

Generally.

The power measurement principle is based upon integration of the power in every period (20 ms at 50Hz). Therefore the HPL110A also measures true power consumption on non sine shaped loads such as frequency inverters.

Programming:

The HPL110A is programmed by the use of only three keys located on the front panel. The „Mode“ key is used to select one of the seven programmable parameters. When a parameter is chosen the value may be altered by the use of the arrow keys.

Measurement ranges:

The HPL110A 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

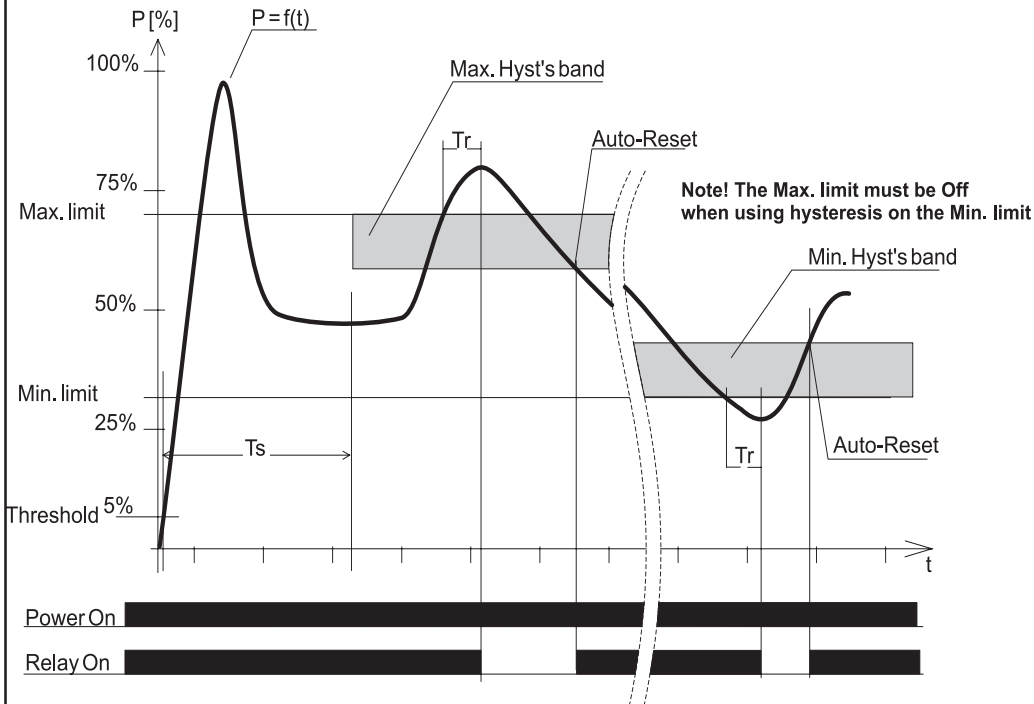
7 and 8 and choose the 1A or 5A current range, depending on the converter (N/1 or N/5). The measurement range in kW = $\sqrt{3} \times U \times I$, where U is the nominal voltage and I is the chosen current range or nominal primary current of the external current converter. Ex. 1A and 400V gives a measurement range of 0.692 kW corresponding to 100%.

Functions

The figure below shows a typical AC-motor power consumption curve (ex. pump) 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 HPL110A.



Theoretically:

$$Md = P2 \times 60 / 2\pi n$$

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 [%] = $100 \times P1/P$, where

P: Measurement range of the HPL110A.

The limits can be deactivated by setting the Min. limit to 0 and the Max. limit to 101%. When a limit is deactivated „Off“ is written on the display.

Peak detectors:

Leave the motor running at normal load and read the peak values by activating the arrow keys in kW[%] - mode. Place the Max. limit appropriately above the Max. peak value and the Min. limit appropriately below the min. peak value. The peak detectors may be reset separately by pressing the relevant arrow key and at the same time activate the Reset key.

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 equals the measurement interval of 20ms (16.7ms at 60Hz).

Resetting 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.

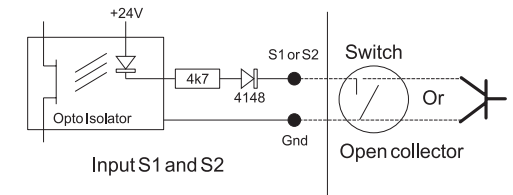


Figure 2

Hysteresis:

The figure to the left shows how possible Max. and Min. hysteresis bands are placed relatively to the limits. The hysteresis band always lies above a Min. limit and below a Max. limit. Hysteresis is activated when an alarm is generated and the external reset is active (Input S1, Auto reset mode). If Auto reset is chosen and both limits are active, only the Max. hysteresis band is active, because the HPL110A only has one relay.

Input S2: Blocking of alarms

Like Ts blocks for alarms during start of the motor, alarms can be ignored by setting S2 to Gnd.

Ex 1: If a brief overload is expected, a PLC output or the like may be used to block for a short period of time.

Ex 2: If the Min. kW limit is used, a spare break switch from the Motor Switch must be connected between the S2 input and Gnd, otherwise an alarm is generated each time the motor is switched off on purpose.

DIP switch:

The DIP switch is accessible through a hole in the housing (see figure 3).

SW.1 - No programming: The parameters may be read but not altered, when SW.1 is on.

SW.2: If this switch is on, no Min. alarm will be given exceeding a Min. limit if kW[%] < 5% before Tr expires.

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