

Installation & Operating Manual

25ISUB-M
11/09 Edition

WEBTROL

Quality Products



Powered By
 **Franklin Electric**

4" WT & WS Series Pumps

**Congratulations On Your Choice
In Purchasing This Webtrol Pump**

Its Quality is unsurpassed in material and workmanship and has been factory tested.
When properly installed, it will give many years of trouble free service.

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Pre-Installation

Examine the components carefully to ensure that no damage has occurred to the liquid end, motor, cable or control box during shipment. Report damage immediately to the shipping carrier or to your dealer. The Webtrol submersible pump should remain in the shipping carton until it is ready to be installed. Do not drop or mishandle the pump prior to installation.

Warning: The motor is equipped with an electrical cable. It should NEVER be used to lift or carry the pump. Damage to the electrical cable can cause shock, burns or death!

The well driller should fully develop the well (See *Figure 2, page 5*). All sand and foreign matter should be removed. If this pump is used to replace an oil-filled submersible motor that has failed, the well must be bailed free of oil.

Pump performance is based upon pumping clear and cold water that is free of air or gases.

Pumps should be sized properly, for flow and head.

To test the well water for purity, contact your local health department for the proper testing procedure.

Maximum water temperature should not exceed 86°F. The pump should be installed at least, 10 feet below the maximum drawdown level but no less than 10 feet from the bottom of the well to allow for sediment build up.

The pump should be installed according to state water well codes governing the setting of pumps. All wiring must meet National Electrical Code or Canadian Electrical Code and local code requirements.

Pipe joint compound can cause plastic to crack. Use only teflon tape when sealing joints in plastic pipe.

Caution: If the pump pressure exceeds the recommended working pressure of the pressure tank, a pressure relief valve capable of passing the entire pump flow should be installed.

Three (3) - Wire Control Boxes And Panel Equipment

Control boxes and panels should never be mounted in direct sunlight or high temperature locations as this will cause a reduction in capacitor life and unnecessary tripping of the overload protectors. The worst place to mount a control box is in a damp well pit, or other humid locations, as this accelerates component failure from voltage breakdown or corrosion. Control boxes with voltage relays, 1 1/2 HP & up, are designed for vertical upright mounting only. Mounting in other positions will affect the operation of the relay.

Caution: Be sure that the control box HP and voltage match the motor.

Installation

A typical installation diagram is shown in *(Figure 1, page 4)*. All electrical work should be performed by a competent electrician in accordance with the National Electrical Code, as well as local codes and regulations.

Never run the pump unless it is completely submerged in water. If operated without water, the pump and motor could be severely damaged.

The riser pipe should be properly sized and selected based upon the flow rate and friction-loss factors.

Protect all piping, fittings and water system components from freezing.

When lowering the pump into the well, use the discharge pipe. A safety cable may be attached to the pump's discharge head lifting eye. Never use the electrical cable to raise or lower the pump. Do not scrape the electrical cable against the well casing while raising or lowering the pump into well. Secure the cable to the discharge pipe at 10' intervals with electrical tape and use cable guards every 20' to avoid cable damage.

Notice: Webtrol 4" Submersible Pumps are assembled with right hand threads. Hold the pump's discharge head with a wrench while installing the riser pipe or a check valve. Be sure you do not loosen the discharge in the tube. Do not hold the pump housing during installation of the riser pipe or a check valve.

Plastic pipe has a tendency to stretch under load. When securing the cable to the riser pipe, allow 2 inches of slack between the taped intervals.

To ensure that the pump and motor are free to rotate, remove the screen and rotate the shaft by hand.

If the pump is capable of over pumping the well, a liquid level control is required.

Attach the riser pipe to the pump. If plastic pipe is used, provide torque arrestors and safety cable. Review typical installation shown in *(Figure 1, page 4)*.

When installing Schedule 80 threaded plastic pipe and extruded couplings, caution should be taken to prevent excessive tightening which can damage the fitting and/or pipe. The correct degree of tightness may be determined by threading the extruded coupling hand tight, plus a half turn with a strap wrench. Pipe wrenches or pliers that may indent or scratch the pipe should not be used. Over tightening may result in eventual or immediate failure due to excessive stress. Do not use pipe dope. Use teflon tape if needed.

An ohmmeter, or megger should be used to measure the insulation resistance on the power cable every 20 feet as the pump is lowered. This will locate any fault in the cable.

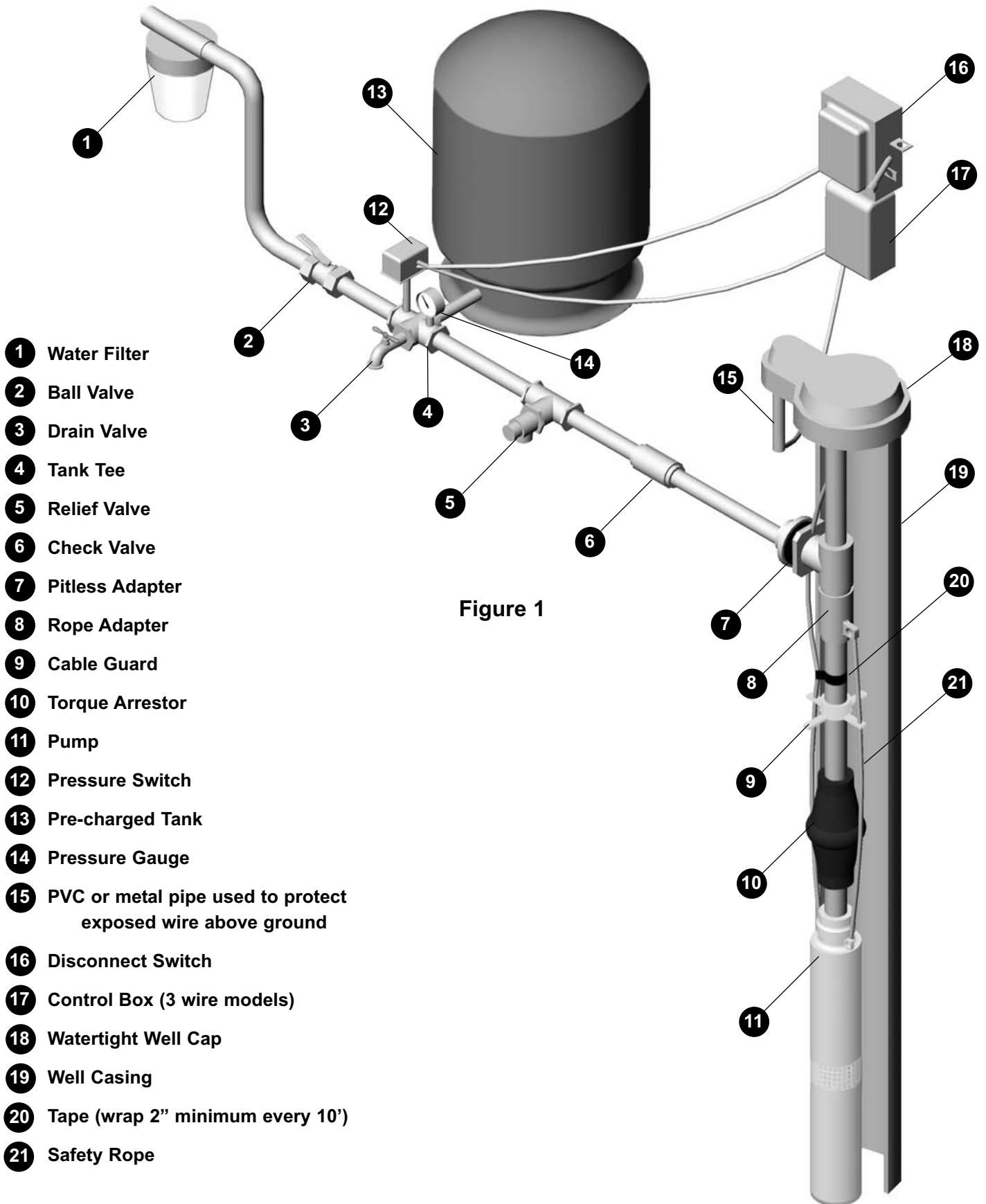
A check valve should always be installed in submersible pump installations. If the pump does not have a built-in check valve, a line check valve should be installed in the discharge line. A line check valve should be installed within 25 feet of the pump, and below the drawdown level of the water supply. For installations deeper than 200 feet, check valves should be installed in 200 foot intervals.

Warning: Failure to ground the control box or panel grounding terminal can result in a serious or fatal electrical shock hazard if a circuit fault occurs.

2-Wire Motor Solid State Controls.

Caution: Restarting the motor within 5 seconds after power is removed may cause the motor overload to trip.

Submersible Pump & Pre-Charged Tank Typical Installation



- 1** Water Filter
- 2** Ball Valve
- 3** Drain Valve
- 4** Tank Tee
- 5** Relief Valve
- 6** Check Valve
- 7** Pitless Adapter
- 8** Rope Adapter
- 9** Cable Guard
- 10** Torque Arrestor
- 11** Pump
- 12** Pressure Switch
- 13** Pre-charged Tank
- 14** Pressure Gauge
- 15** PVC or metal pipe used to protect exposed wire above ground
- 16** Disconnect Switch
- 17** Control Box (3 wire models)
- 18** Watertight Well Cap
- 19** Well Casing
- 20** Tape (wrap 2" minimum every 10')
- 21** Safety Rope

Starting Procedure

Make sure that the pump has been properly grounded prior to testing.

Notice: Never operate the pump with the discharge valve completely closed. The pump can destroy itself if run at shutoff pressure.

Notice: Never start a pump with the discharge valve completely open, if the pump will operate at high flow - low head or if the pump is placed in an artesian well. This can cause the pump to up thrust the impellers-shaft assembly, which can cause premature wear and failure.

To test the well water for clarity, attach a temporary horizontal length of pipe and gate valve to the riser pipe. (See Figure 2)

Make sure the controls are in the off position. Connect the motor leads and power supply to control box, electrical disconnect box or magnetic starter. See wiring diagrams. Do not start the pump!

Partially open the gate valve and start pump. To make sure the 3 phase motor is running in the **right direction**, note the direction of **jerk** as the motor starts. If connections are properly made, the pump will jerk clockwise when looking into the pump discharge when started. If the jerk is counter - clockwise, the motor is running in the wrong direction. Interchange any two cable leads where they connect to the lead terminals in the magnetic starter. Restart the pump and let it operate until the water runs clear of sand, silt and other impurities.

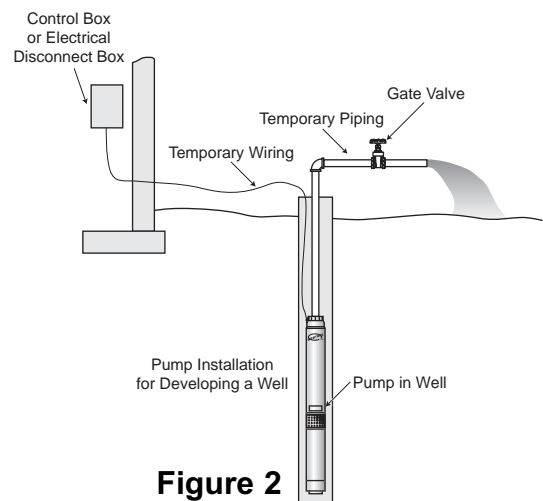


Figure 2

When the water is completely clear at the initial gate valve setting, slowly open valve in small increments allowing the water to clear before progressing. The pump should not be stopped until the water runs clear.

Remove the gate valve for permanent installation.

Install a sanitary well seal or pitless adapter, submersible pump/motor, electrical conduit and surface piping according to local code requirements.

(See Figure 1, page 4) for piping connections to pre-charged pressure tank.

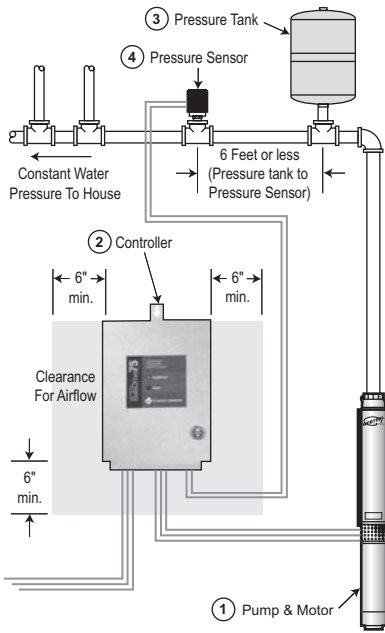
Notice: Check air pre-charge in tank before starting pump. Adjust pre-charge to 2 psi below pump cut-in setting. For example, a pre-charge tank used with a 30-50 pressure switch should be pre-charged with air to 28 PSI (See Table 1). Adjust pre-charge by either adding or bleeding air through the valve located atop the tank. Check pre-charge annually and adjust as needed.

Table 1

Cut - On PSI	Cut - Off PSI	Pre-Charge Pressure PSI
20	40	18
30	50	28
40	60	38

Pressure switches are set to maintain the tank pressure between 20/40 PSI, 30/50 PSI or 40/60 PSI. If another pressure setting is desired, consult the printed instruction card included with the pressure switch.

SubDrive/MonoDrive Systems



Webtrol has added the SubDrive Systems using 3PH motors, and MonoDrive Systems designed for use with 3 wire motors. Both Systems will deliver water at a constant pressure. Carefully read and follow all the safety instructions in the "Installation Manual" that is shipped with the SubDrive/MonoDrive Series Systems.

Webtrol's SubDrive/MonoDrive System consists of only 4 components:

- | | |
|--|---------------------|
| 1) Webtrol's standard pump & motor assembly. | 3) Pressure tank |
| 2) SubDrive/MonoDrive controller. | 4) Pressure sensor. |

Minimum Pressure Tank Size (Total Capacity)		
Pump Flow Rating	Controller Model	Minimum Tank Size
Less than 12 GPM	SubDrive 75 or MonoDrive	2 gallons
	SubDrive 100	4 gallons
	SubDrive 150 or MonoDriveXT	4 gallons
	SubDrive 300	8 gallons
12 GPM or higher	SubDrive 75 or MonoDrive	4 gallons
	SubDrive 100	8 gallons
	SubDrive 150 or MonoDriveXT	8 gallons
	SubDrive 300	20 gallons

Submersible Motor Cooling

Flow Inducer Sleeve



A flow inducer sleeve is a tube over the motor, closed off above the pump intake and extended to the bottom of the motor or lower. The sleeve material is corrosion resistant metal or heavy plastic.

Centering Bolts (3 required) must be located on the motor casting. Do not locate on stator shell.

The submersible motor requires a minimum flow of water past the motor to insure proper cooling. Table 2 below shows the minimum flow rates in GPM for various diameters and motor size.

If the flow rate is less than specified, a flow inducer sleeve or an alternate method of increasing water velocity past the motor must be used for proper cooling.

Several conditions requiring a flow sleeve are; the pump is in an open body of water, the well is top feeding and the well diameter is too large to meet Table 2 flow requirements.

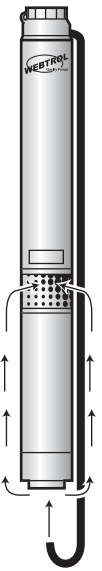
Table 2

Inches Casing or Sleeve I.D.	4" Dia. Motor .25 ft/sec GPM
4	1.2
5	7
6	13

Flow Inducer Discharge Tube

If the casing is too small for a flow inducer sleeve and the pump cannot be raised, a tube may be installed as follows:

- A. Tap a 1/4" tube (ID) into the pump outlet (below check valve).
- B. Clamp it to the pump and motor.
- C. Aim tube upward so flow is introduced 1 foot below the motor.
- D. Protect tube with spacers and angle iron.



Electrical

Warning: A faulty motor or wiring can be an electrical shock hazard if it or surrounding water is accessible to human contact. To prevent this from occurring, connect the motor frame to the power supply grounding terminal with a stranded copper conductor no smaller than the wires carrying current to the motor.

Electrical supply must match the motor voltage, phase and frequency found on the nameplate on the motor and control box. Motor electrical data can be found in tables 5 & 6. If voltage variations are larger than $\pm 10\%$, do not operate the pump.

On 3 phase installations, use a magnetic starter and quick trip overload heaters. Failure to use quick trip heaters in all three lines will not provide adequate motor protection and the warranty will be void.

Caution: Use of smaller than recommended cable voids warranty, can cause failure of the motor to start and operate properly and may cause cable overheating!

Cable Information

Sizes given are for copper wire. If aluminum wire is used, it must be two sizes larger and oxidation inhibitors must be used on the connections. Example: If the table calls for #12 copper wire, #10 aluminum wire would be required.

Note: #11 wire is available, but not often used.

Maximum lengths shown maintain motor voltage at 95% of service entrance voltage, running at maximum nameplate amperes.

To comply to CSA, multiply the cable lengths shown by .6 for maximum feet. This will maintain motor voltage at 97% of service entrance voltage, running at maximum nameplate amperes.

The portion of the total cable length which is between the supply and single phase control box with a line contactor, should not exceed 25% of total maximum allowable to ensure reliable contactor operation. Single phase control boxes without line contactors may be connected at any point in the total cable length.

Table 3

Single Phase Motors														
Two or Three Wire Cable, 60HZ (Service Entrance to Motor-Maximum Cable Length In Feet)														
Motor Rating		60°C Insulation - AWG Copper Wire Size												
Volts	HP	14	12	10	8	6	4	3	2	1	0	00	000	0000
115	1/2	100	160	250	390	620	960	1190	1460	1780	2160	2630	3140	3770
230	1/2	400	650	1020	1610	2510	3880	4810	5880	7170	8720			
	3/4	300	480	760	1200	1870	2890	3580	4370	5330	6470	7870		
	1	250	400	630	990	1540	2380	2960	3610	4410	5360	6520		
	1 1/2	190	310	480	770	1200	1870	2320	2850	3500	4280	5240		
	2	150	250	390	620	970	1530	1910	2360	2930	3620	4480		
	3	0	190	300	470	750	1190	1490	1850	2320	2890	3610		
	5	0	0	0	280	450	710	890	1110	1390	1740	2170	2680	
7 1/2	0	0	0	0	310	490	610	750	930	1140	1410	1720		

Table 4

Three Phase Motors																			
Three Phase, Three Wire Cable, 60HZ (Service Entrance to Motor-Maximum Cable Length In Feet)																			
Motor Rating		60°C Insulation - AWG Copper Wire Size													MCM Copper Wire Size				
Volts	HP	14	12	10	8	6	4	3	2	1	0	00	000	0000	250	300	350	400	500
200	1/2	710	1140	1800	2840	4420													
	3/4	510	810	1280	2030	3160													
	1	430	690	1080	1710	2670	4140	5140											
	1 1/2	310	500	790	1260	1960	3050	3780											
	2	240	390	610	970	1520	2360	2940	3610	4430	5420								
	3	180	290	470	740	1160	1810	2250	2760	3390	4130								
	5	0	170	280	440	690	1080	1350	1660	2040	2490	3050	3670	4440	5030				
7 1/2	0	0	200	310	490	770	960	1180	1450	1770	2170	2600	3150	3560					
230	1/2	930	1490	2350	3700	5760	8910												
	3/4	670	1080	1700	2580	4190	6490	8060	9860										
	1	560	910	1430	2260	3520	5460	6780	8290										
	1 1/2	420	670	1060	1670	2610	4050	5030	6160	7530	9170								
	2	320	510	810	1280	2010	3130	3890	4770	5860	7170	8780							
	3	240	390	620	990	1540	2400	2980	3660	4480	5470	6690	8020	9680					
	5	0	230	370	590	920	1430	1790	2190	2690	3290	4030	4850	5870	6650	7560	8460	9220	
7 1/2	0	0	260	420	650	1020	1270	1560	1920	2340	2870	3440	4160	4710	5340	5970	6500	7510	
460	1/2	3770	6020	9460															
	3/4	2730	4350	6850															
	1	2300	3670	5770	9070														
	1 1/2	1700	2710	4270	6730														
	2	1300	2070	3270	5150	8050													
	3	1000	1600	2520	3970	6200													
	5	590	950	1500	2360	3700	5750												
7 1/2	420	680	1070	1690	2640	4100	5100	6260	7680										
10	310	500	790	1250	1960	3050	3800	4680	5750	7050									

60°C Insulation: The maximum temperature rating of the cable insulation. This includes the water temperature and the increase in the insulation temperature caused by the current flowing thru the wire.

Different Cable Sizes Can Be Used

Depending on the installation, any number of combinations may be used, as long as the total percentage length of the cables used does not exceed 100%. This is to insure that adequate voltage will be supplied to the motor.

Example: In a replacement installation, the well already has 160 feet of buried #10 cable between the service and the well head. What size cable is required in the well with a 3 HP, 230 volt, 1 PH motor setting at 310 feet?

1. According to the table 3, #10 cable is large enough for the 3 HP motor $160 \div 300 = 53.3\%$, since 300 feet is the total allowable.
2. With 53.3% of the total allowable cable already used between the service entrance and the well head, only 46.7% is left for the well. Therefore, the 310 feet needed in the well can only utilize 46.7% of the total feet allowed in the table.
3. From the table, 46.7% of the 470 feet for #8 cable equals only 220 feet, so a larger size is needed. For #6, 46.7% of 750 feet = 350 feet. As a result, #6 can be used for the 310 feet in the well.

Table 5

Single Phase Motors															
Single Phase Motor Specifications (60HZ) 3450 RPM															
Type	Motor Model	HP	Volts	HZ	S.F.	Rated Input (Full Load)		Maximum (S.F. Load)		Winding (1) (Resistance /Ohms) Res. M=Main S=Start	Locked Rotor Amps	KVA Code	Std. Fuse Amps	Dual Element Time Delay Std. Fuse Amps	Circuit Breaker Or Fuse Amps Max Per NEC
						(2) Amps	Watts	(2) Amps	Watts						
Two Wire	244504	1/2	115	60	1.60	10.0	670	12.0	960	1.0-1.3	64.4	R	35	20	30
	244505	1/2	230	60	1.60	5.0	670	6.0	960	4.2-5.2	32.2	R	20	10	15
	244507	3/4	230	60	1.50	6.8	940	8.0	1310	3.0-3.6	40.7	N	25	15	20
	244508	1	230	60	1.40	8.2	1210	9.8	1600	2.2-2.7	48.7	N	30	20	25
244309	1 1/2	230	60	1.30	10.6	1700	13.1	2180	1.5-1.9	66.6	M	35	20	30	
Three Wire	214504	1/2	115	60	1.60	Y10.0 B10.0 R0	670	Y12.0 B12.0 R0	960	M1.0-1.3 S4.1-5.1	50.5	M	35	20	30
	214505	1/2	230	60	1.60	Y5.0 B5.0 R0	670	Y6.0 B6.0 R0	960	M4.2-5.2 S16.7-20.5	23.0	M	20	10	15
	214507	3/4	230	60	1.50	Y6.8 B6.8 R0	940	Y8.0 B8.0 R0	1310	M3.0-3.6 S10.7-13.1	34.2	M	25	15	20
	214508	1	230	60	1.40	Y8.2 B8.2 R0	1210	Y9.8 B9.8 R0	1600	M2.2-2.7 S9.9-12.1	41.8	L	30	20	25
Three Wire W-Run Cap	224300	1 1/2	230	60	1.30	Y10.0 B9.9 R1.3	1660	Y11.5 B11.0 R1.3	2100	M1.7-2.2 S8.0-9.7	52.0	J	35	20	30
	224301	2	230	60	1.25	Y10.0 B9.3 R2.6	2060	Y13.2 B11.9 R2.6	2610	M1.8-2.3 S5.8-7.2	51.0	G	30	20	25
	224302 (3)	3	230	60	1.15	Y14.0 B11.2 R6.1	2940	Y17.0 B12.6 R6.0	3350	M1.0-1.5 S3.5-4.4	83.5	H	45	30	40
	224303 (4)	5	230	60	1.15	Y23.0 B15.9 R11.0	4920	Y27.5 B19.1 R10.8	5620	M.68-1.0 S1.8-2.2	121.0	F	80	45	60

(1) Main winding - black to yellow Start winding - red to yellow

(2) Y=yellow lead, line amps B=black lead, main winding amps R=red lead, start winding amps

(3) Control boxes date coded 02C and older have 35MFD run capacitors and the current values will be (Y14.0, B12.2, R4.7 at FL) & (Y17.0, B14.5, R4.5 at SF load).

(4) Control boxes date coded 01M and older have 60MFD run capacitors and the current values will be (Y23.0, B19.1, R8.0 at FL.) & (Y27.5, B23.2, R7.8 at SF load).

Table 6

Three Phase Motors Three Phase Motor Specifications (60HZ) 3450 RPM														
Motor Model	HP	Volts	HZ	S.F.	Rated Input		Maximum (S.F. Load)		Line to Line Ohms	Locked Rotor	KVA Code Amps	Std. Fuse Amps	Dual Element Time Delay Std. Fuse Amps	Circuit Breaker Amps
					Amps	Watts	Amps	Watts						
234501	1/2	200	60	1.6	2.8	585	3.4	860	6.6-8.4	17.5	N	10	5	8
234511	1/2	230	60	1.6	2.4	585	2.9	860	9.5-10.9	15.2	N	8	5	6
234521	1/2	460	60	1.6	1.2	585	1.5	860	38.4-44.1	7.6	N	4	3	3
234502	3/4	200	60	1.5	3.6	810	4.4	1150	4.6-5.9	23.1	M	15	8	10
234512	3/4	230	60	1.5	3.1	810	3.8	1150	6.8-7.8	20.1	M	10	6	8
234522	3/4	460	60	1.5	1.6	810	1.9	1150	27.2-30.9	10.7	M	5	3	4
234503	1	200	60	1.4	4.5	1070	5.4	1440	3.8-4.5	30.9	M	15	10	15
234513	1	230	60	1.4	3.9	1070	4.7	1440	4.9-5.6	26.9	M	15	8	10
234523	1	460	60	1.4	2.0	1070	2.4	1440	19.9-23.0	13.5	M	6	4	5
234504	1 1/2	200	60	1.3	5.8	1460	6.8	1890	2.5-3.0	38.2	K	20	10	15
234514	1 1/2	230	60	1.3	5.0	1460	5.9	1890	3.2-4.0	33.2	K	15	10	15
234524	1 1/2	460	60	1.3	2.5	1460	3.1	1890	13.0-16.0	16.6	K	8	5	8
234534	1 1/2	575	60	1.3	2.0	1460	2.4	1890	20.3-25.0	13.3	K	6	4	5
234305	2	200	60	1.25	7.7	2150	9.3	2700	1.8-2.4	53.6	L	25	15	20
234315	2	230	60	1.25	6.7	2150	8.1	2700	2.3-3.0	46.6	L	25	15	20
234325	2	460	60	1.25	3.4	2150	4.1	2700	9.2-12.0	23.3	L	15	8	10
234335	2	575	60	1.25	2.7	2150	3.2	2700	14.6-18.7	18.6	L	10	5	8
234306	3	200	60	1.15	10.9	2980	12.5	3420	1.3-1.7	71.2	K	35	20	30
234316	3	230	60	1.15	9.5	2980	10.9	3420	1.8-2.2	61.9	K	30	20	25
234326	3	460	60	1.15	4.8	2980	5.5	3420	7.2-8.8	31	K	15	10	15
234336	3	575	60	1.15	3.8	2980	4.4	3420	11.4-13.9	24.8	K	15	8	10
234307	5	200	60	1.15	18.3	5050	20.5	5810	.74-.91	122	K	60	35	50
234317	5	230	60	1.15	15.9	5050	17.8	5810	1.0-1.2	106	K	50	30	40
234327	5	460	60	1.15	8.0	5050	8.9	5810	4.0-4.9	53.2	K	25	15	20
234337	5	575	60	1.15	6.4	5050	7.1	5810	6.4-7.8	42.6	K	20	15	20
234308	7 1/2	200	60	1.15	26.5	7360	30.5	8450	.46-.57	188	K	90	50	70
234318	7 1/2	230	60	1.15	23.0	7360	26.4	8450	.61-.75	164	K	80	45	60
234328	7 1/2	460	60	1.15	11.5	7360	13.2	8450	2.5-3.1	81.9	K	40	25	30
234338	7 1/2	575	60	1.15	9.2	7360	10.6	8450	4.0-5.0	65.5	K	30	20	25
234595	10	460	60	1.15	15.9	10000	17.3	11400	1.8-2.3	116	L	60	30	45
234598	10	575	60	1.15	12.5	10000	13.6	11400	2.8-3.5	92.8	L	45	25	35

Generator Operation

Warning: To prevent accidental electrocution, automatic or manual transfer switches must be used any time a generator is used as standby or back up on power lines. Contact power company for use and approval.

Whenever the submersible pump is going to be operated using an engine driven generator, the generator manufacturer should be consulted. (See Table 7)

There are two types of generators available, externally and internally regulated (See Table 7). Most are externally regulated. They use an external mounted voltage regulator that senses the output voltage. As the voltage dips at motor start up, the regulator increases the output voltage of the generator.

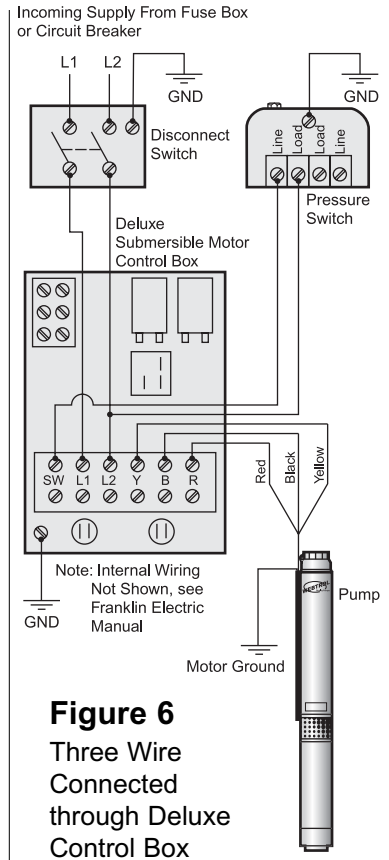
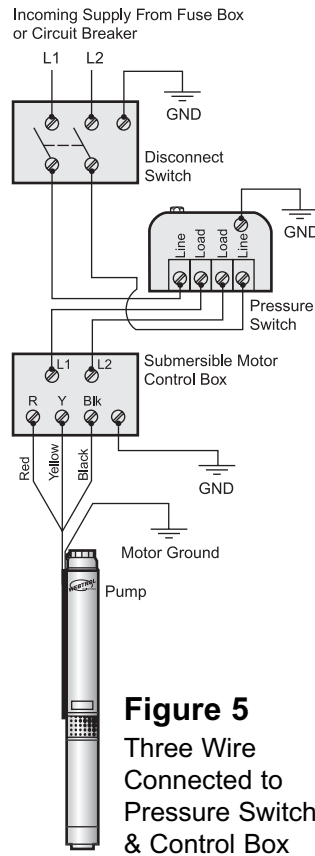
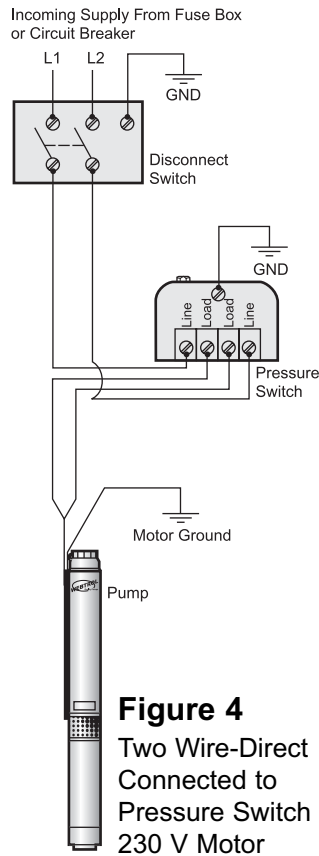
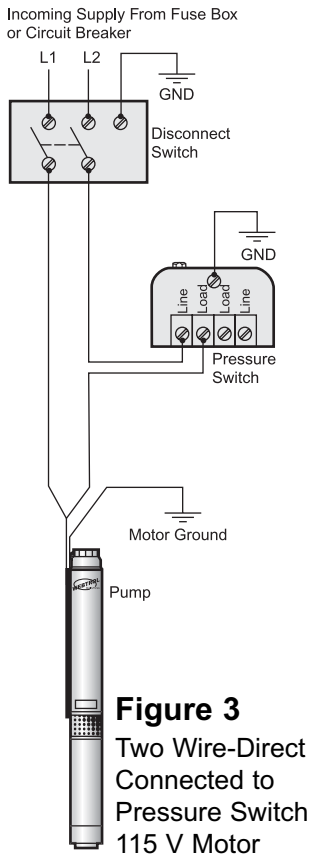
Internally regulated generators have an extra winding in the generator stator and are also called self excited. The extra winding senses the output current to automatically increase the output voltage.

Table 7

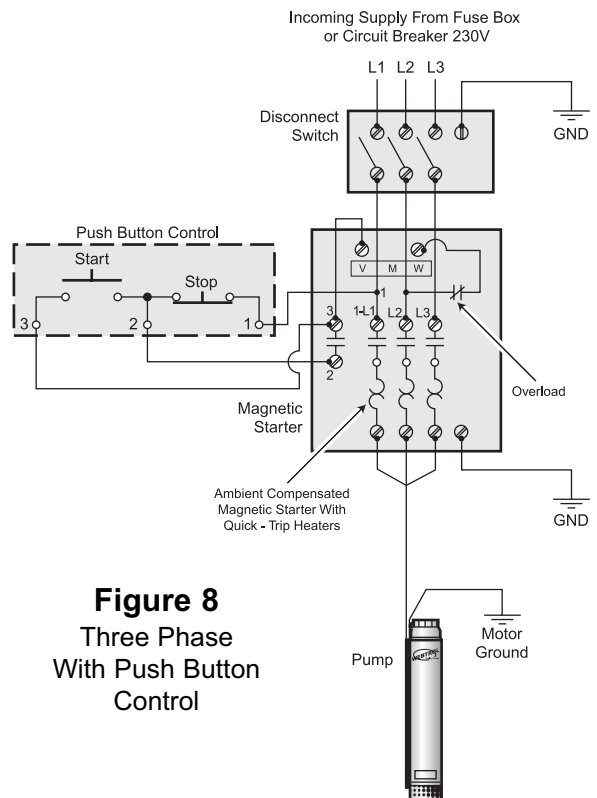
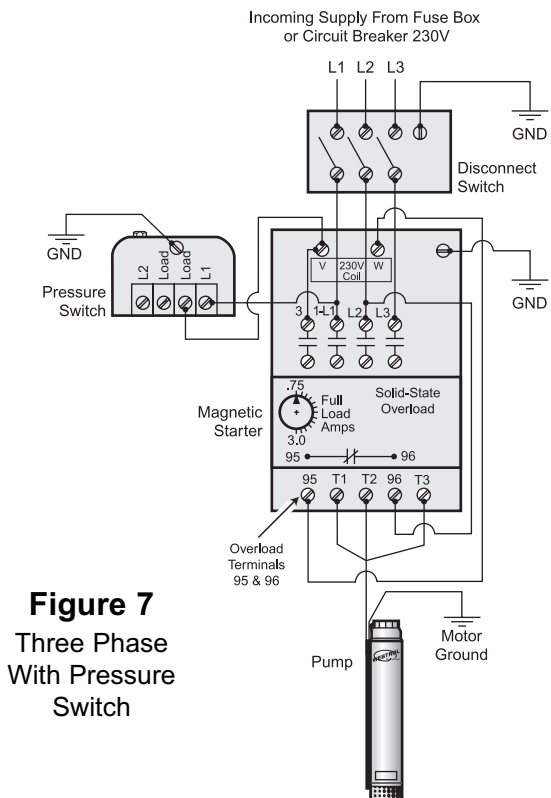
Motor HP	Minimum Rating of Generator			
	Externally Regulated		Internally Regulated	
	KW	KVA	KW	KVA
1/2	2.0	2.5	1.5	1.9
3/4	3.0	3.8	2.0	2.5
1	4.0	5.0	2.5	3.13
1 1/2	5.0	6.25	3.0	3.8
2	7.5	9.4	4.0	5.0
3	10.0	12.5	5.0	6.25
5	15.0	18.75	7.5	9.4
7 1/2	20.0	25.0	10.0	12.5
10	30.0	37.5	15.0	18.75

NOTE: For best starting of two-wire motors the minimum generator ratings should be 50% higher than shown.

Single Phase Motors



Three Phase Motors



System Trouble Shooting

Motor Does Not Start		
Cause of Trouble	Checking Procedure	Correction Action
A. No power or incorrect voltage.	Using voltmeter check the line terminals. Voltage must be $\pm 10\%$ of rated voltage.	Contact power company if voltage is incorrect.
B. Fuses blown or circuit breakers tripped.	Check fuses for recommended size and check for loose, dirty, or corroded connections in fuse receptacle. Check for tripped circuit breaker.	Replace with proper fuse or reset circuit breaker.
C. Defective pressure switch.	Check voltage at contact points. Improper contact of switch points can cause voltage less than line voltage.	Replace pressure switch or clean points.
D. Control box malfunction.	See Franklin Electric Maint. and Installation Manual.	Repair or replace.
E. Defective cable or motor.		
F. Defective wiring.	Check for loose or corroded connections. Check motor lead terminals with voltmeter for power.	Correct faulty wiring or connections.
G. Bound pump.	Locked rotor conditions can result from misalignment between pump and motor or a sand bound pump. Amp readings 3 to 6 times higher than normal will be indicated.	If pump will not start with several trials, it must be pulled and the cause corrected. New installations should always be run without turning off until water clears.

Motor Starts Too Often		
Cause of Trouble	Checking Procedure	Correction Action
A. Pressure switch.	Check setting on pressure switch and examine for defects.	Reset limit or replace switch.
B. Check valve stuck open.	Damaged or defective check valve will not hold pressure.	Replace if defective.
C. Waterlogged tank (air supply).	Check air charging system for proper operation.	Clean or replace.
D. Leak in system.	Check system for leaks.	Replace damaged pipes or repair leaks.

Motor Runs Continuously		
Cause of Trouble	Checking Procedure	Correction Action
A. Pressure switch.	Switch contacts may be "welded" in closed position. Pressure switch may be set too high.	Clean contacts, replace switch or readjust setting.
B. Low level well.	Pump may exceed well capacity. Shut off pump, wait for well to recover. Check static and drawdown level from well head.	Throttle pump output or reset pump to lower level. Do not lower if sand may clog pump.
C. Leak in system.	Check system for leaks.	Replace damaged pipes or repair leaks.
D. Worn pump.	Symptoms of worn pump are similar to those of drop pipe leak or low water level in well. Reduce pressure switch setting, if pump shuts off worn parts may be at fault. Sand is usually present in tank.	Pull pump and replace.
E. Loose or broken motor shaft.	No or little water will be delivered if coupling between motor and pump shaft is loose or if a jammed pump has caused the motor shaft to shear off.	Check for damaged shafts if coupling is loose and replace worn or defective units.
F. Pump screen blocked.	Restricted flow may indicate a clogged intake screen on pump. Pump may be installed in mud or sand.	Clean screen and reset at less depth. It may be necessary to clean well.
G. Check valve stuck closed.	No water will be delivered if check valve is in closed position.	Replace if defective.
H. Control box malfunction.	See Franklin Electric Maint. and Installation Manual.	Repair or replace.

Motor Runs But Overload Protector Trips		
Cause of Trouble	Checking Procedure	Correction Action
A. Incorrect voltage.	Using voltmeter, check the line terminals. Voltage must be within $\pm 10\%$ of rated voltage.	Contact power company if voltage is incorrect.
B. Overheated protectors.	Direct sunlight or other heat source can make control box hot causing protectors to trip. The box must not be hot to touch.	Shade box, provide ventilation or move box away from heat source.
C. Defective control box.	See Franklin Electric Maint. and Installation Manual.	Repair or replace.
D. Defective motor or cable.		
E. Worn pump or motor.		

Trouble shooting continued on back page

Little Or No Liquid Delivered By Pump

Cause of Trouble	Checking Procedure	Correction Action
A. Faulty or incorrectly installed check valve.	Inspect check valve. Is it installed backwards?	Replace if defective.
B. Worn pump.	Reduce pressure switch setting - If pump shuts off worn parts due to sand - usually present in tank - may be the problem.	Pull pump & replace.
C. Pump bound by sand.	Amp readings 3 to 6 times higher than normal will be indicated.	<p>Pull pump clean & reset depth or reverse rotation Warning: Do not reverse rotation with a control box containing a solid state switch or electronic relay, failure will occur.</p> <p>1 phase motor: 1 1/2 HP & up with voltage relay in control box. Switch the red & black leads in the control box. Turn on for 4 seconds, turn off for 1 minute, repeat 3 times.</p> <p>3 Phase motor: interchange any 2 cable leads where they connect to the lead terminals in the magnetic starter. Turn on for 4 seconds, turn off for 1 minute, repeat 3 times.</p>
D. Incorrect motor rotation - 3 phase motor.	Flow rate & pressure will be substantially reduced. For correct rotation the pump should jerk clockwise when looking into the pump discharge when started.	Interchange any 2 cable leads where they connect to the lead terminals in the magnetic starter.
E. Well contains air or gases.	Drain tank. With valve open, turn pump on, if air or gases are present in the water, flow will be intermittent.	Start and stop pump until a constant stream of water is delivered.

Owners Information

Name Of Dealer: _____ Phone: _____

Address: _____

Pump Model No: _____ GPM: _____ Total Dynamic Head: _____ (FT) Date Installed: _____

HP: _____ Volts: _____ Phase: _____ HZ: _____ Service Factor Amps: _____

AWG Cable Size: _____ Ft.: _____

Well Diameter: _____ (IN). Well Depth: _____ (FT). Amount Of Casing: _____ (FT).

Static Water Level: _____ (FT). Well Drawdown: _____ (FT). Pump Setting: _____ (FT).

Pipe Size In Well: _____ (IN). Length Of Pipe In Well: _____ (FT).

Pipe Material: PVC: _____ Galv.: _____

Pipe Size From Well To Discharge Point: _____ (IN). Length Of Pipe From Well To Discharge Point: _____ (FT).

Pipe Material: PVC: _____ Galv.: _____

Pressure Tank: _____ U.S. Gallons: _____ Pressure Switch Setting Cut In PSI: _____ Cut Out PSI: _____

Check Valves At: _____ @: _____ @: _____ @: _____ (FT).

Insulation Resistance: _____ OHMS: _____ OHMS: _____ OHMS

Resistance Between Motor Leads - 3 Wire B/Y: _____ OHMS B/R: _____ OHMS Y/R: _____ OHMS 2 Wire B/B: _____ OHMS

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