

SYNCHROTECT[®] CSS

Synchronizing system for synchronous generators



Reliable synchronizing and paralleling

SYNCHROTECT® CSS (Compact Synchronizing System) is a combination system for paralleling power station or industrial generators with an island network or public network. During paralleling, the circuit breaker may only be closed if both voltages are approximately equal and synchronous. Otherwise, this can lead to serious interference with the network, excessive loading on the machine – in extreme cases even damage to the machine.

SYNCHROTECT CSS performs this function safely and reliably.

Advantages to the customer

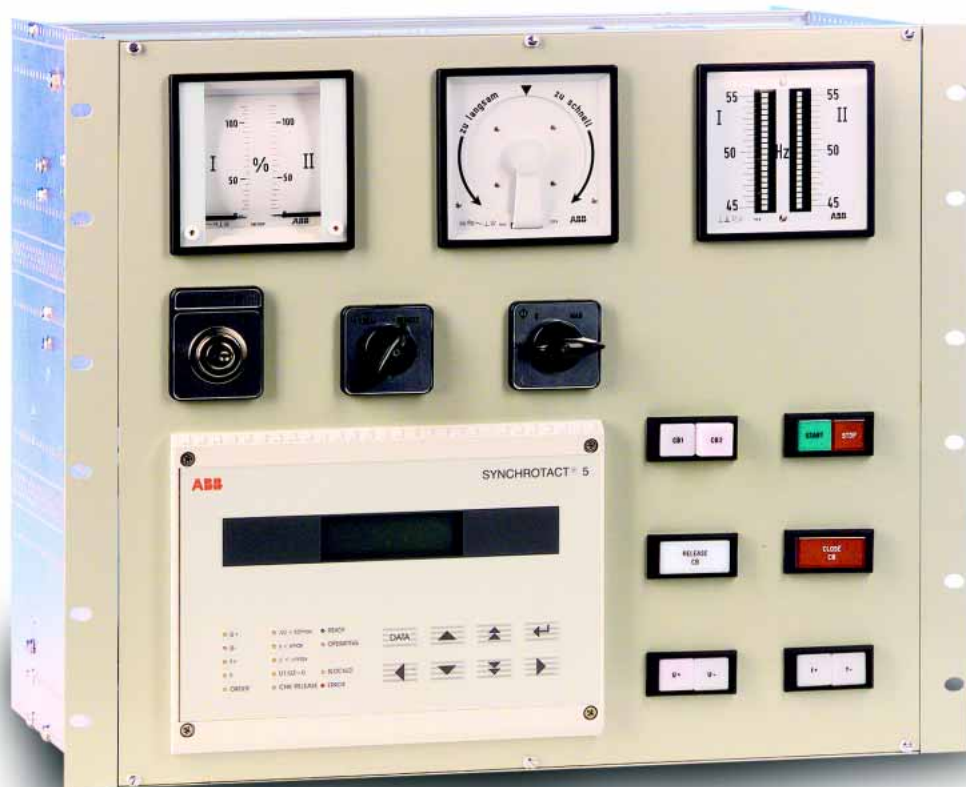
No project planning costs

The use of the already planned and tested synchronizing system saves all project planning costs and increases the safety of the plant. SYNCHROTECT CSS only needs to be installed, connected and commissioned.

Fast commissioning

The PC software “SynView” which is included with the delivery allows commissioning to be carried out quickly and simply:

- Simple setting and recording of parameter values
- Integrated transient recorder means there is no need to connect an external plotter
- Rapid localization of faults using events logger.



The SYNCHROTECT CSS combination system is delivered ready for installation

Description of function

Equipment features and operating modes

In order to guarantee the availability of the plant, SYNCHROTECT CSS consists of a fully automatic (AUTO) and an independent manual (MAN) synchronizing function. A rotary switch is used to select the desired operating mode.

In **AUTO mode**, the voltage and frequency of the generator are automatically brought to tolerable values, then the circuit breaker is closed exactly on phase coincidence, taking into consideration the breaker closing time.

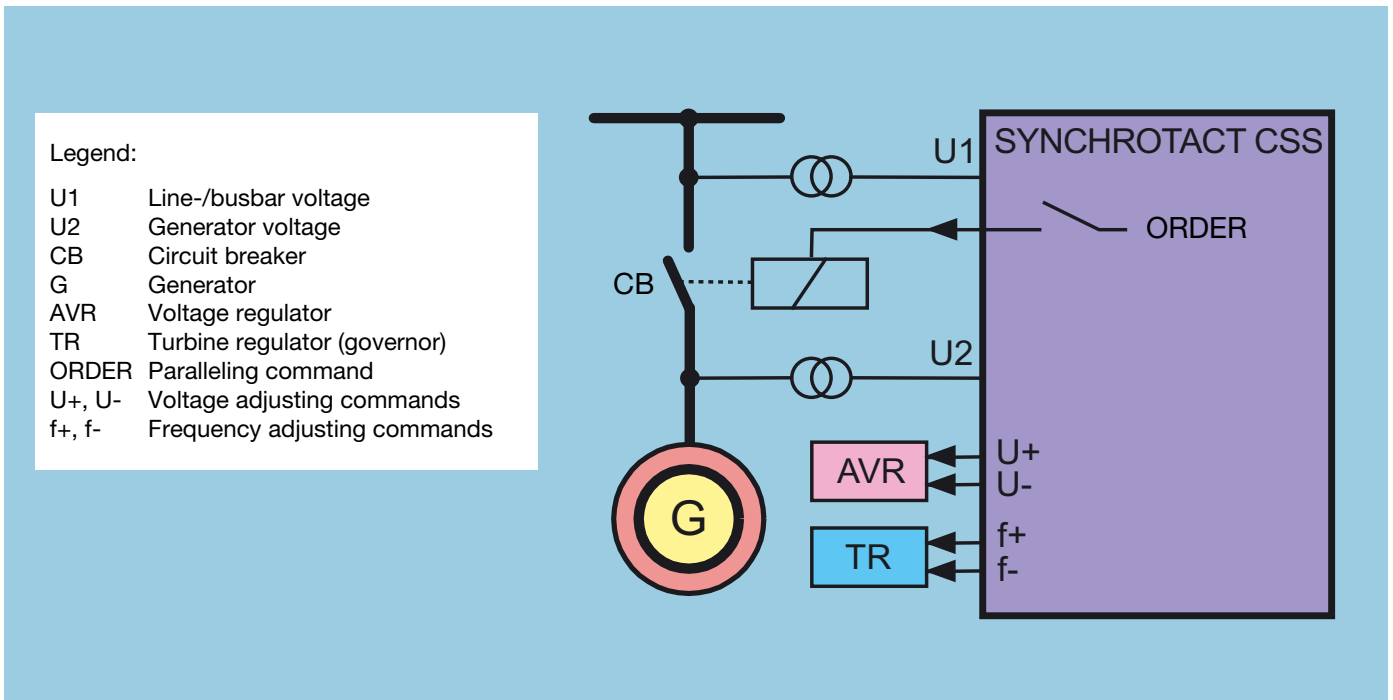
In **MAN mode**, the functions are carried out manually using push-buttons on the front panel, the necessary measured values are displayed on the synchronizing instruments. The closing command is given by holding down the release switch and pressing the command switch at phase coincidence.

TEST mode is identical to AUTO mode, except that the paralleling command is not passed to the circuit breaker, but is displayed on the system.

In versions designed for two circuit breakers, the corresponding paralleling point must be selected before starting the synchronizing process using the push-button switch.

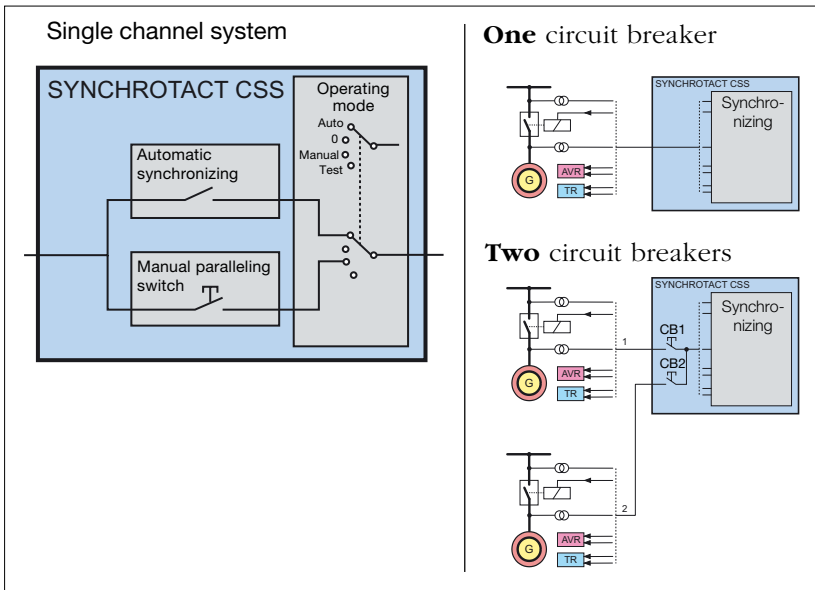
If the function is enabled using a key switch, the circuit breaker can also be closed if one or more voltages are at zero (dead bus).

By switching the control over from “local” to “remote”, automatic synchronizing can also be selected by remote control.



Simplified schematic showing the paralleling of a generator with the network

Design variants



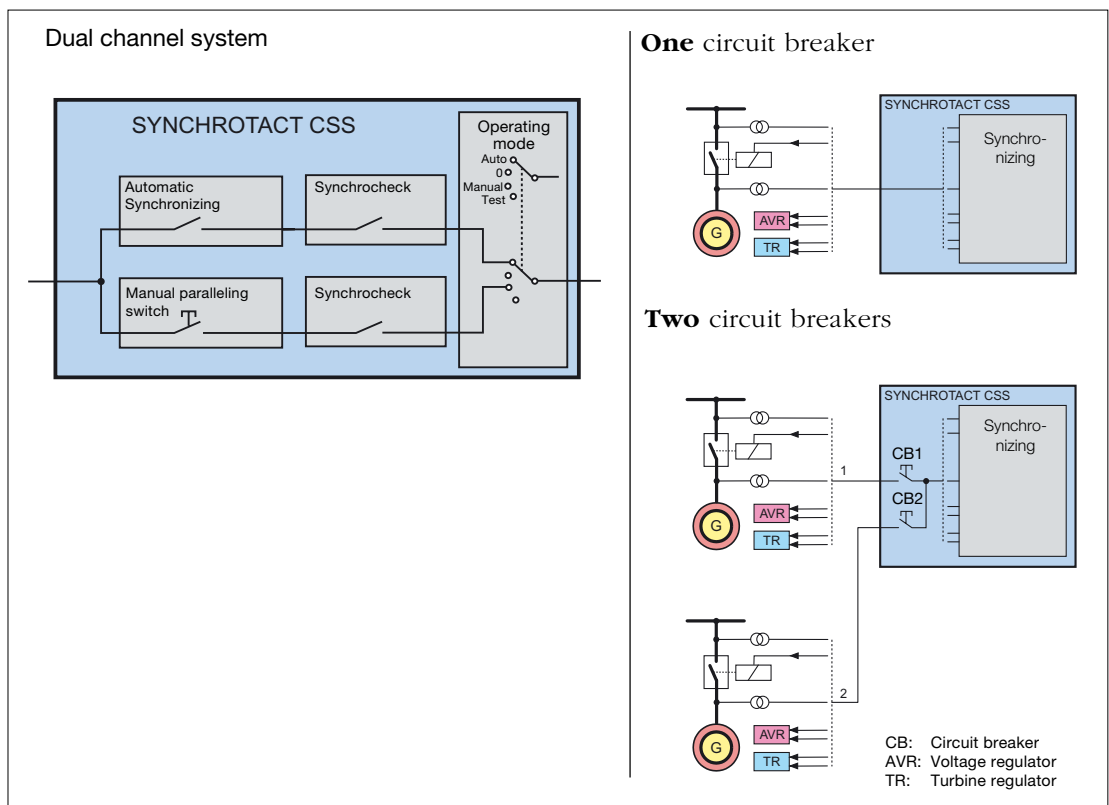
Single and dual channel

In the **single channel versions**, the circuit breaker is closed by the synchronizing device or by manual paralleling.

In the **dual channel versions**, an independent synchrocheck is connected in series in both operating modes. This allows the degree of reliability which is already high in single channel systems to be improved **even further**. It is unlikely that both channels, which are each structured differently in terms of hardware and software, will display the same malfunction simultaneously. The extra price of a dual channel system usually amounts to only a fraction of the possible consequential costs of incorrect paralleling.

One / two circuit breakers

In the versions designed for two circuit breakers, the connection of the selected paralleling point is integrated in the SYNCHROTECT CSS.



Description of the elements

Synchronizing devices:

- Automatic synchronizing device (single or dual channel): Front-panel installation
- In dual channel versions, accessible from rear: Synchrocheck for manual synchronizing

Synchronizing instruments:

- Double voltmeter
- Synchroscope
- Double frequency meter

Controls:

- Key switch for enabling paralleling of zero-voltage lines
- Switchover: remote/local
- Selector switch for operating mode: AUTO/0/MAN/TEST
- Push-button switch for pre-selection of the circuit breaker which is to be synchronized (in versions designed for two circuit breakers).
- Push-buttons for starting or stopping the synchronizing process
- Push-buttons for releasing the paralleling command and manual paralleling
- Push-buttons higher/lower commands for voltage and frequency

Remote indication:

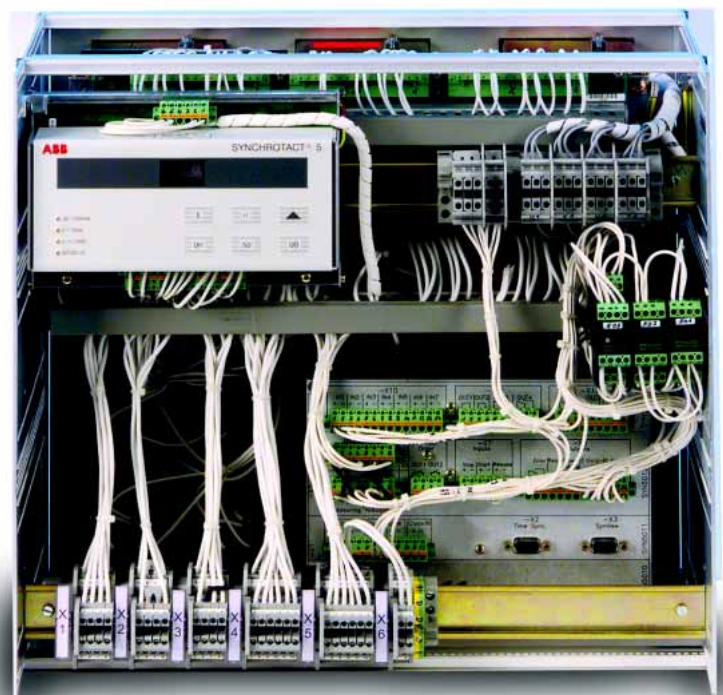
- Locate/remote switch setting
- Readiness for operation
- Operating in AUTO mode
- Fault

SYN 5500:

Device for connection of two paralleling points with SYNCHROTACT CSS for two circuit breakers.



Front view with all operating and display instruments



Rear view of SYNCHROTACT CSS: all terminals and the Synchrocheck SYN 5100 are accessible from the rear

Technical data

Auxiliary voltage

Nominal voltage ranges	110 to 220 V _{AC/DC}
Permissible voltage range	85 to 265 V _{AC} 85 to 375 V _{DC}
Maximum power consumption	25 W / 35 VA

Measuring inputs U1, U2

Nominal voltage range	50 to 130 V _{AC}
Permissible voltage range	0 to 130 % U _n
Nominal frequency	16 ² / ₃ Hz, 50 Hz, 60 Hz

Paralleling relays

Maximum switching voltage	250 V _{AC/DC}
Maximum switching current, continuous	5 A _{AC/DC}
Max. switching power AC/DC ON	1000 VA / W
Max. switching power DC/AC OFF	30 VA / W

Adjusting, command and signalling relays

Maximum switching voltage	250 V _{AC/DC}
Maximum switching current, continuous	1.5 A _{AC/DC}
Max. switching power DC/AC ON/OFF	50 VA / W

Isolation

Dielectric test	IEC 255-5	2 kV
Impulse voltage test	IEC 255-5	5 kV

Temperature ranges

Transport/storage	-40 to +85 °C
Functionally	-25 to +70 °C
Operation (compliance with technical data)	-10 to +55 °C

Emission / immunity (EMC)

Emission, terminal disturbance	EN 55011/	0.15 to 0.5 MHz: 79 dB
	CISPR 11	0.5 to 30 MHz: 73 dB
Emission, radiation disturbance	EN 55011/	30 to 230 MHz: 30 dB
	CISPR 11	230 to 1000 MHz: 37 dB
Electrostatic discharges	IEC 61000-4-2	Contact: 6 kV
		Air: 8 kV
Electromagnetic fields	IEC 61000-4-6	0.15 to 80 MHz 10 V; 80 % AM
	IEC 61000-4-3	80 to 1000 MHz 10 V/m; 80 % AM and PM (900 MHz)
Fast transients/Bursts	IEC 61000-4-4	±1 kV / ±2 kV
Surge voltage	IEC 61000-4-5	±0.5 / ±1.0 / ±2.0 / ±4.0 kV
Voltage dips	IEC 61000-4-11	AC: 30 %: 10 ms
		60 %: 100 ms
		>95 %: 5000 ms
1 MHz burst disturbance	IEC 60255-22-1	common mode
		differential mode
		2.5 kV
		1 kV

Technical data and schematic diagram

CE conformity

EMC Directive	89/336 / EWG	EN 50081-2 EN 50082-2
LV Directive	73/23 / EWG	EN 60950

Degrees of protection acc. to IEC 60529

Front	IP 50
Rear	IP 00

Dimensions

Width × Height × Depth	482 × 399 × 297 mm
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Weight

Depending on type	15 to 16 kg
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Schematic diagram

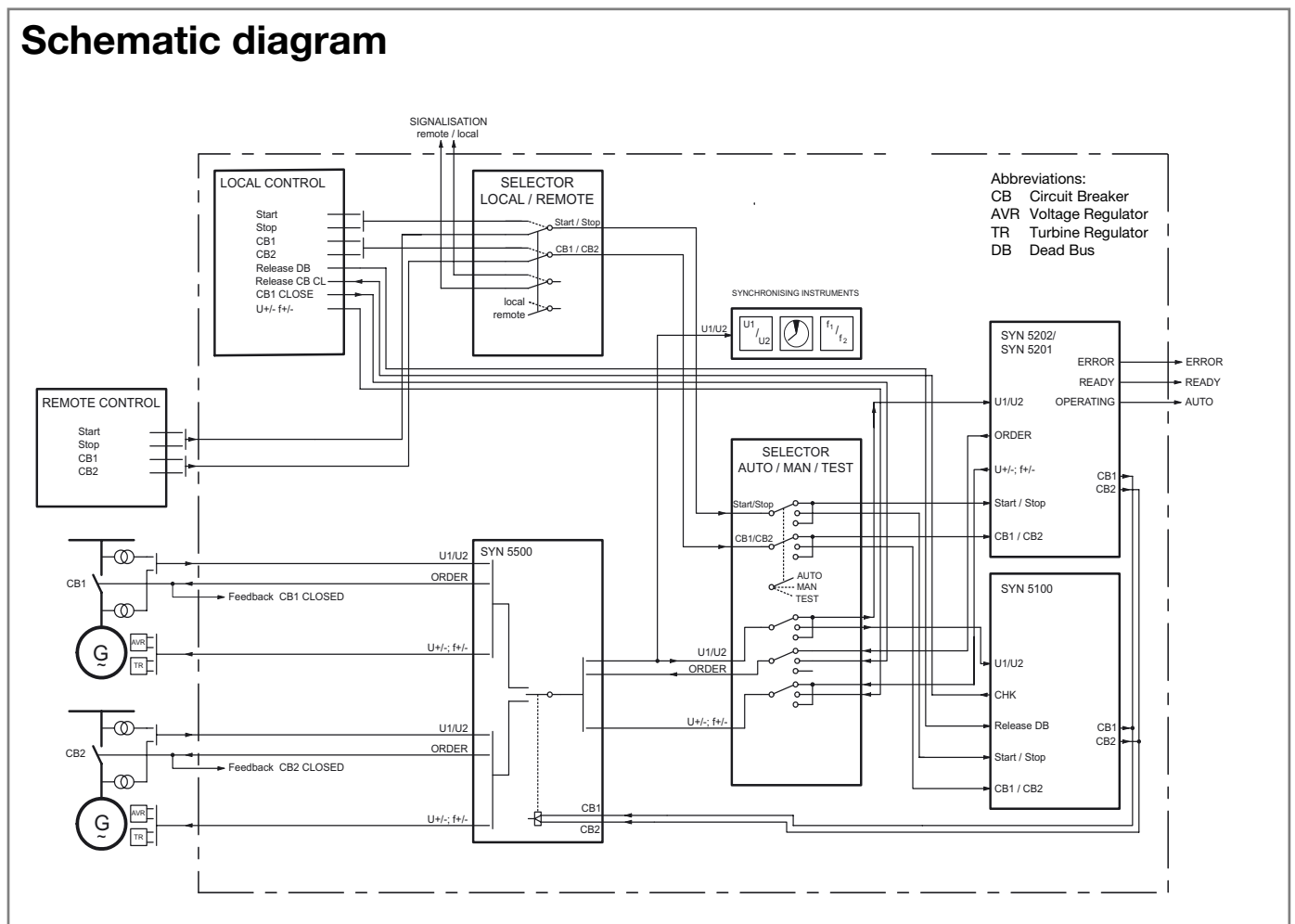




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