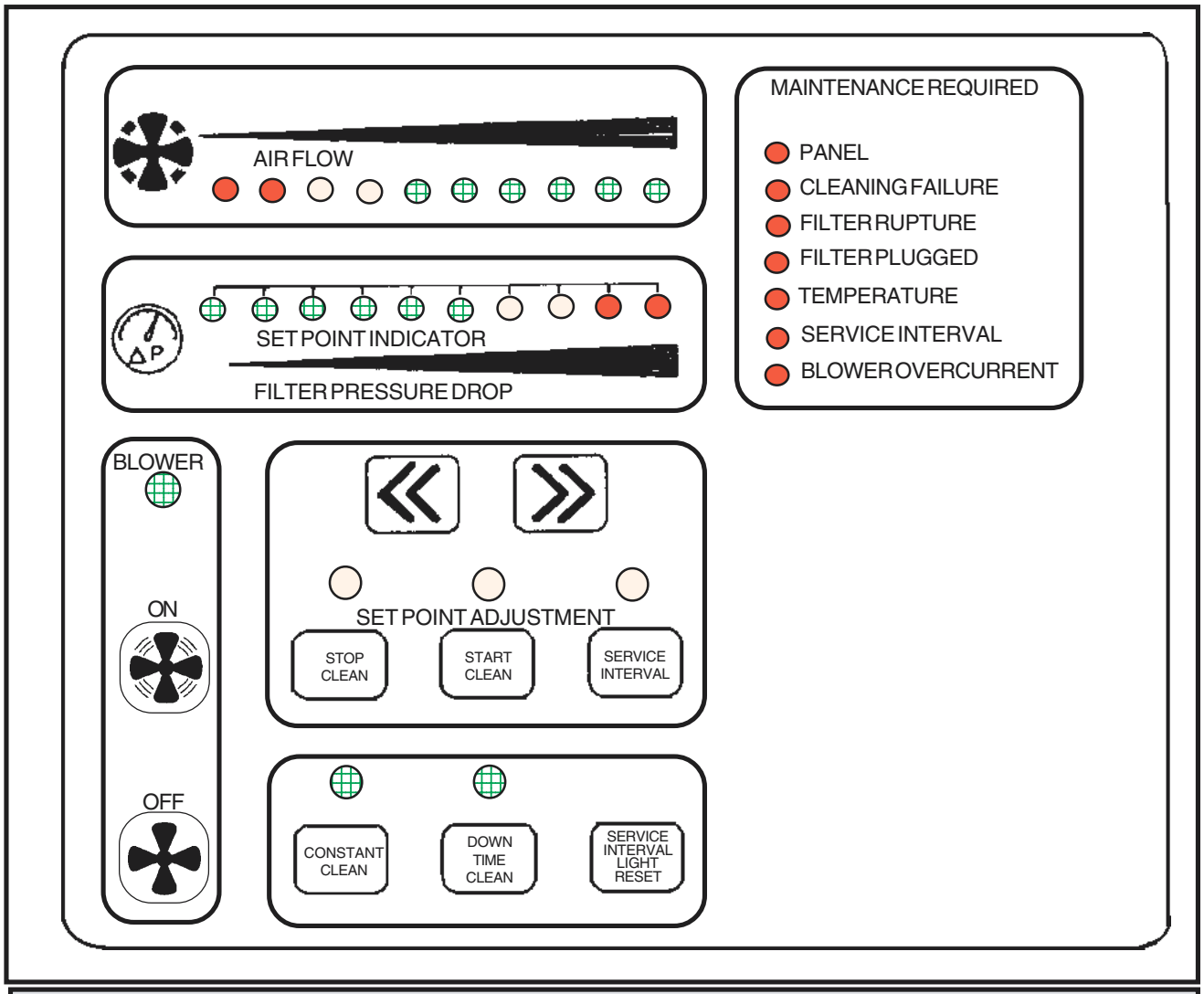
TORIT® INSTALLATION AND OPERATION MANUAL

TORIT CHECKER™BOARD—SDF VERSION

Includes Installation, Operation, and Service Instructions



IMPORTANT

This manual contains specific precautionary statements relative to worker safety. Read this manual thoroughly and comply as directed. It is impossible to list all of the potential hazards of this equipment. Persons installing or operating this equipment should read this manual and be instructed to conduct themselves in a safe manner. All electrical installation and maintenance shall be performed by a qualified electrician. All local electrical codes must be followed.

IOM-71094-00
Revision A

NOTE

Statements indicate precautions necessary to avoid potential equipment failure.

CAUTION

Statements indicate potential safety hazards

CAUTION

APPLICATION OF ELECTRICAL EQUIPMENT:

- **All electrical work is to be done by a qualified electrician according to the national and local electric codes that apply.**
- **All electrical power must be shut off during installation of the Checker™board.**
- **Do not initiate any circuits before all connections have been made.**

Donaldson®

TORIT® PRODUCTS

TORIT PRODUCTS is the leading designer and manufacturer of dust collector systems for the control of industrial air pollution. The Checker™board has been designed to lengthen the life of your machine and filters and to reduce the air consumption of your cleaning. This will reduce maintenance requirements and improve product quality.

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FIGURES

Parts and Service Program

For genuine **TORIT** replacement filters and parts, call the **TORIT** EXPRESS Line:

1-800-365-1331

PARTS ORDERING INFORMATION

When ordering parts, give model number and serial number, part number, description and quantity of parts desired.

DATA SHEET

Customer Name _____

Address _____

Ship Date _____ **Installation Date** _____

Model Number _____

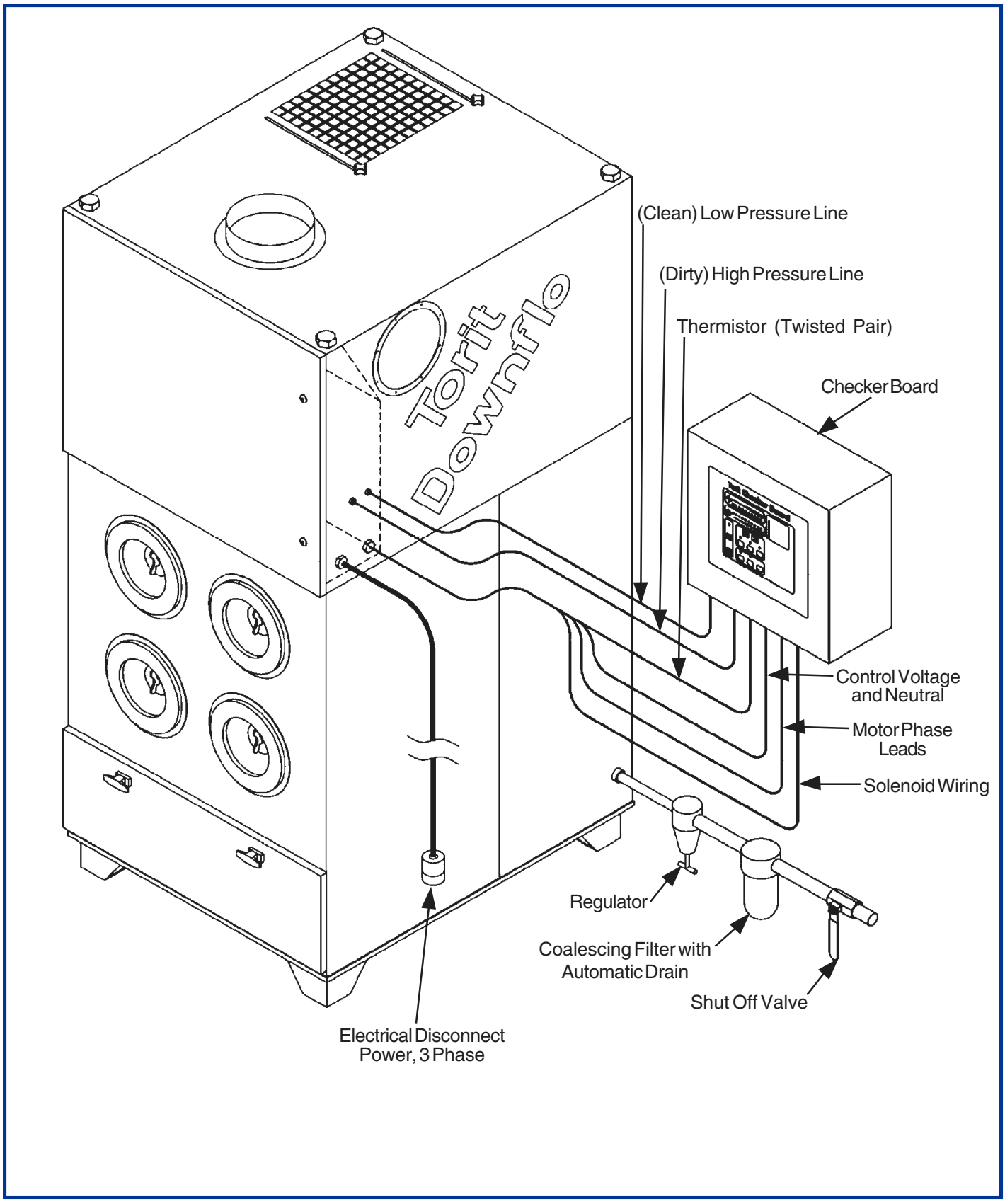


Figure 1
Typical Installation - Remote Enclosure

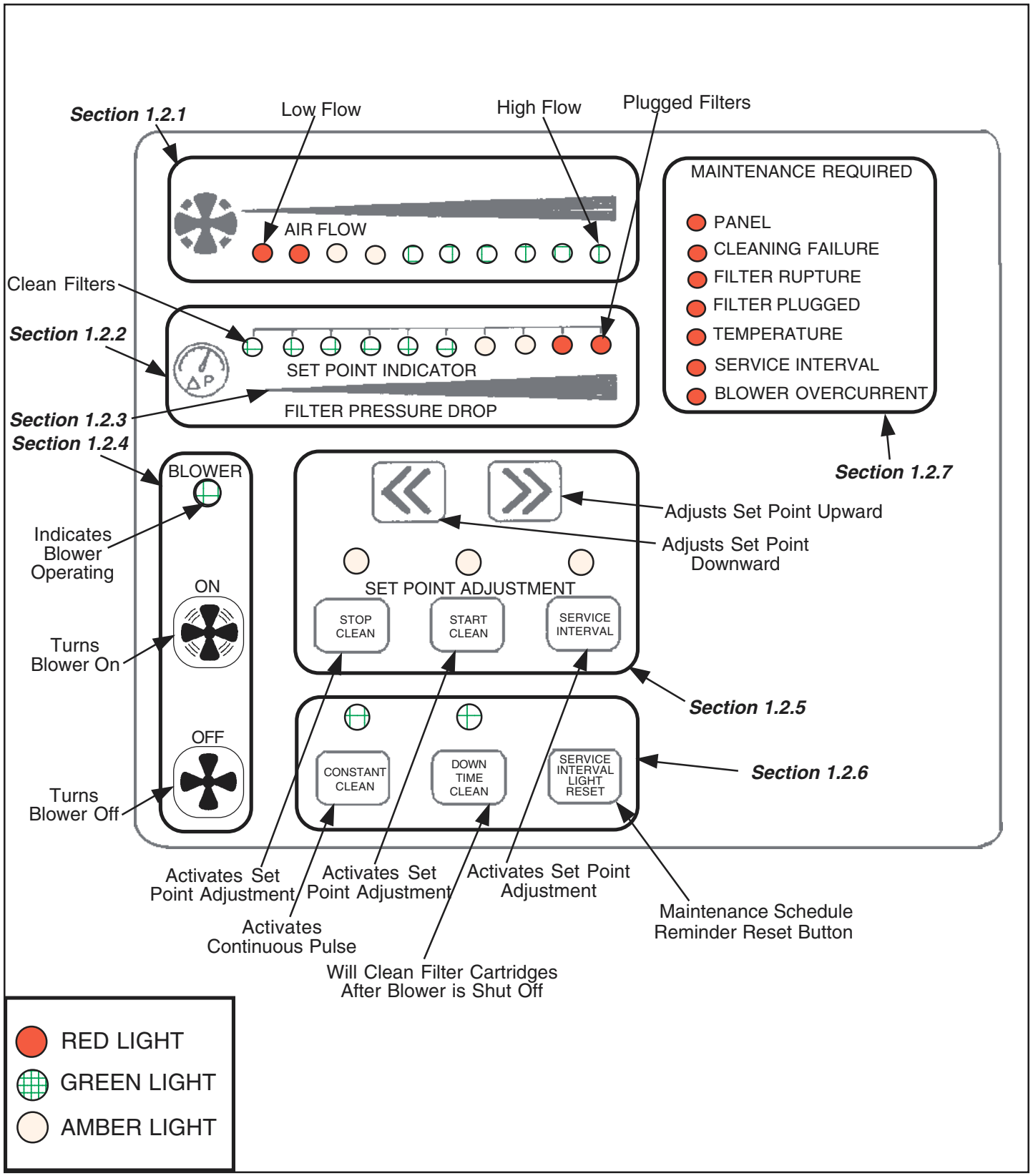


Figure 2
User Interface

1.0 INTRODUCTION

The Checker™ board diagnostic and control panel included with the dust collector is a flexible, cost-effective, and reliable replacement for the solid state timer, Magnehelic®* and Photohelic®* gages.

1.0.1 Specifications

INPUT VOLTAGE: Low Range – 90 to 130 VAC/ 50-60Hz/1 Ø
High Range – 180 to 260 VAC/ 50-60Hz/1 Ø

OUTPUT RELAY VOLTAGE AND CONTACT RATING: The output relays are independent of the input voltage. The relays can accept power from any voltage source desired.
VDE – 8 amps, 250 VAC
UL/CSA – 10 amps, 240 VAC; 8 amps, 24 VDC

PULSE WIDTH (ON TIME): 100 milliseconds (factory set).

PULSE FREQUENCY (OFF TIME): Set at 10 seconds. The off time between pulses can only be changed by modifying parameters contained in the microprocessor software (contact the Torit representative for assistance).

OPERATING TEMPERATURE RANGE: Ambient – 0°F (-18°C) to 140°F (60°C)

RELAYS: There are seven relay positions. Six can be used to drive solenoids.

1.1 Operational Explanation

The Checker board provides several functions:

- Control of the solenoid valves used for filter element cleaning.
- Control of the motor starter for the blower motor.
- Control of the set points used to start and stop the filter element cleaning function.
- Control of the cleaning mode.
- Continuous monitoring and diagnosis of the vital functions of the mechanical and electronic dust collector system components.
- Monitoring of the operating systems.
- Memory storage of the diagnostic readings for up to one year.
- Ability to accept control, monitoring, and adjusting of the set points from a remote computer.
- Visual display of the operating systems.
- Visual warning of abnormal operating conditions.
- Visual warning of system mechanical failures.

1.1.1 Functional Detail

A self-cleaning dust collector requires periodic filter element cleaning. This collector uses pulses of compressed air to dislodge the collected dust cake, consequently lowering the pressure drop across the filter and increasing the airflow.

The Checker board provides cleaning control, diagnostic review of the operational parameters, diagnostic review of the physical health of the system components, and a record of the operational data and fault conditions for future review.
The operator interface provides control of collector functions and operational status information.

The design allows for a host computer to remotely control the collector, accept change to the operational parameters and check the operational status. Several collectors may be controlled and monitored by one external host computer.

*Registered trademarks of Dwyer Instruments Inc.

The Checker board provides the electronic control of the pulse cleaning function. This control function includes starting and stopping the cleaning function at the assigned (adjustable) set points, initiating the individual pulses in an appropriate sequence, providing the correct time interval between pulses, and energizing the solenoid valve for the proper length of time. The microprocessor also provides the logic to control the alternate cleaning modes.

The microprocessor compares the sensor readings and stored values to determine the operational health of the system. This comparison indicates ruptured or plugged filters, cleaning system component malfunction, excessive temperature and blower motor overload due to excess air flow or motor failure. The microprocessor also has an extensive self-diagnostic test program that provides valuable information to a Torit service technician when necessary.

A built-in memory stores operational data at preset intervals and stores all fault indications that occur. The memory accumulates data for approximately one year before overwriting and replacing the oldest information. This data storage provides information to a service technician, assisting in accurate problem diagnosis and providing indication of intermittent system failures.

The Checker board has an RJ-11 connector which allows access by a host computer. This connection provides two-way communication, allowing the host computer to change the settings, start or stop the collector, and retrieve all current readings. With the use of host computer software addressing, one computer could provide remote set point adjustment, start/stop, and monitoring of numerous collectors.

The board also accepts a remote on/off push button or an external control voltage source to actuate the board.

1.2 Standard Features

The user interface display consists of several windows, or panels, each either displaying information or combining set point adjustment and information.

1.2.1 Airflow (Figure 3)

The airflow window display uses a light bar to indicate the relative operating position based on the calibration information placed in the microprocessor memory at start-up.

The light bar has 10 segments. From left to right, the first two are RED, the second two are AMBER, and the remaining six are GREEN. The initial reading at start-up should be in the GREEN range. As the filter elements accumulate dust the airflow indication will move within the light bar range. The first AMBER light indicates the collector airflow is at approximately 40-50 percent of full rated flow. The first RED light indicates a flow of approximately 25-33 percent of the full rated airflow. One light is illuminated at a time to indicate the relative position within the range.

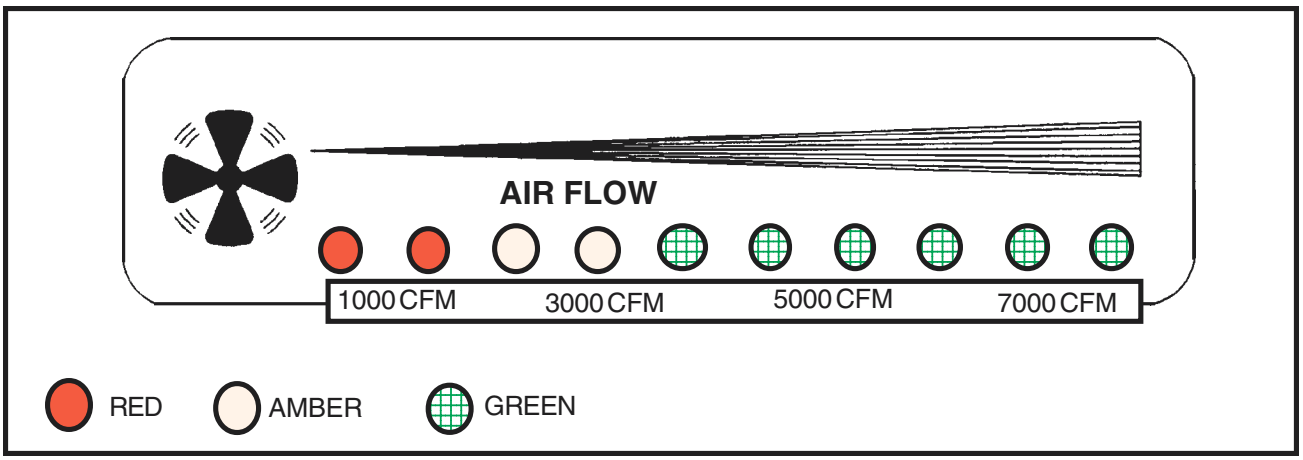


Figure 3
Airflow Display

1.2.2 Filter Pressure Drop (Figure 4)

A single window selectively displays the filter pressure drop (ΔP*) or the relative set points.

The pressure drop indicator is a ten segment light bar. From left to right, the first six lights are GREEN, the next two are AMBER, and the final two are RED. This display indicates the amount of static pressure required to move the airflow from the dirty air plenum to the clean air plenum through the filter media and through the tube sheet opening.
The display provides a near linear division of the available static pressure. The filter pressure drop indicator lights move from left to right in a bar display. Each light indicates 3/4" ΔP. One light is illuminated at a time to indicate the relative position within the range.

1.2.3 Set Point Indicator (Figure 4)

When using the set point adjustments window, the bar display switches to a set point display with one or two lights illuminated. When one light is lit, the set point is indicated. When two lights are lit, the set point is bracketed by the two lights (half step).

In Sections 1.2.1, 1.2.2, 1.2.3 and Figures 3 and 4 are descriptions and pictures of two of the windows located on the cover of the Checker board enclosure. Packed with the enclosure are two stickers (1/4" X 4"). These stickers may be used to indicate airflow in cubic feet per minute. These measurements can be determined during start-up and calibration (Section 4.0 Start Up / Calibration and Adjusting).

**ΔP=Pressure drop across filter elements in inches water gage.*

NOTE
Use a fine point permanent marker to write on strips.

Wipe the surface of the control box to remove any dust. Apply one sticker just below the LEDs on the Airflow Window.

Write in the appropriate airflow as measured in the system (see Figure 3). Airflows shown on Figure 3 are shown as an example only.

1.2.4 Blower ON/OFF (Figure 5)

The Blower window has a blower indicator light (GREEN) and two push buttons. The green ON push button provides power to the pull-in coil of the blower motor starter. The light in this panel indicates the switch closure only. The red OFF button disengages the power to the motor starter pull-in coil and turns off the indicator light.

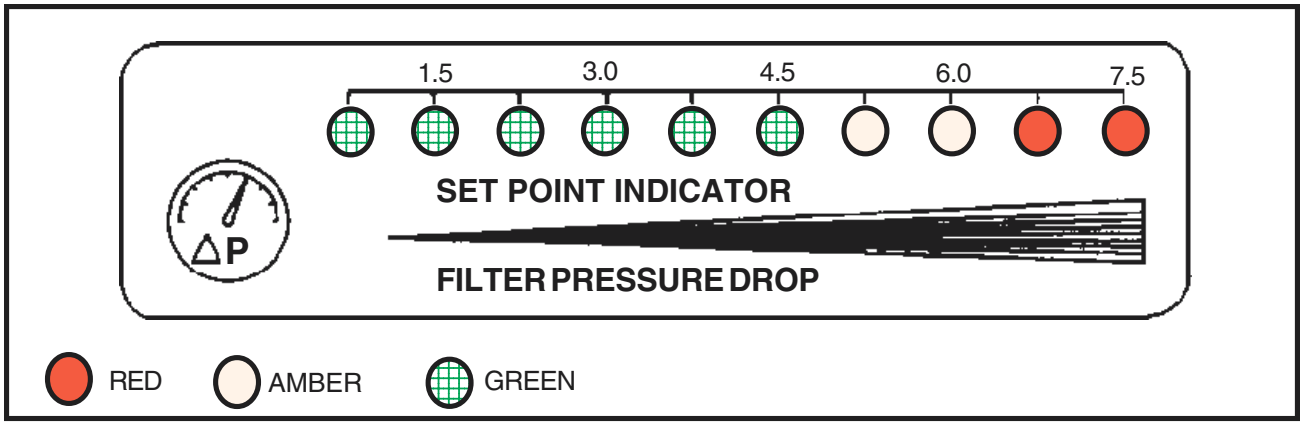


Figure 4
Filter Pressure Drop and Set Point Indicator Display

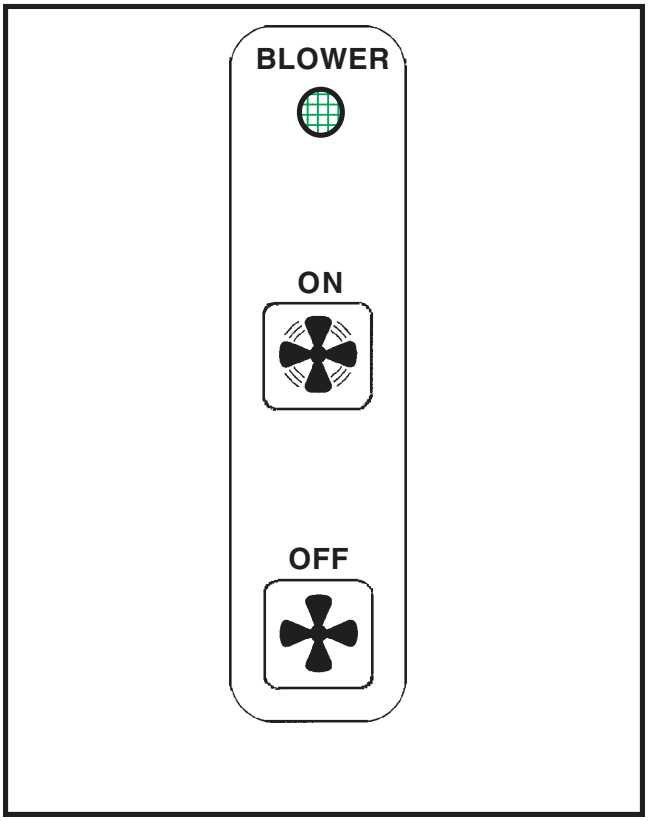


Figure 5
Blower ON/OFF Display

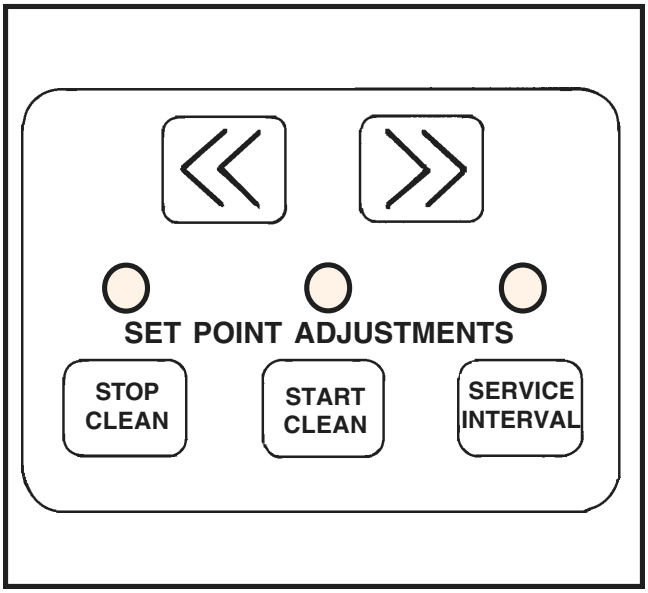


Figure 6
Set Point Adjustments Display

1.2.5 Set Point Adjustments (Figure 6)

This window contains five push buttons and three indicator lights (AMBER), which provide the means to adjust the three functions as labeled. The set points are indicated in the ten light bar graph display labeled Set Point Indicator. The two arrow keys on the adjustment display change the set points. They respond to either single button presses or a push and hold action. Each single press moves the indicator position a half step to the right or left as indicated by the arrow direction. Holding down the arrow key produces a stepping action. To activate the arrow keys, first press one of the three adjustment buttons. As an example, if the START CLEAN button is pressed, the light above the key will indicate successful initiation and the Set Point Indicator bar graph will switch from displaying the filter pressure drop to show the set point. Use the arrow keys to change the set point. The lights in the Set Point Indicator bar graph display will show the new value. When the adjustment is complete, press the START CLEAN button again and the indicator light will go out, showing successful disengagement of the function. The bar graph will revert to displaying the filter pressure drop. The Stop Clean and Service Interval functions operate in the same manner.

The system logic prevents overlap of the Start Clean and Stop Clean set points.

If one of the set point functions is left on, the microprocessor will automatically revert back to displaying the Filter Pressure Drop after two minutes.

NOTE
The push buttons must be held down for approximately one (1) second to initiate an action. This prevents accidental activation.

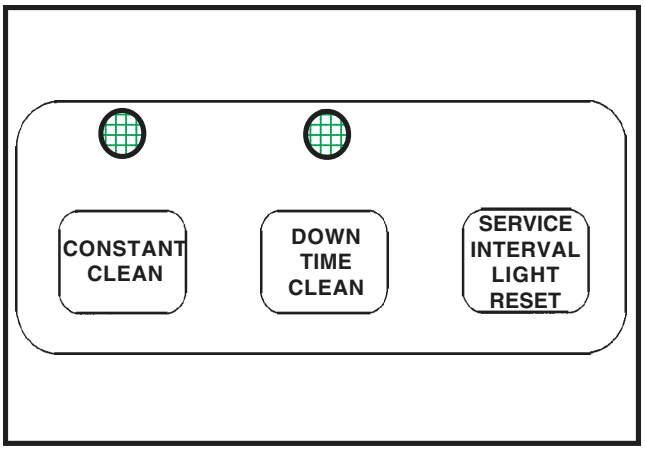


Figure 7
Unlabeled Window

1.2.6 Unlabeled Window (Figure 7)

The unlabeled window below the Set Point Adjustments window provides the operator with the ability to modify the filter cleaning mode. The normal cleaning mode provides cleaning only when the pressure drop is within the range defined by the Start Clean and Stop Clean set points.

CONSTANT CLEAN—This mode ignores the set point for Start Clean and Stop Clean and operates the filter cleaning system continuously while the blower is running. Activate this mode by pressing and holding the Constant Clean button until the indicator light (GREEN) illuminates. Deactivate the mode by holding the button down until the light goes out.

DOWN TIME CLEAN—This mode allows the filter cleaning to continue after the blower motor is turned off. After a delay to allow the blower to stop rotating, the cleaning mode will then start, sequentially pulse cleaning until the end of the preset cycle. At the end of the cleaning cycle, the system shuts down and remains dormant until the system is reactivated. This cleaning mode will remain in effect until turned off, initiating down time cleaning each time the OFF button shuts the system down. To activate this mode, press and hold the DOWN TIME CLEAN button until the indicator light illuminates (GREEN). Deactivate the mode by holding the button down until the light goes out.

SERVICE INTERVAL LIGHT RESET—This button resets the indicator light located in the Maintenance Required window. **The system logic requires that the system be shut down before the reset button will function.** If the system is on, the reset button will have no effect. To reset the indicator light, turn the system off, perform the necessary maintenance (i.e. emptying the hopper/drum or changing filters), and reset the light before restarting the blower.

1.2.7 Maintenance Required (Figure 8)

NOTE
All lights in the Maintenance Required window are red.

The Maintenance Required window contains a group of diagnostic functions which, with the exception of Service Interval, indicate an abnormal condition exists. The Service Interval indicator will allow you to schedule routine service as required by your system. Each of the fault indicator lights, again with the exception of the Service Interval, is either reset each time you press the OFF button or reset automatically when the abnormal condition ends. A fault light that resets at shut down remains off only if the fault condition has been corrected. The Service Interval light has a separate reset button.

PANEL—This indicates that either the microprocessor-based printed circuit board has self-diagnosed a fault in its operation or the power supply voltage applied to the board is not within acceptable limits.

CLEANING FAILURE—This indicates that either a solenoid valve, diaphragm valve, or relay failed to operate resulting in an improper cleaning pulse. This light will also indicate either low pressure or complete lack of compressed air for the cleaning system.

FILTER RUPTURE—This indicates an unexplained, sudden decrease in pressure drop across the filter element. Verify this fault condition by examining the air discharge from the collector. The fault light may also come on as a result of either a sudden closure of an inlet or discharge damper, or other system changes that cause a rapid decrease in air flow.

FILTER PLUGGED—This indicates that the pressure drop across the filter element exceeds the Start Clean set point and that the cleaning system can not lower the pressure drop measurement below the upper limit set point. If the pressure drop does not appear excessive, check the Start Clean set point for proper adjustment.

TEMPERATURE—This fault is preset at the time of shipment. It will signal that the air stream temperature has exceeded the maximum temperature recommended for the filters installed.

SERVICE INTERVAL—The Service Interval feature can be based on either a timer function or an external event. If the Set Point Adjustment for Service Interval responds, the unit is configured as an elapsed time indicator and is intended to signal proper service intervals for the dust collector. The timer can easily signal any routine service required by the system design. If the Set Point Adjustment function does not work, the unit is configured to respond to an external signal, such as a high level indicator. For information on the use of external signals, see Section 2.5.4 EXT IN (External Input #1).

BLOWER OVERCURRENT—This diagnostic light indicates that the blower motor is exceeding the recommended horsepower output, including any service factor. This will usually indicate that the system airflow exceeds the rated operating range. Changing the damper settings or increasing the external static pressure are both ways of reducing the airflow. Operating the collector either prior to installing the ductwork, with filter elements removed, with the door(s) removed, or with the hopper open to the atmosphere will also create excess flow conditions.

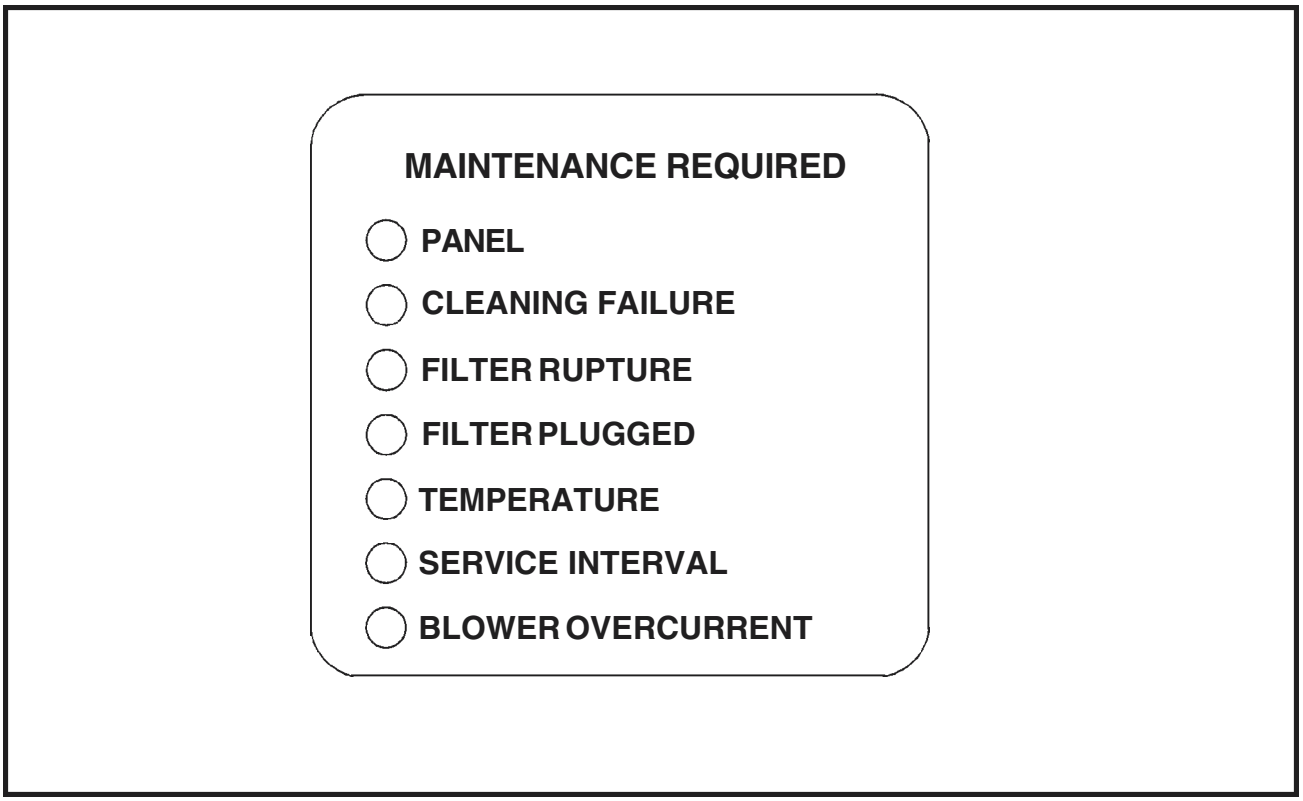


Figure 8
Maintenance Required Display

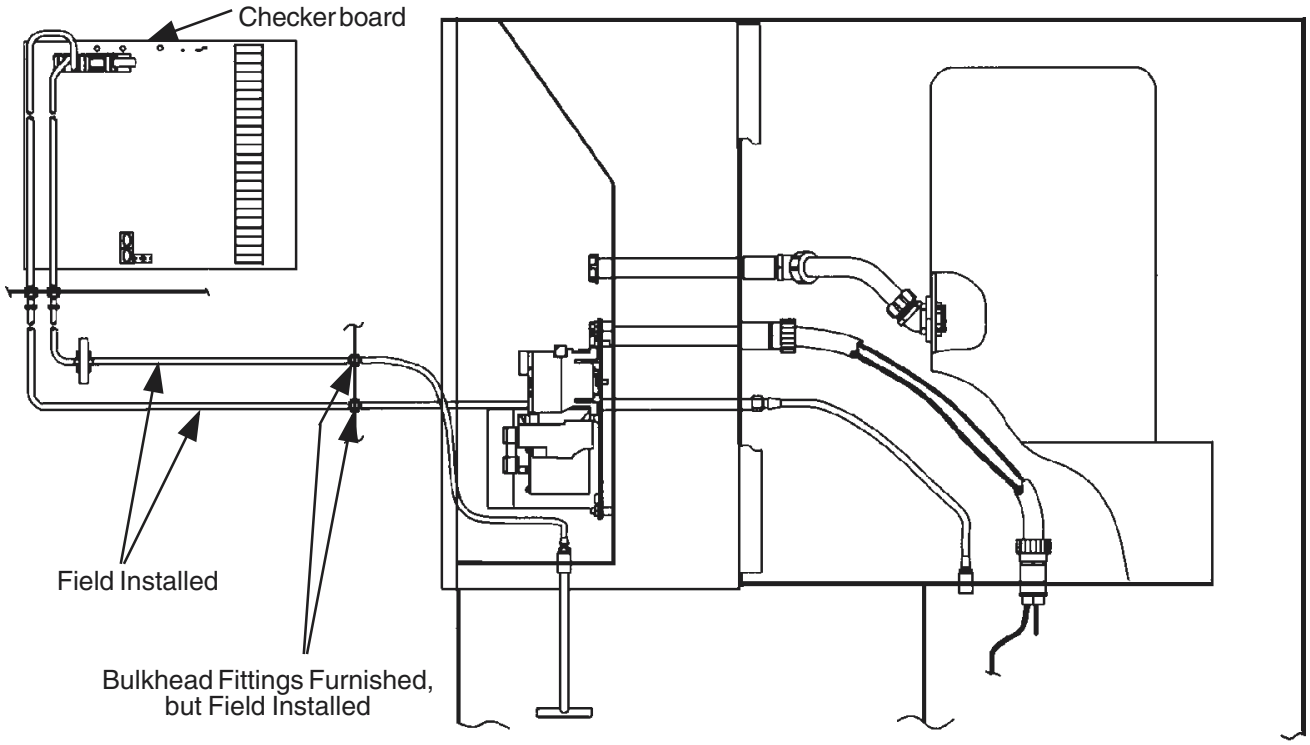


Figure 9
Pneumatic Installation

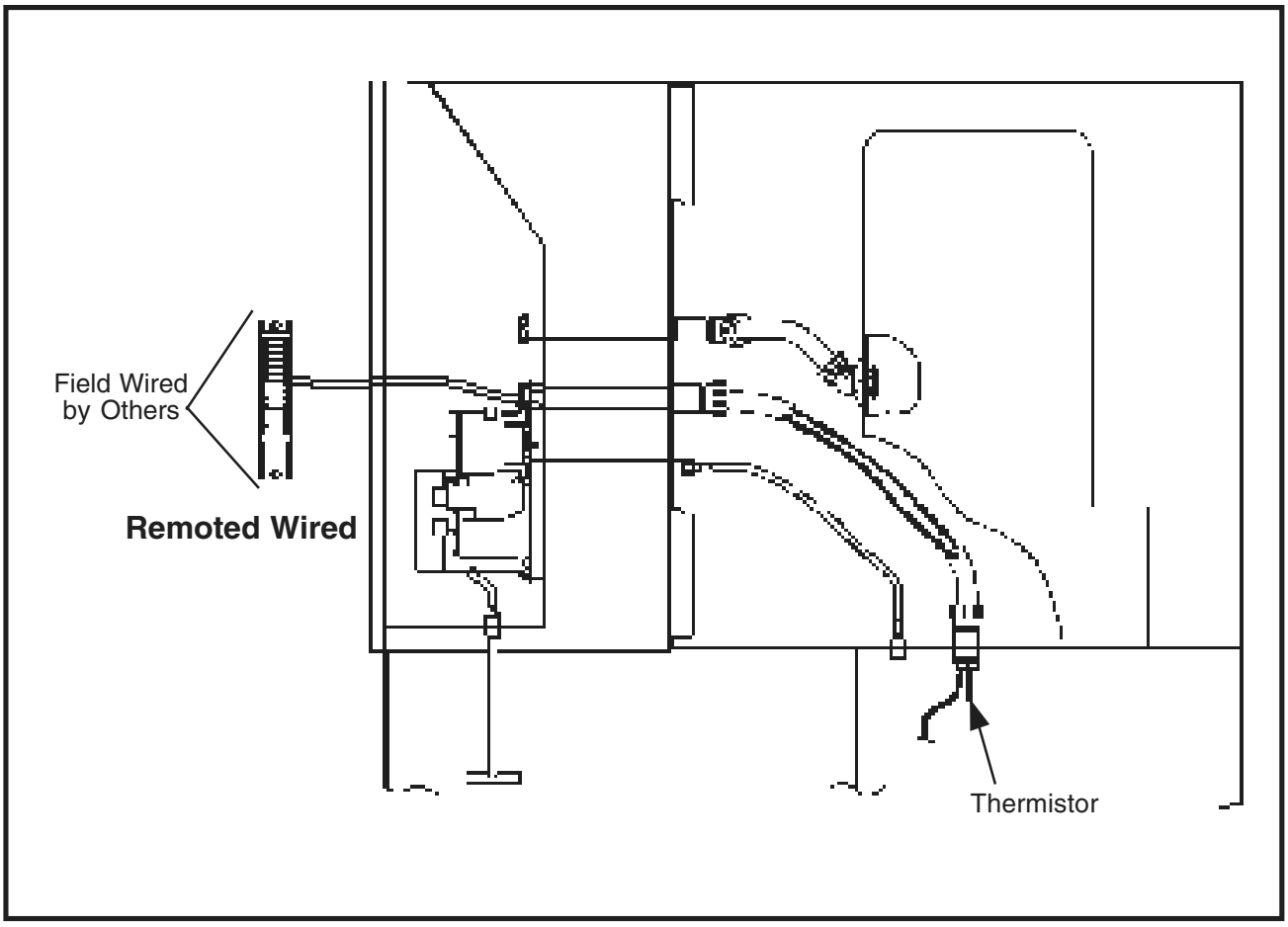


Figure 10
Thermistor

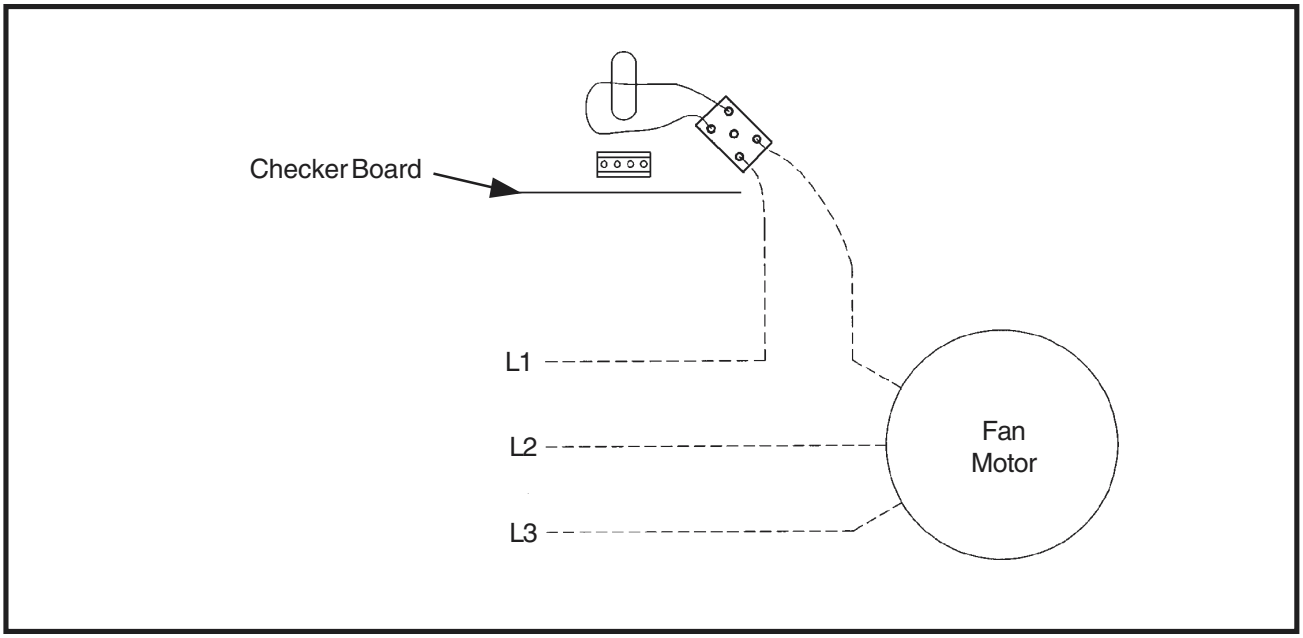


Figure 11
Current Sensor Wiring

2.0 INSTALLATION (Figure 1)

Mounting Instructions—Remote Checker Board

The enclosure for the Checker board should be mounted in a location convenient for the operator or maintenance personnel. Since the display provides visual warning of problems and operating conditions, much of its value is lost if the location does not permit continuous observation. For the longest, most trouble-free operation, mount the enclosure to a wall or column with little or no vibration.

(See Figure 9)

In order to get reliable signals to the sensors, the Checker board's pneumatic sensor lines should not exceed 250 feet. Lengths in excess of this may weaken the signals to the point that they are not readable. Contact the Torit representative for assistance if the sensor lines must be longer than 250 feet. Thirty-five feet of each of the pneumatic tubing lines ship with the remote Checker board.

(See Figure 10)

Field wire from the terminal strip in the Checker board enclosure to the terminal strip in the SDF electrical located at the top-front of the collector. **Follow the "Remote Wired" or "Remote Partially Wired" Point-to-Point wiring diagrams shipped with the collector.**

Use properly grounded shielded twisted pair wire to connect the temperature sensor, preferably in a metal conduit. The shielded twisted pair wire ships with the collector.

NOTE

For additional pneumatic tubing or twisted pair wire please contact the Torit Express Line at 1-800-365-1331.

2.1 Inspection -- Remote Checker Board

NOTE

- **When the Checker board is received, verify that it has not been damaged in shipment.**
- **Compare the items received against the packing slip.**

2.2 Ship Loose Items— Remote Checker Board

Unpack the Checker board enclosure. Some items may have been shipped inside the enclosure. Open the enclosure by loosening the clamp screws on the side(s). Remove any packing materials and properly dispose. Check the components against the packing list to make sure they have been supplied by Torit. If you find any components that are damaged or missing, notify the delivery company and your local Torit representative.

Items shipped loose with the Checker board may include:

- (1) Control Box
- (1) Twisted Pair Cable (50 ft. long)
- (2) Clear Tubing (35 ft. long each)
- (1) Safety Filter
- (1) Connector Tube to Tube
- (4) Print #3EA-37129
- (2) Label Stickers 1/4" X 4"
- (1) Installation and Operation Manual #IOM-71094-00

CAUTION

- **STATIC SENSITIVE ELECTRONIC ASSEMBLY**
- **Microprocessor controlled devices with microcomputers and EPROMS require care to avoid damage due to static discharge. Use proper grounding procedures to avoid permanent damage to this device.**

2.3 Tools Required

- Screw Driver (Wide 5/16 and Narrow 9/64 Slot Tip)
- Wire Strippers
- Knife
- Crescent Wrench
- Hole Knockout: for 1/2" connector (.859 to .906) for 3/4" connector (1.094 to 1.141)
- Wire Cutter
- Needle Nose Pliers
- Channel Lock Pliers

Most electricians will have all of these items as part of their standard tool kit. Some other items that will need to be supplied by the electrician are listed below. The electrician should prepare his requirements according to local codes.

- Conduit (1/2" and/or 3/4")
- Elbow Connectors
- Straight Connectors
- Wire Ties
- Wire Nuts
- Wire – green/white/black/red (#16, 14 or 12 AWG)
- Grounding Lugs

2.4 Pre-Installation— Remote Checker Board

Before installing the Checker board prepare an area that is clean and away from static discharges that could damage the components. Choose a location for the enclosure that will provide easy access to the interface panel on the outside of the enclosure and will allow the cover to be opened fully for service. The distance away from the collector is limited by the length of tubing and twisted pair cable that is provided by Torit. If additional tubing or twisted pair are required, please contact your local Torit representative (s ee Section 2.0.1 Mounting Instructions).

CAUTION

All electrical work must be done by a qualified electrician according to local codes.

NOTE

Read through the entire manual and study the installation prints thoroughly before attempting to install the Checker board. Have the manual and the prints readily available during installation.

2.5 Electrical Installation

CAUTION

Do not attempt to wire any electrical components while energized. Electrocution and/or damage to the components may occur.

2.5.1 Blower Motor Current Sensor Setup Table (See Figures 12 & 13)

The motor amperage located on the motor nameplate is necessary for positioning the jumpers. Determine the voltage input to the motor. The specific voltage will indicate the amp draw on the nameplate. Refer to the column "Blower Motor Full Load Amps" in Figure 12. Choose the amperage that matches the amp rating on the motor. Choose the letter corresponding to the amperage required and refer to Figure 13 for the jumper position.

BLOWER MOTOR CURRENT SENSOR SETUP TABLE

Blower Motor Full Load Amps	50 AMP Current Sensor Jumper Position	Primary Turns Through Sensor Core(s)
0 - 5 AMP	A	2
6 - 10 AMP	A	1
11 - 25 AMP	B	1
26 - 50 AMP	C	1

Figure 12
Setup Table

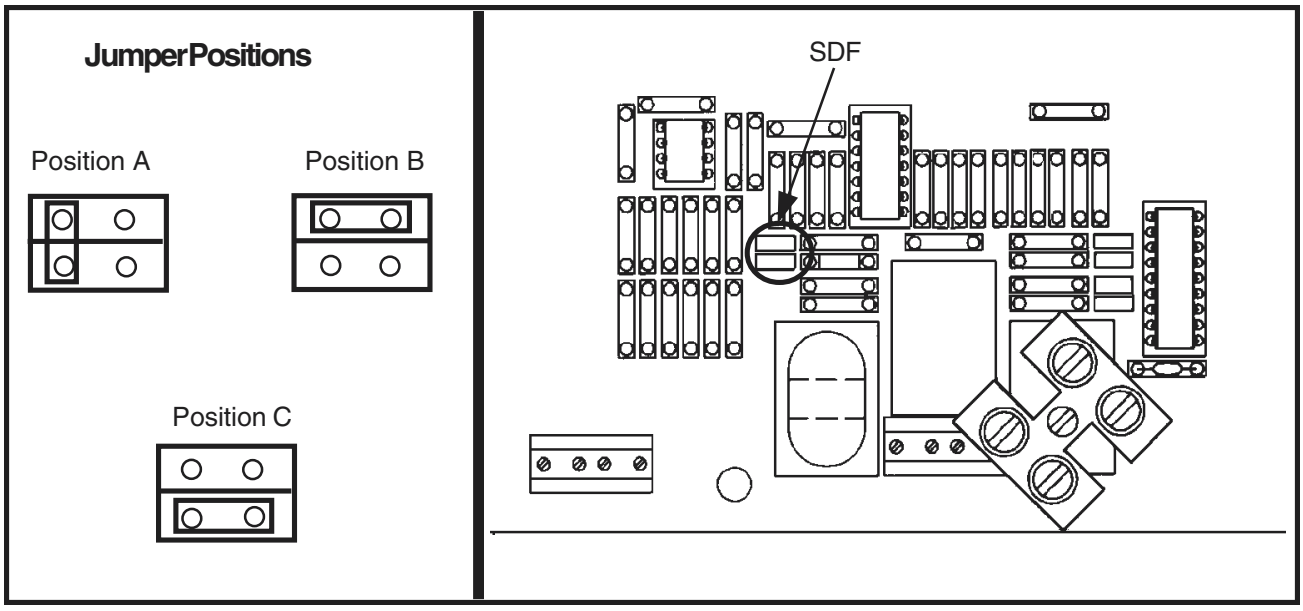


Figure 13
Jumper Position

There is one jumper plug on the main printed circuit board, located as shown in Figure 13.

The third column refers to the number of times that the motor leads are passed through the current sensor coil(s). **Please refer to the wiring diagram supplied with the Checker board.**

2.5.2 Primary Voltage

NOTE

Position the voltage selection slide switch to correspond with the connected voltage.

- Switch Position (See Figure 14)

Position the voltage switch to correspond to the incoming power. When pushed to the left, the switch is set for 90 to 130 VAC. When pushed to the right, the switch is set for 180 to 260 VAC. **The user must provide a control transformer for all other voltages.**

NOTE

The connections to the printed circuit board are all labeled in the silk screening on the edge of the board.

- Incoming Voltage (hot) (See Figure 14)
  IN/OUT HOT

This is the primary voltage source for the board. Acceptable voltages are 90 to 130 or 180 to 260 VAC/50-60Hz/1 Ø. The "hot," or phase, wire connects to the IN terminal. The OUT terminal provides a convenient point to connect the "line" voltage to the other output connections that will operate on the same voltage, such as solenoid relays.

- Incoming Neutral (See Figure 14)
  IN/OUT NEUTRAL

This is the neutral connection for the primary voltage source. The primary connections should attach to the IN side, using either the IN or OUT side to provide "common" connections to the other outputs (such as the relays).

2.5.3 ON/OFF (See Figure 14)

This remote ON/OFF circuit provides an optional switch for applications that need automatic interlocked starting and stopping, and for applications with the panel out of physical reach of the operator. Momentary voltage, impressed across the ON/OFF terminals, switches and latches the circuit. If the collector is ON, it shuts down; if the collector if OFF, it will start. A second momentary connection causes the circuit to revert to the original operational state.

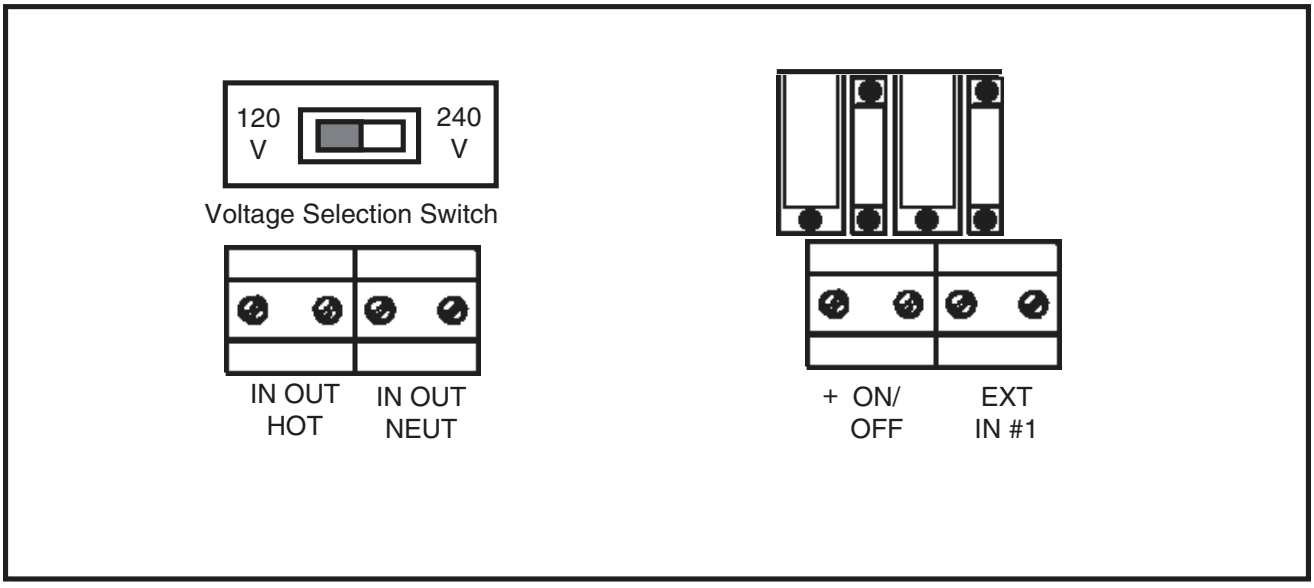


Figure 14
External Input

2.5.4 EXT IN (External Input) #1 (See Figure 8 & 14)

(See SERVICE INTERVAL Section 1.2.7)
External Input #1 (EXT IN #1) permits the customer to control the SERVICE INTERVAL fault light in the MAINTENANCE REQUIRED panel with an external device, such as a high level control in a dust storage container, instead of using the internal timer. One terminal connects to neutral; the second connects to a voltage source, either 120 VAC or 24 VDC, connected through a normally open switch provided by the external fault indication device. **This external output only functions if the configuration in the microprocessor was factory-set to read this input rather than use the internal clock method of indicating a time-based service interval.**

If the SERVICE INTERVAL light is controlled by the internal clock timer, EXT IN #1 does not function.

2.5.5 SER I/O (Serial Port Input/Output) (See Figure 15)

This RJ-11 socket provides the connection for the monitoring and control of multiple collectors. Contact a Torit representative for further information.

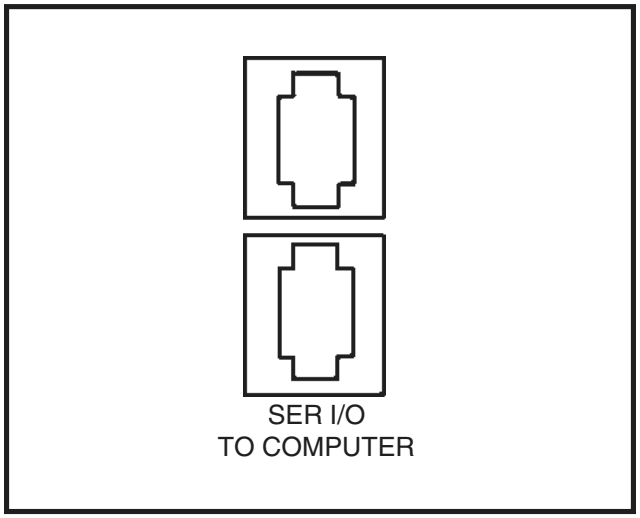


Figure 15
Serial Ports

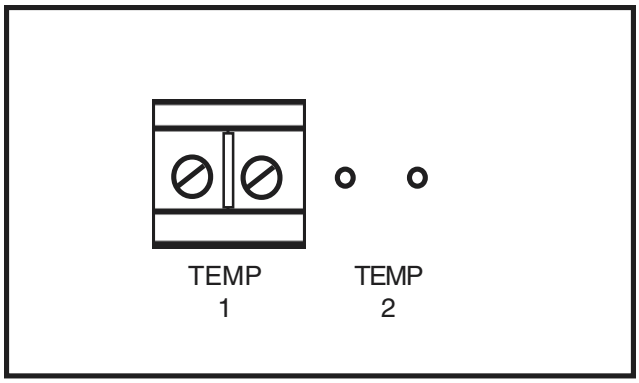


Figure 16
Temperature 1 & 2

2.5.6 SER I/O TO COMPUTER (See Figure 15)

This RJ-11 connection (the one closest to the edge of the printed circuit board) provides the computer interface, allows remote ON/OFF, adjusting of set points, and monitoring of conditions by a host computer. Contact a Torit representative for information related to communication requirements.

2.5.7 TEMP 1 (Temperature) (See Figures 10 & 16)

This is the connection for the thermistor monitoring the air stream temperature in the clean air plenum.

2.5.8 TEMP 2 (See Figures 10 & 16)

This is intended for future use.

2.5.9 CUR 1 (Current) (See Figures 11 & 17)

This is a mounting position for a current sensor. See Figure 11 for proper connections. The current sensor measures the amp draw of the blower drive motor, providing airflow information through the light bar display.

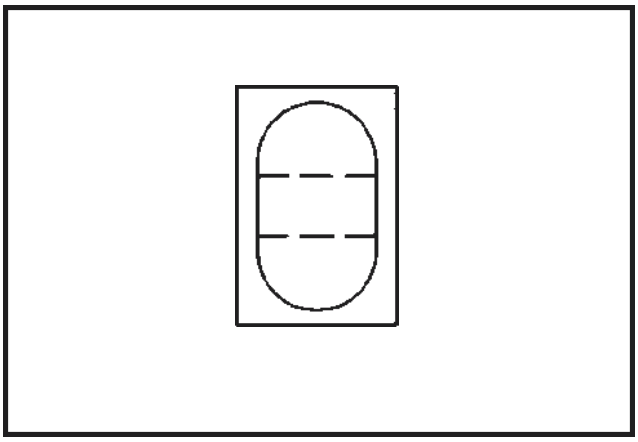


Figure 17
Current Sensor

2.5.10 Solenoid and Motor Starter Relays (See Figure 18 & 20)

Relay #1 is always used to control the pull-in coil on the motor starter that activates and stops the system blower. Relays numbered 2 and higher provide control of the system solenoid valves used for element cleaning.

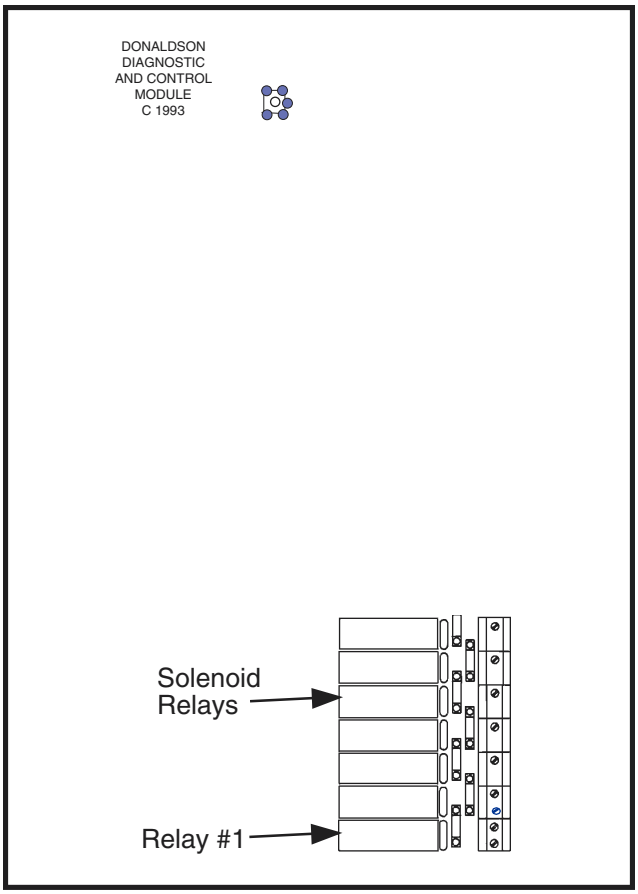


Figure 18
Relays

NOTE
All solenoid relays used must be in numerical sequence without gaps.

The relay outputs can be either 115 Volt AC or 24 Volt DC. The 24 VDC version has a transformer to supply DC current to the relays. The 24 VDC version leaves Relay #2 blank to provide separation of the 115 or 230 VAC motor starter voltage from the 24 VDC used for the solenoid valves.

Relays used for solenoid control can operate up to three solenoids each. Do not connect more than one solenoid on any air manifold to a common relay.

2.5.11 Signal Terminal (See Figure 21)

The Signal terminal provides a means to export a logic signal to a PLC from a transistor-type Optocoupler, indicating that one or more of the Maintenance Required lights are illuminated (see Figure 8). Any fault light, except the SERVICE INTERVAL light, causes the Optocoupler to pass a DC logic signal to a connected PLC for approximately 0.5 seconds.

Typical circuits to use this signal are illustrated in Figure 19.

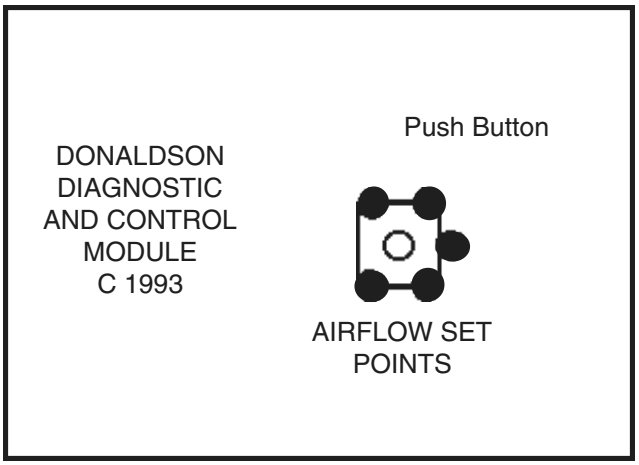


Figure 19
Push Button (Calibration)

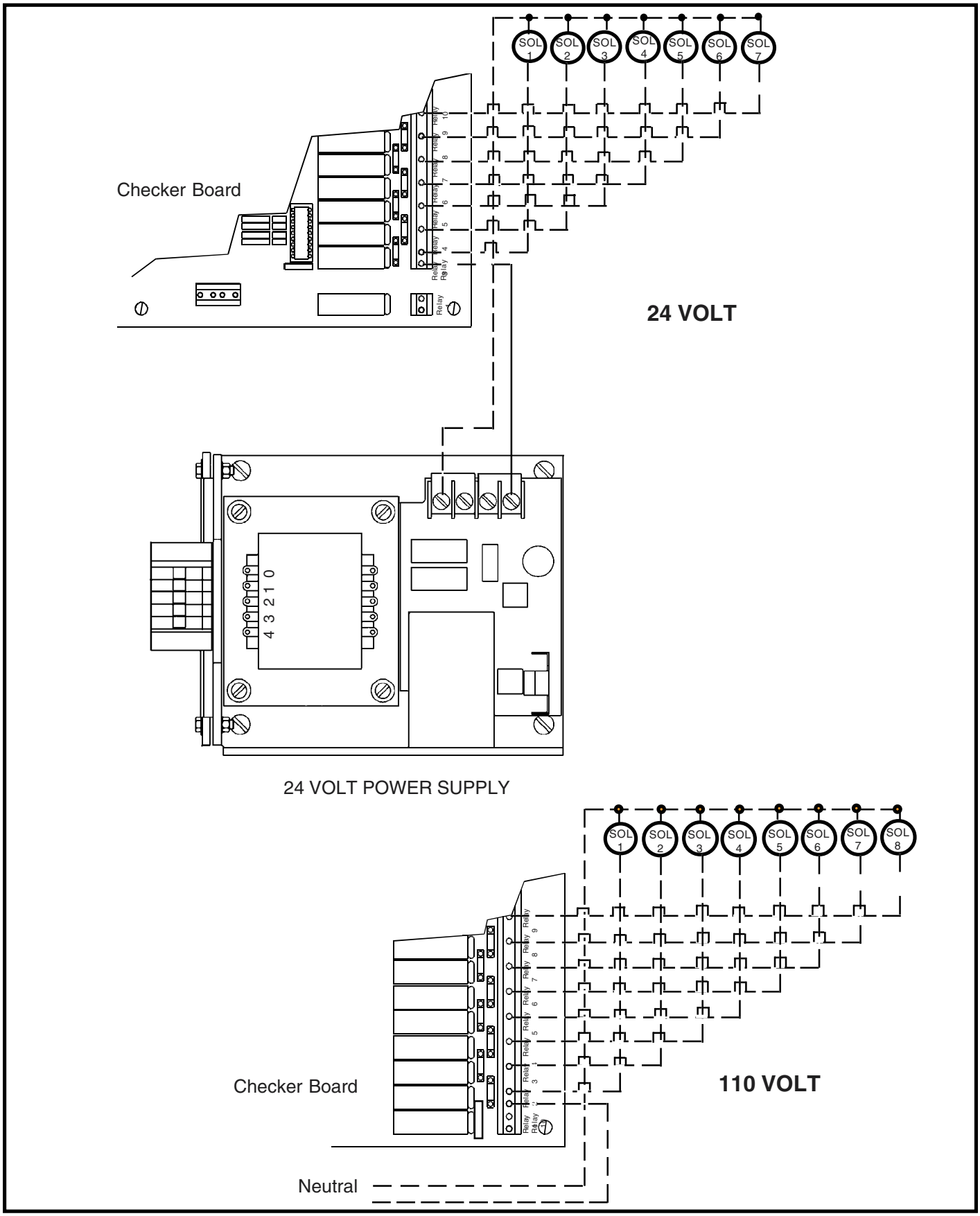


Figure 20
Wiring Diagram

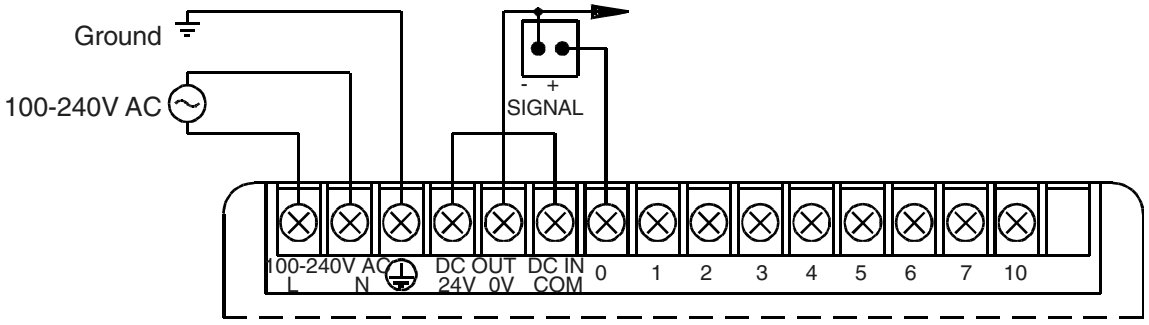
2.6 Pneumatic Installation— Remote Checker Board (See Figure 9)

The Checker board requires pneumatic connections. The collector has tubing fittings installed in the clean air plenum and the dirty air plenum. Attach an airtight, clear tube from the bulkhead fitting on the enclosure to the matching fittings on the SDF. **An installation drawing has been shipped with the Checker board which will show all of the proper connections.**

3.0 PRE-START UP CHECKLIST

- Make sure all connections to both air and electrical are in the correct position according to the installation print.
- Recheck all of the electrical and air connections for tightness and leaks.
- Verify that all electrical systems have been properly grounded.
- Verify the proper installation of the collector(s) for which the Checker board has been installed.
- Verify proper blower rotation by pushing the start-stop button on and off very quickly. The rotation should be clockwise when looking down on the top of the motor (Torit blowers only). See Section 4.0 Start Up/Calibration for blower rotation fault light.

When using the PLC sensor DC power supply:



When using a PLC and an external DC power supply:

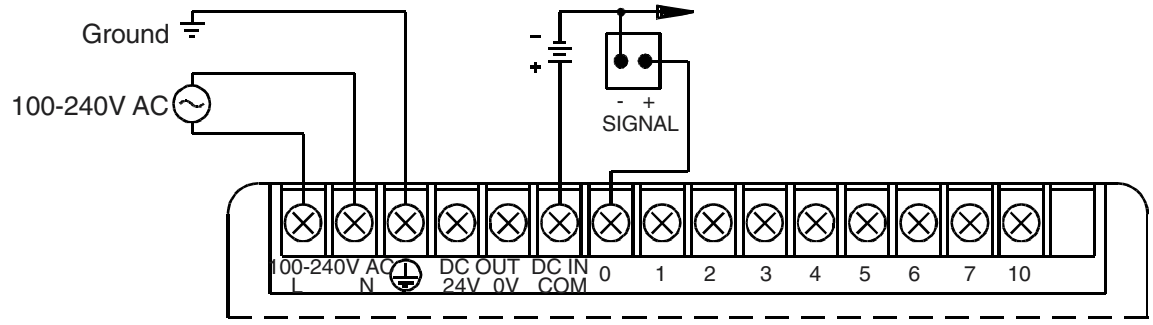


Figure 21
Signal

4.0 START UP

4.1 Calibration – Airflow Bar Graph

Once the collector installation is completed, the ductwork and hoods installed, and the system ready to operate, the computer will require a calibration procedure to properly display the operational airflow.

NOTE

The system must remain running for the entire calibration sequence or none of the information will be stored in memory. If the power to the system is interrupted, start again and complete the entire sequence.

NOTE

Verify that the current sensor jumper (sensitivity) settings match the motor amperage (see Figure 13).

Configure the system at the maximum airflow you will see in the normal use of the system. This means clean filters, the blower inlet or outlet damper open to the maximum flow the system will ever see, and within the horsepower of the motor. Turn the motor on.

Operate the motor for an hour or more to stabilize the operating temperature and amperage draw. The motor amperage draw may decrease due to run-in of bearings. Run-in may vary in time from hours to days.

CAUTION

Do not make contact with any components other than those mentioned. Electrical shock can occur, causing electrocution and damage to the electronic components.

Open the electrical enclosure containing the Checker board main panel. Locate the push button labeled Airflow Set Points located just to the left of relays 23 and 24. Press and hold this push button until the PANEL fault light LED (located in the Maintenance Required window on the cover or door of the enclosure) is lit (see Figures 8 & 19).

Press and hold the Start Clean push button (see Figure 6) until the indicator LED immediately above that button is lit. Use the arrow buttons in that same window to light the LED in the Airflow bar graph appropriate to indicate the desired maximum airflow. Start with the 10th LED (green color) from the left as an appropriate high flow indication.

Press and hold the Start Clean button until the indicator LED goes out.

Use the blower damper or other system airflow control means to lower the system airflow to the lowest airflow that will provide satisfactory performance. This is normally dictated by the lowest airflow that generates transport velocity in the ducting.

NOTE

Insufficient airflows may allow material to build up in the ducting, creating plugging problems.

When you are satisfied that the system is operating at its lowest practical airflow condition, press and hold the Stop Clean button until the indicator LED immediately above that button is lit (see Figure 6). Again, use the arrow buttons to locate and light the LED that seems appropriate for displaying the low flow condition. Use the 1st or 2nd LED (red color) from the left end as a starting point.

Press and hold the Stop Clean push button until the indicator LED goes out. Press and hold the Airflow Set Point push button on the main printed circuit board until the PANEL fault indicator LED goes out (see Figures 6 and 8).

The computer automatically assigns values for all the LEDs in the Air Flow light bar based on calibration values registered by the procedure above. The computer automatically assigns a blower overcurrent value based on 120 percent of the motor amp draw recorded at the time of maximum airflow calibration set point.

This calibration procedure can be repeated to change either the light bar display or to compensate for changes in the system. The only set point that can not be changed with this procedure is the blower overcurrent value. **If you find that the Blower Overcurrent fault light is displayed and ammeter readings indicate the motor is operating at less than its name plate rating, contact the Torit representative for assistance in reassigning the overcurrent value in the computer.**

4.2 Blower Rotation

If the fault light remains on after it has been verified that the blower is rotating in the correct direction, reverse leads #1 and #2 at one end of the twisted pair wiring between the current sensor and the Checker board.

4.3 Start Clean / Stop Clean Adjustment

The microprocessor has default settings from the factory; however, you should establish an initial setting for filter cleaning to match your system configuration.

Each light in the bar graph display is equal to approximately 0.75" wg (see Figure 4). The system logic limits movement of the set point, not permitting the set points to overlap. In other words, the Stop Clean value can not be greater then the Start Clean value, and vice versa.

Start the collector (after installation of all the ductwork and other devices that affect airflow), check the Filter pressure Drop reading, and then set the Stop Clean one light to the right of the initial reading (see Section 1.2.5 Set Point Adjustments). Set the Start Clean three lights to the right of the initial reading. As the filter element ages, the settings will need to be adjusted the maintain stable pressure drop without needless continuous pulsing. Do not set the Stop Clean at the initial reading, as this will clean down to new filter ΔP. A dust cake helps make the filter more efficient and attempting to maintain the initial reading uses excessive compressed air.

4.4 Service Interval

The Service Interval is a timed service interval, adjustable from 8 hours (first light illuminated) to 80 hours (tenth light illuminated). The interval can be adjusted in four hour increments by bracketing the half step, as described in Section 1.2.5 Set Point Adjustments. As an example, this timer function can indicate appropriate time intervals to empty the dust container(s).

If the LED above SERVICE INTERVAL push button will not light, it is configured to function from an external switch. See Section 2.5.4 EXT IN #1 for further information.

7.0 TROUBLESHOOTING GUIDE

TROUBLE	POSSIBLE CAUSE	REMEDY
A. Power LED is not illuminated. The power LED is located at the center of the main printed circuit board.	1. Electrical supply circuit down.	1. Check the electrical supply circuit for proper output voltage. Check the system circuit breaker or fuses.
	2. Disconnect open.	2. Close system disconnect.
	3. Transformer fuse.	3. Check transformer fuses and replace if necessary.
	4. Board input fuse.	4. Check printed circuit board fuse and replace if necessary.
B. Panel—fault light is on.	1. Input voltage does not match the slide switch position.	1. Verify input voltage and set slide switch to match.
	2. Voltage outside the system limits.	2. Provide external transformer circuit.
	3. Temporary low or high voltage.	3. Power down and back up once the "brownout" conditions are corrected.
	4. Component failure.	4. If 3 does not remedy the fault indication, and the input voltage is correct, contact factory service.
	5. System is in the airflow configuration mode.	5. Complete airflow configuration settings and exit to normal mode.
C. Cleaning Failure—fault light is on.	1. Solenoid valve failure.	1. Check for proper valve action and repair or replace as necessary.
	2. Diaphragm valve failure.	2. Check for proper valve action and repair or replace as necessary.
	3. Relay failure.	3. Check relays for proper voltage output.
	4. Solenoid wiring error.	4. Check for proper solenoid wiring.
	5. Lack of compressed air for cleaning.	5. Correct compressed air supply problem.

7.0 TROUBLESHOOTING GUIDE

TROUBLE	POSSIBLE CAUSE	REMEDY
D. Filter Rupture—fault light is on. This fault indicates a major drop in the ΔP* across the tubesheet with no pulse cleaning to cause the change. *ΔP = Pressure Drop across the filter element and tubesheet.	1. Collapsed or ruptured filter element.	1. Verify failure by checking the discharge airflow for visible plume. Replace filters if visible discharge.
	2. Rapid closure of a flow control damper.	2. Reset to correct damper settings.
	3. Motor failure.	3. Check fuses, circuit breakers, and internal reset. Repair or replace as necessary.
E. Filter Plugged—fault light is on.	1. End of a useful filter element life.	1. Replace filter elements as a complete set.
	2. Low compressed air pressure.	2. Correct compressed air pressure to 90 to 100 psi at manifold.
	3. Incorrect set point adjustment.	3. Raise the Start Clean set point above the normal operating ΔP.
F. Temperature—fault light is on.	1. Airstream temperature exceeds the rating of the filter elements.	1. Verify the airstream temperature, replace the filter elements with higher temperature rated version and ask for factory assistance to reset the fault indicator set point.
	2. Fire	2. Extinguish fire and repair and replace elements as required. Eliminate all possible sources of ignition prior to restarting the system.
	3. Short Circuit	3. Check twisted pair; replace if damaged.

7.0 TROUBLESHOOTING GUIDE

TROUBLE	POSSIBLE CAUSE	REMEDY
G. Service Interval—fault light is on.	1. Timer function – time elapsed.	1. To reset the indicator light, press the OFF push button, perform the service, press the Service Interval Light Reset push button, and return to service.
	2. External event function.	2. Perform service indicated by the external device and reset as above.
H. Blower Overcurrent—fault light is on.	1. Faulty motor.	1. Repair or replace as required.
	2. System airflow exceeds the rated flow.	2. Adjust inlet or outlet damper(s).
	3. Lack of proper system flow restriction or open access from ambient to either clean or dirty air plenum.	3. Close open hopper discharge or other openings. Do not attempt to run without inlet ducting attached.
I. Airflow Bar graph—No display	1. Calibration procedure not completed.	1. Follow procedure in Section 4.0.
	2. Phase wire not run through current sensor.	2. Pass one motor phase wire through current sensor.
J. Filter Pressure Drop Bar graph—No display, or all lights illuminated	1. Pneumatic tubing connections incorrect.	1. Reverse the ÐP tubing connections, safety filter must be in the dirty air plenum tube.
	2. Clean filters.	2. Unseasoned filters may not have sufficient pressure drop to illuminated even the first LED. Recheck after operating under load.

7.0 TROUBLESHOOTING GUIDE

TROUBLE	POSSIBLE CAUSE	REMEDY
K. Filter Pressure Drop—bar graph is far out of calibration.	1. One of the tube fittings on the pressure sensor has broken loose from the substrate.	1. If the pressure sensor is mounted on the top side of the printed circuit board, the tube can be remounted with cyanoacrylate adhesive. If mounted on the bottom side of the printed circuit board, replace board.
	2. Leaks or plugged pneumatic fitting or lines.	2. Correct any leaks, loose fittings, and kinked or pinched pneumatic lines. Use compressed air to blow accumulated dust in lines back into the dust collector. Clean or blow out ant plugged fittings.
	3. Plugged pneumatic safety filter.	3. Replace the line filter that protects the pressure sensor.
	4. Zero calibration error. The microprocessor recalibrates the zero point every time the board goes into active mode. If the blower is already operating when the board enters the active mode, or if there is any pressure on either side of the ΔP sensor, the calibration will be incorrect.	4. Turn off blower and Checker board, leaving the Checker board powered and in the inactive mode for 2 minutes. Be sure that the Checker board enters the active mode either before or at the same time as the blower, or disconnect the ΔP tubing from the Checker board before going into the active mode.
	5. Damaged sensor due to overpressure. Sensor rated for a maximum pressure of 6 psi (41 kPa).	5. Replace the Checker board.
M. Blower light illuminated, but blower motor not operating	1. Pull-in coil in completing circuit.	1. Check output pull-in coil in closed position.
	2. Blower motor failure.	2. Check power to motor. If power is available, motor is bad.

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