Datalogger DLU (E)

Instructions for Use

9.1711.10.0x0

At start of software version V7.06

Doc. No. 021821/06/22

THE WORLD OF WEATHER DATA

Safety Instructions

- Before operating with or at the device/product, read through the operating instructions.
  This manual contains instructions which should be followed on mounting, start-up, and operation.
  A non-observance might cause:
  - failure of important functions
  - endangerment of persons by electrical or mechanical effect
  - damage to objects
- Mounting, electrical connection and wiring of the device/product must be carried out only by a qualified technician who is familiar with and observes the engineering regulations, provisions and standards applicable in each case.
- Repairs and maintenance may only be carried out by trained staff or **Adolf Thies GmbH & Co. KG**. Only components and spare parts supplied and/or recommended by **Adolf Thies GmbH & Co. KG** should be used for repairs.
- Electrical devices/products must be mounted and wired only in a voltage-free state.
- **Adolf Thies GmbH & Co KG** guarantees proper functioning of the device/products provided that no modifications have been made to the mechanics, electronics or software, and that the following points are observed:
- All information, warnings and instructions for use included in these operating instructions must be taken into account and observed as this is essential to ensure trouble-free operation and a safe condition of the measuring system / device / product.
- The device / product is designed for a specific application as described in these operating instructions.
- The device / product should be operated with the accessories and consumables supplied and/or recommended by **Adolf Thies GmbH & Co KG** .
- Recommendation: As it is possible that each measuring system / device / product may, under certain conditions, and in rare cases, may also output erroneous measuring values, it is recommended using redundant systems with plausibility checks for **security-relevant applications**.

Environment

- As a longstanding manufacturer of sensors Adolf Thies GmbH & Co KG is committed to the objectives of environmental protection and is therefore willing to take back all supplied products governed by the provisions of "*ElektroG*" (German Electrical and Electronic Equipment Act) and to perform environmentally compatible disposal and recycling. We are prepared to take back all Thies products concerned free of charge if returned to Thies by our customers carriage-paid.

- Make sure you retain packaging for storage or transport of products. Should packaging however no longer be required, please arrange for recycling as the packaging materials are designed to be recycled.

Documentation

- © Copyright **Adolf Thies GmbH & Co KG**, Göttingen / Germany
- Although these operating instructions have been drawn up with due care, **Adolf Thies GmbH & Co KG** can accept no liability whatsoever for any technical and typographical errors or omissions in this document that might remain.
- We can accept no liability whatsoever for any losses arising from the information contained in this document.
- Subject to modification in terms of content.
- The device / product should not be passed on without the/these operating instructions.

Table of Contents

The tables list and list of figures can be found in the appendix.

1 Device Design

Designation	Order No.	Equipment
Data logger DLU	9.1711.10.000	
Data logger DLU-E	9.1711.10.010	With ethernet module
Data logger DLU-E	9.1711.10.x1x	With ethernet module - Customized configuration

Table 1: Device design

Equipment: Data logger DLU (9.1711.10.000) and Data logger DLU E (9.1711.10.x1x)

- **Data logger DLU** in the plastic housing for carrier rail mounting.
- Selectable voltage supply.
- 2.4” colour LCD (320 x 240 pixel).
- Possible to display and adjust the adjustable parameters in the display through touch operation or via the interfaces USB, COM1, COM2 and Ethernet.
- 2 x counter inputs e.g., for precipitation sensors or anemometer with frequency output
- 2 x interfaces for the connection of Thies serial synchronous sensors.
- 1 x Pt100 input for temperature acquisition (configurable measuring current).
- 1 x input 0 … 1V for the connection of a rel. humidity sensor.
- 3 x analogue inputs for current and voltage (±10V, ±20mA), freely configurable.
- 2 x potential-free switch outputs.
- 2 x freely configurable RS485 interfaces (half-duplex / full-duplex) with the following functionality:
  Connection of sensors with THIES or Modbus interpreter
  or
  output of a data telegram
  or
  command interpreter (for commands, configuration and data output).
- 2 x USB interface
- 1 x SD card slot for data output / data transport and FW update.

Equipment: Data logger DLU E (9.1711.10.x1x)

- Network interface for commands, data output and configuration and web presentation.

Scope of supply:

1 x Instruction for use data logger DLU 9.1711.00.000
1 x Description Data logger First Steps - enclosed in the package
1 x Description Thies Cumulus CLOUD + APP First Steps - enclosed in the package
1 x Wiring diagram (order-related connection diagram: Data logger, Measuring transducer etc.)

The instructions for use of the DLU are available for download under the following link:

https://www.thiesclima.com/db/dnl/9.1711.10.0x0_Data logger-DLU_eng.pdf

2 Application / setup of the Data loggers

You have the option of operating the DLU E data logger in different ways. The following illustration is intended to provide an overview.

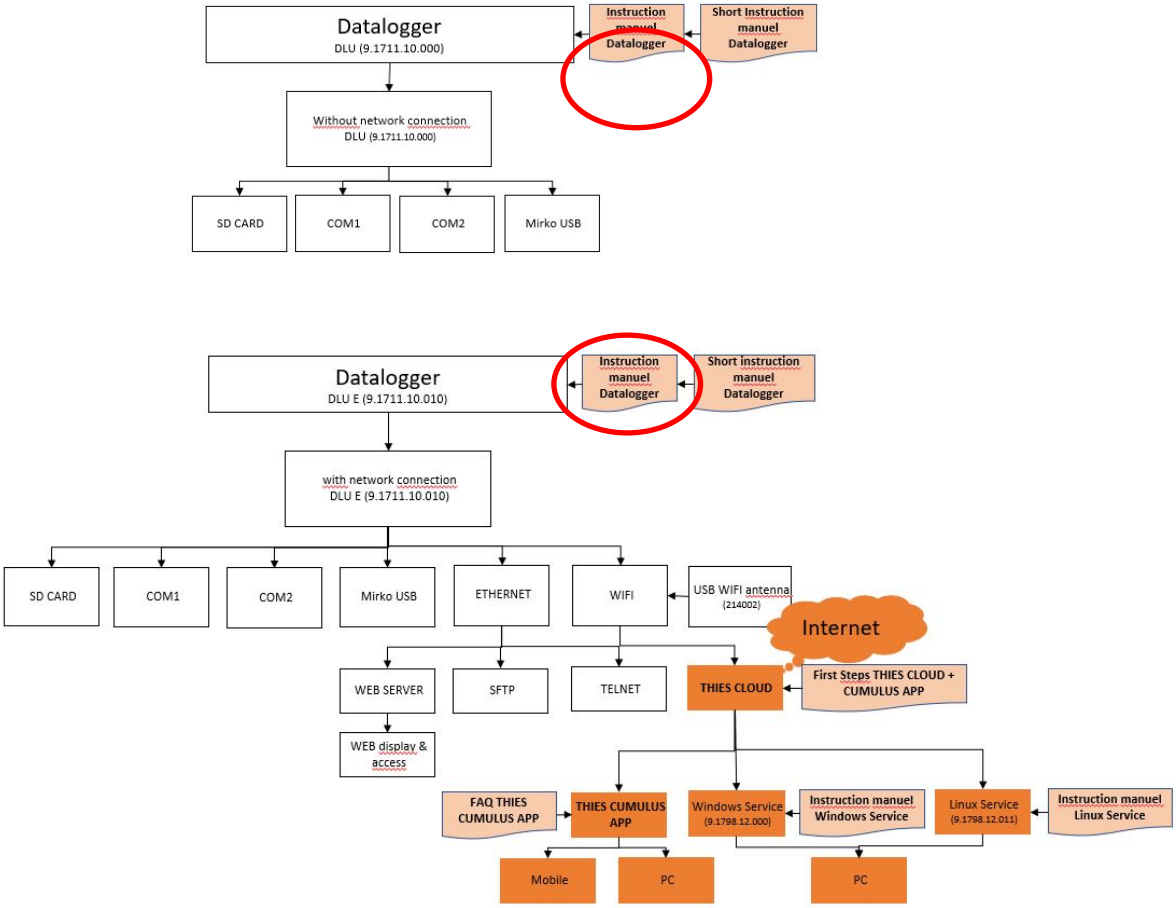

Figure 1: Application options

The Data logger DLU is a complete measurement system for the acquisition, processing and saving of the measurement data from a wide variety of sensors, like e.g.

- Precipitation sensors with pulse outputs.
- Sensors with measuring resistance (e.g. Pt100 temperature sensor).
- Analogue humidity sensors (±2.4V).
- Analogue sensors (±10V or ±20mA).
- Serial sensors (e.g., combi sensors with serial interface).

The following interfaces are used for commands and data output:

- Micro USB (see **Figure 1,** marking ①).
- Ethernet (see **Figure 1,** marking ③).
- COM1 (dependent on the configuration).
- COM2 (dependent on the configuration).

The output of the data can also take place via a memory card (SD card).

- USB (see **Figure 1**, marking ④) is used for the accessory USB WLAN antenna.

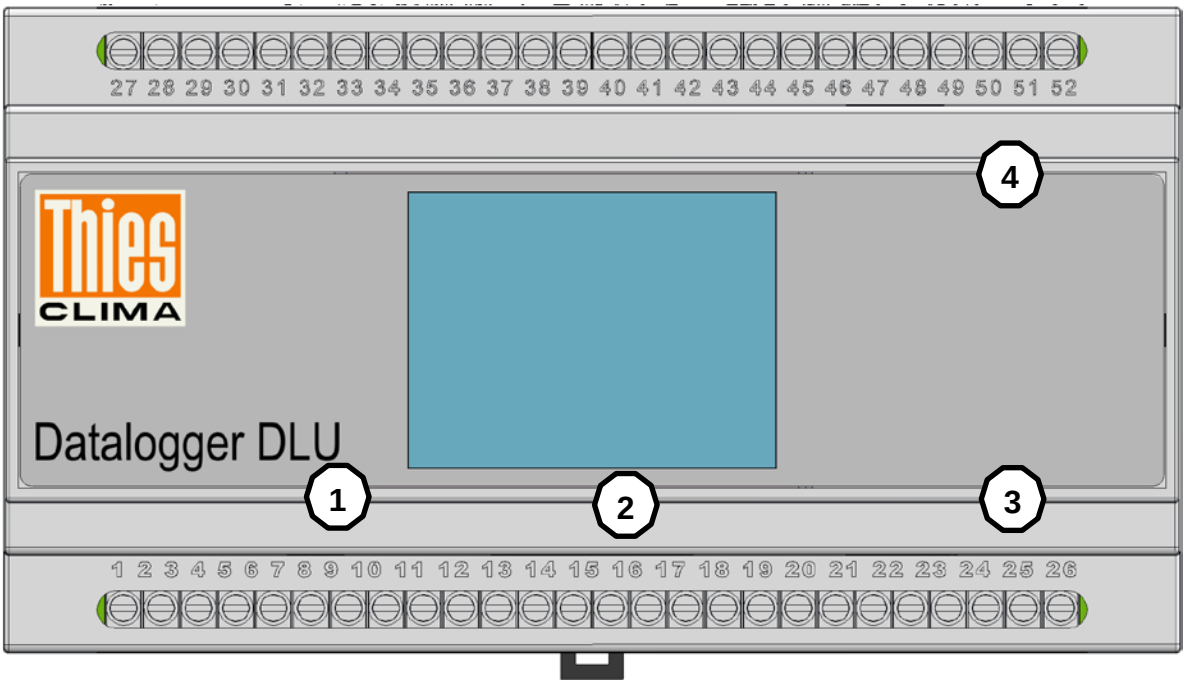

Figure 2: Layout plan of the connections

The points 1 to 4 mark the positions of the input/output interfaces in the housing:

① Slave micro USB connection (USB 2.0 micro B jack)

② SD card slot

③ Network connection (RJ45 jack)

④ Master USB connection (USB 2.0 type A jack)

Following table shows the allocation of the connection terminals of the Data logger:

Terminal	Signal	
1	Supply 24Vac/dc	
2		
3	+	12V accumulator
4	-	
5	+	12V solar
6	-	
7	12V	Sensor supply
8	GND	
9	A	PT100
10	a	
11	e	
12	E	
13	+	0-1V humidity
14	-	
15	Supply +	Analogue IN1
16	IN+	
17	IN-	
18	Supply -	
19	Supply +	Analogue IN2
20	IN+	
21	IN-	
22	Supply -	
23	Supply +	Analogue IN3
24	IN+	
25	IN-	
26	Supply -	
27	GND / AGND	
28	THIES serial 2	CLK (clock)
29		DI (data)
30	THIES serial 1	CLK (clock)
31		DI (data)
32	12V supply (switchable)	+
33		-
34	COM2	RX+
35		RX-
36		TX+
37		TX-
38		GND-COM2
39	COM1	RX+
40		RX-
41		TX+
42		TX-
43		GND-COM1
44	Digital OUT2	+/-
45		+/-
46	Digital OUT1	+/-
47		+/-
48	Digital IN2	+
49		-
50	Digital IN1	+
51		-
52	Earth	

Table 2: terminal allocation

The installation of this rail-mounted device (9 HP, horizontal pitches) is envisaged in distributor systems with common 35mm mounting rails (DIN rail) and covers with a 45mm cut-out measurements. The wiring is connected via jack terminals in the lower and upper device section (see Fehler! Verweisquelle konnte nicht gefunden werden.).

The Data logger is powered by an external 12V accumulator and can therefore work independently from the mains. The accumulator is not part of the scope of supply.

It is also possible to power the logger with 24V AC/DC by means of a mains adapter.

A solar panel can be connected via separate terminals.

An integrated power management, fed by the solar input or the input for 24V AC/DC, charges the external 12V accumulator.

When the accumulator is disconnected, the clock is buffered by several hours with a buffer capacitor.

Operation is guaranteed in a wide temperature range from -20° to 70°C.

The device can be simply operated by means of touch control directly on the display or via the interfaces micro USB, Ethernet, COM1 and COM2. A colour LCD with 320 x 240 pixels acts as a display.

The scanning of the measured values is configurable in the range from one second to 60 minutes. Pulses and frequencies are measured continuously.

The data is saved with time and date in accordance with the configured memory cycle (1s to 60 minutes) in a non-volatile Flash data store (64MB) (i.e. the data is retained even without supply). The data store is designed as a so-called ring memory. Once the ring memory is full, the oldest data set is always the next to be overwritten.

For the checking of the sensors or the measurement inputs, the Data logger can be switched into the maintenance mode. In this mode, the sensor measured values do not go into the memory. I.e. values determined during the maintenance mode are shown in the display as usual, but are not taken into account for the calculation of memory values.

The data and/or measured values can be read out with the optional PC programme “Mevis”.

Note

The following DLL versions are necessary for the compatibility with the PC programme “Mevis”:

DL16 Archive Reader DLL Version V1.17.0.0

DL16 FTP DLL Version V5.29.0.0

Note

The data logger can record a maximum of 100 measured values (channels)! Variables derived from a measured value are also channels.

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3 Installation

Attention
The device must only be installed and wired by qualified skilled personnel. The generally valid codes of practice and the respectively valid regulations and standards are to be adhered to.

3.1 Recommendation for Site Selection

The device is designed for installation indoors. In the case of outdoor use, an additional enclosure with an appropriate protection class is necessary.

Note
Please consider the temperature area of application and protection class when choosing the site

3.2 Mechanical Installation

The Data logger is designed for snap-on installation onto a normal 35mm mounting rail (Hut-, TS35). The mounting rail must be at least as long as the housing width (157mm, 9TE).

Sequence:

- Install a 35mm mounting rail with a length of at least 9HP (157mm) at the installation location.
- Place the data logger DLU on the mounting rail that the top edge of the rail grips into the corresponding groove of the data logger DLU.
- Insert a screwdriver (blade width <4mm) into the slot of the clip and pull the clip downward. The slot is located in the middle of the bottom edge of the housing.
- Press the Data logger DLU completely onto the mounting rail.
- Let go of the clip. The clip snaps in place behind the mounting rail.
- Check whether the housing is firmly fitted onto the rail, by light shaking.

3.3 Electrical Installation

3.3.1 Wiring

In order to build a low-noise (i.e. EMC-compliant) measurement system, the data and measuring lines must be shielded. Thorough earthing of the shielding is to be ensured. Depending on local conditions, a distinction is to be made between:

- **Metal housing**:
  Shields of the lines contact directly to EMC cable glands.
- **Plastic housing or no housing**:
  Produce shield connections via suitable rails or metallic installation plate with appropriate clamps/adhesive bands (see Fehler! Verweisquelle konnte nicht gefunden werden.). The clamps must ensure large-area contact to the cable shield.

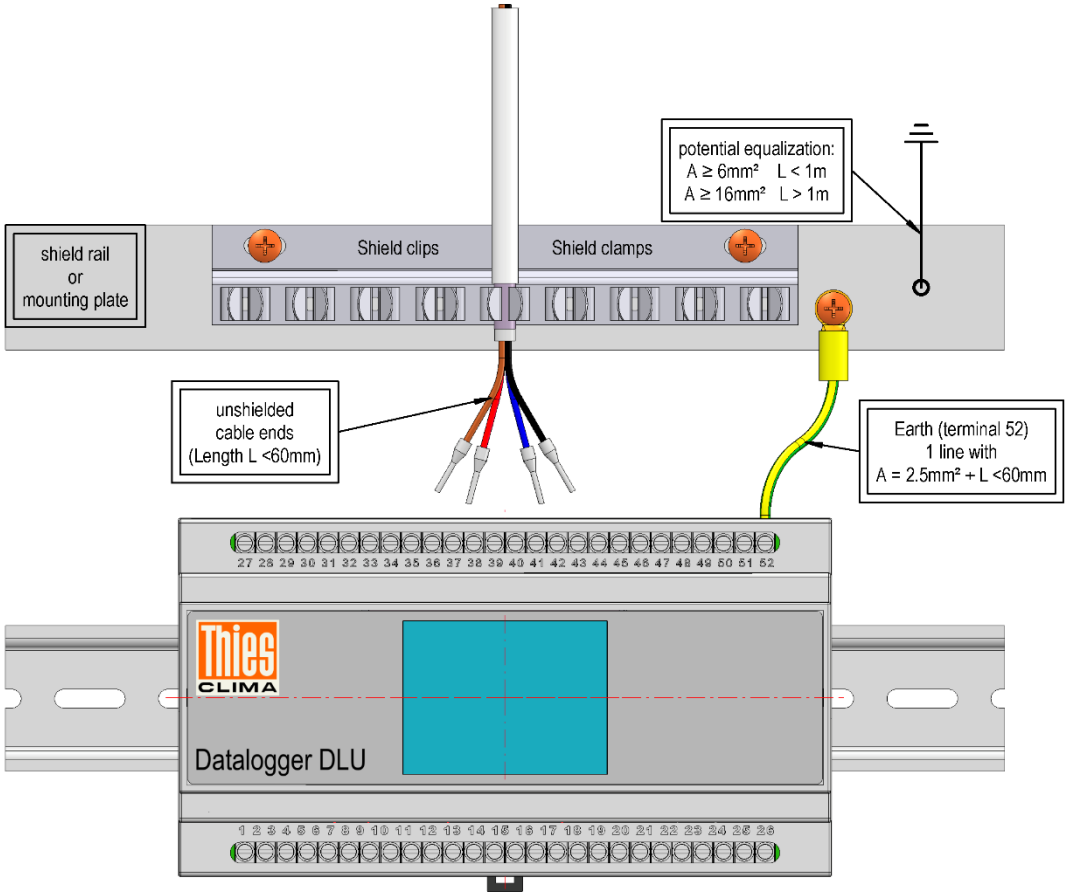


Figure 3: Example of the earthing of the device

The functional earth of the Data logger DLU (terminal 52) is to be connected with a 2.5mm² cable (L <6cm) to an earthed shield rail or mounting rail.

For potential equalisation we recommend the use of the shortest possible cable (≤1m) with a cross-section of at least 6mm² between metal housing and/or shield rail or mounting plate and the protective earth (earthing strip or site equipotential rail).

Attention:
A voltage reversal of the connection lines can lead to the destruction of the device.

Lightning protection measures:

Especially when the device is used outdoors, the installation of additional protective elements (surge arrestor, such as e.g. varistors) and additional network filters (for the 230V network) is to be recommended.

3.3.2 Accumulator

When utilising the 24VAC supply input, we additionally recommend the use of an optional accumulator (please see accessories). Ensure the following polarity when connecting (**red** = **+**, **black** = **-**)!

Replacement or charging is necessary, at the latest, if the displayed voltage sinks below 9.0V. However, discharge of the accumulator under 11.0V should be avoided, because no significant capacity is present any more. The service life of the accumulator is substantially shortened by operation under 10.5V! The new accumulator should be “freshly” charged again before installation, because by self-discharging (approx. 3% per month) it is possible that it may no longer have its maximum capacity. The saved data is retained during changing. The internal clock time is buffered for several hours. Before the accumulator is disconnected, the data should be backed up. After connection, the Data logger starts the boot loader, which starts the normal firmware after approx. 10 seconds.

Notes:
When changing the accumulator when the mains supply is switched on, it is to be ensured that the red cable does not come into contact with the housing parts (short-circuit).

During installation it is to be ensured that all connections are switched to voltage-free and that people and/or devices are not endangered!

3.3.3 Solar Panel

Electrical Connection:

The connection of the optional 12V solar panels is to be carried out in accordance with the wiring diagram (see **chapter 13**). We recommend that the solar panel be earthed to protect it against excess voltages. The integrated 12V solar controller carries out temperature-guided control for optimal charging of the accumulator. Because of the temperature control the accumulator should always be close to the Data logger.

Alignment:

- Direction: the solar panel is always to aligned to the highest solar altitude (south in the northern hemisphere and vice versa) in order to receive optimal power. Use a compass if necessary.
- Angle: the optimal angle of inclination (see Fehler! Verweisquelle konnte nicht gefunden werden.) is dependent on the latitude of the site. If the Data logger is to be used throughout the year, we recommend an angle of inclination for optimal performance in winter:

  Angle of inclination = latitude + 15°

  (Note: does not apply to Arctic regions because of maximum angle of inclination of 90°)

  Example for Berlin: latitude 50.3° → angle of inclination = 50.3° + 15° = 65.3°

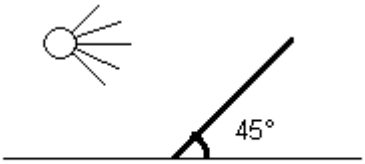


Figure 4: Angle of inclination for solar panel (here 45°)

Note:
A partial shadow caused by the structure or site, e.g. due to sensors or traverses attached above the solar panel, must always be avoided.

Maintenance:

- Dust, snow, leaves etc. on the solar panel reduce the amount of light and the energy yield deteriorates. For this reason, the solar panel surface should be cleaned if necessary.

3.3.4 Potential-free Switch Outputs

The Data logger possesses 2 potential-free switch outputs that can be switched dependent on the configuration.

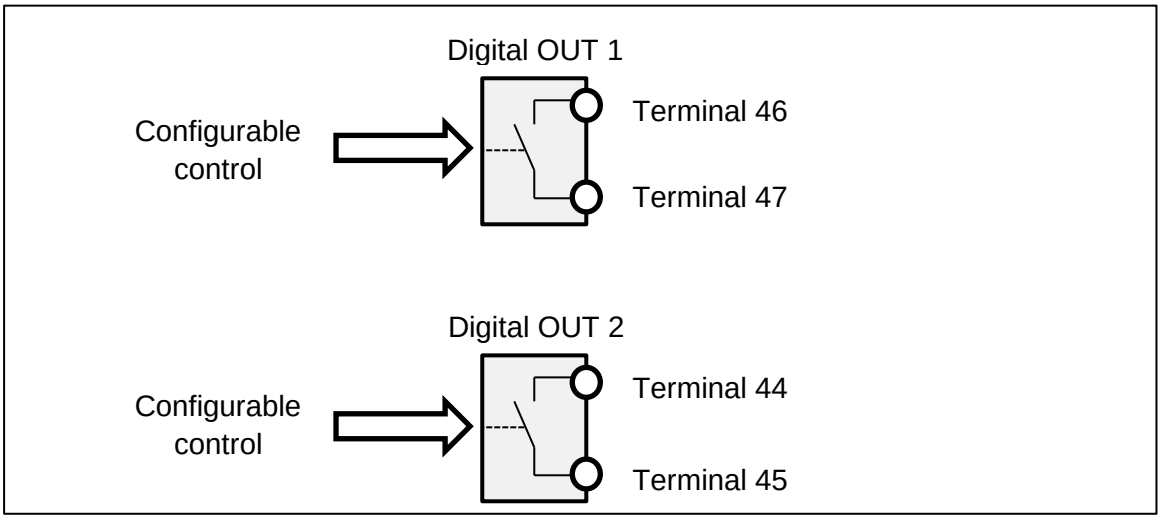


Figure 5: Potential-free switch outputs

The switch outputs are equipped with a current limit of approx. 100mA and can switch voltages up to 42VAC/DC.

3.3.5 RS485 Interfaces (COM1 / COM2)

The Data logger possesses 2 full/half-duplex-capable RS485 interfaces that are controlled independently from the configuration.

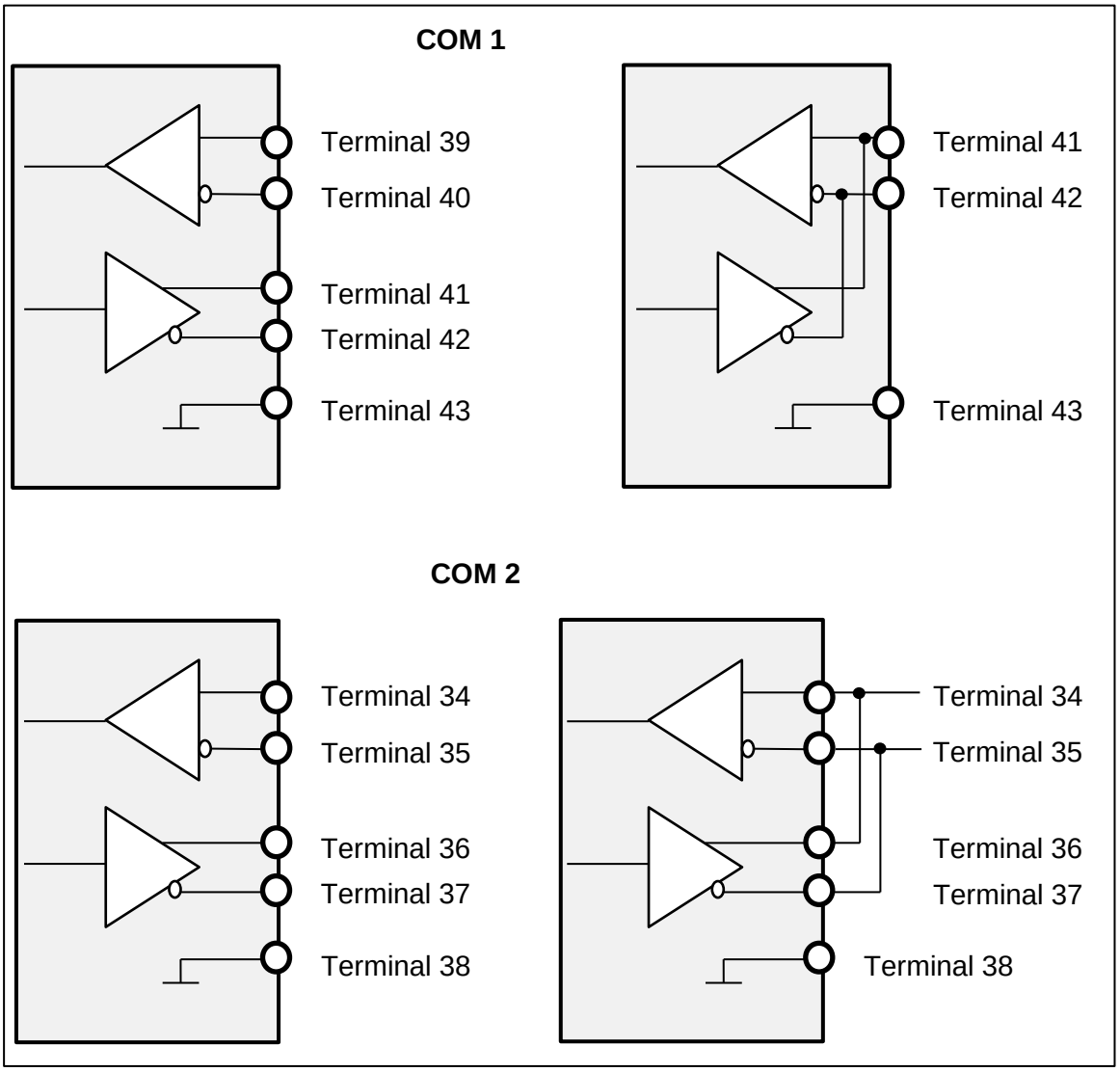


Figure 6: COM1 / COM2 (full/half-duplex)

Note

In the half-duplex operation of the interface COM2, 2 jumpers must be provided externally (34-36, 35-37).

The interface COM1 is galvanically separated from the Data logger voltage supply.

3.3.6 Measuring Transducer Supply

The Data logger possesses various outputs for the supplying of connected measuring transducers that are controlled dependently on the configuration.

Terminal	Signal
7	12V
8	GND
15	3.3V or 5V or 12V
18	GND
19	3,3V or 5V or 12V
22	GND
23	3,3V or 5V or 12V
26	GND
32	12V
33	GND

Table 3: Measuring transducer supply

For the permissible load on the supplies, see technical data.

Note:
The configurable supply voltages are electronically protected against overloading (short circuit) and overtemperature.

4 Operation

When the accumulator is connected, the Data logger automatically starts the so-called bootloader (for the loading of new firmware) and re-initialises itself. The boot loader waits 10 seconds and then starts the current firmware automatically. After the first switching on, the time and date on the display should be checked.

```
Bootloader  V02.02
Wait time:  10s
```

The colour graphic display (320 x 240 pixel, 24Bit RGB) possesses a resistive touch surface via which the entire operation of the Data logger is performed.

All actions are carried out via touch events (pressing) on the symbols shows in the display. The following table shows the available symbols (keys).

Symbol (Button)	Meaning
	Shut down / reset of the Data logger
	Page back
	Page forward
	Activating selection/editing mode
	Push cursor position left
	Shift cursor position to the right
	Increment value at cursor position
	Decrement value at cursor position
	End selecting/editing mode
Ok	End editing mode
	End selection/editing mode without saving
	Delete characters at the cursor (only when editing character strings)

Table 4: Symbols (keys) in the display

4.1 Display Options

The Data logger shows all measured values and parameters in accordance with the configuration on different pages (dialogue pages). In the 1st line, every dialogue page shows the current page number and the total number of pages.

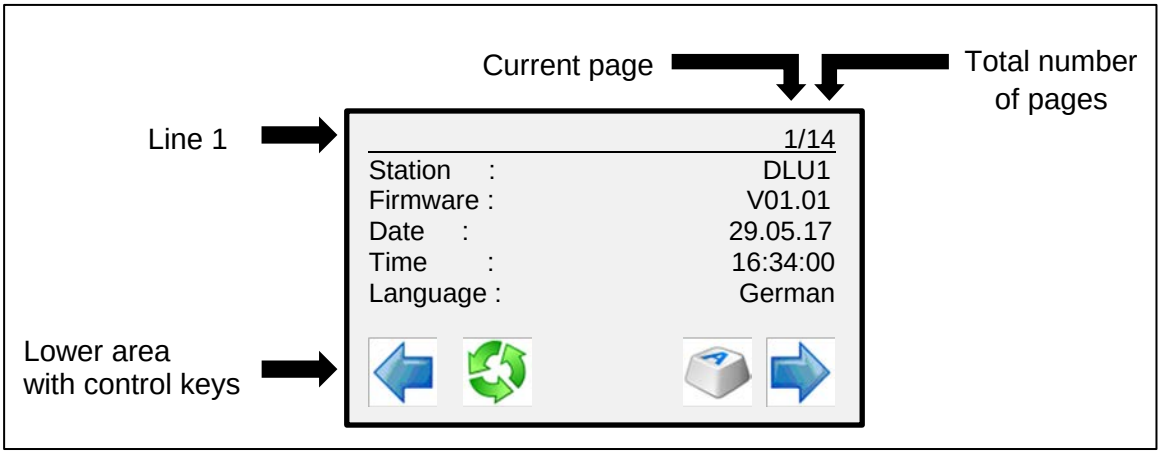


Figure 7: Dialogue page 1

The keys for flicking forwards and backwards are located in the lower part of each dialogue page. Additional control keys are displayed dependent on the dialogue page and/or configuration.

The meanings of the keys are shown in Fehler! Verweisquelle konnte nicht gefunden werden..

4.2 Adjusting Parameters

All dialogue pages that show the button

contain changeable parameters. If the valid password has already been set, pressing the key leads to a change in the “selection mode”, otherwise the password dialogue is displayed.

4.2.1 Password Dialogue

Before the “selection mode” can be activated, the corresponding password must be set. The following figure shows the password dialogue.

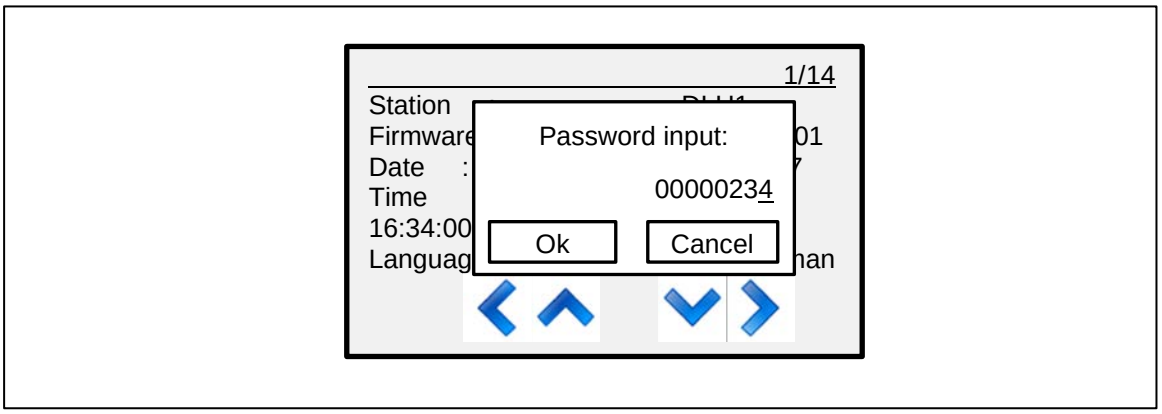


Figure 8: Password dialogue

The password is input with the 4 keys below the input field (“<”, “^”, “v”, “>”) and must be confirmed by pressing the “Ok” button.

Entering an incorrect password will result in the following message being displayed.

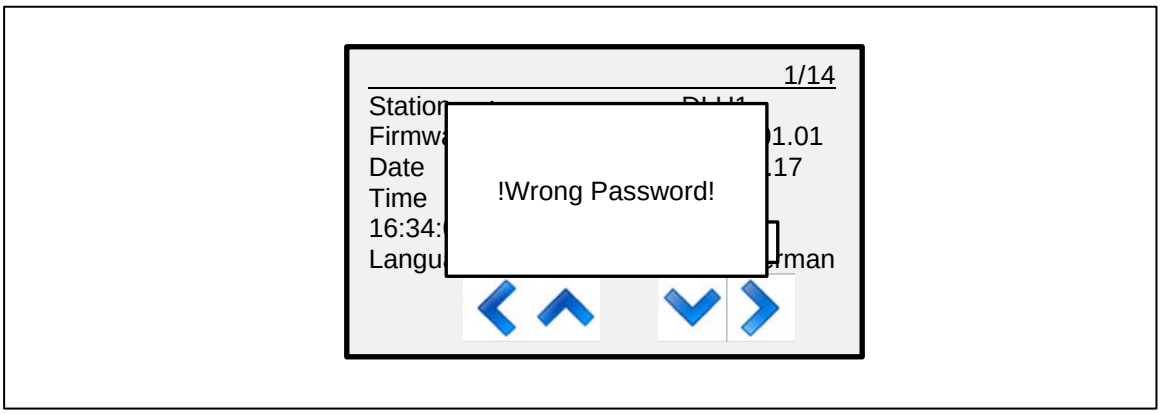


Figure 9: Wrong password dialogue

After approx. 4s the displayed message disappears and the "Password dialog" mode is exited.

4.2.2 Selection Mode

The following figure shows the selection mode for the 1st dialogue page.

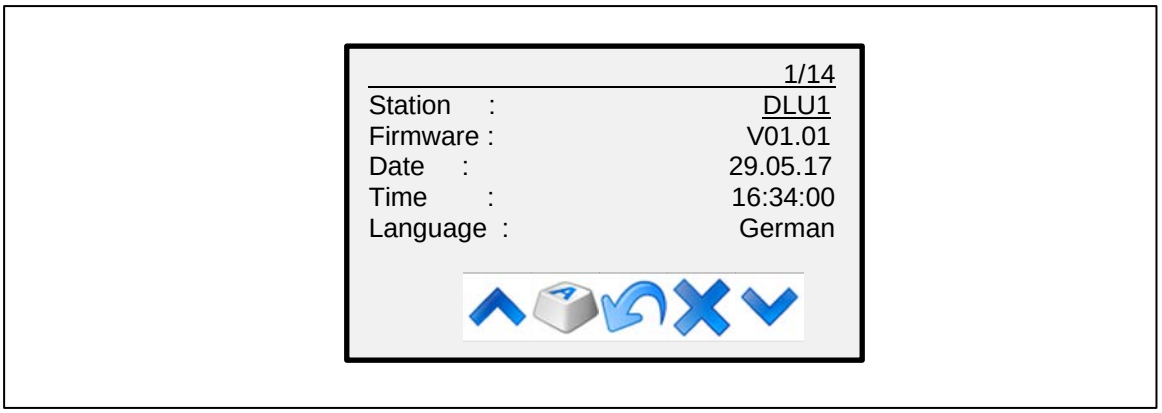


Figure 10: Selection mode

In the selection mode, one can move between the editable entries by pressing the keys

Pressing one of the keys

takes one out of the selection/editing mode. If the changes carried out are not saved, then the key “X” must be pressed.

Renewed pressing of the key “A” causes a switch into the editing mode for the selected entry.

4.2.3 Editing Mode

The following figure shows the editing mode for the entry “Station” on the 1st dialogue page.

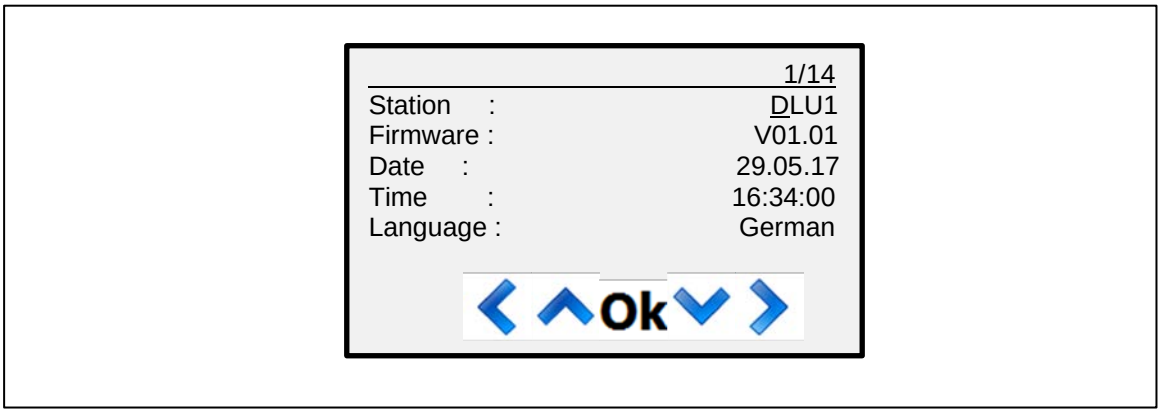


Figure 11: Edit mode

In the editing mode, the content for the current cursor position can be changed by pressing the keys

for numerical values, this increments / decrements the selected position and for texts it moves forwards / backwards through a list with the available ASCII characters.

The cursor can be pushed to the left and/or right by pressing the keys

To leave the editing mode and change to the selection mode press the key “OK”.

Each time the cursor is moved, the key for deleting the character at the current cursor position (⊗) appears for approx. 3 seconds instead of the "OK" key.

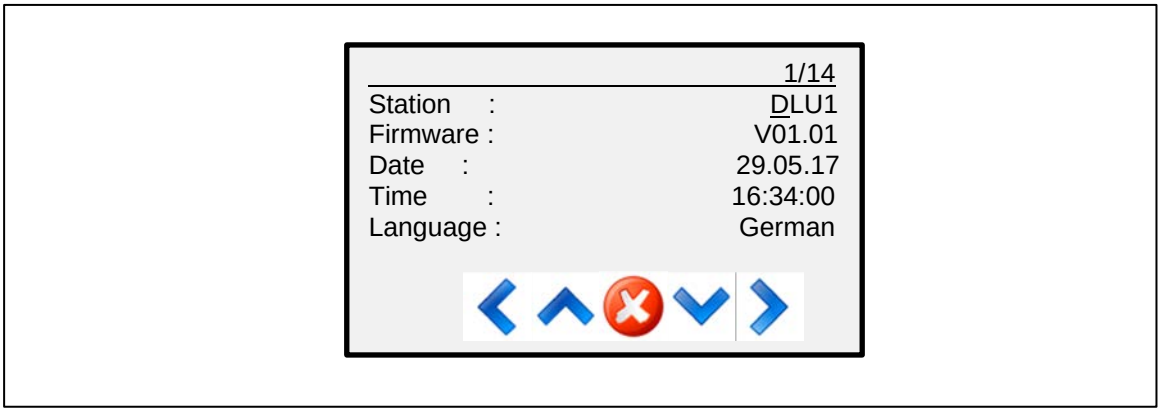


Figure 12: Edit mode (delete character at cursor position)

By pressing the "OK" button, you leave the editing mode and switch back to the selection mode.

4.3 Switch off Data Logger

If the Data logger comprises the option with network interface, it is not permitted to switch off the supply abruptly. In this case, the Data logger must be shut down by the **Command RS** or pressing the key “Reset” on the 1st dialogue page.

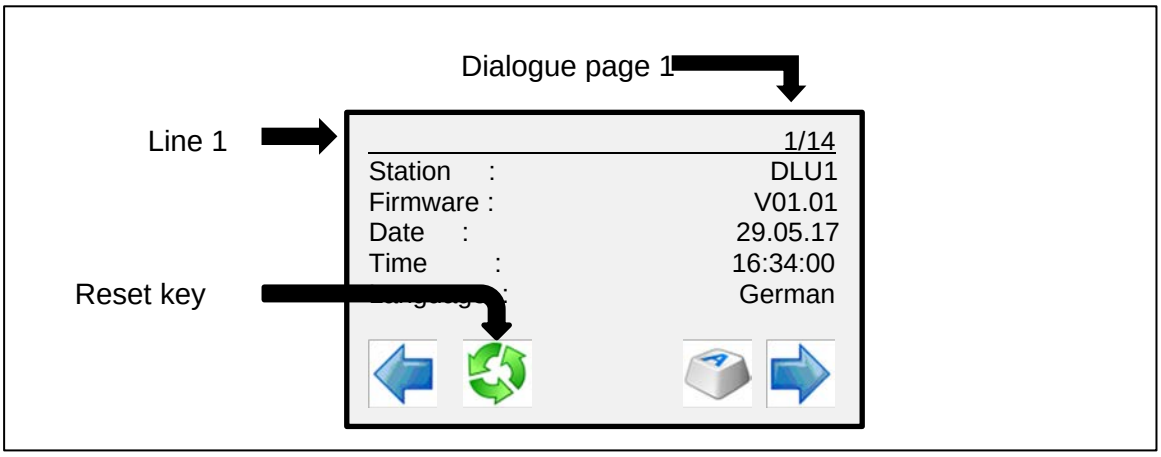


Figure 13: Reset key

After pressing the key “Reset”, the LINUX system in the Data logger is shut down. This is displayed with the information box “Shutdown DLU”.

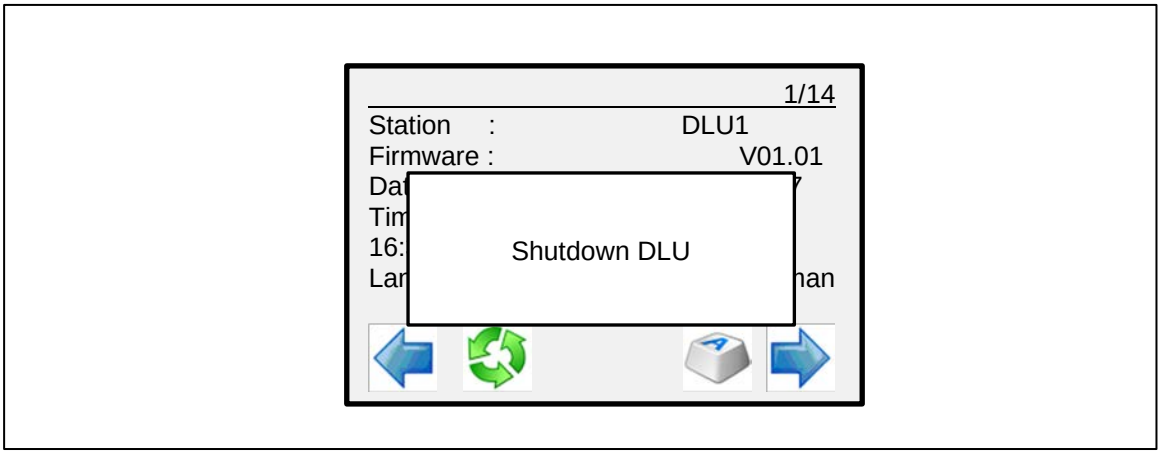


Figure 14: Information box "Shutdown DLU

The shutting down lasts approx. 15s, then a dialogue appears with the possibility of carrying out a restart of the Data logger. In this state, the Data logger can be separated from the supply.

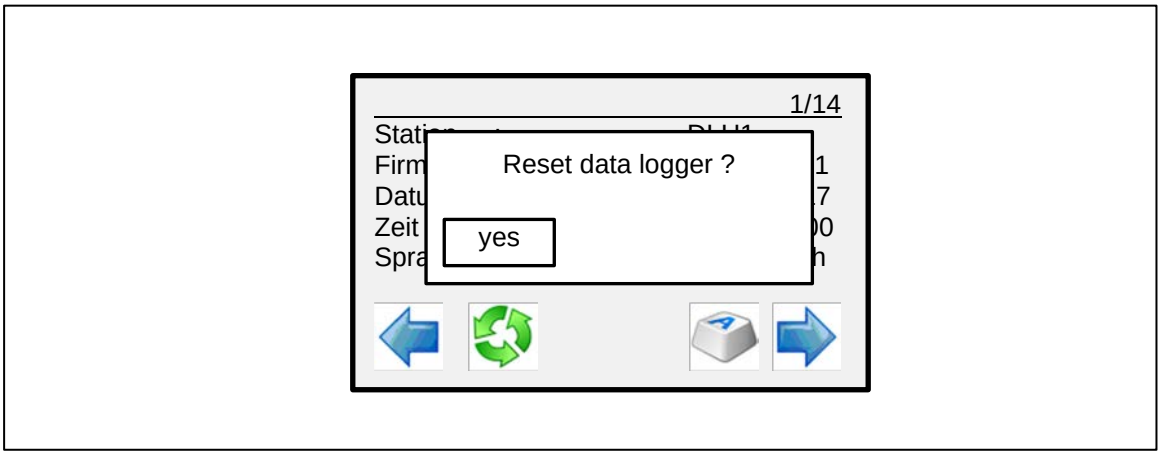


Figure 15: Dialogue “Reset yes”

Pressing the key “yes” carries out a restart of the Data logger.

Attention:

Switching off the supply without shutting down the Data logger can lead to damage and failure of the network interface!

4.4 Loading Configurations from SD Card

If an SD card in the Data logger and contains a configuration file, the "Import" button is displayed on the "SD card" dialog page. The configuration file must have the name "Config.cfg" and be in the root directory of the SD card.

Note:
The dialog page "SD-Card" is always the last page.

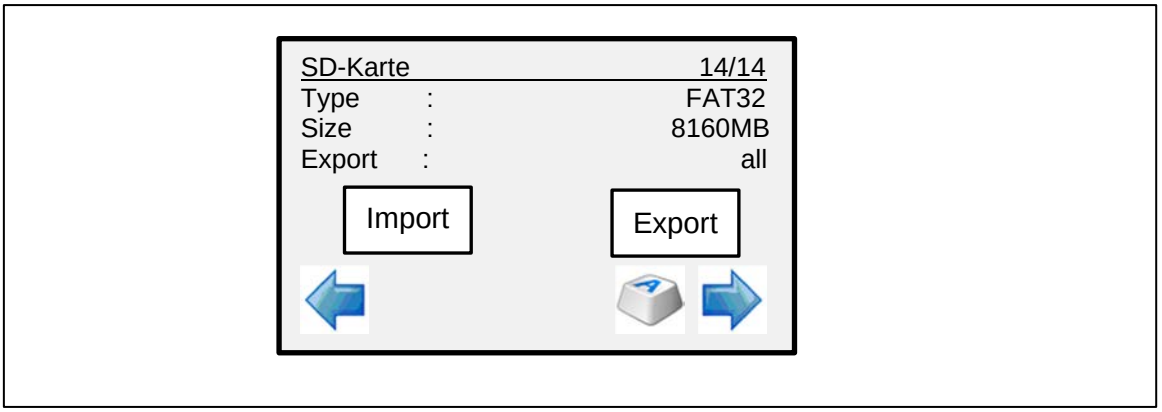


Figure 16: Dialog page „SD card”

After pushing the “Import” button, the following dialog will be displayed.

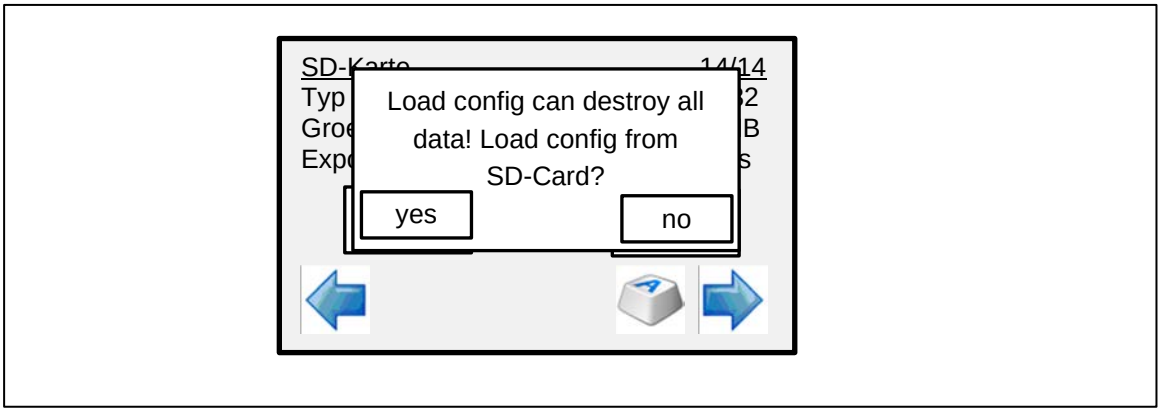


Figure 17: Dialog page "SD-card" with dialog for loading the configuration

Confirming the dialog with "yes" button, the configuration will load from the SD card and then reinitialize the Data logger.

Attention:

Loading the configuration can lead to the loss of all measured values in the Data logger! In order to avoid a possible loss of data, an export should be carried out before loading the configuration (see chapter 6 Data output).

4.5 Timeslot

The data logger supports the configuration of 4 time slices (time slots). A time slice specifies the period of time in which one of the following functions is active:

- Switching contact 1 active/closed (Output: 1)
- Switching contact 2 active/closed (Output: 2)
- 12V supply active at terminals 32/33 (Output: 3)
- no function (Output: 0)

Each time slice is defined by a start and an end time, as well as the linked function (output). If the times are identical, then the relevant time slice is deactivated.

The data logger DLU checks the condition for each time slice in the measurement cycle. A condition is met if the current time during the test is within the time slice period.

Depending on the configuration, the settings for the time slices can be shown and changed on the data logger display.

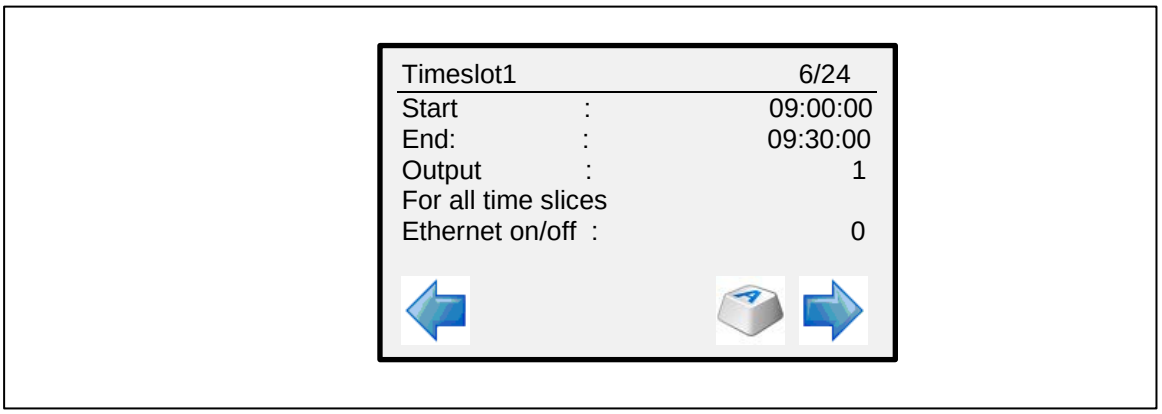


Figure 18: Dialog with settings for time slice 1

The “Ethernet on/off” option enables the network interface to be controlled (switched on/off) depending on the time slices.

Note:

The "Ethernet on/off" option is only available for the data logger DLU E.

Note:

If the "Ethernet on/off" option is set to "1", the network interface is activated for the first 15 minutes after the start of the data logger and then depending on the 4 time slices.

If the "Ethernet on/off" option is set to "0", the network interface is permanently active.

4.6 Network Module (Data logger DLU E 9.1711.10.x1x)

4.6.1 General

The data logger DLU E 9.1711.10.x1x is equipped with an ethernet module.

The module offers the following options:

1. Simultaneous access by several users to the DLU via Ethernet via user logins
2. Access via Telnet, SFTP und WEB
3. Use all commands chapter 7.2 via Telnet
4. Time synchronisation via NTP with UTC or Time zones
5. Creation of several user logins via WEB
6. Optionally usable with a WiFi connection

The WEB pages including the WiFi configuration are described in chapter 9 WEB Server.

Attention:

The network module cannot be retrofitted!

4.6.2 Installation requirements

The customer's communication technology must allow the DLU access to the following URLs / addresses / ports and clarify whether the local network supports DHCP or not in order to ensure smooth commissioning and use:

- http://deb.debian.org/
- http://repos.rcn-ee.com/
- https://www.thiescloud.com
  Port 443
- Sending ping on www.thiescloud.com must be allowed
  Access to NTP time synchronization must be allowed,
  address: de.pool.ntp.org or at.pool.ntp.org at Port 123

If DHCP is supported, the IP address is automatically assigned to the data logger. DHCP is the standard setting of the data logger. You can find out from your administrator whether your local network supports the DHCP service.

Note:

The data logger DLU E should not be operated in parallel with Ethernet and WIFI, this can lead to communication problems.

4.6.3 Set up Network Access

To set up the LAN interface, the DLU must be connected to the local network and started using a LAN cable.

The DLU knows the following 3 LAN operation modes:

1. no LAN
2. LAN with dynamic IP- address assignment (DHCP-network)
3. LAN with static IP address assignment

Note:

Your network administrator can tell you whether you are using a DHCP network in your company.

At delivery, the DLU is preset for dynamic IP address assignment (DHCP). This operating mode is very easy for commissioning. For further operation it is recommended to switch the DLU to a static IP address. For commissioning please see chapter 4.5.2. You can get the static IP address from your network administrator.

Switching from dynamic to a static IP address and changing the IP address can be done in the following ways:

1. Set via the display of the DLU
2. Setting via micro USB, COM1, COM2 or Telnet with remote maintenance commands from chapter 7.2
3. Setting via WEB (see chapter 9.6)

Note:
If possible, the DLU should be operated with a static IP address.

Caution:

The data logger DLU only uses the IPv4 format for the IP address! That means, 4 numbers between 0 and 255, separated by a point e.g. 192.168.7.74.

Caution:

The data logger DLU must be restart after the IP settings, before the changes become active!

Note:
The DLU can only be addressed in the Ethernet with an IP address valid for the network.

4.6.3.1 Connecting with a dynamic IP address assignment

At delivery DHCP is active in the data logger DLU, i.e. the server assigns its network settings to the DLU (IP address, subnet mask, gateway). Most networks are set up in such a way that the IP address is assigned automatically via a DHCP service. Contact your network administrator for more information.

If your network supports DHCP, do the following:

- Set a physical connection to the network using a LAN cable.
- Start the DLU
- After starting the DLU, use the arrow buttons on the DLU display to go to the map for the IP settings and check the settings.

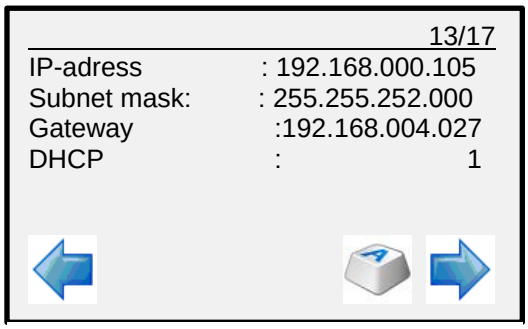


Figure 19: Map IP settings

- It is important that DHCP is set to one.
- Approx 3 minutes after starting, the DLU shows the new IP address that the DLU received from the DHCP server.
- After the automatic IP assignment, the connection can be tested (see Section 4.5.2).

- If the connection is successfully established, the setup with the dynamic IP address is complete.
- Überprüfen Sie die Verbindung, wie in Kapitel 4.6.4 beschrieben.

Note:
With dynamic IP address assignment, the IP address of the DLU changes regularly! Static IP address assignment is therefore recommended.

If you like to use a static IP, the steps in the following chapter must also be carried out.

4.6.3.2 Connecting with a static IP address assignment

If the network does not have a DHCP service or the IP address is to be set statically, you will need a static IP address, the subnet mask and optionally the gateway address from your network administrator.

When it is started for the first time, the logger does not yet have a valid IP address and can therefore only be set via the display, micro USB or optionally via COM. Does the DLU already have a valid IP address that should be changed e.g. through dynamic address assignment, the IP address can also be changed via Telnet or WEB. In the latter cases a LAN connection is necessary, in the other cases the IP address can also be preset without a network. The various types of access should then be tested, as described in Section 4.5.2.

Caution:

The IP parameters can only be edited and set when DHCP is inactive.

4.6.3.2.1 IP settings via display

To set the parameters, proceed as follows:

1. Start the DLU (LAN connection not required)
2. Use the arrow button select the IP Settings dialog.
3. Press the button
4. Enter the password **000234** using the cursor keys and cornfirm with **Ok**.
5. Press the button after that, the IP address is underlined.
6. Scroll using the cursor keys, up and down, up to **DHCP** is underlined (selected).
7. Press again the button to set the parameter for **DHCP**.
8. Using the cursor keys to set **DHCP** to **0** and **Ok**.
9. Scroll using the cursor keys up, set one after another **IP-Adresse**, the Subnet-mask and optional the Gateway with button and set them with the cusor keys. To finish the setting press the button **Ok**.
10. Exit the menu by pressing the button: . The values are saved.
11. To activate the settings, scroll back to the start menu and restart by pressing the button:

12. If the DLU is not yet connected to the network, create the LAN connection to the network and press **Restart Data logger?** and **Yes**.
13. The logger restarted and the network configuration is completed.
14. The connection can be tested in various ways. The various connection tests are described in chapter 4.5.2.

4.6.3.2.2 IP set via maintenance commands

The setting of the DHCP mode, the IP address, the gateway and the subnet mask can be done with remote maintenance commands via the serial interfaces and Telnet. For this purpose, a computer with a terminal program e.g. Tera Term are necessary.

The DLU has the following serial interfaces available:

1. Micro USB, can always be used for configuration.
2. USB is only available for WLAN connection.
3. COM1, function depends on the configuration (optional)
4. COM2, function depends on the configuration (optional)

Note:
Setting the IP address via Telnet and WEB is only possible if the DLU already has a valid IP address in the network, e.g. with dynamic IP assignment.

Depending on the delivery condition, only the micro USB interface can be used for configuration or COM1, COM2 and Telnet via Ethernet.

Note:
COM1 and COM2 can be configured as RS485 half or full duplex! Only a COM that is configured as a Mevis output in the combination circuit diagram can be used!

Note:
The user login is required to change the IP parameters via serial interfaces and Telnet.

To change the IP address, the following steps must be performed:

1. Establish a connection between a computer and the DLU and start the DLU. The connection can be made via the micro -USB connection to the computer. Optionally, COM1, COM2 (RS485 half or full duplex) or a Telnet connection (LAN) are possible, depending on the configuration.
2. The computer should automatically recognize the serial interface after a few seconds.
3. Start the terminal program and establish the connection to the logger. To do this, go to the Settings / Serial Port menu in the terminal program, select the COM, set the baud rate to 115200 baud for micro USB (COM1 & 2 may differ), 8 data bits, none parity and 1 stop bit. Close the window with OK. This enables communication with the

DLU via the serial interface without logging in. Settings for Telnet see picture below. The IP address of the DLU must be set for the server.

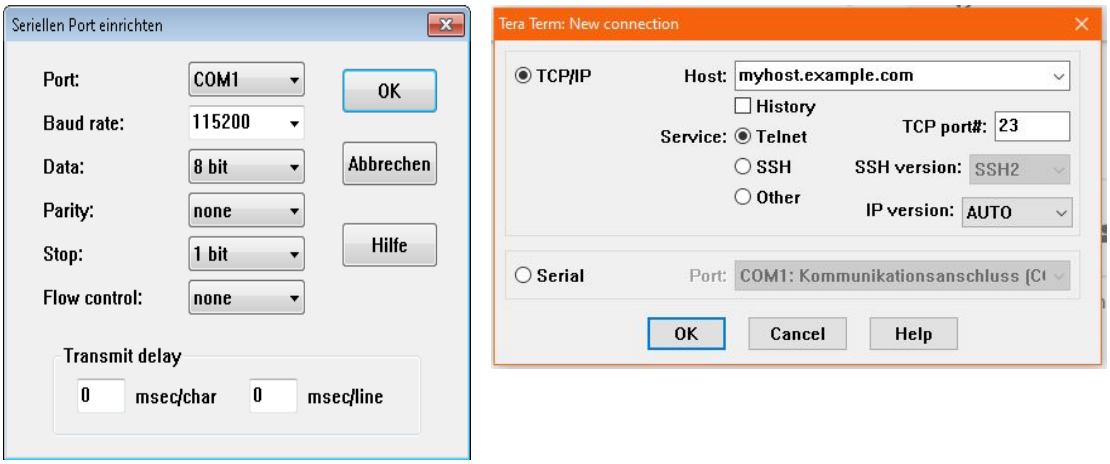


Figure 20: Sample TerTerm configuration for micro USB (left side) and Telnet (right side)

4. Go to the Terminal Settings configuration menu, activate local echo and also close the window with OK, than you can see your own input in the terminal.

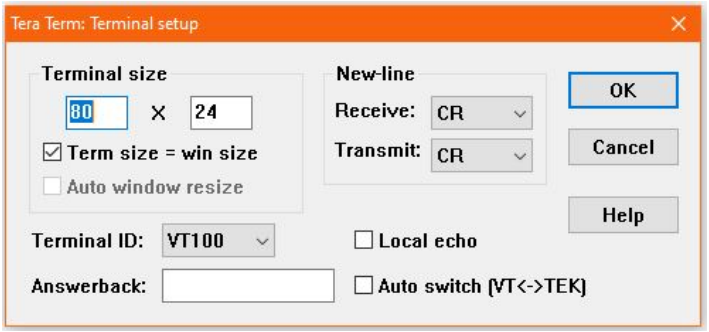


Figure 21: Local echo aktivate

5. Test the connection and check the ID, enter the command 99ID and send it with Enter. The Enter key must be pressed after each command to send the command. This is not mentioned further below.

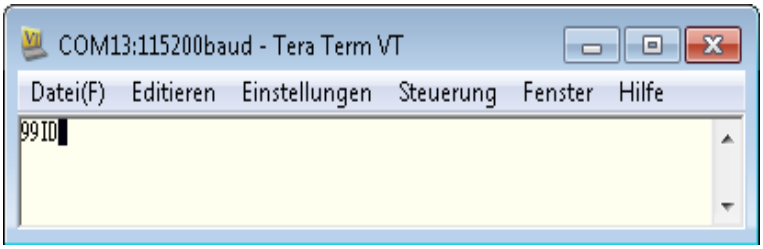


Figure 22: Logger ID query

The figure below shows the response from the sample logger with! 00ID0000. IDs from 0 to 98 are possible. The ID 99 is reserved to address all loggers with the IDs 0 to 98, so e.g. the ID of a logger can be found out.

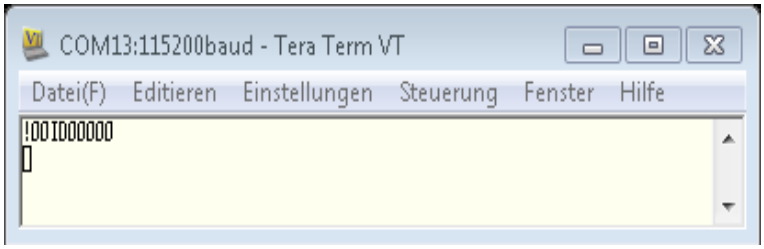


Figure 23: Logger ID answer

6. To change parameters it is necessary to enter a password / key before. This is done with the command **00KY00234** or alternatively with **<STX> KY00234 <ETX>**. The first two **zeros** are the logger ID. If the ID of your logger different, you have to enter the ID of your logger. This also applies to the following commands. The numbers **00234** after **KY** are the key (password), KY is the command to send the password. The notation with **<STX> <ETX>** knows no IDs and can only be used if only one logger is connected, e.g. via micro USB.
7. The dynamic address assignment is then deactivated with the command **00DHCP0**. The **zero** at the end is the parameter for switching off.
8. In the next step the IP address can be adjusted with the command **00IP_ADDR** e.g. **00IP_ADDR 192.168.007.133**. There can be a space between IP_ADDR and the address, but it does not have to be. You will receive the IP address from your network administrator together with the subnet mask and the gateway address.
9. In the same way with the command **00IP_SNM** followed by the subnet mask e.g. 255.255.252.0, set the subnetwork mask and set the gateway address with **00IP_GW**. The gateway address is only necessary if the logger is to be accessed externally.
10. A restart must be carried out to take over the parameters. E.g. with the command **00RS2** or via the display. This is also ensuring that the user login is reset.
11. After the restart, the DLU can be used on the network. Finally, the communication should be tested. This can be done in different ways and is described in the following chapters.
12. To exit, only the terminal program has to be closed.

4.6.3.2.3 IP setting via WEB

Does an Ethernet connection already exist e.g. through dynamic IP assignment, the IP parameters can also be changed via WEB. A computer with a network connection and a WEB browser, e.g. Microsoft Edge are necessary. In addition, the following steps can be used to test the DLU's Ethernet access.

Note:
Setting the IP address via WEB is only possible if the DLU already has a valid IP address in the network, e.g. with dynamic IP assignment.

To do this, proceed as follows:

1. Start the WEB browser
2. Enter in the entry line **http:*//*** followed by the valid IP address of your logger and send the command by pressing the Enter key.
3. If an error message appears instead of the WEB page, enter http: // again followed by the IP address and check the entry for errors. If the error persists, check whether you are using the correct IP for the logger e.g. via the display of the logger and check the connections.
4. After the start page has loaded successfully, open the Settings menu using the button  , and go to the submenu to chance the IP address.
5. In the menu you can change the parameters and with  passed to the logger
6. A restart must be carried out for takeover the changes.

The WEB pages are described in Chapter 8.

4.6.4 LAN-Connecting Check

After valid IP parameters have been set on the DLU or in the event of connection problems, there are several ways to test the LAN connection.

First, the following 3 points should be ensured and checked:

1. All cables should be OK and have correct contact in the socket.
2. The DLU should be switched on and work properly (restart if necessary).
3. IP parameters (address, mask, gate, DNS) should be correctly set (accepted) after the reset.

If the three conditions are OK, the different connection protocols can be tested with the following tests.

1. PING-test
2. SFTP-test
3. Telnet-test
4. WEB-test

4.6.4.1 Test the connection with the "ping" diagnostic tool

After setting the LAN connection, the easiest way to test access to the DLU is with a PC using the PING test. A console window (terminal) must be opened for this. In the Windows 10 operating system, this is done by starting the "cmd.exe" application.

The following steps are to be taken:

1. Click on the Windows icon in the lower left corner of the computer screen. The start window opens similar to the one shown in the image below.

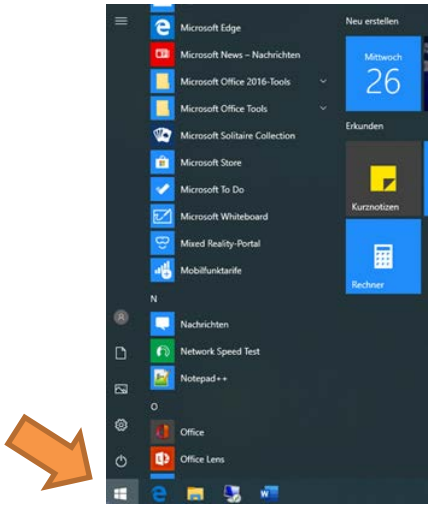


Figure 24: Windows start

2. Then you can type the word **cmd** on the keyboard. When you enter **c**, the following window opens:

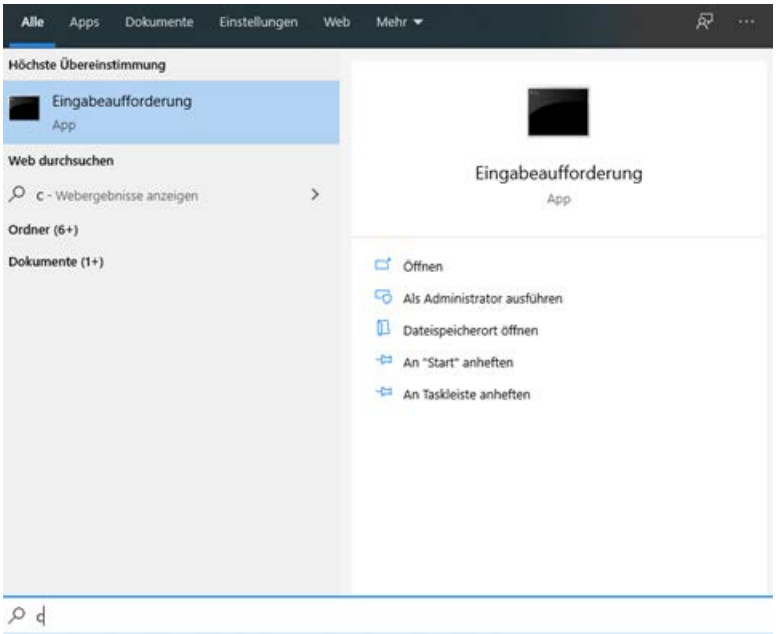


Figure 25: cmd.exe start (german sample)

In the window you can click on the blue area with the mouse. The **cmd.exe** program starts and the console window opens.

3. In the console window just write the word ping, followed by the **IP address** e.g. 192.168.7.133. A space **must** be inserted between the name **ping** and the IP address! Press the **enter key** (↵) to send. The computer sends a short telegram four times and expects an answer four times. In the following picture, the upper part has been successfully answered four times, the lower part shows the course without an answer.

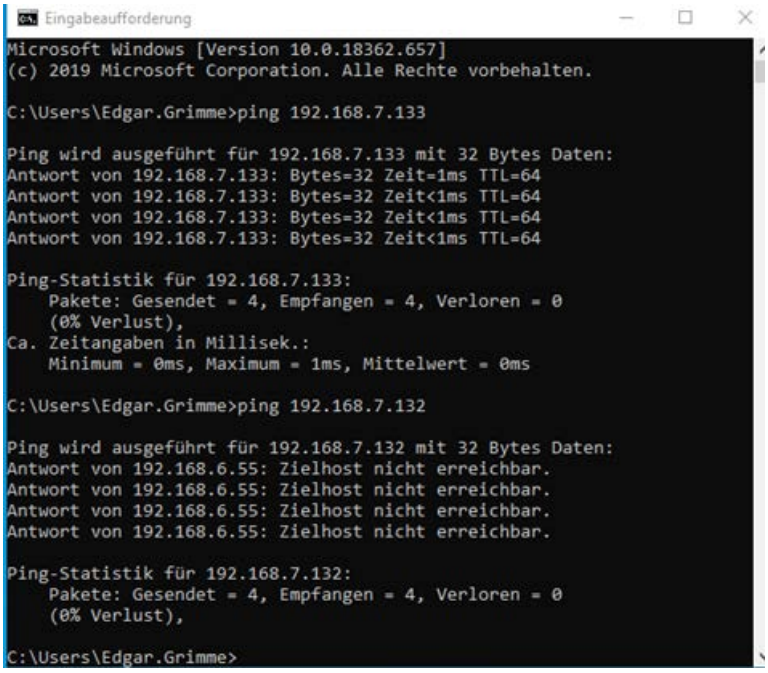


Figure 26: ping Test

4. If your answer looks like the one in the upper half of the window, the test is successful and can be closed. Other tests can be continued.
5. In the event of an error, check the connections again, check the settings of the IP parameters in the display and, if necessary, reset the DLU again. In some cases it can also take up to 5 minutes before a new system is recognized in the network. Therefore, repeat the experiment after a few minutes if necessary. If none of this helps, repeat the test on other sockets and with other cables to rule out hardware errors.
6. Finally, close the console window by entering exit and pressing the **enter key** or simply press the X button at the top right of the window.

4.6.4.2 SFTP- connection check

A program that supports **SFTP** is required for this access and an **SFTP** user must be created via WEB (see Section 9.8). This type of access enables files to be downloaded from the logger or files to be copied to the logger. This makes it possible to download and save the measurement data and the configuration as a text file.

The following example shows the access with the WinSCP program and the example user **DLUuser**.

1. Start the **WinSCP** program. The following input window appears. Enter **the IP address** of your DLU in the input mask, the login name / user name e.g. DLUuser, the associated password / password e.g. **user4DLU** and press **Login**.

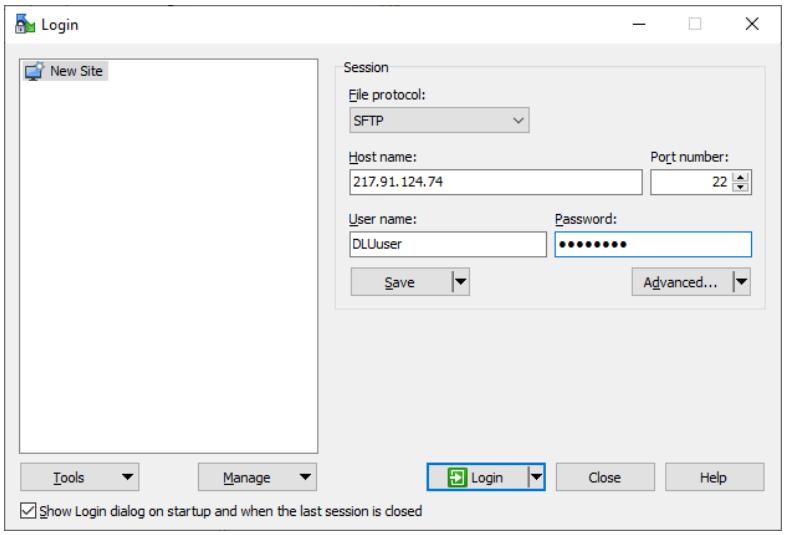


Figure 27: SFTP Login

If the following window appears, the login was incorrect, the login must be repeated.

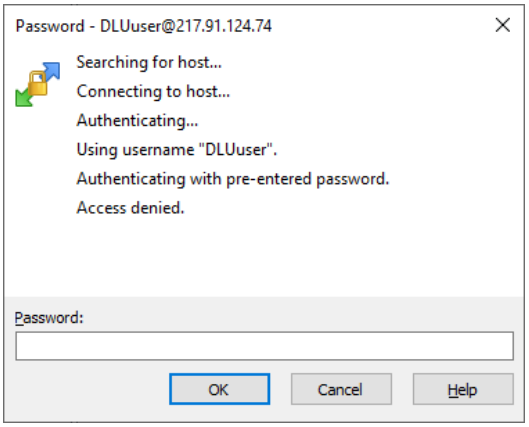


Figure 28: SFTP password login was incorrect

This could be the reasons for the failure of the login:

- Misspelled username (upper / lower case).
- Incorrectly entered password (note upper / lower case).
- Incorrectly IP-Adresse
- User or password has been changed or even deleted.
- If a ping test is negative too, check the connections.

After that, check the entries again and repeat the login again.

2. After a successful login the following window appears:

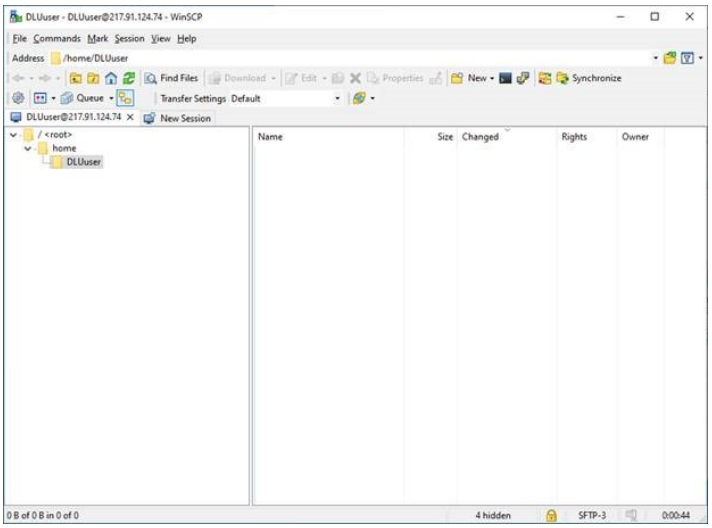


Figure 29: SFTP Home page for user

With a successful login, the **SFTP** access is successfully tested. In the second step, the uploading and downloading of files must be tested. The picture above shows the **DLUuser** folder, which currently does not contain any data.

3. To close the connection, it is sufficient to close the **WinSCP** window. A new window will open in which you will be asked whether you really want to end the session. Confirm that with yes.

Note:
The SFTP users have no write or delete rights. You can only read files.

4.6.4.3 Telnet- connection check

A Telnet program is required for this access. In the following example, the terminal program **Tera Term** is used, which was also used for the IP setting via micro USB, COM & Telnet.

1. Start the programm **Tera Term** . The following start window appears:

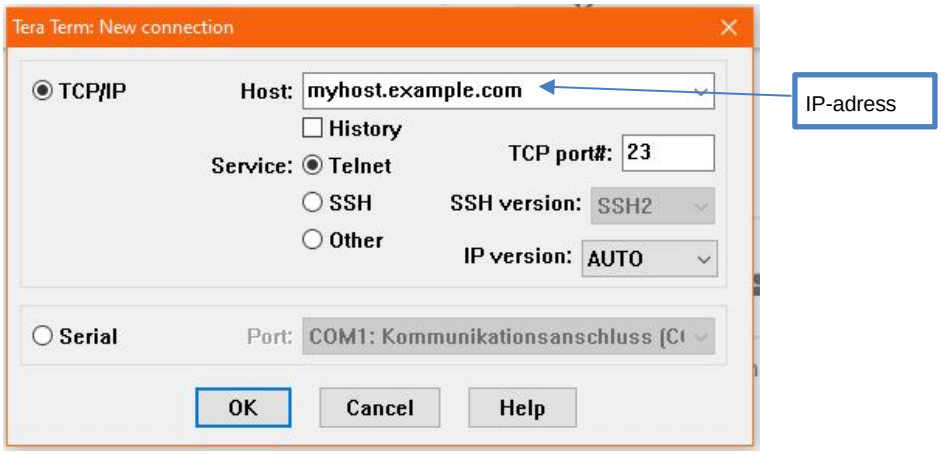


Figure 30: Setting for Telnet-connection (Tera Term)

Select the **TCP / IP** option in the input mask, enter the **IP address** of your DLU in the server edit field, select the Telnet option under Service and set the TCP port 23 as shown in the picture above. The connection is established by pressing the OK button.

2. If a connection cannot be established, the following error message appears after a few seconds:

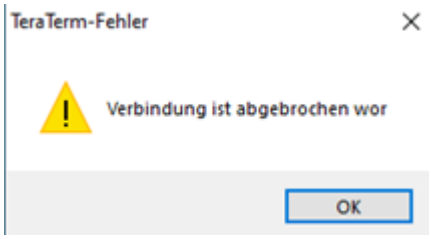


Figure 31: Fail at Telnet-connection

In that case, click the **OK** button to close the window. Then restart the program and check the entries for errors.

3. If the connection is successfully established, an empty terminal window appears. The commands from **Chapter 7.2** can be executed in the window. To query the data logger ID, e.g. the command **99ID** must be entered. The command is sent by pressing the enter key. If the characters are not displayed during input, the option **local echo** must be activated. The option can be found at **Tera Term** under **Settings**

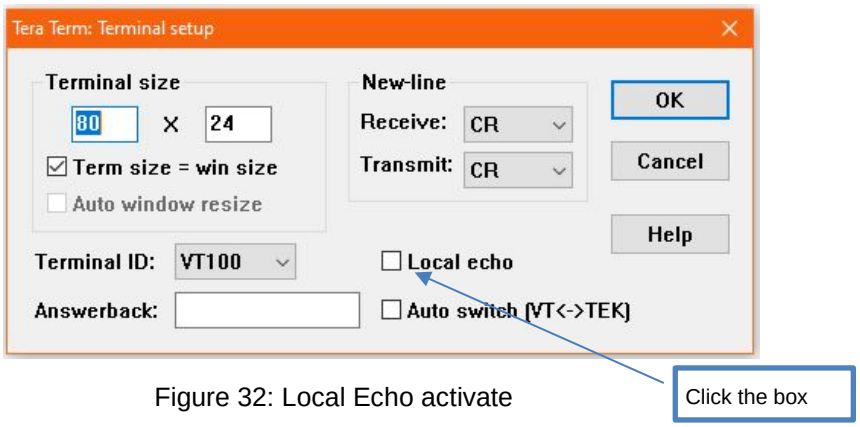


Figure 32: Local Echo activate

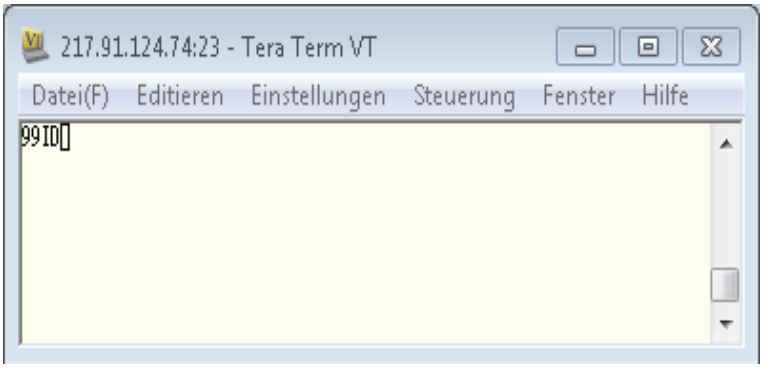


Figure 33: Query the data logger ID

4. Possible response from the DLU to the above request:

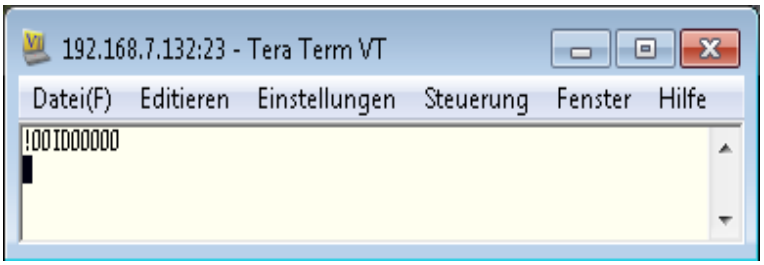


Figure 34: Possible response from the DLU

In the example above, the DLU replies successfully with the ID 00.
The Telnet communication has now been successfully tested and the connection can be disconnected or settings can be made using the commands from Section 7.2.

5. To close the connection, open the window using the key close. The following window opens. Close the window with **OK**

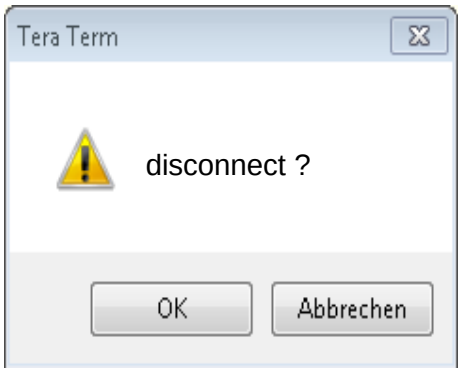


Figure 35: Tera Term disconnect

4.6.4.4 WEB-connection check

Only an internet explorer is required for testing. Details on access are described in Chapter 9

Enter the WEB address of your logger in the address window, e.g. http://192.168.7.132/ and confirm this with Enter.

The start page of the DLU should look something like the following picture:

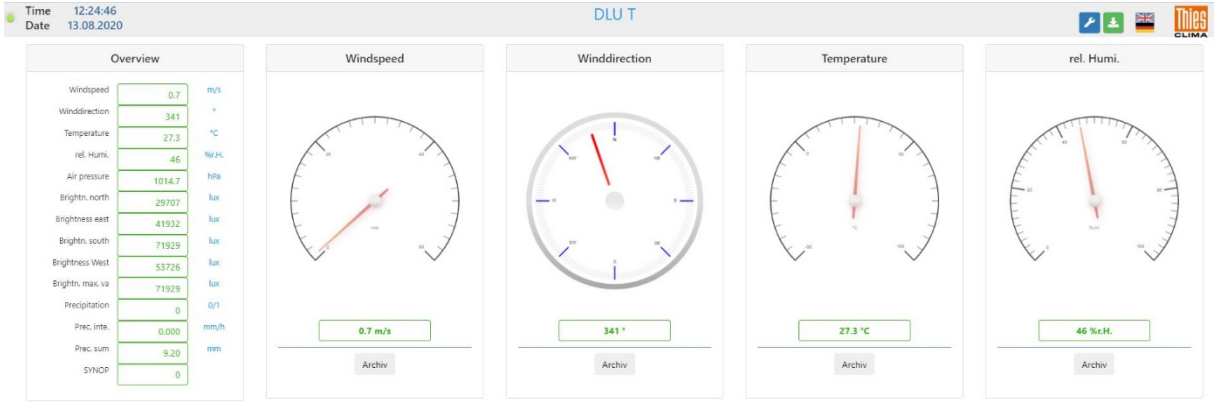


Figure 36: Start page WEB

If the page is displayed correctly, the WEB access is **OK**. Further WEB pages can be called up; details are described in Chapter 9

4.6.5 Login Options

The DLU has different access options and logins depending on the configuration and equipment.

Via the **micro-USB, COM** and **Telnet** access, remote maintenance commands can be accessed without logging in to read measured values and parameters. To write parameters, the login command **KY** followed by a key is required. The valid commands and their structure are described in **Chapter 7**.

For the DLU with Ethernet access, there is also access via **SFTP** to download files and **WEB pages** to view measured values and make configurations.

Access via **SFTP** is only possible via user logins. No user is configured on delivery. Names and passwords for **SFTP** access can be assigned via the WEB login **admin**. The **SFTP** access is described in chapter 4.5.2.2.

You can access the homepage for the WEB without logging in. It is sufficient to enter **http: //** followed by the logger IP address in a web browser. To configure via WEB, the configuration menu must be opened with the administrator login. On delivery, you can access the configuration menu with **admin** and login **1111**. The WEB Seien are described in detail in Chapter 8.

Attention:

The administrator login password should be changed during commissioning! The password must not be forgotten. Otherwise no settings can be made via Ethernet. User settings can then no longer be changed, not even via the display!

5 Measured Value Acquisition

All configured channels are read according to the configured measure interval (1s to 1 hour), and processed and saved in the configured calculation period. The saving is carried out internally, in a non-volatile, 64Mbyte ring memory. If the ring memory is full, then the measured values in the “oldest” sector of the memory are deleted.

Note

The measured values are not saved in maintenance mode.

The processing of the measured values in the calculation period is dependent on the configuration (e.g. averaging).

The Data logger distinguishes between average and extreme values, and between different calculation periods. Average values are saved in archives with the designation “AVx” and extreme values in archives with the designation “EXy”. The placeholders “x” and “y” represent indexes that can accept values from 1 to 16. For each of these 16 average and 16 extreme value archives are possible. Average values with the same calculation period are in the same average value archive (this also applies to the extreme values).

Note

In the data output on SD card, average values are saved in directories with the name “ARCH_AVx” and extreme values in directories with the name “ARCH_EXy”. The placeholders “x” and “y” can accept values from 1 to 16.

The allocation of channels to an average or extreme value archive can be retrieved with the **Command CMD_TS1**_Begin

<id>CMD_TS1_Begin<parameter><CR>	Start time for time slice 1	
Access:	Reading / writing	
Description:	With the "CMD_TS1_Begin" command, the start time for time slice 1 can be read or set.	
Parameter description:	hhmmss	
	hh	Indication of the hour („0“ to „23“)
	mm	indication of the minute („0“ to „59“)
	ss	indication of the second („0“ to „59“)
Value range:	See parameter description	
Initial value:	0	

5.1.1 Command CMD_TS2_Begin

<id>CMD_TS2_Begin<parameter><CR>	Start time for time slice 2
Access:	Reading / writing

Description:	With the "CMD_TS2_Begin" command, the start time for time slice 1 can be read or set.	
Parameter description:	hhmmss	
	hh	Indication of the hour („0“ to „23“)
	mm	indication of the minute („0“ to „59“)
	ss	indication of the second („0“ to „59“)
Value range:	See parameter description	
Initial value:	0	

5.1.2 Command CMD_TS3_Begin

<id>CMD_TS3_Begin<parameter><CR>	Start time for time slice 3
Access:	Reading / writing
Description:	With the "CMD_TS3_Begin" command, the start time for time slice 1 can be read or set.
Parameter description:	hhmmss
	hh: Indication of the hour („0“ to „23“)
	mm: indication of the minute („0“ to „59“)
	ss: indication of the second („0“ to „59“)
Value range:	See parameter description
Initial value:	0

5.1.3 Command CMD_TS4_Begin

<id>CMD_TS4_Begin<parameter><CR>	Start time for time slice 4
Access:	Reading / writing
Description:	With the "CMD_TS4_Begin" command, the start time for time slice 1 can be read or set.
Parameter description:	hhmmss hh Indication of the hour („0“ to „23“) mm indication of the minute („0“ to „59“) ss indication of the second („0“ to „59“)
Value range:	See parameter description
Initial value:	0

5.1.4 Command CMD_TS1_End

<id>CMD_TS1_End<parameter><CR>	End time for time slice 1
Access:	Reading / writing
Description:	The end time for time slice 1 can be read or set with the "CMD_TS1_End" command.
Parameter description:	hhmmss hh Indication of the hour („0“ to „23“) mm indication of the minute („0“ to „59“) ss indication of the second („0“ to „59“)
Value range:	See parameter description
Initial value:	0

5.1.5 Command CMD_TS2_End

<id>CMD_TS2_End<parameter><CR>	End time for time slice 2
Access:	Reading / writing
Description:	The end time for time slice 2 can be read or set with the "CMD_TS2_End" command.
Parameter description:	hhmmss hh Indication of the hour („0“ to „23“) mm indication of the minute („0“ to „59“) ss indication of the second („0“ to „59“)
Value range:	See parameter description
Initial value:	0

5.1.6 Command CMD_TS3_End

<id>CMD_TS3_End<parameter><CR> End time for time slice 3

Access: Reading / writing

Description: The end time for time slice 3 can be read or set with the "CMD_TS3_End" command.

Parameter description: hhmmss

hh	Indication of the hour („0“ to „23“)
mm	indication of the minute („0“ to „59“)
ss	indication of the second („0“ to „59“)

Value range: See parameter description

Initial value: 0

5.1.7 Command CMD_TS4_End

<id>CMD_TS4_End<parameter><CR> End time for time slice 4

Access: Reading / writing

Description: The end time for time slice 4 can be read or set with the "CMD_TS4_End" command.

Parameter description: hhmmss

hh	Indication of the hour („0“ to „23“)
mm	indication of the minute („0“ to „59“)
ss	indication of the second („0“ to „59“)

Value range: See parameter description

Initial value: 0

5.1.8 Command CMD_TS1_Out

<id>CMD_TS1_Out<parameter><CR> Output/function for time slice 1

Access: Reading / writing

Description: With the "CMD_TS1_Out" command, the output/function for time slice 1 can be read or set.

Parameter description:

0	no function
1	Switching contact 1
2	Switching contact 2
3	12V supply at the terminals 32/33

Value range: See parameter description

Initial value: 0

5.1.9 Command CMD_TS2_Out

<id>CMD_TS2_Out<parameter><CR> Output/function for time slice 2

Access: Reading / writing

Description: With the "CMD_TS2_Out" command, the output/function for time slice 2 can be read or set.

Parameter description:

0	no function
1	Switching contact 1
2	Switching contact 2
3	12V supply at the terminals 32/33

Value range: See parameter description

Initial value: 0

5.1.10 Command CMD_TS3_Out

<id>CMD_TS3_Out<parameter><CR> Output/function for time slice 3

Access: Reading / writing

Description: With the "CMD_TS3_Out" command, the output/function for time slice 3 can be read or set.

Parameter description:

0	no function
1	Switching contact 1
2	Switching contact 2
3	12V supply at the terminals 32/33

Value range: See parameter description

Initial value: 0

5.1.11 Command CMD_TS4_Out

<id>CMD_TS4_Out<parameter><CR> Output/function for time slice 4

Access: Reading / writing

Description: With the "CMD_TS4_Out" command, the output/function for time slice 4 can be read or set.

Parameter description:

0	no function
1	Switching contact 1
2	Switching contact 2
3	12V supply at the terminals 32/33

Value range: See parameter description

Initial value: 0

5.1.12 Command CMD_TS_Eth

<id>CMD_TS_Eth<parameter><CR>	Control network interface via time slices
Access:	Reading / writing
Description:	With the "CMD_TS_Eth" command, the control (activation) of the network interface can be set or read via the 4 time slices.
Parameter description:	0 Network interface permanently active 1 Network interface via time slices aktiv
Value range:	See parameter description
Initial value:	0

Command DF_INI. The archive name (e.g. “**Command** AV1” or “EX1”) is stated as a parameter for the command. If the stated archive exists, the design is issued in the form of an INI file. The sequence of the sections also defines the sequence in the data output. The request for the 1st average value archive (“AV1”) is shown below as an example.

00DF_INI AV1

[1]
Name=PT100
ClassID=24
ObjectID=0
Offset=0
Size=0
LinkID=0
TypeID=3
UnitID=3
ExtremID=0
PairRef=1
AvType=0
[2]
Name=analogue IN 1
ClassID=24
ObjectID=0
Offset=0
Size=0
LinkID=1
TypeID=14
UnitID=17
ExtremID=0
PairRef=1
AvType=0
[3]
Name=analogue IN 2
ClassID=24
ObjectID=0
Offset=0
Size=0
LinkID=2
TypeID=14
UnitID=17
ExtremID=0
PairRef=1
AvType=0
[4]
Name=analogue IN 3
ClassID=24
ObjectID=0
Offset=0
Size=0
LinkID=3
TypeID=14
UnitID=17
ExtremID=0
PairRef=1
AvType=0
[5]
Name=rel. humidity
ClassID=24
ObjectID=0
Offset=0
Size=0
LinkID=4
TypeID=4
UnitID=4
ExtremID=0
PairRef=1
AvType=0
[6]
Name=precipitation1
ClassID=24
ObjectID=0
Offset=0
Size=0
LinkID=5
TypeID=11
UnitID=9
ExtremID=0
PairRef=1
AvType=0
[7]
Name=precipitation2
ClassID=24
ObjectID=0
Offset=0
Size=0
LinkID=6
TypeID=11
UnitID=9
ExtremID=0
PairRef=1
AvType=0
[8]
Name=int. temperature
ClassID=24
ObjectID=0
Offset=0
Size=0
LinkID=7
TypeID=3
UnitID=3
ExtremID=0
PairRef=1
AvType=0
[9]
Name=battery voltage
ClassID=24
ObjectID=0
Offset=0
Size=0
LinkID=8
TypeID=14
UnitID=17
ExtremID=0
PairRef=1
AvType=0
[10]
Name=battery current
ClassID=24
ObjectID=0
Offset=0
Size=0
LinkID=9
TypeID=15
UnitID=19
ExtremID=0
PairRef=1
AvType=0
[11]
Name=sync. serial1
ClassID=24
ObjectID=0
Offset=0
Size=0
LinkID=10
TypeID=14
UnitID=17
ExtremID=0
PairRef=1
AvType=0
[12]
Name=sync. serial2
ClassID=24
ObjectID=0
Offset=0
Size=0
LinkID=11
TypeID=14
UnitID=17
ExtremID=0
PairRef=1
AvType=0
[13]
Name=seconds
ClassID=24
ObjectID=0
Offset=0
Size=0
LinkID=12
TypeID=12
UnitID=13
ExtremID=0
PairRef=1
AvType=0
[14]
Name=milliseconds
ClassID=24
ObjectID=0
Offset=0
Size=0
LinkID=13
TypeID=12
UnitID=13
ExtremID=0
PairRef=1
AvType=0

6 Data Output

Basically, there are 5 possibilities on the Data logger for outputting (exporting) the data:

- SD card (memory card Secure Digital).
- Serielle Schnittstelle micro USB (Slave).
- Serial interface COM1 (dependent on the configuration).
- Serial interface COM2 (dependent on der configuration).
- Network interface (Data logger DLU E (9.1711.10.x1x). → THIES CLOUD → THIES CUMULUS APP; Windows Service, Linus Service

Data output via the interfaces COM1, COM2 and micro USB is carried out by the **Command DS**.

A terminal program can be used for serial communication, e.g. Tera Term. The settings in the terminal program must match the settings in the data logger. On delivery, the micro USB interface of the logger has a baud rate of 115200, 8 data bits, no parity, 1 stop bit. The baud rate for COM1 and COM2 can differ from this.

Data output via the SD card takes place via a touch event on the display.

The DLU E with article number 9.1711.10.x1x also has an Ethernet interface. Via this interface, dates can be viewed and downloaded via WEB, SFTP and Telnet. The DS command is also used for Telnet as for micro USB. Text files are downloaded via WEB and SFTP and can be saved in any directory on the computer.

All output data are issued in the ASCII format (plain text). Thanks to this, you are in a position to look at, process and print your datasets, including with text processing programmes. You are therefore also in a position to further process your files via the ASCII interface with standard software such as e.g. spreadsheets, databanks etc..

6.1 Data Output via SD Card

If there is an SD card in the Data logger, the corresponding dialogue page is shown in the display.

Note

The dialogue page “SD card” is always the last page.

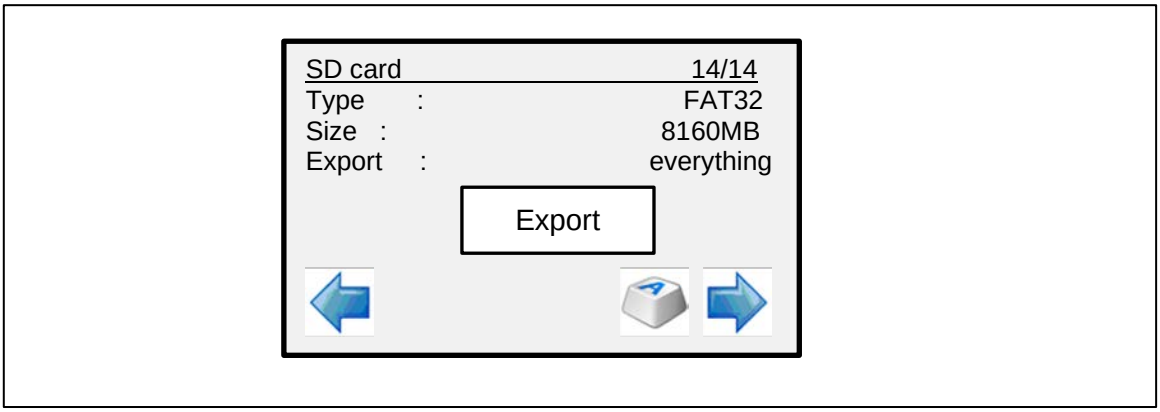


Figure 37: Dialogue page “SD card”

Information from the inserted SD card is shown in the top part of the dialogue page, as well as an editable entry on the setting of the data to be exported. The data output is caused by a touch event on the key “Export”.

The data files are saved on the SD card in the following directory:

D:\aaa\bbbbbbbbbb\ccccccccccccccccccccccccccccccccccc

D

Root directory of the SD card (e.g. “E”)

aaa

Directory „DLU“

bbbbbbbbbb

Directory according to the station name (e.g. “DLU_____”)

ccccccccccccccccccccccccccccccccccc

Directory according to the HW-ID of the Data logger (e.g. “HW_ID_

533331003846344D3330313034363038”)

The following table shows the exported files:

Subfolder	File name	Content
-	config.txt	Configuration (INI file).
-	config_ChList.bid	Channel configuration (binary format).
-	config_DevList.bid	Devices configuration (binary format).
-	logfile.txt	Log file in the ASCII format.
ARCH_AVx	YYYYMMDD.txt YYYY year MM month DD day	Day file for the average value archive “x”, with the measured values in the ASCII format.
ARCH_EXy	YYYYMMDD.txt YYYY year MM month DD day	Day file for the extreme value archive “y”, with the measured values in the ASCII format.

Table 5: Files on SD card

One can export from any Data loggers on an SD card by saving the data in a directory, depending on the clear Data logger hardware ID.

If the data of a Data logger are exported again onto the same SD card, existing data on the SD card is overwritten. This is only a problem if the configuration of the Data logger has changed between the export processes.

Comments:

The user is responsible for using a SD card with enough free storage.

The write-protection switch of the SD card is not used by the Data logger.

We urgently recommend that the data be backed up on other media.

Do not remove the card during writing.

Liability on our part for the loss of the data on the SD card is ruled out.

*Only recommended SD cards are to be used (see also **chapter** Fehler! Verweisquelle konnte nicht gefunden werden.).*

6.1.1 Recommendations SD-CARD

Notes on SD card:

Not all cards available on the market can be tested for compatibility with the Data logger. Problems can therefore arise in rare exceptional cases.

The SD cards must be formatted with the standard "FAT16"-, "FAT32"- or "ExFAT" format (delivery state of SD cards).

6.2 Data Output via COM1, COM2 and Micro USB

Data is output via the interfaces COM1, COM2 and micro USB using the **Command DS,** individually for each average and/or extreme value archive.

The following table shows the possible parameters of the command.

Parameter	Example	Meaning
1	AV1	Stating of the archive with 3 and/or 4 places ("AV1" to "AV16" or "EX1" to "EX16")
2[1]	170529101000	Start point of the form YYMMDDHHNNSS (YY: year, MM: month, DD: day, HH: hours, NN: minutes, SS: seconds)
3[1]	170530101000	End point of the form YYMMDDHHNNSS (YY: year, MM: month, DD: day, HH: hour, NN: Minute, SS: seconds)

Table 6: Data output with command DS

[1)]: The parameters start and end point are optional.

The archived measured values are output in lines, in so-called data rows. The data output is concluded by the end line.

Note:

Only data lines are written in the output via SD card (writing of the day file). The end line is only output with the command DS.

Note on the micro USB slave interface

For communication via micro *USB it is necessary to have an installed VCP driver (Virtual COM Port) on the PC used. VCP drivers ensure that a* micro *USB device is available as an additional COM port on the PC. The user software can then treat the* micro *USB device like a standard COM port. The parameters (baud rate, data bits and parity) must correspond to the setting of the* micro *USB slave interface of the Data logger.*

The driver is available from FTDI (FT245R): http://www.ftdichip.com/

In addition, installation guides in English for different operating systems can be downloaded there.

6.3 Data Line

The data is output in a line with a fixed telegram length. Each line starts with the time stamp, followed by the measured values including status word. The separator between measured value and status word is the semicolon, separator between the measured values and the time stamp is the semicolon. The status word represents a 16-bit integer value without a sign and is always output with 5 places. All data lines are concluded by “CR LF”. A dot is used as a decimal separator. Incorrect values are identified by a status word unequal 0. The end of the data output is identified with an end line with the command DS.

Note:

The time stamp of a data line refers to the end of the measurement.

The status word is bit coded, i.e. every single bit represents a particular status and/or error. The following table shows the meaning of the individual bits.

Bit number	Function	Description
Bit 0		
Bit 1	ADC error	An error has occurred in the AD implementation.
Bit 2	ADC timeout	The AD implementation has not been concluded in the predefined time.
Bit 3	Wire break	A cable break has been detected.
Bit 4	MAX	The channel value has exceeded the configured maximum value.
Bit 5	MIN	The channel value has fallen short of the configured minimal value.
Bit 6	Checksum	The checking of the checksum yielded an error.
Bit 7	Framing	The checking of the data frame yielded an error.
Bit 8	AV buffer low	The number of valid measured values in the average value buffer is too low.
Bit 9	Linked channel index	The channel index for a connected channel is incorrect.
Bit 10	Invalid character	An invalid character was detected.
Bit 11	String too long	The received/decoded string is too long.
Bit 12	Maths error	The calculation being used as the basis caused a mathematical error (e.g. an attempted division by 0)
Bit 13	MODBUS	A MODBUS exception has been received.
Bit 14	Archiving off	The channel is not archived.
Bit 15	Channel off	The channel is switched off.

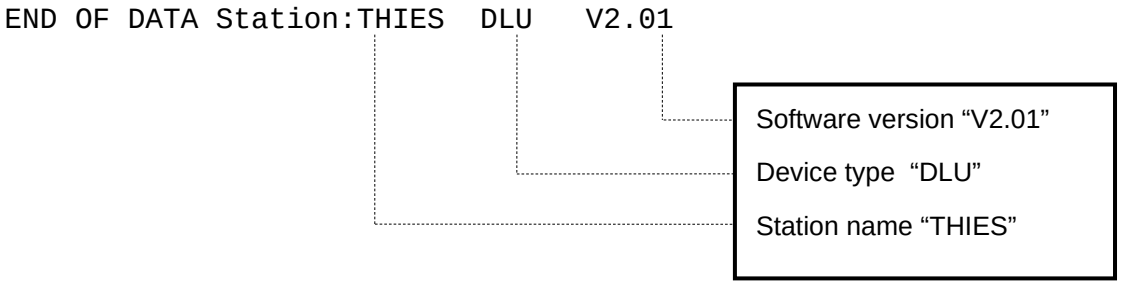
Table 7: Status word

The following example shows the request with the command DS and the response lines from the Data logger.

```
00DS AV2 180605112500 180605112600
05.06.18 11:25:00.000;  2.0;00000;
05.06.18 11:25:05.000;  2.0;00000;
05.06.18 11:25:10.000;  2.0;00000;
05.06.18 11:25:15.000;  2.0;00000;
05.06.18 11:25:20.000;  2.0;00000;
05.06.18 11:25:25.000;  2.0;00000;
05.06.18 11:25:30.000;  2.0;00000;
05.06.18 11:25:35.000;  2.0;00000;
05.06.18 11:25:40.000;  2.0;00000;
05.06.18 11:25:45.000;  2.0;00000;
05.06.18 11:25:50.000;  2.0;00000;
05.06.18 11:25:55.000;  2.0;00000;
05.06.18 11:26:00.000;  2.0;00000;
END OF DATA Station:TK         DLU v02.01
```

6.4 End Line

The end line is only output when the command DS is used.



6.5 Data Output via Network (only Logger with Ethernet Module)

If the DLU is in a network and the Ethernet settings are correct, data can be fetched from the data logger DLU via the network. Configuration of the interface is described in chapter 4.5.1

There are the following options for reading out data from the logger via ethernet:

1. Telnet
2. SFTP (Secure File Transfer Protocol)
3. WEB (see chapter 9)

6.5.1 Collect Data via Telnet

Telnet is a character-oriented protocol via TCP (Transmission Control Protocol) with which all commands from Chapter 7.2 can be used. The data descriptions in Chapters 6.2, 6.3 and 6.4 also apply to Telnet.

The **DS command** is used to read out data and the **DS_ESC command** is used to cancel the reading process. At least the name of the archive must follow the **DS command**, e.g. AV1 to be able to read out all data of the archive. Optionally, a start and stop date / time in the form YYMMDTHHNNSS with YY: year, MM: month, DD: day, HH: hour, NN: minute, SS: second can follow in order to read out only part of the archive.

The three parameters archive name, start time and stop time must be separated by spaces e.g. **00DS AV1 200101000000 200102000000** to read out the values from 01/01/2020 from 0:00:00 to 02/01/2020 0:00:00.

6.5.2 Collect Data via SFTP

FTP is a file-oriented format used e.g. is supported by the **WinSCP** program. Start the **WinSCP** program and log in to the DLU as described in section **4.5.3**. After a successful login, the start folder of the DLU user opens. To download saved measured values, you have to switch to the log directory.
Both the configuration files and the measured value files are stored as text files and can be opened and read with **WinSCP** with a double click.

The contents of the **log** folder and its subfolders can be copied (downloaded) to any destination on the computer. This can be done with **drag & drop** or with the standard Windows commands copy and paste. To do this, mark the files and / or folders in **WinSCP** and then e.g. in a Windows Explorer window.

When the work is done, the **winSCP** program only needs to be closed.

Note

Writing and deleting in the log folder is blocked for the user.

6.5.2.1 The log directory

The **log** directory is located in the path: **root/var/opt/thies/DLU.**

The current configuration file **config.cfg** and, if necessary, other files, e.g. **config.old**. The file **config.old** always contains the last configuration, the file **config.cfg** is always the current configuration.

Depending on the configuration, there are several archive folders in the log directory. The files with the measured values and the associated archive configuration files are located in the folders. In the **log** directory there is at least one subdirectory **ARCH_AV1** for mean values and another directory **ARCH_EX1** for extreme values. Archives with the **ending _old** contain old measured values from a previous configuration and only occur if the archive structures are changed as part of a configuration change.

The following figure shows an example of what the log directory can look like:

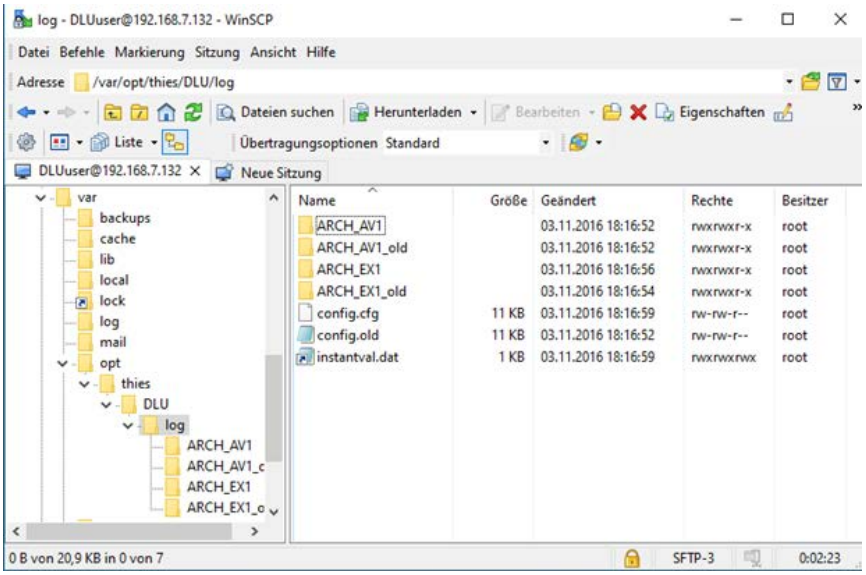


Figure 38: Content log-directory

The following figure shows an excerpt from the configuration file. The section shows the IP address (IP-A) 192.168.7.74 as it is set on delivery.

```
906  USB_FRM=8N1
907  COM1_BR=96
908  COM1_FRM=8N1
909  COM2_BR=96
910  COM2_FRM=8N1
911  IP-A=3232237386
912  IP-SNM=4294966272
913  IP-GW=3232236545
914  PwrSave=0
915  Linux=1
916  StName=
917  DispOff=0
918  TS1B=0
919  TS1E=0
920  TS1O=0
921  TS2B=0
```

Figure 39: Extract from a configuration file

6.5.2.2 The measured value directories

With the data logger DLU there is always at least one mean value archive ARCH_AV1 and usually one extreme value archive ARCH_EX1. The name of a day file is made up of the date of the day, starting with the year e.g. 20170831 for August 31, 2017 and the ending .txt. In addition, there is a configuration file descfile.ini in the archive, which describes the data. All measured values in an archive have the same storage cycle. Measured values with different storage intervals use different archives. Average values are stored in archives with the name ARCH_AVx, where x can be a number from 1 to a maximum of 16.

Extreme values are stored in archives with the name ARCH_EXy, where y can be a number from 1 to a maximum of 16.

If the configuration changes in an archive, the current directory is renamed and given the ending _old e.g. ARCH_AV1_old.

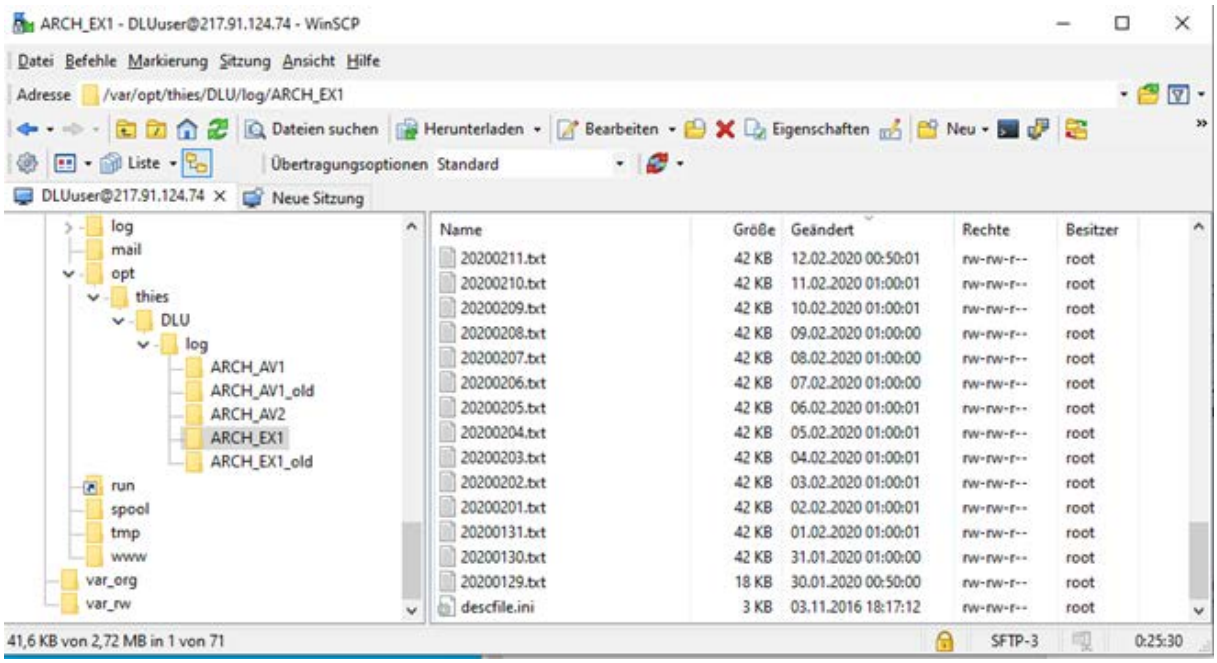


Figure 40: Sample measured value directories

The figure above shows the content of an archive with the configuration file and several daily files.

Each day file contains the measured values in the form of data lines. Each line of data begins with the time stamp, which consists of the date and time. Date and time are separated by a blank sign. The time stamp is followed by the measured values, which are separated by

semicolons. A measured value consists of the value (e.g. -2.476) and its status e.g. 00000. The space is used to separate value and status. An error-free measured value is represented by status 0.

The following picture shows an cutout of the contents of a daily file:

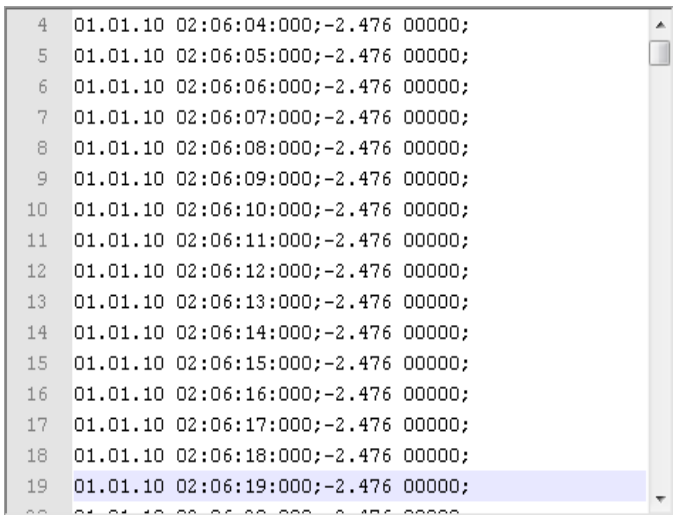


Figure 41: Cutout of a daily file

The configuration file for the DESCFILE.INI archive is used by the Mevis PC program to interpret the measured values in the daily files. The user can use this file to determine the order of the measured values in the daily file.

The section names correspond to consecutive numbers from 1 to a maximum of 100 (e.g. [1]) and identify the position of the measured value (including status) in the data line (after the time stamp). Each section contains keys and values that describe the relevant measured value (e.g. name = PT100).

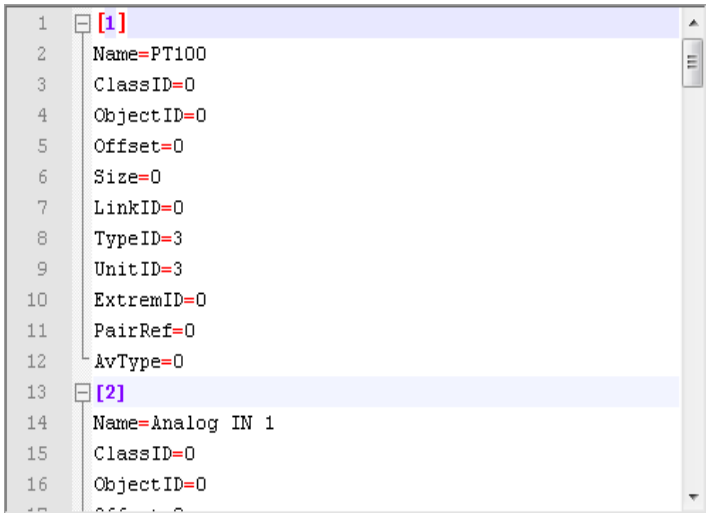


Figure 42: Cutout of a DESCFILE.INI

7 Communication

Communication with the Data logger DLU can take place via the following interfaces:

- Micro USB
- COM1 (dependent on the configuration)
- COM2 (dependent on the configuration)
- Ethernet (Data logger DLU E (9.1711.10.x1x)

Baud rate and framing can be set for the interfaces micro USB, COM1 and COM2. The interfaces COM1 and COM2 also allow the selection of the duplex mode (half or full duplex).

The optional network interface (Ethernet) comprises a Telnet server (port number: 23). The IP address can be adjusted in the Data logger by command or on the display.

The data exchange takes place in the ASCII format with the THIES command interpreter.

The behaviour (configuration) of the Data logger can be changed with the available commands (see **chapter 7.2**).

Upon the starting of the Data logger, the character string “universal logger”, software version, hardware ID and serial number is output.

Example: universal logger
V02.01
533331003846344D3330313034363038
00000000

7.1 Command Interpreter THIES

The THIES command interpreter defines the interface between a master (e.g. PC) and the Data logger as a slave. The Data logger (slave) is always passive in this, i.e. it only responds to requests from the master.

The requests from the master (commands) and the response telegrams from the Data logger (slave) contain only ASCII characters. The following special characters can be used in this:

- \r ➔ carriage return
- \n ➔ line feed
- STX ➔ start of text
- ETX ➔ end of text

7.1.1 Structure of the Commands (requests)

The requests and/or commands have the following structure:

<ID>Command<Space><Parameter><CR>

ID:	Identification number (“00” to “99”)
Command:	Command containing 2 to 12 characters (see command list)
Space:	Optional space character (if the command contains figures)
Parameter:	Parameter value with representable ASCII characters
<CR>:	Carriage Return (13_{dec}; 0x0D)

If the command also comprises figures, a space character must be sent as separation from the parameter.

The optional parameter can accept the following values:

- Parameter value with 1 to 10 places (decimal value without sign, represented in ASCII).
- Character string with up to 256 characters.

If the master sends a command without parameter, then the Data logger responds with the set parameter.

If the command is sent with parameter, it is set in the Data logger and output in the response telegram (➔if necessary, a password level is taken into account).

7.1.2 Structure of the Response Telegram

The response telegrams have the following structure:

!<ID>Command<Space><Parameter><CR>

ID:	Identification number (“00” to “99”)
Command:	Command comprising 2 to 12 characters (see command list)
Space:	Optional space character (if the command contains figures)
Parameter:	Parameter value with representable ASCII characters
<CR>:	Carriage return (13_{dec}; 0x0D)

The response telegram always begins with a “!”.

If the command also comprises figures, the Data logger sends a space character as separation between command and parameter.

The parameter is dependent on the implementation in the Data logger and can accept the following values:

- Parameter value with 1 to 10 places (decimal value without sign, represented in ASCII).
- Character string with up to 256 characters.

Note:

The structure of the response telegram can in some cases differ from the standard (e.g. the measured value telegram)!

Only if the received “ID” agrees with the one set in the Data logger, does the Data logger send a response telegram.

7.1.3 Optional framing with 16Bit CRC

Optionally, the commands can be sent with a framing and 16-bit CRC checksum.

<STX><Command><CCCC><ETX>

<STX>:	STX characters (0x02)
<Command>:	Command with ID and optional parameter, but without end identifier \r (➔see **Structure of the Commands (requests)**)
<CCCC>:	16Bit CRC in ASCII representation (4 characters)
<ETX>:	ETX characters (0x03)

The Data logger identifies the call variant with framing and 16-bit CRC and also sends the response in this format.

<STX><Response><CCCC><ETX>

<STX>:	STX characters (0x02)
<Response>:	Response with ID and parameter (➔see **Structure of the Response Telegram**)
<CCCC>:	16Bit CRC in ASCII representation (4 characters)
<ETX>:	ETX characters (0x03)

The initial value of the 16-bit CRC is 0xffff.

7.2 Commands

The following table shows the available commands, and the corresponding passwords for reading and writing:

Command	Initial value factory setting	Description	Password reading[1] / writing[2]	
Command ArchID	0	Reading of the archive ID.	Without	-
Command BP_COM1	0 (8N1)	Choosing of the framing for COM1.	Without	User
Command BP_COM2	0 (8N1)	Choosing of the framing for COM2.	Without	User
Command BP_USB	0 (8N1)	Choosing of the framing for USB.	Without	User
Command CMD_StoreInt_ARCH_AV1	10m	Storage interval mean value archive 1	Without	User
Command CMD_StoreInt_ARCH_EX1	10m	Storage interval extreme value archive 1	Without	User
Command BR_COM1	96	Choosing of the baud rate for COM1.	Without	User
Command BR_COM2	96	Choosing of the baud rate for COM2.	Without	User
Command BR_USB	1152	Choosing of the baud rate for USB.	Without	User
Command CMD_TS1_Begin	0	Start time for time slice 1	Without	User
Command CMD_TS2_Begin	0	Start time for time slice 2	Without	User
Command CMD_TS3_Begin	0	Start time for time slice 3	Without	User
Command CMD_TS4_Begin	0	Start time for time slice 4	Without	User
Command CMD_TS1_End	0	End time for time slice 1	Without	User
Command CMD_TS2_End	0	End time for time slice 2	Without	User
Command CMD_TS3_End	0	End time for time slice 3	Without	User
Command CMD_TS4_End	0	End time for time slice 4	Without	User
Command CMD_TS1_Out	0	Output/function for time slice 1	Without	User
Command CMD_TS2_Out	0	Output/function for time slice 2	Without	User
Command CMD_TS3_Out	0	Output/function for time slice 3	Without	User
Command CMD_TS4_Out	0	Output/function for time slice 4	Without	User
Command CMD_TS_Eth	0	Control network interface via time slices	Without	User
Command DF_INI	-	Read archive configuration.	User	User
Command DHCP	0	DHCP	Without	User

Command	Initial value factory setting	Description	Password reading[1] / writing[2]	
Command DS_ESC	-	Stop readout process	Without	Without
Command DD	-	Reading/setting date	Without	User
Command FB	1	Quick start mode.	Without	User
Command HI	-	Read hardware ID	Without	-
Command ID	0 (THIES) 1 (MODBUS)	Identification number and/or slave address.	Without	User
Command IP_ADDR	0	IP address	Without	User
Command IP_GW	0	IP-Gateway	Without	User
Command IP_SNM	0	IP subnet mask	Without	User
Command KY	0	Set key / password.	Without	Without
Command LA	0	Language used in the display.	Without	User
Command LL	-	Logger status.	Without	-
Command mm	0	Output of the instantaneous values.	Without	User
Command MM	0	Output of the instantaneous values.	Without	User
Command MM_MEAN	0	Output of the average values.	Without	User
Command MM_EX	0	Output of the extreme values.	Without	User
Command RS	0	Request reset source or carry out reset.	Without	User
Command SV	-	SW version.	Without	-
Command WLAN	0	WLAN Status	Without	User
Command WL_ADDR	0	WLAN IP-adress	Without	User
Command WL_DHCP	0	WLAN DHCP	Without	User
Command WL_GW	0	WLAN IP-Gateway	Without	User
Coammand WL_SNM	0	WLAN IP-subnet mask	Without	User
Command WL_PSK	-	WLAN PSK	Without	User
Command WL_SSID	-	WLAN SSID	Without	User

Table 8: Command list

[1)]: Command without parameter (used to read the set parameter).
[2)]: Command with parameter (used to write a new parameter).
User password: 234

7.2.1 Command ArchID

<id>ArchID<parameter><CR> Archive ID

Access: Reading

Description: With the command “ArchID”, the archive identification number is read.

Parameter description:

Value range: 0...99999999

Initial value: 0

7.2.2 Command BP_COM1

<id>BP_COM1<parameter><CR> Setting the framing COM1

Access: Reading / writing

Description: With the command BP_COM1, the desired framing is set for COM1.

Parameter description:

Parameter	Description
8N1	8 data bits, no parity, 1 stop bit
8O1	8 data bits, uneven parity, 1 stop bit
8E1	8 data bits, even parity, 1 stop bit
8S1	8 data bits, Space parity, 1 stop bit
8M1	8 data bits, Mark parity, 1 stop bit

Value range: 8N1 / 8O1 / 8E1 / 8S1 / 8M1

Initial value: 8N1

7.2.3 Command BP_COM2

<id>BP_COM2<parameter><CR> Setting the framing COM2

Access: Reading / writing

Description: With the command BP_COM2, the desired framing is set for COM2.

Parameter description:

Parameter	Description
8N1	8 data bits, no parity, 1 stop bit
8O1	8 data bits, uneven parity, 1 stop bit
8E1	8 data bits, even parity, 1 stop bit
8S1	8 data bits, space parity, 1 stop bit
8M1	8 data bits, mark parity, 1 stop bit

Value range: 8N1 / 8O1 / 8E1 / 8S1 / 8M1

Initial value: 8N1

7.2.4 Command BP_USB

<id>BP_USB<parameter><CR> Setting of framing USB

Access: Reading / writing

Description: With the command BP_USB, the desired framing is set for USB.

Parameter description:

Parameter	Description
8N1	8 data bits, no parity, 1 stop bit
8O1	8 data bits, uneven parity, 1 stop bit
8E1	8 data bits, even parity, 1 stop bit
8S1	8 data bits, space parity, 1 stop bit
8M1	8 data bits, mark parity, 1 stop bit

Value range: 8N1 / 8O1 / 8E1 / 8S1 / 8M1

Initial value: 8N1

7.2.5 Command CMD_StoreInt_ARCH_AV1

<id>CMD_StoreInt_ARCH_AV1<parameter><CR> Speicherintervall Mittelwertarchiv 1

Access: Reading / writing

Description: With the "CMD_StoreInt_ARCH_AV1" command, the storage interval for the average archive 1 can be read or set.

Parameter description: tt

tt Storage interval („1s“, „5s“, „10s“,„15s“,„20s“,„30s“,„1m“, „2m“,„3m“,„4m“,„4m“,„5m“,„6m“,„10m“,„12m“,„15m“,„20m“,„30m“,„60m“,„2h“,„3h“,„4h“,„6h“,„8h“,„12h“,„24h“)

Range of values: see parameter description

Initialwert: 10m

Note:

The storage intervals of the optional archives 2 to 16 are accessed with the commands "CMD_StoreInt_ARCH_AV2" to "CMD_StoreInt_ARCH_AV16"!

7.2.6 Command CMD_StoreInt_ARCH_EX1

<id>CMD_StoreInt_ARCH_EX1<parameter><CR> Speicherintervall Extremwertarchiv 1

Access:	Reading / writing	
Description:	With the "CMD_StoreInt_ARCH_EX1" command, the storage interval for extreme value archive 1 can be read or set.	
Parameter description:	tt	
	tt	Storage interval („1s“, „5s“, „10s“,„15s“,„20s“,„30s“,„1m“, „2m“,„3m“,„4m“,„4m“,„5m“,„6m“,„10m“,„12 m“,„15m“,„20m“,„30m“,„60m“,„2h“,„3h“,„4h “,„6h“,„8h“,„12h“,„24h“)
Range of values:	see parameter description	
Initialwert:	10m	

Note:

The storage intervals of the optional archives 2 to 16 are accessed with the commands "CMD_StoreInt_ARCH_EX2" to "CMD_StoreInt_ARCH_EX16"!

7.2.7 Command BR_COM1

<id>BR_COM1<parameter><CR> Setting of the baud rate COM1

Access: Reading / writing

Description: With the command BR_COM1, the desired baud rate is set for COM1.

Parameter description:

Parameter	Description
12	1200baud
24	2400baud
48	4800baud
96	9600baud
192	19200baud
384	38400baud
576	57600baud
1152	115200baud
2304	230400baud

Value range: 12 / 24 / 48 / 96 / 192 / 384 / 576 / 1152 / 2304

Initial value: 96

7.2.8 Command BR_COM2

<id>BR_COM2<parameter><CR> Setting the baud rate COM2

Access: Reading / writing

Description: With the command BR_COM2, the desired baud rate is set for COM2.

Parameter description:

Parameter	Description
12	1200baud
24	2400baud
48	4800baud
96	9600baud
192	19200baud
384	38400baud
576	57600baud
1152	115200baud
2304	230400baud

Value range: 12 / 24 / 48 / 96 / 192 / 384 / 576 / 1152 / 2304

Initial value: 96

7.2.9 Command BR_USB

<id>BR_USB<parameter><CR> Setting of the baud rate USB

Access: Reading / writing

Description: With the command BR_USB, the desired baud rate is set for USB.

Parameter description:

Parameter	Description
12	1200baud
24	2400baud
48	4800baud
96	9600baud
192	19200baud
384	38400baud
576	57600baud
1152	115200baud
2304	230400baud
2560	256000baud

Value range: 12 / 24 / 48 / 96 / 192 / 384 / 576 / 1152 / 2304 / 2560

Initial value: 1152

7.2.10 Command CMD_TS1_Begin

<id>CMD_TS1_Begin<parameter><CR>	Start time for time slice 1
Access:	Reading / writing
Description:	With the "CMD_TS1_Begin" command, the start time for time slice 1 can be read or set.
Parameter description:	hhmmss hh — Indication of the hour („0“ to „23“) mm — indication of the minute („0“ to „59“) ss — indication of the second („0“ to „59“)
Value range:	See parameter description
Initial value:	0

7.2.11 Command CMD_TS2_Begin

<id>CMD_TS2_Begin<parameter><CR>	Start time for time slice 2
Access:	Reading / writing
Description:	With the "CMD_TS2_Begin" command, the start time for time slice 1 can be read or set.
Parameter description:	hhmmss hh — Indication of the hour („0“ to „23“) mm — indication of the minute („0“ to „59“) ss — indication of the second („0“ to „59“)
Value range:	See parameter description
Initial value:	0

7.2.12 Command CMD_TS3_Begin

<id>CMD_TS3_Begin<parameter><CR>	Start time for time slice 3
Access:	Reading / writing
Description:	With the "CMD_TS3_Begin" command, the start time for time slice 1 can be read or set.
Parameter description:	hhmmss hh — Indication of the hour („0“ to „23“) mm — indication of the minute („0“ to „59“) ss — indication of the second („0“ to „59“)
Value range:	See parameter description
Initial value:	0

7.2.13 Command CMD_TS4_Begin

<id>CMD_TS4_Begin<parameter><CR>	Start time for time slice 4
Access:	Reading / writing
Description:	With the "CMD_TS4_Begin" command, the start time for time slice 1 can be read or set.
Parameter description:	hhmmss hh Indication of the hour („0“ to „23“) mm indication of the minute („0“ to „59“) ss indication of the second („0“ to „59“)
Value range:	See parameter description
Initial value:	0

7.2.14 Command CMD_TS1_End

<id>CMD_TS1_End<parameter><CR>	End time for time slice 1
Access:	Reading / writing
Description:	The end time for time slice 1 can be read or set with the "CMD_TS1_End" command.
Parameter description:	hhmmss hh Indication of the hour („0“ to „23“) mm indication of the minute („0“ to „59“) ss indication of the second („0“ to „59“)
Value range:	See parameter description
Initial value:	0

7.2.15 Command CMD_TS2_End

<id>CMD_TS2_End<parameter><CR>	End time for time slice 2
Access:	Reading / writing
Description:	The end time for time slice 2 can be read or set with the "CMD_TS2_End" command.
Parameter description:	hhmmss hh Indication of the hour („0“ to „23“) mm indication of the minute („0“ to „59“) ss indication of the second („0“ to „59“)
Value range:	See parameter description
Initial value:	0

7.2.16 Command CMD_TS3_End

<id>CMD_TS3_End<parameter><CR>	End time for time slice 3
Access:	Reading / writing
Description:	The end time for time slice 3 can be read or set with the "CMD_TS3_End" command.
Parameter description:	hhmmss hh Indication of the hour („0“ to „23“) mm indication of the minute („0“ to „59“) ss indication of the second („0“ to „59“)
Value range:	See parameter description
Initial value:	0

7.2.17 Command CMD_TS4_End

<id>CMD_TS4_End<parameter><CR>	End time for time slice 4
Access:	Reading / writing
Description:	The end time for time slice 4 can be read or set with the "CMD_TS4_End" command.
Parameter description:	hhmmss hh Indication of the hour („0“ to „23“) mm indication of the minute („0“ to „59“) ss indication of the second („0“ to „59“)
Value range:	See parameter description
Initial value:	0

7.2.18 Command CMD_TS1_Out

<id>CMD_TS1_Out<parameter><CR>	Output/function for time slice 1
Access:	Reading / writing
Description:	With the "CMD_TS1_Out" command, the output/function for time slice 1 can be read or set.
Parameter description:	0 no function 1 Switching contact 1 2 Switching contact 2 3 12V supply at the terminals 32/33
Value range:	See parameter description
Initial value:	0

7.2.19 Command CMD_TS2_Out

<id>CMD_TS2_Out<parameter><CR>	Output/function for time slice 2
Access:	Reading / writing
Description:	With the "CMD_TS2_Out" command, the output/function for time slice 2 can be read or set.
Parameter description:	0 no function 1 Switching contact 1 2 Switching contact 2 3 12V supply at the terminals 32/33
Value range:	See parameter description
Initial value:	0

7.2.20 Command CMD_TS3_Out

<id>CMD_TS3_Out<parameter><CR>	Output/function for time slice 3
Access:	Reading / writing
Description:	With the "CMD_TS3_Out" command, the output/function for time slice 3 can be read or set.
Parameter description:	0 no function 1 Switching contact 1 2 Switching contact 2 3 12V supply at the terminals 32/33
Value range:	See parameter description
Initial value:	0

7.2.21 Command CMD_TS4_Out

<id>CMD_TS4_Out<parameter><CR>	Output/function for time slice 4
Access:	Reading / writing
Description:	With the "CMD_TS4_Out" command, the output/function for time slice 4 can be read or set.
Parameter description:	0 no function 1 Switching contact 1 2 Switching contact 2 3 12V supply at the terminals 32/33
Value range:	See parameter description
Initial value:	0

7.2.22 Command CMD_TS_Eth

<id>CMD_TS_Eth<parameter><CR>		Control network interface via time slices
Access:		Reading / writing
Description:		With the "CMD_TS_Eth" command, the control (activation) of the network interface can be set or read via the 4 time slices.
Parameter description:	0	Network interface permanently active
	1	Network interface via time slices aktiv
Value range:		See parameter description
Initial value:		0

7.2.23 Command DF_INI

<id>DF_INI<parameter><CR>		Readout archive configuration
Access:		Reading
Description:		With the command “DF_INI”, the available archive name and its configuration are read.
Parameter description:	AAAABBBBBB	
	AAAA	Stating of the archive with 3 and/or 4 places (“AV1” to “AV16” or “EX1” to “EX16”).
	AAAABBBBBB	With the parameter “ARCH_NAMES”, all archive names are output
Value range:		see parameter description
Initial value:	-	

7.2.24 Command DHCP

<id>DHCP<parameter><CR>		Switch DHCP on or off
Access:		Reading / writing
Description:		The command „DHCP“ determines if the IP address is requested automatically by the DHCP server or is used the fixed address.
Parameter description:	0	IP- settings of preset values
	1	IP-settings will be requested ans accenpted by the DHCP-Server at start
Value range:		0, 1
Initial value:		1

7.2.25 Command DS

<id>DS<parameter><CR>	Readout archive
Access:	Reading / writing
Description:	With the command “DS”, the archived measured values are output in lines separated by semicolon characters. If no parameter is stated, all archived measured values are output.
Parameter description:	AAAA BBBBBBBBBBBB EEEEEEEEEEEE
AAAA:	Stating of the archive with 3 and/or 4 digits (“AV1” to “AV16” or “EX1” to “EX16”)
BBBBBBBBBBBB:	Starting time of the form YYMMDDHHNNSS (YY: year, MM: month, DD: day, HH: hour, NN: minute, SS: second)
EEEEEEEEEEEE:	Ending time of the form YYMMDDHHNNSS (YY: year, MM: month, DD: day, HH: hour, NN: minute, SS: second)
Value range:	see parameter description
Initial value:	

7.2.26 Command DS_ESC

<id>DS_ESC<CR>	Stop readout process for archive
Access:	Reading / writing
Description:	With the command “DS_ESC”, the readout of an archive (➔Command DS) is stopped.
Value range:	
Initial value:	

7.2.27 Command DD

<id>DD<parameter><CR>	Date
Access:	Reading / writing
Description:	With the command “DD”, the current date is read or set.
Parameter description:	YYMMDD YY: year MM: month TT: day
Value range:	
Initial value:	

7.2.28 Command FB

<id>FB<parameter><CR>	Quick start mode
Access:	Reading / writing
Description:	With the command “FB”, the quick start mode is set.
Parameter description:	0: quick start mode switched off 1: quick start mode switched on
Value range:	0...1
Initial value:	1

7.2.29 Command HI

<id>HI<parameter><CR>	Hardware ID
Access:	Reading
Description:	With the command “HI”, the 128-bit hardware identification number (clear identification) is read.
Parameter description:	32 places in hexadecimal representation Example 533331003846344D3330313034363038
Value range:	
Initial value:	

7.2.30 Command ID

<id>ID<parameter><CR>	Identification number
Access:	Reading / writing
Description:	This command sets the identification number (THIES interpreter) and/or the slave address (MODBUS RTU Interpreter). A response telegram is only sent if the ‘id’ contained in the command agrees with the one set in the weather station. An exception to this is the generic ‘id’, to which all weather stations respond (THIES Interpreter). After the ‘id’ has been changed the device responds immediately with the new ‘id’.
Parameter description:	99 generic ‘id’ (THIES interpreter) 0 broadcast slave address (MODBUS RTU interpreter)
Value range:	0 to 99 (THIES interpreter) 1 to 247 (MODBUS RTU interpreter)
Initial value:	0 (THIES interpreter) 1 (MODBUS RTU interpreter)

7.2.31 Command IP_ADDR

<id>IP_ADDR<parameter><CR>	IP address
Access:	Reading / writing
Description:	With the command “IP_ADDR”, the IP address of the Data logger is set.
Parameter description:	AAA.BBB.CCC.DDD
	AAA Byte0 (hi-byte)
	BBB Byte1
	CCC Byte2
	DDD Byte3 (lo-byte)
Value range:	0…4294967295 (in 4-byte notation)
Initial value:	0

7.2.32 Command IP_GW

<id>IP_GW<parameter><CR>	IP gateway
Access:	Reading / writing
Description:	With the command “IP_GW”, the gateway of the Data logger is set.
Parameter description:	AAA.BBB.CCC.DDD
	AAA Byte0 (hi-byte)
	BBB Byte1
	CCC Byte2
	DDD Byte3 (lo-byte)
Value range:	0…4294967295 (in 4-byte notation)
Initial value:	0

7.2.33 Command IP_SNM

<id>IP_SNM<parameter><CR>	IP subnet mask
Access:	Reading / writing
Description:	With the command “IP_SNM”, the IP subnet mask of the Data logger is set.
Parameter description:	AAA.BBB.CCC.DDD AAA Byte0 (hi-byte) BBB Byte1 CCC Byte2 DDD Byte3 (lo-byte)
Value range:	0…4294967295 (in 4-byte notation)
Initial value:	0

7.2.34 Command KY

<id>KY<parameter><CR>	Key/password
Access:	Reading / writing
Description:	With the command “KY”, the value is set for the key (password). To change parameters, the necessary password must be set.
Parameter description:	0 no password 234 password for user level
Value range:	0 / 234
Initial value:	0

7.2.35 Command LA

<id>LA<parameter><CR>	Language
Access:	Reading / writing
Description:	With the command “LA”, the language used in the display is set.
Parameter description:	0 German 1 English
Value range:	0 / 1
Initial value:	0

7.2.36 Command LL

<id>LL<parameter><CR>	Logger status	
Access:	Reading / writing	
Description:	With the command “LL”, the current logger status is read out.	
Parameter description:	1	Output of the device descriptors re. serial sensors
	2	Output of binary configuration
	3	Output of MEVIS compatible configuration
	10	Output of the number of data bytes in the input FIFO for the communication with the LINUX board
	11	Output of data bytes in the input FIFO for the communication with the LINUX board
	12	Output of the data bytes in the input FIFO for the communication with the LINUX board (non-representable characters with #xx)
	20	Output of the ASCII table for LCD (ASCII value, height and width)
Value range:		
Initial value:	0	

7.2.37 Command mm

<id>mm<parameter><CR>	Output of the instantaneous values	
Access:	Reading / writing	
Description:	With the command mm, all configured instantaneous values are output in one line.	
Parameter description:	1	Instantaneous values in accordance with archive AV1
	2	Instantaneous values in accordance with archive AV2
	…	
	16	Instantaneous values in accordance with archive AV16
	255	All instantaneous values in sequence (AV1…AV16)
	CFG	Configuration for output using „mm255“
Value range:	1…16 / 255 / CFG	
Initial value:		

7.2.38 Command MM

<id>MM<parameter><CR>	Output der instantaneous values
Access:	Reading / writing
Description:	With the command MM, all configured instantaneous values are output in lines, with pre- and post-text (channel name / unit). If the call takes place with the parameter STS, the status words are output in brackets in addition to the instantaneous values.
Parameter description:	ADC Output of the raw values of the ADC STS Output der instantaneous values with status word
Value range:	
Initial value:	

7.2.39 Command MM_MEAN

<id>MM_MEAN<parameter><CR>	Output of the average values
Access:	Reading
Description:	With the command MM_MEAN, all current measured values are output in accordance with configuration, in lines, with pre- and post-text (channel name / unit).
Parameter description:	
Value range:	
Initial value:	

7.2.40 Command MM_EX

<id>MM_EX<parameter><CR>	Output of the extreme values
Access:	Reading
Description:	With the command MM_EX, all current extreme values are output according to the configuration, in lines, with pre- and post-text (channel name / unit).
Parameter description:	
Value range:	
Initial value:	

7.2.41 Command RS

<id>RS<parameter><CR>	Reset
Access:	Reading / writing
Description:	With the command RS, the reset source is requested (reading without parameter) or a reset carried out (writing with any desired parameter). The following reset sources can be output: GENERAL RESET BACKUP RESET WATCHDOG RESET SOFTWARE RESET USER RESET
Parameter description:	1 Shut down Data logger 2 Shut down Data logger and carry out reset
Value range:	
Initial value:	

7.2.42 Command SV

<id>SV<CR>	SW version
Access:	Reading
Description:	With the command SV, the software version number can be read.
Parameter description:	-
Response telegram:	-
Value range:	-
Initial value:	-

7.2.43 Command WLAN

<id>WLAN<parameter><CR>	WLAN Status
Access:	Reading / writing
Description:	With command „WL“ the status for WLAN is queried (read without parameters) or switched between Ethernet and WLAN (writing with parameter).
Parameter description:	0 Ethernet on / WLAN off 1 Ethernet on / WLAN on
Value range:	0 / 1
Initial value:	0

7.2.44 Command WL_ADDR

<id>WL_ADDR<parameter><CR> WLAN IP-Address

Access:	Reading / writing
Description:	With command „WL_ADDR“ will set the IP adress for WLAN of the Data logger.
Parameter description:	AAA.BBB.CCC.DDD
	AAA Byte0 (Hi-Byte)
	BBB Byte1
	CCC Byte2
	DDD Byte3 (Lo-Byte)
Value range:	0…4294967295 (in 4Byte spelling)
Initial value:	0

7.2.45 Command WL_DHCP

<id>WL_DHCP<parameter><CR> Switch the WLAN DHCP on oder off

Access:	Reading / writing
Description:	With command „WL_DHCP“ determines if the IP address for the WLAN is automatically requested by the DHCP server or the fixed address is used.
Parameter description:	0 IP-settings of the preset value
	1 IP- settings are requested and accepted by the DHCP server at startup.
Value range:	0, 1
Initial value:	1

7.2.46 Command WL_GW

<id>WL_GW<parameter><CR> WLAN IP-Gateway

Access:	Reading / writing
Desciption:	With command "WL_GW" will set the gateway for WLAN of the Data logger.
Parameter description:	AAA.BBB.CCC.DDD
	AAA Byte0 (Hi-Byte)
	BBB Byte1
	CCC Byte2
	DDD Byte3 (Lo-Byte)
Value range:	0…4294967295 (in 4Byte spelling)
Initial value:	0

7.2.47 Coammand WL_SNM

<id>WL_SNM<parameter><CR>	WLAN IP-Subnetzmaske
Access:	Reading / writing
Description:	With command „WL_SNM“ will set the IP subnet mask for WLAN of the Data logger.
Parameter description:	AAA.BBB.CCC.DDD
	AAA Byte0 (Hi-Byte)
	BBB Byte1
	CCC Byte2
	DDD Byte3 (Lo-Byte)
Value range:	0…4294967295 (in 4Byte Schreibweise)
Initial value:	0

7.2.48 Command WL_PSK

<id>WL_PSK<parameter><CR>	WLAN PSK
Access:	Reading / writing
Desctiption:	With command "WL_PSK" will set the key (Pre Shared Key) for the WLAN of the Data logger. The parameter represents a string with a maximum of 16 characters.
Parameter description:	String with max. 16 characters
Value range:	
Initial value:	

7.2.49 Command WL_SSID

<id>WL_SSID<parameter><CR>	WLAN SSID
Access:	Reading / writing
Description:	With command "WL_SSID" will set the network name (Service Set Identifier) for WLAN of the Data logger. The parameter represents a string with a maximum of 32 characters.
Parameter description:	String with max. 32 characters
Value range:	
Initial value:	

7.3 Query the Instantaneous Values via Modbus RTU (COM1/COM2)

The DLU can provide the instantaneous values including their status (see status overview **table 7**: status word) as Modbus RTU slave via COM1 or COM2 (server).

The instantaneous values are represented as 4-byte floating point values (FLOAT according to IEEE754) and the measured value status as unsigned 16-bit values (U16). During transmission, the most significant byte is started ("big endian" format).

A document with the description of the available register addresses is automatically generated during the configuration with the PC program "ThiesDeviceUtility" (when saving the configuration). The following figure shows an example of this register description.

Factory setting datalogger DLU
Register addresses of instantaneous values (MODBUS-RTU)
AB0

Byte order: big endian
Configuration GUID: {C86A0832-7EDB-43B9-9112-21E029502824}

Register address	Data type	Instantaneous values	Unit
35001	FLOAT	Air temperature	°C
35003	U16	State Air temperature	
35004	FLOAT	Radiation	W/m^2
35006	U16	State Radiation	
35007	FLOAT	Air pressure	hPa
35009	U16	State Air pressure	
35010	FLOAT	sunshine	Yes/No
35012	U16	State sunshine	
35013	FLOAT	rel. Humidity	%r.H.
35015	U16	State rel. Humidity	
35016	FLOAT	Precipitation	mm
35018	U16	State Precipitation	
35019	FLOAT	int. Temperature	°C
35021	U16	State int. Temperature	
35022	FLOAT	Battery voltage	V
35024	U16	State Battery voltage	
35025	FLOAT	Battery current	A
35027	U16	State Battery current	
35028	FLOAT	Evaporationlevel	mm
35030	U16	State Evaporationlevel	
35031	FLOAT	Windspeed (COM1, US2D, ID=1)	m/s
35033	U16	State Windspeed (COM1, US2D, ID=1)	
35034	FLOAT	Wind direction (COM1, US2D, ID=1)	°
35036	U16	State Wind direction (COM1, US2D, ID=1)	
35037	FLOAT	Virt. temp. (COM1, US2D, ID=1)	°C
35039	U16	State Virt. temp. (COM1, US2D, ID=1)	
35040	FLOAT	Temp.1 Uni.Amp. (COM1, Uni. Ampl., ID=2)	°C
35042	U16	State Temp.1 Uni.Amp. (COM1, Uni. Ampl., ID=2)	
35043	FLOAT	Sunshineduration	min
35045	U16	State Sunshineduration	
35046	FLOAT	Case temp. SR05 (COM2, PyranoSR05, ID=1)	°C
35048	U16	State Case temp. SR05 (COM2, PyranoSR05, ID=1)	
35049	FLOAT	Glob. rad. (COM2, PyranoSR05, ID=1)	W/m^2
35051	U16	State Glob. rad. (COM2, PyranoSR05, ID=1)	

Figure 43: Modbus register addresses of the instantaneous values example

8 Bootloader

The program for the DLU Data logger can be changed via an interface. The program is divided into two parts:

1. Bootloader
2. Firmware

The bootloader is programmed at the factory during production of the device and can not be changed in the field. The application program (firmware) can be changed in the field using the bootloader. The bootloader can receive the firmware via one of the following interfaces:

- Serial interface (virtual COM port, see marking "1" in **Figure 1: Map of the connections**)
- SD-card

The X-Modem protocol with CRC is used for data transmission via the serial interface. The program file (firmware) is in format Extended-Intel-Hex.

The following steps take place when the Data logger is restarted.

1. Start Bootloader
2. Approx 10s waiting for receiving firmware or a firmware file to be recognized on the SD card.
3. Programming the firmware if a firmware is detected in step 2.
4. Start the firmware.

If no SD card with firmware is inserted, the boot loader issues the following message when restarting:

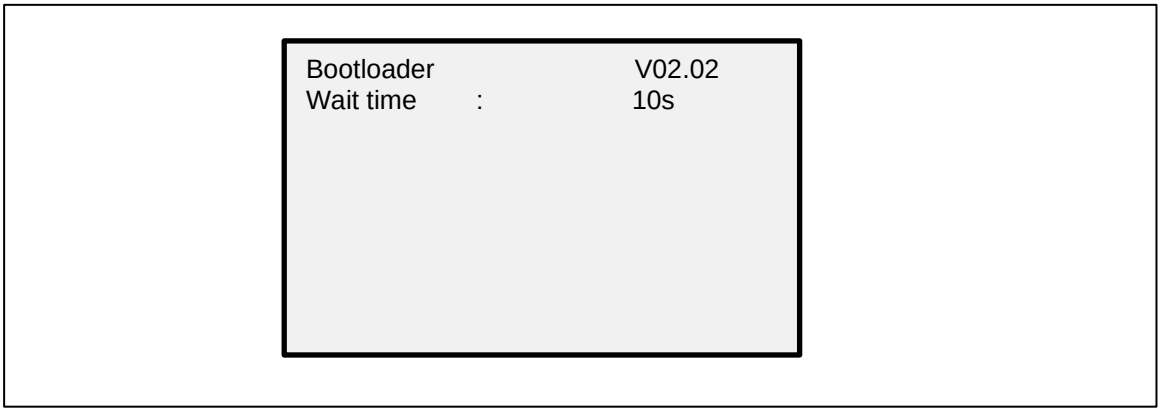


Figure 44: Message when restarting with SD card without bootloader

The number behind "Wait time:" is decremented to 0 every second. This means, that the Data logger DLU waits 10 seconds for the receipt of a firmware or the recognition of a firmware file on the SD card.

8.1 X-Modem CRC (Serial Interface)

The X-Modem-Bootloader always starts with a baud rate of 115200Baud 8N1. The following message appears on a connected terminal program:

Bootloader V02.02

The bootloader outputs the character 'C' every second. This character is the start sequence for the X-Modem protocol. The file of the company goods can now be sent in the terminal program. The protocol used is X-Modem CRC.

After programming the firmware or after the 10s have past, the bootloader starts the firmware. The following message appears on a connected terminal program:

START FW

8.2 Firmware from SD-card

Is an SD card in the slot provided at start-up and a "DluFirm.hex" file is available on the SD card, the bootloader outputs the following message:

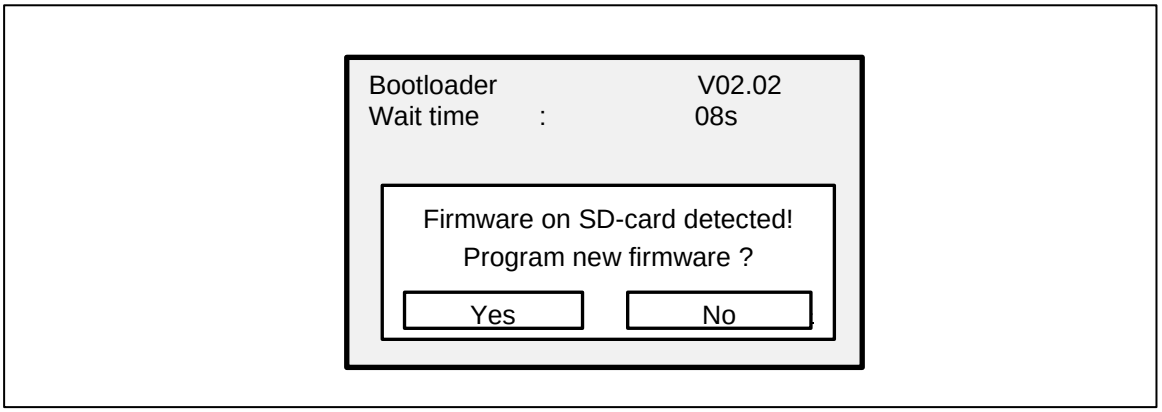


Figure 45: Bootloader output at display (with SD-card)

Pressing "Yes" button to start programming the new firmware. After programming the firmware or after the 10s have past, the bootloader starts the firmware:

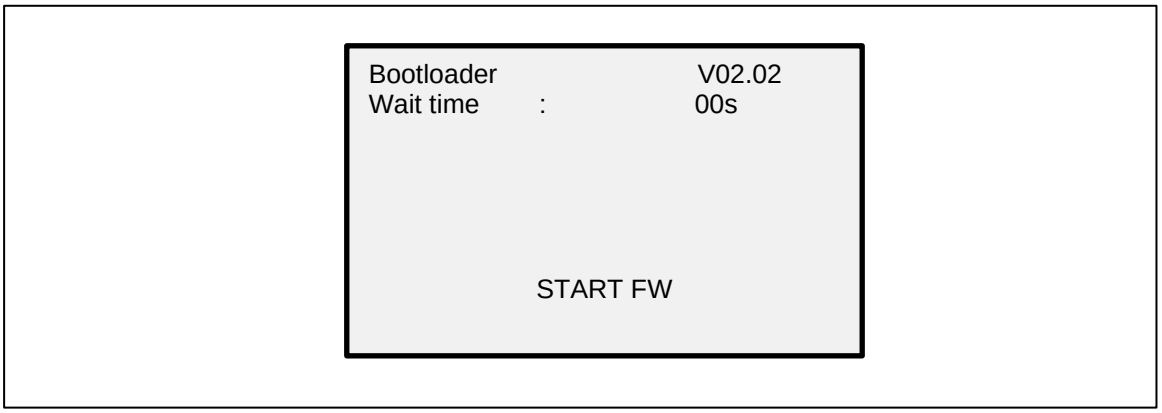


Figure 46: Bootloader output at display (start of the firmware)

9 WEB-Server

The DLU is equipped with a WEB server that supports a WEB display of the instantaneous and archive values. Via the submenu LAN and WiFi settings and also logins can be made and set.

To use the WEB page, the DLU must be connected to the internet or a local network via a LAN connection and a valid IP address for the network must be set in the logger (see 4.5 network module). The WEB server can be accessed from any computer with a WEB browser in the same network by entering the IP address of the logger in a WEB browser.

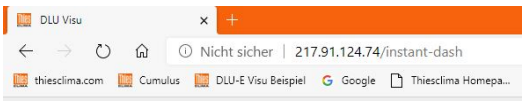


Figure 47: IP-address in WEB browser

A correct entry always begins with **http://**, followed by the IP address e.g. **217.91.124.74**. Each of the numbers separated by dots can be between 0 and 255. After successfully entering the IP address of the logger and confirming with the Enter key, the start page of the DLU is displayed with the current values.

After restarting the logger, it can take up to **5 … 15 minutes** for the data on the WEB server to be displayed. Use the and buttons to scroll through the DLU menu until the Ethernet settings page is visible. The IP address used is displayed there.

If your PC or your local network supports the mDNS (Multicast DNS) service, you can also enter “dlu.local” in the browser. Then the WEB page of the DLU is also called up with this address.

9.1 Start-Page

The start page consists of two parts. In the upper area, the current time, the date, the station name and a green point (the green point shows you if to the logger is online, if the logger is offline the point is orange). There are also buttons in the upper area

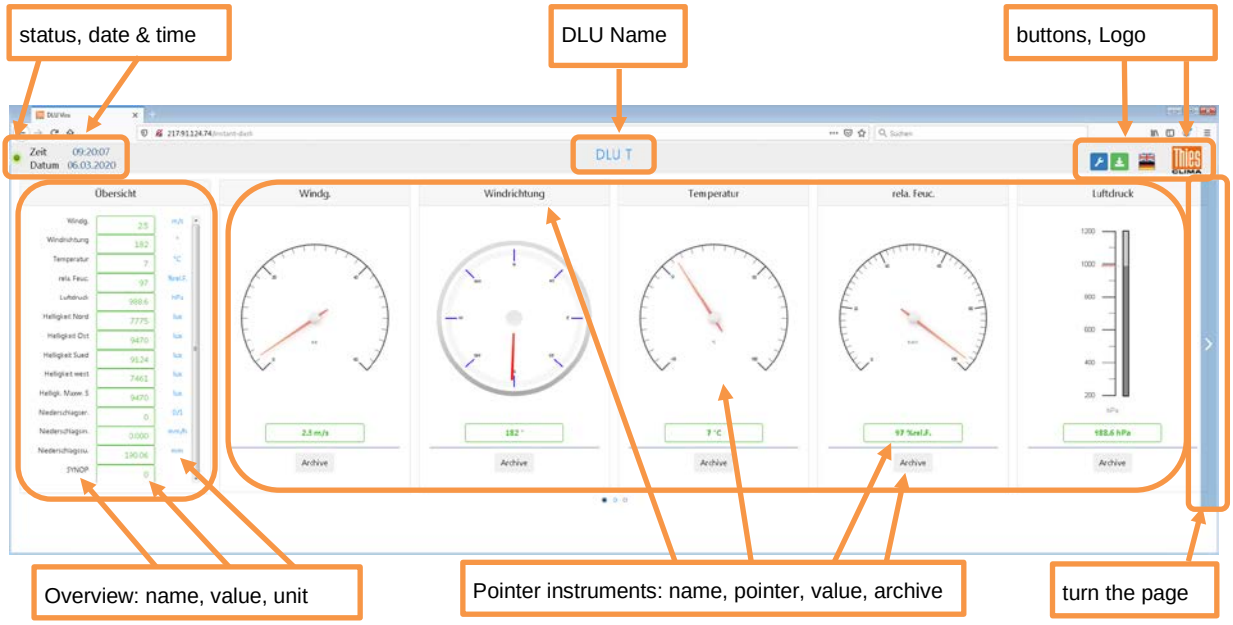


Figure 48: Start WEB page

The button opens the settings menu that requires a login. The button opens the menu for data export (download) and the last two buttons are used to switch the language between German and English. The Thies logo can be seen on the far right. In the lower part, on the left side, the current values of the data logger are shown in an overview one below the other. To the right of this, the measured values are shown in pointer instruments.

To display further pointers, the right edge must be clicked. A blue bar with an arrow appears (see figure above). The blue bar on the right-hand side can be used to scroll to other displays on the right-hand side. If the left edge is clicked with the mouse, a blue bar also appears to scroll to the left. At the end of the pages, the blue bar disappears for the page. The display of the sensor values depends on the current configuration. There is a gray field under each pointer instrument Archive, these buttons open the menus for the archive values.

9.2 View archived Data Values

Via the button Archive windows are opened that graphically display the archive values of the logger for the sensor.

The period for the displayed values can be selected from 6 fixed time ranges (see figure below). The characteristic curves for the mean value, the minimum and the maximum value are displayed.

The scaling of the vertical axis can be switched between the full range of values of the sensor and auto scaling. With automatic scaling, the optimal resolution is selected for the vertical axis. A second checkmark can be used to fill the area below the characteristic lines with color.

Figure 49: View archive data value wind speed as lines

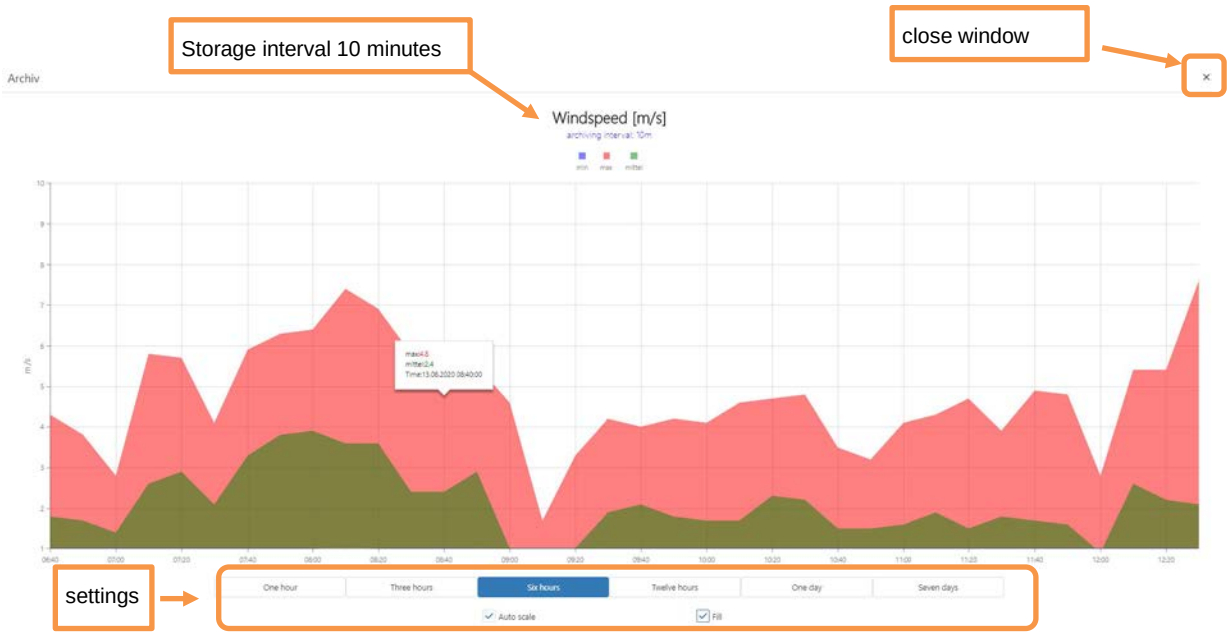
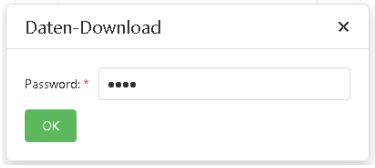


Figure 50: Display of archive values, wind speed, filled areas

9.3 Data Export

The botton  opens the menu for data export.

Via the submenu  , a password can be assigned for the download on the configuration WEB page. If a password has been assigned, the following login mask opens first:



After entering the correct password and pressing the button  , or in the case of no password, a download window will appear that looks like this:

Figure 51: data download via WEB

The start and end date for the period to be read must be specified in the window under **Min. Date** and **Max. Date**. This can be done using the buttons or by changing the preset date.

By placing a check mark to the left of the files, it is determined that the file should be exported. The button enables further files to be displayed.

Via the button  the download will start. Then a new window opens, in which it must be determined whether the files should only be opened or saved. If necessary, another window opens to specify the destination. The **X** in the upper right corner is for closing the window.

9.4 Setting via WEB-Server

With button  and password opens the setting menu.

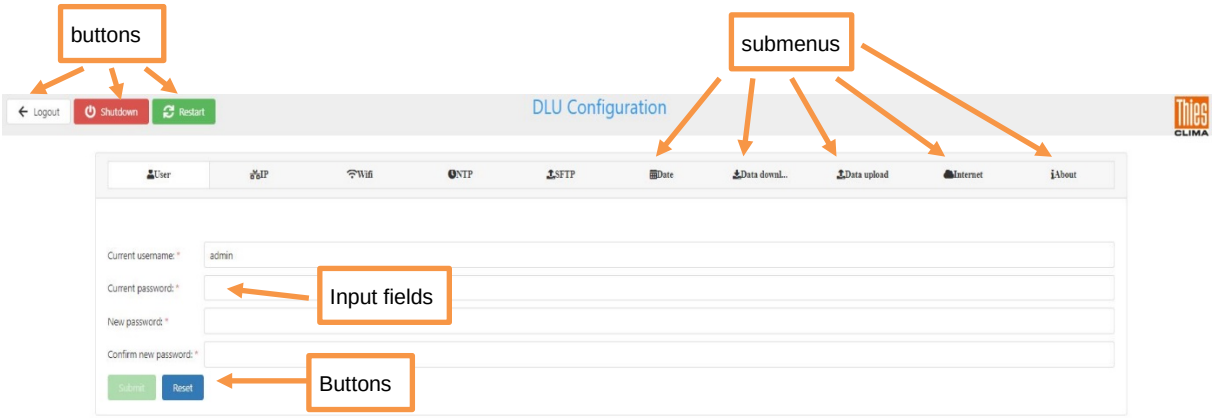
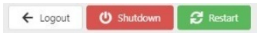


Figure 52: Homepage DLU settings

In the menu you have following submenus:

- User (Start window)
- IP-configuration
- Wifi
- NTP
- SFTP
- Date
- Data download
- Data upload
- Internet
- Info

The user settings can only be reached with the user name **admin** and the password **1111** on delivery. In the settings, the password can be changed on the User tab.

The buttons  are self-explanatory and are used to log out of the configuration menu, to switch off the logger and to perform a restart.
Pressing the button  sends the settings in the WEB view to the data logger. Up to this point in time, the settings in the DLU are unchanged, regardless of what was entered on the WEB page. Use the Reset button to reset the settings on the WEB page to the values from the DLU.

Note:

*All input fields preceded by an * are mandatory fields to enter something.*

Settings are only adopted by the DLU after pressing  *Some settings also require a restart.*

9.5 Benutzer

In the submenu 

the login information for the WEB settings is set. The user name is preset **admin** und als Passwort **1111**. After changing the settings and losing your username and password, there is no way to change the system settings.

Note:

The username and login must be kept safe. No changes are possible without access !

9.6 IP-Settings

In the submenu 

the IP settings of the DLU are configured for the LAN connection.

A click at DHCP (Dynamic Host Configuration Protocol) activates the automatic setting of the parameters via the WEB server. If the DHCP mode is switched off e.g. because the network does not support DHCP, at least the IP address and the subnet mask must be set. The gateway and the DNS (Domain Name System) server are optional.

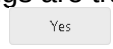
The gateway only needs to be set if the DLU is to be accessed externally via a gateway in the local network.

A DNS address only needs to be specified if the logger is to be accessed by name.

Note:

The gateway address must be specified in order to use NTP.

With button 

the settings are transferred to the data logger. This must be included in another window, with button 

to be confirmed or by 

canceled.

It is recommended to switch off the DHCP after the first start and to use a fixed IP address. You get the IP address, subnet mask, gateway and DNS server from your network administrator.

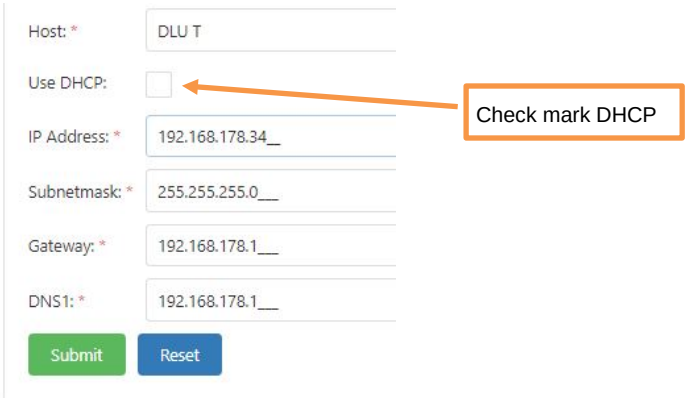


Figure 53: Submenu IP-Adresse

9.7 WIFI

In submenu Wifi the settings for Wifi are configured. An accessory is available for WiFi operation **Wifi-Antenna** (see chapter 15 Accessories) necessary in the USB slot of the data logger. Without an antenna, the checkmark for activation cannot be set.

The configuration must be distinguished between DHCP and non-DHCP networks. With the LAN network, the IP address for the WiFi is automatically assigned by the server in the DHCP WiFi network. Without DHCP, the information for the IP address, subnet mask, DNS1 and gateway must be requested from the system administrator and set on the logger. For routers, the information must be looked up in the manual.

Figure 54: WIFI configuration

*Required fields

First you have to check the box next to **Wifi** to use it. The other fields cannot be selected without the check mark. The **SSID** (Service Set Identifier) automatically recognizes the available networks. The right network must be selected here. The password for the WiFi network access must be entered under **password** and **confirm password**.

Depending on the network type, either the checkmark next to Use **DHCP** must be set or the parameters subnet mask, DNS1, IP address and gateway must be configured with the necessary parameters.

With Submit the data is sent to the DLU and stored permanently. Before that, a window opens in which the uploading with Yes must be confirmed. Otherwise it is canceled.

A restart is required to activate new WiFi settings. After the restart, the start window appears again with the current values. To check the settings, you have to **log in** again as **admin**. As soon as the Wifi menu is opened, the current settings for Wifi are downloaded from the DLU and can be corrected and uploaded again if necessary.

The buttom Reset resets the settings in the window to the settings of the DLU.

The button Reset Wifi should only be used in an emergency if the DLU does not get an IP address from the DHCP server of the WiFi network and the settings are to be deleted.

9.8 NTP

With NTP the time synchronization can be activated via NTP. The time of the DLU is then automatically set **UTC**.

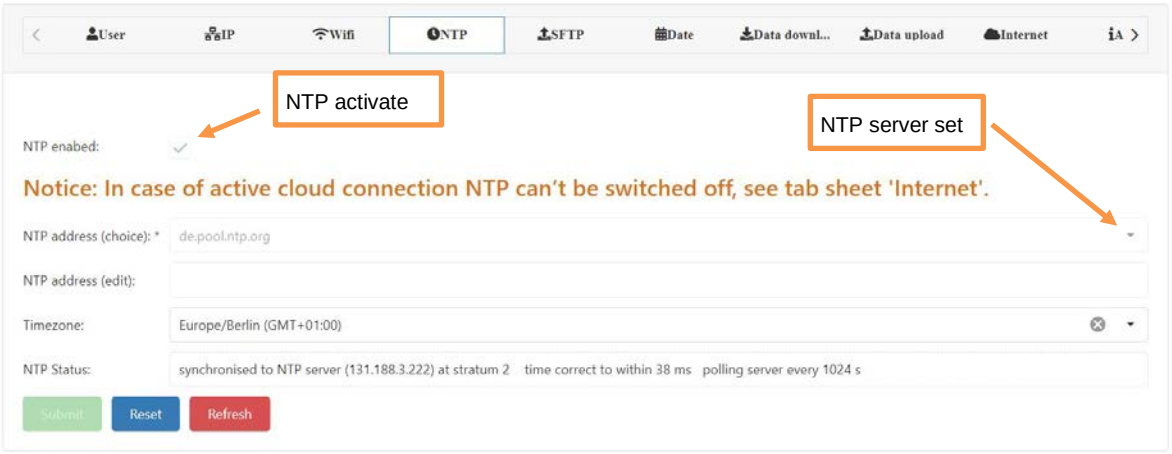


Figure 55: NTP configuration

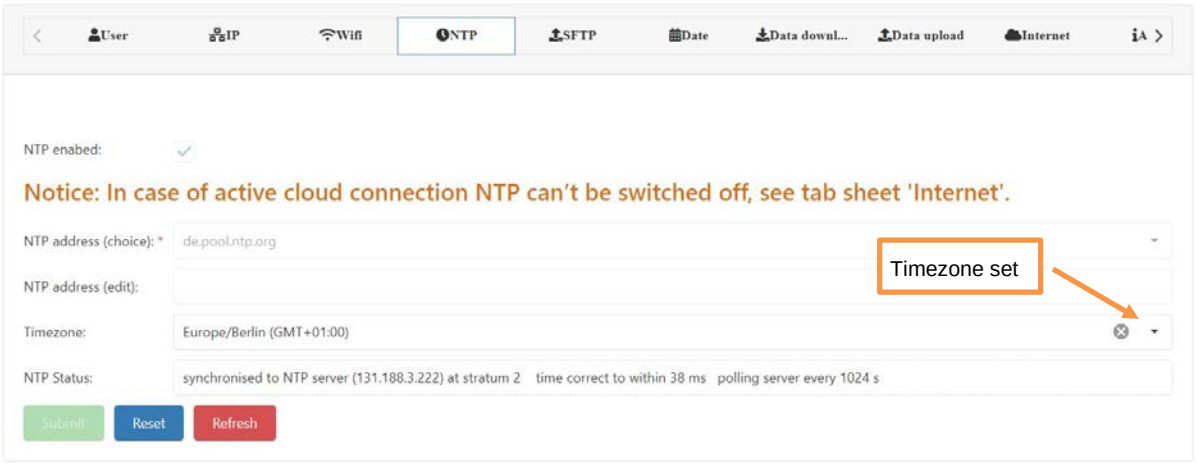


Figure 56: Set NTP timezone

When **NTP** is switched on, the time **cannot** be changed using the **time** and **date**.

The checkmark **NTP enabed** activates the NTP synchronization. In the line **NTP address (choice)** an **NTP** server can be selected or in line **NTP address (edit)** an **NTP** server can be enter.

Using the drop down to select the time zone.

With Submit the data is sent to the DLU and stored permanently. Before that, a window opens in which the uploading with Yes must be confirmed. Otherwise it is canceled.

With Refresh the WEB page is updated with the data from the DLU.

Button Reset has currently no function.

9.9 SFTP

With the menu SFTP you can set and allows additional users to read the data over **SFTP**. On delivery there is only the admin, but he has no SFTP access rights.

A user must be created to use SFTP. To do this, click the button + to add a new user.

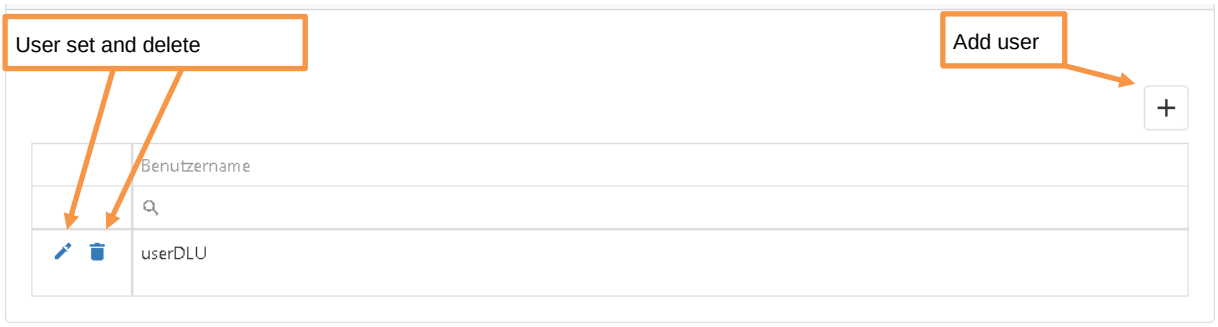


Figure 57: SFTP setting

If you click the button + to add a new user open as follows:

Figure 58: Add user to SFTP

Enter the user name and the same password twice in the menu and with Save save. With Cancel the process can be canceled.

To chance the password, click the button . The window for creating a user opens again with the current settings. Enter the password twice and save with Save. The window closes after a successful change.

To delete using the button . The deletion of a user requires another confirmation with in a new opened window Yes.

9.10 Date

The date and time can be set via the manu Datum. The settings are only possible if in the menu NTP, NTP synchronization is switched off.

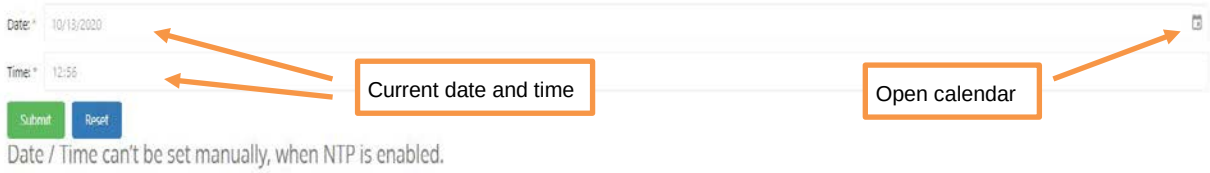


Figure 59: Menu to set time and date

The date can be selected and entered manually. Alternatively, you can use the button the calendar is opened and a date can be selected. The current time must be selected in the line for the time and can then be changed by entering a valid time.
With the button Reset the settings are reset to the old values.
With Submit the data is sent to the DLU and stored permanently. Before that, a window opens in which the uploading with Yes must be confirmed. Otherwise it is canceled.

9.11 Data Download Password

With Daten Dow... you can set the password for data download via WEB. The menu determines if a password necessary and which for download data.

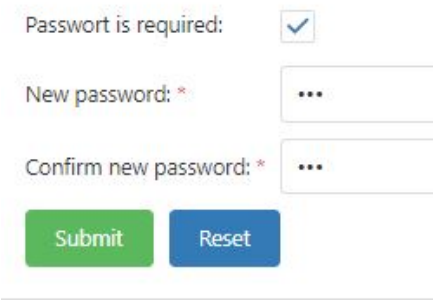


Figure 60: Password menu data download

With Submit the data is uploaded to the logger and stored non-volatile.
Press Reset resets the display to the initial values.

9.12 Data Upload

With button Daten Upload you can reach the WEB and firmware upload.

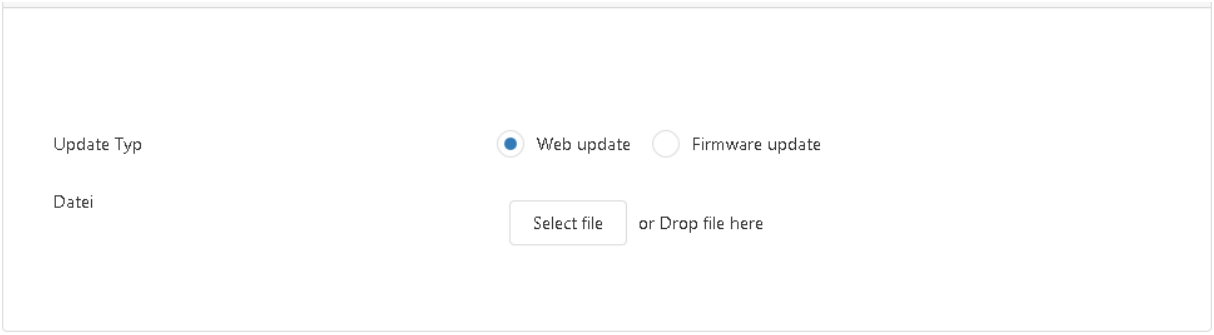


Figure 61: Menu data upload

The update type determines which type of update should be carried out. You can choose between WEP and firmware update. If you select the "Firmware update" option, the configuration can also be updated. By pressing the button Select file opens a window for selecting the desired files. In the window the files can be selected and with Öffnen loading. The new buttons then appear Upload, ↥ und ✕.
With the button Upload and ↥ the files can be uploaded to the DLU. With ✕ you can cancel the upload.

Note:
The file name for the firmware update must be "DluFirm.hex".

Note:
The file name for the configuration update must be "config.cfg".

9.13 Internet Cloud Connection

With the button Internet the menu for setting the cloud connection can be called up. With this setting you can activate / deactivate the cloud connection and check the internet status of the cloud server. The cloud connection is activated by default (default value).

Attension:

If the DLU has no internet connection and is only operated in the LAN, the cloud connection must be deactivated.

In the Internet tab you can check the status of the cloud server and the data exchange status with the cloud.

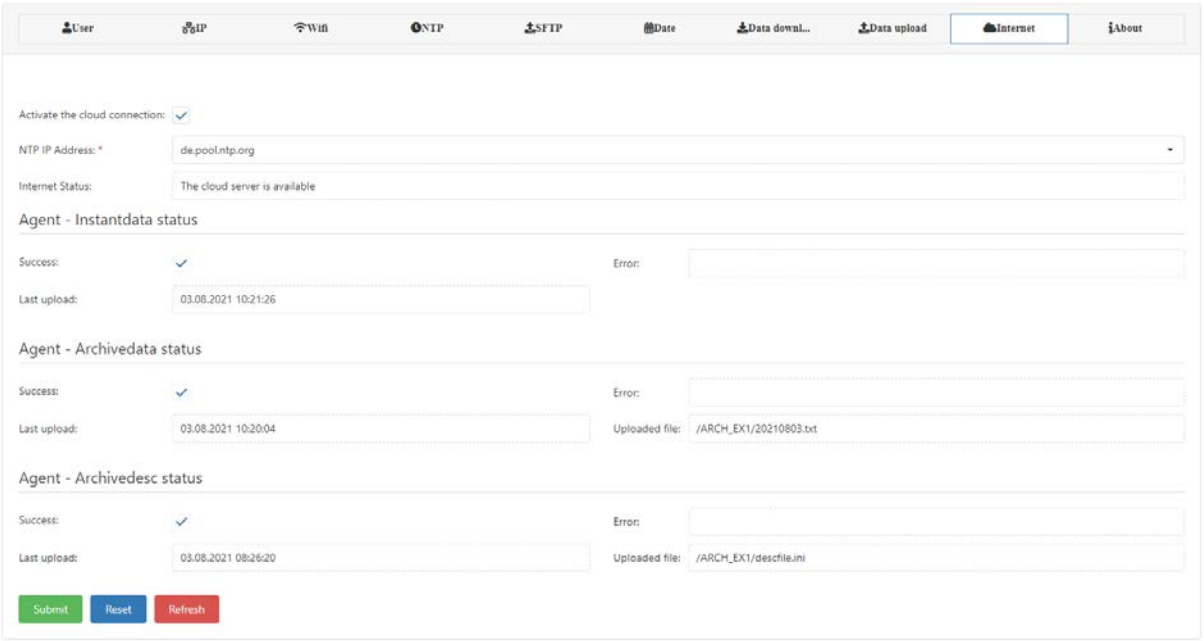


Figure 62: Cloud connection

9.14 Info

The page iInfo show the most important logger information.

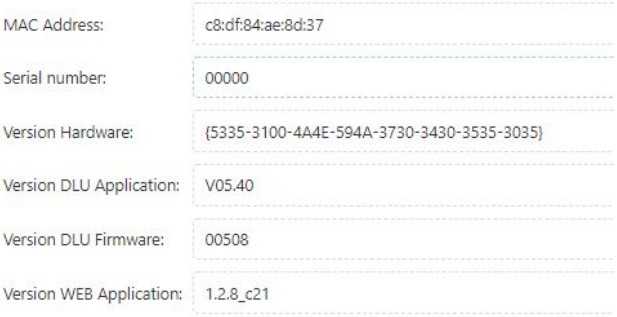
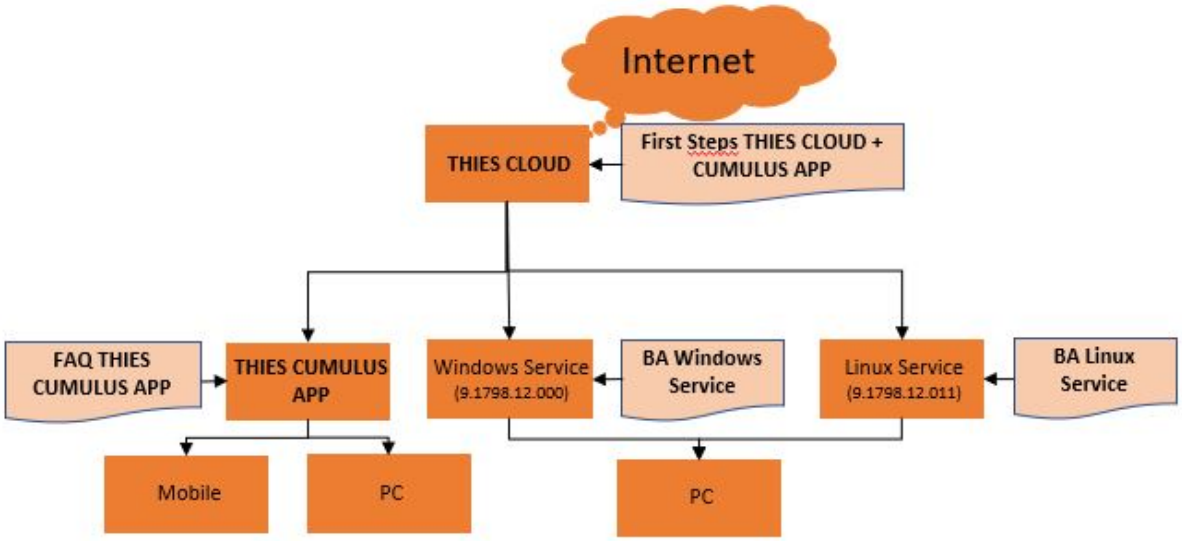


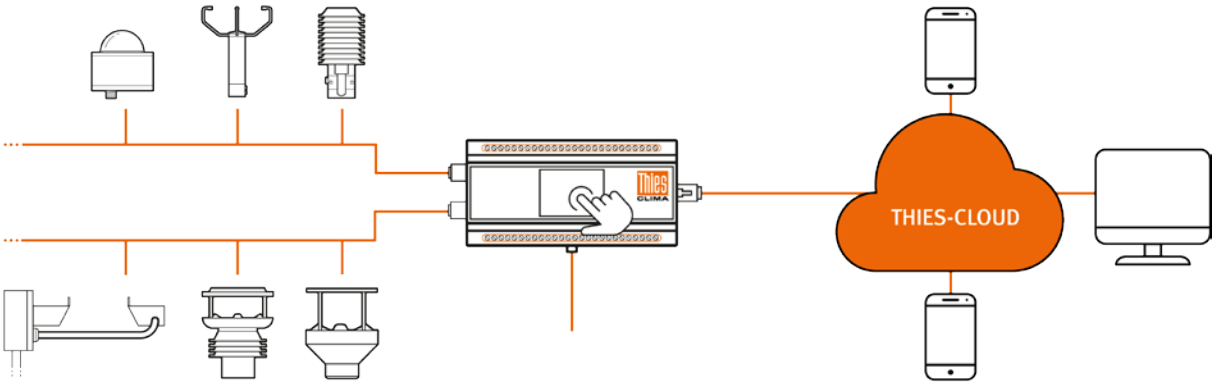
Figure 63: Data logger information

10 THIES Cloud and THIES Cumulus

With the DLU-E you have the possibility to integrate your data logger into the THIES cloud. The following graphics show the possibilities of uses.

You can access the THIES cloud via the WEB (https://www.thiescloud.com/cumulus) or via the THIES Cumulus app with smartphone. The THIES Cumulus app is available for android and IOS in all common stores.





- Saving data
- Management of stations
- Management of users
- Provide and evaluate data
- Transparent access on stations

Further information can be found in the description of the THIES Cloud and THIES Cumulus. Please contact our sales.

11 Technical Data

Housing	plastic
Protection class	IP 20
Current supply	
Supply	24VAC, ± 20%, 0.5A (max. 2A) 24VDC, ± 25%, 0.5A (max. 2A)
Accumulator	Lead accumulator[1)] e.g. 12 VDC, 7 Ah Voltage monitoring [2)] Voltage < 11V: - Deactivate (open) the configurable switching contacts - Exit mode when voltage > 11.5V Voltage < 10,5V: - Switch off the configurable encoder supplies - Switch off the network interface - Switch off COM1 and COM2 - Display of the message "!!! low battery voltage" in the display Exit mode if voltage > 11V
Solar panel	22V no-load voltage, 17V nominal voltage, any power [1)] The following solar modules from Thies can be used: 9.1708.00.000 SOLAR PANEL 12V / 5.5W 9.1708.10.000 SOLAR PANEL 12V / 5.5W 9.1708.20.050 SOLAR PANEL 12V / 50W 9.1708.20.100 SOLAR PANEL 12V / 100W
Average electricity consumption Inactive: COM1, COM2, digital outputs Active: Pt100, analogue IN1, analogue IN2, Analog IN3, rel. humidity, battery current measurement, battery voltage measurement, measuring int. temperature	max. 32mA (Display on, max. clock frequency) min. 1.7mA (Display off, power saving mode active)
Ambient conditions	
Operating temperature	-20 ... +70°C
Storage temperature	-30 ... +80°C
Humidity	max. 100% rel. H, non-condensing
Configurable sensor supply	
3.3V	max. 1.5A (with electronic fuse)
5V	max. 0.5A (with electronic fuse)
12V	max. 1.5A (with electronic fuse)

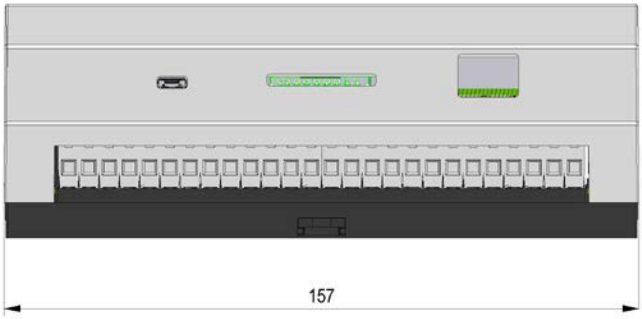
Analogue measurement	
A/D converter	16-bit resolution with differential inputs and 50/60Hz suppression
Accuracy analogue	±0.1% of the measuring span of the sensors, without long-term drift ±0.1°C
Channels	1. supply voltage / battery voltage 2. battery current (±4A) 2. temperature Pt100 (-40...70°C) 3. rel. humidity (±2 V / 0 … 1V correspond to 0 … 100% r. H.) 4. analogue input 1 (±10V or ±20mA) 5. analogue input 2 (±10V or ±20mA) 6. analogue input 3 (±10V or ±20mA) Input resistance voltage measurement (±10V): min. 100kΩ Input resistance voltage measurement (up to ±2V): min. 10MΩ Input resistance current measurement: typ. 200Ω Input resistance battery current measurement: typ. 2mΩ
Digital measurement (inputs/outputs)	
Pulse inputs	2 channels (e.g. reed contact precipitation rocker) Supply: 5V over 10kΩ pull-up Switching threshold of the Schmitt trigger input circuit: Positive (V_{T+}) : 1,3 ... 2,2V Negative (V_{T-}) : 0,6 ... 1,5V Hysteresis ($V_{T+} - V_{T-}$) : 0,4 ... 1,2V
Thies spec. inputs	2 channels for the connection of Thies synchronous-serial transducers
COM1	Potential-free RS485 interface: - Half/full-duplex mode can be switched by SW. - Connection of serial sensors possible. - Command interpreter available. - Baud rates from 1200 Baud to 230400 Baud. - Framing adjustable (8N1, 8E1, 8O1, 8S1, 8M1).
COM2	RS485 interface: - Termination (120 Ω) switchable by SW. - Connection of serial sensors possible. - Command interpreter available. - Baud rates of 1200 Baud to 230400 Baud. - Framing can be set (8N1, 8E1, 8O1, 8S1, 8M1).
Digital outputs	2 potential-free, electronic switching contacts with current limitation Current limitation: typ. 1A max. voltage with opened contact: 50VDC, 35VAC
Measuring rate	1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30s 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60 in
Memory rate	1, 5, 10, 15, 20 30s 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60min
Time base	Real-time clock with automatic leap year recognition. Accuracy adjustable (+2.8 ... –2.8 minutes/day)
Storage capacity	Firmware: 1MB (flash, uploadable via USB or SD card) Data: 64MB (flash) Configuration: 64kB (flash)
Number of data sets	Dependent on the configuration

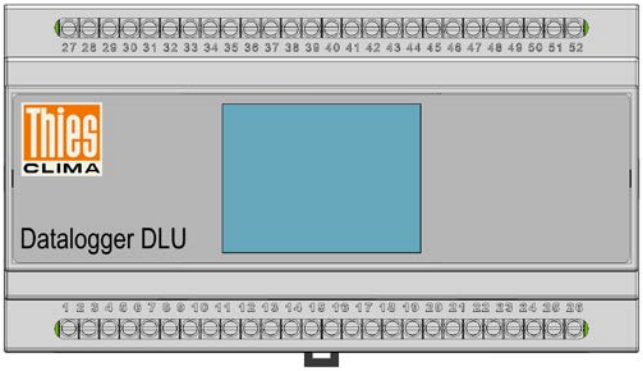
	Example: 276192 data sets (14 channels)
Storage period	Dependent on the configuration Example: > 2 years (14 channels, memory rate 1min)
Data output	
USB	USB 2.0 full speed device, type B jack, type FTDI (FT234XD), VIRTUAL COM PORT driver: **www.ftdichip.com**
COM1	RS485 half or full duplex (potential-free)
COM2	RS485 half or full duplex
Ethernet	Telnet / FTP
Memory Card	SD card formatted with FAT16 / FAT32 / ExFAT, compatible with Microsoft® Windows® and MS-DOS® Compatibility to all cards on the market cannot be guaranteed; the card is therefore to be checked beforehand in combination with the Data logger!
General	
Control	On the device: - 2.4 inch colour display with touch function By remote control: - via COM1 or COM2 or Ethernet or micro USB
LCD display	2,4" – colour display (320 x 240 Pixel)
Mounting type	Snap-in mounting 35mm standard rail DIN EN 60 715, TH35 9TE
Connection type	32 terminal, ∅ max. 2.5mm²
Dimension	157 x 86 x 58.5mm (9TE)

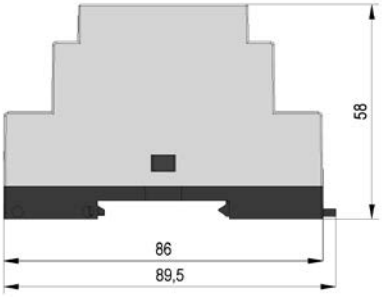
[1] Accumulator and solar panel are not in the scope of supply.

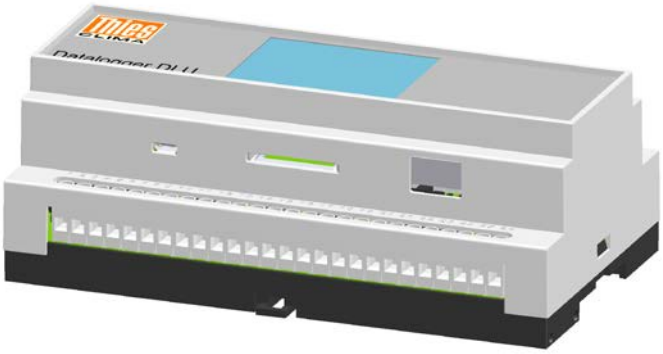
[2)] The battery voltage channel must be configured and active.

12 Dimensioned Drawing









13 Wiring Diagram

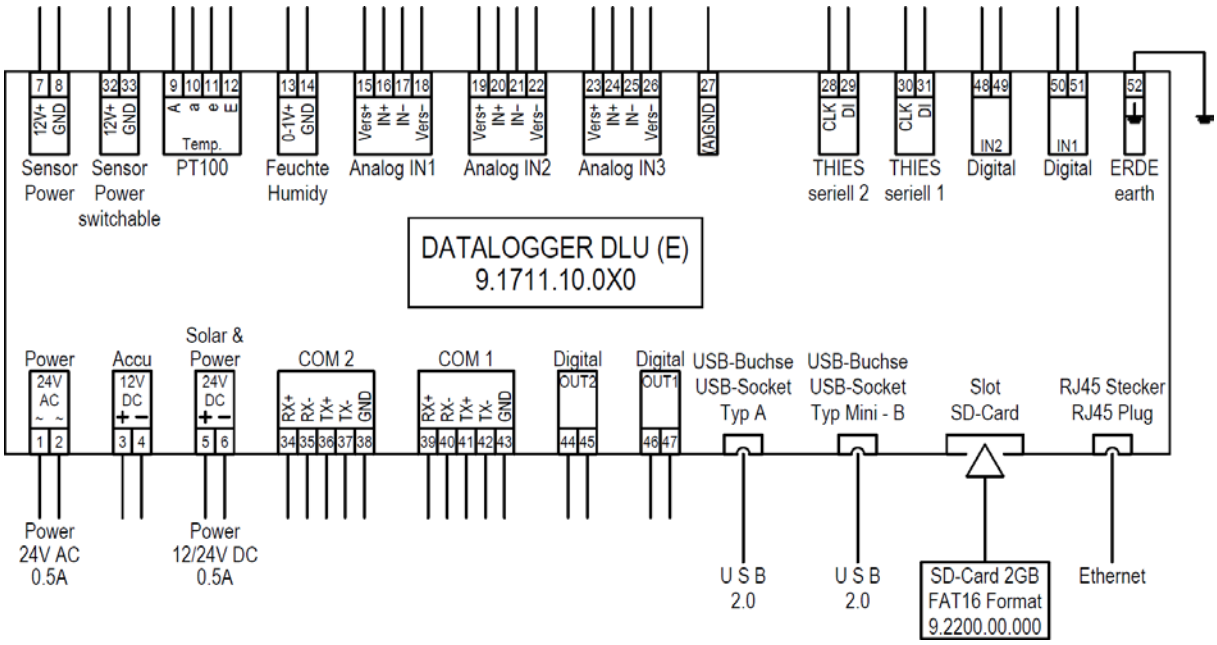


Figure 64: Data logger DLU

Notes:

EMC-compliant installation of the cables: *see **chapter 3.3.1**.*

Outputs of optocoupler: *see **chapter 3.3.4**.*

14 Maintenance

The Data logger DLU is maintenance-free.

Cleaning:
A slightly moistened cloth, without chemical cleaning agents, should be used for the cleaning of the housing.

15 Accessories (optional)

BATTERY 12V 7AH Takes care of the buffering with solar panel supply.	210 375	Nominal capacity: 12V, 7Ah
USB WLAN antenna	214002	With integrated rod antenna
MEVIS Software	9.1796.40.00X	In several languages
SD - CARD 2 GB Used for data storage / data transport	9.2200.00.000	Storage capacity: 2GB
Protective housing for the external mounting of devices with top-hat rail mounting. Equipment: - plastic housing with transparent cover, - top-hat rail, - built-in mains adapter, - Cable glands. • Further protective housings on enquiry.	9.3293.00.000	Housing: Dimensions: 252 x 162 x 120mm (L x B x T) Material: plastic Protection class: IP 67 Mains adapter: Primary: 85 ... 264V AC, 4 5... 65Hz Secondary: 24V DC; 60W
THIES CUMLUS APP	9.1780.00.000	Available in popular app stores.
Windows Service Windows serive with Cloud Data Service	9.1798.12.000	Windows service for communication with the Thies Cloud, the service copies the data from the Thies Cloud to the target system in the background. The received data are saved in a directory that can be selected. The transmission intervals can be set.
Linux Service Linux service with Cloud Data Service	9.1798.12.011	Linux service for communication with the Thies Cloud, the service copies the data from the Thies Cloud to the target system in the background. The received data are saved in a directory that can be selected. The transmission intervals can be set.

Further accessories upon enquiry.

16 More Information / Documents as download

Further information can be found in the documents First Steps Start-Up DLU, First Steps THIES CLOUD, FAQ THIES CUMULUS APP. These documents and also the instruction for use are available for download under the following links.

First Steps Start-Up DLU

https://www.thiesclima.com/db/dnl/9.1711.10.000_Datalogger-DLU_First-Steps_Start-Up_eng.pdf

First Steps Start-Up DLU -E

https://www.thiesclima.com/db/dnl/9.1711.10.x1x_Datalogger-DLU_First-Steps_Start-Up_eng.pdf

First Steps THIES CLOUD + CUMULUS APP

https://www.thiesclima.com/db/dnl/9.1780.00.000_Thies_Cumulus_FirstSteps_en.pdf

FAQ THIES CUMULUS APP

https://www.thiesclima.com/db/dnl/9.1780.00.000_Thies_Cumulus_App_FAQ_en.pdf

Instruction for Use

https://www.thiesclima.com/db/dnl/9.1711.10.0x0_Datalogger-DLU_eng.pdf

17 Appendix Tables List and List of Figures

Tables

Figures

18 EC Declaration of Conformity

Manufacturer: Adolf Thies GmbH & Co. KG
Hauptstraße 76
37083 Göttingen, Germany
http://www.thiesclima.com

Product: Datalogger DLU

Doc. Nr. 1201-44739_CE

Article Overview:

9.1711.00.000 9.1711.10.000 9.1711.10.010 9.1711.10.510

The indicated products correspond to the essential requirement of the following European Directives and Regulations:

2014/30/EU	26.02.2014	DIRECTIVE 2014/30/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility.
2014/35/EU	26.02.2014	DIRECTIVE 2014/35/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 February 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits.
2017/2102/EU	15.11.2017	DIRECTIVE (EU) 2017/2102 of the European Parliament and of the Council of November 15, 2017 amending Directive 2011/65 / EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment.
2012/19/EU	13.08.2012	DIRECTIVE 2012/19/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 4 July 2012 on waste electrical and electronic equipment (WEEE).

The indicated products comply with the regulations of the directives. This is proved by the compliance with the following standards:

DIN EN 61000-6-2	2019-11	Electromagnetic compatibility Immunity for industrial environment
DIN EN 61000-6-3:2007 + A1:2011	2011-09	Electromagnetic compatibility (EMC). Generic standards. Emission standard for residential, commercial and light-industrial environments
DIN EN 61010-1	2020-03	Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements
DIN EN 63000	2019-05	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances.

Legally binding signature:

General Manager - Dr. Christoph Peper

Legally binding signature:

Development Manager - ppa. Jörg Petereit

This declaration certificates the compliance with the mentioned directives, however does not include any warranty of characteristics.
Please pay attention to the security advises of the provided instructions for use.

19 UK-CA Declaration of Conformity

Manufacturer: Adolf Thies GmbH & Co. KG
Hauptstraße 76
37083 Göttingen, Germany
http://www.thiesclima.com

Product: Datalogger DLU

Doc. Nr. 1201-44739_CA

Article Overview:

9.1711.00.000	9.1711.10.000	9.1711.10.010	9.1711.10.510

The indicated products correspond to the essential requirement of the following Directives and Regulations:

1091	08.12.2016	The Electromagnetic Compatibility Regulations 2016
1101	08.12.2016	The Electrical Equipment (Safety) Regulations 2016
RoHS Regulations 2012	01.01.2021	The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012
3113	01.01.2021	Regulations: waste electrical and electronic equipment (WEEE)

The indicated products comply with the regulations of the directives. This is proved by the compliance with the following standards:

BS EN IEC 61000-6-2	25.02.2019	Electromagnetic compatibility (EMC). Generic standards. Immunity standard for industrial environments
BS EN IEC 61000-6-3	30.03.2021	Electromagnetic compatibility (EMC). Generic standards. Emission standard for equipment in residential environments
BS EN 61010-1+A1	31.03.2017	Safety requirements for electrical equipment for measurement, control, and laboratory use. General requirements
BS EN IEC 63000	10.12.2018	Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

This declaration of conformity is issued under the sole responsibility of the manufacturer.

Legally binding signature:

General Manager - Dr. Christoph Peper

Legally binding signature:

Development Manager - ppa. Jörg Petereit

This declaration certificates the compliance with the mentioned directives, however does not include any warranty of characteristics.
Please pay attention to the security advises of the provided instructions for use.

Talk to us about your system requirements.
We will be happy to advise you.

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