



## Pump Control Module

A00960 – 110V (WITH 1000:1A CT)  
A00973 – 24-48V (WITH 1000:1A CT)  
A01273 – 110V (WITH NO CT)

**Operation Manual**

**Pump Control Module Manual**  
Part number: A00960, A00973, A01273

Revision F  
November 2011

**Copyrights**

All rights reserved. This document may not, in whole or part, be copied, photocopied, reproduced, translated, or reduced to any electronic medium or machine readable form without the express written permission of Bramco Electronics.

**Disclaimer**

Bramco has made every attempt to ensure that the information contained in this document is accurate and complete. Bramco makes no representation or warranties of merchantability or fitness for any particular purpose. Bramco reserves the right to make changes to the system and/or document at any time without notice.

**Bramco Electronics**

2 Callistemon Close,  
Warabrook NSW 2304  
Australia  
[www.bramco.com.au](http://www.bramco.com.au)

Ph: +61 2 4014 4444  
Fax: +61 2 4967 4100  
Email: [sales@bramco.com.au](mailto:sales@bramco.com.au)

# Index

OVERVIEW .....	4
1 <b>PHYSICAL LAYOUT</b> .....	5
2 <b>TERMINAL CONNECTIONS</b> .....	5
3 <b>SETUP MODE</b> .....	6
4 <b>MANUAL MODE</b> .....	6
4.1 <b>MANUAL MODE SETUP</b> .....	7
4.2 <b>MANUAL MODE DETAIL OPERATION &amp; INDICATION</b> .....	7
5. <b>AUTOMATIC MODE</b> .....	8
5.1 <b>AUTOMATIC MODE SETUP</b> .....	8
5.2 <b>AUTOMATIC MODE DETAIL OPERATION &amp; INDICATION</b> .....	8
6 <b>CURRENT LOOP</b> .....	9
7 <b>SETTINGS</b> .....	10
7.1 <b>CURRENT RANGES</b> .....	10
7.2 <b>PAUSE RESPONSE TABLE SWITCH SETTINGS</b> .....	11
7.2.1 <b>CURVE A</b> .....	11
7.2.2 <b>CURVE B</b> .....	11
7.2.3 <b>CURVE C</b> .....	12
7.2.4 <b>CURVE D</b> .....	12
7.2.5 <b>CURVE E</b> .....	12
7.2.6 <b>CURVE F</b> .....	13
7.2.7 <b>CURVE G</b> .....	13
<b>SPECIFICATIONS</b> .....	14
<b>FAULT DIAGNOSIS</b> .....	15
8 <b>FUNCTION</b> .....	15
9 <b>TYPICAL CONNECTIONS</b> .....	16

## OVERVIEW

The Pump Control Module (PCM) provides submersible pump control. This module monitors the current used by the pump and differentiates between load and no load currents. Two modes of operation apply. Manual mode will only switch the pump off and wait for manual switch intervention for starting the pump. Automatic mode will do full control of the pump operation by switching the pump on and off based on the level switch inputs and selected pause timer.

An adaptive control algorithm is used to vary the pause and run cycle times for effective automatic pump control. Long run times will cause a short pause time. Short run times will cause long pause times.

The level control inputs are wired optional using external high and low level contacts.

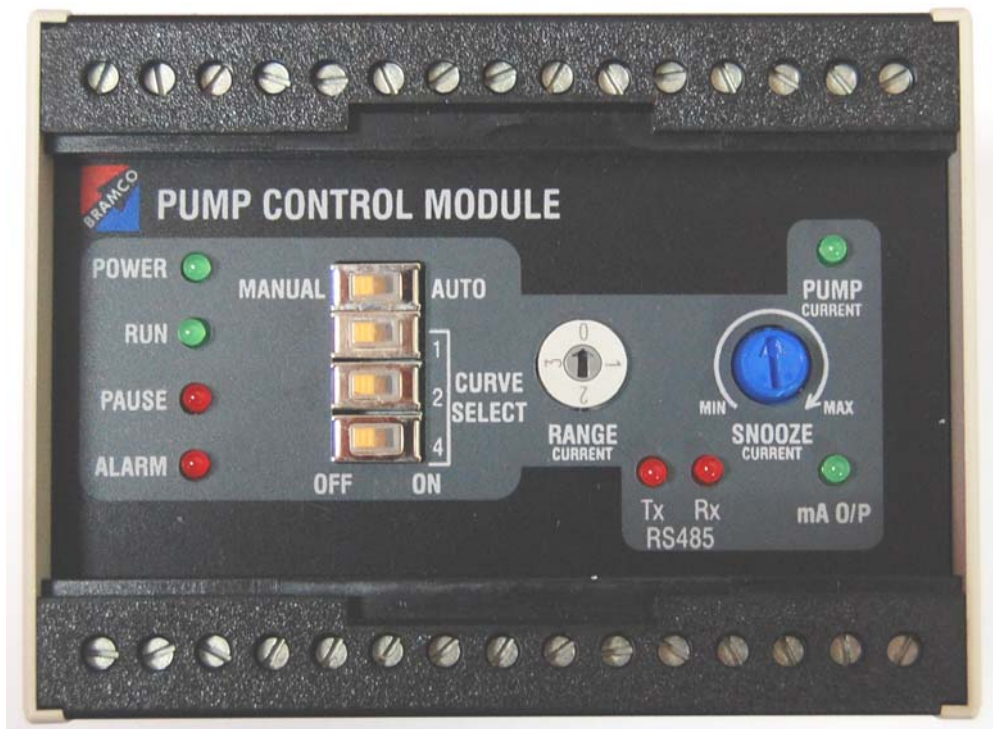


Figure 1 – Front View of Pump Control Module

# 1 Physical Layout

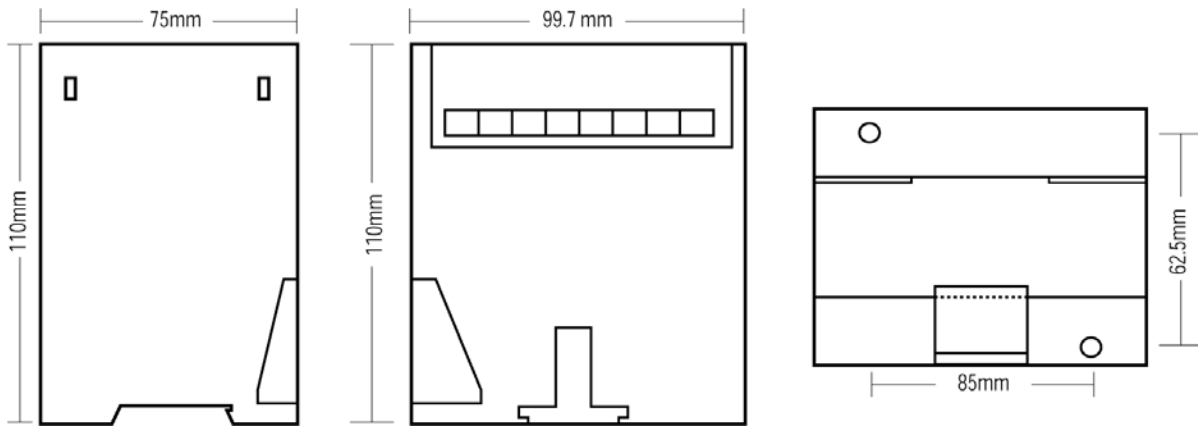


Figure 2 – Enclosure Dimensions

# 2 Terminal Connections

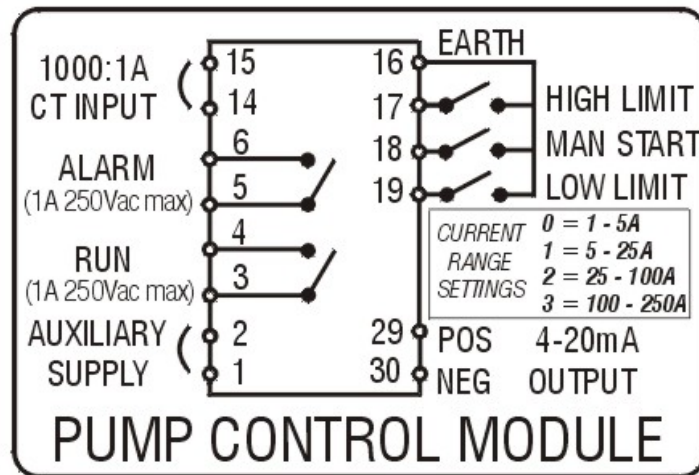


Figure 3 – Side Label showing terminal connections

### 3 Setup Mode

Setup mode is used to adjust the snooze current level. This is the level where if the pump current drops below this level the pump will be stopped to protect it from overheating.

- Connect the PCM with the 1000:1 CT secondary directly into terminal 14 and 15.
- Supply the auxiliary power to terminals 1 and 2.
- Connect the pump run contactor to terminal 3 and 4
- Set the **Manual/Auto switch** to **Manual**
- Set the **curve switch 1,2 and 4** to **ON**
- Set the **current range selector** switch to the appropriate current range
- Adjust the **snooze current** knob **fully clockwise**
- Stop the fluid flow to the pump to be able to get the pump current with no fluid level
- Power the module

With the above settings the module will go into setup mode. This mode is indicated by the RX and TX LED flicker together in 1 second intervals. In this mode the pump will be switched on for 1 minute and then switched off. This time is to set the no load run current level of the pump.

- Turn the **snooze current knob** slowly **anti-clockwise** until the **pump current LED** just **light up**

The module is now **set**.

**NOTE.** If the pump stopped in this mode before the setting is completed, switch the manual/auto switch to auto for 2 seconds and then back to manual. This will restart the pump for another 60 seconds.

### 4 Manual Mode

Manual mode is used on installations where the Pump Control Module does not directly control the operation of the pump. In this mode, the pump will only be **protected, not controlled**.

There are two **monitoring inputs** in this mode.

- The **pump current** that is watched against the snooze current level
- The optionally connected **low fluid level input** contact. This contact must stay open if not used.

The **manual start contact** is used to **run the pump**. This switch is level sensitive. This means that the switch must stay on for the whole time the pump runs. If the switch is moved to the off position (open terminal 18) the pump will stop.

## 4.1 Manual Mode Setup

- Set the **Manual/Auto switch** to **Manual**
- Set the **curve switch 1,2 and 4** to **OFF**

## 4.2 Manual Mode Detail Operation & Indication

When the module is powered in manual mode:

- The **power LED** will come on to show the module is powered
- The **alarm LED** and **alarm relay** will switch on to indicate that the pump is not running.

To start the pump:

- The **start/run switch** must first be opened (stop position) for at least 0.5 seconds and then switched to the run position for the pump to run. This procedure must be repeated every time the pump must be started.

*When the start switch is set:*

- The **alarm LED** as well as the **alarm relay** will switch off
- The **run LED** and **relay** switch on to run the pump
- The **pump current LED** should switch on to indicate pump current load

Conditions that will stop the pump:

- Open the **start/run switch** – switch to stop position
- When the **pump current** is lower than the snooze level current
- When the fluid **low limit switch** close

*When one of these conditions is active the module will:*

- Switch the **alarm LED** as well as the **alarm relay** on
- Switch the **run LED** and **relay** off to stop the pump
- The pump **current LED** should go off to indicate that the power to the pump is off

## 5. Automatic Mode

Automatic mode is used on installations where the pump must be **fully controlled**. The PCM will attempt to start the pump. If PCM senses that there is no fluid to pump, it will switch the pump off for a pause time related to the time that the pump was on.

In addition to this the PCM also monitors two level limit switches. The **high level limit switch** indicates that the fluid level reached a level where the pump must switch on even if the pause time is not finished. The **low level limit switch** indicates that the fluid level reached a level where the pump will run dry soon and must switch off.

There are three **monitoring inputs** in automatic mode.

- The **pump current** that is watched against the snooze current level
- The optionally connected **low fluid level input** contact. This contact must stay open if not used.
- The optionally connected **high fluid level input** contact. This contact must stay open if not used.

The **manual start contact** is not used.

### 5.1 Automatic Mode Setup

- Set the **Manual/Auto switch** to **Auto**
- Set the **curve switch 1,2 and 4** according to **Section 3.2** below

### 5.2 Automatic Mode Detail Operation & Indication

When the **module is powered** in automatic mode:

- The **power LED** will come on to show the module is powered
- The **run LED** and **run relay** will switch on to run the pump

Automatic **start** conditions:

- Power up
- Snooze timer timed out
- The optionally wired high limit switch is closed

**NOTE.** When the pump is started, it will be allowed **20 seconds** to get the fluid flowing. In this time pump motor must start up and reach full load current (pump current above snooze current level).

*Normal run indication:*

- The **run LED** is on indicating the pump is powered
- The **pump current LED** on

Automatic **stop** conditions:

- When the pump current is lower than the snooze level current
- When the fluid low limit switch close

*When one of these conditions is active the module will:*

- Switch the **run LED** and **relay off** to stop the pump
- Switch the **pause LED** on
- The pump **current LED** should go off to indicate that the power to the pump is off

Pause control:

- When the pump was stopped for any reason (controlled by the PCM), the time that the pump was on is used to determine the pause time according to setup tables.
- If the pump was on for less than 60 seconds the longest pause time in the table will be used
- If the pump was on for longer than 60 seconds the next pause time is used and so on till the shortest pause time is selected. From here on if the run time is longer the pause time is fixed on the shortest pause time.
- See tables below

Other indications in Automatic mode:

- When the **two limit switches are both on**, The PCM will go into fixed time mode. In this mode the PCM will switch the pump on for 20 seconds and off for 30 seconds. The **alarm LED and alarm relay** will **toggle** on and off in **1 second** intervals.
- If the **Pump Current LED is off and the High Limit switch is on**, the alarm LED and relay will switch on after 20 seconds of start time. The LED and relay will stay on until the high limit level switch open or the current rises above the snooze current limit during run time.
- If the low level limit switch should go on directly after the pump was started there are a wait time of 10 seconds before the pump will stop.

## **6 Current Loop**

The current loop output (4-20mA) will follow the measured current over the full range where 4mA is the 0A and 20mA the maximum + 2-10% of the ranges full scale.

The current loop operational LED will light up faintly if the current is on at low limit and hard on at full 20mA output.

## 7 Settings

### 7.1 Current ranges

Range Selected	Current
0	1 – 5A
1	5 - 25A
2	25 - 100A
3	100 - 250A

The current range is selected by the miniature rotary switch. The ranges are selected dynamically (As you turn the switch the range change). The ranges above are the only available ranges.

**NOTE.** It is recommended to select a range that enables the current to be set around the centre of the range for ease of adjustment. Both full load and no load currents must be in the range.

## 7.2 Pause response table switch settings

NOTE. Make sure that the switches are set fully to the edges for proper contact.

Curve Select	SW1	SW2	SW4
A	OFF	OFF	OFF
B	ON	OFF	OFF
C	OFF	ON	OFF
D	ON	ON	OFF
E	OFF	OFF	ON
F	ON	OFF	ON
G	OFF	ON	ON
Setup Mode	ON	ON	ON

### 7.2.1 Curve A

*Table is in hours*

Run Time (hr)	Pause Time (hr)
0	12
2	10
4	8
6	6
8	4
10	2

### 7.2.2 Curve B

*Table in minutes*

Run Time (min)	Pause Time (min)
0	20 (20m 0s)
1	17.4 (17m 24s)
2	15.2 (15m 12s)
3	13.2 (13m 12s)
4	11.5 (11m 30s)
5	10 (10m 0s)
6	8.7 (8m 42s)
7	7.6 (7m 36s)
8	6.6 (6m 36s)
9	5.7 (6m 42s)
10	5 (5m 0s)

### 7.2.3 Curve C

Table in minutes

Run Time (min)	Pause Time (min)
0	10 (10m 0s)
1	9.2 (9m 12s)
2	8.7 (8m 42s)
3	8.1 (8m 6s)
4	7.6 (7m 36m)
5	7 (7m 0s)
6	6.6 (6m 36s)
7	6.2 (6m 12s)
8	5.7 (5m 42s)
9	5.4 (5m 24s)
10	5 (5m 0s)

### 7.2.4 Curve D

Table in minutes

Run Time (min)	Pause Time (min)
0	5 (5m 0s)
1	4.6 (4m 36s)
2	4.4 (4m 24s)
3	4.1 (4m 6s)
4	3.8 (3m 48s)
5	3.5 (3m 30s)
6	3.3 (3m 18s)
7	3.1 (3m 6s)
8	2.9 (2m 54s)
9	2.7 (2m 42s)
10	2.5 (2m 30s)

### 7.2.5 Curve E

Table in minutes

Run Time (min)	Pause Time (min)
0	10 (10m 0s)
1	7.6 (7m 36s)
2	5.7 (5m 42s)
3	4.4 (4m 24s)
4	3.3 (3m 18s)
5	2.5 (2m 30s)

7.2.6

**CURVE F**

Table in minutes

Run Time (min)	Pause Time (min)
0	5 (5m 0s)
1	4.4 (4m 24s)
2	3.8 (3m 48s)
3	3.3 (3m 18s)
4	2.9 (2m 54s)
5	2.5 (2m 30s)

**7.2.7 Curve G**

Table in minutes

Run Time (min)	Pause Time (min)
0	2.5 (2m 30s)
1	1.9 (1m 54s)
2	1.4 (1m 24s)
3	1.1 (1m 6s)
4	0.8 (0m 48s)
5	0.6 (0m 36s)

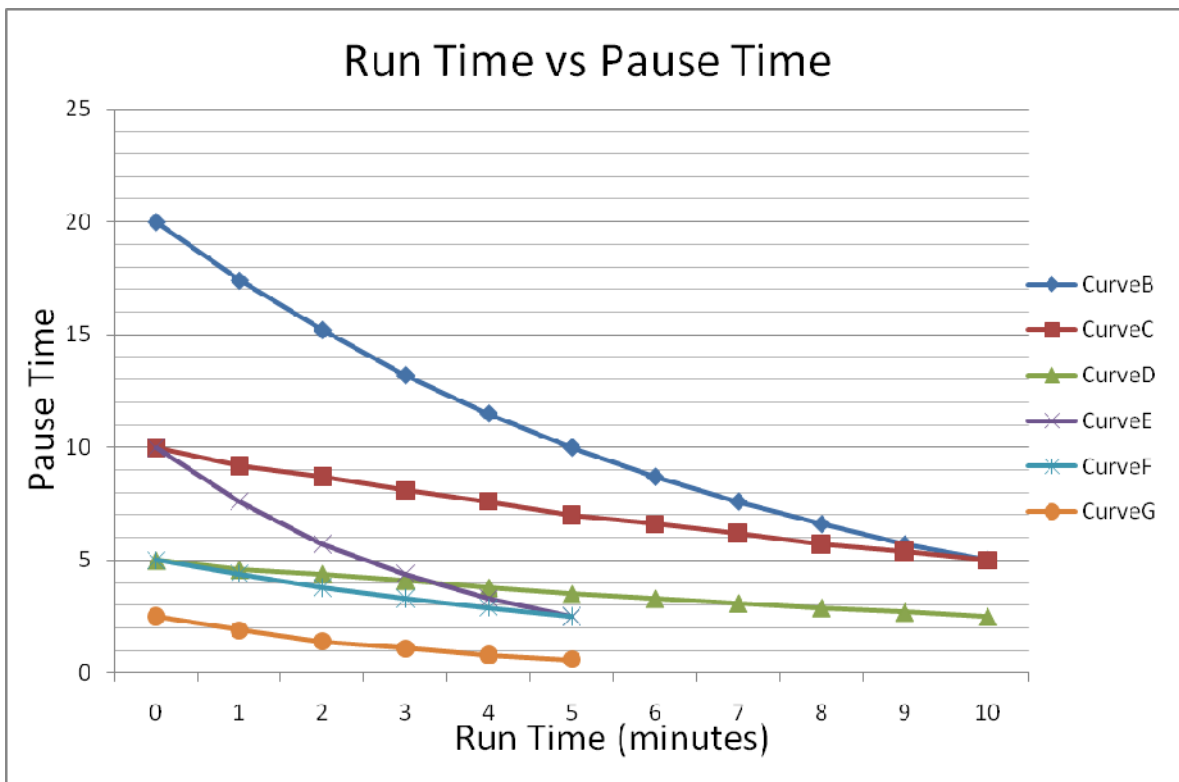


Figure 4 – Run Times vs Pause Times for Automatic Mode (Curve A not shown).

## SPECIFICATIONS

<b>Supply Voltage</b>	A00960 110/240Vac 50/60Hz 3vA A00973 24-48Vac/dc Optional
<b>Motor Current</b>	1-250A using external CT Full range using Bramco 1000:1 special CT
<b>Operating Temp</b>	0-50°C
<b>Relay Function</b>	1 x Changeover set of contacts
<b>Contact ratings</b>	1A 415Vac, 100VA max
<b>Dimensions</b>	100w x 75h x 110d
<b>Material</b>	High impact resistant polycarbonate
<b>Mounting</b>	Din rail and screw mounting
<b>Weight</b>	550g

## Fault Diagnosis

To assist in fault diagnosis, a variety of typical faults are shown, with possible solutions given.

### 8 Function

Indication	Possible condition/suggestion
Power LED is Off	Check the module incoming supply voltage. AC or DC is available?
Alarm LED is On	In manual mode – PCM waiting for start procedure on terminals 16 and 18 In auto mode – the high limit switch is on but pump current does not rise above set point – Check CT connection on terminal 14 and 15 or incorrect snooze current setting or check high limit switch operation.
Alarm LED Flicker	The high and low limit switches are both on. The run relay will cycle on for 20 seconds and off for 30 seconds
Tx and Rx LEDs Flicker	Setup mode is active – switch to auto change the curve select switches as in the description above and set the mode used
Pause LED Flicker	The pause time is finish but the low limit switch is still on
Pump current LED stays Off	Snooze current setting incorrect or CT connections to terminal 14 and 15 open
Current range fixed on range 3	Current range is 0 – 3 and all settings above 3 stays on range 3
Pump does not switch off if low level limit switch come on directly after start	The reaction time of the low level input at start up is 20 seconds to prevent rapid stop and starting of the pump

# 9 Typical Connections

Auto mode does not use the run stop switch.

