Display & Programming.

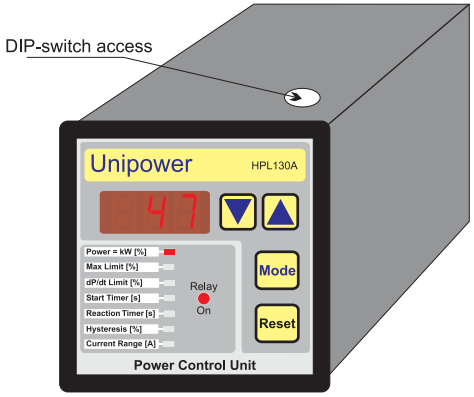
Mode	Function	Parameter	▼	+	▲	Display	Default
Power = kW [%]	kW [%] reading		Min. Peak	dP/dt Peak	Max. Peak	kW [%]	
Max. Limit [%]	Max. Limit	5-100%	Decrease		Increase	Max. Limit [%]	80%
dP/dt Limit [%]	dP/dt Limit	1-50%	Decrease		Increase	dP/dt Limit [%]	10%
dU Limit [%]	dU/dt Limit	1-25%	Decrease		Increase	dU/dt Limit [%]	3%
Start Timer [S]	Start timer	0.1-25.0 Sec.	Decrease		Increase	Ts [Sec.]	2.0 Sec.
Reaction Timer [S]	Tr - Max. Alarm	0.0-25.0 Sec.	Decrease		Increase	Max. Tr [Sec.]	0.1 Sec.
Hysteresis [%]	2-point control	2-50%	Decrease		Increase	Hysteresis [%]	10 %
Current Range [A]	Current range	1, 3, 5, 8 Amp.	Decrease		Increase	1, 3, 5, 8	5 Amp.

The HPL130A is programmed by the use of only three keys located at the front panel. See paragraph about programming on page 2. The parameters and their programming ranges are listed in the function table above. The function of the keys is repeated if continuously activated. Parameters are stored in EEPROM. When no key has been activated for about 5 seconds the display returns to the kW [%] position.

LED Usage

The HPL130A has a number of LEDs, which are used to indicate to the user the condition of the unit, i.e. above trip points or alarms. The table below shows the usage of the LED's

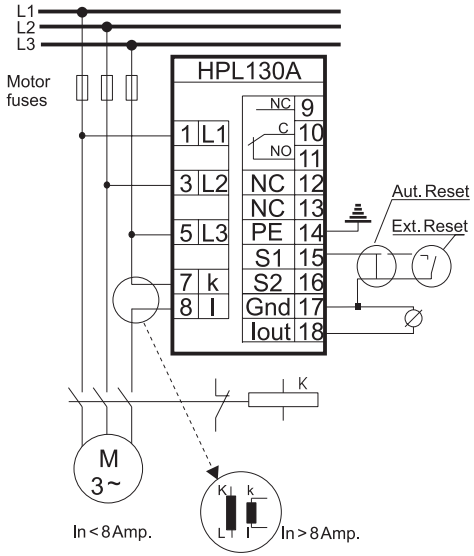
LED usage	
Max. Alarm	Max. Limit LED flashes
dP/dt Alarm	dP/dt Limit LED flashes
dU/dt	dU is written in the display
Start Timer	Ts LED On
Alarm Delay	Tr LED On
Relay closed	Relay On LED On



DIP. sw 1 'Off' = Programming allowed
DIP. sw 1 'On' = Programming protected
DIP. sw 2 = Not used

Figure 3

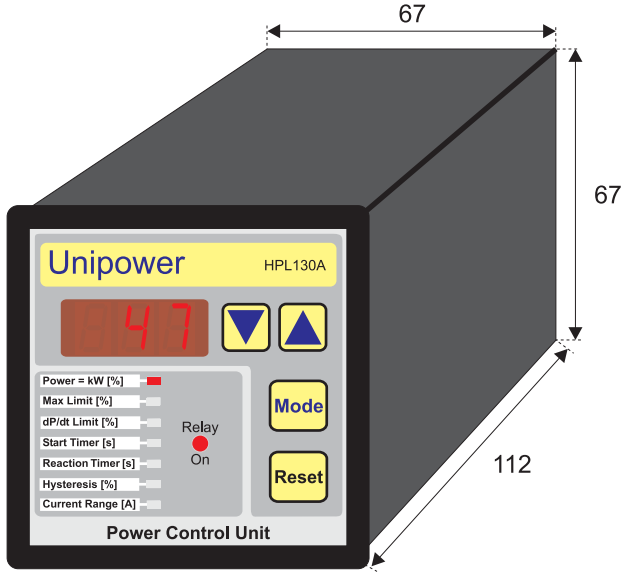
Note!!! An external current converter must always be mounted in the L3-phase for correct measurement. The converter polarity is not important.



Unipower

HPL130A
Version 4.0

Technical information — English edition



Technical Specifications

Mechanical spec.

Housing: Noryl
Mounting: Panel mounting.
Protection class: IP54
Temperature range: -15 - +50 °C.
Weight: App. 400g.
Dimensions: D 112 x W 67 x H 67 mm.

Electrical spec.

Voltage range
See technical info on the unit.
Also available:
3 x 120 VAC -> 3 x 575 VAC
Current range
Internal max, 8 Amp.
External: N/1 or N/5 converter.
Cos(φ) range: 0-1
Frequency range: 50 / 60 Hz.
Consumption: 2 VA
Relay spec.: 250 VAC/5 Amp.

CE-mark to:
EN50081-1, EN50082-2, EN61010-1

Generally

The Unipower HPL130A is a member of a family of „**Intelligent Power Control Units**". The unit measures power (kW) from the following formula:

$$P = \sqrt{3} \times U \times I \times \text{Cos}\varphi$$

The primary function of the unit lies in the supervision and control of machinery driven by 3-phased AC-motors. The HPL130A integrates a Max. kW and a special dP/dt limit detector. The unit has been developed specifically for the supervision of machinery that experiences variable power consumption because of shifting load or large temperature deviations. As well as the support functions Ts, Tr, hysteresis etc. the HPL130A has a built in current converter that works up to 8 Amp.

Generally

The power measurement principle is based upon true kW-measurement. Therefore the HPL130A also measures true power consumption on non sine shaped loads such as frequency inverters.

Programming:
The HPL130A is programmed by the use of only three keys located on the front panel (See paragraph on p. 4).

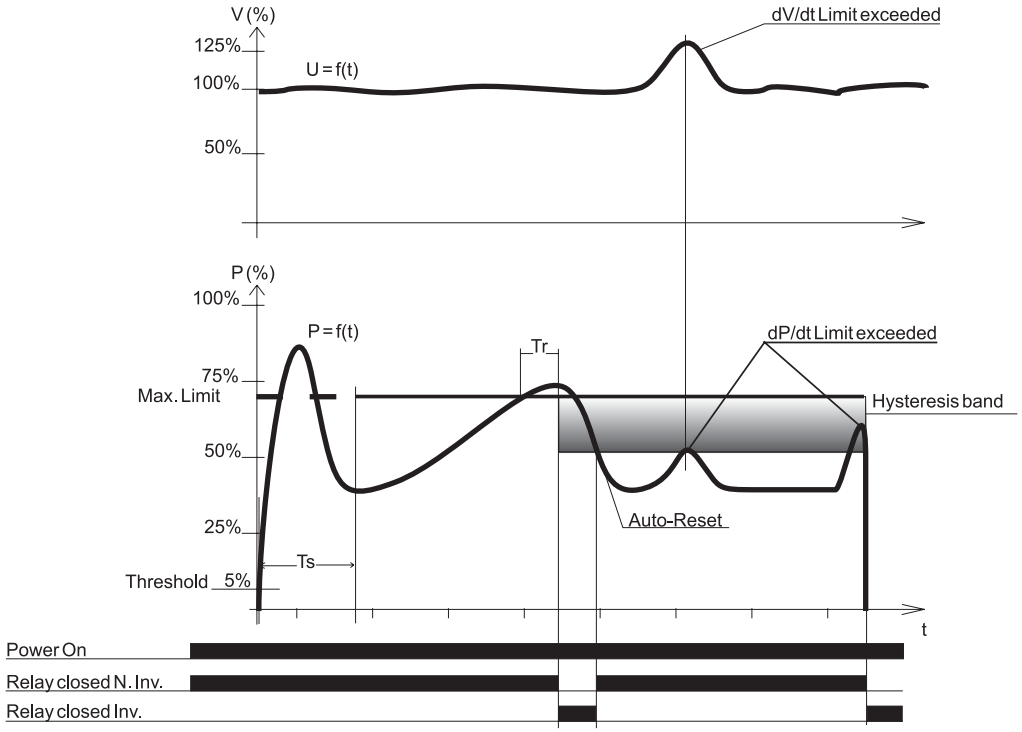
Measurement ranges:
The HPL130A has a built-in current converter that works up to 8A. One of four internal current ranges may be chosen: 1, 3, 5 or 8A. If the unit measures on loads where the current exceeds 8A an external current converter must be connected. This is done by connecting the secondary side of the converter to pin 7 and 8 and choose the 1A or 5A current range, depending on the converter (N/1 or N/5). The measurement range in kW=√3 x U x I, where U is the nominal voltage and I is the chosen current range or nominal primary current of the external current converter. Ex. 1A and 400V gives a measurement range of 0.692kW corresponding to 100%.

Functions

The figure below shows a typical AC-motor power consumption curve immediately after power has been applied to the motor. At the bottom of the figure a bar is shown indicating the position of the relay (On/Off).

Choosing limits:
Deciding the limits can be done in two ways: Theoretically or using the peak detectors in the HPL130A.

Theoretically:
Md = P2 x 60 / (2πn), where
Md: Torque where alarm should be given.
P2: Corresponding shaft power.
n: Revolutions in rev/min.



P1 = P2 + Po (Or from the efficiency curve of the motor.
Limit [%] = 100 x P1/P, where
P: Measurement range of the HPL130A.

Peak detectors:
Leave the motor running at normal load and read the peak values by activating the arrow keys in kW[%] - mode. The Max.peak is shown by arrow-up and the dP/dt peak is shown by activating both arrow keys. Place the Max limit appropriately above the Max peak value and the dP/dt limit appropriately above the dP/dt peak value. The peak detectors may be reset separately by pressing the relevant arrow key (or both) and at the same time activate the Reset key.

dV/dt: Blocking of dP/dt-alarms
dV/dt is used to block dP/dt alarms caused by voltage fluctuations. If the setting for dV/dt is too small, real dP/dt alarms may be blocked. Too large dV/dt setting results in too many unintended alarms. Thus setting the dV/dt is very much an experimental procedure; Leave the motor running at normal load. Set dV/dt as low as possible and increase the value until „dU“ no longer appears in the display. Add 1-2% and a reasonable starting point for dV/dt is set.

Ts: Start timer
The programmable start timer (Ts) is used to avoid alarms at motor start. The Ts delay function is activated after the power consumption reaches 5%. When Ts expires the limits, hysteresis and Tr become active. If the power consumption drops below 5%, the supervision is switched off again.

Tr: Reaction timer
The figure shows how the reaction timer (Tr) is activated after the limit is exceeded. Tr is used to avoid alarms, unless the limit has been exceeded for a certain time. If Tr is set to 0, Tr = 10ms.
Note: Exceeding the dP/dt limit does not initiate a reaction timer.

Reseting alarms:
Alarms may be reset by the reset key on the front panel or by Input S1.

Input S1: Auto or external reset
External reset: S1 is connected to Gnd by the use of a switch or optocoupler output. See fig. 2.
Auto reset: If S1 is connected to Gnd, Auto reset mode is enabled, which leads to reset of alarms by hysteresis. Selecting Auto reset deactivates dP/dt supervision.

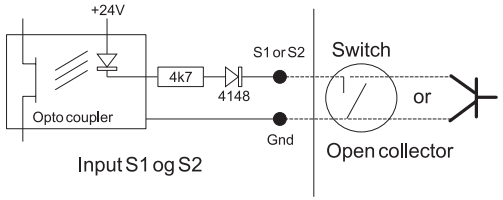


Figure 2

Hysteresis:
The figure to the left shows how a possible hysteresis band is placed relatively to the Max. limit; Always below a Max limit. Hysteresis is activated when an alarm is generated and the external reset is activ (Input S1, Auto reset mode).

Input S2: Blocking of alarms
Like Ts blocks for alarms during start of the motor, alarms can be ignored by setting S2 to Gnd. If a brief overload is expected - either absolute or dP/dt, a PLC output or the like may be used to block for a short period of time.

DIP switch:
The DIP switch is accessible through a hole in the housing. (see figure 3 on p. 4).
Sw.1 - No programming: The parameters may be read but not altered, when Sw.1 is On.
Sw.2: Not used

Iout: 4-20mA
The analogue output (4-20mA) is proportional to the readout in kW[%]. I.e. 4mA at 0% and 20mA at 100%. Iout is set to 0mA by an alarm (both max and dP/dt), but not in Auto-Reset mode, where Iout always reflects the readout.