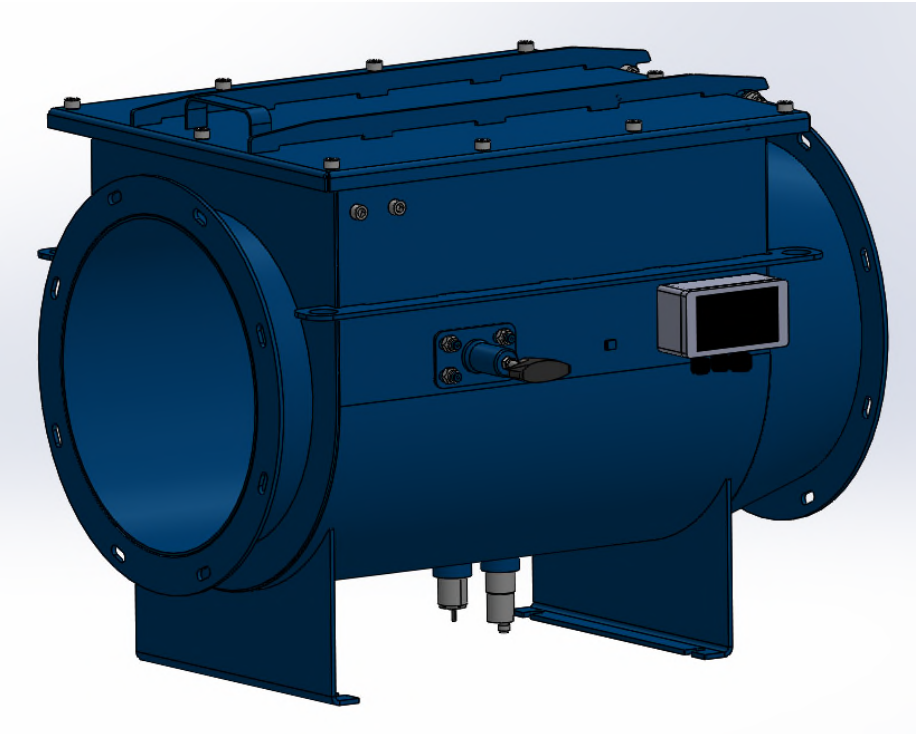
IEP TECHNOLOGIES
HOERBIGER Safety Solutions



IsoFlap™ and IsoFlap™-M
Product Manual

MC-601 Revision AH

THIS DRAWING IS REFERENCED ON AN ATEX CERTIFICATE. IT CANNOT BE ALTERED WITHOUT APPROVAL BY AN AUTHORIZED PERSON. ALL DRAWING CHANGES ARE TO BE SUBMITTED TO THE NOTIFIED BODY FOR APPROVAL PRIOR TO RELEASE.

FOREWORD

This manual is provided as an installation, operation, and maintenance guide for the IEP Technologies IsoFlap™. The IsoFlap should not be installed as an explosion isolation means unless the specific application and valve placement has been reviewed by the end user and confirmed to comply with the installation requirements described in this manual. IEP Technologies 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 one of the following IEP Technologies locations:

Web: www.IEPTechnologies.com

IEP Technologies – USA
Tel: +1 855 793 8407

IEP Technologies – UK
Tel: +44 (0) 1242 283 060

IEP Technologies – Switzerland
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IEP Technologies – Turkey
Tel: +90 232 484 4412

IEP Technologies – France
Tel: +33 (0)1 5803 3980

IEP Technologies – China (HOERBIGER Safety Solutions)
Tel: +86 21 6485 0855 Ext 8211

IEP Technologies – South East Asia (HOERBIGER Safety Solutions)
Singapore
Tel: +65 8127 0321

IEP Technologies – Latin America (HOERBIGER Safety Solutions)
Brazil
Tel: +55 (11) 4446-7400

CERTIFICATIONS AND STANDARDS

The IsoFlap meets the following EU directives, standards and technical specifications, as long as the services to be provided by the end user have been fulfilled according to this product manual; relevant directives and standards and if the machine/system is operated according to its intended use.

IsoFlap products manufactured at IEP Technologies GmbH, Brilon, Germany
2014/34/EU (ATEX) Units and protective systems for use in explosive areas
Identification Protective System: (DN100 – DN1000): CE 1026 Ex D St1
Identification Protective System: (DN100 – DN200): CE 1026 Ex D St2
Identification Equipment: CE 1026 Ex II 1/2 D Ex h IIIC T80°C Da/Db
EC Type Examination: FTZÚ 17 ATEX 0131X
Quality Assurance Notification (QAN): FTZÚ 18 ATEX Q003

IsoFlap products manufactured at IEP Technologies LLC, Marlborough, MA USA
2014/34/EU (ATEX) Units and protective systems for use in explosive areas
Identification Protective System: (DN100 – DN1000): CE 1725 Ex D St1
Identification Protective System: (DN100 – DN200): CE 1725 Ex D St2
Identification Equipment: CE 1725 Ex II 1/2 D Ex h IIIC T80°C Da/Db
EC Type Examination: FTZÚ 18 ATEX 0112X
Quality Assurance Notification (QAN): FM 17 ATEX Q 0040

The following harmonized standards and technical specifications were used:

Standard	Description
DIN EN 16447	Explosion Isolation Flap Valves, last update 07-2014
DIN EN 14460	Explosion Resistant Equipment
EN ISO 80079-34	Explosive Atmospheres, Part 34: Application of Quality Systems for Equipment Manufacture
EN 60079-14	Explosive Atmospheres. Electrical Installations, Design, Selection, and Erection
EN ISO 80079-36	Explosive Atmospheres – Part 36: Non-electrical Equipment for Explosive Atmospheres – Basic Method and Requirements
EN ISO 80079-37	Explosive atmospheres. Non-electrical Equipment for Explosive Atmospheres. Non-electrical Type of Protection Constructional Safety ''c'', Control of Ignition Sources ''b'', Liquid Immersion ''k'

SAFETY SUMMARY

The warnings, cautions and notes in this manual are prioritized as illustrated below.



WARNING

FAILURE TO OBSERVE WARNINGS MAY RESULT IN PERSONAL INJURY OR DEATH



CAUTION

Failure to observe cautions may result in damage to the equipment or in the equipment not operating correctly

NOTE

Contains important and useful additional information regarding the system or equipment parts



WARNING

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 provided, must be followed exactly. If the instructions are not followed, or if the IEP Technologies 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 IEP Technologies for assistance and instructions. Read and understand Section 2, Safety, completely before the start of installation or any maintenance.



WARNING

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 the IsoFlap, 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 IsoFlap must not be operated.

IEP Technologies cannot guarantee that the IsoFlap will 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 properly maintain the IsoFlap, it should increase your safety by providing a line of defense against explosion propagation on the duct work upon which the IsoFlap is installed. The first defense, as always, is a good safety program, including employee training and good housekeeping. The experience of IEP Technologies 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.

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CHAPTER 1 - GENERAL REFERENCES

1.1 INTRODUCTION

This manual specifies installation, operation, and maintenance of the IsoFlap. Please read all instructions carefully. Operate valve 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.

1.2 INTENDED USE

The IsoFlap is intended to be used for explosion isolation of -St1 dusts for sizes DN100 to DN1000, and -St2 dusts for sizes DN100 to DN200 with a minimum Kst value of 50 bar.m/s.[2] Sizes DN100 to DN200 can also be used for St1 metal dust applications with a minimum Kst value of 50 bar.m/s[1].

ATEX EC Type Examination testing of the IsoFlap was performed using dust concentrations above the lower explosive limit (LEL) or at optimum dust concentrations within the duct. In real world applications of the IsoFlap, dust concentrations are likely to be below the LEL of the dust. For this reason and as a conservative measure, allowable dust concentrations for the application of the IsoFlap are limited to dust concentrations in the duct of either 200 g/m^3 or below the LEL, depending on the valve size and the type of dust. For the full range of application limits, please refer to Chapter 6.
The installation of the IsoFlap shall be as follows:

- The installation of the IsoFlap shall be in the following order along the direction of air flow: IsoFlap - filter (container) – fan.
- Installation position is horizontal.
- Air flow velocity: 15 m/s to 30 m/s (2950 ft/min to 5900 ft/min).
- The environmental conditions must between 800 hPA and 1100 hPA (0.116 psi to 0.16 psi).
- The operating temperature range for the IsoFlap must be between -25°C to +80°C (-13°F to 176°F) .
- The operating temperature range for the IsoFlap-M must be between -20°C to 80°C (-4°F to 176°F).
- The maximum experimental safe gap (MESG) of the dust is ≥ 1.3mm for sizes DN100-DN200, and is ≥ 2.0mm for sizes DN250-DN1000. The formula for calculating MESG is as follows:
-

$$MESG = 1.01x\left(\frac{MIEx(MIT + 273)}{273}\right)^{0.157}$$

MESG = Maximum experimental safe gap (mm)
MIE = Minimum ignition energy (mJ)
MIT = Minimum ignition temperature (°C)

- The IsoFlap is a group IIIC device which is appropriate for non-conductive dusts and conductive dusts. Metallic parts like screws, bolts, nuts, etc. which may come into the process flow are not allowed.
- IsoFlap must NOT be used in processes where the combustible explosion hazard comprises of dusts with reactivities (Kst) outside the intended use, pyrotechnic or pyrophoric materials and unstable reactants, such as those containing, or liable to form peroxides. Explosions arising from

[2] Explosion intensities with Kst values less than 50 bar.m/s are not covered by the intended use of the IsoFlap. As will all passive isolation valves (bobbin/flap) the valve closure mechanism relies on the over pressure generated by the deflagration/explosion event. With very low intensity explosions there is a risk that the flame can propagate past the passive valve location before sufficient pressure is generated to close the valve.

polymerization, decomposition or dissociation reactions are also outside of the intended use of the IsoFlap.
- Set-up conditions and maintenance schedule must be followed as specified in Chapter 5.
- Installation of the valve and its operation must always be in accordance with relevant current national standards of the end users' country. The end user is responsible for compliance.
- The user should ensure that the equipment is not installed in a location where it might be subjected to external conditions that might cause a build-up of electrostatic charges on non-conducting surfaces stronger than that caused by manual rubbing. Additionally, cleaning of the equipment should be done only with a damp cloth.

Deviation from the installation instructions is not allowed.
The maximum opening angle of the flap blade is 30° for sizes DN100 to DN710 and 20° for sizes DN800 to DN1000



WARNING **Any uses other than those defined above are not intended. IEP Technologies cannot be held liable for personal injuries or damage to the protected system resulting from non-compliance.**

1.2.1 Unacceptable Use

The following are not allowed:
- Changes in the explosion hazard (Kst) compared to which the IsoFlap system has been designed.
- Changing and rebuilding of the IsoFlap system by the end user without permission from IEP Technologies.
- Any mode of operation which may affect the safety of the IsoFlap system.

1.3 QUALIFICATION OF PERSONNEL

1.3.1 Skilled Personnel

Only Skilled personnel are authorized to perform the commissioning and servicing of the IsoFlap system. Definition of skilled personnel: an individual or individuals with extensive knowledge, training, and experience in the following areas:
- Safety regulations
- Accident prevention regulations
- Basic knowledge of process air handling systems and technology
- Basic knowledge of electrical safety and systems
- Applicable local directives and technologies (i. e., VDE Directives, DIN-Standards, NFPA, NEC, etc.)

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

1.3.2 Qualified Personnel

IsoFlap systems in explosive areas must be checked before their first start-up; after essential changes and at three (3) month intervals by a qualified person to ensure good order and condition. The frequency of inspection shall be permitted to be increased or decreased based on documented

operating experience or a documented hazard analysis, with the approval of both IEP Technologies and the authority having jurisdiction.

1.4 INCOMING INSPECTION

After receiving the IsoFlap:

- Inspect the shipping carton for damage before unpacking it.
- Unpack the control unit and examine it for damage.
- Notify the delivering carrier and IEP Technologies immediately if the carton or equipment appears damaged.
- Save the carton and packing material for inspection and possible re-shipment.

1.5 WARRANTY

This unit complies with the relevant European Regulations as listed on the Manufacturer's Certificate (please refer to page 3). However, specific regulations of the customer's country may not have been taken into consideration, because the machine manufacturer (to which the IsoFlap will be connected) may not know the location of the end user. Our warranty does not include damage resulting from wear and tear, corrosion, internal and external chemical influences, improper handling, and any use that is not as originally intended (see Chapter 1 – Intended Use). Fire and explosion are excluded from warranty.

1.5.1 Warranty Conditions

Warranty conditions to be observed by the IsoFlap system operator are as follows:

- Loading and shipping in accordance with IEP Technologies instructions
- Proper storage before commissioning
- Knowledge and implementation of the Notes and References in this Product Manual
- Expert installation, commissioning, and repair as far as these services are provided by the end user
- Proper operation
- Maintaining the operating parameters, such as dust type or additives, dirty air volume of the connected vessel from which ignition is expected, process temperature, dirty air dust concentration, dew point within dirty air, and air flow velocity
- Operation without modifications to controlling device
- Observing service and inspection intervals by trained staff, any work performed is to be recorded in a record log
- Use of IEP Technologies spare parts only
- In the event of a defect and for its immediate and remedy, please notify IEP Technologies

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

1.5.2 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



WARNING

Working safely is only possible if all available instructions and possibly available operation manuals of additional IsoFlap system components have been read thoroughly and are carefully followed. Each person performing installation, commissioning, operation, and servicing of the IsoFlap must have read the operating and maintenance instructions and understand every detail. This also applies for personnel who operate and work on the IsoFlap system periodically. The operation and maintenance instructions must be within easy reach of the IsoFlap system.

2.1 DIRECTIVES, STANDARDS, AND GUIDELINES

A number of regulations/standards are to be observed when installing the IsoFlap at production facilities. The standards listed below are limited to explosion protection. For additional standards refer to the any applicable local rules and regulations. Please note that the following list may not be complete.

Scope	Regulations	Contents
Fire and Explosion Protection Measures	ATEX 2014/34/EU	"ATEX 137" Workplace Directive
	EN-1127-1	Explosion Prevention and Protection - Basics and Methodology
	BGR-104	Explosion Protection Rules (formerly ZH 1/10)
	VDI 2263, part 1 - 6	"Dust Fires and Dust Explosions", Hazards Assessment and Protective Measures
	OSHA Directive CPL 03-00-00	Combustible Dust National Emphasis Program (Reissued)
	NFPA 69	Standard on Explosion Prevention Systems
	NFPA 654	Standard for the Prevention of Fire and Dust Explosions
	NFPA 91	Standard for Exhaust Systems for Air Conveying

Table 1 – Regulations List

2.2 INSPECTIONS

2.2.1 Inspection before Commissioning by a Qualified Person

The IsoFlap must be checked before first start-up of the process by a qualified person on the IsoFlap good order regarding assembly, installation, location conditions, and safe operation (according to BetrSichV and TRBS 1203 respectively, NFPA 69 or other applicable standards/regulations).

2.2.2 Regular Inspection by a Qualified Person

After essential changes and at three-month intervals, a qualified person must repeat the inspection of the IsoFlap. The frequency of inspection shall be permitted to be increased or decreased based on documented operating experience or a documented hazard analysis, with the approval of both IEP Technologies and the authority having jurisdiction.

2.2.3 Earth Grounding Inspections

The earth grounding must be checked periodically according to applicable local standards.

2.3 HEALTH HAZARDS DUE TO PROCESS SUBSTANCES

Substances transported in the process and through the IsoFlap such as airborne dusts, mists or vapors that may be inhaled or come in direct contact with the skin can be a health hazard.

2.3.1 Personal Protective Equipment

Following the site-specific risk assessment for conducting work on the IsoFlap as installed it will be necessary to use personal protective equipment as appropriate.

2.3.2 Alterations to the IsoFlap System

Alterations to the IsoFlap system which would include alterations to the ductwork, adjustments to the IsoFlap flap which may cause pressure loss, the material being processes/transported and the process air flow, must only be carried out after consulting IEP Technologies since such changes could affect the performance of the IsoFlap.

2.4 DANGER OF CRUSHING AND OVERTURNING

To avoid the risks of crushing, the IsoFlap system must not be operated until assembly has been completed. Perform servicing only when the IsoFlap system has been safely shut down (see Chapter 4 – Shut Down).

2.4.1 Danger of Crushing at the Flap

Danger of crushing by the flap is possible. The system must only be operated after the ductwork has been connected and the inspection door has been closed so that the danger area cannot be reached with extremities.



CAUTION

Operation of the IsoFlap system with the inspection door open is prohibited.

2.4.2 Transportation and Lifting of the Valve

Lifting equipment must only be fastened to following lifting points:

- For sizes DN100 to DN250, use appropriate transport hangers or lifting straps around the flanged pipe connections.
- For sizes DN315 to DN1000, use the four lifting points on the welded stiffeners that are protruding from the sides of the valve.



CAUTION

Take into account adequate load carrying capacity of the lifting mechanism and/or straps.

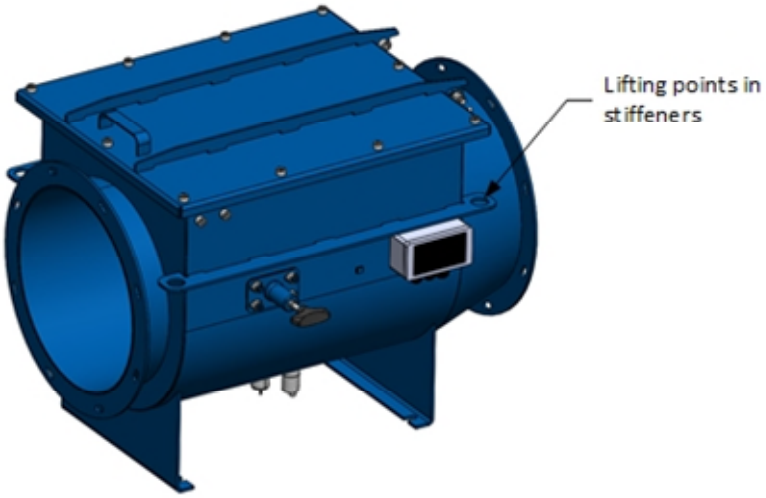


Figure 1 – Lifting Points in Stiffeners

2.5 ELECTRICAL HAZARDS

There is a risk of personal injury or death caused by the electrical components and from the electrical switch and control unit.

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

2.5.1 Classification of Hazardous Zones

The operator must classify the operation area into hazardous zones. The IsoFlap can be used in following zones:

Valve Model	Area	ATEX Zone	NEC Zone	Remarks
IsoFlap Version	Ductwork	Zone 20	Class II, Div 1	This version does not contain sensors.
	Installation Area	Zone 21	Class II, Div 2	This version does not contain sensors.
IsoFlap-M Version	Ductwork	Zone 20	Class II, Div 1	All sizes of the IsoFlap-M are allowed when used with IEP Technologies Interface Module or with an intrinsically safe barrier (see Chapter 4).
	Installation Area	Zone 21	Class II, Div 2	All sizes of the IsoFlap-M are allowed when used with IEP Technologies Interface Module or with an intrinsically safe barrier (see Chapter 4).

Table 2 - Classification of Hazardous Zones

2.5.2 Earth Grounding

The IsoFlap is equipped with continuous grounding in order to avoid spark discharge. The operator has to connect the IsoFlap via the ductwork to the electrical grounding protective system, which is to be provided by the end user. If grounding cables were removed during servicing, they must be properly re-attached and tested before restarting the unit.

All metal components are grounded with either a grounding wire or serrated grounding washers. When performing service or maintenance, make sure to reinstall all components as they were originally installed and test them.

2.6 ADDITIONAL PROTECTIVE MEASURES AGAINST EXPLOSIONS

Application of the IsoFlap is one small part of the possible explosion protection measures required which must be identified via a formal risk analysis of the process. We strongly recommend that you refer to published hazard and operability guidelines to determine any requirements for a comprehensive expert risk analysis.

The IsoFlap provides explosion isolation that is designed to minimize the risk of flame propagation in the direction opposite to the process flow. Other hazards may exist which are outside of the scope of this protection. These may include, but are not limited to, ignitions and/or explosions in upstream components, external dust build-up, external fires, and any external mechanical disruptions. The IsoFlap system is not intended to remove any obligation on the operator for the proper repair, and or maintenance of process equipment, good housekeeping, and proper process control. The plant operator must at all times follow good safety practices, provide and maintain adequate safety equipment and services throughout the process, and ensure that all personnel are advised and trained in respect of all such safety equipment, practices and procedures.

Additional explosion protective measures include, but are not limited to:

- Spark detection and extinguishing equipment
- Explosion pressure relief equipment
- Explosion suppression equipment



WARNING

The IsoFlap cannot be used in conjunction with explosion suppression on the source vessel. The IsoFlap can only be used with non-closing explosion venting devices on the source vessel.

The IsoFlap is used as an explosion protection measure for the purpose of explosion isolation of connected ducts.



WARNING

Explosion scenarios that result from an ignition beyond the boundaries of the protected zones (including the propagation of any explosion into the protected zones), and explosion scenarios that arise from explosible conditions that are more or less intense than those set out considered during the IsoFlap System design (and/or Table's A5 and A6), may not be adequately mitigated by the recommended explosion protection.

2.6.1 Measures to be Taken Following an Explosion or IsoFlap Locking

Following an explosion and/or the locking of the IsoFlap, the IsoFlap housing must be checked for deformation and/or damage. The IsoFlap unit must be cleaned, inspected, and repaired if necessary. This work must be performed by expert personnel only. The bolted hardware connections of the IsoFlap mounting feet and to the ductwork shall also be inspected. Check to ensure all bolted connections are tight and without damage. Contact IEP Technologies for spare parts.

Note: In case of an explosion, the process must be shut down immediately.

2.7 SAFETY DURING MAINTENANCE AND INSPECTION

Preventive and thorough maintenance is essential for the safety of the staff working in the vicinity of the IsoFlap and to ensure proper operation. Only qualified personnel can perform the inspection, maintenance, and service of the IsoFlap.

2.7.1 Maintenance Intervals

Information and specifications regarding maintenance work and its intervals stated in the operating instructions are only recommendations, since IEP Technologies cannot have practical data for the long term and unique operating conditions of each end user. The information stated in the operating instructions is to be supplemented with installation specific practical experience. Also refer to Chapter 5, Inspection, Maintenance, and Troubleshooting.

2.7.2 Pre-Maintenance Measures

Before performing any work such as inspection and maintenance, please perform the following tasks:

- Have the system run approximately one minute without feeding the substances that are to be separated, then turn off the processing machine to be exhausted.
- Refer to Section 2.7.3 - Safe System Shut Down.

2.7.3 Safe System Shut Down

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

- Shut down the process and ensure there is no airflow through the source vessel or the duct work.
- Disconnect or isolate the process from all energy sources.
- Apply lockout tagout device(s) to the energy isolating device(s).
- Release, restrain, or otherwise render safe all potential hazardous stored or residual energy. If a possibility exists for the re-accumulation of hazardous energy, regularly verify during the service and maintenance that such energy has not re-accumulated to hazardous levels.
- Wait until all of the rotating parts have stopped.
- Verify the isolation and de-energization of the process.



WARNING

Shut down of the system should allow for a gradual wind down of the fan. An abrupt and sudden stoppage of air flow may result in the locking of the flap blade.

2.7.4 Maintenance Safety Instructions

- Operate the IsoFlap only if it is in good operating condition.
- Service the safety equipment regularly. At the same time, check for proper functioning of the equipment. Refer to Sections 4.4.1 and 4.4.2 for inspection and functional test procedures.
- Inform the operating staff in a timely manner about the maintenance work that is to be performed
- If ground cables must be removed to perform maintenance work, the cables must be properly reconnected and tested after work has been completed.
- Do not make any changes without prior consultation with IEP Technologies.
- Use original IEP Technologies spare parts only.
- Ensure that supplies as well as replacement parts are disposed of safely in an environmentally friendly manner.

CHAPTER 3 - OPERATION

3.1 OVERVIEW

This chapter covers the operation of the IsoFlap.

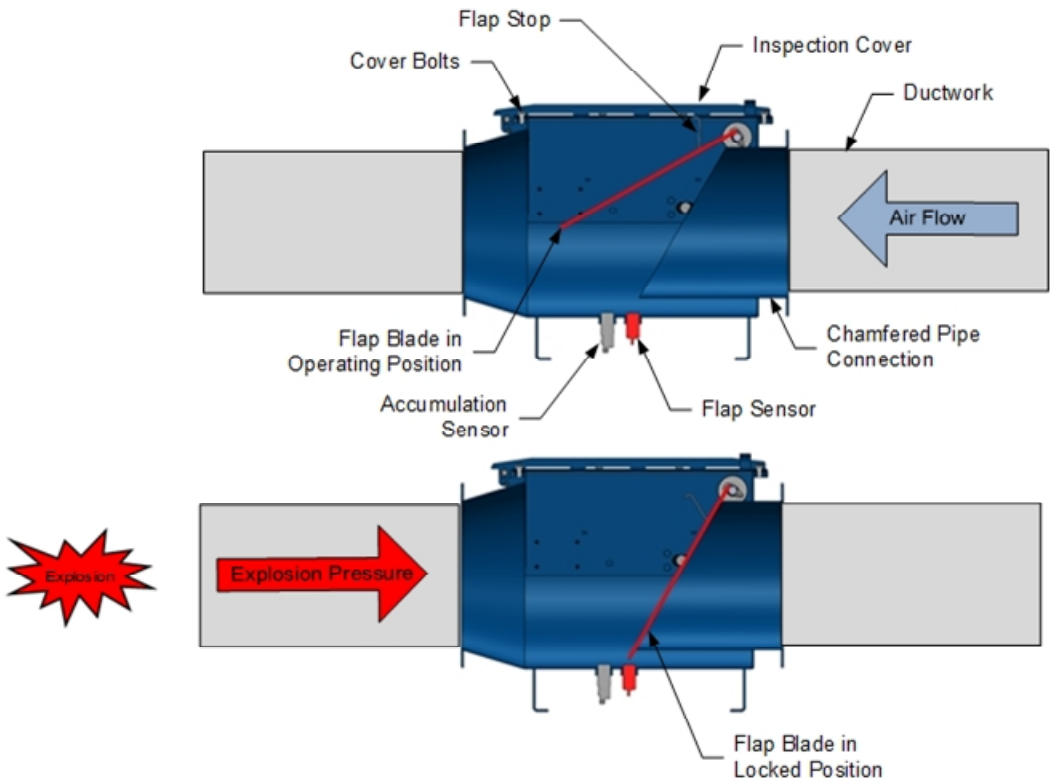


Figure 2 – Operation of the IsoFlap

3.2 OPERATION OF THE ISOFLAP

3.2.1 Normal Operation

The flap blade opens on the low pressure side during operation by the airflow. The flap stop located at the inside of the inspection cover limits the opening angle of the flap to 30° or 20° depending on the size. During a normal process shutdown (no explosion), the flap blade closes due to its own weight and remains unlocked.

3.2.2 Inspection Cover

The valve is equipped with an inspection cover which allows access to the interior of the valve for cleaning, maintenance, and inspection. For sizes DN630 to DN1000, the valve is equipped with a pressurized gas spring on each side of the valve to assist in opening the cover. To open the cover, remove the bolts holding the cover in place and simply lift the cover until it is in the fully open position.

WARNING **The inspection cover should NEVER be opened during operation of the process due to the risk of explosion.**

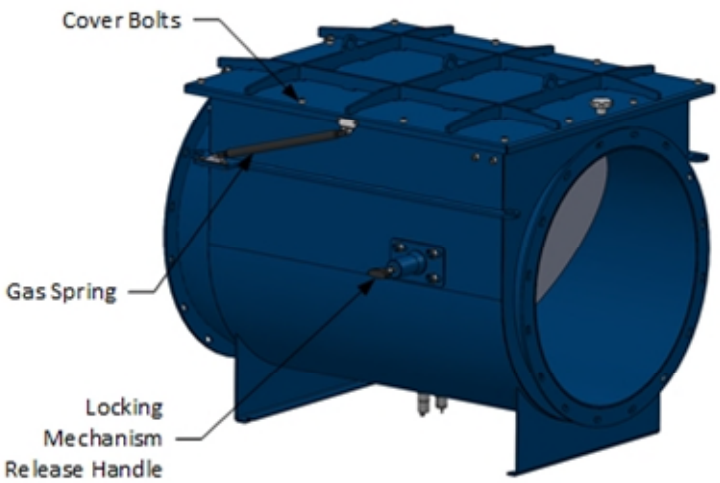


Figure 3 - Inspection Cover & Locking Mechanism

3.2.3 Functional Description of the IsoFlap

During system start up, the flap blade opens by means of the air flow moving through the valve. During normal shut down, the flap blade typically closes but does not lock.

During an explosion event, the flap blade will close due to the pressure wave of the explosion and lock in place.

The locking device keeps the flap from opening again after the primary explosion pressure pulse. Locking the blade in place is important since during the entire explosion event pressure oscillations within the duct can cause the flap to re-open and allow flame and/or burning material to pass.

To release the flap after an explosion, pull the handle located on the side of the valve. Valve sizes greater than DN200 will have multiple locking handles which have to be pulled simultaneously to release the flap.

3.2.3.1 Unlocking IsoFlap during Start Up

During system start up, ensure that the flap blade is not in the locked position and can move freely. The maximum opening angle of the flap blade will be reached after a delay due to system (and fan) start up.

3.2.4 IsoFlap-M Monitoring Sensors

3.2.4.1 Monitoring Sensors

The IsoFlap-M version includes monitoring sensors that provide status conditions in the valve (see Figure 4). The flap sensor monitors if the flap blade is in the “locked” position which is an indication of a possible explosion event when the process is running. Additionally, an accumulation sensor monitors the interior of the valve for dust deposits that may prevent the closure of the flap blade. Both sensors are wired in a junction box on the side of the IsoFlap-M and must be integrated into the process control system.

Note: Not all versions of IsoFlap's include monitoring sensors. See Chapter 6, Table A2 for a list of IsoFlap part numbers containing monitoring sensors.

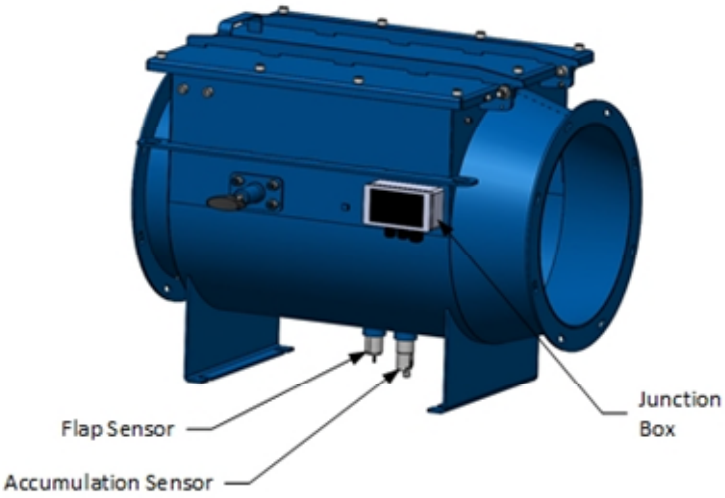


Figure 4 – IsoFlap-M Monitoring Sensors

Note: The flap sensor will detect the position of the flap blade only when it is in the "locked" position. This allows the flap blade to return to its "resting" state (no air flow and no explosion), without activating the flap sensor.

CHAPTER 4 - INSTALLATION AND COMMISSIONING

4.1 STORAGE PRIOR TO COMMISSIONING

The IsoFlap should be stored in a dry, condensation-free environment.

4.2 INSTALLATION

4.2.1 Requirements for the Installation Location

- Consider static weight requirements, such as load capacity of ceilings and other mounting posts in the intended installation location.
- Process and operating temperatures for the IsoFlap must be between -25°C to +80°C (-13°F to 176°F).
- Process and operating temperatures for the IsoFlap-M must be between -20°C to 80°C (-4°F to 176°F).
- The maximum experimental safe gap (MESG) of the dust must be ≥ 1.3mm for sizes DN100-DN200, and ≥ 2.0mm for sizes DN250-DN1000. The formula for calculating MESG is shown in Section 1.2.
- The IsoFlap is certified for pull-flow applications only.
- The IsoFlap is certified for use with non-closing explosion venting devices.
- Installation of the IsoFlap shall be in order along the direction of the air flow (see Figure 5).

CAUTION

Then end user must take precautions to prevent direct sunlight from increasing the temperature of the IsoFlap installation location above the limit of 80°C (176°F).

WARNING

The exterior of the IsoFlap must be kept clear of ice and snow. Failure to do so could lead to the IsoFlap not functioning as intended during an explosion event.

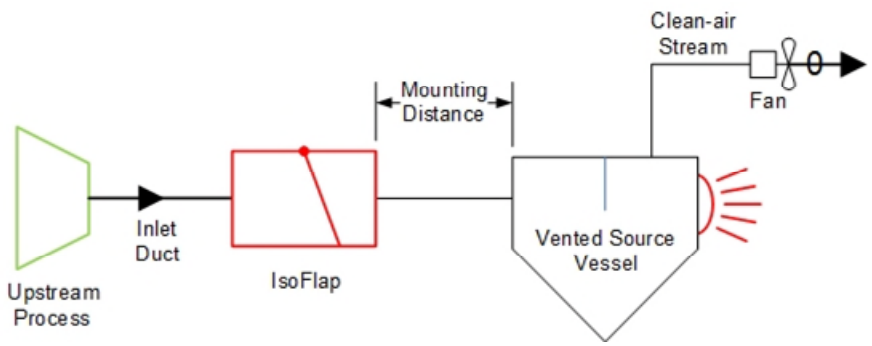


Figure 5 – An IsoFlap Process Diagram shown with a Dust Collector

The IsoFlap must be mounted between the minimum and maximum mounting distance ranges stated in Table A5 and A6. The mounting distance is the distance between the inlet of the source vessel and the connecting flange of the IsoFlap as shown in Figure 6. The length between (1) and (2) must be within the minimum and maximum mounting distances shown in Table A5 and A6. For IsoFlap sizes that can be

used with up to two elbows, the minimum/maximum distances should be measured along the centerline of the duct.

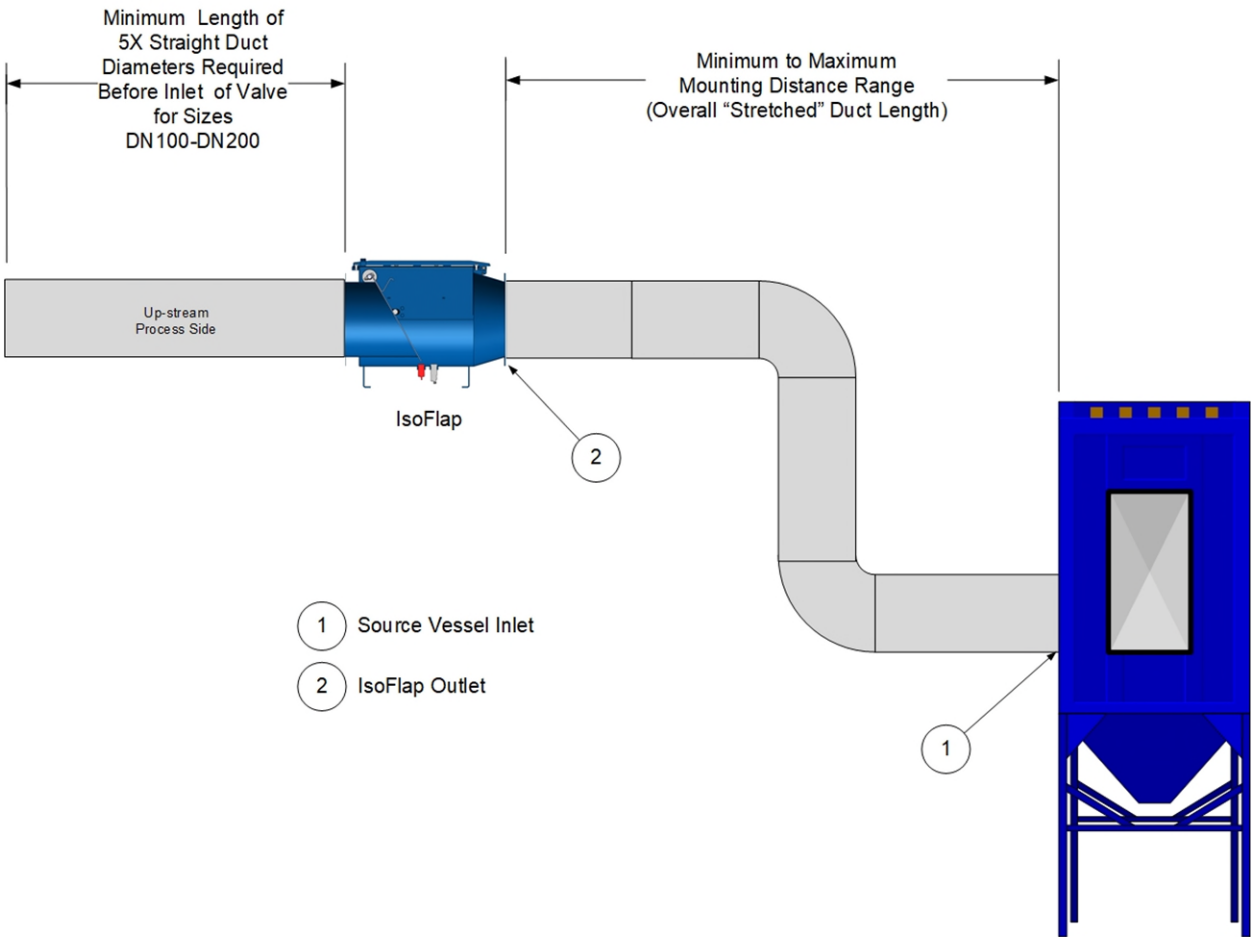


Figure 6 - IsoFlap Installation with Duct

WARNING **The duct size on the inlet of the IsoFlap, and between the IsoFlap and the source vessel must be the same as the diameter of the IsoFlap.**

4.2.2 Fitting

The IsoFlap must be supported independently from the duct work. Additional flanges (see Table A4) can be purchased for use with the IsoFlap-M versions and can be used to adapt the metric flanges of the IsoFlap to Imperial duct sizes. The flanges must be mounted with earth bonding provisions to the connected duct work for proper grounding (see Table A4 for adapter flange dimensions).

When mounting the IsoFlap, pay attention to the horizontal adjustment of the inspection lid in both directions. The level of the valve should be checked with a water level.

Above the valve, provisions for adequate space should be made to allow for inspection and maintenance activities (see information regarding swivel range in Figure A1 and Table A3).

When mounting, please consider air flow direction (see Figure 5).



WARNING

The pressure shock resistance of the ducting between the IsoFlap and the source vessel must be greater than the maximum expected pressure during an explosion event. The expected pressure must be no greater than the maximum pressure resistance of the IsoFlap.

4.3 CONTROL UNIT REQUIREMENTS

4.3.1 General

If using an IsoFlap with monitoring sensors (IsoFlap-M versions only), the flap sensor and accumulation sensor must be monitored by an IEP Technologies Interface Module (P/N 32-710002-002), or other device. The Interface Module can be purchased from IEP Technologies or a similar device can be provided by the end user and must be capable of monitoring the devices per the Logic Diagrams (see Figures 7 and 8). Wiring schematics are provided in Chapter 6.

If the end user is not using the Interface Module available from IEP Technologies, the sensors must be connected to an approved relay type intrinsic safety barrier (i.e. an isolation barrier) such as Pepperl & Fuchs Model KCD2-SR-Ex2.

The relay output from the isolation barrier/relay shall be connected to a controller or interface (also provided by the end user) capable of monitoring the IsoFlap and controlling the process per the Logic Diagrams.

Note: Not all versions of IsoFlap's include monitoring sensors. See Chapter 7, Table A2 for a list of IsoFlap part numbers containing monitoring sensors.



WARNING

If the Interface Module is not used, it is the responsibility of the end user or system integrator to ensure the device used properly monitors the IsoFlap and controls the process per the logic diagrams shown in Figures 7 and 8. Improper monitoring of the flap and accumulation sensor could lead to the IsoFlap not functioning as intended during an explosion event.

4.3.2 Flap Sensor Description

The function of the flap sensor is to monitor the position of the flap blade and provide a signal when the flap is in the "locked" position. If the process is running and the flap sensor changes from normally closed (N.C.) to normally open (N.O.), this is an indication that an explosion event has occurred. During a normal system shutdown (no explosion), the flap sensor does not change state, and the flap is in the "unlocked" position. An LED on the bottom of the sensor will illuminate "yellow" when the flap is in the "open" position. The LED will turn off when the flap is in the "locked" position.



WARNING

If the flap 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.

4.3.3 Flap Sensor Specifications

The flap sensor is an inductive proximity switch, which requires nominal 8.2V operating voltage. This is a normally closed (N.C.), 2-wire NAMUR sensor. The flap sensor changes state only when the flap closes during an explosion event.

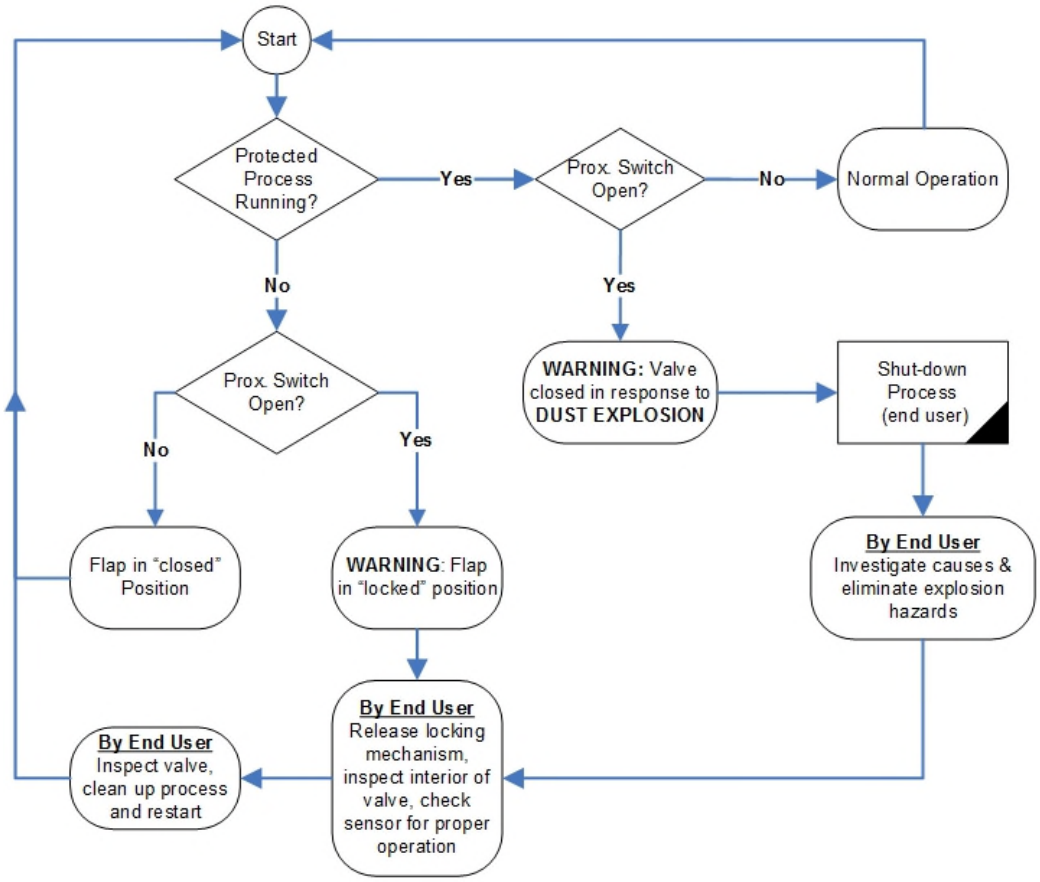


Figure 7 - Flap Sensor Logic

4.3.4 Accumulation Sensor Description

The accumulation sensor monitors the valve interior to determine if there are dust deposits present in the valve that could prevent the proper closure and locking of the flap blade. The sensor monitors the valve continuously while the process is in operation. An LED on the bottom of the sensor will illuminate when it does not detect material. The LED will turn off when it detects material.

4.3.5 Accumulation Sensor Specifications

The accumulation sensor is an adjustable capacitive sensor, which requires nominal 8.2V operating voltage. This is a normally closed (N.C.), 2-wire NAMUR sensor. The accumulation sensor changes state only when it senses material inside the valve.

Upon detection of dust deposits within the valve, the process should be shut down immediately. Accumulated dust inside the valve should be removed and the process re-adjusted to eliminate further

dust accumulation inside the valve, or the sensitivity of the sensor should be adjusted in order to eliminate false signals. All maintenance activities shall be recorded in a maintenance logbook.

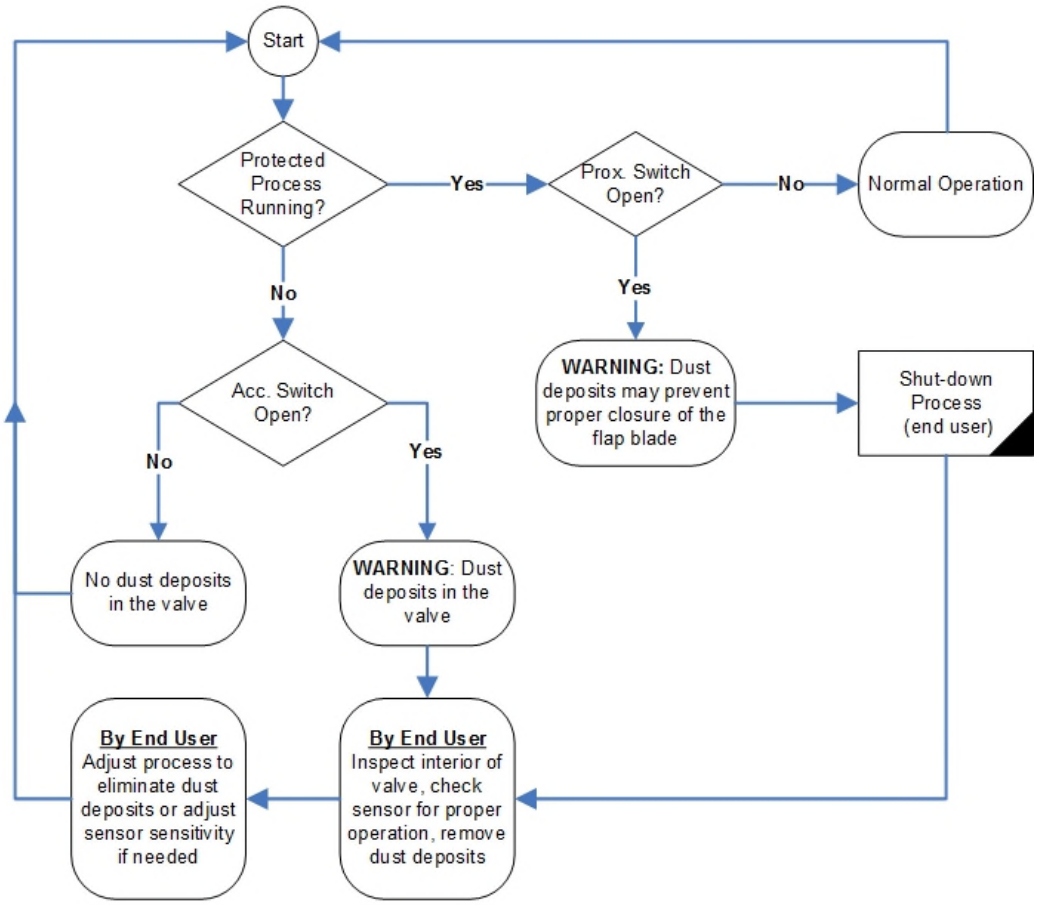


Figure 8 - Accumulation Sensor Logic

4.4 COMMISSIONING

4.4.1 Inspection before Starting

Prior to the first commissioning of the IsoFlap, a complete visual inspection must be performed. The visual inspection should include the following points:

- Is the duct work tightly connected?
- Does the flap close smoothly?
- Does the flap rest on the on the locking plungers when in the “closed” position?
- If included, does closing the flap and placing it in the “locked” position trigger the flap sensor? If not, the sensor must be adjusted.
- If included, adjust the sensitivity of the accumulation sensor? Does the accumulation sensor sense deposits in the valve? If not, adjust the sensitivity.
- Is the inspection cover tightly closed?
- Did the electrical installation go according to regulations?
- Is the IsoFlap grounded properly?

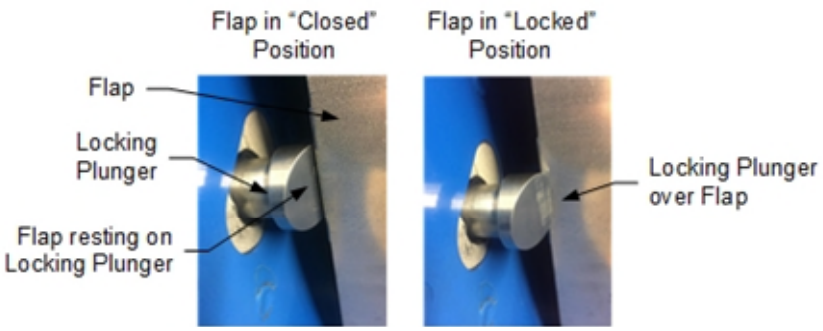


Figure 9 - Flap in "Closed" and "Locked" Position

4.4.2 Functional Test of IsoFlap and Control Unit

A test should also be performed while the process is running to ensure all devices function as intended and the control unit is receiving the proper signals. To perform the test:

- Ensure that the flap is not in the “locked” position.
- Start the process.
- If included, ensure that the accumulation sensor is working correctly and sensing dust deposits within the valve.
- Turn off the process and wait for the fan to wind down.
- Ensure that the flap blade is in the “closed” position and is rested on the locking plunger but is not locked in place.
- If included, ensure that the flap sensor senses the flap blade and the control unit correctly shows the sensor status (see Sections 5.2.3.5 and 5.2.3.6 for Flap and Accumulation Sensor Adjustment).

Note: Not all versions of the IsoFlap include monitoring sensors. See Chapter 6, Table A2 for a list of IsoFlap part numbers containing monitoring sensors.

4.4.3 Switch On

After inspection of the previously mentioned points and functional testing, the system can be commissioned.

4.5 SHUT DOWN

4.5.1 Normal Operation

During system shut down, the flap blade will close due to its own weight. The flap should close but not lock.



WARNING

Shut down of the system should allow for a gradual wind down of the fan. An abrupt and sudden stoppage of air flow may result in the locking of the flap blade.

CHAPTER 5 - INSPECTION, MAINTENANCE, AND TROUBLESHOOTING

5.1 INSPECTION

Prior to inspection or maintenance of the valve interior, ensure that personnel are equipped with appropriate personnel protective equipment depending on the defined hazard.

5.1.1 Opening the Inspection Cover

The IsoFlap is equipped with an inspection cover in order to perform inspections and maintenance activities to the interior of the valve.



WARNING

Open the inspection cover only after the process has been safely shut down and the flap blade is in the closed position.

To open the inspection cover:

- Remove the bolts holding the inspection cover in place.
- Open the inspection cover.
    - For sizes DN100 to DN200, remove the cover and store it in a safe location.
    - For sizes DN250 to DN500, open the cover until the maximum opening angle is reached (>120°) and the locking pin snaps in place.
    - For sizes DN560 to DN1000, a gas spring will assist in opening and keeping the cover open.



WARNING

If the inspection door is not opened sufficiently, the door could fall to the closed position and can cause injury to personnel and equipment. Ensure that the door is fully opened for all sizes and locked in place for sizes DN250 to DN500.



WARNING

There is risk of head injury to personnel when the inspection cover is open due to the protruding flap stop. Take necessary precautions to ensure personnel are not injured by the flap stop while the inspection door is open.

5.1.2 Closing the Inspection Door

To close the inspection door:

- Ensure there are no foreign objects in the interior of the valve.
- For sizes DN250 to DN500, remove the locking pin and slowly close the cover. For sizes DN560 to DN1000, the gas spring will assist in closing the cover slowly.
- Fasten the inspection cover in place using the provided bolts.



WARNING

Carefully close the inspection door and do not let it fall into position. Personnel should be clear of the opening and out of the path of the any moving parts of the valve. Ensure that limbs are not in the path of the closing door in order to eliminate the possibility of injury to personnel.

5.2 RECOMMENDED MAINTENANCE

As per EN16647-2014, periodic inspection checks shall be specified to ensure that the explosion isolation capability of the IsoFlap does not deteriorate (e.g. due to corrosion, abrasion, dust built up on the flap,

dust build up on inside the body of the IsoFlap) and will continue to operate as originally designed in the event of an explosion. The frequency of the inspections shall be sufficient to avoid hazardous situations (situations affecting the functionality of the IsoFlap).

NFPA 69 requires that systems be inspected at 3 month intervals. These intervals can be extended or reduced based on documented operating experience or a documented hazard assessment, and only with approval from the explosion protection system designer and the authority having jurisdiction. The interval is not to exceed 2 years.

The table below shows the recommended inspection areas of the valve. Chapter 2 must be reviewed prior to performing any maintenance work. Any additional maintenance should also be performed on other system components that are listed in separate operating manuals.

Components	Operations to Perform
Flap Blade	• Check the flap blade to make sure it closes smoothly. • Check the angle of the flap blade to ensure it opens to the maximum opening angle of 30°.
Locking Device	• Check to make sure the locking mechanism moves freely and locks the flap blade in place. • Check the locking bolts to ensure they are not damaged from repeated contact with the flap blade.
Entire Assembly	• Inspect all bolted connections. • Inspect all sealings. • Inspect all grounding locations. • Inspect the interior of valve and components for wear, damage, and dust accumulation.
Flap Sensor (IsoFlap-M versions only)	• Check the flap sensor and adjust if needed.
Accumulation Sensor (IsoFlap-M versions only)	• Check the accumulation sensor and adjust if needed.

Table 3 - Inspection and Maintenance Plan



WARNING

All maintenance, inspection, and repair work must only be performed if the main system has been shut down and is safely locked out of operation. See Section 2.7.3.

Note: Not all versions of the IsoFlap include monitoring sensors. See Chapter 7, Table A2 for a list of IsoFlap part numbers containing monitoring sensors.

5.2.1 Information Regarding Maintenance Frequency

Information and specifications regarding maintenance work and its intervals stated in the operating instructions are only recommendations, since IEP Technologies cannot have practical data for the long term and unique operating conditions of each end user. The information stated in the operating instructions is to be supplemented with installation specific practical experience. Also refer to Chapter 5, Inspection, Maintenance, and Troubleshooting.

5.2.2 Recording Inspection and Maintenance Work

Inspection and maintenance work should be recorded in a log book. When parts are replaced, please note the part number and date of replacement.

5.2.3 Inspections to be Performed

5.2.3.1 Inspection of Bolted Connections

All bolted connection of the IsoFlap must be inspected to ensure they are not loose. To inspect the bolted connections:

- Shut down the process and wait for the fan to wind down.
- Check to ensure that all bolted connections are secure and properly tightened.

5.2.3.2 Inspection of Housing

The exterior of the IsoFlap must be inspected to ensure there is no damage or corrosion and is in good condition.

- Inspect the exterior of the valve for damage or corrosion. If the painted surfaces of the IsoFlap show corrosion, damage, or areas with missing paint, these components should be replaced.

5.2.3.3 Inspection of Sealings

The gaskets and seals of the IsoFlap must be inspected to ensure they are sealing properly and in good condition. To inspect the gaskets and seals:

- While the process is running, check the IsoFlap for leakage around the inspection cover, around the gaskets on the flanged pipe connections, around the locking device(s), and around the bearing locations.
- Replace gaskets and seals as needed after process has been safely shut down.

5.2.3.4 Inspection of Flap Blade

The flap blade and chamfered pipe connection in the valve must be inspected for abrasion, defects, and caking or material sediment stuck to the blade. In order to perform the inspection:

- Ensure the system is shut down safely as described in Section 2.7.3.
- Open the inspection cover.
- If the flap is in the “locked” position, pull on the locking mechanism release handle(s) to unlock the flap.
- Inspect both sides of the flap blade and the chamfered pipe that it rests on.
- If wear in excess of 0.020” (0.5 mm) or physical damage is visible on the flap, it must be replaced.



WARNING

Ensure that the flap blade is held in the “open” position during maintenance and inspection activities. Failure to do so could cause physical injury to personnel and damage to the equipment.

5.2.3.5 Inspection of Flap Sensor

The flap sensor must be inspected to ensure it is sensing the flap blade when it is in the "locked" position. To inspect that the flap sensor:

- Ensure the system is shut down safely as described in Section 2.7.3. Push the flap so it is in the "locked" position. For large sizes of the IsoFlap it may be necessary to pull the locking mechanism release handle(s) to position the flap in the "locked" position.
- Once the flap is in the "locked" position, the control unit should provide an indication that the flap is closed.
- If no indication is given, the flap sensor must be either replaced or adjusted (see Chapter 5 – Flap Sensor Adjustment).

Note: Not all versions of IsoFlap's include monitoring sensors. See Chapter 7, Table A2 for a list of IsoFlap part numbers containing monitoring sensors.

5.2.3.5.1 Flap Sensor Adjustment

The flap sensor can be adjusted if it is not correctly detecting the presence of the flap blade. To adjust the flap sensor:

- Ensure the system is shut down safely as described in Section 2.7.3.Open the inspection cover.
- There are two jam nuts located on the flap sensor on the bottom of the valve. Loosen both nuts so the flap sensor screws in and out freely.
- Push the flap blade in towards the chamfered pipe until it locks in place. For large sizes, you may need to pull on the locking mechanism release handle(s) in order to move the flap blade to the "locked" position.
- Check to see if the flap blade is detected by the sensor. The light on the flap sensor will be "off" when the flap is detected and "on" when it is not.
- If the flap blade is not detected by the sensor, screw the flap sensor clockwise until the flap blade is detected. The indicator light on the bottom of the flap sensor will turn "off" when the flap blade is detected.
- Screw the flap sensor in two more turns.
- Pull on the locking mechanism release handle(s) to release the flap blade so it is in the unlocked position. The flap sensor should not sense the flap blade when it is in the unlocked position and the indicator light should be "on".
    - If the flap blade is still detected, turn the flap sensor counter clockwise until it is not detected and repeat previous steps.
- If sensor is functioning properly, tighten the jam nuts to secure the flap sensor.

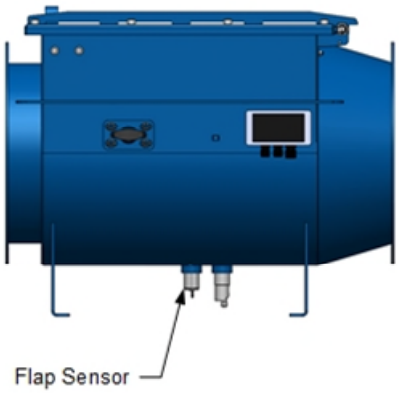


Figure 10 - Flap Sensor Adjustment

5.2.3.6 *Inspection of Accumulation Sensor*

The accumulation sensor must be inspected to ensure it is correctly sensing dust accumulation within the valve. To inspect the accumulation sensor:

- Shut down the process and wait for the fan to wind down.
- Open the inspection cover.
- Clean the top of the level sensor to remove any dust or debris.
- Place approximately 3/8" of the dust on top of the sensor. An indicator light on the bottom of the accumulation sensor is illuminated when dust is not detected. When dust is placed on the sensor, it the light will go "off" and when the dust is removed, the indicator light should turn "on" again. If the accumulation sensor is not sensing the dust properly, it must be adjusted.

Note: Not all versions of IsoFlap's include monitoring sensors. See Chapter 7, Table A2 for a list of IsoFlap part numbers containing monitoring sensors.

Note: The indicator light illuminates on the bottom of the sensor. The potentiometer for sensitivity adjustment is also on the bottom of the sensor. The sensitivity adjustment screw will turn indefinitely in either direction (there is no "stop").

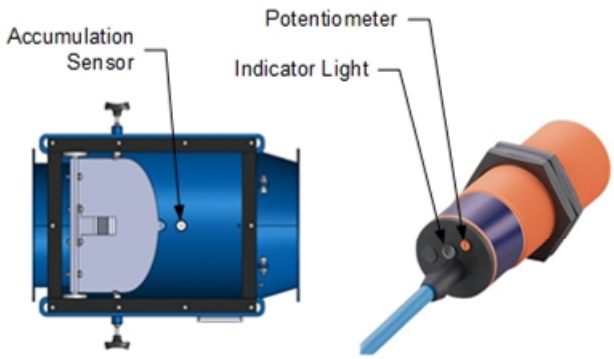


Figure 11 - Accumulation Sensor Adjustment

5.2.3.6.1 Accumulation Sensor Adjustment

The accumulation sensor can be adjusted to ensure it is correctly sensing dust accumulation within the valve. Although the sensor has been preset to sense many different dust types, not all can be accounted

for due to the large variation in dust types and material properties. If the accumulation sensor does not sense the dust at the preset setting, its sensitivity can be increased. If the accumulation sensor is too sensitive and is causing the process to shut down frequently when there are minimal dust deposits, its sensitivity can also be decreased. The customer must use their own judgment, experience, and knowledge of their process in order to determine the correct sensitivity settings.

WARNING

Regardless of the dust and operating conditions, dust accumulation must be detected before it reaches a point where it can impact the closure and locking of the flap blade.

To adjust the accumulation sensor:

- Shut down the process and wait for the fan to wind down.
- Open the inspection cover.
- Clean the top of the level sensor to remove any dust or debris.
- Place approximately 3/8” of dust on top of the sensor and make sure the sensor is completely covered.

Note: Dust may be placed directly on the sensor or using a light plastic cup or dish which is a good way of being able to easily place and remove dust from the sensor. Make sure the container used is of a light weight material and does not affect the proper sensing function of the sensor.



- Check the indicator light on the bottom of the accumulation sensor to see if the dust has been detected. When dust is placed on the sensor, the indicator light should be “off”. To increase the sensitivity of the sensor, turn the potentiometer clockwise. To decrease the sensitivity, turn the potentiometer counter-clockwise.
    - **If the indicator light is illuminated:**
        a. Turn the potentiometer clockwise until the indicator light is “off”.
        b. Turn the indicator light counter-clockwise until the Indicator light turns “on” and note how many degrees the potentiometer was turned.
        c. Turn the potentiometer clockwise until the Indicator light is “off”.
        d. Turn the potentiometer counter-clockwise twice the amount the potentiometer was turned in Step B.
    - **If the indicator light is not illuminated, follow steps “b” through “d” shown above.**
- Remove the dust from the sensor and clean the sensor.
- Place the desired amount of dust on the sensor again to ensure the accumulation sensor is functioning properly.

WARNING

Regardless of the dust and operating conditions, dust accumulation must be detected before it reaches a point where it can impact the closure and locking of the flap blade.

5.2.3.7 Inspection after an Explosion

In the case of an explosion, all of the inspection and maintenance procedures listed in Chapter 5 should be performed. All of the exterior and interior surfaces and components should also be inspected and replaced if they show signs of damage.

Note: After an explosion, there are additional inspections that must be performed on the IsoFlap. Please contact IEP Technologies for additional information on the required inspection procedures.

5.3 SPARE PARTS

The diagram below shows the available spare parts for the IsoFlap. Additional spare parts that are not shown are:

- Bearing
- Shaft
- Cover Gasket
- Bearing Gasket
- Locking Mechanism
- Locking Mechanism Gasket
- Grounding Washers
- Flap Sensor
- Accumulation Sensor

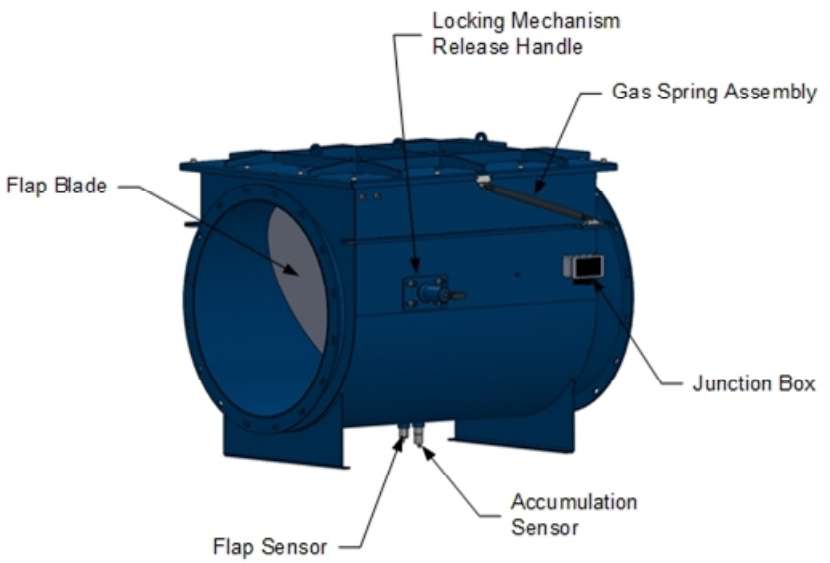


Figure 12 - Spare Parts

5.3.1 Ordering Spare Parts

Please contact the IEP Technologies Customer Service Department for ordering spare parts. Immediate identification of the correct spares ensures a rapid repair of your system.

Note: The housing enclosure cannot be replaced. In cases where the housing enclosure has been damaged or where a replacement is needed, a complete IsoFlap must be purchased. Use original IEP Technologies spare parts only.

CHAPTER 6 - TECHNICAL DATA

6.1 TECHNICAL DATA

Mounting Position	Horizontal only
Fan Location	Pull-flow applications (fan behind protected vessel)
Air Flow Velocity	15 m/s to 30 m/s (2950 ft/min to 5900 ft/min)
Minimum K_{st} Value	50 bar.m/s
Process Operating Pressure	800 hPa to 1100 hPa (0.116 psi to 0.16 psi)
Process Operating Temperatures	-25°C to +80°C (-13°F to +176°F) for IsoFlap -20°C to +80°C (-4°F to +176°F) for IsoFlap-M
Maximum Experimental Safe Gap of Dust (MESG)	≥ 1.3mm for sizes DN100 – DN200 ≥ 2.0mm for sizes DN250 – DN1000
Maximum Surface Temperature	80°C (176°F) for valve body
Paint	Paint and prime per ISO 12944 or phosphate primer and powder coat RAL 5005 “Signal Blue”

Table A1 – Technical Data

Part Number	Description	Flap Sensor	Accumulation Sensor
32-700007-001	IsoFlap-M - DN100	X	X
32-700007-002	IsoFlap-M - DN150	X	X
32-700007-003	IsoFlap-M - DN200	X	X
32-700007-004	IsoFlap-M - DN250	X	X
32-700007-006	IsoFlap-M - DN315	X	X
32-700007-007	IsoFlap-M - DN355	X	X
32-700007-008	IsoFlap-M - DN400	X	X
32-700007-009	IsoFlap-M - DN450	X	X
32-700007-010	IsoFlap-M - DN500	X	X
32-700007-011	IsoFlap-M - DN560	X	X
32-700007-012	IsoFlap-M - DN630	X	X
32-700007-013	IsoFlap-M - DN710	X	X
32-700007-014	IsoFlap-M – DN800	X	X
32-700007-015	IsoFlap-M – DN900	X	X
32-700007-016	IsoFlap-M – DN1000	X	X
32-700107-001	IsoFlap - DN100		
32-700107-002	IsoFlap - DN150		
32-700107-003	IsoFlap - DN200		
32-700107-004	IsoFlap - DN250		
32-700107-006	IsoFlap - DN315		
32-700107-007	IsoFlap - DN355		
32-700107-008	IsoFlap - DN400		
32-700107-009	IsoFlap - DN450		
32-700107-010	IsoFlap - DN500		
32-700107-011	IsoFlap - DN560		
32-700107-012	IsoFlap - DN630		
32-700107-013	IsoFlap - DN710		
32-700107-014	IsoFlap – DN800		
32-700107-015	IsoFlap – DN900		
32-700107-016	IsoFlap – DN1000		

Table A2 – IsoFlap Part Numbers

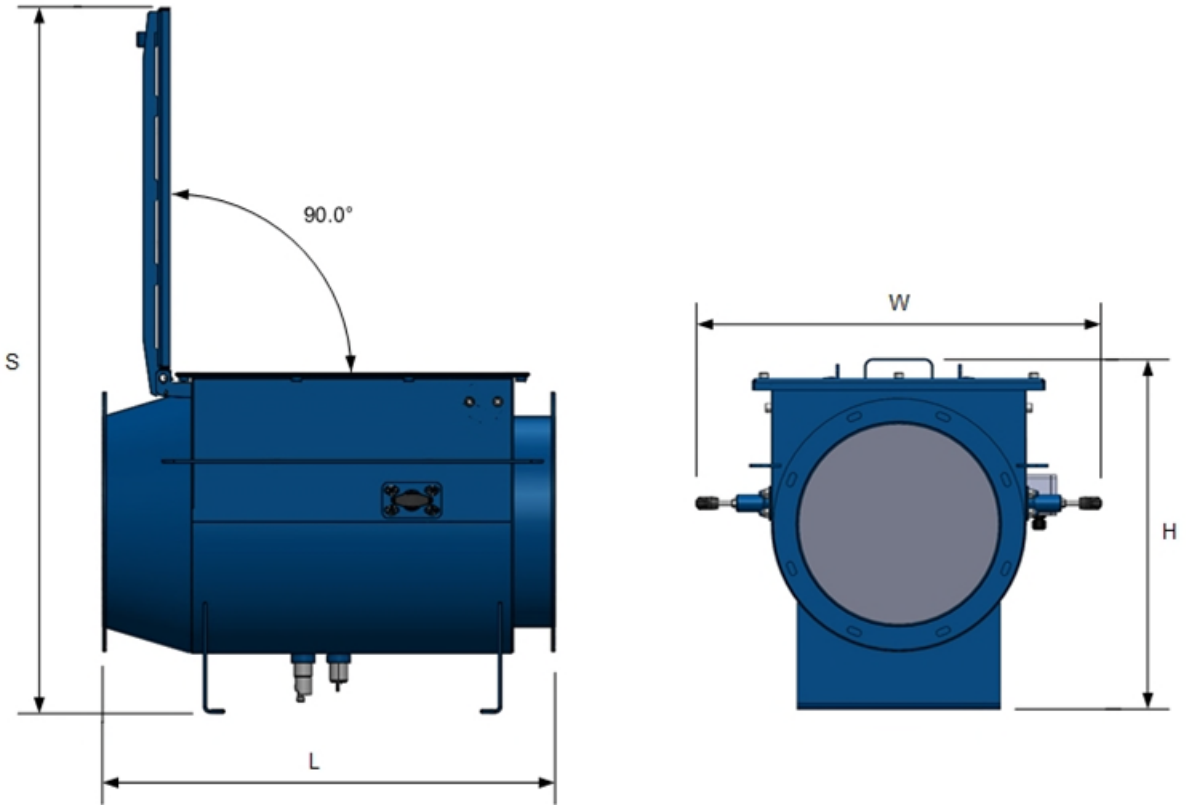


Figure A1 - IsoFlap Dimensions

Part number	Nominal Diameter mm (in)	"L" Length mm (in)	"W" Width mm (in)	"H" Height mm (in)	"S" Door Clearance mm (in)	Weight kg (lbs)	Maximum Opening Angle of Flap Blade
32-700X07-001	100 (4)	324 (12.8)	337 (13.3)	331 (13.0)	N/A	11 (25)	30°
32-700X07-002	150 (6)	384 (15.1)	377 (14.8)	390 (15.4)		18 (40)	
32-700X07-003	200 (8)	442 (15.1)	427 (16.8)	483 (19.0)		26 (57)	
32-700X07-004	250 (10)	630 (24.8)	603 (23.7)	531 (20.9)	1005 (39.6)	43 (95)	
32-700X07-006	315 (12)	705 (27.8)	671 (26.4)	596 (23.5)	1148 (45.2)	57 (126)	
32-700X07-007	355 (14)	752 (29.8)	711 (28.0)	640 (25.2)	1241 (48.9)	64 (143)	
32-700X07-008	400 (16)	804 (31.7)	755 (29.7)	681 (26.8)	1329 (52.3)	85 (187)	
32-700X07-009	450 (18)	862 (33.9)	805 (31.7)	731 (28.8)	1440 (56.7)	98 (216)	
32-700X07-010	500 (20)	919 (36.2)	855 (33.7)	781 (30.7)	1547 (60.9)	111 (245)	
32-700X07-011	560 (22)	1017 (40.0)	1029 (40.5)	906 (35.7)	1726 (68.0)	161 (355)	
32-700X07-012	630 (25)	1098 (43.2)	1098 (43.2)	977 (38.5)	1877 (73.9)	186 (410)	
32-700X07-013	710 (28)	1190 (46.9)	1177 (46.3)	1057 (41.6)	2050 (80.7)	224 (494)	
32-700X07-014	800 (32)	1323 (52.1)	1266 (49.8)	1169 (46.0)	2289 (90.1)	322 (710)	20°
32-700X07-015	900 (36)	1437 (56.6)	1386 (54.6)	1274 (50.2)	2507 (98.7)	378 (834)	
32-700X07-016	1000 (40)	1550 (61.0)	1470 (57.9)	1367 (53.8)	2714 (106.9)	437 (964)	

Table A3 – IsoFlap Dimensions

Part number	Housing and Cover Material EN (ASTM)	Flap Blade Material EN (ASTM)
32-700X07-001	1.0038 (A36)	1.0038 (A36)
32-700X07-002		
32-700X07-003		
32-700X07-004		1.0045 (A572/A678)
32-700X07-006		
32-700X07-007		
32-700X07-008		1.4021 (420)
32-700X07-009		
32-700X07-010		
32-700X07-011		
32-700X07-012		
32-700X07-013		
32-700X07-014		
32-700X07-015		
32-700X07-016		

Table A4 – IsoFlap Materials

Part number	Nominal Diameter mm (in)	K_{ST} max. bar m/sec	Minimum Vessel Volume m^3 (ft^3)	P_{RED} max. bar (psi)	Pressure Resistance bar (psi)	Minimum Experimental Safe Gap MESG mm (in)	Minimum Mounting Distance with 0 or 1 Elbow m (ft)	Minimum Mounting Distance with 2 Elbows m (ft)	Maximum Mounting Distance m (ft)	Dust Concentration in the Duct g/m^3
32-700X07-001	100 (4)	200 (ST1)	0.46 (16.2)	1.0 (14.5)	2.0 (29.0)	> 1.3 (0.05)	1.5 (5.0)	2.6 (8.5)	7.0 (23.0)	200
32-700X07-002	150 (6)				1.5 (21.8)		2.0 (6.6)	3.1 (10.2)		
32-700X07-003	200 (8)							3.2 (10.5)		
32-700X07-004	250 (10)		1.7 (60.0)	0.5 (7.25)	0.8 (11.6)	> 2.0 (0.08)	3.5 (11.6)	4.7 (15.4)		
32-700X07-006	315 (12)									
32-700X07-007	355 (14)									
32-700X07-008	400 (16)		1.6 (56.5)		0.7 (10.2)		5 (16.4)	6.4 (21.0)	8.0 (26.2)	
32-700X07-009	450 (18)									
32-700X07-010	500 (20)									
32-700X07-011	560 (22)		6 (212.0)	0.45 (6.5)				6.1 (20.0)		
32-700X07-012	630 (25)									
32-700X07-013	710 (28)									
32-700X07-014	800 (32)			0.35 (5.0)	0.6 (8.7)		5.6 (18.4)		8.5 (27.9)	< LEL
32-700X07-015	900 (36)									
32-700X07-016	1000 (40)									

Table A5 – IsoFlap and IsoFlap-M Installation Distances and Explosion Parameters for –ST1 Dusts

Part number	Nominal Diameter mm (in)	K_{ST} max. bar m/sec	Minimum Vessel Volume m^3 (ft^3)	P_{RED} max. bar (psi)	Pressure Resistance bar (psi)	Minimum Experimental Safe Gap MESG mm (in)	Minimum Mounting Distance with 0 or 1 Elbows m (ft)	Minimum Mounting Distance with 2 Elbows m (ft)	Maximum Mounting Distance m (ft)	Dust Concentration in the Duct g/m^3
32-700X07-001	100 (4)	300 (ST2)	0.46 (16.2)	1.0 (14.5)	2.0 (29.0)	> 1.3 (0.05)	1.5 (5.0) Up to 1 Elbow Allowed	2.6 (8.5)	7.0 (23.0)	200
32-700X07-002	150 (6)			0.5 (7.25)	1.5 (21.8)		2.5 (8.2) No Elbows Allowed			
32-700X07-003	200 (8)									

Table A6 – IsoFlap and IsoFlap-M Installation Distance and Explosion Parameters for -ST2 Dusts

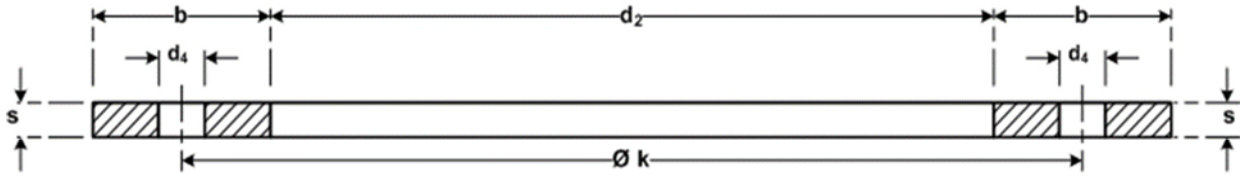
Part number	Nominal Diameter mm (in)	K_{ST} max. bar m/sec	Minimum Vessel Volume m^3 (ft^3)	P_{RED} max. bar (psi)	Pressure Resistance bar (psi)	Minimum Experimental Safe Gap MESG mm (in)	Minimum Mounting Distance with 0 or 1 Elbows m (ft)	Minimum Mounting Distance with 2 Elbows m (ft)	Maximum Mounting Distance m (ft)	Dust Concentration in the Duct g/m^3
32-700X07-001	100 (4)	200 (ST1)	0.46 (16.2)	1.0 (14.5)	2.0 (29.0)	> 1.3 (0.05)	1.5 (5.0)	2.6 (8.5)	7.0 (23.0)	< LEL
32-700X07-002	150 (6)				1.5 (21.8)		3.0 (9.8)	3.1 (10.2)		
32-700X07-003	200 (8)			0.5 (7.25)				3.2 (10.5)		

Table A7 – IsoFlap and IsoFlap-M Installation Distance and Explosion Parameters for Metal Dusts

Part number	Nominal Diameter mm (in)	Air Flow Direction	Valve Orientation	Minimum Air Flow Velocity m/s (ft/s)	Maximum Air Flow Velocity m/s (ft/s)	Minimum Air Flow Volume m^3/h (CFM)	Maximum Air Flow Volume m^3/h (CFM)	Pressure Drop @ 20 m/s or 3950 ft/min Pa (in-H_20)
32-700X07-001	100 (4)	Pull	Horizontal	15 (49.2)	30 (98.4)	424 (250)	848 (499)	200 (0.804)
32-700X07-002	150 (6)					954 (562)	1909 (1123)	190 (0.764)
32-700X07-003	200 (8)					1696 (998)	3393 (1997)	220 (0.884)
32-700X07-004	250 (10)					2651 (1560)	5301 (3120)	260 (1.045)
32-700X07-006	315 (12)					4208 (2477)	8417 (4954)	280 (1.125)
32-700X07-007	355 (14)					5345 (3146)	10690 (6292)	300 (1.206)
32-700X07-008	400 (16)					6786 (3994)	13572 (7988)	240 (0.964)
32-700X07-009	450 (18)					8588 (5055)	17177 (10110)	260 (1.045)
32-700X07-010	500 (20)					10603 (6241)	21206 (12481)	280 (1.125)
32-700X07-011	560 (22)					13300 (7828)	26600 (15656)	310 (1.246)
32-700X07-012	630 (25)					16833 (9908)	33666 (19815)	330 (1.326)
32-700X07-013	710 (28)					21380 (12584)	42759 (25167)	350 (1.407)
32-700X07-014	800 (32)					27143 (15976)	54287 (31952)	N/A
32-700X07-015	900 (36)					34353 (20220)	68707 (40439)	
32-700X07-016	1000 (40)					42412 (24962)	84823 (49925)	

Table A8 – IsoFlap and IsoFlap-M Operating Parameters

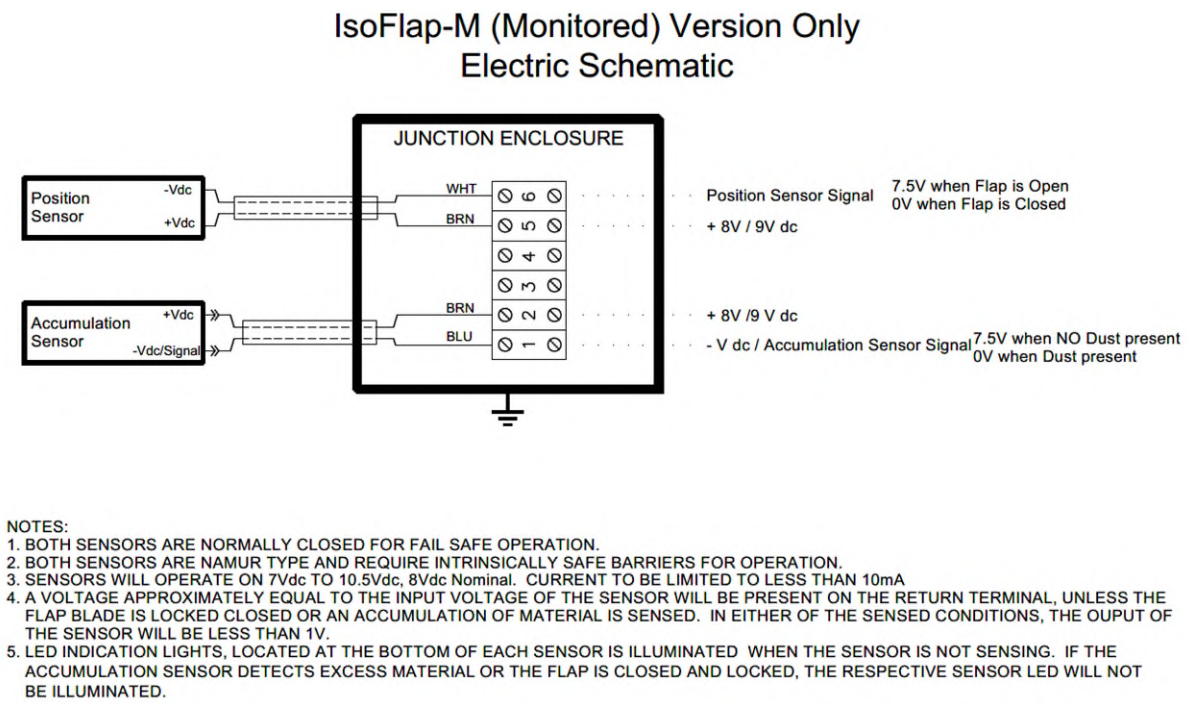
IsoFlap Adapter Flange
Flange Dimensions: per DIN 24154 Series 2
Used to adapt the metric flanges of the IsoFlap to Imperial duct sizes
Can be purchased separately from IEP Technologies
Material: Carbon Steel, Cold Galvanized



DN	"d_2" Inner Diameter mm (in)	"b" Flange Width mm (in)	"s" Thickness mm (in)	"k" Bolt Circle ø mm (in)	"d_4" Hole ø mm (in)	Bolt Hole Quantity	Required Bolt Size mm (in)
100	102 (4.0)	30 (1.2)	6 (0.2)	139 (5.5)	9.5 (0.4)	4	M8 (5/16)
150	152 (6.0)	35 (1.4)	6 (0.2)	191 (7.5)	11.5 (0.5)	8	M10 (3/8)
200	203 (8.0)	35 (1.4)	6 (0.2)	241 (9.5)	11.5 (0.5)	8	M10 (3/8)
250	253 (10.0)	35 (1.4)	6 (0.2)	292 (11.5)	11.5 (0.5)	8	M10 (3/8)
315	305 (12.0)	40 (1.6)	8 (0.3)	366 (14.4)	11.5 (0.5)	8	M10 (3/8)
355	358 (14.1)	40 (1.6)	8 (0.3)	405 (15.9)	11.5 (0.5)	8	M10 (3/8)
400	404 (15.9)	40 (1.6)	8 (0.3)	448 (17.6)	11.5 (0.5)	12	M10 (3/8)
450	454 (17.9)	40 (1.6)	8 (0.3)	497 (19.6)	11.5 (0.5)	12	M10 (3/8)
500	504 (19.8)	40 (1.6)	8 (0.3)	551 (21.7)	11.5 (0.5)	12	M10 (3/8)
560	564 (22.2)	50 (2.0)	8 (0.3)	629 (24.8)	14.0 (0.6)	16	M12 (1/2)
630	634 (25.0)	50 (2.0)	8 (0.3)	698 (27.5)	14.0 (0.6)	16	M12 (1/2)
710	714 (28.1)	50 (2.0)	8 (0.3)	775 (30.5)	14.0 (0.6)	16	M12 (1/2)
800	804 (31.7)	50 (2.0)	8 (0.3)	861 (33.9)	14.0 (0.6)	24	M12 (1/2)
900	904 (35.6)	50 (2.0)	8 (0.3)	958 (37.7)	14.0 (0.6)	24	M12 (1/2)
1000	1005 (39.6)	50 (2.0)	8 (0.3)	1067 (42.0)	14.0 (0.6)	24	M12 (1/2)

Table A9 – IsoFlap-M Adapter Flange Dimensions

Note: The slots on the valve mounting flange are equally spaced on either side of the "12 o'clock" position. When welding the adapter flanges to ducts, make sure the adapter flange holes are aligned with the IsoFlap flange holes.



NOTES:
1. BOTH SENSORS ARE NORMALLY CLOSED FOR FAIL SAFE OPERATION.
2. BOTH SENSORS ARE NAMUR TYPE AND REQUIRE INTRINSICALLY SAFE BARRIERS FOR OPERATION.
3. SENSORS WILL OPERATE ON 7Vdc TO 10.5Vdc, 8Vdc Nominal. CURRENT TO BE LIMITED TO LESS THAN 10mA
4. A VOLTAGE APPROXIMATELY EQUAL TO THE INPUT VOLTAGE OF THE SENSOR WILL BE PRESENT ON THE RETURN TERMINAL, UNLESS THE FLAP BLADE IS LOCKED CLOSED OR AN ACCUMULATION OF MATERIAL IS SENSED. IN EITHER OF THE SENSED CONDITIONS, THE OUPUT OF THE SENSOR WILL BE LESS THAN 1V.
5. LED INDICATION LIGHTS, LOCATED AT THE BOTTOM OF EACH SENSOR IS ILLUMINATED WHEN THE SENSOR IS NOT SENSING. IF THE ACCUMULATION SENSOR DETECTS EXCESS MATERIAL OR THE FLAP IS CLOSED AND LOCKED, THE RESPECTIVE SENSOR LED WILL NOT BE ILLUMINATED.

Figure A2 - IsoFlap-M Electrical Schematic

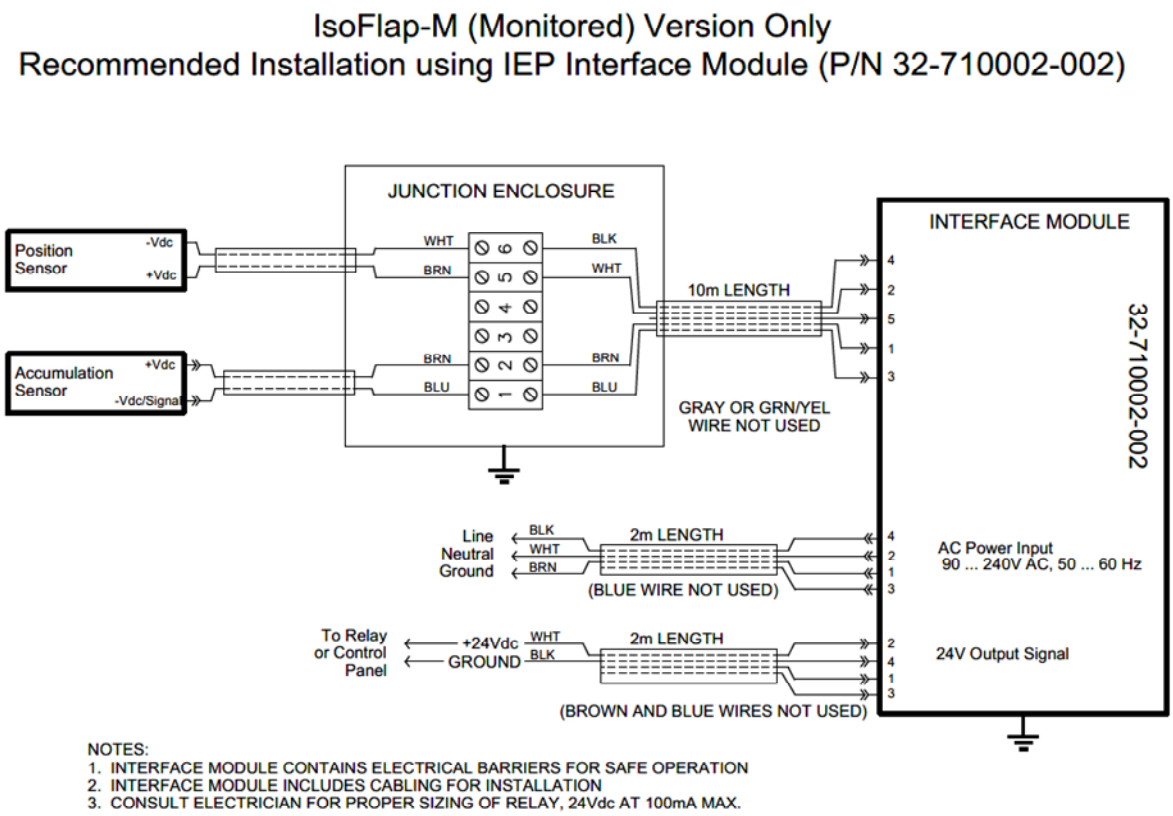


Figure A3 - IsoFlap-M Electrical Installation with Interface Module

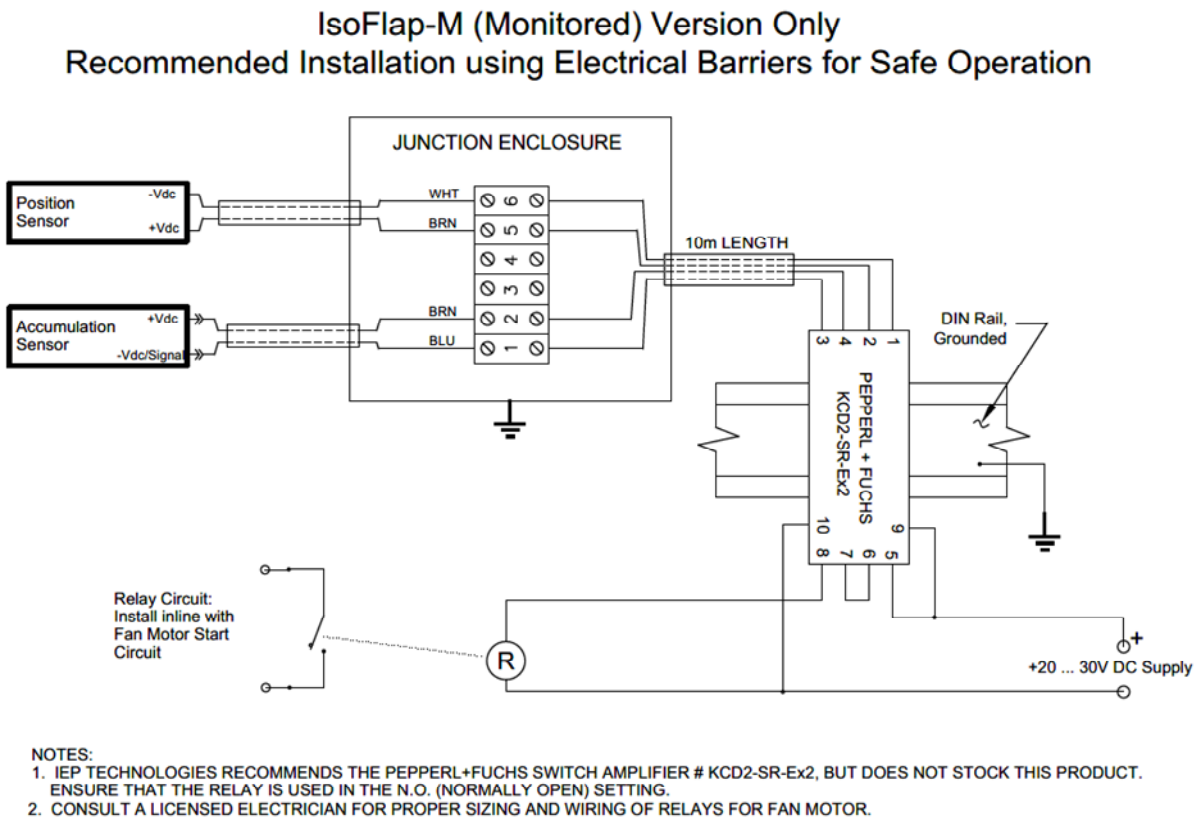


Figure A4 – IsoFlap-M Electrical Installation with Intrinsically Safe Barriers

CHAPTER 7 - DISCLAIMER

These instructions do not purport to cover all the details or variations in the equipment described, nor do they provide for every possible contingency to be met in connection with installation, operation and maintenance. All specifications are subject to change without notice. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to IEP Technologies info@IEPTechnologies.com.

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MC-601 Rev AH
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REVISION PAGE

REV	DESCRIPTION	DATE	APP'D
AH	UPDATED INTENDED USE AND CHARTS (-ST2 & METAL DUSTS & DN1000)	4/22/20	PK
AG	CHANGED 20 METERS TO 10 METERS IN SCHEMATICS	10/10/19	PK
AF	REMOVE 5X UPSTREAM REQUIREMENT FROM DN560-DN710	9/17/19	PK
AE	REMOVE 5X UPSTREAM REQUIREMENT FROM DN250-DN500	5/6/2019	PK
AD	CHANGED NAME TO ISOFLAP	4/11/2019	PK
AC	DCO 16217 ADDED ATEX NOTE TO COVER PAGE	9/24/2018	CP
AB	ADDED CHANGES REQUIRED BY ATEX	9/4/2018	PK
AA	ISSUED	8/27/2018	PK