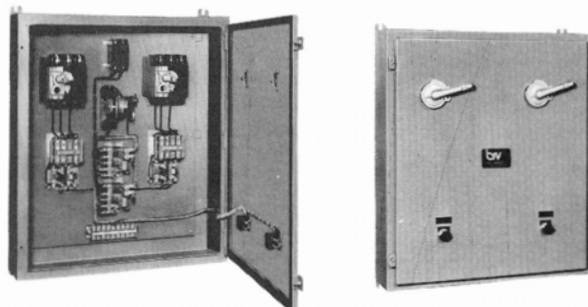


**AUTOMATIC ALTERNATOR COMBINATION STARTER PANELS**

Typical Model C1B Control  
In Nema 1 General Purpose Enclosure

**FEATURES AND ADVANTAGES**

**Quick, Easy Installation** — All controls assembled in compact enclosures for fast, low-cost installation.

**Greater Operator Safety** — Operating handles are interlocked with cover and incorporate provisions for padlocks. Handles must be in the OFF position before the control panel can be opened.

**Accurate, Reliable Operation** — Based on original BIW concept of using the conductivity of liquids as a means of achieving reliable level control.

**Minimum Maintenance** — All components are conservatively rated, factory tested and performance proven.

**STANDARD DUPLEX SYSTEMS**

Ametek has developed a number of basic controls for automatic operation of two pumps. The components include a BIW alternator and two BIW relays suitable for the application. Two across the line magnetic starters with 3 pole fixed-trip thermal overload devices are provided along with HOA selector switches on the cover.

There is a choice of thermal magnetic trip circuit breakers, or fusible disconnect switches for motor short circuit protection.

A complete system wiring diagram with description of operation is provided so that field installation and servicing is easily accomplished.

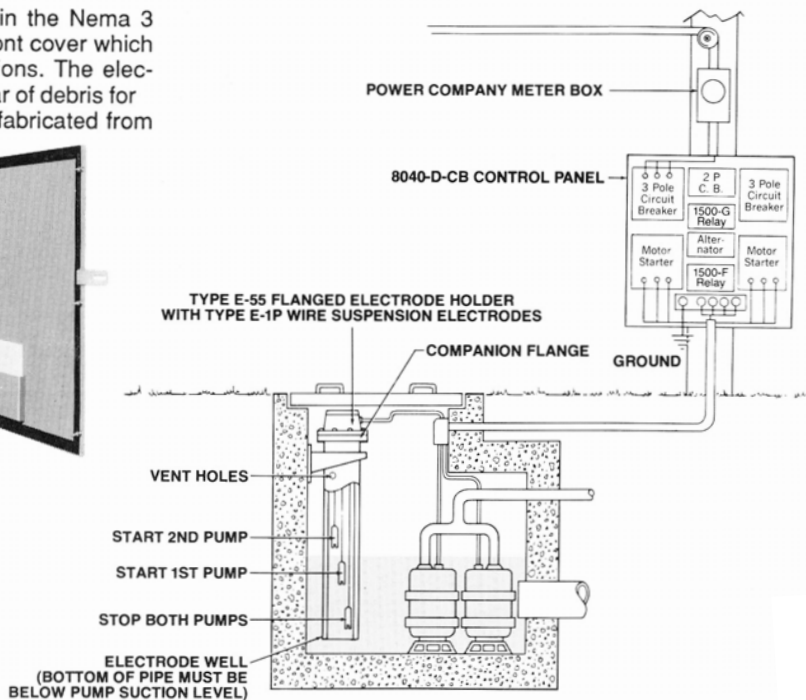
**SPECIAL CONTROL SYSTEMS**

Basic duplex systems can be equipped with a variety of signals, alarms, meters, remote control or other control accessories. Also, instead of our standard automatic alternation, special sequencing or interlocking arrangements are available. Systems for more than two pumps can quickly be designed and provided.

Catalog Section 8044 shows our ability to provide custom panels. Just tell us what you want to accomplish and Ametek will provide the control system.

**TYPICAL STORM DRAIN SUMP CONTROL**

Model 8040-D-C3B control panel is shown in the Nema 3 weather tight enclosure with internal dead front cover which is designed for unattended outdoor installations. The electrode will serve to keep the liquid surface clear of debris for proper contact with the electrodes, and it is fabricated from standard pipe and fittings.



## AUTOMATIC ALTERNATOR COMBINATION STARTER PANELS

### Catalog Number Example

8040-U-C1B2-HOA-L4-N12-1500-S7

ENCLOSURE	
N1	Nema 1
N3	Nema 3 with Internal Deadfront
N4	Nema 4
N12	Nema 12

3 PHASE LINE VOLTAGE	
L2	208-230 Volt 50/60 Hz
L3	460 Volt 50-60 Hz
L4	575 Volt 50/60 Hz

OPTIONAL FEATURES	
X	None
HOA	<sup>1</sup> Hand-Off Auto Switches Furnished as Standard Equipment
PRL	<sup>1</sup> Pump Running Lights
RTM	<sup>1</sup> Running Time Meters

NOTE<sup>1</sup>. One can be furnished for each pump Mounted on cover complete with engraved data plate.

RELAY SENSITIVITY	
S1-S11	Select from Chart Sec. 1500
LF1, HF2	Select from Chart Section 5200
LV1-2 HV3-4-5	Select from Chart Section 5200
V	Select from Chart Section 5300
F1-F8	Select from Chart Section 5300

RELAY TYPE	
1500	Induction Type 1500
5200-L	Series 5200-low sensitivity
5200-H	Series 5200-high sensitivity
5300-P	Series 5300-25 amp contacts
5510	Series 5510-10 amp contacts

TYPE OF CONTROL	
D	Pump Down for 2 Pumps
U	Pump Up for 2 Pumps
H	Hydropneumatic Tank with 2 Pumps

	NEMA SIZE	LINE VOLTAGE	MAX. H.P. RATING	CIRCUIT BREAKER	
				Frame Size	Max. Amp <sup>2</sup>
C1B2	1	208-230	7½	EA	40
		460	10	EH	30
		550-600	10	FA	20
C2B2	2	208-230	15	EA	70
		460	25	FA	50
		550-600	25	FA	50
C3B2	3	208-230	25	FA	100
		208-230	30	JA	125
		460	50	FA	100
C4B2	4	208-230	50	JA	200
		460	100	JA	200
		550-600	100	JA	175

	NEMA SIZE	LINE VOLTAGE	MAX. H.P. RATING	DISCONNECT SWITCH	
				FUSE CLIP SIZE <sup>3</sup>	
C1F2	1	208-230	7½	31-60 ampere	
		460	10	31-60 ampere	
		550-600	10	31-60 ampere	
C2F2	2	208-230	15	61-200 ampere	
		460	25	61-100 ampere	
		550-600	25	61-100 ampere	
C3F2	3	208-230	25	61-100 ampere	
		208-230	30	101-200 ampere	
		460	50	101-200 ampere	
C4F2	4	208-230	50	201-400 ampere	
		460	100	201-400 ampere	
		550-600	100	201-400 ampere	

### ORDERING INFORMATION

In addition to the complete Catalog Number, furnish details on the pump to be controlled including horsepower, voltage and full load current rating.

### PANELS WITH CIRCUIT BREAKERS

NOTE<sup>2</sup>. The actual H.P. rating of the motors must be specified so that properly sized circuit breakers can be provided.

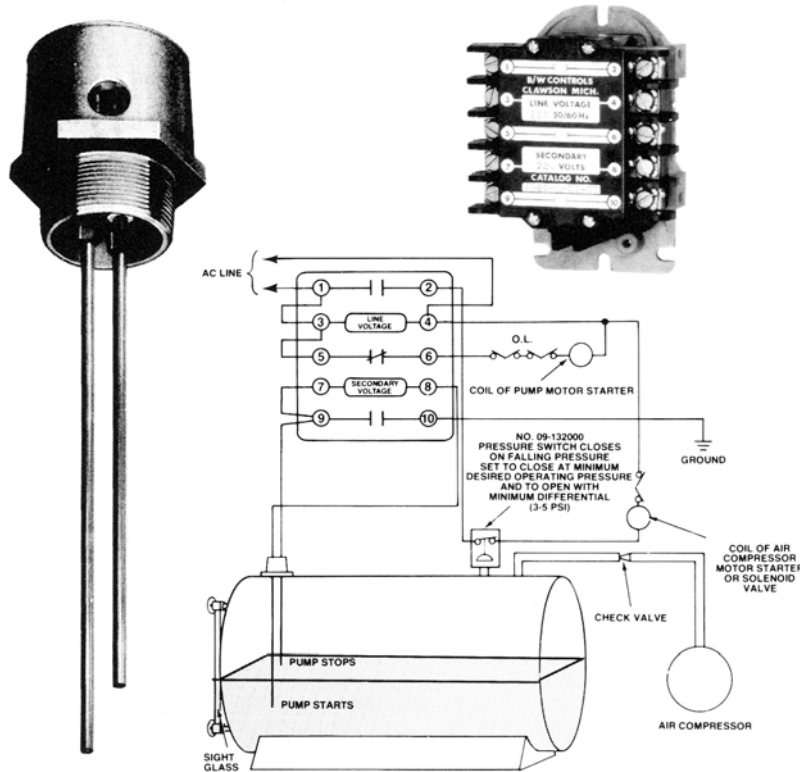
### 4 ELECTRODES REQUIRED

These standard controls are based on two pump start electrodes and one pump stop electrode. A common electrode is included and it may be omitted if a dependable ground return connection to the liquid is provided by other means.

### PANELS WITH FUSIBLE DISCONNECT SWITCHES

NOTE<sup>3</sup>. Fuses are not included. Proper fuses must be provided at time of installation in accordance with N.E.C. requirements.

## HYDROPNEUMATIC TANK PANELS



Typical Single Pump Add-Air Type Hydropneumatic Tank Control consists of a Type 1500-G relay and two electrodes of proper type and length supported by a cast pressure tight electrode holder.

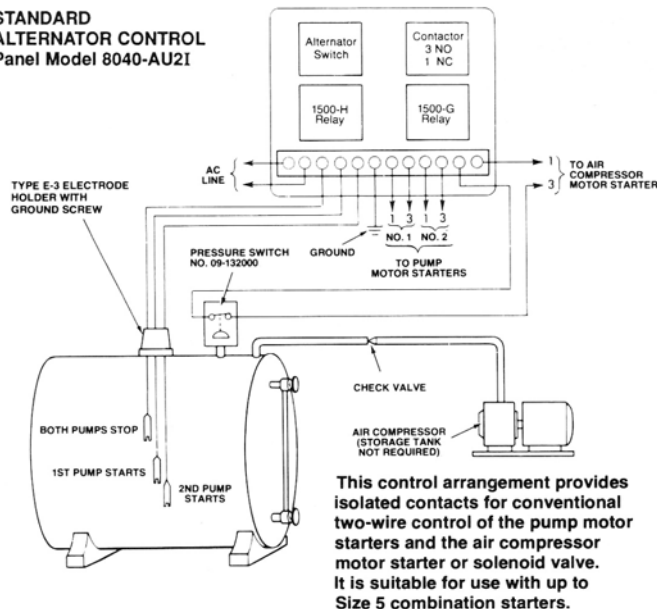
BIW hydropneumatic tank control systems provide simple, positive means of maintaining a properly balanced relationship between the water level and air pressure in house tanks for large and small buildings, subdivision water supplies, and other installations that require reliable, trouble-free operation. Fully automatic on start up, it requires little or no maintenance and minimizes short pump cycling during high demand periods.

### PRINCIPLE OF OPERATION

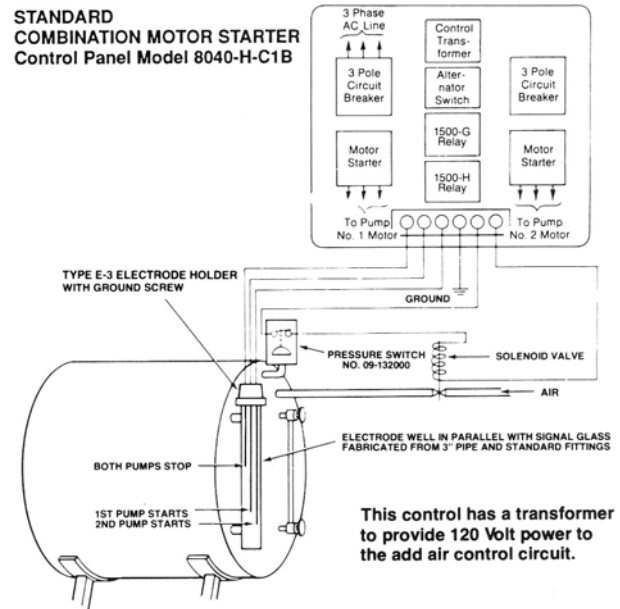
As shown at left, the basic single pump add air system consists of BIW Type 1500-G pump control relay which operates from electrodes installed in the tank to start the pump at a low water level and stop the pumping cycle when the water reaches a given high level. The addition of air into the tank is controlled by a pressure switch and is permitted only when the pump is idle. Thus required air is automatically supplied to the tank whenever pressure drops below the desired lower operating pressure and only enough is added to maintain this pressure until the water level falls below the lower electrode and the pump is started again. When the pump starts, the air supply compressor, or solenoid valve, is locked out and the rising water then gradually compresses the air until the desired upper operating pressure is reached. This occurs when the water level has been pumped up to the upper electrode.

The operating pressure differential of the system is determined by the distance between the pump start and pump stop electrodes instead of by the pressure switch differential, it is essential that electrode lengths be properly established to maintain desired air and water balance at all times.

### STANDARD ALTERNATOR CONTROL Panel Model 8040-AU2I



### STANDARD COMBINATION MOTOR STARTER Control Panel Model 8040-H-C1B



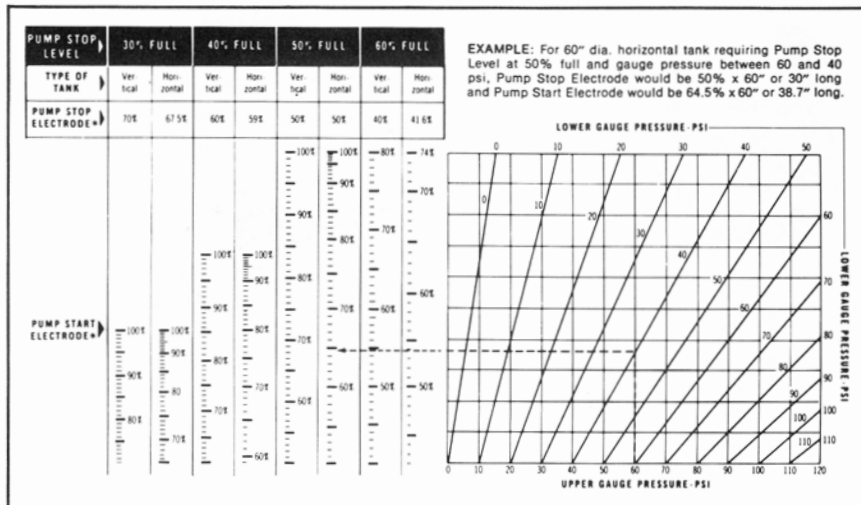
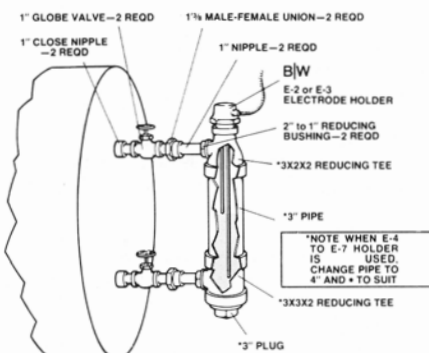
## HYDROPNEUMATIC TANK PANELS

### ELECTRODE EQUIPMENT

For details on electrode holders see Catalog Section 6012, and for electrode information see Section 6013.

Solid rod electrodes are generally used for applications requiring relatively short lengths of six feet or less to reach desired operating levels. If longer lengths are necessary — or if space limitations prevent installation of rod electrodes, Type E-1P or Type E-1S shielded wire suspension electrodes should be used.

**Installation** — Electrode holders should be mounted vertically — either through the top of the tank, with electrodes extending downward to the desired operating levels, or in an external chamber installed on the end of the tank as illustrated below.



\*All electrode lengths are given in per cent of height for Vertical Tanks and per cent of diameter for Horizontal Tanks. Percentage values shown assume electrode holder will be mounted in top of tank.

### HOW TO DETERMINE ELECTRODE LENGTHS

**Pump STOP Electrode** — Select desired Pump Stop Level from the per cent full values listed at top of chart AND NOTE THE PERCENT FACTOR GIVEN FOR Pump STOP Electrode for the type of tank to be controlled. Multiply this percent factor by height or diameter of tank to obtain length of Pump STOP Electrode.

**Pump START Electrode** — Select desired operating pressure range. Then, starting at

the Upper Gauge Pressure listed on the horizontal scale, draw a vertical line up to intersect the diagonal line shown for desired Lower Gauge Pressure. From this point, draw a horizontal line left to the vertical scale in the column used to determine the Pump STOP Electrode length. Multiply the percent factor shown on scale by the height or diameter of tank to obtain length of Pump START Electrode.

### ADD AIR CONTROL



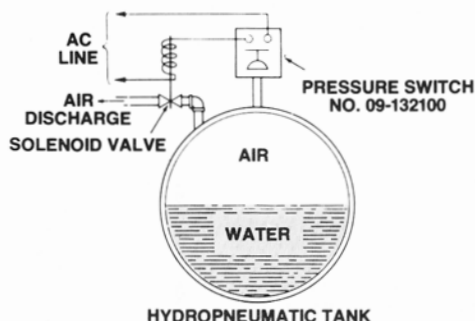
BIW Part No. 09132000  
Range 10-150 psi  
8.0 Amp @ 115 VAC  
5.1 Amp @ 230 VAC

The switch contacts close on falling pressure and must be set to close at the system lower operating pressure. The differential is fixed at approximately 4 psi, so that the addition of air serves only to maintain the system lower pressure. If any other type of pressure switch is used, the operating reset differential must be set to no more than 5 psi.

### DISCHARGE AIR CONTROL



BIW Part No. 09132100  
Range 10-140 psi  
8.0 Amp @ 115 VAC  
5.1 Amp @ 230 VAC



The discharge air control arrangement shown at the left may be added to any basic BIW system, however, it is only required when excess air enters the system from sources such as deep well pumps.

The switch contacts close on rising pressure and should be set about 10 psi above the system upper operating pressure. The reset differential is fixed at approximately 5 psi.

**LONG DISTANCE REMOTE CONTROL PANELS**

Ametek has developed several B|W long distance and low voltage remote control systems designed to meet the requirements of a broad range of industrial and commercial applications.

While these systems have been widely used with electrodes to detect and control levels and interfaces of conductive liquids and moist bulk materials, they incorporate a low voltage sensing circuit which will also operate from contact-type pilot devices such as pressure, flow, float and limit switches, thermostats and pushbuttons, etc. As a result, they can also be used to provide safe, reliable, low cost control of lighting and alarm systems, conveyors, machinery, and automated processing, packaging and transfer equipment.

Selection of the system best suited for a given application depends

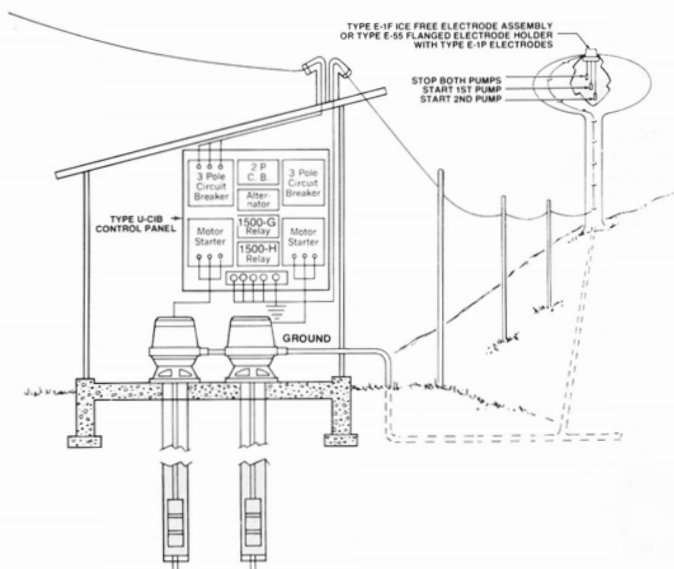
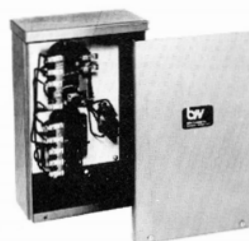
upon the control circuit wiring. In general, maximum distance for an AC sensing circuit is limited by the capacitance of the wires connecting the relay to the pilot device. If a DC sensing circuit is used, distance is limited by the resistance of the control circuit.

For applications requiring an AC sensing circuit use B|W Type 1500 induction relays with 24, 40, or 90 volt secondary coils, or Type 5200-L solid state relays with 270 ohm R1 resistor. For applications requiring a DC sensing circuit use Type 5200-H solid state relay with 10,000 ohm R1 resistor, Type 5300-F1 intrinsically safe control relay, or the 8040-1750 telephone circuit control.

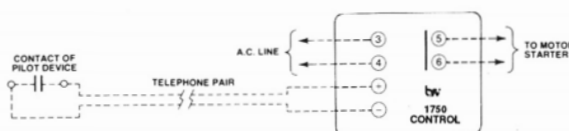
Let our application engineers help you select a system designed to meet your specific needs.

**ELEVATED STORAGE TANK CONTROL**

A model 8040-U-C1B2 control with combination motor starters is shown with Type 1500 induction relays. This arrangement is suitable located up to 900 feet from the tank. For greater distances, Ametek offers various methods of remote control either over direct private wires or leased telephone circuits.

**STANDARD 8040-1750 CONTROL PANEL FOR TELEPHONE CIRCUIT REMOTE CONTROL**

The 1750 control is designed for reliable operation over phone circuits with up to 3000 ohms resistance. A continuous metallic circuit is required between the pilot contact and the 1750 control unit. For installations where an isolated pair is not available, other control systems can be furnished.

**Catalog Number Example**

8040—1750—X—L1—N4

LINE VOLTAGE		ENCLOSURE	
115 Volt 50/60 Hz	L1	OC	Open Chassis
230 Volt 50/60 Hz	L2	N1	Nema 1 & 3R
460 Volt 50/60 Hz	L3	N4	Nema 4
		N12	Nema 12

04136200 Lighting Arrestor  
(For use on Induction Relay secondary circuits up to 360 volts)