SmartPhase - Automatic Phase Correction

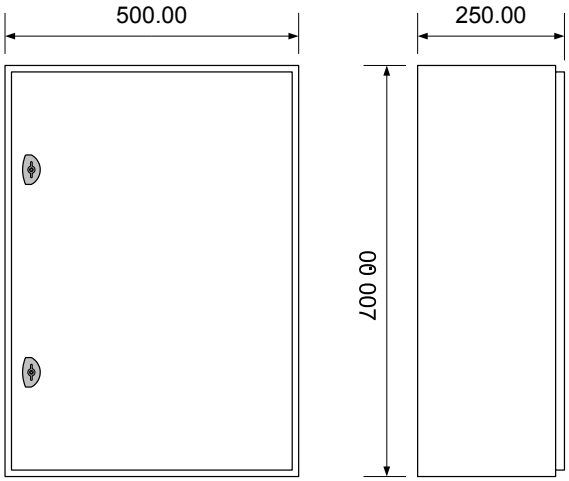
SmartPhase in a fully automatic phase changer for use when an external supply is to be used that may have a different phase rotation to the internal supply. This will cause a problem with motors rotating the wrong way and other equipment affected sometimes causing a more serious problem.

For example a boat will have an on board generator supplying equipment that will be connected and operated correctly. When the boat comes into a mooring with access to shore-power it is preferable and more cost effective to shut the onboard generator down and use the shore-power. If the shore-power has a phase rotation that is different to the on-board generator and it is connected without checking then there will be a problem with equipment not operating correctly with a chance of causing a serious problem. The solution is to rewire the shore-power so that the phase rotation is the same as the on-board generator. This can be an inconvenient, difficult and sometimes hazardous operation.

SmartPhase automatically connects the shore-power to the boat correctly every time.

Some of the features are as follows :-

- Automatically corrects the phase rotation and connects the shore-power.
- Rugged, Reliable and efficient with a long service life with minimal maintenance.
- The control stores the phase rotation of the on-board generator so it does not have to be running to connect the shore-power correctly.
- The connection is made using carefully controlled contactors rated AC3.
- If the shore-power fails SmartPhase will disconnect and when it is reinstated and is stable for a preset period will correct the phase rotation and reconnect.
- Steel Enclosure - RAL7035 - IP66



The above sketch shows the dimensions of the SmartPhase 115A.

Connections are made to the bottom of the enclosure.

Enclosure: sheet steel - degreased, prepared and electro-statically painted with epoxy-polyester powder with a layer of approximately 90 micron.

Colour: RAL7035 - Ingress: IP66

SmartPhase

SmartPhase is an automatic switch that will correct the phase rotation of an incoming supply and connect it to the load. SmartPhase has a particular application on boats that visit different moorings and make use of the available shore-power.

All the equipment on the boat operates from the on-board generator without a problem. However if the boat is moored where shore-power is available then this will be connected to the boat. Unfortunately there is no guarantee that the shore-power is connected with the same phase rotation as the on-board generator.

If the boat is connected to the shore-power and the phase rotation is incorrect it will cause a problem and maybe damage. This means that the phase rotation of the shore-power has to be established by testing and the connection rewired if it is incorrect.

This can be inconvenient, difficult and sometimes hazardous.

SmartPhase tests the shore-power and makes an automatic connection with the correct phase rotation for the boat.

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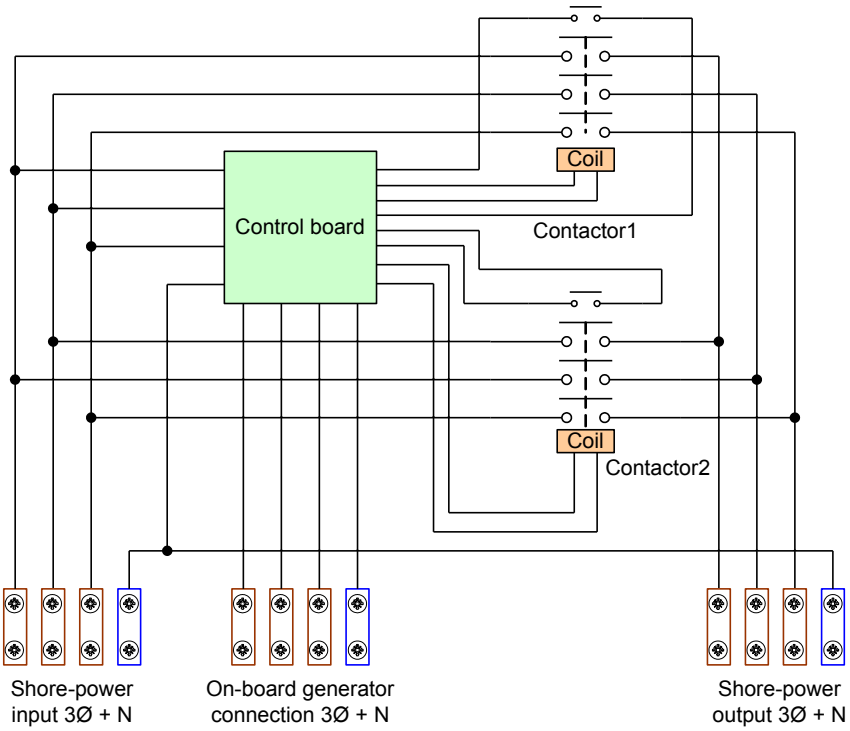

Simplified schematic of SmartPhase

Operation

The on-board generator is connected into the connectors labelled "On-board generator 3Ø + N" in the SmartPhase enclosure. This is not a full power connection and can be fused at 3 Amps. When this is live the control analyses the phase rotation and stores it in non-volatile memory. Whenever the input is live the control will update the information. Because the information on the phase rotation of the on-board generator is stored in memory the generator does not have to be running when the shore-power is connected.

The shore-power is connected into the connectors labelled "Shore-power input 3Ø + N" in the SmartPhase enclosure. The output to the on-board load is connected into the connectors labelled "Shore-power output 3Ø + N".

When the shore-power is connected and switched on the control compares the phase rotation with the stored information of the phase rotation of the on-board generator. If the phase rotation is correct the shore-power is connected directly through to the on-board load by Contactor1.

If the phase rotation of the shore-power is not correct it is corrected and switched through to the on-board load by Contactor2.

If the shore-power fails or becomes disconnected then both Contactor1 and Contactor2 will be switched off. When the shore-power is reinstated and stable for five seconds the process described above will be repeated and the shore-power automatically reconnected to the load with the correct phase rotation.

Switching

Contactors 1 & 2 are carefully controlled to virtually eliminate the chatter that can be caused by the low quality shore-power sometimes experienced.

Shore-power Specification

The shore-power is analysed by the control and is deemed to be of usable quality if certain levels of stability are met and if all three phases are above 70% of the nominal voltage. If the criteria are met the shore-power will be connected through SmartPhase to the on on-board load with the correct phase rotation.

If the shore-power goes outside the pre-programmed specification the control will immediately switch off Contactors 1 & 2 disconnecting the on-board load.

When the shore-power returns to within the pre-programmed specification and is stable for 5 seconds SmartPhase will reconnect the on-board load with the correct phase rotation.

Conclusion

SmartPhase is fully automatic and will connect the shore-power with the correct phase rotation. It is a fit and forget unit that will give many years of trouble free operation. It has been designed and built to operate reliably and efficiently in marine conditions.

Models and Specification

Shore-power	
Voltage	400VAC
Frequency	50/60Hz
Phases	3Ø + N
Low volts cut-off	280 VAC
Current	
SmartPhase115	115 Amp
SmartPhase225	225 Amp
SmartPhase330	330 Amp