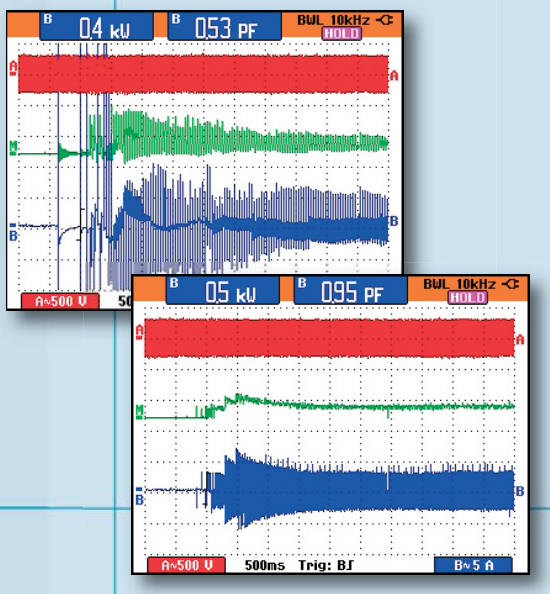
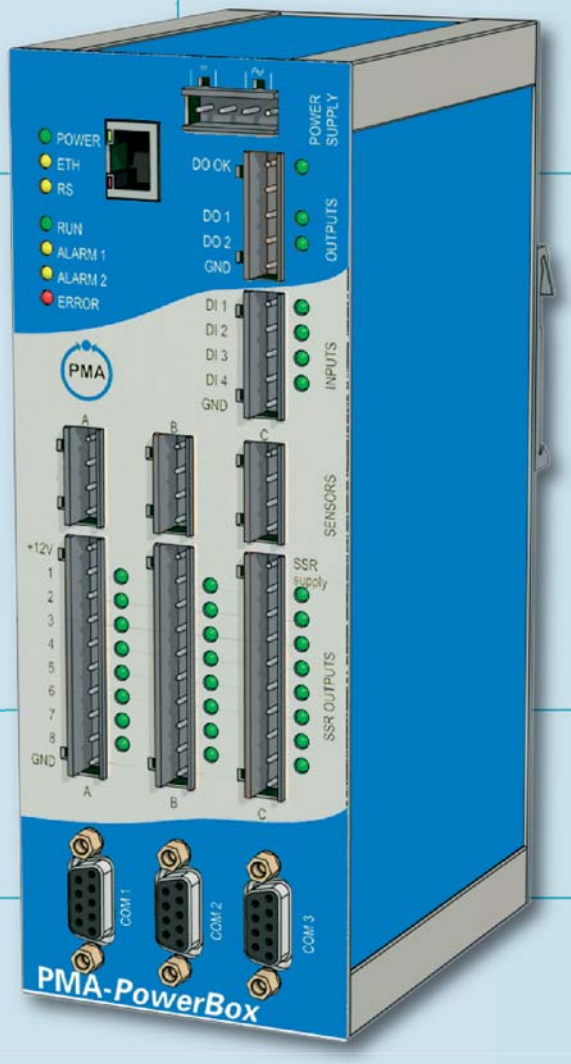
PMA-PowerBox

MULTIPLE ZONE HEATING-LOAD MANAGEMENT





- Synchronization up to 24 zones up to 2000 Ampere
  - → Elimination of harmonics
  - → Prevention of power peaks
  - → No flickering of the power line
  - → Optimization of the real power factor
- Automatic load detection
- Smart Power Limitation

Wir kriegen's geregelt

Close the loop with

PMA

PMA - PowerBox

Heating load-optimization for multiple zones

The PMA PowerBox optimizes electrical multiple heating load systems by intelligent heating load management.
This powerful processing unit with special algorithm enables you to reduce enegy costs.
Synchronized simultaneous heating loads and individual capacity set free the potential to save energy (not just by simple power limiting but by intelligent synchronization of the electrical loads.

- Preventing power peaks
- Optimization of the efficiency factor to 1
- The instantaneous power is kept inside the supply limits
- The PowerBox prevents peak power before it begins
- Short amortization of the investment

The concept of the PowerBox is little more costlier control unit in combination with cost-effective solid state relays.

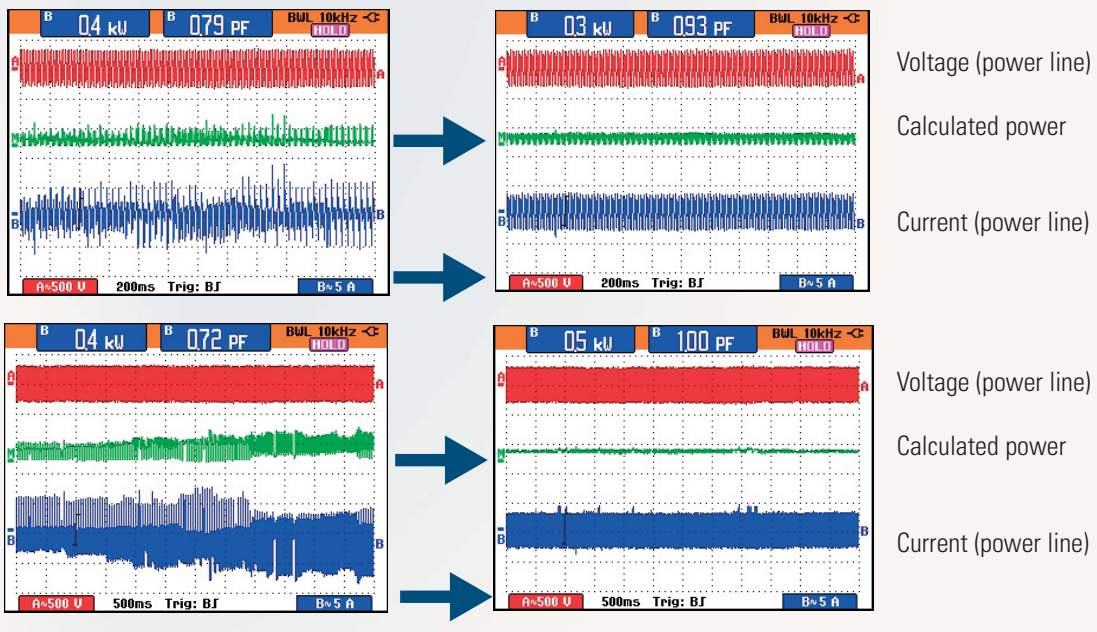
Heating load management for multiple zones

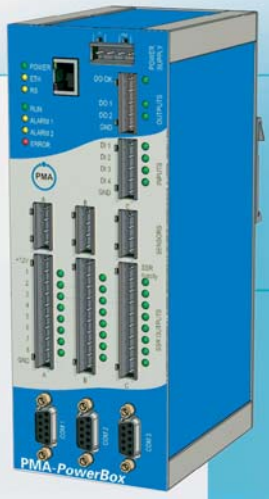
- One push on the button is enough and within a few seconds the self-learning routine collects all process parameters.
- Adjust the maximum power allowed at the power limit.
- Simultaneous and fast wave control of 24 load circuits, 1-2 or 3 phase.
- One current sensor for 8 load zones
- Every control zone is administered separately
  - -Calculation of instantaneous current (min/max), voltage, power...
  - -Calculation of the load resistance for heater break control (HB).
  - -Powermeter and current meter per zone.
  - -Communication via TCP/IP and 3 serial interfaces.
  - -Modbus, DeviceNet and Ethernet/IP are available as option (ModBus Master and Slave).

The load management strategy is very easy to use. The user does not need to study manuals, nor to have a knowledge about the divers synchronization methods. Just start in the “Easy mode”.
The power requests of the single loads are just read and written via interface to the PowerBox.

Oscilloscope grahpic demonstration:

On going measurement on 12-zone system (→ Current on the power line , on the left without , on the right with synchronization)



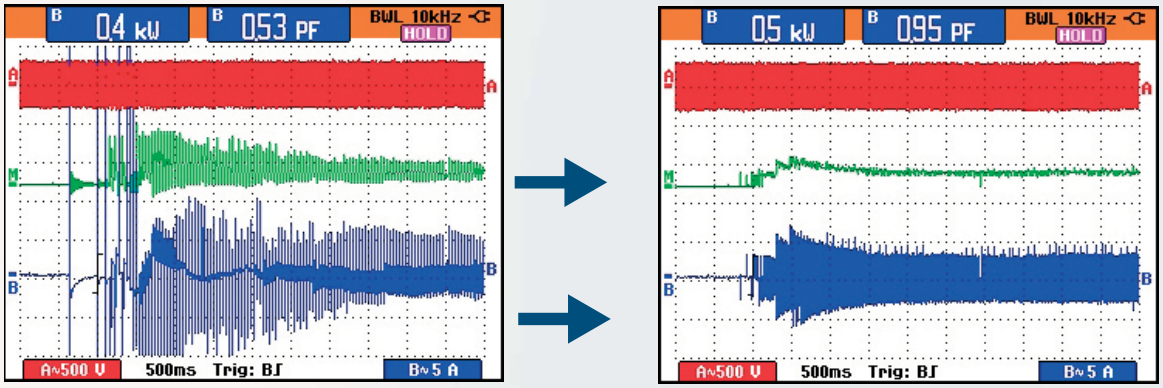


"Real time" synchronization

OLAS (Optimal Live Automatic Synchronisation) on all controlled zones allows the following features:

- The load current is almost sinusoidal
- Optimized timing of synchronization ensures the best possible effective power
- The instantaneous power is very close to the absolute mean value
- Elimination of harmonic waves
- Power saving by reducing of harmonic waves
- No mains flickering
- Optimized start-up behaviour for heating loads with low resistance to cold (e.g. short wave IR-radiators)

Oscilloscope grahpic demonstration: Start-up behaviour during measurement 12 zone IR-radiators



without synchronisation **with synchronisation**

Additional intelligent power limitation

- The intelligent power limitation works together with the synchronization. If this function is activated, the PMA-PowerBox calculates the power in every half cycle in "real time" and controls the outputs for the next half cycle.
- If the total power is smaller than the power limit, all zones are triggered normal and every channel has acess to the full power
- If the total power is larger than the power limit all zones are reduced equally proportional to the overload . Peak demands in the mains supply are avoided and as you do not exceed your capacity you do not have to pay for peak load.
- This function can be actived/deactivated anytime and the limit values can be adjusted during operation.

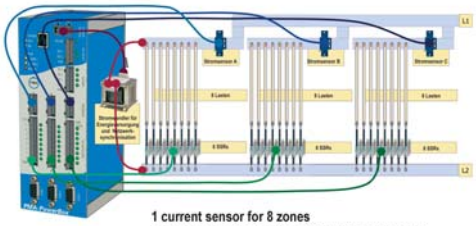
.

Conclusion:

- Current measurement: one sensor for 8 zones up to 2000 Ampere
- The current calculation of the single zones already works from controller output of 2%
- Locally configurable digital in- and outputs are supplied for status signals or control functions
- The PMA-PowerBox is supplied via a one phase current transformer (24V AC/1A)
- The lots of parameters for the single connected loads calculated by the PMA-PowerBox are available via interface.

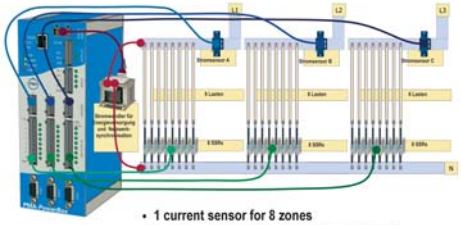
Applications and wiring variations

8, 16 or 24 1-phase loads



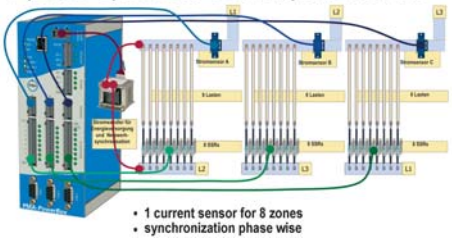
1 current sensor for 8 zones
common synchronization of the 8, 16 or 24 zones

3-phase loads with “neutral” 24 independent loads



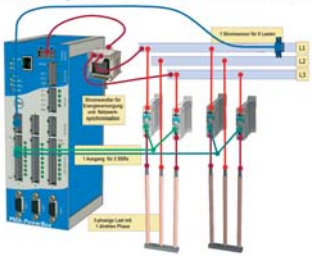
- 1 current sensor for 8 zones
- synchronization phase wise (linear phase?)

3-phase ”open Delta”: 24 independent loads



- 1 current sensor for 8 zones
- synchronization phase wise

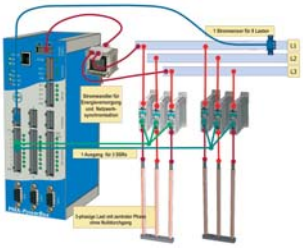
24 x 3-phase loads in economizing circuit



- only 1 control output for 2 solid state relays
- 1 current sensor for 8 zones
- one PowerBox synchronizes 24 3-phase loads

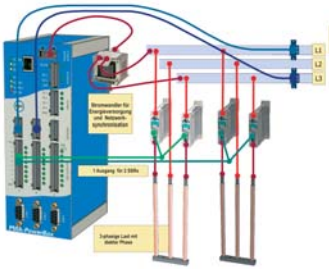
24 x 3-phase loads

Triggering of 3-phase loads with 3 solidstate relays and only one PowerBox output



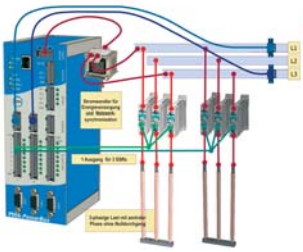
- 1 current sensor for 8 zones
- 2x “zero-switching” solid state relays and 1x “non zero-switching” solid state relays

Higher precision at 3-phase loads in economizing circuits



- 8 x 3-phase loads with 2-phase control in economizing circuits
- one power box for 8 zones with 2 current sensors for higher measuring accuracy

Higher accuracy at 3-phase loads with 3-phase control



- one PowerBox for 8 zones with 2 current sensors for higher measuring accuracy

PMA
Prozeß- und Maschinen-Automation GmbH
Miramstr. 87
34123 Kassel, Germany
Tel.: +49 - 561- 505 1307
Fax: +49 - 561- 505 1710
E-mail: mailbox@pma-online.de
Internet: http://www.pma-online.de

Your local representative

Printed in Germany - Edition 01/2009 - Subject to alteration without notice - 9498 737 59113