

## Parameters.

To access the parameters use the 'Mode'-key to select 'Parameter' and the display will show 'P00'. Using the arrow keys the desired parameter number is entered and selected by pressing the 'Mode'-key. After altering the value press the 'Mode'-key and the parameter is set and stored. The parameters and their function are listed below.

### P01: Auto Reset

On = Hysteresis function enabled  
Off = Hysteresis function disabled

### P02: Auto shut down

On = Alarm is inhibited when motor is shut down  
Off = Alarm is active when motor is shut down.  
Alternatively use input S2 for temporary alarm inhibit

### P03: Iout mode

AnA = 4-20mA proportional to load  
rEL = Alarm output for limit 2

## Indicators.

The unit is equipped with 16 indicators (LEDs) some of which indicate to the user the condition of the unit:

**kW%**, **kW**, **HP**. Illuminated to indicate the displayed units.

**Locked**. Illuminated when the unit is tamper proofed.

**Ts**. Illuminated when the measurement exceeds 5% and is turned off when Ts expires.

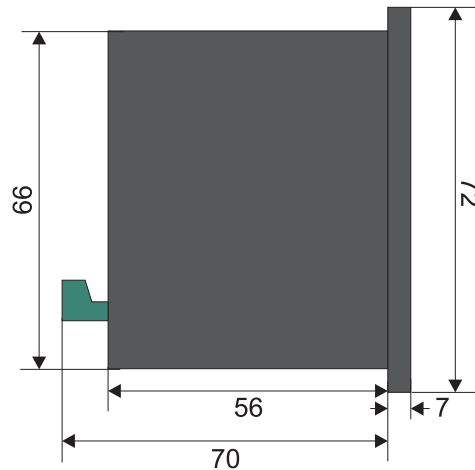
**Tr**. Illuminated when either of the limits is

exceeded as long as the reaction timer ( $T_r$ ) is active. Also the LED corresponding to the limit exceeded is lit.

**Limit 1**. Illuminated when limit 1 is exceeded and the  $T_r$  timer is not yet expired. Blinking when an alarm has occurred on limit 1 and the relay in APM110E is deactivated.

**Limit 2**. Illuminated when limit 2 is exceeded and the  $T_r$  timer is not yet expired. Blinking when an alarm has occurred on limit 2 and either the relay in APM110E is deactivated or the analogue output is set to low (see parameter P03).

## Dimensions



## Connection

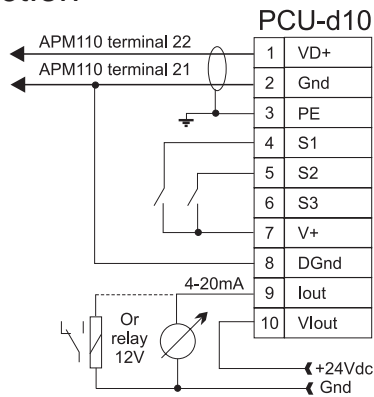


Fig. 2A

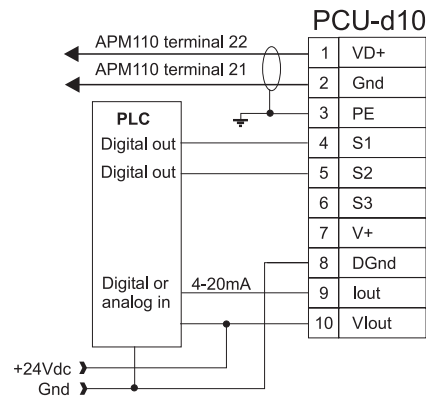


Fig. 2B

# Unipower®

## PCU d10

### Technical information

#### Technical Specifications

##### Mechanical spec.

###### Housing

Noryl

###### Mounting

Panelmounting

Cut-out: 68 x 68 mm

###### Protection class

IP54

###### Temperature range

-15 - +50 °C.

###### Weight

Approx. 140g.

###### Dimensions

D 70 x W 72 x H 72 mm.

##### Electrical spec.

###### Supply

10Vdc (From APM110)

Cable length: max 50m.

###### Consumption

< 1VA

###### Control inputs

+12-30Vdc

###### Analogue output

1) Iout. 4-20mA (Passive)

Supply: +15-30Vdc

Max load (15Vdc): 136Ω

Max load (30Vdc): 818Ω

2) Iout. On/Off (Passive)

Off = 1mA

On = 22mA

###### CE mark to

EN61326-1



#### General

The unit acts as a control/display unit for the Unipower APM110E, to which it is connected with only 2 wires. Although APM110E is a stand alone control module it may be convenient to have a panel mount display.

Unipower d10 integrates a programmable Max. and Min. kW limit detector plus the support functions necessary to establish the efficient and compact supervision or control of various types of machinery such as pumps, fans and conveyor belts. Both setpoints as well as the hysteresis band may be set in either HP, kW or kW%. An analogue output may be used for SCADA/PC input or data logging or as an independent second alarm output.

## Overview

As soon as PCU d10 is connected to APM110E all control functions are taken over by d10 and APM110 acts only as a measuring- and relay unit. Via a two wire connection the power to d10 as well as the kW signal are transferred from APM110E and the control commands are sent back from the d10 on the same two wire connection.

As opposed to other units in the Unipower family the d10 may be programmed in HP, kW or kW%. The setting up of the unit and its functionality is described below.

## Programming

PCU d10 is programmed by only 3 keys placed on the front of d10. The 'Mode' key is used to select one of the programmable parameters. The value of the chosen parameter may be altered using the arrow keys.

## Measurement range

In order to use the d10 correctly regarding HP and kW settings the measurement range (P1)

must correspond to the settings of the APM110E, except when using external CTs (See next paragraph). With the 'Mode'-key select 'P1 [kW]' and enter the desired Power range in kW using the arrow keys to set the numerical value followed by the 'Mode'-key and finally setting the decimal point using the arrow keys. Remember to set the APM110E to the same range by means of the 3-digit switch [Range/Limit]. This way the transferred measurements are converted to the correct HP- and kW-values.

## Measurement range ext. CT

To set up the measurement range when using an ext. CT, a simple calculation is necessary, which may be done by the d10:

Enter the desired Power range as described in the previous section. Now select the used CT under 'Ext. CT' (Remember always to use a N/5A CT) and the correct setting of the APM110E may be seen when selecting 'Set APM [kW]' with the 'Mode'-key. Setting up the APM110E to this value will enable the d10 to display measurements in true HP or kW.

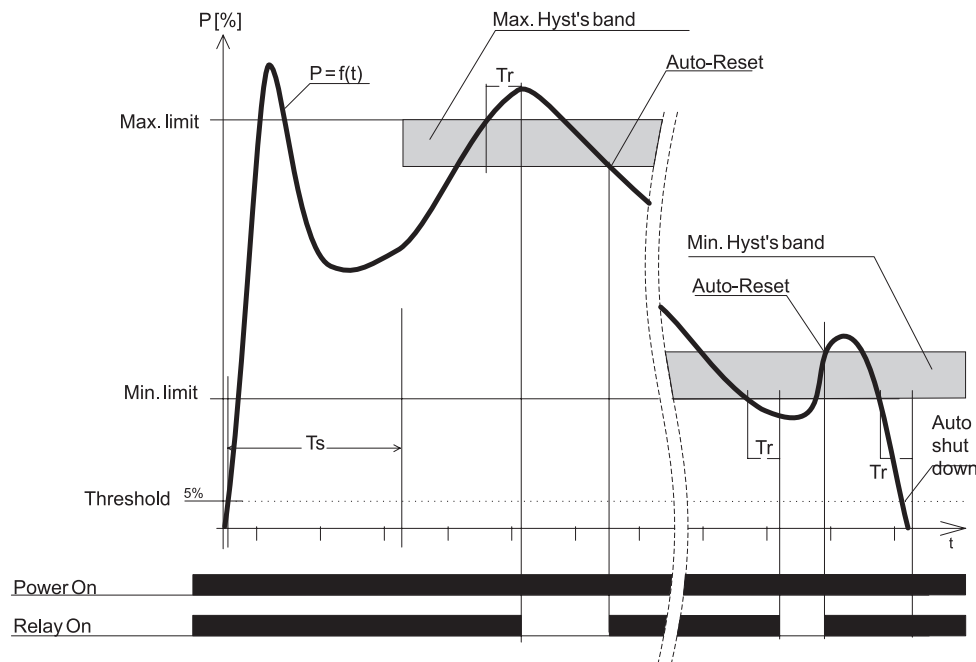


Fig. 1

## Functions

Figure 1 shows a typical AC-motor power consumption curve (eg. 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). The figure also shows the meaning of Ts, Tr and hysteresis.

## Max. Limit

The Max. limit may be set up in HP, kW or kW% in the range corresponding to 5% to 100% of the measurement range. The Max. limit alarm relay is located in the APM110E.

## Min. Limit

The Min. limit may be set up in HP, kW or kW% the same way as the Max. Limit. The output is selectable between the relay of the APM110E and the analogue output of the d10. Using the analogue output provides the user with two independent limits. At normal motor shut down an alarm is given, unless input S2 is active or Auto Shut Down (Parameter P02) is selected.

## Analogue output

The function of the analogue output is selected via Parameter P03 and the possibilities are:

- 1) 4-20mA proportional to the measurement.
- 2) On/Off signal related to Min limit; No alarm = 22mA and Alarm = 1mA. See installation in figure 2A on page 4.

**Note:** If a relay is connected to this output a 12V a low power relay must be used and the control voltage must be 24V.

Suggested relay: Schrack type RTB14012

## Ts: Start timer

The start timer (Ts) is used for avoiding alarms at motor start. The Ts delay function is activated after the power consumption reaches 5%. When Ts expires, limits, hysteresis and Tr become active.

## Tr: Reaction timer

When a limit is exceeded the corresponding Tr is activated. The limit must be exceeded for the duration of Tr before the relay position is changed to Off. If the measurement drops below the limit before Tr expires the timer is reset.

## Auto Reset, Hysteresis

Figure 1 shows how possible Max. and Min. hysteresis bands are placed relatively to the limits. The hysteresis band may be set in HP, kW or kW% in the range corresponding to 2 - 25% of the measurement range. Hysteresis is activated when an alarm is generated and the Auto Reset mode is selected (See Parameter P01)

## Manual Reset

An alarm may be reset either by pressing the 'Reset'-key or connecting the input S1 to 12V.

## Alarm inhibit

Ts inhibits alarms during startup; inhibiting alarms after startup may be done by connecting S2 to 12V.

**Ex. 1:** If a short overload is expected a PLC-output or the like may be used to inhibit alarms for a given time.

**Ex. 2:** During normal shut down of the motor alarms may be avoided by inhibiting during shut down. (Or via Parameter P02).

## Choosing limits

Deciding the limits may be done in two ways: Theoretically or by means of the built-in peak detectors;

## Theoretically

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

Md: Torque where alarm should be given.

P2: Corresponding shaft power.

n: Revolutions in rev./min.

P1 = P2 + Po. Po is the idle power of the motor.

## Peak detectors

Let the motor run at normal conditions and read the peak values by means of the arrow keys Now set the max limit above the max peak and the min limit below the min peak.

## Control inputs

S1: Manual/External reset

S2: Alarm inhibit

S3: Not used

The inputs S1, S2, S3 are isolated via opto-couplers and are activated by means of a dc-voltage of 12-30V. The inputs may also be activated from a PLC