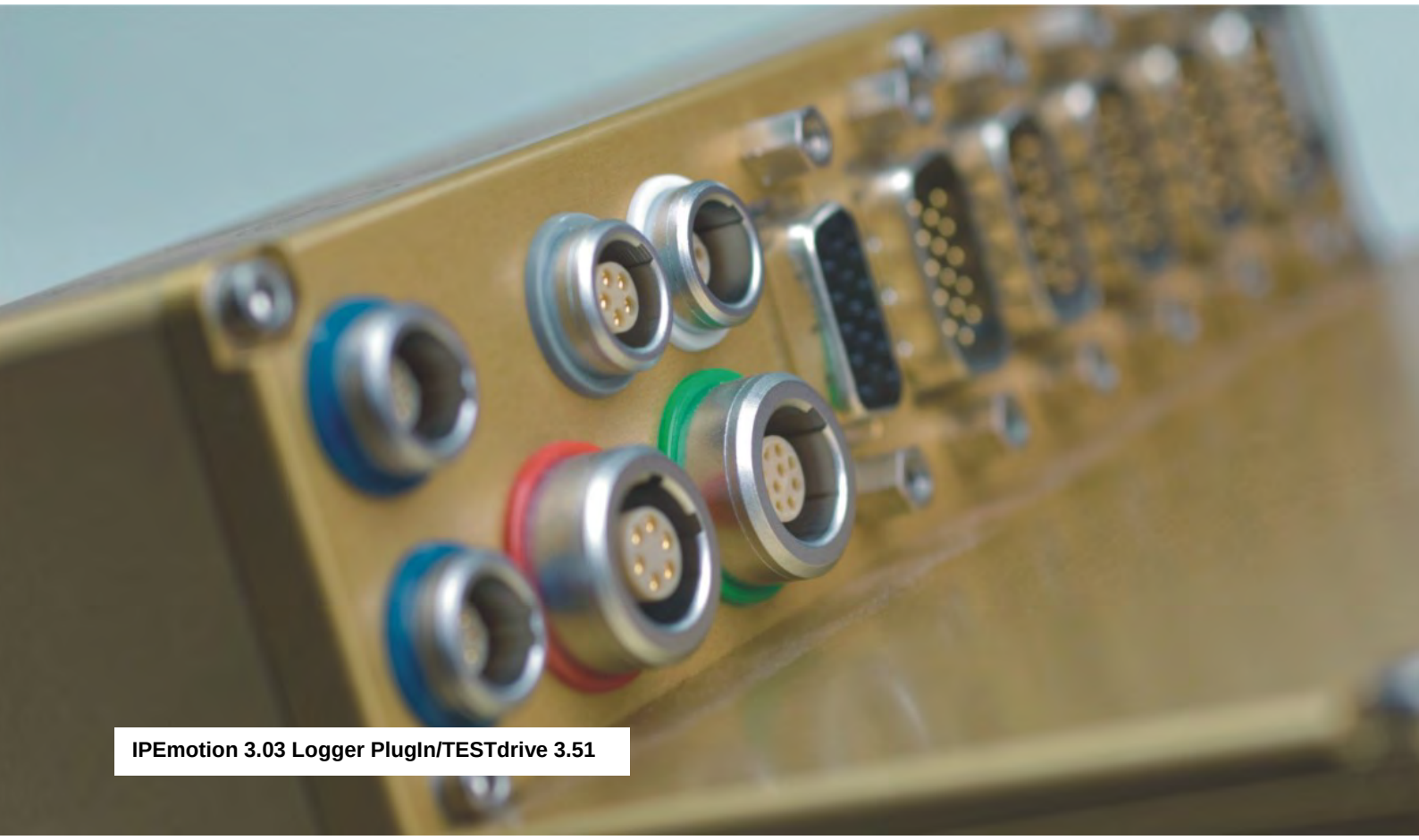
IPETRONIK



IPEmotion 3.03 Logger PlugIn/TESTdrive 3.51

IPE MEASURE
Instrumentation

Data Logger M-/S-LOG, FLEETlog, IPElog

August 2013

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1 Important and general information

1.1 Important information

Please follow these instructions before and during the use and application on any IPETRONIK product!

1.1.1 Safety and Warning instructions

Please follow the instructions **and** information as contained in the user manual!

1. The user can **influence an electronic system by applying the IPETRONIK product**. This might cause risk of personal injury or property damages.
2. The **use and application of the IPETRONIK product is permitted only to qualified professional staff**, as well as, only in appropriate manner and in the designated use.
3. **Before using an IPETRONIK measurement system** in the vehicle it **has to be verified** that **no function of the vehicle, which is relevant for secure operation, might be influenced**:
   - by the installation of the IPETRONIK measurement system in the vehicle,
   - by an potential malfunction of the IPETRONIK system during the test drive.

   In order to avoid possible danger or personal injury and property damages, appropriate actions are to be taken; such actions have to bring the entire system into a secured condition (e.g. by using a system for emergency stop, an emergency operation, monitoring of critical values).

   Please check the following points to avoid errors:

   - Adaption of sensors to components of the electrical system / electronics, brake system, engine and transmission control, chassis, body.
   - Tap of one or several bus systems (CAN, LIN, ETHERNET) including the required electrical connection(s) for data acquisition.
   - Communication with the vehicle's control units (ECUs), especially with such of the brake system and/or of the engine and transmission control (power train control system).
   - Installation of components for remote data transmission (mobiles, GSM/GPRS modems, WiFi and Bluetooth components).
4. **Before** directly or indirectly using **the data acquired by an IPETRONIK measurement system to calibrate control units, please review the data regarding to plausibility**.
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1.2 General information

1.2.1 About this manual

The manual describes the structure of the IPEmeasue data logger devices M-LOG, S-LOG, FLEETlog, and IPElog, as well as, peripheral devices and accessories components.

1.2.2 Version

This manual has the version number 03.51.01, released August 2013

IPEmotion PlugIn IPETRONIK-LOG

Contents described in this document relates to the current release version 03.51.01.

To run this PlugIn an IPEmotion release ≥ V02.00 has to be installed on your computer.

IPEmotion

Contents described in this document relates to the release versions 01.09. to 3.03

1.2.3 Legend of used icons

Tip	*This icon indicates a useful tip that facilitates the application of the software.*
Information	*This icon indicates additional information for a better understanding.*
Attention!	*This icon indicates important information to avoid potential error messages.*

1.2.4 New features, Changes

Please also refer to the latest release notes at:
c:\Program Files (x86)\IPETRONIK\IPEmotion PlugIn IPETRONIK LOG V03.5x.xx\Help

PlugIn IPETRONIK-LOG V03.51		**Release July 2013**
No.	**Feature**	**Description**
1	PIN assignment	FLEETlog and IPElog added
2	Traffic storage groups	Traffic measurement now support different storage groups
3	Extension for IPElog (requires PIC ≥ V01.01.07, FPGA ≥ V01.02.08	NoMessageLost function (NML) WakeOnCAN can be activated for each channel up to 6 ID triggers Logger restart using WakeOnCAN or remote signal CAN-ID trigger now StartNotStopTrigger (instead StartOnly) PIC update per job executable Status indication of the flap for the storage medium with M-VIEWfleet
4	CCP	Command CCP_DISCONNECT implemented
5	Upload and download	Supported with different transfer media (Modem, WiFi)
6	Event controlled measurement	CAN data acquisition based on traffic measurement but handled as signal measurement (DAT format)
7	Masks	for CAN identifiers are supported now
8	File name length	Up to 260 characters are allowed for file names of the external library and configuration files.
9	Stop date, Stop time	Stored as project property with the traffic file
10	PreTriggerTime, PostTriggerTime	Supported as project property

PlugIn IPETRONIK-LOG V03.50		**Release October 2012**
No.	**Feature**	**Description**
1	**Notes** Version reference SC1200 IPElog	 Logger PlugIn ≥ 3.5x requires IPEmotion ≥ 2.xx M-LOG with SC1200 is no longer supported Requires TESTdrive / PlugIn IPETRONIK-LOG ≥ 3.5x
2	Status signal "FIFO overrun"	Indicates the data processing status. Output 0 = OK, Ouput 1 = processor overloaded
3	Debounce time of the remote signal	Configurable delay time within a range of 0 ... 5 seconds. The signal status ist valid if the remote signal lasts for this time without interruption.
4	Extensions TESTdriveCmd.xml	New jobs "OnOK" and "OnError" used for audible alarm of the job "OnConnect"
5	Differnt init modes for module initialization	Connected IPETRONIK modules will be initialized on command: Never, Once-only, Always.
6	Status e-mail with snap shot report	Each time the trigger condition is fulfilled, the current signal values (configured in the mail group) will be sent per mail.
7	Limit display with M-VIEWvga	Indication of limit violation has been revised.
8	V-TABs enable clear text display	Individual text can be assigned to different signal values (or ranges) which is respectively displayed (instead of digits).

1.2.5 Support

Headquarter:

IPETRONIK GmbH & Co. KG
Im Rollfeld 28

76532 Baden-Baden, Germany

Phone +49 7221 9922 0
Fax +49 7221 9922 100

info@ipetronik.com
www.ipetronik.com

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CEOs: Erich Rudolf, Andreas Wocke

Technical support and product information

www.ipetronik.com e-mail: support@ipetronik.com

1.2.6 Related documentation

IPEmotion

The documentation IPEmotion.pdf provides you with a description and useful information related to IPEmotion. This documentation is stored in the following standard language dependent directory: C:\Programs\IPETRONIK\IPEmotion Vxx.xx.xx\Help

1.2.7 Documentation feedback

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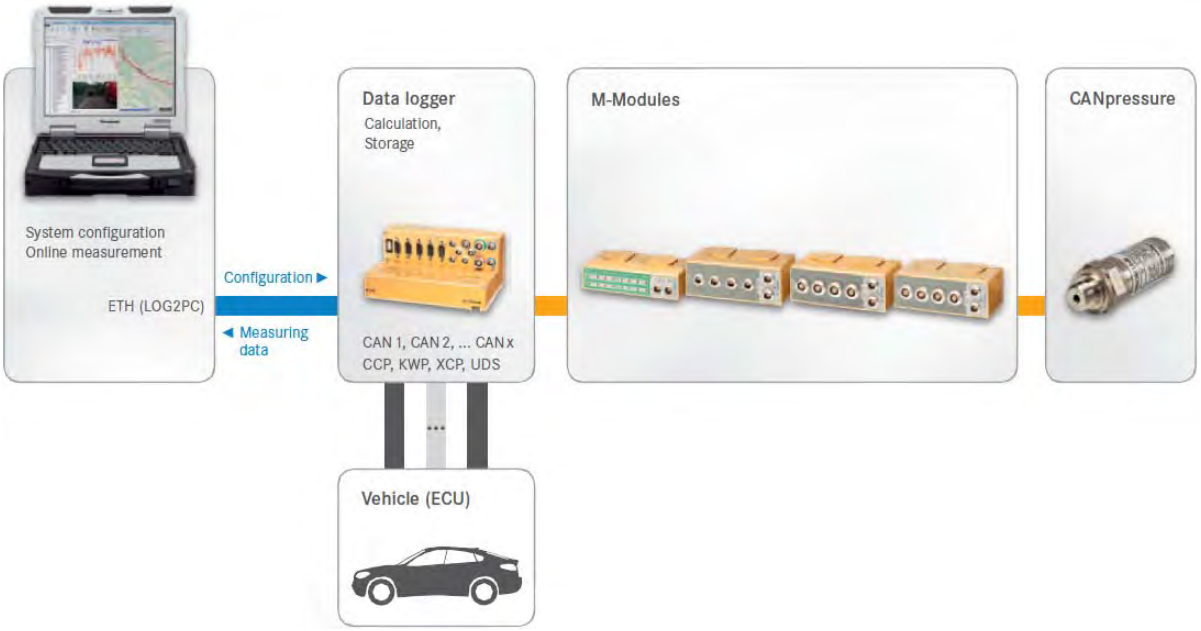
- Version number
- Name of the guide
- Page number or section title
- Brief description of the content (e.g. inaccurate instructions, grammatical errors, or information that require clarification)
- Any suggestions for a general documentation improvement

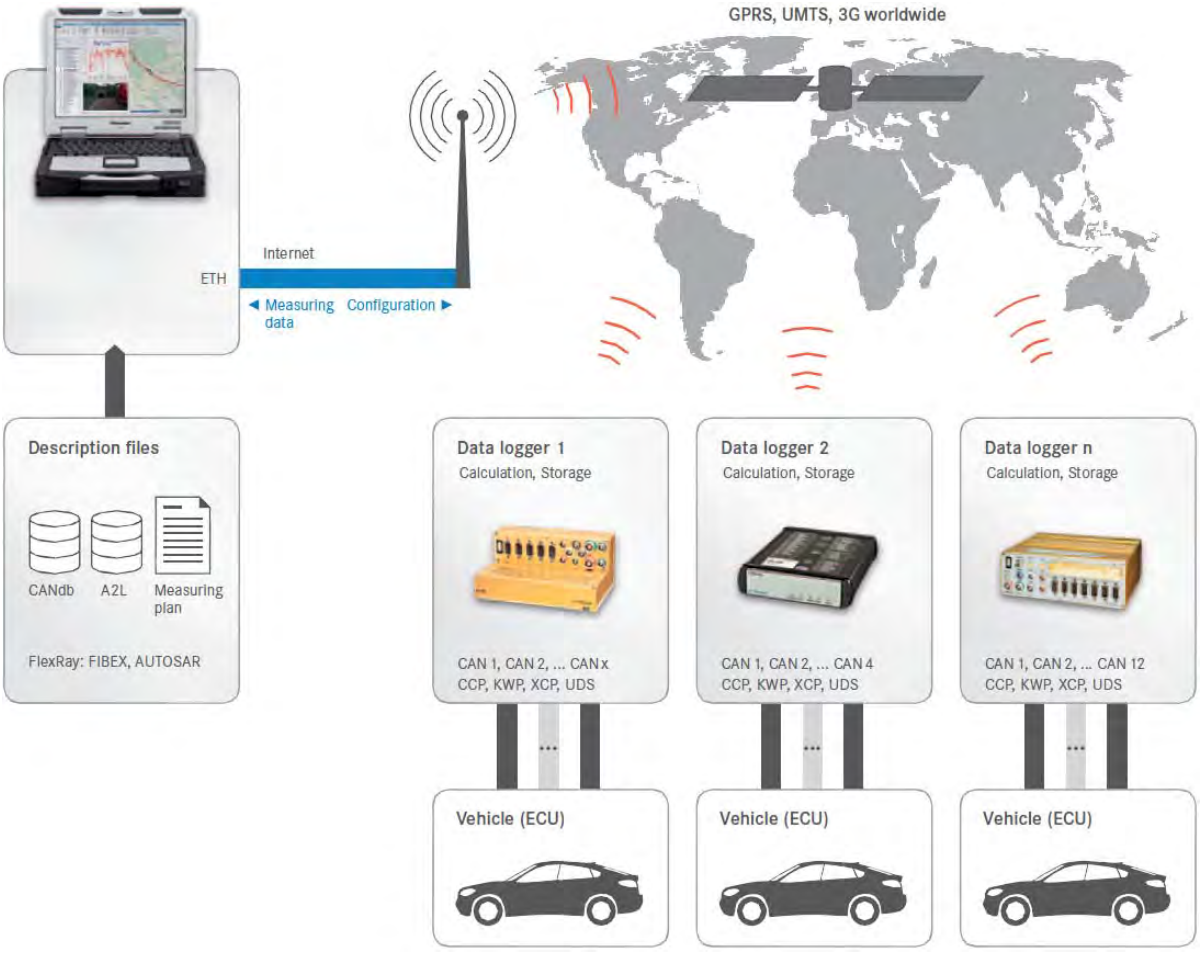
2 System basics

2.1 Data logger applications (extract)

2.1.1 Configuration, Online measurement using Ethernet



2.1.2 Fleet data logger



2.2 Connecting devices via CAN bus

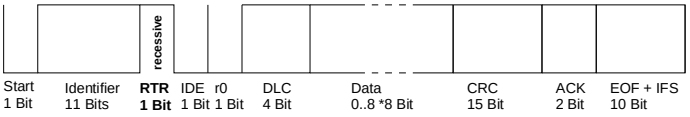
2.2.1 Basics of CAN bus

CAN-Standard

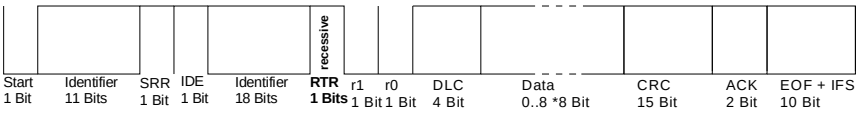
The communication of the IPETRONIK SIM and M devices takes place by using the CAN bus according to the CAN 2.0 A (11 Bit Identifier) and CAN 2.0 B (29 Bit Identifier) specification. Each software application, which is able to detect CAN data via a suitable interface, can detect the device data and process. Examples: CANalyzer, INCA, DIAdem, LabVIEW. The device configuration takes place by using the CAN bus and the IPETRONIK configuration software.

Structure of a CAN message

Remoteframe CAN 2.0A (11 Bit Identifier)



Remoteframe CAN 2.0B (29 Bit Identifier)



User data within the CAN message.
Maximum 8 values in the byte format or 4 values (4 channels) in the Word format can be transferred depending on the CAN message.

CAN 2.0A (11 Bit Identifier)				CAN 2.0A (11 Bit Identifier)		
Bits		**Description**		**Bits**		**Description**
1	SOF	Start of Frame		1	SOF	Start of Frame
11	ID	Identifier		11	ID	Identifier
				1	SRR	
1	IDE	Identifier Extension (0)		1	IDE	Identifier Extension (1)
				18	ID	Identifier (extended)
1	RTR	Remote Transmission Request		1	RTR	Remote Transmission Request
				1	r1	
1	r0			1	r0	
4	DLC	Number of following data bytes		4	DLC	Number of following data bytes
64	Data	Data bytes		64	Data	Data bytes
15	CRC	Error Identification Code		15	CRC	Error Identification Code
2	ACK	Acknowledge		2	ACK	Acknowledge
10	EOF	End of Frame		10	EOFS	End of Frame
110		Sum		130		Sum

Word	Byte	Bit (Message layout in the displaying format „Intel Standard“)							
0	**0**	7	6	5	4	3	2	1	0
	1	15	14	13	12	11	10	9	8
1	**2**	23	22	21	20	19	18	17	16
	3	31	30	29	28	27	26	25	24
2	**4**	39	38	37	36	35	34	33	32
	5	47	46	45	44	43	42	41	40
3	**6**	55	54	53	52	51	50	49	48
	7	63	62	61	60	59	58	57	56

Access to the CAN bus, Transferring properties

The CAN bus allows a safe and effective data transfer of the connected devices (non-destructive bitwise arbitration = resource distribution to different devices). The CAN bus is therefore used as a standard communication medium in the automotive area and the industrial automation.

The most important characteristic CAN bus properties are:

- Every bus participant (node) can send, as well as, receive.
- First of all, the node, which wants to send, needs the authorization. All participants become automatically a recipient (There is no abortion of the data sending process > non-destructive collision).
- No stations are addressed but messages.
- Every message is characterized by its name (Identifier).
- The less the identifier, the higher the message priority.
- A message can transport up to 8 * 8 Bit = 64 Bit (8 Byte) user data, whereas each message requires 110 Bit or 130 Bit (Extended ID).
- Depending on the hardware and the bus line length, up to 1 MBit/ s can be transferred.

The following important conclusions result from the properties above:

- The less the bus load, the less the probability of a “Bus access conflict” (you can call this a real- time capable area).
- A high bus load forces stations to loose messages with a high identifier or to send them more slowly. Messages with a high identifier can “get lost”.
- Not sent messages are only registered by the “Recipient node” because data are missing. If no timeout has been defined, the last valid value is generally sent, i.e. a mistakenly constant value.

Transfer rate, Bus line length

The CAN bus supports a max. transfer rate of 1 MBit/s according to Norm ISO 11898-2.
This value is limited in practice by the following points:

- the bus line length
- the branch line length to the CAN stations
- the bus lines quality and the plug contacts
- the bus line design (twisted, single or two-wire bus)
- bus connection structure and
- type and strength of external perturbations

Example	
Data rate on the bus	1 MBit/s = 1 µs/Bit
Data length of a CAN message	130 Bits gesamt
User data in a message	64 Bit = 4 values with 16 Bit resolution each
Time for a CAN message	130 Bit x 1 µs/Bit = 130 µs/message i.e. 4 values require 130 µs
Calculating the total sampling rate	130 µs match 7.69 kHz
Converted to one channel	4 x 7.69 kHz = 30.76 kHz
Theoretical transfer rate	30 channels with 1 kHz = 30 kHz
Practical experiences	26 channels with1 kHz = 26 kHz The value is lower at guaranteed synchronity.

If CAN messages are not completely used (e.g. only three 16 bit values instead of four per message), less data can be transferred although the sum sampling rate has not yet reached the maximum. This also applies if different sampling rates are defined in one system, because the data division to the CAN messages is not time-optimized (minimum time required).

2.3 Ampacity and voltage drop

Besides the fact that the max. bus line length is defined by the desired data transfer rate, the ampacity and the voltage drop in the system have primarily to be checked. This is especially important for systems with a high number of devices and/or long connections lines of the devices (e.g. distributed systems with connection lines of 3 m (9.84 ft) and more between the device groups). Additional actions should be taken accordingly to the situation.

2.3.1 Ampacity

The maximum current via the M-CAN system cables (e.g. 620-560.xxx) is 4 A (heat generation by transition resistances of the plug contacts).

The system capacity and therefore the power consumption can approximately be calculated by using the number of devices (including the sensor supply). A direct power acquisition in the real system provides exact values.

We recommend one or several of the following actions if the limit value is exceeded:

- Increasing the supply voltage of the devices (e.g. 24 V DC power supply or 42 V DC instead of 12 V)
- Centered voltage supply via T connection or as close as possible to the devices with high power requirements (rather than at the beginning or end of the system chain)
- Additional system supply via a T connection at a suitable position

2.3.2 Voltage drop

Even if the limit value for the ampacity is not reached, long lines in an extensive system can cause perturbations in the acquisition process. This mainly applies to devices at the end of the system chain, because the voltage of the last devices does not exceed the input threshold of 9 V (due to a high voltage drop in the system).

We recommend one or several of the actions mentioned above.

The voltage drop can be calculated by using the following formula:

$$U = R \times I$$

$$R = 2 \times R_{Cable\ [\Omega/m]} \times Length_{Cable\ [m]}$$

$$I = P_{Devices\ [W]} / U_{Devices\ [V]}$$

For estimating the voltage drop, a resistance of

> 50 mΩ/m for the M-CAN cables and
> 35 mΩ/m for the SIM-CAN cables

can be used including the transition resistances of the plug contacts. Systems, which are in the limit range of the voltage drop, should be controlled in individual cases. To do so, our support will be pleased to assist you.

As the power consumption of a device depends on the supply voltage, it is useful to calculate the voltage drop from the chain end to the feeding point. In this case, a minimum voltage of 9 V is set to the last device and the required excitation is calculated. The calculated value should be generously rounded upwards for guaranteeing a safe operation.

Another fact is the variable internal resistance of the input power supplies (low excitation = lower internal resistance).

In practice, this means: If the net excitation decreases (e.g. because of a weak power supply or a high resistivity with long cables), the devices have to readjust to cover the current power requirements. This causes a higher power consumption, which additionally increases the voltage drop.

3 Data logger M-LOG, S-LOG, FLEETlog, IPElog

3.1 Overview

Overview properties and options	M-LOG LX	S-LOG	FLEETlog	IPElog
PC				
CPU, RAM on-board (MB)	**LX800, 256**	**LX800, 256**	**LX800, 256**	**Atom, 1024**
Real-time operating system	✓	✓	✓	✓
IPETRONIK TESTdrive software	✓	✓	✓ **(>= V3.19)**	✓ **(>= V3.50**
Compact flash data storage medium (removable)	✓	✓	✓	—
1.8" SSD data storage medium (removable)	—	—	—	✓
Intelligent power management	✓	✓	✓	✓
Interfaces (Hardware)				
COM1, COM2	✓	✓	—	—
ETH (Ethernet as IPETRONIK system interface)	✓	✓	✓	✓
USB 2.0	**2**	**2**	**2**	**3**
DIG IN / DIG OUT	**4 / 4**	**4 / 4**	**2 / 2**	**4 / 4**
2x CAN High Speed acc. to 11898-2	**Option**	**Option**	—	
4x CAN High Speed acc. to 11898-2	**Option**	**Option**	✓	**3**
2x CAN High Speed acc. to 11898-2 + 2x LIN	**Option**	**Option**	—	
1x CAN High Speed acc. to 11898-2 + 1x CAN Single Wire + 2x LIN	**Option**	**Option**	—	
2x ETH (Ethernet as measurement input)	**Option**	**Option**	—	**Option**
Acquire FlexRay data via FlexRay-Ethernet converter (requires Ethernet input option)	**External**	**External**	—	**External**
WiFi acc. to 802.11b/g	**External** [1)]	**External** [1)]	**FLEETlog WAN**	✓
GPRS/UMTS	**External** [2)]	**External** [2)]	**FLEETlog WAN**	✓
Positioning via GPS and NMEA0183	**External**	**External**	**FLEETlog WAN**	✓
Audio input (standard micro or iMIC)	**External**	**External**	—	—
Video input (USB camera)	**External**	**External**	—	**External**
Protocols, processes				
CCP	**Option**	**Option**	**Option**	**Option**
KWPonCAN, XCPonCAN	**Option**	**Option**	**Option**	**Option**
XCPonEthernet	**Option**	**Option**	—	**Option**
GMLAN	**Option**	**Option**	—	—
Seed & Key	**Option**	**Option**	**Option**	**Option**
UDS	**Option**	**Option**	**Option**	**Option**

Data acquisition / processing / transferring				
Online calculations, different storage groupes	✓	✓	✓	✓
Statistics, also parallel to time related data	**Option**	**Option**	**Option**	**Option**
Packing, splitting, encoding data	✓	✓	✓	✓
CANsend: Data and status signal output via CAN	✓	✓	✓	✓
WakeOnCAN	✓	✓	✓	✓
Traffic measurement	**Option**	**Option**	**Option**	**Option**
LOG2PC	✓	✓	✓	✓
XCP-Service	✓	✓	✓	✓

[1] **COMgate or COMgate WAN** [2] **COMgate WAN**

Overview properties and options	M-LOG LX	S-LOG	FLEETlog	IPElog
Device in general				
Excitation all 12/24/42 VDC power supplies	✓	✓	–	–
Excitation 9 to 36 VDC	✓	✓	✓	✓
Ambient temperature -40 °C to +85 °C (-40 °F to +185 °F)	✓	✓	–	✓
Ambient temperature -20 °C to +70 °C (-4 °F to +158 °F)	✓	✓	✓	✓
Enclosure protection class IP54	✓	✓	–	✓
Enclosure protection class IP30	✓	✓	✓	✓
Port replicator selectable	✓	–	–	–
Removable data storage media	✓	✓	✓	✓
Configuration with IPEconf 4	✓	✓	–	–
Configuration with IPEmotion	✓	✓	✓	✓

Data transfer range of built-in modems (FLEETlog, IPElog)

Frequency range Quad-Band EGSM 850 / 900 / 1800 / 1900

Download rate HSDPA 7,2 Mbps

UMTS/HSDPA (WCDMA/FDD) 2100 MHz

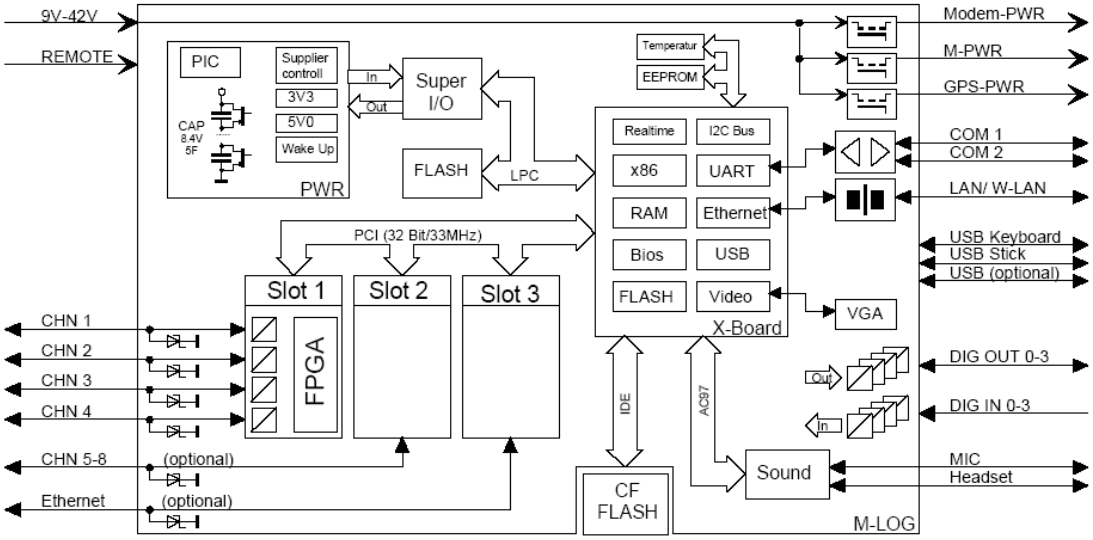
GPRS multi-slot class 12

Edge multi-slot class 12

3.2 Hardware

3.2.1 Block diagram

The block diagram shows the basic structure of the logger board.



3.2.2 Enclosure types

M-LOG with port replicator PR05 **S-LOG front view** **FLEETlog front and rear view**

The M-LOG enclosure is compatible to all M devices. The devices can be easily connected with each other with a dovetail adapter. M-LOG is available with 6 different port replicators (cable connecting adapter). User specific port replicators are available on request.

S-LOG uses a SIM standard enclosure and can easily be integrated into a SIM devices system. Both loggers can be connected to M devices, as well as, to SIM devices (also mixed) with suitable mechanical adapters.

The FLEETlog hardware concept was designed for using the data logger in vehicle fleets, whereas FLEETlog WAN is already equipped with modem, WiFi client, and GPS receiver.

3.2.3 Port replicators and cables

Various cables are available for every port replicator. The complete PIN configuration, as well as, the appropriate cables of the PR05 and PR08 port replicators are shown in the appendix.

Cable overview M-LOG PR05 and S-LOG

1	Bus input
600-580.xxx	D-Sub/ S 9 — CAN, open
620-537.xxx	D-Sub/ S 9 — CAN, Banana
620-593.xxx	D-Sub/ S 9 — 2x CAN, D-Sub open

2	M-CAN
620-560.xxx	Lemo 0B 9 — M-CAN
620-562.xxx	Lemo 0B 9 — SIM-CAN

2	SIM-CAN
600-830.xxx	Lemo 1B 10 — SIM-CAN
600-893.xxx	Lemo 1B 10 angled — SIM-CAN angled
620-562.xxx	Lemo 0B 9 — SIM-CAN

3	Display
620-578.xxx	Lemo 1B 10 — M-VIEW*fleet*
620-595.xxx	Lemo 1B 10 — M-VIEW*graph*

4	Digital input / output
620-324.xxx	D-Sub HD/ P 15 — open

5	COM
620-576.xxx	Sub HD/ S 15 — Modem
620-596.xxx	Sub HD/ S 15 — Modem + GPS

6	Power/Remote
620-574.xxx	Lemo 1B 6 — Banana

7	LAN
620-591.xxx	Lemo 0B 6 — Ethernet RJ45

8	Audio
620-550.xxx	Lemo 0B 5 — Audio In/Out 3.5mm
620-551.xxx	Lemo 0B 5 — Audio In/Out 2.5mm

System and input cables are also available in different lengths and socket configurations.

PIN configuration PR05 and S-LOG

1	BUS INPUTt			
PIN	**CAN 1 CAN 5**	**CAN 2 CAN 6**	**CAN 3 CAN 7 (LIN 1)**	**CAN 4 CAN 8 (LIN 2)**
1	CAN5 – L	CAN6 – L	CAN7 – L (LIN1-VBAT)	CAN8 – L (LIN2-VBAT)
2	CAN1 – L	CAN2 – L	CAN3 – L	CAN4 – L
3	CAN1/5 – GND	CAN2/6 – GND	CAN3/7 – GND (LIN1-GND)	CAN4/8 – GND (LIN2-GND)
4	CAN5 – H	CAN6 – H	CAN7 – H (LIN1 – H)	CAN8 – H (LIN2 – H)
5	Option ($V_{BATT-IN}$, CAN5 WakeOnCAN	Option ($V_{BATT-IN}$, CAN6 WakeOnCAN	Option ($V_{BATT-IN}$, CAN7 WakeOnCAN	Option ($V_{BATT-IN}$, CAN8 WakeOnCAN
6	PWR-GND	PWR-GND	PWR-GND	PWR-GND
7	CAN1 – H	CAN2 – H	CAN3 – H	CAN4 – H
8	Option ($V_{BATT-IN}$, CAN5 WakeOnCAN	Option ($V_{BATT-IN}$, CAN2 WakeOnCAN	Option ($V_{BATT-IN}$, CAN3 WakeOnCAN	Option ($V_{BATT-IN}$, CAN4 WakeOnCAN
9	UB-OUT+	UB-OUT+	UB-OUT+	UB-OUT+

2	M-CAN / SIM-CAN	
PIN	**SIM-CAN**	**M-CAN**
1	CAN – H	M-PWR+
2	CAN – L	M-PWR+
3	CAN – GND	SYNC+
4	Status IN	SYNC–
5	SYNC+	CAN-GND
6	SYNC–	PWR-GND
7	SIM-PWR+	PWR-GND
8	SIM-PWR+	CAN – H
9	PWR-GND	CAN – L
10	PWR-GND	– – –

3	DISPLAY
PIN	**M-VIEW**
1	GPS-PWR
2	Remote-2
3	PWR-GND
4	USB2-DATA– (HOST)
5	USB2-DATA+ (HOST)
6	USB3-DATA– (CLIENT)
7	USB3-DATA+ (CLIENT)
8	USB1-DET
9	USB-GND
10	USB2-PWR (5 V)

4	DIN / DOUT / LED
PIN	**DIGITAL IN / OUT**
1	DIN – 1
2	DIN – 2
3	DIN – 3
4	DIN – 4
5	DIN-GND
6	LOG-PWR
7	LED – 1 (green)
8	LED – 2 (yellow)
9	LED – 3 (redt)
10	DIN-GND
11	DOUT – 1
12	DOUT – 2
13	DOUT – 3
14	DOUT – 4
15	DOUT-COM

5	COM / MODEM / GPS
PIN	**Serial**
1	COM1 – DCD
2	COM1 – RXD
3	COM1 – TXD
4	COM1 – DTR
5	D-GND
6	COM1 – DSR
7	COM1 – DTS
8	COM1 – CTS
9	
10	COM2 – RXD
11	COM2 – TXD
12	DGND
13	GPS-PWR
14	MODEM-PWR
15	PWR-GND

6	PWR / REMOTE
PIN	
1	PWR-IN+
2	PWR-IN+
3	PWR-IN-GND
4	PWR-IN-GND
5	IGN. Line 15
6	REMOTE2

7	LAN
PIN	**Ethernet**
1	ETH-TX+
2	ETH-TX–
3	ETH-RX+
4	ETH-RX–
5	ETH-GND
6	PWR-GND
7	MODEM-PWR

8	AUDIO
PIN	**Micro/Headphone**
1	MICR-REF
2	MICR-SIG
3	HEADPHONE-GND
4	MICR-GND
5	HEADPHONE

3.2.4 Device panel for changing the internal memory card

S-LOG and M-LOG (M-LOG with Upgrade Kit 300) offer a screwed panel for exchanging the cF memory card if required.

The FLEETlog is equipped with a cF card slot behind the folding front panel.

IPElog has a screwless fixed front panel with open/close contact for exchanging the SSD memory card.

Please note the advice to only change the memory card in exceptional cases because of a possible intrusion of foreign material, dirt or water into the device and the logger could be damaged at removing the cF card. The regular data transfer should be done with the USB stick or the wireless connection (modem or WiFi option).

3.2.5 External fuse for logger protection (IPElog, M-/S-LOG, FLEETlog)

Depending on the number of inputs, capacitor charge, and connected devices (M or SIM devices, Modem, GPS receiver), the total power consumption (especially at temperatures of –40 °C / -40 °F) can reach up to approx. 150 Watt. To protect the total system, we recommend an external overload protection with the following tasks:

- *Protection of the supply line in error case*
- *Overload protection of the current source*
- *Logger protection.*

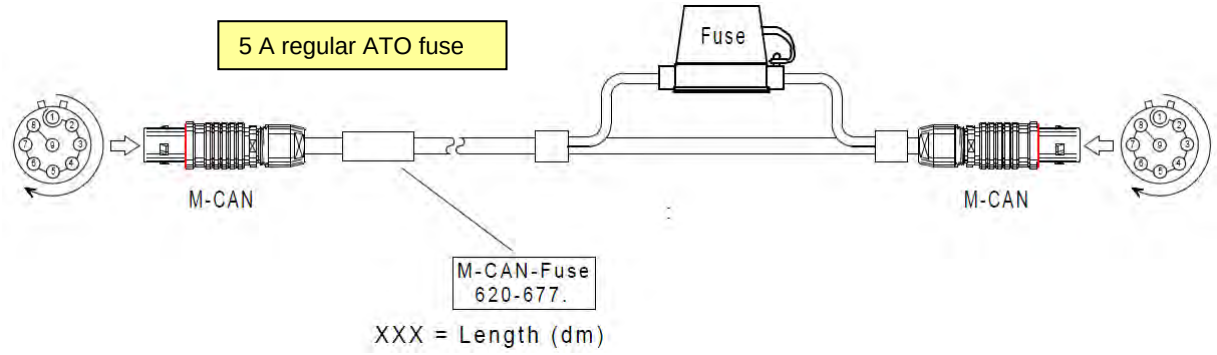
We recommend using a **LittleFuse ATO Fuse Fast Acting Type** with a nominal current of 10 A. At using the maximum charge in ambient temperatures under –40 °C / -40 °F, it can be required to increase the nominal current to 15 A.

The individual electric circuits (also see M-LOG Port replicators, S-LOG = PR05) are internally protected. The internal resistance of multifuse types increases exponentially and limits the current to a minimum. After clearing the cause of error, the resistance decreases to the normal value (automatic resetting).

The motherboard fuse does not work reversibly and must be replaced in the case of a required repair.

3.2.6 Additional short-circuit protection for IPElog and FLEETlog

As the M-CAN connection is not fused by the logger, we recommend to use the cable M-CAN Cable M-CAN/PWR-Fuse (No. 620-677.xxx) in order to prevent the logger from damage caused by a short circuit.



3.2.7 LED status display (flashing codes)

LED display	Mode	Meaning
GREEN	Ready or operating	Device is ready (Operation: see yellow LED)
	Warning I Low voltage	The excitation is between 6 V and 9 V. M-LOG shuts down after 2 minutes at unchanged status.
	Warning II Low voltage	The excitation is under 6 V. M-LOG is buffered by the internal supply and normally shuts down.
YELLOW	Measurement running	The logger writes the data to the internal memory.
	Data medium access (post processing)	Prepare file transfer (zip, split)
	Data transfer	Transfer files via USB, modem, or WiFi
RED	Error, Emergency operation	e.g. at invalid configuration, at less memory capacity, at emergency shut-down due to less excitation A restart is required..

3.2.8 Power-down at excitation loss

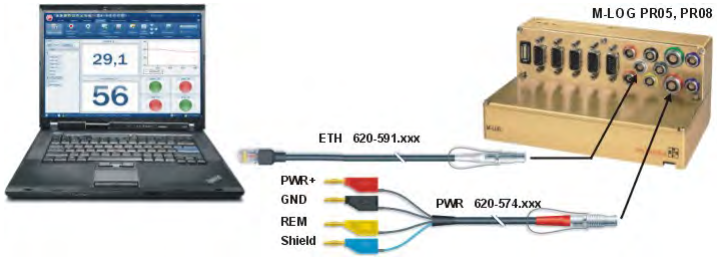
M-LOG, S-LOG, FLEETlog and IPElog are equipped with high-powered capacitors, which guarantee a short excitation in the case of an excitation loss for regularly shutting the system down without data loss. The storage capacity of the capacitors depends on several points (e.g. ambient temperature, aging, charge condition). A data loss can therefore not completely be excluded in the case of a total excitation loss.

M or SIM devices, which are supplied by M-/S-LOG, FLEETlog C2 or IPElog, are immediately switched-off at excitation loss.

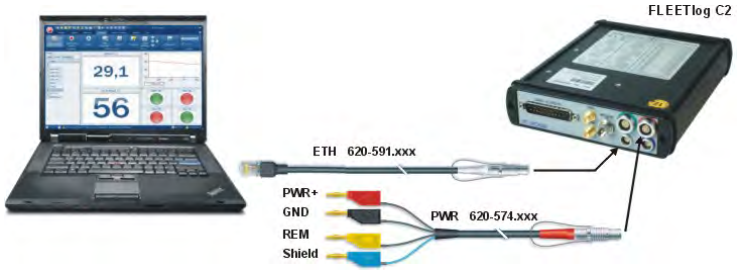
We recommend to revise the switching and the buffer capacitors every 2 years for guaranteeing a clean functionality. The device calibration every 2 years includes this revision.

3.3 Initial start-up

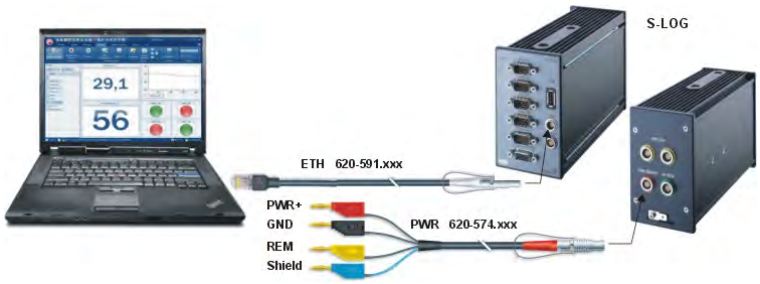
3.3.1 Connecting the logger

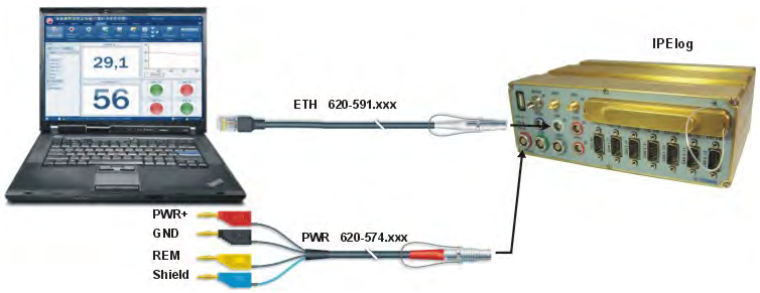


- Connect the red socket using the Power/Remote cable (e.g. 620-574.xxx) with an appropriate power supply (9 V_{DC} ... 36 V_{DC})
  PWR+ = Voltage supply Plus
  GND = Voltage supply Minus
  Shield = Shield or voltage supply Minus



- Connect the white socket using the LAN cable (e.g. 620-591.xxx) with the Ethernet interface of a PCs/Notebook, resp. using the LAN cable (e.g. 620-355.xx) for connection to a network.
- Switch on the logger
  REM = Ignition line 15 or power supply Plus via switch
  → green status LED lights continuously
- Logger starts up and will enter the measurement mode after a short time.
  → yellow status LED lights continuously
- Refer to the **Flow chart of the measuring process** in the appendix for more details.





Useful notes

! If the Ethernet connection to the logger will not work properly, at first transfer the correct IP settings to the logger using an USB stick. Refer to ***Add logger system, creating test configuration (USB stick)***.

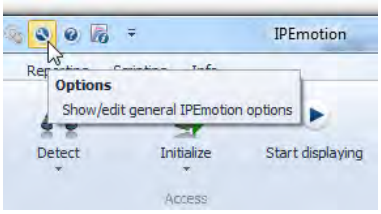
! Using the cable **620-591.xxx LOG Cable ETHERNET (crosslink)** is a point-to-point connection between logger and PC. A fixed IP address is required for both. Refer to ***Static and dynamic IP addresses***.

! When connecting the logger and the PC used for configuration and data acquisition to a network with DHCP server, both have to be set to dynamic IP address, in order to receive the individual IP address by the DHCP server automatically.
In this case use cable **620-355.xxx M-LOG PR05 ETH Cable RJ45**.

Please consider the risk of IP conflicts (same IP address may exist twice), if you use static IP address settings when connected to a network with DHCP support.

3.3.2 Detecting the logger, creating test configuration (Ethernet)

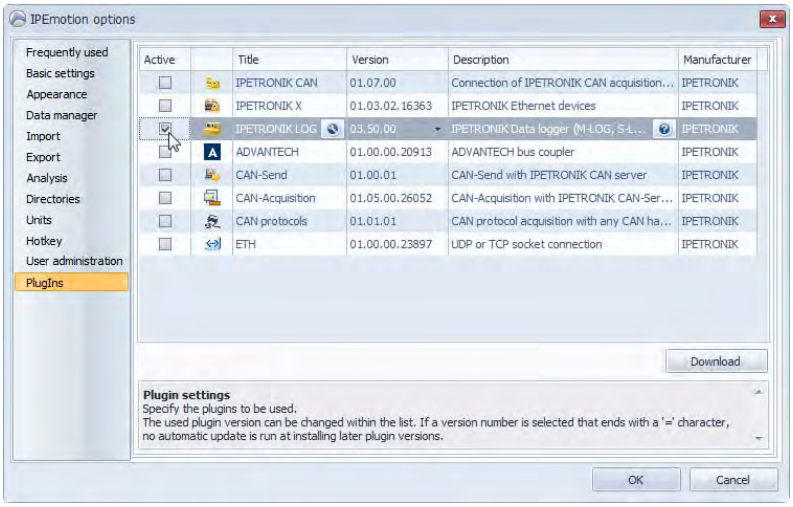
- Start IPEmotion at your PC/Notebook.



! Using Logger PlugIn version ≥ 3.50, IPEmotion ≥ 2.0 is required.

- Activate the PlugIn IPETRONIK-LOG.

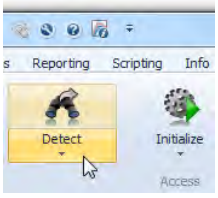
  Options > ***PlugIns*** > ***IPETRONIK LOG***



! The PlugIn IPETRONIK-LOG version 3.50 and higher requires TESTdrive ≥ 3.50 on the logger. Please update the logger application if necessary!

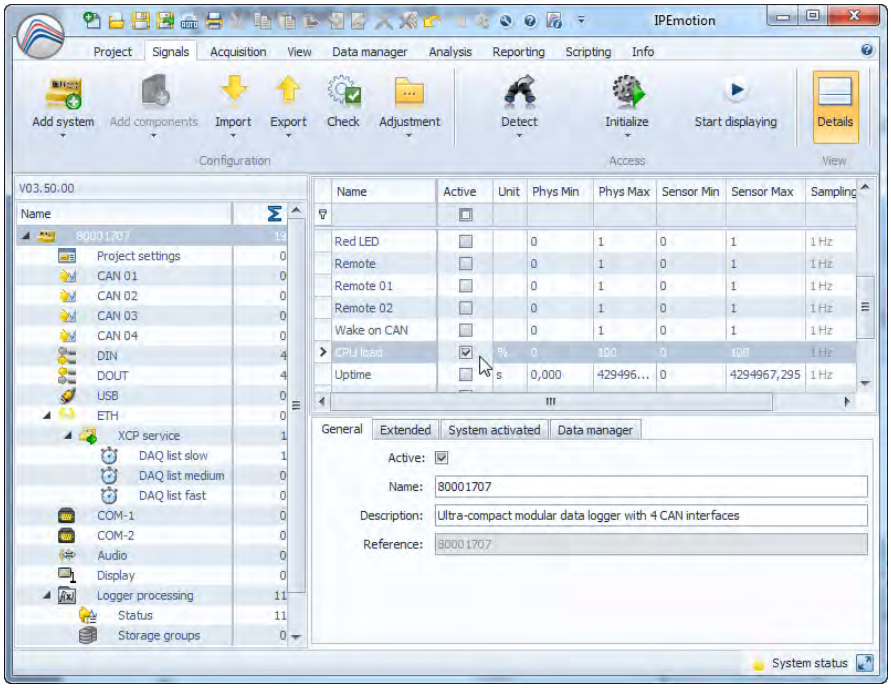
- Select the main tab ***Signals*** .

- Click ***Detect*** to identify the connected hardware components.
  The / all available logger(s) will be displayed in a select list.
  Confirm your selection by activating the corresponding checkbox and click OK. The configuration settings stored on the logger will be readout and displayed.



- Activate the status signal CPU load.

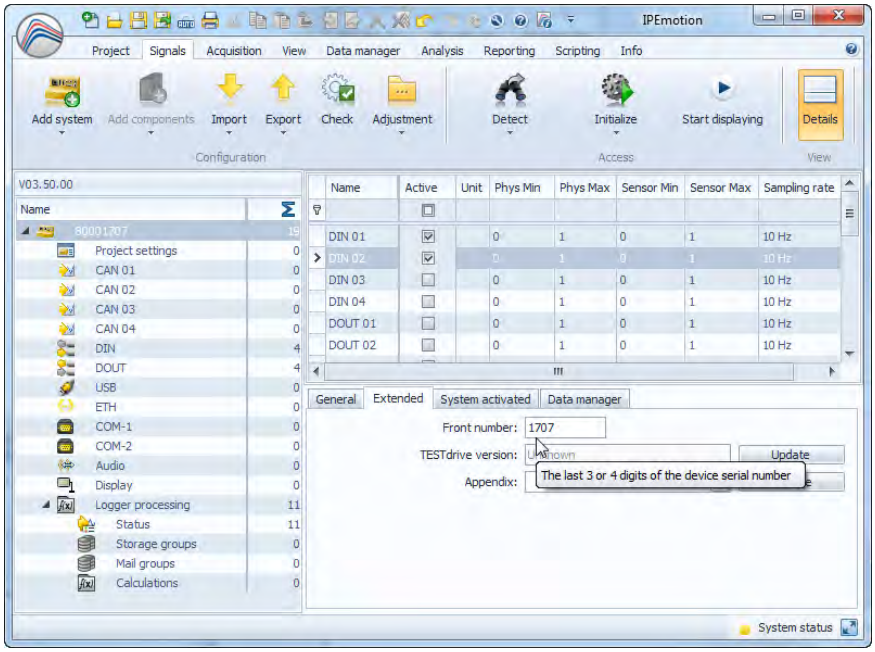
  > Mark the logger at the left hand structure top area and scroll the signal list downwards to CPU load, hook ***Active*** to enable the checkbox.



- Select ***ETH*** from the left hand tree structure, right click and choose > ***Add components*** > **XCP service** from the context menu
- Select ***DAQ list slow*** from the left hand tree structure, right click and choose > ***Add components*** > **Channels** from the context menu
- Mark ***CPU load*** and confirm by clicking ***OK***.
- Mark the logger from the left hand tree structure top area. Click ***Start displaying*** from the tool bar.
- Once the logger has been initialized, the current value of the CPU load is displayed continuously in the signal list. Now logger's ETH communication test and online data streaming via XCP service has been completed succesfully.

3.3.3 Add logger system, creating test configuration (USB stick)

In case the data acquisition or the Ethernet connection is not working properly (e.g. when using obsolete / former configurations, incompatible IP address settings, ...), we recommend to transfer a valid (already succefully tested configuration) per USB stick to the logger.



- Create a logger system:
  Select from the main tabs ***Signals*** > ***Add system*** > e.g. **M-LOG (4CAN)**
- Enter the front number of the logger you will use:
  > Mark the logger at the left hand structure top area and choose the ***Extended*** tab to set the last four digits of the logger's serial number using the field ***Front number***.
- Select the ***Data manager*** tab and activate the check box ***Update connection parameters*** and click to ***Configuration***
- Enter valid settings for the IP address used for the Ethernet connection (auto IP or fixed IP) as described at ***Static and dynamic IP addresses***.
- Create a test configuration.
- Save the current configuration settings in the project (*.icf).
- Export the project as measurement configuration (TSTdrive.mcf) to an individual subdirectory located on your Notebook/PC or direct to an USB stick.

- Unplug the USB stick from the configuration PC.
- Switch on the logger.
- Plug in the USB stick while the logger is running in measurement mode (yellow LED lights). The logger will stop measurement an start data postprocessing, existing data will be moved to the USB stick. This process lasts as long as the yellow LED is flashing.
- Then the logger will search for a new measurement configuration on the USB stick. If a new configuration is found, the application on the logger will be updated and the origin TSTdrive.mcf on the USB stick is deleted.
- Wait until the yellow LED lights nor flashes not any longer and unplug the stick. The logger will switch to measurement operation again.

After all necessary connection parameters have been updated with valid settings (logger, PC), a communication via the LAN cable is supported, including these actions:

- transfer a new configuration to the logger,
- detect the logger and read the configuration from the logger,
- transfer measurement data from the logger to the PC (import measurement files).

3.3.4 Static and dynamic IP addresses

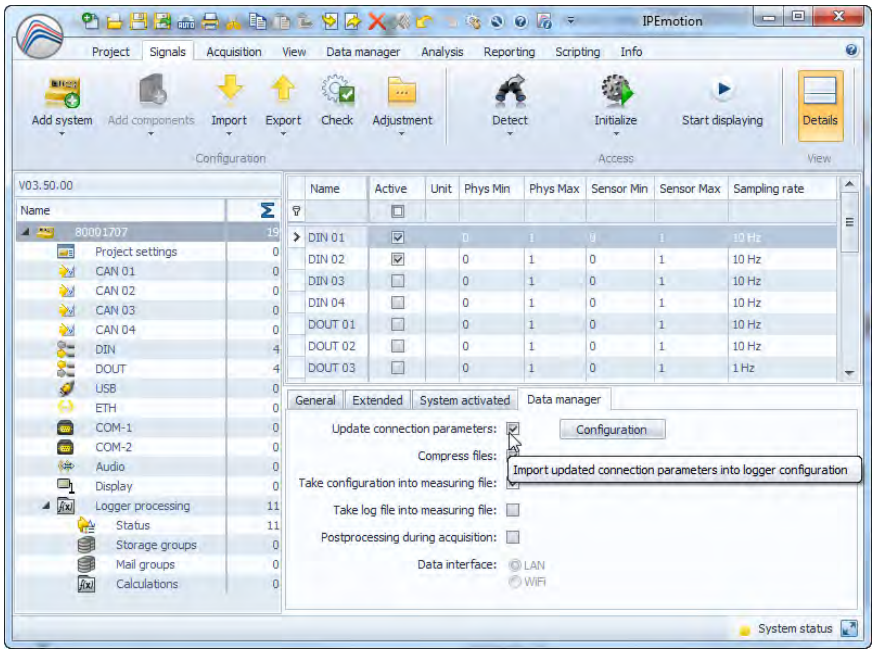
Basically IPETRONIK data loggers can be connected to other network clients via Ethernet in two different ways:

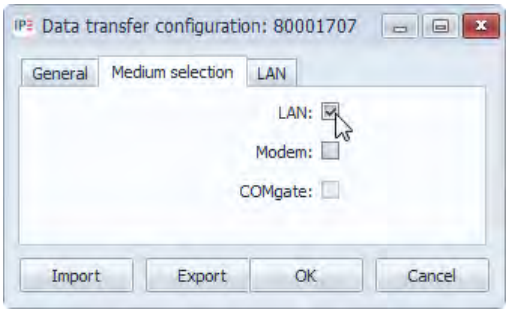
- Point to point connection between the logger and the PC/Notebook.
  Usually neither the logger nor the PC/Notebook supports DHCP (Dynamic Host Configuration Protocol), it is necessary to set a fixed IP address for both.
- Client to client connection between logger and PC/Notebook through a local network. In this case the network server provides DHCP and manages the automatic IP address assignment to all network clients. Therefore logger and PC have to use dynamic IP address settings.

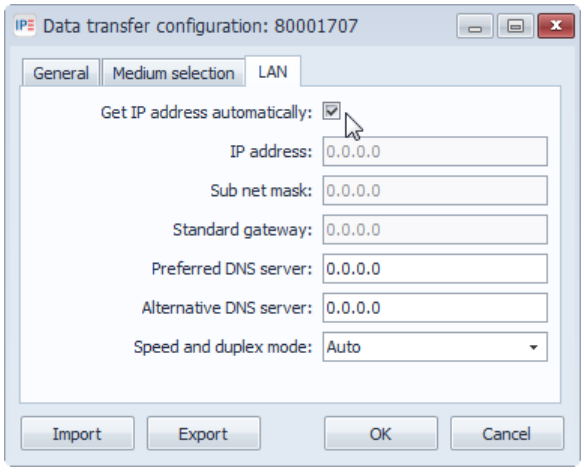
Use the ***Data manager*** tab to enter the settings for the logger:

- Mark the logger at the left hand tree structure top area.
- Select the ***Data manager*** tab from the right hand down area (configuration tabs).and activate the check box ***Update connection parameters***.
- Click ***Configuration***.
- Choose the tab ***Medium selection*** and activate ***LAN***.
- Refer to the dialogs below for dynamic (Get IP address automatically) and static IP address settings.
- When using the static IP address with the logger, it is necessary to adapt the system control settings of the PC/Notebook,

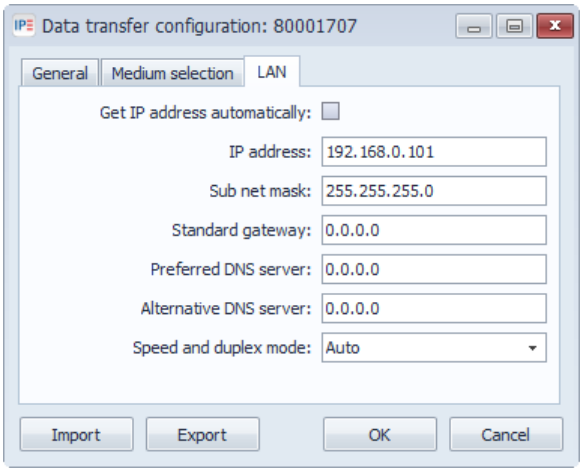
  For example:
  IP address: 192.168.0.100
  Subnet mask: 255.255.255.0







Settings for dynamic IP adddress



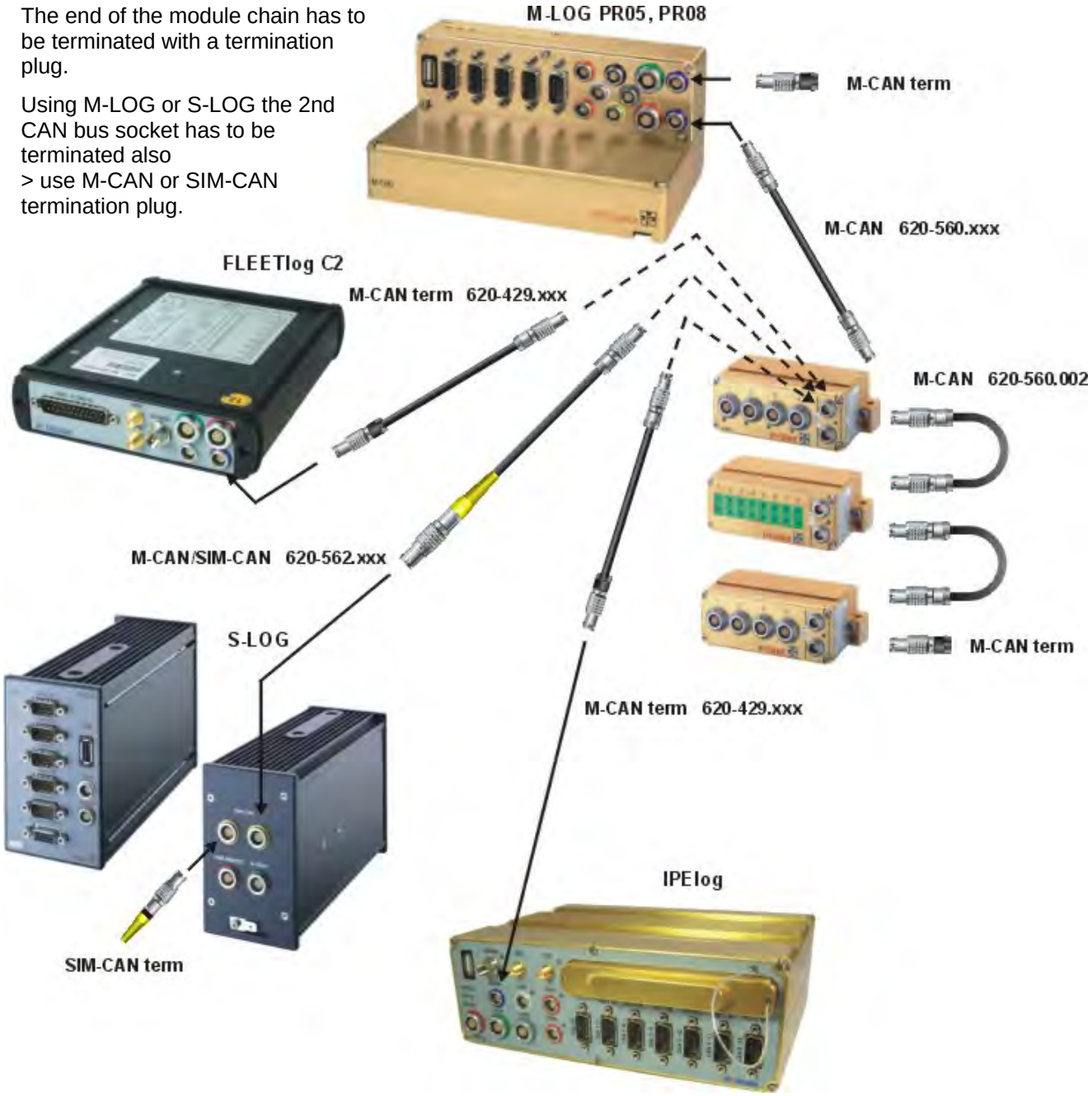
Settings for static IP address

3.3.5 Logger system with CAN modules

All IPETRONIK CAN modules (M-Series, SIM-Series, CANpressure, MultiDAQ, High Voltage Iso DAQ ...) are connected to the data logger with corresponding system cables.

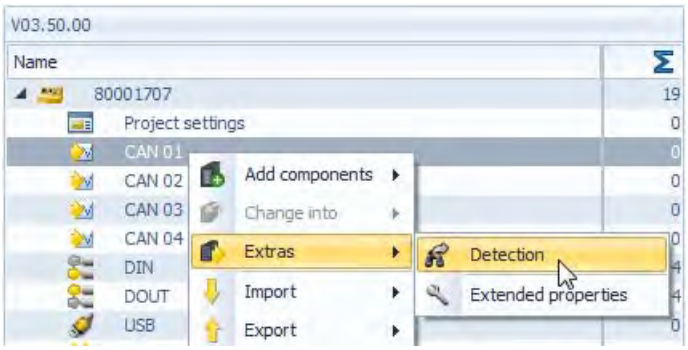
Connecting the modules

- Daisy-chain the modules among one another and connect the system with its respective cable to the logger.
- The end of the module chain has to be terminated with a termination plug.
- Using M-LOG or S-LOG the 2nd CAN bus socket has to be terminated also
  > use M-CAN or SIM-CAN termination plug.



Usually all IPETRONIK CAN modules are connected to the logger through the system connectors M-CAN resp. SIM-CAN with S-LOG. Thus they can be detected and configured by IPEmotion in a user-friendly way. Besides this, it is also possible to connect IPETRONK modules, as well as, non-IPETRONIK CAN modules to a free CAN measurement input. Please note, that you need a separate cable to supply the modules with power for this. Configuration of the modules is done manually or by importing a CANdb file.

Detecting modules, creating test configuration



1. Select the CAN input to which the devices are connected to (CAN 01 is recommended because it is connected with the M-CAN or SIM-CAN socket at the logger).
2. Select **Extras** from the context menu (right mouse button).
3. Select **Detection** to detect the connected devices and to transfer the current settings to the configuration.

MultiDAQ is detected as IPETRONIK CAN device

- Execute ***Detection*** of connected modules as described.
- Configure the modules and the logger (activate channels, set signal scaling, select sample rates, create storage groups, ...)
- Save the current project.
- Initialize the Logger (working Ethernet connection required) or transfer the configuration per USB stick to the logger.

*To display measurement data acquired by the logger using the Ethernet connection, you have to add an **XCP service** at first. Assign all signals to the DAQ lists of the XCP service which you want to be displayed.*
*The **Options** setting **Automatic service administration** will automatically create an XCP service and assign all active signals to the DAQ lists.*

3.3.6 Access to data stored on the logger

The logger stores all data in a Zip archive on internal storage medium (cF card, resp. SD card with IPElog).

MEA_xxxx.zip	measurement data + header file + current configuration
LOG_xxxx.zip	logfile with status reports of the data acquisition

A measurement file (archiv file) is empty, if the sum of the file contents calculated from the files listed below is 0. In this case, the respecitve zip archive will be deleted.

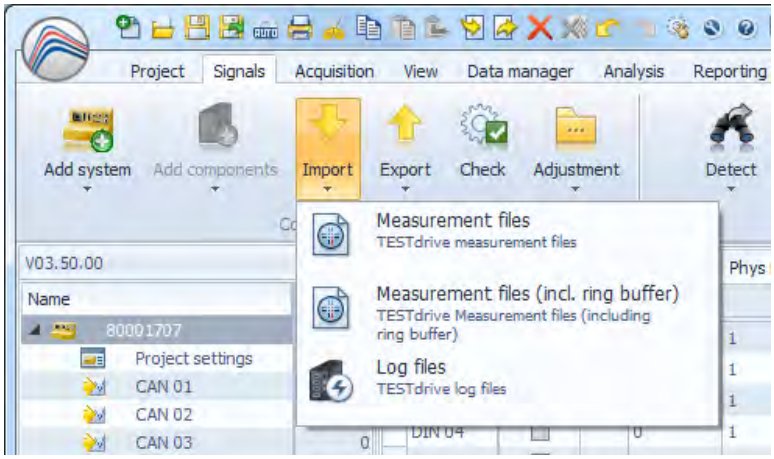
- all files containing storage groups except the DAT files
- all trace files (BD...)
- all statistic files except the DAT files
- Min/Max statistic file (STG)
- Audio/Video files except the DAT files (AVI,WAV,IMG)
- Traffic files (BIN, Quickstart)
- LOG file
- Measurement status file
- PPP debug file (PPP...)

Access (= data transfer to a PC or FTP server) to data stored on the logger is supported:

- per USB stick
- through an Ethernet cable connection
- using COMgate or an internal/external WiFi client
- using COMgate WAN or an internal/external modem

Using a LAN cable connection

Import measurement files / log files



1. Select **Signals** navigation tab.
2. Select logger in the left **Systems** overview.
3. Transfer the current data (internal memory) in the **Signals** navigation tab to PC with **Import > Measurement files**.
4. Transfer the current data (internal memory + pre-/post-trigger data)) in the **Signals** navigation tab to PC with **Import > Measurement files (incl. ring buffer)**.
5. Transfer the current TESTdrive log files in the **Signals** navigation tab to PC with **Import > Log files**.
6. Select the target directory or crate a new folder to save the respective data.

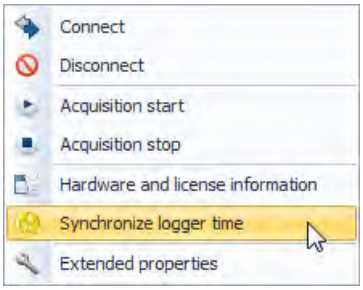
With USB stick

Plug in the USB stick to the running logger. The logger stops data acquisition, saves data, log files and the related configuration to the stick. If the yellow LED is not permanently on, disconnect the USB stick. The logger runs now in acquisition mode..

Please note that data can only be imported via USB if no LAN connection to the logger is activated. Disconnect the logger with the logger context menu.

3.3.7 Synchronizing the logger time

- Mark the logger at the left hand structure top area.
- Right click to the logger entry and select **Extras** > **Synchronize logger time** from the context menu.



Time data of time stamp and log messages have been normalized. Now time stamp output is local time (former UTC). Time stamps reported in XML files always indicate the offset (time lag) to UTC time, e.g. <startdate>2012-04-25T09:30:10+01:00</startdate>

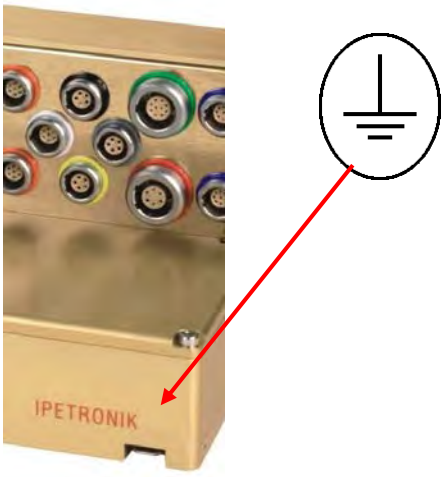
In order to ensure a correct time interpretation of recorded data, the IPETRONIK data converter IPEconverter V02.13 is required.

3.3.8 Updating the measurement application (TESTdrive)

- Copy the file **MLogger.rtb** (standard) or **Logger.prg** (for M-VIEWgraph) to the subdirectory named with the logger's serial number on the USB stick.
- Power up the logger and wait for the yellow LED which indidcates data acqusition.
- Plug in the USB stick to the logger, program update will start automatically.
- Wait until the yellow LED lights no longer and unplug the USB.
  The logger executes a reboot and starts measuring operation with the new application.

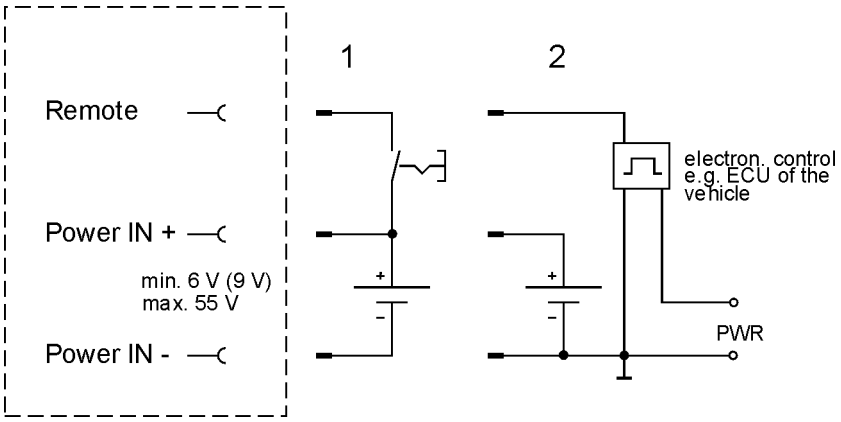
4 External connection

4.1 Grounding



It is absolutely necessary to connect the grounding of the M-LOG case bottom or S-LOG case rear with a suitable ground pin within the overall system. Without this grounding, EMV disturbances and uncontrolled excitation interferences can restrict the measuring process.

4.2 Remote connection



The logger has internal buffer capacitors to avoid a data loss due to sudden voltage losses. The regular shut-down is executed via remote and not by switching-off the excitation!

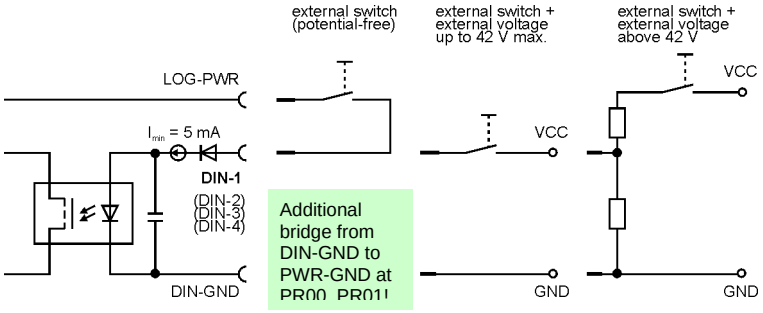
The activating via a remote impulse (impulse length > 20 ms) is also supported. But the continuous remote signal must be received within 60 s, otherwise the logger is shut down by the watchdog.

Example:
Start of measuring system with opening the vehicle door. The continuous remote signal is received at motor start and the system continues measuring. If the continuous signal is not received (no motor start), the logger shuts down after 60 s.

4.3 Digital input/output connection

LOG-PWR switched logger excitation (not stabilized)
The excitation is supplied, as soon as, the logger is activated.

4.3.1 Connecting example digital input



potential free contact with external excitation up to 42 V without any resistor or voltage divider

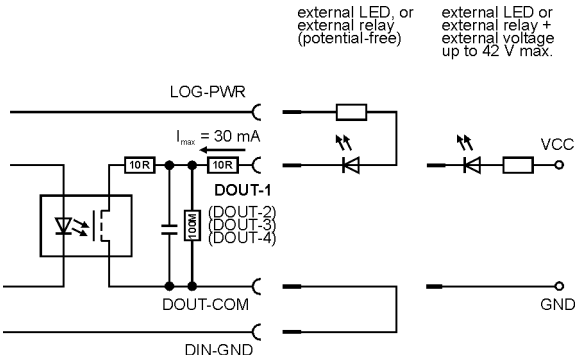
Terminal 15 of the board electrics (all vehicle power supplies up to 42 V without any resistor or voltage divider)

The digital inputs are electrically isolated but the respective DIN-GNDs are all connected to one PIN of the Sub D socket! This PIN has a direct connection to PWR-IN GND with the PR03, PR04, PR05, PR06 port replicators!

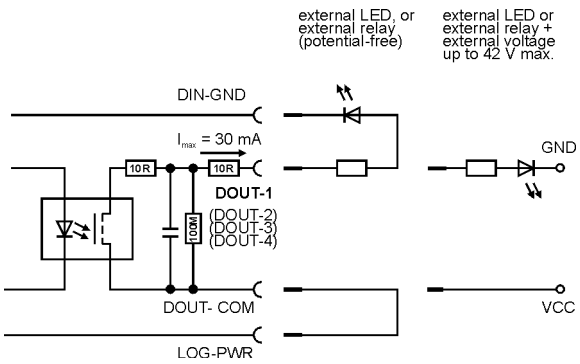
The inputs are protected by an internal 5 mA current limitation.

Required minimum values at the input for a clean functionality:
U_{min} = 3 V bzw. I_{min} = 2 mA

4.3.2 Connecting example digital output



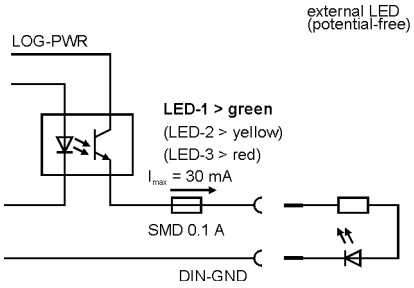
GND (ground) switched
Ri = 20 Ω



V+ (excitation) switched
Ri = 20 Ω

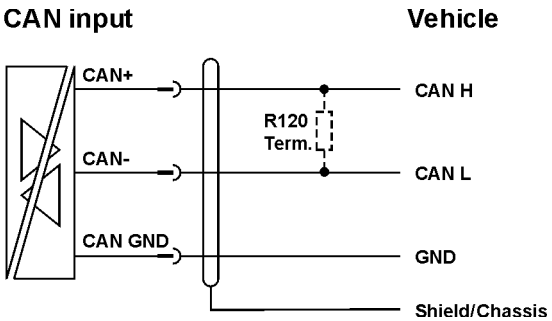
The digital outputs are electrically isolated and can operate bipolarly but the respective COM ports are all connected to one PIN of the Sub D socket!

4.3.3 Connecting example external status LED



4.4 Bus inputs

4.4.1 Connecting example CAN bus

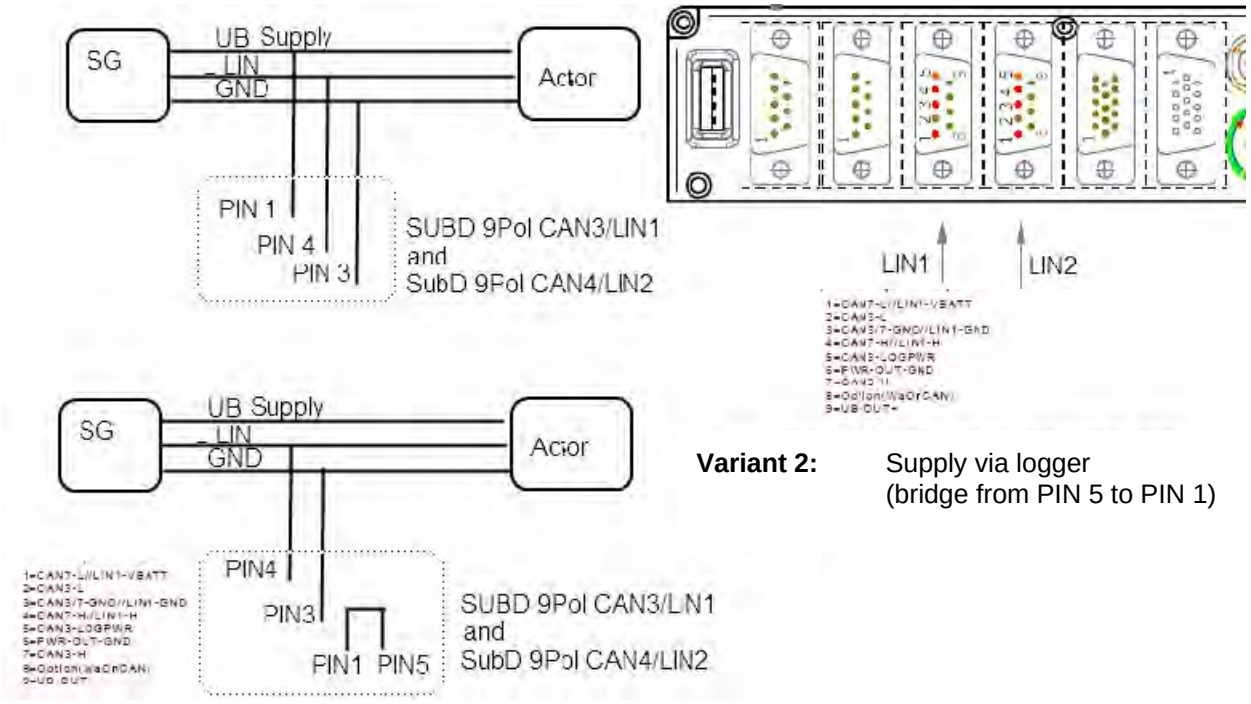


4.4.2 Connecting example LIN bus

Due to the galvanic isolation, the transceiver of the LIN measurement input must be power supplied by an external source. This can be:

1. Connection of the vehicle's bus power supply ($V_{Bsupply}$) or
2. Connection of the logger's power supply (bridge from PIN 5 to PIN 1)

Variant 1: Connect V_B of the external LIN bus



Variant 2: Supply via logger
(bridge from PIN 5 to PIN 1)

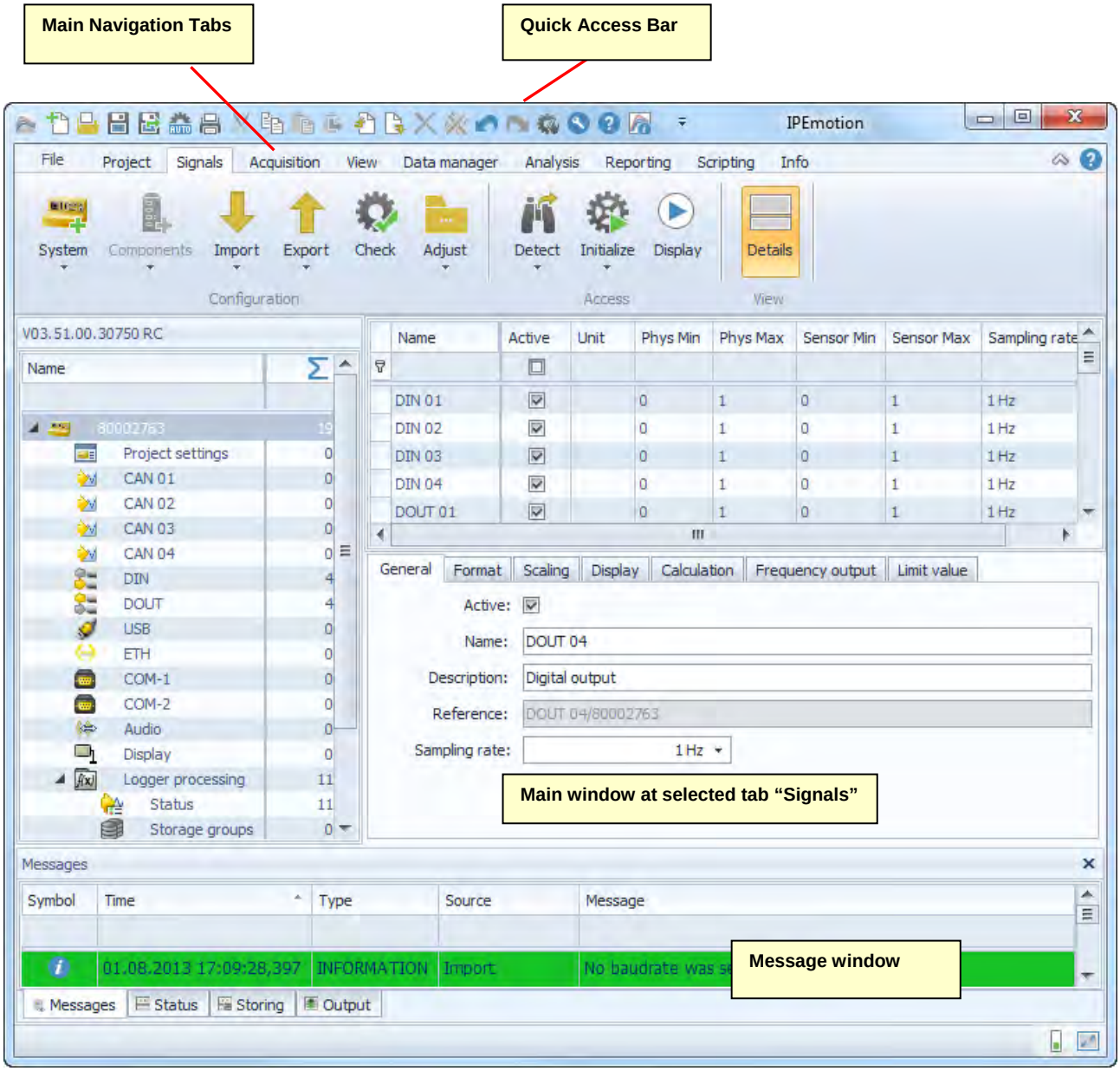
5 Configuration with IPEmotion (extract)

The IPEmotion software is required for configuring a logger measuring system and the corresponding IPETRONIK devices. The software must be installed on the notebook/PC, which is used to configure. (See the instructions in Commissioning). IPEmotion also supports the online data measurement with using the XCP service. You can find a detailed description of IPEmotion in the manual, which can be opened in the software as a PDF.

5.1 First steps

5.1.1 Main dialog

After the start of IPEmotion, the following screen appears.



IPEmotion automatically detects all available hardware connections at starting.

*If you want to reduce the required time, select **Options > PlugIns** for deactivating those interfaces, which are not used.*

5.1.2 Die Title Bar

The title bar contains the quick access bar, the software name, as well as, a tool bar with the following functions:

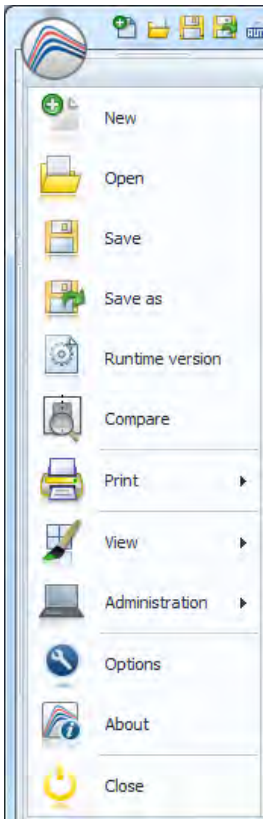
Help – Open the documentation IPEmotion.pdf where you can find useful information for a safe and clean application of the software.

Minimize – Minimize the application window of IPEmotion and place it in the task bar of your desktop.

Maximize – Make the application window visible on your desktop and refit the prior size.

Close – Close the application of IPEmotion.

5.1.3 The file menu



The file or application menu contains basic functions as: **New**, **Open**, **Save**, **Save As**, **Runtime version, Print** and **Close**, as well as, further properties such as **View**, **Options**, **Support file** and **About**.

The right partial view of the application menu contains a list of the recently used projects.

The **Print** function is implemented with limited functionality and not yet localized.

The **View** function contains the menu points **Message window** and the **Reset** command. Show or hide the message window and reset the displaying configuration to the default parameters.

5.1.4 Using the options

With the Options entry, you have the ability to edit user defined settings. You can define the following options:

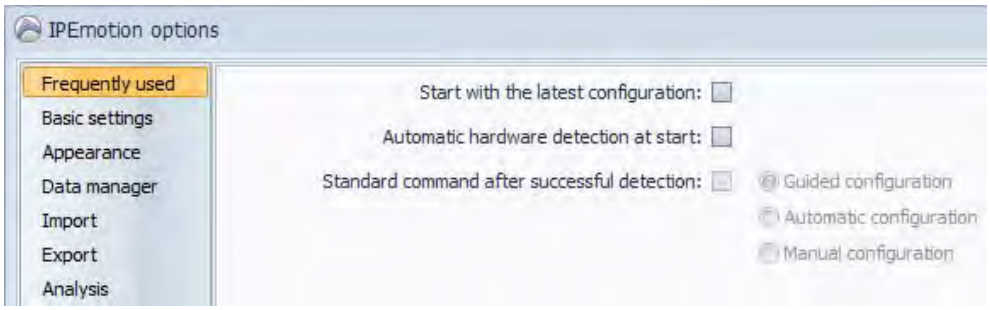
- Frequently used
- Basic settings
- View
- Data manager
- Analysis
- Units
- PlugIns

The following section offers you a detailed overview over the available setting options.

Frequently used

Activate or deactivate **Start with the latest configuration** and define the settings for the **automatic hardware detection**. Activate or deactivate the **automatic hardware detection at start** of IPEmotion and select a possible **standard command after successful detection**:

- Guided configuration
- Automatic configuration or
- Manual configuration

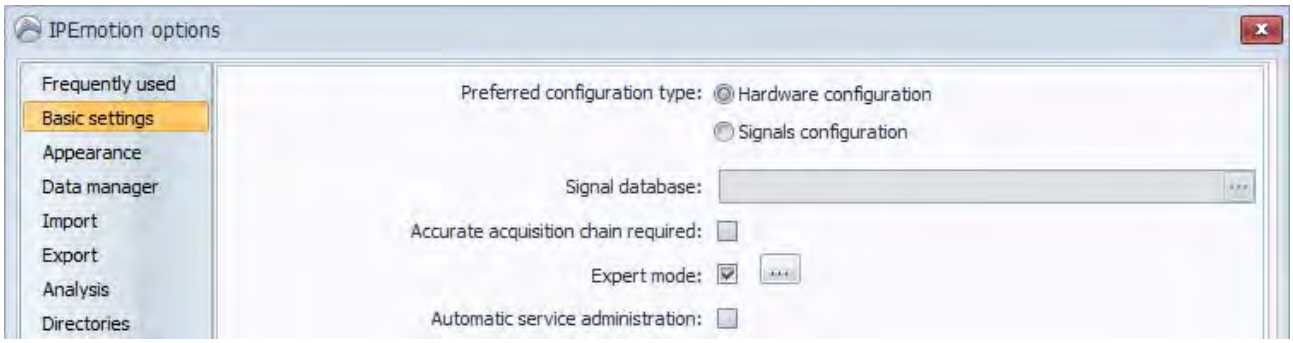


Basic settings

Select a **preferred configuration type**:

- Hardware configuration
- Signals configuration

Activate or deactivate the options: **Accurate acquisition chain required** and **Expert mode**.



Expert mode

The protocol nodes of imported description files (CANdb, A2L, FIBEX,...) are visible, this means, the user has access to the signal properties.
With the protocols CCP and XCP the DAQ lists are displayed and can be processed (delete, move signals).

With the release of IPEmotion V01.07.00 internal channels (-> Variables) for temporary storage tasks have been implemented. Managing this variables is only supported with an enabled Expert mode.

Activate the **Automatic service administration** option to automatically import the active channels into the DAQ lists of the XCP service. These channels are then available in online view.

Please note the restrictions depending on the Ethernet interface of the PC and the number of active channels. In this case, it is recommended to manually import the required channels into the DAQ lists of the XCP service (deactivated Automatic service administration)

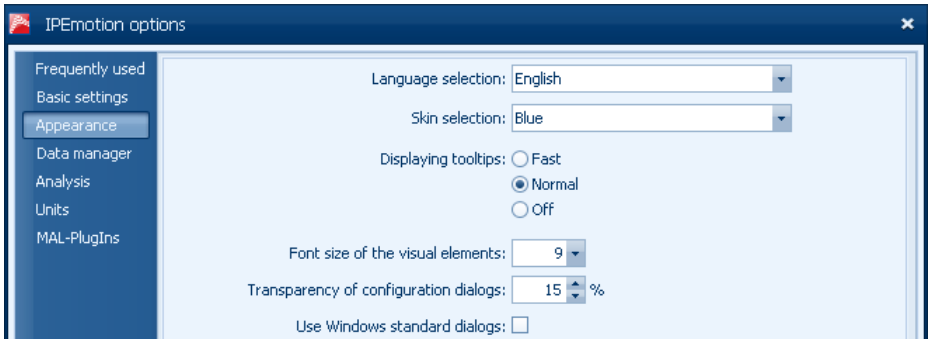
View

Define your **view settings** according the following listed points:

- Language selection
- Skin selection
- Displaying tooltips
- Font size of the visual elements
- Transparency of configuration dialogs (0 – 30 percent)

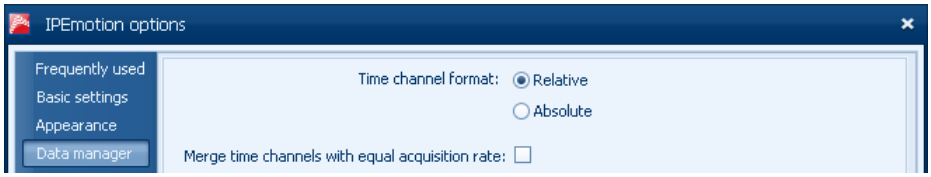
Activate or deactivate the use of the **Windows standard dialogs** for the file and directory selection.

The *Open file* dialog is skin-enabled, i.e. it is shown in the selected user interface type.



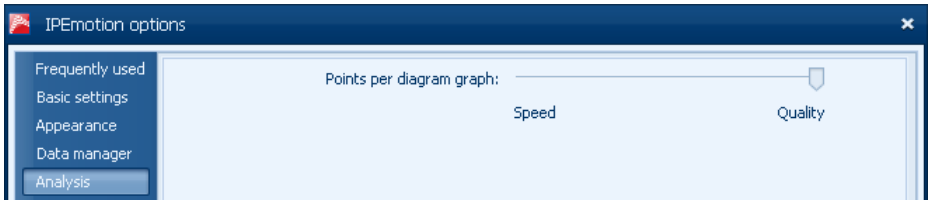
Data manager

Define the **Time channel format** as *Relative* or *Absolute* (This setting is currently not supported for the export into external formats!) and activate or deactivate the option: **Merge time channels with equal acquisition rate**.



Analysis

Select the **points per diagram graph**. Define if all signals are considered in the analysis diagrams at drawing the graph or only the samples. Move the bar accordingly to the preferred speed or quality.



Units

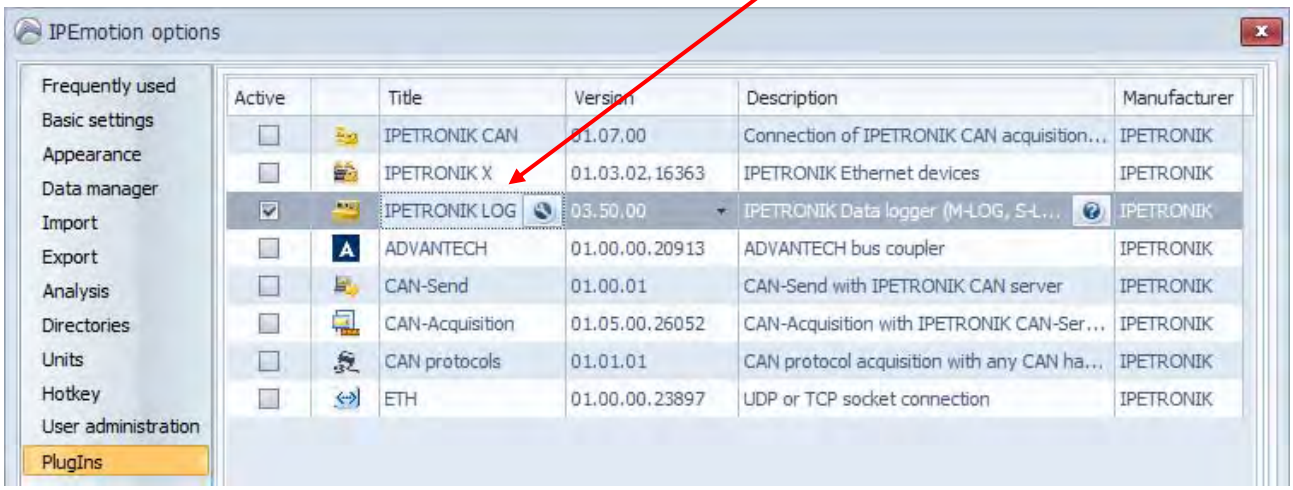
Get an overview according the common physical values and their respective unit and edit them.

PlugIns

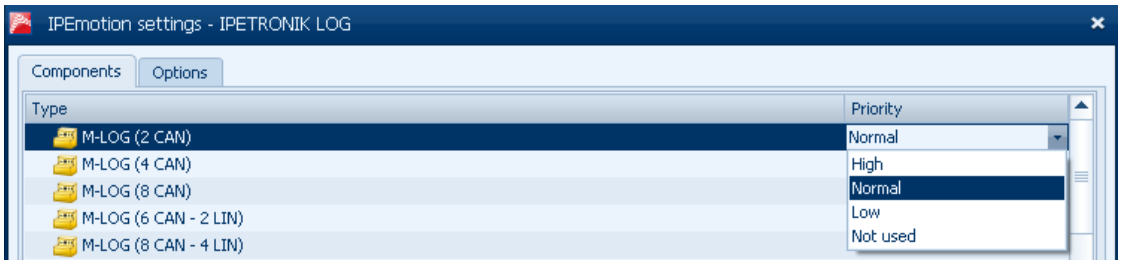
Activate or deactivate the **hardware systems** to be used.

Activate this PlugIn for all logger applications.

The corresponding TESTdrive version must be available at the logger!



With the **Settings** button, you have the ability to define the **components** (module type and priority, e.g. for the type selection of the Dry configuration) of the respective hardware system and to edit additional **options** settings.



The selection of the hardware components for the configuration by using a signal library is based on the **Priority**. This preselection with a priority assignation of the system components facilitates the device selection and improves the system speed.

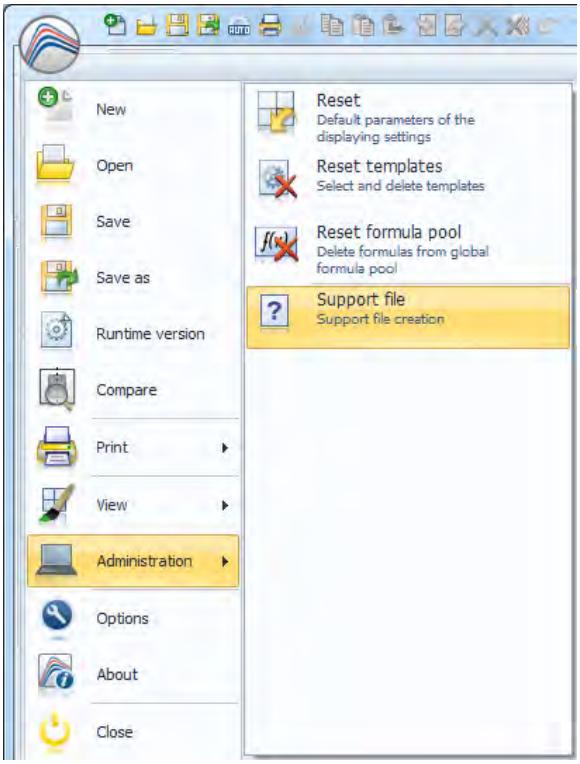
The **High** priority defines a preferred use of the corresponding hardware component at configuring with a signal library. The hardware components, which are defined with the **Not used** priority, cannot be selected for an acquisition.

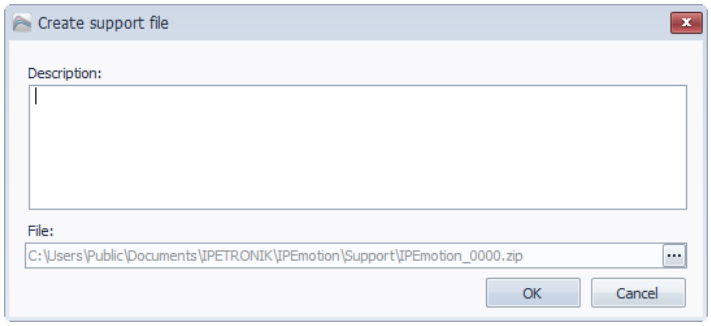
5.1.5 Creating a support file

With the **Support file** entry of the application menu, you have the ability to create a support file and add and/or edit own comments and error descriptions.

Enter in the appearing **Create support file** screen an error description. Accept the default location for the file. To select another location click on the ··· symbol.

After you have specified the location and a user defined file name, click **Save** to return to the **Create support file** screen.





After clicking on **OK** a zip file is generated that contains the error description, as well as, the following information:

- System information (Windows version, computer name, free memory on the local drives, …)
- Current configurations (acquisition, online view, script configurations)
- Trace files (.NET, C++)

If you have any problems while working with IPEmotion, send us this support file at support@ipemotion.com.

5.1.6 IPEmotion working areas (main navigation tabs)

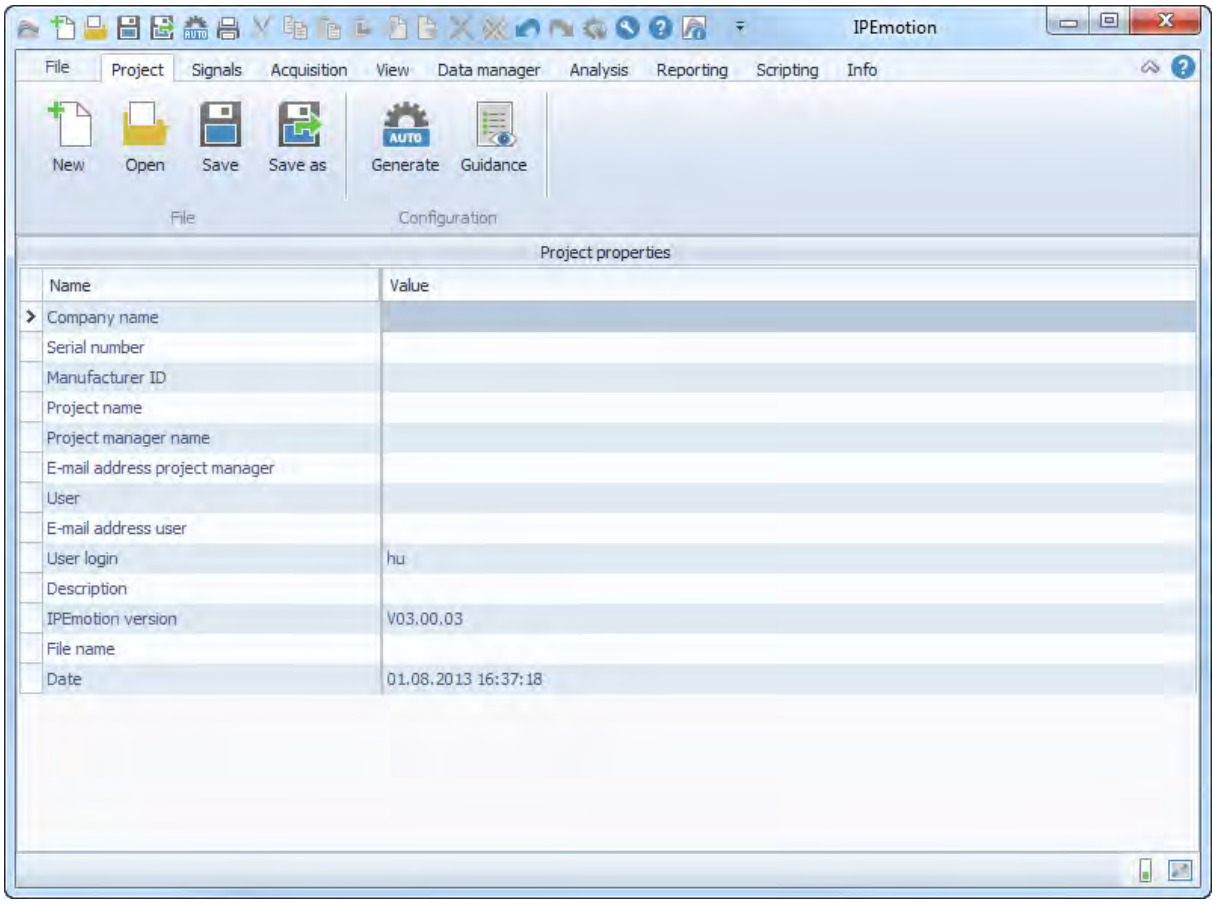
The main navigation tabs allow a quick activation of the different main functions of IPEmotion. A tab displayed in light blue indicates an active function.

IPEmotion is designed to follow the main navigation tabs from left to right. Use this reasonable order like a read thread, which guides you step-by-step to a successful acquisition.

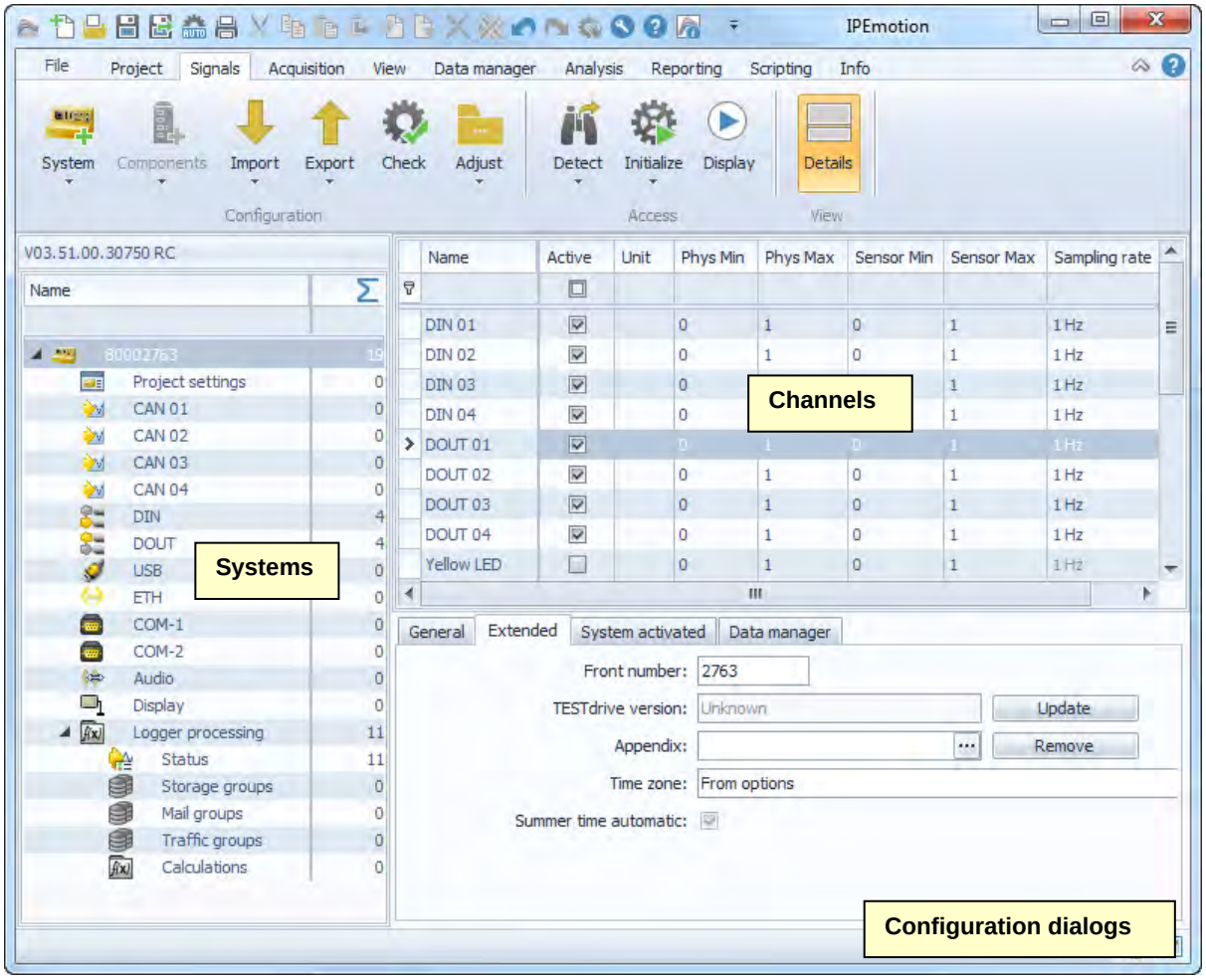
Project	Signals	Acquisition	View	Data manger	Analysis	Reporting	Scripting	Info

Project	Define your general user defined project data.
Signals	Configure the connected acquisition systems and modules.
Acquisition	Configure the desired storage groups and channels.
View	Take a measurement defined by the connected hardware modules and the set configurations.
Data manager	Manage your stored acquired data in all the supported formats.
Analysis	Visualize your channels with diagrams.
Reporting	Create reports and project documentations.
Scripting	Automate your acquisition sequences.
Info	Get a basic overview and general support.

Project



Signals



5.1.7 Info

The chapter offers a basic overview of the IPEmotion software. In addition, it shows useful advices and tips and tricks on how to use IPEmotion.

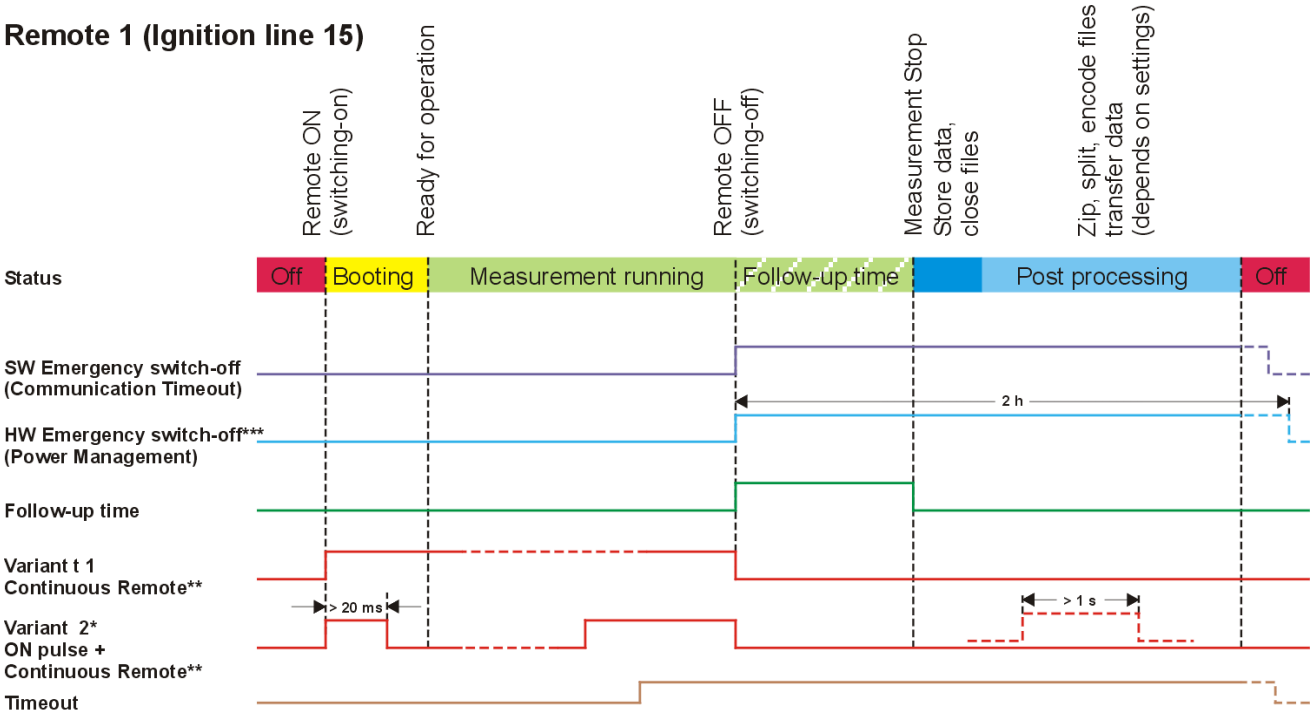
The view Info is divided into the following menu points:

- Welcome
- Release Notes (only in English)
- Red thread
- Tips and tricks
- Keyboard handling
- Documentations
- Contact and support

6 Basic functions

6.1 Switching-on / switching-off

Description of the supported switching-on / switchting-off modes

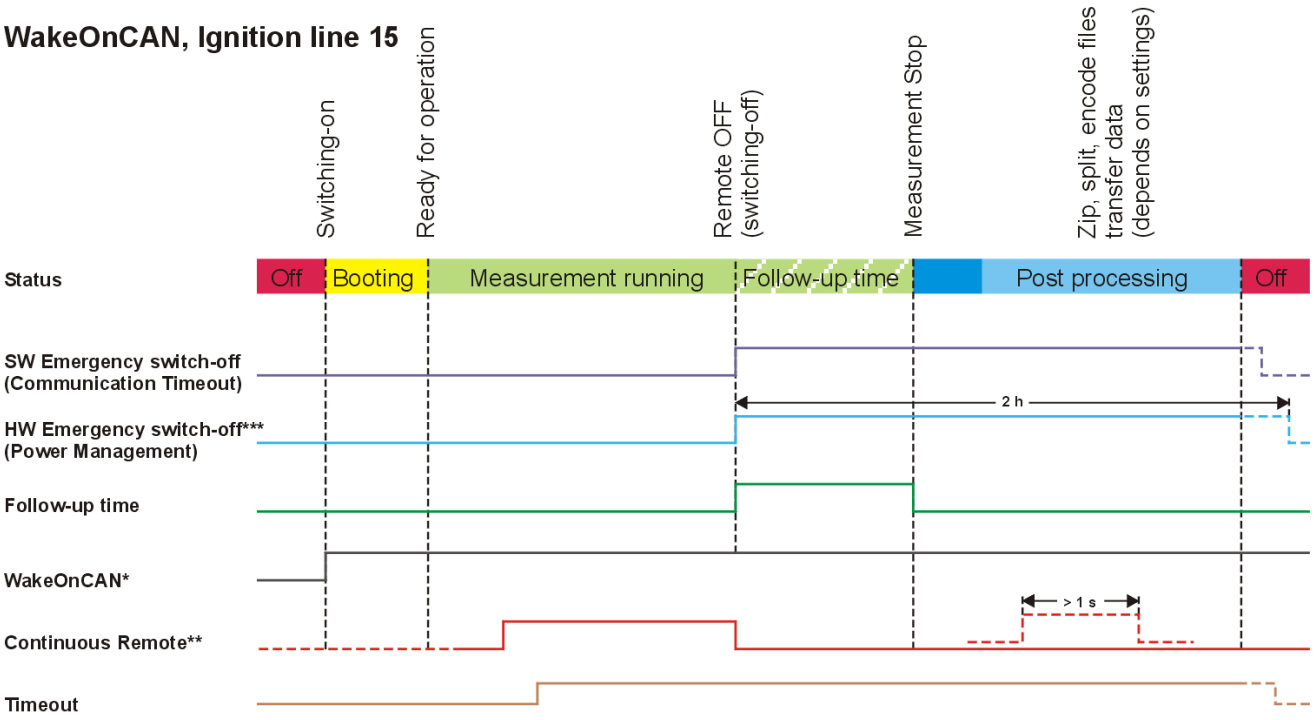


***Variant 2:** Switch-on condition (WakeOnCAN) enabled, continuous remote signal required before timeout expires

****Conitnuous Remote:** If a remote signal (duration > 1 s) is identified during post-processing, the logger will stop this task and start a new acquisition.

*****HW Emergency switch-off:** The logger will be absolutely switched-off by the power management 2 h after the previous falling edge of the remote signal.

WakeOnCAN, Ignition line 15

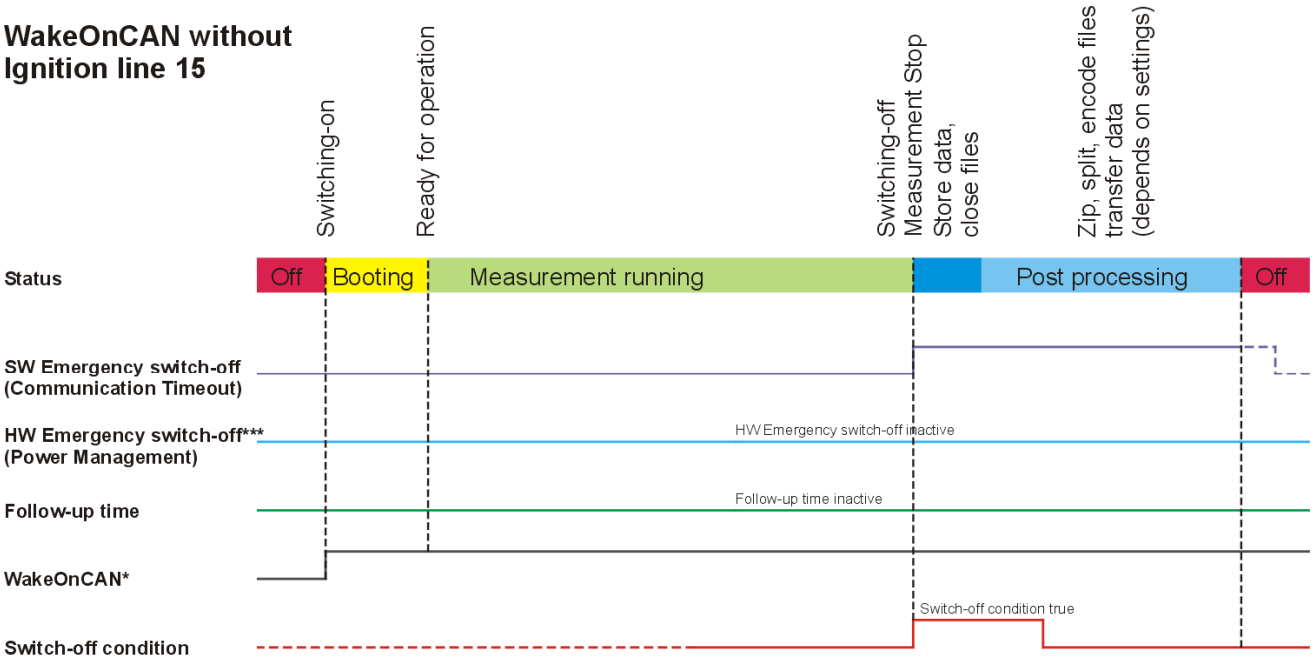


***WakeOnCAN Ign. 15:** Switch-on condition (WakeOnCAN) enabled, continuous remote signal required before timeout expires jumper Pin 3-6 and Pin 8-9 at respective CAN input to indicate bus traffic (WakeOnCAN)!

****Conitnuous Remote:** If a remote signal (duration > 1 s) is identified during post-processing, the logger will stop this task and start a new acquisition.

*****HW Emergency switch-off:** The logger will be absolutely switched-off by the power management 2 h after the previous falling edge

WakeOnCAN without Ignition line 15



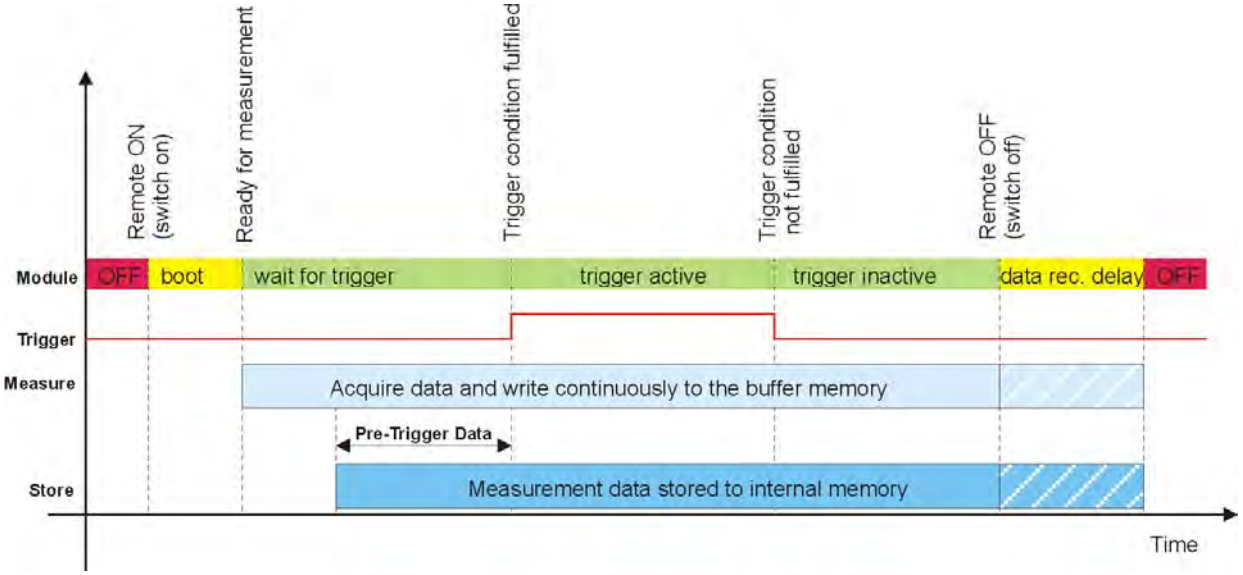
***WakeOnCAN without Ign. 15:** Switch-on condition (WakeOnCAN) enabled,, Switch-off condition configured,, HW Emergency switch-off and Follow-up time out of operation, Timeout inactive Jumper Pin 3-6 and Pin 8-9 at respective CAN input to indicate bus traffic (WakeOnCAN)!

6.2 Triggering

The logger acquisition program offers 4 trigger conditions for every storage group to control the data acquisition. The trigger conditions can be deduced from acquired signals, as well as, from calculated channels. All data is written into the memory (RAM). If a storage condition is met, the data is asynchronously written from the cache into the open measuring file on the flash card.

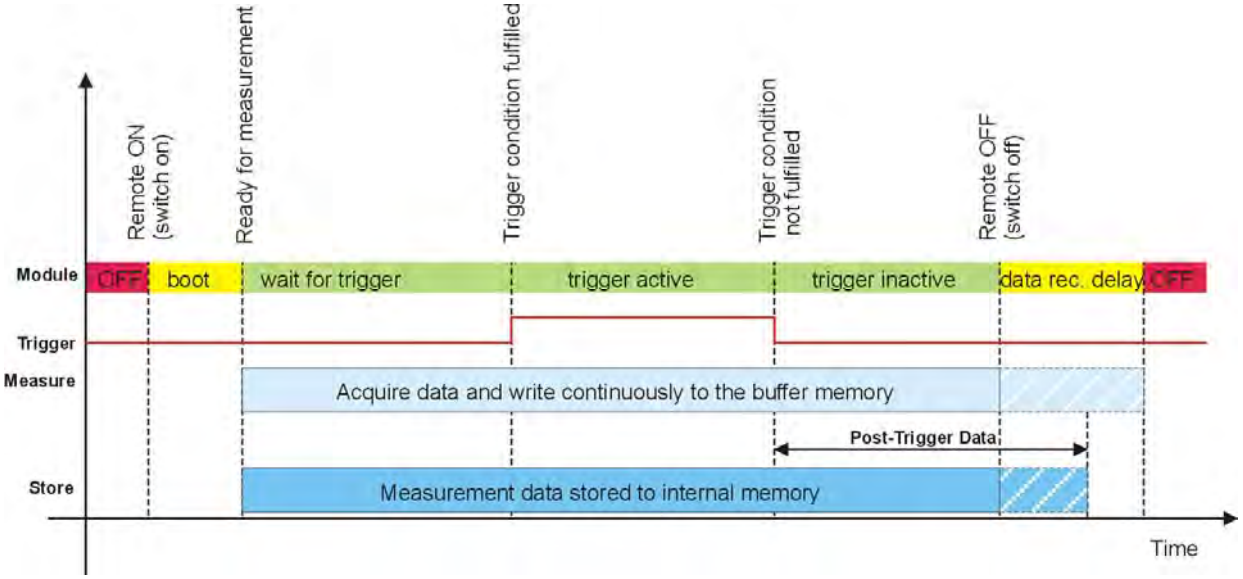
6.2.1 Start-trigger

Start of data storage if trigger condition (impulse) is met. Stop of storage with (correct) logger shut-down (Power down). A defined follow-up time extends the data acquisition for x seconds.



6.2.2 Stop-trigger

Begin of data storage with logger switch-on (Power up). Stop of data storage if trigger condition (impulse) is met. A defined follow-up time extends the data acquisition for x seconds. If no trigger event is set, data is recorded until “Remote OFF” or end of the follow-up time.

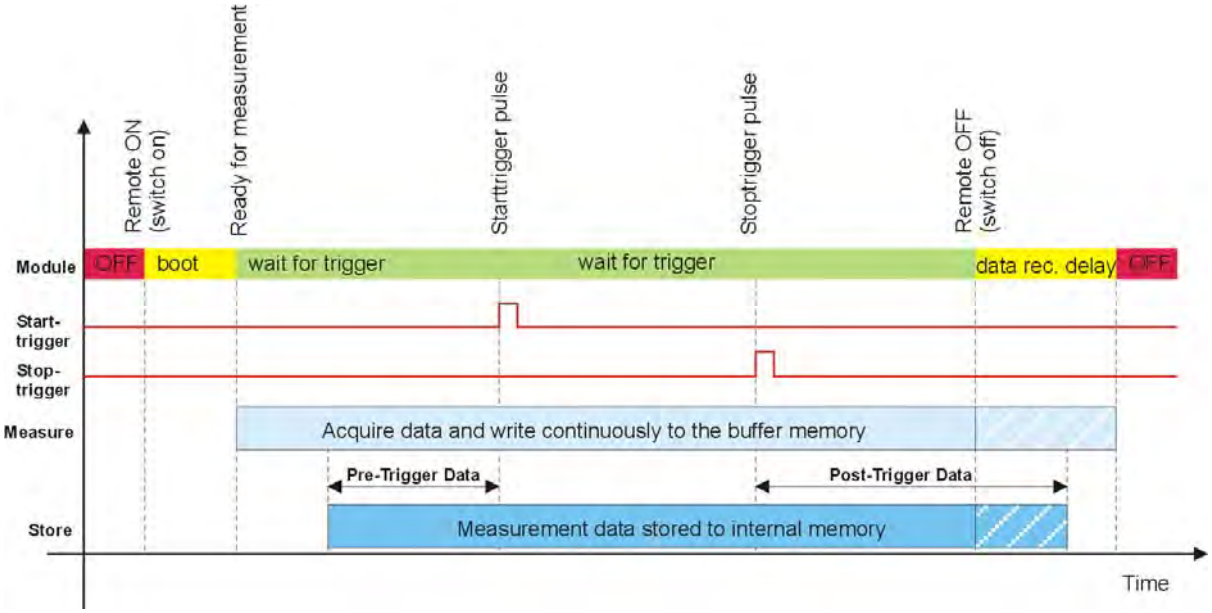


We recommend to use the function VALID(x ; y) in order to avoid irregular NoValues which may influence a correct triggering.
Example:
Start-trigger: VALID(„Channel01“ > 15; 0) *Storage as soon as Channel01 > 15*
Stop-trigger: VALID(„Channel01“ > 15, 1) *Storage as long as Channel01 > 15*

6.2.3 Start- and Stop-trigger

Begin of data storage if start-trigger condition (impulse) is met. Stop of data storage if stop-trigger condition (impulse) is met.

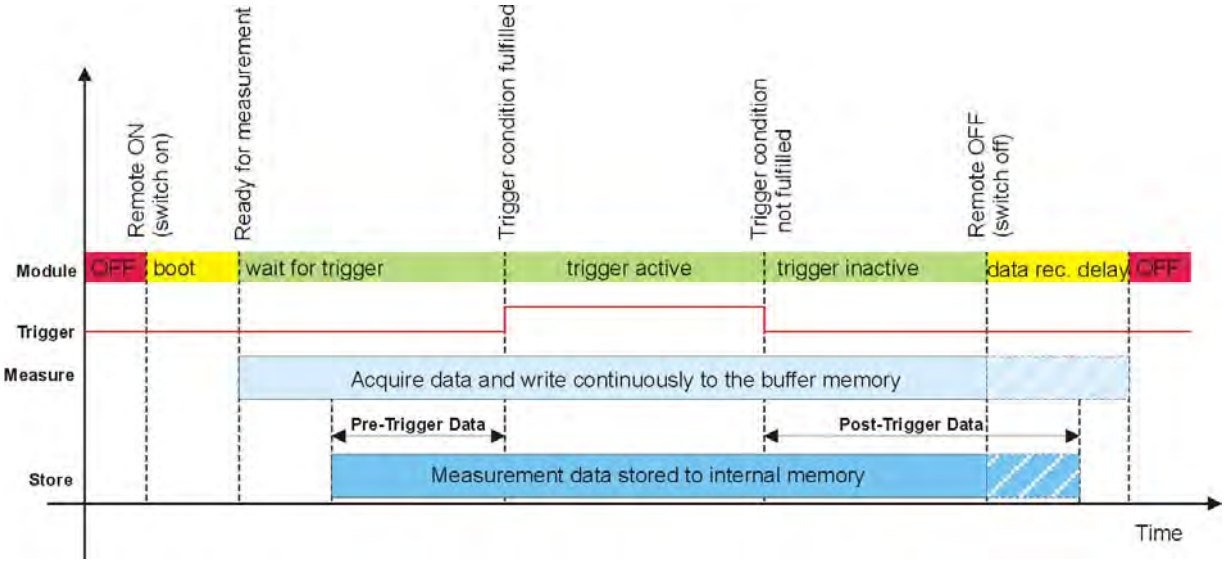
A defined follow-up time extends the data acquisition for x seconds. If no stop-trigger event is set, data is recorded until “Remote OFF” or end of the follow-up time.



6.2.4 Stop is inverted start

Data storage for the time of meeting trigger condition (status).

A defined follow-up time extends the data acquisition for x seconds. If trigger status does not change after successful trigger condition, data is recorded until “Remote OFF” or end of the follow-up time.



*The **Follow-up time** may not be mistaken for the **Post-processing time**. Both settings must be coordinated. The maximum post-processing time is set with **Logger** > **Settings** > **Data transfer timeout**. This setting limites the switch-on duration after successful “Remote OFF” signal. The logger is regularly shut down after this time even if the data post-processing (zipping, splitting, sending) is not yet completed. The post-processing value must be at least 5 min greater than the currently set follow-up time!*

6.2.5 Save trigger channel

If **Save trigger channel** is activated, trigger status and some additional information are stored in an implicit channel (Word data format) in every storage group.

Bit coded information in trigger status channel		
Bit No.	**Description**	**Description (if bit value = 1)**
0	Pre-Trigger	Pre-trigger time running
1	Between start and stop	Trigger signal status This bit is set during the whole acquisition in **Continuous acquisition** mode.
2	Post-trigger	Post-trigger time running
3	Trigger Event	This bit is set for the time of one signal at every Low > High of the trigger signal. It is set once at acquisition start in **Continuous acquisition** mode.
4	Maneuver	Maneuver recording running (No NoValues available anymore)
5	Res	Currently not used!!
6	Res	Currently not used!
7	Res	Currently not used!
8	Res	Currently not used!
9	Res	Currently not used!
10	Res	Currently not used!
11	Res	Currently not used!
12	WakeOnCAN	WakeOnCAN ist active
13	Power Bad	The logger is disconnected from the power supply.
14	Power Good	Buffer capacitors loaded
15	KL. 15	Debounced remote signall (terminal 15)

6.3 Storage groups

TESTdrive supports various storage groups to merge signals (direct signals, as well as, calculated channels) in so-called storage groups. Every storage group can has an own storage rate – independent from the signal rate. This storage rate is valid for all signals in the group, i.e. the signal is detected with the set sampling rate and recorded with the storage rate.

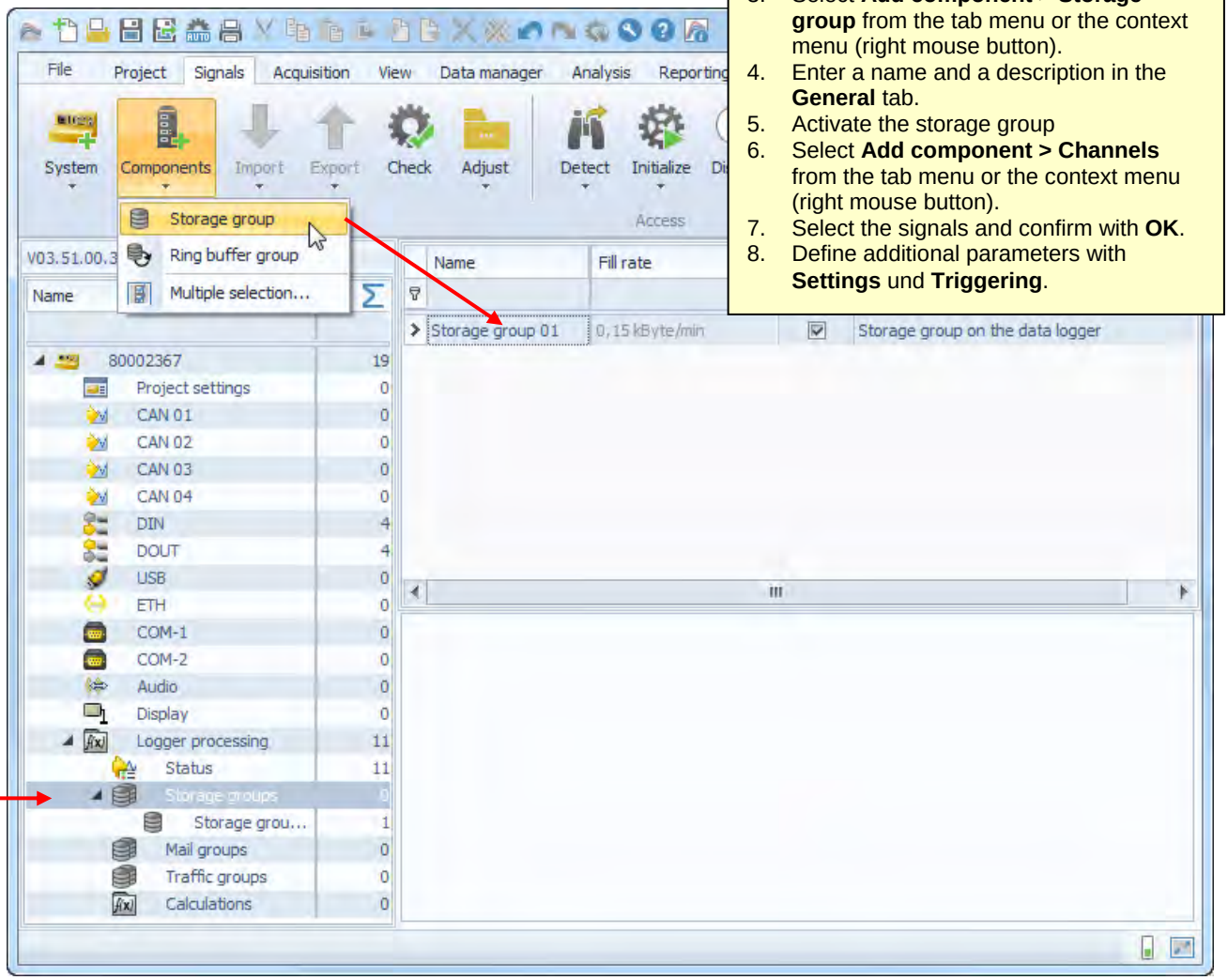
The maximum storage rate of a group is defined by the signal with the highest sampling rate.

The frequency for online calculations corresponds to the highest sampling rate in the calculation.

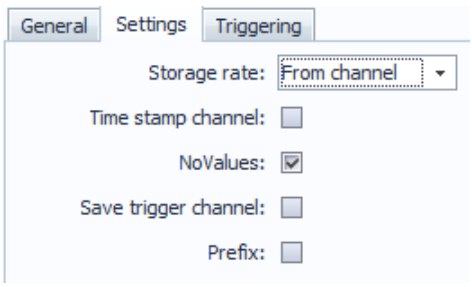
Every storage group can has own trigger conditions (see Triggering). Selected signals can be detected with a high storage rate if required, e.g. in case of a specific event.

6.3.1 Storage group

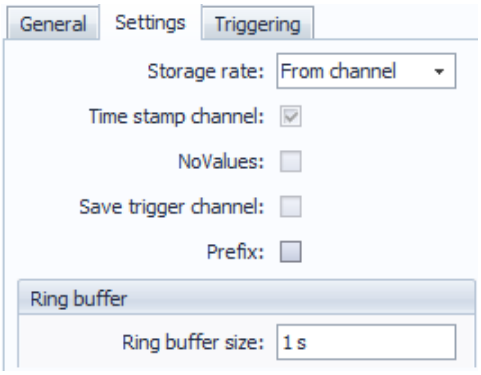
1. Select **Signals** navigation tab.
2. Select **Storage groups**.
3. Select **Add component > Storage group** from the tab menu or the context menu (right mouse button).
4. Enter a name and a description in the **General** tab.
5. Activate the storage group
6. Select **Add component > Channels** from the tab menu or the context menu (right mouse button).
7. Select the signals and confirm with **OK**.
8. Define additional parameters with **Settings** und **Triggering**.



Storage group



Ring buffer group



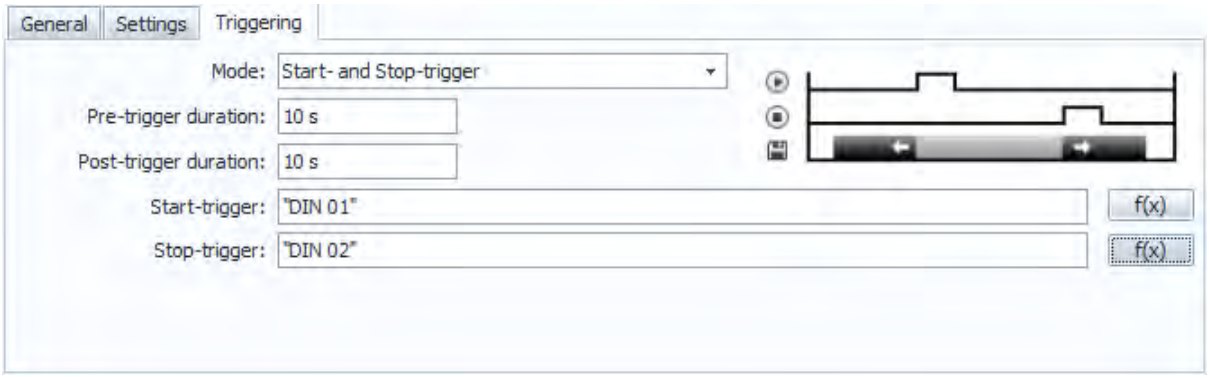
Storage rate Selection of a fixed storage rate or a channel related storage rate (From channel). Using the setting **From channel** means, .the channel with the highest sample rate within the storage group will determine the storage rate.

Time stamp channel The measuring data contain the absolute time channel (logger time).

NoValue	The NoValue between the trigger events, which is defined in the respective channel, is added with **Format**.
Save trigger channel	The trigger status channel is added to the storage group and recorded. This channel contains additional information, which is saved with the single bits in the data set.
Ring buffer size	Defines the size of the ring buffer for measuring. If the max ring buffer size is reached, the memory is overwritten beginning with the oldest data.

Use the ring buffer group to record data, which is only required in case of a specific event, e.g. error case. Define how many data is recorded before and after the event with the pre-trigger and post-trigger. Please note that relevant data can also be overwritten depending on data rate and storage duration!

6.3.2 Trigger settings



Mode	Select the trigger mode from Continuous acquisition (no trigger), Start-trigger, Stop-trigger, Start- and Stop-trigger, Stop as inverted start (see Triggering)
Pre-trigger duration	Data recorded before the trigger event
Post-trigger duration	Data recorded after the trigger event
Start-trigger	Value, which starts the data storage of the respective group.
Stop-trigger	Value, which stops the data storage of the respective group.
Scaling	Triggering the physical value or the raw value of the numerical value calculated with the formula.

Define the triggering conditions as formula from the system signals and calculated signals. You can optimize your data recording with a clever configuration of storage groups and triggering conditions to record signals at a high storage rate only if required. This method reduces the data volume, saves memory, and facilitates the final analysis!

7 Standard functions

7.1 Calculations

TESTdrive supports the online calculation of the signals acquired in the system. The desired calculation is defined with the corresponding software dialog – manually or with the formula editor.

IPEmotion Version 1.03 and PlugIn IPETRONIK-LOG ≥ V03.20 offer a shared formula editor, i.e. the following calculation functions are available in IPEmotion, as well as, in TESTdrive.

Calculations, which are based on each other, must be run in the same cycle rate to get a correct result! If, e.g., the result of a calculation with low cycle rate is used in a calculation with higher cycle rate, a time offset results, which can influence the result according to a signal change (amplitude). In that case, the signal sampling rate of the first calculation must be raised.

The formula editor requires the use of the semicolon ";" instead of the comma "," as variable separator.

If a value within a calculation is "NoValue", the calculation result is "Novalue", too.

7.1.1 Mathematic functions and operations

1 Basic operation				
Operator	**Name**	**Syntax**	**Example**	**Result**
+	Addition	"Temp01" + "Temp02"	15 + 10	25
–	Subtraction	"Temp01" - "Temp02"	15 - 10	5
*****	Multiplication	"Temp01" * "Temp02"	15 * 10	150
/	Division	"Temp01" / "Temp02"	15 / 10	1.5
MOD	Modulo, Division rest	"Temp01" MOD "Temp02"	15 MOD 10	5
ABS( )	Absolute value of a number	ABS("Temp01")	ABS(-15)	15
SIGN( )	Sign of a number	SIGN("Temp01")	SIGN(15) SIGN(0) SIGN(-15)	1 0 -1
NEG( )	Negation of a number	NEG("Temp01")	NEG(15) NEG(-15)	-15 15
(	Begin bracket term	("Temp01" + "Temp02") * 2	(15 + 10) * 2	50
)	End bracket term	("Temp01" - "Temp02") * 2	(15 - 10) * 2	10

2 Power, Square root, Exponential and Logarithm functions				
Function	**Name**	**Syntax**	**Example**	**Result**
^	Power	"Temp01" ^ 2	15 ^ 2	225
SQRT( )	Square root	SQRT("Temp01")	SQRT(25)	5
EXP( )	Exponential function of basis e	EXP("Temp01")	EXP(5)	148.41
LOG( )	Logarithm of basis 10	LOG("Temp01")	LOG(5)	0,4771
LN( )	Logarithm of basis e	LN("Temp01")	LN(5)	1.0986

3 Trigonometric functions, Hyperbola functions		
Function	**Name**	**Range of values in radiant**
SIN( )	Sine	+/-3.99 rad
COS( )	Cosine	+/-3.99 rad
TAN( )	Tangent	+/-3.99 rad
ASIN( )	Arc sine	+/-1.0 rad
ACOS( )	Arc cosine	+/-1.0 rad
ATAN( )	Arc tangent	+/-1.0 rad
SINH( )	Sine Hyperbolicus	+/-1.99 rad
COSH( )	Cosine Hyperbolicus	+/-1.99 rad
TANH( )	Tangent Hyperbolicus	+/-1.99 rad

4 Comparative operations (comparison of variable values)				
Function	**Name**	**Syntax**	**Example**	**Result**
=	Equal	“Temp01“ = “Temp02“	15 = 10 15 = 15	0 1
<>	Unequal	“Temp01“ <> “Temp02“	15 <> 10 15 <> 15	1 0
<	Less than	“Temp01“ < “Temp02“	10 < 15 15 < 15	1 0
>	Greater than	“Temp01“ > “Temp02“	15 > 10 15 > 16	1 0
<=	Less than or equal	“Temp01“ <= “Temp02“	10 <= 15 15 <= 15 20 <= 15	1 1 0
>=	Greater than or equal	“Temp01“ >= “Temp02“	15 >= 10 15 >= 15 15 >= 20	1 1 0
IF(; ;)	If function	IF(“Temp01“ >= “Temp02“; x; y) Query to a specific status. If Occurrence > action 1, otherwise action 2 Example: IF(“Thermo_channel3“ > 30; 1; 0) If Temperature > 30, Result: 1 otherwise 0 Action 1 and 2 can also be calculations.	x = 1; y = 0 “Temp01“ = 15 “Temp02“ = 10 “Temp01“ = 10 “Temp02“ = 15	 1 0

5 Logic operations (comparison of signal states)				
Function	**Name**	**Syntax**	**Example**	**Result**
AND	And	“Temp01“ > “Temp02“ AND “Temp01“ > 10	15 > 5 15 > 10 10 > 5	1 1 0
OR	Or	“Temp01“ > “Temp02“ OR “Temp01“ > 10	15 > 5 10 > 5 10 > 10	1 1 0
XOR	Exclusiv or	“Temp01“ > “Temp02“ XOR “Temp01“ > 10	15 > 5 10 > 5 15 > 15 10 > 10	0 1 1 0
NOT( )	Not	NOT(“Temp01“ > “Temp02“) (inverse state)	15 > 5 15 > 15 5 > 15	0 1 1

6 Boolean operations (bitwise comparison of signal states)				
Function	**Name**	**Description**	**Example**	**Result**
ANDB	And bitwise	Bits which are set in operand1 **and** in operand2 will be set in the result (bit = 1), all others will be not set (bit = 0)	27 ANB 12 11011 ANDB 01100	8 01000
ORB	Or bitwise	Bits which are set in operand1 **or** in operand2 will be set in the result (bit = 1), all others will be not set (bit = 0)	26 ORB 8 11010 ORB 01000 27 ORB 13 11011 ORB 01101	26 11010 31 11111
XORB	Exclusive or bitwise	Bits which are set only in operand1 **or** only in operand2 will be set in the result (bit = 1), all others will be not set (bit = 0)	26 XORB 8 11010 XORB 01000 27 XORB 13 11011 XORB 01101	18 10010 22 10110
NOTB	Not bitwise	Bits which are set in operand1 will be not set in the result (bit = 0), all others will be set (bit = 1)	NOTB 27 NOTB 11011	4 00100

7 Statistic functions				
Function	**Name**	**Syntax , Description**	**Example**	**Result**
MIN( )	Minimum	MIN(“Temp01“)	4 | 12 | 3 | 25 | 17	3
MAX( )	Maximum	MAX(“Temp01“)	4 | 12 | 3 | 25 | 17	25
MEAN( )	Average	Average from all valid values		
MEAN(;)	Average from n values	Average from n valid values		
MINOR(;)	Less value	MINOR(“Temp01“; “Temp02)	4 | 12	4
MAJOR(;)	Greater value	MAJOR(“Temp01“; “Temp02)	4 | 12	12
FLOOR( )	Round integer off	FLOOR(“Temp01“)	13,72	13
CEIL( )	Round integer up	CEIL(“Temp01“)	13,41	14
ROUND( )	Round integer	ROUND(“Temp01“)	13,41 13,72	13 14
LIN(; ; ;)	Linearization	LIN(“Temp01“; x node-1;y node-1; x node-n; y node-n) Runs a linearization with the defined nodes. Between n = 2 and n = 16 nodes can be defined.		

8 Other functions	
Function	**Description**
EDGE_POS( )	Detect positive edge 1 if current value is > 0 and the previous one <= 0
EDGE_NEG( )	Detect negative edge 1 if current value is <= 0 and the previous one > 0

Function	Description	Example	Result
DIFF( )	Runs a differentiation of an operand acc.to: (Opr1(t) – Op1(t-1)) * DeltaT		
INT( )	Calculates the integral of an operand acc. to: "((Op1(t) + Op1(t-1))/2) * DeltaT"		
INT_UP( )	Calculates the upper integral of an operand acc. to: "Op1(t) * DeltaT"		
PREV( )	Outputs the previous value.	PREV(“Temp01“) 4 | 12 | 3 | 25 |	NV | 12 | 3
(„Temp1“ + (PREV („Temp1“)) + (PREV (PREV(„Temp1“)))) / 3	Floating average from the current value and both previous values		
SHL(;)	Shift value bitwise to the left.	1 SHL 2 001 SHL 2	4 100
SHR(;)	Shift value bitwise to the right.	12 SHR 1 1100 SHR 2	6 0110
TESTBIT(;)	Checks the value (0, 1) of the defined bit. If the bit described by operand 2 is set, result = 1, otherwise result = 0 (Counting order starting left hand with 0)	TESTBIT(1101; 3) TESTBIT(1101; 1)	1 0
TESTMASKS(;)	Makes a comparison with a user definable bitmask. If at least one bit is set in operand 1 and also in operand 2, result = 1, otherwise result = 0	TESTMASKS(27, 6) TESTMASKS(27, 4)	1 0
TIME( )	TIME(“Temp01“) A counter that adds the time intervalls of the corresponding sample rate continuously and outputs the sum as long as the operator's value is >= 0.5 In case the operator's value is < 0.5, the counter is reseted and 0 is output.		
TIMER(;)	If no new value is received from the channel defined as Parameter1 within the timeout (Parameter2 in seconds), the output value is '1'.		
VALID( )	Check for validity 1 if value is unequal to NoValue, 0 if value is NoValue		
VALID(x; y)	Avoid Novalues x if value is unequal to NoValue, y if value is NoValue		

7.1.2 Constants

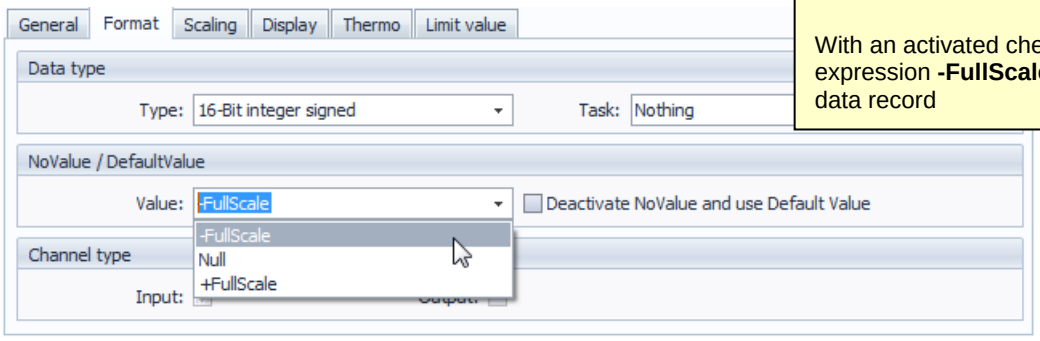
9 Constants	
Constant	**Description**
PI	Pi > π = 3.141592654 ...
SYSTEMRATE	TESTdrive internally works with a fix system rate. This rate depends on the configuration (Channel with highest sampling rate) and can be used for calculations. The system rate can be compared with the timer ticks of a PC clock and is set in Hz. The system rate relates to the working frequency of the PC/Notebook (= Frequency of the High-Performance-Counter).
SYSTEMTIME	Reciprocal value of the system rate (=1/SYSTEMRATE) and is set in seconds. Please note at using a system rate in the MHz range that the system time can only be correctly displayed if sufficient decimals have been defined and Automatic has been selected in Display > Formatting.
SAMPLERATE	Channel sample rate in Hz
SAMPLETIME	Channel acquisition intervall in 1/s

7.1.3 NoValue control

A NoValue alarm can be activated for every signal within the **Format** tab.

Example:
Signal scaling 8 Bit integer signed
Range -128 ... 0 ... 127
NoValue setting = -FullScale
With a signal value of **-128** the expression **NoValue** will be written to the data record.

With an activated check box, the expression **-FullScale** will be written to the data record

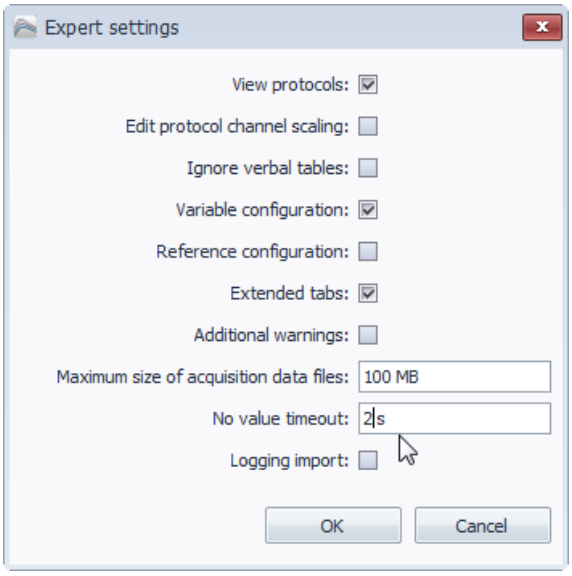


The timeout setting is defined at:

IPEmotion Options > **Basic settings** > **Expert mode** > **Expert settings**

If the timeout expires without any signal value, the entry NoValue resp. the selected standard value ist output for display and data record. A status message is written to the log file.

If a M-VIEWvga is used, this message must be confirmed.



7.1.4 Calculation examples

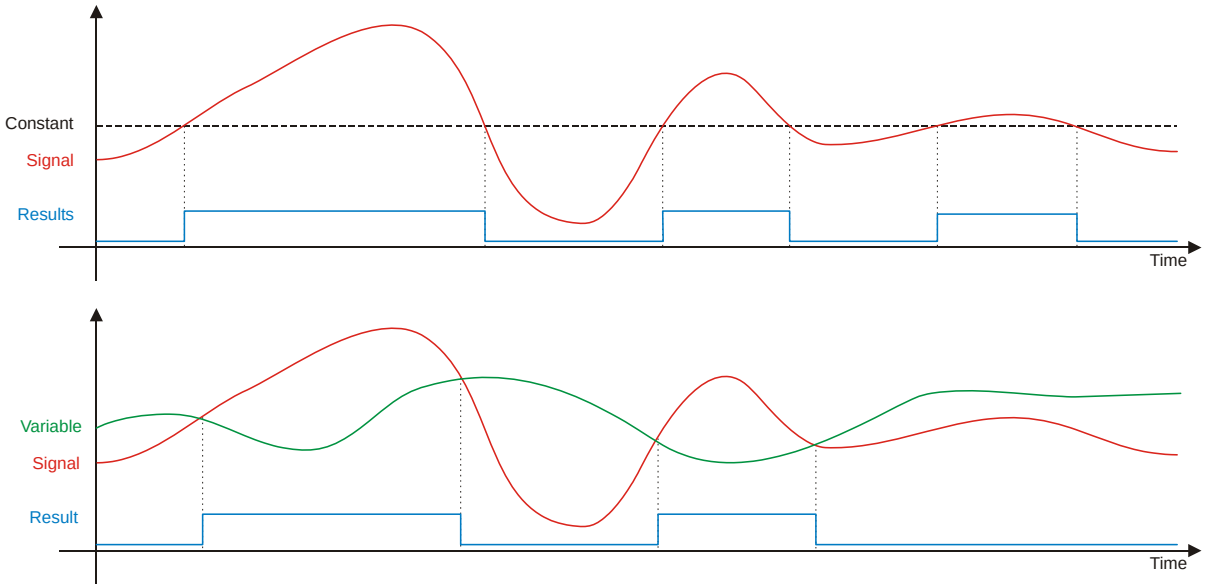
Greater comparison „>“

Syntax **>**

Description Compares the current value (of a channel or a calculation) with a user defined constant or variable. The result is 1, as long as the comparison is true, otherwise the result is 0 (for a false comparison).

Example „Channel01“ > 2 *Comparison with a constant*

„Channel01“ > „Channel02“ *Comparison with a variable*



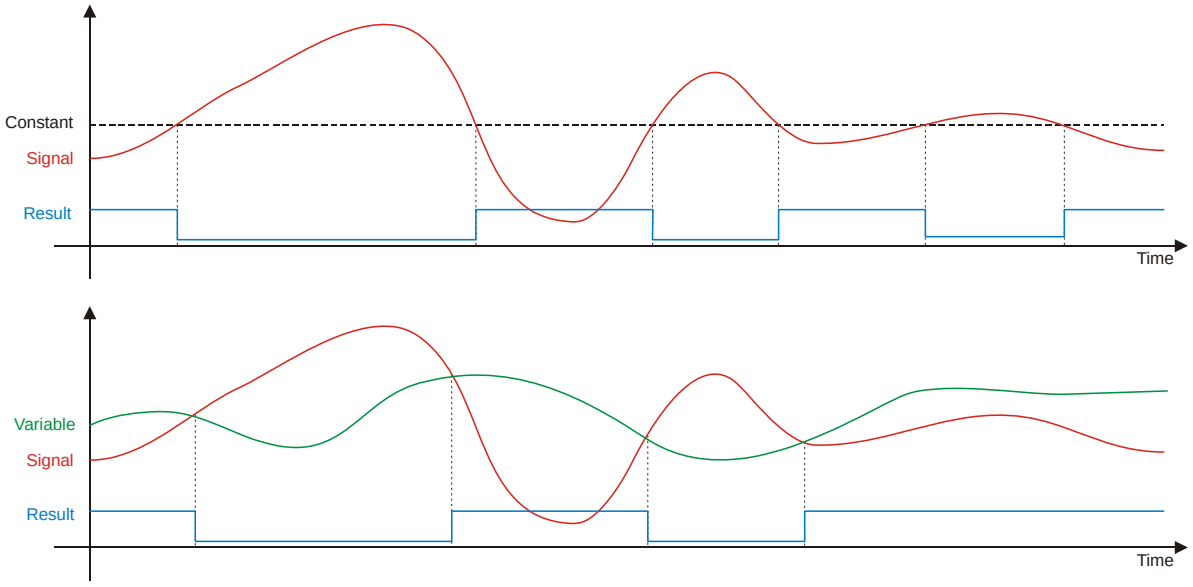
Less comparison „<“

Syntax **<**

Description Compares the current value (of a channel or a calculation) with a user defined constant or variable. The result is 1, as long as the comparison is true, otherwise the result is 0 (for a false comparison).

Example „Channel01“ < 2 *Comparison with a constant*

„Channel01“ < „Channel02“ *Comparison with a variable*



Counter (without reset)

Syntax **„Counter01“ + x**
VALID(“Counter01”; 0) + x

Description Counts continuously with the current sample rate, i.e. the counter value is increased by x with each sample. The rise of the counter slope depends on the currently configured sampling rate and the counter step. A measurement stop resets the counter to 0.

Example
„Counter01“ = „Counter01“ + 1 *Accumulates 1 with each sample*
„Counter01“ = „Counter01“ + 10 *Accumulates 10 with each sample*

Tip Used with TESTdrive (logger application) this recursive formula will result in valid values as the initial value for variables is set automatically. Used with IPEmotion (Acquisition > Calculations > Formulas) the respective formula has to be completed with the Valid function:
„Counter01“ = VALID(„Counter01“; 0) + 1
The Valid function sets the initial counter value to a defined value (here 0) in case the current value is invalid.

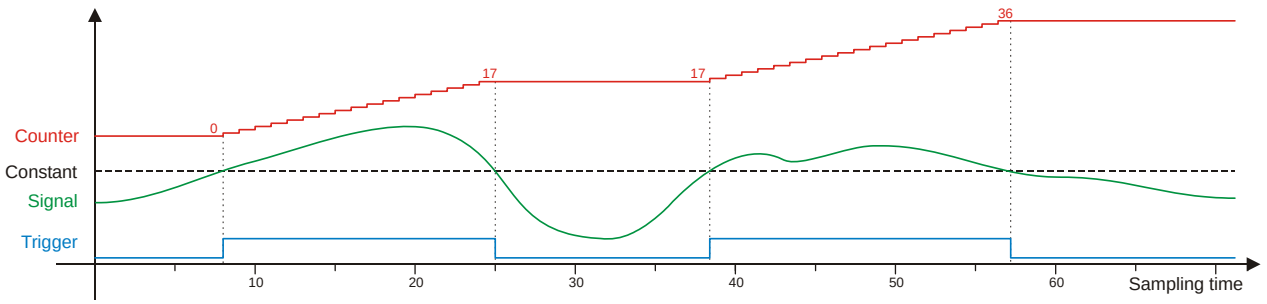
Counter with counting condition

Syntax **IF(“Channel01” > x; „Counter01“ + y; „Counter01“)**
IF(“Channel01” > x; VALID(“Counter01”; 0) + y; VALID(“Counter01”; 0))

Description Counts continuously with the current sample rate, as long as, the current value of "Channel01" is greater than x. The counter value is increased by y with each sample, as long as "Channel01" fulfills the condition. Otherwise the counter remains unchanged. As son as the condition is fulfilled again, the counter continues with the previous value. The rise of the counter slope depends on the currently configured sampling rate and the counter step.
A measurement stop resets the counter to 0.

Beispiel „Counter01“ = IF(“Channel01” > 5; "Counter01“ + 1; „Counter01“)
Accumulates 1 with each sample as long as "Channel01“ is greater than 5.
Stop counting and holding the latest value, as soon as „Channel01“ is less than 5.

Tip Used with TESTdrive (logger application) this recursive formula will result in valid values as the initial value for variables is set automatically. Used with IPEmotion (Acquisition > Calculations > Formulas) the respective formula has to be completed with the Valid function.



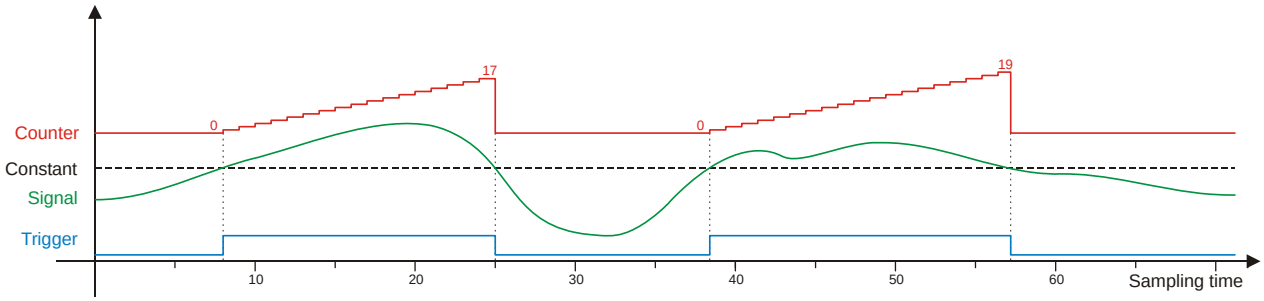
Counter with counting condition and reset

Syntax **IF(“Channel01” > x; „Counter01“ + y; 0)**
IF(“Channel01” > x; VALID(“Counter01”; 0) + y; 0)

Description Counts continuously with the current sample rate, as long as, the current value of "Channel01" is greater than x. The counter value is increased by y with each sample, as long as "Channel01" fulfills the condition. Otherwise the counter will be reset to 0. As son as the condition is fulfilled again, the counter restarts with 0. The rise of the counter slope depends on the currently configured sampling rate and the counter step.
A measurement stop resets the counter to 0.

Beispiel „Counter01“ = IF(“Channel01” > 5; „Counter01“ + 1; 0)
Accumulates 1 with each sample as long as "Channel01“ is greater than 5.
Stop counting and reset to 0, as soon as „Channel01“ is less than 5.

Tip Used with TESTdrive (logger application) this recursive formula will result in valid values as the initial value for variables is set automatically. Used with IPEmotion (Acquisition > Calculations > Formulas) the respective formula has to be completed with the Valid function.



Validation check „VALID“

Syntax **VALID(x)**
VALID(x;y)

Description VALID checks the current value (of a channel or a calculation) for validity, i.e. if the variable's status is „invalid“ (NoValue).
With the VALID(x) function the result is1, as long as x is valid and changes to 0, as soon as the x has the status NoValue.
With the VALID(x;y) function the result is x as long as x is a valid value. As soon as x will be an invalid value (NoValue) the result changes to y. In case y is a variable (instead of a constant) the result of VALID(x,y) will be NoValue, as soon as x, as well as, y are an invalid value.

Example VALID(„Channel01“) *1 if „Channel01“ ≠ NoValue, 0 if „Channel01“ = NoValue*
VALID(„Channel01“;4) *„Channel01“ if „Channel01“ ≠ NoValue, 4 if „Channel01“ = NoValue*

Tip When using a measurement value within a recursive formula (x = x + y) we recommend to use the VALID(x; y) function in order to avoid invalid values (NoValue). Even if the measurement signal becomes valid values, the recursive formula will not be calculated correctly, once a NoValue occurred.
We recommend to use the VALID(x; y) function for any signal which serves as a trigger for a storage group. An invalid trigger signal could prevent the start of the data storage even if the trigger signal will become temporarily valid.

Mean value (averaging) „MEAN“

Syntax **MEAN(x)**
MEAN(x; n)

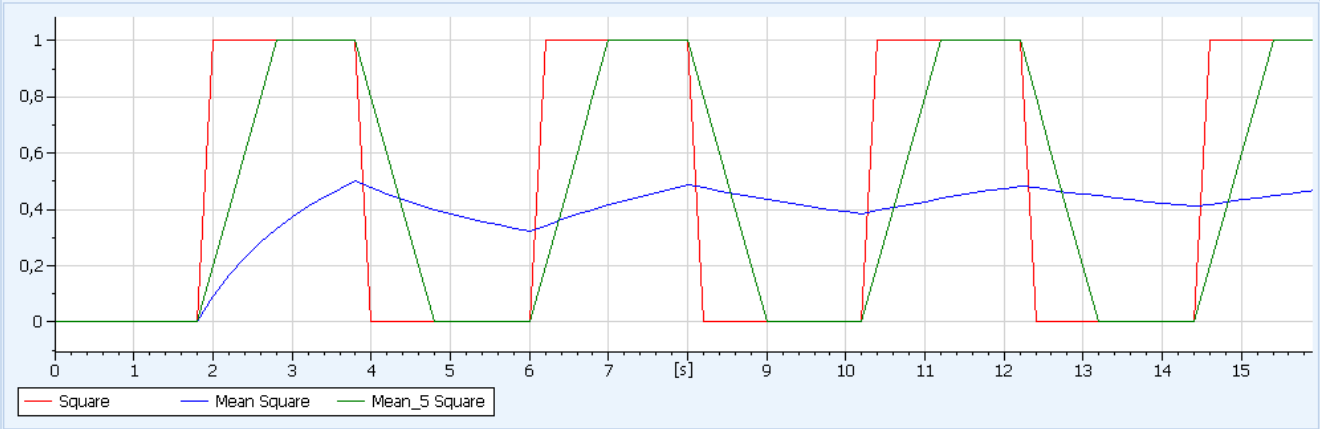
Description MEAN(x) continuously calculates the moving average from all valid measurement values.
MEAN(x; n) berechnet continuously calculates the moving average from n previous measurement values.

Example

MEAN(„Channel01“)	moving average from all values of a measurement
MEAN(„Channel01“; 10)	moving average from 10 values at a time

Tip The diagram shows the differences of the MEAN functions with a rectangle signal (clock 5 Hz)

Square	red	origin signal
Mean Square	blue	moving average
Mean_5 Square	green	moving average from 10 values at a time



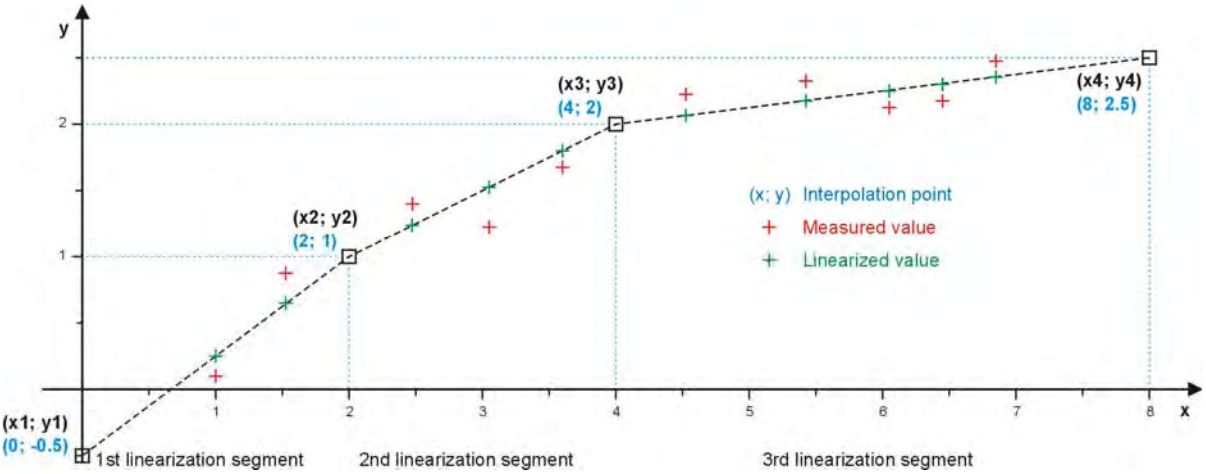
Linearization „LIN“

Syntax **LIN(Operand; x-Node01; y-Node01; x-Node02; y-Node02)**

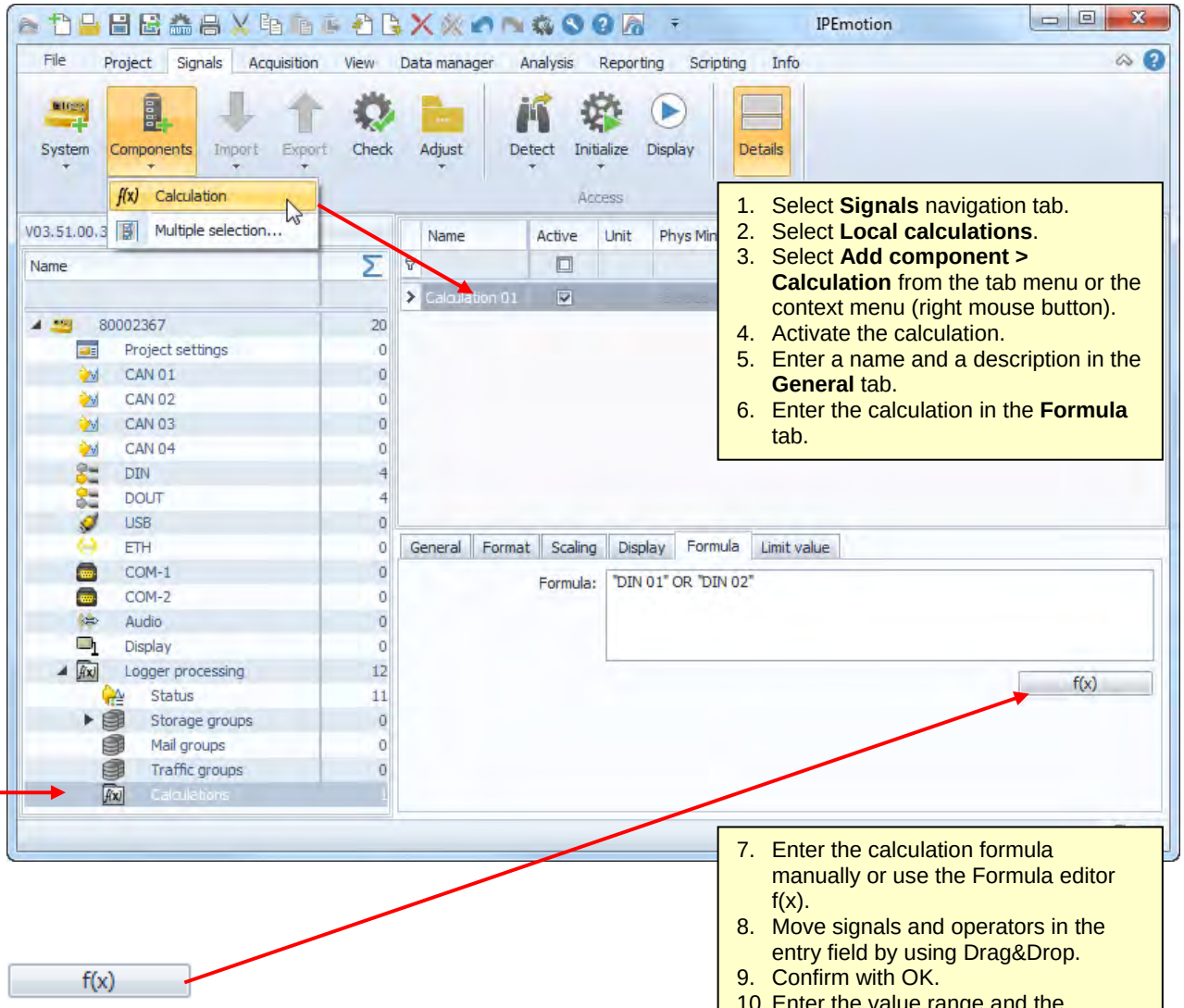
Description Runs a linearization with user defined nodes. Between n = 2 and n = 16 nodes can be defined. The scaled values (Y-axis) are calculated from the original measurement values (X-axis) using factor and offset of the partial linear slope between two nodes.

Example LIN(„Channel01“; 0;-0,5; 2;1; 4;2; 8;2,5)

Tip The linearization enables a non-linear scaling (multipart scaling) used for physical graphs without having a mathematical equation.
Using this multipart scaling an approximation of a mathematical equation is more precise as more nodes are used.



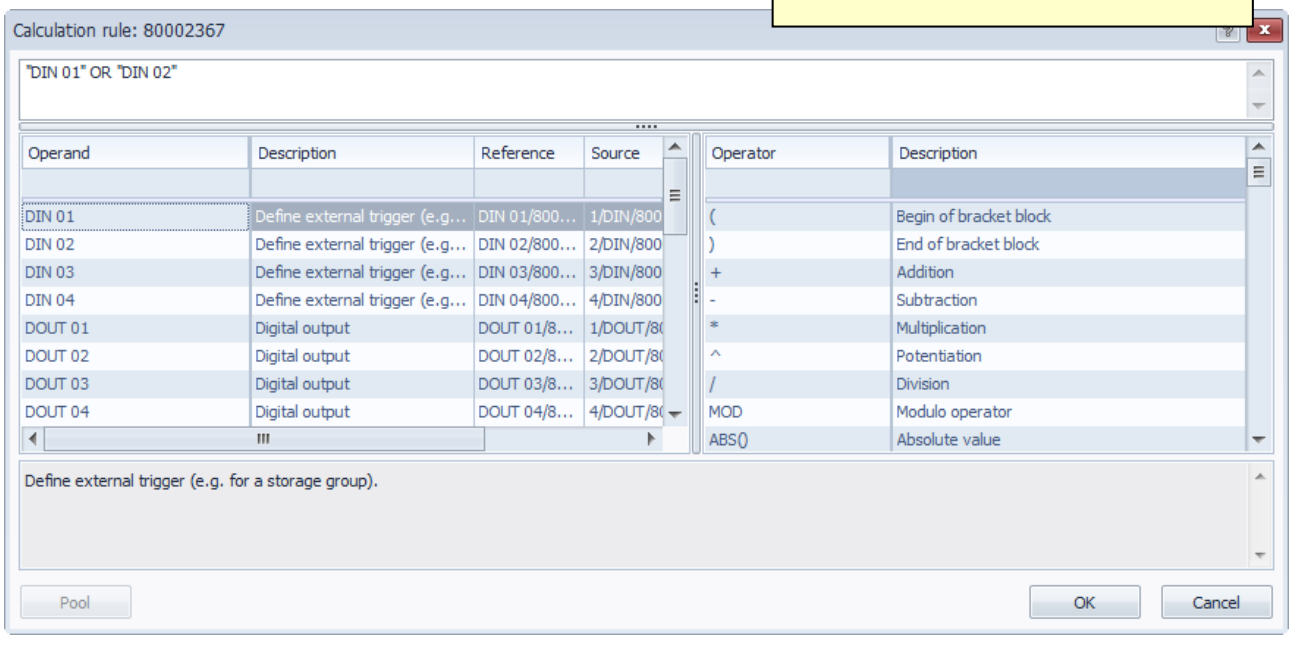
7.1.5 Local calculation



1. Select **Signals** navigation tab.
2. Select **Local calculations**.
3. Select **Add component > Calculation** from the tab menu or the context menu (right mouse button).
4. Activate the calculation.
5. Enter a name and a description in the **General** tab.
6. Enter the calculation in the **Formula** tab.

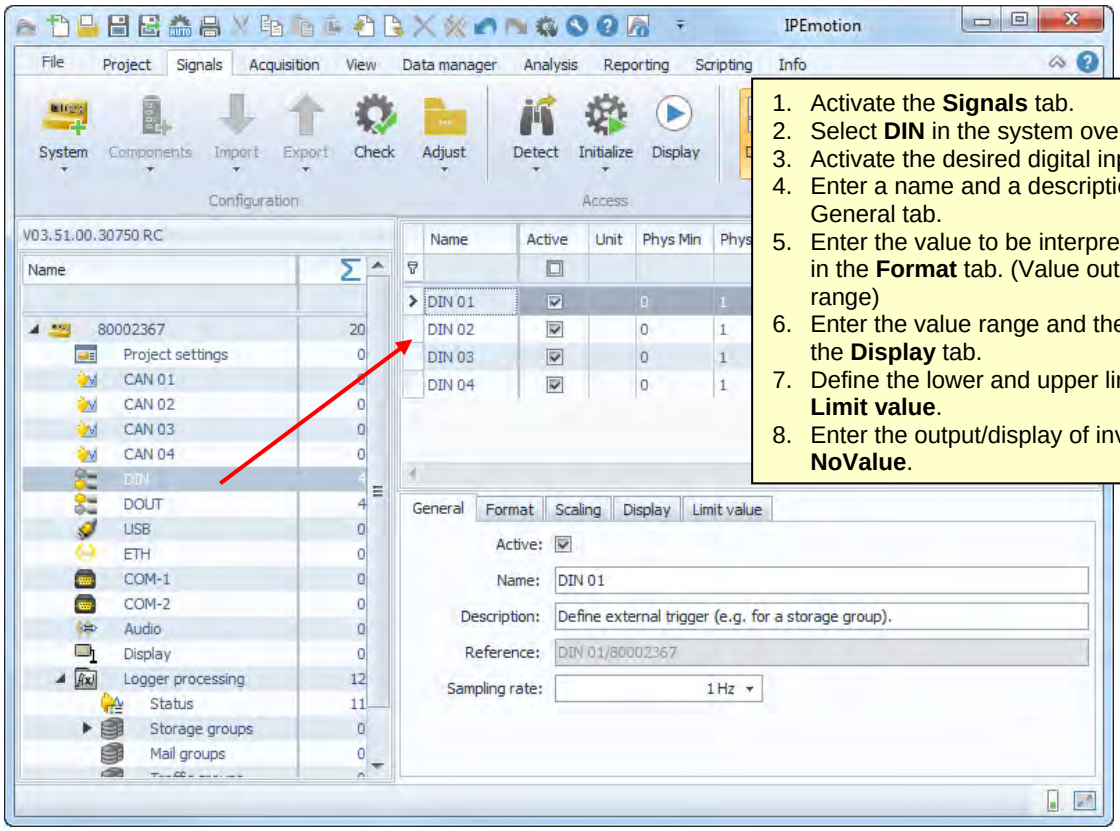
f(x)

7. Enter the calculation formula manually or use the Formula editor f(x).
8. Move signals and operators in the entry field by using Drag&Drop.
9. Confirm with OK.
10. Enter the value range and the decimals in the Display tab.
11. Define additional limit values and/or a NoValue.



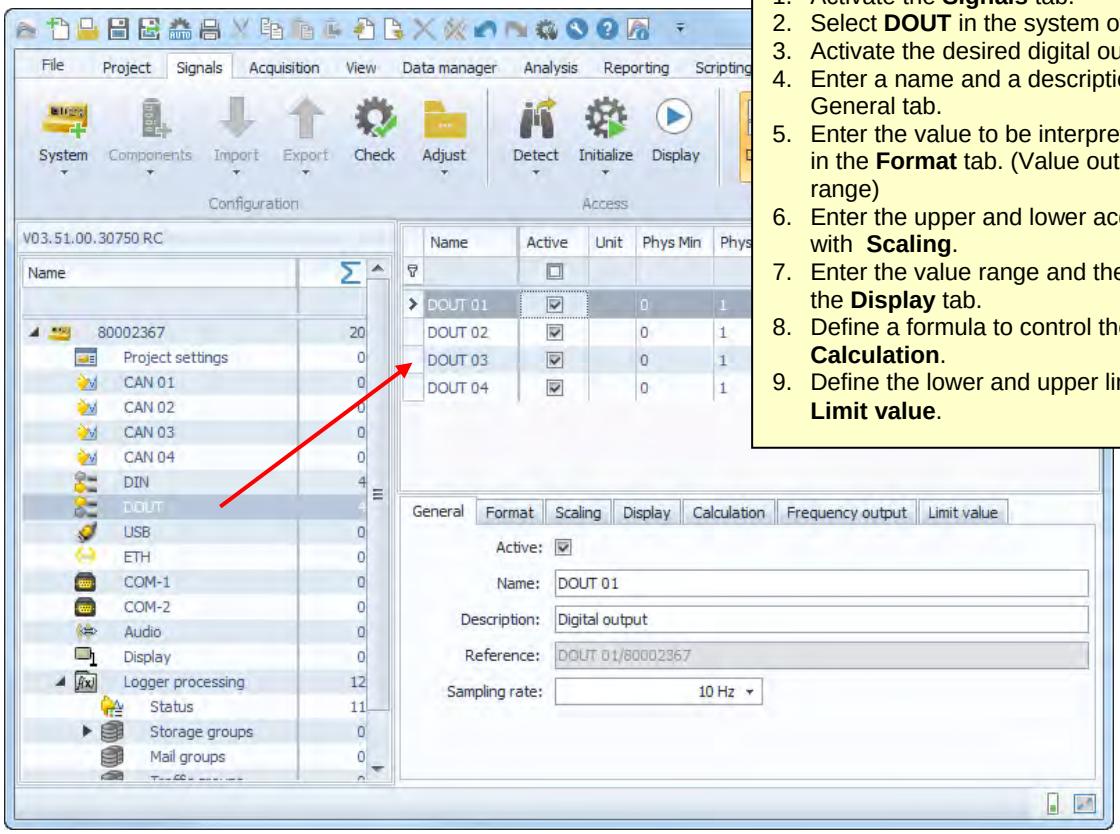
7.2 Digital inputs and outputs

7.2.1 Digital inputs



1. Activate the **Signals** tab.
2. Select **DIN** in the system overview.
3. Activate the desired digital inputs.
4. Enter a name and a description in the General tab.
5. Enter the value to be interpreted as NoValue in the **Format** tab. (Value out of the valid range)
6. Enter the value range and the decimals in the **Display** tab.
7. Define the lower and upper limit value with **Limit value**.
8. Enter the output/display of invalid value with **NoValue**.

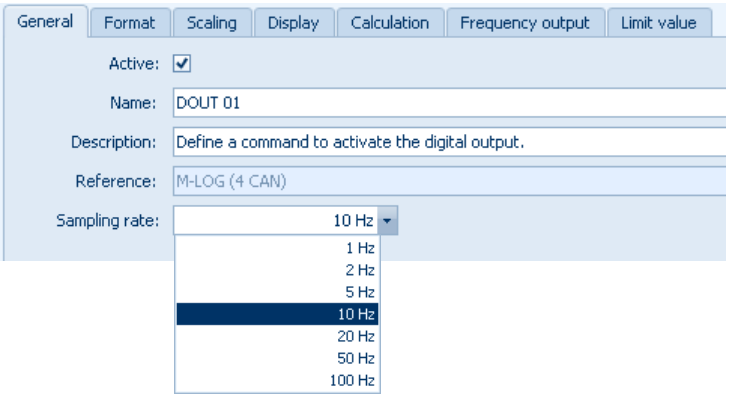
7.2.2 Digital outputs



1. Activate the **Signals** tab.
2. Select **DOUT** in the system overview.
3. Activate the desired digital outputs.
4. Enter a name and a description in the General tab.
5. Enter the value to be interpreted as NoValue in the **Format** tab. (Value out of the valid range)
6. Enter the upper and lower acquisition range with **Scaling**.
7. Enter the value range and the decimals in the **Display** tab.
8. Define a formula to control the output with **Calculation**.
9. Define the lower and upper limit value with **Limit value**.

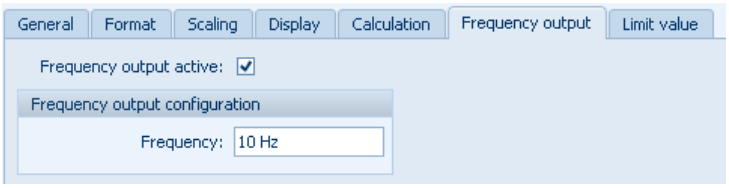
Sampling rate DOUT

The logger's digital outputs (DOUT) support a definable sampling rate (cycle rate) of up to 100 Hz.



Frequency output DOUT

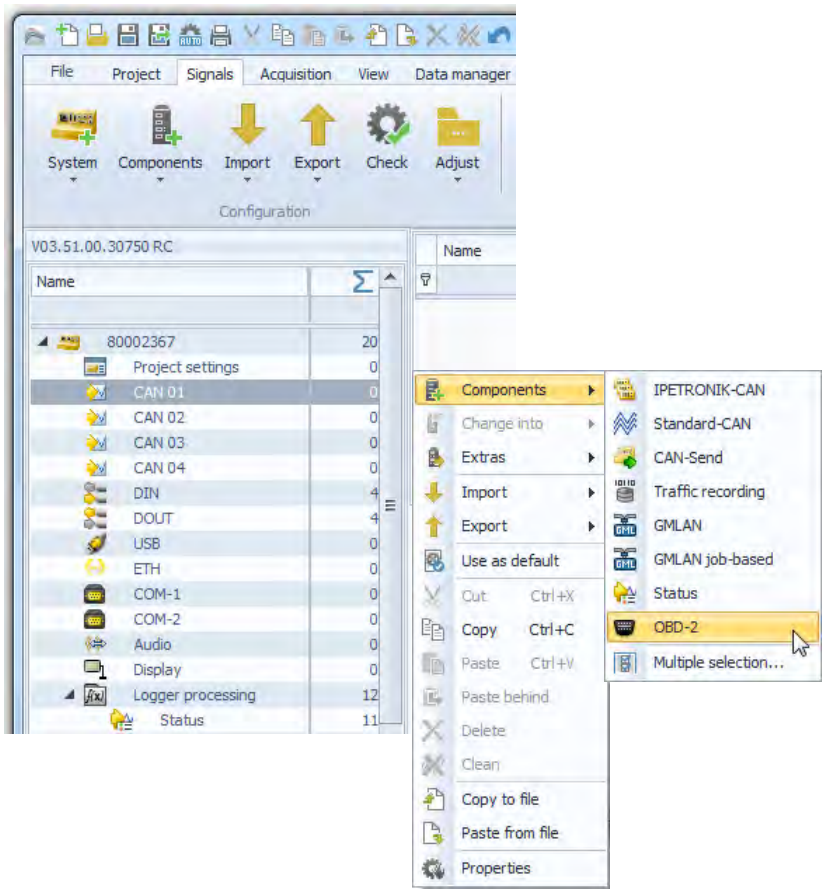
If the frequency output is activated, a square wave voltage is sent. The signal frequency can be configured.



7.3 OBD-2 measurement

With releases of the PlugIn IPETRONIK-LOG / TESTdrive ≥ V03.22 data acquisition using the OBD2 standard (CAN bus) supported.

The OBD-II international standard details a list of 96 predefined signals and measurement parameters which makes it easy to acquire provided operating data by a data acquisition system. This standard is mandatory for petrol engine cars since 2001 respective diesel engine cars since 2003 and trucks since 2005.



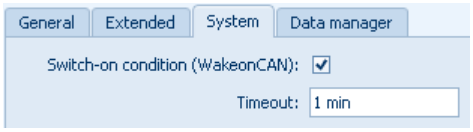
7.4 WakeOnCAN

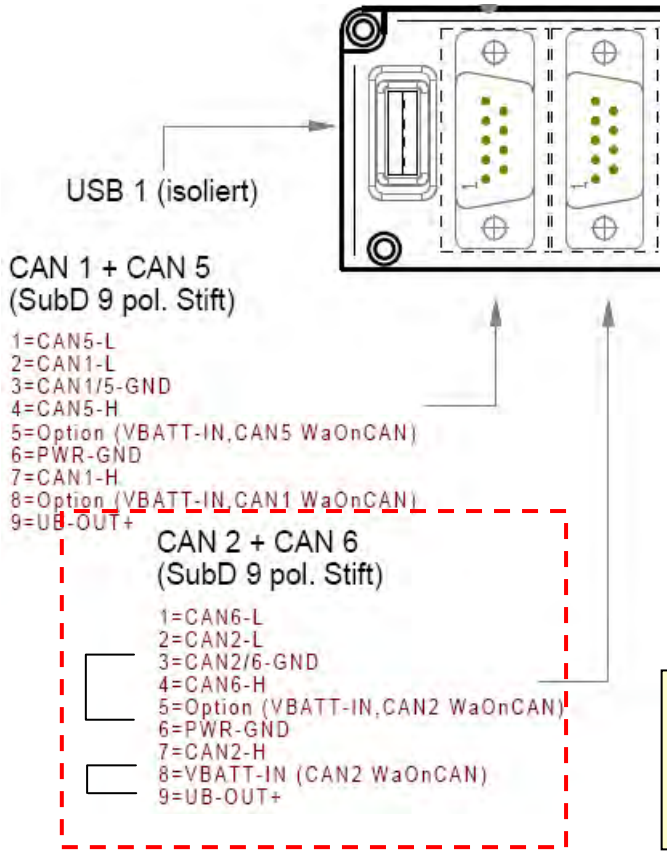
The WakeOnCAN function switches the logger on as soon as the respective CAN bus is active, i.e. when messages are transferred.

7.4.1 ON via WakeOnCAN, OFF via Ignition 15

If there is no **Switch-off time** configured, the remote signal (e.g. terminal 15) must be active within the set timeout to permanently switch-on the logger. The logger is turned off if the remote signal is not received after the timeout. The logger stays in operation mode as long as the remote signal is high. As soon as remote is low, the **Follow-up time** will start and the logger is switched-off when datat postprocessing is finished.

Bridge	Pin 3 (CAN2/6-GND)	→	Pin 6 (PWR-GND)
Bridge	Pin 8 (WaOnCAN)	→	Pin 9 (UB-OUT+)

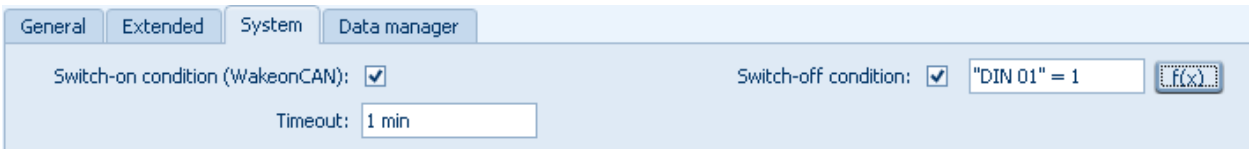




Depending on the CAN card/Port replicator, the WakeOnCAN function supports
- **only at CAN 2,**
- **at CAN 2 and CAN 3**
- **at all CAN inputs (special version)!**

7.4.2 ON via WakeOnCAN, OFF via Switch-off condition

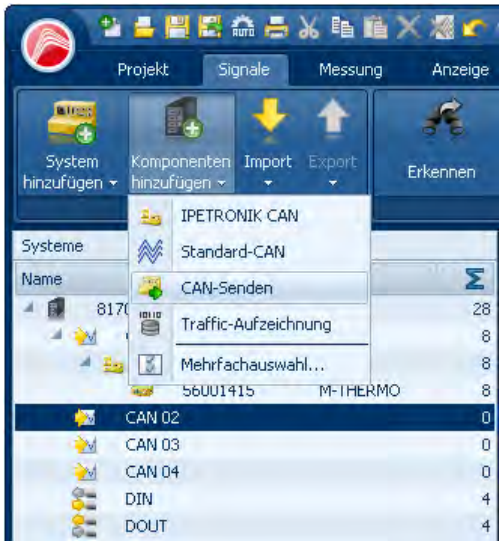
With a configured Switch-off condition the Timeout setting has no influence. The logger stays in operation mode as long as the Switch-off condition is false.



If a temporary remote signal (duration > 1 s) is identified in this mode, the Follow-up time starts with the falling signal edge and the logger is switched off (when postprocessing is finished), even with a false Switch-off condition.

7.5 Output signals via CAN

Status signals



Status signals can be used in one configuration in the same way as measuring channels. Status signals can be added, e.g., into calculations, triggers or storage groups.

Requirement: CAN board with FPGA version > 1.04.00

CAN Send

A CAN input in a logger configuration can be used to send CAN data.

Any data can be sent (also values from calculations or status signals). The information about the signals to be sent can be exported with CANdb.

At least one CAN participant must be connected to the CAN interface to transfer data to the CAN. If this is not the case, TESTdrive sends the following error:

```
E Error sending CAN message in CANSendWorkStation. Counter = 1
```

Options

Start CAN ID:

Enter a start ID. The first signal uses this CAN ID, any further signal gets an ID raised by one. If the sending counter is activated, it is ouput at the start ID.

- TESTdrive 3.11 supports maximum one channel (=signal) per ID.
- With TESTdrive 3.13 several channels can be assigned to one ID.
- It won't be possible to define one ID for a specific channel.
- It is possible to use Extended ID.

Send rate:

It is possible to define the send rate.

The following settings are permitted: 0.5/ 1/ 2/ 5/ 10/ 20/ 50/ 100 Hz

If the send rate is greater than or equal to the source channel rate, the following message is written into the TESTdrive3 log file:

```
D ERROR in CCANSendWorkStation::Put() Fifo full!
```

Send counter:

If the send counter is activated, a 32 bit value beginning from 0 is incremented for every send cycle and output at the start ID. All channels are moved for one ID.

Example:

Start ID = 256

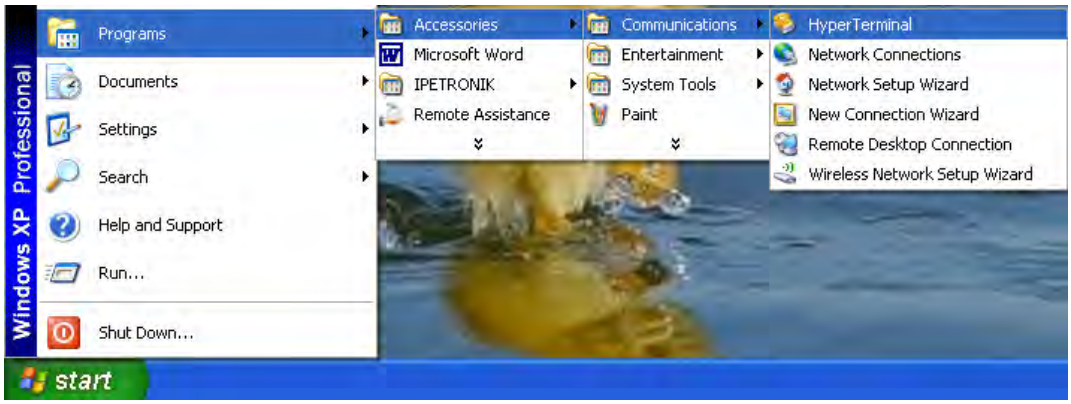
Name	**-- ID --**	**Value**
1st cycle:		
Send counter	-- 256 --	0
Channel_1	-- 257 --	0.01
Channel_2	-- 258 --	0.08
2nd cycle:		
Send counter	-- 256 --	1
Channel_1	-- 257 --	0.12
Channel_2	-- 258 --	0.23

7.6 Log file output via Hyperterminal

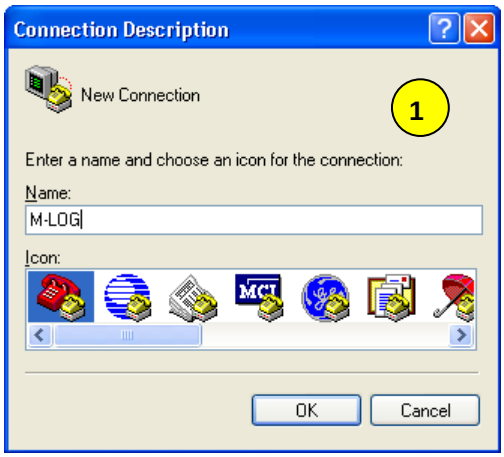
The logger status messages can be displayed online with a RS232 PC or notebook connection. The MLOG.ht file is copied into the following directory:

C:\Documents and Settings\[user]\Startmenu\Programs\Accessories\Communikation\ HyperTerminal\....

Prior to this, a hyperterminal connection must be created.



Or create a new hyperterminal connection:



The following components are required for the connection of M-LOG and PC:

for PCs with serial interface:

1 x USB to RS232 converter

1 x Null modem cable

1 x Gender Changer

for PCs without serial interface:

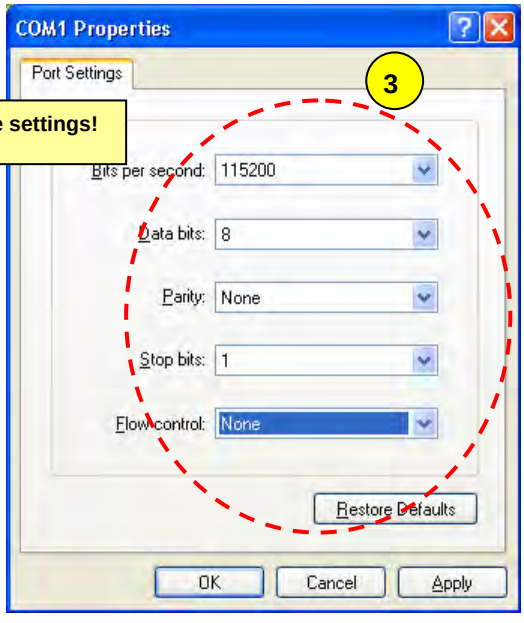
2 x USB to RS232 converter

1 x Null modem cable

1 x Gender Changer

The components for PCs without serial interface are available as an optional package (M-LOG-OPT-086).

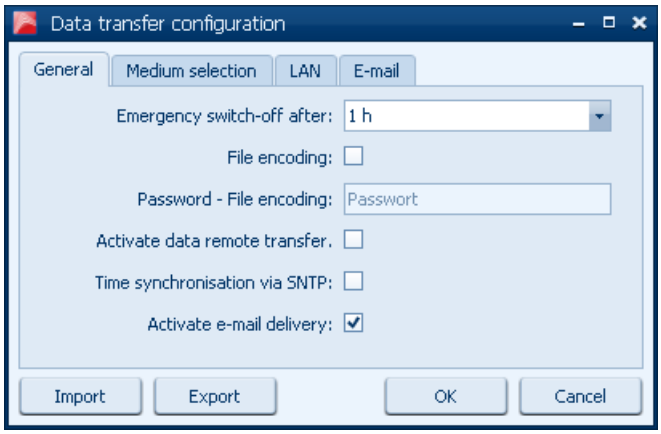
Apply these settings!



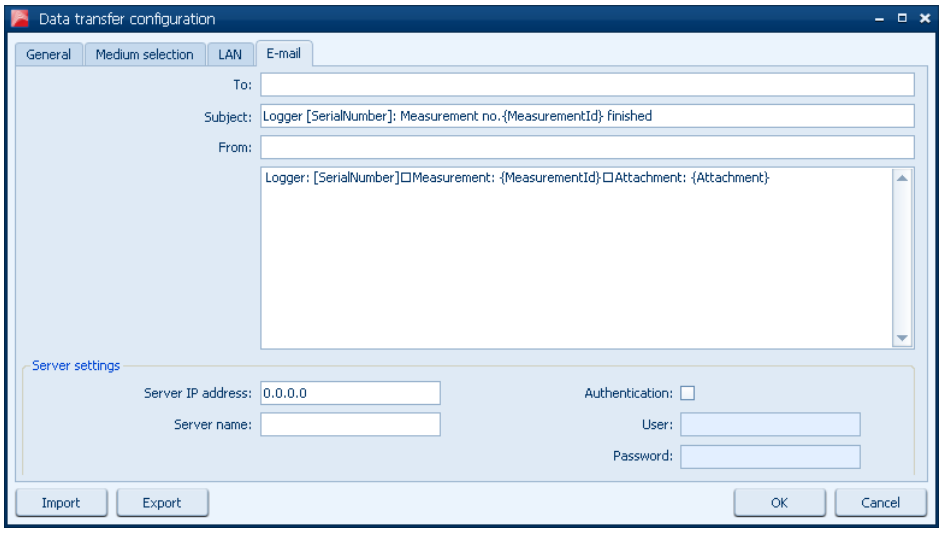
7.7 Send e-mail with status information

If this function is activated and the logger has an internet connection (LAN, WiFi, modem), it sends a status e-mail after acquisition stop with the following content:

- serial number and number of the current acquisition in subject line
- attached log file
- attached measurement status file if activated
- attached STG file (Min-Max list) if activated



1. Select the logger in system overview.
2. Activate the **Data management** tab.
3. Activate the **Update connection parameters > Configuration** to change the settings for data transfer configuration.
4. Select **Activate e-mail delivery**.
5. Define the corresponding setting in the **E-Mail** tab.



To	E-mail address of recipient
Subject	Subject line for serial number and mesaurement number file
From	E-mail address of sender (any text)
Description field	Description of serial number, measurement file number and attachement
Server IP address	IPE address of outgoing mail server (to e-mail account, e.g. smtp.mail.proivder.com) for sending
Server name	Alternative input of server name of outgoing mail server
Authentication	Access authorization to user e-mail account
User	User name
Password	Password

7.8 Output messages to CAN / LIN

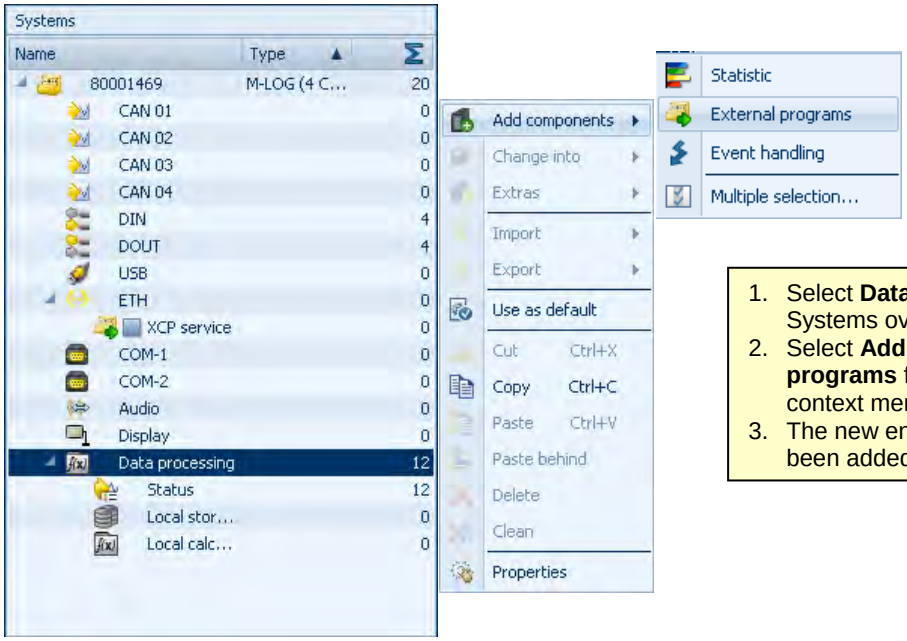
With the Logger PlugIn V03.21.00 / TESTdrive 3.21 and higher an output of user defined messages to CAN bus or LIN bus is supported.

The output timing can be selected from:
- one-time, at start measurement,
- one-time, at stop measurement,
- cyclical every x ms.

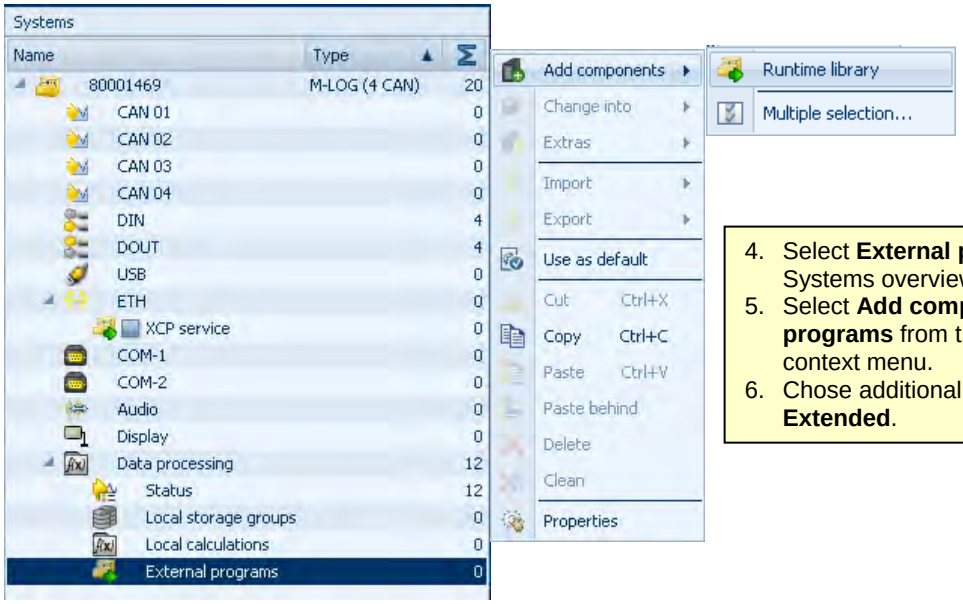
An external file with the *.DAT extension is used to configure the settings for the messages.
A sample file is available from:
c:\Programs\IPETRONIK\IPEmotion PlugIn IPETRONIK LOG V03.xx.xx\Data\Channel.dat

The header of this files contains detailed information regarding to the usage of the parameters.

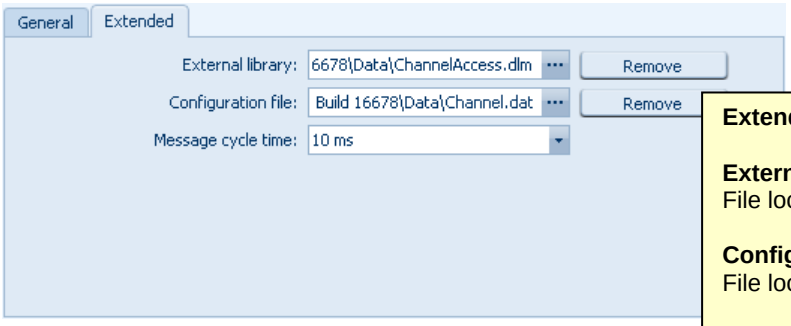
The screenshots below show the implementation of the external file in IPEmotion configuration.



1. Select **Data processing** in the left Systems overview.
2. Select **Add components** > **External programs** from the tab menu or from the context menu.
3. The new entry **External programs** has been added to **Data processing**.



4. Select **External programs** in the left Systems overview.
5. Select **Add components** > **External programs** from the tab menu or from the context menu.
6. Chose additional settings in the tab **Extended**.



Extended (Runtime library)

External library
File location of the external application (DLM)

Configuration file
File location of the configuration (DAT)

Message cycle time
Ouput rate of the message (repetition rate)

Example Offset adjust for IPETRONIK modules connected to the logger's CAN input

The message output feature offers the possibility to broadcast an offset adjust command to IPETRONIK CAN modules with adjust function.

The sample file **OffAddStart.dat** contains the adjust commands for task Manual and Group 1-4.
The sample shows a manual adjust on CAN 01 with a baud rate of 500 kBit/s, executed with a time delay of 2.5 seconds from start measurement.

Brief description of the parameters (see header of the sample Channel.dat for detailed settings):

// Hardware initialization **<---Basic setting of CAN/LIN input**

[Init]

// Channel,	ChnType,	ChnIndex,	ChnMode,	Baudrate
CAN0,	1,	0,	1,	500000

<------ChnType LIN=2 /CAN=1, ChnIndex Nr 0...11=Input , ChnMode 29Bit=2 11Bit=1 / Baud rate

// List of messages (send/receive)
[Messages]
// Name, ID, Length Bytes **<------ ID CAN/LIN -ID; Length= Number of bytes; Bytes = Message**
//

Manuell_1,	0x0, 8,	0x00, 0x91, 0x02, 0xCA, 0x3F, 0x00, 0x80, 0x80	**<----Manual**
Manuell_2,	0x0, 8,	0x00, 0x91, 0x02, 0xCA, 0x3F, 0x00, 0xC0, 0x81	
Manuell_3,	0x0, 8,	0x00, 0x91, 0x02, 0xCA, 0x3F, 0x00, 0x40, 0x8C	
Manuell_4,	0x0, 8,	0x00, 0x91, 0x02, 0xCA, 0x3F, 0x00, 0xC0, 0x8D	
Manuell_5,	0x0, 8,	0x00, 0x91, 0x02, 0xCA, 0x3F, 0x00, 0x00, 0x8E	
Group1_1,	0x0, 8,	0x00, 0x91, 0x02, 0xC5, 0x3F, 0x00, 0x80, 0x80	**<-----Group 1**
Group1_2,	0x0, 8,	0x00, 0x91, 0x02, 0xC5, 0x3F, 0x00, 0xC0, 0x81	
Group1_3,	0x0, 8,	0x00, 0x91, 0x02, 0xC5, 0x3F, 0x00, 0x40, 0x8C	
Group1_4,	0x0, 8,	0x00, 0x91, 0x02, 0xC5, 0x3F, 0x00, 0xC0, 0x8D	
Group1_5,	0x0, 8,	0x00, 0x91, 0x02, 0xC5, 0x3F, 0x00, 0x00, 0x8E	
Group2_1,	0x0, 8,	0x00, 0x91, 0x02, 0xC6, 0x3F, 0x00, 0x80, 0x80	**<-----Group 2**
Group2_2,	0x0, 8,	0x00, 0x91, 0x02, 0xC6, 0x3F, 0x00, 0xC0, 0x81	
Group2_3,	0x0, 8,	0x00, 0x91, 0x02, 0xC6, 0x3F, 0x00, 0x40, 0x8C	
Group2_4,	0x0, 8,	0x00, 0x91, 0x02, 0xC6, 0x3F, 0x00, 0xC0, 0x8D	
Group2_5,	0x0, 8,	0x00, 0x91, 0x02, 0xC6, 0x3F, 0x00, 0x00, 0x8E	
Group3_1,	0x0, 8,	0x00, 0x91, 0x02, 0xC7, 0x3F, 0x00, 0x80, 0x80	**<-----Group 3**
Group3_2,	0x0, 8,	0x00, 0x91, 0x02, 0xC7, 0x3F, 0x00, 0xC0, 0x81	
Group3_3,	0x0, 8,	0x00, 0x91, 0x02, 0xC7, 0x3F, 0x00, 0x40, 0x8C	
Group3_4,	0x0, 8,	0x00, 0x91, 0x02, 0xC7, 0x3F, 0x00, 0xC0, 0x8D	
Group3_5,	0x0, 8,	0x00, 0x91, 0x02, 0xC7, 0x3F, 0x00, 0x00, 0x8E	
Group4_1,	0x0, 8,	0x00, 0x91, 0x02, 0xC8, 0x3F, 0x00, 0x80, 0x80	**<-----Group 4**
Group4_2,	0x0, 8,	0x00, 0x91, 0x02, 0xC8, 0x3F, 0x00, 0xC0, 0x81	
Group4_3,	0x0, 8,	0x00, 0x91, 0x02, 0xC8, 0x3F, 0x00, 0x40, 0x8C	
Group4_4,	0x0, 8,	0x00, 0x91, 0x02, 0xC8, 0x3F, 0x00, 0xC0, 0x8D	
Group4_5,	0x0, 8,	0x00, 0x91, 0x02, 0xC8, 0x3F, 0x00, 0x00, 0x8E	

[Conditions]
// Name Condition

// Messages which have to be send at measurement start **<---- The output sequence is defined by the sequence of the list**
[OnStart]
// Time, Channel, Message

2500000, CAN0, Manuell_1
<-- 2500000 µs after Start /CAN input/ To adjust a group, replace with Group1_1

2500000, CAN0, Manuell_2
<-- 2500000 µs after Start /CAN input/ To adjust a group, replace with Group1_2

2500000, CAN0, Manuell_3
<-- 2500000 µs after Start /CAN input/ To adjust a group, replace with Group1_3

2500000, CAN0, Manuell_4
<-- 2500000 µs after Start /CAN input/ To adjust a group, replace with Group1_4

2500000, CAN0, Manuell_5
<-- 2500000 µs after Start /CAN input/ To adjust a group, replace with Group1_5

Refer to the header of the *.DAT file for further parameter settings.

7.9 Event controlled measurement

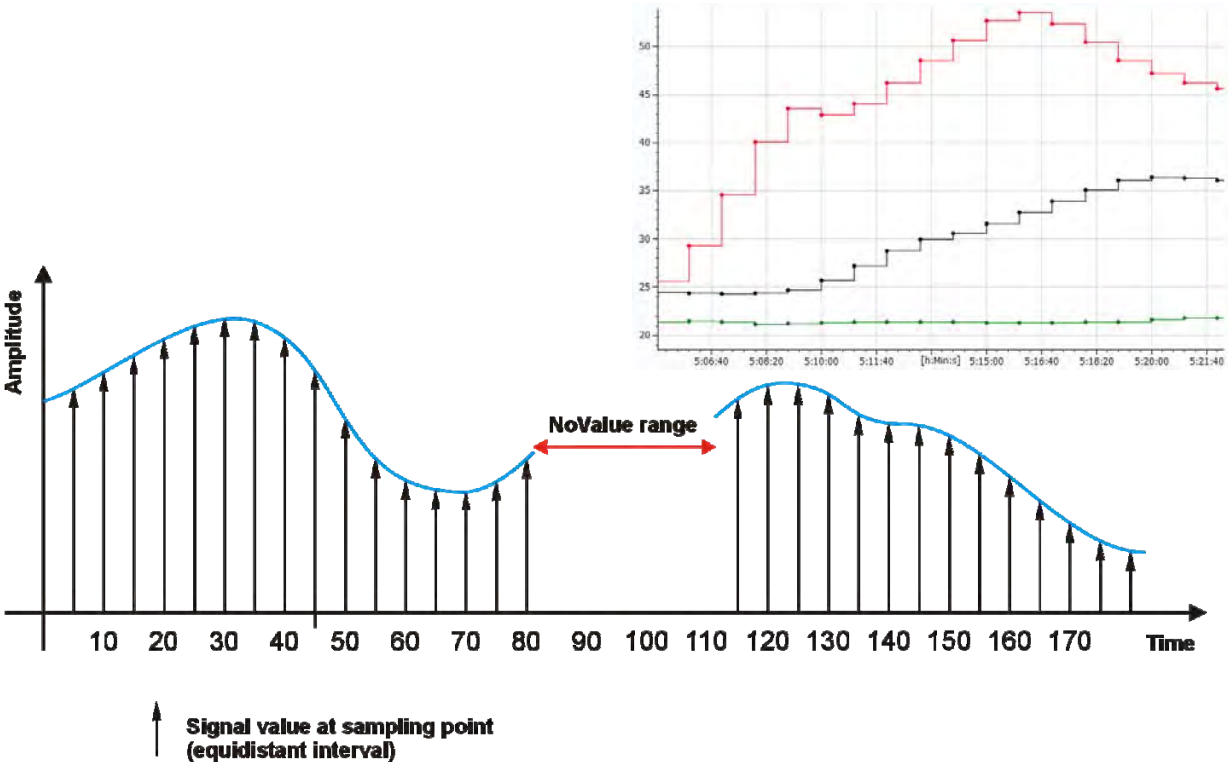
7.9.1 Possibilities for data acquisition

For measurement signal acquisition and storage in electronic systems, analog signals need to be digitalized, first. This is done by taking discrete measuring values from the continuous signal sequence (Sample & Hold) and recording them cyclically. Cyclic recording is also used for native digital signals, e.g. for measuring data packages from bus systems.

For some applications, it is useful to not record CAN bus data cyclically but event-controlled.

In the following, the basic features of both data acquisition types are described.

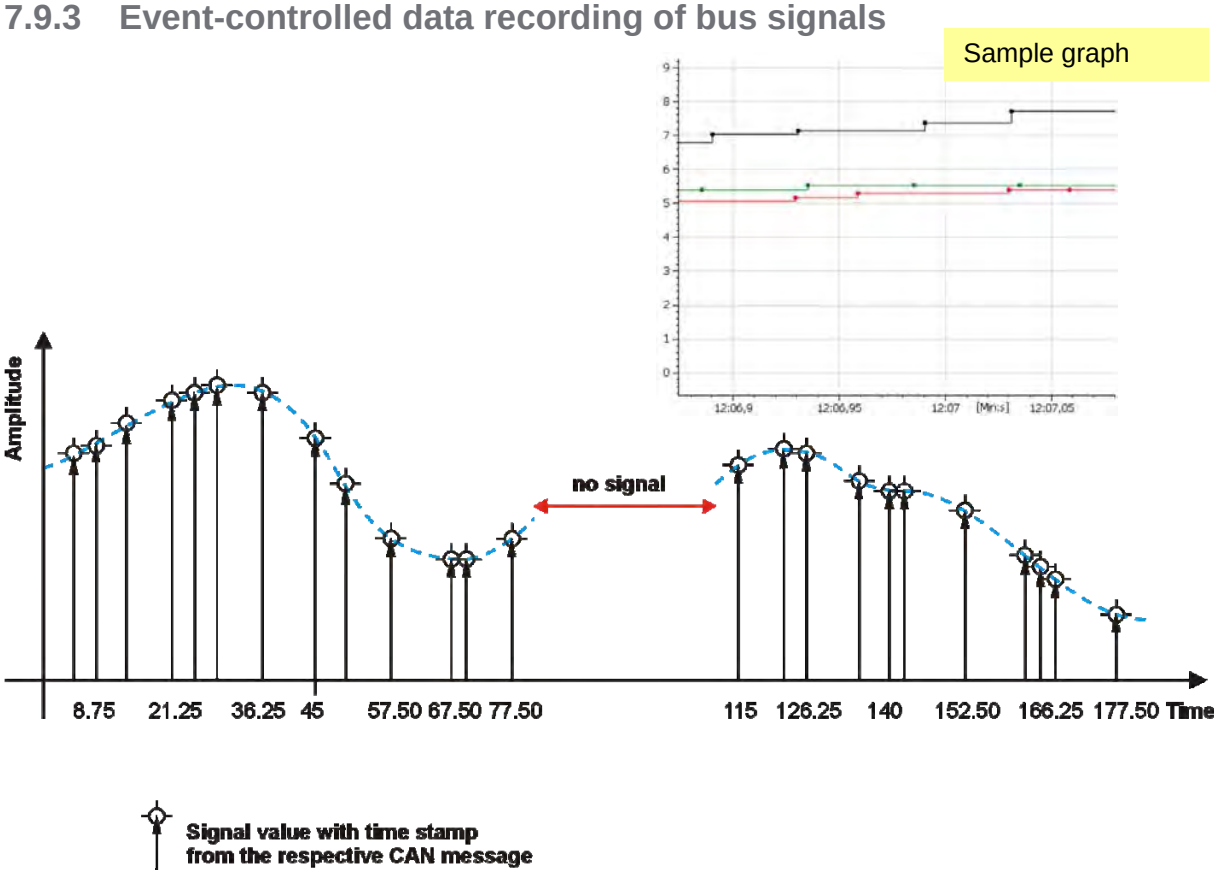
7.9.2 Cyclic data recording of continuous signals



Features of cyclic data recording (PlugIn IPETRONIK-LOG)

- time-based recording in a fixed time grid, e.g. sampling rate 100 Hz
- different storage groups allow different data rates for recording
- individual time channel for each storage group in measurement data set
- continuous recording in equidistant intervals
- suitable for analog signals
- improved time accuracy due to increased sampling rate (oversampling)
- clear comparability of different signals using a synchronization clock (Master Sample Clock MSC)
- protocol measurement during data acquisition using bus systems is possible (CCP, XCP, FlexRay, ...)
- bus signals are allocated to the respective time grid (sampling rate)
- (time) differentiation of two signals is not possible in the time grid
- sampling points without real signal value are indicated with "NoValue" (invalid) in data set

7.9.3 Event-controlled data recording of bus signals



Features of event-controlled data recording (PlugIn IPETRONIK-LOG)

- event-controlled recording without fixed time grid for bus signals, e.g. CAN bus
- all signals of a message are provided with an exact time stamp, as with traffic measurement
- individual time channel for each message in measurement data set
- discontinuous recording without defined time grid
- suitable for measurement of bus signal differences and of sporadic or single signals
- measuring values in different messages feature different time stamps > in the result graph, the time stamps do not lie on the same x-values any more
- no protocol measurement possible (CCP, XCP; FlexRay, ...)
- determination of exact time difference between signals (difference between time stamps)
- "NoValue" entries indicating the absence of signals are avoided

7.9.4 Setting up event-controlled data recording (PlugIn IPETRONIK-LOG)

General

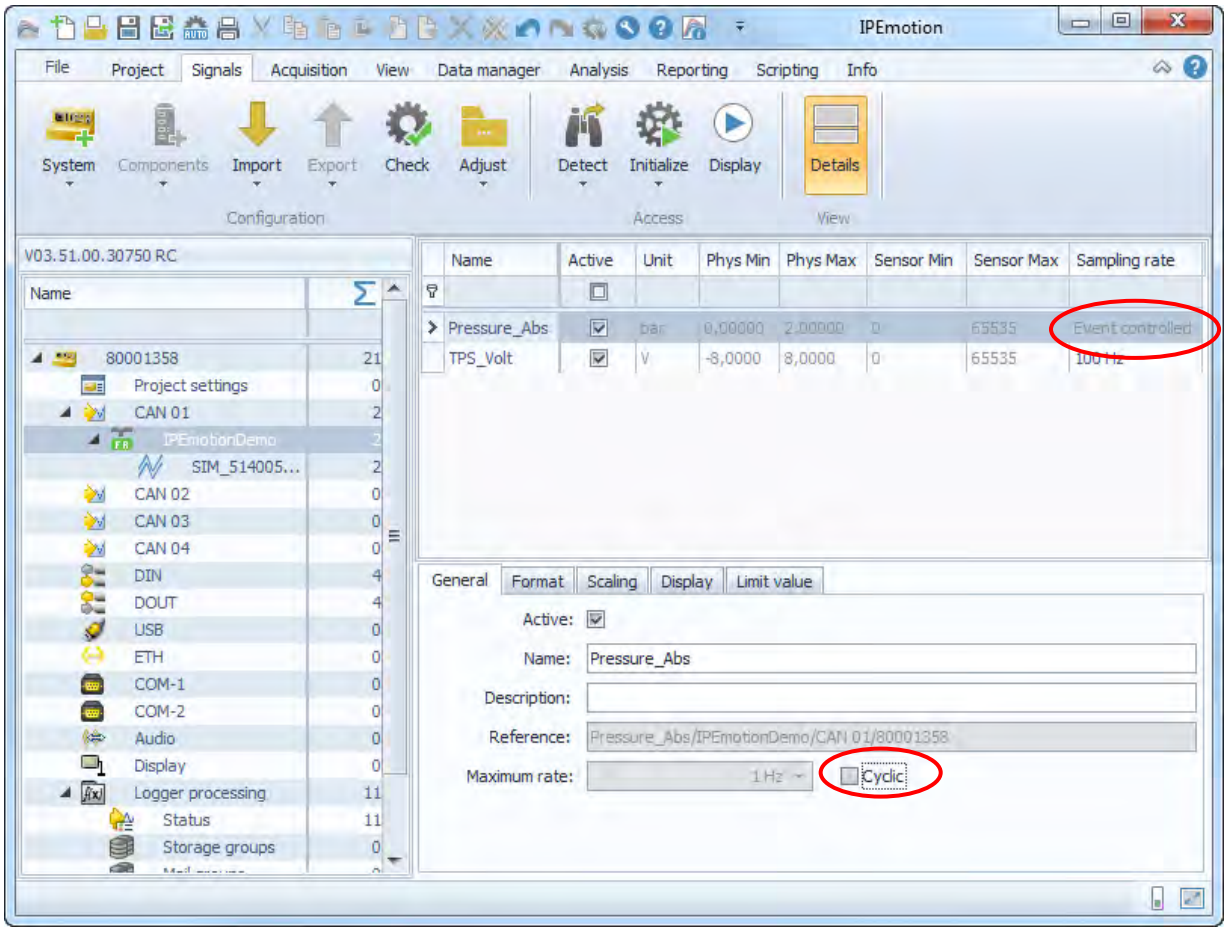
Event-controlled measurement, available from TESTdrive 3.51.00 onwards, features the benefits of signal measurement and traffic measurement:

Signal selection is already interpreted (name, scaling, unit,...). Yet, measurement is not performed cyclically but with "real" time stamp. Signals are only recorded if they really are present on the CAN bus. Using the exact time stamp.

Event-controlled measurement appears like a signal measurement on the configuration surface and in the measurement file. Loggers process the respective storage groups in traffic measurement mode.

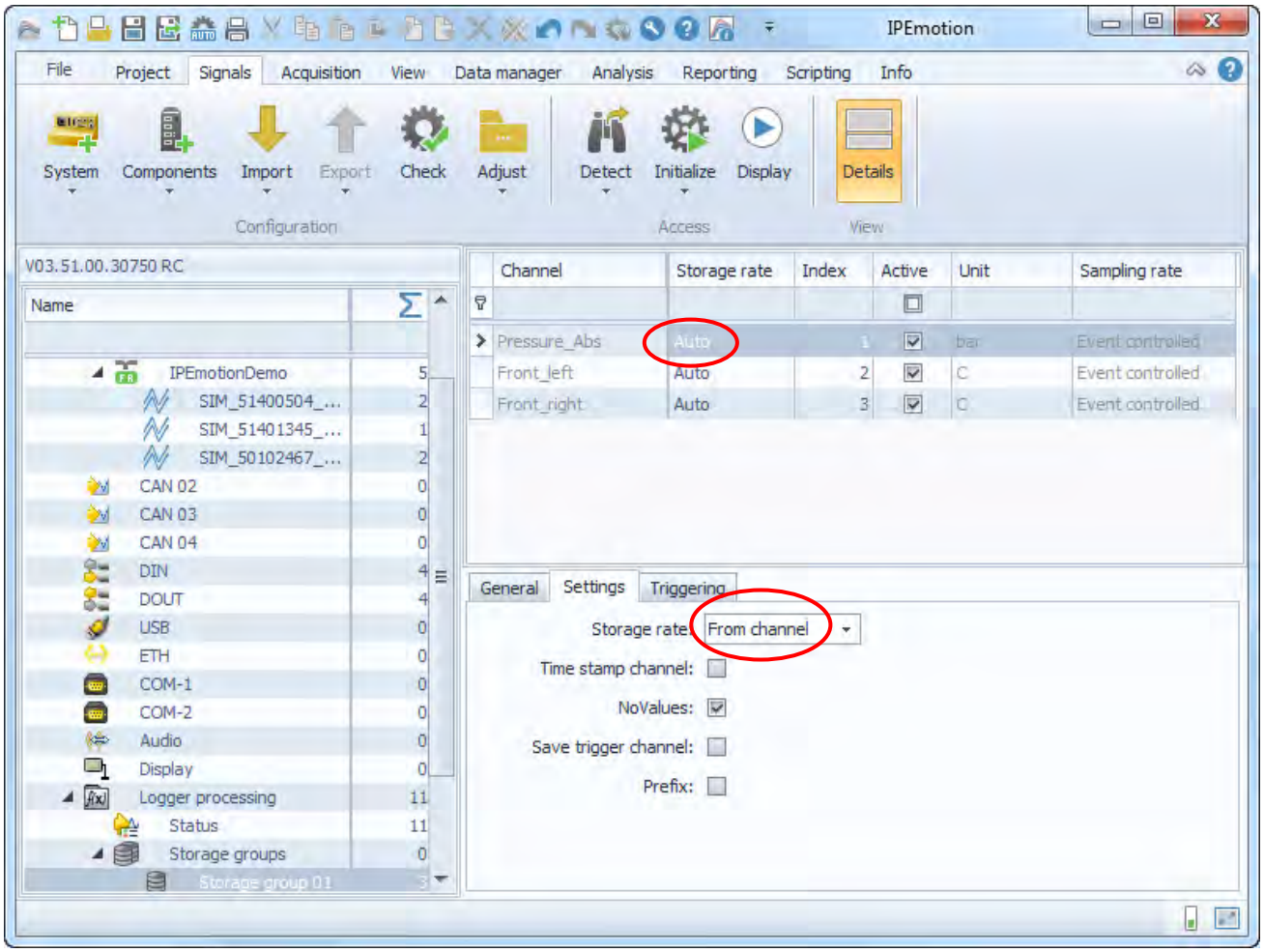
Configuration settings

The respective signals must not be recorded cyclically.



In the storage group, the storage rate has to be set **From channel**. It should not be a fixed storage rate.

As a result, sampling rate is **Event controlled** and storage rate is **Auto**.

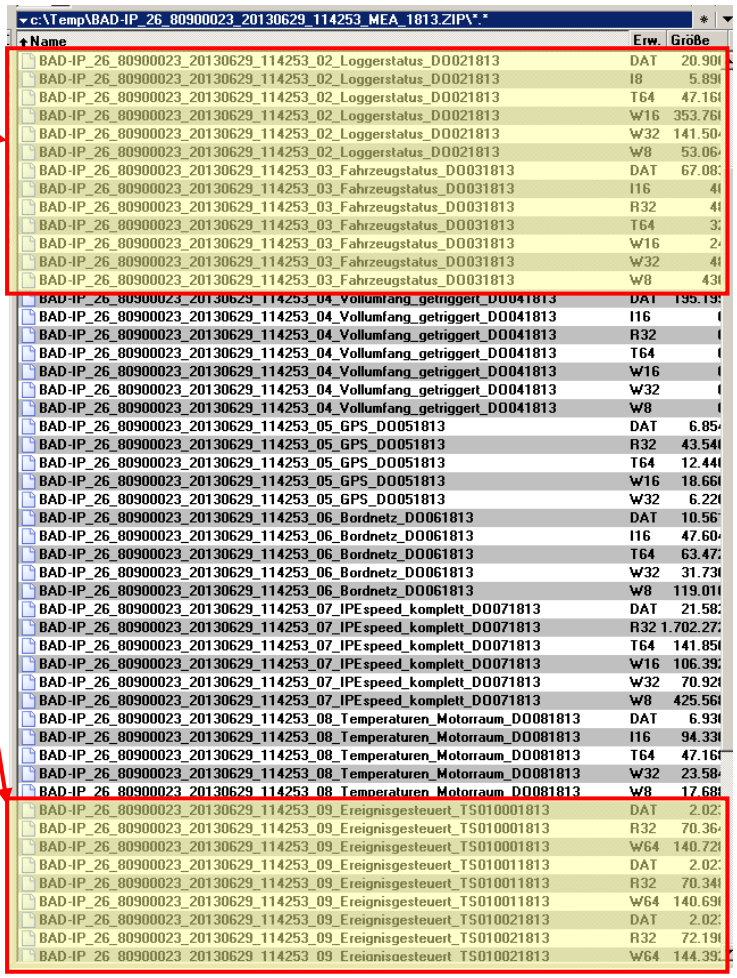


Measurement file

Event-based signals are recorded in an event-based storage group TS_xxxxxx.DAT. A signal-based storage group DOxxxxxx.DAT with cyclic storage rate cannot contain event-based signals since event-controlled or cyclic recording types are properties of signals and not of storage groups.

There are two types DAT files:

- DOxxxxxx.DAT for storage groups with cyclic storage rate and signals with fixed, cyclic sampling rate
- TSxxxxxx.DAT for storage groups with event-controlled, non-cyclic signals without fixed sampling rate



Conclusions

- Each message that is recorded event-controlled receives an individual time channel
- In DAT format of the logger measurement each message creates an own internal storage group (TSxxxxxx.DAT)
- In order to ensure strong system performance, it is useful to check the number of event-controlled measuring signals according to the application (necessary number of storage groups).

Measurement data set

In table view, it becomes obvious that time intervals are not equidistant any more and messages (signals) are no more identical. Each value is measured and saved at the time it actually occurs on the CAN bus.

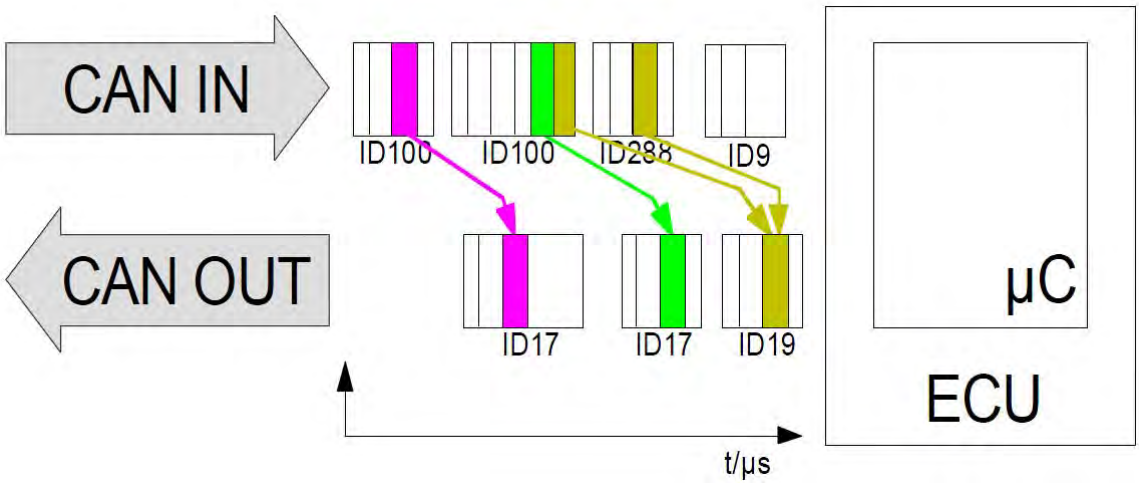
Index	Time BAD-IP_26_8090...	Speed_mph_3 BAD-IP_26_80900023_...	Time BAD-IP_26_80...	Speed_mph_2 BAD-IP_26_809000...	Time BAD-IP_26_8...	Speed_mph_1 BAD-IP_26_809000...
4934	240,898994	2,53171491622925	246,98334	2,76187086105347	247,638911	2,41663670539856
4935	240,97946	2,53171491622925	247,033392	2,76187086105347	247,688266	2,41663670539856
4936	240,999118	2,53171491622925	247,084021	2,76187086105347	247,738998	2,53171491622925
4937	241,079566	2,41663670539856	247,123429	2,76187086105347	247,788547	2,76187086105347
4938	241,098938	2,41663670539856	247,173719	2,64679265022278	247,848182	2,76187086105347
4939	241,179301	2,41663670539856	247,223519	2,64679265022278	247,88858	2,53171491622925
4940	241,260063	2,30155897140503	247,273564	2,64679265022278	247,948201	2,18648099899292
4941	241,289621	2,30155897140503	247,323497	2,64679265022278	247,998492	2,18648099899292
4942	241,318031	2,30155897140503	247,373686	2,64679265022278	248,058398	2,18648099899292
4943	241,389505	2,30155897140503	247,423454	2,64679265022278	248,088545	2,41663670539856
4944	241,41812	2,30155897140503	247,473635	2,64679265022278	248,148236	2,53171491622925
4945	241,489817	2,18648099899292	247,52342	2,64679265022278	248,188478	2,30155897140503
4946	241,508455	2,18648099899292	247,573539	2,53171491622925	248,248249	2,18648099899292
4947	241,579502	2,18648099899292	247,62349	2,53171491622925	248,288752	2,30155897140503
4948	241,608423	2,18648099899292	247,67366	2,53171491622925	248,348459	2,41663670539856
4949	241,679551	2,18648099899292	247,723447	2,53171491622925	248,388811	2,41663670539856
4950	241,708274	2,07140302658081	247,773624	2,53171491622925	248,448397	2,41663670539856
4951	241,779567	2,07140302658081	247,823407	2,53171491622925	248,48874	2,53171491622925
4952	241,808086	2,07140302658081	247,873659	2,53171491622925	248,548416	2,64679265022278
4953	241,879497	2,07140302658081	247,923452	2,41663670539856	248,588424	2,87694883346558
4954	241,908284	2,07140302658081	247,973633	2,41663670539856	248,638883	3,10710477828979
4955	241,979364	2,07140302658081	248,033872	2,41663670539856	248,688384	3,45233845710754

7.9.5 Practical example: Determination of the latency of two signals

Task

An electronic system (ECU) receives messages via CAN bus (input signals) and sends them out again on the CAN bus, e.g. as forwarding or after calculation (output signals).

Processing time = response time of the system is to be determined.



Realization

The response time results from the time difference between input and respective output signal. Since both incoming and outgoing CAN messages are provided with a time stamp, the exact time difference can be determined through event-controlled measurement.

Advantages:

- No event gets lost (not fixed to a sampling rate or to several signals within one sampling interval).
- Unique time stamps from TESTdrive are used.
- Event-controlled measurement is based on traffic measurement > traffic group.
- Each ID generates an event with a new signal value.

8 Options (license required)

8.1 Hardware options (internal)

M-LOG and S-LOG can be extended by 3 slots with different IPETRONIK cards. Max. 3 cards can be combined depending on the assignment to the extension slots and the port replicator. The active CAN cards support a highly accurate 1 µs time stamp. This time stamp is synchronous for all inputs within a card.

8.1.1 CAN cards

The following CAN cards with galvanically isolated high speed inputs acc. to ISO 11898-2 and low speed acc.to ISO 11992-1 are available:

- 2 x CAN High Speed, WakeOnCAN functionality, active data preprocessing and message buffer
- 4 x CAN High Speed, WakeOnCAN functionality, active data preprocessing and message buffer
- 3 x CAN High Speed, WakeOnCAN functionality, active data preprocessing and message buffer + 1 x CAN Low Speed (5 V, fault-olerant)
- 3 x CAN High Speed, WakeOnCAN functionality, active data preprocessing and message buffer + 1 x CAN Low Speed (24 V)

8.1.2 CAN / LIN cards

The following CAN LIN combination cards with galvanically isolated inputs are available:

- 2 x CAN High Speed, WakeOnCAN functionality, active data preprocessing and message buffer + 2 x LIN
- 2 x CAN Single Wire (GMW 3089 V2.1) + 2 x LIN
- 1 x CAN Single Wire (GMW 3089 V2.1) + 1 x CAN High Speed, WakeOnCAN functionality, active data preprocessing and message buffer + 2 x LIN

8.1.3 Ethernet cards

The following ETH card with galvanically isolated inputs is available:

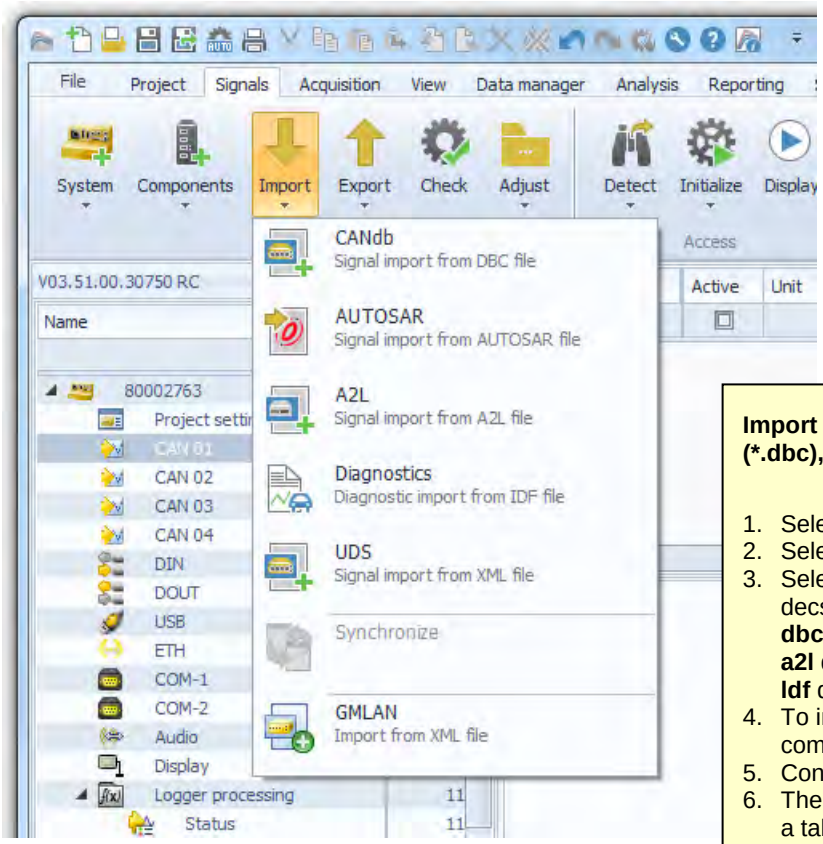
- 2 x ETH 10/100 MBit LAN, e.g. as input via XCPonEthernet or FlexRay-Ethernet converter

8.2 Software options

8.2.1 Import signal description files

IPEmotion supports the import and management of signal descriptions from CANdb (*.dbc), ASAP2 files (*.a2l), and diagnostic description files (*.idf).

The contents are read and managed by importing the original files into a database (Microsoft SQL-Server). The original files are therefore not longer required. Please note at updating the CAN system or the control unit that the current description file must be reloaded to update signal descriptions, if required. An export of the signal settings changed with IPEmotion into the original description file is not possible.



Import data from a description file: CANdb (*.dbc), ASAP2 (.a2l), LINdb (*.ldf)

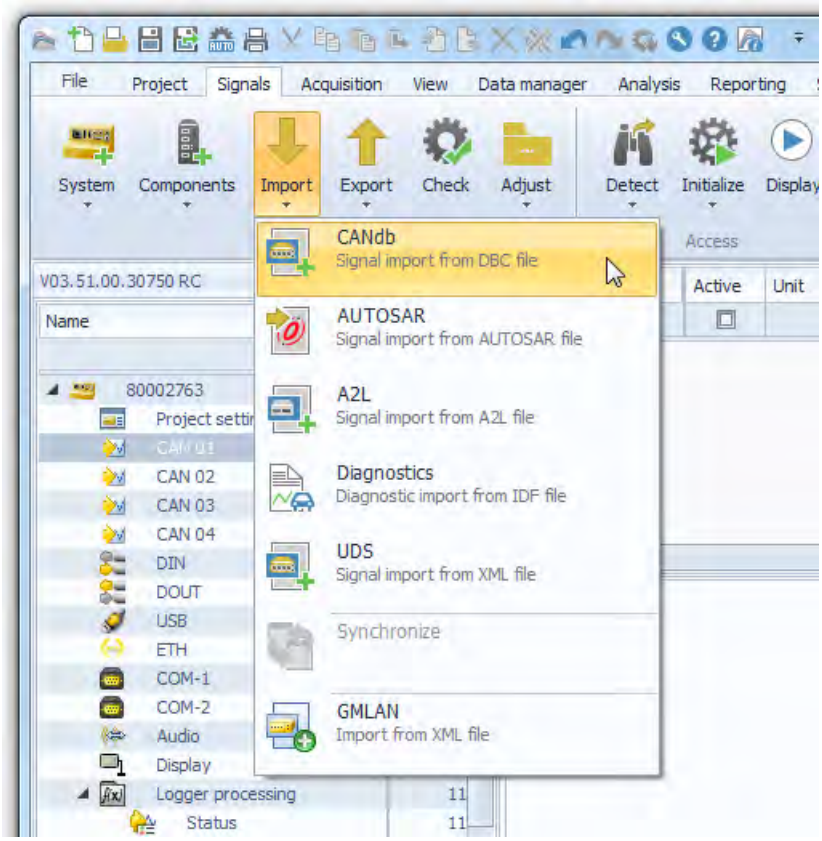
1. Select a CAN input (here CAN 01).
2. Select **Import** from the tool bar.
3. Select the directory and the type of the decsription file to open.
   dbc defines CANdb files
   a2l defines ASAP2 files
   ldf defines LINdb files (LIN Description File)
4. To import an A2L file, select the communication protocol first
5. Confirm with OK.
6. The imported signals (Pool) are displayed in a table.

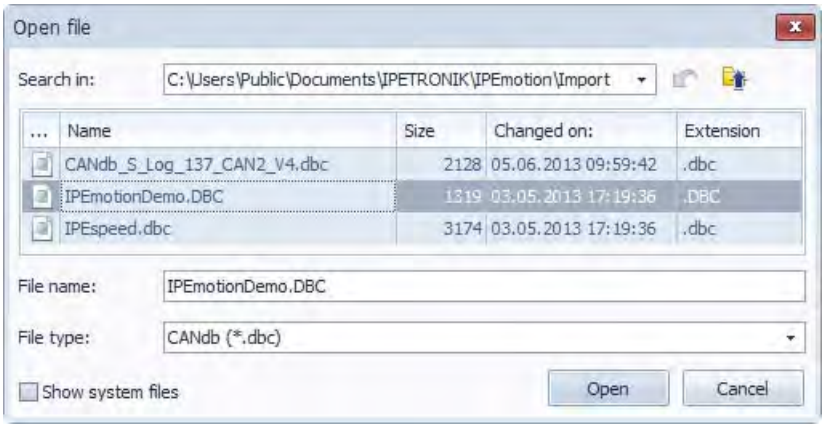
General signals at CAN 01 cannot be configured if CAN 01 is already used for IPETRONIK devices!

Importing signal descriptions from ASAP2 or CANdb is the easiest and most secure method to configure signals.

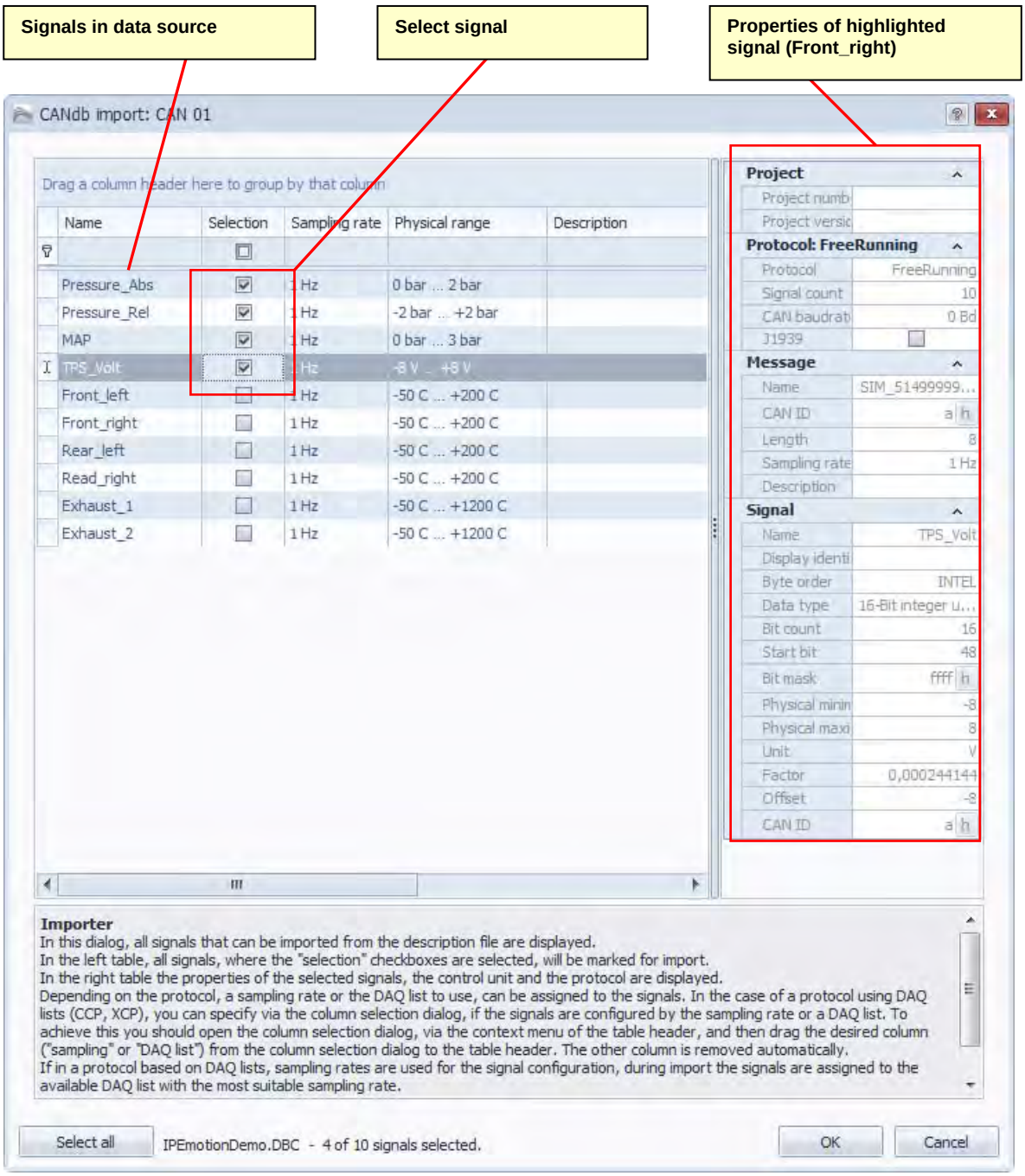
*Signals can also be manually created at an input (without description file). Select **Add components > Standard CAN** from the tool bar within the **Signals** navigation tab.*

Import CANdb file

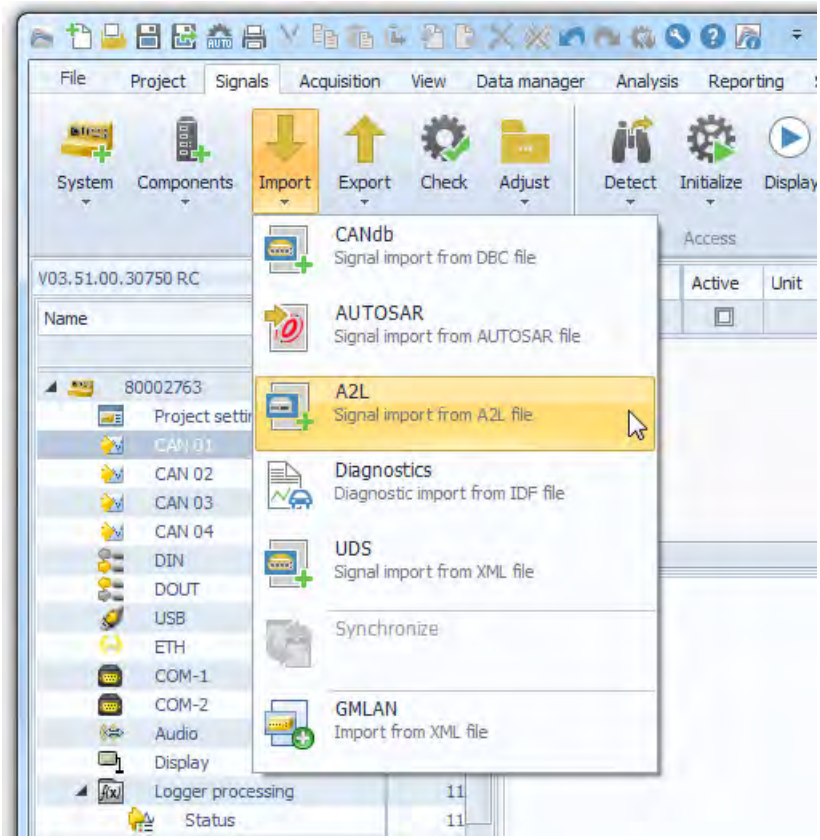


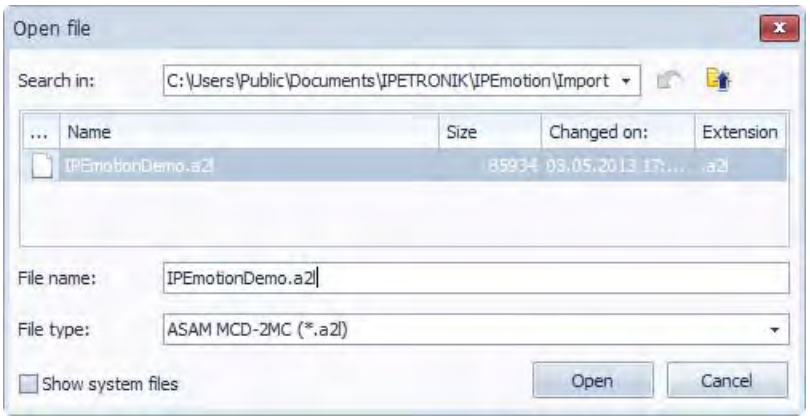


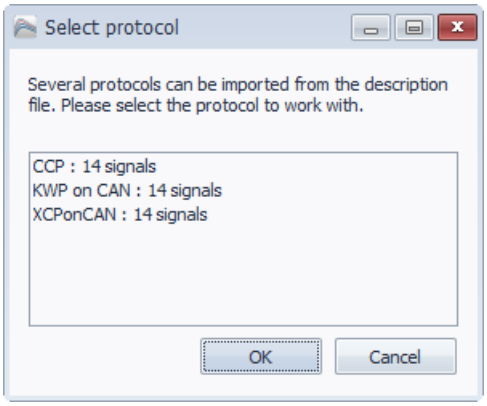
Import signal descriptions from the CANdb



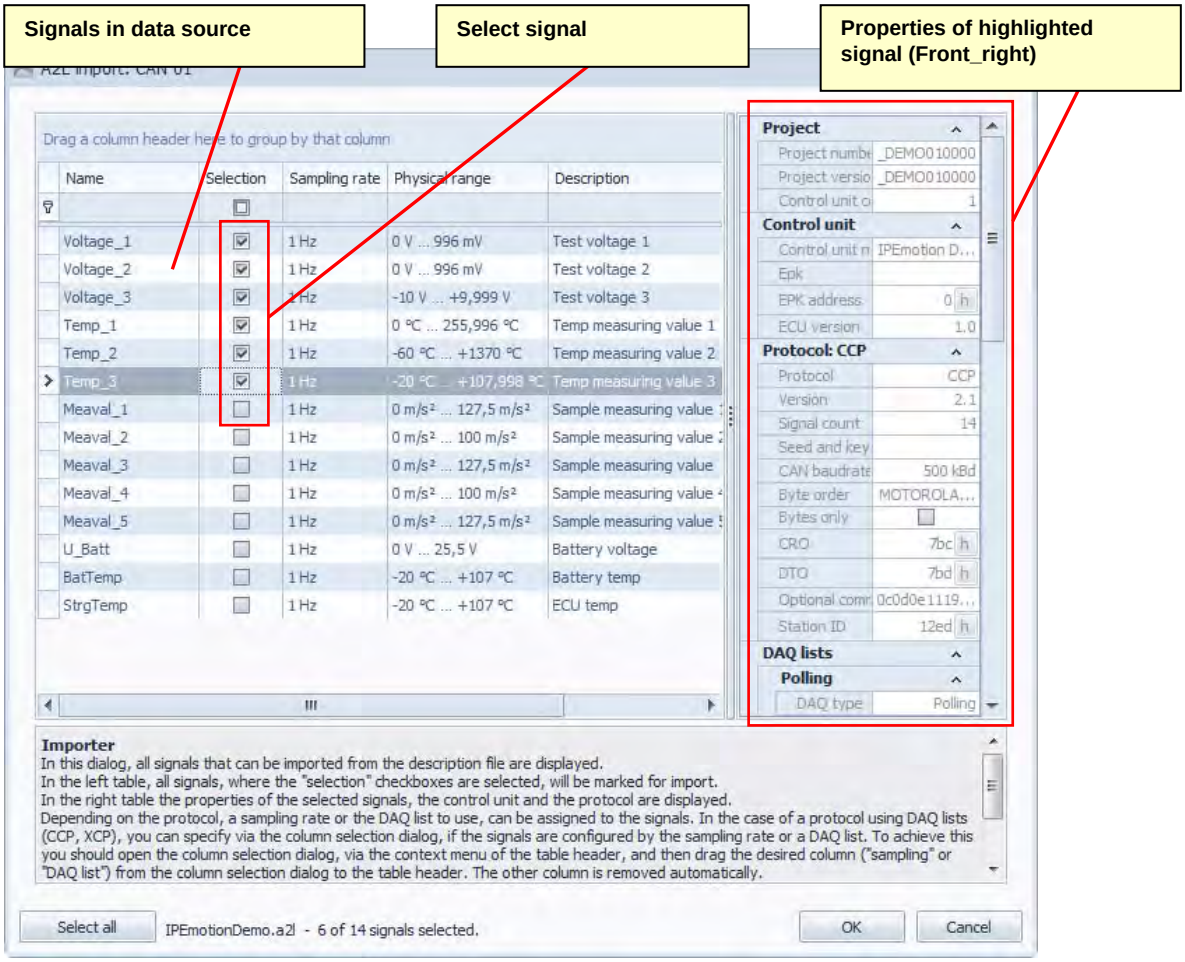
Import ASAP file



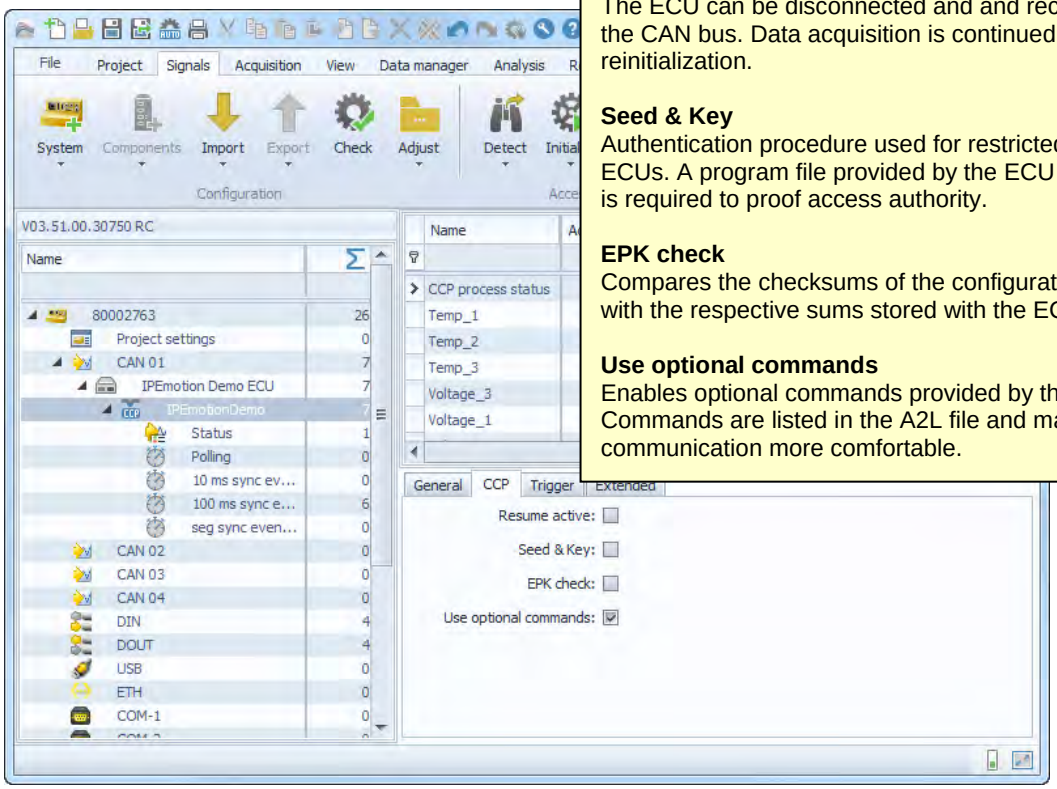




Import signal descriptions from A2L



CCP protocol settings



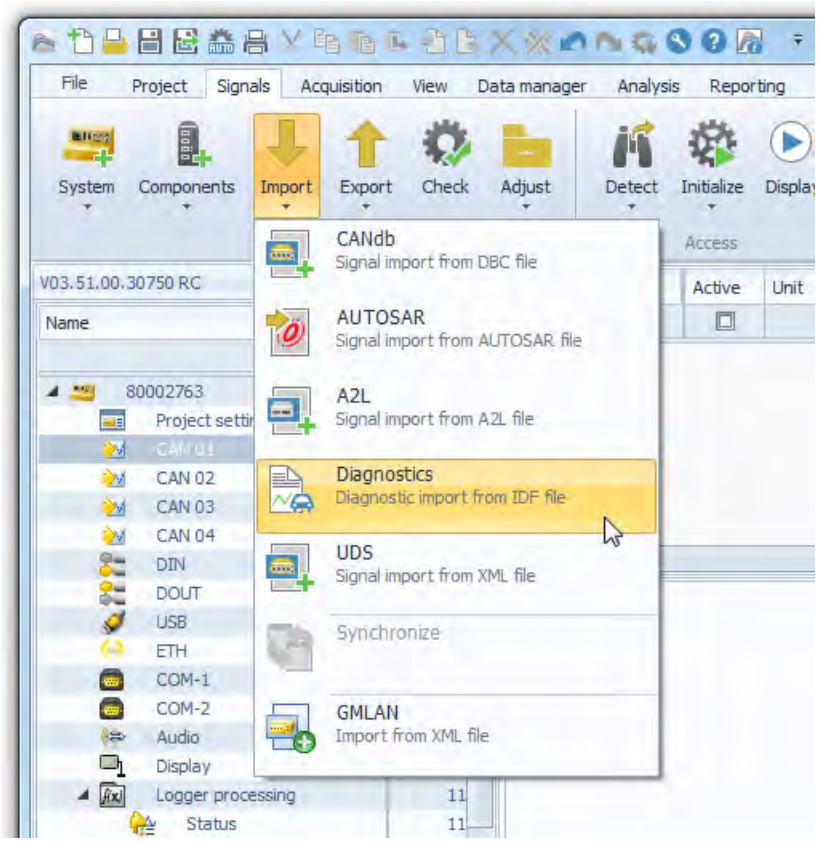
Resume active
The ECU can be disconnected and and reconnected to the CAN bus. Data acquisition is continued after reinitialization.

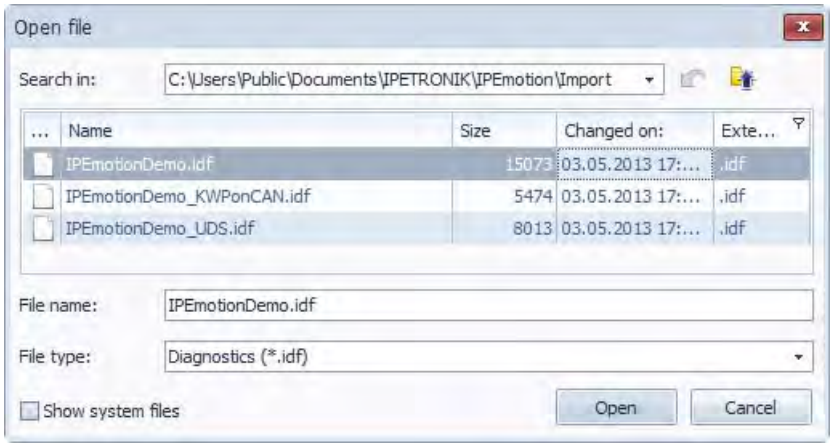
Seed & Key
Authentication procedure used for restricted access to ECUs. A program file provided by the ECU manufacturer is required to proof access authority.

EPK check
Compares the checksums of the configuration (A2L file) with the respective sums stored with the ECU.

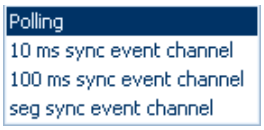
Use optional commands
Enables optional commands provided by the ECU. Commands are listed in the A2L file and make the communication more comfortable.

Import Diagnostic file





8.2.2 Detection mode and cycle rate



Polling

Polling functionality is supported by A2L for CCP and XCP, i.e. no DAQ lists are required.

IPEmotion offers three different speeds for data requests. The times are reference values because the values must be individually requested at the control unit and create a high bus load.

SLOW 1000 ms MIDDLE 100 ms FAST 10 ms

Example: If 5 values are detected in the SLOW polling mode, the 1st value is requested by the control unit a 2nd time after approx. 6 s.

DAQ list or polling?

Communication via CCP protocol takes place by sending the data cyclically or triggered by an event after the first inquiry. The send rate is defined in the respective DAQ list, e.g. 10 ms, 100 ms or synchronous to an event. Not all control units support this mode or the DAQ lists are not included in the A2L file. In this case, the signals can be sampled individually with the polling mode. But this method causes a much higher bus load and therefore longer response times.

8.2.3 Traffic acquisition

The CAN traffic acquisition (also CAN-Trace) allows high-capacitive recording of CAN messages (total bus traffic) with the CAN controller of each measuring input. Due to the fact that a huge amount of data can result from this method within a short time, data acquisition can be restricted with 20 definable admission filters.

Every input has 2 ID trigger to control the traffic acquisition start.

Filters and triggers

With selecting the respective branch, the available filters are displayed in a table. You can now define the ID areas of the CAN messages, which are saved at meeting one of the trigger conditions.

2 ID triggers are available within the traffic properties in the dialog. As soon as one of the trigger conditions is met (OR operation), all filtered CAN messages of the CAN inputs are saved. A condition can be defined for every data byte within the ID trigger (= CAN message). Only if all conditions are met (AND operation), the trigger is activated.

Data format and conversion

Traffic data is saved in a binary file with header (description) and the actual data, e.g. TD001234.bin. To generally use the data (e.g. import in CANalyzer), data is converted into the ASCII format with the data converter.

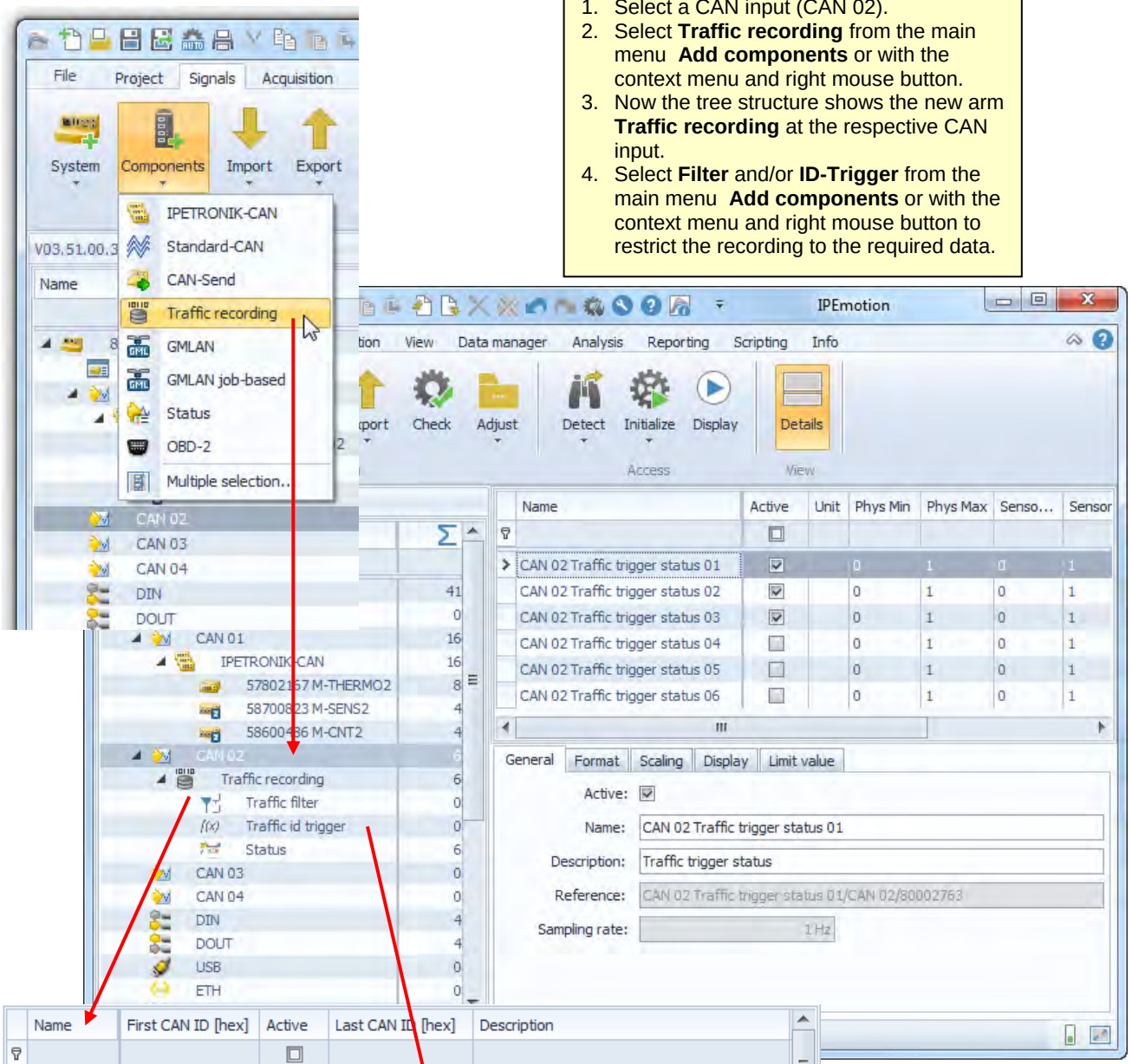
Use the IPETRONIK data converter version 2.xx IPEconverter WIN with graphical user interface (requires a license) or the version with the command line IPEconverter CMD (no license required).

The software, as well as, the documentation are saved at the IPETRONIK CD:

...\IPETRONIK_SoftwareProducts\Tools\DataConverter\…

Configuring traffic acquisition

1. Select a CAN input (CAN 02).
2. Select **Traffic recording** from the main menu **Add components** or with the context menu and right mouse button.
3. Now the tree structure shows the new arm **Traffic recording** at the respective CAN input.
4. Select **Filter** and/or **ID-Trigger** from the main menu **Add components** or with the context menu and right mouse button to restrict the recording to the required data.

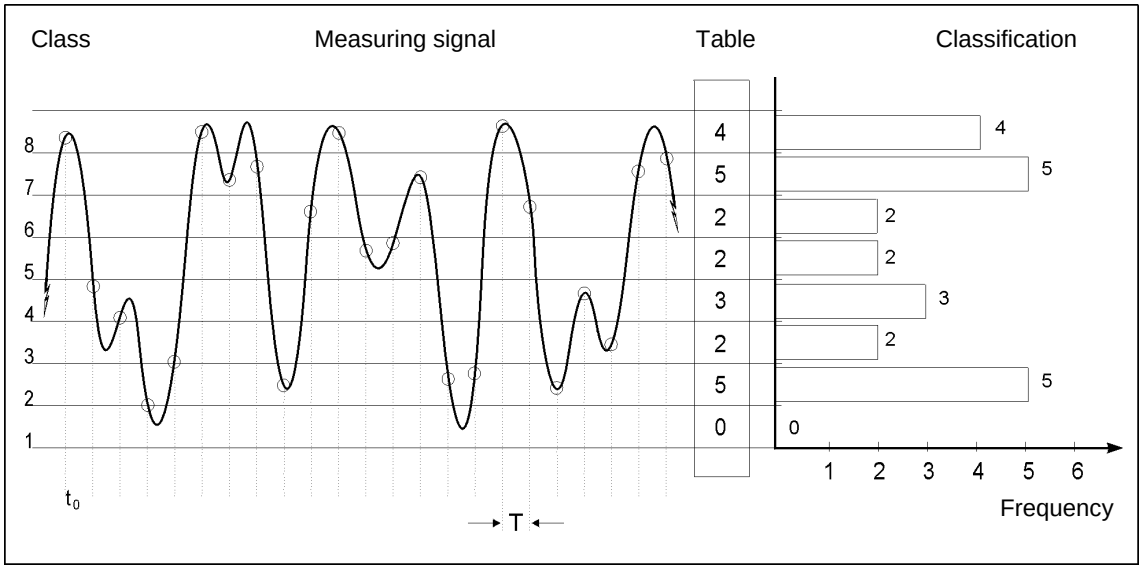


Name	First CAN ID [hex]	Active	Last CAN ID [hex]	Description
Filter 01	0	☐	7ff	Admission filter for reducing the data volume
Filter 02	0	☐	7ff	Admission filter for reducing the data volume
Filter 03	0	☐	7ff	Admission filter for reducing the data volume
Filter 04	0	☐	7ff	Admission filter for reducing the data volume
Filter 05	0	☐	7ff	Admission filter for reducing the data volume
Filter 06	0	☐	7ff	Admission filter for reducing the data volume
Filter 07	0	☐	7ff	Admission filter for reducing the data volume

Name	Active	Description	First CAN ID [hex]	Last CAN ID [hex]	Operator for Byte 1	Value for Byte 1 [hex]	Data for Byte 1 [hex]
ID-Trigger 01	☐	ID-Trigger	a	a	Off	0	ff
ID-Trigger 02	☐	ID-Trigger	a	a	Off	0	ff
ID-Trigger 03	☐	ID-Trigger	a	a	Off	0	ff
ID-Trigger 04	☐	ID-Trigger	a	a	Off	0	ff
ID-Trigger 05	☐	ID-Trigger	a	a	Off	0	ff
ID-Trigger 06	☐	ID-Trigger	a	a	Off	0	ff

8.2.4 Statistics calculation

The frequency of signals is counted and evaluated with classifications. To do so, the acquisition range is divided into equal (equidistant) zones (classes). The current values is assigned to one class at every sampling and the frequency is counted (see figure).



Advantages	Disadvantages
Much less storage required than with a time related acquisition	No original value
Very suitable for statistical analyses (e.g. life cycle tests)	No time reference of the signal

Classification methods

Different classification methods have been developed in the past whereof IPETRONIK supports the most common methods (acc. to DIN 45667, FVA sheet):

- Random sampling counting
- Level crossing counting
- From-To counting
- Edge counting
- Rainflow method (available upon request)

Please find further information in the Classification.pdf document (Classifying with KIM/KAR and DIS) on the IPETRONIK CD or at the FTP info server.

Requirements

Hardware	M-LOG, S-LOG, FLEETlog, IPElog
Configuration	IPEmotion
Software	TESTdrive V03.06 or V03.18 (IPEmotion) or V03.50 (IPElog) or higher

It is recommended to use the latest software version for guaranteeing a clean functionality of all components..

Configuring statistic / classification

1st Step **Creating configuration**

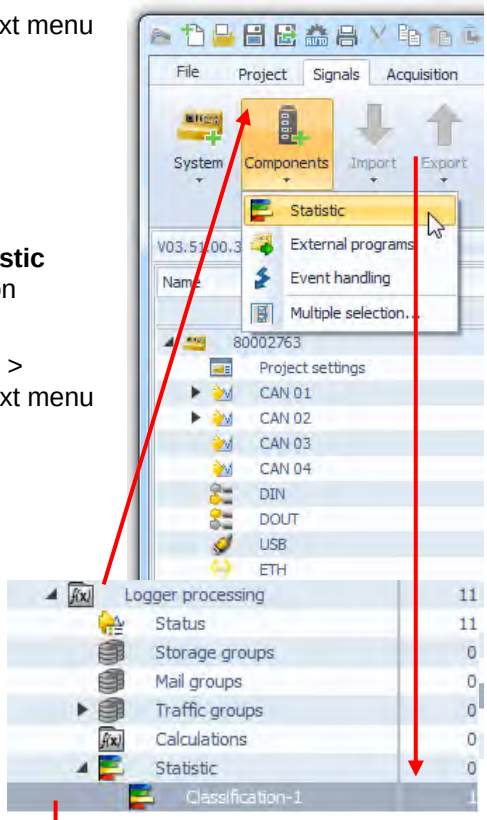
- Start IPEmotion and load an existing configuration or create a new configuration.
- Import the corresponding signal descriptions (CANdb or ASAP2) and/or configure additional IPETRONIK devices.
- Activate the desired inputs and run the required scaling.
- Select a sampling rate or accept the default sampling rate. Please note that the sampling rate, which is selectable in the classification, cannot be higher than the maximum sampling rate.

2nd Step **Defining storage group** **(if time related data is also required)**

- Create a new storage group with **Storage groups** and the context menu **Add components** to also record the time related signals.
- Assign the desired signals to the corresponding storage group.

3rd Step **Defining classification**

- Select **Data processing** in the system structure and select **Statistic** from the main menu **Add components** or with right mouse button > context menu.
- Select **Statistic** in the system structure and select **Components** > **Channel** from the main menu or with right mouse button > context menu to create channels.
- Define additional classification settings within the tabs **General**, **Settings**, and **Trigger**.



Reset behaviour Data is written into a new classification file at changing the configuration or at starting acquisition.

Sampling rate Data storage rate of classification

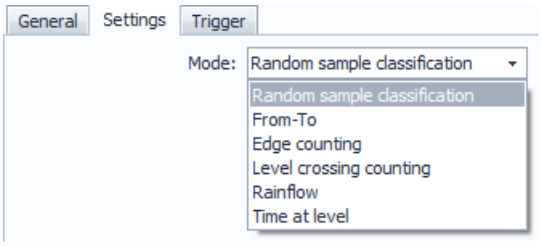
Trigger (Statistik) General trigger, defines start- and stop-trigger, value range 0 / 1

Classification

Name any name for classification

Mode selected classification method

Trigger defines start- and stop-trigger of the active channel (classification start and stop



8.2.5 Operating in FTP mode (terminal server)

TESTdrive version 3.09.00 allows starting M-LOG as FTP server. Data can easily be transmitted with a FTP software (e.g. Total Commander or WS_FTP). Depending on the user rights, data can additionally be deleted or written. A separate USB flash drive incl. TESTdriveCmd.xml file is required for this functionality. The running acquisition is stopped and the log file saved with connecting the USB.

If the TESTdriveCmd.xml file includes the "StartFTPServer" OnConnect job, there is no post processing. TESTdrive reads the corresponding parameters and starts the FTP server.

Server access requires the following user data:

Version	User	Password	Access rights
V03.09.00	guest	none	Read to TO directory

A reboot is automatically running at connecting USB flash drive to correctly stop the service as FTP server.

Procedure:

1. Switch-on M-LOG
2. Connect USB flash drive with TESTdriveCmd.xml
3. Connect Ethernet cable between M-LOG and PC, e.g. 600-591.xxx (M-LOG PR05, S-LOG)
4. Configure network settings of PC, create additional "Alternative configuration"

   User defined

   IP address: 192.168.0.1 (Example)

   Total Commander settings: Server name: 192.168.0.2, Enter user name and password

8.2.6 Recording audio and video data

Recording video data

Data logger supports recording video or single shots with a camera. The camera is connected to the logger USB port.

Following settings are available:

Resolution	Defines the image quality		
"Low"		160 x 120 Pixel (B x H)	30/20/10/5 images per second
"Medium"		320 x 240 Pixel (B x H)	30/20/10/5 images per second
"High"		432 x 240 Pixel (B x H)	30/20/10/5 images per second
Max. recording time	Defines the recording duration		
Frame rate	Defines the number of images per second		

All three options directly influence the required memory.

Trigger	A trigger condition must be defined to start recording.
Trigger mode	Triggering to raw data or scaled values
Raw	Triggering to raw data
Phys.	Triggering to physical values (acc. to scaling)

Recording audio data

Data logger (M-LOG, S-LOG) supports recording audio signals (sounds, speech) with a microphone at the audio input.

Following settings are available:

Bit rate	Defines the audio signal quality 22050 Bit/s (FM radio), 11025 Bit/s (AM radio), 8000 Bit/s (Phone quality)
Max. recording time	Defines the recording duration

Both options directly influence the required memory.

Trigger	A trigger condition must be defined to start recording.
Trigger mode	Triggering to raw data (Raw) or scaled values (Phys)

8.2.7 UDS protocol (Unified Diagnostic Services)

UDS protocol combines KWP2000, GMLAN, and DiagnosticOnCan in one protocol. An advantage is the clear session handling (higher compatibility of different control units). Furthermore, UDS supports modern memory structures, which require a > 32 Bit addressing.

The corresponding description file has the ODX extension.

Control units of some manufacturers already support UDS, which will be used as standard diagnostic in near future.

Jobs overview

TESTdrive V03.15 supports the following jobs, which can be read via UDS:

- FS_READ
- FS_READ_DETAIL
- IDENT
- READ_DATA_REFERENCE
- FG_READ
- DYNAMICALLY_DEFINE_LOCAL_ID

These jobs can be defined with an *.idf file.

Storing data

The results are optionally stored as binary file (*.CSV and *.J**) or as trace and binary file (*.CSV, *.J** and *.T**).

The files are identified as follows:

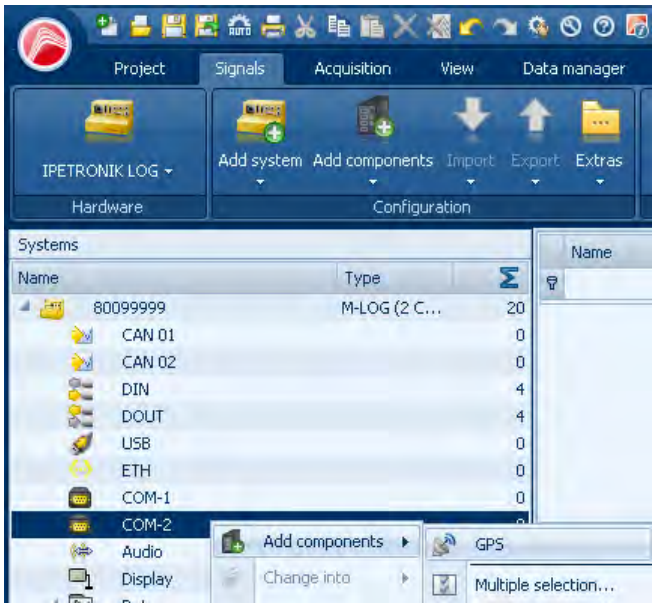
Single data detected via KWPonCAN: (former description)	BDKxxxx.CSV bzw. BDKxxxx.Jxx BDJxxxx.CSV bzw. BDSxxxx.Jxx
UDS data detected via trace mode:	BDUxxxx.txx

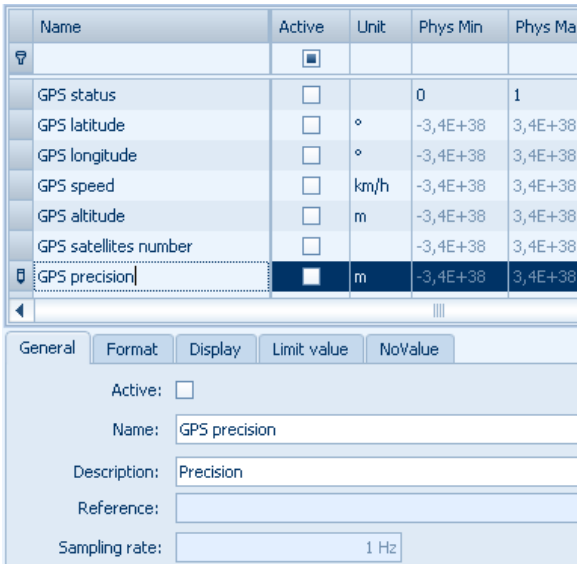
Selecting protocol

The UDS protocol is selected with the corresponding tab in the import module.

8.3 Recording GPS-Data

The GPS receiver GPS 18 and the NMEA protocol option, M-LOG, S-LOG, as well as, FLEETlog WAN with integrated GPS receiver support the continuous recording of GPS data with the global satellite navigation system. This functionality allows positioning and logging of test routes with a data rate of 1 Hz.





Predefined settings are available to configure the acquisition. The single channels are activated as required.

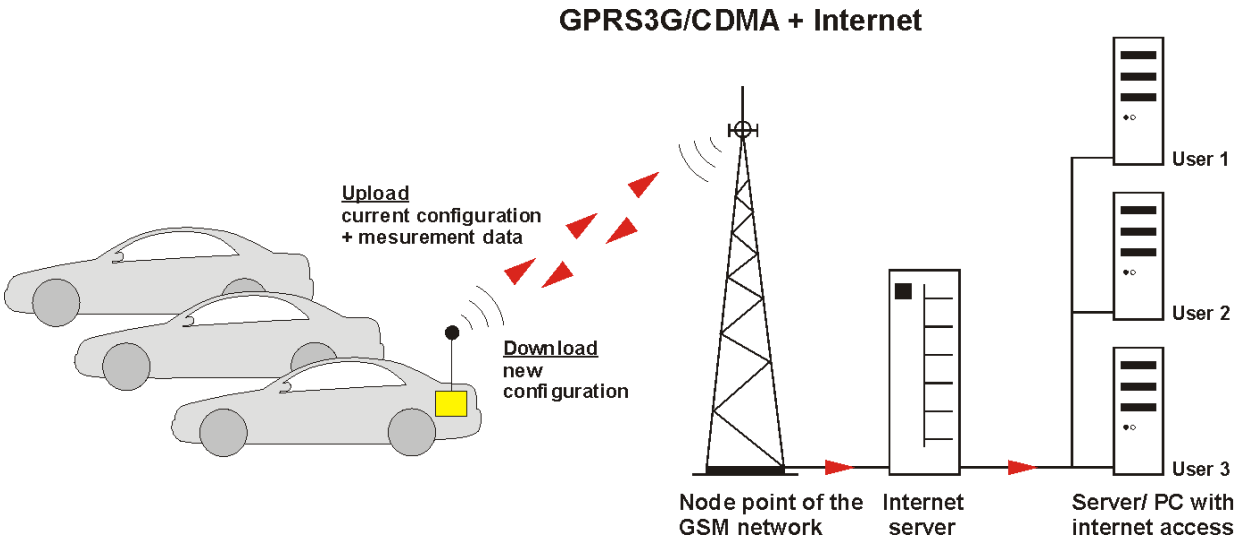
The accuracy of the positioning data is considerably defined by the number of received satellites (12 satelites are in the geostationary orbit).

Due to physics, the accuracy of the height acquisition (Altitude) with this method is considerably lower than that of the length acquisition (Latitude = geographical width, Longitude = geographical length).

8.4 Remote data transfer

The logger offers the availability of wireless data transfer by corresponding options. Single vehicles, as well as, entire vehicle fleets can be managed from one or several bases. Due to the worldwide good to excellent GSM network coverage, regional and global test drives can be managed from any base.

8.4.1 Transferring data using GPRS and Internet to FTP server



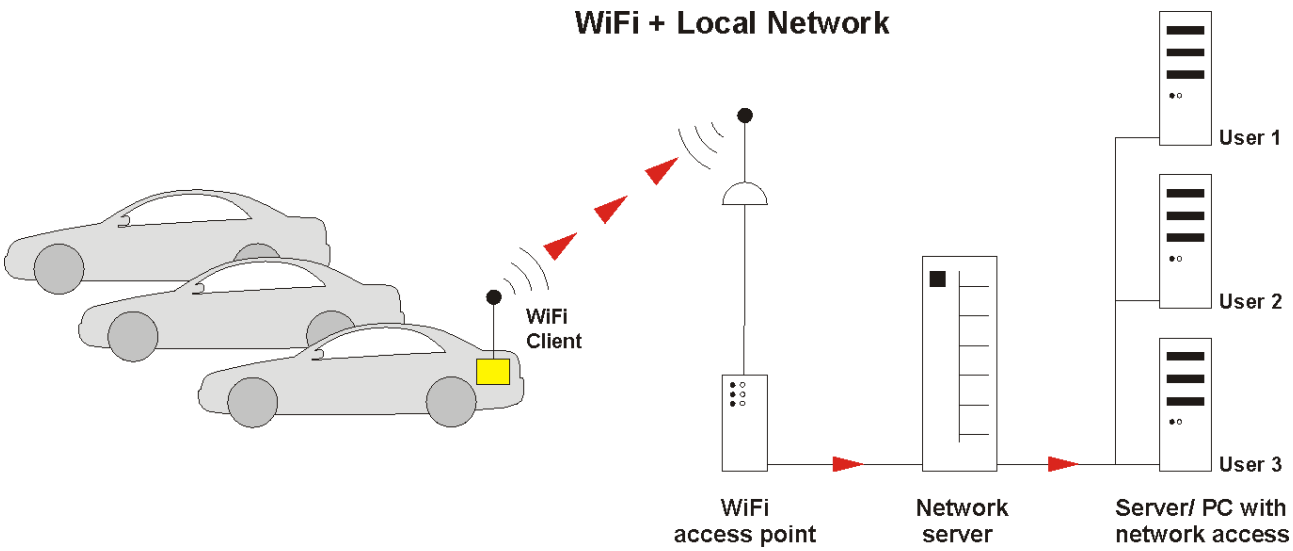
Components

- M-LOG, S-LOG, FLEETlog WAN, IPElog
- M-LOG, S-LOG with GPRS data transfer option with COMgate WAN, antenna, data transfer software or with modem, antenna, data transfer software
- Connecting cables
- SIM card for modem (depending on provider)

Functional principle

A logger in measuring mode continuously stores data as defined in the configuration. If the test series is completed (status of remote signal is inactive, e.g. terminal 15), data is packed and transferred via GPRS in GSM network to the next node point. This data is then transferred via internet to a FTP server for being available for download. All data transfer settings are defined in the IPETRONIK software.

8.4.2 Transferring data using Wireless LAN to netzwork server



Components

- M-LOG, S-LOG, FLEETlog WAN, IPElog
- M-LOG, S-LOG with WiFi data transfer option with COMgate, antenna, data transfer software or with client, antenna, WiFi software
- Connecting cables
- WiFi access point to connect with network (M-LOG, S-LOG)

Funktional principle

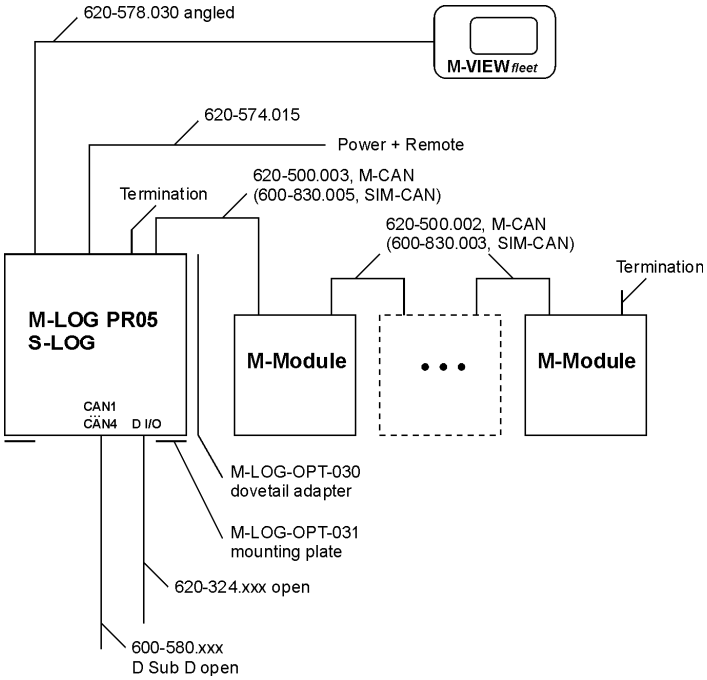
A logger in measuring mode continuously stores data as defined in the configuration. If the test series is completed (status of remote signal is inactive, e.g. terminal 15), data is packed. If the vehicle is within reach of an access point (up to 300 m outdoors), data is transferred via WiFi to the access point. This data is then transferred via local network to a server. If the local network is connected to the internet, data can also be transferred to a FTP server for being available for download. All data transfer settings are defined in the IPETRONIK software. Due to multiple encoding options (transmission protocol and user), a very high degree of security against unauthorized access is guaranteed.

9 Display modules

9.1 M-VIEW*fleet*

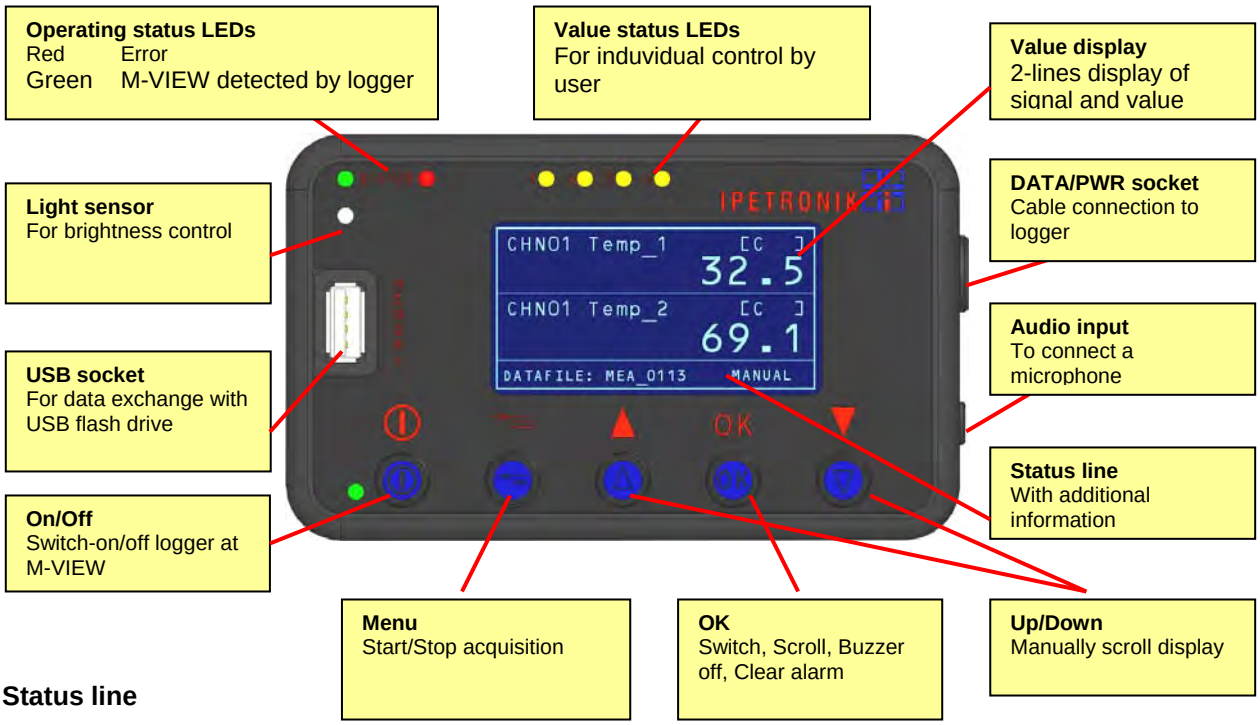
M-VIEW*fleet* is a alphanumerical data display, which is connected to the USB of the logger. M-VIEW*fleet* provides different displaying modes besides four status LEDs and buttons. The number of displayed channels is only limited by the processor load.

Only connect M-VIEW*fleet* to logger **if** logger is **switched-off**. If M-VIEW*fleet* is connected to logger during operation, the USB interface can be damaged.



M-VIEW*fleet* is connected to M-LOG with an USB 2.0 interface. A second USB port of the logger is available at the display. USB 2 is used for e.g. a program update or to exchange measurement or configuration data via USB flash drive. USB connections are designed for a maximum length of 5 m. Display settings are defined in the system configuration.

9.1.1 Keys and LEDs



Status line

The scroll mode ***MANUAL*** (with Up/Down keys) or ***AUTO*** (automatically) is displayed in the right zone of the staus line. The following informatiojn is alternately shown in the left zone:

DATAFILE	Name of current data file
TIME LEFT	Available time in days (D) and hours (H) for data recording
DRIVER	Selected driver
SHIFT	Selected shift (track or road sections belonging together)

OK

Function in standard display

1.	Display Min/Max	Press longer than one second
2.	Back to standard display	Press longer than one second

Function in standard display in scroll mode AUTO:

(Changed from AUTO to MANUAL with Up/Down keys)

1.	Back to auto scroll mode	Press longer than one second

If the key is not pressed, the display changes after 30 s into auto scroll mode.

Switching from MANUAL to AUTO is only possible if auto scroll mode has been activated!

Function at configured alarm limit values:

1.	Buzzer off	Shortly press to switch-off buzzer
2.	Clear alarm	Press longer than one second, Back to standard view

If the alarm has already been cleared 5 times, a final message appears to definitely delete the alarm.

Up/Down ▲ ▼

One line up	▲
One line down	▼
Switch AUTO > MANUAL	▲ or ▼ if AUTO (Auto scrolling) has been activated in configuration

Menu

Stop acquisition -> Press longer than two seconds

Start acquisition -> Press longer than two seconds

The option **Allow start and stop of acquisition** *must be activated in the configuration. The measurement file number is increased by one at every acquisition start. If the option* **Track** *or* **Track/Driver** *(List type selection) is additionally selected, files can be merged to one file until the final end of data recording.*

Devices connected to the logger ***remain switched-off*** *until* ***acquisition stop****.*

ON/OFF button (PIC firmware ≥ V1.05 required on the logger!)

Logger on -> Press longer than one second

Logger off -> Press longer than one second

Green LED shows the status of the switch-on command. (LED on = REM2 ON)

Terminal 15 should not be used with the On/Off key because only one operation is supported either with the On/Off key or with terminal 15. Mixed operations with both remote functions are not possible.

Operating status LEDs

Red 1. Error

2. Logger is booting, initializing M-VIEW

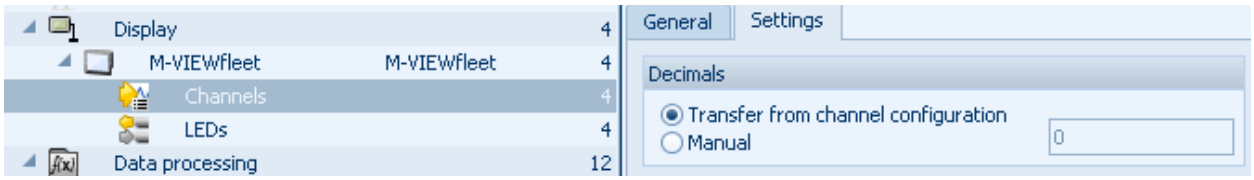
Green Operation, M-VIEW detected by logger

Value status LEDs

The 4 status LEDs can be controlled with calculations. Additional limit violations can therefore individually be displayed.

9.1.2 Configuring M-VIEW*fleet*

- Select Display in the tree structure.
- Select Add components.
- Select M-VIEWfleet.
- Select the desired signals.
- Confirm the desired signals with **OK**.



Define the alarm values for the upper and lower signal limit, if desired. If the current signal reaches the alarm limit, the display changes into the message window and the buzzer sounds. Clear the alarm with OK.

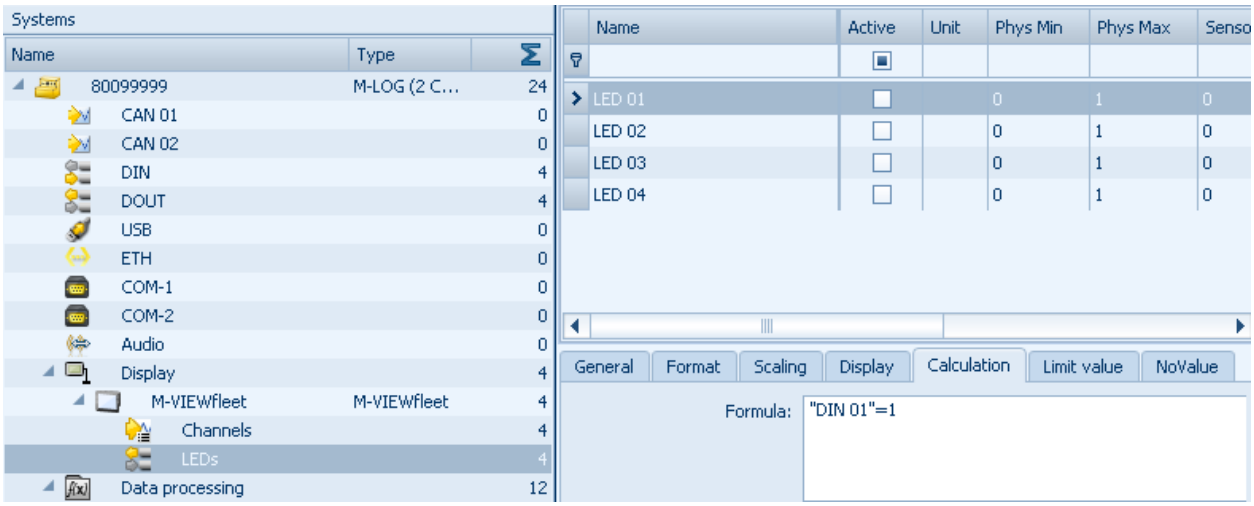
Activate the detection of the minimum and/or maximum values for the respective signal. With pressing OK, the display changes into showing the minima and maxima. If the detection has not been activated, **------.--** is shown. Pressing OK again changes back to standard display.

Define status LEDs for limit display

The 4 status LEDs can be activated by separate and user-defined calculation formulas. Additional thresholds can therefore be defined and reaching these limits can optically be signalized. In addition, the LEDs can be used as status display for the 4 digital logger outputs.

To do so, the following options are available:

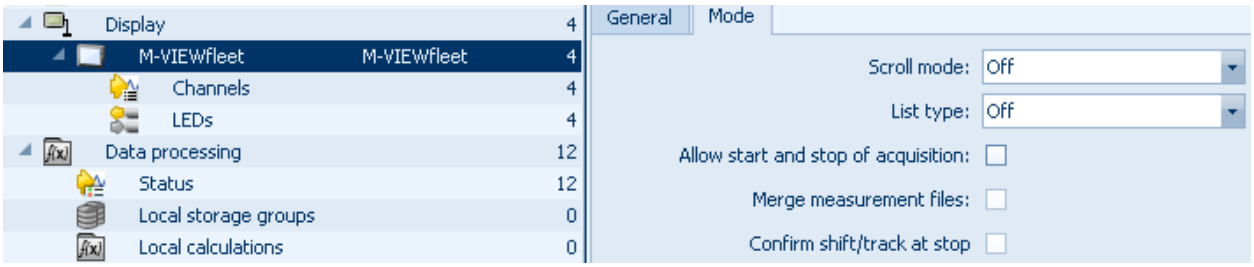
- Use the same formula like at the corresponding digital output
- Status query of digital output to 1 (LED ON, for the time digital output = 1)



Setting display modes

Select ***Active*** to use M-VIEW*fleet* in the configuration.

No further settings can be defined without activating M-VIEWfleet! If an existing M-VIEWfleet configuration is deactivated, the logger display has no function! This is signalized by the red LED. The red LED is also on if the USB port is damaged during operation by disconnecting the cable.



Scroll mode

Off	Manually switching lines with Up/Down
5 s	Continuous line switching in interval of 5 s, display moves line by line from the bottom up in order of signal list

List type

Off	Neither track nor driver defined
Track	Track selection by driver is assigned in data
Track/driver	Track, as well as, driver are selected before start and set in data

The text file of the track selection list is defined in:

...\IPETRONIK\\IPEmotion MAL-PlugIn IPETRONIK LOG V03.xx.xx\Data\MViewfleet\MVIEWfleetTracks.txt

The text file of the driver selection list is defined in:

...\IPETRONIK\\IPEmotion MAL-PlugIn IPETRONIK LOG V03.xx.xx\Data\MViewfleet\MVIEWfleetDrivers.txt

Changes of the entries can manually be defined in the respective text file.

Allow start and stop of acquisition

Pressing the menu key stops the data storage and the current measurement file is closed.

Pressing the menu key again starts the next data storage and the number of measurement file is increased by one.

Merge measurement files

This function requires a selected list type!

The end of every acquisition includes the ***End Shift xxx*** query. If it is confirmed with OK, all previous partial acquisitions of one file are merged and the number for the next measurement file is increased by one. If this function is not activated, an own file is written after every acquisition stop and a following acquisition is recorded with a new number.

Confirm shift/track at stop

A selected list type is required for this function and *Merge measurement files* must be activated!

The query runs after acquisition stop:

End Shift xxx!	***Yes OK?***	Track is stopped, partial acquisitions are merged in one measurement file
	No OK?	Track is continued at next start with same measurement file

The query runs after acquisition start:

Shift xxx Good Trip!	***OK?***	Currently saved track is continued with new acquisition file
	Change OK?	Track and driver can be selected again

If nothing is entered after a query, an acoustic message sounds after 20 s and the saved settings are accepted for the next acquisition.

9.2 M-VIEW*graph*

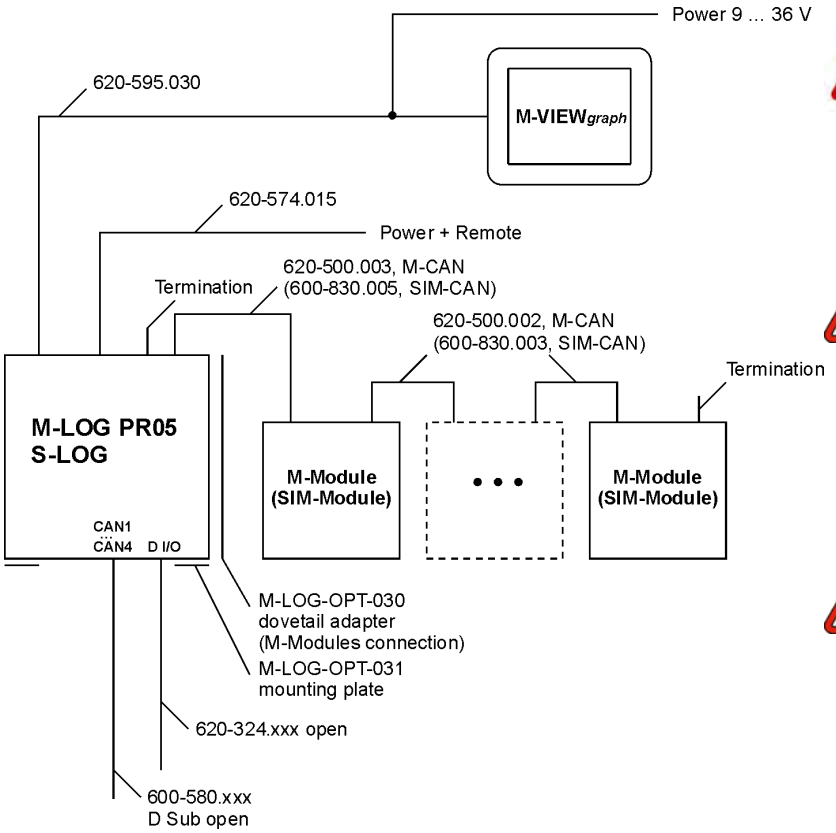
Important advice for mounting!

If mounting with a suction pad holder, the bottom of the display enclosure must be additionally fastened with Velcro tape to an underlayer/board (e.g. dashboard). Free mounting only with the suction pad holder is not permitted for test drives..

M-VIEW*graph* is an alphanumerical and graphical data display.

The display is connected to the logger via USB port. In addition to two status LEDs, it provides four trigger LEDs to show limit violations. The display is controlled with 12 illuminated keys, 4 keys with standard functions, 8 keys, which can individually be defined (projected).

The illuminated 7'' TFT display has a resolution of 800 x 480 pixel to display graph charts and numerical values.

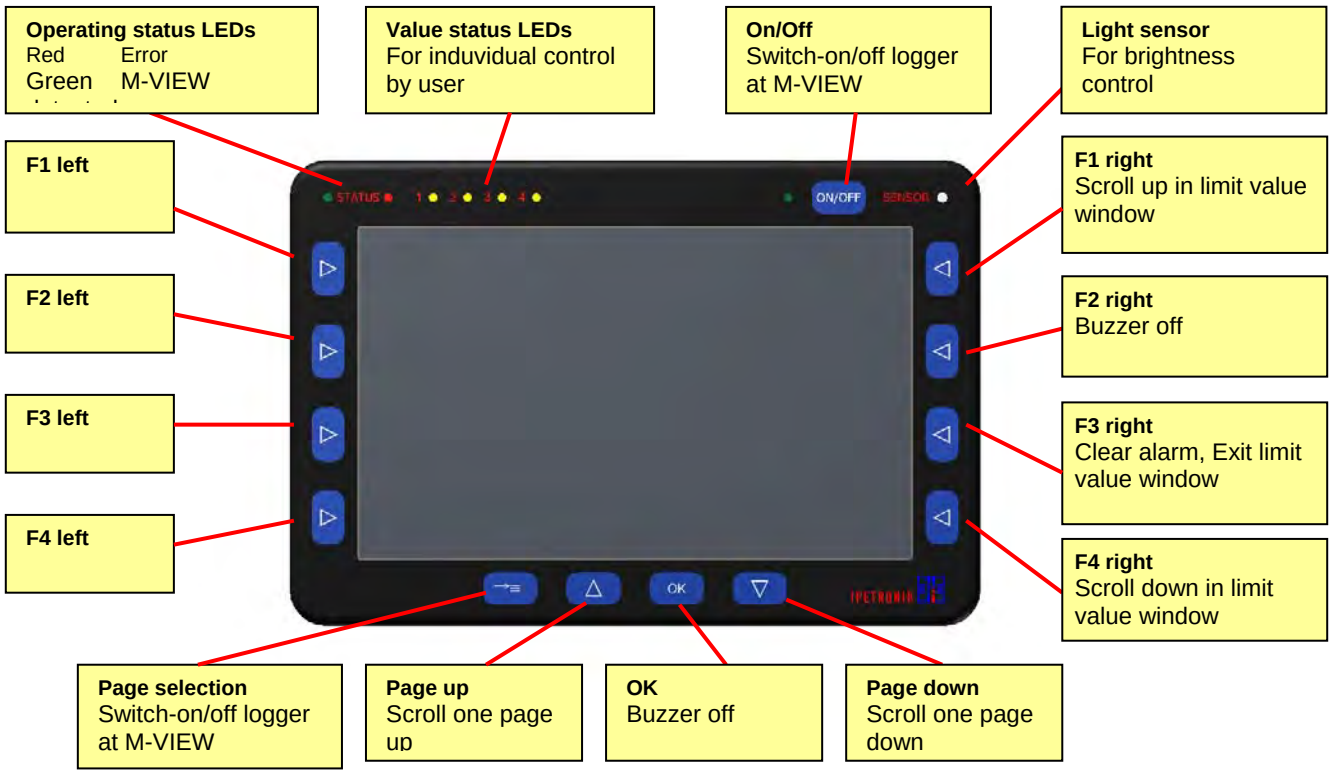


M-VIEW*graph* cannot be supplied with power via the logger as M-VIEW*fleet*.

Connect M-VIEW*graph* and logger **ONLY** if switched-off, otherwise the USB interface could be damaged.

ALWAYS connect PWR- (black banana male connector = PWR-GND) of the M-VIEVgraph cable to avoid overload of the signal GND line (GPS power, Remote2).

9.2.1 Keys and LEDs



The functionality of keys F1 right to F4 right is also available with the touchscreen of the alarm window.

The side keys F1 to F4 left and F1 to F4 right can be used to control data recording with a corresponding configuration, e.g. as start- and stop-trigger.

9.2.2 Configuring M-VIEW*graph*

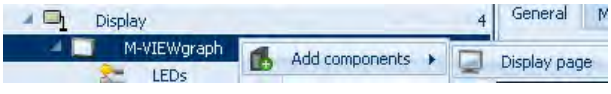
M-VIEW*graph* supports the display of any number of pages. Due to the fact that the processor capability is limited, it is recommended not do create more than 20 to 30 different pages (depending on the proportion of graphical elements).

Configuration of up to 15 pages/200 signals have been tested. Bigger configurations could cause displaying problems.

Use devices with a serial end number > 116 (Processor PXA320) only with firmware version >= 1.05.

Add M-VIEW*graph*, display pages, and channel

- Select Display in the tree structure.
- Select Add components.
- Select M-VIEWgraph.
- Add a **Display page + Channel**.



Define status LEDs for limit display

The 4 status LEDs can be activated by separate and user-defined calculation formulas. Additional thresholds can therefore be defined and reaching these limits can optically be signalized (see M-VIEW*fleet*).

Define display page

The display can be separated into different areas. A page title can be assigned to every page (invisible in measuring mode) and a title can be assigned to every screen zone (visible in measuring mode).

The following layouts can be selected with the current IPEmotion version:

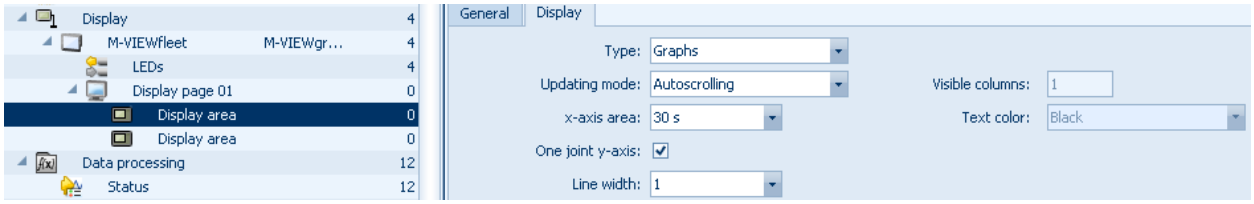
- Full screen
- Horizontal tripartition
- Horizontal bipartition (The screen is horizontally divided to 50% each. The upper area shows graphs and the lower one the current value as numerical display.)
- Horizontal bipartition 75 % to 25 %
- Vertical tripartition
- Vertical bipartition
- Vertical bipartition 75 % to 25 %
- Dynamic

Example 1: Display layout Vertical bipartition

The screen is horizontally divided to 50% each.
Both areas show an alphanumerical display.

The scientific display of values (e.g. 1e-03) is used from TESTdrive 3.17.01 only for very great values.

Graph display settings



Type	**Displaying type**
Graphs	Signal displaying in curves/graphs
Numerical display	Numerical signal displaying
Updating mode	**Scaling type of x-axis**
50 %-Scroll	If the defined interval in ***x-axis area*** is elapsed, 50 % of the window are moved to the left and the graphs move from the middle to the right. If they reach the right end, the 50 % window is moved into the left area and so on.
Autoscrolling	If the defined interval in ***x-axis area*** is elapsed, the current graph data continuously move from right to left.
Autoscaling	If the defined interval in ***x-axis area*** is elapsed, the graph data are accumulated, i.e. scaling of the time axis is dynamically fit.

x-axis area	**Displayed time interval at x-axis** Select an interval from 15/ 30s, 1/ 2/ 5/ 10/ 20/ 30 min, 1/ 2 h.
One joint y-axis	**One joint y-axis for all graphs**
Line width	**Line width of graphs** Define the line width of all graphs in this area, selectr from 1/2/3 pt.

Numeric display settings

Visible columns

Division of the current screen area for numerical display in horizontal and vertical columns.

Text color

Define the text color for all numerical displays in this screen area.

If a **Channel** is selected, following settings can be defined in **Numerical display** tab:

Name

Enter an alternative signal name, e.g. as short description if the original name is too long to show at the configured M-VIEW*graph* display.

Integer places

Number of digits to the left of a separator

Decimal places

Number of digits after a separator

Define limit values (Alarm function)

Limit values of displayed signals can be defined with the main menu ***Acquisition > Add limit value***.

The respective signal limits are directly defined in the signal dialog (channel configuration)!

After every limit violation, the display changes into limit value window and the buzzer sounds. For the time the limit violation is applied, the signal is dislpayed in red.

Following information is shown in the limit value window:

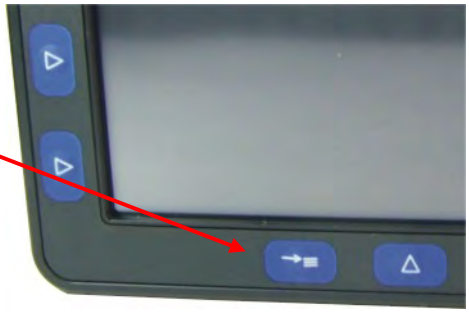
- Signal (signal name) with current value and unit
- Date and time of violation
- Number of previous violations
- defined lower limit value
- defined upper limit value
- Minimum signal value
- Maximum signal value
- Status information (file name, available memory duration, date, time)

Scroll through the single limit value windows with the arrow keys of the touch screen or the F1 / F4 keys if several alarms apply.

After clearing the alarms, the display changes into the measuring window. If the limit violation still applies, the respective signal is shown in red. A change into the alarm window only takes place if a new limit violation applies.

Acquisition start and stop

see M-VIEW*fleet* -> Configuring displaying modes



Shift/driver function

see M-VIEW*fleet* -> Configuring displaying modes

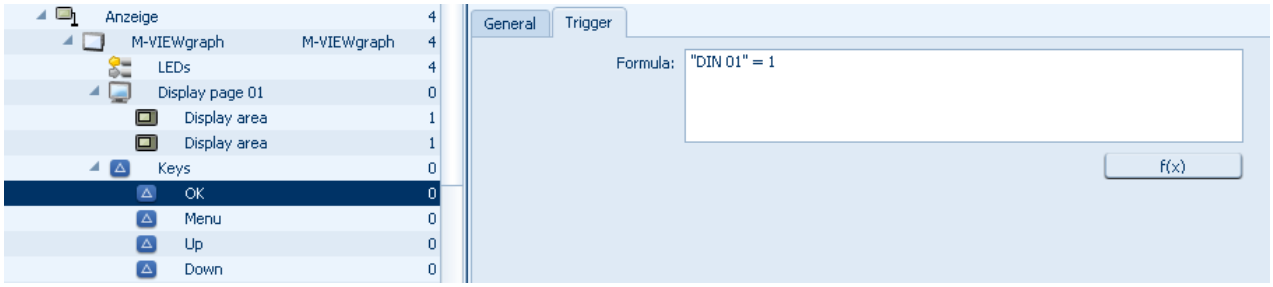
ON/OFF

The logger can manually be started with the ON/OFF button at M-VIEW*graph*. Press the key for approx. 2 s to start the logger and the acquisition. The display LED is on and signalizes operation. An acoustic signal sounds during measuring mode. Press this key again to stop acquisition and shut down the logger.

*Please note that the terminals 30 and 31 of the logger are connected (**not** terminal 15)!*

Simulate function Keys Menu, Up, Down, OK

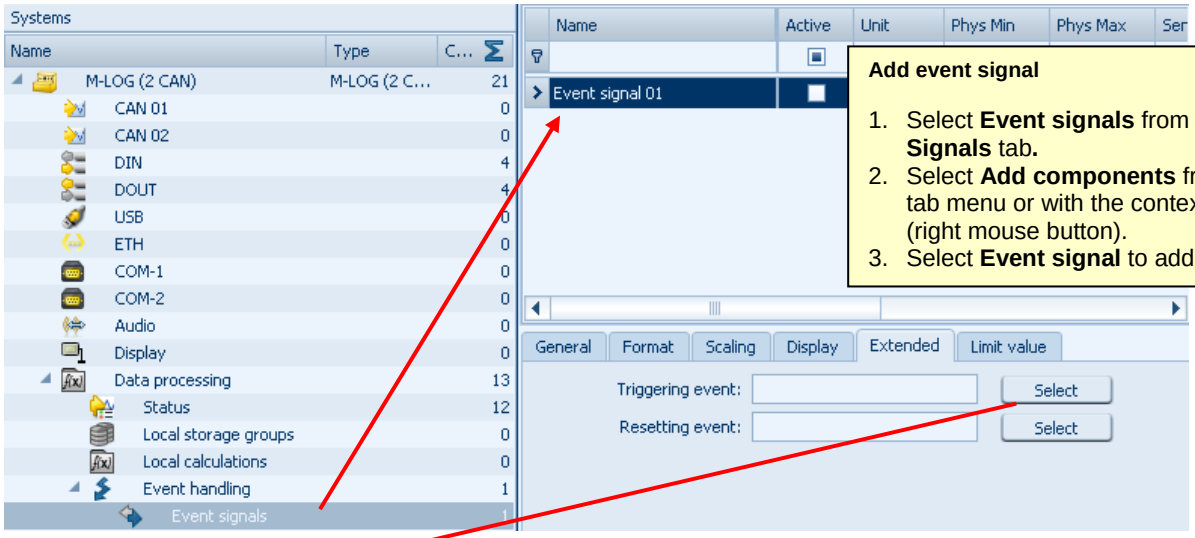
TESTdrive 3.22 offers the additional keys (Menu, Up, Down, OK), which can be controlled with a trigger. Activating a respective key can be simulated with a corresponding formula.



The example shows the “OK“ action, e.g. “Switch-off buzzer“, as soon as the digital input is high.

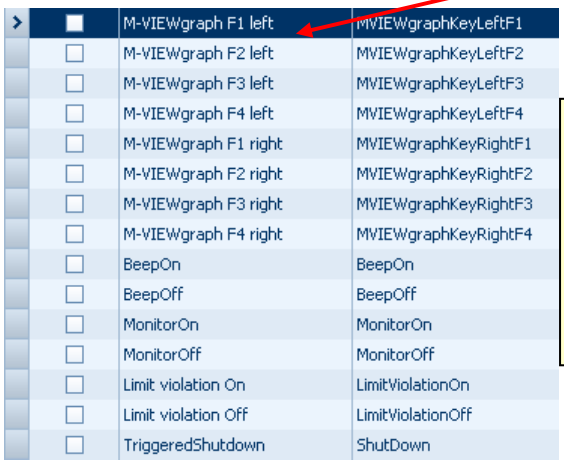
Event handling

Event signals can be used to control data recording, as well as, to switch-on/off external components via the digital outputs.



Add event signal

1. Select **Event signals** from the **Signals** tab**.**
2. Select **Add components** from the tab menu or with the context menu (right mouse button).
3. Select **Event signal** to add it to



Select events

1. Select the **Event signal** from the list.
2. Activate **Extended** tab.
3. Select **Triggering event**.
4. Select **Resetting event**.

The status of the respective event signal remains applied from triggering until

M-VIEWgraph Fx xxx	side keys (right/left) F1 to F4 at M-VIEW*graph*
BeepOn	Buzzer is activated
BeepOff	Buzzer is deactivated
MonitorOn	M-VIEW*graph* is switched-on
MonitorOff	M-VIEW*graph* is switched-off
Limit violation On	At least one limit violation applies.
Limit violation Off	No limit violation applies.
TriggeredShutdown	Remote signal logger off, Logger still in follow-up time

10 Accessories

10.1 Electrical accessories

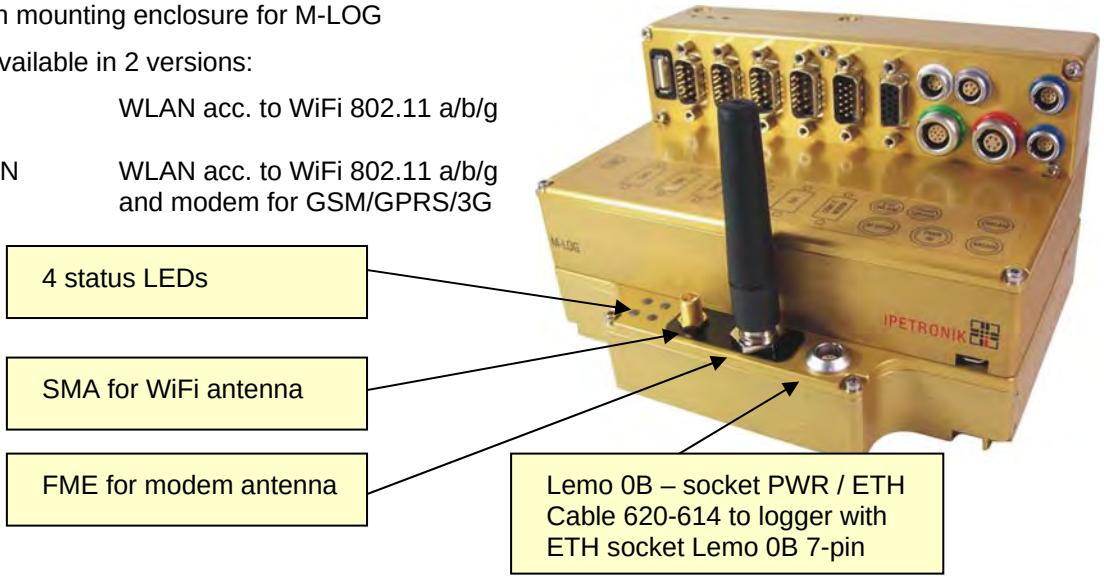
10.1.1 COMgate

COMgate is an intelligent extension device for logger and allows remote transmission of measurement and configuration data.

M-COMgate in mounting enclosure for M-LOG

COMgate is available in 2 versions:

COMgate	WLAN acc. to WiFi 802.11 a/b/g
COMgate WAN	WLAN acc. to WiFi 802.11 a/b/g and modem for GSM/GPRS/3G



LED status display

LED display	Status	Meaning
G R E E N	PWR ON	Device is ready for operation (operation: see LED yellow or orange)
	MODEM	Establishing connection to UMTS/GPRS network
	MODEM	Successfully registered to UMTS/GPRS network
O R A N G E	MODEM	Steady connection
	WiFi	Establishing connection to WiFi network
	WiFi	Successfully registered to WiFi network
Y E L L O W	WiFi	Steady connection.
R E D	ERROR	Interference, potential reasons are: - transfer of new configuration - wrong configuration loaded - general operating interference

M-COMgate requires additional external cooling on M-LOG at operating in ambient temperatures > 70 °C (158 °F)!

10.1.2 Extender

CAN-Extender

Input with status LED (Bus traffic)

Operating status LEDs

ETH/PWR socket to M-LOG

M-LOG Extender is an extension device with 4 additional CAN inputs. M-LOG devices, which are already equipped with a LX800 processor board, as well as, the option Input 2x Ethernet, can be extended without modifying hardware. The extender is screwed to the bottom of the basis device with 4 screws and connected to the logger with the cable 620-406.002 (here PR08, or 620-404.002 for PR03 and 620-405.002 for PR04).

Requirements

- Data logger with LX800
- Option Input 2x Ethernet (with respective port replicator)
- free Ethernet input
- IPEmotion + LOG-PlugIn ≥ 03.19 (Creation and configuration see ETH 01/02 port)

Advices

- The bus inputs of the extender do not support WakeOnCAN and traffic acquisition.
- Data is directly stored on the logger.
- The maximum data rate is 100 Hz.
- The configuration is extended by the additional file *.ecf (Extender Configuration File).

10.1.3 GPS receiver

- GPS mouse for satellite positioning
- Connection to the serial logger interface
- Predefined settings of NMEA protocol configuration software

10.1.4 Bus isolator SAM-CAN-ISO

- High ohm connection of hardware to vehicle CAN
- Electrical isolation between vehicle bus and measurement system
- Connection with short stub
- Version “Hear only“ to avoid unintended influencing of vehicle CAN

SAM-ISO011-23A0

Has e1 approval (**V**ehicle **T**ype **A**pproval VCA) for directly connecting with the CAN bus of public vehicles without restricting the type approval.

10.1.5 iMIC

- compact multifunction device (1.57 * 1.44 * 0.98 in) (40 * 36,5 * 25 mm)
- Voice recording with audio input
- good voice quality
- illuminated trigger button
- 3 status LEDs (green, yellow, multicolor)
- integrated buzzer

Button (illuminated)

Triggering of data recording and/or voice recording via digital input 1.

Status LEDs

LED Yellow Indicates the status of digital output 2 (LED is on if output is active.)

LED Red Indicates the status of digital output 3 (LED is on if output is active.)

LED Multicolor

green	Indicates the status of digital output 1 (green light)
blue	Indicates the satus of the yellow LED (blue light)
red	Indicates the completed boot process. The excitation of the connected devices (at M-CAN or SIM-CAN socket) is switched-on.

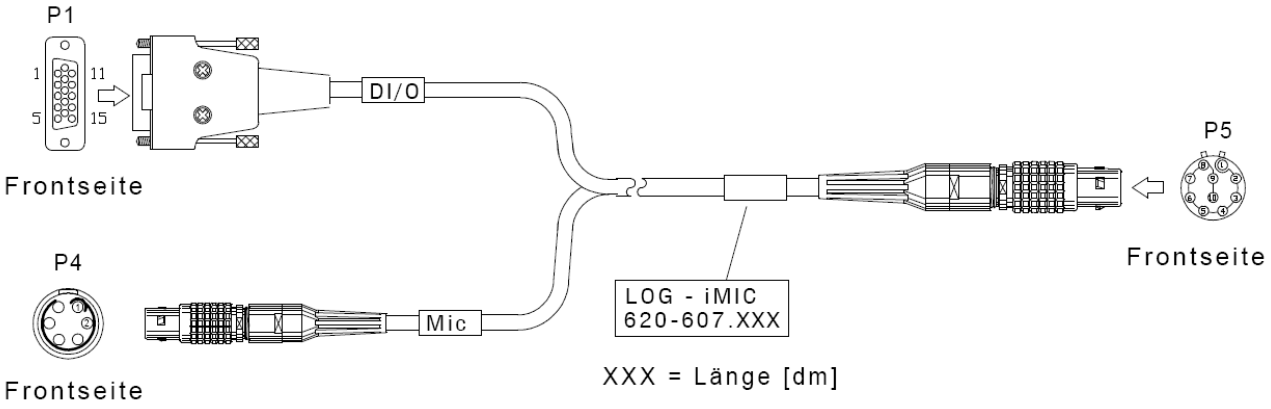
Buzzer

Acoustically indicates the status of digital output 3 (Buzzer ON if output is active).

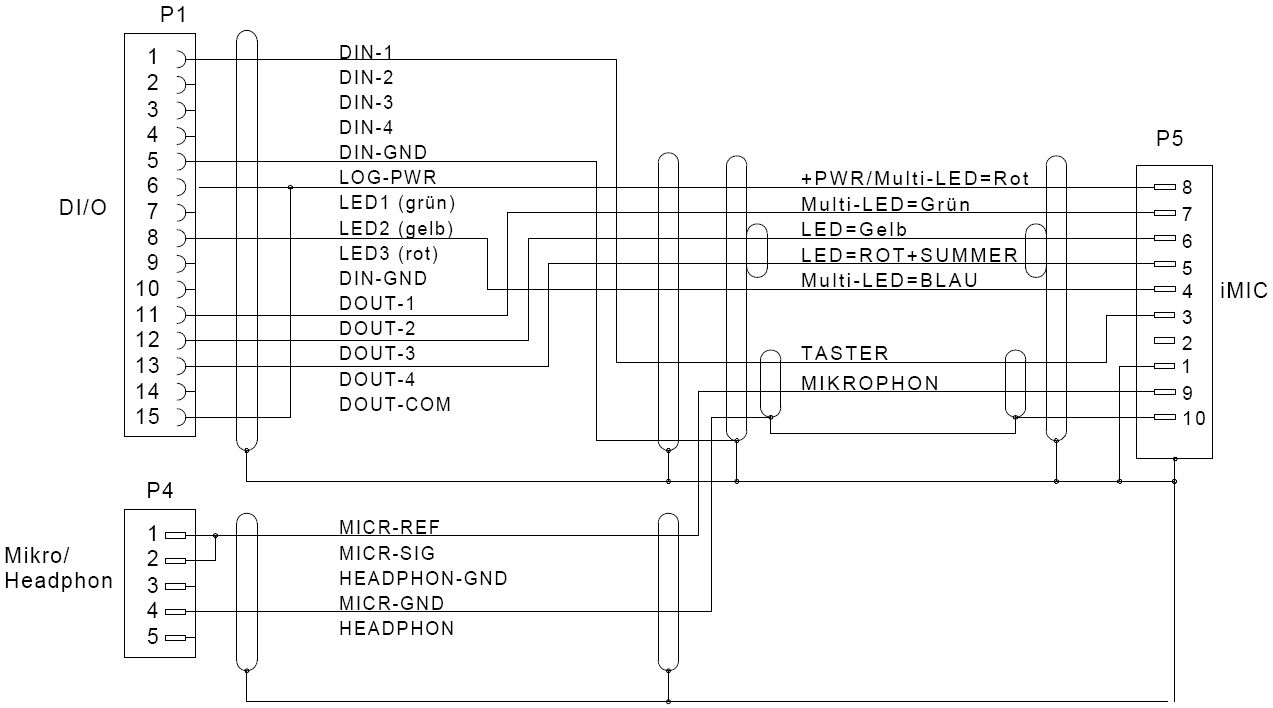
The specific functions of the digital inputs and outputs are defined in the measurement configuration (see Standard functions calculations, trigger, Use of digital inputs and outputs).

The button functionality, as well as, the LEDs and buzzer functionality also depends on the wiring / PIN assignment. If another cable than 620-607.xxx is used, functionality can differ from the one described above.

Cable 620-607.xxx



PIN assignment cable 620-607.xxx



10.2 Mechanical accessories

10.2.1 Module mounting

Dovetail adapter

Adapter plate for mounting to the right M-LOG housing for connecting M devices without tools.

Fastening elements

2 fastening strips for mounting at the device bottom to screw M-LOG to an even surface.

Snap-in fastener

2 snap-in holders + 2 fastening strips for mounting at the device bottom to fix M-LOG at an even plate without tools.

Snap-in adapter

Mounting plate to use a snap-in fastener to fix M-LOG to plate without tools.

Suction pad holder for M-VIEW*fleet* / M-VIEW*graph*

Suction pad holder with pump for fixing driver display on smooth surfaces e.g. at windshield.

Figures are subject to change!

Due to safety reasons, the bottom of the display housing must rest on an underlay (e.g. instrument panel). Avoid a free mounting and do not use the suction pad holder alone for drive tests.

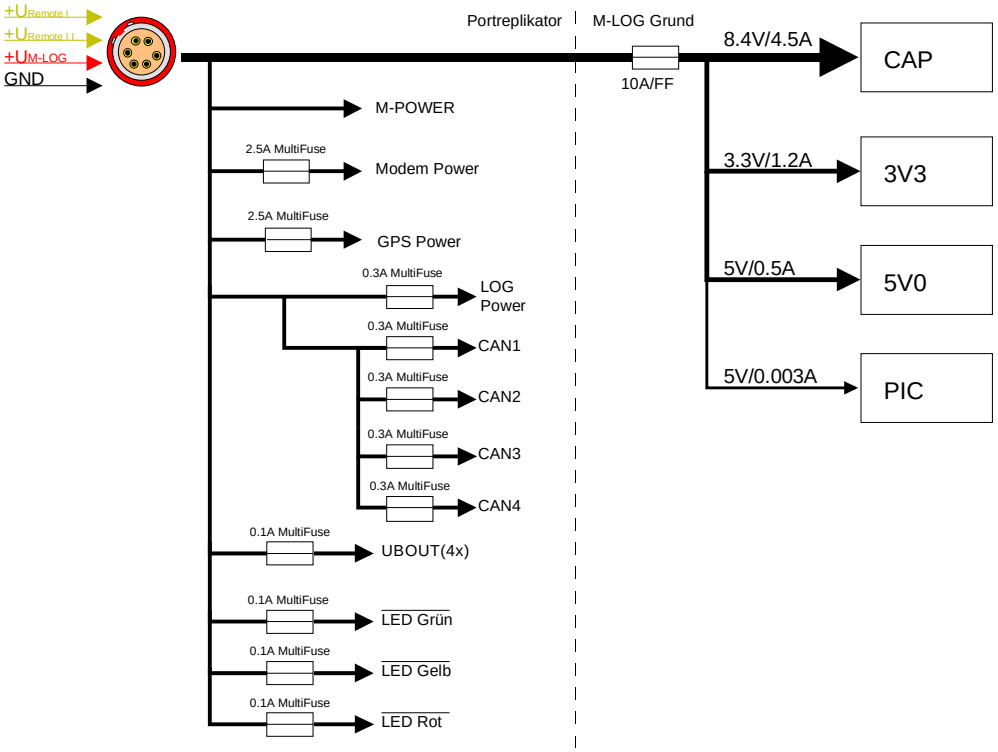
11 Appendix

11.1 Cable connection and Pin assignment

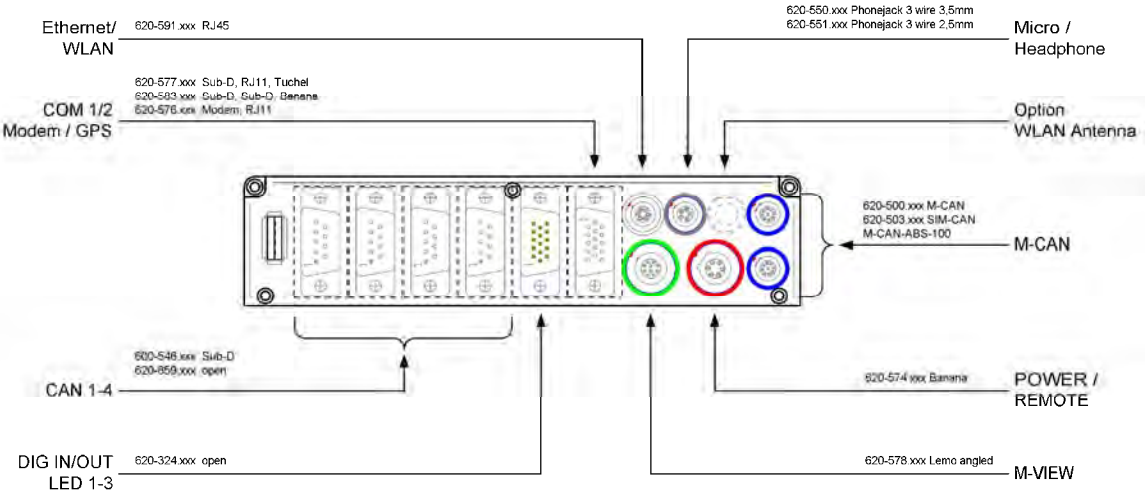
11.1.1 M-LOG port replicators

Port replicator PR05 (4x Sub D 9, PWR-IN/REM Lemo 1B 6 pin)

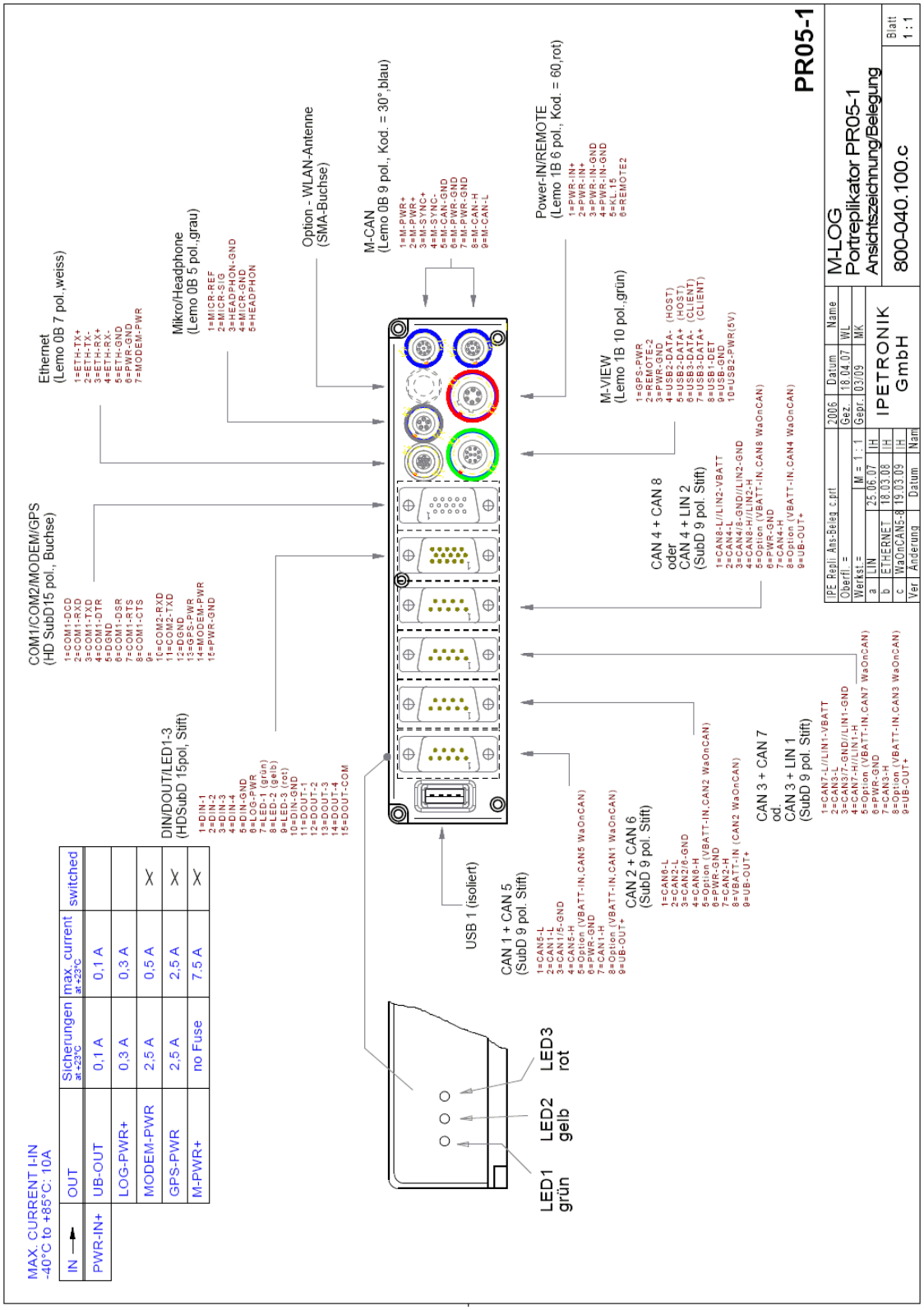
Internal circuits PR05



Cable reference PR05

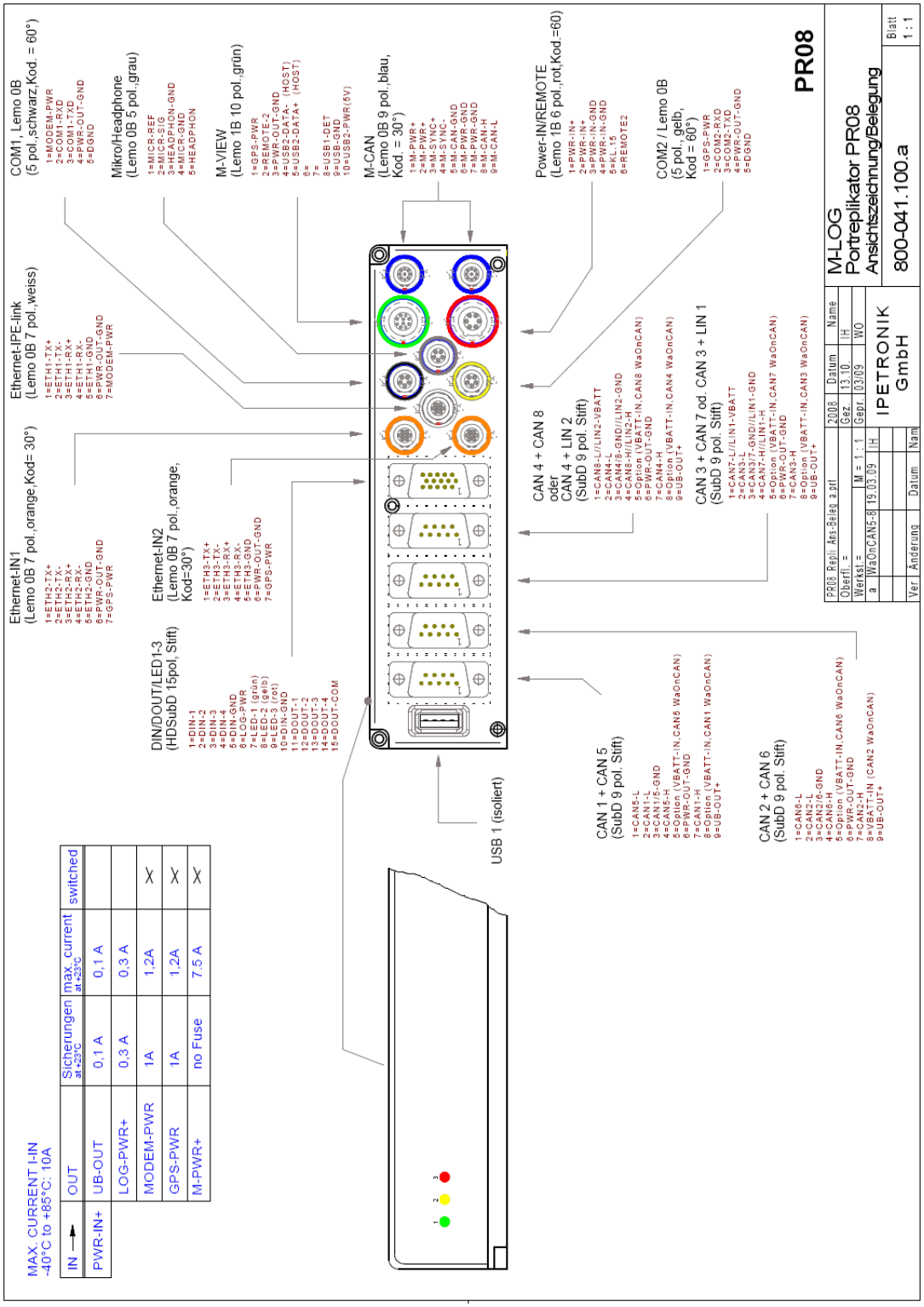


PIN assignment PR05

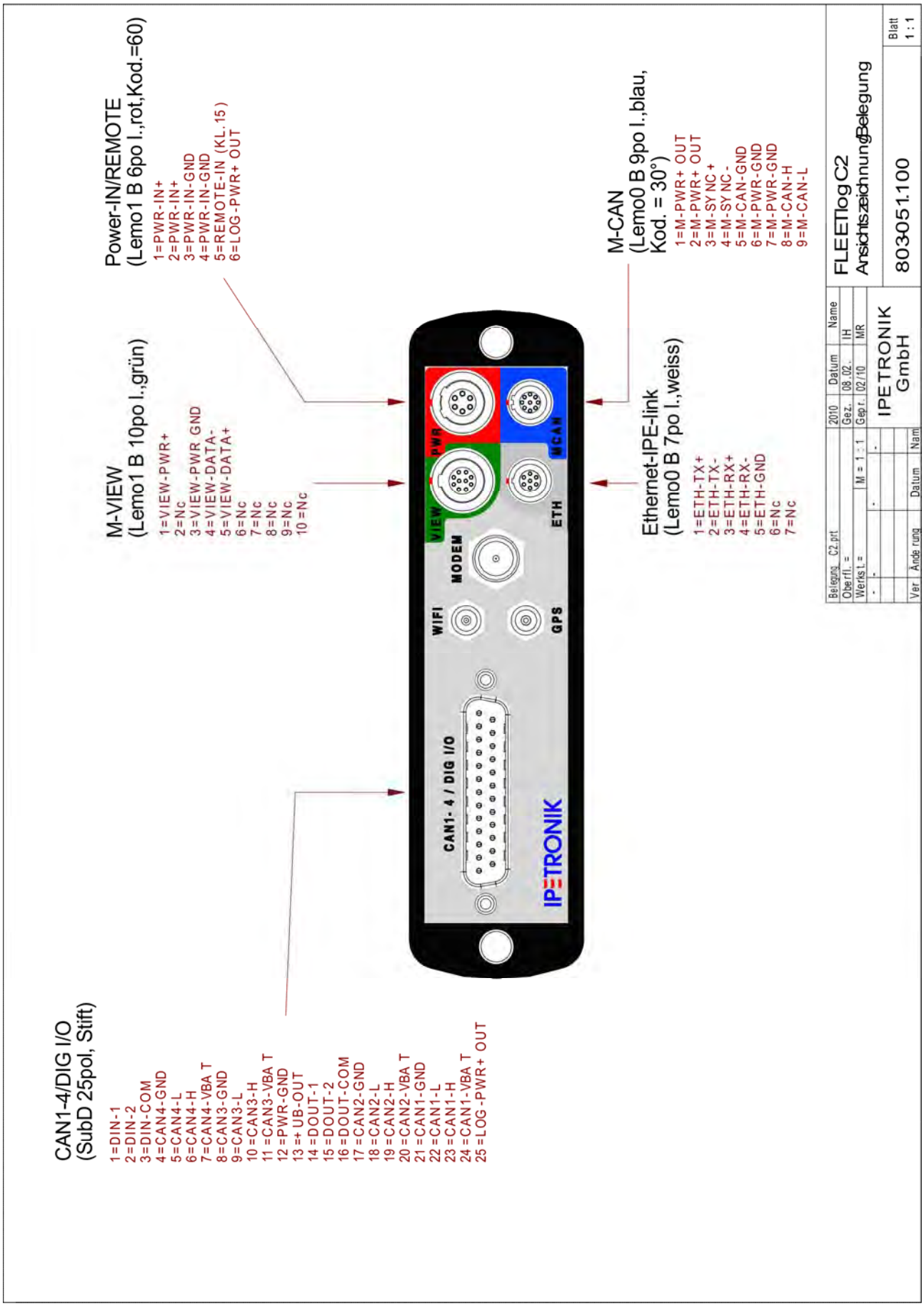


Port replicator PR08 (4x Sub D 9, ETH, PWR-IN/REM Lemo 1B 6 pin)

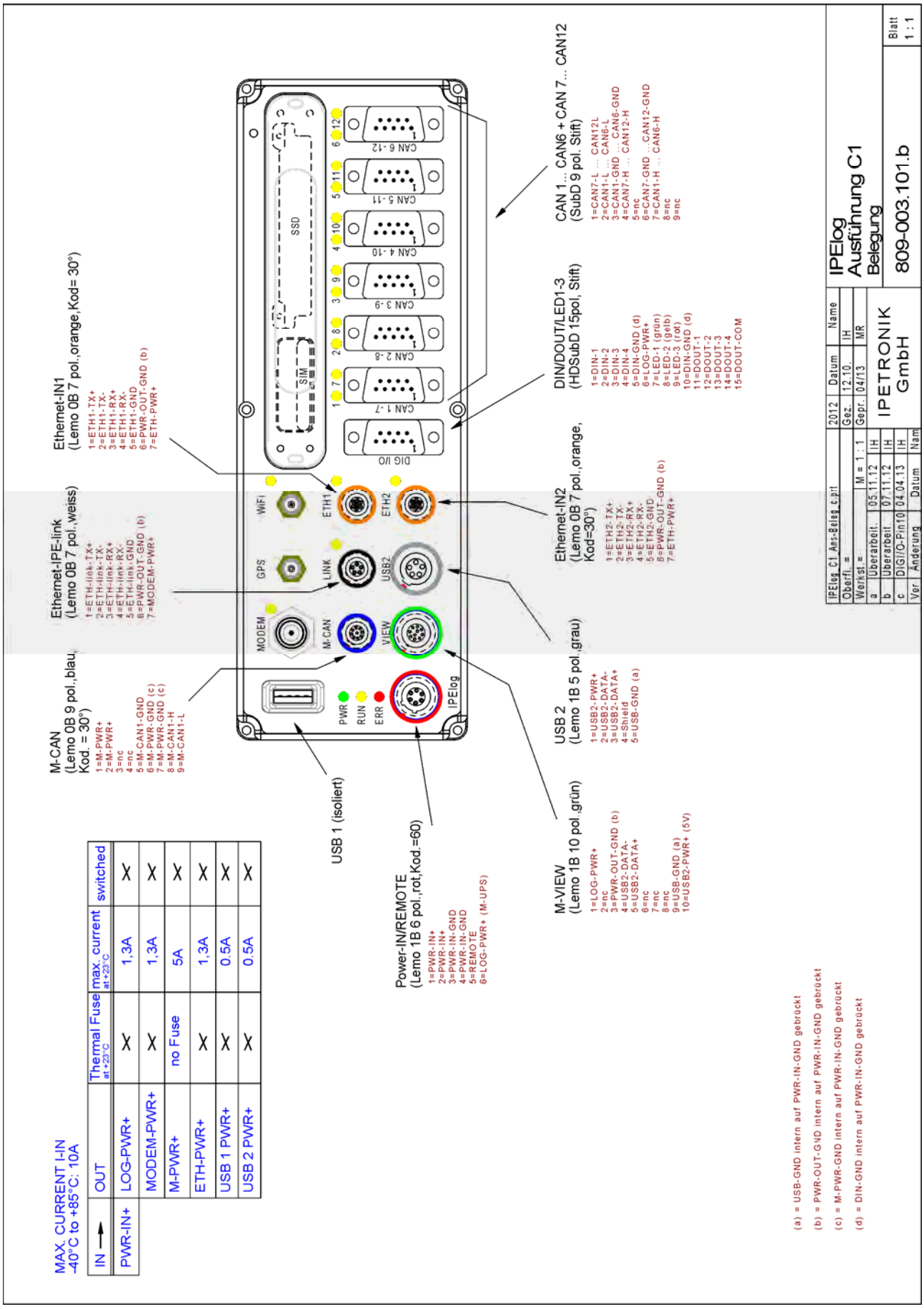
PIN assignment PR08



11.1.2 FLEETlog

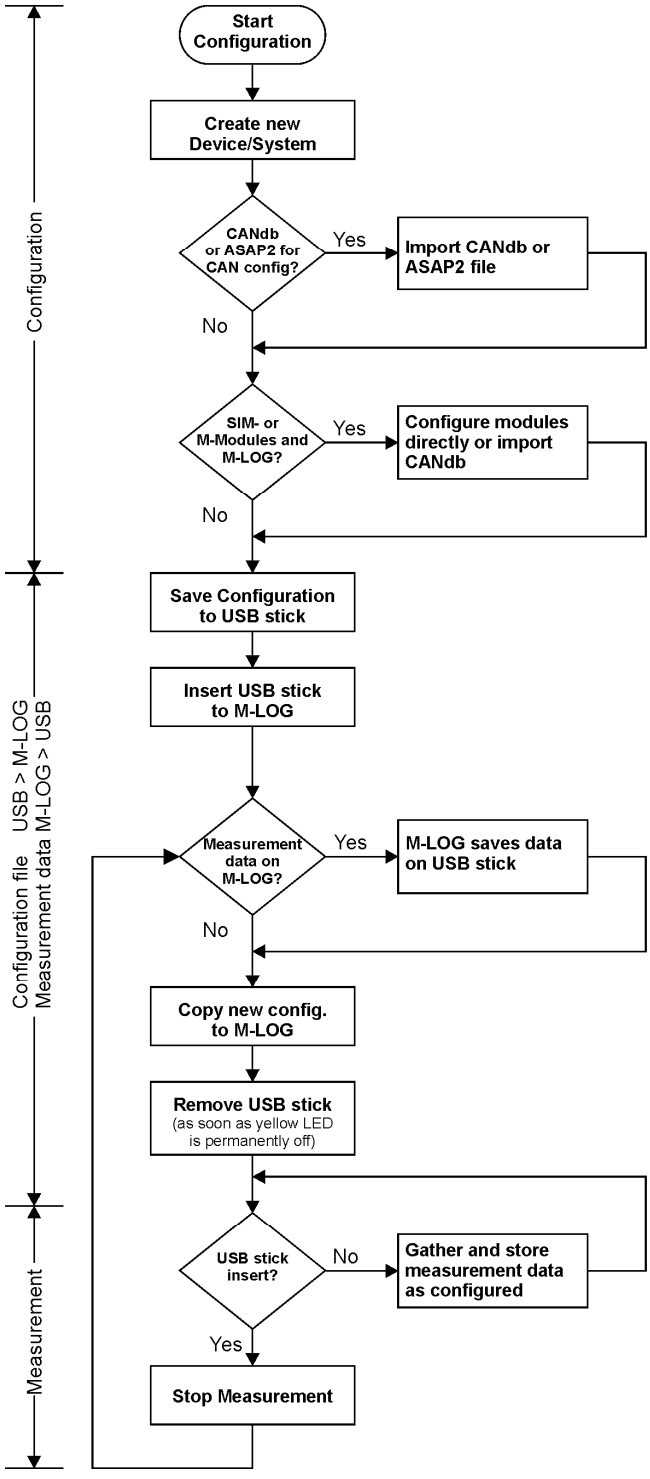


11.1.3 IPElog


IPElog
Ausführung C1
Belegung
809-003.101.b
IPETRONIK GmbH
Ethernet-IN1
(Lemo 0B 7 pol.,orange,Kod= 30°)
Ethernet-IPE-link
(Lemo 0B 7 pol.,weiss)
M-CAN
(Lemo 0B 9 pol.,blau, Kod. = 30°)
USB 1 (isoliert)
Power-IN/REMOTE
(Lemo 1B 6 pol.,rot,Kod.=60)
M-VIEW
(Lemo 1B 10 pol.,grün)
USB 2
(Lemo 1B 5 pol.,grau)
Ethernet-IN2
(Lemo 0B 7 pol.,orange, Kod=30°)
DIN/DOUT/LED1-3
(HDSubD 15pol, Stift)
CAN 1... CAN6 + CAN 7... CAN12
(SubD 9 pol. Stift)
MAX. CURRENT I-IN
-40°C to +85°C: 10A
IN
OUT
Thermal Fuse at+25°C
max. current at+25°C
switched
PWR-IN+
LOG-PWR+
MODEM-PWR+
M-PWR+
ETH-PWR+
USB 1 PWR+
USB 2 PWR+
1,3A
1,3A
5A
1,3A
0.5A
0.5A
no Fuse
(a) = USB-GND intern auf PWR-IN-GND gebrückt
(b) = PWR-OUT-GND intern auf PWR-IN-GND gebrückt
(c) = M-PWR-GND intern auf PWR-IN-GND gebrückt
(d) = DIN-GND intern auf PWR-IN-GND gebrückt

11.2 Starting up

11.2.1 Overview Configuration & Measurement



Configuration via IPEmotion (license required)

Create new or read and process existing configuration.

Configure bus measurement input by import of the respective description file

Configure via IPEmotion

Save configuration as an MCF file (*.mcf).

In case M-LOG is switched off, > switch on the module before. (Do not switch on M-LOG with the USB stick insert!)

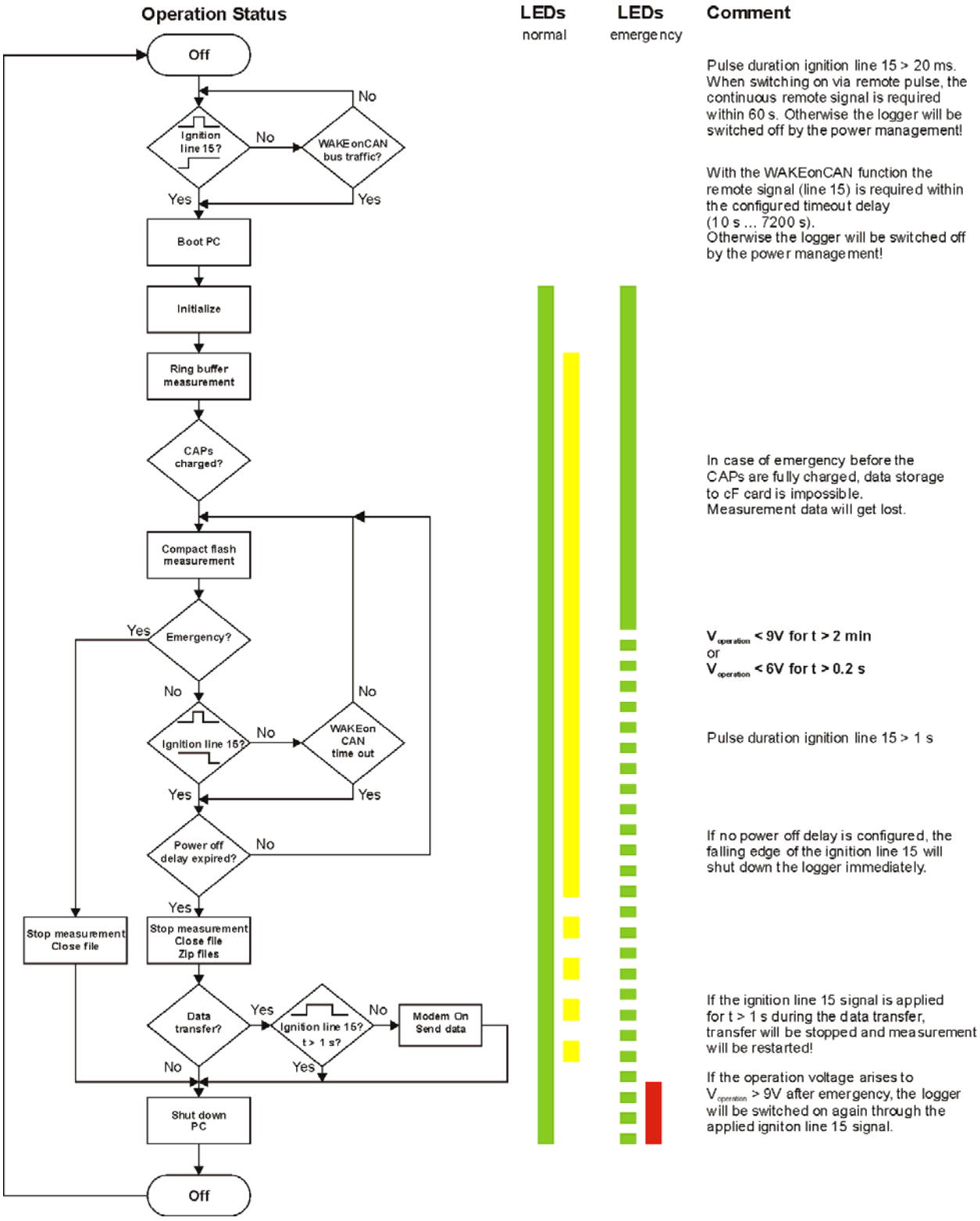
If not already existing, M-LOG creates an specific subdirectory and saves measurement data and the latest configuration to the USB stick. The name of the subdirectory consists of the serial number of M-LOG.

Transfer new configuration from the USB stick to M-LOG

M-LOG automatically starts the measurement application and reads the current configuration.

M-LOG will switch off as soon as the remote input becomes inactive.

11.2.2 Flow chart of the measuring process



11.3 Practical examples

11.3.1 Calculating memory footprint

The memory footprint per storage group results from the following data

- Memory footprint of acquisition channels +
- Memory footprint of time channel (relative and absolute time channel) +
- Memory footprint of header (description file)

Memory footprint of acquisition channels

Acqu. duration [s] x storage rate [1/s] x channel count x 2 Byte = memory footprint in Byte

Memory footprint in Byte / 1024 = memory footprint in kByte

Memory footprint of time channel (IPE:Clock = relative time channel)

Acqu. duration [s] x storage rate [1/s] x 4 Byte = memory footprint in Byte

Memory footprint in Byte / 1024 = memory footprint in kByte

Do not mix the time channel (relative) with the time stamp channel (absolute = Date, time). The time stamp channel is only recorded if activated in storage group dialog.

Memory footprint of header file

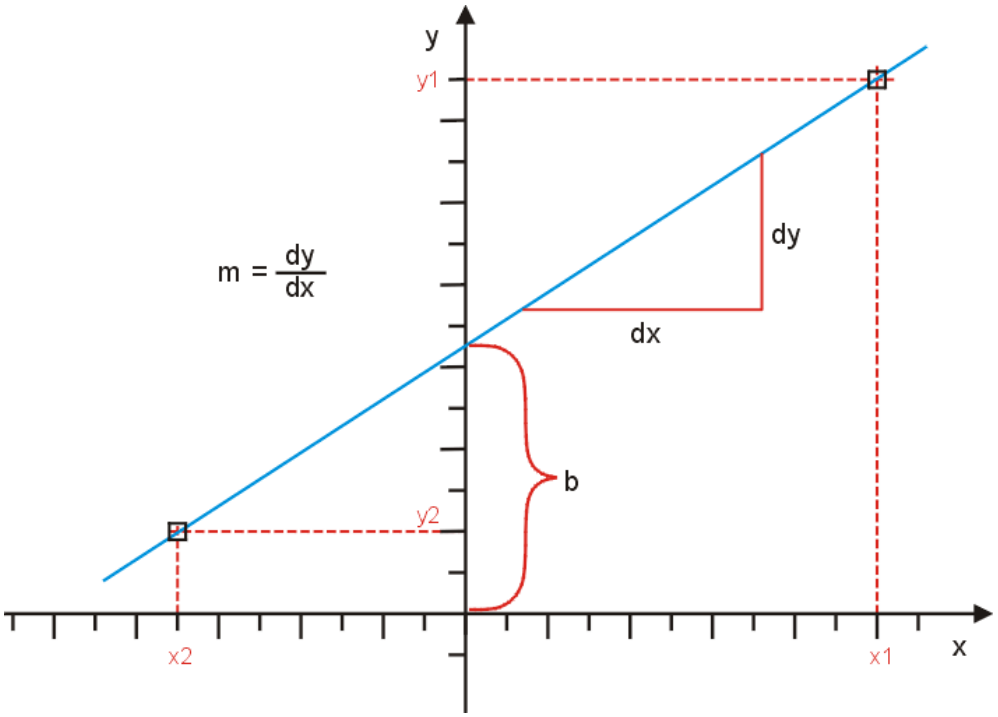
The memory footprint of the header file depends on the size of acquisition configuration (channel count, sampling rate, different data formats, ...) and cannot be defined by a general formula. The size of the header file is usually much smaller so that it can be neglected. Exceptations are short acquisitions or acquisitions with many channels at low storage rate (< 1 Hz).

11.3.2 Linear signal scaling

The conversion of a raw value (binary value, e.g. in a CAN message) into a physical value (value with unit) is effected with the scaling. IPETRONIK offers the scaling calculator and supports linear scaling with the line equation as factor/offset or 2 point scaling.

The scaling of a voltage or current signal (sensor output) into a corresponding physical or percentage value is effected in the same way. The following examples show the connections.

Mathematical basics for the linear equation



Point gradient form

y = m * x + b
b = y - m * x

m = Gradient (gain)
b = constant (offset)

Two points form

m = dy / dx

m = (y1 – y2) / (x1 – x2)

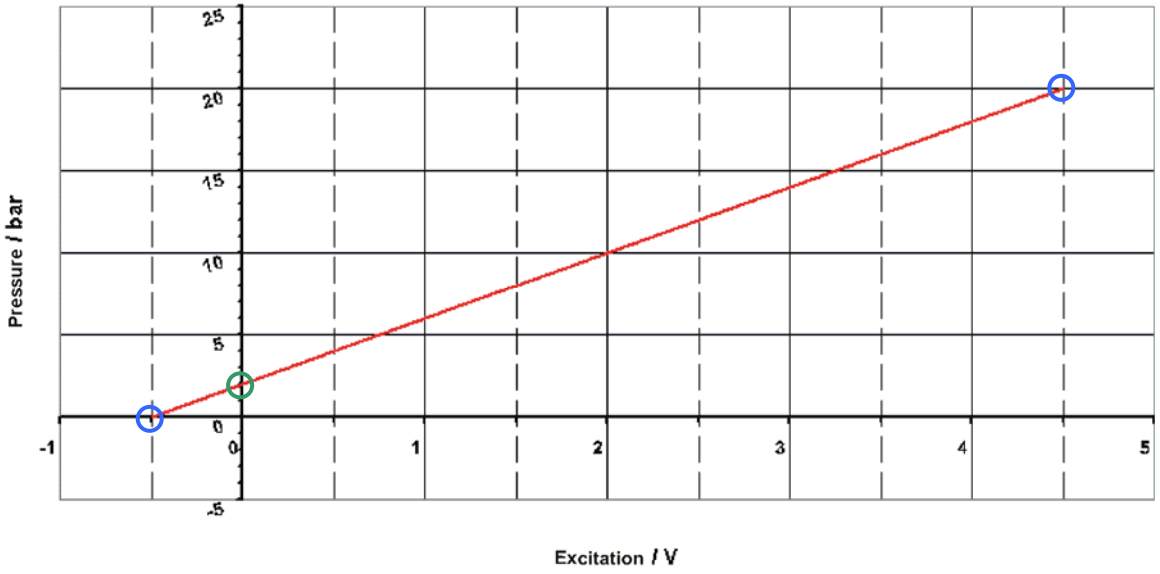
m = Gradient (gain)

Calculation and explanation

1. The linear equation **y = m * x + b** shows the mathematical connection.
2. Calculate the **m** gradient within any input range (signal) and the related output range (physical value).
3. Calculate the offset **b** by using the x and y values for a known point.
4. Calculate, if required, further y values by using the corresponding x values and the equation, e.g. for calculating the physical values for another input range (Channel min, max).

Example pressure sensor

A pressure sensor has an output signal of -0.5 to 4.5 V in the acquisition range 0 … 20 bar.
The voltage signal is converted to the physical value with the linear scaling.

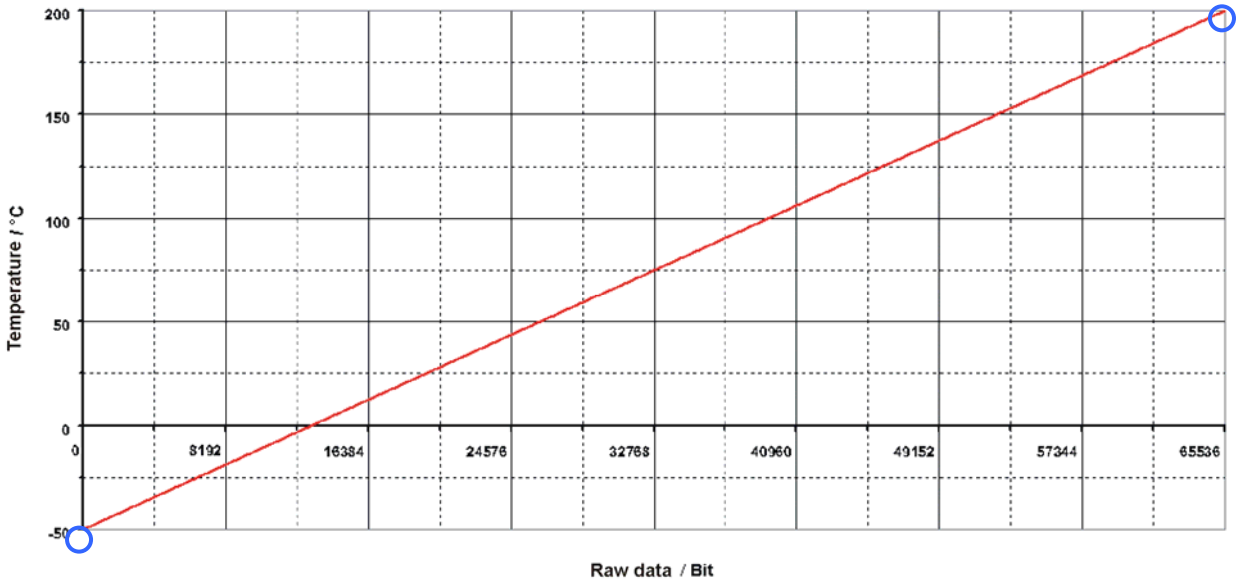


x1	x2	y1	y2	m	b’	b
4.5	-0.5	20	0	4	2	2

Example CAN raw value in the Word unsigned format als temperature

A temperature signal is a CAN message in the Word unsigned format. The value range of 0… 65535 (16 Bit) corresponds to a temperature range of -50 °C … +200 °C.

Please note that the output range has an offset of –50 °C. This must be respected at calculating: (b’ = Offset without output offset, b = Offset + output offset).

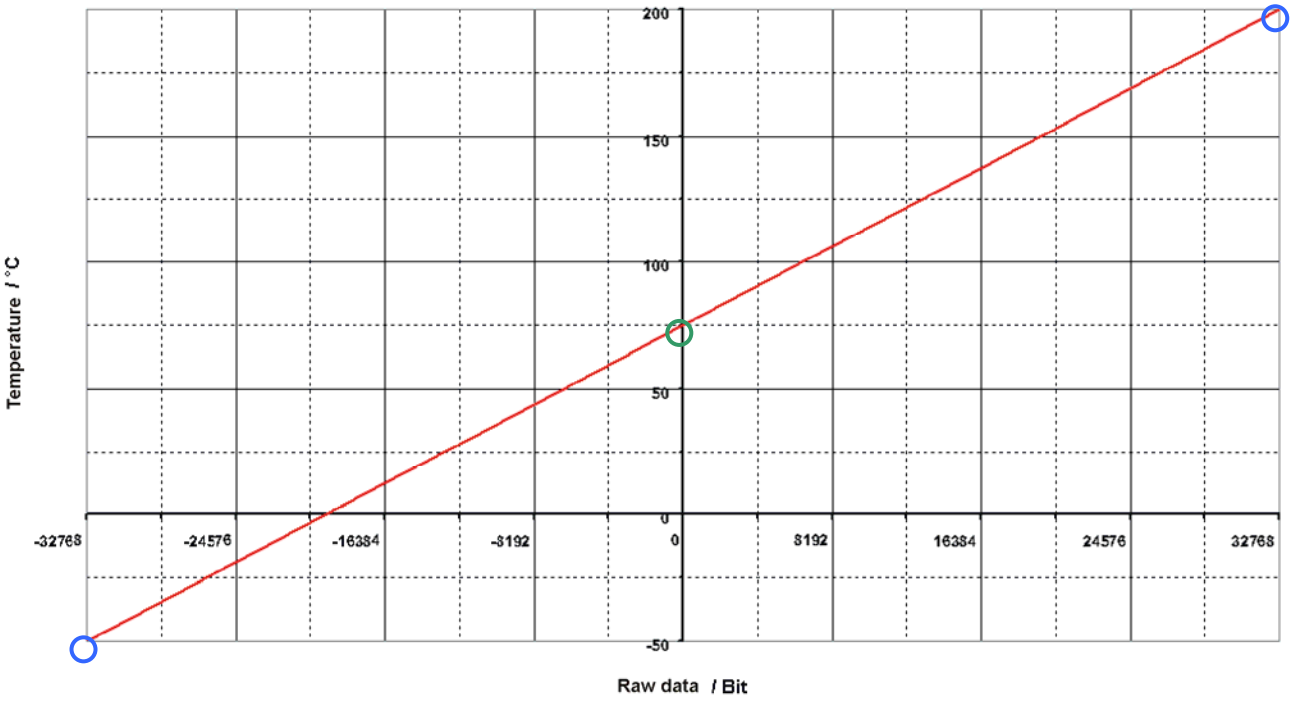


x1	x2	y1	y2	m	b’	b
65535	0	200	-50	0.0038147	0	-50

Example CAN raw value in the Word signed format as temperature

A temperature signal is a CAN message in the Word signed format. The value range of -32768… 0 ... 32767 (16 Bit) corresponds to a temperature range of –50 °C … +200 °C.

Please note that the output range has an offset of –50 °C. This must be respected at calculating: (b' = Offset without output offset, b = Offset + output offset).



x1	x2	y1	y2	m	b'	b
32767	-32768	200	-50	0.0038147	125.0019	75.0019

11.4 Status messages

11.4.1 Most important status messages

Following message types are defined:

I Information W Warning E Error D Debug

Type number: xxx-xxx-xxxx

Number corresponds to the number of the type plate of M-LOG (entry in hw_descr.xml).

Wait max. 3min for write permission (power good)

M-LOG waits until CAPs are loaded (status message "Power good" from PIC). If status is “Power good“, data is written to flash. If this status is nor reached, (PIC) switches off M-LOG after 3 min.

Power good

Message (from PIC) that CAPs are loaded.

Debounce remote signal 1000 ms

Remote signal must be on at least for 1 s to reach “ON“ status. (Debouncing of remote signal)

Remote signal is detected as such if excitation > 6.5 V at PIN terminal:15 of PWR-IN/REM socket.

Watchdog active

PIC transfers control of M-LOG to TESTdrive.

Function: Testdrive cyclically describes a storage range in Powermanagement (PIC) (toggling bit). If this toggling fails for more than two minutes, M-LOG is switched off by Powermanagement (PIC).

Free disk space: xxx/xxx

Indicates the available total memory space. TestDrive 3.09 shows a "Free disk space: xxxx" at the left bottom display window. It shows the available space for data storage (40% of total memory space). Initially, this value fluctuates intensively but stabilizes with a longer acquisition because it is recalculated permanently.

Time left: xx xx:xx:xx

Display bottom left in monitor window. Meaning: d hh:mm:ss

Power bad

If excitation is too low, status is “Power bad“.

Info: This message is not concerned with CAPs contrary to "Power good" message.

Can`t initialize communication mediums

Dev_conf.xml is not included in Config, i.e. no data transfer activated.

Shutdown in 55 min

If data postprocessing (zipping, establishing, data transferring, data sending, etc.) is not completed within 55 min, Testdrive shuts down and data remains on logger.

Emergency shutdown in 60 min

Logger is unconditionally shut down after 60 min. Powermanagement of M-LOG controls the device.

Time left: xx xx:xx:xx

Display bottom left in monitor window. Meaning: d hh:mm:ss

Power bad

If excitation is too low, status is “Power bad“.

Info: This message is not concerned with CAPs contrary to "Power good" message.

Can`t initialize communication mediums

Dev_conf.xml is not included in Config, i.e. no data transfer activated.

Shutdown in 55 min

If data postprocessing (zipping, establishing, data transferring, data sending, etc.) is not completed within 55 min, Testdrive shuts down and data remains on logger.

Emergency shutdown in 60 min

Logger is unconditionally shut down after 60 min. Powermanagement of M-LOG controls the device.

11.4.2 Warning and error messages after program update

Program options without license

TESTdrive Version 3.17 includes a license software to check the use of logger / TESTdrive options. This requires sending new license keys to the logger.

After a TESTdrive program update, potential warning messages can indicate locked options. TESTdrive checks if used functions are really unlocked on the logger. Following warning is written into log file if e.g. all inputs of a card with 4 CAN inputs is used but only 2 are unlocked.

01.04.2009 14:11:45 W CAN1 : Upper limit of licenced CAN interfaces reached. Max= 2

Please contact the sales team at +49 7221 / 9922 – 222 to assist you with warning and error messages, as well as, licensing.

TESTdrive V03.22 deactivates the non-licensed functionality and warns with the red status LED (temporarily at acquisition start). Depending on the missing license, acquisitions are limited (e.g. possible calculations but no classification) or disabled (e.g. at missing license for interface).

If an extender is used at the logger, an additional license for the extender is required!

The system shows the following warning if an extender is used with a non-licensed CCP protocol:

16.02.2011 15:36:01 E Extender.80200011: Error reading XML-Buffer at line 11

11.5 Description of TESTdrive files

TESTdrive provides the measurement files as zip archives. TESTdrive creates separate zip files for every acquisition:

MEA_xxxx.zip (Acquisition data + header file + current configuration)

LOG_xxxx.zip (Protocol file for data acquisition)

A data set of an acquisition always includes a header file (AABBCCC.DAT), at least one acquisition file in DIAdem format, as well as, the corresponding acquisition configuration (e.g. IPEmotion.isf).

The names of the single acquisition files are generated according to the **AABBCCCC.DDD** structure:

After reaching the consecutive file number 9999 (CCCC), counting starts again with 0001!

If the file with this number still exists, it is overwritten with new data!

AA	=	Data type
BB	=	Consecutive number within a data type
CCCC	=	Consecutive number of an acquisition
DDD	=	File extension

AA data type indicates the type of data:

DO	=	**D**ata **O**nline (storage group with time channel)
PM	=	**P**ost **M**ortem data of a ring buffer group (storage group with time channel)
CO	=	**(C)** Classification **O**nline (storage group with statistic data, without time reference)
A0	=	**A**udio **O**nline
V0	=	**V**ideo **O**nline
J	=	**J**ob data = Diagnostic data
ST	=	Min-Max list
TBQS, T	=	CAN/LIN traffic acquisition (during or after boot process)
MV	=	Maneuver recording

The consecutive **BB** number clearly assigns data within one data type. Several storage groups for instance can be detected with real-time data, which are distinguished from each other by this number.

The consecutive **CCCC** number differentiates between single acquisitions. Each acquisition is therefore clearly defined.

The **DDD** file extension defines the data format as follows:

DAT	=	DIAdem header file
T64	=	DIAdem time channel with 64 bit resolution
W8	=	DIAdem data with 8 bit unsigned (BYTE)
W16	=	DIAdem data with 16 bit unsigned (WORD)
W32	=	DIAdem data with 32 bit unsigned (WORD)
I16	=	DIAdem data with 16 bit signed (INTEGER)
I32	=	DIAdem data with 32 bit signed (INTEGER)
R32	=	DIAdem data with 32 bit in floating point displaying (REAL)
R64	=	DIAdem data with 64 bit in floating point displaying (REAL)
WAV	=	Audio file in WAV format
AVI	=	Video file in AVI format
CSV	=	Comma Separated Values
Jxx	=	Binary file with job result

Recorded signals are divided into different files accordingly to data typet, i.e. all 8 bit signals unsigned are in a *.W8 file, all 32 bit signals signed in a *.I32 Datei, etc.

Important advices:

TESTdrive defines the number of the storage group during the initialization process. An assignment of the storage group number to the order in the configuration interface is not given.

All information of a storage group is stored in the DAT file. The DAT file has a 8 bit ASCII format (ANSI code page 1252, ISO 8859-1).

The storage group name can be defined with IPEmotion and is also stored in the DAT file.

All project information are stored in the DAT file (vehicle no., project name, etc.). At working with classifications, the DAT file contains additional fields to define the classification in detail.

11.5.1 Data types

Time-related data (Storage group)

The header file and the corresponding data files are created for every storage group (= signals with common storage rate).

Example (Acquisition no. 699 > DOBBCCCC.DDD)

Storage group 1	DO010699.DAT	Header
	DO010699.R32	32 Bit (Real)
	DO010699.W16	16 Bit (Word unsigned)
	DO010699.W32	32 Bit (Word unsigned)
Storage group 2	DO020699.DAT	Header
	DO020699.W8	8 Bit (Byte unsigned)
	DO020699.W32	32 Bit (Word unsigned)
Storage group x	DO0x0699.DATHeader	
	DO0x0699.W8	16 Bit (Word unsigned)

Statistics

TESTdrive saves classification data in DIAdem format, which includes all parameters in one header file. This header file includes additional information about classification description. Corresponding to the storage groups and the general DIAdem conventions, binary data is included in the same files. These files are separated accordingly to data type and are defined by an extension corresponding to data type, e.g. *.W32, *.R64.

The results of several classifications of the same data type are stored in one binary file. Most classification types create results of the W32 data type. The retention time classification can create different data types.

Example (Acquisition no. 699 > COBBCCCC.DDD)

Header	CO010699.DAT	Header
Classification m … n	CO010699.W32	32 Bit (Word unsigned), can include several classifications
	CO010699.R64	64 Bit (Real), can include several classifications

Audio recording

A DIAdem acquisition and one or several audio files (WAV format) are created with an audio recording.

The DIAdem acquisition contains the trigger event, the WAV file includes the audio data.

Every audio file is assigned to one triggering event. The names of the audio files include the counter value of the trigger channel to create a direct reference within the acquisition data. The respective audio file is recorded for the time of an activated trigger.

Example DIAdem file (Acquisition no. 699 > A000CCCC.DDD)

Trigger channel	A0000699.DAT	Header
	A0000699.W16	16 Bit (Word unsigned)

Example audio file (Acquisition no. 699 > ABBBCCCC.WAV)

Audio sequence 1	A0010699.WAV	Audio data of 1. trigger event
Audio sequence 2	A0020699.WAV	Audio data of 2. trigger event
Audio sequence x	A00x0699.WAV	Audio data of 3. trigger event

Video recording

A DIAdem acquisition and one or several video files (JPG = single image or AVI = video sequence) are created with an video recording.

The DIAdem acquisition contains the trigger event, the JPG or AVI file includes the video data.

Every video file is assigned to one triggering event. The names of the video files include the counter value of the trigger channel to create a direct reference within the acquisition data. The respective video file is recorded for the time of an activated trigger. Exactly one single image is saved per trigger event, independent of the trigger duration.

Example DIAdem file (Acquisition no. 699 > V000CCCC.DDD)

Trigger channel 1 (Video)	V0000699.DAT	Header
	V0000699.W16	16 Bit (Word unsigned)
or		
Trigger channel 1 (Image)	I0000699.DAT	Header
	I0000699.W16	16 Bit (Word unsigned)

Example video file (Acquisition no. 699 > VBBBCCCC.AVI)

Video sequence 1	V0010699.AVI	Video data
Video sequence 2	V0020699.AVI	Video data
or		
Image 1	I0010699.JPG	Image data
Image 2	I0020699.JPG	Image data

Diagnostic acquisition

Error memory and non-recurring data

TESTdrive creates additional files for error memory and non-recurring data. This CSV file (BDJDcccc.CSV) is an overview and includes all information about the completed jobs. Every successful job is saved in a binary file (BDS1cccc.Jxx), which contains the actual data.

A CSV file**, as well as, the corresponding jobs are created after the completed acquisition of UDS services.

**** A CSV file is only created in binary mode, not in trace modeT.**

The names of the single acquisition files are generated according to **BDPECCCC.DZZ** structure:

BD**P**ECCCC.DZZ	with P = U (UDS protocol), P = K (KWP protocol)
BDP**E**CCCC.DZZ	with E = ECU number (1 ... 9)
BDPECCCC.**D**ZZ	with D = J (Job or binary file), D = T (Trace file)
BDPECCCC.D**ZZ**	with ZZ = Job number (01 ... 99)

Beispiel non-recurring data (Acquisition no. 699 > BDPECCCC.DZZ)

Trace file	BDU10699.T01	UDS protocol, ECU no. 1, Acquisition no. 699, Job no. 1
Binary file	BDU10699.J01	UDS protocol, ECU no. 1, Acquisition no. 699, Job no. 1
CSV file	BDJD0699.CSV	Job overview of binary files

Measurement status file

Measurement status file in XML format offers information about the process of a completed acquisition. This includes:

- Acquisition start and stop (… in standardized XML format “DataTime”)
- General system information (hardware, TESTdrive version,…)
- Storage group trigger
- Acquisition / Diagnosis information
- Limit violations
- Maneuver detection

Measurement status file is created after acquisition stop and is stored in the zip container of the acquisition (MEA_xxxx.zip) or attached to the status e-mail if this file creation has previously been activated in IPEmotion **Options > PlugIns > IPETRONIK LOG > PlugIn specific settings > Options > General > Create measurement status file**.

Example Measurement status file (measurement number 699 > MSxxyyyy.xml)

xx = Append number, yyyy = Measurement number

Measurement status file 1	MS010699.xml
Messstatus status file 2	MS020699.xml

If an acquisition is later continued (Append mode), TESTdrive increases the append number in the file name.

Min-Max list (STG file)

TESTdrive creates a separate file (STG file) to record minimum and maximum values of selected signals.

Example STG file (Acquisition no. 699 > STBBCCCC.STG)

STG file 1	ST010699.STG	Min / Max data of storage / process group 1
STG file 2	ST020699.STG	Min / Max data of storage / process group 2

Traffic recording (CAN, LIN)

TESTdrive saves traffic acquisitions in binary format. A traffic acquisition can include two binary files:

- Traffic data recorded by TESTdrive during boot time
- Traffic data recorded by TESTdrive during run time

Advice: Storage of CAN traffic data and LIN traffic data in the same file

The names of the single acquisition files are generated according to **TBBBCCCC.BIN** structure:

TBBBCCCC.BIN	Traffic data recorded by TESTdrive
T**BBB**CCCC.BIN	Consecutive number within an acquisition
TBQSCCCC.BIN	Traffic data recorded by micro controller

Maneuver recording

TESTdrive creates a file in ASCII format for maneuver recordings.

The maneuver file functions like a storage group, i.e. the file receives a consecutive number within the acquisition.

The names of the single acquisition files are generated according to **MVBBCCCC.ASC** structure:

MV**BB**CCCC.ASC	Name of respective storage group

Example (Acquisition no. 699 > MVBBCCCC.ASC)

Storage group 1	DO010699.DAT	Header
	DO010699.I16	16 Bit (Integer signed)
Storage group 2	DO020699.DAT	Header
	DO020699.R32	32 Bit (Real)
Maneuver file	MV030699.ASC	