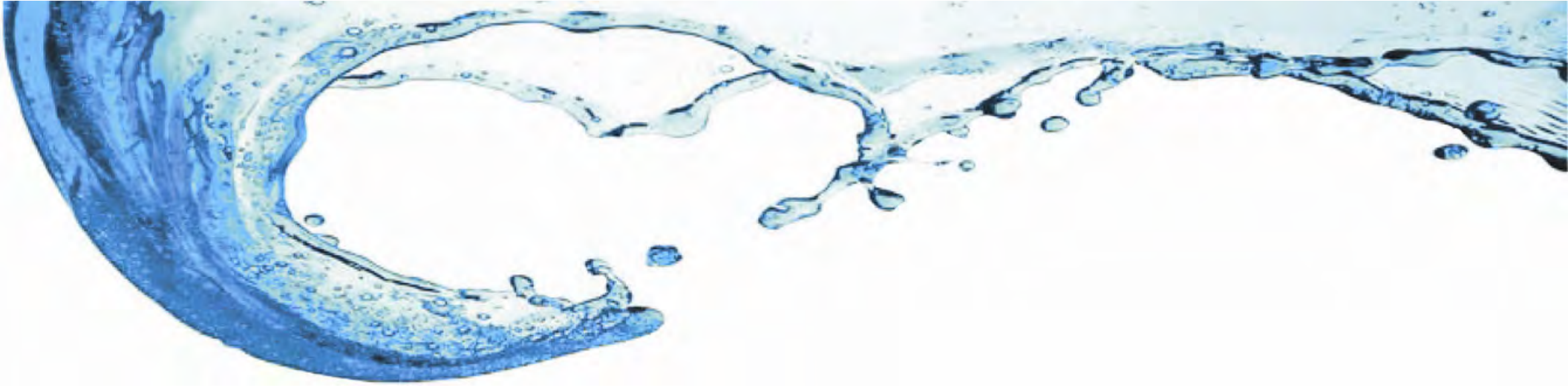


multitrode

WATER • WASTEWATER • PUMP STATION • TECHNOLOGY

MultiSmart iPSM Installation Guide

(Revision 1.1 – 18 Feb 2011)

For setup & configuration of MultiSmart please see the full **Installation and Operations Manual** available on the internet at www.multitrode.com/product-manuals.php

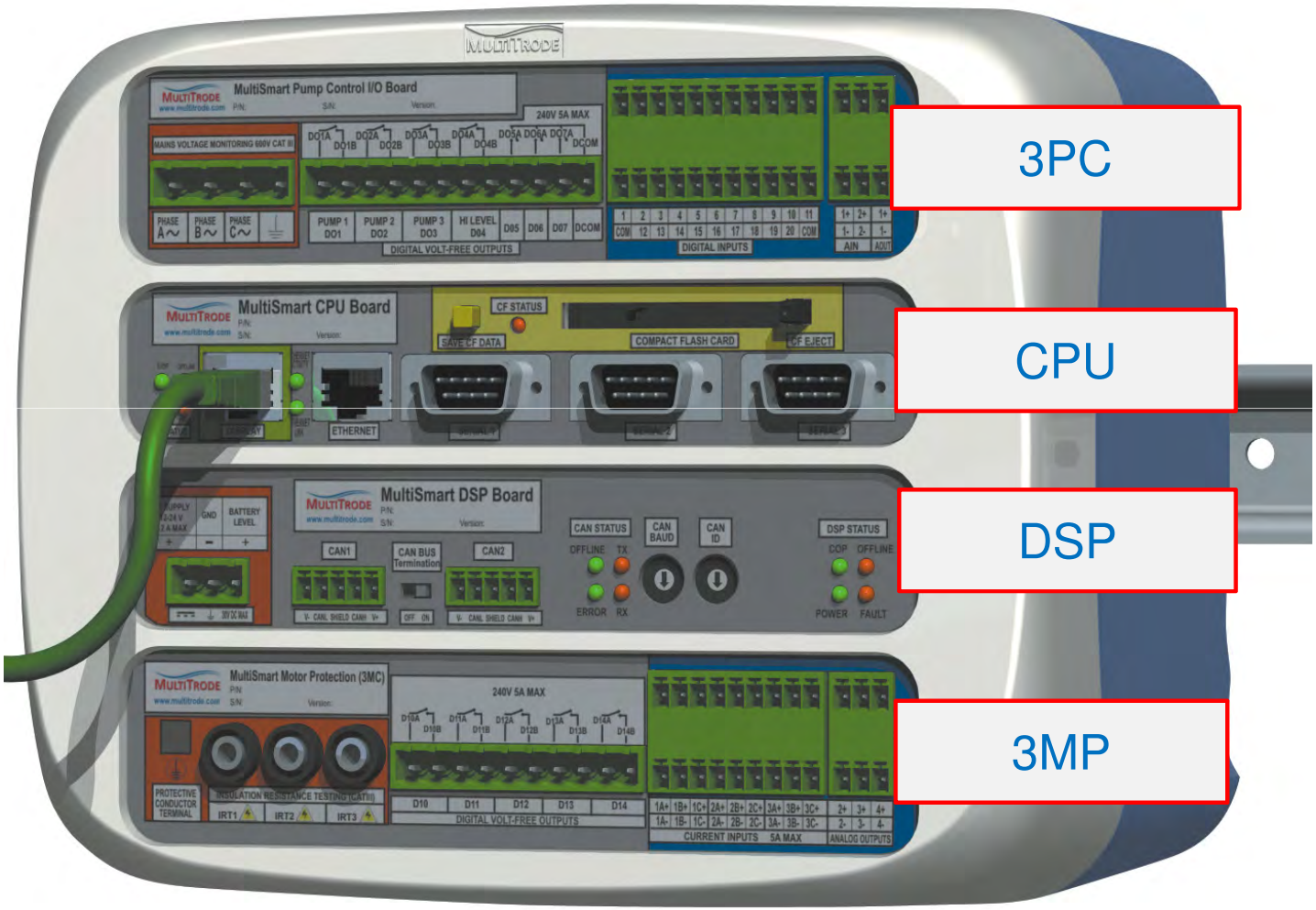
CAUTION: Installer will be liable for any repair costs as a result of damage to MultiSmart because of poor installation practice

PLEASE AVOID THIS - READ PRIOR TO INSTALLATION

MultiSmart Board Descriptions

A MultiSmart comes with up to 4 boards:

- Pump Control / Voltage Monitoring (3PC)
- CPU
- DSP
- Motor Protection (3MP) (This board is optional)



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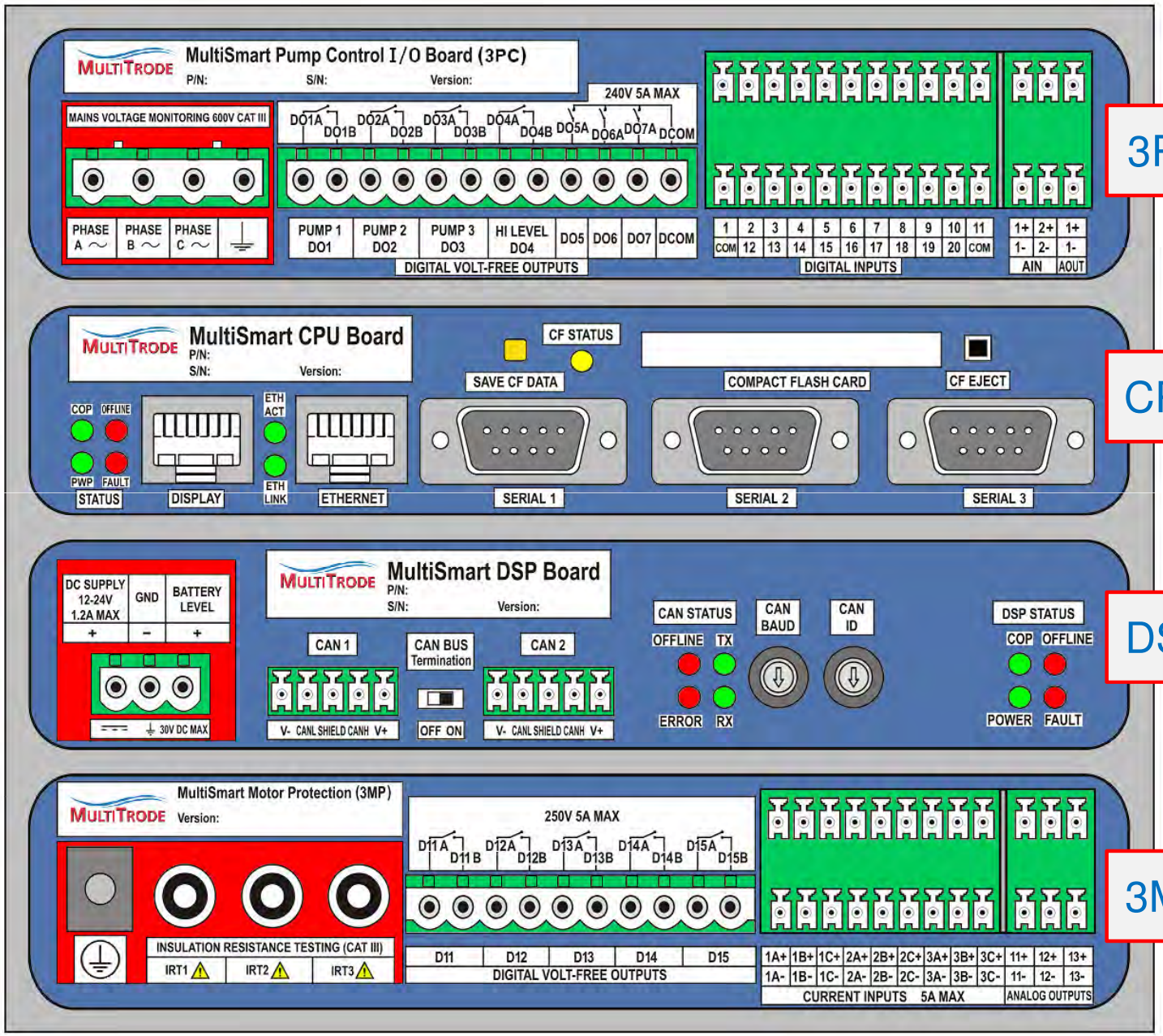
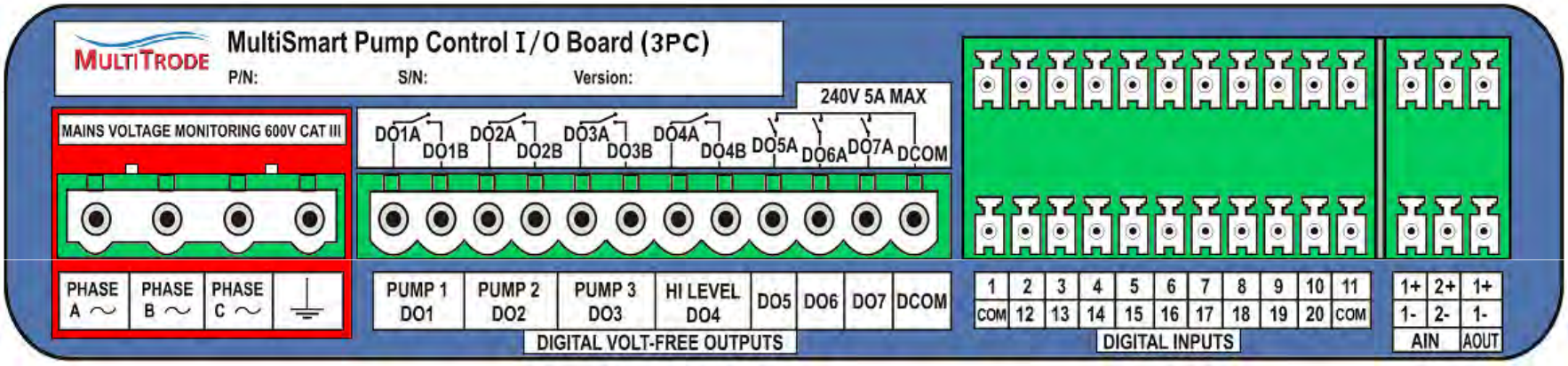


Pump Control I/O Board (3PC)

The Pump Control I/O (3PC) board monitors a single or 3-phase supply and provides digital and analog I/O. Level sensing can be from a MultiTrode probe, ball floats or any 4-20mA sensor.

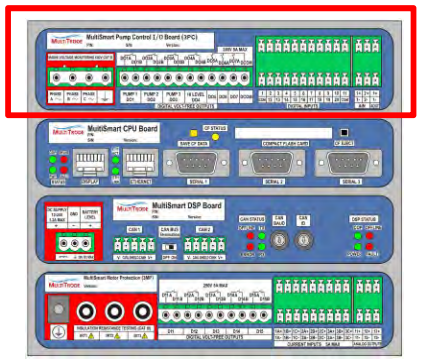


3Ø Voltage Monitoring

Pump Control Outputs Rated at 240V 5A

Probe & Digital Inputs

Analog Inputs / Outputs

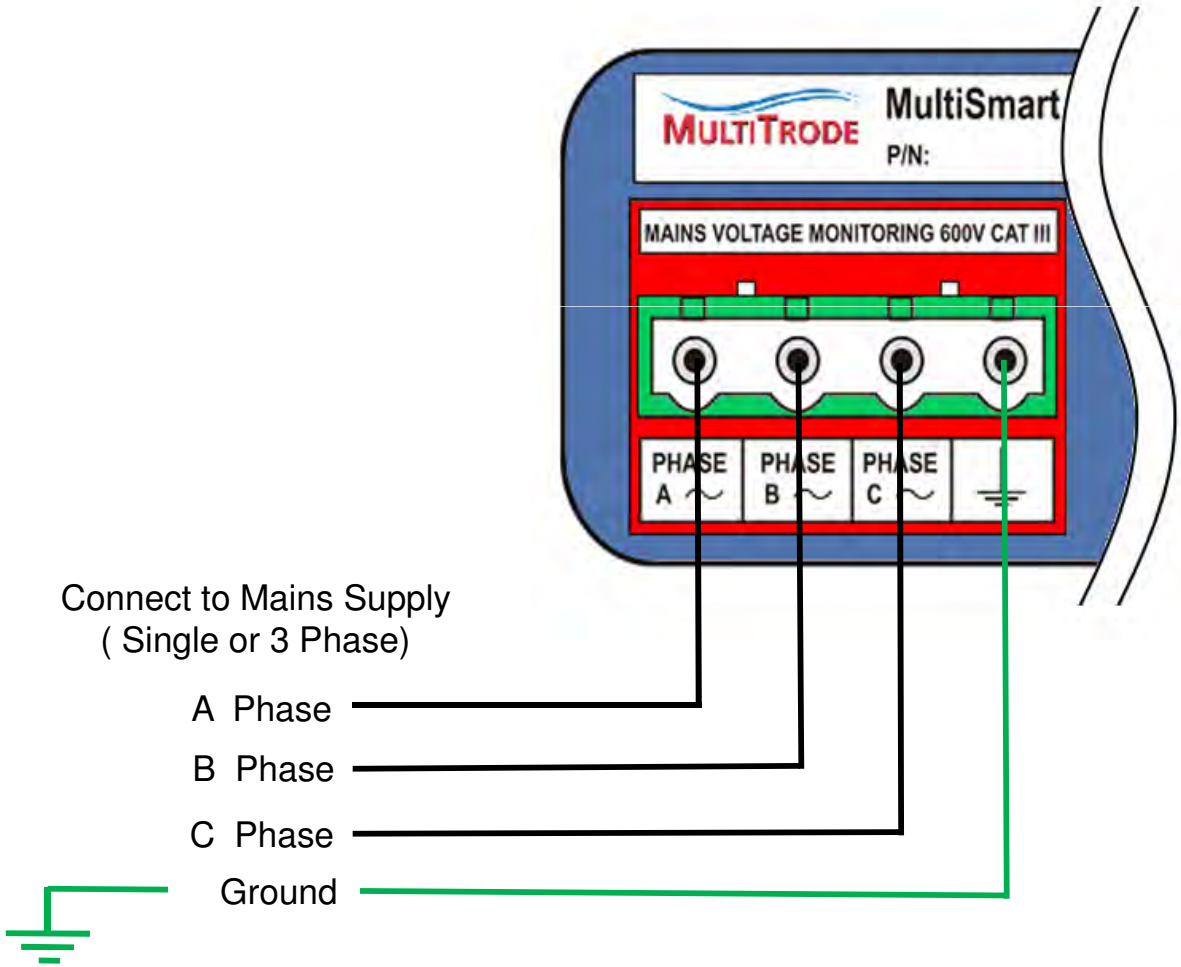


- #1 or “Top” Board
- Also called “3PC” or “I/O” Board

CAUTION: **Do NOT apply voltage to DIGITAL INPUTS connect VOLT FREE contacts ONLY.**

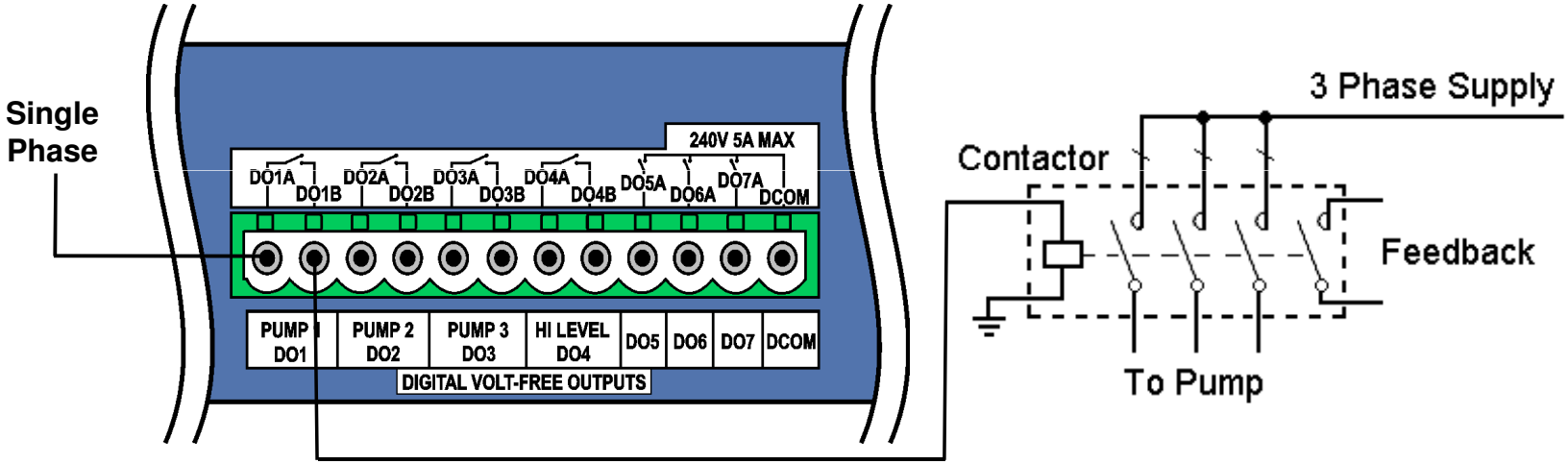
Pump Control I/O Board (3PC)

For voltage monitoring, simply connect the main power supply 3-phase wires directly to the labelled 3-phase inputs on the Pump Control board. (This is not used to power the MultiSmart).



Pump Control I/O Board (3PC)

This board has 7 x voltage free digital outputs available. While some maybe assigned to a particular function during the Setup Wizard or later, the digital outputs remain flexible and can be reassigned at any time. The example below shows the pump run signal connected to a contactor.



Note: Digital outputs 5, 6 and 7 on the 3PC board all share the same external excitation voltage.

CAUTION: **Do NOT exceed the rated voltage & current of the DIGITAL OUTPUTS – 5 amps at 240 VAC.**

Pump Control I/O Board (3PC)

The Pump Control board has two 4-20mA analog inputs for monitoring external sensors or transducers. Below is an example of how to wire a 2-wire transducer on a 4-20mA loop.

- Lead / Signal OUT

+ Lead / Loop Power IN

4-20 mA
Loop

2-wire Pressure Transducer or Ultrasonic
(Requires only (+) DC Power Input)

Loop
Power

\+

—

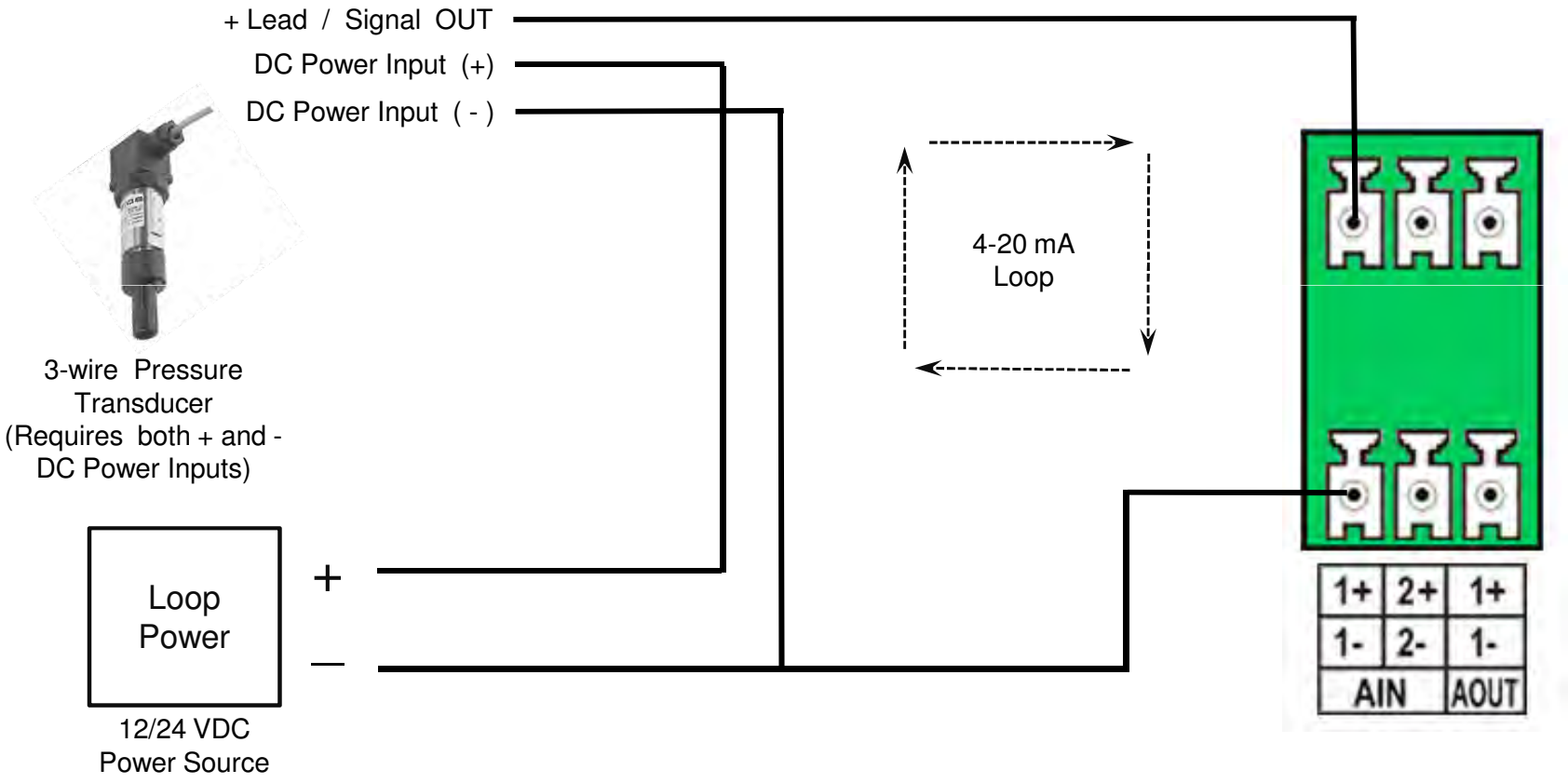
12/24 VDC
Power Source

1+	2+	1+
1-	2-	1-
AIN		AOUT

CAUTION: Do **NOT** connect the (+) from the DC power source directly into the (+) input on the MultiSmart. This will damage the Analog Input and likely cause damage to the entire Pump Control board.

Pump Control I/O Board (3PC)

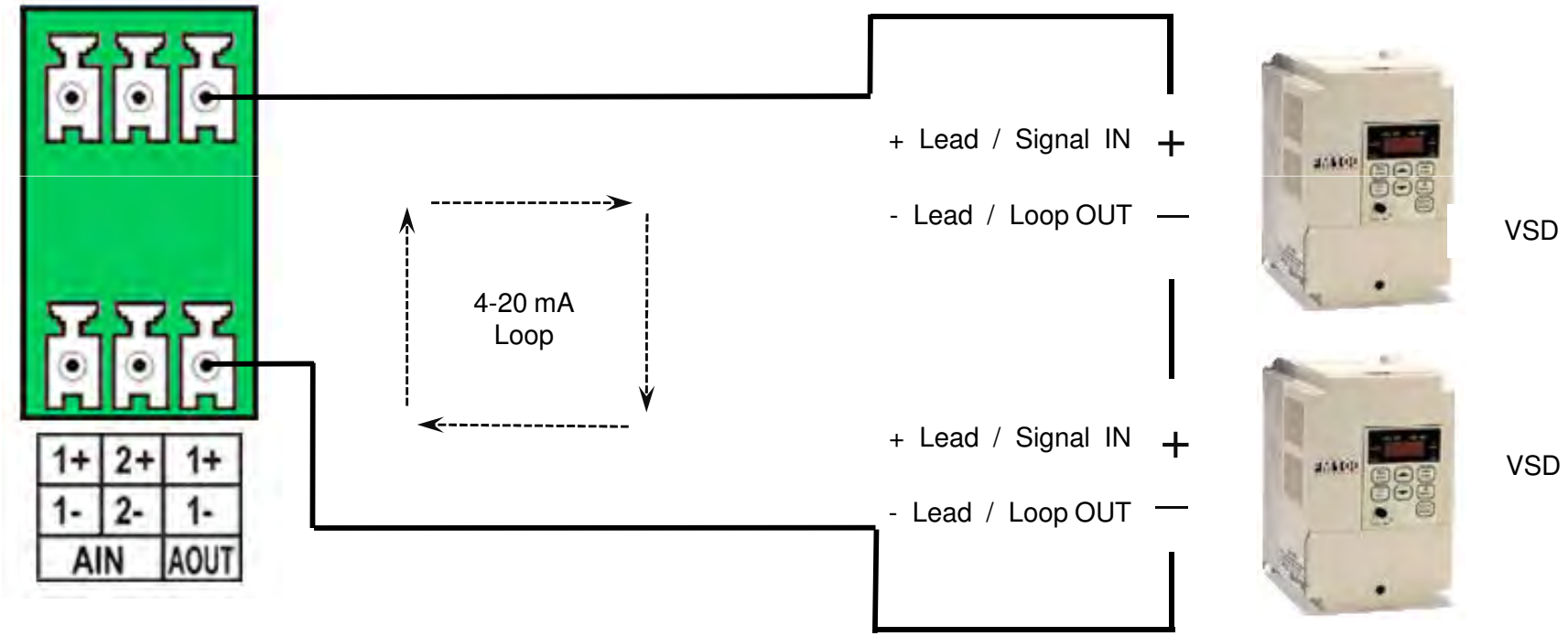
The Pump Control board has two 4-20mA analog inputs for monitoring external sensors or transducers. Below is an example of how to wire a 3-wire transducer on a 4-20mA loop.



CAUTION: Do **NOT** connect the (+) from the DC power source directly into the (+) input on the MultiSmart. This will damage the Analog Input and likely cause damage to the entire Pump Control board.

Pump Control I/O Board (3PC)

The Pump Control board has one 4-20mA analog output that can be used for re-transmitting an analog input value or outputting the VSD control algorithm or producing an analog output value that matches a non-analog sensor such as a probe. Below is an example of how to connect multiple devices to a single analog output.



CAUTION:

Do **NOT** connect an external DC loop power source.
Loop power is supplied by the MultiSmart analog output.
Also do **NOT** connect the Analog output to ground / earth.
Grounding may cause damage to the MultiSmart 3PC board.

Pump Control I/O Board (3PC)

There are many wiring options as the I/O allocation is very flexible and can be easily customised as per the user requirements. The wiring configuration shown is for 1 x Probe and 2 x Pumps, for more setup wizard options including 4-20mA level device see the **Installation and Operations Manual** available on the internet (www.multitrode.com/product-manuals.php).

Default 1A: 10 Sensor Probe + 2 Pumps (Flygt FLS)

Default 1B: 10 Sensor Probe + 2 Pumps (Thermal)

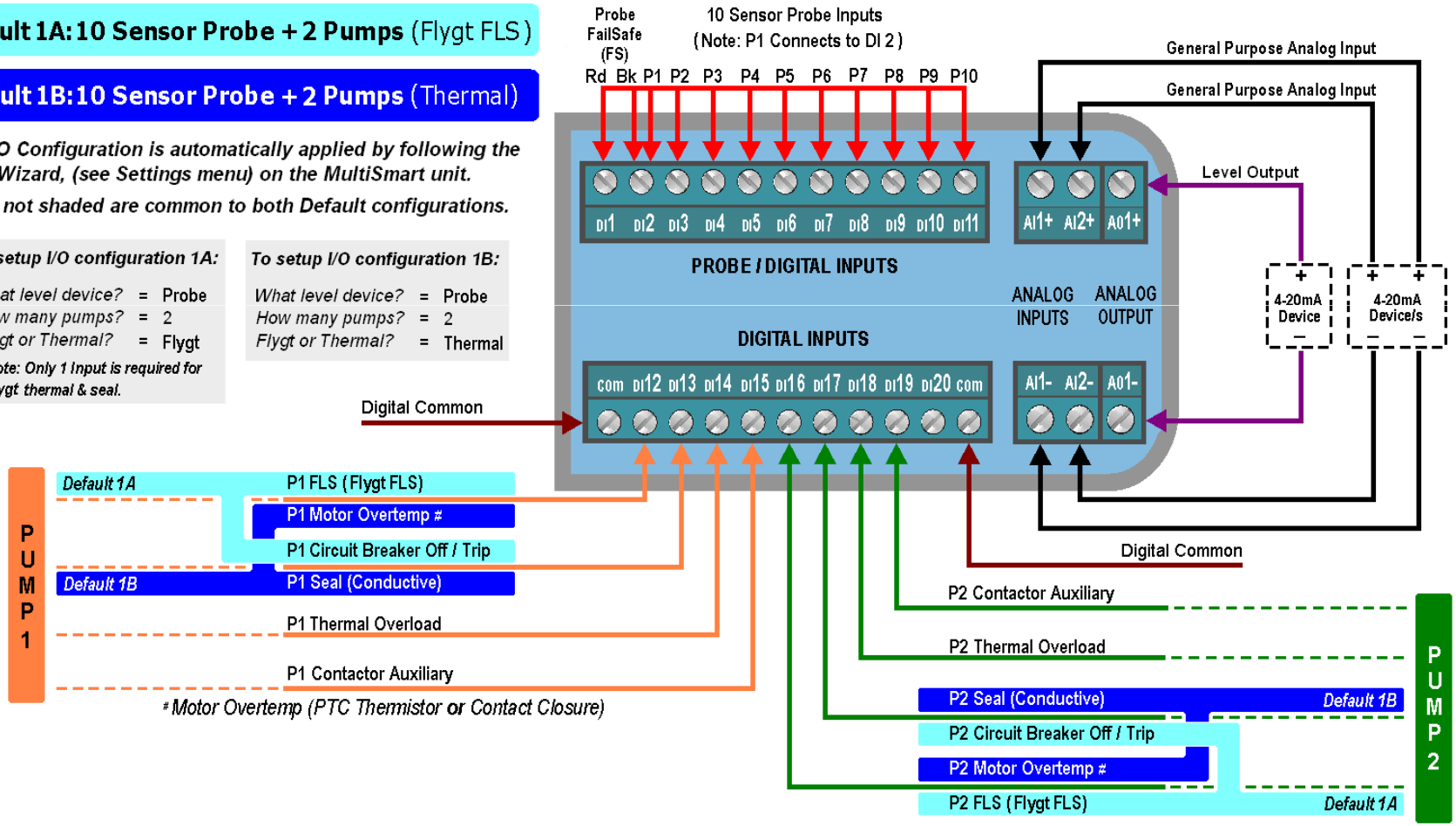
This I/O Configuration is automatically applied by following the Setup Wizard, (see Settings menu) on the MultiSmart unit.

Inputs not shaded are common to both Default configurations.

To setup I/O configuration 1A:		
What level device?	=	Probe
How many pumps?	=	2
Flygt or Thermal?	=	Flygt

Note: Only 1 Input is required for Flygt thermal & seal.

To setup I/O configuration 1B:		
What level device?	=	Probe
How many pumps?	=	2
Flygt or Thermal?	=	Thermal



CAUTION: **Do NOT apply voltage to DIGITAL INPUTS connect VOLT FREE contacts ONLY**

Pump Control I/O Board (3PC)

There are many wiring options as the I/O allocation is very flexible and can be easily customised as per the user requirements. The wiring configuration shown is for 1 x Probe and 3 x Pumps, for more setup wizard options including 4-20mA level device see the **Installation and Operations Manual** available on the internet (www.multitrode.com/product-manuals.php).

Default 2A: 10 Sensor Probe + 3 Pumps (Flygt FLS)

Default 2B: 10 Sensor Probe + 3 Pumps (Thermal)

This I/O Configuration is automatically applied by following the Setup Wizard, (see Settings menu) on the MultiSmart unit.

Inputs not shaded are common to both Default configurations.

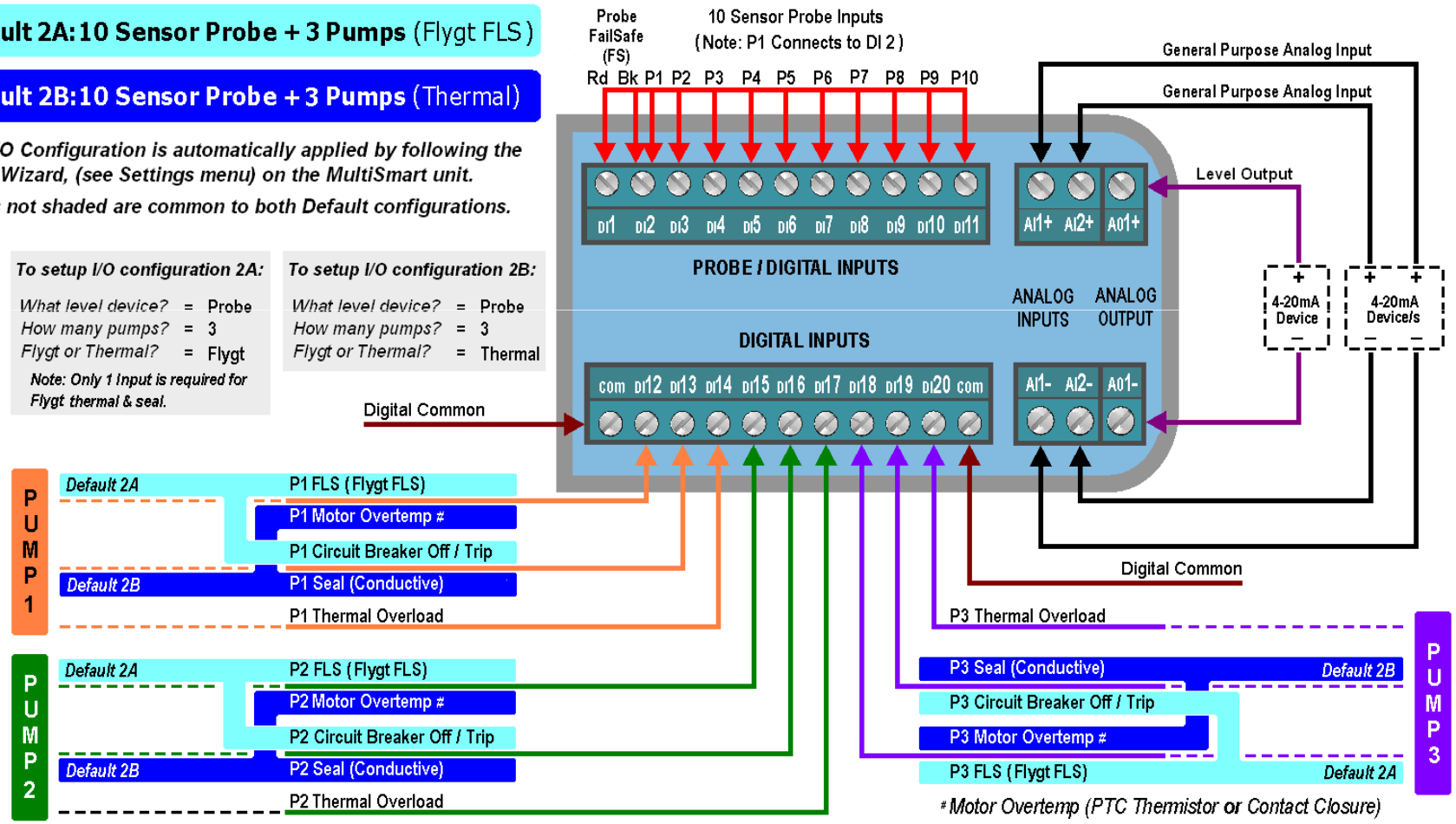
To setup I/O configuration 2A:

What level device?	=	Probe
How many pumps?	=	3
Flygt or Thermal?	=	Flygt

Note: Only 1 Input is required for Flygt thermal & seal.

To setup I/O configuration 2B:

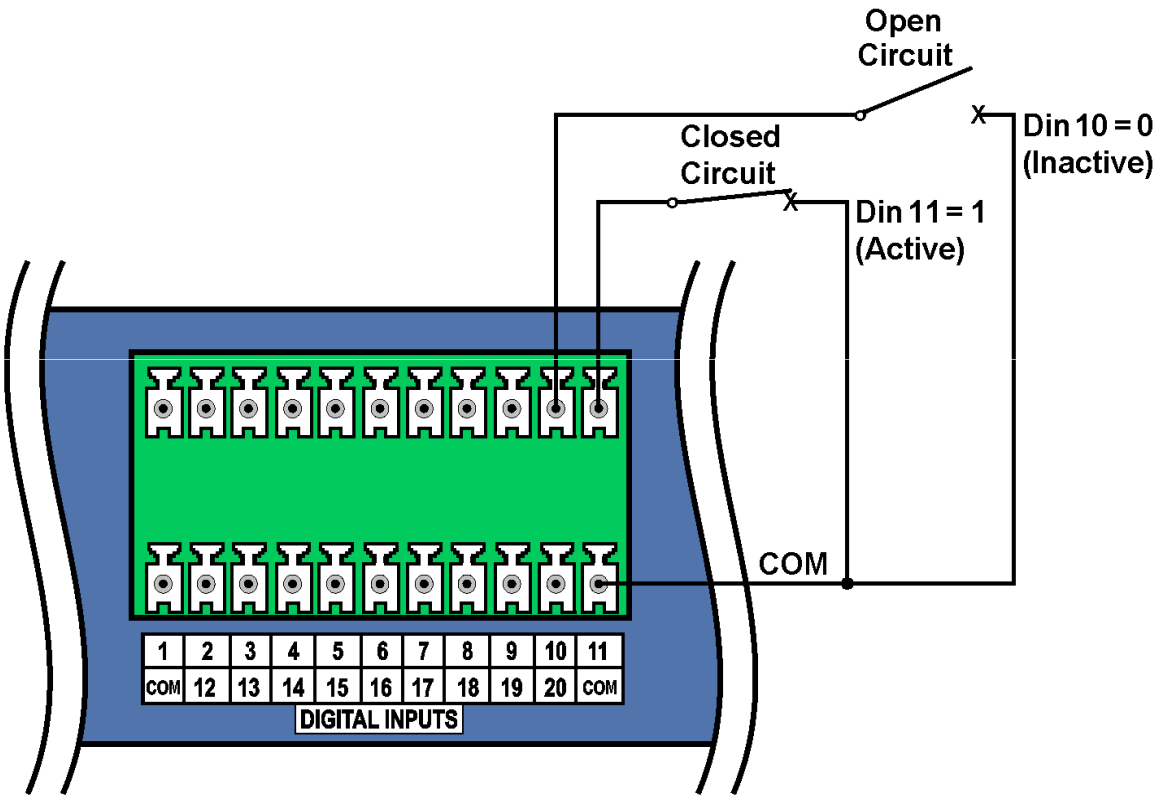
What level device?	=	Probe
How many pumps?	=	3
Flygt or Thermal?	=	Thermal



CAUTION: **Do NOT apply voltage to DIGITAL INPUTS connect VOLT FREE contacts ONLY**

Pump Control I/O Board (3PC)

There are 20 x digital inputs available on the 3PC board. While some maybe assigned to a particular function during the Setup Wizard or later, digital inputs remain flexible and can be reassigned at any time. The digital inputs are volt free so if a voltage is applied it will **DAMAGE** the MultiSmart. The example below illustrates how a common return is used to activate an input.



Note, a digital input "Invert" option allows an open circuit to be the "active" state.

Din #	Mode
1-20	Digital, DC, AC, LSC* (4Hz)
1	Failsafe
16	Flygt CLS
17	Flygt CLS
18	Flygt CLS
19	High Speed Counter (1kHz)
20	High Speed Counter (1kHz)

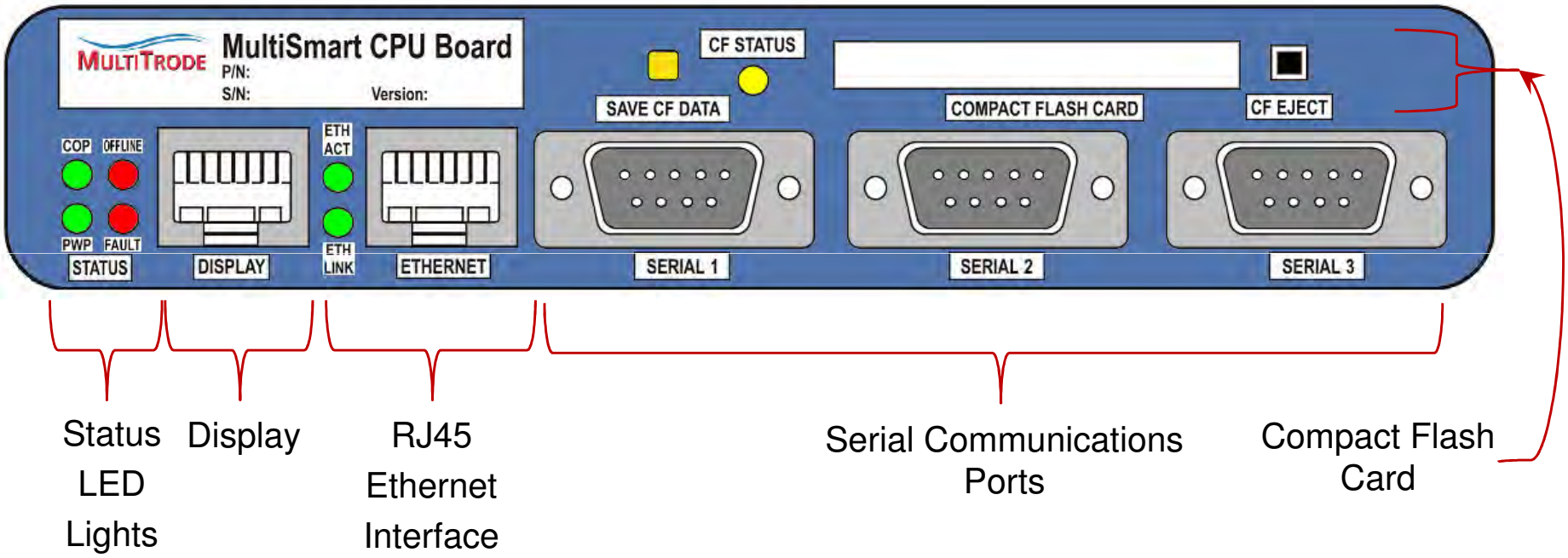
Table 1 – Digital Input Modes

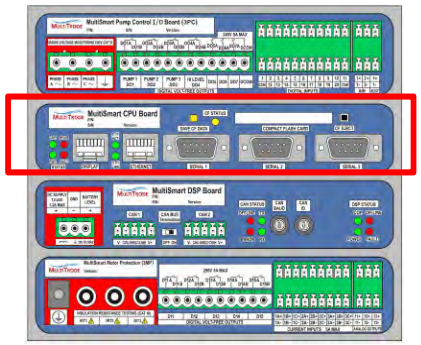
* All inputs have modes Digital, DC, AC and Low Speed Counter (LSC).

CAUTION: **Do NOT apply voltage to DIGITAL INPUTS connect VOLT FREE contacts ONLY**

CPU Board

The CPU board is the core of the MultiSmart Pump Station Manager and provides serial and ethernet communication ports, controls the user interface & has a compact flash card interface.

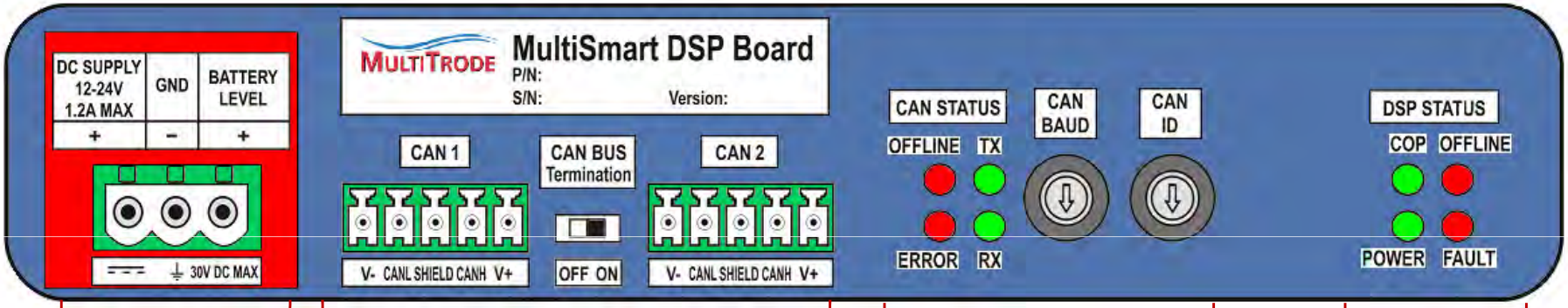




- # 2 or “CPU” Board
- Also called “Comm Board”

DSP Board

The Digital Signal Processor (DSP) board handles the I/O, communicates between multiple I/O modules and is where the DC power supply is connected.

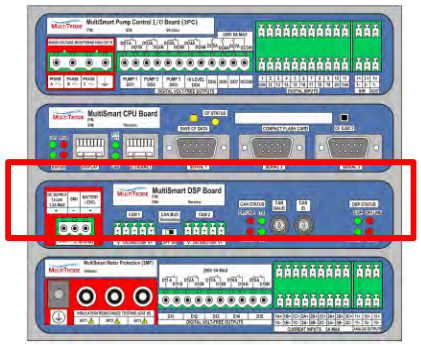


DC Power Supply (12-24VDC)

CAN BUS Wiring Interfaces (For unit to unit comms only)

CAN BUS Control & Status

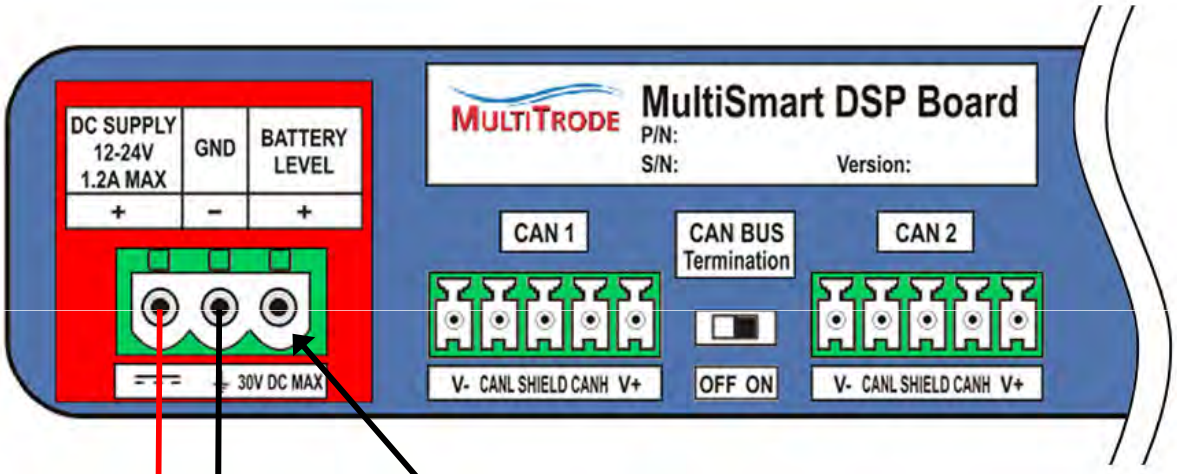
DSP Board Status



- # 3 or “DSP” Board
- Also called “Main Board”

DSP Board

The 12-24VDC power supply is connected into the DSP board as shown below:

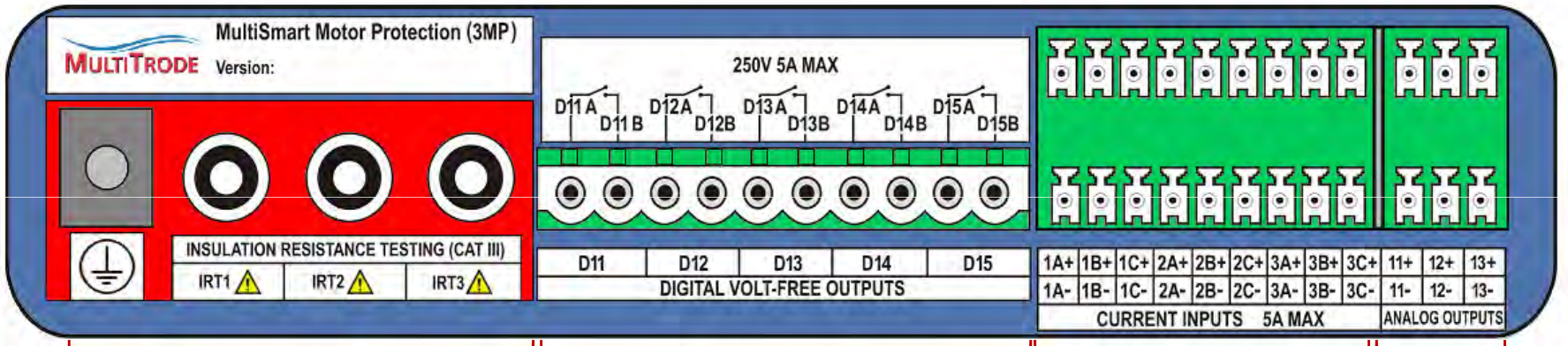


12-24VDC + −

Used to monitor backup battery voltage / charger voltage.
Connect to positive terminal of backup battery.

Motor Protection Board (3MP)

The Motor Protection (3MP) board enables monitoring of single or 3-phase motor currents for up to 3 pumps. It also provides1000VDC insulation resistance testing of motor windings, as well as an additional 5 digital outputs and 3 analog outputs.

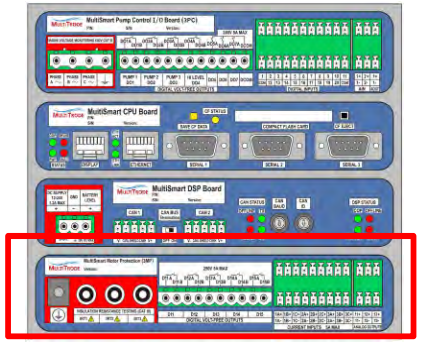


Insulation Resistance Testing (Megger)

5xDigital Outputs Rated at 240V 5A

9xCurrent Inputs

3xAnalog Outputs



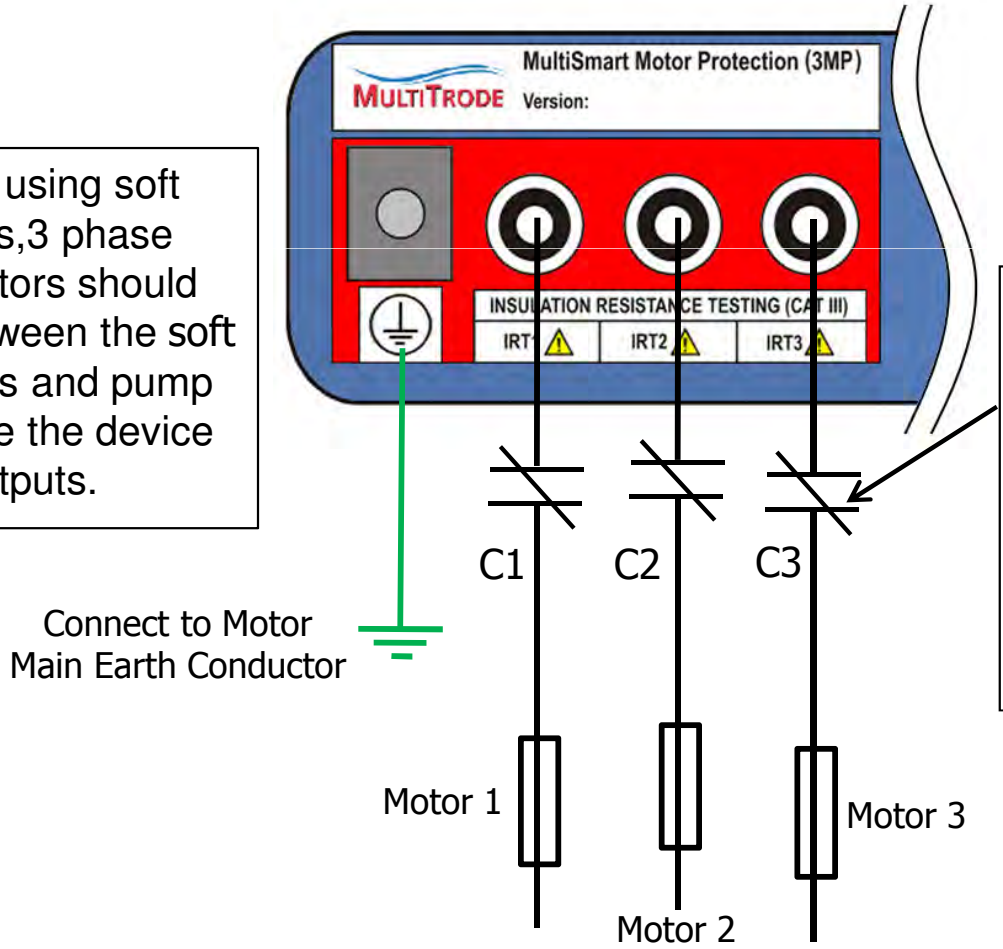
- # 4 or “Bottom” Board
- Also called “Motor Protection Board”

Motor Protection Board (3MP)

IRT "Megger" Testing Interface

The 250/500/1000VDC Insulation Resistance Tester is connected to the pump motor windings and periodically tests them for insulation breakdown.

NOTE 1: When using soft starters or VSDs,3 phase isolation contactors should be installed between the soft starters or VSDs and pump motors to isolate the device from the IRT outputs.

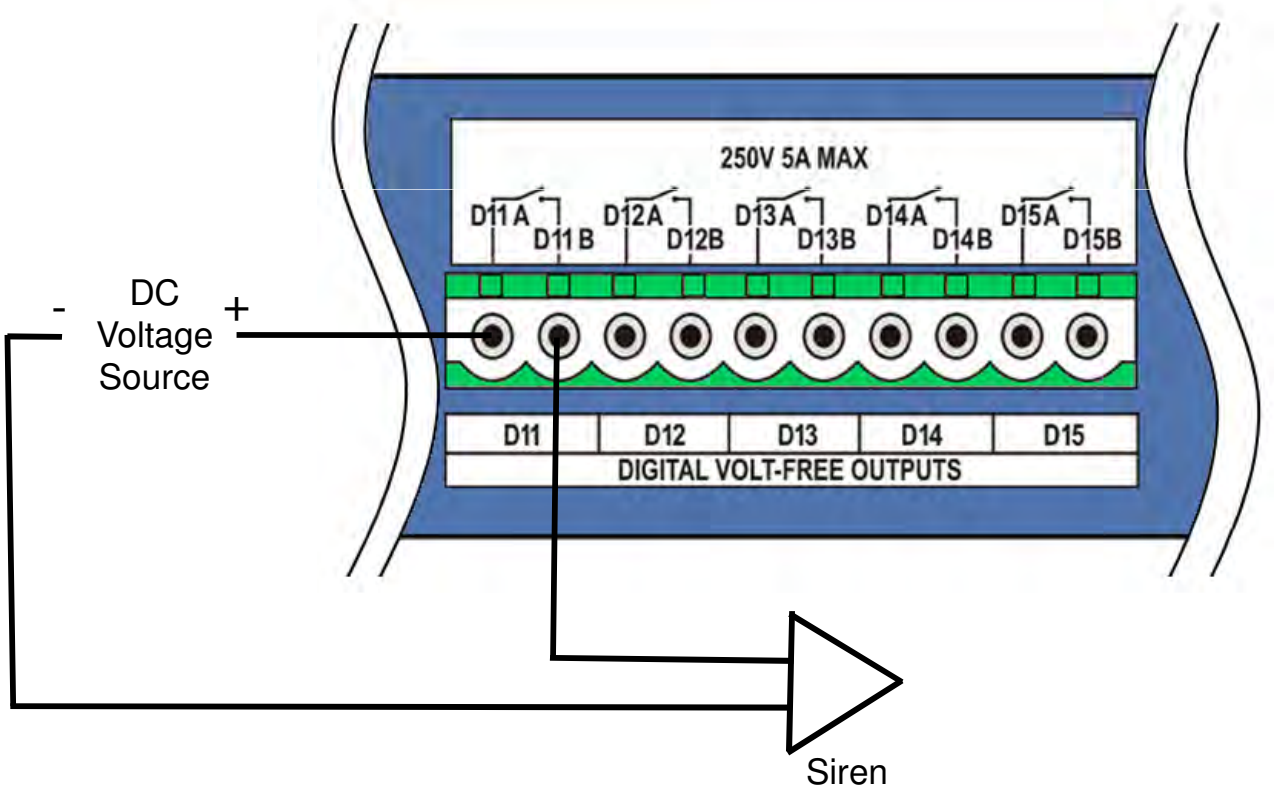


NOTE 2: recommend connecting IRT cable through N/C volt free contact on main pump contactor to prevent voltage coming back on MultiSmart when pump is running, (however this won't damage MultiSmart). This has been identified as best practice.

Motor Protection Board (3MP)

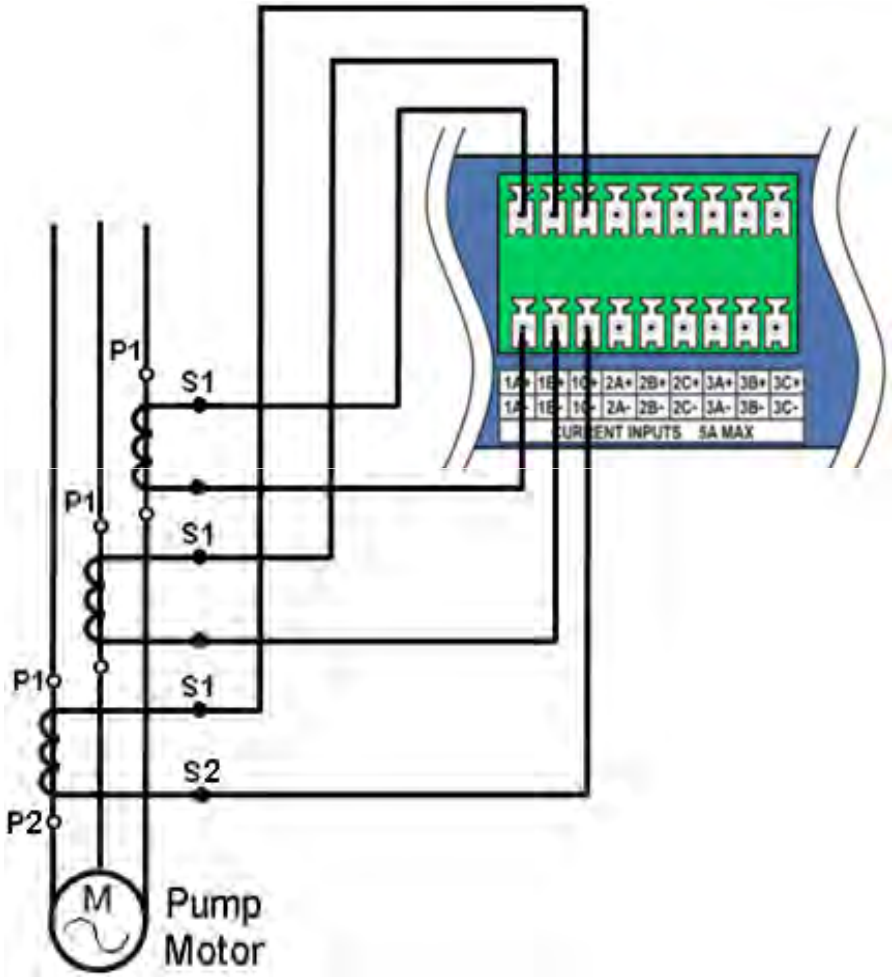
Digital Outputs

The board has 5 x isolated voltage free contact outputs that are rated for 5A at 240VAC. Below are the connections for a DC powered siren used for a high-high level alarm.



Motor Protection Board (3MP)

Current Inputs



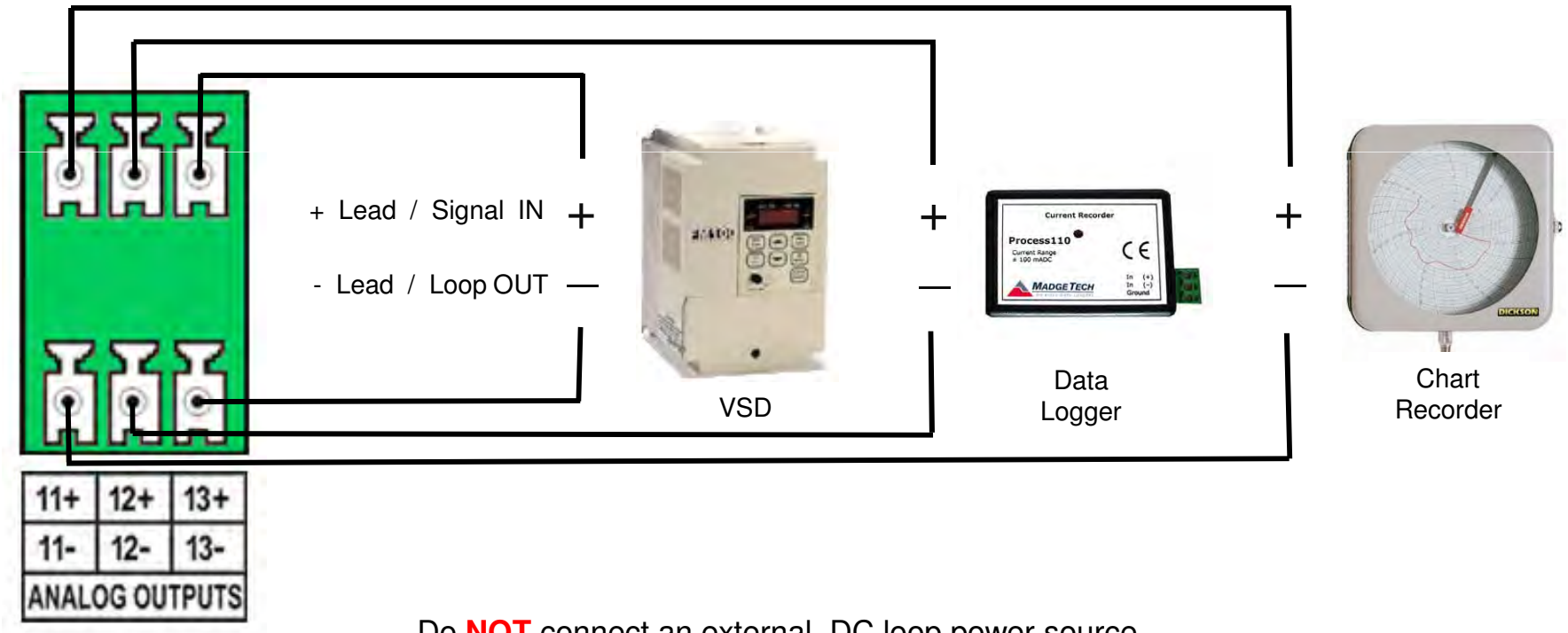
The Energy Monitoring and Motor Protection Board has three sets of three-phase current inputs. These inputs measure between 0-5A and are connected to the secondary of external CTs to measure higher currents. The CTs must be wired with the correct polarity and the current phase sequence must match the voltage phase sequence.

NOTE: CT phase sequences AND polarity (S1 to +ve, S2 to –ve) MUST be correct to ensure energy and efficiency data is displayed correctly.

CAUTION: **CTs must NOT be grounded / earthed / commoned up. Grounding will cause the MultiSmart to experience incorrect current measurements.**

Motor Protection Board (3MP)

The Motor Protection board has 3 x 4-20mA analog outputs that can be used for re-transmitting an analog input value or outputting the VSD control algorithm or producing an analog output value that matches a non-analog sensor such as a probe. Below is an example of how to connect a variety of devices to the 4-20mA analog outputs.



CAUTION:

Do **NOT** connect an external DC loop power source.
Loop power is supplied by the MultiSmart analog output.
Also do **NOT** connect the Analog output to ground / earth.
Grounding might cause damage to the MultiSmart 3MP board.

Setup Wizard

Menu path: Settings → Setup Wizard

This is a function within the MultiSmart that allows the unit to be configured to the user's requirements. A series of questions are displayed (such as station mode and number of pumps used, etc.) from the answers given, a basic configuration is created on the MultiSmart. This includes assigning some digital inputs & outputs and possibly an analog input. (Note, for 4 or more pumps or 2 or more wells, no inputs or outputs are assigned).

Every time the Setup Wizard is run, it deletes the current configuration so to save time it is best to get the basic station configuration correct the first time. The questions displayed during the Setup Wizard are tabled below. The critical or key setup parameters which can only be changed through the Setup Wizard are listed in Table 2 below, the other parameters can be changed through the menus.

Critical Parameters	Options
Station Type	Pump Station, Reservoir, RTU
Station Mode	Fill, Empty
Number of MultiSmarts	1 – 10
Board in Bottom Slot	3PC, 3MP, None
Number of Wells	1 – 3
Number of Pumps	1 – 6

Table 2 – Critical Configuration Parameters

Non-Critical Parameters	Options
Site Key	Yes, No
Units of Measure	US Units (Imperial), Metric
Type of Level Device	Probe, Duo Probe Analog, Remote Level
Flygt or Non-Flygt Pumps	Thermal/Seal, FLS, None
Pump Supply Voltage	208,240,415,480,Custom
DNP3 Address Setup	0 – 65535

Table 3 – Non-Critical Configuration Parameters

Basic Setup Using the Menus

This section summarises how to modify some of the basic MultiSmart I/O using the screen menus.

Digital Outputs

Menu path: Settings → I/O, Faults, & Level → Digital Outputs

To ***view*** a list of the currently assigned and available digital outputs, navigate to **Digital Outputs**.

To ***unassign*** a digital output – from the list of Douts, highlight the require Dout & press **Unassign**.

To **assign** a function to a digital output – from the list of Douts, press **Config**, scroll down and select the required input (or source) for the Dout and press **Select** and **Save**. Up to 3 different sources can be selected and combined using a logical operator (OR, AND or XOR).

Digital Inputs

Menu path: Settings → I/O, Faults, & Level → Digital Inputs

To ***view*** a list of the currently assigned and unassigned digital inputs, navigate to **Digital Inputs**.

To ***unassign*** a digital input – from the list of Dins, press **Faults**, scroll down and highlight the fault associated with the Din, press **Unassign** and **Save**.

To ***assign*** a function to a digital input – from the list of Dins, press **Faults**, scroll down and highlight the required fault and press **Assign**. Now highlight the required Din, press **Select**, **Back** and **Save**.

Basic Setup Using the Menus

Level Device Selection

Menu path: Settings → I/O, Faults, & Level → Level/Control Devices

While a level device is selected during the Setup Wizard, it can be changed at any time to another device and also the units of measure can be changed from the default "%" to m, ft, in, or custom units.

Configuring of an Existing Fault

Menu path: Settings → I/O, Faults, & Level → Faults

To configure a fault, navigate the menus to **Faults.**
Highlight a fault and press **Configure**. From this screen basic fault parameters can be modified, such as the Description, Activation Delay, Pump Unavailable (the actual pump to stop is under **Context**) & Manual Reset Required. Further parameters can be found under the **Actions** button. With only a few exceptions, all faults have this same structure.

Creating a New Fault

Part A: Menu path: Settings → I/O, Faults, & Level → Faults

An existing fault can be modified as described above or one of 10 General Purpose (or custom) faults can be used to create a new fault. From the Faults screen, highlight say "General fault 1" and press **Configure.** At this point basic fault parameters can be modified, as described above.

Part B: Menu path: Settings → I/O, Faults, & Level → Digital Inputs → Faults

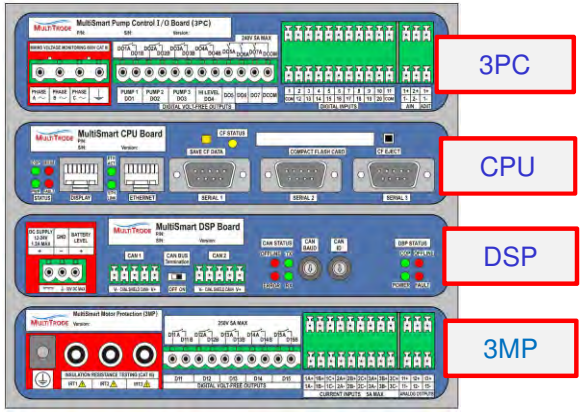
Scroll down & highlight the new fault, press **Assign** and highlight a spare Din & press **Select**, **Back** and **Save**.

MultiSmart Options

The chart below explains how many of each board is included when ordering the various MultiSmart models.

Model	MultiSmart Description	# of Units	Board Types and Quantities			
			3PC	CPU	DSP	3MP
M**3PC**	3 Pump Controller (Basic Unit)	1	1	1	1	-
M**3MP**	3 Pump Controller with Motor Protection	1	1	1	1	1
M**6PC**	6 Pump Controller (Basic with added 3PC board)	1	2	1	1	-
M**6MP**	6 Pump Controller with Motor Protection	2[T]	2	1	2	2

[T] *M**6MP** requires 2 units to support the 7 control boards.*



Further Information

For further setup and configuration information on the MultiSmart intelligent Pump Station Manager, please see the full **Installation and Operations Manual** supplied on the CD enclosed with every MultiSmart and also available from the website.

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