB-9

Illustration 136: SIRIUS STG8 DSUB9

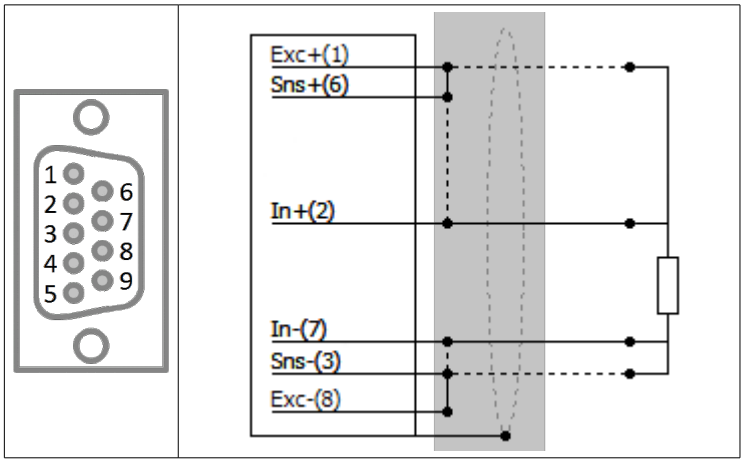
5.13.5.1 STG DSUB-9: Voltage

	Voltage - Single Ended	Voltage – Differential Use only when the sensor is powered by the excitation voltage of the module.
		

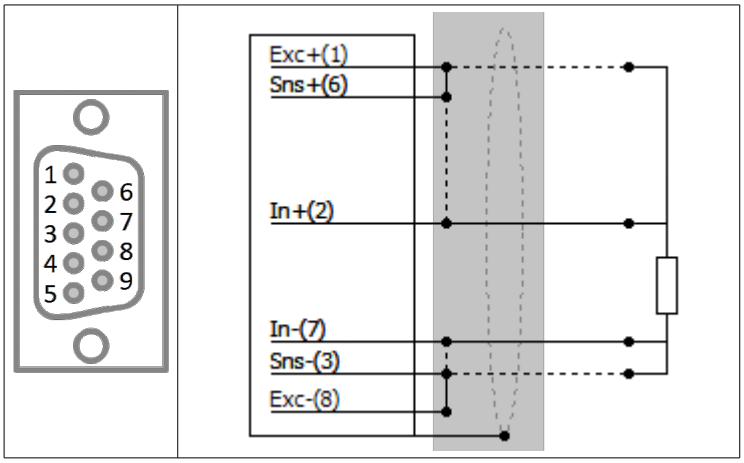
5.13.5.2 STG DSUB-9: Current

	External Direct Shunt	External Loop Powered Shunt
		

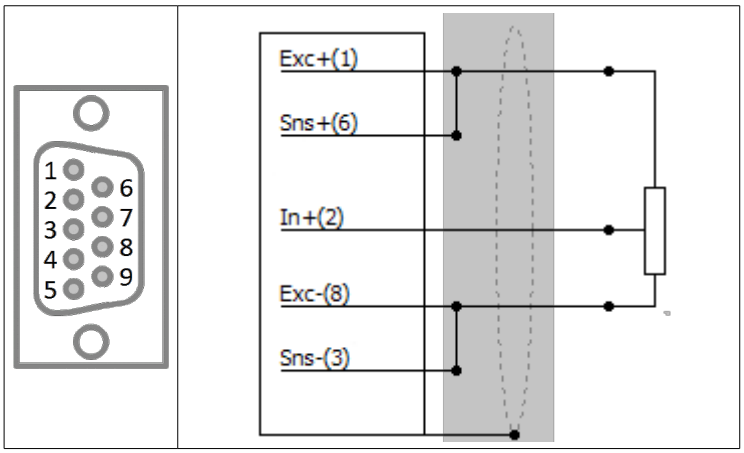
5.13.5.3 STG DSUB-9: Temperature



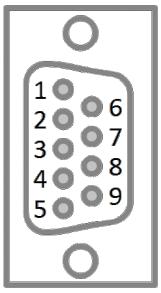
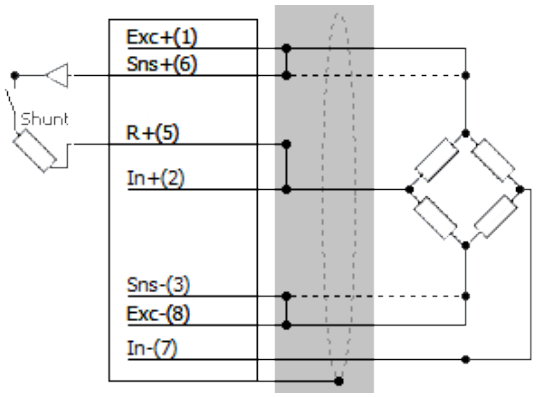
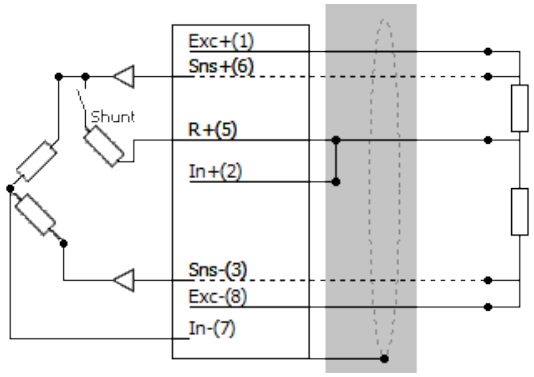
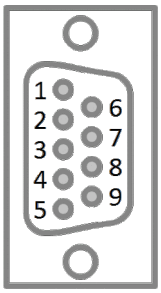
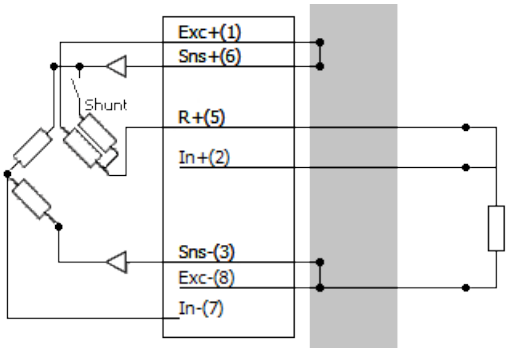
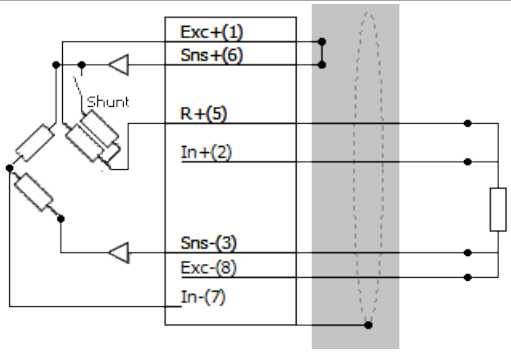
5.13.5.4 STG DSUB-9: Resistance



5.13.5.5 STG DSUB-9: Potentiometer



5.13.5.6 STG DSUB-9: Bridge

	Full Bridge	Half Bridge
		
	Quarter Bridge – 3 wire	**Quarter Bridge – 4 wire**
		

5.14 HD-ACC

5.14.1 HD-ACC Specifications

Inputs	Voltage, IEPE, current (ext. Shunt)			
ADC Type	24bit delta-sigma with 100 kHz/5 kHz anti-aliasing filter (5.2.1 Sirius Dual Core series: High Dynamic (up to 160 dB) page 49)			
Sampling Rate	Simultaneous 200kS/sec			
Ranges	±10 V	±5 V	±1 V	±200 mV
Gain accuracy	±0.05% of reading			
Offset accuracy	±2 mV	±1 mV	±0.2 mV	±0.1 mV
Typ. Dynamic Range@10kS	137 dB	137 dB	137 dB	131 dB
Typ. SNR@10kS	109 dB	109 dB	108 dB	102 dB
Typ. CMR @ 400 Hz (1kHz)	140 dB (120 dB)			
Gain Drift	Typical 10 PPM/K, max. 30 PPM/K			
Offset Drift	Typical 0.3 µV/K + 5 ppm of range/K, max 2 µV/K + 10 ppm of range/K			
Gain Linearity	<0.02%			
Inter Channel Phase-mismatch	0.02° * f_{in} [kHz] + 0.1° (@ 200 kS/sec and 10 V Range)			
Channel Cross talk	150 dB @ 50Hz; 140 dB @ 1kHz			
Input Coupling	DC, AC 0.1 Hz, 1 Hz (3 Hz, 10 Hz per SW)			
Input Impedance	1 MΩ (270 kΩ for AC coupling ≥ 1 Hz) in parallel with 100 pF			
Over-voltage Protection	In+ to In-: 50 V continuous; 200V peak (10msec) In- to GND (differential version): 3 Volt			
Digital Filter (vs. Sample Rate)	1kS/s…50 kS/s	50kS/s…100kS/s	100kS/s…200kS/s	
Bandwidth (-3 dB)	0.494 fs	0.49 fs	0.38 fs	
Alias-free Bandwidth	DC to 0.42fs	DC to 0.32fs	DC to 0.22fs	
Alias Rejection	-95dB	-92dB	-97dB	
Delay through ADC	12/fs	9/fs	5/fs	
Oversampling	256	128	64	
IEPE mode				
Excitation	4, 8 or 12 mA			
Compliance voltage	22 Volt			
Output Impedance	> 100 kΩ			
Sensor detection	Shortcut: < 4 Volt; Open: > 10 Volt			
Additional Specifications				
Input connector	BNC			
TEDS support	IEPE mode only			

Table 23: SIRIUS-HD-ACC specifications

5.14.2 HD-ACC BNC

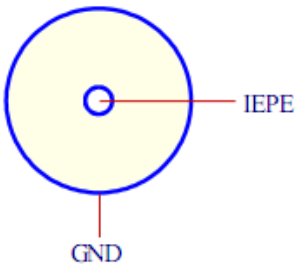


Illustration 137: SIRIUS-HD-ACC: pin-out (BNC)

Illustration 138: SIRIUSi 16xHD-ACC

5.14.3 HD-ACC: Voltage

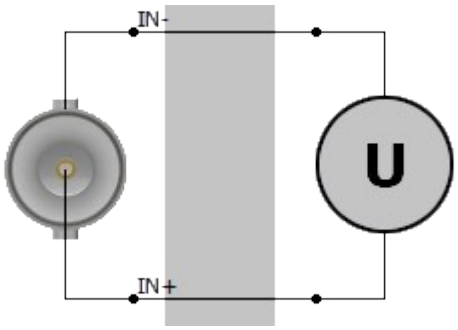


Illustration 139: HD-ACC Voltage

5.14.4 HD-ACC: IEPE

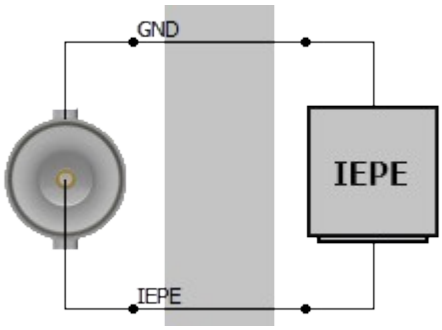


Illustration 140: HD-ACC IEPE

5.15 HD-LV

5.15.1 HD-LV: Specifications

Inputs	Voltage, full bridge strain, current (ext. Shunt)			
ADC Type	24bit delta-sigma with 100kHz/5kHz anti-aliasing filter (5.2.2 Sirius-HD-series: High density (16 channel per slice) page 49)			
Sampling Rate	Simultaneous 200kS/sec			
Ranges	±100V	±10V	±1	±100mV
Gain accuracy	±0.05% of reading			
Offset accuracy	± 20 mV	± 2 mV	± 0.2 mV	± 0.1 mV
Dynamic Range@10kS	134 dB	137 dB	137 dB	125 dB
Typ. SNR@10kS	104 dB	104 dB	104 dB	95 dB
Typ. CMR @ 400Hz (1kHz)	74 dB (70 dB)	86 dB (84 dB)	96 dB (95 dB)	112 dB (102 dB)
Gain Drift	Typical 10 PPM/K, max. 40 PPM/K			
Offset Drift	Typical 0.3 µV/K + 5 ppm of range/K, max 2 µV/K + 10 ppm of range/K			
Gain Linearity	<0.02%			
Inter Channel Phase-mismatch	0.02° * f_{in} [kHz] + 0.1° (@ 200 kS/sec and 10 V Range)			
Channel Cross talk	120 dB @ 10kHz (Range ≤ 10V); 76dB @ 1kHz (Range = 100V)			
Input Coupling	DC			
Input Impedance	1 MΩ for 100V Range; all other Ranges10 MΩ			
Overvoltage Protection	In+ to In-: 100V Range: 200V; all other Ranges: 50V (200V for 10msec)			
Digital Filter (vs. Sample Rate)	1kS/s…50 kS/s	50kS/s…100kS/s	100kS/s…200kS/s	
Bandwidth (-3 dB)	0.494 fs	0.49 fs	0.38 fs	
Alias-free Bandwidth	DC to 0.42fs	DC to 0.32fs	DC to 0.22fs	
Alias Rejection	-95dB	-92dB	-97dB	
Delay through ADC	12/fs	9/fs	5/fs	
Oversampling	256	128	64	
Excitation Voltage	Unipolar or Bipolar Software selectable (programmable with 16 Bit)			
Excitation Level unipolar	0 .. 24 Volt; Predefined levels: 1, 2.5, 5, 10, 12, 15, 20 and 24 V_{DC}			
Exication Level bipolar	2 .. 30 Volt; Predefined levels: 2.5, 5, 10, 12, 15, 24 and 30 V_{DC}			
Accuracy	±0.1 % ±5 mV			
Drift	±50 ppm/K ±100 µV/K			
Stability 10% to 90% load	<0.01%			
Current limit	100mA (1 Watt max. per Channel, 12 Watt max. per Slice)			
Protection	Continuous short to ground			
Bridge Connection Types	Full bridge			
Ranges @ 10V_{Exc}	2mV/V…1000mV/V free programmable			
Sensor Offset Adjust	Software selectable			
Additional Specifications				
Input connector	DSUB-9, BNC (others on request)			
TEDS support	Standard + MSI adapters			

Table 24: Sirius HD-LV Specifications

5.15.2 HD-LV DSUB-9

Illustration 141: SIRIUS HD-LV DSUB-9

Pin	Name	Description
1	Exc+	Excitation +
2	In+	Input +
3	Sns-	Sense -
4	GND	Ground
5	n.c.	Not connected
6	Sns+	Sense +
7	In-	Input -
8	Exc-	Excitation -
9	TEDS	TEDS

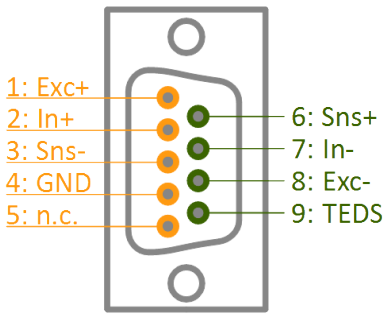
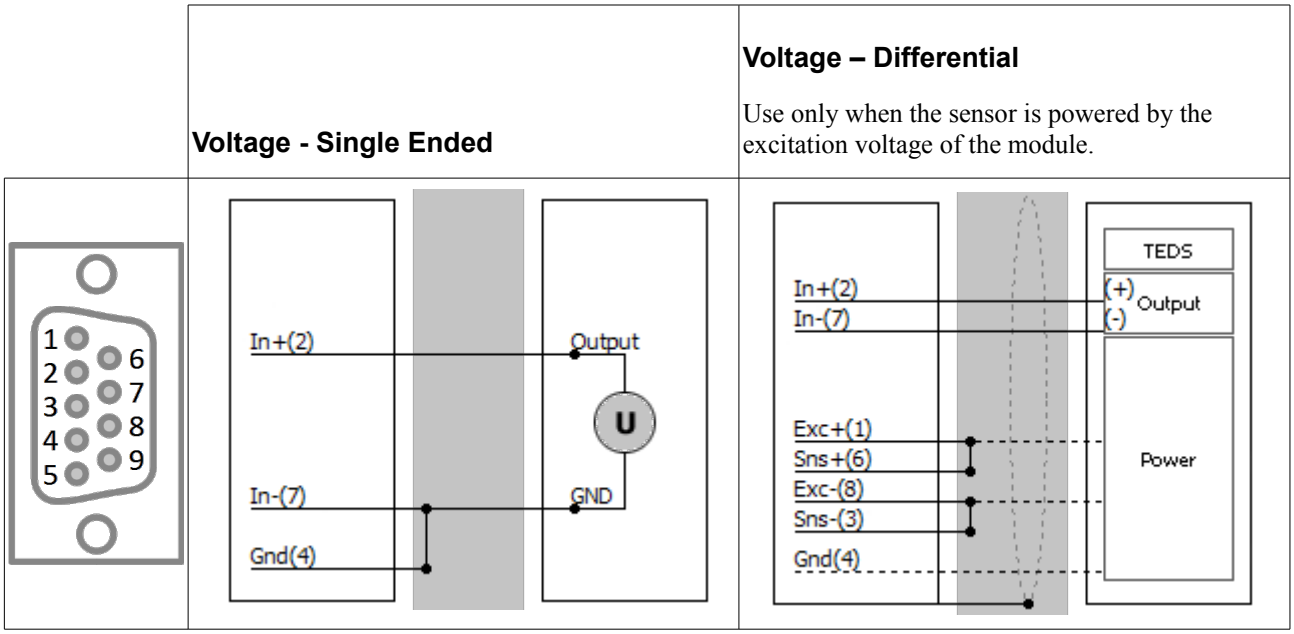
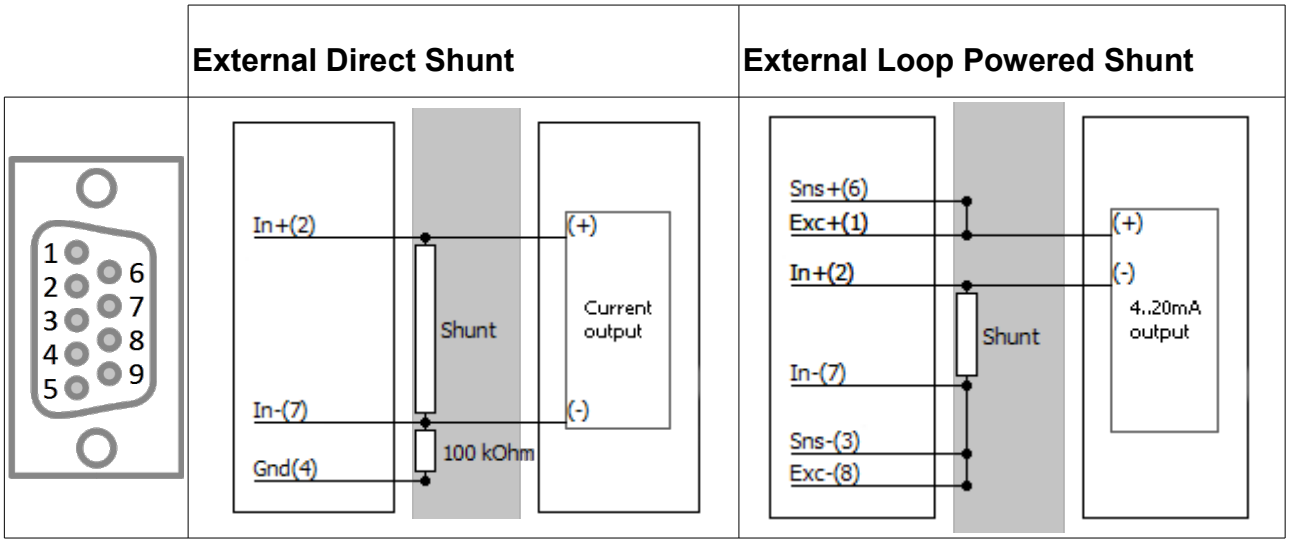


Illustration 142: 5.12.2 HD-LV pin-out DSUB-9

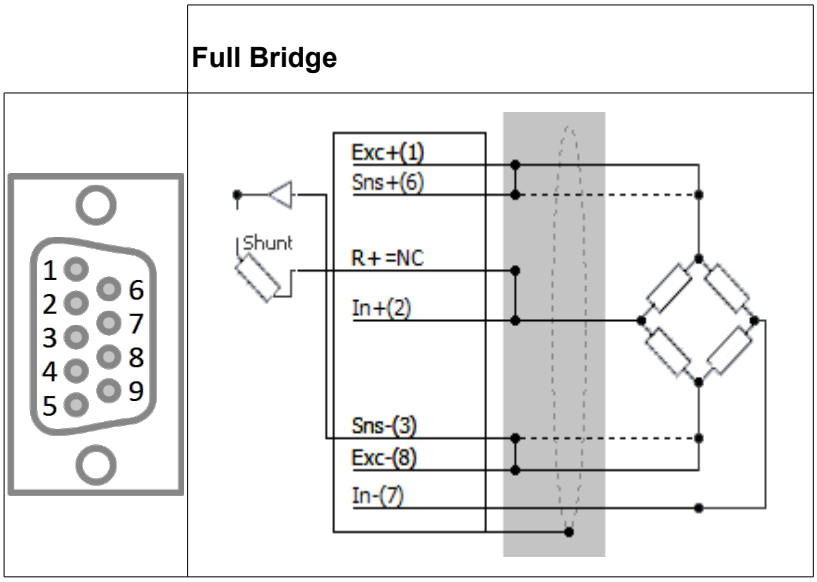
5.15.2.1 HD-LV: Voltage



5.15.2.2 HD-LV: Current



5.15.2.3 HD-LV: Bridge



5.15.3 HD-LV BNC

Illustration 143: SIRIUS HD-LV BNC

5.15.4 HD-LV BNC: Voltage

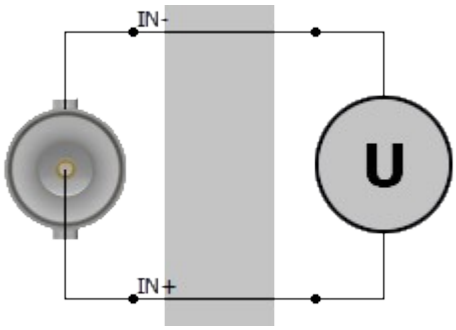


Illustration 144: HD-LV BNC Voltage

5.16 HD-STGS

5.16.1 HD-STGS: Specifications

Inputs	Voltage, full bridge strain, half bridge strain, quarter bridge strain (120Ω and 350Ω), current (ext. Shunt)			
ADC Type	24bit delta-sigma with 100kHz/5kHz anti-aliasing filter (5.2.2 Sirius-HD-series: High density (16 channel per slice) page 49)			
Sampling Rate	Simultaneous 200kS/sec			
Dual Core Ranges (Low Range)	±10V	±1V	±100mV	±10mV
Gain Accuracy	±0.05% of reading			
Offset Accuracy	±2mV	±0.2mV	±0.1mV	±0.1mV
Offset Accuracy after *Balance Amplifier*	±0.2mV	±0.02mV	±0.01mV	±0.01mV
Dynamic Range@10kS	137 dB	137 dB	125 dB	105 dB
Typ. SNR@10kS	105 dB	104 dB	95 dB	75 dB
Typ. CMR @ 400Hz (1 kHz)	86 dB (84 dB)	96 dB (95 dB)	112 dB (102 dB)	112 dB (102 dB)
Gain Drift	Typical 10 PPM/K, max. 40 PPM/K			
Offset Drift	Typical 0.3 µV/K + 5 ppm of range/K, max 2 µV/K + 10 ppm of range/K			
Gain Linearity	<0.02%			
Inter Channel Phase-mismatch	0.02° * f_{in} [kHz] + 0.1° (@ 200 kS/sec)			
Channel Cross talk	120 dB @ 10kHz			
Input Coupling	DC			
Input Impedance	10 MΩ			
Overvoltage Protection	In + to In-: 50 V continuous; 200V peak (10msec)			
Digital Filter (vs. Sample Rate)	1kS/s…50 kS/s	50kS/s…100kS/s	100kS/s…200kS/s	
Bandwidth (-3 dB)	0.494 fs	0.49 fs	0.38 fs	
Alias-free Bandwidth	DC to 0.42fs	DC to 0.32fs	DC to 0.22fs	
Alias Rejection	-95dB	-92dB	-97dB	
Delay through ADC	12/fs	9/fs	5/fs	
Oversampling	256	128	64	
Excitation Voltage	Free programmable (16 Bit DAC)			
Predefined levels	0, 1, 2.5, 5, 10 and 12 V_{DC}			
Accuracy	±0.05 % ±2 mV			
Drift	±50 ppm/K ±100 µV/K			
Stability 10% to 90% load	<0.01%			
Current limit	45mA (200mW max. Power)			
Protection	Continuous short to ground			
Bridge Connection Types	Full bridge, ½ bridge, ¼ bridge (3-wire)			
Ranges	2mV/V…1000mV/V free programmable			
Internal Bridge Completion	½ bridge and ¼ bridge 120Ω and 350Ω			
Bridge Completion Accuracy	0.05 %; TCR: 5 ppm/K (others on request)			
Internal Shunt Resistor	100 kΩ (others on request)			
Typ. Shunt Resistor Accuracy	0.05 %; TCR: 10 ppm/K (others on request)			
Input Short, Sensor Offset Adjust	Software selectable			
Additional Specifications				
Input connector	DSUB-9			
TEDS support	Standard + MSI adapters			

Table 25: 5.12.1 HD-STGS: Specifications

5.16.2 HD-STGS

Illustration 145: HD-STGS with 16 DSUB-9 connectors

Pin	Name	Description
1	Exc+	Excitation +
2	In+	Input +
3	Sns-	Sense -
4	GND	Ground
5	R+	¼ Bridge/Shunt
6	Sns+	Sense +
7	In-	Input -
8	Exc-	Excitation -
9	TEDS	TEDS

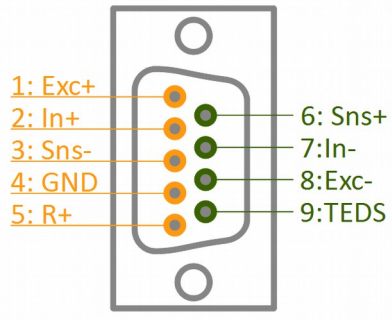
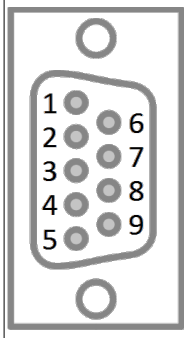
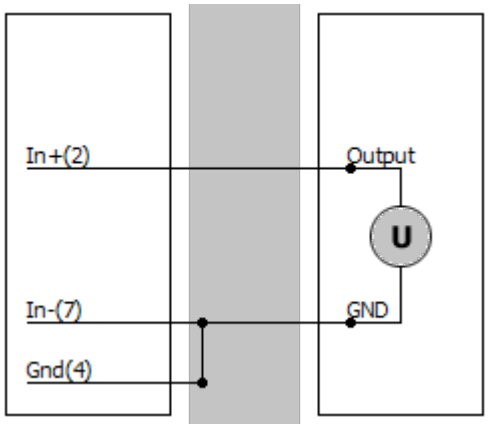
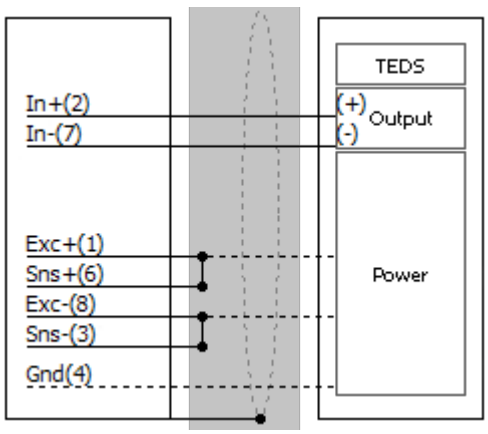
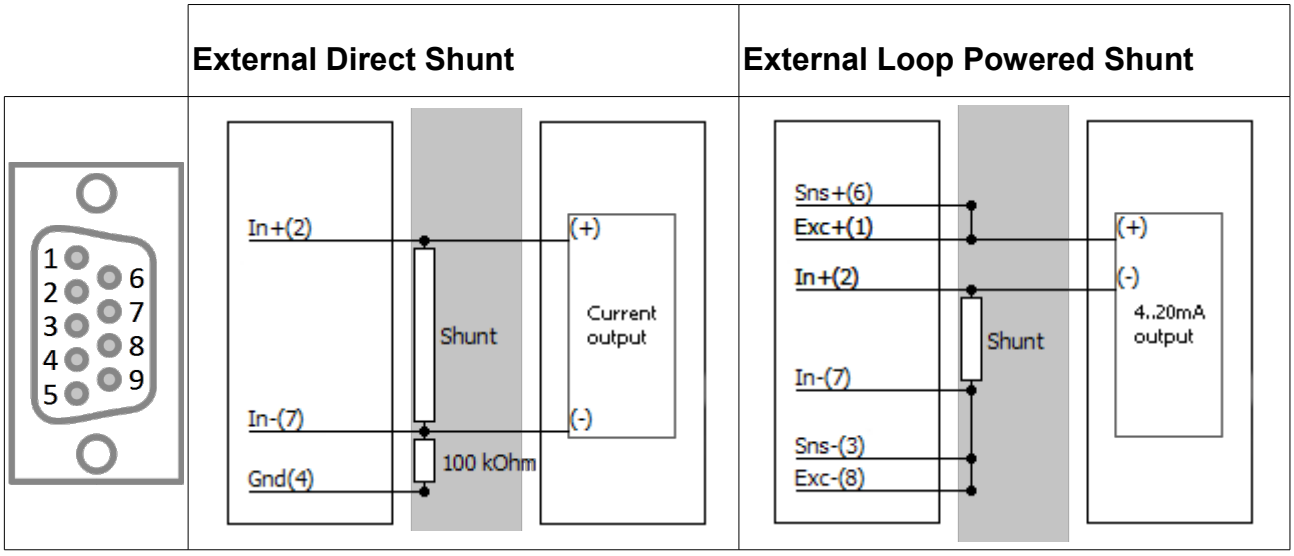


Illustration 146: SIRIUS-HD-STGS pin-out

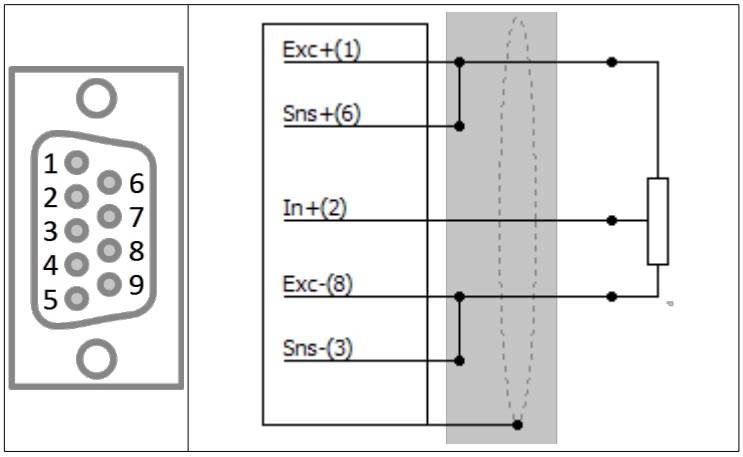
5.16.2.1 HD-STGS: Voltage

	Voltage - Single Ended	**Voltage – Differential** Use only when the sensor is powered by the excitation voltage of the module.
		

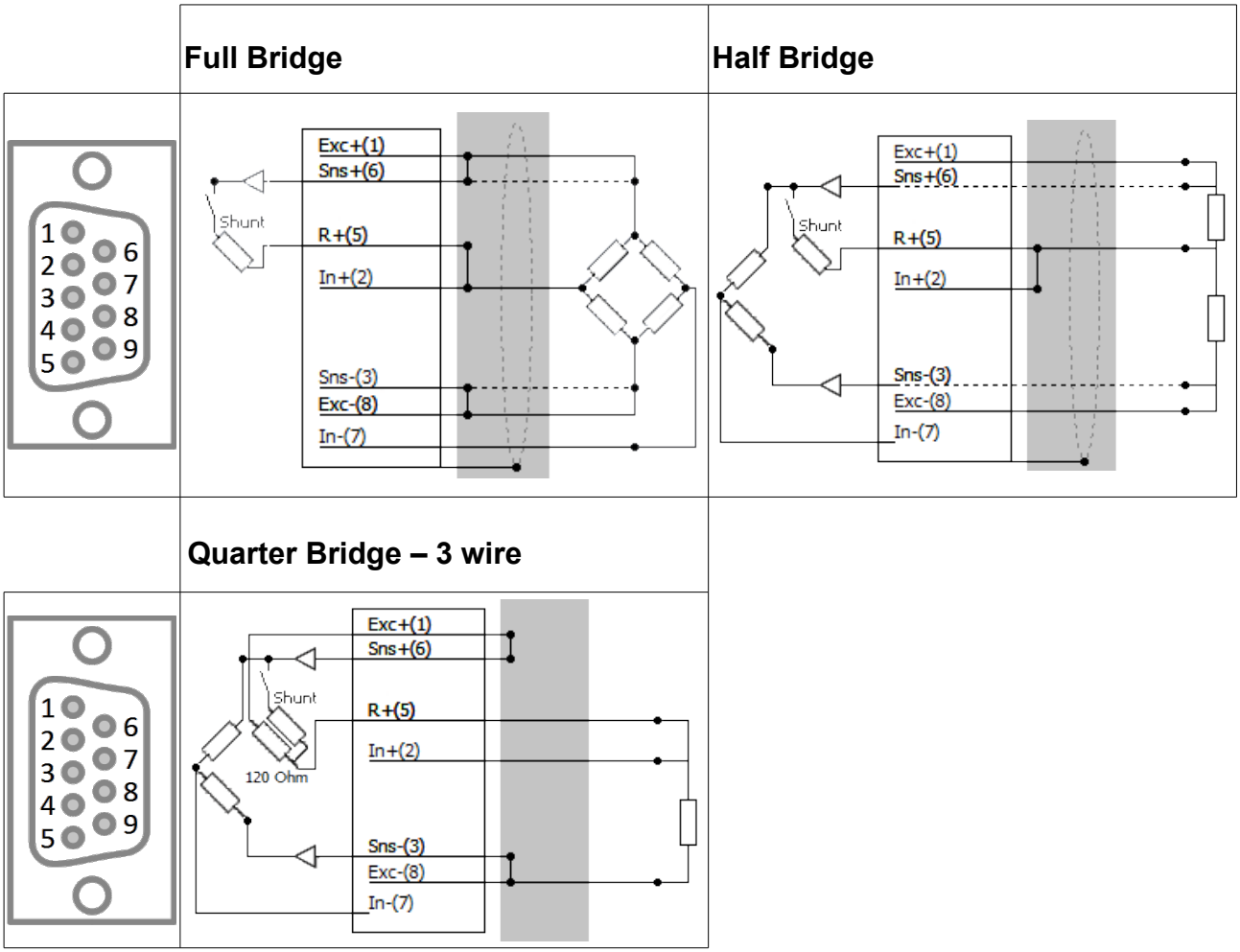
5.16.2.2 HD-STGS: Current



5.16.2.3 HD-STGS: Potentiometer



5.16.2.4 HD-STGS: Bridge



5.16.3 HD-STGS-L1B10f

Illustration 147: HD-STGS-L1B10f

Pin	Name	Description
1	In-	Input -
2	Sns+	Sense +
3	R+	¼ Bridge/Shunt
4	In+	Input +
5	Exc+	Excitation +
6	GND	Measurement GND
7	Exc-	Excitation -
8	Sns-	Sense -
9	Shield	connection to chassis
10	TEDS	TEDS

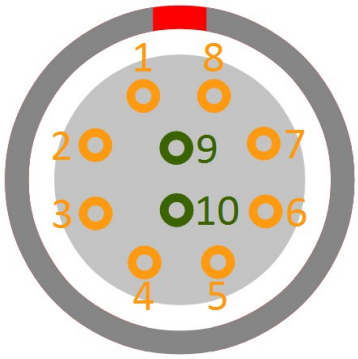


Illustration 148: SIRIUS-HD-STGS: pin-out Lemo 10-pin

5.17 HS-ACC / HS-ACC+

5.17.1 HS-ACC: Specifications

Inputs	Voltage, IEPE, current (ext. Shunt), ACC+ only: counter, discrete			
ADC Type	16bit SAR with 100kHz 5th order analog AAF filter or bypass (5.2.3 Sirius-HS series: High speed and bandwidth page 49)			
Analogue bandwidth	500 kHz			
Sampling Rate	Simultaneous 1 MS/sec			
Voltage ranges	±10 Volt	±5 Volt	±1 Volt	±0.2 Volt
Input Accuracy	±0.05% of reading			
Offset Accuracy	±2mV	±1mV	±0.2mV	±0.1mV
Typ. SNR @ 100kHz	89 dB	89 dB	86 dB	83 dB
Typ. CMR @ 50Hz/400Hz/1kHz	120 / 96 / 88 dB	126 / 100 / 92 dB	140 / 110 / 102 dB	140 / 118 / 110 dB
Gain Drift	Typical 10 ppm/K, max. 30 ppm/K			
Offset Drift	Typical 0.5 µV/K + 10 ppm of range/K, max 3 µV/K + 20 ppm of range/K			
Gain Linearity	<0.02%			
Inter Channel Phase-mismatch	0.02° * f_{in} [kHz] + 0.1°			
Channel Cross talk	120 dB @ 1kHz; 100 dB @ 10kHz			
Input Coupling	DC or AC (1Hz)			
Input Impedance	1 MΩ			
Overvoltage Protection	50 V continuous; 200V peak (10msec)			
Digital low pass filter				
Filter Characteristic	Butterworth or Bessel			
Filter Order	2nd , 4th, 6th or 8th			
Ratio Sample rate to Filter Freq.	From 2 to 100			
Topology	Cascaded IIR Filter (up to 4 sections)			
IEPE mode				
Excitation	4 or 8mA			
Compliance voltage	25 Volt			
Output Impedance	>100 kΩ			
Sensor detection	Shortut: <4Volt; Open: > 19Volt			
Counters (ACC+ type only)	1 counter/3 digital input, fully synchronized with analogue data			
Counter Modes	counting, waveform timing, encoder, tacho, gear-tooth sensor			
Input Level Compatibility	CMOS, LVTTL			
Input Protection	±25Volt continuous			
Alarm output	Open collector, max. 100mA/24Volt			
Additional Specifications				
Input connector	BNC			
TEDS support	IEPE mode only			

Table 26: 5.13.1 HS-ACC specifications

5.17.2 HS-ACC BNC

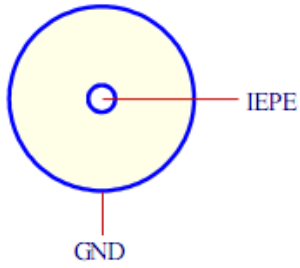


Illustration 149: SIRIUS-HS-ACC: pin-out (BNC)

Illustration 150: SIRIUS-HS-ACC8-BNC

5.17.3 HS-ACC+ (Counter) L1B7f

The HS-ACC+ modules are perfect for high speed sound and vibration IEPE channels plus counter applications. In addition to the HS-ACC module, it also has a 7-pin Lemo connector for digital counters.

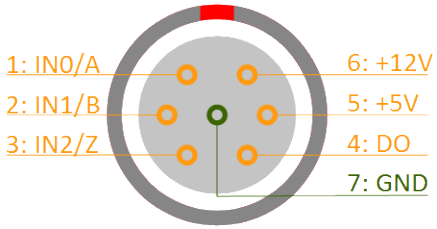


Illustration 151: HS-ACC+: counter pin-out (LEMO 7pin)

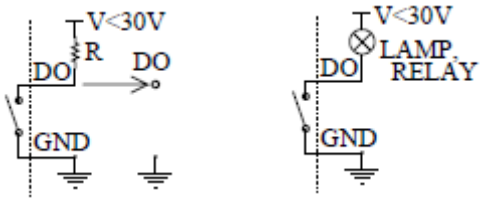
Illustration 152: SIRIUS-HS-ACC8+

Connector type	L1B7f Connector on the module: *EGG.1B.307.CLL* Mating cable connector: *FGG.1B.307.CLAD52*

Table 27: HS-ACC+ Counter Specifications (per module)

Digital Output Configuration

The “switch” of the open collector output is closed when active.



5.17.4 HS-ACC: Voltage

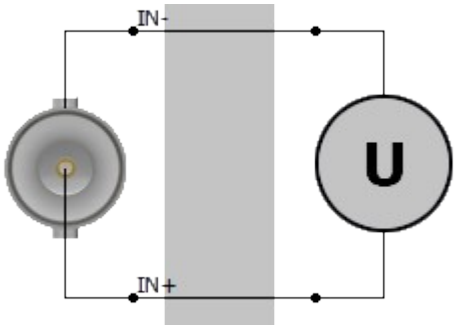


Illustration 153: HS-ACC Voltage

5.17.5 HS-ACC: IEPE

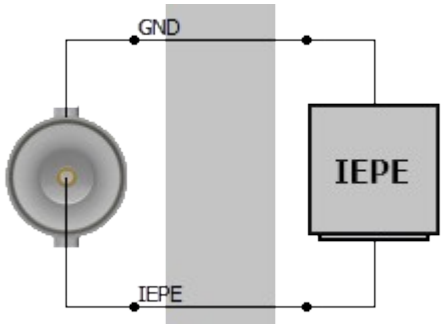


Illustration 154: HS-ACC IEPE

5.18 HS-CHG / HS-CHG+

5.18.1 HS-CHG: Specifications

Inputs	Voltage, IEPE, Charge, Current (ext. Shunt)				
ADC Type	16bit SAR with 100kHz 5th order analogue AAF filter or 500KHz bandwidth (5.2.3 Sirius-HS series: High speed and bandwidth page 49)				
Analogue bandwidth	500 kHz (200 kHz for Charge)				
Sampling Rate	Simultaneous 1 MS/sec				
Voltage ranges	7 ranges: ±10, ±5, ±2, ±1, ±0.5, ±0.2, ±0.1 Volt				
Input Accuracy	**Signal frequency**	**Accuracy**			
	DC	±0.05% of reading ±0.02% of range ±50µV			
	up to 10kHz	±0.1% of reading ±0.05% of range			
	up to 100kHz	±2% of reading ±0.1% of range			
Typ. SNR	**Bandwidth/Range →**	**10 V**	**5 V**	**1 V**	**0.1 V**
	1 Mhz	88 dB	87 dB	85 dB	68 dB
	100 kHz	89 dB	89 dB	88 dB	83 dB
	10 kHz	> 100 dB	> 100 dB	> 100 dB	92 dB
Typ. CMR @ 50Hz/1kHz		>140/120dB	>140/124dB	>140/126dB	>140/126dB
Gain Drift	Typical 10 ppm/K, max. 30 ppm/K				
Offset Drift	Typical 0.5 µV/K + 10 ppm of range/K, max 3 µV/K + 20 ppm of range/K				
Gain Linearity	<0.02%				
Inter Channel Phase-mismatch	0.02° * f_{in} [kHz] + 0.1°				
Channel Cross talk	110 dB @ 1kHz; 90 dB @ 10kHz				
Input Coupling	DC or AC (0.1 Hz, 1 Hz, 10 Hz or 100 Hz)				
Input Impedance	1 MΩ / 100pF				
Overvoltage Protection	50 V continuous; 200V peak (10msec)				
Digital low pass filter					
Filter Characteristic	Butterworth, Bessel or Chebyshev				
Filter Order	2nd , 4th, or 8th				
Ratio Sample rate to Filter Freq.	From 2 to 100				
Topology	Cascaded IIR Filter (up to 4 sections)				
IEPE mode					
Excitation	4 or 8mA				
Compliance voltage	25 Volt				
Output Impedance	>100 kΩ				
Sensor detection	Shortut: <4Volt; Open: > 19Volt				
Charge ranges	7 ranges: ±100 000, 50 000, 20 000, 10 000, 5000, 2000, 1000 pC				
Input Accuracy	±0.5% of reading ±0.05% of range ±2 pC				
Input Coupling	0.01 Hz, 0.03 Hz, 0.1 Hz, 1 Hz, 10 Hz or 100 Hz				
Counters (only on CHG+ type)	1 counter/3 digital input, fully synchronized with analogue data				
Counter Modes	counting, waveform timing, encoder, tacho, gear-tooth sensor				
Input Level Compatibility	CMOS, LVTTL				
Input Protection	±25Volt continuous				
Alarm output	Open collector, max. 100mA/30Volt				
Sensor supply	5V/100mA; 12V/50mA				
Additional Specifications					
Input connector	BNC (others on request)				
TEDS support	IEPE mode only				

Table 28: SIRIUS-HS-CHG specifications

5.18.2 HS-CHG BNC

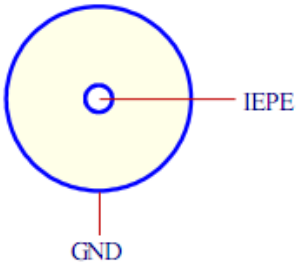


Illustration 155: SIRIUS-ACC: pin-out (BNC)

Illustration 156: SIRIUSi 8xHS-CHG-BNC

5.18.3 HS-CHG+ (Counter) L1B7f

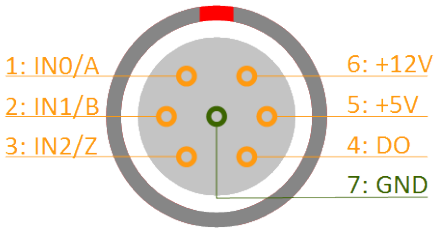


Illustration 157: CNT: counter pin-out (LEMO 7pin)

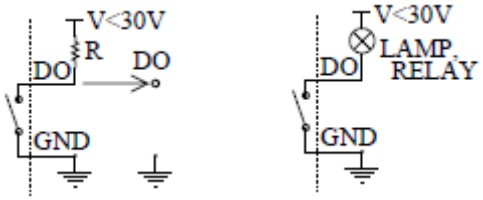
Illustration 158: SIRIUSi 6xHS-CHG, 2xHS-CHG+

Connector type	L1B7f Connector on the module: *EGG.1B.307.CLL* Mating cable connector: *FGG.1B.307.CLAD52*

Table 29: HS-CHG+ counter connector type

Digital Output Configuration

The “switch” of the open collector output is closed when active.



5.18.4 HS-CHG: Voltage

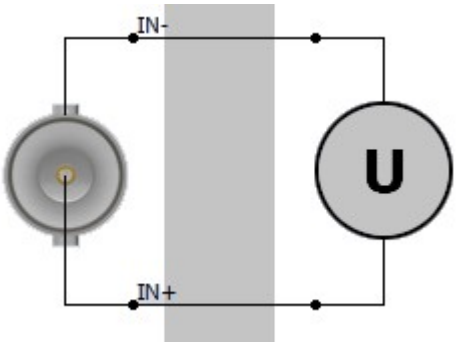


Illustration 159: HS-CHG Voltage

5.18.5 HS-CHG: IEPE

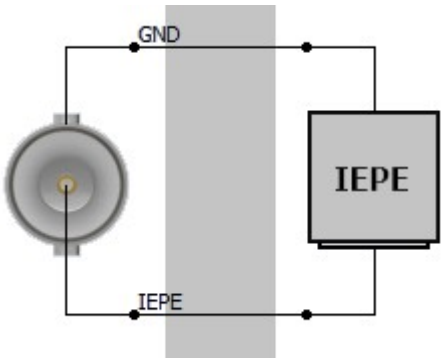


Illustration 160: HS-CHG IEPE

5.18.6 HS-CHG: Charge

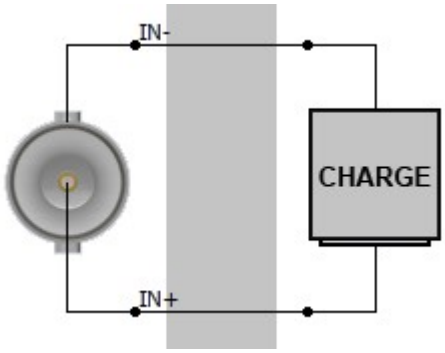


Illustration 161: HS-CHG IEPE

5.19 HS-HV

5.19.1 HS-HV: Specifications

Inputs	Voltage		
ADC Type	16bit SAR with 100kHz 5th order analogue AAF filter or bypass (5.2.1 Sirius Dual Core series: High Dynamic (up to 160 dB) page 49)		
Sampling Rate	Simultaneous 1MS/sec		
Analogue bandwidth	2 MHz		
Voltage ranges	±1600 V, ±800 V, ±400 V, ±200 V, ±100 V, ±50 V, ±20 V		
Input Accuracy[20]	Signal frequency	Accuracy	
	DC	±0.05% of reading ±0.02% of range ±0.04V	
	Up to 10 kHz	±0.1% of reading ±0.05% of range	
	Up to 100 kHz	±2% of reading ±0.1% of range	
	Up to 1000 kHz	±5% of reading ±0.5% of range	
Typ. SNR	1600 Volt	400 Volt	100 Volt
BW: 2 MHz	83 dB	79 dB	71 dB
BW: 100 kHz	85 dB	85 dB	82 dB
BW: 10 kHz	100 dB	97 dB	90 dB
Typ. CMR @ 50Hz (1kHz)	85 dB @ 50 Hz; 75 dB @ 400 Hz; 50 dB @ 10 kHz		
Gain Drift	Typical 10 ppm/K, max. 40 ppm/K		
Offset Drift	Typical 1 mV/K + 1 ppm of range/K, max 2 mV/K + 5 ppm of range/K		
Gain Linearity	<0.02%		
Channel Cross talk	115 dB @ 50Hz; 90 dB @ 1kHz		
Input Coupling	DC II 2pF		
Input Impedance	10 MΩ		
Protection class	CAT III 600 V; CAT II 1000 V		
Over-voltage Protection	In+ to In-: 1.8 kV_{RMS}, Inx to GND: 1.4kV_{RMS}		
Digital lo pass Filter			
Filter characteristic	Butterworth or Bessel		
Filter order	2nd, 4th, 6th or 8th		
Ratio Sample rate to Filter Freq.	From 2 to 1000		
Topology	Cascaded IIR Filter (up to 4 sections)		
Additional Specifications			
Input connector	Banana		
TEDS support	NA		

Table 30: SIRIUS-HS-HV specifications

20 50 V Range (1.2 MHz) and 20 V range (700 kHz) have limited bandwidth

5.19.2 HS-HV Banana

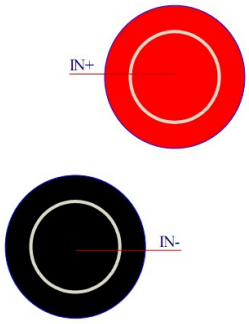


Illustration 162: SIRIUS-HS-HV pin-out Banana plug

Illustration 163: SIRIUSi*8xHS-HV-BAN*

5.19.2.1 HS-HV: Voltage

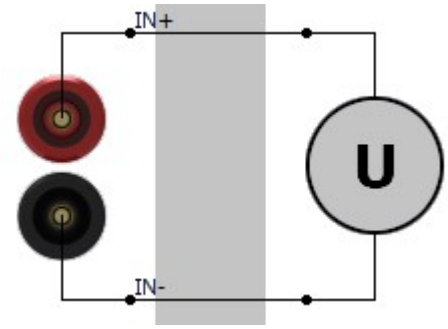


Illustration 164: HS-HV Voltage

5.20 HS-LV / HS-LV+

5.20.1 HS-LV Specifications

Inputs	Voltage, current (ext. Shunt)			
ADC Type	16bit SAR with 100kHz 5th order analogue AAF filter or bypass (5.2.1 Sirius Dual Core series: High Dynamic (up to 160 dB) page 49)			
Sampling Rate	Simultaneous 1MS/sec			
Analog bandwidth[1]	1 MHz			
Voltage ranges	11 ranges: ±100, 50, 20, 10, 5, 2, 1, 0.5, 0.2, 01 and 0.05 Volt			
Input Accuracy	Signal frequency	Accuracy		
	DC	±0.05% of reading ±0.02% of range ±100 µV (2mV for Ranges ≥ 10Volt)		
	Up to 10 kHz	±0.1% of reading ±0.05% of range		
	Up to 100 kHz	±2% of reading ±0.1% of range		
	Up to 500 kHz	±10% of reading ±0.5% of range		
Offset accuracy after Balance Amplifier	Range < 10 V: ±0.002% of range ±3 µV; Range ≥ 10 V: ±0.005% of range			
Typ. SNR	100 Volt	5 Volt	0.5 Volt	0.05 Volt
BW: 1 MHz	85 dB	86 dB	78 dB	59 dB
BW: 100 kHz	88 dB	88 dB	87 dB	76 dB
BW: 10 kHz	> 100dB	> 100dB	95 dB	86 dB
Typ. CMR	100 Volt	5 Volt	0.5 Volt	0.05 Volt
50 Hz	70 dB	88 dB	102 dB	102 dB
400 Hz	70 dB	86 dB	100 dB	100 dB
10 kHz	55 dB	70 dB	80 dB	80 dB
Gain Drift	Typical 10 ppm/K, max. 30 ppm/K			
Offset Drift	Typical 0.3 µV/K + 5 ppm of range/K, max 2 µV/K + 10 ppm of range/K			
Gain Linearity	<0.02%			
Inter channel phase mismatch	0.02° * fin [kHz] + 0.1° (5 V Range)			
Channel Cross talk	Range < 10 V: 120 dB @ 10kHz; Range ≥ 10 V: 95 dB @ 10kHz			
Input Coupling[2]	DC, AC 1 Hz (3 Hz, 10 Hz per SW)			
Input Impedance	Range < 10 V: 10 MΩ; Range ≥ 10 V: 1 MΩ between INx to GND			
Overvoltage Protection	Range < 10 V: 100V (200 V peak for 10msec); Range ≥ 10 V: 300 V cont.			
Digital lo pass Filter				
Filter characteristic	Butterworth, Bessel or Chebyshev			
Filter order	2nd, 4th or 8th			
Ratio Sample rate to Filter Freq.	From 2 to 1000			
Topology	Cascaded IIR Filter (up to 4 sections)			
Excitation Voltage	Unipolar or Bipolar Software selectable (programmable with 16 Bit)			
Excitation Level unipolar	0 .. 24 Volt; Predefined levels: 1, 2.5, 5, 10, 12, 15, 20 and 24 V_{DC}			
Exication Level bipolar	2 .. 30 Volt; Predefined levels: 2.5, 5, 10, 12, 15, 24 and 30 VDC			
Accuracy	±0.1 % ±5 mV			
Drift	±50 ppm/K ±100 µV/K			
Stability 10% to 90% load (bipolar)	<0.01%			
Current limit	200mA (2 Watt max. per Channel, 12 Watt max. per Slice)			
Protection	Continuous short to ground			
Input short, Sensor offset adjust	Software selectable			
Counters (only on LV+ type)	1 counter/3 digital input, fully synchronized and alarm output			
Counter modes	counting, waveform timing, encoder, tacho, gear tooth sensor			
Input level compatibility	CMOS, LVTTL			
Input protection	Up to ±25Volt			
Alarm output	Open collector, max. 100mA/30Volt			
Sensor supply	5V/100mA; 12V/50mA			

Table 31: SIRIUS-HS-LV specifications

1 Bandwidth of ranges ≤0.2 Volt is limited to 800 kHz
2 In- must be within ±10V referred to GND(iso); for Ranges ≥ 10 V the DC value of In- is not rejected

Additional Specifications	
Input connector	DSUB 9, Banana, BNC (others on request)
TEDS support	Standard + MSI adapters

5.20.2 HS-LV+ (Counter) L1B7f

As an additional function to the LV module, the LV+ module also has a 7-pin Lemo connector for digital counters.

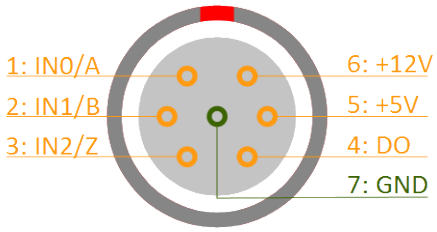


Illustration 165: CNT: counter pin-out (LEMO 7pin)

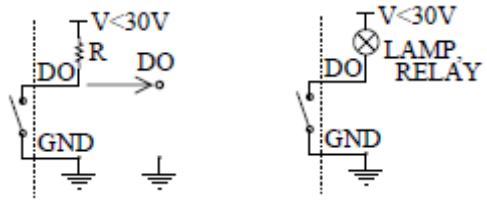
Illustration 166: SIRIUSi-HS 8xLV+

Connector type	L1B7f Connector on the module: `EGG.1B.307.CLL` Mating cable connector: `FGG.1B.307.CLAD52`

Table 32: HS-LV+ counter connector type

Digital Output Configuration

The “switch” of the open collector output is closed when active.



5.20.3 HS-LV BAN

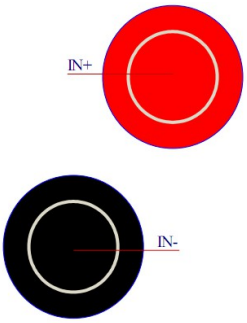


Illustration 167: SIRIUS-HS-LV pin-out Banana plug

Illustration 168: SIRIUSi8xHS-LV-BAN

5.20.4 HS-LV BNC

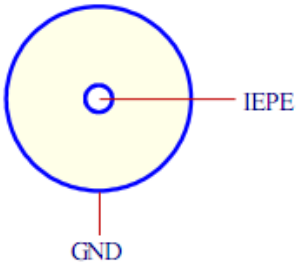


Illustration 169: SIRIUS-HS-LV: pin-out (BNC)

Illustration 170: SIRIUSi 8xHS-LV-BNC

5.20.5 HS-LV DSUB-9

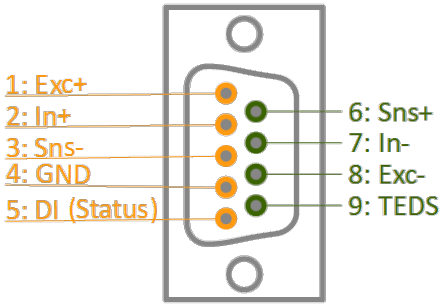


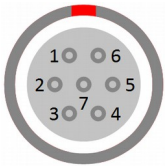
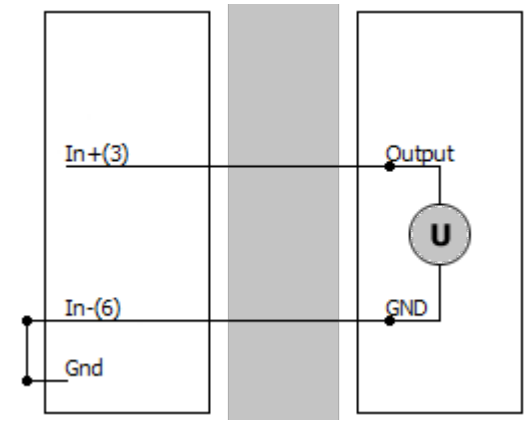
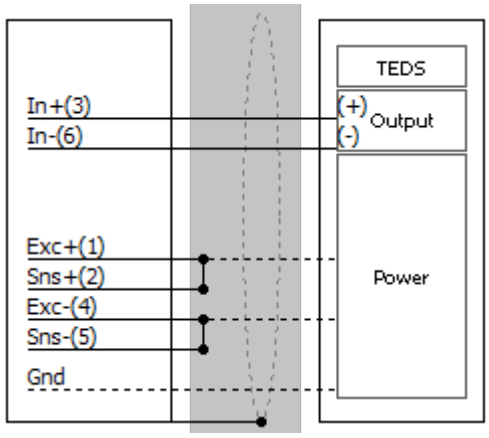
Illustration 171: SIRIUS-HS-LV pin-out DSUB-9

Illustration 172: SIRIUSi 8xHS-LV DSUB9

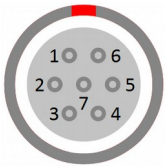
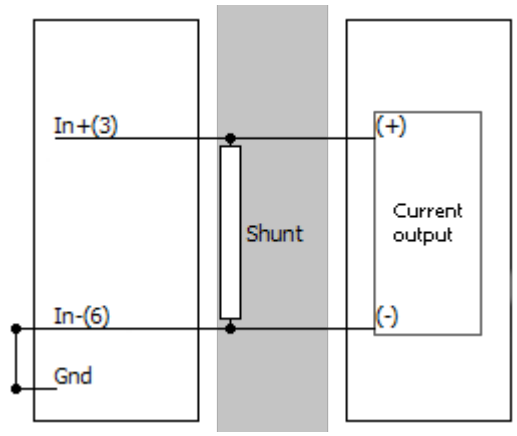
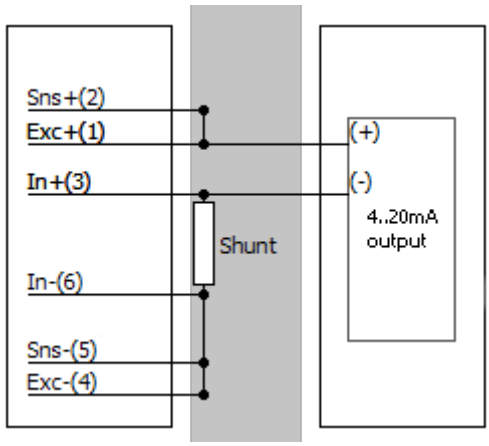
Digital Status Input

Pin 5 *DI (Status)* can be used for digital status input: i.e. show alarm status in DEWESoft® when a current clamp is open.

5.20.5.1 HS-LV DSUB-9: Voltage

	Voltage - Single Ended	Voltage – Differential Use only when the sensor is powered by the excitation voltage of the module.
		

5.20.5.2 HS-LV DSUB-9: Current

	External Direct Shunt	External Loop Powered Shunt
		

5.21 HS-STG / HS-STG+

5.21.1 HS-STG Specifications

Inputs	Voltage, full bridge strain, half bridge strain, quarter bridge strain (120Ω and 350Ω), current (ext. Shunt), resistance, temperature			
ADC Type	16bit SAR with 100kHz 5th order analogue AAF filter or bypass (5.2.1 Sirius Dual Core series: High Dynamic (up to 160 dB) page 49)			
Sampling Rate	Simultaneous 1MS/sec			
Analogue bandwidth[21]	1 MHz			
Voltage ranges	11 ranges: ±50, 20, 10, 5, 2, 1, 0.4, 0.2, 0.1, 0.04 and 0.02 Volt			
Input Accuracy	Signal frequency	Accuracy		
	DC	±0.05% of reading ±0.015% of range ±10µV		
	Up to 10 kHz	±0.1% of reading ±0.05% of range		
	Up to 100 kHz	±2% of reading ±0.1% of range		
	Up to 500 kHz	±10% of reading ±0.5% of range		
Offset accuracy after Balance Amplifier	Range < 10 V: ±0.002% of range ±3 µV; Range ≥ 10 V: ±0.005% of range			
Typ. SNR	50 Volt	5 Volt	0.2 Volt	0.02 Volt
BW: 1 MHz	87 dB	88 dB	81 dB	63 dB
BW: 100 kHz	88 dB	88 dB	85 dB	74 dB
BW: 10 kHz	>100 dB	>100 dB	94 dB	84 dB
Typ. CMR	50 Volt	5 Volt	0.2 Volt	0.02 Volt
50 Hz	70 dB	88 dB	102 dB	102 dB
400 Hz	70 dB	86 dB	100 dB	100 dB
10 kHz	55 dB	70 dB	80 dB	80 dB
Gain Drift	Typical 10 ppm/K, max. 30 ppm/K			
Offset Drift	Typical 0.3 µV/K + 5 ppm of range/K, max 2 µV/K + 10 ppm of range/K			
Gain Linearity	<0.02%			
Inter channel phase mismatch	0.02° * fin [kHz] + 0.1° (5 V Range)			
Channel Cross talk	Range < 10 V: 120 dB @ 10kHz; Range ≥ 10 V: 95 dB @ 10kHz			
Input Coupling[22]	DC, AC 1 Hz (3 Hz, 10 Hz per SW)			
Input Impedance	Range < 10 V: 10 MΩ; Range ≥ 10 V: 1 MΩ between INx to GND			
Over voltage Protection	Range < 10 V: 100V (200 V peak for 10msec); Range ≥ 10 V: 300 V cont.			
Digital lo pass Filter				
Filter characteristic	Butterworth, Bessel or Chebyshev			
Filter order	2nd, 4th or 8th			
Ratio Sample rate to Filter Freq.	From 2 to 1000			
Topology	Cascaded IIR Filter (up to 4 sections)			
Excitation Voltage	Free programmable (16 Bit DAC)			
Predefined levels	0, 1, 2.5, 5, 10, 15 and 20 V_{DC}			
Accuracy	±0.05 % ±2 mV			
Drift	±10 ppm/K ±100 µV/K			
Load stability 0% to 100% load	<0.01%			
Line regulation over 20Ω of change	< 0.005% @ 120Ω load			
Noise @ 10 Volt / 350 Ω	< 200 μV_{rms}@10 kHz BW			
Sense Impedance to Exc / to GND	100 kΩ / 100MΩ			
Current limit	100mA (max. 800mW)			
Protection	Continuous short to ground			
Input short, Sensor offset adjust	Software selectable			
Excitation Current	Free programmable (16 Bit DAC)			
Predefined levels	0.1, 1, 2, 5, 10, 20 and 60 mA_{DC}			
Accuracy (> 10mA)	0.1% ±2µA [0.5% ±50 µA]			
Drift (> 10mA)	15 ppm/K [100 ppm/K]			
Compliance voltage	20 Volt, max. 300 mW			
Output Impedance	>1 MΩ			

21 Bandwidth of ranges ≤0.2 Volt is limited to 800 kHz
22 In- must be within ±10V referred to GND(iso); for Ranges ≥ 10V the DC value of In- is not rejected

Bridge Connection Types	full bridge, ½ bridge and ¼ bridge (3- or 4-wire)
Ranges	2 mV/V…1000 mV/V free programmable with Dual Core
Internal Bridge Completion	½ bridge and ¼ bridge 120Ω and 350Ω
Bridge Completion Accuracy	0.05 %; TCR: 5 ppm/K (others on request)
Internal Shunt Resistor	59.88 kΩ and 175 kΩ, bipolar (to +Exc and -Exc)
Typ. Shunt Resistor Accuracy	0.05 %; TCR: 10 ppm/K (others on request)
Sensor Balance Range	220% of Range (70% for input Range ≥ 5Volt)
Input Short, Sensor Offset Adjust	Software selectable
Counters (only on STG+ type)	1 counter/3 digital input, fully synchronized and alarm output
Counter modes	counting, waveform timing, encoder, tacho, geartooth sensor
Input level compatibility	CMOS, LVTTL
Input protection	±25Volt continuous
Alarm output	Open collector, max. 100mA/30Volt
Sensor supply	5V/100mA; 12V/50mA
Additional Specifications	
Input connector	DSUB 9 (others on request)
TEDS support	Standard + MSI adapters

Table 33: SIRIUS-HS-STG specifications

5.21.2 HS-STG+ (Counter) L1B7f

As an additional function to the ACC module, the ACC+ module also has a 7-pin Lemo connector for digital counters.

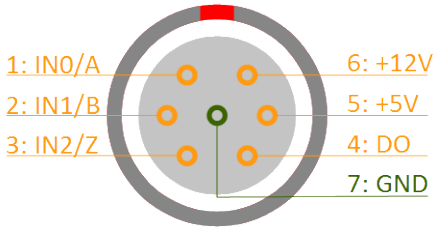


Illustration 173: CNT: counter pin-out (LEMO 7pin)

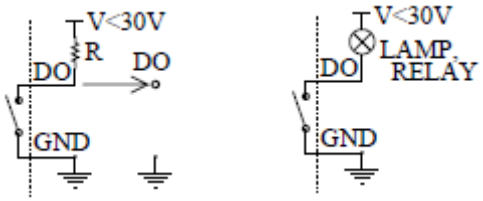
Illustration 174: SIRIUSi 6xHS-STG, 2xHS-STG+

Connector type	L1B7f Connector on the module: *EGG.1B.307.CLL* Mating cable connector: *FGG.1B.307.CLAD52*

Table 34: HS-STG+ counter connector type

Digital Output Configuration

The “switch” of the open collector output is closed when active.



5.21.3 HS-STG DSUB-9

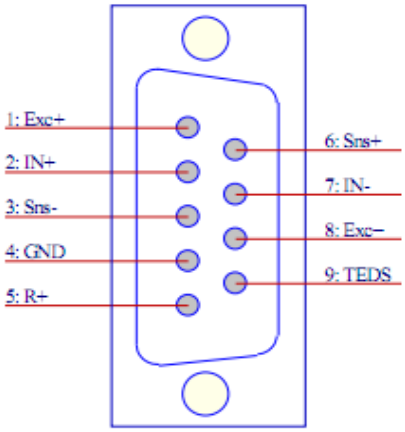
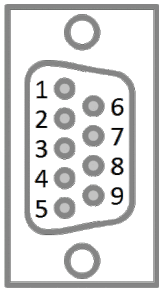
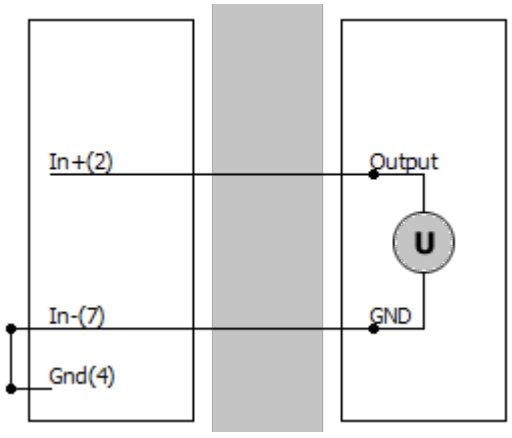
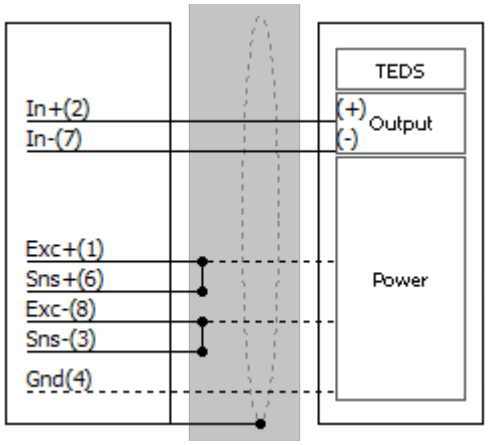


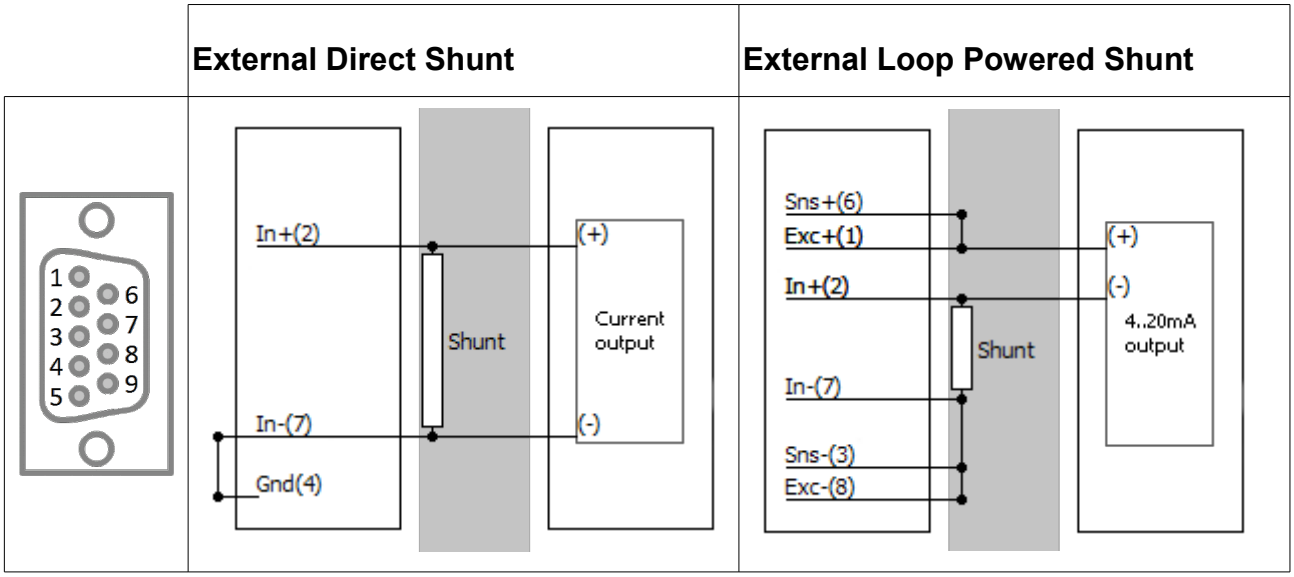
Illustration 175: SIRIUS-HS-STG pin-out DSUB-9

Illustration 176: SIRIUS HS-STG DSUB9

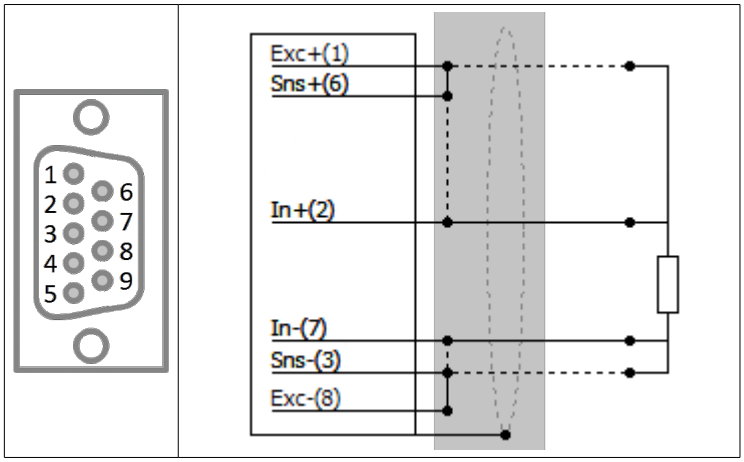
5.21.3.1 HS-STG DSUB-9: Voltage

	Voltage - Single Ended	**Voltage – Differential** Use only when the sensor is powered by the excitation voltage of the module.
		

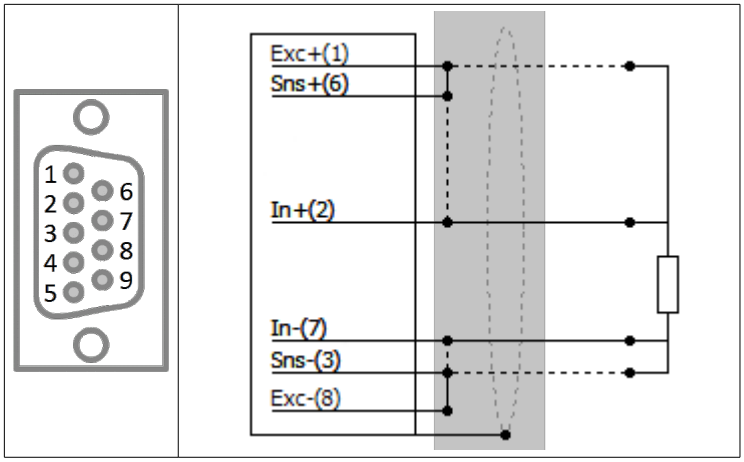
5.21.3.2 HS-STG DSUB-9: Current



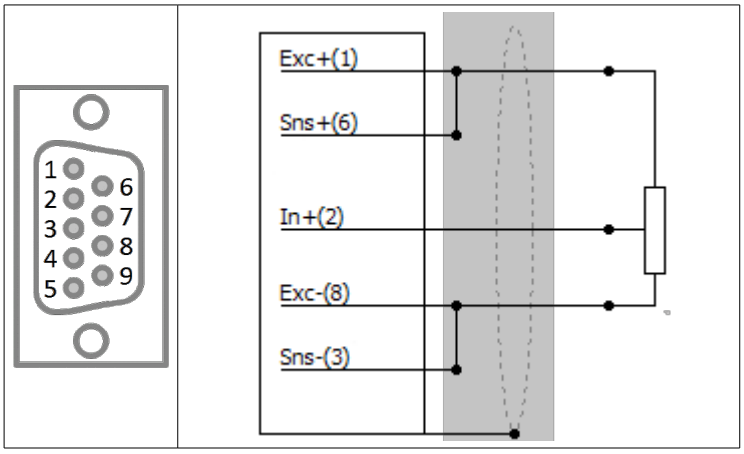
5.21.3.3 HS-STG DSUB-9: Temperature



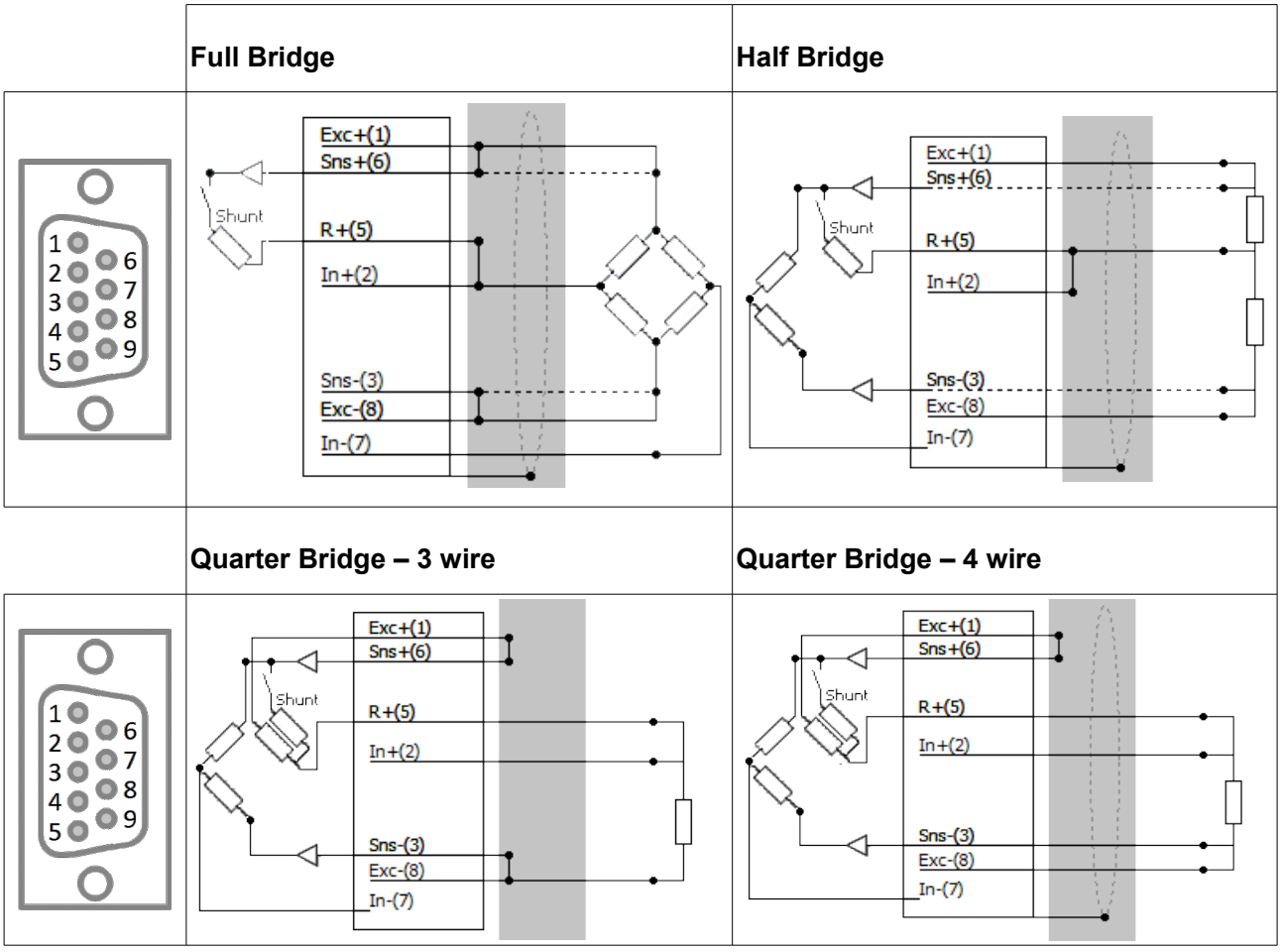
5.21.3.4 HS-STG DSUB-9: Resistance



5.21.3.5 HS-STG DSUB-9: Potentiometer



5.21.3.6 HS-STG DSUB-9: Bridge



5.22 Analogue out OPTION

The 8 optional analogue output channels (BNC connectors) at the rear side are available for all SIRIUS Dual Core slices (see 5.4 SIRIUS Dual Core specifications on page 54).

Note: the *Multi* modules (see 5.11 MULTI on page 70) have the analogue out channels per default on the front-side connectors. When you order a *Multi* module with additional Analogue out OPTION, the front-side analogue out will NOT be connected – only the analogue out of the rear BNC connectors.

Illustration 177: Rear side connectors of the Analogue-out version

5.22.1 Analogue out: Specifications

Inputs	Voltage		
DAC Type	24bit delta-sigma		
Sampling Rate	Simultaneous 200kS/sec		
Number Of Channels	8		
Function	File replay, conditioned AI output, FGEN (software option)		
Specifications			
Full Scale	±10 V		
Analogue out bandwidth	40 kHz		
Accuracy	±0.1% of reading ±0.02 V		
Temperature Drift	±50 ppm/K of reading ±200 µV/K		
Output configuration	Single Ended		
SNR @ 50 (200) kS/s output rate	95 dB (86 dB) @ 100 kHz Bandwidth		
Inter channel phase mismatch	0.1° * f_{out} [kHz] + 0.1°		
THD	< -90 dB @ 1 kHz, 10 $V_{peak-peak}$		
Output Impedance	<1 Ω		
Maximum Output Current	20 mA		
Maximum load	> 1000Ω		
Output Protection	Continuous short to ground		
Signal Delay	**100S/s…50kS/s**	**50kS/s…100kS/s**	**100kS/s…200kS/s**
Signal conditioning mode	14 Samples + 50µs	19 Samples + 2µs	12 Samples + 35µs
Additional Specifications			
Output connector	BNC		

Table 35: Analogue out specifications

6 Accessories

6.1 MSI-Adapters

6.1.1 MSI Overview

Modular Smart Interfaces (MSI) bring an expanded level of flexibility to your measurement system.
MSI-Adapters expand the functionality of many amplifier modules and enable you to use a bridge amplifier (e.g. SIRIUS-STG) for measuring also IEPE®, Thermocouple, Pt100 to Pt2000, charge or voltage up to 200 V.

HINT	
	When **isolation** is required, you must use the MSI-adapters on **isolated** Sirius*i* modules.

Please refer to chapters 5.4 SIRIUS Dual Core specifications (on page 54) and 5.5 SIRIUS HD and HS specifications (on page 55) compatibility overview between Sirius*x* modules and the MSI-adapters.

All MSI-adapters are the size of a D-SUB 9 housing, which contains the electronics as well as the sensor connector. The miniature electronics of each MSI sensor also contain an EEPROM, in which the identification and calibration data of the MSI are stored. Both are read automatically by the DEWESoft® software and entered accordingly into the setup.

- Expand functionality of bridge and voltage inputs
- Automatically detected, easy channel setup in the correct engineering units
- Versions for voltage, thermocouple, RTD, IEPE® and charge sensors

HINT	
	When a TEDs enabled sensor is connected to an MSI adapter, only the TEDs information of the MSI adapter can be used.

6.1.2 General Specifications

6.1.2.1 Calibration

The MSI-adapters are calibrated at 25 °C and meet their specifications when leaving the factory.

The time interval for recalibration depends on environmental conditions. A two year calibration interval is recommended.

6.1.2.2 Environmental

IMPORTANT	
	All specifications within this manual are valid at 25 °C. All MSI-Adapters are produced according to ISO9001 and ISO14001.

Storage Temperature	-30 °C to +85 °C
Operating Temperature	-5 °C to +60 °C
Relative humidity	(MIL202): 0 to 95 % at 60 °C, non-condensing
RFI susceptibility	±0.5 % span error at 400 MHz, 5 W, 3 m

Table 36: MSI Environmental Specifications

6.1.3 MSI-BR-TH-x

The MSI-BR-TH-x allows thermocouple temperature measurement with Sirius modules (also DEWE-43 and DS-MINITAUR). The common thermocouples types *K*, *J* and *T* are supported. For high temperature application also type *C* is supported. A high precision cold junction compensation is included in the adapter.

The non-linearity of the thermocouple is compensated for in software. A TEDS chip (transducer electronic data-sheet) provides automatic adapter identification by software and the calibration data.

In operation with the isolated SIRIUS modules you will get fully **isolated** thermocouple amplifier. In operation with the differential SIRIUS modules (or DEWE-43/DS-MINITAUR) only isolated thermocouples should be used, because the thermocouple input is single ended.

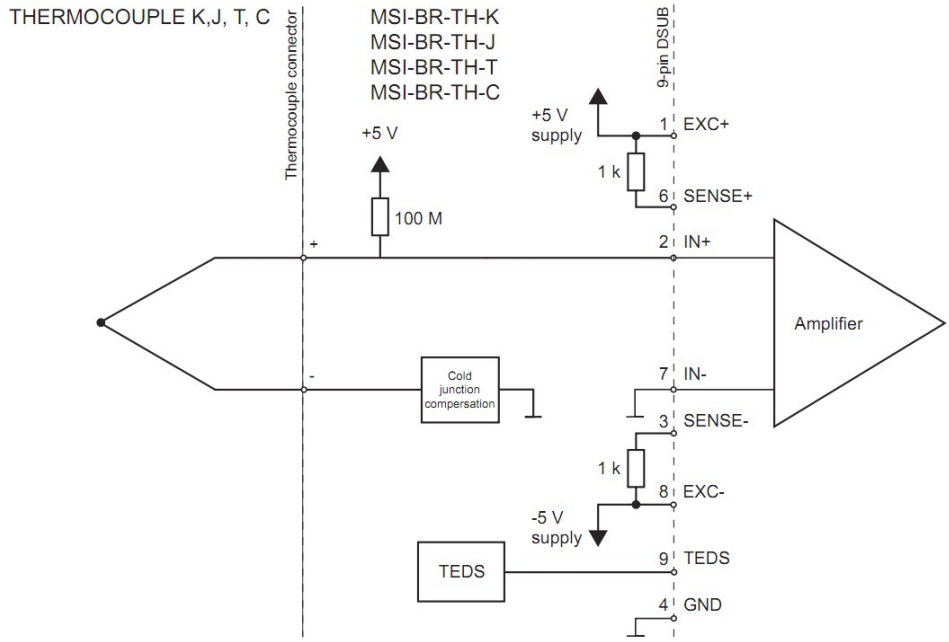


Illustration 178: Basic circuit design of MSI-BR-TH-x

6.1.3.1 BR-TH-x Specifications

Sensor connection	1 m cable with standard miniature thermocouple connector according to TC type
Thermocouple Types	MSI-BR-TH-K: Type K MSI-BR-TH-J: Type J MSI-BR-TH-T: Type T MSI-BR-TH-C: Type C
Cold junction compensation	Integrated
CJC accuracy	1.0°C
Input impedance	> 10 MΩ
BIAS current	50nA
Open TC detection	Yes
Linearisation	Through software according to the sensor type
TEDS	For adapter identification and calibration data

Table 37: MSI-BR-TH-x Specifications

Host amplifier		SIRIUSx-Multi SIRIUSx-STGM	SIRIUSx-STG SIRIUSx-STGMv2 SIRIUSx-HD-STGS	SIRIUSx-HS-STG	SIRIUSx-HD-LV	DEWE-43 DS-MINITAUR
Bandwidth		77 kHz	77 kHz	500 kHz	77 kHz	77 kHz
Typical peak to peak noise (Type K)						
30 kHz bandwidth		0.44 °C	0.44 °C	0.5 °C	0.44 °C	0.44 °C
100 Hz bandwidth		0.22 °C	0.22 °C	0.25 °C	0.22 °C	0.22 °C
1 Hz bandwidth		0.02 °C	0.02 °C	0.02 °C	0.02 °C	0.02 °C
Accuracy including CJC error						
MSI-BR-TH-K for thermocouple type K (DIN EN 60584-1)						
Input Range	Actual reading	Typical accuracy [maximum accuracy]				
-200 to 1370 °C	-200 to -100 °C	±7.0 [±12.0] °C	±4.6 [± 9.0] °C	±4.6 [± 9.0] °C	±4.6 [± 9.0] °C	±4.6 [± 9.0] °C
	-100 to 0 °C	±2.6 [± 6.6] °C	±2.4 [± 4.6] °C	±2.4 [± 4.6] °C	±2.4 [± 4.6] °C	±2.4 [± 4.6] °C
	0 to 500 °C	±2.0 [± 5.5] °C	±1.8 [± 3.5] °C	±1.8 [± 3.5] °C	±1.9 [± 3.5] °C	±1.9 [± 3.5] °C
	500 to 1000 °C	±2.1 [± 6.1] °C	±2.1 [± 4.1] °C	±2.1 [± 4.1] °C	±2.5 [± 4.1] °C	±2.5 [± 4.1] °C
	1000 to 1370 °C	±3.0 [± 7.0] °C	±2.5 [± 5.0] °C	±2.5 [± 5.0] °C	±3.0 [± 5.0] °C	±3.0 [± 5.0] °C
MSI-BR-TH-j for thermocouple type j (DIN EN 60584-1)						
Input Range	Actual reading	Typical accuracy [maximum accuracy]				
-200 to 1370 °C	-200 to -100 °C	±4.0 [± 9.0] °C	±4.0 [± 7.0] °C	±4.0 [± 7.0] °C	±4.0 [± 7.0] °C	±4.0 [± 7.0] °C
	-100 to 0 °C	±2.0 [± 5.7] °C	±1.7 [± 3.7] °C	±1.7 [± 3.7] °C	±2.0 [± 3.7] °C	±2.0 [± 3.7] °C
	0 to 300 °C	±1.6 [± 5.0] °C	±1.6 [± 3.0] °C	±1.6 [± 3.0] °C	±1.6 [± 3.0] °C	±1.6 [± 3.0] °C
	300 to 1000 °C	±2.0 [± 5.2] °C	±1.8 [± 3.2] °C	±1.8 [± 3.2] °C	±2.0 [± 3.2] °C	±2.0 [± 3.2] °C
MSI-BR-TH-T for thermocouple type T (DIN EN 60584-1)						
Input Range	Actual reading	Typical accuracy [maximum accuracy]				
-270 to 400 °C	-250 to -100 °C	±7.0 [±25.0] °C	±7.0 [±19.0] °C	±7.0 [±19.0] °C	±7.0 [±19.0] °C	±7.0 [±19.0] °C
	-100 to 0 °C	±1.8 [± 7.0] °C	±1.8 [± 5.0] °C	±1.8 [± 5.0] °C	±1.8 [± 5.0] °C	±1.8 [± 5.0] °C
	0 to 100 °C	±1.3 [± 5.6] °C	±1.3 [± 3.6] °C	±1.3 [± 3.6] °C	±1.3 [± 3.6] °C	±1.3 [± 3.6] °C
	100 to 400 °C	±1.0 [± 5.0] °C	±1.0 [± 3.0] °C	±1.0 [± 3.0] °C	±1.0 [± 3.0] °C	±1.0 [± 3.0] °C
MSI-BR-TH-C for thermocouple type C (ASTM E988-96)						
Input Range	Actual reading	Typical accuracy [maximum accuracy]				
-270 to 400 °C	0 to 1000 °C	±3.0 [±12.0] °C	±3.0 [± 8.0] °C	±3.0 [± 8.0] °C	±3.0 [± 8.0] °C	±3.0 [± 8.0] °C
	1000 to 1600 °C	±4.0 [±11.6] °C	±4.0 [± 8.6] °C	±4.0 [± 8.6] °C	±4.0 [± 8.6] °C	±4.0 [± 8.6] °C
	1600 to 2300 °C	±6.7 [±19.0] °C	±6.7 [±14.0] °C	±6.7 [±14.0] °C	±6.7 [±14.0] °C	±6.7 [±14.0] °C

Table 38: MSI-BR-TH-x Accuracy

6.1.3.2 Pin-out

Pin	Description
1	Excitation+
2	Input +
3	Sense-
4	Ground
5	n.c.
6	Sense+
7	Input-
8	Excitation-
9	TEDS

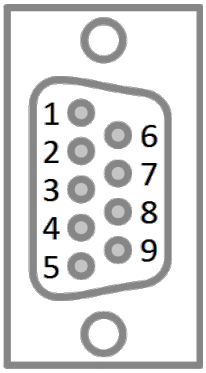


Illustration 179: MSI-BR-TH-x pin-out

6.2 DS Battery Packs

6.2.1 Specifications

	DS-BP2i	DS-BP4i
Input Voltage Range	10-36V	12-36V
Output Voltage	24V	24V
Output Voltage (running on batteries)	14.5V	
Max. Power Out:	160W	250W
Total capacity (min) at fully charged state	12.5Ah	25Ah
Battery life (min) at max. rated power	1h	1.5h
Wrong polarity protection	■	
Hot-swappable	■	
Status display	■	
Isolation	500V	
Weight		
without batteries	1.6kg	1.9kg
with all batteries	2.9kg	4.5kg
single battery	0.65kg	0.65kg

Table 39: DS Battery Packs Overview

6.2.2 DS-BP2i: Battery Pack

The battery pack can be connected to any SIRIUS systems via the click-mechanism (see 4.1.1.1 Click mechanism on page 24).

Illustration 180: DS-BP2i- Battery Pack

Illustration 181: DS-BP2i– Rear Side

EXAMPLE 1

The DS-BP2i can power:

- a single ACC+ slice for over 12 hours (e.g. when you use it with an external laptop)
- an S-BOX and an ACC+ slice for over 2 hours

6.2.2.1 Pin-out (Power Connector)

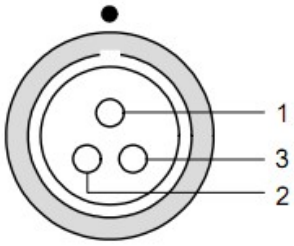


Illustration 182: DS-BP2i Power Connector

Pin	Name
1	V+
2	GND
3	n.c.

L2B3f

Power connector (for Input): *ECG.2B.303.CLV*

Mating connector (for the cable): *FGJ.2B.303.CLAD92*

6.2.3 DS-BP4*i*: Battery Pack

Illustration 183: DS-BP4i- Battery Pack

The battery pack can be connected to any SIRIUS systems via the click-mechanism (see 4.1.1.1 Click mechanism on page 24).

EXAMPLE 2

The DS-BP4*i* can power:

- a single ACC+ slice for over 24 hours (e.g. when you use it with an external laptop)
- an S-BOX and an ACC+ slice for over 4 hours

6.2.3.1 Pin-out (Power Connector)

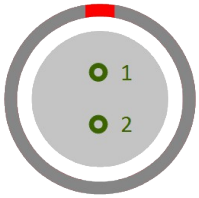


Illustration 184: DS-BP4i Power connector (Input)

Pin	Name
1	V+
2	GND

L2B2f

Power connector (on the S-BOX): *ECG.2B.302*

Mating connector (for the cable): *FGJ.2B.302*

Illustration 185: DS-BP4i Power connector (Input): pin-out (LEMO)

6.2.4 Dimensions

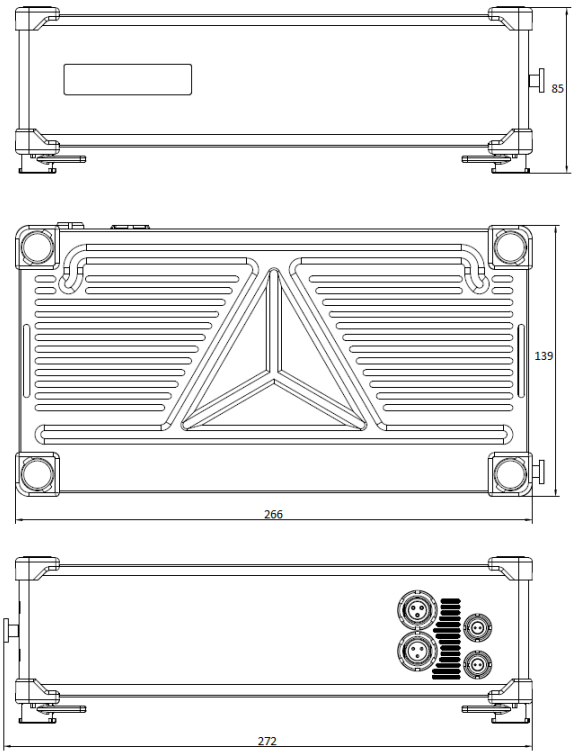


Illustration 186: DS-BP2i- Battery Pack

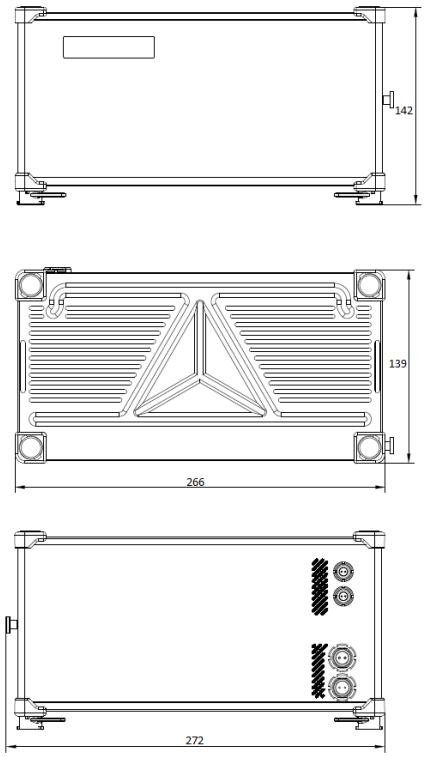


Illustration 187: DS-BP4i- Battery Pack

7 Advanced Topics

The topics in this chapter are optional and only recommended for advanced users or Dewesoft staff.

7.1 Wireless Connection

This topic will show how to establish a wireless connection between an S-BOX running Windows 7 Professional and a Samsung Galaxy Tab 2 running Android 4.x.

7.1.1 Prerequisites

We assume that the Windows 7 PC has DEWESoft® and the DEWESoft®-NET option installed.

Note: you do not need to activate the DEWESoft®-NET option in DEWESoft® (and thus you also don't need to buy a valid license for the DEWESoft®-NET option) – in this example we just need the installation of the Ultra VNC server (which is automatically done when the DEWESoft®-NET option is being installed).

HINT	The procedure is prepared and tested only for the Dewesoft S-BOX – it may not work on other PC's: • It will only work on Windows 7 (e.g. Windows XP does not support Hosted WLAN) • User access control should be disabled • Not all WLAN drivers support Hosted WLAN

Detailed information about the *Hosted Network* feature of Windows 7 can be found here:
http://msdn.microsoft.com/en-us/library/dd815243%28VS.85%29.aspx

7.1.2 Hosted Network on Windows 7

The hosted network feature of Windows 7 creates a software-based wireless access point (AP) (sometimes referred to as a SoftAP) that uses a designated virtual wireless adapter. This allows the Windows 7 PC to create a wireless network that other devices can connect to.

We have prepared some scripts that will handle all the setup work – you will find the scripts in the `Extras\LAN_HostedNetwork` folder of your SIRIUS installation USB stick.

The folder contains 3 script files – you just need to start the script `ApplyHostedNetwork.bat` as *Administrator:* See Illustration 188: First, hold down the *SHIFT* key and right-click the script `ApplyHostedNetwork.bat`. Then select *Run as administrator* from the pop-up menu.

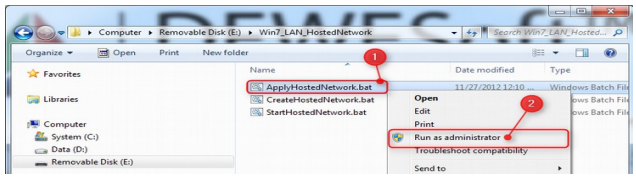


Illustration 188: Run as administrator

1. Read the notes and press any key to continue
2. enter the SSID of the hosted network: you will see the SSID in the list of available networks on your tablet
3. Enter a password to access the network.
   For this demonstration we use a simple password – you should use a more secure one (maybe with Caps, numbers and even special characters)

When the script is done, everything is correctly configured and set-up, you should already see our S-BOX network in the *Network list* of the S-BOX (see Illustration 190 below).

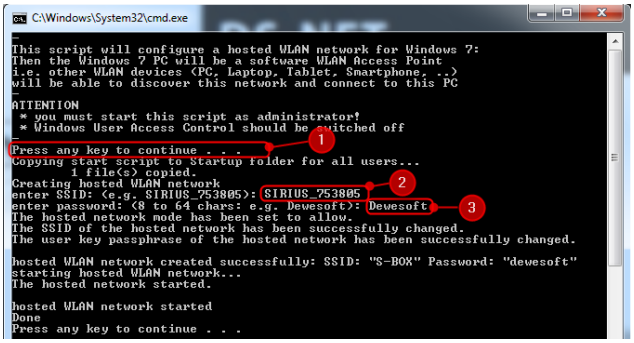


Illustration 189: Script

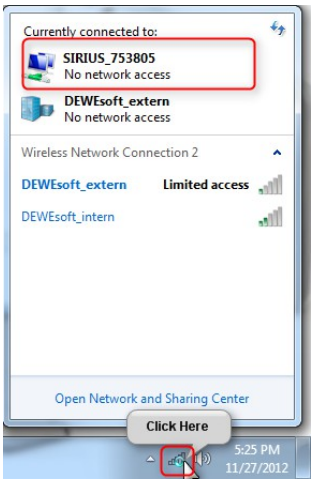
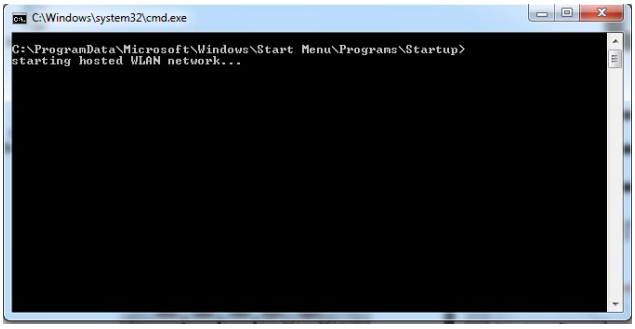


Illustration 190: Network

During the execution the script `StartHostedNetwork.bat` has been copied to the `Startup` folder of all Windows users (see Illustration 191): so when you restart your PC and log on for the next time, the hosted network will be started automatically – during a short time, you will see the Windows command shell:



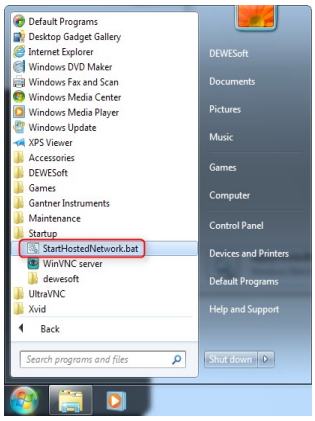


Illustration 191: Startup

HINT

If you ever want to deactivate the Hosted Network, just delete the `StartHostedNetwork.bat` script from the `Startup` folder and restart your PC.

7.1.3 Android: WiFi connection

In the list of available Wi-Fi networks of your Android tablet, you will already see the hosted WLAN network (see Illustration 192).

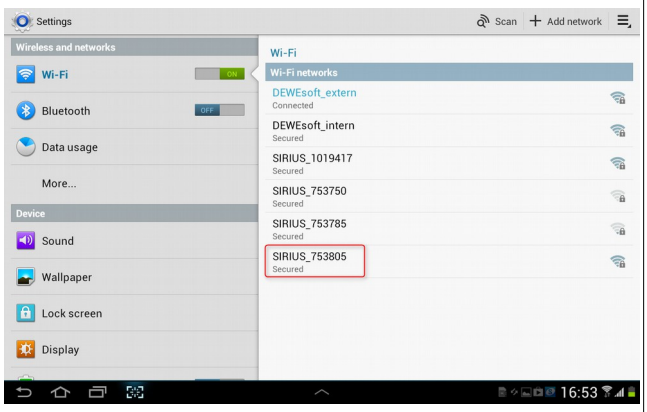


Illustration 192: Android Wi-Fi Network List

Click on our network (*SIRIUS_753805*) to open the connection dialogue, enter the password *Dewesoft* and click **Connect**.

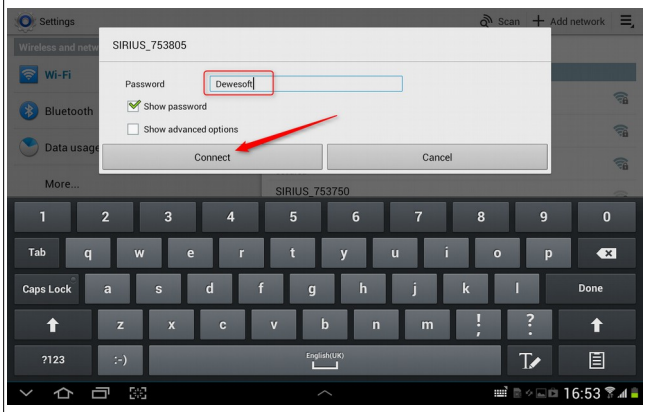


Illustration 193: Android Wi-Fi Connect

That's it. The WLAN network in the Wi-Fi list of your Android device should now show *Connected*.

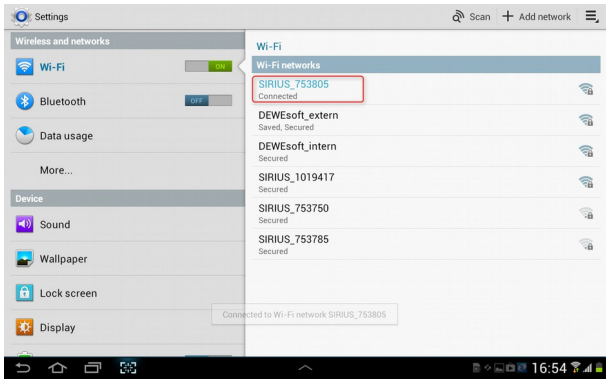


Illustration 194: Android Wi-Fi Connected

7.1.4 Android: VNC

Next, we need a program to connect to the VNC server on the S-BOX. There are many different VNC programs available in the *Google Play Store*. For this demonstration we will use the free program *Jump Desktop Free* (for detailed description and help see: http://jumpdesktop.com/).

First, install the *Jump Desktop Free* program on your tablet via the *Google Play Store*.

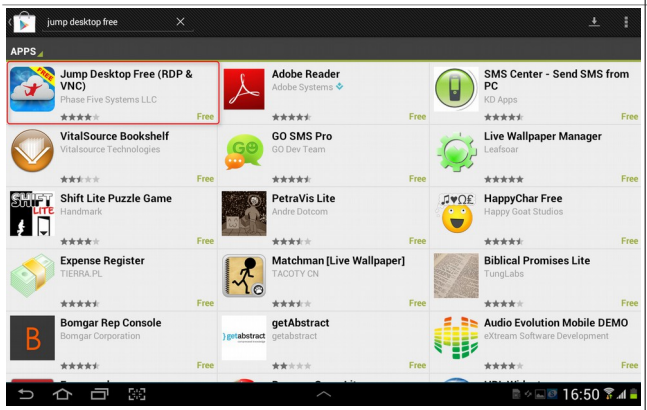


Illustration 195: Google Play Store

After the installation is complete, just click on the *Jump* icon on your desktop to start the VNC program:

Illustration 196: Jump Icon

Select the setup type *Manual Setup*:

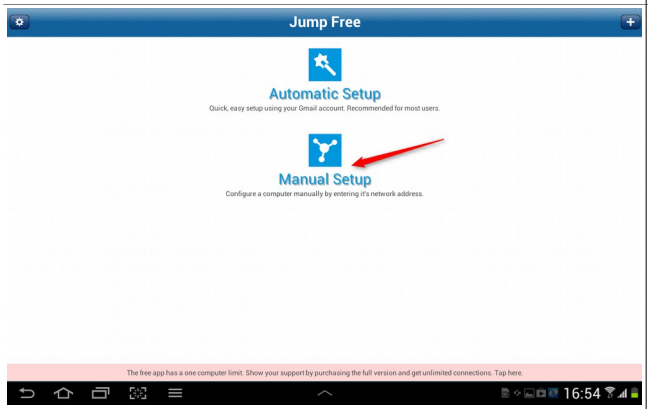


Illustration 197: Setup Type

In the Add Connection dialogue enter the IP-address `192.168.173.1` (this id the default IP address of the hosted WLAN network that we have created on the S-BOX) and select *VNC* as *Connection Type*. Then click the **Save** button.

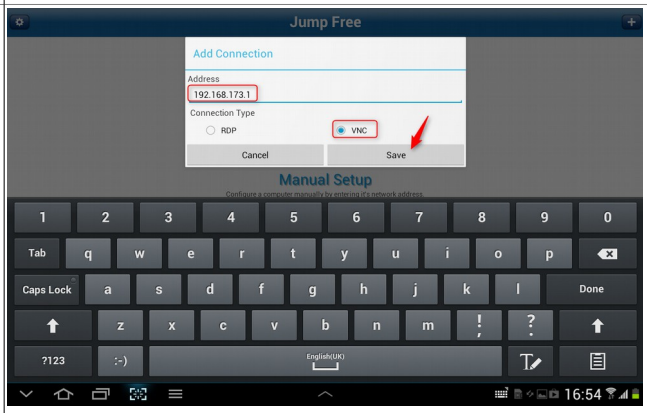


Illustration 198: Add Connection

Next, you will see all settings of the connection. You can change the *Display Name* if you like.
Click the **Back** button ⮌ to get back to the *Connection List*:

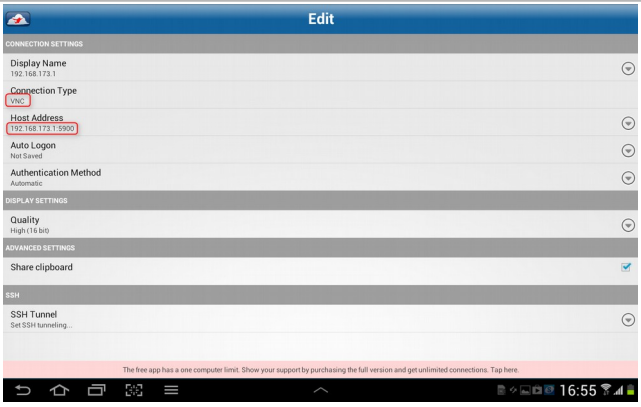


Illustration 199: Connection Settings

In the connection list you can click anywhere in area ❶ to open the connection – or click on the wrench symbol ❷ to change the settings of the connection.
Note: the free version of the *Jump Desktop* software only supports one connection.

Illustration 200: Connection List

When you open the connection, the program will connect to the Ultra VNC server running on the S-BOX. When you do this for the first time, you must enter the password for the VNC server. The default password of the DEWESoft® VNC instance is the small letter `a`. Enter the password and click **Login**.	You will immediately see the screen of the S-BOX and you have complete control over the S-BOX. You can use the mouse, enter text and use all special keys via the *Jump Desktop* program.

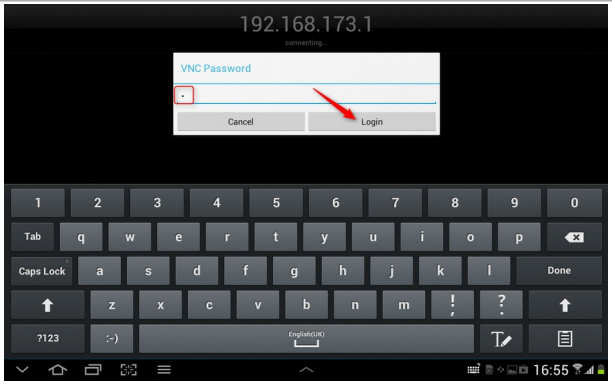
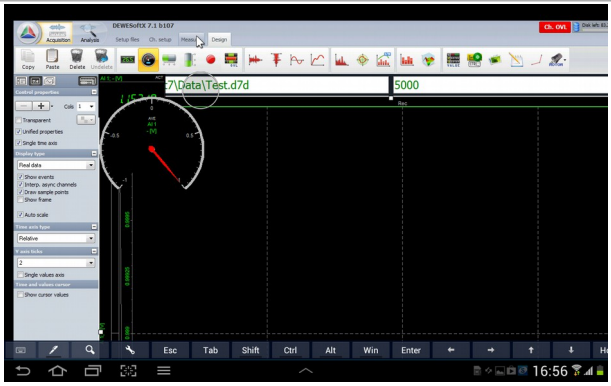

	

Illustration 201: VNC password	*Illustration 202: Active VNC Connection*

Click	Tap the screen
Double click	Double tab the screen
Right click	Long tab or two finger tab
Left mouse drag	2 quick taps and drag (don't lift your finger up after the 2nd tap - like on a trackpad)
Scroll Wheel	Two finger vertical swipe (up or down)
Zoom	Pinch the screen (2 fingers)
Quickly show or hide keyboard	Three finger tap

Table 40: Jump Desktop: Important gestures

7.2 Synchronisation

When acquiring data from multiple measurement channels, the degree to which the data of the different channels can be correlated to each other in time can be very important. If the data of the different channels is not synchronised, your analysis may be inaccurate or even completely wrong. The faster you acquire the data, the more important synchronisation becomes (e.g. when you only acquire one data point for a temperature measurement per minute for a relatively short measurement period, synchronisation to other measurement channels may be irrelevant).

Since this is such an important point, DEWESoft® offers you a wide range of possible ways to synchronise you data. To understand all the DEWESoft® features and settings, it is important to know the basics and the definition of the terms that are used in this discussion: so the following glossary should give us a sold foundation for the advanced topics that will follow.

When we talk about synchronisation in this chapter, we always mean inter-device-synchronisation between different measurement devices: e.g. between 2 SIRIUS systems or between SIRIUS and DEWE-43 or a DS-NET system, etc. Also the data from different channels and modules inside one measurement system are subject to synchronisation. This intra-device-synchronisation is usually very accurate and thus negligible.

7.2.1 Synchronisation Glossary

7.2.1.1 Sampling

The analogue signals that we want to measure are continuous time signals. Since all computer based systems are digital, we need to convert those continuous time signals to discrete time signals: this process is called sampling.
A sample refers to a value at a point in time.

The Illustration 203 shows the continuous analogue signal.

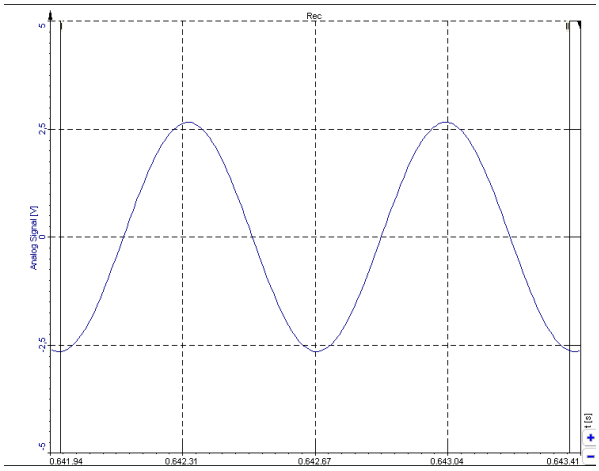


Illustration 203: Continuous signal

Illustration 204 below shows the sampled version of the signal in Illustration 203. The actual data consists only of the sampled points that you see. The lines in between the points are just interpolated.

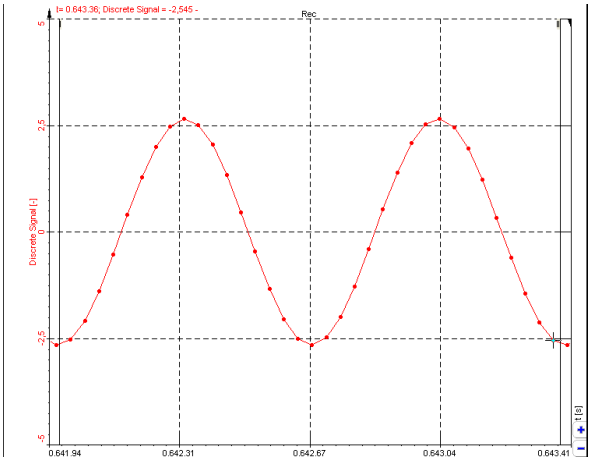


Illustration 204: Sampled (discrete) signal

Illustration 205 below shows another sampled version of the signal in Illustration 203. But in comparison to Illustration 204 we used a lower sample rate in this case. Because of the lower sample rate, we have fewer data points acquired and thus the interpolated signal does not resemble the original signal as good as Illustration 204 does.

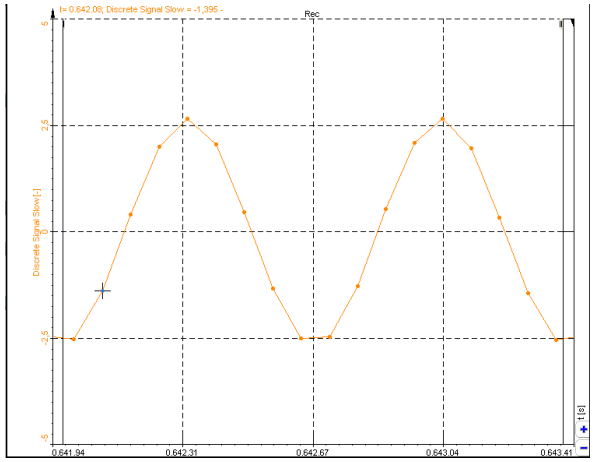


Illustration 205: Slower sampled (discrete) signal

The sampling rate (aka. sample rate, sampling frequency) defines the number of samples per second taken from the continuous signal to create the discrete signal. The unit for the sampling rate is hertz (Hz) .
The inverse of the sampling frequency is the sampling period or sampling interval, which is the time between samples.

7.2.1.2 Clock

A clock signal is a particular type of signal that oscillates between a high and a low state and is utilized like a metronome to coordinate actions.

E.g. each SIRIUS chassis has an internal clock. The sampling of the data-points is always correlated to this clock – so that the data-points of all channels (on all modules) refer to the same point in time[23].

23 Like all real-world devices also the clock generator of SIRIUS is not ideal. But this is negligible related to the sample rates.

7.2.1.3 Masterclock

Masterclock is a DEWESoft® term that refers to the main clock that is used to synchronize data and actions inside the DEWESoft® software.

Clockmaster is another DEWESoft® term that refers to the hardware device that provides the masterclock to DEWESoft®.

There are several possible source for the masterclock:

- whenever you have activated an analogue device (e.g. SIRIUS, DEWE-43) in DEWESoft® it will be used as clockmaster
- when you have no hardware devices activated at all, then the computer's clock will be used

In the example of Illustration 206 we have used one channel called *DEWE-43_Voltage* (from a DEWE-43 of course), one mathematical channel called *Math DEWE43-half* (which just divides the value of the *DEWE-43_Voltage* channel by 2) and one channel of a DS-NET called *V1*.

Since DEWE-43 is an analogue device (just like SIRIUS), it will be the clockmaster. The mathematical channel will be synchronized with the masterclock: thus the points ❶ and ❷ are perfectly aligned.

The channels of the DS-NET system are of course asynchronous in this case, thus the data point ❸ is not aligned to the synchronous channels.

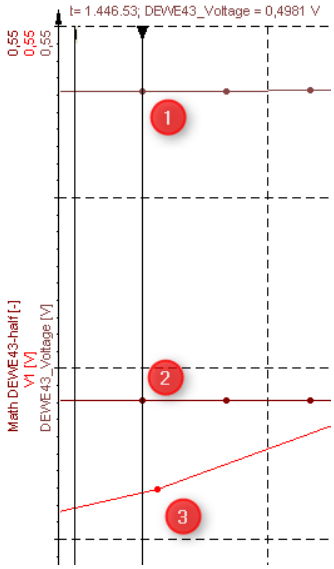


Illustration 206: Masterclock

7.2.1.4 Sampling jitter

The sampling frequency is normally assumed to be constant. Samples should be converted at regular intervals.

In real-world application this can not be achieved. The error introduced is called sampling jitter, which describes the time variation of the real clock in relation to the ideal clock.

7.2.1.5 Sync / Async channels

In DEWESoft® there are 2 fundamentally different types of channels: synchronous (e.g. analogue data) and asynchronous (e.g. CAN data) channels.

Synchronous channels always have exactly one data point related to the masterclock and the time between 2 adjacent data points is always constant.

In the example below you can see 3 synchronous channels and that the data points of all the channels are perfectly aligned to each other.

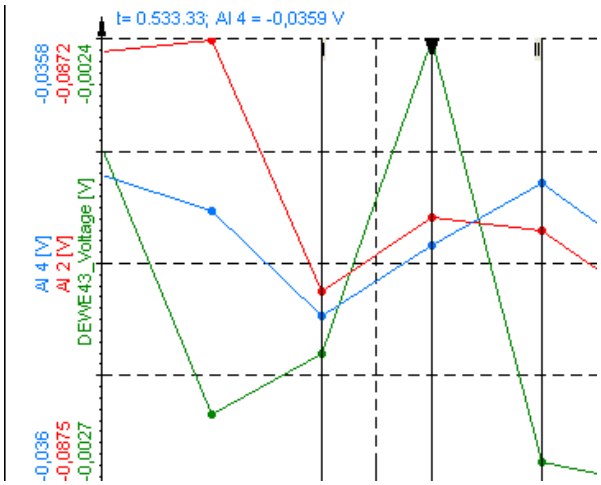


Illustration 207: Synchronous channels

Asynchronous channels may have data points at any instant of time and the time between 2 adjacent data points may vary.

In the example below you see the green signal which is a synchronous channels of a SIRIUS (which is clock master) and 3 channels from 3 different DS-NET systems which are of course asynchronous. When you take a look at he black line denoted with ❶ in Illustration 208 you can see that the asynchronous data points are not aligned to the green synchronous data points and also not aligned to each other.

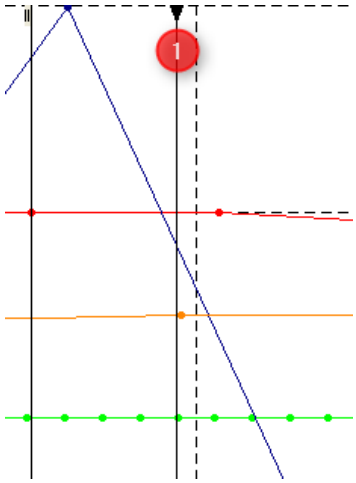


Illustration 208: Asynchronous channels

Sync channels are much easier to handle because of the fact that the time between all their data points is equal. This also makes some computations much easier (which means, that CPU power is much lower).
E.g. displaying sync channels in a recorder is easy, but displaying asynchronous channels in a recorder requires many more calculations and thus much more CPU power (because we need to calculate the right horizontal position for each data point).

Some functions in DEWESoft® only work with synchronous channels: e.g. in the channel list of the FFT or scope screen only sync channels will show up – async channels cannot be used.

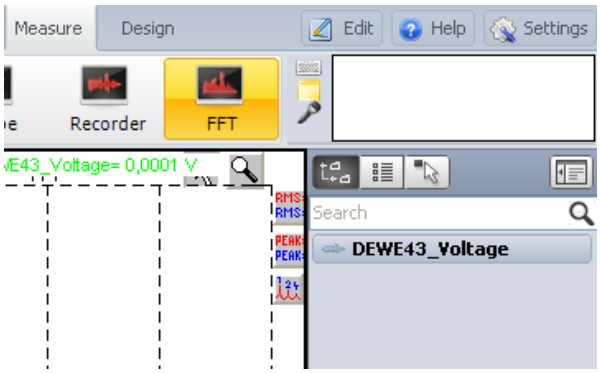


Illustration 209: FFT screen: only sync channels

In the recorder screen you can also use async channels. The Illustration 210 shows the Recorder screen with the same channel setup as Illustration 209.

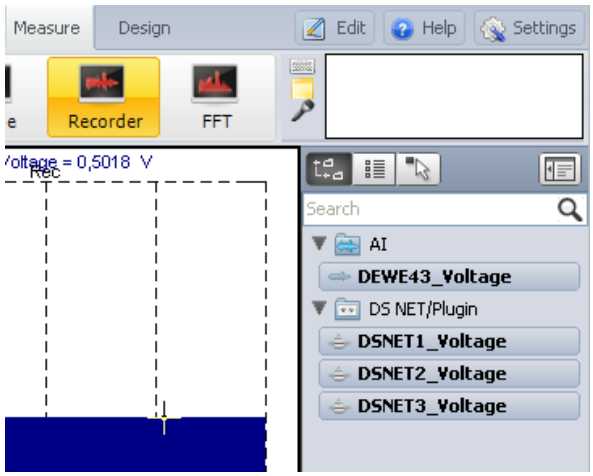


Illustration 210: Recorder screen: also async channels

7.2.2 Sync options

When you have several measurement systems, each of those systems has it's own internal clock (e.g. 2 SIRIUS systems). Since no real-world hardware is perfect the 2 clocks will run at slightly different speeds and thus will drift more and more apart from each other.

Hardware synchronisation

The best way to synchronise the clocks of several devices is to use some sort of hardware synchronisation (e.g. a synchronisation cable) that transmits a signal that can be used by the devices to synchronise their clocks to each other.

You can synchronize SIRIUS systems to each other or also to other devices (e.g. DEWE-43, DS-NET).

Note that the hardware synchronisation function is not related in any way to the setting of the clockmaster.

No synchronisation

If you use no synchronisation at all the time shift between the signals of the 2 devices will become bigger and bigger the longer the measurement takes.

At the beginning of the measurement the 2 signals will be very good aligned. In Illustration 211 you can only see one of the signals, because the second one is exactly the same and thus hidden behind the red one.

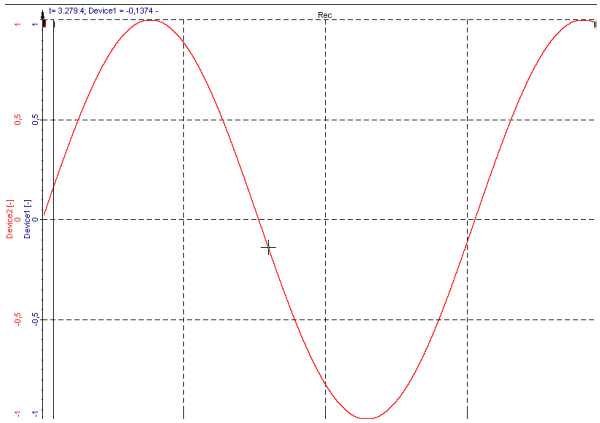


Illustration 211: No sync: start of measurement

After some time (depending on the relative clock drift of the 2 devices), you will see that the signals are not perfectly aligned any more...

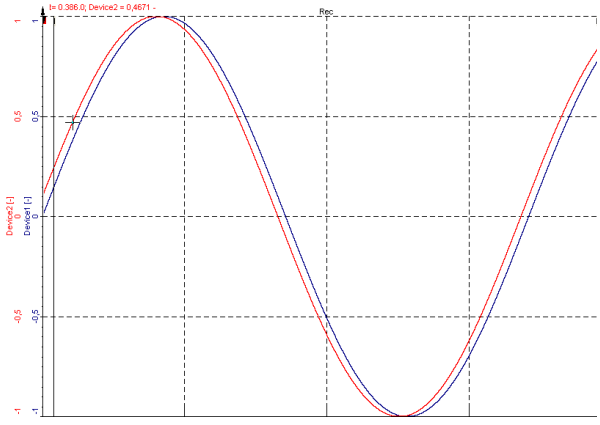


Illustration 212: No sync: small offset

...and the longer the measurement takes, the worse the offset will become.

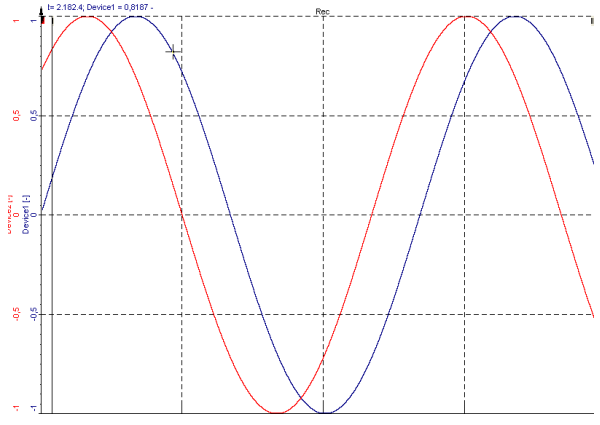


Illustration 213: No sync: big offset

Software synchronisation

When the data that we get from asynchronous devices includes also a time-stamp, DEWESoft® can do a so called *software synchronisation*. In this case, the channels will still be asynchronous and will have a time delay relative to other synchronous channels, but at least the time-drift will stay almost constant.

The DS-NET plug-in will always use soft sync for asynchronous channels.

Illustration 214 shows 3 channels of 3 different DS-NET systems. DSNET1 and DSNET2 are connected via hardware sync cables (DSNET3 is not).
We do not use any analogue device.

You can see that the channels of the synchronised systems DSNET1_Voltage, DSNET2_Voltage are perfectly aligned to each other and the the asynchronous channel DSNET3_Voltage of the 3rd (not hardware-synchronised) system is delayed by some milliseconds (which is often acceptable when you are measuring slow signals).

Even if you leave that measurement running for days and weeks, the time drift will stay almost constant.

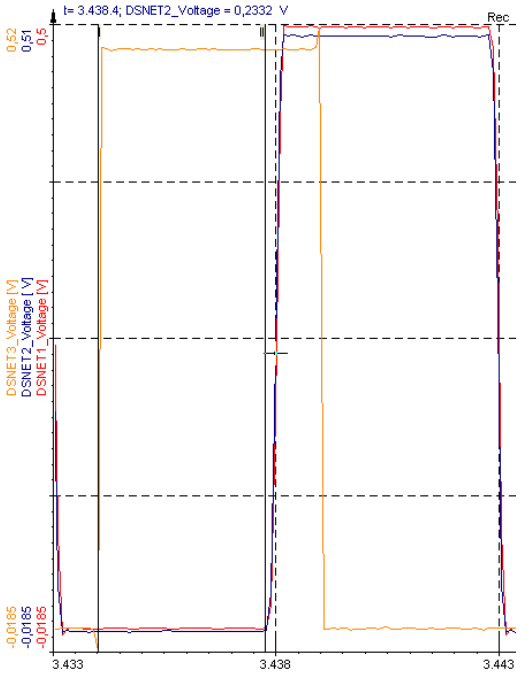


Illustration 214: Soft sync

7.2.2.1 One PC and 2 SIRIUS chassis

In this case you must connect your SIRIUS chassis systems with special synchronisation cables (see Illustration 215). The cables have 4 pin *Lemo* connectors which fit into the *SYNC* connectors on the back side of the SIRIUS chassis (see Illustration 21 on page 15).

These cables can be ordered as options to your SIRIUS system under the following designations: SYNC-CBL-05M (0.5m length), SYNC-CBL-3M (3m length).

Illustration 215: HW-sync cable

7.2.2.2 Several PCs and SIRIUS systems

When you want to use several PCs you need to activate the DEWESoft® NET option in *slave mode* on each measurement PC.
With one more client PC running DEWESoft® with the NET option configuration as master measurement unit, you can connect to any of the measurement PCs, take a look at the data and even reconfigure the DEWESoft® settings of the measurement PC.

When you want to connect to several measurement PCs at the same time (e.g. to store the data in one file), then you need some sort of very exact synchronisation between the measurement PCs. This is very important, because since no clock is perfect the clocks of the measurement PCs would diverge over time and the data that you collect over the NET option would not be synchronous!

Please consult the DEWESoft® online help for all *Timing* options.

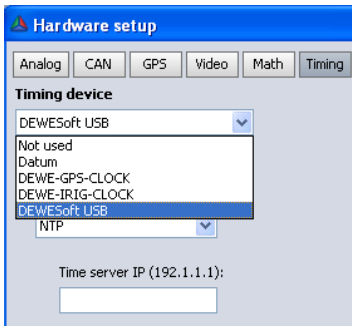


Illustration 216: Hardware setup: Timing

8 Appendix

8.1 Glossary and abbreviations

This glossary includes explanations of some of the most important terms and abbreviations that are used in documentation.

Bit

Bit, the basic unit of information storage, a single binary digit that is either 0 or 1.

see also Baud (Bd)

Baud (Bd)

is synonymous to symbols per second per second. It is the unit of symbol rate, also known as baud rate or modulation rate; the number of distinct symbol changes.

A baud rate, by definition, means the number of times a signal in a communications channel changes state or varies.

EXAMPLE 3 	A 2400 baud rate means that the channel can change states up to 2400 times per second.

This is often confused with the bit rate (expressed in bit/s), which is related, but may be different.
The number of bit per baud is determined by the modulation technique.

EXAMPLE 4 	If we use a baud rate of 2400,and a phase modulation (which can transmit four bits per baud), this means that we can transfer 9600 bit/s. 2400 baud x 4 bits per baud = 9600 bps

The baud rate (communication speed) between the DS GATE and the measurement modules can be configured via software.

CJC

Cold junction compensation.

Thermocouples measure the temperature difference between two points, not absolute temperature. To measure a single temperature one of the junctions - normally the cold junction - is maintained at a known reference temperature, and the other junction is at the temperature to be sensed.

Having a junction of known temperature, while useful for laboratory calibration, is not convenient for most measurement and control applications. Instead, they incorporate an artificial cold junction using a thermally sensitive device such as a thermistor or diode to measure the temperature of the input connections at the instrument, with special care being taken to minimize any temperature gradient between terminals. Hence, the voltage from a known cold junction can be simulated, and the appropriate correction applied. This is known as cold junction compensation.

dB

The decibel (dB) is a logarithmic unit that indicates the ratio of a physical quantity (usually power or intensity) relative to a specified or implied reference level. A ratio in decibels is ten times the logarithm to base 10 of the ratio of two power quantities.

Dewesoft

Dewesoft refers to the company.

DEWESoft® refers to the software suite for data acquisition, data processing, data analysis and much more.

see www.dewesoft.com

DEWE-43

Dewesoft's hand-held USB measurement instrument (perfect for use with a laptop) can measure with sample rates up to 200kS/s per channel. It has 8 analogue inputs, 8 counter inputs, 24 digital inputs and 2 CAN ports.
This hand-held instrument is most flexible to acquire signals like voltage, current, temperature, strain, vibration, pressure and more. Perfect to do recording, signal analysis, machine analysis, FFT and reporting.

The DEWE-43 can be hardware synchronised with SIRIUS and DS-NET systems.

Illustration 217: DEWE-43

Dynamic Range

Dynamic Range is the ratio of a specified full scale input range to the to the minimum detectable value (peak spurious signal). The value for dynamic range is expressed in decibels (dB).

DSP

A digital signal processor (DSP) is a specialized microprocessor with an optimized architecture for the fast operational needs of digital signal processing.

The measurement modules use DSPs to process the the measured data.

FFT

Fast Fourier transformation (FFT) can be used to show the frequency components of the acquired signals in amplitude and frequency. DEWESoft® has a built-in visual control that makes FFT easy to use.

FPGA

A field-programmable gate array (FPGA) is an integrated circuit designed to be configured by the customer or designer after manufacturing: hence *field-programmable*.

GND

the electrical ground (aka. earth)

GPS

The Global Positioning System (GPS) is a space-based global navigation satellite system that provides reliable location and time information in all weather and at all times and anywhere on or near the Earth when and where there is an unobstructed line of sight to four or more GPS satellites.

Hz

The hertz (symbol: Hz) is the SI unit of frequency defined as the number of cycles per second of a periodic signal.

IRIG-B

The Inter Range Instrumentation Group (IRIG) is the standards body of the Range Commanders Council (RCC). They publish a number of standards: e.g. IRIG timecodes The different timecodes defined in the Standard have alphabetic designations. A, B, D, E, G, and H.
IRIG-B has a Bit rate of 100 Hz.

LED

A light-emitting diode is a semiconductor light source.

It is used in all modules of the SIRIUS system to indicate the status of the modules.

LEMO

LEMO is the name of the high quality push-pull connectors that are used for cable connections: e.g. the power-supply cable and the sync cables of the SIRIUS system. The company that produces these connectors is also called LEMO (www.lemo.com)

Microsoft®

Microsoft® Corporation is a public multinational corporation head-quartered in Redmond, Washington, USA that develops, manufactures, licenses, and supports a wide range of products and services predominantly related to computing through its various product divisions.

DEWESoft® is a Windows®-based application and thus a Windows® operating system must be installed on the measurement PC where DEWESoft® is installed.

see www.microsoft.com

NET Option

aka. DEWESoft NET, DEWE NET

With DEWE-NET your measurement system can be controlled remotely with ease of use you couldn't imagine before. DEWE-NET also serves as the centre of Distributed Data Acquisition systems where you have multiple systems located either together or scattered across an entire continent. IRIG and GPS time will take care that data will stay synchronized, no matter how long the acquisition runs.

OS

An operating system (OS) is a set of system software running on a device that manages the system hardware.

This may refer to the operating system of a PC (Windows is required for DEWESoft®) or to the operating system of the SIRIUS system.

PC

SIRIUS systems are typically connected to a Personal Computer which runs DEWESoft® to fetch the measurement data.

See also: Host System

RMS

Root Mean Square (RMS), also known as the quadratic mean, is a statistical measure of the magnitude of a varying quantity. It is especially useful when variates are positive and negative, e.g., sinusoids. RMS is used in various fields, including electrical engineering.

RTD

Resistance thermometers, also called resistance temperature detectors or resistive thermal devices (RTDs), are temperature sensors that exploit the predictable change in electrical resistance of some materials with changing temperature; e.g. Pt100 and Pt1000

SNR

Signal to Noise Ratio (SNR) is the ratio of the RMS value of the full scale input range to the total RMS noise measured with the inputs shorted together. The value for SNR is expressed in decibels (dB).

SNTP

Simple Network Time Protocol (SNTP) is a protocol for synchronizing the clocks of computer systems over packet-switched, variable-latency data networks. It is a simpler and less accurate version of the Network Time Protocol (NTP).

Synchronisation cable

These synchronisation cables can be used to synchronise several SIRIUS chassis with each other: see 7.2 Synchronisation for details.

USB

Universal Serial Bus is a specification to establish communication between devices and a host controller (usually PCs).

SIRIUS systems use a USB connection to connect to a PC.

Windows®

A PC operating system by Microsoft®. DEWESoft® will work on Windows® XP, Windows® Vista and Windows® 7. Windows® is a registered trademark of Microsoft Corporation in the United States and other countries.

8.2 Documentation version history

Revision number: 779
Last modified: Sun 19 Apr 2015, 12:59

Version	Date [dd.mm.yyyy]	Notes
1.0.0	26.11.2011	☑ initial revision ☑ changes to orig. wiring image: counter voltage is 12V (instead of 15V) ☑ changes to orig. wiring image: CAN voltage is 15V (instead of 12V)
1.0.1	04.12.2011	☑ Added bridge ranges of MULTI8 ☑ corrected Illustration 62: SIRIUS-MULTI8 pin-out DSUB-15 (pin 12) ☑ updated/corrected module specifications ☑ updated Illustration 53: SIRIUS chassis: connectors on the back side ☑ removed STG module ☑ corrected captions of: Illustration 61: SIRIUS-MULTI8 and Illustration 63: SIRIUS-HV8
1.0.2	04.12.2011	☑ Added bridge connection diagrams
1.0.3	16.01.2012	☑ Corrected text of Bridge measurement tables ☑ Corrected typical power consumption: Table 7: SIRIUS-ACC8 specifications ☑ Added chapter about 'Isolation'
1.0.4	12.03.2012	☑ Added 3.3.1.1 Troubleshooting ☑ Corrected module overview: MULTI module does not have digital output
1.1.0	01.12.2012	☑ Intermediate version for VOLVO - only STG modules! ☑ added STG-M pin-out ☑ added STG8 modules ☑ major changes to chapter 5 SIRIUS Hardware ☑ added new chapter 6.1 Wireless Connection# ☑ updated to DEWESoftX 7.1 (screenshots, installation info)
1.1.1	21.12.2012	☑ Major changes ☑ added ACC, HV, MULTI, STGM ☑ added STG LEMO10 ☑ STG-LEMO7: pinnings were wrong ☑ updated specifications
1.1.2	15.03.2013	☑ Added STGM+ ☑ 4.7 DS-BP2: Battery Pack: added weight ☑ ACC+: added connector article numbers ☑ SNR → Typ. SNR
1.1.3	16.03.2013	☑ STGM: Typ. SNR for 10 V range (Dual Core) is now 125dB (was 119dB). ☑ Corrected caption of Illustration 59 (was *back side*) ☑ added: 4.6.3.2 S-BOX: GPS connector ☑ removed *Excitation Voltage* from: Table 6: SIRIUS-ACC8 specifications ☑ changed counter specification tables for ACC+ and STGM+ to show values per module, STGM+: removed digital output from specs table
1.1.4	20.06.2013	☑ STG specifications enhanced ☑ Analogue-out specifications updated

Version	Date [dd.mm.yyyy]	Notes
1.2.0	14.08.2013	☑ Added Rack version Sirius R8 ☑ Renamed modules and slices according to new naming conventions ☑ Added fanless S-BOX ☑ Added 4.7.1 DS-BP-2 Dimensions ☑ Added DS-BP-4 ☑ Added new modules incl. HD and HS series ☑ Module Specifications table now spans 2 pages ☑ Changed External Loop Powered Shunt Screenshots ☑ Added chapter for Accessories
1.2.1	09.09.2013	☑ Updated to Open Office Writer version 4.0 ☑ Removed most frames around images ☑ Corrected VGA and GPS connectors of SBOX-R8 rear-side
1.2.2	02.12.2013	☑ Update to Lemo Counter sections ☑ Counter pin 4 is now DO ☑ added Counter Output Configuration ☑ Added 5.11.2 STGS+ (Counter) L1B7f ☑ Added STGM-DB, STGM-L2B16f, HD-STGS-L1B10f ☑ Updated specifications
1.2.3	24.03.2014	☑ Added Counter Information to *5.5. General Specifications* ☑ Corrected info about Power-On switch for the Power connector of the S-BOX ☑ Added Pin-out for DS-BPx ☑ Added Option to GPS connectors ☑ Updates Module Specifications: more details for Input Accuracy (Gain and Offset are now separated), updated Current Limits ☑ STGS is now called STGMv2 ☑ SIRIUS-SBOX is now called SIRIUS-SBOX2 ☑ Flash32 is now Flash120 ☑ SSD: 240GB is now standard (960GB option)
1.3.0	13.11.2014	☑ New orange logo and style ☑ *non-isolated* is now called *differential* ☑ Added CHG, LV, HD-ACC, HS-CHG, HS-HV, HS-LV, HS-STG ☑ Replaced STGM with STGMv2, HV with HVv2 and STG with STGv2 ☑ Added SIRIUS-R2D, SIRIUS-R8D, updated SIRIUS-R8 ☑ Corrected specs ☑ HS-ACC (sampling rate) ☑ MULTI: Bridge Ranges ☑ HD-LV: ADC type, Over-voltage Protection ☑ HD-STGS: ADC type, Bridge Ranges, Exc. Voltage, removed Counters ☑ Analogue-out: bandwidth ☑ Expanded general specifications ☑ SBOXx-GPS: removed 1Hz: all others are optional ☑ Added power connector pins and mating connectors
1.3.1	23.01.2015	☑ Added HD-ACC module ☑ Added HD-LV BNC ☑ Updated Specs: LV2 , Multi, STGv2, STGMv2, HS-ACC, HS-CHG, HS-STG
1.4.0	18.04.2015	☑ Added EtherCAT® information