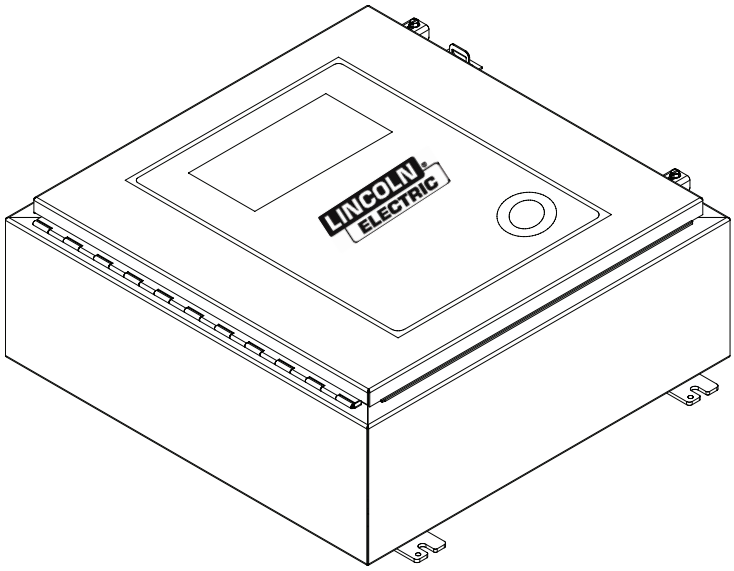
Operator's Manual

Guardian® Control Panel



For use with machines having Code Numbers:

AD1387-87, AD1387-89

Register your machine:
www.lincolnelectric.com/register

Authorized Service and Distributor Locator:
www.lincolnelectric.com/locator

Save for future reference

Date Purchased

Code: (ex: 10859)

Serial: (ex: U1060512345)

IM10361 | Issue Date 16-Jul

THE LINCOLN ELECTRIC COMPANY
22801 St. Clair Avenue • Cleveland, OH • 44117-1199 • U.S.A.
Phone: +1.216.481.8100 • www.lincolnelectric.com

THANK YOU FOR SELECTING A QUALITY PRODUCT BY LINCOLN ELECTRIC.

PLEASE EXAMINE CARTON AND EQUIPMENT FOR DAMAGE IMMEDIATELY

When this equipment is shipped, title passes to the purchaser upon receipt by the carrier. Consequently, claims for material damaged in shipment must be made by the purchaser against the transportation company at the time the shipment is received.

SAFETY DEPENDS ON YOU

Lincoln arc welding and cutting equipment is designed and built with safety in mind. However, your overall safety can be increased by proper installation ... and thoughtful operation on your part. **DO NOT INSTALL, OPERATE OR REPAIR THIS EQUIPMENT WITHOUT READING THIS MANUAL AND THE SAFETY PRECAUTIONS CONTAINED THROUGHOUT.** And, most importantly, think before you act and be careful.

⚠ WARNING

This statement appears where the information must be followed exactly to avoid serious personal injury or loss of life.

⚠ CAUTION

This statement appears where the information must be followed to avoid minor personal injury or damage to this equipment.

KEEP YOUR HEAD OUT OF THE FUMES.

DON'T get too close to the arc. Use corrective lenses if necessary to stay a reasonable distance away from the arc.

READ and obey the Safety Data Sheet (SDS) and the warning label that appears on all containers of welding materials.

USE ENOUGH VENTILATION or exhaust at the arc, or both, to keep the fumes and gases from your breathing zone and the general area.

IN A LARGE ROOM OR OUTDOORS, natural ventilation may be adequate if you keep your head out of the fumes (See below).

USE NATURAL DRAFTS or fans to keep the fumes away from your face.

If you develop unusual symptoms, see your supervisor. Perhaps the welding atmosphere and ventilation system should be checked.

WEAR CORRECT EYE, EAR & BODY PROTECTION

PROTECT your eyes and face with welding helmet properly fitted and with proper grade of filter plate (See ANSI Z49.1).

PROTECT your body from welding spatter and arc flash with protective clothing including woolen clothing, flame-proof apron and gloves, leather leggings, and high boots.

PROTECT others from splatter, flash, and glare with protective screens or barriers.

IN SOME AREAS, protection from noise may be appropriate.

BE SURE protective equipment is in good condition.

Also, wear safety glasses in work area **AT ALL TIMES.**

SPECIAL SITUATIONS

DO NOT WELD OR CUT containers or materials which previously had been in contact with hazardous substances unless they are properly cleaned. This is extremely dangerous.

DO NOT WELD OR CUT painted or plated parts unless special precautions with ventilation have been taken. They can release highly toxic fumes or gases.

Additional precautionary measures

PROTECT compressed gas cylinders from excessive heat, mechanical shocks, and arcs; fasten cylinders so they cannot fall.

BE SURE cylinders are never grounded or part of an electrical circuit.

REMOVE all potential fire hazards from welding area.

ALWAYS HAVE FIRE FIGHTING EQUIPMENT READY FOR IMMEDIATE USE AND KNOW HOW TO USE IT.

SECTION A: WARNINGS

CALIFORNIA PROPOSITION 65 WARNINGS

WARNING: Breathing diesel engine exhaust exposes you to chemicals known to the State of California to cause cancer and birth defects, or other reproductive harm.

- Always start and operate the engine in a well-ventilated area.
- If in an exposed area, vent the exhaust to the outside.
- Do not modify or tamper with the exhaust system.
- Do not idle the engine except as necessary.

For more information go to www.P65 warnings.ca.gov/diesel

WARNING: This product, when used for welding or cutting, produces fumes or gases which contain chemicals known to the State of California to cause birth defects and, in some cases, cancer. (California Health & Safety Code § 25249.5 *et seq.)*

WARNING: Cancer and Reproductive Harm www.P65warnings.ca.gov

ARC WELDING CAN BE HAZARDOUS. PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS SHOULD CONSULT WITH THEIR DOCTOR BEFORE OPERATING.

Read and understand the following safety highlights. For additional safety information, it is strongly recommended that you purchase a copy of "Safety in Welding & Cutting - ANSI Standard Z49.1" from the American Welding Society, P.O. Box 351040, Miami, Florida 33135 or CSA Standard W117.2-1974. A Free copy of "Arc Welding Safety" booklet E205 is available from the Lincoln Electric Company, 22801 St. Clair Avenue, Cleveland, Ohio 44117-1199.

BE SURE THAT ALL INSTALLATION, OPERATION, MAINTENANCE AND REPAIR PROCEDURES ARE PERFORMED ONLY BY QUALIFIED INDIVIDUALS.

FOR ENGINE POWERED EQUIPMENT.

1.a. Turn the engine off before troubleshooting and maintenance work unless the maintenance work requires it to be running.

1.b. Operate engines in open, well-ventilated areas or vent the engine exhaust fumes outdoors.

1.c. Do not add the fuel near an open flame welding arc or when the engine is running. Stop the engine and allow it to cool before refueling to prevent spilled fuel from vaporizing on contact with hot engine parts and igniting. Do not spill fuel when filling tank. If fuel is spilled, wipe it up and do not start engine until fumes have been eliminated.

1.d. Keep all equipment safety guards, covers and devices in position and in good repair. Keep hands, hair, clothing and tools away from V-belts, gears, fans and all other moving parts when starting, operating or repairing equipment.

1.e. In some cases it may be necessary to remove safety guards to perform required maintenance. Remove guards only when necessary and replace them when the maintenance requiring their removal is complete. Always use the greatest care when working near moving parts.

1.f. Do not put your hands near the engine fan. Do not attempt to override the governor or idler by pushing on the throttle control rods while the engine is running.

1.g. To prevent accidentally starting gasoline engines while turning the engine or welding generator during maintenance work, disconnect the spark plug wires, distributor cap or magneto wire as appropriate.

1.h. To avoid scalding, do not remove the radiator pressure cap when the engine is hot.

ELECTRIC AND MAGNETIC FIELDS MAY BE DANGEROUS

2.a. Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding current creates EMF fields around welding cables and welding machines

2.b. EMF fields may interfere with some pacemakers, and welders having a pacemaker should consult their physician before welding.

2.c. Exposure to EMF fields in welding may have other health effects which are now not known.

2.d. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

2.d.1. Route the electrode and work cables together - Secure them with tape when possible.

2.d.2. Never coil the electrode lead around your body.

2.d.3. Do not place your body between the electrode and work cables. If the electrode cable is on your right side, the work cable should also be on your right side.

2.d.4. Connect the work cable to the workpiece as close as possible to the area being welded.

2.d.5. Do not work next to welding power source.

ELECTRIC SHOCK CAN KILL.

3.a. The electrode and work (or ground) circuits are electrically “hot” when the welder is on. Do not touch these “hot” parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.

3.b. Insulate yourself from work and ground using dry insulation. Make certain the insulation is large enough to cover your full area of physical contact with work and ground.

In addition to the normal safety precautions, if welding must be performed under electrically hazardous conditions (in damp locations or while wearing wet clothing; on metal structures such as floors, gratings or scaffolds; when in cramped positions such as sitting, kneeling or lying, if there is a high risk of unavoidable or accidental contact with the workpiece or ground) use the following equipment:

- Semiautomatic DC Constant Voltage (Wire) Welder.
- DC Manual (Stick) Welder.
- AC Welder with Reduced Voltage Control.

3.c. In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, nozzle or semiautomatic welding gun are also electrically “hot”.

3.d. Always be sure the work cable makes a good electrical connection with the metal being welded. The connection should be as close as possible to the area being welded.

3.e. Ground the work or metal to be welded to a good electrical (earth) ground.

3.f. Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.

3.g. Never dip the electrode in water for cooling.

3.h. Never simultaneously touch electrically “hot” parts of electrode holders connected to two welders because voltage between the two can be the total of the open circuit voltage of both welders.

3.i. When working above floor level, use a safety belt to protect yourself from a fall should you get a shock.

3.j. Also see Items 6.c. and 8.

ARC RAYS CAN BURN.

4.a. Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Headshield and filter lens should conform to ANSI Z87. I standards.

4.b. Use suitable clothing made from durable flame-resistant material to protect your skin and that of your helpers from the arc rays.

4.c. Protect other nearby personnel with suitable, non-flammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.

FUMES AND GASES CAN BE DANGEROUS.

5.a. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. **When welding hardfacing (see instructions on container or SDS) or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and within applicable OSHA PEL and ACGIH TLV limits using local exhaust or mechanical ventilation unless exposure assessments indicate otherwise. In confined spaces or in some circumstances, outdoors, a respirator may also be required. Additional precautions are also required when welding on galvanized steel.**

5. b. The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically thereafter to be certain it is within applicable OSHA PEL and ACGIH TLV limits.

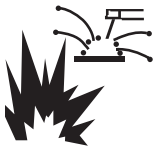
5.c. Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.

5.d. Shielding gases used for arc welding can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.

5.e. Read and understand the manufacturer’s instructions for this equipment and the consumables to be used, including the Safety Data Sheet (SDS) and follow your employer’s safety practices. SDS forms are available from your welding distributor or from the manufacturer.

5.f. Also see item 1.b.

WELDING AND CUTTING SPARKS CAN CAUSE FIRE OR EXPLOSION.



6.a. Remove fire hazards from the welding area. If this is not possible, cover them to prevent the welding sparks from starting a fire. Remember that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas. Avoid welding near hydraulic lines. Have a fire extinguisher readily available.

6.b. Where compressed gases are to be used at the job site, special precautions should be used to prevent hazardous situations. Refer to "Safety in Welding and Cutting" (ANSI Standard Z49.1) and the operating information for the equipment being used.

6.c. When not welding, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.

6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been "cleaned". For information, purchase "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", AWS F4.1 from the American Welding Society (see address above).

6.e. Vent hollow castings or containers before heating, cutting or welding. They may explode.

6.f. Sparks and spatter are thrown from the welding arc. Wear oil free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes and a cap over your hair. Wear ear plugs when welding out of position or in confined places. Always wear safety glasses with side shields when in a welding area.

6.g. Connect the work cable to the work as close to the welding area as practical. Work cables connected to the building framework or other locations away from the welding area increase the possibility of the welding current passing through lifting chains, crane cables or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.

6.h. Also see item 1.c.

6.I. Read and follow NFPA 51B "Standard for Fire Prevention During Welding, Cutting and Other Hot Work", available from NFPA, 1 Batterymarch Park, PO box 9101, Quincy, MA 022690-9101.

6.j. Do not use a welding power source for pipe thawing.

CYLINDER MAY EXPLODE IF DAMAGED.

7.a. Use only compressed gas cylinders containing the correct shielding gas for the process used and properly operating regulators designed for the gas and pressure used. All hoses, fittings, etc. should be suitable for the application and maintained in good condition.

7.b. Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.

7.c. Cylinders should be located:

- Away from areas where they may be struck or subjected to physical damage.
- A safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame.

7.d. Never allow the electrode, electrode holder or any other electrically "hot" parts to touch a cylinder.

7.e. Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.

7.f. Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.

7.g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-I, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association, 14501 George Carter Way Chantilly, VA 20151.

FOR ELECTRICALLY POWERED EQUIPMENT.

8.a. Turn off input power using the disconnect switch at the fuse box before working on the equipment.

8.b. Install equipment in accordance with the U.S. National Electrical Code, all local codes and the manufacturer's recommendations.

8.c. Ground the equipment in accordance with the U.S. National Electrical Code and the manufacturer's recommendations.

Refer to http://www.lincolnelectric.com/safety for additional safety information.

ELECTROMAGNETIC COMPATABILITY (EMC)

CONFORMANCE

Products displaying the CE mark are in conformity with European Community Council Directive of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility (89/336/EEC). It was manufactured in conformity with a national standard that implements a harmonized standard: EN 60974-10 Electromagnetic Compatibility (EMC) Product Standard for Arc Welding Equipment. It is for use with other Lincoln Electric equipment. It is designed for industrial and professional use.

INTRODUCTION

All electrical equipment generates small amounts of electromagnetic emission. Electrical emission may be transmitted through power lines or radiated through space, similar to a radio transmitter. When emissions are received by other equipment, electrical interference may result. Electrical emissions may affect many kinds of electrical equipment; other nearby welding equipment, radio and TV reception, numerical controlled machines, telephone systems, computers, etc. Be aware that interference may result and extra precautions may be required when a welding power source is used in a domestic establishment.

INSTALLATION AND USE

The user is responsible for installing and using the welding equipment according to the manufacturer's instructions. If electromagnetic disturbances are detected then it shall be the responsibility of the user of the welding equipment to resolve the situation with the technical assistance of the manufacturer. In some cases this remedial action may be as simple as earthing (grounding) the welding circuit, see Note. In other cases it could involve construction of an electromagnetic screen enclosing the power source and the work complete with associated input filters. In all cases electromagnetic disturbances must be reduced to the point where they are no longer troublesome.

Note: The welding circuit may or may not be earthed for safety reasons according to national codes. Changing the earthing arrangements should only be authorized by a person who is competent to access whether the changes will increase the risk of injury, e.g., by allowing parallel welding current return paths which may damage the earth circuits of other equipment.

ASSESSMENT OF AREA

Before installing welding equipment the user shall make an assessment of potential electromagnetic problems in the surrounding area. The following shall be taken into account:

a. other supply cables, control cables, signaling and telephone cables; above, below and adjacent to the welding equipment;

b. radio and television transmitters and receivers;

c. computer and other control equipment;

d. safety critical equipment, e.g., guarding of industrial equipment;

e. the health of the people around, e.g., the use of pacemakers and hearing aids;

f. equipment used for calibration or measurement

g. the immunity of other equipment in the environment. The user shall ensure that other equipment being used in the environment is compatible. This may require additional protection measures;

h. the time of day that welding or other activities are to be carried out.

The size of the surrounding area to be considered will depend on the structure of the building and other activities that are taking place. The surrounding area may extend beyond the boundaries of the premises.

METHODS OF REDUCING EMISSIONS

Mains Supply

Welding equipment should be connected to the mains supply according to the manufacturer's recommendations. If interference occurs, it may be necessary to take additional precautions such as filtering of the mains supply. Consideration should be given to shielding the supply cable of permanently installed welding equipment, in metallic conduit or equivalent. Shielding should be electrically continuous throughout its length. The shielding should be connected to the welding power source so that good electrical contact is maintained between the conduit and the welding power source enclosure.

Maintenance of the Welding Equipment

The welding equipment should be routinely maintained according to the manufacturer's recommendations. All access and service doors and covers should be closed and properly fastened when the welding equipment is in operation. The welding equipment should not be modified in any way except for those changes and adjustments covered in the manufacturers instructions. In particular, the spark gaps of arc striking and stabilizing devices should be adjusted and maintained according to the manufacturer's recommendations.

Welding Cables

The welding cables should be kept as short as possible and should be positioned close together, running at or close to floor level.

Equipotential Bonding

Bonding of all metallic components in the welding installation and adjacent to it should be considered. However, metallic components bonded to the work piece will increase the risk that the operator could receive a shock by touching these metallic components and the electrode at the same time. The operator should be insulated from all such bonded metallic components.

Earthing of the Workpiece

Where the workpiece is not bonded to earth for electrical safety, not connected to earth because of its size and position, e.g., ships hull or building steelwork, a connection bonding the workpiece to earth may reduce emissions in some, but not all instances. Care should be taken to prevent the earthing of the work piece increasing the risk of injury to users, or damage to other electrical equipment. Where necessary, the connection of the workpiece to earth should be made by a direct connection to the work piece, but in some countries where direct connection is not permitted, the bonding should be achieved by suitable capacitance, selected according to national regulations.

Screening and Shielding

Selective screening and shielding of other cables and equipment in the surrounding area may alleviate problems of interference. Screening of the entire welding installation may be considered for special applications.

[1] Portions of the preceding text are contained in EN 60974-10: "Electromagnetic Compatibility (EMC) product standard for arc welding equipment."

As a rule of thumb, for many mild steel electrode, if the air is visibly clear and you are comfortable, then the ventilation is generally adequate for your work. The most accurate way to determine if the worker exposure does not exceed the applicable exposure limit for compounds in the fumes and gases is to have an industrial hygienist take and analyze a sample of the air you are breathing. This is particularly important if you are welding with stainless, hardfacing or Special Ventilation products. All Lincoln MSDS have a maximum fume guideline number. If exposure to total fume is kept below that number, exposure to all fume from the electrode (not coatings or plating on the work) will be below the TLV.

There are steps that you can take to identify hazardous substances in your welding environment. Read the product label and material safety data sheet for the electrode posted in the work place or in the electrode or flux container to see what fumes can be reasonably expected from use of the product and to determine if special ventilation is needed. Secondly, know what the base metal is and determine if there is any paint, plating, or coating that could expose you to toxic fumes and/or gases. Remove it from the metal being welded, if possible. If you start to feel uncomfortable, dizzy or nauseous, there is a possibility that you are being overexposed to fumes and gases, or suffering from oxygen deficiency. Stop welding and get some fresh air immediately. Notify your supervisor and co-workers so the situation can be corrected and other workers can avoid the hazard. Be sure you are following these safe practices, the consumable labeling and MSDS to improve the ventilation in your area. Do not continue welding until the situation has been corrected.

NOTE: The MSDS for all Lincoln consumables is available on Lincoln's web-site: www.lincolnelectric.com

Before we turn to the methods available to control welding fume exposure, you should understand a few basic terms:

Natural Ventilation is the movement of air through the workplace caused by natural forces. Outside, this is usually the wind. Inside, this may be the flow of air through open windows and doors.

Mechanical Ventilation is the movement of air through the workplace caused by an electrical device such as a portable fan or permanently mounted fan in the ceiling or wall.

Source Extraction (Local Exhaust) is a mechanical device used to capture welding fume at or near the arc and filter contaminants out of the air.

The ventilation or exhaust needed for your application depends upon many factors such as:

- Workspace volume
- Workspace configuration
- Number of welders
- Welding process and current
- Consumables used (mild steel, hardfacing, stainless, etc.)
- Allowable levels (TLV, PEL, etc.)
- Material welded (including paint or plating)
- Natural airflow

Your work area has adequate ventilation when there is enough ventilation and/or exhaust to control worker exposure to hazardous materials in the welding fumes and gases so the applicable limits for those materials is not exceeded. See chart of TLV and PEL for Typical Electrode Ingredients, the OSHA PEL (Permissible Exposure Limit), and the recommended guideline, the ACGIH TLV (Threshold Limit Value), for many compounds found in welding fume.

Ventilation

There are many methods which can be selected by the user to provide adequate ventilation for the specific application. The following section provides general information which may be helpful in evaluating what type of ventilation equipment may be suitable for your application. When ventilation equipment is installed, you should confirm worker exposure is controlled within applicable OSHA PEL and/or ACGIH TLV. According to OSHA regulations, when welding and cutting (mild steels), natural ventilation is usually considered sufficient to meet requirements, provided that:

1. The room or welding area contains at least 10,000 cubic feet (about 22' x 22' x 22') for each welder.
2. The ceiling height is not less than 16 feet.
3. Cross ventilation is not blocked by partitions, equipment, or other structural barriers.
4. Welding is not done in a conned space.

Spaces that do not meet these requirements should be equipped with mechanical ventilating equipment that exhausts at least 2000 CFM of air for each welder, except where local exhaust hoods or booths, or air-line respirators are used.

Important Safety Note:

When welding with electrodes which require special ventilation such as stainless or hardfacing (see instructions on container or MSDS) or on lead or cadmium plated steel and other metals or coatings which produce hazardous fumes, keep exposure as low as possible and below exposure limit values (PEL and TLV) for materials in the fume using local exhaust or mechanical ventilation. In conned spaces or in some circumstances, for example outdoors, a respirator may be required if exposure cannot be controlled to the PEL or TLV. (See MSDS and chart of TLV and PEL for Typical Electrode Ingredients.) Additional precautions are also required when welding on galvanized steel.

BIBLIOGRAPHY AND SUGGESTED READING

ANSI Z87.1, Practice for Occupational and Educational Eye and Face Protection, American National Standards Institute, 11 West 42nd Street, New York, NY 10036.

Arc Welding and Your Health: A Handbook of Health Information for Welding. Published by The American Industrial Hygiene Association, 2700 Prosperity Avenue, Suite 250, Fairfax, VA 22031-4319.

NFPA Standard 51B, Cutting and Welding Processes, National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9146, Quincy, MA 02269-9959.

OSHA General Industry Standard 29 CFR 1910 Subpart Q. OSHA Hazard Communication Standard 29 CFR 1910.1200. Available from the Occupational Safety and Health Administration at http://www.osha.org or contact your local OSHA office.

The following publications are published by The American Welding Society, P.O. Box 351040, Miami, Florida 33135. AWS publications may be purchased from the American Welding society at http://www.aws.org or by contacting the AWS at 800-443-9353.

ANSI, Standard Z49.1, Safety in Welding, Cutting and Allied Processes. Z49.1 is now available for download at no charge at http://www.lincolnelectric.com/community/safety/ or at the AWS website http://www.aws.org.

AWS F1.1, Method for Sampling Airborne Particulates Generated by Welding and Allied Processes.

AWS F1.2, Laboratory Method for Measuring Fume Generation Rates and Total Fume Emission of Welding and Allied Processes.

AWS F1.3, Evaluating Contaminants in the Welding Environment: A Strategic Sampling Guide.

AWS F1.5, Methods for Sampling and Analyzing Gases from Welding and Allied Processes.

AWS F3.2, Ventilation Guide for Welding Fume Control.

AWS F4.1, Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances.

AWS SHF, Safety and Health Facts Sheets. Available free of charge from the AWS website at http://www.aws.org.

LISTED BELOW ARE SOME TYPICAL INGREDIENTS IN WELDING ELECTRODES AND THEIR TLV (ACGIH) GUIDELINES AND PEL (OSHA) EXPOSURE LIMITS

INGREDIENTS	CAS No.	TLV mg/m3	PEL mg/m3
Aluminum and/or aluminum alloys (as Al)*****	7429-90-5	10	15
Aluminum oxide and/or Bauxite*****	1344-28-1	10	5**
Barium compounds (as Ba)*****	513-77-9	****	****
Chromium and chromium alloys or compounds (as Cr)*****	7440-47-3	0.5(b)	.005(b)
Fluorides (as F)	7789-75-5	2.5	2.5
Iron	7439-89-6	10*	10*
Limestone and/or calcium carbonate	1317-65-3	10	15
Lithium compounds (as Li)	554-13-2	10*	10*
Magnesite	1309-48-4	10	15
Magnesium and/or magnesium alloys and compounds (as Mg)	7439-95-4	10*	10*
Manganese and/or manganese alloys and compounds (as Mn)*****	7439-96-5	0.2	5.0(c)
Mineral silicates	1332-58-7	5**	5**
Molybdenum alloys (as Mo)	7439-98-7	10	10
Nickel*****	7440-02-0	1.5	1
Silicates and other binders	1344-09-8	10*	10*
Silicon and/or silicon alloys and compounds (as Si)	7440-21-3	10*	10*
Strontium compounds (as Sr)	1633-05-2	10*	10*
Zirconium alloys and compounds (as Zr)	12004-83-0	5	5

Supplemental Information:

(*) Not listed. Nuisance value maximum is 10 milligrams per cubic meter. PEL value for iron oxide is 10 milligrams per cubic meter. TLV value for iron oxide is 5 milligrams per cubic meter.

(**) As respirable dust.

(*****) Subject to the reporting requirements of Sections 311, 312, and 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and of 40CFR 370 and 372.

(b) The PEL for chromium (VI) is .005 milligrams per cubic meter as an 8 hour time weighted average. The TLV for water-soluble chromium (VI) is 0.05 milligrams per cubic meter. The TLV for insoluble chromium (VI) is 0.01 milligrams per cubic meter.

c) Values are for manganese fume. STEL (Short Term Exposure Limit) is 3.0 milligrams per cubic meter. OSHA PEL is a ceiling value.

(****) There is no listed value for insoluble barium compounds. The TLV for soluble barium compounds is 0.5 mg/m3.

TLV and PEL values are as of April 2006. Always check Material Safety Data Sheet (MSDS) with product or on the Lincoln Electric website at http://www.lincolnelectric.com

Page

TECHNICAL SPECIFICATIONS	
MEASUREMENTS	24”H X 24”W X 8”D
WEIGHT	75 LB / 34 KG
INPUT POWER	120 VAC, 60 Hz (175 W)
PULSE TIME	0.01 - 9.99 SEC. (0.25 SEC. FACTORY SETTING)
PAUSE TIME	1-999 SEC. (60 SEC. FACTORY SETTING)
SHUT DOWN CLEANING	0-99 CYCLES (3 CYCLES FACTORY SETTING)
SAFETY CLASSIFICATION	IP 54 / NEMA 12
MINIMUM OPERATING TEMPERATURE	14ºF (-10ºC)
MAXIMUM OPERATING TEMPERATURE	122ºF (+50ºC)
AD1387-87	PRESSURE CONTROLLED CLEANING UP TO 32 VALVES
AD1387-89	PRESSURE CONTROLLED CLEANING UP TO 64 VALVES

SAFETY PRECAUTIONS

- Service and Repair should only be performed by Lincoln Electric Factory Trained Personnel.
- Electric connections should be executed in accordance with local requirements. Ensure compliance with the EMC regulatory arrangements.
- During installation, always use Personal Protective Equipment (PPE) to avoid injury. This also applies to persons who enter the work area during installation.
- Use sufficient climbing gear and safety guards when working higher than 6 feet (local restrictions may apply).
- Never install any product in front of entrances and exits which must be used for emergency services.
- Do not move, puncture, cut or otherwise disturb any gas, water pipes and/or electric cables.
- Make sure the wall, ceiling or support system is strong enough to support the weight of the products being mounted.
- Ensure the workspace is well illuminated.
- Use common sense. Stay alert and keep your attention to your work. Do not install the product when you are under the influence of drugs, alcohol or medicine.
- Make sure that the installation location, contains sufficient approved fire extinguishers.
- **Install according to the National Fire Protection Association (NFPA) requirements and the state and local authorities having jurisdiction**.

SELECT SUITABLE LOCATION

Position the Guardian Control Panel in a dry location where there is free circulation of clean air. Dirt, dust or any foreign material that can be drawn into the machine should be kept at a minimum. Do not expose the Guardian Control Panel to direct sunlight, as the electrical circuits must not be subjected to extreme temperatures. All electrical connections must be made in such a manner that water and condensation cannot run into the control panel via the cables. The control box should be powered from a non-switched source.

Mounting location should be at eye level as periodic adjustments may be needed.

ENVIRONMENTAL AREA

Keep the machine inside and dry at all times. Do not expose to rain. Never place liquids on top of the machine.

STACKING

The Guardian Control Panel cannot be stacked.

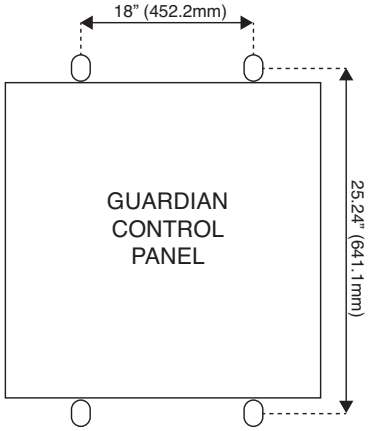
TILTING

Place the Guardian Control Panel directly on a secure, level surface that is not subject to vibration.

INSTALLATION

1. Using a drill, make four mounting holes 18” X 25.24” apart on the selected mounting surface. See Figure A.1.

Figure A.1



2. Carefully position the Guardian Control Panel onto the mounting surface and secure it using the appropriate mounting hardware.

ELECTRICAL CONNECTIONS

Make all electrical connections compatible to your local city / state code.

⚠ WARNING

ELECTRIC SHOCK can kill.

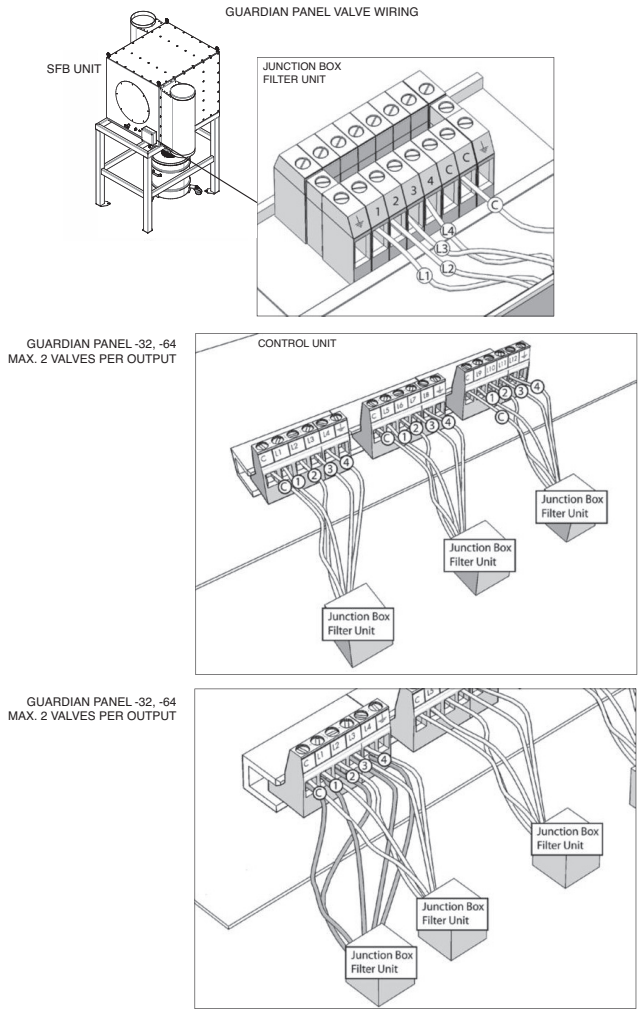
- Only qualified personnel should perform this installation.
- Insulate yourself from the work and ground.
- Always connect the Guardian Control Panel to a power supply grounded according to the National Electrical Code and local codes.

---

3. Using minimum of 16AWG/1.5 sq mm wire, connect the valves from the terminal block on the filter module(s) to the terminal block(s) inside the Guardian Control Panel. See Figure A.2. See Wiring Diagram.

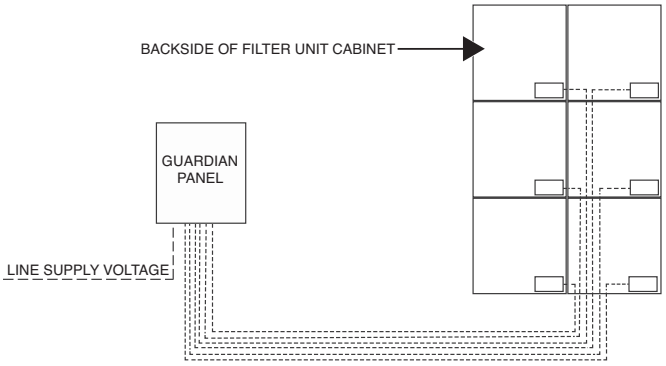
NOTE: Some larger installations may require additional holes to be made in the Guardian Control Panel to allow for additional wiring.

Figure A.2



4. Valves must be connected in such a manner that the cleaning cycle begins with the valves at the top of the filter bank and progresses to the valves at the bottom of the filter bank. See ***Cleaning Schedule***. See Figure A.3. See Wiring Diagram.

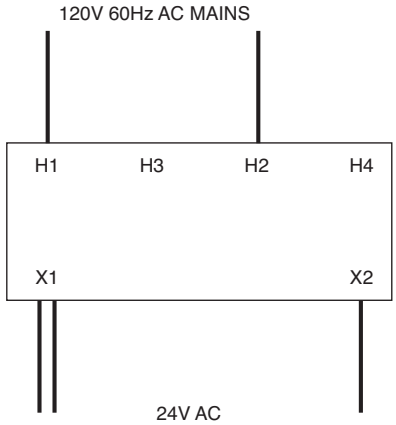
Figure A.3



5. Connect the equipment to a permanent power feed if shut-down cleaning is required.
6. Make sure that the terminal voltage on the transformer matches the actual line supply voltage coming into the control box. Check transformer output once connected. It should be 24 - 28 volts. See Figures A.4. See Wiring Diagram.

NOTE: See Wiring Diagram for connection to normally closed contactor accessory points. This connection will control on-line and off-line filter cleaning functions.

Figure A.4



7. When all connections have been made, secure the junction box on the rear of the filter bank.
8. Connect the ethernet cable from the VFD to the Ethernet port on the side of the Guardian Control Panel. See Wiring Diagram.
9. Connect the pressure control panel to the Guardian Control Panel. See Pressure Control Panel Operators Manual. See Wiring Diagram.
10. Connect the Guardian Fire Control System to the Guardian Control Panel. See Guardian Fire Control System Operators Manual. See Wiring Diagram.
11. When all connections have been made, secure the Guardian Control Panel.

CLEANING SCHEDULE

Valves are connected in such a manner that the cleaning cycle begins with the valves at the top of the filter bank and progress to the valves at the bottom of the filter bank. See Figures A.5 and A.6.

Figure A.5

EXAMPLE
ONE VALVE / ONE OUTPUT

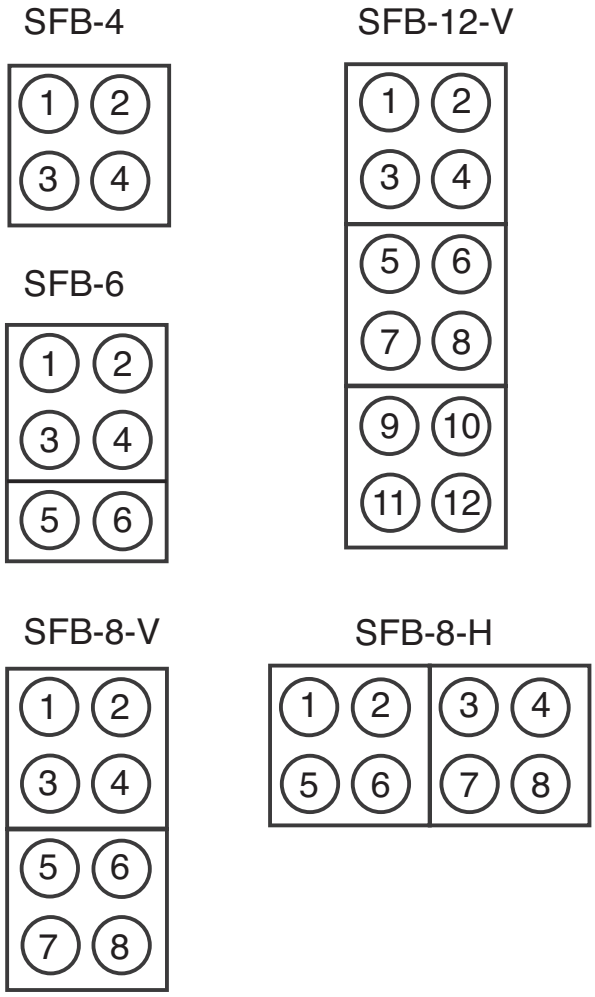
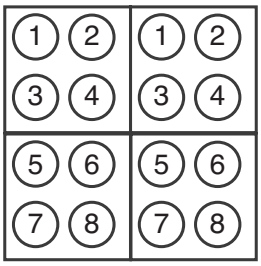
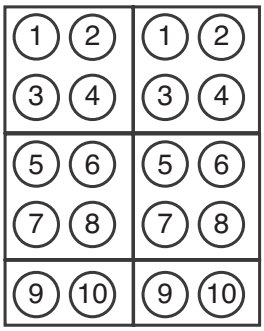


Figure A.6
EXAMPLE
TWO VALVE / ONE OUTPUT

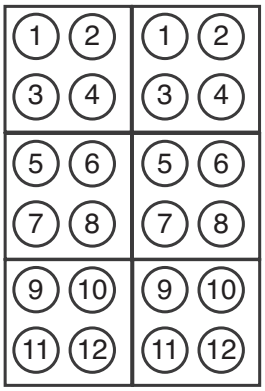
SFB-16



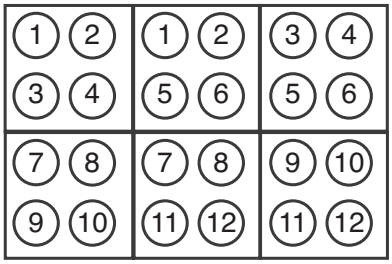
SFB-20



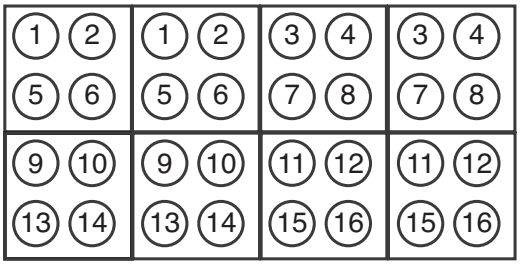
SFB-24/V



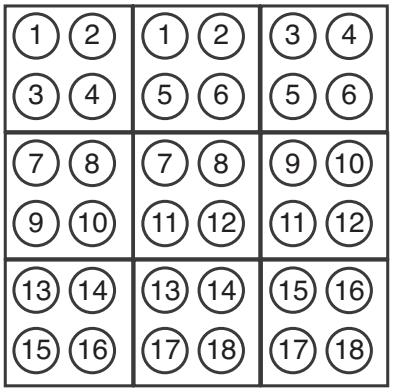
SFB-24



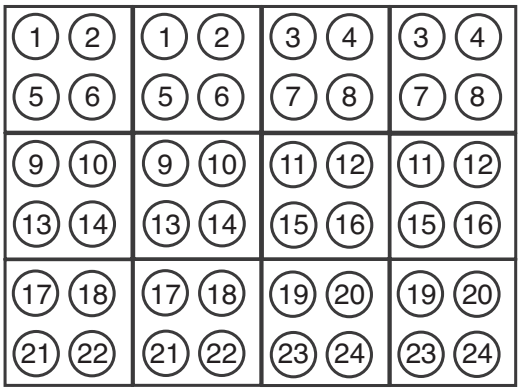
SFB-32



SFB-36



SFB-48-H



PRODUCT DESCRIPTION

The Guardian Control Panel is a control system designed to control a fan motor, filter bank cleaning unit and an optional Janus fire suppression product. The system utilizes an Allen-Bradley Micro850 PLC (Programmable Logic Controller) connected to a Panelview 800 HMI (Human Machine Interface) terminal and a Powerflex 400 VFD (Variable Frequency Drive).

FAN MOTOR CONTROL

The fan motor may be controlled either manually with start / stop buttons or automatically at preset start and stop times. The times are entered on a series of screens on the HMI for the days-of-week and can have up to four start / stop times per day.

FILTER CLEANING CONTROL

The cleaning mechanism is comprised of pneumatic solenoid valves that blast pulses of air though the filer cartridges in order to loosen the weld fume particulate so that it falls into collection container. The valves can be sequenced manually or automatically based on the differential air pressure drop across the filter banks.

JANUS RELEASE CONTROL

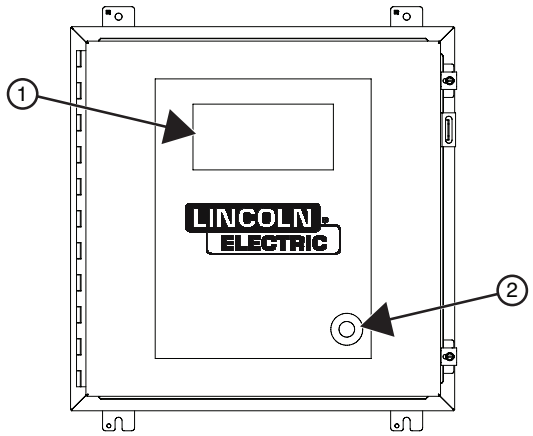
The optional Janus fire suppression system is monitored by the Guardian Control Panel to stop the fan motor and close the barrier valves if a fire is detected.

USER INTERFACE OVERVIEW

The user interacts with the control system via the Panelview 800 graphic terminal, also referred to as an HMI. The user navigates through a series of screens to enter setpoints, activate pushbuttons and monitor system status. See Figure B.1, for location of operator controls and indicators.

1. Panelview 800 graphic terminal used to interact with control system.
2. E-stop button to stop fan motor in the event of an emergency.

Figure B.1



POWERING UP YOUR SYSTEM

1. Pull the E-Stop button out to the non-depressed position.
2. Plug the power cord into a standard outlet.
3. Guardian system will start up.
4. Wait a few minutes until the system displays the initial splash screen on the HMI.

SPLASH SCREEN

The splash screen is displayed upon power up to identify the HMI application. Touch any area on the screen to continue to the main screen.

Figure B.2

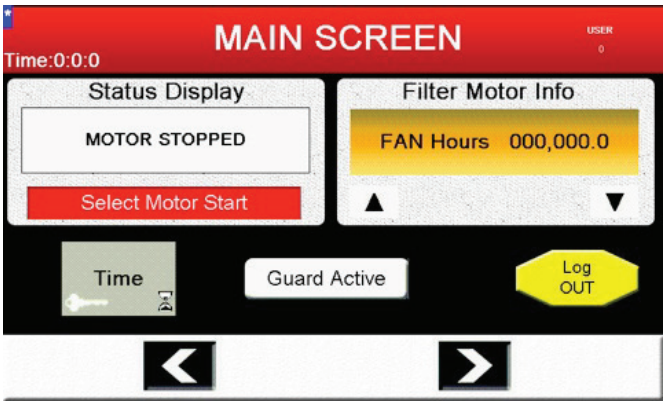
MAIN SCREEN

The main screen displays status information and provides navigation to other screens in the system.

The main screen allows the user to:

- View cycle status information.
- View filter motor information.
- View Guardian active status.
- Navigate to Time Setup screen.
- Navigate to other top five level (Main Screen, Fan Start Screen, Fan Input Screen, Fan Read Screen and Main Filter) screens.

Figure B.3



TITLE BAR

All screens contain a title bar at the top of the screen. The screen name is displayed in the center while the time is displayed to the left. Also for the five main navigation screens, the currently logged in user name is displayed. If no user is logged in, the user name will be blank.

STATUS DISPLAY

The status display area contains a status indicator and a cycle indicator. The status indicator displays one of twelve possible states of the fan motor / filter cleaner:

- Motor Stopped
- Motor Auto/Run
- Motor Manual Run
- Filter Clogged. Press Filter MSG Button.
- Manual Cleaning
- Auto Cleaning Lo Press Reached
- Auto Cleaning MED Press Reached
- Filter High Press Reached. Time To Purchase Filters.
- Auto Cleaning Pressure Alarm Reached
- Motor Start Failure. Service Motor.
- Motor Cooling <SETPOINT>s Cool Time (ACTUAL)

The cycle indicator displays one of three possible states of the cycle:

- Select Motor Start
- Auto Cycle Selected
- Manual Cycle Selected

FILTER MOTOR INFO

The filter motor info area contains a State Indicator. The State Indicator displays one of fifteen possible states of the fan motor / filter cleaner:

- FAN Hours nnn.n
- Filter Hours nnn.n
- Filter Pressure nnn PA
- Manual Cleaning nnnn
- Low Filter Clean nnnn
- Med Filter Clean nnnn
- High Filter Clean nnnn
- PAlarm Filter Clean nnnn
- Total Pulses nnn
- Filter Failure nnn
- Output Freq. nnn.n Hz
- Output Current nnn.n Amps
- Output Power nnn.n KW
- Est. Savings $nnnn.n
- Motor Failure nnn

The up arrow and down arrow buttons below the state indicator are used to navigate through the list. If the top of the list is reached, the up arrow will no longer be displayed. Likewise if the bottom of the list is reached, the down arrow will no longer be displayed.

TIME BUTTON

The time button is used to navigate to the time setup screen. This screen is password protected, you will have to enter the correct password on the pop up keypad to access this screen.

GUARD ACTIVE INDICATOR

The guard active indicator displays guard active if the Guardian system has been activated. If the Guardian system is not activated the indicator displays Guard off.

LOG OUT BUTTON

The log out button is used to change the current user back to the default user (All Users). Password protected screens will then need the correct password to be entered on the pop up keypad.

LEFT AND RIGHT NAVIGATION BUTTONS

The left and right navigation buttons are used to navigate between the top five screens in the screen hierarchy in a round robin fashion. The top five screens are the Main Screen, Fan Start Screen, Fan Input Screen, Fan Read Screen and Main Filter Screen. See Figures B.4 - B.8.

Figure B.4

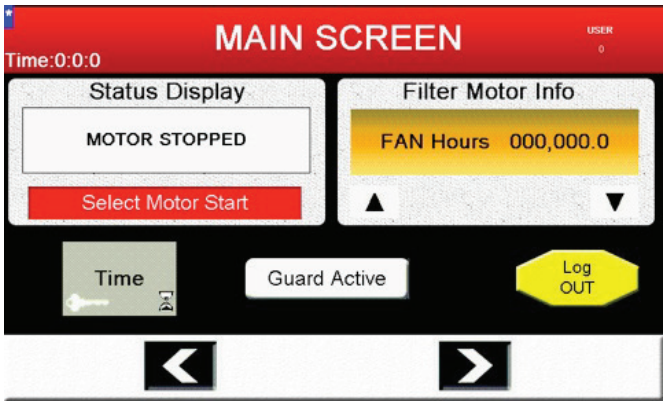


Figure B.5

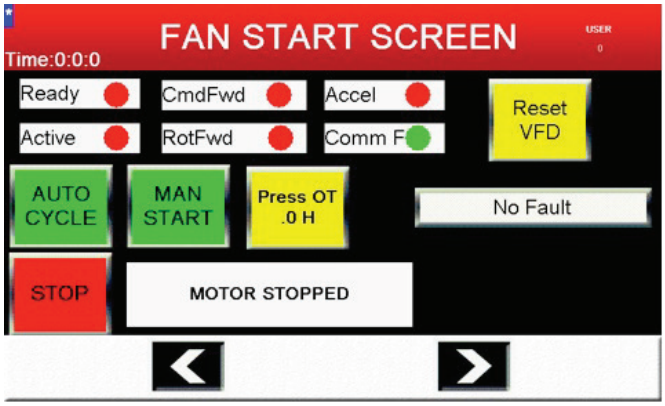


Figure B.6

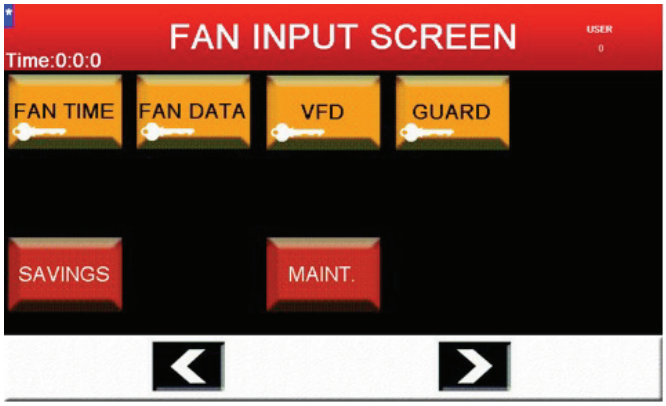


Figure B.7

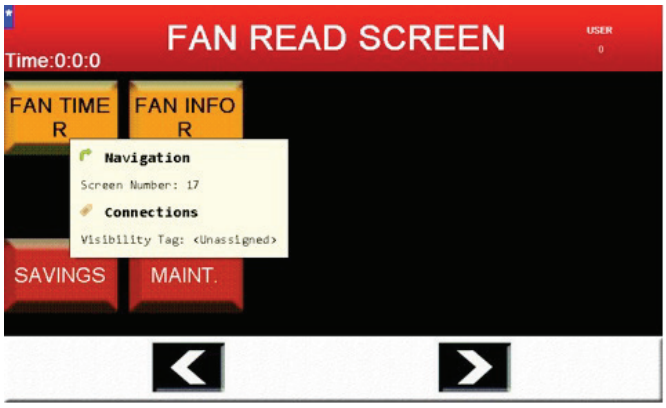
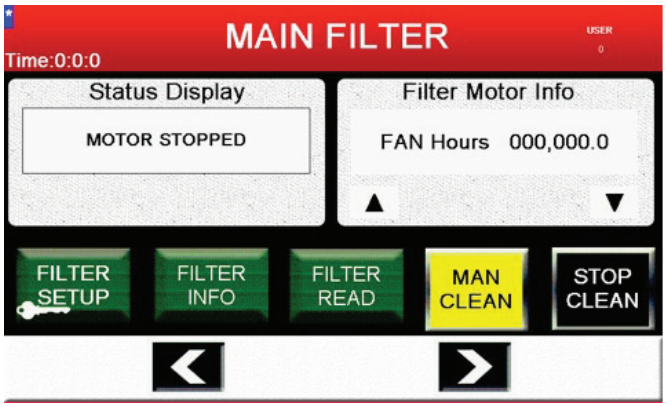


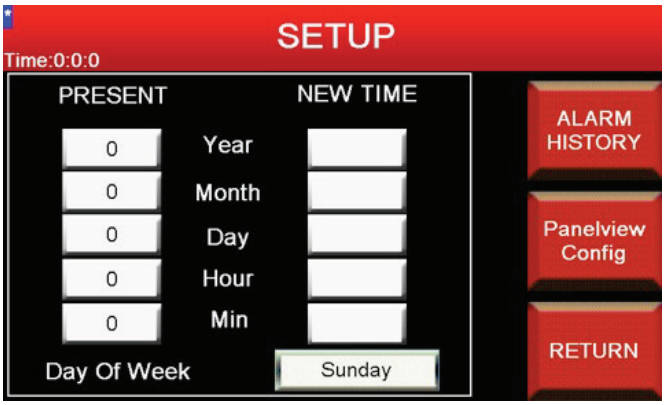
Figure B.8



TIME SETUP SCREEN

The user can set the system time and date here which is used for automatic start and stop at preset times. Also allows navigation to the alarm history and panelview configuration screens. The time is entered using military time, i.e. the twenty-four hour clock.

Figure B.9



PRESENT

Displays the current date and time.

DAY OF WEEK

Displays the current day-of-week.

NEW TIME

Touch the year, month, day, hour and min areas to enter the current date and time on a pop up numeric keypad. The present time is automatically updated when the enter button on the numeric keypad is pressed. The value for the year must be in the range of 2012 to 2050 (inclusive), month 1 to 12, day 1 to 21. The value for the hour must be within the range of 0 to 23, while the minute must be in the range of 0 to 59. If a value outside of these ranges is entered, the value will be rejected and a warning message will be displayed.

ALARM HISTORY BUTTON

The alarm history button is used to navigate to the alarm history screen.

PANELVIEW CONFIG BUTTON

The panelview config button is used to exit the HMI application and go to the panelview configuration screen. This button should be used by qualified technicians only.

RETURN BUTTON

The return button is used to navigate back to the main screen.

ALARM BANNER

The alarm banner pops up on any screen when an alarm occurs. There are three buttons that can be used to address the alarm:

Figure B.10

ACK BUTTON

Acknowledges receipt of the alarm displayed in the alarm banner. Pressing the ack button closes the alarm banner but does not clear the alarm condition. The alarm is marked as acknowledged in the alarm history.

When you press the ack button, the alarm acknowledged in the alarm list object is the alarm above the last acknowledged alarm, regardless of which alarm is highlighted.

CLEAR BUTTON

Clears the alarm from the alarm banner without acknowledging the alarm and closes the banner, unless another alarm is awaiting acknowledgment. Pressing the clear button does not clear the alarm condition.

If the operator is not required to acknowledge any alarms, the alarm banner must contain a clear button.

CLOSE BUTTON

Closes the alarm banner without performing any action on the alarm.

ALARM HISTORY SCREEN

Displays system alarms and the time and that they occurred.

Figure B.11

ALARM LIST

The alarm list area displays alarms that have occurred. The alarm message text is displayed in the left column, followed by the occurrence time and date. Acknowledged alarms are displayed on a yellow background while un-acknowledged alarms are displayed on red. The currently selected alarm is displayed on a white background. The possible alarms are:

- VFD Comm Fault. Check Cable
- No Air Pressure
- Filter Clogged
- Barrier Valves failed to open. Check switches and air supply.
- Inlet Barrier Valve failed to open. Check reed switch.
- Barrier Inlet Valve Reed SW on immediately.
- Outlet Barrier Valve failed to open. Check reed switch.
- Barrier Outlet Valve Reed SW immediately.
- Will not clean, all valves disabled.
- E-Stop Button Pressed, drive will not run.
- Fan inhibit. Janus Fire Guardian Fault
- Guardian fault reported. Check Janus Fire System.
- Fan Auto inhibit. Guardian fault
- Motor Failed to start 25 times. Please service motor.
- Will not clean, no valves are enabled.
- OT inhibited. No time.
- VFD start disabled. VFD must be on and press reset VFD PB.
- Cannot write to VFD. VFD not active.
- VFD Faulted during fan run.
- VFD write error.

ALARM LIST NAVIGATION BUTTONS

The alarm list navigation buttons are used to move the cursor up and down the alarm list. The currently selected alarm appears on a white background.

CLEAR ALL ALARMS BUTTON

The clear all alarms button removes all alarms from the alarm. Note that even though the alarm doesn't appear in the list, the alarm may still be active in the system.

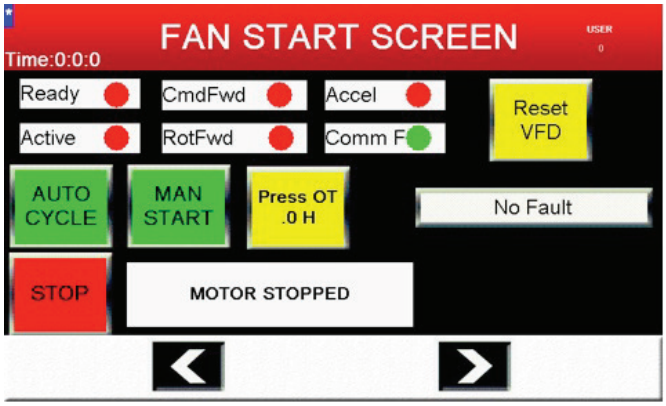
RETURN BUTTON

The return button is used to return to the time setup screen.

FAN START SCREEN

Allows the user to start the fan in manual or auto mode and extend the fan on time. If there is a drive fault, it can be reset. Provides navigation buttons to the other 5 top level screens.

Figure B.12



DRIVE STATUS INDICATORS

The drive status indicators show the state of the VFD (Variable Frequency Drive) that controls the fan motor.

Ready – The VFD doesn't have any active faults and is ready to accept start commands.

Active – The VFD has received a start command and is actively controlling the motor.

CmdFwd – The VFD is being commanded to rotate forward.

Accel – The VFD is accelerating to the commanded frequency (speed).

Comm F – Communications between the PLC and VFD are not working.

RESET VFD BUTTON

The reset VFD button is used to attempt to clear any faults in the VFD.

VFD FAULT INDICATOR

Displays the fault status of the drive. The possible faults are:

- No Fault
- No Fault
- Aux Input
- Power Loss
- Under Voltage
- Over Voltage
- Motor Stalled
- Motor Overload
- HeatSink OT
- HW Over Current
- Ground Fault
- Load Loss
- Analog Input Loss
- Auto Restart Tries
- Phase U to Ground Fault
- Phase V to Ground Fault
- Phase W to Ground Fault
- Phase UV Short
- Phase UW Short
- Phase VW Short
- Param. Defaulted
- Software Overcurrent
- Drive Overload
- Power Unit Fail
- Net Loss
- Comm Loss
- Function Loss
- Parameter Checksum Error
- IO Board Fail

AUTO CYCLE BUTTON

Pressing the auto cycle button begins automatic start / stop operation of the fan motor. The fan will start and stop at the times entered in the fan times screen based on the current time.

MAN START BUTTON

Pressing the man start button begins manual mode of operation. The fan motor will start and run until the Stop button is pressed.

STOP BUTTON

Pressing the stop button cancels both modes of operation and stops the fan motor, if running.

STATUS INDICATOR

The Status Indicator displays one of twelve possible states of the fan motor / filter cleaner:

- Motor Stopped
- Motor AUTO/RUN
- Motor Manual Run
- Filter Clogged. Press Filter MSG Button.
- Manual Cleaning
- Auto Cleaning Lo Press Reached
- Auto Cleaning Med Press Reached
- Filter High Press Reached. Time To Purchase Filters.
- Auto Cleaning Pressure Alarm Reached.
- Motor Start Failure. Service Motor.
- Motor Cooling <SETPOINT> S Cool Time (ACTUAL)

PRESS OT BUTTON

Pressing the press OT button will extend the fan motor run time by the amount entered in the fan data screen's overtime entry field. If overtime is not active, the button displays the overtime setpoint value. If overtime is active, the button displays the actual time remaining.

LEFT AND RIGHT NAVIGATION BUTTONS

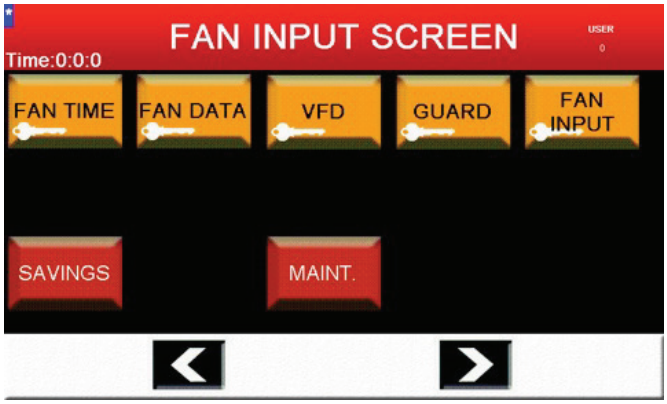
The left and right navigation buttons are used to navigate between the top five screens in the screen hierarchy in a round robin fashion.

FAN INPUT SCREEN

The fan input screen contains navigation buttons to go to the fan start / stop data entry screens, as well as the VFD and Guarding setup screens. Note that these screens are password protected, indicated by the presence of a key on the button graphic.

The savings and maintenance screens are also accessible from this screen. Refer to the screen navigation diagram for more information.

Figure B.13



FAN TIME BUTTON

The fan time button is used to navigate to the fan time screen where up to four start / stop times can be entered for each day-of-week. Note that this screen is password protected.

FAN DATA BUTTON

The fan time button is used to navigate to the fan data screen where drive operation parameters can be entered. Note that this screen is password protected.

VFD BUTTON

The VFD button is used to navigate to the VFD screens where the drive parameters can be changed. Note that this screen is password protected.

GUARD BUTTON

The Guard button is used to navigate to the Guardian screen where the Guardian parameters can be changed and the barriers operated manually. Note that this screen is password protected.

FAN INPUT BUTTON

The fan input button is used to navigate to the fan input screen which has buttons for setting or clearing the start / stop times for all of days-of-week at one time.

SAVINGS BUTTON

The savings button is used to navigate to the savings screen which displays the estimated savings gained by using a VFD verses an across-the-line motor starter.

MAINT. BUTTON

The maint. button is used to navigate to the analog maintenance screen which displays the scaled airflow analog input and allows the user to select the type of sensor used.

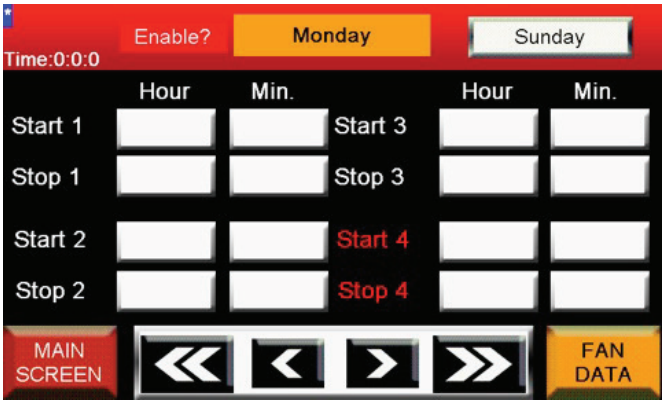
LEFT AND RIGHT NAVIGATION BUTTONS

The left and right navigation buttons are used to navigate between the top five screens in the screen hierarchy in a round robin fashion.

FAN TIMES SCREEN

The fan time screen is used to enter fan start and stop times for all of the days-of-week. Up to four start and stop times can be entered for each day. The fourth start / stop time has the ability to extend into the next day. The times are entered using military time, i.e. the twenty-four hour clock.

Figure B.14



START / STOP TIMES

Touch the start or stop hour or minute areas to enter the time on a pop up numeric keypad. The value for the hour must be within the range of 0 to 23 (inclusive), while the minute must be in the range of 0 to 59. If a value outside of this range is entered, the value will be rejected and a warning message will be displayed.

ENABLE? BUTTON

The Enable? button on the left side of the title bar is used to make the start / stop times for a given day active. Pressing the Enable? area of the screen will toggle between the active and inactive state. If the times are inactive the text will read Enable? on a red background. If the times are active the text will read Enabled on a green background.

NAVIGATION BUTTONS

The navigation buttons centered at the bottom of the screen are used to select the days-of-the-week. The buttons with the single left or right arrow go to the previous or next day, respectively. The buttons with the double left or right arrow go to the first and last day of the week, i.e. Monday or Sunday. Note that if on the first or last day, the left or right buttons will not be displayed because there is no previous or next day, respectively.

DAY-OF-WEEK INDICATOR – CENTER OF TITLE BAR

The indicator at the center of the title bar displays the day-of-week that is currently being edited. This day is selected using the navigation buttons described above.

DAY-OF-WEEK INDICATOR – RIGHT SIDE OF TITLE BAR

The indicator on the right side of the title bar displays the current day-of-week, as set by the time setup screen.

MAIN SCREEN BUTTON

The main screen button is used to navigate back to the main screen.

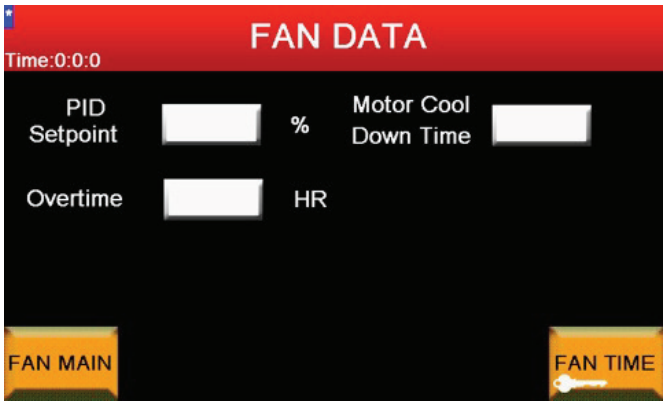
FAN DATA BUTTON

The fan data button is used to navigate to the fan data screen, described below.

FAN DATA SCREEN

The fan data screen is used to change the values of three setpoints used to control the operation of the fan.

Figure B.15



PID SETPOINT

The value entered in the PID setpoint is written to parameter 157 PID setpoint in the drive. This parameter is used when the drive is controlling the speed using the PID loop. See drive manual for more details. The minimum value is zero and the maximum value is one hundred.

MOTOR COOL DOWN TIME

The motor cool down time is the time that must elapse after the motor is stopped and can be turned on again. The setting is in seconds and the default time is 30. This is a protection scheme to prevent the motor from overheating. The minimum value is thirty and the maximum value is one hundred and eighty.

OVERTIME

When the overtime button on the fan start screen is pressed, the fan on time is extended by the time entered in the overtime field. The time is entered in hours with one decimal point. The minimum value is zero and the maximum value is eight.

FAN MAIN BUTTON

The fan main button is used to navigate to the fan input screen.

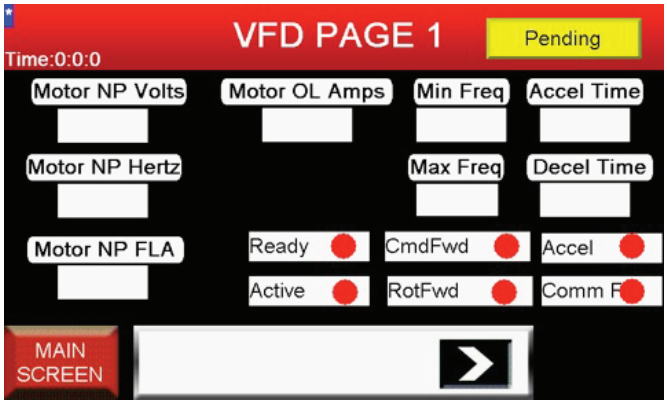
FAN TIME BUTTON

The fan main button is used to navigate to the fan time screen.

VFD PAGE 1 AND 2 SCREENS

The VFD Page 1 and 2 screens allows a qualified technician to change certain parameters within the drive. Also some of the drive status bits are displayed. This is a convenience for the technician, otherwise the tech would have to use a computer with CCW software or the drive keypad to change the parameters. See the drive manual for more details on the available parameters.

Figure B.16



PARAMETERS

- **Motor NP Volts** – Changes parameter 31 Motor Name Plate Volts (20~525)
- **Motor NP Hertz** – Changes parameter 32 Motor Name Plate Hertz (15~320)
- **Motor NP FLA** – Changes parameter 200 Motor Name Plate Full Load Amps (1~320)
- **Motor OL Amps** – Changes parameter 33 Motor Over Load Current (1~150)
- **Min Freq** – Changes parameter 34 Minimum Frequency (10~320)
- **Max Freq** – Changes parameter 35 Maximum Frequency (10~320)
- **Accel Time** – Changes parameter 39 Acceleration Time (1~320)
- **Decel Time** – Changes parameter 40 Acceleration Time (1~320)

WRITE STATUS INDICATOR

Located on right side of title bar, displays the status of Ethernet write messages to the drive:

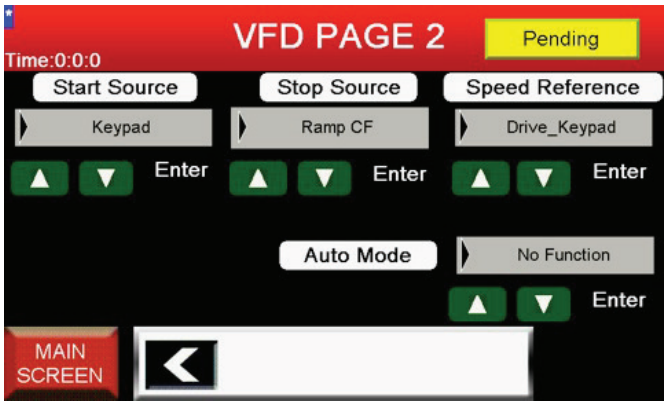
Pending

Ready

Failed

Good

Figure B.17



PARAMETERS

Start Source: Keypad, 3 Wire, 2 Wire, 2 Wire Lvl Sens, 2 Wire Hi Speed, Comm Port, 2 Wire lvlv Enbl

Stop Source: Ramp CF, Coast CF, DC Brake CF, DCBrkAuto CF, Ramp, Coast, DC Brake, DC BrakeAuto

Speed Reference: Drive_Keypad, Internal_Freq., Analog In1, Analog In2, Preset Freq., Comm Port

Auto Mode: No Function, Hnd_Off_Auto, Local/Remote, Auto/Manual

NAVIGATION BUTTONS

Switches between the two screens

MAIN SCREEN BUTTON

Navigates back to the main screen.

GUARDIAN SCREEN

The Guardian screen allows the user to activate or deactivate the Janus fire suppression system. Also barriers can be operated and monitored.

Figure B.18

GUARDIAN ACTIVE BUTTON

Pressing the guardian active button toggles between the active and off state. If the Guardian is active, the control system monitors the Janus system. If a problem is detected, the motor is stopped and the barriers are closed. Change the Guardian to off if the optional Janus fire suppression system is not installed.

BARRIER FAULT TIME

The barrier fault time is the amount of time that elapses after the barrier solenoid valves are energized and the barrier reed switches are checked for activation. If the reed switches have not been activated, an alarm will be generated. The time is entered in seconds, with a minimum value of 5 and a maximum value of 30.

BARRIER UP AND DOWN BUTTONS

When the technician is in the Guardian screen, the barrier up and down buttons can be used to open or close the barrier doors. If the tech leaves the screen, the barrier valve will return to normal operation.

BARRIER INDICATORS

Figure B.19

The barrier indicators display the state of the barrier closed reed switches. Grey when off (open) and green when on (closed).

MAIN SCREEN BUTTON

The main screen button is used to navigate to the main screen.

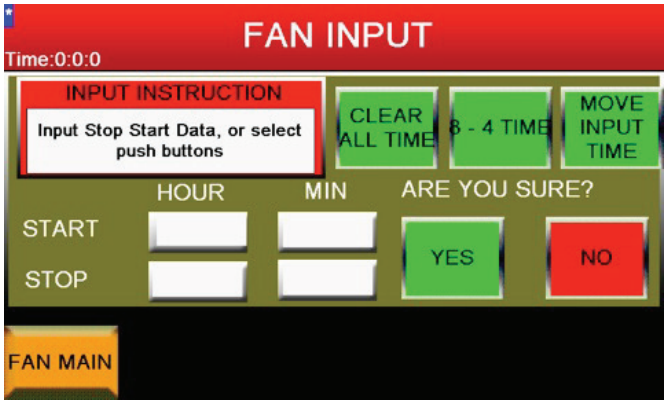
MAIN MOTOR BUTTON

The main motor button is used to navigate to the main fan data screen.

FAN INPUT SCREEN

The fan input screen has buttons for setting or clearing the start / stop times for all of days-of-week at one time.

Figure B.20



CLEAR ALL TIME BUTTON

The clear all time button is used to clear all four start and stop times for all seven days-of-the-week. After pressing the button, the user must then push the Yes or No button to confirm or cancel the operation.

8-4 TIME BUTTON

The 8-4 time button is used to set the first start time hour to 8 and first stop time hour to 16 for all seven days-of-the-week. After pressing the button, the user must then push the Yes or No button to confirm or cancel the operation.

MOVE INPUT TIME BUTTON

The move input time button is used to set the first start time and first stop time to the values entered in the start / stop times on this screen for all seven days-of-the-week. After pressing the button, the user must then push the Yes or No button to confirm or cancel the operation.

START / STOP HOUR / MIN ENTRIES

The start /stop hour / min entries are used with the move input time button to set the first start time and first stop time to the values entered in these fields for all seven days-of-the-week.

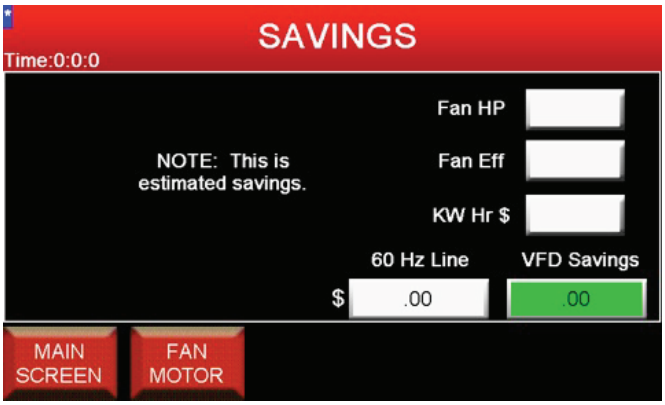
FAN MAIN BUTTON

The fan main button is used to navigate back to the fan input screen.

SAVINGS SCREEN

The savings screen is used to display the estimated savings gained by using a VFD verses an across-the-line motor starter to control the fan motor. The calculation is based on the screen input parameters and the elapsed run time and elapsed kW hours from the drive.

Figure B.21



FAN HP ENTRY

Enter the motor horsepower from the motor name plate.

FAN EFF ENTRY

Enter the motor efficiency from the motor name plate.

KW HR $ ENTRY

Enter the cost per kW hour from the electric company.

60 HZ LINE INDICATOR

Displays the cost if the fan motor were operated with an across-the line motor starter based on the current elapsed run time from the drive to calculate the kW hours used.

VFD SAVINGS INDICATOR

Displays the cost savings when using a VFD. The energy cost based on the elapsed kW hours from the drive is subtracted from the 60 Hz Line cost. The VFD is more efficient than an across-the-line motor start and will use less kW hours.

MAIN SCREEN BUTTON

The main screen button is used to navigate to the main screen.

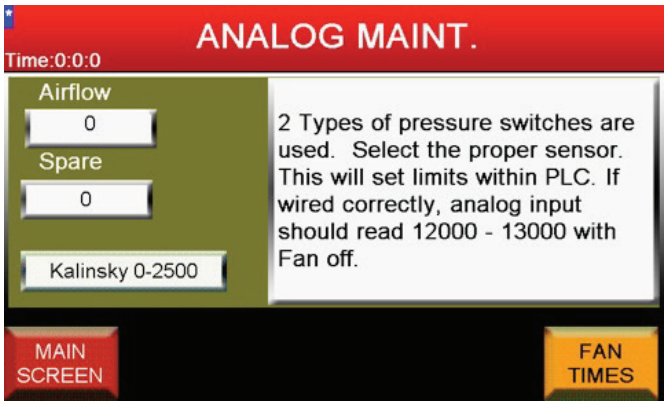
MAIN MOTOR BUTTON

The main motor button is used to navigate to the main fan data screen.

ANALOG MAINT. SCREEN

The analog maintenance screen displays the actual value of the two analog inputs and allows the user to select the type of pressure sensor in use.

Figure B.22



AIRFLOW INDICATOR

The airflow indicator displays the actual value of analog input 1, to which is attached the pressure sensor. The value is displayed in engineering units (counts). The analog input resolution is 12 bits so the value will range from 0 to 4096.

SPARE INDICATOR

The spare indicator displays the actual value of analog input 2, which is not used at this time. The value is displayed in engineering units (counts). The analog input resolution is 12 bits so the value will range from 0 to 4096.

PRESSURE SENSOR SELECT BUTTON

The pressure sensor select button is used to choose which type of pressure sensor is in use. The two possible types are Kalinsky 0-2500 and Dwyer 0-3000.

MAIN SCREEN BUTTON

The main screen button is used to navigate to the main screen.

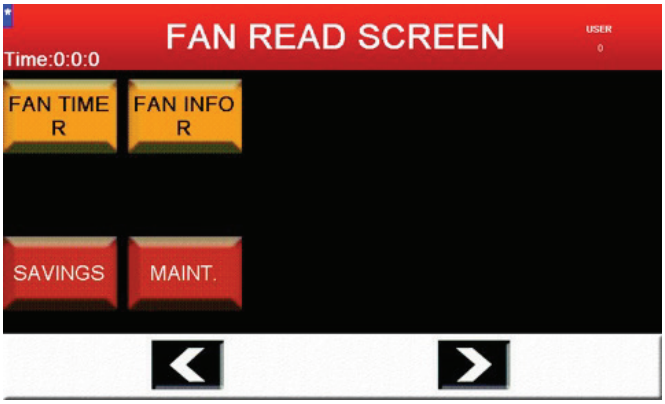
FAN TIMES BUTTON

The fan main button is used to navigate to the fan input screen.

FAN READ SCREEN

The fan read screen contains navigation buttons to read-only versions of the fan time screen and motor info screen. It also has navigation buttons to the savings and maint. screens.

Figure B.23



FAN TIME R BUTTON

The fan time r button is used to navigate to the fan time read screen where up to four start / stop times can be viewed for each day-of-week. Note that this screen is not password protected, it is read-only.

FAN INFO R BUTTON

The fan info r button is used to navigate to the motor info read screen where drive operation parameters can be viewed. Note that this screen is not password protected, it is read-only.

MAIN SCREEN BUTTON

The main screen button is used to navigate to the main screen.

FAN TIMES BUTTON

The fan main button is used to navigate to the fan input screen.

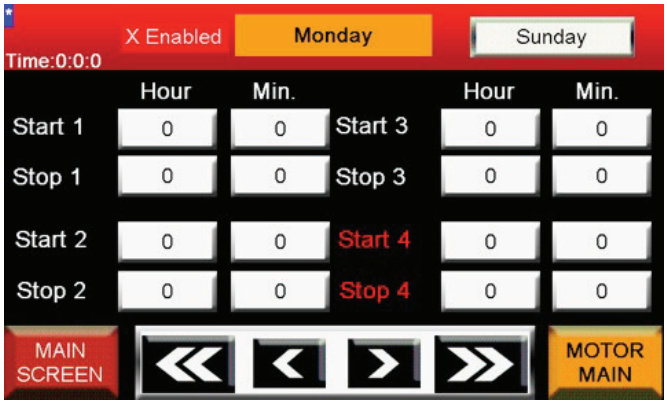
LEFT AND RIGHT NAVIGATION BUTTONS

The left and right navigation buttons are used to navigate between the top five screens in the screen hierarchy in a round robin fashion.

FAN TIME READ SCREEN

The fan time read screen is a read-only version fan time screen described above. The start and stop times cannot be changed, therefore the screen is not password protected.

Figure B.24



Refer to the fan time screen for a description of the objects on this screen.

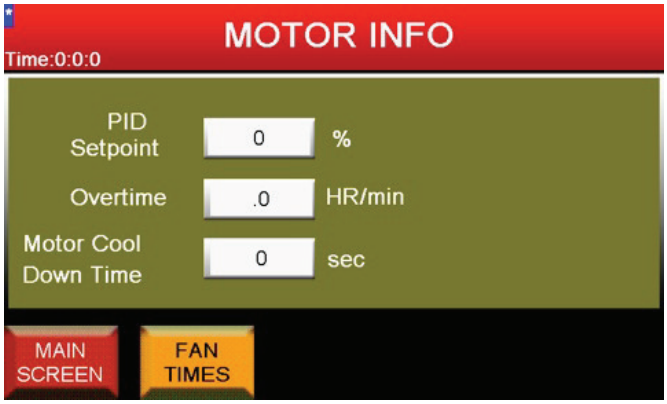
MOTOR MAIN BUTTON

The motor main button navigates back to the fan read screen.

MOTOR INFO READ SCREEN

The motor info read screen is a read-only version of the fan info screen described above. The parameters cannot be changed, therefore the screen is not password protected.

Figure B.25



Refer to the fan info screen for a description of the objects on this screen.

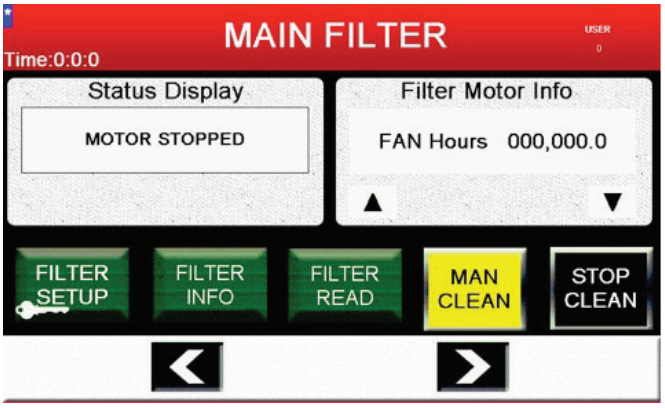
MOTOR MAIN BUTTON

The motor main button navigates back to the fan read screen.

MAIN FILTER SCREEN

The main filter screen displays status information and provides navigation to the filter screens. Also manual cleaning start / stop buttons are available.

Figure B.26



STATUS DISPLAY AND FILTER MOTOR INFO

The status display and filter motor info indicators are the same as on the main screen. See the Main Screen section for details on these indicators.

FILTER SETUP BUTTON

The filter setup button is used to navigate to the filter setup screen which allows the user to enter parameters used for controlling the automatic and manual cleaning operation. Note that this screen is password protected.

FILTER INFO BUTTON

The filter info button is used to navigate to the knowledge screen which contains information of filter replacement.

FILTER READ BUTTON

The filter read button is used to navigate to the filter setup read screen, which is a read-only version of the filter setup screen. The cleaning parameters cannot be edited, therefore the screen is not password protected.

MAN CLEAN BUTTON

The man clean button is used to initiate a manual cleaning cycle. The manual cleaning cycle energizes all of the non-inhibited solenoid valves in sequence, one time. Note that an automatic cleaning must not be active.

STOP CLEAN BUTTON

The stop clean button is used to stop all automatic and manual cleaning cycles except for Delta P.

LEFT AND RIGHT NAVIGATION BUTTONS

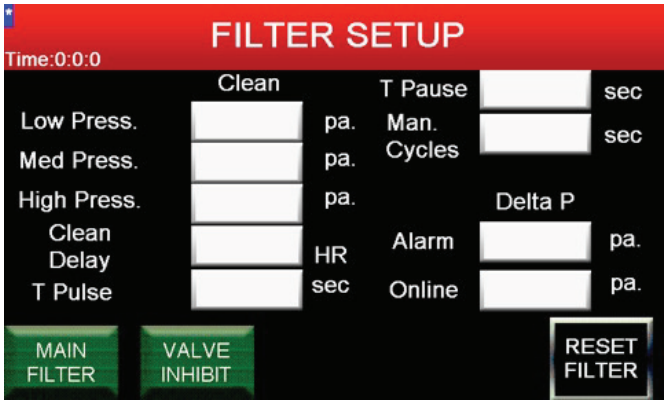
The left and right navigation buttons are used to navigate between the top five screens in the screen hierarchy in a round robin fashion.

FILTER SETUP SCREEN

The filter setup screen contains setpoints used to control the cleaning operations. These parameters contain pressure settings in pascal (Pa) and time setting in hours and seconds. There are four types of automatic cleaning; Low Pressure, Medium Pressure, High Pressure and Delta P. When the fan is running the differential pressure drop across the filters is monitored and if it rises above any of the setpoints, the appropriate cleaning cycle will executed the next time the fan stops. The exception is the Delta P alarm cleaning, in which case the cleaning cycle will run continuously.

The cleaning cycles will turn on each of the non-inhibited valves in sequence for the amount of time entered in T Pulse and will delay for the time entered in T Pause before moving to the next valve. The number of complete cycles executed is determined by the alarm level; Low Pressure executes 2 cycles, Medium Pressure executes 4 cycles and High Pressure executes 6 cycles. Again the exception is the Delta P alarm cleaning.

Figure B.27



LOW PRESS. ENTRY

The low pressure setpoint is used to determine if a low pressure cleaning cycle should be executed the next time the fan motor stops. This parameter is compared to the scaled analog input value from the pressure sensor to make the determination. The low pressure cycle executes the complete valve sequence twice. The minimum value is 800 Pa and the maximum value is 1,000 Pa. The default is 800 Pa.

MED PRESS. ENTRY

The medium pressure setpoint is used to determine if a medium pressure cleaning cycle should be executed the next time the fan motor stops. This parameter is compared to the scaled analog input value from the pressure sensor to make the determination. The medium pressure cycle executes the complete valve sequence four times. The minimum value is 1,000 Pa and the maximum value is 1,200 Pa. The default is 1,000 Pa.

HIGH PRESS. ENTRY

The high pressure setpoint is used to determine if a high pressure cleaning cycle should be executed the next time the fan motor stops. This parameter is compared to the scaled analog input value from the pressure sensor to make the determination. The high pressure cycle executes the complete valve sequence six times. The minimum value is 1,200 Pa and the maximum value is 1,400 Pa. The default is 1,200 Pa. Note that if high pressure cleaning is reached, the user should order and install replacement filters.

CLEAN DELAY ENTRY

The clean delay setpoint is used to determine if the there has been enough running hours on the filter to initiate any cleaning cycle, including Delta P alarm. The minimum value is 0 hours and the maximum value is 20 hours. The default is 20 hours.

T PULSE ENTRY

The T pulse setpoint is used to determine how long each solenoid valve will remain energized during the cleaning cycle. The minimum value is 0 seconds and the maximum value is 1.20 seconds. The default is 1.20 seconds.

T PAUSE ENTRY

The T pause setpoint is used to determine the time delay between activations of each solenoid valve during the cleaning cycle. The minimum value is 0 seconds and the maximum value is 1,000 seconds. The default is 60 seconds.

MAN. CYCLES ENTRY

The manual cycles setpoint determines the number of complete valve sequences to execute during the manual cleaning cycle. The minimum value is 1 cycle and the maximum value is 25 cycles. The default is 1 cycle.

DELTA P ALARM ENTRY

The Delta P alarm setpoint is used to determine if the Delta P alarm cleaning cycle should be executed immediately, whether the fan is running or not. This parameter is compared to the scaled analog input value from the pressure sensor to make the determination. The Delta P cycle executes the complete valve sequence continuously until the actual pressure drops below the Delta P Online setpoint. The minimum value is 0 Pa and the maximum value is 2,500 Pa. The default is 1,300 Pa. Note that if Delta P cleaning is reached, the user should order and install replacement filters.

DELTA P ONLINE ENTRY

The Delta P online setpoint is subtracted from the Delta P alarm setpoint and stored. If the Delta P cleaning is active and the actual pressure drops below this stored value, the Delta P cleaning sequence is canceled. If the actual pressure remains above this stored value for more than 2 seconds, a filter clogged alarm is generated. The minimum value is 100 Pa and the maximum value is 2,500 Pa. The default is 100 Pa.

RESET FILTER BUTTON

The reset filter button is used to cancel all automatic cleaning cycles and reset the filter hours to zero.

MAIN FILTER BUTTON

The main filter button is used to navigate back to the main filter screen.

VALVE INHIBIT BUTTON

The valve inhibit button is used to navigate to the valve inhibit screen.

VALVE INHIBIT SCREEN

The valve inhibit screen contains buttons to turn off unused valves that have not been installed. This will shorten the cleaning cycle since inhibited valves will not be processed.

INHIBIT BUTTONS

Pressing any of the inhibit buttons will toggle between the inhibited and non-inhibited (active) states. If the valve is not inhibited, the text will read Inhibit? on a green background. If the valve is inhibited, the text will read Inhibited! on a red background.

MAIN FILTER BUTTON

The main filter button is used to navigate back to the main filter screen.

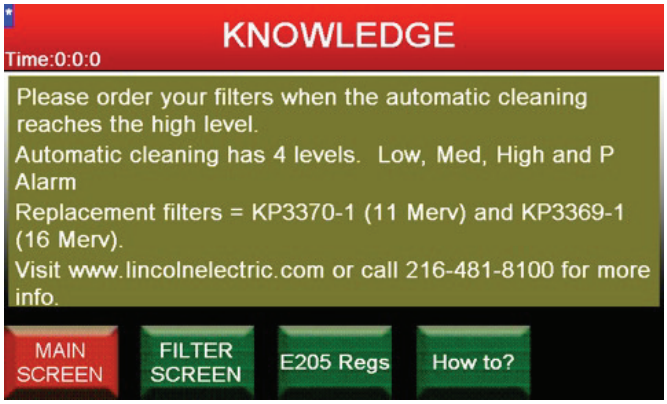
FILTER SETUP BUTTON

The filter setup button is used to navigate to the filter setup screen.

KNOWLEDGE SCREEN

The knowledge screen contains some text describing the cleaning levels and replacement filters. The screen also has navigation buttons to some further information screens, E205 regs and How to?.

Figure B.28



MAIN SCREEN BUTTON

The main filter button is used to navigate back to the main screen.

FILTER SCREEN BUTTON

The filter screen button is used to navigate back to the main filter screen.

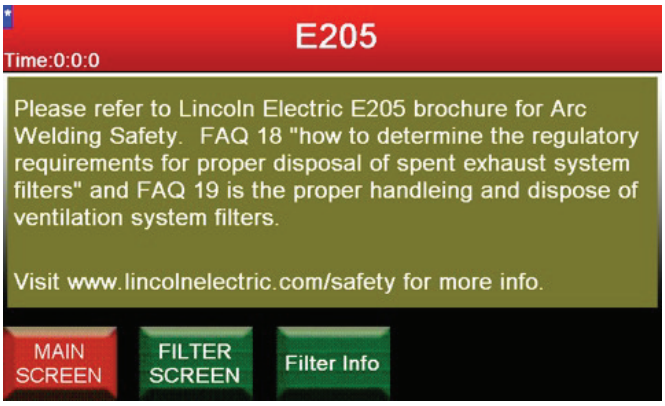
E205 BUTTON

The E205 button is used to navigate to the E205 screen.

E205 SCREEN

The E205 screen contains some text describing the E205 brochure and disposal of filters. The screen also has a navigation buttons to some further information screens, How to?.

Figure B.29



MAIN SCREEN BUTTON

The main filter button is used to navigate back to the main screen.

FILTER SCREEN BUTTON

The filter screen button is used to navigate back to the main filter screen.

FILTER INFO BUTTON

The E205 button is used to navigate to the first of three replace screens.

REPLACE SCREENS REPLACE 1, REPLACE 2, REPLACE 3

The Replace 1, Replace 2 and Replace 3 screens contain instructions for replacing the filter cartridges with navigation button.

Figure B.30

Figure B.31

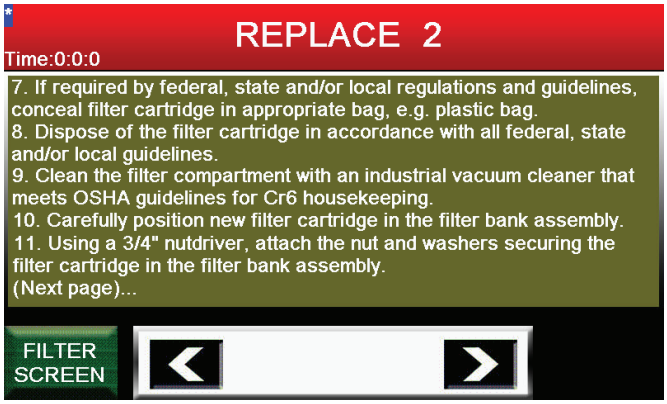
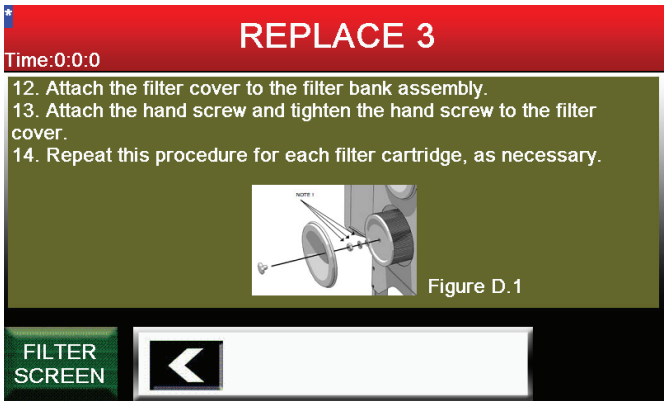


Figure B.32



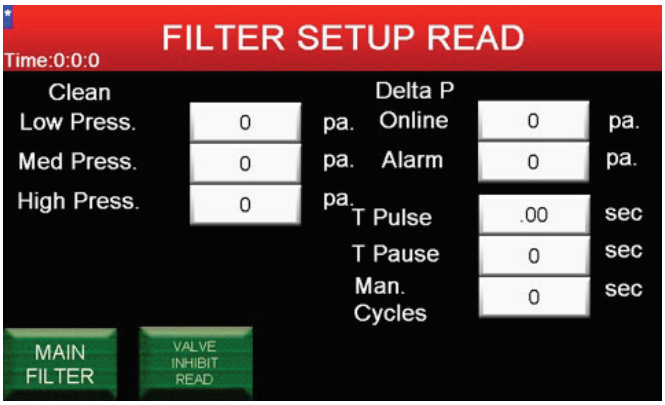
FILTER SCREEN BUTTON

The filter screen button is used to navigate back to the main filter screen.

FILTER SETUP READ SCREEN

The filter setup read screen is a read-only version of the filter setup screen. See the filter setup screen for a description of the objects on this screen. Since the parameters cannot be changed, the screen is not password protected.

Figure B.33



MAIN FILTER BUTTON

The main filter button is used to navigate back to the main filter screen.

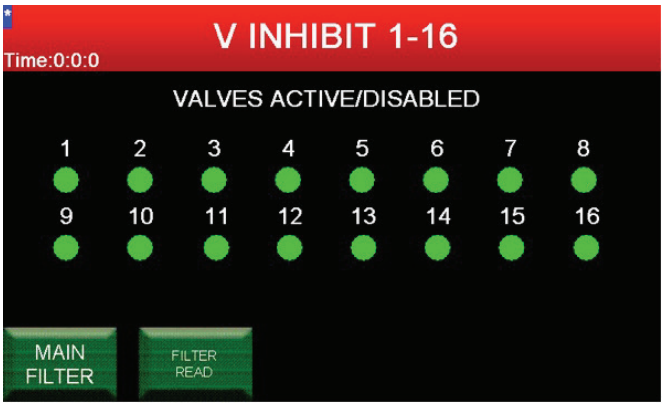
VALVE INHIBIT READ BUTTON

The valve inhibit read button is used to navigate to the valve inhibit read screen.

VALVE INHIBIT READ SCREEN

The Valve Inhibit Read screen is a read-only version of the Valve Inhibit screen. See the Valve Inhibit screen for a description of the objects on this screen. Since the parameters cannot be changed, the screen is not password protected.

Figure B.34



MAIN FILTER BUTTON

The main filter button is used to navigate back to the main filter screen.

FILTER READ BUTTON

The filter read button is used to navigate to the filter setup read screen.

ACCESSORIES

There are currently no accessories available for the Guardian Control Panel.

MAINTENANCE

There is no maintenance necessary for the Guardian Control Panel.

HOW TO USE TROUBLESHOOTING GUIDE

⚠ WARNING

Service and repair should be performed by only Lincoln Electric Factory Trained Personnel. Unauthorized repairs performed on this equipment may result in danger to the technician and machine operator and will invalidate your factory warranty. For your safety and to avoid Electrical Shock, please observe all safety notes and precautions detailed throughout this manual.

This Troubleshooting Guide is provided to help you locate and repair possible machine malfunctions. Simply follow the three-step procedure listed below.

Step 1. LOCATE PROBLEM (SYMPTOM).

Look under the column labeled "PROBLEM (SYMPTOMS)." This column describes possible symptoms that the machine may exhibit. Find the listing that best describes the symptom that the machine is exhibiting.

Step 2. POSSIBLE CAUSE.

The second column labeled "POSSIBLE CAUSE" lists the obvious external possibilities that may contribute to the machine symptom.

Step 3. RECOMMENDED COURSE OF ACTION

This column provides a course of action for the Possible Cause, generally it states to contact your local Lincoln Authorized Field Service Facility.

If you do not understand or are unable to perform the Recommended Course of Action safely, contact your local Lincoln Authorized Field Service Facility.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

Observe Safety Guidelines detailed in the beginning of this manual.

TROUBLESHOOTING GUIDE

SYMPTOMS	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
When the 'Auto Cycle' button is pressed the system will not start.	1. Make sure the correct input power is being applied. 2. Check the status LEDs on the drive cover. 3. Check clock set up (Time / Date). 4. System may be trying to start during programmed down time. 5. Make sure the system/run switch inside the Guardian Fire Control System is in the 'RUN' position when operating the system.	1. If all recommended possible areas of misadjustment have been checked and the problem persists, **Contact your local Lincoln Authorized Field Service Facility. 1-888-935-3878.**
When the 'Start Button' is pressed the system starts and then stops.	1. Check for fault / alarm on display. 2. Machine may be shutting down on scheduled down time.	1. If all recommended possible areas of misadjustment have been checked and the problem persists, **Contact your local Lincoln Authorized Field Service Facility. 1-888-935-3878.**
The clock reads the wrong time/date.	1. See the Operation Section of this manual.	1. If all recommended possible areas of misadjustment have been checked and the problem persists, **Contact your local Lincoln Authorized Field Service Facility. 1-888-935-3878.**
Number of run cycles changed..	1. See the Operation Section of this manual.	1. If all recommended possible areas of misadjustment have been checked and the problem persists, **Contact your local Lincoln Authorized Field Service Facility. 1-888-935-3878.**

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

Observe Safety Guidelines detailed in the beginning of this manual.

TROUBLESHOOTING GUIDE

SYMPTOMS	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
The air flow is diminished.	1. Filter clogged (check display).	1. If all recommended possible areas of misadjustment have been checked and the problem persists, **Contact your local Lincoln Authorized Field Service Facility. 1-888-935-3878.**
The alarm banner is activated on the Guardian Control Panel.	1. Check fault / alarm read out on display. 2. Check compressed air connection. 3. Check filter pressure on display. 4. If a VFD fault occurs, call authorized electrician.	1. If all recommended possible areas of misadjustment have been checked and the problem persists, **Contact your local Lincoln Authorized Field Service Facility. 1-888-935-3878.**
Particulate is emitting from the collection drum.	1. Empty collection drum. 2. Check seals and clamp on collection drum.	1. If all recommended possible areas of misadjustment have been checked and the problem persists, **Contact your local Lincoln Authorized Field Service Facility. 1-888-935-3878.**
There is an abnormal amount of weld fume in work zone.	1. Check to make sure the machine is powered on. 2. Have an electrician check fan speed on VFD. 3. Make sure fume extraction arms are on and in the proximity of work being performed.	1. If all recommended possible areas of misadjustment have been checked and the problem persists, **Contact your local Lincoln Authorized Field Service Facility. 1-888-935-3878.**

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the test/repairs safely, contact the Lincoln Electric Service Department for electrical troubleshooting assistance before you proceed. Call 1-888-935-3877.

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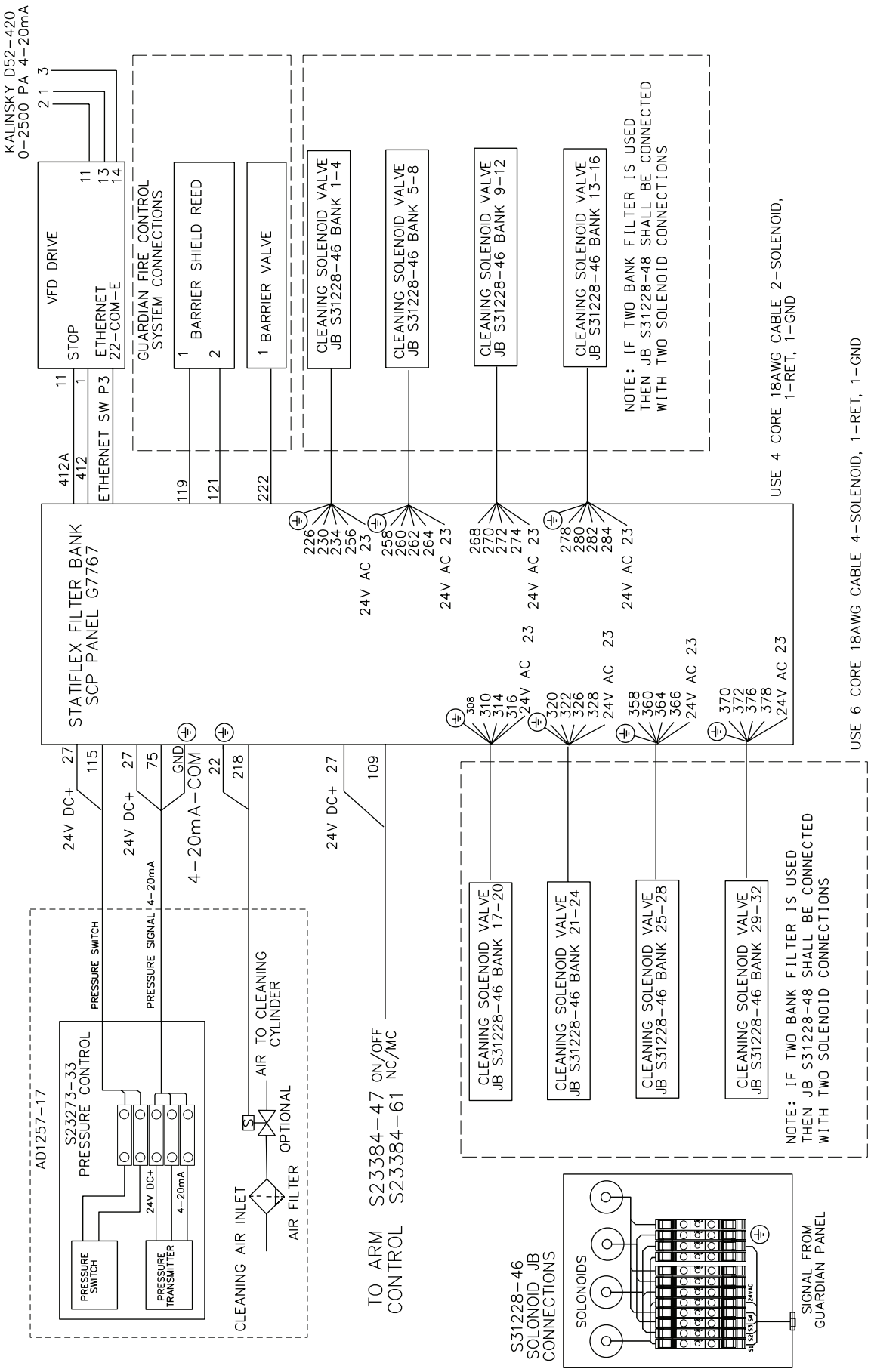
Figure G.1 - Wiring Diagram



CUSTOMER ASSISTANCE POLICY

The business of The Lincoln Electric Company is manufacturing and selling high quality welding equipment, consumables and cutting equipment. Our challenge is to meet the needs of our customers and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for advice or information about their use of our products. We respond to our customers based on the best information in our possession at that time. Lincoln Electric is not in a position to warrant or guarantee such advice and assumes no liability, with respect to such information or advice. We expressly disclaim any warranty of any kind, including any warranty of fitness for any customer's particular purpose, with respect to such information or advice. As a matter of practical consideration, we also cannot assume any responsibility for updating or correcting any such information or advice once it has been given, nor does the provision of information or advice create, expand or alter any warranty with respect to the sale of our products.

Lincoln Electric is a responsive manufacturer, but the selection and use of specific products sold by Lincoln Electric is solely within the control of and remains the sole responsibility of the customer. Many variables beyond the control of Lincoln Electric affect the results obtained in applying these types of fabrication methods and service requirements.

Subject to Change – This information is accurate to the best of our knowledge at the time of printing. Please refer to www.lincolnelectric.com for any updated information.

THE LINCOLN ELECTRIC COMPANY
22801 St. Clair Avenue • Cleveland, OH • 44117-1199 • U.S.A.
Phone: +1.216.481.8100 • www.lincolnelectric.com