



PCM – A00960

PCM – A00973

Pump Control Module
Version 1.0 RevD

Operation Manual

Pump Control Module Manual
Part number: A00960

Version 1.0
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OVERVIEW

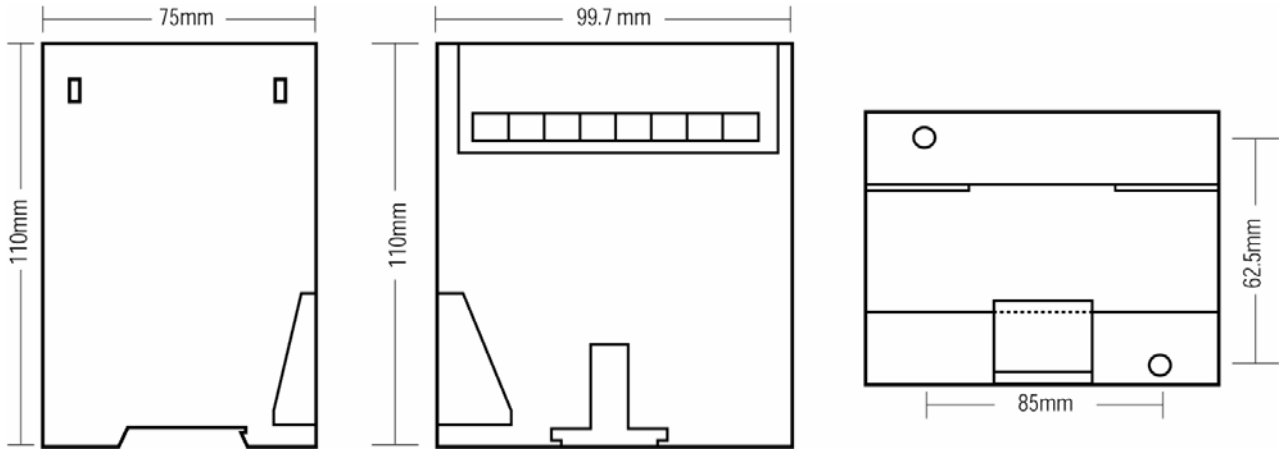
The Pump Control Module (PCM) provides submersible pump control. This module monitors the current used by the pump and differentiates between load and no load currents. Two modes of operation apply. Manual mode will only switch the pump off and wait for manual switch intervention for starting the pump. 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.

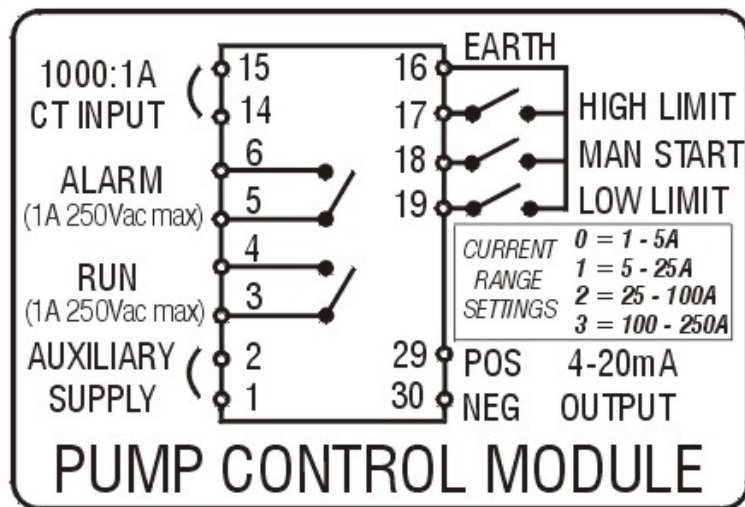
The level control inputs are wired optional using external high and low level contacts.



1 PHYSICAL LAYOUT



2 Terminal Connections



Front View



PCM Operation

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 terminal 1 and 2 depending on the power supply range
- 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 is not allowed to switch on automatically. In this case 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 **pause LED** will switch on to indicate that the pump is not running for 10 seconds
- After the 10 second pause 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 **two limit switches is 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.
- When 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.
- When the **pause time** ran out but the **low limit switch** is on the pause LED will start to flicker.
- If the high level limit switch should go on directly after the pump was stopped there are a wait time of 30 seconds before the pump starts.

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. Any other setting on the rotary switch will select range 3.

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.

4	2	1	CURVE SELECT
OFF	OFF	OFF	A
OFF	OFF	ON	B
OFF	ON	OFF	C
OFF	ON	ON	D
ON	OFF	OFF	E
ON	OFF	ON	F
ON	ON	OFF	G
ON	ON	ON	SETUP MODE

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
1	17.4
2	15.2
3	13.2
4	11.5
5	10
6	8.7
7	7.6
8	6.6
9	5.7
10	5

7.2.3 Curve C

Table in minutes

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

7.2.4 Curve D

Table in minutes

Run Time (min)	Pause Time (min)
0	5
1	4.6
2	4.4
3	4.1
4	3.8
5	3.5
6	3.3
7	3.1
8	2.9
9	2.7
10	2.5

7.2.5 Curve E

Table in minutes

Run Time (min)	Pause Time (min)
0	10
1	7.6
2	5.7
3	4.4
4	3.3
5	2.5

7.2.6 Curve F

Table in minutes

Run Time (min)	Pause Time (min)
0	5
1	4.4
2	3.8
3	3.3
4	2.9
5	2.5

7.2.7 Curve G

Table in minutes

Run Time (min)	Pause Time (min)
0	2.5
1	1.9
2	1.4
3	1.1
4	0.8
5	0.6

SPECIFICATIONS

Supply Voltage	A00960 110/240Vac 50/60Hz 3vA A00973 24-48Vac/dc Optional
Motor Current	1-250A using external CT Full range using Bramco 1000:1 special CT
Operating Temp	0-50°C
Relay Function	1 x Changeover set of contacts
Contact ratings	1A 415Vac, 100VA max
Dimensions	100w x 75h x 110d
Material	High impact resistant polycarbonate
Mounting	Din rail and screw mounting
Weight	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 limit switch come on directly after start	The reaction time of the pump at start up is 20 seconds to allow the pump to overcome obstacles that prevent direct flow of the fluid
Pump does not start directly when high limit switch is applied after stopping	The reaction time of the PCM after stopping is 30 seconds to allow the motor to stop before applying current again

9 Typical Connections

Auto mode does not use the run stop switch.

