

# Protection and synchronizing board

Technical Offer Specification -  
protection and synchronizing board for one turbine driven alternator  
10 MVA, 11 KV, 50 Hz

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This technical specification comprises the following items :

- Item 1) Alternator protection and synchronizing board
- Item 2) Spare parts
- Item 3) Commissioning
- Item 4) The VDE and IEC regulations
- Item 5) Make of components

All materials offered in accordance with VDE and/or IEC standards, for a design ambient temperature of 35 degrees centigrade.

The given ratings for c.b.'s are "frame size ratings"

The products and systems described in this specification are manufactured and marketed using a quality system certified by TÜV Rheinland and based on German standard DIN ISO 9001 (certificate registration No. 09 100 4377)

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## Item 1) - Alternator protection and synchronizing board

### Switchboard design :

Factory build and tested switchboard acc. to DIN EN 60 439, classification VDE 0660, Teil 500, Form 1, for indoor mounting in enclosed electrical work shops.

Designed as free standing type in a steel plated frame construction, with front doors, with rubber profile gasket and sash fasteners.

Universally enclosed with 1,5 mm sheet steel, doors 2,0 mm thick, primer with respective pretreatment and finishing paint with structural lacquer.

Bottom open for mounting on a cable duct to be mounted on site for cable entry and outlet.

For protective measures, rigid earthing is provided according to VDE 0110 with total potential balance, N- and PE busbars are layed separately, N busbar isolated.

Coating : RAL 7032 structure

Labelling : English, resopal white with black lettering

Doors : hinged at right hand side

Instrumentation : frame size 96 x 96 mm, with 90° scale, deflection class 1,5

Protection class : IP 42

Cable entry : from the bottom

The entire switchboard is ready assembled and wired for connection.

### Outside dimensions approx.:

width : ..... mm

height : 2,000 mm

depth : 600 mm

**Accessories :**

Inside panel lighting and one grounded socket outlet on the mounting plate.

All incoming current- and voltage measuring wires are lead opposite the measuring disconnect terminals

**Incomings for :**

1 x 415/240 V, 50 Hz/AC auxiliary supply

1 x battery voltage 24 V/DC or 110 V/DC

**For alternator protection :**

1 digital indicating instrument, combined with the temperature tripping device, with measuring points for indication of the generator winding and bearing temperature

1 Generator- / mains monitor, with measuring circuits for :

- voltage supervision (27+59)

- frequency supervision (81)

- voltage vector surge supervision (78)

for gen. decoupling in case of mains failure within an extremely short time\*

1 overcurrent and short circuit protection relay, (50/51)

1 restricted earth fault protection relay, (50N/51N)

1 back up earth fault protection relay, (50N/51N)

1 rotor earth fault protection relay, (64N)

1 reverse power relay, (32)

1 low forward power relay, (37)

1 over-/undervoltage relay, (27/59)

1 over-/underfrequency relay, (81)

1 alternator differential protection relay, (87G)

1 negative sequence relay, (46)

1 field failure / impedance protection relay, (40)

1 trip circuit supervision relay

1 lock out relay

**For alternator measuring and control:**

3 voltmeters

1 frequency meter

3 ammeters with additional bimetal movement, with max. pointer

1 wattmeter for unbalanced load

1 kVar-meter

1 cos.-phi meter

1 operating hour meter

1 kWh-meter

1 clean power chart recorder, single channel type

1 exciter voltmeter

1 exciter ammeter

Transducers, 4-20 mA, for remote indication of :

- 1 x voltage
- 1 x frequency
- 3 x current
- 1 x active power
- 1 x reactive power
- 1 x powewre factor

1 microprocessor controlled supervision unit, with 24 supervision circuits, with LED-display for fault and status indication, with push buttons for „HORN OFF“ and „RESET / LAMP TEST“.

1 aux. relay for TURBINE STOP

1 ditto, generator C.B. ON

1 ditto, generator C.B. OFF

1 ditto, generator de-excitation

- 1 voltage setting potentiometer, motor operated
- 1 exciter excitation ON/OFF switch
- 1 circuit breaker control switch
- 1 mimic diagram with semaphore indicator for generator C.B. and earthing switch
  - potentialfree contacts for remote signalling
  - various aux.- and time relays as well as mcb's for measuring and control circuits

**for automatic synchronizing :**

- 1 synchronizing selector switch "automatic - manual"
- 1 automatic synchronizer, incl. frequency balancer and voltage balancer ,all important functions are indicated by LED's and are built in light emitted chain showing the angular difference of the system.

**for manual synchronizing :**

- 1 double voltmeter
- 1 double frequency meter
- 1 synchronoscope
- 1 synchronizing check relay
- 1 speed control switch
- 1 voltage control switch
- 1 push button for generator C.B. "ON" at manual synchronization

## **Item 2) - Spare parts**

- 1 overcurrent and short circuit protection relay (50/51)
- 1 stator earth fault protection relay (50N/51N)
- 1 reverse power relay (32)
- 1 microprocessor controlled supervision unit, with 24 supervision circuits, with LED-display for fault and status indication, with push buttons for „HORN OFF“ and „RESET / LAMP TEST“
- 10 spare fuses for control circuits (MCCB)
- 5 auxiliary relays, 2- pole, encapsulated, plug in type
- 5 auxiliary relays, 4- pole, encapsulated, plug in type
- 2 sockets for 2-pole auxiliary relays
- 2 sockets for 4-pole auxiliary relays
- 5 time relays
- 3 semaphore indicators
- 2 control switches
- 2 push buttons

## **Item 3) - Commissioning**

The customer does all installation work with his own staff. We presume that the necessary qualified fitters and electricians are available.

After completion of the installation work SEG will deligate a technician against charging the daily expenses for the following commissioning works :

- checking of the cable connections, made by customers staff
- commissioning of the equipment delivered by |SEG
- setting and test of the protection system, supplied by SEG
- functional test of the system, together with the alternator technicians
- instruction of customers operator staff
- final test together with the customer and handing over the equipment

## Item 4) - The VDE- and IEC-regulations

The following VDE- and IEC regulations will be considered :

Switchgear and control gear up to 1 kV	VDE 0660 and IEC 50/157/158/277/408
Fuses up to 1 kV	VDE 0636 and IEC 269
Current transformers and potential transformers	VDE 0414 and IEC 185/186
Measuring instruments	VDE 0410 and IEC 258
Protection relays	VDE 0435 and 834 / IEC 255 and 801
Protection calss	DIN 40050 and IEC 68
Installations and erections of equipment up to 1 kV	VDE 0100 and IEC 92
Cables	VDE 0250/0281/0293 and IEC 302/228/173
Battery systems	VDE 0510 and IEC 86
Earthing	VDE 0141
Drawings	DIN 40700 and IEC 117

## Item 5) - Make of Components

This offer is based on application of the following material:

- enclosure of panels	make Rittal
- aux. contactors	make Klöckner Moeller or ABB
- miniature circuit breakers	make AEG
- encapsulated plug-in type aux. relays	make Izumi
- time relays	make Omron
- control switches	make Sontheimer
- measuring instruments	make Iskra or equivalent
- function and supervision units	make SEG
- electronic protection relays	make SEG
- automatic synchronizer -	make SEG
- internal control wires	make Siemens, type H07V-K
- terminals for control wiring	make Phoenix

SEG  
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