



# Automation Devices, Inc.

7050 West Ridge Road, Fairview, PA 16415-2099

Phone: 814-474-5561

FAX: 814-474-2131

E-mail SALES@AUTODEV.COM  
AUTODEV.COM

## Amplitude Controller Model 6000.1 GENERAL PURPOSE



File No. E183233

**Input: 120 VAC, 50/60 HZ.**

(Operating range 90-130 VAC)

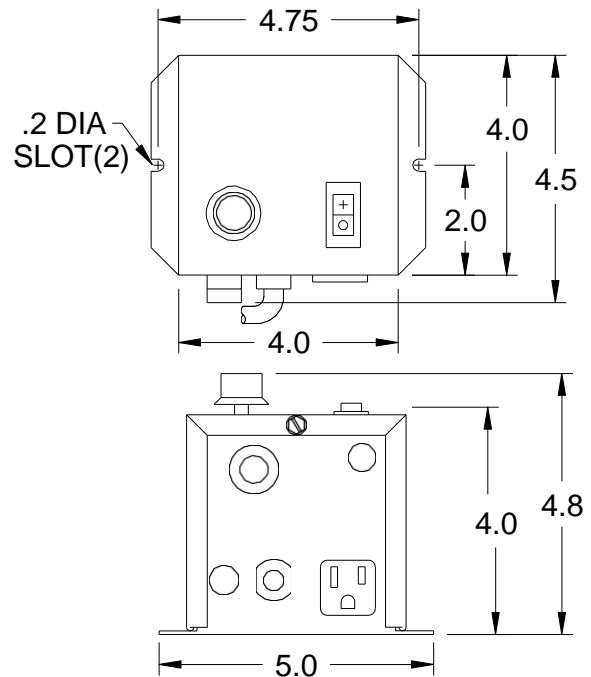
**Single Unit Fuse Size: 15 AMPS**

**Output: 0-120 VAC**

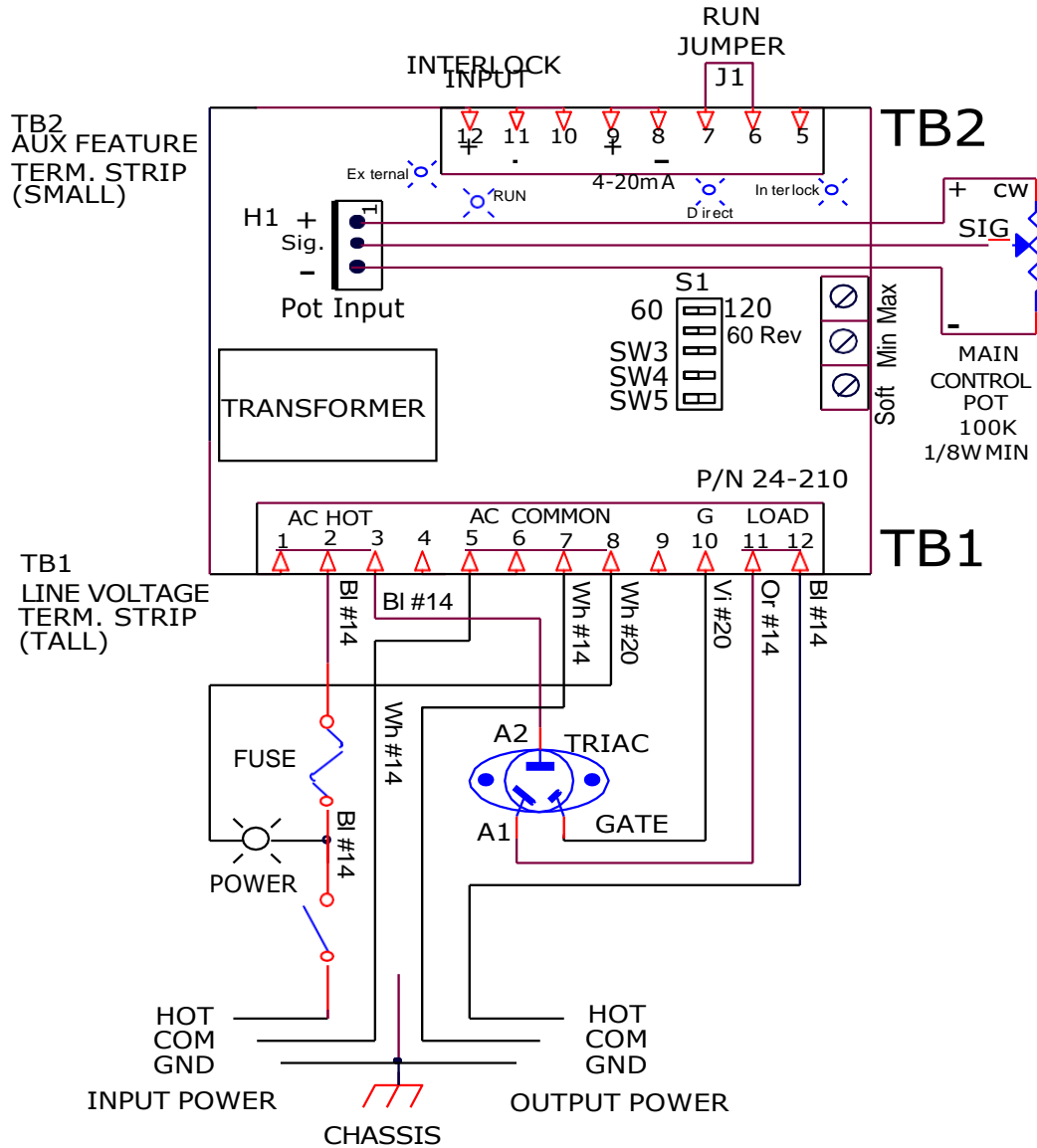
100% Duty Cycle 0.6-12A, 80% for 13-15A

Circuit Board P/N 24-210

Controller Information: This unit is based on the 6000 Series feeder control. For more information on this unit, refer to the enclosed Adjustments and Set Up pages.



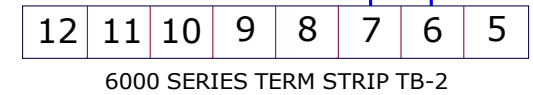
**Amplitude Controller  
Model 6000 Series**



**OFF/ON CONTROL GUIDE**  
P/N 24-210/24-211

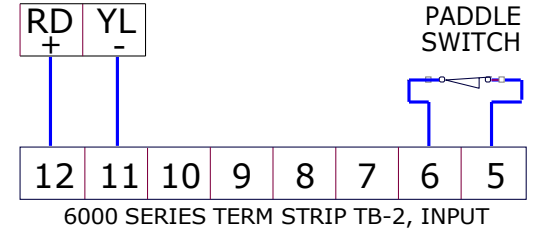
See section 6 of the Application Note for more details.

**A) LOW CURRENT SWITCH**



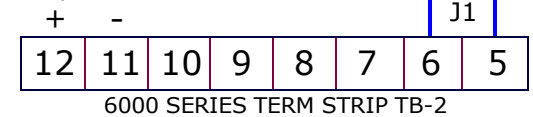
**B) FEEDER BOWL/HOPPER INTERLOCK**  
6800 SERIES

TERM STRIP TB-2, OUTPUT



**C) LOW VOLTAGE INPUT SWITCHING**  
(DC Voltage from PLC)

10-30 VDC INPUT VOLTAGE  
OFF/ON CONTROL



MODEL	INPUT VAC	AMPS	OUTPUT
6000.1	120 VAC	15	0-120



## Amplitude Controller Model 6000 Series



### Instructions

For Circuit Board Part Numbers  
24-210 (120V) & 24-211 (240V)

#### General Description

The 6000 Series controls are designed to power vibratory bowls, storage hoppers and linear inline feeders. The controls are designed to run continuously or can be turned on and off with a PLC, a contact closure or interlocked to the operation of a part sensing control.

Standard features include a soft start adjustment, minimum and maximum output adjustments, full wave/half wave selector switch, line voltage compensation, 4-20mA and 0-5VDC amplitude control.

Note: 6400 Series and 6800 Series controls are available for use on applications requiring a three wire DC sensor, an interlock output, or a Constant Feed Rate (vibration feedback) sensor.

## ADJUST AND SET UP

### 1. SELECT THE PULSE SETTING

Choose an output mode of 120 or 60 by sliding the OUTPUT PULSE mode DIP switch (S1) to the appropriate position.

Other names for "120 Pulses Per Second" are AC or 7200 VPM (Vibrations Per Minute). "60" is the same as DC or 3600 VPM or Rectified.

For 40 or 30 pulse settings or 60 pulse waveform reversal, see the "S1 Programming Chart" and the 6000 Series Advanced Application Note.

**Note: The MAX trimpot may need readjustment after changing the pulse switch setting.**

### 2. LIMITING THE MAXIMUM OUTPUT OF CONTROL

The **MAX** output trimpot can be adjusted to limit the maximum vibration level of the vibratory feeder when the Main Control Dial is fully turned up. When setting up the MAX output of the feeder control, the output wiring to feeder must be connected and the control set for the proper pulse (60 or 120) setting. A Run Jumper must be connected as shown on either the wiring diagram or the ON/OFF Control Guide.

- Power input should be **OFF** or disconnected.
- Open cover to allow access to circuit card.
- Adjust the **MAX** Output trimpot counter-clockwise to its minimum setting.
- Using **CAUTION**, turn power **ON**.
- Rotate the **MAIN CONTROL DIAL** on front cover clockwise to its highest setting.
- Adjust the **MAX** Output trimpot so that the output to the feeder reaches its desired maximum level.

### 3. SETTING THE MINIMUM OUTPUT LEVEL OF CONTROL

When the vibratory feeder is nearly empty, turn the **MAIN CONTROL DIAL** to "1" and adjust the **MIN** trimpot to just below the proper feed rate. The MIN trimpot also serves as the "low speed" trimpot for 2-speed operation. See "S1 Programming Chart" for feature selection details.

### 4. MAIN CONTROL DIAL

The output power is controlled by the **MAIN CONTROL DIAL**. It is a logarithmic-tapered power out curve (non-linear) that spreads the power broadly across the **MAIN CONTROL DIAL**. The logarithmic taper power curve helps to give maximum "Fine Control" over the output speed of the vibratory feeder. When very precise adjustment of the **MAIN CONTROL DIAL** is needed, increase the MIN trimpot setting and/or decrease the MAX trimpot setting. For precise scaling at low amplitudes, use the linear POT taper or reduce the Max pot setting. To select a linear pot taper for the Main Control Dial, see the "S1 Programming Chart."

### 5. SETTING THE SOFT-START

The start-up rate of the control output can be adjusted to ramp up to the desired output level instead of starting abruptly. Soft-start keeps parts from falling off the tooling, reduces spring shock, and hammering when the control turns ON. Turn the **SOFT** Start trimpot clockwise for the gentlest start (about a 6 sec. ramp up to full output). Turn the trimpot fully counter-clockwise for no soft start.

### 6. REMOTE OFF/ON CONTROL

A Run Jumper has been installed at the factory as shown on the enclosed wiring diagram.

Remote OFF/ON operation of the control can be configured to operate in one of the following ways.

- A **low current switch** such as a paddle switch can replace the factory-installed Run Jumper "J1." The "Run Contact" connects to terminals 6 and 7. The contact must be able to switch 5VDC and 2mA. The control will run only when the contact is closed. Refer to Section A of the OFF/ON CONTROL GUIDE.
- Feeder Bowl/Hopper Interlock** allows the Hopper control to operate only when the Bowl is running and the paddle switch contact is closed. The **interlock input** on terminals 11 and 12 of TB2 is controlled by the **interlock output** of a "Parts Sensing Feeder Bowl Control" such as a 6800 Series control

Remove jumper "J1" of this control from terminals 6 and 7. Connect the Hopper Paddle switch to alternate terminals 5 and 6. Connect TB2 terminals 11 and 12 of this control to the "Parts Sensing Control". Refer to Section B of the OFF/ON CONTROL GUIDE. Check specific instructions for the "Parts Sensing Control" wiring. Note: Only use Bowl/Hopper Interlock with a 6800 and 6000 Series control. Two 6000 Series controls will not interlock to each other since neither one has an **interlock output**.

- C. **Low Voltage DC** can be used to turn the control **ON** and **OFF**. Move jumper "J1" from terminal 7, to terminal 5, (6 remains the same). Then connect the positive signal (+10 to 30VDC @ 10mA) to terminal 12 and the negative to terminal 11 of TB2. The control will now turn **ON** when the DC signal is present at terminals 11 and 12 of TB2. This input is optically isolated. Refer to Section C of the OFF/ON CONTROL GUIDE. TB-2 terminals 5-7 are transformer isolated from the line voltage circuit.

**7. REMOTE SPEED CONTROL**

Remote control of the power level can be accomplished by the following methods:

- A. 4-20mA signal from a PLC can be used to remotely vary the output of the control instead of the Main Control Dial. The 4-20mA input is automatically in control whenever a 4-20mA signal is applied to the control (terminals TB2-8 & 9). The Main Control dial setting is ignored whenever there is a 4-20mA signal. The 4-20mA input is transformer isolated from the power line. In an environment with high electrical noise, use a shielded cable for the 4-20mA signal. The "S1 Programming Chart" shows how change to 0-20mA speed control instead of the default of 4-20mA.
- B. A 0-5VDC Analog input signal may be applied in place of the Main Control Dial at H1. The 0-5VDC input is transformer isolated from the power line.

**8. LINE VOLTAGE COMPENSATION**

Fluctuations in the line voltage can cause a feeder bowl to vary its feed rate. The line voltage compensation feature adjusts the control's output to help compensate for fluctuations in the supply voltage. If it becomes necessary to disable this

feature, set "Disable LVC" from the S1 programming chart.

**9. OUTPUT CONNECTIONS**

The 120V models in general purpose enclosures provide a standard North American receptacle (NEMA 5-15R) for connection to the feeder. 240V models have a pigtail output cord. Power cords are optional on Oil Resistant models.

**10. SUPPLEMENTARY FEATURES**

Special supplementary software features can be enabled on the 24-210/24-211 circuit boards. The features include: *linear pot taper, 0-20mA control, empty bowl timer, low pulse rates, and two speed pots*. See the S1 Switch Programming Chart. For more feature information request the 6000 Series Advanced Application Note.

**11. STATUS LEDs**

When any of the inputs are active, the associated LED will turn ON. When the RUN input conditions are met, the RUN LED will turn ON. See section 6 and the wiring diagram's ON/OFF Control Guide for more information on how to satisfy the RUN conditions.

**WARNING:**

**Fuses should be replaced with a Bussman ABC or Littelfuse 3AB "Fast Acting" type or equivalent of manufacturer's original value.**

**Mounting this control on a vibrating surface will void the warranty.**

**TROUBLESHOOTING**

Basic Procedure – To ascertain whether the problem lies in the controller, take the following steps:

- A. Check that the fuse is good. Disconnect the input power and tighten the screw terminals.
- B. For the control output to be on: Make sure that the proper input power is present. The **MAIN CONTROL DIAL** must be turned up or if the 4-20mA input is used, it must have over 5mA. Either the **DIRECT LED** must be lit or both the **INTERLOCK** and **EXT VOLTS LEDs** must be lit. Anytime the output is turned on, the **RUN LED** will be ON. To light the **DIRECT LED**, a Run

Jumper must be connected at TB2-6 & TB2-7. To light the **INTERLOCK LED**, a Run Jumper must connect TB2-5 to TB2-6. To illuminate the **EXT VOLTS LED**, a 10-30 VDC signal must be present at TB2-11 & 12. See the section titled "**Remote OFF/ON control**" for more information.

- C. Connect an AC voltmeter across the **LOAD** terminals (with the **LOAD** connected) and vary the **MAIN CONTROL DIAL** from minimum to maximum. In 120 pulse mode, the output should vary from approximately 30% to 98% of the input voltage depending on the setting of the **MIN** and **MAX** trimpots. In 60 pulse mode the output should vary from 20% to around 85% of the input voltage.
- D. On new installations: If the Feeder only hums but it doesn't feed any parts, try changing the **60/120** DIP switch (S1) to the opposite position.

When neither a humming sound nor any vibration can be detected in the vibratory feeder, the problem may be in the controller.

NOTE: The enclosure may feel quite warm when the load current is in the 12-15 Amp range.

<b>S1 Programming Chart</b>			
<b>Program Description</b>	<b>S1 Switch Positions</b>		
	<b>SW3</b>	<b>SW4</b>	<b>SW5</b>
Standard Program	0	0	0
Linear Pot Taper	1	0	0
0-20mA option	0	1	0
Empty Bowl Timer	1	1	0
Disable LVC	0	0	1
2-Speed Operation	1	0	1
30/40 Pulse Operation	0	1	1
Low Amplitude at "1"	1	1	1