37359A

TUG 4 Packages
Temperature Monitoring Unit

Operation Manual
Software Version 2.6xx

Manual 37359A

WARNING

Read this entire manual and all other publications pertaining to the work to be performed before installing, operating, or servicing this equipment. Practice all plant and safety instructions and precautions. Failure to follow instructions can cause personal injury and/or property damage.

The engine, turbine, or other type of prime mover should be equipped with an overspeed (overtemperature, or overpressure, where applicable) shutdown device(s), that operates totally independently of the prime mover control device(s) to protect against runaway or damage to the engine, turbine, or other type of prime mover with possible personal injury or loss of life should the mechanical-hydraulic governor(s) or electric control(s), the actuator(s), fuel control(s), the driving mechanism(s), the linkage(s), or the controlled device(s) fail.

Any unauthorized modifications to or use of this equipment outside its specified mechanical, electrical, or other operating limits may cause personal injury and/or property damage, including damage to the equipment. Any such unauthorized modifications: (i) constitute "misuse" and/or "negligence" within the meaning of the product warranty thereby excluding warranty coverage for any resulting damage, and (ii) invalidate product certifications or listings.

CAUTION

To prevent damage to a control system that uses an alternator or battery-charging device, make sure the charging device is turned off before disconnecting the battery from the system.

Electronic controls contain static-sensitive parts. Observe the following precautions to prevent damage to these parts.

- **Discharge body static before handling the control (with power to the control turned off, contact a grounded surface and maintain contact while handling the control).**
- **Avoid all plastic, vinyl, and Styrofoam (except antistatic versions) around printed circuit boards.**
- **Do not touch the components or conductors on a printed circuit board with your hands or with conductive devices.**

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Important definitions

WARNING

Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation that, if not avoided, could result in damage to equipment.

NOTE

Provides other helpful information that does not fall under the warning or caution categories.

Revision History

Rev.	Date	Editor	Change
NEW	05-10-xx	TP	Release based on 37303 Rev. NEW
A	07-09-12	TP	Minor corrections

Content

Illustrations and Tables

Illustrations

Tables

Chapter 1.
General Information

Related Documents

Type		English	German
Temperature Monitoring Unit TUG 4			
TUG 4 Packages Manual	this manual ⇨	37359	GR37359

Table 1-1: Manual - overview

Overview

The versions described in this operating instructions only vary as far as the number of measuring inputs and the interface is concerned.

- **TUG 408B** 8 measuring inputs
- **TUG 412B** 12 measuring inputs
- **TUG 412B/SU** 12 measuring inputs + CAN bus, Modbus or Profibus interface
- **TUG 416B** 16 measuring inputs
- **TUG 416B/SU** 16 measuring inputs + Modbus or Profibus interface

Please refer to the name plate of your TUG 4 to establish the correct type.

Intended Use The control unit must only be operated as described in this manual. The prerequisite for a proper and safe operation of the product is correct transportation, storage, and installation as well as careful operation and maintenance.

NOTE

This manual has been developed for a unit fitted with all available options. Inputs/outputs, functions, configuration screens and other details described, which do not exist on your unit may be ignored.

The present manual has been prepared to enable the installation and commissioning of the unit. Because of the large variety of parameter settings, it is not possible to cover every possible combination. The manual is therefore only a guide. In case of incorrect entries or a total loss of functions, the default settings can be taken from the enclosed list of parameters.

Chapter 2.
Electrostatic Discharge Awareness

All electronic equipment is static-sensitive, some components more than others. To protect these components from static damage, you must take special precautions to minimize or eliminate electrostatic discharges.

Follow these precautions when working with or near the control.

1. Before performing maintenance on the electronic control, discharge the static electricity on your body to ground by touching and holding a grounded metal object (pipes, cabinets, equipment, etc.).

2. Avoid the build-up of static electricity on your body by not wearing clothing made of synthetic materials. Wear cotton or cotton-blend materials as much as possible because these do not store static electric charges as much as synthetics.

3. Keep plastic, vinyl, and Styrofoam materials (such as plastic or Styrofoam cups, cup holders, cigarette packages, cellophane wrappers, vinyl books or folders, plastic bottles, and plastic ash trays) away from the control, the modules, and the work area as much as possible.

4. **Opening the control cover may void the unit warranty.**
   Do not remove the Printed Circuit Board (PCB) from the control cabinet unless absolutely necessary. If you must remove the PCB from the control cabinet, follow these precautions:

   - Ensure that the device is completely de-energized (all connectors must be disconnected).
   - Do not touch any part of the PCB except the edges.
   - Do not touch the electrical conductors, connectors, or components with conductive devices with your hands.
   - When replacing a PCB, keep the new PCB in the protective antistatic bag it comes in until you are ready to install it. Immediately after removing the old PCB from the control cabinet, place it in the protective antistatic bag.

CAUTION

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual 82715, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules.*

Chapter 3.
Housing

Dimensions

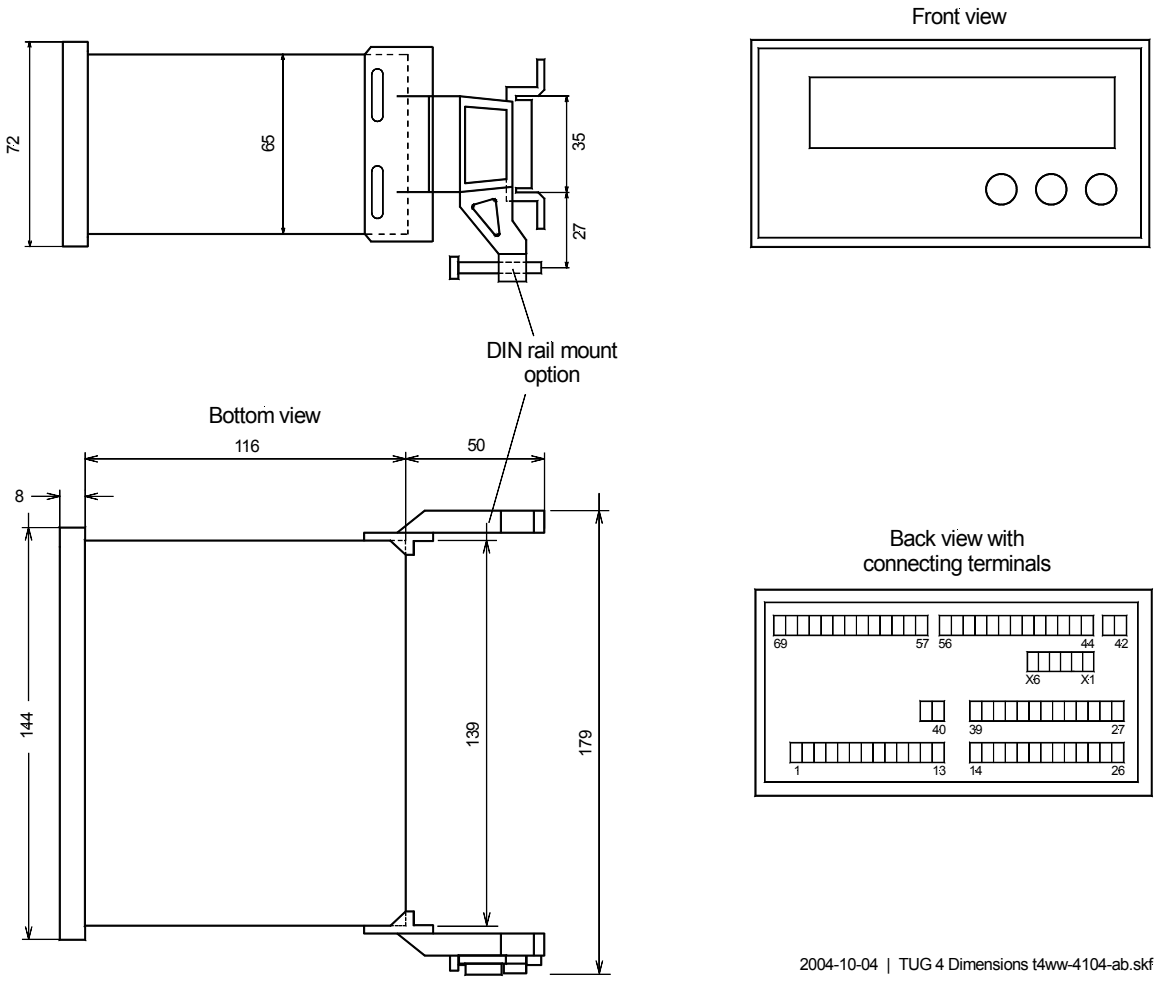

Figure 3-1: Dimensions TUG 4

NOTE

The connecting terminals shown in Figure 3-1 only exist for units with maximum equipment. Units with less inputs or no interface, are not equipped with all connecting terminals.

Chapter 4.
Wiring Diagrams

TUG 408B

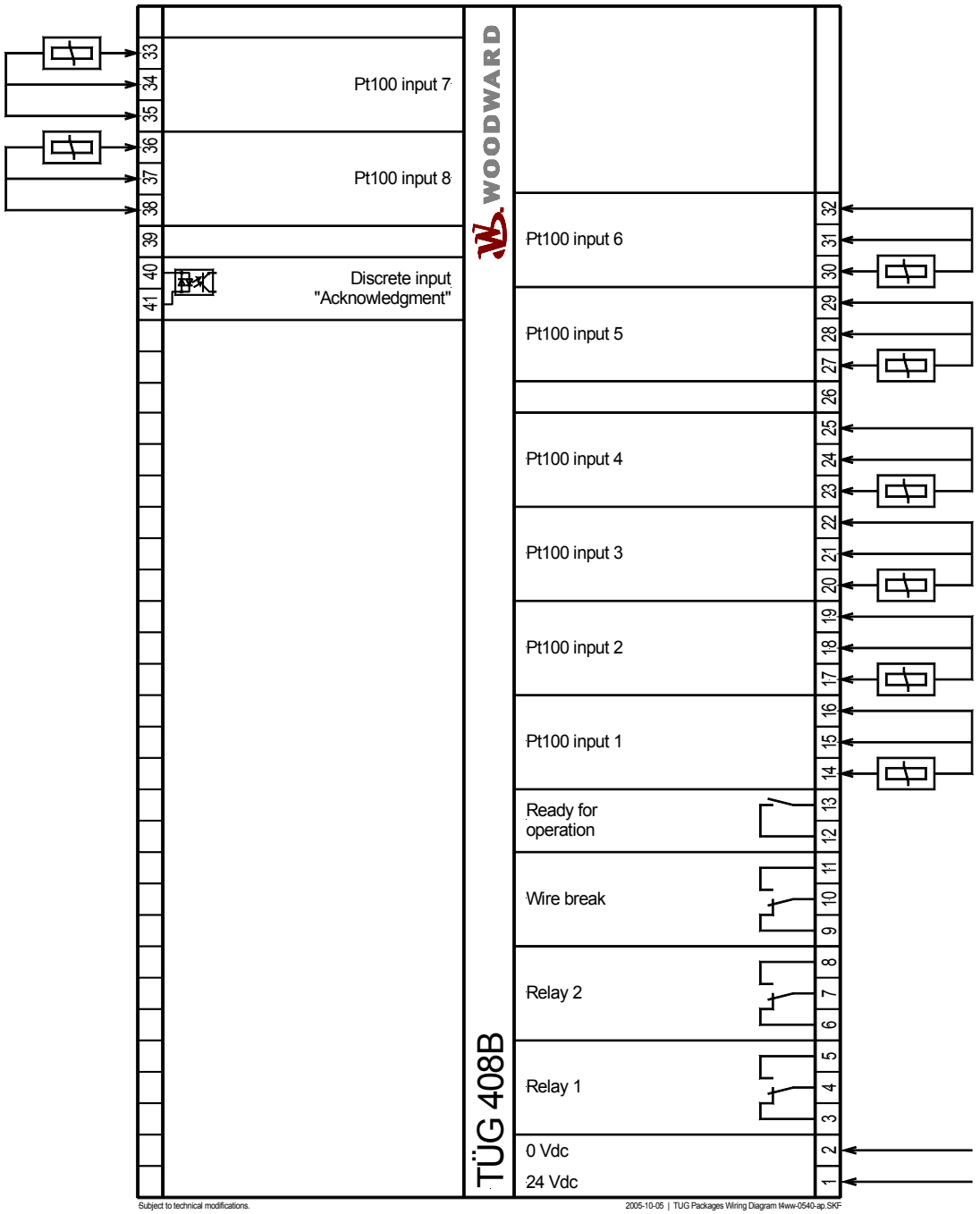

Figure 4-1: Wiring diagram TUG 408B

TUG 412B

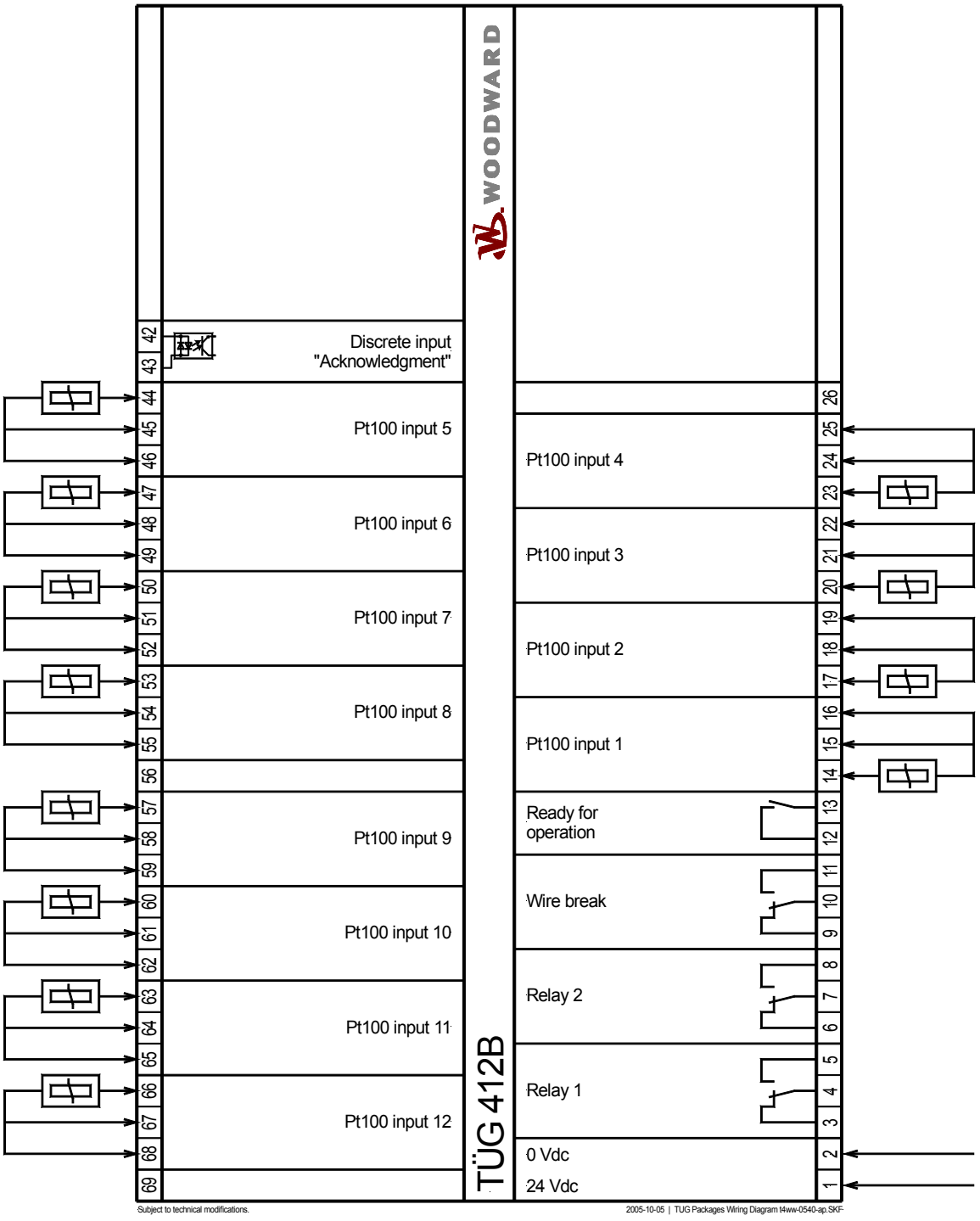

Figure 4-2: Wiring diagram TUG 412B

TUG 412B/SU CAN Bus

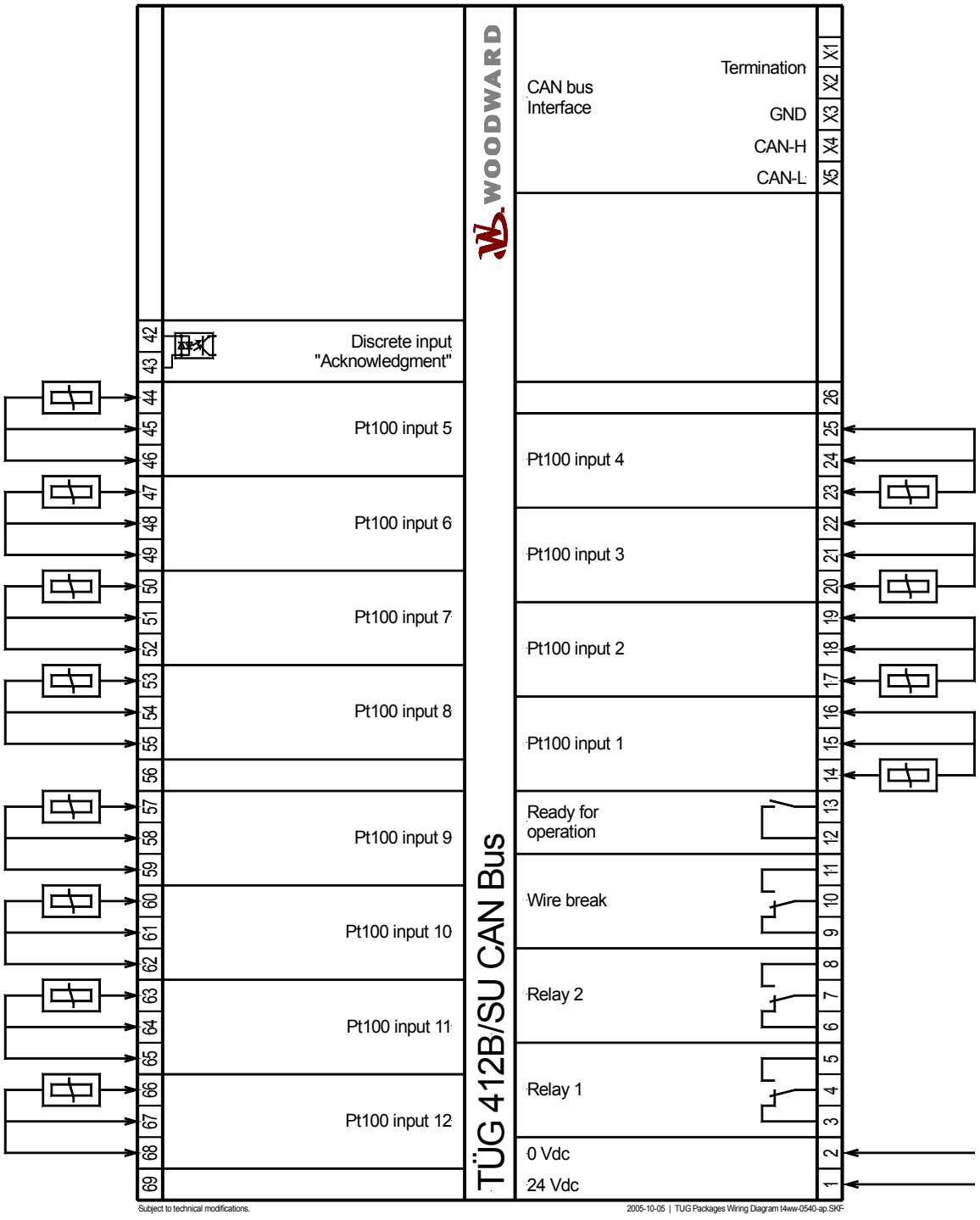

Figure 4-3: Wiring diagram TUG 412B/SU CAN bus

TUG 412B/SU Modbus

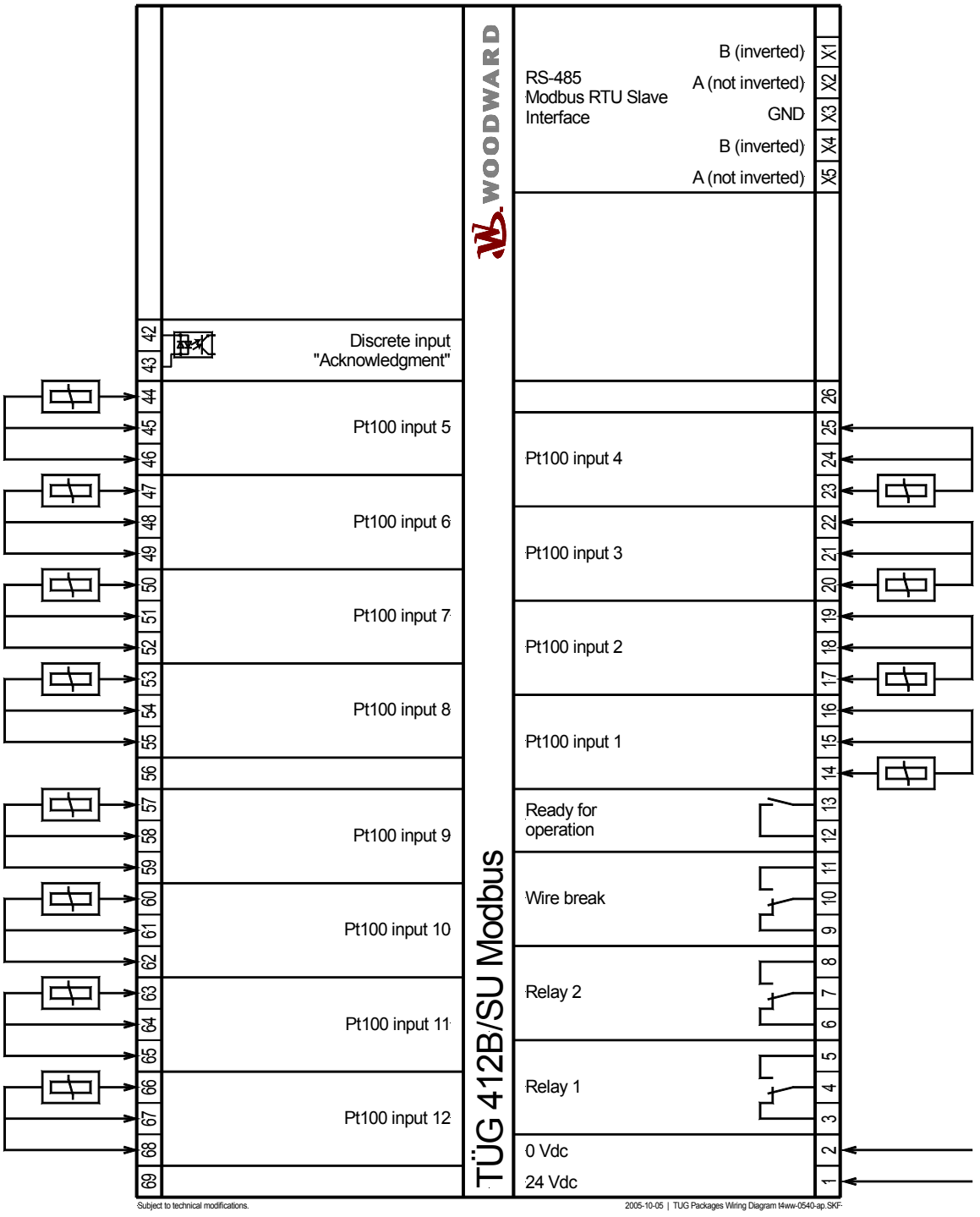

Figure 4-4: Wiring diagram TUG 412B/SU Modbus

TUG 412B/SU Profibus

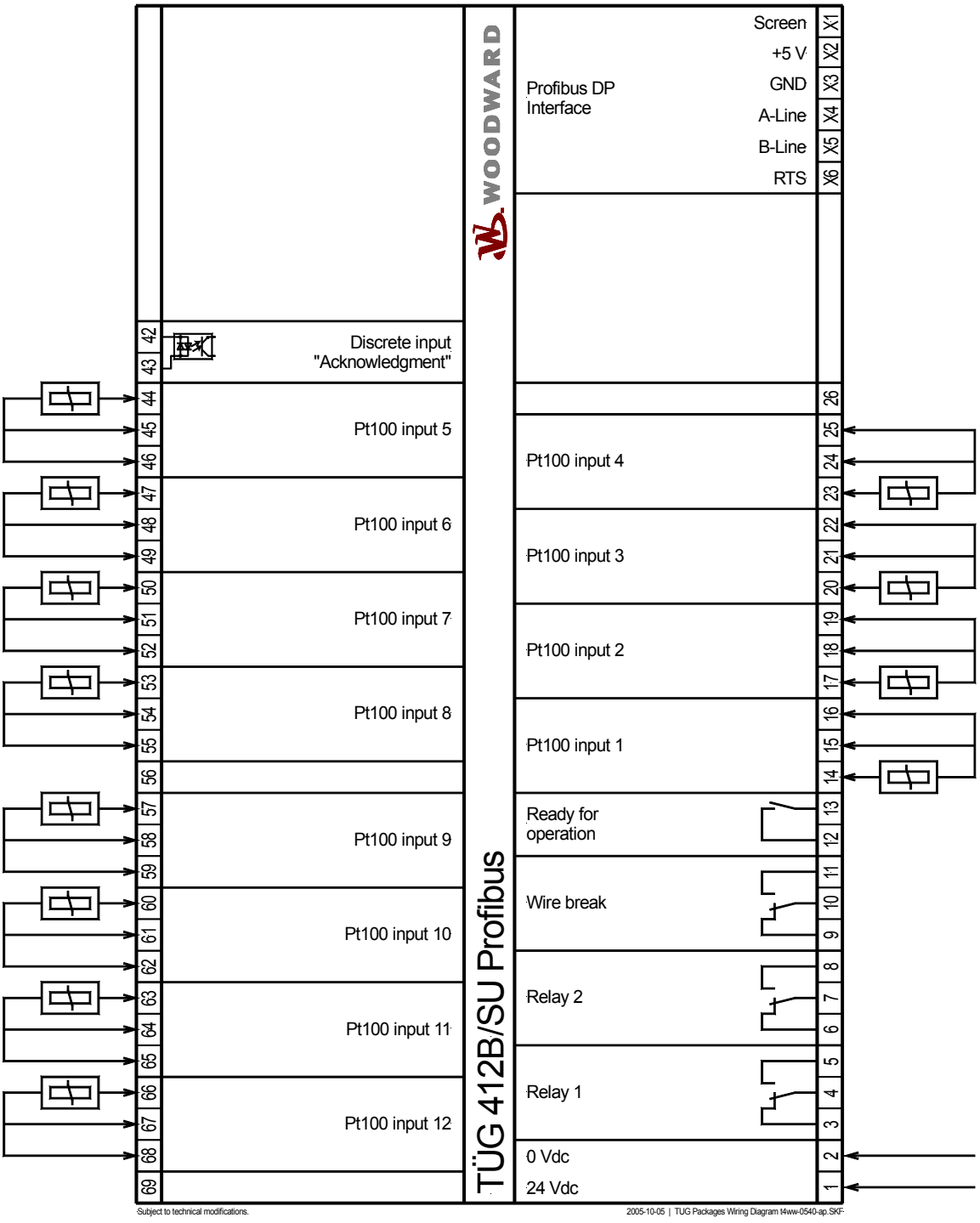

Figure 4-5: Wiring diagram TUG 412B/SU Profibus

TUG 416B

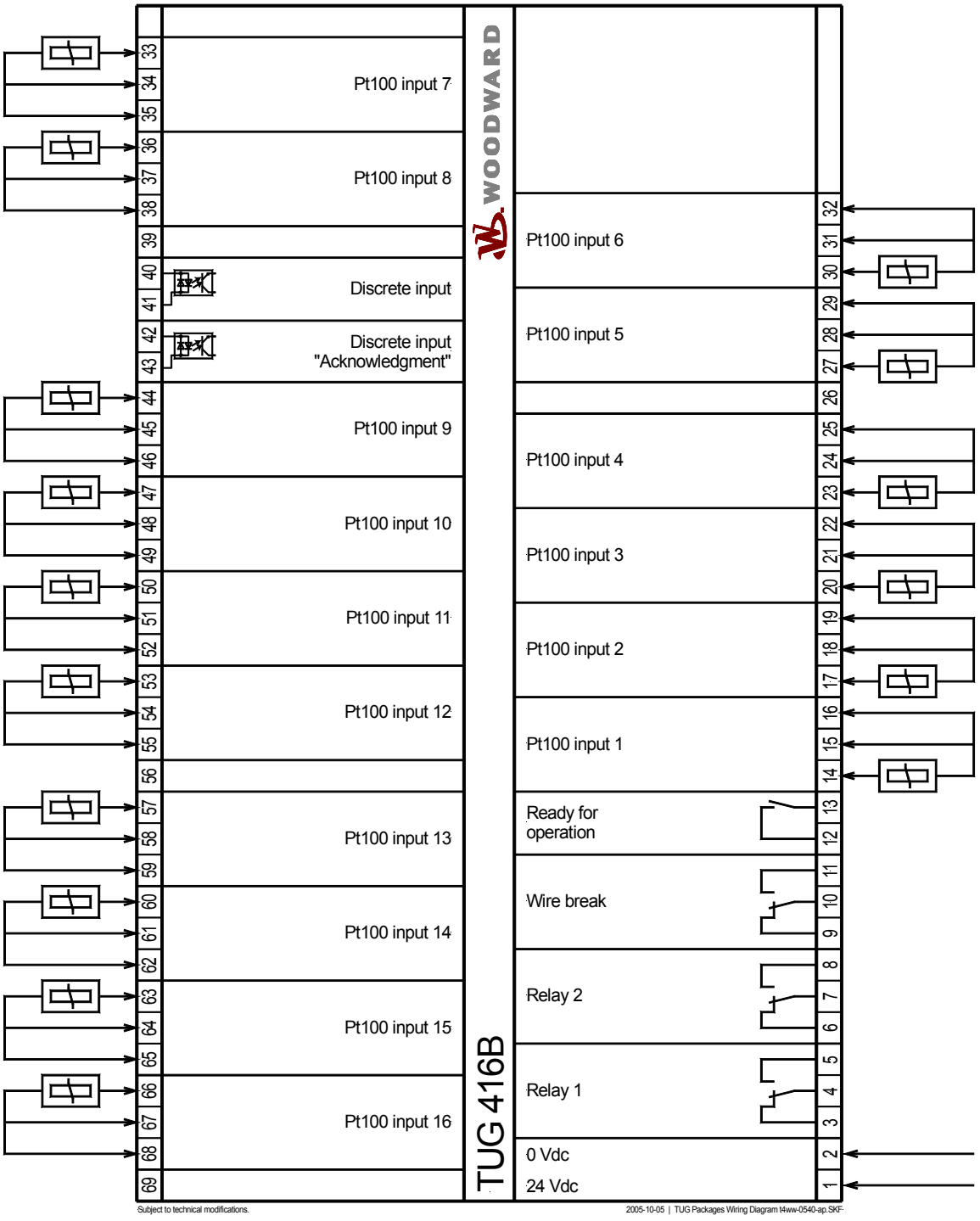

Figure 4-6: Wiring diagram TUG 416B

TUG 416B/SU Modbus

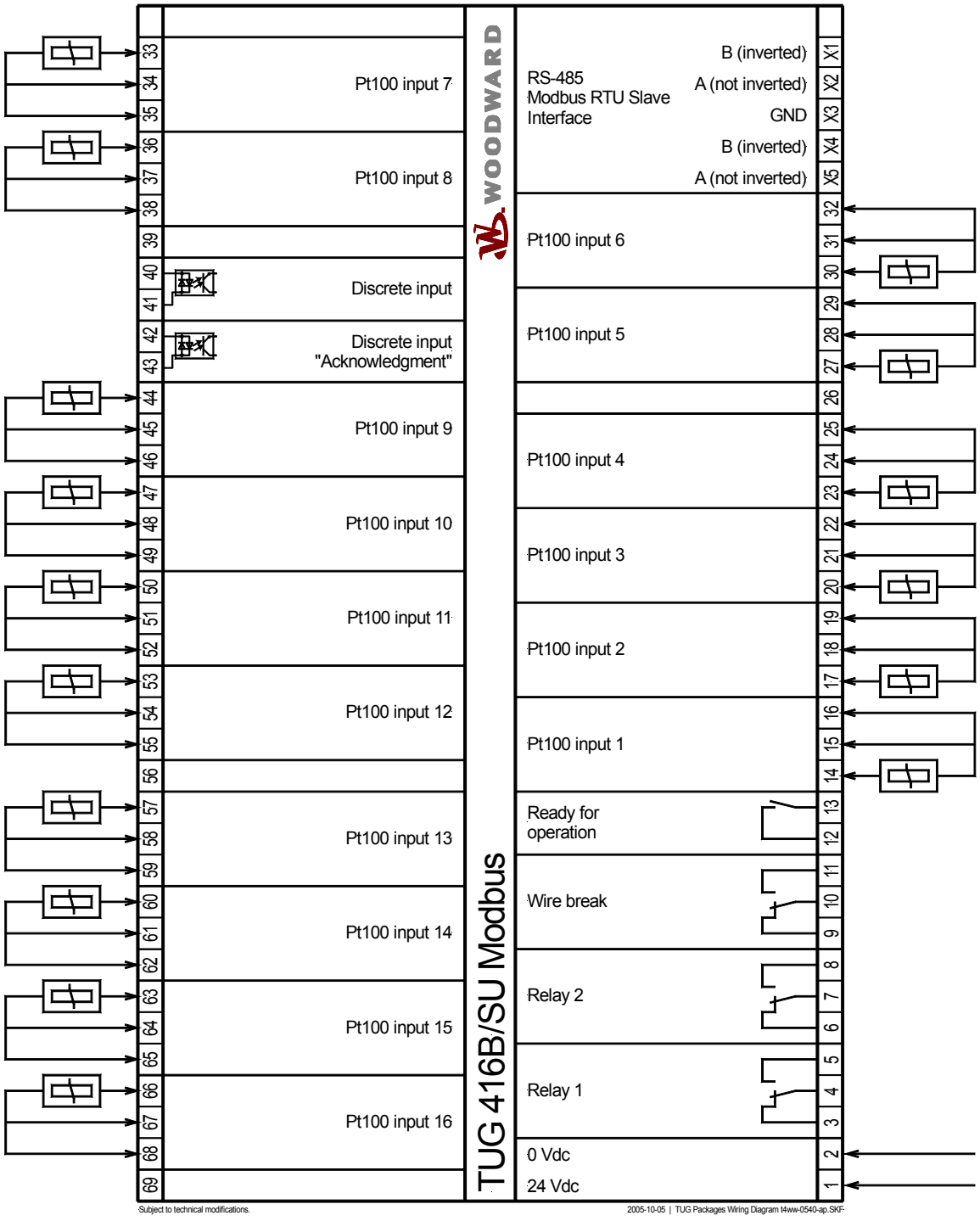

Figure 4-7: Wiring diagram TUG 416B/SU Modbus

TUG 416B/SU Profibus

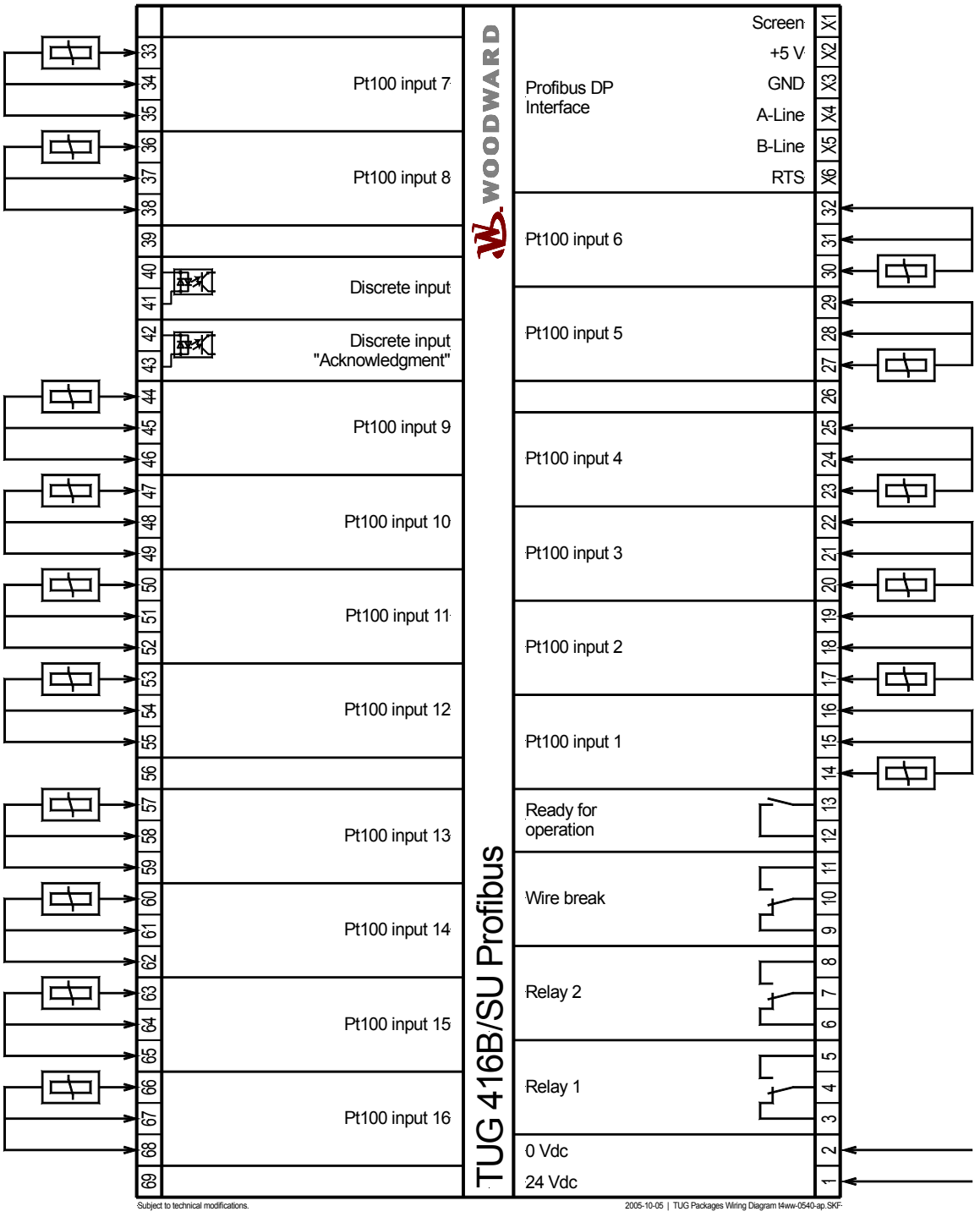

Figure 4-8: Wiring diagram TUG 416B/SUProfibus

Chapter 5.
Connection

CAUTION

A circuit breaker must be provided near the unit and in a position easily accessible to the operator. This must also bear a sign identifying it as an isolating switch for the unit.

NOTE

Inductive devices connected to the system (such as operating current coils, undervoltage tripping units, or auxiliary/power contacts) must be connected to a suitable interference suppressor.

Power Supply

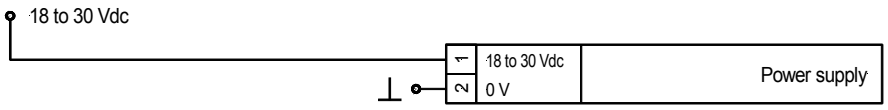

Figure 5-1: Power supply

Terminal	Description	A_{max}
2	0 V reference potential	2.5 mm²
1	18 to 30 Vdc	2.5 mm²

Table 5-1: Power supply- terminal assignment

Discrete Inputs

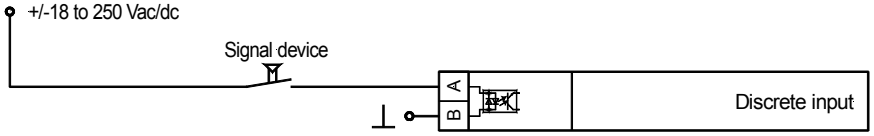

Figure 5-2: Discrete inputs

Terminal		Description (according to DIN 40 719 section 3, 5.8.3)	A_{max}
A	***B***	***N.O. contact***	
TUG 408			
40	41	Discrete input "Clear" (Acknowledge)	1.5 mm²
TUG 412 / 416			
40	41	Discrete input 1 (without function)	1.5 mm²
42	43	Discrete input 2 "Clear" (Acknowledge)	1.5 mm²

Table 5-2: Discrete inputs - terminal assignment

Relay Outputs

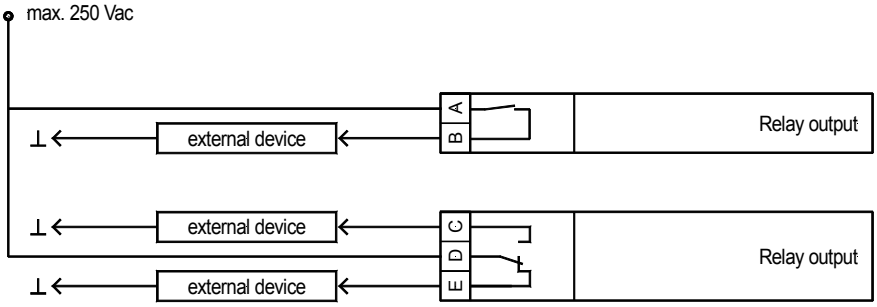

Figure 5-3: Relay output

Terminal			Description	A_{max}
Make contact				
Root ***A***	Closing ***B***			
13	12		Ready for operation	1.5 mm²
Change-over contact				
Closing ***C***	Root ***D***	Opening ***E***		
5	4	3	Limit value 1 exceeded	1.5 mm²
8	7	6	Limit value 2 exceeded	1.5 mm²
11	10	9	Wire break	1.5 mm²

Table 5-3: Relay output - terminal assignment

Measuring Inputs

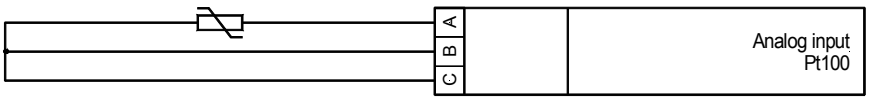

Figure 5-4: Measring input Pt100

Terminal			Description	A_{max}
A	***B***	***C***		
TUG 408B, TUG 412B, TUG 416B				
14	15	16	Pt100 temperature input 1	1.5 mm²
17	18	19	Pt100 temperature input 2	1.5 mm²
20	21	22	Pt100 temperature input 3	1.5 mm²
23	24	25	Pt100 temperature input 4	1.5 mm²
TUG 412B				
44	45	46	Pt100 temperature input 5	1.5 mm²
47	48	49	Pt100 temperature input 6	1.5 mm²
50	51	52	Pt100 temperature input 7	1.5 mm²
53	54	55	Pt100 temperature input 8	1.5 mm²
57	58	59	Pt100 temperature input 9	1.5 mm²
60	61	62	Pt100 temperature input 10	1.5 mm²
63	64	65	Pt100 temperature input 11	1.5 mm²
66	67	68	Pt100 temperature input 12	1.5 mm²
TUG 408B, TUG 416B				
27	28	29	Pt100 temperature input 5	1.5 mm²
30	31	32	Pt100 temperature input 6	1.5 mm²
33	34	35	Pt100 temperature input 7	1.5 mm²
36	37	38	Pt100 temperature input 8	1.5 mm²
44	45	46	Pt100 temperature input 9 only 416	1.5 mm²
47	48	49	Pt100 temperature input 10 only 416	1.5 mm²
50	51	52	Pt100 temperature input 11 only 416	1.5 mm²
53	54	55	Pt100 temperature input 12 only 416	1.5 mm²
57	58	59	Pt100 temperature input 13 only 416	1.5 mm²
60	61	62	Pt100 temperature input 14 only 416	1.5 mm²
63	64	65	Pt100 temperature input 15 only 416	1.5 mm²
66	67	68	Pt100 temperature input 16 only 416	1.5 mm²

Table 5-4: Analog inputs - terminal assignment

Interface (Option SU)

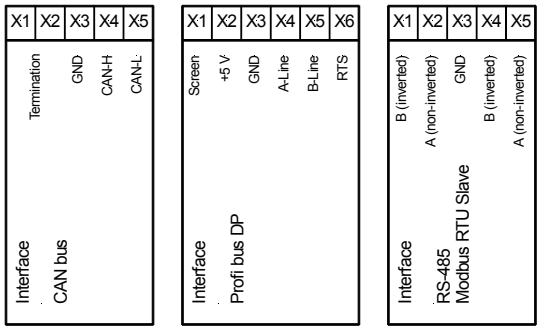

Figure 5-5: Interfaces

Terminal					Description
A (X1)	**B** (X2)	**C** (X3)	**D** (X4)	**E** (X5)	
B	A	GND	B	A	RS-485, Modbus RTU Slave
		GND	CAN-H	CAN-L	CAN bus

A (X1)	**B** (X2)	**C** (X3)	**D** (X4)	**E** (X5)	**F** (X6)	
Shield	+5 V	GND	A-Line	B-Line	RTS	Profibus DP (File LEON00D9.GSD must be used)

Tabelle 5-5: Interfaces - terminal assignment

NOTE

Please note that both ends of the CAN bus must be terminated between CAN-H and CAN-L with a resistance which corresponds to the surge impedence of the cable (e.g. 120 Ohm). Also, the Profibus DP must be terminated according to the specification (refer to General Data for the Interfaces on page 41).

CAN Bus Connection

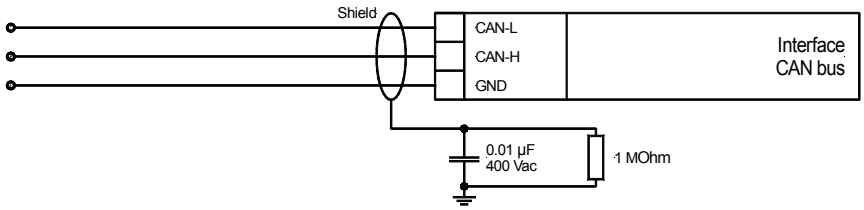

Figure 5-6: CAN bus wiring

Please note that the CAN bus must be terminated at each end of the bus! Figure 5-7 is a schematic of the CAN bus with the termination resistors installed.

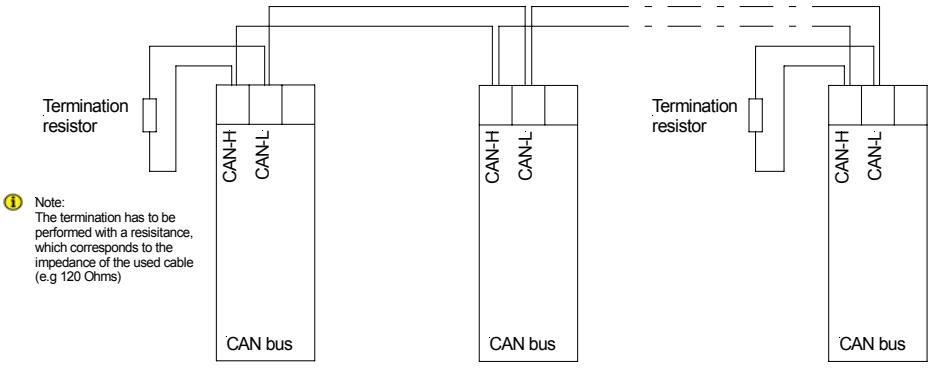

Figure 5-7: CAN bus - schematic wiring and termination

Possible CAN Bus Problems

If no data is transmitted on the CAN bus, check the following common reasons for CAN bus communication problems:

- T structure bus is utilized
- CAN-L and CAN-H are interchanged
- Not all devices on the bus are using identical Baud rates
- Terminating resistor are missing
- Baud rate to high for wiring length

Maximum CAN bus Length

The maximum length of the communication bus wiring is dependent on the configured Baud rate. Refer to Table 5-6 for the maximum bus length (Source: CANopen; Holger Zeltwanger (Hrsg.); 2001 VDE VERLAG GMBH, Berlin und Offenbach; ISBN 3-8007-2448-0).

Baud rate	Max. length
1000 kbit/s	25 m
800 kbit/s	50 m
500 kbit/s	100 m
125 kbit/s	250 m
50 kbits/s	1000 m
20 kbit/s	2500 m

Table 5-6: Maximum CAN bus length

The maximum specified length for the communication bus wiring might not be achieved if wire of poor quality is utilized, there is high contact resistance, or other conditions exist. Reducing the baud rate may overcome these issues.

Chapter 6.
Functional Description

Overview

The temperature monitoring unit TUG 4 is based on a microprocessor driven measuring method, which guarantees a high-precision and cost-efficient recording of 8, 12 or 16 temperature measuring inputs without the use of external measuring transducers or auxiliary devices (Pt100 in two- or three-wire technology). Standard devices are able to measure temperatures within a range of -20 °C up to 225 °C.

The TUG 4 monitors two adjustable limit values for each measuring input including broken wire detection. The device displays the condition of each measuring input. In addition, the freely configurable name of each measuring input will be displayed, as well as the measured value including the measuring unit.

Function

The TUG 4 LC-display indicates all measured values including the corresponding name of the measuring input for 8 (12, 16) Pt 100 temperature sensors (two- or three-wire technology). Each measuring input can be set to either high limit or low limit monitoring compared to two configurable limits (e.g. pre-alarm and shut-off) including broken wire detection. The name and value of each measuring input will be displayed in rotation. The condition of all measuring inputs (switched on/off, alarms) will be displayed at the same time.

It is possible to configure the name of each measuring input and. A temperature offset for Pt100 measuring inputs (to compensate wire length if two-wire measurement is applied) can be configured as well. Each measuring input can be individually switched on or off.

An internal test routine cyclically monitors the operational performance of the device. A "Ready for operation" relay output communicates proper function of the unit. Exeeding the configured limits will enable the two common alarm relay outputs for threshold 1 and threshold 2 (dry form C contacts).

For the transmission of the measured variables, the TUG 4 can be equipped with interfaces (CAN bus, Modbus RTU Slave, Profibus DP).

Alarm messages can be acknowledged by initiating a low to high or a high to low signal at the discrete input "Acknowledge" (terminals 40/41 or 42/43 depending on model). The alarm will be acknowledged 5 seconds after the control unit recognizes the signal has been input. Any fault conditions which still exist will result in reactivation of the alarm in the control unit.

Display

Standard Display

The first line indicates the name and measured value of the current measuring input. This line will automatically scroll through all measuring inputs that are switched on. By pressing the "Display" button the scroll mode can be interrupted and restarted. By pressing the "Man.scroll" button, the display will advance to next measuring input. If an alarm occurs, the display changes to indicate the all active alarms in the order of occurrence (see "Alarm Display").

The second line indicates the current conditions of all present measuring inputs with different symbols. The symbols are described as follows:

- ✶ No limit exceeded
- **1** Limit 1 (lower limit) exceeded
- **2** Limit 2 (upper limit) exceeded
- **D** Wire break occurred
- **-** Measuring input has been switched off

A blinking symbol indicates an alarm, which has not yet been acknowledged. The cursor in the second line indicates which measuring input is currently displayed in the first line.

These display screens are either displayed automatic scrolling or can be manually advanced by pressing the "Man. scroll" button.

Alarm Display

If an alarm occurs, the device changes to the alarm display and the auto-scrolling mode will stop. The maximum temperature measured since the alarm has ocurred will be displayed in °C. In order to clearly indicate that the temperature shown is not the current temperature but a maximum value, the display alternates between the current temperature value and the text message "MAX".

The second line indicates the alarm conditions of all measuring inputs by using symbols. A blinking symbol indicates an alarm, which has not yet been acknowledged. Specific alarm conditions are indicated by the type of symbol (limit value 1, limit value 2, wire break). However, this does not necessarily correspond to the current condition of the measuring input. After the alarm has been acknowledged, the display will stop blinking and will automatically revert to the input’s current status. The cursor in the second line indicates the measuring input currently being displayed in the first line.

Each single alarm can be acknowledged seperately by using the "Clear" button. To acknowledge the next alarm (in the order of their occurence), the button "Display↓" must be pressed to advance to the next alarm. After all alarms have been acknowledged, the display will revert back to the monitoring display.

Common Alarm

If at least one alarm has been detected, the corresponding relay output ("threshold 1", "threshold 2", or "wire break") will be energized. Acknowledging an alarm can be accomplished in three different ways:

- **Relay programming:**
  - Relay self reset "NO"
  - Relay acknowledge "YES"

  → **Function**
  - *Auto-resetting of the relay*
    The relays do not reset automatically if the alarm is no longer present
  - *Manual acknowledge*
    The relays can be reset with the "Clear" button regardless whether an alarm is present or not

- **Relay programming:**
  - Relay self reset "NO"
  - Relay acknowledge "NO"

  → **Function**
  - *Auto-resetting of the relay*
    The relays do not reset automatically if the alarm is no longer present
  - *Manual acknowledge*
    The relays cannot be reset with the "Clear" button as long as an alarm is present

- **Relay programming:**
  - Relay self reset "YES"
  - Relay acknowledge "YES"

  → **Function**
  - *Auto-resetting of the relay*
    The relays reset automatically as soon as the alarm is no longer present
  - *Manual acknowledge*
    The relays can be reset with the "Clear" button regardless whether an alarm is present or not

Acknowledgement

Acknowledging alarms can be accomplished in different ways:

- In the active alarm mode, alarms that have not been acknowledged (blinking digit) can be acknowledged individually by pressing the "Clear" button. The display can be manually advanced to the next alarm message by pressing the "Display↓" button. If the parameters "Broken wire relay acknowledge", "Relay thresh. 1 acknowledge" or "Relay thresh. 2 acknowledge" have been configured to "YES", the corresponding relay will also be de-energized.

- If the ”Clear” button has been pressed and held for more than 5 secs, all alarms will be acknowledged simultaneously unless different settings were selected in the configuration menu. This can be done in the alarm indication mode as well as in the standard display mode. Alarm conditions which still exist will be detected and displayed again.

- If the digital input "Acknowledge" has been energized for more than 5 secs, all alarms will be acknowledged simultaneously and independent of the settings in the configuration menu. Alarms which are still present will be re-evaluated and displayed again.

- Some interface protocols allow an alarm to be acknowledged via the interface. The detection of an input signal going from low to high or high to low in the control bit "External acknowledgement" is required for this. Continuous signals input into the "External acknowledgement" are ignored.

Chapter 7.
Display and Control Elements

Front Panel

The touch-sensitive front panel has a plastic coating. All keys have been designed as touch-sensitive membrane keys. The Liquid Crystal display displays 2 rows × 16 characters that are indirectly illuminated in red. The contrast of the display can be infinitely adjusted with a rotary potentiometer positioned on the left.

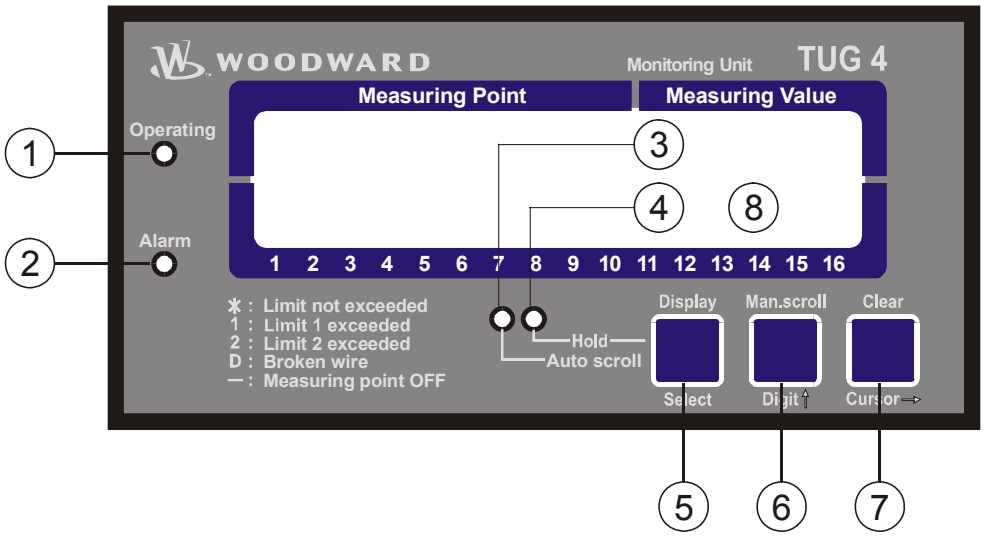

Figure 7-1: Front panel

LEDs:

①	"Operating"	Indication of the "Operating" mode
②	"Alarm"	Reply "Alarm is present"
③	"Auto scroll"	Scrolling of the display screens is enabled
④	"Hold"	Scrolling of the display screens is disabled

Push Buttons:

⑤	"Display / Select"	Selection: Auto scroll / Hold and confirm selection
⑥	"Man.scroll / Digit↑"	Scroll display and increase digit
⑦	"Clear / Cursor→"	Clear message and move cursor one position to the right

LC Display:

⑧	"LC-Display"	LC display

LEDs

① ***LED "Operating"***

Readiness for operation **Color "GREEN"**

The LED "Operating" indicates the operating mode and the measurment monitoring is performed according to the configured values.

② ***LED "Alarm"***

Alarm message **Color "RED"**

Alarm messages are indicated by the LED "Alarm" as follows:
Continuous .... The alarm has been acknowledged and is still present.
Blinking ..... The present alarm has not been acknowledged yet.

③ ***LED "Auto scroll"***

Display Scrolling **Color "ORANGE"**

The display of the measured values and the alarms scrolls continuously through all measuring inputs.

④ ***LED "Hold"***

Display Hold **Color "ORANGE"**

The display of the measured values and alarms is locked to one measuring input. The display may be advanced with the "Man.scroll↓" button.

Push Buttons

In order to facilitate setting the parameters, the buttons have an AUTOSCROLL function. This permits the user to rapidly advance to the next display screen, configuration screen, digit, or cursor position. The AUTOSCROLL function is enabled if the user presses and holds the respective key.

⑤ ***"Display" "Select" Button***

Display / Select

Display..... By pressing this button, the display can be changed between hold and Scroll mode.

Select..... If the initially displayed value has been changed with the "Digit↑" ⑥ or "Cursor→" ⑦ buttons, it will be stored by pushing the "Select" button ⑤ once. Pushing the "Select" button ⑤ again makes the display advance to the next configuration screen. This function is only enabled when in the configuration mode.

⑥ ***"Man.scroll" "Digit↑" Button***

Man.scroll / Digit↑

Man.scroll..... By pressing this button the display can be manually advanced to the next alarm message or measuring input.

Digit↑ ..... This button increases the digit at the cursor position when in the configuration mode. It will only be increased within the configurable limits according to the parameter list in the appendix. If the highest permissible number has been reached, the digit returns to the lowest possible value automatically.

⑦ ***"Clear" "Cursor→" Button***

Clear / Cursor→

Clear.....Alarm messages are deleted by pressing this button. This function is described in detail on page 24 in the section titled "Acknowledgement".

Cursor→.....This button moves the cursor one position to the right when in the configuration mode. If the right-most position has been reached, the cursor returns to the first digit at the left of the value to be entered.

LC Display

⑧ ***DISPLAY "LC Display"***

LC Display

The LC display outputs particular messages and values depending on the selected mode. In the operation mode, the measured values are displayed. Parameters are displayed and may be changed in configuration mode.

The standard feature two-line LC display may be used to retrieve performance quantities when the automatic mode is activated. While in configuration mode, the individual parameters are indicated.

Chapter 8.
Configuration

To activate the configuration mode, press the "Man.scroll" ⑥ and "Clear" ⑦ buttons simultaneously. You can advance through the individual configuration screens by pressing the "Select" ⑤ button while in the configuration mode. Pressing and holding the "Select" ⑤ button activates the AUTOSCROLL function to enable rapid scrolling through the screens. Please note that it is only possible to scroll backwards through the last four configuration screens (Exception: it is not possible to scroll from the first to the last screen). This is accomplished by simultaneously pressing and releasing the "Select" ⑤ and "Cursor→" ⑦ buttons.

SPRACHE/LANGUAGE Deutsch	**Language selection** — **German/English** The screens (configuration and display screens) can be displayed in either German or English.
Softwareversion V2.6xxx	**Software version** Display of the software version (xxx stands here for changes which do not affect the function of the unit).

Password

The unit is equipped with a two-level code and configuration hierarchy, which enables it to visualize various configuration screens for different users. A distinction is made between:

Code level 0 (CL0) User: Third party
This code level does not permit access to any parameters.

Code level 2 (CL2) User: Commissioner
With code level 2 the user has complete access to all parameters (displaying and changing). Additionally in this level the user may change the code number for level 2 or disable the password protection.

NOTE

If the code level is set once, this will not be changed even when entering the configuration mode repeatedly. If wrong code number is entered, the code level will be set to CL0 and the unit parameters will be locked for unauthorized personnel. Two hours after the last operation the unit automatically returns to code level CL0. . The operator may return to the desired level by entering the correct code number.

NOTE

The "Enter code" configuration screen described in the following appears only if the "Password protection" configuration screen is configured ON.

```
Enter code
          0000
```

Enter code number **0000 to 9999**

On accessing the configuration mode, a code number, which identifies the various users, is requested. The displayed number XXXX is a random number (RN) which is confirmed with the "Select" ⑤ button. If the random number has been confirmed with "Select" ⑤ without being changed, the unit's code level remains unchanged. There are two four-digit code numbers (0000 to 9999) to change the code level and set up new code numbers for users. No code number is required for the code level CL0 "User" because the user is usually not granted access to configuration level (protected by the coding).

```
Password
Protection    ON
```

Password protection **ON/OFF**

ON..... Access to configuration is done by entering the correct code number (code level 2). If a wrong code number was entered, the configuration will be blocked.

OFF..... Access to the configuration screens is permanently set to code level 2 and the code number is not requested. This parameter can only be changed if the code number for code level 2 has been entered before.

```
Define level 2
code          XXXX
```

Code level 2 (Commissioner) **0000 to 9999**

This screen appears in this code level only. The code number for this code level is set after entering the digits in this screen. The user is granted the access rights assigned to him after entering his code.
The default setting for this code level (CL) is **CL2 = 0 0 0 2**

Measuring Inputs

Depending on the selected type, the unit is equipped with 8, 12, or 16 measuring inputs. The following configuration settings are identical for each measuring input.

```
Configure
input 1       YES
```

Configure measuring input 1 **YES/NO**

In order to facilitate configuration, the configuration can be enabled seperately for each measuring input. Selecting "YES" or "NO" does not effect the monitoring function. This entry has the following effects only:

YES..... The configuration screens of the selected measuring input are displayed and may either be viewed ("Select" ⑤ button), or parameters may be modified (buttons "Digit↑" ⑥ and "Cursor→" ⑦, and "Select" ⑤).

NO..... The parameters of the following block are not displayed, cannot be modified, and are skipped.

Pt100 Measuring Inputs

NOTE

The following configuration screens are exemplary for measuring input 1 and identical for each other measuring input.

```
Input 1
              ON
```

Monitoring of measuring input 1 **ON/OFF**

ON .....The value of this input appears in the display, and monitoring is enabled.
OFF .....No display or monitoring are performed.

```
Text input 1
```

Text measuring input 1 **user-defined**

User-definable text of up to 10 characters which may be programmed using the "Digit↑" ⑥ and "Cursor→" ⑦ buttons and confirmed with the "Select" ⑤ button.

```
Threshold 1
Input 1    000°C
```

Threshold 1 of measuring input 1 **-999 to 999 °C**

If the measured value exceeds/falls below this threshold value (selection via parameter “low limit mon./high limit mon.”), a “threshold 1” alarm will be generated.
If the measured value needs to be displayed only without monitoring threshold 1, this value must be configured above the largest expected value for this measuring input (e.g.: max. value water temperature expected = 80 °C, configured value = 999 °C).

```
Threshold 2
Input 1    000°C
```

Threshold 2 of measuring input 1 **-999 to 999 °C**

If the measured value exceeds/falls below this threshold value (selection via parameter “low limit mon./high limit mon.”), a “threshold 2” alarm will be generated.
If the measured value needs to be displayed only without monitoring threshold 2, this value must be configured above the largest expected value for this measuring input (e.g.: max value water temperature expected = 80 °C, configured value = 999 °C).

```
Offset input 1
            00°C
```

Offset measuring input 1 **-99 to 99 °C**

In order to correct measurement errors and deviations, an offset value may be adjusted. Especially in the case of a two-wire measurement, deviations requiring compensation may occur.

```
Monit. input 1
high limit mon
```

Monitoring input function **high limit / low limit monitoring**

The monitoring function can be configured as follows:
high limit ...The configured threshold must be **exceeded** in order to generate an alarm message.
low limit.....The measured value must **fall below** the configured threshold value.

Discrete Inputs

```
DI  Acknowledge
Energize to ack.
```

Function of discrete input acknowledge release/ energize to ack.

energize to ack. ... The Discrete Input acknowledge will be enabled by a changing from a high signal to a low signal.
release to ack. ..... The Discrete Input acknowledge will be enabled by a changing from a low signal to a high signal.

Relay Outputs

```
Wire break relay
acknowledge  YES
```

Wire break alarm relay can be acknowledged YES/NO

Yes..... The relay will automatically reset when the Discrete Input acknowledge has been enabled.
No ..... The relay will not automatically reset when Discrete Input acknowledge has been enabled if the alarm “broken wire” is still present.

```
Relay thresh.1
acknowledge  YES
```

Yes..... The relay will automatically reset when the Discrete Input acknowledge has been enabled.
No ..... The relay will not automatically reset when Discrete Input acknowledge has been enabled if the alarm “threshold 1” is still present.

```
Relay thresh.2
acknowledge  YES
```

Yes..... The relay will automatically reset when the Discrete Input acknowledge has been enabled.
No ..... The relay will not automatically reset when Discrete Input acknowledge has been enabled if the alarm “threshold 2” is still present.

```
Relay self reset
            YES
```

Yes..... The relay will automatically reset immediately after the corresponding alarm condition has been acknowledged.
No ..... The relay can only be reset when the Discrete Input acknowledge has been enabled, even if the alarm condition has already been acknowledged.

Interfaces (Option SU)

```
Configure
Interface    YES
```

Interface configuration **YES/NO**

YES .....The interface can be configured and is enabled. The subsequent parameters of this function are displayed.
NO .....Interface function is disabled and the subsequent parameters of this function are not displayed.

Screens for Protocol Profibus DP Slave

```
Profibus station
             000
```

Station number Profibus DP Slave **1 to 125**

Station number for Profibus DP slave.

```
Profibus
Watchdog     NO
```

Bus monitoring Profibus DP Slave **YES/NO**

YES .....A data bit cyclically changed-over by the Profibus DP slave is monitored. If the change-over of this data bit fails to happen for more than 10 s, the control issues a command for a bus reset.
NO .....The bus monitoring is disabled.

Screens for Protocol Modbus RTU Slave

```
Device number
MOD-Bus      000
```

Device number Modbus RTU Slave **1 to 255**

Device number for the Modbus RTU Slave.

```
Baudrate
             0000
```

Baud rate Modbus RTU Slave **1.200 / 2.400 / 4.800 / 9.600 / 19.200**

The baud rate of the Modbus RTU Slave is defined here.

```
Parity
             none
```

Parity Modbus RTU Slave **none / even / odd**

The parity of the Modbus RTU Slave is defined here.

```
Stopbits
             one
```

Stop bits Modbus RTU Slave **one / two**

The number of stop bits of the Modbus RTU Slave is defined here.

```
Delay to send
MOD-Bus     00ms
```

Delay time for sending after read request **00 to 50 ms**

The response message of the slave will be sent out with a minimum time delay configured in this screen. It may be required to adapt the response time to the timing of the master unit. If a time delay is not configured, data transfer errors may occur because the response behavior of the slave is too fast.

Screens for Protocol CAN Bus

```
CAN No.
                0
```

Device number CAN Bus **1 to 8**

Device number for the CAN bus.

Chapter 9.
Commissioning

DANGER

When commissioning the control, please observe all safety rules that apply to the handling of live equipment. Ensure that you know how to provide first aid in the event of an uncontrolled release of energy and that you know where the first aid kit and the nearest telephone are. Never touch any live components of the system or on the back of the system:

L I F E T H R E A T E N I N G

WARNING

Only a qualified technician may commission unit. The "EMERGENCY-STOP" function must be operational prior to commissioning of the system, and must not depend on the unit for its operation.

ATTENTION

1. **Prior to commissioning ensure that all connections are in accordance with the wiring diagram. Any absence of or incorrect connection of voltage measuring devices or other signals may lead to malfunctions and damage the unit, the engine, and/or components connected to the unit!**

Procedure:

2. After wiring the unit and ensuring all measuring devices are connected correctly, apply the control system voltage (i.e. 12/24 Vdc). The "Operating" LED will flash.
   Two-wire measurement: When connecting a Pt100-measuring resistance which is not equipped for three-wire technology, the free terminal must be connected with the corresponding center terminal as indicated in the wiring diagram (see appendix) (e.g. for measuring input 1 terminals 15 and 16 must be jumpered).

3. By pressing the "Digit↑" ⑥ and "Cursor→" ⑦ buttons simultaneously the configuration and test mode is enabled. After entering the correct code number, all parameters may be configured (see the chapter regarding the parameters).

4. After the parameters of the device have been properly configured, press the "Digit↑" ⑥ and "Cursor→" ⑦ buttons simultaneously to exit the configuration mode and return to the automatic mode.

5. Verify the measurements displayed by the controller are correct.

Chapter 10.
Technical Data

Ambient variables ----------
- Power supply (V_{aux}) ..... 24 Vdc (18 to 30 Vdc)
- Intrinsic consumption..... max. 10 W
- Ambient temperature for storage .....-30 to +80 °C / -22 to +176 °F
- Ambient temperature for operation.....-20 to +70 °C / -4 to +158 °F
- Ambient humidity ..... 95 %, not condensing

Potential-free relay outputs----------
- Contakt material.....AgCdO
- General purpose (GP) (resistive load).....
  AC ..... 2.00 Aac at 250 Vac
  DC .....2.00 Adc at 24 Vdc
  0.36 Adc at 125 Vdc
  0.18 Adc at 250 Vdc
- Pilot duty (PD) .....
  AC B300
  DC .....1.00 Adc at 24 Vdc
  0.22 Adc at 125 Vdc
  0.10 Adc at 250 Vdc

Analog inputs---------- **freely scalable**
Resolution .....10 bit
- Pt100 input..... for measuring resistor according to IEC 751
  [Pt100] 2/3 wire measurment -10 to 200°C

Interfaces (Option Su) ----------
CAN bus interface.....**galvanically isolated**
- Insulating voltage..... 1,500 Vdc
- Version.....CAN bus
- Internal line termination..... not existing

Profibus interface
- Version..... Profibus DP Slave Standard

Modbus interface
- Version.....Modbus RTU Slave Standard

Housing ----------
- Type ..... APRANORM DIN 43 700
- Dimensions (B × H × T) ..... 144 × 72 × 118 mm
- Front panel cutout (B×H).....138 [+1.0] × 68 [+0.7] mm
-
- Connection .....screw terminals depending on connector strip 1.5 mm² or 2.5 mm²
  use only 60/75 °C copper leads
  use only class 1 cables(or similar)
- Recommended tightening torque ..... 0.5 Nm
- Weight..... depending on type, approx. 800 g

Protection ----------
- Protection class .....with professional installation IP 42 from front
  IP 54 from front with gasket (No. 8923-1037), IP 21 from back
- Front folio .....insulating surface
- Disturbance test (CE).....tested according to applicable EN guidelines

Appendix A.
Interface (Option SU)

Transmitting Telegram

Number				Content (Words)	Unit/Bit	Remark
	Modbus	CAN bus	Profibus			
	Word	**Word**	**Byte**			
	1	**MUX=1, 1**	**0/1**	Telegram type	"501"	
	2	**MUX=1, 2**	**2/3**	Measuring input 1 (14/15/16)	°C	Option Th: no unit
	3	**MUX=1, 3**	**4/5**	Measuring input 2 (17/18/19)	°C	Option Th: no unit
	4	**MUX=2, 1**	**6/7**	Measuring input 3 (20/21/22)	°C	Option Th: no unit
	5	**MUX=2, 2**	**8/9**	Measuring input 4 (23/24/25)	°C	Option Th: no unit
	6	**MUX=2, 3**	**10/11**	Measuring input 5 (27/28/29)	°C	Option Th: no unit
	7	**MUX=3, 1**	**12/13**	Measuring input 6 (30/31/32)	°C	Option Th: no unit
	8	**MUX=3, 2**	**14/15**	Measuring input 7 (33/34/35)	°C	Option Th: no unit
	9	**MUX=3, 3**	**16/17**	Measuring input 8 (36/37/38)	°C	Option Th: no unit
	10	**MUX=4, 1**	**18/19**	Measuring input 9 (44/45/46)	°C	Option Th: no unit
	11	**MUX=4, 2**	**20/21**	Measuring input 10 (47/48/49)	°C	Option Th: no unit
	12	**MUX=4, 3**	**22/23**	Measuring input 11 (50/51/52)	°C	Option Th: no unit
	13	**MUX=5, 1**	**24/25**	Measuring input 12 (53/54/55)	°C	Option Th: no unit
	14	**MUX=5, 2**	**26/27**	Measuring input 13 (57/58/59)	°C	Option Th: no unit
	15	**MUX=5, 3**	**28/29**	Measuring input 14 (60/61/62)	°C	Option Th: no unit
	16	**MUX=6, 1**	**30/31**	Measuring input 15 (63/64/65)	°C	Option Th: no unit
	17	**MUX=6, 2**	**32/33**	Measuring input 16 (66/67/68)	°C	Option Th: no unit
	18	**MUX=6, 3**	**34/35**	Fault 1 is or has been present but has not been acknowledged yet.	Bit 15 = 1	Measuring input 16
					Bit 14 = 1	Measuring input 15
					Bit 13 = 1	Measuring input 14
					Bit 12 = 1	Measuring input 13
					Bit 11 = 1	Measuring input 12
					Bit 10 = 1	Measuring input 11
					Bit 9 = 1	Measuring input 10
					Bit 8 = 1	Measuring input 9
					Bit 7 = 1	Measuring input 8
					Bit 6 = 1	Measuring input 7
					Bit 5 = 1	Measuring input 6
					Bit 4 = 1	Measuring input 5
					Bit 3 = 1	Measuring input 4
					Bit 2 = 1	Measuring input 3
					Bit 1 = 1	Measuring input 2
					Bit 0 = 1	Measuring input 1

Number				Content (Words)	Unit/Bit	Remark
	Modbus	CAN bus	Profibus			
	19	**MUX=7, 1**	**36/37**	Measuring input active (ON)	Bit 15 = 1	Measuring input 16
					Bit 14 = 1	Measuring input 15
					Bit 13 = 1	Measuring input 14
					Bit 12 = 1	Measuring input 13
					Bit 11 = 1	Measuring input 12
					Bit 10 = 1	Measuring input 11
					Bit 9 = 1	Measuring input 10
					Bit 8 = 1	Measuring input 9
					Bit 7 = 1	Measuring input 8
					Bit 6 = 1	Measuring input 7
					Bit 5 = 1	Measuring input 6
					Bit 4 = 1	Measuring input 5
					Bit 3 = 1	Measuring input 4
					Bit 2 = 1	Measuring input 3
					Bit 1 = 1	Measuring input 2
					Bit 0 = 1	Measuring input 1
	20	**MUX=7, 2**	**38/39**	Wire break alarm is present	Bit 15 = 1	Measuring input 16
					Bit 14 = 1	Measuring input 15
					Bit 13 = 1	Measuring input 14
					Bit 12 = 1	Measuring input 13
					Bit 11 = 1	Measuring input 12
					Bit 10 = 1	Measuring input 11
					Bit 9 = 1	Measuring input 10
					Bit 8 = 1	Measuring input 9
					Bit 7 = 1	Measuring input 8
					Bit 6 = 1	Measuring input 7
					Bit 5 = 1	Measuring input 6
					Bit 4 = 1	Measuring input 5
					Bit 3 = 1	Measuring input 4
					Bit 2 = 1	Measuring input 3
					Bit 1 = 1	Measuring input 2
					Bit 0 = 1	Measuring input 1
	21	**MUX=7, 3**	**40/41**	Threshold 1 alarm is present	Bit 15 = 1	Measuring input 16
					Bit 14 = 1	Measuring input 15
					Bit 13 = 1	Measuring input 14
					Bit 12 = 1	Measuring input 13
					Bit 11 = 1	Measuring input 12
					Bit 10 = 1	Measuring input 11
					Bit 9 = 1	Measuring input 10
					Bit 8 = 1	Measuring input 9
					Bit 7 = 1	Measuring input 8
					Bit 6 = 1	Measuring input 7
					Bit 5 = 1	Measuring input 6
					Bit 4 = 1	Measuring input 5
					Bit 3 = 1	Measuring input 4
					Bit 2 = 1	Measuring input 3
					Bit 1 = 1	Measuring input 2
					Bit 0 = 1	Measuring input 1

Number				Content (Words)	Unit/Bit	Remark
	Modbus	CAN bus	Profibus			
	22	**MUX=8, 1**	**42/43**	Threshold 2 alarm is present	Bit 15 = 1	Measuring input 16
					Bit 14 = 1	Measuring input 15
					Bit 13 = 1	Measuring input 14
					Bit 12 = 1	Measuring input 13
					Bit 11 = 1	Measuring input 12
					Bit 10 = 1	Measuring input 11
					Bit 9 = 1	Measuring input 10
					Bit 8 = 1	Measuring input 9
					Bit 7 = 1	Measuring input 8
					Bit 6 = 1	Measuring input 7
					Bit 5 = 1	Measuring input 6
					Bit 4 = 1	Measuring input 5
					Bit 3 = 1	Measuring input 4
					Bit 2 = 1	Measuring input 3
					Bit 1 = 1	Measuring input 2
					Bit 0 = 1	Measuring input 1
	23	**MUX=8, 2**	**44/45**	Wire break is or has been present but has not been acknowledged yet.	Bit 15 = 1	Measuring input 16
					Bit 14 = 1	Measuring input 15
					Bit 13 = 1	Measuring input 14
					Bit 12 = 1	Measuring input 13
					Bit 11 = 1	Measuring input 12
					Bit 10 = 1	Measuring input 11
					Bit 9 = 1	Measuring input 10
					Bit 8 = 1	Measuring input 9
					Bit 7 = 1	Measuring input 8
					Bit 6 = 1	Measuring input 7
					Bit 5 = 1	Measuring input 6
					Bit 4 = 1	Measuring input 5
					Bit 3 = 1	Measuring input 4
					Bit 2 = 1	Measuring input 3
					Bit 1 = 1	Measuring input 2
					Bit 0 = 1	Measuring input 1
	24	**MUX=8, 3**	**46/47**	Threshold 1 alarm is or has been present but has not been acknowledged yet.	Bit 15 = 1	Measuring input 16
					Bit 14 = 1	Measuring input 15
					Bit 13 = 1	Measuring input 14
					Bit 12 = 1	Measuring input 13
					Bit 11 = 1	Measuring input 12
					Bit 10 = 1	Measuring input 11
					Bit 9 = 1	Measuring input 10
					Bit 8 = 1	Measuring input 9
					Bit 7 = 1	Measuring input 8
					Bit 6 = 1	Measuring input 7
					Bit 5 = 1	Measuring input 6
					Bit 4 = 1	Measuring input 5
					Bit 3 = 1	Measuring input 4
					Bit 2 = 1	Measuring input 3
					Bit 1 = 1	Measuring input 2
					Bit 0 = 1	Measuring input 1

Number				Content (Words)	Unit/Bit	Remark
	Modbus	CAN bus	Profibus			
	25	**MUX=9, 1**	**48/49**	Threshold 2 alarm is or has been but has not been acknowledged yet.	Bit 15 = 1	Measuring input 16
					Bit 14 = 1	Measuring input 15
					Bit 13 = 1	Measuring input 14
					Bit 12 = 1	Measuring input 13
					Bit 11 = 1	Measuring input 12
					Bit 10 = 1	Measuring input 11
					Bit 9 = 1	Measuring input 10
					Bit 8 = 1	Measuring input 9
					Bit 7 = 1	Measuring input 8
					Bit 6 = 1	Measuring input 7
					Bit 5 = 1	Measuring input 6
					Bit 4 = 1	Measuring input 5
					Bit 3 = 1	Measuring input 4
					Bit 2 = 1	Measuring input 3
					Bit 1 = 1	Measuring input 2
					Bit 0 = 1	Measuring input 1
	26 (52, 53)	**MUX=9, 2**	**50/51**	Transmission counter		

NOTE

The word 50/51 is increased every 20 ms. This word can be used to check whether the bus is functional.

Receiving Telegram (Profibus DP)

The remote control data are only accepted by the TUG 4 if the device is equipped with a Profibus interface.

Number	Content (Words)	Unit/Bit	Remark
00/01	Bus mode	Bit 15	Internal (should be set to "0")
		Bit 14	Internal (should be set to "0")
		Bit 13	Internal (should be set to"0 ")
		Bit 12	Internal (should be set to "0")
		Bit 11	Internal (should be set to "0")
		Bit 10	Internal (should be set to "0")
		Bit 9	Internal (should be set to "0")
		Bit 8	Internal (should be set to "0")
		Bit 7	Internal (should be set to "0")
		Bit 6	Internal (should be set to "0")
		Bit 5	Internal (should be set to "0")
		Bit 4	Internal (should be set to "0")
		Bit 3	Internal (should be set to "0")
		Bit 2	Internal (should be set to "0")
		Bit 1	Internal (should be set to "0")
		Bit 0	If the monitoring function is activated (Watchdog), this bit must be toggled every 4 s. The TUG monitors this bit and resets the Profibus if this bit should not toggle.
02/03	Internal		Should be set to "0" .
04/05	Internal		Should be set to "0" .
06/07	Internal		Should be set to "0" .
08/09	Internal		Should be set to "0" .
10/11	Internal		Should be set to "0".
12/13	Internal		Should be set to "0" .
14/15	Internal		Should be set to "0" .
16/17	Internal		Should be set to "0" .
18/19	Internal		Should be set to "0" .
20/21	Control word	Bit 15	Should be set to "0" .
		Bit 14	Should be set to "0" .
		Bit 13	Should be set to "0" .
		Bit 12	Should be set to "0" .
		Bit 11	Should be set to "0" .
		Bit 10	Should be set to "0" .
		Bit 9	Should be set to "0" .
		Bit 8	Should be set to "0" .
		Bit 7	Should be set to "0" .
		Bit 6	Should be set to "0" .
		Bit 5	Should be set to "0" .
		Bit 4	External acknowledgement. The TUG accepts an alarm acknowlegement via the bus only if the bit changes from "0" to "1" , and if this signal is present for at least 500 ms .
		Bit 3	Should be set to "0" .
		Bit 2	Should be set to "0" .
		Bit 1	Should be set to "0" .
		Bit 0	Should be set to "0" .

Receiving Telegram (Modbus RTU Slave)

The remote control data are only accepted by the TUG 4 if the device is equipped with a Modbus interface.

Number	Content (Words)	Unit/Bit	Remark
1	Internal		
2	Internal		
3	Internal		
4	Internal		
5	Internal		
6	Internal		
7	Internal		
8	Internal		
9	Internal		
10	Control word	Bit 15	Should be set to "0" .
		Bit 14	Should be set to "0" .
		Bit 13	Should be set to "0" .
		Bit 12	Should be set to "0" .
		Bit 11	Should be set to "0" .
		Bit 10	Should be set to "0" .
		Bit 9	Should be set to "0" .
		Bit 8	Should be set to "0" .
		Bit 7	Should be set to "0" .
		Bit 6	Should be set to "0" .
		Bit 5	Should be set to "0" .
		Bit 4	External acknowledgement. The TUG accepts an alarm acknowlegement via the bus only if the bit changes from "0" to "1" , and if this signal is present for at least 500 ms .
		Bit 3	Should be set to "0" .
		Bit 2	Should be set to "0" .
		Bit 1	Should be set to "0" .
		Bit 0	Should be set to "0" .

General Data for the Interfaces

General Data For CAN bus

Parameters	Transmission protocol	CAN (CiA)
	Hardware	CAN bus
	Transmitting rate	125 kBaud
	Particularity	Bt0 = 03, Bt1 = 1C

About every 200 ms a data telegram of 8 bytes is sent cyclically . It is structured as follows (all word sizes in High Byte / Low Byte) format:

ID	800 + CAN-number
Byte 1	always 221
Byte 2	Multiplexor
Byte 3/4	1. Data word (see table no. 1), multiplexed (MUX = 1, 1)
Byte 5/6	2. Data word (see table, no. 2), multiplexed (MUX = 1, 2)
Byte 7/8	3. Data word (see table, no. 3), multiplexed (MUX = 1, 3)
Byte 9/10	4. Data word (see table, no. 4), multiplexed (MUX = 2, 1)
Byte 11/12	5. Data word (see table, no. 5), multiplexed (MUX = 2, 2)
etc.	

General Data For Modbus RTU Slave

Parameters	Transmission protocol	Modbus RTU Slave
	Hardware	Interface RS-485
	Transmitting rate	ajdustable
	Slave addresse	adjustable
	Parity	adjustable

With one command, a maximum of 30 words can be read and 4 words can be written. The Modbus function codes 03, 04, 06 and 16 are supported.

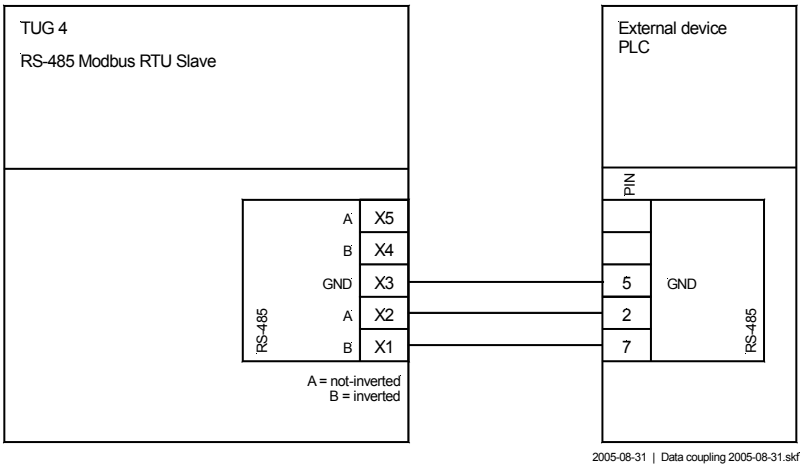

Figure 10–1: Interface - Modbus connection

General Data For Profibus DP

Using Profibus DP control data can be transmitted to the TUG unit. (e.g. Discrete Input acknowledge).

Reception range Byte 0 and subsequent bytes Telegram corresponding to description
Example: Byte 0/1 = telegram call sign "501"
Byte 2/3 = temperature 1
Byte 4/5 = temperature 2
Byte 6/7 = temperature 3
etc.

Transmitting range Byte 0 and subsequent bytes Telegram according to description
Example: Byte 0/1 = Busmode
Byte 2/3 = internal
...
Byte 20/21 = control word
etc.

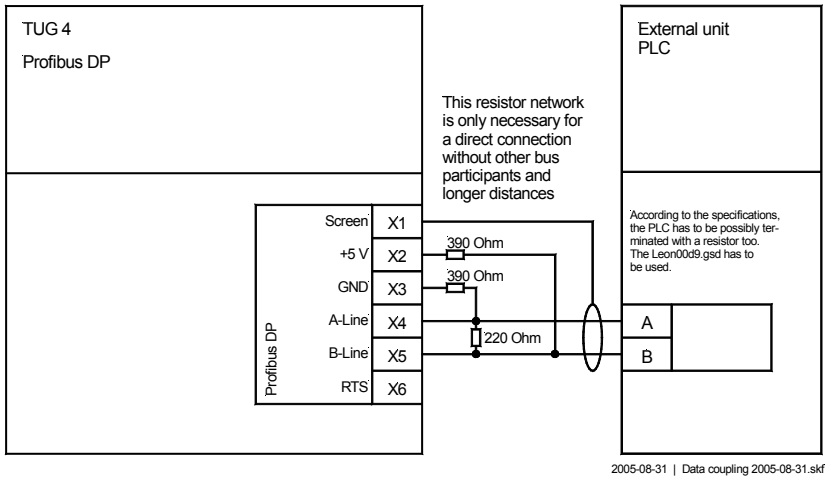

Figure 10–2: Interface - Profibus connection

Appendix B.
Parameter List

Device number P/N _____ Rev _____

Version _____

Project _____

Serial number S/N _____ Date _____

Option	Parameter		Adjustment range	Default value	Customer settings	
	Language		german/english	english	☐ g ☐ e	☐ g ☐ e
	Software version		-	-	-	-
	Enter code		0000 to 9999	random number		
	Password protection		ON/OFF	OFF		
	Define level 2 code		0000 to 9999	0002		
	CONFIGURATION OF THE MEASURING INPUTS					
408-416	Pt100-Measuring input 1					
..	**Configure**	**Input 1**	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
..	**Input 1**		ON/OFF	ON	☐ on ☐ off	☐ on ☐ off
..	**Text**	**Input 1**	user defined	No.1 -0000		
..	**Threshold 1**	**Input 1**	-999 to 999 °C	100 °C		
..	**Threshold 2**	**Input 1**	-999 to 999 °C	120 °C		
..	**Offset**	**Input 1**	-99 to 99 °C	0 °C		
..	**Monit.**	**Input 1**	high limit /low limit mon.	high limit mon.	☐ h ☐ l	☐ h ☐ l
..	Pt100-Measuring input 2					
..	**Configure**	**Input 2**	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
..	**Input 2**		ON/OFF	ON	☐ on ☐ off	☐ on ☐ off
..	**Text**	**Input 2**	user defined	No.2		
..	**Threshold 1**	**Input 2**	-999 to 999 °C	100 °C		
..	**Threshold 2**	**Input 2**	-999 to 999 °C	120 °C		
..	**Offset**	**Input 2**	-99 to 99 °C	0 °C		
..	**Monit.**	**Input 2**	high limit /low limit mon.	high limit mon.	☐ h ☐ l	☐ h ☐ l
..	Pt100-Measuring input 3					
..	**Configure**	**Input 3**	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
..	**Input 3**		ON/OFF	ON	☐ on ☐ off	☐ on ☐ off
..	**Text**	**Input 3**	user defined	No.3		
..	**Threshold 1**	**Input 3**	-999 to 999 °C	100 °C		
..	**Threshold 2**	**Input 3**	-999 to 999 °C	120 °C		
..	**Offset**	**Input 3**	-99 to 99 °C	0 °C		
..	**Monit.**	**Input 3**	high limit /low limit mon.	high limit mon.	☐ h ☐ l	☐ h ☐ l
..	Pt100-Measuring input 4					
..	**Configure**	**Input 4**	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
..	**Input 4**		ON/OFF	ON	☐ on ☐ off	☐ on ☐ off
..	**Text**	**Input 4**	user defined	No.4		
..	**Threshold 1**	**Input 4**	-999 to 999 °C	100 °C		
..	**Threshold 2**	**Input 4**	-999 to 999 °C	120 °C		
..	**Offset**	**Input 4**	-99 to 99 °C	0 °C		
408-416	**Monit.**	**Input 4**	high limit /low limit mon.	high limit mon.	☐ h ☐ l	☐ h ☐ l

Option	Parameter	Adjustment range	Default value	Customer settings	
	CONFIGURATION OF THE MEASURING INPUTS				
408-416	Pt100-Measuring input 5				
..	**Configure Input 5**	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
..	**Input 5**	ON/OFF	ON	☐ on ☐ off	☐ on ☐ off
..	**Text Input 5**	user defined	No.5		
..	**Threshold 1 Input 5**	-999 to 999 °C	100 °C		
..	**Threshold 2 Input 5**	-999 to 999 °C	120 °C		
..	**Offset Input 5**	-99 to 99 °C	0 °C		
..	**Monit. Input 5**	high limit /low limit mon.	high limit mon.	☐ h ☐ l	☐ h ☐ l
..	Pt100-Measuring input 6				
..	**Configure Input 6**	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
..	**Input 6**	ON/OFF	ON	☐ on ☐ off	☐ on ☐ off
..	**Text Input 6**	user defined	No.6		
..	**Threshold 1 Input 6**	-999 to 999 °C	100 °C		
..	**Threshold 2 Input 6**	-999 to 999 °C	120 °C		
..	**Offset Input 6**	-99 to 99 °C	0 °C		
..	**Monit. Input 6**	high limit /low limit mon.	high limit mon.	☐ h ☐ l	☐ h ☐ l
..	Pt100-Measuring input 7				
..	**Configure Input 7**	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
..	**Input 7**	ON/OFF	ON	☐ on ☐ off	☐ on ☐ off
..	**Text Input 7**	user defined	No.7		
..	**Threshold 1 Input 7**	-999 to 999 °C	100 °C		
..	**Threshold 2 Input 7**	-999 to 999 °C	120 °C		
..	**Offset Input 7**	-99 to 99 °C	0 °C		
..	**Monit. Input 7**	high limit /low limit mon.	high limit mon.	☐ h ☐ l	☐ h ☐ l
..	Pt100-Measuring input 8				
..	**Configure Input 8**	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
..	**Input 8**	ON/OFF	ON	☐ on ☐ off	☐ on ☐ off
..	**Text Input 8**	user defined	No.8		
..	**Threshold 1 Input 8**	-999 to 999 °C	100 °C		
..	**Threshold 2 Input 8**	-999 to 999 °C	120 °C		
..	**Offset Input 8**	-99 to 99 °C	0 °C		
408-416	**Monit. Input 8**	high limit /low limit mon.	high limit mon.	☐ h ☐ l	☐ h ☐ l
412-416	Pt100-Measuring input 9				
..	**Configure Input 9**	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
..	**Input 9**	ON/OFF	ON	☐ on ☐ off	☐ on ☐ off
..	**Text Input 9**	user defined	No.9		
..	**Threshold 1 Input 9**	-999 to 999 °C	100 °C		
..	**Threshold 2 Input 9**	-999 to 999 °C	120 °C		
..	**Offset Input 9**	-99 to 99 °C	0 °C		
..	**Monit. Input 9**	high limit /low limit mon.	high limit mon.	☐ h ☐ l	☐ h ☐ l
..	Pt100-Measuring input 10				
..	**Configure Input 10**	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
..	**Input 10**	ON/OFF	ON	☐ on ☐ off	☐ on ☐ off
..	**Text Input 10**	user defined	No.10		
..	**Threshold 1 Input 10**	-999 to 999 °C	100 °C		
..	**Threshold 2 Input 10**	-999 to 999 °C	120 °C		
..	**Offset Input 10**	-99 to 99 °C	0 °C		
..	**Monit. Input 10**	high limit /low limit mon.	high limit mon.	☐ h ☐ l	☐ h ☐ l
..	Pt100-Measuring input 11				
..	**Configure Input 11**	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
..	**Input 11**	ON/OFF	ON	☐ on ☐ off	☐ on ☐ off
..	**Text Input 11**	user defined	No.11		
..	**Threshold 1 Input 11**	-999 to 999 °C	100 °C		
..	**Threshold 2 Input 11**	-999 to 999 °C	120 °C		
..	**Offset Input 11**	-99 to 99 °C	0 °C		
412-416	**Monit. Input 11**	high limit /low limit mon.	high limit mon.	☐ h ☐ l	☐ h ☐ l

Option	Parameter		Adjustment range	Default value	Customer settings	
	CONFIGURATION OF THE MEASURING INPUTS					
412-416	Pt100-Measuring input 12					
..	**Configure**	**Input 12**	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
..	**Input 12**		ON/OFF	ON	☐ on ☐ off	☐ on ☐ off
..	**Text**	**Input 12**	user defined	No.12		
..	**Threshold 1**	**Input 12**	-999 to 999 °C	100 °C		
..	**Threshold 2**	**Input 12**	-999 to 999 °C	120 °C		
..	**Offset**	**Input 12**	-99 to 99 °C	0 °C		
412-416	**Monit.**	**Input 12**	high limit /low limit mon.	high limit mon.	☐ h ☐ l	☐ h ☐ l
416	Pt100-Measuring input 13					
..	**Configure**	**Input 13**	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
..	**Input 13**		ON/OFF	ON	☐ on ☐ off	☐ on ☐ off
..	**Text**	**Input 13**	user defined	No.13		
..	**Threshold 1**	**Input 13**	-999 to 999 °C	100 °C		
..	**Threshold 2**	**Input 13**	-999 to 999 °C	120 °C		
..	**Offset**	**Input 13**	-99 to 99 °C	0 °C		
..	**Monit.**	**Input 13**	high limit /low limit mon.	high limit mon.	☐ h ☐ l	☐ h ☐ l
..	Pt100-Measuring input 14					
..	**Configure**	**Input 14**	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
..	**Input 14**		ON/OFF	ON	☐ on ☐ off	☐ on ☐ off
..	**Text**	**Input 14**	user defined	No.14		
..	**Threshold 1**	**Input 14**	-999 to 999 °C	100 °C		
..	**Threshold 2**	**Input 14**	-999 to 999 °C	120 °C		
..	**Offset**	**Input 14**	-99 to 99 °C	0 °C		
..	**Monit.**	**Input 14**	high limit /low limit mon.	high limit mon.	☐ h ☐ l	☐ h ☐ l
..	Pt100-Measuring input 15					
..	**Configure**	**Input 15**	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
..	**Input 15**		ON/OFF	ON	☐ on ☐ off	☐ on ☐ off
..	**Text**	**Input 15**	user defined	No.15		
..	**Threshold 1**	**Input 15**	-999 to 999 °C	100 °C		
..	**Threshold 2**	**Input 15**	-999 to 999 °C	120 °C		
..	**Offset**	**Input 15**	-99 to 99 °C	0 °C		
..	**Monit.**	**Input 15**	high limit /low limit mon.	high limit mon.	☐ h ☐ l	☐ h ☐ l
..	Pt100-Measuring input 16					
..	**Configure**	**Input 16**	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
..	**Input 16**		ON/OFF	ON	☐ on ☐ off	☐ on ☐ off
..	**Text**	**Input 16**	user defined	No.16		
..	**Threshold 1**	**Input 16**	-999 to 999 °C	100 °C		
..	**Threshold 2**	**Input 16**	-999 to 999 °C	120 °C		
..	**Offset**	**Input 16**	-99 to 99 °C	0 °C		
416	**Monit.**	**Input 16**	high limit /low limit mon.	high limit mon.	☐ h ☐ l	☐ h ☐ l

Option	Parameter	Adjustment range	Default value	Customer settings	
	CUSTOMER SETTINGS				
	CONFIGURATION OF THE DIGITAL INPUTS				
	DI acknowledge	energize to ack./ release to ack.	energize to ack.	☐ e ☐ r	☐ e ☐ r
	CONFIGURATION OF THE SIGNAL RELAYS				
	Wire break relay acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Relay thresh.1 acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Relay thresh.2 acknowledge	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	Relay self reset	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
	CONFIGURATION OF THE INTERFACE				
SU	Configure Interface	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
SU PRO	PROFIBUS-station	1 to 125	1		
SU PRO	PROFIBUS Watchdog	YES/NO	NO	☐ Y ☐ N	☐ Y ☐ N
SU MOD	Device number MOD-Bus	0 to 255	1		
..	Baudrate	1,200/2,400/4,800/ 9,600/19,200 Baud	9,600Baud		
..	Parity	none/even/odd	none		
..	Number of Stopbits	one/two	one		
SU MOD	Delay to send MOD-Bus	00.0 to 50.0 ms	02.0ms		
SU CAN	CAN No.	1 to 8	1		

Appendix C.
Service Options

Product Service Options

The following factory options are available for servicing Woodward equipment, based on the standard Woodward Product and Service Warranty (5-01-1205) that is in effect at the time the product is purchased from Woodward or the service is performed. If you are experiencing problems with installation or unsatisfactory performance of an installed system, the following options are available:

- Consult the troubleshooting guide in the manual.
- Contact Woodward technical assistance (refer to "How to Contact Woodward" later in this chapter) and discuss your problem. In most cases, your problem can be resolved over the phone. If not, you can select which course of action you wish to pursue based on the available services listed in this section.

Returning Equipment for Repair

If a control (or any part of an electronic control) is to be returned to Woodward for repair, please contact Woodward in advance to obtain a Return Authorization Number. When shipping the unit(s), attach a tag with the following information:

- name and location where the control is installed;
- name and phone number of contact person;
- complete Woodward part numbers (P/N) and serial number (S/N);
- description of the problem;
- instructions describing the desired repair.

CAUTION

To prevent damage to electronic components caused by improper handling, read and observe the precautions in Woodward manual 82715, *Guide for Handling and Protection of Electronic Controls, Printed Circuit Boards, and Modules.*

Packing a Control

Use the following materials when returning a complete control:

- protective caps on any connectors;
- antistatic protective bags on all electronic modules;
- packing materials that will not damage the surface of the unit;
- at least 100 mm (4 inches) of tightly packed, industry-approved packing material;
- a packing carton with double walls;
- a strong tape around the outside of the carton for increased strength.

Return Authorization Number RAN

When returning equipment to Woodward, please telephone and ask for the Customer Service Department in Stuttgart [+49 (711) 789 54-0]. They will help expedite the processing of your order through our distributors or local service facility. To expedite the repair process, contact Woodward in advance to obtain a Return Authorization Number, and arrange for issue of a purchase order for the unit(s) to be repaired. No work can be started until a purchase order is received.

NOTE

We highly recommend that you make arrangement in advance for return shipments. Contact a Woodward customer service representative at +49 (711) 789 54-0 for instructions and for a Return Authorization Number.

Replacement Parts

When ordering replacement parts for controls, include the following information:

- the part numbers P/N (XXXX-XXX) that is on the enclosure nameplate;
- the unit serial number S/N, which is also on the nameplate.

How to Contact Woodward

Please contact following address if you have questions or if you want to send a product for repair:

Woodward GmbH
Handwerkstrasse 29
70565 Stuttgart - Germany

Phone: +49 (711) 789 54-0 (8.00 - 16.30 German time)
Fax: +49 (711) 789 54-100
e-mail: stgt-info@woodward.com

For assistance outside Germany, call one of the following international Woodward facilities to obtain the address and phone number of the facility nearest your location where you will be able to get information and service.

Facility	Phone number
USA	+1 (970) 482 5881
India	+91 (129) 409 7100
Brazil	+55 (19) 3708 4800
Japan	+81 (476) 93 4661
The Netherlands	+31 (23) 566 1111

You can also contact the Woodward Customer Service Department or consult our worldwide directory on Woodward's website (**www.woodward.com**) for the name of your nearest Woodward distributor or service facility. [For worldwide directory information, go to **www.woodward.com/ic/locations**.]

Engineering Services

Woodward Industrial Controls Engineering Services offers the following after-sales support for Woodward products. For these services, you can contact us by telephone, by e-mail, or through the Woodward website.

- Technical support
- Product training
- Field service during commissioning

Technical Support is available through our many worldwide locations, through our authorized distributors, or through GE Global Controls Services, depending on the product. This service can assist you with technical questions or problem solving during normal business hours. Emergency assistance is also available during non-business hours by phoning our toll-free number and stating the urgency of your problem. For technical engineering support, please contact us via our toll-free or local phone numbers, e-mail us, or use our website and reference technical support.

Product Training is available on-site from several of our worldwide facilities, at your location, or from GE Global Controls Services, depending on the product. This training, conducted by experienced personnel, will assure that you will be able to maintain system reliability and availability. For information concerning training, please contact us via our toll-free or local phone numbers, e-mail us, or use our website and reference ***customer training***.

Field Service engineering on-site support is available, depending on the product and location, from our facility in Colorado, or from one of many worldwide Woodward offices or authorized distributors. Field engineers are experienced on both Woodward products as well as on much of the non-Woodward equipment with which our products interface. For field service engineering assistance, please contact us via our toll-free or local phone numbers, e-mail us, or use our website and reference ***field service***.

Technical Assistance

If you need to telephone for technical assistance, you will need to provide the following information. Please write it down here before phoning:

Contact

Your company _____

Your name _____

Phone number _____

Fax number _____

Control (see name plate)

Unit no. and revision: P/N: _____ REV: _____

Unit type TUG 4_____

Serial number S/N _____

Description of your problem

_____

_____

_____

_____

_____

_____

We appreciate your comments about the content of our publications.

Please send comments to: stgt-documentation@woodward.com

Please include the manual number from the front cover of this publication.

Woodward GmbH
Handwerkstrasse 29 - 70565 Stuttgart - Germany
Phone +49 (711) 789 54-0 • Fax +49 (711) 789 54-100
stgt-info@woodward.com

Homepage

http://www.woodward.com/power

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2007/9/Stuttgart