

Industriefunkuhren



Technical Manual

Switch-Box - System 5000

for automatic signal switch-over

ENGLISH

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Version number (Firmware / Manual)

THE FIRST TWO DIGITS OF THE VERSION NUMBER OF THE TECHNICAL MANUAL AND THE FIRST TWO DIGITS OF THE FIRMWARE VERSION MUST **COMPLY WITH EACH OTHER**. THEY INDICATE THE FUNCTIONAL CORRELATION BETWEEN DEVICE AND TECHNICAL MANUAL.

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Symbols and Characters



Operational Reliability

Disregard may cause damages to persons or material.



Functionality

Disregard may impact function of system/device.



Information

Notes and Information.



Safety regulations

The safety regulations and observance of the technical data serve to ensure trouble-free operation of the device and protection of persons and material. It is therefore of utmost importance to observe and compliance with these regulations.

If these are not complied with, then no claims may be made under the terms of the warranty. No liability will be assumed for any ensuing damage.



Safety of the device

This device has been manufactured in accordance with the latest technological standards and approved safety regulations

The device should only be put into operation by trained and qualified staff. Care must be taken that all cable connections are laid and fixed in position correctly. The device should only be operated with the voltage supply indicated on the identification label.

The device should only be operated by qualified staff or employees who have received specific instruction.

If a device must be opened for repair, this should only be carried out by employees with appropriate qualifications or by **hopf**Elektronik GmbH.

Before a device is opened or a fuse is changed all power supplies must be disconnected.

If there are reasons to believe that the operational safety can no longer be guaranteed the device must be taken out of service and labelled accordingly.

The safety may be impaired when the device does not operate properly or if it is obviously damaged.

CE-Conformity



This device fulfils the requirements of the EU directive 89/336/EWG "Electromagnetic compatibility" and 73/23/EWG "Low voltage equipment".

Therefore the device bears the CE identification marking (CE = Communautés Européennes = European communities)

The CE indicates to the controlling bodies that the product complies with the requirements of the EU directive - especially with regard to protection of health and safety for the operator and the user - and may be released for sale within the common markets.

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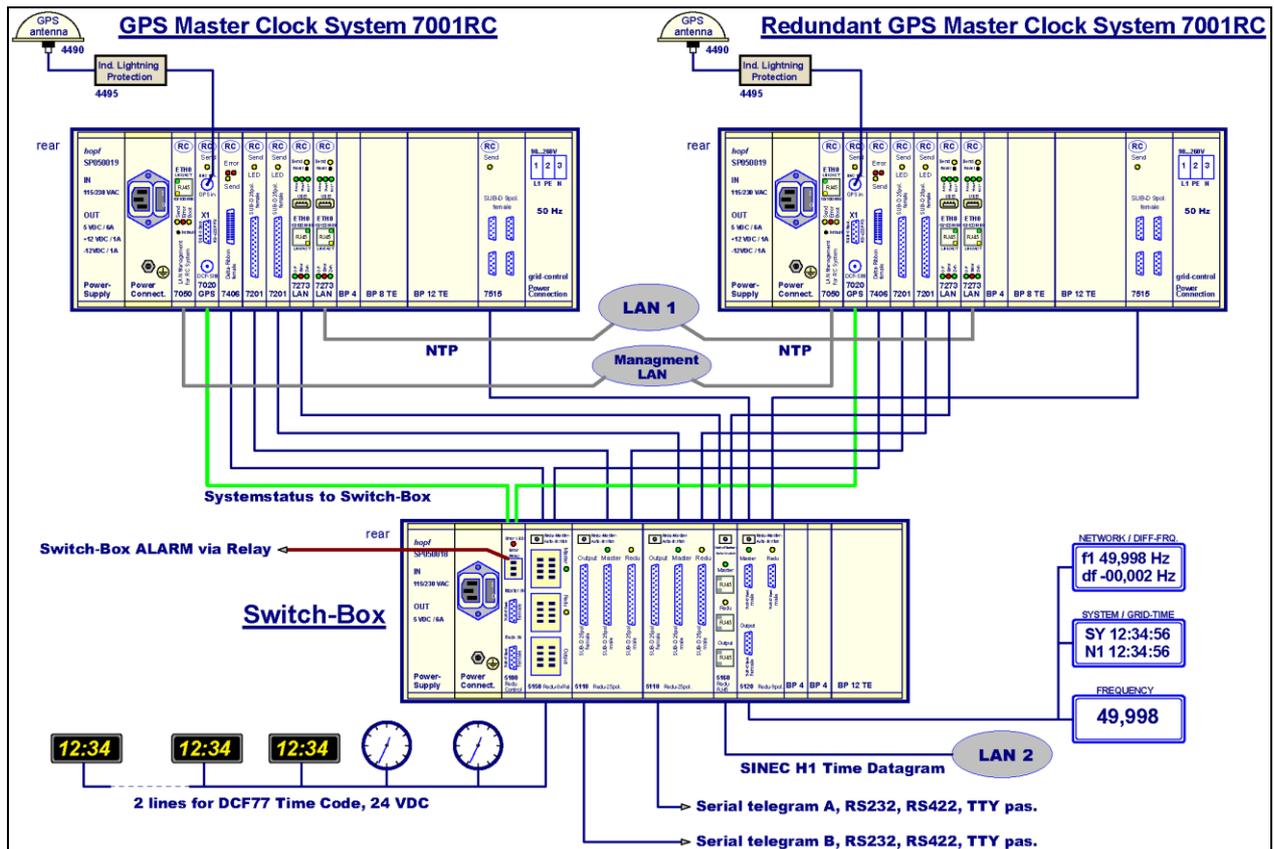
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1 System Description Switch-Box - System 5000

Switch-Box - System 5000 was designed and developed for setting up redundant clock systems in the

"hot standby function with automatic status-dependent signal switchover"

operating mode. Switch-Box - System 5000 is used when the most stringent demands are placed on the availability of a clock system.



This system guarantees that the signal output always switches over to the redundant system as soon as the latter demonstrates a lower fault level than the master system.

The Switch-Box realizes this fault-dependent signal switchover between the master and its redundant system by monitoring the status of the respective clock system. The Switch-Box can be configured in two different operating modes for this purpose:

Dynamic Error Status (for System 7001 and 7001RC)

In order to output the status information to the Switch-Box, clock systems 7001 and 7001RC generate special status information which can be picked up via a SUB-D connector on the front panel of Control Board 7020/7020RC.

Different priorities can be assigned to the various error messages in the clock systems in order to define optimum switchover conditions for the customer's application.

The clock systems can be monitored for 4 conditions in this mode:

- Total failure / line breakage
- Major fault
- Minor fault
- System O.K.

Static Error Status (for Series 6000 systems)

This mode was designed for Series 6000 clock systems; however in this mode the Switch-Box can also be controlled by external systems (on providing the required signals at a suitable signal level).

Two static signals of the clock systems are monitored in this mode:

- Operation/voltage O.K.
- Synchronicity O.K.

Where appropriate, a built-in self-monitoring feature in System 5000 informs the user both visually and via a relay that the Switch-Box is unable to switch over to the redundant system. In addition, in "Dynamic Error Status" mode an error message is transmitted if the connection cable used for status monitoring between the Switch-Box and the clock system is disconnected or broken.

Due to the system's modular construction, the Switch-Box can easily be adjusted to the respective customer requirements or upgraded by the customer at a later date.

Thus specially adapted Switch-Boards, which generally facilitate easy connection between Switch-Box and clock system, are available for the various clock system output boards.

System 5000 is supplied as standard in a 3U/84HP - 19" rack (**U = height unit / HP = part units**).

Furthermore, in addition to the standard AC power supply unit, a variety of input voltages and power supply units is available in both AC and DC versions.

In combination with the equipment's complete freedom from maintenance and high reliability, a high level of availability of the connected clock systems is achieved in addition to a high degree of flexibility.

The **hopf** Switch-Box - System 5000 further expands the innovative product range of **hopf** Elektronik GmbH.

Some basic functions of the system:

- Base system in **1/1 19" rack** (3U/84HP) including Control Board 5100 and power supply unit
- Power supply **115/230V AC** – other voltages possible
- **Intelligent signal switchover** dependent on the operating conditions of the Master and Redundant systems
- **Free assignment** of error priority in the **hopf** System 7001 and 7001RC
- **Error and status reporting incorporated into Switch-Box** for switchover availability over relay (dry contact) and LEDs
- All Switch-Boards are **hot-plug** compatible
- System completely **maintenance-free**
- All **cable connections** on the rear
- **Status LEDs** on both front and rear
- Casing with additional **ground screw** for cables up to 16mm²
- Incoming voltage feed with **mains switch** in accordance with IEC/EN 60320-1/C14 and EMI **line interference suppression filter**
- **Prepared for customer retrofitting** of Switch-Boards
- No additional **blanking panels** required on system expansion
- **Casing extension** with additional Switch-Board slots possible for larger systems
- **Switchover mode** for each Switch-Board adjustable via **switch on the board faceplate** (output fixed to Redundant System / output fixed to Master System / output controlled by Switch-Box)
- Complete electrical isolation of the Master and Redundant clock system output signals
- **Easy expansion of existing stand-alone systems** to a redundant system with "hot standby function with automatic status-dependent signal switchover to redundant system"

Expansion Options

- Customer-specific system adaptations for "tailor-made" project solutions

1.1 Switch-Box - System 5000 Safety Concept

In the design of Switch-Box - System 5000 special emphasis was placed on the high availability of the complete clock system even during the presence of a fault.

The following aspects were taken into consideration for the different fault conditions:

- Signal output even in the case of **Switch-Box voltage failure** by means of signal switchover via relay (signal output always from the Master System in this case)
- Error message from the Switch-Box via relay and LEDs in the event of **faulty transmission of status signals** to the Switch-Box (e.g. broken cable)
- Error message from the Switch-Box via relay and LEDs followed by switchover or further output of the Master System's signals in the event of the transmission of ambiguous **status signals** to the Switch-Box
- Error message of the Switch-Box via relay and LEDs in the event of the **total failure of the Master or Redundant System**
- Error message of the Switch-Box in the event of **power supply failure**
- Error message of the Switch-Box via relay in the event of **failure of Control Board 5100**
- **Manual configuration of signal outputs** to the Master or Redundant System is possible (not in the event of power failure)
- **In case of doubt** the Master System's signals are always transmitted

1.2 Switch-Box - System 5000 Construction

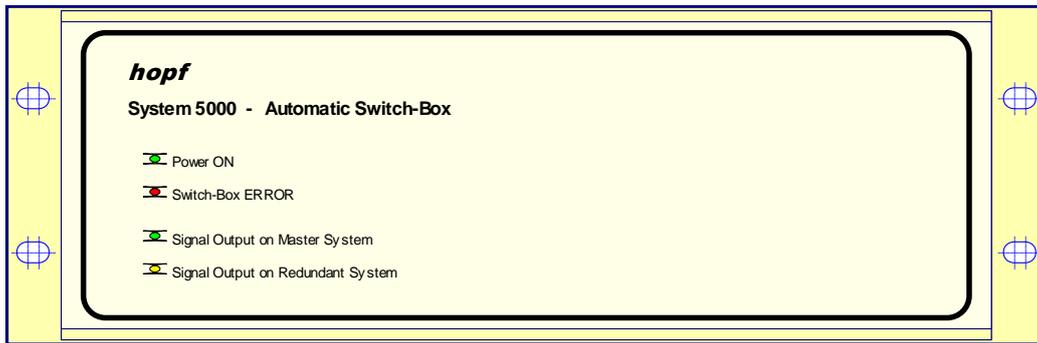
Due to the modular construction, the system can be individually configured for a variety of applications and is easy to upgrade or convert in the event of changes to the installation conditions.

1.2.1 19" Rack (3U/84HP)

The basic system comprises:

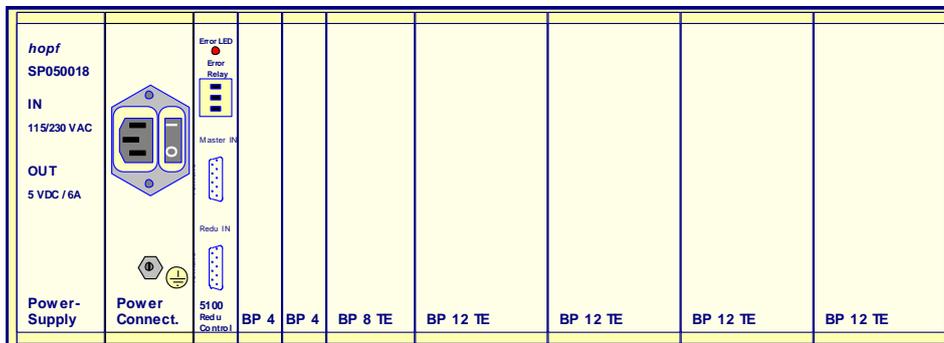
- 1/1 19" rack 3U/84HP
- Standard power supply unit with 115/230V AC / 30VA (47-63Hz)
Other input voltages and power supply units available
- Incoming voltage feed with mains switch and line filter
- Connection for protection earth cables up to 16mm²
- System front panel with status LEDs

System front panel:



- Control Board 5100 for:
 - Evaluation of the Master and Redundant System status signals
 - Control of the status LEDs
 - Control of the Switch-Board
 - Control of the ERROR relay
- System-Bus with 16x 3U/4HP expansion slots for Switch-Boards

System rear side/connection side:



1.2.2 Status LEDs

The system has status LEDs on both front and rear sides. These allow the system status to be identified when installed in the control panel both via the front panel and while checking the cabling on the rear of the system.

The system has the following status LEDs:

- 4x LEDs on the system front panel for the following:
 - Power ON (green)
 - Switch-Box ERROR (red)
 - Signal output from the Master System (green)
 - Signal output from the Redundant System (yellow)



The signal output LEDs only display the correct output status for Switch-Boards in the standard configuration (switchover condition: MINOR alarm and switch on board faceplate: AUTO or switch disabled).

- 1x LED on Control Board 5100: Switch-Box ERROR (red)
- 2x LEDs on Switch-Boards: Output on Master (green) or Redundant (yellow)
- 1x LED on power supply unit

1.2.3 Slots for Switch-Boards

In a standard system, 17x 4HP slots are available on the System-BUS. Each slot is equipped with a VG ledge.

The first slot is reserved for Control Board 5100. The remaining slots can be allocated to any desired Switch-Boards with no additional action required by the customer.

The systems are delivered in such a way that the rear side of the system can always be fully closed using the residual blanking panels following any subsequent expansion with Switch-Boards.

1.2.4 System-BUS of Switch-Box - System 5000

The internal System-BUS of Switch-Box - System 5000 serves to:

- Distribute the power supply to the installed boards
- Distribute the switchover signals of Control Boards 5100

1.3 Quick Install

- Ground the system
- Connect the power supply
- Configure the boards
- Make the connection between Switch-Box and Master / Redundant System
- Switch on the power supply
- Check the status LEDs
- Carry out a function test on the Switch-Box

2 Installation

The following section describes the installation of the system hardware.

2.1 Installing the 19" Rack

Carry out the following steps:

- Insert the rack into the control panel and fasten to the mounting brackets on the front side of the rack using 4 screws.
- Make sure that there is sufficient space between the connection side of the rack and the control panel in order to be able to mount the connection cable on the system and replace Switch-Boards.
- Do not cover ventilation slots on the top or bottom sides of the casing in order to guarantee adequate convection.

2.2 Grounding

Switch-Box - System 5000 is generally grounded via the ground wire in the power supply cable.

An additional ground wire for the realization of over voltage concepts can be connected to the casing by means of the ground screw located on the rear side of the system.

2.3 AC Power Supply

The standard AC power supply unit is described here; however the connection data on the nameplate of the respective device always applies.

Pay attention to the following when connecting voltage:

- Correct voltage type (AC or DC)
- Voltage level

Incoming voltage is supplied via a power cable with mains switch and EMI filter in accordance with IEC/EN 60320-1/C14.



- Check that the mains switch is in position "0" (= off).
- Plug the power cable into the system's mains power socket.
- Connect the power cable to the power supply or switch on the line circuit breaker.



Connecting incorrect voltage to the System 5000 can damage the system.

2.3.1 Safety and Warning Instructions

Please read these instructions carefully in order to guarantee safe operation of the equipment and to use all of its functions.



Caution: Never work on a live unit. Danger to life!

Switch-Box - System 5000 is an installed device. Installation and commissioning must only be carried out by suitably qualified specialist personnel. Relevant national and international regulations (e.g. VDE, DIN) must be observed.

Particular attention must be paid during commissioning to ensure that:

- The mains power connection has been carried out professionally and there is guaranteed protection against electric shock
- The grounding conductor is connected
- All supply lines are adequately fused and dimensioned
- All output lines are adequately dimensioned in accordance with the maximum output current of the equipment, or specially fused
- Adequate convection is guaranteed

The equipment contains components containing life-threatening voltage and a high level of stored energy.

2.3.2 Power Supply Unit Specifications

All specifications concerning AC power supply can be found in **chapter 8 Technical Data System 5000 incl. Switch Boards**.

2.3.3 Fuse Protection

Care must be taken to ensure adequate fuse protection of the supply voltage when connecting Switch-Box - System 5000.

The corresponding technical data should be taken from the equipment nameplate.

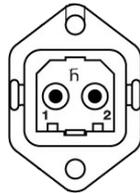


If the internal fuse (equipment protection) trips, it is highly probable that the equipment is faulty. In this case the equipment must be checked in the factory.

2.4 DC Power Supply (Option)



Make sure that the external voltage supply is switched off. Pay attention to correct polarity and connection to ground when connecting the lead.



- The power supply cable is connected to the Switch-Box - System 5000 over a 2 pole connector with additional ground connection and interlock:

+V_{in}: Positive pole (contact 1)
 -V_{in}: Negative pole (contact 2)
 PE: Ground



Connecting incorrect voltage to the System 5000 can damage the system.



Grounding:

The negative pole (-V_{in}) and ground (PE) are connected together on the system side as standard.

2.4.1 Power Supply Unit Specifications

All specifications concerning DC power supply can be found in **chapter 8 Technical Data System 5000 incl. Switch Boards**.

2.4.2 Fuse Protection

Care must be taken to ensure adequate fuse protection of the supply voltage when connecting Switch-Box - System 5000.

The corresponding technical data should be taken from the equipment nameplate.



If the internal fuse (equipment protection) trips, it is highly probable that the equipment is faulty. In this case the equipment must be checked in the factory.

2.5 Status Signal Input Connection

The scope of supply of Switch-Box - System 5000 includes 2 connection lines for the connection between the Switch-Box and System 7001 or 7001RC (operating mode: Dynamic Error Status).

These lines are connected to Connector X1 of Control Board 7020 or 7020RC and the respective input of Control Board 5100.

Instructions concerning System 7001RC

On System 7001RC, at the customer's request the signal output for the Switch-Box can be lead out to a separate SUB-D connector in order to allocate Interface X1 to the serial line for the remote software.

Instructions concerning Systems 6842, 6855 and 6850 (not applicable to 1U systems)

These systems do not, as standard, have signal outputs to control a Switch-Box. At the customer's request this signal output can be lead out separately to a SUB-D connector.

In this case the connection between the systems and the Switch-Box control board is also made with the connection cables supplied.

Connection cables

The scope of supply for the Switch-Box includes 2 connection cables with the following specification:

2m connection cable – 9 pole SUB-D socket on 9 pole SUB-D connector (1:1, shield-shield)



Due to the connection cables between the systems a galvanic connection is formed between the two casings.

2.5.1 "Master Status" Input

The 9-pole SUB-D female connector makes the connection of the master systems status signals to the control board 5100.

9 pole – SUB-D female connector



Pin	Assignment
1	n.c.
2	n.c.
3	n.c.
4	Input -1-
5	GND
6	n.c.
7	n.c.
8	Input -2-
9	GND

n.c. = not connected
 Input -1- = Dynamic Error Status and
 Static Error Status - Radio
 Input -2- = Static Error Status - Operation

2.5.2 "Redu Status" Input

The 9-pole SUB-D female connector makes the connection of the redu systems status signals to the control board 5100.

9 pole – SUB-D female connector

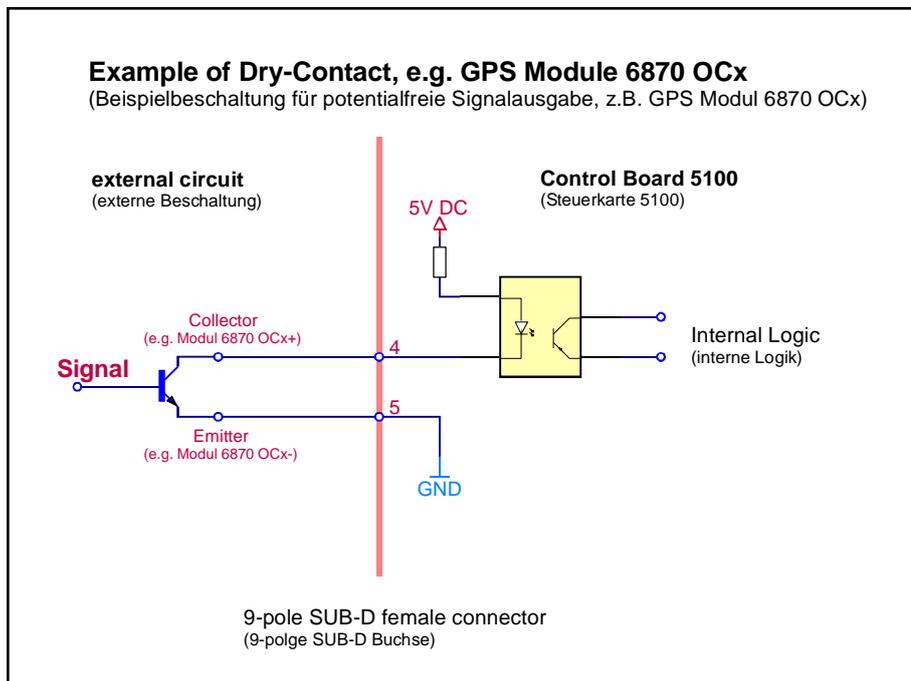
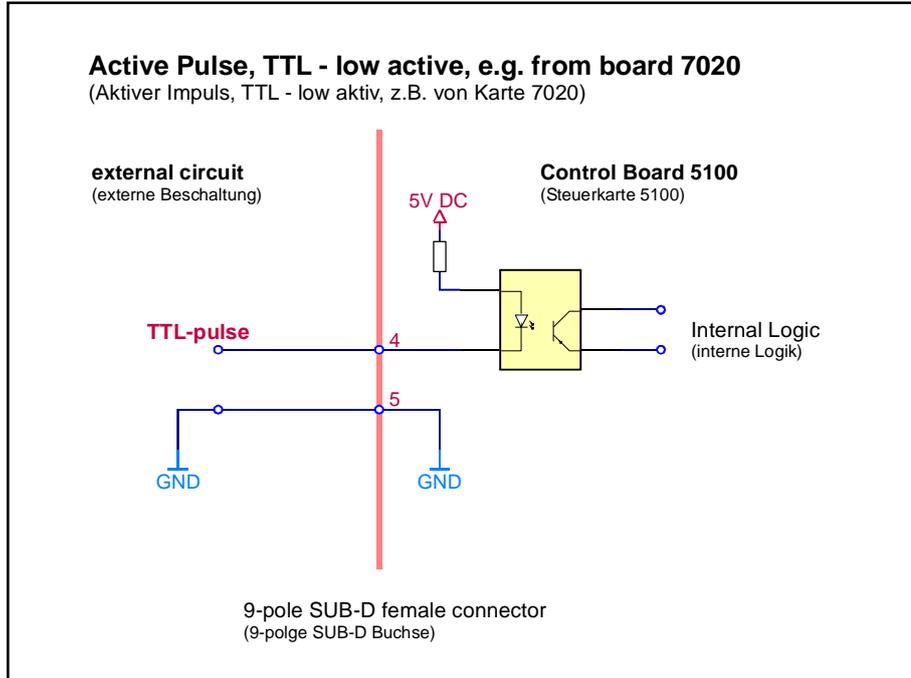


Pin	Assignment
1	n.c.
2	n.c.
3	n.c.
4	Input -1-
5	GND
6	n.c.
7	n.c.
8	Input -2-
9	GND

n.c. = not connected
 Input -1- = Dynamic Error Status and
 Static Error Status - Radio
 Input -2- = Static Error Status - Operation

2.5.3 Examples of Input Switching

The status inputs can be switched via TTL signals or via "Dry Contact" (Relay or Optical Coupler).



2.6 ERROR Relay Connection

A pluggable screwing terminal makes the connection of the ERROR relays in the front panel of the control board 5100.

3 pole – connector



Pin	Assignment
1	Normally closed
2	Common
3	Normally open

2.7 Switch-Board Connection

The Switch-Board connection is described in the respective Switch-Board section (see **chapter 5 Switch-Boards**).

3 Commissioning

This section describes the commissioning of Switch-Box - System 5000.

3.1 General Procedure

Commissioning is structured as follows:

- Configure Control Board 5100 and the Switch-Boards to the required functionality via the jumper on the boards - (see **chapter 5 Switch-Boards**).
- Check the cabling:
 - Grounding
 - Power supply
 - Status signal input for Master and Redundant systems
 - ERROR relay
 - Switch-Boards
- Disconnect all connections to the target systems of the Switch-Board (OUT) (recommended)
- Switch on Switch-Box - System 5000
- Power LEDs on front side light up
- Carry out function test of Switch-Box - System 5000
- Commissioning the Switch-Boards:
 - Check the function of the function boards to be switched over
 - Make the connections to the target system
 - Check the connected devices for signal transfer

3.2 Switch on the Operating Voltage

AC Power Supply:



Place the mains switch to the "ON" position.

The green check light on the switch, the LED control indicator on the power supply unit and the power LED on the front side of Switch-Box - System 5000 all light up.

DC Power Supply:



Switch on the external voltage source.

The LED control indicator on the power supply unit and the power LED on the front side of Switch-Box - System 5000 both light up.

The remaining LEDs on the front and rear sides light up in accordance with the respective received status of the Master or Redundant system.

3.3 Function Test (Basic Function)

This section only describes how to check the basic function of the Switch-Box in Dynamic Error Status mode (for System 7001 and 7001RC).

All other function tests must be checked in accordance with the respective configuration of the Switch-Box and its Switch-Boards on the basis of the switchover conditions for the respective configuration (see **chapter 4.1.1 Dynamic Status Signal Monitoring (System 7001/7001RC)** and **chapter 4.1.2 Static Status Signal Monitoring (Series 6000 Systems)**).

The following are required in order to be able to carry out the test:

- The Master and Redundant systems must display "System O.K." status
- The front panel switches on the Switch-Boards must be set to "A" for automatic switchover

The Switch-Box must display the following status for correct connection to the Master and Redundant systems:

- The power LED lights up on the front side
- The ERROR LEDs are off on the front side and on Board 5100
- The ERROR relay is energized on Board 5100 (no error)
- The signal output is switched on the Master System (see LEDs on front and rear side of the system)

Step 1

In this condition the first test is to disconnect the connection between Board 5100 and the Master System. Thereafter the Switch-Box should behave as follows:

- The ERROR LEDs light up immediately on the front side and on Board 5100
- The ERROR relay immediately de-energizes on Board 5100 (error)
- After 2-3 seconds the Switch-Boards switch to signal output from the Redundant System
- After 2-3 seconds the front panel LED "Signal Output on Master System" switches to "Signal Output on Redundant System"

Step 2

In this condition the front panel switches, if activated, are set to position "M" for output of signals of the Master System. Thereafter the Switch-box should behave as follows:

- The signal output of the Switch-Boards is reset to the Master System
- The LEDs "Master" on the Switch-Boards are lightning
- The ERROR LEDs continue to light up on the front side and on Board 5100
- The ERROR relay remains de-energized on Board 5100 (error)
- The front panel LED "Signal Output on Redundant System" continues to light up

Thereafter the front panel switches are reset to position "A" for automatic switch-over and the Switch-Boards are backspaced to signal output of the redundant System.

Step 3

In this condition the connection is disconnected between Board 5100 and the Redundant System. Thereafter the Switch-Box should behave as follows:

- The ERROR LEDs continue to light up on the front side and on Board 5100
- The ERROR relay remains de-energized on Board 5100 (error)
- After 2-3 seconds the Switch-Boards switch back to signal output from the Master System
- After 2-3 seconds the front panel LED "Signal Output on Redundant System" changes back to "Signal Output on Master System"

Step 4

In this condition the connection is regenerated between Board 5100 and the Master System. Thereafter the Switch-Box should behave as follows:

- The ERROR LEDs continue to light up on the front side and on Board 5100
- The ERROR relay remains de-energized on Board 5100 (error)
- The Switch-Board signal output remains on the Master System
- The front panel LED "Signal Output on Master System" continues to light up

Step 5

In this condition the connection is regenerated between Board 5100 and the Redundant System. Thereafter the Switch-Box should behave as follows:

- The ERROR LEDs go out on the front side and on Board 5100
- The ERROR relay re-energizes on Board 5100 (no error)
- The Switch-Board signal output remains on the Master System
- The front panel LED "Signal Output on Master System" continues to light up

Step 6

In this condition the front panel switches, if activated, are set to position "R" for output of signals of the Redundant System. Thereafter the Switch-Box should behave as follows:

- The signal output of the Switch-Boards switch over to the Redundant System
- The LEDs "Redu" on the Switch-Boards are lightning
- The ERROR LEDs discontinue to light up on the front side and on Board 5100
- The ERROR relay remains energized on Board 5100 (no error)
- The front panel LED "Signal Output on Master System" continues to light up

Thereafter the front panel switches are reset to position "A" for automatic switch-over and the Switch-Boards are backspaced to signal output of the Master System.

This concludes the testing of the basic function. All further checks, as required, take place by generating the various fault conditions in the Master and Redundant systems. See **chapter 4.1 Operating Modes** for the respective switchover conditions.

4 System Parameterization and Operation

The adjustable functions of the Switch-Box are described below.

4.1 Operating Modes

This section describes the 2 operating modes of the Switch-Box:

- Dynamic Error Status (for System 7001 and 7001RC)
- Static Error Status (for Series 6000 systems)

4.1.1 Dynamic Status Signal Monitoring (System 7001/7001RC)

In order to transmit status information to the Switch-Box, clock systems 7001 and 7001RC generate special status information which can be picked up via a SUB-D connector on the front panel of Control Board 7020 / 7020RC.

In this operating mode clock systems 7001 and 7001RC are monitored for four conditions:

- Total failure / line breakage
- Major error
- Minor error
- System O.K.

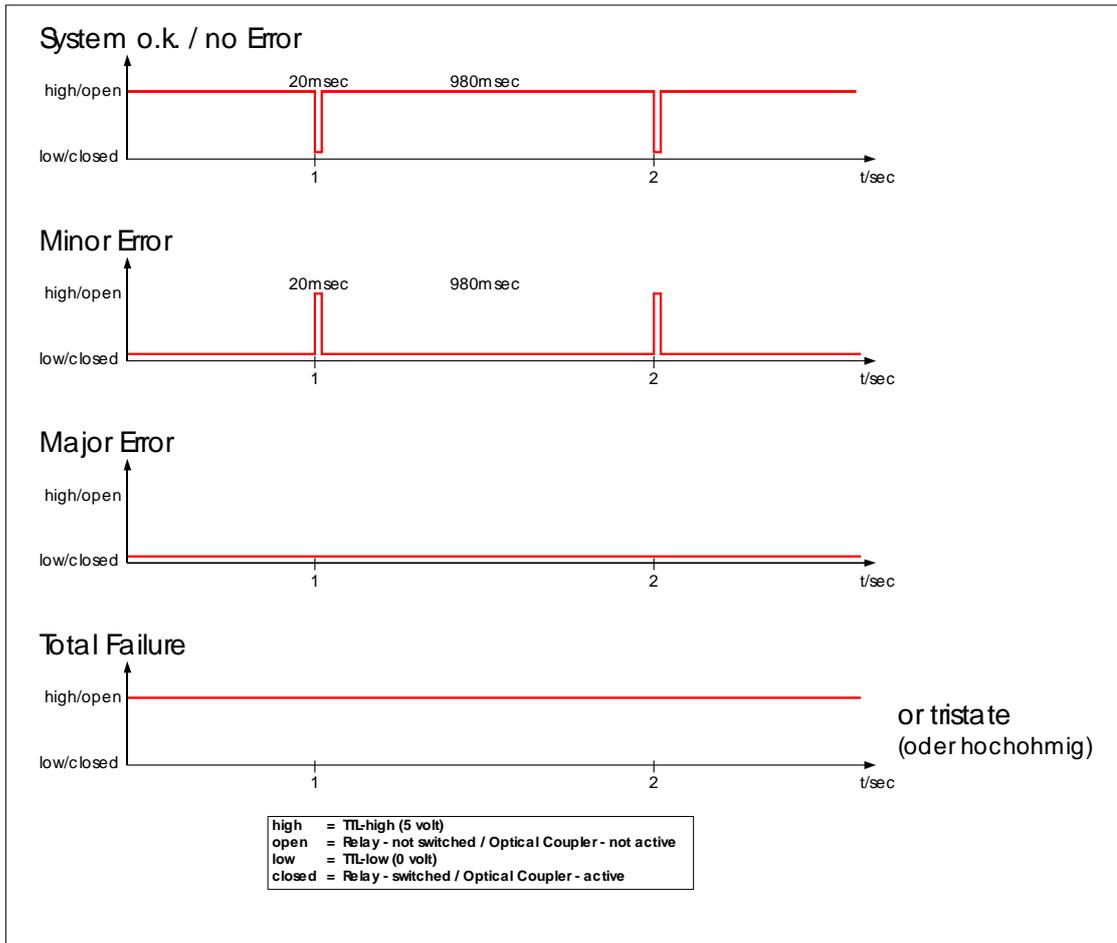


To operate the Switch-Box in this mode the System 7001 / 7001RC must be configured for operation on a Switch-Box. The output from Control Board 7020 / 7020RC must be set to **Switch-Box Control** and **Error Reporting** must be set to "**Dynamic**".



If setting "dynamic status signal control" is made the respectively second input "Input -2-" is ignored on the control board 5100.

4.1.1.1 Analyzable Status Signals



4.1.1.2 Switchover/Output Conditions

In the Dynamic Error Status mode the individual Switch-Boards can be configured to two different patterns of behavior:

- Signal switchover initiated by a MINOR error (standard)
- Signal switchover initiated by a MAJOR error



Signal switchover function initiated by a MAJOR error:

When configured in such a way, the Switch-Board only switches over to the Redundant System when the Master System transmits a MAJOR alarm or fails completely and the status of the Redundant System is higher than the status of the Master System.

Output Behaviour for Switch Boards configured to MINOR Error (Standard):

Function - Switch-Box	Status - Master System	Status - Redundancy System	Signal output Switch-Box	ERROR Switch-Box
O.K.	O.K.	O.K.	Master	---
O.K.	O.K.	Minor	Master	---
O.K.	O.K.	Major	Master	---
O.K.	Minor	O.K.	Redundancy	---
O.K.	Minor	Minor	Master	---
O.K.	Minor	Major	Master	---
O.K.	Major	O.K.	Redundancy	---
O.K.	Major	Minor	Redundancy	---
O.K.	Major	Major	Master	---
O.K.	Failure	O.K./Min./Maj.	Redundancy	Active
O.K.	O.K./Min./Maj.	Failure	Master	Active
O.K.	Failure	Failure	Master	Active
Power Failure	Never mind	Never mind	Master	Active (Relays only)

Switching Conditions for Switch-Boards configured to MAJOR Alarm:

Function - Switch-Box	Status - Master System	Status - Redundancy System	Signal output Switch-Box	ERROR Switch-Box
O.K.	O.K.	O.K.	Master	---
O.K.	O.K.	Minor	Master	---
O.K.	O.K.	Major	Master	---
O.K.	Minor	O.K.	Master	---
O.K.	Minor	Minor	Master	---
O.K.	Minor	Major	Master	---
O.K.	Major	O.K.	Redundancy	---
O.K.	Major	Minor	Redundancy	---
O.K.	Major	Major	Master	---
O.K.	Failure	O.K./Min./Maj.	Redundancy	Active
O.K.	O.K./Min./Maj.	Failure	Master	Active
O.K.	Failure	Failure	Master	Active
Power Failure	Never mind	Never Mind	Master	Active (Relays only)

4.1.2 Static Status Signal Monitoring (Series 6000 Systems)

Each system (Master and Redundant) transmits two static status information signals to the Switch-Box in this mode:

- Operation/Voltage O.K. or Error
- Synchronicity O.K. or Error

The Switch-Box also checks the plausibility of the status information at the same time. Thus the Switch-Box transmits an error whenever a system outputs the following status information:

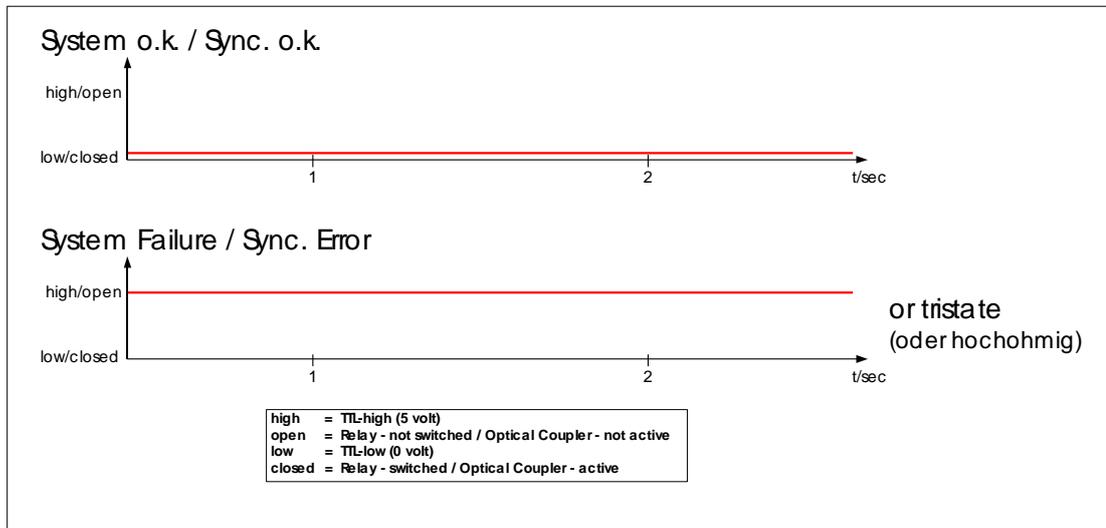
- Operation/Voltage **Error** but
- Synchronicity **O.K.**

This status is not permissible and is therefore classified as an error.



The Switch-Box is **not able** to detect a line breakage in the status signal feed in this mode

4.1.2.1 Analyzable Status Signals



4.1.2.2 Switchover/Output Conditions

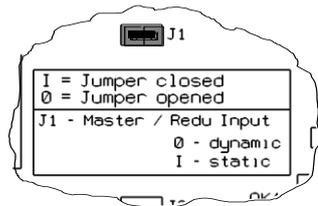
Switch-Box Function	Master Operation	Master Function	Redu Operation	Redu Function	Switch-Box Signal Output	Switch-Box ERROR
O.K.	O.K.	O.K.	O.K.	O.K.	Master	---
O.K.	O.K.	O.K.	O.K.	Error	Master	---
O.K.	O.K.	O.K.	Error	Error	Master	---
O.K.	O.K.	O.K.	Error	O.K.	Master	Active
O.K.	O.K.	Error	O.K.	O.K.	Redundant	---
O.K.	O.K.	Error	O.K.	Error	Master	---
O.K.	O.K.	Error	Error	Error	Master	---
O.K.	O.K.	Error	Error	O.K.	Master	Active
O.K.	Error	O.K.	O.K.	O.K.	Redundant	Active
O.K.	Error	O.K.	O.K.	Error	Redundant	Active
O.K.	Error	O.K.	Error	Error	Redundant	Active
O.K.	Error	O.K.	Error	O.K.	Master	Active
O.K.	Error	Error	O.K.	O.K.	Redundant	---
O.K.	Error	Error	O.K.	Error	Redundant	---
O.K.	Error	Error	Error	Error	Master	---
O.K.	Error	Error	Error	O.K.	Master	Active
Power Failure	Immaterial	Immaterial	Immaterial	Immaterial	Master	Active (relay only)

4.2 Control Board 5100 (Operating Mode Selection)

The operating mode of the Switch-Box is configured via a jumper on Control Board 5100.

There is a choice of two modes:

- Dynamic Error Status (for System 7001 and 7001RC)
- Static Error Status (for Series 6000 systems)



4.2.1 ERROR Relay Response

The response of the ERROR relay can **not** be configured. The relay always has the following function:

- **O.K. / No Error** ⇒ Relay active/energized
- **Error** ⇒ Relay inactive/de-energized

4.3 Switch-Boards 51XX

All Switch-Boards have a standard configuration. The basic configuration is set via a jumper on the printed circuit board and operated via the front panel switch as required.

4.3.1 Switchover Response

The switchover response of the Switch-Board is configured via a jumper on the printed circuit board.

Switch Condition: **MINOR Alarm (Standard)**

The Switch-Board always switches over to the Redundant System when the Redundant System has better status than the Master System.

Switch Condition: **MAJOR Alarm**

The Switch-Board only switches over to the Redundant System when the Master System has a MAJOR error.

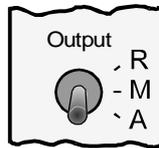


The required setting in order for the set configuration to become effective is:

- Front panel switch on position (A)utomatic **or**
- Front panel switch switched to "Offline" via jumper

4.3.2 Manual Determination of Signal Output

The user can manually determine the signal output of the Switch-Board with the switch located on its front panel. This switch has three positions:



Standard = (A)utomatic

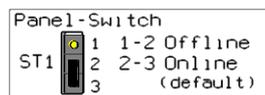
- (R)edundant
The Switch-Board is configured to transmit signals from the Redundant System independently of Control Board 5100.



In the event of a power failure or a faulty power supply unit the signal output reverts back to the Master System

- (M)aster
The Switch-Board is configured to transmit signals from the Master System independently of Control Board 5100.
- (A)utomatic
The Switch-Board is controlled by Control Board 5100.

In order to protect the Switch-Board from accidental switchover or unintentional determination of the signal output, the front panel switch can be disabled via a jumper on the Switch-Board.



(Standard = Switch enabled)

When the front panel switch is disabled the Switch-Board is **always** controlled automatically by Control Board 5100.

5 Switch-Boards

This section describes the Switch-Board's properties and scope of supply.

5.1 General

The following points must be taken into consideration when working with Function Boards:

Electrical Properties



The Switch Boards support **hot plug**.

It is **not** necessary to switch the system off in order to replace a board.

Power Supply

The operating voltage for all Switch-Boards is supplied via the internal system-BUS.

Slot Selection

In principle each new Switch-Board can be installed on any desired point of the base system. The only requirement is **a sufficient number of free slots** in the system.

5.1.1 Replacing a Switch-Board

The following steps are required to replace a Switch-Board with an identical model while retaining all previous functions:

- Disconnect all connections on the Switch-Board to be replaced
- Loosen the screws on the Switch-Board and pull it out of the system
- Transfer all jumper settings from the old Switch-Board to the new Board
- Insert the new Switch-Board into the system and tighten the screws
- Check the function of the Switch-Board using the front panel switch where appropriate
- Place the front panel switch (if enabled) in the desired position
- Remake all connections



The Switch-Boards support **hot plug**. It is **not** necessary to switch the system off in order to install or remove a Switch-Board.

5.1.2 Installing an Additional Switch-Board

In principle each new Switch-Board can be installed on any desired point of the base system. The only requirements are **a sufficient number of free slots** in the system and **sufficient power** supplied by the available power supply unit.

The following steps are required to install a Switch-Board:

- Calculate whether the duty available from the power supply unit is sufficient for the additional Switch-Board (see **chapter 5.1.2.1 Calculating the Required Power Supply Unit Duty**)
- Check whether sufficient free slots are available for the installation of the additional Switch-Board
- Loosen the screws on the blanking panels and remove
- Set all jumper settings on the Switch-Board to the desired configuration
- Insert the new Switch-Board into the system and tighten the screws
- Check the function of the Switch-Board using the front panel switch where appropriate
- Place the front panel switch (if enabled) in the desired position
- Make all connections



The Switch-Boards support **hot plug**. It is **not** necessary to switch the system off in order to install or remove a Switch-Board.

5.1.2.1 Calculating the Required Power Supply Unit Duty

In order for the Switch-Box to be able to switch over clock system signals in the event of an error, the duty of the power supply unit must be guaranteed to be sufficient to energize all relays on the Switch-Boards.

A power supply unit duty of 30 Watts is available in the standard System 5000. The following table gives information about the current consumption of the base system and the individual Switch-Boards and serves to calculate the required power supply unit duty:

Components	Quantity	Current Consumption	Total
Base System including Control Board 5100	1x	1.00W (5V/0.20A)	1.00W
Switch-Board 5110		2.75W (5V/0.55A)	
Switch-Board 5111		4.75W (5V/0.95A)	
Switch-Board 5120		2.00W (5V/0.40A)	
Switch-Board 5125		3.50W (5V/0.70A)	
Switch-Board 5130		1.00W (5V/0.20A)	
Switch-Board 5150		2.50W (5V/0.50A)	
Switch-Board 5160		2.00W (5V/0.40A)	

Required power supply unit duty	Σ	W
---------------------------------	----------	----------



The value of the required power supply unit duty calculated here must **never** exceed the duty of the power supply unit(s) used in the Switch-Box. Otherwise there is a danger that, in the event of an error, the Switch-Box will be unable to switch over to the Redundant System.

If the duty of the standard power supply unit is insufficient, higher duty power supply units are available and can generally be exchanged for the standard power supply unit on a like for like basis.

5.1.3 Removing Switch-Boards

The following steps must be taken to remove a Switch-Board from the system:

- Disconnect all connections on the Switch-Board to be replaced
- Loosen the screws on the Switch-Board and pull it out of the system
- Close off the aperture in the panel using a blanking panel

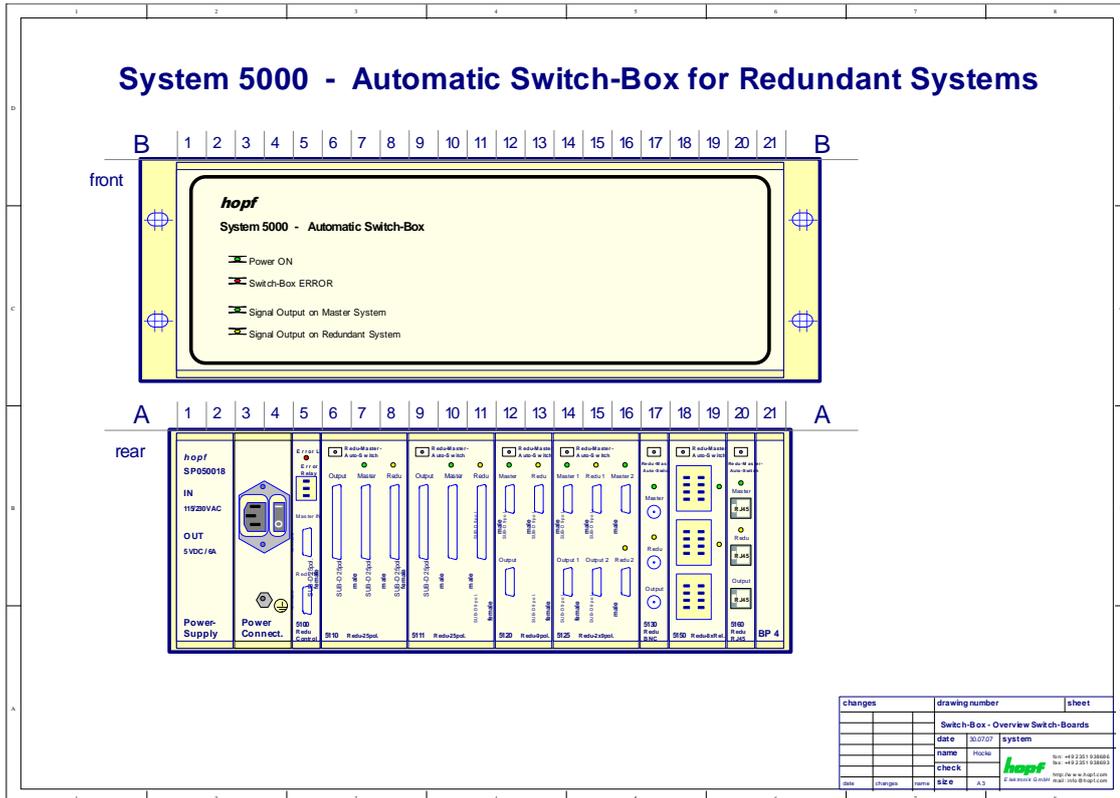


The Switch-Boards support **hot plug**. It is **not** necessary to switch the system off in order to install or remove a Switch-Board.

5.2 Switch-Boards for System 5000 – Summary

The fundamental differences between Switch-Boards relate to the connectors and the number of lines to be switched over.

Most of the Switch-Boards are designed in such a way that connections can be generated to the majority of System 7001 and 7001RC Function Boards using the connection cables supplied. The connection lines which are included in the scope of supply of the Switch-Board can be taken from its individual description.



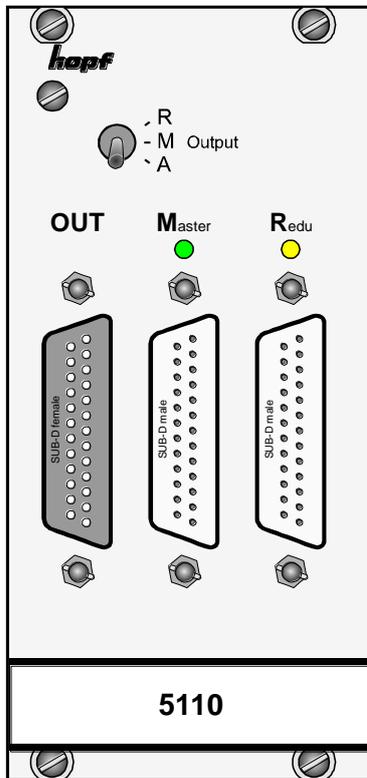
Summary of Switch-Boards currently available:

Switch-Board 5110 - 25-pole	This Switch-Board switches 13 contacts on a 25-pole SUB-D socket. Suitable for Board(s): 7201/7201RC 6841H1
Switch-Board 5111 - 25-pole	This Switch-Board switches the contacts on a 25-pole SUB-D socket (all 25 contacts). Suitable for: Switching various digital signals
Switch-Board 5120 - 9-pole	This Switch-Board switches the contacts on a 9-pole SUB-D socket. Suitable for Board(s): 7210 7221/7221RC 7245/7245RC 7266 (digital)/7266RC (digital) 7515/7515RC and individual signals
Switch-Board 5125 - 2x 9-pole	This Switch-Board switches the contacts on 2 9-pole SUB-D sockets. Suitable for Board(s): 7210 7221/7221RC 7515/7515RC
Switch-Board 5130 - BNC	This Switch-Board switches the contacts on a BNC socket. Suitable for Board(s): 7265/7265RC 7318/7318RC 7266(analog)/7266RC(analog) 7530 DCF-SIM of Boards 7015/7020/7020RC
Switch-Board 5150 - 8x relays	This Switch-Board has 8 switchover relays with 1.5A contact load rating. Suitable for Board(s): 7406/7406RC and individual signals (e.g. pulses)
Switch-Board 5160 - RJ45	This Switch-Board switches the contacts on an RJ45 socket. Suitable for Board(s): 7270/7270RC 7271/7271RC

5.3 Switch-Board 5110 – 1x 25-pole SUB-D (13 Relays)

12HP Euro-board with 64-pole VG ledge (a/c) per DIN41612 with 13 relays for signal switchover and 2 LEDs for displaying output status.

3U/12HP



Required slots: 3x 4HP

Required duty of power supply unit: 2.75W

Option:

- Relay and optical coupler for transmitting the output status of the Switch-Board on the internal VG ledge

Board panel:

- 1x 25-pole SUB-D female connector (OUT)
- 2x 25-pole SUB-D male connector (Master / Redu)
- Master (GREEN) and Redundant (YELLOW) LED
- (R)edundant – (M)aster – (A)uto - Switch

Function:

- Switch-Board voltage-free: Switch-Board switched to signal output from the Master System
- Setting the switchover condition
 - ⇒ This can be set for MINOR or MAJOR alarm by means of a jumper on the board.

Standard: Switchover condition MINOR alarm

- Manual output setting
 - ⇒ The switch on the front panel of the Switch-Board can be set to determine whether the board is to be controlled automatically by the Switch-Box Control Board (A), set to output on the Master System (M) or on the Redundant System (R).
 - ⇒ This switch on the front panel of the Switch-Board can be disabled by means of a jumper on the board (the board is controlled by the Control Board in this case).

Standard:

Switch setting (A)utomatic / Switch enabled

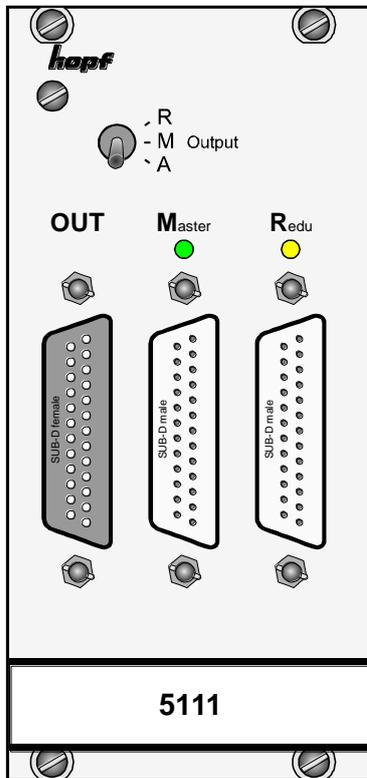
Accessories included:

- 2x 2m connection cable
25-pole SUB-D female connector to 25-pole SUB-D male connector (1:1, Shield-Shield)

5.4 Switch-Board 5111 – 1x 25-pole SUB-D (25 Relays)

12HP Euro-board with 64-pole VG ledge (a/c) per DIN41612 with 25 relays for signal switchover and 2 LEDs for displaying output status.

3U/12HP



Required slots: 3x 4HP

Required duty of power supply unit: 4.75W

Option:

- Relay and optical coupler for transmitting the output status of the Switch-Board on the internal VG ledge

Board panel:

- 1x 25-pole SUB-D female connector (OUT)
- 2x 25-pole SUB-D male connector (Master / Redu)
- Master (GREEN) and Redundant (YELLOW) LED
- (R)edundant – (M)aster – (A)uto - Switch

Function:

- Switch-Board voltage-free: Switch-Board switched to signal output from the Master System
- Setting the switchover condition
 - ⇒ This can be set for MINOR or MAJOR alarm by means of a jumper on the board.

Standard: Switchover condition MINOR alarm

- Manual output setting
 - ⇒ The switch on the front panel of the Switch-Board can be set to determine whether the board is to be controlled automatically by the Switch-Box Control Board (A), set to output on the Master System (M) or on the Redundant System (R).
 - ⇒ This switch on the front panel of the Switch-Board can be disabled by means of a jumper on the board (the board is controlled by the Control Board in this case).

Standard:

Switch setting (A)utomatic / Switch enabled

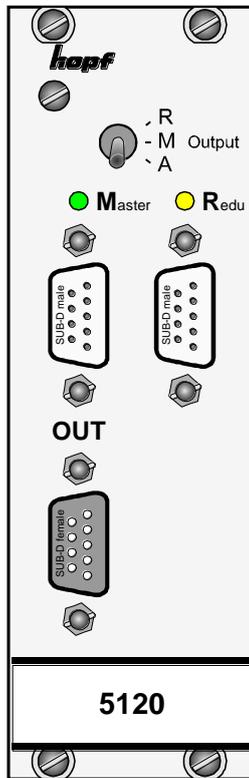
Accessories included:

- 2x 2m connection cable
25-pole SUB-D female connector to 25-pole SUB-D male connector (1:1, Shield-Shield)

5.5 Switch-Board 5120 – 1x 9-pole SUB-D

8HP Euro-board with 64-pole VG ledge (a/c) per DIN41612 with 9 relays for signal switchover and 2 LEDs for displaying output status.

3U/8HP



Required slots: 2x 4HP

Required duty of power supply unit: 2.00W

Option:

- Relay and optical coupler for transmitting the output status of the Switch-Board on the internal VG ledge

Board panel:

- 1x 9-pole SUB-D female connector (OUT)
- 2x 9-pole SUB-D male connector (Master / Redu)
- Master (GREEN) and Redundant (YELLOW) LED
- (R)edundant – (M)aster – (A)uto - Switch

Function:

- Switch-Board voltage-free: Switch-Board switched to signal output from the Master System
- Setting the switchover condition
 - ⇒ This can be set for MINOR or MAJOR alarm by means of a jumper on the board.

Standard: Switchover condition MINOR alarm

- Manual output setting
 - ⇒ The switch on the front panel of the Switch-Board can be set to determine whether the board is to be controlled automatically by the Switch-Box Control Board (A), set to output on the Master System (M) or on the Redundant System (R).
 - ⇒ This switch on the front panel of the Switch-Board can be disabled by means of a jumper on the board (the board is controlled by the Control Board in this case).

Standard:

Switch setting (A)utomatic / Switch enabled

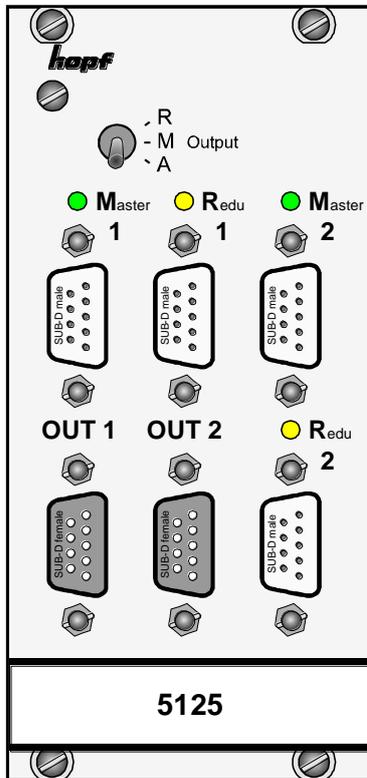
Accessories included:

- 2x 2m connection cable
9-pole SUB-D female connector to 9-pole SUB-D male connector (1:1, Shield-Shield)

5.6 Switch-Board 5125 – 2x 9-pole SUB-D

12HP Euro-board with 64-pole VG ledge (a/c) per DIN41612 with 18 relays for signal switchover and 2 LEDs for displaying output status.

3U/12HP



Required slots: 3x 4HP

Required duty of power supply unit: 3.50W

Option:

- Relay and optical coupler for transmitting the output status of the Switch-Board on the internal VG ledge

Board panel:

- 2x 9-pole SUB-D female connector (OUT)
- 4x 9-pole SUB-D male connector (Master / Redu)
- Master (GREEN) and Redundant (YELLOW) LED
- (R)edundant – (M)aster – (A)uto - Switch

Function:

- Switch-Board voltage-free: Switch-Board switched to signal output from the Master System
- Setting the switchover condition
 - ⇒ This can be set for MINOR or MAJOR alarm by means of a jumper on the board.

Standard: Switchover condition MINOR alarm

- Manual output setting
 - ⇒ The switch on the front panel of the Switch-Board can be set to determine whether the board is to be controlled automatically by the Switch-Box Control Board (A), set to output on the Master System (M) or on the Redundant System (R).
 - ⇒ This switch on the front panel of the Switch-Board can be disabled by means of a jumper on the board (the board is controlled by the Control Board in this case).

Standard:

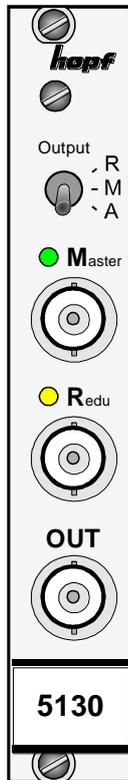
Switch setting (A)utomatic / Switch enabled

Accessories included:

- 4x 2m connection cable
9-pole SUB-D female connector to 9-pole SUB-D male connector (1:1, Shield-Shield)

5.7 Switch-Board 5130 – 1x BNC

3U/4HP



Required slots: 1x 4HP

Required duty of power supply unit: 1.00W

4HP Euro-board with 64-pole VG ledge (a/c) per DIN41612 with 2 relays for signal switchover and 2 LEDs for displaying output status.

Caution: This Board is suitable for switching signals with a maximum frequency of 100 kHz

Option:

- Relay and optical coupler for transmitting the output status of the Switch-Board on the internal VG ledge

Board panel:

- 3 x BNC socket (Master/Redu/OUT)
- Master (GREEN) and Redundant (YELLOW) LED
- (R)edundant – (M)aster – (A)uto - Switch

Function:

- Switch-Board voltage-free: Switch-Board switched to signal output from the Master System
- Setting the switchover condition
 - ⇒ This can be set for MINOR or MAJOR alarm by means of a jumper on the board.

Standard: Switchover condition MINOR alarm

- Manual output setting
 - ⇒ The switch on the front panel of the Switch-Board can be set to determine whether the board is to be controlled automatically by the Switch-Box Control Board (A), set to output on the Master System (M) or on the Redundant System (R).
 - ⇒ This switch on the front panel of the Switch-Board can be disabled by means of a jumper on the board (the board is controlled by the Control Board in this case).

Standard:

Switch setting (A)utomatic / Switch enabled

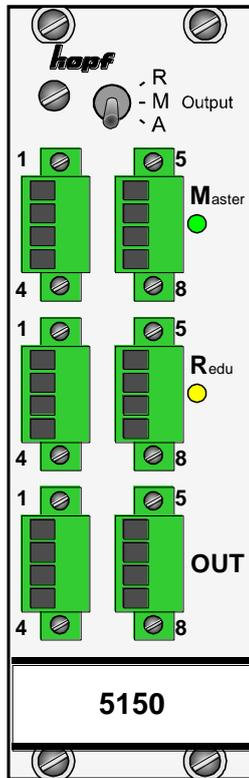
Accessories included:

- 2x 2m connection cable
BNC to BNC connector
(Cable: RG59 – 75 Ohms)

5.8 Switch-Board 5150 – 8x Power Relay (Screwing Terminal)

8HP Euro-board with 64-pole VG ledge (a/c) per DIN41612 with 8 relays for signal switchover and 2 LEDs for displaying output status.

3U/8HP



Required slots: 2x 4HP

Required duty of power supply unit: 2.50W

Option:

- Relay and optical coupler for transmitting the output status of the Switch-Board on the internal VG ledge

Board panel:

- 3 Connection Terminals each with 2x 4-pole pluggable screwing terminals (cable cross-section max. 1.5 mm²) - (Master/Redu/OUT)
- Master (GREEN) and Redundant (YELLOW) LED
- (R)edundant – (M)aster – (A)uto - Switch

Function:

- Switch-Board voltage-free: Switch-Board switched to signal output from the Master System
- Setting the switchover condition
 - ⇒ This can be set for MINOR or MAJOR alarm by means of a jumper on the board.

Standard: Switchover condition MINOR alarm

- Manual output setting
 - ⇒ The switch on the front panel of the Switch-Board can be set to determine whether the board is to be controlled automatically by the Switch-Box Control Board (A), set to output on the Master System (M) or on the Redundant System (R).
 - ⇒ This switch on the front panel of the Switch-Board can be disabled by means of a jumper on the board (the board is controlled by the Control Board in this case).

Standard:

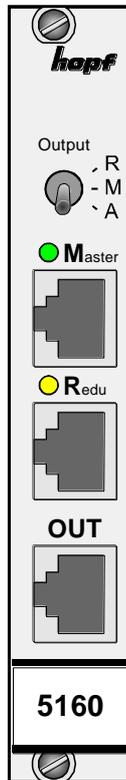
Switch setting (A)utomatic / Switch enabled

Accessories included:

- Delivery **without** connection cable

5.9 Switch-Board 5160 – 1x RJ45

3U/4HP



Required slots: 1x 4HP

Required duty of power supply unit: 2.00W

4HP Euro-board with 64-pole VG ledge (a/c) per DIN41612 with 8 relays for signal switchover and 2 LEDs for displaying output status.

Attention: This board is suitable for signal changes with a maximum frequency of 100 MHz.

Option:

- Relay and optical coupler for transmitting the output status of the Switch-Board on the internal VG ledge

Board panel:

- 3x RJ45 female connector (Master/Redu/OUT)
- Master (GREEN) and Redundant (YELLOW) LED
- (R)edundant – (M)aster – (A)uto - Switch

Function:

- Switch-Board voltage-free: Switch-Board switched to signal output from the Master System
- Setting the switchover condition
 - ⇒ This can be set for MINOR or MAJOR alarm by means of a jumper on the board.

Standard: Switchover condition MINOR alarm

- Manual output setting
 - ⇒ The switch on the front panel of the Switch-Board can be set to determine whether the board is to be controlled automatically by the Switch-Box Control Board (A), set to output on the Master System (M) or on the Redundant System (R).
 - ⇒ This switch on the front panel of the Switch-Board can be disabled by means of a jumper on the board (the board is controlled by the Control Board in this case).

Standard:

Switch setting (A)utomatic / Switch enabled

Accessories included:

- 2x 2m connection cable
RJ45 female connector to RJ45 female connector (1:1)

6 System Indicators / Error Analysis / Troubleshooting

System 5000 provides a variety of indicators for the purpose of representing system status and for problem analysis.

A built-in self-monitoring feature in System 5000 informs the user both visually and via a relay when the Switch-Box is no longer able to switch over to the Redundant System or when one or both clock systems are transmitting incorrect status information.

Conditions and errors which arise are displayed and transmitted in a variety of forms.

6.1 Status and Error Indicators

The system status and any errors occurring can be identified by means of the following components:

6.1.1 Status LEDs

The system has status LEDs on both front and rear sides (see *chapter 1.2.2 Status LEDs*).

6.1.1.1 "Power ON" LED (Front)

The "Power ON" LED lights up when the system is switched on and the operating voltage is available. This LED goes out if the operating voltage fails, the system is switched off or the power supply unit is defective.

6.1.1.2 "Switch-Box ERROR" LED (Front)

The "Switch-Box ERROR" LED lights up when:

- Control Board 5100 is not receiving status information from the Master and/or Redundant System or this information is invalid.
- The Switch-Box detects an internal error which would prevent switchover to the Redundant System.

6.1.1.3 "Signal Output on Master System" LED (Front)

The "Signal Output on Master System" LED always lights up when the Switch-Box detects that the system status of the Master System is better than or equivalent to that of the Redundant System and the Switch-Boards are switched to transmit signals on the Master System.

6.1.1.4 "Signal Output on Redundant System" LED (Front)

The "Signal Output on Redundant System" LED lights up when the Switch-Box detects that the Redundant System has better system status than that of the Master System and the Switch-Boards are switched to transmit signals on the Redundant System.

6.1.1.5 AC Mains Switch ON (Rear Side)

The "ON" light on the mains switch lights up as soon as operating voltage is supplied to the system and it is switched on. This light goes out if the operating voltage fails or the system is switched off.

6.1.1.6 Power Supply Unit LED (Rear Side)

The "Power ON" LED lights up as soon as operating voltage is supplied to the system and it is switched on. This light goes out if the operating voltage fails, the system is switched off or the power supply unit is defective.

6.1.1.7 ERROR LED on Board 5100 (Rear Side)

The "ERROR" LED on Board 5100 lights up when:

- Control Board 5100 is not receiving status information from the Master and/or Redundant System or this information is invalid.
- The Switch-Box detects an internal error which would prevent switchover to the Redundant System.

6.1.1.8 Master / Redu LEDs on the Switch-Boards

Master LED

Lights when the signal output of the respective Switch-Board is set to transmit signals on the Master System.

Redu LED

Lights when the signal output of the respective Switch-Board is set to transmit signals on the Redundant System.

6.1.2 ERROR Relay

The "ERROR" relay on Control Board 5100 is energized/switched when there is no error on the Switch-Box.

The "ERROR" relay de-energizes when:

- The operating voltage fails.
- The system is switched off.
- The power supply unit is defective.
- Control Board 5100 is not receiving status information from the Master and/or Redundant System or this information is invalid.
- The Switch-Box detects an internal error which would prevent switchover to the Redundant System.

6.2 Error Scenarios

This section describes various error scenarios which allow the customer to make an initial analysis of the problem. They also provide assistance in describing the fault when making contact with **hopf** Support.

Two fundamental error scenarios may occur on the Switch-Box:

- The Switch-Box is no longer able to switch over to the Redundant System
- The Switch-Box is not receiving correct status information from the Master and/or Redundant System

6.2.1 Total Breakdown

Case 1

Description

- Mains switch light off
- Power Supply LED off
- All other Switch-Box LEDs off
- ERROR relay de-energized (error)
- Signal output of the Switch-Boards switched to Master System

Reason/ Trouble Shooting

- Failure of operating voltage
- System turned off

Case 2

Description

- Mains switch light on
- Power Supply LED off
- All other Switch-Box LEDs off
- ERROR relay de-energized (error)
- Signal output of the Switch-Boards switched to Master System

Reason/ Trouble Shooting

- Too low operating voltage
- Defective power supply unit
- The Control Board 5100 receives no or rather an invalid status information from Master and/or Redundant System
- The Switch-Box has detected an internal failure avoiding a switch-over to the Redundant System

6.2.2 Failure indication of Switch-Box and switch to Master System

Description

- Mains switch light on
- Power Supply LED on
- ERROR LED on front side and board 5100 on
- ERROR LED on front side and board 5100 on
- Signal output switched to Master System

Reason/ Trouble Shooting

- The Redundant System transmits no or rather an implausible status signal to the Switch-Box:
 - Cable break
 - Unplugged
 - Redundant System turned off/defective
 - Wrong configuration of Redundant System
- Master and Redundant Systems transmit no or rather an implausible status signal to the Switch-Box:
 - Cable break
 - Unplugged
 - Systems are turned off/defective
 - Wrong configuration of Systems
- Control Board 5100 defective

6.2.3 Failure indication of Switch-Box and switch to Redundant System

Description

- Mains switch light on
- Power Supply LED on
- ERROR LED on front side and board 5100 on
- ERROR relay off (error)
- Signal output switched to Redundant System

Reason/ Trouble Shooting

- The Master System transmits no or rather an implausible status signal to the Switch-Box:
 - Cable break
 - Unplugged
 - Master System turned off/defective
 - Wrong configuration of Master System
- Defective Control Board 5100

6.3 Support from *hopf*

If the system presents an error scenario other than those described in **Chapter 6.2 Error Scenarios**, please contact Support at **hopf** Elektronik GmbH with a detailed description of the fault and the following information:

- Serial number of the system (nameplate on the casing)
- When the fault occurred: during commissioning or operation
- Detailed fault description

Please send this information to the following e-mail address:

support@hopf.com



Providing a detailed fault description and the information listed above avoids the need for additional clarification and speeds up processing by our Support Department.

7 Care and Maintenance

The Switch-Box - System 5000 is generally maintenance-free. If the system requires cleaning the following points should be taken into consideration.

7.1 General guidelines for cleaning

The following must **not** be used to clean Switch-Box - System 5000:

- Fluids
- Cleaning agents containing solvents
- Cleaning agents containing acids
- Abrasive media

The use of such cleaning agents or media could damage the system.



Do not use a wet cloth to clean the system.
There is the danger of an electric shock.

To clean the system use a cloth that is:

- antistatic
- soft
- non-fabric
- damp

7.2 Cleaning the housing



Whilst cleaning the housing of an active system make sure that connections or cables are not loosened. There is a risk that the system could become damaged and lose functionality.

8 Technical Data System 5000 incl. Switch Boards

Special Version:

Hard- and software alterations according to customer specifications are possible.



The **hopf** company withhold the right to hard- and software alterations.

8.1 Basis System

General Data – Basis System	
Operation:	Via Jumper and Switch on the front panels
Protection type of housing:	IP20
Protection class:	I, with PE connection. additional earth clamp for cable up to 16mm ²
Housing design:	Aluminium, closed
Housing Dimension (Standard):	19" System, 3U/84HP, depth 243mm
Cooling:	Convection, ventilation top/bottom
Display:	Status-LEDs on front and rear side
MTBF (Basis-System with Board 5100):	> 429,000 hours
Weight (Basis-System):	approx. 4.0kg

AC Voltage Supply (with standard power supply)	
Nominal input voltage:	115 / 230V AC / 47-63Hz Connection via rubber connector by IEC/EN 60320-1/C14
Power Consumption (at nominal values):	approx. 0.7A (115V AC) / 0.4A (230V AC)
Power failure bypass at rated load:	> 20msec.
Isolation voltage input / output:	3.000V _{eff}
Output Data (internal only)	
Internal nominal output voltage:	5V DC
Nominal output current I _N 0°C ... +55°C:	6A (U _{OUT} = 5V DC)
Efficiency:	> 70%
Function display (Power LED (Front) + Power Supply LED)	LED green

DC Power Supply 24V or 48V (Option)			
Nominal input voltage:	24V DC	or	48V DC
Input voltage range:	18-36V DC	or	36-72V DC
Power consumption (at nominal values):	2.5A	or	1.3A
Power failure bypass at rated load:	> 3msec.		
Isolation voltage (EN60950) Input / Output:	2.000V _{eff}		

Output Data (internal only)	
Internal nominal output voltage:	5V DC
Nominal output current I_N 0°C ... +55°C:	6A ($U_{OUT} = 5V$ DC)
Efficiency:	> 70%
Function display (Power LED (Front) + Power Supply LED)	LED green

Ambient Conditions		
Temperature range:	Operation:	0°C to +55°C
	Storage:	-20°C to +75°C
Humidity:		max. 95%, no condensation

CE compliant to EMC Directive 89/336/EEC and Low Voltage Directive 73/23/EEC	
Safety / Low Voltage Directive:	DIN EN 60950-1:2001 + A11 + Corrigendum
EN 61000-6-4:	
EMC (Electromagnetic Compatibility) Stability:	EN 610000-4-2 /-3/-4/-5/-6/-11
EN 61000-6-2:	EN 61000-3-2 /-3
Interference voltage: EN 55022	EN 55022 Class B
Interference radiation: EN 55022	EN 55022 Class B

Control Board 5100	
Operation:	Via Jumper on the board
Protection type of the single board:	IP00
Board dimensions:	Euro Board 100mm x 160mm, 3U/4HP
Power Supply:	5V DC \pm 5% (via VG-ledge)
Power Consumption:	approx. 160mA
Weight:	approx. 0.13kg
Connection:	Status signal input 2x 9-pole SUB-D female connector ERROR Relays 3-pole pluggable screwing terminal Max. cable cross-section (stiff/flexible): 1.5mm ²
ERROR Relays:	Number of Relays: 1 Relay Max. switching current: 1.0A at 30V DC 0.3A at 60V DC 0.5A at 125V AC Max. switching voltage: 60V DC / 125V AC Mechanical switching cycles / at load: 10 Millions / 10,000

8.2 Switch Boards

Switch-Board 5110 - 25-pole	
Operating:	Via Jumper and switch on the board
Protection type of the single board:	IP00
Board dimensions:	Euro-Board 100mm x 160mm, 3U/12HP
Power Supply:	5V DC \pm 5% (via VG-ledge)
Power Consumption:	approx. 550mA
MTBF:	> 1,593,000 hours
Weight:	approx. 0.23kg
Connection:	1x 25-pole SUB-D female connector (OUT) 2x 25-pole SUB-D male connector (Master/Redu)
Switching relays:	Number of Relays: 13 Relays Max. switching current: 1.0A at 30V DC 0.3A at 60V DC 0.5A at 125V AC Max. switching voltage: 60V DC / 125V AC Mechanical switching cycles / at load: 10 Millions / 10,000

Switch-Board 5111 - 25-pole	
Operating:	Via Jumper and switch on the board
Protection type of the single board:	IP00
Board dimensions:	Euro-Board 100mm x 160mm, 3U/12HP
Power Supply:	5V DC \pm 5% (via VG-ledge)
Power Consumption:	approx 950mA
MTBF:	> 1,168,000 hours
Weight:	approx 0.25kg
Connection:	1x 25-pole SUB-D female connector (OUT) 2x 25-pol. SUB-D male connector (Master/Redu)
Switching relays:	Number of Relays: 25 Relays Max. switching current: 1.0A at 30V DC 0.3A at 60V DC 0.5A at 125V AC Max. switching voltage: 60V DC / 125V AC Mechanical switching cycles / at load: 10 Millions / 10,000

Switch-Board 5120 - 9-pole	
Operating:	Via Jumper and switch on the board
Protection type of the single board:	IP00
Board dimensions:	Euro-Board 100mm x 160mm, 3U/8HP
Power Supply:	5V DC \pm 5% (via VG-ledge)
Power Consumption:	approx. 400mA
MTBF:	> 3,375,000 hours
Weight:	approx. 0.17kg

Connection:	1x 25-pole SUB-D female connector (OUT) 2x 25-pole SUB-D male connector (Master/Redu)
Switching relays:	Number of Relays: 13 Relays Max. switching current: 1.0A at 30V DC 0.3A at 60V DC 0.5A at 125V AC Max. switching voltage: 60V DC / 125V AC Mechanical switching cycles / at load: 10 Millions / 10,000

Switch-Board 5125 - 2x 9-pole	
Operating:	Via Jumper and switch on the board
Protection type of the single board:	IP00
Board dimensions:	Euro-Board 100mm x 160mm, 3U/12HP
Power Supply:	5V DC \pm 5% (via VG-ledge)
Power Consumption:	approx. 700mA
MTBF:	> 1,513,000 hours
Weight:	approx. 0.24kg
Connection:	1x 25-pole SUB-D female connector (OUT) 2x 25-pole SUB-D male connector (Master/Redu)
Switching relays:	Number of Relays: 13 Relays Max. switching current: 1.0A at 30V DC 0.3A at 60V DC 0.5A at 125V AC Max. switching voltage: 60V DC / 125V AC Mechanical switching cycles / at load: 10 Millions / 10,000

Switch-Board 5130 - BNC	
Operating:	Via Jumper and switch on the board
Protection type of the single board:	IP00
Board dimensions:	Euro-Board 100mm x 160mm, 3U/4HP
Power Supply:	5V DC \pm 5% (via VG-ledge)
Power Consumption:	approx. 200mA
MTBF:	> 6,161,000 hours
Weight:	approx. 0.14kg
Max. Signal frequency:	100kHz
Connection:	1x 25-pole SUB-D female connector (OUT) 2x 25-pole SUB-D male connector (Master/Redu)
Switching relays:	Number of Relays: 13 Relays Max. switching current: 1.0A at 30V DC 0.3A at 60V DC 0.5A at 125V AC Max. switching voltage: 60V DC / 125V AC Mechanical switching cycles / at load: 10 Millions / 10,000

Switch-Board 5150 - 8x Relay	
Operating:	Via Jumper and switch on the board
Protection type of the single board:	IP00
Board dimensions:	Euro-Board 100mm x 160mm, 3U/8HP
Power Supply:	5V DC \pm 5% (via VG-ledge)
Power Consumption:	approx. 500mA
MTBF:	> 5,344,000 hours
Weight:	approx. 0.22kg
Connection:	3 Connection Terminals each with 2x 4-pole pluggable screwing terminals (Master/Redu/OUT) Max. cable cross-section (stiff/flexible): 1,5mm ²
Switching relays:	Number of Relays: 8 Relays Max. switching current: 2.0A Max. switching voltage: 125V DC / 125V AC Mechanical switching cycles / at load: 10 Millions / 10,000

Switch-Board 5160 - RJ45	
Operating:	Via Jumper and switch on the board
Protection type of the single board:	IP00
Board dimensions:	Euro-Board 100mm x 160mm, 3U/4HP
Power Supply:	5V DC \pm 5% (via VG-ledge)
Power Consumption:	approx. 400mA
MTBF:	> 4,747,000 hours
Weight:	approx. 0.15kg
Max. Signal frequency:	100MHz
Connection:	3 RJ45 female connectors (OUT/Master/Redu)
Switching relays:	Number of Relays: 8 Relays Max. switching current: 1.0A at 30V DC 0.3A at 60V DC 0.5A at 125V AC Max. switching voltage: 60V DC / 125V AC Mechanical switching cycles / at load: 10 Millions / 10,000

9 Housing Drawing

1/1 19" rack (3U/84HP)
1/1 19" Baugruppenträger (3HE/84TE)

changes		drawing number	02090	page
		1/1 19" rack (3U/84HP)		
		date	04.02.03	System
		name	Gr. / Vo.	
		check		
date	changes	name	size	A4

post box 1847
 D-58468 Lüdenscheid
 fon: (02351) 938686
 fax: (02351) 459590

All dimensions in mm (inch)
alle Maßangaben in mm (inch)

1/1 19" double size rack (6U/84HP)
1/1 19" 2-fach Baugruppenträger (6HE/84TE)

changes		drawing number	02091	page
		1/1 19" double sized rack (6U/84HP)		
		date	04.02.03	System
		name	Gr. / Vo.	
		check		
date	changes	name	size	A4

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All dimensions in mm (inch)
alle Maßangaben in mm (inch)