



Form 2207 – Action Facts

SUBMERSIBLE MOTOR INSTALLATION RECORD

INFORMATION SUPPLEMENT

1.0 MOTOR

- 1.1 Verify motor nameplate data meets the application – hp, voltage, phase, and Hertz.
- 1.2 Check that the motor shaft rotates freely by hand on the second of two complete rotations. (On large motors, this usually requires a motor coupling with a cheater handle welded to it.)
- 1.3 Check that the motor lead assembly is not damaged.
- 1.4 Measure insulation resistance to ground at 500 volts – BEFORE SUBMERGED. It should be a minimum of 200 megohms or 200,000,000 ohms.
- 1.5 Measure insulation resistance to ground at 500 volts – AFTER SUBMERGED. It should be a minimum of 0.5 megohms or 500,000 ohms.
- 1.6 Verify the system is operating within the $\pm 10\%$ of nameplate voltage requirement.
- 1.7 Verify the system will not ever operate in excess of the maximum amps indicated on the nameplate.
- 1.8 Verify the system is operating at 5% or less current unbalance.

Notice:

- If current unbalance exceeds 5%, the maximum operating amps must be derated to the nameplate Full Load Amps.
- Warning - System current unbalance can not exceed 10% without causing heating and mechanical wear issues.
- The submersible motor amperage % unbalance is typically 6x greater than its voltage % unbalance.
- Thus, 0.8% voltage unbalance = greater than 5% current unbalance, and 1.7% voltage unbalance = greater than 10% current unbalance.

2.0 PUMP

- 2.1 Verify the pump nameplate and curve data meets the application hp, rpm, and flow/TDH requirements.
- 2.2 Verify the pump NPSH requirement will be met at all times.
- 2.3 Check that the pump shaft rotates freely by hand before installation.
- 2.4 Check that the pump shaft moves up about $\frac{1}{4}$ inch when it is coupled to the motor.
- 2.5 Check that the pump guard is not pinching the motor leads, especially where it enters and exits the guard.

Notice:

- Pumps and motors 5 hp and above should be assembled in a vertical position to ensure correct alignment.
- A motor-pump assembly 5 hp and above should never be lifted from a non-vertical position by the pump discharge because it can bend the shaft in one or both of the products.

3.0 POWER SUPPLY (3-PHASE)

- 3.1 Verify the transformer kVA rating is adequate for the motor per the Franklin Application (AIM) manual requirement.
- 3.2 Verify that all transformers have the same kVA rating.
- 3.3 Verify the 3-Phase pump panel fuses or its circuit breaker are correctly sized per the Franklin Application (AIM) manual requirement.
- 3.4 Verify the 3-Phase pump panel motor contactor is correctly sized per the Franklin Application (AIM) manual requirement.
- 3.5 Verify the 3-Phase pump panel motor overload is ambient compensated.
- 3.6 Verify the 3-Phase pump panel motor overload has a NEMA Class 10 trip curve.
- 3.7 Verify the 3-Phase pump panel motor overload heaters or its dial setting are correctly selected based on the system's operating point and not just arbitrarily set at the maximum motor operating amps.
- 3.8 At no time should the system operating amps or the motor overload system running point setting be higher than the motor nameplate maximum amp rating.

Notice:

- Electronic overloads should be set at the normal system operation point.
- Electronic overloads have a built-in multiplier of 115-125% times the input amps to determine the overload trip point.

4.0 POWER SUPPLY (1-PHASE)

- 4.1 Verify the transformer kVA rating is adequate for the motor per the Franklin Application (AIM) manual requirement.



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- 4.2 Verify the motor control box and the motor are made by the same manufacturer.
- 4.3 Verify the motor control box hp rating and its voltage match the motor rating exactly. If not, a premature failure of the control box or motor should be expected.

5.0 HIGH SURGE PROTECTION

- 5.1 Verify the submersible motor has a dedicated surge arrestor.
All submersible motors require a dedicated surge arrestor.
Motors 5 hp and smaller marked “Equipped with Lightning Arrestors”, have a built-in surge arrestor.
- 5.2 Verify the surge arrestor is mounted as close to the motor as practical.
The location is usually in the pump panel, but sometimes it is placed at the well head in a separate electrical box.
- 5.3 Verify the surge arrestor is grounded below the lowest drawdown water level.
This is usually accomplished by attaching the drop cable ground wire to the motor lead or the motor ground lug.
- 5.4 Verify the ground conductor size meets the minimum requirements of the National Electrical Code and all other relevant national, state, regional, and local codes.
- 5.5 Verify the motor is connected to both the electrical system ground and the motor.

6.0 ELECTRICAL DROP CABLE

- 6.1 Verify the temperature rating of the drop cable – typically 60 °C, 75 °C, 90 °C or 125 °C.
- 6.2 Verify if the cable is single conductor or jacketed conductor. Web cable is considered jacketed cable by regulating agencies.
- 6.3 Verify the conductor size – typically AWG, MCM or mm².
- 6.4 Verify if the conductor material is copper; if not, determine the material and contact the factory for acceptability.
- 6.5 Verify the drop cable meets or exceeds the requirements of the Franklin Application (AIM) manual.

Notice:

- If the service entrance to pump panel or the pump panel to motor cable is not a copper material, contact the factory for the correct length derating factors.

7.0 MOTOR COOLING

- 7.1 Verify that the well water temperature does not exceed the maximum ambient temperature indicated on the nameplate of the motor.
- 7.2 Verify there is a minimum of 10 feet of clear water between the bottom of the motor and the bottom of the well.
- 7.3 Verify that all water entering the well is coming from below the lowest part of the motor.
- 7.4 Verify the system pumping rate will never deliver less flow than is required by the Franklin Application (AIM) manual to flow by-and-around the full length of the motor for cooling purposes.
- 7.5 Verify that 3-phase motors above 7.5 hp in a vertical potable water well should not exceed 100 starts in 24 hours and each start should include a minimum of 3 minutes ON and 10 minutes OFF.

Notice:

- If any water is entering the well above the lowest part of the motor, a flow sleeve is required.

8.0 MOTOR-PUMP INSTALLATION

- 8.1 Verify that the drop cable is supported to the drop pipe every 10 feet.
- 8.2 Verify at least one spring loaded (non-drilled) check valve is in the drop pipe.
Preferably, the first check valve should be located at the top of the first pipe joint above the pump discharge (~20 feet) if the pump does not have a check built in to its discharge.
- 8.3 Verify all pipe joints are as tight as practical.
The minimum torque should never be less than 10 foot-pounds times the motor nameplate hp rating.
- 8.4 Verify the rotation of the pump is correct.
It is preferable to do this by checking the flow and current in both directions on 3-phase motors.
This can be done by having the electrician swap any two leads.
This is considered “best practice” since pumps under some conditions can supply amp readings and a visual flow observation that can be extremely misleading.



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SUBMERSIBLE MOTORS INSTALLATION RECORD

RMA Number

KEY DEALER #

DISTRIBUTOR

Name: _____
City: _____
State: _____ Zip: _____

INSTALLER

Name: _____
City: _____
State: _____ Zip: _____

END USER

Name: _____
City: _____
State: _____ Zip: _____

Well ID or GPS: _____ Water Temperature: _____ °F °C

Application/Water Use (e.g. potable water, irrigation, municipal, fountain, etc.): _____

Date Installed (mm/yy): _____ Date Failed (mm/yy): _____ Motor Position Shaft-Up: Yes No

Operating Cycle: ON Time Per Start _____ Hrs. Mins. Time OFF Between Stop & Restart _____ Hrs. Mins.

MOTOR

Model: _____ Serial Number: _____ Date Code (if updated): _____

MOTOR OVERLOAD

System Typical Operating Current: _____ Amps @ _____ Volts

Overload: FE SubMonitor Input Amps _____ D3 Attached Yes No Fault Settings Attached Yes No

Other Manufacturer Model: _____ Dial Set at: _____ or Heater # _____

NEMA Class: 10 20 30 Ambient Compensated: Yes No

Power to Motor by: Full Volt Starter VFD Soft Starter VFD or Soft Starter Mfr. & Model: _____

PUMP

Manufacturer: _____

Model: _____

Stages: _____

Design Rating: _____ gpm @ _____ ft TDH

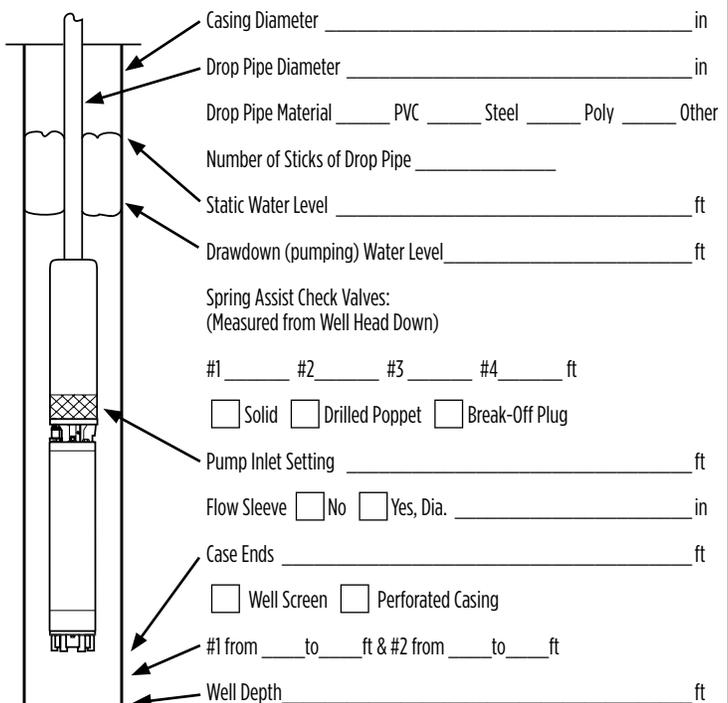
Horsepower Required by Pump End: _____

Actual Pump Delivery: _____ gpm @ _____ psi

What Controls When System Runs & Stops:

(e.g. pressure, level, flow, manual on/off, timer, time clock etc.)

WELL DATA (All measurements from well head down.)



YOUR NAME / DATE

_____ / _____



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SUBMERSIBLE MOTORS INSTALLATION RECORD

RMA Number

TRANSFORMERS

Number of Transformers: Two Three Transformers Supply Motor Only: Yes No Unsure

Transformer #1: _____ kVA Transformer #2: _____ kVA Transformer #3: _____ kVA

POWER CABLES & GROUND WIRE

Service Entrance to Pump Control Panel:

Length: _____ ft. & Gauge: _____ AWG/MCM

Material: Copper Aluminum Construction: Jacketed Individual Conductors Web Twisted

Temperature Rating of Cable: 60 °C 75 °C 90 °C 125 °C or Insulation Type: _____ (e.g. THHN)

Pump Control Panel to Motor:

Length: _____ ft. & Gauge: _____ AWG/MCM

Material: Copper Aluminum Construction: Jacketed Individual Conductors Web Twisted

Temperature Rating of Cable: 60 °C 75 °C 90 °C 125 °C or Insulation Type: _____ (e.g. THHN)

Ground Wire Size: From Control Panel to Motor: _____ AWG/MCM

Control Grounded to (mark all that apply):

Well Head Metal Casing Motor Driven Rod Power Supply

INCOMING VOLTAGE

No Load L1-L2 _____ L2-L3 _____ L1-L3 _____

Full Load L1-L2 _____ L2-L3 _____ L1-L3 _____

RUNNING AMPS & CURRENT BALANCE

Full Load L1 _____ L2 _____ L3 _____

% Unbalance: _____

CONTROL PANEL

1 Pump Panel Manufacturer/Fabricator: _____

Short Circuit Protection - Fuses or Circuit Breaker

Option #1 - Fuse

Manufacturer: _____ Model: _____ Rating: _____ Amps

Type: Time-Delay Standard

Option #2 - Circuit Breaker

Manufacturer: _____ Model: _____ Rating: _____ Amps Setting: _____

Starter - Full Voltage, Reduced Voltage, Soft-Starter or VFD (Variable Frequency Drive)

Option #1 - Full Voltage

Manufacturer: _____ Model: _____ Size: _____ Contacts: NEMA IEC

Option #2 - Reduced Voltage

Manufacturer: _____ Model: _____ Ramp Time to Full Voltage: _____ sec.

3 Option #3 - Soft-Starter or VFD

Manufacturer: _____ Model: _____ Max. Continuous Amp Output Rating: _____

Min. Setting: _____ Hz & GPM: _____ Max. Setting: _____ Hz & GPM: _____

Start Ramp Time to 30 Hz: _____ sec. Stop Mode: Power Off Coast 30-0 Hz Ramp _____ sec.

Special Output Filter Purchased: Yes No

Output Filter Manufacturer: _____ Model: _____ % Reactance: _____

4 Surge Arrestor: No Yes, Manufacturer: _____ Model: _____