TopMessage ProfiSignal Software



TopMessage devices



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onformity



SO 9001.



Safety regulations

Please observe the following safety regulations by all means.

- Thus, you protect your device and yourself as well:
- Disconnect the supply voltage before you start working at the voltage-carrying parts there is danger to life with high voltages!
- A control voltage of as much as 36 V max. can be applied to the input terminals of the Message devices. The installation can only be made by qualified personnel as unintended touching of lines carrying a voltage of more than 40 V will result in danger to life.
- Cross voltages, that might arise between the different signal lines can also become seriously dangerous for you.
- Electronic component parts are sensitive to electrostatic charging. In order not to damage your devices, carry off from yourself possible static chargings, before you touch the circuit board or component parts. We would recommend to wear a conductive wrist band.
- Please take care that the signal lines will be connected professionally to the screw terminals.
- Only use the intended tools to open the device.
- Upon disconnection of the supply voltage the data transmission will be interrupted which can entail data losses.



1 TopMessage and TopLab

The manuals apply to TopMessage and TopLab devices. Both types of devices only differ by design and signal connections.



TopMessage Master (GBDT)

DIN rail mounting and screw terminals for sensor connection.



TopMessage Slave (Extension Unit GSLT)

DIN rail mounting and screw terminals for sensor connection.

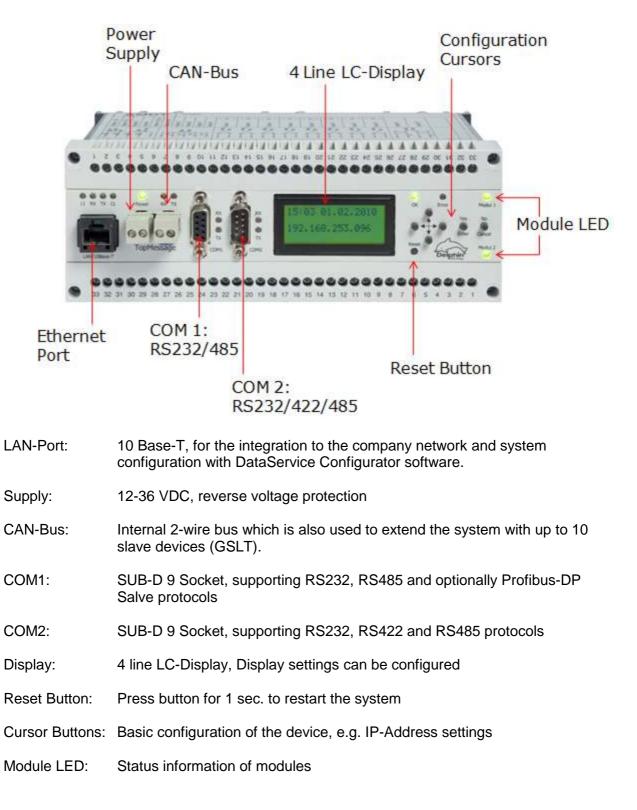


TopLab (Master GBDT-L)

Table device with 4mm banana plugs for sensor connection.



1.1 Device overview

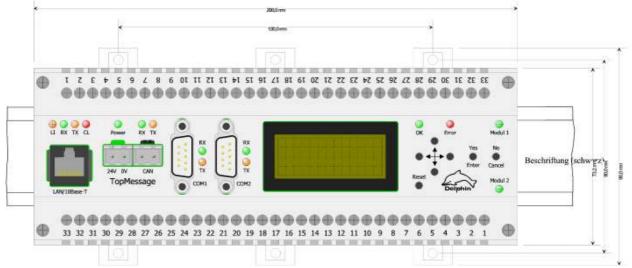




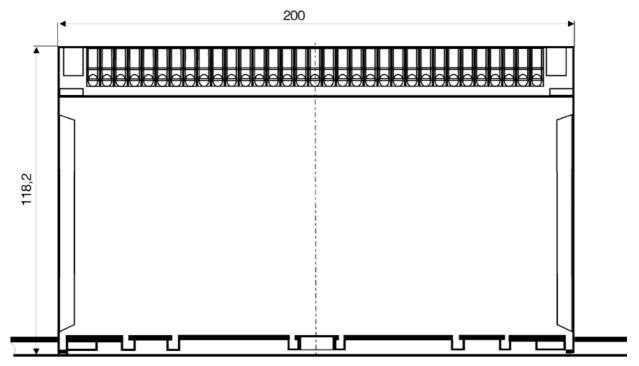
1.2 Device dimensions

Housing (WxHxD – 200x73x118 mm) for basic and extension devices. Mounting rail DIN EN 50023 or screw fixture.

Front view:



Side view:



Detachable screw clamps, 33 clamps in 2 rows, cable protection, connection wiring, max. 2,5mm²



1.3 General technical data

GENERAL TECHNICAL SPECIFICATION				
Weight	1 kg			
Dimensions	200 x 73 x 118 mm			
Material	Plastic Housing			
Humidity	80%, non Condensing			
Temperature Range	-20 60 °C			
Power Supply	12 (18) - 36 VDC external, Revers Voltage Protection			
Power Consumption	10 Watt			
Mounting	DIN Rail			
Ethernet	10 Base-T (half/ful Duplex) / TCP/IP, UDP, ICMP			
Display	4 lines, 15 characters, backlight			
Real Time Clock	100 ms Resolution			
Key Pad	6 keys			
Number of Status LED	14			
Web Server	Built-in for HMI Design			
Serial Port COM 1	RS232 - 125 kBaud / RS485 - 500 kBaud			
Serial Port COM 2	RS232 - 125 kBaud / RS485 - 500 kBaud / RS422			
Protocols	TCP/IP, Modbus RTU (Master & Slave) , Modbus TCP (Master & Slave), GPS (NMEA), GSM Modem			
Sensor Connection	Screw terminal, 2,5mm ²			



2 Connection to PC

2.1 Setting the IP-Address

In order to establish a direct connection between PC and the Message device the cross over cable included in the delivery is required. The configuration of the IP-Address through the cursors is explained in the following chapters.



LAN Socket: RJ45 (8pol. TP/UTP-Socket) 10Base-T (Twisted Pair, 10 Mbps) Galvanic Isolation : 1kV

To establish a connection between the Message device and the PC the appropriate network settings (IP-Address and Subnet Mask) are very import. The IP address is valid for the master and all slaves connected via CAN-Bus. The selected IP addresses must not be occupied by other participants in the network.

If possible, use the factory-set addresses. However, please check that the IP addresses differ from each other if you operate several master devices in a network.

Interfaces	Access via the menus	Factory setting
Data network connection	Main Menu / Setup /	192.168.254.xxx
Ethernet-LAN10Base-T	LAN 10Base-T / IP address	
Serial port COM1	Main Menu / Setup /	192.168.001.001
RS232 or RS485	Serial COM1 / IP address	
Serial port COM2	Main Menu / Setup /	192.168.002.002
RS232 or RS485	Serial COM2 / IP address	

Each interface (LAN, COM1, COM2) requires its own IP address.

Remark:

If you link the Message devices to an existing company's network, clarify the allocation of the IP addresses with your network administrator.

For Ethernet connection the numbers (xxx) to be selected from the range "1" to "254" ("0" and "255" must not be selected by any of the devices connected to the network; these numbers cannot be set on the devices!).



2.2 Function of NetMask

The Net-Mask serves to adapt to the prevailing network and subnetwork structures, and should filter out of the current data transfer in the network the appropriate information for the master. Default setting : 255.255.255.0

Only alter, if necessary.

Clarify the allocation of the setting with your network administrator.



3 Connect supply voltage



Plug :

LP-plug clamp 2-pin. E. g. Wieland 8113B/2VL, order no. 25.326.3253.0

24V+ connection 1 (left) 0V / earth connection 2 (right)

 $\begin{array}{l} U_{\text{IN}} \colon 12..28 \ V_{\text{AC}} \pm 10\% \ / \ 12..36 \ V_{\text{DC}} \pm 10\% \\ U_{\text{IN MIN AMDT}} \colon 18 \ V_{\text{AC/DC}} \end{array}$

P_{max}: 10 Watt

Protection: internal Fuse: 2 A T



4 Serial interfaces

4.1 COM 1 - RS232/485-Interface



The interface can be used as RS232 or RS485. Communication mode RS232 / RS485 is configured through software settings. Baud rate : RS232 : 125 kbaud Baud rate: max. 5 Mbaud (PROFIBUS: 6 Mbaud) Galvanic isolation : 1kV. 9 pole Sub-D Socket, Pinout like PROFIBUS, DIN/EN/ISO 19245-1

4.1.1 COM 1 - RS232-pinout

Pin	Bez.	Description
1	Shield	Protective Ground
2	-	
3	TxD	Transmit Data
4	-	-
5	GND	Signal Ground
6	-	
7	-	
8	RxD	Receive Data
9	-	

4.1.2 COM 1 - RS485 pinout (also PROFIBUS-DP Slave)

Pin	Designation	Signal	
1		Shield	Shield, Protective Ground
2		-	
3	B/B´	RxD/TxD-P	Receive- / Transmit-Data-P
4		-	
5	C/C´	DGND	Data Ground (M5V)
6		VP	Supply Voltage -Plus (P5V)
7		-	
8	A/A´	RxD/TxD-N	Receive- /Transmit-Data-N
9		-	

4.2 COM 2 - RS232/422/485-Interface





The interface can be used as RS232. Baud rate : RS232 : 125 kbaud Galvanic isolation : 1kV. Protocols : TCP/IP, firmware and customer specific 9 pole Sub-D plug, pin version acc. PC, DIN 41 652, part 1 (ISO 4902)

4.2.1 COM 2 - RS232 pinout

Pin	Designation	Description
Casing	Shield, Screen	Protective Ground
Screen		
1	DCD	Data Carrier Detect
2	RxD	Receive Data
3	TxD	Transmit Data
4	DTR	Data Terminal Ready
5		Signal Ground
6	DSR	Data Set Ready
7	RTS	Request to Send
8	CTS	Clear to Send
9	A1	Ring Indicator

4.2.2 COM 2 - RS422 pinout

Pin	Designation	Description
Casing Shield	Shield	Protective ground
1	RxD	Receive data, not inverted
2	RxD*	Receive data. inverted
3	TxD*	Transmit data. inverted
4	TxD	Transmit data, not inverted
5		Signal ground



4.2.3 COM 2 - RS485 pinout

Pin	Designation	Description
Casing	Shield	Protective ground
Shield		
1,4	D	Data not inverted
2,3	D*	Data inverted
5		Signal ground

Remark:

Pin 1 and 4 as well as 2 and 3 must be bridged

4.2.4 COM 2 - modem connection

If you wish to connect a modem via serial interface, you must use the interface COM2. It is connected with a non-crossed serial 1:1 cable (one end of the cable is a plug the other one a socket) which is usually included in the modem delivery.



5 LC-Display of the master

5.1 Function of the LC-Display

The 4 line LC display is on the master, type GBDT. The display has several functions. All settings apply also to the connected slaves, type GSLT. The LC-Display with four lines serves to enter the basic settings.

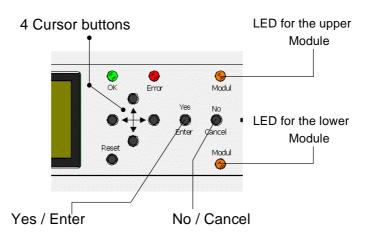
- IP-Addresses,
- Date and time,
- I/O Module numbers -addresses of the individual modules.

Also the display can be configured individually to show status readings of the device or any channel readings. In the default settings the time, date and IP-Address is shown on the display. The display will also show system message.

These and other other configuration settings can be carried out with the configuration software "TopMessage Configurator".

5.2 Function of the operating keys

The configuration is carried out through the 4 cursor buttons and two conformation buttons (yes/no).



No-Cancel key	1.) Do not carry out entry.
	2.) Upward in the menu
	By several pressing the main menu is reached.
Yes-Enter key	1.) Open a menu point,
	2.) Confirm entry and close menu point
Cursor keys	1.) Navigate in the menu (up/down)
up/down, right left	2.) Entry of numbers
	right/left \rightarrow select decimal point
	up/down → select number 010



5.3 Setting of date and time

During normal operation an automatic time synchronization between PC and device shall be configured. The configuration of the NTP-Time Server can be done easily with the software TopMessage Configurator. However, it is also possible to change the time settings manually via the LC display.

Access to date-time-setting

Main Menu / Setup / Set Date Time Output at LC display

→Setup
→Set Date Time
Change ?
09:12 26.02.2002

If you wish to alter the time, press the "Enter" key now. The marker now appears at the bottom line. right/left \rightarrow select decimal position up/down \rightarrow select number 0....X

5.4 Setting of IP-Address

Access to LAN/10base-T-setting

Main Menu / Setup / LAN 10Base-T / IP address

Output at LC display

If you like to alter the IP-Address, press the "Enter" key now. The last digit will be located (underlined). Select for xxx a number between 1 .. 254 Select for each basic device in LAN a different IP address.

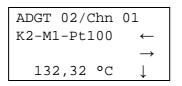


5.5 Display of the measurement values

For the service, which is to say possible fault diagnosis, it is very useful, to follow up the measurement values of the individual channels on the display. Thus, faults in the sensor range can be easily discovered.

Access to modules and channels

Main Menu / Channels / Hardware-Channel /



- 1. line : Module type, module address/channel number in module.
- 2. line : Individual name of the channel (12 characters max.).
- 4. line : Measurement value of the channel.

Navigating between the modules and the channels

Cursor keys left/right : Navigate between the modules Cursor keys up/down : Navigate between the channels

5.6 Module addresses allocation

5.6.1 General instructions

You find the module addresses labeled on the devices.

The module addresses are preset factory side.

Order of the module addresses

Each module in a basic or extension device requires an address. It is necessary in order to identify clearly the channels in the modules.

An intervention on the part of the customer will only be necessary if

- A module should be added
- A module should be removed
- A module should be replaced (in the case of faults). For the replaceable module the same module number must be allocated.

Valid module addresses : 1 to 99

In the basic device the module numbers start with 1 and 2. Afterwards the module numbers are allocated factory-preset in ascending order.

Module 1		Module 3		Module 5		Module n
Master	CAN-Bus	Slave 1	CAN-Bus	Slave 2	CAN-Bus	Slave n
Module 2		Module 4	0, 11, 200	Module 6		Module n+1

Upper module always has an uneven number, the lower module always an even number.



Inactive module

An inactive module is built in.

- a module address had not yet been allocated.
- the module address "Zero" had been allocated.

In case a module is connected that is not yet known to the master, this module will be perceived by the master, however still left ignored (inactive module).

Active module

Only if a module address is allocated to a module, this module is active and can be configured.

Location of the terminal block, of the just selected module

Next to the terminal blocks green LEDs with the name "module" are located. The LED with the appropriate terminal block is blinking, if the module has just been selected.

5.6.2 Allocate a module address

Access to module-address-setting

Main Menu / Setup / Modules Output at LC display

→Setup				
\rightarrow Modul	es	5		
Change	?			
DIOT:		#	01	

With the cursor keys up/down you move from module to module.

If you wish to alter the module address, press the "Enter" key now. The last digit is located (underlined). right/left \rightarrow select decimal point up/down \rightarrow select number 0..10



5.6.3 Mount/dismount I/O module

Warning: Please avoid static charge upon dismounting/mounting of the Message device and upon exchange of a I/O module.

Working steps (Dismount):

- Disconnect device from supply voltage.
- Remove all plug connectors from the front panel.
- Detach the 4 screws at the ends of the 2 terminal blocks. Then remove terminal blocks from device.
- Slightly impress the both locking hooks at the sides of the housing bar with a screw driver or similar and thus pull the bar with the cards out of the housing.
- The outer cards are the I/O modules. The corresponding module must now be removed and the new one plugged on.

Working steps (Mount):

- The assembly of the device must be carried out in reverse order with the following points to be observed:
- Check that all pins of the plug connector are plugged in the holes of the power supply resp. CPUT printed circuit board.
- The printed circuit boards have one direction in the housing. Use it this way that the front panel resp. central bar fits on the housing.
- Please take note that the printed circuit boards sit in the guidings upon insertion into the basic housing and are pushed into the housing until end stop.
- Before the front panel is attached to the housing the LEDs should again be aligned.
- The terminal blocks are again screwed on. Note: Special terminal blocks for the modules ADGT, ADIT, ADVT, AAST concerning cold reference junction.

Working steps (Settings after replacement of I/O module):

- Replug the plug connectors on the front and reconnect supply voltage.
- After initializing the LED should now blink "OK". This is confirmed with the "Yes/Enter" key as often as the main menu is reached.
- Now change to "Setup" and confirm with "Yes/Enter".
- Then navigate with the cursor to the submenu "Modules" and select with "Yes/Enter".
- Click once again with "Yes/Enter" on the corresponding module (LED of the module is blinking and allocate a module number). Confirm with "Yes/Enter".
- Finally press the "No/Cancel" key as often as you will finally be out of the configuration menu.



5.6.4 Delete a module

If you intend to delete a module, proceed as follows: Allocate the module the module address ",zero" and remove the module.

5.6.5 How to replace a module

Replacing the same type of module.

Disconnect the supply voltage and replace module.

Building in a new module into a basic or extension device has been described in the manual "B1-I/O modules".

Reconnect supply voltage.

The new module is being recognized as inactive. Now you must allocate the same module address of the previous module to this module.

Replacing different type of module.

- In case the new module is a different type, e. g. replacing ADVT by ADIT.
- Allocate the module the module address "zero".
- Disconnect the supply voltage.
- Replace the module.
- Insert the new module into the same plug-in place. The mounting of the modules is explained above.
- Reconnect the supply voltage. The new module is being recognized as inactive.
- As described earlier, now allocate the same module address.

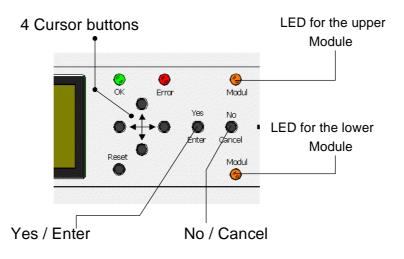
Remark:

After changing modules and module numbers it is recommended to restart the TopMessage Configurator software. You can also use the hot key (STRG+I) or in the menu the option "reinitialize"



6 LEDs / display of error messages

The device shows its operational state via the LEDs "OK" and "Error".



OK-LED on	Normal operational state
OK-LED blinking	An operational message is there
ERROR-LED blinking	An error message is there

Messages are immediately displayed with current date / time and must be acknowledged by the user. Messages remain preserved also upon restart of the device and upon disconnection of the supply voltage.

6.1 List of operational messages

User: <text></text>	Message of a user
New Module found: YYYY (S/N:	A new I/O module had been found upon
xxx)	system start
Module Watchdog: Module xx	Module xx does no longer answer. Possible
dead	reasons: CAN-Bus terminators not
	plugged-in, CAN-Bus-cable faulty, GSLT
	without supply voltage, module faulty
Module Watchdog: Module xx	Module xx answers again.
alive	_
Modem COM2: Max Init attempts	Modem does not react / with ERROR on
excecded	initialization. Check modem.
Modem COM2: DCD not set after	Modem does not set Carrier Detect after
CONNECT	connection set up. Check modem
	configuration.
Modem COM2: DCD set after Init	Modem sets Carrier Detect already after
	initialization. Check modem configuration.



6.2 List error messages:

Battery empty: Main Memory	Internal buffer battery is empty,
	measurement data are lost. Leave device
	at supply voltage for several hours
Battery empty: Ext. Memory	s.a.
Battery empty: Real time clock	Internal buffer battery empty, time invalid
Real time clock failure: Oscillator	Error of real time clock. Sequence error of
failure	an empty battery or hardware failure
Real time clock failure: Real Time	Time invalid, reset clock
invalid	
Real time clock failure: Switching	Real time clock is faulty. Operation with
to backup clock	inaccurate "emergency clock"
User: <text></text>	Message of a user
MEM Error: <text></text>	Fault of memory extension
Channel problem: <text></text>	A channel caused a problem concerning
	running time
Channel config problem: <text></text>	A channel ascertains a problem with its
	configuration
IP-Addr. conflict with MAC	The network participant with the MAC
aa:bb:cc:dd:ee:ff	aa:bb:cc:dd:ee:ff has the same IP address,
	one of the participants must be changed
	(consult network administrator)
MAC conflict with IP-Addr.	The network participant with the IP address
xx.yy.zz.aa	xx.yy.zz.aa has the same MAC, one of the
	participants must be changed (consult
	network administrator)
IP-Addr. conflict LAN – COM1	Two interfaces of the device have the same
	IP address. One must be changed



7 Connection of extension devices

7.1 Extension with GSLT Salve units

For the extension of a system up to 10 extension devices (slaves) can be connected to a basic device (master) via CAN-Bus. The slaves must be positioned in the near of the appropriate master, as the line length of the CAN-Bus is limited. Only the masters are connected to the data network via Ethernet.

Basic device/master, Type GBDT Extension devices/slaves, Type GSLT

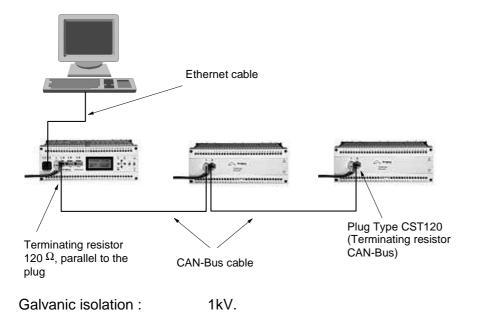
The CAN-Bus serves for the internal communication between the individual modules and the CPU in the basic device. The devices, basic device (master, type GBDT) and extension devices (slaves, type GSLT) are connected via the CAN-Bus plug connectors.

7.2 CAN-Bus terminating resistors

Attach 1 piece 120 Ohm resistor at the CAN-Bus clamp on the basic device. (Included in the delivery). The CAN plug clamp CST 120 must be plugged onto the end of the bus of the last extension device. (Included in the delivery). The CAN-Bus must be terminated at the beginning and at the end by means of a 120 Ω resistor.

Maximum CAN-Bus length:

The maximum length of the CAN bus (total length of the CAN bus cables) amounts to 10 meters in the standard version (on master and one slave). **Longer CAN-Bus available on request !**





Counter plug

LP-plug clamp 2-pin : e. g. Wieland 8113B/2VL, order no. 25.326.3253.0 Connection 1 (left) CANL Connection 2 (right) CANH

CAN-Bus cable

CAN-Bus cables with various lengths can be ordered from Delphin directly TYPE : CKx X = length of the cable in meters

Case 1 no extension devices (slaves)

The CAN plug clamp with the 120Ω terminating resistor must be plugged onto the free plug of the CAN-Bus connection. CAN plug clamp: CST 120 Type CST120 is included in the delivery of the basic devices.

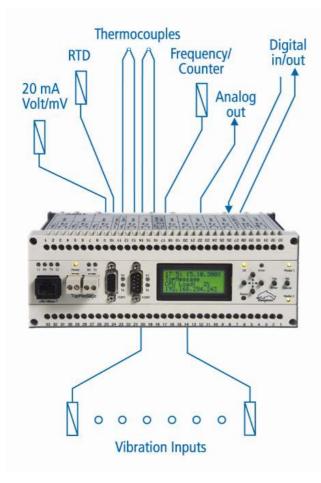
Case 2 with extension devices (slaves)

Upon the connection of extension devices the termination must always be made on both sides of the bus.

The resistors are clamped parallel to the both lines at the 2-pin plug clamps. The resistors are included in the delivery of the basic devices.



8 Sensor connection at one glance



Input for voltage (V/mV), current (20mA), resistance thermometer (Pt100), thermocouples, frequency inputs, state inputs, switch outputs.

Neither isolating amplifiers, transformers nor signal conditioning are required.

Each input can be individually adjusted for different sensor types.



9 I/O modules

Two IO modules fit in each basic and extension device. There is a free assignment of the modules to the slots.

9.1 I/O module overview

With the following tables gives an overview of the availabel I/O-modules.

Туре	Analog inputs ¹⁾		Analog outputs		Digital inputs (with counter)	Digital outputs
ADGT	8	V/mV, 20mA, Pt100, TC, pH				
ADIT	10	V/mV, 20mA, Pt100, TC, pH	1	20mA		1
ADVT	15	V/mV, 20mA, TC, pH				
AAST	4	V/mV, 20mA, Pt100, TC, pH	4	20mA	2	2
ADFT	8	V/mV, 20mA	2	010V	4 (2)	4
AMDT ²⁾	8	V/mV, 20mA	2	010V	4 (2)	4
DIOT					12 (11)	16
IOIT					24	1
OTPT					1	24

1) TC = Thermocouple

2) AMDT is handled in an own manual

Тур	Sample rate (total), maximum (of each I/O module)	Sequential /parallel sampling
ADGT	60 samples/s	seq.
ADIT	600 samples/s	seq.
ADVT	600 samples/s	seq.
AAST	600 samples/s	seq.
ADFT	10.000 samples/s	par.
AMDT ¹⁾	10.000 / 160.000 samples/s	par.

1) AMDT is handled in an own manual



9.2 Galvanic isolation

Тур	Galvanic isolation to the system and the supply	Galvanic isolation from channel to channel	permissible difference voltage from channel to channel
ADGT	750 VDC	560 VDC / 400 VAC	
ADIT	750 VDC		110 VDC
ADVT	750 VDC		110 VDC
AAST	750 VDC		110 VDC
ADFT	750 VDC		100 VDC
AMDT ¹⁾	750 VDC		100 VDC
DIOT	2500 VDC	2500 VAC	
IOIT	2500 VDC	2500 VAC	
OTPT	2500 VDC	2500 VAC	

1) AMDT is handled in an own manual

9.3 I/O modules – CAN-Bus

All I/O modules transfer the data though a common two-wirer-bus (CAN). This CAN-Bus can transfer 3.300 samples per second. The modules ADFT and AMDT are using an optimized transfer mechanism where 3 samples are transferred in one CAN-Bus message.

Тур	Max. total transfer rate of two-wire-bus (CAN)
ADGT, ADIT,	3300 samples/s
ADVT, AAST	
ADFT	10000 samples/s
AMDT ¹⁾	10000 samples/s

1) AMDT is handled in an own manual

Remark:

With ADFT the full load can be reached already with <u>one</u> I/O module. Based on technical properties <u>only one</u> I/O module ADFT can be installed in a system.

9.4 Common features of the I/O modules

- Scaling: Each channel can be scaled individually, so that the output appears in the desired unit, e. g. range 0..20 bar or 5..2400 l/min etc.
- Each channel can be allocated an individual measuring range
- The sample rate of analog inputs can be set for each channel.
- Protection against electro-magnetic influences.
- Any number of lower and upper limits per channel can be activated. Output can be directly processed to digital outputs (no need of host computer).
- Compensation of measurement errors of the sensors



9.5 Technical data overview

9.5.1 Technical data: ADGT / ADIT / ADVT / AAST

Analog inputs

Voltage measuring ranges :

+-156 mV to +-10 V, Unipolar and bipolar ranges

Current measuring ranges :

0..20 mA and 4..20 mA, External shunt resistor 10..500 Ω 2-wire transducers can be directly connected

Sample rate (total), maximum :

ADGT60 samples/s,ADIT, ADVT, AAST600 samples/sSequential sampling, conversion time adjustable per channel

Resolution : 24 Bit (about 7 decimal digits)

Input impedance :

>1 G Ω (10 M Ω ADGT)

Accuracy (DC) :

V/mV, mA0.01 % of measuring rangePt1000.1 KPt10000.01 KThermocouples0.1 % of measuring range, after compensation

Thermocouples :

Cold reference junction build in. NiCr-NiAl (K), NiCr-CuNi (E), NiCrSi-NiSi (N), Fe-CuNi (L), Fe-CuNi (J), Pt10Rh-Pt (S), Cu-CuNi (U), Pt13Rh-Pt (R), Cu-CuNi (T), Pt30Rh-Pt6Rh (B), W5Re-W26Re (C) Measuring range –270 up to 2320 °C , depends on the rmocouple type

Resistance thermometers :

Pt50, Pt100, Pt250, Pt500, Pt1000, Pt5000 : 2-, 3- or 4-wire circuit Reference current circuit with 1 mA for each channel Measuring range -270 up to 850 °C, depends on Pt-t ype

Resistance measurement :

 $0 \dots 10 k\Omega$



pH measurement : Temperature compensation integrated

Self calibration :

DC offset, cyclic, adjustable

Digital filter :

Low pass, 6..1000 Hz, adjusted automatically

Galvanic isolation between channels of ADGT: 560 VDC, 400 VAC

Electric strength of input :

110 V continuous

Analog outputs

Output signal : 0..20 mA, 4..20 mA, maximum shunt resistor is 650 Ω Resolution : 16 Bit Galvanic isolation : 750 V from channel to channel, to supply and to system Accuracy : +-0.05 %

Digital inputs

State inputs : High level: 3.5..90 V / 2 mA (typ. 2.7 mA @ 5V) Low level: 0..1.5 V / 0..1.5 mA Galvanic isolation: 2.5 kV, Reverse voltage protection: 1 kV Update rate: 1 kHz (1 ms) Evaluable signal pulse duration: >1 ms Highest continuous signal frequency: 50 Hz

Modified module: Digital Input for switching AC Voltage

High level: 18..270 V / 2 mA (typ. 2.7 mA @ 24V) Low level: 0..12 V / 0..1.5 mA Galvanic isolation: 2.5 kV, Reverse voltage protection: 1 kV Update rate: 1 kHz (1 ms) Evaluable signal pulse duration: >1 ms

Digital outputs

Switch outputs : Switching voltage: max. 50 V DC Switching current: max. 2.5 A DC Recovery diode integrated Galvanic isolation: 2.5 kV



9.5.2 Technical data: ADFT

Analog inputs

Voltage measuring ranges :

+-156 mV to +-10 V, in 7 steps, unipolar and bipolar range

Current measuring ranges :

0..20 mA and 4..20 mA, external shunt resistor 10..500 Ω

Input signal bandwith : DC to 4000 Hz

Sample rate :

10 to 10000 Hz, in 10 steps, adjustable per channel Channels with same sample rate are sampled in parallel

Total sample rate :

10 to 10000 samples/s for 4-channel mode 10 to 8500 samples/s for 8-channel mode

Resolution :

14 Bit (1.2 mV for measuring range +-10 V)

Anti alias filter :

Optional digital low-pass filter of 8th/4th order. Cut-off frequency adapted automatically. For sample rates 100 to 10000 Hz.

Input impedance :

 $\Omega M 8.0$

Permissible voltage difference, channel to channel :

100 V DC in total, continuous

Input protection : +-250 V DC

DC/AC coupling :

DC coupling adjusted ex works. Change by DIP switch inside device.

Accuracy (DC) :

Measuring range +-10V/5V/2,5V/1,25V:	+-0.1 % o.f.s. or +-10mV/5mV/2.5mV/1.3mV
Measuring range +-0.625V:	+-0.2 % o.f.s. or +-1.3mV
Measuring range +-0.312V:	+-0.3 % o.f.s. or +-0.9mV
Measuring range +-0.156V:	+-0.4 % o.f.s or +-0.6mV



Analog outputs

Output signal : 0..10 V, max. 4 mA (min. $2.5 \text{ k}\Omega$) Resolution : 12 Bit (2.4 mA)Analog ground : Clamps '-' are connected with 1 k Ω to internal analog ground point Accuracy : +-0.25 % of full scale, or +-25mV

Digital inputs / Counter

State inputs :

High level: 3.5 to 90 V / 2 mA (typ. 2.7 mA bei 5V) Low level: 0 to 1.5 V / 0 to 1.5 mA Update rate: 1 kHz (1 ms) Smallest evaluable signal pulse duration: 2.5 ms Highest continuous signal frequency: 50 Hz Galvanic isolation: 2.5 kV, Revers voltage protection: 1 kV

Frequency/Counter inputs :

Mode 'frequency measurement' or 'pulse count' Frequency measurement within range 0.2 Hz to 50 kHz Gate time from 250 to 5000 ms (in steps of 250 ms) Pulse count within range 16 Bit or 0 to 65535

Accuracy (of frequency measurement) : Range up to 100 Hz : +-1 % of input frequency Range above 100 Hz : +-1 Hz

Digital outputs

Switch outputs :

Switching voltage: max. 50 V DC Switching current: max. 2.5 A DC Recovery diode integrated Galvanic isolation: 2.5 kV



9.5.3 Technical data: DIOT / IOIT / OTPT

Digital inputs / Counter

State inputs :

High level: 3.5 to 90 V / 2 mA (typ. 2.7 mA bei 5V) Low level: 0 to 1.5 V / 0 to 1.5 mA Galvanic isolation: 2.5 kV, Revers voltage protection: 1 kV Update rate: 1 kHz (1 ms) Evaluable signal pulse duration: >1 ms Highest continuous signal frequency: 50 Hz

Modified module: Digital Input for switching AC Voltage

High level: 18.270 V/2 mA (typ. 2.7 mA @ 24V) Low level: 0..12 V/0..1.5 mA Galvanic isolation: 2.5 kV, Reverse voltage protection: 1 kV Update rate: 1 kHz (1 ms) Evaluable signal pulse duration: >1 ms

Frequency/Counter inputs :

Mode 'frequency measurement' or 'pulse count' Max. input frequency is 30 kHz Gate time from 1 to 6000 ms (in steps of 1 ms) Pulse count within range 16 Bit or 0 to 65535

Accuracy (of frequency measurement) :

Range 0 to 1 kHz : +-1 Hz Range >1 kHz to 10 kHz : +-5 Hz Range >10 kHz to 30 kHz : +-10 Hz

Digital outputs

Switch outputs :

Switching voltage: max. 50 V DC Switching current: max. 2.5 A DC Recovery diode integrated Galvanic isolation: 2.5 kV



10 I/O modules 10.1 ADGT module

See also technical data in section 9.5.1

Analog Inputs

Features :

8 analog inputs Sample rate (total) : 60 samples/s Channels can be configured individually for sensor type voltage (V/mV), current (20 mA), resistance thermometer (Pt100), thermocouples, pH channels. Differential inputs. Very high measuring accuracy. Self calibrating. Galvanic isolation. Wire breakage monitoring.

Functions :

Scaled and linearized measured data

Available measuring ranges :

The following tables show the available measuring ranges, which can be configured by software.

Voltage measuring range :

Measuring range, unipolar	010	05	02.5	01.25	00.625	00.312	00.156	V
Measuring range, bipolar	+-10	+-5	+-2.5	+-1.25	+-0.625	+-0.312	+-0.156	V

Current measuring range :

Measuring range	020	420	mA
Shunt resistor	10/50/100/125/250/500	10/50/100/125/250/500	Ω

The terminating shunt resistors are to be positioned externally between the clamps '+' and '-'.

Measuring range for thermocouples :

Thermocouple	Typ K NiCr-NiAl	Typ E NiCr-CuNi	Typ N NiCrSi-NiSi	Typ L Fe-CuNi	Typ J Fe-CuNi	Typ S Pt10Rh-Pt	
Measuring range	-2701372	-2701000	-2701300	-200900	-2101200	-501767	C
Thermocouple	Typ U Cu-CuNi	Typ R Pt13Rh-Pt	Typ T Cu-CuNi	Typ B Pt30Rh-Pt6Rh	Typ C W5Re-W26Re		
Measuring range	-200600	-501767	-270400	01800	02320		C

For thermocouples the measuring range refers to cold reference junction temperature of 0°C:

Measuring range for resistance thermometers

Resistance thermometer	Pt 50/100/250/500/1000	Pt 1000	
Measuring range	-260850	-260270	C



10.1.1 Wiring diagram (industry)

	A)()	Т		N	ote	s:																								
	Channel 1				Channel 2		Channel 1 - 2		Channel 3			Channel 4		Channel 3 - 4		Ref. Junction	Channel 9			Channel 5			Channel 6		Channel 5 - 6		Channel 7			Channel 8		Channel 7 - 8	
+	•••••••••••••••••••••••••••••••••••••			·	+ + Analog	Indui	- + I I I I I I I I I I I I I I I I I I	+ ← @ – ^{Ref}	+ + Analog	Input	+ +	+ + Analog	- + Input	- + I I I Ref return	+ + H	Analog	Input	- [+ cturn	+ ←@ _{Ref}	+ + Analog	- + Input	+ + (3) _{Ref}	+ + Analog	Input	- +	+ + 4 -00	+ + Analog	- + Input	+	+ + Analog	-	- + I I Ref return	
1	2	3	4		5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	

Connection of different sensors.

See also notes on the instrumentation in section 5

Connect resistance thermometers (Pt100/1000) with 4-wire interface :

l ref +	Current reference for resistance thermometers
ln +	Positive signal input
In -	Negative signal input
I ref -	Return point for current reference

Connect voltage signals (V/mV) and thermocouples :

In +	Positive signal input
In -	Negative signal input

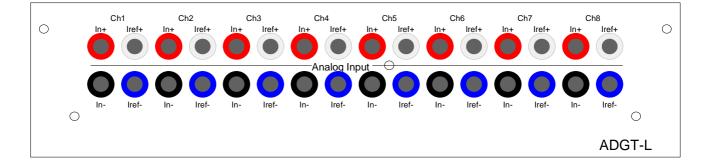
Connect current signals (0/4..20 mA) :

ln +	Positive signal input
In -	Negative signal input

The terminating shunt resistors are to be positioned externally between the clamps '+' and '-'. Resistors alternatively 10 / 50 /100 /125 / 250 / 500 Ω (0,05%).



10.1.2Wiring diagram (laboratory)



Connection information: see above.



10.2 ADIT module

See also technical data in section 9.5.1

Analog inputs

Features

10 analog inputs Sample rate (total) : 800 samples/s Channels can be configured individually for sensor type voltage (V/mV), current (20 mA), resistance thermometer (Pt100), thermocouples, pH channels. Galvanic isolation. Very high measuring accuracy. Self calibrating Wire breakage monitoring.

Functions :

Scaled and linearized measured data Alarm output to digital channels.

Available measuring ranges :

The following tables show the available measuring ranges, which can be configured by software.

Voltage measuring range :

Measuring range, unipolar	010	05	02.5	01.25	00.625	00.312	00.156	V
Measuring range, bipolar	+-10	+-5	+-2.5	+-1.25	+-0.625	+-0.312	+-0.156	V

Current measuring range :

Measuring range	020	420	mA
Shunt resistor	10/50/100/125/250/500	10/50/100/125/250/500	Ω

The terminating shunt resistors are to be positioned externally between the clamps '+' and '-'.

Measuring range for thermocouples :

Thermocouple	Typ K NiCr-NiAl	Typ E NiCr-CuNi	Typ N NiCrSi-NiSi	Typ L Fe-CuNi	Typ J Fe-CuNi	Typ S Pt10Rh-Pt	
Measuring range	-2701372	-2701000	-2701300	-200900	-2101200	-501767	C
Thermocouple	Typ U Cu-CuNi	Typ R Pt13Rh-Pt	Typ T Cu-CuNi	Typ B Pt30Rh-Pt6Rh	Typ C W5Re-W26Re		
Measuring range	-200600	-501767	-270400	01800	02320		C

For thermocouples the measuring range refers to cold reference junction temperature of 0°C:

Measuring range for resistance thermometers

Resistance thermometer	Pt 50/100/250/500/1000	Pt 1000	
Measuring range	-260850	-260270	C



Analog output

Features

1 Analog output Output signal 0..20 mA 16 bit resolution Galvanically isolated

Scaling

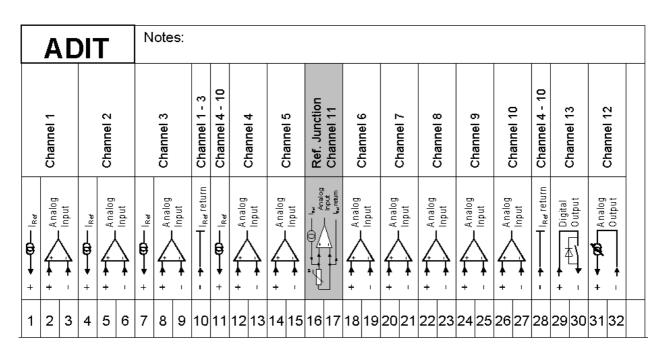
The channels can be scaled individually. The scale data input can take place in the desired unit (e.g. range 0..20 bar or 5.2400 l/min). The output takes place as a scaled current signal.

Digital output

Switching voltage: Max.: 50V DC Switching current: Max.: 2.5A DC Free wheeling diode integrated Galvanic isolation: 2.5 kV



10.2.1 Wiring diagram (industry)



Connection of different sensors :

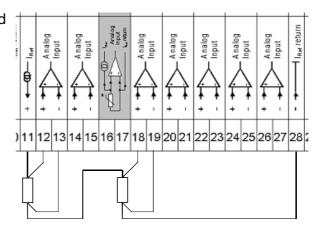
See also notes on the instrumentation in section 5

Connect resistance thermometers (Pt100/1000) with 4-wire interface :

I ref +	Current reference for resistance thermometers
In +	Positive signal input
In -	Negative signal input
l ref -	Return point for current reference

<u>Important hint</u>: Channels 4 to 10 are provided with a common current reference. You have to use a series connection for current path of resistance thermometers.

Example: Channels 4 and 6 connected with resistance thermometers. Series connection of current path from clamp 11 to clamp 28.





Connect voltage signals (V/mV) and thermocouples :

In +	Positive signal input
In -	Negative signal input

Connect current signals (0/4..20 mA) :

ln +	Positive signal input
In -	Negative signal input

The terminating shunt resistors are to be positioned externally between the clamps '+' and '-'. Resistors alternatively 10 / 50 /100 /125 / 250 / 500 Ω (0,05%).

Connection of actuators :

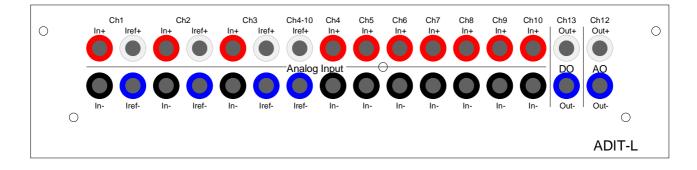
Connect actuator	with digital output :
	Dealth a shared autout

Out +	Positive signal output
Out -	Negative signal output

Connect actuator with analog output :

Out +	Positive signal output
Out -	Negative signal output

10.2.2Wiring diagram (laboratory)



Connection information: see above.



10.3 ADVT module

See also technical data in section 9.5.1

Analog inputs

Features

15 analog inputs Sample rate (total) : 600 samples/s Channels can be configured individually for sensor type voltage (V/mV), current (20 mA), thermocouples, pH channels. Galvanic isolation. Very high measuring accuracy. Self calibrating Wire breakage monitoring.

Functions :

Scaled and linearized measured data

Available measuring ranges :

The following tables show the available measuring ranges, which can be configured by software.

Voltage measuring range :

Measuring range, unipolar	010	05	02.5	01.25	00.625	00.312	00.156	V
Measuring range, bipolar	+-10	+-5	+-2.5	+-1.25	+-0.625	+-0.312	+-0.156	V

Current measuring range :

Measuring range	020	420	mA
Shunt resistor	10/50/100/125/250/500	10/50/100/125/250/500	Ω

The terminating shunt resistors are to be positioned externally between the clamps '+' and '-'.

Measuring range for thermocouples :

Thermocouple	Typ K NiCr-NiAl	Typ E NiCr-CuNi	Typ N NiCrSi-NiSi	Typ L Fe-CuNi	Typ J Fe-CuNi	Typ S Pt10Rh-Pt	
Measuring range	-2701372	-2701000	-2701300	-200900	-2101200	-501767	C
Thermocouple	Typ U Cu-CuNi	Typ R Pt13Rh-Pt	Typ T Cu-CuNi	Typ B Pt30Rh-Pt6Rh	Typ C W5Re-W26Re		
Measuring range	-200600	-501767	-270400	01800	02320		C

For thermocouples the measuring range refers to cold reference junction temperature of 0°C:



10.3.1 Wiring diagram (industry)

A	D\	/Т	N	ote	s:																										
Channel 1	Channel 2	Channel 3	Channel 1		Channel 5		Channel 6		Channel 7				Channel 8			Channel 9	Channel 10		Channel 11		Channel 10	-	Channel 13	•	Channel 11	-	¬		Channel 16	-	
+ + Analog - + Input	+ + Analog	+ + Analog - + Input	+ + Analog	- + Input	+ + + Analog	- + Input	+ + Analog	- + - Input	+ + +	- + Input	+ + + Analog	- + Input			+ + +	- + Input	+ + Analog	- + Input	+ + Analog	- + Input	+ + Analog	-	+ + Analog	-	+ + Analog	Input	+ + Analog	-			
1 2	3 4	56	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32			

Connection of different sensors:

See also notes on the instrumentation in section 5

Connect voltage signals (V/mV) and thermocouples :

In +	Positive signal input
In -	Negative signal input

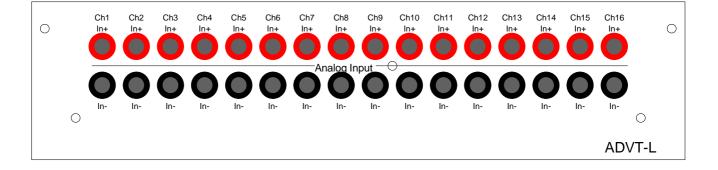
Connect current signals (0/4..20 mA) :

ln +	Positive signal input
In -	Negative signal input

The terminating shunt resistors are to be positioned externally between the clamps '+' and '-'. Resistors alternatively 10 / 50 /100 /125 / 250 / 500 Ω (0,05%).



10.3.2 Wiring diagram (laboratory)



Connection information: see above.10.3.1



10.4 AAST module

See also technical data in section 9.5.1

Analog inputs

Features

4 analog inputs Sample rate (total) : 600 samples/s Channels can be configured individually for sensor type voltage (V/mV), current (20 mA), resistance thermometer (Pt100), thermocouples, pH channels. Galvanic isolation. Very high measuring accuracy. Self calibrating Wire breakage monitoring.

Functions :

Scaled and linearized measured data Alarm output to digital channels.

Available measuring ranges :

The following tables show the available measuring ranges, which can be configured by software.

Voltage measuring range :

Measuring range, unipolar	010	05	02.5	01.25	00.625	00.312	00.156	V
Measuring range, bipolar	+-10	+-5	+-2.5	+-1.25	+-0.625	+-0.312	+-0.156	V

Current measuring range :

Measuring range	020	420	mA
Shunt resistor	10/50/100/125/250/500	10/50/100/125/250/500	Ω

The terminating shunt resistors are to be positioned externally between the clamps '+' and '-'.

Measuring range for thermocouples :

Thermocouple	Typ K NiCr-NiAl	Typ E NiCr-CuNi	Typ N NiCrSi-NiSi	Typ L Fe-CuNi	Typ J Fe-CuNi	Typ S Pt10Rh-Pt	
Measuring range	-2701372	-2701000	-2701300	-200900	-2101200	-501767	C
Thermocouple	Typ U Cu-CuNi	Typ R Pt13Rh-Pt	Typ T Cu-CuNi	Typ B Pt30Rh-Pt6Rh	Typ C W5Re-W26Re		
Measuring range	-200600	-501767	-270400	01800	02320		C

For thermocouples the measuring range refers to cold reference junction temperature of 0°C:

Measuring range for resistance thermometers

Resistance thermometer	Pt 50/100/250/500/1000	Pt 1000	
Measuring range	-260850	-260270	ĉ



Analog output

Features :

4 Analog output Output signal 0..20 mA Resolution 16 bit Galvanic isolation

Scaling :

The channels can be scaled individually. The scale data input can take place in the desired unit (e.g. range 0..20 bar or 5.2400 l/min). The output takes place as a scaled current signal.

Digital inputs / Counter

Features :

2 Digital inputs High level: 3.5 to 90 V / 2 mA (typ. 2.7 mA bei 5V) Low level: 0 to 1.5 V / 0 to1.5 mA Galvanic isolation: 2.5 kV Revers voltage protection: 1 kV

Digital output

Features

2 Digital outputs Switching voltage: max.: 50V DC Switching current: max.: 2.5A DC Free wheeling diode integrated Galvanic isolation: 2.5 kV



10.4.1 Wiring diagram (industry)

AA	ST	N	lote	s:																			
Channel 1	Channel 2	Channel 1 - 2		Channel 3		Channel 4		Channel 3 - 4		Ref. Junction Channel 5		Channel 6	I	Channel 7		Criannel 8	Channel 9	Channel 10	Channel 11	Channel 10 - 11	Channel 12 - 13	Channel 12	Channel 13
+ + • • • • • • • • • • • • • • • • • •	+ + • • • • • • • • • • • • • • • • • •	- + - Input	+ 4 + 1 Ref	+ + Analog	undui → → +	+ + Analog	-	- + I I Ref return	+	Analog	- T- IRef return	+	- + Output	+ Analog	+ +	- + Output	+ + A Analog - + Output		+ + Digital	-			Ξİ
1 2 3	4 5	6 7	8	9 1	10 11	12	13	14	15 1	6 17	18	19	20	21 22	223	24	25 26	527	28	29	30	31	32

Connection of different sensors :

See also notes on the instrumentation in section 5

Connect resistance thermometers (Pt100/1000) with 4-wire interface :

I ref +	Current referenz for resistance thermometers
ln +	Positive signal input
In -	Negative signal input
l ref -	Return point for current referenz

Connect voltage signals (V/mV) and thermocouples :

In +	Positive signal input
In -	Negative signal input

Connect current signals (0/4..20 mA) :

ln +	Positive signal input
In -	Negative signal input

The terminating shunt resistors are to be positioned externally between the clamps '+' and '-'. Resistors alternatively 10 / 50 /100 /125 / 250 / 500 Ω (0,05%).



Connect signal to digital input :

In + Positive signal input	•	•
In - Negative signal input	+	Positive signal input
III - Negative signal input] -	Negative signal input

Hint: The two digital inputs have a common clamp "In -"

Connection of actuators :

Connect actuator with digital output :

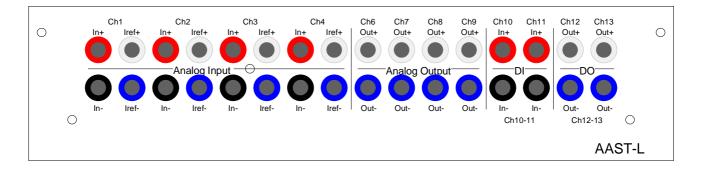
Out +	Positive signal output
Out -	Negative signal output

Hint: The two digital outputs have a common clamp "Out +"

Connect actuator with analog output :

Out +	Positive signal output
Out -	Negative signal output

10.4.2Wiring diagram (laboratory)



Connection information: see above.



10.5 ADFT module

See also technical data in section 9.5.2

Analog inputs

Features :

The I/O module ADFT offers a higher total sample rate than the other modules (see above). The sampling is continuously and in parallel. Any of the 8 analog inputs can operate with a sample rate of 10 to 10000 Hz. Channels with identical sample rate are measured synchronously. The maximum total sample rate is 10000 samples/s.

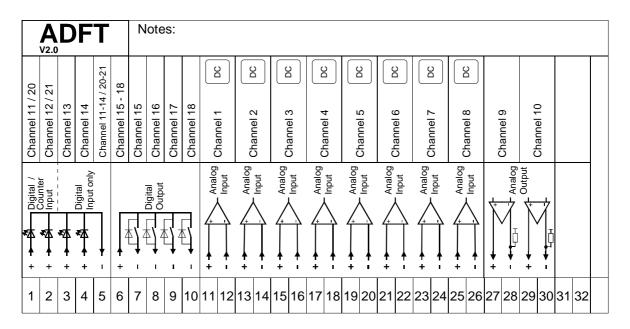
Voltage measuring range :

```
+-10000 mV / +-5000mV / +-2500mV / +-1250mV / +-625mV / +-312mV / +-156mV, alternatively also with unipolarer range
```

Current measuring range :

0..20mA or 4..20mA, with terminating shunt resistors 10/50/10/125/250/500 Ω

10.5.1 Wiring diagram (industry)



Connection hints :

See also technical data in section 9.5.2



Analog inputs :

Voltage signals of max. +-10 V within frequency range of DC to 4000 Hz can be connected. Input impedance is 0.8 M Ω . Current signals (0/4..20 mA) are connected by means of terminating shunt resistor (between clamp '+' and '-'). DC coupling is preset ex works. Change by DIP switch inside device possible. Permissible channel-to-channel voltage difference is 100 V DC in total.

Analog outputs :

Output range is 0..10 V. Max. load is 4 mA (min. 2,5 k Ω) Clamps '-' are connected with 1 k Ω to internal analog ground point.

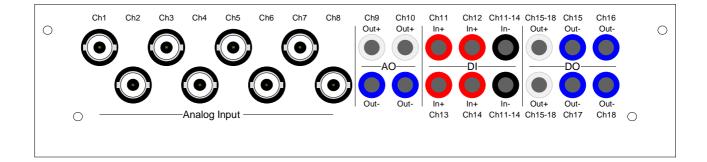
Digital inputs / counters

Square signals (pulses) of 5 V / 12 V or 24 V can be connected. Low level is <1.5 V. High level is >3.5 V. Common '-' clamp. Galvanic isolation. Frequency measurement within range 0.2 Hz to 50 kHz.

Digital outputs

Switching voltage is max. 50 VDC. Switching current is max.: 2.5 ADC. Common '+' clamp. Galvanic isolation.

10.5.2Wiring diagram (laboratory)



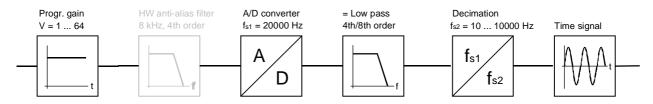
Connection information: see above.



10.5.3 Mode of operation

Mode of operation of analog inputs

Block diagram



Programmable amplification

Depending on the selected measuring range +-10000mV to +-156mV the analog signal from the sensor will be 1 to 64 times amplified.

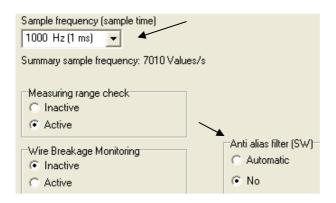
	Properties	Options	Sensorcomper	nsation	Connection	Reference	
	Sensor <u>t</u> yp	e	Mo <u>d</u> e		M <u>e</u> asuring F	lange	
	Voltage	•	bipolar	-	+/-10000.0	0 mV	-
Ì					1		

HW-Anti-Alias-Filter

There is now analog low pass filter in front of the A/D converter. The advantage is that there are no filtering effects and distortions on the time signal. However, the user should be aware of Alias effects when sample rate and analog signal frequency do not match the Shannon / Nyquist theorem.

A/D-Converter

The A/D converter is sampling continuously with 20000Hz. All active inputs are sampled in parallel. The user can chose is preferred sample rate 10Hz to 10000Hz by selection it from the drop down list box. The A/D converter is then working accordingly with an internal oversampling of 2000 to 2 samples.





SW-Anti-Alias-Filter

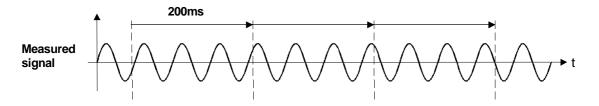
If required a software anti alias filter can be activated. This digital filter has a cut-off frequency of 40% of the selected sample rate

Decimation

This describes the process of reducing the number of samples to the selected sample rate. Example: A sample rate of 1000 Hz leads to 20-time over sampling. In this case 19 of 20 samples are skipped.

Time signal

The recorded time signal will is transferred in block format. The standard block length is 200ms. With this setting 5 blocks are transferred in one second. The block length can be also configured to 100 ms (10 blocks / sec.) or to 500ms (2 blocks / sec.). With a sample rate of 1000Hz and with a block length of 200ms the system will transfer 200 samples in one block.



In the standard setting the DSP processor of the ADFT module is calculating the "True RMS value" (RMS = Root Mean Square) from each block. This value is also displayed in the DataService Configuration software. If required the user can also change the settings to "Mean Value".

Characteristic	
True RMS value	•
🔿 Mean value	



10.6 DIOT module

See also technical data in section 2.2.3

Digital inputs / counters

Features :

12 digital inputs, from that 11 with additional counters High level: 3.5 to 90 V / 2 mA (typ. 2.7 mA bei 5V) Low level: 0 to 1.5 V / 0 to1.5 mA Galvanic isolation: 2.5 kV, Revers voltage protection: 1 kV

Counters :

11 channels can be configured as counter channel, frequency channel or state input channel. Max. input frequency: 30 kHz, Counter capacity: 16 bit Gate time (in case of frequency measurement): 1 to 6000 ms (step 1 ms)

Scaling :

Each frequency channel can be scaled individually, so that the output is shown directly in the desired unit, e.g. range, 5..2400 l/min. etc.

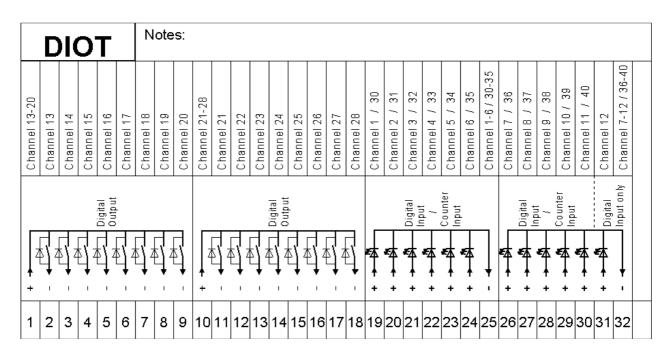
Digital outputs

Features

16 Digital outputs Switching voltage: max. 50 VDC. Switching current: max.: 2.5 ADC. Galvanic isolation: 2.5 kV, Free wheeling diode integrated



10.6.1 Wiring diagram (industry)



Connection of sensors / actuators :

Connect signal to digital input :

ln +	Positive signal input
ln -	Negative signal input

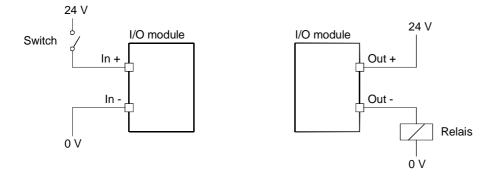
Hint: Any group of 6 digital inputs has a common clamp "In -"

Connect actuator with digital output :

Out +	Positive signal output
Out -	Negative signal output

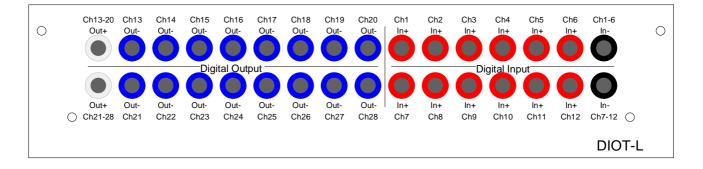
Hint: Each group of 8 digital outputs has a common clamp "Out +"

Connection examples :





10.6.2 Wiring diagram (laboratory)



Connection information: see above.



10.7 IOIT module

See also technical data in section 2.2.3

Digital inputs

Features :

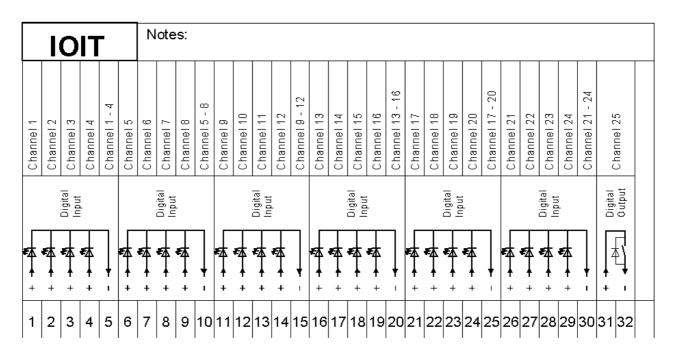
24 digital inputs High level : 3.5 to 90 V / 2 mA Low level: 0 to 1.5 V / 0 to1.5 mA Galvanic isolation: 2.5 kV, Reverse voltage protection: 1 kV

Digital outputs

Features 1 Digital output Switching voltage: max. 50 VDC. Switching current: max.: 2.5 ADC. Galvanic isolation: 2.5 kV, Free wheeling diode integrated



10.7.1 Wiring diagram (industry)



Connection of sensors / actuators :

Connect signal to digital input :

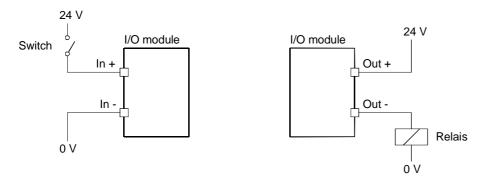
ln +	Positive signal input
In -	Negative signal input

Hint: Any group of 4 digital inputs has a common clamp "In -"

Connect actuator with digital output :

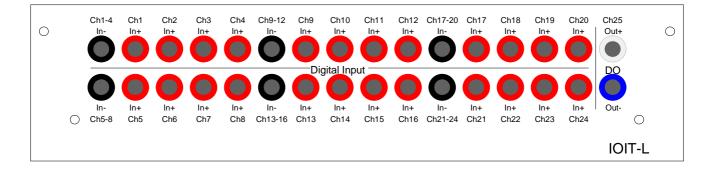
Out +	Positive signal output
Out -	Negative signal output

Connection examples :





10.7.2 Wiring diagram (laboratory)



Connection information: see above.



10.8 OTPT module

See also technical data in section 2.2.3

Digital inputs

Features :

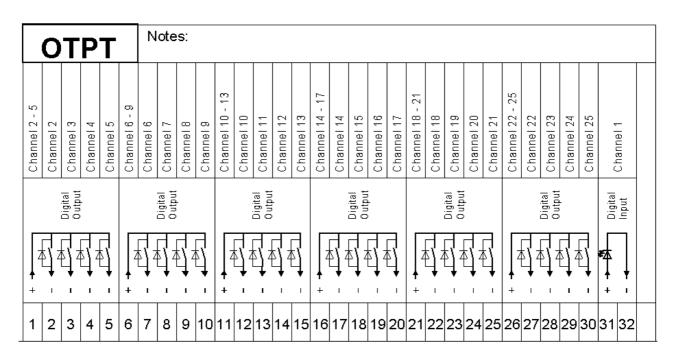
1 digital input High level : 3.5 to 90 V / 2 mA Low level: 0 to 1.5 V / 0 to1.5 mA Galvanic isolation: 2.5 kV, Reverse voltage protection: 1 kV

Digital outputs

Features 24 Digital outputs Switching voltage: max. 50 VDC. Switching current: max.: 2.5 ADC. Galvanic isolation: 2.5 kV, Free wheeling diode integrated



10.8.1 Wiring diagram (industry)



Connection of sensors / actuators:

Connect signal to digital input :

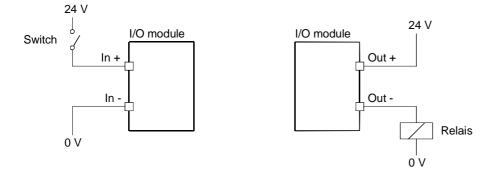
ln +	Positive signal input
ln -	Negative signal input

Connect actuator with digital output :

Out +	Positive signal output
Out -	Negative signal output

Hint: Each group of 4 digital outputs has a common clamp "Out +"

Connection examples :





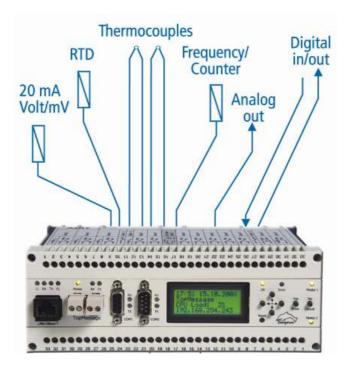
10.8.2 Wiring diagram (laboratory)

- not defined -



11 Instrumentation

In this section you will learn how the individual sensor types like voltage signals (V/mV), current signals (20mA), thermocouples and resistance thermometers (Pt100) are connected to the Message devices, and what should be observed here.



Technicians, engineers and scientists need frequently systems for measurement data acquisition. The Message-Devices from Delphin are developed for this task and make the data acquisition very easy. The sensors can be directly connected to the devices and the scaling to engineering unit is performed directly by the device. Through the Ethernet interface the data can be transferred to the LAN Network and any PC for analysis. Thanks to the Message devices it is very simple to create a link between the technical process and the computer.



11.1 Basic terms

Galvanic isolation, galvanic decoupling

are the most important characteristics of devices for data acquisition assuring accurate measured data.

The inputs and outputs of the Message devices are galvanically isolated. Thus the dangerous earth loops will be avoided.

Potential compensation

In principle potential compensation is no longer needed with the Message devices. The permissible potential differences a listed in table in section 9.1.



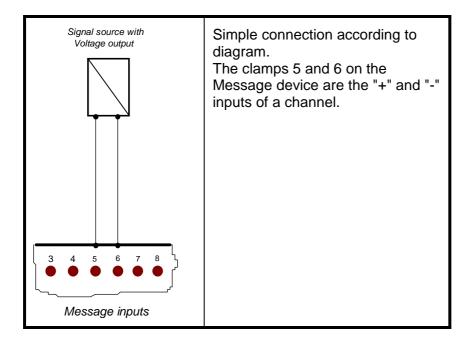
11.2 Connection of voltage signals (V/mV)

Application

Serves for the data acquisition with sensors with voltage output.

The measuring ranges are mostly 0..10 V or +-10 V, also +-1 V or +-100 mV. Voltage inputs are more sensitive to electro-magnetic noise than current inputs. (see next

section)



Protection against electro-magnetic noise

For high-speed measurements and the high filter frequencies thus necessary, the use of shielded cables can in some cases be required. See section 11.7.2



11.3 Connection of current signals (20 mA)

Application

Current signals are prevailing in industry due to their insensitivity to electro-magnetic noise. Nowadays, most measurement converters are equipped with current inputs.

In use are 0..20 mA and 4..20 mA. The 4..20 mA signal is especially suitable for wire breakage monitoring, since the current value will only drop below 4 mA in the case of a wire breakage.

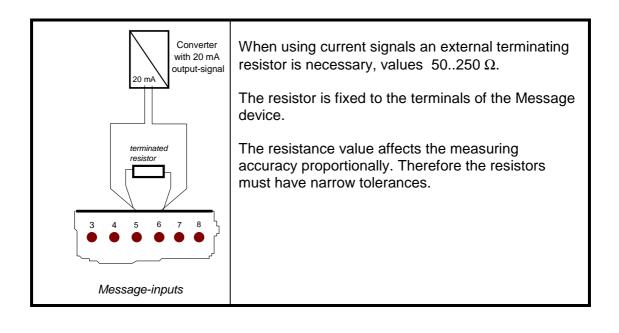
Terminating resistor

An external terminating resistor is necessary for the Message devices, values between 50..250 Ω . The resistor will be fixed at the clamps of the Message device.

The resistance value affects the measurement accuracy proportionally. Therefore the resistors must have narrow tolerances and a small temperature coefficient.

Burden

Attention has to be paid to the burden of the measurement source when selecting the size of the terminating resistor. If several measurement devices, e.g. Message device and panel instrument, are connected to a signal source (in series), the sum of the terminating resistors must not exceed the value of the max. burden (mostly 500...1000 Ohm).





11.4 Selection of temperature sensor

For temperature measurements with the Message devices, resistance thermometers (Pt100, Pt1000) and thermocouples can be used.

For the measurement range -200...+200 $^{\circ}$, Pt100s should preferably be used. Due to the advanced miniaturization (sensor diameter: 3 mm and lower) you can achieve excellent measurement results with resistance thermometers (class A according to DIN) which are available at favorable prices.

Thermocouples prove their strength at high temperatures, small measurement points (e.g. 0,5 mm diameter and smaller) as well as in acquiring fast temperature changes

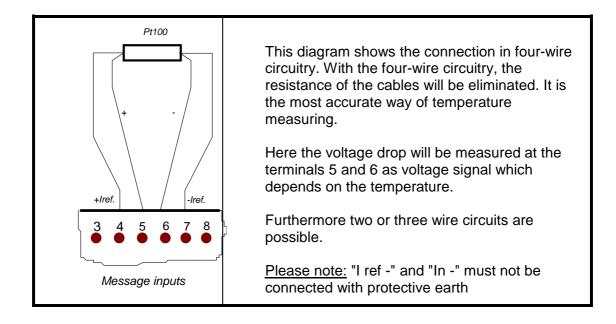


11.5 Connection resistance thermometer (Pt100)

Application :

Besides the thermocouples, the Pt100 is the sensor which is used most for temperature measurements.

The application with the Message devices is very simple. For each analog channel the current reference "I ref" is available. The current reference feeds the temperature-dependent resistance Pt100 with constant current.



Three-Wire-Circuitry

In the three-wire circuitry the signals "I ref +" and "In +" will be combined to one cable. In this case the resistance of the measurement wirer is included to the overall resistance measurement which will increase the measurement error. With long cables the measurement error is increasing. At a length of 2 m and more, significant deviations can already be measured.

Two-Wire-Circuitry

In the two-wire circuitry the signals "I ref +", "In +" and the signals "I ref -", "In -" will be combined each to one cable. Due to this the resistance of these cables will not be compensated any more. The longer the cables the greater the measurement error. At a length of approx. 1 m and more, significant deviations can be measured.



11.6 Connection of thermocouples

Application

Thermocouples are the most important temperature transducers next to the Pt100. Thermocouples are used for temperatures exceeding 600°C. The module ADG is available for measurements with thermocouples.

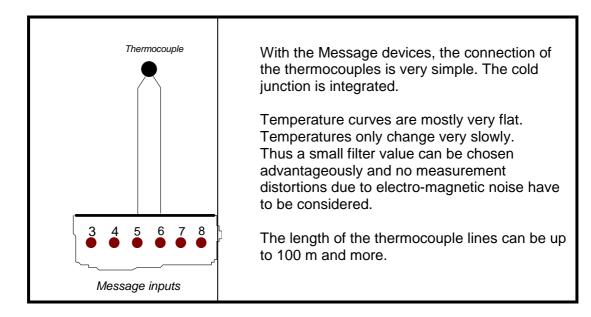
Mode of Operation

Thermocouples are active transducers. Depending on the type of thermocouple and on the temperature measurement range they will deliver a voltage value ranging from 0 to approx. 20 mV.

Thermocouples supply a difference temperature between the warm end (measurement point) and the cold end (reference point).

You will get the absolute temperature by adding the temperature of thermocouple and the temperature of the reference measurement point.

The user of the Message device can disregard it. The cold junction is installed in the Message device. The absolute temperature value will be calculated by the software.



Warning :

If you use shielded thermocouples, never connect the shield (screen) to the clamps of the Message devices. The inputs are galvanically isolated.

Choose a good earth point.



11.7 Noise suppression

11.7.1 Power line interference

Power line interference will appear as noise of 50Hz or 60Hz. So result is cyclical error of measured value.

With selection of "A/D measuring time" (see section above) an internal low pass filter is adjusted.

The filter characteristic gives optimal power line noise supression for several settings.

F	Properties	Options	Sensorcompensation	on	Conne
Tolerance realtime data 0 %					
	Fract	ional <u>d</u> igits	2		Meas
	_	uring Time		~	<u>C</u> alibr
	120 ms (5	50 Hz)	▼		<u>C</u> alibi
	120 ms (5		▲time: 1269 ms		
	100 ms (6				
	96 ms (50	IHz]	ik 👘		
	90 ms				
	80 ms (60	IHz)			
	67,2 ms (6	60 Hz)			
	60 ms (50	Hz)			

Meaning of optional Information '(60 Hz)' : This is good selection for power line noise suppression.



11.7.2 Shielded measurement cables.

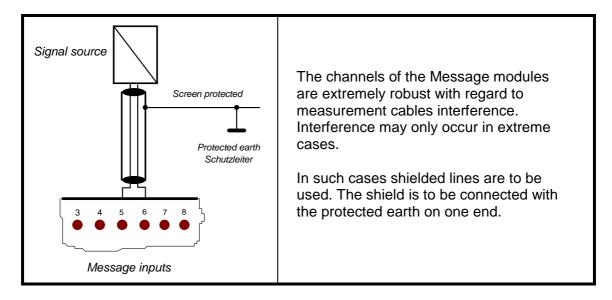
Electro-magnetic influences affecting the device and the supply lines of the supply voltage are to be expected.

Electro-magnetic influences affecting the measurement cables

The influence on the measurement cables will be limited by input filters whose filter frequency will be set per software (see section above).

Shielded lines may have to be used for fast measurement which cause high filter frequencies. A shield is usually not required.

Shielded measurement cables



<u>Warning:</u>

Never connect the shield (screen) to the terminals of the Message devices. These inputs are galvanically isolated. Select a good earth point.



12 Top/LogMessage Configurator

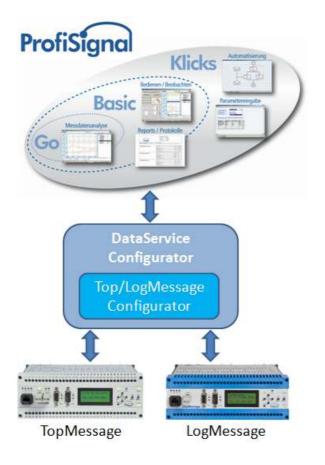
The software module "Top/LogMessage Configurator" is the basic configuration and communication software for Message devices. You need the configuration software for:

- Device settings
- Channel configuration
- Memory configuration
- Virtual Channel configuration
- Configuration of the Serial interfaces

12.1 Software Architecture

The Message devices are available with different software options of **ProfiSignal Go, Basic** and **Klicks**. With ProfiSignal you can very easily analyze measurement data, create individual HMI mimics or even configure fully automated test sequences for product testing with integrated reporting.

The main configuration software is the **DataService Configurator**. This software is required to establish a connection to the devices, configuration of databases for online archiving, scheduler events, alarm rules and the user administration. Within the software DataService Configurator the **Top/LogMessage Configurator** is launched to configure Message devices.





12.2 Launch Top/LogMessage Configurator

The Top/LogMessage Configurator will be started from the software DataService Configurator from the tab sheet channels.

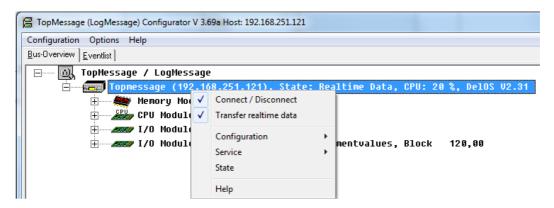
Connections Channels	Database Alerting	Scheduler	User management	
Channel		A	Value	Channeltype
E CPU Mod	Store chann	nel in		
	Manually of	nel in et device tim	e	•
I/O Modu	Manually se		e	Interfaces
	Manually se		e	

12.3 Bus overview

The actual configuration of the Message devices is carried out with the software Top/LogMessage Configurator. The Bus overview provides an overview of the different modules.

	3 TopMessag	e (LogMessage) Configurator V 3.69a Host: 192.168.251.121
	Configuration	Options Help
Ī	<u>B</u> us-Overview	<u>E</u> ventlist
T	⊡@,	TopMessage / LogMessage
	—	📰 Topmessage (192.168.251.121), State: Realtime Data, CPU: 14 %, DelOS V2.31
		🗄 🛲 🗮 Memory Module
		🕀 🥔 CPU Module
		🕀 🛲 🖅 I/O Module 1: AAST
		🗄 🛲 🛲 I/O Module 2: AMDT, State: Measurementvalues, Block 157,00

With right click on the device the configuration menu can be accessed. The configuration options will be explained in the following chapters.





12.4 Event list

The event list records all changes made to the device. This event list will be rebuild after each reboot of the system.

TopMessage (LogMessage) Configurator V 3.69a Host: 192.168.251.121
Configuration Options Help
Bus-Overview Eventlist
23.09.2010 10:29:09.256 TopMessage (LogMessage) Configurator V 3.69a Host: 192.168.251.121 initialize
23.09.2010 10:29:09.256 Operating System: Windows NT 6.1
23.09.2010 10:29:09.262 RECU-Config from 192.168.251.121
23.09.2010 10:29:09.524 HOST 192.168.251.121 : Open socket connection
23.09.2010 10:29:09.617 Connected 192.168.251.121
23.09.2010 10:29:09.877 RECV-Config from 192.168.251.121
23.09.2010 10:29:09.882 RECV-Config from 192.168.251.121
23.09.2010 10:29:14.268 Server disabled and inactive



13 Device configuration & service

ſ	🖁 TopMessage (LogMessage) Configurat	or V 3.69a Host: 192.168.	251.121		
	Configuration Options Help				
l	<u>B</u> us-Overview <u>E</u> ventlist				
l	⊟ 🔍 TopMessage / LogMe	ssage			
	⊕ Memor ✓ ⊕ £PU N ✓	Connect / Disconnect Transfer realtime data	04642	: Realtime Data,	CPU: 20 %, DelOS V2.31
		Configuration Service) }	Basic setting Valuetables	496,00
		State Help		Address book Safety settings	
		Theip		Module assigment Modemsettings	
				Store Restore	
				Save PLC-variables	

13.1 Configuration menu

13.1.1 Basic settings 1

In the basic settings menu fundamental configurations are carried out.

		Timezone / Synchronisation		
Hostname: Domain: Section: Location: Device: Comment:	TopMessage mydomain Section Location P1.1 This is a TopMessage device	NTP-Client: NTP-Server: NTP request mode: NTP cycle: Unsynchronized timestamps Set DataService automatically a	▼ active 192.168.248.040 ☞ Cyclic ○ Time 1800 ▼ accept (0 = inactive) as NTP backup server: ▼ enabled	s
TCP/IP IP-adress (LAN): Netmask (LAN):	192.168.251.121 255.255.240.0	Timezone (+/-): autom. daylight saving (Europe).: IP-adress (COM1): Netmask (COM1):	120	min ving)
200	192.168.254.254	IP-adress (COM2): Netmask (COM2):	192.168.2.2 255.255.255.0	
Gateway: 1. DNS: 2. DNS:	192.168.250.20			

Device name:

TopMessage Devices



Includes the parameters "host name" (necessary for DNS operation) and "domain" (for E-mails). The further parameters have no effects on the communication and have a mere informative purpose.

TCP/IP:

Here the basic connection parameters for the operation within the LAN network can be configured. If the device has also been entered in DNS (device names→host names), it is also possible to work with the host name here. For this purpose the device must know at least one DNS-Server. Should the device be reachable in different subnets, a gateway must be entered. For sending Emails, the host name of the SMTP-Server is needed.

IP address

The TCP/IP protocol demands an IP address by each subscriber in the network. The IP address runs as follows: Example : 192.168.254.161

Note:

The number 0 and 255 are not permitted on the last part of the IP address. They also cannot be entered for Message devices.

Netmask:

The Netmask is a filter for the TCP/IP communication. Usually only devices within the same Netmask can communicate with each other. It is important that device IP addresses within one Netmask have a difference where the netmask is zero. Each device in a local network must have a different IP address, which must differ only in the last three digits.

Example: Netmask = 255.255.255.0IP1 = 192.168.254.13, IP2 = 192.168.254.78 ok IP1 = 192.168.254.13, IP2 = 192.168.253.12 ok wrong, IP differs on the 3. position Netmask = 255.255.0.0IP1 = 192.168.254.122, IP2 = 192.168.123.3 ok IP1 = 192.168.254.122, IP2 = 192.2.2.5 ok

Gateway: If inquired IP addresses are not in the range that has been declared valid through the netmask for the local network (see under "wrong" examples), the communication can be set up via a Gateway. This is e. g. the case for all Internet inquiries. For the properties of the TCP/IP protocol the IP address of a Gateway (computer or device) which provides this function can therefore be indicated. Normally, this is a router. Of course, the IP address must be valid for the local network!

MTU:

Here the sizes of the TCP/IP package can be defined.

IP-Forwarding:

The Message device an server as a router and forward IP-addresses in the scope of GSM modem communication.



UPD Broadcast and Search Broadcast:

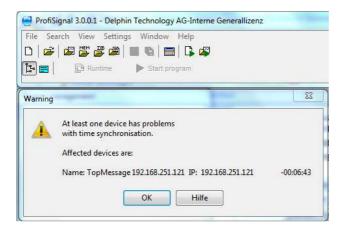
With deactivated broadcast function the DataService Configurator will not be able to list the device which is connected to the network. In this case other users of the Network will not be able to find the device automatically.

Timezone / Synchronisation:

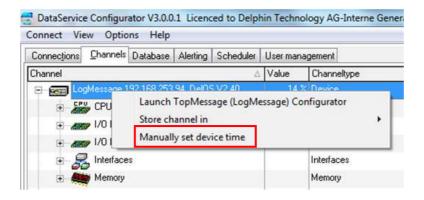
The time synchronization between PC and Message device are very important to have a synchronous data presentation on the ProfiSignal software. If time is not synchronous the following message appears in the DataService configurator.

DataService Configurator V3.0.0.1 Licenced to Delphin 1	Fechnology AG-Interne	Generallizer	nz State: Connected to 'Data	Service ID 1012' at PC
Connect View Options Help				
Connections Channels Database Alerting Scheduler Use	er management			
Name	∀ Host/IP	Connect	State	Drivertype
🖃 🗝 🗊 DataService ID 1012	PC91	Yes	Online	DataService
TopMessage PublicTopM	194.25.251.245	Yes	Online	TopMessage
TopMessage 192.168.251.121	192.168.251.121	Yes	Online, Time of device differ	TopMessage
Software channels	PC91			Software Channel
Expert Key 100L		Yes	Offline	Expert Key

When the software ProfiSignal is started the following warning message comes up where the concerned device IP address and the time difference is reported.



When the time settings of the Message device do not instantly lead to a synchronization, you can manually synchronize the PC with the Message device through the DataService Configurator from the tab sheet channels.





NTP Client:

The check box NTP Client (NTP = Network Time Protocol) is the main control function to activate or deactivate the time synchronization between PC and Message device. If a NTP server is configured and reachable the Message device will receive the current time from this server. In the case that <u>no NTP</u> server is available, or cannot be reached the DataService Configurator will show the message "Online, Time synchronization (NTP) error".

Connect View Options Help			
Connections Channels Database Alerting Scheduler User man	nagement		
Name 🛆	Host/IP	Connect	State
🖃 🖷 🗐 DataService ID 1012	PC91	Yes	Online
Expert Key 100L		Yes	Offline
Software channels	PC91		
TopMessage 192.168.251.121	192.168.251.121	Yes	Online, Time sychronisaton (NTP) erro
TopMessage PublicTopM	194.25.251.245	Yes	Online

It is recommended to configure the DataService Configurator as back up NTP server.

NTP Server:

Normally the PC with the ProfiSignal application and the Message devices are linked up to the overall company network. In this case it is recommended to use the global NTP time server of the company to synchronies the Message device.

You can obtain the IP address of the NTP server from your systems administrator.

NTP request mode:

In order to activate the time synchronization the request cycle time has to be defined. It is recommended to have a request cycle time of 30 minute = 1800 sec.

Accept unsynchronized time stamps:

It is recommended to activate the check box to accept unsynchronized time stamps. This has the following advantage. In some cases the NTP server is for any reason not synchronized to a time reference server. The Message device will get the information from the NTP server whether the NTP was able to synchronies himself or not. If the check boy is not activated the Message device will not consider the time of the NTPS server as trustworthy. However, if the Message device is connected to a local PC only and the PC also operates as a time server it is probably not relevant whether the NTP server of the local PC can make synchronization to a reference time server or not.

DataService automatically as backup NTP:

It is recommended to activate this check box so that the DataService Configurator can serve as a backup NTP time server in the case that the main NTP server is not reachable.



Time zone:

Here the time zone will be configured in minutes. You can find out your time zone by accessing the data and time icon on your control panel of the PC. For Germany the time zone is UTC + 1 hour.

atum und Uhrzeit	Zusätzliche Uhren		
	Datum: Donnerstag, J Uhrzeit: 14:05:22	23. September 2010	
1 miles	11		
Zeitzone – (UTC+01:00) Ar	nsterdam, Berlin, Bern, Ro	n Datum und Uhrzeit änder	m
	nsterdam, Berlin, Bern, Ro		'n
(UTC+01:00) Ar Die Sommerzei so eingestellt, c	t endet am Sonntag, 31. C	om, Stockholm, Wien Zeitzone ändern Oktober 2010 um 03:00. Die Uh kt eine Stunde zurückgestellt	r ist
(UTC+01:00) Ar Die Sommerzei so eingestellt, c V Benachricht	t endet am Sonntag, 31. C Jass sie zu diesem Zeitpur	om, Stockholm, Wien Zeitzone ändern Oktober 2010 um 03:00. Die Uh kt eine Stunde zurückgestellt stellt wird	r ist

Automatic daylight saving Europe:

In Europe the time is change twice a year. The Message device can automatically anticipate the time change when the check box is activated.

Summer time:	Last Sunday in March, 2 hrs AM (1 hour ahead)
Winter Time:	Last Sunday in October, 3 hrs AM (1 hour back)

Remark:

The activation of day light saving settings during the summer time is causing an update of the time zone. When the time zone is configured e.g. for + 60 minutes (UTC +1 Germany) and you activate the day light saving afterwards the system will update the time zone automatically to 120 minutes when you open the dialog again. Under this specific circumstance the updated time zone is correct and the system will run correctly.



13.1.2Basic Settings 2

онср		Mail / HTTP	
Node:	Disable 👻	Mail-Server:	mail
HCP settings:	P-Adresse (LAN)	Sender domain:	🗖 otherdomain.de
	🗹 Netzmaske (LAN)		🔲 Skip hostname in sender address
	NTP-Server DNS-Server	Sender name:	🗖 event
	Hostname		- Channelname not as sender
	Domain Zeitzone		L name
	Syslog-Server	Default HTTP-file:	/default.html
	IP-Forwarding Default Gateway	Boot HTTP-Path:	1
			4
Syslog			
nin, Rep. Level:	Disable	-	
Gerver:	0.0.0		
	. Barris services		

DHCP:

In case your network supports "DHCP" you can configure the Message device in the way that it will receive its IP-address dynamically and can be reached via host name in the Top/LogMessage Configurator. For this option you activate under settings 2 the mode

"Boot/DHCP" (Attention: older servers might require: "native Bootp").

Select from the following list "DHCP-settings" the parameters that should be taken over and which are supported by your DHCP-server.

Contact your network administrator for information on DHCP-server.

Syslog:

In case the system report of the Message devices should be centrally filed on a PC, enter the IP-address of PC as well as the logging level. If you select log level INFO all information will be logged. All logging information will be stored in the file DataService Config on the ProfiSignal installation directory.

Mail / HTTP:

Here the mail servers resp. the HTTP starting paths must be entered. In order to send an Email via your provider you will require the following settings:

Domain:	Domain_of your_Poviders.de
Sender-Domain:	Domain_of your_Poviders.de
Mail-Server (SMTP):	smtp. Domain_of your_Poviders.de
Option:	"No hostname in sender" active



13.1.3 Basic Settings 3

ettings 1 Settings 2 Settin				
Console		Channelcycle		
Display line 1:	Time/Date 💽	Cycletime:	100	💌 ms
Display line 2:	<blank></blank>			
Display line 3:	LAN IP Adress	PROFIBUS		
Display line 4:	<blank></blank>	Station address:		126
Console Timeout:	60 s	Ident-Number:		0x721
	188 Jac	No address change from master:	active	
Watchdog Module-Connection (CAN): PC-Connection: Reset at watchdog failure: Timeout: Monitored IP:	active active active 10 sec 000.000.000			
PLC	1			
PLC-program:	🔽 active 🦳 Stop 🙃 Run			
	100 • m	s		
Cycletime:				

Console:

Different display functions can be allocated individually to each line of the display. Display functions besides time and IP addresses for LAN (default setting) and COM 1 / 2 can also be among other measurement values of individual channels or states of the interface. Timeout console indicates the cycle in which it is being changed from the submenus in the respective main menus or back to the standard display.

Watchdog:

The module communication and the PC communication as well (together with the indicated PC) can be provided with a watchdog. In the default settings only the module communications is monitored. In order to report watchdog messages a limit channel is required.

PLC:

Activates the internal PLC resp. sets the cycle time. This function is only relevant when PLC programs are configured in the Message device.

Channel cycle:

Cycle time in which analog/digital outputs and time based virtual channels (as e.g. timer and integrator) are performed resp. are set.



Caution:

Small cycles may lead to negative side effects (too high CPU-load or faster filling up of data memory).

Profibus:

The Message devices can be ordered with the option for Profibus-DP Slave communication. In order to use the Message device for PLC applications the station address and the indent number has to be defined. With the delivery of the device you will also receive a special GSD file.

13.1.4 Value tables

Here there is the possibility to file up to 72 tables with up to 7936 values.

Teble munible					
1	• In	ien input		Output	
f able marrie	1	120		a	
Delault Table 1	2	0,5		a	
łode	1	0,6		1	
Linewoolion	+ 4	2		1	1
lumber of values	and the second se				
(-				
	1.77.7				
Export					
Esport					
			2000		
			Free values	7913	
	Cano	-	Free values	7910	Extingle

Three modes are available for this:

Set value curve

Indicate the values and the duration; between the values it is being interpolated. (>is used by set point channel)

Sequential circuit

Switch up to 16 signals either time related or triggered dependent on a signal (> is used by set point channel)

Linearization

Give your value table (input and output values) your linearization function (>is used by linearization channel)

Besides the manual input there is also the possibility for the import/export of tables. The configuration of the table is explained in more detail in the section "Virtual Channels".



13.1.5 Address book

In the address book up to 40 "addressees" can be filed; address book entries can cover the formats of "E-mail", "SMS" "Datastring" and "Fax". These entries can be used by the event channel. More details about the configuration of event channels can be found in the chapter "Virtual Channels".

Index	Name 🔺	Address book entry
1.	sms	Address book entry
2.	Entry #2	Name: E-mail
3.	Entry #3	
4.	Entry #4	Type: Email 💌
5.	Entry #5	
6.	Entry #6	Address
7.	Entry #7	p
8.	Entry #8	
Э.	Entry #9	
10.	Entry #10	
11.	Entry #11	
12.	Entry #12	
13.	Entry #13	
14.	Entry #14	
15.	Entry #15	
16.	Entry #16	
17.	Entry #17 +	
0]K Abbruch <u>E</u> diting Entry	<u>QK</u> <u>Abbruch</u>
		Last Change 20.09.2010 14:54:20



13.1.6Safety settings

It is possible to limit the access to the Message devices through a user administration / registration and also through an IP interlock on the network level.

Safety settings	User protection:
User protection	
 ✓ Console ✓ DELP ✓ FTP ✓ Telnet ✓ PPP ✓ HTTP 	 Console: Console at device DELP: Top/LogMessage Configurator / real time data / channel configuration FTP: Other configuration / read out memory Telnet: System console PPP: Modem / serial connections HTTP: Browser access
IP protection IP administr	ation IP access protection:
OK Abort	In the case of activated protection the device only accepts only connections of permitted IP addresses.

Install:

The user administration is switched on in the main menu "options" by activating the option "user protection". The user "SUPERVISOR" is part of the default installation. In order to create other users the following administration menu is available. You can choose from 6 different user profiles.

pMessage Userlist			diversion of	dennes a			
	Usemame	Password	Password replay	Rights	inaktive		
1	Supervisor	*******	********	Superuser			
2	Operator	#1000KR00#	NOTIONA	User			
3	Anonymous			Guest	Г		
4	Test	BIOM	XXXX	Guest	. Г		
5				Guest			
6				User Configurator			
7				Administrator Superuser			
8				None			



User Profiles:					
Guest:	The user has	access to real time data only.			
User:	The user has access to the internal memory and he can establish a Telnet connection.				
Configurator:		The user can configure the devices with the Top/LogMessage Configurator as far as this is permitted by the safety settings of the devices.			
Administrator		operate / configure the Top/LogMessage Configurator device with of the user administration completely.			
Superuser:	The user can restrictions.	operate / configure the Top/LogMessage Configurator without any			
		SUPERVISOR SUPERVISOR			

Log in

When the user administration is activated the corresponding user name and password must be included in the connection setting of the DataService Configurator. In the example a connection is established with the user "Test" and the corresponding password.

Top-/LogMessage connection settings	×
General Found devices	
Host	<u>P</u> ort
192.168.251.121	1029 🔻
ETP mode	
Passive	
Connection	BAS entru
RAS entry LAN	•
Connect	
Manually Automatically (a Automatically (a Automatically (a Autom. (only sto	
Username Password	
Test ****	
OK Cance	l Help



Login on Message device level:

When the password protection is activated a long in on device level is also required. If the user administration in the Top/LogMessage Configurator is deactivated or if there isn't any user logged in, the log in at the device is made with the user name "anonymous" without password. If data should be transferred in this state, the user must be installed "anonymous" in the concerned device.

IP administration:

The IP addresses of the devices (e. g. PC) which should have access to the device must be entered into the IP list.

Remark:

In the case of modem or serial connection the IP address is allocated to the PC by the device. The allocated address is the incremented IP address of the selected interface. This address must be entered in the IP administration, if data com connections should be possible.

Example:

If COM2 has the IP address 192.168.2.2, the PC will be allocated the address 192.168.2.3. The address 192.168.2.3 must be added to the IP list.



13.1.7 Module assignment

In the following configuration menu the module numbers are linked to the I/O modules. The module number is very important. Without an assigned module number it is not possible to configure the module and it is also not visible in the Bus overview in the Top/LogMessage Configurator. When a module is selected for assignment the corresponding LED on the Message devices is flashing. The flashing LED indicated which module is concerned. The module number can be obtained from the device as it is printed next to the LED. The module assignment can also be carried out through the LCD display of the Message device.

Assign r	module	5					
Mod	ule nb.	Module type		State			
2		AMDT, V2.00		Online	_		
1	R	eassign modul	le	►			
 	R	eplace module	e	►			
	C	hange numbe	er	×		Module 1	
	D	elete module				Module 2	
		ciete module	_			Module 3	
						Module 4	
						Module 5	
						Module 6	
						Module 7	
						Module 8	
						Module 9	
						Module 10	
						Module 11	
						Module 12	
						Module 13	
						Module 14	
						Module 15	
						Module 16	
,						Module 17	
			A	\bort		Module 18	
						Module 19	
						Module 20	



13.1.8 Modem parameter

On demand it is possible here to change the configuration of a modem or add a new type of modem. Please take the respective information from the documentation of your modem.

Nodem	Query at initialisation	Connect 1	Pos. answer
None Microlink ISDN/TLV.34	AT+CPIN?^M	CONNECT	ОК
Microlink 56K	Query compare	Connect 2	Neg. answer
LOGEM LGH 28.8D1 U-1496E M20	+CPIN: SIM PIN	l.	ERROR
TC35/MC35	Initstring pos. compare	Connect 3	
LOGES LGH 64k BM-33k6/ISDN pro Elite 2864ID	AT+CPIN="####"^M~~~~~		
Elike 2004ID	Initstring neg. compare	Connect 4	Timeout after dial [ms]
łodemname			120000
TC35/MC35	Initstring	, Busy 1	Time between dials [ms]
hort modemname	ATZ^M~~~ATS0=0+CMGF=1+CLIF	ERROR	10000
TC/MC35	Dial prefix	Busy 2	Max. dial retries
fanufacturer	ATD	BUSY	5
Siemens			21 5
	Dial suffix	Busy 3	Max. init retries
fodemproperties	îΜ	NO DIAL	5
✓ GSM 07.07 FAX Class 2.0	Escape sequence	Busy 4	Default baudrate
■ FAX Class 2 ✓ FAX Class 1	^[~~~+++~~~	NO CARRIER	115200
Debuginformation Detect Carrier	Hangup sequence	Ignore response 1	
 Toggle DTR to Hangup Answer Call 	ATH^M		
Inputecho(Sim) ✔ SetDTR at INIT	Ring	Ignore response 2	
Set DTR at CONNECT (Sim)	RING		
	Ring answer	Online query	
OK Abort	ATA^M	AT+CSQ^M	Reset all moderns



13.1.9 Store / recover configuration

Store

Indicate path and file name in the opening dialog box. Thus, several test set-ups can be quickly exchanged and recovered.

Speichern 🛛 🏭 C	ionfig	▼ ← È [*] II	
Name	*	Änderungsdatum	Тур
Project_2 Default.tmc		11.06.2010 09:54 11.06.2010 10:17	Dateiordner TMC-Datei
<	- M		

Recover

Select the file with the configuration to be recovered. Configurations can, if the hardware is matching with them, be recovered on different Message devices.

If the device is not recognized due to its series number during the plausibility checks, a corresponding warning will be issued. However, it is anytime possible to copy the configuration into a different device.

Step:	Check Modules	A	bort	
Progress:	Γ			
rning				n Bertore anvhowi
The The	e serialnumber of the device does	sh t match with stor	e_0 connourano	



During the restore process the system is checking the serial numbers of the modules of the configuration with the serial numbers of the modules in the configuration (.tmc) file. If the serial number do not match a manual module assignment is necessary. The module assignment is carried out in the following screen.

Assign modul		×
The shown module o Please assign it man	-	ed safely by its serialnumber.
Ignore Module	Stored configure	ation:
	Moduletype:	DIOT
Apply offline	Modulenumber:	9
Previous Module	Selected Modul	le (blinking):
	Moduletype:	No matching module
Next Module	Modulenumber:	found.
Assign Module		Assign modules automatically

Ignore module:

The channels of the displayed module (from the configuration file) are not recovered.

Apply offline:

The displayed module is added in the device (without appropriate physical module). The channels of the module are operable as soon as the physical module is connected.

Previous module / next module:

If there are several modules of the same module type inside the device, select the appropriate module.

The "module" –LED of the selected module is blinking during selection.

Allocate module:

The currently selected module will be allocated the displayed module of the configuration file.

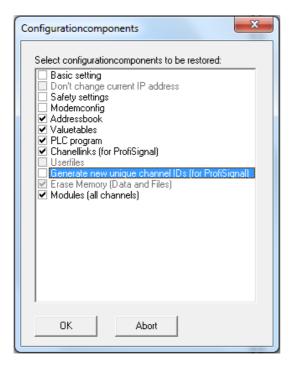
Allocate modules automatically:

This function tries to allocate the modules automatically. The allocation is made according to the following rules:

- 1. Modules without an equivalent physical module (type) are applied "Offline"
- 2. Modules with the same module no. are allocated
- 3. The modules are allocated with ascending module no.
- 4. Not allocated modules (without module no.) are allocated one after the other (coincidentally !)



In the final step you can chose which parts of the configuration you would like to restore.



Basic setting:

Basic settings of the device: Interface settings, network parameters, etc.

Safety settings:

Configuration data of the IP interlock and all users established in the device.

Modem configuration:

Configuration parameters of the installed modems.

Delete supernumerary software and storage channels

:If this option is displayed in gray, there are no supernumerary channels in the device.

I/O module x: yyy

If a module is displayed in gray, the configuration file does not contain any configuration information for this module.

(After the storage the module was added to the configuration file).

Note:

If there are changes at the module table required for the configuration recovery (module type, series no. etc.), the channels can no longer be recovered partly.

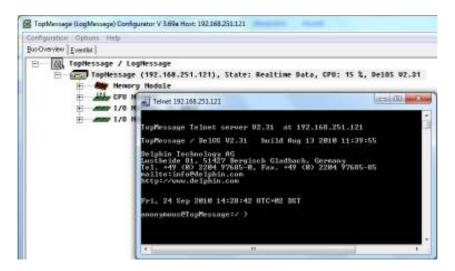


13.2 Service Menu

Configuration Options H	elp			
<u>B</u> us-Overview <u>E</u> ventlist				
🖃 🔟 TopMessage	1	LogMessage		
🗄 💳 🗂 TopMe	ssa	ge (192.168.251.12	1),	State: Realtime Data, CPU: 2
🖻 — 🦛	~	Connect / Disconnect		
±	~	Transfer realtime data		
		Configuration	×	: Measurementualues. Block
		Service	•	Open telnet connection
		State		Open browser connection
		Help		Store system report Firmware update
	-			
				Format memory

13.2.1 Open telnet connection

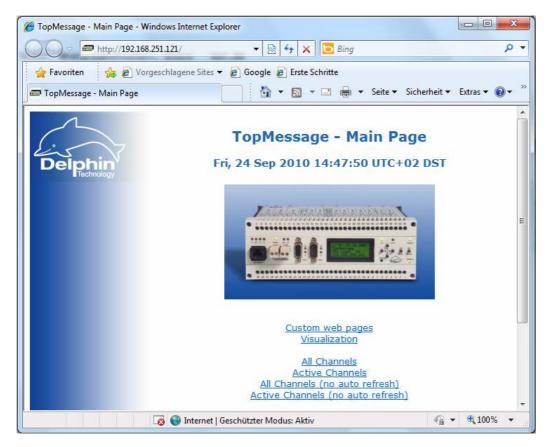
The function establishes a Telnet connection to the selected device. With this connection you can carry out commands via the system console of the device. This function is intended for service purposes only and must be used after hotline instructions only. **Operation error can crash the system!**





13.2.2Browser connection

The Message devices have an inbuilt web browser. The web browser can be used to access device and channel information. It is not possible to make any configurations through the browser.





13.2.3 Generate system report

This function generates a systems report of the device and stores them for service purposes in a text file. Please perform this function before each hotline contact and have the file ready.

Speichem 🛛 🏭 Confi	9	🝷 🗢 🔁 📩 🖬 🕇	
Name	*	Änderungsdatum	Тур
Project_2		11.06.2010 09:54	Dateiordner

System Report.tmr - Editor	
Datei Bearbeiten Format Ansicht ?	
<pre>µ92.168.251.121 at 24.09.2010 14:52:44 # TopMessage System-Protocol # Fri, 24 Sep 2010 14:52:54 UTC+02 DST</pre>	
**** 24 Sep 2010 UTC+02 0001 ****	•



13.2.4Update firmware

The device firmware is called DeIOS. The firmware version is always tested together with the corresponding ProfiSignal version. The latest firmware is installed in the directory of ProfiSignal in the folder "Firmware". When you receive an update of the ProfiSignal software you many carry out a firmware update. The following screen automatically indicates which parts should be updated.

Curre	Current software: Update			New softwa	are:	
Firmv	vare:	DelOS V2.31		Firmware:	DelOS V2.32	Select
Load	ler:	Loader V2.30	•	Loader:	Loader V2.31	Select
AMD	T:	AMDOS V3.42		AMDT:	AMDOS V3.42	Select
ADF	T:	None found	Γ	ADFT:	ADFOS V3.42	Select
Step:	Sele	ction				Update
Progress:	Jelei					Abort

13.2.5Formats memory

With the command all data of the memory will be deleted. However the storage groups and related channels will not be deleted.

Confirm	X
?	Should the memory formated? All measurement data and user files (eg. TopVisu process views) will be deleted.
	<u>Yes</u> <u>N</u> o

13.2.6 Reboot device

With this command the device will carry out a reboot. The report can be made also through the Rest bottom on the front panel of the Message device.





13.3 State

In the service menu "State" the general device information is indicated.

TopMessage State	1,00	8	X
IP-Adresse: MAC	192.168.251.1; 00:50:C2:13:84		1029
Serialnumber:		PCBNR:	101010101
Cycle time:	250 ms	CAN-Freq.:	1000 kHz
Hardware Rev.:	1117	Firmware:	DelOS V2.32 build Sep 1 2010 12:55:38
Base Memory:	2.00 MB	Loader:	Loader V2.31 build Aug 13 2010 11:44:40
Extended Memory:	976,99 MB	Bootblock:	BootBlock V1.71 build Jul 41999 01:36:55
Additional hardware:	PROFIBUS	Software licences:	Top∨isu
CPU-Load:		Actual Time:	24.09.2010 15:36:46 UTC+02
Last powerfail:	20.09.2010 15:	47:34 UTC+02	
Last boottime:	24.09.2010 15:	15:09 UTC+02 Reas	on: HardRst/WDog/SoftRst/
Battery failure f	Main Memory:	0	
Battery failure	Ext. Memory:	0	
Batter	y failure RTC:	0	
Oscillat	or failure RTC	0	
Rea	Time in∨alid:	0	[/////////////////////////////////////
Running on I	Backup clock:	0	<u> </u>

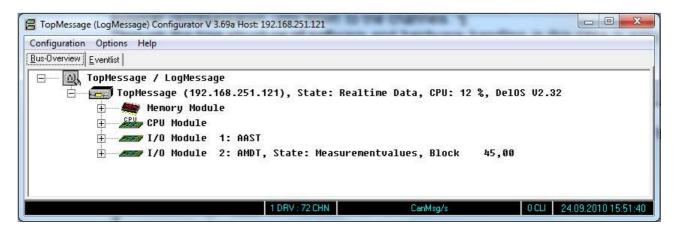


14 Channel configuration

The basic configuration of your Message devices is finally the channel configuration. Only with these configurations it is possible to process the different signal and sensor types, no matter if current, voltage or temperature sensor is required.

14.1 Bus Overview

If the connection between computer and the Message devices is established, you will have an explorer representation until down to the channels. Through the tree structure the navigation between the different levels is easy.



Interface level:

This uppermost level indicates through which interfaces (drivers) the Message devices are connected with the computer.

Device level:

Message devices and Lab devices, the IP addresses of which had been selected.

IO/ module level:

I/O modules with the hardware channels of the Message devices.

Channel level:

Channels of the individual modules.



14.2 Hardware channels

Hardware channels acquire the signals on the hardware modules. The following different I/O channels on module level are available:

- Analog input
- Analog output
- Status input
- Digital output
- Frequency / Counter input
- Gate time

14.3 Channel level

In the **Explorer** view you can now open the individual modules just down to the channel level. Open and close. This occurs as known from Windows by clicking on the "+" or "-" symbol.

nfiguration Options Help •Overview <u>E</u> ventlist					
 TopMessage / Loc	Messane				
	(192.168.251.121), S	tate: Realtime Data	CP	II: 12 %, DelAS U2,	32
	, Module		,		
	dule 1: AAST				
	1:Analog-Input	:AI_TEMP_TRAN	:	25,2 °C	(15:56:21)
	2:Analog-Input	:AI_TEMP_1	:	23,0 °C	(15:56:21)
	3:Analog-Input	:AI_CURRENT_ACCU	:	0 mA	(15:56:21)
- ‡ >	4:Analog-Input	:AI_VOLTAGE_ACCU	:	1239 mV	(15:56:21)
	5:Analog-Input	:REFERENCE TEMP	:	37,3 °C	(15:56:19)
1	6:Analog-Output	:AO_PID_LOAD_CUR	:	0,00 mA	(15:50:51)
	7:Analog-Output	:AnaOut #02/AAST	:	inactive	
<u>+</u> @_	8:Analog-Output	:AO_LED	:	20,00 mA	(15:50:51)
<u>+</u> @_	9:Analog-Output	:AnaOut #04/AAST	:	inactive	
	10:Digital-Input	:DigIn #01/AAST	:	inactive	
_**	11:Digital-Input	:DigIn #02/AAST	:	inactive	
	12:Digital-Output	:DO_RELAY_LOAD	:	0 BOOL	(15:50:51)
1	13:Digital-Output	:DO_RELAY_UnLOAD	:	0 BOOL	(15:50:51)
🕂 🛲 I/O Ma	odule 2: AMDT, State	: Measurementvalues,	, B1	ock 270,00	

By double clicking on the individual channels you will reach the channel configuration.

It signifies from the left to the right

Channel number:	Hardware or software channel number.
Channel type:	Channel type, e. g. "analog input"
Channel name:	Name of the channel, max.16 characters
Measured data:	Scaled (actual) measured data value
Units:	Engineering units, max. 6 characters
Time stamp:	Time stamp of last measured data value



14.3.1 Open the configuration dialogues

By double click on the requested channel the dialogue **channel configuration** opens.

modulogpo e	hanneltype		Address		
Active AAST	Analog Input		[032]:01:001		
Name AI_TE	MP_TRAN	1	Unit C		
Longtext Temp	erature		70		1
Properties Options 9	Sensorcompensa	ation	Connection Reference	PLC	
Sensor <u>t</u> ype	PT xxx		Measuring Range Senso	10	
Pt xxx (RTD) 🔹	100	•	-260.0850.0 °C	→ °C	•
	<u>G</u> raf. Scale				
Min	0				
Max	100				
🗌 Default value on e	atror				
	error				
☐ Default value on e [-300	error				
	attor				
	error				
	error				
	error				

Introduction

Each channel can be configured individually. If it is not required, it can be switched off (delete tick in **active**). Once a channel has been configured, the configuration data are transmitted to the corresponding Message device. The new configuration is immediately effective. The configuration is stored in the Message device in an EEProm and is thus cannot get lost. New configuration data overwrite old ones. Switching off or resetting the Message devices does not cause the loss of the configuration.

Upon start of the Top/LogMessage Configurator the configuration will automatically be read out from the Message device. This ensures that the Message device is operated with the correct device configuration.



14.3.2Common fields, for all channel types

Channel description

Moduletype	Channeltype		Address	
Active AAST	Analog Input		[032]:01:001	
Name Al	TEMP_TRAN	 Unit	ΰC	

Switch: Active

This switch set the channel to active or passive mode.

Fields: Module type, Channel type, Address

Example of address field:

[032]:01:001

- :032 Channel ID
- :01 I/O module number
- :001 channel number

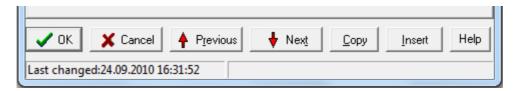
Field: Name

Input of an individual channel name, max. 16 characters max. Serves to identify the channel. Also appears on the LC display of the Message device.

Field: Unit

Input of an individual physical unit (bar, m/min, °C). Also appears on the LC display of the Message device.

Fields at the lower part:



OK	Confirmation and saving of changes
Previous	One channel downward
Next	One channel upward
Copy	Put the contents of a channel into an buffer memory
Insert	Insert the contents of a channel from the buffer memory to this channel
Help	Access to device documentation and technical manuals



14.4 Configure analog inputs

By double click on the required channel in the explorer the dialog "channel configuration" opens.

14.4.1 Register "Properties"

Properties	Options	Sensorcompensation	Connection Reference PLC
Sensor <u>t</u> yp Voltage	e •	Mo <u>d</u> e bipolar 💌	M <u>e</u> asuring Range +/-10000.00 mV
M <u>e</u> as	uring Range	e <u>S</u> cale	
Min -100	00	-10000	
Max 1000	0	10000	

Field: Sensor type

Select the sensor (or sensor signal) which you wish to connect to this channel. The selection possibilities are restricted by the selected I/O module type.

Field: Mode

Select "unipolar" signal range (only positve values) or "bipolar" signal range (positive/negative values).

Field: Measuring range

Serves to select a required (physical) measuring range. The list field supplies the measuring ranges available.

Field: Measuring range, Min/Max and Scale Min/max'

The two input fields "measuring range" (Min/Max) and "scale" (Min/Max) correspond with each other. The scaling refers to the range, as this is selected in the measuring range. Enter here two points of the linear sensor characteristic curve.

Measuring range	Measuring range, min./max.	Scale, min./max.
± 10 000 mV	± 10 000 mV	± 20 bar
010 000 mV	05 000 mV	030 bar
010 000 mV	010 000 mV	020 bar
± 625 mV	±100500 mV	20100 m/min.
020 mA	020 mA	530 bar
420 mA	420 mA	0150 bar

Examples

For temperature sensors scaling is preset maximum possible range, which is generally determined by the sensor. Within these limits only a scaling which corresponds to the application can be set.



Example:

Measuring range	Scale, Min/Max
-200850 ℃ (Pt100)	0100 °C
-2701372 ℃ (NiCrNi)	0300 °C

Hint: The computers trend graphic use the scaling min/max for the scaling (range) of the Y-axis.

14.4.2 Register "Options"

Properties	Options	Sensorcompensation Connection Reference PLC			
Realtime o Tolerance		% ☐ Scaled	Measuring Interval active Measure all x cycles		
<u>A</u> /D Mea:	tional <u>d</u> igits suring Time		✓ Calibration Calibrate all 2^x cycles		
160 ms (Overall mo		▼ uretime: 524 ms	Reference junction		
Measuri C Inac @ Activ		heck	[036]:01:005 REFERENCE TEMP		
Wire Bra Inac Activ		nitoring			

Field: Tolerance, real-time data

This input is based on the adaptive storage concept of the Message devices. A measured value is only stored with time and date stamp if it lies outside the tolerance of the previous value. The percentage value refers to the scale (see input scaling min/max). Optionally, press the button "scaled" and enter the absolute value.

Field: Fractional digits

Enter the requested number of the fractional digits (from 0 to 9).

Field: A/D measuring time'

Is close to the conversion time of the analog-to-digital converter. It can be adjusted for each channel individually. The real measuring cycle time is calculated from the sum of the selected values of the individual active channels. This information is valid for I/O modules with sequential sampling thus for ADGT, ADIT, ADVT, AAST.

For thermocouples please select the greatest possible A/D measuring time.



Option: Measuring rang check

Enables a permanent check of the valid measuring range.

Option: Wire break monitoring

Enables a permanent wire break monitoring.

Hint: Active wire break monitoring slows measurements down. The wire break monitoring can be monitored via a limit channel to report alarm status information.

Option: Measuring interval active

Channels, where the measurement density is unproblematic, often temperature channels, can be measured with a reduced measurement density. This has advantages for the capacity utilization and also saves memory space. Enter a factor in the field "measure all x cycles" in order to reduce measuring cycle.

Option: Calibration

If you attach great importance to high measuring accuracy, the auto-calibration should be switched on. Thus, this channel calibrates automatically, e. g. upon changing of the ambient temperature. Typical setting is 10 for $2^{10} = 1024$ cycles.

Field: Reference junction (only for sensor type "thermocouple")

The internal temperature reference can be replaced by an external temperature reference measuring point. The external reference measuring point must be equipped with a Pt100. The temperature reference junction is preconfigured for the modules ADGT, ADIT, AAST and ADVT. Without an active temperature reference junction the thermocouple measurement is not possible.

Remark:

One analog input channel serves as cold reference junction channel for thermocouples (ADGT, ADIT, ADVT, AAST). This channel is configured ex works. This configuration must not be altered. The function of the thermocouples would then no longer be ensured.



14.4.3 Register "Sensor compensation"

Properties Options	Sensorcompensati	on Connection	Reference PLC
Compensation <u>a</u>	ctive		
<u>S</u> et	<u>A</u> ctual		
Min 0	0,128		
Max 100	99,75		
Hint:Use scaled unit	8		

Option: Sensor compensation

The sensor compensation permits the compensation of sensor errors. For this purpose the sensor must be calibrated, i. e. the error must be known on two points of the identification line (e.g. a Pt100 at 0° and 100 °C). The input of value s occurs in scaled units – also for temperature sensors.

Warning

If you do not wish to use the sensor compensation, you have to remove the checkmark "Compensation active" by all means. The sensor compensation alters the measurement values!

14.4.4 Register "Connection"

This register shows the clamps and the connection for the input signal. The drawing is depending on the selected sensor type. (Example: Thermocouple)

Properties Options Sensor	compensation	Connection	Reference	PLC
Module: 1 Channel: 1				
	2	~		
		$^{\prime}$ >		
	3			



14.4.5Register "Reference" Properties Options Sensorcompensation Connection Reference PLC Listed channels used this channel: [004] LI_ALRT_TMP_TRAN [009] LI_WIRE_BREAK [009] LI_WIRE_BREAK

This register provides a list of all channels which use this channel as source channel.

14.4.6 Register "PLC"

Properties Options Sensorcompensation Connection Reference	PLC	
PLC		
Inactive		
PLC-Type		
REAL		

This register has no function any more.



14.5 Configuration of analog outputs

The analog outputs of AAST and ADIT module can be used to control other external devices. The analog outputs provide 0..20 mA or 4..20 mA signals. The analog output can be controlled through the ProfiSignal software or through other internal channels

14.5.1 Register "Properties"

Moduletype	Channeltype		Address	
Active AAST	Analog Output		[037]:01:006	
Name A0	PID_LOAD_CUR		mA	
Longtext load	d current at the tran	isistor (V1)	50- 	
roperties Options	Connection Rel	ference F	1C]	
Source		Inter	nal Channel	
Internal Channel 🔄	·	[01]	7]:00:017 PID	CONTROL
<u>S</u> cale	Output (mA)	<u>O</u> utput	range	
din 0	0	(• O.,	20 mA	🔲 Value as mA/mV
Max 1	20	C 4		🥅 no scale limit
Manual/Default Val	Je.			
Manual/Default Vali	Je			
	ue 			
0			• Next	<u>C</u> opy Insert Help

Field: Source

Selects one of several signal sources.

- Internal channel Output is controlled by device-internal quantity
- PC Output is controlled by PC (computer, DCS)
- Manual Output is controlled by hand (this dialog)
- PLC Output is controlled by device-internal PLC process

In the example the output is controlled by device-internal PID controller channel.



Field: Internal channel

See above, field "Source"

Field: Manual/Default value

Manual output value (for source 'Manual') or start value (after power-up of device)

Fields: Scale / Unit / Output

This setting defines the assignment of source and output. The show example assigns 0 to 1 of the PID controller to an output of 0..20 mA.

Option: Output range

You can select between 0..20 mA and 4..20 mA

Option: no scale limit

This configuration allows to input lager points via the ProfiSignal application then the channel actually can process.

14.5.2 Register "Options"

Properties	Options	Connection	Reference PLC
Realtime o Tolerance		% 🗖 Scale	d
🔲 no trar	nsmission		
Fract	ional <u>d</u> igits	2	
Wire Bre	akage Mo tive	nitoring	
C Activ	'e		

Field: Tolerance realtime data

This input is based on the adaptive storage concept of the Message devices. A measured value will only be stored with time and date stamp if this lies outside the tolerance of the previous value. The greater the tolerance the more memory space is saved. The percentage value refers to the scaling.

Field: Fractional digits Enter the requested number of the fractional digits (0 to 9). **Option: Wire break monitoring**

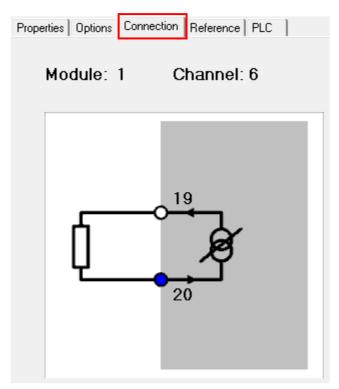
Enables a permanent wire break monitoring.



Hint: Active wire break monitoring slows measurements down. The wire break monitoring can be monitored via a limit channel to report alarm status information.

14.5.3 Register "Connection"

This register shows the clamps and the connection for the output signal.



14.5.4 Register "Reference"

This register provides a list of all channels which use this channel as source channel.



14.5.5Register "PLC"

This register has no function any more.



14.6 Configuration of digital inputs 14.6.1 Register "Properties"

Field: Output (PC)

Low level and high level are assigned to numerical values 0 and 1. Other values are possible. e.g. for better display representation (evaluation software).

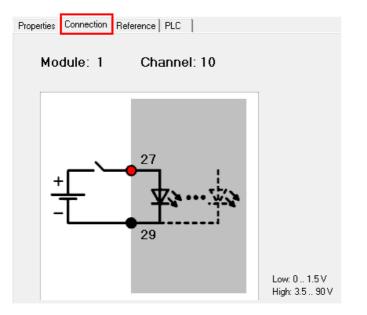
Option: Inverting

Off	No inverting
On	Logic level low and high are changed
Channel	The inverting is controlled through an internal channel.



14.6.2 Register "Connection"

This register shows the clamps and the connection for the input signal.



14.6.3 Register "Reference"

This register provides a list of all channels which use this channel as source channel.

Properties Connection	Reference	PLC				
Listed channels used this channel:						
[020] M:Storage #0	20		_			

14.6.4 Register "PLC"

This register has no function any more.



14.7 Configuration of digital outputs

14.7.1 Register "Properties"

Channelconfiguration	
Moduletype Channeltype	Address
Active AAST Switch Output	[043]:01:012
Name DO_RELAY_LOAD	Unit BOOL
Longtext Switch	
Properties Connection Reference PLC	1
Source	Internal Channel
PC 🔹	[000] None
<u>S</u> cale	
Lo 0	Invert
Hi 1	
Manual/Default Value	
Lo	
Persistent	
VOK X Cancel A Previous	₩ Next Copy Insert Help
Last changed:20.09.2010 14:54:16	

Field: Source

Selects one of several signal sources.

- Internal channel Output is controlled by device-internal channel
- PLC Output is controlled by device-internal PLC process (set point channel)
 - PC Output is controlled by PC / ProfiSignal application
- Manual Output is controlled by hand (this dialog)

Field: Internal channel

See above, field "Source"

Field: Manual/Default value

Manual output value (for source 'Manual') or start value (after power-up of device)

Field: Scale

Defines the assignment of logical level low and high.

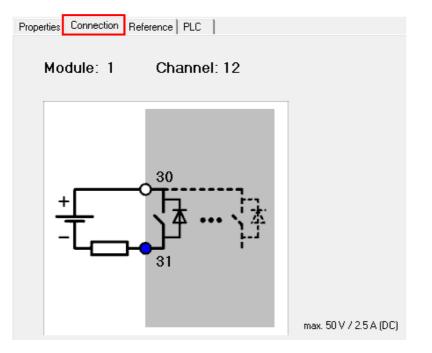
Option: Inverting

Logic level low and high level are changed.



14.7.2 Register "Connection"

This register shows the clamps and the connection for the output signal.



14.7.3 Register "Reference"

This register provides a list of all channels which use this channel as source channel.



14.7.4 Register "PLC"

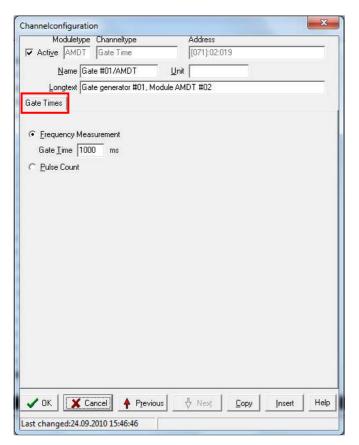
This register has no function any more.



14.8 Config. of frequency inputs /counters

14.8.1 Setup mode and gate time

The additional channel 'Gate time' must be configured for this purpose, first of all. Hint: The setting is valid for <u>all</u> frequency/counter channels the I/O module.



Mode: Frequency measurement

During the evaluation the number of the pulses per gate time is registered. The gate time can be set in wide limits. You must take care that the pulse number which is counted during the gate time will not exceed the value of 65.535 pulses.

Mode: Pulse count

During the evaluation the current count of the pulses is registered.

Example for frequency measurement:

Suppose you have a flow measurement with max. of 40 liter/s. Per liter 10 pulses are generated.

Gate time	Pulses per gate time, max.	Scaled measured value, max.
1000 ms	400	40 liter/s
2000 ms	800	40 liter/s
3000 ms	1200	40 liter/s

Select higher gate time if higher resolution is desired.



14.8.2 Register "Properties"

After having defined the 'gate time' you can now configure the actual channel 'frequency'.

Moduletype	Channeltype	Addre	ess		
Active AMDT	Frequency/Counter	[072]:02:020		
Name Flo	ow rate	Unit Liter.	/sec		
Longtext Flo	ow measurement				1
roperties Options	Sensorcompensatio	n Connectio	n Reference I	PLC	
<u>P</u> ulse Count	<u>S</u> cale				
Min 0	0				
Max 400	40				
	10	10	121	Insert	Help
🖌 ок 🛛 🗶 с		: 🚽 🔶 Ne	xt <u>C</u> opy		

Fields: Pulse count and Scale

Mode 'Frequency measurement'

Enter assignment between 'pulses per gate time' and 'scaled measured data'. The shown example assigned 400 pulses/s to a flow of 40 l/s.

Mode 'Pulse count'

Enter assignment between 'pulse count' and 'scaled measured data'.



15 Calibration

The sensor compensation for several channels can be carried out automatically. You start the automatic sensor compensation via the main menu "configuration / offset/calibration".

Configuration Optio	ns Help	
Offset/Calibratio	LogHessag ge (192.1 Memory Hodul CPU Module	68.251.121), State: Realtime Data, CPU: e
)ffset/Calibration		×

100

Calibration first point Value for second calib.point::

Calibration second point

activate Calibration

Restart Calibration

V <u>C</u>lose

Calibration:

According to the type of calibration you require one (only offset) or two (offset and gradient) calibration points.

Activate calibration points:

The compensation points obtained during calibration will be taken over into the channel configuration of the selected channels and the sensor compensation will be activated.

Deactivate calibration:

The sensor compensation of the selected channels will be activated if necessary.

Note: Only channels without already activated sensor compensation can be calibrated.



16 Data memory

16.1 Introduction

In the basic version the Message devices include a data memory of appr. 0,5 MB. Optionally it can be extended to 1 GB for 128 Mio. records. All measurement values are provided with time and date stamp. Thus, data can be related to real time. The resolution of the time stamp is in millisec.

Adaptive storage:

Through the special design of the Message devices' data memories the data storage can be usefully adapted to your application. The adaptive storage permits a very powerful data compression so that the data according to the configuration of the data memory can be stored for a very long time. Adaptive means that a measurement value of a channel is only stored if its value deviates from its predecessor. If the measurement values are constant through a long period of time, only one measurement value is stored for this period.

Online/Offline data transmission to PC:

Through the battery buffered data memory the Message devices are at the same time data loggers. The measurement data can simultaneously be transferred to PC online and be stored in the Message devices as well.

Reliable measurement data acquisition:

Through the possibility to configure redundant data storage in PC and in the Message devices measurement data acquisition is reliable.

Readout data memory:

The Top/LogMessage Configurator permits to read out the data memories of the individual Message devices and transfer the data to PC. During the data transfer from the Message device to the PC the storage process is not affected and the system keeps logging.



16.2 Configure data memory

Mark in the Memory module of the Message device. Through right mouse click on the marked Memory module a selection dialog will open.

Select "Create Storegroup"

nfiguration Options Help					
s-Overview Eventlist					
🖳 🔟 TopMessage / Lo	gMessage				
😑 📻 TopMessage	(192.168.251.121), S	tate: Realtime Data	, CP	'U: 14 %, DelOS V2.	32
🕀 🦛 Memor 🕀 🏭 CPU M	Create Storegroup				
	Help				
‡ ⊵	1:Analog-Input		:	0,2 mV	(14:32:12)
	2:Analog-Input	:AI_TEMP_1	:	21,6 °C	(14:32:12)
; ⊳	3:Analog-Input	:AI_CURRENT_ACCU	:	0 mA	(14:32:12)
; ⊳	4:Analog-Input	:AI_VOLTAGE_ACCU	:	1235 mV	(14:32:12)
→	5:Analog-Input	:REFERENCE TEMP	:	36,5 °C	(14:32:08)
<u>+</u> @_	6:Analog-Output	:AO_PID_LOAD_CUR	:	0,00 mA	(13:29:35)
<u>+</u> @_	7:Analog-Output	:AnaOut #02/AAST	:	inactive	
	8:Analog-Output	:AO_LED	:	20,00 mA	(13:29:35)
	9:Analog-Output	:AnaOut #04/AAST	:	inactive	
	10:Digital-Input	:DigIn #01/AAST	:	Ø	(13:35:48)
	11:Digital-Input	:DigIn #02/AAST	:	inactive	
	12:Digital-Output	:DO_RELAY_LOAD	:	0 BOOL	(13:29:35)
	13:Digital-Output	:DO_RELAY_UnLOAD	:	Ø BOOL	(13:29:35)
н. же 1/0 м	odule 2: AMDT, State	: Measurementvalues	, B1	.ock 605,00	



16.2.1 Main configuration

Configure main configuration first in order to activate a memory group (partition). The necessary parameters are:

Data type:	Standard	normal analog, digital, calculated measurement values
	Complex	time signals, FFT of AMDT / ADFT module

Memory type: Circular memory: The latest data is always available. The oldest data is erased from the memory. Continuous memory: All data is saved to the memory group until all storage capacity is used. Then the data storage is stopped.

Memory size: The size of the storage group can be individually configured. You can always see how much free storage capacity is available.

Modulet	уре	Channeltype		Address			
Z Active CPL	T	Storegroup		[021]:00:02	21		
<u>N</u> ame	ME	M 1	 Unit	8	1		
<u>L</u> ongtext	Me	mory Group		-80. 			
fain Configuratio	on	Memory Properties	s Channe	llist Refere	nce PLC	1	
			- 411				_
Datatype							
 Standa 							
C Comple	ex (A	MDT / ADFT Inpu	its / FFT)				
Storagetyp	e			_			
 Circula 	r, co	ntinuous memory					
C Continu	lous	memory					
Memorysize: 50000	-	available Mem 986528 KB	ory:				
1							
Hint: Mainpr	oper	ties can only chan	ged oncel				
🔲 Add cha	nnel	configuration to F	TP data tra	nsfers			
(not need	led f	or reading memory	with Busm	anager)			
		15.	19		Tanan (E marine (C	
🖌 ок 📔 🗙	0	incel 🕴 🛉 P <u>r</u> evi	- CONTRACT - 20	🖢 Next 📗	Сору	Insert	Help



16.2.2Memory properties

Channelconfiguration				×
Moduletype Channeltype		Address		
Active CPUT Storegroup		[021]:00:021		
Name MEM 1	<u>U</u> nit	%		
Longtext Memory Group				<u>î</u>
Main Configuration Memory Properties	Channe	llist Reference P	LC	
Store Single step Edge trigger Level trigger Permanent	Trigge	source: [000] Nor Post: 0	ms	*
Force storage C Inactive C Cyclically C Trigger	1	Interval: 1800 source: [000] Nor	s	¥
Erase memory by trigger	Trigger	source: [000] Nor	ie:	-
Don't store start values				
VOK X Cancel + Previo	us 🚺	Next Copy	lnsert	Help
Last changed:27.09.2010 14:39:00				

Store:

Mode: Permanent

This is the default configuration. The modules permanent records all group related channels permanently.

Field: Trigger source

The trigger source channel allows to control the data storage depending on the status of the source channel.

Mode: single step

Upon start of the event exactly one value per channel is stored. These values are being synchronized to the moment of the event, so that all values have the same time stamp.

Store Single step	Trigger source:	[004]:00:004 A	lert 1	•
C Edge trigger	Post	0	ms	
C Level trigger		,		
O Permanent				



Mode: edge trigger

The data recording is started at the event of a rising edge and will run until the post time is elapsed. In this example an event post recording time of 2 seconds is configured.

Store C Single step	Trigger source:	[004]:00:004 A	lert 1	•
 Edge trigger 	Post:	2000	ms	
C Level trigger		,		
C Permanent				

Mode: level trigger

The trigger source channel is activating the data storage. The storage group will record all data when the trigger signal is high.

Store C Single step	Trigger source:	[004]:00:004 Ale	rt 1 💌
 Edge trigger Level trigger Permanent 	Post:	0	ms

Force storage:

Mode Inactive:

This is the default configuration.

Mode cyclical:

When the cyclical storage is activated you can chose any storage interval. In this example a forced storage for all channels of the storage group is performed every 1800 sec. The time stamp will not be changed in this mode.

Force storage O Inactive	Interval:	1800	s
Cyclically	Trigger source:	[000] None	~
C Trigger			

Mode: Trigger

The forced storage can also be activated from a trigger channels.

Force storage			*
C Inactive	Interval:	1800	s
C Cyclically	Trigger source:	004]:00:004 M	emory Trigger 💌
 Trigger 			

In this mode the raising edge is the trigger event. The settings in the storage tolerance are not considered. All channels and all values are recorded. The time stamp of the measurement values will not be changed also.



Remark:

This cycle time for forced storage events must be smaller than the cycle time (scheduler) for reading out the data memory. If the readout cycle (scheduler) is 24 h, the value in sec. must be smaller than 24 h (e. g. 12 h). If stored data are transferred to PC, for each channel at least one value must be available. If not, this channel is not visible on the trend graphics. In the example a value of 1800 sec. has been entered. This corresponds to half an hour.

Delete memory contents triggered

If this function is activated the contents of memory can be deleted event dependent (positive edge)

Don't store start values

If this field is active, you don't get start values, if the system is booting (e.g. firmware update)



16.2.3Channel list

In the tab sheet channels you can add all channels which should be stored in the memory group.

Moduletype	: Channeltype	Address
✓ Active CPUT	Storegroup	[021]:00:021
<u>N</u> ame MI	ЕМ 1	Unit 🕱
Longtext M	emory Group	
Main Configuration	Memory Properties	Channellist Reference PLC
Availab	le Channels:	Stored Channels:
[034]:01:003 A [035]:01:004 A [036]:01:005 R [037]:01:006 A [038]:01:007 A [039]:01:008 A [040]:01:009 A [040]:01:009 A [041]:01:010 D [042]:01:011 D [043]:01:012 D [044]:01:013 D [044]:01:013 D [044]:01:013 D [061]:02:009 A [062]:02:011 D [072]:02:020 F [064]:02:021 C	naOut #04/AAST igIn #01/AAST O_RELAY_LOAD O_RELAY_UNLO na.Out #01/AMD ma.Out #01/AMD ig.In #01/AMDT low rate ig.In #02/AMDT	[002]:00:002 VA_PID_NULL [005]:00:005 VA_RESET [018]:00:018 VA_SET_CURRENT [011]:00:011 Calculate #011 [032]:01:001 AI_TEMP_TRAN [033]:01:002 AI_TEMP_1
	Add ->	<- Remove
Tolerance of new Realtime data	added / created cha tolerance C	annels. Defaultvalue: 0,00 %
🗸 ок 🛛 🗶 с	ancel 🕴 🔺 Previo	us Vext Copy Insert Help

Mark the respective channel you want to store and click on the field "add" (or simply drag it into the right field by means of the mouse). The channels will then appear on the right side ("stored channels"). Analogous to this channels to be stored are erased.

Real time data tolerance

With the "tolerance of added channels" you can activate a tolerance for all channels through the "default value" or you activate the "real time data tolerance" for the memory channels. If you use real time data tolerance, the tolerance can be defined for each channel individually. Only if the measurement value is changing by the tolerance value, a new measurement value will be stored.

Default value

The percentage value refers to the scaled value. If you choose default value in percent the same storage tolerance to all channels of the storage group is applied.



16.3 Delete data memory configuration

By clicking on the entry "delete channel" in the context menu of the memory group the complete memory configuration will be deleted. This is useful, if you do no longer want to use the storage group of the Message device. You can also delete single channels from the storage group.

onfiguration Options Help us-Overview <u>Eventlist</u> E O, TopMessage / LogMessage E TopMessage (192.16 E May Memory Module	58.251.121), State: Realtime Data	, CPU: 13 %, DelOS V2.32	
	regroup Properties B:Storechannel Delete channel Help Help S:Storechannel :AI_TEMP_1 S:Storechannel :A0_PID_LOAD_CUR S:Storechannel :DigIn #01/AAST Help :DigIn #01/AAST Help :DigIn #01/AAST	810 (F)	(15:48:54)



17 COM - ports

The serial interfaces of Message devices (Comports) are within the CPU module and can be configured like a channel there.

TopMessage (LogMessage) Configurator V 3.69a Host: 192.168.25	51.121		
Configuration Options Help			
Bus-Overview Eventlist			
🖃 🖳 TopMessage / LogMessage			
📄 👘 🛲 TopMessage (192.168.251.121), S	tate: Realtime D	ata, CPU	: 13 %, DelOS
🗄 🔤 Memory Module			
CPU Module			
	:Disabled	:	inactive
	:Disabled	:	inactive
🗄 🗄 10:Channelgroup	:Test	:	-
🕀 🛲 I/O Module 1: AAST			
🗄 🛲 I/O Module 2: AMDT, State	: Measurementval	ues, Blo	ck 279,00

It is possible to select 23 different driver types directly besides interface parameters like Baudrate and Handshake, etc.

medalogpe	Channeltype	Address	
Active CPUT	COMPort	[1001]:00:002	
<u>N</u> ame Dis	abled		
Longtext			
nterface			
Interface Mode	,	Modem	
Disabled		None	-
Baud Rate 115.2 kBaud	-	Stop Bits	-
RS232	<u> </u>	8	<u> </u>
-	-		-
Handshake		Parity	
kein (no-hand	shake) 💌	keine (no-parity)	-



17.1.1 List of available COM port drivers

The following divers are implemented on the COM port. The Profibus-DP Slave driver is an option and has to be ordered separately.

Disabled **OpenPCS** PPP GS DA13 ANSI ASCII Output Yokogawa Recorder User Protocol MetraHit Resol / V-Bus Modbus RTU Master MIGAN / MIPAN GS DA20/xx ASCII Bus AEG SCPI SHORT microSYST mitex microSYST MIPAN PROFIBUS DP slave Sartorius xBPI microSYST mitouch Modbus RTU Slave FID2000 User Proto New

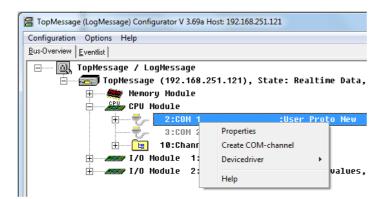


17.2 Create COM channel

In the first step you have to select the main driver from the interface mode. In this example the driver "User Proto New" is selected.

Moduletype Channeltype		Address	
Active CPUT COMPort		[1001]:00:002	
Name User Proto New	 Unit		
Longtext		70 II	
terface Protocol Specification			
Interface Mode		Modem	
User Proto New		None	<u> </u>
RS 232/485		Data Bits	
RS232 -		8	-
Baud Rate		Chan Dite	
19.2 kBaud		Stop Bits	_
-		1	<u> </u>
Handshake		Parity	
kein (no-handshake) 📃 💌		keine (no-parity)	_
🖊 OK 🛛 🗶 Cancel 💧 🛉 Previo	ous ,	Next Copy	Insert He

In the next step the COM channel is created.





On COM Channel level you can now see the configuration parameters for the driver "User Proto New". The configuration screen is depending on the driver you chose in the first place.

Moduletype Channeltype	Address	
Active CPUT COM-Channel	[021]:00:021	
Name COM #021	<u>U</u> nit	
Longtext Communicaton #02	ſ	
Properties Options Communication	Reference PLC	
	Source	
🖲 Input 🔿 Output	[000] None	*
Dutputmode	Period [ms]	
Cyclically	1000	Show pollstring
Address Subaddress Channel	Length	🗖 Show date
0 0 0	6	Show time
	Leading Zeros Always sign	☐ Show ms
Data Type	Fractional digits	📕 Show tagname
×	2	Show value
_ength	Max. Line Length	🗖 Show unit
4 Bytes	F [80	Show longtext
Diffset	Separator	
0 Bytes	Space]
/erzögerung	Pollstring / Filterstring	Datastring as pollstr.
0 ms		
ASCII-Hex-Format	Line End (3 char)	🗖 Datastring first
ASCII char as value	#0D#0A	Fixed line length
	100	



18Virtual channels

Virtual channels are extended functions of the Message devices. The term virtual channels refers to a general description of many different functions which can be configured inside the Message devices. This includes functions of:

- Math
- Logic
- Alarm
- Events
- Switching
- Control

The output of the virtual channels is calculated directly online on the device CPU. It is possible to combine many virtual channels with each other to cover large and complex logic and control functions. The Message devices can cover up to 1000 channels consisting of I/O channels and virtual channels. Every virtual channel can be saved to the internal memory of the device.

18.1 Available virtual channels

1	Channel Group	To organize and structure channels
2	Average	Average value can be calculated from any source channel. The available functions are:
		 time related average value,
		 moving average value
		 time related and moving average value.
3	Calculation	With the calculation channels calculations with the channels are made online and independently in the Message devices, e. g. temperature differences, ratios, efficiencies etc. can be realized. The results of the calculation channels can be treated like measurement channels and be used as these in the software programmes.
4	Variable	The Variable channel can store parameters which can be dynamically updated through the ProfiSignal Basic or Klicks applications or manually.
5	Integrator	 A versatile configurable function for the integration / summing formation of analog signals and counting pulses. Edge counter The edge counter counts the edges of a source (status input). A reset source that resets the counter can be activated. Thus, each status input can be used as frequency input. Integral Module DIOT contains 16 Bit counter inputs. Thus, the capacity of these counter amounts to appr. 65 000 pulses. One of the functions "differentiator and integrator" serves to prevent that pulses get lost upon the overflow of the counter. The functions "integrator adaptive" and "integrator cyclical" calculate the integral. Operating hours counter

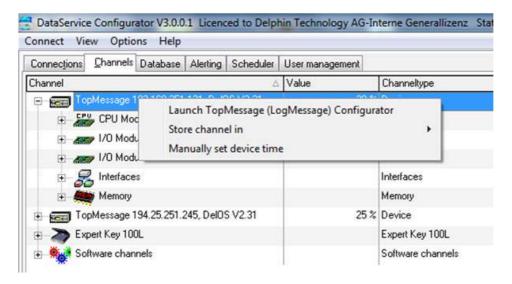


		Increases the counter permanent.
		Adder: Adds values of a source.
		Stop watch : Calculates the time between two signal edges
6	Differentiator	Is calculating the difference between two measurements
0	Differentiator	(gradient). The time basis can be configured individual.
7	Setpoint	With this channel individual set point curves can be
1	Serpoint	configured. This channel can also sequence the switching of
		up to 16 digital outputs.
8	PID-CLC	PID regulator channels permit the continuous regulation of a
Ŭ		process quantity. P, I, PI and PID regulators can be
		selected. In addition settings like e. g. dead zone, control
		variable limitation etc. are possible
9	Linearisation	With given x-value the channel searches in the table resp.
•		calculates (interpolated) the y-value of a discrete function.
10	Strain-Gauge	This channel is calculating characteristics for strain gauge
		inputs.
11	Spectral-Component	This channel provides a very specific analysis of FFT
		channels. This channel can only be used in combination with
		the AMDT module
12	Limit	Limit channels are used for Alarm and Event management.
		For each channel (analog, digital, calculation channel),
		lower and upper limit values can be established. Limit values
		can be used internally and externally. For the external
		function digital outputs can be switched (alarm functions).
13	Logic	Logic functions for Boolean operations.
14	FlipFlop	FlipFlops are use to cover control functions as they can store
		values and perform resets on trigger signal
15	Timer	Timer channels are mostly used to produce selectively
		edges and pulses at digital outputs. Thus you have a tool to
		control external installations in the required form.
		Pulse duration modulator
		Release delayed edges
		 Response delayed edges
		 Alarm-clock functions related to time
		Pulse generator
16	Event	The event channel is frequently used for e-mail or SMS
		notification in case of alarm
17	X-Message	This virtual channel permits, among others per LAN
		connection, to import the value of a channel from a further
		Message Device
18	Modbus (LAN)	This channels allows for cross linking between two devices.
		Any channel of one device can be integrated to another
		device.



18.2 Channel summary (Explorer)

In order to configure the "virtual channels" the Top/LogMessage Configurator has to be started. The Top/LogMessage Configurator is launched from tap sheet channels of the DataService Configurator.



The Top/LogMessage Configurator software provides an overview of the device. In the Memory module the internal data storage is configured. In the CPU Module are the software channels and the 2 COM ports are configured. I/O module refers to the installed modules of the system.

figuration Options Help Overview <u>E</u> ventlist					
 TopMessage / Log	Message		-		
	(192.168.251.121), S	tate: Realtime Data,	, CP	U: 19 %, DelOS V2.:	31
🗄 🥌 Memory	Module				
EPU Mo	dule				
<u></u> <u> </u>	2:COM 1	:Disabled	:	inactive	
	3:COM 2	:Disabled	:	inactive	
÷	10:Channelgroup	:Test	:	-	
i /0 Mo	dule 1: AAST				
\$	1:Analog-Input	:AI_TEMP_TRAN	:	25,8 °C	(13:14:25)
\$₽>	2:Analog-Input	:AI_TEMP_1	:	23,5 °C	(13:14:25)
‡₽>	3:Analog-Input	:AI_CURRENT_ACCU	:	0 mA	(13:14:25)
*	4:Analog-Input	:AI_VOLTAGE_ACCU	:	1247 mV	(13:14:25)
	5:Analog-Input	:REFERENCE TEMP	:	38,1 °C	(13:14:22)
	6:Analog-Output	:AO_PID_LOAD_CUR	:	0,00 mA	(13:10:20)
	7:Analog-Output	:AnaOut #02/AAST	:	inactive	
	8:Analog-Output	:AO_LED	:	20,00 mA	(13:10:20)
	9:Analog-Output	:AnaOut #04/AAST	:	inactive	
	10:Digital-Input	:DigIn #01/AAST	:	inactive	
	11:Digital-Input	:DigIn #02/AAST	:	inactive	
	12:Digital-Output	:DO_RELAY_LOAD	:	0 BOOL	(13:10:20)
1	13:Digital-Output	:DO_RELAY_UnLOAD	:	0 BOOL	(13:10:20)
	dule 2: AMDT, State	: Measurementvalues,	, B1	ock 27,00	

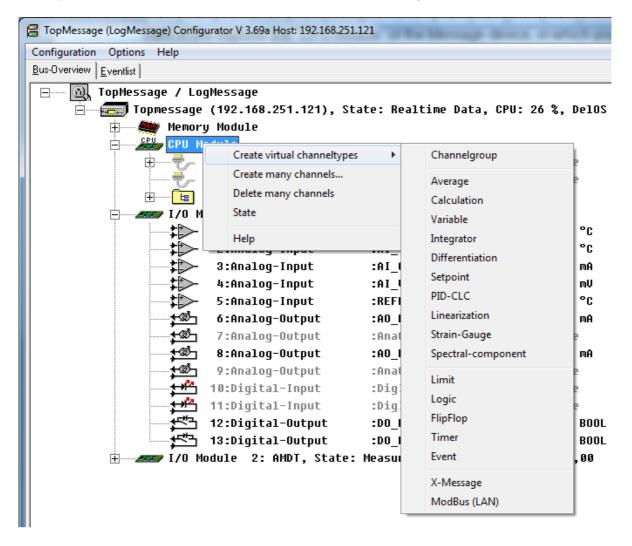


18.3 Creating virtual channel types

Mark in the explorer the "CPU module" of the Message device, in which you want to set up a virtual channel. Click with right mouse key on the marked "CPU module" and a selection dialog opens.

Select > "Create virtual channel types"

Click on the virtual channel you want to create, When you have created the channel in the next step the configuration is carried out.





18.4 Generate several virtual channels

Mark in the explorer the "CPU module" of the Message device, in which you want to set up one or more virtual channels. Click with right mouse key on the marked "CPU module". A selection dialog opens.

Select "create many channels".

The following window appears:

Channeltype	Number
Averages:	d
Calculation:	0
/ariables:	0
ntegrators:	0
Differentiations:	0
Setpoints:	0
9D-CLCs:	0
inearizations:	0
Strain-gauges:	0
pectral component:	0
.imits:	0
ogic channels:	0
TipFlop channels:	0
limers:	0
Events:	0
<-Message Channels:	0
ModBus (LAN):	0
ок 📄	Cancel

Click the requested number of channels (max. 99) per channel type, which you want to set up. After clicking on "OK" the channels will be set up and the window that had been opened last will be closed.



19Calculation channel

Mark this calculation channel. Double click on the calculation channel. The dialog channel configuration opens.

M	oduletyp	e Channelt	уре		Address	
🗸 Active	CPUT	Calculat	ion		[016]:00:016	
1	Name S	UM		<u>U</u> nit	°C	
Lor	ngtext C	alculate #01	16		S	1
^o roperties	Option	s Formula	Referenc	e PLC		
<u>F</u> ormula	v00 + v	01				
Char	nnel					
v0 <u>0</u> [032	2]:01:001	TEMP_1				•
v0 <u>1</u> [033	3]:01:002	TEMP_2				Ŧ
v0 <u>2</u> [000)] None					•
v0 <u>3</u> [000] None					•
v0 <u>4</u> [000] None					•
v0 <u>5</u> [000]None					+
Val × Al !(x) × M SIN LO	id operat ND y, x (AX y, x t I(x), COS G(x), LN(RT(x), x	4IN y (x), TAN(x) x)	10 v05 or v logi logi Ma: Trig Log Squ	cal AND cal NOT ximum / jonometi garithmu	/ / OR function function Minimum function ric function (Rad) s ot / Power	
	ÓD y		100000	dulo		

FORMULA: Enter the requested calculation formula here. Tick the check box "Active" to activate the calculations. Max. 6 variables (V00 to V05 channels) can be processed in this channel.

Ignore error state of source ignores the state of sources.



Herein signifies

Column	Value range	Function
1. position		"V" stands for variable
2. position	0 to 1	"0" current value, "1" previous value
3. position	0 to 5	Max. variable possible.

For each variable a channel can be selected via the selection menu.

Entry in the formula

The formula can include max. 68 characters. Constants must not be more than 9 digits; if necessary, the exponential presentation (s. b.) must be selected.

For brackets the usual mathematic rules are applied.

Point before dash calculation is valid. (AND before OR)

Constants may be written in scientific exponential spelling

"1,234" can be written as follows: "1,234", "1.234", "0.1234e1", "123.4e-2"

General configuration example

ABS(v00-v01)

Channelconfiguration
Moduletype Channeltype Address
Active CPUT Calculation [016]:00:016
Name Example 1 Unit °C
Longtext Calculate #016
Properties Options Formula Reference PLC
Eormula ABS (v00-v(01)
Channel
v0 <u>0</u> [032]:01:001 TEMP_1
v01 [033]:01:002 TEMP_2
v0 <u>2</u> [000] None
v0 <u>3</u> [000] None
v0 <u>4</u> [000] None
v0 <u>5</u> [000] None

Returns the unsigned difference between two analog values, e. g. 2 temperatures



Valid Operators / Functions for a calculating formula:

Operators for Boolean Logic: (Syntax is "x OPERATOR y") (Result 0 or 1)

- < Compares for Less
- = Compares for Equality
- > Compares for Greater
- <= Compares for Less / Equal
- <> Compares for Unequality
- >= Compares for Greater / Equal
- AND Boolean AND
- OR Boolean OR
- XOR Boolean Exclusive OR

Operators for Arithmetic Functions:

+, -, * / ^	Basic calculations
Λ	Power (x ^y)
&	AND Bit Operation
	OR Bit Operation
#	XOR Bit Opertion
>>	Shift Right
<<	Shift Left
MOD	Modulo-Function (Rest of division)
MIN	Returns smaller value
MAX	Returns greater value

Functions: (Syntax is "FUNKTION(x)")

NOT	Boolean NOT (Alias: "!(x)")
~	BOT Bit operation
SIN	Sinus-Function
COS	Cosinus-Function
TAN	Tangens-Function
LOG	Logarithm to Base 10
LN	Logarithm naturalis to Base e
EXP	Exponential function to Base $e(e^x)$
SQRT	Square Root function
ABS	Absolute value function

Constants

PI	Ludolph's Constant π = 3,1415927
E	Euler's Constant e = 2,7182818

Please Note:

The operators AND, OR, XOR, MIN, MAX and MOD have to be embedded in blanks (SPACE) <u>Examples:</u> "V01 AND V02" "V01 MOD V02" "V01 MIN 1.234"

Nesting (Example: "(a MAX b) MIN (c MAX d)") is possible.



20Average channel

With this channel it is possible to calculate an Average value e.g. from an analog input channel like temperature. In the configuration dialogue register "options" you can select the hardware channel for the averaging with the help of the pull down menu. Together with the average of a channel a smoothing of the measurement value is achieved. If the average is generated over a status input, the result will be the ratio from High to Low level

Available are: Time related average, moving average, time related and moving average

20.1 Configuration of mean channels

Open in the register "Bus summary" of the Explorer the required mean channel by double click. The dialogue channel configuration opens.

Channelconfigur	ation	×
Modulet	ype Channeltype	Address
Active CPU	IT Average	[021]:00:021
<u>N</u> ame	Average	<u>U</u> nit
<u>L</u> ongtext	Average #021	
Properties Opti	ons Reference PLC	
	Y-axis Range (PC)	
Min	0	
Мах	1	

In the field **range of Y-axis (PC)** you define the range at evaluation in PC. Suppose the measurement range of the analog channel amounts to $0..100 \,^{\circ}$. For the average only the range $10...90^{\circ}$ is of interest, thus this can be defined here.



Mo	oduletype	Channeltype		Address			
Active	CPUT	Average		[021]:00:	021		
1	ame Ave	rage	<u>U</u> nit	1			
Lor	igtext Ave	erage #021					
roperties	Options	Reference PLC					
Realtime d	lata				511 1725×		
Folerance	0	% 📄 Scaled	[032]:	01:001 TE	MP_1		•
no tran	ismission		🔲 lgr	iore source	errorstate		
Average	related g related ur al value	d sliding		sult Minimum Average Maximum Vectorial A Standard E Variance Harmonic / Geometric Value num)eviation Average Average		
				leset]] None			*
			F	leset-sourc	e timestamp		
/ ок	🗶 Ca	ncel 🛉 🛉 P <u>r</u> evi	ous	👆 Next	Сору	Insert	П
						-	1 (

20.2 Mode "Time related"

Under "reference channel" you select the source channel, to which the averaging should refer.

Averages are computed in fixed time blocks specified in "Duration". The average as configured above is calculated not time synchronized.

If you require a synchronised average the "Source-Reset" needs to be activated. With this trigger signal the start of the blocks is defined.

If the average should be calculated in real time synchronous, use a time synchronized pulse generator as source reset. Thus the start of the blocks is synchronized with the clock hours resp. minutes or seconds. Half hour cycles will then start exactly at clock hours and half clock hours. Half clock hours are usual e. g. for the acquisition of environmental data.



"**Memory tolerance**" is based on the adaptive storage concept of the Message devices. A measured value will only be stored with time and date stamp if this lies outside the tolerance of the previous value.

The greater the tolerance the more memory space is saved.

The percentage value refers to the scaling (see scaling in the register settings). Besides the (arithmetic) averaging the following types can be adjusted furthermore:

Minimum	Smallest measurement value within interval	
Maximum	Biggest measurement value within interval	
Vectorial average	Averaging at unit circle (e.g. mass fow in air conditioning technology)	
Standard deviation	Square root of variance (not mean deviation !)	
Variance	Mean square deviation related to mean value	
Harmonic average	Reciprocal of a mean calculated from reciprocal value.	
Geometric average	N-th root from the product of n measurement values	
Value Number	Counting number of measurement	



annelconfiguration	
Moduletype Channeltype	Address
Active CPUT Average	[021]:00:021
Name Average	Unit
Longtext Average #021	
Properties Options Reference	PLC
Realtime data	
Tolerance 0 % T Scale	d [032]:01:001 TEMP_1 -
no transmission	Ignore source errorstate
	Result
Fractional <u>d</u> igits 2	
Average Type	O Minimum
 Time-related Sliding 	
Time-related und sliding	Average
	Maximum
Measurements 3	Shift Register

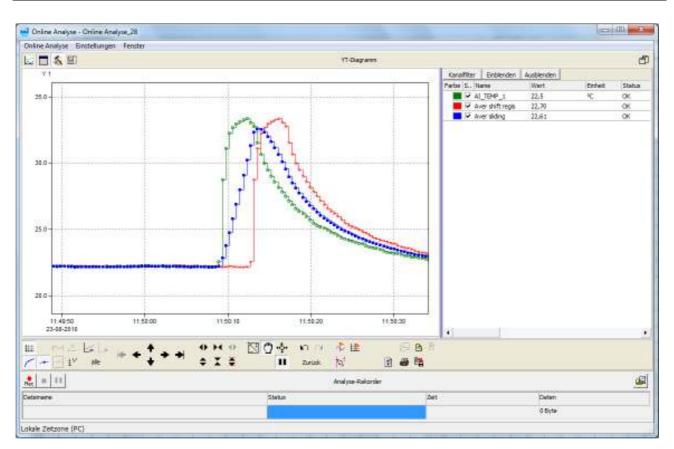
_ _ _ _ _ _ _ _ _ . .

If you select moving, write in the field "measurements" the number for the moving average. The maximum value is 120.

This channel can also calculate the Minimum or maximum value over the number of defined measurements

The "Shift Register" is a special mode of the sliding average. With this mode the sliding average is calculated after "n-number of measurements" are taken. The following trend diagram shows the 3 channels: Original Measurement, Sliding Average over 10 values, Shift register channel (red curve)







Moduletype	: Channeltype	Address		
Active CPUT	Average		[021]:00:021	
Name Av	/erage	<u>U</u> nit		
Longtext Av	/erage #021	0		
Properties Options	Reference PLC			
Realtime data Tolerance 0 % Scaled no transmission Fractional digits 2 Average Type Time-related Sliding Time-related und sliding Actual value Measurements 3 Duration (sec) 10		[032]:01:001 TEMP_1		
		[000]	eset None	

20.4 Mode "Time related and sliding

In this setting you can calculate moving averages of block averages.

E. g. 10.sec block averages are computed, which can now be inserted in a moving averaging. The field "duration" covers the block length for the average. You can also define the block length by activating the "Reset" source channel.



21 Limit channel

For each channel a lower-bound and an upper-bound can be established. For each limit channel only one limit value can be set. If it is necessary to establish more bounds for one analog input, additional limit channels must be created.

Moduletype Channeltype				Address			
Active CPUT Limit				[028]:00:028			
Ì	Name	Limi	it	<u>U</u> nit			
Lor	ngtext	Limi	it #028				
roperties	Optic	ns	Reference PL	C			
				-	Limit	Hysteresis	
Fixed limit				1	0		
🔘 Vari					Rang	e: ± 3	
1.	e break		nitor			l.	-
	e monit	10			📰 Delay	1,0	s
- 1031	chdog				Generate Alarm		
Persistence			- tê	Overrun			
					 Rangeviolati 	ion	
							2.5
Default V	alue				🗹 No alarm if sou	urce has wirebreak	
0							
	monatak						
Cource e	noistau				H 1 10	. F	
	e				Monitored Channel	2005	-
🔲 ignore					0321.01.001 111	MIF_1	
Invalid va	alues				1 leads		•
📄 ignore Invalid va	alues				Limit [1000] None		
📄 ignore Invalid va 📝 ignore	alues			tioniku	[000] None		×
 □ ignore Invalid va ☑ ignore ☑ Self-lo 	alues : icking		Alarm-P		[000] None Reset		×
📄 ignore Invalid va 📝 ignore	alues : icking		Alarm-P		[000] None		×
 □ ignore Invalid va ☑ ignore ☑ Self-lo 	alues icking tent			Priority	[000] None Reset [000] None	opy <u>I</u> nsert	



The following setting are possible:

Fixed limit

The threshold is entered in the upper field "limit".

Variable limit

The threshold is supplied by channel selectable from the list ("limit" below)

Wire break monitor

Monitors the wire break on a channel

State monitor

Generates an alarm at a selected event

Watchdog

Checks the state of the communication of the Message devices (master and slave)

Persistent

The value of the output is stored and reload after each power on of the Message device

Under "**Monitored channel**" select the analog channel, to which the monitoring should be related.

In the field "**Limit**" the alarm threshold is set. In this case is 1.

"Hysteresis" modifies the value of the reset of the alarm. If the monitored channel values pass the limit the alarm is set to high, if the hysteresis is set, before the alarm is set to low, not only the values have to be inside the limit but also they havce to be inside the limit + hysteresis

In the field "Generate alarm" it can be selected when the output has to be high (overrun: the value is higher than the limit, underrun the value is lower than the limit, range violation is when the value is outside the limit value ± range value).

No alarm if source has wire break doesn't sets a wire break of the monitored channel as alarm state.

With **Source error states ignore** the error state of the monitored channel are ignored.

With Source invalid values ignore the invalid values of the monitored channel are ignored.

With **Self Locking** when the output is set to one it stays to one even if the limit is not pass anymore. This can be reset from the signal chosen in the reset list down.

When the **Self Locking** flag is set it is possible to choose **Alarm priority** or **Reset priority**. The first flag allows the reset only if the alarm condition is not violated. The second flag allow the reset every time.



21.1 State monitor

In the mode State monitor it is possible to react on different system states.

Mo	odulety	pe	Channeltype		Address			
Active	CPU	r]	Limit		[028]:00:028			
1	ame	Limi	it #028	<u>U</u> nit	-			
Lor	ngtext	Limi	it #028	20				
roperties	Optic	ins	Reference PLC					
				н Т	Limit		Hysteresis	
C Fixed	d limit				1		0	
O Varia					Ra	ange; ±	3	
 Wire State 			nitor		🗖 Delay		1,0	s
O Wat					 Generate Ala		1	
O Pers	istence				Wire brea	21		
Default V 0 Source er		e			Overrang Underran Hardware Not A Nu Infinity (+1	ge Failure mber (N	laN)	
🛄 ignore					Monitored Cha	nnel		
Invalid va	lues				 [000] None			•
📝 ignore					Limit			
					[000] None			~
Self-lo	cking		🗌 Alarm-Pri	ority	Reset			
Persis	tent		🗌 Reset-Pri	iority	[000] None			Ψ.
	-	120	ncel 🛉 🗛 P <u>r</u> evia	-	margar fill		17	1 Curr
/ OK		12-	man Brains	110	🖢 Next	Сору	Insert	Help

Alarm at:

Wire break	Wire break at monitored channel
Configuration error	Problem with configuration of monitored channel
Invalid value	Invalid value at monitored channel
Overrange	Overranging of the monitored channel
Underrange	Underranging of the monitored channel
Hardware failure	Hardware failure
Not a Number	The value is NaN (Calculating square root from negative values)
Infinity (+/- Inf)	Calculation Channel were division by 0



21.2 Watchdog

The Watchdog function is monitoring the communication between the units (Master – Slave) and also to the Top/LogMessage Configurator. When one communication partner is out of service an alarm is generated which could e.g. switch a digital output for annunciation.

Mo	duletyp	o one	inneltyp			Address			
Active	CPUT	Lin	iit			[028]:00:	028		
M	lame L	.imit #0	28		<u>U</u> nit	[
Lon	gtext L	imit #0	28						
Properties	Option	is Re	ference	PLC					
		nonitor				Limit 1	Range;		\$
 Wate Persi 	chdog					🗖 Delay		1,0	S
Wato Persi	chdog stence alue	- i					Channel	1.0	S
Wato Persi Default Va O Source er ignore	chdog stence alue rorstate	- i				Delay	1962 020672	1.0	S
Wato Persi Default Va O Source er ignore Invalid va	chdog stence alue rorstate	- i				Monitored	1962 020672	1.0	S
Wato Persi Default Va O Source er ignore	chdog stence alue rorstate	- i				M <u>o</u> nitored [000] Non	e	1.0	S
Wato Persi Default Va O Source er ignore Invalid va	shdog stence alue rorstate	- i		larm-Priorit	y	M <u>o</u> nitored [000] Non Limit	e	1.0	S



21.3 Configuration of a switch output for the limit channel

For alarm or status annunciation you can feed the status of the limit channel to a digital output channel (switch output).

The steps are as following:

- 1. Select the required digital output channel of our I/O module
- 2. Change the source channel to "Internal Channel"
- 3. Link the required limit channel which should switch the output to "Internal Channel".

141	odulety	pe Cł	nanneltype		F	Address					
🗸 Active	AAST	r s	witch Output			[043]:01:0	12				
1	<u>N</u> ame	Switch	Output	U	nit			11			
Lor	ngtext				-			-1.			
^D roperties	Conn	ection	Reference	PLC							
Source				1	nterr	nal Channi	el				
Internal C	hanne	•		Ĩ	[028]:00:028 L	.imit 1		•		
			<u>S</u> cale								
		Lo	0					Inv	ert		
		Hi	1						213		
		6.965	(3)								
Manual/[)efault'	Value									
)efault '	Value .	Ţ								
Manual/[Lo)efault'	Value ,	•								
)efault '	Value	•								
)efault	Value	•								
)efault	Value	•								
)efault	Value	-								
)efault	Value ,	-								
)efault	Value	•								
)efault	Value ,	•								
)efault	Value	•								
Lo		Value	•								
		Value	-								
Lo		Value	•								
Lo	tent	2	■ el I I I P <u>r</u> e	vious		Next	Co		Insert	11	Help



22Timer channel

Timer channels are often used to produce selectively edges and pulses for digital outputs. With these a tool to control external device it is available.

In detail the following modes are possible:

- Pulse duration modulator
- Release delayed edges
- Response delayed edges
- Alarm-clock functions related to time
- Pulse generator

22.1 Pulse duration modulator (PWM)

M	odulet	vpe (Channeltype		Addre:	ss			
🗸 Active	CPU		Timer)`	[029]:	00:029)`
	Name	Time	r PWM 25%	Unit	-		12		
			r #029	<u>0</u> 0%	1				
		-		1222	212	1			
Properties	Opti	ons	Timeroptions	Reference	PLC				
Mode			Upper Lim	it Limiter					
PWN	4		0,99						
O Rele	ase de	alau	Lower Lim	it Limiter					
		995) 	0.01	K Elimet					
🔘 Resp	oonse	delay							
O Alarr	n clocł	ĸ	Source						
C Sign	al gen	erator)30 PWM 25	/	_			
			ignore						
				-					
Cycletime	6					10			
Cycletime		0	variable (ms)			1,0	S	•]	

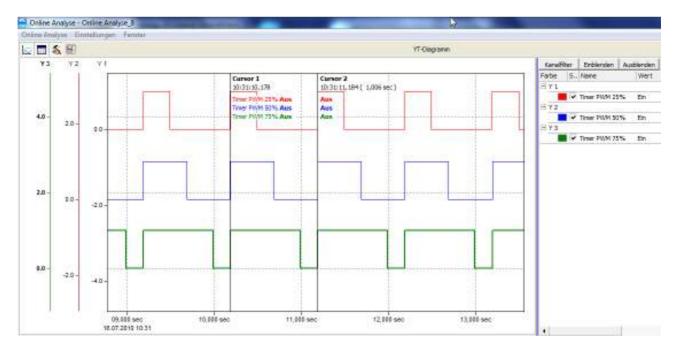


The pulse duration modulator allows to control the pulse duration of the timer depending of an external input. The cycle time can be set to a constant value or it can be dynamically adjusted through another integral channel of the system.

The pulse width is dynamically adjusted depending on the set value of the source channel. The value of the source is calculated in percentage on the given time interval given by the set source lower and the upper limit.

Example:

The pulse duration will last the same percentage value of the cycle period. E.g. If the source value is 25, and the cycle time has been set on 1000 ms (1 sec), the pulse duration will amount to 25 % of 1000 ms, i.e. 250 ms



The upper and lower limit for the output assures that the pulse duration will not be less than the lower limit or more than the upper. The source channel should take values in the range of 0,01 und 0,99 only.

E.g. if the lower limiter amounts to 10%, the upper to 90% and the cycle time to 10000 ms, the corresponding limits are around 1 and 9 sec.



22.2 Release delay

It is possible to generate pulses which are triggered by a rising or falling edge of a source and are reset after the selected pulse duration.

22.2.1 Rising edge - not retriggerable

Mo	dulety	pe .	Channeltype		Addres	s			
🗸 Active	CPU	T	Timer		[029]:	00:029)
٨	lame	Time	r Release	<u>U</u> nit	1		18		
			er #029						
Properties	Optic	-	Timeroptions	Reference	PLC	1			
1	opa	115	1 morepacito	Hereferice	110				
Mode		1997) 	🔘 🔘 both	edge 1 edge edges					
🔘 Alarm	i clock	2	Source	127					
i Signa	al gene	erator				•			
			Retrigg Source ignore Reset [000] Nor	errorstate		Ŧ			
Delay	tant	C) variable (ms)			0,1	S	•	

In this mode the timer is started by a rising edge (diagram 1) and is reset after the selected pulse duration. Rising edges occurred before the reset have no influence on the timer.



After the timer reset a rising edge starts the timer again.

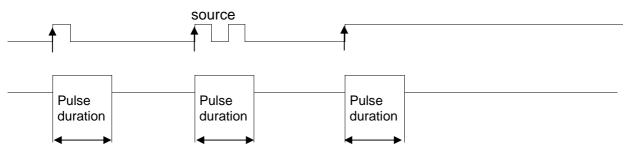


Diagram 1

22.2.2 Rising edge - retriggerable

In comparison with the not retriggerable timer the retriggerable timer can be started before a reset occurs (diagram 2).

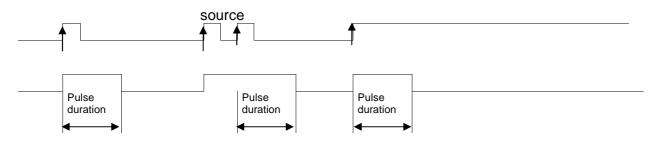


Diagram 2



22.2.3 Falling edge - not retriggerable

At a positive edge the timer is set on High (diagram 3), however it requires a negative edge in order to start the pulse. The timer will be reset after the selected pulse duration. Positive and negative edges will be ignored before reset.

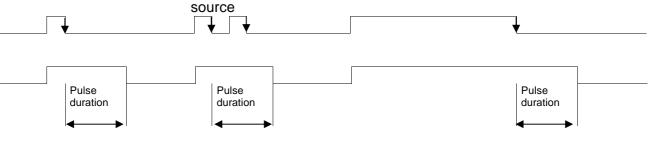


Diagram 3

22.2.4 Negative edge - retriggerable

The pulse can be started even before a reset occures. (diagram 4).

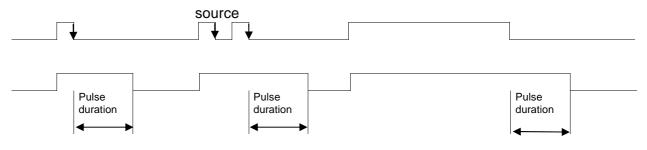


Diagram 4

22.2.5 Both edges

The mode "both edges" is the combination of the trigger signals of "positive" and "negative edge".



22.3 Response delay

Mo	dulety	эе і	Channeltype		Addres	s		
🗸 Active	CPU1		Timer		[029]:0	00:029		
N	lame -	Time	r Response	<u>U</u> nit	<u> </u>			
<u>L</u> on	gtext -	Time	r #029					
Properties	Optio	ns	Timeroptions	Reference	PLC	1		
22	ase del	elay	Source	errorstate		•		
Delay	ant	C	variable (ms)]		0,1	s •	
🗸 ок 丨	×	Can	cel A Pr	evious	Nex	. .	Çopy Insert	Help

The response delay timer is triggered through a rising edge of the source channel. As you can see on diagram 5 the timer will reach the high status only when the source channel is staying high as long or longer than the delay time. To visualize this function the diagram 5 shows 3 high pulses which stay only a short time high. Due to the short high status the timer in "Response Delay" mode is not started.

The timer will be reset at the first falling edge of the source channel.



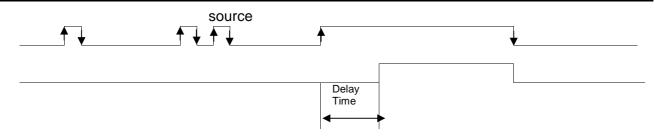


Diagram 5



22.4 Alarm clock

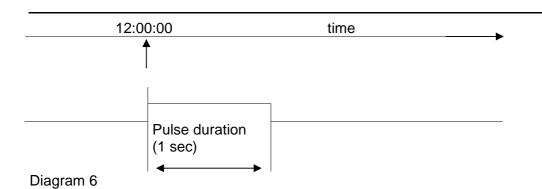
Four types of alarm-clock channels are available

22.4.1 Daily alarm clock

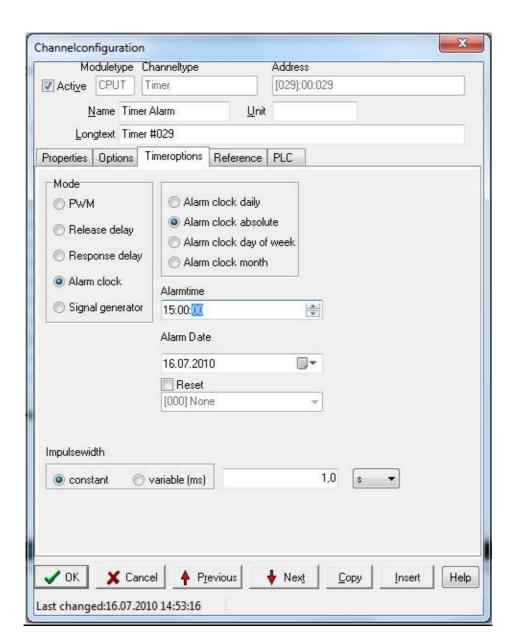
 Active CPUT Timer (029):00:029 Name Timer Alarm Unit Longtext Timer #029 Properties Options Timeroptions Reference PLC Mode PW/M Release delay Alarm clock daily Alarm clock day of week Alarm clock month Alarm time 12:00: Reset (000) None
Longtext Timer #029 Properties Options Timeroptions Reference PLC Mode Mode PW/M Release delay Alarm clock daily Alarm clock absolute Alarm clock day of week Alarm clock month Alarmtime 12:00:
Properties Options Timeroptions Reference PLC Mode PW/M Alarm clock daily Alarm clock absolute Alarm clock day of week Alarm clock month Alarmtime 12:00: Reset Reset
Properties Options Timeroptions Reference PLC Mode PW/M Alarm clock daily Alarm clock absolute Alarm clock day of week Alarm clock month Alarmtime 12:00: Reset Reset
Mode PWM Release delay Response delay Alarm clock day of week Alarm clock day of week Alarm clock month Alarmtime 12:00:
Impulsewidth Impulse

The alarm-clock will be set on High each day at the selected time and be reset after the selected pulse width (diagram 6)



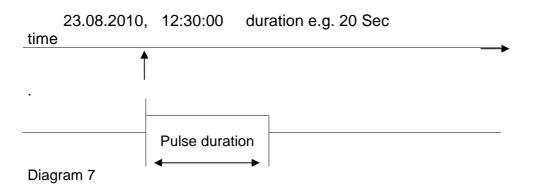


22.4.2 Absolute alarm clock





Only once on the specified day the alarm-clock will be set to High and be reset after the pulse duration (diagram 7).



22.4.3 Alarm clock - weekday

Every week at the selected weekday the alarm-clock will be set on High at the selected time and be reset after the pulse duration (diagram 8)

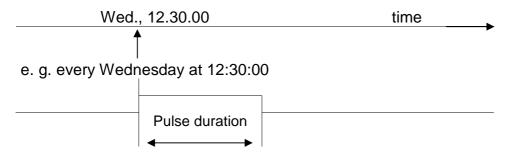


Diagram 8

22.4.4 Alarm clock - month

Every month at the selected day of the month the alarm-clock will be set on High at the selected time and be reset after the pulse duration (diagram 9)

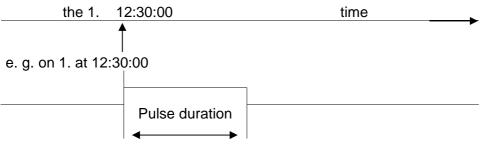


Diagram 9



22.5 Signal generator

With the signal generator real time synchronized pulses and also real time independent pulses can be generated. It is also possible to generate pulses synchronously with another source channel.

22.5.1 Time synchronized signal generator

It is possible to generate real time synchronous pulses in the following units:

- seconds
- minutes
- hours

Mo	odulety	ре	Chan	neltype	ŝ.		Addre	SS						
🗸 Acti <u>v</u> e	CPU	T	Time	r.]	[029]	00:029)					
N	lame	Time	er Sign	nal Ger		Uni	t			14				_
	igtext		1			1				11				
Properties	Optic	-		roption		eference	PLC	1						
ropenies	opac	ins	TIME	roption	> nt	ererence	FLU							
🔘 Resp	ase de Ionse d	1051	ı.	🔿 Sig 🔘 Sig	nal ge nal ge	signal ge ener, sou ener, sou ener, per:	rce (edg rce (leve	22						
O Alarm Signation	n clock al gene		r											
2.2	al gene	erato		Rese 000] N				*						
 Signa Cycle 1 	al gene dth tant	erato	h	000) N	one		↓ Ne:	1,	D (<u>s</u>	•	sert	1.5	Help



The time synchronized, related to seconds pulse generator has the following functions: Real time synchronization, i. e. one minute has a defined number of pulses.

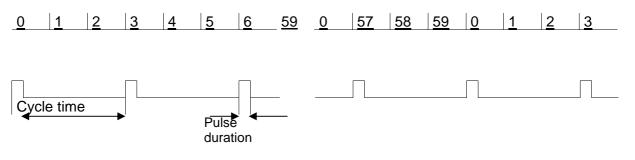


Diagram 10

If the real time clock in the device is set, the pulse generator automatically adjusts to the change and keeps on running real time synchronous.

22.5.2 Signal generator source (edge)

The first pulse is triggered by a positive edge of the source.

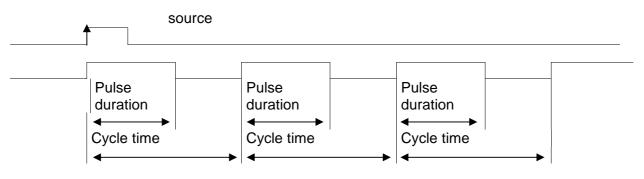


Diagram 11

22.5.3 Signal generator source (level)

Pulses are only generated with active source.

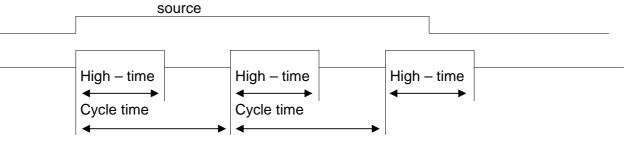


Diagram 12



22.5.4 Signal generator persistend

Pulse are generated independent of the source.

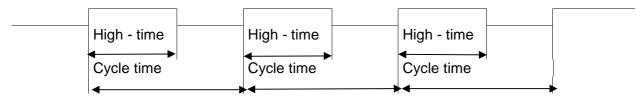


Diagram 13



23Integrator

Edge counter

The edge counter counts the edges of a source (status input).

The type of edge can be positive or negative. A reset source can be activated to reset the counter.

Each status input (Digital Input) can also be used as counter input.

Integral

Module DIOT has two 16 bit counter inputs. The AADST and AMDZ modules also have counter inputs. The maximal number that this counter is able to reach is 65 535. The function "differentiator + integrator" can be used to prevent the overflow of the counter and pulses loss. In this mode the integral of a source is also done.

Operating hours counter

Increments the counter value each hour.

Adder

Adds the values of a source

Stop watch

Calculates the elapsed time between two pulses.

NOTE:

The measurement value of the integrator channel, (as displayed in the Top/LogMessage Configurator) is a type float and has a 7.5 digits precision. Internally the Message device it is calculating with data type double. Due to this fact rounding errors arise within the Top/LogMessage Configurator display.

23.1 Edge counter

The edge counter counts the edges of a source (status input). The type of edge can be positive or negative.

A reset source can be activated to reset the counter. If this source is a timer channel, i. e. a constant reset time is set, the result will be the pulses frequency.

Each status input can also be used as frequency input. (E.g. 24 channels of the module IOIT)

Remark:

The display value on the Top/LogMessage Configurator of the integrator channel has the data format float with an accuracy of 7,5 digits. The Device is internally calculating with the data format Double. This may causes some rounding errors on the display value.



23.1.1 Counter mode

Mo	duletype	Channeltype		Address	
Active	CPUT	Integrator		[049]:00:049	
Ň	ame Inte	egrator Count	<u>U</u> nit		
Lon	gtext Inte	egrator #049			
Properties	Options		eference P	c	
Mode Edge Integ Opera Adde	ral ating hour r	s counter [h]	Counter m increm conterent increm	ent	 Rising Edge Falling Edge
Increment [000] Non Decrease	ie			•	
[000] Nor				-	
n Reset	value tak	eover			
Start value	e: 0				

In the mode edge counter, signals can be counted easily (increasing and decreasing) or can be combined (increase/decrease). In each case the source of the increase (decrease) must be selected and the type of edge (positive or negative) must be configured.



23.1.2 Reset

With the Reset source the counter can be reset. If this source is a timer channel, i.e. a constant time interval is generated the result of edge counter channel will be the frequency of the pulses.

	JT Integrator		[049]:00:049	
	Integrator Count			
	milegrator count	<u>U</u> nit	1	
Longtext	Integrator #049			
perties Opti	ons Integrator R	eference P	C	
Mode Edge cour Integral Operating I Adder Stopwatch	hours counter [h]	Counter m Coincrem Coincrem O decrer	ent	it ◎ Rising Edge
crement sourc 100] None ecrease sourc 100] None			•	
] Reset 100] None	C Actual value		-	
] Trigger value 100] None	e takeover		-	
art value: 0				

Actual Value

The "Actual value" function can only be activated in the "Reset" mode. If it is active, the channel will display online new values. If it is inactive, the channel will count internally, and will display the result only when it is reset.

Persistent

When the "Persistent" flag is set the result of the channel is stored and even after a power loss is retrieved after restart.

Trigger Value takeover

With this function you can have a separate trigger channel to update the reading of the integrator channel.



23.2 Integral

23.2.1 Differentiator + Integrator

Module DIOT has six 16 Bit counter inputs. The capacity of these counter amounts to 65.535 pulses. The "differentiator + integrator" channel is used to prevent pulses loss due to counter overflow. In this mode the differences between the current value and the last value of the hardware counter are added.

Mo	oduletyp	e Channeltype		Address		
Active	CPUT	Integrator		[049]:00:04	9	
1	ame li	ntegrator Integ	Unit			
Lon	igtext Ii	ntegrator #049				
Properties	Option		Reference P	LC		
Mode Edge Integ Oper Adde Stop	ral ating ho r	r purs counter [h]	○ Differe	entiator+Integr entiator ator adaptive ator cyclic	ator	
Source [000] Nor	ie			•		
n Reset	: 0					
C	e: U					
Start value						
Start value	ent					
	2000 - Contra - Contr	Cancel 🛉 🛉 P	revious	Vext		Insert Help

Example 1:

Source: 104 110 115 115 120 130 150 150 160.....65530 10 100 Channel: 0 6 11 11 16 26 46 46 56.....65426 65441 65531



23.2.2 Differentiator

Calculates the differences between the previous and the actual measurement value of the selected source channel.

	odulety	ре	Chann	eltyp	е			Add	iress				
Active	CPU	T	Integr	ator				[04	9]:00:0	49			
1	<u>N</u> ame	Inte	grator li	nteg		l d	<u>J</u> nit	Ē			18		
Lor	ngtext	Inte	grator ‡	1049		10		2.0					
roperties	Optic	ons	Integr	ator	Refe	ence	PL	.C	1				
Properties Options Integrator F Mode Edge counter Integral Operating hours counter [h] Adder Stopwatch				1	 Dif Inti 	ferei ferei egra	ntiato ator a	or+Integ or Idaptive Syclic					
[000] Nor	ne												
[000] (10)								2	•				
Start valu	e: 0								•				
Start valu	e: 0 tent	Г	ncel		P <u>r</u> evia				• lex <u>t</u>	Co	~ 1	Inse	 Hel

Example 2:

 Source:
 4
 10
 15
 15
 20
 30
 50
 50
 60
 ...
 65530
 10
 100

 Channel:
 0
 6
 5
 0
 5
 10
 20
 0
 10
 ...
 10
 15
 90



23.2.3 Integrator adaptive

	Address
Active CPUT Integrator	[049]:00:049
Name Integrator Integ	Unit
Longtext Integrator #049	
Properties Options Integrator F	Reference PLC
Mode Edge counter Integral Operating hours counter [h] Adder	Function Differentiator+Integrator Differentiator Integrator adaptive
Stopwatch	C Integrator cyclic
Source	
[000] None	*
Reset Actual value [000] None	
	▼ ▼ Referencetime Sourcε 60

The integrator will calculate the integral of a source, if the value of the source has changed.

In case the source reset is active, the integrator will return the value before reset (e.g. hourly values, daily values). It is recommended to use the time synchronized pulse generator (timer) as source reset for sec. and min. values. For the hourly, daily, weekly and monthly values the modus "Adder" is recommended.

"Actual Value" can only be selected when the "Reset" is activated. The channel will update the reading after every integration step. If "Actual Value" is not selected the system will integrate internal but show no updated reading on the screen. It will show the final value after reset.



Reference source is the reference time of the unit of the source in sec. (see examples).

Example 1

Be the unit of the source litre/sec., the reference time should amount to 1 sec. and the source should supply permanently 1. If 1 sec. is integrated, the result will be 1 litre.

Example 2

Be the unit of the source litre/min., the reference time should amount to 60 sec. and the source should supply permanently 1. If 1 min. is integrated, the result will be 1 litre.

Example 3

Be the unit of the source litre/hour, the reference time should amount to 3600 sec. and the source should supply permanently 1. If 1 hour is integrated, the result will be 1 litre.

The "Present value" function can only be activated in the "Reset" mode. If it is active, the channel will supply the result after each integration step. If it is inactive, the channel will integrate internally, however, will supply the result, if it is reset.



23.2.4 Integrator cyclic

If a source changes slowly or never, it is likely that the integrator will calculate faulty results. For this type of source channels, it is recommended to use the "integrator cyclic".

M	odulety	pe	Chann	eltype	9			Add	ress					
Active	CPUT		Integr	ator				[04	9]:00:	049				
1	Name I	nteg	grator			ļ	<u>J</u> nit							
Lor	ngtext I	nteg	grator ‡	ŧ049									 	
roperties	Optio	ns	Integr	ator	Refe	erence	PL	.C	1					
Mode Edge Integ Oper Adde Stop	pral ating h er		counte	er (h)		Functi	ferei ferei egra	ntiati Itor a	or idaptiv	_	or			
Source					-				yene					
Source [000] Nor			Actual 1	value										
Source (000) Nor	ne		Actual A	value					 ▼ 					
Source [000] Nor I Reset [000] Nor	ne ne		sctual s	value			lefei		 ▼ etime ! 	Sour	ce [s]			
Source [000] Nor V Reset	ne ne e: 0		Actual v		Pŗevi	() 	lefei	renc	.	Sour	ce [s]			He

If "Reset" is active the integrator calculates the integral of the source every time.

If "start with edge" is active the integral will only be calculated after the first positive edge of the source.



23.3 **Adder**

MOU	duletype	Channeltype	10.1	Address		
Active	CPUT	Integrator		[012]:00:012		
N	ame Inte	egrator	<u>U</u> nit			
Long	text Inte	egrator #012				
Properties	Options	Integrator R	eference P	_C		
Mode Edge (Integra Opera Adder Stopw Source [000] None	al ting hour atch	s counter [h]		•		
[000] None	,			•		

As upon integrating the amount of the complete integral is considerably higher than the part to be added, which is added with each change of the source resp. with each transit, it is recommended to avoid the rounding error, which is to say to sum up second values or minute values of the triggered "integrator adaptive" or the triggered "integrator cyclic".

By that the summer adds the next part of the integral only when the source has changed. It is thus reached that bigger parts are summed up, so that errors that might arise upon adding of a very small to a considerably bigger number (several decades) are avoided.



Hourly, daily, weekly, and monthly values can be gained by triggering the adder through the corresponding pulse generator (timer) resp. alarm clock. As source for the hour adder the (triggered) sec. and min. integrator resp. "integrator permanently" can be taken. On the other hand the hour adder can serve as source for the day adder etc..

The "Present value" function can only be activated in the "Reset" mode. If it is active, the channel will supply the result after each integration step. If it is inactive, the channel will integrate internally, however, will supply the result, if it is reset.



23.4 Operation hours counter

	duletype	Channeltype		Address		
C Active	CPUT	Integrator)`	[012]:00:01	2)
1	ame Inte	egrator	Unit			
Lor	igtext Inte	egrator #012				
Properties	Options	Integrator Refe	rence Pl	C		
) Integ	ating hour :r	s counter [h]				
[000] Nor	ie			•		
🔽 Reset						
[000] Nor	ie					
Topolition						
Start value						

Is the source 1 hour on High, the operation hours counter calculates 1. When you record short time periods (e.g. minutes) it is recommended to change the display to more decimal place to see the readings.

In the case of the active "Reset" function, the operation hours counter will be set on 0 at each rising edge of the "Reset source" channel.



23.5 Stop watch

	oduletyp	e Channe	altype		Address				
Active	CPUT	Integra	ator)`	[012]:00	0:012)
1	Name I	ntegrator		Unit			12		-
		- ntegrator #	012				-01		_
					-				
roperties	Option	ns Integra	itor Here	erence Pl	.L				
Mode				Measure					
C Edge		÷ľ		Level I	ength				
O Integ				Period	length				
		ours counte	# [h]						
C Adde									
Stop	watch								
Start/Stop	ì								
[000] Nor	20				-	ο LI2	jh-level		
-	at start						w-level		
								-	
		parated							
Start/9	otop sep								
Start/S	otop sep								
Start/S	otop sep								
Start/S	otop sep								
Start/S	otop sep								
Start/S	otop sep								
Start/S	otop sep								
Start/S	otop sep								
Start/S									
	ent	Cancel	♠ Prev		Next	1 <u>c</u>	- 1 -	Insert	Help

The difference in time between two signal edges (optionally from one or two signal sources) can be calculated in this mode. The resolution is in milliseconds, the error < 100ms. Furthermore there is the possibility to calculate the pulse duration of a signal.

Level Length:Will calculate how long the source channel is staying high or low.Period Length:Will calculate the time between two rising or falling edges.Reset at start:Sets the measurement value at start to "0".Retrigger:Restarts the stop watch with a start edge. This function is only available
when Start and Stop pulse are coming from separate source channels.



24Set point channel

The set point generator allows to generate **set point curves**. The set point curves can be used internally and externally. Externally the set point courses can be put on analog outputs so that external devices like regulators etc. can be controlled. Internally it is possible to integrate the set point courses in many other functions. Set point courses can be shown to the operator on the screen (like other channels).

Sequence controls

With these up to 16 digital outputs can be switched time dependent and dependent on other conditions (sequence controls).

24.1 Configure set point channels

Moduletype	Channeltype	Address	
Active CPUT	Setpoint	[014]:00:014	
<u>N</u> ame Set	point #014	Unit	
	point generator #014		
roperties Options	Setpoint Reference	PLC	
Table		1.00	
Default Table 1	▼ Edil		
Table select			
[000] None		*	
Leave a constant			
Not Triggered Triggered	Edge triggere	d	
Source			
[000] None		*	
I Hold			
[000] None		*	
Reset			
[000] None		*	
Mirrored			
V Auto-Cycle		0	
Signal Generation Switching Block			
🖊 ОК 🛛 🗶 Са	ncel 🛉 Arevious	♦ Next Copy	Insert Hel



Table number

You can configure max. 72 set point curves. Each set point curve has its own value table. Through the "table number" one of the 72 set point curves is selected. However you can also select the table automatically through an internal channel of the device. For this you need to activate "table select" and the table number of this channel will automatically load this corresponding set point table . This is practical if you want to play different set point tables depending on the control or test you are performing.

Input of set point table values

- Click on icon "EDIT" in the configuration dialog.
- Enter name of table (not necessarily required).
- Select "set point curve" as mode.
- Define number of values.
- Select relative or absolute indication of time. (See. "example" in table configuration).
- Adjust the required unit of time duration (Millisec., sec., minutes or hours).
- Enter values and time duration.
- Press "OK".

able number						
1	▼ Inde	ex Time[ms]	Value	F actoriality		
able name	1.	0	0	Example:		
) efault Table 1	2.	0	0			
lode	3.	0	0	Value ↑		
foue Set value curve	4.	0	0	2		
ime indication						
elative	-			with Time: relative	with T	ime: absolute
	-			with Time: relative Index [ms] Value	-	ime: absolute [ms] Value
elative ime unit	•			Index [ms] Value	Index 1.	[ms] Value 0 1
elative ime unit ns				Index [ms] Value 1. 0 1 2. 1000 2	Index 1. 2.	(ms) Value 0 1 1000 2
elative ime unit ns Export				Index [ms] Value 1. 0 1 2. 1000 2 3. 2000 2	Index 1. 2. 3.	(ms) Value 0 1 1000 2 3000 2
elative ime unit ns				Index [ms] Value 1. 0 1 2. 1000 2 3. 2000 2 4. 0 1	Index 1. 2. 3. 4.	[ms] Value 0 1 1000 2 3000 2 3000 1
elative ime unit ns Export				Index [ms] Value 1. 0 1 2. 1000 2 3. 2000 2 4. 0 1 5. 1000 1	Index 1. 2. 3. 4. 5.	[ms] Value 0 1 1000 2 3000 2 3000 1 4000 1
elative ime unit ns Export		Free values	7913	Index [ms] Value 1. 0 1 2. 1000 2 3. 2000 2 4. 0 1	Index 1. 2. 3. 4.	[ms] Value 0 1 1000 2 3000 2 3000 1



Note:

If the time indication has the setting "absolute", it is required that the time values are increasing with every line. The system allow to input smaller values than the previous one. If you do so the following error message appears: "Invalid value in line (number), column 1".

When the time indication is set to "relative" the system also allows to define the time basis through a another internal source channel. When the source is bigger than 0, the set value channel assumes the corresponding value. That gives you the ability to dynamically control the time basis on the set point curve.

Table number				
1	▼ Index	Time[ms]	Value	
Table name	1.	0	0	
Default Table 1	2.	1	10	
Mode	3.	[005]:00:005 VA_RESET	12	
Set value curve	- 4.	12	2	
4 Time indication relative Time unit				
ms Export Import				
		Free values	7913	
ОК	Cancel			Example

The table can be stored in ASCII format clicking "Export" with a tabular separator between the columns "time" and "value".

Such table can e.g. be loaded by EXCEL. With "Import" a table generated in e.g. EXCEL can be load into the device.

7922 free storage locations are provided in 72 different tables. The number of free locations is shown under the table ("Free table vales")



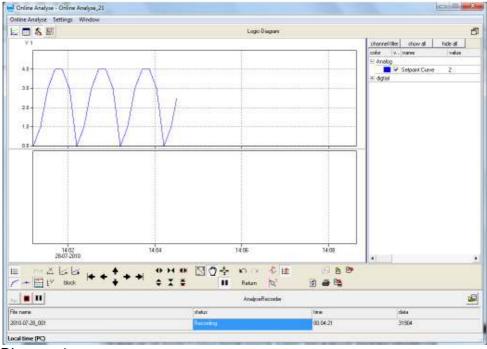
24.2 Signal generator

There are different settings available to start and reset and the signal generator channel. In the following the different configuration options will be explained.

1	 Index 	Tewisi	Value
Table rates	1.	0	D
Default Table 1	2	10	1
Made	2	10	3
Set value curve	- 4	10.0	4
	5	10	4
Londen of values 7	6	10	3
/ line indication	17	10	D
lines unit	-		
t Espeat Impost			
Export		Fires yokan	7910
Espeat Impost	Cancel	0.0000057	7910

24.2.1 Auto cycle – not triggered

The set value curve is being generated continuously and independently from the source immediately after the Message device is powered up.







24.2.2 Auto cycle - triggered

When the trigger channel is high the set point curve will be started. The set point curve will also start to play when the device is powered up and the source channel is already high.

	oduletype	Channelt	ype		Address		
🗸 Active	CPUT	Setpoint			[014]:00:	014	
1	ame Se	tpoint Curv	e	<u>U</u> nit	1		
Lor	igtext Se	tpoint gene	erator #014				
Properties	Options	Setpoint	Reference	PLI	2		
Table			-				
Default	Table 1		▼ Edi	t			
🔲 Table	e select						
[000] N	one			-			
-				_			
O No	Triggere	d 📄	Edge trigger	ed			
🧿 Trig	gered		Single Step	2			
Source							
):019 Trig	aer		+			
		a-:					
[000] N	1						
	23010 2			Y			
[000] N							
[[000] 14	0110						
🔲 Mirro							
	Cycle			0			
V Auto		1.1	0 = unlimited	1			
Sig	nal Gener itching Blo	ator					

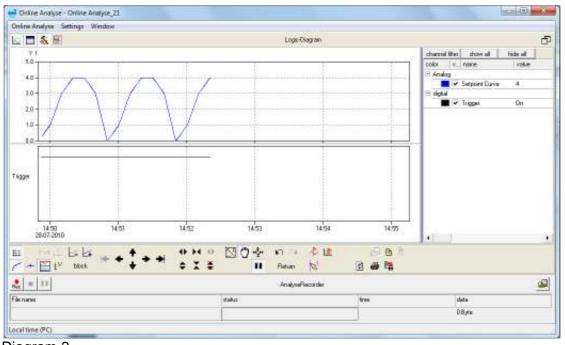


Diagram 2



24.2.3 Auto cycle – edge triggered

When the check box "Edge Triggered" is activated the set point curve will only start if the trigger channel has an rising edge.

Ha	aquiete	Channely	(pel)	Address	
Adire	CPUT]	Sepone		(014) 000014	
1	are Set	point Curve		Ini	
(an	gant Set	taxint game	nator #014	28/2	
Toperies	Options	Selpowr	Relevence F	PLC	
Table					
Detault	Table 1		• Edit	1	
Table Table	select :				
[000] 44	νe.		1.9		
1		THE STATES			
Not 🐨 Trip	Trippered pred		Edge triggered Single Step		
Source					
[079]00	tti 9 Trigg	pei		- 1	
Hold					
(000) No	ne :			-	
Rese					
10000 No	re			-	
Verar Verar			(D = unlexited	0	
10000	al Genes shing 8 k	80	n - numuning		

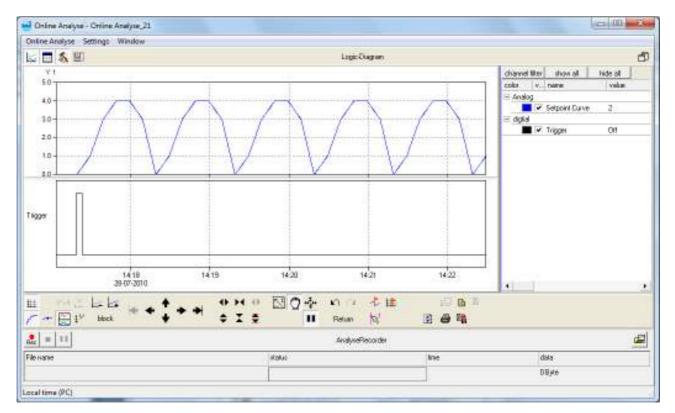


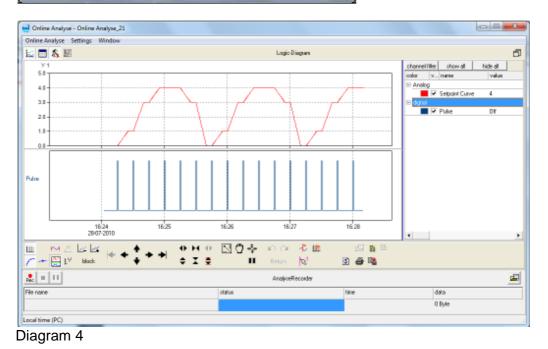
Diagram 3



24.2.4 Auto cycle – edge triggered + single step

With the function "single step" the set point curve is played back in steps. Whenever the source channel is rising to high the next step of the curve is running. Here in this example the source channel is a timer with a 15 sec pulse cycle time.

Mo	oduletype	Channeltype	1.9	Address	
🔽 Active	CPUT	Setpoint		[014]:00:014	1
1	ame Se	point Curve	<u>U</u> nit		
Lor	igtext Se	point generator #	014		18
Properties	Options	Setpoint Refe	rence PL	2	
Table					
Default	Table 1	•	Edit		
Table	e select				
[000] N			-		
Teres ()					
🔘 Nol () Trig	: Triggerei ggered	d ⊽ Edge ta ⊽ Single			
Source					
[024]:00):024 Puls	e	•		
- Hold					
):021 Hold	1	*		
Rese	ł				
[000] N	one		*		
I Mirro	S747 4	0 = unl	0 imited		
🔵 Sw	itching Blo	17	/ious	Next Copy	Insert Help

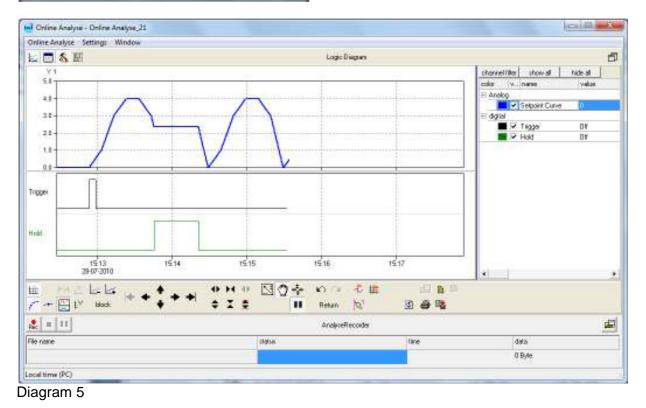




24.2.5 Auto cycle – edge triggered + hold trigger

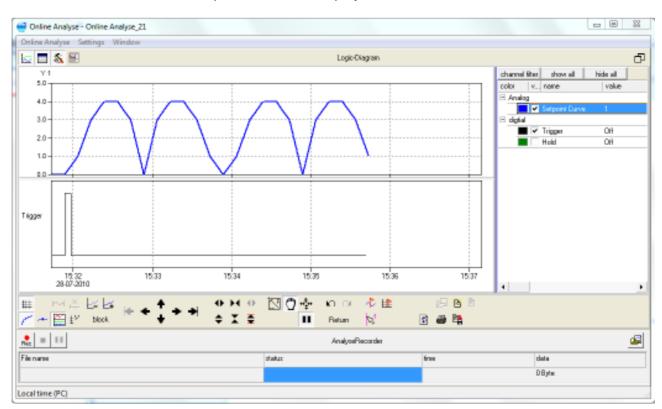
The set point curve can be stopped with a separate "Hold" trigger channel. When the hold trigger channel is high the set point curve is stopped and will restart when the hold trigger is back to low.

tennelconfiguration	
Noddetgee Channeliges	Addyst
Active CPUT Selpose	(014) 000014
Marre: Selpoint Curve	Ura .
Longtest Selpoint generator #014	
Properties Options Selpowr Relevence	PLC
Table	
Detault Table 1 • Eck	hind.
Table select	
(000) None	a .
I was a marked and the second second	
Not Triggered Triggered Triggered Single Step	4
Source	
(019) 00:019 Trigger	÷.
W Hold	
(021) 00:021 Hold	• 1
Read	
[000] None	-
Verand Z Auto-Cpcin D = unimbed	0
Signal Generator Switching Block	
	♦ Neit Scop Junet Hadp





24.2.6 Mirrored function



With the mirror function the set point curve will be played in mirror mode.

Diagram 6



24.3 Switching block mechanism

In the mode "Switching Block" up to 16 adjustable outputs are controlled corresponding to the Bit pattern (set and reset).

Moduletyp	pe Channe	eltype		Address	
Active CPUT	Setpoi	nt		[012]:00:01	12
<u>N</u> ame S	Switching B	lock	<u>U</u> nit	1	
Longtext	Setpoint gei	nerator #0	12		
operties Option	ns Setpoi	nt Refere	ence PLI	2	
Table				Output 1	[106]:02:015 Dig.Out #01
Default Table 1		-	Edit	Output 2	[107]:02:016 Dig.Out #02
Table select	1			Output 3	[108]:02:017 Dig.Out #03
[000] None			Ŧ	Output 4	[109]:02:018 Dig.Out #04
🔘 Not Trigge	red 🔲	Edge trig	harred	Output 5	[000] None
 Not higge Triggered 		Single S	2.55	Output 6	[000] None
Source				Output 7	[000] None
[013]:00:013 T	rigger		•	Output 8	[000] None
Hold				Output 9	[000] None
[000] None				Output 10	[000] None
Reset				Output 11	[000] None
[000] None			Ŧ	Output 12	[000] None
Mirrored				Output 13	[000] None
Auto-Cycle			0	Output 14	[000] None
		0 = unlin	nited	Output 15	[000] None
 Signal Ger Switching 				Output 16	[000] None
🖊 ОК 🛛 🗙	Cancel	♠ Previ	ous	🔶 Nex <u>t</u>	<u>C</u> opy Insert H



Remark:

In order to set a digital output for the "Switching Mode", the channel configuration of the digital output should be set "PLC". Only one switching channel should be linked to one digital output. If there is more than one snitching channel related to one digital output an error message "Config Error" occurs.

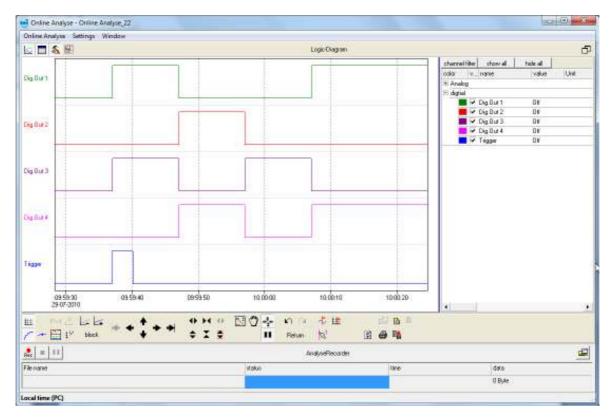
141	odulety	pe	Channel	type			Address	i.			
Active	AME	T	Switch (Dutput			[106]:0;	2:015			
1	<u>N</u> ame	Dig.l	Dut #01		L	<u>J</u> nit	1				
Lor	ngtext	Digit	al output	#01, M	odule A	MD	Г #03				
roperties	Con	nectio	on Refe	erence	PLC	1					
ource						Inte	mal Cha	nnel			
PLC		-]			[00	Ó] None			×	
		Lo	0						[]] In	vert	
		Hi	1						<u> </u>		
		1.11	1.55								
Manual/E)efault	Valu	e								
Manual/E Lo)efault	Valu	e •								
)efault	Valu	e T								
)efault	Valu	e T								
)efault	Valu	e T								
)efault	Valu	e •								
)efault	Valu	e •								
)efault	Valu	e T								
)efault	Valu	e •								
Lo		Valu	e T								
		Valu	e								
Lo	tent		e • •	A Pres	ious		• Next		<u>С</u> ору	Įnse	 Hel



In order to configure a Bit pattern the table mode should be changed to "Sequential circuit".

Table number																				
1 -	Index	Time[s				1	2	3	4	5	6	7	8	9	10	11	12 1	3 14	4 15	16
Table name	1.	0				7	Г	7	Г		Г	Γ	Г	Γ	Г	Г		П	Г	
Default Table 1	2.	10					~		~		Γ				Γ					
Mode	3.	10						•	Γ	Ū	Γ			Ū						
Sequential circuit 📼	4.	10				~			~		Γ	Г	Г						Г	
lumber of values																				
4 values	1																			
ime indication																				
relative 🔹	5																			
	9																			
and the second se																				
	1																			
)																			
	5																			
s 🗸 🔻																				
s 🔻																				
s 🗸 🔻																				
s 🗸 🔻			Free va	lues	7	'913														
Import	Cancel		Free va	lues	7	'913												Exa	mple	

The following diagram shows the switching status of the 4 digital outputs according to the Bit pattern configured above. A trigger source is used to start the switching.





25 Variable

Variable channels are required if you want to feed parameters from ProfiSignal applications into the Message device. The variable channel is storing the parameters which can be used as input for other virtual channels also.

1.1.1	odulety	pe	Channeltype		Address			
🗸 Active	CPU	T	Variable		[013]:00:01	3		
1	Name	Vari	able	<u>U</u> nit	1	1		
Lor	ngtext	Vari	able #013					
^o roperties	Optic	ons	Reference	PLC				
Source			-	.00.				
PC			•]					
Min			0					
Max			100					
2127197			0.7.7%					
Manual/E)efault	Valu	ie					
Manual/E 0)efault	Valu	ie					
)efault	Valu	ie					
)efault	Valu	le					
)efault	Valu	ie					
)efault	Valu	ie					
	Default	Valu	ie					
)efault	Valu	ie					
0		Valu	ie					
		Valu	ie					
0	tent		ncel P	revious	Next	Сору	Insert	Help

There are three different functions settings available

PC	This function is required to link the channel to ProfiSignal applications and to feed parameters from the application to this channel.
PLC	no function
Manual	With this function a constant value can be stored in the variable channel



26 Differentiator

The differentiator channel calculates the derivate of a source (alteration per time).

141	odulety	ре	Channe	eltype			Address			
🗸 Active	CPU	T	Differe	ntiation		<u>ן</u>	[015]:00	:015		1
ļ	<u>N</u> ame	Diffe	erentiato	or	<u> </u>	Init	-			
Lor	ngtext	Diffe	erentiato	or #015						18
^o roperties	Optic	ons	Differe	ntiation	Referen	nce	PLC	ł		-6
Source	e									
100000000000000000000000000000000000000		2AL	TEMP_	1						
Refere	encetim	ne Sr	ource (n	ารไ						
1000			oaroo [n	.~1						
in T 💟	gger									
Contraction of the second	gger 00:013	3 Trig	gger				•	Į		
[013]:	00:013						•			
[013]:	00:013			n hardw	are count	ters				
[013]:	00:013			m hardw	are count	ters	Ŧ			
[013]:	00:013			n hardw	are count	ters]		
[013]:	00:013			n hardw	are count	ters	-]		
[013]:	00:013			n hardw	are count	ters]		
[013]:	00:013			n hardw	are count	ters				
[013]:	00:013			n hardw	are count	ters				
[013]:	00:013			n hardw	are count	ters				
[013]:	00:013			n hardw	are count	ters				
[013]:	00:013			n hardw	are count	ters				
[013]:	00:013			n hardw	are count	ters]		

If a source has measurement unit "quantity" and is derived, the unit of the differentiator channel will be "quantity/time". This is exactly the opposite of integrating. The unit is entered in the field "time basis-source (ms)".

Example 1: If 1000 ms are set under "time basis-source (ms)", the unit will be "quantity/sec."

Example 2: If 60000 ms are set under "time basis-source (ms)", the unit will be "quantity/min."

Example 3: If 3600000 ms are set under "time basis-source (ms)", the unit will be "quantity/hour."

If the trigger is not active the value will be derived only when the source has changed. If the trigger is active the value will be derived every positive edge of the selected trigger source.



27 Linearization channel

The linearization channel uses the linearization table. This table stores values in pairs of INPUT values and OUTPUT values.

	oduletu	De	Channe	tvpe		_	Address	-		_		_	
🗸 Active	CPU	·	Differen	10.00		Ĩ	[015]:0						1
1	<u>N</u> ame	Diffe	erentiato	r	<u>L</u>	Init							_
Lor	ngtext	Diffe	erentiato	r #015									
^p roperties	Optic	ons	Differer	ntiation	Referen	nce	PLC	ŀ.					
Source													
2000 Contract Contrac		2.AI_	TEMP_	1									
Refere	ncetin	ne So	ource (m	s]									
1000													
🧾 Trig	gger												
[013]:		3 Trig	gger										
[013]:	00:013			1 1				-					
[013]:	00:013			n hardw	are count	ters		•					
[013]:	00:013			n hardw	are count	ters		•					
[013]:	00:013			n hardw	are count	ters							
[013]:	00:013			ı hardw	are count	ters							
[013]:	00:013			n hardw	are count	ters							
[013]:	00:013			ı hardw	are count	ters							
[013]:	00:013			n hardw	are count	ters		-					
[013]:	00:013			ı hardw	are count	ters		-					
[013]:	00:013			ı hardw	are count	ters							
[013]:	00:013 nsider	over		n hardw		ters	Next		<u>С</u> ору		Insert		Help

The input of the values is similar to the set point channel. It is important to choose the modus "linearization".

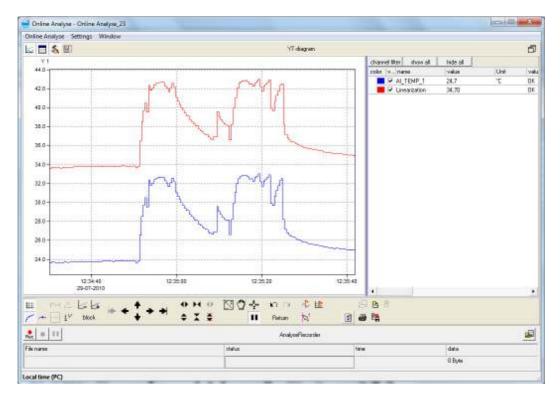
The input values provided by the source channel are converted to the corresponding output values.



Example 1: The linearization table is shifting an input value by 10° . The input channel (source channel) is AI_TEMP_1 and a value of 20° is converted to an output value of 30° .

Table number				
1 .	 Index 	Input	Output	
Table name	1.	20	30	
Default Table 1	2.	30	40	
Mode	3.	40	50	
Linearization •	-			
Number of values				
	-			
	-			
Export				
Export				
Export Import				
		Free values	7914	
	Cancel	Free values	7914	Example

If the source channel has an INPUT value in-between the values specified in the table the OUTPUT value will be interpolated.





Remark:

Each subsequent input value in the table should be larger than the previous one (strictly monotone rising function), so that the channel is operating correctly. With wrong values on the input column the message appears "Illegal value at row (number), column 1".

If the source supplies a value which is smaller than the first or bigger than the last input value of the table, the result will be the first resp. the last output value and the channel be declared invalid.

fable number				
1	🔹 In	dex	Input	Output
fable name	1.		20	30
Default Table 1	2.		15	40
Mode	3.	1	40	50
Linearization	-			
3				
Export				Illigal Value at Row 2, Col 1



28FlipFlop

When the error states of the signal inputs should not be processed, activate **ignore error state of source** (valid for all FlipFlop types).

28.1 JK FlipFlop

Mo	duletype	Channeltype		Add	lress	
🗸 Active	CPUT	FlipFlop		[02	0]:00:020	
<u>N</u>	ame Fli	pFlop JK	<u>U</u> nit	1		
Long	gtext Fli	pFlop #020				
)ptions Fl	ipFlop	Reference PLC				
O D	Flip-Flop Flip-Flop Flip-Flop		ј Рг. >Сік.— К_СІ.			
Preload:	[021]:0	10:021 PRELOAD		•	Inverted	
J:	[014]:0	10:014 J		•	Inverted	
Clock:	[019]:0	0:019 CLOCK		•	Inverted	E Level
К:	[016]:0	10:016 K		•	Inverted	
Clear:	[019]:0	0:019 CLOCK		•	Inverted	
		reload and Clear w errorstate	ith Clock			
Persis	tent					
🗸 ОК	×c	ancel 🛉 🛉 Pre	vious	∳ N	lex <u>t</u> <u>C</u> opy	Insert Help

Signal inputs J and K: reset the FlipFlop with next clock edge, resp. with next active level

Preload / Clear :	Presetting for the FlipFlop (priority on Clear); can be synchronized with clock
Persistent	Recent state is recovered upon restart
Level	Switches the clock from edge to level operation



28.2 D FlipFlop

Mo	duletype	Channeltype		Add	dress		
Active	CPUT	FlipFlop		[01	1]:00:011		
N	ame Flip	Flop D	<u>U</u> nit	Î			
Lon	gtext Flip	Flop #011		-			
Iptions F	lipFlop	Reference PLC	1				
D	Flip-Flop Flip-Flop Flip-Flop) >Clĸ.−				
D:	[033]:0	1:002 AI_TEMP_1		•	Inverted	📝 Analog	
Clock:	[013]:0	0:013 Trigger		•	Inverted 📃	🔽 Level	
Ignore	e source	errorstate					
Persis	stent						
							130

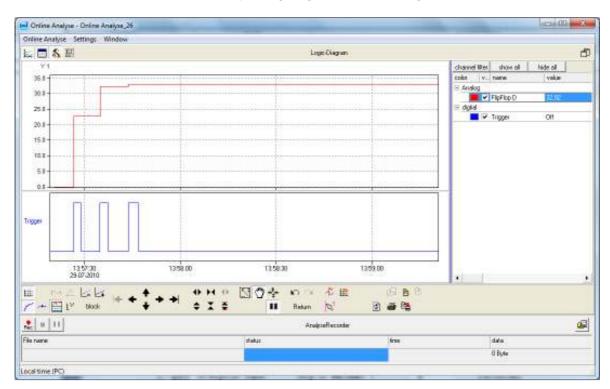
Signal input D sets the FlipFlop with next clock edge, resp. next active level

Analog Takes the (analog) value of signal input D

Clock The clock signal is the trigger channel to update the Flip Flop with the value of the analog input at an rising edge. The clock signal can also be configured in level mode. In this case the Flip Flop will be updated when the clock signal is going from high to low.

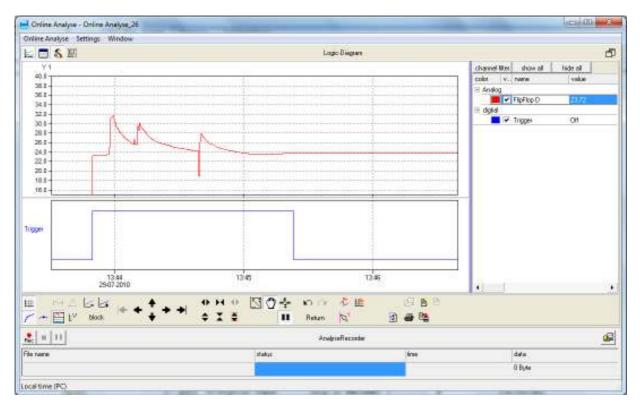
Persistent Recent state is recovered upon restart





Without activated level mode: Every rising edge of the clock signal will update the Flip Flop.

With activated level mode: The Flip Flop will be permanently updated when the clock signal is high and will also save the last value when the clock signal is falling.





28.3 SR FlipFlop

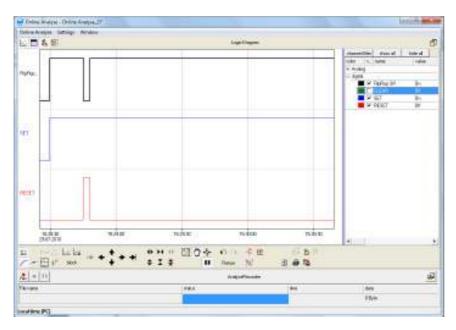
Channelconf	figuration		X
1	duletype Channeltype		Address
Active	CPUT FlipFlop	_	[015]:00:015
N	ame FlipFlop SR	<u>U</u> nit	
Long	gtext FlipFlop #015		
Options Fli	ipFlop Reference PLC		
© D ∣	Flip-Flop Flip-Flop Flip-Flop]_ ;	
S:	[016]:00:016 SET		Inverted Set priority Edge
R:	[019]:00:019 RESET		 Inverted
Clear:	[013]:00:013 Trigger		 Inverted
🔲 Ignore	e source errorstate		
Persis	tent		
✓ OK Last change	X Cancel Previous		Next Copy Insert Help

Signal inputs S Signal inputs R

Is setting the Flip Flop to high

Will reset the Flop Flop to low for the reset time period. The Flip Flop is going back to high provide the Set channel (S) is still high The last state is recovered after restart

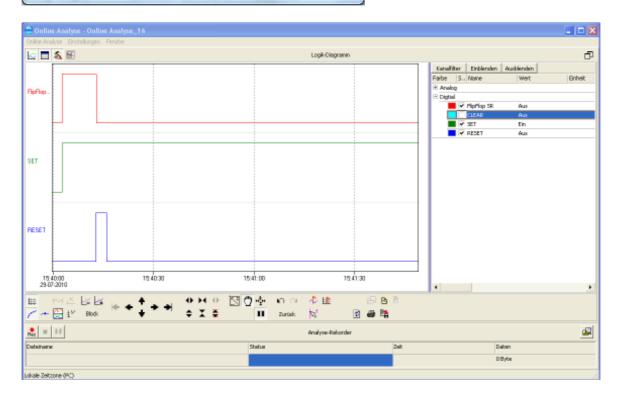
Persistent





When the check box "Edge is activated the Flip Flop will be resetet to low even of the set channel (S) is still high.

M	oduletype	Channeltype		Add	ress		
🗸 Active	CPUT	FlipFlop		[01	5]:00:015		
1	Name Flip	Flop SR	Unit	-			
Lor	ngtext Flip	Flop #015		-		01	
Options F	FlipFlop	Reference PLC					
O D	Flip-Flop Flip-Flop Flip-Flop		>S <u>-Ra</u>				
S:	[016]:00	0:016 SET		•	Inverted	C Set priority	
R:	[013]:00	0:013 RESET		•	Inverted		
Clear:	[019]:00	0:019 CLEAR		•	Inverted		
🔲 Ignoi	re source (stent	errorstate					





Moduletype Cha Active CPUT Log	nneltype jic	Address [012]:00:012		
Name Logic #0	12	<u>U</u> nit		
Longtext Logic Fu	nction #012			
ptions Logic Referen	nce PLC			
Logic gate type			1	-
🕐 NOT	Input	Source	Inverted	ľ
AND	1.	[005]:00:005 VA_RESET		-
OR OR	2.	[011]:00:011 FlipFlop D		
O NAND	3.	[000] None		
 NOR ANTIVALENCE EQUIVALENCE 	4.	[000] None		
	5.	[000] None		
© EXOR	6.	[000] None	_	
C EXNOR	7.	[000] None		
Edge detector	8.	[000] None		
	9.	[000] None	I	
	10.	[000] None	1	
Source errorstate	11.	[000] None		
🔲 ignore	12.	[000] None	Г	
	13.	[000] None		.,
ignore				

29Logic channel

The logic channel offers the possibility of linking digital signals easily.

Simply select one of the indicated logic operator and the inputs (max. 32). It is also possible to negate the input signal by checking of the button "inverted".

For simple Boolean calculations it is recommended to use the logic channel rather than the calculation channel, because the calculation channel requires more processor performance than the logic channel.

Ignore error state of the source must be selected, if invalid or error states should not be acquired by the logic channel.



30PID regulators

PID regulator channels allow the control of a process quantity. P, I, PI and PID controllers can be selected. Other settings like e. g. dead zone, control variable limitation etc. are also possible.

30.1 Introduction to control engineering

This chapter will give you an introduction to control engineering in order to understand the PID regulator.

30.1.1 Conventions

- Y Control signal = Start value of the controller
- X Control quantity = Process quantity to be controlled
- W Set value = Target value of process quantity.
- Z Interference quantity = Interfering influence from the process to the process quantity
- Xd Deviation = W X
- K_s Path system gain = $\Delta X / \Delta Y$ of a path step response
- Tu Delay time
- Tg Recovery time
- Tt Dead time
- W Inflection point
- K_I Integral-action coefficient
- T_I Integration time



30.1.2 Control path

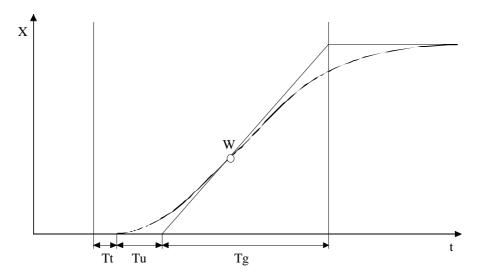
In order to find an appropriate controller, it is necessary to know the properties of the control path to be influenced.

The control path is the part of a plant which is between the final control element and the measuring point of the control quantity. The final control element and the measuring element are also part of the control path.

Basically, control paths can be divided into two categories:

- Control paths with compensation: After a change of the control or interference variable the control variable strives for a new final value (steady state). E. g. flow 2, temperature etc.
- Control paths without compensation: Control paths not striving for a final value (integrating control paths) are called control paths without compensation. E. g. liquid level

Most control paths consist of P systems (amplification/attenuation), one or more T1-systems (lowpass) and if possible one dead time (run time). Paths with P-T1 response are called control paths of 1st order. Control paths with several T1-systems respectivly control paths n. order. Control paths with compensation of this kind have the following characteristic step response:

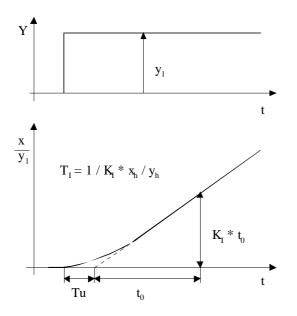




The controllability of such a control path by the use of a PID controller can be estimated as follows:

Tg / Tu > 10 : well controllable Tg / Tu \approx 6 : medium controllable Tg / Tu < 3 : difficult controllable

For control paths with dead time, Tg / (Tt + Tu) defines the controllability. Step response of a control path without compensation:



30.1.3 Continuous-action controllers (PID)

In the case of continuous-action controllers the control variable Y assumes any value within a control range.

- P-controller: changes the control variable without delay proportionally to the change of the controlled signal.
- I-controller: (Integrator) allocates a certain control speed to a certain control difference.
- PI-controller: includes a proportional and an integrating part.
- PD-controller: This regulator consists from a P-controller and a D-element. The Delement allocates a certain modification speed of the control difference to a control variable.
- PID-regulator: The control variable consists from a proportional, an integral and a differential part.



Controller selection:

Regulator	Р	I	PI	PD	PID
Path (with compensation)					
Pure dead time	Unsuitable	Somewhat worse than PI	Reference and interference	Unsuitable	Unsuitable
Dead time and delay 1. order	Unsuitable	Worse than PI	Somewhat worse than PID	Unsuitable	Reference and interference
Dead time and delay 2. order	Unsuitable	Bad	Worse than PID	Bad	Reference and interference
Delay 1. order and small dead time (delay time)	Reference	Unsuitable	Interference	Reference with delay time	Interference with delay time
Higher order	Unsuitable	Worse than PID	Somewhat worse than PID	Unsuitable	Reference and interference
Without compensation and with delay	Reference (without delay)	Unsuitable, instable	Interference (without delay)	Reference	Interference



30.2 Adjustment of the regulator characteristics

Different standards have been established for the choice of the controller characteristics. This part describes the adjustment standards by Chien, Hrones and Reswik. Please read more adjustment standards and rules from the relative technical literature.

30.2.1 Adjustment rules for control paths with compensation:

From the step response of the control path define the following characteristics of the control path:

- Path system gain K_s
- Recovery time Tg
- Delay time Tu
- For paths with dead time, instead of the delay time Tu, the virtual dead time Tu + Tt

The controller characteristics (only reference values) can be calculated according to the following table:

Controller	•	rol characteristic overshoot)	Control characteristic with appr. 20% overshoot		
	```	/			
Optimization for:	Interference	Reference	Interference	Reference	
Р	K ≈ 0,3 * Tg / Tu	K ≈ 0,3 * Tg / Tu	K ≈ 0,7 * Tg / Tu	$K \approx 0,7 * Tg / Tu$	
PI	K ≈ 0,6 * Tg / Tu	K ≈ 0,35 * Tg / Tu	K ≈ 0,7 * Tg / Tu	K ≈ 0,6 * Tg / Tu	
	Tn ≈ 4 * Tu	Tn ≈ 1,2 * Tg	Tn ≈ 2,3 * Tu	Tn ≈ Tg	
PID	K ≈ 0,95 * Tg / Tu	K ≈ 0,6 * Tg / Tu	K ≈ 1,2 * Tg / Tu	K ≈ 0,95 * Tg / Tu	
	Tn ≈ 2,4 * Tu	Tn ≈ Tg	Tn ≈ 2 * Tu	Tn ≈ 1,35*Tg	
	Tv ≈ 0,42 * Tu	Tv ≈ 0,5 * Tu	Tv ≈ 0,42 * Tu	Tv ≈ 0,47 * Tu	

Note:

As further adjustment standard in the automatic determination of the regulator characteristics (see chapter) the T-sum rule has been implemented.

# 30.2.2 Adjustment rules for control paths without compensation:

From the step response of the control path define the following characteristics of the control path:

- Integral-action coefficient K_I
- Delay time Tu

The controller characteristics (only reference values) can be calculated according to the following table:

Controller	K	Tn	Tv
Р	0,5 / (K _I * Tu)		
PD	0,5 / (K _I * Tu)		0,5 * Tu
PI	0,42 / (K _I * Tu)	5,8 * Tu	
PID	0,4 / (K _I * Tu)	3,2 * Tu	0,8 * Tu



## **30.3 Configure PID controllers**

The specific setting of the controller channel is made in the register cards "Controller", "Extended1" and "Extended2".

Settings in the tab "Extended1" and "Extended2" are only required for special applications. The controller channel receives its input values (set value "W" and control variable "X") from 2 physical or virtual channels of the device. The controller channel gives as output value the control variable "Y" in the defined value range 0,0 - 1,0. If the output of the controller channel is directly linked with an analog output, there 0,0 - 1,0 as scaling will also have to be entered.

30.3.1	Tab	"Controller"	

Modulet	уре	Channelty	pe	. ł	Address		
Active CPL	JT	PID-CLC			[023]:00:0	123	
<u>N</u> ame	CLC	C #023	U	nit			
<u>L</u> ongtext	Clo	sed Loop C	ontroller #023				
roperties 0pt	ions	Controller	Extended 1	Ex	tended 2	Reference PLC	]
Controller type				11	Beferenc	ce Variable (w)	
P-Quota	1		Amplification		[000] Nor	Caller de la construction de la co	•
I-Quota	0		Reset Time		Controlled	d Variable (x)	
Zero mark cont	rol v.	ariable Y	W46363688W4759		[000] Nor	ne	•
0							
D1-Quota	0		Rate Time	0.00	Y-Han	d	
			11171520107	-	Switch Cl	and the fact that the fact that the	
Delay D1 Q	uota				[000] Not	ne	*
Delay Time					yH-Chanr		
0					[000] Nor	ne	*
Controller pers	iister	ł					
🖊 ок 🛛 🗙		ncel 🛔 🛉	Previous		Next	Copy Inse	rt   He



- Reference variable (W): Indication of the source channel for the reference variable. Normally an analog input, a marker, or an output of a different regulator (cascade) can be used as source channel. In case of a cascade take care that the reference regulator has a fixed output value range of 0,0 – 1,0, if necessary, a conversion by means of a calculation channel is required.
- Control variable (X): Indication of the source channel for the control variable. Usually an analog input can be used as source.
- Y-hand: By activating this option the optional manual switching of the controller is activated. This allow to change the output value of the controller to a value from another channel.
- Switch channel: Indication of the source channel for the activation of the controller manual switching. If there is a value of >= 1,0 at the switch channel, the value of the yH channel is output as control signal (Y)
- YH channel: Indication of the source channel for the "manual value" of the regulator.
- P quota: By activating this option the P quota of the controller is activated. In the input field "gain" the gain factor (K) of the regulator must be entered.
- I quota: By activating this option the I quota of the regulator is activated. In the input field "reset time" the reset time (Tn) of the regulator must be indicated in seconds.
- Initial value I term / zero point control variable Y: When the I quota is activated the initial value of the I quota (Y(0) = I(0) * K) or the zero point of the control variable (0,0 1,0) can be set.
- D1 quota: By activating this option the 1. D quota of the regulator is activated. In the input field "rate time" the rate time (Tv) of the regulator in seconds must be indicated.
- Delay D1 quota: By activating this option it is possible to set the 1. D quota to a delayed difference calculation. The delay time must be indicated in seconds in the input field "1. delay time".
- Controller persistent: For optimizing reasons the control variable of the regulator is only recalculated with a change of the control variable. By activating this option the control variable is calculated upon each request of the control variable through a linked channel (output), even if there is no change in the control variable. The use of this option is not recommended.



## 30.3.2 Tab "Extended 1"

Moduletype	Channeltype	Address
Active CPUT	PID-CLC	[023]:00:023
<u>N</u> ame CL	C #023	Init
Longtext Clo	sed Loop Controller #023	
Properties Options	Controller Extended 1	Extended 2 Reference PLC
P Quota acts o x x 2 xd D1 Quota acts x 2 xd D1 Quota acts 0 nly negat 0 All Values 0 nly positiv D2 Quota acts x x x 0 xd	on on ve Values re Values	2 Quota Rate Time D2-Quota Delay D2 Quota Delay Time 0 Feedback Limiter to D2 Attenuation Limiter Feedback 0
🗸 ОК 🛛 🗶 С.	ancel 🛉 Previous	♦ Next Copy Insert Help

- P / D1 / D2 quota acts on: These options define, if the respective controller component processes the control difference "xd" (according to the possibly calculated "dead zone") or directly the control variable "x" as input value.
- D1 quota acts on: Through this option it is defined on which input values the 1. D quota reacts. All non acting values are processed as 0,0. This option is only available, if 1. D quota does not work as "delayed D quota".
- D2 quota / delay D2 quota: Analog to the 1. D quota the 2. D quota can be configured.
- Feedback Limiter to D2: By activating this option the control variable that has been cut off in the previous control cycle is reduced to the 2. D quota. In the input field "Attenuation Limiter Feedback" the degree of the feedback must be entered (1,0 = complete reducing).



## 30.3.3 Tab "Extended 2"

Mo	oduletyp	e Channelty	pe	Address		
Active	CPUT	PID-CLC	54C	[023]:00:	023	
1	Name C	LC #023	U	nit		
Lor	ngtext C	losed Loop C	ontroller #023			
roperties	Option	is Controller	Extended 1	Extended 2	Reference PLC	
Blindzo	one	Alt -	97 - 36 	TY Limiter	28 2804 28	-
V xc	d Blindzo	one		V Li	miter	
S CHERNE						
2 per la constance	point of	xd Blindzone		122000233	Limit Y Limiter	
0				0		
Exte	nsion of	xd Blindzone		Upper	Limit Y Limiter	
0				0		
		12	E-	🔶 Next		
🗸 ок		Cancel 🕴 🛉				Help

- xd Dead zone: By activating this option the dead zone of the control difference is activated. In the input field "Zero point of the xd dead zone" the zero point of the dead zone must be indicated. In the input field "Extension of the xd dead zone" the maximum deviation from the zero point of the dead zone, within which the control deviation is set to 0,0, must be entered.
- Y Limiter: This option permits the restriction of the value range of the control variable. The cut off quota of the control variable can optionally be reduced to the 2. D term. The limits of the control variable must be entered in the input fields (0,0 - 1,0).



# **30.4** "Real time" configuration and automatic calculation of the regulator characteristics

Alternatively to the above standard configuration it is possible to alter the regulator characteristics (K, Tn, Tv) of a "Standard" PID regulator directly via slide regulator. It is also possible to have calculated the regulator characteristics automatically. The requirement for using this alternative configuration is a PID regulator channel without delayed 1. D quota and without using the extended options. Call of the alternative configuration:

After marking the PID regulator channel in the Explorer view it is possible to call in the context menu (right mouseclick) the option "Paramet setting".

	_CONTROLLER Longna	me controls the load cycle (k	oad current)	
Controllertype 🔋				
	0,0001		0,01	
Gain:	4	man	P.	0,000701
	All second s			
_	0,1		10	0,530 sec
Reset time:	4		•	0,530 sec
	0,01		10	
Derivative time:	4		•	sec
				Use parameter
Automatic se 1.0utputvalue 0.20		0,80	Important note:	
1.Outputvalue 0,20	2.Outputvalue	0,80	Warning: During ascertainin controlled system can reach	g parameter your
1.Outputvalue 0,20	2.Outputvalue	0,80	Warning: During ascertainin	g parameter your
1.Outputvalue 0,20 Controlled system pr	2.Dutputvalue ( operty Signal noise		Warning: During ascertainin controlled system can reach	g parameter your
1.Outputvalue 0,20 Controlled system pr Compensation	2.Outputvalue ( operty Signal noise ation	Controller conduct	Warning: During ascertainin controlled system can reach	g parameter your

## **30.4.1 Manual change of parameters**

- Regulator type: In this selection list the regulator type can be indicated (P, I, PI, PD and PID). The selection "inactive" switches off the PID regulator channel. If the selection "Ext." is displayed, an option of the regulator channel which is inadmissible for this configuration dialogue illegal option will be activated.
- Slide regulators K / Tn / Tv: By positioning of the slide regulators the corresponding regulator parameters will be directly altered.
- Input fields: The regulator parameters can optionally be changed in the input fields. The changed values are imported by pressing the button "Import" from the regulator. The scalings of the slide regulators are if necessary adapted to the new parameters.



### **30.4.2** Automatic calculation of the regulator characteristics

By analysis of the step response of the control path the regulator characteristics will be automatically calculated.

#### Paths with compensation:

After calculation of the system gain (K_s) and the cumulative time constant (T_{$\Sigma$}) the parameter K, Tn and Ty will be calculated after the T sum rule in dependence upon the regulator type.

### Note:

### The T sum rule is only suitable for paths with s-form step response.

For the following path definition is  $\mathsf{T}_\Sigma$  :

$$F_{s}(p) = K_{s} \frac{(1+T_{D,1}p)(1+T_{D,2}p)\cdots(1+T_{D,m}p)}{(1+T_{1}p)(1+T_{2}p)\cdots(1+T_{n}p)} e^{-pT_{t}}$$
  
$$T_{\Sigma} = T_{1} + T_{2} + \cdots + T_{n} - T_{D,1} - T_{D,2} - \cdots - T_{D,m} + T_{t}$$

The following table includes the setting rules after T sum:

	Regulator		Regulator parameter				
		K _R	T _N	Tv			
Normal setting	Ρ	1/Ks	-	-			
	PD	1/K _s	-	$0,33 T_{\Sigma}$			
	PI	0,5/K _S	$0,5 T_{\Sigma}$	-			
	PID	1/K _s	$0,66 T_{\Sigma}$	$0,167 T_{\Sigma}$			
Fast setting	PI	1/K _s	0,7 Τ _Σ	-			
	PID	2/K _S	0,8 Τ _Σ	0,194 T _Σ			

Fast setting is only suitable for P-T₁ and P-T₂ similar control paths

### Paths without compensation:

After the calculation of the integral-action coefficient  $K_i$  and the delay time Tu the parameters K, Tn and Tv after Chien, Hrones and Reswik are determined. (see **error! Source of reference could not be found)** 

### Procedure of the automatic calculation of the regulator characteristic:

After the start the 2. control variable, the 1. control variable and once again the 2. control variable are put on the control path in succession. After reaching the steady state (paths with compensation) resp. a constant slope (paths without compensation) after each step, the next step is put on the control path. After the end of the 3. step the regulator characteristics are determined from the calculated path parameters.

Should the control path get into critical state during the automatic calculation, this can be stopped any time.



Options:

- 1. control variable: Here the 1. control variable must be indicated (0,0 1,0). The 1. control variable is predetermined for control paths without compensation (0,0).
- 2. Control variable: Here the 2. control variable must be indicated (0,0 1,0). The 2. control variable must deviate at least 0,25 from the 1. control variable.
- Compensation: Indication about the response of the control path: With or without compensation.
- Signal noise: Indication about the signal noise of the measurement data acquisition. If the automatic calculation with the setting "normal" does not recognize the steady point or puts the next step too early on the control path (steady point has not yet been reached), the automatic calculation with the setting "strong" can be repeated.
- Control response: Here the required control response must be selected. The setting "fast" causes a reduced transient time together with a stronger overshoot of the control variable.
- Calculate parameters: The automatic calculation is started. During this operation the current control variable is permanently displayed.

For the automatic calculation an adequate measurement cycle for the control variable must be set. A possible active tolerance must be deactivated during the automatic calculation (0%). e. g. no sampling in ms grid with a slow temperature control path.

During the automatic calculation all fault variables should be eliminated as far as possible or should be very low.

e. g. locking of the drain in a liquid level control path.

### Important notes:

The **suitability of your control path** for calculation of the regulator characteristics by means of path step responses presented here, is to be taken from the corresponding **technical literature**.

It is basically possible, that the complete production plant gets into critical state during the automatic calculation caused by interactions.

If you should not be sure whether your control path / production plant gets into critical state, **do not** use the automatic calculation of the regulator

characteristics !



# **31 Event channel**

The event channel can send messages to a recipient caused by a trigger event. This recipient is stored in an address book. Depending on the configuration the system can send E-mail or SMS-Messages .

	Modulety	/pe	Channeltype		Address	
Act	ive CPU	T	Event-Kanal		[025]:00:025	
	<u>N</u> ame	Eve	ent #025	<u>U</u> nit		
	Longtext	Eve	ent handler #025			
vent	Referen	ce	PLC			
Sourc	é				Message:	
[000]	None		•		-	
					🔽 Current Time	
mport			-		📝 Own Longname	
			•,		🔲 Own Tagname	
Recip					Source Longname	
Activ	e Address	ee			Source Tagname	
M	sms				Data-Source Longname	
	none					5 7
	none				Data-Source Tagname	
	none				Source Value	
	none				🔲 Data-Source Value	
_	none				🔽 Signature	
	none				Data source	
	none				[000] None	-
E	dit					
/ 0	K 🖌	C.	ncel 🛉 🛉 Prev		Next Copy Inse	ert Help

The message text can be individually configured from the channel names, long texts of the event channel and its source channel to build meaningful short messages.



# 32Modbus LAN (TCP)

The Modbus LAN channels are interface channels to exchange data between other communication partners who support the Modbus TCP protocol. Modbus TCP communication partners could be another PC, Message device, a sensor or any other third party device.

Basics about the Modbus TCP communication:

One communication partner should be the Modbus Server. All other communication partners are configures as Modbus Clients. The data flow between the devices is not independent of the Server or Client configuration. Every communication partner can send data to the server or read data from the server. The data flow is configured through the function code settings.

The configuration parameters are compliant to the Modbus standards.

The following example shows the principle of the communication settings. In this exercise two Message Devices are used.



## 32.1 Configuration examples

Case 1: Server (192.168.251.121) is providing an analog value (temperature) Client (IP 192.128.251.41) is reading the value from the server.

		X					
	liker:	Linennesconngu		Addwrrt			
		Congest	or sold by " a low below his on solar billing a	Add with (204) 00.304			
onbus Server 1 Line		Here	Modbur Client 1	Lina .			
orbue over TCP Channel #015		Longtee	Langtest Norbus over TCP Channel #204				
NotBus (LAN) Reference	PLC	Properties Op	tions ModBuo (LAN) Release	ence PLC			
🔿 Glenk (Master) 🔹 Server	(Slave)	Mode	B Gent (Master)	Server (Slave)			
0 4 0		Server Addess Register	192,168,251,121 D				
FC03 Read Holding Registers (033)01:002 AL TENP_1	•	Function	FOOD Read Holding Rep	print. •			
Not 12 Ex	•	Data Type:	food 32 Bit				
🗄 Sequertial query		Paind(re)	1000				
	Uniterclaster [] problem Server 1 [] prof problem Server 1 [] prof problem over TCP Drawnel #015 [] ModBue (LAM) [] Reference [] [] Clenk (Master] @ Server [] Clenk	Diservering     Address       Lottanilated     [015] (00015)       Setue Server 1     Linit       Setue Server 1     Linit       Setue Server 1     Linit       ModBue (LAW)     Reference       PLC     Image: PLC       Client (Maules)     Server (Slave)       P     Image: PLC       P     Image: PLC       P     Image: PLC       Image: PLC     Image: PLC <td>Discretingpe       Address         untransistent       (005) 000005         oobse server 10P Ouernal #015       Longtee         ModBus (LAM)       Reference       PLC         ModBus (LAM)       Reference       PLC         O       Gent (Mastest * Server (Slave)       Mode         Slaves Add       Slaves Address         0       40       Slaves Address         F003 Read/Holding Registrem       *         (Bast 32 Ell       *         Duala Type:       Paried (arc)</td> <td>Discretifying Address       Modelings       Address         Instantion       (015) 00000       Modelings       Discretifying and address       Modelings         Instantion       (015) 00000       Modelings       Discretifying and address       Modelings       Discretifying address       Modelings         Instantion       (015) 00000       Modelings       Discretifying address       Discretifying addr</td>	Discretingpe       Address         untransistent       (005) 000005         oobse server 10P Ouernal #015       Longtee         ModBus (LAM)       Reference       PLC         ModBus (LAM)       Reference       PLC         O       Gent (Mastest * Server (Slave)       Mode         Slaves Add       Slaves Address         0       40       Slaves Address         F003 Read/Holding Registrem       *         (Bast 32 Ell       *         Duala Type:       Paried (arc)	Discretifying Address       Modelings       Address         Instantion       (015) 00000       Modelings       Discretifying and address       Modelings         Instantion       (015) 00000       Modelings       Discretifying and address       Modelings       Discretifying address       Modelings         Instantion       (015) 00000       Modelings       Discretifying address       Discretifying addr			

onfiguration Options Help				
lus-Overview Eventlist				
	TCP/IP -01 (192.168.251.41), St emory Module PU Module 2:COM 1	ate: Realtime Data, CPU :PROFIBUS DP slav:	J: 12 %, DelOS V2. _	31
	- 3:COM 2	:User Proto New :	<del></del>	
	206:Channelgroup	:ChannelGroup :	2	
	204:ModBus (LAN)	:Modbus Client 1 :	24	(15:33:44)
TopMessage Configurator V 3 nfiguration Options Help				
us-Overview Eventlist	CP/IP			
nopMessage T	CP/IP age (192.168.251.121), S mory Module U Module	State: Realtime Data, C	PU: 28 %, DelOS V	2.30
e 🕅, TopMessage T e Topmess Me	age (192.168.251.121), S mory Module	State: Realtime Data, C :Disabled :	PU: 28 %, DelOS V inactive	2.30
n TopMessage T	age (192.168.251.121), S mory Module U Module			2.30
A TopMessage T Topmess A Me A Me 	age (192.168.251.121), S mory Module V Module 2:COM 1	:Disabled :	inactive	2.30
TopMessage T Topmess Me Me CP	age (192.168.251.121), S mory Module U Module 2:COM 1 3:COM 2 10:Channelgroup Mo- 15:ModBus (LAN) 0 Module 1: AAST	:Disabled : :Disabled : :ChannelGroup : :Modbus Server 1 :	inactive inactive - 23	2.30 (15:33:54)
• • • • • • • • • • • • • • • • • • •	age (192.168.251.121), S mory Module U Module 2:COM 1 3:COM 2 10:Channelgroup M. 15:NodBus (LAN)	:Disabled : :Disabled : :ChannelGroup : :Modbus Server 1 :	inactive inactive - 23	



Case 2: Client (IP 192.168.251.121) is providing an analog value (temperature) to the Server with IP 192.128.251.41

IENT			SERV		
nnelconfigura			Channelconfiguration	on Channeligne	Address
	pe Charnelype	Addese (015)00.015	Active CPUT	(c) indicate a site in the second se second second sec	(204) 00:204
50.079	Modbue Client 2	Ur	Hare M	orbur Server 2	Urð.
	Modeus over TCP Chann		Longtest N	odbur over TCP Channel	#284
	me Modflue (LAN) Red		Properties Option	ModBus (LAN) Relat	ence PLC
			10000		
Mode:	🧟 Clant (Macter) 🛛	Server (Slave)	Mode	Clerk(Master) 👻	Server (Slave)
Slove Adl :	1				
Server:	192.168.251.41				
Addeos	1		Addware	1	
Register'	4 0002		Register	4 0002	
Function	PC16 Presel Multiple	Regi 🔹	Function	FC16 Prevel Multiple Re	·
Quele	10331 01 002 AL_TEM	P.) *)			
DataType	10et 32.84	•	Dista Type:	fort 32 Bit	- C1 600
Period (not)	1000				
	E Sequented query			🖺 Sequential query	
Bus-Overview	Eventlist TopMessage TC	P/IP			
			State: Realtime Data, CPU:	12 %, DelOS V	2.31
	EPU				
	€	= 2:COM 1	:PROFIBUS DP slav:	<u>184</u>	
		- 3:COM 2	:User Proto New :	170	
			:ChannelGroup :	-	
		204:ModBus (LAN)	:Modbus Server 2 :	26	(15:51:50)
TopMessag	ge Configurator V 3.6	580 Host: 192.168.251.121			
onfiguration					
Bus-Overview		D / T D			
<u>O</u>			), State: Realtime Data, CF	011- 22 % Dollo	5 112 3.0
		nory Module	,, scale, nealline paid, br	5. 22 %, PC103	
		Module			
	₹	2:COM 1	:Disabled :	inactive	
		3:COM 2	:Disabled :	inactive	
	÷		:ChannelGroup :		
	L	0	:Modbus Client 2 :	26	(15:52:00)
			nana <u>na dia kaoman</u> ia dia kaominina dia kaominin	2002 <u>2002</u> 2003	
			tate: Measurementvalues, Bl	lock 155,00	
			tate: Measurementvalues, Bl	lock 155,00	
			tate: Measurementvalues, Bl	lock 155,00	



# 33 Spectral-component

The analysis of Spectral components is only available in combination with the AMDT module. The FFT-characteristics channel must be configured on the AMDT module in the first place.

This virtual channel was developed to enable very specific FFT-spectrum analysis. The user can select and analyse a very small section of the spectrum (up to 9 FFT lines) around a "Watched Frequency".

Moduletype Channeltype		Address	
Active CPUT Spectal corr	nponent	[011]:00:011	
Name SpectComp #011	Ur	it	
Longtext Spectral Compon	ent #011		
operties Options Spectral cor	mponent Re	ference PLC	
	12		
Source FFT/Spectra:			
[000] None	▼]		
Watched frequency (Hz):	6 G.		
🍥 constant 🔘 variable	100,000		
4			
Cbserved lines	Charact	eristic computation	
©1	💿 Sum		
	Sum	5 	
07	C Sau	are means	
© 9	C oqu	io modito	
🖊 OK 🛛 🗶 Cancel   🔺 I	Previous	Vext Copy Inse	rt He



# 34X-Message

With an X-Message channel you can link channels from one Message device to another Message device. To configure the X-Message channel the IP address of the other Message device and the channel ID are required. The Channel-ID can be seen on the channel configuration dialog.

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Active	CPU	CPUT X-Message					[207]:00:207						
1	ame	XM:	5G 1			<u>U</u> nit	Î			11			
Lon	igtext	Cros	ssMessa	ge #2	207					-67			
operties	Optic	ons	X-Mess	age	Refer	ence	PLC						
Device (	IP):	Man	ual					-	192	168.2	51.121		
Channel	(ID): I	Man	ual					•	033				
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Channelconfiguration							x
Moduletype Ch	nanneltype		Address				
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Longtext Temp	input for other demon	istratio	ons				
Properties Options S	ensorcompensation	Con	nection	Reference	PLC		
Sensor <u>t</u> ype	Mo <u>d</u> e	M <u>e</u> a	asuring R	lange Senso	or		
Fe-CuNi (J) 🛛 🔻	bipolar 👻	-21	0.0120	0.0 °C	•	°C	•
	<u>G</u> raf. Scale						
Min	0						
Мах	100						