DEWESoft®
measurement innovation

Krypton™
Technical Reference Manual
Version: 1.0.0

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

Table Of Contents

1 Notice....1
1.1 Safety instructions....2
2 About this document....7
2.1 Legend....7
2.2 Online versions....8
2.2.1 Krypton™ Technical Reference Manual....8
2.2.2 DEWESoft® tutorials....8
3 Getting Started....9
3.1 Software installation....9
3.1.1 DEWESoft® installation....9
3.2 Connecting Krypton™....9
3.2.1 Daisy chain Krypton™ slices....9
3.2.2 Power Connection....9
3.2.3 Data connection....10
3.3 DEWESoft®....10
3.3.1 Online Help....10
3.3.2 DEWESoft® Settings....11
3.3.3 Channel Setup....12
3.3.4 Measure mode....13
3.4 Troubleshooting....13
4 Connection Overview....15
4.1 Power Connection....15
4.1.1 SIRIUS EtherCAT®....15
4.1.2 Sirius® USB....15
4.1.3 Krypton™ Power Supply....15
4.1.4 ECAT Power Junction....15
4.1.5 Other Power Cables....16
4.2 Sync Connection....16
4.2.1 No Sync....16
4.2.2 SIRIUS EtherCAT®....16
4.2.3 ECAT Sync Junction....17
4.3 Connection Examples....17
4.3.1 Krypton™ only....18
4.3.2 EtherCAT® only....19
4.3.3 Sync Junction....20
4.3.4 Power Junction....21
4.3.5 Sirius® USB and Single Krypton™....22
4.3.6 Sirius® USB synced with Krypton™....23
5 Measurement Slices....25
5.1 EtherCAT®....25
5.1.1 Standard EtherCAT® features....25
5.1.2 DS-EtherCAT+....25
5.1.3 Data Transfer Combinations....26
5.2 Krypton™ Specifications....27
5.2.1 General Specifications....27
5.2.2 Krypton™ Slice Specifications....27
5.3 TH: Thermocouple....28
5.3.1 TH: Specifications....28
5.3.2 Kryptoni-8xTH....28
5.3.3 Kryptoni-16xTH....29
5.3.4 Sensor Break Detection....29
5.4 LV: Low Voltage....30
5.4.1 LV: Specifications....30
5.4.2 Kryptoni-4xLV....30
5.4.3 Kryptoni-8xLV....31
5.5 STG: Strain Gauge....32
5.5.1 STG: Specifications....32

5.5.2 Krypton-3xSTG....33
5.6 DIO: Digital Input/Output....36
5.6.1 DIO: Specifications....36
5.6.2 DIO connectors....37
5.6.3 Kryptoni-16xDI....37
5.6.4 Kryptoni-8xDI-8xDO....37
5.6.5 Kryptoni-16xDO....37
6 Hardware overview....39
6.1 Enclosure....39
6.1.1 EtherCAT® connector: 8-pin Lemo....39
6.1.2 Mechanical Locking of Slices....39
6.2 LEDs....40
6.2.1 INIT state....40
6.2.2 PRE-OP state....40
6.2.3 SAFE-OP state....40
6.2.4 OP state....40
6.3 Dimensions....41
6.3.1 Single Slice....41
6.3.2 Dual Slice....41
7 Service Guide....43
7.1 Firmware upgrade....43
7.1.1 Preparation....43
7.1.2 Start the Firmware upgrade....44
8 Appendix....47
8.1 Glossary and abbreviations....47
8.2 Documentation version history....51

1 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 scroll down to the *Worldwide distributors* list to find a dealer in your country or region.

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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Printing History:

Version 1.0.0, Revision 192
Released 2015
Last changed: 23. November 2015 11:45

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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 Krypton™ Version 1.0.0.

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 slices using DEWESoft®
- Technical data

Only DEWESoft® Version X2-SP4 or higher support Krypton™.

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 Krypton™ Technical Reference Manual

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

http://www.dewesoft.com/download

In the *Manuals & Brochures* section click the download link for the *Krypton users manual*.

Also check the Krypton™ product page for updates: http://www.dewesoft.com/products/krypton

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 *Manuals & Brochures* section click the download link of the *DEWESoft X1 user manual* entry.

3 Getting Started

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

To follow these steps, you need the following items:

- your brand new Krypton™ system (included in the shipment)
- your Krypton™ USB stick (included in the shipment)
- your PC with Windows® 7 or higher

3.1 Software installation

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

3.1.1 DEWESoft® installation

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

Krypton™ is supported in DEWESoft® X2 or higher.

Attach the Krypton™-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 `DEWESoft_FULL_X2_SP4.exe`. Then just follow the steps of the Install-wizard.

HINT 	When you read this document there may already be a newer version of the installer available. Then the file-name may vary: e.g. `DEWESoft_FULL_X2_SP5.exe`, `DEWESoft_FULL_X3.exe`, etc.

3.2 Connecting Krypton™

3.2.1 Daisy chain Krypton™ slices

When you use more than one Krypton™ slice, you should first daisy chain the Krypton™ slices. The daisy chain cables transfer power, data and synchronisation.

3.2.2 Power Connection

Connect power (6-50V_{DC}) to your Krypton™ device. There are several options for the power connection (see 4.1 Power Connection on page 15 for details).
Connect the power supply cable to the one-and-only free OUT connector of the Krypton™ slices.

HINT 	When you connect the power to a single Krypton™ slice and no other cables are connected, then none of the LEDs will be on. As soon as you also establish a data-connection (e.g. to another Krypton™ slice or to the PC), a LED should be on: see 6.2 LEDs on page 40 for details

3.2.3 Data connection

To establish the data-connection attach the data-cable to the one-and-only free IN connector of the Krypton™ device/s and the RJ45 connector directly to the Ethernet card of your PC (where DEWESoft® is installed). Note: Since EtherCAT® is compatible to Ethernet, any standard Ethernet card should work.
As soon as you have connected the data-cable the *L*-LED will be active: see 6.2 LEDs on page 40.

HINT	
	Make sure to connect the data-cable directly to the Ethernet card of your PC. Do not use any switches or hubs.

3.2.3.1 Launcher

Now, that we have connected all the cables (daisy chain, power, data) to the Krypton™ slices and the PC, the DEWESoft® launcher will automatically pop-up and show the connected devices. Then just click on the **Run Dewesoft…** button:

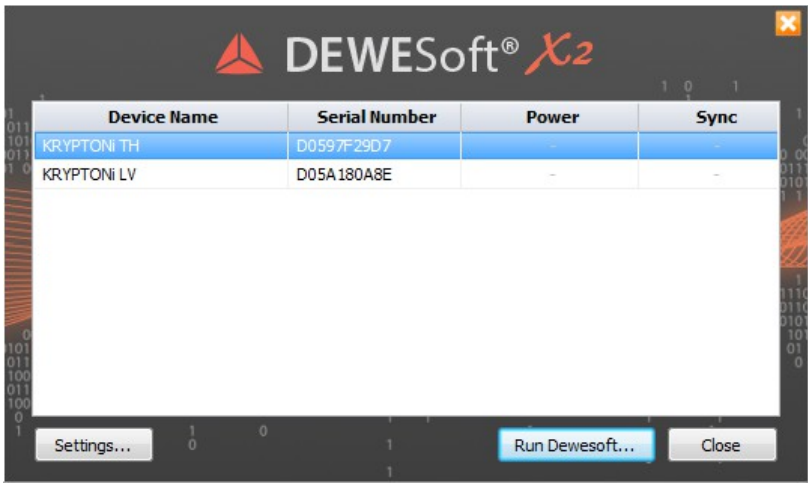


Illustration 1: DEWESoft® Launcher

3.3 DEWESoft®

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

3.3.1 Online Help

Note that this chapter 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. Note, that there are also other interesting items: *Tutorials* will open the DEWESoft® Tutorials document and *Dewesoft home page* will open the DEWESoft® web-page in your browser.

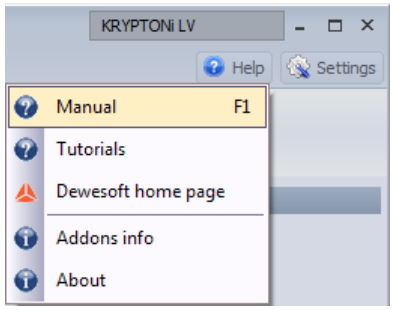


Illustration 2: Help Menu

3.3.2 DEWESoft® Settings

The connected devices will show up in the DEWESoft® settings. Click on the **Settings** button at the right top ❶, and then on the **Settings** item ❷ in the pop-up to open the DEWESoft® settings dialogue.

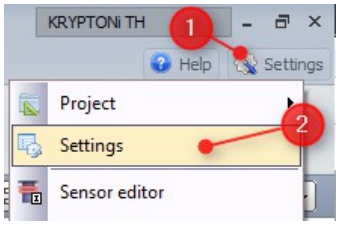


Illustration 3: DEWESoft® settings

In the *Devices* section, you can see the connected Krypton™ slices. When you select one of them, the properties pane at the right will show the related data: e.g. Serial number, Firmware version, etc.

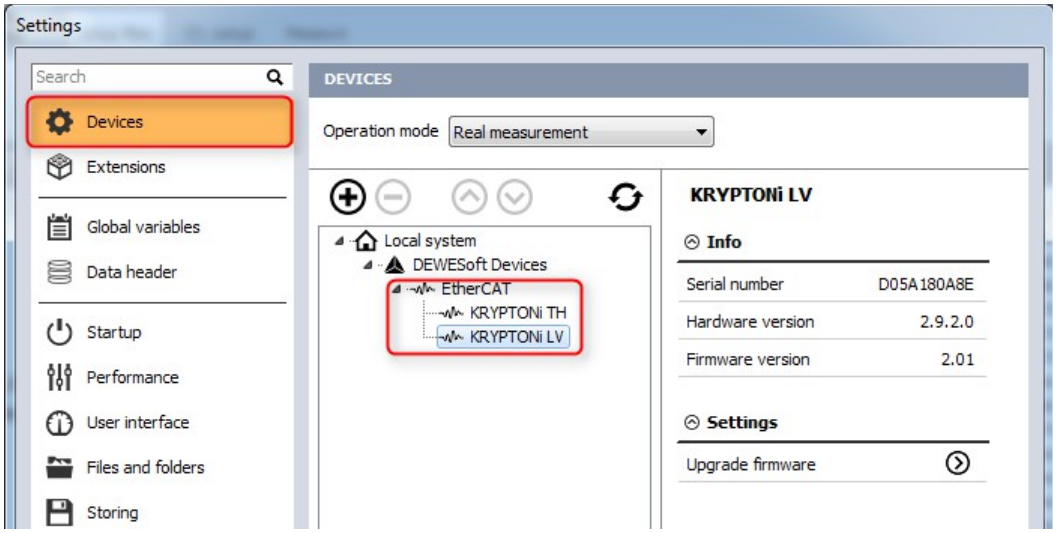


Illustration 4: DEWESoft® settings: Devices

3.3.2.1 Licensing

As soon as you activate any Krypton™ slice, DEWESoft® will be licensed and you are ready to go (the license information is stored in the Krypton™ device). No need for any online or offline licensing.

3.3.3 Channel Setup

In the channel setup you can see a preview of the connected devices on the left side. Note: When you click on a connector in the image ❷ the corresponding channel in the *Channel setup grid* will automatically be selected ❸. This also works the other way around: when you select a channel (or multiple channels) in the setup grid, the corresponding connectors in the image will be highlighted.

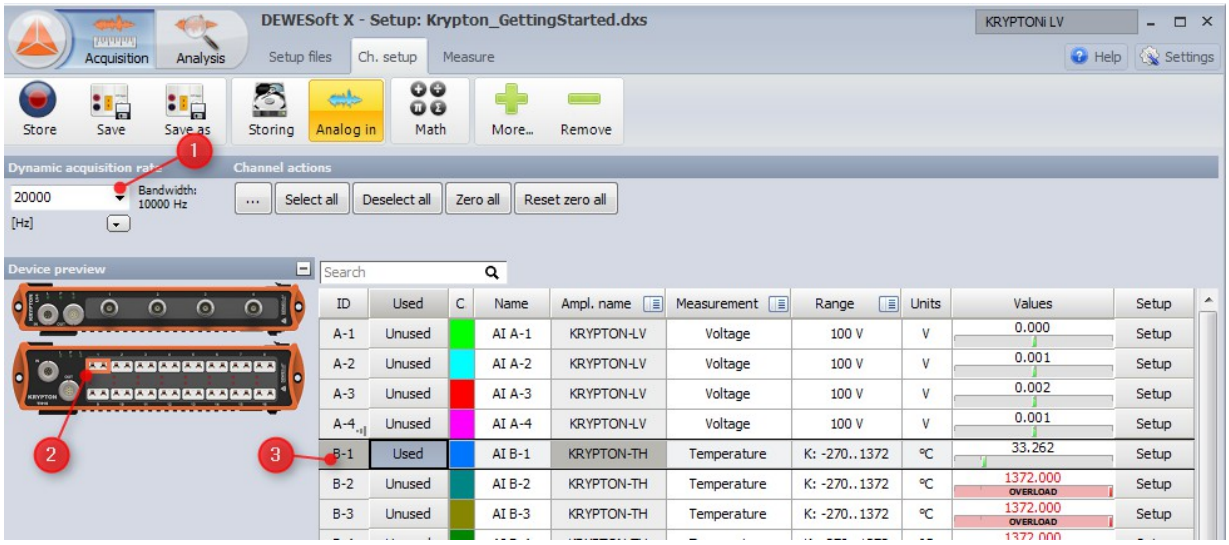
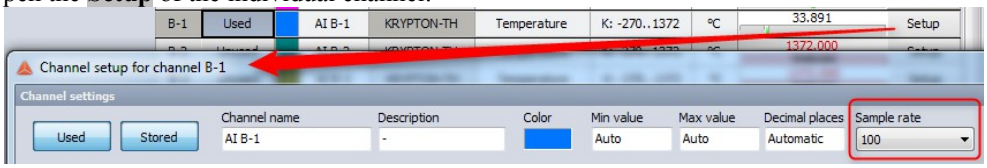


Illustration 5: Channel Setup

The sampling rate (❶) will be set for all connected Krypton™ slices: of course only up to the max. sampling rate of the individual slices.

EXAMPLE 1

In Illustration 5 you can see that we have an LV slice (which has a sampling rate of max. 20kHz) and a TH slice (which has a max. sampling rate of only 100Hz).
In the Dynamic acquisition drop-down menu (❶), you can select sampling rates up to the highest supported sampling rate of the connected slices: 20kHz in our example.
Since the TH slice has a max. sampling rate of 100Hz, the 20kHz setting is of course ignored and the sampling rate of the TH channels will be set to 100Hz. You can see this when you open the **Setup** of the individual channel:



3.3.4 Measure mode

Finally, we click on **Measure** and will immediately see the measurement data in the default recorder screen:

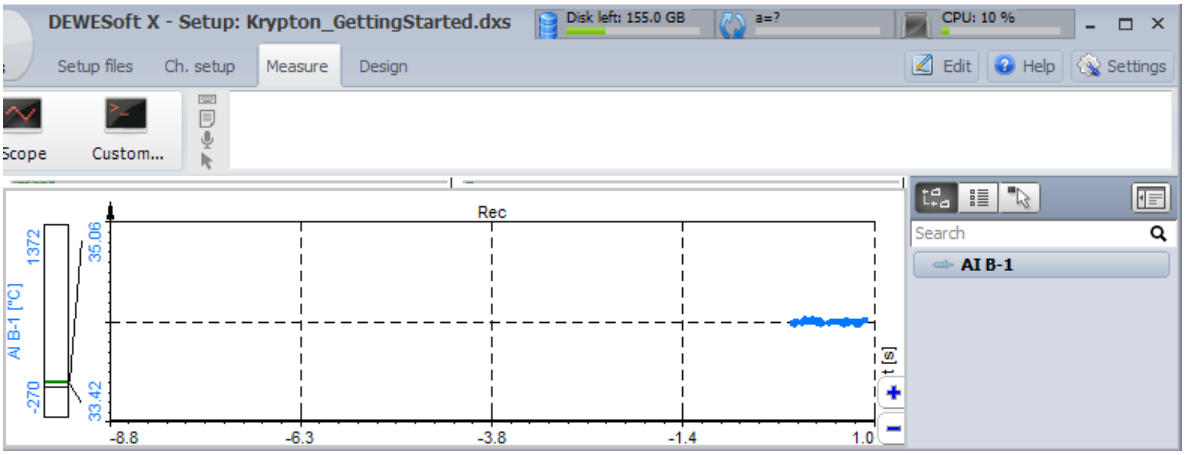


Illustration 6: Measure Mode

3.4 Troubleshooting

Krypton™ device not found by DEWESoft®

- If you did not restart Windows® after the DEWESoft® installation, restart now
- Make sure, that you have started DEWESoft® version X2 or higher
- Make sure that the Krypton™ power supply is connected and okay (check the LEDs: see 6.2 LEDs on page 40)
- Check your LAN settings
- Try to restart DEWESoft®
- Try to restart the PC
- Contact support@dewesoft.com

4 Connection Overview

Depending on your measurement requirements and which other Dewesoft hardware you use, there are different options to provide power and synchronisation to your Krypton™ slices.

4.1 Power Connection

This chapter describes the different ways how you can provide power to your Krypton™ slice/s. The Krypton™ supply voltage must be 6-50V_{DC}.

4.1.1 SIRIUS EtherCAT®

The Sirius® EtherCAT® devices (i.e. SIRIUS-SBOX*we*, SIRIUS*ie*, etc.) have an 8-pin Lemo connector that can provide power, data and sync for the Krypton™ slices. So you can simply use any of the ECAT-to-ECAT expansion cables (e.g. *L1T8m-L1T8f-04M*).
For a detailed example see chapter: 4.3.2 EtherCAT® only on page 19.

4.1.2 Sirius® USB

When you use Krypton™ together with Sirius® USB slices in one measurement, then Krypton™ can be powered directly from the *Power OUT* connector of a Sirius® USB slice via a Sirius®-to-Krypton™ power cable: e.g. article number: e.g. *L1T8m-L1B2m-1M*.
For a detailed example see chapters: 4.3.5 Sirius® USB and Single Krypton™ on page 22, 4.3.6 Sirius® USB synced with Krypton™ on page 23

4.1.3 Krypton™ Power Supply

The *Krypton™ Power Supply* is available as an option in our web-shop.: Article number: *PS-120-L1T8m*. You can connect the LEMO 8-pin connector of the *Krypton™ Power Supply* directly to the OUT connector of the Krypton™ slice. For a detailed example see: 4.3.1 Krypton™ only on page 18.

Output Voltage	24V_{DC}
Current	5A
Power	120W
Connector	LEMO 8 pin male *L1T8m*
Article number	*PS-120-L1T8m*

Table 2: Krypton™ Power Supply Specifications

4.1.4 ECAT Power Junction

The *ECAT Power Junction* box (article number: *ECAT-POWER-JUNCTION*) can be used to inject power into the Ethernet connection between your PC and the Krypton™ slices: so that you only have one cable for power and data to your Krypton™ slices. For a detailed example see: 4.3.4 Power Junction on page 21

Illustration 7: Power Junction Box

Connector Label	Connector type	Info
POWER IN	2-pin LEMO	9-48V_{DC}: e.g. for connection from the Power-Out connector of a Sirius® slice
Ethernet	RJ-45	Ethernet data connection to your PC The Ethernet cable should always be shielded! You can use an EIA568-B straight or crossover cable.
EtherCAT®	8-pin LEMO	Power and Data connection to your Krypton™ slice/s use any of the ECAT to ECAT expansion cables (e.g. *L1T8m-L1T8f-10M*)

Table 3: Power Junction Box Specifications

4.1.5 Other Power Cables

When none of the options above match your requirement you can also order special power cables.

4.1.5.1 Cigarette Lighter

When you do some measurement in the car, you can also use the cigarette lighter as power source for your Krypton™ slice: Article number: *L1T8m-CIG-2M*.

4.1.5.2 Banana Connectors

When your power source has banana connectors, you can order the cable with article number: *L1T8m-BAN-2M*.

4.2 Sync Connection

Depending on your measurement you may want/need to provide a synchronisation signal to your Krypton™ devices.

4.2.1 No Sync

When you do not provide any synchronisation signal, then there are 2 cases to consider:

1. You do **NOT** use any other measurement device in DEWESoft® that provides the Master-clock (i.e. **NO** DEWE-43, Sirius®, GPS-timing, etc.)
   Then the Krypton™ channels will be synchronous channels
   for a detailed example see: 4.3.1 Krypton™ only on page 18

2. You do use Krypton™ together with another measurement device in DEWESoft® that provides the Master-clock (i.e. DEWE-43, Sirius®, GPS-timing, etc.)
   Then the Krypton™ channels will be asynchronous channels
   Note: even in this case the channels of all Krypton™ slices in the same EtherCAT® measurement chain will be synchronous to each other
   for a detailed example see: 4.3.4 Power Junction on page 21

4.2.2 SIRIUS EtherCAT®

The Sirius® EtherCAT® devices (i.e. SIRIUS-SBOX*we*, SIRIUS*ie*, etc.) have an 8-pin Lemo connector that can provide power, data and sync for the Krypton™ slices. So you can simply use any of the ECAT to ECAT expansion cables (e.g. *L1T8m-L1T8f-04M*) and the sync signal of the Sirius® EtherCAT® device will also be used by the Krypton™ slices.
For a detailed example see:4.3.2 EtherCAT® only on page 19

HINT

When you use a Sirius® USB slice and a SIRIUS-SBOX*we*, then you must connect the sync connector of the Sirius® USB slice to the sync connector of the SIRIUS-SBOX*we*, so that the same sync signal can be injected into the EtherCAT® signal for your Krypton™ slice/s.

4.2.3 ECAT Sync Junction

The *ECAT Sync Junction* box can be used to inject the sync signal into the EtherCAT® line. The source of the sync signal must be IRIG B DC: thus, the sync signal of Sirius® USB slices can be directly connected to the *ECAT Sync Junction* box.
for a detailed example see: 4.3.6 Sirius® USB synced with Krypton™ on page 23

Illustration 8: ECAT Sync Junction box

Connector Label	Connector type	Info
IN	8-pin LEMO	EtherCAT® input connector: e.g. connection to the PC via `L1T8f-RJ45-1M` cable
OUT	8-pin LEMO	EtherCAT® output connector to your Krypton™ slice/s use any of the ECAT to ECAT expansion cables (e.g. `L1T8m-L1T8f-10M`)
SYNC	4-pin LEMO	Input connector for the IRIG-B-DC signal (TTL level), e.g. external, or directly from Sirius® USB Note: the two SYNC connectors are directly connected, so you can use the other connector as output (to daisy-chain the same sync signal to other devices: e.g. DEWE-43, DS-CAM, etc.)

Table 4: Power Junction Box Specifications

4.3 Connection Examples

This chapter shows some connection examples to give an idea of what combinations are possible.

Illustration 9 shows the legend for the data signal line coding, that will be used throughout the examples.

A solid line means, that this cable has the power supply voltage. A dashed line means, that the cables has no power supply voltage.

Orange means, that the synchronisation signal is on the cable. Blue means, that the data is transferred over this cable.

Note: only the active signals will be shown: i.e. when you have an 8-pin EtherCAT® cable (which can transfer everything: Data, Sync and Power), but there is no sync signal active, the cable will be displayed as a solid blue line (since we have Power and Data).

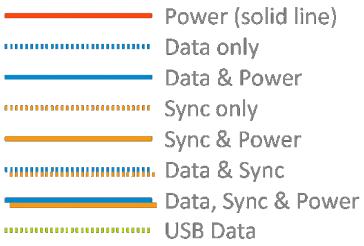


Illustration 9: Legend of Data Signals

4.3.1 Krypton™ only

When you use Krypton™ only for the measurement (i.e. not in combination with Sirius®, etc.), you can directly connect Krypton™ to your PC and you need a power supply. That's it. All Krypton™ channels will be synchronous.

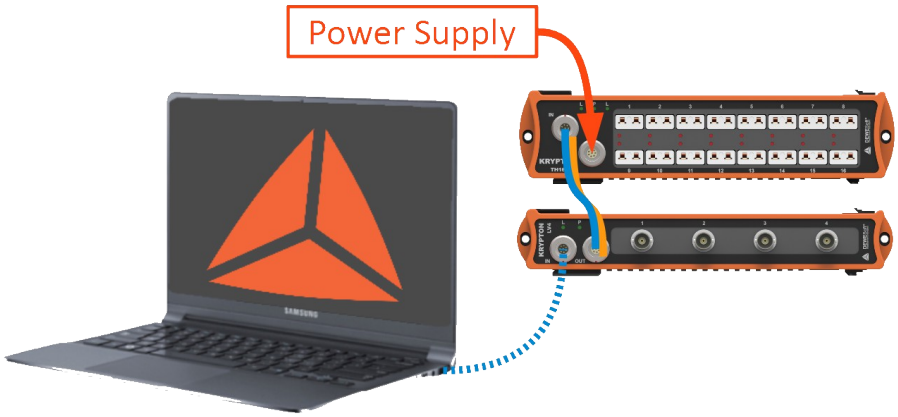


Illustration 10: Krypton™ only

Device Connector	Cable Image Type Art. Number-Example	Device Connector	Description
 PC RJ45	ECAT to PC *L1T8f-RJ45-1M*	 ECAT Sync Junction IN (8-pin LEMO)	Ethernet connection between DEWESoft® and the Krypton™ slice/s.
	DC-power supply cable *L1T8m-BAN-2M*	 Krypton™ slice OUT (8-pin LEMO)	Power input into the Krypton™ measurement chain.
 Krypton™ slice IN (8-pin LEMO)	ECAT to ECAT *L1T8m-L1T8f-02M*	 Krypton™ slice OUT (8-pin LEMO)	Data, Sync and Power connection between the Krypton™ slices.

4.3.2 EtherCAT® only

When you use DEWESoft® EtherCAT® devices only, the connection is straight forward. Just connect all devices via ECAT-to-ECAT cables.

Illustration 11: EtherCAT® only

Device Connector	Cable Image Type Art. Number-Example	Device Connector	Description
			Data, Sync and Power connection between the Krypton™ slices, the Sirius® EtherCAT® slice and the Sirius® EtherCAT® S-BOX.
DS-EtherCAT® device IN (8-pin LEMO)	ECAT to ECAT *L1T8m-L1T8f-02M*	DS-EtherCAT® device OUT (8-pin LEMO)	

4.3.3 Sync Junction

The Sync Junction box can be used to join the Ethernet and the Sync lines in a single 8-pin ECAT cable:

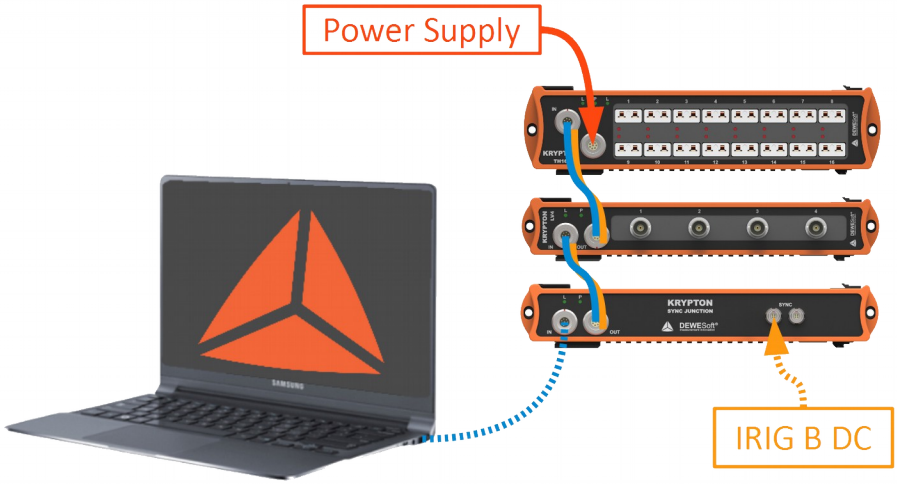


Illustration 12: Sync Junction

Device Connector	Cable Image Type Art. Number-Example	Device Connector	Description
 PC RJ45	ECAT to PC `L1T8f-RJ45-1M`	 ECAT Sync Junction IN (8-pin LEMO)	Ethernet connection between DEWESoft® and the Sync Junction box.
	Sync-cable `L00B4m-L00B4m-0.2m`	 ECAT Sync Junction SYNC (4-pin LEMO)	Input of the IRIG-B-DC synchronisation signal. Signal source may be e.g. an external IRIG-B-DC signal
	DC-power supply cable `L1T8m-BAN-2M`	 Krypton™ slice OUT (8-pin LEMO)	Power input into the Krypton™ measurement chain.
 Krypton™ slice IN (8-pin LEMO)	ECAT to ECAT `L1T8m-L1T8f-02M`	 Krypton™ slice or Sync Junction OUT (8-pin LEMO)	Data, Sync and Power connection between the Krypton™ slices and the Sync-Junction box.

4.3.4 Power Junction

The Power Junction box can be used to join the Ethernet and the Power lines in a single 8-pin ECAT cable:

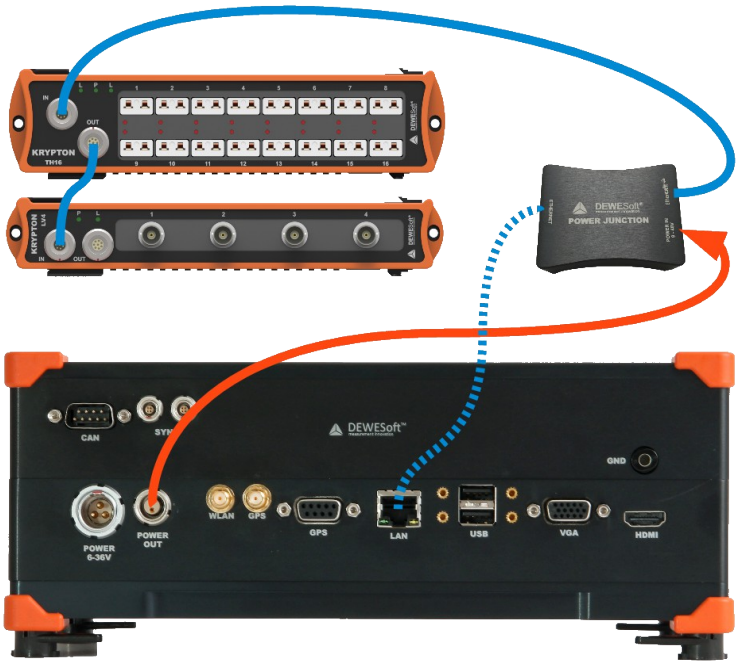


Illustration 13: Sync Junction

In the example in Illustration 13 we use a Sirius® S-BOX multi-slice (i.e. at the bottom, there is an S-BOX and at the top a Sirius® USB slice). Since we do not use any synchronisation in this example (see: 4.2.1 No Sync on page 16), Sirius® will provide the Master-clock and the Krypton™ channels are asynchronous.

A reason to use a setup like this with the Power Junction box, may be when the Krypton™ devices are far away from the Sirius® system and there is no power supply available (i.e. in a temperature measurement chamber).

Device Connector	Cable Image Type Art. Number-Example	Device Connector	Description
 S-BOX LAN (RJ45)	ECAT to PC *L1T8f-RJ45-1M*	 Power Junction ETHERNET (RJ45)	Ethernet connection between DEWESoft® and the Power Junction box.
 S-BOX POWER OUT (2-pin LEMO)	DC-power supply cable *L1B2m-L1B2f-0.2m*	 Power Junction POWER IN (2-pin LEMO)	Power input into the Krypton™ measurement chain.
 Krypton™ slice IN (8-pin LEMO)	ECAT to ECAT *L1T8m-L1T8f-20M*	 Krypton™ slice OUT (8-pin LEMO) or Power Junction EtherCAT (8-pin LEMO)	Data and Power connection between the Krypton™ slices and the Power-Junction box.

4.3.5 Sirius® USB and Single Krypton™

When you want to expand your Sirius® measurement system with a single Krypton™ slice (i.e. for temperature measurement), you don't need any junction boxes at all (i.e. for the slow temperature measurement synchronisation is not necessary).

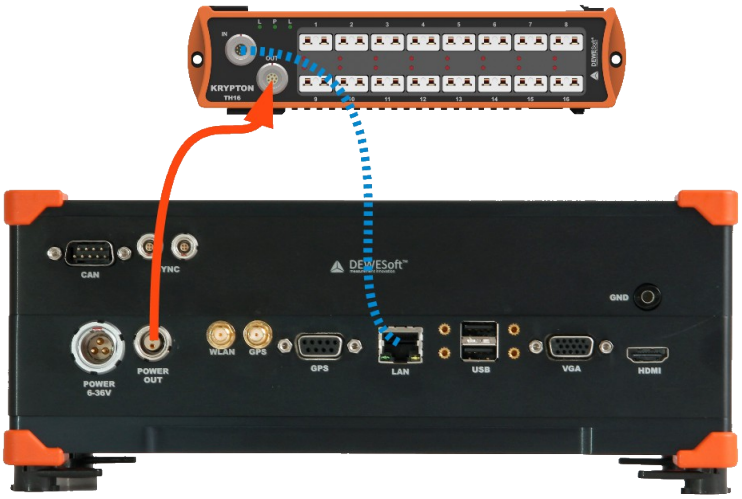
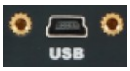


Illustration 14: Sirius® USB and a single Krypton™ TH

Device Connector	Cable Image Type Art. Number-Example	Device Connector	Description
 S-BOX LAN (RJ45)	ECAT to PC *L1T8f-RJ45-1M*	 Krypton™ slice IN (8-pin LEMO)	Ethernet connection between DEWESoft® and the Krypton™ slice.
 S-BOX POWER OUT (2-pin LEMO)	Sirius®-to-Krypton™ power cable *L1T8m-L1B2m-04M.*	 Krypton™ slice OUT (8-pin LEMO)	Power input into the Krypton™ measurement slice.

4.3.6 Sirius® USB synced with Krypton™

Illustration 15: Sirius® USB and Krypton™ with Sync

Device Connector	Cable Image Type Art. Number-Example	Device Connector	Description
 PC USB	Standard USB cable	 Sirius® USB Mini USB	USB data connection from the PC to the Sirius® USB slice.
 S-BOX LAN (RJ45)	ECAT to PC *L1T8f-RJ45-1M*	 Power Junction ETHERNET (RJ45)	Ethernet connection between DEWESoft® and the Power Junction box.
 S-BOX POWER OUT (2-pin LEMO)	DC-power supply cable *L1B2m-L1B2f-0.2m*	 Power Junction POWER IN (2-pin LEMO)	Power input into the Krypton™ measurement chain.
 Sirius® USB SYNC (4-pin LEMO)	Sync-cable *L00B4m-L00B4m-0.2m*	 ECAT Sync Junction SYNC (4-pin LEMO)	Input of the IRIG-B-DC synchronisation signal. Signal source is the Sirius® USB slice
 Power Junction EtherCAT (8-pin LEMO)	ECAT to ECAT *L1T8m-L1T8f-20M*	 ECAT Sync Junction IN (8-pin LEMO)	Data and Power connection between the Power-Junction box and the ECAT Sync Junction box.
 Krypton™ slice IN (8-pin LEMO)	ECAT to ECAT *L1T8m-L1T8f-02M*	 Krypton™ slice or Sync Junction OUT (8-pin LEMO)	Data, Sync and Power connection between the Krypton™ slices and the Sync-Junction box.

5 Measurement Slices

5.1 EtherCAT®

Krypton™ uses EtherCAT® for communication between the slices.
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 synchronisation purposes).

5.1.1 Standard EtherCAT® features

Strong points of standard EtherCAT®:

- Point to point communication
- High distance between slices possible (100 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 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.
- *Synchronisation*: 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
- DEWESoft® only supports DS-EtherCAT+. Standard EtherCAT® is not supported.
- EtherCAT® needs a dedicated network interface: i.e. you cannot mix EtherCAT® to your existing Intranet (LAN network) or Internet1 (i.e. connect them to the same Ethernet-switch)

5.1.3 Data Transfer Combinations

DEWESoft® can only acquire data from Dewesoft hardware which uses the DS-EtherCAT+ protocol.

The Krypton™ EtherCAT® slices have 2 modes of operation:

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

5.2 Krypton™ Specifications

5.2.1 General Specifications

General	
Power Supply	6-50V_{DC}
Operating Temperature	-40 to 85°C
Storage Temperature	-40 to 85°C
Shock & Vibration	>100 g
Communication	
Data Rate	100Mbit bus speed
Interface	LEMO 1T EtherCAT® hybrid cable (single cable for power + sync + data) see also: 6.1.1 EtherCAT® connector: 8-pin Lemo on page 39
EtherCAT®: Max. Cable Length	100m
Max. Throughput per Chain	600kS/s
Max. Number of Slices[1]	100 (additional power injectors required)
Sync Accuracy	below 1 sample to Sirius®

5.2.2 Krypton™ Slice Specifications

	8xTH	16xTH	4xLV	8xLV	3xSTG	16xDI	8xDI-8xDO	16xDO
# Input Channels	8	16	4	8	3	16	8	-
# Output Channels	-	-	-	-	-	-	8	16
Isolated	■	■	■	■	-	■	■	■
Data Rate per Channel	100Hz		20kHz		20kHz	20kHz		
Voltage	±1V, ±100mV		±100V		±10V, ±1V, ±100mV, ±10mV			
Input Coupling	DC		DC		DC			
Chapter on Page	28		30		32	36		
Bridge connections					Full, ½, ¼ (3-wire)			
Range (programmable)					2..1000mV/V			
Internal Completion					120/350Ω			
Sensor Excitation (prog.)					1..15V_{DC}, 0.4W/ch			
Internal Shunt (prog.)					100kΩ[2]			
General								
IEPE/ICP Sensors					MSI			
Resistance					MSI			
Temp. (Pt100 to Pt2000)					MSI			
Temp. Thermocouple	■				MSI			
Potentiometer					■			
LVDT					MSI			
Charge					MSI			
Current			Ext. Shunt		Ext. Shunt			
TEDS Interface					■			
Advanced					Low power, Sensor&Amplifier balancing			
Input Connector (Default)	Mini TC (copper)		BNC		DB9[2]	DB25		
Environmental Rating	IP67[3]		IP67[4]		IP67[4]	IP67[4]		
Typ. Power Consumption	3W	4W	2.5W	3W	2.4W	2W	2W	2W
Approx. Weight	700g	1000g	700g	1000g	700g	700g	700g	700g
Approx. Dimensions[5] [mm]	212x39x55	213x54x55	212x39x55	213x54x55	212x39x55	212x39x55	212x39x55	212x39x55

Table 5: Krypton™ Slice Specifications

1 When the max. allowed current and supply voltage dropout is reached, you must add power injectors
2 Others on request
3 Depending on the mating connector types, for non corrosive liquids only, IP65 standard
4 Depending on the mating connector types
5 Without connectors (find the exact values with/without connectors in the *Specification* chapter of the corresponding slice)

5.3 TH: Thermocouple

The Krypton™ TH slices have thermocouple-connectors for temperature measurement.

5.3.1 TH: Specifications

The following table shows the specifications for Krypton™ TH slices (see also 5.2.1 General Specifications on page 27)

Inputs	8 (8xTH) or 16 (16xTH) isolated universal thermocouple and voltage	
ADC Type	24bit delta-sigma	
Sampling Rate	Simultaneous 100S/sec	
Voltage Ranges	±1V	±100mV
Input Accuracy	±0.02% of reading ±10µV	±0.02% of reading ±10µV
Typical SNR@10/100 S/sec	115/106dB	110/106dB
Gain Drift	Typical 3ppm /K (max. 10ppm/K)	
Offset Drift	0.03µV/K	
Gain Linearity	<0.01%	
Input Coupling	DC	
Input Impedance	100 MΩ	
Thermocouple	TC types: K, J, T, R, S, N , E, C, U, B	
Accuracy	±0.02% of reading ±0.5°C ±10µV	
Resolution	<0.001°C	
Sampling rate →	**10 S/s**	**100 S/s**
Typical Noise	0.007°C_{RMS}@Type K	0.02°C_{RMS}@Type K
Additional Specifications		
Input connector	Mini Thermocouple connector (copper)	
Isolation voltage	1000 V_{peak} channel/ground & channel/channel	
Environmental rating	IP67[6]	
	8xTH	**16xTH**
Power consumption	3 Watt	4 Watt
Weight	700g	1000g
Dimensions	212x38.1x54.7mm	213x53.5x54.7mm

Table 6: Krypton™ TH specifications

5.3.2 Krypton*i*-8xTH

The Krypton*i*-8xTH slice has 8 thermocouple-connectors for temperature measurement.

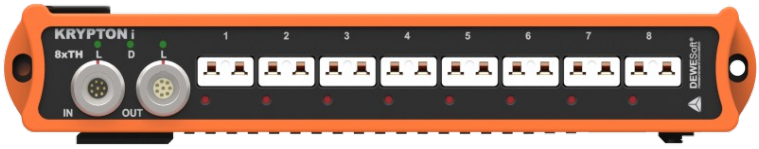


*Illustration 16: Krypton*i*-8xTH*

6 Depending on the mating connector types, for non corrosive liquids only, IP65 standard

5.3.3 Krypton*i*-16xTH

The Krypton*i*-16xTH slice has 16 thermocouple-connectors for temperature measurement.

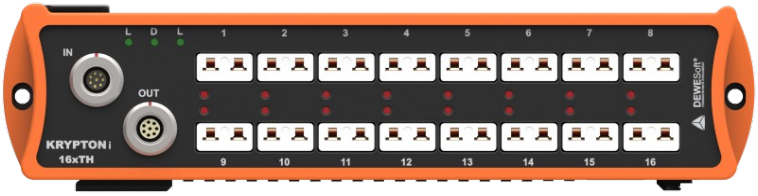


*Illustration 17: Krypton*i*-16xTH*

5.3.4 Sensor Break Detection

The Krypton*i*-TH slices have a red led for each channel, which is only relevant when the channel is in temperature mode. The LED will be on, when the channel is out of range (positive or negative). This is a quick indication of a broken sensor connection: when the thermocouple is open, the LED is on.

5.4 LV: Low Voltage

The Krypton™ LV slices have BNC connectors for measurement of low voltages.

5.4.1 LV: Specifications

The following table shows the specifications for Krypton™ LV slices (see also 5.2.1 General Specifications on page 27)

Inputs	4 (LV-4) or 8 (LV-8) isolated voltage	
ADC Type	24bit delta-sigma with 20kHz/1kHz anti-aliasing filter	
Sampling Rate	Simultaneous 20kS/sec	
Voltage Range	±100V	
Accuracy	±0.03% of reading ±5mV	
Typical SNR@10kS	100dB	
Typical CMR@400Hz/1kHz	70dB/65dB	
Gain Drift	Typical 10 ppm/K, max. 20 ppm/K	
Offset Drift	Typical 5µV/K,10µV/K	
Gain Linearity	<0.01%	
Inter-channel Phase Mismatch	0.02° * F_{in}[kHz]+0.1°	
Input Coupling	DC	
Input Impedance	1 MΩ	
Noise	0.7mV_{RMS}	
Overvoltage Protection	In+ to In-: 200V continuous, 350V_{peak}(100msec)	
Digital Filter		
Bandwidth (-3dB)	0.49 fs	
Alias-free Bandwidth	DC to 0.453 fs	
Alias Rejection	-100dB	
Delay Through ADC	37 / fs	
Oversampling	16	
Additional Specifications		
Input Connector	BNC	
Isolation Voltage	1000 V_{peak} channel/ground & channel/channel	
Environmental Rating	IP67[7]	
	4xLV	**8xLV**
Power Consumption	2.5 Watt	3 Watt
Weight	700g	1000g
Slice Dimensions	212x38.1x54.7mm	213x53.5x54.7mm
Dimensions with Connectors	212x38.1x66.8mm	213x53.5x66.8mm

Table 7: Krypton™ LV specifications

5.4.2 Krypton*i*-4xLV

The Krypton*i*-4xLV slice has 4 BNC connectors for voltage measurement.

*Illustration 18: Krypton*i*-4xLV*

7 Depending on the mating connector types

5.4.3 Krypton*i*-8xLV

The Krypton*i*-8xLV slice has 8 BNC connectors for voltage measurement.

*Illustration 19: Krypton*i*-8xLV*

5.4.3.1 Krypton*i*-LV BNC: Voltage

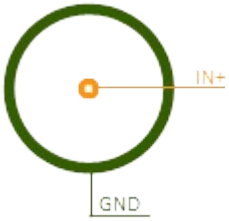


*Illustration 20: Krypton*i*-LV: pin-out (BNC)*

*Illustration 21: e.g. Krypton*i*-8xLV*

5.5 STG: Strain Gauge

The Krypton™ STG slices have DSUB-9 connectors for voltage or strain measurement.

5.5.1 STG: Specifications

The table below shows the specifications for Krypton™ STG slices (see also 5.2.1 General Specifications on page 27)

Inputs	Voltage, full bridge strain, ½ bridge strain, ¼ bridge strain			
ADC Type	24bit delta-sigma with 20kHz/1kHz anti-aliasing filter			
Sampling Rate	Simultaneous 20kS/sec per channel (software-selectable)			
Voltage Ranges	±10V	±1V	±100mV	±10mV
Input Accuracy	±0.03% of reading, ±0.02% of range, ±0.1mV			
Offset Accuracy after Balance Amplifier	0.2mV	0.02mV	0.01mV	0.01mV
Typical Dynamic Range@10kS	139dB	139dB	129dB	110dB
Typical SNR@10kS	107dB	107dB	97dB	78dB
Typical CMR @ 400Hz/1kHz	86dB/84dB	96dB/95dB	112dB/102dB	112dB/102dB
Gain Drift	Typical 10 ppm/K (max. 40 ppm/K)			
Offset Drift	Typical 0.3µV/K + 5ppm of range/K, max 2µV/K + 10ppm of range/K			
Gain Linearity	< 0.02%			
Input Coupling	DC			
Input Impedance	10 MΩ			
Overvoltage Protection	In+ to In-: 50V continuous, 200V peak (10msec)			
Digital Filter				
Bandwidth (-3dB)	0.49fs			
Alias-free Bandwidth	DC to 0.453 fs			
Alias Rejection	-100dB			
Delay through ADC	37 / fs			
Oversampling	16			
Excitation Voltage	Free programmable (16 bit DAC)			
Predefined Levels	0, 1, 2.5, 5, 10 and 15V_{DC}			
Accuracy	±0.05% ±2mV			
Drift	±50ppm/K ±100µV/K			
Stability 10% to 90% Load	<0.01%			
Current Limit	45mA (400mW max. Power)			
Protection	Continuous short to ground			
Bridge Connection Types	full bridge strain, ½ bridge strain, ¼ bridge strain (3-wire)			
Ranges	2…1000mV/V free programmable			
Internal Bridge Completion	½ bridge and ¼ bridge 120 and 350Ω			
Bridge Completion Accuracy	0.05 %; TCR: 5ppm/K (others on request)			
Internal Shunt Resistor	100kΩ (others on request)			
Shunt Resistor Accuracy	0.05%; TCR: 10ppm/K (others on request)			
Input Short, Sensor Offset Adjust	Software-selectable			
Additional Specifications				
Input connector	DB9 (others on request)			
TEDs support	Standard + DSI adapters			
Environmental rating	IP67[8]			
Power consumption	2.4W (4W 120Ω @ 5V load)			
Weight	700g			
Slice Dimensions	212x38.1x54.7mm			
Dimensions with Connectors	212x38.1x58.2mm			

Table 8: Krypton™ STG specifications

8 Depending on the mating connector types

5.5.2 Krypton-3xSTG

The Krypton-3xSTG slice has 3 DSUB connectors.

Illustration 22: Krypton-3xSTG

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

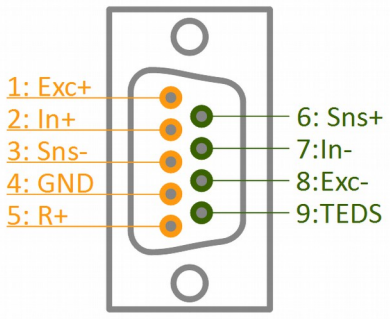
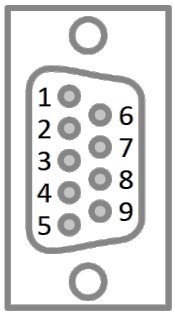
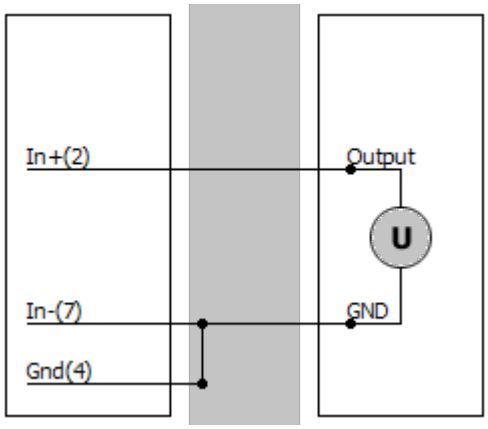
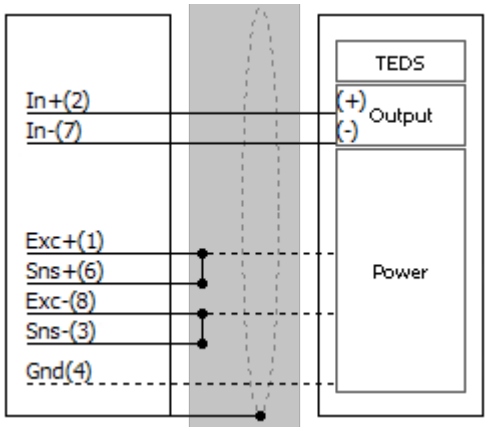
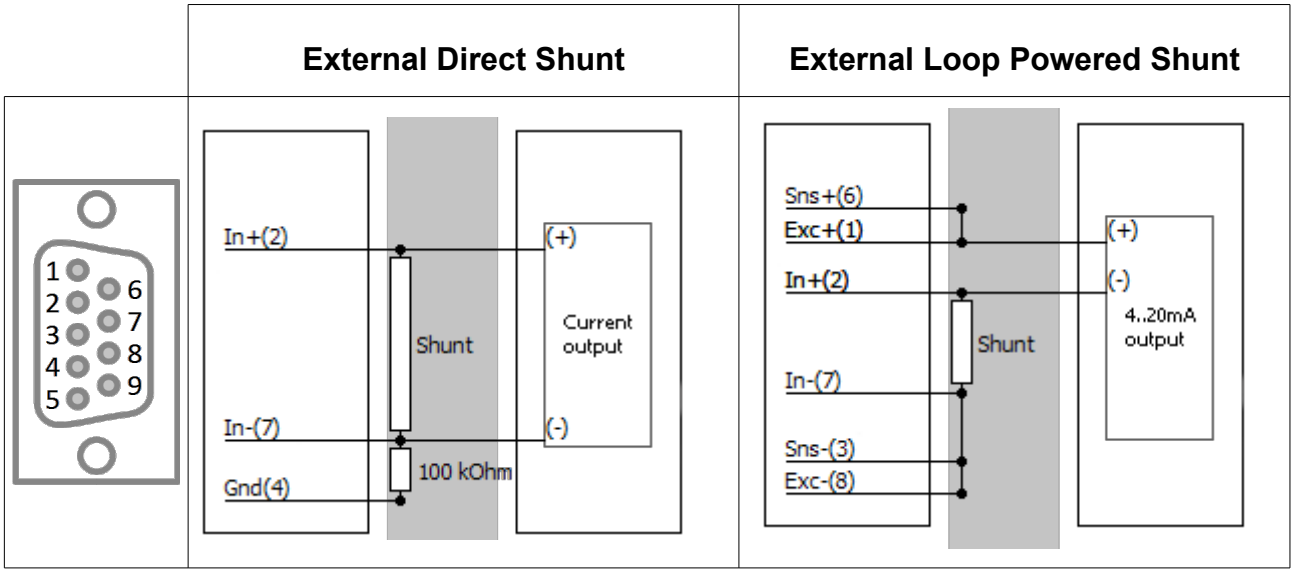


Illustration 23: Krypton-3xSTG pin-out DSUB-9

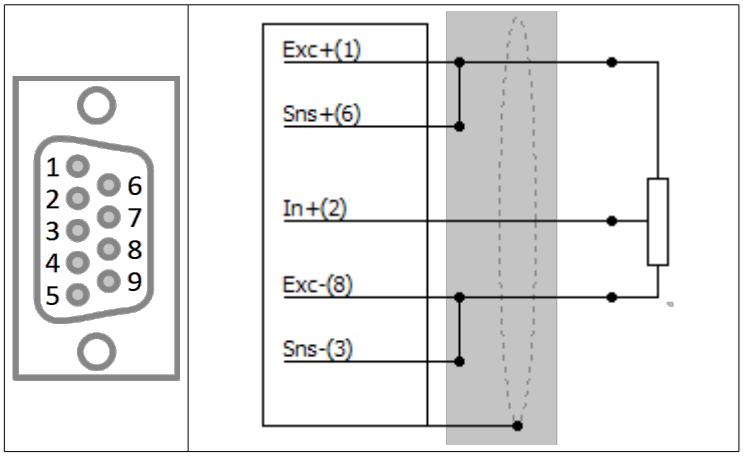
5.5.2.1 Krypton-3xSTG: Voltage

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

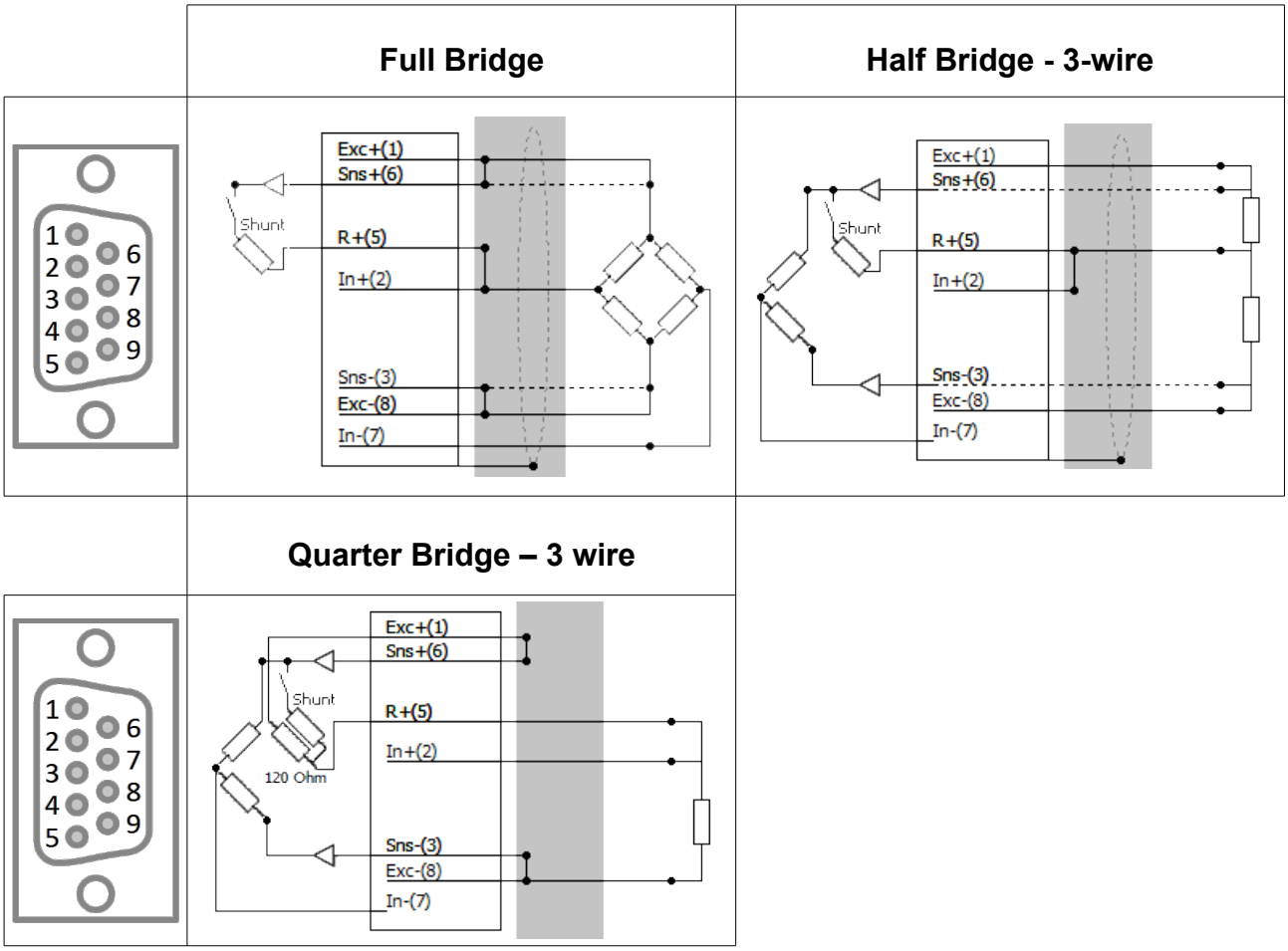
5.5.2.2 Krypton-3xSTG: Current



5.5.2.3 Krypton-3xSTG: Potentiometer



5.5.2.4 Krypton-3xSTG: Bridge



5.6 DIO: Digital Input/Output

Krypton™ DIO slices have two 25pin DSUB connectors. The DIO slices are also available as waterproof version.

HINT

The Krypton™ DIO slices do not have counter functionality. If this is required, we recommend to use Sirius® or DEWE-43.

5.6.1 DIO: Specifications

The table below shows the specifications for Krypton™ digital slices (see also 5.2.1 General Specifications on page 27)

	16xDI	8xDI-8xDO	16xDO
Digital Input			
Isolated Input Channels	16	8	
Compatibility	CMOS Configuration		
Input low level	U_{IN} < 0.8V		
Input high level	U_{IN} > 2.4V		
Input high current @5V U_{IN}	< 1.8 mA		
Input high current @30V U_{IN}	< 6 mA		
Propagation delay	< 1 µsec		
Sampling rate	Simultaneous 20kS/sec		
Overvoltage protection	40V continuous (65V peak)		
Isolation voltage peak	250V channel/ground & channel/channel		
Digital Output			
Isolated Output Channels		8	16
Compatibility		Open collector with 10kΩ pull-up to +5V	
Maximum sink current		150mA (not protected)	
Maximum switching voltage		50V	
Propagation delay		< 20µsec	
Maximum update rate		depending on EtherCAT master	
Isolation voltage peak		250V channel to ground, no channel to channel isolation	
General Specifications			
Environmental rating	IP67[9]	IP67[9]	IP67[9]
Power consumption	2 Watt	2 Watt	2 Watt
Weight	700g	700g	700g
Slice Dimensions	212x38.1x54.7mm		
Dimensions with Connectors	212x38.1x58.2mm		

Table 9: Krypton™ DIO specifications

9 Depending on the mating connector types

5.6.2 DIO connectors

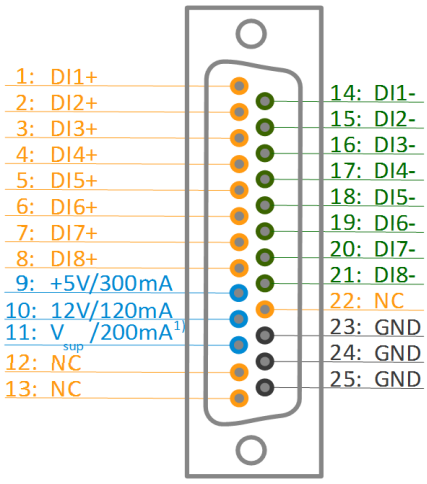


Illustration 24: Digital Input 25pin

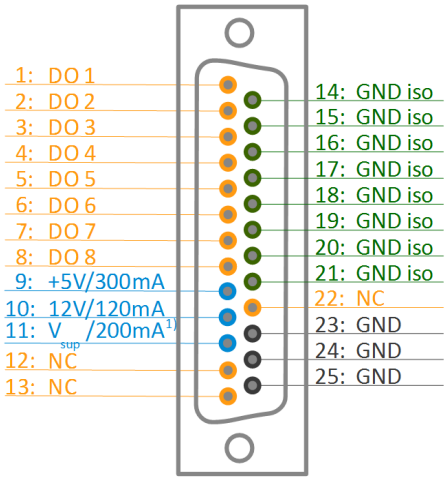


Illustration 25: Digital Output 25pin

1) The supply voltage from the slice is routed to pin 11.

5.6.3 Kryptoni-16xDI

The Kryptoni-16xDI slice has 16 digital input channels: 8 on each of the two 25-pin connectors.

Illustration 26: Kryptoni-16xDI

5.6.4 Kryptoni-8xDI-8xDO

The Kryptoni-8xDI-8xDO slice has 8 digital input and 8 digital output channels on the corresponding 25-pin connector.

Illustration 27: Kryptoni-8xDI-8xDO

5.6.5 Kryptoni-16xDO

The Kryptoni-16xDO slice has 16 digital output channels. 8 on each of the two 25-pin connectors.

Illustration 28: Kryptoni-16xDO

6 Hardware overview

6.1 Enclosure

6.1.1 EtherCAT® connector: 8-pin Lemo

The EtherCAT® connector can transfer power, the measurement data and synchronisation signal in one single cable.

Cable

Illustration 29: EtherCAT® cable

#	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

Pinout

Pin	Name	Description	Cable # / Colour	
1	TD+	Transmit +	6	White
2	TD-	Transmit -	5	Red
3	RD+	Receive +	4	Yellow
4	RD-	Receive -	3	Blue
5	V+	Voltage +	1	Red
6				
7	GND	Ground	2	Blue
8				

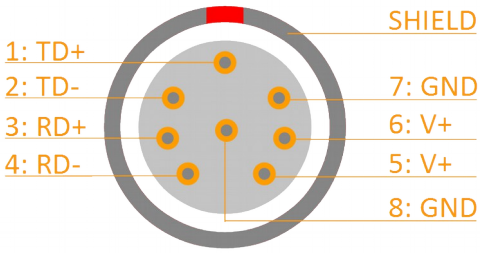


Illustration 30: Krypton™: pin-out Lemo 8-pin (male)

6.1.2 Mechanical Locking of Slices

Krypton™ slices can easily be stacked together. The mechanical lock mechanism is on the top and bottom of each Krypton™ slice. Here is a view of the bottom lock mechanism:

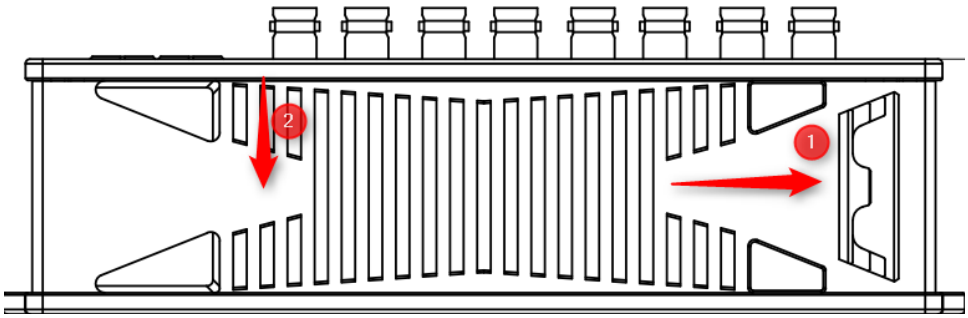


Illustration 31: Lock mechanism: Bottom

To lock 2 Krypton™ slices, first fit the nose of the bottom part (❶) into the matching part of the other Krypton™ slice. Now apply a little force to move the slice to the right, until the 2nd part of the mechanism (❷) can move down. Now release the force and the Krypton™ slice will move back to the left and both slices are now locked.

To release the lock, just reverse the locking-procedure. Move the top slice to the right, until you can lift it up a little. Then the Krypton™ slices are separated again.

6.2 LEDs

Each Krypton™ slice has 3 green LEDs: *L, D, L* . The LED blinking codes adhere to the EtherCAT® specification.

- *L* means Link: i.e. the In- (left *L*-LED) or Out-connector (right *L*-LED) is linked to another Krypton™ slice or to the measurement PC
- *D* is for Data: it is active only when the Data transfer is active
  this requires that power is connected AND the slice is linked to another slice or a PC

Note: older versions may have the label *P* (for *P*rotocol) instead of *D*.

6.2.1 INIT state

When you power the Krypton™ slice and there is no EtherCAT® master connected (i.e. DEWESoft® is not running or the slice is not connected to the PC), the slice will be in the INIT state. In this state the *D* LED will be OFF.
The *L* LED will be ON when you connect another Krypton™ slice.

6.2.2 PRE-OP state

In this state the EtherCAT® master is detecting the slaves and reads their basic information: the *D* LED is fast blinking.
DEWESoft® will set the Krypton™ slice in the PRE-OP state when you enter the *Device settings* (3.3.2 DEWESoft® Settings on page 11) or when you are loading the setup.

6.2.3 SAFE-OP state

In this state the EtherCAT® master is already reading the data from the slice/s at a slow sampling rate: the *D* LED is slowly blinking.
DEWESoft® will set the Krypton™ slice/s in the SAFE-OP state when you are in *Channel Setup* (3.3.3 Channel Setup on page 12).

6.2.4 OP state

In this state the EtherCAT® master is reading the data from the slice/s at the desired sampling rate: the *D* LED is turned ON.
DEWESoft® will set the Krypton™ slice/s in the OP state when you are in *Measure Mode* (3.3.4 Measure mode on page 13).

6.3 Dimensions

Krypton™ slices can be stacked together. There are different enclosure dimensions available. Note that the mounting hole distance (202mm) is the same for all slices. For exact numbers see the *Specifications* chapter of the corresponding slices.

6.3.1 Single Slice

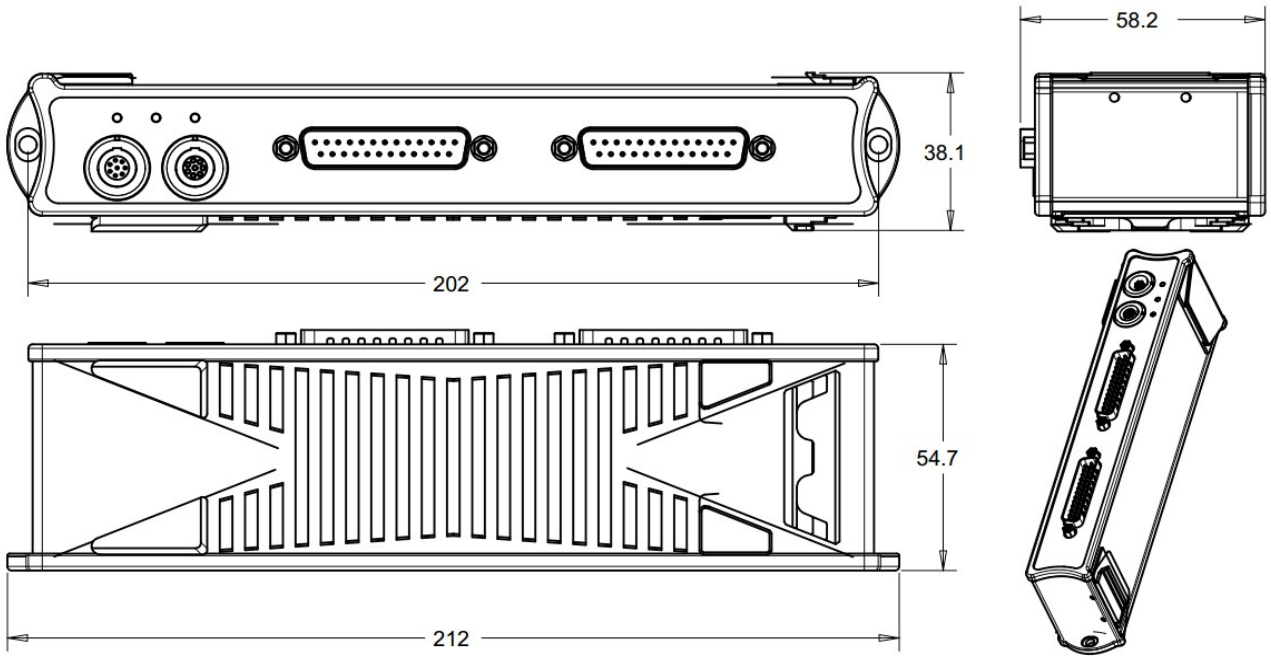


Illustration 32: Dimensions: Krypton™ Single Slice 212x39x55mm

6.3.2 Dual Slice

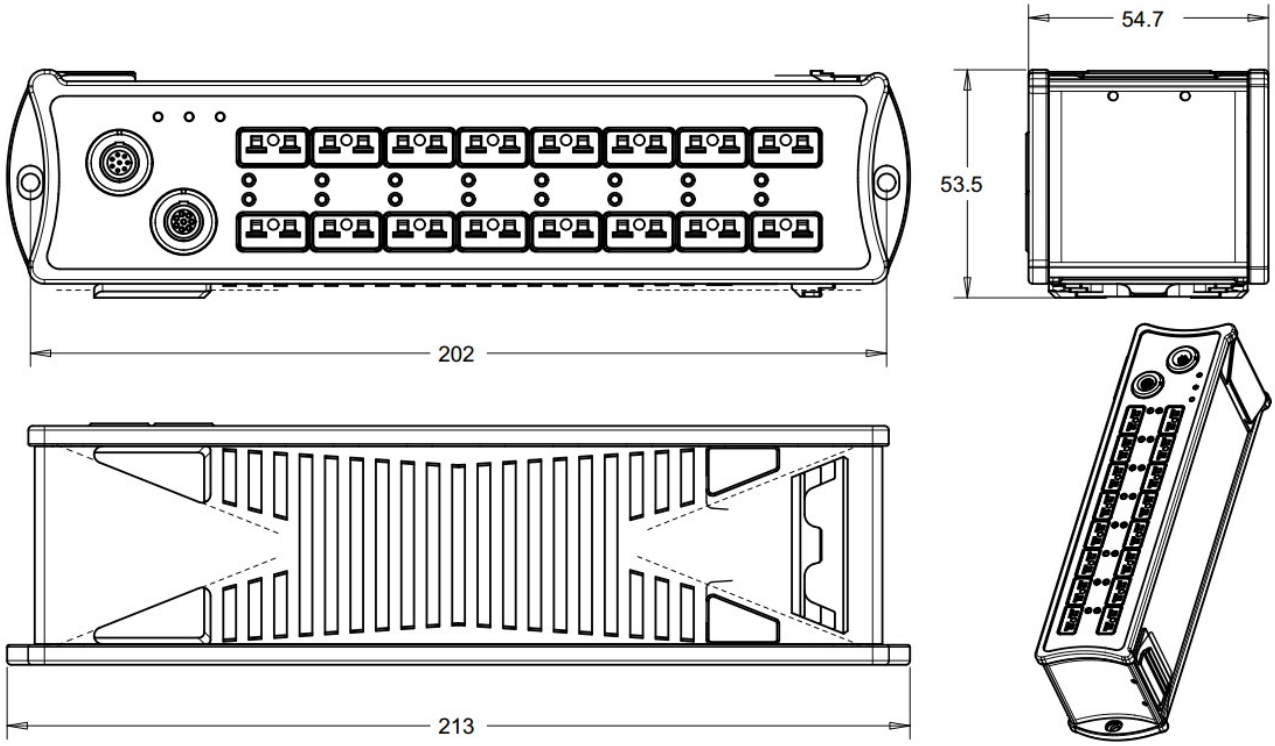


Illustration 33: Dimensions: Krypton™ Dual Slice 213x54x55mm

7 Service Guide

7.1 Firmware upgrade

This chapter shows how to upgrade the firmware of your Krypton™ measurement system.
Note: the firmware upgrade procedure should only be executed by experienced personnel and only when explicitly told so, by the Dewesoft support team.

IMPORTANT

Make sure, that the communication to the Krypton™ and the power supply are not interrupted during the firmware upgrade procedure. Otherwise the system may become broken and you must send it back for repair.

7.1.1 Preparation

7.1.1.1 Download

First, you need to download the firmware archives from our web-page: http://www.dewesoft.com/download#Drivers

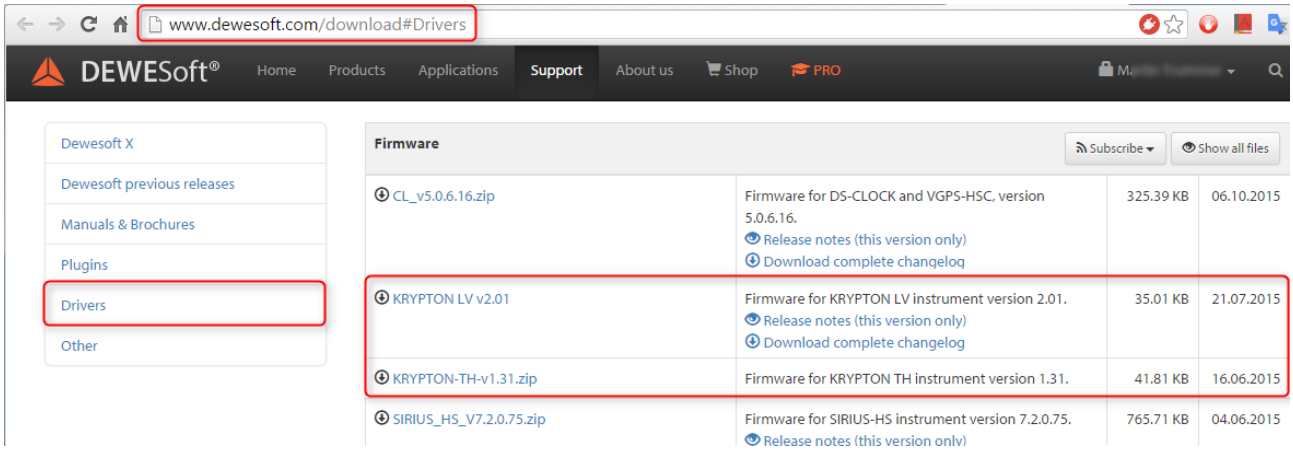


Illustration 34: Webpage: Download Krypton™ Firmware

In the *Firmware* section find the firmware for your Krypton™ slice (e.g. the current archive for Krypton™ LV is called: `KRYPTON LV v2.0.1`[10]) and download it to your PC.

7.1.1.2 Extract

Next we need to extract the files in the downloaded archive/s. In Windows® Explorer, right click on the archive file and select **Extract All…**

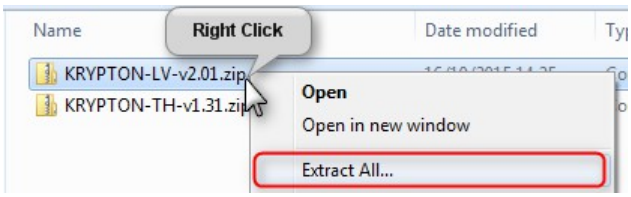


Illustration 35: Windows® Explorer: Extract Archive

10 Since the version number is included in the file-name, the file-name may of course change in the future: i.e. `KRYPTON LV v3.1.2`

The zip archive contains a single file with the extension `.fwu`

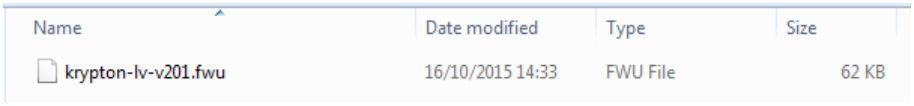


Illustration 36: Extracted Firmware file

7.1.2 Start the Firmware upgrade

IMPORTANT

Before you start the upload of the Krypton™ firmware, it is a good idea to check again, if you have the correct version for your slice. Read the description on the web-page and also the hints in chapter 7.1.1.1 Download no page 43.
The worst thing to do is to interrupt the firmware-upgrade – then your system may be broken and you may need to send it back for repair.

Open the DEWESoft® settings dialogue. Click on the **Settings** button at the right top ❶, and then on the **Settings** item ❷ in the pop-up.

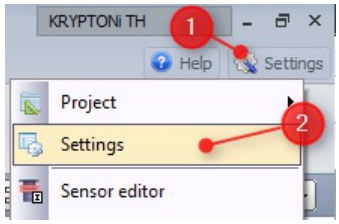


Illustration 37: DEWESoft® settings

In the *Devices* section, you can see the connected Krypton™ slices.

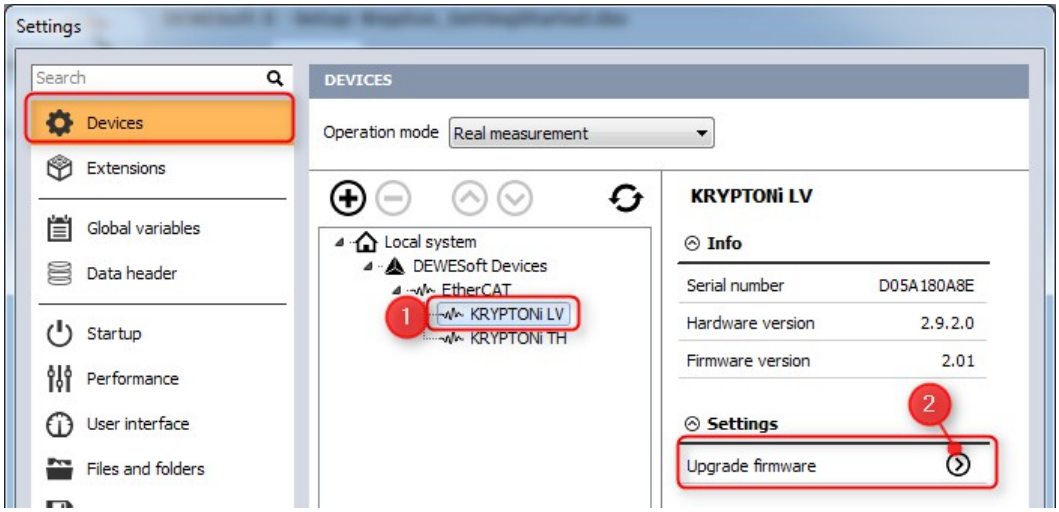


Illustration 38: Settings dialogue: Krypton™ Firmware upgrade

When you select one of the connected Krypton™ slices(❶), the properties pane at the right will show the related data: e.g. Serial number, Firmware version, etc. Now click on the arrow icon (❷) of *Upgrade Firmware*.
In the file selection dialogue, select the correct firmware file (`*.fwu` – that we have just downloaded and extracted).
When you click the **Open** button, the firmware-upgrade will start right away.
When the upgrade is complete, you should see a success message:

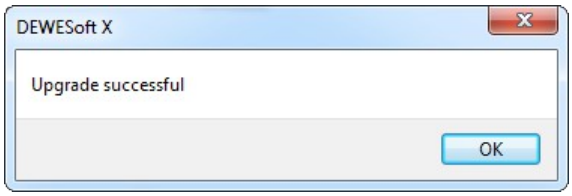


Illustration 39: Firmware upgrade success

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)

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

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.

ECAT

see 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® is registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.

Ethernet

Ethernet is a family of computer networking technologies for local area networks (LANs).

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.

LAN

A local area network (LAN) is a computer network that interconnects computers within a limited area.

LED

A light-emitting diode is a semiconductor light source.
It is used in all Krypton™ slices of the to indicate the operating status.

LEMO

LEMO is the name of the high quality push-pull connectors that are used for cable connections..
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

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

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).

USB

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

Sirius® USB slices use a USB connection.

Windows®

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

8.2 Documentation version history

Revision number: 192
Last modified: Mon 23 Nov 2015, 11:45

Version	Date [dd.mm.yyyy]	Notes
1.0.0	23.11.2015	☑ initial version