

# BOSS™

## FDD-Monitor

### OPERATION AND MAINTENANCE MANUAL



OVER  
100 YEARS  
OF QUALITY

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**WARNING – This equipment must only be used, maintained or serviced by trained competent engineers. If in any doubt please do not touch this equipment. Please contact BSS Industrial or your reseller for additional advice, information and guidance.**

# LIABILITY

All technical information, data and information contained herein are correct at the time of publication. To the best of our knowledge this information is the sum of our current findings and experience. We reserve the right to make technical changes subject to the future development of the BOSS™ product referred to in this publication. Hence no rights may be derived from technical data, descriptions and illustrations. Technical pictures, drawings and graphs do not necessarily correspond to the actual assemblies or parts as delivered. Drawings and pictures are not to scale and may contain symbols for simplification.

# WARRANTY

**Active Period:** Manufacturing defects for 18 months from the date of manufacture or 12 months from the date of commissioning, whichever is sooner.

This warranty covers manufacturing defects only.

Please note that removal of the identification data labels from the equipment will render the manufacturing warranty null and void.

Manufacturing defects confirmed within the active warranty period will be corrected at no charge.

**The warranty is conditional upon the following clauses:**

- 1.1 The equipment must be commissioned by a trained, competent engineer or qualified person, who can verify the integrity of the equipment at that time. The qualified person must confirm in writing that the equipment is undamaged as a result of transportation and installation and is fit to begin the warranty period.
- 1.2 Photographic evidence must be collected at the time of commissioning to verify the condition of the equipment at that time.
- 1.3 A trained, competent engineer or qualified person must test the equipment annually.
- 1.4 This warranty covers the equipment against manufacturing defects. Normal wear and tear is not covered by this agreement and should form part of a separate service agreement.
- 1.5 The equipment must be stored, installed and operated in a frost-free and dry area. Damage resulting from exposure to adverse temperatures or other adverse environmental conditions will not be covered by this agreement.
- 1.6 Any and all non-warranty service visits and non-warranty inspection visits are chargeable and are not covered by this warranty.

Any service costs are applicable if a defect or problem manifests as a direct result of the connected system, misuse, incorrect handling, incorrect installation or incorrect commissioning of the unit.

Confirmed manufacturing defects will be addressed as per the above. Additional remedial works due to the misuse, incorrect handling, incorrect installation or incorrect commissioning of the unit remain chargeable.

# COPYRIGHT

The information contained in this manual is confidential. The manual may be circulated among authorised personnel only. It may not be distributed to third parties. All documentation is protected by copyright. Distribution or other forms of reproduction of documents, even extracts, exploitation or notification of the contents hereof is not permitted, unless otherwise specified in writing by VEXO® International (UK) Ltd. Infringements are liable to prosecution and payment of compensation. We reserve the right to exercise all intellectual property rights.

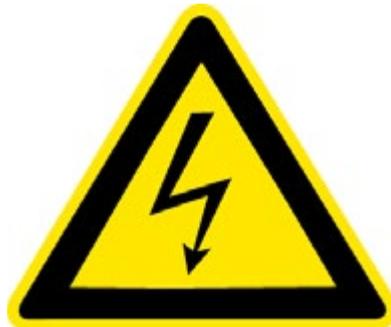
# GENERAL SAFETY INSTRUCTIONS

Disregard for, or lack of attention to, the information and measures contained in this manual may pose a hazard to people, animals, the environment and tangible assets. Failure to observe the safety regulations and the neglect of other safety measures may lead to the lapse of liability for damages in the event of damage or loss.

## Definitions

- Operator: Natural person or legal entity who owns and uses the product, or whom use of the product has been entrusted to on the basis of a contractual agreement.
- Principal: Legally and commercially liable client in relation to the system as a whole.
- Responsible person: The representative appointed to act by the installer or operator.
- Qualified person (QP): Any person whose professional training, experience and recent professional activity affords them the requisite professional knowledge. This implies that such people have knowledge derived from relevant national and internal safety regulations.

# ELECTRICAL WARNING SYMBOL



## Danger - electric current

Disregarding these warnings may:

- endanger health,
- cause death, fire or other damage,
- lead to the overloading of individual components and to damage,
- or otherwise impair the unit's function.

## Caution - warning for mistakes and wrong basic assumptions

**Consider the implications of errors and incorrect set-up conditions carefully!**

Disregarding these warnings may lead to:

- serious personal injury,
- overloading of individual components and damage,
- impair the unit's function.

## PURPOSE & USE OF THIS MANUAL

The following pages list the information, specifications, measures and technical data that will allow relevant personnel to operate the product safely and for its intended purpose. Responsible persons or those engaged by them, performing required services relating to this product, must study this manual to ensure a good understanding of the information contained herein. Such services include: storage, transportation, installation, electrical installation, commissioning and re-starting, operation, maintenance, inspection, repair and dismantling.

Where the product is to be used in plants/facilities that do not comply with harmonized European regulations and relevant technical rules and guidelines of professional associations for this field of application, the present document is purely for informative and reference purposes. As this unit may be subject to unlimited inspection at all times, this manual must be kept in the immediate vicinity of the installed unit, at least within the confines of the operations room.

## QUALIFICATIONS REQUIRED, ASSUMPTIONS

All personnel must possess the relevant qualifications to carry out the required services, and be physically and psychologically capable to do so effectively.

Operating instructions are transferred by BSS Industrial representatives, or others assigned by them, during delivery negotiations, or on demand

On-site requirements include logistics, manual handling, and the preparation of an installation location with the requisite foundation engineering to accommodate the unit and the requisite hydraulic and electrical connections, the electrical installation for the power source of the equipment and installation of the BMS signal leads if required.

## APPROPRIATE USE

This equipment is designed for use on sealed and un-sealed thermal systems (heating, chilled and condenser water). It is designed to confirm when a filter or item of equipment is blocked with a designated differential pressure rating and signal the fact with either an audible alarm, strobe light and/or a BMS common alarm signal. The maximum operating water limits of this equipment are 10Bar.

## SUPPLIED GOODS

The items delivered must be compared against the items listed on the shipping note and inspected for conformity. Unpacking, installation and commissioning may be started only once the product has been checked as conforming with the intended use. In particular, exceeding the permissible operating or design parameters may lead to malfunctioning, component damage and personal injury.

The product may not be used if circumstances are not in line with our conformity statement, or if the delivery proceeded incorrectly in any other manner.

## **TRANSPORTATION, STORAGE, UNPACKING**

The equipment is delivered in packing units conforming to contract specifications, or specifications required for certain transportation methods and climate zones.

At a minimum, packing units meet the requirements of BSS's packaging guidelines.

Important note: Deliver the packed goods as close as possible to the envisaged set-up location and make sure there is a vertical, solid surface to which the goods can be mounted / secured.

## **EMERGENCY STOP / EMERGENCY OFF**

The required EMERGENCY - STOP facility, in line with directive 2006/42EC, is present in the main power switch on the front panel. Refer to the BOSS™ PD-Monitor™ Schematic, item 6 on page 9 of this document.

## **PERSONAL PROTECTIVE EQUIPMENT (PPE)**

To prevent or minimize the risk of personal injury, PPE must be used when doing potentially dangerous work, or other activities, if alternative safety measures cannot be taken.

Any alternative safety measures must comply with the requirements set by the main contractor or operator of the plant room or the site in question. In the absence of alternative safety measures, the minimum requirements for operating the product are safety goggles, hand protection, well-fitting clothing and sturdy, closed and skid-proof footwear.

## **EXCEEDING PERMITTED PRESSURE &/OR TEMPERATURE LEVELS**

Equipment used in combination with the BOSS™ PD-Monitor™ must guarantee that the permitted operating temperature and the permitted medium temperature (heat transfer medium) cannot be exceeded. Excess pressure and temperature may lead to component overload, irreparable damage to components, loss of function and, as a result, to severe personal injury and damage to property. These safeguards must be checked/inspected regularly.

## SAFEGUARDS

The equipment supplied is equipped with the required safety devices. To test their effectiveness or restore the original set-up conditions, the equipment must first be taken out of service. Taking the system out of service implies that power should be isolated, hydraulics isolated and then vented.

## EXTERNAL FORCES

Avoid any additional forces (e.g.: forces caused by heat expansion, vibration or dead weights on the flow and return lines).  
These can lead to damage / leakage in water-bearing pipework, loss of stability of the appliance and potential failure of pressure bearing components.

## ELECTRICAL EQUIPMENT INSPECTIONS

Regardless of the prescriptions of the property insurer / operator, it is recommended to demonstrably inspect the electrical equipment of the BOSS™ PD-Monitor™ together with the heating or chilled installation at least every 12 months.

## MAINTENANCE & REPAIR

These services may only be carried out when the BOSS™ PD-Monitor™ is shut down. The BOSS™ PD-Monitor™ equipment must be taken out of service and guarded against unintentional re-starting until the maintenance work is finished.

When installed with a BOSS™ X-POT™, the control panel can be interconnected to a BMS or alarm system to allow for indication that the filter is ready for change and the magnets are ready for cleaning.

The VEXO® iX-2 Controller is fitted with a combined visual illuminated flashing beacon in low light situations for visual indication and sounder as an indication of filter blockage.

The unit must be inspected on an annual basis, and the electrical and mechanical components verified for operation and integrity.

Task	BOSS™ PD-Monitor™
Visual inspection of components	6 mths - Site Engineer
Operational check of hydraulic components	12 mths - Annual Service - Qualified person
Operational check of electrical components	12 mths - Annual Service - Qualified person

## OBVIOUS MISUSE

- Operation at incorrect water pressures, voltage and/or frequency.
- Use in inappropriate system designs and environments.
- Use of non-permitted or inappropriate installation materials.

## PRODUCT DESCRIPTION

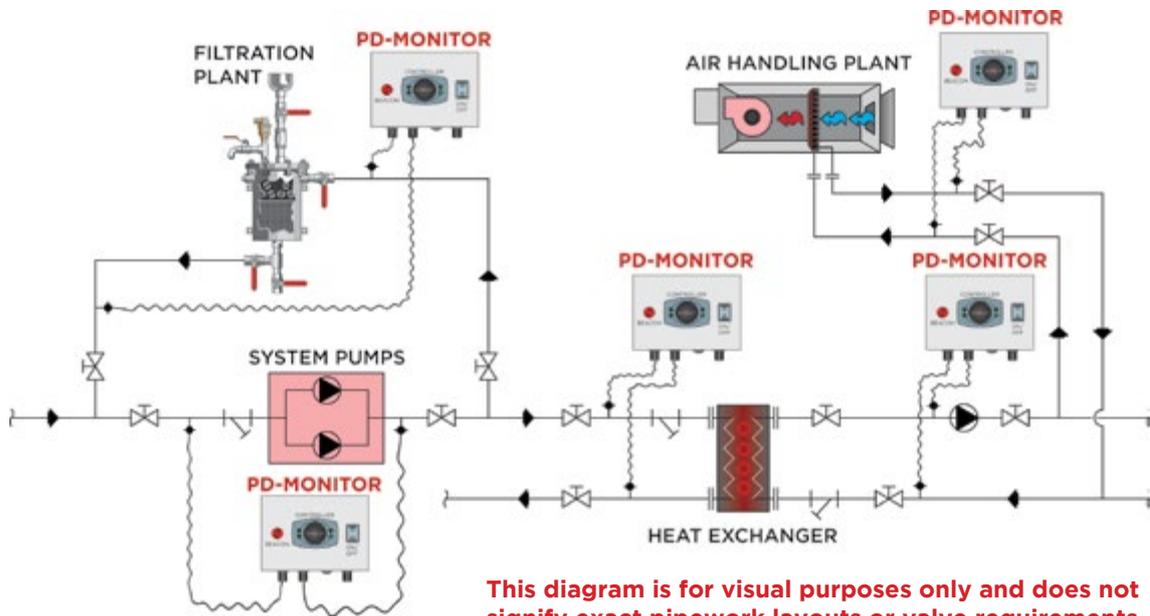
The BOSS™ PD-Monitor™ is a packaged pressure differential monitoring unit. It is a fully assembled, factory tested, wall-mounted unit incorporating:

- 2No 4-20 milliamp pressure transducers.
- VEXO® iX-2 12-volt Controller with BMS connectivity - option.
- Strobe light -(visual warning alarm).
- 5-amp Relay for blocked filter and sensor fail alarm.
- 5-amp Common alarm relay to be used as a signal contact for BMS system N/O.
- VEXO® iX-2 Controller incorporates buzzer / sounder (mute button provided).
- Pre-set to 0.4Bar pressure differential.
- Working Pressure up to 10Bar.
- Working temperature from -40°C up to 100°C.

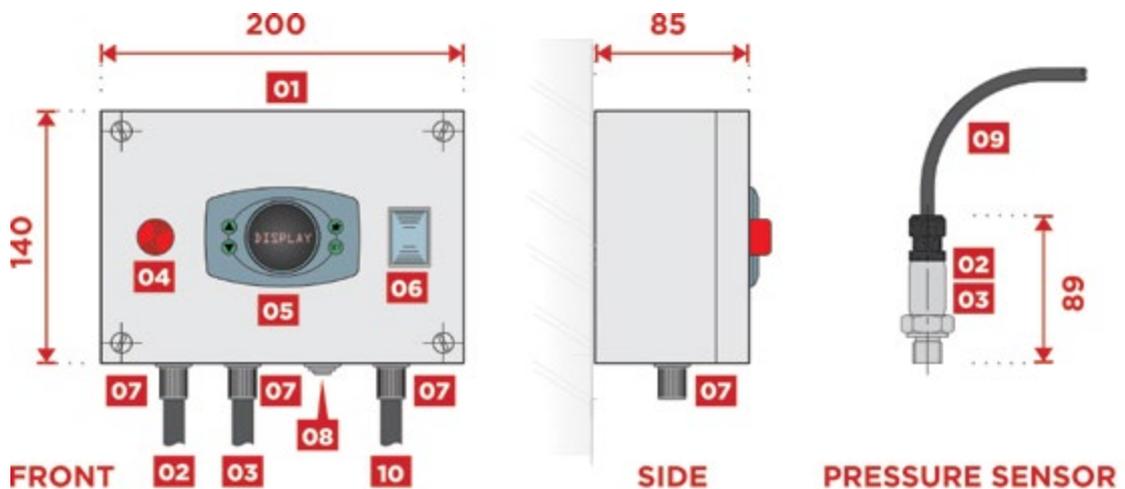
Model	Max. Working Pressure	Weight (kg)	Dimensions			Max. Working Temp.	Min. Working Temp.
			Width (mm)	Depth (mm)	Height (mm)		
<b>BOSS™ PD-Monitor™</b>	<b>10 Bar</b>	<b>1.3</b>	<b>200</b>	<b>90</b>	<b>140</b>	<b>100°C</b>	<b>-40°C</b>

Model	Electrical Supply	Transducer Conn.	IP-Rating
<b>BOSS™ PD-Monitor™</b>	<b>230/1/50</b>	<b>1/4" BSP</b>	<b>40</b>

# SCHEMATIC LAYOUT OF VARIOUS INSTALLATIONS



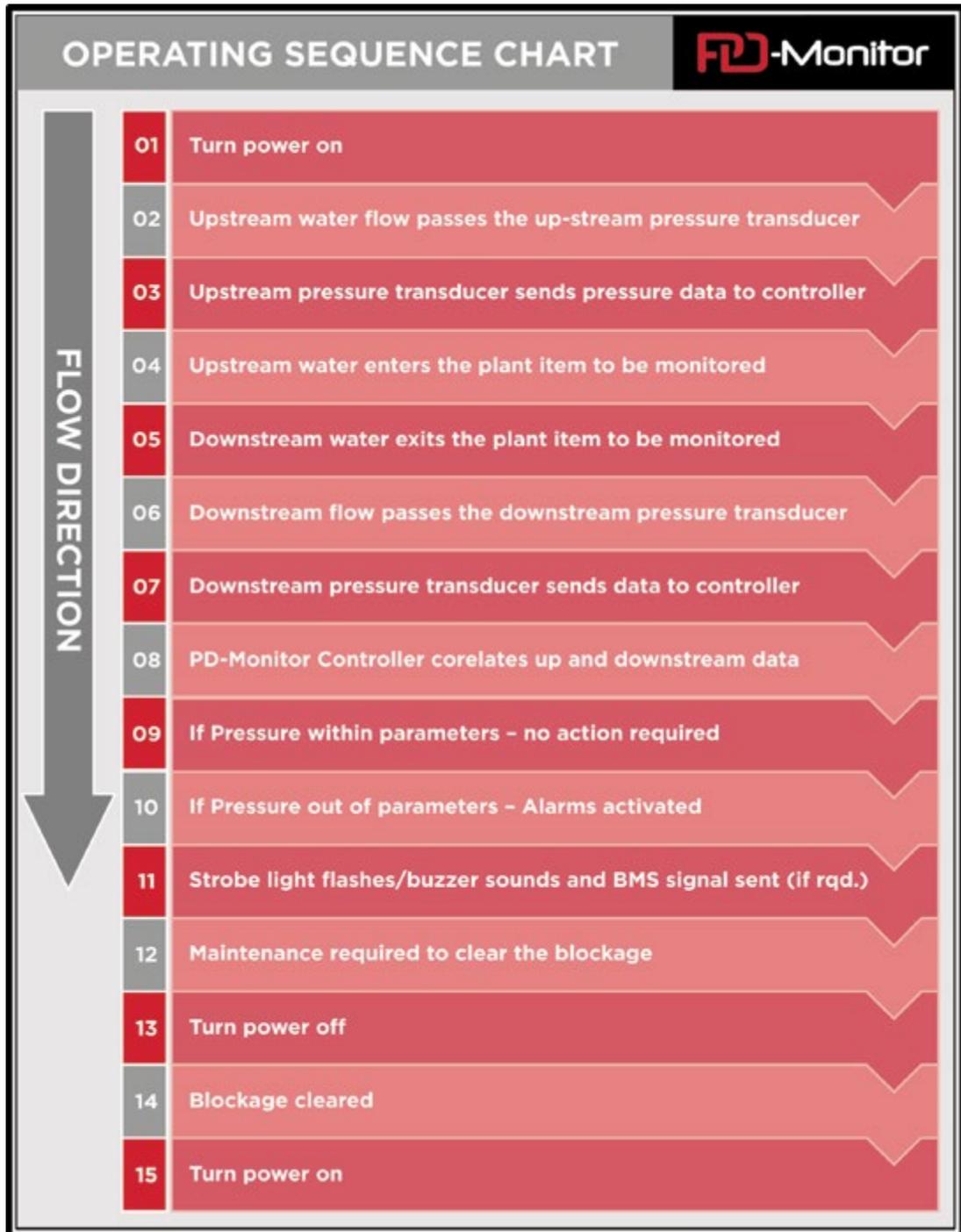
## COMPONENT LIST

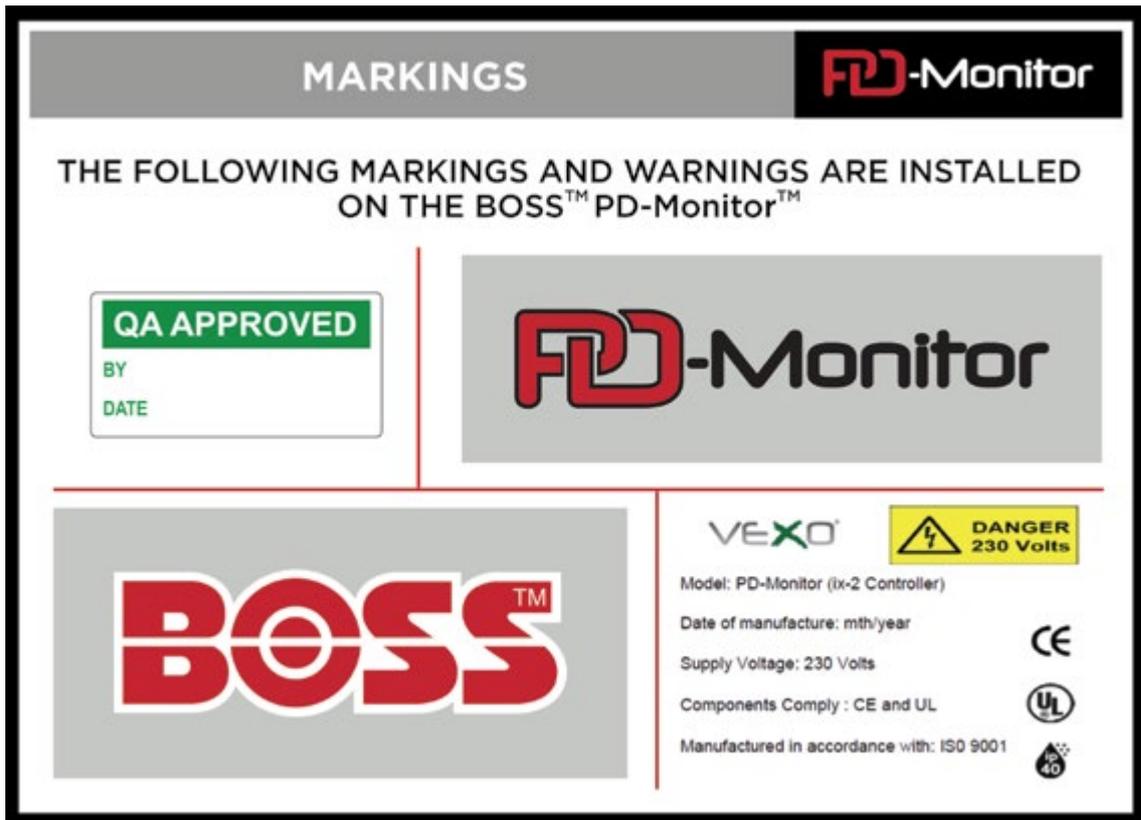


- 01** PD-Monitor™ Controller Unit
- 02** Pressure transducer #1. Upstream of plant to be monitored
- 03** Pressure transducer #2. Downstream of plant to be monitored
- 04** PD-Monitor™ Flashing Beacon
- 05** VEXO® iX-2 12 Volt Controller (with BMS-connectivity option)
- 06** PD-Monitor™ main electrical isolation switch
- 07** 3No. 16mm Cable Glands
- 08** Blank gland for BMS (Spare within PD-Monitor™)
- 09** 1.8m flying cable for the pressure transducers
- 10** Power cable to be connected to a suitable isolator (by a qualified technician)

# OPERATING PRINCIPLE

The BOSS™ PD-Monitor™ is designed to be a self-contained pressure differential monitor and alarm signalling device. It has a dedicated up-stream pressure transducer and down-stream pressure transducer connection to a sealed or open vented system. As system fluid passes through the hydraulic components in the flow sequence below, if the pressure detected up-stream and down-stream is out of the pre-set parameters within the VEXO iX-2 Controller, the alarm settings are activated to signal a blockage within the item of plant the unit is monitoring.





## INSTALLATION

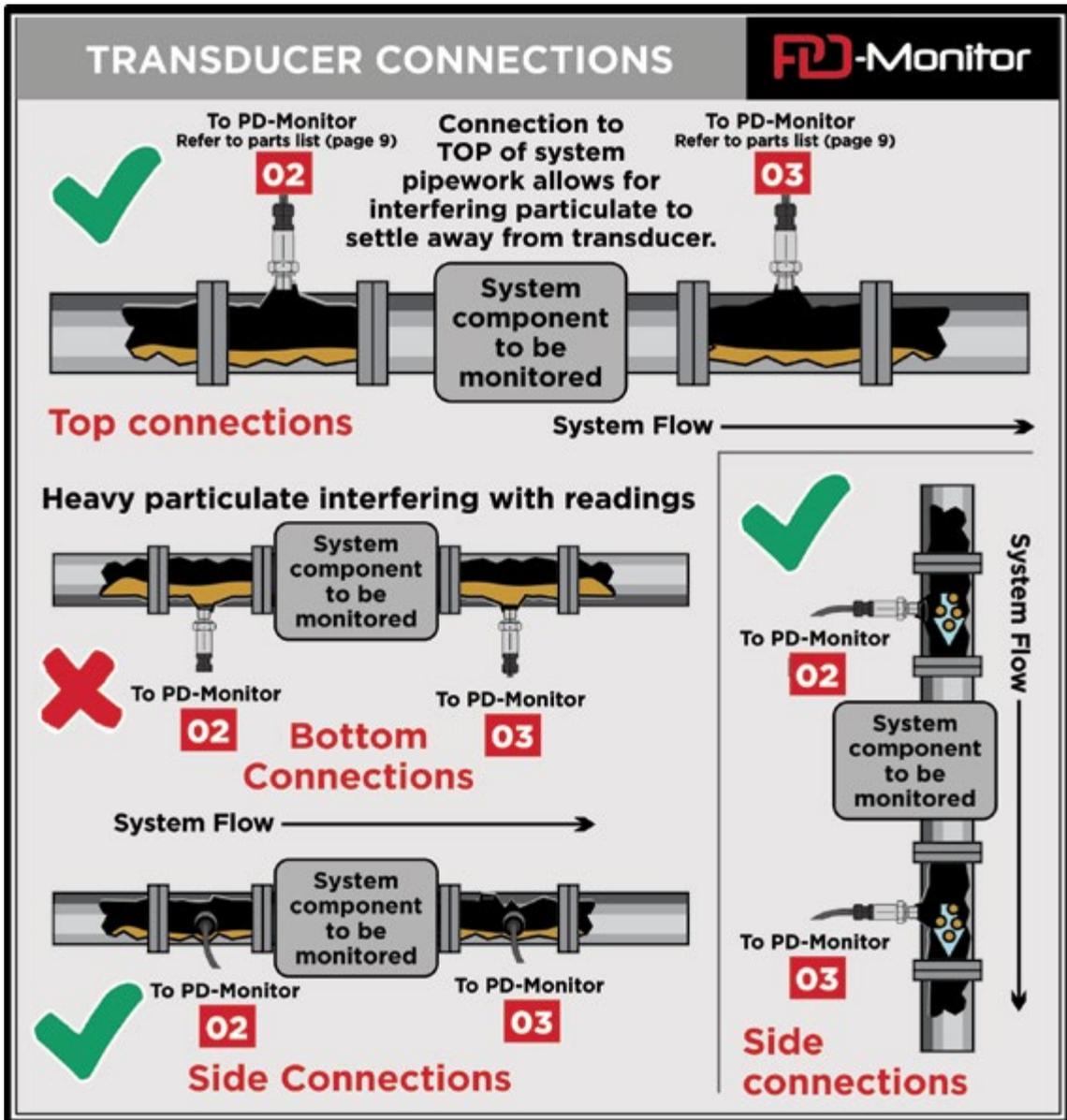
### BASIC INSTALLATION REQUIREMENTS

The BOSS™ PD-Monitor controller unit (item 1) is to be positioned and fixed to a sturdy wall / frame as close as possible to the item of plant to be monitored. The pressure transducers need to be connected either side of an item of plant which requires the pressure differential to be monitored. Please note that the pressure transducers are supplied with a 1.8M flying lead.

The BOSS™ PD-Monitor controller unit is supplied with a 0.9M flying 2 core and earth mains cable (item 10). This is to be used to power the unit. This 'mains' cable needs to be connected to a suitable 230V - 13A isolator (supplied by others) as a main point of electrical isolation. The isolator can then be served by a dedicated 240V mains power supply or, for example a 230V connection from a dedicated pump which supplies the system in which the BOSS™ PD-Monitor controller unit is monitoring.

Pressure Transducer 1 (item2) is to be located up-stream of the plant item and Pressure Transducer 2 (item 3) is to be located down-stream of the plant item. Each pressure transducer has a 1/4" BSP thread for connecting to the system pipework with a suitable sealing compound.

Each transducer is connected to the transducer cable via a Packard plug. Ensure the cables from the Packard plug to the controller unit (item 1) are kept clear of fouling, are secured to a hard surface, and that any spare cable is coiled and cable-tied. Keep the transducer cable away from electrical mains cables where possible as this may interfere with the current and provide false readings.



## CRITICAL INSTALLATION REQUIREMENTS

### The equipment must be sited:

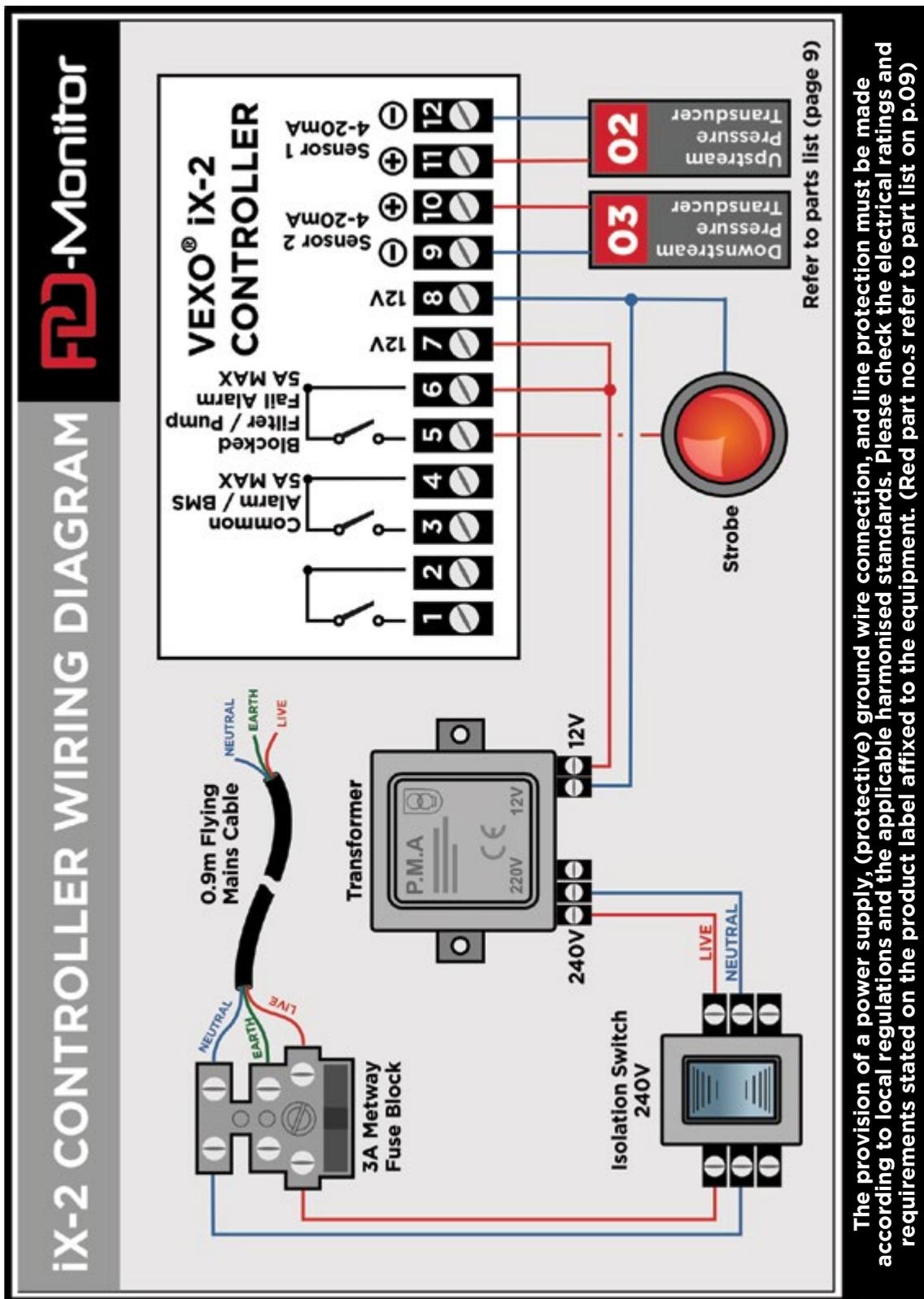
- In a frost-free area (>5°C), protected from adverse environmental conditions.
- In a well-lit area to allow for safe maintenance.
- On a flat, vertical, level, solid wall or frame with clear access of 200mm all around the controller unit.

### Care must be taken when handling this equipment. Appropriate safety measures must be in place in respect of use, handling and application of:

- Electrical equipment.
- Sealed system water.
- Hydraulic equipment.

**It is essential to ensure the environment that this equipment is installed in is safe to work in and is free from trip hazards.**

# ELECTRICAL CONNECTIONS & WIRING DIAGRAM



# COMMISSIONING



## WARNING

**This equipment must only be used, maintained or serviced by trained, competent engineers. If in any doubt please do not touch this equipment.**

## 1. General

The BOSS™ PD-Monitor™ is a 'Plug and Play' unit. It is supplied factory set with the Differential Pressure set to 0.4 Bar. Refer to setting parameters on page 15 for changing the differential pressure.

The operator should read this section prior to hand-over of the equipment from the installation operative to familiarise him/herself with the operating procedures of the VEXO® iX-2 Controller and the BOSS™ PD-Monitor™ unit as a whole.

The Control System is based around a VEXO® iX-2 Controller complete with I/O modules. A Display Panel is fitted to the VEXO® iX-2 Controller to allow interrogation and adjustment of the parameters.

In the event of a power failure, the VEXO® iX-2 Controller will return to its last set operating mode once power has been restored.

**Ensure the power supply to the BOSS™ PD-Monitor™ is 230V ~ 1 N PE 50Hz via a suitable Fused Spur.**

The power supply to the BOSS™ PD-Monitor™ is provided from either a dedicated 240V power supply or the system pump electrical supply that the BOSS™ PD-Monitor™ is monitoring. Therefore, the BOSS™ PD-Monitor™ will only be activated when the main system pump is running and active. The power supply is then connected to the main BOSS™ PD-Monitor™ Mains Isolation Switch, refer to the unit schematic, item 10 on page 9 (Schematic) of this document. The power is then distributed throughout the BOSS™ PD-Monitor™ via an internal wiring loom.

## 2. BOSS™ PD-Monitor™ Specification

- 2No ~ 4-20 milliamp pressure transducers monitor the pressure differential on the inlet and outlet of the X-POT side stream filter or the item of plant e.g. plate heat exchanger, pump set etc.
- The VEXO iX-2 12-Volt Controller, with built-in buzzer, is located in the housing box with a strobe and electrical isolation switch on the front.
- Power is supplied to the VEXO iX-2 controller via an internal 12-volt transformer which receives its power from the 240V mains supply or via a dedicated spur from the system pump which is serving the system the PD-Monitor is applied to.
- The VEXO iX-2 Controller has 2 relays within:
  - 5-amp alarm relay for blocked filter alarm and sensor fail.
  - 5-amp common alarm relay which can be configured to normally open or closed and is to be used for a signal contact for a BMS system.
- When energised the VEXO iX-2 controller will start and display "Run", the pressure transducers up-stream and down-stream of the X-POT or plant to be monitored will monitor the pressure differential across the X-POT or other plant item etc.
- When the VEXO iX-2 controller senses the pre-set pressure differential has been achieved, the controller will display and scroll "Blocked Filter". The VEXO iX-2 will then power the strobe light and internal buzzer.
- To observe the pressure readings from the two pressure transducers:
  - Press the "up" arrow (button 1) for sensor 1 up-stream pressure transducer reading.
  - Press the "down" arrow (button 2) for sensor 2 down-stream pressure transducer reading.

# COMMISSIONING (continued)

## 3. Enable monitoring

It is important to visually inspect the electrical connections, components and conduit serving the BOSS™ PD-Monitor™ unit before commencement of the operation of the unit.

It is important to visually inspect the BOSS™ PD-Monitor™ unit hydronic connections before commencement of the operation of the unit to confirm the following:

- The integrity of all fittings and pipework connecting the heating / chilled system to the BOSS™ PD-Monitor™ – ensure that there are no leaks.
- When the BOSS™ PD-Monitor™ has been filled with system water and pressurised, check the hydronic integrity of all fittings and pipework.

## 4. Activation

The BOSS™ PD-Monitor™ can now be activated by pressing the Isolator Switch from the 'Off' position to the 'On' position. The VEXO® iX-2 Controller will now scroll the following...

< Run >

# VEXO® iX-2 CONTROLLER

## 1. SETTING PARAMETERS



The Differential Pressure is factory set to 0.4 Bar. To reset the parameters (for example, the pressure differential) the following sequence needs to be followed on the VEXO® iX-2 Controller:

- Press and hold "set" (button 4), for 5 secs to access the pressure differential parameter.
- The first digit will start to flash off and on.
- Using the up arrow (button 1) or down arrow (button 2) enter code '815" by pressing "set" (button 4) after each number has been assigned.
- When '815" has been achieved, press "set" (button 4) for 5 seconds.
- The current pressure differential setting will appear.
- The differential pressure can now be changed to between 0.1Bar and 1.0Bar.
- Using the up arrow (button 1) or down arrow (button 2) enter the new desired pressure differential parameter.
- Hold "set" (button 4) for 5 seconds, this will store the new setting and re-boot the VEXO iX-2 controller. The new setting will be saved and the controller will return to the main screen.

# VEXO® iX-2 CONTROLLER (Continued)

## 2. SETTING PARAMETERS



## 3. ALARM CONDITIONS

If the PD-Monitor detects pressure outside of set parameters during normal operation, fault condition will be initialised.

- In alarm conditions, the internal buzzer will sound on the controller. This can be muted by pressing the mute (button 3).
- In alarm conditions, the strobe light will function.
- The VEXO iX-2 controller can be powered down by pressing the electrical isolation switch on the fascia to off.
- Once the alarm conditions and actions have been rectified, the controller can be reset by re-powering the unit. To power up the unit, switch the electrical isolation switch on the fascia to 'on'.
- Monitoring will resume.

## 4. FAULT MESSAGES

The VEXO® iX-2 Controller display will scroll a fault message as below if a fault is detected. The VEXO® iX-2 Controller will also initiate the visual strobe and sounder to alert the user.

FAULT MESSAGE	PD-Monitor™ Operation	Solution
Blocked Filter	Shutdown	Isolate the PD-Monitor™ and clean/change filters to allow PD-Monitor™ to operate
Sensor 1 Fail	Shutdown	Call engineer to check connections and replacement of the pressure transducer
Sensor 2 Fail	Shutdown	Call engineer to check connections and replacement of the Pressure Transducer

If connected to a BMS, The VEXO® iX-2 Controller will alert the user with a “Common Fault” signal.

# VEXO® iX-2 CONTROLLER MONITORING

**Volt-free contacts are provided for the following conditions. The contacts are rated 5 amp, 230v maximum**

<p><b>Filter On</b> – VEXO® iX-2 Controller will scroll “Run” during normal operation.</p> <p>The screen scrolls: <b>&lt; Run &gt;</b></p>	
<p>The VEXO® iX-2 Controller will scroll “Blocked Filter” if a filter is blocked. - Filter Blocked, Clean / Replace Filters</p> <p>The screen scrolls: <b>&lt; Blocked Filter &gt;</b></p>	
<p>The VEXO® iX-2 Controller will scroll “Sensor 1 Fail” in the event of an upstream pressure transducer failure. - Upstream Pressure Transducer Failure</p> <p>The screen scrolls: <b>&lt; Sensor 1 Fail &gt;</b></p>	
<p>The VEXO® iX-2 Controller will scroll “Sensor 2 Fail” in the event of a downstream pressure transducer failure. - Downstream Pressure Transducer Failure</p> <p>The screen scrolls: <b>&lt; Sensor 2 Fail &gt;</b></p>	

## 1. VEXO® iX-2 CONTROLLER PARAMETERS

No	Parameter	Default Value	Range
0	Pressure Differential	0.4 Bar	0.1 - 1.0 Bar
1	Alarm Relay Contacts	0	0 = N/C 1 = N/C
2	Sensor Minimum Pressure	0 Bar	0.0 - 10.0 Bar
3	Sensor Maximum Pressure	10 Bar	0.0 - 10.0 Bar
4	ID Number	0	
5	Pump Hours		
6	Alarm Count		

## ELECTRICAL CHECKS & INSPECTION



**To stop electrical equipment (PD-Monitor), cut power to the main control unit by pressing the Mains ON/OFF Power Switch (6) to the OFF position. The power supply must remain off for the entire duration of the check/inspection.**

**It is forbidden to alter or use non-original components or replacement parts without written authorisation. Such acts may result in serious personal injury and endanger operational safety. They will also render any claim for damages against product liability void.**

## DECOMMISSIONING & DISMANTLING



### **WARNING**

**This equipment must only be used, maintained or serviced by trained, competent engineers. If in any doubt please do not touch this equipment.**

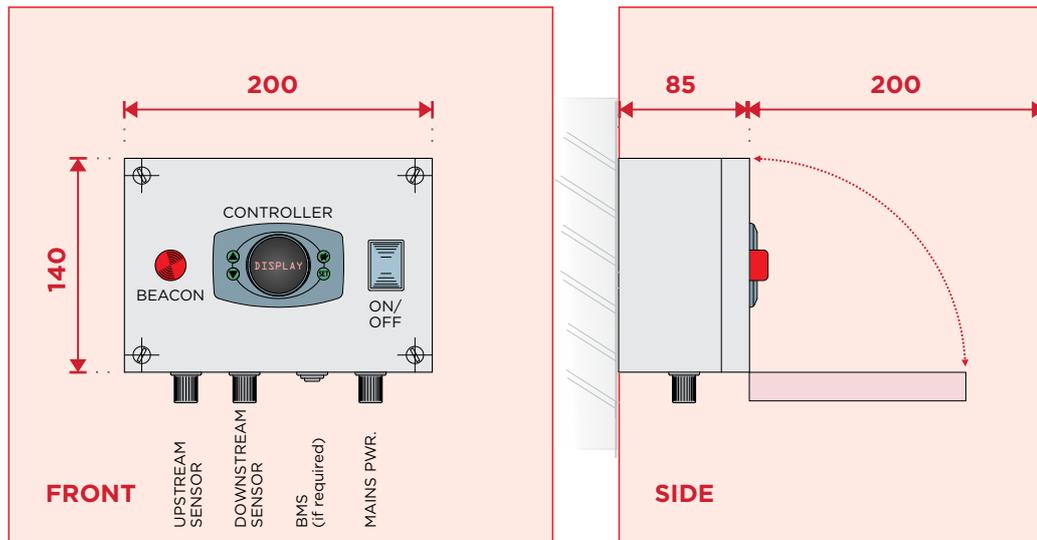
**Please contact BSS Industrial or your reseller for additional advice, information and guidance.**

At the end of the lifespan, or at the planned decommissioning of the equipment, please ensure that:

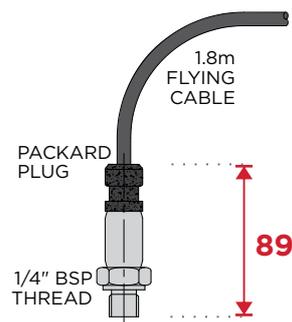
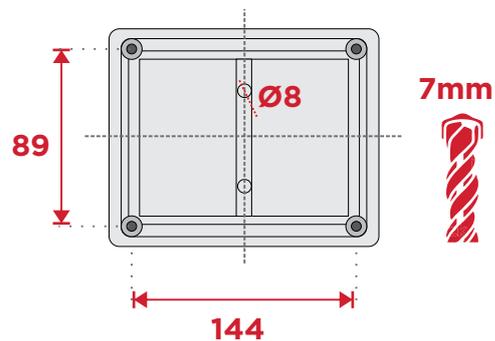
- The control panel is separated from the power supply.
- The hydraulic system connections are closed off and isolated.

**Caution: Water areas should first be vented and then emptied. This water may be conditioned, contain anti-freeze or other substances and, as such, must be disposed of in accordance with the local legislative requirements.**

The destination of and further processing of the construction components should be carried out in agreement with the relevant waste management service provider.

**WARNING!** WEAR APPROPRIATE PPE WHEN OPERATING THE BOSS™ PD-Monitor™**INSTALLATION BY QUALIFIED/EXPERIENCED TECHNICIANS ONLY****NOTE: ALL MEASUREMENTS ARE FOR GUIDANCE**

Leave at least 100mm free space in all directions to ensure sufficient access and 200mm from the front of the unit to enable unhindered opening of the front service panel.

**PRESSURE SENSOR****MOUNTING HOLES**



# Declaration of Conformity

Manufacturer	Factor
<b>Elektronics Europe Ltd</b>	<b>BSS Industrial</b>
4C The Gateway, Silkwood Business Park, Fryers Way, Wakefield. WF5 9TJ	BOSS Court, 7 Barton Close, Grove Park, Leicester. LE19 1SJ.

**Range Name:**  
BOSS™ PD-Monitor

**Operating Conditions**  
**10 Bar** Maximum Working Pressure (fluid)  
**+40°C** Minimum Working Temperature - **+100°C** Maximum Working Temperature

**IP40** Protection Rating

**Additional Information**  
All appropriate components bear the CE Mark prior to assembly, and are bound by their individual applicable directives including but not limited to:

**Low Voltage Directive**  
2006/95/EC

**Electromagnetic Compatibility Directive**  
2004/108/EC

Signed on  
**15<sup>th</sup> January 2019**

for and on behalf of Vexo International (UK) Limited

**Richard Cowley, Technical Director**

Vexo International (UK) Ltd. 6 The Granary Building, Millow Hall Farm, Millow, Biggleswade, Bedfordshire, SG18 8RH  
T: 01767 500 150, Registered in England & Wales No: 072 05096

# BOSS™ WATER TREATMENT PRODUCTS



**WARNING!** WEAR APPROPRIATE PPE WHEN OPERATING THE BOSS™ PD-MONITOR



**INSTALLATION BY QUALIFIED/EXPERIENCED TECHNICIANS ONLY**

**INSTALLED BY:** \_\_\_\_\_ **DATE:**   •   •

**NOTES:** \_\_\_\_\_  
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## General notes:

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BOSS Court, 7 Barton Close, Grove Park, Leicester, LE19 1SJ  
[www.bssindustrial.co.uk](http://www.bssindustrial.co.uk)  
Tel: 0116 245 5940

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