PSM-2 POWER SUPPLY MODULE INSTRUCTIONS

PSM Model 2 equipped with Field Programmable Output Voltages

MODEL PRODUCT OFFERING / VARIATIONS:

- **PSM-2** Metal case housed surface mountable unit
- **MLPSM-2** PSM in a standard ModuLogger plastic frame
- **MLBATT-PSM2** a PSM incorporated into the ModuLogger ML-Batt battery pack. (Includes the 6 alkaline D-Cells normally contained in the ML-Batt Module.)
- **PSM2-PP** a stand-alone portable power source including a PSM with batteries. Fully enclosed in plastic and metal housing.

OVERVIEW:

This instruction sheet applies to the PSM-2, MLPSM-2, MLBATT-PSM2 and PSM2-PP Power Supply Modules. Reference is made collectively to these models as "PSM". Instructions particular to a model specify the full Model Number.

Note: if the Serial Number noted on the side label of the PSM ends with an X, this unit has custom settings (typically special output voltages). Contact the factory with questions.

The PSM-2 provides two Voltage Outputs: a field Programmable Output (10, 15 or 24 Vdc) and a 5Vdc Fixed Output. These supply voltages are generated from a battery input via the provided pigtail and in-line connector or from another external DC source connected to the PSM terminal strip "External Input" terminals. (Note: Energy efficiency with a supply via the pigtail is approximately 20% more efficient than via the External Input route, however in all but the most demanding applications, this advantage in efficiency won't result in a recognizable difference in performance.) The PSM is typically used to power transducers and or loop transmitters so that their outputs can then be logged by an associated data logger. The PSM outputs can be cycled ON/OFF via a Control Input connection which typically is connected to a data logger digital (0/5Vdc) output. In this way, the power to the sensor can be turned on momentarily, the sensor output sampled by the data logger, then the power can be cycled OFF until the next reading is due... thereby conserving battery energy. In the OFF state, the PSM draws extremely low current (apx 300 uA).

The PSM outputs are protected against and can withstand continual shorts and overloads however for normal reliable voltage regulation and lifetime, utilize the chart below to size loads connected to the PSM.

Programmable Output Voltage Setting	Maximum Fixed (+5Vdc) Output Current	Maximum Total Current (Programmable Output current plus the +5Vdc Output current)
24	21mA	60 mA
15	40mA	100 mA
10	80mA	150 mA

Table 1: PSM Output Current Capacities

Example 1; with the PSM Programmable output set to 15 Vdc, and no load connected to the +5Vdc (fixed) Output, a maximum current of 40mA can be continuously supplied.

Example 2: with the PSM Programmable output set to 24Vdc and no load applied to the Programmable Output, up to 21mA can be continuously supplied by the +5Vdc Fixed Output Supply. (note that in this case

since no current is required from the 24 Vdc supply, change the output of the Programmable Supply to 10Vdc and then 80mA of current will be available from the Fixed +5Vdc supply).

Example 3: with the PSM Programmable Output supply set to 15Vdc and four 4 to 20mA loops being powered for a worst case current draw of 80mA (4 x 20mA), only 20mA should be drawn from the +5Vdc Fixed Power Supply output.

> *Note that the above examples assume that the current will be drawn continuously. Cycled outputs can exceed these guidelines. Contact the factory for guidance for your specific application.*

The External and Pigtail Inputs are protected from inadvertent reverse polarity connection. The pigtail input uses a polarized connector and color-coded leads (red is positive) and mates with the Logic Beach data logging products battery pigtail.

ELECTRICAL CONFIGURATION:

Prior to the installation of the PSM, the unit should be configured for desired electrical operation. Two parameters must be jumper configured on the PSM2 (Ref Figure 7):

1. Control Signal Logic - The PSM outputs can be controlled (ie cycled ON/OFF) under control of a digital signal (0/5 Vdc signal) into the Control Input terminals. This feature allows for conservation of battery energy by only applying power to the sensors to be excited just prior to and during a reading of the sensor outputs. Refer to the Terminal Strip Connections section of these instructions for wiring details.

On PSM's with Serial Numbers greater than 99150a, this Control Signal can be configured in the field for two modes of operation:

A) Turn ON with a HIGH (ie greater than 3.0 Vdc) Control Signal input (factory default)
B) Turn ON with a LOW (ie less than 0.5Vdc) Control Signal input

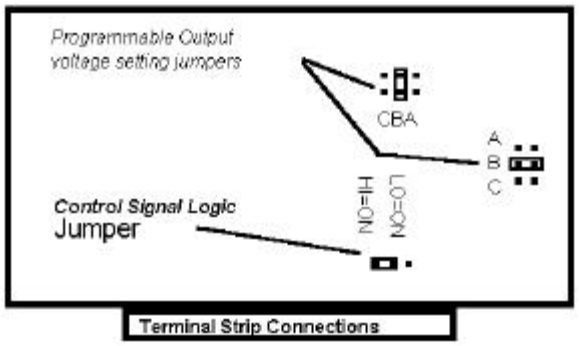
This Turn ON logic is determined by the position of a Logic Jumper located on the circuit board (Figure 7). Markings on the circuit board indicate which two of the three pins to short together for the desired operation. The jumper may be located on either side of the circuit board depending on the model of PSM. *Note that the jumper must be installed in one of the two positions to operate.*

If cycled operation is not desired, the PSM outputs can be forced to a continuous ON state by setting the Logic Jumper to LO=ON and wiring a jumper between the Control Input terminal and one of the four Common Ground terminals (which will hold the Control Input LO).

2. Programmable Output Voltage Setting - Two output supplies are available on the PSM. One is fixed standard at 5Vdc and the other can be field configured for one of 3 output voltage settings... 10Vdc, 15Vdc (factory default jumper setting) or 24Vdc. Two different 3 position (A-B-C) jumpers determine the setting of this field programmable output voltage. Note that jumpers may be located on either side of the circuit board depending on the model of PSM. (see Figure 7 for jumper locations). The positions are marked on the circuit board with letters A, B, and C.

Note: Two sets of pins labelled A-B-C exist on the PCB. Both jumpers must be installed on the same letter pins for proper operation.

To configure the output voltage for a specific voltage, set both jumpers per the following table:



Output Voltage	Jumper Setting
10 Vdc	A-A
15 Vdc	B-B
24 Vdc	C-C

Figure 7: PSM Jumper locations

HARDWARE INSTALLATION:

PSM-2 Model Installation:

This model of the PSM is supplied in an anodized aluminum housing and is designed to be mounted to a surface in a relatively protected environment. It is not weatherproof. On each of the mounting tabs, a 6-32 insert is provided allowing for mounting to a plate or housing via 6-32 machine screws inserted from the outside. Additionally, each tab has two 1/8" dia holes allowing for riveting or other screw fastening to a surface.

The unit can be held in place while marks are made on the mounting surface through the threaded inserts. The unit can then be moved aside and clearance holes (9/64" or 5/32") drilled for a 6-32 machine screw. (Figure 1)

Pigtail Connection: If a 6 to 10 Vdc input is available (typically six series alkaline C or D-Cells) the slightly more efficient Pigtail input can be used for power supply to the PSM. Note that the voltage must be within the 6 to 10Vdc range for operation. The red wire is positive.

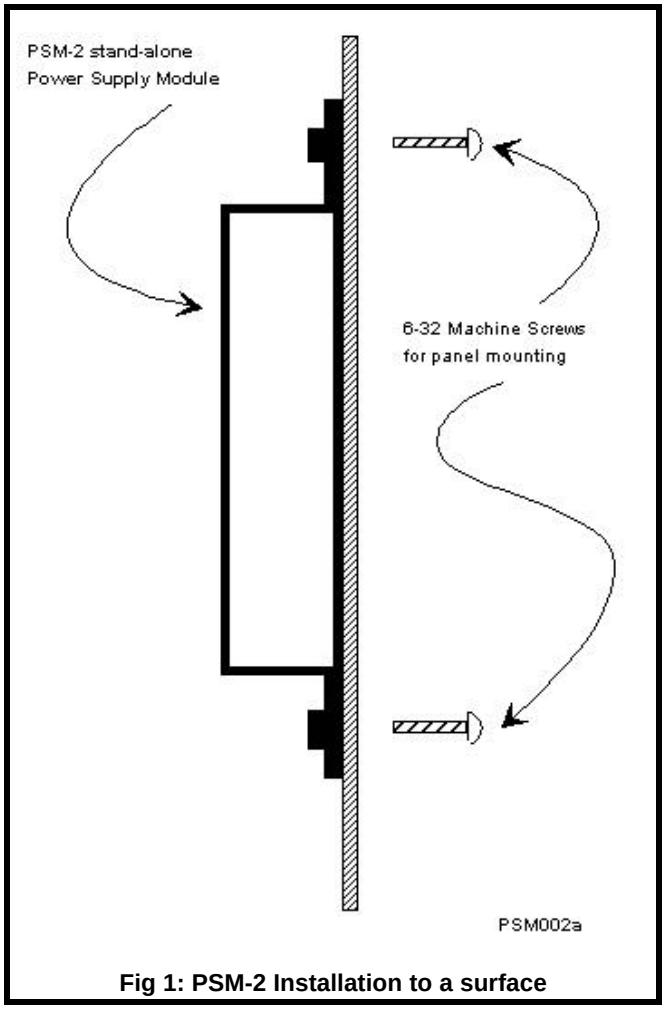


Fig 1: PSM-2 Installation to a surface

MLBATT-PSM2 Model Installation:

This model of the PSM is designed to be installed into a ModuLogger or ModuLogger "Mini" data logging system that currently *does not have the ML-BATT battery pack option installed*. Six alkaline D-cells are an integral part of this PSM model. If the ML-BATT battery pack module is already installed in the logger, a MLPSM-2 module should be installed instead of the MLBATT-PSM2 (see MLPSM-2 Installation below). As supplied from the factory, the MLBATT-PSM2 consists of the power supply circuit board connected to six D-cells via the pigtail and in-line connector.

To install the MLBATT-PSM2 into a ModuLogger (Figure 2), remove the bottom metal plate from the ModuLogger stack by removing (and saving) the four black screws on the side of the ModuLogger. This will expose the ML-CPU printed circuit board and its attached short pigtail with an in-line connector. Plug the connector on the ML-CPU and the mating connector on the PSM together, install the supplied foam pad on top of the batteries (route the pigtail through a cut in the foam)

and install the PSM into the stack. Some pressure will be required to compress the foam slightly while the side screws are re-installed.

With the system wired via the pigtails as described above, the current from the batteries flows via the battery pigtail to the PSM (powering it) then out of the PSM and into the ML-CPU board pigtail... providing power for the logger.

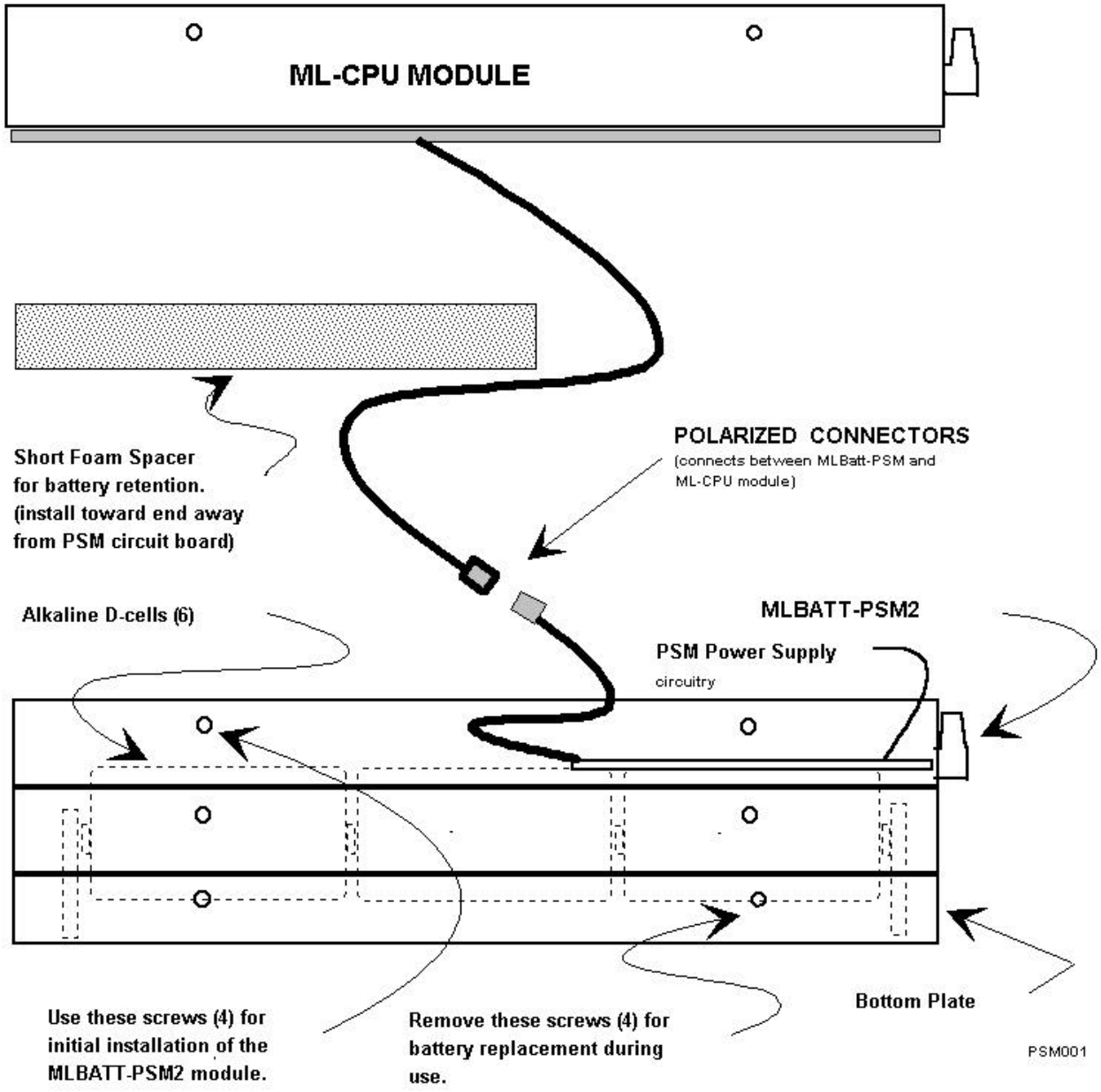


Fig 2: Installation of the MLBATT-PSM2 Module into a ModuLogger System

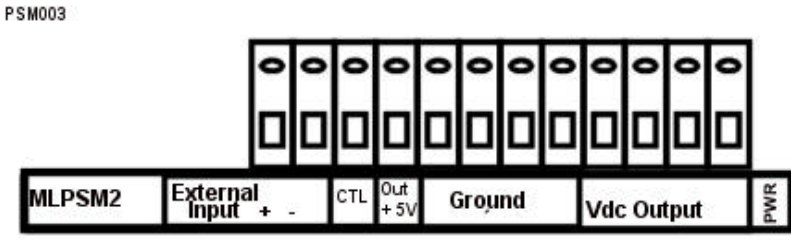
MLPSM-2 Model Installation:

This model of the PSM is designed to be installed into a ModuLogger or ModuLogger “Mini” data logging system that is powered from an external source and does not utilize the ML-BATT six D-cell battery pack. It is nearly identical to the MLBATT-PSM2 except that it does not have the D-cell battery pack included and has an unpluggable terminal strip connector.

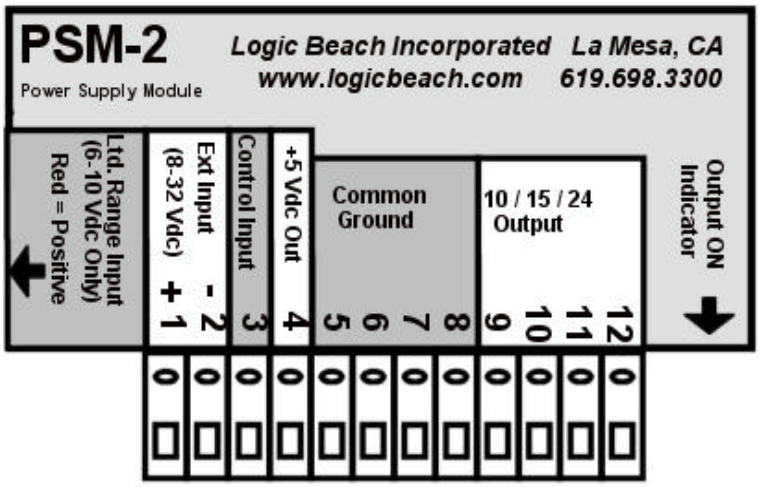
To install into a ModuLogger, remove the bottom metal back plate from the ModuLogger stack by removing (and saving) the four black screws on the side of the ModuLogger. Add the MLPSM-2 into the stack , reinstall the metal back plate and install 8 black machine screws (4 previously removed and 4 provided with the MLPSM-2) to hold the assembly together. Note that for this system, the short pigtails provided on the MLPSM-2 and the pigtail with connector on the ML-CPU board are not used and should be left unconnected.

TERMINAL STRIP CONNECTIONS:

All models of the PSM have a 12 position terminal strip that provides connection terminals for input signals/supplies and output of the excitation voltages. (Note that on the MLBATT-PSM2 model, the terminal strips are not unpluggable and consist of two adjacent terminal strips which are each numbered from 1-6. For this model, identify the correct terminal location by the label or counting from left to right from 1 to 12). The terminal strip connections are identified in Figure 3.



Terminal Strip Connections;
MLBATT-PSM2 and MLPSM-2 Models



Terminal Strip Connections for PSM-2 Model

Fig 3: MLBATT-PSM2, MLPSM-2 and PSM -2 Model Terminal Strip Connections

Following are details on the terminal strip connections:

External Input (terminals 1-2):

If an external Vdc supply source is available in the range of 8 to 32 Vdc (and meets the associated logger input voltage range as well), this external supply can be connected to both the PSM External Input terminals as well as the logger External Supply terminals (see logger User's Manual), thereby powering both units simultaneously. This connection is done in parallel as shown in Figure 4.

If the PSM pigtail is also connected to the logger batteries, in the event that the External Power source input lapses, the logger and PSM will automatically transfer to the batteries and continue to log.

Control Input (terminal 3):

A 0/5Vdc control signal can be connected to the Control Input terminal which will control the ON/OFF state of the PSM output supplies. The positive lead connects to the CONTROL input terminal and the negative lead connects to one of the four COMMON GROUND terminals on the PSM. Typically, this control signal is supplied by one of the Digital Outputs on the HyperLogger or ModuLogger systems. The output voltage turns on approximately 20mS after application of the Control Signal.

The logic for this control signal can be programmed via a jumper. Refer to the *Electrical Configuration* section earlier in this manual.

+5 Vdc Fixed Output (terminal 4):

When the PSM is ON, a stable 5Vdc output will be present at this terminal. This voltage will be within the range of 4.85 to 5.15 Vdc and very stable over time and temperature. The output can deliver up to 80mA of output current continuously (refer to Table 1 for current capacity listings with various configurations). This output is short-circuit and thermally protected. The green Output ON Indicator will light when this supply is ON.

Loads connected to this +5Vdc output should have their negative terminals eventually connected back to the Common Ground terminals on the PSM.

Note: the output current capacity is a function of the selected Programmable Output setting and total load current from the PSM. Refer to Table 1 for current capacity listings with various configurations. Contact factory with questions.

Common Ground (terminals 5 through 8):

These four terminals provide a ground connection for both power supply outputs and the Control Input ground. All four terminals are connected together internally.

Programmable Output (terminals 9 through 12):

When the PSM is ON, a stable +10, 15 or 24Vdc output will be present at these terminals (all four terminals are connected together internally). The actual output voltage will be as programmed and described earlier in this manual in the *Electrical Configuration* section. The output voltages will be very stable over time and temperature. The output can deliver up to 100mA of output current continuously (refer to Table 1 for current capacity listings with various configurations). This output is short-circuit and thermally protected. The green Output ON Indicator will light when this supply is ON.

Loads connected to this Programmable Output should have their negative terminals eventually connected back to the Common Ground terminals on the PSM.

Note: the output current capacity is a function of the selected Programmable Output setting and total load current from the PSM. Refer to Table 1 for current capacity listings with various configurations. Contact factory with questions.

APPLICATIONS:

Two Wire 4-20mA Transmitter Application:

Figure 4 shows a typical wiring diagram for powering a 4-20mA two wire pressure transmitter with the PSM and connection to a logger input channel. In this case, the transmitter can be powered with the standard +15Vdc supply output. At maximum current (ie 20mA), 2 Vdc is dropped across the 100 ohm internal resistor in the data logger leaving a minimum of 12.7 Vdc (ie 14.7Vdc - 2Vdc) across the transmitter.

For general information... many 4-20mA transmitters will run on as low as 8 to 12 Vdc across their terminals... check with the manufacturer on your transmitter specs and perform a voltage drop analysis before deploying.

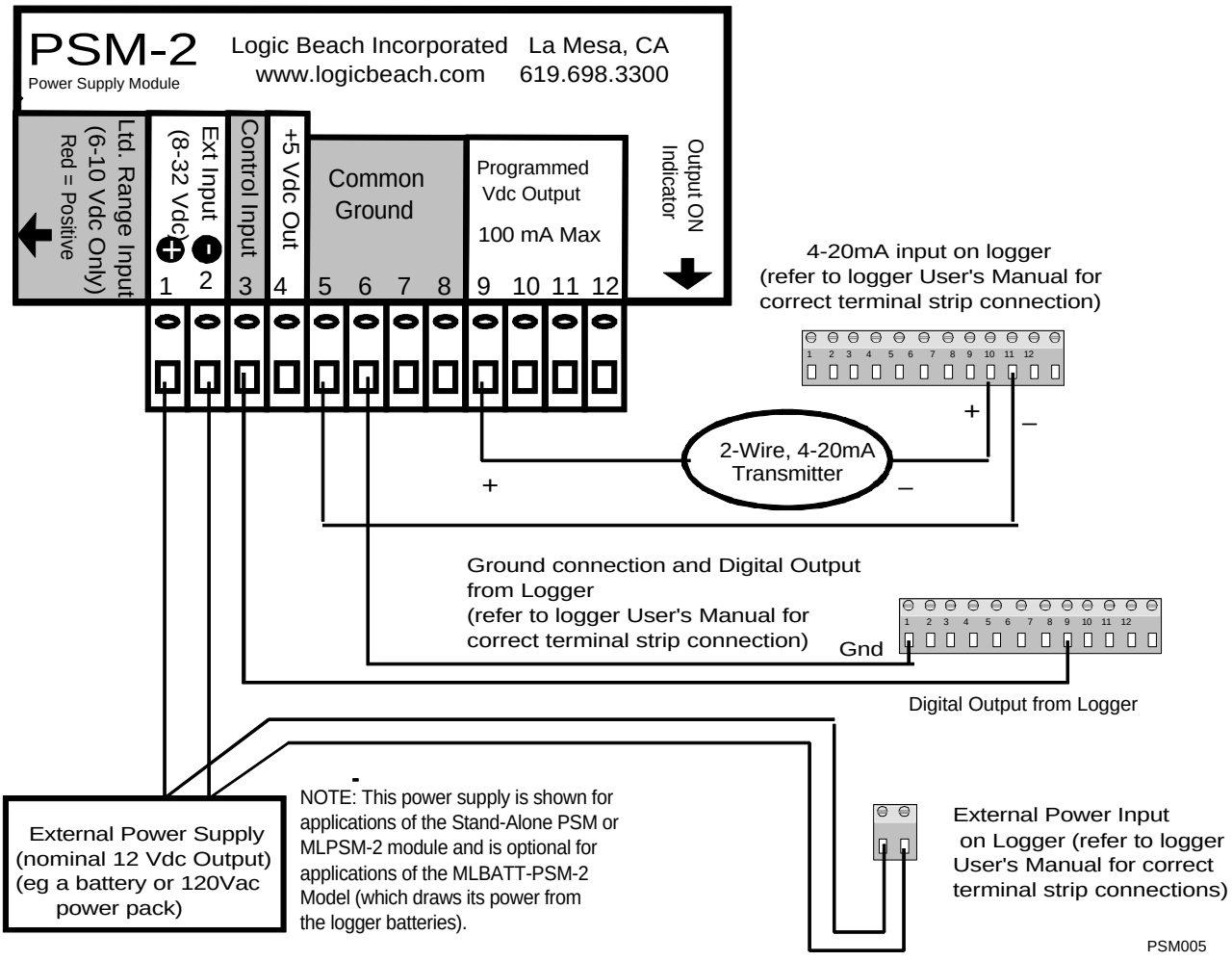


Fig 4: 4-20mA Loop Transmitter Powered by the PSM

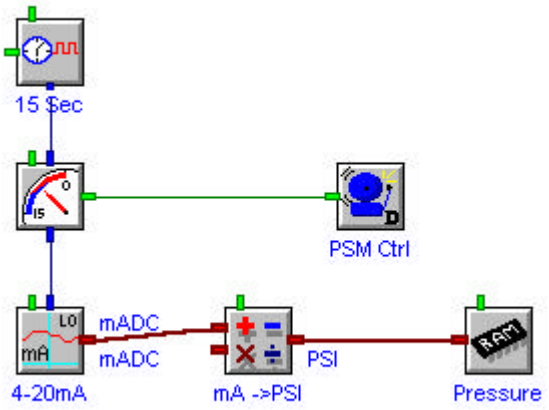


Figure 5 shows a corresponding data logger Program Net built with HyperWare that can be used to cycle the power on the PSM (via a logger Digital Output and the Warm-Up Icon) as well as take the reading and store it to memory..

Fig 5: 4-20mA Loop HyperWare Program Net

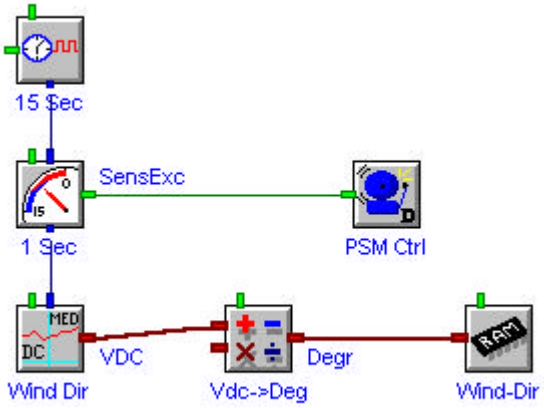


Fig 6: Wind Direction HyperWare Program Net

Potentiometer (resistance) Measurement:

Figure 7 shows a typical wiring diagram for powering and logging data from a rotary potentiometer connected to a wind direction sensor. In this case, the +5Vdc output from the PSM is used as the wind direction sensor is a 10K ohm resistance. This results in a power dissipation of just 2.5mW which is a quite acceptable power dissipation level for most wind sensors.

Figure 6 shows a corresponding program net for reading the wind direction output as a voltage and converting this to compass degrees. Contact Logic Beach for an application note on calculating average wind direction within the logger.

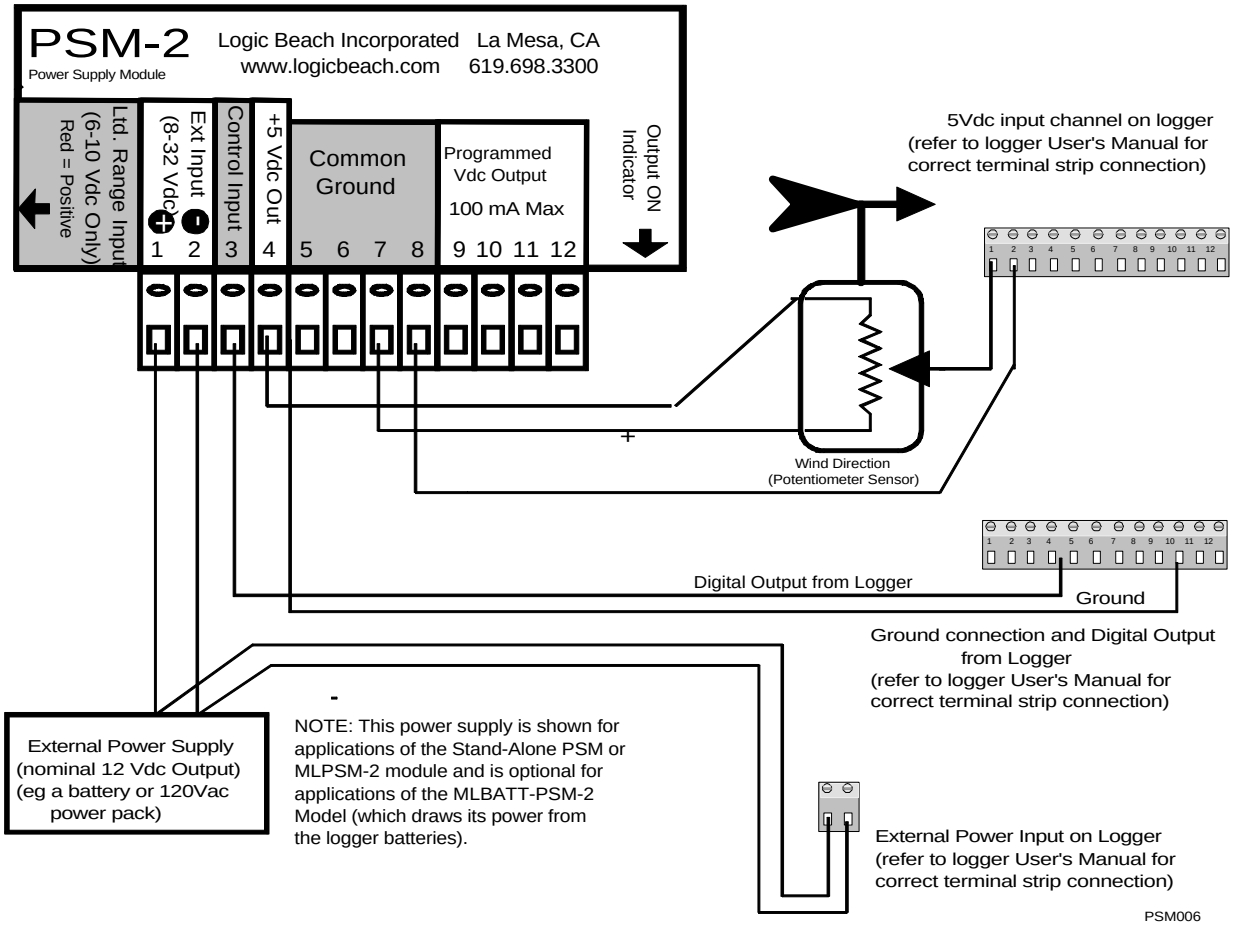


Fig 8: Potentiometer Wind Direction Sensor Excitation and Logging of Sensor (Vdc) Output