Blaster Master II Timer Model: TBM-II-06

Operating Instructions

Global®
PLC Timers

VIBRATORS VIBRATORS AIR BLASTERS
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I. INTRODUCTION

This manual will assist with the installation and operation of Global Blaster Master II Timers. Please read the entire manual to assure proper installation, configuration, and operation of this equipment. Instructions apply to model: **TBM-II-06**

What is a Blaster Master II Timer:

The Global Manufacturing Blaster Master II is a micro-controller based sequencing timer with from one to six active timing channels. While the firing time for each channel is fixed at 1/2 second, the time between channels, and between firing sequences is field adjustable. Included with your timer is:

1. Mount Hardware
2. Cable to connect the timer processor to a computer serial port
3. Unitronics Unitronics no longer provides a CD disc with the Set-up program. Instead you must download the program for free from:

https://unitronicsplc.com/software-visilogic-for-programmable-controllers

Your timer already has the software d program for controlling Air Blasters installed. The cable and software will only be needed if the program must be modified at some time in the future.

Applications:

The Blaster Master II Timer is designed to control one or more Air Blasters used to solve bulk flow problems in silos, hoppers, chutes, storage piles, or kilns. The timer signals the 3-Way normally open solenoid valves used to activate the Air Blasters. This control can be manual, using push buttons on the timer front cover, or automated, activating the Air Blasters in a configured timed sequence. Automated operation can be controlled remotely by a manual switch or by a flow switch that responds to a blockage in material flow. The timer provides six channels, which would normally control the sequential firing of up to six Air Blasters. Two Air Blasters can be controlled by a single channel expanding the timers control to 12 Air Blasters, but all Air Blasters activated by the same timer channel will fire simultaneously.

⚠ SAFETY PRECAUTIONS

This timer is used to control Air Blasters, which can produce an air blast exceeding 1,000 ft/sec (300 m/sec) and 15,000 lb. (6,800 kg) of force. Be sure to read and follow all safety precautions.

⚠ DANGER

- Do not stand in front of any Air Blaster during discharge. The air blast can cause serious injury.
- Use of the Air Blaster to shoot a projectile may cause serious injury or death.

⚠ WARNING

- All OSHA, ANSI and owner's safety procedures and regulations must be followed during installation, operation, and maintenance of this timer and the Air Blasters it controls.
- Be sure no person is in the Air Blaster discharge area before activating the timer.
- Turn off the timer ON/OFF switch, lock-out the input power to the timer, depressurize all Air Blasters, and lock-out the air shut-off valves in the closed position before entering the Air Blaster discharge area. Do not reactivate timer until the discharge area is clear.

NOTE:

- A two second delay is programmed into the numbered KEYS used to fire the Air Blasters on a particular channel when in MANUAL mode and the ENTER key used to activate the firing cycle when in AUTOMATIC mode to prevent accidental firing of Air Blasters. Be sure to hold selected button down for at least two seconds to allow time for timer to respond. However, there is no delay for the OFF mode of the front panel ON-OFF switch. For user safety, turning the ON-OFF switch to the OFF position will immediately stop the timer.

II. BLASTER MASTER II OPERATION

General Overview

How the Blaster Master Timer Works:

The Blaster Master II Timer can be operated in the following modes:

Manual Operation: Air Blasters on each channel are fired manually when the mode selector is in the MANUAL position. The numbered key corresponding to the desired channel must be depressed for two seconds. After firing, a channel is locked out for 60 seconds before it can be re-fired (gives Air Blaster time to recharge).

Automatic Operation: Air Blasters are fired automatically when the mode selector is in the AUTOMATIC position and the ENTER key is depressed for two seconds. Active Air Blaster channels are sequentially energized for 1/2 second each. The time between each channel firing is user determined, as well as the time delay before the start of a new cycle. This sequence continues to repeat as long as the system is powered and in the AUTOMATIC mode. Loss of power or deactivating the timer by using the front panel ON/OFF switch will reset the system to the first Air Blaster channel. The ENTER key must be depressed for two seconds to restart automatic firing.

Remote Operation: Remote operation is identical to the Automatic mode except the mode selector is in the REMOTE position and a contact closure must be made across terminals 1 and 5 on the left end of the row of channel relay terminals. Contact closure of the control relay can be initiated by a computer output, manual switch, flow switch, or other device. The control relay must remain closed for the timer to continue to operate. If the relay opens the timer will reset back to the first channel in the firing cycle and will wait for the relay to close again.

Power Requirements:

Input power: 100-240V AC, 50/60Hz, 1.1A.
Output power: 24V DC, 1.5A. The timer output voltage must match the voltage of the solenoid valves used to activate the Air Blasters. This timer is designed to operate 24V DC solenoid valves.

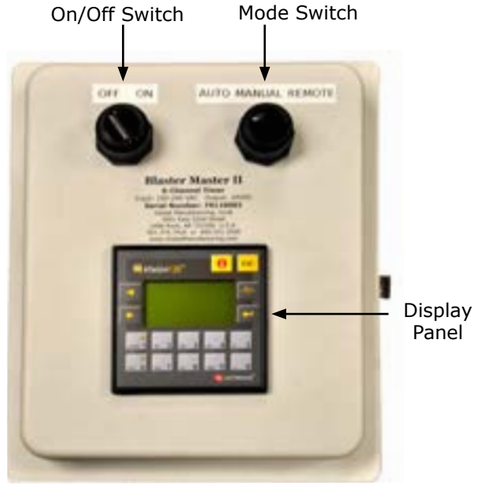
⚠ Caution!

- Do not connect timer to a 230 volt solenoid valve.
- Do not connect timer to a 115 volt solenoid valve.

The power supply in the Blaster Master II is protected from shorts in the output wiring. A short circuit in any Air Blaster solenoid circuit will cause the power supply to shut down. Normally there is a green light (DC OK) that glows on the front of the power supply when the power is on. This light will turn off when the power supply shuts down because of a short in one of the DC circuits. To view the power supply, open the timer box. The power supply is located in the back of the box.

Front Panel Controls:

ON/OFF Switch: The ON/OFF switch is used to turn the power on to the timer. The initial screen flashes on for 3 seconds and then displays the MODE of operation corresponding to the position of the Mode selector switch and the number of the active timer channels. If a channel is active it is listed. If it is deactivated its number will not appear on the display. In the example display below, the timer is in MANUAL mode and all 6 channels are active.



Mode Switch: The Mode switch is used to select the desired operational mode – Automatic, Manual, or Remote. Mode of operation can be changed at any time regardless of whether the power is on or off.

NOTE:

- If the timer is turned ON while the mode switch is in the Automatic mode, the firing cycle will not fire until the ENTER key is pressed for two seconds.

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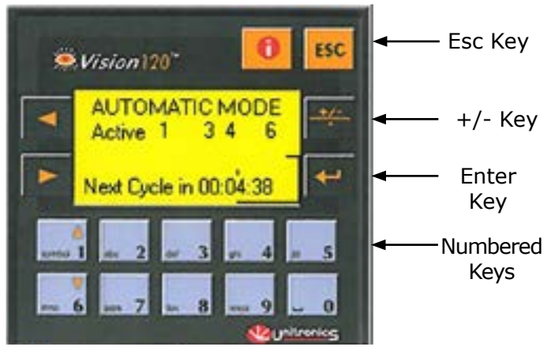
ENTER Key: Located on the right side of the display panel above the "5" key. The ENTER key is used to initiate the firing cycle when the timer is set in AUTOMATIC mode. The ENTER key must be pressed for 2 seconds. This will initiate firing of the Air Blasters connected to the ACTIVE channels displayed on the AUTOMATIC MODE screen. In the example below Air Blasters connected to channels 1, 3, 4, & 6 will fire in that sequence. The sequence of firing will continue until the ON/OFF Switch is moved to the OFF position.



Also note in the example above, that all 4 channels have fired and the clock at the bottom of the display shows 4 minutes and 38 seconds until the beginning of the next firing cycle. The ENTER key is also used to accept the entries made when configuring the delay times.

+/- Key: Located on the right side of the display panel directly above the ENTER key. This key is used to display the configuration menu.

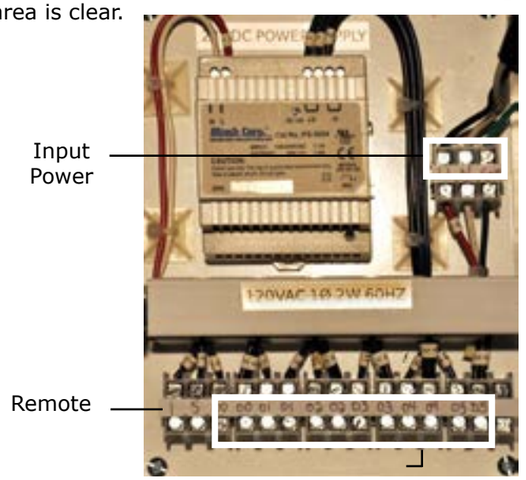
ESC Key: Yellow key located in the top right corner of the display panel. This key is used to return the display to the mode of operation screen after configuring one of the timer properties (Active Channels, time delay between channels, or time delay between cycles).

Numbered Keys: Each channel can be fired manually when the mode selector is in the MANUAL position and the numbered key corresponding to the desired channel is pressed for 2 seconds. The number of the desired channel must appear on the MANUAL MODE screen as ACTIVE for it to fire. After firing, a channel is locked-out for 60 seconds before it can be re-fired (gives Air Blaster time to recharge). The numbered keys are also used when selecting options from the Configuration Menu and to enter values for the time delay intervals.

Internal Controls: Access to the inside of the Blaster Master II enclosure should be limited. Activation of the timer, mode selection, channel activation, and interval times are all accomplished from the keypad on the front of the timer. The enclosure only needs to be open during initial installation and when modifying any of the wiring connections. Also, if the timer stops unexpectedly, it is helpful to inspect the "DC OK" light on the front of the power supply. If the timer is known to be getting power, but this light has gone out, it indicates that there is a short in one of the circuits running from the timer to the solenoid valves.

⚠ WARNING

- The sub-panel mounted board has exposed 115 volt or 230 volt power which is a shock hazard! Before making connections to this board, the branch circuit device (breaker or fusible switch) must be used to disconnect all power to the Blaster Master II.
- A stainless steel padlock hasp is provided to lock the enclosure. It is strongly recommended that the timer be locked against unauthorized entry.
- Before entering the Air Blaster discharge area, turn off the main ON/OFF switch, lock-out the input power to the timer, depressurize all Air Blasters, and lock the air shut-off valves in the closed position. Do not reactivate timer until the discharge area is clear.



Input Power Terminals - The incoming power terminals are located on the right side of the sub panel mounted in the back of the timer box. Voltage should be 100-240 volts AC, 50/60 Hz. (The power supply adjusts to the delivered input power and provides 24 volts DC to the timer circuits.)

NOTE:

- Contact the Global Manufacturing or your distributor if other voltages are required.

- A "short-circuit" in any Air Blaster solenoid circuit will cause the power supply to shut down. The green "DC OK" light on the front of the power supply will go out when the power supply is in this "shut down" state.

Terminals 1 and 5 - This pair of terminals is used when REMOTE operation is desired. Connect a control relay to these terminals to provide remote control to the timer from a computer, manual switch, or flow switch. The timer will activate and run as long as the control relay remains closed. If the relay is opened, the timer will reset to the first channel in the cycle and will wait for the relay to close again before resuming operation at the beginning of a new cycle. Voltage at these terminals is 24V DC. The current required is 8 mA.

⚠WARNING

- At no time should power be applied to these terminals as it will cause irreparable damage to the timer.

Terminals 00 through 05 - These are terminals for channel relays 1 through 6. Air Blaster solenoids are connected to these terminals. Up to two solenoids may be connected to each channel. Keep in mind that all Air Blasters connected to a given channel will fire simultaneously.

⚠WARNING

- Solenoid voltage must match timer voltage. This timer is designed to operate 24V DC solenoid valves. Do NOT connect this timer to 115 volt or 230 volt solenoids. If the timer & solenoid voltages do not match, contact Global Manufacturing or your distributor.

Blaster Master II Timer Configuration:

Regardless of the mode of operation (Manual, Automatic, or Remote), the timer needs to be configured for which channels will be used, the time delay between channels, and the time delay between cycles. These selections are made using the keypad on the front of the timer.

While in any mode, press the +/- key (just above the ENTER Key) to bring up the following configuration menu:

Channel Activation: Regardless of the Mode of operation (Manual, Automatic, or Remote), a timer channel must be ACTIVATED before it will fire. From the Configuration Menu, press the "0" Key to open the Select Active Channels screen. A screen similar to the one below will appear.

The numbered key symbols on the screen indicate which channels are currently active. The factory setting is only Channel 1 activated. This particular example shows that channels 1, 3, 5 and 6 are active. Pressing one of the number keys (1-6) will toggle that channel between the active and inactive mode. Set each of the channels 1-6 to either active or inactive. When selection is complete press the ESC key to return to the original MODE screen.

NOTE:

Keep in mind that if a channel is set as ACTIVE, but is not actually used there will still be a delay in the firing cycle allotted to that channel (see Set Delay After Firing).

Setting the time delay between Channels: The time delay after the firing of one channel and the firing of the next can be easily configured for the Blaster Master II Timer. The minimum delay is 1 second (00:01) and the maximum delay is 59 minutes and 59 seconds (59:59). The factory setting is 1 minute (01:00). There is no global setting. The delay must be set for each ACTIVE channel. From the Configuration Menu press the "1" key to open the Set Delays After Firing screen. A screen similar to the one below will appear.

In the example above there is a delay of five seconds after each channel fires before the next one is activated. If it is desired to fire channel #2 five seconds after channel #1, and then wait five minutes before channel #3, channel #1 would be set to five seconds (00:05), and channel #2 would be set to five minutes (05:00). The missing digit for Channel 1 above is actually flashing to signify it can be changed with the keypad. Enter the desired setting using the numbered keys on the keypad. If you make a mistake you can use the LEFT ARROW key to go back a place. After entering the setting for a channel, press the ENTER key and the "flashing digit" will advance to the next channel. After entering the settings for all six channels press the ESC key to return to the original MODE screen.

NOTE:

There is no global setting; each channel must be set independently.

Setting the Time Delay Between Cycles: The time delay after the completion of one firing cycle and the beginning of the next cycle can be easily configured for the Blaster Master II Timer. The minimum delay is 1 minute (00:01) and the maximum delay is 99 hours and 59 minutes (99:59). The factory setting is 5 minutes (00:05). From the Configuration Menu, press the "2" key to open the Set Cycle Times screen. A screen similar to the one below will appear.

In the example above there is a delay of five minutes after each cycle ends before the next one is activated. The missing digit above is actually flashing to signify it can be changed with the keypad. Enter the desired setting using the numbered keys on the keypad. If you make a mistake you can use the LEFT ARROW key to go back a place. After entering the setting, press the ENTER key to record the setting. Press the ESC key to return to the original MODE screen.

NOTE:

- Following the last active channel, there is a Between Channel Firing delay before the start of the Between Cycle Time delay. See Appendix B -Calculating Cycle Times.

- Contact the factory if other timing ranges are required.

Non-volatile Memory: All configuration entries to the controller are in non-volatile memory - no values are lost when the power is lost to the controller. The exception to this is the various timers. While they retain their preset delay time values, they reset to the beginning of their timing cycle when power is restored.

III. INSTALLATION

Preparation and Background:

Blaster Master II Timer Placement: Select an appropriate location for the timer. Keep in mind the following when selecting a location. Refer to the Air Blaster plumbing diagrams in Appendix C for a general overview of the entire Air Blaster system.

1. The timer needs to be in a convenient location for the mode of operation (manual, automatic, or remote).

2. The timer needs to be in a convenient location so that it can be turned off while Air Blaster maintenance is taking place.

3. For optimum performance the timer should be within 1,500 feet of the Air Blaster solenoid valves and within 300 feet of the remote contact.

Visual Inspection: Please note the condition of the shipping container before opening. The shipping container will include the Blaster Master II timer, mount hardware, and operating instructions. Make sure all parts are located before discarding the container. Inspect the Blaster Master for any damage that might have occurred during shipment. Please verify that all items ordered have been received. Contact Global Manufacturing Customer Service or your distributor if there are any missing parts, apparent damage, or other irregularities. Report any damage to the delivery service. Complete any necessary claim forms. Please note the serial number located on the front of the timer above the display panel.

Mounting the Enclosure:

⚠ WARNING

- Before working on timer, turn off and lock out / tag out energy supply source.
- If equipment will be installed in an enclosed area, test gas levels or dust content before using a cutting torch or welding equipment. Using a cutting torch or welding in an area with sufficient gas or dust levels can cause an explosion.
- All OSHA, ANSI, NEC and owner's safety procedures and regulations must be followed during installation, operation, and maintenance of this timer.

Mount the timer securely in the selected location. Hardware is provided. Drill the appropriate size holes in the timer enclosure for the wiring from the solenoids, power source, and any auxiliary input (remote inputs).

Connecting Solenoid Valves: Connect the wires from the Air Blaster solenoid valves to the channel relay terminals (00 through 05). As many as TWO solenoids can be connected to each channel. Be sure to attach each solenoid to the appropriate channel because this connection determines the firing sequence of the Air Blasters.

Channel 1 = terminals 00
Channel 2 = terminals 01
Channel 3 = terminals 02
Channel 4 = terminals 03
Channel 6 = terminals 05

Connecting Power Source: Connect the power source to the incoming power terminals. L1 = Power Lead (black), N = Neutral (white), and GND = Ground (green).

Connecting for Remote Operation: If the Blaster Master II timer is to be remotely controlled attach low voltage wires from the control relay to the 1 &5 Auxiliary Terminals on the left end of the channel relay terminals. 24V DC / 8 mA.

⚠ WARNING

- At no time should power be applied to these terminals as it will cause irreparable damage to the timer. 24VDC Power is supplied by the timer.
- Keep low voltage and 115 volt or 230 volt wiring in separate conduits.

If a remote switch is desired to allow an operator to shut down the timer quickly in the event of an emergency we suggest a commonly available red mushroom head maintained contact switch. This would be wired into the input power circuit so that an operator can quickly KILL the power to the timer and shut the system down.

Configuring the Blaster Master II Timer: The Blaster Master timer should be configured to meet the needs of your application. Follow the steps below to insure all options are understood and the proper settings are made to give the performance you desire.

1. Determine which timer channels are to be used. Following the instructions in "Channel Activation" on page 6, activate only the channels to be used. An Air Blaster attached to an inactive channel will not be fired. If a channel, which has no attached Air Blaster is ACTIVATED there will be an extra time delay between the preceding active channel and the following active channel corresponding to the delay set on the Set Delays After Firing Screen.

2. Determine the desired start-up options. Set the MODE switch to Auto, Manual, or Remote. This will determine how the timer will function when it is first turned on or when power is restored after an interruption. How will the timer be activated? If the front panel push buttons will be used as needed to fire each channel, set the timer for MANUAL. If only the ON/OFF switch will be used and the timer is programmed to fire each channel according to the desire internal settings, set the timer for AUTOMATIC. If the timer will be activated by a remote switch, computer, or another timer, set the timer for REMOTE.

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3. Determine the time between Air Blaster firings. The time delay after the firing of one Air Blaster and the firing of the next can be the same or different for each channel. Follow the instructions in "Setting the Time Delay Between Channels" on page 6. Contact Global Manufacturing or your distributor if other timing ranges are required.

4. Determine the time between cycles. What is the time delay after the last Air Blaster fires and the start of the next cycle? Take that time and deduct the between channel firing time for the last channel in the cycle to determine the between cycles time (a between channels firing delay will occur after the last channel in the cycle fires before the between cycle delay begins).

IV. BLASTER MASTER II START-UP PROCEDURES

Once the Blaster Master II timer is installed and configured, follow the steps below to test and prepare your timer for operation:

1. Set the Blaster Master II timer in MANUAL mode.

2. Be sure all personnel are clear of the Air Blaster discharge area.

3. Open the shut-off valves to allow the Air Blasters to fill with air.

4. Energize power circuits to timer.

5. Turn the Power selector switch on the front of the timer to the ON position.

6. The MANUAL mode display should appear on the timer showing the desired channels as ACTIVE. Reconfigure the active channels if necessary.

7. Once the Air Blasters are charged, test each Air Blaster separately by pressing the appropriate numbered key on the keypad. Remember the key must be pressed for two seconds to initiate firing. Refer to the Troubleshooting Guide in Appendix A, if the appropriate Air Blaster(s) does not fire.

8. If the Air Blasters fire correctly in MANUAL mode, move the MODE selector switch to the desired mode. Test the timer configuration and adjust as necessary to obtain the desired results.

9. After satisfactory completion of the above Steps, your Global Manufacturing Blaster Master II timer is ready for use.

APPENDIX A

TROUBLESHOOTING

Prior to shipment, all Global Blaster Master timers are tested to ensure all features are operational and all times are accurate. The following list should help identify the causes of problems that can occur and gives possible solutions to eliminate those problems.

PROBLEM	POSSIBLE CAUSE	SOLUTION
No display on timer screen	ON/OFF Switch in OFF position.	Turn ON/OFF Switch to ON position.
	No power to timer.	Check input power circuit.
	Short in connections to solenoid valves.	Power supply DC OK light will be off. Check wiring to solenoid valves.
Air Blasters do not fire when in MANUAL MODE and numbered keys are pressed	2 second delay programmed into system.	Press appropriate key for two seconds or longer until timer responds.
	Timer not in MANUAL mode.	Turn MODE selector switch to MANUAL.
	Selected channel is not in ACTIVE state.	Channel number of the desired circuit should appear as ACTIVE on the MANUAL MODE screen. If it is not listed, go to the configuration menu to activate the desired channel.
	ON/OFF Switch in OFF position.	Turn ON/OFF Switch to ON position.
No power to timer.	Check input power circuit.	Short in connections to solenoid valves.
	Short in connections to solenoid valves.	Power supply DC OK light will be off. Check wiring to solenoid valves.
	Disconnected wiring.	Verify wiring connections at the timer terminals and solenoid valves.

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APPENDIX B

CALCULATING CYCLE TIMES

Formula for calculating actual cycle time for specific timer configurations:

T = 0.5n + T1 +T2 + T3 + T4 + T5 +T6 + Tc

Where:

T = Actual cycle time in seconds (time between two sequential firings of a channel)
n = Number of channels being used (from 1 to 6)
Tn = Time delay for Channel n (1 – 3,599 seconds)
Tc = Time belay between cycles (from 60 – 359,940 seconds)

Example:

Three (3) Air Blaster channels used.
Between channel firing time setting is 30 seconds for each channel.
Between cycle time setting is 2 minutes = 120 seconds.
What is the total cycle time in seconds?

T = 0.5x3 + 30 +30 + 30 + 120 = 211.5 seconds

APPENDIX C

BLASTER MASTER II SPECIFICATIONS

Number of Timer Channels:	1 to 6, field adjustable
Blasters per channel:	Up to 3 depending on solenoid
Input Power:	100-240 volts AC, 50/60 Hz, 1.1 amps max
Output Power:	24V DC, 1.5 amps
Operating Temperature:	32 – 130°F (0-55°C) Ambient
Enclosure:	NEMA 4, FRP
Dimension (overall):	11.73”H x 9.85”W x 9.44”D
Maximum distance to blasters:	1500 feet
Maximum distance to Remote contact:	300 feet
Wire size:	14 AWG – 22AWG

APPENDIX D

AIR BLASTER PLUMBING DIAGRAM

Using a Quick Exhaust Valve

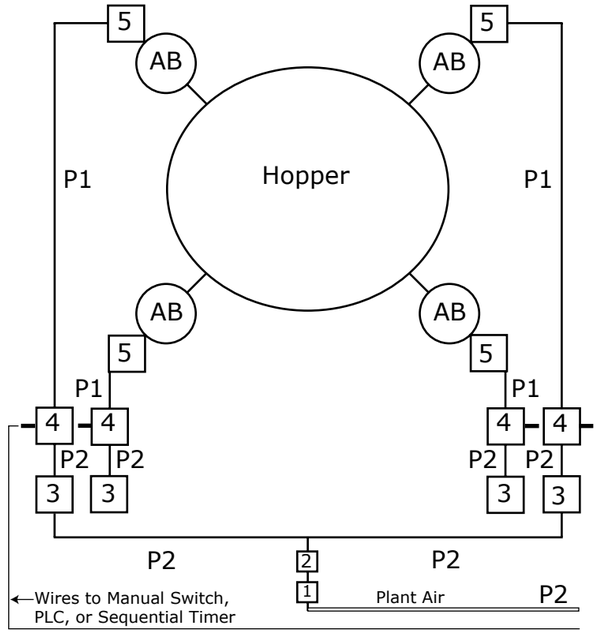
1 = ½" Shut-Off Ball Valve
2 = ½" Filter/Regulator/Gauge
3 = ½" Check Valve
4 = ¾" 3-Way Normally Open Control Valve
5 = 1" Quick Exhaust Valve (QEV)
or
¾" QEV for 2.5" AB
or
Global's QEV attached to AB
AB = Air Blaster
P1 = ¾" Airline rated for 150 PSI (10.3 Bar)
P2 = ½" Airline rated for 150 PSI (10.3 Bar)

Notes:

Airlines and fittings have NPT threads.

Use 1 Filter/Regulator for every 4 AB's.

This configuration provides optimum Blaster performance and allows the control valve to be located up to 100 feet from the Air Blaster.



No Quick Exhaust Valve Used

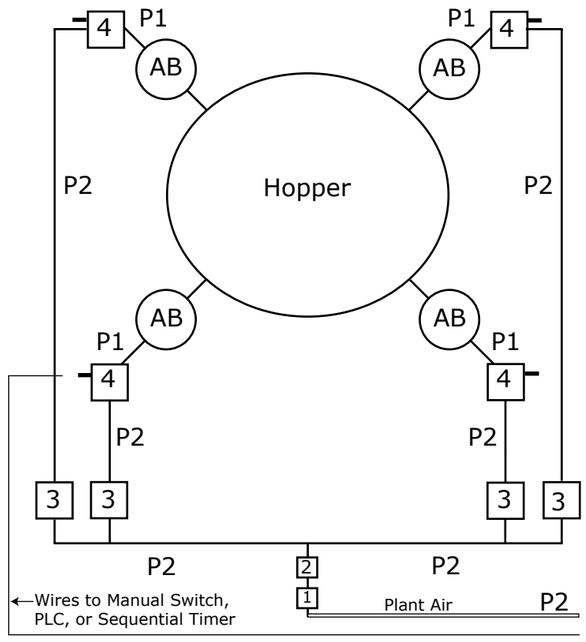
1 = ½" Shut-Off Ball Valve
2 = ½" Filter/Regulator/Gauge
3 = ½" Check Valve
4 = ¾" 3-Way Normally Open Control Valve
or
1" 3-Way Normally Open Control Valve for all 6" Air Blasters
AB = Air Blaster
P1 = ¾" Airline rated for 150 PSI (10.3 Bar)
P2 = ½" Airline rated for 150 PSI (10.3 Bar)

Notes:

Airlines and fittings have NPT threads.

Use 1 Filter/Regulator for every 4 AB's.

This configuration provides optimum Blaster performance when the Control Valve (4) is located within 10 feet of the Blaster. Using a smaller Control Valve or placing it further than 10 feet from the Blaster will significantly decrease AB performance. If control valve must be located further than 10 feet from AB, install appropriate QEV.



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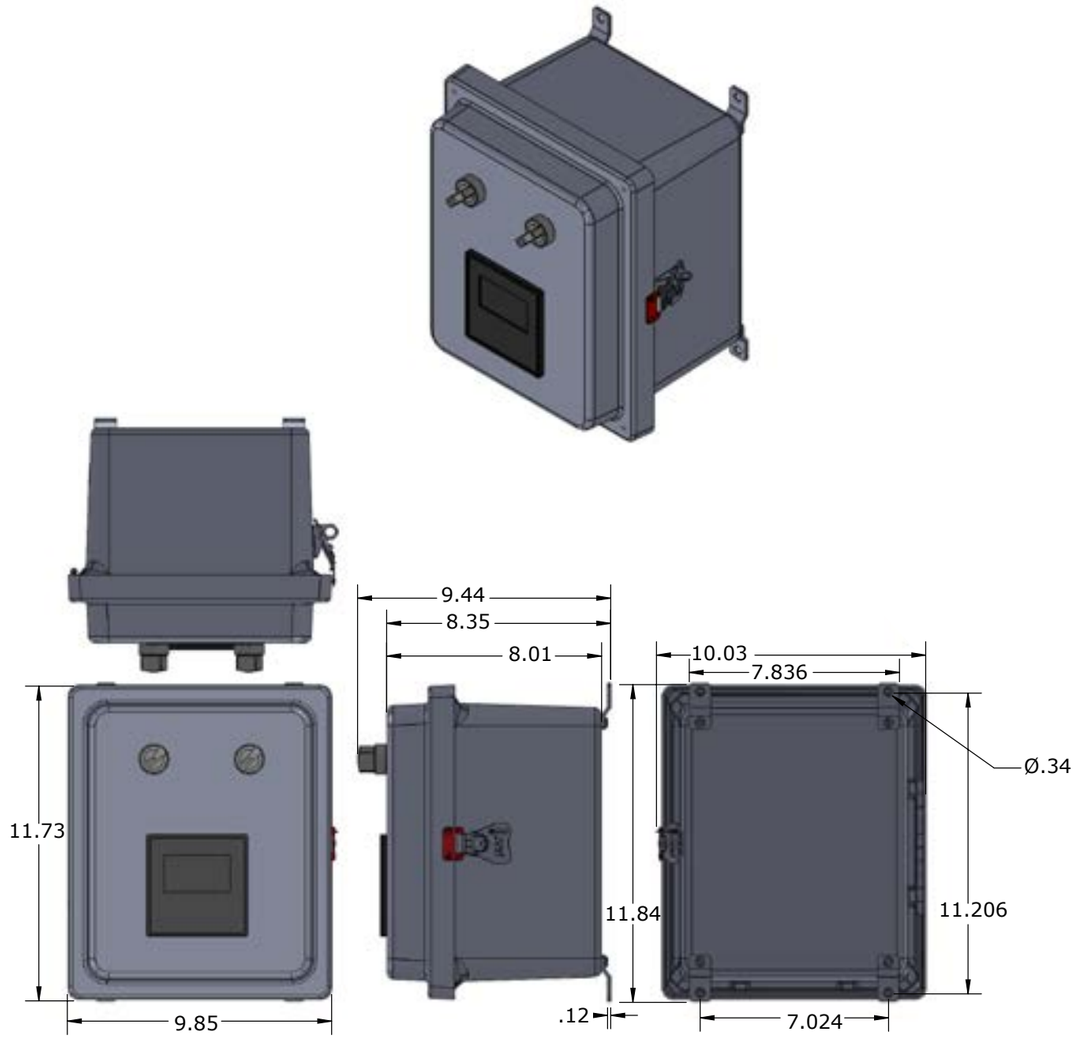
APPENDIX E

BLASTER MASTER II DIMENSIONAL DRAWINGS

Dimensions are in inches



APPENDIX F

BLASTER MASTER II WIRING DIAGRAM