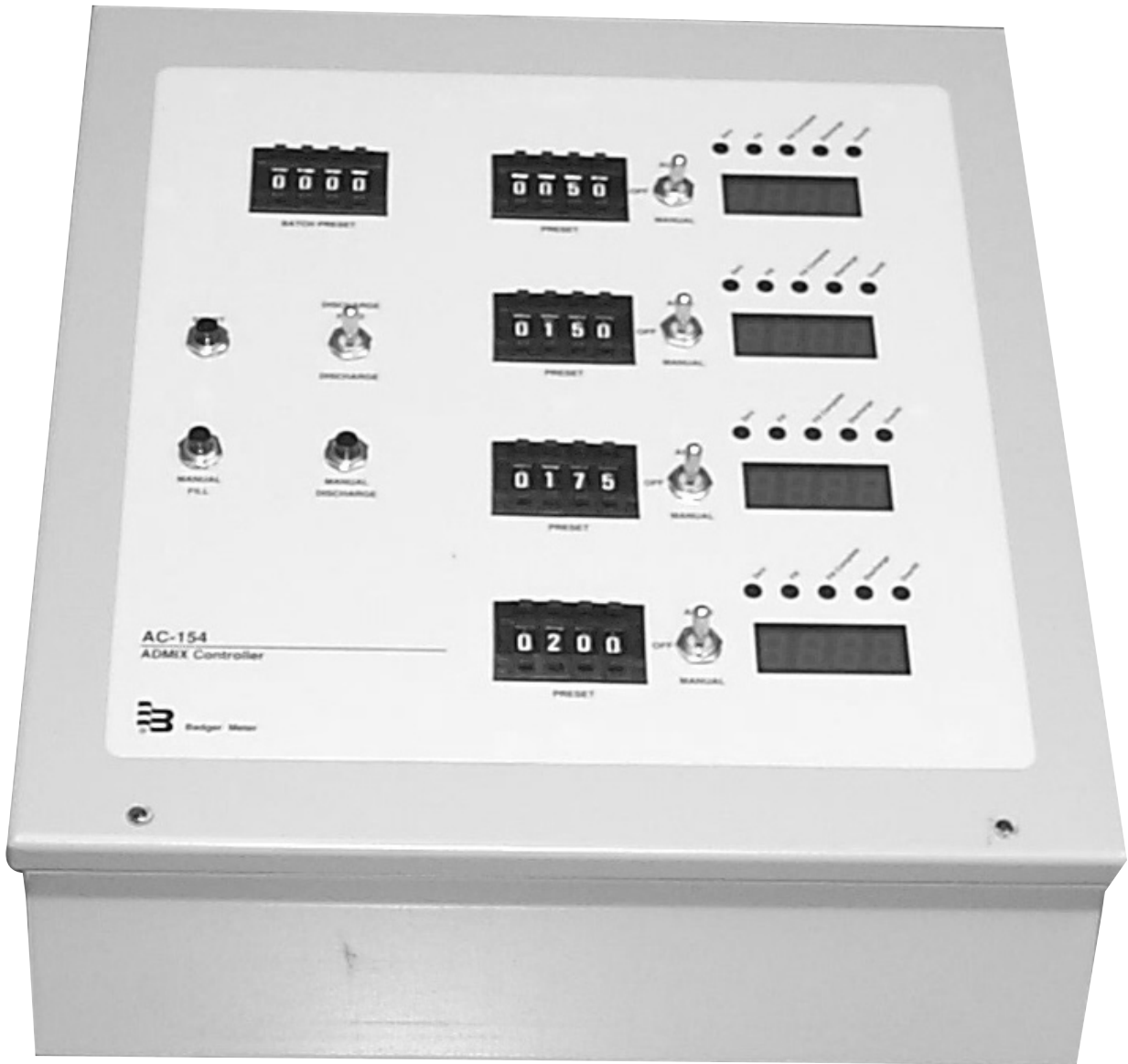




Badger Meter

Admix Controller

Model AC-154



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SCOPE OF THIS MANUAL

This manual explains the installation and operation of the Model AC-154 Admix Controller. To ensure proper performance of this controller, the instructions given in this manual should be thoroughly understood and followed. Keep this manual in an accessible location for future reference.

DESCRIPTION

The controller is designed to operate up to four concrete admixture dispenser systems. Solid-state circuitry and microprocessor technology give the controller superior operating characteristics.

The standard controller is set up to operate off a 120V AC power supply, but as an option, can be operated off 220/240V AC. The controller uses opto-isolated I/O modules for inputs from flow meters and probes, and outputs to solenoid valves. The standard units require 120V AC inputs and provide 120V AC outputs. These I/O modules can be changed to provide DC volt or 220/240V AC outputs, as well as accept DC or 220/240V AC inputs.

Easy to operate, the controller allows the operator to batch admixtures in total ounces, ounces per cubic yard, or ounces per 100 wt cement. The controller has many other features and operating characteristics. You will find that this unit is truly the most versatile and well equipped admix controller offered.

UNPACKING AND INSPECTION

Upon opening the shipping container, visually inspect the product and applicable accessories for any physical damage such as scratches, loose or broken parts, or any other sign of damage that may have occurred during shipment.

NOTE: If damage is found, request an inspection by the carrier's agent within 48 hours of delivery and file a claim with the carrier. A claim for equipment damage in transit is the sole responsibility of the purchaser.

CONNECTING THE POWER SUPPLY

The AC-154 Admix Controller operates from a 120V AC 50/60 Hz 1 Amp power supply. As an option, it can be operated from a 220/ 240V AC 50/60 Hz 0.5 Amp power supply. The power supply connection is through a power entry module. See *Figure 2 on page 4* for location of the power entry module. The power entry module is equipped with a 3-prong male power cord connector, a power ON/OFF switch, and a 250V 2 Amp fuse. Enclosed with the controller is a 6-foot power cord for connecting the power entry module to a standard 120V AC outlet.

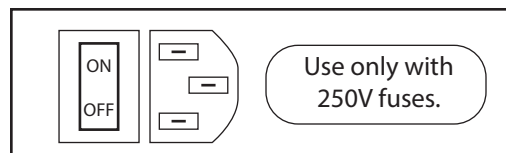


Figure 1: Power entry module

WIRING PROCEDURE

The terminal block inside the controller contains 48 terminals for wire connections. Use 18-gauge insulated stranded wire for connection between the controller and admixture dispensers. This manual provides detailed diagrams to illustrate the proper wiring procedure for all standard functions. At installation, be sure to comply with all national and local electrical codes.

CAUTION

DISCONNECT POWER SUPPLY BEFORE CONNECTING WIRES TO ANY OF THE TERMINALS.

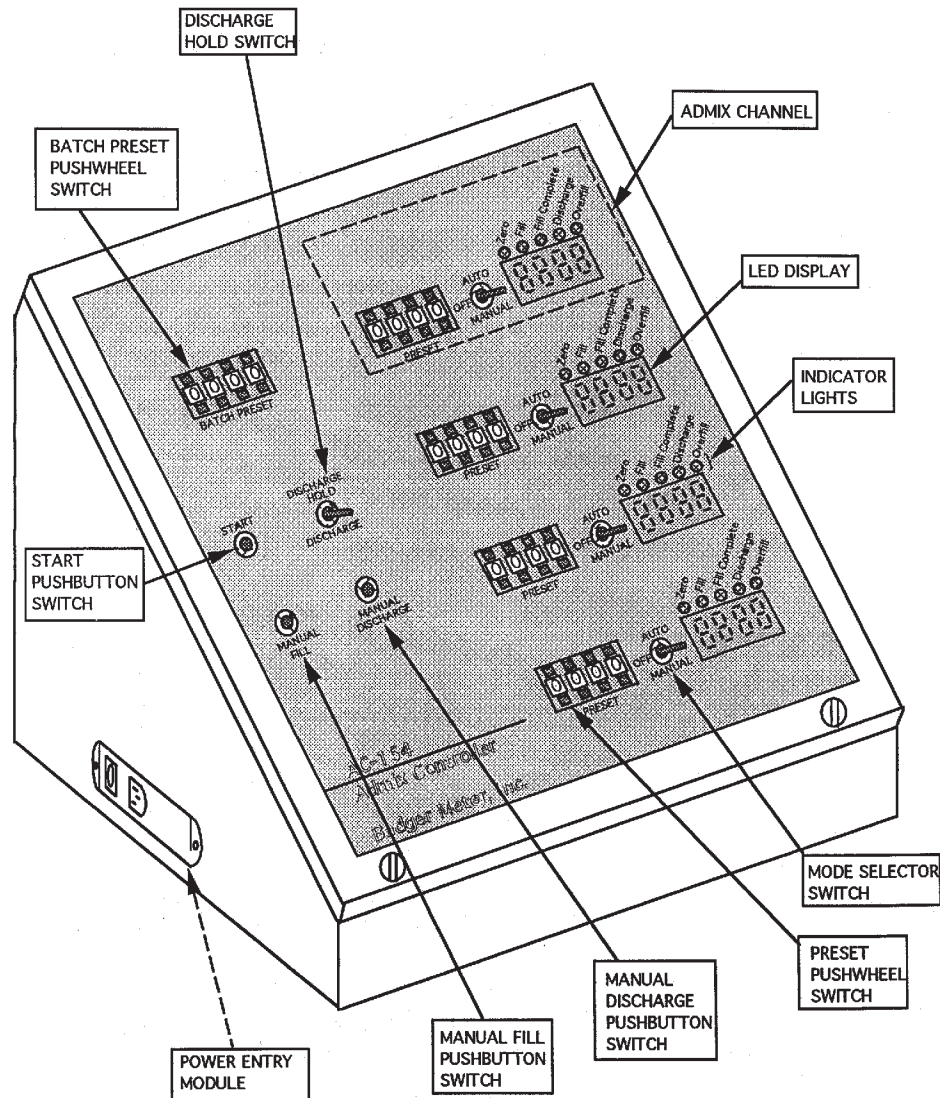


Figure 2: AC-154 admix controller faceplate

CONNECTING THE PULSE TRANSMITTER

The controller is designed to accept a 120V AC count input. An I/O module accepts the count input from a flow meter transmitter and, in turn, operates the controller count display. As an option, the count input can be modified to accept a 12...24V DC or 220/240V AC count input. *Figure 3* shows connection between the controller and Badger Meter® Reed Switch Transmitters Model PM-5 and CT. *Figure 4 on page 6* shows the connection for a Badger Meter Electronic Scalable Transmitter Model PFT-1E.

For ease of operation, set up the meter transmitter for one pulse per ounce.

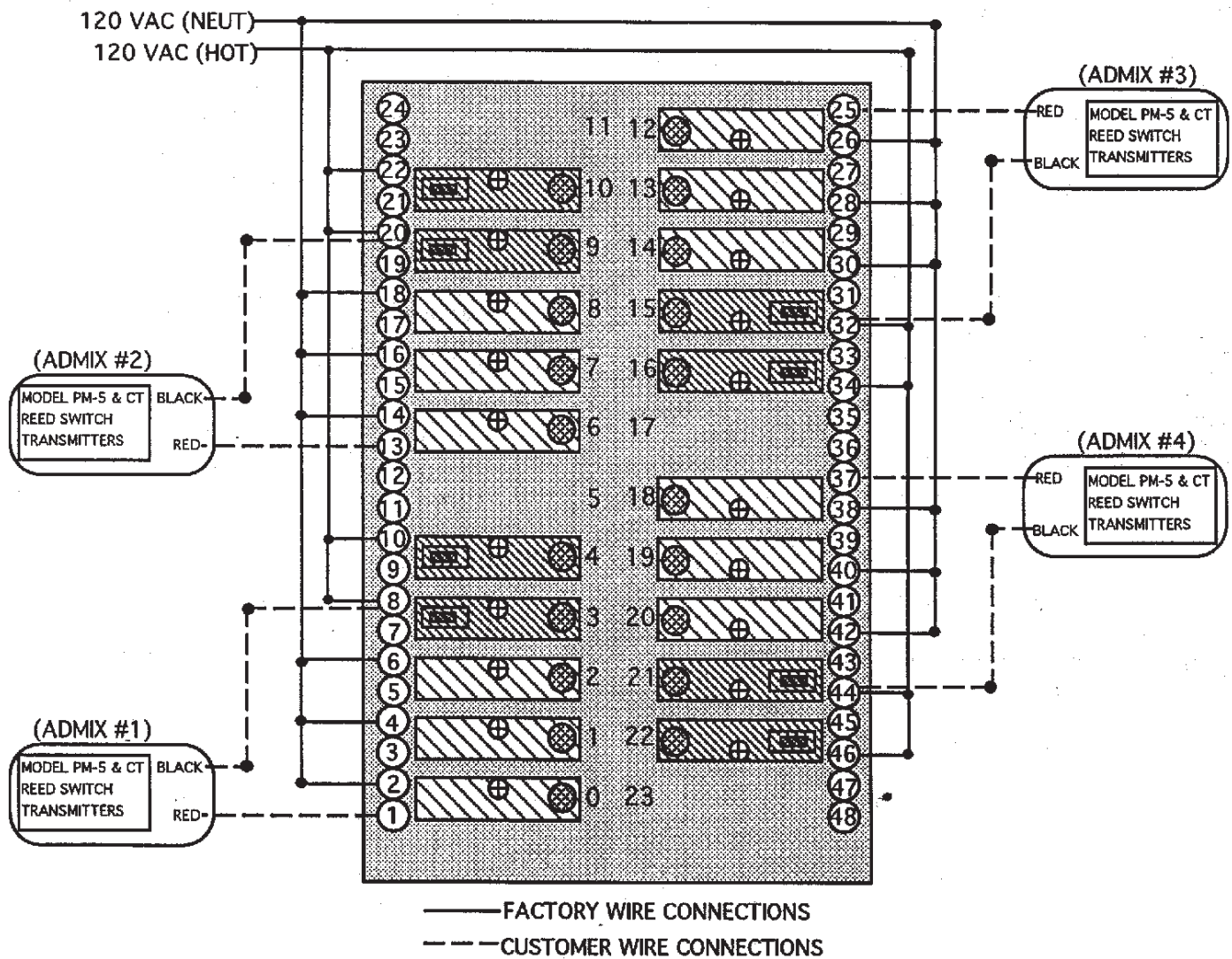


Figure 3: Connection between AC-154 and reed switch transmitters

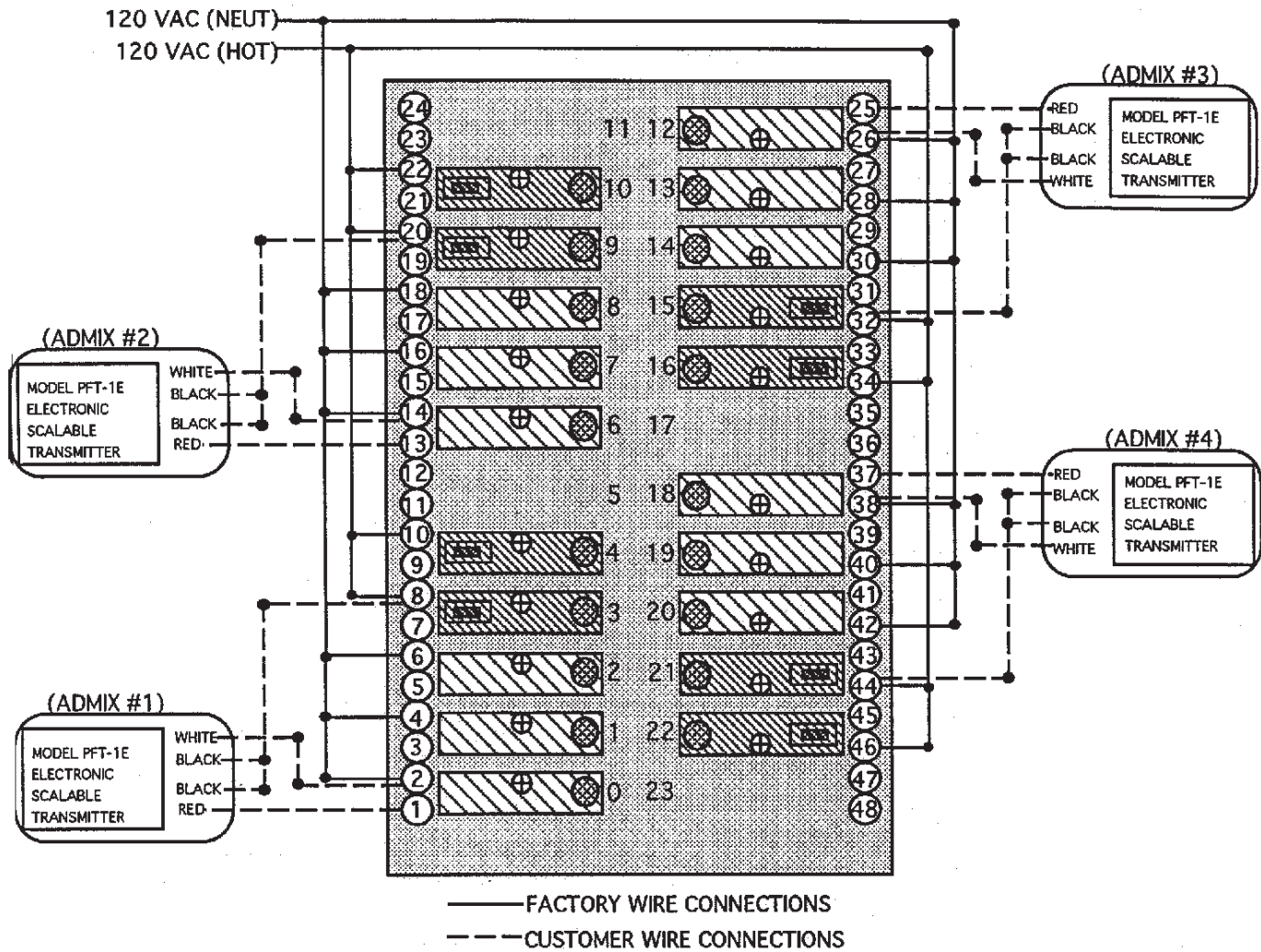


Figure 4: Connection between AC-154 controller and electronic scalable transmitters

CONNECTING THE ZERO AND OVERFILL RELAYS

The controller requires both a Zero and Overfill input for proper operation. The Zero and Overfill inputs need to be a dry contact closure from a probe amplifier such as Badger Meter Model DP-10.

NOTE: The controller cannot be connected directly to Zero and Overfill probes.

The standard controller provides a 120V AC fused output to control fill and discharge solenoid valves. An I/O module is controlled by a microprocessor to provide this output when required.

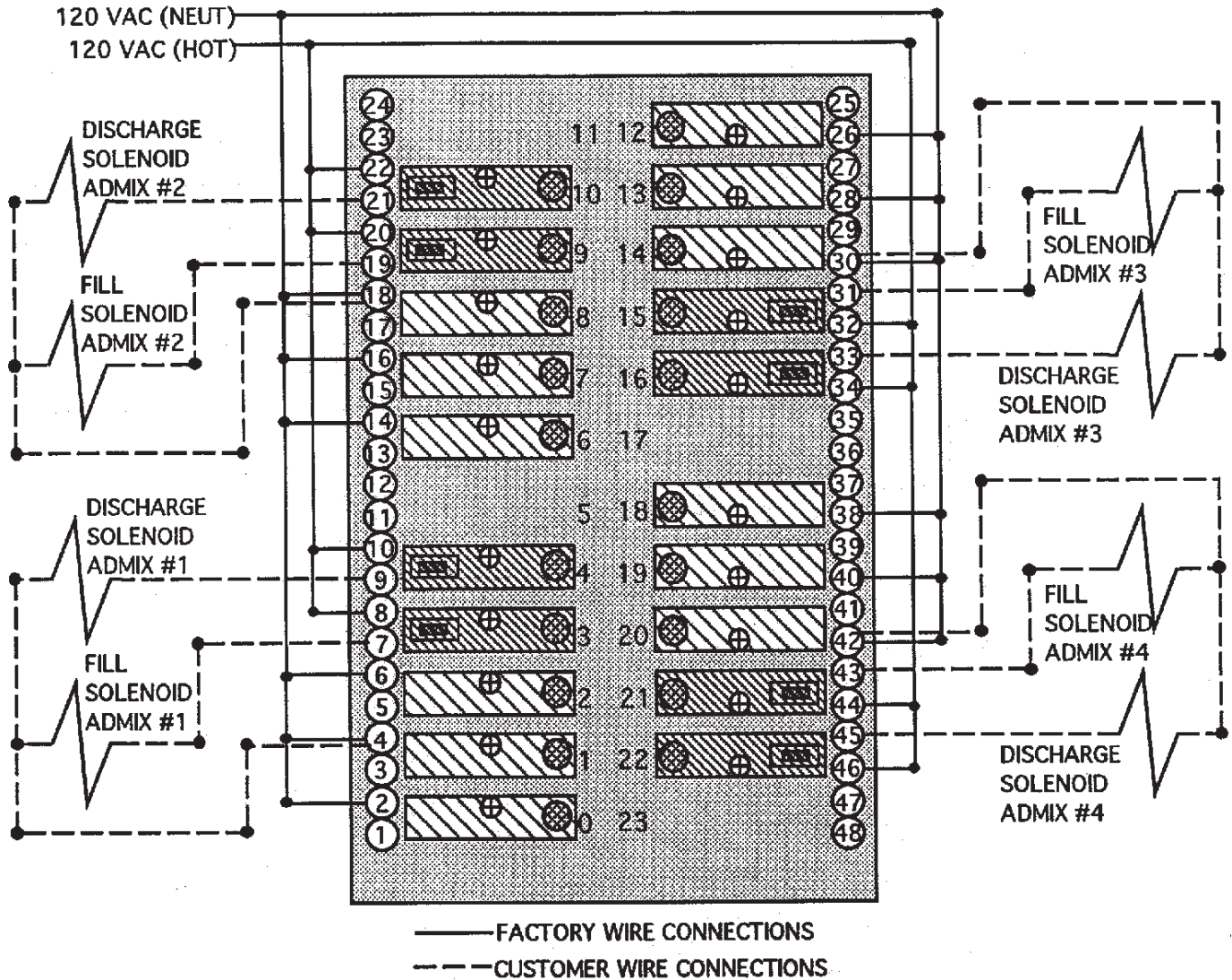


Figure 5: Connection between AC-154 controller and solenoid valves

OPERATING THE CONTROLLER

The AC-154 Admix Controller can be operated in Manual or Automatic modes of operation through the use of switches located on the front panel.

The following instructions refer to certain switches to press or turn ON at a given time. See *Figure 2 on page 4* for the location of all front panel switches and displays.

Manual Operation

1. Select the admix channel to be operated manually.
2. Place the Mode selector switch in the **MANUAL** position. Only one admix channel can be selected to operate in manual mode.
3. Place the mode selectors on all remaining admix channels in the **OFF** or **AUTO** position. If more than one mode selector is placed in the manual position, the LED displays "EEEE", indicating an error in mode switch setting.

Press and hold down the **Manual Fill** button. The Fill indicator illuminates and the Fill Solenoid Output turns ON.

As the fill cycle proceeds, the pulse transmitter on the dispenser system sends a pulse to the controller. These pulses display on the admix channel counter at the rate of one count for each pulse.

Also during the fill cycle, material comes in contact with the Zero probe and the Zero indicator illuminates. The fill cycle continues until you release the Manual Fill button or material comes in contact with the overflow probe.

4. Release the **Manual Fill** button. It automatically returns to an OFF position, causing the Fill indicator and Fill Solenoid Output to turn OFF.

If material comes in contact with the overflow probe, the Fill Solenoid Output is turned off even if the **Manual Fill** button is pressed. The Overflow indicator illuminates to warn of an overflow condition. When an overflow condition occurs, the Manual Discharge is the only function you can operate.

Manual Discharge

To operate the Manual Discharge function:

1. Press and hold down the **Manual Discharge** button. The Discharge indicator illuminates and the Discharge Solenoid Output turns ON. As the discharge cycle continues, material drops below the Zero Probe and the Zero indicator turns OFF.
2. Release the **Manual Discharge** button. It automatically returns to an OFF position, causing the Discharge indicator and the Discharge Solenoid Output to turn OFF.

Automatic Operation

In an automatic mode of operation, the controller provides three ways of batching admixtures:

- Total number of ounces
- Ounces per 100 wt of cement
- Ounces per cubic yard of concrete

All four admix channels will need to be batched in one of these three ways. The controller is not designed to batch some admixtures one way and others another. Choosing one of these three ways is the first step in automatic operation.

All, or as many desired admix channels, may be operated in an automatic mode.

1. Place the Mode Selector Switch on the desired admix channels in the **AUTO** position.
 2. For those channels not selected, place the Mode Selector Switch on in the **OFF** position.
 3. To batch admixtures in total ounces per batch, set the Batch Preset pushwheel switch at 0000.
 4. Set the Preset pushwheel switch for the total number of ounces required. See Example 1 in *Table 1 on page 9*.
- To batch admixtures in ounces per 100 wt of cement, set the Batch Preset pushwheel switch for the total amount of cement required. See Example 2 in *Table 1 on page 9*. Next, set the Preset pushwheel switch for the number of ounces required per 100 wt of cement. See Example 3 in *Table 1 on page 9*.
 - To batch admixtures in ounces per cubic yard of concrete, set the Batch Preset pushwheel switch for the cubic yards of concrete being batched. See Example 4 in *Table 1 on page 9*. Next, set the Preset pushwheel switch for the total ounces required per cubic yard of concrete. See Example 5 in *Table 1 on page 9*.

As the pushwheel switches are being set to the desired setting, the digital display shows the total number of ounces required. The controller automatically calculates the total ounces required according to the pushwheel switch setting and displays that amount on the LED display.

When the Mode selector switch and pushwheel switches are set, the automatic fill cycle is ready to start.

Starting the Automatic Fill Cycle

Press and release the **Start** button. The Fill indicator illuminates, the Fill Solenoid Output turns ON, and the LED display resets to 0000.

As admixture flows, the controller receives pulses from the dispenser flow meter, and begins counting these pulses on the LED display.

As the fill cycle continues, the Zero indicator illuminates when admixture comes in contact with the dispenser's zero probe. The fill cycle continues until the LED display reaches the total amount required, then the Fill indicator goes OFF, the Fill Solenoid Output turns OFF, and the Fill Complete indicator illuminates.

| Example | A Load of Concrete Requires | Set Pushwheel | To Setting | Notes |
|---------|--|---------------|------------|---|
| 1 | 62 ounces of admixture | Preset | 0062 | — |
| 2 | 3275 pounds of cement | Batch Preset | 3275 | — |
| 3 | 4.2 ounces of admixture per 100 wt of cement | Preset | 0425 | When the AC-154 operates in ounces per 100 wt of cement, the Preset feature has an implied decimal point between the second and third digits. This allows for settings of 0.01...99.99 ounces per 100 wt of cement. |
| 4 | A batch if 8.5 cubic yards | Batch Preset | 0850 | When the AC-154 operates in ounces per cubic yard of cement, the Batch Preset feature has an implied decimal point between the second and third digits. This allows for settings of 0.01...99.99 cubic yards. |
| 5 | A Batch requires 32.5 ounces per cubic yard | Preset | 3250 | |

Table 1: Sample settings

THE AC-154 SAFETY FEATURES

The AC-154 Admix Controller is equipped with four safety features:

- Overfill protection
- Fail safe
- No start on Zero indication
- Shutoff on batch error

Overfill Protection

The overfill protection prevents the admixture from escaping out the top of the dispenser's measuring unit in case of an overfill condition. When admixture comes in contact with the dispenser overfill probe, the Overfill indicator illuminates and the fill cycle is stopped, whether in a manual or automatic mode of operation. The only function that may be operated is the manual discharge. See "Manual Operation" on page 8.

Fail Safe

The fail safe feature prevents an overfill condition if a flow meter error occurs or a no-flow condition exists. If the controller does not receive a pulse from the dispenser flow meter within a 5-second time period after **Start** is pressed during automatic fill cycle operation, the LED display will show **FAIL**. Also, the automatic fill cycle is stopped on the admix channel that has the failure. All other admix channels that do not have the failure will operate normally.

When a failure of this type exists, the admix channel with the failure can be operated in a manual mode until the problem can be deleted and solved.

No start, on zero indication, prevents a double batch of admixture. If admixture is in contact with the dispenser zero probe, indicating to the controller that there is admixture in the measuring unit, the controller will not allow an automatic batch to be started. This way an overdose or double batch will be prevented. The admix dispenser measuring unit must be at a zero level before an automatic batch can be started. The controller will allow for a manual batch in this condition.

Shutoff on Batch Error

Shutoff on batch error allows an automatic batch to be stopped at any time during the fill or discharge cycle. If you start an automatic batch then discover that an admix is not needed or batch size is not properly set, you can stop the automatic batch. Place the Mode selector switch in the **OFF** position to stop the batch from the admix channel that is turned off.

TIME DISCHARGE FEATURE

The time discharge feature allows the admix dispenser discharge line to be blown empty after each batch. Time discharge can be adjusted from 0...90 seconds in 10-second increments.

Four rotary switches are on the door-mounted circuit board—one switch for each admix channel. Using a small, flat-blade screwdriver, point the arrow to the desired time period. See *Figure 6*. During automatic operation, with time discharge being used, the controller will complete the fill cycle and go into the discharge cycle. When the admix level reaches a zero level, the time discharge cycle begins timing, keeping the admix dispenser in a discharge cycle for the set period of time, allowing the admix dispenser discharge line to be emptied. If this function is not needed, point the arrow to the zero position on the rotary switch.

TIME DELAY DISCHARGE FEATURE

The time-delay discharge feature sequences the discharge of admixtures. Use the adjustable rotary switch to set time periods of 0...90 seconds in 10-second increments on each of the four admix channels.

The four rotary switches for this feature are located on the door-mounted circuit board inside the controller enclosure. Using a small, flat-blade screwdriver, point the arrow to the desired time period. See *Figure 6*.

During normal automatic mode of operation, the controller will complete the fill cycle and then delay for the set period of time before beginning the discharge cycle.

When this feature is not needed, set the rotary switches to the zero position.

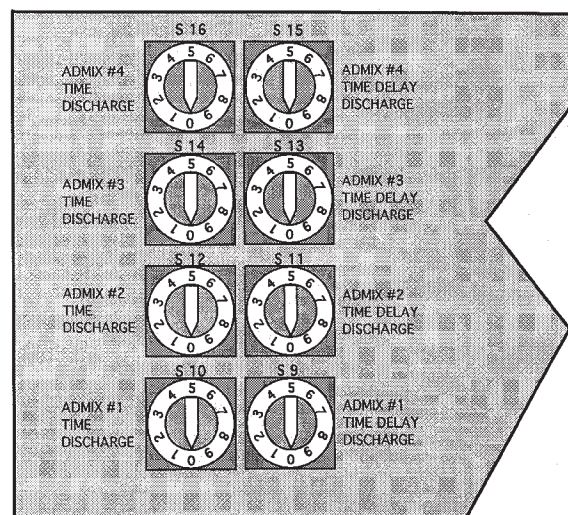


Figure 6: Rotary switches for time-discharge and time-delay-discharge

REMOTE SIGNAL OPERATION

As an option, the AC-154 Admix Controller can be set up to accept a remote signal from an external source. Two types of operation can be achieved with remote signals:

- Remote Start
- Remote Fill/Discharge

Remote Start Function

The Remote Start requires a momentary switch closure from an external source for operation. See *Figure 7* for wiring connection.

The Remote Start function operates in parallel with the Start button, located on the front panel. When the Remote Start Signal is received, the controller operates as if the Start button has been pressed. See "Automatic Operation" on page 8.

Remote Fill/Discharge Function

The Remote Fill/Discharge requires a Momentary Contact Closure to start the fill cycle and a Momentary Contact Closure to start the discharge cycle.

The Remote Fill Signal is connected to the same terminals as the Remote Start. See *Figure 7* for the Remote Fill Signal connection and the connection for the Remote Discharge Signal. When using the Remote Start/Discharge, the Remote Discharge jumper must be placed in the position shown in *Figure 8*. Please note that when only the remote start is being used, the jumper needs to be removed.

For correct operation, using the Remote Fill/Discharge Signals, place the Discharge/Discharge Hold switch in the Discharge position. When the Remote Fill Signal is received, the controller will begin and complete an automatic fill cycle. Once the fill cycle is complete, the discharge cycle will hold until which time a remote discharge signal is received. At this time the controller will begin the discharge cycle and complete the batch.

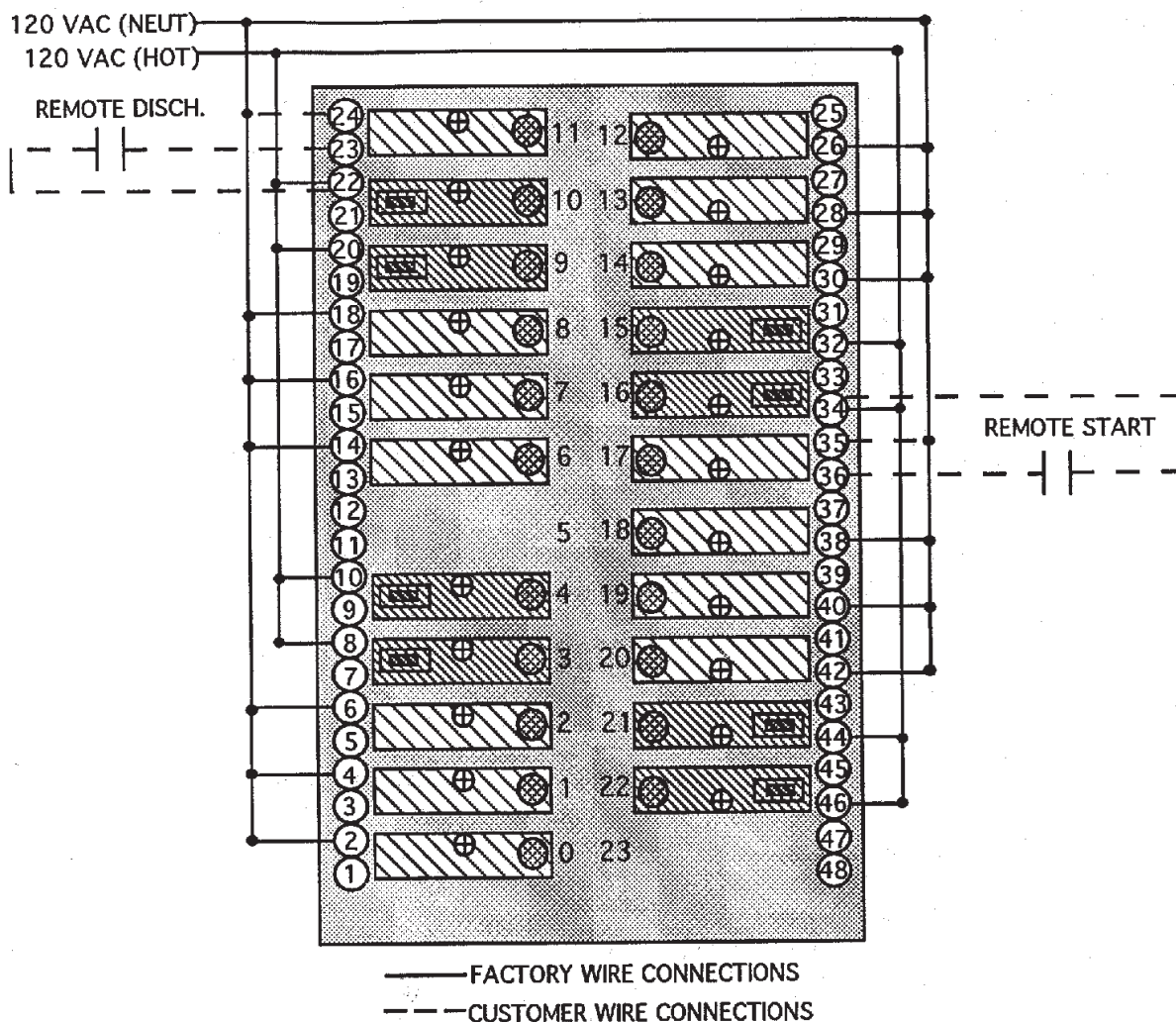


Figure 7: Remote fill/remote start connections

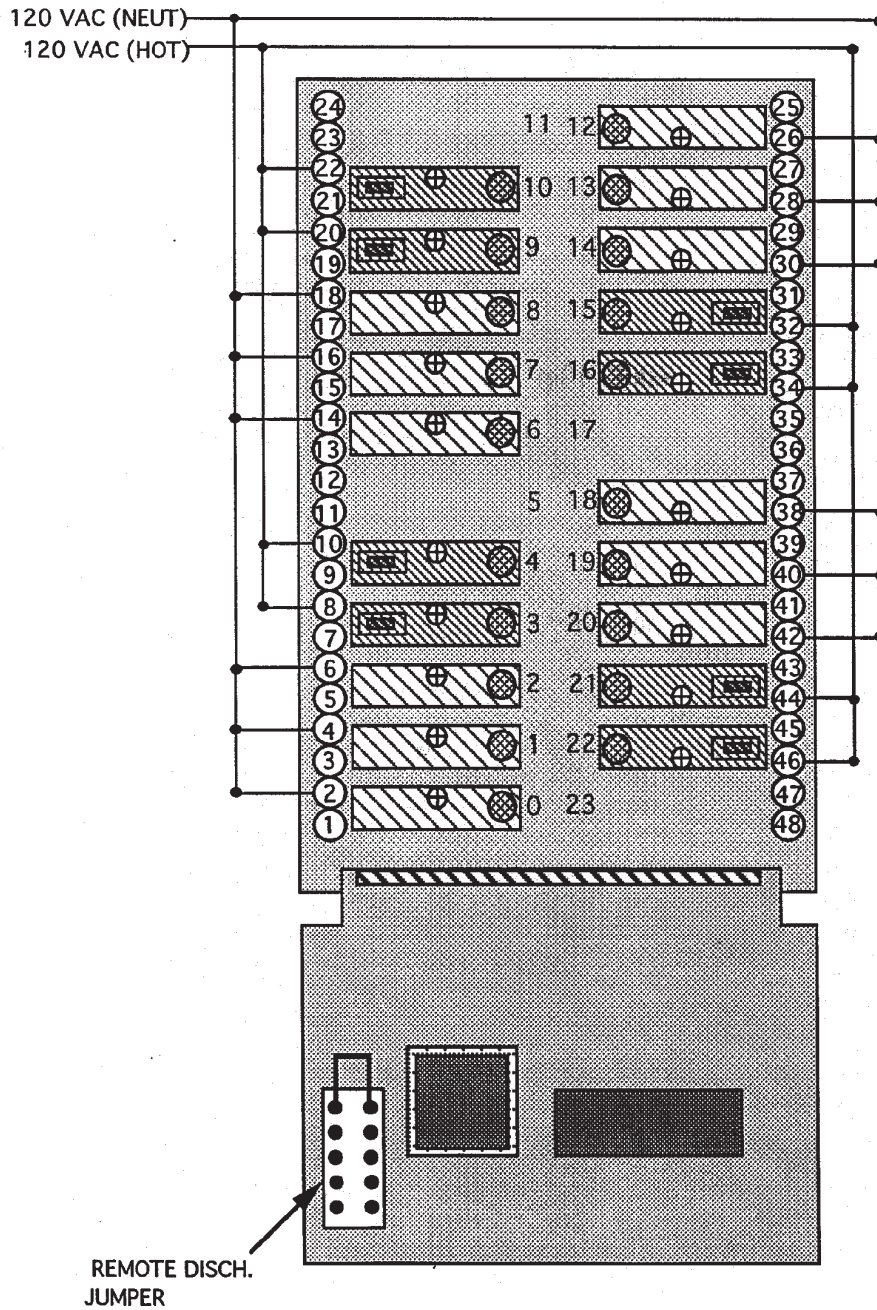


Figure 8: Remote discharge jumper position

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