

Technical Tip: iQPump1000 Setup Procedure for Use with Seametrics AG3000 Flow Meter

Product(s): iQpump1000

Doc. No. TN.iQp.04

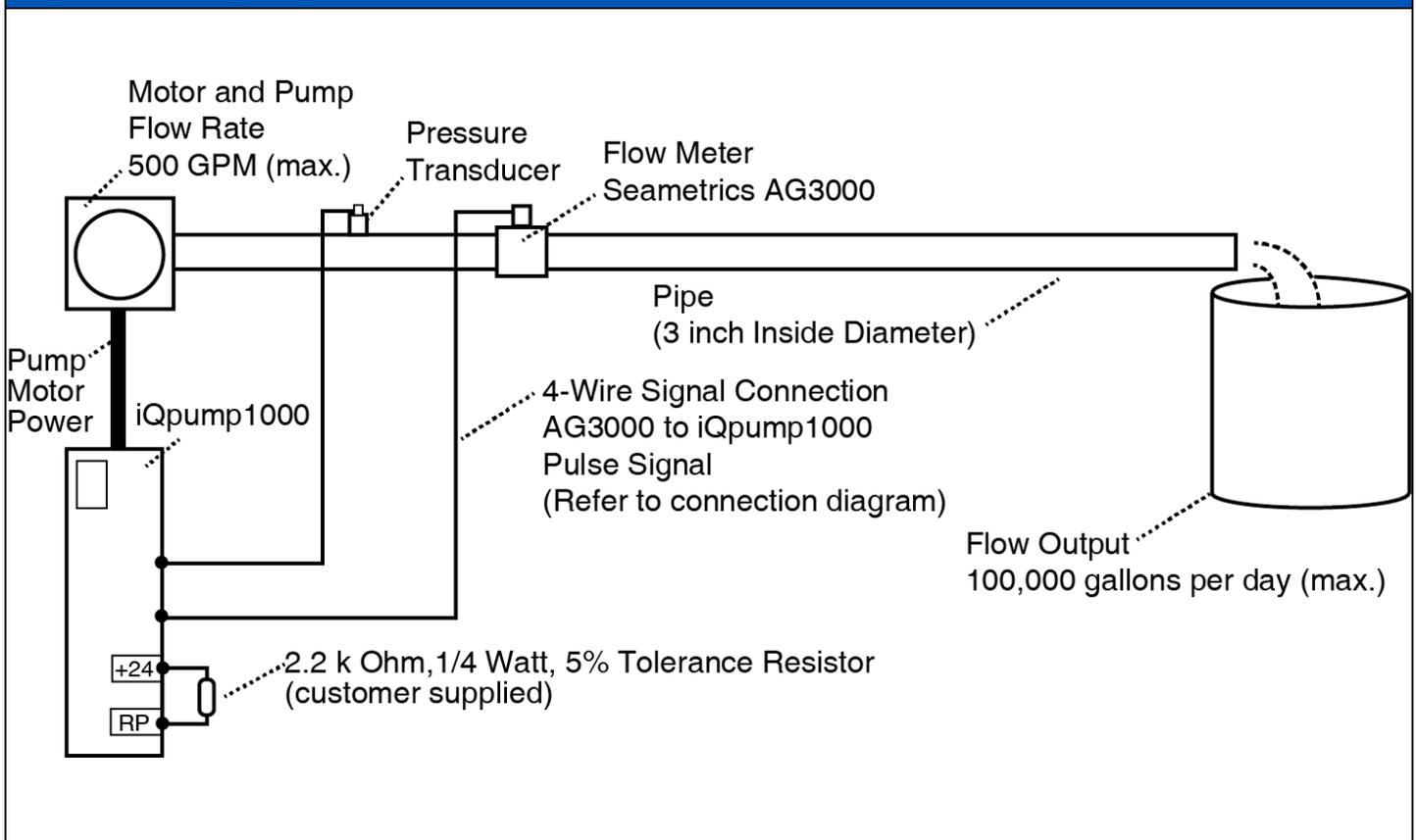
SUMMARY

This Technical Tip provides an example set-up for a Yaskawa iQPump1000 drive and a Seametrics AG3000 Flow Meter.

Features of this system example:

- ✓ Display flow rate
- ✓ Check for high or low flow rates and provide a digital output/alarm/fault
- ✓ Display accumulation of flow over time (volume)
- ✓ Provide a digital output/alarm/fault for high accumulation totals
- ✓ Provide constant pressure system
- ✓ Limit flow rate to 500 gallons per minute (GPM) to avoid pumping off the well
- ✓ Limit accumulation to 100,000 gallons per day (GPD)

Figure 1: Example System Overview



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SYSTEM COMPONENTS

Component		Description
iQpump1000 Drive		Available models: CIMR-PW□A 200 V Class: 3/4 to 175 HP ND CIMR-PW□A 400 V Class: 3/4 to 1000 HP ND CIMR-PW□A 600 V Class: 2 to 250 HP ND
Customer supplied	Flow Meter (Seametrics)	The flow meter displays flow rate and total accumulation. Model: AG3000 (Magnetic Type) Flow Meter (http://www.seametrics.com) <ul style="list-style-type: none"> ▪ 3 inch cross-section (I.D.) ▪ 25.228 pulses per gallon (PPG) ▪ 700 GPM capacity limit
	Pressure transducer	Produces pressure feedback signal for a constant pressure system
	Pull-up Resistor	2.2 k Ohm 1/4 Watt 5% tolerance resistor 

PROCEDURE

Warning ! - Electrical Shock Hazard. Do not allow unqualified personnel to perform work on the drive. Installation, maintenance, inspection, and servicing must be performed by authorized personnel familiar with installation, adjustment, and maintenance of AC drives Failure to comply may result in electrocution.

Warning ! - Electrical Shock Hazard. Shut off the power supply to the drive before wiring the main circuit terminals. The internal capacitor remains charged even after the power supply is turned off. After shutting off the power, wait for at least the amount of time specified on the drive before touching any components. Failure to comply may result in electrocution.

Warning ! - Electrical Shock Hazard. Do not connect or disconnect wiring while the power is on. Failure to comply may result in death or serious injury

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PREREQUISITES (PRIOR TO PERFORMING THIS PROCEDURE)

- Install the iQpump1000: Follow the instructions in TOEPYAIP1W02 iQpump1000 Installation & Start-up Guide provided in product packaging.
- Mechanically install the Seametrics AG3000 flow meter according to manufacturer's instructions. Route shielded signal cable from the meter to the iQpump1000 I/O terminals.
- *Install pressure transducer if used.
- *Configure pressure regulation function if used (Refer to iQpump1000 User Manual TOEPYAIP1W01**, parameter A1-03=6008 Constant Pressure Mode)
- Pre-charge function is enabled and functional (optional)
(Refer to ***iQpump1000 User Manual TOEPYAIP1W01*****, parameters: P4-01, P4-02, P4-03, P2-02)
- Loss-of-Prime function is enabled and functional (optional)
(Refer to ***iQpump1000 User Manual TOEPYAIP1W01***, parameters: P4-05, P4-08)

***Note:** Required if constant pressure regulation is desired

****iQpump1000 User Manual Download URL:**

<https://www.yaskawa.com/links?type=documents&docnum=TOEPYAIP1W01&name=>

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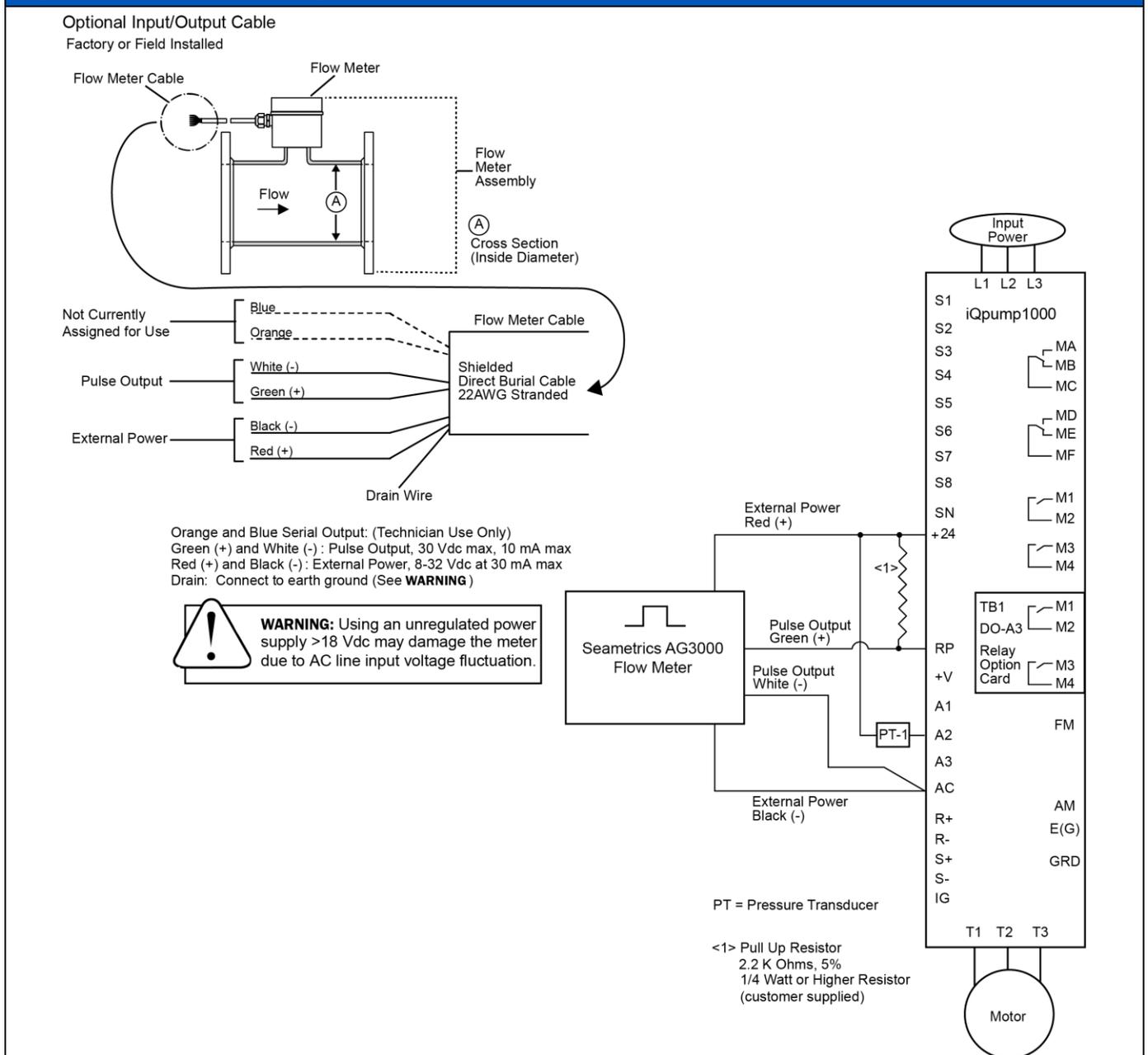
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STEP 1 – MAKE ELECTRICAL CONNECTIONS

1.1 Refer to **Figure 2**. Make electrical connections to the iQpump1000.

Figure 2: Connection Diagram



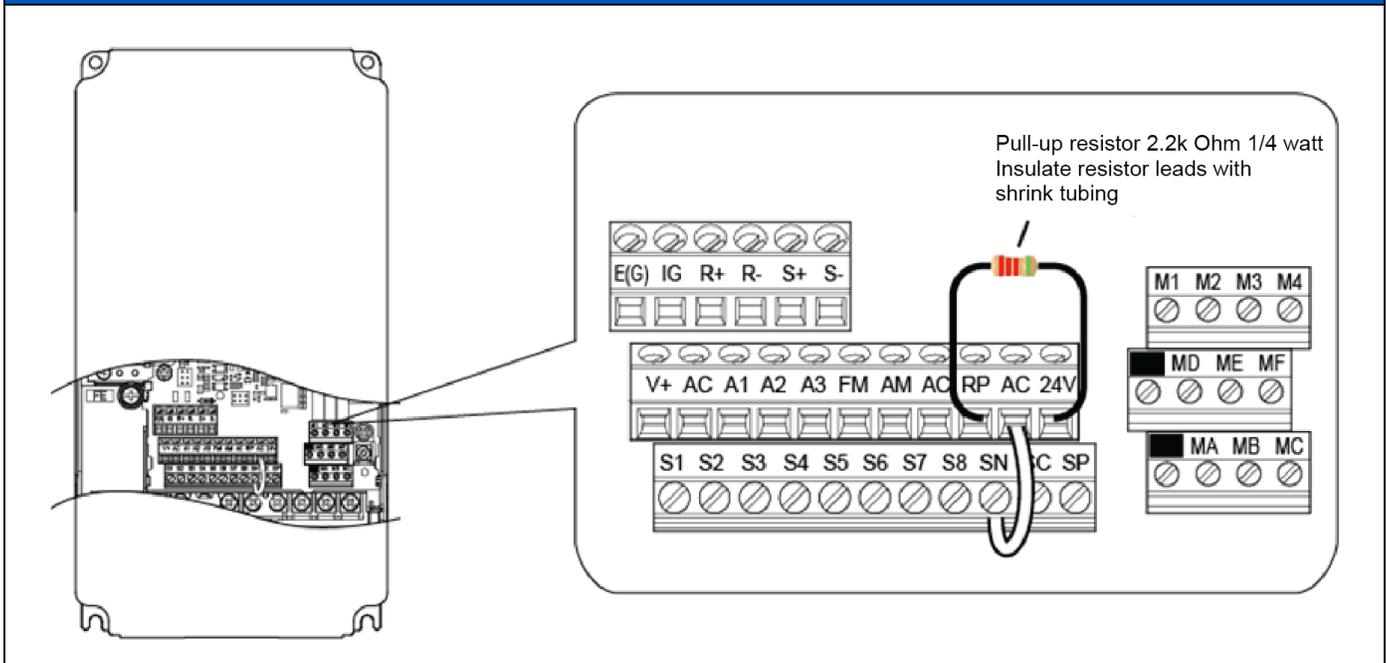
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1.2 Install a pull-up resistor at iQpump1000 I/O terminals RP and 24V as shown in **Figure 3**. The pulse train output of the Seametrics AG3000 Flow Meter is a “sinking” type that requires a customer-supplied 2.2k Ohm resistor to condition the signal for the iQpump1000.

Figure 3: iQpump1000 Control Terminal Arrangement with Pull-up Resistor Installed



1.3 Re-install all covers on the iQpump1000.

1.4 Re-install the JVOP-183 digital operator on the iQpump1000 drive.

STEP 2 – VERIFY SIGNAL FROM FLOW METER TO IQPUMP1000

WARNING ! - *Sudden Movement Hazard.* Clear all personnel from the drive, motor, and machine area before applying power. System may start unexpectedly upon application of power, causing death or serious injury.

Preparation:

Prepare a digital multi-meter with a frequency counter function to measure a signal at iQpump1000 I/O terminals AC to RP.

2.1 Energize the drive. The JVOP-183 digital operator should display: U1-01= 0.00 Hz.

2.2 Verify the pump is primed, and the system is prepared to receive flow.

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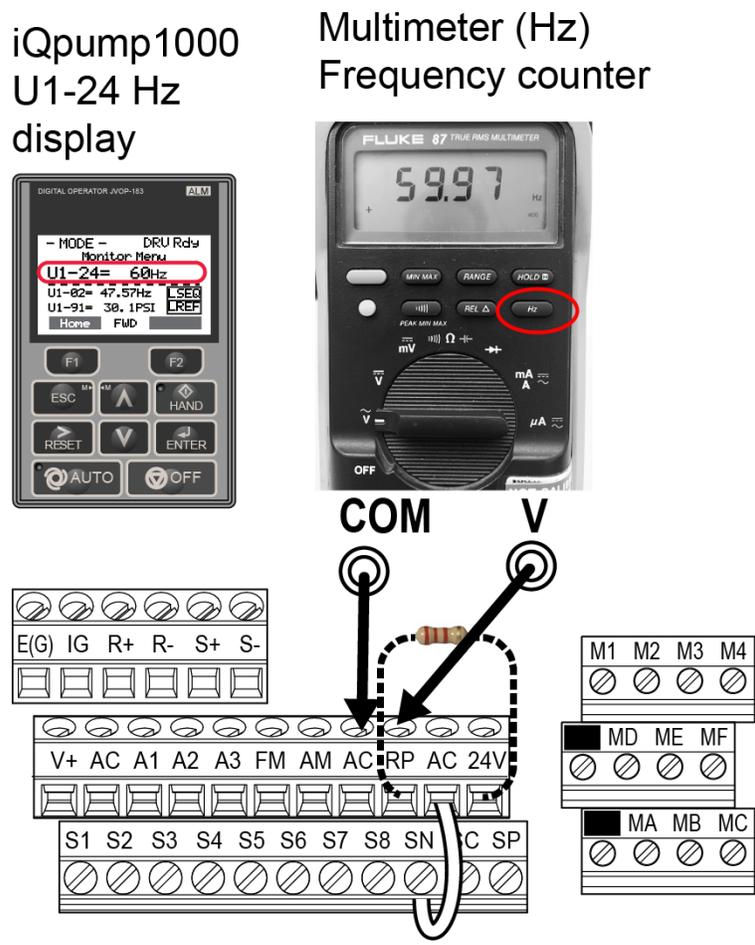
WARNING ! - Sudden Movement Hazard. Clear all personnel from the drive, motor, and machine area before applying power to prevent injury from unexpected motor rotation.

2.3 Start the iQpump1000 by pressing the HAND key on the JVOP-183. To set HAND SPEED, press ENTER and adjust P5-02 to set the speed to a known safe operating speed.

2.4 View parameter U1-24 to verify that the RP terminal on the iQPump1000 is receiving a signal from the AG3000 flow meter. **Refer to Figure 4.**

2.5 Measure the signal across I/O terminals AC and RP, **Figure 4.**

Figure 4: Flow Meter Signal Verification (Terminals AC to RP)

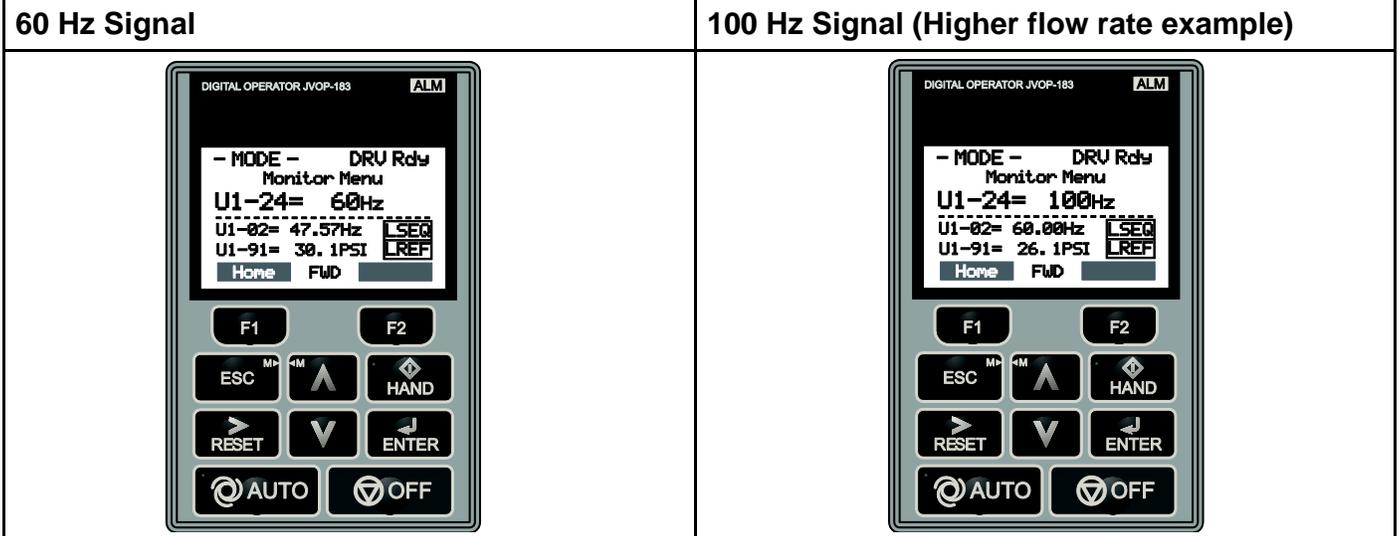


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Figure 5: iQPump1000 Parameter U1-24 Flow Meter Output Signal Display



2.6 Alternate Method for Flow Meter Signal Verification (if multi-meter is not available)

Use an analog GPM gauge in proximity to the flow meter, to find flow rate.

2.7 Convert the U1-24 (Hz) display to GPM for comparison.

Because the U1-24 display reads in HZ and the analog gauge reads GPM we must convert the U1-24 display to GPM for comparison.

Multiply the U1-24 display value by 60 secs →

$$60 \text{ Hz} \times 60 = 3,600 \text{ pulses per minute (PPM)}$$

2.8 Divide 3,600 PPM by 25.228 PPG. 25.228 is the calibrated flow meter output for an AG3000 meter →

$$3600 \text{ PPM} / 25.228 \text{ PPG} = \mathbf{142.7 \text{ GPM @ 60 Hz}}$$

High Frequency (pulse/gal)	3"	4"	6"	8"	10"	12"
	25.228	16.362	6.307	3.344	2.150	1.530

***Note:** PPG can be found on the AG3000 flow meter spec sheet.

2.9 Compare the calculated result from **STEP 2.8**, to the pipe mounted analog gauge GPM value. The two values should match.

2.10 Recheck all electrical connections for a wiring error and make corrections if a substantial difference in the compared readings exists (no match).

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STEP 3 – PARAMETER SETTINGS

3.1 Verify system pressure regulation is function properly.

3.2 Ensure other desired features such as Pre-Charge, or Loss of Prime are functioning before proceeding.

Refer to the *iQpump1000 User Manual TOEPYAIP1W01* for details about Pre-Charge and Loss of Prime.

Note: In this example, the iQPump1000 drive will shut down and require resetting if the system reaches the setting level set in parameter P6-17.

Table 1. iQPump1000 Parameter Settings for Seametrics AG3000 Meter (Example)

Parameter	Setting	Description
H6-01 Pulse Train Input Terminal RP Function Selection	5	Sets RP (Pulse train input terminal) pulse input for flow meter function. This will disable all other H6 parameters
P6-01 Flow Meter Scale	700	Sets flow meter maximum gpm (gallons per minute) flow rate. 700 GPM maximum scaling is according to AG3000 flow meter specifications. Note: Set to the expected maximum flow the system will see, taking into account unusual conditions such as broken main lines that may produce excessive flows.
P6-02 Turbine Scale 1	25.0	Coarse setting of pulses per gallon PPG rating. Set P6-02=25.0 (Whole numbers to left of decimal) Note: The flow rate from example flow meter specification is a fixed rate of 25.228 ppg (pulses per gallon) . The specified flow rate will vary based on the Seametrics flow meter model.
P6-03 Turbine Scale 2	.228	Fine setting of pulses per gallon (PPG) rating. Set P6-03=0.228 (Fractions to right of decimal)
P6-12 AccumLvl*1000	100	Accumulation level in thousands. Set parameter P6-12=100. Example: 100 = 100,000 gallons per day maximum accumulation. The maximum daily accumulation rate depends on the unique requirements of a particular system.

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Parameter	Setting	Description
P6-15 Accum Behavior	3	Set parameter P6-15=3 to cause a fault if limit set in P6-12 is reached. Note: Fault and reset on matching accumulated level set in P6-11 to P6-14.
P6-17 High Flow Level	500	Maximum flow allowed gallons per minute (GPM) Set parameter P6-17=500 GPM. Maximum flow allowed is 500 GPM in this example.
P6-19 High Flow Sel	2	Requires user reset after fault. Set parameter P6-19=2 to cause a fault if limit set in P6-17 is reached.

Monitor Parameters

3.3 View iQPump1000 monitor parameters, U1-83 through U1-87, to find current system flow rate and accumulation levels during system operation.

Table 2. Monitor Parameters

No.	Name	Description
U1-24	Input Pulse Monitor	The frequency in Hz to pulse train input terminal RP from the flow meter.
U1-83	Flow Rate	The flow rate based on the pulse input frequency or the analog voltage (flow rate input) and parameters P6-01 and P6-04. The Flow Rate is gpm (gallons per minute) in this example.
U1-84	Volume * 1000000	The recorded volume from the flow meter (pulse input or analog voltage). Total volume is calculated as follows: Total Volume=(U1-84 * 1000000) + (U1-85 * 1000) + (U1-86 * 100) + (U1-87 * 10)
U1-85	Volume * 1000	
U1-86	Volume * 1	
U1-87	Volume * 0.0001	

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Reading Accumulation: Monitors U1-84 to U1-87

3.4 Refer to **Table 3**. Observe Monitors U1-84 to U1-87 to build digits for total accumulation.

Table 3. Example Accumulation Readings - iQpump1000 Display

Monitor No.	U1-84	U1-85	U1-86	U1-87	Total
Display Example →	28	413	546	.245	Display Value
Meaning →	28,000,000	413,000	546	.245	28, 413, 546.245 Gallons

TROUBLESHOOTING

Table 4 provides troubleshooting tips from the Seametrics Flow Meter instructions.

Table 4. Troubleshooting – AG3000 Flow Meter (from Seametrics LT-65200290-042115)

Problem	Probable Cause	Corrective action
Blank display	Dead battery	Replace battery pack.
Flow rate steadily reads zero when there is flow	Flow is below cutoff (very low)	Reading will resume when flow increases.
	There is air in the meter	Reposition meter for full pipe.
Display reads [-]	Meter is installed backward	Note flow direction arrow, reverse meter.
Flow rate intermittently drops when there is flow	There is air in the meter	Reposition meter for full pipe or rotate to avoid bubbles.
Erratic reading	Improperly equalized	Check for proper equalization.
	Pulsing flow	Use external power source (allows more flow averaging).
	Rapidly changing conductivity (chemigation applications)	Install chemigation line downstream of meter (or enough upstream for thorough mixing of fluids before meter).