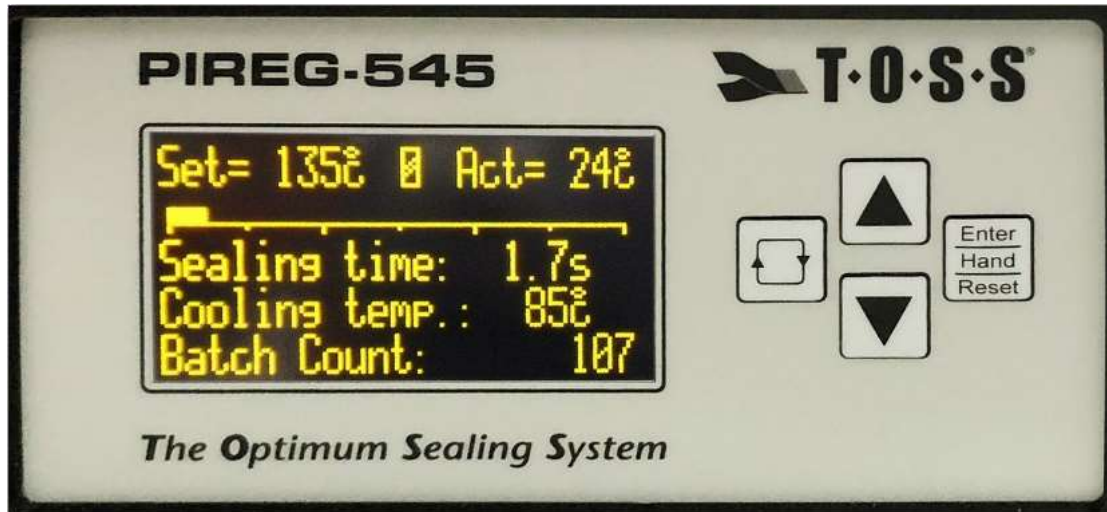


# PIREG<sup>®</sup>-545 Operator's Guide



*Perfect Seals ... Every Time*

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## 1. General, safety and warning instructions

### 1.1. Note on the Operator's Guide

The purpose of this Operator's Guide is to ensure optimum installation, commissioning, operation and maintenance of the PIREG®-545 and must be read prior to carrying out any of the actions described. Keep the operator's guide handy and accessible to all users for possible referencing. Pass this guide on to future users of the PIREG®-545.

All necessary settings are described in this operator's guide. Should difficulties nevertheless arise during commissioning or operation, please do not carry out any unauthorised manipulations. You could put yourself and others at risk as well as jeopardize your warranty claim. In such cases, please contact us immediately:



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### 1.2. Icons and symbols



**Danger:** Indicates a hazard that could result in personal injury. Whenever this symbol is used, the device description must be consulted, and the accompanying instructions must be observed and followed in order to avoid hazards.



**Danger:** Indicates a hazard due to electrical current. Failure to observe the safety instructions may result in serious or fatal injuries.



**Danger:** Indicates a hazard due to hot surfaces or burn up that could result in personal injury.



**Note:** Indicates particularly important information which, if ignored, can lead to material damage, for example.

### 1.3. General safety instructions



The safety instructions and warnings given in this description must be followed to guarantee safe operation of the equipment. The equipment can be operated without impairing the operational reliability if the conditions stated in the technical specifications are observed.



The equipment may only be installed and started-up by suitably trained personnel. Maintenance and repair of the equipment may only be carried out by trained personnel, who are familiar with the dangers and guarantee conditions.

### 1.4. Application



The PIREG®-545 resistance temperature controller may **only** be used for the heating and temperature control of TOSS approved heat seal bands as via isolating transformers in accordance with the regulations, notes and warnings contained in this description.

Non-observance of the instructions or incorrect use of the equipment can result in impairment of the safety or overheating of the heat seal band, the electrical wiring or the transformer.

### 1.5. Heat Seal Bands and Genuine TOSS Alloy 20®

A basic precaution for the functioning and safe operation of the complete heat sealing system is the use of suitable heat seal bands such as genuine TOSS Alloy 20 heat seal bands.

The positive temperature coefficient of the heat seal band must be equal or greater than the positive temperature coefficient set on the PIREG®-545. This appropriate temperature coefficient of the heat seal band must be set on the PIREG®-545 by means of the built-in display. The temperature coefficient of the heat seal band must be positive over the entire temperature range.



**Caution:** Using heat seal bands with too low a temperature coefficient or adjusting the controller to a temperature coefficient that is too high, can result in uncontrolled overheating or the burning out of the heat seal band.

Heat seal bands connected in parallel must be strictly symmetrical and performed in such a way that no over-current arises if two heat seal bands on opposite sides should touch.

If series-connected heat seal bands must be used, the effect on the over-current reaction if two sealing bands on opposite side should touch needs to be taken into consideration.

### 1.6. Impulse Transformer

The sealing transformer must be configured according to EN 61558 (VDE 0570) resp. UL 5085 (isolating transformer with reinforced isolation) and in a single-chamber design



**Caution:** There must be sufficient protection against accidental contact if the transformer is installed in a machine frame. Furthermore, ensure that water, cleaning liquids or conducting liquids do not come into contact with the transformer. The conductor wiring cross sections should be designed to match the actual currents. Non-observance of these notes may result in impairment of the electrical safety.

For best results, the transformer's performance and the secondary voltage must be properly designed for the given heat seal band (refer to the TOSS Application Report). The rate of the heat-up time is determined by the secondary voltage being supplied. The proper selection of the secondary voltage for a target temperature increase of 300°C should only allow for a heat-up period of  $\geq 240$  ms.

Measuring impulses continue while the PIREG®-545 is in the OFF state. Therefore, the higher the secondary voltage for a given heat seal band the greater the difference may be between the actual resting temperature and the ambient temperature.

### 1.7. Current Transformer



The current transformer is an essential part of the control system. Only the Toss CT-50 current transformers may be used. The current transformer may only be operated with ballast resistance. The ballast resistance is integrated into the PIREG®-545. The current transformer must be mounted in such a way that magnetic leakage fields from the sealing transformer or other leakage fields do not affect the measurement.

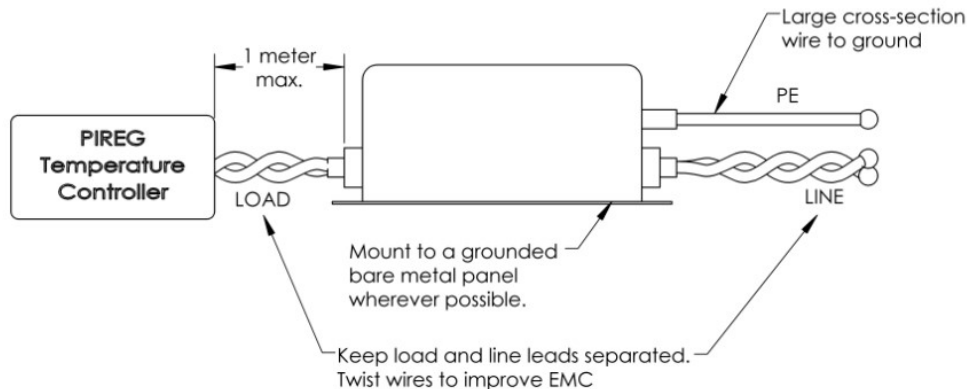


**Caution:** The used cable to the heating conductor can heat up the current transformer.

### 1.8. Line filter

A suitable line filter must be used to comply with the EMC directives listed in section 1.10. This guarantees compliance with the limit value for interference emission and are an essential component to the CE mark. The correct specification of the line filter is determined by the current load of the specific heat sealing application.

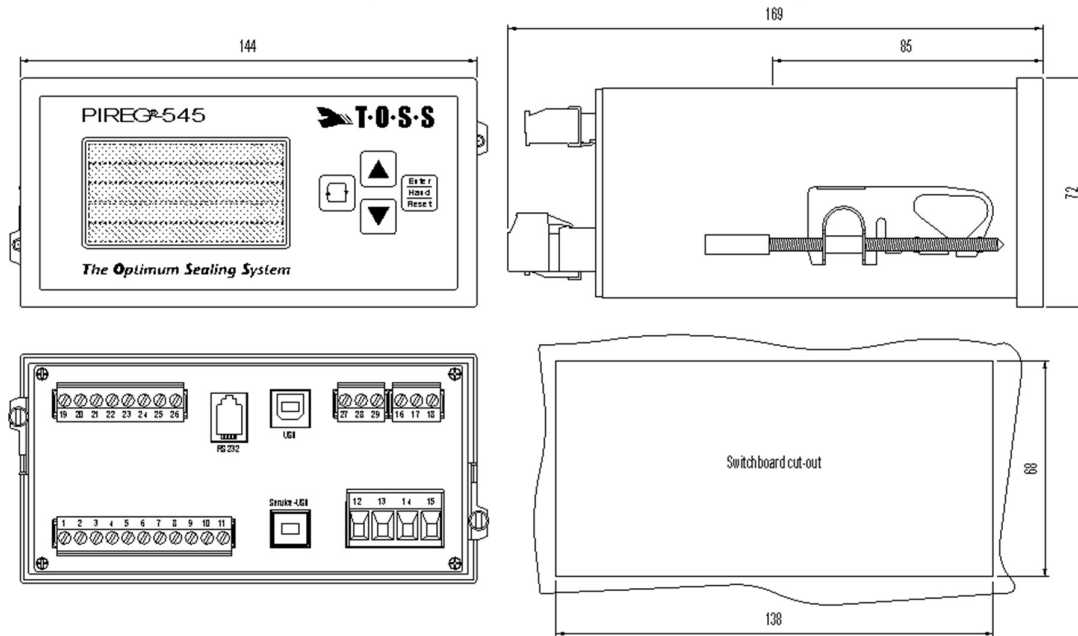
This information can be found on the TOSS application report. It is important that the filter's supply wires not be run parallel with the filter's output wires.



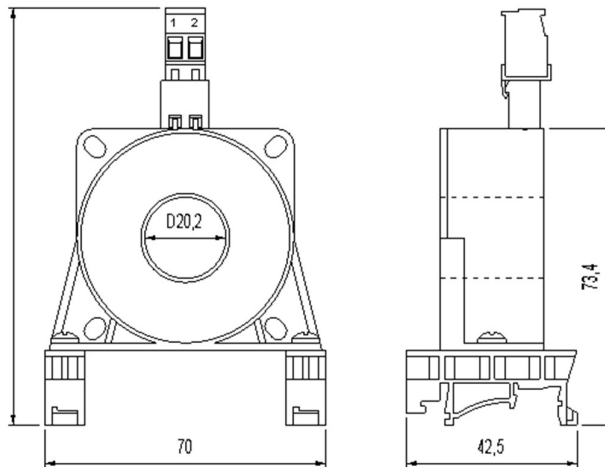
### 1.9. General assembly instructions and dimensions

The PIREG®-545 resistance temperature controller is only suited for use in an electrical cabinet. Open operation is not permitted. The controller is designed for mounting in a control panel and the current transformer is mounted on a 35mm mounting rail as per EN 60715 (EN 50022). When assembling the controller on the control panel, there must be a distance of at least 20mm away from any adjacent devices. Heat dissipation from neighboring devices must be taken into account (note the ambient temperature specifications).

## PIREG®-545 Temperature Controller



## Current Transformer CT -50 (Section 1.7.)



### 1.10. CE Conformity & cUL listing

#### 2014/35/EU, Low voltage Directive

- EN 61010-1:2011-07,

Safety requirements for electrical equipment, control, and laboratory use.

#### 2014/30/EU, Electromagnetic compatibility Directive

- EN 61000-6-2:2016-05,

Electromagnetic compatibility (EMC) – Part 6-2: Generic standards - Immunity for industrial environments

- EN 61000-6-3:2011-09,

Electromagnetic compatibility (EMC) – Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments

***A suitable line filter is required for packaging machinery so that the machinery is compliant with the electromagnetic compatibility directive.***

#### 2011/65/EU, RoHS directive



### **cUL certification:**

- UL61010-1 and CAN/CSA C22.2 No. 61010-1-12:

Electrical Equipment For Measurement, Control, and Laboratory Use; Part 1: General Requirements

- UL61010-2-030 and CAN/CSA C22.2 No. 61010-2-030-18:

Electrical Equipment For Measurement, Control, and Laboratory Use; Part 2-030 Particular requirements for equipment having testing or measuring circuits

### **1.11. Maintenance**

The PIREG®-545 resistance temperature controller does not require any special maintenance. However, an occasional check or tightening of the connection terminals is recommended. Dust deposits on the controller can be removed with dry compressed air once the power has been switched off.

### **1.12. Disposal**



Do not dispose of the device with household waste! The PIREG®-545 and its components must be disposed of via the local collection points for electronic waste in accordance with the WEEE Directive 2012/19/EU on waste electrical and electronic equipment.



Incorrect disposal can pose a risk to the environment. The PIREG®-545, its components and packaging materials must be disposed of in accordance with national waste treatment and disposal regulations.

## **2. Controller Description and Installation Overview**

The PIREG®-545 resistance temperature-controller is a temperature controller with a built-in time control, which is used to control the temperature of genuine TOSS Alloy 20 heat seal band material, or suitable heat seal bands, for impulse heat sealing of polymeric films, laminate films, and non-woven materials, and for controlling some basic functions of heat sealing machines.

**NOTE:** Some examples of heat sealing application include, bag/pouch sealing, vertical or horizontal form/fill/seal, film splicing, custom port sealing, tube sealing, and seaming non-woven materials.

The impulse transformer is used by the PIREG®-545 on the primary side. The heat seal band is fed from the secondary side of the transformer. As the heat seal band resistance changes with temperature, the measuring signals are received directly from the heat seal band and are made available to the controller at rate of 50 times per second when operated at 50Hz or at a rate of 60 times a second when operated at 60Hz.

The PIREG®-545 temperature controller has four control inputs and three relay outputs that can control various functions of the heat sealing machine. In addition, there is an alarm output.

The temperature coefficient of genuine TOSS Alloy 20 heat seal band material, or suitable heat seal band material must be positive. Its resistance increases when it is heated. This change in resistance is used for temperature control. The temperature controller measures and regulates the resistance of the heat seal band. The actual temperature is determined by measuring the voltage and current to calculate its temperature reference resistance (Rref).

**NOTE:** TOSS Alloy-20 heat seal bands can be straight or contoured shaped to provide flat, uniform sealing or they can be round, beaded, or T-profiled to perform a seal and cut operation. Seal and cut can also be performed in contoured shapes. Ask your TOSS applications engineer for more information.

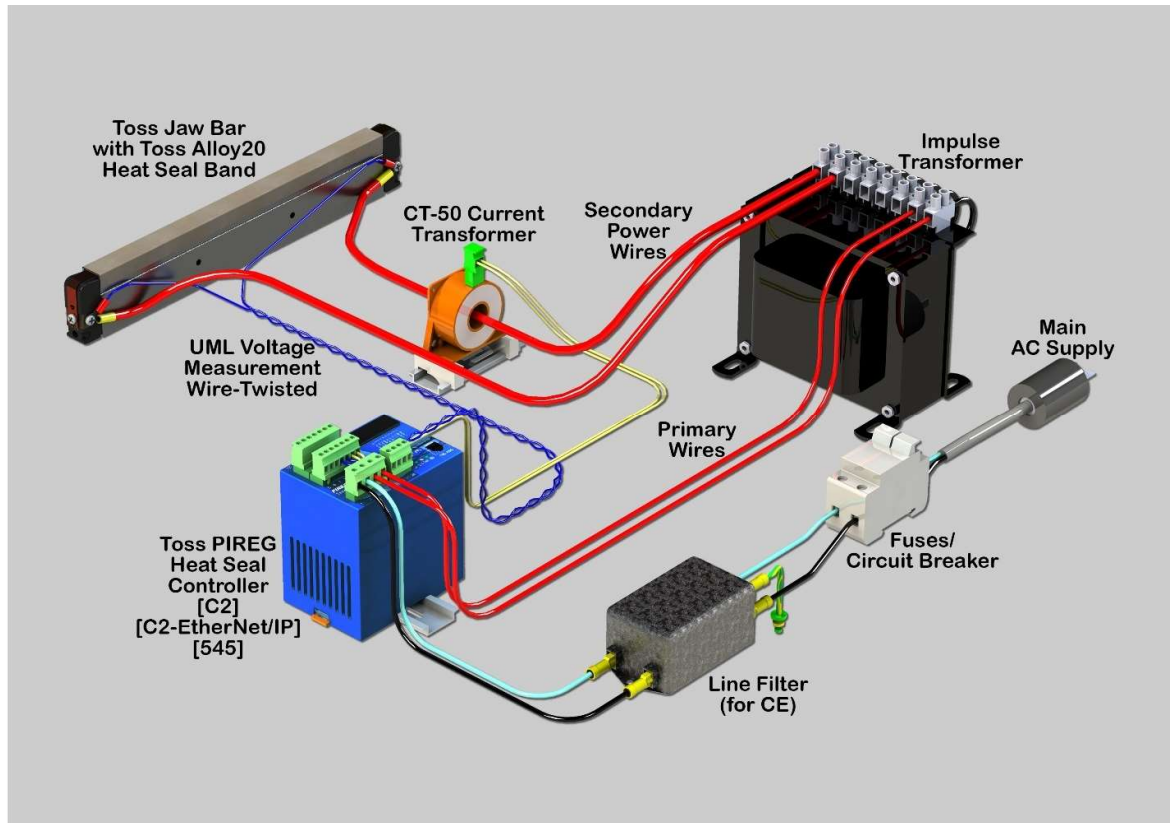
The PIREG®-545 can be easily operated with the built-in display unit. An OLED module with five lines containing twenty-one digits each is used for the display. The PIREG®-545 can operate up to a temperature range as high as 500°C.

During auto-calibration, the controller sets itself to the secondary voltage of the transformer and the current through the heat seal band. The secondary voltage of the transformer may be within a range of 1...80 V. Higher secondary voltage ranges are possible with the use of TOSS series resistor. The current measured with a current transformer can range from 20 to 400A.

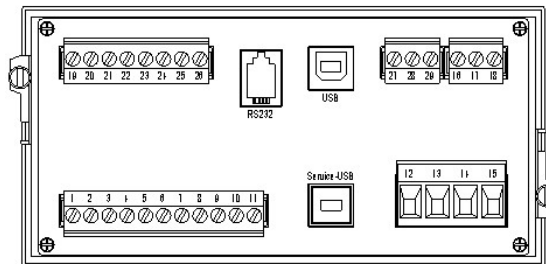
The PIREG®-545 performs the auto-calibration process within a variable ambient temperature range of 0-50°C. During this process, the actual ambient temperature must be set in the controller.

The PIREG®-545 provides a measurement pause function. During the measurement pause, the PIREG®-545 stops the resistance measurement making it possible to interrupt the heat seal band circuit without generating an alarm. The measurement pause is controlled using either the reset or calibration-start inputs.

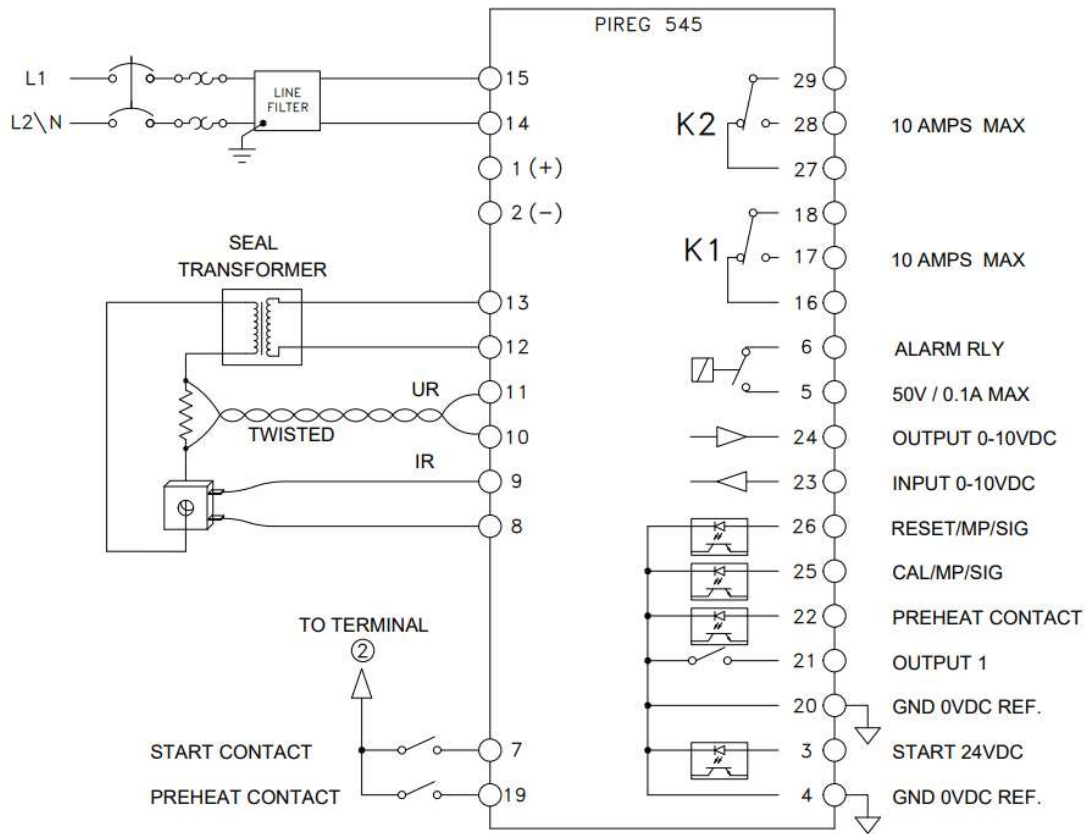
## 2.1. Installation Overview



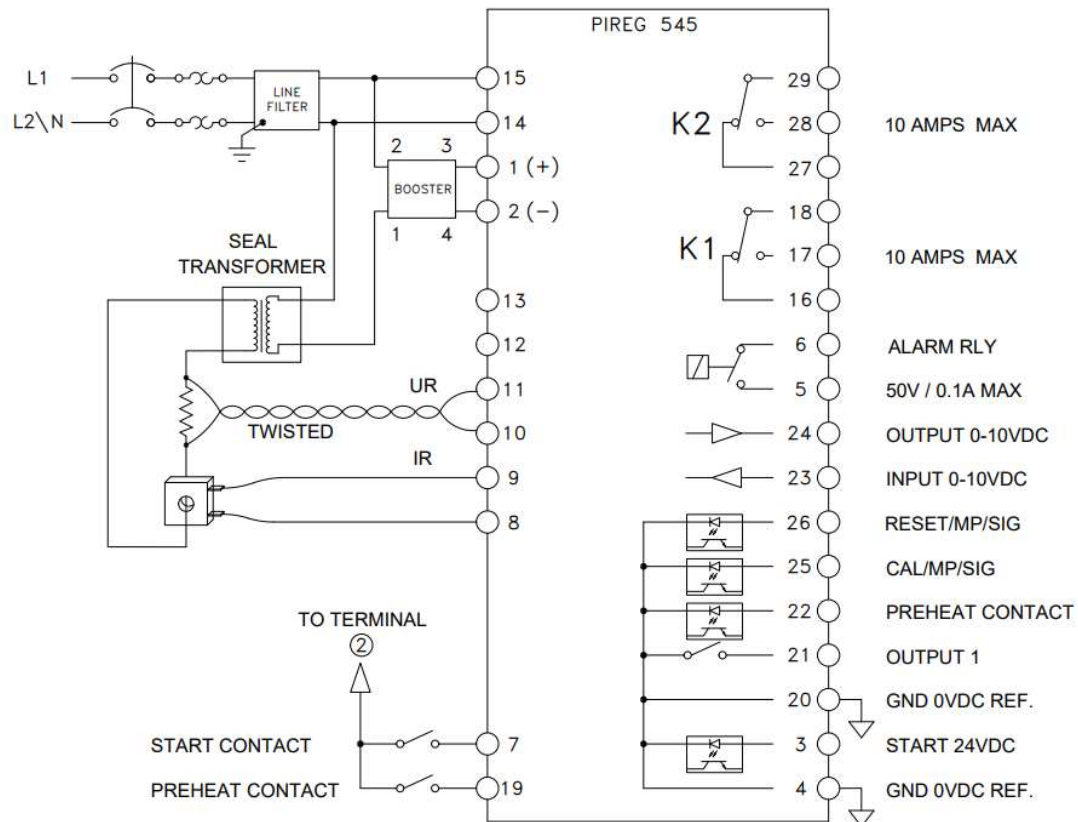
## 2.2. PIREG®-545 rear electrical pin-out



### 2.3. Wiring diagram for the PIREG®-545



### 2.4. Wiring diagram for the PIREG®-545 WITH external solid-state relay (Booster)



### 3. Installation and commissioning

First, check that the voltage stated on the PIREG®-545 resistance temperature controller matches the mains voltage, and that the transformer primary current matches the controller's load current capability.



For safe operation, the PIREG®-545 resistance temperature controller may only operate in symmetrical TN and TT networks.



During installation, an overcurrent protection device must be provided in front of the mains input of the PIREG®-545.

The PIREG®-545 must be connected to the mains voltage via an easily accessible and marked isolating device (e.g., switch or circuit breaker).

#### 3.1. Installation

The PIREG®-545 resistance temperature controller is only suited for use in a switch cabinet. Open operation is not permitted.

The PIREG®-545 is intended to be used in a safety enclosure which should conform with requirements for protection against the spread of fire, against electrical shock, against mechanical hazards and should have adequate rigidity according to UL 61010-1.

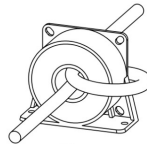
The controller is designed for mounting in a control panel and the current transformer is mounted on 35mm mounting rails as per EN 60715 (EN 50022). When mounting the controller, observe a minimum distance of at least 20 mm to adjacent devices and cabling on all sides.

Heat dissipation from neighbouring devices must be considered (note the ambient temperature specifications).

#### 3.2. Configuring the secondary voltage and current

The secondary voltage of the transformer may be within a range of 1...80V while the current measured with a current transformer can range from 20 to 400 A. During AUTOCAL, the secondary voltage and current are configured automatically. If during AUTOCAL it is found that the voltage and/or current is outside of the permissible range an Error signal will be displayed on the screen.

If the secondary current falls below 20A, the secondary voltage wire must be looped through the CT-50 current transformer a second time (or multiple times). Refer to the TOSS application report.



2x

#### 3.3. Configuring the settings

Prior to initial operation, the correct temperature coefficient must be set for the genuine TOSS Alloy 20 heat seal band material, or the suitable heat seal band material being used. Setting too high a temperature coefficient may lead to overheating of the heat seal band. If necessary, the variable reference temperature must be set.

In addition, the temperature range, and the transformer type must be set. The heating ramp can be adjusted before or after auto-calibration.

Then the PIREG®-545 controller can be auto-calibrated. The settings for the sequence control, monitoring, relays etc. can be specified before or after auto-calibration.

#### 3.4. Connecting the PIREG®-545

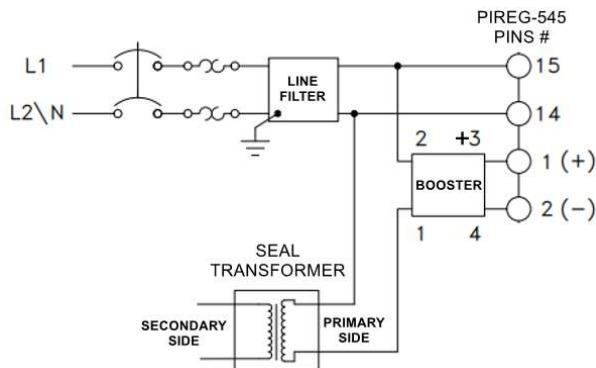
The PIREG®-545 must be connected according to the wiring diagrams in [Section 2.3](#) or [Section 2.4](#) when using an external solid-state relay (Booster). It is not necessary to pay attention to the polarity of the current  $I_r$  and voltage  $U_r$  measurement cables to the heat seal band, nor to the connection of the sealing transformer on the primary or secondary side.

When connecting a target value potentiometer, it is vital to pay attention to the correct phase sequence. In the 0 °C setting, the resistance between terminals X20 and X23 must be 0 Ω. See [Section 5.8.5](#).

The measurement cables for voltage measurement ( $U_r$ ) must be connected directly to the heat seal band and have to be twisted. ( $\geq 50$  turns per meter). The cables from the sealing transformer should be connected to the heat seal band with cable lugs and not with plug-type connections. Ensure that the conductors are of adequate cross-section. No additional components, such as fuses, switches or resistance-loaded ammeters should be integrated in the secondary circuit of the sealing transformer.

### 3.5. External Solid State Relay (booster)

Based on the specific heat sealing application, when high primary currents are to be expected (continuous current > 5A or peak current > 25A) an external solid state relay (booster) is required. The connections are to be made at terminals 1 & 2. A complete wiring diagram with an external solid state relay can be found in [Section 2.4](#) of this manual. Installation of the external solid state relay does not require special settings.



### 3.6. Control inputs

The control inputs for Start (pins 7+2) and Preheating (pins 19+2) may not be actuated before the PIREG®-545 controller is switched on for the first time. (If auto-calibration is not suitable any more after the heat seal band was changed, the heat seal band may overheat).

### 3.7. Connecting to the mains voltage

Following connection to the mains, the PIREG®-545 controller will switch to the error state with the error message “Data error, saved calibration values do not match the setting” as settings were not yet made. The necessary settings via the menus or interfaces and calibration must now be carried out. The icon “Pause” should be displayed following a successful calibration.

### 3.8. The TOSS Alloy 20 & Suitable Heat Seal Band Materials

The TOSS Alloy 20 heat seal band is an important component of the control circuit because it functions both as a temperature sensor and heating element at the same time.

The measurement principle of the resistance temperature controller requires that the TOSS Alloy 20 or suitable heat seal band has a positive temperature coefficient, which is set at the PIREG®-545. The controller offers a selection of the four fixed Tc-settings, 1.) Alloy L-746ppm, 2.) Alloy A20K-862ppm 3.) Alloy A20C-1235ppm, and 4.) Norex-4830ppm. The four fixed Tc-settings relate to heat seal bands that are available at TOSS. A “variable” Tc-settings selective is also available. This allows for the use of heat seal bands that do not match any of the ppm values available from the four fixed Tc-settings. With “variable” selected, a ppm range of 400...2200ppm is programmable. The use of a heat seal band with a smaller temperature coefficient than can be set within “variable” range on the controller can result in the heating element getting overheated or burning up. Despite full heating capacity, the actual value cannot reach the target value.

The “variable” selection is also used when an NIST validated temperature is required. Adjusting the “variable” ppm allows the operator to calibrate the bands temperature to an independent, NIST calibrated, temperature measuring device.

During initial heating of the heat seal band to between 250° and 300°C, the cold resistance of the heat seal band can vary by 2 - 3 % (burn-in effect). This resistance variation results in a zero-point error of 20° - 30°C. After a few heating cycles, this zero-point error needs to be corrected by a new auto-calibration.

Overheated or burnt-out heat seal bands should not be used because of irreversible changes in the temperature coefficients.

A constructional measure to improve the exact temperature control and to increase the life of the heat seal band and the Teflon (PTFE) coating is to copper-plate or silver-plate the heat seal band's contacts. This measure ensures that the TOSS Alloy 20 heat seal band contacts remain cold and allows the controller to measure only where sealing is taking place. The temperature of the heat seal band can only be determined by the PIREG®-545 as the mean of all parts of the heat seal band. If any individual parts of the heat seal bands that are exposed or otherwise not in contact with any heat dissipating areas, they will heat up faster than those sections of the heat seal band that are able to dissipate their heat. In this case, the temperature reached at these sections will be lower than the temperature displayed by the controller and the sealing performance will be worse.

Auto-Calibration of the PIREG®-545 is recommended every time the heat seal band is installed/replaced, in order to correct any tolerances of the heat seal band arising during manufacture. When TOSS Alloy 20 heat seal bands are used, burn-in will again be necessary.

### 3.9. Burning in the genuine TOSS Alloy 20 heat seal band

With the sealing tool held open, the genuine TOSS Alloy 20 heat seal band should be "burnt in" in such a way that the "Start" signal is applied and a target temperature is slowly increased from zero. The final burn-in temperature should be at least 50°C above the determined application sealing temperature. The genuine TOSS Alloy 20 heat seal band should be monitored (initial colors, hot spots). Auto-Calibration should be carried out again following burn-in and complete cool down of the heat seal band.

### 3.10. Current Transformer



To reduce the risk of electric shock, always open or disconnect circuit from power distribution system (or service) or building before installing or servicing current transformers.



The following must be observed when installing the current transformer:

- The current transformers may not be installed in equipment where they exceed 75 percent of the wiring space of any cross-sectional area within the equipment.
- Restrict installation of current transformer in an area where it would block ventilation openings.
- Restrict installation of current transformer in an area of breaker arc venting.
- Not suitable for Class 2 wiring methods and Not intended for connection to Class 2 equipment.
- Secure current transformer and route conductors so that the conductors do not directly contact live terminals or bus.

### 3.11. When the controller does not work correctly

See [Section 5.7](#). - Alarm State

## 4. Operation

### 4.1. Buttons

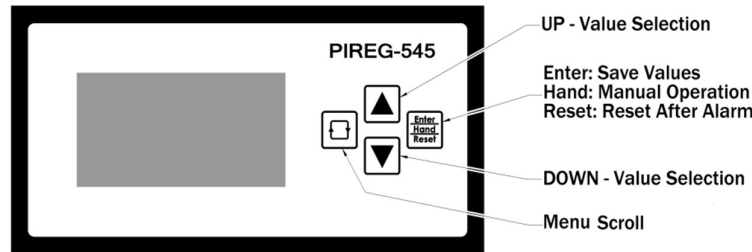
The operation of the PIREG®-545 controller is executed by four buttons indicated as follows:

Menu Scroll

up

down

Enter / Hand / Reset



#### 4.1.1. Changing between menu levels:



The PIREG®-545 has four menu levels: 1) Settings, 2) Configuration, 3) Advance Configuration, and 4) Security Protection.





**Note:** Levels 3 and 4 are only available when the "Advance PIREG® Features" in Configuration menu 227 is set to ON.

- ✓ **Setting Menu:** The start point for all menu levels is the Home Screen and Settings menu. From the Home Screen, press the Menu Scroll button to advance through the various Settings menus.
- ✓ **Configuration menus:** From the Home Screen, hold the Menu Scroll button for longer than 2s to change to the Configuration menus. Then press the Menu Scroll button to advance through the various Configuration menus.
- ✓ **Advanced Configuration menus:** From the Home Screen, simultaneously hold the Menu Scroll button and button for longer than 2s to change to the Advanced Configuration menus. Then press the Menu Scroll button to advance through the various Advanced Configuration menus.
- ✓ **Security Protection menus:** From the Home Screen, simultaneously hold the Menu Scroll button and button for longer than 2s to change to the Security Protection menus. Then press the Menu Scroll button to advance through the various Security Protection menus.



#### 4.1.2. Setting of numeric values:

Numeric values are altered by pressing the ▲ or ▼ buttons. Once altered, it starts to blink indicating it has been altered. To select the altered numeric value, press the Enter button , and the blinking stops. Pressing the Menu Scroll button  will advance the controller to the next menu without altering the accepted value.

#### 4.1.3. Setting of functions:



Functions are altered by pressing the ▲ or ▼ buttons. Once altered, it starts to blink indicating it has been altered. To select the altered function, press the Enter button , and the blinking stops. Pressing the Menu Scroll button  will advance the controller to the next menu without altering the accepted function.

#### 4.1.4. Accepting numeric values or functions:

Accepting numeric values or functions is executed by pressing the Enter button . If the altered setting is not accepted within 15 seconds by pressing the Enter button , it will not be altered, and the previously accepted value is kept. Auto Accept can be programmed in Advance Configuration 314. With Auto Accept set to ON, the altered setting will flash for 2 seconds and then automatically accepted.

#### 4.1.5. Menu return:

Returning from all menus back to the Home Screen can be achieved three ways:

- 1) Holding the Enter button  for 2 seconds.
- 2) Repeatedly pressing the Menu Scroll button  to advance through the entire set of menus found in the menu level currently in.
- 3) Automatic return from all menus back to Home Screen will happen after 20s of inactivity. This can be activated in Advance Configuration menu 312.



#### 4.1.6. Brightness:

Setting the brightness of the display-lighting can be altered by pressing the ▲▼ buttons while in the Home Screen. The setting will be saved when the setting has not been altered for 3 seconds.

#### 4.1.7. Edit Prevention:

If a value or function cannot be altered an “x” will appear in front of the value/function for 1s to indicate that the alteration is not allowed.

#### 4.1.8. Locking:

To prevent inadvertent altering of settings two locking feature exists. The first method for locking and unlocking is done from the Home Screen by simultaneously pressing the ▲ + ▼ +  buttons. Before using this feature, it must be turned ON in Advance Configuration menu 313. The second method for locking and unlocking is to hold the Menu Scroll button  while the controller is being powered ON or while the start menu is displayed after reset. See [Section 6.2](#) for Locking Symbols.

## 5. Functions

### 5.1. Control

With the PIREG®-545, there are the following control settings which must be performed before start-up.

#### 5.1.1. Setting temperature coefficients:

The heat seal band's temperature coefficient must be set on the PIREG®-545. The temperature coefficient is a material constant specific to the heat seal band material being used for the heat seal band.



Using heat seal bands with too low a temperature coefficient or adjusting the controller to a temperature coefficient that is too high, can result in uncontrolled overheating or burning out of the heat seal band.

There are four selectable temperature coefficients, Alloy A20C, Alloy A20K, Alloy L, and Norex. A Variable temperature coefficient exists allowing for the precise calibration of a specific heat sealing system.

#### 5.1.2. Temperature range:

The PIREG®-545 offers a choice between four fixed temperature ranges of 200, 300, 400 and 500°C and a variable maximum temperature dependent on the selected range.

#### 5.1.3. Transformer type:

The PIREG®-545 must be adapted to the type of sealing transformer, EI core (commonly preferred) or toroidal core.

#### 5.1.4. Reference temperature:

The reference temperature is the environmental (ambient) temperature at which the heat seal band resistance, called reference resistance (Rref), is determined during the auto-calibration process. With the PIREG®545, the reference temperature may be set between 0 and 50°C.

### 5.2. Auto Calibration and Temp. Coefficient Correction:

During auto-calibration, the PIREG®-545 ambient temperature reading independently adapts to the combination of sealing transformer and the heat seal band material being used.

### 5.2.1. Establishing the ambient temperature's reference resistance (Rref):

The ambient temperature of 0-50°C must be set in the controller before the auto-calibration process can begin (Settings Menu 107). Before the auto-calibration begins, it is important the heat seal band is at the ambient temperature to ensure accuracy throughout the entire temperature range. At the conclusion of the auto-calibration process the "ACT" temperature on the Home Screen will reflect that of the reference temperature.

### 5.2.2. Single-point temperature coefficient correction:

With the single-point temperature coefficient correction, the actual measured temperature difference for one selected operating temperature (preferably the optimal sealing temperature in which the machine will be operated at) can be corrected. The PIREG®-545 allows the user to compare the selected operating temperature to the actual measured temperature of the heat seal band. The user can then store the actual measured temperature, thus correcting the reference resistance (Rref) for the chosen operating temperature. At the conclusion of the single point calibration, when the Rref has been corrected, the temperature correction is saved until it is requested to be performed again.



**Note:** During Single Point calibration, it is important to relieve the sealing force from the heat seal band while it is heating to the Single Point set temperature. This will allow for the heat seal band to expand freely during heat-up without risk of damaging the heat seal band. The K1 relay, K2 relay, or Output1 can all be programmed to provide a control message to open and close the heat seal jaw bar, while the temperature-coefficient correction is in process. When programmed, the chosen relay is actuated after a delay of 250 ms and when the actual temperature has exceeded 95% of the desired temperature. The chosen relay is released when the heat seal band's actual temperature is reported back to the PIREG®-545. (from V1.00/1.07/1.29/1.23)

### 5.2.3. 8-Point Temperature-coefficient correction:

Actual measured temperature differences can be corrected by this feature. When requested, at the conclusion of the initial auto-calibration stage, the heat seal band is heated to eight temperature stages by the PIREG®-545. When the PIREG®-545 is programmed to operate at a temperature range of 300°C, the eight temperature stages are 50, 77, 104, 131, 159, 186, 213 and 240°C. When programmed for a range of 500°C, the eight temperature stages are 50, 100, 150, 200, 250, 300, 350 and 400°C. At each stage, the PIREG®-545 allows the user to compare the stage temperature to the actual measured temperature of the heat seal band. The user can then store the actual measured temperature, thus correcting the reference resistance (Rref) for that temperature stage. At the conclusion of the 8-point calibration, when the Rref for each temperature stage has been corrected, the entire temperature correction is saved until it is requested to be performed again.



**Note:** During 8-Point calibration, it is important to relieve the sealing force from the heat seal band while it is heating to the various pre-set temperature points. This will allow for the heat seal band to expand freely during heat-up without risk of damaging the heat seal band. The K1 relay, K2 relay, or Output1 can all be programmed to provide a control message to open and close the heat seal jaw bar, while the temperature-coefficient correction is in process. When programmed, the chosen relay is actuated after a delay of 250 ms and when the actual temperature has exceeded 95% of the desired temperature. The chosen relay is released when the heat seal band's actual temperature is reported back to the PIREG®-545. (from V1.00/1.07/1.29/1.23)


## 5.3. Off-state

In the Off state, and with measurement pause inactive, the PIREG®-545 continually measures the heat seal band's resistance, calculates its temperature, and it is displayed as the actual value ("Act") on the Home Screen. Since power is introduced to the heat seal band for measuring the resistance, it heats up slightly in the Off state, depending on the heat seal band voltage.

The controller switches from the Off state to the On state when the "Start" signal is applied. If the "Autocal Start" signal is applied at pins 25 + 20, the PIREG®-545 switches to calibration mode then returns to the Off state when calibration has been successful. See [Section 5.8.3](#).

In the Off state it is possible to activate a measurement pause (from V1.00/1.07/1.29/1.23). During the measurement pause, the PIREG®-545 stops the resistance measurement making it possible to interrupt the heat seal band circuit without generating an alarm. The measurement pause is automatically stop, if the On state or the calibration state is activated.

## 5.4. On state

In the On state, the PIREG®-545 regulates the heat seal band temperature in accordance with the set value. As soon as the "Start" signal is removed, the controller returns to the Off state. The controller can also be programmed in Configuration menu 213 to switch to the ON state by holding down the Enter button  from the Home Screen.

## 5.5. Time control

The time control can be switched On and Off in Configuration menu 209. If the time control is switched Off, then a sealing process with the set desired temperature is only activate when a "Start" signal is present. If



the time control is switched On, a sealing cycle with subsequent start delay, sealing time and cooling time will be started automatically after the "Start" signal is applied. If the time control is switched On w/ start supervising, a sealing cycle with subsequent start delay, sealing time and cooling time is only activate when a "Start" signal is present.

#### **5.5.1. Preheating:**

"Preheating" can be used to preheat the heat seal band during a pause in the sealing cycle. The PIREG®-545 adjusts the heat seal band temperature to the programmed preheating temperature. This feature reduces the time it takes for the heat seal band to reach the "Set" sealing temperature. Preheating can be activated two ways, 1) it can be controlled by using a 24VDC signal at pins 22 + 20 or 2) via a controlled contact at pins 2 and 19. The preheating temperature can be set irrespective of the desired temperature. The minimum Preheat temperature is 40°C. See [Section 5.8.2](#)

#### **5.5.2. Start delay:**

Start delay is the delay time after the "Start" signal has been applied and until sealing time starts. During the start delay the heat seal band is not heated by the PIREG®-545. If preheating has been switched on, it continues through the start delay.

#### **5.5.3. Sealing time:**

During the sealing time the PIREG®-545 adjusts the heat seal band temperature according to the set target value. Depending on the setting for Start of Sealing Time, the sealing time can start with the "Start" signal or after the "Set" temperature has been reached.

#### **5.5.4. Cooling phase:**

The sealing time is followed by the cooling phase. Depending on the setting for the Cooling Mode, the heat seal band is cooled down for either a set time or to a preset temperature. The cooling temperature can either be set as an absolute temperature or as a percentage of the programmed "Set" temperature.

### **5.6. Monitoring**

#### **5.6.1 Temperature diagnostic:**

Temperature diagnostic is a temperature monitoring feature enabled and set in the PIREG®-545. During the sealing process, the actual temperature is monitored to ensure that it is within an OK temperature control limits. If the actual temperature falls out of the OK temperature control limits for longer than the programmed diagnostic delay, the PIREG®-545 enters the alarm state.

#### **5.6.2. Temperature rise monitor:**

The temperature rise monitor is a monitoring feature enabled and set in the PIREG®-545. With this feature, the temperature rise is monitored after the "Start" signal has been applied. If the "Set" temperature value does not reach the set OK temperature range within the set heating period, the PIREG®-545 enters the alarm state.

#### **5.6.3. Start signal monitor:**

With time control set to "ON / w. start supervising", a sealing cycle can be interrupted when the "Start" signal is no longer applied during the running sealing cycle. This monitor can be linked to various machine functions deemed important to achieving a quality heat sealing cycle.

## 5.7. Alarm state

The PIREG®-545 enters the Alarm state only when it detects an error. The controller monitors the mains voltage, the heat seal band temperature, the current and voltage measurements on the heat seal band, the calibration parameters and the monitor functions.

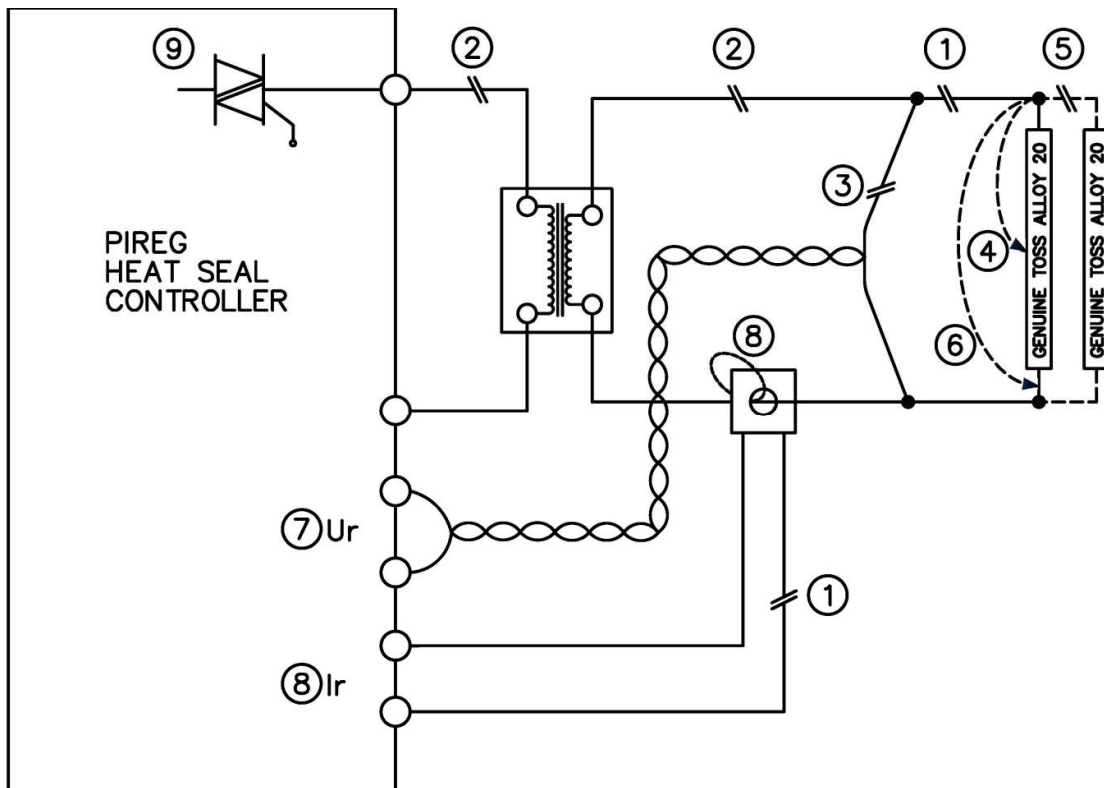
Here the error's number, its description and a possible remedy are given.

### 5.7.1. Possible Alarms:

<b>Alarm Code</b>	<b>Alarm Cause</b>	<b>Analog</b> (Between Pins 20 & 24)	<b>Fault Area</b>
101	<i>Current signal Ir missing</i>	0.66	1
102	<i>Voltage signal Ur missing</i>	1.33	3
103	<i>Current Ir and voltage Ur signal missing</i>	2.00	2 or 9
104	<i>Current signal Ir too high</i>	6.33 <> 10	Run Autocal 7 or 8 <b>or</b> Loose Contact 4, 5, or 6
105	<i>Voltage signal Ur too high</i>		
106	<i>Current signal Ir and voltage signal Ur too high</i>		
107	<i>Temperature step, down</i>	2.66	Loose Contact 4, 5, or 6
108	<i>Temperature step, up</i>		
111	<i>Calibration Error: Current signal Ir too low</i>	6.66 <> 10	8
	<i>Calibration Error: Current signal Ir too high</i>		
112	<i>Calibration Error: Voltage signal Ur too low</i>	7.33 <> 10	7
	<i>Calibration Error: Voltage signal Ur too high</i>		
	<i>Calibration Error: Voltage signal Ur unstable</i>		
113	<i>Calibration Error: Current signal Ir and voltage signal Ur too high</i>	8.00 <> 10	7 or 8
	<i>Calibration Error: Current signal Ir and voltage signal Ur too low</i>		
	<i>Calibration Error: Current signal Ir too low, Voltage signal Ur too high</i>		
	<i>Calibration Error: Current signal Ir too high, Voltage signal Ur too low</i>		
	<i>Calibration Error: R20 cannot be determined</i>		
	<i>Calibration Error: P-factor could not be determined</i>		
121	<i>Calibration Error: Reference temperature too high</i>		
122	<i>Calibration Error: Range of Tc correction exceeded</i>		
123	<i>Calibration Error: Temperature for steadiness and dynamic too low</i>		

Alarm Code	Alarm Cause	Analog (Between Pins 20 & 24)	Fault Area
201	Line frequency missing	3.33	Check Power Supply
204	Line voltage too low		
205	Line voltage too high		
211	Calibration values do not fit setting	6.00 <> 10	Run Autocal
221	Communication control RS232 connection		
	Communication control USB connection		
	Communication control TM6 thermometer		
222	Communication control internal connection 1		
	Communication control internal connection 2		
302	Temperature too low	6.33 <> 10	Run Autocal <b>or</b> Loose Contact 4, 5, or 6
303	Temperature too high		
304	Heatup timeout, Heatup time exceeded	4.00	Run Reset (Check Config Menu 219)
307	Temperature diagnosis activated, temperature too low	2.66	4, 5, or 6
308	Temperature diagnosis activated, temperature too high		
901	Device error	4.66	Check Controller
902	Internal error		
903	Write/read error of memory		

**5.7.2. Fault Area Diagram:**



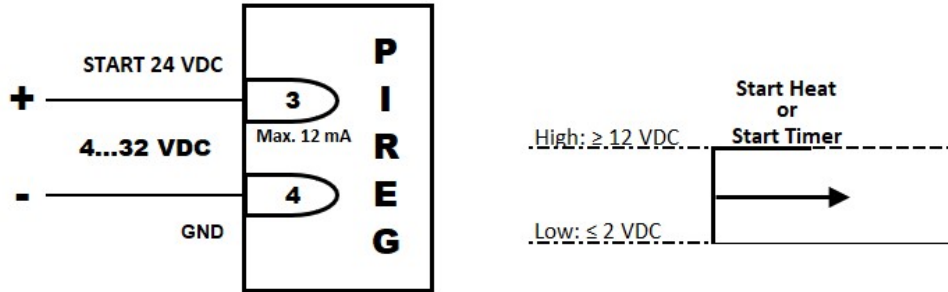
Fault Area	Reason	Possible Causes
1	Current signal missing between Ur measurement connection point and heat seal band.	<ul style="list-style-type: none"> <li>• Wire break (check crimp connectors), heat seal band break</li> <li>• Loose/defective contacting to heat seal band</li> </ul>
	CT-50 current transformer signal missing	<ul style="list-style-type: none"> <li>• Ir measuring wire from current transformer to temperature controller is loose or not connected.</li> </ul>
2	Primary circuit disconnect	<ul style="list-style-type: none"> <li>• Wire break, triac in controller defective</li> <li>• Primary winding of isolation transformer disconnected</li> </ul>
	Secondary circuit disconnect before Ur pickoff point	<ul style="list-style-type: none"> <li>• Wire break</li> <li>• Secondary winding of isolation transformer disconnected</li> </ul>
3	Ur signal missing	<ul style="list-style-type: none"> <li>• Ur measuring wire loose or disconnected</li> </ul>
4	Resistance shift, partial short-circuit	<ul style="list-style-type: none"> <li>• Heat Seal band intermittently in contact with conductive parts (clamp, opposite heat sealing bar, etc.)</li> </ul>
5	Parallel circuit disconnect	<ul style="list-style-type: none"> <li>• Wire break, heat sealing band break</li> <li>• Loose or defective contacting to heat seal band</li> </ul>
6	Full short-circuit	<ul style="list-style-type: none"> <li>• Heat Seal band installed incorrectly, insulation at the ends of the heat sealing bar is missing or incorrectly installed</li> <li>• Heat seal band in full contact of conductive part(s)</li> </ul>
7	Ur signal incorrect	<ul style="list-style-type: none"> <li>• Ur signal outside tolerable range of 0.4...80 VAC</li> </ul>
8	Ir signal incorrect	<ul style="list-style-type: none"> <li>• Ir signal outside tolerable range of 20...500 A</li> </ul>
	Turns thru CT-50 current transformer incorrect	<ul style="list-style-type: none"> <li>• Check number of turns (two or more turns required for current signal less than 20 A)</li> </ul>
9	Internal controller fault	<ul style="list-style-type: none"> <li>• Hardware fault (replace controller)</li> </ul>

## 5.8. Inputs

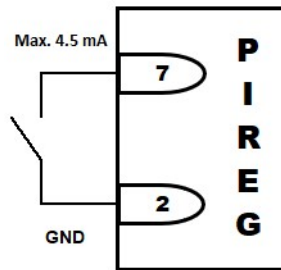
### 5.8.1. Start inputs:

The PIREG<sup>®</sup>-545 has two Start inputs.

- A sealing cycle is started by applying a 24VDC signal to the start input (3) with GND (4)



- A sealing cycle is started by applying a connection of the Start-Contact input (7) to AGND (2).



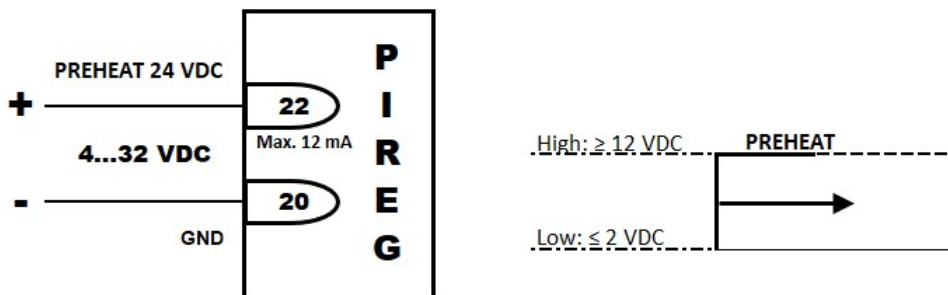
With time control switched On and the “On w/ start supervising” monitoring function deactivated, a sealing cycle with subsequent start delay, sealing time and cooling time will be started automatically after the “Start” signal is applied.

If the 8-point temperature coefficient correction is selected during auto-calibration, the correction process is also controlled by the Start inputs, during manual operation. The single-point temperature coefficient correction is also controlled by the Start inputs.

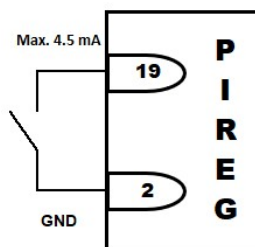
### 5.8.2. Preheat inputs:

The PIREG<sup>®</sup> has two preheat inputs.

- Preheat can be activated by applying a 24VDC signal to the Preheat input (22) and GND (20).



- Preheat can be activated by applying a connection of the Preheat-Contact input (19) to AGND (2).

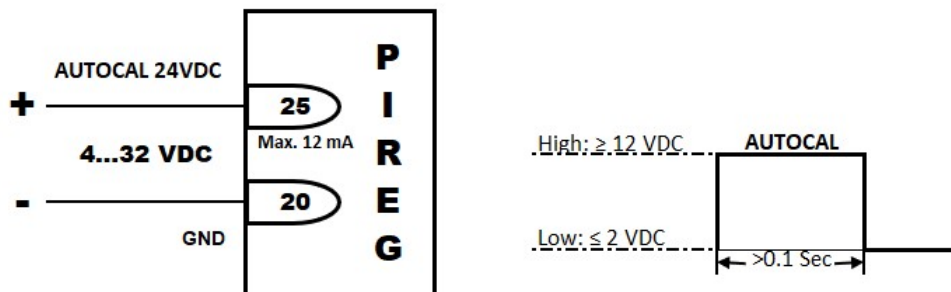


When a 24VDC signal is applied to the preheat input (22) between two sealing cycles or the Preheat-Contact input (19) is connected to AGND (2), the PIREG®-545 regulates the heat seal band temperature to the set preheat temperature. **NOTE: With Preheat is active all menu screens, except screen 101 "Set Temp", are locked. No adjustments are allowed because the controller is in the ON state. Remove the Preheat signal to enable programing changes.**

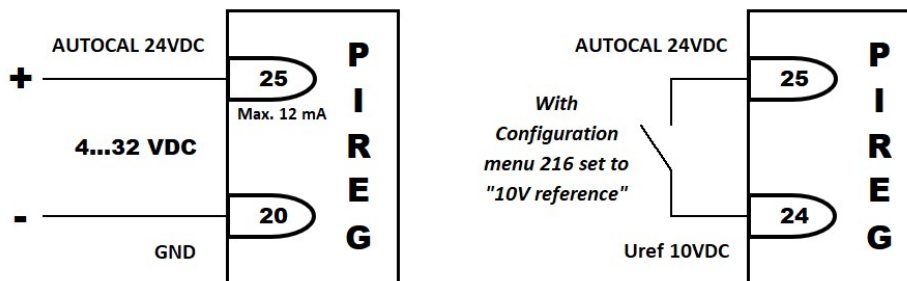
### 5.8.3. Autocal Start Input:

The Autocal Start input (25) provides two programmable functions:

- **Calibration-start:** With a high signal at the Autocal Start input (25) in the Off and Fault states, the PIREG®-545 switches to the auto-calibration state. Here the PIRGEG-545 ambient temperature reading is adapted to the combination of the heat seal band and sealing transformer. During the controller's calibration function, the signal can be reduced to low.



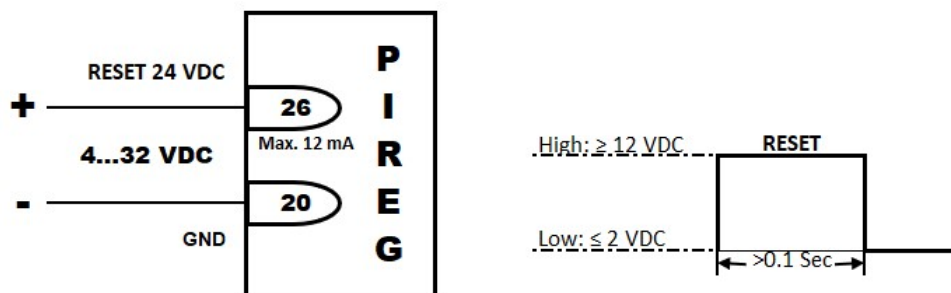
- **Measurement pause:** In Advance Configuration menu 318, the Autocal input can be programmed to measurement pause. With a high signal at the Autocal Start input (25) in the Off state, the PIREG®-545 stops the resistance measurement making it possible to interrupt the heat seal band circuit without generating an alarm. (from V1.00/1.07/1.29/1.23).



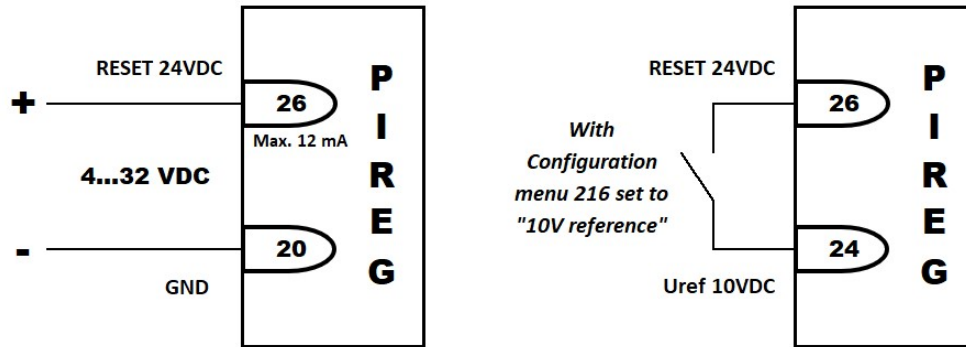
### 5.8.4. Reset Input:

The Reset input (26) provides two programmable functions:

- **Reset Input:** With a high signal at the Reset input (26), the PIREG®-545 is reset to the Power On state in the event of a fault even without switching off at the mains.



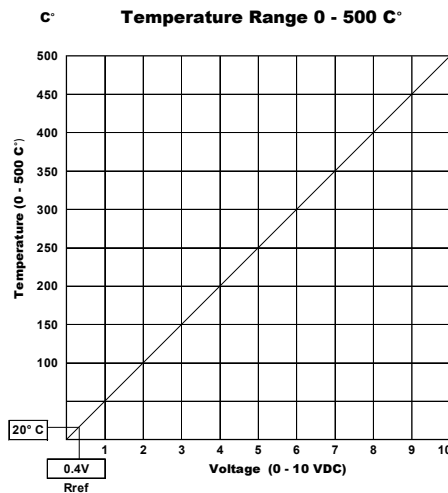
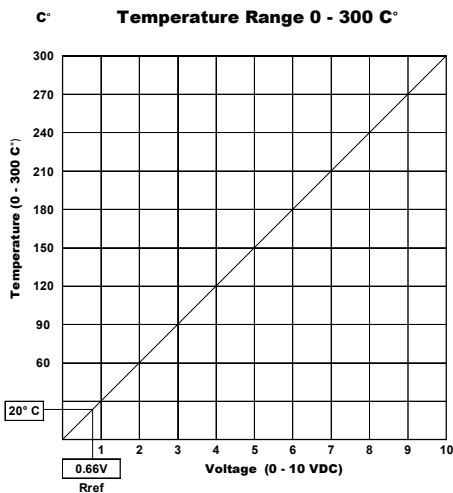
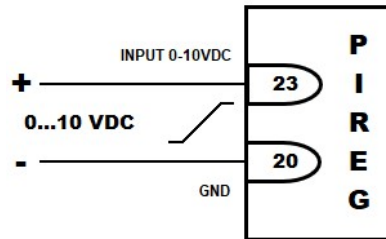
- **Measurement pause:** With a high signal at the Reset input (26) in the Off state, the PIREG®-545 stops the resistance measurement making it possible to interrupt the heat seal band circuit without generating an alarm. (from V1.00/1.07/1.29/1.23)



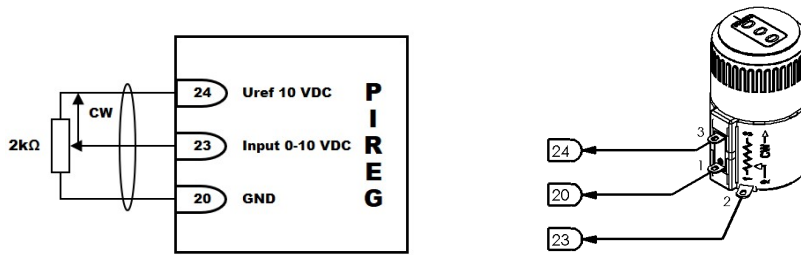
### 5.8.5. “Set” Temperature Input:

It is possible to program the “Set” temperature (heat sealing temperature) on the PIREG®-545 three different ways:

- **Internal:** The “Set” temperature can be programmed from the PIREG®-545’s Settings menu 101.
- **With 0–10VDC:** The “Set” temperature can be programmed by applying a 0–10VDC voltage to the analog input at terminals 23 and 20. The applied voltage is linear to the programmed temperature range set in Configuration menu 206. I.e., 10V corresponds to 300°C, if the selected temperature range is 300°C. And 10V corresponds to 500°C, if the selected temperature range is 500°C.



- **With Potentiometer:** The temperature set value is set by a potentiometer. In the case of the potentiometer, the cutter is linked to the set-value input (23), the CW connection to the actual value output (24) and the CCW connection to the GND connection (20). In this setting, the Actual Value Output must be programmed in Configuration menu 216 to operate as a “10V reference” voltage source with an output voltage of 10V. Pay attention to the direction of rotation when connecting the potentiometer. In the case of clockwise rotation on the potentiometer, the voltage should increase at the set value input. The chosen temperature range is imaged to the set value voltage, as described above.



## 5.9. Outputs

### 5.9.1. Actual Temperature Output:

The actual temperature output (24) can be programmed in Configuration menu 216 to supply a voltage in the range of 0-10V, proportional to the heat seal band's temperature ("real temperature"). The output voltage is linear to the programmed temperature range set in Configuration menu 205. I.e., 10V out corresponds to 300°C, if the selected temperature range is 300°C. And 10V out corresponds to 500°C, if the selected temperature range is 500°C. The actual value output can supply a maximum current of 5 mA.

It can also be programmed as a constant voltage source with an output voltage of 10V ("10V reference"). This setting is required when a potentiometer is being used to program the "Set" temperature.

The "10V reference" programming can also be used as a means to the Measurement Pause function. With Actual Temperature Output (24) connected to the Autocal Start input (25) or connected to the Reset input (26), the Measurement Pause function can be enabled.

### 5.9.2. Alarm output:

The alarm output (5/6) is a relay switching contact used to signal an alarm state. The contact can be set to "closed" (**normal**) or "open" (**inverse**) when the relay is actuated. The factory setting of this relay contact is "closed" (**normal**) when a fault occurs.

### 5.9.3. Booster output:

The booster output (1/2) is used to control an external solid-state relay (booster). Using an external solid-state relay is required when high primary currents are to be expected (continuous current > 5A or peak current > 25A) based on the specific heat sealing application. Installation of an external solid state relay does not require special settings. A TOSS Applications Engineer can assist in determining whether or not an external solid-state relay (booster) will be required.

### 5.9.4. K1 and K2 - Control relay outputs:

The control relay outputs K1 (16/17/18) and K2 (27/28/29) each provide a change-over contact. The switching capacity is only designed for control functions. A selection of switching functions can be found in section 3.10.

### 5.9.5. Output 1 - Message relay:

Message relay Output 1 (21) provides a NO contact, which works against the GND contact (20). The contact can be set to closed (**normal**) or open (**inverse**) when the relay is actuated. The switching capacity of the relay contact is only designed for message functions. The relay contact has been factory-set in such a way that the relay contact is closed (**normal**) when the relay is pressed. A selection of switching functions can be found in section 5.10.

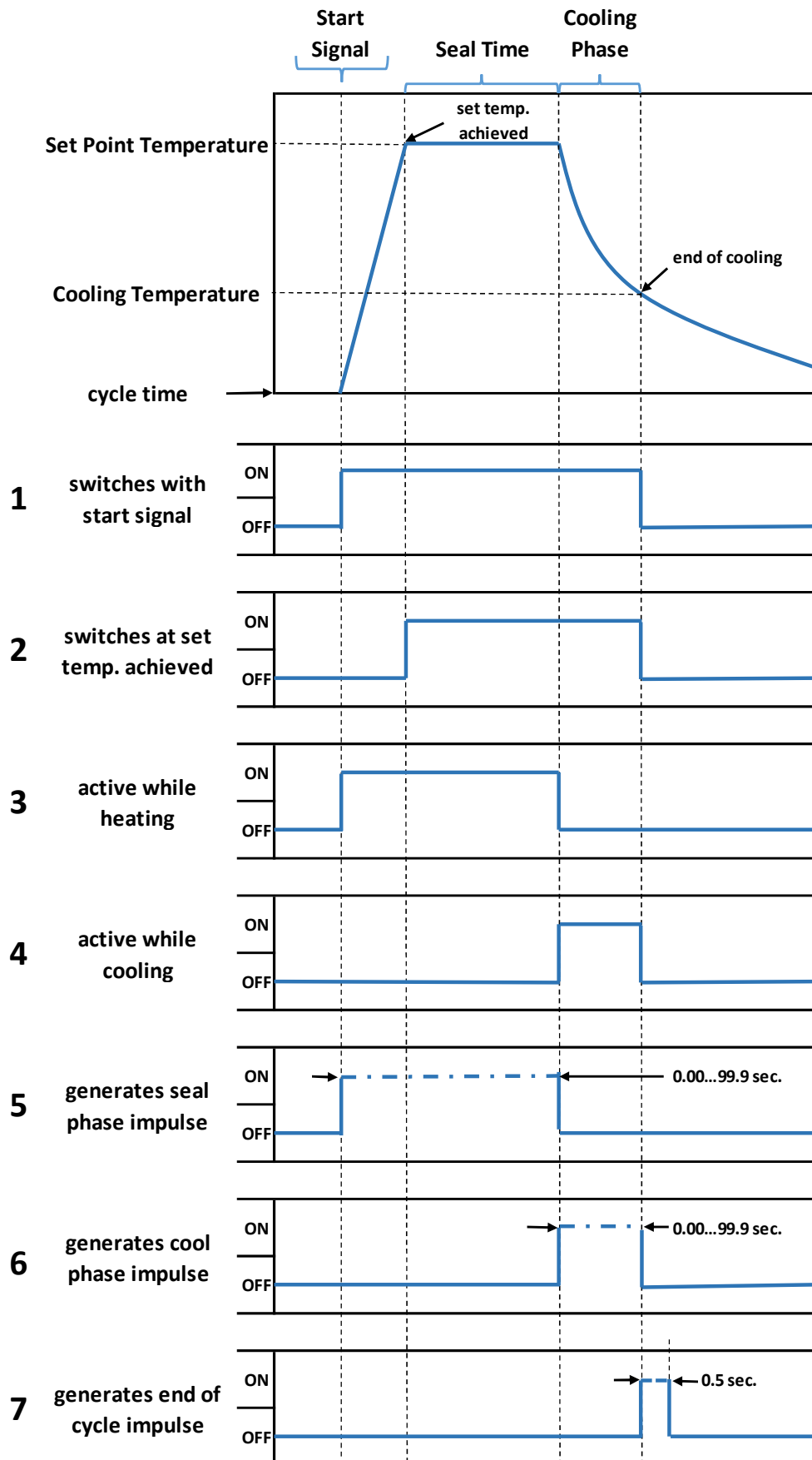


### 5.10. Relay and Output Functions - K1 Relay, K2 Relay, Output 1

The following 13 functions can be set independently for the two control relay outputs (K1 & K2) and the message output (Output 1).

	SETTING	RELAYS K1 & K2 / OUTPUT 1 FUNCTIONS
	<b>- with time control "ON"</b>	
1	"switches with START-signal"	Relays/Output are activated with receipt of "start" signal and deactivated when cooling phase has ended.
2	"switches at set-temp achieved"	Relays/Output are activated when "Act" temperature has reached 95% of "Set" temperature and deactivated when cooling phase has ended.
3	"active while heating"	Relays/Output are activated during heating phase.
4	"active while cooling"	Relays/Output activated during cooling phase.
5	"generates seal phase impulse"	Relays/Output are activated at the start of a sealing cycle or during the sealing time for the selected duration. The selected duration of the impulse can be set in Configuration menu 212a or 222a or Advance Configuration menu 307a.
6	"generates cool phase impulse"	Relays/Output are activated at the start of the cooling phase (end of heating phase) for the selected duration. The selected duration of the impulse can be set in Configuration menu 212a or 222a or Advance Configuration menu 307a.
7	"generates end of cycle impulse"	Relays/Output are activated at the end of cooling phase for 500ms.
8	"active when ACT=SET"	Relays/Output are activated when "Act" temperature is within the temperature OK zone of the "Set" temperature. The OK zone is set in the setting menu 207 and 208.
9	"active when ACT=SET wL"	Relays/Output are activated when the "Act" Temperature is within the temperature OK zone based on the "Set" temperature. If the "Act" temperature leaves the OK zone, the relays/output will deactivate and remain so even when "Act" temperature returns to the OK zone (w/ Latch function). The OK zone is set in the setting menu 207 and 208.
10	"OFF"	Relays/Output are off.
11	"active while alarm"	Relays/Output are activated in the alarm state.
12	"active while calibration OK"	Relays/Output are activated after successful calibration.
13	"while tc correction"	Relays/Output are activated during temperature coefficient correction. The relays/output are used as a control message to open and close the welding bar while the temperature-coefficient correction (single-point & 8-point). The relays/output is actuated after a delay of 250 ms and when the actual temperature has exceeded 95% of the desired value. The relay is released when the heat seal band's actual temperature is reported back to the PIREG-545. (from V1.00/1.07/1.29/1.23)
	<b>- with time control "OFF"</b>	
8	"active when ACT=SET"	Same as above
9	"active when ACT=SET wL"	Same as above
10	"OFF"	Same as above
11	"active while alarm"	Same as above
12	"active while calibration OK"	Same as above
13	"while tc correction"	Same as above

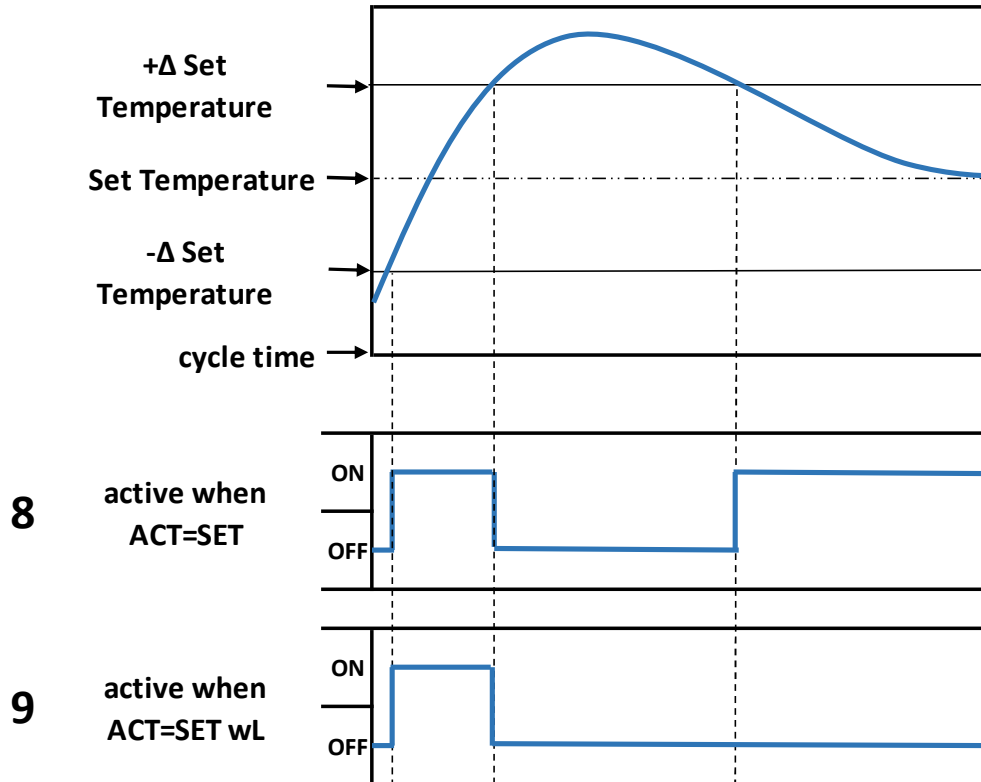
### 5.10.1. Timing Charts for Relay and Output Functions



### 5.10.1. Timing Charts Continued:

Relays K1, K2, and Output 1 are activated when "Act" temperature is within the temperature OK zone of the "Set" temperature. The OK zone is set in the setting menu 207 and 208. (Chart #8).

Relays K1, K2 and Output 1 are activated when the "Act" Temperature is within the temperature OK zone based on the "Set" temperature. If the "Act" temperature leaves the OK zone, the relays/output will deactivate and remain so even when "Act" temperature returns to the OK zone (w/ Latch function). The OK zone is set in the setting menu 207 and 208. (Chart #9)



## 5.11. Display functions

### 5.11.1. Languages:

The following languages can be set for the PIREG<sup>®</sup>-545 display unit:

German      English      French      Italian      Spanish      Russian

### 5.11.2. Brightness:

Setting the brightness of the display-lighting can be altered by pressing the ▲▼ buttons while in the Home Screen. The setting will be saved when the setting has not been altered for 3 seconds.

### 5.11.3. Hold mode:

If the "Hold" mode is enabled, the actual temperature value "ACT" which was measured at the end of the sealing process or the sealing time will be displayed. You can select whether the measured actual value is only displayed for 2 seconds or until the following sealing process or sealing cycle is started.

### 5.11.4. Batch and Cycle Counters:

The PIREG<sup>®</sup>-545 has two resettable batch counters (0-9999999) for counting the number of seal cycles for a given batch. One can be programmed so as to be displayed on the Home Screen and it can be reset from the Settings Menu 113. The second can be both found and reset from the Configuration menu 214. In the case of an overflow the counters automatically reset to zero.

The PIREG<sup>®</sup>-545's also has a total life-cycle counter (0-999999999) that cannot be reset.

### 5.11.5. Recipe Storage:

The PIREG<sup>®</sup>-545 can store up to 9 recipe settings. These recipes store the parameter settings for various applications making it easy for the operator to quickly recall a stored recipe when the sealing application has changed.

### 5.11.6. Security Protection:

The PIREG<sup>®</sup> 545 controller offers three levels of Security Protection designed to allow the user to limit access to the various menu settings. (See [Section 7.1.](#)) The three levels including the menu screens they protect are as follows:

- **Settings Security Protection [S]** – Protects menu screens 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, & 112. Note: Settings can only be password protected (locked) when Level 1 and Level 2 are being password protected (locked)
- **Level 1 Security Protection [1]** – Protects menu screens 201, 202, 203, 204, 205, 206, 207, 208, 210, 211, 213, 214, 217, 218, 219, 225, 226, 227, 301, 302, 303, 308, 309, 310, 312, & 313. Note: Level 1 can only be password protected (locked) when Level 2 is being password protected (locked)
- **Level 2 Security Protection [2]** – Protects menu screens 209, 212, 215, 216, 222, 223, 304, 305, 307, 311, & 314.

When a menu screen has been password protected (locked) and an alteration is attempted in that menu screen, an “x” will appear in front of the value/function for 1s to indicate that alteration is not allowed.

The factory password for all levels is “0000”. To lock any level the operator must first “Change” the factory password “0000” and establish a new password. The four zeros “0000” will be displayed as the password in all screens until a new password has been created. Once a new password has been created four stars “\*\*\*\*” will replace the zeros to signify that a new password has been created.



**Note:** If a password has been established and lost, a master override password has been pre-programmed for entry in screens 405, 410 and 416. Call TOSS for instructions.

### 5.11.7. Temperature unit:

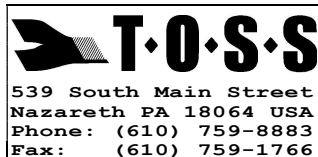
The PIREG®-545's offers the possibility of showing temperatures in either [°C] or [°F]. The temperature unit is used only for displaying the temperatures. When programmed to [°F] the controller continues to operate internally with the [°C] system. This means that when temperatures are set in the [°F] system, display increments of 2°F may occur due to calculation rounding.

## 6. Menu structure

Shortcuts:      [S]:      Settings Password protection      [1]:      Level 1 Password protection  
                          [2]:      Level 2 Password protection

### 6.1. Start

Line 1  
 Line 2  
 Line 3  
 Line 4  
 Line 5  
 Line 6  
 Line 7  
 Line 8



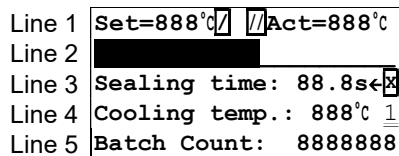
After activating resistance temperature controller PIREG®-545, start-menu appears for 2s before automatic change to working menu is executed.

**Line 1...4:** Logo of company Toss Machine Components  
**Line 5...6:** Main office of company Toss Machine Components with postcode and place  
**Line 7...8:** Phone and fax number of company Toss Machine Components

### 6.2. Home Screen

#### 6.2.1. Home Screen with time control ON

##### Home Screen w/ time control ON



**Line 1:** The "Set" displays the programmed sealing temperature set in the Setting menu 101

"Act" displays the actual temperature of the heating element. If Hold-mode is activated in the Setting menu 106 "Act" will be replaced by "Hold" for as long as the value of the final temperature achieved is kept.

In the middle the symbols "K1" and "K2" display the activation of relay K1 and K2.

**Line 2:** Moving bar chart of the actual temperature.

**Line 3:** Displays the sealing time set in Setting menu 104. During a sealing cycle the seal time display can be programmed in the Advance Config menu 308 to count down or up to show the sequence of sealing time or it can be programmed to remain fixed.

On the right side the symbol "L" is displayed when the activation of locking was performed by pressing the scroll button at turn ON.

**Home Screen w/ time control ON - Continued**

Line 1	Set=888°C [ ] [ ] Act=888°C
Line 2	[ ]
Line 3	Sealing time: 88.8s ← [ ]
Line 4	Cooling temp.: 888°C [ ]
Line 5	Batch Count: 8888888

**Line 3 (Continued)** On the right side the symbol “ [ ] ” is displayed when the activation of locking was performed by pressing the button combination [ ] + [ ] + [ ] simultaneously. Before using this feature, it must be activated in Advance Configuration menu 313.

**Line 4:** Display of the programmed cooling phase set in Setting menu 105. Cooling phase can be programmed as “temp.” or “time” in Configuration menu 210. During a sealing cycle the cooling time display, when selected, can be programmed in the Advance Config menu 309 to count down or up to show the sequence of cooling time or it can be programmed to remain fixed.

On the right side the symbol “ 1 ” or “ 2 ” display the selected calibration 1 or 2, if the calibration switching is activated. If the measurement pause is activated, the symbol [ ] is shown on the right side.

**Symbol ←:** The Symbol “←” in line 3 and 4 marks the activation of sealing and cooling phase.

**Line 5:** Displays Batch counting. This is only if the batch counter is ON in Configuration menu 226. The batch counter will be reset in Setting menu 113.

**Function of Buttons form the Home Screen**

Button [ ]: Advance to the setting menus, starting with Settings menu 101.

Button [ ] >2s: Hold the button [ ] for longer than 2s to advance to the Configuration menus, start with the menu 201.

Button [ ] + [ ] >2s: If the advanced PIREG® features is activated in Configuration menu 227, hold the button [ ] and [ ] for longer than 2s to advance to the Advanced Configuration menus, start menu 301.

Button [ ] + [ ] >2s: If the advanced PIREG® features is activated in Configuration menu 227, hold the button [ ] and [ ] for longer than 2s to advance to the Security Protection menus, start with the menu 401.

Button [ ]: When the “HAND” function is activated in Configuration menu 213, pressing Hand button [ ] can trigger a manual sealing cycle, as long as [ ] button is kept pressed or the current programmed cycle.

Button [ ] [ ]: Setting of brightness of display-lighting. The setting will be automatic take-over, when the setting is not altered for 3 seconds.

**6.2.2. Home Screen with time control OFF**

**Home Screen w/ time control OFF**

Line 1	Set= 888°C [ ] Act=888°C
Line 2	[ ]
Line 3	[ ] [ ]
Line 4	[ ] 1
Line 5	Batch Count: 8888888

**Line 1...2:** Functions same as described above.

**Line 3:** On the right side the symbol “ [ ] ” is displayed when the activation of locking was performed by pressing the scroll button [ ] at turn ON.

On the right side the symbol “ [ ] ” is displayed when the activation of locking was performed by pressing the button combination [ ] + [ ] + [ ] simultaneously. Before using this feature, it has to be activated in Advance Configuration menu 313.

**Line 4:** On the right side the symbol “ 1 ” or “ 2 ” display the selected calibration 1 or 2, if the calibration switching is activated. If the measurement pause is activated, on the right side the symbol [ ] is showed.

**Line 5:** Functions same as described above.

### 6.2.3. Alarm Screen

Line 1	<u>1</u> ALARM	⏏
Line 2	ERROR: Seal wire	
Line 3	ERROR CODE: 102	
Line 4	RESET KEY	

**Line 1:** Name of menu.

On the right side the symbol "⏏" is displayed when the activation of locking was performed by pressing the scroll button ⏏ at turn ON.

On the right side the symbol "⏏" is displayed when the activation of locking was performed by pressing the button combination ▲ + ▼ + ⏏ simultaneously. Before using this feature, it has to be activated in Advance Configuration menu 313.

On the left side the symbol "1" or "2" display the selected calibration 1 or 2 at the error is occurred, if the calibration switching is activated.

**Line 2...3:** Alternate between the error area and the error number and the description of fault.




















**Line 4:** Shows the next possible action.











**Button ⏏:** The PIREG®-545 executes a reset.

**Button ⏏:** Advances to the setting menu 107 (AUTOCAL) to start an auto-calibration, if it is possibly.

### 6.3. Setting-menu

<p><b>Settings Menu 101 – Seal Temperature</b></p> <table border="1"> <tr> <td>SETTINGS</td> <td>101</td> </tr> <tr> <td>Seal. temp.:</td> <td>888°C</td> </tr> <tr> <td colspan="2">(Ext./40...300°C)</td> </tr> </table>	SETTINGS	101	Seal. temp.:	888°C	(Ext./40...300°C)		<p>Settings menu 101 is used to program the sealing temperature ("Set" value visible on Home Screen). Press the ▲ ▼ buttons to alter setting and accept by pressing the Enter button ⏏.</p> <p><b>Note:</b> Sealing temperature is limited to the selected temperature range programmed in Configuration menu 205 and the selected maximum temperature setting programmed in Configuration menu 206. The sealing temperature can also be set by with a 0-10V external signal at input terminals 20+23. Select "Ext" if this is desired. Press the Menu Scroll ⏏ to advance to Settings menu 102.</p>
SETTINGS	101						
Seal. temp.:	888°C						
(Ext./40...300°C)							
<p><b>Settings Menu 102 – Preheat Temperature</b></p> <table border="1"> <tr> <td>SETTINGS</td> <td>102</td> </tr> <tr> <td>Preheat temp.:</td> <td>888°C</td> </tr> <tr> <td colspan="2">(OFF/40...300°C)</td> </tr> </table>	SETTINGS	102	Preheat temp.:	888°C	(OFF/40...300°C)		<p>Settings menu 102 is used to program a preheating temperature. Press the ▲ ▼ buttons to alter setting and accept by pressing the Enter button ⏏. <b>Preheat must first be enabled. See section (→ 5.8.2.) for details.</b></p> <p><b>Note:</b> The Preheat function is used to maintain the TOSS Alloy 20 heat seal band at constant temperature between 40°C and "Set" temperature while the machine is idle. It is limited to the selected maximum temperature setting programmed in Configuration menu 206 and the minimum value is 40°C. With "Off" the preheating is turned off.</p> <p>Press the Menu Scroll ⏏ to advance to next Setting menu:</p> <ul style="list-style-type: none"> <li>- with Time Control On advances to Settings menu 103</li> <li>- with Time Control Off advances to Settings menu 106</li> </ul>
SETTINGS	102						
Preheat temp.:	888°C						
(OFF/40...300°C)							

<p><b>Settings Menu 103 – Start Delay</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p style="text-align: right;">SETTINGS      103</p> <p>Start delay:      8.8s</p> <p>(0.0...9.9s)</p> </div>	<p>Setting menu 103 is used to program a time delay that will proceed the Sealing time. Press the   buttons to alter setting and accept by pressing the Enter button . The Start delay begins when the start signal is received and is then followed by the Sealing time. The start delay can be programmed between 0.0 and 9.9 seconds. Press the Menu Scroll  to advance to Settings menu 104</p>
<p><b>Settings Menu 104 – Sealing Time</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p style="text-align: right;">SETTINGS      104</p> <p>Sealing time:    88.8s</p> <p>(Extern/0.0...99.9s)</p> </div>	<p>Setting menu 104 is used to program the Sealing time. Press the   buttons to alter setting and accept by pressing the Enter button . The Sealing time can be programmed between 0.0 and 99.9 seconds or can be programmed by an external timer.</p> <p><b>Note:</b> This function is only active when Time Control is set to ON in Configuration menu 209</p> <p>Press the Menu Scroll  to advance to Settings menu 105</p>
<p><b>Settings Menu 105 – Cooling Mode</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p style="text-align: right;">SETTINGS      105</p> <p>Cooling temp.:  100°C</p> <p>(50...300°C)</p> </div>	<p>Setting menu 105 is used to program the cooling mode. Press the   buttons to alter setting and accept by pressing the Enter button .</p> <p><b>Note:</b> The Cooling mode can be programmed to operate in one of the following modes programmable in Configuration menu 210.</p> <ul style="list-style-type: none"> <li>- Absolute (temperature): Range 50...300°C. It is limited to the selected maximum temperature setting programmed in Configuration menu 206 and the minimum value is 50°C.</li> <li>- Relative (percentage of Sealing temp.): Range 40...100%.</li> <li>- Time: Range 0...99.9s</li> </ul> <p>Press the Menu Scroll  to advance to Settings menu 106</p>
<p><b>Settings Menu 106 – Hold Mode</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p style="text-align: right;">SETTINGS      106</p> <p>Hold mode: OFF</p> <p>(OFF/ON/2 sec.)</p> </div>	<p>Settings menu 106, Hold mode, allows the operator to display the final sealing temperature achieved during the sealing cycle. This temperature reading will be displayed in the upper right-hand corner of the Home Screen (“Act” temperature). Press the   buttons to alter setting and accept by pressing the Enter button .</p> <p><b>Note:</b> The Hold mode can be programmed to operate in one of the following modes:</p> <ul style="list-style-type: none"> <li>- Off: Actual temperature will be displayed continuously.</li> <li>- On: The final seal temperature achieved will be displayed until the start of the next sealing cycle.</li> <li>- 2 Sec.: The final seal temperature achieved will be display for two seconds following the sealing cycle.</li> </ul> <p>Press the Menu Scroll  to advance to Settings menu 107</p>
<p><b>Settings Menu 107 - AutoCal</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p style="text-align: right;">SETTINGS      107</p> <p>AUTOCAL to: 20°C</p> <p>(0...50°C)</p> <p>Start with Enter</p> </div>	<p>Settings menu 107, AUTOCAL, calibrates the voltage and current signals to the reference ambient temperature displayed on this menu screen. The reference temperature should be the actual temperature of the ambient TOSS Alloy 20 heat seal band, within the range of 0 - 50°C. Press the   buttons to alter the reference temperature setting and accept by pressing the Enter button . Pressing the Enter button a second time begins the execution of AUTOCAL. Upon completion, the reference temp will appear on the Home Screen, “Act” temperature.</p>

<p><b>Settings Menu 107 – AutoCal CONTINUED</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p style="text-align: center;">SETTINGS      107</p> <p>AUTOCAL to: 20°C (0...50°C) Start with Enter</p> </div>	<p> <b>Note:</b> The AUTOCAL function plays a critical role in the temperature accuracy of the controller. AUTOCAL should only be executed when the machine has been idle long enough for the heat seal band to be resting at ambient temperature. If upon machine start-up the “Act” temperature found on the Home Screen does not reflect the ambient temperature (+/- 1°) executing an AUTOCAL is required.</p> <p>Pressing the Enter button  with or without changing the reference temperature will started the AUTOCAL process. Press the Menu Scroll  to advance to Settings menu 111</p>
<p><b>Settings Menu 108 - Auto-Comp</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p style="text-align: center;">SETTINGS      108</p> <p style="text-align: center;">- AUTOCOMP - Please wait...</p> </div>	<p>AUTOCOMP is part of the calibration process that allows the controller to compensate the phase angles between the Voltage (Ur) and Current (Ir) measuring signals. AUTOCOMP will always running after AUTOCAL.</p> <p>Upon completion of AUTOCOMP the display will automatically advance to the following menus dependant on programming in Adv. Configuration 301.</p> <ul style="list-style-type: none"> <li>- Temperature coefficient (Tc) correction set to OFF in Adv. Config. 301 advances to Home Screen</li> <li>- Temperature coefficient (Tc) correction set to “Single Pt.” along with reset command in Adv. Config. 301 &amp; 302a advances to Settings menu 109.</li> <li>- Temperature coefficient (Tc) correction set to “8 Point.” Along with reset command in Adv. Config 301 &amp; 302b advances to Settings menu 110.</li> </ul>
<p><b>Settings Menu 109 - Single Point Calibration</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p style="text-align: center;">SETTINGS      109</p> <p>Sing. pt calibration Set=888°C      Act=888°C Start with Enter</p> </div>	<p>Settings menu 109 will only appear at the conclusion of Autocomp when Single Point Temperature Coefficient (Tc) Correction has been programmed in Advance Configuration menu 301 and a Single Point Tc Correction reset has been requested in Advance Configuration menu 302a.</p> <p>Setting menu 109 is for Single Point Temperature Calibration. This calibration feature enables the operator to calibrate the PIREG®-545 controller to a single temperature point with the aid of an independent NIST calibrated measuring device.</p> <p> <b>Note:</b> If no reset has been requested in Advance Config 302a then the previous temperature coefficient correction will remain stored at the end of any subsequent Autocal process.</p> <p>To start the single point temperature coefficient correction, using the  button, select the desired calibration temperature (“Set”), displayed on the left side of the screen and press the Enter  button to accept.</p> <p>Press the Enter  button again to start single point calibration.</p> <p>On the right side of the display screen the actual value (Act) of the PIREG®-545 is displayed (uncorrected). While the process is running, use the  button to set on the right side the actual measured temperature of the heat seal band. The text “Act” will be change to “Corr”. Press the Enter  button to save.</p> <p>Press the Enter  button again to end the Single point calibration.</p>



### Settings Menu 110 – 8-Point Calibration

```
SETTINGS      110
8-point calibration
Set=888°C     Act=888°C
Start with Enter  8
```

Settings menu 110 will only appear at the conclusion of Autocomp when 8-Point Temperature Coefficient (Tc) correction has been programmed in in Advance Configuration menu 301 and an 8-Point Tc Correction reset has been requested in Advance Configuration menu 302b.

Setting menu 110 is for 8-Point Temperature Calibration. This calibration feature enables the operator to calibrate the PIREG®-545 controller to 8 pre-set temperature points with the aid of an independent NIST calibrated measuring device.



**Note:** If no reset has been requested in Advance Config 302a then the previous temperature coefficient correction will remain stored at the end of any subsequent Autocal process.

Press the Enter button to start 8-Point calibration

The pre-set “Set” temperature will be displayed on the left side of the display. The actual value of the PIREG®-545 is displayed (still uncorrected) is displayed on the right side.

While the process is running use the buttons to set on the right side the actual measured temperature for the heat seal band. The text “Act” will be change to “Corr”. Press the Enter button to save and advance to the next pre-set correction point.

The number of the actual step (0...8) is displayed. On the left side of the step number the symbol “↑” is shown during heat up and the symbol “✓” is shown when the temperature has been corrected.

Throughout the process of 8-Point temperature coefficient correction, while the process is running, the information changes to “continue with Enter” for correction points 2...7 and changes to “Stop with Enter” after saving point 8.

### Settings Menu 111 – Recall Recipe

```
SETTINGS      111
Recall recipe: 2

(1...9)      -free-
```

Setting menu 111 is used to Recall a previously saved sealing recipes (Sets of sealing parameters). The PIREG® allows for the storage of up to 9 different recipes. Press the buttons to select the recipe to be recalled and accept by pressing the Enter button . The text “free” and “occupied” shows the state of the selected recipe number.

Press the Menu Scroll to advance to Settings menu 112



### Settings Menu 112 – Save Recipe

```
SETTINGS      112
Save current
recipe setting: 1
(1...9)      -occupied-
```



Setting menu 112 is used to Save the current set of sealing parameters (i.e. sealing temperature, preheat temperature, start delay, sealing time and cooling parameter). The PIREG® allows for the storage of up to 9 different recipes. Press the buttons to select the recipe number to be saved and accept by pressing the Enter button . The text “free” and “occupied” shows the state of the selected recipe number. From Settings screen 112, an “Occupied” recipe can be cleared by simultaneously pressing the + + Enter buttons for 2 seconds.
















Press the Menu Scroll to advance to the next Setting menu:








- with Batch Counter On advances to Settings menu 113
- with Batch Counter Off advances to Home Screen.








<p><b>Settings Menu 113 – Batch Counter Reset</b></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: right;">SETTINGS      113</p> <p>Batch counter</p>   <p>Reset with ENTER</p> </div>	<p>Setting menu 113 is used to reset the Batch Counter displayed on the Home Screen only with Batch Counter set to “On” in Configuration menu 226.</p> <p>Press the Enter button  to reset the batch counter to zero.</p> <p>Press the Menu Scroll  to advance back to the Home Screen.</p>
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#### 6.4. Configuration-menu



**Advancing to the Configuration menus:** From the Home Screen, hold the Menu Scroll button  for longer than 2s to change to the Configuration menus. Then press the Menu Scroll button  to advance through the various Configuration menus.

<p><b>Configuration Menu 201 - Language</b></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: right;">CONFIGURATION    201</p> <p>Language: english</p> <p>D-E-FR-IT-SP-Py</p> </div>	<p>Configuration menu 201 is used to select the display language (German (D), English (E), French (FR), Italian (IT), Spanish (SP), and Russian (Py)).</p> <p>Press the   buttons to select the language and accept by pressing the Enter button . Press the Menu Scroll  to advance to Configuration menu 202.</p>
<p><b>Configuration Menu 202 – Recall / Save Settings</b></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: right;">CONFIGURATION    202</p> <p>Factory settings:</p> <p>Recall factory settings</p> </div>	<p>Configuration menu 202 is used for:</p> <ul style="list-style-type: none"> <li>- Recall factory settings – <i>recalls all configuration settings as received from the TOSS factory.</i></li> <li>- Save customer settings – <i>Allows machine builder to save all configuration settings custom to the specific OEM equipment.</i></li> <li>- Recall customer settings – <i>Restores saved OEM equipment settings.</i></li> </ul> <p> <b>Note:</b> To clear the saved customer setting press the combination  +  +  for 2 seconds.)</p> <p>Press the   buttons to select the desired function and accept by pressing the Enter button . Press the Menu Scroll  to advance to the Configuration Menu 203.</p>
<p><b>Configuration Menu 203 – Alloy Tc Selection / ppm</b></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p style="text-align: right;">CONFIGURATION    203</p> <p>Temperature coefficient: 1265ppm</p> <p>e.g. Alloy-A20C</p> </div>	<p>Configuration menu 203 is used for the selection of the heat seal band Alloy. There are four (4) fixed Alloy/Tc-settings and a “variable” Tc-settings.</p> <p>The fixed Alloy/Tc-settings selections are:</p> <ol style="list-style-type: none"> <li>1.) Alloy L - 746ppm</li> <li>2.) Alloy A20K - 862ppm</li> <li>3.) Alloy A20C - 1265ppm</li> <li>4.) Norex - 4830ppm</li> </ol> <p>If a fixed Alloy/Tc-setting is selected, pressing the Menu Scroll  will advance to the next Configuration menu 205.</p> <p>5.) “variable” Tc-settings – 400...2200ppm</p> <p><b>Note:</b> If the “variable” Tc-setting is selected with Advanced PIREG® features <b>OFF</b> (Configuration 227) pressing the Menu Scroll  will advance to the next Configuration menu 204.</p> <p><b>Note:</b> If the “variable” Tc-setting is selected with Advanced PIREG® features <b>ON</b> (Configuration 227), at the selection of the “variable” Tc settings the text “variable / (Tc1, Tc2 &amp; Tc3)” is displayed. Pressing the Menu Scroll  to advance to the Configuration menu 204a.</p>

<p><b>Configuration Menu 204 – Variable Tc Setting</b></p> <p>Advanced PIREG features OFF</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>CONFIGURATION 204 Temperature coefficient: 8888ppm (400...2200ppm)</p> </div>	<p>Set the variable Tc setting between the ranges of 400...2200ppm.</p> <p>Press the Menu Scroll  to advance to Configuration menu 205</p>
<p><b>Configuration Menu 204 a-d – Variable Tc Settings</b></p> <p>Advanced PIREG features ON</p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>CONFIGURATION 204a Temperature coefficient Tc1: 8888ppm (400...9999ppm)</p> </div> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-top: 10px;"> <p>CONFIGURATION 204b Temperature coefficient Tc2: ±8888ppm (0...±9999ppm)</p> </div> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-top: 10px;"> <p>CONFIGURATION 204c Temperature coefficient Tc3: ±8888ppm (0...±9999ppm)</p> </div> <div style="border: 1px solid black; padding: 5px; width: fit-content; margin-top: 10px;"> <p>CONFIGURATION 204d Temperature coefficient temp. for S: 888°C      D: 888°C</p> </div>	<p>Set the variable temperature coefficient Tc1 between the ranges of 400...9999ppm. Press the Menu Scroll  to advance to Configuration menu 204b for setting variable temperature coefficient Tc2</p> <p>Set the variable temperature coefficient Tc2 between the ranges of 400...9999ppm. Press the Menu Scroll  to advance to Configuration menu 204c for setting variable temperature coefficient Tc3</p> <p>Set the variable temperature coefficient Tc3 between the ranges of 400...9999ppm. Press the Menu Scroll  to advance to Configuration menu 204d.</p> <p>For each variable Tc-setting the PIREG®-545 controller determines the maximum temperature for steady (S) and dynamic (D) resistance development of heating band. In any case selected temperature zone has to be lower than temperature value for steadiness (S) and dynamics (D).</p> <p>Press the Menu Scroll  to advance to Configuration menu 205</p>
<p><b>Configuration Menu 205 – Temperature Range</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>CONFIGURATION 205 Range: max. 888°C  (200/300/400/500°C)</p> </div>	<p>Configuration menu 205 is used for selecting the temperature range (200, 300, 400 or 500°C). This programmed temperature range setting is always used for the set range input at pin X23.</p> <p>Press the Menu Scroll  to advance to Configuration menu 206</p>
<p><b>Configuration Menu 206 – Maximum Temp. Setting</b></p> <div style="border: 1px solid black; padding: 5px; width: fit-content;"> <p>CONFIGURATION 206 Max. temp.: 888°C  (100...888°C)</p> </div>	<p>Configuration menu 206 is used for selecting the maximum temperature setting of the “Set” temperature in the Setting menu 101 and of the Preheat temperature in Setting menu 102.</p> <p>The maximum allowable temperature depends on temperature range setting programmed in Configuration menu 205.</p> <p>If the voltage on the Set temperature input (X23) is higher than the maximum temperature setting, the PIREG®-545 change to error state.</p> <p>Press the Menu Scroll  to advance to Configuration menu 207</p>




<p><b>Configuration Menu 207 – Low Temperature Deviation</b></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>CONFIGURATION 207 Set achieved: -88K  (-99...-5K)</p> </div>	<p>Configuration menu 207 is used for setting of the lowest allowable temperature deviation in relation to “Set” Temp. This setting is only applied when “temperature diagnosis” is programmed ON in Configuration menu 217. This lower limit is even used for preheat control. Press the Menu Scroll  to change to Configuration menu 208</p>
<p><b>Configuration Menu 208 – High Temperature Deviation</b></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>CONFIGURATION 208 Set exceeded: 88K  (6...99K)</p> </div>	<p>Configuration menu 208 is used for setting of the highest allowable temperature deviation in relation to “Set” Temp. This setting is only applied when “temperature diagnosis” is programmed ON in Configuration menu 217. This highest limit is even used for preheat control. Press the Menu Scroll  to change to Configuration menu 209</p>
<p><b>Configuration Menu 209 – Time Control</b></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>CONFIGURATION 209 Time control: OFF  (OFF/ON/ON w.st.su.)</p> </div>	<p>Configuration menu 209 is used for selection point of time control (sequence control) is activated with (“ON”) and with start control (“ON / w. start supervising”) and deactivating with (“OFF”). Press Menu Scroll  to change to Configuration menu with: - time control turned Off advance to Configuration menu 212 - time control turned On advance to Configuration menu 210</p>
<p><b>Configuration Menu 210 – Cool Mode Selection</b></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>CONFIGURATION 210 Cool mode: absolute  (no/abs./rel./time)</p> </div>	<p>Selection point for cooling mode:  Absolute: Cooling is set to a desired temperature. Relative: Cooling is set as a percentage of sealing temperature. Time : Cooling is set to time.  Press the Menu Scroll  to advance to Configuration menu 211</p>
<p><b>Configuration Menu 211 – Start of Sealing Timer</b></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>CONFIGURATION 211 Sealing time starts at set-temp.achieved</p> </div>	<p>Selection for the start of sealing time.  “at start heating”: Sealing time starts upon a start signal. "at set-temp. achieved": sealing time starts when temperature of heating band exceeds 95% of rated value.  Press the Menu Scroll  to advance to Configuration menu 212</p>
<p><b>Configuration Menu 212 – K1 Relay Function</b></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>CONFIGURATION 212 Relay K1 OFF</p> </div>	<p>Selection function of Relay K1: For complete list of options refer to Section 5.10. “Relay and Output Functions”. Press the Menu Scroll  to advance to Configuration 213 menu. If the Relay K1 function is programmed to generate seal phase impulse (5) or cooling phase impulse (6), press Menu Scroll  to advance to Configuration Menu 212a to set duration time of pulse.</p>





<p><b>Configuration Menu 212a – K1 Impulse Duration</b></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>CONFIGURATION 212a Set duration: 88.8s  (0...99.9s)</p> </div>	<p>Setting of the duration of impulse. Show adjustable setting zone.</p>
<p><b>Configuration Menu 213 – “Hand” Button Function</b></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>CONFIGURATION 213 Blockade of the HAND key: OFF (ON/OFF/START CYCLE)</p> </div>	<p>Selection for the function of the “HAND”  button in the Home Screen. By selecting "OFF", the pressing of  button in Home Screen triggers execution of a sealing procedure as long as  button is kept pressed. By selection the setting "START CYCLE", this setting by pressing of  button in Home Screen starts a sealing cycle according to settings of time control.</p>
<p><b>Configuration Menu 214 – Seal Cycles (Resettable)</b></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>CONFIGURATION 214 Cycles: 8888888  Reset with ENTER</p> </div>	<p>Display of executed sealing cycles <b>Button </b>: Press the button  to set the cycles counter to zero.</p>
<p><b>Configuration Menu 215 – Alarm Relay Switch Mode</b></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>CONFIGURATION 215 Alarm relay: normal  (normal/inverse)</p> </div>	<p>Selection for switching mode of relay at entry of fault, either close (“normal”) contact or break (“inverse”) contact. Show selectable setting zone.</p>
<p><b>Configuration Menu 216 – Output 0-10 VDC / Ref.</b></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>CONFIGURATION 216 Analog out provides real temperature</p> </div>	<p>Selection of the function for the actual value output (24); either as real temperature output 0...10V (“real temperature”) or as reference output for 10V (“10V reference”).</p>
<p><b>Configuration Menu 217 – Temperature Diagnosis</b></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>CONFIGURATION 217 Temperat. Diagnosis: OFF (OFF/ON)</p> </div>	<p>Selection to activate and deactivate temperature control. The OK zone is set in the setting menu 207 and 208.</p>



<p><b>Configuration Menu 218 – Temp. Diagnosis Time Delay</b></p> <pre> CONFIGURATION 218 Time delay for temp.diagnos.: 88.8s (0.0...99.9s) </pre>	<p>Setting of delay for temperature control. Temperature control starts only after sequence of this delay. Delay starts when true value reaches temperature-OK-zone.</p>
<p><b>Configuration Menu 219 – Heat-Up Time Out</b></p> <pre> CONFIGURATION 219 Heatup time out: OFF (OFF/0.0...99.9s) </pre>	<p>Selection for heat-up timeout. At the activation of a “start” signal, the PIREG® 545 monitors the time taken to reach the desired “Set” temperature OK-zone. If the “Set” temperature OK-zone is not achieved within the selected heat-up timeout period, the controller will fault, and the error code 304 will be displayed. Heat-up timeout can be programmed OFF or from 0.0 to 99.9 seconds. The OK zone is set in the Configuration menu 207 and 208.</p> <p>This is also used to for setting of possible preheating time, during which actual measured temperature value must be within temperature OK-zone.</p>
<p><b>Configuration Menu 222 – Output 1 Function</b></p> <pre> CONFIGURATION 222 Output 1 OFF </pre>	<p>Selection function of Output 1: For complete list of options refer to Section 5.10. “Relay and Output Functions”. Press the Menu Scroll  to advance to Configuration 223 menu. If the Output 1 function is programmed to generate seal phase impulse (5) or cooling phase impulse (6), press Menu Scroll  to advance to Configuration Menu 222a to set duration time of pulse.</p>
<p><b>Configuration Menu 222a – Output 1 Impulse Duration</b></p> <pre> CONFIGURATION 222a Set duration: 88.8s (0...99.9s) </pre>	<p>: Setting of the duration of impulse.</p>
<p><b>Configuration Menu 223 – Output 1 Switching Mode</b></p> <pre> CONFIGURATION 223 Output 1: normal (normal/inverse) </pre>	<p>: Selection for switching mode of output 1 at activated either close (“normal”) contact or break (“inverse”) contact. Show selectable setting zone.</p>
<p><b>Configuration Menu 225 – Temperature Unit C° or F°</b></p> <pre> CONFIGURATION 225 Temperature unit: Celsius (Celsius/Fahrenheit) </pre>	<p>Selection of temperature units</p>

<p><b>Configuration Menu 226 – Batch Counter-Home Screen</b></p> <pre> CONFIGURATION  226 Batch counter:  OFF (OFF/ON) </pre>	<p>Selection of batch counter turned on or off. The batch counter displays the executed sealing cycles in the Home Screen. The batch counter will be reset in setting menu 113</p>
<p><b>Configuration Menu 227 – Advance PIREG Features</b></p> <pre> CONFIGURATION  227 Adv. PIREG features: OFF (OFF/ON) </pre>	<p>Selection for deactivating and activating advanced PIREG® features.</p>






## 6.5. Advanced configuration menu



**Advancing to the Advanced Configuration menus:** From the Home Screen, simultaneously hold the Menu Scroll button  and  button for longer than 2s to change to the Advanced Configuration menus. Then press the Menu Scroll  button to advance through the various Advanced Configuration menus.



<p><b>Advance Config. Menu 301 – Tc Correction</b></p> <pre> ADVANCE CONFIG.  301 Tc corr.: OFF (OFF/Single pt/8 pt) </pre>	<p>Press the  button to change to the next advance config. menu</p> <ul style="list-style-type: none"> <li>-with Tc correction “off” change to advance config. menu 304.</li> <li>-with Tc correction “Single pt” change to advance config. menu 302.</li> <li>-with Tc correction “8 pt” change to advance config. menu 302a.</li> </ul> <p><b>Line 1:</b> Name and Number of menu  <b>Line 2:</b> Selection for deactivating and activating the temperature coefficient correction. The selection is confirmed as always with the button .</p> <p><b>Line 3:</b> In line 3 will be displayed the text “saved”, if the temperature coefficient correction was successfully running after calibration.</p>
<p><b>Advance Config. Menu 302a – Single Point Correction Reset</b></p> <pre> ADVANCE CONFIG.  302a Tc correction: Single point Reset with ENTER </pre>	<p>: Single point temperature coefficient correction chosen from menu 301.</p> <p><b>Line 4:</b> Direction to Reset. Reset Single point temperature coefficient correction by pressing of  button. After Reset the single point temperature coefficient correction a new correction is possibly after a new auto-calibration.</p>
<p><b>Advance Config. Menu 302b – 8-Point Correction Reset</b></p> <pre> ADVANCE CONFIG.  302b Tc correction: 8 point Reset with ENTER </pre>	<p>8-point temperature coefficient correction chosen from screen 301.</p> <p><b>Line 4:</b> Direction to Reset. Reset 8-point temperature coefficient correction by pressing of  button. After Reset the 8-point temperature coefficient correction a new correction is possibly after a new auto-calibration.</p>

<p><b>Advance Config. Menu 303 – Tc Correction Heating Time</b></p> <pre> ADVANCE CONFIG.  303 Tc correction Heating time:    OFF (OFF/1...999s) </pre>	<p>Setting of heating time for automatic temperature coefficient correction with temperature controller TM6. If setting is “off” temperature coefficient correction has to be manual controlled.  <b>Line 4:</b> Show adjustable setting zone.</p>
<p><b>Advance Config. Menu 304 – P-Factor Correction</b></p> <pre> ADVANCE CONFIG.  304 P-factor correction:      OFF (OFF/30...250%) </pre>	<p>: Setting of correction value of P-factor-correction. If P-factor correction is deactivated by setting a value smaller than thirty, text "off" is displayed instead of numeric value.</p>
<p><b>Advance Config. Menu 305 – Calibration Compare Time</b></p> <pre> ADVANCE CONFIG.  305 Calibration compare time:    15s (15s/30s) </pre>	<p>Selection for calibration compare time.</p>
<p><b>Advance Config. Menu 307 – K2 Relay Function</b></p> <pre> ADVANCE CONFIG.  307 Relay K2 OFF </pre>	<p>Selection function of Relay K2: For complete list of options refer to Section 5.10. “Relay and Output Functions”.  Press the Menu Scroll  to advance to Advance Config 308 menu. If the Relay K1 function is programmed to generate seal phase impulse (5) or cooling phase impulse (6), press Menu Scroll  to advance to Advance Config Menu 307a to set duration time of pulse.</p>
<p><b>Advance Config. Menu 307a – K2 Impulse Duration</b></p> <pre> ADVANCE CONFIG.  307a Set duration:    88.8s (0...99.9s) </pre>	<p>Setting of the duration of impulse.</p>
<p><b>Advance Config. Menu 308 – Seal Time Count Direction</b></p> <pre> ADVANCE CONFIG.  308 Seal time counting Direction        OFF (OFF/UP/DOWN) </pre>	<p>Selection for setting of displayed sealing time in Home Screen during a current sealing cycle. It can be selected either display of adjusted sealing time, or display counts up or down running time of sealing cycle.</p>



<p><b>Advance Config. Menu 309 – Cool Time Count Direction</b></p> <pre> ADVANCE CONFIG.  309 Cool time counting Direction        OFF (OFF/UP/DOWN) </pre>	<p>Selection for setting of displayed cooling time in Home Screen during a current sealing cycle. It can be selected whether adjusted cooling time or display counting up or down to show the actual running down of cooling time will be displayed.</p>
<p><b>Advance Config. Menu 310 – Heating Ramp-Up</b></p> <pre> ADVANCE CONFIG.  310 Heating ramp:    OFF (OFF/1s/2s/5s) </pre>	<p>Selection for period of heating ramp Show selectable setting zone.</p>
<p><b>Advance Config. Menu 311 – Transformer Type Selection</b></p> <pre> ADVANCE CONFIG.  311 Transformer type: EI core (EI- /Toroidal core) </pre>	<p>Selection for transformer type</p>
<p><b>Advance Config. Menu 312 – Menu Return to Home Screen</b></p> <pre> ADVANCE CONFIG.  312 Menu return:     OFF (OFF/20s) </pre>	<p>Selection for deactivating and activating of automatic menu-reset after 20s.</p>
<p><b>Advance Config. Menu 313 – Locking Function (ON/OFF)</b></p> <pre> ADVANCE CONFIG.  313 Locking:         OFF (OFF/ON) </pre>	<p>Selection for deactivating and activating locking of display unit against inadvertent altering of settings. In order to execute settings, locking has to be deactivated by button combination  +  + , which is also used to activate locking. An alternative possibility for locking is to press the  button while the start menu is displayed after reset or turn on the line voltage.</p>
<p><b>Advance Config. Menu 314 – Auto Accept Value Changes</b></p> <pre> ADVANCE CONFIG.  314 Auto. accept:    OFF (OFF/ON) </pre>	<p>Set to "On" to automatically accept changes to values. Setting to "Off" requires pressing the  button to accept changes to values.</p>

<p><b>Advance Config. Menu 315 – Total Life Cycles</b></p> <pre> ADVANCE CONFIG.  315  Tot.cycles:88888888 </pre>	<p>Total counter of executed sealing cycles. It is not possible to set counter to zero.</p>
<p><b>Advance Config. Menu 316 – PIREG 545 Software Version</b></p> <pre> ADVANCE CONFIG.  316   PIREG-545-100 1.09 1.17 2.01 2.00 www.TOSSHEATSEAL.com </pre>	<p>Type of resistance temperature controller PIREG®-545  <b>Line 3:</b> Version of device and program versions  <b>Line 4:</b> Address of Web-site of the Company.</p>
<p><b>Advance Config. Menu 317 – Reset Input Function</b></p> <pre> ADVANCE CONFIG.  317 Reset Input:   Reset (Reset/M.Pause/Sig.) </pre>	<p>Selection of the following functions of the Reset input. The selection is confirmed as always with the button .</p> <p>(1) Reset: With a signal at the input the PIREG®-545 executes a reset.</p> <p>(2) Measurement pause: With a high signal at the Reset input (26) in the Off state, the PIREG®-545 stops the resistance measurement making it possible to interrupt the heat seal band circuit without generating an alarm. If the measurement pause is activated, the symbol  is shown on the right side of the cooling line on the Home screen. See <a href="#">Section 6.2</a></p> <p>(3) Select Signal, Calibration Switching: Selection of the calibration 1 or 2. The PIREG®-545 has the possibility to handle the calibration of two heat seal bands.  In configuration menu 317a select the time delay for the change between calibration 1 and 2.</p>
<p><b>Advance Config. Menu 317a – Reset Input Time Delay</b></p> <pre> ADVANCE CONFIG. 317a Time delay:      88s  (Off/1...99s) </pre>	<p>Setting of the time delay at the change between the calibration 1 and 2.</p>

<p><b>Advance Config. Menu 318 – AutoCal Input Function</b></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>ADVANCE CONFIG. 318 AutoCal Input: AutoCal (A. Cal/M. Pause/Sig.)</p> </div>	<p>Selection of the following functions of the Reset input. The selection is confirmed as always with the button .</p> <p>(1) AutoCal: With a signal at the input the PIREG®-545 start a calibration.</p> <p>(2) Measurement pause: With a high signal at the Autocal Start input (25) in the Off state, the PIREG®-545 stops the resistance measurement making it possible to interrupt the heat seal band circuit without generating an alarm. . If the measurement pause is activated, the symbol  is shown on the right side of the cooling line on the Home screen. See <a href="#">Section 6.2</a></p> <p>(3) Select Signal, Calibration Switching: Selection of the calibration 1 or 2. The PIREG®-545 has the possibility to handle the calibration of two heat seal bands.</p> <p>In configuration menu 318a select the time delay for the change between calibration 1 and 2.</p>
<p><b>Advance Config. Menu 318a – AutoCal Input Time Delay</b></p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p>ADVANCE CONFIG. 318a Time delay: 88s  (Off/1...99s)</p> </div>	<p>Setting of the time delay at the change between the calibration 1 and 2.</p>

## 7. Security Protection

### 7.1. Security Protection Levels

The PIREG®-545 controller offers three levels of Security Protection designed to allow the user to limit access to the various menu settings. The three levels including the menu screens they protect are as follows:

Settings Security Protection [S] – Protects menu screens 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, & 112.



**Note:** Settings can only be password protected (locked) when Level 1 and Level 2 are being password protected (locked).

Level 1 Security Protection [1] – Protects menu screens 201, 202, 203, 204, 205, 206, 207, 208, 210, 211, 213, 214, 217, 218, 219, 225, 226, 227, 301, 302, 303, 308, 309, 310, 312, & 313.



**Note:** Level 1 can only be password protected (locked) when Level 2 is being password protected (locked).

Level 2 Security Protection [2] – Protects menu screens 209, 212, 215, 216, 222, 223, 304, 305, 307, 311, & 314.

To advance to the Security Protection menu 401 from the Home Screen, simultaneously hold the Menu Scroll button and button for longer than 2s. Pressing the Menu Scroll button for 2 seconds while in the Security Protection menu 401 will return the controller back to Home Screen.

When a menu screen has been password protected (locked) and an alteration is attempted in that menu screen, an “x” will appear in front of the value/function for 1s to indicate that alteration is not allowed.

The factory password for all levels is “0000”. To lock any level the operator must first “Change” the factory password “0000” and establish a new password. The four zeros “0000” will be displayed as the password in all screens until a new password has been created. Once a new password has been created four stars “\*\*\*\*” will replace the zeros to signify that a new password has been created.

A password is set per digit. To enter a password, begin by pressing either the or button. Four zeros (“0000”) will appear flashing with the first digit shaded. Once this occurs, follow the keystrokes below to enter and accept a password:

Press the or button to enter the first digit →press the Menu scroll button

Press the or button to enter the second digit →press the Menu scroll button

Press the or button to enter the third digit →press the Menu scroll button

Press the or button to enter the fourth digit →press the Enter button to accept the entry.



**Note:** If a password has been established and lost, a master override password has been pre-programmed for entry in screens 405, 410 and 416. Call the manufacturer for instructions.

### 7.2. Security Protection Menus

#### 7.2.1 Security Protection menu 401: Security level selection





```
SECURITY PROTEC. 401
Password protection
for: SETTINGS
(SETTINGS/LEV1/LEV2)
```

Security Protection menu 401 allows the operator to select the protection level to be altered. The symbol / indicates the lock and unlock state of the password level. Press the buttons to select the desired password level and accept by pressing the Enter button . Press the Menu Scroll button to advance to the next Security Protection menu:

- with Settings selected advances to Security Protec. menu 402
- with Level 1 selected advances to Security Protec. menu 407
- with Level 2 selected advances to Security Protec. menu 412

### 7.2.2. Security Protection menu 402: Settings Level, function selection

```
SECURITY PROTEC. 402
Settings password:
LOCK
(LOCK/UNLOCK/CHANGE)
```

Security Protection menu 402 is the home screen for the Settings level password protection. Press the   buttons to select the desired command and accept by pressing the Enter button . Then press the Menu scroll button  to advance to the next Security Protection menu for Settings.


- with “LOCK” selected controller advances to Security Protection menu 403.
- with “UNLOCK” selected controller advances to Security Protection menu 404.
- with “CHANGE” selected controller advances to Security Protection menu 406.







**Note:** To lock any level the operator must first “Change” the factory password “0000” and establish a new password.














To return back to the Security Protection menu 401 without making any changes press the Menu scroll button  twice.



### 7.2.3. Security Protection menu 403: Settings Level, locking function


```
SECURITY PROTEC. 403
Enter settings
password to LOCK
PASSWORD: 0000 
```

Security Protection menu 403 allows the operator to password protect (lock) the Settings level. The symbol  /  indicates the lock and unlock state of the settings level. The start value from the factory is “0000”. This “0000” will be displayed until a new password has been entered, then “\*\*\*\*” will be displayed.


The password is set per digit. To enter the password, begin by pressing either the  or  button. Four zeros (“0000”) will appear flashing with the first digit shaded. Once this occurs, follow the keystrokes below enter and accept the password:



1. Press the  or  button to enter the first digit →press the Menu scroll button 
2. Press the  or  button to enter the second digit →press the Menu scroll button 
3. Press the  or  button to enter the third digit →press the Menu scroll button 
4. Press the  or  button to enter the fourth digit →press the Enter button  to accept the entry. (**not the Menu scroll button **)



The display changes back to “\*\*\*\*” and the unlock symbol  will change to the locked symbol .














Press the Menu Scroll button  to return back to Security Protection menu 401.



### 7.2.4. Security Protection menu 404: Settings Level, unlocking function


```
SECURITY PROTEC. 404
Enter settings
password to UNLOCK
PASSWORD: 0000 
```

Security Protection menu 404 allows the operator to unlock the Settings level. The symbol  /  indicates the lock and unlock state of the settings level. The start value from the factory is “0000”. This “0000” will be displayed until a new password has been entered, then “\*\*\*\*” will be displayed.

The password is set per digit. To enter the password, begin by pressing either the  or  button. Four zeros (“0000”) will appear flashing with the first digit shaded. Once this occurs, follow the keystrokes below enter and accept the password:

1. Press the  or  button to enter the first digit →press the Menu scroll button 
2. Press the  or  button to enter the second digit →press the Menu scroll button 
3. Press the  or  button to enter the third digit →press the Menu scroll button 
4. Press the  or  button to enter the fourth digit →press the Enter button  to accept the entry. (**not the Menu scroll button **)

The display changes back to “\*\*\*\*” and the lock symbol  will change to the unlocked symbol .

Press the Menu Scroll button  to return back to Security Protection menu 401.

### 7.2.5. Security Protection menu 405: Settings Level, changing password function

```
SECURITY PROTEC. 405
Enter current
settings password:
PASSWORD: 0000
```

Security Protection menus 405 and 406 allows the operator to change the Settings level password from an existing password to a new password. In Security Protection menu 405 the current password is entered. The start value from the factory is "0000". This "0000" will be displayed until a new password has been entered, then "\*\*\*\*\*" will be displayed. The current password is set per digit. To enter the current password, begin by pressing either the ▲ or ▼ button. Four zeros ("0000") will appear flashing with the first digit shaded. Once this occurs, follow the keystrokes below enter and accept the current password:

1. Press the ▲ or ▼ button to enter the first digit →press the Menu scroll button ⏪
2. Press the ▲ or ▼ button to enter the second digit →press the Menu scroll button ⏪
3. Press the ▲ or ▼ button to enter the third digit →press the Menu scroll button ⏪
4. Press the ▲ or ▼ button to enter the fourth digit →press the Enter button ⏩ to accept the entry. (**not the Menu scroll button ⏪**)

Upon pressing the Enter button ⏩ to accept the current password the controller advances to Security Protection menu 406. If an incorrect password is entered the controller will remain in Security Protection menu 406.

It is possible to change the password for any level even when that level is locked. The new password will be accepted.

### 7.2.6. Security Protection menu 406: Settings Level, set new password function

```
SECURITY PROTEC. 406
Enter new
settings password:
PASSWORD: 0000
```

In Security Protection menu 406 the new password is to be entered. The new password is set per digit. To enter the new password, begin by pressing either the ▲ or ▼ button. Four zeros ("0000") will appear flashing with the first digit shaded. Once this occurs, follow the keystrokes below enter and accept the new password:

1. Press the ▲ or ▼ button to enter the first digit →press the Menu scroll button ⏪
2. Press the ▲ or ▼ button to enter the second digit →press the Menu scroll button ⏪
3. Press the ▲ or ▼ button to enter the third digit →press the Menu scroll button ⏪
4. Press the ▲ or ▼ button to enter the fourth digit →press the Enter button ⏩ to accept the entry. (**not the Menu scroll button ⏪**)

Upon pressing the Enter button ⏩ to accept the new password the password display changes to "\*\*\*\*\*". Press the Menu Scroll button ⏪ to return back to Security Protection menu 401.

### 7.2.7. Security Protection menu 407: Level 1, function selection

```
SECURITY PROTEC. 407
Level 1 password:
LOCK
(LOCK/UNLOCK/CHANGE)
```

Security Protection menu 407 is the home screen for Level 1 password protection. Press the ▲ ▼ buttons to select the desired command and accept by pressing the Enter button ⏩. Then press the Menu scroll button ⏪ to advance to the next Security Protection menu for Level 1.

- with "LOCK" selected controller advances to Security Protection menu 408.
- with "UNLOCK" selected controller advances to Security Protection menu 409.
- with "CHANGE" selected controller advances to Security Protection menu 410.







**Note:** To lock any level the operator must first "Change" the factory password "0000" and establish a new password.














To return back to the Security Protection menu 401 without making any changes press the Menu scroll button ⏪ twice.



### 7.2.8. Security Protection menu 408: Level 1, locking function


```
SECURITY PROTEC. 408
Enter Level 1
password to LOCK
PASSWORD: 0000
```

Security Protection menu 408 allows the operator to password protect (lock) the Level 1. The symbol  /  indicates the lock and unlock state of the settings level. The start value from the factory is "0000". This "0000" will be displayed until a new password has been entered, then " \* \* \* \* " will be displayed.

The password is set per digit. To enter the password, begin by pressing either the  or  button. Four zeros ("0000") will appear flashing with the first digit shaded. Once this occurs, follow the keystrokes below enter and accept the password:



1. Press the  or  button to enter the first digit →press the Menu scroll button 
2. Press the  or  button to enter the second digit →press the Menu scroll button 
3. Press the  or  button to enter the third digit →press the Menu scroll button 
4. Press the  or  button to enter the fourth digit →press the Enter button  to accept the entry. (**not the Menu scroll button **)



The display changes back to " \* \* \* \* " and the unlock symbol  will change to the locked symbol .














Press the Menu Scroll button  to return back to Security Protection menu 401.



### 7.2.9. Security Protection menu 409: Level 1, unlocking function


```
SECURITY PROTEC. 409
Enter Level 1
password to UNLOCK
PASSWORD: 0000
```

Security Protection menu 409 allows the operator to unlock the Level 1. The symbol  /  indicates the lock and unlock state of the settings level. The start value from the factory is "0000". This "0000" will be displayed until a new password has been entered, then " \* \* \* \* " will be displayed.

The password is set per digit. To enter the password, begin by pressing either the  or  button. Four zeros ("0000") will appear flashing with the first digit shaded. Once this occurs, follow the keystrokes below enter and accept the password:

1. Press the  or  button to enter the first digit →press the Menu scroll button 
2. Press the  or  button to enter the second digit →press the Menu scroll button 
3. Press the  or  button to enter the third digit →press the Menu scroll button 
4. Press the  or  button to enter the fourth digit →press the Enter button  to accept the entry. (**not the Menu scroll button **)



The display changes back to " \* \* \* \* " and the lock symbol  will change to the unlocked symbol .










Press the Menu Scroll button  to return back to Security Protection menu 401.





### 7.2.10. Security Protection menu 410: Level 1, changing password function


```
SECURITY PROTEC. 410
Enter current
Level 1 password:
PASSWORD: 0000
```

Security Protection menus 410 and 411 allows the operator to change the Level 1 password from an existing password to a new password. In Security Protection menu 410 the current password is entered.

The start value from the factory is "0000". This "0000" will be displayed until a new password has been entered, then " \* \* \* \* " will be displayed. The current password is set per digit. To enter the current password, begin by pressing either the  or  button. Four zeros ("0000") will appear flashing with the first digit shaded. Once this occurs, follow the keystrokes below enter and accept the current password:

1. Press the  or  button to enter the first digit →press the Menu scroll button 
2. Press the  or  button to enter the second digit →press the Menu scroll button 
3. Press the  or  button to enter the third digit →press the Menu scroll button 

4. Press the  or  button to enter the fourth digit →press the Enter button  to accept the entry. (not the Menu scroll button )



Upon pressing the Enter button  to accept the current password the controller advances to Security Protection menu 411. If an incorrect password is entered the controller will remain in Security Protection menu 410.














It is possible to change the password for any level even when that level is locked. The new password will be accepted.



### 7.2.11. Security Protection menu 411: Level 1, set new password function

```
SECURITY PROTEC. 411
Enter new
Level 1 password:
PASSWORD: 0000
```

In Security Protection menu 411 the new password for Level 1 is to be entered.





The new password is set per digit. To enter the new password, begin by pressing either the  or  button. Four zeros (“0000”) will appear flashing with the first digit shaded. Once this occurs, follow the keystrokes below enter and accept the new password:

1. Press the  or  button to enter the first digit →press the Menu scroll button 
2. Press the  or  button to enter the second digit →press the Menu scroll button 
3. Press the  or  button to enter the third digit →press the Menu scroll button 
4. Press the  or  button to enter the fourth digit →press the Enter button  to accept the entry. (not the Menu scroll button )

Upon pressing the Enter button  to accept the new password the password display changes to “ \* \* \* \* “. Press the Menu Scroll button  to return back to Security Protection menu 401.

### 7.2.12. Security Protection menu 412: Level 2, function selection

```
SECURITY PROTEC. 412
Level 2 password:
LOCK
(LOCK/UNLOCK/CHANGE)
```

Security Protection menu 412 is the home screen for the Level 2 password protection. Press the   buttons to select the desired command and accept by pressing the Enter button . Then press the Menu scroll button  to advance to the next Security Protection menu for Level 2.


- with “LOCK” selected controller advances to Security Protection menu 413.
- with “UNLOCK” selected controller advances to Security Protection menu 414.
- with “CHANGE” selected controller advances to Security Protection menu 416.







**Note:** To lock any level the operator must first “Change” the factory password “0000” and establish a new password.














To return back to the Security Protection menu 401 without making any changes press the Menu scroll button  twice.

### 7.2.13. Security Protection menu 413: Level 2, locking function



```
SECURITY PROTEC. 413
Enter Level 2
password to LOCK
PASSWORD: 0000 
```


Security Protection menu 413 allows the operator to password protect (lock) the Level 2. The symbol  /  indicates the lock and unlock state of the settings level. The start value from the factory is “0000”. This “0000” will be displayed until a new password has been entered, then “ \* \* \* \* “ will be displayed.

The password is set per digit. To enter the password, begin by pressing either the  or  button. Four zeros (“0000”) will appear flashing with the first digit shaded. Once this occurs, follow the keystrokes below enter and accept the password:


1. Press the  or  button to enter the first digit →press the Menu scroll button 
2. Press the  or  button to enter the second digit →press the Menu scroll button 
3. Press the  or  button to enter the third digit →press the Menu scroll button 
4. Press the  or  button to enter the fourth digit →press the Enter button  to accept the entry. (not the Menu scroll button )






The display changes back to “ \* \* \* \* ” and the unlock symbol  will change to the locked symbol .














Press the Menu Scroll button  to return back to Security Protection menu 401.



#### 7.2.14. Security Protection menu 414: Level 2, unlocking function


```
SECURITY PROTEC. 414
Enter Level 2
password to UNLOCK
PASSWORD: 0000 
```

Security Protection menu 414 allows the operator to unlock the Level 2. The symbol  indicates the lock and unlock state of the settings level. The start value from the factory is “0000“. This “0000” will be displayed until a new password has been entered, then “ \* \* \* \* ” will be displayed.

The password is set per digit. To enter the password, begin by pressing either the  or  button. Four zeros (“0000”) will appear flashing with the first digit shaded. Once this occurs, follow the keystrokes below enter and accept the password:

1. Press the  or  button to enter the first digit →press the Menu scroll button 
2. Press the  or  button to enter the second digit →press the Menu scroll button 
3. Press the  or  button to enter the third digit →press the Menu scroll button 
4. Press the  or  button to enter the fourth digit →press the Enter button  to accept the entry. (not the Menu scroll button )



The display changes back to “ \* \* \* \* ” and the lock symbol  will change to the unlocked symbol .














Press the Menu Scroll button  to return back to Security Protection menu 401.


#### 7.2.15. Security Protection menu 415: Level 2, changing password function

```
SECURITY PROTEC. 415
Enter current
Level 2 password:
PASSWORD: 0000
```

Security Protection menus 415 and 416 allows the operator to change the Level 2 password from an existing password to a new password. In Security Protection menu 415 the current password is entered.

The start value from the factory is “0000“. This “0000” will be displayed until a new password has been entered, then “ \* \* \* \* ” will be displayed. The current password is set per digit. To enter the current password, begin by pressing either the  or  button. Four zeros (“0000”) will appear flashing with the first digit shaded. Once this occurs, follow the keystrokes below enter and accept the current password:

1. Press the  or  button to enter the first digit →press the Menu scroll button 
2. Press the  or  button to enter the second digit →press the Menu scroll button 
3. Press the  or  button to enter the third digit →press the Menu scroll button 
4. Press the  or  button to enter the fourth digit →press the Enter button  to accept the entry. (not the Menu scroll button )



Upon pressing the Enter button  to accept the current password the controller advances to Security Protection menu 416. If an incorrect password is entered the controller will remain in Security Protection menu 416.




It is possible to change the password for any level even when that level is locked. The new password will be accepted.

#### 7.2.16. Security Protection menu 416: Level 2, set new password function

```
SECURITY PROTEC. 416
Enter new
Level 2 password:
PASSWORD: 0000
```

In Security Protection menu 416 the new password for Level 2 is to be entered.

The new password is set per digit. To enter the new password, begin by pressing either the  or  button. Four zeros (“0000”) will appear flashing with the first digit shaded. Once this occurs, follow the keystrokes below enter and accept the new password:

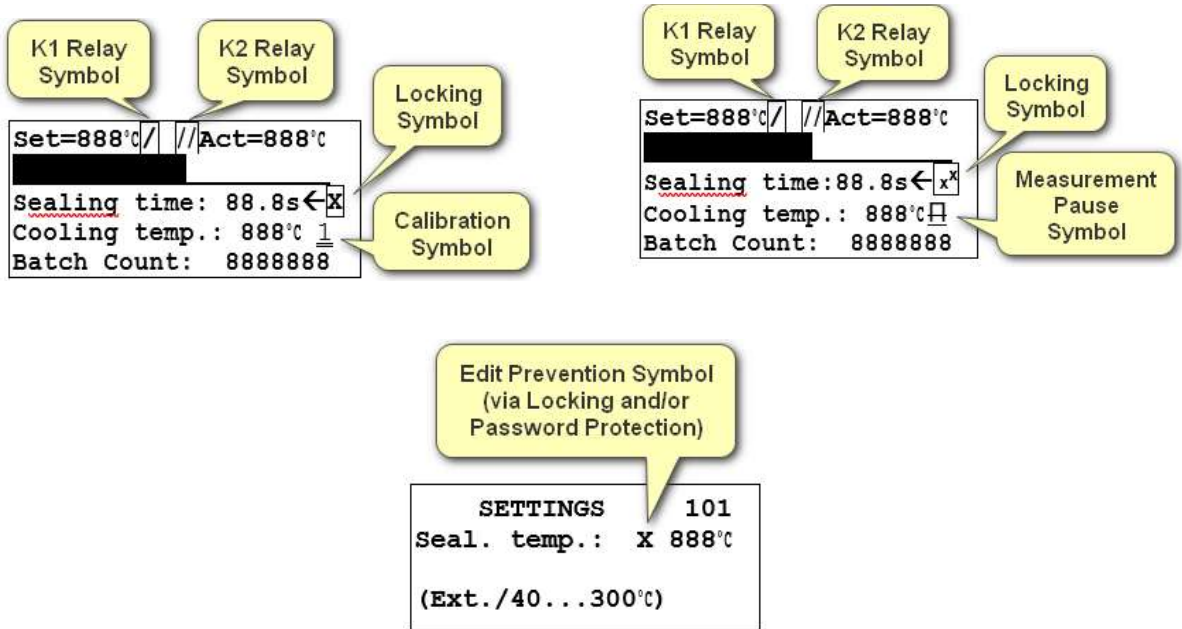
1. Press the  or  button to enter the first digit →press the Menu scroll button 

2. Press the or button to enter the second digit →press the Menu scroll button
3. Press the or button to enter the third digit →press the Menu scroll button
4. Press the or button to enter the fourth digit →press the Enter button to accept the entry. (**not the Menu scroll button** )

Upon pressing the Enter button to accept the new password the password display changes to “ \* \* \* \* “. Press the Menu Scroll button to return back to Security Protection menu 401.

## 8. Technical data

### 8.1. Screen Symbols



See [Section 6.2](#) and [Section 7.1](#) for full description.

### 8.2. Controller

<b>Mains voltages:</b>	Terminal L1 (15), L2/N (14), T2 (13) and T1 (12)
<b>Option:</b>	110 (-15%) ... 120 V (+10%) (Voltage fluctuation: 93 ... 132 VAC) Allowable mains supply systems and mains voltage: - Three-phase four-wire system with earthed neutral (symmetrical TN and TT networks) 66/115 V 120/208 V - Single-phase (split-phase) three-wire systems 110/220 V 115/230 V 120/240 V Remarks to voltage value above: - „Outer conductor–neutral conductor“/„Outer conductor–outer conductor“
<b>Standard:</b>	220 (-15%) ... 240 V (+10%) (Voltage fluctuation: 187 ... 264 VAC) Allowable mains supply systems and mains voltage: - Three-phase four-wire system with earthed neutral (symmetrical TN and TT networks) 127/220V 220/380 V 230/400 V 240/415 V - Single-phase (split-phase) three-wire systems 110/220 V 115/230 V 120/240 V 220/440 V 240/480 V Remarks to voltage value above: - „Outer conductor–neutral conductor“/„Outer conductor–outer conductor“
<b>Option:</b>	380 (-15%) ... 415 V (+10%) (Voltage fluctuation: 323 ... 457 VAC) Allowable mains supply systems and mains voltage: - Three-phase four-wire system with earthed neutral (symmetrical TN and TT networks) 220/380 V 230/400 V 240/415 V Remarks to voltage value above: - „Outer conductor–neutral conductor“/„Outer conductor–outer conductor“
<b>Mains connection:</b>	Connection between outer and neutral conductor or between two outer conductors, whereby the nominal voltage between outer conductor and earth must not exceed 300 V.
<b>Overvoltage category:</b>	III
<b>Mains frequency:</b>	50 - 60 Hz (Frequency fluctuation: 45 ... 65 Hz)

<b>Current consumption:</b>	Terminal L1 (15), L2/N (14), T2 (13) and T1 (12)		
	Nominal current:	$I_{max} = 5 \text{ A}$	(Actuator Internal thyristors)
<b>Actuators:</b>			
<b>Internal thyristors:</b>	Actuator with antiparallel thyristors on an internal heat sink in the PIREG-545		
	Continuous heating, maximum load current:	$I_{max} = 5 \text{ A}$	- 100 % operation factor
	Impulse heating, maximum load current:	$I_{max} = 25 \text{ A}$	- max. 20 % operation factor, resp. - max. 6 s on-time
	Max. peak current ( $t_{peak} = 10\text{ms}$ ):	$I_{TSM} = 500 \text{ A}$	
	Leakage current in closed state:	at 120 V: $I_D = 12 \text{ mA}$ at 240 V: $I_D = 11 \text{ mA}$ at 415 V: $I_D = 13 \text{ mA}$	
	Power limit load, integral ( $t=10\text{ms}$ ):	$I^2t = 1250 \text{ A}^2\text{s}$	
	Fusing:	The fuse must suffice for the electrical current limits defined above.	
<b>External solid-state relay:</b>	Solid-state relay, instantaneous switching		
	Galvanic separation:	The galvanic separation between the control (Terminal 19 and 20) and the load circuit (Mains) must be configured as double or reinforced isolation, according to EN 61010 resp. UL 61010.	
	Characteristic values for the solid-state relay:		
	DC no-load voltage load of the PIREG-545:	$V_{HILo} = 5 \text{ V}$	
	DC internal resistance of the PIREG-545:	$R_{wh} = 94 \ \Omega$	
	Maximum supply output current:	$I_{HILo} = 10 \text{ mA}$	
	Maximum allowable switch-on delay:	$t_{ein} = 0.2 \text{ ms}$	
	Maximum allowable switch-off delay:	$t_{out} = 0.25 \text{ ms}$	
	Connection of control circuit at PIREG-545:	Terminal 1 (+) / Terminal 2 (-)	
	Circuit:	SELV or PELV circuit	
<b>Power consumption:</b>	7.8 W		
<b>Overcurrent protection device</b>	Max. nominal current:	$I_{nommax} = 10 \text{ A}$	
	Fuse types:	For a UL-compliant installation, UL 248 or UL 489 overcurrent protection devices should be used. - Miniature circuit breakers acc. to EN 60898 (characteristics B, C, D, K or Z) - Miniature circuit breakers acc. to UL489 (characteristics B, C, D, K or Z) - Fuse gG according to IEC 60269 - Fuse Class CC or Class J according to UL 248 (characteristics Fast-Acting or Time-Delay)	
<b>Temperature coefficients:</b>			
	Temperature coeff. 1:	$Tk1 = 7.46 \times 10^{-4} \text{ 1/K}$	$Tk2 = 0$ $Tk3 = 0$ (Alloy L)
	Temperature coeff. 2:	$Tk1 = 12.65 \times 10^{-4}$ (from V1.00/1.19/1.33/1.26)	$Tk2 = 0$ $Tk3 = -70 \times 10^{-9} \text{ 1/K}^3$ (Alloy A20C)
	Temperature coeff. 3:	$Tk1 = 48.3 \times 10^{-4} \text{ 1/K}$	$Tk2 = -6.12 \times 10^{-6} \text{ 1/K}^2$ $Tk3 = 2.80 \times 10^{-9} \text{ 1/K}^3$ (NOREX)
	Temperature coeff. 4:	$Tk1 = 8.62 \times 10^{-4} \text{ 1/K}$	$Tk2 = 0$ $Tk3 = 0$ (Alloy A20K)
	Temperature coefficient variable setting	$Tk1 = +4.00 \dots$ $+99.99 \times 10^{-4} \text{ 1/K}$	$Tk2 = -99.99 \dots$ $+99.99 \times 10^{-6} \text{ 1/K}^2$
			$Tk3 = -99.99$ $+99.99 \times 10^{-9} \text{ 1/K}^3$
<b>Temperature range:</b>			
	Temp. range 2:	0...200 °C	Under-temp. -10 °C      Over-temperature 240 °C
	Temp. range 3:	0...300 °C	Under-temp. -10 °C      Over-temperature 360 °C
	Temp. range 4:	0...400 °C	Under-temp. -10 °C      Over-temperature 480 °C
	Temp. range 5:	0...500 °C	Under-temp. -10 °C      Over-temperature 600 °C
	Temperature range variable setting	$0 \dots U_{nominal}$ $U_{nominal} = 100 \dots 500 \text{ °C}$	Under-temp. -10 °C      Over-temperature $U_{nominal} +20 \%$
<b>Time values (50Hz):</b>			
	Initialization:	After power on or reset signal:	2 s
	Power interruption:	During an interruption to the line voltage, the PIREG-545 switches to the error state or starts with a reset once the line voltage has been re-established.	$\geq 80 \text{ ms}$
	Start (heating):	Switch on delay:	36..0.55 ms
		Switch off delay:	26..0.45 ms
	Preheating	Switch on delay:	25..80 ms
		Switch off delay:	25..75 ms
	Remanence setting:	After power on, reset and calibration of EI core transformer:	80 ms
		After power on, reset and calibration of toroidal core transformer:	300 ms
		During sealing process with EI core transformers	40 ms
		During sealing process with toroidal core transformers	80 ms
		During sealing process with toroidal core transformers with sealing pauses of longer than 10 minutes	160 ms
		Current conduction angle of EI core transformer:	3.1 ms
		Current conduction angle of toroidal core transformer:	1.8 ms
	Calibration start:	Switch on delay:	46..0.55 ms
	Calibration:	Max. calibration time temperature reference time= 15 s:	215 s
		Max. calibration time temperature reference time= 30 s:	290 s
		Temp. reference time 1:	15 s
		Temp. reference time 2:	30 s
	Reset:	Trigger delay:	55..65 ms
	Heat-up Ramp:		without /2 /3 /5 s
<b>Control inputs:</b>			
control voltage :	Start (3), calibr. start (25) and reset input (26) are floating		
	control voltage :	$V_{contr} = 4 - 32 \text{ VDC}$ (bipolar)	
	Max. control voltage:	$V_{contr,max} = \pm 40 \text{ V}$	
	Control current:	$I_{contr} = 1 - 12 \text{ mA}$	
	Supply:	SELV or PELV circuit	
Control contact:	Control contact (7) and preheating contact input (19) on the potential of the measuring side		
	Contact voltage	$U_{Contact} = 5 \text{ V}$	
	Contact current:	$I_{Contact} = 4 \text{ mA}$	

	Contact type:	potential-free switching contact				
	Circuit:	SELV or PELV circuit				
<b>Set value input:</b>	The input (23) is floating and protected against polarity mismatch					
	Set value voltage:	V <sub>set</sub> = 0 - 10 VDC. Depending on the set temp. range, corresponds to: 0...200 °C    0...300 °C    0...400 °C    0...500 °C    0...U <sub>nominal</sub>				
	Max. control voltage:	V <sub>set val.max</sub> = ±20 V				
	Max. input current:	I <sub>inmax</sub> = 20 µA				
	Input resistance:	R <sub>in</sub> = 1 MΩ				
	Supply:	SELV or PELV circuit				
<b>Voltage measuring input:</b>	Signal voltage (10/11):	V <sub>R</sub> = 1 - 80 V				
	Max. signal voltage:	V <sub>Rmax</sub> = 120 V				
	Max. input current:	I <sub>inmax</sub> = 2 mA				
	Input resistance:	Range 1: R <sub>in</sub> = 6.4 kΩ    at U <sub>R</sub> = 1...11.3 V Range 2: R <sub>in</sub> = 60 kΩ    at V <sub>R</sub> = 11.3 - 80 V				
	Measurement Category:	CAT II				
	Supply:	Secondary circuit provides by the mains voltage (see above, Overvoltage category III). The sealing transformer must be configured according to EN 61558 (VDE 0570) resp. UL 5085 (isolating transformer with reinforced isolation) and UL 61010.				
<b>Current measuring input:</b>	Signal current (8/9):	I <sub>R</sub> = 20...500 mA    V <sub>IR</sub> = 0.1 - 2 V				
	Max. signal current:	I <sub>Rmax</sub> = 500 mA    V <sub>IRmax</sub> = 2.5 V				
	Input resistance:	R <sub>in</sub> = 5 Ω (ballast resistance)				
	Measurement Category:	CAT II				
	Circuit:	SELV or PELV circuit				
<b>Actual Value Output:</b>	The output (24) is floating and protected against mismatch of polarity					
	Actual value voltage:	V <sub>actual value</sub> = 0...10 VDC, depending on the set temp. range, corresponds to: 0...200 °C    0...300 °C    0...400 °C    0...500 °C    0...U <sub>nominal</sub>				
	Max. output voltage:	V <sub>actual value max</sub> = 10.1 VDC				
	Max. output current:	I <sub>actual value</sub> = 5 mA				
	Internal resistance:	R <sub>i</sub> = 10 Ω				
	Circuit:	SELV or PELV circuit				
<b>Message relay output:</b>	Reed relay contact NO contact message relay (21/20), floating					
	Max. switching capacity (ohmic load):	10 W				
	Max. switching voltage:	60 VDC/ 30 VAC				
	Max. switching current:	0,5 ADC/ 0,35 AAC				
	Nominal load (ohmic load):	50 V / 100 mA				
	Lifetime: electrical	1x10 <sup>7</sup> at nominal load				1x10 <sup>9</sup> at 5V with 100mA
	Supply:	SELV or PELV circuit				
<b>Control relay outputs:</b>	Relay change-over contact control relay 1 (16/17/18) and 2 (27/28/29), floating					
	Max. switching capacity (ohmic load):	2000 VA/ 192 W				
	Max. switching voltage:	150 VDC/ 250 VAC				
	Max. switching current:	10 A				
	Nominal load (ohmic load):	8 A/ 250 VAC				8A/ 24 VDC
	Lifetime: electrical:	100x10 <sup>3</sup> with ohmic load				
	mechanical:	20x10 <sup>6</sup>				
<b>Alarm output:</b>	Reed relay normally open contact (5/6), floating					
	Max. switching capacity (ohmic load):	10 W				
	Max. switching voltage:	60 VDC/ 30 VAC				
	Max. switching current:	0,5 ADC/ 0,35 AAC				
	Nominal load (ohmic load):	50 V / 100 mA				
	Lifetime: electrical	1x10 <sup>7</sup> at nominal load				1x10 <sup>9</sup> at 5V with 100mA
	Supply:	SELV or PELV circuit				
<b>Interfaces:</b>						
<b>RS232 interface:</b>	Format (factory setting):	9600 bauds, 1 start bit, 8 data bits, 1 stop bit, no parity				
	Baud rates:	9600 bits/s    19200 bits/s    38400 bits/s    57600 bits/s    115200 bits/s				
	RxD input voltage:	±30 V		RxD input resistance: 3...7 kΩ		
	TxD output voltage:	±5 V with 3 kΩ load		TxD output resistance: 300 Ω		
	Supply:	SELV or PELV circuit				
<b>USB interface:</b>	Format:	USB 1.1 and 2.0    Converter from USB to RS232 interface				
	RS232 format (factory setting):	9600 bauds, 1 start bit, 8 data bits, 1 stop bit, no parity				
	RS232 baud rates:	9600 bits/s    19200 bits/s    38400 bits/s    57600 bits/s    115200 bits/s				
	USB input voltage:	-0,5...+3,8 V				
	Supply:	SELV or PELV circuit				
	Controller:	FDTI Chip FT232RL website: <a href="http://www.ftdichip.com">http://www.ftdichip.com</a>				
	Connection interface:	USB 2.0 Typ B				
<b>EMC (CE):</b>	Interfer. immunity:	IEC 61000-6-2				
	Interfer. emission:	IEC 61000-6-3 The PIREG-545 complies with the limits of the interference emission only with the addition of a mains filter (compulsory).				
<b>Connections:</b>	Plug-in screw terminals					
	Clamping range 0.2...2.5 mm <sup>2</sup> (AWG 24...12), tightening torque 0.6...0.6 Nm					
	Material: polyamide, not reinforced, flammability class UL94 V0					
<b>Connecting cable:</b>	Rigid or Flexible	Mains cable:	cross-section 0,2...4 mm <sup>2</sup> (AWG 24...10)			
		Control cable:	cross-section 0,2...2,5 mm <sup>2</sup> (AWG 24...12)			
		minimum temperature rating 70 °C				
<b>Type:</b>	Encapsulated in isolating case					
<b>Housing:</b>	Switchboard housing according to IEC 61554/Din 43700, Material: Noryl fiber reinforced PPE/PS, flammability class UL94 V0 (no fire protection housing)					
<b>Protection class:</b>	Protection class II					
<b>Pollution class:</b>	2					
<b>Protection type:</b>	IP20 (*: not part of the acceptance according to UL 61010)					
<b>Mounting:</b>	Mounted switchboard, cut-out 138 x 68 mm					
<b>Dimensions (W x H x D):</b>	144 x 72 x 169 mm					

<b>Installation:</b>	Minimum distance to adjacent devices and cabling on all sides at least 20 mm
<b>Weight:</b>	970 g
<b>Shock resistance:</b>	10 g
<b>Altitude:</b>	max. 2000 m
<b>Humidity:</b>	Maximum relative humidity 80% at temperatures up to +31°C, decreasing linearly up to 50% relative humidity at +40°C.
<b>Operating temperature:</b>	5...50 °C
<b>Storage temperature:</b>	-10...70 °C
<b>UL file:</b>	E516189

### 8.1.1. Standards - CE marking

	The PIREG-545 complies with the following standards, provisions and directives	
<b>Low voltage directive:</b>	2014/35/EU	
	Standard: DIN EN 61010-1	Safety requirements for electrical equipment for measurement, control and laboratory use.
<b>EMC directive:</b>	2014/30/EU	
	Standard: DIN EN 61000-6-2	Electromagnetic compatibility (EMC) – Part 6-2: Generic standards - Immunity for industrial environments
	DIN EN 61000-6-3	Electromagnetic compatibility (EMC) – Part 6-3: Generic standards - Emission standard for residential, commercial and light-industrial environments
<b>RoHS directive:</b>	2011/65/EU	

### 8.3. Current transformer

<b>Type:</b>	PIREG-CT-50	
<b>Max. nom. input current:</b>	500 A	Through hole (Primary circuit)
	Supply:	Secondary circuit provides by the mains voltage (see above, Overvoltage category III). The sealing transformer must be configured according to EN 61558 (VDE 0570) resp. UL 5085 (isolating transformer with reinforced isolation) and UL 61010.
<b>Measurement Category:</b>	CAT II	
<b>Max. operation voltage:</b>	160 V	(Voltage between primary and secondary circuit at non isolated through hole conductor.)
<b>Mains frequency:</b>	50 - 60 Hz	
<b>Max. nom. output voltage:</b>	2,5 V	Terminal 1 and 2 (Secondary circuit)
<b>Max. nom. output current:</b>	500 mA	
<b>Maximum load resistor:</b>	5 Ω	
<b>Transformation ratio:</b>	1 : 1000	
<b>Connections:</b>	Plug-in screw terminals Clamping range 0.2...2.5 mm <sup>2</sup> (AWG 24...12), tightening torque 0.6...0.6 Nm Material: polyamide, not reinforced, flammability class UL94 V0	
<b>Connecting cable:</b>	Rigid or Flexible	cross-section 0,2...2,5 mm <sup>2</sup> (AWG 24...12)
<b>Type:</b>	Encapsulated in isolating case	
<b>Housing:</b>	Material: polyamide fibre-reinforced, PA-F; sealing compound: polyurethane, flammability class UL94 V0	
<b>Mounting plate:</b>	Material: polyamide, PA, flammability class UL94 V0	
<b>Pollution class:</b>	2	
<b>Protection type:</b>	IP20* (*: not part of the acceptance according to UL 61010)	
<b>Mounting:</b>	fast mounting on 35-mm mounting rails, in accordance with EN 60715 (EN 50022)	
<b>Dimensions (W x H x D):</b>	70 x 42,5 x 103,5 mm	
<b>Weight:</b>	180 g	
<b>Shock resistance:</b>	10 g	
<b>Altitude:</b>	max. 2000 m	
<b>Humidity:</b>	Maximum relative humidity 80% at temperatures up to +31°C, decreasing linearly up to 50% relative humidity at +40°C.	
<b>Operating temperature:</b>	0...50 °C	
<b>Storage temperature:</b>	-10...70 °C	
<b>UL file:</b>	E509199	

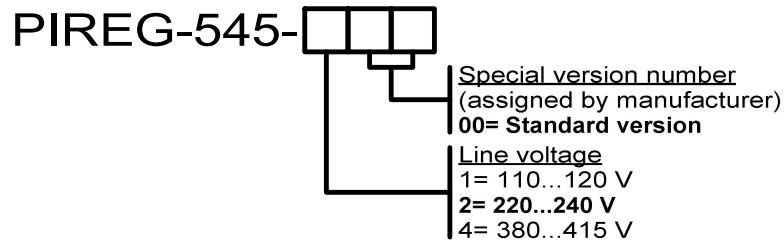
### 8.4. Sealing transformer

The sealing transformer must be configured according to EN 61558 (VDE 0570) resp. UL 5085 (isolating transformer with reinforced isolation). The sealing transformer must not be applied with reduced induction.

### 8.5. External thermometer DTM3000

<b>Type:</b>	The DTM3000 is a handy thermometer for thermocouple sensors.	
<b>Sensor:</b>	Thermocouple type K (NiCr-Ni)	
<b>Measuring range:</b>	-200 °C...+1370 °C	
<b>Accuracy:</b>	±0.1 % Full-Scale (only instrument)	
<b>Resolution:</b>	0.1 °C	
<b>Display:</b>	1-line LCD	
<b>connection:</b>	Miniature flat plug	
<b>RS232 interface:</b>	Format: 9600 baud, 1 start bit, 8 data bits, 1 stop bit, no parity	Connection: Binder series 719, 4 pole
<b>Supply voltage:</b>	Battery: 9V-Block, size 6F22	Lifetime: approx. 125 h
<b>Housing:</b>	Plastic (ABS)	
<b>Dimensions (W x H x D):</b>	60 x 120 x 26 mm	
<b>Weight:</b>	130 g	
<b>Operating temperature:</b>	0...60 °C	
<b>Remark:</b>	The thermometer TM6 is no longer available.	

## 8.6. Ordering codes



## 8.7. Spare parts

Terminal 1...11:	Phoenix Contact	MVSTBW 2,5/11-ST BDO:1-11	1926633
Terminal 12...15:	Phoenix Contact	PC 4/ 4-ST-7,62	1804920
Terminal 16...18:	Phoenix Contact	MVSTBW 2,5/ 3-ST BD:18-16 SO	1882010
Terminal 19...26:	Phoenix Contact	MVSTBW 2,5/ 8-ST BD2:26-19 SO	1942138
Terminal 27...29:	Phoenix Contact	MVSTBW 2,5/ 3-ST BD2:29-27 SO	1703746
Terminal 1...2:	Phoenix Contact	MVSTBW 2,5/ 2-ST-5,08 BD:1-2	1942138

## 9. Application note

### 9.1. Application instructions

The following application instructions are available for the PIREG<sup>®</sup>-545 controller which simplify operation of the PIREG<sup>®</sup>-545:

**Temperature coefficient correction:** Operation of the temperature coefficient correction which is an additional calibration component of the PIREG<sup>®</sup>-545.

**Single-point TC correction:** Operation of the single-point temperature coefficient correction for correcting tolerances of the temperature coefficient in only one operating point.



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