Unipower PCU

522

Power [%] | Tr [Sec]
Power[kW] | Hyst's
Display | C.T. [Amp]
Locked | P1 max.
Ts [Sec] | Aux.
Limit 1 | Setup
Limit 2 | Relay 1
Limit 3 | Relay 2

Mode

Reset

Power Control Unit

The Concept

The Unipower PCU 4123 is a universel Power Control Unit, which is based upon experiences from the Unipower HPL-family. The unit has three programmable limits, which act on two seperate relays. The limits are power related and power is measured from the formula:

$$P = \sqrt{3} \times U \times I \times \cos\varphi.$$

Besides kW the units also measures true RMS-voltage(U, Volt), RMS-current (I, Amp.), power factor and frequency (f, Hz). Current and voltage is sampled at a rate of 10kHz. The digitized values are used to calculate all measurement variables, which may all be shown on the display. The unit is designed for panel mounting.

Features

- Three programmable limits.
  - Max, Min, dP/dt
- Measurement/Display of
  - Power (kW or kW[%]) 2 %
  - Voltage (V)   1 %
  - Current(A)   1 %
  - Power factor   3 %
  - Frequency (Hz)   0.5 %

- Phase-order supervision.
- Peak detektor of all measurement variables (Max & Min)
- Analogue output 4-20mA proportional to kW.
- Scaling of analogue output for kW.
- Two relay outputs.
- Internal current converter up to 8 Amp.

Technical Specifications

Mechanical

Housing: Noryl.
Monting: Panel mounting. DIN 43700
Dimensions: H 72 x W 72 x D 143 mm.
Protection Class: IP54.
Operating Temperature Range: -15 - +55 ℃.
Weight: Approximately 500g.
CE-marked to : EN 50081-2, EN50082-2, EN61010-1

Electrical

Supply Voltage Range: 3 x 330 - 3 x 450 Volt AC.
Current Range: External N/1 or N/5 converter.
Power-factor Range: 0-1.
Frequency Range: 45 - 65 Hz.
Consumption: Supplied from measurement system, 3 VA.
Relay outputs: 250V, 5A AC1
Analogue output: 4 - 20 mA, max. 400 ohm.
The output is electrically isolated from the measurement system.

Display & Programming

Mode	Function	Parameter	▼	▲	Display	Default
Power(%)	kW (%P1) display		Min. kW (%P1)	Max. kW (%P1)	kW (%P1)	
Power(kW)	kW display		Min. kW	Max. kW	kW	
Display	Display prog.	kW,I,U,PF,Freq,dP,dU	Min.	Max.	Actual value	Power [kW]
Locked	Programming lock	On, Off			"On/Off"	"On"
Ts[Sec]	Start timer	0 - 250 Sec.	Decrease	Increase	Ts[Sec]	2 sec.
Limits	Limit values	5-100%/1-50%/1-20%	Decrease	Increase	Limits [%]	
Tr[Sec]	Response timer	0.01 - 25 Sec.	Decrease	Increase	Tr[Sec]	0.1 sec.
C.T.Amp.	Converter type	1-8 Int., N/1, N/5	Decrease	Increase	1 - 5000 Amp.	1
P1 max	P1 max scaling	50 - 100% af P1	Decrease	Increase	50-100% af P1	0.693 kW
Setup	Door to setup					

Display function.

1. Power [%]. Display of kW in % of the selected range (see 10).

2. Power kW. Display of kW or the variable selected in display (3).

3. Display. Mode for display of I[Amp], U[V~], F[Hz], PF/cosj, P/dt[%], dU/dt[%]. The variables are selected with the arrow keys and displayed under Power kW (see 2).

4. Locked. Programming lock.

5. Ts. Start-delay[Sec]. Avoids alarms during motor starting.

6. Limit. Limit-value in % of the scaled measurement range. The displayet shows [hi%], [lo%], [dP%], [dU%]. The limit LED's are lit during programming of Tr and hysteresis and when a limit is exceeded.

7. Tr. Response-delay [Sec]. The time, which a limit must be exceeded, in order to generate an alarm.

8. Hysteresis[%]. The hysteresis is used with simple two-point regulations. The hysteresis band is located below a max. limit and above a min. limit.

9. C.T. [Amp]. Programming of current range. Internal current converter up to 8 Amp. External current converter N/1 or N/5 A. N in standard values up to 5000 Amp.

10. P1 Max. Scaling function. The secondary measurement may be scaled to be a percentage of the primary measurement range (50-100%). Iout, limits and hysteresis is related to the secondary scaled range.

11. Aux. Reserved for costumer specific options.

12. Setup. Function programming of the unit. See below.

Programming.

The PCU 4123 is operated/programmed by only four keys located on the front panel. The **"Mode"** key is used to change the display from showing kW to show and/or alter other parameters and variables. The parameters and their operating ranges is shown in the functiontable above. The led's on the front panel shows which variabel is selected. Before a variable may be changed the units must be **'onlocked'**. This is done by activation of the mode-key until the led **'Locked'** is lit. The display now shows 'on' and when both arrow keys have been activated for five seconds the display changes to 'off' and the unit may be programmed. The led 'Locked' flashes when the unit is unlocked. The unit is locked again by pressing reset or it changes back to 'Locked' again after about 5 minuttes. The variables are saved into **EEPROM.** When measurement variables are shown the **arrow keys are used to show max/min values.** If no key has been activated for about 7 seconds the display returns to the kW position. The max/min values are preset to their current values after power-on when the start-timer Ts expires. Note: The keys are repeated when continously activated.

Setup.

The setup-mode is used to modify the functionality of the unit. Limits may be activated or deactivated, the analogue output may be configured and phase-order supervision may be switched on/off etc. In order to enter setup-mode the mode-key must be activated until the led 'Setup' is lit. Then both arrow keys must be activated for app. 5 seconds to enable setup.

The flow-chart on the opposite page shows how setup is constructed. Please follow the arrows after each selection in order to locate the next programmable parameter. If the display text is different from the flow-chart the display is showed in parenthesis with bold text. The display continously flashes between parameter-text and the parameter value. This parameter-text is shown on the flow chart in grey boxes. The reset key is used to exit setup.

The parameters are as follows:

Limit: Off, Hi, Lo, dP/dt

'Hi' indicated a limit has been defined as a max. limit while 'Lo' means min. limit. Limit1 cannot get switched 'Off'. Only limit2 may be a dP/dt limit in which case limit3 becomed a dU/dt limit. The dU/dt limit is programmed as a percentage of the nominal voltage. If limit2 is switched 'Off' then limit3 is switched 'Off' as well. If both limit2 and limit3 are 'Hi' the input In2 is used to switch between limit2 and limit3. Limit3 is switched off, if limit2 is 'Lo'.

Reset mode: Manual, automatic

Automatic reset activates the hysteresis band, which is placed above a min. limit and below a max. limit. A manual reset is generated by the activation of the reset-key or by switching In1 to ground for a short period.

Relay polarity: Inverted, non-inverted

In2: Special, normal

Special mode indicates In2 is used to switch between 2 limits (limit2 and limit3), which resembles the functionality of HPL426. In normal mode In2 may be used to disable alarms like for instance to avoid a min. alarm when a motor is stopped in purpose.
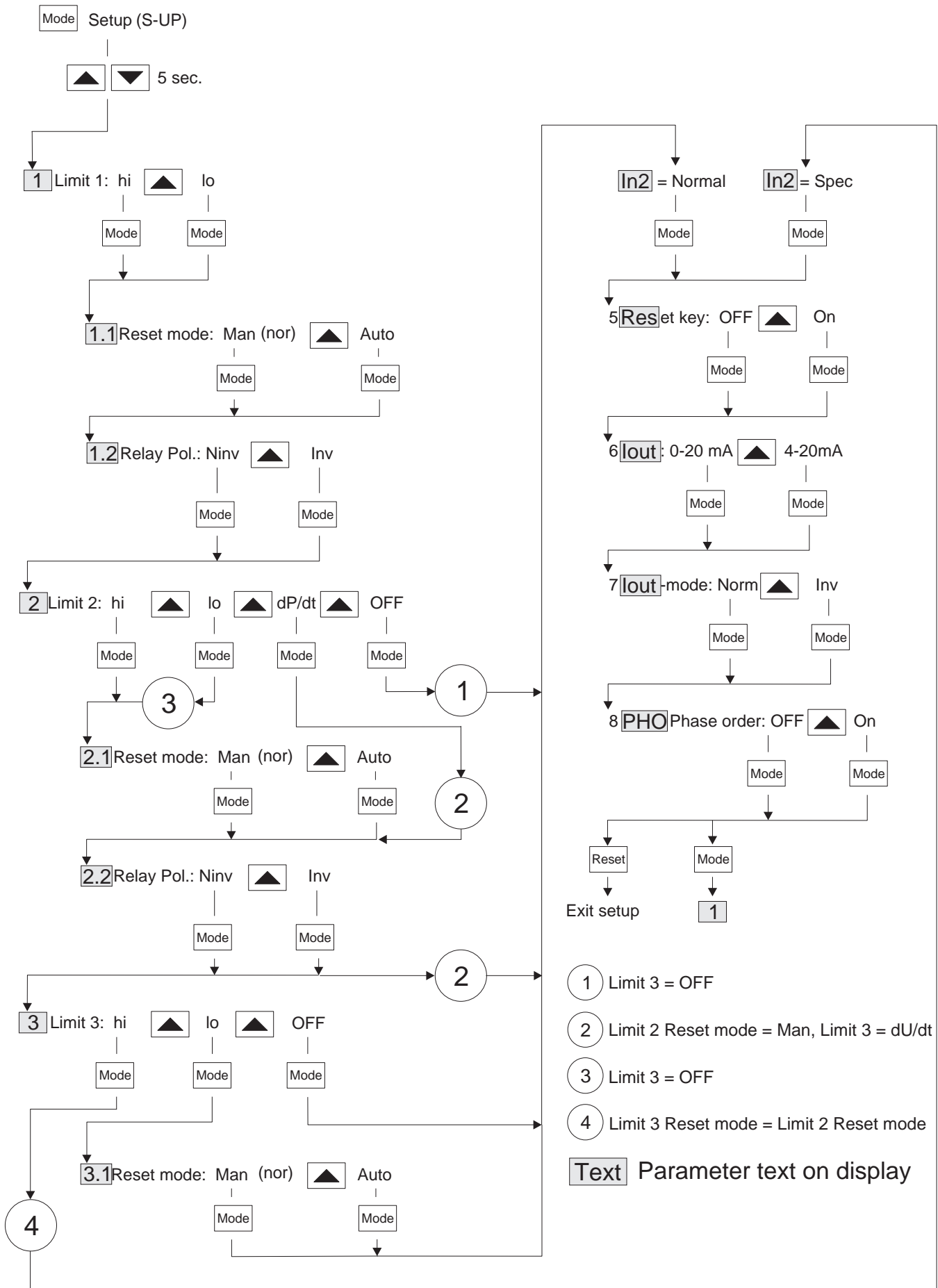
Reset key: On, Off.

When reset key is 'Off' the alarm may not be reset from the reset key.

Iout: 0-20mA, 4-20mA

Iout mode: Normal, Inverted

If Iout mode is inverted then Iout = 20-0mA or 20-4mA.

Setup flow chart

Mode Setup (S-UP)

▲ ▼ 5 sec.

1 Limit 1: hi ▲ lo

Mode Mode

1.1 Reset mode: Man (nor) ▲ Auto

Mode Mode

1.2 Relay Pol.: Ninv ▲ Inv

Mode Mode

2 Limit 2: hi ▲ lo ▲ dP/dt ▲ OFF

Mode Mode Mode Mode

(3) (1)

2.1 Reset mode: Man (nor) ▲ Auto

Mode Mode

(2)

2.2 Relay Pol.: Ninv ▲ Inv

Mode Mode

(2)

3 Limit 3: hi ▲ lo ▲ OFF

Mode Mode Mode

3.1 Reset mode: Man (nor) ▲ Auto

Mode Mode

(4)

In2 = Normal   In2 = Spec

Mode Mode

5 Reset key: OFF ▲ On

Mode Mode

6 Iout : 0-20 mA ▲ 4-20mA

Mode Mode

7 Iout -mode: Norm ▲ Inv

Mode Mode

8 PHO Phase order: OFF ▲ On

Mode Mode

Reset Mode

Exit setup   1

(1) Limit 3 = OFF

(2) Limit 2 Reset mode = Man, Limit 3 = dU/dt

(3) Limit 3 = OFF

(4) Limit 3 Reset mode = Limit 2 Reset mode

Text Parameter text on display

Definitions etc.

dP/dt: In applications with variable load it is often not possible to use a fixed max. limit but instead a dP/dt-limit may be used. The dP/dt term means power change per time unit (in this case only positive power change). The dPdt limit indicates how fast a power change is acceptable for normal operation. A typical application is a transport elevator, which may sometimes be full loaded and other times only light loaded. The variable load makes is impossible to protect the machine for blocking loads by using a fixed max. limit. The solution is to program the dP/dt limit in a way, which allows slow dP/dt changes generated by variable load and variable friction to be accepted, and a fast dP/dt caused by blocking to trip the relay and immediately stop the machinery.

dU/dt: Used together with the dP/dt-limit. The dU/dt is used to avoid false alarms generated by sudden mains voltage fluctuations. If a dP/dt alarm is generated and the dU/dt limit is exceeded at the same time the dP/dt alarm is ignored.

In2: If PCU4123 is used to supervise machinery driven by two-speed motors In2 is used to switch between the two max. limits (limit2 and limit3), one for each speed. The start-delay Ts is activated by every speed change.
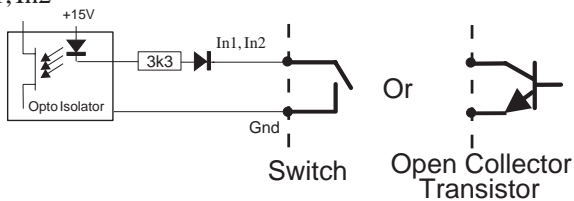
In2 on: Limit 2 is active.

In2 off: Limit 3 is active.

Relay outputs:

Limit 1 is associted to relay 1.

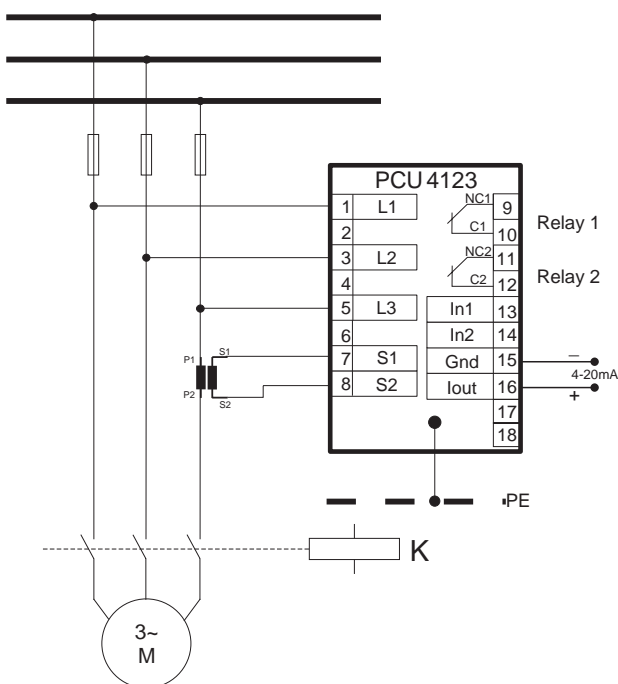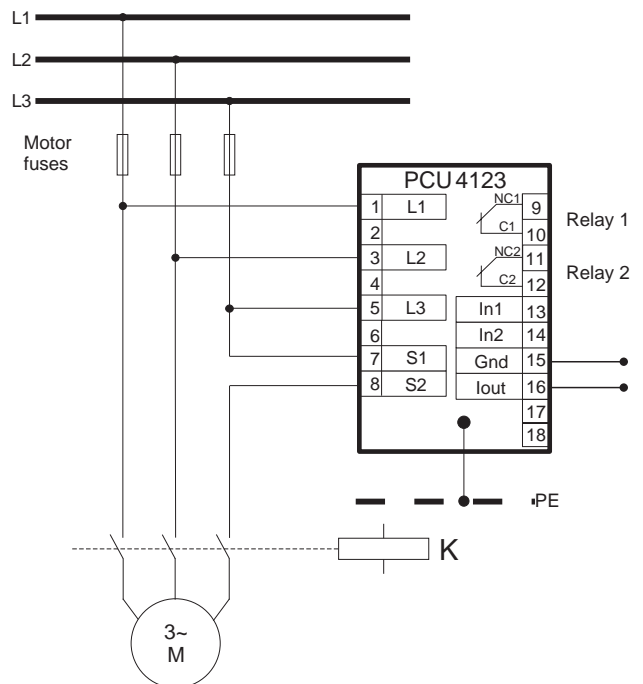Limit 2 and Limit 3 is associated with relay 2.

Input: In1, In2

Switch   Or   Open Collector Transistor

Measurement range.

P1 max. = **1.73** x **Unom** x **I**, where Unom is defined as the nominal supply voltage and I is the current converter primary current.

Phase current > 8 Amp. (External converter)

Phase current < 8 Amp. (Internal converter)

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 distributor.

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