

Unipower[®]

PCU d12

Technical information

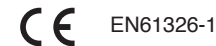
Technical Specifications

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 APM112E)
Cable length: max 50m.
- Consumption**
< 1VA
- Control inputs**
+12-30Vdc
- Analogue output**
4-20mA (Passive)
Supply: +15-30Vdc
Max load (15Vdc): 136Ω
Max load (30Vdc): 818Ω



General

The unit acts as a control/display unit for the Unipower APM112E, to which it is connected with only 2 wires. Although APM112E is a stand alone control module it may be convenient to have a panel mount display. Unipower d12 integrates programmable High and Low trip points 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 may be set in either HP, kW or kW%. An analogue output may be used for SCADA/PLC input or data logging or act as a second alarm output using an external relay.

Software lock.

To avoid accidental change of the settings a software lock is present. To „unlock“ the unit use the 'Mode'-key to select 'Locked' and subsequently use either of the arrow keys to change the display from showing 'On' to showing 'Off'. Now the settings may be altered. When no key has been activated for 1 minute the software lock is automatically reenabled
Note: If the hardware lock is enabled (See paragraph on page 3 for details) the software lock cannot be disabled and settings are all read-only.

Indicators.

The unit is equipped with LED indicators 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.

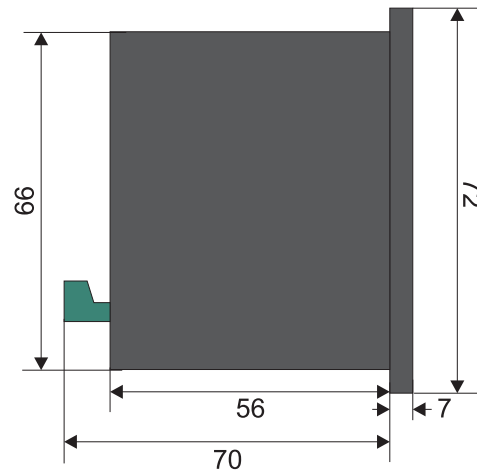
Start-T. Illuminated when the measurement exceeds 5% and is turned off when the start timer expires.

T-Delay. Illuminated when either of the Trip points is exceeded as long as the Trip Delay (Tr) is active. Also the LED corresponding to the Trip point exceeded is lit.

HIGH. *Illuminated* when the High Trip point is exceeded and the Trip Delay timer is not yet expired. *Flashing* when a Trip has occurred on the High Trip point and the relay in APM112E is deactivated.

LOW. *Illuminated* when the Low Trip point is exceeded and the Trip Delay is not yet expired. *Flashing* when a Trip has occurred on the Low Trip point and the relay in APM112E is deactivated.

Dimensions



Connection

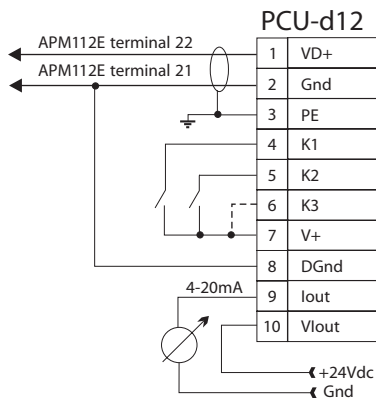


Fig. 2A

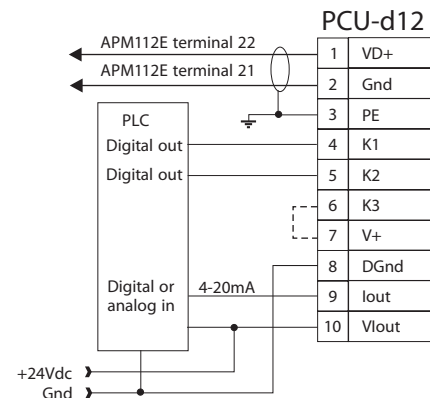


Fig. 2B

Overview

As soon as PCU D12 is connected to APM112E all control functions are taken over by D12 and APM112E acts only as a measuring- and relay unit. Via a two wire connection the power to D12 as well as the kW signal are transferred from APM112E and the control commands are sent back from the D12 on the same two wire connection.

As opposed to most other units in the Unipower family the D12 may be programmed in HP, kW or kW%. The setting up of the unit and its functionality is described in the following.

Programming

PCU D12 is programmed using only 3 keys placed on the front of D12. 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.

Measuring range

In order to use the D12 correctly regarding HP and kW settings there needs to be consistency in the range settings between the D12 and the APM112E. With the 'Mode'-key select 'PRGM' and choose the unit (HP or kW) in which the range

should be entered. Then select 'PWR Max' and enter the desired Power range using the arrow keys to first set the numerical value followed by the 'Mode'-key and finally setting the decimal point using the arrow keys. (If using external CT please see the next paragraph.) Finally - if desired - enter the motor efficiency by selecting 'MTR Eff' with the 'Mode'-key and adjust with the arrow keys. Now the D12 has been set up to display true HP and kW readings and the APM112E needs to be set accordingly. With the 'Mode'-key select 'PTR kW' and adjust the APM112E to the value displayed by means of the 3-digit switch [kW Range/Max Limit]. This way the transferred measurements are converted to the correct HP- and kW-values.

Measuring range ext. CT

To set up the measuring range when using an ext. CT, a simple calculation is necessary, which may be done by the D12:

Enter the desired Power range and Motor efficiency as described in the previous section. Now select the used CT under 'Ext. CT' (Remember always to use an N/5A CT) and the correct setting of the APM112E may be seen when selecting 'PTR kW' with the 'Mode'-key.

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 Start timer, Trip Delay (Tr) and Auto Shut Down.

High Trip point

The High Trip point may be set up in HP, kW or kW% in the range corresponding to 5% to 100% of the measuring range. The High Trip relay is located in the APM112E.

Low Trip point

The Low Trip point may be set up in HP, kW or kW% the same way as the High Trip point. The output is shared with the High Trip, i.e. the relay in the APM112E. At normal motor shut down no alarm is given - i.e. Auto Shut Down is permanently enabled.

Choosing setpoints

Determining the setpoints 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 High Trip above the max peak and the Low Trip below the min peak.

Analogue output

The analogue output serves two purposes:

- 1) 4-20mA proportional to the measurement during normal operation. It will output 4mA at 0% and 20mA at 100% of the measuring range.
- 2) Low (< 1mA) during a trip condition. This may be used as a second remote trip signal. When the trip is reset the output returns to reflect the measured power as described in 1).

Start-T: 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 Trip points and response timers become active.

T-Delay: Trip Delay (Tr)

When a limit is exceeded the corresponding Trip Delay 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

Permanently connecting a wire jumper between terminals 4 and 7 enables the input K1 permanently establishing an Auto Reset function. This will automatically reset any trip condition as soon as the cause of the trip is no longer present.

Manual Reset

An alarm (A Trip condition) may be reset either by pressing the 'Reset'-key or connecting the input K1 to 12V - by a push button for instance.

Trip inhibit

The Start timer inhibits trips during startup; inhibiting trips after startup may be done by connecting K2 to 12V; If a short overload is expected a PLC-output or the like may be used to inhibit trips for a given time.

Hardware lock

To prevent unwanted changes to a running system a hardware lock may be enabled by permanently connecting a wire jumper between terminals 6 and 7. Now all entered settings may be displayed but not altered.

Control inputs

K1: Manual/External reset

K2: Trip inhibit

K3: Hardware lock

The inputs K1, K2, K3 are isolated via optocouplers and are activated by means of a dc-voltage of 12-30V. The inputs may also be activated from a PLC

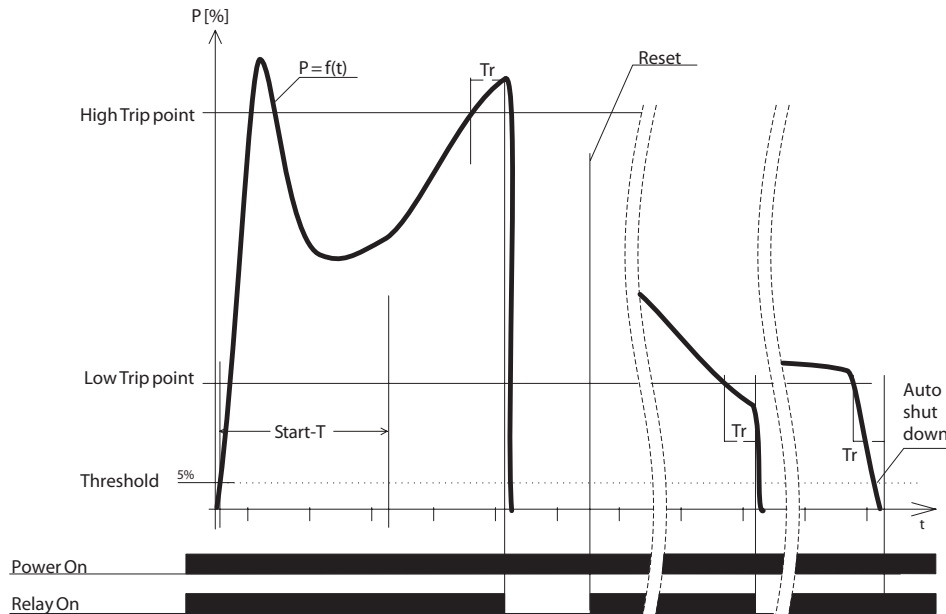


Figure 1