FENWAL®
EXPLOSION PROTECTION

Fenwal® ProFlapPlus Interface Panel Installation and Operation Manual

MC-573 Revision AB

FOREWORD

This manual is provided as an installation, operation, and maintenance guide for the Fenwal ProFlapPlus Interface Panel. The Interface Panel should not be installed in any system unless the specific application and system design has been reviewed and approved by Fenwal.

Fenwal recommends that only authorized personnel install, service, and maintain the system. This entire manual should be reviewed before installation is started.

If problems not covered in this manual arise, or if further clarification of the instructions presented within this manual are required, contact Fenwal Protection Systems Industrial Explosion Protection Division or service group at:

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SAFETY SUMMARY

IMPORTANT INFORMATION
READ CAREFULLY

Explosion-protection systems must be correctly installed and carefully maintained to ensure they function properly. Therefore, all instructions in this manual, as well as any other information furnished, must be followed exactly. If the instructions are not followed, or if the Fenwal system is modified, installed on other equipment for which it was not designed, or if changes are made in the process being protected, the system may fail to provide the intended protection. This may result in property damage, personal injury and/or loss of life.

If you find any of the instructions, safety notes or other information provided within to be unclear, or if you have any questions, you should immediately contact your local Fenwal explosion protection system distributor or the IEP Design Engineering or Service Department at Kidde-Fenwal for assistance and instructions. Read and understand Section 2, Safety, completely before the start of installation or any maintenance, and review it periodically.

The Warnings, Cautions, Notes, and Servicing Instructions provided in this manual must be followed exactly to ensure proper and safe operation of the equipment.
The location, correctness of installation, and quality of maintenance of this equipment is critical to its proper and safe operation.
Failure to follow instructions may result in equipment damage, personal injury, or death due to equipment malfunction or failure to operate equipment properly.

IMPORTANT INFORMATION – READ CAREFULLY

Before using this ProFlapPlus Interface Panel, please read the operating instructions thoroughly, in particular the chapters "General References" and "Safety." Compliance with the operating instructions is essential, so if you have not understood these instructions completely, the Interface Panel must not be operated.

Not all explosions can be suppressed or isolated, and Fenwal cannot guarantee that its equipment will suppress or isolate all explosions that might occur at your facility, or in your equipment. However, as long as you do not modify your equipment or change your process, and as long as you properly maintain the Fenwal equipment, it should increase your safety by providing a line of defense against explosions. The first defense, as always, is a good safety program, including employee training and good housekeeping.

The experience of Fenwal over the past 50 years indicates that properly maintained and operated explosion protection systems have the potential to substantially reduce or eliminate damage and personal injury from explosions. We believe that our equipment can help provide a safer workplace and save money from possible damage and claims in the event of an explosion.

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CHAPTER 1

GENERAL REFERENCES

INTRODUCTION

This manual specifies installation, operation, and maintenance of the ProFlapPlus Interface Panel. Please read all instructions carefully. Operate Interface Panel only after following the installation, operation, and maintenance instructions.

Always keep this manual handy and refer to it if you are not certain how to operate and handle the unit properly.

INTENDED USE

Intended use means that these instructions must be read and understood, and that the Interface Panel is operated and serviced accordingly.

The ProFlapPlus Interface Panel (P/N 32-710001-001) is intended for function monitoring and control of the ProFlapPlus back pressure flap valves. The Interface Panel is capable of monitoring and controlling all versions of the ProFlapPlus, including both St1 (NS 140 - NS 1000) and St2 (NS 140 - NS 315) configurations.

Set-up conditions and maintenance schedule must be followed as specified by the manufacturer. Installation of the Interface Panel and its operation must always be in accordance with relevant current national standards of the customer's country. The customer is responsible for compliance.

Any use other than those defined above is not intended. We cannot be held liable for personal injuries or damage to the system resulting from non-compliance. The customer bears the risk himself.

Unacceptable Use

The following are not allowed:

- Function monitoring and control of devices for which the Interface Panel has not been designed
- Changing and rebuilding of the system by the customer without permission
- Any mode of operation which may affect the safety of the system or the customer

QUALIFICATION OF PERSONNEL

Only trained personnel may operate the system. Personnel in question must have proper qualifications; fields of competence as well as responsibilities for any work that is to be carried out must be clearly defined.

Skilled Personnel

Only Skilled personnel are authorized to perform the commissioning and servicing of the system. Definition of skilled personnel: An individual or individuals with extensive knowledge, training, and experience in the following areas:

- Safety regulations
- Accident prevention regulations

- Federal, state, and local rules and regulations, as well as any relevant national standards or guidelines (NFPA, etc.).

Skilled personnel must:
- Be able to analyze the work they have been assigned to do; identify and avoid possible risks and hazards.
- Be qualified and authorized by the person responsible for machine safety to perform the required tasks.

Qualified Personnel

Interface Panels used in explosion protection systems must be checked before their first start-up, after essential changes, and at intervals defined by the ProFlapPlus Installation and Operating Manual, by a qualified person to ensure good order and condition.

WARRANTY

Our warranty does not include damage resulting from wear and tear, corrosion, or internal and external chemical influences, improper handling, and any use that is not as originally intended (Chapter 1, Intended Use). Fire and explosion are excluded from warranty.

Warranty Conditions

Warranty conditions to be observed by the system operator are as follows:
- Loading and shipping in accordance with Fenwal's instructions.
- Proper storage before commissioning.
- Knowledge and implementation of the notes and references in the operating manual.
- Expert installation, commissioning, and repair as far as these services are provided by the customer.
- Proper operation.
- Maintaining the operating parameters.
- Operation without modifications to device.
- Observing service and inspection intervals by trained staff, any work performed is to be recorded in a log.
- In the event of a defect, please notify Fenwal.

Note: If exceptions have been agreed upon in contractual documents, the conditions stipulated in those documents are considered valid.

Expiration of Warranty

The Warranty expires in cases of non-compliance with above-mentioned conditions, and in the event of natural disasters.

CHAPTER 2

SAFETY

Working safely is only possible if all available instructions and possibly available operation manuals of additional system components have been read thoroughly and are carefully followed.

Each person performing installation, commissioning, operation, and servicing must have read the operating and maintenance instructions and understand every detail. This also applies for personnel who operate and work on the system periodically. The operation and maintenance instructions must be within reach of the system.

STANDARDS AND GUIDELINES

A number of regulations/standards are to be observed when installing and operating the devices at production facilities. The installer is to ensure that wiring complies with all federal, state, and local codes, including but not limited to NFPA 70: National Electric Code.

INSPECTIONS

Inspection before Commissioning by a Qualified Person

Interface Panels used in explosion protection systems must be checked before first start-up by a qualified person on its good order regarding assembly, installation, location conditions, and safe operation.

Regular Inspection by a Qualified Person

Regular inspection intervals should be conducted per the ProFlapPlus Installation and Operating Manual.

Inspections According to NFPA 77

The earth grounding must be checked periodically per NFPA 77.

Dust Control Measurements

Regularly necessary dust control measurements should be taken by qualified personnel with the required specialization.

HEALTH HAZARDS DUE TO EXHAUSTED SUBSTANCES

Personal Protective Equipment

Please provide necessary personal protective equipment to the operating personnel. This equipment should include:

- Safety glasses
- Hearing protection
- Gloves
- Protective clothing

- Full face masks with appropriate filter cartridges (protection class depending on the hazardousness of the dust)

DANGER OF CRUSHING AND OVERTURNING

To avoid the risks mentioned below, the system must not be operated until assembly has been completed. Perform servicing only when the system has been safely shut down (please see Section 2.8.2).

ELECTRICAL HAZARDS

There is a risk of personal injury or death caused by electrical current from electrical components and from the electrical switch and Interface Panel.

- Work on these components must only be performed by qualified electricians.
- All electrical components should be connected to a protective grounding system.

FIRE AND EXPLOSION HAZARDS

A residual risk remains on systems used for the extraction of combustible or explosive substances in spite of fire and explosion protective measures. The manufacturer cannot provide a 100 % safety guarantee and does not assume liability in the case of damage.

Earth Grounding

The Interface Panel is equipped with continuous grounding in order to avoid spark discharge. The operator must ensure the Interface Panel is properly grounded to comply with all federal, state, and local codes. If grounding cables were removed during servicing or maintenance, they must be properly re-attached before restarting the unit.

SAFETY DURING MAINTENANCE AND INSPECTION

Preventive and thorough maintenance is essential for the safety of the staff working with the Interface Panel. In addition, it ensures the proper operation of the device. Please have only qualified personnel perform the inspection, maintenance, and service work.

Safe System Shut Down

For safe system shut down, please perform the following tasks:

- Turn off the blower motor/fan of the interlocked process.
- Secure the blower motor/fan switch against re-activation (lock it by means of a padlock).
- Turn off any explosion suppression unit that is installed to avoid a false release.
- Wait until all of the rotating parts have stopped and secure them.
- Turn off power to the Interface Panel.

Maintenance Safety Instructions

- Operate the Interface Panel only if it is in proper working condition.
- Service the safety equipment regularly. At the same time check for proper functioning of the equipment.
- Inform the operating staff in a timely manner about the maintenance work that is to be performed, appoint a person in charge, and have welding, soldering, and gas cutting work authorized by a qualified safety inspector for approval prior to starting.
- Provide suitable fire extinguishers.

- If ground cables must be removed to perform maintenance work, the cables must be properly reconnected after work has been completed.
- Do not make any changes without prior consultation with Fenwal.
- Use original manufacturer's spare parts only.

CHAPTER 3

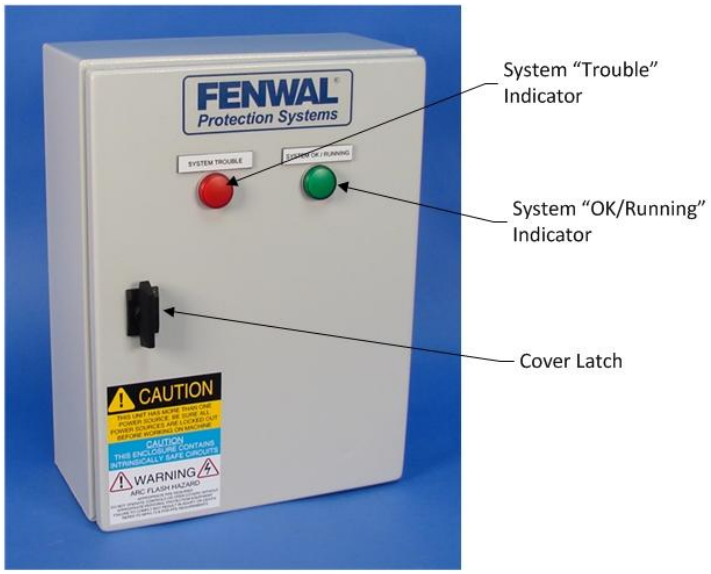
COMPONENTS

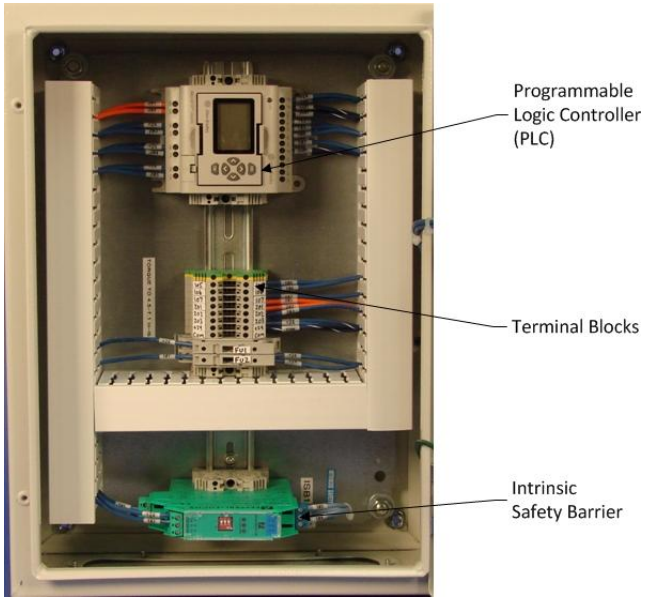
OVERVIEW

The ProFlapPlus Interface Panel is a PLC based system controller designed for use with all versions of the ProFlapPlus flap valves. The primary function of the Interface Panel is to monitor and control the operation of the flap valve.

The Interface Panel consists primarily of a PLC, intrinsically safe (IS) barrier, and terminal blocks. The front panel contains two indicator lights which are wired to the PLC, and provide "Trouble", "Alarm", and "System Running" status. The Interface Panel requires 24 VDC supply voltage capable of supplying 5 amps for operation.

When the front panel is open, access is provided to all electrical connection terminals, the PLC, and the IS barrier. The PLC includes push buttons which are used to adjust timing settings and control the solenoid (-St2 only) of the flap valve. The PLC includes four outputs, two of which are used for control of the indicator lights, and two of which are available for process interlocks and remote annunciation.





Indicator Lights

The indicator lights will provide the status of the flap valve while the protected process is both shut down and during operation. The green light "System OK/Running" is on when the system is running with no alarm or trouble conditions present. The red light "System Trouble" will flash when there is a trouble condition, and is steady when the system has an alarm condition.

The possible "alarm" conditions are:

- On startup, the deposit sensor is not made (flap blade does not open) within the specified amount of time.
- On shut down, the deposit sensor is not made (flap blade does not close) within the specified amount of time.
- During normal operation, if the deposit sensor is made (flap blade is closed) this would indicate a possible explosion event.

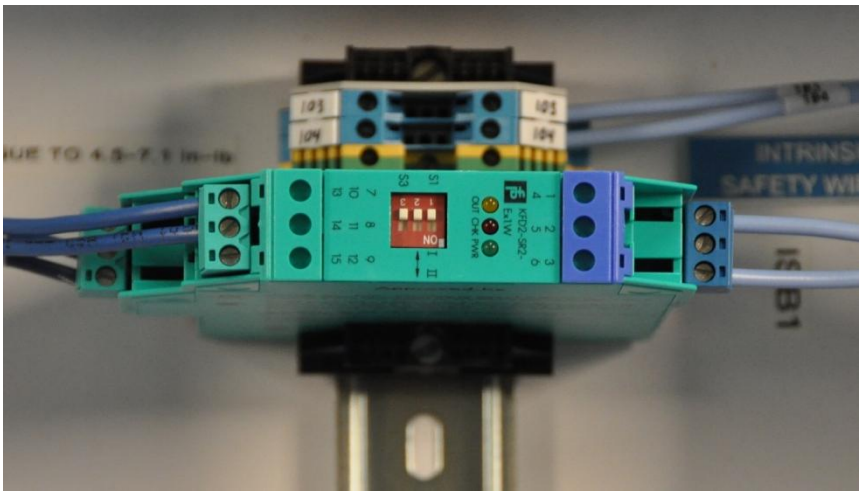
The only possible "trouble" condition is:

- During operation, the wear sensor has indicated an excessive amount of wear.

System OK/Running (Green Light)	System Trouble (Red Light)	System Status
Off	Off	Interface Panel is off
On	Off	Interface Panel is on and monitoring ProFlapPlus, there are no alarms or troubles present
On	On	Flap blade has not opened within specified time period (startup)
		Flap blade has not closed within specified time period (shutdown)
		Flap blade is closed, possible explosion event (during operation)
On	Flashing	Wear sensor indicates excessive wear on flap blade

Intrinsic Safety Barrier

The Interface Panel includes an intrinsic safety barrier for monitoring of the wear and tear sensor. When the wear and tear sensor indicates an abrasion during operation, the panel will indicate a trouble condition and the "System Trouble" indicator will flash. The relay output from the isolation barrier relay is connected to the PLC.



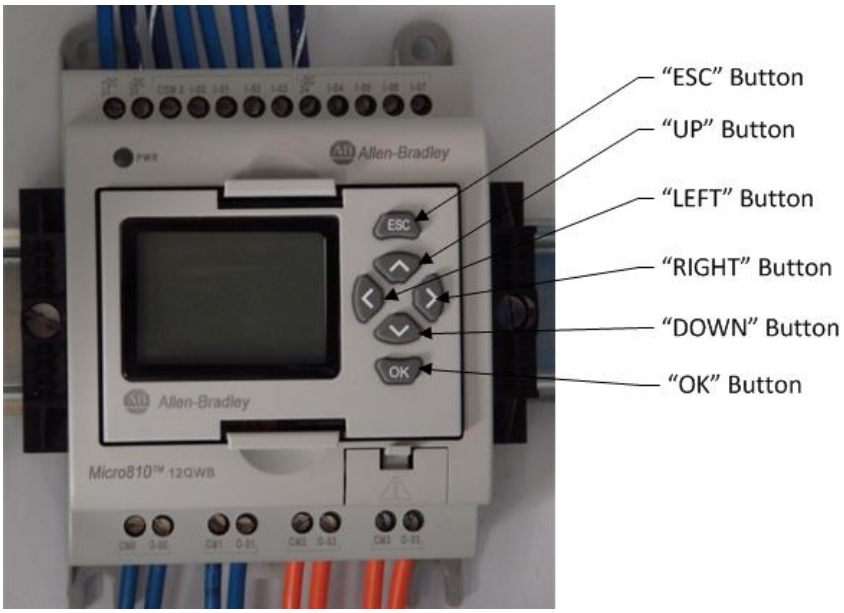
Programmable Logic Controller

The PLC monitors and/or controls the wear and tear sensor, deposit sensor, and locking solenoid and determines if the flap valve is functioning properly.

The PLC contains four relay outputs, three of which are normally open and closed when energized, and one of which is normally closed. Outputs 00 and 01 on the PLC are rated for 8 amps at 240 VAC. Outputs 02 and 03 on the PLC are rated for 4 amps at 240 VAC. Outputs 02 and 03 are used for control of the indicating lights. Output 01 is used for control of the locking solenoid for the –St2 version of the ProFlapPlusII flap valve. Output 00 is used for control of process interlock functions.

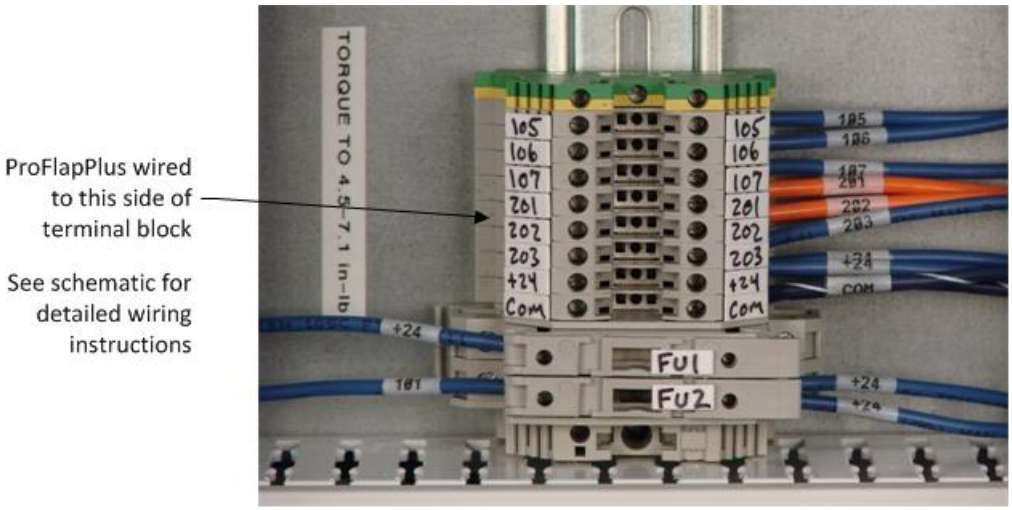
The PLC is used to adjust the on and off times for the deposit sensor and solenoid. The "ON DELAY" and "OFF DELAY" time periods for the deposit sensor are adjustable from 10 to 180 seconds. The "ENERGIZE" time for the locking solenoid is adjustable from 10 to 180 seconds as well. To change the time periods, use the following:

- To increase the "ON DELAY" time, press the "OK" button and then the "UP" arrow on the PLC
- To decrease the "ON DELAY" time, press the "OK" button and then the "DOWN" arrow on the PLC
- To increase the "OFF DELAY" time, press the "OK" button and then the "RIGHT" arrow on the PLC
- To decrease the "OFF DELAY" time, press the "OK" button and then the "LEFT" arrow on the PLC
- To increase the "ENERGIZE" time, press the "ESC" button and then the "UP" arrow on the PLC
- To decrease the "ENERGIZE" time, press the "ESC" button and then the "UP" arrow on the PLC



Terminal Blocks

The Interface Panel contains terminal blocks for connections to the ProFlapPlus valve. The ProFlapPlus flap valve is wired to the terminal blocks as shown below. For specific wiring instructions, see schematic in Appendix A for –St1 valves and Appendix B for –St2 valves.



CHAPTER 4

INSTALLATION

STORAGE

The Interface Panel should be stored in a dry, condensation-free environment. Storage temperatures for the Interface Panel should be between -40°F and 185°F.

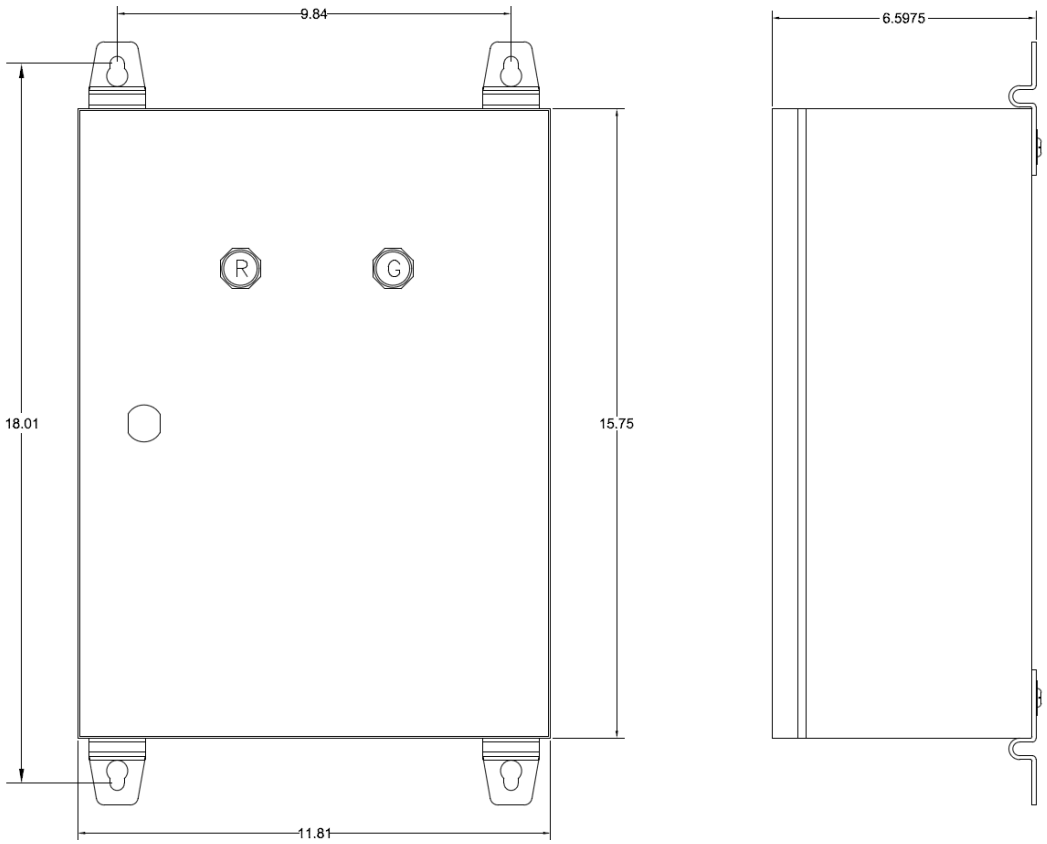
INSTALLATION

Requirements for the Installation Location

- Consider static weight requirements, such as load capacity of ceilings and other mounting posts in the intended installation location.
- Temperatures at the installation location of the Interface Panel should be between 32°F and 131°F.
- The Interface Panel is not rated for use in hazardous locations and should be installed outside of any hazard area.

Mechanical Installation

The Interface Panel is designed to be wall mounted to a flat surface. The surface should be capable of supporting the weight of the panel which is 15 lbs. The mounting hole pattern and overall dimensions for the panel are shown below.



Electrical Installation

The Interface Panel must be wired as shown in this manual. The recommended wire size for all wiring is 16 awg. All wiring must be copper and comply with all federal, state, and local codes. Splices in wiring runs are not allowed. All wiring connections inside panel should be torqued to 4.5 to 7.1 in-lbs.

Electrical connections to the panel must be installed in a manner that will prevent moisture ingress inside. Junction boxes are to be approved for use as required by the installation location. Weatherproof junction boxes and fitting are required to prevent water ingress into the panel.

All wires should be color coded or numbered to facilitate service. A copy of the coding scheme should be readily available to maintenance and inspection personnel.

An electrical schematic for both the –St1 and –St2 versions of the flap valve are provided in Appendix A.

DC Power Requirements

A DC power supply is used to provide power to the Interface Panel. The DC power supply should be capable of providing 5 amps at 24 VDC (130 to 150 watts) and is to be provided by the customer.

Electrical schematics and wiring information are provided in Appendix A for both versions of the flap valve (-St1 and –St2).

CHAPTER 5

OPERATION

Overview

On system startup, the Interface Panel monitors the status of the valve and indicates whether or not an alarm or trouble has occurred. Specifically, it monitors the deposit sensor to ensure the flap blade is fully opened within a specific amount of time. For –St2 versions of the flap valve, it also controls the locking solenoid which allows the flap blade to open. During normal operation, the Interface Panel monitors the deposit sensor and wear and tear sensor for all versions of the flap valve. On system shut down, the Interface Panel monitors the deposit sensor to ensure it is closed.

Monitoring of the Deposit Sensor

The deposit sensor of the flap valve is a normally open sensor which monitors the position of the flap blade and provides a signal when the flap is closed.

On system startup, the Interface Panel monitors the deposit sensor to ensure the flap blade has opened within the specified "ON DELAY" time period. The time period is adjustable from 10 to 180 seconds through the Interface Panel's PLC, and should be long enough to allow the flap blade to fully open. If this signal is not indicated on "system on", an alarm will be indicated and the system must not be set into operation again.

During normal operation, if the deposit sensor is made (contacts closed), this would indicate that a possible explosion has occurred.

If the deposit sensor signals a closed flap during operation, this is an indication of a possible explosion within the system. The process must be shut down immediately.

On system shut down, the Interface Panel monitors the deposit sensor to ensure the flap blade has closed within the specified "OFF DELAY" time period. Typical process airflow does not immediately stop, thus the signal from the deposit sensor needs to be delayed after system shut down. The delay period is adjustable from 10 to 180 seconds through the Interface Panel's PLC, and should be long enough to allow the flap blade to close during normal operation. If the deposit sensor is not made within the specified time period, this is an indication that the valve is not fully closed due to dust deposits.

If the deposit sensor is made while the system is running (running alrm), or if the deposit sensor is not made within the off-delay (stopped alarm) an alarm is indicated by the red indicator light which will stay on. The running alarm can be cleared by cycling power. The stopped alarm will automatically clear, once the alarm is remedied.

Monitoring of the Wear and Tear Sensor

The wear and tear sensor of the flap valve monitors the condition of the flap blade. The sensor must be connected to the Interface Panel through an intrinsically safe barrier which is contained inside the panel. The Interface Panel continuously monitors the wear and tear sensor in order to determine if the there is excessive abrasion within the flap valve. If the sensor detects a substantial amount of wear, the red pilot light will flash and the Interface Panel indicating a "Trouble" condition. During this time the interconnected process can still be run.

Control of the Locking Solenoid

During an explosion event, the flap blade will close due the pressure wave propagating out the protected vessel. The locking solenoid of the ProFlapPlus (-St2) locks the flap blade in the closed position, and mitigates flame and pressure wave propagation to connected vessels during operation. When airflow is off, the flap blade is closed and locked in place mechanically by the locking solenoid.

On system startup, the Interface Panel energizes the solenoid to allow the flap blade to open within the specified "ENERGIZE" time period. The time period is adjustable from 10 to 180 seconds through the Interface Panel's PLC, and should be long enough to allow the flap blade to fully open.

The locking device must be locked (de-energized) again after the 10 to 180 second time period. This will allow proper function of the flap blade in the event of an explosion.

COMMISSIONING

Inspection before Starting

Prior to the first commissioning of the Interface Panel, please perform a complete visual inspection regarding the following points:

- Is the panel securely mounted?
- Is there sufficient clearance to allow for the panel door to be opened?
- Are the electrical connections to panel made according to relevant codes and regulations?

START UP

After inspection of the previously mentioned points, the system may be commissioned. Turn on power to the Interface Panel. Turn on the blower motor/fan of the interlocked process. Turning on the blower motor/fan will provide an input signal (via terminal 107) to start the PLC functions (see "Typical Process" circuitry in Appendix A schematics). The Interface Panel will then monitor the opening of the flap blade (via the deposit sensor), and provide a visual indication of the system status through the indicating lights on the front panel. If the flap blade opens within the specified time period, the "SYSTEM OK/RUNNING" light will be illuminated; otherwise the "SYSTEM TROUBLE" light will be illuminated.

SHUT DOWN

To shut down the Interface Panel, first turn off the blower motor/fan of the interlocked process. The panel will monitor the closing of the flap blade (via the deposit sensor), and provide a visual indication of the system status through the indicating lights on the front panel. If the flap blade closes within the specified time period, the "SYSTEM OK/RUNNING" light will be illuminated; otherwise the "SYSTEM TROUBLE" light will be illuminated. After maintenance or inspection has been completed, turn off power to the Interface Panel.

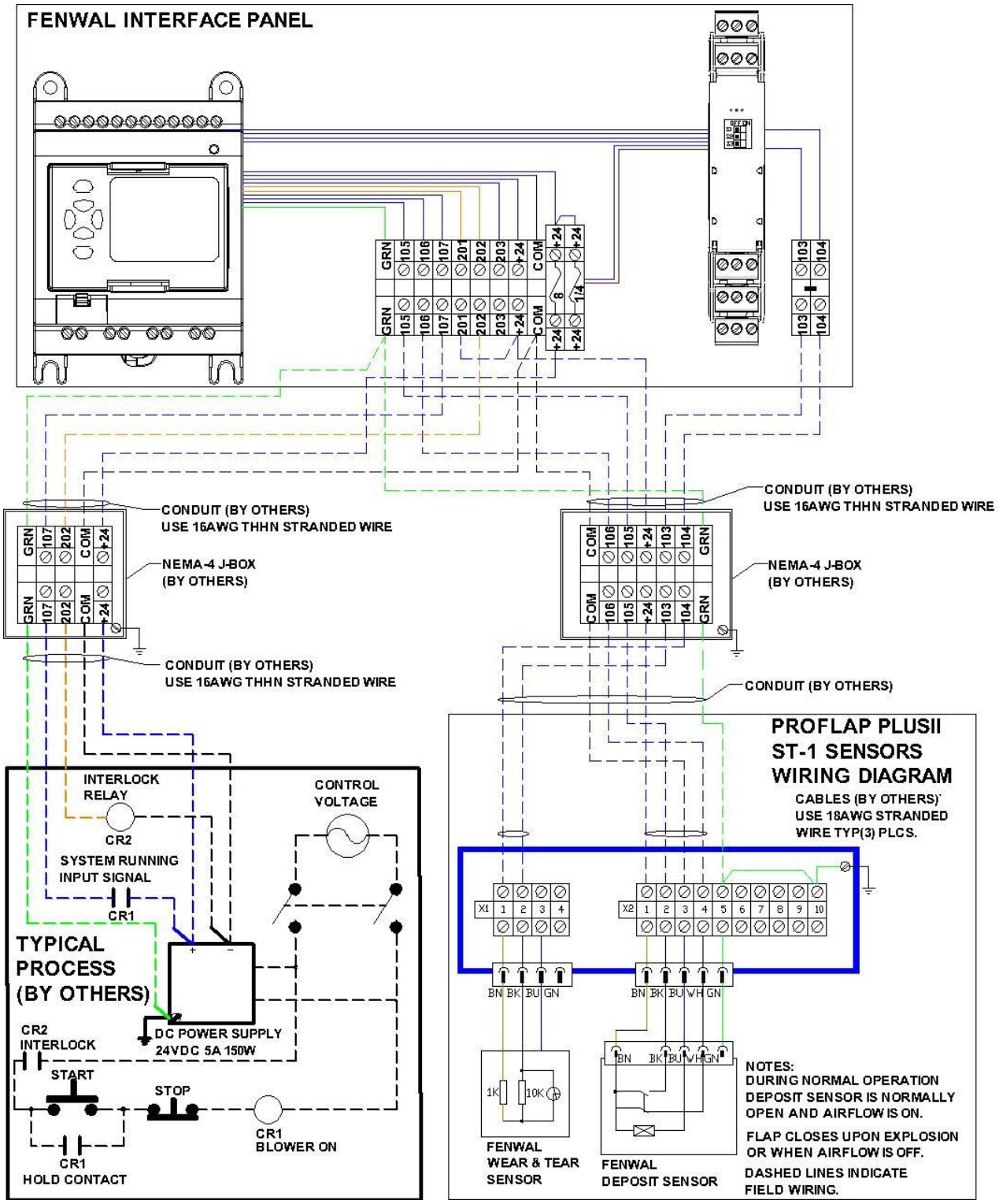
MAINTENANCE

The Interface should be checked periodically to ensure the proper operation of all functions and components. As the Interface Panel monitors the functions of the ProFlapPlus flap valve, the maintenance intervals should be conducted per the ProFlapPlus Installation and Operating Manual by qualified personnel only.

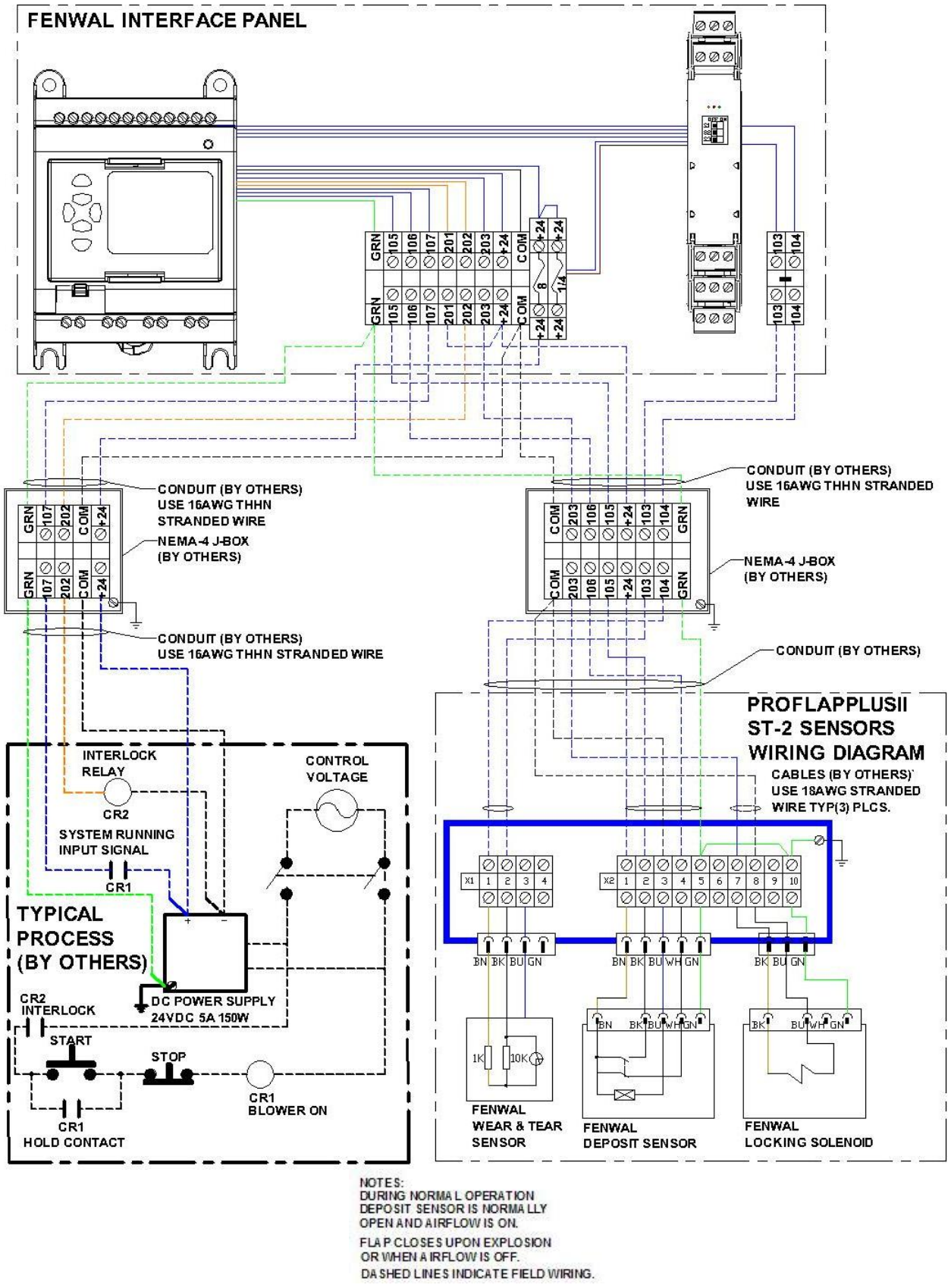
APPENDIX A

TECHNICAL DATA

Electrical Schematic for ProFlapPlus –St1



Electrical Schematic for ProFlapPlus –St2



NOTES:
DURING NORMAL OPERATION
DEPOSIT SENSOR IS NORMALLY
OPEN AND AIRFLOW IS ON.

FLAP CLOSES UPON EXPLOSION
OR WHEN AIRFLOW IS OFF.
DASHED LINES INDICATE FIELD WIRING.