# RESISTRON

## UPT-606 (GB)

## Operating instructions


**Important features**

- Microprocessor technology
- Complete control via PROFIBUS-DP interface
- Automatic zero calibration (AUTOCAL)
- Automatic optimization (AUTOTUNE)
- Automatic frequency adjustment
- Large current and voltage range
- Booster connection as standard
- 0…10VDC analog output for ACTUAL temperature
- Alarm function with fault diagnosis

12.6.06

ROPEX Industrie-Elektronik GmbH
Gansäcker 21
D-74321-Bietigheim-Bissingen (Germany)
Tel: +49/(0)7142/7776-0
Fax: +49/(0)7142/7776-19
E-Mail: info@ropex.de
Internet: www.ropex.de

# Contents

# 1 Safety and warning notes

This CIRUS temperature controller is manufactured according to DIN EN 61010-1. In the course of its manufacture it passed through quality assurance, whereby it was subjected to extensive inspections and tests.
It left the factory in perfect condition.
The recommendations and warning notes contained in these operating instructions must be complied with, in order to guarantee safe operation.
The device can be operated within the limits indicated in the "Technical Data" without impairing its operational safety. Installation and maintenance may only be performed by technically trained, skilled persons who are familiar with the associated risks and warranty provisions.

## 1.1 Use

CIRUS temperature controllers may only be used for heating and temperature control of heatsealing elements which are expressly suitable for them, and providing the regulations, notes and warnings contained in these instructions are complied with.

**In case of non-compliance or use contrary to the intended purpose, there is a risk that safety will be impaired or that the heatsealing element, electrical wiring, transformer etc. will overheat. Ensuring such compliance is the personal responsibility of the user.**

## 1.2 Heating element

The temperature coefficient of a CIRUS temperature controller is specially adapted to CIRUS heating elements.

**The controller is not allowed to be operated with any other heatsealing bands because they could be overheated and damaged beyond repair.**

## 1.3 Impulse transformer

A suitable impulse transformer is necessary to ensure that the control loop functions perfectly. This transformer must be designed according to VDE 0570/ EN 61558 (isolating transformer with reinforced insulation) and have a one section bobin. When the impulse transformer is installed, suitable shock protection must be provided in accordance with the national installation regulations for electrical equipment. In addition, water, cleaning solutions and conductive fluids must be prevented from seeping into the transformer.

**Incorrect installation of the impulse transformer impairs electrical safety.**

## 1.4 Current transformer PEX-W2/-W3

The current transformer supplied with the CIRUS temperature controller is an integral part of the control system.

**Only the original ROPEX PEX-W2 or PEX-W3 current transformer may be used. Other transformers may cause the equipment to malfunction.**

The current transformer may only be operated if it is connected to the CIRUS temperature controller correctly (see section 9, "Startup and operation"). The relevant safety instructions contained in section 8.3, "Power supply", must be obeyed. External monitoring modules can be used in order to additionally increase operating safety. They are not included in the scope of supply of the standard control system and are described in a separate document.

## 1.5 Line filter

The use of an original ROPEX line filter is mandatory in order to comply with the standards and provisions mentioned in section 1.7 "Standards / CE marking" on page 4. This device must be installed and connected according to the instructions contained in section 8.3, "Power supply" as well as the separate documentation enclosed with the line filter.

## 1.6 Warranty provisions

The statutory provisions for warranties apply for a period of 12 months following the delivery date.
All devices are tested and calibrated in the factory. Devices that have been damaged due to faulty

connections, dropping, electrical overloading, natural wear, incorrect or negligent handling, chemical influences or mechanical overloading as well as devices that have been modified, relabeled or otherwise altered by the customer, for example in an attempt to repair them or install additional components, are excluded from the warranty.
Warranty claims must be examined in the factory and approved by ROPEX.

### 1.7 Standards / CE marking

The controller described here complies with the following standards, provisions and directives:

| | |
|---|---|
| DIN EN 61010-1 (VDE 0411-1) | Safety provisions for electrical measuring, control and laboratory devices (low voltage directive). Overvoltage category III, pollution severity 2, safety class II. |
| DIN EN 60204-1 | Electrical equipment of machines (machinery directive) |
| EN 50081-1 | EMC interference emissions according to EN 55011, group 1, class B |
| EN 50082-2 | EMC interference immunity: ESDs, RF radiation, bursts, surges. |

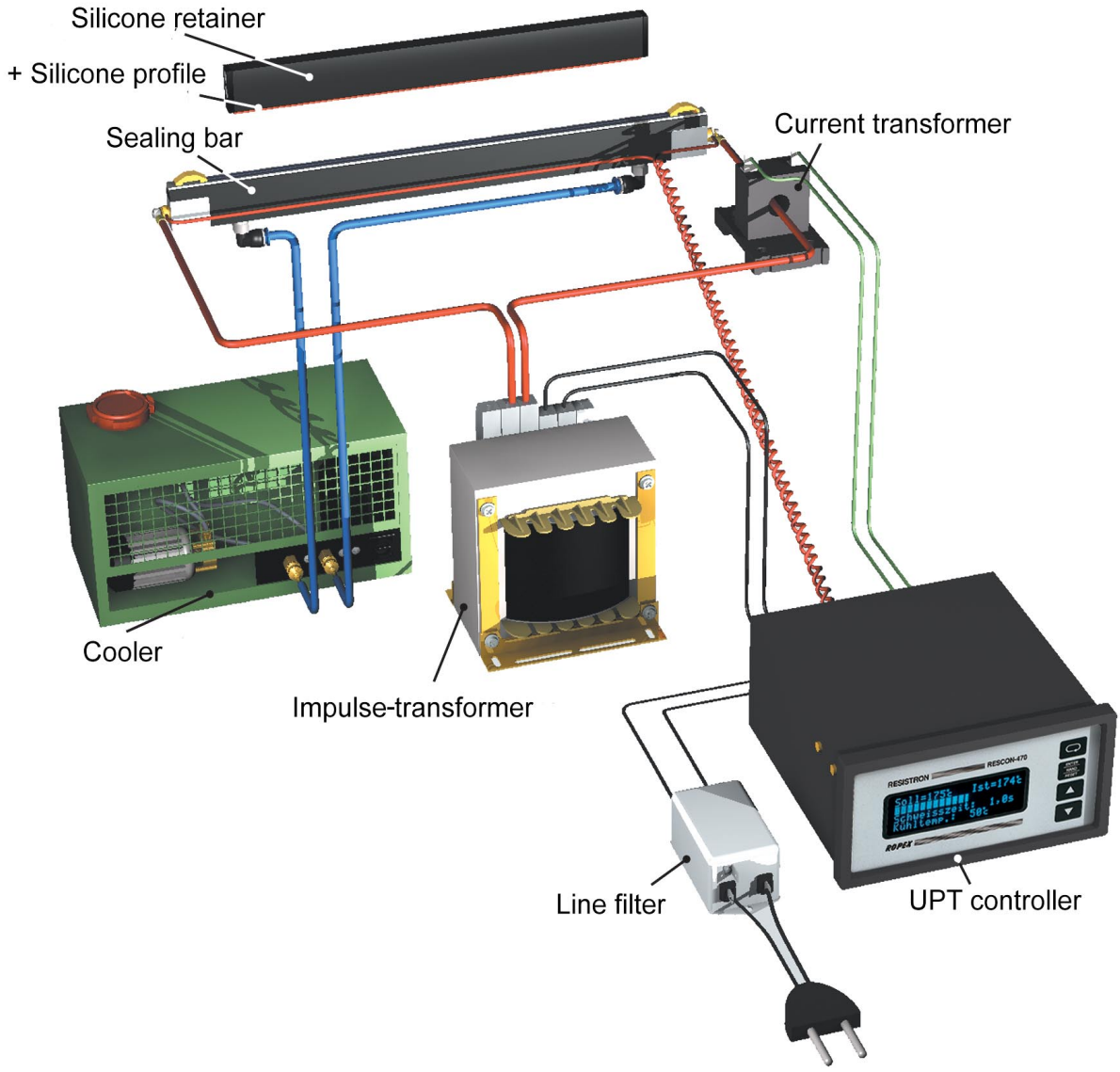
Compliance with these standards and provisions is only guaranteed if original accessories and/or peripheral components approved by ROPEX are used. If not, then the equipment is operated on the user's own responsibility.
The CE marking on the controller confirms that the device itself complies with the above-mentioned standards.
It does not imply, however, that the overall system also fulfils these standards.
It is the responsibility of the machine manufacturer and of the user to verify the completely installed, wired and operationally ready system in the machine with regard to its conformity with the safety provisions and the EMC directive (see also section 8.3, "Power supply"). If peripheral components (e.g. the transformer or the line filter) from other manufacturers are used, no functional guarantee can be provided by ROPEX.

## 2 Application

This CIRUS temperature controller is an integral part of the "series 600". Its sole purpose is to control the temperature of CIRUS/UPT heating elements, wich are used mainly for Impulse-heatsealing PP and RE films.

The most important applications are packaging machines, pouch-making machines, splicers, machines for making pharmaceutical and medical products etc.

# 3 System description

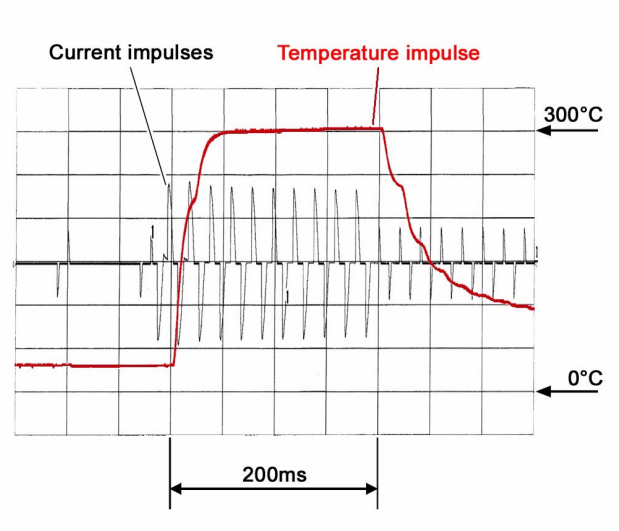



The basic design of the overall system is shown in the diagram above.
CIRUS heating elements, and in particular UPT heating elements, are high-performance systems which operate efficiently and reliably providing all the components in the control loop are optimally tuned to one another – and to the task at hand. Exact compliance with the installation and wiring instructions is essential. The system has been evolved and optimized by ROPEX GmbH in an intensive development process. Users who follow our technical recommendations will profit from the unique functionality of this technology, which reduces the customer's effort for installation, commissioning and maintenance to a minimum.

## 3.1 Temperature controller

The controller calculates the resistance of the heating element by measuring the current and voltage at a high sampling rate (= line frequency), compares it with the set point and – if the difference is not 0 – adjusts the heating current with the help of a phase angle-controlled transformer so that set = actual.
The fact that purely electrical variables are measured in quick succession and the small mass of the heating

layer of the UPT heating element together result in a highly dynamic, thermo-electrical control loop.




Thanks to its microprocessor based technology, the controller features an optimized control algorithm as well as numerous functions tailored to the various tasks, such as "AUTOCAL", ALARM with fault diagnosis etc. These are described in detail below.
The CIRUS temperature controller UPT-606 is equipped with a PROFIBUS-DP interface. This interface can be used to control all the controller functions and interrogate controller information.
The ACTUAL temperature of the heating element is supplied to the PROFIBUS interface and to an analog 0 to 10V DC output. The real heating element temperature can thus be displayed on an external temperature meter (e.g. ATR-x).
The UPT-606 features an integrated fault diagnosis function, which tests both the external system (heating element, wiring etc.) and the internal electronics and outputs a selective error message in case of a fault.
To increase operational safety and interference immunity, all PROFIBUS signals are electrically isolated from the controller and the heating circuit.
The compact design of the CIRUS temperature controller UPT-606 and the plug-in connections make this controller easy to install.

### 3.2 Current transformer

The PEX-W2 or PEX-W3 current transformer supplied with the CIRUS UPT-606 controller is an integral part of the control system. Only this original ROPEX current transformer is allowed to be used.
Never attempt to operate the current transformer with open connections!

### 3.3 Booster

If the maximum load exceeds the rated current of the controller (↳ section 5 "Technical data" on page 8), an external switching amplifier (booster) must be used (↳ section 4.1 "Accessories" on page 6).
The other system components – UPT sealing bars, transformers, filter, cooler etc. – are described in separate brochures.

## 4 Accessories and modifications

A wide range of compatible accessories and peripheral devices are available for the CIRUS temperature controller UPT-606. They allow it to be optimally adapted to your specific heatsealing application and to your plant's design and operating philosophy.

### 4.1 Accessories

The products described below are only a few of the wide range of accessories available for CIRUS temperature controllers (↳"Accessories" leaflet).

| | |
|---|---|
|  | **Analog temperature meter ATR-x**<br>For front panel mounting or mounting on a top hat rail (DIN TS35 rail).<br>Analog indication of the ACTUAL temperature of the heating element in °C. The meter damping of the unit is optimized for the abrupt temperature changes that occur in impulse mode. |

| | |
|---|---|
|  | **Digital temperature meter DTR-x**<br>For front panel mounting or mounting on a top hat rail (DIN TS35 rail).<br>Digital indication of the ACTUAL temperature of the heating element in °C, with HOLD function. |
|  | **Line filter LF-xx480**<br>Essential in order to ensure CE conformity.<br>Optimized for the CIRUS temperature controller. |
|  | **Impulse transformer ITR-x**<br>Designed according to VDE 0570/EN 61558 with a one section bobbin.<br>Optimized for impulse operation with CIRUS temperature controllers.<br>Specified according to the heatsealing application<br>(↳ ROPEX Application Report). |
|  | **Booster B-xxx400**<br>External switching amplifier, necessary for high primary currents (continuous current > 5A, pulsed current > 25A). |
|  | **Monitoring current transformer MSW-1**<br>For detecting frame short-circuits on the heating element.<br>Used as an alternative to the standard PEX-W2 current transformer. |
|  | **Measurement cable UML-1**<br>twisted measurement cable for the $U_R$-voltage measurement.<br>Trailing cable, halogene und silicone free. |

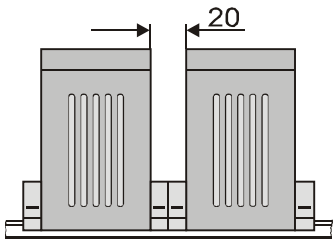
## 4.2 Modifications (MODs)

Owing to its universal design, the CIRUS temperature controller UPT-606 is suitable for a very wide range of heatsealing applications.
One modification (MOD) is available for the CIRUS temperature controller UPT-606 for implementing special applications.

### MOD 01

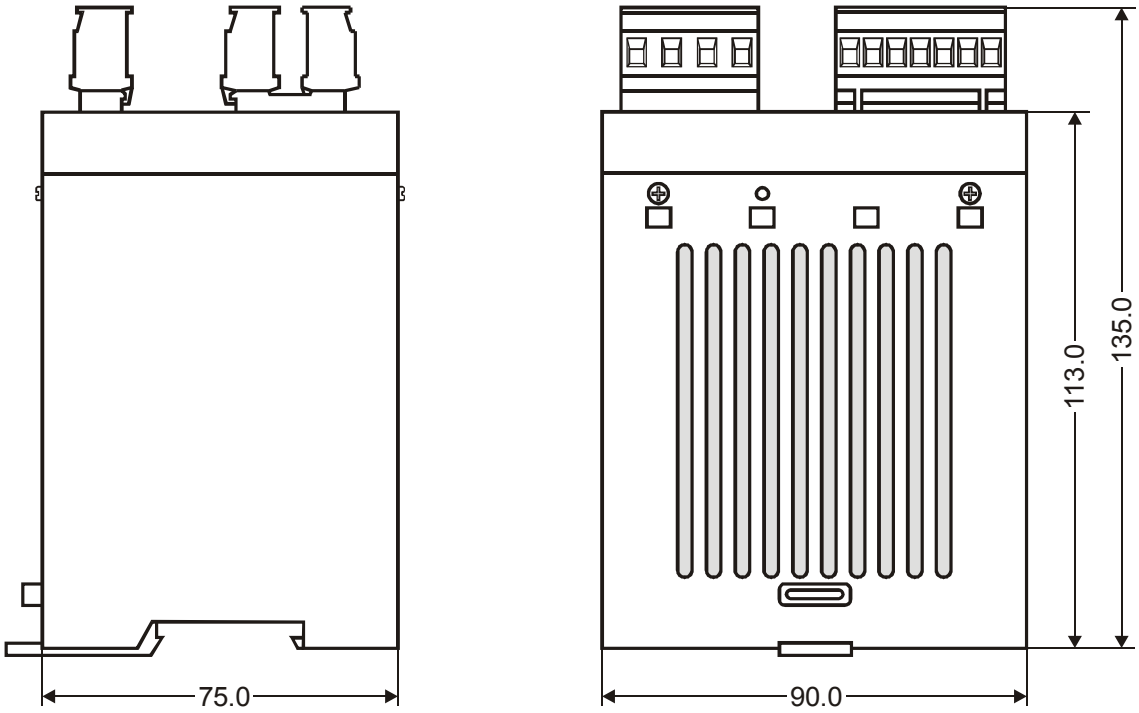
Amplifier for low secondary voltages ($U_R$ = 0.25…16VAC). This modification is necessary, for example, for very short or low-resistance heating elements.

# 5 Technical data

| | |
|---|---|
| **Type of construction** | Housing for installation in the electrical cabinet<br>Snaps onto a standard top hat rail (DIN TS35 rail, 35 mm) acc. to DIN EN 50022<br>Dimensions: 90 x 75mm; height: 135mm (incl. terminals) |
| **Line voltage** | <u>All controllers manufactured as of January 2004:</u><br>115VAC version: 115VAC -15%…120VAC +10% (equivalent to 98…132VAC)<br>230VAC version: 230VAC -15%…240VAC +10% (equivalent to 196…264VAC)<br>400VAC version: 400VAC -15%…415VAC +10% (equivalent to 340…456VAC)<br><br><u>All controllers manufactured up to December 2003:</u><br>115VAC, 230VAC or 400VAC, tolerance: +10% / -15%<br><br>depending on version selected (↳ section 12 "How to order" on page 31) |
| **Line frequency** | 47…63Hz, automatic adjustment to frequencies in this range |
| **Auxiliary supply**<br>Terminals 5+7 or PROFIBUS plug, pins 2+7 | 24VDC, Imax = 30mA<br>Tolerance: +10 / -10%<br>The auxiliary supply can be fed either via terminals 5 and 7 or via the PROFIBUS plug at pins 2 and 7. |
| **PROFIBUS-DP interface** | Baud rates: 9.6kbaud; 19.2kbaud; 45.45kbaud; 93.75kbaud; 187.5kbaud; 500kbaud; 1.5Mbaud; 3Mbaud; 6Mbaud; 12Mbaud<br>Plug acc. to IEC 61158 |
| **Analog output**<br>(actual value)<br>Terminals 17+18 | 0…10V DC, Imax = 5mA<br>Equivalent to 0…300°C<br>Accuracy: ±1% add. 50mV |
| **Alarm relay**<br>Terminals 12, 13, 14 | $U_{max}$ = 50VDC, $I_{max}$ = 0.2A, changeover contact, potential-free |
| **Maximum load**<br>(primary current of impulse transformer) | $I_{max}$ = 5A (duty cycle = 100%)<br>$I_{max}$ = 25A (duty cycle = 20%) |
| **Power dissipation** | max. 20W |
| **Ambient temperature** | +5…+45°C |
| **Degree of protection** | IP20 |
| **Installation** | If several controllers are installed on one top hat rail (DIN TS35 rail), a clearance of at least 20mm should be allowed between them.<br>  |
| **Weight** | Approx. 0.7kg (incl. connector plug-in parts) |
| **Housing material** | Plastic, polycarbonate, UL-90-V0 |

| | |
|---|---|
| **Connecting cables**<br>Type / cross-sections | Rigid or flexible; 0.2…2.5 mm² (AWG 24…12)<br>Plug-in connectors<br><br>**If ferrules are used, they must be crimped in accordance with DIN 46228 and IEC/EN 60947-1.**<br>**This is essential for proper electrical contact in the terminals.** |

# 6 Dimensions




# 7 Installation

↳ See also section 1 "Safety and warning notes" on page 3.

**Installation and startup may only be performed by technically trained, skilled persons who are familiar with the associated risks and warranty provisions.**

## 7.1 Installation steps

1. Please refer to the safety and warning notes (↳ section 1 "Safety and warning notes" on page 3).
2. The information provided in the customized ROPEX Application Report, which is prepared by ROPEX specifically for each application, should be heeded at all times.
3. All electrical components, such as the controller, the impulse transformer and the line filter, should be installed as close as possible to the UPT sealing bar(s) in order to avoid long wires.
4. Connect the voltage measurement cable $U_R$ directly to the UPT sealing bar and lay it twisted to the controller (UML-1 voltage measurement cable ↳ section 4 "Accessories and modifications" on page 6).
5. Ensure an adequate cable cross-section for the primary and secondary circuits (↳ Application Report).
6. Use only ROPEX impulse transformers or transformers approved by ROPEX. Please note the power, the duty cycle and the primary and secondary voltages (↳ Application Report).

## 7.2 Installation procedure

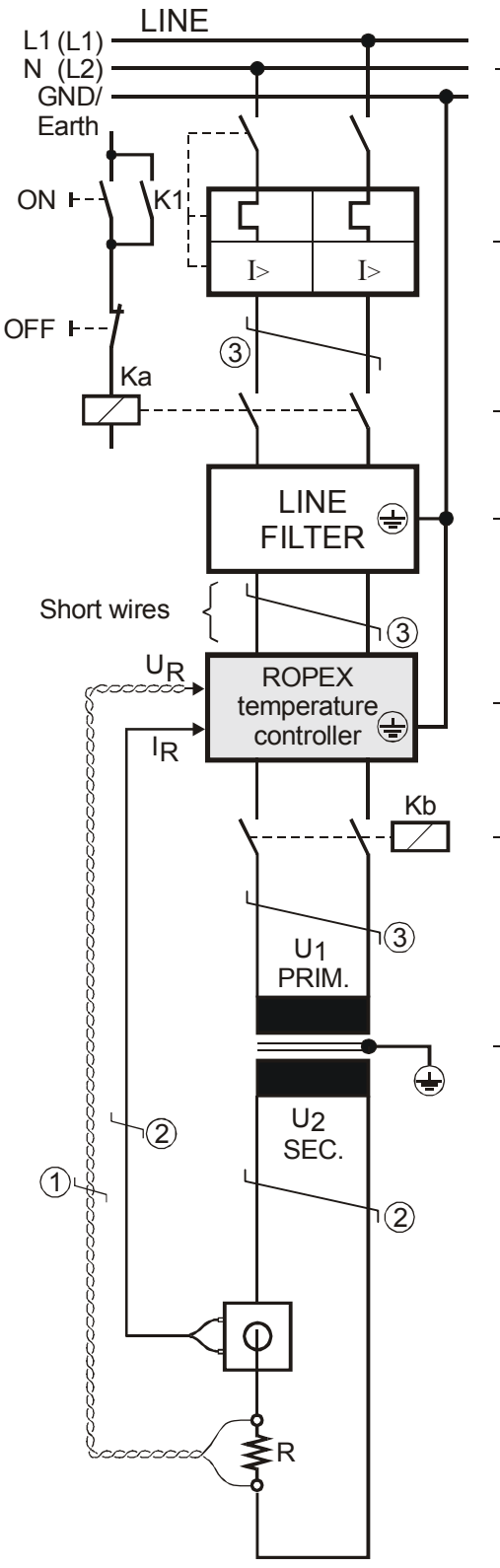
Proceed as follows to install the CIRUS temperature controller UPT-606:

1. Switch off the line voltage and verify that the circuit is de-energized.
2. The supply voltage specified on the nameplate of the CIRUS temperature controller must be identical to the line voltage that is present in the plant or machine. The line frequency is automatically detected by the CIRUS temperature controller in the range from 47 Hz...63 Hz.
3. Install the CIRUS temperature controller in the electrical cabinet on a standard top hat rail (DIN TS35 rail, according to DIN EN 50022). If several controllers are installed on one top hat rail, the minimum clearance specified in section 5 "Technical data" on page 8 must be allowed between them.
4. Wire the system in accordance with the instructions in section 7.3 "Power supply" on page 11, section 7.6 "Wiring diagram (standard)" on page 13 and the ROPEX Application Report. The information provided in section 7.1 "Installation steps" on page 9 must also be heeded additionally.
5. Connect the CIRUS temperature controller to the PROFIBUS master using a cable according to IEC 61158.

**Check the tightness of all the system connections, including the terminals for the impulse transformer windings.**

6. Make sure that the wiring conforms to the relevant national and international installation regulations.

## 7.3 Power supply




**Line**
115VAC, 230VAC, 400VAC

**Circuit breaker**
Double-pole, C characteristic
(↳ ROPEX Application Report)
Short-circuit protection only.
CIRUS temperature controller not protected.

**Relay Ka**
For "HEAT ON - OFF" function (all-pole) or "EMERGENCY STOP".

**Line filter**
The filter type and size must be determined according to the load, the transformer and the machine wiring (↳ ROPEX Application Report).
Do not run the filter supply wires (line side) parallel to the filter output wires (load side).

**CIRUS temperature controller** belonging to the 4xx Series.

**Relay Kb**
Load break (all-pole), e.g. in combination with the alarm output of the temperature controller.

**Impulse Transformer**
Designed according to VDE 0570/EN 61558 (isolating transformer with reinforced insulation). Connect core to ground.
Use transformers with a one section bobbin. The power, duty cycle and voltage values must be determined individually according to the application (↳ ROPEX Application Report and "Accessories" leaflet for impulse transformers).

**Wiring**
The wire cross-sections depend on the application (↳ ROPEX Application Report).
Guide values:
Primary circuit: min. 1.5mm², max. 2.5mm²
Secondary circuit: min. 4.0mm², max. 25mm²

① These wires must always be twisted (>20/m)
② These wires must be twisted (>20/m) if several control loops are laid together ("crosstalk").
③ Twisting (>20/m) is recommended to improve EMC.

## 7.4 Line filter

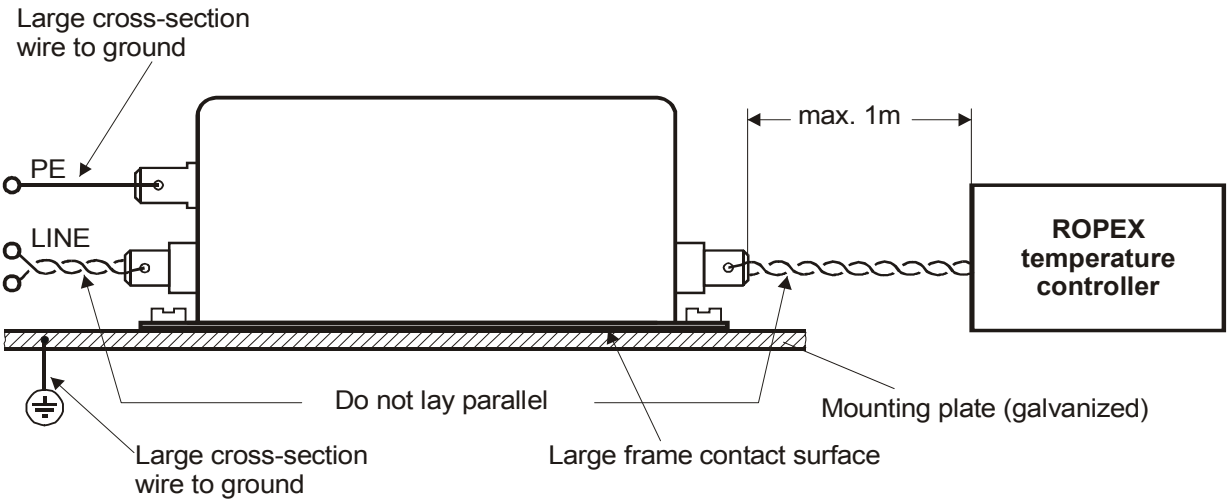
To comply with EMC directives – corresponding to EN 50081-1 and EN 50082-2 – RESISTRON control loops must be operated with line filters.
These filters damp the reaction of the phase-angle control on the line and protect the controller against line disturbances.

**The use of a suitable line filter is part of the standards conformity and a prerequisite of the CE mark.**

ROPEX line filters are specially optimized for use in RESISTRON control loops. Providing that they are installed and wired correctly, they guarantee compliance with the EMC limit values.
You can find the exact specification of the line filter in the ROPEX Application Report calculated for your particular heatsealing application.
For more technical information: ↳ "Line filter" documentation.

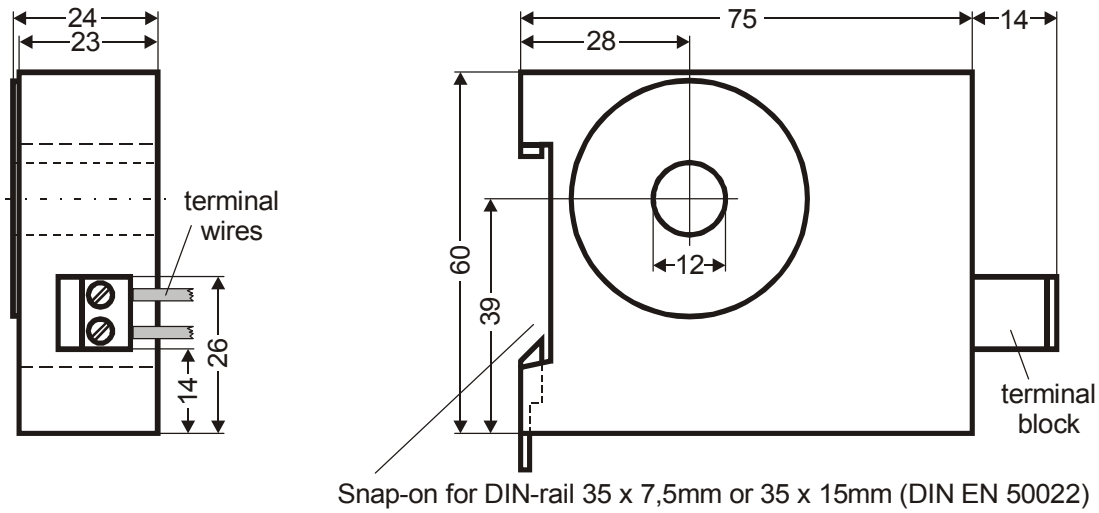
**It is permissible to supply several RESISTRON control loops with a single line filter, providing the total current does not exceed the maximum current of the filter.**

The wiring instructions contained in section 7.3 "Power supply" on page 11 must be observed.

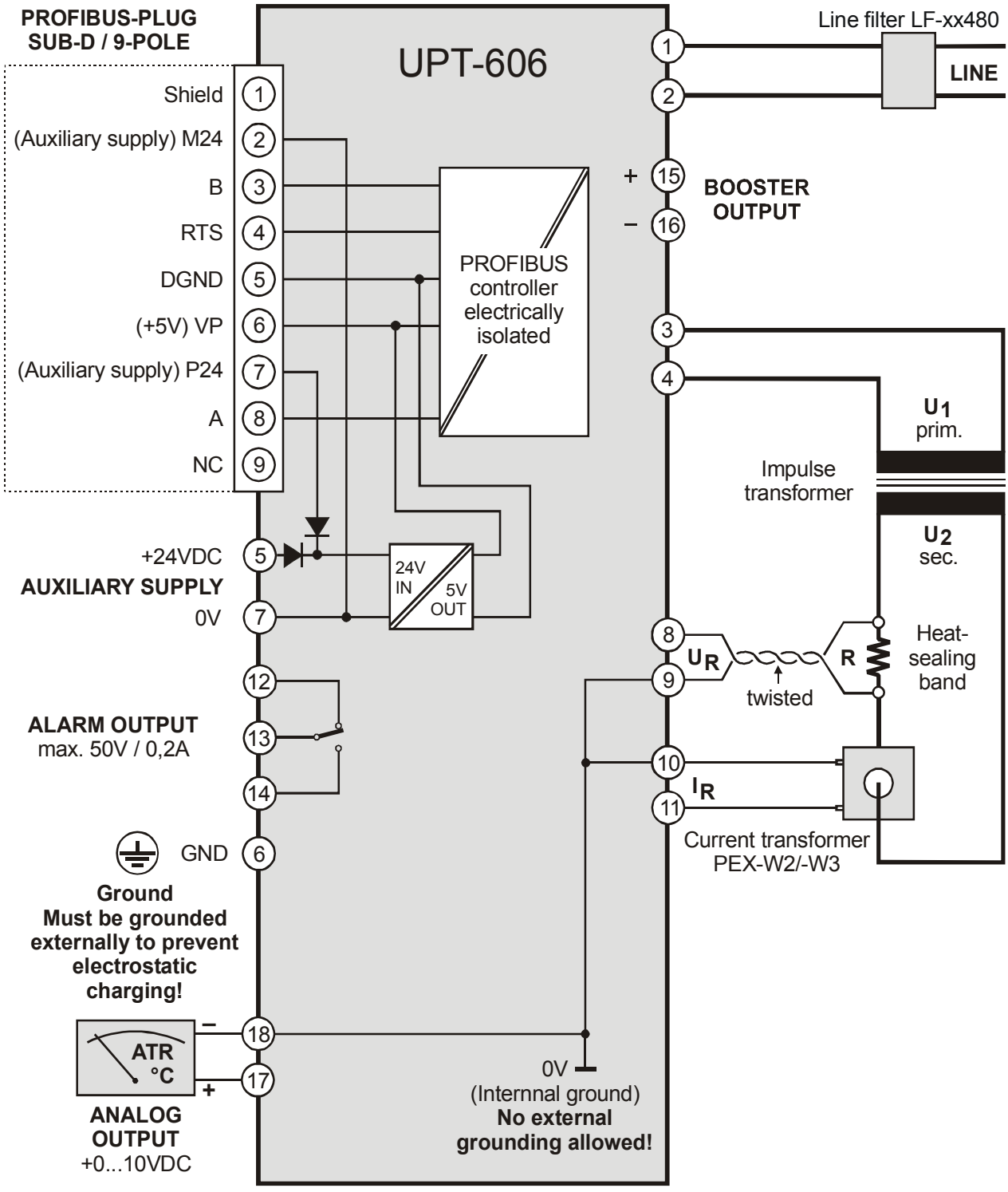



## 7.5 Current transformer PEX-W3

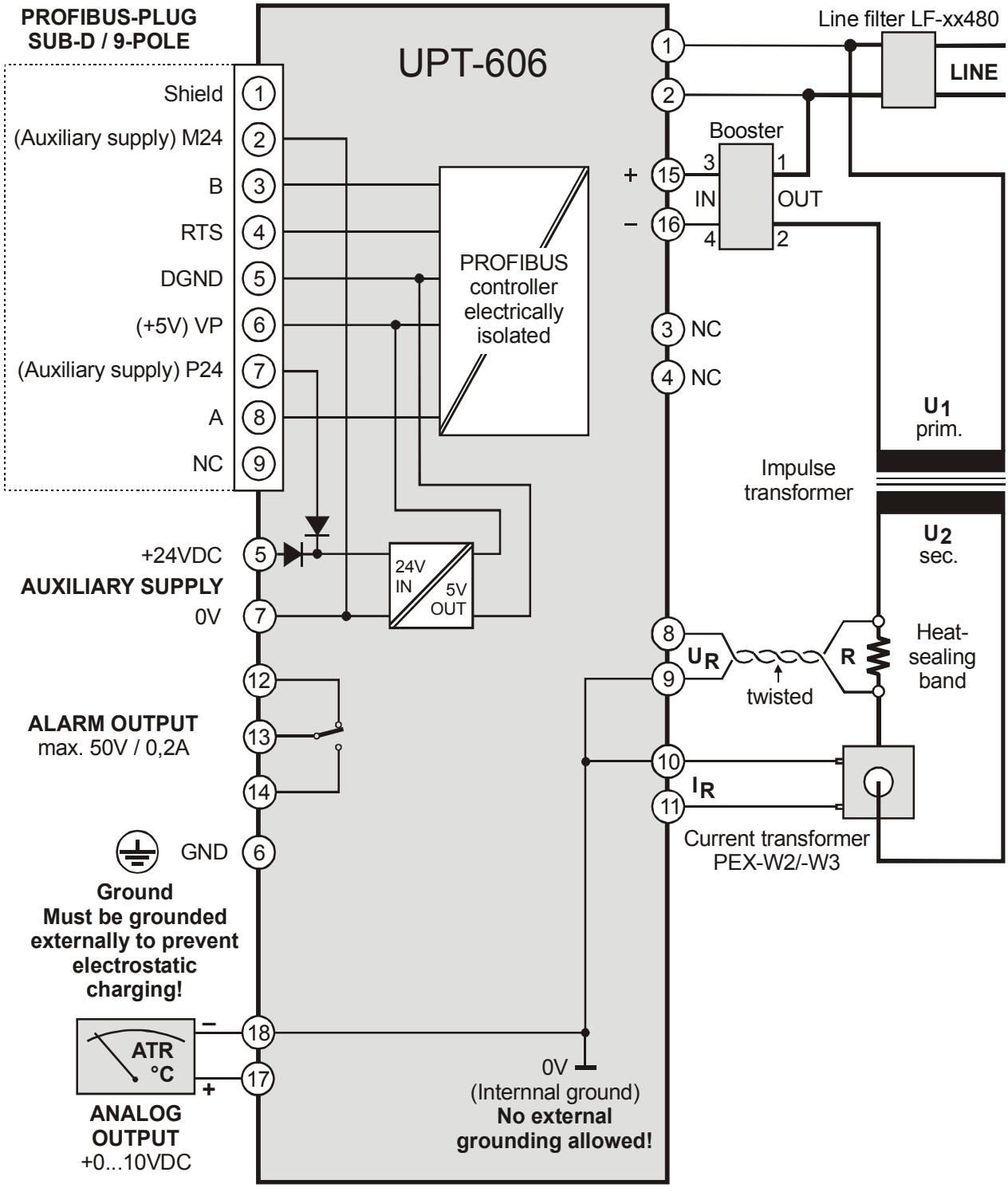
The PEX-W3 current transformer supplied with the RESISTRON temperature controller is an integral part of the control system. The current transformer may only be operated if it is connected to the temperature controller correctly (↳ section 7.3 "Power supply" on page 11).



## 7.6 Wiring diagram (standard)

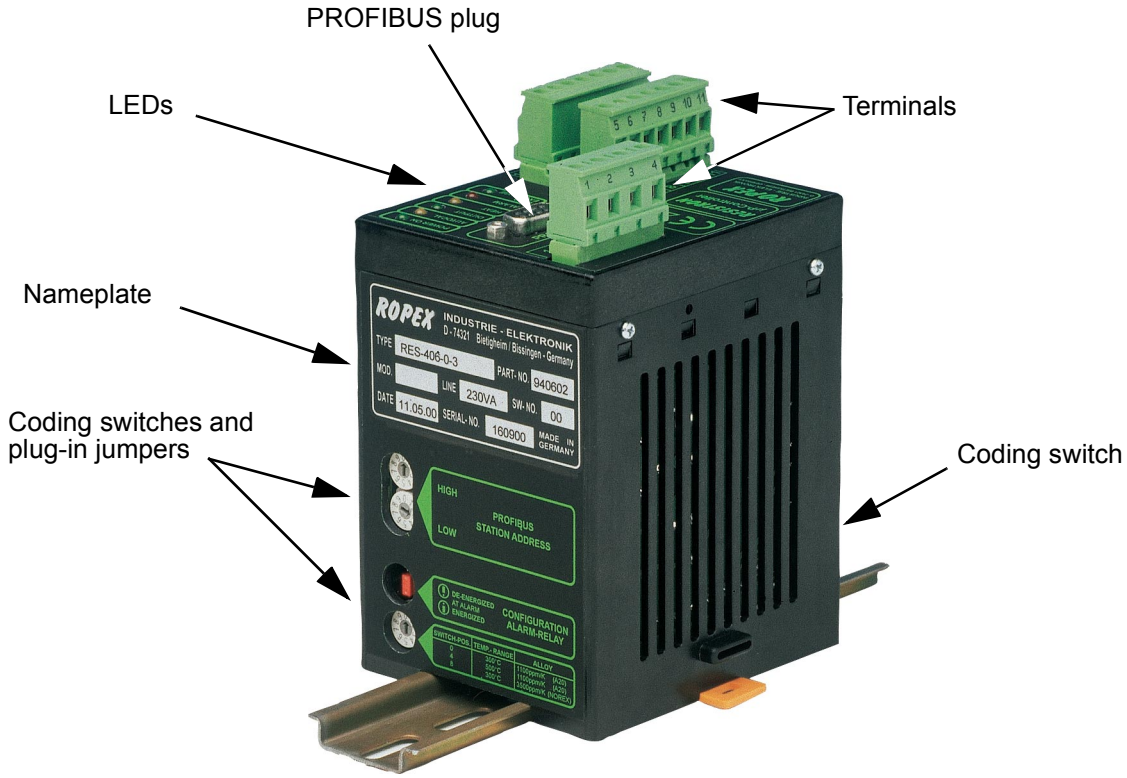


## 7.7 Wiring diagram with booster connection



# 8 Startup and operation

## 8.1 View of the controller



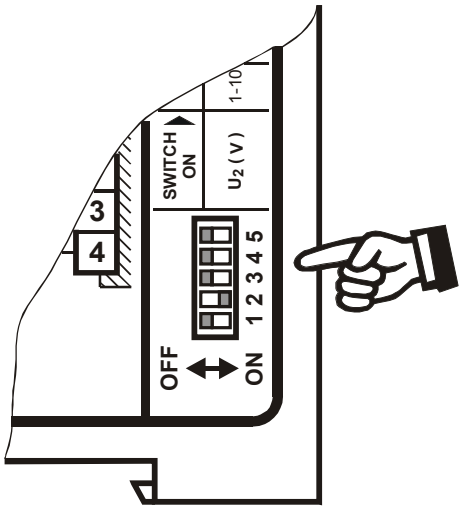

## 8.2 Controller configuration

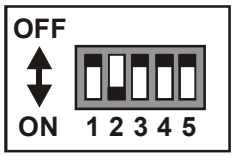
**The controller must be switched off in order to configure the coding switches and plug-in jumpers.**

### 8.2.1 Configuration of the DIP switches for secondary voltage and current

Set the DIP switches for matching the secondary voltage $U_2$ and the secondary current $I_2$ to the correct position for **your** application.

**You can find the exact configuration of the DIP switches in the ROPEX Application Report calculated for your particular application.**



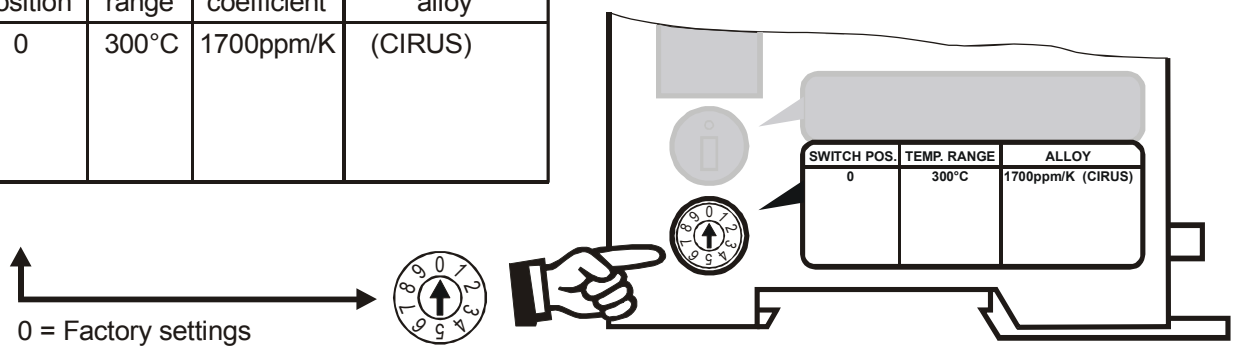

⇨ Factory settings

| $U_2$ ⇩ | DIP switch 1 | 2 | 3 | $I_2$ ⇩ | DIP switch 4 | 5 |
|---|---|---|---|---|---|---|
| 1...10V | ON | OFF | OFF | 30...100A | OFF | OFF |
| 6...60V | OFF | ON | OFF | 60...200A | ON | OFF |
| 20...120V | OFF | OFF | ON | 120...400A | ON | ON |

If the secondary current $I_2$ is less than 30A, the PEX-W2/-W3 current transformer must have two turns (↳ ROPEX Application Report).


### 8.2.2 Configuration of the rotary coding switch for the temperature range and alloy

| Switch position | Temp. range | Temp. coefficient | Element alloy |
|---|---|---|---|
| 0 | 300°C | 1700ppm/K | (CIRUS) |

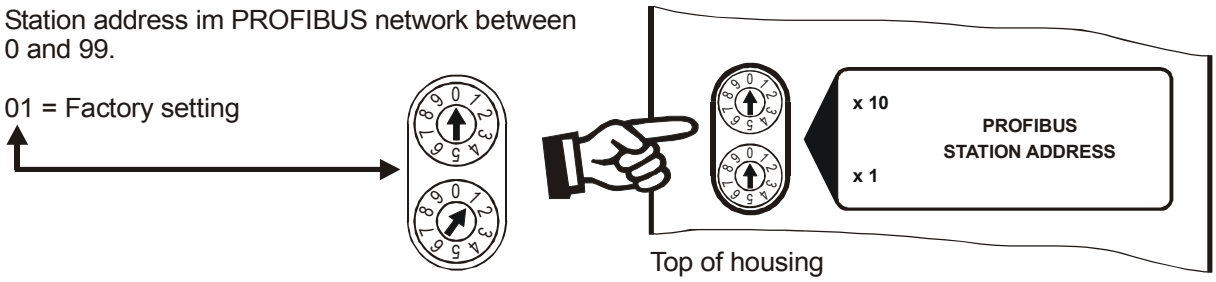



**The setting of the rotary coding switch for the temperature range and alloy can be overwritten with the parameter data (↳section 9.6 "Parameter data" on page 24).**

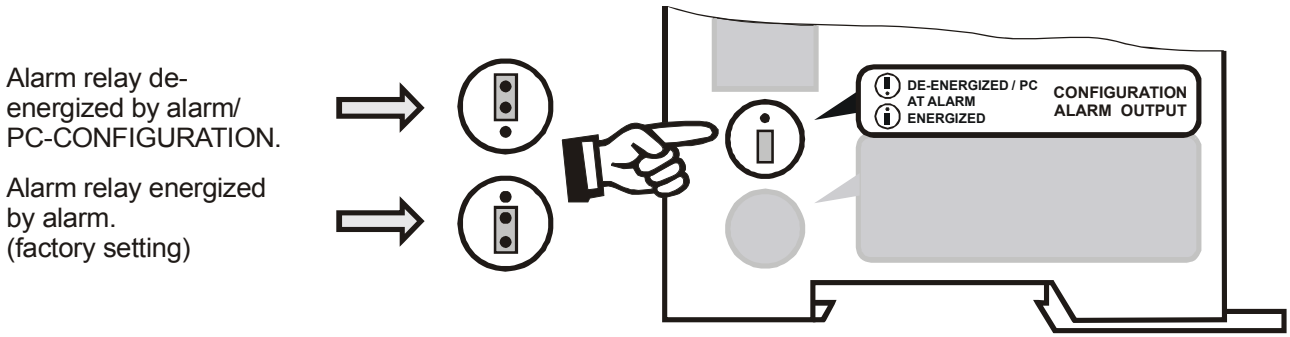
### 8.2.3 Configuration of the rotary coding switches for the station address

The station address of the UPT-606 in the PROFIBUS network can be set between 0 and 99 with these coding

switches. A new setting does not take effect until the next time the controller is switched on.




### 8.2.4 Configuration of the alarm relay




**If the jumper is not inserted, the alarm relay is permanently energized. The other functions of the controller (e.g. heating, AUTOCAL etc.) are not impaired by this.**

## 8.3 Startup procedure

Please also refer to section 1 "Safety and warning notes" on page 3 and section 2 "Application" on page 4.

**Installation and startup may only be performed by technically trained, skilled persons who are familiar with the associated risks and warranty provisions.**

### 8.3.1 Initial startup

Prerequisites: The controller must be correctly installed and connected (↬ section 7 "Installation" on page 9).
Proceed as follows to start up the controller for the first time:

1. Switch off the line voltage and verify that all circuits are de-energized.
2. The supply voltage specified on the nameplate of the controller must be identical to the line voltage that is present in the plant or machine. The line frequency is automatically detected by the temperature controller in the range from 47…63 Hz.
3. The settings of the coding switches on the controller depend on the ROPEX Application Report, the heating element that is used and the required station address in the PROFIBUS network (↬ section 8.2 "Controller configuration" on page 15).
4. Link the device master file into the PROFIBUS master (↬ section 9.2), select the required communication module ("compact" or "extended" protocol) and start the communication.
5. Make sure that the "ST" bit is not set.
6. Switch on the line voltage and the 24 VDC auxiliary supply (the order is arbitrary).
7. When the voltage is switched on, the yellow "AUTOCAL" LED lights up for approximately 0.3 seconds to indicate that the controller is being powered up correctly. This LED blinks slowly (1 Hz) as long as no PROFIBUS communication is active. It does not go out again until it detects an active communication.
8. The green "DATA EXCHANGE" LED lights up to indicate an active PROFIBUS communication.

9. One of the following states then appears:

| "ALARM" LED | "OUTPUT" LED | ACTION |
|---|---|---|
| OFF | Short pulses every 1.2s | Go to 10 |
| BLINKS fast (4Hz) | OFF | Go to 10 |
| Lit continuously | OFF | Fault diagnosis (↳ section 9.10) |

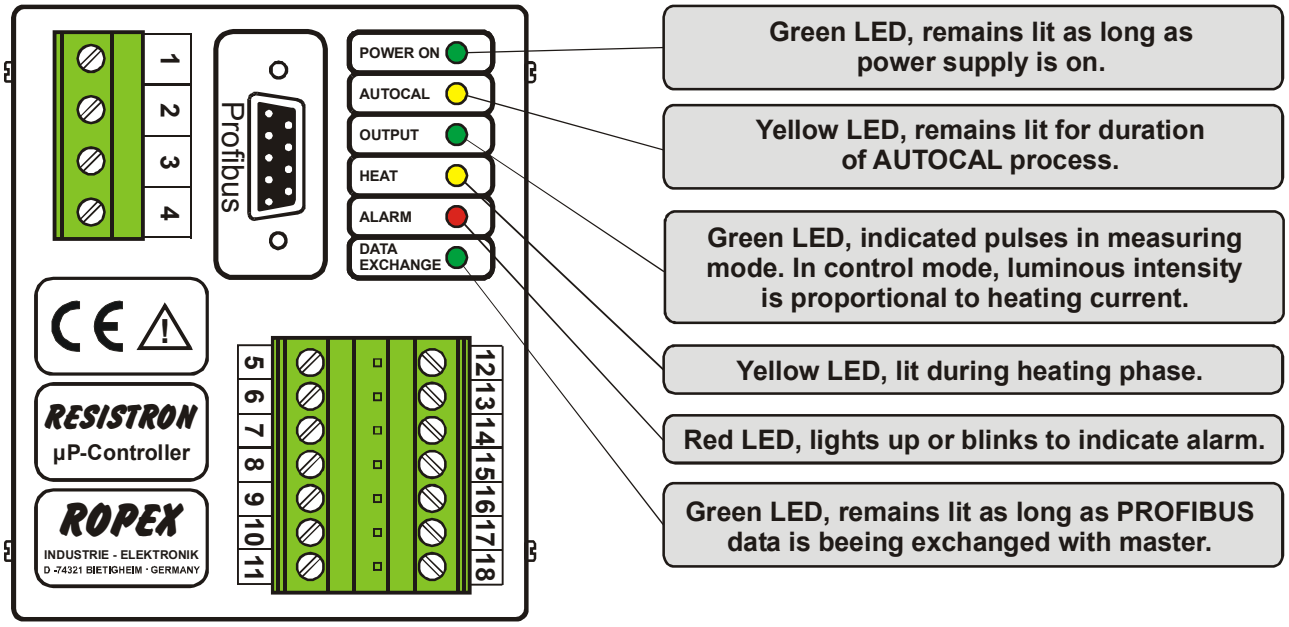
10. Activate the AUTOCAL function while the heating element is still cold by setting the "AC" bit (**A**UTO**C**AL) in the PROFIBUS protocol (↳ section 9.3 "PROFIBUS protocol" on page 20). The yellow "AUTOCAL" LED lights up for the duration of the calibration process (approx. 10…15s). The "AA" bit (**A**UTOCAL **a**ctive) is set in addition and a voltage of app. 0V appears at the actual value output (terminals 17+18). If an ATR-3 is connected, it indicates 0…3°C (corresponds to app. 0VDC).
    When the zero point has been calibrated, the "AUTOCAL" LED goes out and a voltage of app. 0.66VDC appears at the actual value output instead. If an ATR-3 is connected, it must be set to "Z".
    If the zero point has not been calibrated successfully, the "AL" bit (**al**arm active) is set and the red "ALARM" LED blinks slowly (1Hz). In this case the controller configuration is incorrect (↳ section 8.2 "Controller configuration" on page 15 and ROPEX Application Report). Repeat the calibration after the controller has been configured correctly.
11. When the zero point has been calibrated successfully, specify a defined temperature by means of the PROFIBUS protocol (set point) and set the "ST" bit. The "RA" bit (controller active) is then activated and the "HEAT" LED lights up. The heating and control process can be observed at the actual value output:
    The controller is functioning correctly if the temperature (which corresponds to the signal change at the analog output or the actual value in the PROFIBUS protocol) has a harmonious motion, in other words it must not jump abruptly, fluctuate or deviate temporarily in the wrong direction. This kind of behavior would indicate that the $U_R$ measuring wire have been wired incorrectly.
    If an error code is displayed, please proceed as described in section 9.10 "Error messages" on page 27.

**The controller is now ready**

# 9 Controller functions

See also section 7.6 "Wiring diagram (standard)" on page 13.

## 9.1 Indicators and controls



In addition to the functions shown in the diagram above, various controller operating states are indicated by the LEDs. These states are described in detail in the table below:

| LED | Blinks slowly (1 Hz) | Blinks fast (4 Hz) | Lit continuously |
|---|---|---|---|
| **AUTOCAL** (yellow) | No PROFIBUS communication | AUTOCAL requested, but function disabled | AUTOCAL executing |
| **HEAT** (yellow) | — | START requested, but function disabled | START executing |
| **OUTPUT** (green) | In control mode the luminous intensity is proportional to the heating current. | | |
| **ALARM** (red) | Configuration error, AUTOCAL not possible | Controller calibrated incorrectly, run AUTOCAL | Fault, ↳ section 9.10 |
| **DATA EXCHANGE** (green) | — | — | Communication with PROFIBUS master active |

**The following sections describe only controller-specific functions. For general information about PROFIBUS and the system configuration, please refer to the description of your PLC.**

## 9.2 Device master file (GSD)

Configuring tools for the PROFIBUS-DP master that must be configured interpret the contents of the slave device master files and use them to create a master parameter set for the PROFIBUS master, which is responsible for useful data communication. The *ROP_07EA.GSD* file of the UPT-606 contains all the controller information needed for the configuration, e.g. the possible baud rates, parameter descriptions, alarm signals etc. The device master files and the associated display files (.DIB, for visualizing states) are supplied with the controller in German (.GSG) and English (.GSD or .GSE). They can be requested by E-Mail (support@ropex.de) or they can be downloaded from our website (www.ropex.de).
After the required device master file has been linked into the configuring tool, you must select one of the two communication modules ("compact" or "extended"). This determines which protocol will be used by the UPT-606 to communicate with the PROFIBUS master.

**If you want to use all features of the controller make sure that the appropriate version of the device master file is used.**


## 9.3 PROFIBUS protocol

The PROFIBUS protocol can be configured either as "compact" (16 bits for input data and 16 bits for output data) or as "extended" (2 x 16 bits for input data and 2 x 16 bits for output data). The protocol is determined at the configuring stage by selecting a module ("compact" or "extended"). The compact protocol is sufficient for efficient communication with the UPT-606. The extended protocol separates the set point and the actual value of the UPT-606 from the status information and the control functions, to enable it to be decoded more easily by the PROFIBUS master.

**Bits 0…7 form the low byte and bits 8…15 the high byte ("INTEL format").**

### 9.3.1 "Compact" protocol

The 16-bit **input data** from the PROFIBUS master to the UPT-606 contains the set point and the control functions and has the following structure:

| | Control function | | | | Spare | | | Set point | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Name: | RS | ST | AC | MP | 0 | 0 | 0 | | | | | | | | | |
| Bit no.: | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

The 16-bit **output data** from the UPT-606 to the PROFIBUS master contains the actual value or the alarm code and the status information and has the following structure:

| | | | | | | | | | | | | | Alarm code if AL = 1 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Status information | | | | | | | Actual value (compact) if AL = 0 | | | | | | | | |
| Name: | AA | AG | AL | TE | TO | RA | VZ | | | | | | A3 | A2 | A1 | A0 |
| Bit no.: | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

### 9.3.2 "Extended" protocol

The extended protocol transfers 2x16bits. The 2x16-bit **input data** contains the set point in word ① and the control functions in word ②:

| ① | Spare | | | | | | | Set point | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Name: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | | | | | | | | |
| Bit no.: | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

| ② | Spare | | | | | | | | | | | | Control function | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Name: | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | MP | RS | ST | AC |
| Bit no.: | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

The 2x16-bit **output data** contains the actual value in word ① and the alarm code and status information in word ②:

| ① | Actual value (signed) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Name: | VZ | | | | | | | | | | | | | | | |
| Bit no.: | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

| ② | Spare | | | | Alarm code | | | | Spare | | Status information | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Name: | 0 | 0 | 0 | 0 | A3 | A2 | A1 | A0 | 0 | 0 | AA | AG | AL | TE | TO | RA |
| Bit no.: | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |

## 9.4 Input data

The term "input data" refers to the data that is transferred from the PROFIBUS master to the UPT-606. It contains the set point and the control functions, such as START or AUTOCAL for the UPT-606. These functions are explained in the following.

### 9.4.1 Automatic zero calibration "AUTOCAL" (AC)

Because of the automatic zero calibration (AUTOCAL) function, there is no need to adjust the zero point manually on the controller. This function matches the controller to the resistance of the system and calibrates it to the value which is predefined in the parameter data (section 9.6.4 "Variable calibration temperature" on page 25). If no parameter data is transferred by the PROFIBUS master, the default value is 20 °C.
The AUTOCAL request ("AC" bit = 1) is executed by the controller providing the AUTOCAL function is not disabled.
The automatic calibration process takes about 10…15 seconds. The heating element is not heated during this process. The yellow LED on the front panel lights up while the AUTOCAL function is active and the controller reports "AUTOCAL active" ("AA" bit = 1) in the output data. The actual value output (terminals 17+18) is 0…3 °C (corresponds to app. 0 VDC).

**You should always wait for the heating element and the bar to cool down (to ambient temperature) before activating the AUTOCAL function.**

**Reasons for disabled AUTOCAL function:**

1. The AUTOCAL function cannot be activated until 10 seconds after the controller is switched on. During this time the controller reports "AUTOCAL disabled" ("AG" bit = 1) in the output data.
2. The AUTOCAL function is not activated if the heating element is cooling down at a rate of more than 0.1 K/sec. If the "AC" bit is activated, the function is executed automatically providing the cooling rate has fallen below the above-mentioned value.
3. If the "START" bit ("ST" bit = 1) is activated, the AUTOCAL function is not executed ("HEAT" LED lit).
4. AUTOCAL cannot be activated if error codes 1…3, 5…7 occur at start-up. AUTOCAL cannot be activated with error codes 5…7 if the controller has operated correctly, at least one time, after start-up (section 9.10 "Error messages" on page 27).

**If the AUTOCAL function is disabled ("AG" bit = 1) and if you attempt to activate it ("AC" bit = 1) then the "AUTOCAL" LED blinks fast (4 Hz).**

### 9.4.2 Start (ST)

When the "START" bit is activated ("ST" bit = 1), the controller-internal set/actual comparison is enabled and the heating element is heated up to the SET temperature. It remains at this temperature either until the "ST" bit is reset or until the actual heating time exceeds the preset heating time limit (section 9.6.5 "Heating time limit" on page 25).
The "HEAT" LED on the front panel of the UPT-606 lights up continuously for the duration of the heating phase.
A start request is not processed if the AUTOCAL function is active, the controller has reported an alarm, the set point is less than 20 °C higher than the calibration temperature or the "RS" bit is set. In all these cases the "HEAT" LED blinks.
The heating process is terminated if the "ST" bit is reset or if a PROFIBUS fault occurs.

**The "ST" bit is only accepted if the AUTOCAL function is deactivated and there are no alarms.**

### 9.4.3 Reset (RS)

This bit resets the controller if the controller reports an alarm.
No AUTOCAL or START requests are accepted as long as the "RS" bit is set. The power section is not activated in this state and no measuring impulses are generated. Consequently, the actual value is no longer updated. The reset request is not processed until the "RS" bit is reset. The PROFIBUS communication is not interrupted by a controller reset. The controller simply requests the parameter data from the PROFIBUS master again.

**The controller performs an internal initialization run lasting approximately 500 ms after the "RESET" signal is deactivated. The next heatsealing process cannot be started until it has finished.**

**If a contactor K2 is used to deactivate the control loop (↳ section 7.3 "Power supply" on page 11), it must be energized again 50 ms at the latest after the "RESET" signal is deactivated. If it is energized too late, an alarm signal will be output by the controller.**

### 9.4.4 Measurement pause (MP)

No more measuring impulses are generated by the controller as soon as the "MP" bit is set. From then on, only fault nos. 5, 6 and 7 are evaluated and output by the fault diagnosis function. In addition, the actual value is no longer updated. The last valid value before the bit was set is output. As soon as the bit is reset, new measuring impulses are generated, all error messages are evaluated and the actual value is updated again.
This bit is only active in measuring mode. "ST", "RS" and "AC" take priority. The bit is suitable for all applications in which the electrical connections of the heating element need to be disconnected during normal operation without triggering an alarm (e.g. sliding rail contacts).
In contrast with the "RS" bit (RESET), the "MP" bit does not reset any alarm signals when it is set. The controller is activated again as soon as the bit is reset, in other words there is no initialization phase.

**When the controller is started, it only evaluates the "MP" bit if the system test (including the functional test of the heating circuit) is successful. This can take several 100 ms.**

### 9.4.5 Set point

A set point of up to 300 °C is allowed. If you attempt to enter a higher set point, it is limited to 300 °C internally.

## 9.5 Output data

The term "output data" refers to the data that is transferred from the UPT-606 to the PROFIBUS master. It contains the current actual value and all important information about the momentary status of the controller. If an alarm is signaled, the fault can be diagnosed accurately with the help of the alarm code.

### 9.5.1 AUTOCAL active (AA)

The "AA" bit indicates that the AUTOCAL function is currently executing.

### 9.5.2 AUTOCAL disabled (AG)

If the "AG" bit is set, the AUTOCAL function is temporarily disabled. This is the case if "START" is active or if the heating element is still in the cooling-down phase.

### 9.5.3 Alarm active (AL)

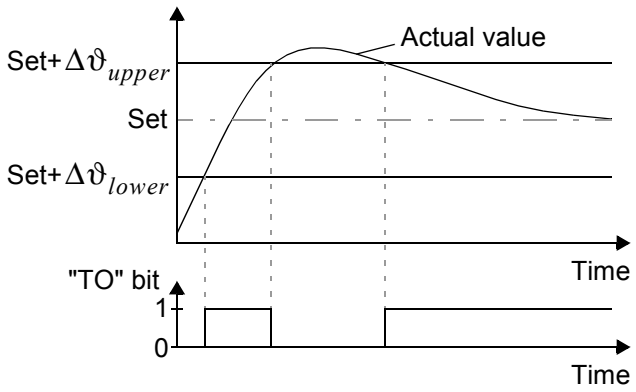
If the "AL" bit is set, an alarm has been triggered but not yet reset. The alarm code provides information about the exact cause of the fault (↳ section 9.10 "Error messages" on page 27).

### 9.5.4 Temperature reached (TE)

The "TE" bit is set if the actual temperature exceeds 95% of the set temperature. As soon as the control mode is exited ("ST" bit = 0) or an alarm is signaled ("AL" bit = 1), this status bit is reset again.

### 9.5.5 Temperature OK (TO)

The UPT-606 checks whether the actual temperature is within a settable tolerance band ("OK" window) on either side of the set temperature. The lower ($\Delta\vartheta_{lower}$) and upper ($\Delta\vartheta_{upper}$) limits of the tolerance band can be changed independently of one another by means of the parameter data (↳ section 9.6 "Parameter data" on page 24). If the actual temperature is inside the specified tolerance band, the "TO" bit is set (see graph below):




Unlike the "Temperature reached" status bit ("TE" bit), the actual temperature is evaluated independently of the control mode.

### 9.5.6 Controller active (RA)

The UPT-606 has processed the "START" request successfully and entered the control mode if the "RA" bit = 1.

### 9.5.7 Sign (VZ)

In the compact protocol, the sign bit indicates whether the actual value is positive or negative.

### 9.5.8 Actual value

If you are using the *compact* protocol, the actual value itself is always positive. The sign bit (VZ) then indicates whether the amount of the actual value is positive or negative. If an alarm is signaled, the actual value contains the alarm code.
If you are using the *extended* protocol, all 16 bits of the first word must be interpreted as a signed number (twos complement notation). During the calibration procedure or if an alarm is signaled, the actual value is 0. The alarm code is contained in separate bits.

### 9.5.9 Alarm code

If an alarm is signalled ("AL" bit = 1), the alarm code allows the exact cause of the fault to be determined.
In the compact protocol the alarm code appears instead of the actual value in bits 0…3, while in the extended protocol it is contained at bit positions 8…11 in the second word (↳ section 9.10 "Error messages" on page 27).
In addition to the alarm code, the PROFIBUS diagnostics function also sends alarm signals to the PROFIBUS master. The error messages corresponding to the alarm codes are already stored in the device master file, so that they appear automatically in plain text on the PROFIBUS master whenever the device diagnosis for the UPT-606 is interrogated there. The language in which the error messages are displayed depends on the selected device master file.

## 9.6 Parameter data

The parameter data contains values for selecting the heating element alloy, the temperature range, the upper and lower tolerance band limits for temperature monitoring, the calibration temperature and the optional heating time limit. It is transferred from the PROFIBUS master to the UPT-606 each time the system is started up. If the parameter data is changed during operation, the UPT-606 performs a reset. The PROFIBUS communication is not interrupted. The parameter data has the following structure:

| No. | Function | Default value[1] | Possible values |
|---|---|---|---|
| 0…3 | Reserved, set to 0 | 0 | 0 |
| 4 | Temperature range / alloy | 10 | 0, 10 |
| 5 | Lower temperature OK threshold | 10K | 3…99K |
| 6 | Upper temperature OK threshold | 10K | 3…99K |
| 7 | Calibration temperature | 20°C | 0…40°C |
| 8 | Heating time limit (100ms units) | 0 | 0…50 (0…5.0s) |
| 9 | Extended controller dignostis | activated | deactivated, activated |
| 10 | Measuring impulse duration | 17 | 17…30 (1.7…3.0ms) |
| 11 | Data format | High/Low byte (Intel) | High/Low byte (Intel), Low/High byte (Motorola) |
| 12 | Correction factor | 100% | 25…200% |

1. The default value is stored in the device master file and transferred from the PROFIBUS master to the UPT-606 when the system is started up.

### 9.6.1 Temperature range and alloy

This parameter selects both the temperature range and the heating element alloy. You can overwrite the setting

of the rotary coding switch by changing the default value (10).

| Value | Temperature range | Alloy |
|---|---|---|
| 0 | 300°C | TCR = 1700 ppm |
| 10 | Rotary coding switch setting | Rotary coding switch setting |

**You must always execute the AUTOCAL function after changing this parameter.**

### 9.6.2 Lower temperature OK threshold

Lower threshold value for the "OK" window.

### 9.6.3 Upper temperature OK threshold

Upper threshold value for the "OK" window.

### 9.6.4 Variable calibration temperature

The calibration temperature is set to 20 °C as default. You can change it to another value between 0 °C and 40 °C in order to adapt it to the temperature of the cooled-down heating element.

**You do not need to execute the AUTOCAL function after changing the calibration temperature.**

### 9.6.5 Heating time limit

The heating time limit provides additional protection against unwanted permanent heating. The controller automatically deactivates the heating impulse after the set heating time limit has elapsed if the start bit remains set for longer than the time specified by this limit. The start bit must be reset before the controller can be started up again.
The heating time limit is deactivated as default (0), but can be set to any value between 0 s and 5.0 s (0 and 50).

### 9.6.6 Extended controller diagnosis

The extended controller diagnosis uses the diagnostic function of the PROFIBUS protocol to display several faults of the UPT-606 on the PROFIBUS master directly. For each fault there is a text message stored in the device master file so the alarm codes appear on the PROFIBUS master in plain text if the master has the capability to display text messages.
With the help of parameter No. 9 the extended controller diagnosis can be activated or deactivated. The default setting is "activated".
Although the extended controller diagnosis ist deactivated, there is the fault diagnosis which is coded in the protocol.

### 9.6.7 Measuring impulse duration

The length of the measuring impulses generated by the controller can be set with parameter no. 10. It may be necessary to set a measuring impulse that is longer than the default 1.7 ms for certain applications.

### 9.6.8 Data format

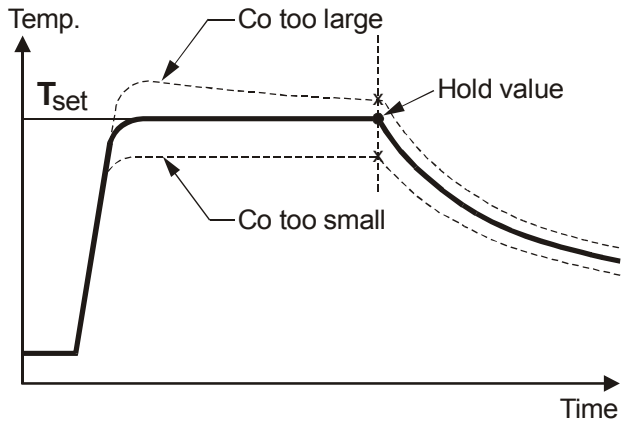
This parameter specifies the order of the bytes (Intel: "high/low byte", Motorola: "low/high byte") in the cyclic data for both input and output data (↳ section 9.3 "PROFIBUS protocol" on page 20). We recommend setting "low/high byte (Motorola)" for Siemens controllers.

### 9.6.9 Correction factor Co

The correction factor Co permits the UPT-640 controller to be adapted to the real conditions in the machine (type of UPT heating element, impulse transformer specification, length of connecting wires, cooling etc.).
Proceed as follows to determine the optimum correction factor Co (setting in section 9.6 "Parameter data" on page 24):
Controller settings:
- Set temperature: 160…180 °C
- Sealing time: 0.20…0.30 s

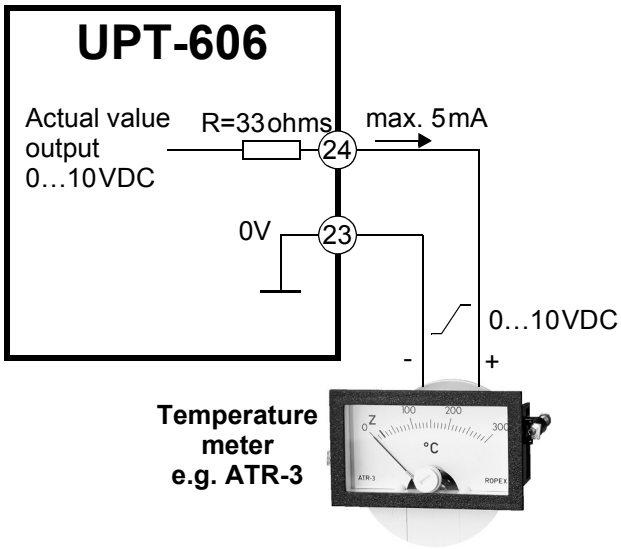
Slowly increase the correction factor – starting either with the lowest value (50 %) or with the value recommended in the ROPEX Application Report minus 25 % – to the real temperature value at the end of the sealing time (hold value) = set temperature.
The correction factor should be checked, and if necessary corrected, whenever the machine is

operated or the set temperature or the heatsealing time are changed.



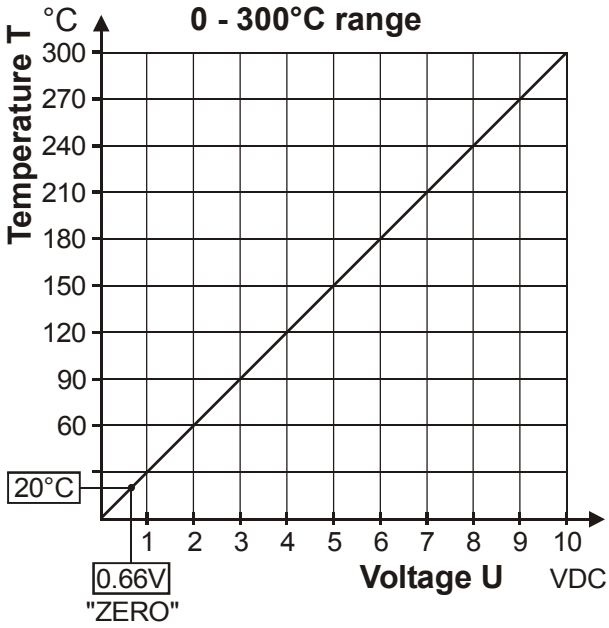

## 9.7 Temperature indication (actual value output)

The UPT-606 supplies an analog 0…10VDC signal, which is proportional to the real ACTUAL temperature, at terminals 17+18.




Voltage values:
0VDC → 0°C
10VDC → 300°C

The relationship between the change in the output voltage and the ACTUAL temperature is linear.




An indicating instrument can be connected to this output in order to visualize the temperature of the heating element.
The characteristics of the ROPEX ATR-3 temperature meter (size, scaling, dynamic response) are ideally suited to this application and this instrument should therefore always be used (section 4 "Accessories and modifications" on page 6).
It not only facilitates SET-ACTUAL comparisons, but also enables other criteria such as the heating rate, set point reached within the specified time, cooling of the heating element etc. to be evaluated.
This meter moreover permits disturbances in the control loop (loose connections, contacting or wiring problems) as well as any line disturbances to be observed extremely effectively and interpreted accordingly. The same applies if mutual interference occurs between several neighboring control loops.

**This output is not potential-free and might have the potential of the secondary voltage of the impulse transformer. External grounding is not allowed. If this warning is ignored, the controller will be damaged by frame currents. Contact-voltage protection must be installed at the terminals of the external temperature meter.**

If an alarm is signaled, the analog output at terminals 14+18 is used to display a selective error message (section 9.10 "Error messages" on page 27).

## 9.8 Booster connection

The UPT-606 controller has a connection for an external switching amplifier (booster) as standard. This connection (at terminals 15+16) is necessary for high primary currents (continuous current > 5A, pulsed current > 25A). The switching amplifier should be connected as described in section 7.7 "Wiring diagram with booster connection" on page 14.

## 9.9 System monitoring/alarm output

To increase operating safety and to avoid faulty heat-sealing, this controller incorporates special hardware and software features that facilitate selective fault detection and diagnosis. Both the external wiring and the internal system are monitored.
These features assist the operator in identifying the cause of abnormal operations.
A system fault is reported or differentiated by means of the following indications.

**A.) Red "ALARM" LED on the controller with three states:**

1. **Blinks fast (4Hz)**
   The AUTOCAL function should be executed (error codes 8+9).
2. **Blinks slowly (1Hz)**
   The system configuration is incorrect and the zero calibration (AUTOCAL function) was unsuccessful (↳ section 8.2 "Controller configuration" on page 15). It corresponds to error codes 10…12.
3. **Lit continuously:**
   This indicates that a fault is preventing the controller from being started (error codes 1…7).
   As a rule, it refers to an external wiring fault.

**B.) Alarm relay (relay contact terminals 12+13+14):**

This relay is set in the factory as follows:

- **DE-ENERGIZED** in operating states A.1 and A.2, but energized if the "ST" bit is activated in one of these states.
- **ENERGIZED** in operating state A.3.

If the alarm relay is configured opposite to the factory setting (↳ section 8.2.4 "Configuration of the alarm relay" on page 17), these states are reversed.

**C.) Error code indication via the PROFIBUS protocol**

If a fault occures the "AL" bit is set and in the compact protocol the alarm code appears instead of the actual value in bits 0…3, while in the extended protocol it is contained at bit positions 8…11 in the second word (↳ section 9.5.9 "Alarm code" on page 24).

**D.) Error code output via the 0…10VDC analog output (terminals 17+18):**

Since a temperature indication is no longer necessary if a fault occurs, the analog output is used to display error messages in the event of an alarm.
12 voltage levels are offered for this purpose in the 0…10VDC range, each of which is assigned an error code (↳ section 9.10 "Error messages" on page 27).
If a state that requires AUTOCAL occurs – or if the controller configuration is not correct – (error codes 8…12), the signal at the analog output jumps back and forth at 1Hz between the voltage value which corresponds to this error and the end of the scale (10VDC, i.e. 300°C).
If the "ST" bit is activated in one of these states, the voltage value does not change any more.
Selective fault detection and indication can thus be implemented simply and inexpensively using the analog input of a PLC with a corresponding error message (↳ section 9.10 "Error messages" on page 27).

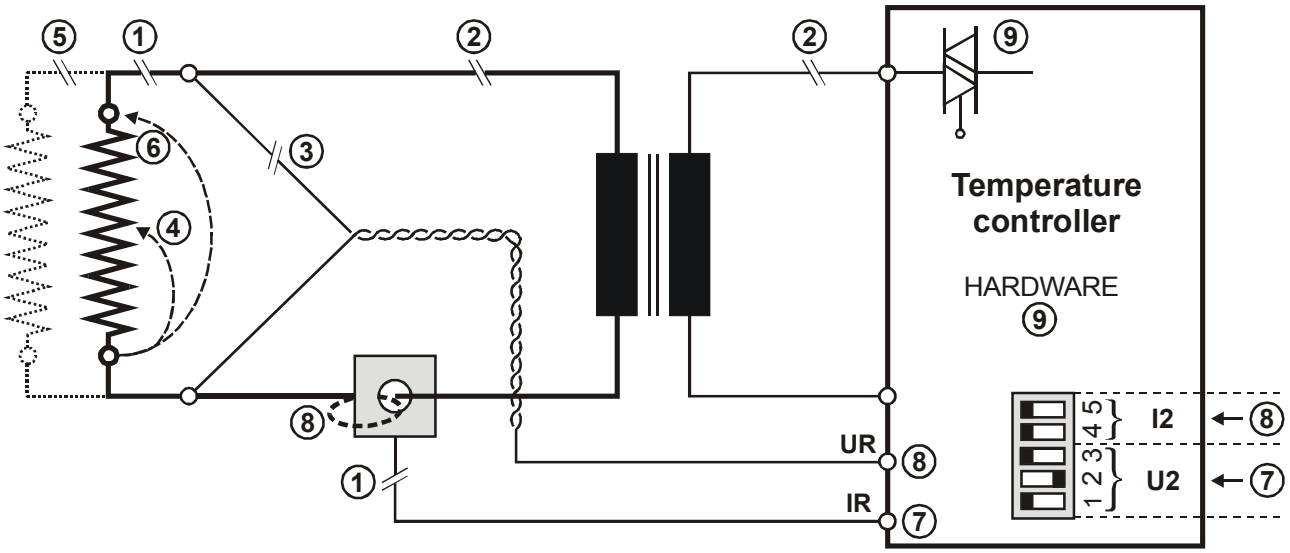
## 9.10 Error messages

In addition to the fault diagnosis which is coded in the protocol, you can also access the PROFIBUS diagnostics function (extended controller diagnosis). The alarm codes appear in the configuring tool in plain text, because they are stored in the device master file.
The table below shows how the analog voltage values correspond with the faults that have occurred. It also describes the fault and the required corrective action.
The block diagram in section 9.11 "Fault areas and causes" on page 29 permits each fault to be cleared quickly and efficiently.

**⚠ If the actual value output is evaluated in order to identify an error message - in the higher-level controller, for instance - the tolerance window must be adjusted to prevent it from being incorrectly interpreted. Please note the tolerances of the actual value output (↳ section 5 "Technical data" on page 8).**

| Error code | Act. value output; Voltage [V] | Temp. 300°C [°C] | ALARM LED | STATUS of alarm relay (factory set.) | Cause | Action if machine started for first time | Action if machine already operating, HS elem. not chang. |
|---|---|---|---|---|---|---|---|
| **1** | 0.66 | 20 | Lit Continuously | Closed | $I_R$ signal missing | Fault area ① | Fault area ① |
| **2** | 1.33 | 40 | | | $U_R$ signal missing | Fault area ③ | Fault area ③ |
| **3** | 2.00 | 60 | | | $U_R$ and $I_R$ signals missing | Fault area ② | Fault areas ②⑨ |
| **4** | 2.66 | 80 | | | Temperature step | Fault areas ④⑤⑥ (loose contact) | Fault areas ④⑤⑥ (loose contact) |
| **5** | 3.33 | 100 | | | Frequency fluctuation, inadmissible line frequency | Check power supply | Check power supply |
| **6** | 4.00 | 120 | | | Internal fault | **Run** RESET | **Run** RESET |
| **7** | 4.66 | 140 | | | Internal fault, controller defective | Replace controller | Replace controller |
| **8** | 5.33 10 | 160 300 | Blinks fast (4 Hz) | Open, does not close until "START" signal (voltage value at analog output then no longer changes) | $U_R$ and/or $I_R$ signal incorrect | **Run** AUTOCAL | Fault areas ④⑤⑥ |
| **9** | 6.00 10 | 180 300 | | | Data error | **Run** AUTOCAL | --- |
| **10** | 6.66 10 | 200 300 | Blinks slowly (1 Hz) | | $I_R$ signal incorrect, calibration not possible | Fault area ⑧, check configuration | --- |
| **11** | 7.33 10 | 220 300 | | | $U_R$ signal incorrect, calibration not possible | Fault area ⑦, check configuration | --- |
| **12** | 8.00 10 | 240 300 | | | $U_R$ and $I_R$ signals incorrect, calibration not possible | Fault areas ⑦⑧, check configuration | --- |

## 9.11 Fault areas and causes

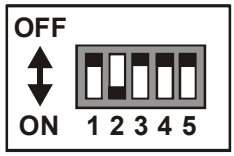
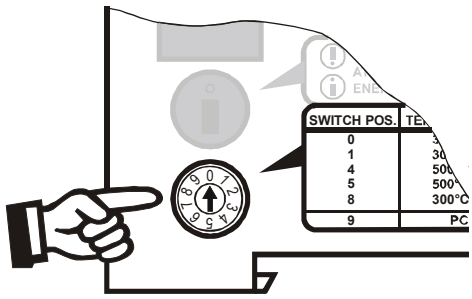
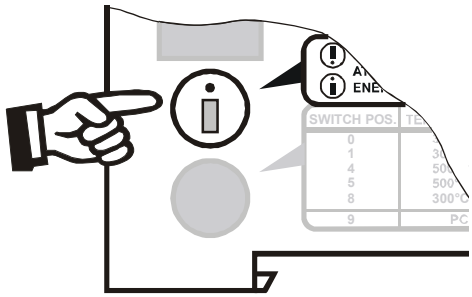
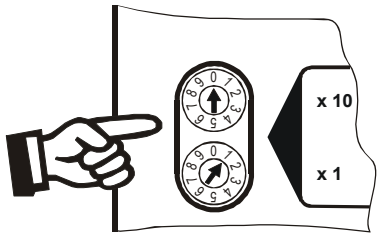



The table below explains the possible fault causes.

| Fault area | Explanation | Possible causes |
|---|---|---|
| ① | Load circuit interrupted after $U_R$ pickoff point | - Wire break, heating element break<br>- Contact to heating element is defective |
| | PEX-W2 current transformer signal interrupted | - $I_R$ measuring wires from current transformer interrupted |
| ② | Primary circuit interrupted | - Wire break, triac in controller defective<br>- Primary winding of impulse transformer interrupted |
| | Secondary circuit interrupted before $U_R$-pickoff point | - Wire break<br>- Secondary winding of impulse transformer interrupted |
| ③ | $U_R$ signal missing | - Measuring wires interrupted |
| ④ | Partial short-circuit (delta R) | - heating element partially bypassed by conducting part (clamp, opposite heating bar etc.) |
| ⑤ | Parallel circuit interrupted | - Wire break, heating element break<br>- Contacting to heating element defective |
| ⑥ | Total short-circuit | - heating element installed incorrectly, insulation at heating bar ends missing or incorrectly installed<br>- Conducting part bypasses heating element completely |
| ⑦ | $U_R$ signal incorrect | - DIP switches 1 - 3 configured incorrectly ($U_2$ range) |
| ⑧ | $I_R$ signal incorrect | - DIP switches 4 + 5 configured incorrectly ($I_2$ range) |
| | Turns through PEX-W2 current transformer incorrect | - Check number of turns (two or more turns required for currents < 30A) |
| ⑨ | Internal controller fault | - Hardware fault (replace controller) |

# 10 Factory settings

The CIRUS temperature controller UPT-606 is configured in the factory as follows:

| | | |
|---|---|---|
| DIP switches<br>for<br>secondary voltage<br>$U_2$ and current $I_2$ |  | $U_2$ = 6…60 VAC<br>$I_2$ = 30…100 A<br><br>DIP switches: 2 ON<br>1, 3, 4, 5 OFF |
| Rotary coding switch<br>for<br>sealing element alloy<br>and<br>temperature range |  | heating element alloy: 1700 ppm<br>Temperature range: 300 °C<br><br>Rotary coding switch: "0" position |
| Plug-in jumper<br>for<br>alarm relay |  | Alarm relay is energized at alarm |
| Rotary coding switches<br>for<br>station address |  <br>Top of housing | Station address = $01_{dec}$ |

# 11 Maintenance

The controller requires no special maintenance. Regular inspection and/or tightening of the terminals – including the terminals for the winding connections on the impulse transformer – is recommended. Dust deposits on the controller can be removed with dry compressed air.

# 12 How to order

| | |
|---|---|
|  | **Contr. UPT - 606 / . . . VAC**<br>**115**: Power supply 115VAC, Art. No. 660601<br>**230**: Power supply 230VAC, Art. No. 660602<br>**400**: Power supply 400VAC, Art. No. 660603<br>Scope of supply: Controller includes connector plug-in parts (without current transformer)<br><br>**Modification MOD . . (optional, if required)**<br>e.g.<br>**01**: MOD 01, Art. No. 800001 (Amplifier for low voltage)<br><br>Please indicate the article numbers of the controller and the required modifications (optional) in all orders,<br>e.g. UPT-606/400VAC + MOD 01<br>(controller for 400VAC power supply with amplifier for low voltage)<br>Art. No. 660603 + 800001 must be ordered |
|  | **Current transformer PEX-W3**<br>Art. No. 885105 |
|  | **Line filter LF- . . 480**<br>**06**: Continuous current 6A, 480VAC, Art. No. 885500<br>**35**: Continuous current 35A, 480VAC, Art. No. 885506 |
|  | **Impulse transformer**<br>See ROPEX Application Report<br>for design and ordering information |
|  | **Temp. meter ATR- .**<br>**3**: 300°C range, Art. No. 882130<br>**5**: 500°C range, Art. No. 882150 |
|  | **Booster B- . . . 400**<br>**075**: Max. pulse load 75A, 400VAC, Art. No. 885301<br>**100**: Max. pulse load 100A, 400VAC, Art. No. 885304 |

# 13 Index