

Installer Electrical Training

Most of you will never wire a pumped effluent system. However, as the installer you are responsible for the proper working order when you turn in your shot sheet (EHP-6) front and back, and the permit (EHP-19) filled out on the back by the installer and turned in front and back also. If the electrician says we don't need that or something similar get yourself another electrician.

All electrical components of an onsite wastewater system are subject to the National Electrical code (NEC). The NEC is not updated often however it does get updated. It is your responsibility to stay current. The NEC in AR is enforced through the Labor Board.

The system Main Disconnects (breakers), like an AC Unit disconnect, must be within sight of the external electrical components of any pumped effluent system. The wiring TO the Disconnect must be made by a licensed electrician but the wiring FROM the Disconnect to the system may be made by the Installer. All breakers and or outlets must be GFCI type. Outlets are not to be considered disconnects unless authorized by the manufacturer in writing. Piggyback breakers are **NOT** allowed. If the system is a demand type, the Designated Representative (DR) never determines the size breaker to be used. The installer will be responsible for that determination. Take the Full Load Amperage (FLA) of the pump and multiply times 1.25 the result will be the breaker size. **Ex.** FLA is 15 Amps $15 \times 1.25 = 18.75$ you would use a 20 Amp breaker.

A minimum of 2 circuits are required, 1 circuit will be for the Alarm and 1 will be for the pump. The pump circuit will be the one that is higher in amperage. When wiring these components **all pump connections** on a wiring diagram will be labeled with a **T** (motor connection) **all incoming power** will be listed with an **L** (for Line) and an **N** (neutral). Convention must be followed with these connections, Black to Black, White to White and Green to ground. The wire size for these circuits will be determined by the ampacity of the breaker and the distance to the electrical component. If using Romex, the only type that may be used has a gray sheath. If using multi strand wires, they must be waterproof and burial rated. (Go Over wire and ampacity chart)

All circuits must be encased in PVC electrical conduit, which is also gray, from the main disconnect to the control panel. Even though PVC, water pipe is **NOT** a substitute. The conduit must be Schedule 40 until it breaks the plane of the Earth then it changes to Schedule 80 (including the sweep) and anchored for every 3 feet of rise. When making connections inside the riser, they must be made in an airtight waterproof junction box. The connections must utilize either butt splicers with heat shrink or encapsulated wire nuts. Anytime there is conduit from the riser to any electrical component an electrical seal off kit must be used. The seal off kit protects the internal electrical components of a pumped effluent system in case the junction box should fail. When using a junction box that will be also using a control panel there will be **7** connections 2 for high water alarm 3 for the pump and 2 for Low Level Cutout (**required when using a timed dose**). If all the components are in very close proximity to the riser cord grips will suffice.

Sizing the pump if the recommended pump is not available. Do **NOT** go on Horsepower. A pump curve is necessary along with the Gallons Per Minute (GPM) and Total Dynamic Head (TDH). (**Go over pump curves**)

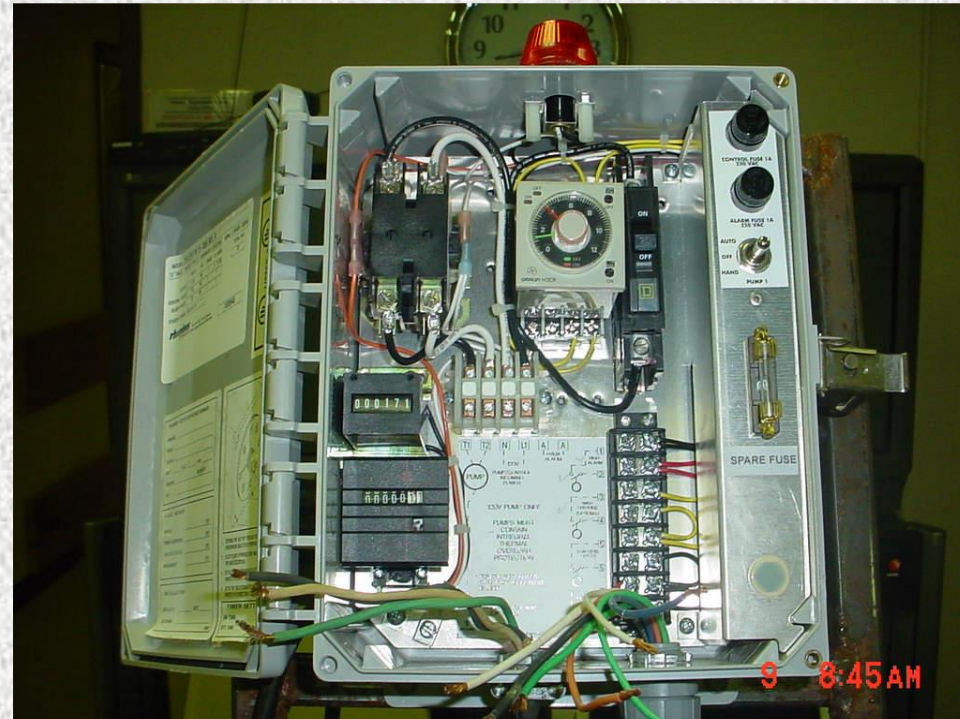
The Control Panel may be mounted on the side of the structure (**NOT mobile homes**) or on a post near the system, again within sight of the Disconnect. Make sure all electrical components are above natural ground where they will not be affected by surface water.

Make sure you use an Effluent quality pump. They are specifically designed to handle anaerobic wastewater. A plain dewatering sump pump will disintegrate over time in this environment. Never use a Macerater Pump. SUMP stands for Submersible Pump.

ELECTRICITY 101

- **Watertight connections**
 - Butt Connectors with heat shrink**
 - Encapsulated Wire Nuts**
- **“Seal Off” Kit**
- **Control Panel Placement (Eyesight or lockout breakers)**
- **Pump Curve (TDH, GPM)**
- **Circuit Disconnect**

Control Panels



Ratings Label

MODEL: 1121W914H10E

1 PHASE, SIMPLEX TYPE 4X

SCHEMATIC #: 1008001C

SERIAL #: 5554-00321

	VOLTS	HZ	PHASE	FL AMPS	TOTAL FLA
MOTOR 1:	120	60	1	8 TO 15	19
CONTROL CIRCUIT:	120	60	1	2	
ALARM CIRCUIT:	120	60	1	2	

STARTING DEVICE: MOTOR CONTACTOR

17134.0

Schematic Symbols



FUSE



SPST SWITCH



SPST PUSH SWITCH



HAND, OFF, AUTO SWITCH



GROUND



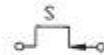
LIQUID LEVEL (N.O.) FLOAT



RED ALARM BEACON



AUDIO ALARM (HORN)



SOLID STATE FLASHER



MOTOR CONTACTOR COIL



ELAPSED TIME METER



EVENT COUNTER



GREEN INDICATOR LIGHT



START RELAY COIL



START RELAY (N.C.) CONTACT



RUN CAPACITOR



START CAPACITOR



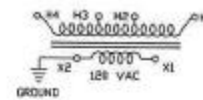
CONTROL RELAY COIL



(N.O.) CONTACT



(N.C.) CONTACT



MULTITAP TRANSFORMER



ANTI-CONDENSATION HEATER



LIGHTNING ARRESTOR



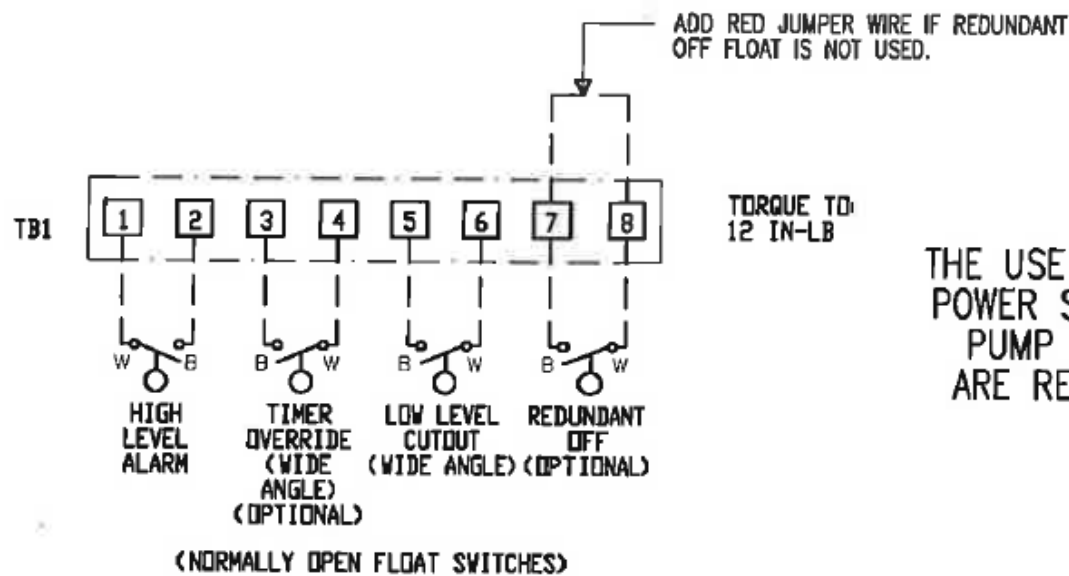
THERMAL CUTOUT (N.C.)



PUMP (MOTOR)



CIRCUIT BREAKER

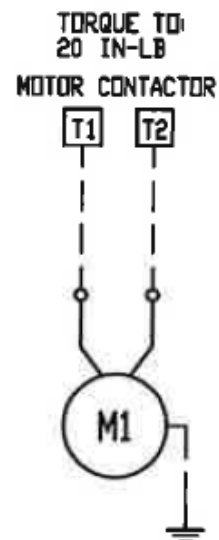
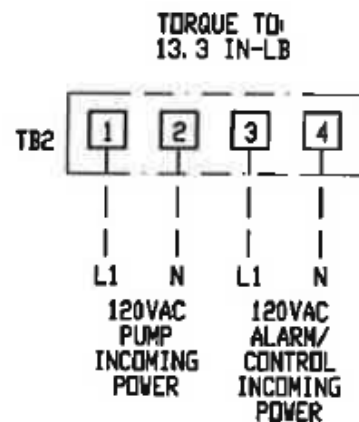


< PUMP CHAMBER >

OVERLOAD PROTECTION,
 MAIN DISCONNECT AND OVERCURRENT PROTECTION
 OF INCOMING FEEDER CIRCUIT PROVIDED BY OTHERS
 AND MUST BE SIZED ACCORDING TO PUMP/MOTOR
 MANUFACTURING SPECIFICATIONS



THE USE OF SEPARATE
 POWER SOURCES FOR
 PUMP AND ALARM
 ARE RECOMMENDED



BRANCH CIRCUIT PROTECTION FOR
 THE CONTROL AND ALARM CIRCUITS
 MUST BE PROVIDED BY THE INSTALLER.
 AN INVERSE TIME CIRCUIT BREAKER
 NOT TO EXCEED 20 AMPS IS REQUIRED.

TEMPERATURE RATING OF FIELD INSTALLED CONDUCTORS MUST BE AT LEAST 140 DEG. F.
 (60 DEG. C.). TERMINAL STRIPS AND GROUND LUG USE COPPER CONDUCTORS ONLY.

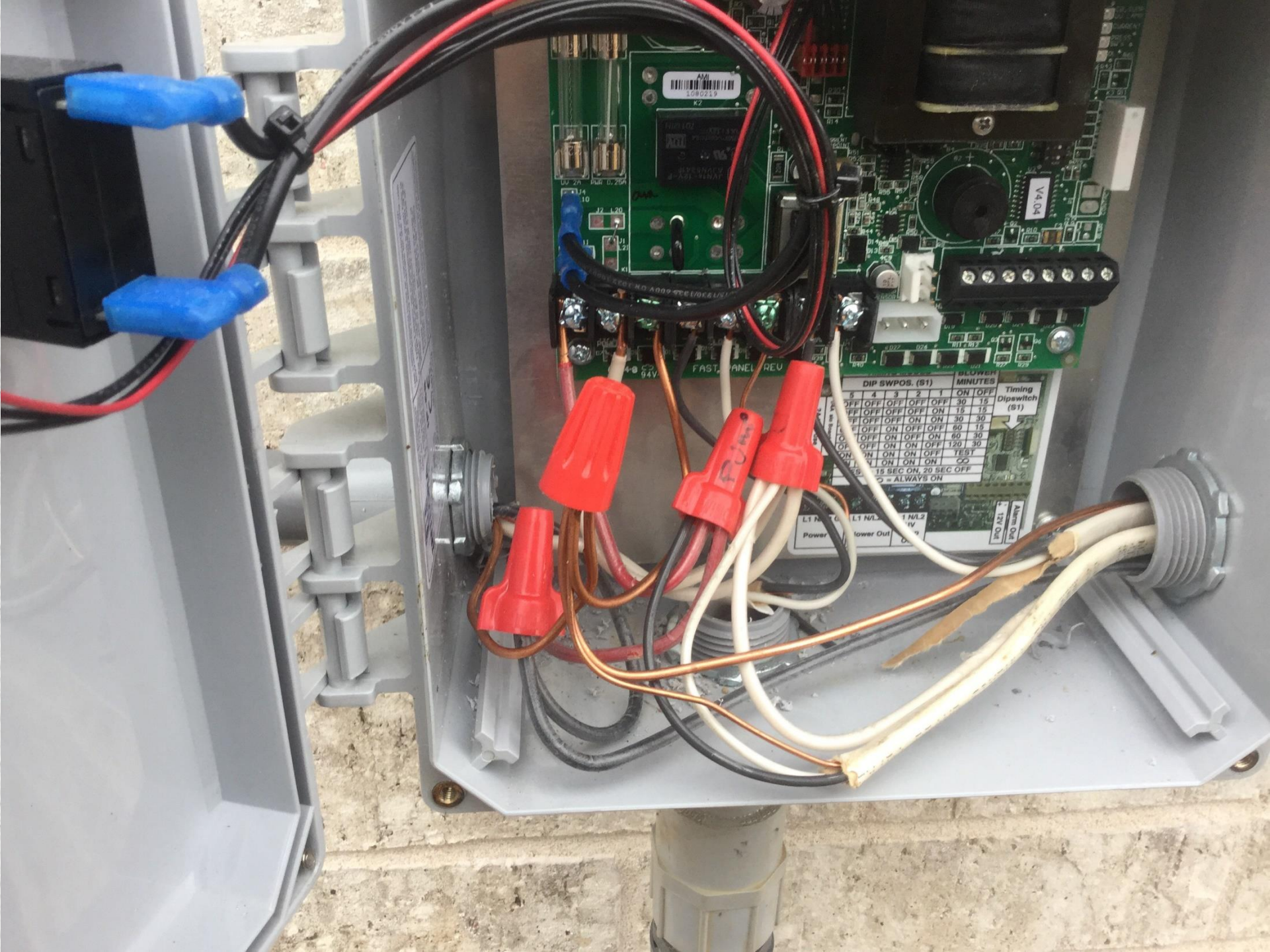
CONNECT GROUND LUG IN PANEL TO A SECURE EARTH GROUND

DASHED LINES REPRESENT FIELD WIRING

FIELD WIRING SECTION







DIP SWPOS. (S1)					MINUTES		Timing Dipswitch (S1)
5	4	3	2	1	ON	OFF	
OFF	OFF	OFF	OFF	OFF	30	15	
OFF	OFF	OFF	OFF	ON	15	15	
OFF	OFF	OFF	ON	ON	30	30	
OFF	ON	OFF	OFF	OFF	60	15	
OFF	ON	OFF	ON	ON	60	30	
OFF	ON	ON	ON	OFF	120	30	
ON	ON	ON	ON	ON	TEST		
ON	ON	ON	ON	OFF	∞		
TEST = 15 SEC ON, 20 SEC OFF							
∞ = ALWAYS ON							

L1 N1 L1 N1 L1 N1 L1 N1 L1 N1
Power Lower Out

Alarm On
12V





WIRE SIZE CHART – 110 VOLTS

WIRE SIZE	LOAD	AMPS --	120 volts	SINGLE	PHASE	
*AWG	10 AMPS	15 AMPS	20 AMPS	25 AMPS	30 AMPS	40 AMPS
14	58	39	29	N/A	N/A	N/A
12	80	60	45	36	N/A	N/A
10	150	100	75	60	50	N/A
8	230	154	115	92	77	62
6	367	245	184	147	123	105
4	665	443	334	267	223	165

**American Wire Gage*

(DISTANCE IN FEET)

Examples:

- 1) How far can you run a 20 AMP breaker on 12-gauge wire? **Up to 45'**
- 2) What size wire is needed to run a 25 AMP breaker 75 feet? **8-gauge wire**
- 3) How far can you run a 30 AMP breaker on 12-gauge wire? **You can't!**

WIRE SIZE CHART – 240 VOLTS

WIRE SIZE	LOAD	AMPS --	240 volts	SINGLE	PHASE	
*AWG	10 AMPS	15 AMPS	20 AMPS	25 AMPS	30 AMPS	40 AMPS
14	132	87	65	N/A	N/A	N/A
12	132	138	103	76	N/A	N/A
10	329	209	167	129	109	N/A
8	489	328	253	187	154	109
6	823	568	417	336	258	207
4	1339	893	687	526	427	338

**American Wire Gage*

(DISTANCE IN FEET)

Example: An Onsite Wastewater System’s control panel requiring 30 amps that is 20 feet from the power source will require a minimum 10-gauge wire.

Important Information:

Fuses and circuit breakers are needed to protect circuits, power components and loads. Fuses and circuit breakers have one main purpose to break the electrical circuit if the current (amps) flowing in that circuit exceed the rating of the device. Any size fuse may be used safely with the fuse rating being lower than the maximum ampacity of the smallest wire in the circuit. Fuses and circuit breakers are typically able to allow three times their rated current for a few seconds, this is for handling the surge necessary for the starting of motors. In the event of a short circuit, which can cause the sudden draw of hundreds or even thousands of amps through the circuit, the fuse will melt or the circuit breaker will open before the wire catches on fire.