ROHDE&SCHWARZ

USER MANUAL

Test System Versatile Platform PowerTSVP

TS-PWA3

User Manual

for ROHDE & SCHWARZ Test System Versatile Platform PowerTSVP

5th Issue / 11.05 / D 1157.8143.12

ROHDE & SCHWARZ GmbH & Co. KG
Corporate Headquarters
Mühldorfstr. 15
D-81671 München

Telephone: ...49 (0)89/4129-13774
Fax: ...49 (0)89/4129-13777

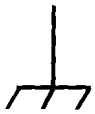
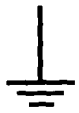
Printed in the Federal Republic of Germany. Errors excepted, subject to technical change without notice.

Safety Instructions

This unit has been designed and tested in accordance with the EC Certificate of Conformity and has left the manufacturer's plant in a condition fully complying with safety standards.

To maintain this condition and to ensure safe operation, the user must observe all instructions and warnings given in this operating manual.

Safety-related symbols used on equipment and documentation from R&S:

							
Observe operating instructions	Weight indication for units >18 kg	PE terminal	Ground terminal	Danger! Shock hazard	Warning! Hot surfaces	Ground	Attention! Electrostatic sensitive devices require special care

1. The unit may be used only in the operating conditions and positions specified by the manufacturer. Unless otherwise agreed, the following applies to R&S products:

   IP degree of protection 2X, Pollution severity 2, overvoltage category 2, altitude max. 2000 m.

   The unit may be operated only from AC supply mains fused with max. 16 A.

2. For measurements in circuits with voltages Vrms > 30 V, suitable measures should be taken to avoid any hazards.

   (using, for example, appropriate measuring equipment, fusing, current limiting, electrical separation, insulation).

3. If the unit is to be permanently wired, the PE terminal of the unit must first be connected to the PE conductor on site before any other connections are made. Installation and cabling of the unit to be performed only by qualified technical personnel.

4. For permanently installed units without built-in fuses, circuit breakers or similar protective devices, the supply circuit must be fused such as to provide suitable protection for the users and equipment.

5. Prior to switching on the unit, it must be ensured that the nominal voltage set on the unit matches the nominal voltage of the AC supply network.

   If a different voltage is to be set, the power fuse of the unit may have to be changed accordingly.

6. Units of protection class I with disconnectible AC supply cable and appliance connector may be operated only from a power socket with grounding contact and with the PE conductor con- nected.

7. It is not permissible to interrupt the PE conductor intentionally, neither in the incoming cable nor on the unit itself as this may cause the unit to become electrically hazardous.

   Any extension lines or multiple socket outlets used must be checked for compliance with relevant safety standards at regular intervals.

8. If the unit has no power switch for disconnection from the AC supply, the plug of the connecting cable is regarded as the disconnecting device. In such cases it must be ensured that the power plug is easily reachable and accessible at all times (length of connecting cable approx. 2 m). Functional or electronic switches are not suitable for providing disconnection from the AC supply.

   If units without power switches are integrated in racks or systems, a disconnecting device must be provided at system level.

9. Applicable local or national safety regulations and rules for the prevention of accidents must be observed in all work performed.

   Prior to performing any work on the unit or opening the unit, the latter must be disconnected from the supply network.

   Any adjustments, replacements of parts, maintenance or repair may be carried out only by authorized R&S technical personnel.

   Only original parts may be used for replacing parts relevant to safety (e.g. power switches, power transformers, fuses). A safety test must be performed after each replacement of parts relevant to safety.

   (visual inspection, PE conductor test, insulation-resistance, leakage-current measurement, functional test).

continued overleaf

Safety Instructions

10. Ensure that the connections with information technology equipment comply with IEC950 / EN60950.
11. Lithium batteries must not be exposed to high temperatures or fire.

    Keep batteries away from children.

    If the battery is replaced improperly, there is danger of explosion. Only replace the battery by R&S type (see spare part list).

    Lithium batteries are suitable for environmentally friendly disposal or specialized recycling. Dispose of them in appropriate containers only.

    Do not short-circuit the battery.
12. Equipment returned or sent in for repair must be packed in the original packing or in packing with electrostatic and mechanical protection.
13. Electrostatics via the connectors may damage the equipment. For the safe handling and operation of the equipment, appropriate measures against electrostatics should be implemented.
14. The outside of the instrument is suitably cleaned using a soft, lint-free dustcloth. Never use solvents such as thinners, acetone or similar, as they may damage the front panel labeling or plastic parts.
15. Any additional safety instructions given in this manual are also to be observed.

Additional safety instructions:

- Any alteration to the basic equipment is prohibited, unless carried out by persons authorized to do so according to section 9 of these safety instructions.
- In case that a module is inserted which is specified for an analog bus operation < 60 VDC, then this limit is also restrictively valid for the total system.
- The voltage limits for exposed voltage-carrying parts under DIN EN61010-1/6.3 must on no account be exceeded.
  If the use of higher voltages is required, this may be done only after consultation with R&S.
- The total power which may be drawn from the secondary side depends on the format of the relevant backplane segment (typically 250VA).
- When installing in racks, the ventilation of the system must be such that the specified data sheet values of 0 ... 50 °C are adhered to.

CERTIFICATE

DQS GmbH

Deutsche Gesellschaft zur Zertifizierung von Managementsystemen

hereby certifies that the company

Rohde & Schwarz GmbH & Co. KG

Mühldorfstrasse 15
D-81671 München

with the production sites as listed in the annex

for the scope
Design and Development, Production, Sales, Services of Electronic-Measurement and Communication-Equipment and Systems

has implemented and maintains a

Quality Management System.

An audit, documented in a report, has verified that this quality management system fulfills the requirements of the following standard:

DIN EN ISO 9001 : 2000

December 2000 edition

The quality management system of the sites marked with (*) in the annex fulfills the requirements set out by the international and German Road Traffic Regulations
including the approval objects as listed in the appendix.

This certificate is valid until	2008-01-23
Certificate Registration No.	001954 QM/ST
Frankfurt am Main	2005-01-24

This certificate is based on a quality audit in cooperation with the CETECOM ICT Services GmbH as a Notified Body under the Scope of the EC directive 99/5/EC.
It was verified by the Notified Body that the supplementary requirements of the Annex V of the European Concil Directive 99/5/EC are fulfilled.

Ass. iur. M. Drechsel
Dipl.-Ing. S. Heinloth
MANAGING DIRECTORS

Senior Executive Officer of CETECOM ICT Services GmbH
Dipl.-Ing. J. Schirra

DQS is member of: IQNet THE INTERNATIONAL CERTIFICATION NETWORK

D-60433 Frankfurt am Main, August-Schanz-Straße 21

Deutscher Akkreditierungs Rat DAR
TGA-ZM-02-90
KBA-ZM-A 00023-95

Appendix to Certificate Registration No.: 001954 QM/ST

Rohde & Schwarz GmbH & Co. KG

Mühldorfstrasse 15
D-81671 München

The international and German Road Traffic Law
was audited regarding the following approval objects:

No.: 22 Electrical/Electronic Sub Assembly

This appendix (as of 2005-01-24) is only valid in connection
with the above-mentioned certificate.

Annex to Certificate Registration No.: 001954 QM ST

Rohde & Schwarz GmbH & Co. KG

Mühldorfstrasse 15
D-81671 München

Organizational unit/site	Scope
ROHDE & SCHWARZ GmbH & Co. KG Service Centre Cologne **ROHDE & SCHWARZ Systems GmbH** Graf-Zeppelin-Strasse 18 D-51147 Köln	Technical services in the field of measuring/communication techniques maintenance/repair calibration training technical documentation Development, production, systems
Rohde & Schwarz FTK GmbH Wendenschloßstrasse 168 D-12557 Berlin	Design and Development, Production and Sale of Communication Equipment, Installations and systems
Rohde & Schwarz GmbH & Co. KG Kaikenrieder Strasse 27 D-94244 Teisnach	Design and Development, Production, Sales, Services of Electronic-Measurement and Communication-Equipment and Systems
Rohde & Schwarz závod Vimperk s.r.o. Spidrova 49 CZE-38501 Vimperk Tschechische Republik	Design and Development, Production, Sales, Services of Electronic-Measurement and Communication-Equipment and Systems
(*) **Rohde & Schwarz GmbH & Co. KG** Mühldorfstrasse 15 81671 München	Design and Development, Production, Sales, Services of Electronic-Measurement and Communication-Equipment and Systems
(*) **Rohde & Schwarz Messgerätebau GmbH** Riedbachstrasse 58 D-87700 Memmingen	Design and Development, Production, Sales, Services of Electronic-Measurement and Communication-Equipment and Systems

This annex (as of 2005-01-24)is only valid in connection with the above-mentioned certificate.

Support Center

Telephone Europe: **+49 180 512 42 42**

Telephone worldwide: **+49 89 4129 13774**

Fax: **+49 89 4129 13777**

e-mail: customersupport@rohde-schwarz.com

If you have any technical queries about this Rohde & Schwarz equipment, our Hotline at the Support Center of Rohde & Schwarz Vertriebs-GmbH will be glad to help.

Our team will discuss your queries and look for solutions to your problems.

The Hotline is open Mondays to Fridays from 08.00 to 17.00 hrs.

For queries outside office hours, you can leave a message or send a note via fax or email. We will then get back to you as soon as possible.

ROHDE & SCHWARZ

Contents

5th Issue 11.05

5th Issue 11.05

5th Issue 11.05

5th Issue 11.05

Figures

5th Issue 11.05

5th Issue 11.05

Tables

5th Issue 11.05

5th Issue 11.05

1 User Information

1.1 Foreword

We congratulate you on your purchase of a **ROHDE & SCHWARZ** Test System Versatile Platform PowerTSVP.

We would emphasize that only attendance at one of our regular inhouse training seminars can ensure your successful operation of the Test System Versatile Platform in the long term.

Please do not hesitate to contact us should you have any queries whilst working with the Test System Versatile Platform.

We look forward to working with you

ROHDE&SCHWARZ

GmbH & Co. KG

5th Issue 11.05

1.2 Related Documentation

Comprehensive documentation is supplied to enable you to use the Test System Versatile Platform PowerTSVP efficiently. The operating manual comprises the following sections:

- User Information
- Safety
- Description
- Commissioning
- Operation
- Maintenance
- Plug-In Modules
- Interface description
- Technical Data

The **Appendices** contain:

- Declaration of Conformity

NOTE:

In the event of any discrepancies between data in this manual and the technical data in the data sheet, the data sheet takes precedence.

5th Issue 11.05

1.3 Purpose of the User Manual

This User Manual provides the information that is necessary for

- the commissioning and
- the proper and safe operation

of the Test System Versatile Platform PowerTSVP.

This User Manual must be carefully read by the operator/engineer who is responsible for working with the PowerTSVP before it is powered up for the first time.

As well as the operating instructions and the health and safety instructions which apply at the site where the system is used, the applicable technical standards and regulations for safe and proper working must be complied with.

The operating instructions must be available at or near the PowerTSVP at all times.

The owner must supplement the operating instructions with national accident prevention and environmental protection regulations as appropriate.

5th Issue 11.05

1.4 Explanation of Symbols

The Test System Versatile Platform PowerTSVP has been manufactured in accordance with accepted engineering practice and the latest scientific and technical findings.

Nevertheless there are certain risks which cannot be designed out of equipment.

Additional safety instructions have been developed to provide adequate safety for the personnel working on the PowerTSVP.

A satisfactory level of safety when using the PowerTSVP cannot be guaranteed unless these instructions are followed.

Certain sections of text are specially highlighted. These sections have the following meaning:

DANGER!

Failure to follow instructions can result in personal injury!

ELECTROCUTION HAZARD!

Failure to follow instructions can result in personal injury!

WARNING!

Failure to following instructions can cause damage to the Test System Versatile Platform PowerTSVP.

CAUTION!

Failure to follow instructions can result in incorrect measurements.

NOTE:

Highlights important details to which special attention must be paid and that make work easier.

5th Issue 11.05

2 Safety

2.1 General

The Test System Versatile Platform must be operated in accordance with the safety regulations which apply in the owner's country.

NOTE:

Safety risks created by an application that is based on the Test System Versatile Platform must be eliminated by suitable additional arrangements (e.g. integration in the Emergency Stop circuit).

NOTE:

Failure to observe the safety regulations governing the operation of the Test System Versatile Platform shall void any liability or guarantee claims against ROHDE & SCHWARZ GmbH & Co. KG.

2.2 Safety Instructions

ELECTROCUTION HAZARD!

The Test System Versatile Platform may only be opened by suitably trained technical personnel! The appropriate regulations governing work carried out on electrical equipment must be complied with.

The PowerTSVP must be isolated from the electrical supply before work commences.

WARNING!

Never link out defective fuses. Always replace defective fuses with fuses of the same rating.

The electrical equipment fitted to the PowerTSVP must be checked at regular intervals. Defects such as loose connections, scorched cables etc. must be rectified immediately.

The enclosed safety sheet must be complied with.

5th Issue 11.05

3 Description

3.1 Usage

3.1.1 General

The **Test System Versatile Platform TSVP** is a standardized modular platform for the program-controlled testing of modules and terminals in the factory or laboratory. With its flexible configuration and the use of worldwide standards, it can be perfectly adapted to suit the needs of the user.

The PowerTSVP is primarily intended as a flexible switching unit for measurement signals, signal sources and UUT loads. This facilitates the migration of existing and proprietary “Rack and Stack” systems to a production test platform.

CompactTSVP (TS-PCA3) and PowerTSVP (TS-PWA3) can be combined to create more complex ATE (**A**utomatic **T**est **E**quipment) systems with a high number of test pins. The PowerTSVP is controlled either by the **system controller** of a CompactTSVP (cPCI system) or by an external PC. A serial bus system (CAN Bus) is used to trigger the modules in the PowerTSVP. External cabling is used to make the connection with the measurement and trigger bus of the CompactTSVP.

The PowerTSVP can be fitted with special ROHDE & SCHWARZ switching and load modules. The unit provides an analog bus that can be used to make complex connections. The modules can also be used without any modification in the CompactTSVP. Up to four PowerTSVP's can be cascaded.

The peripheral modules can be quickly and flexibly adapted to the UUTs by preceding the PowerTSVP with an **adapter frame** which connects the signals securely and with a low rate of wear.

5th Issue 11.05

3.1.2 Explanation of Terms

The following terms and standards are used in this manual:

CompactPCI (abbreviated to “cPCI” in this document) is an open standard of the PICMG (PCI Industrial Manufacturers Group) that adapts the PCI standard for industrial applications. It uses high-grade connection techniques and mechanical components, and applies the same electrical specifications as the PCI standard. This makes it possible to use inexpensive components and existing PCI developments even under industrial conditions. Other features include a high integration density, the option of a 19" installation and shielding for the plug-in modules. Its definition as an open standard means that a large, worldwide variety of cards is available. This standard is used in the CompactTSVP.

PXI (PCI eXtensions for Instrumentation) is a standard defined by National Instruments which extends cPCI. The PowerTSVP adopts the same mechanical specifications and the interfacing with the trigger system.

CAN (Controller Area Network) is a serial bus system whose high system and configuration flexibility is achieved by a content-oriented addressing scheme, i.e. it defines so-called “message identifiers“ and not device addresses. Systems can be added to an existing network without the need for hardware or software modifications. The CAN protocols is defined in ISO 11898.

Rear I/O is the name given to a design that allows input and output lines of the cPCI connectors P1 and P2 to be accessed from the rear of a backplane. Pluggable Rear I/O modules can be used for this purpose in the CompactTSVP and the PowerTSVP.

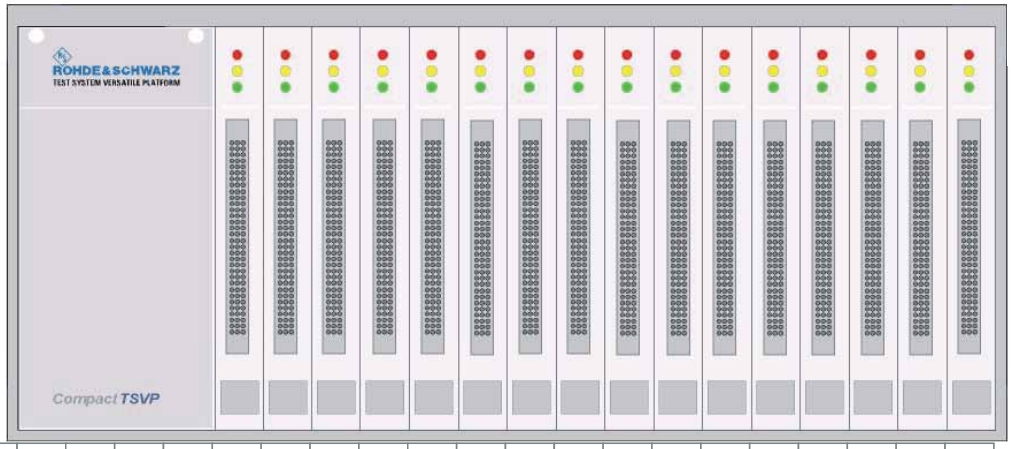
5th Issue 11.05

3.1.3 System Information

The PowerTSVP has a modular structure that allows a range of system configurations tailored to the specific needs of the user.

The PowerTSVP contains 16 slots for front plug-in modules conforming to Rohde & Schwarz format. The connector P2 that is defined in the cPCI standard is referred to here as P20, because of a different assignment. Slots A3, A4 are fitted with a PSU as standard. An optional PSU can be fitted in slots A1, A2. Slots 1 to 16 provide access to the PXI trigger bus, CAN bus and analog bus. Space for Rear I/O modules is provided at the back of the PowerTSVP.

The configuration of the PowerTSVP is shown in Figure 3-1.



Bus / Slot	A1	A2	A3	A4	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
PXI Trigger																				
CAN																				
Analog Bus																				
Rear I/O																				
Power Supplies																				

Figure 3-1 Configuration of the PowerTSVP

Table 3-1 summarizes some further characteristics of the PowerTSVP that are important for a Test System Versatile Platform.

Other Characteristics PowerTSVP
Powerful cPCI PSU for 250 W (expandable to 500 W)
Controlled by **CAN Bus**
The internal **analog bus** makes it possible to distribute measurement/stimuli signals among the plug-in modules with no additional cabling work.
Optional: Front mounted **adapter interface** on the PowerTSVP that uses spring contacts to facilitate rapid and high-pole contacting with the UUTs (see Figure 3-4).
System serviceability is monitored by a built-in **self-test capability** and **system monitor** (operating voltages, temperature)

Table 3-1 Other Characteristics PowerTSVP

5th Issue 11.05

3.2 Views

Figure 3-2 and Figure 3-3 show the PowerTSVP with slots covered.

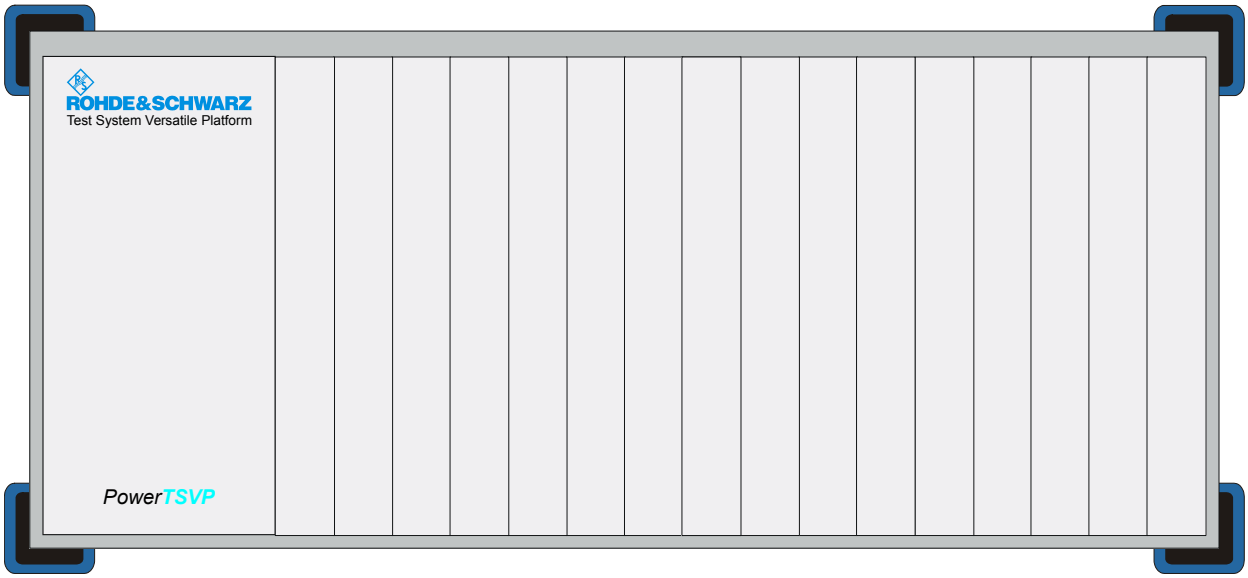


Figure 3-2 Front View

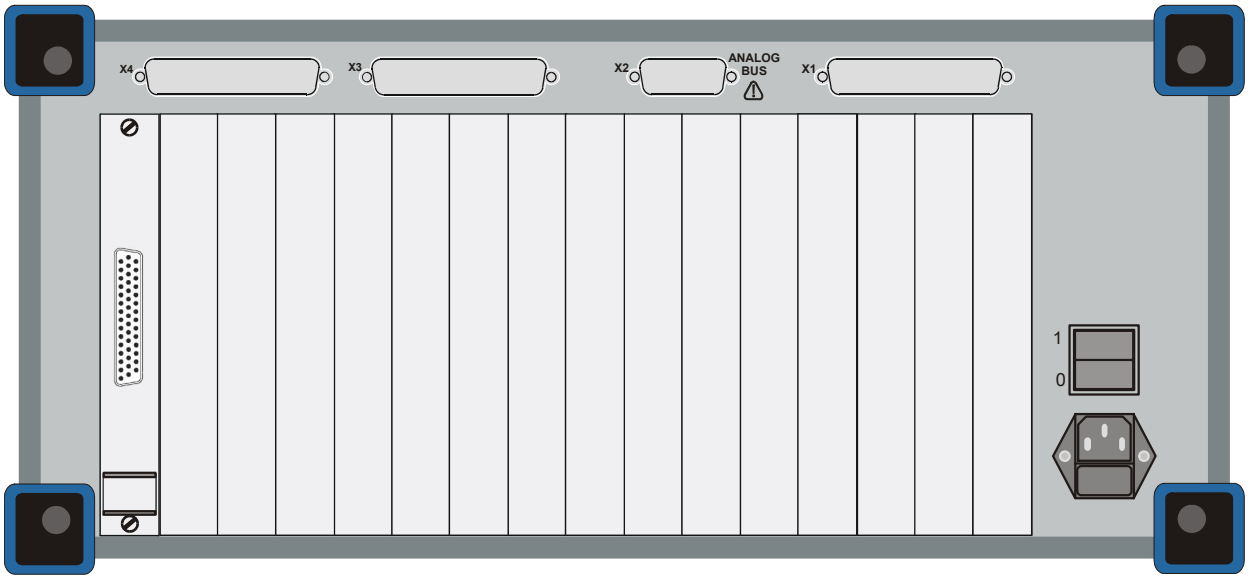


Figure 3-3 Rear View

The PowerTSVP can be operated with an adapter interface (optional) which is flange-mounted to the front panel (see Figure 3-4)

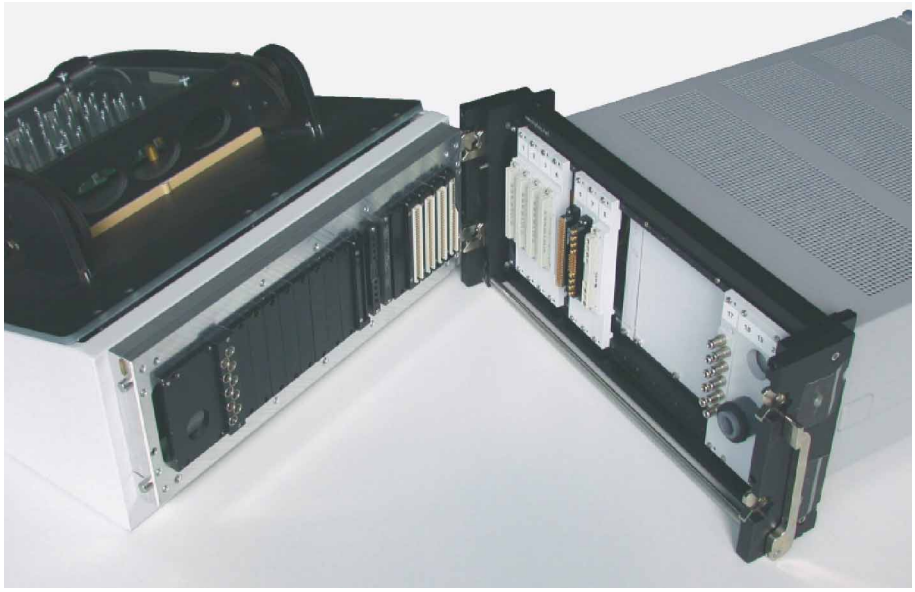


Figure 3-4 Adapter Interface

3.3 Layout

3.3.1 Case

The PowerTSVP uses the standard Rohde & Schwarz case of the “Design 2000” (see Figure 3-5). The characteristics of the case are summarized in the Table 3-2.

Figure 3-5 BW 2000 Case

HF-immune case to Rohde & Schwarz “Design 2000”
Dimensions: 19", height 4U, 430mm deep
Use as desktop unit or rack-mounted case
Mounted in 19" rack using the telescopic slide set or on support rails
Side case handles that remain on the unit when mounted in the rack.
Four rugged detachable rubber feet provide rear protection.
Unused slots can be covered by front sub-panels that maintain the integrity of the HF-immunity. Contact springs are mounted between the individual front sub-panels for this purpose.
The case is suitable for 3U high plug-in boards.
The remaining space in the case can be used for adaption to the standard UUT connector or for concealed (cross) cabling.

Table 3-2 Features of the BW 2000 Case

3.3.2 Slot Layout

3.3.2.1 Plan View

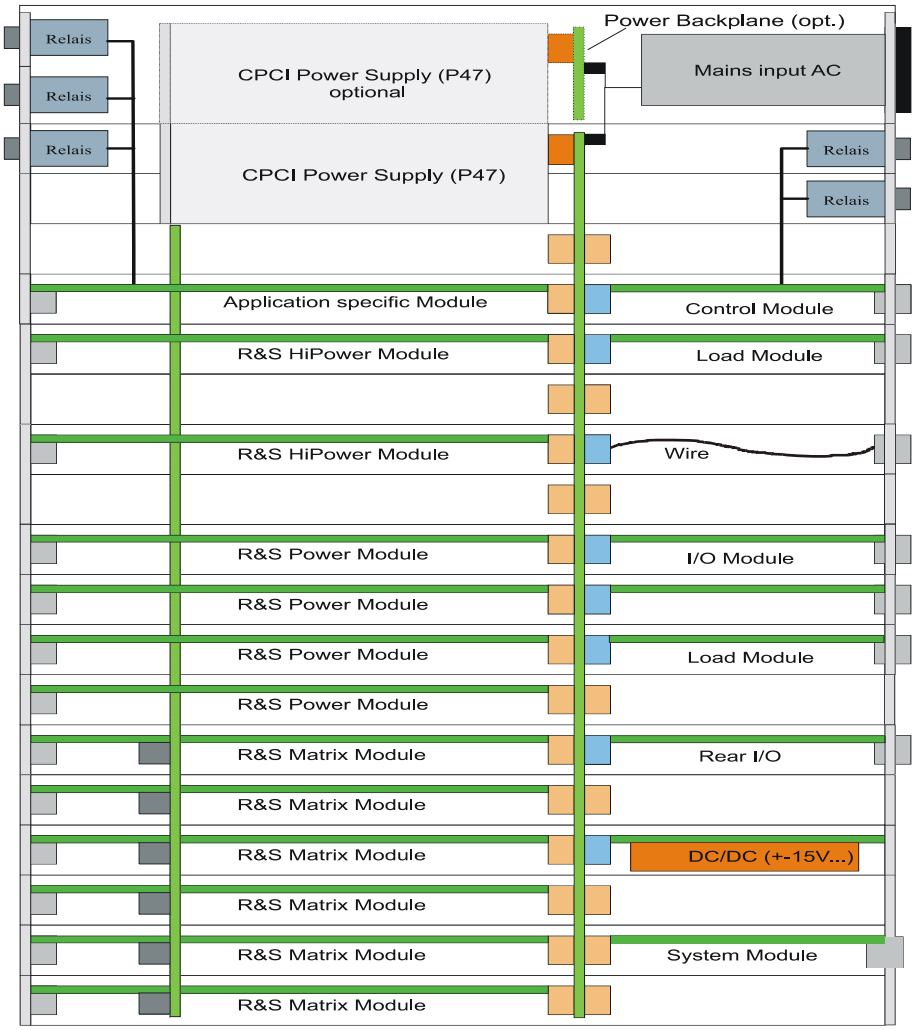


Figure 3-6 Plan View (example)

3.3.2.2 Side View

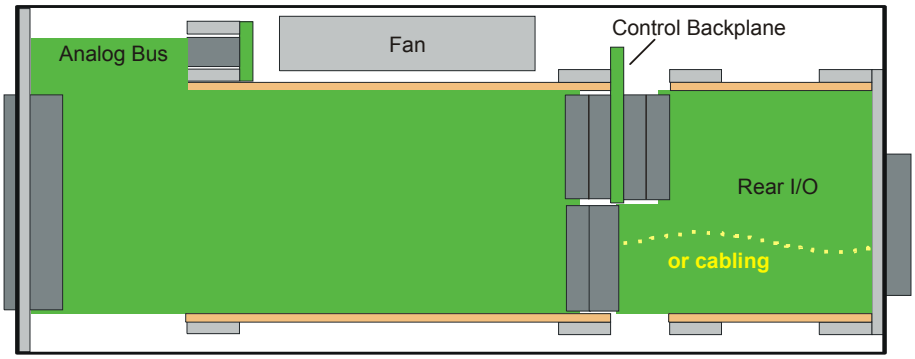


Figure 3-7 Side View

3.3.3 Backplanes

The PowerTSVP contains the following backplanes:

- Control backplane with PICMG Power Interface and Rear I/O support
- Analog Bus Backplane
- Power backplane with PICMG Power Interface (optional)

Figure 3-8 shows the backplanes with the bus systems. The assignment of the connectors is detailed in Section 8.

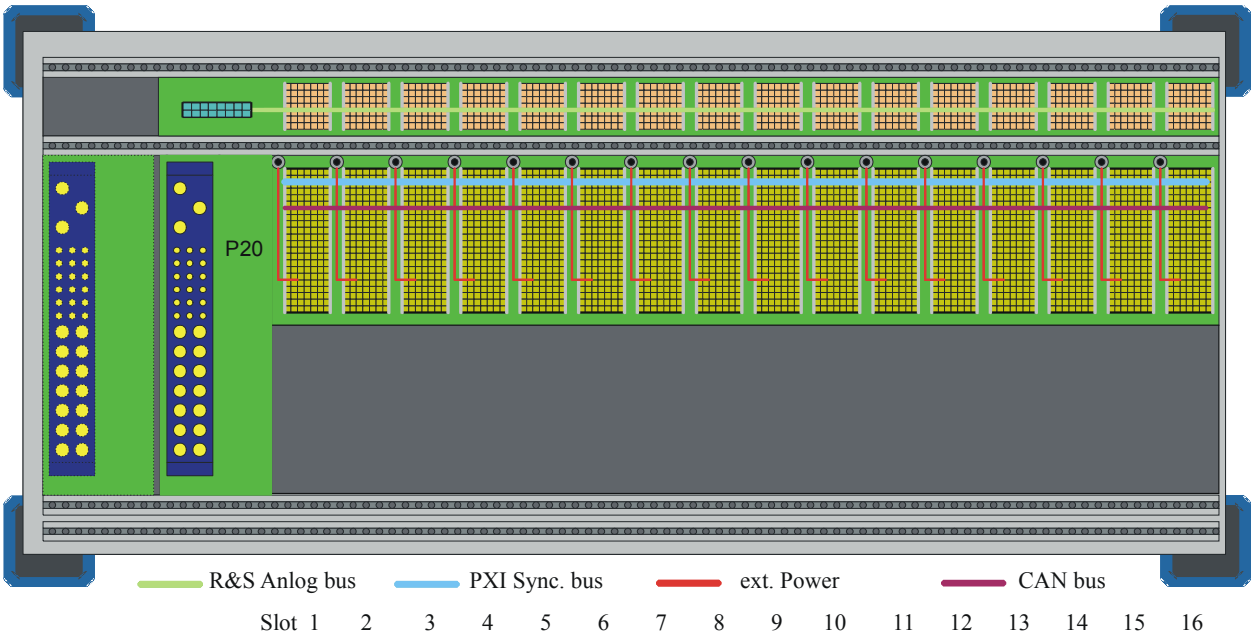


Figure 3-8 Backplanes and Bus Systems

3.3.3.1 Control Backplane

The control backplane is implemented for 16 plug-in modules to R&S format with front slots. The P2 connector of the cPCI system is used for the control interface. Pin assignment is R&S-specific (designation: P20) and compatible with the CompactTSVP, so plug-in modules for the PowerTSVP can also be operated in the CompactTSVP.

Connector X0 (P47) serves as a power interface for a cPCI standard PSU. An additional PSU can be plugged onto an optional power backplane, in which case the connection with the control backplane is made with an ATX power supply cable.

Support for the Rear I/O concept according to Standard IEEE 1101.11-1998 is implemented for P20. Voltages up to 125 VDC can be routed in the Rear I/O area.

The PXI trigger bus according to PXI R2.0 is also implemented.

The **CAN bus** *[1] is integrated as the management bus, and is available at all slots. Signals CAN_L and CAN_H can be terminated with jumpers and resistors (Figure 3-9). Instead of being terminated, the bus can be extended externally using the extension connector X80.

*[1] to standard CAN 2.0b (1Mbit)

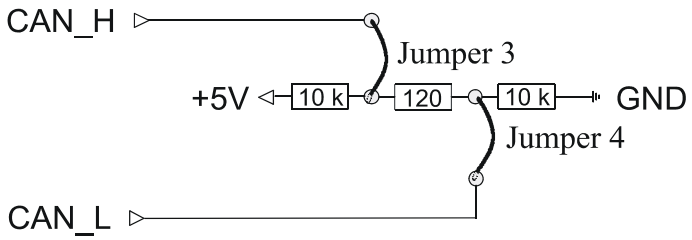


Figure 3-9 CAN Bus Termination

Number Lines	U_{max} (VDC)	Pin
2	5	CAN_H: P20/C1 CAN_L: P20/D1

Table 3-3 CAN Bus

5th Issue 11.05

Two additional **external signals** (e.g. supply voltages) can be fed in via a plug-in module in P20. This input can come from an internal AC/DC module or from other external signal sources. One way in which this feature can be used is to provide a primary voltage for generating local supply voltages (DC/DC converter).

Number Lines	U_{max} (VDC)	I_{max}/Slot (ADC)	Pin
2	60	2	input for ext. signals: P20: AUX1 B20, E19 P20: AUX2 A20, D19

Table 3-4 External Additional Signals

Lines with +5 V and +12 V are taken from connector X0 (P47) to optional threaded studs. This makes it easy to connect AUX1 to +5 V and AUX2 to +12 V, e.g. using an optional bus bar or cable (see Figure 3-10).

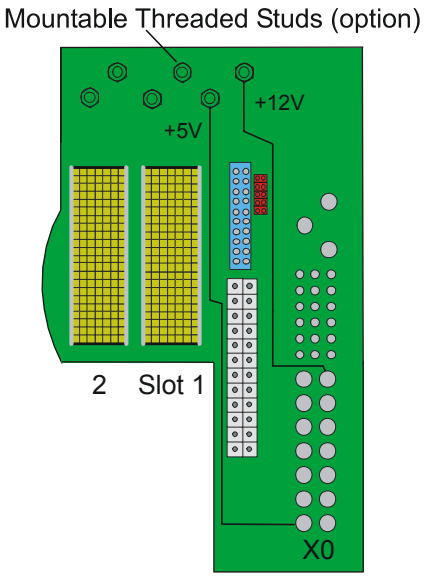


Figure 3-10 Mountable Threaded Studs on the Control Backplane

3.3.3.2 Analog Bus Backplane

To make cabling easy, the PowerTSVP contains an analog bus with 8 signals to facilitate the noise-immune and variable connection of switching modules and measuring instruments. The analog bus backplane is located in the front section above the control backplane. Requirements for high crosstalk attenuation and low capacitance of the signal lines to GND are met by a special layout.

The C module (2 mm connector system) is used as the connectors (X1...X16). Plug-in modules with no analog bus connector access the analog bus via a 26-pin connector (X22) and R&S switch modules. Signals IL1_x and IL2_x (Instrument Line) are passed from slots 5 to 16 to connector X22 (see Section 4.4.2).

The analog bus signals pass from connector X21 to connector X2 at the back of the PowerTSVP (see Section 4.4.2).

The electrical characteristics of the analog lines are:

- Voltage 125 VDC max.
- Current 1 A max.

5th Issue 11.05

3.3.3.2.1 Concept of the Analog Bus

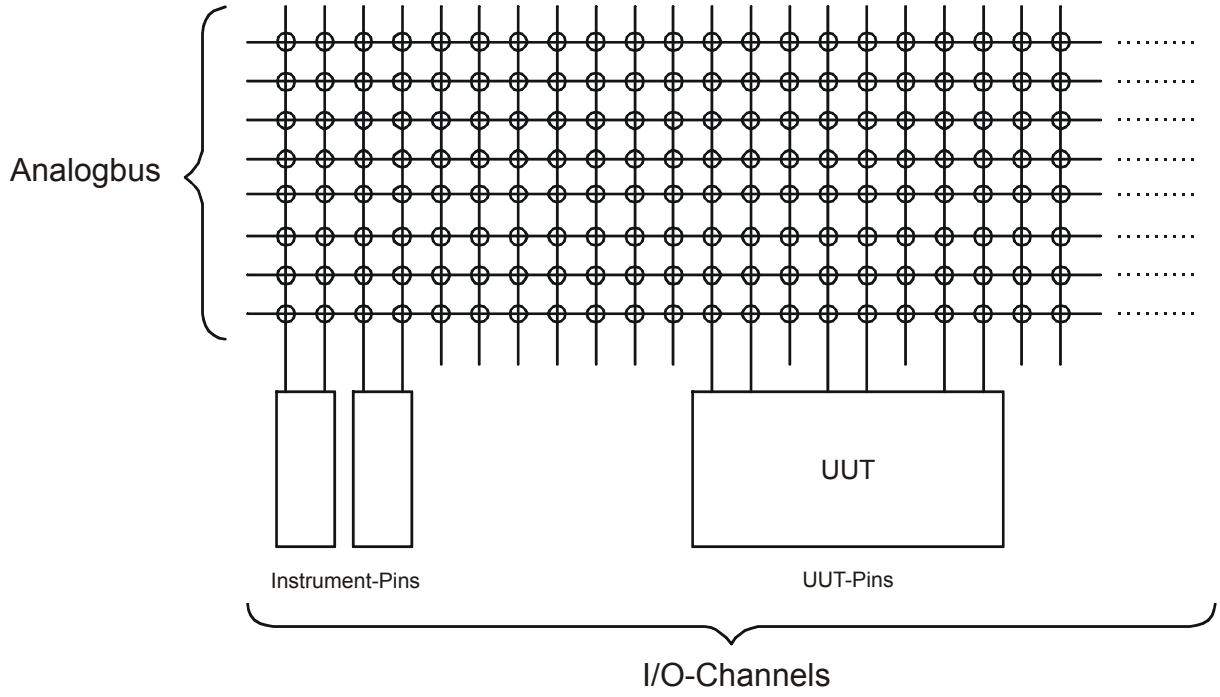


Figure 3-11 Principle of the Analog Bus

The analog bus in the PowerTSVP connects I/O channels of different plug-in modules to each other under program control. I/O channels may be connections of instruments (measuring and stimuli devices) and connections of the device on test. Up to 8 different signals can be connected simultaneously (see Figure 3-11).

The analog bus can be used flexibly with the ROHDE & SCHWARZ-specific plug-in modules. 8 equivalent lines are basically available (ABa1, ABa2, ABb1, ABb2, ABc1, ABc2, ABd1, ABd2). External instruments are usually connected to the PowerTSVP with a rear I/O connection. The signals for the UUT are made available at the front-end connector of the various plug-in modules on the PowerTSVP.

The analog bus can be used in different ways:

- as 1 bus with 8 lines.
- in 2 part-buses with 4 lines each.

The split of the analog bus into part-buses depends on the plug-in modules which are used and the application that is to be implemented..

The analog bus concept of the PowerTSVP corresponds to the most reqirements of the measurement technology:

- A small number of buses for a large number of I/O channels (e.g. In-Circuit-Test with 3 to 6 buses.)
- As many signals as possible simultaneously for a moderate number of I/O channels (e.g. function test with 8 buses of 50 to 100 I/O channels).
- Parallel test with split analog bus.

Line paths or higher-frequency signals are usually connected locally by special switching modules and not via the analog bus.

3.3.3.2.2 Typical Use of the Analog Bus

The use of the analog bus and individual bus lines is illustrated with available R&S modules and standard modules (see Figure 3-12).

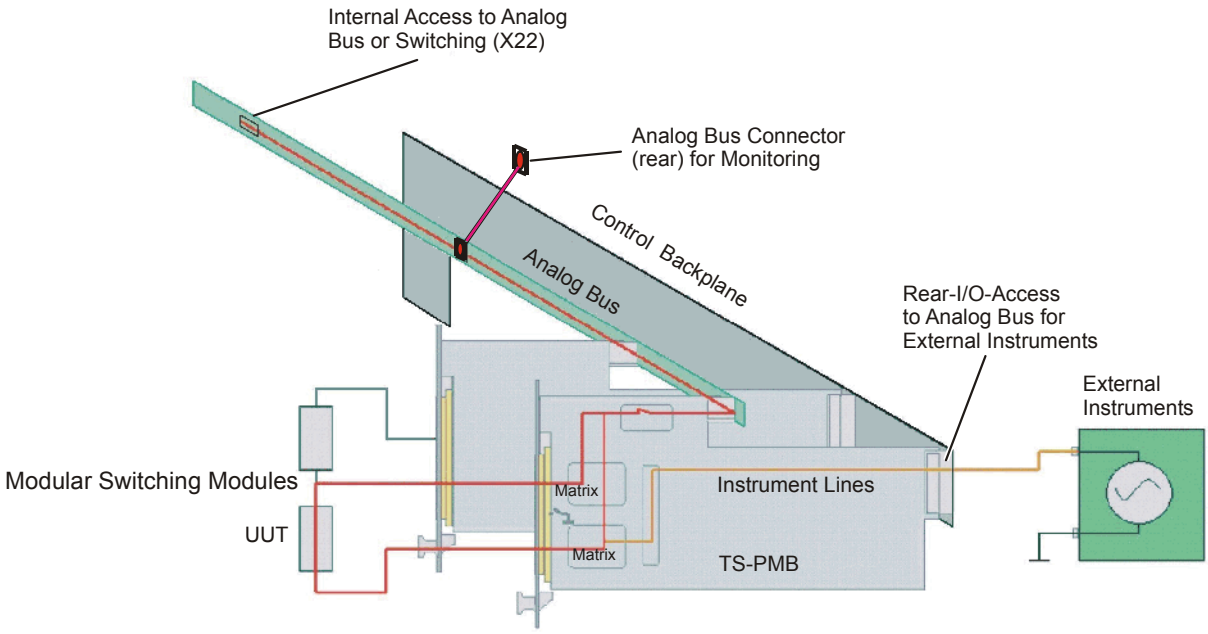


Figure 3-12 Use of the Analog Bus in the PowerTSVP (Example)

3.3.3.3 Power Backplane

The use of a second cPCI PSU in slots A1, A2 requires the optional Power Backplane (conforms to standard PICMG 2.0). From the power backplane, a cable with three connectors leads to a 24-pin ATX connector on the control backplane. The three connectors are as follows (see also Section 8, Interface Description):

- X12, 20-pin
- X13, 10-pin
- X16, 4-pin

The second PSU can be used to boost the power of the standard PSU when connected in parallel. Alternatively it can be used to supply the device on test.

3.3.4 Ground Concept

An electrically conductive CHA-GND (chassis GND) pad in the mounting area on the control backplane provides an impedance grounding to the chassis. Screw connections and a busbar on the control backplane are used to make a low-resistance connection for GND and CHA-GND, while a star connection between GND and CHA-GND using a busbar prevents unwanted ground loops.

A capacitor creates the HF connection between GND and CHA-GND at each slot. A 1 MOhm resistor discharges the capacitors and dissipates static.

A 3-pin connector provides the 230 VAC supply for the PSU on the control backplane (at X0).

The optional power backplane is supplied with AC voltage parallel to the control backplane.

The PE conductor must be bonded to the case with a grounding cable.

5th Issue 11.05

The GND signal of the analog bus backplane is connected by a cable and screw terminal to the GND on the cPCI backplane. This prevents the large induction loops that would occur if a return via chassis were to be used.

The ground screen of the analog bus between two PowerTSVP is connected to CHA-GND (chassis).

In the second PowerTSVP CHA-GND must not be connected to GND to prevent ground loops. The connections are sketched in Figure 3-13.

GND sense of +5 V and +3.3 V (of the second PSU as well) are connected to GND at the grounding star point.

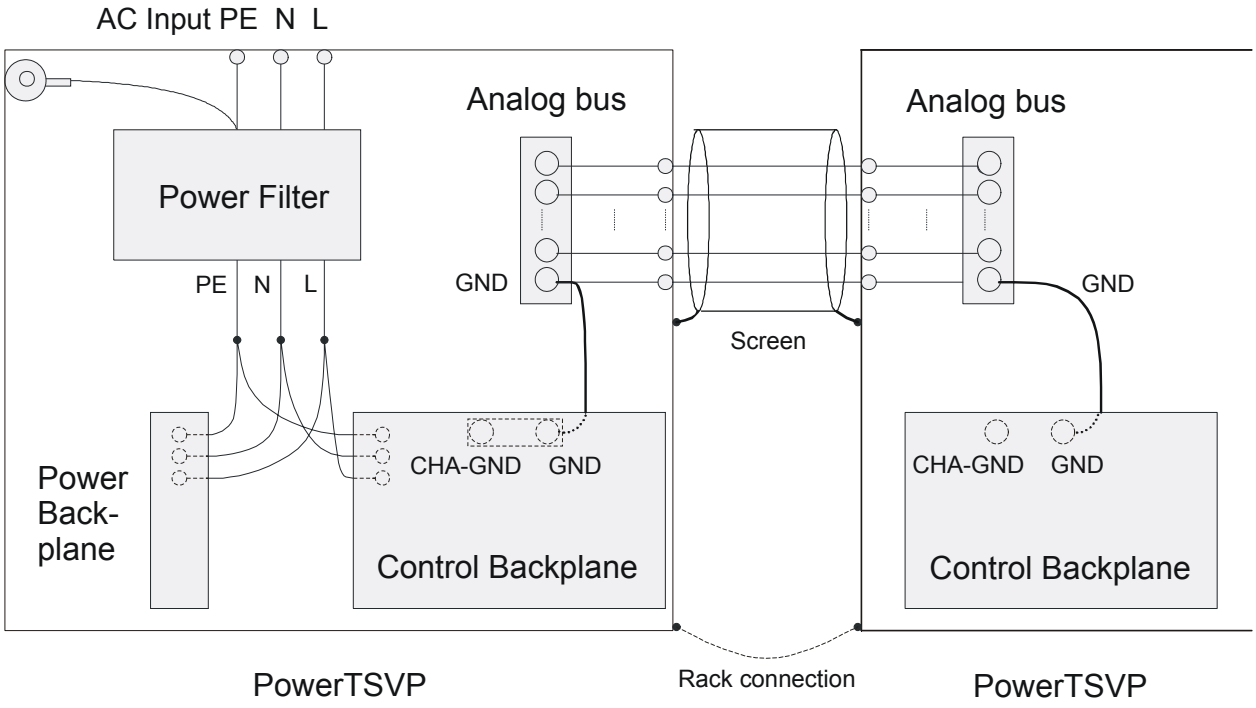


Figure 3-13 Ground Concept

3.3.5 Geographical Addressing of the Slots with GA0 ... GA5

The physical slot addresses are coded with the signals GA0 ... GA5 (see cPCI specification). For slot 1, GA0 ... GA3 are connected to GND. In order to distinguish between slots of different connected PowerTSVP basic units , GA4 and GA5 are configured with jumpers (see jumper field in Section 8).

The coding for slot recognition is carried out with GA0 ... GA3 as follows:

Slot	Code
1	0000
2	0001
3	0010
4	0011
5	0100
6	0101
7	0110
8	0111
9	1000
10	1001
11	1010
12	1011
13	1100
14	1101
15	1110
16	1111

Note:
0: Pin connected to GND via resistor
1: Pin open

3.3.6 CAN Bus

For controlling of the switch modules TS-PMB and TS-PSM1 as well as the control modules TS-PSYS1 and TS-PSYS2, the CAN bus is used in TS-PCA3 and TS-PWA3. The CAN bus numbering results from the following scheme:

CAN*u::v::w::x*

u = Board Number
v = Controller Number
w = Device Number
x = Slot Number

Board Number and Controller Number are always 0. The Device Number of the frame is determined by the settings of the jumpers on the backplane (see Section 3.3.7). For Rear-I/O modules like TS-PSYS1 and TS-PSYS2, a 4 has to be added to the Device Number.

Example: CAN*0::0::5::15*

Board Number: *0*
Controller Number: *0*
Device Number: *5* (Device 1, Rear-I/O)
Slot Number: *15*

The following table shows the jumper configuration for the bus terminations CAN1 (System) und CAN2 (User).

Modul	CAN-Bus	offen	terminiert
TS-PCA3	CAN1 (System)	Jumper J3 and Jumper J4 open	Jumper J3 and Jumper J4 geschlossen
TS-PWA3	CAN1 (System)	Jumper J4 and Jumper J5 open	Jumper J4 and Jumper J5 closed
TS-PSYS1, TS-PSYS2	CAN1 (System)	Jumper JP6 open	Jumper JP6 closed
TS-PSYS1, TS-PSYS2	CAN2 (User)	Jumper JP7 open	Jumper JP7 closed

Table 3-5 CAN Bus Termination

3.3.7 Configurations with several Frames

In the following figure, the terminating resistors are depicted in yellow.

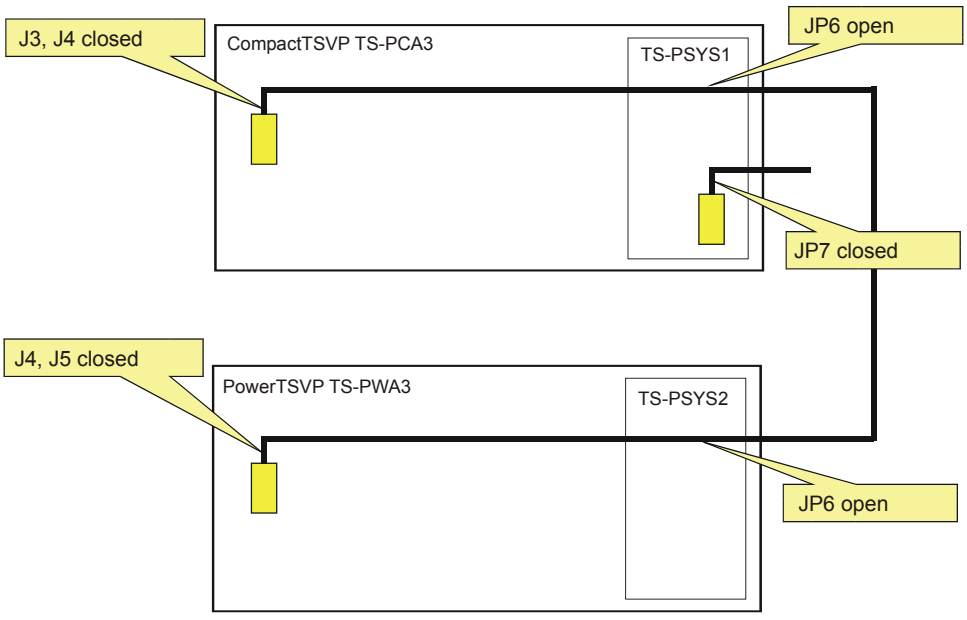


Figure 3-14 Configuration example TS-PCA3 und TS-PWA3

CAN1 (System) is being connected between the two frames via cable TS-PK02 (option). The termination is carried out on both backplanes. The jumpers on the system modules TS-PSYS1 and TS-PSYS2 have to be left open.

According to Section 3.3.5, the jumpers for device addressing must be set as follows:

TS-PCA3: J1 set → Device 1

TS-PWA3: J1 set, J2 not set → Device 2

J1 (GA4)	J2 (GA5)	Device
set	set	1
set	not set	2
not set	set	3
not set	not set	4

Table 3-6 Device Addressing

3.3.8 Switching the PSU

Signal PS-ON is used to power the PSU outputs on and off. Jumper 3 is removed for this purpose (see jumper field in Section 8) and replaced by an external switch. Signal PS-ON is available at the extension connector X80.

3.3.9 Line Inlet and Power Switch

The line inlet and power switch are at the back of the PowerTSVP (see Figure 3-3).

3.3.10 Cooling

The PowerTSVP possesses a powerful cooling concept. The slots at the front (optional in the Rear I/O area) are cooled by a vertical flow of air. The four fans are above the slots and are connected to the back-plane by series contact connectors (see Figure 3-15). The fan speed is controlled by the internal temperature.

Fans for the Rear I/O area can be retrofitted if required. The supply for these fans can be taken off expansion connector X80.

WARNING!

Adequate space for air inlet and outlet should be allowed when the case is rack mounted, with at least half a height unit (22 mm) being left above and below the chassis!

For desktop mounting, ensure that the case is not covered over!

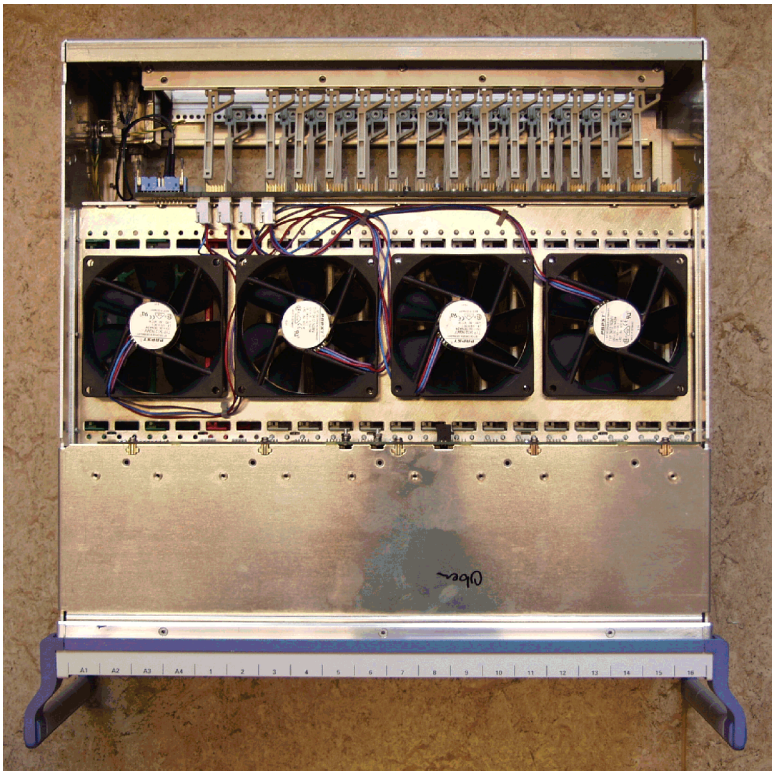


Figure 3-15 Layout of Fans in the Frame

3.4 System Module TS-PSYS2

3.4.1 General

The TS-PSYS2 is in the **Rear I/O slot 15** of the PowerTSVP. It acts primarily as a CAN-Interface and therefore as an interface for communication with R&S CAN modules in the CompactTSVP and PowerTSVP.

Additional system functions such as voltage and temperature monitoring, trigger signals and optocoupler interface are used to integrate the CompactTSVP and PowerTSVP in a complete system.

3.4.2 Characteristics

TS-PSYS2
RTM type with cPCI interface
2 independent CAN interfaces (2.0 A/B, 1 Mb/s)
System functions via CAN node (microcontroller) - Voltage monitor - Temperature measuring (internal) - Enable of the PXI trigger signals to the exterior - 4 optocoupler outputs - 4 optocoupler inputs - 2 switchable, short-circuit proof output voltages - System identification
Manual selection of the local or external system clock, and its buffering with jumper

Table 3-7 Characteristics of the TS-PSYS2

3.4.3 Circuit Diagram of the TS-PSYS2

Figure 3-16 shows the circuit diagram of the TS-PSYS2

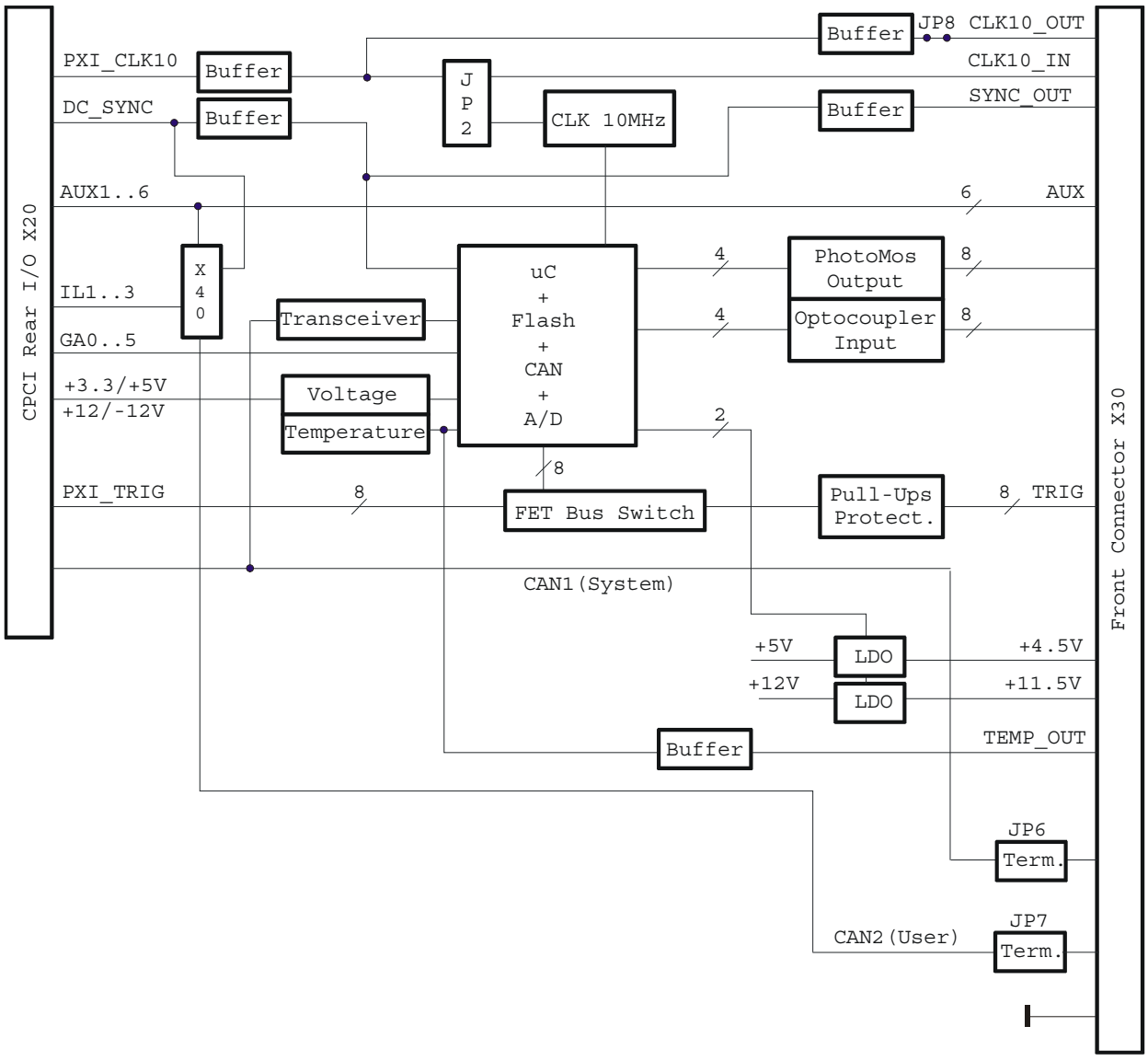


Figure 3-16 Circuit Diagram of the TS-PSYS2

3.4.4 Structure of the TS-PSYS2

The TS-PSYS2 is the size of a standard cPCI-RTM (Rear Transmission Module) and is mounted in slot 15 at the rear of the TSVP chassis.

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Connector X20 is used to make the connections to the Rear I/O side of the control backplane in the PowerTSVP. Connector X30 is a 44-pin D-sub socket (High Density). Jumper field X40 as well as the Jumpers JP2, JP6, JP7 and JP8 are placed on the circuit board.

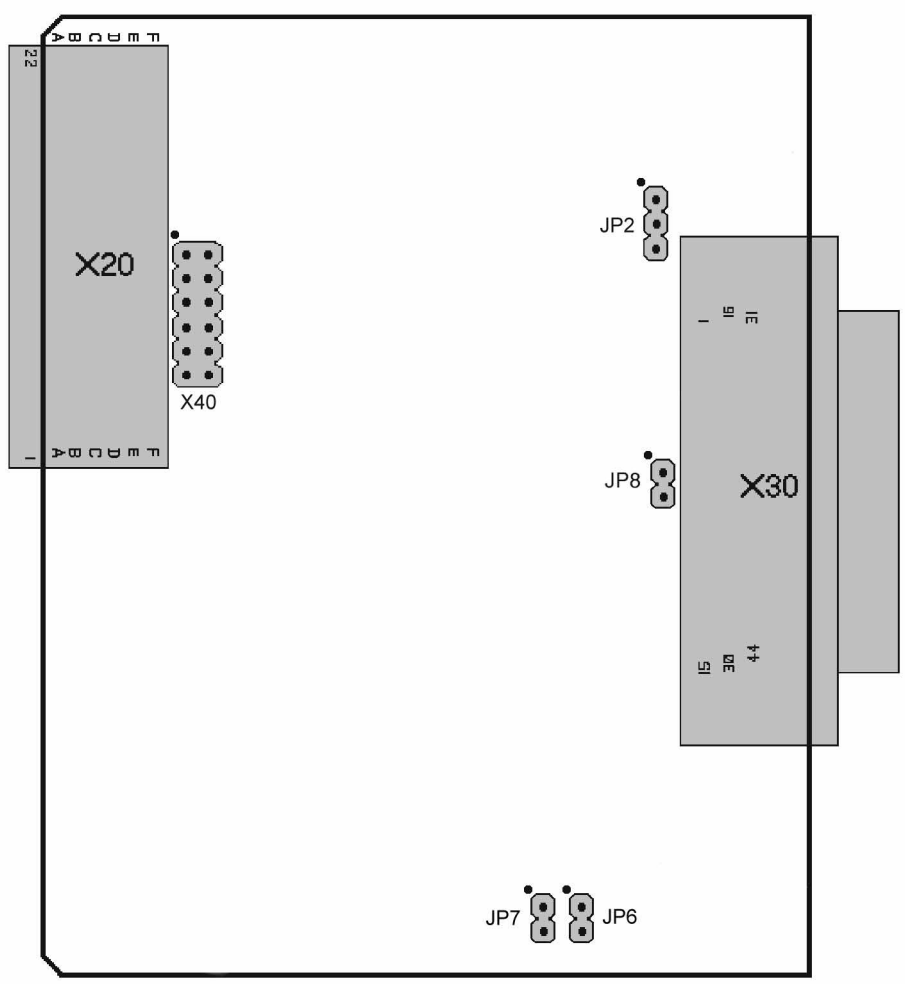

Figure 3-17 Connectors and Jumpers on the TS-PSYS2

Symbol	Use
X20	Rear I/O
X30	Front Connector
X40	Jumper field Rear I/O signals

Table 3-8 Connectors on the TS-PSYS2

3.4.5 Functional Description of the TS-PSYS2

(see also Figure 3-16)

3.4.5.1 Control

The TS-PSYS2 is controlled by the CompactTSVP or PC. It provides two CAN bus channels (type 2.0 A/B to ISO 11898):

- CAN1: Internal connection, for controlling the R&S modules
- CAN2: General Usage

The CAN lines are terminated manually with a jumper on the PSYS2 (see Section 8.4)

3.4.5.2 System Functions

The system functions are implemented by an 8 bit microcontroller which operates at a 10 MHz system speed. It communicates with the system controller in the CompactTSVP or PC across the CAN1 port. The following functions are available:

- 8 x enable of PXI trigger signals to the outside (e.g. PowerTSVP)
- 4 x optocoupler outputs (for PLC or handling systems)
- 4 x optocoupler inputs (for PLC or handling systems)
- 2 x enable for additional supply voltages (+4.5 V / +11.5 V)
- 3 x supply voltage measurement
- 1 x measurement of the internal temperature

3.4.5.2.1 PXI Trigger

The input/output of trigger signals (X20) is controlled separately for each signal. On the output side the signals are terminated by pullup resistors and protected by self-healing fuses and d.c. clamp diodes. The external trigger lines are available at connector X30.

3.4.5.2.2 Floating Outputs

4 PhotoMos relays (with internal current limiter) are triggered by a µC port. The signals are available at connector X30.

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3.4.5.2.3 Floating Inputs

A C port reads the status of 4 optocoupler inputs (2 x 2-pin). The current at the inputs is limited so that inputs signals can be fed in unconditioned within a wide voltage range. These inputs are available at connector X30.

3.4.5.2.4 Output voltages

Two voltage regulators with output-enable control generate switchable, short-circuit proof voltages of +4.5 V and +11.5 V at X30. These voltages can be used to supply external components (e.g. signal lamps).

3.4.5.2.5 Measuring the cPCI Supply Voltages

The supply voltages present at connector X20 (+5 V / +12 V / -12 V) are measured with the A/D ports of the µC.

3.4.5.2.6 Temperature Measurement

An A/D port of the C is used to measure the ambient temperature of the plug-in module. A temperature-to-voltage converter is used as the sensor. The temperature-proportional analog voltage is also output at connector X30 for monitoring purposes (TEMP_OUT).

3.4.5.2.7 Geographical Addressing

According to the cPCI specification, each slot is assigned its own digital slot code (GA code). This code is used internally to directly address the µC.

3.4.5.3 System Clock

A local quartz crystal generates the 10 MHz system pulse for the PXI system (PXI_CLK10). Alternatively a very accurate reference pulse can be fed in across X30. Jumper JP2 is used to select an internal or external clock source. The jumper functions are shown in Section 8.4.

5th Issue 11.05

3.4.5.4 Signal Looping

A number of signal lines are looped from connector X30 to connector X20. These are used to input/output Rear I/O signals (e.g. for the R&S switching modules TS-PMB, TS-PSAM)

Number Lines	Signal Name	Current Carrying Capacity
2 4	AUX1 ... 2 AUX3 ... 6	3 A 1.5 A

3.4.5.5 Local Signal Outputs

Special signals of the Power-TSVP can be connected to connector X20 (Rear I/O) with the help of jumper field X40. The jumper functions are described in Section 8.4.

WARNING!

Jumpers only permitted when system voltages are < 60 VDC

Number Lines	Signal Name	Current Carrying Capacity
3	AUX4 ... 6	1.5 A
3 (6)	IL1 ... 3	1.5 A
2	CAN2	

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3.4.6 Driver Software

The TS-PSYS2 is triggered by a universal driver software. The local microcontroller is triggered by the CAN1 bus and the R&S-specific protocol.

The following software modules are installed during driver installation:

- RSCAN
- RSPSYS

3.4.7 Self-Test

The TS-PSYS2 has no built-in self-test capability. The function of the internal CAN bus can be checked with the local CAN node.

3.5 Function Description

The functionality of the PowerTSVP depends essentially on the installed plug-in modules and the related software. The PowerTSVP is basically suitable for all types of production tests.

An adapter interface can be flange-mounted on the front of the PowerTSVP for the rapid and high-pole adaption of UUTs (see Figure 3-4).

5th Issue 11.05

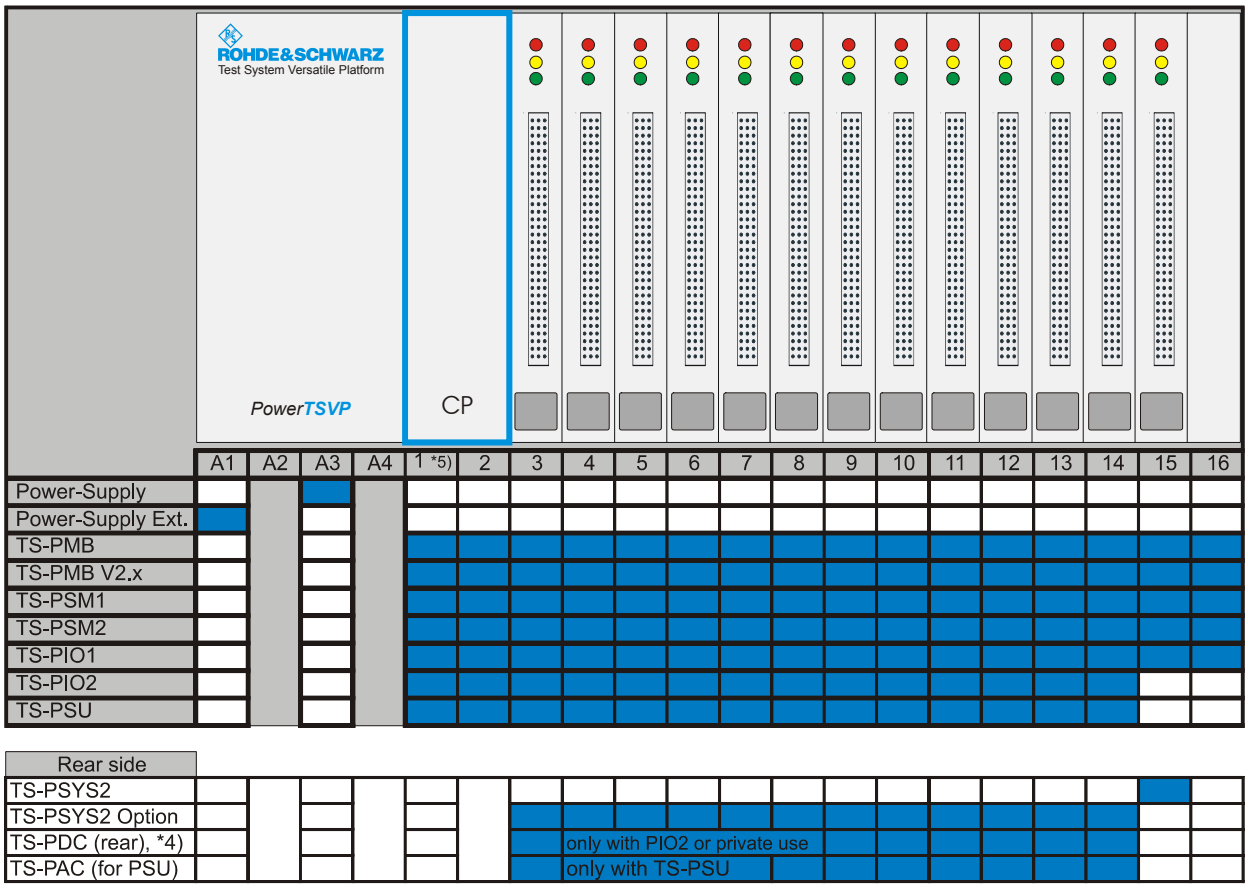
3.6 Permitted Module Configurations

Because of the different properties of plug-in modules, for example

- control bus
- power supply
- rear-I/O module required
- controller function
- power pack

there are restrictions on the use of plug-in slots

Figure 3-18 shows an overview of which modules can be operated in which plug-in slots.



*4) TS-PDC (rear), all Versions, Frame numbering limited to 1 TS-PWA3-frame, no restriction with V
*5) Take care that no short to module front panel in slot on left side (slot 2 in TS-PCA3, slot A4 in TS-PWA3)

Figure 3-18 Module Configuration TS-PWA3

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4 Commissioning

4.1 Safety Instructions

When commissioning the PowerTSVP the safety instructions in Section 2 must be followed.

4.2 Setting Up

4.2.1 Rack Mounting

The rack mounting kit supplied by ROHDE & SCHWARZ must be used for rack mounting the TSVP.

WARNING!

A minimum clearance of half a height unit should be allowed above and below the PowerTSVP !
This space can be used to fit filter mats.

The TSVP is installed in six steps:

- Unscrew the four case feet from the base.
- Screw the 19 inch brackets contained in the rack mounting kit under the side handles, replacing the old screws with the longer screws.
- Remove the four rubber tips from the feet.

WARNING!

Do not unscrew the rear four feet as this will loosen the body of the case!

- Affix the self-adhesive plastic slide rails.
- Place the unit into the rack on prepared aluminum rails.
- Fix the PowerTSVP by screwing the 19 inch side brackets to the rack.

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NOTE:

Check the position of the locknuts in the rack before sliding in the PowerTSVP.

- If required, insert and attach filter mats above and below the TSVP.

An optional **telescopic rail set** is also available. The telescopic rails are fitted to the side of the “BW 2000” case. The PowerTSVP can then be pushed into the prepared support in the rack.

4.2.2 Desktop Setup

When the TSVP is set up on a desktop, the minimum gap under the unit is provided by the feet on the “BW 2000” case.

WARNING!

Do not obscure the ventilation louvers on the top of the unit! The minimum clearance of half a height unit must be ensured!

4.3 Installation

4.3.1 Safety Instructions

WARNING!

Comply with ESD (Electrostatic Discharge) regulations when fitting plug-in modules.

4.3.2 Compatibility

NOTE:

Only the ROHDE & SCHWARZ specific modules with CAN bus triggering can be plugged into the PowerTSVP.

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4.3.3 Module Installation

To install an R&S plug-in module, proceed as follows:

- Run down and power off the PowerTSVP
- Select a suitable slot (see Section 4.3.2)
- Remove the appropriate front panel by slackening off the screws

WARNING!

Check backplane connectors for bent pins! Any bent pins must be straightened!
Failure to do this may permanently damage the backplane!

- Push in the plug-in module using moderate pressure
- The top snap pin on the module must locate in the right-hand and the bottom pin in the left-hand hole on the TSVP chassis

WARNING!

Use both hands to guide the module and carefully plug it into the backplane connectors

- The module is correctly located when a distinct 'stop' can be felt
- Tighten the top and bottom screws on the front panel of the plug-in module

4.3.4 Driver Installation

The drivers to be installed for the plug-in modules will depend on the operating system and the module itself, and you should therefore consult the documentation supplied for the particular module.

4.4 Connections

4.4.1 Line Inlet

The PowerTSVP requires a supply with the range of 110 V_{AC} / 60 Hz or 230 V_{AC} / 50 Hz. Fuse protection for the line inlet must not exceed a rating of 16 A.

The PSU used in the PowerTSVP has **automatic voltage selection** between 100 and 240 VAC (see also Section 9, Technical Data).

4.4.2 Connections at the Rear

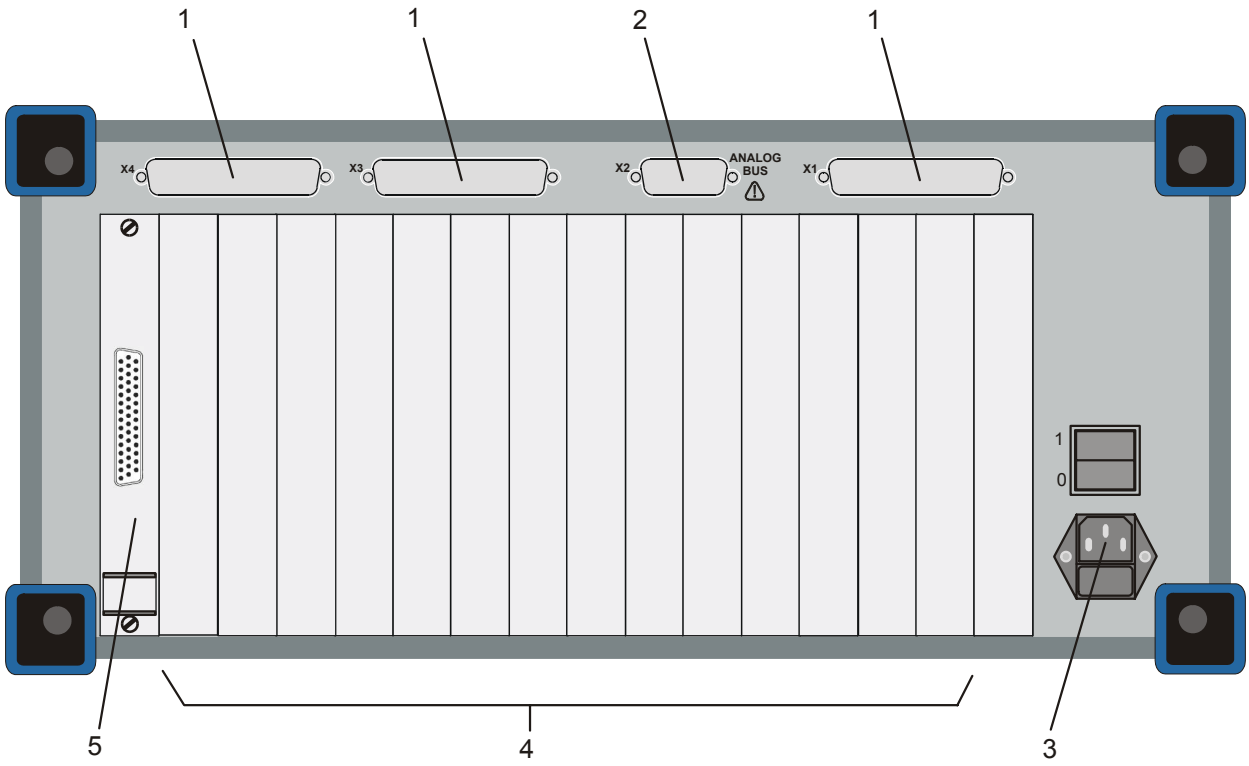

Figure 4-1 Rear Connections

1 Knockouts for system and user-specific connections
2 Analog bus connections
3 Line Inlet
4 Slots for Rear I/O modules
5 System module

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In its basic configuration, the PowerTSVP only has the power connection (3), the analog bus connection (2) and the connector for the system module (5). All other connections are system and user-specific.

System-specific connectors (e.g. D-sub) can be installed at the back of the PowerTSVP (1). You will find more details in Section 4.5: Cabling.

4.4.3 Connections at the Front

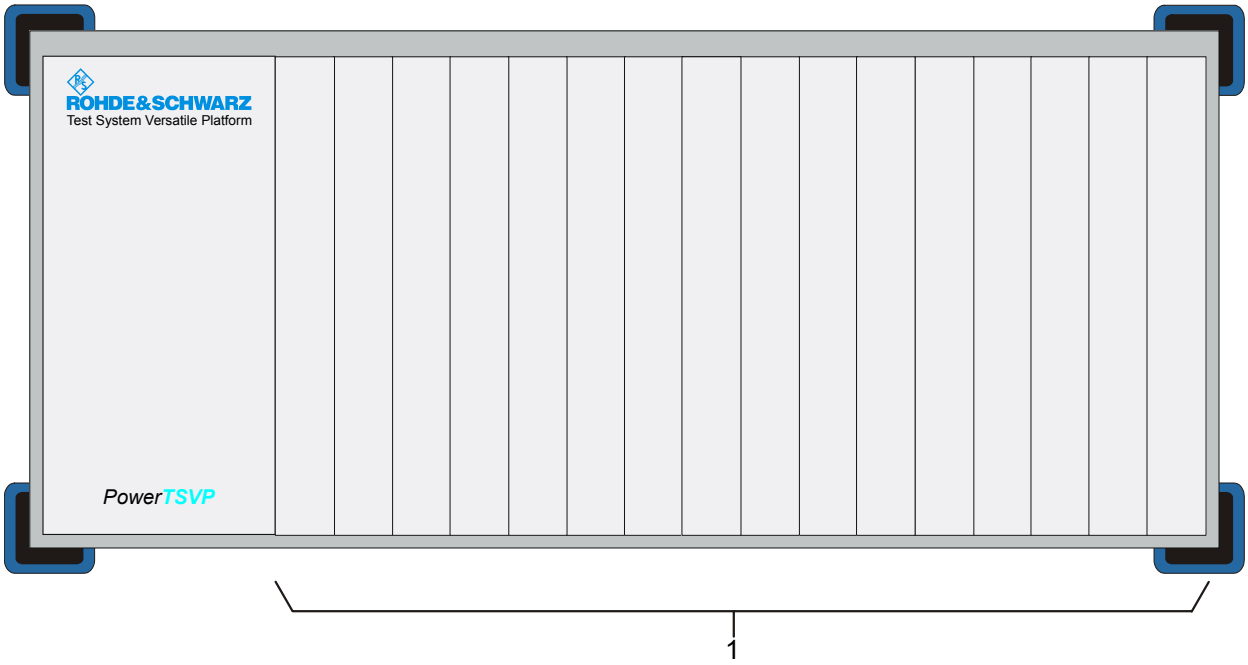

Figure 4-2 Front Connections

1 Slots (16)

The Test System Versatile Platform PowerTSVP has no connections in its basic configuration. The existing slots can be fitted with system and user-specific plug-in modules and connections.

4.5 Cabling

4.5.1 Concept

The PowerTSVP offers comprehensive options for inner, internal and external cabling.

- **Inner cabling:** Cabling by bus systems permanently installed in the PowerTSVP.
  - CAN bus on the control backplane
  - PXI Trigger bus on the control backplane
  - Analog bus on separate backplane
- **Internal cabling:** Cabling inside the case of the PowerTSVP. Here, plug-in modules are connected with connectors used in the PowerTSVP case:
  - Cabling of the analog bus
  - Cabling of ROHDE & SCHWARZ modules to rear connectors or to each other
- **External cabling:** Cabling outside the case.

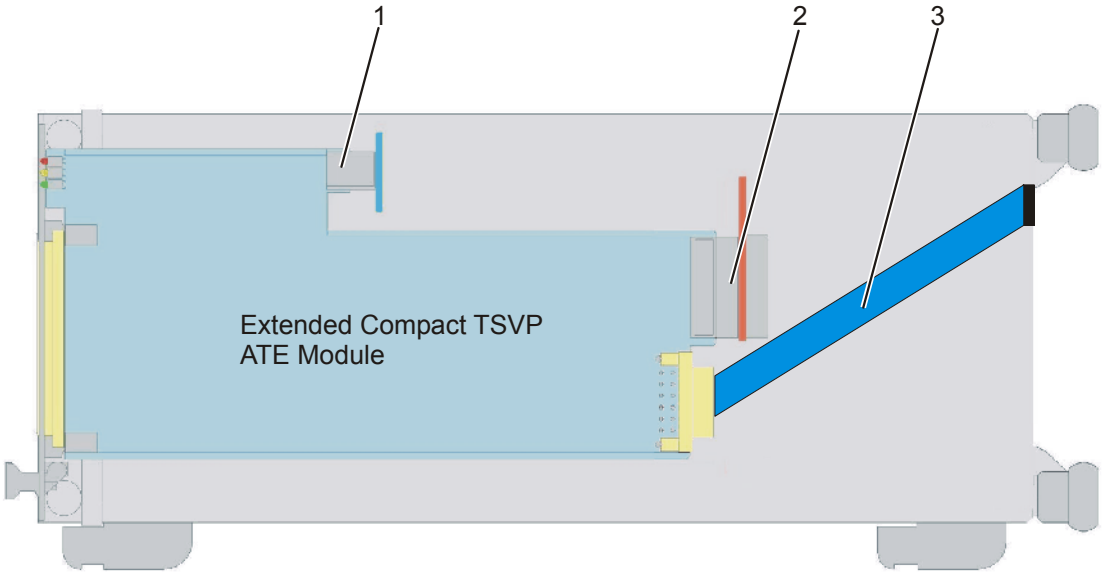

Figure 4-3 Inner and Internal Cabling Variants

1 Analog bus
2 PXI Trigger Bus
3 Cabling of R&S modules to rear connectors

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These various cabling options provide a number of benefits:

- Separating the adapter side (front) from the infeed of external devices (rear) creates a clear signal concept with no cross-wiring outside the case.
- Wiring is kept safe from inadvertent changes.
- The simple inner cabling concept means that modules can be quickly replaced during servicing. Bus connections are used instead of cable connections.
- System-specific connectors (e.g. D-sub) can be installed at the rear, from where signals are connected to the analog bus or the adapter interface. HF signals can also be carried in this way, for example.

4.5.2 Analog bus

The analog bus is available at all slots of the PowerTSVP with its own backplane. Switching modules can access the analog bus via connectors X1 ... X16 at the various slots; this is described in Section 3 “Construction”.

The following are available

- 8 bus-structured lines for user-defined signal paths up to max. 125 VDC (1 A) between ROHDE & SCHWARZ specific plug-in modules.

NOTE:

Only the Rohde & Schwarz plug-in modules use the analog bus directly. However external access to the analog bus is possible using R&S switching modules or the analog bus connector at the back of the unit.

4.5.3 PXI Trigger Bus

Measurement and switching modules can be synchronized with the PXI trigger bus. The external output of the signals is provided by the system module.

The following signals are available

- Trigger bus with 8 lines (PXI_TRIG0 ...7)

4.5.4 External Cabling

External cabling is used to connect measuring and stimuli devices as well as the UUT to the PowerTSVP.

Implementing the following concept should ensure the clarity of external cabling design:

- **Cabling to the test devices should be at the front of the TSVP**. An adapter frame can be flange-mounted here if required.
- **The cabling to measuring and stimuli devices is at the rear of the TSVP**. System and user-specific terminals and plug and socket connectors can be fitted in the back for this purpose (see Figure 4-1 and Figure 4-3).

This concept ensures a high degree of clarity, rapid adaption to different test tasks and allows the simple replacement of plug-in modules.

4.5.5 Opening the Case

ELECTROCUTION HAZARD!

- **The case of the Test System Versatile Platform PowerTSVP should only be opened by qualified engineers!**
- **Before opening the case, the PowerTSVP must be powered off and isolated from the power supply!**

WARNING!

The ESD (electrostatically sensitive device) regulations must be complied with when opening the case of the PowerTSVP.

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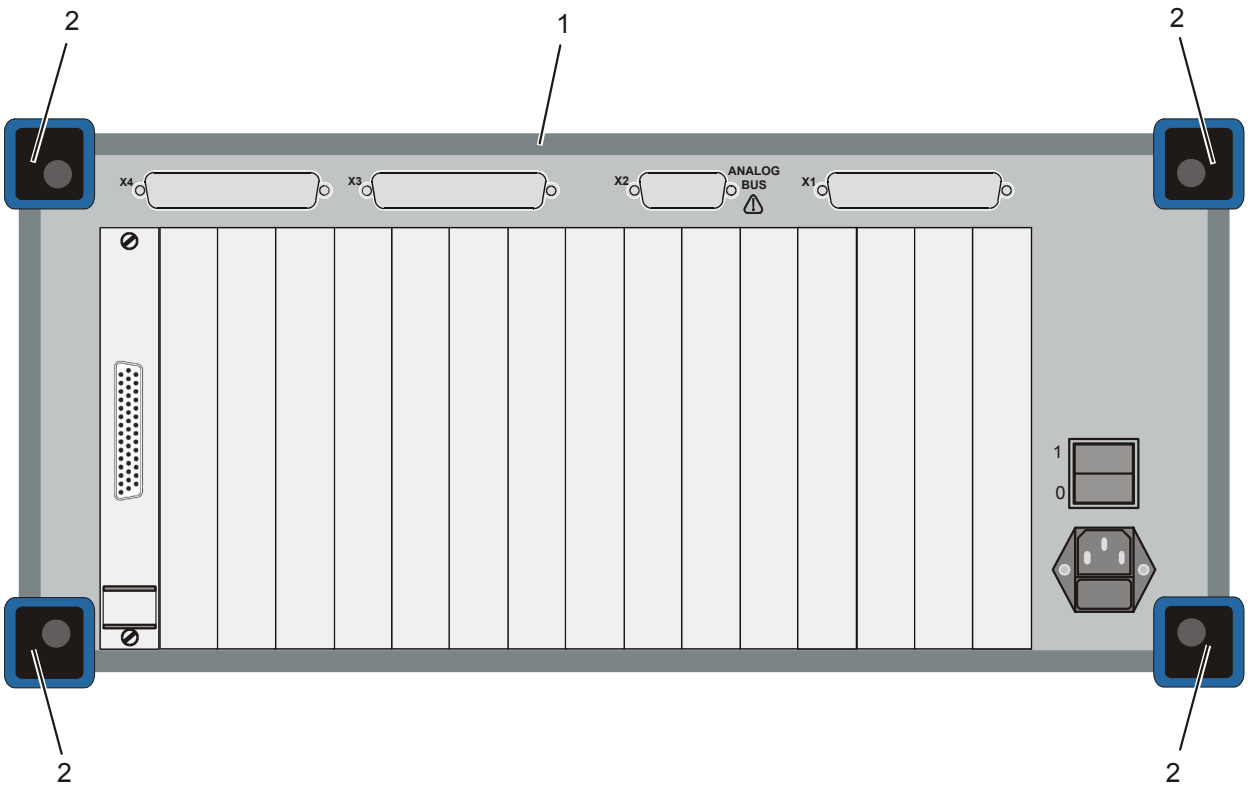

Figure 4-4 PowerTSVP Rear View

1 Case body
2 Rear case feet (4)

The case of the PowerTSVP must be opened for internal cabling purposes. To do this, proceed as follows:

1. Disconnect all connections at the front and rear of the PowerTSVP.
2. Unscrew the four feet at the back of the PowerTSVP.
3. Set the PowerTSVP on its front handles and carefully pull down the case body from the PowerTSVP.

The PowerTSVP is now accessible from all sides. The case is closed in reverse order of opening.

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5 Operation

5.1 General

The PowerTSVP does not have any controls - all operation is performed by the software.

HINWEIS:

Please refer to the appropriate documentation for details of software operation.

5.2 Self-Test

A system self-test consists of:

- A self-test of the PowerTSVP
- System self-test, including connections between the individual devices
- With rack-mounting, there is a self-test of the built-in devices, where supplied (GPIB devices, PSU etc.)

The system self-test is expandable. The self-test can also be called by remote control.

HINWEIS:

The call of the system self-test depends on the software that is used.

The DMM contacts the installed ROHDE & SCHWARZ plug-in modules in succession via the analog measuring bus. In this way it is possible to test all connections and relay contacts for volume resistance and insulation.

5th Issue 11.05

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6 Maintenance

6.1 Important User Information

NOTE:

The Test System Versatile Platform PowerTSVP is maintenance free.

DANGER!

Only clean the PowerTSVP when it is powered down.

WARNING!

Electrical interfaces must not be cleaned with liquid products such as contact spray.

6.2 Cleaning

The following equipment and materials are recommended for cleaning the Test System Versatile Platform PowerTSVP:

- Vacuum cleaner
- Brush
- Soft, lint-free cloths

WARNING!

Never use aggressive products to clean the PowerTSVP.

Depending on the environmental conditions, it may be necessary to remove the individual plug-in modules from the PowerTSVP and clean them with a vacuum cleaner.

WARNING!

Comply with ESD (electrostatic discharge) regulations when working on the plug-in modules of the PowerTSVP.

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6.3 Fuse Replacement

The power supply to the PowerTSVP is protected by fuses. These are located in the built-in plug at the rear of the PowerTSVP.

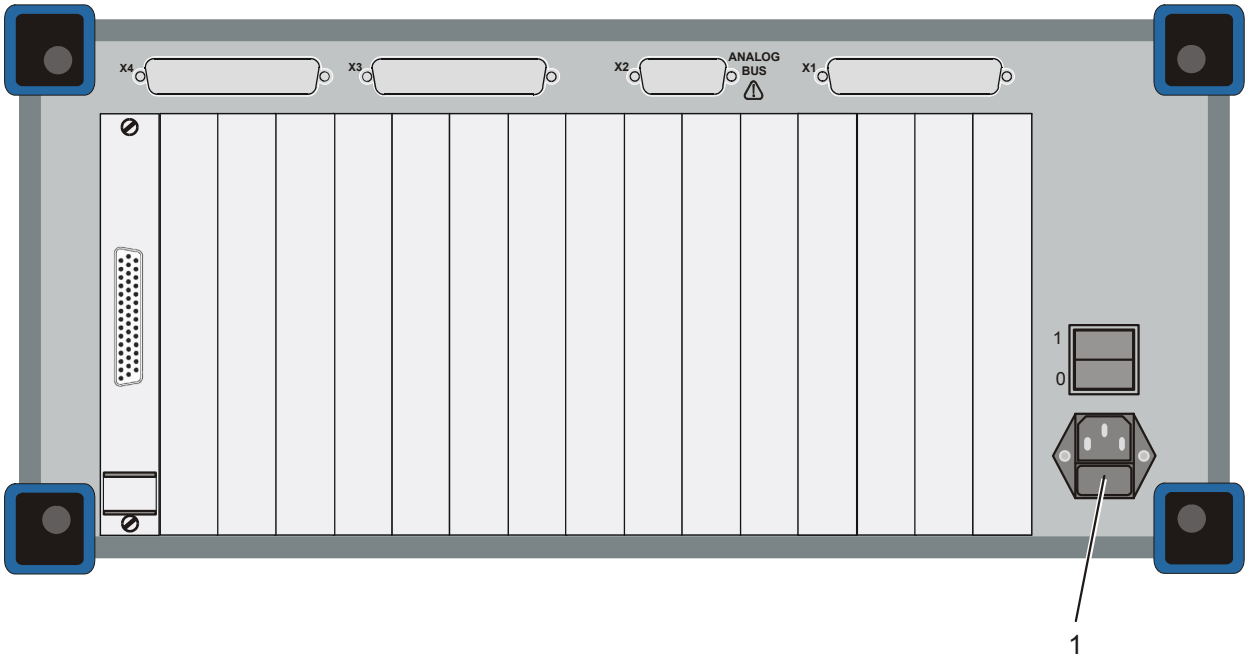

Figure 6-1 PowerTSVP Rear View

1 Built-in plug with fuses (2 x IEC 127-T6.3H/250V)

A blown fuse is replaced as follows:

1. Power off the PowerTSVP.
2. Isolate the PowerTSVP from the power supply (built-in plug).
3. Remove the fuseholder from the built-in plug.
4. Replace the blown fuses.

NOTE:

You may be able to tell a blown fuse just by looking at it. In case of doubt, test the fuse with a multimeter.

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WARNING!

You should identify the cause of the problem and rectify it before replacing the fuse.

Fuses are fitted in reverse order of removal.

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7 Plug-In Modules

7.1 General

Various types of plug-in modules can be used in the PowerTSVP (see Figure 7-1).

- Extended PowerTSVP ATE modules (fitted depth 300 mm)
- Rear I/O modules

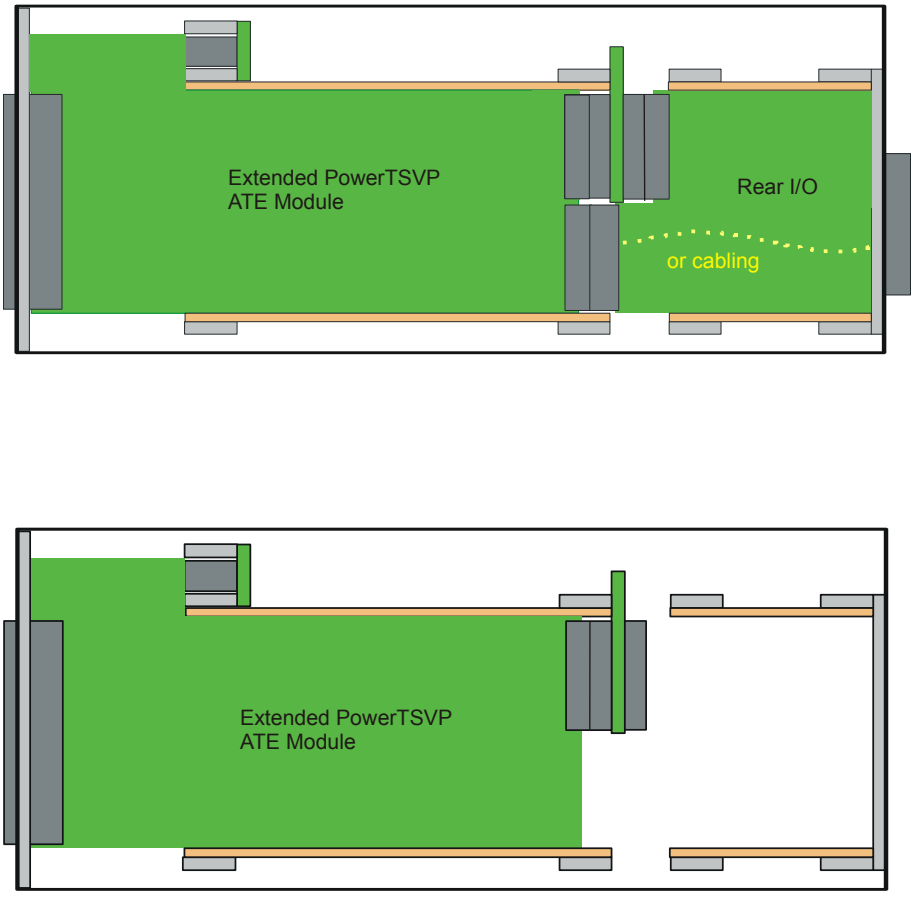

Figure 7-1 Plug-in modules in the PowerTSVP

Connectors and connector shells to DIN 41612 suitable for the front connectors of the plug-in modules are available from a number of suppliers including

Siemens, with the following reference numbers

Case	C42334-Z61-C2
Locking lever, left	C42334-Z61-C11
Locking lever, right	C42334-Z61-C12
Round cable insert	C42334-Z61-C16
96-way plug connector type R	V42254-B1240-R960 (WireWrap)

Other suppliers include Harting (shells and connectors), Erni and Panduit (connectors only).

NOTE:

With adapters, you should remember that the count sequence on connector P20 at the back of the control backplane is the mirror image of the front.

NOTE:

The plug-in modules used in the PowerTSVP are described in separate documents.

5th Issue 11.05

8 Interface Description

8.1 Control Backplane

8.1.1 Position of Interfaces

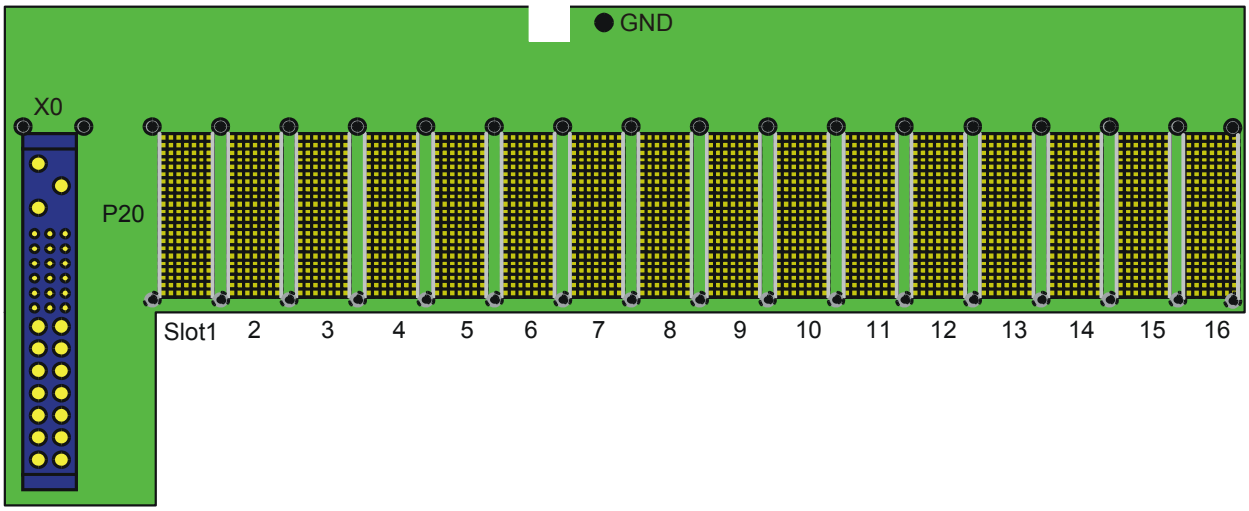

Figure 8-1 Control Backplane (Front View)

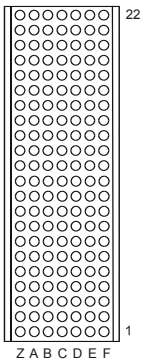

Figure 8-2 Connector P20 Front (Mating Side)

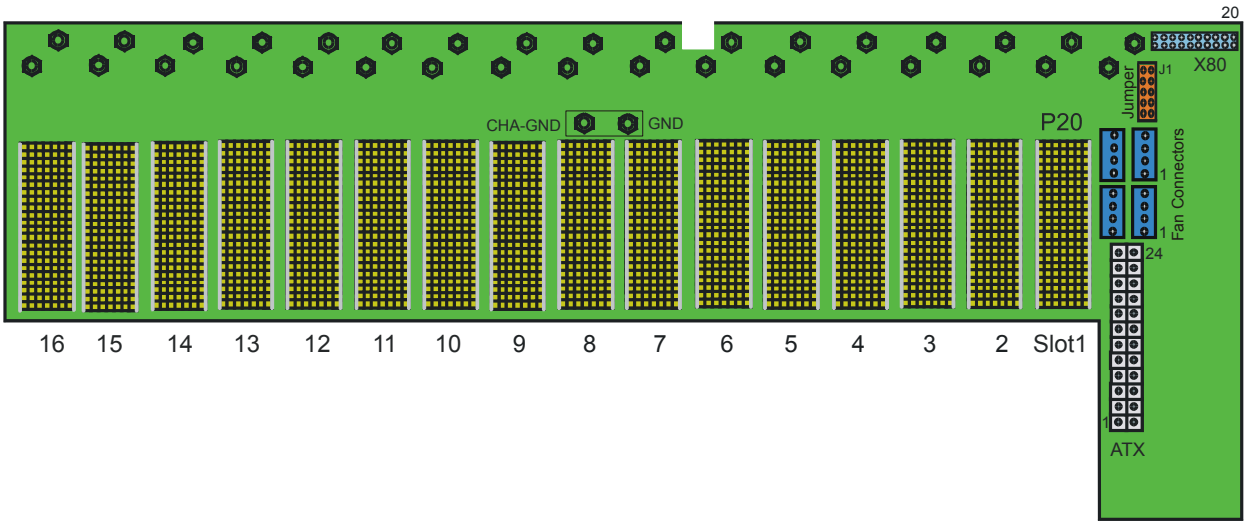

Figure 8-3 Control Backplane (Rear View)

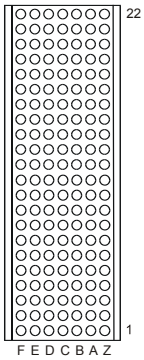

Figure 8-4 Connector P20 Rear (Mating Side)

Note: The count sequence is the mirror image of the front.

8.1.2 Connector P20 (Slots 1 ... 16)

NC = not connected, NP = not populated, BPIO = Backpanel I/O

Pin	Z	A	B	C	D	E	F	
22	GND	GA4	GA3	GA2	GA1	GA0	GND	
21	GND	PXI_LBR0	GA5	PXI_LBR1	PXI_LBR2	PXI_LBR3	GND	
20	GND	PXI_LBR4 AUX2	PXI_LBR5 AUX1	PXI_LBL0	GND	PXI_LBL1	GND	
19	GND	PXI_LBL2	GND	PXI_LBL3	PXI_LBL4 AUX2	PXI_LBL5 AUX1	GND	
18	GND	PXI_TRIG3	PXI_TRIG4	PXI_TRIG5	GND	PXI_TRIG6	GND	P20
17	GND	PXI_TRIG2	GND	RSV AUX3	PXI_STAR AUX4	PXI_CLK10	GND	
16	GND	PXI_TRIG1	PXI_TRIG0	RSV AUX5	GND	PXI_TRIG7	GND	
15	GND	PXI_BRSV DCSYNC	GND	RSV AUX6	PXI_LBL6 +5V	PXI_LBR6 +5V	GND	
14	NC	AD[35] BPIO	AD[34] BPIO	AD[33] BPIO	GND BPIO	AD[32] BPIO	NC	C
13	NC	AD[38] BPIO	GND BPIO	V(I/O) BPIO	AD[37] BPIO	AD[36] BPIO	NC	O
12	NP	AD[42] BPIO	AD[41] BPIO	AD[40] BPIO	GND BPIO	AD[39] BPIO	NP	N
11	NP	AD[45] BPIO	GND BPIO	V(I/O) BPIO	AD[44] BPIO	AD[43] BPIO	NP	N
10	NC	AD[49] BPIO	AD[48] BPIO	AD[47] BPIO	GND BPIO	AD[46] BPIO	NC	E
9	NC	AD[52] BPIO	GND BPIO	V(I/O) BPIO	AD[51] BPIO	AD[50] BPIO	NC	C
8	NC	AD[56] BPIO	AD[55] BPIO	AD[54] BPIO	GND BPIO	AD[53] BPIO	NC	T
7	NC	AD[59] BPIO	GND BPIO	V(I/O) BPIO	AD[58] BPIO	AD[57] BPIO	NC	O
6	NC	AD[63] BPIO	AD[62] BPIO	AD[61] BPIO	GND BPIO	AD[60] BPIO	NC	R
5	NC	C/BE[5]# BPIO	GND BPIO	V(I/O) BPIO	C/BE[4]# BPIO	PAR64 BPIO	NC	
4	NC	V(I/O) BPIO	PXI_BRSV BPIO	C/BE[7]# BPIO	GND BPIO	C/BE[6]# BPIO	NC	
3	GND	PXI_LBR7 BPIO	GND	PXI_LBR8 +12V	PXI_LBR9 BPIO	PXI_LBR10 BPIO	GND	
2	GND	PXI_LBR11 BPIO	PXI_LBR12 +5V	UNC BPIO	PXI_LBL7 1-WIRE	PXI_LBL8 +12V	GND	
1	GND	PXI_LBL9 BPIO	GND	PXI_LBL10 CAN_H	PXI_LBL11 CAN_L	PXI_LBL12 +5V	GND	

Table 8-1 Connector P20 up to Serial Number 100020 (Slots 1 ... 16)

Pin	Z	A	B	C	D	E	F	
22	GND	GA4	GA3	GA2	GA1	GA0	GND	
21	GND	BPIO	GA5	BPIO	BPIO	BPIO	GND	
20	GND	AUX2	AUX1	+5V	GND	+5V	GND	
19	GND	-12V	GND	+5V	AUX2	AUX1	GND	
18	GND	PXI_TRIG3	PXI_TRIG4	PXI_TRIG5	GND	PXI_TRIG6	GND	P20
17	GND	PXI_TRIG2	GND	AUX3	AUX4	PXI_CLK10	GND	
16	GND	PXI_TRIG1	PXI_TRIG0	AUX5	GND	PXI_TRIG7	GND	
15	GND	PXI_BRSVA15	GND	AUX6	+5V	BPIO	GND	
14	NC	BPIO	BPIO	BPIO	BPIO	BPIO	NC	C
13	NC	BPIO	BPIO	BPIO	BPIO	BPIO	NC	O
12	NP	BPIO	BPIO	BPIO	BPIO	BPIO	NP	N
11	NP	BPIO	BPIO	BPIO	BPIO	BPIO	NP	N
10	NC	BPIO	BPIO	BPIO	BPIO	BPIO	NC	E
9	NC	BPIO	BPIO	BPIO	BPIO	BPIO	NC	C
8	NC	BPIO	BPIO	BPIO	BPIO	BPIO	NC	T
7	NC	BPIO	BPIO	BPIO	BPIO	BPIO	NC	O
6	NC	BPIO	BPIO	BPIO	BPIO	BPIO	NC	R
5	NC	BPIO	BPIO	BPIO	BPIO	BPIO	NC	
4	NC	BPIO	PXI_BRSVB4	BPIO	BPIO	BPIO	NC	
3	GND	RSDO	GND	BPIO	RRST#	RSA0	GND	
2	GND	RSCLK	RSA2	RSA1	RSDI	+12V	GND	
1	GND	RCS#	GND	CAN_H	CAN_L	+5V	GND	

Table 8-2 Connector P20 as from Serial Number 100021 (Slots 1 ... 16)

8.1.3 Connector X0 (P47)

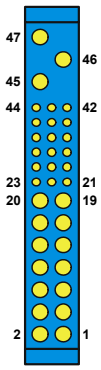

Figure 8-5 Connector X0 (P47) (Mating Side)

Pin[1]	[2]	Signal Name	Description
1-4	M	V1	V1 Output
5-12	M	RTN	V1 and V2 Return
13-18	M	V2	V2 Output
19	M	RTN	V3 Return
20	M	V3	V3 Output
21	M	V4	V4 Output
22	M	RTN	Signal Return
23	M	Reserved	Reserved
24	M	RTN	V4 Return
25	M	Reserved [3]	
26	M	Reserved	Reserved
27	S	EN#	Enable
28	M	Reserved [3]	
29	M	NC	Not connected
30	M	V1SENSE	V1 Remote Sense
31	M	Reserved [3]	
32	N	NC	Not connected
33	M	V2SENSE	V2 Remote Sense
34	M	S RTN	Sense Return
35	M	V1SHARE	V1 Current Share

Table 8-3 Assignment X0 (P47)

Pin[1]	[2]	Signal Name	Description
36	M	V3SENSE	V3 Remote Sense
37	M	Reserved [3]	
38	M	DEG#	Degrade Signal
39	M	INH#	Inhibit
40	M	Reserved [3]	
41	M	V2SHARE	V2 Current Share
42	M	FAL#	Fail Signal
43	M	Reserved [3]	
44	M	V3SHARE	V3 Current Share
45	L	CGND	Chassis Ground
46	M	CAN	AC Input Neutral
47	M	ACL	AC Input Line

Table 8-3 Assignment X0 (P47)

[1] Pin numbers illustrated are of the female backplane connector

[2] L=long length pins, M=medium length pins, S=short length pins

[3] For future options

8.1.4 ATX Connectors

Pin	Signal	Signal	Pin
12	V3 Current Share	V2 Current Share	24
11	5 V Sense	3.3 V Sense	23
10	+12 V	+5 V	22
9	FAL-	V1 Current Share	21
8	PW-OK	PRST-	20
7	GND Sense	GND	19
6	+5 V	GND	18
5	GND	GND	17
4	+5 V	PS-ON	16
3	GND	GND	15
2	+3.3 V	-12 V	14
1	+3.3 V	+3.3 V	13

Table 8-4 ATX Connector Assignment

8.1.5 Fan Connectors X90, X91, X92, X93

Pin	Signal
4	FANCTRL
3	+12V
2	NC
1	GND

Table 8-5 Assignment of X90 ... X93

5th Issue 11.05

8.1.6 Expansion Connector X80

Pin	Signal	Signal	Pin
1	PS-ON	GND	2
3	PW OK	GND	4
5	RESERVED	GND	6
7	CAN_H	CAN_L	8
9	N.C.	N.C.	10
11	+3.3 V	GND	12
13	+5V	GND	14
15	-12V	GND	16
17	+12V	GND	18
19	+12V	GND	20

Table 8-6 Assignment of X80

8.1.7 Jumper Field

J1	GA4
J2	GA5
J3	PS-ON
J4	TERM_CAN_L
J5	TERM_CAN_H

Table 8-7 Jumper Field Assignment

8.2 Analog Bus Backplane

8.2.1 Position of Interfaces

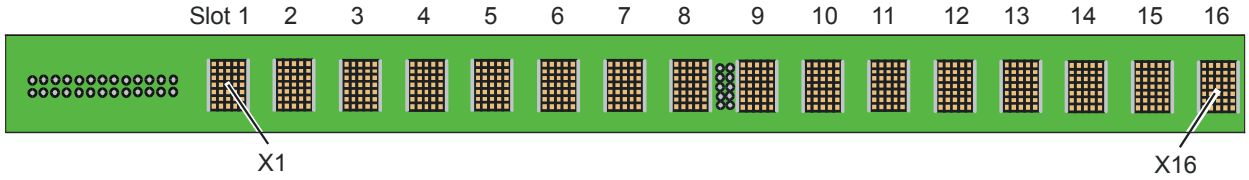

Figure 8-6 Analog Bus Backplane (Front View)

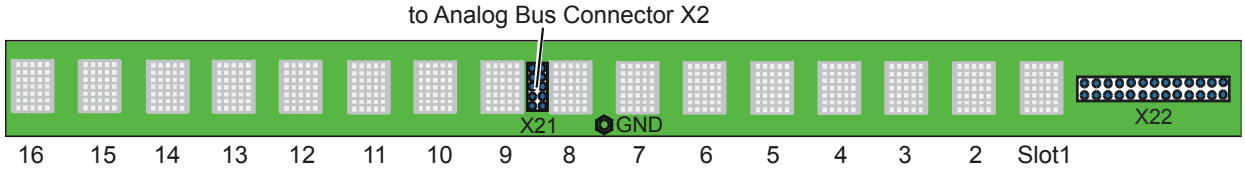

Figure 8-7 Analog Bus Backplane (Rear View)

8.2.2 Analog Bus Connectors X1 ... X16

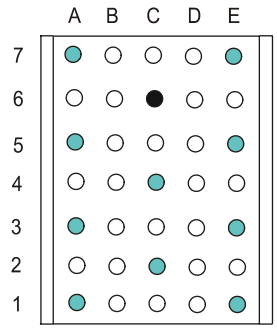

Figure 8-8 Connectors X1 ... X16 (Mating Side)

Pin	A	B	C	D	E
7	IL1_x				IL2_x
6			GND		
5	ABa1				ABc1
4			ABb1		
3	ABb2				ABc2
2			ABa2		
1	ABd1				ABd2

Table 8-8 Assignment of X1... X16

Note:
IL1_x = IL1 of the slot

8.2.3 Analog Bus Connector X21

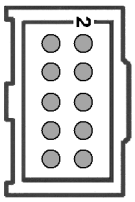

Figure 8-9 Connector X21 (Mating Side)

Pin	Signal	Pin	Signal
1	GND	2	GND
3	ABc1	4	ABa1
5	ABc2	6	ABb1
7	ABa2	8	ABb2
9	ABd2	10	ABd1

Table 8-9 Assignment of X21

5th Issue 11.05

8.2.4 Analog Bus Connector X22

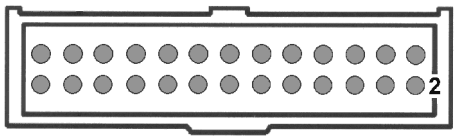

Figure 8-10 Connector X22 (Mating Side)

Pin	Signal	Pin	Signal
1	IL1_5	2	IL2_5
3	IL1_6	4	IL2_6
5	IL1_7	6	IL2_7
7	IL1_8	8	IL2_8
9	IL1_9	10	IL2_9
11	IL1_10	12	IL2_10
13	IL1_11	14	IL2_11
15	IL1_12	16	IL2_12
17	IL1_13	18	IL2_13
19	IL1_14	20	IL2_14
21	IL1_15	22	IL2_15
23	IL1_16	24	IL2_16
25	GND	26	GND

Table 8-10 Assignment of X22

Note:
IL1_5 = IL1 of slot 5

8.3 Power Backplane (Option)

8.3.1 Position of Interfaces

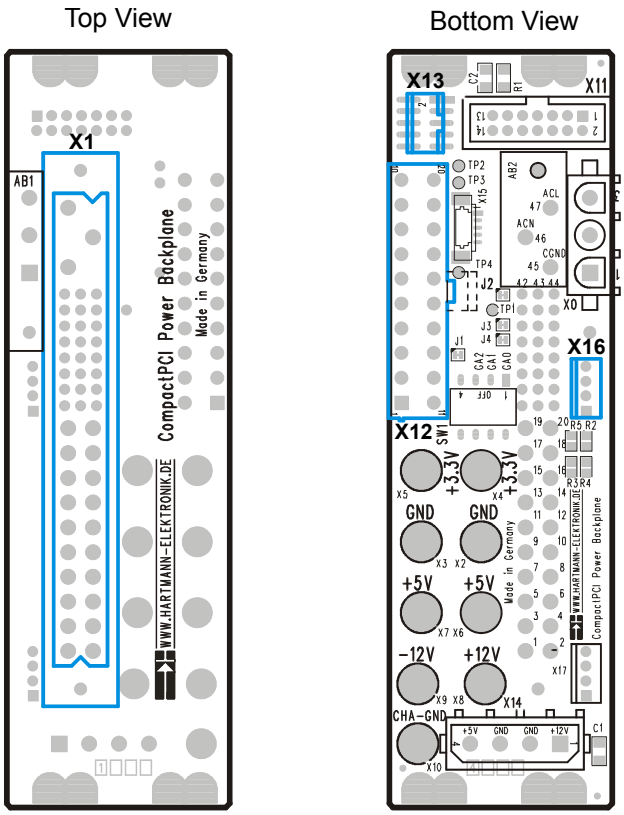

Figure 8-11 Power Backplane

8.3.2 Power Backplane Utility Connector X13

Pin	Signal	Signal	Pin
1	PRST-	FAL-	6
2	DEG-	+3.3 V Sense	7
3	+3.3V	GND Sense (3.3V)	8
4	+5V	+5V Sense	9
5	GND	GND Sense (5V)	10

Table 8-11 Assignment of X13

8.3.3 Power Backplane ATX Connector X12

Pin	Signal	Signal	Pin
10	+12 V	+5 V	20
9	NC	+5 V	19
8	PW-OK	NC	18
7	GND	GND	17
6	+5 V	GND	16
5	GND	GND	15
4	+5 V	PS-ON	14
3	GND	GND	13
2	+3.3 V	-12 V	12
1	+3.3 V	+3.3 V	11

Table 8-12 Assignment of X12

8.3.4 Power Backplane Connector X16

Pin	Signal
1	V1 Current Share
2	V2 Current Share
3	V3 Current Share
4	NC

Table 8-13 Assignment of X16

8.3.5 Power Backplane Connector X1 (P47)

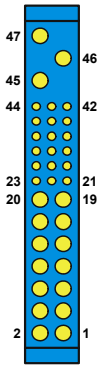

Figure 8-12 Connector X1 (P47) (Mating Side)

Pin [1]	[2]	Signal Name	Description
1-4	M	V1	V1 Output
5-12	M	RTN	V1 and V2 Return
13-18	M	V2	V2 Output
19	M	RTN	V3 Return
20	M	V3	V3 Output
21	M	V4	V4 Output
22	M	RTN	Signal Return
23	M	Reserved	Reserved
24	M	RTN	V4 Return
25	M	Reserved [3]	
26	M	Reserved	Reserved
27	S	EN#	Enable
28	M	Reserved [3]	
29	M	NC	Not connected
30	M	V1SENSE	V1 Remote Sense
31	M	Reserved [3]	
32	N	NC	Not connected
33	M	V2SENSE	V2 Remote Sense
34	M	S RTN	Sense Return
35	M	V1SHARE	V1 Current Share

Table 8-14 Assignment of X1 (P47)

Pin [1]	[2]	Signal Name	Description
36	M	V3SENSE	V3 Remote Sense
37	M	Reserved [3]	
38	M	DEG#	Degrade Signal
39	M	INH#	Inhibit
40	M	Reserved [3]	
41	M	V2SHARE	V2 Current Share
42	M	FAL#	Fail Signal
43	M	Reserved [3]	
44	M	V3SHARE	V3 Current Share
45	L	CGND	Chassis Ground
46	M	CAN	AC Input Neutral
47	M	ACL	AC Input Line

Table 8-14 Assignment of X1 (P47)

[1] Pin numbers illustrated are of the female backplane connector

[2] L=long length pins, M=medium length pins, S=short length pins

[3] For future options

8.4 Interfaces of the TS-PSYS2

8.4.1 TS-PSYS2 Connector X20

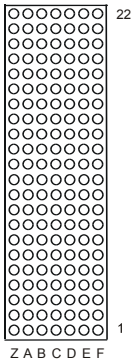

Figure 8-13 TS-PSYS2 Connector X20 (Mating Side)

NC = not connected, NP = not populated

Pin	Z	A	B	C	D	E	F	
22	GND	GA4	GA3	GA2	GA1	GA0	GND	
21	GND	PXI_LBR0	GA5	PXI_LBR1	PXI_LBR2	PXI_LBR3	GND	
20	GND	AUX2	AUX1	+5 V	GND	+5 V	GND	
19	GND	-12 V	GND	+5 V	AUX2	AUX1	GND	
18	GND	PXI_TRIG3	PXI_TRIG4	PXI_TRIG5	GND	PXI_TRIG6	GND	
17	GND	PXI_TRIG2	GND	AUX3	AUX4	PXI_CLK10	GND	X20
16	GND	PXI_TRIG1	PXI_TRIG0	AUX5	GND	PXI_TRIG7	GND	
15	GND	DC_SYNC	GND	AUX6	+5 V		GND	C
14	NC						NC	O
13	NC						NC	N
12	NP						NP	N
11	NP			IL1			NP	E
10	NC						NC	C
9	NC			IL3			NC	T
8	NC						NC	O
7	NC			IL2			NC	R
6	NC						NC	
5	NC						NC	
4	NC						NC	
3	GND		GND				GND	
2	GND					+12 V	GND	
1	GND		GND	CAN1_H	CAN1_L	+5 V	GND	

Table 8-15 TS-PSYS2 Assignment X20

8.4.2 TS-PSYS2 Connector X30

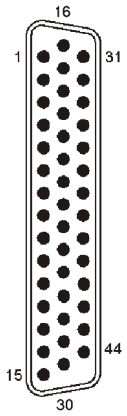

Figure 8-14 TS-PSYS2 Connector X30 (Mating Side)

Pin	Signal	Pin	Signal	Pin	Signal
1	AUX1	16	CLK10_IN	31	TRIG0
2	AUX2	17	CLK10_OUT	32	TRIG1
3	AUX3	18	Reserved	33	TRIG2
4	AUX4	19	GND	34	TRIG3
5	AUX5	20	+4.5 V	35	TRIG4
6	AUX6	21	+11.5 V	36	TRIG5
7	TEMP_OUT	22	GND	37	TRIG6
8	OUT1_COM	23	OUT1_NO	38	TRIG7
9	OUT2_COM	24	OUT2_NO	39	CAN2_H
10	OUT3_COM	25	OUT3_NO	40	CAN2_L
11	OUT4_COM	26	OUT4_NO	41	CAN1_H
12	IN1_H	27	IN1_L	42	CAN1_L
13	IN2_H	28	IN2_L	43	GND
14	IN3_H	29	IN3_L	44	CHA-GND
15	IN4_H	30	IN4_L		

Table 8-16 TS-PSYS2 Assignment X30

8.4.3 TS-PSYS2 Jumper Field X40

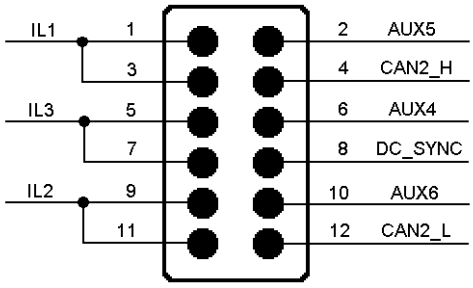

Figure 8-15 Signals at the TS-PSYS2 Jumper Field X40

8.4.4 TS-PSYS2 Jumper JP2

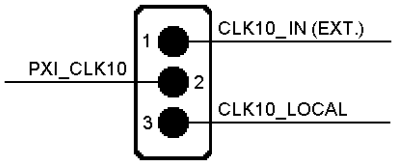

Figure 8-16 Signals at the TS-PSYS2 Jumper JP2

8.4.5 TS-PSYS2 Jumper JP6 and JP7

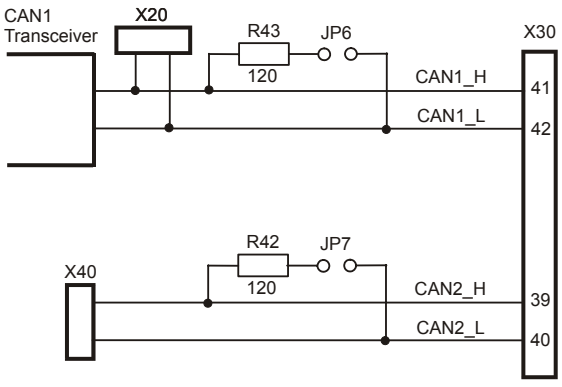

Figure 8-17 TS-PSYS2 Jumper JP6 and JP7

8.4.6 TS-PSYS2 Jumper JP8

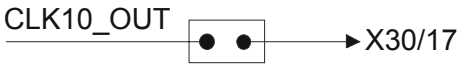

Figure 8-18 Signal at the TS-PSYS2 Jumper JP8

8.5 External Analog Interface

8.5.1 Analog Bus Connector X2

The analog bus connector X2 is located at the back of the PowerTSVP and is connected to analog bus connector X21 on the analog bus backplane.

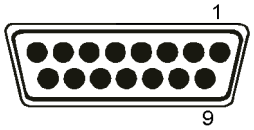

Figure 8-19 Analog Bus Connector X2 (Mating Side)

Pin	Signal
1	GND
2	ABc1
3	GND
4	ABc2
5	GND
6	ABa2
7	GND
8	ABd2
9	GND
10	ABa1
11	GND
12	ABb1
13	GND
14	ABb2
15	ABd1

Table 8-17 Assignment of X2

5th Issue 11.05

9 Technical Data

HINWEIS:

In the event of any discrepancies between data in this manual and the technical data in the data sheet, the data sheet takes precedence.

9.1 Specification

Control Backplane

Bus Systems	CAN 2.0b, 1 Mbit PXI Trigger bus, 8 signals
Slots	16 R&S switch modules, R&S Rear I/O modules (opt.) 1 x Peripheral CAN, Rear I/O with wiring 1 x PSU CompactPCI, P47 Connector 1 x expansion, e.g. for redundant PSU (UUT supply)

System Module	Rear I/O interface CompactPCI according to CAN Bus (2 x CAN 2.0b) Local CAN node ATMEL 89C51CC01: 4 x outputs, PhotoMos relays 42 Vrms 4 x inputs, optocouplers, 2.4 V ... 42 Vrms, 5 mA 2 x switchable ext. voltage 4.5 V at 1 A; 11.5 V at 1 A 8 x switchable ext. trigger input/outputs 4 x monitoring: Temperature; 5 V; +12 V; -12 V buffered PXI clock 10 MHz, 2 ppm, 1 ppm/year

Analog Bus Backplane

Analog Bus Lines	8 (connectors at the back)
Voltage	125 Vrms max.
Current	1 A max.
Bandwidth	40 MHz min. (3 dB)
Crosstalk (typical) without plug-in modules	<-60 dB (100 kHz) <-45 dB (1 MHz) <-26 dB (10 MHz)

5th Issue 11.05

9.2 General Data

Nominal temperature range	+5 °C ... +40 °C
Operating temperature range	0 °C ... +50 °C
Storage temperature range	-40 °C ... +70 °C
Humidity	+40 C, 95% rel. humidity, non condensing
Cooling	4 fans, low-noise, temperature controlled
EMC	according to EMC Directive 89/336/EEC and Standard EN61326
Mechanical Data (non-operating state)	
Vibration, sinusoidal	according to ICE1010-1, EN611010, MIL-T-28800 D class 5, 5 Hz ... 150 Hz, max. 2 g at 55 Hz, 55 Hz ... 150 Hz, 0.5 g constant
Vibration, optional	according to DIN IEC60068-2-64, 10 Hz ... 30 Hz, acceleration 1.2 g
Shock	according to MIL-STD 810D 40 g shock spectrum
Electrical Safety	CE, DIN EN6010-1
PSU AC)	Standard CompactPCI PSU, 250 W, P47 connector
Input voltage	100 V ... 240 V 10 % (AC)
Input frequency	50 Hz ... 60 Hz 5 %
Current consumption	250 VA max.
Output voltages	3.3 V at 40 A max. 5.0 V at 40 A max. +12 V at 5.5 A max. -12 V at 1.5 A max.
Dimensions	465 mm x 193 mm x 517 mm (19", 4U)
Rack mounting set	Standard mounting BW2000
Weight	
Basic unit	9.3 kg

5th Issue 11.05

9.2.1 Dimensions and Weight of the TS-PSYS2

Dimensions	
Height	100 mm (3U) board height, 4U front plate
Width	18 mm
Length	board length approx. 80 mm
Weight	200 g