



8 a.m. - 5 p.m. Sales Available  
International: 1-919-443-0207  
Toll Free: 1-888-551-3082



Visit Our Website  
[www.wakeindustrial.com](http://www.wakeindustrial.com)



Email Us  
[sales@wakeindustrial.com](mailto:sales@wakeindustrial.com)

*All Products from Wake Industrial, LLC, come with:*

### Sales and Repairs

We specialize in providing immediate product delivery when your system goes down. We have thousands of In-Stock automation products and offer a full range of repair options.

### Fast Shipping

We ship worldwide, offering any type of shipping method with all the major logistic companies such as FedEx, UPS, DHL, USPS, and a variety of freight carriers.

### Quality Guarantee

With standards like our 1 year warranty on ALL products, we can guarantee a better customer service experience than any other company within our industry.

### Damage Free Delivery



All of our products are cleaned, go through quality control and are shipped using a custom military grade foam to ensure your product arrives undamaged. We have the capability to ship both small 1lb products and large 200lb+ automation parts regardless of your location.

---

### Stay In Touch

Wake Industrial, LLC  
1620 Old Apex Road  
Cary, NC 27513

*Wake Industrial is not affiliated with nor an authorized distributor or representative of any manufacturers, brands or products listed.*

**Call:** 1-888-551-3082  
**International:** 1-919-443-0207  
**Fax:** 1-919-267-1705

**Email:** [sales@wakeindustrial.com](mailto:sales@wakeindustrial.com)  
**Website:** [www.wakeindustrial.com](http://www.wakeindustrial.com)

*PST 6000*

# **PST 6000.XXX Thyristor Power Unit**

with integrated control function

## **Technical Information**

Edition

# 101

*PST 6000*

# **PST 6000.XXX Thyristor Power Unit**

with integrated control function

## **Technical Information**

1070 080 058-101 (2001.04) GB



Reg. no. 16149-03

© 2000-2001

This manual is the exclusive property of Robert Bosch GmbH,  
also in the case of Intellectual Property Right applications.  
Without their consent it may not be reproduced or given to third parties.

Discretionary charge € 10.-



# Contents

|          | Page   |
|----------|--|
| <b>1</b> | <b>Safety instructions</b> . . . . . <b>1-1</b>                        |
| 1.1      | Safety instructions and symbols attached to the product . . . . . 1-1  |
| 1.2      | Safety instructions and symbols used in this manual . . . . . 1-2      |
| 1.3      | Intended use . . . . . 1-3   |
| 1.4      | No admittance for persons fitted with cardiac pacemakers . . . . . 1-4 |
| 1.5      | Qualified personnel . . . . . 1-5                                      |
| 1.6      | Installation and assembly . . . . . 1-6                                |
| 1.7      | Electrical connection . . . . . 1-9                                    |
| 1.8      | Ensuring EMC of the completely assembled system . . . . . 1-12         |
| 1.9      | Operation of the thyristor power units . . . . . 1-13                  |
| 1.10     | Retrofits and modifications by the user . . . . . 1-14                 |
| 1.11     | Maintenance, repair . . . . . 1-15                                     |
| 1.12     | Working safely . . . . . 1-16  |
| <b>2</b> | <b>Setup</b> . . . . . <b>2-1</b>                                      |
| 2.1      | Features . . . . . 2-1   |
| 2.2      | Modules and components . . . . . 2-2                                   |
| 2.3      | Function . . . . . 2-4   |
| 2.4      | Monitoring . . . . . 2-4   |
| <b>3</b> | <b>Notes on Rating</b> . . . . . <b>3-1</b>                            |
| <b>4</b> | <b>Commissioning</b> . . . . . <b>4-1</b>                              |
| <b>5</b> | <b>Maintenance</b> . . . . . <b>5-1</b>                                |
| <b>6</b> | <b>Malfunction</b> . . . . . <b>6-1</b>                                |
| <b>7</b> | <b>Type overview</b> . . . . . <b>7-1</b>                              |
| 7.1      | Features . . . . . 7-1   |
| <b>8</b> | <b>PST 6100.XXX L</b> . . . . . <b>8-1</b>                             |
| 8.1      | PST 6100.XXX L overview . . . . . 8-1                                  |
| 8.2      | Explanation of drawings . . . . . 8-1                                  |
| 8.3      | PST 6100.XXX L front panel . . . . . 8-2                               |
| 8.4      | Technical data, PST 6100.XXX L . . . . . 8-4                           |
| 8.5      | Dimensioned drawing, PST 6100.XXX L . . . . . 8-5                      |
| 8.6      | Electrical connection, PST 6100.XXX L . . . . . 8-6                    |
| 8.7      | Load diagram, PST 6100.XXX L . . . . . 8-7                             |
| 8.8      | Accessories, PST 6100.XXX L . . . . . 8-8                              |
| 8.8.1    | Dimensioned drawing, accessories kit . . . . . 8-8                     |
| 8.9      | Ordering accessories . . . . . 8-10                                    |

|           |   | Page        |
|-----------|---|-------------|
| <b>9</b>  | <b>PST 6250.XXX L .....</b>                 | <b>9-1</b>  |
| 9.1       | PST 6250.XXX L overview .....               | 9-1         |
| 9.2       | Explanation of drawings .....               | 9-1         |
| 9.3       | PST 6250.XXX L front panel .....            | 9-2         |
| 9.4       | Technical data, PST 6250.XXX L .....        | 9-4         |
| 9.5       | Dimensioned drawing, PST 6250.XXX L .....   | 9-5         |
| 9.6       | Electrical connection, PST 6250.XXX L ..... | 9-6         |
| 9.7       | Load diagram, PST 6250.XXX L .....          | 9-7         |
| 9.8       | Accessories, PST 6250.XXX L .....           | 9-8         |
| 9.8.1     | Dimensioned drawing, accessories kit .....  | 9-8         |
| 9.9       | Ordering accessories .....                  | 9-10        |
| <br>      |   |             |
| <b>10</b> | <b>CE declaration of conformity .....</b>   | <b>10-1</b> |
| <br>      |   |             |
| <b>A</b>  | <b>Annex .....</b>                          | <b>A-1</b>  |
| A.1       | Index .....                                 | A-1         |

# 1 Safety instructions

The products described were developed, manufactured and tested in compliance with the fundamental safety requirements of the EU machine directive. These products normally pose no danger to persons or property if used in accordance with the handling stipulations and safety notes prescribed for their configuration, mounting, and proper operation.

## **Nevertheless, there is some residual risk!**

Therefore, you should read this manual before installing, connecting or commissioning the products. Store this manual in a place to which all users have access at any time!

This manual describes the:

- PST 6000 thyristor power units

The functions of the integrated weld timer are described in a separate manual.

## 1.1 Safety instructions and symbols attached to the product



Warning of dangerous electrical voltage!



Lug for connecting PE conductor only!

## 1.2 Safety instructions and symbols used in this manual

---



### **DANGEROUS ELECTRICAL VOLTAGE**

This symbol is used to warn of **dangerous electrical voltage**. Failure to observe the instructions in this manual in whole or in part may result in **personal injury**.

---



### **DANGER**

This symbol is used wherever insufficient or lacking compliance with instructions may result in **personal injury**.

---



### **CAUTION**

This symbol is used wherever insufficient or lacking compliance with instructions may result in **damage to equipment or data files**.

---

 **Note:** This symbol is used to draw the user's attention to special circumstances.

★ This symbol is used if user activities are required.

Modifications in this manual as compared to a previous edition are marked by black vertical bars in the margin.



### 1.3 Intended use

PST 6000 thyristor power units are designed for connection of welding transformers.

These thyristor power units are designed for use in

- resistance welding of metals and
- are suitable for operation in industrial environments as per DIN EN 50082-2 and 50081-2 on electromagnetic compatibility (EMC).


They are not intended for any other use!



#### **DANGER**

**Any use other than for the purpose indicated may result in personal injury of the user or third parties or in damage to equipment, the workpiece to be welded, or environmental damage.**

**Therefore, our products must never be used for any other than their respective intended purpose!**

- 
-  **Note: For operation in residential environments, in trade and commercial applications and small enterprises, an individual permit of the national authority or test institution is required; in Germany, please contact the Regulierungsbehörde für Telekommunikation und Post (RegTP) or its local branch offices.**

The faultless, safe functioning of the product requires proper transport, storage, erection and installation as well as careful operation.

## 1.4 No admittance for persons fitted with cardiac pacemakers



### **DANGER**

**WARNING for persons fitted with cardiac pacemakers!**

To protect persons fitted with cardiac pacemakers, no-entry signs should be posted because pacemaker malfunction (missed pulses, total failure), pacemaker program interference or even program destruction is to be expected!!!

 **Note:** We recommend that warning signs like the one shown below are posted at every entrance to manufacturing shops housing resistance-welding equipment:



## 1.5 Qualified personnel

The requirements as to qualified personnel are based on the requirements profiles as defined by the ZVEI (Zentralverband Elektrotechnik und Elektronikindustrie - German Electrical and Electronic Manufacturers' Association) and the VDMA (Verband deutscher Maschinen- und Anlagenbau - German Engineering Federation) in:

**Weiterbildung in der Automatisierungstechnik**  
**edited by: ZVEI and VDMA**  
**Maschinenbau Verlag**  
**Postfach 71 08 64**  
**D-60498 Frankfurt.**

This manual is designed for technicians and engineers with special welding training and skills. They must have a sound knowledge of the hardware components of the weld control system, the PST 6000 thyristor power units and the welding transformers.

Interventions in the hardware and software of our products, unless described otherwise in this manual, are reserved to specialized Bosch personnel.

Tampering with the hardware or software, ignoring warning signs attached to the components, or non-compliance with the warning notes given in this manual can result in serious bodily injury or property damage.

Only skilled persons as defined in IEV 826-09-01 who are familiar with the contents of this manual may install and service the products described.

Such personnel are

- those who, being well trained and experienced in their field and familiar with the relevant standards, are able to analyze the work to be carried out and recognize any hazards.
- those who have acquired the same amount of expert knowledge through years of experience that would normally be acquired through formal technical training.



### **DANGER!**

**An exception are persons with cardiac pacemakers!**

**The strong magnetic fields occurring in resistance welding may affect the proper functioning of pacemakers. This may be fatal or cause serious personal injury!**

**Therefore, persons with pacemakers must stay clear of resistance welding systems.**

**We recommend that warning signs as per DIN 40023 are posted at every entrance to manufacturing shops housing resistance-welding equipment.**

---

Please note our comprehensive range of training courses. More information is available from our training center (Phone: +49 / 6062 / 78-258).

## 1.6 Installation and assembly

---

**DANGER**

Non-workmanlike installation or mounting may lead to personal injury or damage to property.

Therefore, it is essential that you take the technical data (environmental conditions) into account for installation or mounting.

Installation or mounting must be carried out by skilled personnel only.

---

**DANGER**

Insufficient degree of protection may be life-threatening or cause damage to property!

The degree of protection of thyristor power units is IP 20. They must be installed in switchgear cubicles providing a degree of protection of no less than IP 54.

---

**DANGER**

Danger of injury and of damage to property through incorrect installation!

Devices and, in particular, operating means, must be installed so as to be properly safeguarded against unintentional operation or contact.

---

**DANGER**

Risk of injury from sharp-edged sheet metal!  
Wear protective gloves!

---

**DANGER**

Danger of personal injury and damage to property through inadequate fastening!

The place for installing the thyristor power units, and their method of fastening, must be suitable for their weight!

Injuries and bruises may be caused by lifting weights which are too heavy or by sharp metal edges!

Due to the heavy weight of individual modules several persons are required for installation and assembly.

Wear safety shoes and safety gloves!

---

**DANGEROUS ELECTRICAL VOLTAGE**

Before the modules are installed, the respective mounting station must be safely isolated from supply and properly safeguarded to prevent unintentional or unauthorized reclosing.

---

**CAUTION****Short circuits!**

When cut-outs are drilled or sawed in switchgear cubicles, metal burr may get into modules already installed there. Or, when cooling water lines are connected, water may leak into the thyristor power units installed.

The possibility of short circuits occurring in the process or even the destruction of the devices cannot be entirely ruled out.

Therefore, guard any existing modules well before you install a new module! Any and all warranty excluded in case of non-compliance.

---

**CAUTION****Heat accumulation!**

Thyristor power units must be mounted with a minimum clearance of 100 mm on top and at the bottom. Without this minimum clearance, heat may accumulate and cause power unit failure.

---

**CAUTION**

In the case of air-cooled thyristor power units, the temperature inside the housing must stay within the specified range. Thyristor power units must always be operated under forced-air cooling conditions. Convection cooling will not be sufficient!

---

**CAUTION**

Leaks in the cooling water circuit may cause consequential damage! Cooling water leaks may damage adjacent components. Therefore, when mounting water-cooled modules, always ensure that other devices in the switchgear cabinet are well protected against leaking cooling water.

---

**CAUTION**

Damage to property through inappropriate or insufficient cooling of the thyristor power units!

Water-cooled thyristor power units may only be operated when the cooling water circuit is active! Condensation on water-carrying components must be prevented.

Damage to property through insufficient water quality in the cooling water circuit!

Deposits in the cooling system may reduce the water flow, thus impairing the performance of the cooling system with time.

Therefore, you should ensure that your cooling water has the following properties:

- pH value : 7 to 8.5
- Degree of hardness  $D_{\max}$  : 10 German degrees  
(1 German degree = 1.25 British degrees = 1.05 US degrees = 1.8 French degrees)
- Chlorides : max. 20 mg/l
- Nitrates : max. 10 mg/l
- Sulfates : max. 100 mg/l
- Insoluble substances : max. 250 mg/l

Tap water usually meets these requirements. However, an algicide should be added.

- ★ Make sure that all contact surfaces are bright, i.e. free of paint, plastic coating or dirt/oxidation.
- ★ Mount the device in a vertical position.

## 1.7 Electrical connection

---



### **DANGEROUS ELECTRICAL VOLTAGE**

The mains voltage is associated with many dangers!

Possible consequences of improper handling include death or most severe injuries (personal injuries) and damage to property. For this reason, the electrical connection must always be made by an electrical expert in compliance with the valid safety regulations, the mains voltage and the maximum current consumption of the individual units of the equipment.

The mains voltage must match the nominal voltage given on the nameplate of the product!

The equipment must be appropriately fused on the supply side!

Prior to connecting a thyristor power unit, the following must be strictly observed:

- Power OFF.
  - Provide a safeguard to prevent unintentional reclosing.
  - Verify that the system is safely isolated from supply and de-energized.
  - Connect to earth and short circuit.
  - Cover up or safeguard all live parts.
- 



### **DANGEROUS ELECTRICAL VOLTAGE**

Handling live parts at mains voltage may result in death, severe bodily injury or considerable damage to property unless appropriate precautions are taken.

For this reason, the electrical connection must always be made by an electrical expert in compliance with the valid safety regulations, the mains voltage and the maximum current consumption of the individual units of the equipment.

Incorrect mains voltage may render the system dangerous or cause electrical component failure!

Therefore, please ensure the following:

- The mains voltage must match the nominal voltage given on the nameplate of the product!
  - Mains voltage fluctuation or variation from the nominal voltage must be within the specified tolerance range (see Technical Data).
  - The equipment must be appropriately fused on the mains side!
  - Proper and well insulated tools must be used for handling electric connections!
-

**DANGEROUS ELECTRICAL VOLTAGE**


Danger of life through insufficient protective conductor system!  
The thyristor power units must be connected to the protective earthing (PE) circuit of the system. Please ensure that the cross-sectional area of cables used for protective conductor wiring is sufficiently large. The electrical continuity of the protective earthing circuit must be verified in accordance with EN 60204 Part 1.

**DANGEROUS ELECTRICAL VOLTAGE**

Thyristor power units may be operated in earth neutral systems only. Protective grounding is the only protective measure permitted as per EN 50 178 (DIN VDE 0160)!

**DANGEROUS ELECTRICAL VOLTAGE**

Operation in unbalanced networks (only one network phase grounded) is not permitted.

 **Note:** It is recommended that the whole welding system be operated within a separate welding power network.

**CAUTION**

Connecting lines and signal lines must be laid so as to avoid negative effects on the function of the units through capacitive or inductive interference!

Interference is frequently coupled and de-coupled in long cables. Therefore, thyristor power unit cables and control cables must be routed separately. The influence of interfering cables on cables susceptible to interference can be minimized by keeping the following distances:

- > 100 mm if cables are run in parallel for < 10 m,
- > 250 mm if cables are run in parallel for > 10 m.

The thyristor power unit should be mounted close to the welding systems so as to avoid cable lengths of more than 25 m.

**CAUTION**


Connection cables may come off and apply dangerous voltage to system components!

It is crucial that cables are properly fixed.



- ★ **PE connection** : Connect to a central earth point. Make sure that cable cross-sectional areas are sufficiently large!
- ★ All conductor cross-sections must be large enough for the loads to be connected.
- ★ **U1 connection** : Connect to L1 system phase.
- ★ **V1 connection** : Connect to L2 system phase.
- ★ **U2 and V2 welding transformer outputs** : Connect to welding transformer.

## 1.8 Ensuring EMC of the completely assembled system

 **Note:** The completely assembled system with the welding transformer complies with prEN 50240, the EMC product standard for resistance welding systems, and EN 55011 (October 1997), EMC product family standard class A, group 2, rated current > 100 A.

- Only for industrial applications.
- Safe clearance from residential areas  $\geq 30$  m.
- Safe clearance to communication systems (wireless, telephone)  $\geq 10$  m.
- Cable length of mains feeder  $\geq 10$  m.
- Interference suppression measures: When switchgear cabinet doors are open, operation of radio devices or cell phones is permitted only beyond a safe clearance of  $\geq 2$  m.

## 1.9 Operation of the thyristor power units

---

**DANGER**

Danger of personal injury and damage to property if devices are operated before they have been properly installed!

The devices are designed to be installed in housings or switchgear cabinets and must not be operated unless properly installed and switchgear cabinet doors are closed!

---

**DANGER**

Danger of personal injury and damage to property through missing or false interpretation of fault messages!

Therefore, closing of the temperature contact (thermostatic switch, break contact) must inhibit the connected timer!

As regards fault analysis, see also the section on "Malfunction".

---

**DANGER**

Danger of bruises through electrode movement!

All users, line designers, welding machine manufacturers and welding gun producers are obliged to connect the output signal of the Bosch weld timer which initiates the electrode movement so that the applicable safety regulations are complied with.

The risk of bruises can be considerably reduced by means of, e.g., two-handed start, guard rails, light barriers etc.

---

**CAUTION**

Damage to property through insufficient cooling of the modules!

Ensure that the modules are properly cooled during operation. Condensation on water-carrying components must be prevented. In the case of air-cooled thyristor power units, the temperature inside the mounting station must remain in the specified range. In the case of water-cooled thyristor power units, the maximum permitted cooling-water temperature must not be exceeded.

---

**CAUTION**

Damage to property through excessive welding current!

The maximum welding current depends on the thyristor unit and the welding transformer in use. It must not be exceeded.

Therefore, the user must check the load in each case. See also the section on "Load diagrams".

Any and all warranty excluded in case of non-compliance.

---

## 1.10 Retrofits and modifications by the user

---

**DANGER**

Retrofits or modifications may have negative effects on the safety of the unit!

Product modification may cause death, severe or light personal injury, damage to property or environmental damage.

Therefore, please contact us prior to making any modification. This is the only way to determine whether modified components are suitable for use with our products.

---

## 1.11 Maintenance, repair

---



### **DANGEROUS ELECTRICAL VOLTAGE**

Prior to any maintenance work - unless described otherwise - the system must always be switched off!  
In the event of necessary measurement or test procedures on the active system, these have to be performed by skilled electrical personnel.  
In any case, suitable insulated tools must be used!

---



### **DANGER**

Danger of life through inappropriate EMERGENCY-STOP facilities!  
EMERGENCY-STOP facilities must be operative in all modes of the system. Releasing the EMERGENCY-STOP facility must by no means result in an uncontrolled restart of the system! First check the EMERGENCY-STOP circuit, then switch the unit on!

---



### **DANGER**

Danger of explosion of batteries!  
Do not forcefully open batteries, do not attempt to charge, solder or incinerate the battery.  
Empty batteries should always be replaced by new ones!  
The applicable regulations on the disposal of empty batteries or accumulators must be observed.

---



### **DANGER**

The right to perform repair/maintenance work on the components of the thyristor power units is reserved to the BOSCH service department or to repair/maintenance units authorized by BOSCH!

---



### **CAUTION**

Only use spare parts approved by BOSCH!

---

## 1.12 Working safely

---

**DANGER**

During operation of the welding equipment welding splashes are to be expected! They may cause eye injuries or burns.

Therefore:

- wear protective goggles
  - wear protective gloves
  - wear flame-retardant clothes
- 

**DANGER**

Danger of injury from sheet metal edges and danger of burns from weld metal!

Therefore: - wear protective gloves

---

**DANGER**

In the environment of resistance welding systems, magnetic field strengths have to be expected which are above the limit values specified in VDE 0848 Part 4. Especially if manual guns are used, the limit values for extremities may be exceeded.

In cases of doubt, you should measure the field strength and take additional measures to ensure safety and health at work.

---

**CAUTION**

The strong magnetic fields occurring in the resistance welding process may cause permanent damage to wrist watches, pocket watches, or cards with magnetic stripes (e.g. EC cards).

Therefore, you should not carry any such items on you when working in the immediate vicinity of the welding equipment.

---

## 2 Setup

### 2.1 Features

- Integrated control functionality
- Integrated weld timer
- Flexible parallel and/or serial I/O interfaces
- Fieldbus interfaces for communication
- Integrated control and monitoring functions
- Control functionality separate from monitoring functionality
- Air or water cooled
- Less cabling required due to system component integration
- Functionality designed for welding quality optimization
- Easily integrated into a portable welding box system (SCHWEISSKOFFER)
- BOS-5000 operator interface provides for easy programming, operation and diagnostics



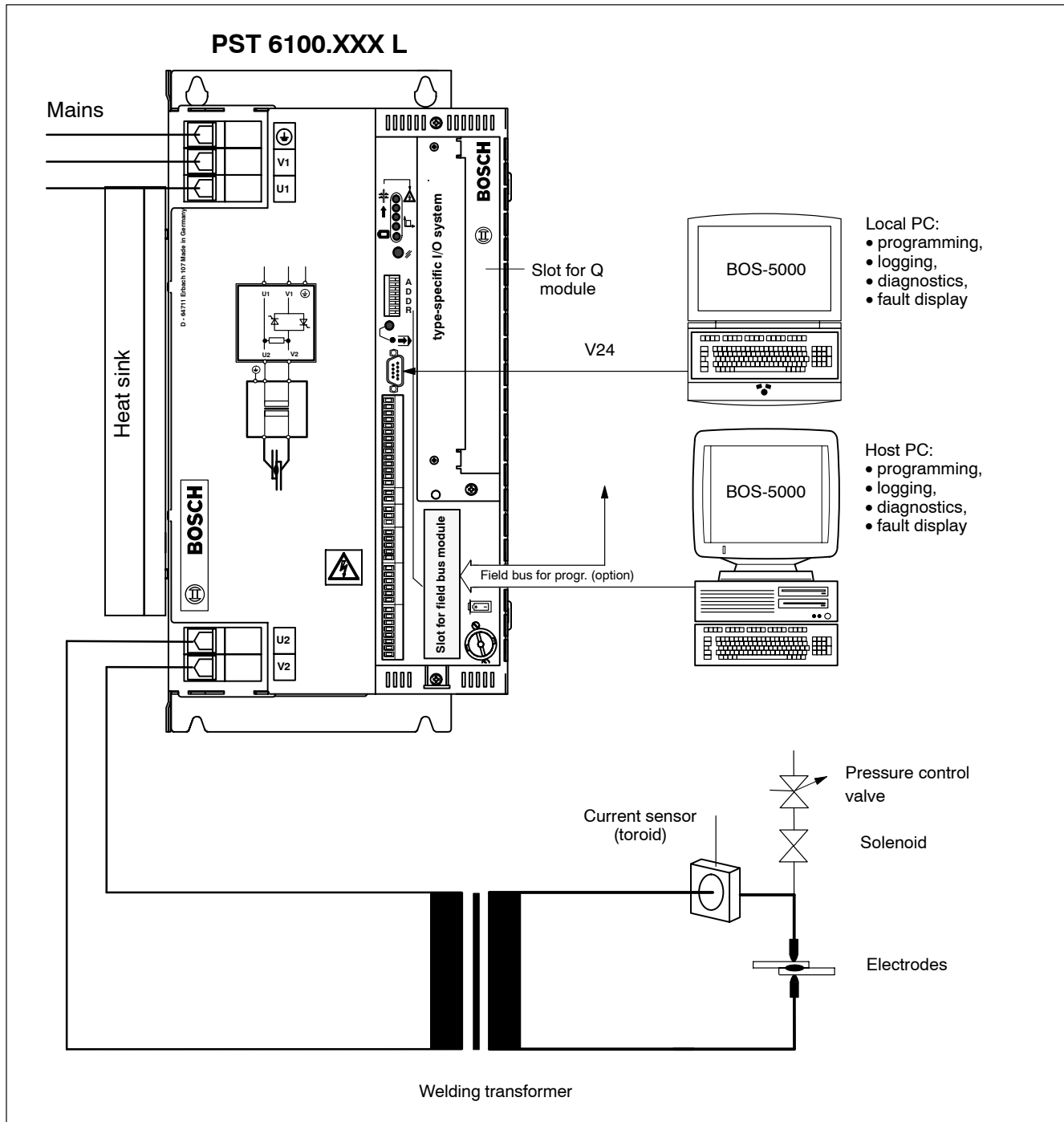
*PST 6000.XXX thyristor power unit*

## 2.2 Modules and components

The PST 6000 thyristor power units serve to control the welding transformers.

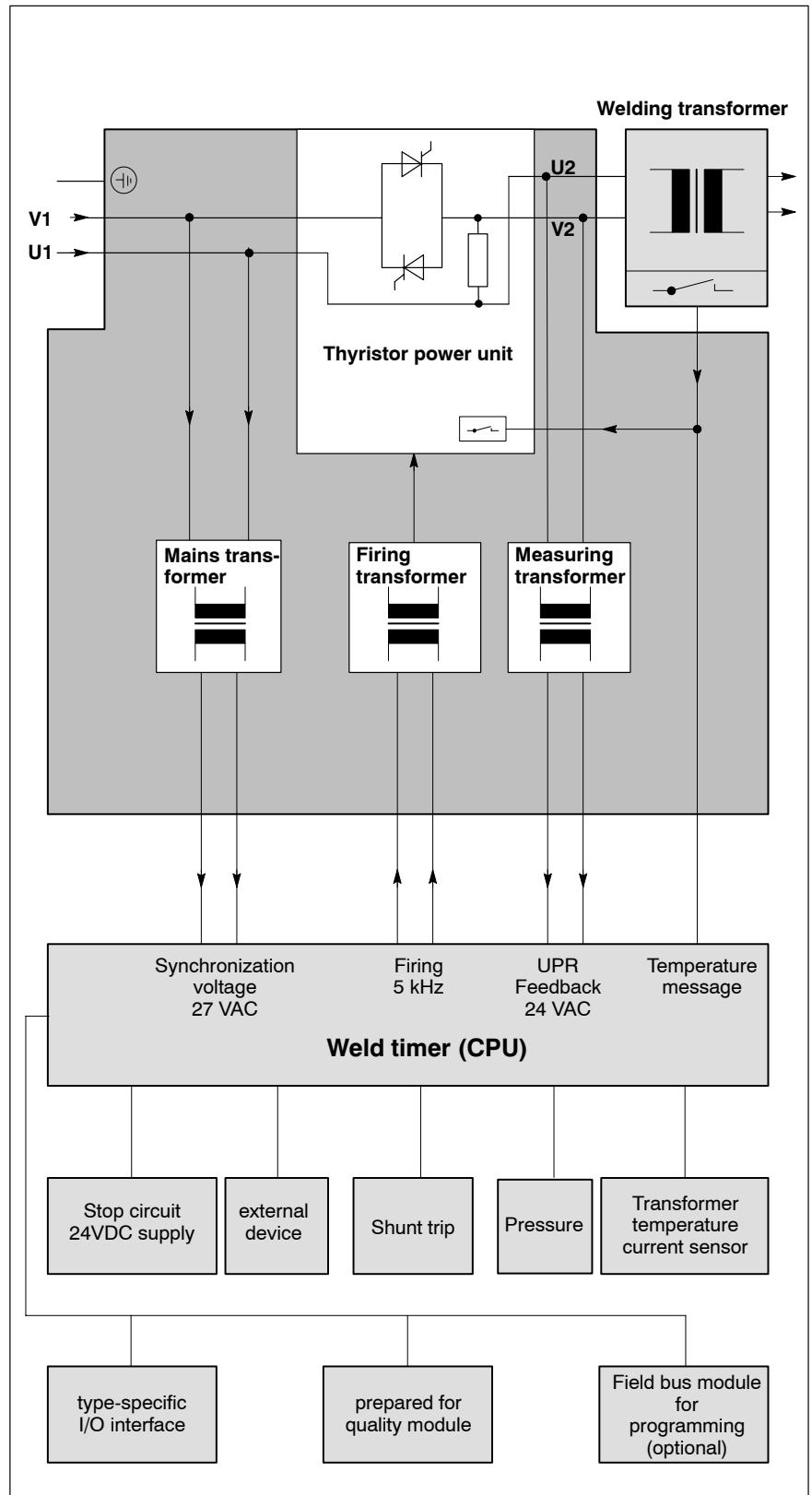
Integrated features:

- the weld timer (central processing unit, CPU)
- one slot for the type-specific I/O interface
- one slot for the field bus module for programming (optional)
- one slot for retrofitting a quality module (optional)



Setup for welding



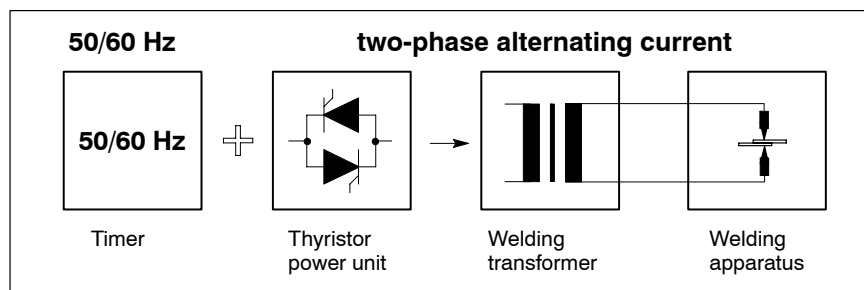


Block diagram of a thyristor power unit

## 2.3 Function

The thyristor power unit is designed for alternating current resistance welding. Key components of an AC welding system are the thyristor power unit, the weld timer and the welding transformer.

The figure below shows the basic functional design.



*Basic functional design of the AC welding process*

## 2.4 Monitoring

In order to ensure high operational reliability, various monitoring functions are incorporated in the PST 6000 thyristor power unit.

There is a thermostatic switch to signal any overload on the thyristor power unit to the weld timer.

The weld timer will then output a "Thyristor unit fault" message.

When the fault has been cleared, the error message is reset as follows:

- with the reset button on the weld timer front panel
- by an input signal for acknowledgement (type-specific)
- by an input on the BOS-5000 operator interface
- by an input on the Bosch operator terminal (BT)

### 3 Notes on Rating

The load capability of a thyristor power unit is always predefined by the type designation indicating the specific maximum welding transformer rating.



#### CAUTION

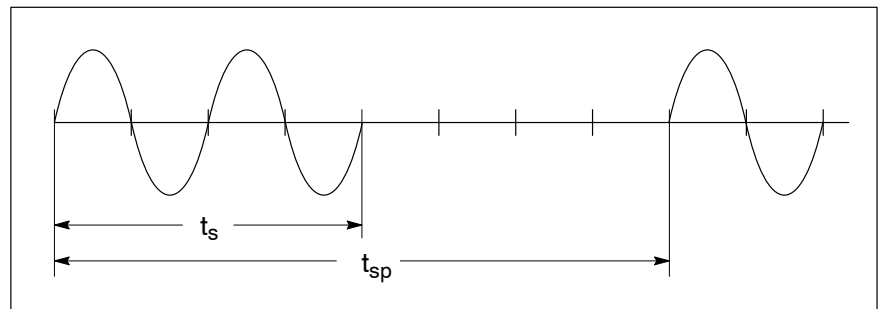
**Overloading may cause damage to the thyristor power unit!  
Always check the actual load applied on the thyristor power unit! Any  
and all warranty excluded in case of damage caused by overload.**

To check the actual load, use the load diagram. It shows the

- output currents ( $I_{\text{PRIM}}$  in A) relative to
- the duty cycle (ED in %) at
- maximum ambient temperature (in °C)

that can be switched by the PST 6000 thyristor power unit.

The weld time  $t_s$  and the overall weld cycle duration  $t_{\text{sp}}$  must be known to determine the duty cycle.



*Weld time and overall weld cycle duration*

The duty cycle is computed as follows:

$$ED = \frac{t_s}{t_{\text{sp}}} * 100\%$$

Example: In the graph shown above, the weld time is 2 periods and the overall weld cycle duration is 4 periods. This results in a duty cycle  $ED = 50\%$ .

$$ED = \frac{2 \text{ per.}}{4 \text{ per.}} \cdot 100\% = 50\%$$

**Note:** If different weld times or overall weld cycle times occur on a machine, the longest weld time and the shortest overall weld cycle time (to be determined, if required, by adding the longest weld time to the shortest cool time) must be used for calculating the duty cycle!

When you have calculated the duty cycle, you can use load diagrams to verify the proper selection of the thyristor power unit.

Notes:

## 4 Commissioning



### **DANGEROUS ELECTRICAL VOLTAGE**

**Danger of life in case of contact with live parts!**

**Upon commissioning, the thyristor power unit is energized!**

---



### **CAUTION**

**Cooling!**

**Please make sure that there is sufficient cooling capacity.**

**In the case of water cooled thyristor power units, ensure that the cooling water inlet connection is turned on and check the water temperature.**

**Any and all warranty excluded in case of non-compliance.**

---

- Check the mechanical system of the welding outfit.
- Check the electrical installation.
- Check the auxiliary equipment:
  - pneumatic system
  - cooling water or cooling system.
- Check the operability of the emergency-stop devices.
- **Cutting in the thyristor power unit:**
  - Apply mains voltage.
  - The thyristor power unit starts working. The green "Power" LED on the front panel of the weld timer (CPU) lights up.
- Check power supply and 24 V DC supply.
- Check peripheral I/O signals:
  - sensor signals,
  - communication with other weld timers.
- Check weld programs (for programmed current values and weld times).
- **Cutting off the thyristor power unit:**
  - Verify the safe isolation from supply.

Notes:

## 5 Maintenance

---



### **DANGEROUS ELECTRICAL VOLTAGE**

All maintenance work must be carried out by skilled electricians in compliance with the valid safety regulations, the mains voltage and the maximum current input values of the individual system components.

Prior to connecting a thyristor power unit, the following must be strictly observed:

- Power OFF.
  - Provide a safeguard to prevent unintentional reclosing.
  - Verify the safe isolation from supply.
  - Connect to earth and short circuit.
  - Cover up or safeguard all live parts.
- 



### **DANGEROUS ELECTRICAL VOLTAGE**

Prior to any maintenance work - unless described otherwise - the system must always be switched off!

In the event of necessary measurement or test procedures at the active system, the applicable safety and accident prevention regulations must be strictly observed. In any case, suitable insulated tools must be used!

**Danger of life through inappropriate EMERGENCY-STOP facilities! EMERGENCY-STOP facilities must be operative in all modes of the system. Releasing the EMERGENCY-STOP facility must by no means result in an uncontrolled restart of the system!**

**Danger of explosion of batteries!**

**Batteries must not be opened forcefully, recharged, soldered at the cell body or thrown into fire!**

**Replace empty batteries with new ones only!**

---



### **DANGEROUS ELECTRICAL VOLTAGE**

The right to perform repair/maintenance work on the thyristor power unit components is reserved to the BOSCH service department or to repair/maintenance units authorized by BOSCH!

**Only use spare parts/replacement parts approved by BOSCH!**

**Run-down batteries or accumulators must be disposed of according to regulations.**

---

- Check connections and terminals of all connecting cables for tight fit at regular intervals. Check all cables for damage.
- Check or replace battery at regular intervals.
- Clean the air cooler.
- Maintenance of cooling water circuit:  
Check for leaks, corrosion and moisture condensation.



## 6 Malfunction

Although the design of the thyristor power units is quite rugged, malfunctions may occur in a few exceptional cases, e.g. for the following reasons:

- incorrect electrical connection or mains voltage surges,
- insufficient cooling or overload on the thyristor power unit may trigger the thermal detector,
- current parameters set are higher than the maximum current permitted or the monitoring values.

In case of failure, the green LED "Ready" ↑ on the front panel of the weld timer unit goes out. Further information is provided by the diagnostics function, the error message display on the BOS-5000 operator interface, or a message on the Bosch BT operator terminal.



### **DANGEROUS ELECTRICAL VOLTAGE**

**Danger of life in case of contact with live parts!**

**Disconnect the system from the mains supply before troubleshooting or replacing a fuse!**

### **Thermal detector response**

The thyristor power unit contains a thermostatic switch, which transmits a message to the integrated weld timer if the temperature reaches or rises above  $\geq 80^{\circ}\text{C}$  ( $\pm 5^{\circ}\text{C}$ )

If this happens, the weld timer blocks any further sequence.

The green LED "Ready" on the front panel of the weld timer unit goes out and the message "Thyristor unit temperature" is output.

| <b>Possible causes</b>                   | <b>Corrective action</b>   |
|--|--|
| Dirt accumulation in heat sink           | Clean out the heat sink  |
| Excessive ambient temperature            | Check for sufficient convection.<br>Checking external forced ventilation may be required.  |
| Capacity of thyristor power unit too low | Compute duty cycle and check selection using load diagram (see section "Notes on Rating"). |
| No or insufficient cooling water flow    | Check cooling water inlet and/or temperature.  |

Notes:

## 7 Type overview

### 7.1 Features

#### **PST 6100.XXX L**

- Thyristor power unit for welding transformers up to max. 76 kVA
- Air cooling
- Integrated control function
- Rated voltage 400 to 600 Volt, 50/60 Hz
- Rated current 110 A (continuous thermal current)

#### **PST 6250.XXX L**

- Thyristor power unit for welding transformers up to max. 250 kVA
- Air cooling
- Integrated control function
- Rated voltage 400 to 600 Volt, 50/60 Hz
- Rated current 200 A (continuous thermal current)

Notes:

## 8 PST 6100.XXX L

### 8.1 PST 6100.XXX L overview

- PST 6100.XXX L :
  - Thyristor power unit for welding transformers up to max. 76 kVA
  - Air cooling
  - Integrated control function
  - Rated voltage 400 V -20% to 600 V +10%, 50/60 Hz

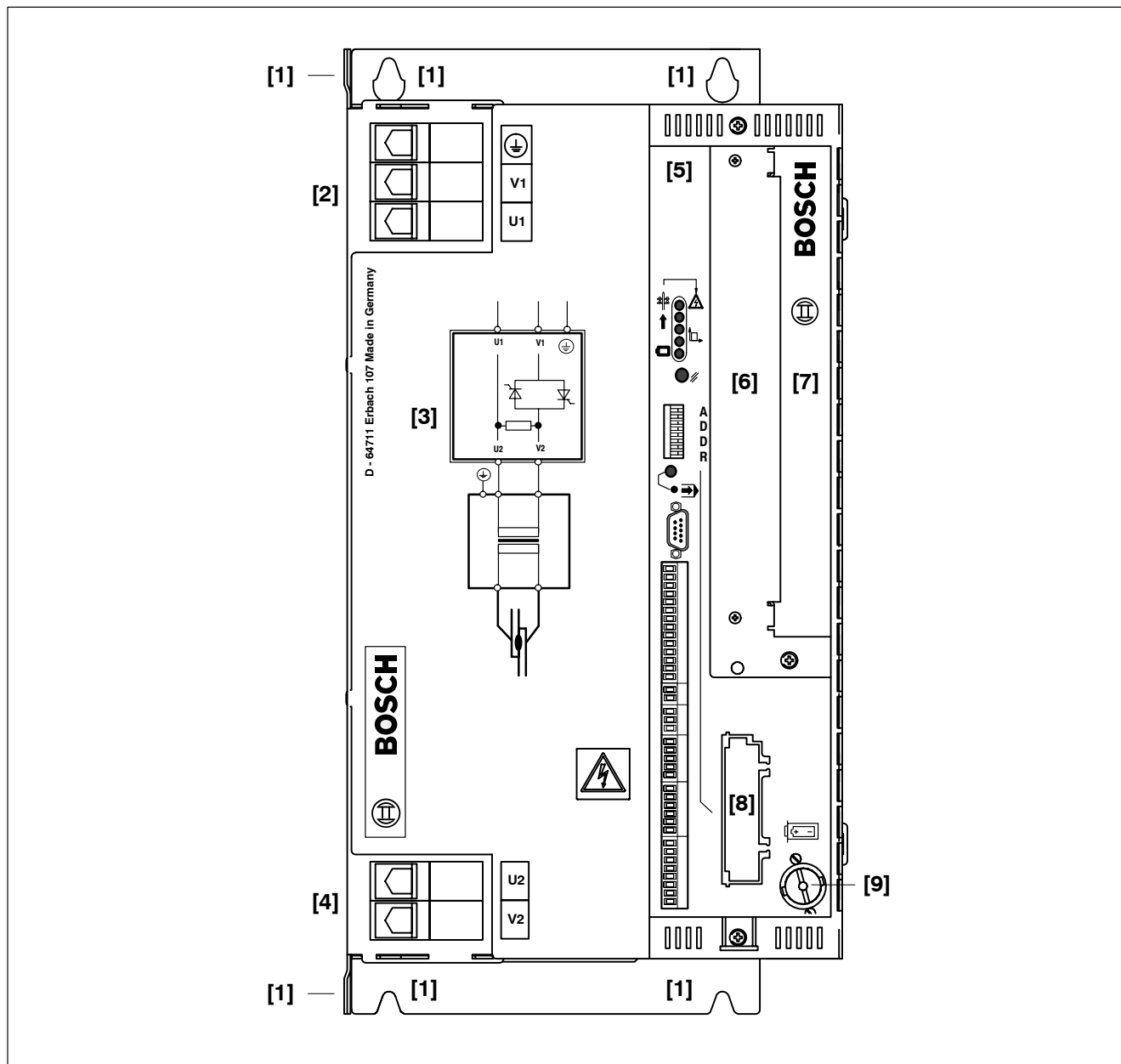
### 8.2 Explanation of drawings

The following drawings show the

- front plate with modules of the thyristor power unit
  - integrated weld timer
  - slot for the parallel, serial or fieldbus I/O interface
  - slot prepared for retrofitting a quality module
  - slot for fieldbus interface for programming (optional)
- technical data
- dimensions and mounting options
- mains connection
  - connection of the welding transformer
- load diagram
- accessories and part numbers

 **Note: No heat sinks shown on drawings.**

## 8.3 PST 6100.XXX L front panel



PST 6100.XXX L front panel

- [1] M6 mounting options
  - rear panel
  - left side panel (mounting cutout required)
- [2] mains supply connection
- [3] thyristor power unit symbol
- [4] welding transformer connection
- [5] integrated weld timer
- [6] slot for type-specific I/O interface:
  - parallel I/O interface
  - serial I/O interface
  - fieldbus I/O interface

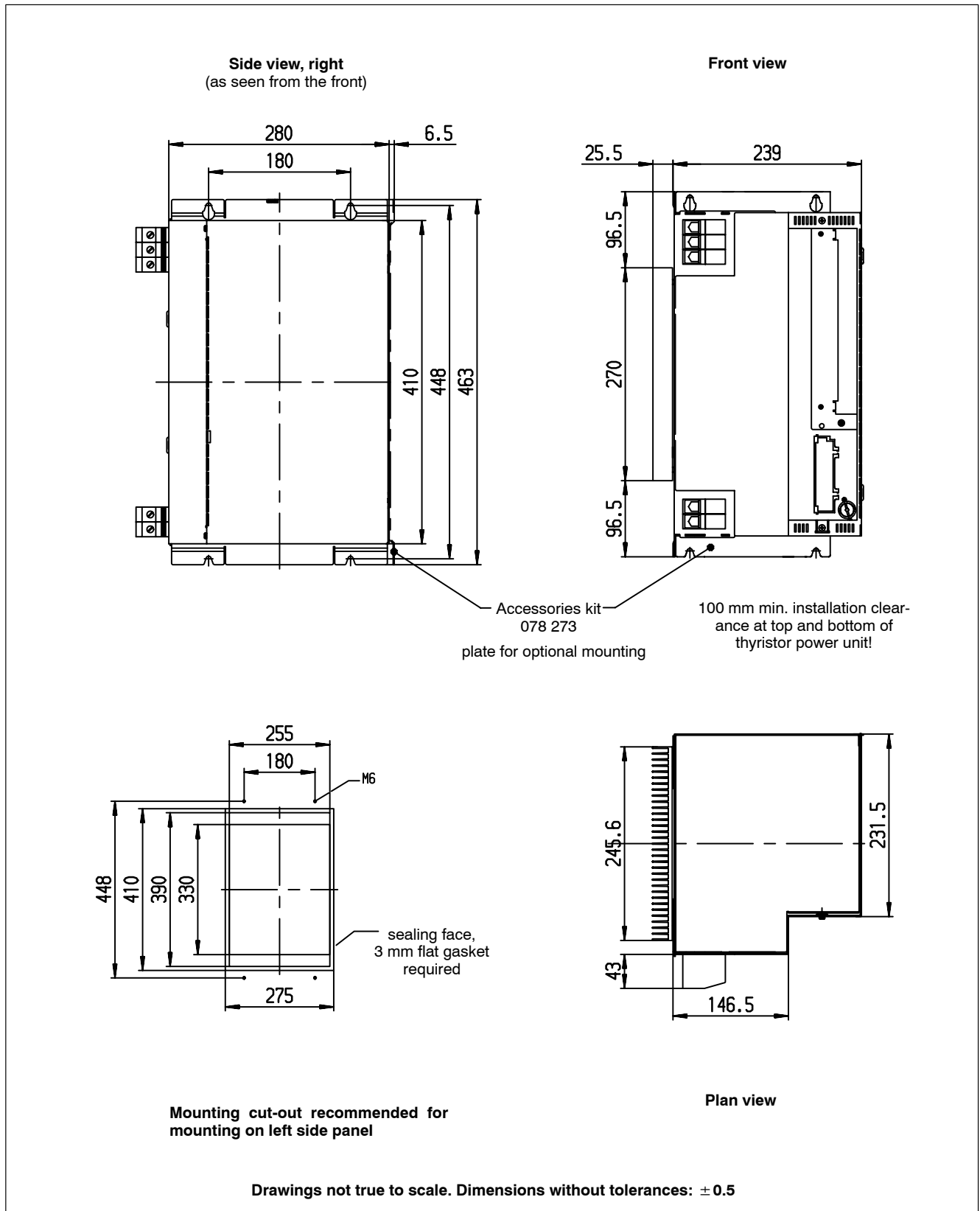
- [7] slot for retrofitting a quality module
- [8] slot for fieldbus interface for programming
- [9] battery compartment

## 8.4 Technical data, PST 6100.XXX L

|   |  |
|---|--|
| Type  | 2-phase thyristor power unit, module designed for recessed mounting  |
| Weld timer  | integrated   |
| I/O interface   | Slot for parallel, serial or fieldbus interface  |
| Quality module  | Slot prepared for retrofitting   |
| Degree of protection                                    | IP 20; designed for modular enclosure or for installation in switchgear cabinets with IP 54  |
| Thyristor power unit ambient temperature                | max. 55° C   |
| Cooling   | air, max. 45° C  |
| Temperature monitoring                                  | integrated   |
| Storage temperature                                     | -25° C to +70° C   |
| Corrosion   | The ambient air must be free of acids, caustic solutions, corrosive agents, salts and metal vapors of any major concentration  |
| Humidity  | Humidity class F as per DIN 40040; 20° C at 90% relative humidity; 40° C at 50% relative humidity (as per VDE 0113); Moisture condensation on the thyristor power units must be prevented. |
| Air pressure  | Any within a range of up to 2000 m above sea level   |
| Line voltage connection grounded TN or TT system        | 400 V -20% to 600 V +10%; 50/60 Hz   |
| Nominal system current; max. continuous thermal current | 130 A  |
| Voltage supply; Weld timer CPU; I/O interface           | 24 V DC; min. 19 V DC up to max. 30 V DC as per EN 61131-2, (external power supply), or, alternatively, power supply from the weld current system (internal power supply)                  |
| Duty cycle (ED)   | max. 50% duty cycle permitted (regardless of possible power unit operating currents, limited by the built-in 2.2 k $\Omega$ de-excitation resistor)  |
| Clock frequency   | 50/60 Hz   |
| Overvoltage protection                                  | MOV; Metal Oxide Varistor  |
| Electrical connection, mains supply and transformer     | via box terminal; max. 50 mm <sup>2</sup>  |
| Wire range  | 50 mm <sup>2</sup>   |
| Basic switchgear cabinet loss                           | 70 W   |
| Weight  | approx. 12.5 kg  |
| Mounting position                                       | vertical or with its back on mounting plate  |

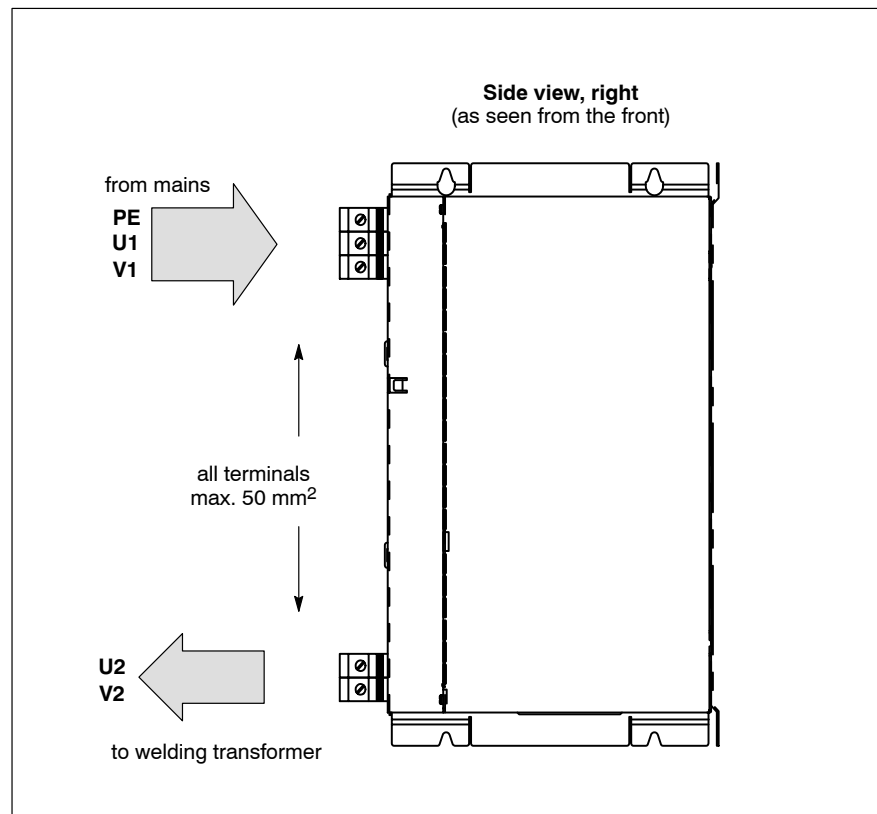


**8.5 Dimensioned drawing, PST 6100.XXX L**




Dimensioned drawing, PST 6100.XXX L

## 8.6 Electrical connection, PST 6100.XXX L

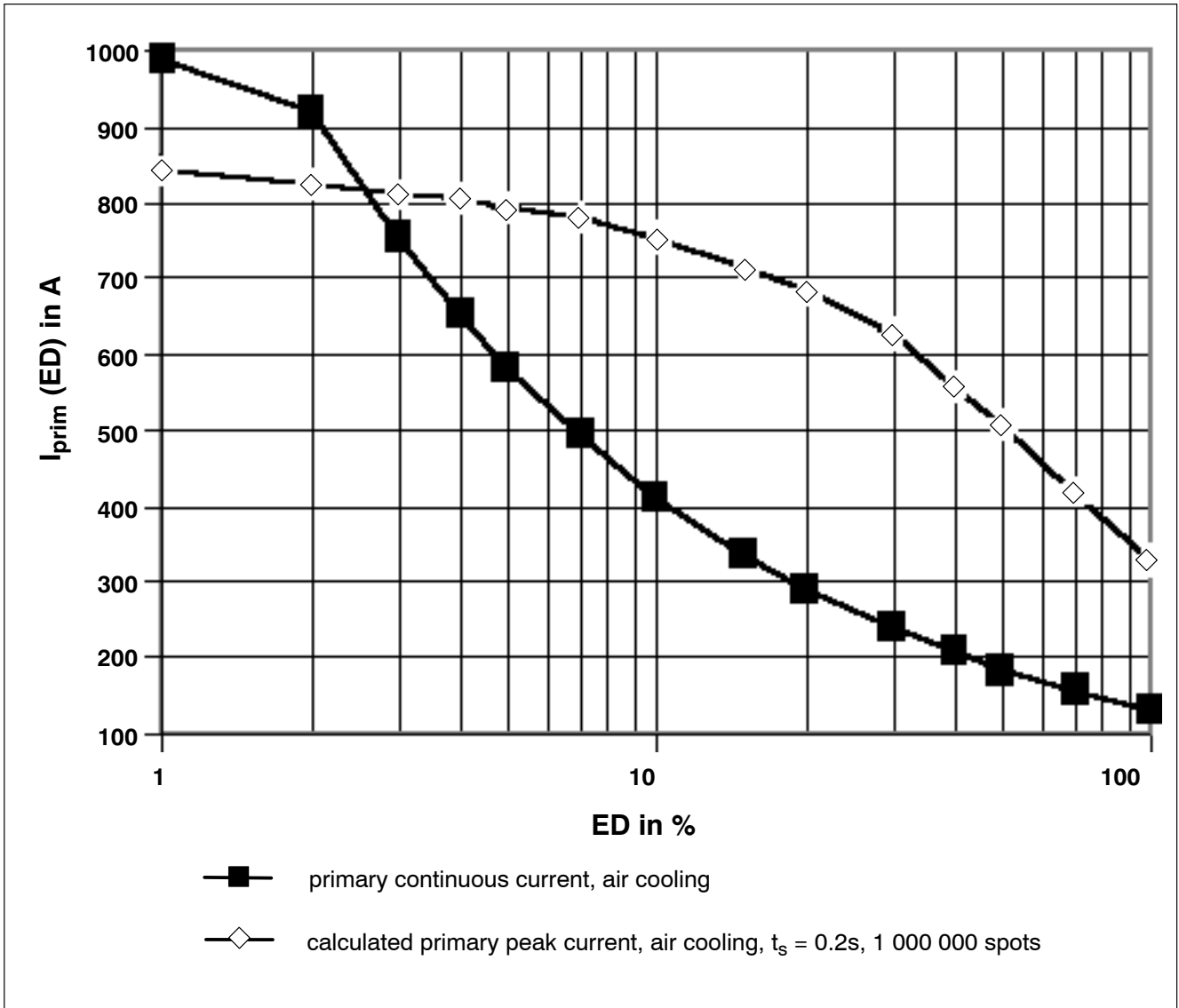


*Electrical connection, PST 6100.XXX L*

 **Note:** For the connections of the various control functions, please see the respective manuals "PST 6000, Control and I/O Level Description".

8.7 Load diagram, PST 6100.XXX L

 Note: For a general description of load diagrams, see Section 3

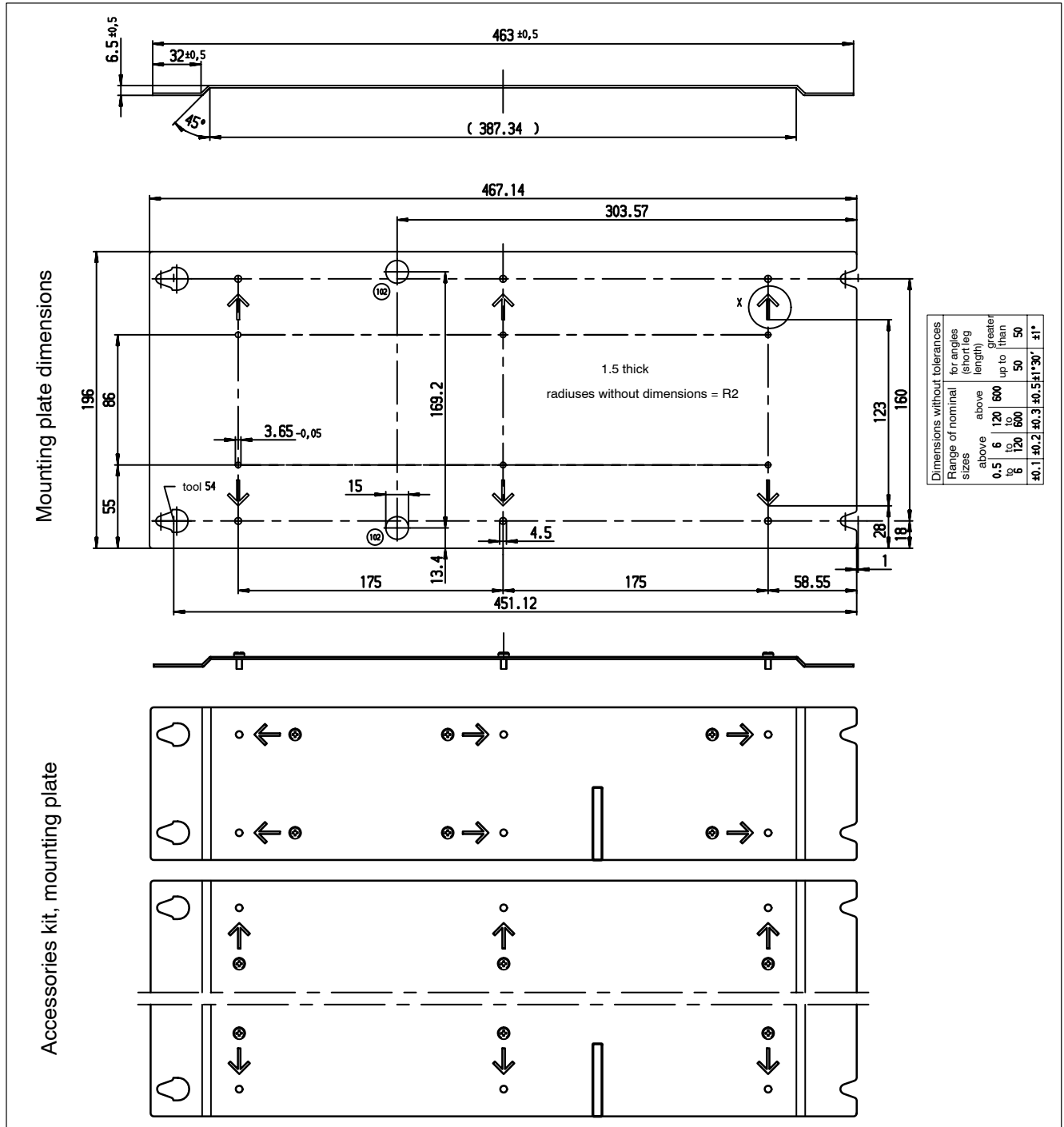


Load diagram, PST 6100.XXX L

8.8 Accessories, PST 6100.XXX L

8.8.1 Dimensioned drawing, accessories kit

An accessories kit is available for mounting the inverter with its back on the mounting plate.



Dimensioned drawing, accessories kit

- For I/O module, see Technical Information, PST 6000, Control and I/O Level Description.
- For insertable profiles for electric connection, see the section on ordering.

## 8.9 Ordering accessories

**Not** included in shipment:

| <b>Designation</b>   | <b>Part no.</b> |
|--|-----------------|
| Insertable profile for pin connectors on small wire sizes, line connection and welding transformer connection                      | 1070 918 779    |
| Accessories kit for PST 6100.XXX L mounting  | 1070 078 273    |
| SSR 81.00 current sensor without fixing device, in the form of a toroid coil; 55 mm internal diameter; with 5-pole sleeve terminal | 1070 048 099    |
| SSR 81.01-08 current sensor with fixing device; e.g. for various electrode makes   | on request      |
| Mating connector for SSR 81.0X current sensor  | 1070 913 489    |
| Sensor cable LiYCY 2x2x0,75 mm <sup>2</sup> shielded   | 1070 913 494    |

## 9 PST 6250.XXX L

### 9.1 PST 6250.XXX L overview

- PST 6250.XXX L :
  - Thyristor power unit for welding transformers up to max. 250 kVA
  - Air cooling
  - Integrated control function
  - Rated voltage 400 V -20% to 600 V +10%, 50/60 Hz

### 9.2 Explanation of drawings

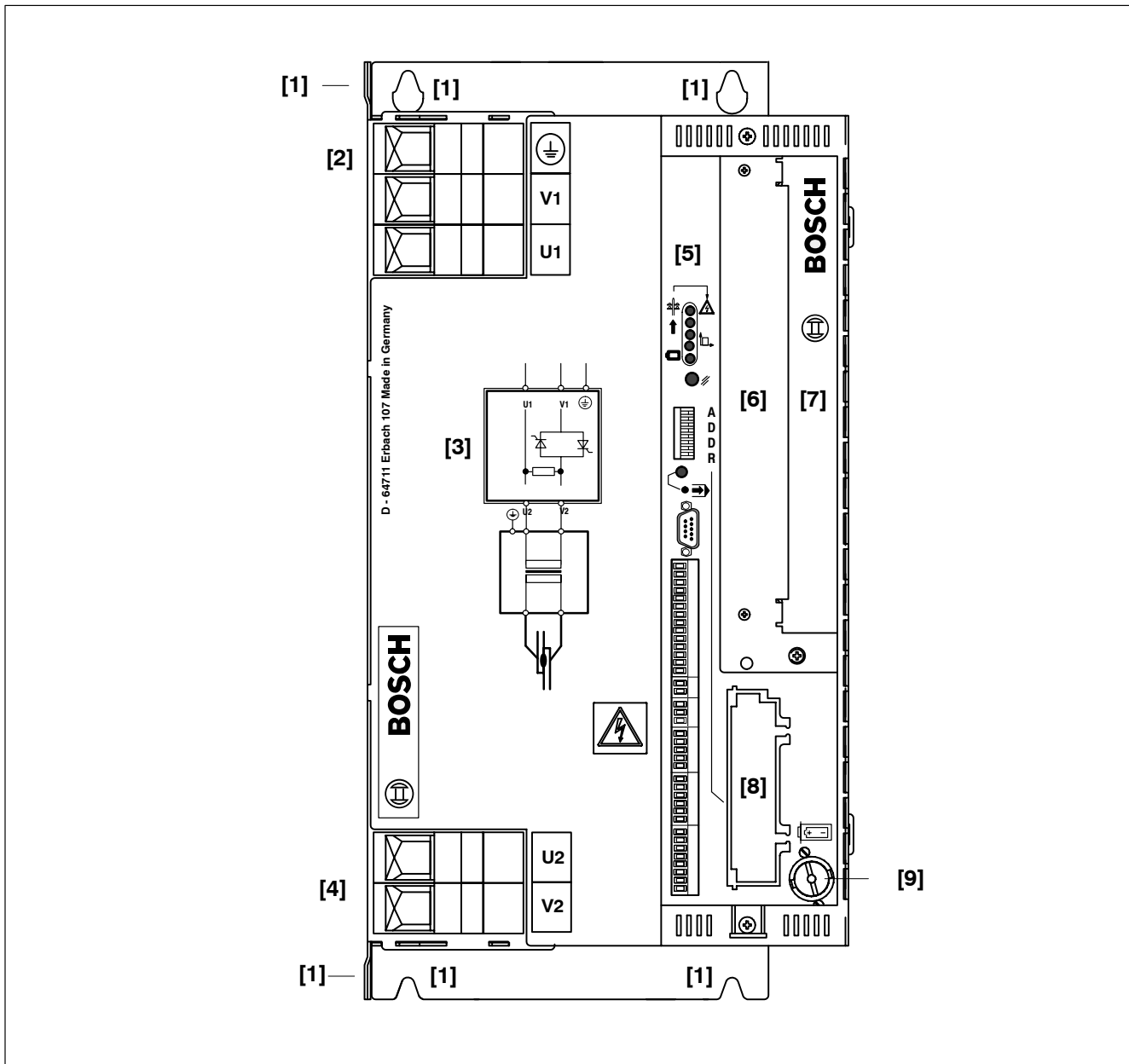
The following drawings show the

- front plate with modules of the thyristor power unit
  - integrated weld timer
  - slot for the parallel, serial or fieldbus I/O interface
  - slot prepared for retrofitting a quality module
  - slot for fieldbus interface for programming (optional)
- technical data
- dimensions and mounting options
- mains connection
  - connection of the welding transformer
- load diagram
- accessories and part numbers



**Note: No heat sinks shown on drawings.**

## 9.3 PST 6250.XXX L front panel



PST 6250.XXX L front panel

- [1] M6 mounting options
- rear panel
  - left side panel (mounting cutout required)
- [2] mains supply connection
- [3] thyristor power unit symbol
- [4] welding transformer connection
- [5] integrated weld timer
- [6] slot for type-specific I/O interface:
- parallel I/O interface
  - serial I/O interface
  - fieldbus I/O interface

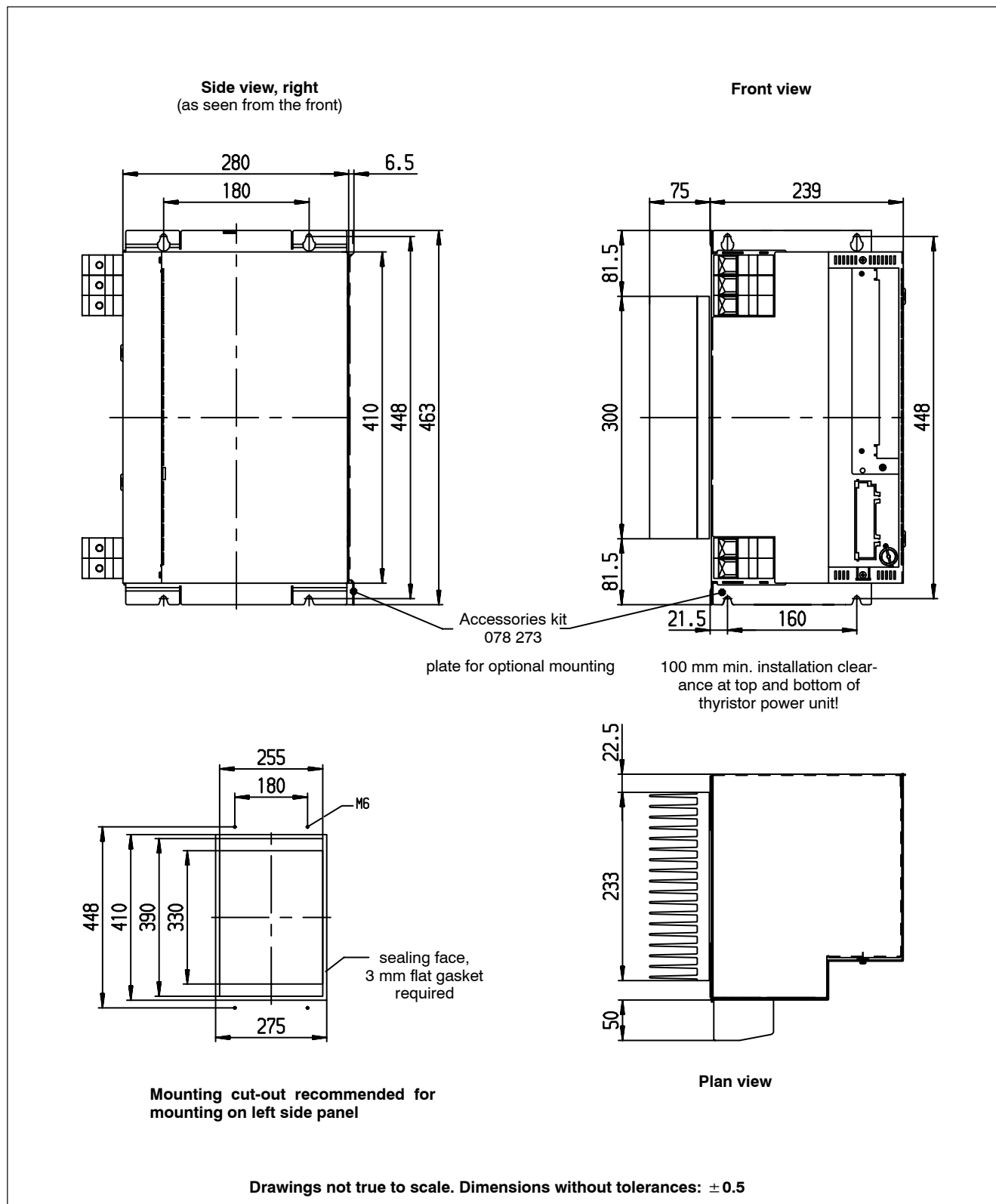


- [7] slot for retrofitting a quality module
- [8] slot for fieldbus interface for programming
- [9] battery compartment

## 9.4 Technical data, PST 6250.XXX L

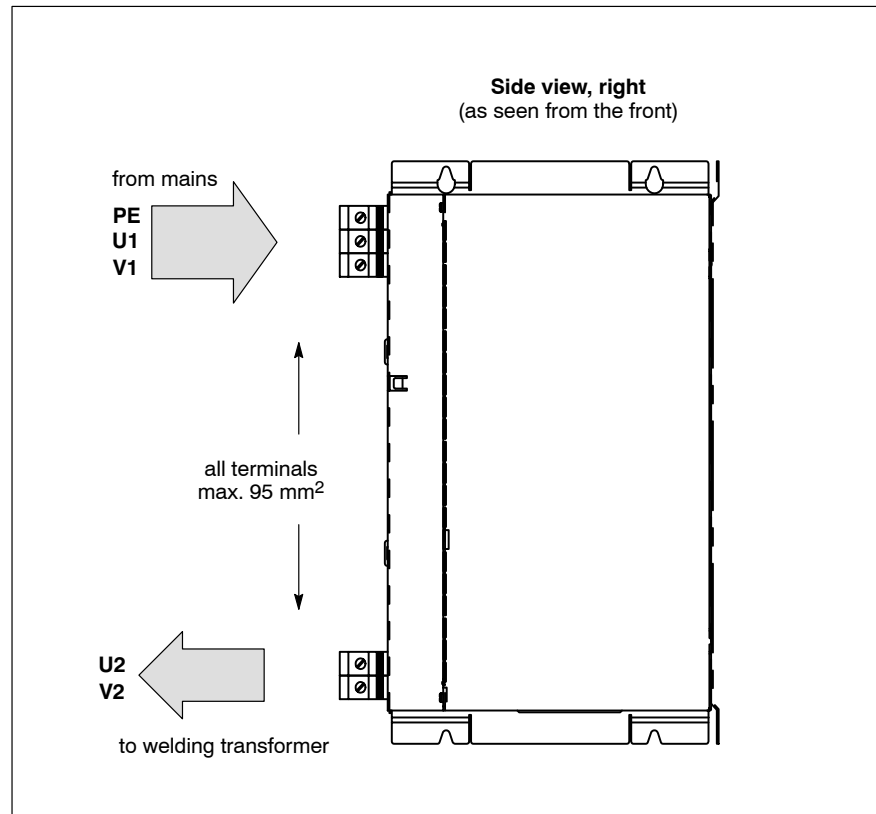
|   |  |
|---|--|
| Type  | 2-phase thyristor power unit, module designed for recessed mounting  |
| Weld timer  | integrated   |
| I/O interface   | Slot for parallel, serial or fieldbus interface  |
| Quality module  | Slot prepared for retrofitting   |
| Degree of protection                                    | IP 20; designed for modular enclosure or for installation in switchgear cabinets with IP 54  |
| Thyristor power unit ambient temperature                | max. 55° C   |
| Cooling   | air, max. 45° C  |
| Temperature monitoring                                  | integrated   |
| Storage temperature                                     | -25° C to +70° C   |
| Corrosion   | The ambient air must be free of acids, caustic solutions, corrosive agents, salts and metal vapors of any major concentration  |
| Humidity  | Humidity class F as per DIN 40040; 20° C at 90% relative humidity; 40° C at 50% relative humidity (as per VDE 0113); Moisture condensation on the thyristor power units must be prevented. |
| Air pressure  | Any within a range of up to 2000 m above sea level   |
| Line voltage connection grounded TN or TT system        | 400 V -20% to 600 V +10%; 50/60 Hz   |
| Nominal system current; max. continuous thermal current | 200 A  |
| Voltage supply; Weld timer CPU; I/O interface           | 24 V DC; min. 19 V DC up to max. 30 V DC as per EN 61131-2, (external power supply), or, alternatively, power supply from the weld current system (internal power supply)                  |
| Duty cycle (ED)   | max. 50% duty cycle permitted (regardless of possible power unit operating currents, limited by the built-in 2.2 k $\Omega$ de-excitation resistor)  |
| Clock frequency   | 50/60 Hz   |
| Overvoltage protection                                  | MOV; Metal Oxide Varistor  |
| Electrical connection, mains supply and transformer     | via box terminal; max. 95 mm <sup>2</sup>  |
| Wire range  | 95 mm <sup>2</sup>   |
| Basic switchgear cabinet loss                           | 70 W   |
| Weight  | approx. 12.5 kg  |
| Mounting position                                       | vertical or with its back on mounting plate  |

**9.5 Dimensioned drawing, PST 6250.XXX L**




Dimensioned drawing, PST 6250.XXX L

## 9.6 Electrical connection, PST 6250.XXX L

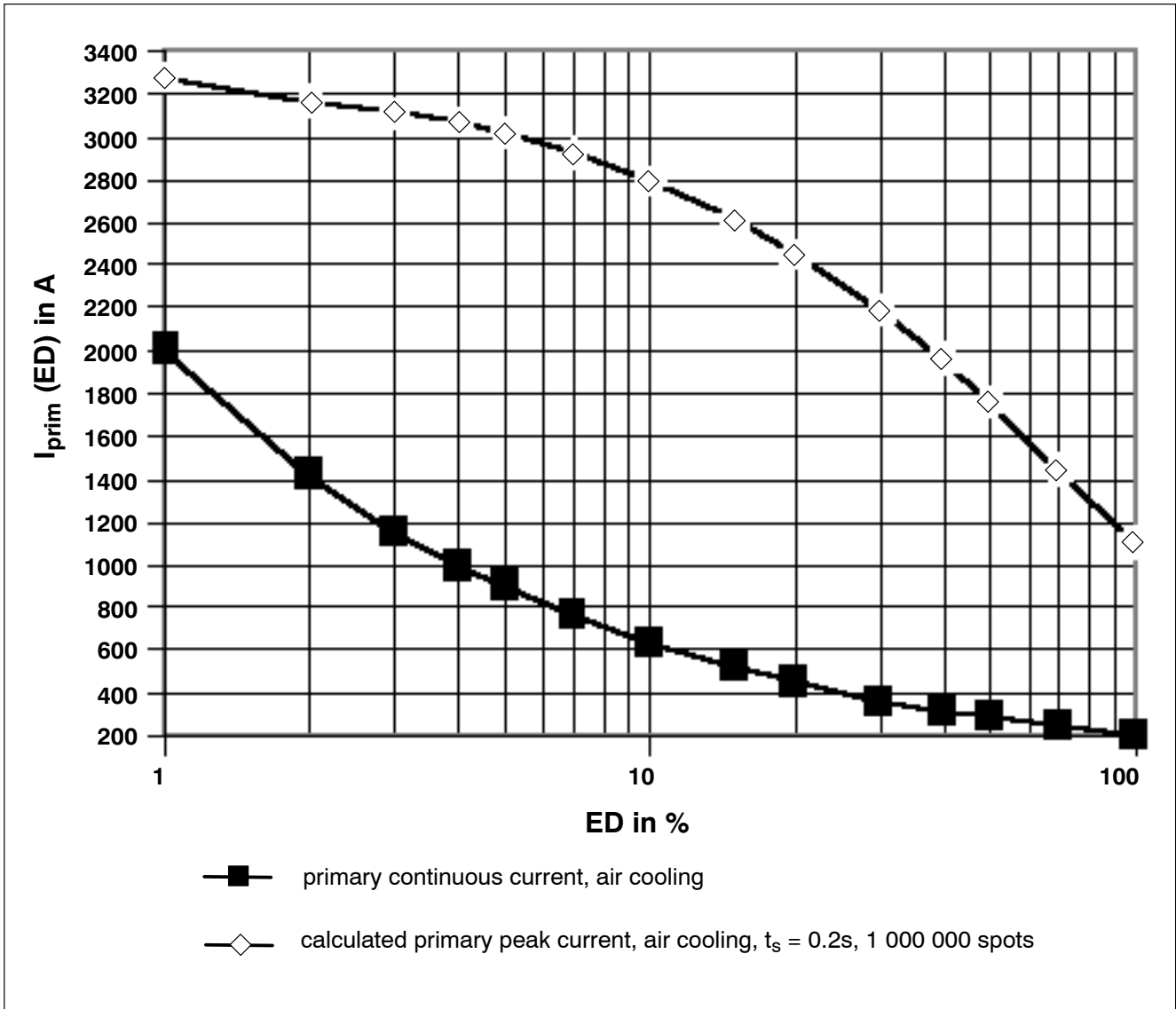


Electrical connection, PST 6250.XXX L

 **Note:** For the connections of the various control functions, please see the respective manuals "PST 6000, Control and I/O Level Description".

9.7 Load diagram, PST 6250.XXX L

 Note: For a general description of load diagrams, see Section 3

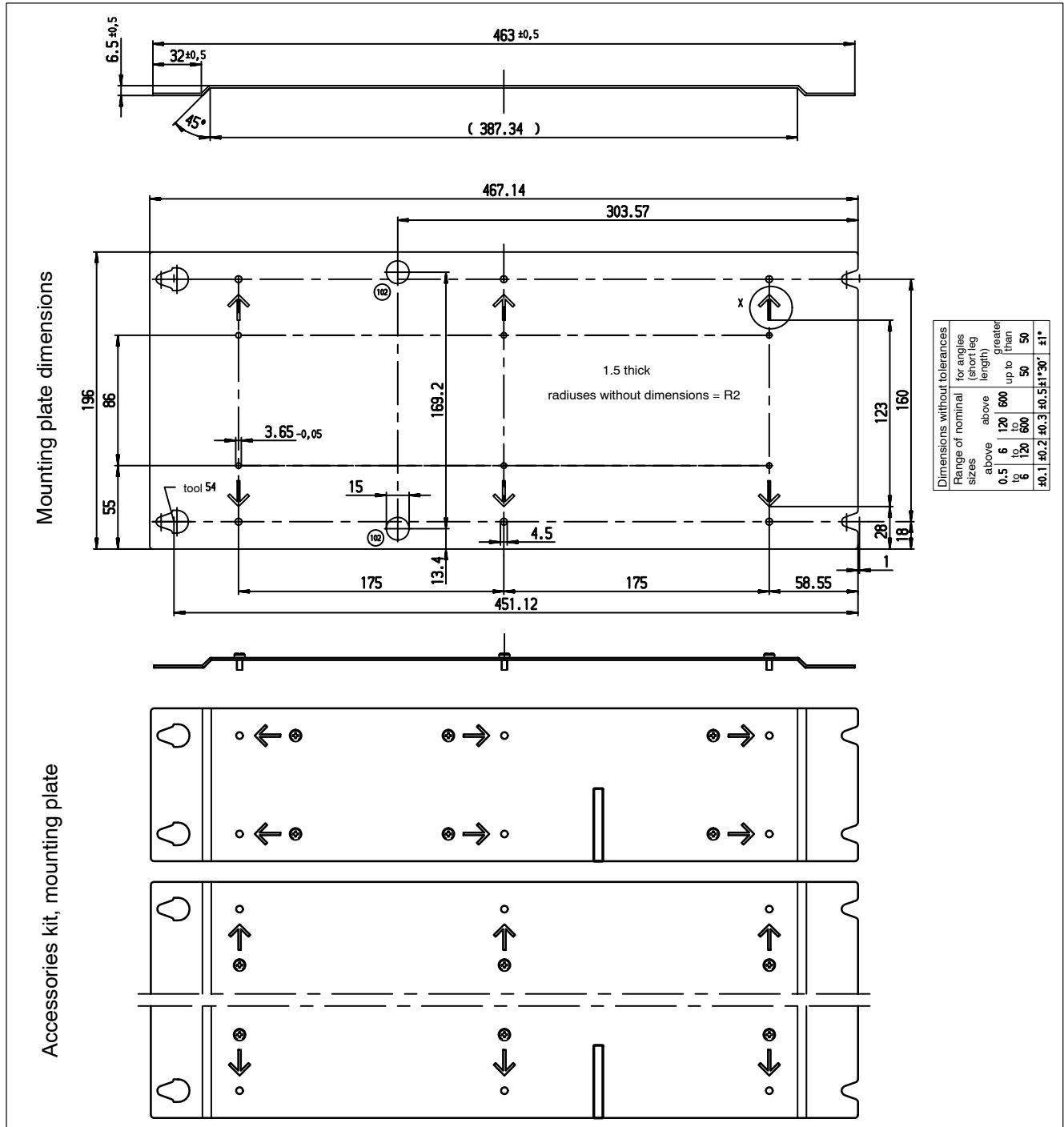


Load diagram, PST 6250.XXX L

## 9.8 Accessories, PST 6250.XXX L

### 9.8.1 Dimensioned drawing, accessories kit

An accessories kit is available for mounting the inverter with its back on the mounting plate.



Dimensioned drawing, accessories kit

- For I/O module, see Technical Information, PST 6000, Control and I/O Level Description.
- For insertable profiles for electric connection, see the section on ordering.

## 9.9 Ordering accessories

**Not** included in shipment:

| <b>Designation</b>   | <b>Part no.</b> |
|--|-----------------|
| Insertable profile for pin connectors on small wire sizes, line connection and welding transformer connection                      | 1070 918 466    |
| Accessories kit for PST 6250.XXX L mounting  | 1070 078 273    |
| SSR 81.00 current sensor without fixing device, in the form of a toroid coil; 55 mm internal diameter; with 5-pole sleeve terminal | 1070 048 099    |
| SSR 81.01-08 current sensor with fixing device; e.g. for various electrode makes   | on request      |
| Mating connector for SSR 81.0X current sensor  | 1070 913 489    |
| Sensor cable LiYCY 2x2x0,75 mm <sup>2</sup> shielded   | 1070 913 494    |



# 10 CE declaration of conformity

EG Konformitätserklärung  
 EC declaration of conformity  
 Déclaration "CE"

Hiermit erklären wir, daß unser Produkt, Typ: PST 6000  
 We hereby declare that our product, type:  
 Nous déclarons par la présente que notre produit, type: Typen gemäß beiliegender Liste

folgenden einschlägigen Bestimmungen entspricht:  Maschinenrichtlinie (89/392/EWG, 91/368/EWG, 93/68/EWG und 93/44/EWG)  
 complies with the following relevant provisions: Machinery Directive (89/392/EEC, 91/368/EEC, 93/68/EEC and 93/44/EEC)  
 correspondent aux dispositions pertinentes suivantes: Directive sur les machines (89/392/CEE, 91/368/CEE, 93/68/CEE et 93/44/CEE)

Niederspannungsrichtlinie (73/23/EWG, 93/68/EWG und 93/44/EWG)  
 Low voltage Directive (73/23/EEC, 93/68/EEC and 93/44/EEC)  
 Directive sur les basses tensions (73/23/CEE, 93/68/CEE et 93/44/CEE)

EMV-Richtlinie (89/336/EWG, 93/68/EWG und 93/44/EWG)  
 EMC Directive (89/336/EEC, 93/68/EEC and 93/44/EEC)  
 Directive EMV (89/336/CEE, 93/68/CEE et 93/44/CEE)


Angewendete harmonisierte Normen, insbesondere:  
 Applied harmonized standards, in particular:  
 Normes harmonisées utilisées, notamment:  
EN 50081-2  
EN 50082-2  
EN 50178  
EN 60204-1

Angewendete nationale Normen und technische Spezifikationen, insbesondere:  
 Applied national technical standards and specifications, in particular:  
 Normes et spécifications techniques nationales qui ont été utilisées, notamment:

Formular 1070074976 - 102W611

29.11.99 [Signature] TED  
 Datum / Unterschrift / Technische Betriebsleitung

25.11.1999 [Signature] AT/EWS  
 Datum / Unterschrift / Entwicklungsleitung

**BOSCH**   
 Robert Bosch GmbH  
 Geschäftsbereich Automationstechnik  
 Betrieb Erbach  
 Postfach 1162  
 D-64701 Erbach/Odw.

Sach-Nr. 1070 80444 -102\_474

Notes:

# A Annex

## A.1 Index

### Symbols

"Ready" LED, 6-1

"Ready" message, 6-1

### A

Accessories kit, 8-10, 9-10

Accessories, PST 6100.XXX L, 8-8

Accessories, PST 6250.XXX L, 9-8

Air pressure, 8-4, 9-4

Ambient temperature, 3-1, 8-4, 9-4

Assembly, 1-6

### B

Basic switchgear cabinet loss, 8-4, 9-4

Battery, 5-1

Battery compartment, 8-3, 9-3

Block diagram of a thyristor power unit, 2-3

### C

Cables, 1-10

CE declaration of conformity, 10-1

Clock frequency, 8-4, 9-4

Commissioning, 4-1

Components, 2-2

Connection

U1, 1-11

U2, 1-11

V1, 1-11

V2, 1-11

Welding transformer, 1-11

Cooling, 8-4, 9-4

Cooling water, 1-8

Chlorides, 1-8

Degree of hardness, 1-8

Insoluble substances, 1-8

Nitrates, 1-8

pH value, 1-8

Sulfates, 1-8

Corrosion, 8-4, 9-4

Current sensor, 8-10, 9-10

### D

Degree of protection, 8-4, 9-4

Dimensioned drawing, accessories kit, 8-8, 9-8

Dimensioned drawing, PST 6100.XXX L, 8-5

Dimensioned drawing, PST 6250.XXX L, 9-5

Duty cycle, 3-1, 8-4, 9-4

### E

ED duty cycle, 3-1

Electrical connection, 1-9, 8-4, 9-4

Electrical connection, PST 6100.XXX L, 8-6

Electrical connection, PST 6250.XXX L, 9-6

EMC, 1-12

EMERGENCY-STOP facilities, 1-15, 5-1

### F

Features, 2-1, 7-1

Field bus module, 2-2

Fieldbus interface for programming, 8-1, 9-1

Function, 2-4

## H

Humidity, 8-4, 9-4

## I

I/O interface, 2-2, 8-1, 8-4, 9-1, 9-4

I/O module, 8-9, 9-9

Insertable profile, 8-10, 9-10

Installation, 1-6

Integrated weld timer, 8-1, 9-1

Intended use, 1-3

## L

Line voltage connection, 8-4, 9-4

Load capability, 3-1

Load diagram, 3-1

Load diagram, PST 6100.XXX L, 8-7

Load diagram, PST 6250.XXX L, 9-7

## M

Mains supply, 8-4, 9-4

Maintenance, 1-15, 5-1

Malfunction, 6-1

Malfunctions, 6-1

Maximum welding current, 1-13, 3-1

Modifications, 1-2

Modifications by the user, 1-14

Modules, 2-2

Monitoring, 2-4

Monitoring functions, 2-4

Mounting, 1-6

Mounting position, 8-4, 9-4

## N

Nominal system current, 8-4, 9-4

Notes on rating, 3-1

## O

Operation, 1-13

Ordering accessories, 8-10, 9-10

Output currents, 3-1

Overall weld cycle duration, 3-1

Overload, 2-4

Overvoltage protection, 8-4, 9-4

## P

Pacemaker, 1-4

PE connection, 1-11

PST 6100.XXX L, 8-1

PST 6100.XXX L front panel, 8-2

PST 6100.XXX L overview, 8-1

PST 6250.XXX L, 9-1

PST 6250.XXX L front panel, 9-2

PST 6250.XXX L overview, 9-1

## Q

Qualified personnel, 1-5

Quality module, 2-2, 8-1, 8-4, 9-1, 9-4

## R

Repair, 1-15, 5-1

Replacement parts, 5-1

Retrofits, 1-14

## S

Safety instructions, 1-1, 1-2

Sensor cable, 8-10, 9-10

Setup, 2-1

Spare parts, 1-15, 5-1

Storage temperature, 8-4, 9-4

Symbols, 1-2

## T

Technical data, PST 6100.XXX L, 8-4

Technical data, PST 6250.XXX L, 9-4

Temperature monitoring, 8-4, 9-4

Test procedures, 1-15, 5-1

Thermal detector, 6-1

Thyristor load, 3-1  
Thyristor unit temperature, 6-1  
Training courses, 1-5  
Type, 8-4, 9-4  
Type overview, 7-1

## V

Voltage supply, 8-4, 9-4

## W

Weight, 8-4, 9-4  
Weld time, 3-1  
Weld timer, 2-2, 8-4, 9-4  
Welding current, maximum, 1-13  
Welding splashes, 1-16  
Wire range, 8-4, 9-4  
Working safely, 1-16



