

# Rexroth PSI 6500.xxx Master-Slave

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Edition 02

## Technical Information



**Title** Rexroth PSI 6500.xxx  
Master-Slave

**Type of Documentation** Technical Information

**Document Typecode** DOK-PS6000-MasterSlave-FK02-EN-P

**Purpose of Documentation** The present manual informs about

- Functionality and
- Special features with regard to the electric connection of the master-slave mode available in the PSI 6500.xxx.

**Record of Revisions**

Description	Release Date	Notes
DOK-PS6000-MasterSlave-FK01-EN-P	06.2003	
DOK-PS6000-MasterSlave-FK02-EN-P	04.2004	

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**Validity** The data specified above only serve to describe the product. No statements concerning a certain condition or suitability for a certain application can be derived from our information. The given information does not release the user from the obligation of own judgement and verification. It must be remembered that our products are subject to a natural process of wear and aging.

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## Table of Contents

**Table of Contents**

	Page
<b>1</b>	<b>Safety Instructions . . . . . 1-1</b>
1.1	Possible Safety Markings on the Product . . . . . 1-1
1.2	Safety Instructions in this Manual . . . . . 1-2
1.3	Intended Use . . . . . 1-3
1.4	Qualified Personnel . . . . . 1-4
1.5	Installation and Assembly . . . . . 1-6
1.6	Electrical Connection . . . . . 1-8
1.7	Operation of the Product . . . . . 1-9
1.8	Retrofits and Modifications by the User . . . . . 1-10
1.9	Maintenance, Repair . . . . . 1-11
1.10	Working Safely . . . . . 1-12
1.11	CE mark . . . . . 1-13
<b>2</b>	<b>Fundamentals on the Master-Slave Mode . . . 2-1</b>
2.1	Function . . . . . 2-2
2.2	How to Use Current Sensors . . . . . 2-4
2.3	Diagnosis . . . . . 2-6
<b>3</b>	<b>Electric Connection . . . . . 3-1</b>
3.1	Power, Transformer and Temperature Contact . . . . . 3-1
3.2	External Secondary Circuit Current Sensor (X3) . . . . . 3-2
3.2.1	Reducing the Measurement Signal . . . . . 3-3
3.3	Master-Slave Connection (X6, X7) . . . . . 3-4
<b>4</b>	<b>CE Marking . . . . . 4-1</b>
<b>A</b>	<b>Appendix . . . . . A-1</b>
A.1	Abbreviations . . . . . A-1
A.2	Index . . . . . A-2

Table of Contents

Notes:

## Safety Instructions

# 1 Safety Instructions

The products described were developed, manufactured and tested in compliance with the fundamental safety requirements of the EU machinery 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 or programming the welding system. Store this manual in a place to which all users have access at any time!

The content of this manual refers to

- the functionality and
- the specific electric connection

of a master-slave combination with PSI 6500.xxx.

**You need the present manual as a supplement to the basic documentation of the product, if you intend the master-slave mode in your application.**

- ★ Therefore, please pay attention to the following documentation as well:
  - Control and I/O Level, Technical Information for PSx 6xxx.100, PSx 6xxx.190 or PSx 6xxx.000  
Control and I/O Level, Technical Information
  - Medium-Frequency Inverter, Technical Information (1070 080 028) for PSI 6500.xxx

## 1.1 Possible Safety Markings on the Product



Warning of dangerous electrical voltage!



Lug for connecting PE conductor only!



Function ground, ground with low parasitic voltage



Connection of shield conductor only

## Safety Instructions

### 1.2 Safety Instructions in this Manual

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#### **DANGEROUS ELECTRICAL VOLTAGE**

This symbol is used to warn of **dangerous electrical voltage**. The 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**.


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#### **CAUTION**

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

---

 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.

## Safety Instructions

## 1.3 Intended Use

The product described

- serves in connection with a welding transformer and the appropriate power supply unit for
  - resistance welding of metalsand
- is suitable for operation in industrial environments in accordance with the following standards:
  - EN 50178
  - EN 50081-2
  - EN 50082-2
  - EN 60204-1

In residential environments, in trade and commerce as well as small enterprises class A equipment may only be used if it does not inadmissibly interfere with other equipment.

It is 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!**

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- ☞ **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, assembly and installation as well as careful operation.

## Safety Instructions

### 1.4 Qualified Personnel

The requirements as to qualified personnel are based on the requirement profiles 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 software and hardware components of the weld timer, the power supply used, and the welding transformer.

Project engineering, programming, start and operation as well as the modification of program parameters is reserved to properly trained personnel! This personnel must be able to judge potential hazards arising from programming, program changes and in general from the mechanical, electrical, or electronic equipment.

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



## Safety Instructions

**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.**



No entry for persons with cardiac  
pacemakers!  
Danger!

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

Safety Instructions

## 1.5 Installation and Assembly

---



**DANGEROUS ELECTRICAL VOLTAGE**

**Danger of life during installation work while systems are switched on!**

**Make sure that all plant sections undergoing operations during the installation are de-energized and sufficiently protected against accidental reclosing!**

---



**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**

**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**

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

**The place for installing the modules, and their method of fastening, must be suitable for their weight!**

---



**DANGER**

**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.**

---



**DANGER**

**The safety and accident prevention regulations as amended shall be observed!**

**Wear a protective helmet, safety shoes and gloves!**

---

## Safety Instructions

**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 modules 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! Modules 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 inverter failure.

**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 insufficient water quality in the possibly required 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 =  
12.5 British degrees =  
10.5 US degrees =  
18 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.

- ★ For information about dimensions and installation accessories of the product as a whole as well as information about the cooling system, please refer to the manuals of the power supply units (see page 1-1).

Safety Instructions

## 1.6 Electrical Connection



### **DANGEROUS ELECTRICAL VOLTAGE**

The line voltage causes considerable risks!

Improper handling may result in death, personal injury or material damage.

For that reason, the electric connection may only be established by an electrician.

The applicable safety regulations as well as the nominal and limit values of all parts of the plant or system must be taken into consideration.



### **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**

Error messages that fail to be evaluated or are evaluated improperly may cause personal injury and material damage!

For instance, switching of a transformer temperature contact (thermal switch, normally closed contact) must result in blocking of the connected control.



### **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 decoupled in long cables.

Therefore, power 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 product should be mounted close to the welding systems so as to avoid cable lengths of more than 25 m.

- ★ In addition, please comply with all safety regulations regarding electrical connections and the EMC of the system as a whole in the manuals of the power supply units (see page 1-1).

## Safety Instructions

## 1.7 Operation of the Product

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**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.

This applies, above all, to the master-slave mode, because it permits parallel connection of several units to increase the welding capacity. 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. Please comply with regulation BGV B11 of the German Berufsgenossenschaft (professional association) "Unfallverhütungsvorschrift elektromagnetische Felder".

---

**DANGER**

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:

---



No entry for persons with cardiac  
pacemakers!  
Danger!

---

**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!

---

## Safety Instructions

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### **DANGER**

**Danger of bruises through electrode movement!**

All users, line designers, welding machine manufacturers and welding gun producers are obliged to connect output signals which initiate the electrode movement so that the applicable safety regulations are complied with.

For example, by means of "Two-handed start", fences, light barriers etc. the risk of bruises can be considerably reduced.

---



### **CAUTION**

**Overheating through inappropriate or insufficient cooling.**

The temperature inside the housing must stay within the specified range.

**Air-cooled medium-frequency inverters must always be operated under forced-air cooling conditions. Convection cooling will not be sufficient!**

**Water-cooled medium-frequency inverters may only be operated when the cooling water circuit is active! Condensation on water-carrying components must be prevented.**

---

## 1.8 Retrofits and Modifications by the User

---



### **DANGER**

**Modifications to the product may have negative effects on the safety of the unit!**

The possible consequences include death, severe or light injury (personal injury), damage to property or environmental hazards. Therefore, please contact us prior to making any modifications. This is the only way to determine whether changes can be made without any problems.

---

## Safety Instructions

## 1.9 Maintenance, Repair

**DANGEROUS ELECTRICAL VOLTAGE**

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

**DANGER**

Lithium batteries can cause skin burns or explode in case of improper handling! Therefore, do not forcefully open batteries, do not attempt to charge or heat up batteries over 100°C!

**CAUTION**

Please use only spare parts approved by us! Use only original replacement batteries! In any case, spent batteries and accumulators should be disposed of as hazardous waste!

**CAUTION**

**Danger to the module!**

All ESD protection measures must be observed when using the module! Prevent electrostatic discharges!

The following protective measures must be observed for modules and components sensitive to electrostatic discharge (ESD)!

- Personnel responsible for storage, transport, and handling must have training in ESD protection.
- ESD-sensitive components must be stored and transported in the prescribed protective packaging.
- ESD-sensitive components may only be handled at special ESD-workplaces.
- Personnel, working surfaces, as well as all equipment and tools which may come into contact with ESD-sensitive components must have the same potential (e.g. by grounding).
- Wear an approved grounding bracelet. The grounding bracelet must be connected with the working surface through a cable with an integrated 1 MΩ resistor.
- ESD-sensitive components may by no means come into contact with chargeable objects, including most plastic materials.

Safety Instructions

## 1.10 Working Safely

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**DANGER**

If the start signal is present in the event of an error reset (acknowledgement), the control immediately starts the program run! Hazardous machine movements may be the result!

Therefore, before fault reset, you should make sure that there are no persons in the danger zone of the welding equipment!

---



**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

---



**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.

---



## Safety Instructions

**1.11 CE mark****CAUTION**

The CE mark for thyristor unit - welding transformer combinations (see section 4) refers to industrial applications.

For other combinations/applications, the certificate must be derived from the above, or a new certificate must be issued, if necessary, by the line designer / user.

The product described corresponds to an application variant which cannot comply with the regulations for terminals, machines or plants. For that reason, the product may only be used as described.

The electrical and mechanical safety and the environmental effects (foreign bodies, moisture) must be evaluated on the installed final product.

When installed, the product may have different EMC properties. For that reason, it is appropriate that the manufacturer of the final product tests the EMC properties of the final product (terminals, machines, plants).

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Safety Instructions

Notes:

Fundamentals on the Master-Slave Mode

## 2 Fundamentals on the Master-Slave Mode


The types PSI 6500.xxx of the PS 6000 series are provided with the “master-slave mode” functionality.

### Features of the master-slave mode:

- Synchronization of up to 3 PSI 6500.xxx of the same type, for increasing the welding capacity. In this process, welding currents of max. 360 kA can be achieved with transformers with a transmission of  $n = 50$ .
- Automatic control of all slaves by the master.
- An “error reset” at the master (via the user interface or by means of the Reset button on the front panel) also causes an automatic “error reset” at the slaves.
- Hence, assemblies for I/O and programming connection are only required for the master, if necessary for the application.
- Easy parameterization. Only one unit in the network is parameterized via the user interface (as master with 1 or 2 slaves).  
Units that are coupled to the master via the master-slave connection cable are automatically parameterized as slaves and accept all relevant parameters from the master (e.g. transformer parameters, etc.).
- Identical basic hardware for master and slave.

**Examples:** attainable welding peak currents

Ap- plica- tion	Type: PSI 6500.xxx	Max. inverter output current per unit	PSG number per unit (transformer transmission)	Max. secondary peak current per unit	Max. possible welding peak current with	
					1 slave	2 slaves
Weld	.190	1 kA	1x12-V trans- former ( $n = 38$ )	38 kA (permanent current: max. 25 kA)	approx. 76 kA	approx. 114 kA
Weld	.190	1 kA	1x9-V transformer ( $n = 50$ )	50 kA (permanent current: max. 33 kA)	approx. 100 kA	approx. 150 kA
Projec- tion or spot	.000 .100	2.4 kA	3 x PSG 3200 ( $n = 38$ )	91 kA (with a secondary resistance of 85 $\mu$ ohms)	approx. 180 kA	approx. 270 kA
Projec- tion or spot	.000 .100	2.4 kA	4 x PSG 3100 ( $n = 50$ )	120 kA (with a secondary resistance of 28 $\mu$ ohms)	approx. 240 kA	approx. 360 kA

 **For dimensions, line connection, cooling or welding capacities of the individual units, please refer to the manual of the power section used (see page 1-1).**

## Fundamentals on the Master-Slave Mode

---



### **CAUTION**

**There may be malfunctions and damage!  
Improper installation, incorrect connection or maloperation may  
cause unexpected or wrong unit reactions and may, thus, result in  
hazardous situations at the welding system.  
For that reason, all instruction in the various manuals must be ob-  
served!**

---

## 2.1 Function

The entire master-slave combination is exclusively controlled via the master.

As is the case with an application without “master-slave mode”, it is only the master that communicates with the higher-order PLC or the robot via its I/O assembly (e.g. I/O DISK1) and that is coupled to a higher-order control/programming unit via a programming bus interface (e.g. PROFI-BUS), if necessary.

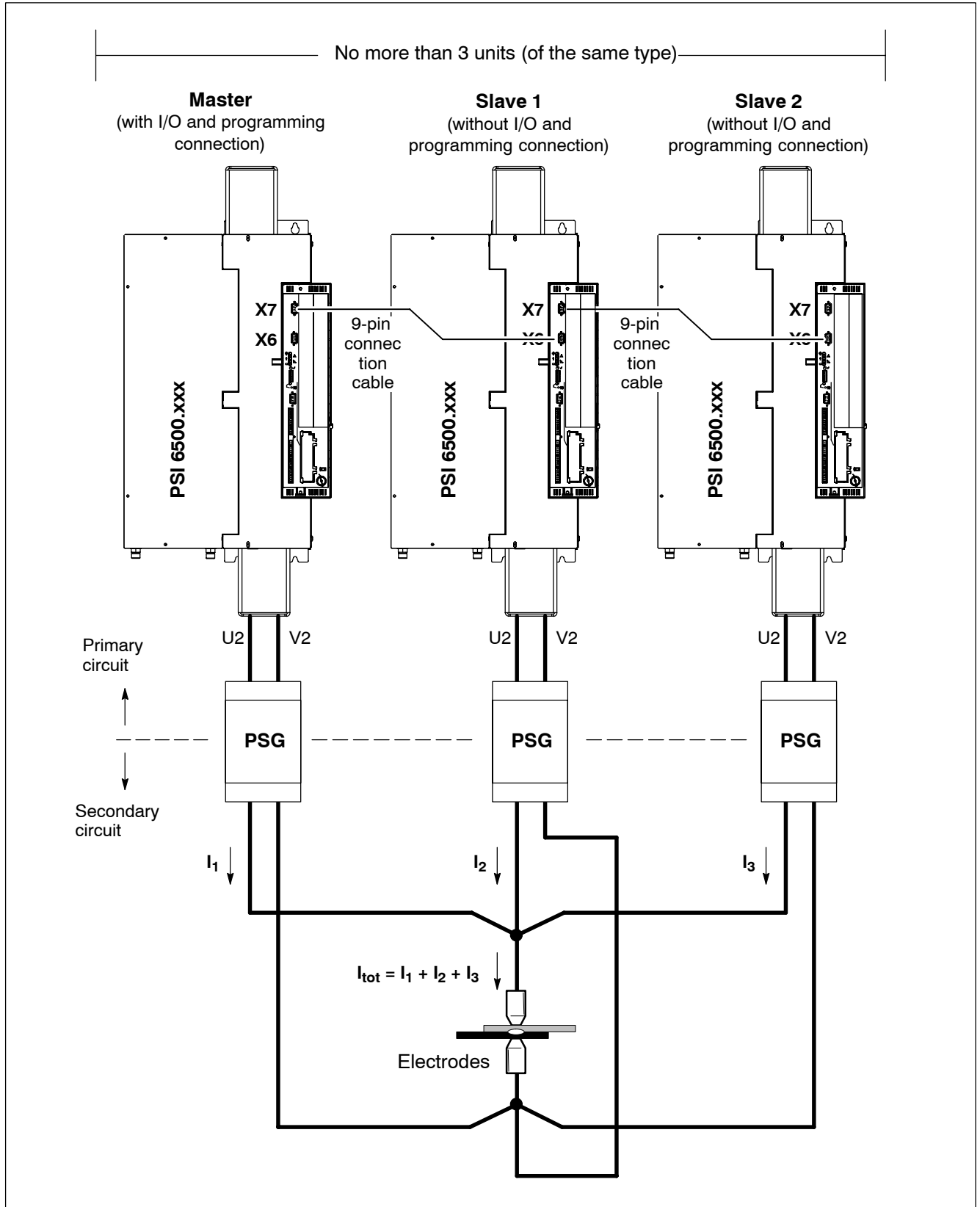
The slaves are connected sequentially to the master via 9-pin connection lines.

These are used by the master to activate the power sections of the slaves synchronously with its own power section and to reset error states, if occurring in the individual slaves, after they have been eliminated. The slaves use the connection lines, for instance, to signal “ready” and the particular actual value of the primary current to the master.

Each individual unit activates a single welding transformer or (via the primary-side parallel circuit) several welding transformers (with identical electric data!).

The secondary-side parallel circuit of all transformers provides the possibility of increasing the welding capacity accordingly.

Fundamentals on the Master-Slave Mode



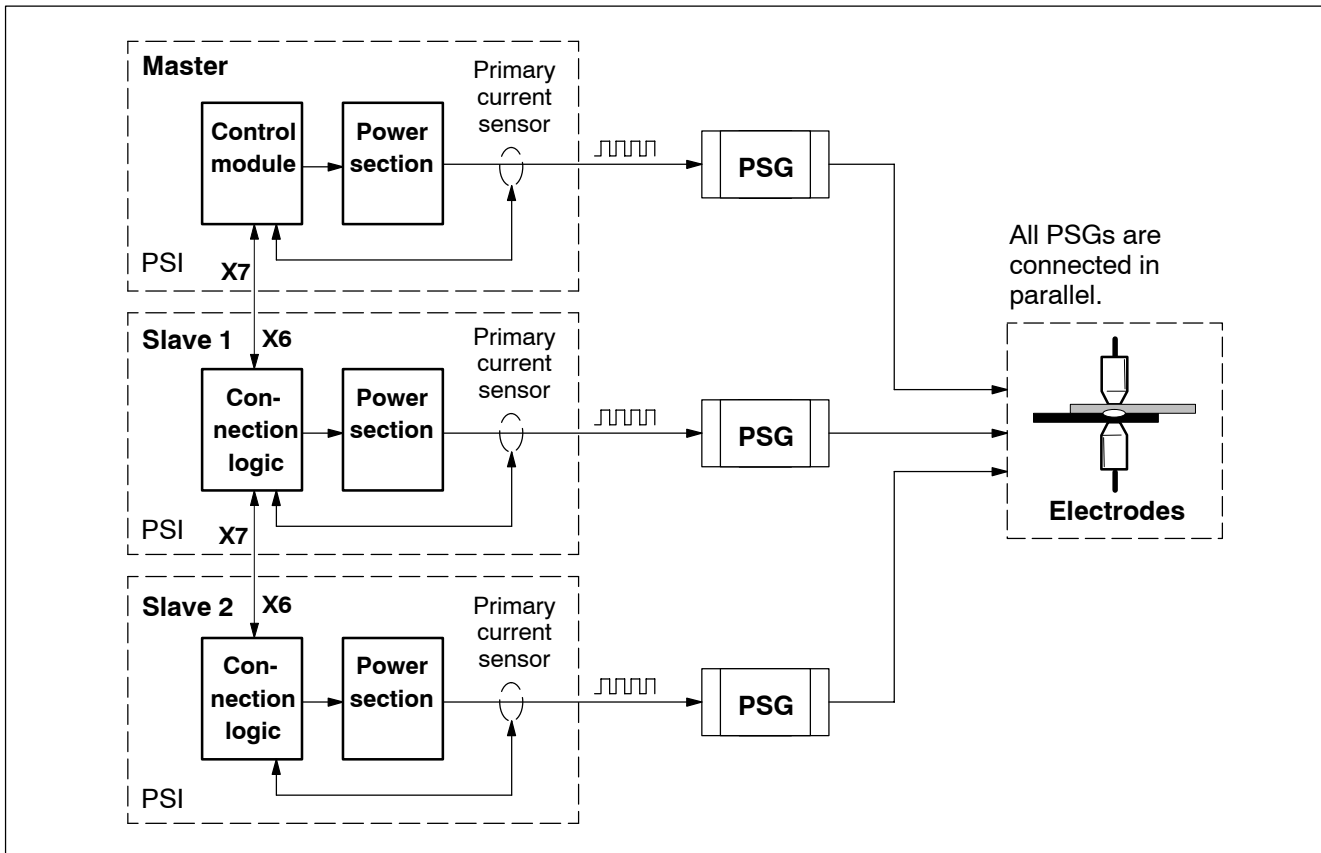
"Master-Slave mode" principle

## Fundamentals on the Master-Slave Mode

## 2.2 How to Use Current Sensors

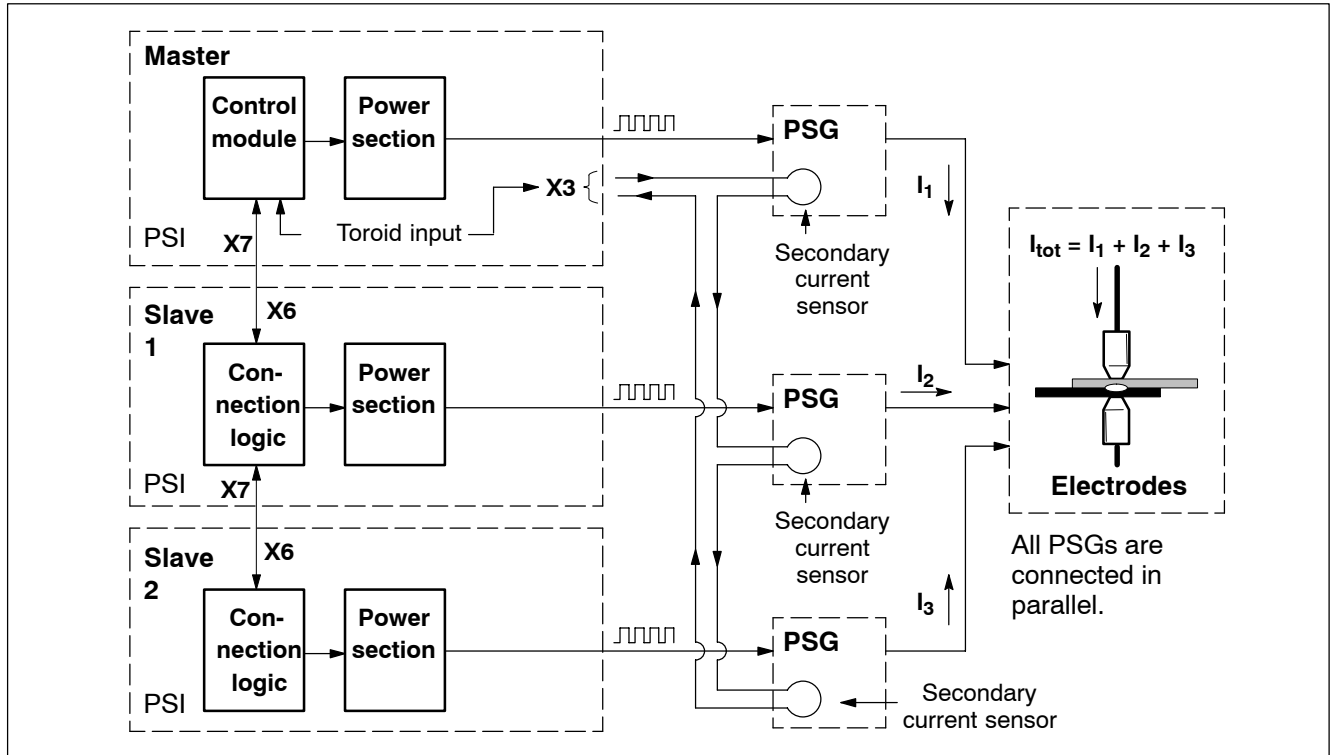
Some special items must be observed in the master-slave mode when actual currents are measured.

- Actual currents may only and exclusively be controlled or monitored by the master!** For that reason,
  - the slaves must transfer the measurement values of their primary circuit current sensor to the master; the slaves transfer this information via the connection cable at X6;
  - secondary circuit current sensors must always be connected to the toroid-input of the master (X3, terminals 1 and 2; see page 3-2).
- The position and number of the current sensors in the secondary circuit are dependent on each other!** Observe the following:
  - If only one current sensor is used in the secondary circuit, its measurement value must be proportional to the welding current.
  - If several current sensors are used in the secondary circuit, the total of their measurement values must be proportional with the welding current. Here, the following applies:
    - all sensors must have the same sensitivity,
    - all sensors must be connected in series, and
    - the output voltages of the sensors must always have the same sign.

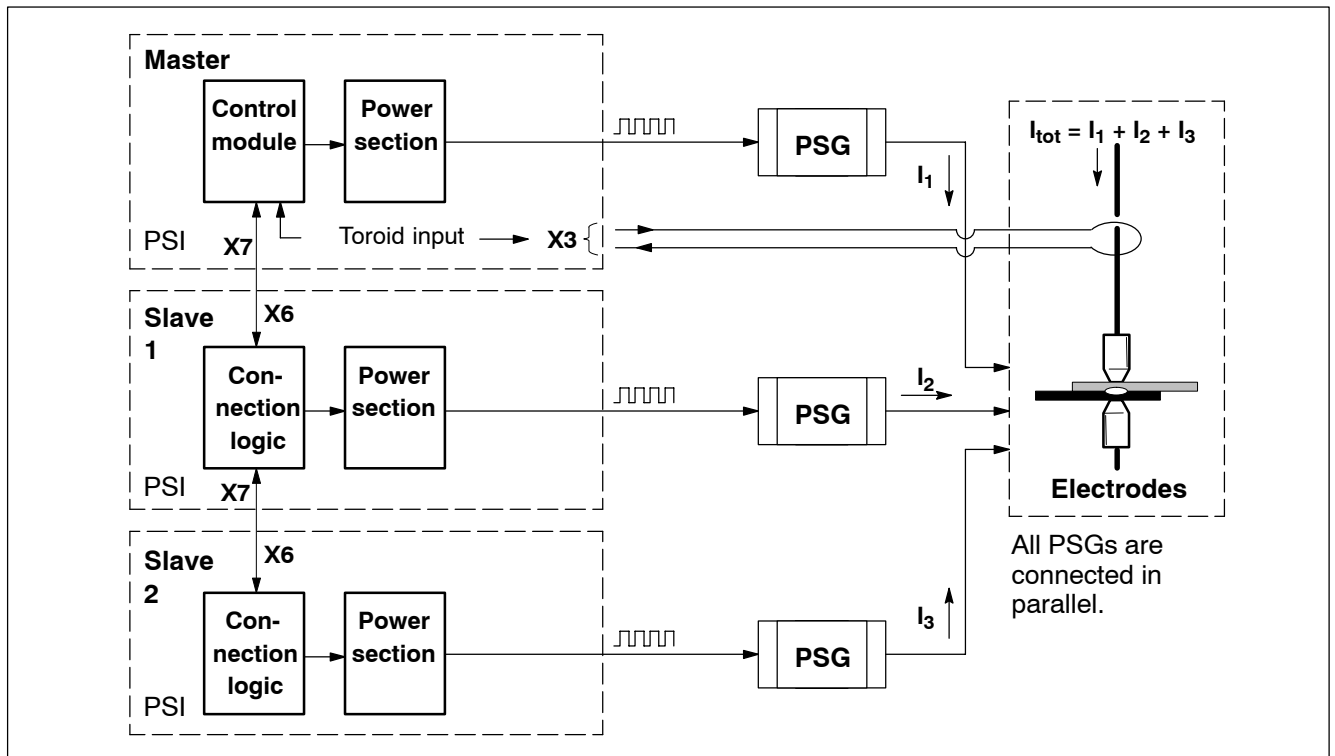


Master-slave mode when the primary current sensors integrated in the PSI are used

Fundamentals on the Master-Slave Mode



Master-slave mode when the secondary current sensors integrated in the PSG are used



Master-slave mode when a single external secondary current sensor is used

Fundamentals on the Master-Slave Mode

☞ **For fundamental explanations on the PHA and CCR regulation modes, please refer to the “Control and I/O Level, Technical Information” documentation of the particular unit types (PSx 6xxx.100, PSx 6xxx.190 and PSx 6xxx.000).**

## 2.3 Diagnosis

Using the master-slave connection (X6, X7), a slave informs its master only globally about an error state, not about the precise error cause. In this case, the master disables its “ready” state (as the slave beforehand). In order to eliminate slave errors that cannot be reset by a simple “error reset” at the master (see note below), the precise error cause must be known and, if necessary, the error must be manually acknowledged directly at the slave (in case of non-self-acknowledging errors; see note below).

For that reason,

- you can connect (X1) a laptop with installed user interface (“BOS” or “LT IB” with the type PSI 6500.000), for instance, to the slave, read the slave error via the user interface, eliminate and, if necessary, acknowledge the error, or
- you can connect all slaves to a higher-order welding processor (PC with BOS user interface) via a programming bus interface, in addition to the master. This centrally provides the possibility of displaying and resetting the error for all units that are connected.

☞ **”An “error reset” at the master can be achieved**

- via the user interface or
- via the Reset button on the front panel.

☞ **“Self-acknowledging” means that errors are automatically cleared by the control after the error cause has been eliminated. In this case, a manual “error reset” is not required.**

**Examples: - E/Stop circuit open / no 24V =  
- Power voltage off / too low**

At the moment, the following messages or errors are defined for a slave:

Ok	Hardware fault
Driver fault	Battery low
Cooling temperature too high	Restore active
Power voltage off / too low	Memory deleted
No 24V= supply	Slave fault
Overcurrent or earth fault	
E/Stop open / no 24V=	
24V off / too low	



## 3 Electric Connection

 For detailed information on the electric connection of a single unit, please refer to the

- “Control and I/O Level, Technical Information” documentation of the particular unit types (PSx 6xxx.100, PSx 6xxx.190 and PSx 6xxx.000) and
- in the manual of the power section used (see page 1-1).

The present manual provides supplements to this information that is essential for using the master-slave mode.

### 3.1 Power, Transformer and Temperature Contact

It is not necessary to turn on the master and the connected slaves simultaneously (logic supply at X4).

It should, however, be noted that the master signals “Ready” to the higher-order control logic only if all connected slaves signal “Ready” to the master (logic/power supply present, connections to the master established, etc.).

- ★ Ensure that all connection lines are appropriately dimensioned!
- ★ Ensure that the stop circuit is interrupted even in case of a slave failure!
- ★ Only welding transformers with identical electric data may be connected in parallel.
- ★ Only use connection lines of the same length for all parallel transformers in the primary circuit.
- ★ Only use connection lines of the same length for all parallel transformers in the secondary circuit. If possible, connect the individual current branches in parallel shortly before the electrodes.
- ★ Connect the temperature contacts of all transformers used in series and connect the complete circuit always to the master (X3, terminals 4 and 5).

The temperature input of a unit that is configured as a slave is deactivated automatically!!

## Electric Connection

### 3.2 External Secondary Circuit Current Sensor (X3)

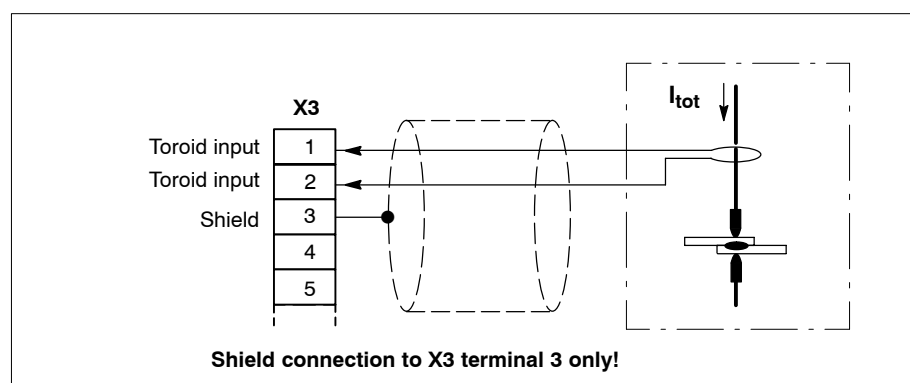
Connection:	Master-side to X3. Female connector, 3.5 mm grid, 8 poles, max. 1.5 mm <sup>2</sup> . The mating male connector is included in the scope of delivery.
Line length:	max. 100 m (with the line type recommended)
Line type:	shielded, core cross-section min. 0.75 mm <sup>2</sup> , (e.g.: 2 x 2 x 0.75 mm <sup>2</sup> LiYCY, order no.: 1070 913 494)

This input is required

- if the constant current regulation (CCR) is used and the “secondary” current measurement is parameterized and/or
  - if the monitoring stop is deactivated and the “secondary” current measurement is parameterized.
- ★ The external secondary circuit current sensors may only and exclusively be connected to the master.

☞ **PSI units are additionally provided with an integrated current sensor for the primary circuit of the welding transformer. This provides the possibility of selecting secondary or primary current measurement via the user interface. If current times are greater than 1 sec, the primary current measurement must always be used!**

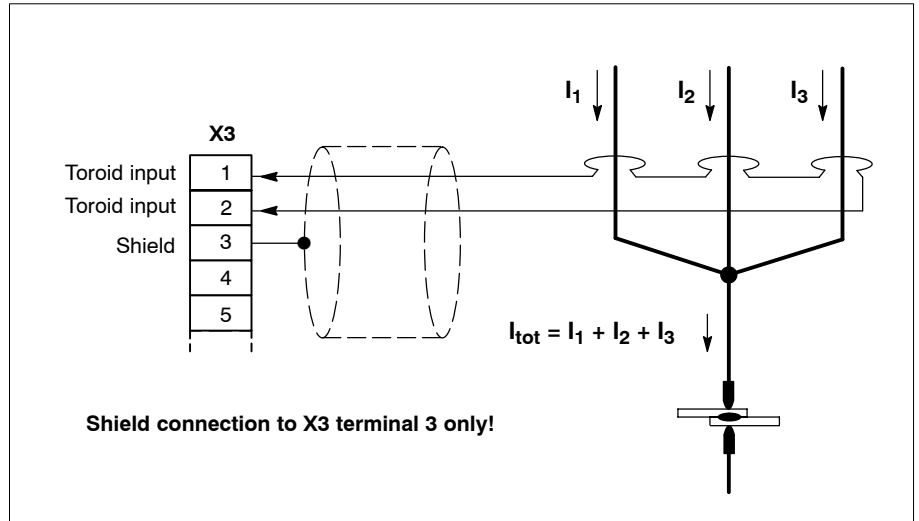
☞ **The type PSI 6500.190 only provides the “primary” current measurement.**



*Connection of a single secondary-side current sensor*

- ★ In case of a failure of the secondary-side current sensor, operation can be maintained by switching over to the primary current measurement. This, however, requires that the current must first be scaled after the switchover!

## Electric Connection



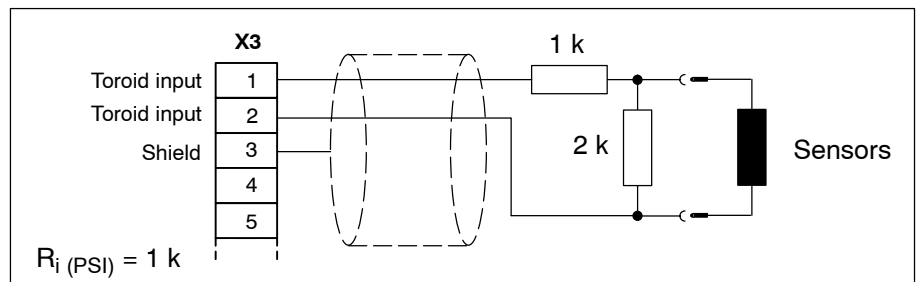
Connection of several secondary-side current sensors

☞ **If secondary-side welding currents are >120 kA, adjustment measures must be taken when connecting the sensors! Observe the instructions in Chapter 3.2.1.**

### 3.2.1 Reducing the Measurement Signal

In the master-slave mode, currents of up to 360 kA can be achieved in the secondary circuit, if two slaves are used. This cannot be covered by the voltage range available at the sensor input of the master (greatest measurement range of the master: up to a maximum of 160 kA).

For that reason, the sensors must be adjusted if currents exceeding 120 kA are required in the secondary circuit.



Adjustment circuit required for secondary circuit currents of >120 kA

Features of the adjustment circuit:

- Divides the signal range by two without changing the terminator of the sensors
- Reduces the sensitivity of the sensors to approx. 70 mV/kA

Electric Connection

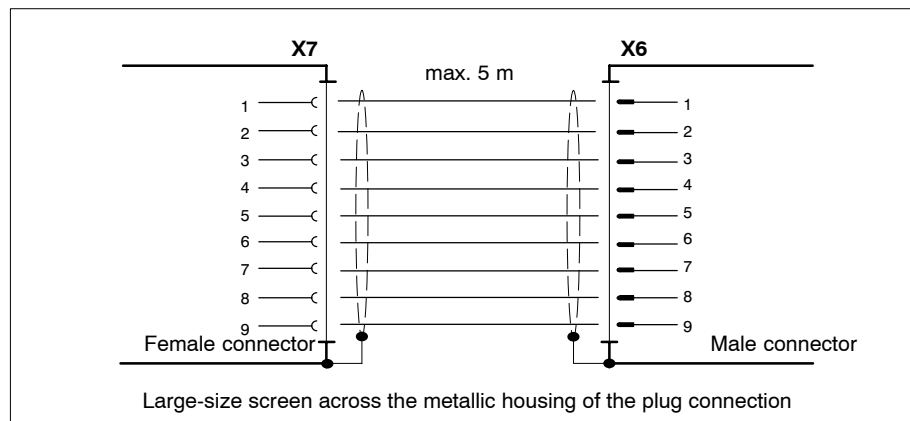
- ★ If you use the adjustment circuit, you must
  - deactivate the “measuring circuit test” function (the external resistance in the measuring circuit is considerably increased if the adjustment circuit is used),
  - rescale (current), because the sensitivity of the sensors is reduced by their being connected in series.

### 3.3 Master-Slave Connection (X6, X7)

Connection: to the slave: X7;  
 D-Sub, 9 pins, by male connector on the cable side.  
 to the Master: X6;  
 D-Sub, 9 pins, by female connector on the cable side.  
 Signals are galvanically isolated.  
 Ordering no. of cable set (5 m): 088112

Line length: between 2 units max. 5 m  
 (with the line type recommended)

Line type: shielded, core cross-section min. 0.34 mm<sup>2</sup>,  
 (e.g.: 10 x 0.34 mm<sup>2</sup> LiYCY)



☞ **Once a unit detects an existing connection to X6, it is automatically parameterized as slave!**

CE Marking

**4 CE Marking**

EG Konformitätserklärung EC declaration of conformity Déclaration "CE"	
Hiermit erklären wir, daß unser Produkt, Typ: We hereby declare that our product, type: Nous déclarons par la présente que notre produit, type:	PSI 6500 Typen siehe Variantenliste
folgenden einschlägigen Bestimmungen entspricht: complies with the following relevant provisions: correspond aux dispositions pertinentes suivantes:	<input checked="" type="checkbox"/> <b>Maschinenrichtlinie</b> (98/37/EG) <b>Machinery Directive</b> (98/37/EEC) <b>Directive sur les machines</b> (98/37/CEE)
	<input checked="" type="checkbox"/> <b>Niederspannungsrichtlinie</b> (73/23/EWG, 93/68/EWG und 93/44/EWG) <b>Low voltage Directive</b> (73/23/EEC, 93/68/EEC and 93/44/EEC) <b>Directive sur les basses tensions</b> (73/23/CEE, 93/68/CEE et 93/44/CEE)
	<input checked="" type="checkbox"/> <b>EMV-Richtlinie</b> (89/336/EWG, 93/68/EWG und 93/44/EWG) <b>EMC Directive</b> (89/336/EEC, 93/68/EEC and 93/44/EEC) <b>Directive EMV</b> (89/336/CEE, 93/68/CEE et 93/44/CEE)
Angewendete harmonisierte Normen, insbesondere: Applied harmonized standards, in particular: Normes harmonisées utilisées, notamment:	
EN60204-1 EN 50178 EN 50081-2 EN 50082-2	
Angewendete nationale Normen und technische Spezifikationen, insbesondere: Applied national technical standards and specifications, in particular: Normes et specifications techniques nationales qui ont été utilisées, notamment:	
9.12.2003 <i>U. Keller</i> Datum / Unterschrift / Entwicklungsleitung	Bosch Rexroth AG Electric Drives and Controls P.O.Box 1162 D-64701 Erbach/ Odw. Germany
11.12.2003 <i>[Signature]</i> Datum / Unterschrift / Technische Betriebsleitung	
	Sach-Nr. 1070 084001 - 101_474      Seite 1 von 2
Anlage QSR-30-A2, Version 3.6.2002, Formblatt EG Konformitätserklärung	

CE Marking

Notes:

## Appendix

**A Appendix****A.1 Abbreviations**

AC	Alternate current.	HOT	Hold-open time. Time between two spots, in which the solenoid valve is not activated. Only relevant in the serial-spot mode.
DC	Direct current.	PE	Protective earth.
AER	Assemblies under electrostatic risk.	PU	Programming unit / welding processor.
EMC	Electromagnetic compatibility.	PHA	Phase angle.
SS	Single-spot mode. For automatic devices and manual systems.	PSG	Transformer-rectifier unit for PSI types.
ESD	Electrostatic discharge. Abbreviation for all terms concerning electrostatic discharges, e.g. ESD protection, ESD risk.	PST	Pause time. Time between the current pulses/blocks (1st, 2nd, 3rd PST).
EST	End slope time. Time required for the POW to drop until completion of the 2nd CT.	RO	Relay output.
ext.	External. For instance, in connection with the +24-V voltage for signal elements (switches) and controlling elements (valves) outside of the control unit.	SD	Scale divisions. Measure for the electric phase angle.
SC	Stepping contact. The signal is emitted after completion of the spot.	Slope	Current slope. Current rises/drops from an initial to a final output.
MST	Main switch trigger.	SS	Serial spot. Mode for manually operated systems.
PC	Pulse count. Number of pulses forming the 2nd CT.	PLC	Programmable logic control.
kA	Kiloamperes.	WC	Weld control. Also called "Schub", "Takter" or resistance weld control.
CCR	Constant current regulation. Maintains the electric current in the welding circuit at a constant level.	SST	Start slope time. Time in which the POW rises from the beginning of the 2nd CT.
CVR	Constant voltage regulation. Compensates variations in line voltage.	Stepper	Power readjustment for electrode wear compensation.
POW	General abbreviation of power. Can refer to SD (scale divisions) or kA.	CT	Current time. There are three different current times: 1st CT (preheating current time); 2nd CT (main welding current time); and 3rd CT (reheating current time). All three current times can be programmed differently with regard to time and power. Pulses and slope can only be programmed in the 2nd CT.
PS	Power section (thyristor or converter).	Temp.	Temperature.
SV	Solenoid valve. Activation of the cylinders, for closing the electrodes.	MC	Monitoring contact. E.g. for monitoring the pressure cylinder (which closes the electrodes) or for monitoring the electrode position (e.g. "Pressure contact").
SLLC	System load limiting control. Monitors and affects the load in the system.	DAT	Derivative-action time. Time elapsing before the welding current time. The electrodes compress the weld metal.
HT	Holding time. Time after the last current time, for the weld metal to cool down.	PHT	Preheating time. Also called 1st CT.
RHT	Reheating time. Also called 3rd CT.	Ign.	Ignition. Enabling and disabling of the ignition pulses for activation of the power section.

Appendix

## A.2 Index

### Symbols

“Master-slave mode” principle, 2-3

### A

AER, A-1

Assembly, 1-6

### C

Cables, 1-8

CE mark, 1-13

CE marking, 4-1

Connection, 3-1

Connection lines, 3-1

Constant current regulation, 3-2

Cooling, 2-1

Cooling water, 1-7

Chlorides, 1-7

Degree of hardness, 1-7

Insoluble substances, 1-7

Nitrates, 1-7

pH value, 1-7

Sulfates, 1-7

### D

Dimensions, 2-1

### E

Electrical connection, 1-8

EMERGENCY-STOP facilities, 1-8

Error reset, 2-6

ESD, A-1

Electrostatic discharge, 1-11

grounding, 1-11

workplace, 1-11

ESD-sensitive components, 1-11

### G

Grounding bracelet, 1-11

### I

Installation, 1-6

Intended use, 1-3

### L

Line connection, 2-1

### M

Maintenance, 1-11

Master-slave connection, 3-4

Master-slave mode, 2-1

Modifications, 1-2

Modifications by the user, 1-10

Modules sensitive to electrostatic discharge. See  
ESD-sensitive components

### P

PE, A-1

Primary circuit, 3-2

### Q

Qualified personnel, 1-4

### R

Repair, 1-11

Retrofits, 1-10

### S

Safety instructions, 1-2

Secondary circuit current sensor, 3-2

Sensor adjustment, 3-3

Spare parts, 1-11

Stop circuit, 3-1

### T

Temperature input, 3-1

Test procedures, 1-11

Toroid input, 2-4

### W

Welding capacities, 2-1

Welding splashes, 1-12

Working safely, 1-12

### X

X3, 3-2

X6, 3-4

X7, 3-4



Appendix

Notes:

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