Manual

AUTOMATION

WAGO-TO-PASS® 761

TO-PASS® Compact, 8 AI, Web, MODBUS

761-216

Telecontrol module for fault detection/indication, monitoring and remote control

Version 2.0.0

WAGO®
INNOVATIVE CONNECTIONS

WAGO Kontakttechnik GmbH & Co. KG

Hansastraße 27
D-32423 Minden

Phone: +49 (0) 571/8 87 – 0
Fax: +49 (0) 571/8 87 – 1 69

E-Mail: info@wago.com

Web: http://www.wago.com

Technical Support

Phone: +49 (0) 571/8 87 – 5 55
Fax: +49 (0) 571/8 87 – 85 55

E-Mail: support@wago.com

Every conceivable measure has been taken to ensure the accuracy and completeness of this documentation. However, as errors can never be fully excluded, we always appreciate any information or suggestions for improving the documentation.

E-Mail: documentation@wago.com

We wish to point out that the software and hardware terms as well as the trademarks of companies used and/or mentioned in the present manual are generally protected by trademark or patent.

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1 Notes about this Documentation

Note

Keep this documentation!
The operating instructions are part of the product and shall be kept for the entire lifetime of the device. They shall be transferred to each subsequent owner or user of the device. Care must also be taken to ensure that any supplement to these instructions are included, if applicable.

1.1 Validity of this Documentation

This documentation is only applicable to the telecontrol module 761-216 (TO-PASS® Compact, 8 AI, Web, MODBUS) and its variation 761-216/000-001.

1.2 Copyright

1.3 Symbols

⚠ DANGER

Personal Injury!
Indicates a high-risk, imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ DANGER

Personal Injury Caused by Electric Current!
Indicates a high-risk, imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING

Personal Injury!
Indicates a moderate-risk, potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION

Personal Injury!
Indicates a low-risk, potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

NOTICE

Damage to Property!
Indicates a potentially hazardous situation which, if not avoided, may result in damage to property.

NOTICE

Damage to Property Caused by Electrostatic Discharge (ESD)!
Indicates a potentially hazardous situation which, if not avoided, may result in damage to property.

Note

Important Note!
Indicates a potential malfunction which, if not avoided, however, will not result in damage to property.

Information

Additional Information:
Refers to additional information which is not an integral part of this documentation (e.g., the Internet).

1.4 Number Notation

Table 1: Number notation

Number code	Example	Note
Decimal	100	Normal notation
Hexadecimal	0x64	C notation
Binary	'100' '0110.0100'	In quotation marks, nibble separated with dots (.)

1.5 Font Conventions

Table 2: Font conventions

Font type	Indicates
italic	Names of paths and data files are marked in italic-type. e.g.: *C:\Programme\WAGO-I/O-CHECK*
Menu	Menu items are marked in bold letters. e.g.: **Save**
>	A greater-than sign between two names means the selection of a menu item from a menu. e.g.: **File** > **New**
Input	Designation of input or optional fields are marked in bold letters, e.g.: **Start of measurement range**
“Value”	Input or selective values are marked in inverted commas. e.g.: Enter the value “4 mA” under **Start of measurement range**.
[Button]	Pushbuttons in dialog boxes are marked with bold letters in square brackets. e.g.: **[Input]**
[Key]	Keys are marked with bold letters in square brackets. e.g.: **[F5]**

2 Important Notes

This section includes an overall summary of the most important safety requirements and notes that are mentioned in each individual section. To protect your health and prevent damage to devices as well, it is imperative to read and carefully follow the safety guidelines.

2.1 Legal Bases

2.1.1 Subject to Changes

WAGO Kontakttechnik GmbH & Co. KG reserves the right to provide for any alterations or modifications that serve to increase the efficiency of technical progress. WAGO Kontakttechnik GmbH & Co. KG owns all rights arising from the granting of patents or from the legal protection of utility patents. Third-party products are always mentioned without any reference to patent rights. Thus, the existence of such rights cannot be excluded.

2.1.2 Personnel Qualification

All sequences implemented on Series 761 devices may only be carried out by electrical specialists with sufficient knowledge in automation. The specialists must be familiar with the current norms and guidelines for the devices and automated environments.

All changes to the controller should always be carried out by qualified personnel with sufficient skills in PLC programming.

2.1.3 Use of the *TO-PASS*® Telecontrol Modules in Compliance with Underlying Provisions

The *TO-PASS*® telecontrol modules receive digital and analog signals from sensors and transmit and output them to higher-ranking controllers. Additionally, it is possible to (pre-)process them.

The devices have been developed for use in an environment that meets the IP20 protection class criteria. Protection against finger injury and solid impurities up to 12.5 mm diameter is assured; protection against water damage is not ensured. Unless otherwise specified, operation of the device in wet and dusty environments is prohibited.

2.1.4 Technical Condition of Specified Devices

The components to be supplied Ex Works, are equipped with hardware and software configurations, which meet the individual application requirements. WAGO Kontakttechnik GmbH & Co. KG will be exempted from any liability in case of changes in hardware or software as well as to non-compliant usage of components.

Please send your request for modified and new hardware or software configurations directly to WAGO Kontakttechnik GmbH & Co. KG.

2.2 Disclaimer

TO-PASS® telecontrol modules communicate using the GSM network (Global System for Mobile Communication). Exemptions cannot be made for GSM services used by the *TO-PASS*® telecontrol modules as they may be exposed to faults in the service provider's network. WAGO Kontakttechnik GmbH & Co. KG has no involvment with these types of problems.

Therefore, WAGO Kontakttechnik GmbH & Co. KG will reject any guarantee for the implementation of commands transmitted from and received by the *TO-PASS*® telecontrol module.

2.3 Firmware Licensing Terms

2.3.1 Firmware with Open Source GPL

The *TO-PASS*® Compact telecontrol module firmware contains Open Source software under GPL. According to Section 3b of GPL, we offer you the source code.
You can obtain the source code with licensing terms of the Open Source software from WAGO Kontakttechnik GmbH & Co. KG on request. Send your request to support@wago.com with the subject "Open Source TO-PASS Compact".

2.4 Block Rounding for GPRS Connections

The connection to the provider is established separately for each GPRS data transfer up to Firmware Version 2.31 (approx. 1 ... 2 kBytes). As a result, at least one block rounding per data transfer is billed.

Starting from Firmware Version 2.31, a permanent GPRS connection is established to the provider. Therefore, data transfers made within the billing period (e.g., one day) are summated for block rounding. In the event of continuing disturbances in the data transfer, the *TO-PASS*® telecontrol module will briefly interrupt the permanent GPRS connection, which also effects block rounding.

2.5 Safety Advice (Precautions)

For installing and operating purposes of the relevant device to your system the following safety precautions shall be observed:

DANGER

Do not work on components while energized!
All power sources to the device shall be switched off prior to performing any installation, repair or maintenance work.

DANGER

Installation only in appropriate housings, cabinets or in electrical operation rooms!
TO-PASS® telecontrol modules are exposed operating equipment. They may only be assembled in housings, cabinets or in electrical operation rooms. Access is only permitted via a key or tool to authorized qualified personnel.

DANGER

Use SELV/PELV power source only!
The *TO-PASS*® telecontrol module must only be powered from a PELV (Protective Extra Low Voltage) or SELV (Safety Extra Low Voltage) power source complying with the limited power source (LPS) requirements per DIN EN 60950-1.

⚠ WARNING

Please note the following information about FCC Part 15!

FCC Part 15.19
This device complies with Part 15 of the FCC Rules.
Operation is subject to the following conditions:
1. this device may not cause harmful interference, and
2. this device must accept any interference received, including interference that may cause undesired operation.

FCC Part 15.21
Modifications not expressly approved by this company could void the user's authority to operate the equipment..

Installation by qualified electrician only
The *TO-PASS*® telecontrol module must be operated with Antenna 758-0963.
The antenna gain main not exceed 3 dBi.
Only qualified staff can install and maintain the *TO-PASS*® remote module and its antenna. The transmitted must be off when working on or nearer to the antenna than specified below.

HF-Exposition
The external antenna operated with the *TO-PASS*® remote module must be at least 20 cm away from people. The antenna may not be positioned, so that it works in conjunction with any other antenna or transmitter.

⚠ CAUTION

Hot surface!
The surface of the housing can become hot during operation. If the device was operated at high ambient temperatures, allow it to cool off before touching it.

NOTICE

Do not reverse the polarity of connection lines!
Avoid reverse polarity of data and power supply lines, as this may damage the devices involved.

NOTICE

Replace defective or damaged devices!
Replace defective or damaged device/module (e.g., in the event of deformed contacts), since the long-term functionality of device/module involved can no longer be ensured.

NOTICE

Protect the components against materials having seeping and insulating properties!
The components are not resistant to materials having seeping and insulating properties such as: aerosols, silicones and triglycerides (found in some hand creams). If you cannot exclude that such materials will appear in the component environment, then install the components in an enclosure being resistant to the above-mentioned materials. Clean tools and materials are imperative for handling devices/modules.

NOTICE

Cleaning only with permitted materials!
Clean soiled contacts using oil-free compressed air or with ethyl alcohol and leather cloths.

NOTICE

Do not use any contact spray!
Do not use any contact spray. The spray may impair contact area functionality in connection with contamination.

NOTICE

Avoid electrostatic discharge!
The devices are equipped with electronic components that you may destroy by electrostatic discharge when you touch. Pay attention while handling the devices to good grounding of the environment (persons, job and packing).

3 Device Description

3.1 Scope of Delivery

The scope of delivery of the *TO-PASS*® telecontrol module, without options, includes only the *TO-PASS*® telecontrol module. Suitable antennas are available as accessories.

Note

SIM Card
Please note that one SIM card is required to operate each *TO-PASS*® telecontrol module and may be obtained from typical service providers such as T-Mobile, VODAFONE or EPlus. WAGO Kontakttechnik GmbH & Co. K.G. is prepared to assist with the selection of the most cost-effective tariff for your application.

3.2 Use

The *TO-PASS*® product family is designed for wireless communication of signals and messages. This includes:

- compact module for the connection of signals from plants,
- transmission,
- preparation of values for the operator.

TO-PASS® telecontrol modules 761-216 may be used as:

- fault indicator,
- remote data request system,
- data memory,
- event logger,
- permanent on-line link,
- telecontrol modules.

The system is connected in wireless mode to PCs, hand computers, Internet PCs, web servers, mobile telephones, fax, e-mail receivers or land-line telephones. Influences to the system are also possible.

Communication occurs using the global mobile radio network “GSM” (Global System for Mobile Communication). A SIM card is required for the *TO-PASS*® telecontrol module to use this network. As in the case of a mobile telephone, the *TO-PASS*® telecontrol module requires the SIM card in order to be able to “log on” to the network.

When generating a new configuration file, you can select the scope of functions based on the available firmware versions, or on the required functionalities. Differences between these are shown in the following table.

Table 3: Overview of functions

Functionality	**FW 2.20**	**FW 2.31**	**FW 2.32**	**FW 2.33**
Module name length (Identity)	8 characters*)	16 characters*)	16 characters*)	16 characters*)
“Prepaid” request	Always active	Can be de-activated	Can be de-activated	Can be de-activated
Address length	40 characters*)	60 characters*)	60 characters*)	60 characters*)
Data transmission to the value script	Standard script	SV=01.01	SV=01.01	SV=2.00
Data transmission to the logger script	Standard script	LV=2.00	LV=2.00	LV=2.01
Address(es) for SMS interval	First address	Selectable	Selectable	Selectable
Configuring GPS settings	Not possible	Possible with mobile devices	Possible with mobile devices	Possible with mobile devices
"Prepaid" request text	„*100#“	„*100#“	„*100#“	Parameterizable
Number check	7 characters*)	7 characters*)	7 characters*)	0 ... 20 characters*)
Script version	Standard	Extended	Extended	Parameterizable
Time request script	Not implemented	Not implemented	Not implemented	Implemented
Counter inputs	Not supported	Not supported	Not supported	Supported
Delay time	Not supported	Not supported	Not supported	Supported
Turn-off time	Supported to a limited extent:	Supported to a limited extent:	Supported to a limited extent:	Extended
Resolution of analog outputs	Without decimal places	Without decimal places	Without decimal places	With decimal places
Switched Web interval	Not possible	Not possible	Can be used	Can be used
Setpoint setting via Web check-back	Not possible	Not possible	Not possible	Can be used
Limited SMS transmission	Not possible	Not possible	Not possible	Can be used
Acknowledgement text	"ACK"	"ACK"	"ACK"	Parameterizable
MODBUS format	Supported to a limited extent:	Supported to a limited extent:	Supported to a limited extent:	Extended

No other components are required, other than the SIM card to connect to the GSM mobile radio network and a GSM antenna (available as an accessory). Modems and interfaces are already installed in the *TO-PASS*® telecontrol module.

3.3 View

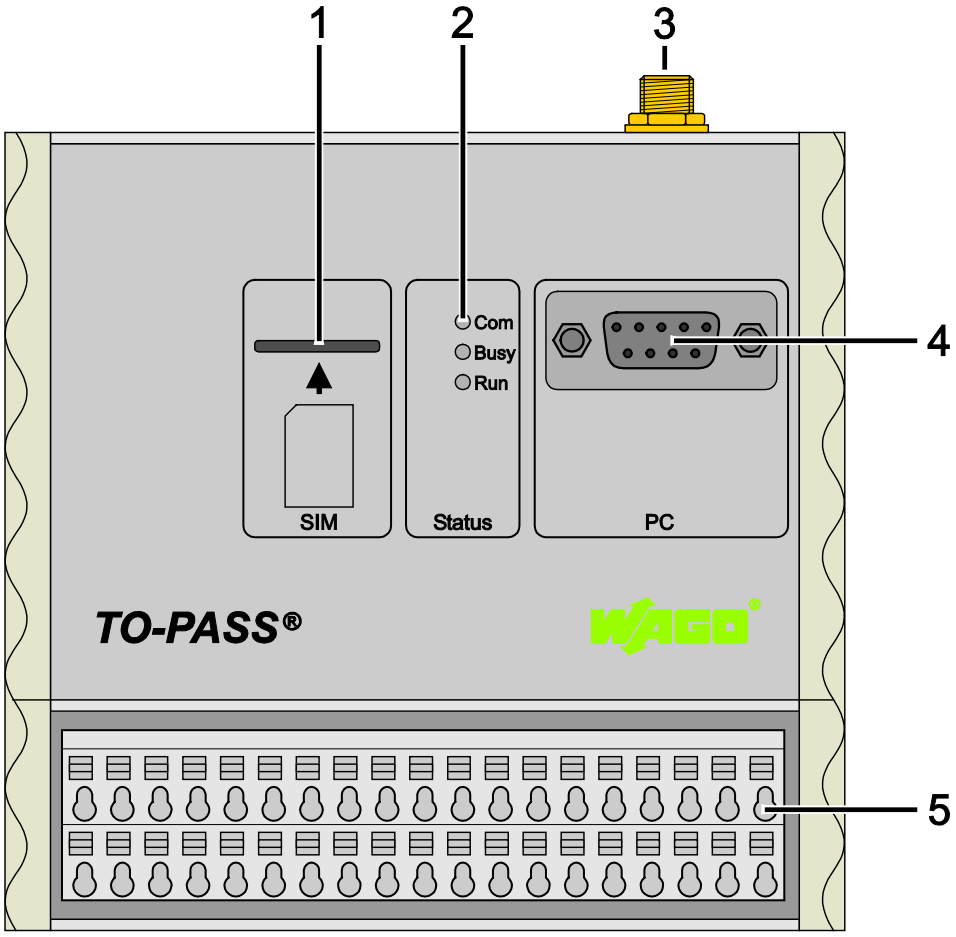


Figure 1: Front view

Position	Description
1	SIM Card insert
2	Antenna connection
3	Statusindication
4	PC interface
5	Connecting terminals for the supply, inputs and outputs

3.4 Connectors

3.4.1 Antenna

The screw connector (SMA socket) for the GSM antenna is located at the top of the housing.

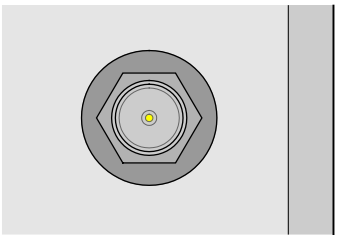


Figure 2: Antenna connection

Note

Observe the maximum length of the antenna cable!

The total length of the antenna cable shall not exceed 30m! The reception quality decreases with increasing antenna cable length!

3.4.2 Operating Voltage

DANGER

Use SELV/PELV power source only!
The *TO-PASS*® telecontrol module must only be powered from a PELV (Protective Extra Low Voltage) or SELV (Safety Extra Low Voltage) power source complying with the limited power source (LPS) requirements per DIN EN 60950-1.

Table 4: Terminal assignment for operating voltage

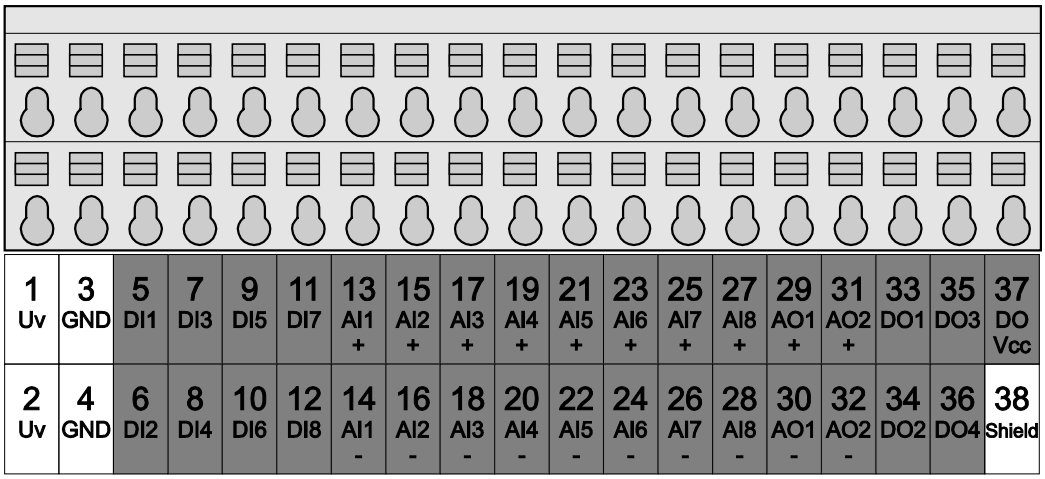


Figure 3: Terminal assignment for operating voltage

Connection	Short name	Designation
1,2	Uv	Operating voltage (+) DC +10 … 30 V
3, 4	GND	Operating voltage (-) DC 0 V, Ground
38	Shield	Enclosure screening, connection of the PE

Note

Connect the shield connection to the DIN rail!
The shield connection of the *TO-PASS*® telecontrol module (shield, terminal 38) must be connected to the DIN rail. The DIN rail must have a low-impedance ground (see section "Connections" > "Ground").

3.4.3 Grounding

3.4.3.1 Framework Assembly

When setting up the framework, the carrier rail must be screwed together with the electrically conducting cabinet or housing frame. The framework or the housing must be grounded. The electronic connection is established via the screw. Thus, the carrier rail is grounded.

DANGER

Ensure sufficient grounding is provided!
You must take care to ensure the flawless electrical connection between the carrier rail and the frame or housing in order to guarantee sufficient grounding.

3.4.3.2 Insulated Assembly

Insulated assembly has been achieved when there is constructively no direct conduction connection between the cabinet frame or machine parts and the carrier rail. Here the earth ground must be set up via an electrical conductor accordingly valid national safety regulations.

Note

Recommendation
The optimal setup is a metallic mounting plate with grounding connection with an electrical conductive link with the carrier rail.

The separate grounding of the carrier rail can be easily set up with the aid of the WAGO ground wire terminals.

Table 5: WAGO ground wire terminals

Item No.	Description
283-609	1-conductor ground (earth) terminal block make an automatic contact to the carrier rail; conductor cross section: 0.2 -16 mm^2 **Note**: Also order the end and intermediate plate (283-320).

3.4.3.3 Grounding of the *TO-PASS®* Telecontrol Module

The shield connection of the *TO-PASS®* telecontrol module (shield, terminal 38) must be connected to the grounded DIN rail.

3.4.4 Shielding

3.4.4.1 General

Shielding of the data and signal lines reduces electromagnetic interference, thus enhancing signal quality. Measurement errors, data transmission errors, and even destruction due to excessive voltage can be prevented this way.

Note

Connect the cable shield to the ground potential!

Integrated shielding is mandatory to meet the technical specifications in regards to measuring accuracy. Connect the cable shield and ground potential at the inlet to the cabinet or housing. This allows induced interference to dissipate and to be kept away from devices in the cabinet or housing.

Note

Improve shielding performance by placing the shield over a large area!

Higher shielding performance is achieved via low-impedance connection between shield and ground. To achieve this, connect the shield over a large surface area, e.g., WAGO shield connecting system. This is especially recommended for large-scale systems where equalizing current or high impulse-type currents caused by atmospheric discharge may occur.

Note

Keep data and signal lines away from sources of interference!

Route data and signal lines separately from all high voltage cables and other sources of high electromagnetic emissions (e.g., frequency converter or drives).

3.4.4.2 Bus Lines

The shielding of bus lines is described in the respective configuration guidelines and standards for the bus system.

3.4.4.3 Signal Lines

Note

Use shielded signal lines!

Use only shielded signal lines for serial and analog signals. Only then can you ensure that the accuracy and interference immunity specified for the respective I/O module can be achieved, even in the presence of interference acting on the signal cable.

Signal lines for analog signals must be shielded. The shield for the signal lines must be connected to Terminal 38 (Shield) of the *TO-PASS®* telecontrol module, e.g., via the DIN rail.

3.4.4.4 WAGO Shield Connecting System

The WAGO shield connecting system consists of shield clamping saddles, busbars and various mounting carriers to enable a wide variety of setups. For more information on this, refer to the "Accessories" section of the main catalog.

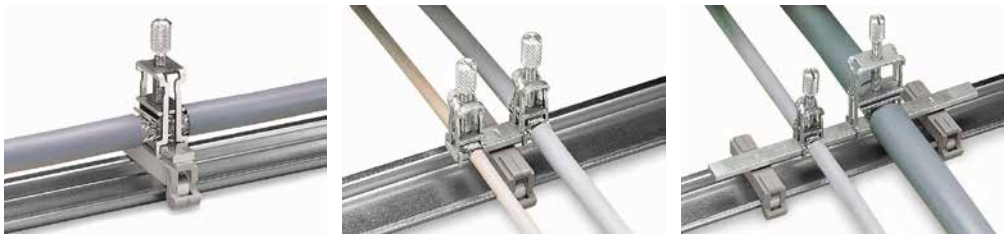


Figure 4: Example of the WAGO shield connecting system

3.4.5 Digital Inputs

DANGER

Only connect SELV/PELV voltages!
Only SELV/PELV voltages shall be connected to the device terminals.

Table 6: Terminal assignment for digital inputs

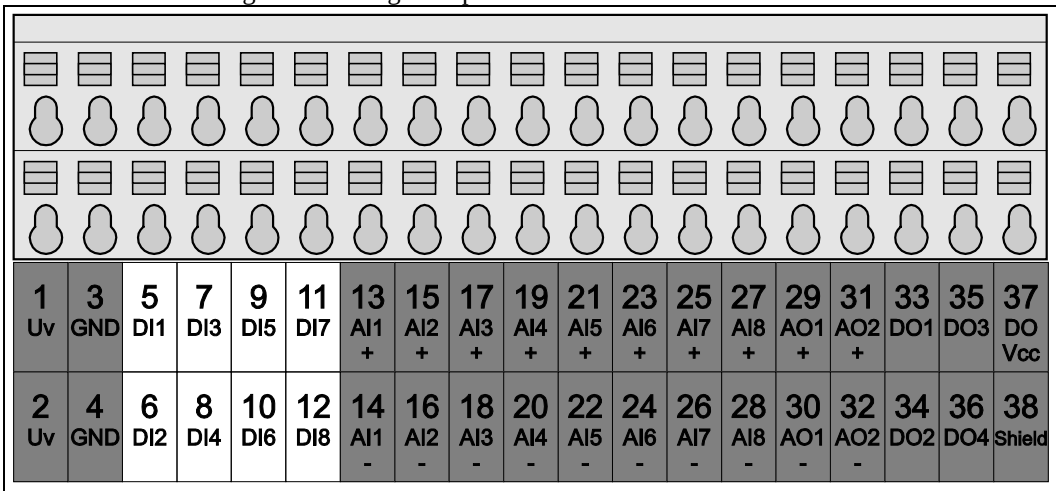


Figure 5: Terminal assignment for digital inputs

Connection	Short name	Designation
5	DI1	Digital input 1
6	DI2	Digital input 2
7	DI3	Digital input 3
8	DI4	Digital input 4
9	DI5	Digital input 5
10	DI6	Digital input 6
11	DI7	Digital input 7
12	DI8	Digital input 8

Digital inputs DI1 … DI4 can also be configured alternatively as counter inputs, starting from Firmware Version FW 2.33. For more information about configuring, refer to the Section "Configuring" > "Counter Inputs".

3.4.6 Counter Inputs

DANGER

Only connect SELV/PELV voltages!
Only SELV/PELV voltages shall be connected to the device terminals.

Digital inputs D1 … D4 can be configured as counter inputs.

Table 7: Counter input pin assignments

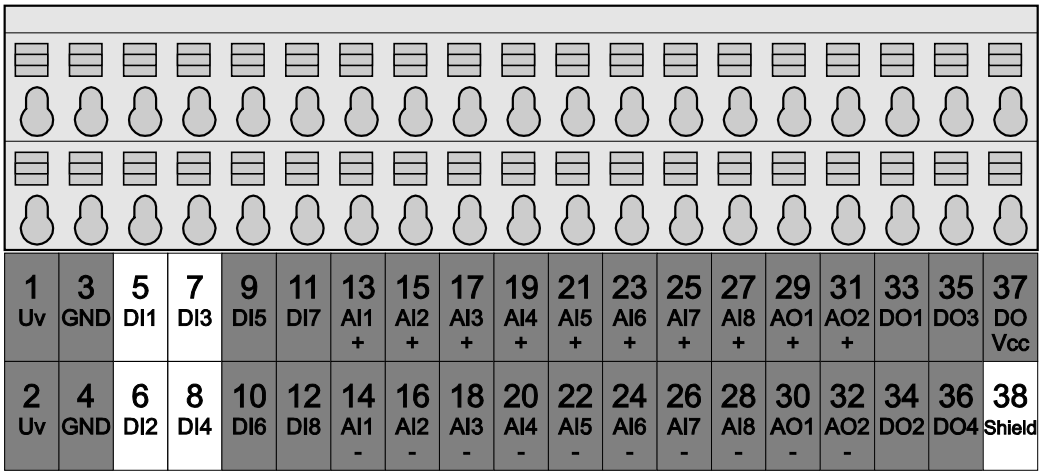


Figure 6: Counter input pin assignments

Connection	Short name	Explanation
5	DI1	Counter input 1 (configurable)
6	DI2	Counter input 2 (configurable)
7	DI3	Counter input 3 (configurable)
8	DI4	Counter input 4 (configurable)
38	Shield	Shield termination

Note

Connect shielding!
Shielded cables are recommended for the counter inputs.
When using shielded cables, the shield must be routed to the grounded DIN rail (see Section "Connections" > "Shielding").

3.4.7 Analog Inputs

DANGER

Only connect SELV/PELV voltages!
Only SELV/PELV voltages shall be connected to the device terminals.

Table 8: Terminal assignment for analog inputs

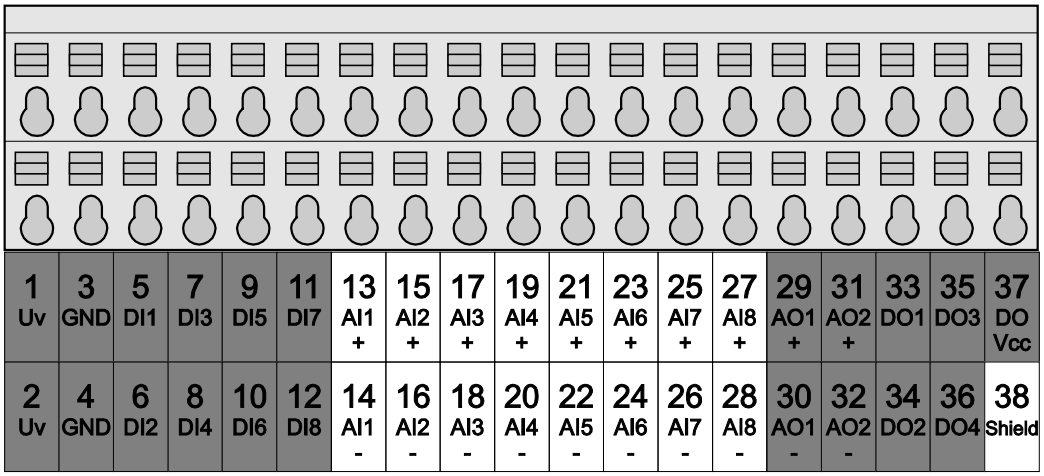


Figure 7: Terminal assignment for analog inputs

Connection	Short name	Designation
13	AI1+	Analog input 1 (+)
14	AI1-	Analog input 1 (-)
15	AI2+	Analog input 2 (+)
16	AI2-	Analog input 2 (-)
17	AI3+	Analog input 3 (+)
18	AI3-	Analog input 3 (-)
19	AI4+	Analog input 4 (+)
20	AI4-	Analog input 4 (-)
21	AI5+	Analog input 5 (+)
22	AI5-	Analog input 5 (-)
23	AI6+	Analog input 6 (+)
24	AI6-	Analog input 6 (-)
25	AI7+	Analog input 7 (+)
26	AI7-	Analog input 7 (-)
27	AI8+	Analog input 8 (+)
28	AI8-	Analog input 8 (-)
38	Shield	Enclosure screening

Note

Analog inputs are single-ended!
The analog inputs are single-ended and the “Aix–” connections are connected internally to the “GND” connections.

Note

Connect shielding!
Shielded cables are required for analog inputs. The cable shield must be connected to the grounded DIN rail (see section "Connections" > "Shielding").

3.4.8 Digital Outputs

DANGER

Only connect SELV/PELV voltages!
Only SELV/PELV voltages shall be connected to the device terminals.

Table 9: Terminal assignment for digital outputs

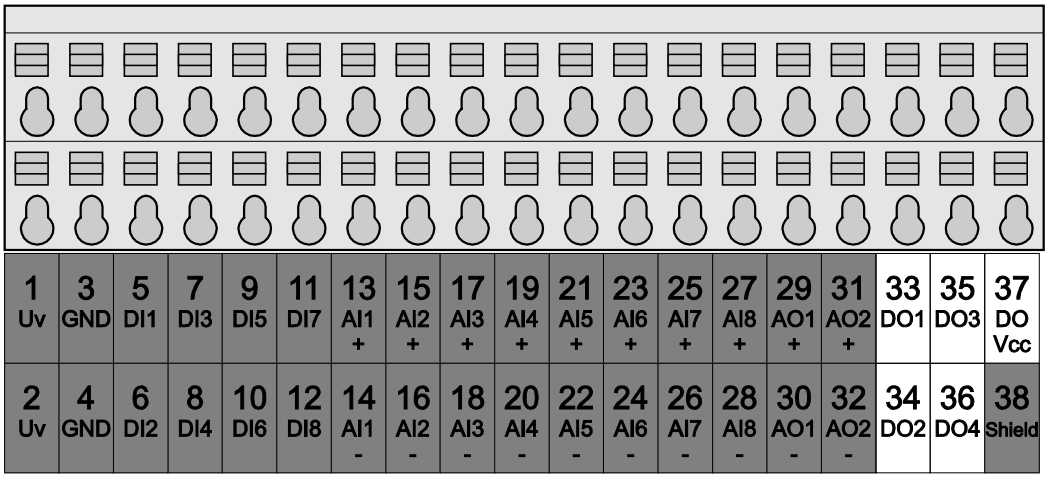


Figure 8: Terminal assignment for digital outputs

Connection	Short name	Designation
33	DO1	Digital output 1
34	DO2	Digital output 2
35	DO3	Digital output 3
36	DO4	Digital output 4
37	DO Vcc	(+) Voltage for the digital outputs

3.4.9 Analog Outputs

DANGER

Only connect SELV/PELV voltages!
Only SELV/PELV voltages shall be connected to the device terminals.

Table 10: Terminal assignment for analog outputs

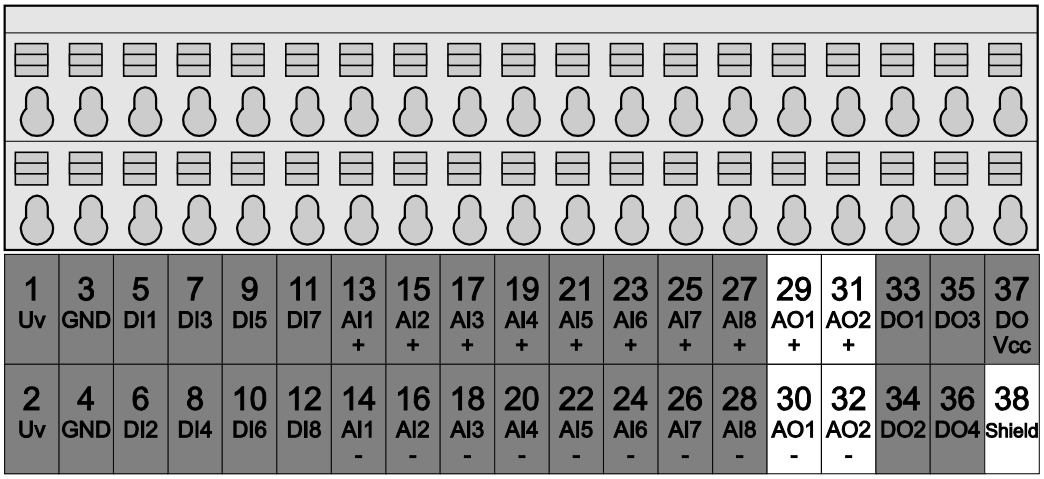


Figure 9: Terminal assignment for analog outputs

Connection	Short name	Designation
29	AO1+	Analog output 1 (+)
30	AO1-	Analog output 1 (-)
31	AO2+	Analog output 2 (+)
32	AO2-	Analog output 2 (-)
38	Shield	Enclosure screening

Note

Connect shielding!
Shielded cables are required for analog outputs. The cable shield must be connected to the grounded DIN rail (see section "Connections" > "Shielding").

3.4.10 Serial Interface to the PC and MODBUS Interface

Table 11: Serial interface to the PC and MODBUS interface

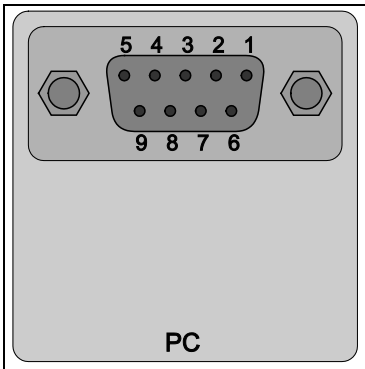


Figure 10: Serial interface to the PC and MODBUS interface

Pin	Description
1	Not assigned
2	TXD
3	RXD
4	Not assigned
5	GND
6	Not assigned
7	MODBUS RX
8	MODBUS TX
9	Not assigned

Table 12: PC interface cable assignment

TO-PASS® Telecontrol Module			PC (D-Sub 9)	
Pin	**Description**		**Pin**	**Description**
2	TXD	→	2	RXD
3	RXD	←	3	TXD
5	GND		5	GND

Note

Connecting laptops and PCs without serial interface:

If the laptop or PC does not have a serial interface, use the USB adapter 761-9005, which is available as an accessory.

Table 13: MODBUS cable assignment

TO-PASS® Telecontrol Module			MODBUS slave	
Pin	**Description**		**Pin**	**Description**
5	GND			MODBUS GND
7	MODBUS RX	←		MODBUS TX
8	MODBUS TX	→		MODBUS RX

3.5 Display Elements

Table 14: Display Elements

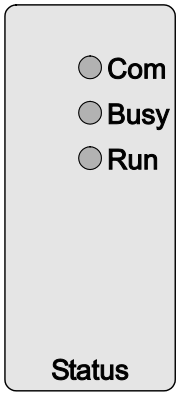


Figure 11: Display Elements

Com	Busy	Run	Description
X	X	Green 0.5 Hz blinking	Ready to operate
Green	X	X	Communication via RS232 interface
Green 1 Hz blinking	X	X	Firmware update
X	Green	X	GSM modem is activated - Initialization (takes approx. 40 s after system start-up if everything is OK) - SMS/GPRS processing - Antenna is not connected (the modem is searching for a network) - Poor GSM network (the modem is searching for a network)
X	Green 1 Hz blinking	X	Error in communication with SIM card - No SIM card available - SIM card is defective
X	Green 5 Hz blinking	X	Serious error in communication with GSM modem - PIN of SIM card in TO-PASS® parameterization is deactivated, but not on SIM card - Incorrect PIN set on TO-PASS® - SIM card locked
X: Any state (ON or OFF)			

3.6 Technical Data

3.6.1 Housing

Table 15: Technical Data Housing

Dimensions (W x H x L)	109 mm x 105 mm x 78 mm
Weight	Approx. 412 g
Operating temperature	-20 °C ... +70 °C
Storage temperature	-40 °C ... +85 °C
Type of mounting	DIN 35 rail
Degree of protection	IP 20
Wire connection	Terminal strips (WAGO 250 Series) with push-wire connection
Cross section	0,5 mm² … 1,0 mm² AWG 22 … AWG 14 „sol“
Stripped length	9 mm … 10 mm

3.6.2 Supply

Table 16: Technical Data Supply

Operating voltage	+10 V ... +30 VDC
Nominal voltage, operation with mains power	+24 VDC
Nominal voltage, operation using battery	+12 VDC
Bias current (with +24 VDC power supply, without external protective circuit)	approx. 20 mA
Current for transmission (with +24 VDC power supply)	< 500 mA

3.6.3 GSM Antenna Connection

Table 17: Technical Data GSM Antenna Connection

Connection	SMA socket
Cable length (max.)	30 m
Bandwidth	70 MHz in GSM (850 MHz) 80 MHz in EGSM (900 MHz) 170 MHz in DCS (1800 MHz) 140 MHz in PCS (1900 MHz)
Gain	< 3 dBi
Impedance	50 Ohm
Input power	> 2 W (peak power)
VSWR (max.)	<= 10:1
VSWR (recommended)	<= 2:1

3.6.4 GSM Communication

Table 18: Technical Data Communication

Number of recipients	4
Recipient types	PC, SMS, e-mail, phone, fax
Communication	GSM quad-band
Communication types	SMS (bidirectional), telecommunication dial-up connection (CSD), GPRS connection to Internet

3.6.5 MODBUS Communication

Table 19: Technical Data MODBUS Communication

MODBUS interface	RS-232
MODBUS Protocol	RTU
MODBUS register query	Input; Holding
Interface speed	9600 Baud / 19200 Baud
Interface parameters	8N2 / 8E1 / 8O1 / 8N1

3.6.6 Digital Inputs

Table 20: Technical Data Digital Inputs

Number of inputs	8
Input type	Type 3 acc. to IEC 61131-2
Input voltage	0 V ... 30 V DC
Signal voltage „0“	0 V … 5 V DC
Signal voltage „1“	7 V … 30 V DC
Input current $_{max.}$ (at 30 V DC)	2.9 mA

3.6.7 Counter Inputs

Table 21: Technical Data Counter Inputs

No. of counters	Max. 4, configurable
Counter frequency	Max. 2000 Hz
Resolution	32 bits
Count direction	Up/Down

3.6.8 Analog Inputs

Table 22: Technical Data Analog Inputs

Number of inputs	8
Input current	0/4 mA ... 20 mA
Internal resistance	Approx.. 200 Ω / 20 mA
Resolution	12 bit
Measuring error (25°C)	< ±1 % of the full scale value
Temperature coefficient	< ±0.1 % / K of the full scale value

3.6.9 Digital Outputs

Table 23: Technical Data Digital Outputs

Number of outputs	4
Output type	Semiconductor outputs
Output current	0.5 A/30 V DC, short-circuit protected
Type of load	Resistive, inductive, lamps
Energy dissipation $W_{max.}$ (unique switching off)	125 mJ; $L_{max} = 2 * W_{max} / I^2$

3.6.10 Analog Outputs

Table 24: Technical Data Analog Outputs

Number of outputs	2
Output current	0/4 mA ... 20 mA
Load impedance	≤ 600 Ω
Resolution	12 bit
Measuring error (25°C)	< ±1 % of the full scale value
Temperature coefficient	< ±0.1 % / K of the full scale value

3.6.11 Data and Event Logger

Table 25: Technical Data Data and event logger

Memory type		Ring memory
Memory size	Without configured counters	4096 process images
	With configured counters	2048 process images

3.7 Approvals

The following approvals have been granted for the telecontrol module 761-216and all versions thereof:

CE	Conformity Marking
cULus	$_{C}UL_{US}$ UL508
R&TTE	Complaint with 1999/5/EG directive (per Article 3.2)
RoHS	Device complies with European RoHS directive.
FCC	Verification per FCC 15b

The following approvals have been granted for the standard version of the telecontrol module 761-216:

Approval, Canada

Approval, Croatia

Approval, Mexico

Approval, Turkey

The following approvals have beeen granted for versions 761-216/000-001:

PTCRB	PCS Type Certification Review Board, with Software Index 01 (FW 02.30.14) and Hardware Index 01

Approval, USA

3.8 Standards and Guidelines

761-216 telecontrol modules meet the following requirements on emission and immunity of interference:

EMC CE-Immunity to interference	acc. to EN 61000-6-2: 2005 and acc. to EN 61131-2: 2007
EMC CE-Emission of interference	acc. to EN 61000-6-3: 2007 and acc. to EN 61131-2: 2007

4 Mounting

Note

IP20 degree of protection
The protection class of the *TO-PASS*® telecontrol module is IP 20. For this reason, WAGO Kontakttechnik GmbH & Co. KG recommends mounting in a housing or in a switching cabinet.

Note

Ambient temperature -20 °C to +70 °C
The *TO-PASS*® telecontrol module is designed for an ambient temperature of -20 °C to +70 °C.
In the event of higher or lower temperatures, proper cooling or heating arrangements must be provided.
Please contact WAGO Kontakttechnik GmbH & Co. K.G. for assistance.

The *TO-PASS*® telecontrol module is designed to mount on a DIN 35 carrier rail.

4.1 Mounting the *TO-PASS*® telecontrol module to the DIN rail

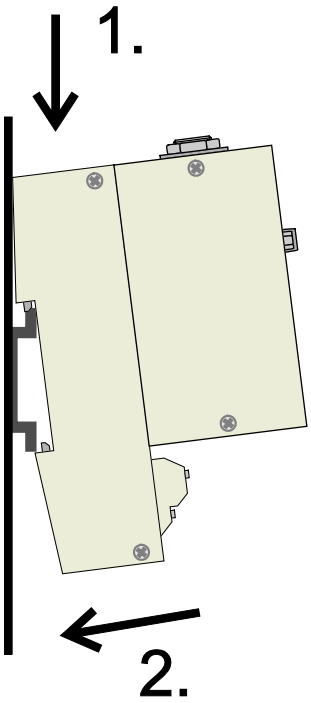


Figure 12: Mounting the *TO-PASS*® telecontrol module to the DIN rail

1. Place the *TO-PASS*® telecontrol module on the DIN rail from above.
2. Press the undersurface against the lower DIN rail edge until the *TO-PASS*® telecontrol module locks into place.

4.2 Removing the *TO-PASS*® telecontrol module from the DIN rail

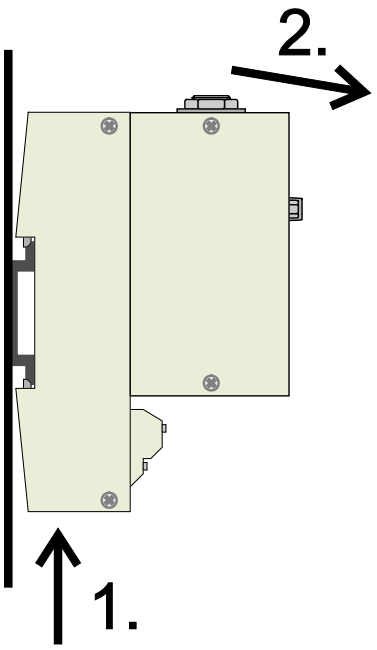


Figure 13: Removing the *TO-PASS*® telecontrol module from the DIN rail

1. Press the undersurface against the lower DIN rail edge until the *TO-PASS*® telecontrol module is no longer locked in place.

2. Remove the *TO-PASS*® telecontrol module from the DIN rail.

5 Connect Devices

5.1 Connecting the Push-wire Connections to the Conductor

The push-wire connections of the *TO-PASS*® telecontrol modules are designed for solid or fine-stranded conductors with cross sections between 0.5 … 1.5 mm² (AWG 22 … 14 „sol“).

Note

Connect only one conductor per clamp!
Only connect one conductor to each push-wire connection. Do not connect more than one conductor at one single connection!

If more than one conductor must be routed to one connection, these must be connected in an up-circuit wiring assembly, for example using WAGO feed-through terminals.

Terminate both solid and ferruled conductors without actuation by simply pushing them in. For all other conductor types, a suitable operating tool must be used to open the push-wire connection for connection.

Note

Observe strip length!
When using short ferrules, the retention force of the push-wire connection may be reduced. Strip length from 9 to 10 mm must be observed for a safe push-wire connection.

1. To open the push-wire connection, use the tool to press the button above the connection.
2. Insert the conductor into the corresponding connection opening.
3. To close the push-wire connection, release the button. The conductor is clamped.

5.2 Connection Examples

Note

Connect the shield connection to the DIN rail!
The shield connection of the *TO-PASS*® telecontrol module (shield, terminal 38) must be connected to the DIN rail. The DIN rail must have a low-impedance ground (see section "Connections" > "Ground").

5.2.1 Digital Inputs

DANGER

Only connect SELV/PELV voltages!
Only SELV/PELV voltages shall be connected to the device terminals.

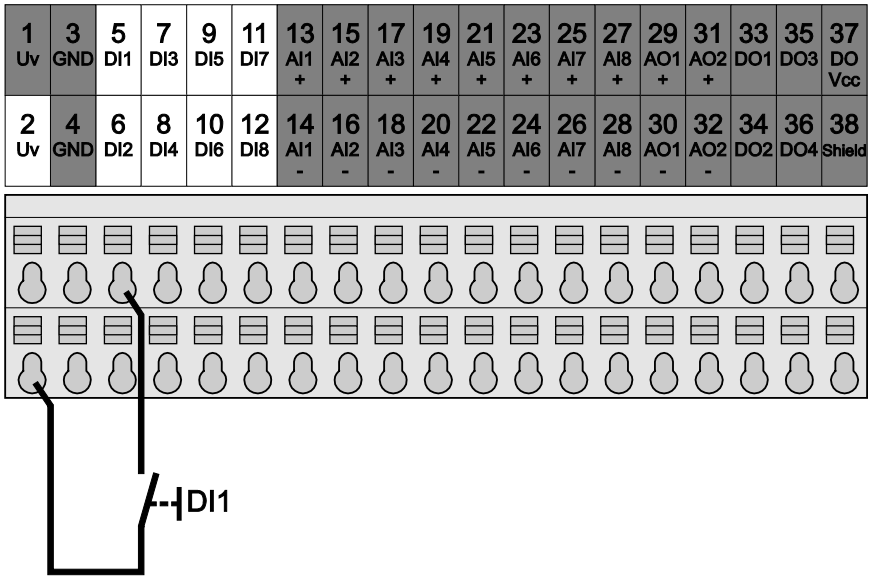


Figure 14: Connection example for switch at input DI1

5.2.2 Counter Inputs

DANGER

Only connect SELV/PELV voltages!
Only SELV/PELV voltages shall be connected to the device terminals.

Note

Connect shielding!
Shielded cables are recommended for the counter inputs.
When using shielded cables, the shield must be routed to the grounded DIN rail (see Section "Connections" > "Shielding").

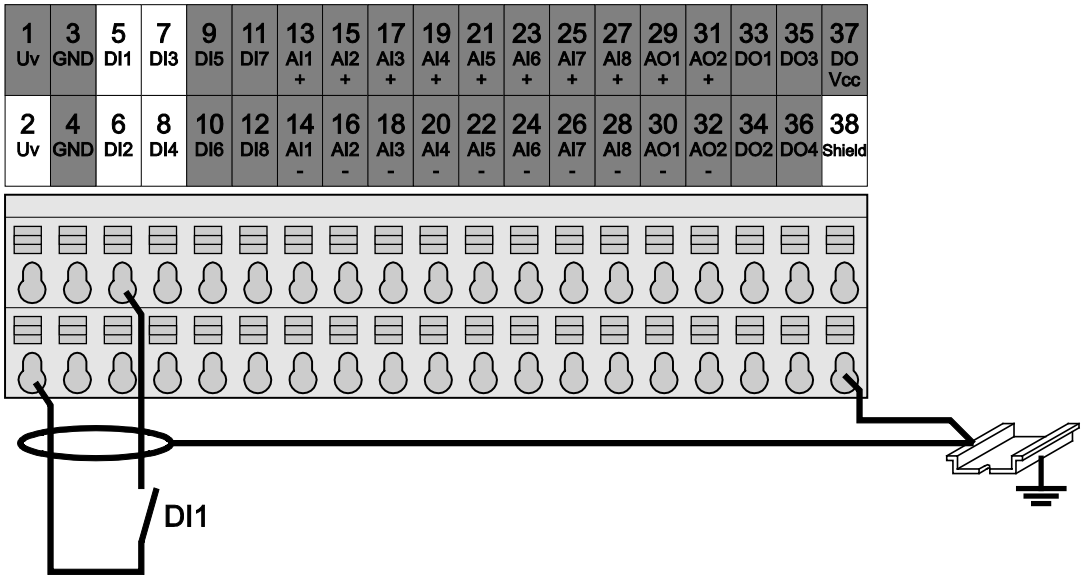


Figure 15: Connecting example, switching contact at counter input DI1

5.2.3 Analog Inputs

DANGER

Only connect SELV/PELV voltages!
Only SELV/PELV voltages shall be connected to the device terminals.

Note

Analog inputs are single-ended!
The analog inputs are single-ended and the “Aix–” connections are connected internally to the “GND” connections.

Note

Connect shielding!
Shielded cables are required for analog inputs. The cable shield must be connected to the grounded DIN rail (see section "Connections" > "Shielding").

5.2.3.1 Current Measurement

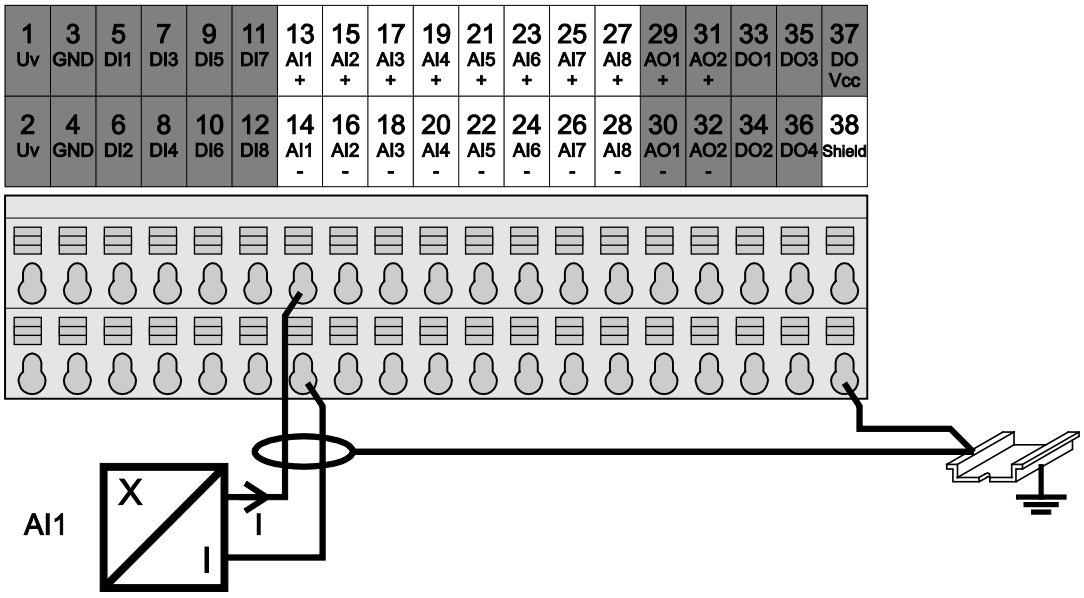


Figure 16: Connection example of transducer with current output at input AI1

5.2.3.2 Voltage Measurement

Note

Voltage measurement can only be performed via U/I transformer!
Voltage measurement cannot be performed via multiplier at the analog inputs, since the internal resistance of the *TO-PASS*® telecontrol module depends on the input current.
WAGO 857 Series *JUMPFLEX* Isolation Amplifiers for level conversion may be used for voltage measurement via *TO-PASS*® telecontrol modules.

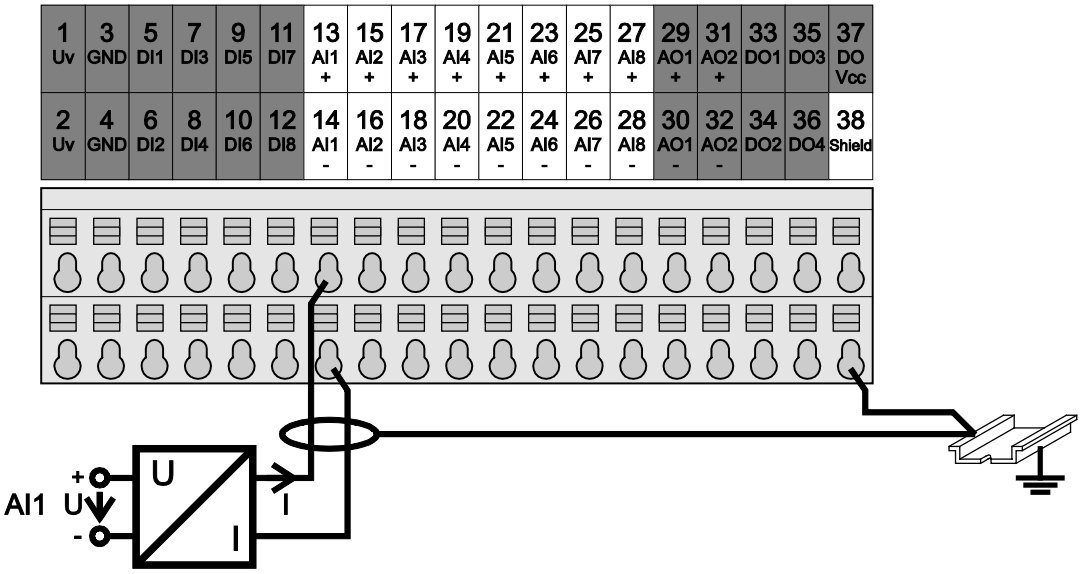


Figure 17: Connection example for voltage measurement via U/I converter at input AI1

5.2.4 Digital Outputs

DANGER

Only connect SELV/PELV voltages!
Only SELV/PELV voltages shall be connected to the device terminals.

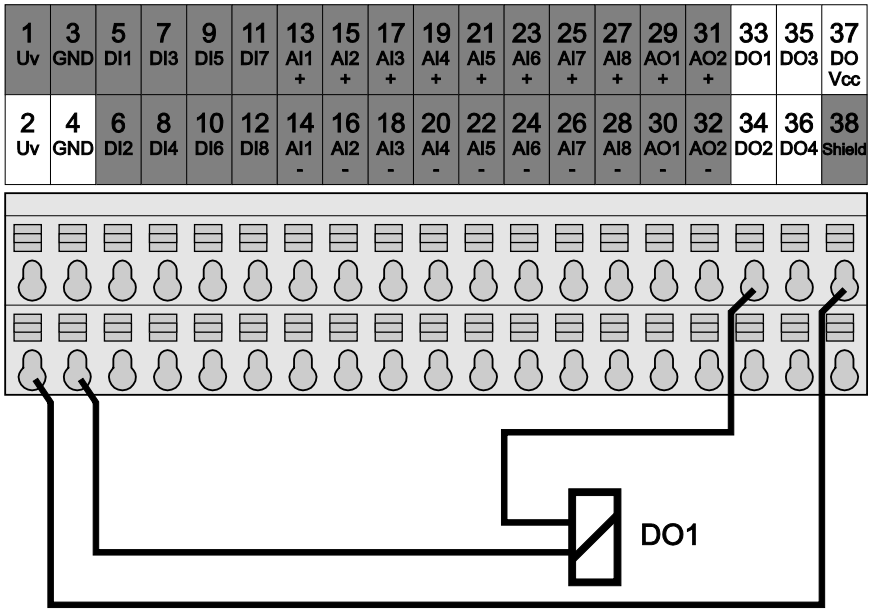


Figure 18: Connection example for a relay at DO1 output

5.2.5 Analog Outputs

DANGER

Only connect SELV/PELV voltages!
Only SELV/PELV voltages shall be connected to the device terminals.

Note

Connect shielding!
Shielded cables are required for analog outputs. The cable shield must be connected to the grounded DIN rail (see section "Connections" > "Shielding").

5.2.5.1 Current Measurement

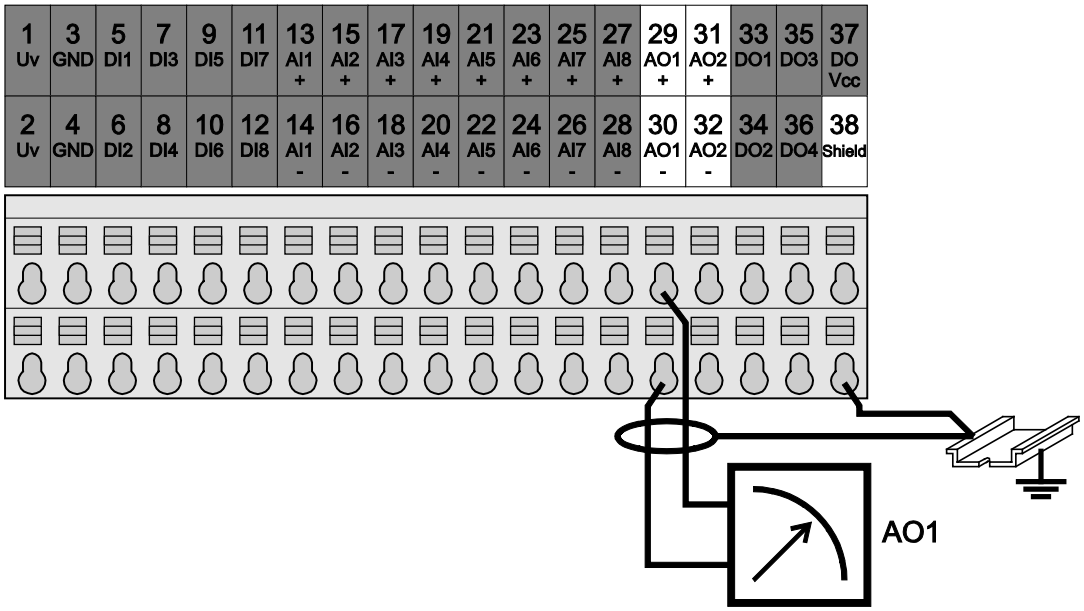
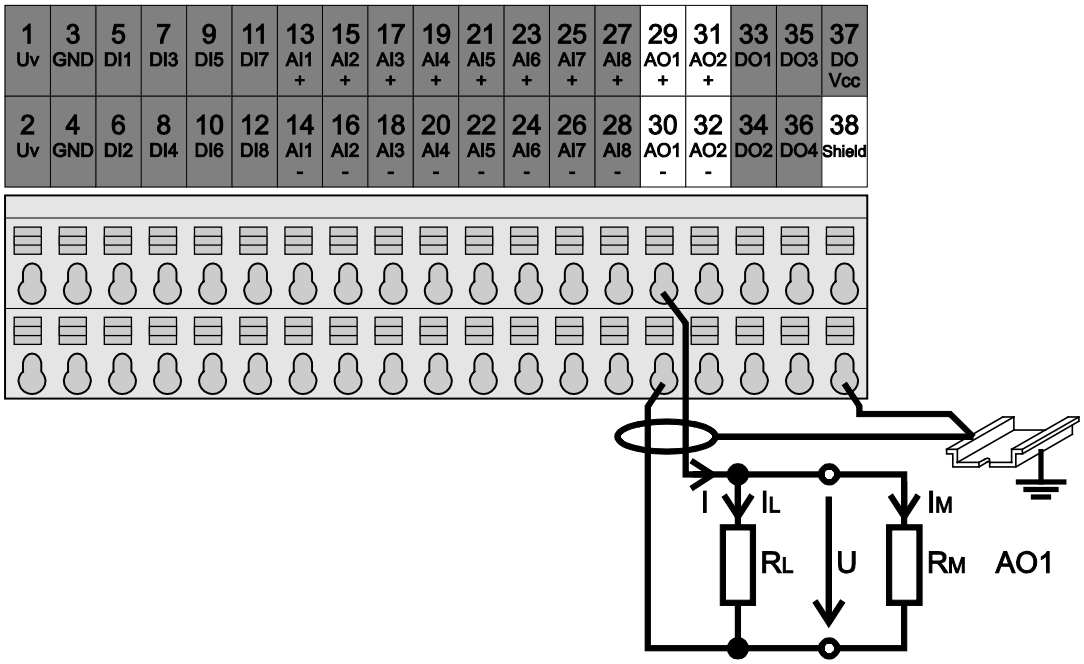


Figure 19: Connection example for a display device at AO1 output

5.2.5.2 Voltage Measurement



R_L: Load resistance, R_M: Internal resistance of measuring device

$R_L \parallel R_M$ must be less than 600 Ω.

With $R_M >> R_L$, the impact of R_M can be neglected.

5.2.6 MODBUS Interface

5.2.6.1 Serial Interface for MODBUS and PC

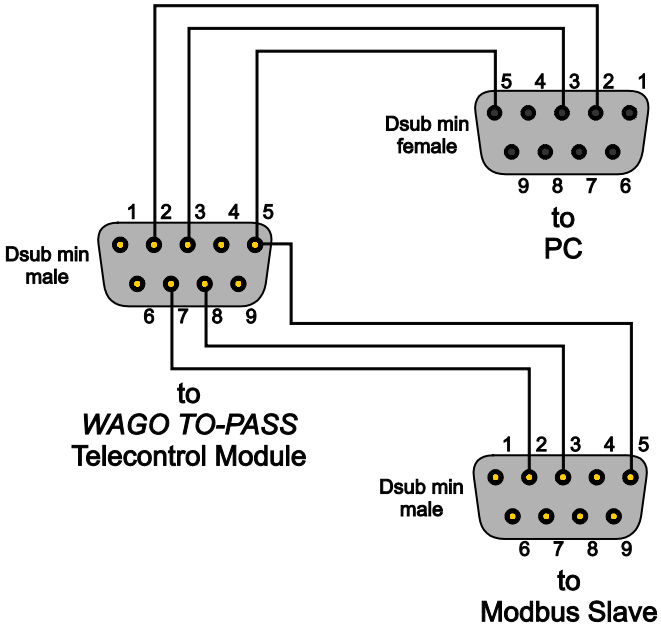


Figure 20: Connection example for serial interface for MODBUS and PC

5.2.6.2 MODBUS RS-485 Network

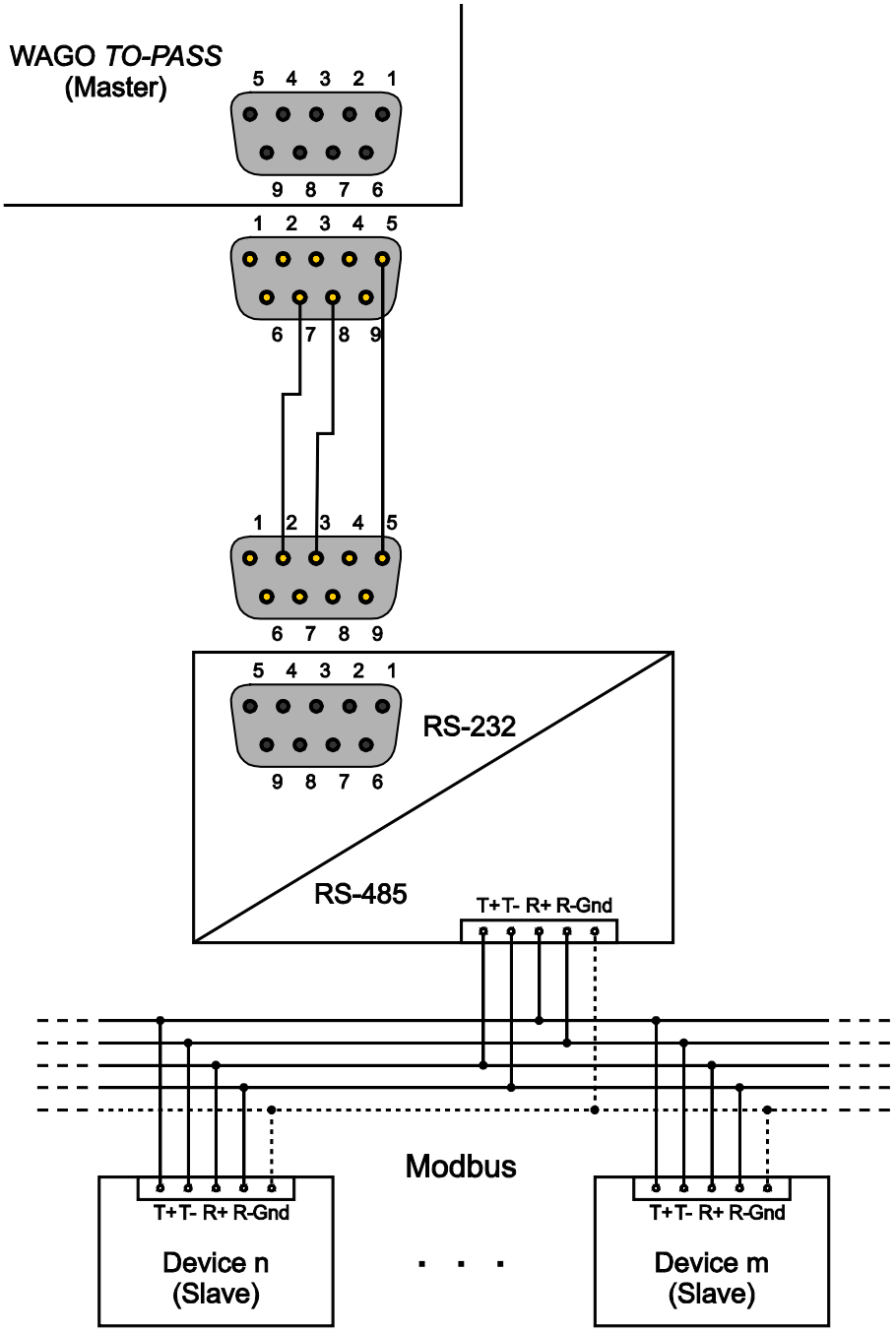


Figure 21: Connection example for MODBUS RS-485 Network (Fullduplex)

6 Commissioning

6.1 Installing the Operating Software

1. Place the CD with the *TO-PASS*® operating software in the CD drive of the PC.

   The "Autostart" function is normally activated on set-up.
   If the set-up program does not start automatically, perform steps 2 to 6.

2. Close all applications so that the desktop is displayed by the operating system.

3. Move the mouse pointer over the **[Start]** button of the Windows operating system and click the right mouse button.

4.. Select Windows “Explorer” using a double click

5. Select the CD drive in which you have placed the CD with the operating software.

6. Start the "*WAGO TO-PASS_SETUP(2.17).EXE"* program, or a newer version in the main directory on the CD.

7. Follow the menu prompting to choose a default installation path.
   Starting with Version 2.17 of the operating software, the module files and exported, logged information are stored in a central directory:

   Windows XP
   Documents and settings\All Users\(Common)Documents\
   WAGO Software\WAGO TO-PASS

   Windows 7:
   User\Public\Public documents\WAGO Software\
   WAGO TO-PASS

   You can save an update file in the "update" subdirectory that can then be used for a firmware update.

8. Installation has been completed successfully when the message "Software has been installed successfully" appears.

6.2 Starting the *TO-PASS*® Telecontrol Module

Note

Do not switch on yet!

Do not switch on the *TO-PASS*® telecontrol module until you are prompted to do so; do not insert the SIM card for this procedure.

Note

Deactivate the PIN!

During commissioning, the SIM card may be disabled when an incorrect or incomplete PIN is entered. It is therefore recommended that you disable the PIN of the SIM card to be inserted. To do this, insert the SIM card in a mobile telephone and select the menu option Security > Disable PIN.

Note

Deactivate the call diversion

Deactivate all call diversions of the SIM card to be inserted to achieve a trouble-free availability of the *TO-PASS*® telecontrol module.

Before using the *TO-PASS*® telecontrol module it must first be configured with the telephone number.

1. Every *TO-PASS*® telecontrol module requires an SIM card for proper operation. You can obtain an SIM card from any mobile telephone service provider. Special data cards are recommended.

2. Every SIM card contains a telephone number and a PIN code for enabling the SIM card to be used in the *TO-PASS*® telecontrol module.

   Always have this telephone number and PIN code on hand.

3. Connect the PC to the installed *TO-PASS*® telecontrol module via the serial interface.

4.. If the PC has only USB interfaces, a USB – RS-232 adapter is required. Install the driver supplied with the adapter according to the adapter manufacturer's specifications.
   A USB adapter is available as an accessory 761-9005.

5. Start up the PC and then the *TO-PASS*® operating software.

6. Select the menu item **File > Settings**.

7.Set this as a "RS-232" connection and select the appropriate interface, e.g. "COM1".

8. Then select menu item **File > New module**.

9. When generating a new configuration file, select the firmware version for the device that implements the required functionality as the first version in the **Function selection** field.
The device versions, along with the associated enabling firmware indices are displayed to make selection easier.
In the field **Module name** enter an identifier for the new device (maximum 8 places for FW version 2.20, or 16 places for all other firmware versions). This identity is the name of your *TO-PASS*® telecontrol module and serves as an identifier. It can only be changed at a later time by completely overwriting it. The identifier is also transmitted as an SMS, fax or e-mail in the event of an error and should therefore be a typical identifier that is easy to associate with the location of use, such as "Tank 1".

10. A new module will be created at the top left of the screen in the project tree. Click on "+" to reveal the rest of the tree. Select the entry "Identity" and enter the phone number for the SIM card in the **Phone number** field at the right. In the following line, deactivate the **[Use PIN]** button, so that the *TO-PASS*® telecontrol module does not use the PIN code. Also deactivate the PIN on the SIM card! To do this, insert the SIM card into a cell phone and under menu item **Security** select **Deactivate PIN**.

11. If the PIN code must be used, activate the **[Use PIN]** button in the *TO-PASS*® operating software and enter the PIN in the field provided. Also activate the PIN code for your SIM card using your cell phone.

12. Switch on the power to the *TO-PASS*® telecontrol module. The "Busy" LED will begin flashing shortly after this.

13. In the operating software select the menu item **Edit > Write parameters**. The operating software now transmits the parameters to the *TO-PASS*® telecontrol module.

14. Wait until transmission is complete and the "COM" LED goes out.

15. Switch off the *TO-PASS*® telecontrol module.

16. Use a pointed object (e.g., screwdriver) to carefully slide the SIM card into the SIM slot of your *TO-PASS*® telecontrol module until it locks into place. The SIM card is then positioned 2 mm within the enclosure.
The SIM card can be released by pressing on it again.

17. Switch the *TO-PASS*® telecontrol module on again and wait until the initialization phase is completed. Initialization is completed when the "Busy" LED goes out.

18. Your *TO-PASS*® telecontrol module is now ready for use and can be configured. Follow the instructions given in the Section "Configuration" for this.

7 Parameterizing

7.1 General Settings

Select the menu item **File** > **Settings** for making general settings, such as type of connection, interface or language for the *TO-PASS*® operating interface.

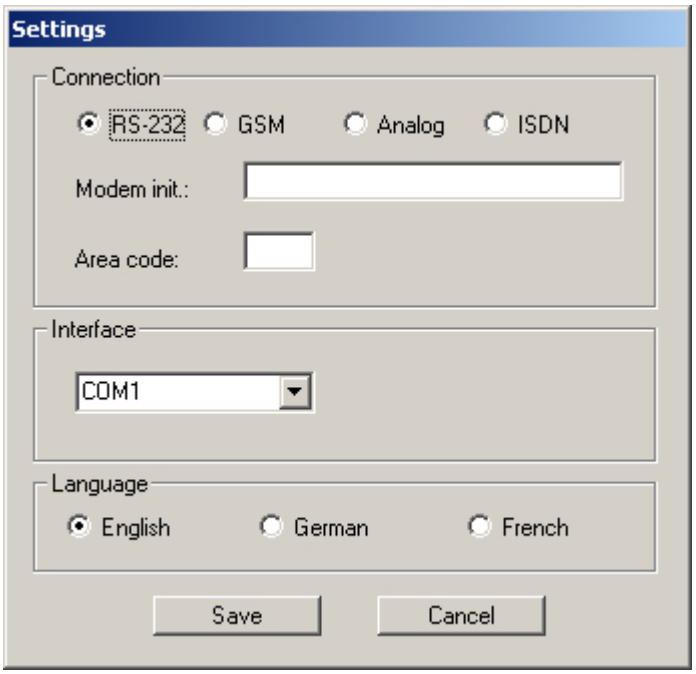


Figure 22: General settings

Table 26: General settings

Connection	
RS-232 / GSM / Analog / ISDN	Select the type of connection for communicating with the *TO-PASS*® telecontrol module: RS-232 Direct connection via RS-232 cable GSM Dial-up using GSM modem on the PC Analog Dial-up using analog modem on the PC ISDN Dial-up using ISDN modem on the PC
Modem init.	If the connection is to be established via a modem and this modem requires initialization, enter the initialization string in this field.
Area code	If this connection is to be established via a modem at an analog or ISDN PBX and a trunk code is required for this, enter the trunk code in this field.

Table 26: General settings

Interface	
COM1 ... COMx	Here, select the serial interface where the communication cable is connected with a RS-232 connection.
Language	
English / German / French	Select the langauge for the *TO-PASS®* operator interface here.

To apply the settings and close the dialog window, click **[Save]**.

To close the dialog window without applying the settings, click **[Cancel]**.

7.2 Reading Parameters from the Module

After you have set the type of connection for communicating with the *TO-PASS*® telecontrol module, you are then able to read out the parameters of the connected module.

Select the menu option **Edit > Read Parameters**. The software then reads out all the parameters of the *TO-PASS*® telecontrol module.

Then you can adapt the parameter according to your requirements.

7.3 Identity

Select the *TO-PASS*® telecontrol module to be configured from the project tree; under it, select the **Identity** option.
On the right side you will find the selection field for the function, the display field for the name, the input field for the telephone number, buttons and input fields for the PIN, roaming and prepaid and the input field for the alarm counter.

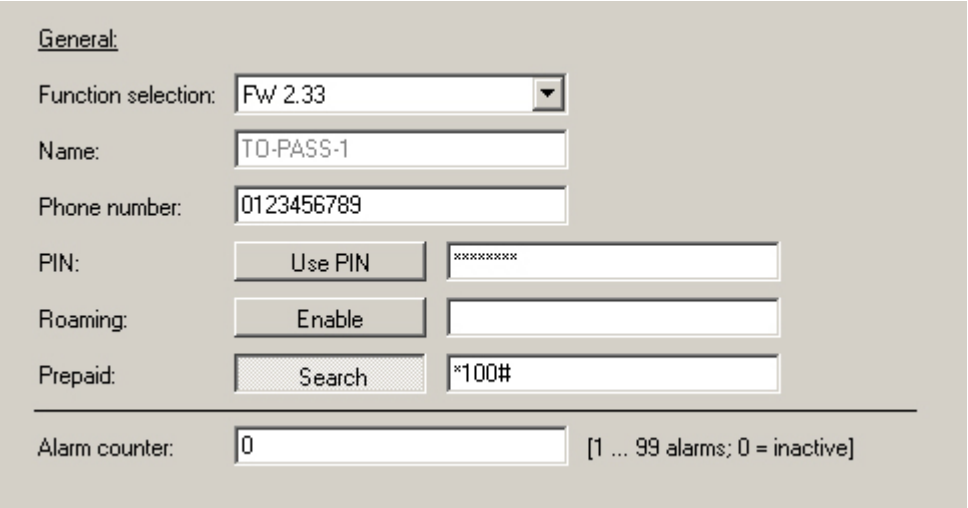


Figure 23: Configuring the identity

Table 27: Configuring the identity

General	
Function selection	You can redifine the firmware version in this selection field, that is to say the available scope of functions (e.g., to ensure compatibility with devices already in use). When you define an older firmware version a check is first conducted to determine whether the settings made for this version can be used.
Name	The module name of the *TO-PASS*® telecontrol module is displayed in this field. The module name is assigned when a new module is set up and can only be changed later by overwriting it with a new identity (not via a modem connection).
Phone number	In this field enter the phone number of the SIM card used in the module.
PIN	To use the PIN number of the installed SIM card, click the [**Use PIN**] button and enter the PIN number in the field provided.
Roaming	Roaming is always activated in *TO-PASS*® telecontrol modules. To select a favorite carrier, click the **[Allow]** button and enter the 5-digit carrier ID in the field provided. The telecontrol mode will then always attempt to use this favorite carrier while roaming.
Prepaid	Click the **[Poll]** button to transmit information with the data telegram to a prepaid card that you use. In the input field enter the 5-digit polling code, e.g., "*100#" to determine your remaining balance. Entering of a polling code is possible starting with Firmware Version FW 2.33.
Alarm counter	Enter the maximum value in this field to limit the number of alarms transmitted by the *TO-PASS*® telecontrol module each hour. If, in the event of a failure (e.g., loose connection), the maximum number is exceeded, alarms will no longer be sent. The alarm counter can be reset by an SMS being sent to the *TO-PASS*® telecontrol module with the text "RESET", or by switching the *TO-PASS*® telecontrol module off and then on again. Enter a value of "0" to deactivate limiting.

7.4 Addresses

The *TO-PASS*® telecontrol module can communicate with a maximum of four transmitters/receivers via GSM. Messages are sent by the *TO-PASS*® telecontrol module as SMS; however, they can also be sent as an e-mail, fax or voice mail, as defined in configuration.
The *TO-PASS*® telecontrol module can also transmit messages to an Internet address.

Select the *TO-PASS*® telecontrol module to be configured from the project tree and the option **Addresses**.
The input fields for the addresses are on the right side:

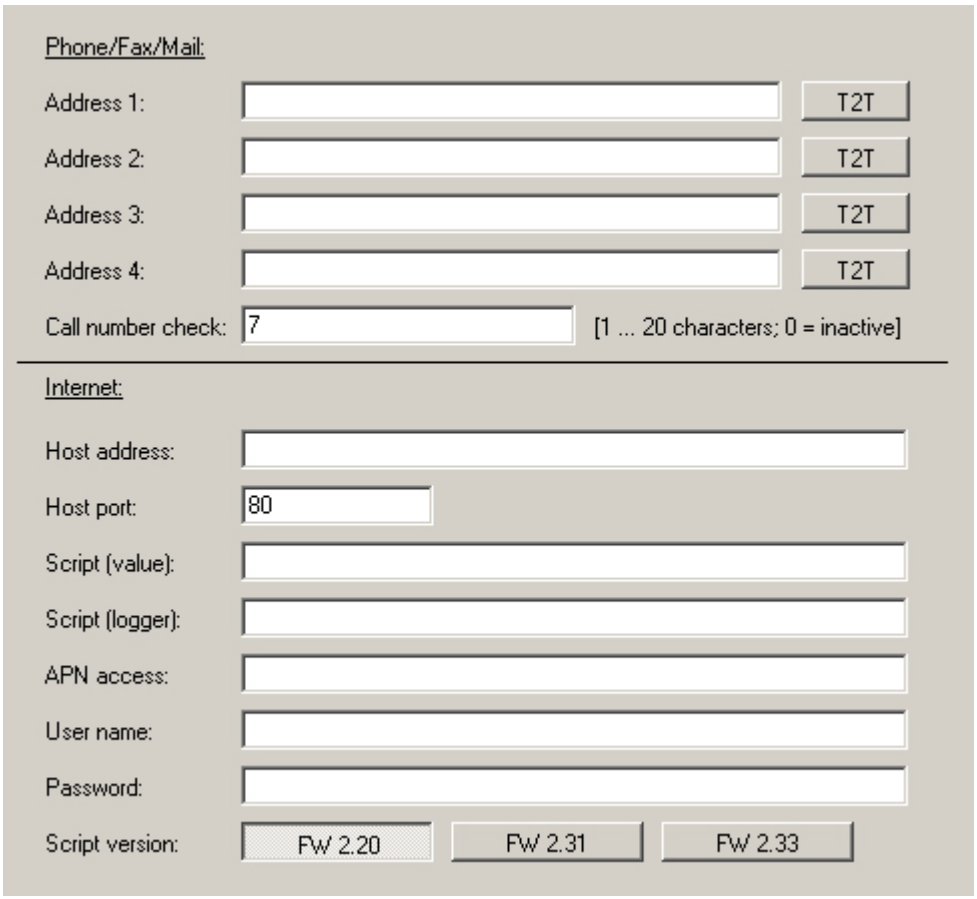


Figure 24: Configuring the addresses

Table 28: Configuring the addresses

Phone/Fax/Mail	
Address 1 ... Address 4	Enter the target addresses in these fields: **Transmission as SMS:** Enter the mobile phone number of the recipient. Click the button **[T2T]** when the SMS recipient is also a *TO-PASS®* telecontrol module, e.g., when alarm messages are to be used as switching commands in the other *TO-PASS®* telecontrol module. **Transmission as e-mail:** First, enter the e-mail identifier for the provider of the SIM card being used. The following identifiers may be used: - T-Mobile: 8000 - VODAFONE: 3400 - E-Plus 7676245. Enter a comma (,) after this identifier, followed by the e-mail address, e.g., for a T-Mobile SIM card: "8000,receiver@provider.net". **Transmission as fax:** Follow the instructions from the provider for transmissions as fax messages. For T-Mobile or Vodafone, for example, enter the identifier "99" directly in front of the fax number: "99057123456789".
Number check	In this field enter the number of digits to be used for number checking. If the entered number is longer than the number of digits entered in this field the last digits of the number will be checked. This function is available starting with Firmware Version FW 2.33.
	 **Note** **Address allocation is only possible when number checking is activated!** Incoming SMS messages cannot be allocated to an address in the memory when number checking is not active, meaning, for example, that standby is not possible. If there are delays in responding when number checking is not activated, the target address may be overwritten by a new SMS.

Table 28: Configuring the addresses

Online	
Host address	In this field enter the host address for the Web portal for test purposes, e.g., "www.to-pass.com".
Host port	In this field enter the port for the Web portal (e.g., "80" for most http applications)
Script (value), for transmitting alarms and status messages	In this field enter the script name for data transmission, for test purposes, e.g., "wago/saveTO-PASS.php". The "saveTO-PASS.php" script checks the version indications from transmitted data and forwards this information to the processing script.
Script (Logger), for transmitting the data of the logger	
APN access*	In this field enter the APN access point (Access Point Name) for the SIM card provider, e.g.,: T-Mobile: "internet.t-mobile" Vodafone: web.vodafone.de (The specified APN is not valid for prepaid cards.)
User name*	In this field enter the user name for SIM card provider access point, e.g.,: T-Mobile: Entry required, content - any Vodafone: any
Password*	In this field enter the password for the SIM card provider access point, e.g.,: T-Mobile: Entry required, content - any Vodafone: any
Script version	Use this button to select the script version to define the information that is to be transmitted to the Web portal.

* The examples for APN access, user name and password comply with the information valid at the time this manual was written. The required entries can be found in the current documentation of your SIM card provider.

7.5 Configuring Inputs and Outputs

7.5.1 Digital Inputs

Select your *TO-PASS*® telecontrol module from the left side of the project tree using the identifier. Select the input to be configured under **Digital Inputs**.

Digital inputs 1 … 4 can be configured as counter inputs starting from Firmware Version FW 2.33.
The counters count up or down from the given starting and end value.
With upward counting, exceeding of two counter values can be reported.
With downward counting, transgression of two counter values can be reported.

The parameters of the input are given on the right side.
The buttons and input fields for digital inputs 1 … 4 and 5 … 8 (when provided) are identical:

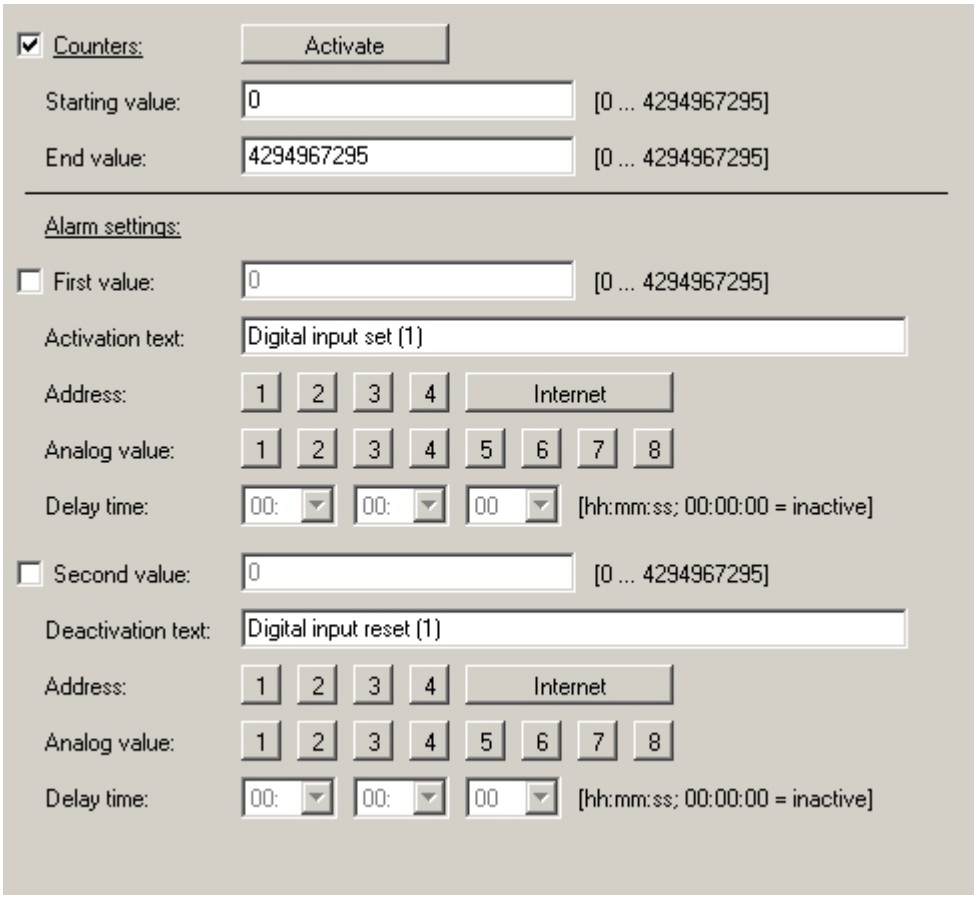


Figure 25: Configuring digital inputs 1 … 4

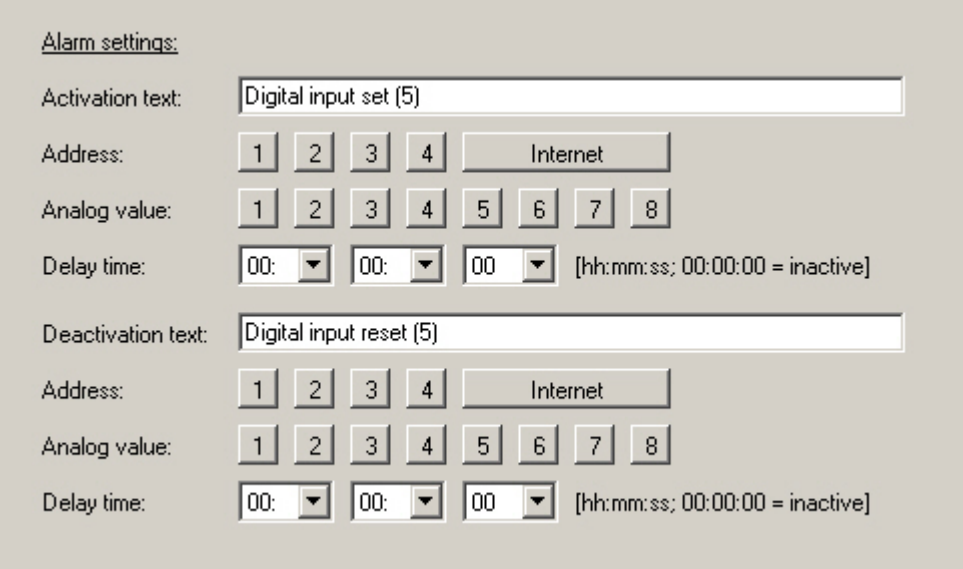


Figure 26: Configuring digital inputs 5 … 8 (when provided)

Table 29: Configuring of digital inputs

Counters (only for digital inputs 1 … 4)	
Counters	Check this box to use the selected digital input as a counter input. To activate the counter click the button **[Activate]**. This button is only active when the input is used as a counter input. On completion of configuration, the counter can be activated/deactivated during operation via the visualization system. This function is available starting with Firmware Version FW 2.33.
Starting value	In this field enter the starting value for the counter. This field is only active when the input is used as a counter input.
End value	In this field enter the end value for the counter. This field is only active when the input is used as a counter input. If the starting value is less than the end value the counter will count upward. If the end value is exceeded, the counting process is restarted from the starting value. If the starting value is greater than the end value the counter will count downward. If counting then continues below the end value, the counting process is restarted from the starting value.

Table 29: Configuring of digital inputs

Alarm settings	
First value	Check this box to have a message sent when the first limit is exceeded for upward counting or when the first lower limit is violated for downward counting. In the field provided, enter the first limit for which a message is to be sent when this limit is violated (upper/lower limit) (see below). The check box and the input field are active only when the input is used as a counter input.
Activation text	In this field enter the text to be contained in the message transmitted when the digital input has been set, or when the counted value has violated the first limit.
Address	Use this button to select the addresses to which the message is to be transmitted when the digital input has been set, or when the counted value has violated the first limit. Click the button **[Internet]** for applications with GPRS transmission.
Analog value	Use these buttons to select up to four analog values which can also be transmitted with the message when the digital input has been set, or when the counted value has violated the first limit.
Delay time	In these fields select the time (in hours, minutes and seconds) by which the message is to be delayed after setting of the digital input. If the input is reset before the defined delay period elapses, no activation/deactivation message will be sent. Enter "00:00:00" in this field to deactivate this function. The message will then be sent immediately. This function is available starting with Firmware Version FW 2.33. The selection fields are active only when the input is used as a digital input.
Second value	Check this box to have a message sent when the second limit is exceeded for upward counting or when the second lower limit is violated for downward counting. In the field provided, enter the second limit for which a message is to be sent when this limit is violated (upper/lower limit) (see below). The check box and the input field are active only when the input is used as a counter input.

Table 29: Configuring of digital inputs

Deactivation text	In this field enter the text to be contained in the message transmitted when the digital input has been reset, or when the counted value has violated the second limit.
Address	Use this button to select the addresses to which the message is to be transmitted when the digital input has been reset, or when the counted value has violated the second limit. Click the button **[Internet]** for applications with GPRS transmission.
Analog value	Use these buttons to select up to four analog values which can also be transmitted with the deactivation message when the digital input has been reset, or when the counted value has violated the second limit.
Delay time	In these fields select the time (in hours, minutes and seconds) by which the message is to be delayed after resetting of the digital input. If the input is set again before the defined delay period elapses, no activation/deactivation message will be sent. Enter "00:00:00" in this field to deactivate this function. The message will then be sent immediately. This function is available starting with Firmware Version FW 2.33. The selection fields are active only when the input is used as a digital input.

7.5.2 Multiplex Input

You can configure digital inputs DI1 ... DI4 as multiplex inputs. These four inputs will then additionally be read in as a combination and intepreted as a binary number. The following applies in this case:

DI1 = 2^0 = 1,
DI2 = 2^1 = 2,
DI3 = 2^2 = 4 and
DI4 = 2^3 = 8.

Thus, for example, if DI1 and DI3 are set, then the binary number is 5. If only DI4 is set, then the binary number is 8.

In the multiplex table you can define an alarm message for each of the 16 statuses (0 ... 15). The recipients of the messages can be selected using the multiplex settings.

Note

Counter inputs cannot be evaluated as multiplex inputs!

Counter inputs cannot be evaluated as multiplex inputs, as these inputs cannot be set.

7.5.2.1 Multiplex Settings

Select your *TO-PASS*® telecontrol module from the left side of the project tree using the identifier. Select the **Multiplex Settings** option under **Multiplex Input**. The buttons for enabling multiplex operation and the selection of the recipients of the analog values to be transmitted are provided on the right side.

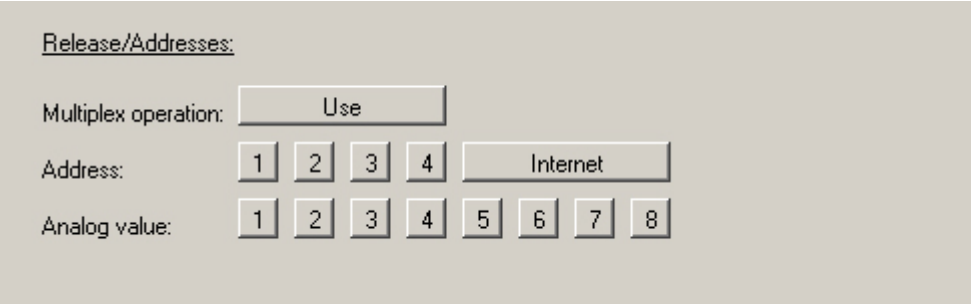


Figure 27: Configuring multiplex operation settings

Table 30: Configuring multiplex operation settings

Enable/Addresses	
Multiplex operation	Click the button **[Use]** to enable/disable multiplex operation for digital inputs DI1 ... DI4. If a status combination of digital inputs DI1 ... DI4 is fulfilled in multiplex operation for which a message text has been defined, a corresponding message will then be sent (see below).
Address	Use this button to select the addresses to which the message is to be transmitted when the corresponding status combination of digital inputs DI1 … DI4 is fulfilled. Click the button **[Internet]** for applications with GPRS transmission.
Analog value	Use these buttons to select four analog values which can also be transmitted with the message text when the corresponding status combination of digital inputs DI1 … DI4 is fulfilled.

7.5.2.2 Multiplex Alarm Text

Select your *TO-PASS*® telecontrol module from the left side of the project tree using the identifier. Select the **Multiplex Table** option under the **Multiplex Input** entry. The input fields for the alarm texts pertaining to the 16 statuses are provided on the right side.

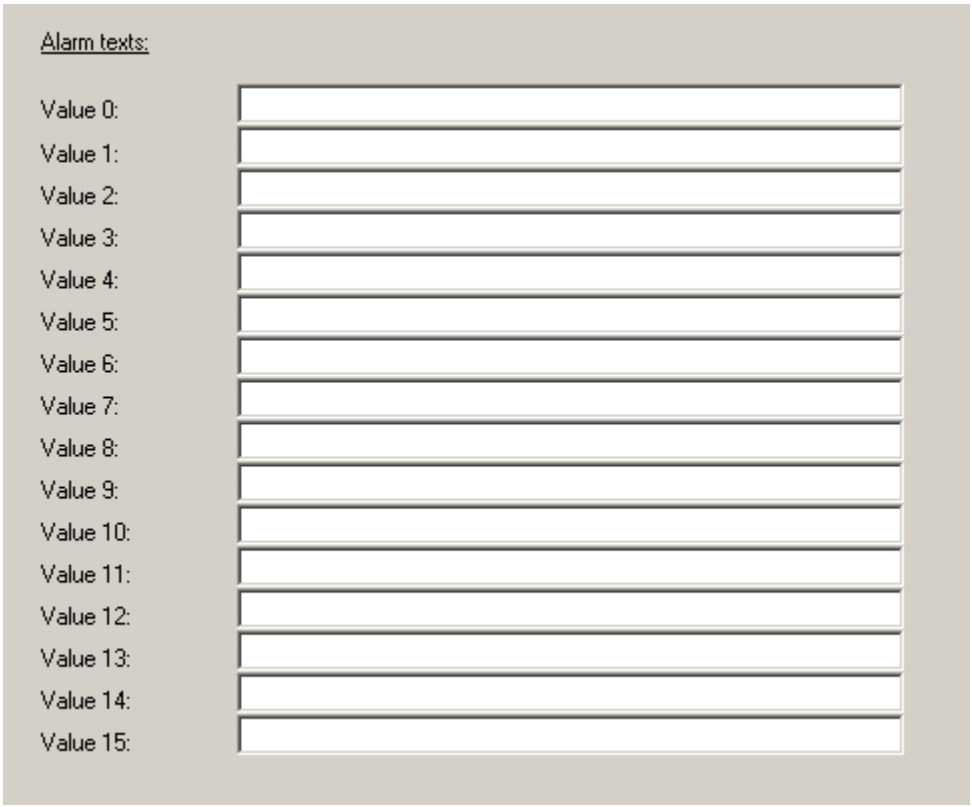


Figure 28: Configuring multiplex operation alarm texts

Table 31: Configuring multiplex operation alarm texts

Alarm texts	
Value 0 ... Value 15	In these fields enter the texts to be transmitted in the message when the corresponding status combination of digital inputs DI1 … DI4 are fulfilled. Messages are not sent for status combinations without any entries.

7.5.3 Analog Inputs

Select your *TO-PASS*® telecontrol module from the left side of the project tree using the identifier. Select the input to be configured under **Analog Inputs**. The parameters of the input are given on the right side.
The buttons and input fields are identical for all analog inputs:

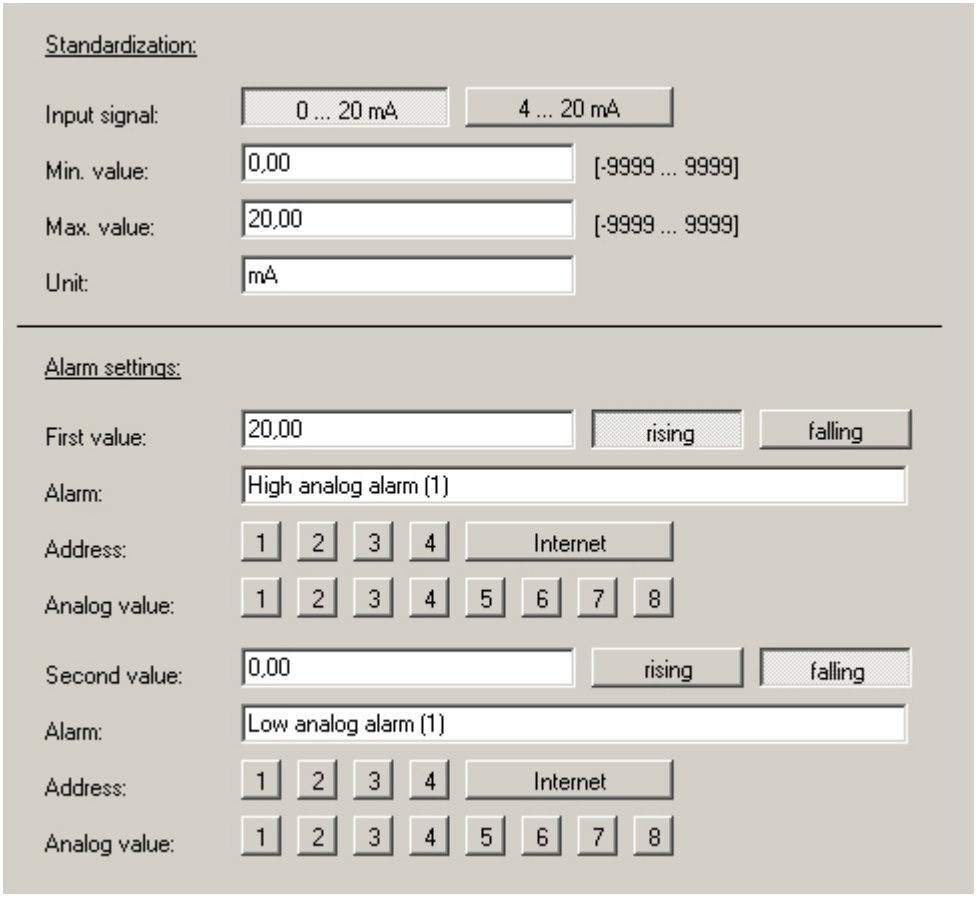


Figure 29: Configuring the analog inputs

Table 32: Configuring the analog inputs

Standardization	
Input signal	Use these buttons to select the input signal for the sensor connected to the *TO-PASS*® telecontrol module.
Min. value	In this field enter the starting value from which the given value is normalized. This value corresponds to the minimum input current value of 0 mA or 4 mA.
Max. value	In this field enter the end value up to which the given value is normalized. This value corresponds to the maximum input current 20 mA.
Unit	In this field enter the unit with a maximum of 5 characters with which the normalized process value is to be transmitted.

Table 32: Configuring the analog inputs

Alarm settings	
First value	In this field enter the first limit for which a message is to be sent when this limit is violated (upper/lower limit) (see below). Use the buttons to select whether the message is to be sent for violation of the upper [**increasing]** or lower limit value [**decreasing]**.
Message	In this field enter the text to be contained in the message transmitted when the analog value has violated the first (upper/lower) limit.
Address	Use these buttons to select the addresses to which the message is to be transmitted when the analog value has violated the first limit. Click the button **[Internet]** for applications with GPRS transmission.
Analog value	Use these buttons to select up to four analog values which can also be transmitted with the message when the analog value has violated the first (upper/lower) limit.
Second value	In this field enter the second limit for which a message is to be sent when this limit is violated (upper/lower limit) (see below). Use these buttons to select whether the message is to be sent for violation of the upper [**increasing]** or lower limit value [**decreasing]**.
Message	In this field enter the text to be contained in the message transmitted when the analog value has violated the second (upper/lower) limit.
Address	Use this button to select the addresses to which the message is to be transmitted when the analog value has violated the second (upper/lower) limit. Click the button **[Internet]** for applications with GPRS transmission.
Analog value	Use these buttons to select up to four analog values which can also be transmitted with the message when the analog value has violated the second (upper/lower) limit.

7.5.4 Digital Outputs

Select your *TO-PASS*® telecontrol module from the left side of the project tree using the identifier. Select the output to be configured under the entry **Digital Outputs**.

The parameters of the output are given on the right side. The input fields are identical for all digital outputs:

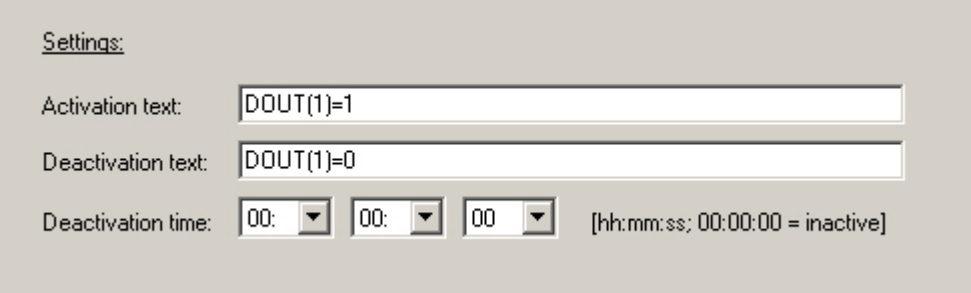


Figure 30: Configuring the digital outputs

Table 33: Configuring the digital outputs

Settings	
Activation text	In this field enter the activation text for the output. When the *TO-PASS*® telecontrol module receives this text as an SMS it switches this digital input on and connects the DC voltage available at terminal 37 to the corresponding output.
Deactivation text	In this field enter the deactivation text for the output. When the *TO-PASS*® telecontrol module receives this text as an SMS it deactivates this digital output and disconnects the DC voltage available at terminal 37.
Turn-off time	In these fields select the turn-off time for the output in hours, minutes and seconds. If the digital output has been activated, it will remain active for the time defined here and voltage remains applied at terminal 37. When this time elapses, the output switches off the voltage at terminal 37 automatically. The maximum turn-off time is limited to "00:01:59" up to Firmware Version FW 2.33. Define a time of "00:00:00" hh:mm:ss to deactivate this function. The output will then remain permanently activated until the next deactivation message is received.

7.5.5 Analog Outputs

Select your *TO-PASS*® telecontrol module from the left side of the project tree using the identifier. Select the output to be configured under **Analog Outputs**.

The parameters of the output are given on the right side.
The buttons and input fields are identical for all analog outputs:

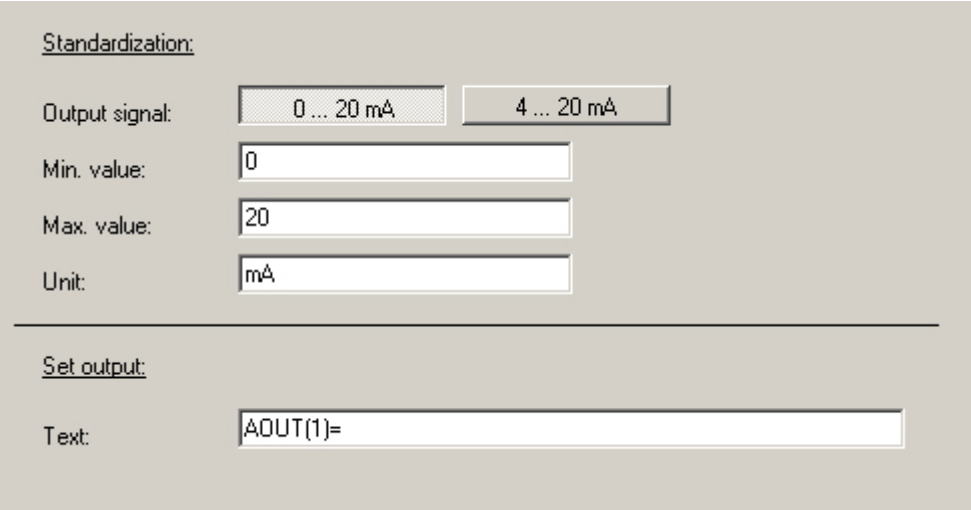


Figure 31: Configuring the analog outputs

Table 34: Configuring the analog outputs

Standardization	
Output Signal	Use these buttons to select the output signal for the actuator connected to the *TO-PASS*® telecontrol module.
Min. value	In this field enter the starting value from which the output value is normalized. This value corresponds to the minimum output current value of 0 mA or 4 mA.
Max. value	In this field enter the end value up to which the output value is normalized. This value corresponds to the maximum output current 20 mA.
Unit	In this field enter the unit with a maximum of 5 characters with which the normalized process value is to be transmitted.
Set output	
Text	In this field enter the text for setting the output. If this text is transmitted with a value situated within the min. and max. value, the *TO-PASS*® telecontrol module sets the analog output to the specified value.

Note

Evaluation of places after the decimal point

Starting with Firmware 02.33.08, places after the decimal point are also taken into account for switching of the analog outputs. A period (decimal point) "." must be used as the separator. Up to four digits are evaluated. With a minimum value of 0 and a max. value of 20, two digits can be used after the decimal point, allowing a value of "5.55" to be evaluated, for example. Configuring is performed without places after the decimal point.

7.6 Configuring Error Detectors

The *TO-PASS*® telecontrol module can transmit error messages to a maximum of four recipients. The recipients are informed either directly one after another or (if configured) after expiration of the time delay for acknowledgment. The message is sent by the *TO-PASS*® telecontrol module as an SMS; however, it can also be sent as an e-mail, fax or voice mail. In addition, the error messages can also be transmitted to a Web portal.

Note

Device-dependent Function

Devices with GPRS functionality (device identifier "Web") are required to transmit error messages to a Web portal.

Note

Note the calculation packet size!

Please note the information given on calculation packet size in the Section "Important Information - Rounding of Blocks for GPRS Links."

7.6.1 Alarm Messages for Digital Inputs

If on or off states of digital inputs are to be sent as error messages, select the desired recipient for the respective input statuses using buttons **[1]** ... **[4].** Click the **[Internet]** button to also transmit the message to a Web portal.
In addition, you can also specify the analog values that are to be transmitted along with the error message.

7.6.2 Limit Messages for Counter Inputs

If violations of upper/lower counter limits are to be sent as error messages, activate the respective counter value and select the desired recipient using buttons **[1]** ... **[4]**.
Click the **[Internet]** button to also transmit the message to a Web portal.

You can also specify the analog values that are to be transmitted along with the error message.

7.6.3 Limit Messages for Analog Inputs

You can specify a maximum of 2 limit values for every analog input for which (upper/lower) limit value violations are to be sent as error messages.
Enter the desired value and select whether the error message is to be sent for violation of the upper or lower limit value using the buttons [**increasing]** or [**decreasing]**.
Select the desired recipient for the respective limit value using the buttons **[1] …**

[4].
Click the **[Internet]** button to also transmit the message to a Web portal.
In addition, you can also specify the analog values that are to be transmitted along with the error message.

7.6.4 Acknowledgement

Acknowledgment is the confirmation that a message has actually been sent to the recipient. Select the *TO-PASS*® telecontrol module from the project tree using the identifier. Select the entry **Acknowledgment** under the option **Special Functions**. The right side contains the input fields for the waiting time, the number of repetitions and the response text.

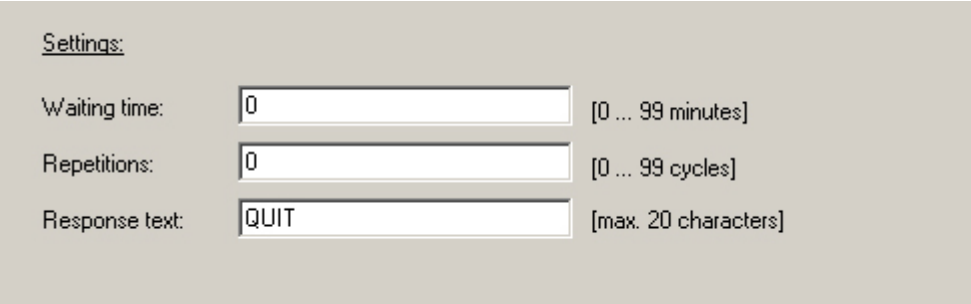


Figure 32: : Configuring the acknowledgment response

Table 35: Configuring the acknowledgement response

Settings	
Waiting time	In this field enter the time that the *TO-PASS*® telecontrol module waits for an acknowledgement after transmitting an alarm SMS. Acknowledgement is in the form of an SMS containing the configured response text, or a simple call by the recipient to the *TO-PASS*® telecontrol module. The *TO-PASS*® telecontrol module registers the call. You then receive an acknowledgement SMS containing the identifier, the response text and the alarm text.
Repetitions	In this field enter the number of acknowledgement cycles. If no recipient acknowledges the message of the *TO-PASS*® telecontrol module, then the entire cycle can be executed again, allowing the *TO-PASS*® telecontrol module to inform the first address once again and to wait for an acknowledgment.
Response text	In this field enter the SMS acknowledgement text (up to 20 characters). This input field is available starting with Firmware Version FW 2.33.

7.7 Transmission Repeat Times

Select the *TO-PASS*® telecontrol module from the project tree using the identifier. Select the entry **Repeat times** under the option **Special Functions**. The input fields for the Web interval, the Web outputs and the SMS interval and buttons for target addresses are located on the right side.

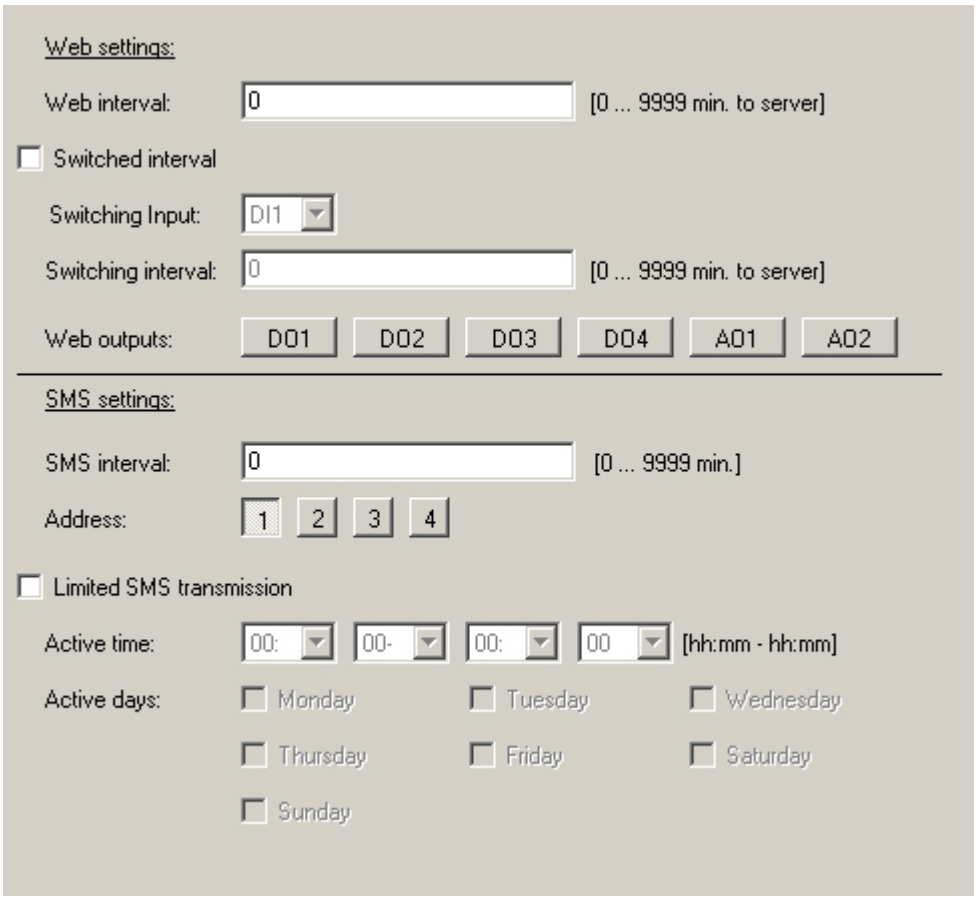


Figure 33: Configuring the transmission repeat times

Table 36: Configuring the transmission repeat times

Web settings	
Web interval	In this field enter the cycle time in minutes to define the intervals that the *TO-PASS*® telecontrol module is to send data to the Internet. Enter a "0" to deactivate cyclical data transmission. The maximum value that you can enter here is 9999 minutes, which corresponds to around one transmission per week.
	Note **Device-dependent function** The function is only available for devices with GPRS functionality (device identification "Web").
	Note **Note the calculation packet size!** Please note the information given on calculation packet size in the Section "Important Information - Rounding of Blocks for GPRS Links."
Switched interval	Check this box to have the transmission interval switched as a function of the status of a digital input between Web interval and switching interval. This function is available starting with Firmware Version FW 2.33.
Switching input	In this field, select a digital input to be used for switching of the transmission interval between Web interval (Off status of the input) and the switching interval (On status of the input). When the status of the switching input changes, the initial transmission is triggered, followed by transmission at the cycle time defined in the field **Switching interval**. This selection field is active only when the **Switched interval** box is checked.
	Note **Counter inputs may not be defined as switching inputs** Counter inputs may not be used as switching inputs, as no status changes are evaluated for these inputs.
Switching interval	In this field enter the cycle time in minutes to define the intervals that the *TO-PASS*® telecontrol module is to send data to the Internet. Enter a "0" to deactivate cyclical data transmission. The maximum value that you can enter here is also 9999 minutes.
Web outputs	Use these buttons to select the inputs whose default setpoints can be modified via responses from the Web portal. This function is available starting with Firmware Version FW 2.33.

Table 36: Configuring the transmission repeat times

SMS Settings	
SMS interval	Here, enter the cycle time in minutes to define the intervals that the *TO-PASS*® telecontrol module is to send data to the addresses defined under **Address**. SMS content is specific to devices and firmware used and is described in the Section "Operation – Remote Polling by SMS". The cyclic SMS can, for example, be used for operational supervision.
Address	Use this button to select the addresses to which the message is to be transmitted in defined cycles.
Limited SMS transmission	Check this box to limit the SMS interval to certain days of the week and to certain times of day. Time adjustment must be performed for limited SMS transmission to check the day of the week and the active time. The first SMS is transmitted when the starting value for the active time on an active day is reached. The SMS is also transmitted when a cycle time of "0" has been defined. The transmission cycle is started when the cycle time is situated within the active time. This function is available starting with Firmware Version FW 2.33.
Active time	In these fields you can select the starting and end points for the active time in "hh:mm". The starting point must be before the end time. A selection not in line with these requirements will be adapted automatically. These selection fields are active only when the box **Limited SMS transmission** has been checked.
Active days	Check these boxes to mark the active days for SMS transmission. These boxes are active only when the **Limited SMS transmission** box has been checked.

7.8 Time Adjustment

Select the *TO-PASS*® telecontrol module from the project tree using the identifier. Select the entry **Acknowledgment** under the option **Time setting**. The buttons for various settings pertaining to time adjustment are located on the right side.

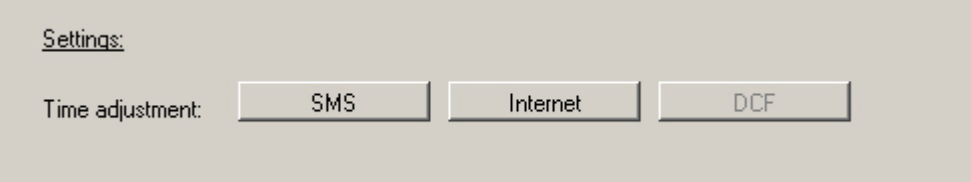


Figure 34: Setting the time adjustment

Table 37: Setting the time adjustment

Settings	
Time adjustment	The *TO-PASS*® telecontrol module sends an SMS to itself and receives the current time from the provider transmitted by this SMS when the **[SMS]** button is clicked. Time adjustment using an SMS takes place only once when the *TO-PASS*® telecontrol module is restarted, or when an SMS with the text "Time" is received. When the **[Internet]** button is clicked, the *TO-PASS*® telecontrol module takes the time from the response by the Web portal on each transmission to the Web portal. The transmission runtimes may cause time differences to occur.

7.9 MODBUS

The MODBUS functionality facilitates connectivity for MODBUS interface-equipped devices. The devices must be configured as slave devices and are connected via PC interface. As a result, the *TO-PASS*® telecontrol module operates as a master.
A maximum of up to 64 registers can be queried.

7.9.1 MODBUS Settings

Select the *TO-PASS*® telecontrol module from the project tree using the identifier.
Select the **MODBUS Settings** option under the **MODBUS** entry.
The buttons for the MODBUS format and the input field for the polling cycle time are provided on the right side:

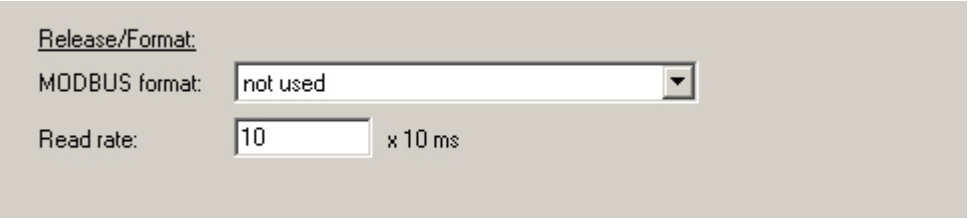


Figure 35: Configuring the MODBUS settings

Table 38: Configuring the MODBUS settings

Enable/Format	
MODBUS format	Select the transmission format for MODBUS communication; the format selected must be compatible with the controller used. The following formats are possible:
	Not used (no MODBUS connection)
	9600 (8N2), RTU Input (0x04)
	9600 (8E1), RTU Input (0x04)
	9600 (8O1), RTU Input (0x04)
	9600 (8N1), RTU Input (0x04)*
	9600 (8N2), RTU Holding (0x03)*
	9600 (8E1), RTU Holding (0x03)*
	9600 (8O1), RTU Holding (0x03)*
	9600 (8N1), RTU Holding (0x03)*
	19200 (8N2), RTU Input (0x04)*
	19200 (8E1), RTU Input (0x04)*
	19200 (8O1), RTU Input (0x04)*
	19200 (8N1), RTU Input (0x04)*
	19200 (8N2), RTU Holding (0x03)*
	19200 (8E1), RTU Holding (0x03)*
	19200 (8O1), RTU Holding (0x03)*
	19200 (8N1), RTU Holding (0x03)*
	* These functions are available starting with Firmware Version FW 2.33.
Polling cycle	Here, enter the MODBUS subscriber polling cycle time in multiples of 10 ms. The requested MODBUS subscriber must reply within this time. This means that the polling cycle time is a function of the response time of the slowest subscriber.

7.9.2 MODBUS Alarm

When using the MODBUS functionality, an input of a MODBUS device can be defined that triggers an alarm when it assumes the high state (logical "1").
The alarm request is made via the function code "Read Discrete Inputs" (0x02).
Alarm messages are also initiated for communication errors.

Select the *TO-PASS*® telecontrol module from the project tree using the identifier.
Select the option **MODBUS alarm** under the **MODBUS** entry.
The input fields and buttons for the alarms are provided on the right side.

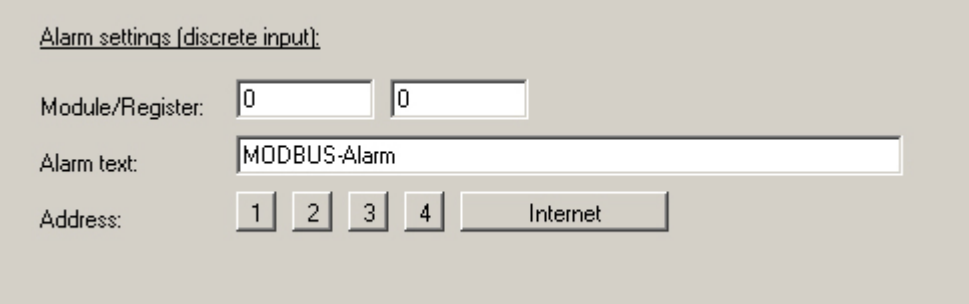


Figure 36: Configuring the MODBUS alarm

Table 39: Configuring the MODBUS alarm

Alarm Setting (Discrete Input)	
Module/Register	Enter the address of the MODBUS subscriber in the **Module** input field and the number of the register to be polled in the **Register** column.
Alarm text	In this field enter the message sent when the selected MODBUS input assumes the high state or when the MODBUS status is being modified.
Address	Use this button to select the addresses to which the message is to be transmitted when the MODBUS input has been set. Click the button **[Internet]** for applications with GPRS transmission.

7.9.3 MODBUS Registers

A maximum of 64 registers can be read from the connected MODBUS subscribers. The registers are compiled in four groups (1 ... 16, 17 ... 32, 33 ... 48, 49 ... 64).

Select the *TO-PASS*® telecontrol module from the project tree using the identifier. Select the option **MODBUS** Registers for the corresponding group under the **MODBUS** entry.
The input fields for the addresses of the registers to be polled are provided on the right side. The input fields are identical for all register groups:

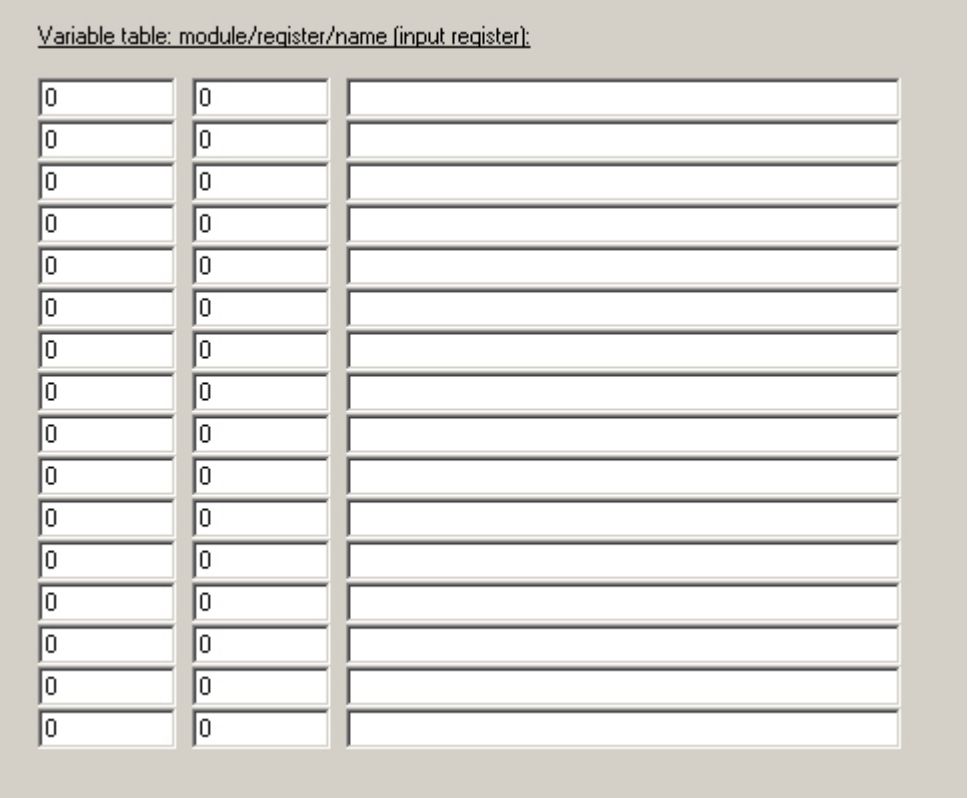


Figure 37: Configuring the MODBUS registers

Table 40: Configuring the MODBUS registers

Variable table: module/register/name (input register):	
Register 1* 16, (Registers 17 ... 32, Registers 33 ... 48, (Registers 49 ... 64)	Enter the address of the MODBUS subscriber in the **Module** column and the number of the register to be polled in the **Register** column. You can enter a designator in the **Name (input register)** column. Each value is read in as a 16-bit value and a maximum of 64 values can be read.

7.10 Data Logger

Select the *TO-PASS*® telecontrol module from the project tree using the identifier. Select the entry **Data Logger** under the option **Special Functions**. The input field for the cycle time and a button for calculating the average value are located on the right side.

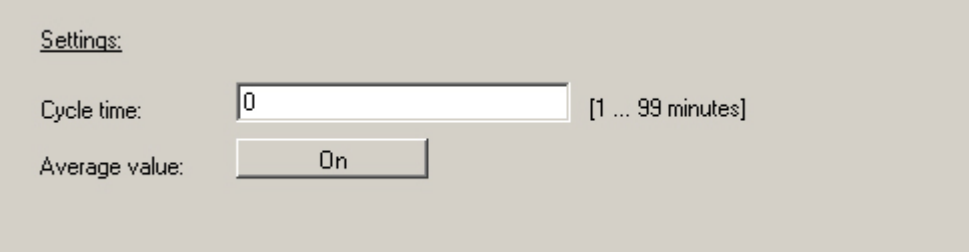


Figure 38: Configuring the data logger

Table 41: Configuring the data logger

Settings	
Cycle time	In this field enter the cycle time in minutes at which the process image is to be saved. The process image is specific to devices and firmware used and is described in the Section "Operation – Data Logger (DSP)". The data logger is a cyclic buffer; i.e., when the buffer is full, the oldest process images are overwritten (F.I.F.O). The size of the data logger depends on the device used and is specified in the technical data sheet.
Average value	Press the **[On]** button to switch average value calculation on or off. If average value calculation is on, the analog input values read at a sampling rate of 10 ms are added within a cycle time. The total is than divided by the number of values read in the cycle time and saved.

7.11 Writing Parameters to the Module

After you have adapted all parameters for the *TO-PASS*® telecontrol module to your requirements, you have to write the parameters to the connected module.

Select the menu option **Edit > Write Parameters**. The software then writes all parameters to the *TO-PASS*® telecontrol module.

After the COM LED goes out, the *TO-PASS*® telecontrol module is ready for operation.

8 Operation

8.1 Remote Query of Process Values

The *TO-PASS*® telecontrol module offers two options for remote inquiry of the process values available:

- Query via SMS
- Query with the *TO-PASS*® Operator Program

8.1.1 Remote Polling via SMS

For remote polling via SMS, send an SMS containing the text "State" to the *TO-PASS*® telecontrol module.
The *TO-PASS*® telecontrol module responds promptly with an SMS to your mobile phone containing all of the current process values.

Table 42: SMS format

Value transmitted:	Meaning
Module 1	Identity
10010011	Condition of the digital inputs 1 ... 8 (0 = not set, 1 = set)
+00.00mA	Analog input 1
+00.00mA	Analog input 2
+00.00mA	Analog input 3
+00.00mA	Analog input 4
+00.00mA	Analog input 5
+00.00mA	Analog input 6
+00.00mA	Analog input 7
+00.00mA	Analog input 8
0110	Condition of the digital outputs 1 ... 4 (0 = not set, 1 = set)
+00.00mA	Analog output 1
+00.00mA	Analog output 2
Normal Status	Status text or prepaid information (optional)
AC=99	Alarm counter (displays the alarms that are still possible per hour). The alarm counter only transmitted when enabled (Alarm counter parameter in the Identifier dialog <> "0").

If at least one digital input is configured as a counter input, the counter status is added to the SMS. The additional lines are added in front of the "Status text" line. The counter status shows the last change that has occurred since the last SMS transmission, or after a system start (independent of the value and logger status).

Example:

Table 43: Items added to SMS for counter inputs

Value transmitted	Explanation
0	Status counter 1 (no counter)
e34560000	Status counter 2 (counter active, counter value = 34560000)
C10000000	Status counter 3 (counter value changed, value = 10000000)
R0	Status counter 4 (counter reset, value = 0)

The counter status may be one of the following statuses:

Table 44: Counter status

Status	Explanation
0	Digital input not configured as a counter.
e:ZW	Counter is active: Counter value.
d:ZW	Counter is not active: Counter value.
o:ZW	Counter overflow: Counter vlaue.
r:ZW	Counter has been reset: Counter value.
s:ZW	Counter has been started: Counter value.
c:ZW	Counter value has been changed: Counter value.
ZW	Counter value

8.1.2 Remote Polling using the *TO-PASS®* Operating Program

To display the process values with the *TO-PASS®* operator program, select the menu item **Visualization > Process values**. The program establishes a link to the *TO-PASS®* telecontrol modules selected. Please note the mode used to dial up the *TO-PASS®* telecontrol modules, either via direct RS-232 cable connection or an analog ISDN or GSM modem dial-up. The selection is specified in the menu option **File > Settings**.

8.1.2.1 Inputs/Outputs

Press the **[I/O]** button to display the process values of the inputs and outputs. The process values displayed are valid if the on-line display is green.

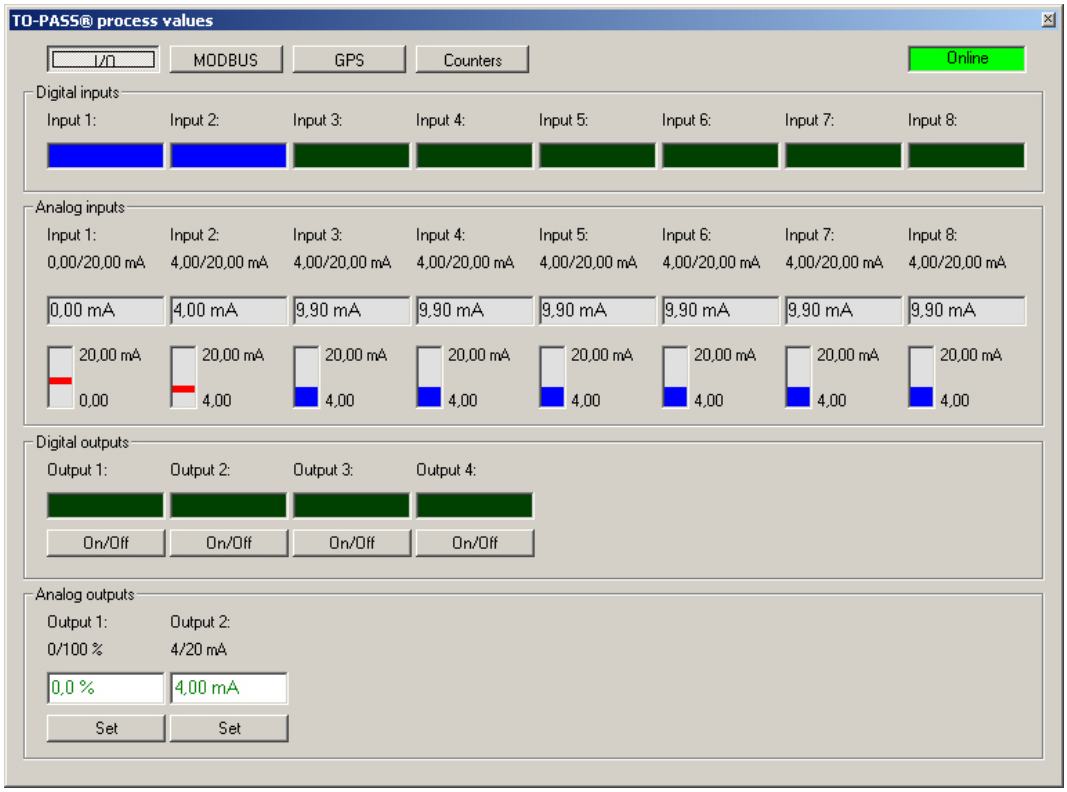


Figure 39: Visualization of the process values

Process values pertaining to inputs are displayed in the upper portion of the window and those pertaining to digital and analog outputs are displayed in the lower portion of the window.

Digital inputs configured as counter inputs are highlighted in blue.

Note

Displaying the Analog Values
The process values of the analog inputs and outputs are displayed with 8-bit resolution.

8.1.2.2 MODBUS

Press the **[MODBUS]** button to display the MODBUS process values. The process values displayed are valid if the on-line display is green.

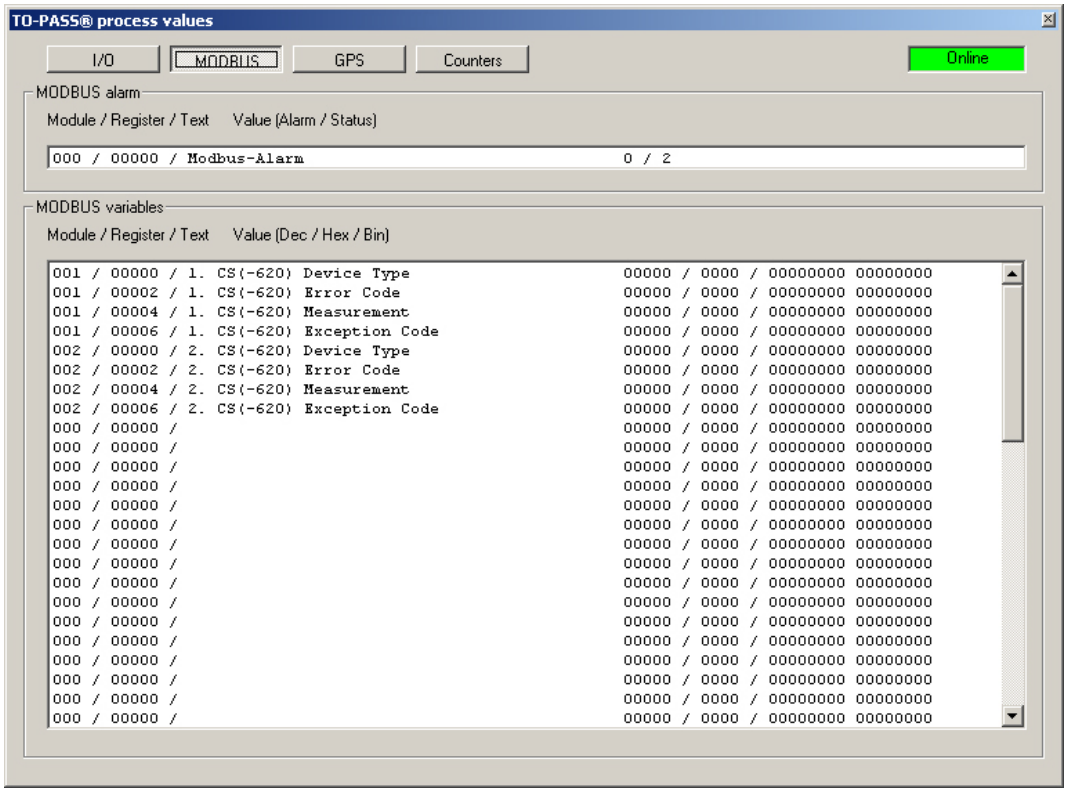


Figure 40: MODBUS process values

MODBUS Alarm
In this line, the variable for the MODBUS alarm (Module/Register/Text) is displayed with the corresponding value (Alarm/Status).

MODBUS Variables
In this table, the MODBUS variables (Module/Register/Text) are displayed with the corresponding values (Dec/Hex/Bin).

8.1.2.3 Counters

To display the counter process values, click the **[Counter]** button (possible only when inputs have been configured as counters). The process values displayed are valid when the on-line indicator is highlighted in green.

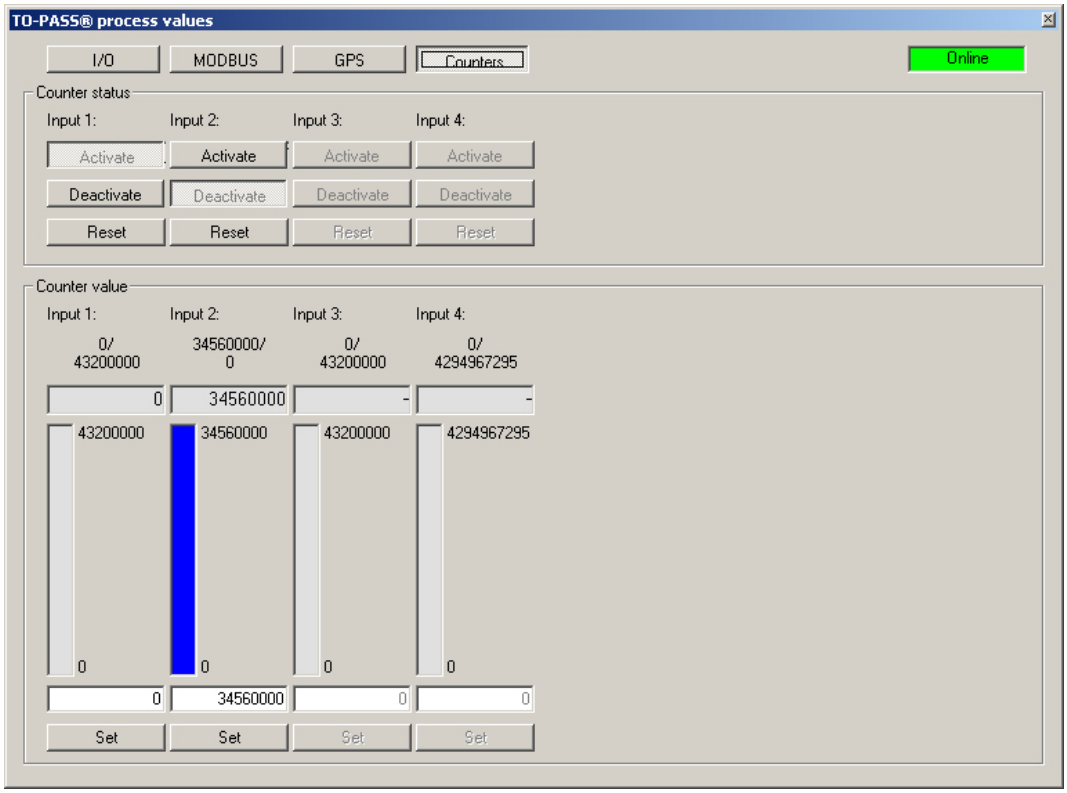


Figure 41: Counter process values

The counter statuses are shown at the top of the window, while the counter values, the starting and end values and the limits are shown at the bottom.

8.2 Telecontrol

TO-PASS® telecontrol modules offer the option of influencing a process remotely with the help of their analog and digital outputs. There are two methods available:

- Telecontrol via SMS
- Telecontrol with the *TO-PASS*® operator program.

8.2.1 Telecontrol via SMS

8.2.1.1 Setting or Resetting a Digital Output

To set or reset a digital output, send an SMS with the text that is entered under **Activation text** or **Deactivation text** for the output to the TO-PASS® telecontrol module. The *TO-PASS®* telecontrol module acknowledges the command with an SMS containing the identifier and the transmitted text.

Example:

Table 45: Example of parameters for **Set DO**

Parameter	Setting
Activation text	DOUT1=1
Deactivation text	DOUT1=0
Turn-off time	00:00:00

Send an SMS with the text "DOUT1=1" to the *TO-PASS®* telecontrol module to switch on output 1. The *TO-PASS®* telecontrol module acknowledges the command with an SMS with the identifier and the text "DOUT1=1 OK!".

Send an SMS with the text "DOUT1=0" to the *TO-PASS®* telecontrol module to switch off output 1. The *TO-PASS®* telecontrol module acknowledges the command with an SMS with the identifier and the text "DOUT1=0 OK!"

8.2.1.2 Setting an Analog Output

To set an analog output, send an SMS with the text, which is entered under **Set output**, and the value to be set to the *TO-PASS*® telecontrol module. The *TO-PASS*® telecontrol module acknowledges the command with an SMS containing the identifier, the transmitted text and the set value.

Example:

Table 46: Example of parameters for **Set AO1**

Parameter	**Setting**
Output Signal	0 ... 20 mA
Min. value	0
Max. value	100
Unit	%
Text	AOUT1=

Send an SMS with the text "AOUT1=75" to set analog output 1 to a value of 15 mA = 75%. The *TO-PASS*® telecontrol module acknowledges the command with an SMS containing the identifier and the text "AOUT1=+00075% OK!".

Starting with Firmware 02.33.08, places after the decimal point are also taken into account for setting of the analog outputs. A period (decimal point) "." must be used as the separator. Up to four digits are evaluated. For 0 .... 100%, one digit remains to be used after the decimal point, allowing a value of "75.5" to be evaluated, for example.
"AOUT1=+075.5%OK!" is transmitted as a reply.

8.2.1.3 Changing the Counter Value or Status

To change the value or the status of a counter, send an SMS containing the text "Counter" and the corresponding control commands (more than one can be sent) to the *TO-PASS*® telecontrol module.
The control commands identify the counter input and the actual command.

Table 47: Control commands for counters

Control command	Function
Cx= (x: 1 ... 4)	Select counter 1 ... 4
E	Activate counter
D	Deactivate counter
R	Reset counter
n (e.g., 500)	Set counter value

Control commands must be concluded with a semicolon (";").

The *TO-PASS*® telecontrol module acknowledges the command with an SMS containing the identifier and the transmitted text.

Example:

To activate Counter 2 and set it to 500, and to also deactivate Counter 3, send an SMS containing the text "Counter: C2=E C2=500 C3=D;" to the *TO-PASS*® telecontrol module.
The *TO-PASS*® telecontrol module acknowledges the command with an SMS containing the identifier and the text "COUNTER: OK!".

8.2.2 Telecontrol with the *TO-PASS®* Operator Program

To display the process values with the *TO-PASS®* operator program, select the menu item **Visualization > Process values**. The program establishes a link to the *TO-PASS®* telecontrol modules selected. Please note the mode used to dial up the *TO-PASS®* telecontrol modules, either via direct RS-232 cable connection or an analog ISDN or GSM modem dial-up. The selection is specified in the menu option **File > Settings**.

8.2.2.1 Inputs/Outputs

Press the **[I/O]** button to display the process values of the inputs and outputs. The process values displayed are valid if the on-line display is green.

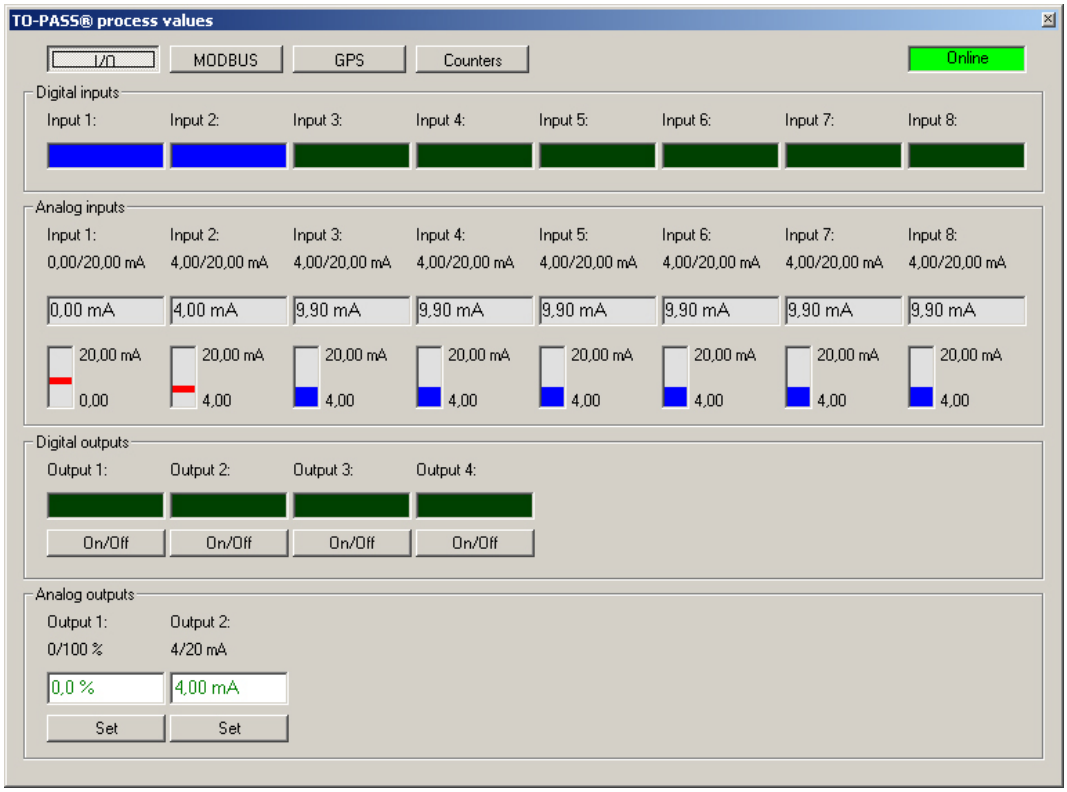


Figure 42: Visualization of the process values

Process values pertaining to inputs are displayed in the upper portion of the window and those pertaining to digital and analog outputs are displayed in the lower portion of the window.

Digital inputs configured as counter inputs are highlighted in blue.

Note

Displaying the Analog Values
The process values of the analog inputs and outputs are displayed with 8-bit resolution.

You can set or reset the digital outputs by pressing the **[Set/Reset]** buttons.

To set an analog output, enter the required numerical value in the corresponding input field and then click the associated button **[Set]**.

8.2.2.2 Counters

To display the counter process values, click the **[Counter]** button (possible only when inputs have been configured as counters). The process values displayed are valid when the on-line indicator is highlighted in green.

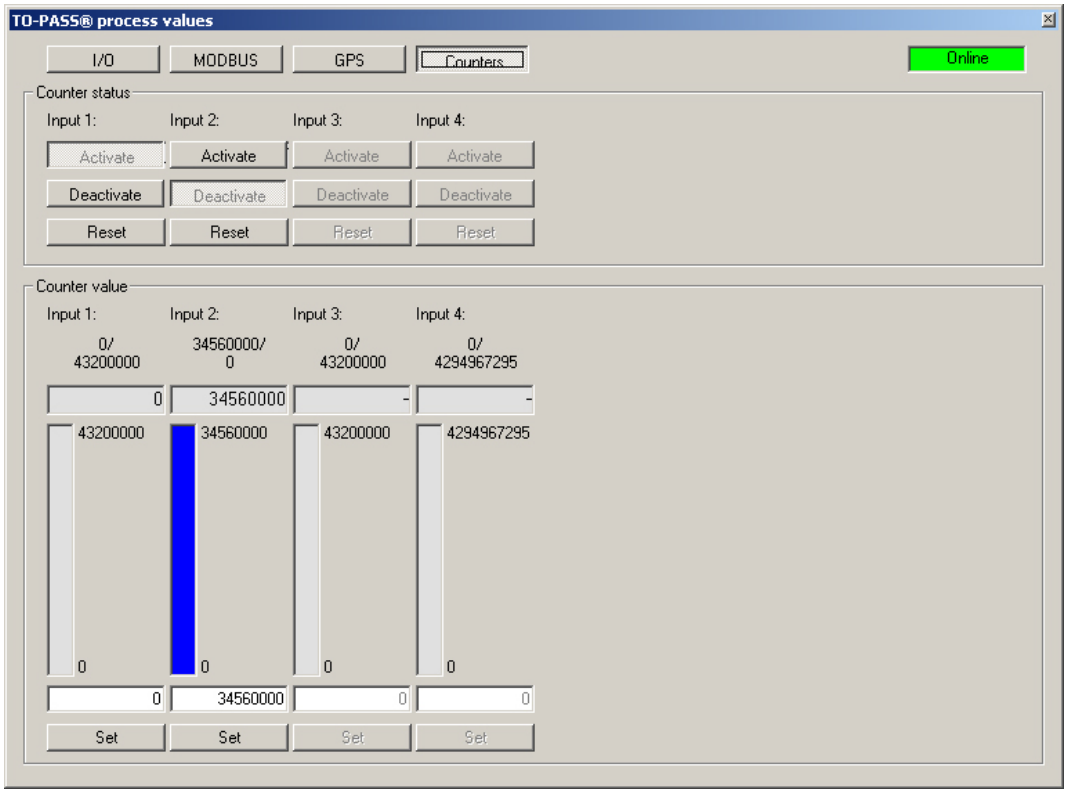


Figure 43: Counter process values

The counter statuses are shown at the top of the window, while the counter values, the starting and end values and the limits are shown at the bottom.

To start a counter, click the button **[Activate]**.

To stop a counter, click the button **[Deactivate]**.

To restore the counter to its starting value, click the button **[Reset]**.

To set a counter to a new value, enter the required counter value in the corresponding input field and then click the associated button **[Set]** to apply the new value.

8.3 Acknowledging Error Messages

If a waiting time not equal to 0 has been set for the acknowledgment of error messages, the *TO-PASS*® telecontrol modules expects an acknowledgment of error messages from the recipient.

Acknowledgement is in the form of an SMS containing the configured response text, or a simple call by the recipient to the *TO-PASS*® telecontrol module.
The *TO-PASS*® telecontrol module registers the call.
You then receive an acknowledgement SMS containing the identifier, the response text and the alarm text.

Note

Acknowledgement by phone call is based on the card being used!

Some data cards do not allow voice links, meaning that acknowledgement is only possible via SMS.

If the message is not acknowledged within the defined waiting time, the *TO-PASS*® telecontrol modules sends the error message automatically to the next recipient entered under addresses and waits again for the defined waiting time for an acknowledgment.

If none of the defined recipients acknowledge the error message and the number of repetitions is not set to 0, then the procedure is repeated either until a recipient acknowledges the error message or the maximum number of repetitions has been reached.

8.4 Switching to Standby

Note

Standby authorization
Switching standby on and off is only possible by subscribers whose telephone number has been entered in the address list!

Using the "Standby" function, it is optional to change all messages sent by the *TO-PASS*® telecontrol modules specifically to the respective ready state. This takes place with simple changeover via SMS.

To do this, just send an SMS with the text "Standby1" to the *TO-PASS*® telecontrol modules. The *TO-PASS*® telecontrol module then transmits all alarm messages to the SMS sender. Other receivers defined in the *TO-PASS*® telecontrol modules are no longer informed.

To switch this function off, send an SMS with the text "Standby0" to the *TO-PASS*® telecontrol modules.

The *TO-PASS*® telecontrol module sends the SMS “STANDBY OK!” at the start of the standby function and the “STANDBY END!” at the end of the standby function.

8.5 Displaying the Data Logger (DSP)

The *TO-PASS*® telecontrol module is equipped with a data logger. The size of the data logger depends on the device used and is specified in the technical data.

A process image contains all of the digital and analog inputs available at the *TO-PASS*® telecontrol module. Starting with Firmware Version 2.31, the process image will also contain all analog and digital outputs and, starting from Firmware Version 2.33 all of the counter statuses and counter values.
The cycle time with which the process image is to be saved can be configured. The average value can also be provided for the analog input values for cyclical storage.

To read the contents of the data logger, select the menu item **Edit > Read all data records**. Then display all values of the data logger using the menu item **Visualization > Data logger**.

Either select all inputs or only specific inputs with the help of the selection field in the upper portion of the window.

All entries are displayed as a table with the complete process image. Digital inputs and outputs are displayed as bar charts; analog inputs and outputs as a curve diagram.

Above the table or the diagram, the date and time of the first value displayed is shown on the left side, and, on the right side, the date and time of the last value displayed.

The navigation buttons on the right side of the window have the following meaning:

Table 48: Navigation DSP

Button	Function
	Jumps to the first data record of the table or the diagram
	Jumps to the previous data record
	Goes back by 20 data records
	Goes forward by 20 data records
	Jumps to the next data record
	Jumps to the last data record of the table or the diagram
	Pages the table or the diagram back to the first data record
	Stops paging in the table or the diagram
	Pages the table or the diagram forward to the last data record

As an alternative, you can also display all data records saved via **Edit** > **Display all data records** or all new data records for the selected telecontrol module via **Edit** > **Display new data records**. Here, no distinction is made between DSP or ESP.

8.6 Displaying the Event Logger (ESP)

In contrast to the data logger, the event logger saves the complete process image of the *TO-PASS*® telecontrol modules only when an event occurs. This can be the setting of a digital input or even the violation of a limit value. All digital and analog values available at the *TO-PASS*® telecontrol modules are saved.

To read the contents of the event logger, select the menu option **Edit > Read all data records**. It is possible to display all values of the event logger with the help of the menu option **Visualization > Event logger**.

Either select all events or only specific events with the help of the selection field in the upper portion of the window.

The events are displayed in a list with the date, time and the event text.

As an alternative, you can also display all data records saved via **Edit** > **Display all data records** or all new data records for the selected telecontrol module via **Edit** > **Display new data records**. Here, no distinction is made between DSP or ESP.

9 Diagnostics

9.1 Test Inputs and Outputs

To test the inputs and outputs select the menu option **Controller > Test I/O**.
The following window is displayed:

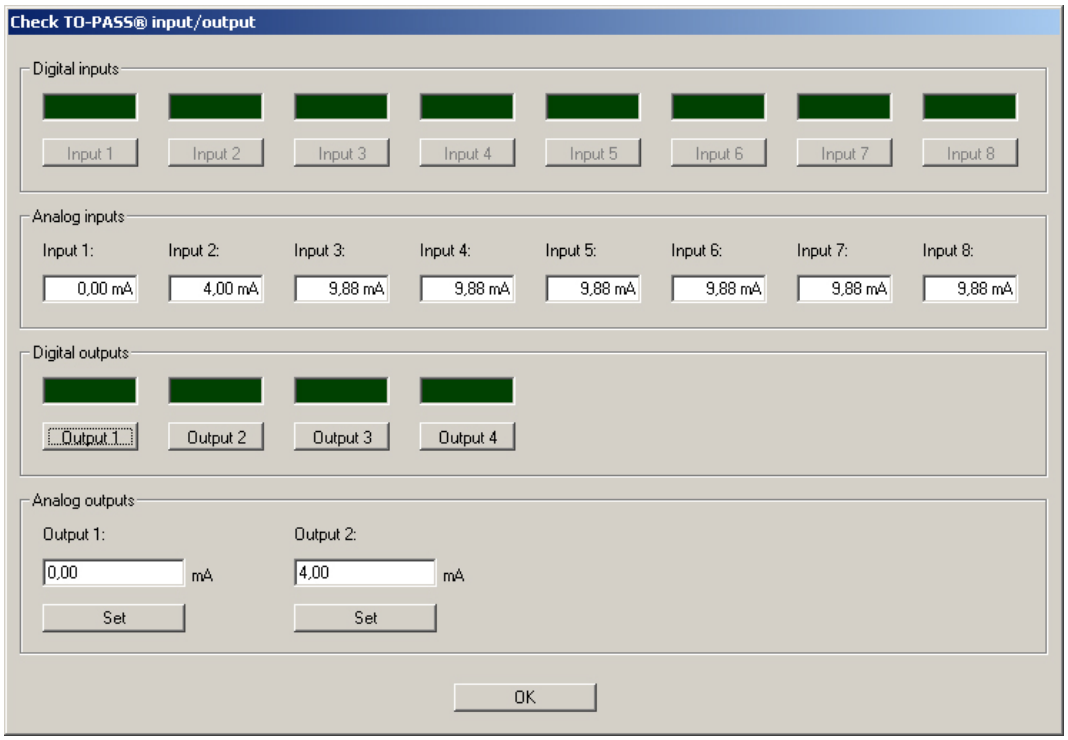


Figure 44: Test inputs and outputs

The process values of the inputs are displayed in the upper area and the process values of the outputs are displayed in the lower area.

By pressing the buttons **[Output 1]** … **[Output 4]** in the upper area switch digital inputs on and off.

A value range of 0 mA … 20 mA and 4 mA … 20 mA is defined for the analog outputs. No decimal places can be entered.
Enter the required numerical value and click the **[Set]** button to set the analog outputs.
Once the output has been set, the imported value is normalized with decimal places.

Click **[OK]** to end the test and close the window.

Alternatively, the inputs and outputs can also be tested with the help of the menu option **Visualization > Process values**.

9.2 Testing the Counter Inputs

To test the counter inputs, select the menu item **Edit > Test counters**.

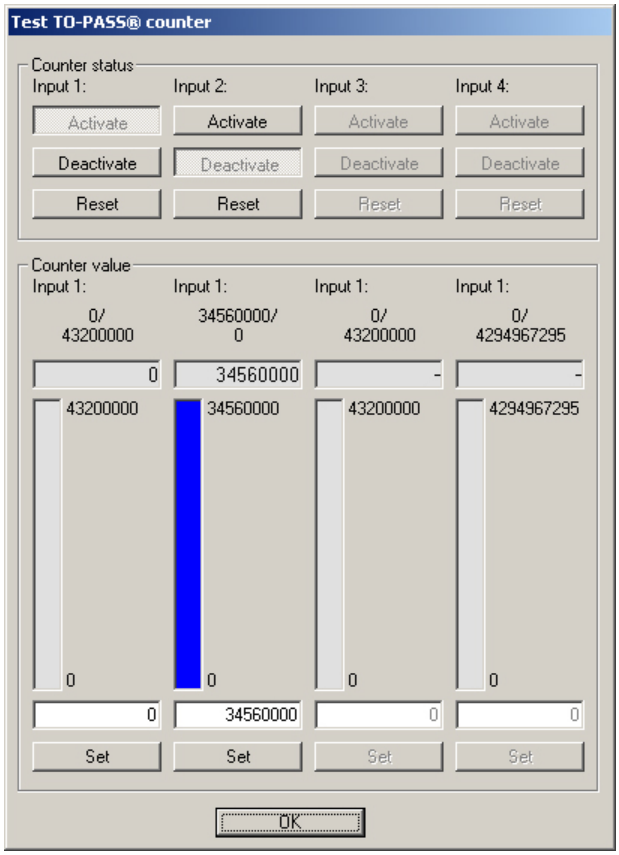


Figure 45: Testing counters

The counter statuses are shown at the top of the window, while the counter values, the starting and end values and the limits are shown at the bottom.

To start a counter, click the button **[Activate]**.

To stop a counter, click the button **[Deactivate]**.

To restore the counter to its starting value, click the button **[Reset]**.

To set a counter to a new value, enter the required counter value in the corresponding input field and then click the associated button **[Set]** to apply the new value.

Click **[OK]** to end the test and close the window.

Alternatively, the counter inputs can also be tested using the menu item **Visualization > Process values**.

9.3 Testing the Connection

Note

Direct serial link required
The connection may only be tested with a direct serial link to the *TO-PASS*® telecontrol module.

To test the connection, select the menu option **Edit > Test SMS/GPRS**. The following window is displayed:

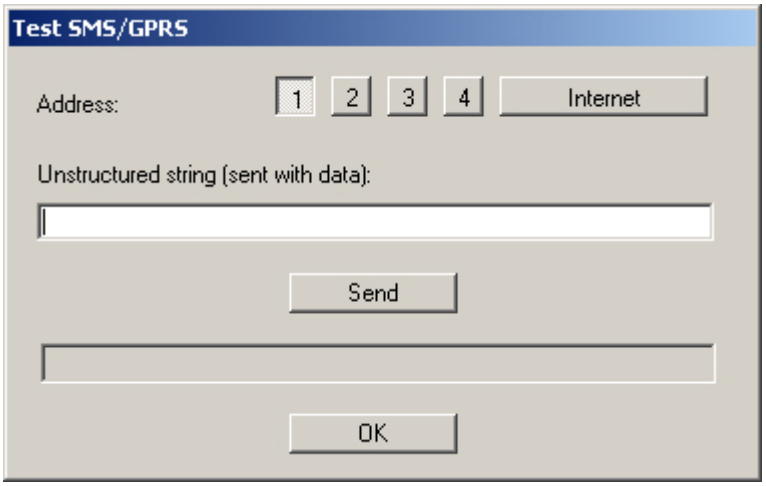


Figure 46: Testing the connection

Select the address to send an SMS to and enter the text to be sent. Click the [**Send**] button to send the message. The status of the transmission is then displayed.

Click **[OK]** to end the test and close the window.

9.4 Testing the Modem

Note

Direct serial link required
The modem test may only be performed with a direct serial link to the *TO-PASS*® telecontrol module.

To test the mode, select the menu item **Modem > Test**.
The following window is displayed:

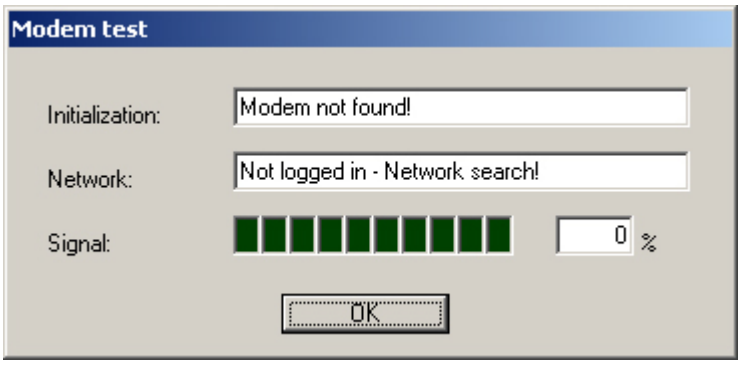


Figure 47: Testing the modem

A link to the modem is established and the signal strength displayed.

Click **[OK]** to end the test and close the window.

10 WAGO *TO-PASS*® Web

10.1 Setting Parameters

Select the *TO-PASS*® telecontrol module to be configured from the project tree. Select the **Addresses** option in order to enter the parameters for transmission to a Web portal.

You can initially use our WAGO *TO-PASS*® portal for test purposes.
To do this, enter "www.to-pass.com" as the **Host address** and the value "80" as the **Host port.** Enter "wago/saveTO-PASS.php" as the script name under **Script (Values)** and/or under **Script (Logger)**.

Enter the information for your SIM card provider for **APN access**, **user name** and **password** (see also Section “Parameter setting” > “Addresses”).

Under **Special Functions**, select **Repetition Time** and set the **WEB Interval** for the cyclic transmission to the Web portal, e.g., 5 minutes.

Select the messages that are also to be sent to the Web portal, and click the **[Internet]** button.

Communication as SMS or to the Web portal can be tested under the menu item **Processing > Test SMS/GPRS**. Click the **[Internet]** button and enter any text, such as “TEST” in the field **Unstructured Text**. Then click **[Send]**. The reply "Web Refresh = 0" should follow after approx. 20 seconds.

Now go to the Web address www.to-pass.com and click **[MyTO-PASS]**. Enter “test” as the user name and “test” as the password.
Now select your *TO-PASS*® telecontrol module from the following list and click the **[Display]** button.

10.2 HTTP Request

The HTTP method "POST" transmits the process image of the *TO-PASS*® telecontrol module to the Internet to the WAGO *TO-PASS*® portal. A data set consists of form data in the context of the request (header and data string).

All data is transmitted in a string (ASCII characters) without any line breaks. Individual variables are separated by the “&” character.

10.2.1 Example HTTP Request

The HTTP request consists of both header and data string, which are separated by an empty line (<CR><LF> = Carriage Return + Line Feed).

To improve readability line breaks have been inserted within the data string.

```
POST /wago/saveTO-PASS.php HTTP/1.0<CR><LF>
Host: www.to-pass.com<CR><LF>
Content type: application/x-www-form-urlencoded<CR><LF>
Content length: 249<CR><LF>
<CR><LF>
ID=TO-PASS;12345&PA=0000;home ;99
&TI=11/05/05,14:34:21
&D1=1;0&D2=0;0&D3=0;0&D4=0;0&D5=0;0&D6=0;0&D7=0;0&D8=0;0
&A1=+00.00;mA;0&A2=+00.00;mA;0&A3=+00.00;mA;0&A4=+00.00;mA;0
&A5=+00.00;mA;0&A6=+00.00;mA;0&A7=+00.00;mA;0&A8=+00.00;mA;0
&US=Test measuring points
```

10.3 Data Sets

To distinguish the structure of the incoming data sets, the new data sets are marked with a version variable. The variable is structured as “xx.yy”, while “xx” is changed for major modifications and “yy” is changed for minor extensions.

In the data set descriptions, the maximum number of characters is indicated in square brackets.

Starting from Firmware Version 02.33.08, you can select the script version to be applied to data transmission.
The scope of functions is limited for older script versions (e.g., counter inputs not accounted for).

10.3.1 Value Script

Data transmission to the value script is activated via alarm, cyclical transmission repetitions (Web interval) or connection test. Data packet information contains the process image at the time of activation.

10.3.1.1 Value Script FW 2.20 (Standard)

Table 49: Data format for value script FW 2.20 (Standard)

Index	Variable	Contents	Format
0	ID	Identity	Identity[8];Serial number[5]
1	PA	Parameter	Cycle time[4];Provider[5];Alarm counter[2]
2	TI	Date, time	YY/MM/DD,hh:mm:ss;
3	D1	Digital input 1	Value[1];Alarm[1]
4	D2	Digital input 2	Value[1];Alarm[1]
5	D3	Digital input 3	Value[1];Alarm[1]
6	D4	Digital input 4	Value[1];Alarm[1]
7	D5	Digital input 5	Value[1];Alarm[1]
8	D6	Digital input 6	Value[1];Alarm[1]
9	D7	Digital input 7	Value[1];Alarm[1]
10	D8	Digital input 8	Value[1];Alarm[1]
11	A1	Analog input 1	Value[6];Unit[5];Alarm[1]
12	A2	Analog input 2	Value[6];Unit[5];Alarm[1]
13	A3	Analog input 3	Value[6];Unit[5];Alarm[1]
14	A4	Analog input 4	Value[6];Unit[5];Alarm[1]
15	A5	Analog input 5	Value[6];Unit[5];Alarm[1]
16	A6	Analog input 6	Value[6];Unit[5];Alarm[1]
17	A7	Analog input 7	Value[6];Unit[5];Alarm[1]
18	A8	Analog input 8	Value[6];Unit[5];Alarm[1]
19*	US	Unstructured string	Data[40]
20**	MA	MODBUS alarm	Value[2];Status[2];Alarm[1]
21**	MV	MODBUS variables	64 x Value[4]
22***	PO	GPS position	String data[75]

* The variable is sent only if a Web refresh occurs via serial interface. ** The variables are sent only if MODBUS is switched on.
*** The variable is sent only if the GPS functionality is available in the *TO-PASS*® telecontrol module.

Note

Alarm marker for the multiplex function

When the multiplex function is used, the alarm markers for D1 to D4 are all '1' for a multiplex alarm.

10.3.1.1.1 Example of Value Script FW 2.20 (Standard)

To improve readability, line breaks have been inserted.

```
ID=TO-PASS;12345
&PA=0000;home ;99
&TI=11/05/05,14:34:21
&D1=1;0&D2=0;0&D3=0;0&D4=0;0&D5=0;0&D6=0;0&D7=0;0&D8=0;0
&A1=+00.00;mA;0&A2=+00.00;mA;0&A3=+00.00;mA;0&A4=+00.00;mA;0
&A5=+00.00;mA;0&A6=+00.00;mA;0&A7=+00.00;mA;0&A8=+00.00;mA;0
&US=Hello
&PO=123155.000,5217.9742N,00855.2710E,4.4,74.9,2,214.30,6.0,3.2,
110505.00
```

10.3.1.2 Value Script FW 2.31 (Extended)

Due to extended functionalities, the value script has been extended to include a version designation ("01.01") as well as supply voltage, output values and GPS information. Furthermore the identity may also be up to 16 characters long.

Table 50: Data format for value script FW 2.31 (extended)

Index	Variable	Contents	Format
0	ID	Identity	Identity[16];Serial number[5]
1	SV	Value script version	Version number[5] (currently “01.01”)
2	PA	Parameter	Cycle time[4];Provider[5];Alarm counter[2]
3	TI	Date, time	YY/MM/DD,hh:mm:ss;
4	D1	Digital input 1	Value[1];Alarm[1]
5	D2	Digital input 2	Value[1];Alarm[1]
6	D3	Digital input 3	Value[1];Alarm[1]
7	D4	Digital input 4	Value[1];Alarm[1]
8	D5	Digital input 5	Value[1];Alarm[1]
9	D6	Digital input 6	Value[1];Alarm[1]
10	D7	Digital input 7	Value[1];Alarm[1]
11	D8	Digital input 8	Value[1];Alarm[1]
12	A1	Analog input 1	Value[6];Unit[5];Alarm[1]
13	A2	Analog input 2	Value[6];Unit[5];Alarm[1]
14	A3	Analog input 3	Value[6];Unit[5];Alarm[1]
15	A4	Analog input 4	Value[6];Unit[5];Alarm[1]
16	A5	Analog input 5	Value[6];Unit[5];Alarm[1]
17	A6	Analog input 6	Value[6];Unit[5];Alarm[1]
18	A7	Analog input 7	Value[6];Unit[5];Alarm[1]
19	A8	Analog input 8	Value[6];Unit[5];Alarm[1]
20	S	Supply voltage	Value[6];Unit[5];Alarm[1]
21	DO	Digital outputs	4 x Value[1]
22	AO	Analog outputs	2 x (Value[5];Unit[5];)
23*	US	Unstructured string	Data[40]
24**	PO	GPS position	String data[75]
25**	GI	GPS information	Deviation[5];8 x Flag[1];
26***	MA	MODBUS alarm	Value[2];Status[2];Alarm[1]
27***	MV	MODBUS variables	64 x Value[4]

* This variable is sent only if a connection test is performed via the serial interface (SMS test).

** This variable is sent only if the GPS functionality is available in the *TO-PASS*® telecontrol module.

*** These variables are sent only if MODBUS is switched on.

Note

Alarm marker for the multiplex function

When the multiplex function is used, the alarm markers for D1 to D4 are all '1' for a multiplex alarm.

Table 51: Meaning of flag

Flag 1	Flag 2	Flag 3	Flag 4	Flag 5	Flag 6	Flag 7	Flag 8
Flag 1	0:	GPS has not been started.					
	1:	GPS has been started.					
Flag 2	0:	Position deviation is not enabled.					
	1:	Position deviation is enabled.					
Flag 3	0:	GPS receiver is turned off.					
	1:	GPS receiver is turned on.					
Flag 4	0:	No valid position available.					
	1:	Valid position available.					
Flag 5	0:	Static mean value is being calculated in the upper area.					
	1:	Static mean value calculation is complete in the upper area.					
Flag 6	0:	Static mean value is being calculated in the lower area.					
	1:	Static mean value calculation is complete in the lower area.					
Flag 7	Reserved						
Flag 8	Reserved						

10.3.1.2.1 Example of Value Script FW 2.31 (Extended)

To improve readability, line breaks have been inserted.

```
ID=TO-PASS(Ext);12345
&SV=01.01
&PA=0000;home ;99
&TI=11/05/05,12:19:51
&D1=0;0&D2=0;0&D3=0;0&D4=0;0&D5=0;0&D6=0;0&D7=0;0&D8=0;0
&A1=+00.00;mA;0&A2=+00.00;mA;0&A3=+00.00;mA;0&A4=+00.00;mA;0
&A5=+00.00;mA;0&A6=+00.00;mA;0&A7=+00.00;mA;0&A8=+00.00;mA;0
&VS=+25.16;V(Uv);0
DO0000
&AO=+0000;mA;+0400;mA
&US=Hello
&PO=101550.000,5217.9860N,00855.2699E,4.4,51.5,2,309.35,3.7,2.0,11
0505,00
&GI=0.03;1;1;0;1;0;0;0
```

10.3.1.3 Value Script FW 2.33 (Counter Inputs)

The counter inputs have resulted in counter data, signal quality and an indicator being added to the display for the value script ("SV=02.00") and to an update of the MODBUS registers and analog outputs.

Example:

ID=GpsLongTest;50645
&SV=02.00
&PA=0000;home ;99
&HT=1
&TI=00/01/01,00:00:37
&D1=0;0&D2=0;0&D3=0;0&D4=0;0&D5=0;0&D6=0;0&D7=0;0&D8=0;0
&A1=+00.01;mA;0&A2=+03.70;mA;0&A3=+09.87;mA;0&A4=+09.89;mA;0
&A5=+09.90;mA;0&A6=+09.89;mA;0&A7=+09.88;mA;0&A8=+09.87;mA;0
&VS=+23.97;V(Uv);0
&DO=0000
&AO=+000.0;%;+04.00;mA
&C1=0;0;0
&C2=r;20F5800;0
&C3=r;0;0
&C4=0;0;0
&SQ=21
&US=Hello
&MA=00;00;0
&MV=0026;0000;002E;0064;0026;0000;0054;0064

&HT=1: (value always 1) the device time has not been set (&TI entry is operating hours information, started on 01.01.00 at 00:00:00), otherwise this entry is not present.

&AO: The analog outputs are formatted with decimal places.

&Cx: Counter status[1];counter value[8];Alarm[1]

The variables for the counters are only transmitted when at least one input has been configured as a counter.
The counter status can assume the statuses indicated by the transmitted SMS:

Table 52: Counter status

Status	Explanation
0	Digital input not configured as a counter.
e	Counter is active.
d	Counter is not active.
o	Counter overflow.
r	Counter has been reset.
s	Counter has been started.
c	Counter value has been changed.

The counter status shows the last change that has occurred since the last value script transmission, or after a system start (independent of the SMS and logger status).
The counter values are indicated as hexadecimal values (as are the MODBUS values).
Alarms can have the following statuses:

Table 53: Alarm status

Status	Explanation
0	No alarm
1	First value reached/transgressed
2	Second value reached/transgressed

If both values are reached simultaneously, only status "2" is transmitted.

&SQ: Signal quality or modem connection (without formatting):

Table 54: Signal quality (from AT Reference Guide by Telit)

Value	Quality
0	(-113) dBm or less
1	(-111) dBm
2 ... 30	(-109)dBm ... (-53)dBm / 2 dBm per stage
31	(-51)dBm or greater
99	Unknown or cannot be measured

&MV: Transmission is performed only up to the last configured register (module address not 0).
If registers were not previously parameterized (module address = 0), these will be marked as "ZERO".
If errors occurred during register querying, these will be flagged with "ERRO".

10.3.1.4 Example of Value Script FW 2.33 (Counter Inputs)

To improve readability, line breaks have been inserted.

```
ID=TO-PASS(Cnt);12345
&SV=02.00
&PA=0000;home ;99
&TI=11/05/05,12:19:51
&D1=0;0&D2=0;0&D3=0;0&D4=0;0&D5=0;0&D6=0;0&D7=0;0&D8=0;0
&A1=+00.00;mA;0&A2=+00.00;mA;0&A3=+00.00;mA;0&A4=+00.00;mA;0
&A5=+00.00;mA;0&A6=+00.00;mA;0&A7=+00.00;mA;0&A8=+00.00;mA;0
&VS=+25.16;V(Uv);0
DO0000
&AO=+00.00;mA;+04.00;mA
&C1=0;0;0
&C2=r;20F5800;0
&C3=r;0;0
&C4=0;0;0
&SQ=21
&US=Hello
&PO=101550.000,5217.9860N,00855.2699E,4.4,51.5,2,309.35,3.7,2.0,11
0505.00
&GI=0.03;1;1;0;1;0;0;0;0
&MA=00;02;0
&MV=0026;NULL;002E;0064;0026;ERRO;0054;0064
```

10.3.2 Logger Script

Data transmission to the logger script is activated via cyclical transmission repetitions (Web interval). Data packet information contains the logger's values that have not been acknowledged yet.

10.3.2.1 Logger Script Standard

In the standard format, 10 logger entries are transmitted in a packet. Each entry consists of a compressed data set of 14 binary bytes, which are attached to the hexadecimal character string of the variable. This way, two characters are transmitted per byte.

Table 55: Data format for logger script FW 2.20 (standard)

Index	Variable	Contents	Format
0	ID	Identity	Identity[8];Serial number[5]
1	PA	Parameter	Cycle time[4];Provider[5];Alarm counter[2]
2	TI	Date, time	YY/MM/DD,hh:mm:ss;
3	LO	Logger data sets	Log[280]

10.3.2.1.1 Binary Data Format for Data Set

```
Byte: 0       1       2       3       4       5       6
(Bit 765432107654321076543210765432107654321076543210765432107654321076543210)
Cont.: PNNNNNNNSJJJJJMMMMDDDDDhhhhhmmmmmmssssssDIN.....AIN1....

Byte: 7       8       9       10       11       12       13
(Bit 765432107654321076543210765432107654321076543210765432107654321076543210)
Cont.: AIN2....AIN3....AIN4....AIN5....AIN6....AIN7....AIN8....

P:      Pointer for the next data set to be saved
NNNNNNN:Event number
S:      Data set already sent
YYYY: Year
DDDDD:  Day
MMMM:               Month
hhhhh:  Hour
mmmmmm: Minute
ssssss: Second
DIN.....: Digital inputs
AINx....:     Analog input channel x (x = 1 ... 8)
```

Note

Alarm marker for the multiplex function

When the multiplex function is used, the alarm markers for D1 to D4 are all '1' for a multiplex alarm.

Reception must be acknowledged with "Values stored" (refer to HTTP Response).
The data sets must be decompressed at the Web portal.
The data sets with the bits set P=1 or S=1 are invalid and must be deleted.
The data sets at the Web portal must be sorted by date/time.

10.3.2.1.2 Example for Logger Script Standard

To improve readability, line breaks have been inserted.

```
ID=TO-PASS;12345
&PA=0005;home ;99
&TI=11/05/05,14:36:11
&LO=
092D4AD10000000000000000000
562D4AD12300000000000000000
3F2D4AD12A00000000000000000
562D4AD13700000000000000000
562D4AD15900000000000000000
562D4AD16400000000000000000
3F2D4AD16900000000000000000
562D4AD19A00000000000000000
3F2D4AD1A90000000000000000
3F2D4AD1E80000000000000000
```

10.3.2.2 Logger Script Extension

The logger script has been updated due to extended functionalities. The “02.00” version designation has been assigned due to major modifications.

Table 56: Data format for logger script FW 2.31 (extended)

Index	Variable	Contents	Format
0	ID	Identity	Identity[8];Serial number[5]
1	LV	Logger script version	Version number[5] (currently “02.00”)
2	PA	Parameter	Cycle time[4];Provider[5];Alarm counter[2]
3	TI	Date, time	YY/MM/DD,hh:mm:ss;
4	LIO1	1. I/O message	[74] (see LIOx variable data format table)
5*	LPD1	1. GPS message	[81] (see LPDx variable data format table)
6	LIO2	2. I/O message	[74] (see LIOx variable data format table)
7*	LPD2	2. GPS message	[81] (see LPDx variable data format table)
8	LIO3	3. I/O message	[74] (see LIOx variable data format table)
9*	LPD3	3. GPS message	[81] (see LPDx variable data format table)
10	LIO4	4. I/O message	[74] (see LIOx variable data format table)
11*	LPD4	4. GPS message	[81] (see LPDx variable data format table)
12	LIO5	5. I/O message	[74] (see LIOx variable data format table)
13*	LPD5	5. GPS message	[81] (see LPDx variable data format table)
14**	LIO6	6. I/O message	[74] (see LIOx variable data format table)
15**	LIO7	7. I/O message	[74] (see LIOx variable data format table)
16**	LIO8	8. I/O message	[74] (see LIOx variable data format table)
17**	LIO9	9. I/O message	[74] (see LIOx variable data format table)

* This variable is sent only if the GPS functionality is available in the *TO-PASS*® telecontrol module.
** This variable is not sent if the GPS functionality is available in the *TO-PASS*® telecontrol module.

The meaning of the LIOx and LPDx variables are given in the following tables:

10.3.2.2.1 Data Format for LIOx Variable

Table 57: Data format for logger script FW 2.31 (extended), Variable LIOx

Index	Contents	Format
0	Message counter	Message counter[4];
1	Event (cyclic logger)	Event[2];
2	Event time stamp	YY/MM/DD,hh:mm:ss;
3	Digital input image	Image[2];
4	1. analog input	Value > 3
5	2. analog input	Value > 3
6	3. analog input	Value > 3
7	4. analog input	Value > 3
8	5. analog input	Value > 3
9	6. analog input	Value > 3
10	7. analog input	Value > 3
11	8. analog input	Value > 3
12	Supply voltage	Value > 3
13	Digital output image	Image[1];
14	1. analog output	Value > 3
15	2. analog output	Value > 3

10.3.2.2.2 Data Format for LPDx Variable

Table 58: Data format for logger script FW 2.31 (extended), Variable LPDx

Index	Contents	Format
0	GPS position status	Status 2
1	GPS UTC time stamp	YY/MM/DD,hh:mm:ss;
2	Time stamp milliseconds	Value > 3
3	Latitude	Minutes[4];Rest[4];Direction[1];
4	Longitude	Minutes[4];Rest[4];Direction[1];
5	Horizontal accuracy	Accuracy[2];
6	Elevation	Elevation[4];
7	Position accuracy	Accuracy[1];
8	Direction	Degree[4];
9	Speed in km/h	Speed[4];
10	Speed in knots	Speed[4];
11	Number of satellites	Number[1];
12	Deviation	Deviation[4]

10.3.2.2.3 Example for Logger Script Extension

To improve readability, line breaks have been inserted.

```
ID=TO-PASS(Ext);12345
&LV=02.00
&PA=0005;home ;99
&TI=11/05/05,08:38:22
&LIO1=0019;09;11/05/05,08:33:44;00;000;000;000;000;000;000;000;000
;C4A;0;000;000
&LPD1=10;08/01/01,06:33:35;274;0;0;N;0;0;W;00;0;0;0;0;0;0;0
&LIO2=001A;3F;11/05/05,08:34:02;00;000;000;000;000;000;000;000;000
;BA2;0;000;000
&LPD2=10;08/01/01,06:33:55;274;0;0;N;0;0;W;00;0;0;0;0;0;0;0
&LIO3=001B;56;11/05/05,08:34:26;00;000;000;000;000;000;000;000;000
;B89;0;000;000
&LPD3=C0;11/05/05,06:34:25;276;C41;2600;N;216;1621;E;0C;4D34;3;26A
F;21;11;7;0
&LIO4=001C;56;11/05/05,08:34:36;00;000;000;000;000;000;000;000;000
;B83;0;000;000
&LPD4=C0;11/05/05,06:34:38;148;C41;2683;N;217;AD0;E;14;17E;3;F92;2
E;18;6;51
&LIO5=001D;3F;11/05/05,08:35:01;00;000;000;000;000;000;000;000;000
;B78;0;000;000
&LPD5=C0;11/05/05,06:34:58;0;C41;268C;N;217;A93;E;F4;1BF;2;4AF2;12
;9;0;1
```

Calculating values from LIOx:

The states of the digital inputs and outputs are mapped in a binary coded way:

Digital input image: 0x90 → ’1001.0000’ → Inputs 1 and 4 are set.
Digital output image: 0x8 → ’1000’ → Output 1 is set.

Analog values and supply voltage are mapped as 12-bit value in hexadecimal format:

Analog values: 0x000 … 0xFDF → 0.00 mA ... 20.00 mA
Supply voltage: 0x000 … 0xFDF → 0.00 V ... 35.20 V

The calculations for longitudes/latitudes (see below) refer to the format as transmitted in the NMEA data (ccmm.mmmm with cc = degree, mm.mmmm = Angular minute). The cc.mm format is used to indicate the direction (also according to NMEA definition).

Calculating values for LPDx:

Latitude: 5217.9860N → 52 * 60 + 17 = 3137 = 0xC41,
9860 = 0x2684 → C41;2684;N;
Longitude: 00855.2699E → 8 * 60 + 55 = 535 = 0x217,
2699 = 0xA8B → 217;A8B;E;
Horizontal accuracy: 4.4 → 4.4 * 10 = 44 = 0x2C → 2C;
Altitude in m: 51.5 → 51.5 * 10 = 515 = 0x203 → 203;
Position accuracy: 2 → 2;
Direction: 309.35 → 309 x 60 + 35 = 18575 = 0x488F → 488F;
Speed in km/h: 3.7 → 3.7 * 10 = 37 = 0x25 → 25;
Speed in knots: 2.0 → 2.0 * 10 = 20 = 0x14 → 14;
Number of satellites: 6 → 6 = 0x6 → 6
Deviation in km: 0.03 → 0.03 * 100 = 3 = 0x3 → 3

Recalculating values from LPDx:

Latitude: C41;2683;N; → 0xC41 = 3137 → 3137 / 60 = 52 Rest 17,
0x2683 = 9859 → 5217.9859N
Longitude: 217;AD0;E; → 0x217 = 535 → 535 / 60 = 8 Rest 55,
0xAD0 = 2768 → 855.2768E
Horizontal accuracy: 14; → 0x14 = 20→ 20 / 10 = 2.0
Altitude in m: 17E; → 0x17E = 382 → 382 / 10 = 38.2
Position accuracy: 3; → 0x3 = 3
Direction: F92; → 0xF92 = 3986 → 3986 / 60 = 66 Rest 26 → 66.26
Speed in km/h: 2E; → 0x2E = 46 → 46 / 10 = 4.6
Speed in knots: 18; → 0x18 = 24 → 24 / 10 = 2.4
Number of satellites: 6; → 0x6 = 6
Deviation in km: 51; → 0x51 = 81 → 81 / 100 = 0.81

10.3.2.3 Logger Script FW 2.33 (Counter Inputs)

The counter inputs have resulted in counter data and an indicator being added to the display for non-set time (operating hours) to the logger script ("LV=02.01").

Example:

&HT=1 (same as for Value Script)
&LCD2=0;0;e;20F5800;d;0;0;0

10.3.2.3.1 Data Format of an LCDx Variable

Table 59: Data format, logger script extension, Variable LCDx

Index	Contents	Format
0	Counter status 1st input	Status 1
1	Counter value 1st input, hexadecimal	Value > 8
2	Counter status 2nd input	Status 1
3	Counter value 2nd input, hexadecimal	Value > 8
4	Counter status 3rd input	Status 1
5	Counter value 3rd input, hexadecimal	Value > 8
6	Counter status 4th input	Status 1
7	Counter value 4th input, hexadecimal	Value > 8

The counter status can assume the statuses indicated by the transmitted SMS:

Table 60: Counter status

Status	Explanation
0	Digital input not configured as a counter.
e	Counter is active.
d	Counter is not active.
o	Counter overflow.
r	Counter has been reset.
s	Counter has been started.
c	Counter value has been changed.

The counter status shows the last change that has occurred since the last logger script transmission, or after a system start (independent of the SMS and value status).

&HT=1: (value always 1) the device time has not been set (&TI entry is operating hours information, started on 01.01.00 at 00:00:00), otherwise this entry is not present.

Table 61: Number of data sets

Script Version	GPS	Counters	&LO	&LIO	&LPD	&LCD
FW 2.20	-	-	10			
FW 2.31	O	-		9		
FW 2.31	X	-		5	5	
FW 2.33	O	O		9		
FW 2.33	X	O		5	5	
FW 2.33	O	X		6		6
FW 2.33	X	X		4	4	4

Example: navigation of level 3.

```
ID= TO-PASS(Cnt);12345
&LV=02.01
&PA=0010;home ;99
&TI=12/09/05,05:51:31
&LIO1=0000;21;00/01/01,00:09:16;00;003;32E;7D5;7D9;7DA;7D8;7D6;7D5
;AD0;0;000;32D
&LCD1=0;0;r;54600;r;0;0;0
&LIO2=0001;11;00/01/01,00:09:52;00;CE3;32E;7D5;7D8;7DA;7D7;7D6;7D4
;ACE;0;D04;32D
&LCD2=0;0;e;54600;d;0;0;0
&LIO3=0002;78;00/01/01,00:15:42;00;D01;32E;7D5;7D9;7DB;7D9;7D7;7D5
;ACF;0;D04;32D
&LCD3=0;0;o;545F9;d;0;0;0
&LIO4=0003;69;00/01/01,00:16:38;00;D01;32E;7D5;7D9;7DA;7D8;7D6;7D5
;ACF;0;D04;32D
&LCD4=0;0;e;2A2F2;d;0;0;0
&LIO5=0004;78;00/01/01,00:17:22;00;D01;32E;7D5;7D9;7DA;7D8;7D6;7D5
;ACF;0;D04;32D
&LCD5=0;0;o;48C79;d;0;0;0
&LIO6=0005;71;00/01/01,00:17:22;00;D01;32E;7D5;7D9;7DA;7D8;7D6;7D5
;ACF;0;D04;32D
&LCD6=0;0;o;48C79;d;0;0;0
```

10.3.2.4 Time Request Script FW 2.33

If time adjustment is to take place via the Internet, a time request script is transmitted on system start in order to adjust the time when a reply is received. This script does not include any process data.

Example:

```
ID= TO-PASS(Cnt);12345 &TV=01.00
```

10.4 HTTP Response

The response to the request contains a string and, optionally, the time of the Web portal.

The Web portal time adjusts the time of the WAGO *TO-PASS*® telecontrol module.

The data string must contain the following text:

“Values stored” or “Values stored:YY/MM/DD,hh:mm:ss”.

Date and time are optional and are required only if the time of the WAGO *TO-PASS*® telecontrol module is to be set via the Web portal.

The Web portal can also report that the data has not been accepted, or that the indicated script version is not supported:

"Values not stored"

Starting from Firmware Version 02.33.08, setpoint settings for digital and analog outputs and for changing the counters can be transmitted as replies.

Table 62: Setpoint settings

Variable	Contents	Format
?AO1	1. analog output	Normalized value (decimal places allowed)
&AOn	n. analog output (n: 2)	
&DOn	n. digital output (n: 1 ... 4)	0 = not set, 1 = set
&CEn	n. activate counter input (n: 1 ... 4)	0 = active, 1 = inactive
&CRn	n. reset counter input (n: 1 ... 4)	1 = reset
&CVn	n. change counter value (n: 1 ... 4)	Value[8], hexadecimal

Only those outputs that are available and that are configured for the Web outputs are evaluated. A check should be made for inbound data sets to determine which inputs have been configured as counters. There is no reply indicating whether the counter setting and switching of the outputs has been successful. The subsequent data transfer would have to be evaluated to determine this (e.g., by a feedback loop to an input with additional alarm generation).

10.4.1 Example of HTTP Response

The HTTP response consists of both header and data string, which are separated by an empty line (<CR><LF> = Carriage Return + Line Feed).

```
HTTP/1.1 200 OK<CR><LF>
Date: Fri, 19 Sep 2008 11:22:23 GMT<CR><LF>
Server: Apache <CR><LF>
Content length: 31<CR><LF>
Keep alive: timeout=15, max=100<CR><LF>
Connection: Keep-Alive<CR><LF>
Content type: text/html<CR><LF>
<CR><LF>[...]]
Values stored:08/09/19,13:22:23
```

The header depends on both installation and Web portal settings and may deviate from the illustration shown above.

Beispiel für Sollwertvorgaben (Zeilenumbrüche zur besseren Lesbarkeit):

```
Values stored:12/09/05,12:31:57
?AO1=12.13&AO2=12.52&AO3=0&AO4=0&AO5=0&AO6=0&AO7=0&AO8=0
&DO1=0&DO2=0&DO3=1&DO4=1&DO5=0&DO6=0&DO7=0&DO8=0
&CV2=000001F4
&CR2=1
&CE2=1
&CV3=0000C350
&CE3=0
```

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WAGO Kontakttechnik GmbH & Co. KG
Postfach 2880 • D-32385 Minden
Hansastraße 27 • D-32423 Minden
Phone: +49/5 71/8 87 – 0
Fax: +49/5 71/8 87 – 1 69
E-Mail: info@wago.com

Internet: http://www.wago.com