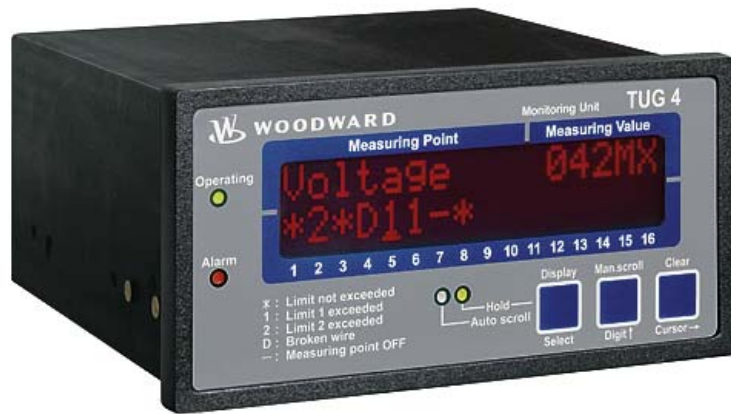




TUG 4 Temperature Monitoring Unit



Operation Manual Software Version 1.6xx/2.6xx

**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.

Woodward reserves the right to update any portion of this publication at any time. Information provided by Woodward is believed to be correct and reliable. However, Woodward assumes no responsibility unless otherwise expressly undertaken.

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Revision History

Rev.	Date	Editor	Change
NEW	04-12-22	TP	Release
A	07-09-12	TP	Minor corrections; range enlargement example added



INACTIVE – FOR REFERENCE ONLY

The information in this publication is no longer current, and may not reflect changes or safety issues that have occurred since the publication was originally released.

Refer to the TUG 4 Packages manual 37359 for more recent information about the TUG 4 unit.

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Chapter 1. General Information



Related Documents



Type	English	German
Temperature Monitoring Unit TUG 4		
TUG 4 – Manual	this manual ⇨	37303 GR37303

Table 1-1: Manual - overview

Overview



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

- **TUG 404** 4 measuring inputs
- **TUG 408** 8 measuring inputs
- **TUG 412** 12 measuring inputs
- **TUG 416** 16 measuring inputs

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.

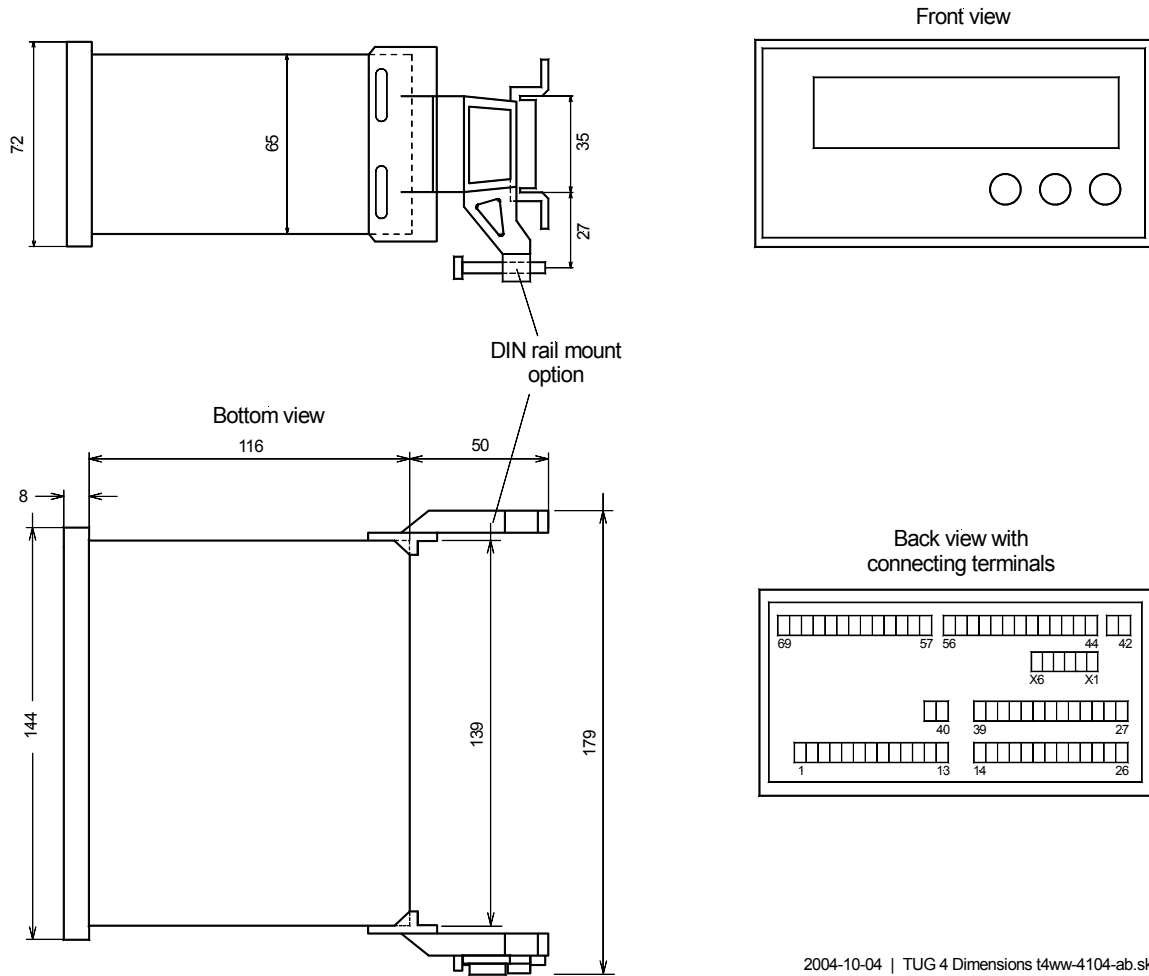


CAUTION

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

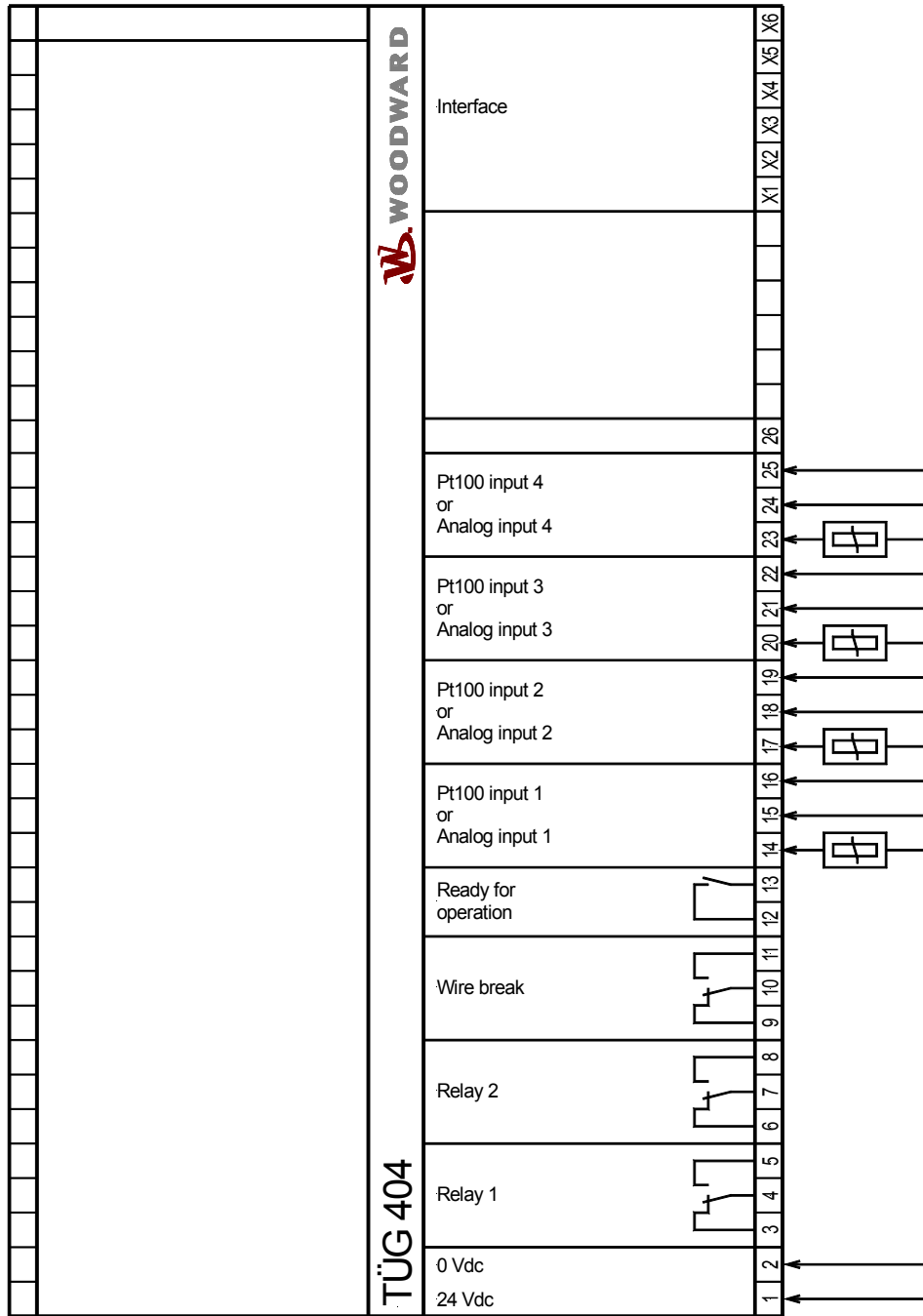


2004-10-04 | TUG 4 Dimensions t4ww-4104-ab.skf

Figure 3-1: Dimensions TUG 4

Chapter 4. Wiring Diagrams

TUG 404

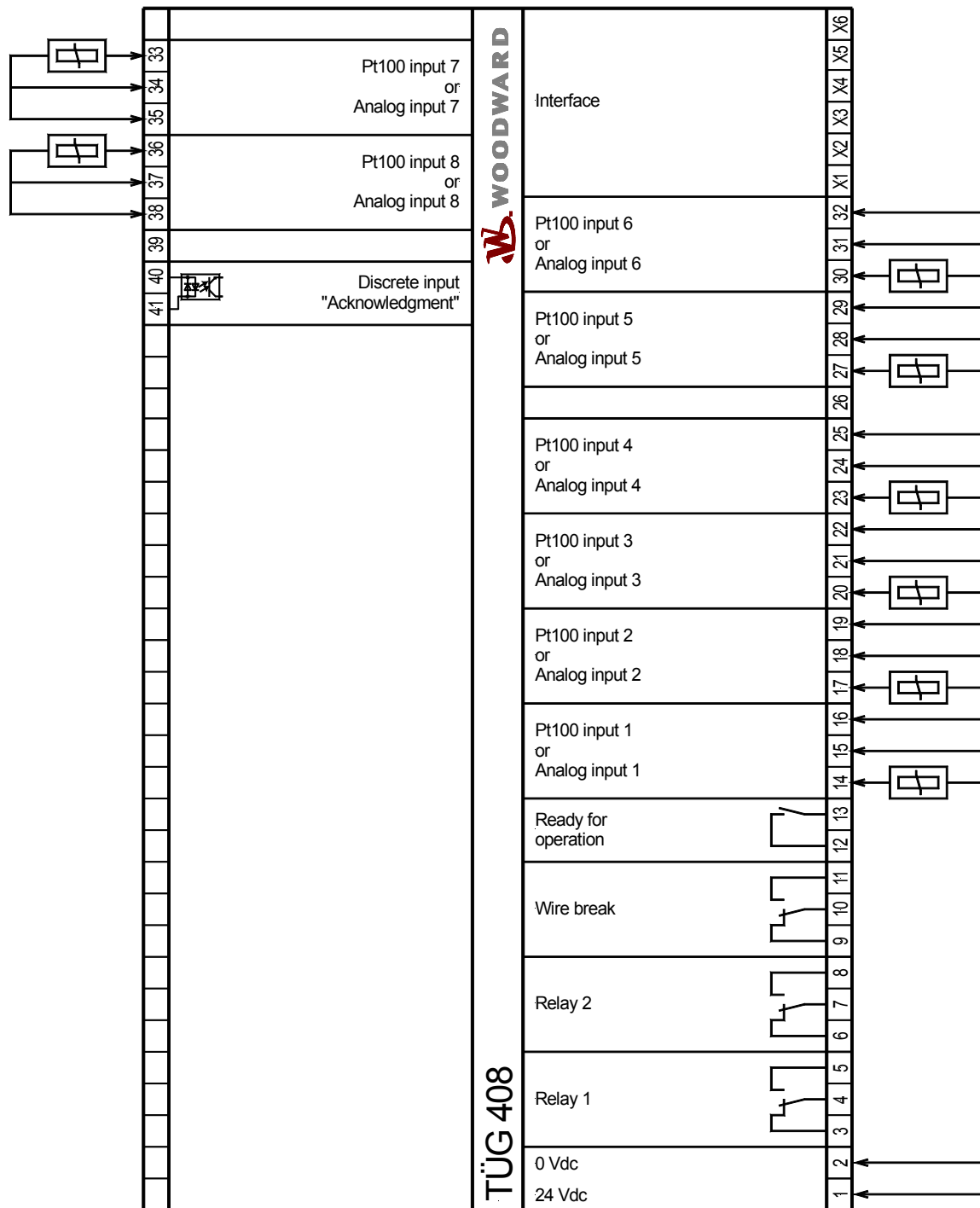


Subject to technical modifications.

2004-09-22 | TUG 4 Wiring Diagram Mww-0439-ap.skf

Figure 4-1: Wiring diagram TUG 404

TUG 408



Subject to technical modifications.

2004-09-22 | TUG 4 Wiring Diagram Hww-0439-ap.skf

Figure 4-2: Wiring diagram TUG 408

TUG 412

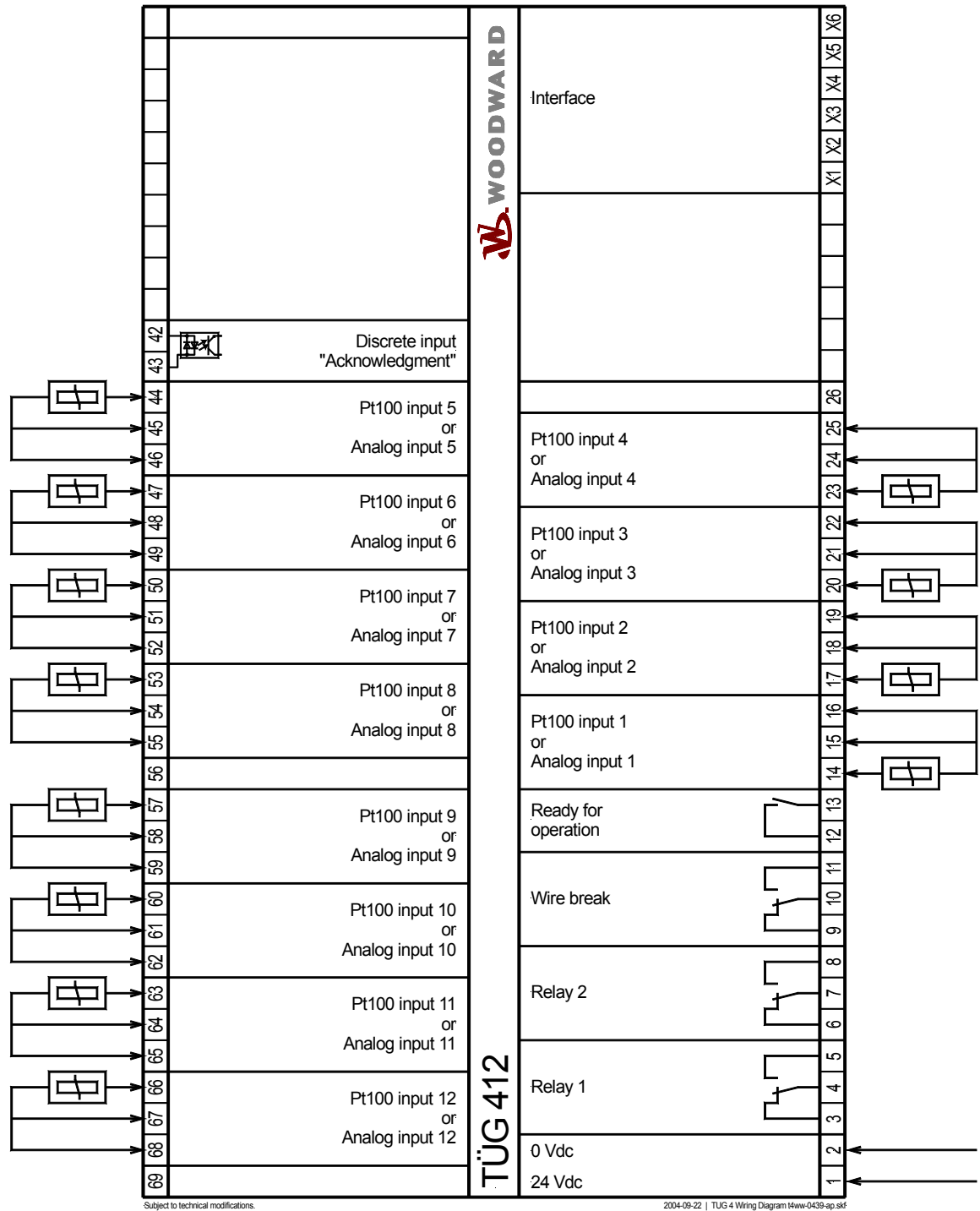
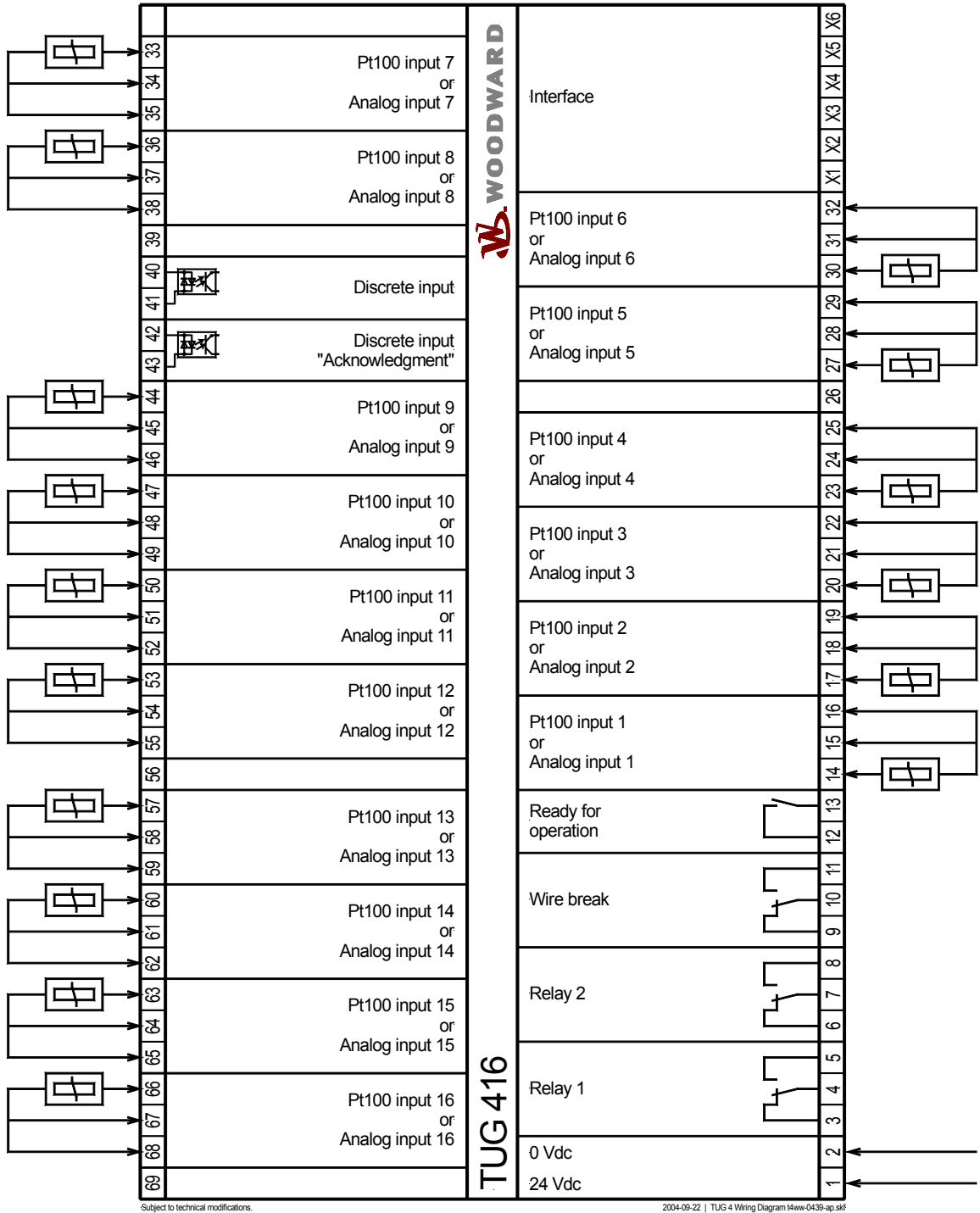


Figure 4-3: Wiring diagram TUG 412

TUG 416



Subject to technical modifications.

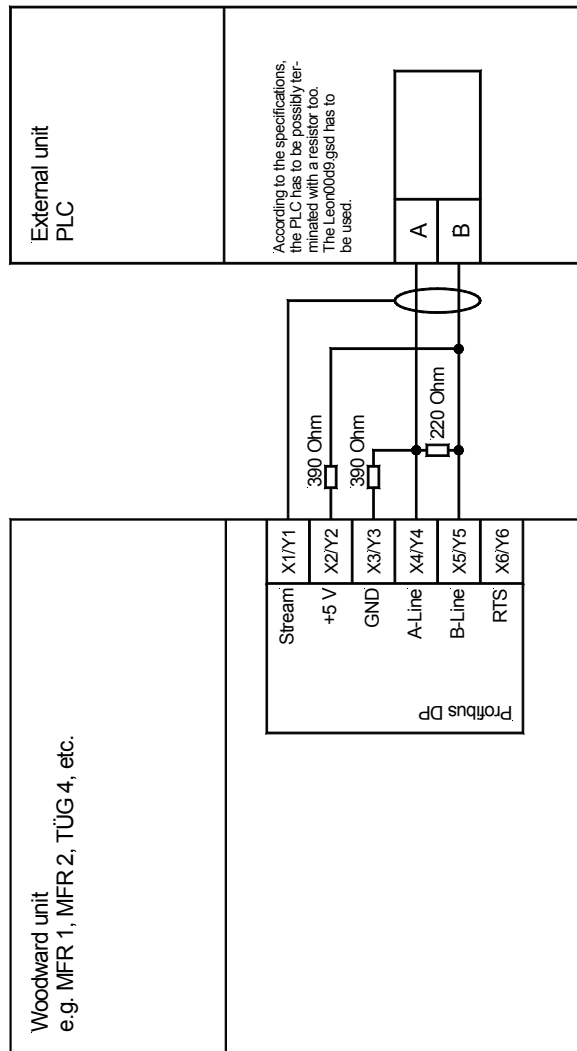
2004-09-22 | TUG 4 Wiring Diagram 14ww-0439-ap.skf

Figure 4-5: Wiring diagram TUG 416

Data Coupling TUG 4 Via Profibus DP



Data coupling Coupling direct out of the units via Profibus DP slave



2003-01-24 | Datenkopplung 2004-08-30.skf

Figure 4-6: Data coupling TUG 4

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

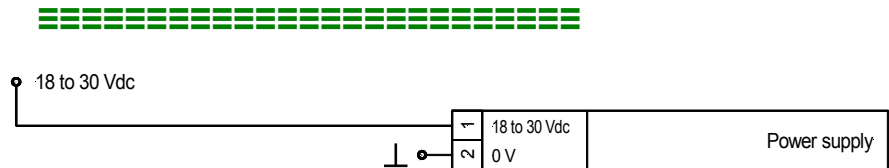


Figure 5-1: Power supply

Terminal	Description	A _{max}
2	0 V reference potential	2.5 mm ²
1	18 to 30 Vdc	2.5 mm ²

Table 5-1: Power supply- terminal assignment

Discrete Inputs

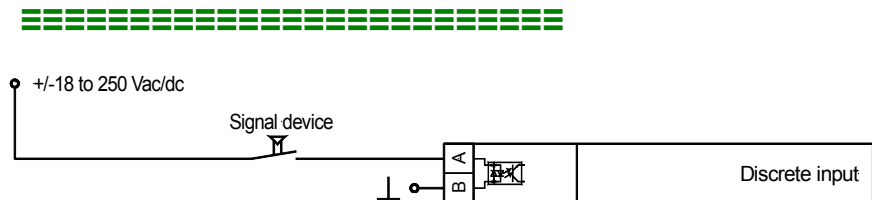


Figure 5-2: Discrete inputs

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 mm ²
TUG 412 / 416			
40	41	Discrete input 1 (without function)	1.5 mm ²
42	43	Discrete input 2 "Clear" (Acknowledge)	1.5 mm ²

Table 5-2: Discrete inputs - terminal assignment

Relay Outputs

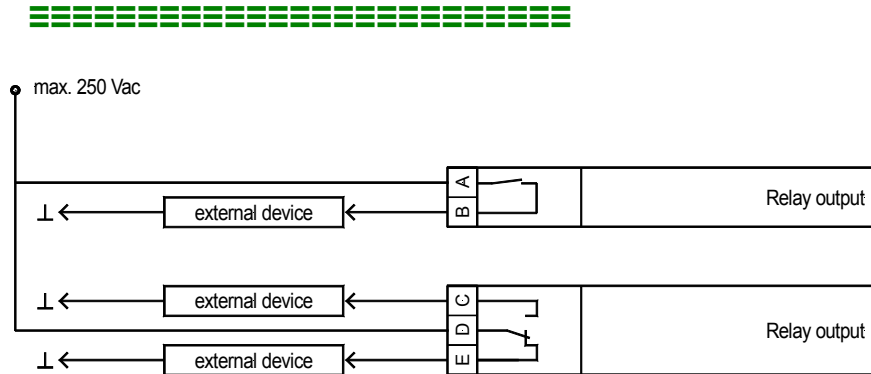


Figure 5-3: Relay output

Terminal		Description	A _{max}
<i>N.O. contact</i>			
Root A	Closing B		
13	.	Readiness for operation	1.5 mm ²
<i>Form C contacts</i>			
Closing C	Root D	Opening E	
5	4	3	Limit value 1 exceeded 1.5 mm ²
8	7	6	Limit value 2 exceeded 1.5 mm ²
11	10	9	Wire break 1.5 mm ²

Table 5-3: Relay output - terminal assignment

Measurement Inputs/Analog Inputs (Option Th)

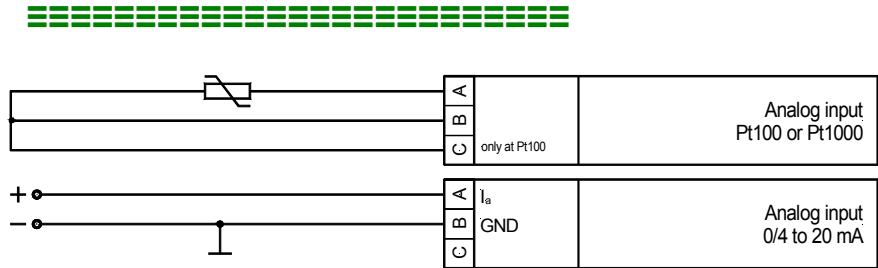


Figure 5-4: Analog inputs

Terminal			Description	A _{max}
A	B	C		
TUG 404, TUG 408, TUG 412, TUG 416				
14	15	16	Temperature/analog input 1	1.5 mm ²
17	18	19	Temperature/analog input 2	1.5 mm ²
20	21	22	Temperature/analog input 3	1.5 mm ²
23	24	25	Temperature/analog input 4	1.5 mm ²
TUG 412				
44	45	46	Temperature/analog input 5	1.5 mm ²
47	48	49	Temperature/analog input 6	1.5 mm ²
50	51	52	Temperature/analog input 7	1.5 mm ²
53	54	55	Temperature/analog input 8	1.5 mm ²
57	58	59	Temperature/analog input 9	1.5 mm ²
60	61	62	Temperature/analog input 10	1.5 mm ²
63	64	65	Temperature/analog input 11	1.5 mm ²
66	67	68	Temperature/analog input 12	1.5 mm ²
TUG 408, TUG 416				
27	28	29	Temperature/analog input 5	1.5 mm ²
30	31	32	Temperature/analog input 6	1.5 mm ²
33	34	35	Temperature/analog input 7	1.5 mm ²
36	37	38	Temperature/analog input 8	1.5 mm ²
44	45	46	Temperature/analog input 9 only 416	1.5 mm ²
47	48	49	Temperature/analog input 10 only 416	1.5 mm ²
50	51	52	Temperature/analog input 11 only 416	1.5 mm ²
53	54	55	Temperature/analog input 12 only 416	1.5 mm ²
57	58	59	Temperature/analog input 13 only 416	1.5 mm ²
60	61	62	Temperature/analog input 14 only 416	1.5 mm ²
63	64	65	Temperature/analog input 15 only 416	1.5 mm ²
66	67	68	Temperature/analog input 16 only 416	1.5 mm ²

Table 5-4: Analog inputs - terminal assignment

Interface (Option Su)

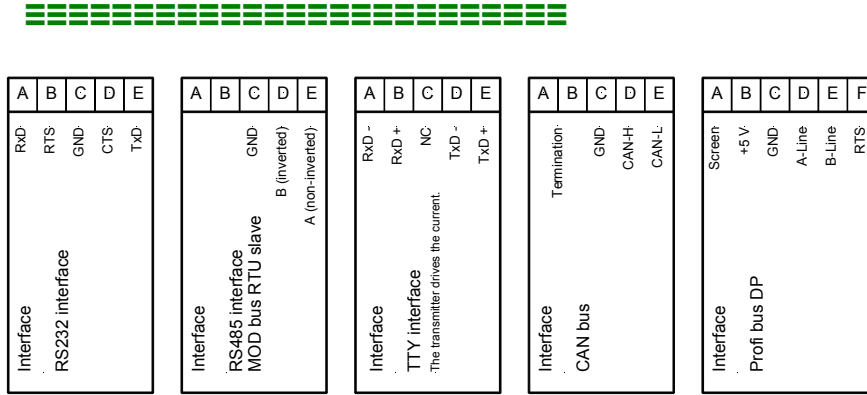


Figure 5-5: Interfaces

Terminal						Description
A (X1)	B (X2)	C (X3)	D (X4)	E (X5)	F (X6)	
RxD	RTS	GND	CTS	TxD		RS-232
		GND	B	A		RS-485, MOD bus RTU Slave
RxD-	RxD+	NC	TxD-	TxD+		TTY (transmitter drives current)
		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

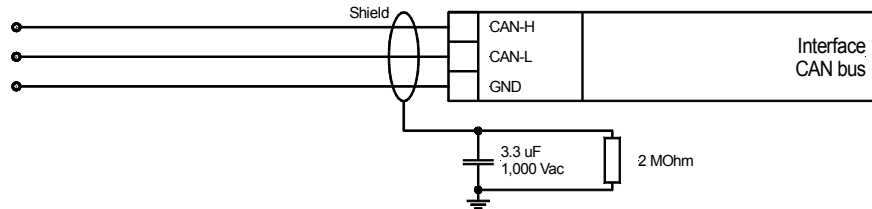


Figure 5-6: CAN bus



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 impedance of the cable (e.g. 120 Ohm). Also, the Profibus DP must be terminated according to the specification (refer to Data Coupling TUG 4 on page 14).

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 4, 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. Other analog inputs (e. g. for thermocouples, pressure sensors, 20 mA sensors) and temperature ranges are available as options.

The following standard types are available:

- **TUG 404** = 4 × Pt 100 temperature measuring inputs
- **TUG 408** = 8 × Pt 100 temperature measuring inputs
- **TUG 412** = 12 × Pt 100 temperature measuring inputs
- **TUG 416** = 16 × Pt 100 temperature measuring inputs

Function



The TUG 4 LC-display indicates all measured values including the corresponding name of the measuring input for 4 (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. Exceeding 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 (Siemens DK 3964 for Interpreter RK 512, MOD bus RTU Slave, Profibus DP, CAN bus). Different hardware configurations are available depending on the interface type (RS-232, RS-485 or TTY).

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 occurred 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 separately by using the "Clear" button. To acknowledge the next alarm (in the order of their occurrence), 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:

- | | |
|--|---|
| <ul style="list-style-type: none"> • Relay programming: - Relay self reset "NO" - Relay acknowledge "YES" | <p>→ Function</p> <ul style="list-style-type: none"> - <u>Auto-resetting of the relay</u>
The relays do not reset automatically if the alarm is no longer present - <u>Manual acknowledge</u>
The relays can be reset with the "Clear" button regardless whether an alarm is present or not |
| <ul style="list-style-type: none"> • Relay programming: - Relay self reset "NO" - Relay acknowledge "NO" | <p>→ Function</p> <ul style="list-style-type: none"> - <u>Auto-resetting of the relay</u>
The relays do not reset automatically if the alarm is no longer present - <u>Manual acknowledge</u>
The relays cannot be reset with the "Clear" button as long as an alarm is present |
| <ul style="list-style-type: none"> • Relay programming: - Relay self reset "YES" - Relay acknowledge "YES" | <p>→ Function</p> <ul style="list-style-type: none"> - <u>Auto-resetting of the relay</u>
The relays reset automatically as soon as the alarm is no longer present - <u>Manual acknowledge</u>
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" (TUG 408/412/416) 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.

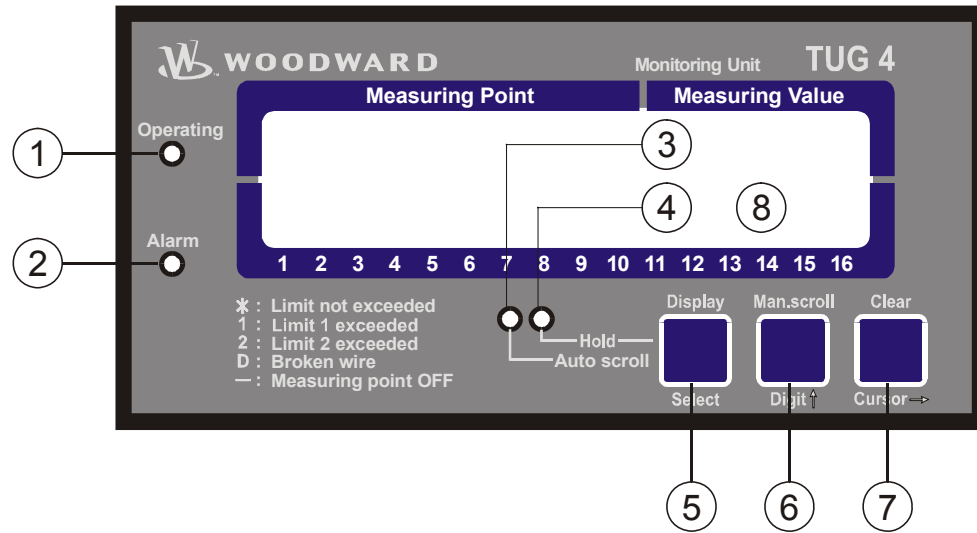


Figure 7-1: Front panel

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" |
| <p>The LED "Operating" indicates the operating mode and the measurement monitoring is performed according to the configured values.</p> | | | |
| ② | LED
"Alarm" | Alarm message | Color "RED" |
| <p>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.</p> | | | |
| ③ | LED
"Auto scroll" | Display Scrolling | Color "ORANGE" |
| <p>The display of the measured values and the alarms scrolls continuously through all measuring inputs.</p> | | | |
| ④ | LED
"Hold" | Display Hold | Color "ORANGE" |
| <p>The display of the measured values and alarms is locked to one measuring input. The display may be advanced with the "Man.scroll↓" button.</p> | | | |

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 |
| <p>DisplayBy pressing this button, the display can be changed between hold and Scroll mode.</p> <p>SelectIf 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.</p> | | |
| ⑥ | "Man.scroll"
"Digit↑"
Button | Man.scroll / Digit↑ |
| <p>Man.scrollBy pressing this button the display can be manually advanced to the next alarm message or measuring input.</p> <p>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.</p> | | |

- ⑦ **"Clear"** **Clear / Cursor→**
"Cursor→"
Button
 - Clear** Alarm messages are deleted by pressing this button. This function is described in detail on page 21 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 User: Third party

(CL0) This code level does not permit access to any parameters.

Code level 2 User: Commissioner

(CL2) 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**

ONAccess 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.
OFFAccess 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 4, 8, 12, or 16 measuring inputs. The following configuration settings are identical for each measuring input. As an example the settings are listed for input 1 only.

Configure input 1
YES

Configure measuring input 1 **YES/NO**

In order to facilitate configuration, the configuration can be enabled separately for each measuring input. Selecting "YES" or "NO" does not effect the monitoring function. This entry has the following effects only:
YESThe 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)).
NOThe parameters of the following block are not displayed, cannot be modified, and are skipped.

Pt100 Measuring Inputs

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.

0/4 to 20 mA Measuring Inputs

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+unit inp.1
000mbar

Text and unit for measuring input 1 **user-defined**

The description of the analog input may be programmed using this parameter. A maximum of four zeros may be used place holders for the numerical measuring values to be displayed. Any characters (e.g. comma) may divide the placeholders., The measured values subsequently appear wherever the zeros are placed.

Examples: [Tank 0000 Liter]
[Charge ct 0,000A]
[Oil pr. 0,0 bars]

Measuring range
Input 1 0-00mA

Measuring range **0 to 20 mA / 4 to 20mA**

The measuring range 0 to 20 mA or 4 to 20 mA is selected via this parameter. If the 4 to 20 mA setting is selected and a current of less than 2 mA is measured, the control issues a broken wire alarm(see below).

Value at 0%
Input 1 0000

Lowest input value **-9.999 to 9.999**

A numerical value is assigned to the scaleable analog input which corresponds to the lowest input value. This is defined as the value that is read (e.g. 0 %= 0 kW, 0 V) when the analog input is at its minimum value (0 mA or 4 mA).

Value at 100%
Input 1 0000

Highest input value **-9.999 to 9.999**

A numerical value is assigned to the scaleable analog input which corresponds to the highest input value This is defined as the value that is read (e.g. 100 %= 500 kW, 400 V) when the analog input is at its maximum value (20mA).

Threshold 1
Input 1 0000

Threshold 1 value of input 1 **-9.999 to 9.999**

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. maximum water pressure value expected = 2 bars, configured value = 10 bars).

Threshold 2
Input 1 0000

Threshold 2 value of input 1 **-9.999 to 9.999**

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. maximum water pressure value expected = 2 bars, configured value = 10 bars).

```
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.

```
Measuring
filter time
```

Measuring filter time constant**OFF / [time constant from list]**

The measured value is either be displayed in real-time (setting "OFF") or the display will be refreshed at a configured rate, which is filtered using a time constant. Available time constants are 0.04/0.08/0.16/0.32/0.64/1.28/2.56/5.12 seconds.

Example for the enlargement of the analog input range:

If a temperature range from 0° to 30° C is to be measured, the following settings may be utilized:

```
Text+unit inp.1
Temperature 00 C
```

The display is defined by the term "Temperature", two zeros as wildcards for the two-digit temperature display and the character "C".

```
Value at 0%
Input 1    0000
```

The value at 0% for the minimum input value of the analog input (0 or 4 mA) is configured with 0 [° C].

```
Value at 100%
Input 1    0030
```

The value at 100% for the maximum input value of the analog input (20 mA) is configured with 30 [° C].

The disadvantage of this setting is the display resolution of only 1° C. This problem may be solved by enlarging the range. The following settings show how to improve the display resolution by enlarging the range:

```
Text+unit inp.1
Temp.    00.00 C
```

The display is defined by the term "Temp.", four zeros, separated by a decimal point as wildcards for the four-digit temperature display with two decimals and the character "C".

```
Value at 0%
Input 1    0000
```

The value at 0% for the minimum input value of the analog input (0 or 4 mA) is configured with 0 [° C].

```
Value at 100%
Input 1    3000
```

The value at 100% for the maximum input value of the analog input (20 mA) is configured with 30 [° C] (3000 stands for 30.00 [° C] here with the four-digit temperature display with two decimals.

Now, the display resolution is 0.01° C.

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

YesThe 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**

YesThe 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**

YesThe 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**

YesThe 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 DK3964

Destination data block	000
---------------------------	-----

Data block RK512	0 to 255
------------------	----------

Data block address for receiver (e.g. PLC).

Destination data word	000
--------------------------	-----

Data word RK512	0 to 255
-----------------	----------

Data word address for receiver (e.g. PLC).

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 MOD Bus RTU Slave

Device number	
MOD-Bus	000

Device number MOD Bus RTU Slave **1 to 255**

Device number for the MOD Bus RTU Slave.

Baudrate	
	0000

Baud rate MOD Bus RTU Slave **1.200 / 2.400 / 4.800 / 9.600 / 19.200**

The baud rate of the MOD Bus RTU Slave is defined here.

Parity	
	none

Parity MOD Bus RTU Slave **none / even / odd**

The parity of the MOD Bus RTU Slave is defined here.

Stopbits	
	one

Stop bits MOD Bus RTU Slave **one / two**

The number of stop bits of the MOD Bus 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:

LIFE THREATENING



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**-----
- Kontakt 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
 - 0/4 to 20 mA input differential measurement, max. burden 250 Ω
 - 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
 - RS-232 interface**
 - Version.....RS-232 Standard
 - RS-485 interface**
 - Version.....RS-485 Standard
 - 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
3964	MOD bus	CAN bus	Profibus			

Byte	Word	Word	Byte				
00	01	1	MUX=1, 1	0/1	Telegram type	"501"	
02	03	2	MUX=1, 2	2/3	Measuring input 1 (14/15/16)	°C	
04	05	3	MUX=1, 3	4/5	Measuring input 2 (17/18/19)	°C	
06	07	4	MUX=2, 1	6/7	Measuring input 3 (20/21/22)	°C	
08	09	5	MUX=2, 2	8/9	Measuring input 4 (23/24/25)	°C	
10	11	6	MUX=2, 3	10/11	Measuring input 5 (27/28/29)	°C	
12	13	7	MUX=3, 1	12/13	Measuring input 6 (30/31/32)	°C	
14	15	8	MUX=3, 2	14/15	Measuring input 7 (33/34/35)	°C	
16	17	9	MUX=3, 3	16/17	Measuring input 8 (36/37/38)	°C	
18	19	10	MUX=4, 1	18/19	Measuring input 9 (44/45/46)	°C	
20	21	11	MUX=4, 2	20/21	Measuring input 10 (47/48/49)	°C	
22	23	12	MUX=4, 3	22/23	Measuring input 11 (50/51/52)	°C	
24	25	13	MUX=5, 1	24/25	Measuring input 12 (53/54/55)	°C	
26	27	14	MUX=5, 2	26/27	Measuring input 13 (57/58/59)	°C	
28	29	15	MUX=5, 3	28/29	Measuring input 14 (60/61/62)	°C	
30	31	16	MUX=6, 1	30/31	Measuring input 15 (63/64/65)	°C	
32	33	17	MUX=6, 2	32/33	Measuring input 16 (66/67/68)	°C	
34	35	18	MUX=6, 3	34/35	Fault 1 is or has been present but has not been acknowledged yet.	Bit 15 = 1	
						Bit 14 = 1	Measuring input 16
						Bit 13 = 1	Measuring input 15
						Bit 12 = 1	Measuring input 14
						Bit 11 = 1	Measuring input 13
						Bit 10 = 1	Measuring input 12
						Bit 9 = 1	Measuring input 11
						Bit 8 = 1	Measuring input 10
						Bit 7 = 1	Measuring input 9
						Bit 6 = 1	Measuring input 8
						Bit 5 = 1	Measuring input 7
						Bit 4 = 1	Measuring input 6
						Bit 3 = 1	Measuring input 5
						Bit 2 = 1	Measuring input 4
						Bit 1 = 1	Measuring input 3
						Bit 0 = 1	Measuring input 2
						Measuring input 1	

Number				Content (Words)	Unit/Bit	Remark
3964	MOD bus	CAN bus	Profibus			
36 37	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
					38 39	20
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					
40 41	21	MUX=7, 3	40/41	Threshold 1 alarm is present		
					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	
3964	MOD bus	CAN bus	Profibus				
42	43	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
44	45	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
46	47	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
3964	MOD bus	CAN bus	Profibus			
48 49	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					
50 51	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 the corresponding option.

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 acknowledgement 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 the corresponding option.

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 acknowledgement 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 Procedure 3964 (TTY, RS-232, RS-485)

Data	Length of characters	8 Bit
	Stopbit	1 Bit
	Parity bit	1 Bit with even parity
	Data format	16 Bit Binary values, leading high-byte
	Transmitting rate	9.600 Baud. Other baudrates upon request. The data records are cyclically transmitted.

Process Interpreter RK 512 See Siemens documents for procedure 3964.

General Data For MOD Bus RTU Slave

Parameters	Transmission protocol	MOD bus RTU Slave
	Hardware	Interface RS485
	Transmitting rate	adjustable
	Slave address	adjustable
	Parity	adjustable

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

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 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.

Appendix B. Revision History

Version number	Modification valid from			Modification
	Date	Serial number	Documentation	
1.6000/ 2.6000	2004-08-19		GR 37303 Revision NEW	New <i>TUG 4/ Su</i> Modbus Interface Hardware version 2.6xxx replaces previous version 1.6xxx Changed Restructuring of the configuration screens

Appendix C. 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	<input type="checkbox"/> g <input type="checkbox"/> e <input type="checkbox"/> g <input type="checkbox"/> e	
	Software version	-	1.6xxx	- -	
	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					
404-416	Pt100-Measuring input 1				
	.. Configure	Input 1	YES/NO	NO	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> Y <input type="checkbox"/> N
	.. Input 1		ON/OFF	ON	<input type="checkbox"/> on <input type="checkbox"/> off <input type="checkbox"/> on <input type="checkbox"/> 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.	<input type="checkbox"/> h <input type="checkbox"/> l <input type="checkbox"/> h <input type="checkbox"/> l
	0/4 to 20 mA-Measuring input 1				
	.. Configure	Input 1	YES/NO	NO	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> Y <input type="checkbox"/> N
	.. Input 1		ON/OFF	ON	<input type="checkbox"/> on <input type="checkbox"/> off <input type="checkbox"/> on <input type="checkbox"/> off
	.. Text+unit	Input 1	user defined	No.1 -0000	
	.. Measuring range	Input 1	0 to 20/4 to 20 mA	0 to 20 mA	
	.. Value at 0%	Input 1	-9,999 to 9,999	0000	
	.. Value at 100%	Input 1	-9,999 to 9,999	0200	
	.. Threshold 1	Input 1	-9,999 to 9,999	0100	
	.. Threshold 2	Input 1	-9,999 to 9,999	0120	
	.. Monit.	Input 1	high limit /low limit mon.	high limit mon.	<input type="checkbox"/> h <input type="checkbox"/> l <input type="checkbox"/> h <input type="checkbox"/> l
	Pt100-Measuring input 2				
	.. Configure	Input 2	YES/NO	NO	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> Y <input type="checkbox"/> N
.. Input 2		ON/OFF	ON	<input type="checkbox"/> on <input type="checkbox"/> off <input type="checkbox"/> on <input type="checkbox"/> 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.	<input type="checkbox"/> h <input type="checkbox"/> l <input type="checkbox"/> h <input type="checkbox"/> l	
0/4 to 20 mA-Measuring input 2					
.. Configure	Input 2	YES/NO	NO	<input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> Y <input type="checkbox"/> N	
.. Input 2		ON/OFF	ON	<input type="checkbox"/> on <input type="checkbox"/> off <input type="checkbox"/> on <input type="checkbox"/> off	
.. Text+unit	Input 2	user defined	No.2 -0000		
.. Measuring range	Input 2	0 to 20/4 to 20 mA	0 to 20 mA		
.. Value at 0%	Input 2	-9,999 to 9,999	0000		
.. Value at 100%	Input 2	-9,999 to 9,999	0200		
.. Threshold 1	Input 2	-9,999 to 9,999	0100		
.. Threshold 2	Input 2	-9,999 to 9,999	0120		
.. Monit.	Input 2	high limit /low limit mon.	high limit mon.	<input type="checkbox"/> h <input type="checkbox"/> l <input type="checkbox"/> h <input type="checkbox"/> l	

Option	Parameter	Adjustment range	Default value	Customer settings
CONFIGURATION OF THE MEASURING INPUTS				
404-416	Pt100-Measuring input 3			
	Configure	Input 3	YES/NO	NO <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> Y <input type="checkbox"/> N
	Input 3		ON/OFF	<input type="checkbox"/> on <input type="checkbox"/> off <input type="checkbox"/> on <input type="checkbox"/> 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. <input type="checkbox"/> h <input type="checkbox"/> l <input type="checkbox"/> h <input type="checkbox"/> l
	0/4 to 20 mA-Measuring input 3			
	Configure	Input 3	YES/NO	NO <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> Y <input type="checkbox"/> N
	Input 3		ON/OFF	<input type="checkbox"/> on <input type="checkbox"/> off <input type="checkbox"/> on <input type="checkbox"/> off
	Text+unit	Input 3	user defined	No.3 -0000
	Measuring range	Input 3	0 to 20/4 to 20 mA	0 to 20 mA
	Value at 0%	Input 3	-9,999 to 9,999	0000
Value at 100%	Input 3	-9,999 to 9,999	0200	
Threshold 1	Input 3	-9,999 to 9,999	0100	
Threshold 2	Input 3	-9,999 to 9,999	0120	
Monit.	Input 3	high limit /low limit mon.	high limit mon. <input type="checkbox"/> h <input type="checkbox"/> l <input type="checkbox"/> h <input type="checkbox"/> l	
404-416	Pt100-Measuring input 4			
	Configure	Input 4	YES/NO	NO <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> Y <input type="checkbox"/> N
	Input 4		ON/OFF	<input type="checkbox"/> on <input type="checkbox"/> off <input type="checkbox"/> on <input type="checkbox"/> 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
	Monit.	Input 4	high limit /low limit mon.	high limit mon. <input type="checkbox"/> h <input type="checkbox"/> l <input type="checkbox"/> h <input type="checkbox"/> l
	0/4 to 20 mA-Measuring input 4			
	Configure	Input 4	YES/NO	NO <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> Y <input type="checkbox"/> N
	Input 4		ON/OFF	<input type="checkbox"/> on <input type="checkbox"/> off <input type="checkbox"/> on <input type="checkbox"/> off
	Text+unit	Input 4	user defined	No.4 -0000
	Measuring range	Input 4	0 to 20/4 to 20 mA	0 to 20 mA
	Value at 0%	Input 4	-9,999 to 9,999	0000
Value at 100%	Input 4	-9,999 to 9,999	0200	
Threshold 1	Input 4	-9,999 to 9,999	0100	
Threshold 2	Input 4	-9,999 to 9,999	0120	
Monit.	Input 4	high limit /low limit mon.	high limit mon. <input type="checkbox"/> h <input type="checkbox"/> l <input type="checkbox"/> h <input type="checkbox"/> l	
408-416	Pt100-Measuring input 5			
	Configure	Input 5	YES/NO	NO <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> Y <input type="checkbox"/> N
	Input 5		ON/OFF	<input type="checkbox"/> on <input type="checkbox"/> off <input type="checkbox"/> on <input type="checkbox"/> 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. <input type="checkbox"/> h <input type="checkbox"/> l <input type="checkbox"/> h <input type="checkbox"/> l
	0/4 to 20 mA-Measuring input 5			
	Configure	Input 5	YES/NO	NO <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> Y <input type="checkbox"/> N
	Input 5		ON/OFF	<input type="checkbox"/> on <input type="checkbox"/> off <input type="checkbox"/> on <input type="checkbox"/> off
	Text+unit	Input 5	user defined	No.5 -0000
	Measuring range	Input 5	0 to 20/4 to 20 mA	0 to 20 mA
	Value at 0%	Input 5	-9,999 to 9,999	0000
Value at 100%	Input 5	-9,999 to 9,999	0200	
Threshold 1	Input 5	-9,999 to 9,999	0100	
Threshold 2	Input 5	-9,999 to 9,999	0120	
Monit.	Input 5	high limit /low limit mon.	high limit mon. <input type="checkbox"/> h <input type="checkbox"/> l <input type="checkbox"/> h <input type="checkbox"/> l	
	Pt100-Measuring input 6			
	Configure	Input 6	YES/NO	NO <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> Y <input type="checkbox"/> N
	Input 6		ON/OFF	<input type="checkbox"/> on <input type="checkbox"/> off <input type="checkbox"/> on <input type="checkbox"/> 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. <input type="checkbox"/> h <input type="checkbox"/> l <input type="checkbox"/> h <input type="checkbox"/> l

Option	Parameter	Adjustment range	Default value	Customer settings		
CONFIGURATION OF THE MEASURING INPUTS						
0/4 to 20 mA-Measuring input 6						
..	Configure	Input 6	YES/NO	NO	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N
..	Input 6		ON/OFF	ON	<input type="checkbox"/> on <input type="checkbox"/> off	<input type="checkbox"/> on <input type="checkbox"/> off
..	Text+unit	Input 6	user defined	No.6 -0000		
..	Measuring range	Input 6	0 to 20/4 to 20 mA	0 to 20 mA		
..	Value at 0%	Input 6	-9,999 to 9,999	0000		
..	Value at 100%	Input 6	-9,999 to 9,999	0200		
..	Threshold 1	Input 6	-9,999 to 9,999	0100		
..	Threshold 2	Input 6	-9,999 to 9,999	0120		
..	Monit.	Input 6	high limit /low limit mon.	high limit mon.	<input type="checkbox"/> h <input type="checkbox"/> l	<input type="checkbox"/> h <input type="checkbox"/> l
Pt100-Measuring input 7						
..	Configure	Input 7	YES/NO	NO	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N
..	Input 7		ON/OFF	ON	<input type="checkbox"/> on <input type="checkbox"/> off	<input type="checkbox"/> on <input type="checkbox"/> 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.	<input type="checkbox"/> h <input type="checkbox"/> l	<input type="checkbox"/> h <input type="checkbox"/> l
0/4 to 20 mA-Measuring input 7						
..	Configure	Input 7	YES/NO	NO	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N
..	Input 7		ON/OFF	ON	<input type="checkbox"/> on <input type="checkbox"/> off	<input type="checkbox"/> on <input type="checkbox"/> off
..	Text+unit	Input 7	user defined	No.7 -0000		
..	Measuring range	Input 7	0 to 20/4 to 20 mA	0 to 20 mA		
..	Value at 0%	Input 7	-9,999 to 9,999	0000		
..	Value at 100%	Input 7	-9,999 to 9,999	0200		
..	Threshold 1	Input 7	-9,999 to 9,999	0100		
..	Threshold 2	Input 7	-9,999 to 9,999	0120		
408-416	Monit.	Input 7	high limit /low limit mon.	high limit mon.	<input type="checkbox"/> h <input type="checkbox"/> l	<input type="checkbox"/> h <input type="checkbox"/> l
Pt100-Measuring input 8						
..	Configure	Input 8	YES/NO	NO	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N
..	Input 8		ON/OFF	ON	<input type="checkbox"/> on <input type="checkbox"/> off	<input type="checkbox"/> on <input type="checkbox"/> 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		
..	Monit.	Input 8	high limit /low limit mon.	high limit mon.	<input type="checkbox"/> h <input type="checkbox"/> l	<input type="checkbox"/> h <input type="checkbox"/> l
0/4 to 20 mA-Measuring input 8						
..	Configure	Input 8	YES/NO	NO	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N
..	Input 8		ON/OFF	ON	<input type="checkbox"/> on <input type="checkbox"/> off	<input type="checkbox"/> on <input type="checkbox"/> off
..	Text+unit	Input 8	user defined	No.8 -0000		
..	Measuring range	Input 8	0 to 20/4 to 20 mA	0 to 20 mA		
..	Value at 0%	Input 8	-9,999 to 9,999	0000		
..	Value at 100%	Input 8	-9,999 to 9,999	0200		
..	Threshold 1	Input 8	-9,999 to 9,999	0100		
..	Threshold 2	Input 8	-9,999 to 9,999	0120		
408-416	Monit.	Input 8	high limit /low limit mon.	high limit mon.	<input type="checkbox"/> h <input type="checkbox"/> l	<input type="checkbox"/> h <input type="checkbox"/> l
Pt100-Measuring input 9						
..	Configure	Input 9	YES/NO	NO	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N
..	Input 9		ON/OFF	ON	<input type="checkbox"/> on <input type="checkbox"/> off	<input type="checkbox"/> on <input type="checkbox"/> 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.	<input type="checkbox"/> h <input type="checkbox"/> l	<input type="checkbox"/> h <input type="checkbox"/> l
0/4 to 20 mA-Measuring input 9						
..	Configure	Input 9	YES/NO	NO	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N
..	Input 9		ON/OFF	ON	<input type="checkbox"/> on <input type="checkbox"/> off	<input type="checkbox"/> on <input type="checkbox"/> off
..	Text+unit	Input 9	user defined	No.9 -0000		
..	Measuring range	Input 9	0 to 20/4 to 20 mA	0 to 20 mA		
..	Value at 0%	Input 9	-9,999 to 9,999	0000		
..	Value at 100%	Input 9	-9,999 to 9,999	0200		
..	Threshold 1	Input 9	-9,999 to 9,999	0100		
..	Threshold 2	Input 9	-9,999 to 9,999	0120		
..	Monit.	Input 9	high limit /low limit mon.	high limit mon.	<input type="checkbox"/> h <input type="checkbox"/> l	<input type="checkbox"/> h <input type="checkbox"/> l

Option	Parameter	Adjustment range	Default value	Customer settings
CONFIGURATION OF THE MEASURING INPUTS				
Pt100-Measuring input 10				
..	Configure	Input 10	YES/NO	NO <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> Y <input type="checkbox"/> N
..	Input 10		ON/OFF	<input type="checkbox"/> on <input type="checkbox"/> off <input type="checkbox"/> on <input type="checkbox"/> off
..	Text	Input 10	user defined	
..	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. <input type="checkbox"/> h <input type="checkbox"/> l <input type="checkbox"/> h <input type="checkbox"/> l
0/4 to 20 mA-Measuring input 10				
..	Configure	Input 10	YES/NO	NO <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> Y <input type="checkbox"/> N
..	Input 10		ON/OFF	<input type="checkbox"/> on <input type="checkbox"/> off <input type="checkbox"/> on <input type="checkbox"/> off
..	Text+unit	Input 10	user defined	No.10 -0000
..	Measuring range	Input 10	0 to 20/4 to 20 mA	0 to 20 mA
..	Value at 0%	Input 10	-9,999 to 9,999	0000
..	Value at 100%	Input 10	-9,999 to 9,999	0200
..	Threshold 1	Input 10	-9,999 to 9,999	0100
..	Threshold 2	Input 10	-9,999 to 9,999	0120
412-416	Monit.	Input 10	high limit /low limit mon.	high limit mon. <input type="checkbox"/> h <input type="checkbox"/> l <input type="checkbox"/> h <input type="checkbox"/> l
Pt100-Measuring input 11				
..	Configure	Input 11	YES/NO	NO <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> Y <input type="checkbox"/> N
..	Input 11		ON/OFF	<input type="checkbox"/> on <input type="checkbox"/> off <input type="checkbox"/> on <input type="checkbox"/> 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
..	Monit.	Input 11	high limit /low limit mon.	high limit mon. <input type="checkbox"/> h <input type="checkbox"/> l <input type="checkbox"/> h <input type="checkbox"/> l
0/4 to 20 mA-Measuring input 11				
..	Configure	Input 11	YES/NO	NO <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> Y <input type="checkbox"/> N
..	Input 11		ON/OFF	<input type="checkbox"/> on <input type="checkbox"/> off <input type="checkbox"/> on <input type="checkbox"/> off
..	Text+unit	Input 11	user defined	No.11 -0000
..	Measuring range	Input 11	0 to 20/4 to 20 mA	0 to 20 mA
..	Value at 0%	Input 11	-9,999 to 9,999	0000
..	Value at 100%	Input 11	-9,999 to 9,999	0200
..	Threshold 1	Input 11	-9,999 to 9,999	0100
..	Threshold 2	Input 11	-9,999 to 9,999	0120
..	Monit.	Input 11	high limit /low limit mon.	high limit mon. <input type="checkbox"/> h <input type="checkbox"/> l <input type="checkbox"/> h <input type="checkbox"/> l
Pt100-Measuring input 12				
..	Configure	Input 12	YES/NO	NO <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> Y <input type="checkbox"/> N
..	Input 12		ON/OFF	<input type="checkbox"/> on <input type="checkbox"/> off <input type="checkbox"/> on <input type="checkbox"/> 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
..	Monit.	Input 12	high limit /low limit mon.	high limit mon. <input type="checkbox"/> h <input type="checkbox"/> l <input type="checkbox"/> h <input type="checkbox"/> l
0/4 to 20 mA-Measuring input 12				
..	Configure	Input 12	YES/NO	NO <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> Y <input type="checkbox"/> N
..	Input 12		ON/OFF	<input type="checkbox"/> on <input type="checkbox"/> off <input type="checkbox"/> on <input type="checkbox"/> off
..	Text+unit	Input 12	user defined	No.12 -0000
..	Measuring range	Input 12	0 to 20/4 to 20 mA	0 to 20 mA
..	Value at 0%	Input 12	-9,999 to 9,999	0000
..	Value at 100%	Input 12	-9,999 to 9,999	0200
..	Threshold 1	Input 12	-9,999 to 9,999	0100
..	Threshold 2	Input 12	-9,999 to 9,999	0120
412-416	Monit.	Input 12	high limit /low limit mon.	high limit mon. <input type="checkbox"/> h <input type="checkbox"/> l <input type="checkbox"/> h <input type="checkbox"/> l
Pt100-Measuring input 13				
416	Configure	Input 13	YES/NO	NO <input type="checkbox"/> Y <input type="checkbox"/> N <input type="checkbox"/> Y <input type="checkbox"/> N
..	Input 13		ON/OFF	<input type="checkbox"/> on <input type="checkbox"/> off <input type="checkbox"/> on <input type="checkbox"/> 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. <input type="checkbox"/> h <input type="checkbox"/> l <input type="checkbox"/> h <input type="checkbox"/> l

Option	Parameter	Adjustment range	Default value	Customer settings
CONFIGURATION OF THE MEASURING INPUTS				
.. 0/4 to 20 mA-Measuring input 13				
..	Configure	Input 13	YES/NO	NO
..	Input 13		ON/OFF	ON
..	Text+unit	Input 13	user defined	No.13 -0000
..	Measuring range	Input 13	0 to 20/4 to 20 mA	0 to 20 mA
..	Value at 0%	Input 13	-9,999 to 9,999	0000
..	Value at 100%	Input 13	-9,999 to 9,999	0200
..	Threshold 1	Input 13	-9,999 to 9,999	0100
..	Threshold 2	Input 13	-9,999 to 9,999	0120
416	Monit.	Input 13	high limit /low limit mon.	high limit mon.
416	Pt100-Measuring input 14			
..	Configure	Input 14	YES/NO	NO
..	Input 14		ON/OFF	ON
..	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.
..	0/4 to 20 mA-Measuring input 14			
..	Configure	Input 14	YES/NO	NO
..	Input 14		ON/OFF	ON
..	Text+unit	Input 14	user defined	No.14 -0000
..	Measuring range	Input 14	0 to 20/4 to 20 mA	0 to 20 mA
..	Value at 0%	Input 14	-9,999 to 9,999	0000
..	Value at 100%	Input 14	-9,999 to 9,999	0200
..	Threshold 1	Input 14	-9,999 to 9,999	0100
..	Threshold 2	Input 14	-9,999 to 9,999	0120
..	Monit.	Input 14	high limit /low limit mon.	high limit mon.
..	Pt100-Measuring input 15			
..	Configure	Input 15	YES/NO	NO
..	Input 15		ON/OFF	ON
..	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.
..	0/4 to 20 mA-Measuring input 15			
..	Configure	Input 15	YES/NO	NO
..	Input 15		ON/OFF	ON
..	Text+unit	Input 15	user defined	No.15 -0000
..	Measuring range	Input 15	0 to 20/4 to 20 mA	0 to 20 mA
..	Value at 0%	Input 15	-9,999 to 9,999	0000
..	Value at 100%	Input 15	-9,999 to 9,999	0200
..	Threshold 1	Input 15	-9,999 to 9,999	0100
..	Threshold 2	Input 15	-9,999 to 9,999	0120
..	Monit.	Input 15	high limit /low limit mon.	high limit mon.
..	Pt100-Measuring input 16			
..	Configure	Input 16	YES/NO	NO
..	Input 16		ON/OFF	ON
..	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
..	Monit.	Input 16	high limit /low limit mon.	high limit mon.

Option	Parameter	Adjustment range	Default value	Customer settings		
CONFIGURATION OF THE MEASURING INPUTS						
..	0/4 to 20 mA-Measuring input 16					
..	Configure	Input 16	YES/NO	NO	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N
..	Input 16		ON/OFF	ON	<input type="checkbox"/> on <input type="checkbox"/> off	<input type="checkbox"/> on <input type="checkbox"/> off
..	Text+unit	Input 16	user defined	No.16 -0000		
..	Measuring range	Input 16	0 to 20/4 to 20 mA	0 to 20 mA		
..	Value at 0%	Input 16	-9,999 to 9,999	0000		
..	Value at 100%	Input 16	-9,999 to 9,999	0200		
..	Threshold 1	Input 16	-9,999 to 9,999	0100		
..	Threshold 2	Input 16	-9,999 to 9,999	0120		
416	Monit.	Input 16	high limit /low limit mon.	high limit mon.	<input type="checkbox"/> h <input type="checkbox"/> l	<input type="checkbox"/> h <input type="checkbox"/> l
	Messwert Filter	Zeit Konst.	AUS/0,04/0,08/0,16/ 0,32/0,64/1,28/2,56/5,12	0,32 s		
CUSTOMER SETTINGS						
CONFIGURATION OF THE DIGITAL INPUTS						
	DI acknowledge		energize to ack./ release to ack.	energize to ack.	<input type="checkbox"/> e <input type="checkbox"/> r	<input type="checkbox"/> e <input type="checkbox"/> r
CONFIGURATION OF THE SIGNAL RELAYS						
	Wire break relay	acknowledge	YES/NO	NO	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N
	Relay thresh.1	acknowledge	YES/NO	NO	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N
	Relay thresh.2	acknowledge	YES/NO	NO	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N
	Relay self reset		YES/NO	NO	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N
	Configure	Interface	YES/NO	NO	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N
3964	Destination data	block	0 to 255	138		
3964	Destination data	block	0 to 255	10		
PRO	PROFIBUS-station		1 to 125	1		
PRO	PROFIBUS	Watchdog	YES/NO	NO	<input type="checkbox"/> Y <input type="checkbox"/> N	<input type="checkbox"/> Y <input type="checkbox"/> N
MOD	Device number	MOD-Bus	0 to 255	1		
MOD	Baudrate		1,200/2,400/4,800/ 9,600/19,200 Baud	9,600Baud		
MOD	Parity		none/even/odd	none		
MOD	Number of Stopbits		one/two	one		
MOD	Delay to send	MOD-Bus	00.0 to 50.0 ms	02.0ms		
CAN	CAN No.		1 to 8	1		

Appendix D. 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.



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stgt-info@woodward.com

Homepage

<http://www.woodward.com/power>

Woodward has company-owned plants, subsidiaries, and branches, as well as authorized distributors and other authorized service and sales facilities throughout the world.

**Complete address/phone/fax/e-mail information
for all locations is available on our website (www.woodward.com).**

2007/9/Stuttgart