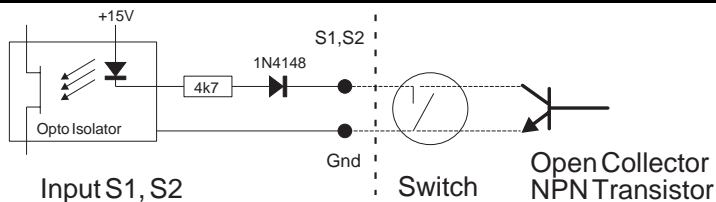
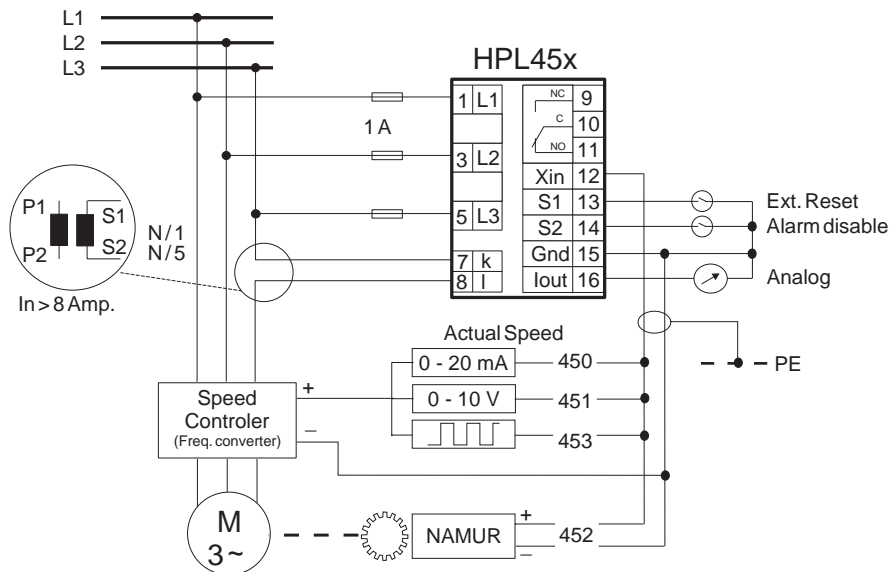


Example

The example shows the HPL450 used as overload protection device for a crane, which is driven by a motor controlled by a variable frequency converter. When the max. limit is exceeded the relay NC1 opens. The drawing does not show the actual connection of the alarm relays (application specific). The overload alarm must be reset either from the keyboard or from the external reset key located on the front panel. The HPL450 must be

mounted before the variable speed drive. The input S2 is used to disable the overload limit supervision when the crane is moving downwards. If the motor current exceeds 8 Amp. and external current converter must be mounted in the L3-phase.

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



If you need further information about the HPL-family of **Intelligent Power-Control Units** and its ability to solve your problems, please do not hesitate to contact your

WENtechnology

Raleigh, NC, USA

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Unipower HPL450 Version 1.5

Technical information

English Edition

Technical Specification

Electrical

Voltage Range

See technical info on module
Delivery range:
3 x 120 VAC -> 3 x 575 VAC.

Current Range

Internal: max. 8 A.
External: N/1 or N/5 converter.

Cosφ Range: 0-1.

Frequency Range: 50 / 60 Hz.

Consumption

Supply voltage=measurement voltage, 3 VA

Relay Output: 250 VAC/5 Amp.

Analogue Output

4-20 mA, 0-400 Ohm, electrically isolated from the measurement system.

Analogue Input

See technical info on module

Mechanical

Housing

Makrolon 8020 (30% GV), UL94V-1 (house).
Makrolon 2800, UL94V-2 (connector + front).

Mounting

Snap-on construction for 35mm DIN rail mounting or panel mounting.

Protection Class

IP40 (house), IP20 (connector).

Temperature Range: -15 - +50 °C.

Weight: Approximately 500g.

Dimensions: D 75 x W 56 x H 110 mm.

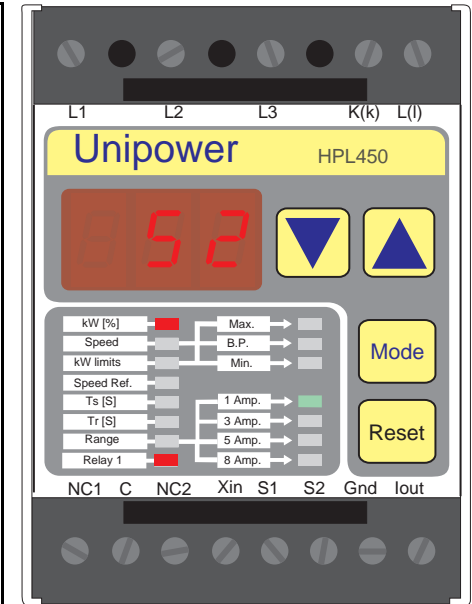
Terminal tight. torque: 7lbs/in, 0.79Nm
Use 60/75 copper (CU) wire only

CE mark to:

EN50081-1, EN50082-2, EN61010-1

UL certified:

UL 508 - Industrial Control Equipment



THE CONCEPT

The Unipower HPL450 is a member of a family of **"Intelligent Power-Control Units"**, which is based upon the latest advance in Microcontroller Technology. The unit measures true power-consumption and shows the consumption as a percentage of the selected power-range. The power-consumption (kW) is calculated from the basic formula:

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

The primary function of the unit lies in the supervision and control of machinery driven by 3-phase AC-motors. The HPL450 is exclusively developed for the supervision of machinery driven by variable speed drives. An example would be the supervision of a crane which must be supervised efficient when the speed of the crane changes (acceleration or deceleration). The HPL450 includes a built-in current converter that works up to 8 Amp. Currents greater than 8 Amp. are supported by the use of an additional external current converter.

Programming & Display.

Mode	Function	Variable 450-451/452-453	▼	▲	Display	Default 450-451/452-453
[kW] %	kW display		Min. peak	Max. peak	kW [%]	
Speed	Speed display			kW limit	Speed or (kW[%])	
kW limits	Max. kW limit	1 - 100%	Decrease	Increase	Max. limit [%]	80%
kW limits	B.P. kW limit	Off, 1 - 100%	Decrease	Increase	B.P. limit [%]	Off
kW limits	Min. kW limit	1 - 100%	Decrease	Increase	Min. limit [%]	20%
Speed limits	Max. speed limit	1-100%/5 - 999Hz	Decrease	Increase	Max. speed	100%/500Hz
Speed limits	B.P speed limit	Off, 1-100/Off, 1 - 999	Decrease	Increase	B.P speed	Off
Speed limits	Min. speed limit	1-100%/5 - 999Hz	Decrease	Increase	Min. speed	10%/50Hz
Ts[S]	Start delay	0.1 - 25.0 Sec.	Decrease	Increase	Ts [Sec]	2.0 Sec.
Tr[S]	Alarm reaction time	0.0 - 25.0 Sec.	Decrease	Increase	Tr [Sec]	0.1 Sec.
Range	Current Range	1, 3, 5, 8 Amp.	Decrease	Increase	"Cur"	5 Amp.

The HPL450 is programmed by the use of only three keys located on the front panel. The mode key is used to switch the display from showing kW [%] to display one of ten programmable variables. All the variables and their programming ranges are listed in the function table above. The red mode LED in combination with the red Max., Min. and B.P. LED's are used to show which variable may be altered. When a variable has been selected by the mode key then the value may be altered by the two arrow-keys. Note that the keys are repeated if held down continuously. Variables are stored in EEPROM. When no key has been activated for about 5 seconds the display returns to the kW [%] position (Normal Operation). When the Dip. Sw. 1 is 'On' the unit is protected against programming; but it is still possible to display current settings.

Function	Display
kW[%] Alarm	Max. LED flashing
Start delay	Ts LED lit
Alarm delay	Tr LED lit
Relay 1 closed	Relay 1 LED lit

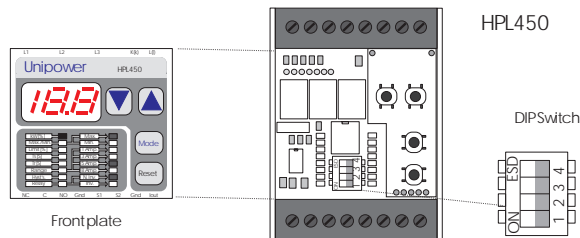
DIP Switch Usage		
SW 1	Unit protected	On
SW 1	Unit unprotected	Off
SW 2	Not to be changed	
SW 3	Not used	Off
SW 4	Not used	Off

Default



Dip. Switch Access

1. Disconnect the Mains Power.
2. Remove the plastic cover.
3. Change the switch settings and assemble the unit again.



Unit selection (Analog input)

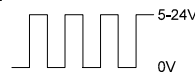
HPL450:
0-20 mA
Input resistance: 100 ohm

HPL451:
0-10 V
Input resistance: 10 kohm

HPL452:
NAMUR
Frequency range: 4-999 Hz

HPL453:

Square wave:
Input resistance: 10 kohm
Frequency range: 4-999 Hz
Voltage range:



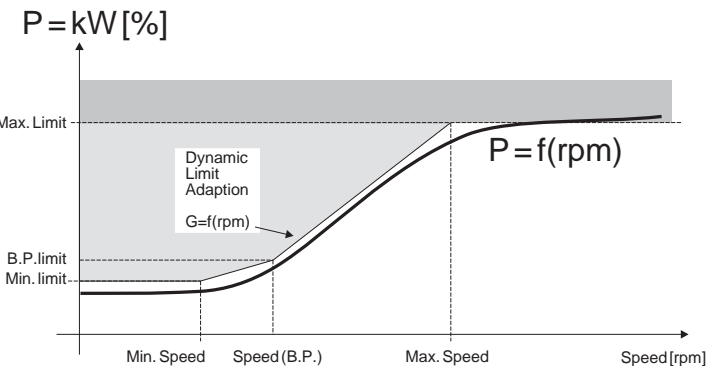
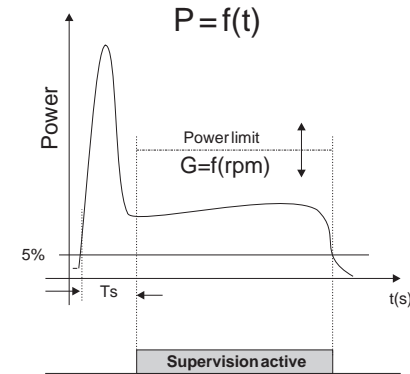
AC:

Input resistance: 10 kohm
Frequency range: 4-999 Hz
Voltage range: 5-24 V

Function

The drawing below shows a characteristic power-consumption curve for an AC-motor immediately after power has been applied. A curve showing the limit's dependence on the motor speed is also shown. The programmable start timer (Ts) is used to filter out from the protection/regulation cycle the large peak power consumption generated by the motor when starting. The Ts delay function is activated after the power consumption reaches 5%. When Ts has expired then the limits and Tr becomes active. If the power consumption drops below 5%

then the supervision is switched off again. The alarm reaction time, Tr, is used to avoid alarms unless the power consumption has been greater than the limit for a certain time duration. The HPL450 receives a signal (Xin) proportional to the speed of the motor. The kW limits are a function of the input signal Xin (motor speed). Three speed limits and three corresponding kW limits may be programmed into the unit. The unit shows "Err" when not (Min.Speed)<(B.P.Speed)<(Max.Speed) or when (B.P.kW)<(Min.kW).



Limit Programming

The power-consumption limits are a function of the analog input signal Xin. The input signal Xin is proportional to the total speed-range which corresponds to 0 - 100% or 4 - 999 Hz. The actual speed-range is programmed in the mode "Speed Limits" - "Max./Min." and the corresponding kW % limits are programmed in the mode "kW % Limits" - "Max./Min". If the speed to kW function is non-linear it is possible to program a third speed and kW limit (breakpoint limit). Note! when the display shows speed it is possible to display the actual kW limit by pressing the arrow-up key.