Application:
Intelligent coupling of PFC systems in Master/Slave function

Problem:

In practise, PFC systems are being used on different supplies leading to a temporary or constant coupling of the different supply transformers (redundancy/replacement supply etc.) which means parallel driven PFC systems.
The consequence is that the system are influencing each other, and the lifte time decrease due to higher numbers of switching operations.
In the worst case the systems will constantly switch each other on and off – they oscillate.
Even by a careful adjustement of the particular power factor controllers (e.g. exact calibration of sensitivity and switching times), a mutual interference cannot be completely avoided.
The more systems work together in parallel, the more difficult it will be to control the situation.

Solution:

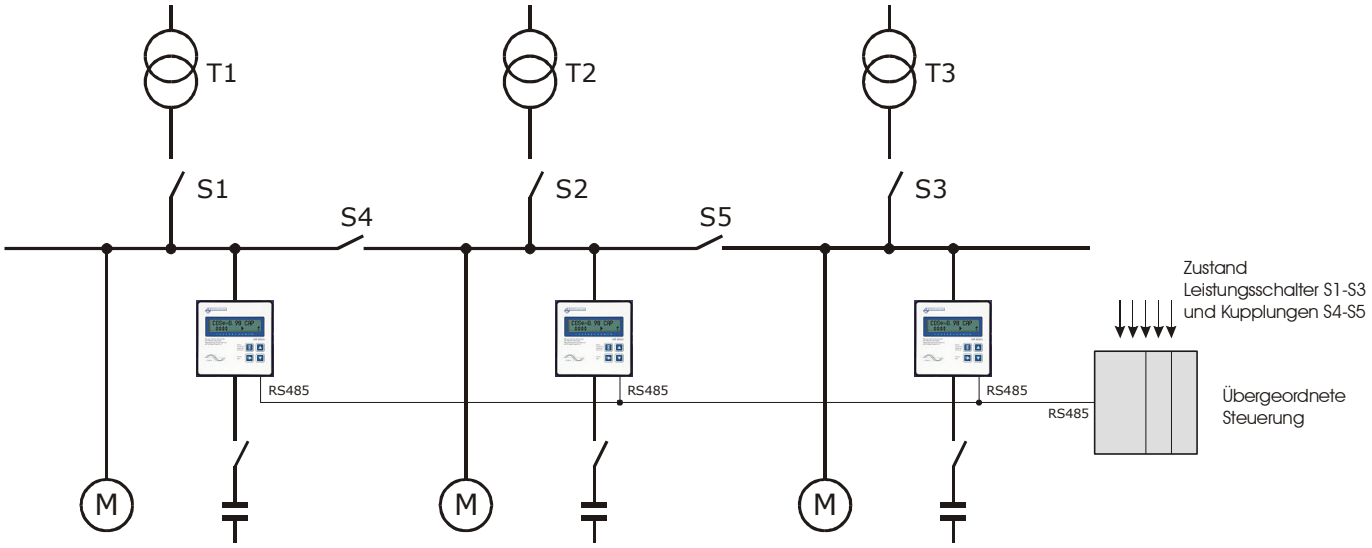
Due to this reason an additional component was developed allowing the compensation system to work in parallel on more supplies without any retroactivity.
This solution avoids problems as mentioned above.
Another big advantage is the possibility of balancing, i. e. when the coupling switches are closed, the necessary capacitor steps will be "distributed" equally at the busbar.
(Example: 3 PFC systems operating in parallel, actual demand are 6 steps of 50kvar → each system is switching in 2 steps)
The symmetric distribution is important for the relief of the bus bars at the supply, as the single loads are influencing the different losses as well.

This solution is possible by the usage of a master control and the usage of the controller BR6000-R12/S485 (with I/O port).
All information needed (actual state of power and coupling switches) are fed into the controlling via digital inputs, and also into the internally measured and calculated values of the controllers which are connected via the I/O port RS485.
The steerage evaluates all signals and provides the necessary switching commands to the controllers to guarantee a optimized controlling.
All reasonable switching combinations of the power switches are possible. All available PFC-banks are included into the control-process, e.g. also PFC-systems where the power switch of the feeder is open whilst the coupling switch is connected to the system.
The maximum extension of the system is 6 compensation banks. In case of a shut down of the master controlling unit (i.e. voltage drop), all compensation banks will work as independent units and secure a certain compensation power.

References

Up to now we have installed ten systems with up to 6 linked compensation banks and have been successfully tested.

Picture 1 shows the connection principle of 3 PFC-systems at 3 supplies with the possibility of coupling. If for example all switches apart from S4 are closed, the first compensation bank will work independently, whilst the remaining systems are working in parallel and symmetrically.



Realization

To realize such a solution, only power factor controllers with above mentioned I/O port are necessary (BR6000-R12/S485) with a appropriate software tool.

Following control systems are available:

BR-VIP-2	Standard version for 2 systems, consisting of steering (supply as click-in on DIN-Hut rail), dimensions approx. 100 x 75 x 80 mm (W x H x D) including programmed software tool and accessories (plugs).
BR-VIP-3	as above, but for 3 coupled systems
BR-VIP-6	as above, but for 6 coupled systems

On demand we offer the consulting of such projects.

Options

The system additionally can be used for monitoring and internal data transfer for the networks of all connected systems. Therefore an optional Interface for the steerage is necessary. Following protocols can be served: Profibus DP, CAN open, INTERBUS-S, RS-232, Ethernet

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