# PAULWEGENER

## MESSTECHNIK SEIT 1921

**Operating manual**

Data acquisistion system

# PWBlogg

Device alternatives: N6/4 to N6/7

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# General safety instructions

- This device must only be installed and operated in compliance with the instructions and warning notices of the dedicated technical documentation.

- Only qualified personnel must install and operate this device.

- The data logger's power supply is done by a lithium primary battery. This can optionally be done by a power supply unit too. In this case the internal lithium battery supplies the data logger during temporary power failure.

Please note the following safety advice before you install and operate the devices:

- The power supply units and batteries delivered by manufacturer must exclusively be used. Failure to do so may result in severe damage and accidents.

- Please pay attention to intactness of all connection cables. If there are cable damages, put the device out of operation immediately. Contact maufacturer for repair.

- Do not charge lithium batteries, throw them into fire or expose them to heat, as this can lead to battery explosion and result in personal injury and/or material damage.

- If fluid from battery pack gets into your eyes, rinse them with plenty of water and see a doctor.

- Never use water to extinguish burning batteries! EXPLOSION HAZARD!

- Do not use damaged batteries!

- Do not short-circuit batteries!

**Attention: The electronics consists of electrostatic sensitive components. Pay attention to the ESD operation instructions when handling with this electronics!**

# Special conditions for use in potentially explosive gas atmospheres of the zone 2

- Mounting and connecting the device must only be done if there is no potentially explosive atmosphere.

- This device must only be used in areas with pollution level 2 as defined in IEC60991-1.

- This device is only suitable in areas with low risk of mechanical hazards.

- Connecting and disconnecting the plug connectors are only permitted if there is no explosive atmosphere. Unused sockets must be closed with dedicated protective caps.

- Unplugged connectors are not permitted in hazardous areas. Always remove unplugged connectors from hazardous areas!

- Opening the case (e.g. for battery change) must only be done if there is no potentially explosive atmosphere.

- The case must only be cleaned by using wet cloths, otherwise there is the danger of spark ignition by electrostatic discharge.

- The memory card (SD memory expansion) must be put in or removed only in case of nonexistence of an explosive atmosphere. This interface must be closed thereafter by the dedicated protective cap.

- The „online outlet" for data transmission and data logger configuration must only be used in case of nonexistence of an explosive atmosphere. If not used, the „online outlet" must be closed with the dedicated cap.

- If the online outlet is permanently used, make sure that the connected devices are with voltage rating no more than 60V AC or 75V DC. Furthermore make sure that there is a transient protection and that it is set to a value that does not exceed 140% of the rated voltage.

- If the data logger is supplied by external voltage, the power supply unit delivered by manufacturer must exclusively be used. This is always connected with the supply voltage outside of the explosion-hazard area. Use the power supply unit only at the intended supply voltage. Supplying the data logger using different power supply units and additional equipment is not permitted.

- If the device is equipped with a lithium ion battery, charging this battery must be done outside the potentially explosive areas.

- For integration into the system's potential equalization use the dedicated port at the data logger's case. The pressure transducer are grounded via process connection.

**Note:** The data logger's battery circuit is operatively grounded at its case.

**Any subsequent modification to the device results in the consequence that a secure use is no more guaranteed within ex-zone 2 and the EC declaration of conformity loses ist validity.**

## Mounting notes:
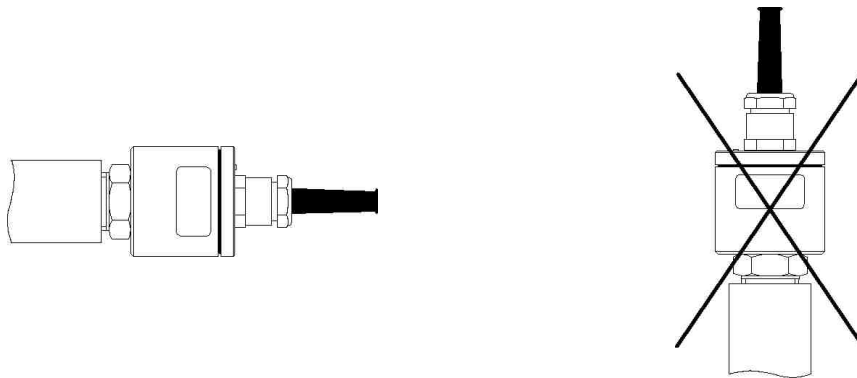


Relative pressure transducers contain a venting device and should be horizontally positioned.
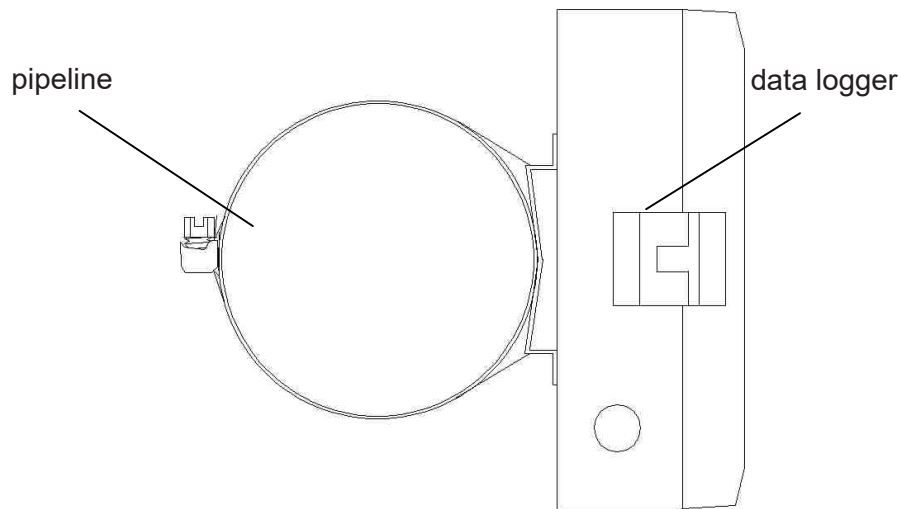


Data loggers (side view) can optionally be mounted on pipelines or the like by band clamp.

# Contents

# 1 Start-up instruction

Please note the following references during the first initiation of data measuring- and storage devices:
- Install the software PWB-Soft first.
- Then connect data logger at a serial interface (RS232/USB) of the PC by means of data cables for online connection.
- Start software.
- Set up serial interface in the dialog box „Settings" of menu item „File".
- Establish a communication between PC and data logger via „Connection".
- Make all necessary settings in dialog field „Configuration". In particular, note that a **1 minute sample rate** is adjusted at the delivery of the device in order to take care of the battery.
- After pressing „OK", the controller is configured again and the memory is cleared. Measurement   can start now.
- Note that the data logger must be turned on for activating measurement and the adjusted measurement start time must be reached!

**Note:** The relative pressure transducer on devices with delivery date from July 2005 are equipped with venting device in mint condition. This small circular-shaped venting device is on the sealing cap of the transducer. **Pay attention that the venting device is not removed or damaged!**

**Note:** Connecting Namur transducers at the data logger must only be done in zero potential state, otherwise, when short circuits occur, the internal protective circuit may releases and hence the input becomes disable! When using pluggable input leads, alternatively, transducers can be connected in unplugged state.

**Note:** The firmware 3.1.35 provides that digital transducers which could not be queried 10 times in succession, are excluded from query. This way battery power is saved if individual transducers are activated but not plugged. If transducers are not queried (anymore), a „-" is shown as reading. To put a transducer into operation after plugging, there are two options:

1. Deactivating and activating measurement.

2. Calling the channel in online view, thereafter long pressing Esc key.

Both options provide query ban release and the transducer will be measured again.

# 2 Data acquisition system PWBlogg

The data acquisition system PWBlogg is deployed in industrial process control or at storage and freight room monitoring in accordance with EU guidelines or while recording of climate data, at building monitoring, at pipeline building or in transit of food or slightly perishable products.

## 2.1 Components of data logger PWBlogg N6/x

Data loggers PWBlogg N6/4 to N6/7 consist of following units. These allow in their entirety  reading acquisition and -storage, evaluation of measuring data on PC/laptop/PDA and adaptation to specific measuring problems. Figure 1 describes components at data logger N6/7.
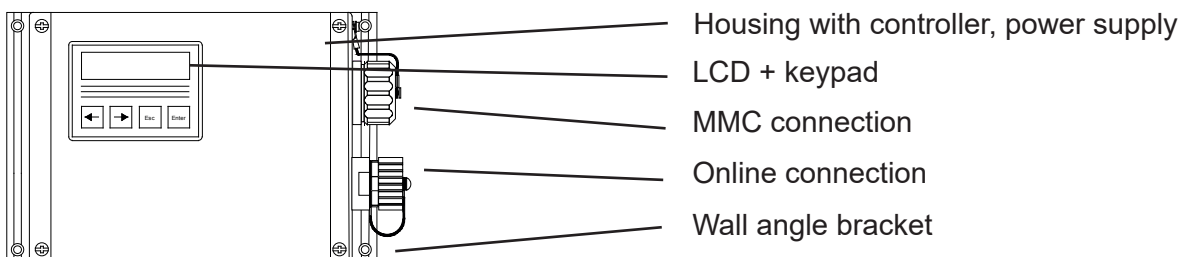


Housing with controller, power supply

LCD + keypad

MMC connection

Online connection

Wall angle bracket

Figure 1 type N6/7

*Controller*
It controls all features of the data logger such as data acquisition and -storage, display control and evaluation of keypad commands, backup by MultiMediaCard as well as activation of peripherals (PC, printer or modem). The controller contains an internal memory which can store approx. 260.000 up to 500.000 readings, independent of MultiMediaCard.

*Transducers*
The transducers record physical measurement quantities such as pressure or temperature and convert them into electrical signals which can be processed by measuring system. All PWBlogg standard transducers are suitable for battery-operating. Transducers with standard signal output (e.g. 4-20 mA) can also be connected, either firmly with the measuring system or contacted by plug-in connectors. The data logger N6/7 also provides to integrate up to 2 pressure transducers inside the housing of the logger. A pressure equalization element makes sure that there is the necessary pressure equalization.

*LCD and keypad*
The control of data logger functions is menu-driven by LCD and keypad. In addition to the online feature of checking current readings, numerous settings can be made on data logger directly.

*Online connection*
The communication of the data logger to a connected PC/laptop/Pocket-PC, modem or printer is done by online connection. It is equipped with a sealing cap to keep the degree of protection of the housing.

*MMC connection*
The transmission of measuring data from internal memory to the MultiMediaCard is done by menu command or automatically at full memory as well as in case of power failure of data logger. The MMC can also be used for configuration of the data loggers. The memory card is used like a drive (floppy disk/HDD) on PC/laptop. Measuring data are stored in files and can be copied, opened and deleted.

*Software*
The software PWB-Soft 2.1 is used for readout of measuring data, for configuring measurement and erasure of memory. Data can be represented in tabular form and graphic. Data acquisition can also be observed online at PC.

## 2.2 Device types

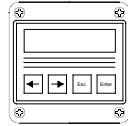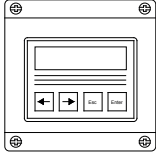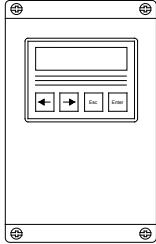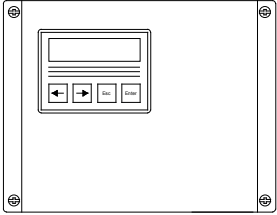The basic version of data loggers PWBlogg N6/x consists of following components:

- Aluminium housing
- Up to 496kB data memory
- 9V-lithium battery (1200mAh)
- Backup battery for data backup
- LCD with keypad

The data loggers can be equipped with different menu versions. Currently there are two versions available:

- Standard menu
- RLBK menu, in particular for pipeline construction test case

| Typ | Bauform |
|---|---|
| **PWBlogg <u>N6/5</u>**<br>– Housing 80x80x60 mm<br>– Degree of protection IP 67<br>– Lithium battery with 2100 mAh, 4200 mAh (optional)<br>– Logging of **up to 4 Measurement signals** | |
| **PWBlogg <u>N6/6</u>**<br>– Housing 100x100x60 mm<br>– Degree of protection IP 67<br>– Lithium battery with 2100 mAh, 4200 mAh, 7200 mAh (optional)<br>– Logging of **up to 4 Measurement signals** | |
| **PWBlogg <u>N6/4</u>**<br>– Housing 100x160x65 mm; mobile and stationary deployment<br>– Degree of protection IP 65<br>– Lithium battery with 16500 mAh (optional)<br>– MultiMediaCard port (optional)<br>– Measurement signal converter for standard signals<br>– Logging of **up to 6 Measurement signals** | |
| **PWBlogg <u>N6/7</u>**<br>– Housing 180x140x80 mm; mobile and stationary deployment<br>– Degree of protection IP 65<br>– Lithium battery with 16500 mAh or Ex 1-Li-BP (optional)<br>– MultiMediaCard port (optional)<br>– Measurement signal converter for standard signals<br>– Logging of **up to 8 Measurement signals** | |

The types differ with regard to design and possible equipment.

Further optional equipment features of all device types:

- Battery-operated mini printer for report printout (graphic and numeric)
- Alarm output, threshold signalling devices (according to customer request)
- Portable case (plastic) with foam insertions
- Remote data transmission via iModem (analog, GSM)
- Alarm report as SMS to mobile phone or fax machine (only via iModem)
- Mains adapter 230 VAC / 12 VDC
- Wall angle bracket
- Model for Ex-zone 2
- On/Off-switch

Further customer requirements can be realised on request.

## 2.3    Transducers

The possibility of flexible adaptation to most different measurement tasks is a characterising for the data acquisition system PWBlogg. For this purpose, we offer specific transducers which are supplied directly by the measuring system without additional power supply.

Standard transducers and/or measuring inputs are available for following measurement quantities:

- Pressure
- Temperature
- Counting input
- Status input
- Standard signal input

Measurement signal converters are available for connection of any transducers with standard signal output such as 0..20mA, 4..20mA, 0..10V, 0..1V. 8 transducers can be connected at the same time.

*Analog inputs*

Up to 4 analog transducers (pressure, temperature etc.) can be connected. For each transducer the resolution 8 bit, 12 bit, 14 bit or 16 bit can be adjusted separately. For example, a temperature signal can be recorded with 8 bit and a pressure signal can be processed with 16 bit at the same time. For each analog input can be adjusted a lower and an upper limit as well as a hysteresis. By means of a hysteresis can be prevented an oscillation of the alarm output within the threshold between adjusted limit value and standard operating range. So that simple control tasks can be put into effect.

*Status inputs*

There are up to 4 status inputs available. These allow logging of switching contacts (eg safety shut-off valve). For recording the state of contacts, switches etc., the input is configured as status input. Now, the operator can assign a text with up to 5 characters to any state. Thus, e.g. it is possible to mark a SAV with „open" or „closed". The state can be read easily on display of the data logger and on tabular evaluation. A freely selectable status can be indicated as alarm status. This quality can be used to fulfill an event-driven recording.

*Counting inputs*

Data loggers of type series N6/x can acquire up to 4 pulse signals. The operator can freely adjust the pulse value. Pulses can be recorded in terms of meter reading as well as flow signal or as combination of both. A voltage pulse, an open collector or a dry reed contact can be used as pulse signal.

Counting inputs can be operated as NF-inputs (< 5 Hz) or as HF-inputs (> 5 Hz). According to this configuration, the flow is acquired from medium number of pulse per interval 2 or from time lag of 2 successive pulses.

**The measuring ranges of the transducers connected to the data logger PWBlogg are configured by manufacturer and can not be changed.**

## 2.4     Settings

Following settings to the requirements of measurement can be adapted on site by means of configuration dialog of PWB-Soft on PC/laptop/Pocket-PC:

* Identification (eg company address)
* Abbreviation (location/time)
* Measurement start (date/time)
* Sample rate (min 1ms; max 1h)
* Alarm rate (if required)
* Threshold defaults for analog channels
* Way of data storage (ring memory/linear memory)

Following settings can be changed on device:

* Start measurement
* Interval 1 and 2      (sample rate)
* Memory type          (ring memory/linear memory)
* Abbreviation
* Module time

In standard menu adjustable only:

* Memory mode       (store at all times/in case of alarm only)
* Sample mode        (permanent threshold monitoring/standard mode)

In RLBK menu adjustable only:

- W400 parameters

Devices with MMC interface can additionally store parameter changes in a file and transfer them by MMC.

*Start and interrupt measurement*
The reading recording can be started or interrupted by Enter key or switch. Once the measurement is activated, it started once as the adjusted start time is reached.
When using Enter, an authentication mechanism (activated by respective configuration) prevents switching-off of measuring by mistake.

*Interval 1 and Interval 2*
Two interval increments (sampling rate) to acquire measuring values can be set. Interval 1 can be set from 1s to 1h and is used for recording of readings during standard operation. Interval 2 can be adjusted from 1ms to 1min and is activated once a threshold violation is detected.

*Threshold monitoring*
The data logger provides specifying thresholds and records threshold violations by means of a second sample rate. This leads to improved logging and evaluation of such events. Additional to the threshold, a hysteresis can be specified. Therefore, it is possible when using an alarm output to realise a simple control. At digital channels (status) an alarm can be triggered at any status change of the signal.

Parameters to monitor thresholds are described as follows:

*Memory saving mode*
The memory saving mode specifies if measuring data are always recorded or in case of an alarm only. So it provides event-driven data recording.

*Sample mode*
The sampling mode can be set to „limit value monitoring" or „standard". At „standard" mode, interval 1 values are measured and recorded (depending on memory saving mode). In case of a threshold violation a redirection to interval 2 is done where measuring is carried out as long as the threshold violation is cancelled (in consideration of adjusted hysteresis values).

The setting „permanent limit value monitoring" means permanent sampling in interval 2. This leads to an immediate identification of threshold violations. Thereafter, the memory interval 1 is redirected to interval 2. Please note that frequent sampling of transducers increases power consumption of data logger and decreases economic life-time of the battery!

Digital signals and pulses are always monitored in interval 2, independent of adjusted sampling mode because of a low power consumption. That means e.g. if there is a threshold violation of flow rate or a monitored safety valve operates, the alarm mode is switched on directly. Now, all data are measured and recorded in interval 2.

*RLBK devices:* The storage mode should be set to ‚permanent' and the sample mode to ‚standard'. RLBK devices support both parameters in the software only!

*Shorted alarm storage*
*I*n case of a threshold violation normally data recording is continued with interval period 2. The period of data recording can be much shorter than expected. To avoid it, the option „shorted alarm storage" can lower that period of time where interval 2 for storage is used. The storage is limited to a maximum of 2 x interval 1 (e.g. 2 x 5 min). Subsequently, it is continued to measure in interval 2 but recorded just with the cycle of interval 1.

*Reading recording and backup on MMC*
Reading recording occurs optionally at ring memory or at linear memory mode. The measurement ends at linear memory mode as soon as memory is filled completely. At full memory at ring memory mode, the oldest data in each case are overwritten with current values so that continuous recording is possible.

In case of full memory at devices with MMC interface, all stored data are transferred to the memory of the MMC before overwriting the oldest data. **But it is only possible at ring memory mode!** The MMC creates a reading file which can be opened and evaluated by software PWB-Soft.

Depending on type and factory setting, data backup can be done in day files and in one year file!

**Note:** RLBK devices do not provide automatic backup at full memory! Backup can only be done after calling the menu function ‚Backup'!

*Password protection*
The configuration can be protected via password against unauthorized access. Without knowledge of password, it is not possible to clear stored data or to change configuration of the data acquisition system. This also applies to configuration changes on device.

Note that the password on data logger can only be entered as numeric string. Shall it be possible to change configuration on data logger, the password must be entered as numeric string as well.

*Error sources*
The analog signals of transducers are converted into a digital value with resolution of 8 bit, 12 bit, 14 bit or 16 bit. The following table demonstrates the difference between resolutions by means of a 16 bar transducer. The values, represented in PWB-Soft program or on LCD must be rounded to the defaulted number of decimal places so that the increment between two neighbouring values is not always identical.

| ADU | digital steps | resolution |
|---|---|---|
| 8 bit | 256 | 62,5 mbar |
| 12 bit | 4096 | 4 mbar |
| 14 bit | 16384 | 1 mbar |
| 16 bit | 65535 | 0,25 mbar |

Table: AD conversion, resolution

Potential error sources are non-linearities of AD-converter which are irrelevant on resolution of 8 bit or 12 bit. However, another important one is the digital step at small resolutions. At the limit of two sequent digital values, the tolerance between the measured (in digital steps presentable) and the real value (other sources of error excluded) already amounts ½ resolution step. As in the table 8 bit is equivalent to 31,25 mbar. Additionally, there are device-dependent sources of error such as temperature drop or deterioration of components. At resolutions as 14 bit and 16 bit, they have much importance.

## 2.5   Threshold signalling

If there is an exceeding of the threshold or it falls below, an online-presentation (triangle symbols) will appear on display. Furthermore, the data loggers possess 2 separate alarm outputs for signalling threshold violations. If there is an identification of an exceeding of the limit or the opposite way round, so the respective alarm output is activated. Once the signal is in regular range again (in consideration of hysteresis), the respective alarm output is deactivated again. While alarm state is on, it is switched over from interval 1 to interval 2 so that in case of an alarm state the measurement signal can be terminably finer resolved.

Shall the alarm state be signalled far from measuring location, there are different options:

• Use of floating switch and activation of available monitoring equipment
• Alarm message by SMS to a mobile phone via connected GSM-modem
• Alarm message by voice output by a threshold signalling device

At locations without telephone jack or any other connection to the place of alarm signalization, the wireless transmittance of the alarm message via GSM modem can be used. An alarm signalling by voice output is possible everywhere, where a phone connection is available. The threshold signalling device is connected to the phone and must be supplied via delivered AC-adapter. Subsequently, the configuration in accordance with separate instruction is done. Four telephone numbers which are dialed in alarm case can be entered at the most. While answering the phone, a speech alarm up to 20 sec is sent. If a complete device system is available consisting of data logger, threshold monitoring system and optional modem, the threshold signalling device is supported on a short-duration with the battery of the data logger to keep the entered data.

Further technical solutions of the alarm message can also be implemented to customer requirement.

# 3    Operating the data logger N6

Controlling data logger functions is done by keypad and LCD. Different functions are arranged in a menu structure with several levels which facilitates retrieving of features desired as well as expanding of the existing system to customer specifications.

## 3.1    Notes on key operation

*Standard key functions*

| | | |
|---|---|---|
| ← | | previous menu item, previous channel ... |
| → | | next menu item, next channel ... |
| Esc | short: | one menu level back, cancel |
| Esc | long: | input break |
| Enter | short: | calls menu item |
| Enter | long: | input confirmation |

*Special key functions at input/setting of text/periods*

← → cursor keys

The character to be entered / value to be set can be reached by bidirectional paging within one character selection. If the respective cursor key is pressed longer, the selection of characters runs by themselves till the key is released.

Enter - key short:                    **= cursor to the right**

Short pressing Enter completes the entire input of the character selected and moves to the next digit. When entering text, the next character can be entered this way. If time is entered, the next place will be positioned.

Enter - key long (approx. 2s)        **= OK**

Long pressing ‚Enter' completes the entire input and after confirmation request, it adopts changes as the case may be.

Esc - key short                    **= cursor to the left**

The Esc key moves the input cursor one digit backward. If the time is entered, thereby the cursor is moved only. If text is entered (short text, password), the ‚Esc'-key operates as delete key as well. It deletes the character at cursor position.

| Esc | - key long (approx. 2s) | **= cancel** |

Long pressing ‚Esc' cancels input and rejects all changes.

### *Setting predefined parameters / options*

If parameters / settings are selected from a list (e.g. sample rate), the call of the respective dialog is identified by a check mark. To change the setting, the new value is shown by using the arrow keys. Thereafter, it has to be marked (check mark) by short ‚Enter'. That setting will be adopted as the dialog is quitted by continuous ‚Enter'. Two subsequent questions have to be confirmed by ‚yes'.
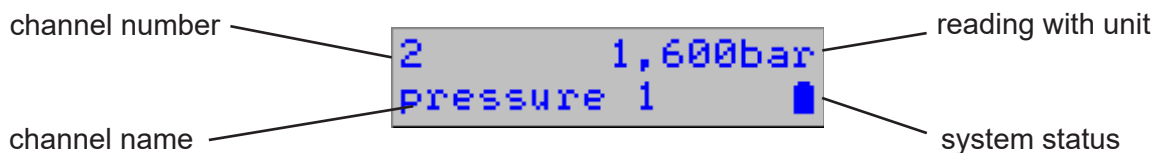
## 3.2    Online display

Controlling the data logger functions is done by keypad and LCD. The different functions are arranged in a menu structure to facilitate retrieving them and to upgrade the existing system according tpo customer's specifications.

### 3.2.1    Online display when measurement is activated

When enabling display (if measurement is on), the current reading of the last selected channel will be displayed. Change-over between transducers connected is done by arrow keys. Special information on reading can be displayed by ‚Enter' and ‚Esc'.

*Example display:*

channel number ⸺ reading with unit

```
2          1,600bar
pressure 1         ■
```

channel name ⸺ system status

The Online display consists of  real reading display with unit and channel number as well as of an infoline of several layers (line 2 of display).

**Channel number and reading**

The first line of the online display shows channel number and reading. The channel number corresponds to the number of the channel indicated on the type plate. The reading is shown including dedicated unit.

Status signals display the respective status text (as specified in configuration) instead of a value.

A current threshold exceeding/falling below at the channel displayed is indicated by an arrow symbol (up, down) after the channel number!

If transducers with Live-Zero-Signal (e.g. pressure transducer) are used, the reading flashes in case the transducer is not connected or defect.

### *Infoline*

Channel name and system status are shown in the Infoline of the main level. The next level can be called by ‚Enter'. The previous one is activated again by ‚Esc'. The Infoline consists of 5 levels:

• description of the transducer displayed
• current reading difference to the first value since last reset of minima and maxima or since activating measurement (delta-value); in particular helpful e.g. when pressure tests are carried out!
• measuring period since last reset of minima and maxima or after activating measurement, the ♥ symbol indicates the ongoing measuring (symbol frequency equates to sample rate)
• minimum reading with dedicated measuring period (is indicated by turns)
• maximum reading with dedicated measuring period

The Infoline is also used to indicate following warning messages:

- in case of a threshold violation: ‚'!!! Alarm !!!' is indicated and the transducer which triggered it will be displayed
- if the battery is lower than 10%, every time if the display is activated, the message ‚!!! Battery !!!' will be shown!

The warning messages can be switched-off by ‚Esc'.

### 3.2.2   Online display when measuring is deactivated

If measuring is off, the device type is displayed in the upper line. The current status is displayed in the second line.
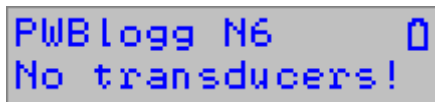
Measuring can (still) be deactivated, because:

1. the on/off switch of the device is in off-position or measuring was switched off by menu

```
PWBlogg N6        🗋 ———————— system status
Measuring off!
```
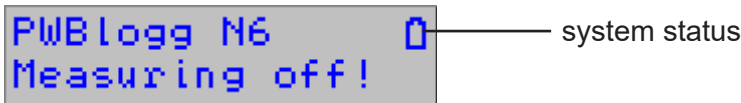
→ In this case measuring can only be acticated by user!

2. all transducers are deactivated

```
PWBlogg N6        🗋
No transducers!
```

→ To start measuring, at least one transducer has to be activated by PWB-Soft!

3. memory of the device is full (at storage mode ‚linear memory')

```
PWBlogg N6        🗋
Memory full!
```
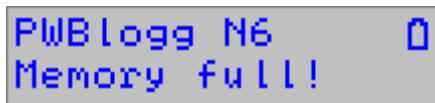
→ The memory of the device has to be read out and the device has to be restarted.

4. the battery of the device has been removed or recognized as entirely discharged

```
PWBlogg N6        🗋
Battery alert!
```
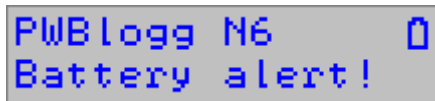
→ Battery has to be replaced or recharged (RLBK devices with rechargeable battery only) and the battery date has to be refreshed if necessary!

5. start time for the measuring not reached yet (start time is displayed by turns)

```
PWBlogg N6        🗋      PWBlogg N6        🗋
Meas. started!           01.11.07 00:00
```

→ Measuring starts automatically once start time is reached.

### 3.2.3   System status

The system status indication is used to display most important pieces of status information of the data logger. Normally, the battery symbol is displayed here. Following further symbols are shown flashing:

| | |
|---|---|
| 🍸 | PC/printer etc. connected |
| ▮ | GSM level indication if iModem is connected (the taller the bar the better the reception) |
| 🗋 | Access to MMC/SD card - do not remove the card! |

## 3.3    Menu

Special settings and function calls are made by the menu of the device. The menu can be reached from reading display by pressing ‚Esc' or ‚Enter'. The menu can be quitted by ‚Esc' to return to the online display.

The menu appears in the second line of the display and provides following functions:

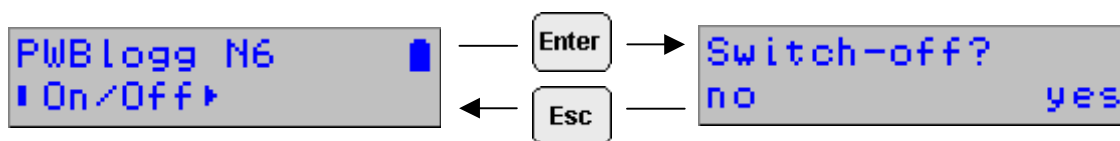- On/Off
- Set to zero
- Reset Min/Max
- Print
- Parameter
- Settings
- Backup

Change-over between several menu items (in several submenus too) is done by arrow keys!

### *Ein/Aus*



The menu item ‚On/Off' enables switching on/off measurement.

**Please note: This menu item is not provided at devices with On/Off switch!**

If measurement is on, the question ‚Switch off?' will appear. The query can be confirmed and measurement can be switched off by ‚Enter', quitted without saving by ‚Esc'.

If measurement is off, it can be activated in the same menu item. The question ‚Switch on?' will appear.

**Please note: If a password is activated, engaging/disengaging can only be done after the correct password is entered.**

### *Set to zero*
After confirmation by user, the current channel displayed will be set to zero, provided that it is a relative pressure channel which is calculated from absolute pressure connected to a device!

The transducer can be set to zero if it is pressureless and indicates a value different from zero or if based on current reading e.g. a potential pressure drop shall be logged (it is recommended to use the difference display in the infoline!).

### *Reset Min/Max*
All minima and maxima of active channels are reset here to the current reading. At the same time the initial value of the difference display in the infoline is set and the measurement period is set to 00:00:00.

### *Print*
Provides printout of the values by a connected printer (DPU414 / W25)
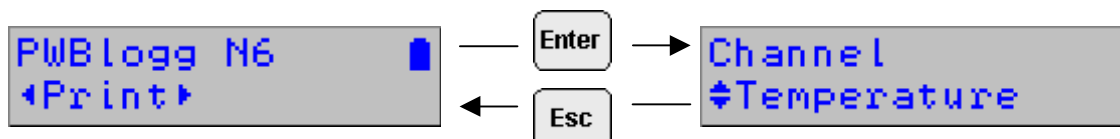


First of all, the choice between normal-, enlarged printout (zoom) or status reading is made. Subsequently, the channel to be printed has to be selected by arrow keys.

For further information on printing, in particular on W400 see also at **section 4**.

The ‚Enter' key actuates print operation, ‚Esc' cancels it at any time!

### *Parameters*
The parameter entry for the data logger comprises primary parameters which can be set at measuring point. The dialog is password protected to prevent unauthorised access.

**The information given at section 3.1 applies to setting the parameters!**

### Start measurement

The time of start measurement is set here. This parameter can be used e.g. for running measurement at several data loggers synchronously! The single fields (day, month, year, hour, minute) are selected by ‚Enter'/'Esc' and set by arrow keys. Long pressing (2s) ‚Enter' confirms input. The menu item is quitted without saving by pressing ‚Esc'.
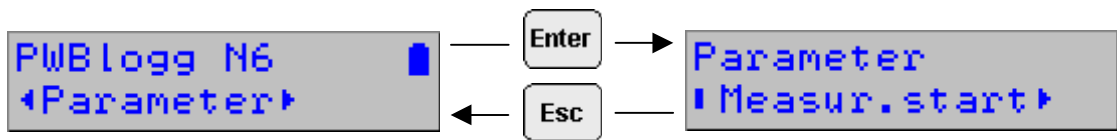
### Interval 1

The period between two reading samples at normal operation (no threshold violation) is set here.

### Interval 2

This interval determines the period between two reading samples in case of an alarm and serves as time basis for calculation and display of current flow values as well as for query status signals.

The connection between interval 1 and interval 2 requires that interval 1 is always an integer multiple of interval 2. The increments for setting interval 2 result therefrom. Interval 2 can not be longer than interval 1.

### Storage type

Provides selection between linear memory and circular buffer. The linear memory stops reading logging once the memory is full. If circular buffer is used, the oldest readings are overwritten at full memory.

### Storage mode (in standard menu only)

The storage mode determines at what time data are stored. It can be selected between ‚Store always' and ‚Alarmvals only' (threshold violations are logged only).

### Sample mode (in standard menu only)

The sample mode defines sampling permanently in interval 2 in case of standard operation (alarm monitoring) or if it is switched over to sampling and logging in interval 2 only in case of alarm.

### W400 (RLBK only)

This menu item is designed for setting/checking the W400 parameters. It is only activated at devices which were set up for realisation of a W400 test.

### Short text

The ‚short text' entered can be changed here. Please note the details on entering texts (section 3.1).

### Load from MMC

If data loggers are equipped with MMC interface, a parameter record can also be loaded from a MultiMedia-Card. For this purpose a configuration data file (kfg-file) has to be created initially. This menu item enables reading the file into the data logger.

Please note that the measurement start is not stored in the file. Hence a measurement start specification can only be done using measurement start dialog in parameter menu or online on PC!

### Restart

Restart saves changed parameters and deletes data memory. Before data are deleted, an authentication mechanism appears to be confirmed by ‚Enter'.

### Settings
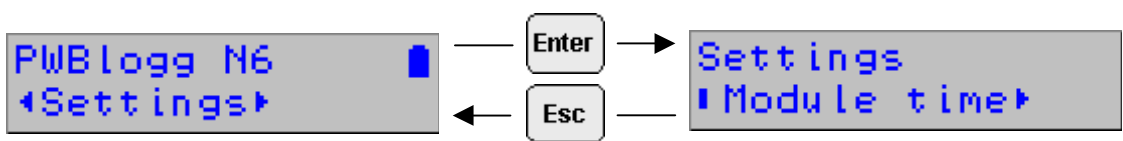
*Module time*
The system time of the data logger is set here (see also section 3.1).

**Note: The memory contents of the data logger have to be deleted in order to set time! Hence the new time will be saved not until the authentication mechanism is confirmed and a password is entered (if set).**

*LCD*
If turn-on-time is 90s, display automatically turns off 90s after last keypress. If ‚Permanent‘ is set, display remains on as long as measurement is on. This option leads to higher power consumption and should only be activated at devices which are intended for short-term deployment (e.g. pressure tests).

*LCD contrast*
The contrast of the LCD is slightly dependent on temperature and can directly be set on the data logger by means of the arrow keys. This setting is displayed in percent.

*Printer*
The type of printer to be used for optional printout of a thermal printer is set here.

*Battery*
Status is set to 100% here after battery change.

***Backup***
After authentication mechanism, a backup of measurement data on the memory card will be started. A flashing memory card symbol is displayed while saving. Access to submenu items is denied during storage process!
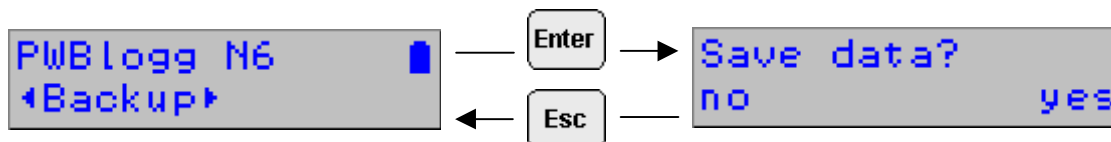


‚Save data started...‘ appears as confirmation message on display. The memory card symbol flashes in the system status display of the online dialog while saving (3.2.3.).
**Submenus can not be called while saving!**

**Status**
Most important system conditions are displayed here. Each piece of information can be shown by means of the arrow keys.

Displayed are:
*   Module time
*   Memory (internal, entire- and free memory)
*   MMC (memory available on MMC/SD and free memory)
*   Operating hours
*   Battery date and calculated remaining capacity
*   Serial number of the data logger
*   Year of manufacture
*   Hardware version
*   Firmware state

# 4      Output and calculation of W400 protocol files

Devices with RLBK menu allow input and change of W400 parameters as well as calculation of the resulting checking parameters. When printing out data (normal, zoom or status), the data logger automatically verifies if valid W400 parameters has been set. In that case most important W400 parameters are calculated by means of preset data and printed out on the thermal printer!

## 4.1    Contraction method

On the basis of the single check sections the specified <u>pressure lowering</u> ‚dPerf‘ as well as the allowable volume change ‚dVzul‘ are calculated and displayed. If dimensions of several section are different, the values of pressure lowering specified in table 6 of the W400 standard are weighted! The allowable volume change is calculated by using the formula specified in appendix A section A4 of the standard, without consideration of pipe tolerances!

## 4.2    Normal method

The normal method specifies fixed testing periods, testing pressures and allowable pressure drops for different materials and pipe dimensions (table 8 of standard W400).

The validity of parameters entered is verified. All sections have to feature comparable materials and dimensions! If all data are valid, the specified testing periods, the maximum allowable amount of drain relating to 1 bar measured pressure drop (total value has to be calculated on site!) as well as the allowable pressure drop are displayed.

## 4.3    Accelerated normal method

This method is only allowed for cast iron and steel with cement lining up to DN600! The amount of drain dVerf in ml as well as the minimum pressure drop dPmin which has to be set itself when drawing are displayed.

For all methods proceed as follows:
1. Entering general parameters on PC (test location, client etc.). These fields can alternatively be left blank to be able to fill in an on-site protocol.
2. Data transfer into a configuration file on MMC or straight into the device.
3. Input correction on device on site.
4. Printout of a ‚status‘ protocol before test procedure which enables reading of test parameters on thermal printer protocol.
5. Test itself is carried out.
6. Printout of all relevant charts on site and evaluation of the test if necessary.
7. Postprocessing of the test at office including printout of a complete protocol.

**Note:** If several tests are carried out, a data backup has to be done before each test. For that purpose data are stored on MMC or read out by PC/laptop.

**Reading of test parameters from MMC**

The MMC allows reading of test parameters from a kfg-file. This file can be created on PC/PDA and stored on MMC. The menu item ‚parameter‘/‘read from MMC‘ on the data logger enables data transfer into it. A kfg-file can comprise several parameter records. The selection of a parameter record is done by means of its number! So it is possible to prepare several tests on PC and transfer them into the data logger in succession to be carried out there.

# 5    Battery

## 5.1    Battery check

Two different battery types can be used for power supply of a data logger:

1. 9V E-block lithium battery PP3 with capacity of 1200 mAh
2. 7,2V lithium battery pack

The battery state is checked by the firmware of the data logger. All activities of peripherals are taken into consideration, i.e. the length of times in which the display is on or the data logger is online. The activities are acquired and included to evaluation of battery capacity. **The influence of very low temperatures to the available capacity of the battery pack can not be considered in respect of evaluation.**

The manufacturer gives an estimate of durability of the measuring system on request.

Measurement is stopped after falling below minimum voltage and the data logger is operated by energy-saving mode. Thereafter, a back-up battery provides power supply to avoid loss of data over a longer period (even if battery is changed). If battery capacity falls below 20%, battery should be replaced. Recycling of used batteries/rechargeable batteries is described in the paragraph „Recycling of batteries and old appliances".

## 5.2 Battery change

**We recommend, battery change should be carried out by manufacturer.** Please consider following procedure if you want to change it by yourself.

- The battery you need is provided by manufacturer. The 7,2V-battery pack is equipped with a special pin-and-socket connector.
- Read out the stored data and deactivate measurement.
- Unscrew the cross-head screw of the housing.
- Loose pin-and-socket connector on battery pack carefully and remove the old battery.
- Place the new battery in the battery tray and fit it with the adhesive pad which is designed for it.
- Connect battery with pin-and socket connector of data logger.
- Close the housing again without crimping the connecting cable inside.
- Refresh battery date on menu of the data logger or by means of the oftware PWB-Soft.

*General information note for battery change*
The battery change should be carried out without any loss of data when back-up battery is intact. Reading out of data is only used as guarantee in case of a discharged back-up battery. A change of the back-up battery can only be carried out by manufacturer!

**Please note:**
When changing battery type (e.g. from BP2.1N5 to BP4.2N5), you must enter the different battery capacity in the data logger! Otherwise the battery state can not be correctly monitored!

## 6 Accumulator power supply

### 6.1 General safety instructions

Power supply of the data measurement and storage devices is done by a built-in lithium-ion accumulator. Take notice of the following safety instructions:

- Use the provided charger exclusively.

- Do not charge within explosive hazard areas.

- Do not charge near easily inflammable items.

- Do not short-circuit the lithium ion accumulator.

- Never extinguish burning accumulators by use of water. EXPLOSION HAZARD!

- Do not throw it into fire! EXPLOSION HAZARD!

- Do not charge unattended.

- Never open the cells. EXPLOSION HAZARD!

- Do not use damaged accumulators!

- When having skin contact to the electrolyte, rinse it at once by use of much water and soap and consult a doctor.

- When having eye contact to the electrolyte, rinse it at once by use of much water and soap and consult an eye doctor.

- Dispose of entirely discharged accumulators only.

### 6.2 Charging the built-in accumulator

- Use only the delivered original charger for charging the accumulator.

- Make sure that the input voltage, specified at the charger, equals the local supply voltage.

- The used power socket must be accessible during the entire charging process.

- While charging, the temperature must be between +10°C and +45°C.

- After use, separate the device from power network. Do not leave the device connected to the power net-work e.g. for several days. The device is principally intended for use with the internal accumulator.

- During charging process, the status LED's at the charger indicate the state of charge (red = charging, green = charging finished).

- An entirely discharged accumulator needs approximately 3 hours to be charged.

- You can get information about the accumulator's residual capacity via PC software PWB-Soft. To take care of the accumulator, you should deactivate measurement if you do not use it for a while by setting measu-rement start ahead. Ideally, you store the data logger with residual capacity of approximately 20 %, but never with discharged accumulator.

**Note: Depth discharge leads to permanent damage of the accumulator!**
When falling below minimum voltage, reading recording stops and the data logger is used in energy saver mode.
If its residual capacity falls below 20 %, then the accumulator should be charged at the latest. We recommend 100% charging prior to any use.
The accumulator must not be replaced by user. If a new accumulator is necessary for your data logger, send the device to the manufacturer for replacing it.

# 7 Use of MultiMediaCard (MMC/SD)

## 7.1 The MMC/SD in general

The optional MultiMediaCard (MMC) provides a backup option for data saved in the logger into a non-volatile external storage medium. As the MMC is automatically recognised by PC/laptop as removable medium, so measured data transmission is wireless.

Backup on memory card is optionally done by menu command or automatically. If an error occurs while sa-ving data, the operation is stopped and an error message is shown. The result of the last automatical storage appears as error- or success message if measurement is engaged again.

If automatical storage is used, after 5 minutes the data logger tries to transfer data to the memory card again. This procedure is repeated 10 times at most. If no successful access possible, the card will be highlighted as invalid!

In order to rewrite the card, it has to be removed (if necessary after checking on PC) and inserted into the data logger again.

For purpose of evaluation of a reading file, the memory card including backup has to be inserted into the card reader of the PC/laptop. The reading file desired can be opened on your removable medium by means of the program PWB-Soft.

## 7.2 Notes on avoidance of data loss

- When removing the card from the data logger, make sure that there is no access to the card at that mo-ment (flashing card symbol on display)!

- Do not forget to use the Windows feature ‚Eject' before removing the memory card from your PC/laptop!

- A correct storage of collected measuring data on the external memory card is only guaranteed if memory cards supplied by Paul Wegener GmbH are used!

## 7.3 Use on data logger

The card should be formatted before using on data logger e.g. by means of the Windows feature ,Format' in ,My computer'/'File explorer'.

Please note that the cards are only formatted using format FAT and FAT 32 respectively! Other file systems are not recognised by the data logger. Furthermore, older data loggers can only handle the FAT format. If the card shall also be used on older loggers, only FAT should be used.

After formatting, the card can be used on the data logger without any further preparations. Optionally, it is possible to transfer a configuration file (,*.kfg' which belongs to the data logger) to the memory card.

When inserting the card into the data logger, the free memory space on the card is automatically determined.

**Note: As this piece of information has to be determined by searching the free sections on the card, it can take some minutes, in particular, if cards with large memory capacity are used! During that time a flashing card symbol is shown on system status display.**

**You should not remove the card while searching!**

## 7.4 Created files

Creating reading files on N6 devices is different depending on type. Devices with standard menu store data consecutively. It can be done manually or automatically in day- and year files.

In order to create reading files manually on the data logger, the menu item ,Backup' is provided (section ,Menu'). Each data logger uses a dedicated directory for its files which corresponds to its serial number. Files of type „*.PWB" are created within this directory. The filenames are automatically created by the current date (year, month, day - e.g. „20071015.PWB").

**For devices with standard menu only:**

File names are automatically created after the current date (year/month/day - e.g. ,20071015.PWB').

It is advantageous that the file can be definitely assigned with the option of a simple sorting as well as a definite creation of the filename. If data are manually or automatically stored several times a day, new data are attached to the already created file!

If the option ,Storage daily' is set (preset), last data are written into the day file at midnight every day. Subsequently, a new file is created. Otherwise a new file will only be created at full memory.

Additional to the day files where all readings are stored, a year file is created on the memory card where readings every 15 minutes are written into or in case of a threshold violation current readings are written into. This fils is named after the year (e.g. ,2007.PWB').

**For devices with RLBK menu only:**

Devices with RLBK menu basically store on demand via menu only. Consecutively numbered files are created here (e.g. ,DAT_0000.PWB'). The file number increments consecutively up to 9999 after every successful storage process.

**Note: If the memory card is accessed, a flashing memory card symbol appears on display. The card should remain inserted in the device as long as this symbol flashes! Otherwise, the card can be damaged!**

It is recommended to assign definite names to the subdirectories (principle of the data logger) when transferring data to PC, so file names can easily be assigned to the respective data logger and hence the risk of having similar file names is reduced.

# 8      Notes on use of printer PORTI-W 25

Additional to the printer PORTI-W25, there are a paper roll, a connecting cable to the data logger and a charger. Interfaces for power supply and communication are at the printer.
**The printer must be switched off before cables are plugged!**

## Changing paper roll

Please make sure that paper dedicated to the thermal printer is used only.

1. Switch off the printer.
2. Open the cover of the paper roll. For that purpose, press at both sides until the locking device is loosened.
3. Remove the blank roll.
4. Insert the new roll.
5. Be sure to note the correct running direction.
6. Pull a small amount of paper and then close the cover.
7. Tear off the paper.
8. If the last printing process was incomplete, print again.

The configuration of the printer was done by manufacturer and it must not be modified.

## Operating the printer

The paper is advanced on line by pressing the FEED button. The POWER LED is on whenever the printer is on. When the battery is almost exhausted, the LED flashes with red colour occasionally. In this case, you must recharge the battery by using the power supply unit. A flashing ERROR LED indicated an error such as paper end, cover open etc.

## Self test

The self test checks whether the printer has any problems and checks the following:

1. Make sure paper roll has been installed properly.
2. Turn on the power while holding down the FEED button.
3. The self test prints the current printer status, which provides the control ROM version and the communication method setting.
4. After printing the current printer status, self test printing will print a pattern using te built-in character set.
5. The self test automaically ends. Now the printer is ready to receive data.

## Miscellaneous notes

1. Do not pull the paper out when the cover is closed.
2. Because the thermal elements of the print head are easy to break, so do not touch them with any metal objects.
3. Since the areas around the print head become very hot during and just after printing, do not touch them.
4. Do not use the cover open button except when necessary.
5. Do not touch the surface of the print head because dust and dirt can stick to the surface and damage the elements.
6. Only dedicated thermal paper should be used.

Chemicals on thermal paper as well as touching the prints with metal objects can cause discoloration.  When storing thermal paper in a card case or sample notebook, be sure to use only products made of polyethylene, polypropylene or polyester. If thermal paper touches diazo copy paper immediately after copying, the printed surface may be discolored. Thermal paper must not be stored with the printed surface against each other because the printing may be transferred between the surfaces. **The thermal paper should be protected from high temperature, humidity and light.**

**Specifications**

| | |
|---|---|
| Print methode | direct thermal line printing |
| Dot density | 203 DPI |
| Printing width | 104 mm |
| Paper width | 117 mm |
| Characters per line | 80 |
| Printing speed | 35 mm / sec |
| Receive buffer size | 10 KByte |

**Note:**        Printing speed may be slower, depending on the data transmission speed and the combination of control commands.

| | |
|---|---|
| Supply voltage | AC adapter: 8.6 DCV / 1.2 A |
| | Battery:        7.2 V / 1.2 A |
| Ambient conditions | Temperature:      0°C - 40°C    (operating) |
| | -10°C - 50°C (storage) |
| | Humidity:        30% - 80%    (operating) |
| | 10% - 90%    (storage) |
| | (does not apply to the paper) |

# 9        Technical specifications

| | |
|---|---|
| Analog inputs | max. 4 inputs 0..3 V, optional 0..20 mA, 4..20 mA, 0..1 V or 0..10 V recording when sampling interval is adjusted |
| Counting inputs | max. 4 inputs for floating distance contact or voltage pulse pulse width > 10ms, max. 50 pulses per second, logging of meter readings and flows |
| Data memory | 256kB, optional up to 496kB optional changeable memory card (MultiMediaCard up to max. 2GB) |
| Limit value | adjustable upper and lower limit value for each analog channel |
| Sampling rate | freely adjustable 1s to 1h |
| AD converter | 8 bit (256 digital levels, ±½ LSB) 12 bit (4096 digital levels, ±1 LSB) 14 bit (16384 digital levels, ±1LSB) 16 bit (65536 digital levels, ±1LSB) |
| Real time clock | deviation 5 ± 23 ppm ($\Delta f/f0$) at 25°C |
| Storage mode | ring memory mode(overwrites oldest data at full memory or linear memory mode (stops at full memory) |
| Interface | RS232-interface or RS485 (full duplex), 9600 Bd maximum 57600 Bd at reading data minimum 2400 Bd at printing via mini printer 8 data bits, 1 start bit, 1 stop bit, no parity check |
| LCD display | 2 x 16 characters, contrast and display duration adjustable |
| Power supply | 9V E-block lithium battery PP3 (capacity 1200 mAh) or 7,2V lithium battery pack (capacity 16500 mAh) |
| • Explosion protection | ⟨Ex⟩ II 3G Ex ec [ic Gc] IIC T4 Gc X (optional) |
| • Environment | -20°C ≤Ta ≤ 60°C pollution level 2 |

Electrical parameters for intrinsically safe status and counting inputs (maximum values per circuit):

Voltage U0:            9,2 V
Current I0:            9,3 mA
Power P0:              21,4 mW
Capacitance Ci:        1 nF
Inductance Li:         insignificant

Maximum allowed external capacitance and inductance at ignition protection Ex ic IIC:

Capacitance C0:    36 µF
Inductance L0:     925 mH

Please note the regulations for the wiring of intrinsically safe circuits!

## 9.1    EMC

In accordance with EN 61000-6-3 (emitted interference in living quarters) and with EN 50081-2 (interference resistance in industrial field).

## 9.2    Standard transducers

| Transducer type, dimensions | Measuring ranges | Class / Deviation |
|---|---|---|
| Temperature transducer, integrated in controller | -40..40 °C to –20..60 °C | ±1 K |
| Temperature transducer Ø 6 mm | -20..60 °C | ±1 K |
| Pressure transducer, Ø 40 mm, connection G½ | 0..50 mbar to 0..70 bar | ±1,0% |
| Pressure transducer, Ø 25 mm, connection G½ | 0..40 bar to 0..400 bar | ±1,0% |
| Pressure transducer, Ø 25 mm, connection G½ | 0..1 bar to 0..400 bar | ± 0,5% |
| Counting/status input | ( potential-free contact; | max. 50 Hz ) |

All transducers are delivered with 1m cable. Longer connecting cables are possible.

## 9.3    Data memory

Storage times of the internal memory result from the number of channels occupied, from preset sample intervals 1 and 2 as well as from storage and sample mode. If the reading resolution is > 8 bit (12, 14 or 16 bit), possible storage times will halve themselves. The signal inputs cause different memory requirements (analog-, state- and pulse inputs). We can do the preliminary work for you for each of the combinations of those parameters occupied.

# 10    Recycling of batteries and old appliances

Used electric appliances, batteries and rechargeable batteries are subject to particular statutory provisions. Batteries, rechargeable batteries and electric appliances must not be disposed with the household waste. The end user is obligated to return them by the law. Used electric appliances, batteries and rechargeable batteries can be disposed at collecting points, municipal disposal areas or by manufacturer / supplier.

The Paul Wegener GmbH as seller of batteries and electric appliances fulfills its take-back obligation and disposes used batteries and old electric appliances free of charge. This take-back obligation, however, limits itself to used electric appliances, batteries and rechargeable batteries which belong or belonged to the product range of the Paul Wegener GmbH and the amount which was delivered by the Paul Wegener GmbH. The end user bears the forwarding charges.

# EU-DECLARATION OF CONFORMITY

Product name:

## PWBlogg N6/4, N6/5, N6/6, N6/7

The specified products are in compliance with following European directives.

**2014/30/EU**    electromagnetic compatibility
**2014/34/EU**    equipment and protective systems intended for use in potentially explosive atmospheres

and have been developed and tested using the following standards:

**EN 61000-6-3:2011-09**    subject basic standard for emitted interference  – emitted interference for living quarters, business- and trade areas as well as small firms
**EN 61000-6-2:2011-06**    subject standard for interference resistance – industrial sector
**EN 60079-0:2019-09**    electrical equipment for potentially explosive atmospheres, section 0: general requirements
**EN 60079-7:2016-08**    potentially explosive atmospheres - section 7: equipment protection by increased safety „e"
**EN 60079-11:2012-06**    explosive atmosphere - section 11: equipment protection by intrinsic safety „i"

Marking as category 3 - equipment for use in gas explosion-hazard areas of the zone 2:

⟨Ex⟩ **II3G  Ex ec [ic Gc] IIC T4 Gc X**
**-20 °C ≤ Ta ≤ +60 °C**

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**The special conditions for use in gas explosion**-hazard **areas must be observed!**
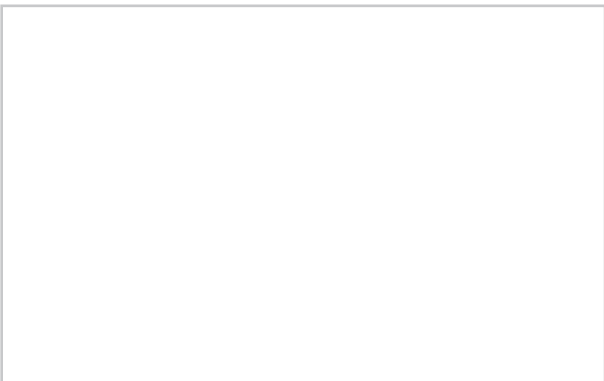
Ballenstedt, 14.03.2023

Wegener
Managing Director

# 11    Troubleshooting

| Problem | Measure |
|---|---|
| Software reports:<br>„No modules found!" | Check the following:<br>• if correct interface chosen<br>• if cable to data logger and PC is connected properly |
| No data stored in controller | Check, if:<br>• a pre-set starting time is reached and measuring is activated<br>• battery is functional<br>• all transducers and cable are functional<br>• readings are shown on LCD<br>• moisture is intruded in the data logger |
| Battery is low | Change battery or have it changed by manufacturer |
| Password forgotten | Read out measuring data, send reading file to manufacturer |
| No connection possible via modem | Check on PC as well as on data logger if:<br>• power supply of the modem is functional<br>• modem and data logger or PC are connected properly<br>• modem is initialized correctly on PC or on data logger<br>• correct type of modem was selected in dialog „settings" when configurating<br><br>If you use a GSM modem, check in addition if:<br>• the correct PIN number entered into configuration of data logger and/or in settings on PC<br><br>In case of error messages in modem dialog of software, check if:<br>• initialization parameters are supported by your modem |
| Software does not read measuring data completely or reports errors when reading out the data | Check, if:<br>• all cable connections are made properly<br>• moisture is intruded in the data logger<br>• battery of data logger is functional<br><br>Connect it directly again (menu item „module/connect") and start reading measuring data again<br><br>Modern computers have power management functions. During shutdown of hard disk or change into standby mode the CPU can be busy temporarily, so that it „oversleeps" the sent characters. This leads to abort of reading out. If necessary, stretch times for activating standby functions or switch off the power management. |
| Not enough memory | Data backup has to be done.<br>Delete or rather format the card. |
| Could not create MMC file | General error message if write/read problems on the card occur.<br>Maybe wrong file system or card is not readable. |

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