

## Peak Load Controller LR5500

Compact small-scale control unit for emergency power supplies and peak load operation



### Application

The peak load controller LR5500 is a tried and tested small-scale control unit for power control for generators in the public network, especially for optimizing the drawing of power from the network and avoiding peaks when drawing power. The unit has a +/- 20 mA analog input for power recording and 4 switching inputs which determine the control procedure. An externally connectable potentiometer allows the setpoint value to be optionally readjusted on the control level. The outputs are equipped with potential-free relay contacts which the user can directly integrate into his circuits.

The potentiometer settings for the operating of the control unit can be seen from the marking of the controllers. The controller is a PT three-point step controller. The control deviation results from the size of the dead time setting. The "Pulse" and "Pause" adjusters allow the adjustment rate to be set within a wide range.

The test run under load necessary according to VDE 0108 is carried out without interruption. The unit is equipped with protective measures which allow the unit to be used in disturbed environments.

### Inputs – Measuring Circuits

- |                                 |  |   |
|---------------------------------|--|---|
| 4 digital inputs                | S2 on (connect terminals 4+5):<br>S1 on (connect terminals 3+5):<br>K2 on (connect terminals 2+5):<br>K1 on (connect terminals 1+5): | Switch on (Start) generator<br>Generator stays "On" after mains return<br>Feedback from mains power switch<br>Feedback from generator power switch. |
| 2 analog inputs                 | for power recording from the measuring transducer +/- 20 mA<br>for external potentiometer  |   |
| 2 time circuits 0.1 to 1 second | for up-down adjustment   |   |
| 4 threshold indicators          | 0 to 100%  |   |
| 1 three-point step controller   | with 2 relay outputs for the up-down adjustment pulses.  |   |

### Functions

#### -Peak load operation (parallel operation) on:

S2 is switched on. The generator receives a permanent start command from the peak load controller LR5500 (terminal 53/54). After synchronization of the power switch (generator in parallel with the network), the peak load controller LR5500 adjusts the active power to the preselected setpoint value. The adjustment rate can be adapted to the control loop via the Pulse and Pause adjusters.

#### -Peak load operation off (during operation) :

S2 is switched off during operation: the peak load controller LR5500 adjusts the generator to the preselected minimum power (no load). When the value falls below the minimum power, the start command (terminal 53/54) is taken back and the generator switches off. After the generator power switch (K1) switches off, the power control is blocked.

#### -Peak load operation off :

S2 is off. The controller LR5500 is in standby operation.

#### -Emergency power supply operation with back-synchronisation

S1 on (normal operation) and S2 off: generator switches off.

After mains failure, the LR5500 receives a start request to S2 and the generator receives the start command to terminal 53/54. The generator is started and takes over emergency current operation. After the mains returns, S2 is switched off (peak load operation off), but the start command for the generator stays switched off at first (generator runs on) until the generator is synchronised with the mains and K2 closes. Then the start command is taken back and the generator switches off.

If there are problems with the switching back of the mains switch after the mains returns, this function can be deselected (S1 off). Switching back is then carried out with interruption at a time selected by the operator of the system.

## Settings

**-External setpoint potentiometer:** terminal 8/9/10

If an "external" setpoint potentiometer is integrated into a system, for example into the front panel of the switchgear, the internal potentiometer has the function "Limitation of setpoint".

Example: Internal potentiometer set to 80%. The active power setpoint value can now be set to between 0 and 80% at the external setpoint adjuster.

**-Switching point minimum power:** terminal 43/44

For example setting to 10%

The generator is run down to this value before switching off. This contact can also be used to for example release a power factor controller.

**-Switching point reverse power:** terminal 13/14

If, with a generator operated in parallel with another generator, the drive power is missing, for example due to lack of fuel or a fault in the injection system, the function of a generator thus converts directly to the "Motor operation" function. The generator draws active power from the mains and the generator drives the diesel. The prime mover is in great danger: all control times and the oil flow are no longer correct and the prime mover can be damaged. The generator is switched off by the relay after 20 seconds and the "Reverse power" display LED lights up immediately after the setpoint value is exceeded.

**-Setting the reverse power switching point:**

Settings must be made according to the guidelines of the generator manufacturers. Approximate values:

Diesel generators	: 5% to 8% of rated power
Gas engines	: 4% to 6% of rated power
Turbines	: 2% to 4% of rated power

## Cabling

Terminals 1 to 5: within switchgear, max. 10 m

Terminals 6 + 7 20 mA : without shielding, cables twisted

Terminals 6 + 7 10 V : shielded, shield on terminal 8, max. 10 m

Terminals 8 to 10 : shielded, shield on terminal 8, max. 10 m

In order to avoid compensatory currents (interference) in the shield of shielded cables, position the shield on one side only and isolate it on the other side. Make no connection between housing and shield.

## Technical Data

Type	Peak Load Controller LR5500
Construction	Plastic housing on 35 mm hat rail acc. to DIN EN 50022 bzw. DIN 46277
Material of housing	Bayblend FR 1439/0240 modified ABS with burning protection UL 94 VO
Dimensions, Weight	104x68x110mm (BxHxT), ca. 0.4 kg
Rated voltage	231VAC (L1-N) Other voltages on request
Power Consumption	appr. 2.5W
Input Signal (actual value)	+/- 20mA (10V on request), 50 Ohm (50K for 10V)
Extern Potentiometer	10 k-Ohm
Dead Zone	0.1 – 10% of total range
Reverse Power	range 0.1 – 10% with delay of relay output appr. 20 sec
Minimum Power	range 0.1 – 100% without delay to output relay contact
Hysteresis	appr. 2%
Switching Accuracy	0.5% for 0 – 55°C
Pulse duration	0.1 – 1 sec
Pause duration	0.1 – 1 sec
On period	100 %
Contact rating	5A/250VAC , 5A/30VDC , 0,015 Ohms , 10 <sup>5</sup> switchings
Isolating voltage	3000V (Coil-Contact), 1000V (open contact)
Connecting terminals	Potentialfree, for wire connection up to 2,5 mm <sup>2</sup>
Type of protection	Housing IP 40 , Terminals IP 20 (or VDE 0106T100/VBG4 )
Ambient temperature	-10 °C bis +55°C, 95% Hum
Mains isolating	EN 60 742 (Safety transformers)
General regulations	EN 50 178 (Electrical units in power current installation)
Radio interference	EN 55 022/B
EMV	EN 61000 und EN V 50 140
Installation position	Any
Maintenance	Maintenancefree

## Taking into Operation

<b>Presettings:</b>	Pulse	1 sec	Minimum power	10%
	Pause	10 sec	Dead zone	100%
	Reverse power	40%	Setpoint value	50%

### Test operation without automatic speed adjustment:

Disconnect speed adjustment pulses at terminal 23 and 33 and switch on the switchgear. Close switch S2 (request for parallel operation). Contact 53/54 (Start) now closes and the "Start" LED lights up.

The answering signals K2 (mains switch closed) and K1 (generator switch closed) switch on the actual power controller and the "Up" LED flashes. Now run up the generator manually (speed adjuster in the system) until the "Setpoint" LED flashes. The "Up" LED goes off.

Now increase the speed of the generator until the "Setpoint" LED goes off and the "Down" LED flashes.

Decrease the speed manually again until it falls below the setpoint, i.e. until the "Up" LED flashes and the "Minimum power" LED is still on. If switch S2 is now opened, the "Down" LED must flash. The speed is now decreased still further until it falls below the "Minimum power" and the "Start" LED goes off. This throws off the generator switch.

### Switching to readiness:

Connect speed adjustment pulses at terminal 23 and 33 and close S2. After switching in parallel, the peak load control unit must run the generator up to the nominal load, after opening S2 remove the load and switch off.

Setting the control speed: The correction process should run quickly and without overshooting. For the test, the active power should be adjusted manually and the "Pulse" and "Pause" potentiometers set accordingly. After manual adjustment of the active power, the generator must adjust to the preselected setpoint value each time.

### Back-synchronisation function:

Close switch S1, switch S2 is open. Now simulate mains failure. Generator takes over power supply. Now mains return. LED "Start" lights up until mains switch is closed.

**Main failure function, switching back with interruption:** switch S1 and S2 open.

## Circuit Diagram

