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Water Monitoring Solutions

Part No. 825-318 Rev. 1.1

HydroMace 3000

QUICK START GUIDE

40 1968-2008 YEARS
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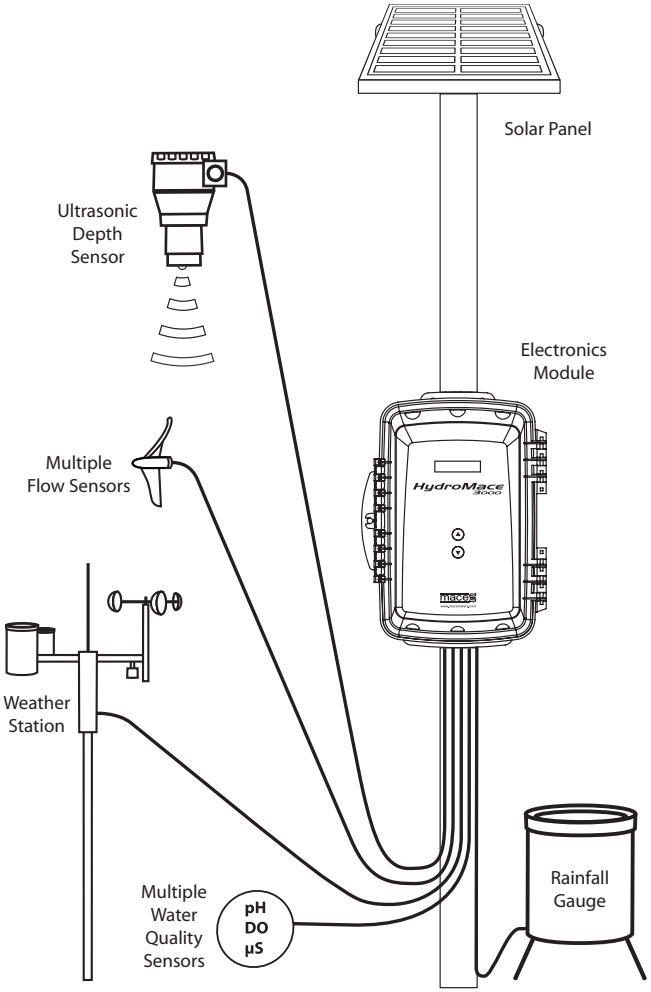
1. Introduction

This Quick Start Guide describes the basic installation of the HydroMace 3000. The detailed ***"HydroMace 3000 Product Manual"*** is available for download from **www.macemeters.com**

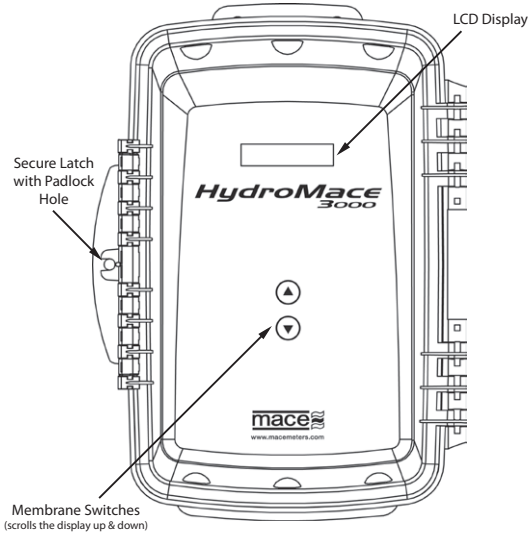
The HydroMace 3000 typically consists of four main components:

- The electronics module
- The sensor(s)
- The solar panel (or power supply)
- FloCom+ software enabling you to configure and download your HydroMace 3000

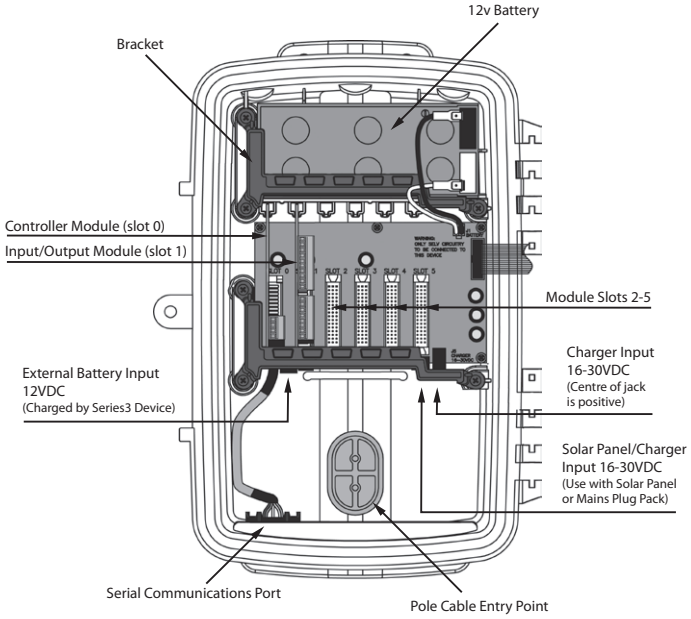
IMPORTANT: The minimum version of FloCom+ required to communicate with the HydroMace 3000 is **Version 1.1.2.0** You can check the version number by clicking ***"Help"*** from the main menu and clicking ***"About FlocomPlus".*** The latest version of FloCom+ is available for download from **www.macemeters.com**

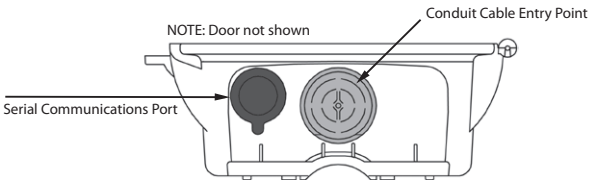


ELECTRONICS MODULE - FRONT



ELECTRONICS MODULE - INSIDE





ELECTRONICS MODULE - UNDERSIDE

2. Installing the Electronics Module

Installing the Electronics Module on a pole or a wall and setting up the solar panel cannot be covered in this Quick Start Guide. Please download the ***"HydroMace 3000 Product Manual"*** from **www.macemeters.com** for detailed instructions.

3. The I/O (Input/Output) Card

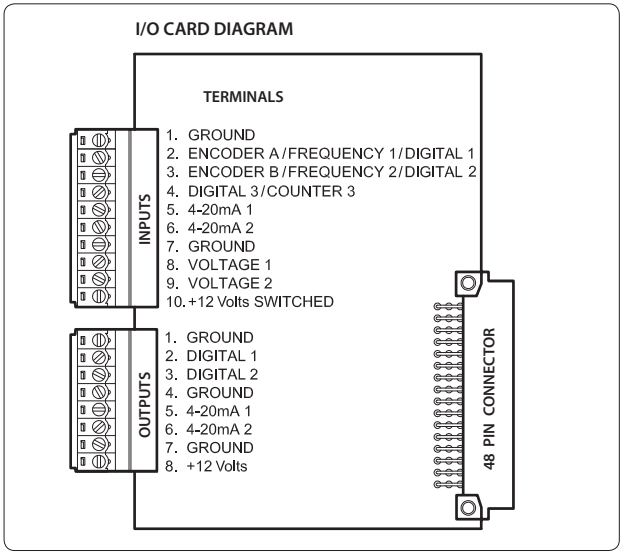
The I/O card supplied in the HydroMace 3000 provides the inputs for connecting environmental monitoring sensors and outputs for connection to ancillary devices.

The input and output terminals available on each I/O card are shown in the diagram below.

MACE recommends the user studies the relevant documentation supplied with each third party sensor prior to connection

WARNING: The maximum system current available for powering sensors attached to ALL I/O cards is 1.25 Amps at 12VDC

WARNING: The maximum input voltage on any terminal is 30VDC

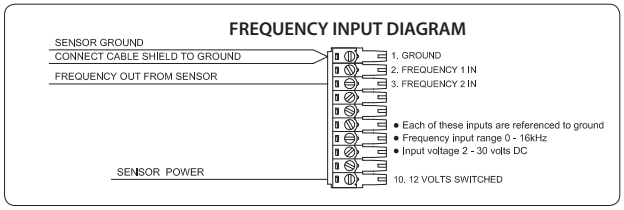


Should insufficient I/O be available on a single I/O card another card (Part No. 850-329) should be purchased. HydroMace 3000 supports a maximum of four I/O cards

4. Wiring digital inputs

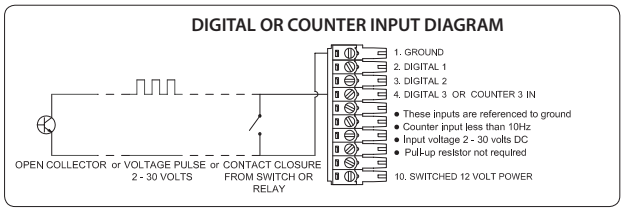
FREQUENCY INPUT: Each I/O card provides up to two frequency inputs for connecting devices such as ultrasonic depth sensors and/or flow meters. The frequency input terminals available on each I/O card are shown in the diagram below.

NOTE: If a frequency input is wired a shaft encoder input is not available



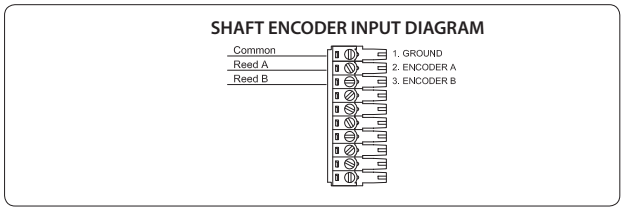
DIGITAL OR COUNTER INPUT: Each I/O card provides up to three digital inputs or one counter input for connecting devices such as rainfall gauges, hours run meters and/or counting pulses.
The digital/counter input terminals available on each I/O card are shown in the diagram below.

NOTE: If a shaft encoder input is wired only a single digital/counter input is available



SHAFT ENCODER INPUT: Each I/O card provides one input for connecting a shaft encoder. The shaft encoder input terminals available on each I/O card are shown in the diagram below.

NOTE: If a shaft encoder input is wired only a single digital/counter input is available. NO frequency input is available

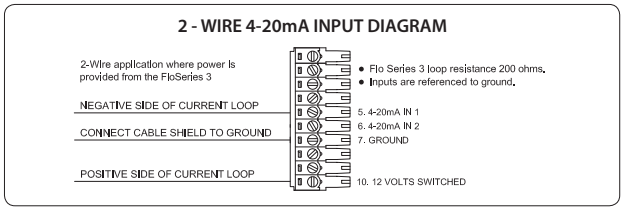


Should the field application require a shaft encoder and a frequency input another I/O card (Part No. 850-329) should be purchased

5. Wiring analogue inputs

NOTE: 12 VDC sensor power is available on terminal 10 of the input terminal strip. This is a switched power supply and the warm up time for sensors that require power is configurable using FloCom+ software. FloCom+ is available for download from www.macemeters.com

2 - WIRE 4-20mA INPUT: Each I/O card provides up to two 4-20mA inputs for connecting devices such as ultrasonic depth sensors and/or flow meters. The 4-20mA input terminals available on each I/O card are shown in the diagram below.



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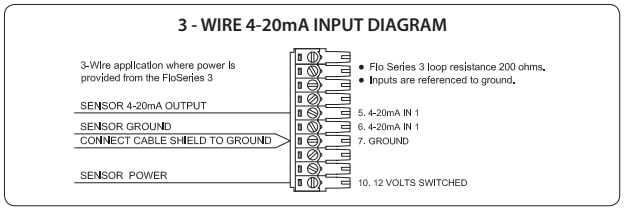
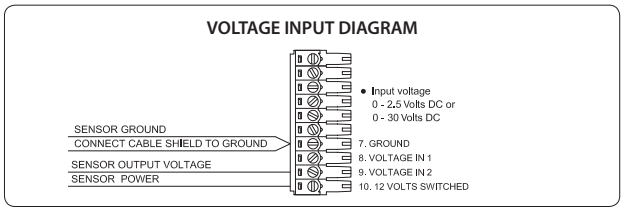


VOLTAGE INPUT: Each I/O card provides up to two voltage inputs for connecting devices such as ultrasonic depth sensors, conductivity probes and/or temperature sensors. The voltage input terminals available on each I/O card are shown in the diagram below.

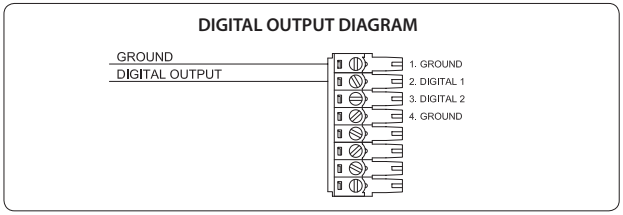
NOTE: The input voltage range can be either 0 - 2.5 VDC or 0 - 30 VDC



6. Wiring digital outputs

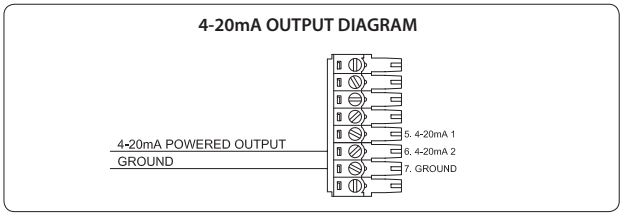
DIGITAL OUTPUT: Each I/O card provides up to two digital outputs for sending pulses to devices such as water samplers and/or data loggers. The digital output terminals available on each I/O card are shown in the diagram below.

NOTE: The pulse output consists of a 50 millisecond pulse with a 50 millisecond space between pulses



7. Wiring analogue outputs

4-20mA OUTPUT: Each I/O card provides up to two 4-20mA outputs for sending signals to devices such as SCADA systems and/or PLC's. The 4-20mA output terminals available on each I/O card are shown in the diagram below.



8. Installing FloCom+ Software

FloCom+ software and the ***"HydroMace 3000 Product Manual"*** covering software installation can be downloaded from **www.macemeters.com** Brief instructions as follows:

1. Run the ***"FlocomPlus_[version number].exe"*** file to start the installation process.

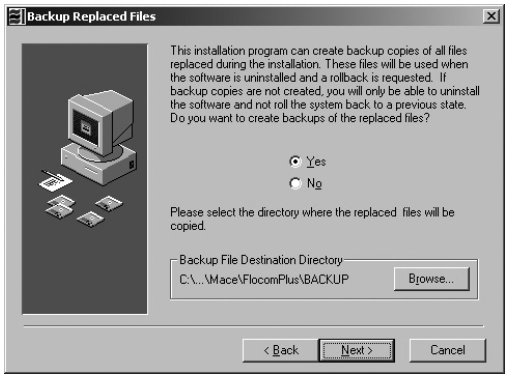
2. Follow the instructions on the welcome screen then click ***"Next"***.

3. Choose a location on your computer to install FloCom+. The default option in your program files is ***"Mace\FlocomPlus"***. Click ***"Next"***.

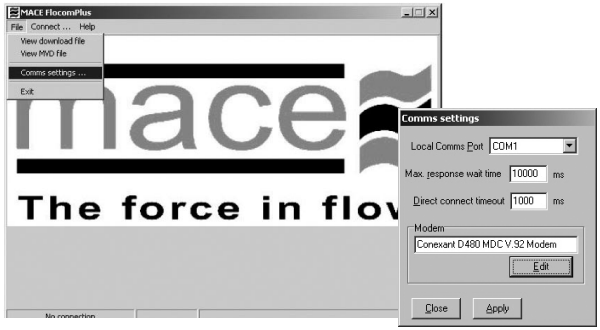
4. FloCom+ will ask if you wish to create backups of replaced files. We advise you to click ***"Yes"*** then ***"Next"***.

5. Select a Program Manager Group. ***"Mace utilities"*** is the default group. We suggest leaving this as is. Click ***"Next"*** to begin installation.

6. Once the software installation is complete, click ***"Finish"*** to exit the setup program. FloCom+ is now ready to be used.



7. Run FloCom+ using the shortcut provided on your desktop. The startup menu will appear as shown below. Click ***"File>Comms settings..."*** to configure FloCom for your computer.

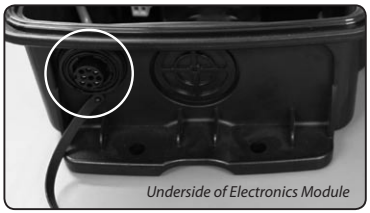


8. Select the serial port of your computer which will be used to communicate with the Flo Series3 device when a local connection will be made (i.e with a serial cable directly connected to the device).

If you are using a USB to Serial adapter please refer to the product documentation supplied with the adapter to ensure the correct driver is installed

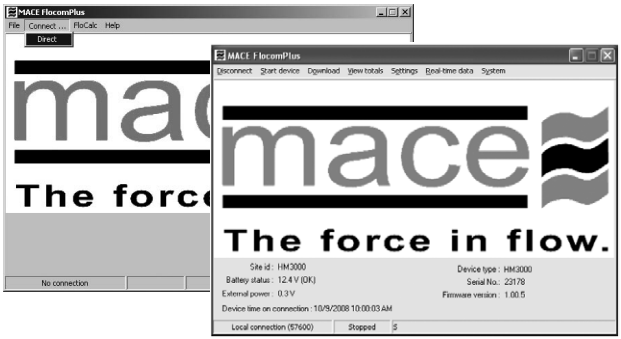
9. Connecting to the device

1. Connect the MACE serial cable (Part No. 891-300) provided between the serial port of the computer and the serial port of the FloSeries3 device located on the underside of the electronics module.


Underside of Electronics Module

2. Click ***"Connect>direct"***. Enter the password which has been set in the unit and select continue. (The default password is ***"superid"***).

3. The main menu which includes the device status summary screen is now visible as shown below.



The device must be configured and started before the meter will record flow

10. Configuring the device

Essential steps to configure your HydroMace 3000

1. Edit General Settings
2. Add Modules
3. Add Channels
4. Edit Channels
5. Add Outputs (where required)
6. Edit Outputs (where required)
7. Configure FloSI (where required)
8. Apply Settings

For detailed information on configuring the device refer to the FloCom+ software section of the ***"HydroMace 3000 Product Manual"*** which is available for download from **www.macemeters.com**

11. Flume and weir configuration

The HydroMace 3000 contains in-built equations for allowing users to measure flow rate through rated structures such as flumes and weirs. The table below lists the structures supported and the equations used to calculate flow rate.

All of the weir equations assume that the flow is fully contracted, meaning that the approach channel is wide enough and deep enough that the proximity of the floor and sidewalls to the weir opening does not affect the flow *(Tony L. Wahl, Bureau of Reclamation Hydraulics Laboratory in Denver, Colorado, USA)*.

The equations used by the HydroMace 3000 and reproduced here are used with permission of U.S. Dept. of the Interior, Bureau of Reclamation - Hydraulic Investigations and Laboratory Services Group. For further information users are encouraged to visit the following websites:

www.usbr.gov/pmts/hydraulics_lab/pubs/wmm/index.htm
www2.alterra.wur.nl/Internet/webdocs/ilri-publicaties/publicaties/Pub20/pub20.pdf

For detailed information on configuring a flow rate channel using a flume/weir, refer to the FloCom+ software section of the ***"HydroMace 3000 Product Manual"*** which is available for download from **www.macemeters.com**

Flume and Weir Equation Summary

	Equation, cfs (head measured in feet)	Equation, kL/sec (m^3/sec) ~ head measured in meters
Contracted rectangular weir	$Q=3.33(L-0.2h_1)h_1^{1.5}$	$Q=1.84(L-0.2h_1)h_1^{1.5}$
Suppressed rectangular weir	$Q=3.33(L)h_1^{1.5}$	$Q=1.84(L)h_1^{1.5}$
V-notch weir, 90°	$Q=2.49h_1^{2.48}$	$Q=1.34h_1^{2.48}$
V-notch weir, 30°	$Q=(8/15)(2g)^{0.5}C_e\tan(\theta/2)(h_1+k_h)2.5$	$Q=(8/15)(2g)^{0.5}C_e\tan(\theta/2)(h_1+k_h)2.5$
V-notch weir, 45°	$Q=(8/15)(2g)^{0.5}C_e\tan(\theta/2)(h_1+k_h)2.5$	$Q=(8/15)(2g)^{0.5}C_e\tan(\theta/2)(h_1+k_h)2.5$
V-notch weir, 60°	$Q=(8/15)(2g)^{0.5}C_e\tan(\theta/2)(h_1+k_h)2.5$	$Q=(8/15)(2g)^{0.5}C_e\tan(\theta/2)(h_1+k_h)2.5$
Cipoletti weir	$Q=3.367(L)h_1^{1.5}$	$Q=1.86(L)h_1^{1.5}$
Parshall flumes	$Q=Ch_a^n$	$Q=0.552*Ch_a^n$
Replogle flumes (long-throated flumes or "ramp" flumes)	$Q = K_1(h_1+K_2)^U$	$Q = K_1(h_1+K_2)^U$
Palmer-Bowlus flumes	$Q = K_1(h_1+K_2)^U$	$Q = K_1(h_1+K_2)^U$

Definitions, cfs
Q = discharge, cfs
L = weir width, ft
h_1 = upstream head, ft
C_e = V-notch weir coefficient
k_h = V-notch weir head adjustment factor, ft
θ = V-notch weir angle, degrees
h_a = Parshall flume upstream head, ft
C = Parshall flume coefficient
n = Parshall flume exponent
g = acceleration due to gravity, 32.2 ft/s^2

Definitions, kL/sec
Q = discharge, kL/sec
L = weir width, m
h_1 = upstream head, m
C_e = V-notch weir coefficient
k_h = V-notch weir head adjustment factor, m
θ = V-notch weir angle, degrees
h_a = Parshall flume upstream head, m
C = Parshall flume coefficient
n = Parshall flume exponent
g = acceleration due to gravity, 9.806 m/s^2