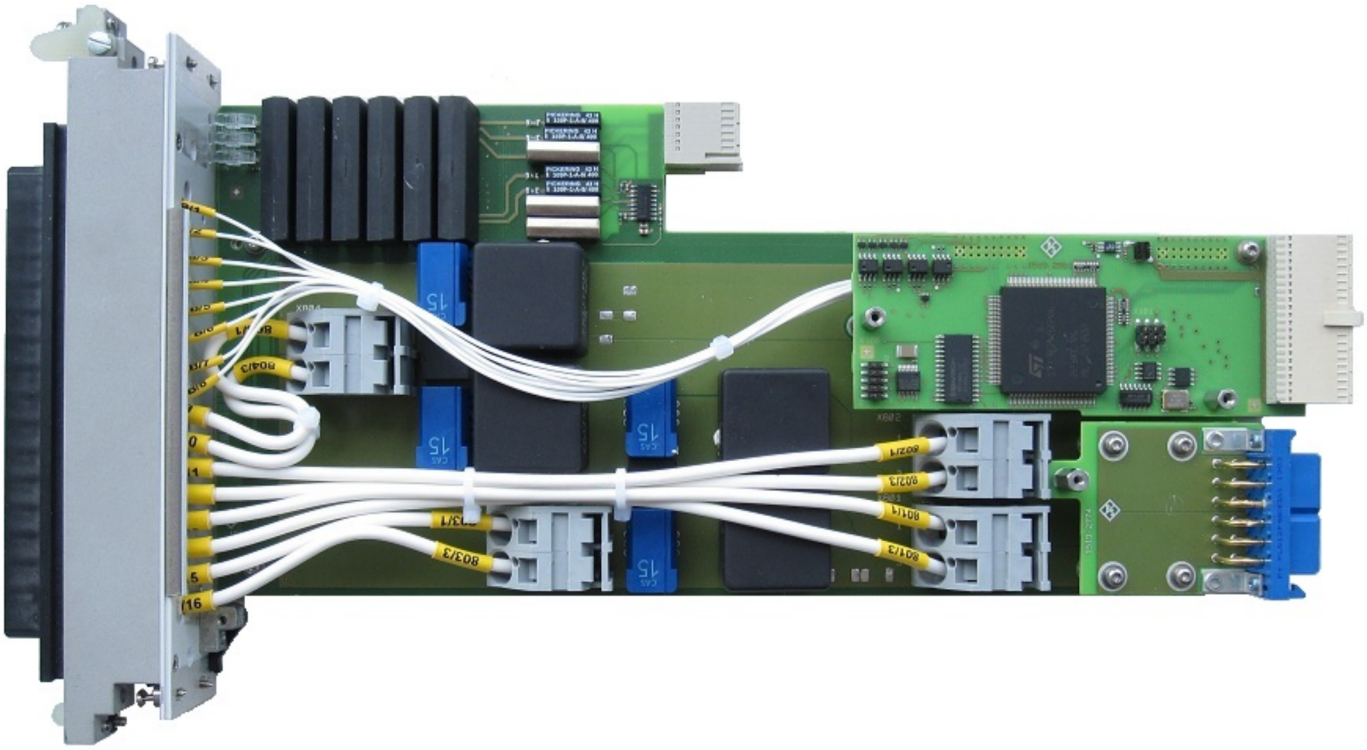
R&S®TS-PSM5
High-Power Switch Module
User Manual



1178280902
Version 02

ROHDE&SCHWARZ
Make ideas real

This manual describes the following R&S®TSVP modules:

- R&S®TS-PSM5
- R&S®TS-PRIO5

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1178.2809.02 | Version 02 | R&S®TS-PSM5

The following abbreviations are used throughout this manual: R&S®TS-PSM5 is abbreviated as R&S TS-PSM5 and R&S®TS-PRIO5 is abbreviated as R&S TS-PRIO5.

Contents

1 Safety information (multilingual)

This option or accessory is designed for a specific Rohde & Schwarz product. Multilingual safety information is delivered with the product. Follow the provided installation instructions.

Esta opción o este accesorio están diseñados para un producto Rohde & Schwarz concreto. El producto va acompañado de información de seguridad en varios idiomas. Siga las instrucciones de instalación puestas a disposición.

Diese Option oder dieses Zubehör ist für ein bestimmtes Rohde & Schwarz Produkt vorgesehen. Mit dem Produkt werden mehrsprachige Sicherheitsinformationen geliefert. Befolgen Sie die mitgelieferten Installationsanweisungen.

Cette option ou cet accessoire est conçu pour un produit Rohde & Schwarz spécifique. Des informations de sécurité multilingues sont fournies avec le produit. Suivez les instructions d'installation fournies.

Questa funzione opzionale o accessoria è progettata per un prodotto Rohde & Schwarz specifico. Con il prodotto sono fornite informazioni sulla sicurezza in formato multilingue. Seguire le istruzioni di installazione allegate.

Esta(e) opção ou acessório foi concebida(o) para um produto específico da Rohde & Schwarz. Serão fornecidas informações de segurança multilingues com o produto. Siga as instruções de instalação fornecidas.

Αυτή η προαιρετική επιλογή ή εξάρτημα έχει σχεδιαστεί για συγκεκριμένο προϊόν Rohde & Schwarz. Μαζί με το προϊόν παρέχονται πληροφορίες ασφαλείας σε πολλές γλώσσες. Ακολουθήστε τις παρεχόμενες οδηγίες εγκατάστασης.

Din l-għażla jew aċċessorju huma mfassla għal prodott Rohde & Schwarz speċifiku. L-informazzjoni multilingwi dwar is-sikurezza hija pprovduta mal-prodott. Segwi l-istruzzjonijiet ipprovduti għall-installazzjoni.

Deze optie of dit accessoire is ontwikkeld voor een specifiek product van Rohde & Schwarz. Het product wordt geleverd met veiligheidsinformatie in meerdere talen. Volg de meegeleverde installatie-instructies.

Denne mulighed eller tilbehørsdel er designet til et specifikt Rohde & Schwarz produkt. En flersproget sikkerhedsanvisning leveres sammen med produktet. Følg de medfølgende installationsanvisninger.

Detta tillval eller tillbehör är avsett för en särskild produkt från Rohde & Schwarz. Säkerhetsinformation på flera språk medföljer produkten. Följ de medföljande installationsanvisningarna.

Tämä vaihtoehto tai lisävaruste on suunniteltu tietylle Rohde & Schwarz -yrityksen tuotteelle. Tuotteen mukana on toimitettu monikieliset turvallisuusohjeet. Noudata annettuja asennusohjeita.

Dette alternativet eller ekstrautstyret er utformet for et spesifikt Rohde & Schwarz produkt. Flerspråklig sikkerhetsinformasjon leveres med produktet. Overhold installasjonsveiledningen som følger med.

See valik või lisaseade on mõeldud konkreetsele Rohde & Schwarz tootele. Tootega on kaasas mitmekeelne ohutusteave. Järgige kaasasolevaid paigaldusjuhiseid.

Šī opcija vai piederums ir izstrādāts īpaši Rohde & Schwarz produktam. Produktam pievienota drošības informācija vairākās valodās. Ievērojiet sniegtos uzstādīšanas norādījumus.

Ši parinktis ar priedas skirti konkrečiam Rohde & Schwarz gaminiui. Su gaminiu pateikiama saugos informacijos keliomis kalbomis. Laikykitės pateikiamų montavimo nurodymų.

Þessi auka- eða fylgibúnaður er hannaður fyrir tiltekna Rohde & Schwarz vöru. Öryggisupplýsingar á mörgum tungumálum fylgja með vörunni. Fylgið meðfylgjandi uppsetningarleiðbeiningum.

Tá an rogha nó an oiriúint seo ceaptha le haghaidh táirge Rohde & Schwarz sonrach. Cuirtear eolas sábháilteachta ilteangach ar fáil leis an táirge. Lean na treoracha suiteála a thugtar.

Эта опция или принадлежность предназначена для конкретного продукта Rohde & Schwarz. В комплект поставки продукта входят инструкции по технике безопасности на нескольких языках. Соблюдайте прилагаемые инструкции по установке.

Ця опція або приладдя призначені для конкретного виробу Rohde & Schwarz. Інструкції з техніки безпеки кількома мовами постачаються разом із виробом. Дотримуйтеся наданих інструкцій зі встановлення.

Ta opcja lub akcesorium jest przeznaczone do określonego produktu Rohde & Schwarz. Dostarczany produkt zawiera informacje w wielu językach dotyczące bezpieczeństwa. Należy postępować zgodnie z dostarczonymi instrukcjami instalacji.

Tato varianta nebo příslušenství je určeno pro konkrétní produkt Rohde & Schwarz. S produktem jsou dodávány vícejazyčné bezpečnostní informace. Řiďte se přiloženými pokyny k instalaci.

Táto verzia alebo príslušenstvo je navrhnutá pre špecifický výrobok Rohde & Schwarz. S výrobkom sa dodávajú viacjazyčné bezpečnostné pokyny. Riaďte sa dodanými pokynmi na inštaláciu.

Ta možnost ali dodatek je zasnovan za določen izdelek podjetja Rohde & Schwarz. Izdelku so priložena varnostna navodila v več jezikih. Upoštevajte priložena navodila za namestitev.

Ezt a beállítást vagy tartozékot egy adott Rohde & Schwarz termékhez tervezték. A termékhez többnyelvű biztonsági információt mellékelünk. Kövesse a mellékelt szerelési utasításokat.

Тази опция или аксесоар са проектирани за специфичен продукт на Rohde & Schwarz. Многоезикова информация за безопасност се доставя с продукта. Следвайте предоставените инструкции за монтаж.

Ova opcija ili oprema namijenjena je za određeni proizvod tvrtke Rohde & Schwarz. Uz proizvod su dostavljene sigurnosne napomene na više jezika. Pratite isporučene upute za ugradnju.

Ova opcija ili pribor je dizajniran za određeni Rohde & Schwarz proizvod. Proizvodu su priložene sigurnosne informacije na više jezika. Slijedite priložena uputstva za instalaciju.

Ova opcija ili dodatni pribor je projektovan za određeni Rohde & Schwarz proizvod. Bezbednosne informacije na više jezika se isporučuju uz proizvod. Sledite dostavljena uputstva za instalaciju.

Această opțiune sau acest accesoriu a fost conceput pentru un produs specific Rohde & Schwarz. Informațiile multilingve privind siguranța sunt livrate împreună cu produsul. Urmați instrucțiunile de instalare furnizate.

Ky opsion ose aksesor është krijuar për një produkt specifik Rohde & Schwarz. Bashkë me produktin jepen edhe informacionet e sigurisë në shumë gjuhë. Ndiqni udhëzimet e dhëna të instalimit.

Оваа опција или додаток се наменети за одреден производ на Rohde & Schwarz. Со производот се испорачани повеќејазични безбедносни упатства. Следете ги дадените упатства за инсталација.

Bu opsiyon veya aksesuar, belirli bir Rohde & Schwarz ürünü için tasarlanmıştır. Çok dilli güvenlik uyarıları ürünle birlikte teslim edilir. Size sağlanan kurulum talimatlarına uyun.

אפשרות זו או האביזר מיועדים למוצר ספציפי של Rohde & Schwarz. מידע רב-לשוני בנושא בטיחות מצורף למוצר. יש לפעול בהתאם להנחיות ההתקנה המצורפות.

تم تصميم هذا الخيار أو الملحق لمنتج معين من منتجات Rohde & Schwarz. يتم تزويد معلومات السلامة متعددة اللغات مع المنتج. اتبع تعليمات التركيب الموضحة.

این قابلیت یا وسیله جانبی منحصراً برای محصول به خصوص Rohde & Schwarz طراحی شده است. اطلاعات ایمنی چندزبانه همراه این دستگاه ارائه شده است. دستورالعمل‌های نصب ارائه شده را دنبال کنید.

اس اختیار یا حصے کو مخصوص Rohde & Schwarz پروڈکٹ کے لئے تیار کیا گیا ہے۔ پروڈکٹ کے ساتھ کثیر السانی زبانوں میں تحفظ کی معلومات فراہم کی جاتی ہیں۔ فراہم کردہ تنصیب کی ہدایات پر عمل کریں۔

Şu opsiýa ýa-da esbap Rohde & Schwarz anyk önüm üçin niýetlenilen. Dürli dildäki howpsuzlyk barada maglumat önüm bilen bile üpjün edilýär. Üpjün edilen gurnama ugrukdyrmalaryny ýerine ýetiriň.

इस विकल्प या एक्सेसरी को एक विशेष Rohde & Schwarz उत्पाद के लिए डिज़ाइन किया गया है. उत्पाद के साथ बहुभाषी सुरक्षा जानकारी दी जाती है. प्रदान किए गए इंस्टालेशन अनुदेशों का पालन करें.

本**选**件或附件**专门设计**用于特定的 Rohde & Schwarz **产**品。**产**品随附多**种语**言版本的安全**资讯**。**谨**遵文件中的安装**说**明。

本オプションアクセサリは、特定の Rohde & Schwarz 製品向けに設計されています。多言語で記載された安全情報が製品に付属します。付属のインストール手順に従ってください。

이 옵션 또는 액세서리는 특정 Rohde & Schwarz 제품용으로 설계되었습니다. 제품과 함께 다국어로 작성된 안전 정보가 제공됩니다. 함께 제공된 설치 지침을 따르십시오.

本選配或配件專門設計用於特定的 Rohde & Schwarz **產**品。**產**品隨附多種語言版本的安全資訊。遵守文件中的安裝**說**明。

Tùy chọn hoặc phụ kiện này dành riêng cho một sản phẩm Rohde & Schwarz cụ thể. Thông tin an toàn đa ngôn ngữ được cung cấp kèm theo sản phẩm. Thực hiện theo hướng dẫn lắp đặt kèm theo.

ตัวเลือกหรืออุปกรณ์เสริมนี้ออกแบบมาสำหรับผลิตภัณฑ์ Rohde & Schwarz โดยเฉพาะ โดยจะมีการจัดส่งข้อมูลด้านความปลอดภัยหลายภาษามาให้พร้อมกับผลิตภัณฑ์ ปฏิบัติตามคำแนะนำในการติดตั้งที่ให้ไว้

Pilihan atau aksesori ini direka bentuk untuk produk Rohde & Schwarz yang tertentu. Maklumat keselamatan berbilang bahasa disertakan bersama produk. Ikut arahan pemasangan yang diberikan.

Opsi atau aksesori ini dirancang untuk produk Rohde & Schwarz tertentu. Informasi keamanan dalam beberapa bahasa juga disertakan bersama produk. Ikuti petunjuk pemasangan yang disediakan.

Esta opción o este accesorio están diseñados para un producto Rohde & Schwarz en concreto. El producto va acompañado de información de seguridad en varios idiomas. Siga las instrucciones de instalación proporcionadas con el producto.

Esta opção ou acessório foi desenvolvido para um produto Rohde & Schwarz específico. Informações de segurança em vários idiomas acompanham o produto. Siga as instruções de instalação disponibilizadas.

2 Documentation overview

This section provides an overview of the R&S TSVP (test system versatile platform) user documentation.

All documents are delivered with the Generic Test Software Library ("R&S GTSL") installation package. After installing the software, you can open all the documentation from the Windows "Start" menu. Additionally, you can find detailed information about the software interfaces in the "R&S GTSL Help" folder in the Windows "Start" menu.

The user documentation and "R&S GTSL" installation package are also available for download in GLORIS at:

https://gloris.rohde-schwarz.com/

For details, see the R&S TSVP Getting Started manual.

2.1 Getting started manual

Introduces the R&S TSVP (test system versatile platform) and describes how to set up and start working with the product. It includes safety information.

A printed version is delivered with the instrument.

2.2 User manuals

Separate manuals are provided for the base units, the individual plug-in module types, as well as for the control software and the calibration tool:

- Base unit manual
  The base unit user manuals introduce the base units and describes how to set up and operate the product. It includes safety information and information on maintenance and instrument interfaces. It includes the contents of the getting started manual.
- Plug-in module manuals
  Contain the description of the specific modules. Basic information on setting up the R&S TSVP (test system versatile platform) is not included.
- In-System calibration user manuals
  Provide all the information required for installation and operation of the in-system calibration R&S TS-ISC solution.
- Control software
  - R&S GTSL
    Generic Test Software Library
  - R&S EGTSL
    Enhanced Generic Test Software Library
  - R&S IC-Check

Generic Test Software Library

2.3 System manual

Describes the complete R&S TSVP (test system versatile platform) as a whole, including the combined use of R&S CompactTSVP and R&S PowerTSVP, plug-in modules and generic test software. It also includes typical use cases.

Additionally, it describes known installation problems (hardware and software) along with possible solutions.

2.4 Service manual

Describes the self-test to check correct operation, troubleshooting and fault elimination, and contains mechanical drawings and spare part lists.

2.5 Printed safety instructions

Provides safety information in many languages. The printed document is delivered with the product.

2.6 Brochures and specifications

Separate brochures are provided for the base unit, the individual plug-in module types, as well as for the control software. The brochures provide an overview of the base units and each additional module, and also contain the technical specifications. They also list the hardware options and their order numbers, and optional accessories.

2.7 Release notes and open source acknowledgment

The release notes list new features, improvements and known issues of the current software version. In addition, the available firmware versions and the firmware update procedure for plug-in modules are described.

The open-source acknowledgment document provides verbatim license texts of the used open source software.

3 Welcome to the R&S TS-PSM5

The R&S TS-PSM5 high-power switch module is inteded for use in the chassis of the R&S TSVP base unit. The module occupies two slots. Control of the module is via the CAN bus.

The module is available in two versions:

- It can be ordered with a connector of the Virginia Panel Corp. (VPC) on the front of the module as R&S TS-PSM5 (variant 03), order no. 1519.2768.03. The connector is connected to the individual channels of the module via terminals on the base board using a pre-assembled cable set.
- The R&S TS-PSM5B (variant 02), order no. 1519.2768.02, is delivered without VPC, the user can connect his loads or power supply units with his own cables via apertures on the front plate of the module to the terminals of the channels.

A soft panel is available for operating the R&S TS-PSM5. Control is via an IVI switch driver.

Features of the R&S TS-PSM5

- Control via CAN bus
- Four channels for currents up to 50 A
- Four channels for currents up to 2 A
- Current measurement capabilities using shunt resistors or current-voltage-converters
- Feed-through of all channels to the rear of the R&S PowerTSVP chassis is possible by means of the R&S TS-PRIO5 rear I/O module
- Feed-through of all 2 A channels and the 50 A channels 5 and 8 to the rear of the R&S CompactTSVP chassis is possible by means of the optional R&S TS-PK04 cable set
- Support via R&S Signal Routing Library
- Self-test capability
- Soft panel for interactive operation
- IVI switch driver available

The lifetime of the 50 A relays is dependent on the power to be switched. It is therefore recommended for large currents to increase the voltage after the close of the contact, if it is to be above 14 V. At a maximum operating frequency of 1 Hz it is in addition to observe a ratio of 1:10 between the on and the off state. In permanent operation of the 50 A relays with low switching voltages and low switching currents there is a risk of an increase in the contact resistance due to a forming film on the contact surfaces. It is therefore recommended to regularly switch the contacts under load (e.g. 10 A / 12 V).

Features of the R&S TS-PRIO5

- Feed-through of all 2 A channels to the rear panel of the chassis R&S PowerTSVP.
- Feed-through of all 50 A channels to the rear panel of the chassis R&S PowerTSVP.

4 Module tour

The R&S TS-PSM5 can consist of several hardware components, depending on your setup.

4.1 R&S TS-PSM5

The R&S TS-PSM5 module consists of a base board to which all relays and terminal blocks are attached, a digital board mounted on it where the processor and the FRAM are attached and a sheet metal plate which mechanically stabilizes the module.

The R&S TS-PSM5 is available in two variants.

- R&S TS-PSM5 (variant .03)
- R&S TS-PSM5B (variant .02)

The main difference from a functional view between the two variants is that the R&S TS-PSM5B does not have a connector on the front panel.

The cabling of the connector (VPC) mounted on the front of the R&S TS-PSM5 (variant 03) with the appropriate terminals on the base board has already been done.

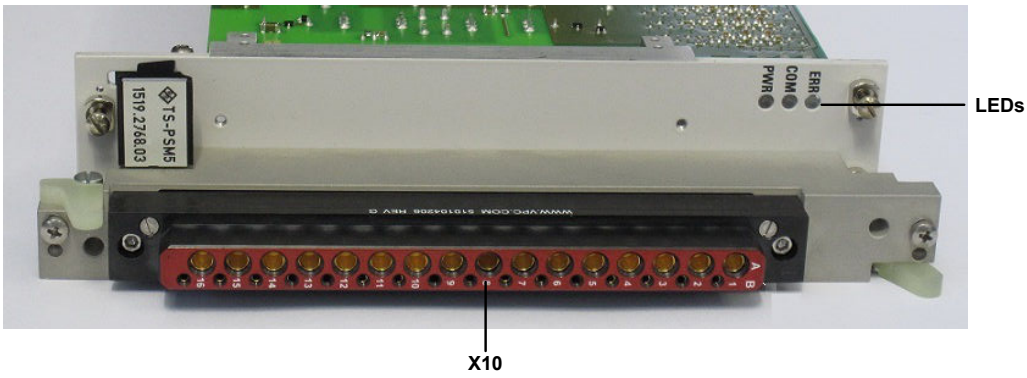

Figure 4-1: Front panel of the R&S TS-PSM5 variant 03

LEDs = Chapter 4.1.1, "Status LEDs", on page 15
X10 = Chapter 4.1.3, "Connector X10", on page 16

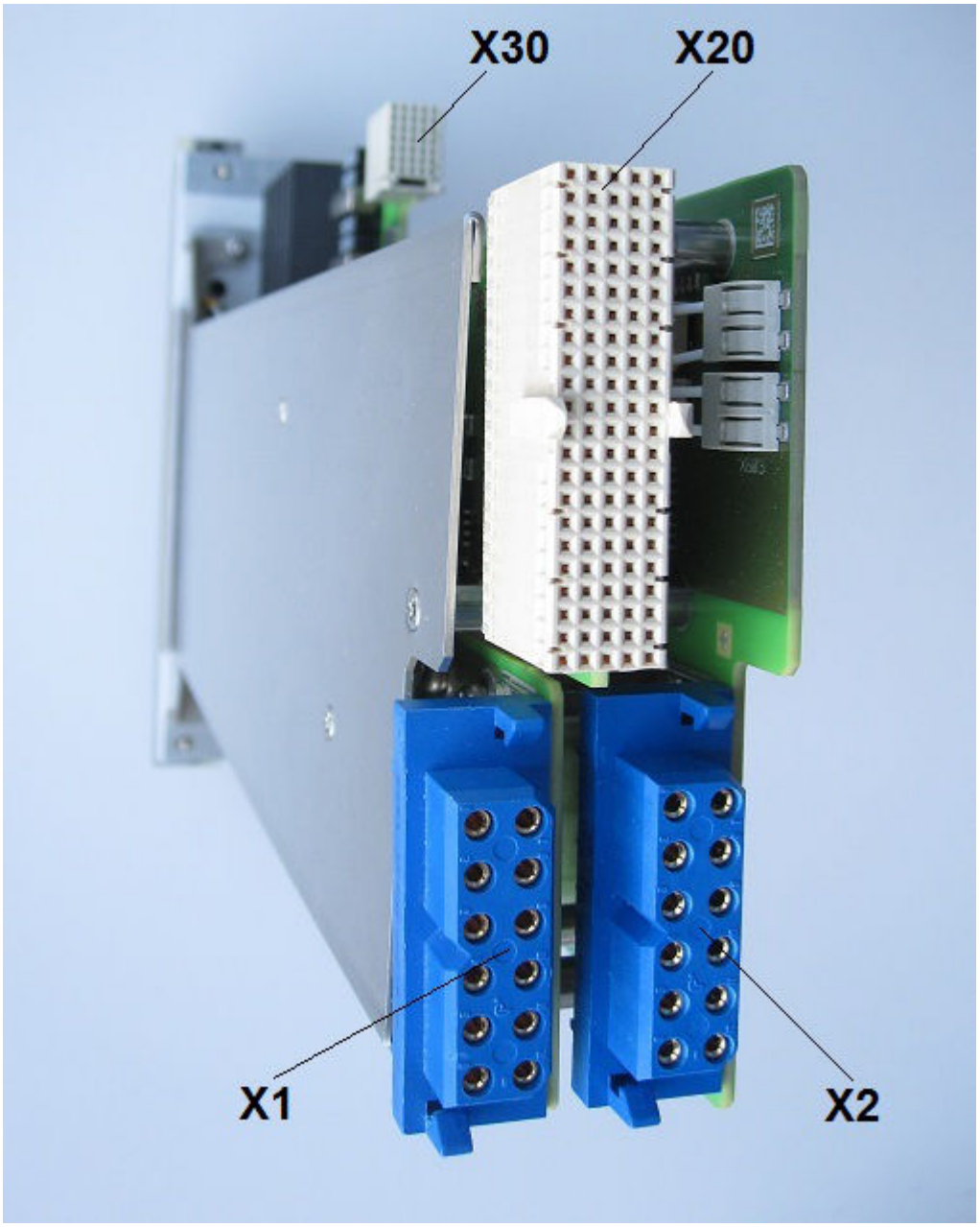

Figure 4-2: Rear panel of the R&S TS-PSM5 (incl. PXI expansion for connection to module on rear panel)

X1 / X2 = Chapter 4.1.2, "Connectors X1 / X2", on page 16
X20 = Chapter 4.1.4, "Connector X20", on page 16
X30 = Chapter 4.1.5, "Connector X30", on page 16

4.1.1 Status LEDs

The LEDs on the front indicate the current status of the module.

- "PWR" (green LED)

Indicates that all necessary supply voltages are present.

- "COM" (yellow LED)
  Indicates data exchange via the interface.
- "ERR" (red LED)
  Indicates an error condition if illuminated.

4.1.2 Connectors X1 / X2

Interface to connect the R&S TS-PRIO5 rear I/O module to the R&S TS-PSM5.

- Connector X1 connects channels 5 and 8 to the R&S TS-PRIO5 when you use that optional module in a R&S PowerTSVP.
- Connector X1 alternatively connects channels 5 and 8 to the R&S TS-PK04 cable set when you use it with a R&S CompactTSVP.
- Connector X2 connects channels 6 and 7 to the R&S TS-PRIO5 when you use that optional module in a R&S PowerTSVP.

Note that one contact is designed for a maximum current of 16 A. For that reason six high current contacts are connected in parallel.

See Chapter C.1.1, "Connector X1", on page 45 and Chapter C.1.2, "Connector X2", on page 46 for a detailed description of the connectors.

4.1.3 Connector X10

Type: VPC

Available on the R&S TS-PSM5, variant .03.

Interface to connect UUTs to the module.

See Chapter C.1.3, "Connector X10 (only R&S TS-PSM5 (variant 03))", on page 47 for a detailed description of the connectors.

4.1.4 Connector X20

Type: PXI extension

Interface to connect channels 1 to 4 to the R&S TS-PRIO5 when you use that optional module in a R&S PowerTSVP.

See Chapter C.1.4, "Connector X20", on page 48 for a detailed description of the connectors.

4.1.5 Connector X30

Interface for analogue bus access for self-test and current measurement.

See Chapter C.1.5, "Connector X30", on page 49 for a detailed description of the connectors.

4.2 R&S TS-PRIO5

The R&S TS-PRIO5 is an optional rear panel I/O module that you can connect with the R&S TS-PSM5 in a R&S PowerTSVP. The R&S TS-PRIO5 provides a feed-through of all channels of the R&S TS-PSM5 module to the rear panel of the R&S PowerTSVP.

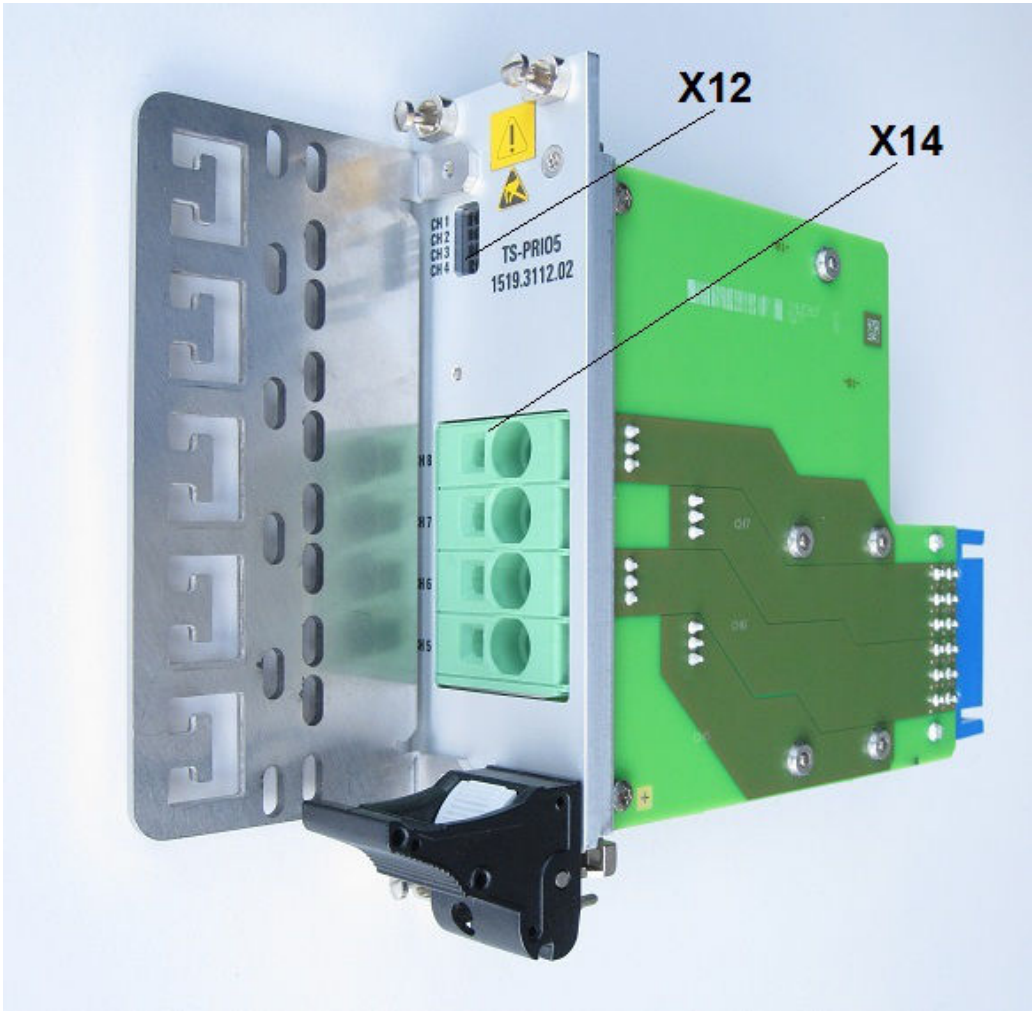

Figure 4-3: Front panel of the R&S TS-PRIO5

X12 / X14 = Chapter 4.2.3, "Connector X12 / X14", on page 19

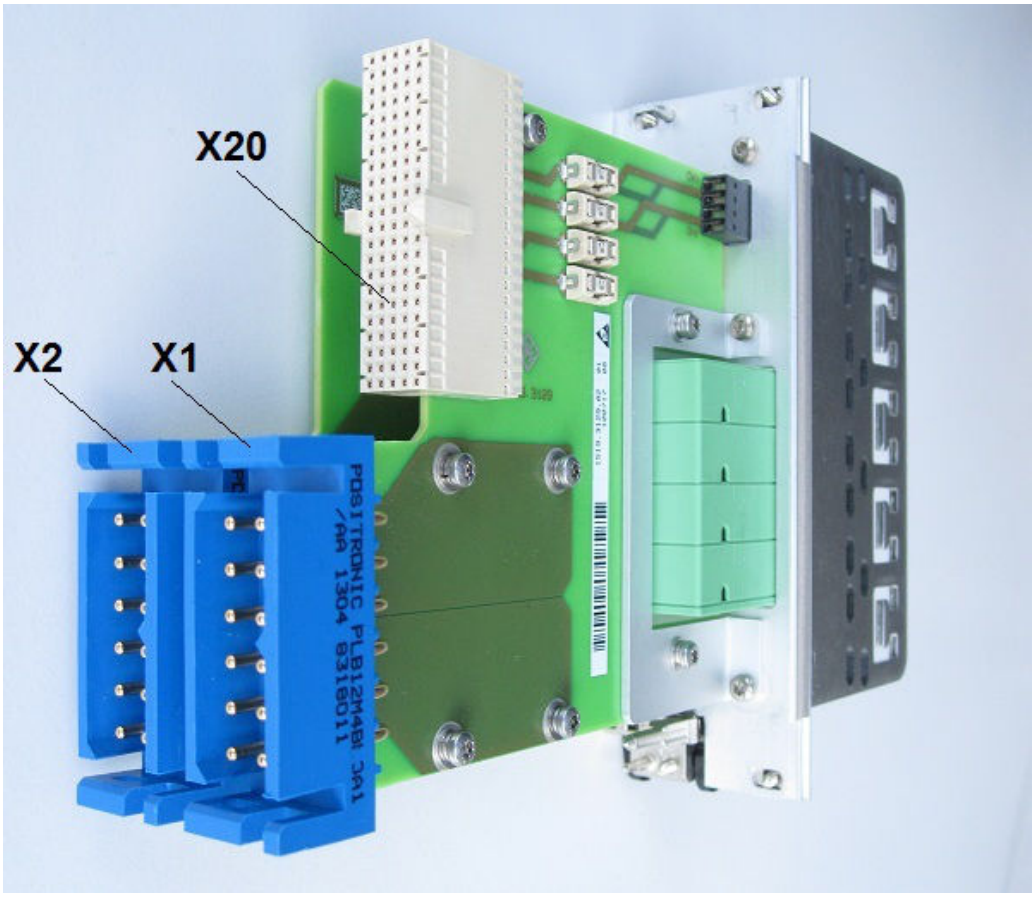

Figure 4-4: Rear panel of the R&S TS-PRIO5

X1 / X2 = Chapter 4.2.1, "Connector X1 / X2", on page 18
X20 = Chapter 4.2.2, "Connector X20", on page 19

The R&S TS-PRIO5 module holds fuses for the 2 A channels. See Chapter 8.1, "Changing fuses", on page 39 about information on how to replace blown fuses.

The 50 A channels are not protected by fuses. We recommend to provide external assurance measures when adapting the module.

4.2.1 Connector X1 / X2

Interface to connect the R&S TS-PRIO5 rear I/O module to the R&S TS-PSM5.

- Connector X1 connects channels 5 and 8 to the R&S TS-PSM5.
- Connector X2 connects channels 6 and 7 to the R&S TS-PSM5.

Six pins in each connector form a channel.

See Chapter C.2.1, "Connector X1", on page 50 and Chapter C.2.2, "Connector X2", on page 51 for a detailed description of the connectors.

4.2.2 Connector X20

Type: PXI extension

Interface to connect channels 1 to 4 to the R&S TS-PSM5.

See Chapter C.2.3, "Connector X20", on page 52 for a detailed description of the connectors.

4.2.3 Connector X12 / X14

Interface to connect loads or supply units to the 2 A channels and 50 A channels of the R&S TS-PSM5.

Type (X12): PTSM 0.5/ 4-2.5-H THR R32 - 1770908 (manufacturer: Phoenix Contact)

Type (X14): SPT 16/ 4-H-10.0-ZB - 1735804 (manufacturer: Phoenix Contact)

- X12: Interface of the 2 A channels 1 to 4 to the load or voltage source.
  X12 can take wires with a maximum of 0.5 mm^2 cross-section surface.
- X14: Interface of the 50 A channels 5 to 8 to the load or voltage source.
  X14 is suitable for wires with a maximum of 16 mm^2 cross-section surface.

For more information about connecting wires to the connectors, see Chapter 5.2, "Preparing the R&S TS-PSM5B (variant .02)", on page 22.

See Chapter C.2.4, "Connector X12", on page 54 and Chapter C.2.5, "Connector X14", on page 55 for a detailed description of the connectors. See also the specifications from the manufacturer of the connectors (Phoenix Contact).

4.3 R&S TS-PK04 and -PK04P

The cable sets R&S TS-PK04 and R&S TS-PK04P (for R&S PowerTSVP) allow access to the 50 A high current channels 5 and 8 and all 2 A channels of the R&S TS-PSM5 through connectors X3 and X4 on the rear of the base units.

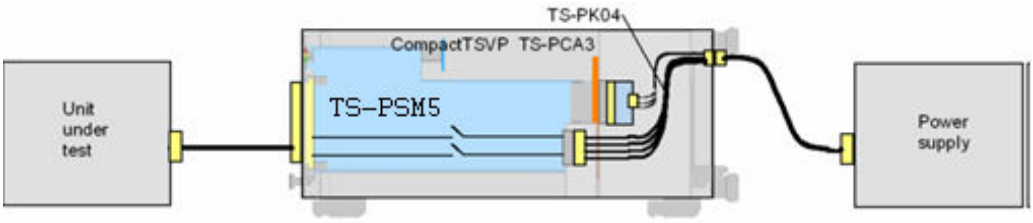

Figure 4-5: Overview of the R&S TS-PSM5 with R&S TS-PK04 in the R&S CompactTSVP

In Figure 4-6 the installation of the R&S TS-PK04 cable set in the R&S CompactTSVP and its connections to the R&S TS-PSM5 (here shown in simplified form) is shown.

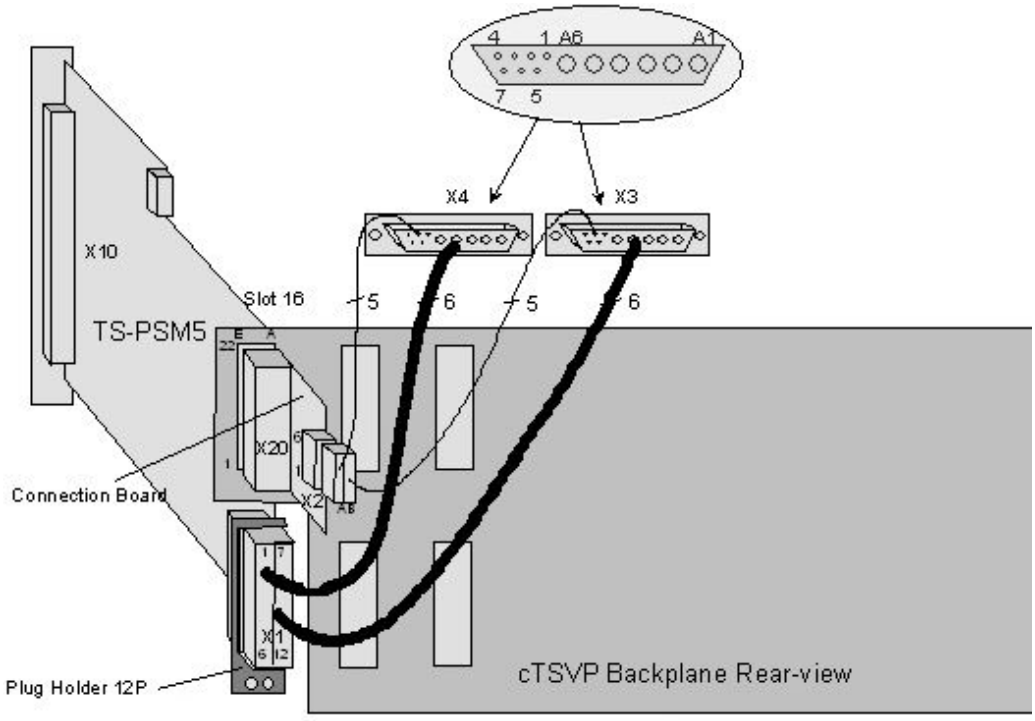

Figure 4-6: R&S TS-PK04 installation in R&S CompactTSVP

4.3.1 Connector X1

Interface of the 50 A channels 5 and 8 to the R&S TS-PSM5.

4.3.2 Connectors X3 and X4

Interface of the 50 A channels 5 and 8 and the 2 A channels 1 to 4 to a load or voltage source.

► **NOTICE!** Note that one contact is designed for a maximum current of 16 A. To avoid damage to the R&S TSVP, always connect at least four high-current contacts in parallel.

Connect one line of the external load or power supply to at least four contacts of the X3 and X4 connectors.

See Chapter C.3.1, "Connector X3", on page 55 and Chapter C.3.2, "Connector X4", on page 56 for a detailed description of the connectors.

4.3.3 Connector X20

Interface of 2 A channels 1 to 4 to the R&S TS-PSM5.

5 Installing the module

5.1 Installing the R&S TS-PSM5

The R&S TS-PSM5 is a module installed at the front panel of the R&S TSVP base unit.

Note on slots usage in PXI based R&S TSVP base units:

- In slots 4/5 to 13/14, operating the R&S TS-PSM5 requires modules R&S TS-PRIO or R&S TS-PRIO4 on the corresponding rear slot. This is the only way that the R&S TS-PSM5 can be connected to the necessary power supply in these slots.
- Using slots 15/16 has no such restrictions.
- Installing the R&S TS-PRIO5 is not possible in the PXI based base units.

Note on slot usage in R&S PowerTSVP:

- The R&S TS-PSM5 can be installed in slot 1/2 to 15/16.
  We recommend not to use slot 1/2 of the R&S PowerTSVP, because of sensitive components of the module can be damaged by the adjacent power supply. If you must use slot 1/2 to install the R&S TS-PSM5, make sure there is no point of contact between the power supply and the module, for example by using the insulation plate that is part of the delivery. Refer to the getting started for a description on how to install the insulation plate.
- The R&S TS-PRIO5 can be installed in rear slots 1/2 to 13/14.

If the R&S TS-PSM5 is operated in slots 15\16 on either R&S TSVP base unit, you can run all 2 A channels and the 50 A channels 5 and 8 to the X3 and X4 connectors on the rear of the chassis via the optional R&S TS-PK04 / -PK04P cable set.

1. Install the module as described in the user manuals for the base units.

   For additional information about installing the R&S TS-PSM5 and its optional accessories, see:
   - Chapter 5.2, "Preparing the R&S TS-PSM5B (variant .02)", on page 22
   - Chapter 5.3, "Installing the R&S TS-PRIO5", on page 26

2. **WARNING!** Risk of electric shock. The test environment, e.g the UUT or additional power supplies, can supply high voltages to the instruments. In this case, the voltage can also apply to the signal output connectors of the R&S TSVP, in particular the analog bus connector X2.
   Therefore, do not connect or disconnect devices from the X2 connectors while connected to an external power supply or UUT.

   Always connect both ends of the cable connecting the R&S CompactTSVP and R&S PowerTSVP. Thus, you avoid the risk of touching the X2 connector with a possibly hazardous voltage applied.

   CAUTION! Risk of skin burns and instrument damage. Do not exceed the maximum voltages and currenty given in the specifications. Voltages and currents higher than the specified voltages can overheat the relays and circuit board and damage the module or cause skin burns.

Take the system into operation as described in the user manuals for the base unit.

5.2 Preparing the R&S TS-PSM5B (variant .02)

Compared to the completely cabled R&S TS-PSM5 (variant .03 - with mounted VPC connector), the R&S TS-PSM5B (variant 02) does not have channel wiring and has a simple front plate. Using the R&S TS-PSM5B, you can wire the channels as you need. To do so, connect suitable cables from the terminals of the individual channels on the module base board through the front plate openings to a load or power source.

Opening the module

Reaching all terminals on the base board you must remove the plate that reinforces the module and the digital circuit board.

1. Place the module carefully on a nonslip surface to avoid damaging the module components.
2. Remove the plate from the module.
   a) Unscrew the three screws on top of the module.
   b) Unscrew the two screws on the front plate of the module.
3. Disconnect the digital circuit board from the base board.
4. Unscrew the three screws that secure the digital circuit board.
5. Carefully remove the digital circuit board.

Figure 5-1shows the position of the connecting terminals on the base board.

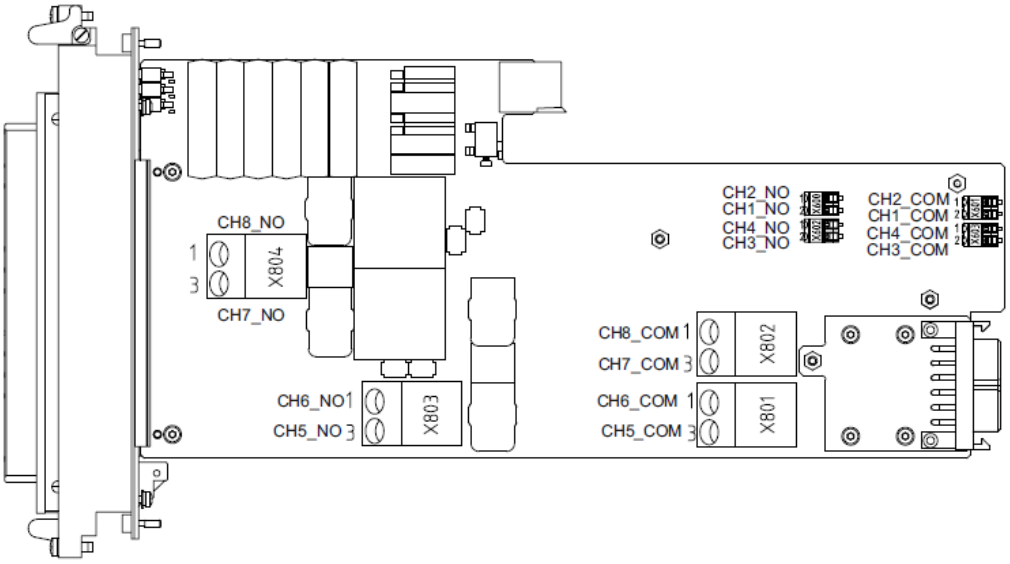

Figure 5-1: Position of the connecting terminals on the base board

The metal plate mounted on the front panel of the module allows to fix the wires connected to the terminals X12 and X14 using cable ties and thus to provide strain relief for the connections.

Mounting the terminal wires of 50 A channels (channels 5 to 8)

1. Open the terminal contact CH5_COM to be able to connect a wire to channels 5 to 8.
   a) Place a flat-head screwdriver in the upper square opening of the terminal.
   b) Press down the metal spring with a slight levering action.
   c) Carefully push the screwdriver into the terminal as far as it goes.
   Leave the screwdriver in the terminal.

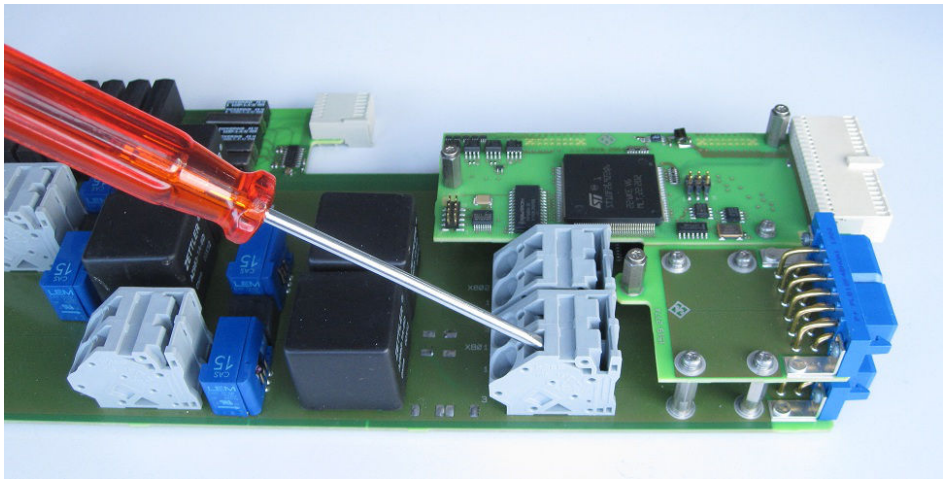

Figure 5-2: Opening the terminal contact CH5_COM

2. Insert the wire into the exposed lower opening.
   To establish a good connection the wire must be free of its insulation by a length of about 13 mm.

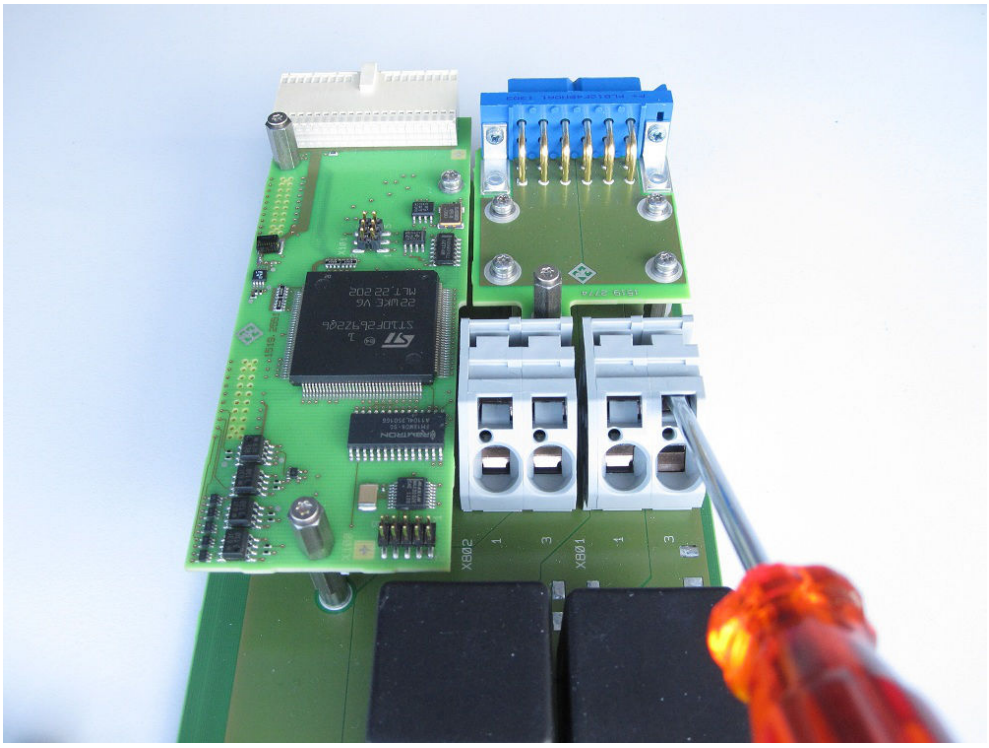

Figure 5-3: The wire can be mounted in the lower round opening

3. Remove the screwdriver.
   The metal spring will spring back and clamp the inserted wire firmly and form a good connection with low contact resistance.

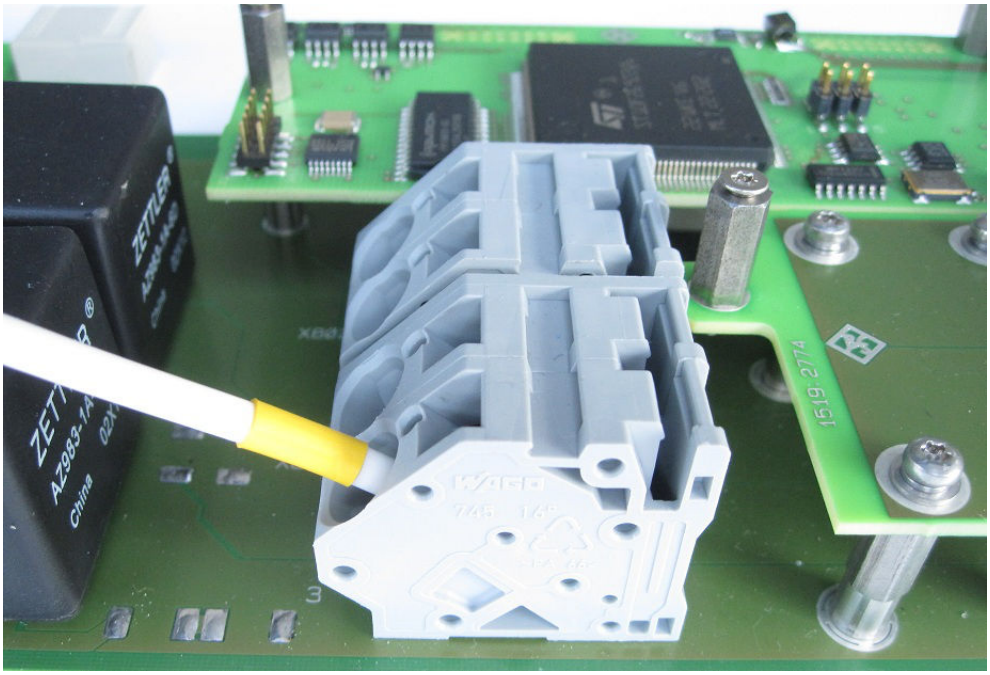

Figure 5-4: Mounted wire in clamp

In the 50 A terminals of the R&S TS-PSM5 (variant 03) wires labelled AWG 10 are finely stranded. The wires are each mounted without ferrules in the terminals. More information on this terminal can be obtained from the manufacturer WAGO.

The terminal is labelled as follows:

- Series 745, 10 mm
- Order number: 745-502/006-000

Mounting the terminal wires of 2 A channels (channels 1 to 4)

1. Press down the plastic fish plate on the upper side of the terminal to displace the metal spring inside the terminal.
   Use a sharp object, for example a small Phillips screwdriver.
2. Insert the wire into the side opening.
   To establish a good connection the wire must be free of its insulation by a length of about 7 mm.

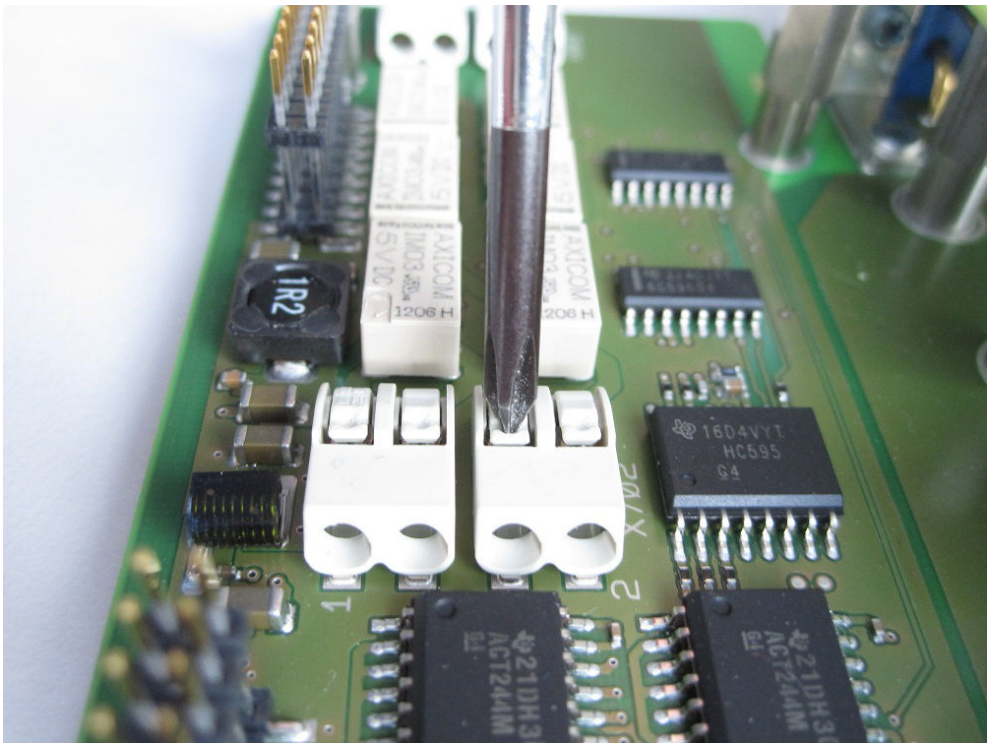

Figure 5-5: Opening the terminal contact CH4_NO

In the 2 A terminals of the R&S TS-PSM5 (variant 03) wires labelled AWG 24 are finely stranded. The wires are each mounted without ferrules in the terminals. More information on this terminal can be obtained from the manufacturer WAGO.

The terminal is labelled as follows:

- Series 2060 SMD, 4 mm
- Order number: 2060-402/998-404

Reassembling the module

1. Secure the digital circuit board (three screws).
2. Attach the stabilizing plate to the module (two screws on the front plate and three screws on top of the module).
   Make sure to mount the stabilizing plate properly. Although the stabilizing plate has no effect on the functioning of the module, it prevents the module from being bent while installing it in the base unit. This could lead to the X1 and X2 high current connectors not sitting perfectly and an increased contact resistance occurring to the rear-mounted R&S TS-PRIO5 or the R&S TS-PK04 cable set.

Figure 5-6 shows an example of a completely wired R&S TS-PSM5B.

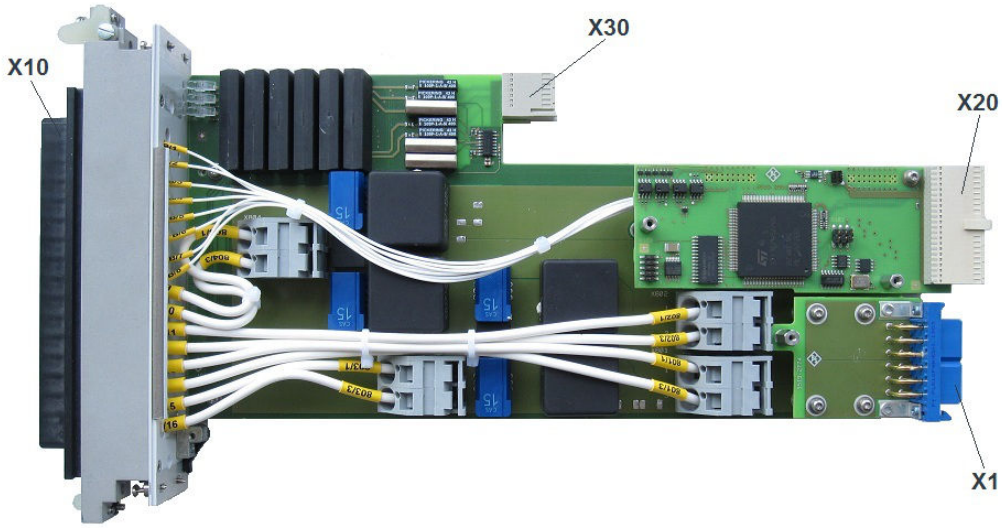

Figure 5-6: Base board R&S TS-PSM5 (variant 03)

5.3 Installing the R&S TS-PRIO5

The R&S TS-PRIO5 is a module installed at the rear of the R&S PowerTSVP.

For a detailed description on how to install modules, refer to the user manual of the R&S PowerTSVP.

6 Functions

6.1 R&S TS-PSM5

(see Chapter B, "Block diagram", on page 44)

6.1.1 Signal concept

The power relays of all channels of the R&S TS-PSM5 can be wired up with power supplies or loads via the front of the module. In addition all channels can be routed to the rear of the R&S PowerTSVP chassis via the optional R&S TS-PRIO5 Rear-I/O-Module. In the R&S CompactTSVP chassis there is the option to route all 2 A channels and 50 A channels 5 and 8 to the rear via the R&S TS-PK04 cable set.

Each channel can be used as a sense line or power line in order to create a connection between load and power supply unit.

The voltage drop corresponding to the current flow through each channel of the R&S TS-PSM5 can be measured via shunt resistors on the 2 A channels and current-voltage-converter on the 50 A channels via the chassis's analogue bus. The exact value of the shunt resistors is determined when calibrating the module. Similarly, for each 50 A channel the current-voltage characteristics exists.These values are used for calculating the actual current through the channel. The amount of current through a channel can be retrieved from the module via the IVI switch driver when the measured voltage level is specified.

The R&S TS-PSM5 (variant 03) can be ordered with a Virginia Panel Corp. (VPC) connector on the front of the module. The connector is connected to the individual channels of the module via terminals on the base board using a pre-assembled cable set. In the R&S TS-PSM5B (variant 02) without VPC the user can connect his loads or power supply units with his own cables via apertures on the front plate of the module to the terminals of the channels.

The short-circuit relays between adjacent 50 A channels can be loaded only up to 30 A. They are intended for system- and self-test purposes.

6.1.2 System functions

The system functions are implemented by a local processor with internal Flash. There is also an external FRAM. The cycle counters of all relays on the R&S TS-PSM5 are located in the FRAM. The readings can be retrieved from the module via the IVI switch driver.

The functions of the R&S TS-PSM5 can be summarized as follows:

- Analog function test
- Connection of voltage/current sources
- Connection of test component loads

(original loads, simulated/electronic load)

- Switch simulation

6.1.3 Application examples

6.1.3.1 Measuring current during active load

A typical application example for the use of a R&S TS-PSM5 module is connection of a load to a voltage supply. In the example shown below (Figure 6-1) the voltage supply is connected to the COM lines on the rear of the R&S TS-PSM5 . This can be done by installing the R&S TS-PK04 / -PK04P cable set or the R&S TS-PRIO5. The load is connected to the NO lines located on the front of the R&S TS-PSM5 . The voltage supply's force lines are lead along to the load via two 50 A channels , whereas the sense lines are lead along 2 A channels.

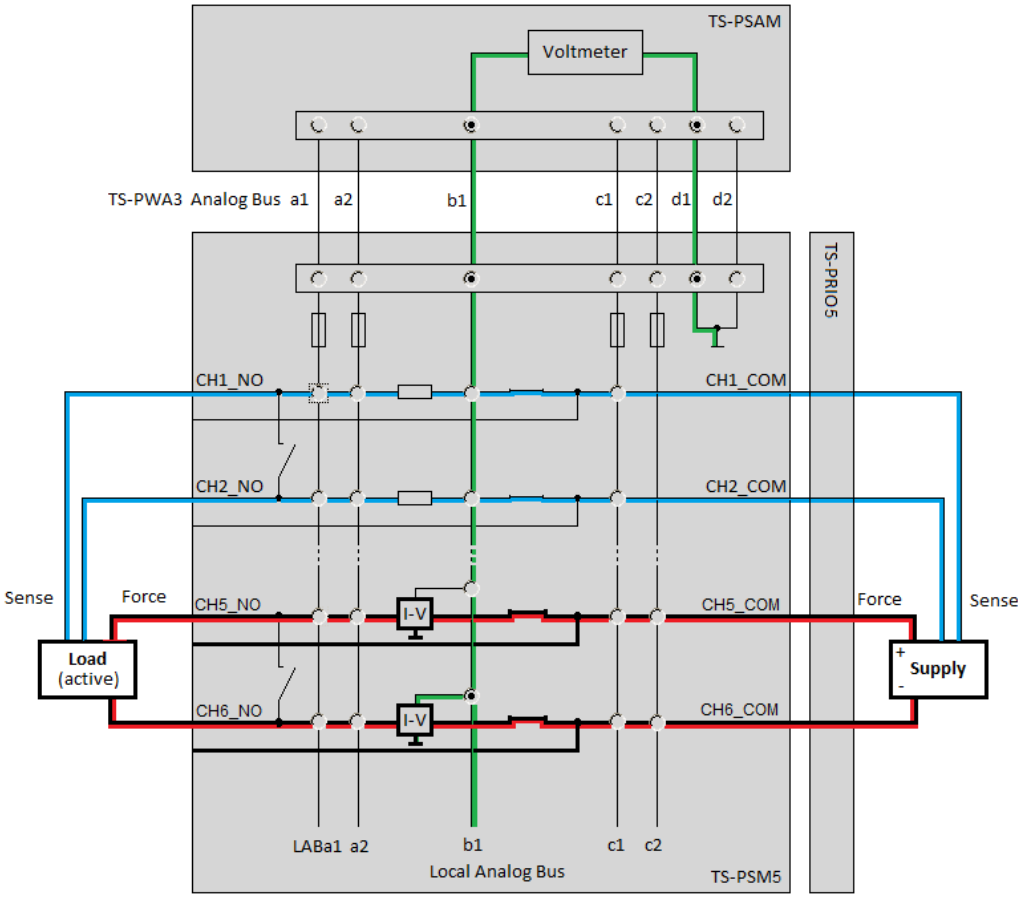

Figure 6-1: Application example - measuring current with active load

The relatively high current , which in the load's switched on active state flows through the 50 A channels, can be determined via a current-voltage-converter (I-V). The output voltage of the converter is conducted via the R&S TS-PSM5's matrix- or coupling

relays to the analogue bus of the chassis and from there to, for example, the R&S TS-PSAM measurement module. The measurement module's voltmeter ascertains the voltage. Via the rspsm5_GetCalculatedCurrent function of the IVI software driver that is part of the R&S TS-PSM5 , the current belonging to this voltage level can be retrieved. It is calculated via correction values stored on the module. See also the programming example later on in this document.

When current flows from the NO- to the COM- Connection of a 50 A channel gives a positive voltage value at the current-voltage-converter. If the current flows in the reverse direction, a negative voltage value is measured.

The current paths are coloured red in the diagram above, the lines with sense voltage are blue and the paths over which the current-voltage-converter´s voltage is measured are coloured green.

6.1.3.2 Current measurement with load in standby mode

If now the small amount of residual current is to be determined by the load, if the latter is in standby mode, another version of switching is chosen. The current-voltage converter in the 50 A channels work in the range of 350 mA (typ.) to 50 A. At current strengths below 350 mA (typ.) a return value of 0 A would be received from the IVI software driver function using the method described above.

Small currents up to one ampere can be measured directly from the R&S TS-PSAM module's ammeter. If the current measurement gives a value via the high power channel's current-voltage converter that is less than or equal to 1 A, then the switching as shown in Figure 6-2 can be used for the current measurement. With the channel 5 high power relay opened, the entire current is conducted via matrix- and coupling relays on the analogue bus and from there to the ampere meter of the R&S TS-PSAM's measurement module. These lines are coloured red.

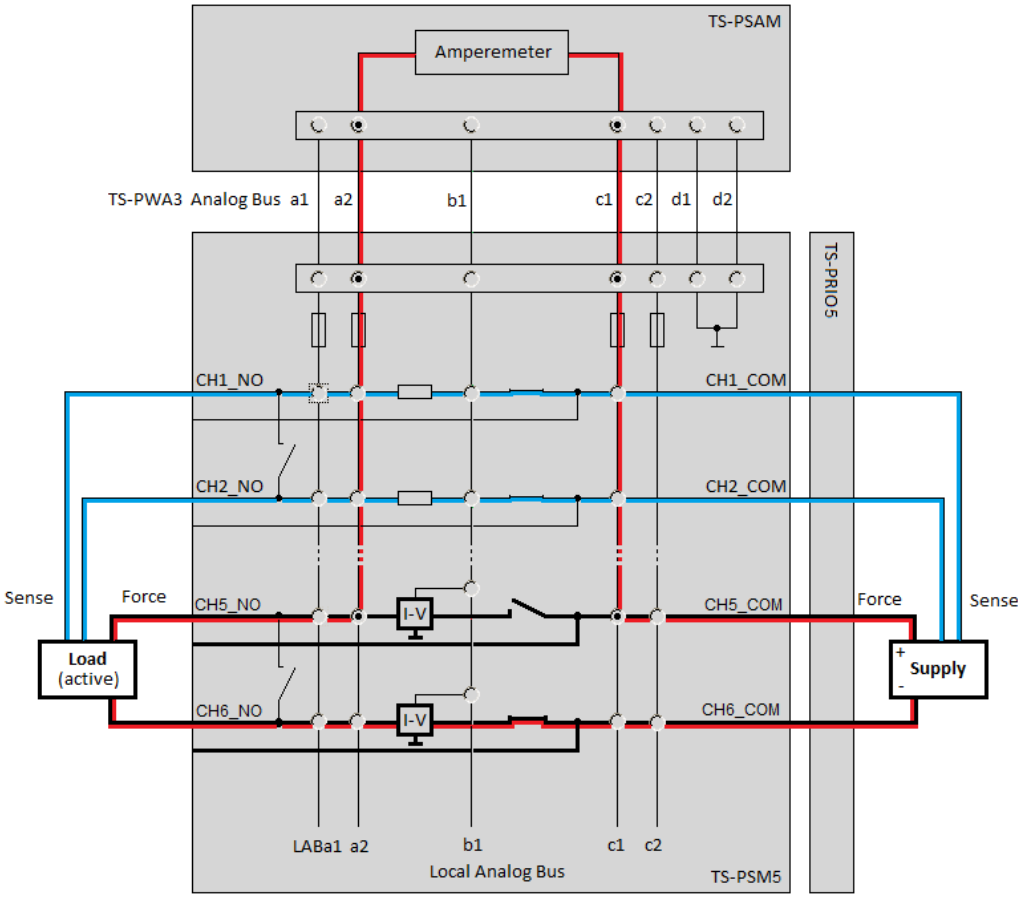

Figure 6-2: Application example - current measurement with load in standby mode

7 Software

7.1 Driver software

A LabWindows IVI driver that supports the class IVI SWTCH is available to control the High-Power Switch Module R&S TS-PSM5 All additional functions of the hardware are supported by specific extensions of the driver. The driver is a component of the ROHDE & SCHWARZ GTSL software. All functions of the driver are documented extensively in online Help and in the LabWindows/CVI Function Panels.

During driver installation, the following software modules are installed:

Table 7-1: Driver installation R&S TS-PSM5

Module	Path	Comment
`rspsm5.dll`	`<GTSL directory>\Bin`	Driver
`rspsm5.chm`	`<GTSL directory>\Bin`	Help files
`rspsm5.fp`	`<GTSL directory>\Bin`	LabWindows CVI Function Panel file, function panels for CVI development interface
`rspsm5.sub`	`<GTSL directory>\Bin`	LabWindows CVI attribute file. This file is required by some „function panels“.
`rspsm5.lib`	`<GTSL directory>\Bin`	Import Library
`rspsm5.h`	`<GTSL directory>\Include`	Header file for the driver

To use the driver, the IVI and VISA libraries from National Instruments are necessary.

7.2 Softpanel

The software package of the R&S TS-PSM5 includes a so-called softpanel. The softpanel enables interactive operation of the module.

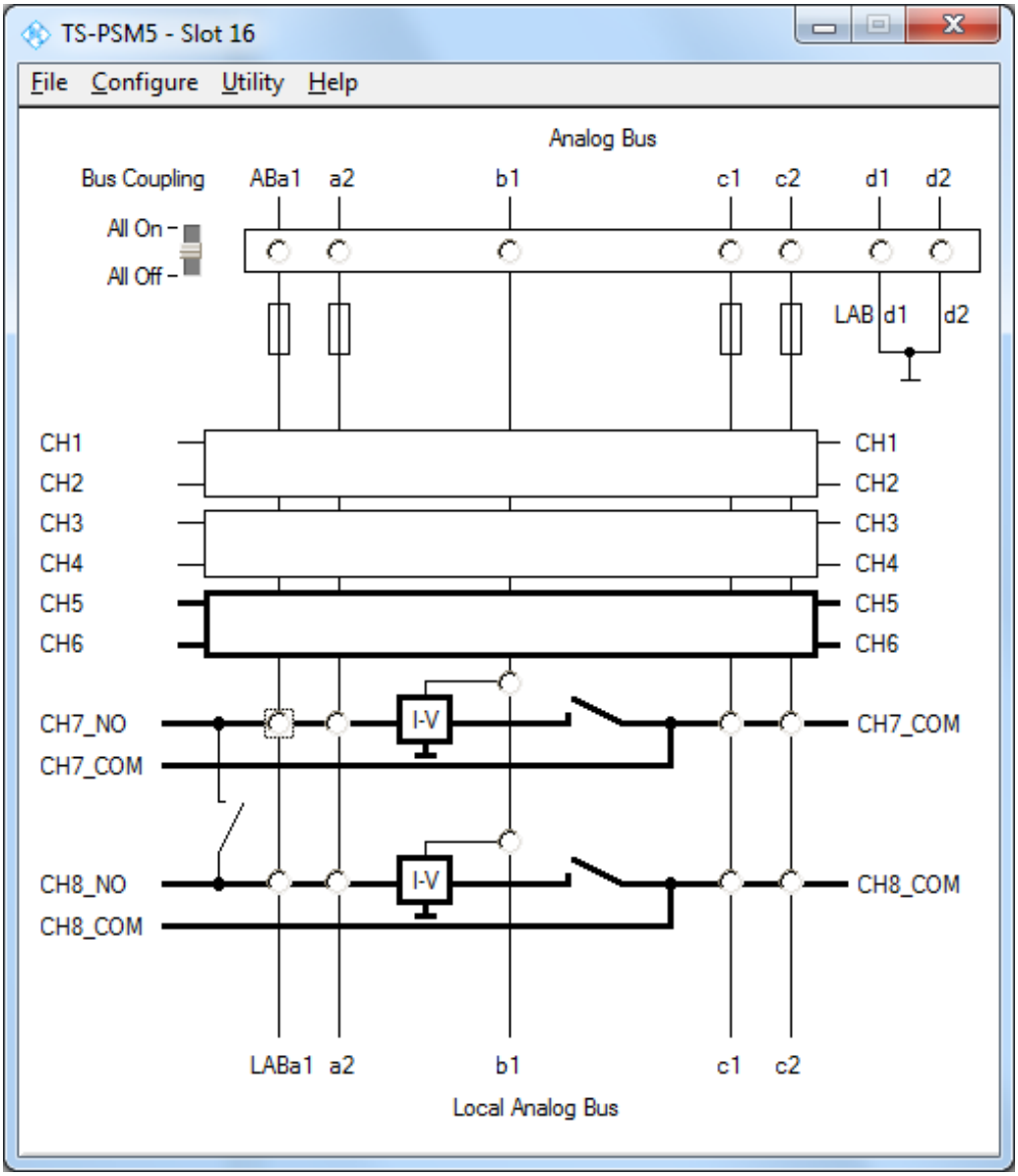

Figure 7-1: Softpanel R&S TS-PSM5

7.3 Programming with GTSL libraries

```
/*
  This example connects an external power supply to a load via TS-PSM5
  channels 5 and 6. The power supply is connected to CH5_COM and
  CH6_COM at the rear of the module TS-PSM5 and the load is connected
  to CH5_NO and CH6_NO at the front of the module. The sense-lines of
  the power supply are routed to the load via TS-PSM5 channels 1 and 2.
  The current through channel 6 is determined indirectly by measuring
  the voltage at the current-voltage-converter of channel 6.
```

```
  Later on, the load is set to standby mode and the low standby current
  is measured directly via the ampere meter of TS-PSAM. Therefore
  the power relay of channel 5 is opened and the standby current is
  bypassed via matrix relays to the analog bus and TS-PSAM module.

  Error handling is not considered in this sample in order to keep it
  easy to read. The return status should be checked for "errorOccurred"
  after each library call.

  The following configuration files are used in this example:


physical.ini
------------

  [device->PSM5]
  Description  = "TS-PSM5 Module in Frame 1 Slot 16"
  Type         = PSM5
  ResourceDesc = CAN0::0::1::16
  Frame        = 1
  Slot         = 16
  DriverDll    = rspsm5.dll
  DriverPrefix = rspsm5
  DriverOption = "Simulate=0,RangeCheck=1"
  SFTDll       = sftmpsm5.dll
  SFTPrefix    = SFTMPSM5


  [device->PSAM]
  Description  = "TS-PSAM Module in Frame 1 Slot 6"
  Type         = PSAM
  ResourceDesc = PXI3::10::INSTR
  Frame        = 1
  Slot         = 6
  DriverDll    = rspsam.dll
  DriverPrefix = rspsam
  DriverOption = "Simulate=0,RangeCheck=1"
  RioType      = PDC
  ; Note: the self test DLL and prefix keywords must be removed for the
  ;       first TS-PSAM module, because it is already tested in the
  ;       basic self test.
  ; SFTDll     = sftmpsam.dll
  ; SFTPrefix  = SFTMPSAM


  ; Analog bus pseudo-device, used by ROUTE, SWMGR and EGTSL
  [device->ABUS]
  Type         = AB
```

```
application.ini
---------------

  [bench->psm5SampleApp]
  Simulation        = 0
  Trace             = 1

  DigitalMultimeter = device->PSAM

  SwitchDevice1     = device->PSAM
  SwitchDevice2     = device->PSM5

  AnalogBus         = device->ABUS


  ; Channel tables
  AppChannelTable   = io_channel->psm5SampleApp


  ;--------------------------------------------------------------------
  ; The application channel table lists all logical channel names for the
  ; in-circuit-test, switch manager and the routing library.
  ;--------------------------------------------------------------------
  [io_channel->psm5SampleApp]

  DMM_HI            = PSAM!DMM_HI
  DMM_LO            = PSAM!DMM_LO
  PSM5_CH1_NO       = PSM5!CH1_NO
  PSM5_CH1_COM      = PSM5!CH1_COM
  PSM5_CH2_NO       = PSM5!CH2_NO
  PSM5_CH2_COM      = PSM5!CH2_COM
  PSM5_CH5_NO       = PSM5!CH5_NO
  PSM5_CH5_COM      = PSM5!CH5_COM
  PSM5_CH6_NO       = PSM5!CH6_NO
  PSM5_CH6_COM      = PSM5!CH6_COM
  PSM5_CH6_IV       = PSM5!CH6_IV
  PSM5_LABD1        = PSM5!LABD1
*/


#include <ansi_c.h>
#include <userint.h>

#include "resmgr.h"
#include "route.h"
#include "dmm.h"
#include "rspsm5.h"


int main (int argc, char *argv[])
```

```
{

  long      residRoute;  /* resource ID for signal routing library */
  long      residDmm;    /* resource ID for dmm library            */

  short     errorOccurred = 0;
  long      errorCode = 0;
  char      errorMessage [GTSL_ERROR_BUFFER_SIZE] = "";

  double    voltageResult = 0.0;
  double    currentResultLoadActive = 0.0;
  double    currentResultLoadStandby = 0.0;
  int       resultsCount = 0;

  ViSession psm5SessionHandle = -1;


  /* load the physical and application configuration files */


  RESMGR_Setup ( 0, "physical.ini", "application.ini",
                 &errorOccurred, &errorCode, errorMessage);

  /* initialize the signal routing library */
  ROUTE_Setup ( 0, "bench->psm5SampleApp", &residRoute,
                &errorOccurred, &errorCode, errorMessage);

  /* initialize the dmm library */
  DMM_Setup ( 0, "bench->psm5SampleApp", &residDmm,
              &errorOccurred, &errorCode, errorMessage);

  /* close coupling relays to TS-PCA3 Analog Bus */
  DMM_Conf_Coupling_Relays ( 0, residDmm, 1,
                             &errorOccurred, &errorCode, errorMessage);

  /* set dmm function, resolution and auto ranging */
  DMM_Conf_Measurement ( 0, residDmm, "DC_VOLTS", 0.0, "AUTO_RANGE_ON",
                         1.0e-4,
                         &errorOccurred, &errorCode, errorMessage);

  /* connect DMM_HI and DMM_LO to local analog bus lines b1 and d1 */
  ROUTE_Execute ( 0, residRoute, "DMM_HI > $LABb1, DMM_LO > $LABd1",
                  &errorOccurred, &errorCode, errorMessage);

  /* connect the current-voltage-converter of TS-PSM5 channel 6 to analog
     bus line b1;
     connect local analog bus line d1 (GND) to analog bus line d1; */
  ROUTE_Execute ( 0, residRoute, "PSM5_CH6_IV > $LABb1 > $ABb1,
                  PSM5_LABD1 > $ABd1",
                  &errorOccurred, &errorCode, errorMessage);
```

```
/* close low-power-relays of TS-PSM5 channel 1 and channel 2 to route
   the sense-lines of the power supply to the load */
ROUTE_Execute ( 0, residRoute, "PSM5_CH1_NO > PSM5_CH1_COM, PSM5_CH2_NO
               > PSM5_CH2_COM",
               &errorOccurred, &errorCode, errorMessage);

/* close high-power-relays of TS-PSM5 channel 5 and channel 6;
   wait for debounce for all switch modules */
ROUTE_Execute ( 0, residRoute, "PSM5_CH5_NO > PSM5_CH5_COM,
                PSM5_CH6_NO > PSM5_CH6_COM, ?#",
                &errorOccurred, &errorCode, errorMessage);

/* measure voltage at current-voltage-converter of TS-PSM5 channel 6 */
DMM_Read ( 0, residDmm, 1.0, 1, &voltageResult, &resultsCount,
           &errorOccurred, &errorCode, errorMessage);

/* Get the TS-PSM5 ivi-switch-driver session handle which is needed to
   call driver functions */
RESMGR_Get_Session_Handle (0, residRoute, "SwitchDevice2",
                           &psm5SessionHandle,
                           &errorOccurred, &errorCode, errorMessage);

/* get the current value which corresponds to the measured voltage
   value at TS-PSM5 channel 6 */
rspsm5_GetCalculatedCurrent ( psm5SessionHandle, "CH6",
                              voltageResult,
                              &currentResultLoadActive );


MessagePopup( "User Activity", "Please switch off the load.\n---\n"
                               "The load is now in standby mode." );


/* measure voltage at current-voltage-converter of TS-PSM5 channel 6;
   make sure it is below 1 A */
DMM_Read ( 0, residDmm, 1.0, 1, &voltageResult, &resultsCount,
           &errorOccurred, &errorCode, errorMessage);

/* get the current value which corresponds to the measured voltage
   value at TS-PSM5 channel 6 */
rspsm5_GetCalculatedCurrent ( psm5SessionHandle, "CH6",
                              voltageResult,
                              &currentResultLoadStandby );


if( currentResultLoadStandby < 1.0 )
{
  /*
     the current through the load is lower than 1 ampere - we can switch
```

```
    the current directly to the ampere meter of the TS-PSAM module
    to perform a more sensitive measurement of the standby current
  */

  /* disconnect DMM_HI and DMM_LO from local analog bus lines b1 and
     d1 */
  ROUTE_Execute ( 0, residRoute, "DMM_HI | $LABb1, DMM_LO | $LABd1",
                  &errorOccurred, &errorCode, errorMessage);

  /* disconnect the current-voltage-converter of TS-PSM5 channel 6
     from analog bus line b1;
  ROUTE_Execute ( 0, residRoute, "PSM5_CH6_IV | $LABb1 | $ABb1,
                  PSM5_LABD1 | $ABd1",
                  &errorOccurred, &errorCode, errorMessage);

  /* set dmm function, resolution and auto ranging */
  DMM_Conf_Measurement ( 0, residDmm, "DC_CURRENT", 0.0,
                         "AUTO_RANGE_ON", 1.0e-4,
                         &errorOccurred, &errorCode, errorMessage);

  /* connect DMM_LO to local analog bus line a2 and DMM_HI to analog
     bus line c1 */
  ROUTE_Execute ( 0, residRoute, "DMM_LO > $LABa2, DMM_HI > $LABc1",
                  &errorOccurred, &errorCode, errorMessage);

  /* bypass the high-power-relay and current-voltage-converter of
     TS-PSM5 channel 5 with the ampere meter of TS-PSAM */
  ROUTE_Execute ( 0, residRoute,
                  "PSM5_CH5_COM > $LABc1 > $ABc1,
                  PSM5_CH5_NO > $LABa2 > $ABa2",
                  &errorOccurred, &errorCode, errorMessage);

  /* open the high-power relay on TS-PSM5 channel 5;
     wait for debounce for all switch modules */
  ROUTE_Execute ( 0, residRoute, "PSM5_CH5_NO | PSM5_CH5_COM, ?#",
                  &errorOccurred, &errorCode, errorMessage);

  /* measure the current throught the ampere meter of TS-PSAM */
  DMM_Read ( 0, residDmm, 1.0, 1, &currentResultLoadStandby,
             &resultsCount,
             &errorOccurred, &errorCode, errorMessage);
}

/* disconnect all existing connections */
ROUTE_Execute ( 0, residRoute, "||",
                &errorOccurred, &errorCode, errorMessage);

/* close the libraries */
DMM_Cleanup (0, residDmm, &errorOccurred, &errorCode, errorMessage);
```

```
  ROUTE_Cleanup (0, residRoute, &errorOccurred, &errorCode,
                 errorMessage);

  RESMGR_Cleanup (0, &errorOccurred, &errorCode, errorMessage);


  {
    char buffer[100];
    sprintf( buffer, "Load Active Current: %.3f A\n"
                     "Load Standby Current: %.3f A",
             currentResultLoadActive, currentResultLoadStandby);
    MessagePopup( "User Information", buffer );
  }

  return(0);
}
```

8 Maintenance, storage and disposal

8.1 Changing fuses

The optional rear I/O module R&S TS-PRIO5 holds 3 A fuses for the low 2 A channels.

If the module does not work, it is possible that a blown fuse is the cause. The fuses are located on the side of the module.

1. Turn off the device as described in the user manual of the R&S PowerTSVP.
2. Remove any external power supply.
3. Remove the module from the R&S PowerTSVP as described in the user manual of the R&S PowerTSVP.
4. Check the condition of the fuse.
5. Replace the blown fuse. Only use a fuse of the specified type.
   The fuse type and its characteristics are indicated next to the fuse holder.
6. Reinsert the module into the R&S PowerTSVP.

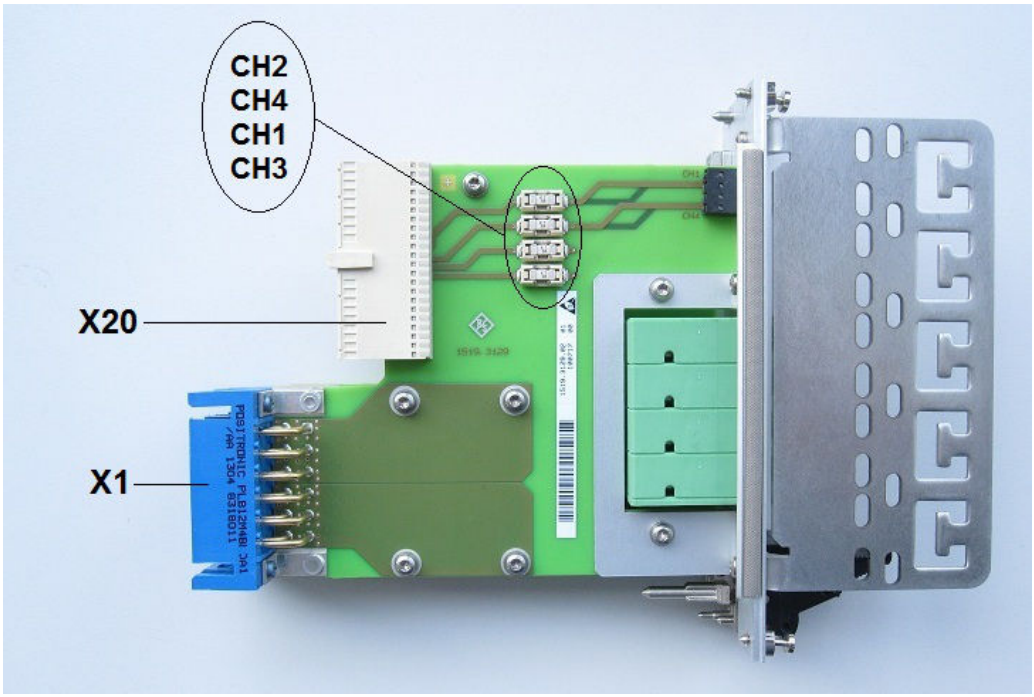

Figure 8-1: Location of the 3 A fuses on the R&S TS-PRIO5

8.2 Storage

Protect the product against dust. Ensure that the environmental conditions, e.g. temperature range and climatic load, meet the values specified in the data sheet.

8.3 Disposal

Rohde & Schwarz is committed to making careful, ecologically sound use of natural resources and minimizing the environmental footprint of our products. Help us by disposing of waste in a way that causes minimum environmental impact.

Disposing electrical and electronic equipment

A product that is labeled as follows cannot be disposed of in normal household waste after it has come to the end of its service life. Even disposal via the municipal collection points for waste electrical and electronic equipment is not permitted.

Figure 8-2: Labeling in line with EU directive WEEE

Rohde & Schwarz has developed a disposal concept for the eco-friendly disposal or recycling of waste material. As a manufacturer, Rohde & Schwarz completely fulfills its obligation to take back and dispose of electrical and electronic waste. Contact your local service representative to dispose of the product.

9 Troubleshooting

If the system is not running properly, try to find the problem with the following tests. If the tests do not help to locate the problem, contact your Rohde & Schwarz service representative.

9.1 LED test

The module has three LEDs on its front panel that indicate its status.

After turning on the system, all LEDs light up for a short time to indicate that the power supply is present and that all LEDs are working.

- A single LED does not light up in that time frame:
  Indicates a faulty LED or faulty LED control.
- All LEDs do not light up during that time frame:
  Indicates that the power supply for the module is faulty.
  Check the status LEDs of the main power supply module in slot A3 and A4.

For rear modules, you have to check the LEDs separately, see "Power-on test for modules with a rear I/O supply module" on page 42.

9.2 Power-on test

The power-on test runs at the same time as the LED test. The following statements can be made regarding the different display states of the LEDs.

- "PWR LED" (green LED) = on
  Indicates that all power supply voltages are present.
- "PWR LED" (green LED) = off
  Indicates that at least one power supply voltage is missing.
- "ERR LED" (red LED) = off
  If the green LED is illuminated at the same time, indicates that the system is working without any errors.
- "ERR LED" (red LED) = on (or blinking)
  Indicates a hardware problem.

Power-on test for modules with a rear I/O supply module

If the green LED indicates a problem with the supply voltage, check the LEDs of the corresponding rear I/O supply module separately. If the LEDs on the rear I/O module also indicate a supply voltage failure, replace the rear I/O module.

9.3 R&S TSVP self-test

The R&S TSVP self-test is an extensive test procedure for the whole system or individual components. After the test is done, you receive a test report for all components that have been tested.

The self-test uses the R&S TS-PSAM module as a measurement unit. The functionality of the modules in the system is ensured by measurements via the analog measurement bus.

For more information about running the system self-test and the test procedures, refer to the R&S TSVP service manual.

9.4 Contacting customer support

Technical support – where and when you need it

For quick, expert help with any Rohde & Schwarz product, contact our customer support center. A team of highly qualified engineers provides support and works with you to find a solution to your query on any aspect of the operation, programming or applications of Rohde & Schwarz products.

Contact information

Contact our customer support center at www.rohde-schwarz.com/support, or follow this QR code:

Figure 9-1: QR code to the Rohde & Schwarz support page

Annex

A Specifications

For an overview of technical specifications of the R&S TS-PSM5 module, refer to the corresponding product brochure / data sheet.

If discrepancies exist between information in this manual and the values in the data sheet, the values in the data sheet take precedence.

B Block diagram

Figure B-1 shows the block diagram of the high-power switch module R&S TS-PSM5.

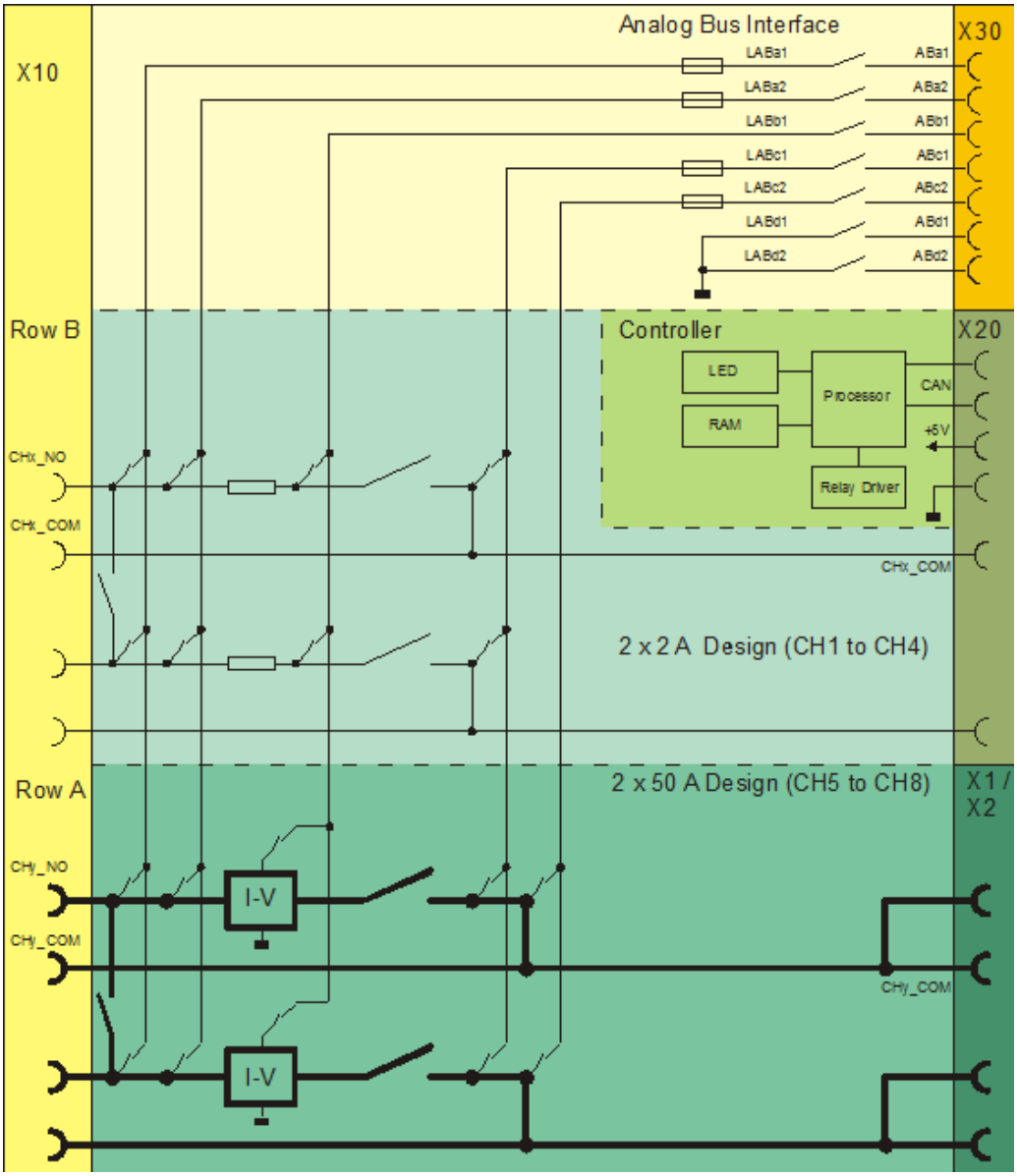

Figure B-1: Block diagram R&S TS-PSM5

C Interface description

C.1 R&S TS-PSM5

C.1.1 Connector X1

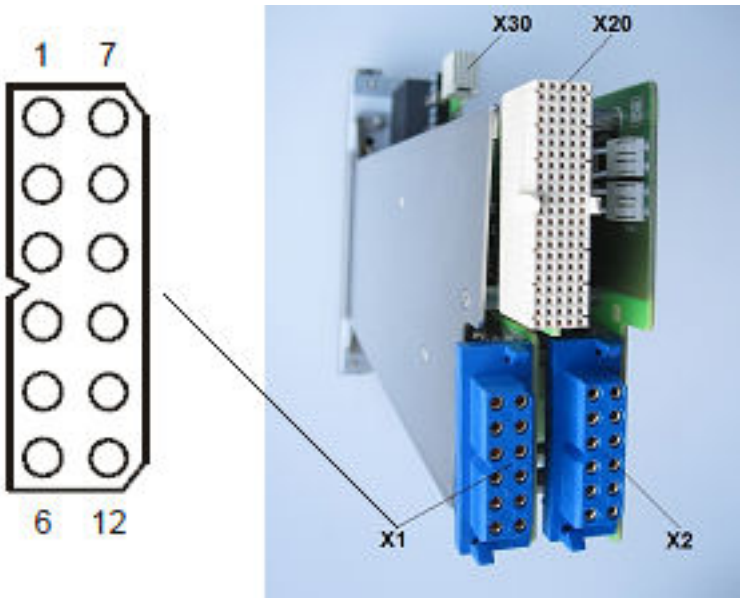

Figure C-1: R&S TS-PSM5 connector X1 (view: plug side)

Table C-1: R&S TS-PSM5 connector X1 assignment

Pin	Channel	Pin	Channel
1	CH8_COM	7	CH8_COM
2	CH8_COM	8	CH8_COM
3	CH8_COM	9	CH8_COM
4	CH5_COM	10	CH5_COM
5	CH5_COM	11	CH5_COM
6	CH5_COM	12	CH5_COM

C.1.2 Connector X2

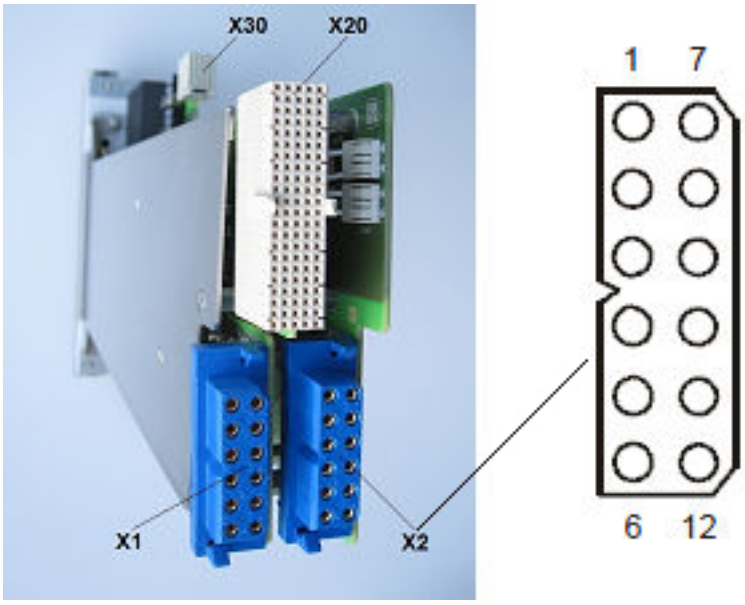

Figure C-2: R&S TS-PSM5 connector X2 (view: plug side)

Table C-2: R&S TS-PSM5 connector X2 assignment

Pin	Channel	Pin	Channel
1	CH7_COM	7	CH7_COM
2	CH7_COM	8	CH7_COM
3	CH7_COM	9	CH7_COM
4	CH6_COM	10	CH6_COM
5	CH6_COM	11	CH6_COM
6	CH6_COM	12	CH6_COM

C.1.3 Connector X10 (only R&S TS-PSM5 (variant 03))

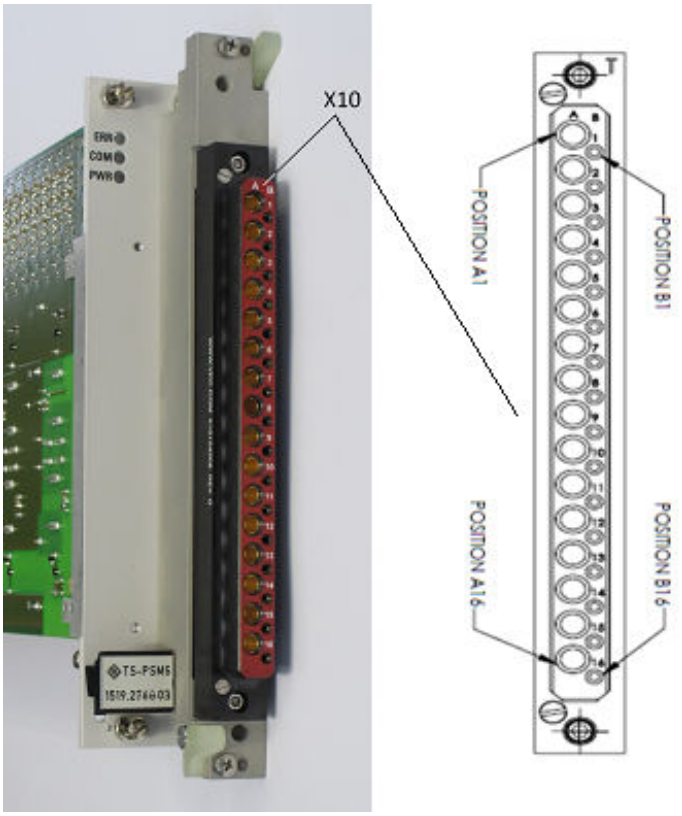

Figure C-3: R&S TS-PSM5 (variant 03) connector X10

Table C-3: R&S TS-PSM5 (variant 03) connector X10 assignment

Pin	A	B	Pin	A	B
1	--	CH2_NO	9	CH8_NO	--
2	--	CH1_NO	10	CH7_NO	--
3	--	CH4_NO	11	CH8_COM	--
4	--	CH3_NO	12	CH7_COM	--
5	--	CH2_COM	13	CH6_COM	--
6	--	CH1_COM	14	CH5_COM	--
7	--	CH4_COM	15	CH6_NO	--
8	--	CH3_COM	16	CH5_NO	--

C.1.4 Connector X20

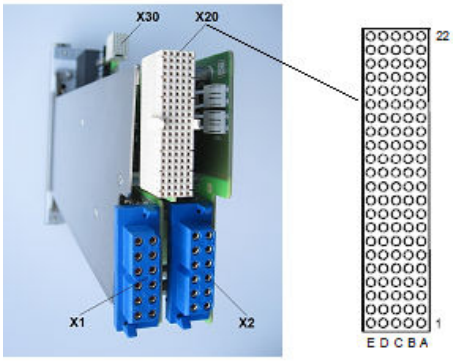

Figure C-4: R&S TS-PSM5 connector X20 (view: plug side)

Pin	E	D	C	B	A
22	GA0	GA1	GA2	GA3	GA4
21				GA5	
20	+5V	GND	+5V		
19			+5V	GND	
18		CAN_EN			
17				GND	
16		GND			
15		+5V		GND	
14					
13					
12	CH4_COM				CH2_COM
11					
10	CH3_COM				CH1_COM
9					
8					
7					
6					
5					
4					
3	RSA0	RRST#		GND	RSDO
2		RSDI	RSA1		RSCLK
1	+5V	CAN_L	CAN_H	GND	RCS#

Figure C-5: R&S TS-PSM5 Belegung Steckverbinder X20

C.1.5 Connector X30

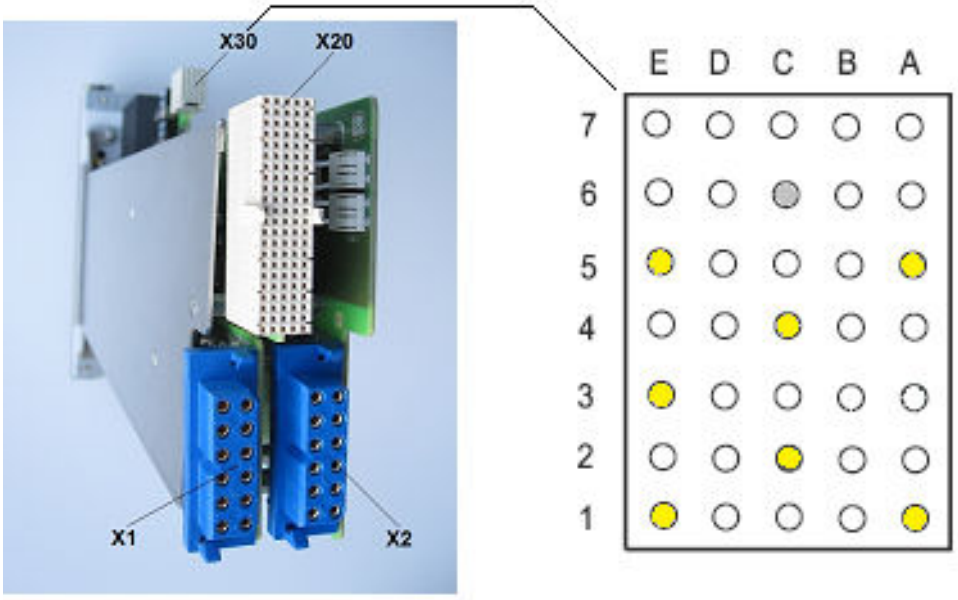

Figure C-6: R&S TS-PSM5 connector X30 (view: plug side)

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

Figure C-7: R&S TS-PSM5 Belegung Steckverbinder X30

C.2 R&S TS-PRIO5

C.2.1 Connector X1

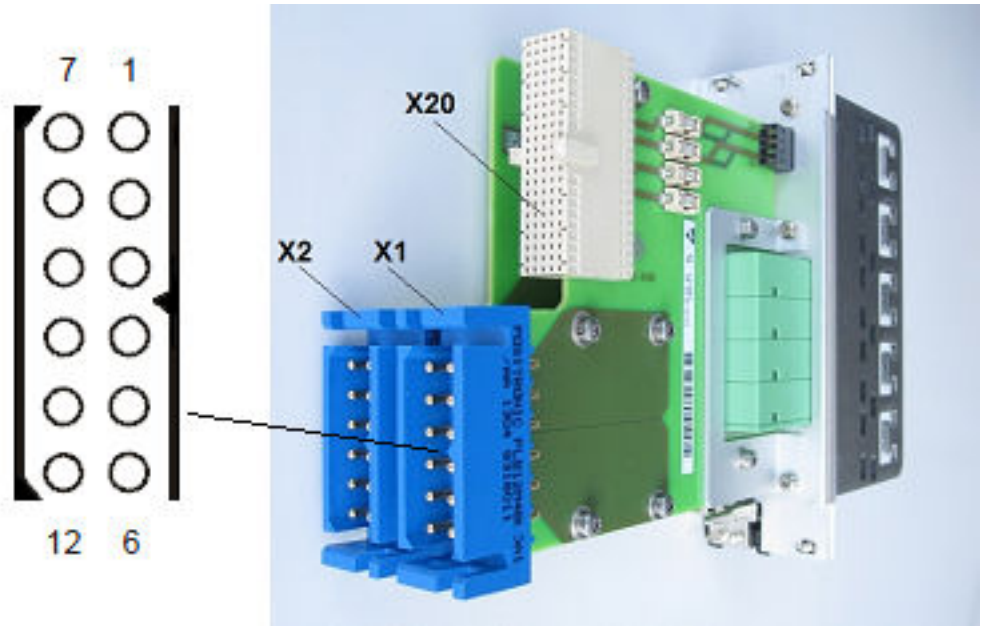

Figure C-8: R&S TS-PRIO5 connector X1 (view: plug side)

Table C-4: R&S TS-PRIO5 connector X1 assignment

Pin	Channel	Pin	Channel
7	CH8_COM	1	CH8_COM
8	CH8_COM	2	CH8_COM
9	CH8_COM	3	CH8_COM
10	CH5_COM	4	CH5_COM
11	CH5_COM	5	CH5_COM
12	CH5_COM	6	CH5_COM

C.2.2 Connector X2

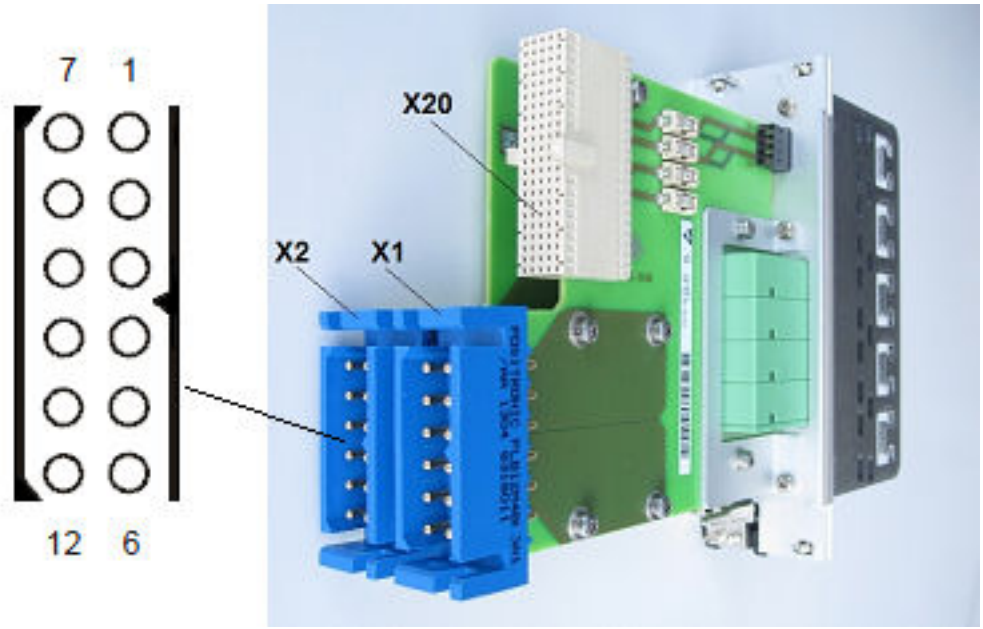

Figure C-9: R&S TS-PRIO5 connector X2 (view: plug side)

Table C-5: R&S TS-PRIO5 connector X2 assignment

Pin	Channel	Pin	Channel
7	CH7_COM	1	CH7_COM
8	CH7_COM	2	CH7_COM
9	CH7_COM	3	CH7_COM
10	CH6_COM	4	CH6_COM
11	CH6_COM	5	CH6_COM
12	CH6_COM	6	CH6_COM

C.2.3 Connector X20

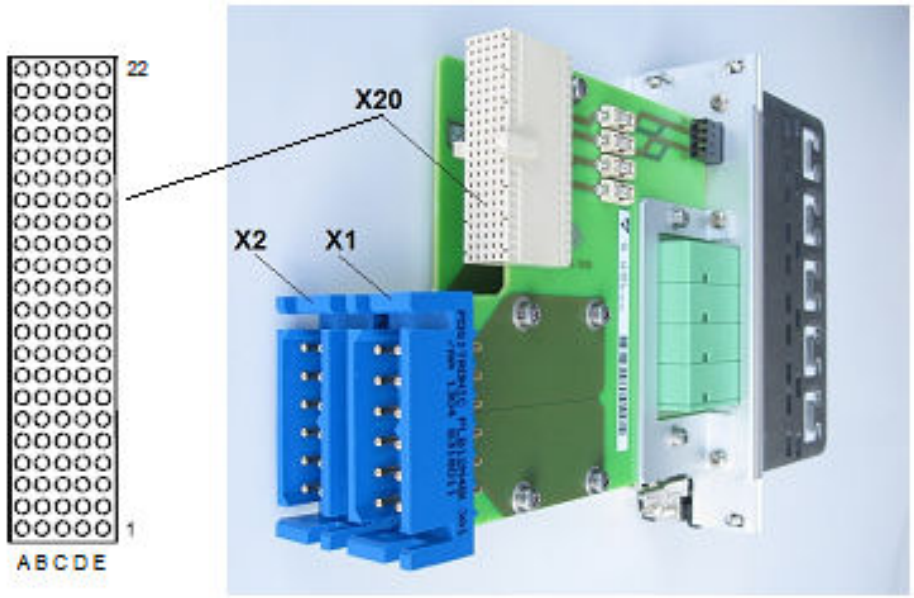

Figure C-10: R&S TS-PRIO5 connector X20 (view: plug side)

Pin	A	B	C	D	E
22					
21					
20					
19					
18					
17					
16					
15					
14					
13					
12	CH2_COM				CH4_COM
11					
10	CH1_COM				CH3_COM
9					
8					
7					
6					
5					
4					
3					
2					
1					

Figure C-11: R&S TS-PRIO5 Belegung Steckverbinder X20

C.2.4 Connector X12

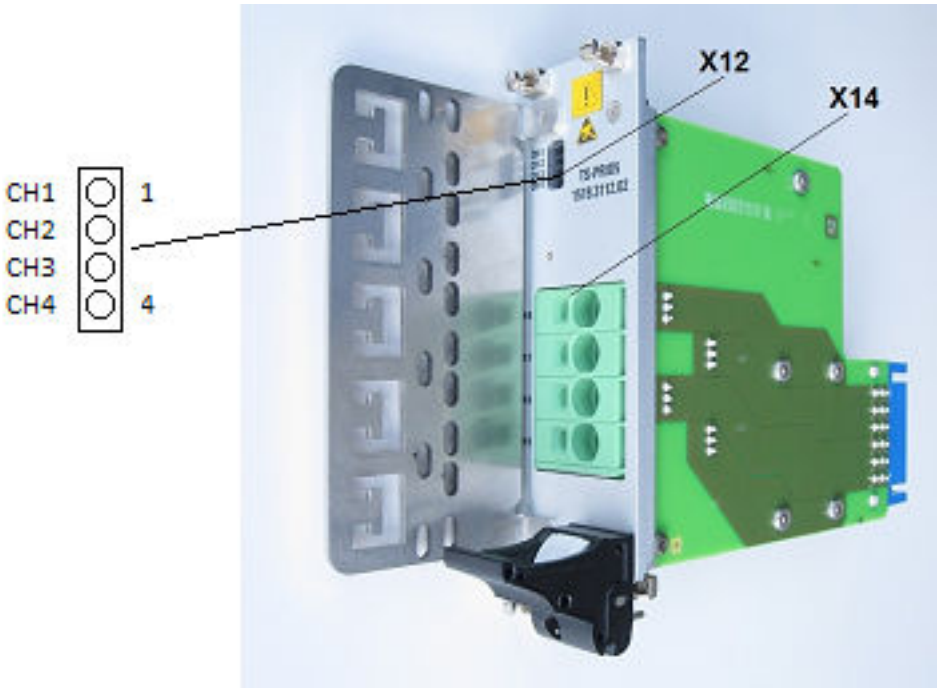

Figure C-12: R&S TS-PRIO5 terminal X12

Table C-6: R&S TS-PRIO5 terminal X12 assignment

Pin	Channel
1	CH1_COM
2	CH2_COM
3	CH3_COM
4	CH4_COM

C.2.5 Connector X14

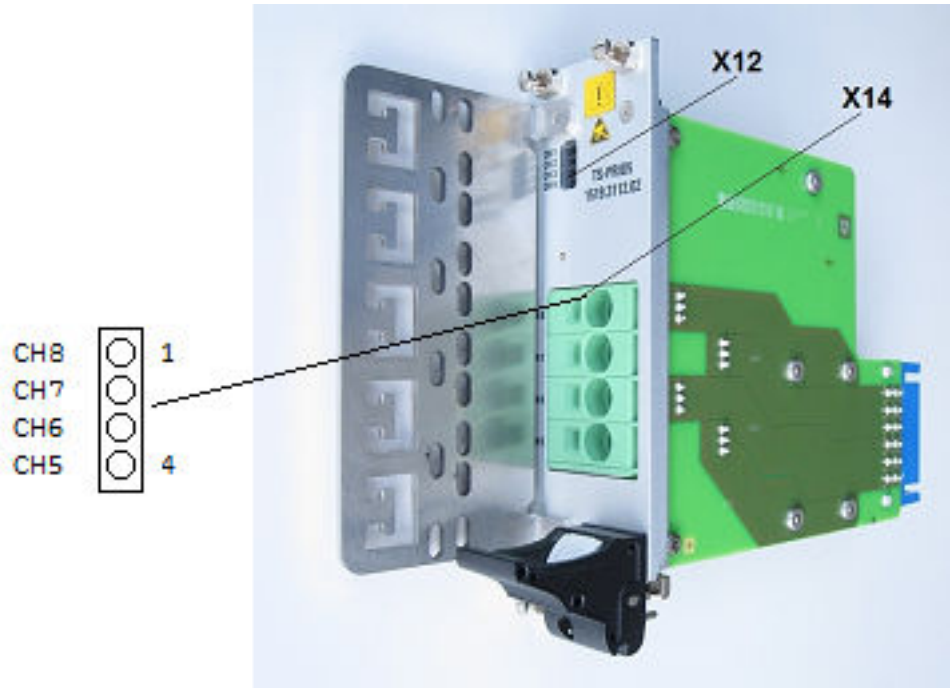

Figure C-13: R&S TS-PRIO5 terminal X14

Table C-7: R&S TS-PRIO5 terminal X14 assignment

Pin	Channel
1	CH8_COM
2	CH7_COM
3	CH6_COM
4	CH5_COM

C.3 R&S TS-PK04 / -PK04P

C.3.1 Connector X3

See also Chapter 4.3.2, "Connectors X3 and X4", on page 20.

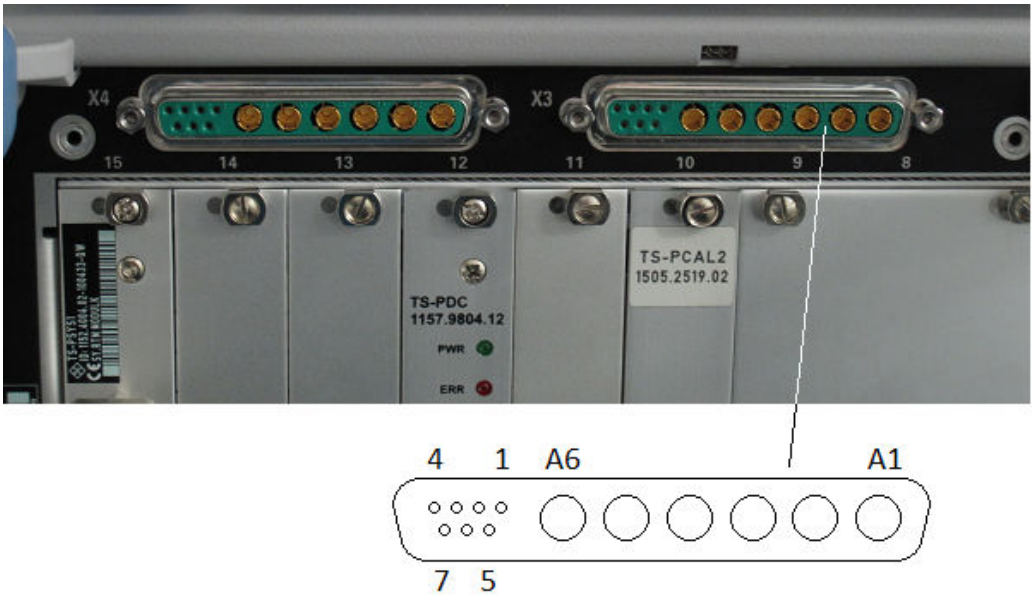

Figure C-14: Connector X3 - rear of the base unit

Table C-8: Connector X3 assignment

Pin	Channel	Pin	Channel
A1	CH8_COM	1	CH4_COM
A2	CH8_COM	2	CH3_COM
A3	CH8_COM	3	--
A4	CH8_COM	4	--
A5	CH8_COM	5	--
A6	CH5_COM	6	--
		7	--

C.3.2 Connector X4

See also Chapter 4.3.2, "Connectors X3 and X4", on page 20.

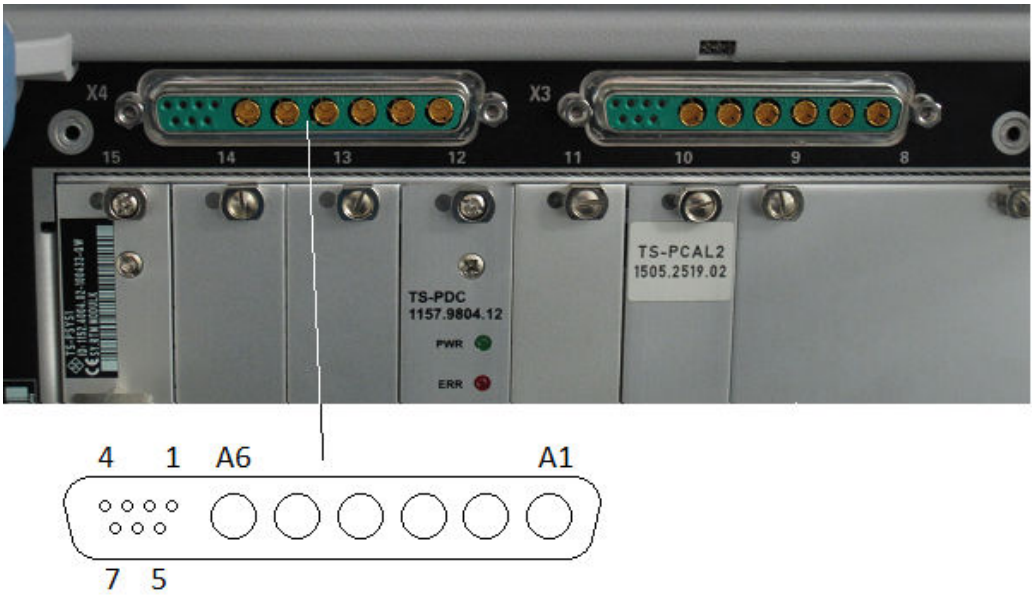

Figure C-15: Connector X4 - rear of the base unit

Table C-9: Connector X4 assignment

Pin	Channel	Pin	Channel
A1	CH5_COM	1	CH2_COM
A2	CH8_COM	2	CH1_COM
A3	CH5_COM	3	--
A4	CH5_COM	4	--
A5	CH5_COM	5	--
A6	CH5_COM	6	--
		7	--