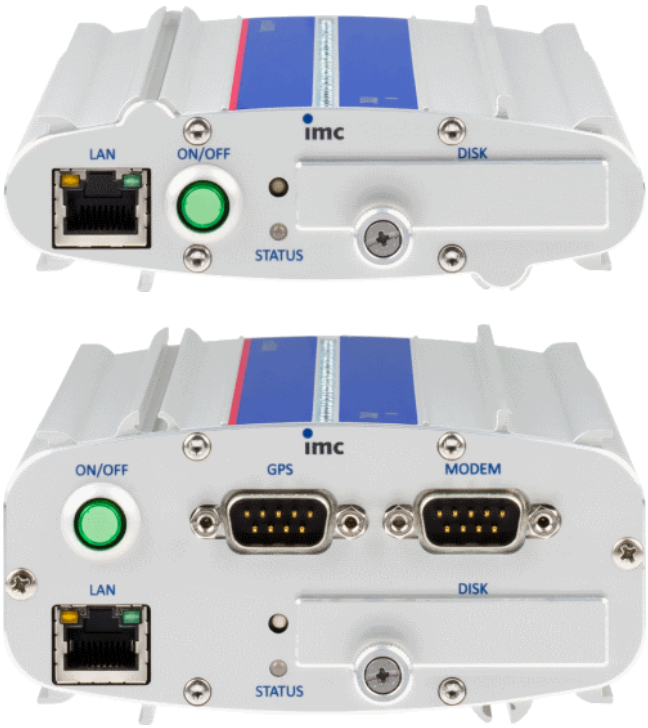
imc BUSDAQ / BUSLOG

Manual

Version 3 R 6 - 2018-10-17



imc Test & Measurement GmbH • Voltastraße 5 • 13355 Berlin • Germany

Foreword

Thank you for deciding to purchase our product. We wish you total success in accomplishing your measurement assignments with the help of your hardware and software. If you have any open questions about our products, please contact our Hotline (hotline@imc-tm.de).

Disclaimer of liability

The contents of this documentation have been carefully checked for consistency with the hardware and software systems described. Nevertheless, it is impossible to completely rule out inconsistencies, so that we decline to offer any guarantee of total conformity.
We gratefully accept any suggestions for improvements, please contact our Hotline (hotline@imc-tm.de).

We reserve the right to make technical modifications of the systems.

Copyright

imc Software and Microsoft® Windows
imc software runs on the Microsoft® Windows operating system.

GPL Sources
Some components of our hardware use software, that is licensed under GNU General Public License (GPL). A description can be found at the imc STUDIO setup DVD in folder "*Products\imc DEVICES\OSS*".

1 General

1.1 Notes / Quality Management

Quality Management

imc Test & Measurement GmbH holds DIN-EN-ISO-9001 certification since May 1995. You can download the CE Certification, current certificates and information about the imc quality system on our Webpage: www.imc-tm.com/about-imc/quality-assurance.

imc Warranty

Subject to the general terms and conditions of imc Test & Measurement GmbH.

ElektroG, RoHS 2, WEEE, CE

Reference

The manufacturer's declaration on ElektroG, RoHS, WEEE and the CE certification can be found on the imc website: www.imc-tm.com

Product Improvement and change requests

Please help us to improve our documentation:

- What terms or descriptions are incomprehensible?
- What additions and enhancements you suggest?
- Where have material mistakes slipped in?
- Which spelling or typing errors have you found?

Responses and other feedback should be directed to the Hotline 6 (phone / e-mail)
or by writing to: imc Test & Measurement GmbH, Voltastrasse 5 in 13355 Berlin, Germany

Remarks Concerning EMC

imc BUSDAQ / BUSLOG satisfies the EMC requirements for unrestricted use in industrial settings.

Any additional devices connected to imc BUSDAQ / BUSLOG must satisfy the EMC requirements as specified by the responsible authority (within Europe[1]) in Germany the BNetzA - "Bundesnetzagentur" (formerly BMPT-Vfg. No. 1046/84 or No. 243/91) or EC Guidelines 2014/30/EU. All products which satisfy these requirements must be appropriately marked by the manufacturer or display the CE certification marking.

Products not satisfying these requirements may only be used with special approval of the regulating body in the country where operated.

All signal lines connected to imc BUSDAQ / BUSLOG must be shielded and the shielding must be grounded.

Note

The EMC tests were carried out using shielded and grounded input and output cables with the exception of the power cord. Observe this condition when designing your experiment to ensure high interference immunity and low jamming.

[1] If you are located outside Europe, please refer the appropriate EMC standards used in the country of operation.

FCC-Note

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules (CFR 15.105)[2]. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment on and off, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult our imc hotline 6 or an experienced radio or television technician for help.

Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by imc may void the user's authority to operate this equipment.

[2] FCC - United States Federal Communications Commission

Cables

Connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods to maintain compliance with FCC Rules and Regulations.

Industrial Safety

We certify that imc BUSDAQ / BUSLOG in all product configuration options corresponding to this documentation conforms to the directives in the accident prevention regulations in "Electric Installations and Industrial Equipment" (DGUV Regulation 3)[3].

This certification has the sole purpose of releasing imc from the obligation to have the electrical equipment tested prior to first use (§ 5 Sec. 1, 4 of DGUV Regulation 3). This does not affect guarantee and liability regulations of the civil code.

[3] Formerly BGV-A3

Observe Notes and Warnings

The measurement system has been carefully designed, assembled and routinely tested in accordance with the safety regulations specified in the included certificate of conformity and has left imc in perfect operating condition. To maintain this condition and to ensure continued danger-free operation, the user should pay particular attention to the remarks and warnings made in this chapter. In this way, you protect yourself and prevent the device from being damaged.

Read this manual **before turning the device** on for the first time.

Warning

Before touching the device sockets and the lines connected to them, make sure static electricity is drained. Damage arising from electrostatic discharge is not covered by the warrantee.

Ambient temperature

The limits of the ambient temperature cannot be given as a lump sum because they depend on many factors of the specific application and environment, such as air flow/convection, heat radiation balance in the environment, mounting structure, system configuration/single or block (click), connected cables, operating mode, etc. This is taken into account by specifying the operating temperature instead. Furthermore, it is not possible to predict any sharp limits for electronic components. Basically, reliability decreases when operating under extreme conditions (forced ageing). The operating temperature data represent the extreme limits at which the function of all components can still be guaranteed.

1.2 imc Customer Support / Hotline

If you have problems or questions, please contact our Customer Support/Hotline:

imc Test & Measurement GmbH

Hotline Berlin (Germany): **+49 (0)30 / 467090-26**

Hotline Frankfurt (Germany): **+49 (0)6172 / 59672-40**

E-Mail: hotline@imc-tm.de

Internet: www.imc-tm.com

International partners

For our international partners see www.imc-tm.com/our-partners/distributor.

Tip for ensuring quick processing of your questions:

If you contact us **you would help us**, if you know the **serial number of your devices** and the **version info of the software**. This documentation should also be on hand. Thank you!

- The device's serial number appears on the nameplate.
- The program version designation is available in the About-Dialog (click on the symbol in the menu bar).

1.3 Instruction manual

This instruction manual provides important notes on using the device. The safe working is conditional on compliance with all safety measures and instruction specified.

Additionally, all accident prevention and general safety regulations pertinent to the location at which the device is used must be adhered to.

This instruction manual exclusively describes **the device (hardware)**, not how to operate the **imc software**! The instructions for the imc measurement software are provided in their own manual. Read carefully the manual before beginning any work!

1.4 Liability limitations

All specifications and notes in the operating instruction manual are subject to applicable standards and regulations, and reflect the state of the art well as accumulated years of knowledge and experience.

The manufacturer declines any liability for damage arising from:

- failure to comply with the instructions provided,
- inappropriate use of the equipment,
- additionally, the general terms and conditions of the company imc Test & Measurement GmbH apply.

1.5 Guarantee

Each device is subjected to a 24-hour "burn-in" before leaving imc. This procedure is capable of recognizing almost all cases of early failure. This does not, however, guarantee that a component will not fail after longer operation. Therefore, all imc devices are guaranteed to function properly for two years. The condition for this guarantee is that no alterations or modifications have been made to the device by the customer.

Unauthorized intervention in the device renders the guarantee null and void.

1.6 Before starting

Condensation may form on the circuit boards when the device is moved from a cold environment to a warm one. In these situations, always wait until the device warms up to room temperature and is completely dry before turning it on. The acclimatization period should take about 2 hours. This is especially recommended for devices without ET (extended environmental temperature range).

We recommend a warm-up phase of at least 30 min prior to measure.

Existing ventilation slits must be kept unimpeded to avoid heat buildup in the device interior.

The devices have been designed for use in clean and dry environments. It is not to be operated in 1) exceedingly dusty and/ or wet environments, 2) in environments where danger of explosion exists nor 3) in environments containing aggressive chemical agents.

1.7 Notes on maintenance and servicing

No particular maintenance is necessary.

Note

The specified maximum errors are valid for 1 year following delivery of the device under normal operating conditions (note ambient temperature!).

For devices with UPS functions, we recommend maintenance every 2-3 years. Please read the notes in the chapter rechargeable accumulators and batteries 15. When returning the device in connection with complaints, please include a written, outlining description of the problem, including the name and telephone number of the sender. This will help expedite the process of problem elimination.

For questions by telephone please be prepared to provide your device's serial number and have your imc installation software, as well as this manual at hand, thanks! The serial number, necessary power supply, interface type and software version included can be determined from the plaque on the side of the device.

1.8 Safety

This section provides an overview of all important aspects of protection of personnel for reliable and trouble-free operation. Failure to comply with the instructions and protection notes provided here can result in serious danger.

1.8.1 Responsibility of the user

The device is for use in commercial applications. The user is therefore obligated to comply with legal regulations for work safety.

Along with the work safety procedures described in this instruction manual, the user must also conform to regulations for safety, accident prevention and environmental protection which apply to the work site.

The user must also ensure that any personnel assisting in the use of the device have also read and understood the instruction manual.

1.8.2 Operating personnel

Warning

- **Danger of injury due to inadequate qualifications!**
- Improper handling may lead to serious damage to personnel and property. When in doubt, consult qualified personnel.
- Work which may only be performed by trained imc personnel may not be performed by the user. Any exceptions are subject to prior consultation with the manufacturer and are conditional on having obtained corresponding training.

The manual distinguishes the following degrees of qualification for performing various actions:

- Users of the measurement equipment. Fundamentals of measurement engineering. Recommended: knowledge of foundations of electrical engineering. Familiarity with the Microsoft Windows operating system. Users may not open or modify the device.
- Qualified personnel is able, due to training in the field and to possession of skills, experience and familiarity with the relevant regulations, to perform work assigned while independently recognizing any hazards.

1.8.3 Special dangers

This segment states what residual dangers have been identified by the hazard analysis. Observe the safety notes listed here and the warnings appearing in subsequent chapters of this manual in order to reduce health risks and to avoid dangerous situations.

DANGER!

- Lethal danger from electric current!
- Contact with conducting parts is associated with immediate lethal danger. Damage to the insulation or to individual components can be lethally dangerous.

Therefore:

- In case of damage to the insulation, immediately cut off the power supply and have repair performed.
- Work on the electrical equipment must be performed exclusively by expert electricians.
- During all work performed on the electrical equipment, it must be deactivated and tested for static potential.

DANGER!

- Injuries from hot surfaces!
- Devices from imc are designed so that their surface temperatures do not exceed limits stipulated in EN 61010-1 under normal conditions.

Therefore:

- Surfaces whose temperature can exceed the limits under circumstances are denoted by the symbol shown at left.

1.9 After unpacking...

Check the delivered system immediately upon receiving it for completeness and for possible transport damage. In case of damage visible from outside, proceed as follows:

- Do not accept the delivery or only accept it with reservations
- Note the extent of the damage on the packing documents or on the delivery service's packing list.
- Begin the claims process.

Please check the device for mechanical damage and/ or loose parts after unpacking it. The supplier must be notified immediately of any transportation damage! Do not operate a damaged device!

Check that the list of accessories is complete (product package 53):

- AC/DC-power adaptor (not for racks) with cable and pre-assembled connector
- DC-power connector
- Getting started with your imc measurement device (printed)

Note

File a claim about every fault as soon as it is detected. Claims for damages can only be honored within the stated claims period.

1.10 Transport

When transporting imc BUSDAQ / BUSLOG, always use the original packaging or a appropriate packaging which protects the device against knocks and impacts. If transport damages occur, please be sure to contact the imc Customer Support. Damage arising from transporting is not covered in the manufacturer's guarantee. Possible damage due to condensation can be limited by wrapping the device in plastic sheeting. The represented handling label for lithium ion batteries can be attached also independently printed on the package (e.g. by gluing on the package or in a transparent unlabeled document bag). Note however that the form and the format are accurately given by IATA and the expression has to take place in color. Format: 120 x 110 mm.

Lithium Battery Handling Label:
UN 3480 / UN3481

1.11 Storage

As a rule, the measurement device can be stored at temperatures ranging from -20°C to +85°C.

1.12 Cleaning

- Always unplug the power supply before cleaning the device. Only qualified service technicians are permitted to clean the housing interior.
- Do not use abrasive materials or solutions which are harmful to plastics. Use a dry cloth to clean the housing. If the housing is particularly dirty, use a cloth which has been slightly moistened in a cleaning solution and then carefully wrung out. To clean the slits use a small soft dry brush.
- Do not allow liquids to enter the housing interior.
- Be certain that the ventilation slits remain unobstructed.

2 Start of operation with the Hardware

2.1 Precautions for operation

Certain ground rules for operating the system, aside from reasonable safety measures, must be observed to prevent danger to the user, third parties, the device itself and the measurement object. These are the use of the system in conformity to its design, and the refraining from altering the system, since possible later users may not be properly informed and may ill-advisedly rely on the precision and safety promised by the manufacturer.

Note

If you determine that the device cannot be operated in a non-dangerous manner, then the device is to be immediately taken out of operation and protected from unintentional use. Taking this action is justified under any of the following conditions:

I. the device is visibly damaged,
II. loose parts can be heard within the device,
III. the device does not work
IV. the device has been stored for a long period of time under unfavorable conditions (e.g. outdoors or in high-humidity environments).

1. Observe the data in the chapter "Technical Specs", to prevent damage to the unit through inappropriate signal connection.
2. If you are using a internal device drive, observe the notes in the imc software manual. Particular care should be taken to comply with the storage device's max. ambient temperature limitation.
3. Change the removable flash storage with care.

2.2 Supply

The range of permitted supply voltages is 10 .. 50 V DC. The table-top power supply unit which is included standard delivers 15 V_{DC} at a max. power consumption of 60 W. The AC input voltage can be 110 .. 240V 50/60Hz.

Note

Please note, that the operation temperature of the desktop supply is prepared for 0°C to 40°C, even if your measurement devices is designed for extended temperature range!

Connecting a DC supply source such as a car battery is also fundamentally possible. Note when making such a connection:

- ***Grounding*** of the device must be provided. If the supply voltage source has a ground reference (ground connected to the (–) terminal), then the device is automatically grounded via the (–) terminal. The table-top power supply unit is configured in this manner.
- The ***supply line*** must take the form of a low-resistance cable of sufficient cross-section. Any extra (suppression) filters connected in the middle of the supply circuit should not contain any serial inductance coils of more than 1 mH. Otherwise and extra parallel capacitor is needed.

Pin configuration supply connector:

Binder connector	
Pin 1	+ Supply
Pin 2	- Supply, Ground
Pin 3	n. c.

Type: ESTO RD03 series 712 3-poles

2.2.1 DC power supply at CAN-Nodes 1 and 2

If desired, the DC power supply can be made accessible at the CAN-nodes 1 and 2 (DSUB pin 1 and 5). This connection is protected by a current limiter and provides either supply of the imc BUSDAQ's from the CAN-bus or supply of connected imc CANSAS modules from the imc BUSDAQ’s power supply unit.

2.2.2 DC power supply of connected CANSAS units

Not only the imc BUSDAQ device can be supplied with power externally, as described above, but also, it is possible to power connected imc CANSAS modules from the imc BUSDAQ’s power supply unit. Here, too, a cable of sufficient cross-section is needed. The load current can have a maximal value of 1 A per node, which is provided by a current limiter.

2.2.3 Notes on operation with power supply lead through the device

- With this setup, the maximum current of 1 A must not be exceeded. The CANSAS modules’ low power consumption should not be underestimated, since low supply voltages can cause high power values via high current. E.g. two CAN/UNI8 modules with a power consumption of approx. 30 W (with connected sensors) already exceed the limit by having a current of 2 A at 15 V. Additional factors are the voltage drop along long wires, and small wire cross-sections. In any case, it is necessary to first calculate the power consumption and the current strengths to be expected.
- By dint of its engineering, the CAN-bus is ideally suited to re-structuring systems. However, this can easily lead to situations where the current demands and wire cross sections were correctly chosen originally, but the specifications were later violated when the system was gradually supplemented with new modules.
- It is always possible to use only one supply source. If an external supply is applied to the CAN-bus and the BUSDAQ’s power supply unit is additionally connected, the BUSDAQ can be damaged irreparably. Under no circumstances may the BUSDAQ’s power supply unit be used as an uninterrupted power supply for the connected CAN-Bus system.
- The current limiter attempts to ensure that the measurement is correctly closed and that data loss is thus avoided. Nevertheless, incorrect configuration may lead to data loss or damage of the BUSDAQ unit. When in doubt, please contact our Customer Service department.
- Using -SUPPLY does not replace the CAN_GND connection! CAN_GND should always be connected, independent from this power supply. CAN_GND is necessary to keep a defined level for CAN_H and CAN_L.

2.2.4 UPS and power fail function

Automatic conclusion of measurement and data saving upon power outage

imc BUSDAQ comes with a UPS-function (uninterruptable power supply) for the power supply. In case of a power outage, this prevents data loss, and is referred to "Power Fail". This function ensures that in case of power failure, the measurement is automatically closed correctly and the collected data are saved to the internal µ-Disk in time.

The **buffer-time** constant determines the duration for which imc BUSDAQ can continue to perform measurement after a power outage. Thus, brief interruptions of the power supply will not cause a measurement to be aborted.

The buffer time constant is ten seconds for **imc BUSLOG** and **imc BUSDAQ-2** ten, and fifteen seconds for **imc BUSDAQ-X**. Immediately after the running measurement is completed, that takes another 10 seconds.

Note

- Always be sure to shut the device off by means of the power switch. If the power supply line is simply disconnected instead, the Power Fail function is activated and the storage battery is needlessly run down.
- The stated specifications are valid for a fully charges rechargeable battery at room temperature. For temperatures below 20°C, these times are no longer guaranteed.
- If the resulting channel sampling time is > 5 seconds, closing the measurement takes longer than the guaranteed buffer time constant.
- The buffer time constant can be changed using the device software. See the device software manual *Device properties*...: Entry *USV*.
- If the device is only supplied with power for the brief duration of a measurement, the Power Fail function can not be guaranteed to work! In particular with imc BUSLOG and imc BUSDAQ, the capacitors' charging time is not sufficient to bridge the buffer duration and conclude the measurement.

2.2.5 Main switch

Switch ON

The device's ***main switch*** is a power-on button with a built-in "POWER"-LED which must be pressed down for approx. 1 sec. to achieve activation, indicated by the "POWER"-LED flashing. If the device boots correctly, three short beep-tones are emitted.

Switch OFF

To switch the device off, press the power-on button again down for approx. 1 sec, what will cause a constant blinking of the "POWER"-LED. This causes the device to not be deactivated abruptly during a running measurement. Instead, any files on the internal hard drive involved are closed before the device switches off by itself. This process takes up to 10 sec. Holding the power-on button down is not necessary!

If no measurement is currently running, it takes only approx. 1 sec. for the device to be deactivated.

2.2.6 Remote On/Off

The imc BUSDAQ can be activated and deactivated via the Control switch. When the pin Remote On/Off is connected with –Supply via a push-button switch, the device can be activated/ deactivated as with the green LED-button. I.e., one short push of the button switches the device on or off after a brief delay.

If these pins are ***connected via a closed two-way switch, the device remains on throughout***. In such a case, the device's green push-button switch has no effect! In order to turn the device off, the switch must be opened and then closed again, mimicking the behavior of a push-button switch.

The remote operation with **imc BUSDAQ-X** devices is only possible with a switch at the control socket not with a push-button. In case of a closed switch on the control socket the device will be activated permanently and it will turn off when the switch has been opened.

Reference

Please find here the pin configuration of the CTRL-socket 50.

2.3 Grounding, shielding

In order to comply with Part 15 of the FCC-regulations applicable to devices of Class B, the system must be grounded.

2.3.1 Grounding

In order to comply with Part 15 of the FCC-regulations valid for devices of Class B, the system must be grounded. Grounding is also the condition for the validity of the technical specifications stated.

When using the included table-top power adapter, this is ensured by the protection ground terminal: at the ***LEMO terminal of the included table-top power adapter***, both the power supply's negative contact, and the shielding and connector pod are connected with the network cable's protection ground.

The DC power voltage applied to the device itself (***LEMO-socket***) is ***not isolated***, i.e. it has contact with the electrical system ground ("GND") or the frame ("CHASSIS")!

When drawing power from an isolated DC power supply (e.g. battery), be sure to provide grounding by making a connection to the frame.

2.3.2 Shielding

As a matter of principle, the use of shielded and grounded cabling is required in order to comply with the relevant EMC and interference suppression limits.

In many cases, the use of an affordable multi-wire single-layer shielded cable (even for multiple channels) is adequate.

Remarks

- Protect the CAN-H-L against common mode voltage using shielded cables.
- Connect chassis with earth ground.
- Use CAN-Ground.
- Use shielded cables, connect shield to chassis.
- To avoid compensation currents, always connect the shielding to one side (potential) only.

2.3.3 Potential difference with synchronized devices

Note

When using multiple devices connected via the ***Sync terminal*** for synchronization purposes, ensure that all devices are the same voltage level. Any potential differences among devices may have to be evened out using an additional line having adequate cross section.

Alternatively it is possible to isolate the devices by using the module ***ISOSYNC***, see also chapter Synchronization in the software manual, or use fibre optic converter ACC/SYNC-FIBRE..

2.4 Fuses (polarity-inversion protection)

The device supply input is equipped with maintenance-free polarity-inversion protection. No fuses or surge protection is provided here. Particularly upon activation of the device, high current peaks are to be expected. When using the device with a DC-voltage supply and custom-designed supply cable, be sure to take this into account by providing adequate cable cross-section.

2.5 Batteries

There is a Li-battery (3.0 V) soldered onto the motherboard.

For an uninterruptable power supply (UPS) capacitors are used to supply the *imc BUSLOG* and *imc BUSDAQ-2* device. *imc BUSDAQ-X* are equipped with two lead cell storage batteries (4 V), 0.5 Ah. No special maintenance should be necessary. No fuses are included in the device.

For BUSDAQ-X (MP0,5-4 4V Pb) the manufacturer specifies 5-7 years @ T<20°C and less than 1 year @ 50°C, if the discharge is very little (Trickle-life). Charging these internal backup batteries is accomplished automatically when the activated device receives a supply voltage. Due to the inevitable leakage of charge we recommend that the device be activated at least every 3 months to prevent the batteries from dying.

In case the UPS is used a lot (many discharge and recharge cycles), the life time depends on how much (deep) it has been discharged (is the UPS buffering only for a short time or is the UPS discharged completely every time?). The manufacturer specifies 200 cycles @100% discharging and 1200 cycles @ 30% and 25°C ambient temperature. (that should be true in general for all Pb accus.)

For *imc BUSLOG* and *imc BUSDAQ-2* capacitors are used as batteries (EPCOS UltraCap). The manufacturer specifies more than 10 years @ T<45°C and 2 years @ 65°C. The number of discharge/recharge cycles is specified with 500000 @ 25°C and 0.5 A discharge current (*imc BUSLOG* needs up to 0.6 A).

imc recommends maintenance every 2-3 years.

2.6 LEDs and Beeper

6 Status LEDs and a beeper are provided at imc BUSDAQ-X devices as additional visual and acoustic "output channels". They can be used just as standard output channels in imc Online FAMOS by assigning them the binary values "0" / "1" or functions taking the Boolean value range. Interactive setting and Bit-window display for these output channels is neither especially useful nor supported.

It is not possible to deactivate the beeper by software. The beeper indicates the starting buffering period of the UPS.

Note

LEDs and Beeper are only provided with imc BUSDAQ-X devices!

3 Introduction

3.1 The imc BUSDAQ / BUSLOG Family

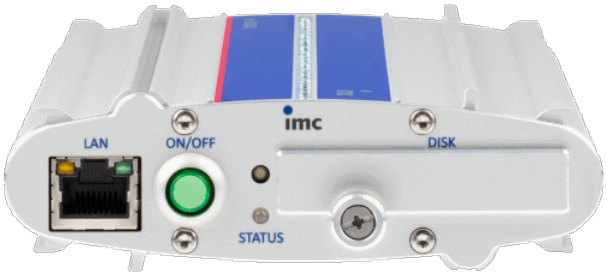
The imc BUSDAQ / BUSLOG family of measurement equipment performs synchronized capture of CAN messages, particularly of measured data and status information. Some models can be connected to the LIN and ARINC busses, in addition to the CAN-bus. Up to 8 nodes as well as a variety of protocols such as CCP and KWP2000 are supported.

An imc BUSDAQ unit can be connected to any CAN-bus subscribers such as sensors, measurement amplifiers or electronic control units. Measured data transmitted via CAN-bus can be triggered, displayed and mathematically processed as desired.

The protocol parameters are configured by means of the very user-friendly software imc DEVICES and can be saved expressed in their physical units.

imc BUSLOG

This affordable module is designed with permanently configured basic functions for standard, clearly defined data logging tasks. Its low power consumption, its signal-driven sleep mode and its capacity for rapid resumption of measurement by means of "Wake up on CAN", in only 200 ms, destines imc BUSLOG particularly for vehicle and fleet test applications.

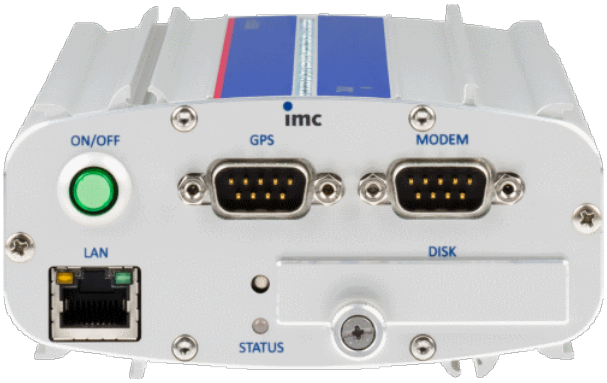


imc BUSLOG (Front)

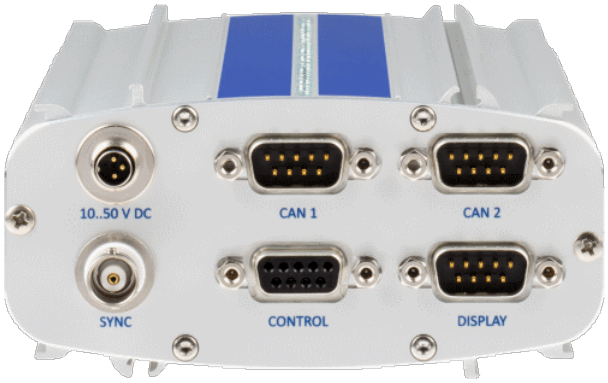
imc BUSLOG (back)

imc BUSDAQ-2

imc BUSDAQ-2 with its two nodes and expanded functions such as online functions, WLAN, modem, Display, and direct GPS connection is the standard module for measurement networks with decentralized CAN subscribers such as sensors, control units or CANSAS measurement modules.



imc BUSDAQ-2 (Front)

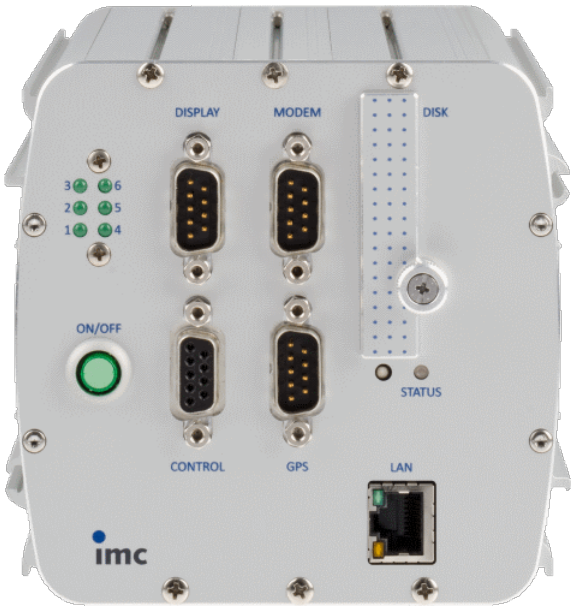


imc BUSDAQ-2 (back)

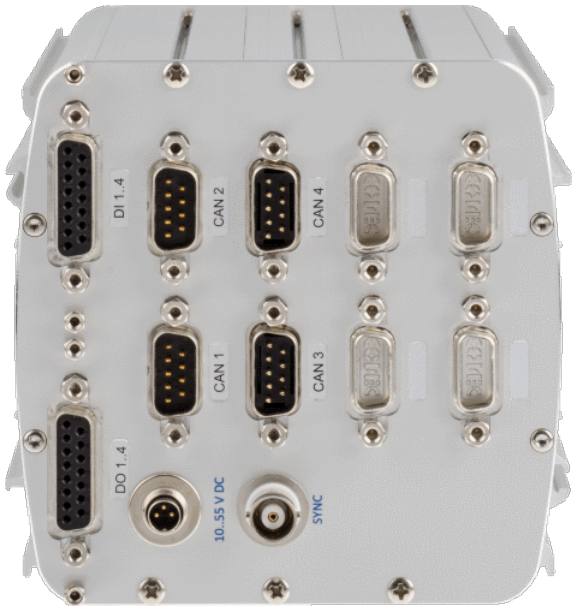
imc BUSDAQ-X

imc BUSDAQ-X is the universal system module, which can be expanded with additional multi-bus interfaces to up to 8 nodes.

With the extended functions, such as online-functions, WLAN, modem, Display, digital in- and outputs, as well as directly connectible GPS, even complex measurement networks or dive test applications are no problem.



imc BUSDAQ-X (Front)



imc BUSDAQ-X (back)

3.2 Operating software

- imc BUSDAQ*flex*, imc BUSDAQ, imc SPARTAN, imc C-SERIES and measurement devices from the imc CRONOS-series is operated using the operating software **imc STUDIO**. The operating software enables complete manual and automatic setting of the measurement parameters, real-time functions, trigger machines and data saving modes. Display of measurement plots in the curve window and, as well as experiment documentation in the Report Generator, are integral elements of the software. There are extensive triggering options and data storage options adapted to particular applications. Together with the supplementary software imc Online FAMOS, the raw data can be processed in real time to yield the result data in the desired format, and can be displayed.
- imc CANSAS modules can be configured directly from the operating software if the imc CANSAS software is on the same computer. A separate connection from the imc CANSAS module to the PC, e.g. via a USB-CAN adapter, is not necessary.
- For special tasks such as system integration in test rigs, there are comfortable interfaces for all common programming languages like Visual Basic ™, Delphi ™ or LabVIEW.

3.3 Sampling interval

The sampling rates of **Field-bus channels** are not subject to any particular rule and may be as diverse as desired. The **aggregate sampling** rate of the system is the **sum of the sampling rates** of all active channels.

3.4 Device Overview

imc STUDIO connects with the imc measurement devices e.g. via the local area network (LAN). In order to be used e.g. via the LAN, the devices must normally be prepared (see "Setup - Connect the device").

Some of the capabilities discussed in this manual only pertain to certain device models. The associated device groups are indicated at the respective locations in the manual. The groups are shown in the following table which can be used with imc STUDIO.

— not available • standard o optional

CRFX imc CRONOS*flex* CRC imc CRONOS*compact* CRPL imc CRONOS-PL

Device	TCP/IP Interface [MBit/s]	Supported data carrier			RAM		Rate [1] [kHz]	Short description
		CF	PCMCIA	Hard drive	Data [MB]	Interface [MB]		
Group 2: SN12XXXX								
imc CRPL -2, -3, -4, -8, -13, -16 imc CRSL-2, -4	100	—	•	o	14	16 (32 from 2007	400	Modular system to identify on date of manufacture (as of summer, 2003)
Group 3: SN12XXXX								
imc C1 imc C-SERIES	100	—	•	—	14	32	400	
Group 4: SN13XXXX								
imc BUSDAQ imc BUSDAQ*flex*	100	•	—	o	16	32	400	Field bus data logger
imc SPARTAN	100	•	—	o	16	32	400	Modular system
Group 5: SN14XXXX								
imc SPARTAN-R	100	•	—	o	16	32	400	Modular system
imc CRC-400 imc CRFX-400	100	•	—	o	16	32	400	Modular system
imc miniPOLARES	100	•	—	—	16	32	400	
imc C1-1-LEMO-FD imc C-SERIES-FD	100	•	—	—	16	32	400	

Device	TCP/IP Interface [MBit/s]	Supported data carrier			RAM		Rate [1] [kHz]	Short description
		USB	Express Card	Hard drive	Data [MB]	Interface [MB]		
Group 6: SN16XXXX								
imc CRFX-2000	100	•	•	o	16	512	2000 via EtherCAT else 400	Modular system

Device	TCP/IP Interface [MBit/s]	Supported data carrier			RAM		Rate [1] [kHz]	Short description
		USB	CFast	Hard drive	Data [MB]	Interface [MB]		
Group 7: SN19XXXX								
imc CRC-400GP imc CRC-2000G imc CRFX-2000G(P)	1000	•	•	o	16	256	2000 via EtherCAT else 400	Modular system

1 Max. aggregate sampling rate (see data sheet)

Groups	Storage media
Group 4-6	For the purpose of onboard data storage, devices within those groups, are equipped with **CF-Card, ExpressCard slot**. imc CRONOS-devices within those groups can be equipped with an internally **fixed hard drive** available as an **option**.
Group 7	For the purpose of onboard data storage devices within this group are equipped with an **CFast-Card slot**. Devices within this group can be equipped with an internally **fixed hard drive** available as an **option**.

3.5 Device options

3.5.1 Vector Database Linkage

In many cases, parameter settings are already available as a Vector database which can be imported by any *imc BUSDAQ* modules. This makes it possible to set large amounts of parameters quickly and easily.

The data storage media used are either Compact Flash data carriers or IDE hard drives, having various data storage capacities depending on requirements. The standard equipped Ethernet TCP/IP interface enables easy connection to the PC or integration into decentralized measurement networks.

3.5.2 imc Online FAMOS

imc Online FAMOS is a program package offering online data processing on the built-in signal processor. Using imc Online FAMOS it is possible to subject data from different channels jointly to computational operations and thus form computed (virtual) channels which return the specified results in real time. In particular, imc Online FAMOS enables monitoring of measurements, where the crossing of a signal limit can be indicated on the display or by the closing of a relay contact. Entering commands is accomplished in a simple manner resembling the operation of a pocket calculator. The computational power provided is sufficient for reacting in real time even given the sum sampling rate. This makes it possible to implement two and three-step controllers. Not least of this online processing's abilities is data reduction, where complex triggering conditions are formulated and measurement data are only stored when necessary.

imc Online FAMOS is not available for imc BUSLOG.

Reference

For details, refer to Chapter imc Online FAMOS, in the device software manual.

3.5.3 Operation without PC

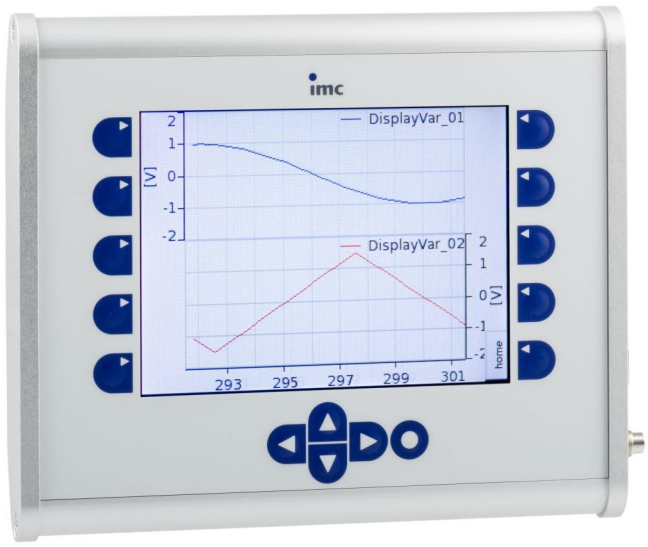
To operate a imc BUSDAQ-2 or –X unit, you don’t necessarily need a PC. Your device will start the measurement independently, if an autostart has been prepared. Using the display, you can use its keyboard to control the measurement. The display serves as a comfortable status indicator device and can replace or complement the imc operating software when it comes to controlling the measurement. It can even be used where no PC can go.

The Display can be connected or disconnected at any time without affecting a running measurement. This makes it possible, to check the status of multiple devices running simultaneously one at a time.Detailed descriptions of the functions are presented in the chapter *Display* of the imc software manual.

Note

There is no display option for imc BUSLOG!

3.5.3.1 Graphical display



The optional display screen enables interaction between the user and a running measurement process by posting read-outs of system states and allowing parameter adjustments via the membrane touch panel.

If the measurement device is prepared for opening a particular configuration upon being activated, it's possible to carry out the measurement without any PC. The Display serves as a convenient status indicator.

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Properties:

- 320 x 240 pixels in 65536 colors
- Housing dimensions approx. 306 x 170 x 25 mm; Readout screen size: approx. 11.5 cm x 8.6 cm
- Bore diameter for Display fixing: diameter core hole 5.11 mm; diameter exterior 6.35 mm (1/4" - 20 UNC)
- Weight: approx. 1 kg

Note

- The Display is controlled by a serial RS232 connection. The update frequency can't be changed. It depends on the load of the device, which is at best 15 Hz.
- The Display must be powered via the 3-pole Binder connector.

3.5.4 Device disk

The optional imc BUSDAQ Compact Flash is built into the device and is accessible after unscrewing the disk-lid.

3.5.5 SYNC

For a synchronized measurement use the SYNC terminal. That connector has to be connected with other imc devices or a DCF77 antenna.

Note

- When using multiple devices connected via the Sync terminal for synchronization purposes, ensure that all devices are the same voltage level. Any potential differences among devices may have to be evened out using an additional line having adequate cross section. Alternatively it is possible to isolate the devices by using the module ISOSYNC.
- If the SYNC plug at your device is marked with a yellow ring surrounding the BNC connector it is already isolated and it is protected against potential differences.
- See also chapter Synchronization in the imc software manual.
- In sleep mode, synchronized measurement is not possible because the wake up is too short to synchronize the internal clock.

3.5.5.1 Optical SYNC Adapter: ACC/SYNC-FIBRE

One fundamental feature of all imc measurement devices, whether belonging to the device families imc CRONOS*flex*, imc CRONOS*compact*, imc CRONOS-SL, imc CRONOS-PL, imc SPARTAN, imc BUSDAQ, imc BUSDAQ*flex* or imc C-SERIES, is their ability to synchronize multiple devices, even of differing models, and to operate them all in concert. The synchronization is typically accomplished by means of a Master/Slave process via the electrical SYNC-signal, which terminates on the devices at a BNC socket.

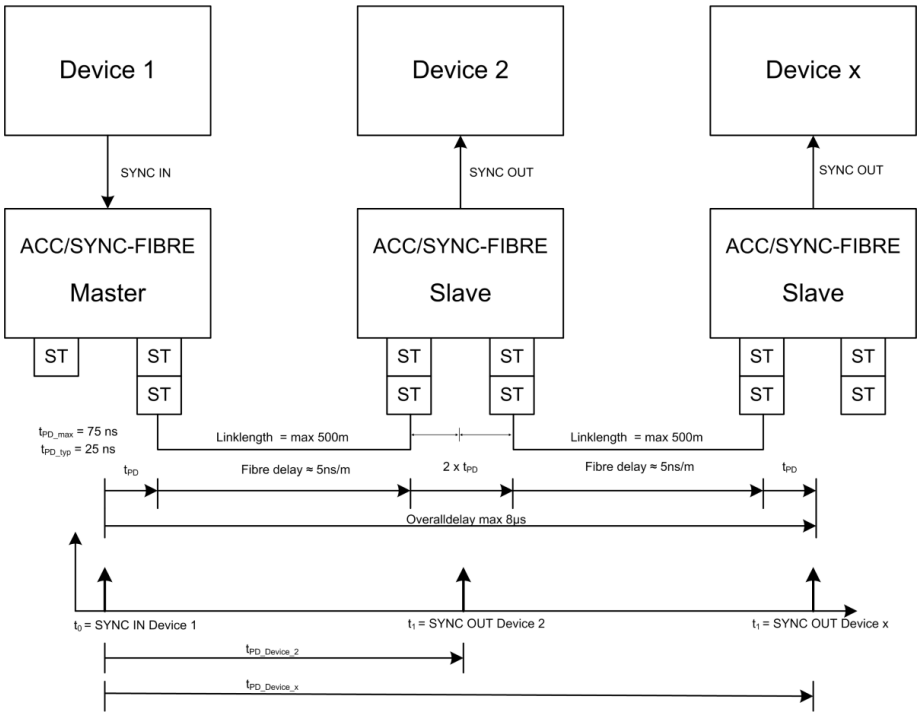
In areas of high electrical interference, or where long-distance signal transmission is needed, the signal can be conducted via fiber optic cabling with total isolation and no interference. For this purpose, the externally connectable optical SYNC adapter ACC/SYNC-FIBRE is available.

When this adapter is used, the BNC socket is not, but rather one of the DSUB-9 sockets for the GPS, DISPLAY or MODEM, which then conducts both the isolated electrical SYNC signal and additionally a supply voltage which is required by the adapter, as well as supplying directional indication (Master to Slave).

For this reason, any imc measurement devices used must be remodeled in accommodation to one of the DSUB-9 sockets. Once either the MODEM or the GPS socket has been remodeled, it is no longer usable for its original purpose. For the GPS socket, this does not apply. Even parallel operation is possible (via Y-cable), if the GPS-data are only used for the position data and the adapter is used for the SYNC signal.

For whichever signal (adapter or BNC) is currently connected, both the electrical and the optical mode can be used, however not both at the same time.

The plug is designed for the extended environmental range. The imc measurement devices used with this adapter require some modification.



Find here technical details: ACC/SYNC-FIBRE 44

3.5.6 GPS

At the nine-pin GPS socket it is possible to connect a GPS-receiver of the type **Garmin GPS18LVC, GPS18-5Hz etc.**. This makes it possible to achieve absolute **synchronization to GPS time**. If the GPS-mouse has reception, the measurement system synchronizes itself automatically. **Synchronization with a NMEA source** is possible. The precondition for this is that the clock must return the GPRMC-string along with the one-second-interval clock signal.

All **GPS information** can be **evaluated** and subjected to **subsequent processing** by imc Online FAMOS.

GPS signals are **available as**: process vector variables and fieldbus channels.

GPS information	Description
pv.GPS.course	Course in °
pv.GPS.course_variation	Magnetic declination in °
pv.GPS.hdop	Dilution of precision for horizontal
pv.GPS.height	Height over sea level (over geoid) in meter
pv.GPS.height_geoidal	Height geoid minus height ellipsoid (WGS84) in meter
pv.GPS.latitude pv.GPS.longitude	Latitude and longitude in degree. (Scaled with 1E-7)
pv.GPS.pdop	Dilution of precision for position
pv.GPS.quality	GPS quality indicator 0 Invalid position or position not available 1 GPS standard mode, fix valid 2 differential GPS, fix valid ...
pv.GPS.satellites	Number of used satellites.
pv.GPS.speed	Speed in km/h
pv.GPS.time.sec	the number of seconds since 01.01.1970 00:00 hours UTC. For this reason, it is no longer possible to assign the value to a Float-format channel without loss of data. This count of seconds can be transformed to absolute time under Windows and Linux.To do this, use the function below. `MySeconds = CreateVChannelInt( Channel_001, pv.GPS.time.sec)`
pv.GPS.vdop	Dilution of precision for vertical see e.g. www.iota-es.de/federspiel/gps_artikel.html (German)

For internal use only:

- pv.GPS.counter
- pv.GPS.test
- pv.GPS.time.rel
- pv.GPS.time.usec

Notes

pv.GPS.latitude and **pv.GPS.longitude** are scaled as **integer 32 with 1E-7**. They must be **proceeded as integer channels**, otherwise **precession will be lost**. If the virtual channel is created by a addition with a channel, the result must be multiplied by 10^{-7}:

```
latitude = Channel_001*0+pv.GPS.latitude *1E-7
```

RS232 port settings

For imc devices to be able to use a GPS receiver, the following conditions must be met:

- **Baud rate**: Possible values are 4800, 9600, 19200, 38400, 57600 or 115200
- 8 bit, 1 stop bit, no flow control
- The following **NMEA strings** must be sent: ***GPRMC, GPGGA, GPGSA***. The order of the strings must be adhered to.
  Additional strings should be deactivated. If this is not possible, all other strings must be **before** the GPGSA string!
- The receiver must deliver a **1Hz clock**.
- The rising edge of the clock must mark the second specified in the next GPRMC string.
- All three strings should be sent as soon as possible after the 1Hz clock, so that there is sufficient time for processing between the last string and the next 1Hz clock.

3.5.7 Sleep/Resume mode

The imc BUSDAQ with CAN-Interface is able to start a measurement out of a sleep mode within an extremely short time. It is optimized for very low power consumption. Therefore it is especially suitable for recording CAN data of vehicles, as soon as they have been started.

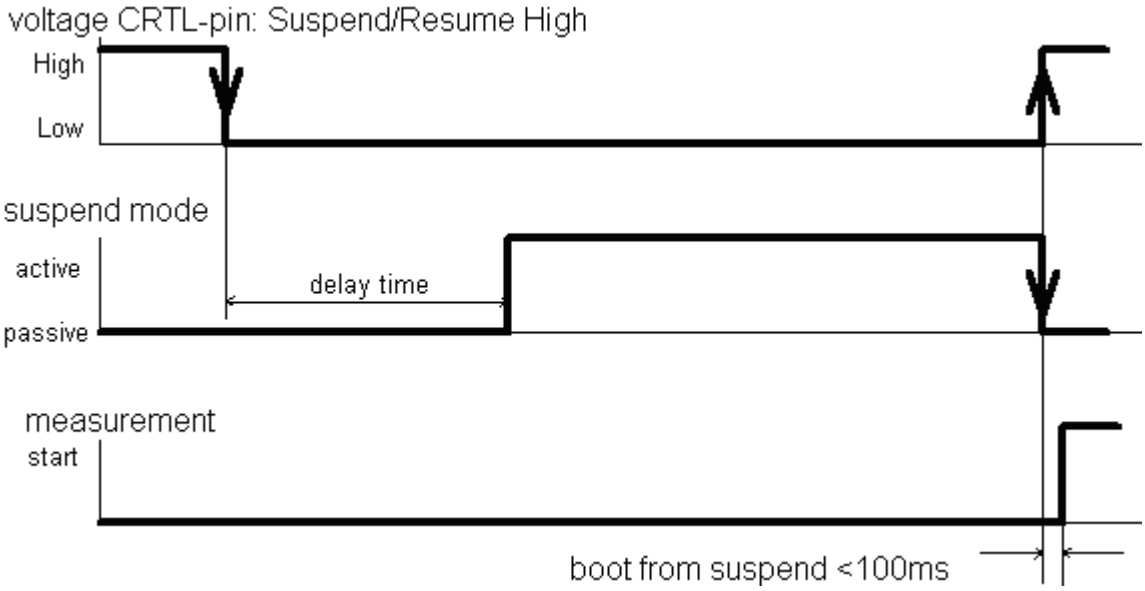
A new operation mode has been developed in which the device isn’t switched off, but put into a sleep or ***sleep mode***. The transition from sleeped to normal operation takes less than 200 ms.

Note

- Sleep/Resume Mode is only supported for imc BUSDAQ devices with CAN interface. Other field busses won't be supported.
- In case CANSAS modules are synchronized by imc BUSDAQ with CAN-1 protocol, synchronization after resume is not assured.

3.5.7.1 Description

In the ***sleep*** operation mode, imc BUSDAQ consumes less than 200 mW with a full charged battery. If an experiment has been written to the device drive or internal flash, the experiment will be run after less than 200 ms upon leaving the sleep mode (resume).



3.5.7.2 Preparing the imc BUSDAQ: diskstart / autostart

The device will be prepared as soon as ***one experiment*** has been written to the devices as a **diskstart or autostart configuration**. It doesn't matter whether that configuration has been saved to the internal flash, the removable drive or the internal IDE drive. But it is important that there is only one experiment inside the device.

Important Notes

- If more than one diskstart configuration is present in the device, sleep mode is not available, because a selected has to be made when starting.
- No more than 300 folders may be on the internal data carrier! Otherwise, a startup time within 200 ms is not ensured.

3.5.7.3 Activate sleep mode

To enable the sleep/resume mode, it is necessary to jumper the pins ***Sleep/Resume Mode*** enable/disable and ***–Supply***. After the desired configuration is saved as a diskstart, the device is put into sleep mode by ***a voltage transition from High to Low at the CTRL-plug's pin*** "Sleep/Resume High"; see circuit on CTRL plug pin configuration 50. This happens after a **delay time.** That delay time can be changed with a special program by imc at any time.

Delay time

The delay time allows the following features:

- Default is 5 seconds
- Prevent voltage peaks on pin “Sleep/Resume High” of the CTRL plug from activating the sleep mode.
- The user must apply a clear voltage of some duration to the pin “Sleep/Resume High” into sleep mode. If the device is to be switched automatically upon ignition of a vehicle, the car can be restarted without interrupting the measurement.
- When stopping the measurement, the switching-off process (e.g. of a vehicle to be measured) will be recorded completely.

Note

In very rare cases involving particular system setups, the activation process may cancel. In this case, the LED first shines continuously orange, after which the device reboots automatically.

3.5.7.4 Step by Step: summarization

1. Connect the device to the PC and create the desired configuration. Make sure that the channels are recorded to the internal disk.
2. Open diskstart dialog by (imc DEVICES menu Measurement > Diskstart | imc STUDIO: Ribbon (Setup): *Configuration > Diskstart*)
    a. Write diskstart configuration to the device
    b. The configuration’s location doesn’t matter
    c. Only one diskstart configuration
3. Activate sleep mode by applying voltage to the CRTL-plug’s pins. The LED is orange for the delay time and indicates successful activation of the sleep mode by blinking green.
4. Start measurement by applying voltage to the pins of the CRTL-plug.
5. For checking purposes, connect to the device. A message appears “Measurement running – connect; stop, cancel”. Connect and check the running measurement.

3.5.7.5 Error Handling

Error handling with Autostart, up to and including firmware version 2.8R4:

If an error occurred during an automatic Autostart, the LED on the device's removable drive shines. No measurement took place.

Error handling with Autostart as of firmware version 2.8R5:

1. If an error occurs during an automatic Autostart, the device reboots and tries again to prepare for Autostart.
2. If this fails again, the device reboots and now tries to prepare the Autostart in such a way the **no** data are written to the internal data carrier. In case the drive is full or not present, the Autostart is prepared anyway. In particular for imc BUSDAQ devices, this ensures that the transition to Sleep Mode and the Resume function in response to WakeOnCAN continue to work. This error is indicated by the LED on the removable data carrier and if possible by an entry in the logfile 29,
   e.g. `2013-09-11 13:12:46.046892 M#:Autostart failed! Ignoring device's data storage settings at next try! E#:-4009 R#:2`
3. If this attempt also fails, the system reboots again and an empty Standard-experiment is set up. The status-LED continues to shine. If possible, the following entry is then written in the logfile 29:
   e.g. `2013-09-11 14:12:46.012345 M#:Autostart failed! Using empty configuration for next try! E#:-5001 R#:3`

General handling of internal errors up to and including firmware version 2.8R4:

In consequence of fatal internal errors (unexpected hardware problems, e.g. due to electrical disturbances, bus errors, etc.), the device had previously no longer been operable. In order to continue use, the device needed to be switched off and then on again.

Error handling during Resume as of firmware version 2.8R5:

1. In case of fatal internal errors, the device automatically reboots. If there is an internal data carrier, an entry is made in the logfile DeviceXXXXXX.syslog (XXXXXX = the device's serial number) in the root directory.
   e.g.: `2013-09-11 09:55:31.135739 M#:SIGSEGV occurred, forcing reset!`
2. Following the reboot, the system tries again to prepare for Autostart.

Error handling with Sleep/Resume prior to firmware version 2.6R3SP22, 2.7R3SP11, 2.8R1

If an error occurred during the transition to Sleep mode, this was indicated by the red status-LED. In that case, the device remained activated at normal power consumption.

Error handling with Sleep as of firmware version 2.6R3SP22, 2.7R3SP11, 2.8R1 through version 2.8R4

1. If an error occurs during the transition to Sleep mode, the device reboots. Subsequently, a new attempt is made to go into Sleep mode.
2. if necessary, this is repeated twice.
3. If even the third attempt fails, another reboot is performed and the empty Standard-experiment is prepared.
   If possible, the following entry is then made in the logfile 29:
   e.g. `2013-09-11 14:12:46.012345 M#:Suspend failed! Using empty configuration for next try! E#:-5001 R#:3`
   If this attempt is successful, the Suspend mode is indicated by a red blinking LED (instead of the customary green blinking LED). If it does not succeed, Step 3 is repeated as often as necessary.

Error handling with Sleep/Resume as of firmware version 2.8R5

Steps 1 and 2 match those of the predecessor version

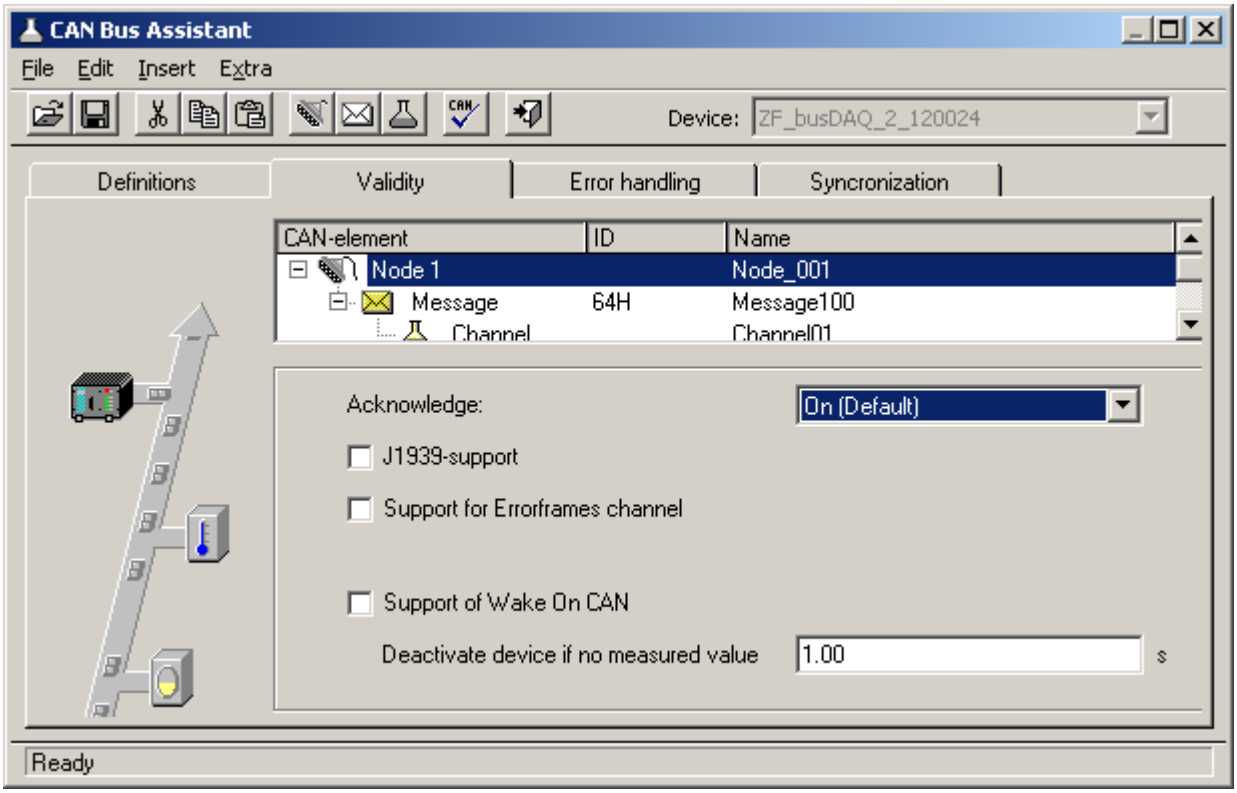
3. If this fails again, the device reboots and tries to prepare the Autostart experiment in such a way that **no** data are written to the internal data carrier. For cases where the drive is full or not present, the Sleep/Resume is prepared anyway. In consequence, devices having WakeOnCAN can be started from Sleep. This error is indicated during the Suspend by red blinking LED on the removable data carrier. If possible, this is also noted by an entry in the logfile 29.
   E.g. `2013-09-11 13:12:46.046892 M#:Autostart failed! Ignoring device's data storage settings at next try! E#:-4009 R#:2`
4. If even this attempt fails, the system reboots and the empty Standard-experiment is prepared. If possible, the following entry is now written in the logfile 29:
   e.g. `2013-09-11 14:12:46.012345 M#:Autostart failed! Using empty configuration for next try! E#:-5001 R#:3`
   If this attempt succeeds, the Suspend mode is indicated by a red blinking LED (instead of the customary green blinking LED). If it does not succeed, step 4 is repeated as often as necessary.

3.5.8 Wake On CAN

Wake On CAN enables the functionality of Sleep mode in dependence on the CAN-Bus activity. As soon as data arrive at the CAN-node, the device starts measurement. After a specifiable time without bus activity, the device returns to the Sleep mode.

Systems supply or activate the measurement device separately from the connected CAN-bus thus avoid premature startup of data capture and the resulting unnecessary power consumption.

The prerequisite is the appropriate configuration of the Remote connection, described previously, which enables the hardware-driven Sleep mode. Previously, the Sleep mode was available without any additional preparation of the experiment in the device software. The *Wake On CAN* function is a supplemental AND condition and must be activated in the CAN-Assistant.



The option Support of *Wake On CAN* appears on the page Validity if a node is selected in the CAN-element tree diagram. If it isn't shown, this indicates that your device's hardware isn't set up for this function.

Under Deactivate device if no measured value x s, enter the time interval whose elapse without the arrival of data is to be interpreted as deactivation of the CAN-sensors.

Each node can be adjusted individually.

3.5.9 Power LED: meaning of blink and color codes

ON/OFF		**Code**	**Function**
		Permanent green	Normal operation
		Green blinking	Power fail recognized or device is switching off

3.5.10 LED meaning of blink and color codes

	Code	Function
	Green blinking upon activation	Normal booting process. After successful booting, the LED extinguishes.
	Green blinking at 1s rhythm	Device is in sleep mode.
	Permanent green	Error after Auto- or Diskstart (e.g. data overflow at the internal drive)
	Permanent orange	Sleep signal recognized - device is within delay time.
	Permanent red	Error

After booting or a successful started measurement after sleep mode the LED is switched off.

3.6 Circuit and pin configuration of the CTRL plug

3.6.1 LEMO Type 0B for BUSLOG

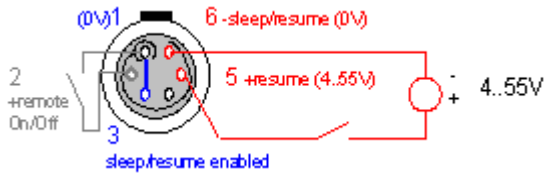
The sleep mode is controlled by a voltage applied at the CTRL-plug's pin +Sleep/Resume High. The sleep mode is activated when this voltage is switched off (<1 V). The devices will wake up and start the measurement as soon as the voltage (4 to 55 V) is applied.

To enable the Sleep/Resume Mode, there must be a connection between *Sleep/Resume Mode* enable/disable and *–Supply*.

The pin configuration of the LEMO plug 50.

Sleep / Resume configuration available

1. Configuration with external voltage source



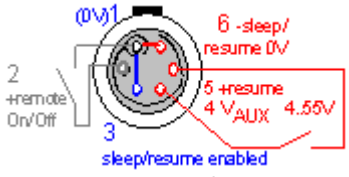
view: socket

Pins 1 and 3 are connected to activate the Sleep/ Resume mode.

An external voltage source at Pin 5 wakes the device from the sleep mode.

The reference of the external voltage source must be connected to Pin 6.

2. Configuration with supply voltage at Pin 4



view: socket

Here too, Pins 1 and 3 are connected in order to activate the Sleep/Resume mode.

The module's auxiliary voltage is led through Pin 4, and is used for applying voltage to Pin 5.

The reference of the Sleep/Resume circuit at Pin 6 is implemented by a jumper to Pin 1.

Remote On/Off

The device can be powered on or off by the control-plug's ***Remote On/Off pin***. Therefore, Remote On/Off (**pin 2**) has to be connected with –Supply (**pin 1**) using a push button.

Note

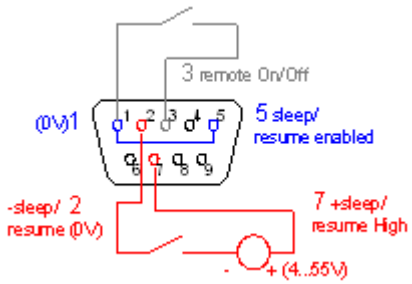
If Pins 1 and 2 (Remote On/Off and –Supply) are connected constantly, the device remains switched on. Then the green power-on push button is not able to switch the device off.

3.6.2 DSUB9 for imc BUSDAQ-X and imc BUSDAQ-2

The pin configuration of the DSUB-9 plug 50.

Sleep / Resume configurations available

1. Configuration with external voltage source



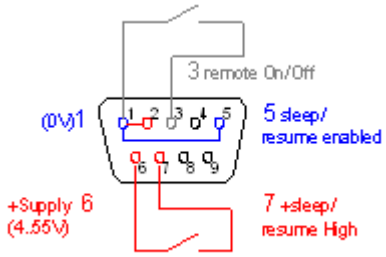
view: plug connector

Pins 1 and 5 are connected to activate the Sleep/ Remote mode.

An external voltage source at Pin 7 wakes the device from the sleep mode.

The reference of the external voltage source must be connected to Pin 2.

2. Configuration with supply voltage at pin 6



view: plug connector

Here too, Pins 1 and 5 are connected in order to activate the Sleep/Remote mode.

The module's supply voltage is led through Pin 6, and is used for applying voltage to Pin 7.

The reference of the Sleep/Resume circuit at Pin 2 is implemented by a jumper to Pin 1.

Remote On/Off

The device can be powered on or off by the control-plug's ***Remote On/Off pin*** or with the standard Power-On push button. Therefore, Remote On/Off (**pin 3**) has to be connected with -Supply (**pin 1**) using a push button.

imc BUSDAQ-X devices can be powered on or off with a switch *(*or with the standard Power-On) and not with push button.

Note

If Pins 1 and 3 (*Remote On/Off* and *–Supply*) is connected permanently, the device remains switched on. Even with the Power-On push button it is not possible to switch off the device, when this configuration (jumper) is set.

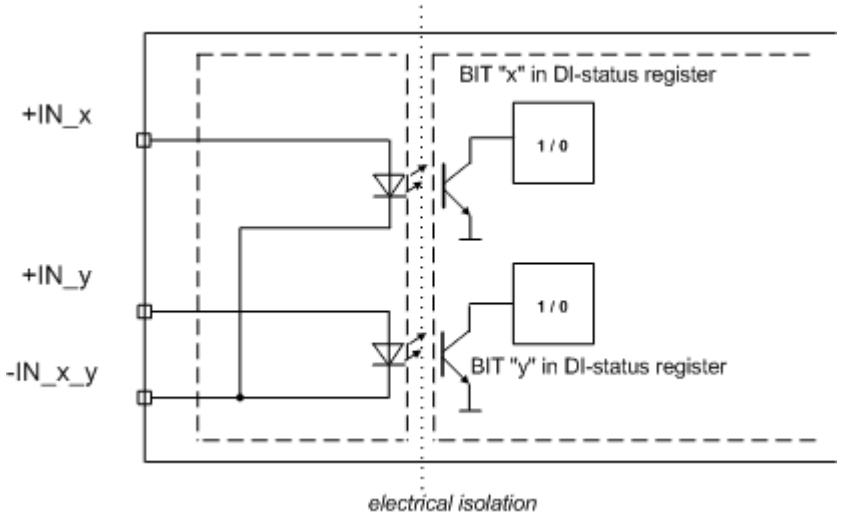
3.7 Digital inputs and outputs for imc BUSDAQ-X

The type *imc BUSDAQ-X* provides you with 4 binary inputs and 4 electronic switches outputs.

3.7.1 Digital Inputs

Parameter	Value	Comment
Channels	4	Each pair of channels has a common ground reference and is isolated from the other inputs, the power supply and CAN-Bus, but not mutually.

The digital input potion possesses 4 inputs which can take samples at rates of up to 10 kHz. Every pair of inputs has a common ground reference and are not mutually isolated. However, this input pair is isolated from all other pairs.



Pin configuration of the DSUB plug for the digital inputs.

Pinconfiguration of the DSUB15 plugs for the digital inputs 51.

3.7.1.1 Input voltage

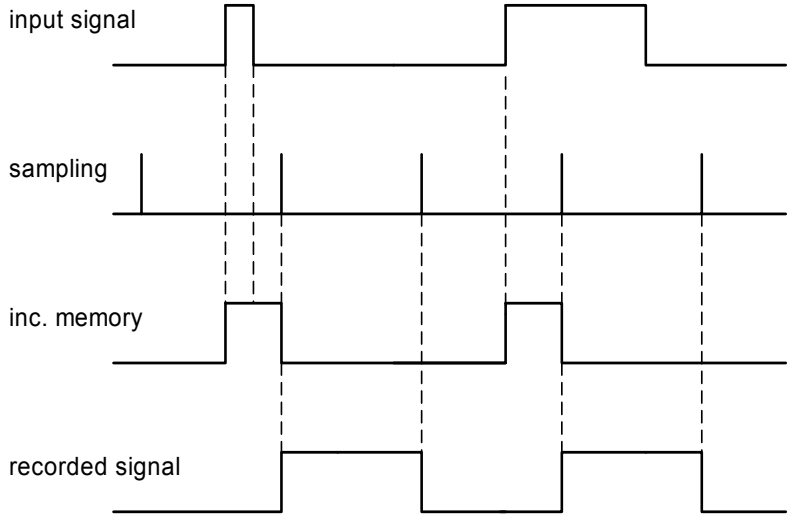
The input voltage range for two digital inputs can be set for either 5 V (TTL-range) or 24 V. The switching is accomplished by means of a jumper between pin LEVEL x/y and reference voltage -IN x/y:

- If LEVEL x/y and reference voltage -IN x/y are jumpered, both bits work with 5V and a threshold of 1.7..1.8 V.
- If LEVEL x/y is open, 24 V and a threshold of 6.95 ...7.05 V are valid.

Thus, an unconnected plug is set by default for 24 V. This prevents 24 V from being applied to the voltage input range of 5 V.

3.7.1.2 Sampling interval and brief signal levels

The digital inputs can be recorded in the manner of an analog channel. It isn't possible to select individual bits for acquisition; all 4 bits (digital port) are always recorded. The hardware ensures that the brief HIGH level within one sampling interval can be recognized.

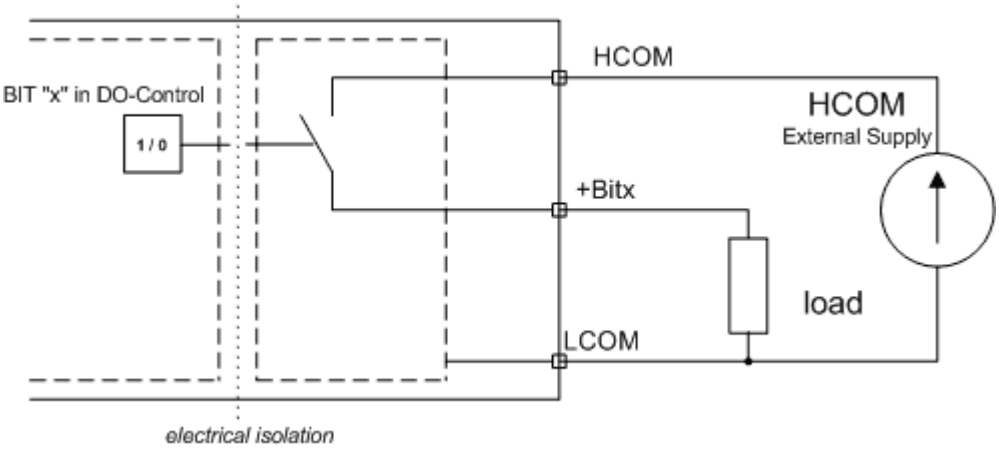


3.7.2 Digital Outputs

Parameter	Value	Comment
Channels	4	All outputs and the external voltage supply have a common ground reference and are isolated from the other inputs, the power supply and CAN-Bus, but not mutually.

The output voltage must be provided by an external voltage supply connected to pin HCOM. That voltage has to be in the range of 5 to 30 V. The load will be connected to Bit_x. All outputs and the external supply have a common reference at pin LCOM, but are isolated from all other components of the imc BUSDAQ-X.

The outputs are switched by transistors. The maximum current is limited to 0.7 A.



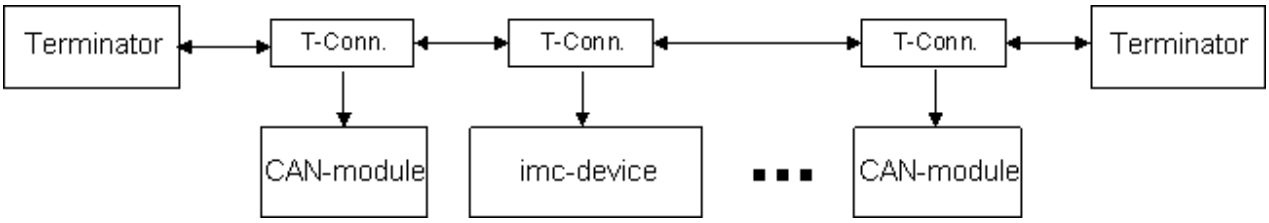
Pin configuration of the DSUB plug for the digital outputs.

Pin configuration of the DSUB-plugs for the digital oututs 51.

3.8 Field bus cabling

3.8.1 CAN, CAN FD cabling

imc BUSDAQ / BUSLOG is equipped with 2 to 8 nodes which are joined up by a tee-junction. Connect the tee-junction to the 9-pin DSUB plug.



imc BUSDAQ / BUSLOG with connected tee-junction

Note that for a transfer rate of 1 Mbit/s to the CAN-Bus the stub line of a tee-junction may only be up to 30 cm long. In general, the wiring within imc BUSDAQ / BUSLOG is already 30 cm long. Therefore if an external tee-junction is connected, the junction must be connected straight into the terminal.

In this context it doesn't matter whether the other sensors are connected via tee-junction or not. The illustration simply shows the options available.

Find here the technical details 39 and the pin configuration 46 of the CAN-Bus interface.

Find here the technical details and the pin configuration 46 of the CAN FD interface.

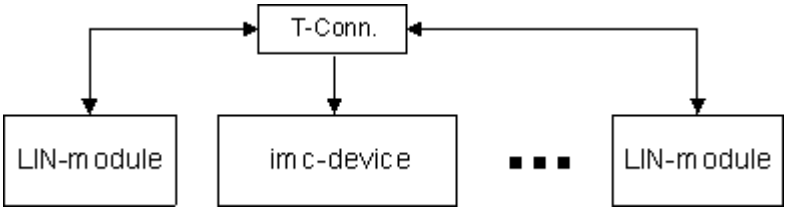
Connecting the terminators

- Terminator-resistance is 120 Ω as per CAN in Automation (CiA).
- If terminators are connected, then between Pins 2 and 7.
- Terminators are only applied at the ends of the bus; nowhere else in the line. The bus must always end at a terminator.

Note

With High-Speed CAN a termination on each node can be activated by software.

3.8.2 LIN-cabling



LIN-cabling

To the technical data 40 and the pin configuration 46 of the LIN-BUS interface.

3.8.3 J1587-cabling

Identical to CAN-Bus. However there's only one connector for J1587 Bus. The baud rate is always 9600.

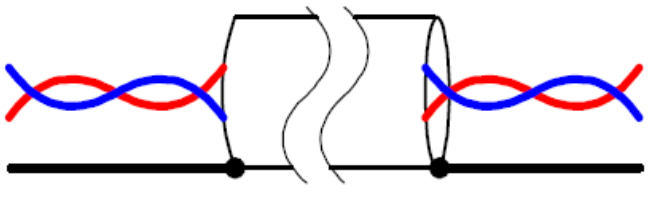
To the technical data 39 and the pin configuration 46 of the J1587-bus interface.

3.8.4 ARINC-cabling

imc standard: DSUB-15

This pin configuration corresponds the suggested imc standard. Transmitting channels and any differing pin configuration can be considered as special order.

We recommend for the connection twisted and shielded wiring:



To the technical data 41 and the pin configuration 48 of the ARINC-Bus interface.

3.8.5 FlexRay-cabling

Standard 1x DSUB-9

Reference

To the technical data 40 and the pin configuration (optional 2x DSUB-9) 47 of the FlexRay interface.

3.8.6 XCPoE-cabling

Standard 1x RJ45

Reference

To the technical data 41 and the pin configuration 47 of the XCPoE interface.

4 Technical Specs

4.1 imc BUSDAQ-2 / imc BUSDAQ-X / imc BUSLOG

Parameter	imc BUSLOG	imc BUSDAQ-2	imc BUSDAQ-X	Remarks
PC connector: Ethernet TCP/IP	10/100 MBit, approvable cable length for 100 MBit Ethernet max. 100 m according IEEE 802.3			
Fieldbus-nodes	2	2	2 to 8	isolated
Baud rate	max 1 Mbit/s	max 1 Mbit/s	max 1 Mbit/s	
Channels	<512	<512	<512	per device
Digital inputs Digital outputs	- -	- -	4 (DSUB-15) 4 (DSUB-15)	opto coupler TTL / 24 V isolated
LAN-interface	TCP/IP	TCP/IP	TCP/IP	10/100 Mbit/s, RJ45
Modem external Modem internal	- -	DSUB-9 optional	DSUB-9 optional	 analog, ISDN, GSM radio modem
WLAN-Adapter internal	-	-	optional	
Display	-	extern	extern	DSUB-9
GPS	-	extern	extern	
Sync. plug	SMB	BNC	BNC	DCF
CTRL plug	LEMO type 0B	DSUB-9	DSUB-9	
Vector database	yes	optional	optional	
Storage compact flash hard disk (HDD or SSD)	 optional -	 optional -	 optional optional	the storage medium's temperature range applies
Online-processing	-	optional	optional	imc Online FAMOS
Overload protection	60 V	60 V	60 V	
Supply	10 V to 50 V_{DC}	10 V to 50 V_{DC}	10 V to 50 V_{DC}	Default up to 55 V_{DC} some early modules only up to 32V_{DC}; follow identification plate.
Supply connector	Binder: ESTO RD03 series 712 3-poles			
max. load for CAN supply per node	<1 A	<1 A	<1 A	option for node 1 and 2
Power consumption	200 mW <3 W	200 mW <8 W	200 mW / slot <8 W	sleep-,ode @25°C and charged battery meas.-mode
USV Charging time of the UPS Super-Caps	1 s 3 min.	1 s 3 min.	1 s 8 min.	integrated (Super-Caps), Shut-down delay with power outage minimum active operation for full UPS functionality
Start time	0.2 s 30 s	0.2 s 30 s	0.2 s 30 s	after sleep-mode after power on
Transfer into/ out of sleep-mode	external signal or switch to jumper + switch or Wake up on CAN-Bus			5 V to 55 V
Temperature range	-40..+85°C	-40..+85°C	-40..+85°C	operating temperature

Parameter	imc BUSLOG	imc BUSDAQ-2	imc BUSDAQ-X	Remarks
Dimensions in mm	185 x 30 x 110	185 x 51 x 110	185 x 110 x 110	L x W x H (in mm)
Weight	650 g	850 g	2 kg (8 nodes)	

4.2 Further Technical Specs

4.2.1 Fieldbus: Technical Details

4.2.1.1 CAN-Bus Interface

Parameter	Value	Remarks
Number of CAN-nodes	2	one galvanically isolated node per connector (each with CAN IN and CAN OUT)
Terminal connection	2x DSUB-9	
Topology	bus	
Transfer protocol	configurable per software: CAN High Speed (max. 1 MBaud) CAN Low Speed (max. 125 KBaud)	individually for each node according to ISO 11898 according to ISO 11519
Operating mode	Multi Master principle	
Direction of data flow	sending and receiving	
Baud rate	5 kBit/s to 1 MBit/s	configurable via software; maximum is depending on selected protocol (High/Low Speed)
Max. cable length at data transfer rate	25 m at 1000 kBit/s 90 m at 500 kBit/s	CAN High Speed cable delay 5.7 ns/m
Termination	120 Ω	switchable by software for each node
Isolation strength	60 V	to system ground (case, CHASSIS)
Direct access for configuration of imc CANSAS modules	yes	via the CAN node of the device, with imc STUDIO

To the pin configuration 46 and the cabling 36 of the CAN-Bus interface.

4.2.1.2 J1587-Bus Interface

Parameter	Value	Remarks
Nodes	1	
Terminal connection	1x DSUB-9	
Topology	Bus	
Transfer protocol	J1587 with RS485 interface	 custom version: special order
Direction of data flow	sending and receiving	
Baud rate	9600 Bit/s	
Isolation strength	60 V	to system ground (case, CHASSIS)

To the pin configuration 46 and the cabling 36 of the J1587 interface.

4.2.1.3 LIN-Bus Interface

Parameter	Value	Remarks
Nodes	2	for each node LIN_IN / LIN_OUT
Terminal connection	2x DSUB-9	one DSUB for each node
Topology	Bus	
Transfer protocol	LIN 2.1, LIN 2.0, LIN 1.3	LIN 1.3 and LIN 2.x specifications can run on a bus simultaneously
Operating mode	Master and/or Slave	
Direction of data flow sending receiving	 Display variables, virtual bits LIN data in measurement channels	
Baud rate	1 to 20 kBit	
Data rate	30 kS/s	
Termination	Pull up resistor	selectable via software Master/Slave
Isolation strength	60 V	to system ground (case, CHASSIS)

To the pin configuration 46 and the cabling 36 of the LIN interface.

4.2.1.4 FlexRay Interface

Parameter	Value	Remarks
Number of FlexRay nodes	1 additional 1 cold start node	1x channel A+B for modules type FlexRay2
Terminal connection Standard	1x DSUB-9 per module	optionally 2x DSUB-9 (channel A+B separately)
Topology	Bus	
Transfer protocol	FlexRay protocol specification v3.0	
	XCP- specification Universal Measurement and Calibration Version 1.2.0; Date: 2013-06-20”	• ASAM_AE_MCD-1_XCP_BS_Protocol-Layer_V1-2-0.pdf “ASAM MCD-1 (XCP); Protocol; Protocol Layer Specification; • ASAM_AE_MCD-1_XCP_AS_Flexray-Transport-Layer_V1-2-0.pdf “ASAM MCD-1 (XCP on FlexRay); Protocol; FlexRay Transport Layer;
Operating mode	Sync nodes, cold start nodes or normal nodes	
Direction of data flow sending	 Display variables, virtual bits, process vector variables and Etherbit	 Cyclic and Single Shot Frames with imc Online FAMOS
Baud rate	2.5 / 5.0 or 10.0 MBit	
Max. cable length at data transfer rate	see FlexRay protocol	
Data rate	 max 30 kSample/s max 60 kSample/s	per module current modules type FlexRay2
Isolation strength	60 V	to system ground (case, CHASSIS)

To the pin configuration 47 and the cabling 37 of the FlexRay interface.

4.2.1.5 XCPoE Master-Slave Interface

Parameter	Value	Remarks
Nodes	1	
Terminal connection	1x RJ45	
Topology	star	
Transfer protocol	XCP -Part 1- Overview XCP -Part 2- Protocol Layer Specification XCP -Part 3- Transport Layer Specification XCP on Ethernet (TCP_IP and UDP_IP) XCP -Part 4- Interface Specification XCPplus	Ver. 1.0; ASAM e.V. Ver. 1.0; ASAM e.V. Ver. 1.0; ASAM e.V. Ver. 1.0; ASAM e.V.
Operating mode	Master or Slave	A2L file can be imported (XCPplus support included) A2L-file will be generated
Transmittable channel type when operating as slave	All meas. channels (analog, digital, fieldbus-, as well as virtual channels (OFA)	
Data rate	max. 100 kHz max. 10 kHz	depending on system configuration Slave Master
Max. cable length	100 m	
Hardware interface (Physical Layer)	Ethernet 100 Mbit	
Isolation strength	standard Ethernet specification	

To the pin configuration 47 and the cabling 37 of the XCPoE interface.

4.2.1.6 ARINC-Bus Interface

Parameter	Value typ.	min. / max.	Remarks
Number of Rx-channels	8		
Number of Tx-channels	4		
Terminal connection	2x DSUB-15		
Transfer protocol	ARINC 429		
Baud rate	Low (12.5 kbit/s) High (100 kbit/s)		
Max. voltage for each Rx connection		±29 V	to System ground (protection ground)
Max. voltage for each Tx connection	5 V	4.5 V / 5.5 V	to GND "ZERO": min -0.25 V .. max 0.25 V
	10 V	9 V / 11 V	differential "ZERO": min -0.5 V .. max 0.5 V
Isolation strength	no galvanically isolation		

To the pin configuration 48 and the cabling 37 of the ARINC interface.

4.2.2 Color Display

Parameter	Color Display	
Display	5.7² TFT	
Colors	65536	
Resolution	320 x 240	
Backlight	LED	
Contrast (typ.)	600:1	
Brightness (typ.)	450 cd/m²	
Connection cable	RS232, max. 2 m	
Dimensions (W x H x D)	192 x 160 x 30 mm (w/o connectors)	
Display area	approx. 11.5 x 8.6 cm	
Weight	approx. 1 kg	
Supply voltage	9 V to 32 V_{DC} 6 V to 50 V_{DC} upon request	
Power consumption	approx. 3 W with 100% back light	
Temperature range	-20°C to +60°C ≤+85°C	operating temperature module interior temperature
Rel. humidity	80% up to 31°C, above 31°C: linear declining to 50%, according DIN EN61010-1	
Terminal connections	DSUB-9 (female) for connection to measurement device 3-pin Binder (metal) ESTO RD03 series 712, 3-pin for external current supply	
Miscellaneous	membrane touch panel with 15 buttons robust metal frame anti-reflection coated glass pane to protect display	

Description the display 21 and the DSUB-9 pin configuration 49.

Included accessories

- Modem cable in the extended temperature range
- AC/DC power supply unit
- POWER plug

4.2.3 Synchronization and time base

Time base per device without external synchronization			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Accuracy RTC		±50 ppm 1 µs (1 ppm)	not calibrated (standard devices), at 25°C calibrated devices (upon request), at 25°C
Drift	±20 ppm	±50 ppm	-40°C to +85°C operating temp.
Ageing		±10 ppm	at 25°C, 10 years

Time base per device with external synchronization signal				
Parameter	**GPS**	**DCF77**	**IRIG-B*** **	**NTP*** **
Supported formats	NMEA / PPS*		B002 B000, B001, B003**	version 4 (downwards compatible)
Precision	±1 µs			<5 ms after ca. 12 h
Jitter (max.)	±8 µs			
Voltage level	TTL (PPS*) RS232 (NMEA)	5 V TTL level		---
Input resistance	1 kΩ (pull up)	20 kΩ (pull up)		---
Input connector	DSUB-9 connector non-isolated "GPS"	BNC connector "SYNC" (isolated, depending on the model)		Ethernet
Shield potential input		models with non-isolated BNC connector: system ground models with isolated BNC connector: isolated signal-GND		---

* PPS (pulse per second): signal with an impulse >5 ms is necessary

** using BCD information only

*** NTP and IRIG-B do not come standard with imc BUSDAQ. BUSDAQ Standard devices have serial numbers below 140000 belonging to Device Group 4. **Upon request, NTP and IRIG-B are available** with a **special** BUSDAQ model. These special models are devices having serial numbers > 140000 and belong to Device Group 5. Please note the documentation which ships with the device and which deviates from that of the standard device.

Synchronization with DCF77 for several devices (Master/Slave)			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Max. cable length		200 m	BNC cable RG58
Max. number of devices		20	slaves only
Common mode	0 V		with non-isolated BNC connector: devices must have the same ground voltage level, otherwise signal quality problems (signal artifacts and noise) may result. Aavailable optional external isolation: see ISOSYNC
		max. 50 V	with isolated BNC connector: SYNC-signal is already internally isolated, for reliable operation even with different ground voltage level (ground loops)
Voltage level	5 V		
DCF input/output	connector "SYNC"		BNC
Shield potential, DCF input	system ground		see remarks common mode

Isolated SYNC-connection		
Parameter	**Value typ.**	**Remarks**
BNC connection	isolated, not connected with housing	marked by a yellow ring around the BNC connector (depending on production date)
Isolation strength	300 V	1 minute
Delay	<100 ns	@ 25°C

ISOSYNC (optional external device for an isolated decoupling of the SYNC signal)			
Parameter	**Value typ.**	**min. / max.**	**Remarks**
Isolation strength	1000 V		1 minute
Delay	5 µs		@ 25°C
Temperature range		-35°C to +80°C	

4.2.4 ACC/SYNC-FIBRE

Parameter	**Value typ.**	**min./ max.**	**Remarks**
Compatible with	GPS-connection imc measurement device		Modification of the GPS-connection is necessary (device preparation for SYNC-FIBRE). The simultaneous use of both SYNC-FIBRE and the device's SYNC plug (BNC) is not allowed. Only the SYNC-FIBRE or the SYNC plug (BNC) can be used.
Terminal connection	2x ST plug 1x DSUB-9		FOC connection with measurement device
Supply	5 V	±10%	out of device internal sensor supply
Power consumption	0.5 W	±10%	
Propagation Delay tPD	25 ns	75 ns	SYNC-In to Opto-Out or Opto-In to Sync-Out
Link length		500 m	Length of the fiber optic distance between two ACC/SYNC-FIBRE
Total delay		8 µs	SYNC-In first device to SYNC-Out last device
Fiber Optics plug type	ST		
Fiber Optics	50 / 125 µm 62.5 / 125 µm		
Wave length	820 nm		
General			
Extended environmental range	-40°C to + 85°C		condensation temporarily allowed

Find here the description of the ACC/SYNC-FIBRE 22.

5 Pin configuration

Rear view

imc BUSLOG | imc BUSDAQ-2 | imc BUSDAQ-X

Front view

imc BUSLOG | imc BUSDAQ-2 | imc BUSDAQ-X

5.1 Pin configuration of the field busses

5.1.1 CAN-Bus, CAN FD (DSUB-9)

DSUB-PIN	Signal	Description	Use in device
1	+CAN_SUPPLY	optional supply	unused as per standard* (supply I < 1 A)
2	**CAN_L**	**dominant low bus line**	connected
3	**CAN_GND**	**CAN Ground**	connected
4	nc	reserved	do not connect
5	-CAN_SUPPLY	optional supply	unused as per standard* (supply I < 1 A)
6	**CAN_GND**	**optional CAN Ground**	connected
7	**CAN_H**	**dominant high bus line**	connected
8	nc	reserved (error line)	do not connect
9	nc	reserved	do not connect

Find here the technical data 39 and the cabling 36 of the CAN-Bus interface.

* Optional and only at CAN node 1 and 2, see DC power supply on CAN-Nodes 1 or 2 12.

5.1.2 LIN-Bus (DSUB-9)

DSUB-PIN	Signal	Description
1	nc	
2	nc	
3	**LIN_GND**	LIN Ground
4	nc	
5	nc	
6	**LIN_GND**	Optional LIN Ground
7	**LIN_INPUT/OUTPUT**	LIN bus line
8	nc	
9	nc	

Find here the technical data 40 and the cabling 36 of the LIN-Bus interface.

5.1.3 J1587-Bus (DSUB-9)

DSUB-PIN	Signal	Description	Use in device
1	nc	reserved	unused
2	**TX/RX +**	J1587 bus line	connected
3	**TX/RX -**	J1587 Ground	connected
4	nc	reserved	unused
5	nc	reserved	unused
6	**TX/RX +**	J1587 bus line	connected
7	**TX/RX -**	J1587 Ground	connected
8	nc	reserved	unused
9	nc	reserved	unused

Find here the technical data 39 and the cabling 36 of the J1587-Bus interface.

5.1.4 FlexRay-Bus (DSUB-9)

imc standard: One DSUB-9 connector with two channels

DSUB-Pin	Signal	Description
1	nc	
2	BM channel A	negative bus line channel A
3	GND	FlexRay ground
4	BM channel B	negative bus line channel B
5	GND	FlexRay ground
6	nc	
7	BP channel A	positive bus line channel A
8	BP channel B	positive bus line channel B
9	nc	

Option: Two DSUB-9 connectors (CON1 and CON2) with one channel each

DSUB-Pin	CON1	CON2
1	nc	nc
2	BM channel A (negative bus line channel A)	BM channel B (negative bus line channel B)
3	GND	GND
4	nc	nc
5	GND	GND
6	nc	nc
7	BP channel A (positive bus line channel A)	BP channel B (positive bus line channel B)
8	nc	nc
9	nc	nc

Find here the technical data 40 and the cabling 37 of the FlexRay-Bus interface.

5.1.5 XCPoE (RJ45)

Standard Ethernet 1x RJ45. Find here the technical data 41 and the cabling 37 of the XCPoE interface.

5.1.6 ARINC-Bus (DSUB-15)

CON 1					
ARINC-Interface with 8 Rx channels			**ARINC-Interface with 8 Rx and 4 Tx channels**		
DSUB Pin	Signal	Description	DSUB Pin	Signal	Description
Standard 4x Rx			**Standard 4x Rx; 2x Tx**		
1	Rx1A	receiving channel 1A	1	Rx1A	receiving channel 1A
9	GND	GND	9	Tx1A	sending channel 1A
2	Rx1B	receiving channel 1B	2	Rx1B	receiving channel 1B
10	GND	GND	10	Tx1B	sending channel 1B
3	Rx2A	receiving channel 2A	3	Rx2A	receiving channel 2A
11	GND	GND	11	GND	GND
4	Rx2B	receiving channel 2B	4	Rx2B	receiving channel 2B
12	GND	GND	12	GND	GND
5	Rx3A	receiving channel 3A	5	Rx3A	receiving channel 3A
13	GND	GND	13	Tx2A	sending channel 2A
6	Rx3B	receiving channel 3B	6	Rx3B	receiving channel 3B
14	GND	GND	14	Tx2B	sending channel 2B
7	Rx4A	receiving channel 4A	7	Rx4A	receiving channel 4A
15	GND	GND	15	GND	GND
8	Rx4B	receiving channel 4B	8	Rx4B	receiving channel 4B

CON 2					
ARINC-Interface with 8 Rx channels			**ARINC-Interface with 8 Rx and 4 Tx channels**		
DSUB Pin	Signal	Description	DSUB Pin	Signal	Description
Standard 4x Rx			**Standard 4x Rx; 2x Tx**		
1	Rx5A	receiving channel 5A	1	Rx5A	receiving channel 5A
9	GND	GND	9	Tx3A	sending channel 3A
2	Rx5B	receiving channel 5B	2	Rx5B	receiving channel 5B
10	GND	GND	10	Tx3B	sending channel 3B
3	Rx6A	receiving channel 6A	3	Rx6A	receiving channel 6A
11	GND	GND	11	GND	GND
4	Rx6B	receiving channel 6B	4	Rx6B	receiving channel 6B
12	GND	GND	12	GND	GND
5	Rx7A	receiving channel 7A	5	Rx7A	receiving channel 7A
13	GND	GND	13	Tx4A	sending channel 4A
6	Rx7B	receiving channel 7B	6	Rx7B	receiving channel 7B
14	GND	GND	14	Tx4B	sending channel 4B
7	Rx8A	receiving channel 8A	7	Rx8A	receiving channel 8A
15	GND	GND	15	GND	GND
8	Rx8B	receiving channel 8B	8	Rx8B	receiving channel 8B

Find here the technical data 41 and the cabling 37 of the ARINC-Bus interface.

5.2 DSUB-9 pin configuration

5.2.1 Display

DSUB-PIN	Signal	Description	Use in device
1	DCD	Vcc 5V	connected
2	RXD	Receive Data	connected
3	TXD	Transmit Data	connected
4	DTR	5V	connected
5	GND	ground	connected
6	DSR	Data Set Ready	connected
7	RTS	Ready To Send	connected
8	CTS	Clear To Send	connected
9	R1	Pulldown to GND	connected

To the description 21 and the technical data of the displays 42.

5.2.2 Modem (external)

For imc BUSDAQ-2 and imc BUSDAQ-X only

DSUB-PIN	Signal	Description	Use in device
1	DCD	Data Carrier Detect	connected
2	RxD	Receive Data	connected
3	TxD	Transmit Data	connected
4	DTR	Data Terminal Ready	connected
5	GND	Ground	connected
6	DSR	Data Set Ready	connected
7	RTS	Ready To Send	connected
8	CTS	Clear To Send	connected
9	nc	reserved	unused

5.2.3 GPS

DSUB-9		GPS 18 LVC	GPS 18 - 5Hz
Pin	Signal	Color	Color
1	Vin	Red	Red
2	RxD1*	White	White
3	TxD1	Green	Green
4	-	-	-
5	GND, PowerOff	2x Black	2x Black
6	-	-	-
7	PPS (1 Hz clock)	Yellow	Yellow
8	-	-	-
9	-	-	-

* Pin configuration at measurement device. At the GPS-mouse Rx and Tx are interchanged.

5.3 CTRL-plug pin configuration

LEMO type 0B for imc BUSLOG

Pin	Signal	Description
1	-Supply	0 V
2	Remote On/Off	On/off by a short-period connection (push-button) to pin1 (–Supply)
3	Sleep/Resume Mode enable/disable	Activate the Sleep/Resume mode with jumper top pin1 (-Supply)
4	$+V_{AUX}$	5 V or 10 V to 55 V (Voltage of power supply (over R=1 kW)) Only for control functions, no load!
5	+Sleep / Resume High	sleep mode: 0 V to 1 V; Resume Mode: 4 V to 55 V
6	-Sleep / Resume Low	0 V

To the description of the LEMO plug 31

DSUB-9 for imc BUSDAQ-2 and BUSDAQ-X

Pin	Signal	Description
1	-Supply	0 V
2	-Sleep / Resume Low	0 V
3	Remote On/Off	On/off by a short-period connection (push-button)[1] to pin1 (–Supply)
4	NC	
5	Sleep/Resume Mode enable/disable	Activate the Sleep/Resume mode with jumper top pin1 (-Supply)
6	$+V_{AUX}$	5 V or 10 V to 55 V (Voltage of power supply (over R=1 kW)) Only for control functions, no load!
7	+Sleep / Resume High	sleep mode: 0 V to 1 V; Resume Mode: 4 V to 55 V
8	NC	
9	NC	

To the description of the DSUB-9 plug 32.

1 imc BUSDAQ-X devices can be powered on or off with a switch (or with the standard Power-On) and not with push button.

5.4 DI/DO pin configuration (DSUB-15)

imc BUSDAQ-X only

Plastic Metal connector

ACC/DSUB-		ACC/DSUBM-		DI2-4		DO4	
				DIGITAL IN		DIGITAL OUT	
DSUB Pin	Terminal	DSUB Pin	Terminal	standard * until MultiIO6	from MultiIO7 on	standard * until MultiIO6	from MultiIO7 on
1				+IN1		BIT1	
9	1	9	1	-IN1/2	+IN1	HCOM	BIT1
2	2	2	2	+IN2	+IN2	BIT2	BIT2
10	3	10	3	LEVEL 1/2	-IN1/2	HCOM	BIT3
3	4	3	4	+IN3	+IN3	BIT3	BIT4
11	5	11	5	-IN3/4	+IN4	HCOM	
4	6	4	6	+IN4	-IN3/4	BIT4	
12	7	12	7			HCOM	
5	8	5	8			LCOM	
13	9	13	9		LEVEL 1/2 **		
6	10	6	10				
14	11	14	11				HCOM
7	12	7	12		LEVEL 3/4 **		LCOM
15	14	15	15				LCOM
8	17	8	18				
	13		13				
	18		14				
⏚	15	⏚	16		CHASSIS		CHASSIS
⏚	16	⏚	17		CHASSIS		CHASSIS

*

IMPORTANT NOTE

The pin configuration does not match with any imc-DSUB15 plug! From hardware version Multi IO7 on, the imc DSUB connector ACC/DSUB-DI2-4 and ACC/DSUB-DO4 can be used.

** LEVEL open = 24V; LEVEL 1/2 and -IN 1/2 or (LEVEL 3/4 and -IN 3/4) jumpered=TTL

Description of the digital inputs 33 and outputs 35.

The different MultiIO varieties can be distinguished by the button for exchanging the CF card.

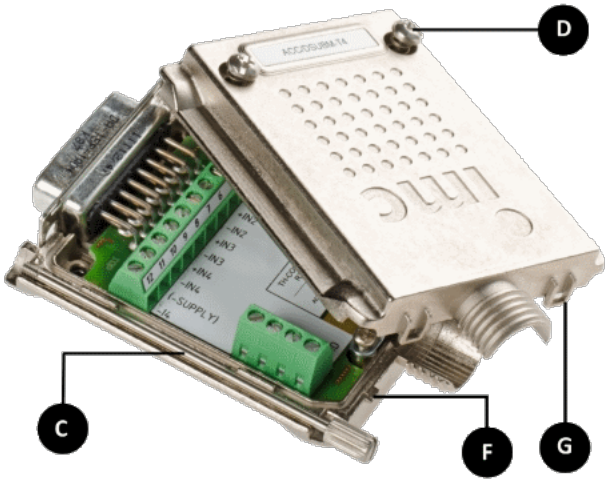
From Multi IO7 onwards, the button is countersunk, so that to press it a sharp object like a pen is needed. Up until Multi IO6 the button was black and protruding.

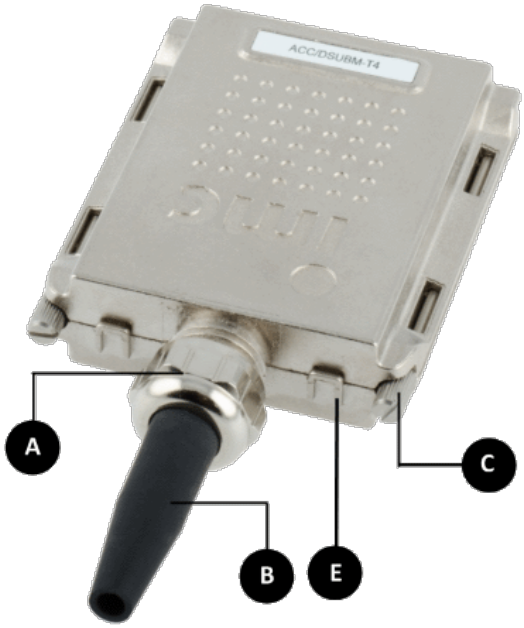
5.4.1 Metal connector

ACC/DSUBM-xxx

Open the Metal connector:

1. Unscrew the cable fitting (cable gland)
2. Remove the bend protection
3. Unscrew the lid screws
4. Lift the lid in the DSUB connection area and unfasten the nose of the slot





A: Pressure nut
B: Bend protection
C: Fastening screw for the devices' front pane
D: Lid screws
E: Locking key (Nose / Slot)
G: Slot
F: Nose

Close the Metal connector:

1. Assemble the lid by snapping the nose into the slot (see the following picture)
2. Audible click when the lid snaps in the front of the DSUB pod
3. Insert the bend protection
4. The pressure nut must be screwed back on
5. The lid screws can be tightened

6 Product package

Included accessories

- 230/110 V power adapter (optionally with country-specific network cable)
- Supply connector for power supply at ESTO supply terminal RD03 712-Series 3-pin
- imc BUSDAQ / imc BUSLOG printed Getting Started
- Test certificate
- 1x Ethernet patch cable with latch protection (uncrossed, 2 m)
- 6-pin Remote connector LEMO.0B.306 included in delivery of *imc BUSLOG* and *imc BUSDAQ-2-ET*

Optional

- enabled Vector database (CAN-DB) (default for *imc BUSLOG*)
- imc FAMOS Reader incl. Curve Manager manual
- imc Online FAMOS, Online FAMOS Professional, ClassCountingKit. (not for *imc BUSLOG*)
- 2 m DSUB-9 CAN-cable (CAN/cable-Type 2)
- 1 set of DSUB-9 CAN terminators (CAN-Termi)
- Y- cable (CAN/Y-cable 25cm)
- Compact-Flash card

7 Last Changes

Amendments and bug-fix in Version 3 R 6

General	New
	Company name: imc Test & Measurement GmbH

Amendments and bug-fix in Version 3 R 5

Chapter	Amendments
General	smaller changes and improvements
GPS	RS232 port settings, please find here the conditions that must be met 25

Chapter	Bug-fix
ARINC	DSUB pinning revised!

Amendments and bug-fix in Version 3 R 4

Chapter	Amendments
General	imc BUSDAQ-X devices can be powered on or off with a switch (or with the standard Power-On) and not with push button.

Amendments and bug-fix in Version 3 R 3

Chapter	Amendments
General	file size reduced by optimizing the pictures

Amendments and bug-fix in Version 3 R 2

Chapter	Amendments
Power Supply	new pic of the pin configuration added
product package 53	new network cable with latch protection

Chapter	Bug-fix
FlexRay	typing error in the pin configuration

Amendments and bug-fix in Version 3 R 1

Chapter	Amendments
General	improved structure
	pics of the devices in new imc design

Version currently released	Date of current edition	Version in previous manual	Date of version in the last manual
V 1.7	09.06.2015	V 1.6	21.11.2013

8 Symbols and legend

Tips and recommendations

Note!
... highlights useful tips, recommendations and information for efficient and trouble-free operation.

Reference
...indicates where to find more detailed or otherwise related information.

Drawings of the pin alignment

The number in each connection drawing is meant to be the correspondent LEMO pin.

Notes of caution

Warning notes are denoted in this manual by symbols. The notes begin with a signal phrase characterizing the extent of the danger. Be certain to observe these notes carefully to avoid accidents and harm to persons and equipment.

Caution!
...indicated a potentially hazardous situation which could cause slight injury if not avoided.

Danger of electric shock!
... warns of danger from electrical voltages at the measurement object which are conducted into the measurement inputs. The device itself does not produce dangerous voltages.

Caution!
...refers to potentially hazardous situations which can cause equipment damage if not avoided.

Symbols on your measurement device

Caution! Danger area!
Due to the insufficient space at the measurement inputs the calculation parameters can not be stated nearby. Before starting consider the calculation parameters of the measurement inputs in this manual.

Danger of electrical shock!
... points on both, the danger outgoing from the measurement source and on the danger at the measurement inputs (e.g. HV modules) and dangerous voltage coming from the measurement device (e.g. MIC-SUPPLY).

Recycling!

... points out, concerning WEEE guideline, that the product may not be thrown in the domestic refuse. The product was brought into the market after 2005 August 13th.

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