

Installation Instructions

Type LSR-S™, LSR-SS™ Rupture Disks & GR-C™ Safety Heads

II-LSRS-EN Rev 0



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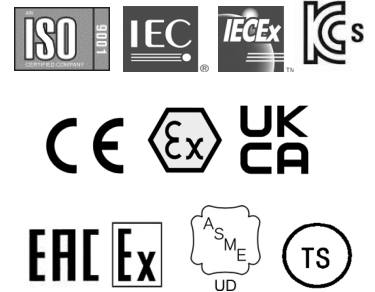
BS&B Safety Systems

Installation Instructions

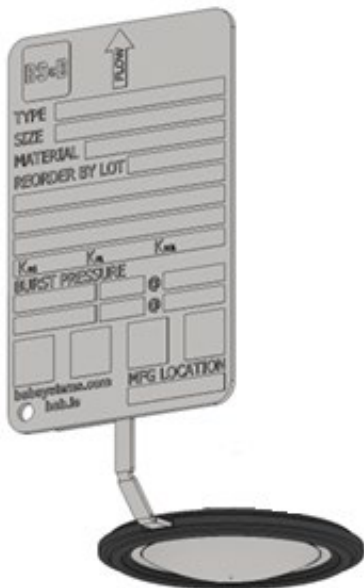
For Type LSR-S™, LSR-SS™ Rupture Disks & GR-C™ Safety Heads.

WARNING – Read these instructions carefully and completely before attempting to unpack, install or service the rupture disc. Rupture disks are non-reclosing pressure relief devices and are intended to provide a pressure relief opening in the event of a rapid rise in pressure. Rupture disks are designed to open at a specified pressure and temperature, thereby relieving the excessive pressure or excessive vacuum in the structure to be protected. **It is imperative that the rupture disk device and sensor be properly installed and safely vented in order to avoid bodily injury, damage to property, pollution and loss of product.** BS&B Safety Systems L.L.C. and BS&B Safety Systems Limited supply rupture disk devices selected by their customers, which are manufactured in reliance upon information and specifications supplied by the customer. BS&B Safety Systems L.L.C. and BS&B Safety Systems Limited are not liable for any damage resulting from improper installation, improper system design, unsafe venting, or other factors beyond BS&B Safety Systems L.L.C. and BS&B Safety Systems Limited control. Do not locate the rupture disk where personnel, equipment or property will be exposed to released product, pressure and temperature through the activated rupture disk. Handle carefully; rupture disk and or sensor device tag may have sharp edges. Final determination of the size and suitability of BS&B products for the use contemplated by the buyer is the sole responsibility of the buyer.

Certification



ORDER REPLACEMENT OF DISKS / DISKS & SENSOR / SAFETY HEADS ASSEMBLIES BY LOT NUMBER (shown on product).



SAFETY PRECAUTIONS

The installation of the rupture disk or sensor must be carried out by trained and competent personnel.



Do not locate the rupture disk where personnel will be exposed to discharge media from a ruptured disk. Do not remove rupture disks from packaging for inspection until ready to install.

Provide adequate support for piping and connections to absorb recoil / reaction forces when the disk ruptures.

The rupture disk and corresponding safety head and pipe connections should not be subjected to bending stresses.

Do not locate the disk where it may be subjected to thermal shock. Moisture, rain, condensation or snow may cause a thermal shock to the disk causing the disk to burst below its marked Burst Pressure. A protector is recommended for temperature above 212°F (100°C), consult BS&B Safety Systems.

When the disk ruptures, the resulting shock wave may affect the operating performance of downstream equipment.



Handle carefully, disk and tag may have sharp edges.

Corrosion and process conditions may affect disk deterioration and necessitate more frequent replacement.

Do not reinstall a rupture disk that has been removed from a safety head even if it has not ruptured.

Disk Types	Safety Head	Description
LSR-S™	GR-C™	Reverse Buckling Rupture Disk
LSR-SS™	GR-C™	Reverse Buckling Rupture Disk with Integrated Sensor

Sensor Type	Description
SAS™ or KBA-S™	Optional Sanitary Alert Sensor for burst indication

BEFORE INSTALLING

Inspect Safety Head

Inspect Safety Head's and Flange's mating surfaces for foreign material. Pits, dirt or grit can damage the rupture disk affecting disk performance or cause leakage. Clean if necessary.

Ensure mating pipework is parallel to permit proper functioning of the rupture disk.

The rupture disk and Safety Head must not be machined or modified in any way except with the approval of BS&B Safety Systems L.L.C. or BS&B Safety Systems Ltd. Failure to obtain such approval voids the warranty on this product.

Inspect the Rupture Disk

Handle the rupture disk carefully holding the disk by the tag and the perimeter only. Examine seating and domed surfaces for nicks, dents, scratches and foreign material which can damage the disk or cause leakage or affect the burst pressure. **Do not install a damaged disk.** Installation of a damaged disk may result in a premature bursting of the disk. The GCR™ series uses SAF™ technology (Structural Apex Forming) and the designed precision indentation in the center of the disk is present in all cases to assist operating accuracy.

Inspect the Integrated Sensors

- Do not remove disk and sensor assembly from its package until it is required for installation. Handle the assembly with care, disk and tag may have sharp edges, holding the assembly by the perimeter only. Examine the sensor checking the membrane and gasket for tears, scratches and foreign material that can damage the sensor, cause leakage, lead to false signals or otherwise affect the electrical or mechanical performance of the sensor.
- Do not install a damaged disk and sensor assembly, for example, if the wire circuit mounted on the orange polyamide support has been severed, or if there is any damage to the polyamide. Installation of a damaged disk and sensor assembly may result in a false signal or leakage.
- Do not rub the sensor membrane. Clean using only a damp cloth.
- Do not fold, twist or stretch the sensor as this may break or weaken the conductive circuit and cause a false signal.
- The disk and sensor assembly does not produce excessive surface temperatures, infra-red, electromagnetic or ionizing radiation when appropriately powered according to these instructions.
- Do not subject the disk and sensor assembly to excessive structural bending stresses through ferrule connections.
- Select gasket materials appropriate to the service conditions.
- Check that the performance characteristics of the disk and sensor assembly match that required by the application.
- Competent trained personnel should install the disk and sensor assembly devices in accordance with these installation instructions and user electrical requirements.
- Do not locate where the disk and sensor assembly membrane may be exposed to snow, ice, and heavy rain.
- Do not locate where the sensor to cable connection may be damaged from bending or stress.

- The disk and sensor assembly is not designed for dust service conditions.
- Check that all the disk and sensor assembly materials are compatible with the process conditions to avoid false signal generation due to corrosive attack on the disk.
- The sensor assembly should not be installed in contact with conductive process media as this may cause a false signal.
- Ensure that the opening of the disk and sensor assembly does not affect the performance of downstream equipment.
- The sensor **must not** be modified in any way except with the approval of BS&B Safety Systems L.L.C or BS&B Safety Systems Ltd. Unapproved modification may affect pressure containment and/or disk and sensor performance. Failure to obtain such approval voids the warranty on this product.
- Do not reinstall a disk and sensor assembly that has been used between ferrules even if the conductor has not broken. Each disk and sensor assembly is provided with integral gaskets. Do not remove or modify gaskets before use as this may affect sealing to the pressure system and damage the disk and sensor assembly.
- For assistance or advice on the compatibility of process media with the 'disk and sensor assembly', contact BS&B Safety Systems L.L.C or BS&B Safety Systems Ltd.

Inspect the Clamps

BS&B recommends the assembly of BS&B Sanitary products using an Alfa Laval **Tri-Clover®** Tri-Clamp 13MHHS 3 segment heavy duty clamp with a hexagonal nut enabling control of installation torque. Optionally BS&B can supply the notched Tri-Clamp 13MHHS that allows clearance for the sensor cable.

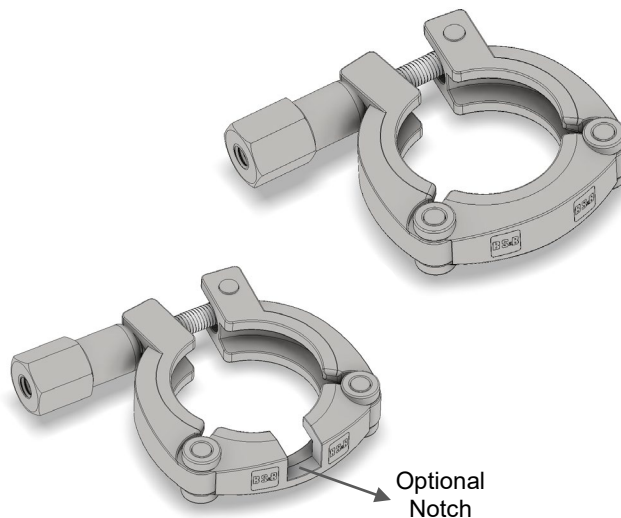


Using clamps other than indicated above may result in achieving improper clamping force to seal the rupture disc.

Check the alignment of the ferrules. Do not use the clamp to pull pipes and components into alignment.

Ensure the gap between the ferrule faces is the same width as the gasket to minimize pipe stress.

Check the clamp for any sign of deformation, bent components, loose hinges, damaged threads, or indentations caused by uneven compression.

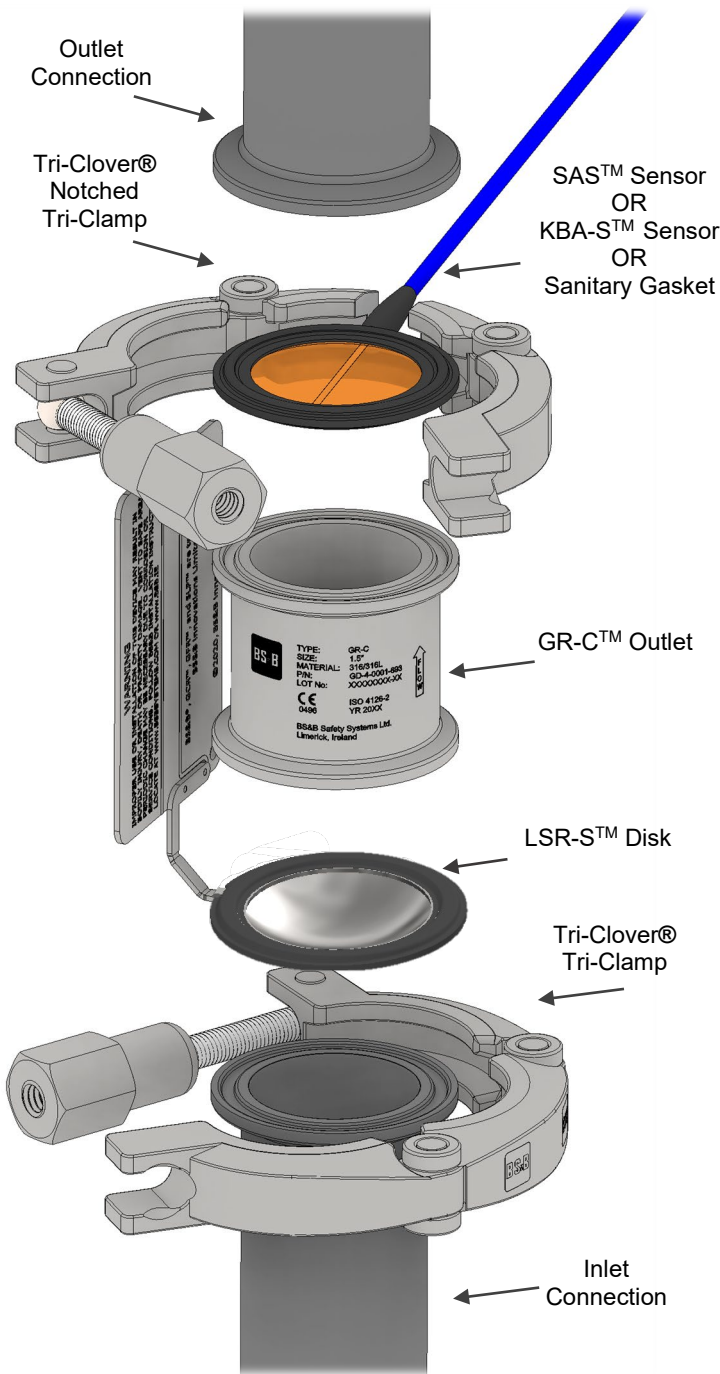


INSTALLATION

Rupture Disk must be assembled between GR-C™ Safety Head and standard pipe ferrules / pipe spools.

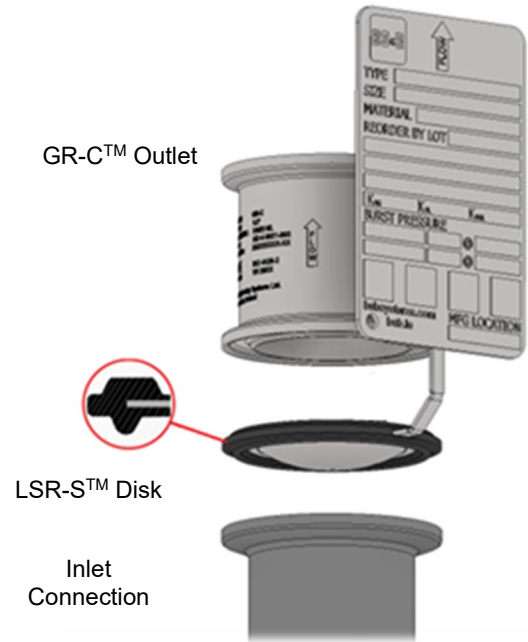
! When installing or uninstalling a disk and sensor assembly, disconnect the electrical monitoring equipment prior to removal of the sensor from the piping system.

GR-C™ Safety Head with LSR-S™ Rupture Disk and Sanitary Alert Sensor Arrangement

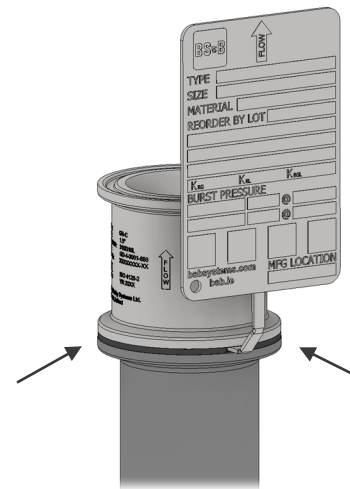


INSTALLATION STEPS

1. Locate the flow arrow on the new rupture disk and on the safety head and ensure it points towards the correct relief flow path for your system (Refer to your P&ID if unsure of relief flow path direction).
2. Place undamaged rupture disk on inlet fitting. The convex side of the disk, the dome, faces the inlet.
3. Carefully place Safety Head outlet in position show. Ensure that the disk gasket's larger seal bead mates properly with the outlet groove.



4. Ensure gasket seats properly into the ferrules.



5. Assemble unit with sanitary clamp. Both ferrules must fit inside clamp groove prior to tightening the clamp.

6. Ensure sealing of rupture disk in Safety Head by applying the torque value to the hexagon nut as shown below. A BS&B hexagonal torque nut is recommended.

DIN 32676 series C ("ASME BPE") connections (DIN 11866 series C piping)

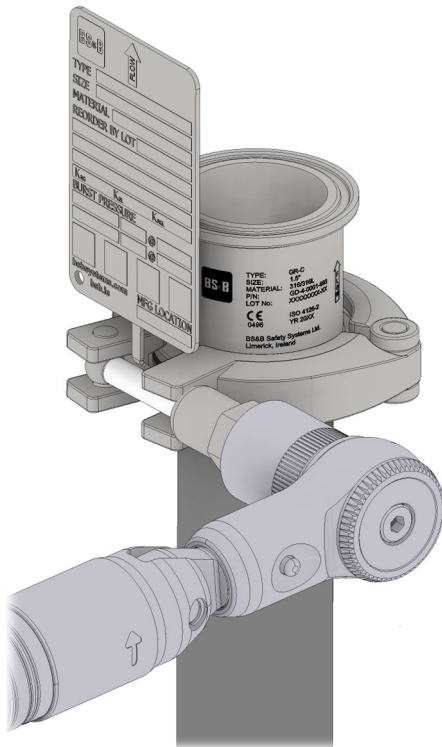
Sanitary Fittings and Nominal Disk Size		Torque for Fluoropolymer (soft) Gaskets		Torque for PTFE or Fluoropolymer Steel (hard) Gaskets	
inch	mm	in.lb	Nm	in.lb	Nm
1.0	25	40	5	80	10

Table 1

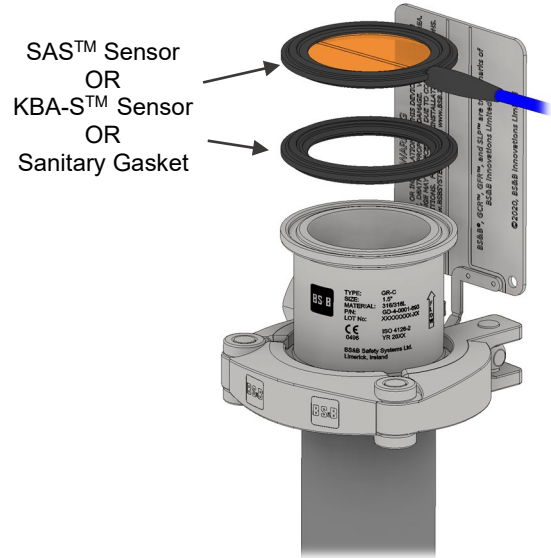


CAUTION: Un-even or under-torqueing can cause leakage. Excessive torqueing cause damage to the sensor and rupture disk.

7. Tighten clamp and gasket to BS&B recommended (table1) torque using an 18 mm AF socket for hexagonal nut.



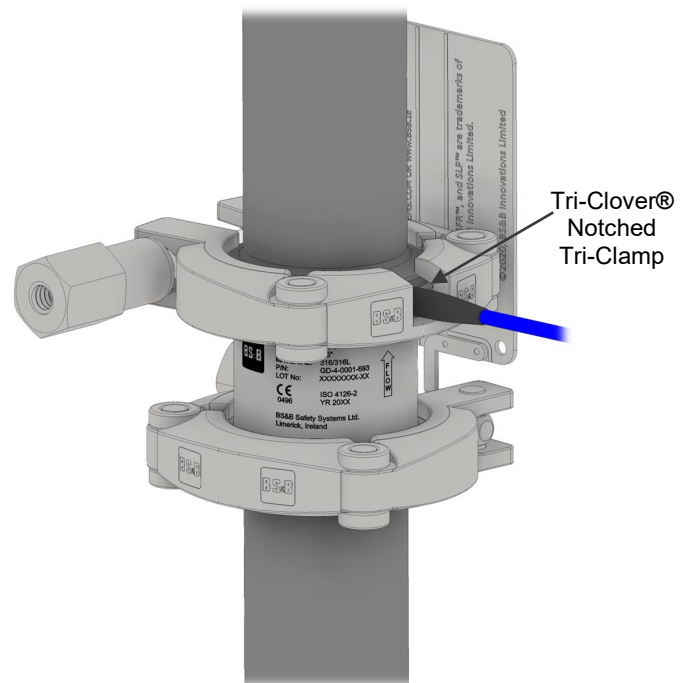
8. Place a new sanitary gasket or if installing a Sanitary Alert Sensor SAS™ or KBA-S™ on the downstream ferrule.



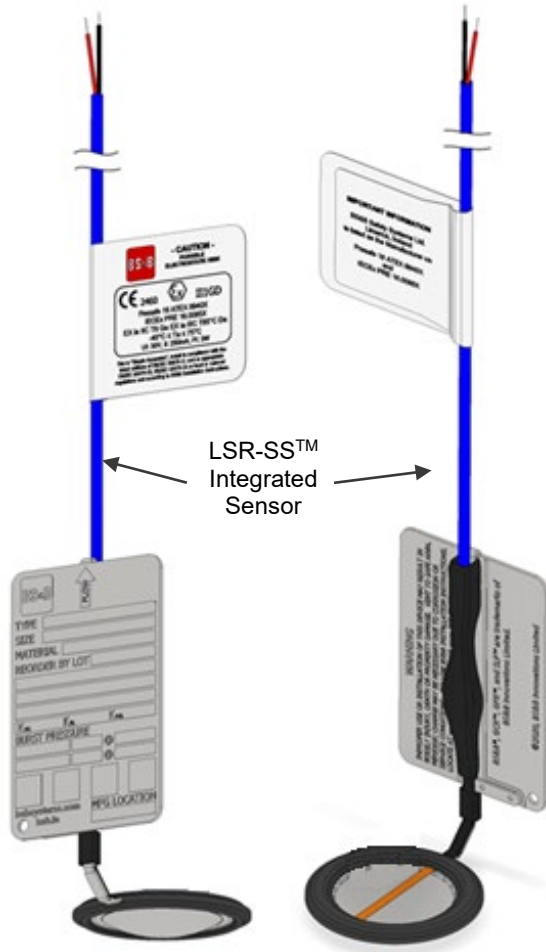
9. Install downstream discharge tubing. Ensure gasket or SAS™ sanitary alert sensor is seated properly into the seat of both ferrules before installing the clamp.

10. For SAS™ sanitary alert sensor or KBA-S™, if the notched clamp is used route cable through the notch, otherwise route the cable on top of the clamp tightening screw, ensure the cable is not obstructed or compressed or cut by the sanitary clamp. Ensure both ferrules are inside the groove before tightening the clamp.

11. Tighten clamp and gasket to BS&B recommended torque (table 1) using an 18 mm AF socket for hexagonal nut.



LSR-SS™ WITH INTEGRATED SENSORS



- Competent trained personnel should install the disk and sensor assembly devices in accordance with these installation instructions following the Installation steps on previous section and user electrical requirements.
- Install the disk and sensor assembly in the pipeline before connecting the electrical monitoring equipment. When uninstalling a rupture disk and sensor assembly, disconnect the electrical monitoring equipment prior to removal of the sensor from the piping system.
- Do not locate where the disk and sensor assembly membrane may be exposed to snow, ice, and heavy rain. This may break the sensor wire.
- Do not locate where the sensor to cable connection may be damaged from bending or stress.
- The disk and sensor assembly are not designed for dust service conditions.
- Handle the sensor with care. Do not fold, twist or stretch the sensor as this may break or weaken the conductive circuit and cause a false signal.
- Check that all the disk and sensor assembly materials are compatible with the process conditions to avoid false signal generation due to corrosive attack on the disk.
- The sensor assembly should not be installed in contact with conductive process media as this may cause a false signal.

- Ensure that the opening of the disk and sensor assembly does not affect the performance of downstream equipment.
- The sensor **must not** be modified in any way except with the approval of BS&B Safety Systems. Unapproved modification may affect pressure containment and/or disk and sensor performance. Failure to obtain such approval voids the warranty on this product.

Temperature Range

Suitable for process temperatures -40°F (-40°C) to a maximum of 450°F (232°C).

NOTE: For European CE marked sensors, certification classification is dependent on the ambient temperature at the sensor location, ensure that the correct temperature classification has been ordered.

CAUTION: Do not locate cable on or near hot surfaces.

Cable maximum operating temperature specification is:

- Standard Cable: -4°F (-20°C) to 167°F (75°C). BELDEN® 9451 or similar.
- High Temperature Cable: -85°F (-65°C) to 392°F (200°C). BELDEN® 9451SB or similar.
- LSZH (Low Smoke Zero Halogen): -22°F (-30°C) To 221°F (105°C). BELDEN® 9451SB or similar.

Electrical Specification

- Maximum Voltage: 30 V DC
- Maximum Power: 3W (for ATEX, IECEx, EAC Ex)
- Maximum Current: 250mA (500mA without ATEX, IECEx, EAC Ex)

Lower values shall be used where Intrinsically Safe conditions are to be maintained. Sensors are designed to function at a few microwatts of power.

CE (ATEX) & IECEx Marked Sensors

The sensor assembly is deemed "simple apparatus" and where certified complies with EN/IEC 60079-0 & EN/IEC 60079-11, "Explosive Atmospheres - Equipment Protection by Intrinsic Safety" and the ATEX Directive 2014/34/EU and IECEx Standard under the following marking codes:

Ex II 1 G D

Ex ia IIC T6 Ga	EX ia IIIC T85°C Da	-40°C ≤ Ta ≤ +75°C
Ex ia IIC T5 Ga	EX ia IIIC T100°C Da	-40°C ≤ Ta ≤ +90°C
Ex ia IIC T4 Ga	EX ia IIIC T135°C Da	-40°C ≤ Ta ≤ +125°C
Ex ia IIC T3 Ga	EX ia IIIC T200°C Da	-40°C ≤ Ta ≤ +190°C
Ex ia IIC T232°C Ga	EX ia IIIC T232°C Da	-40°C ≤ Ta ≤ +217°C

IMPORTANT - Within the “Safe Area” of the installation, the system designer / installer to ensure the sensor is connected to a customer supplied Ex safety barrier or Ex isolated barrier in line with requirements of EN/IEC 60079-25 and EN/IEC 60079-26. All electrical equipment should be installed and maintained to a recognized national standard.

Marking

Each disk and sensor assembly is marked with the following information;

- Rupture Disk and Sensor Assembly Type.
- Rupture Disk and Sensor Assembly nominal size and corresponding pipe flange rating.
- Lot number.
- In addition, for European CE Marked Disk and Sensor Assembly, where certified the following additional marking is applied to the sensor tag;
- CE mark and notified body number “2460”.
- Electrical certification code markings.
- Certificate number “*Presafe 16 ATEX 8940X*” & *IECEx PRE 16.0085X*”.
- Warning of possible Electrostatic Risk.
- Year of Manufacture.

EAC Ex Marked Sensors to TR-CU-012

The sensor assembly is deemed “simple apparatus” and where certified has explosion protection Exi (ia) as per GOST 31610.11-2014 (IEC 60079-11:2011), ensured by indicator design and build compliance to GOST 31610.0-2014 (IEC 60079-0:2011).



Explosion proof & Ignition proof marks as per GOST 31610.0;

0Ex ia IIC T6 Ga X	EX ia IIIC T85°C Da X	-40°C ≤ Ta ≤ +75°C
0Ex ia IIC T5 Ga X	EX ia IIIC T100°C Da X	-40°C ≤ Ta ≤ +90°C
0Ex ia IIC T4 Ga X	EX ia IIIC T135°C Da X	-40°C ≤ Ta ≤ +125°C
0Ex ia IIC T3 Ga X	EX ia IIIC T200°C Da X	-40°C ≤ Ta ≤ +190°C
0Ex ia IIC T232°C (T2) Ga X	EX ia IIIC T232°C Da X	-40°C ≤ Ta ≤ +217°C

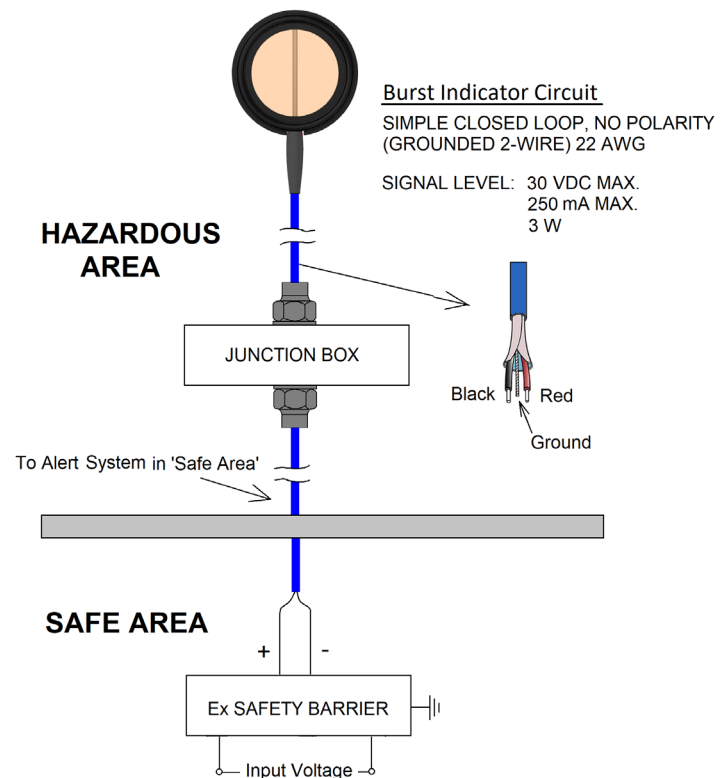
IMPORTANT - Within the Safe Area of the installation, the system designer / installer to ensure the sensor is connected to a customer supplied Ex safety barrier or Ex isolated barrier in line with requirements of GOST 31610 (EN/IEC 60079-25 and EN/IEC 60079-26). All electrical equipment should be installed and maintained to a recognized national standard.

EAC Ex Marking

Each disk and sensor assembly are marked with the following information.

- Rupture Disk and Sensor Assembly Type.
- Rupture Disk and Sensor Assembly nominal size and corresponding pipe flange rating.
- Lot number.
- **EAC Ex** mark.
- Warning of possible Electrostatic Risk.
- Year of Manufacture.
-

WIRING CONFIGURATION



- JB can be provided loose by BS&B or by Customer Installer.
- JB to be wired by Customer Installer.
- JB must be IP20 minimum.
- JB must have suitable Ex rated Cable Glands.
- JB must be marked 'Contains Intrinsically Safe Circuits'.
- JB must be installed in compliance with EN/IEC 60079-14 'Explosive Atmospheres. Electrical Installations Design, Selection & Erection or other mandated regional or national standards.

The outer Sheath of cable to be blue in color or marked 'Contains Intrinsically Safe (IS) Circuits'. (TYP)

Periodic Maintenance and Replacement Considerations

Rupture disks and safety heads are neither designed nor intended to be “permanent” products. Periodic inspection and replacement of rupture disks are strongly recommended. A rupture disk should be replaced, for example, if damaged, corroded, subject to excessive cycling or fatigue, pitted, accumulating customer product, or otherwise subject to any condition that may impair or impede the operation of the Rupture disk.

When inspecting Rupture disks installed in a pre-torqued safety head (holder), the disk-holder assembly may be removed, inspected, and, if determined to be fit for continued use, reinstalled while ensuring that the original and proper torque on the holder cap screws is not relaxed. Rupture disks installed in safety heads not having the pre-torqued feature must be replaced when the flange stud torque is relaxed. Rupture disks of that type (tension-loaded, forward-acting disks) in non-pretorqued safety heads are not suited to inspection by removal and re-installation.

Neither a damaged disk nor a damaged safety head should be subject to further use. Customers may request BS&B's inspection of safety heads. In some instances, BS&B may recondition holders to provide for continued use.

Due to varying customer applications and processes, BS&B is unable to provide a uniform inspection and replacement period recommendation for disks and holders. At the outside, BS&B recommends an inspection cycle of no longer than 24 months or the standard inspection cycle of the owner / operator of the facility, whichever is more frequent.

Process pressure and / or temperature fluctuations may cause a rupture disk to activate prematurely due to excessive cycling and characteristic fatigue. To minimize potential releases and / or downtime associated with cycle fatigue activations, BS&B recommends a maximum replacement cycle of 36 months from the date of installation unless a BS&B “Relief Device Manager” or a BS&B-approved real-time monitoring system is used that is capable of sampling and identifying pressure spikes or excursions occurring in the single millisecond range.

Shelf-life

Shelf life is dependent upon the shelf life of the integrated gasket. Consult BS&B for shelf-life recommendations.

Storage Conditions

Inside dry storage (relative air humidity not more than 60%) at room temperature (+15°C to +25°C) and out of direct sunlight.

Disposal

Rupture disks with integral sensors and sensor packaging do not contain hazardous substances or hazardous materials in their construction. Sensor packaging is suitable for recycling. Sensors exposed to hazardous substances shall be decontaminated before disposal. Disposal of decontaminated sensors in authorized landfill in line with local and national laws is recommended.

Warranty

The manufacturer ("Manufacturer") of these goods ("Goods") warrants the Goods, when installed, used and maintained in accordance with the Manufacturer's specifications, requirements, installation instructions and other directions, against defective workmanship and materials for the periods specified below. Buyer's failure to install, use and maintain the Goods in strict compliance with all material operating specifications and at minimum recommended intervals shall void this warranty.

Manufacturer warrants its Goods as follows:

- Pressure relief devices, including rupture disk devices, pressure relief valves, sensors, explosion vents and buckling pin devices - 12 months from date of shipment.
- Flame arresters, breather vents - 12 months from date of shipment.
- Manufacturer's original equipment manufactured parts - 12 months from date of shipment.
- Spare parts for same - 90 days from date of shipment.

Warranty Limitations

Manufacturer manufactures and supplies Goods in reliance upon information and specifications provided by Buyer. The Buyer's or user's facility design, facility operating conditions and environment, process specifications, installation procedures, materials, hazard analysis risks, and/or other operational conditions can affect the performance of the Goods. Manufacturer shall have no liability, of whatever nature, resulting or arising from: (a) Buyer's failure to account for, disclose fully, and/or take appropriate precautions regarding all material operating conditions, facility design and operation details, design parameters, process specifications (including, but not limited to, fuel grade, process temperatures, process material, K_{st} , P_{max} , vibration involved and/or presence of corrosive or toxic materials), and system or vessel requirements; (b) placement of the Goods in a location other than represented to Manufacturer or required by Manufacturer; (c) Buyer's failure to protect other facility equipment and/or conduct an appropriate hazard analysis; (d) improper installation of the Goods; (e) any misrepresentations or omissions by Buyer; (f) and/or the system's operation, discharge or operation of the Goods as designed. If Manufacturer's quotation was based on assumptions regarding any of these factors (including K_{st} and/or P_{max} values), it is the Buyer's responsibility to verify the accuracy of such values.

Manufacturer does not warrant any article not manufactured by Manufacturer or its affiliated companies; those goods are subject solely to the warranties provided by their respective manufacturers and permitted to be passed through by a seller to Buyer. Manufacturer will provide a copy of those warranties upon request. Customer service or alteration of the Goods shall void this warranty.

Manufacturer does not warrant Goods against loss or damage caused directly or indirectly by Buyer's or user's improper system design; by the improper use, maintenance or installation (including improper mounting or torque) of the Goods; or by corrosion, erosion, malfunction or release from this or any other device caused by acids, chemicals, fumes, rust, dirt, debris, thermal shock, shock waves, water or moisture ingress, propagation from unprotected equipment, or other external agencies over which Manufacturer has no control.

No agent, distributor, employee or other representative (including Manufacturer's Distributors and Sales Representatives) has the right to modify or expand Manufacturer's standard warranty applicable to the Goods or to make any representations as to the Goods other than those set forth in Manufacturer's product literature and any such unauthorized affirmation, representation or warranty, if made, should not be relied upon by Buyer and shall not form a part of these Terms and Conditions.

The Goods should be inspected and replaced periodically. To determine the appropriate inspection and replacement intervals, the Buyer and user of the Goods should consider all application, installation precision, and process-environment conditions and parameters, including but not limited to, whether the user's process involves pressure cycles (pulsations), involves temperature fluctuations, has the potential for corrosion or degradation of the Goods, and whether there are other relevant process variables that may reduce the service life of the Goods or otherwise prevent the Goods from performing as designed and intended.

THE WARRANTIES HEREIN GIVEN ARE EXCLUSIVE AND IN LIEU OF ALL WARRANTIES, EXPRESS OR IMPLIED, BY OPERATION OF LAW OR OTHERWISE, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. BUYER'S SOLE AND EXCLUSIVE REMEDY FOR BREACH OF ANY WARRANTY SHALL BE, AT SELLER'S OPTION, THE REPAIR OR REPLACEMENT OF THE GOODS, EX WORKS, SELLER'S POINT OF SUPPLY. MANUFACTURER'S AGGREGATE TOTAL LIABILITY TO BUYER FOR ANY AND ALL LOSS OR DAMAGE ARISING OUT OF BUYER'S USE OR INABILITY TO USE THE PRODUCT SHALL IN NO EVENT EXCEED THE PURCHASE PRICE OF THE PRODUCT. IN NO EVENT SHALL SELLER BE LIABLE FOR SPECIAL, INCIDENTAL, CONSEQUENTIAL OR PUNITIVE DAMAGES RESULTING FROM USE OF THE GOODS.

SERVICES WARRANTY

Warranty - Manufacturer warrants its labor, repair, installation, maintenance, and commissioning services for a period of ninety (90) days from the date of service.

BS&B Safety Systems, L.L.C. and BS&B Safety Systems Ltd. are here to assist you in providing a safe and efficient workplace. For assistance on installation, audits, training or technical advice, please contact our Customer Service Department.

This document is related to EU-Type examination certificate 'Presafe 16 ATEX 8940X' and related to EAC Ex examination certificate. Document changes must be approved by the Engineering Department of BS&B Safety Systems Ltd.

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