Supplementary instructions

PLICSMOBILE

GSM/GPRS radio module

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Contents

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1 For your safety

1.1 Authorised personnel

All operations described in this operating instructions manual must be carried out only by trained specialist personnel authorised by the plant operator.

During work on and with the device the required personal protective equipment must always be worn.

1.2 Appropriate use

The PLICSMOBILE is an external GSM/GPRS radio unit for transmission of measured values and for remote parameter adjustment of plics® sensors.

Operational reliability is ensured only if the instrument is properly used according to the specifications in the operating instructions manual as well as possible supplementary instructions.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden.

1.3 Warning about incorrect use

Inappropriate or incorrect use of the instrument can give rise to application-specific hazards, e.g. vessel overfill or damage to system components through incorrect mounting or adjustment.

1.4 General safety instructions

This is a state-of-the-art instrument complying with all prevailing regulations and guidelines. The instrument must only be operated in a technically flawless and reliable condition. The operator is responsible for the trouble-free operation of the instrument.

During the entire duration of use, the user is obliged to determine the compliance of the necessary occupational safety measures with the current valid rules and regulations and also take note of new regulations.

The safety instructions in this operating instructions manual, the national installation standards as well as the valid safety regulations and accident prevention rules must be observed by the user.

For safety and warranty reasons, any invasive work on the device beyond that described in the operating instructions manual may be carried out only by personnel authorised by the manufacturer. Arbitrary conversions or modifications are explicitly forbidden.

The safety approval markings and safety tips on the device must also be observed.

1.5 Safety label on the instrument

The safety approval markings and safety tips on the device must be observed.

1.6 CE conformity

The device fulfills the legal requirements of the applicable EC guidelines. By affixing the CE marking, we confirm successful testing of the product.

You can find the CE Certificate of Conformity in the download section of our homepage.

Electromagnetic compatibility
The instrument is designed for use in an industrial environment. Nevertheless, electromagnetic interference from electrical conductors and radiated emissions must be taken into account, as is usual with a class A instrument according to EN 61326-1. If the instrument is used in a different environment, its electromagnetic compatibility with other devices must be ensured by suitable measures.

1.7 Radio license for Europe

The instrument is in conformity with EU directive 1999/05/EG (R&TTE).

1.8 Environmental instructions

Protection of the environment is one of our most important duties. That is why we have introduced an environment management system with the goal of continuously improving company environmental protection. The environment management system is certified according to DIN EN ISO 14001.

Please help us fulfill this obligation by observing the environmental instructions in this manual:

- Chapter "*Packaging, transport and storage*"
- Chapter "*Disposal*"

2 Product description

2.1 Configuration

Note:
This supplementary instructions manual describes the optionally available GSM/GPRS radio module PLICSMOBILE which is integrated in the second housing chamber of a plics® sensor. This instructions manual is a supplement to the respective operating instructions manual of the sensor and thus cannot be used as a self-contained operating instructions manual.

Scope of delivery

The scope of delivery encompasses:

- Sensor with integrated PLICSMOBILE
- Antenna (internal or external)
- Mini-USB cable
- Cable gland (included in delivery)
- Documentation
  - This operating instructions manual
  - If necessary, further certificates

Constituent parts

As an option, the GSM/GPRS radio module PLICSMOBILE can be mounted in a plics® sensor with double chamber housing (only when the sensor is thus ordered, retrofitting not possible). The PLICSMOBILE is in the side chamber and the sensor electronics is in the upper chamber of the housing.

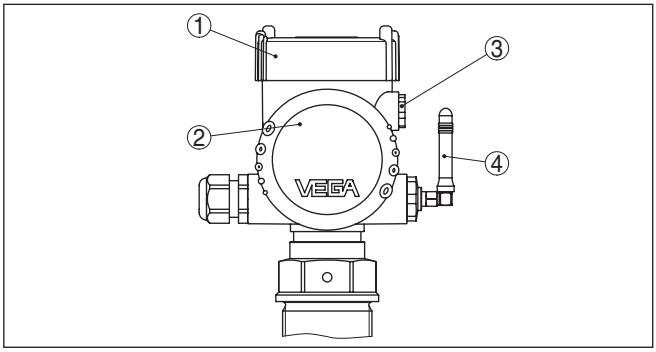

Fig. 1: Sensor with integrated PLICSMOBILE

1 Housing chamber with sensor electronics
2 Housing chamber with PLICSMOBILE electronics
3 Blind plug (can be replaced by the included cable gland)
4 External antenna (optional)

2.2 Principle of operation

Application area

The PLICSMOBILE is a GSM/GPRS radio unit for transmission of measured values and for remote parameter adjustment of plics® sensors. Due to the large operating voltage range and the integrated power saving functions, a mains-independent power supply via bat-

tery or solar cells is possible. Typical applications are measured value transmission from mobile vessels, battery-operated level measurement and deep well measurement.

The measured value and message transmission can be optionally carried out via e-mail or SMS. Furthermore, the measured values can be transitted via http for visualisation in VEGA Inventory System. The use of PLICSMOBILE is particularly suitable for inventory management, VMI (Vendor Managed Inventory) and remote enquiry.

Functional principle

The internal radio unit PLICSMOBILE is integrated in the second housing chamber of a plics® sensor. The measured value recorded by the sensor is transferred via the I^2C interface to the PLICSMOBILE.

The transmission of measured values, event messages and diagnostic information to the user is carried out via the GSM/GPRS network. Thanks to quadband technology, the device can be used virtually anywhere in the world. There is also the option of accessing the connected sensor via remote parameter adjustment.

Voltage supply

The voltage supply is provided via a standard low voltage (external power supply unit/battery/accumulator). You can find detailed specifications in chapters "*Connecting to power supply*" and "*Technical data*".

If desired, PLICSMOBILE can also power the sensor electronics.

2.3 Operation

The adjustment is made via PACTware and the respective DTM by using the integrated USB connection.

3 Mounting

3.1 General instructions

Information:
You can find the general mounting instructions in the operating instructions manual of the respective sensor. The instructions listed below are a supplement to that part of the radio module.

Installation position

Check before mounting if there is sufficient coverage (signal strength) by the chosen mobile phone provider at the planned location. This can be simply tested with a mobile phone. Make sure the SIM cards in the PLICSMOBILE and in the mobile phone are from the same mobile phone provider. If the radio reception is too weak, you should search for a better position. In closed rooms this would be, for example, close to a window or at least closer to an outer wall. As an option, an external antenna with complete confectioned cable is available.

Select a mounting location where the instrument is within easy reach for mounting and connecting as well as for the connection via USB. To facilitate mounting, the housing can be rotated by 330° without the use of any tools.

Note:
During operation, a distance of at least 20 cm should be kept between the antenna and persons working nearby. Operation of the instrument with smaller distances is not recommended.

4 Connecting to power supply

4.1 Preparing the connection

Note:
You can find the general connection instructions in the operating instructions manual of the respective sensor. The instructions listed below are a supplement to that part of the radio module.

Keep in mind that when using PLICSMOBILE, no additional external indication such as e.g. VEGADIS 61 can be connected.

4.2 Connection options

Voltage supply of sensor electronics and PLICSMOBILE can be carried out in the following two ways:

Common power supply of sensor electronics and PLICSMOBILE

With this version, only one voltage supply for both electronics modules is required. The voltage supply is connected to the PLICSMOBILE. The sensor connection cable transmits, in addition to the measured value, also the voltage supply of the sensor. Hence there is no 4 … 20 mA or Fieldbus signal from the sensor electronics available for processing, e.g. via a PLC/control system. Hence, measured value transmission can be only carried out via radio transmission through e-mail/SMS/WEB-VV. Every sensor with integrated PLICSMOBILE is shipped in this version.

Separate power supply of sensor electronics and PLICSMOBILE

With this version, the sensor electronics and the PLICSMOBILE are each powered by a separate voltage supply. The measured values can be transmitted via radio link and the 4 … 20 mA or Fieldbus signal is also available for processing, for example via a PLC. If this version is used, the internal connection cable must be separated and isolated at the terminals of the sensor electronics. The blind stopper in the upper housing chamber must be replaced by the included cable gland. Connection of the sensor power supply is then carried out as described in the respective operating instructions manual.

4.3 Connection steps PLICSMOBILE

The connection of PLICSMOBILE must be carried out in general and is independent of the selected connection variant (separate or common power supply).

Proceed as follows:

1. Unscrew housing cover of the lateral housing chamber
2. Loosen compression nut of the cable gland on the left and remove blind plug
3. Remove approx. 10 cm (4 in) of the cable mantle, strip approx. 1 cm (0.4 in) of insulation from the ends of the individual wires
4. Insert the cable into the cable gland through the cable entry

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Fig. 2: Connection steps 4 and 5

5. Insert the wire ends into the terminals according to the wiring plan

Information:
Solid cores as well as flexible cores with wire end sleeves are inserted directly into the terminal openings. In case of flexible cores without end sleeves, press the terminal from above with a small screwdriver, the terminal opening is then free. When the screwdriver is released, the terminal closes again.

6. Check the hold of the wires in the terminals by lightly pulling on them
7. Connect the screen to the internal ground terminal, connect the external ground terminal to potential equalisation
8. Tighten the compression nut of the cable entry gland. The seal ring must completely encircle the cable
9. Screw the housing lid back on

The electrical connection is finished.

Information:
The terminal block is pluggable and can be removed from the electronics. To do this, lift the terminal block with a small screwdriver and pull it out. When reinserting the terminal block, you should hear it snap in.

4.4 Connection steps sensor electronics

These steps must only be carried out if the sensor electronics is to be powered via an additional voltage supply, for example, if the 4 … 20 mA signal has to be evaluated.

Proceed as follows:

1. Unscrew housing cover of the upper housing chamber

2. Loosen and isolate the internal connection cable from the terminals
3. Remove the blind plug of the upper housing chamber
4. Insert the cable gland which is included in the delivery
5. Carry out connection as described in the operating instructions manual of the sensor

4.5 Wiring plan

Wiring plan PLICSMOBILE

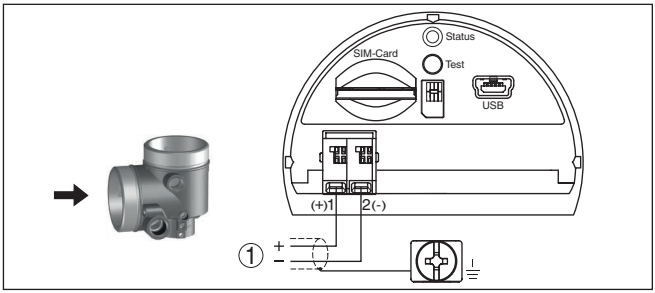

Fig. 3: Connection of the PLICSMOBILE supply voltage

1 Voltage supply

5 Battery operation and power saving mode

5.1 Battery operation

If no network-supported voltage supply is available, PLICSMOBILE can be also powered via the battery. You can find detailed specification for voltage supply in chapter "*Technical data*".

When battery operation and time-controlled measurement transmission are activated, the power saving mode should be switched on and the sensor should be set to HART multidrop mode to increase the operating time (details see chapter "*Power options*").

5.2 Battery sizing

When selecting an external battery/accumulator, the following points must be observed:

Power consumption in power saving mode:
If a battery or an accumulator is used which cannot be automatically charged cyclically, the power saving mode should be activated. With an operating voltage of e.g. 12 V, a standby power consumption of 0.3 mW must be taken into account. With an assumed lifetime of e.g. one year, the requirement is approximately 2.6 Wh, which corresponds to a battery capacity of 0.22 Ah at 12 V. The standby power consumption at specific operating voltages is stated in the "*Technical data*".

Power requirement complete measurement cycle incl. measured value transmission:
A measurement cycle lasts approximately 60 to 120 seconds (dependent on sensor type and network quality) and includes automatic switching on of the sensor (HART multidrop mode with 4 mA), recording of the measured value, measured value transmission and a return to the power saving mode. During this time, approximately 20 mWh of energy is required. For example, with one measurement per day, this adds up to approx. 9.6 Wh per year, which corresponds to a battery capacity of approx. 0.8 Ah at 12 V.

Examples for battery capacity depending on the number of transmission cycles

Number of messages/day	Annual consumption PLICSMOBILE		
	Standby energy demand	Energy demand for message transmission	Required battery capacitance with 12 V
1	2.6 Wh	9.6 Wh	0.8 Ah
2	2.6 Wh	16.8 Wh	1.4 Ah
4	2.6 Wh	32.4 Wh	2.7 Ah
8	2.6 Wh	61 Wh	5.1 Ah
24	2.6 Wh	178.8 Wh	14.9 Ah

Note:
Due to the nature of the system, each battery and accumulator has a self-discharge which can vary considerably dependent on the type. This is very important for the calculation of the required capacitance. In the listed examples, this self-discharge is not taken into accunt. The available capacitance depends also considerably from the temperature. The specifications refer to a temperature of 20 °C (68 °F).

5.3 Power options

In the DTM (see chapter "*Parameter adjustment with PACTware"*) you can select under the menu item "***Energy options***" between the modes "***Continuous operation***" and "***Power saving mode***".

Permanent operation

In permanent (non-stop) operation PLICSMOBILE and the sensor always remain switched on. Only in this mode can the instrument be used for level monitoring and send an e-mail when a certain level is reached or an error occurs (measured value/status-controlled transmission). In permanent operation PLICSMOBILE allows remote parameter adjustment. Configuration changes on PLICSMOBILE as well as the sensor can thus be carried out remotely from any PC with PACTware.

Power saving mode

In this mode, the integrated GSM modem as well as the sensor connected to PLICSMOBILE are switched on automatically if a time-controlled message transmission is pending. After the correct measured value is recorded, the login into the GSM network is carried out and the measured value sent. The system then returns to power saving mode. The time for this transaction depends on the connected sensor type and the network quality and is normally 60 to 120 seconds. A pressure transmitter, for example, receives the measured value much faster than a radar or ultrasonic sensor.

Note:
Please note that event-controlled transmission (measured value/ status-controlled) is not possible in the power saving mode. A dial-in connection for remote parameter adjustment is also not possible during the inactive time.

HART multidrop

When using battery operation and a HART sensor with non-required 4 … 20 mA signal, we recommend setting the sensor to multidrop mode. In such case, the sensor consumes constantly only 4 mA independently of the measured level, which can increase battery life considerably. A description of the activation of multidrop mode can be found in the operating instructions of the indicating and adjustment module.

6 Setup

6.1 Adjustment system

Setup requirements

A pC with PACTware and respective DTM is required for setup. The connection is carried out via a standard mini USB cable (in the scope of delivery). A released SIM card (Mini-SIM) with data transmission option must be used in PLICSMOBILE. A good network coverage of the used GSM/GPRS network must be available at the place of operation.

Adjustment on the instrument is limited to a test key and an LED. With these, the operation and the status of the instruments can be checked (selection of the GSM network, standby …).

Display and adjustment elements

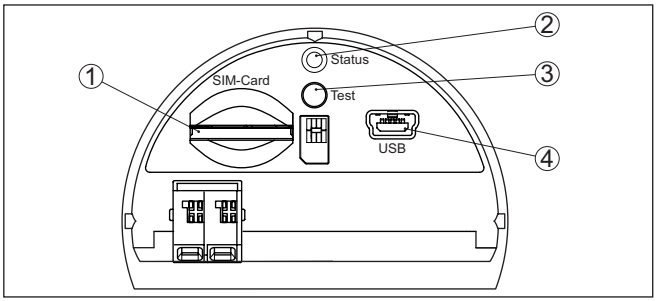

Fig. 4: Display and adjustment elements

1 SIM card slot (Mini-SIM format)
2 Status indication
3 Key to the test operation
4 Mini-USB interface

Information:
The function description of the key and the status indication is available in chapter "*Mobile phone network and SIM card*".

6.2 Connect the PC

Connection of the PC via USB

The parameter adjustment of PLICSMOBILE is carried out via PC and USB interface. The required connection is located in the electronics housing. Keep in mind that proper functioning of the USB interface can only be guaranteed in the (limited) temperature range of 0 … +60 °C.

If the PC is provided with a Full-Power-USB-Port, the PLICSMOBILE is powered via the integrated USB power supply. Parameter adjustment is thus possible without connected power supply, but measured value recording and transmission is not possible. Power supply via USB is not possible with a Low-Power-USB-Port.

Note:
The connection via USB requires a driver. First install the driver before connecting PLICSMOBILE to the PC.

The required USB driver is included on the CD "*DTM Collection*". You should always use the latest version to ensure support of all instrument functions. The system requirements for operation correspond to those of the "*DTM Collection*" or of PACTware.

During installation of the "*DTM Collection*", the appropriate instrument driver is installed automatically. When PLICSMOBILE is connected, the driver installation is completed autonomously and is ready for operation without a restart.

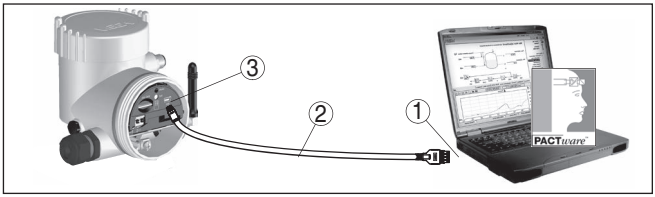

Fig. 5: Connection of the PC via USB

1 USB interface of the PC
2 Mini-USB connection cable (in the scope of delivery)
3 USB interface of PLICSMOBILE

6.3 Parameter adjustment with PACTware

Prerequisites

For adjustment via PC, the configuration software PACTware and a suitable instrument driver (DTM) according to FDT standard are required. The up-to-date PACTware version as well as all available DTMs are compiled in a DTM Collection. The DTMs can also be integrated in other frame applications according to FDT standard.

Note:
To ensure that all instrument functions are supported, you should always use the latest DTM Collection. Furthermore, not all described functions are included in older firmware versions. You can download the latest instrument software from our homepage. A description of the update procedure is also available in the Internet.

The basic operation of the software is described in the operating instructions manual "*DTM Collection/PACTware*" attached to each DTM Collection and which can also be downloaded from the Internet. Detailed descriptions are available in the online help of PACTware and the DTMs.

Standard/Full version

All device DTMs are available as a free-of-charge standard version and as a full version that must be purchased. In the standard version, all functions for complete setup are already included. An assistant for simple project configuration simplifies the adjustment considerably. Saving/printing the project as well as import/export functions are also part of the standard version.

In the full version there is also an extended print function for complete project documentation as well as a save function for measured value and echo curves. In addition, there is a tank calculation program as well as a multiviewer for display and analysis of the saved measured value and echo curves.

6.4 Mobile network and SIM card

An activated SIM card (Mini-SIM format) with data transmission option is required for setup.

Information:
The SIM card does not belong to the scope of delivery of the instrument. To avoid roaming costs, the card should be bought in the country in which the PLICSMOBILE is installed and operated. If you are using a VEGA Ident Card, this is unimportant because no roaming costs will incur.

VEGA-Ident-Card

To make the measured value transmission and remote maintenance as simple as possible, VEGA offers the service package "*Wireless data transmission*". This package includes an Ident Card (SIM card in Mini-SIM format) incl. all incurring data transmission costs and a world-wide 24 h support.

Dial-In (remote parameter adjustment)

Dial-in connections on PLICSMOBILE are only possible if the installed SIM card supports the data service CSD (Circuit Switched Data). Dial-in connections are used for remote parameter adjustment. Here, the use of GPRS is not possible.

Note:
Keep in mind that with a dial-up connection (CSD connection), the billing is time-based. When used over a longer period, considerable connection costs can accrue.

Information:
When the power saving mode is activated in PLICSMOBILE, it cannot be contacted by a dial-in connection during the inactive time. During the active time (during a data transmission), incoming dial-in connections are accepted and maintained independent of the power saving mode until the dial-in connection is terminated.

Dial-Out (measured value transmission)

Data connections (Dial-Out) from PLICSMOBILE can be optionally established via GPRS (volume-based billing) or a dial-up connection (CSD, time-based billing). The transmission mode can be selected when setting up via PACTware and DTM. Outgoing connections are used for measured value transmission via E-mail/SMS/VEGA Inventory System.

The data transmission can be either carried out via CSD but also via GPRS. The availability of GPRS at the location of PLICSMOBILE depends on the respective mobile network provider. With CSD, the transmission costs are calculated by means of the required time. With GPRS, the calculation is made according to the transmitted data volume. For this, the data transmission should be always carried out via GPRS, if possible.

Note:
Keep in mind that with a dial-up connection (CSD connection), the billing is time-based. When used over a longer period, considerable connection costs can accrue.

When transmitting the measured value via e-mail or Inventory System, approximately 5 KB data are transmitted. With hourly transmission, for example, this will result in a monthly total net data volume of approximately 4 MB.

In dependence on the selected tariff, the mobile network provider carries out a so-called block rounding. When checking out of the GPRS network, the billing units are rounded. Since PLICSMOBILE checks out of the GPRS network after transmission of every message (if the energy saving mode is activated), this block rounding is applied with each transmission. If for example a tariff with a block rounding to 100 KB is used, an hourly measurement transmission results in a monthly billing volume of over 70 MB. For that reason, choose a pure data tariff plan (M2M) with the lowest possible block rounding.

Insert SIM card

Insert the card with the beveled side in front into the card slot until it snaps in. The contact surface must point downward.

Note:
The electronics must be voltage-free when inserting the SIM card. To ensure this, the entire voltage supply must be switched off. This includes disconnecting any battery that might be installed and the USB cable. Take ESD protective measures when handling the SIM card. Electrostatic discharges can damage the SIM card or the PLICSMOBILE.

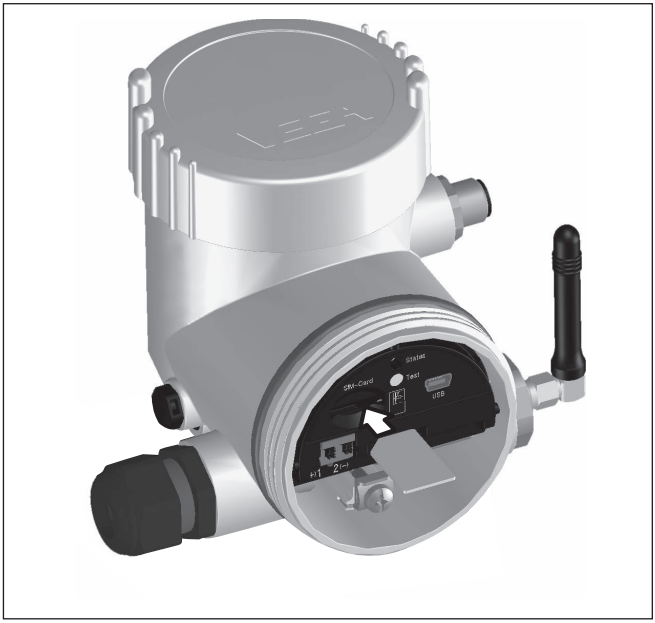

Fig. 6: Insert Mini-SIM card

Activate SIM card

To avoid misuse, the SIM card is generally locked by a PIN. To ensure that PLICSMOBILE can contact these locked SIM cards, first of all

the PIN must be entered. For this purpose the assistant "*Activate SIM card*" is available in the DTM. Enter here the correct PIN for the card. The assistant also offers the option of changing the PIN.

Information:
When using the VEGA Ident Card, entering or deactivating a PIN is not required.

Then check if the card is logged into the network and if sufficient network coverage (signal strength) exists. For a reliable measured value transmission, a signal strength of at least 30 % should be displayed. This can be checked in the DTM menu "*Network information*" under "*Setup - Diagnosis*". You can also see the general device status via the status indication.

Status indication

The following operating conditions are signalled via the LED status indication:

- **LED does not light:** no operating voltage or power saving mode active
- **Constant flashing:** Instrument is not logged into the GSM network
- **Unsteady flashing (long OFF/short ON):** instrument is booked into the GSM network
- **Continuous light:** Transmitting or dia-up connection (via CSD) active

Test key

When PLICSMOBILE is in power saving mode, a login procedure can be triggered by briefly pushing the test key. The user can thus check via the status LED whether a login into the GSM network is possible.

6.5 Internet connection and measured value transmission

Internet connection (Dial-Out)

The transmission of measured values via e-mail or to the VEGA Inventory System is always based on an Internet connection. Access data (user name/password) are required for this connection. With a CSD connection a dial-in number must be entered, with a GPRS connection a special dial-in number is required. With a GPRS connection, the APN (Access Point Name) must be stated in addition. You can get this information from your mobile phone provider.

Note:
Keep in mind that with a dial-up connection (CSD connection), the billing is time-based. When used over a longer period, considerable connection costs can accrue. Hence a GPRS connection should always be preferred over a CSD connection.

When using the VEGA service package "*Wireless data transmission*" and the VEGA Inventory System, you need no access data or additional information because the required parameters are already preset.

Information:
Further information and a list of current mobile network providers along with their access data can be found in the online help of the PLICSMOBILE DTM.

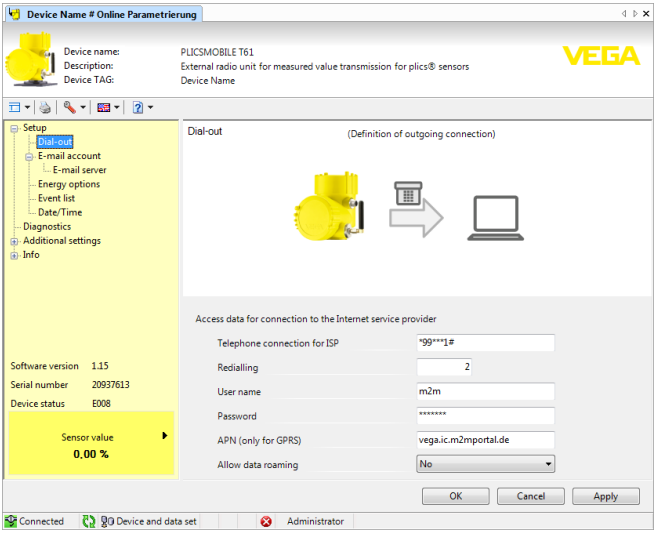

Fig. 7: Entering the Internet access data

Measured value transmission

The measured values can be transmitted optionally in the following ways:

- Via integrated mail client to any e-mail address
- Via SMS to any mobile phone
- Via http to the VEGA Inventory System

Under the DTM menu item "*Event list*" there is a convenient assistant for setting up measured value transmission. The measured values can be transmitted at individually definable times or intervals. A message can also be triggered when a certain level is exceeded or underrun. In addition, a status-controlled measured value transmission can be carried out, for example when a fault signal occurs.

E-mail transmission

For this option, an e-mail account with name of the inbox and outbox server (POP3/SMTP) as well as the user name/password are required for authentication. These data are available from your e-mail provider. From software version 1.15, an encrypted connection via TLS is preset. Please note that for encrypted connections, other server names must normally be used. You can find further information in the online help of the PLICSMOBILE DTM.

The measurement data can be sent either directly in the e-mail or in an attached file. The formats TXT, CSV, HTML or XML are available.

Note:
The following settings are necessary if you also want to send e-mails while using the Inventory System and a VEGA Ident Card:

- User name: "***m2m***"
- Password: "***sim***"
- APN: "***internet.m2mportal.de***"

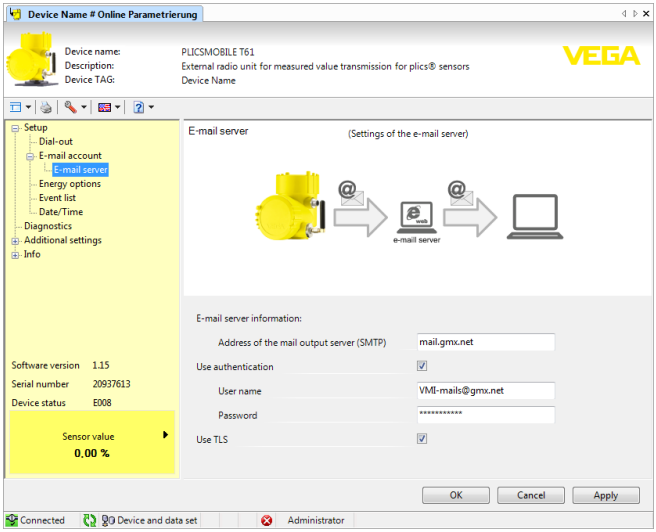

Fig. 8: Input of the e-mail access data

SMS transmission

For measured value transmission via SMS, no additional access data are required because all needed information is already available via the mobile phone contract.

VEGA Inventory System

For the configuration, only the URL or the IP address of the Inventory server are required. When hosting is carried out through VEGA, the server is contacted via the URL: "*data-vis.vega.com*". If Inventory System is hosted in your company, you will get the URL from your IT department.

Remote parameter adjustment (Dial-In)

The setup of PLICSMOBILE and sensor is carried out via USB and a PC with PACTware and respective DTM. If there is a SIM card with activated CSD service at hand, access can then be carried out via the radio connection (remote parameter adjustment).

Note:
Keep in mind that remote parameter adjustment is realized via a dial-up connection (dial-in), for which billing is time based. When used over a longer period, considerable connection costs can accrue.

7 Maintenance and fault rectification

7.1 Maintenance

If the instrument is used properly, no special maintenance is required in normal operation.

7.2 Rectify faults

Reaction when malfunction occurs

The operator of the system is responsible for taking suitable measures to rectify faults.

Causes of malfunction

Maximum reliability is ensured. Nevertheless, faults can occur during operation. These may be caused by the following, e.g.:

- Measured value from sensor not correct
- Voltage supply
- Interference in the cables

Fault rectification

The first measures to be taken are to check the input/output signal as well as to evaluate the error messages via the DTM. The procedure is described below. In many cases, the causes can be determined and the faults rectified in this way.

24 hour service hotline

Should these measures not be successful, please call in urgent cases the VEGA service hotline under the phone no. **+49 1805 858550**.

The hotline is manned 7 days a week round-the-clock. Since we offer this service worldwide, the support is only available in the English language. The service is free, only standard call charges are incurred.

Error messages

Error code	Cause	Rectification
No indication of the signal strength	No GSM network available	– Check network availability via mobile phone
E008	Sensor not found	– Check connection of the sensor
E013	Sensor signals error, no valid measured value	– Check sensor parameter adjustment – Send sensor for repair
E030	Sensor in boot phase Measured value not valid	– Check sensor parameter adjustment
E034	EEPROM CRC error	– Switch the instrument off and on – Carry out a reset – Send instrument for repair
E035	ROM CRC error	– Switch the instrument off and on – Carry out a reset – Send instrument for repair
E036	Instrument software not executable (during software update and after failed update)	– Wait until software update is finished – Carry out another software update

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Error code	Cause	Rectification
E042	Hardware error with selfcheck	– Send instrument for repair
E053	Sensor measuring range is not read correctly	– Communication error: Check sensor cable and screening
E086	Error communication hardware (initialisation of the radio module failed)	– Initialisation is carried out automatically. If the error exists permanently, send instrument for repair

Reaction after fault rectification

Depending on the reason for the fault and the measures taken, the steps described in chapter "*Set up*" may have to be carried out again.

8 Supplement

8.1 Technical data

Voltage supply	
Operating voltage[1]	8 … 32 V DC
Power consumption[2]	
– Power saving mode (9 V/12 V)	0.18 mW/0.3 mW
– Power saving mode (24 V/32 V)	1.8 mW/3.7 mW
– Permanent operation	1.1 W
– Peak power (measured value transmission)	5.1 W
Power requirement[3]	
– Measurement cycle incl. transmission	20 mWh

Mobile network	
SIM card slot	Mini-SIM (25 x 15 mm)
Radio frequency	Quadband GSM (850/900/1800/1900 MHz)
Antenna connection	SMA socket
Antenna version	Isotropic (Omni) antenna

USB interface[4]	
Quantity	1 x in the lateral housing chamber
Plug connection	Mini-B (4-pole)
USB specification	2.0 (Fullspeed)
Max. cable length	5 m (196 in)

Ambient conditions	
Ambient temperature	
– Instrument in general	-25 … +60 °C (-13 … +140 °F)
– USB interface	0 … +60 °C (+32 … +140 °F)
Storage and transport temperature	-25 … +80 °C (-13 … +176 °F)

Radio approvals	
Radio approvals of the integrated GSM modem	
– FCC ID	RI7GE865
– IC (Industry Canada)	5131 A-GE865

Approvals

Instruments with approvals can have different technical specifications depending on the version.

[1] When the instrument is powered by an external voltage supply, make sure the voltage supply unit has a sufficient current carrying capacity. With a voltage supply <9.6 V, current peaks of up to 2 A must be expected.
[2] The listed power specifications include the voltage supply of a HART sensor with 20 mA.
[3] The listed energy requirement includes the voltage supply of a HART sensor (VEGAPULS 61 with 4 mA (multidrop mode) and 12 V operating voltage.
[4] Limited temperature range, see ambient conditions

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For that reason the associated approval documents of these instruments have to be carefully noted. They are part of the delivery or can be downloaded under www.vega.com via "*VEGA Tools*" and "*serial number search*" as well as via "*Downloads*" and "*Approvals*".

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