

Busmann series BSPD

Type 1 and Type 2 surge protective devices for switchgear and power distribution panels



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1.0 Introduction

1.1 Manual organization

This installation manual describes the safe installation, testing and operation of the Bussmann™ series BSPD Surge Protective Devices (SPDs).

This manual is organized into the following sections:

- 1.0 Introduction
- 2.0 Installation
- 3.0 Operating features
- 4.0 Troubleshooting
- 5.0 Specifications
- 6.0 Catalog number system
- 7.0 Warranty

1.2 Product overview

The BSPD protects critical electrical and electronic equipment from damage by surges. This is done by shunting surges (and other transient disturbances) to ground and away from the equipment on the circuit that's being protected. It does this in nanoseconds by providing a low impedance surge path-to-ground while allowing a continued, uninterrupted flow of power to the circuit's loads.

The BSPD is designed for wall mounting (or other vertical surface) as close as possible to the electrical cabinet or panelboard. The BSPD is available in voltage ratings from 208-600Vac, with surge current capacity ratings of 120kA, 200kA, 300kA and 400kA in either NEMA 1 or NEMA 4 enclosures.

The BSPD is available in three configurations; 1)Basic, 2)Standard, and 3) Standard with Surge Counter as described in Section 3, *Operating Features*. Each configuration is available for Delta and Wye electrical systems.

All BSPD models have been tested by Underwriters Laboratory (UL) and are listed to UL 1449, 3rd Edition.

The *Basic* configuration BSPD units are Type 1 SPDs that can be installed on either the lineside or loadside of the service entrance panel overcurrent protective device. The *Standard* and *Standard with Surge Counter* configurations are Type 2 SPDs that can **only** be installed on the loadside of the service entrance panel overcurrent protective device.

All BSPD units enable compliance with 2014 NEC® 700.8 that requires a listed SPD to be installed in or on all emergency system switchboards and panelboards.

1.3 Safety precautions

A licensed/qualified electrician must complete all instructions in this manual in accordance with the National Electric Code (NEC®), state, and local codes and agency requirements, or other applicable country codes. All applicable local electrical codes supersede these instructions.

1.4 Catalog numbering system

Each BSPD has a name plate that identifies the parameters used for manufacture. These parameters are expressed in letters and numbers to reflect the series, kA rating, voltage/system type code (e.g., Wye or Delta), configuration and NEMA enclosure rating, as shown in Table 1. To see the complete catalog numbering / product build-a-code system, see Section 6.0, *Catalog Number System*.

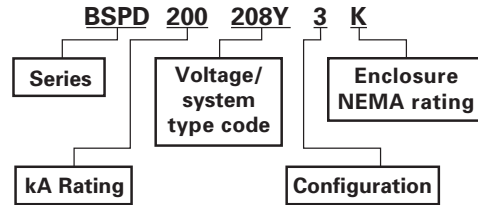


Table 1. catalog numbering system

For example, a 208 volt Wye (4-wire plus Ground) for use in a NEMA 1 application requires an SPD build-a-code catalog number BSPD200208Y3K, where:

- BSPD = SPD model
- 200 = the kA rating (200kA)
- 208Y = the voltage/system type (208Vac, Wye)
- 3 = the configuration (Standard with surge counter)
- K = the enclosure rating (NEMA 1)

These numbers appear as part of the product labels attached to the side of the SPD. See Figure 1.

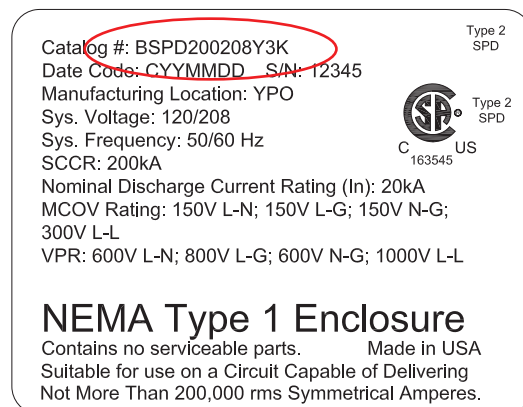
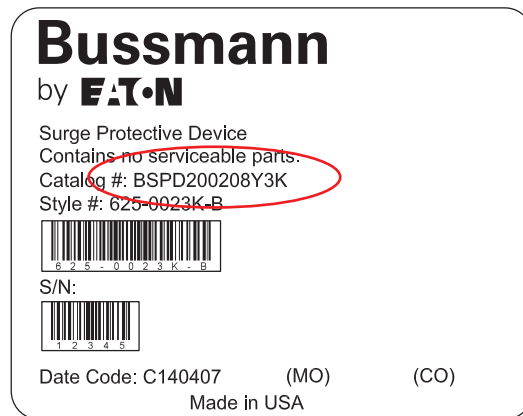


Figure 1. product labels

1.5 Signal words

The signal words “DANGER,” “WARNING,” “CAUTION” and “NOTICE” (along with their assigned symbol) throughout this manual indicate the degree of hazard the user may encounter.

These symbols and words are defined as:



DANGER: Indicates a hazardous situation which, if not avoided, will result in death or serious injury.



WARNING: Indicates a hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION: Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.



NOTICE: Indicates a hazardous situation which, if not avoided, could result in property damage.

	DANGER
	<p>HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH</p> <p>WILL RESULT IN DEATH OR SERIOUS INJURY</p> <p>Working on or near energized circuits poses a serious risk of electric shock. De-energize all circuits before installing or servicing this equipment and follow all prescribed safety procedures.</p>

	CAUTION
	<p>ELECTRIC SHOCK HAZARD</p> <p>Ungrounded power systems are inherently unstable and can produce excessively high line-to-ground voltages during certain fault conditions.</p> <p>During these fault conditions any electrical equipment, including an SPD, may be subjected to voltages, which exceed their designed ratings.</p> <p>This information is being provided to the user so that an informed decision can be made before installing any electrical equipment on an ungrounded power system.</p>

1.6 Qualified person

For the purpose of this Instruction Leaflet, a qualified person:

- (a) is familiar with the subject equipment and the hazards involved with their application, use, administration and maintenance.
- (b) is trained and authorized to de-energize, clear, ground, and tag circuits and equipment in accordance with established safety practices.
- (c) is trained in the proper care and use of personal protective equipment such as rubber gloves, hard hat, safety glasses or face shields, arc-flash clothing, etc., in accordance with established safety practices.
- (d) is trained to render first aid.

- (e) has received safety training to recognize and avoid the hazards involved.
- (f) has the skills and knowledge pertaining to the construction and operation of this equipment and its installation.

IMPORTANT: These procedures do not claim to cover all possible details or variations encountered with the installation of a Surge Protective Device (SPD), nor do they provide for all possible conditions that may be encountered. If further information is desired or needed to address any particular issue not covered in this document, contact your Bussmann products representative. The information in this document does not relieve the user from exercising good judgment, nor from using sound safety practices.

Note: Because Eaton has a policy of continuous product improvement, we reserve the right to change design specifications without notice. Should a conflict arise between the general information in this document and the contents of drawings or supplementary material, or both, the latter shall take precedence. For the latest version of this Instruction Leaflet, download “Instruction sheet” from the Eaton website at: www.cooperbussmann.com/Surge.

The contents of this Instruction sheet are not part of, nor do they modify, any prior or existing agreement, commitment or relationship. The Bussmann terms and conditions of sale constitute the entire obligation of Bussmann. The warranty in the terms and conditions of sale is the sole warranty of Bussmann. Any statements in this document do not create new warranties or modify any existing warranty.

1.7 Safety Concerns

This instruction sheet is not comprehensive. It is assumed the SPD installer will follow established safety procedures for working in an electrical environment. For more information on safety precautions and procedures, consult the following websites:

- National Fire Protection Association (NFPA) www.nfpa.org
- Underwriters Laboratories (UL) www.ul.com
- National Electrical Mfgs. Association (NEMA) www.nema.org
- American National Standards Association (ANSI) www.ansi.org
- Institute of Electrical and Electronics Engineers (IEEE) www.ieee.org

1.8 Equipment Testing

Every Bussmann series BSPD unit is tested at the factory for dielectric breakdown. No further SPD testing is required for installation.

If you desire to test the electrical distribution system or equipment by performing dielectric, megger, or hi-potential tests, any installed SPD must be disconnected from the power distribution system to prevent damage to the unit.

Follow this procedure to safely disconnect the SPD:

For SPDs connected to a circuit breaker or fuse:

- A. 3-wire Delta SPDs: Turn off the circuit breaker or remove the fuses from the fuse holder to isolate the SPD.
- B. Wye SPDs: Turn off the circuit breaker or remove the fuses from the fuse holder to isolate the SPD and remove the Neutral connection

1.5 Señalamientos

Las palabras de señalamiento "PELIGRO", "ADVERTENCIA", "PRECAUCION" y "AVISO" (junto con su símbolo asignado) en este manual indican el grado de peligro que el usuario puede encontrar.

Estos señalamientos y palabras están definidos como:



PELIGRO: indica una situación peligrosa que, de no evitarse, provocará la muerte o lesiones graves.



ADVERTENCIA: indica una situación peligrosa que, de no evitarse, provocará la muerte o lesiones graves.



PRECAUCION: indica una situación peligrosa que, de no evitarse, puede provocar lesiones leves o de consideración.



AVISO: indica una situación peligrosa que, de no evitarse, puede provocar daños materiales.

	PELIGRO
	<p>PELIGRO DE CHOQUE ELÉCTRICO, EXPLOSIÓN O ARCO ELÉCTRICO. PUEDE PROVOCAR LA MUERTE O LESIONES GRAVES</p> <p>Trabajar con o cerca de circuitos energizados conlleva serios riesgos de sufrir una descarga eléctrica. Desenergice todos los circuitos antes de instalar o dar servicio a este equipo y siga todos los procedimientos prescritos de seguridad.</p>

	PRECAUCION
	<p>RIESGO DE CHOQUE ELÉCTRICO</p> <p>Los sistemas de energía no aterrizados a tierra son inherentemente inestables y pueden producir voltajes excesivamente altos de la línea a tierra durante ciertas condiciones de falla.</p> <p>Durante estas condiciones de falla cualquier equipo eléctrico, incluyendo un SPD, puede estar sujeto a voltajes que superan su clasificación con la que fueron diseñados.</p> <p>Esta información se proporciona al usuario para que la tenga en cuenta antes de instalar cualquier equipo eléctrico en un sistema de energía no aterrizados.</p>

1.6 Personal calificado

Para el propósito de estas instrucciones, una persona calificada es aquella que:

- (a) está familiarizada con el equipo descrito y los peligros que estén involucrados con su aplicación, uso, administración y mantenimiento.
- (b) está capacitada y autorizada para desenergizar, limpiar, conectar a tierra y etiquetar circuitos y equipo de acuerdo con las prácticas de seguridad establecidas.
- (c) está entrenada en el cuidado y uso de equipos de protección personal, como guantes de goma, casco, gafas de seguridad o protectores faciales, ropa de arco eléctrico, etc, de acuerdo con las prácticas de seguridad establecidas.

(d) está entrenada para dar primeros auxilios.

(e) ha recibido entrenamiento de seguridad para reconocer y evitar los riesgos involucrados.

(f) tiene las habilidades y conocimientos relativos a la construcción y operación de este equipo y su instalación.

IMPORTANTE: Estos procedimientos no pretenden cubrir todos los detalles posibles o variaciones encontradas mientras se instala el SurgePOD PRO, ni prevén medidas específicas para todas las condiciones posibles. Si se desea o se necesita más información para tratar cualquier asunto en particular que no se incluye en este documento, póngase en contacto con su representante Eaton. La información contenida en este documento no exime al instalador de ejercer un buen juicio, ni de hacer uso de buenas prácticas de seguridad.

Nota: ya que Bussmann tiene la política de mejora constante de producto, nos reservamos el derecho de cambiar las especificaciones de diseño sin previo aviso. En caso de diferencias entre la información general de este documento y el contenido de los dibujos o material complementario, o ambos, este último será el que prevalezca. Para obtener la última versión de estas instrucciones puede bajar la "Hoja de Instrucciones" de la página web de Eaton en: www.cooperbussmann.com/Surge.

Los contenidos en esta Hoja de Instrucciones no son parte de, ni modifican, cualquier acuerdo previo o existente, compromiso o relación. Los términos y condiciones de venta de Bussmann constituyen la totalidad de su obligación. La garantía en los términos y condiciones de la venta es la única garantía de Bussmann. Todas las declaraciones contenidas en este documento no crean nuevas garantías o modifican cualquier garantía existente.

1.7 Asuntos de seguridad

Estas instrucciones no son limitativas. Se asume que el instalador del SurgePOD PRO seguirá las medidas de seguridad establecidas para trabajar en un ambiente eléctrico. Para obtener más información sobre las precauciones y procedimientos de seguridad, consulte los siguientes sitios web:

- Asociación Nacional de Protección contra Incendios (NFPA por sus siglas en inglés) www.nfpa.org
- Laboratorios de Consulta sobre Seguridad y Certificación (UL por sus siglas en inglés) www.ul.com
- Asociación Nacional de Fabricantes Eléctricos (NEMA por sus siglas en inglés) www.nema.org
- Asociación Nacional Estadounidense de Estándares (ANSI por sus siglas en inglés) www.ansi.org
- Instituto de Ingenieros Eléctricos y Electrónicos (IEEE por sus siglas en inglés) www.ieee.org

1.8 Pruebas al equipo

Cada unidad de la Bussmann series BSPD es probada en la fábrica por una ruptura dieléctrica. No se necesitan más pruebas para la instalación del SPD.

Si usted desea probar el sistema de distribución de energía o algún equipo llevando a cabo pruebas dieléctricas, de alto potencial o de medición de aislamiento, cualquier SPD instalado debe ser desconectado del sistema de distribución de energía para prevenir daños a la unidad.

Siga estos pasos para desconectar de manera segura el SPD:

Para SPDs conectados a un interruptor termomagnético o a un fusible:

- A. SPDs trifásicos Delta: Apague el interruptor termomagnético o remueva los fusibles del su portafusibles para aislar el SPD.
- B. SPDs en Y: Apague el interruptor termomagnético o remueva los fusibles del su portafusibles para aislar el SPD y remueva la conexión del Neutro.

1.5 Mots indicateurs

Les mots indicateurs "DANGER", "AVERTISSEMENT", "ATTENTION", ET "AVIS" (avec leur symbole attribué) indiquent, tout au long de ce manuel, le degré de risque que l'utilisateur pourrait rencontrer.

Ces symboles et mots indicateurs sont définis comme:

DANGER: indique une situation dangereuse qui, si non évitée, entraînera la mort ou des blessures graves.



AVERTISSEMENT: indique une situation dangereuse qui, si non évitée, pourrait entraîner la mort ou des blessures graves.



ATTENTION: indique une situation dangereuse qui, si non évitée, pourrait entraîner des blessures mineures ou modérées.



AVIS: indique une situation dangereuse qui, si non évitée, pourrait entraîner des dommages matériels.



1.6 Personne Qualifiée

	DANGER
	<p>RISQUE DE CHOC ÉLECTRIQUE, D'EXPLOSION OU DE COUP D'ARC ENTRAÎNERA LA MORT OU DES BLESSURES GRAVES</p> <p>Travailler sur ou près des circuits sous tension pose un risque sérieux de choc électrique. Couper l'alimentation de tous les circuits avant d'installer ou d'entretenir l'équipement et suivre toutes mesures de sécurité prescrites.</p>

	ATTENTION
	<p>RISQUE DE CHOC ÉLECTRIQUE</p> <p>Les systèmes électriques sans mise à la terre sont intrinsèquement instables et peuvent produire des tensions phase-terre trop élevées lors de certaines conditions de défaut.</p> <p>Lors de ces conditions de défaut, tous les équipements électriques, y compris les DPS, peuvent être soumis à des tensions supérieures à leur capacité nominale.</p> <p>Cette information est offerte à l'utilisateur afin que celui-ci puisse prendre une décision informée avant d'installer tout équipement électrique dans un système électrique sans mise à la terre.</p>

Aux fins de ce feuillet d'instructions, une personne qualifiée:

- (a) est familière avec l'équipement en question et les dangers impliqués dans son application, son usage, son administration et son entretien.
- (b) est formée et autorisée à éteindre, dégager, mettre à la terre, et marquer l'équipement et les circuits, conformément aux pratiques de sécurité établies.
- (c) est formée à l'usage et l'entretien approprié de l'équipement de protection personnelle, tel que les gants en caoutchouc, le casque et les lunettes de sécurité, les vêtements de protection de coup d'arc, etc., conformément aux pratiques de sécurité établies.

- (d) est formée pour administrer les premiers soins.
- (e) a reçu la formation de sécurité servant à reconnaître et éviter les dangers impliqués.
- (f) détient les compétences et les connaissances relatives à la construction et au fonctionnement de cet équipement et de son montage.

IMPORTANT: Ces procédures ne prétendent pas couvrir tous détails et variations possibles lors du montage d'un Dispositif de Protection contre les Surtensions (DPS) ni ne prétendent-elles fournir des solutions pour toutes conditions pouvant être rencontrées. Si de plus amples renseignements sont désirés ou requis pour adresser toute problématique particulière non couverte par ce document, veuillez contacter votre représentant Bussmann. L'information contenue dans ce document ne libère pas l'installateur d'exercer bon jugement, ni d'utiliser de bonnes pratiques de sécurité.

Note: Étant donné que Bussmann a une politique d'amélioration continue de ses produits, nous réservons le droit de modifier les spécifications de conception sans préavis. Dans le cas d'un conflit entre l'information générale contenue dans ce document, et un dessin technique ou un matériel supplémentaire, ou tous deux, c'est les derniers qui prévalent. Pour obtenir la version la plus récente de ce feuillet d'instructions, télécharger « Feuillet d'Instruction » du site Web Bussmann à: www.cooperbussmann.com/Surge.

Le contenu de ce feuillet d'instructions ne fait pas partie, ni ne modifie, toute entente précédente ou existante, ni engagement ou relation. Les termes et conditions de vente de Bussmann.

constituent l'obligation entière de Bussmann. La garantie dans les termes et conditions de vente est la seule garantie offerte par Bussmann. Aucune déclaration dans ce document n'offrira de nouvelles garanties, ni modifiera toute garantie existante.

1.7 Questions de sécurité

Ces instructions ne sont pas exhaustives. Il est présumé que l'installateur du DPS suivra les consignes de sécurité établies pour travailler dans un environnement électrique. Pour plus d'informations sur les précautions et les procédures de sécurité, veuillez consulter les sites Web suivants:

- National Fire Protection Association (NFPA) www.nfpa.org
- Underwriters Laboratories (UL) www.ul.com
- National Electrical Manufacturer's Association (NEMA) www.nema.org
- American National Standards Association (ANSI) www.ansi.org
- Institute of Electrical and Electronics Engineers (IEEE) www.ieee.org

1.8 Essai des Équipements

Chaque dispositif de la Bussmann série BSPD est mis à l'essai à l'usine pour rupture diélectrique. Aucun autre essai du DPS n'est requis pour le montage.

Si vous désirez mettre à l'épreuve le système de distribution électrique ou l'équipement en entreprenant des mises à l'essai de rigidité diélectrique ou par mégohmmètre, les DPS installés doivent être débranchés du système de distribution de l'énergie.

Suivez cette procédure afin de débrancher le DPS sans danger:

Pour les DPS connectés à un disjoncteur, ou un fusible:

- A. DPS Delta à 3 fils : Éteindre le disjoncteur ou retirer les fusibles du porte-fusible afin d'isoler le DPS.
- B. DPS en Y : Éteindre le disjoncteur ou retirer les fusibles du porte-fusible afin d'isoler le DPS et retirer la connexion du neutre. Suivre ces instructions attentivement pour assurer un montage et assemblage adéquat. Assurez-vous que toutes attaches et connexions soient bien serrées selon les valeurs spécifiées. Un montage non conforme à ces instructions annulera la garantie. Afin d'assurer l'intégrité du montage fini, NE PAS installer le DPS si celui-ci a subi une chute ou a été endommagé lors du montage.

2.0 Installation

Important: Read these instructions carefully to assure proper installation. Ensure all fasteners and connections are tightened to specified values. Installation in a manner inconsistent with these instructions will void the warranty.

To ensure integrity of finished installation, do NOT install the SPD if it has been dropped or abused during the installation process.

The SPD contains no user serviceable parts and cannot be repaired. Performing the following may compromise the unit's performance and will void the warranty:

- Do NOT open or tamper with NEMA 1 units
- Do NOT remove deadfront of, or tamper with NEMA 4X units
- Do NOT megger or hi-pot test the unit
- Do NOT install in a system that has a nominal voltage greater than the unit's rated nominal system voltage
- Do NOT install with lead lengths less than six (6) inches. Doing so will void the warranty

2.1 Preparation for installation

Type 1 and Type 2 SPD NOTE: The *Basic* configuration BSPD units are Type 1 SPDs that can be installed on either the lineside or loadside of the service entrance panel overcurrent protective device. The *Standard* and *Standard with Surge Counter* configurations are Type 2 SPDs that can **only** be installed on the loadside of the service entrance panel overcurrent protective device.

Before installing a BSPD unit, do the following:

- Verify the SPD's UL Type is correct for the intended installation — see above note on Type 1 and Type 2 SPDs
- Confirm that the system voltage and type (Wye/Delta) matches the SPD you are installing. Check the label on the side of the SPD for system voltage and type (see *Catalog Number System* on page 11 for details).
- Verify that the area is clear of any dirt, debris or clutter that may hamper the installation process
- Verify that there is enough space to install the SPD (see dimensions in Section 2.3, *Installation Procedures*).
- Confirm that all tools, equipment and supplies needed for the installation are available
- Check the facility grounding system. All grounding, bonding and earthing must meet the NEC® and any other national, state and local electrical codes and agency standards.

2.2 Installation locations

The BSPD SPD can be installed next to, above or below any existing electrical cabinet or panelboard.

The ideal mounting location is as close to the electrical enclosure and electrical connection points as possible. The BSPD unit should be mounted in such a way as to minimize lead length and any sharp bends in the wiring conduit.

2.3 Installation procedures

1. Before mounting the SPD, first determine the location and ensure that the mounting surface can support the weight of the SPD (See Figures 2, 3 and 4 for model weights). For maximum performance, mount the unit as close as possible to the wiring connection points within the enclosure.
2. Lay out the four enclosure mounting holes using the enclosure dimensions provided in Figures 2, 3 and 4. Drill the appropriate holes per the product dimensions and use #10 fasteners for NEMA 1 enclosures and 1/4" fasteners for NEMA 4X enclosures.

3. Determine the correct length and install metal conduit onto the SPD. NEMA 1 SPDs have a 3/4 inch trade size chase nipple and NEMA 4X SPDs have a 3/4 inch trade size hub. Route all Phase, Neutral (where applicable), Ground and Form C contact wires (where applicable) through the conduit.
4. Determine the hole location on the receiving electrical cabinet/panelboard and either remove the knock-out provided or drill/punch the appropriate size hole at this location. Route the SPD wires through the enclosure hole and mount the SPD unit using the appropriate fasteners for the enclosure's NEMA rating. Be sure to remove metallic shavings/plug created during the drilling or punching process.

Note: On NEMA 4X enclosures, be sure to use appropriate fittings/gaskets that retain the integrity of the SPD's and electrical cabinet's NEMA 4X ratings after being installed per the manufacturer's specifications.
5. Select the correct wiring diagram for the SPD you are installing. You must refer to this diagram while wiring the SPD. See Figures 6 and 7.
6. Determine the wire lengths required to make the Ground and Neutral (where applicable) connections and cut the wires to the appropriate lengths. Again, maximize SPD performance by keeping these wires as short as possible.
7. Determine the wire lengths required to make the SPD Phase connections and cut the wires to the appropriate length. (To maximize SPD performance keep wire length as short as possible.) Connect the Phase wires.

Note: For wire lengths longer than six (6) inches, maximize SPD performance by twisting once for every four (4) inches of wire length.
8. BSPD *Standard* and *Standard with Surge Counter* configurations have a Form C contact relay for remote monitoring. The Form C contacts are rated at 150Vac/125Vdc at 1A max. Make the remote monitoring connections per the Form C contact relay wire color codes in Figure 5. Follow all national, state and local electrical codes and agency standards when making these connections.

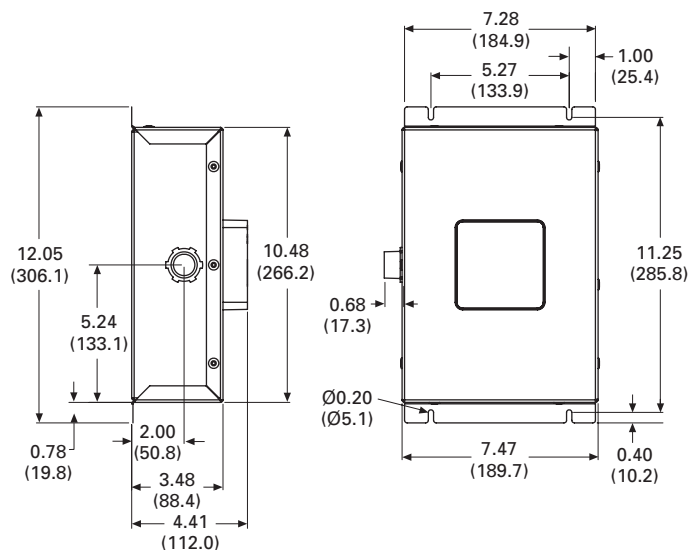


Figure 2. 120-200kA Units in a NEMA 1 Enclosure, Weight = 6.8 lbs (3.1 kg)

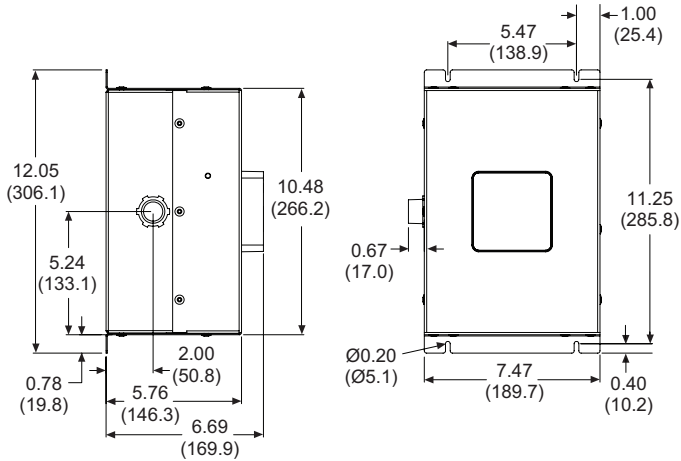


Figure 3. 300-400kA units in a NEMA 1 enclosure, weight = 13.5 lbs (6.1 kg)

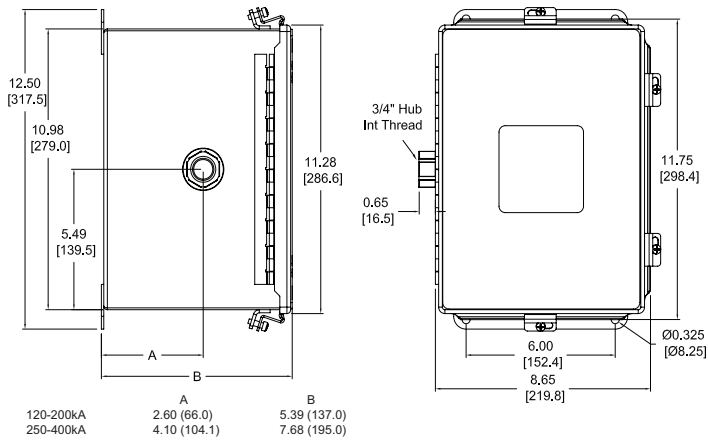


Figure 4. 120-400kA units in a NEMA 4X enclosure, weight = 120-200kA; 14.6 lbs (6.6 kg), 250-400kA; 21.0 lbs (9.5 kg)

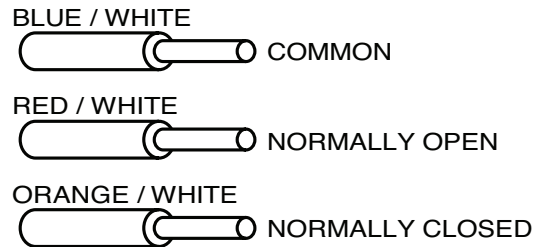


Figure 5. form C contact relay wire color codes

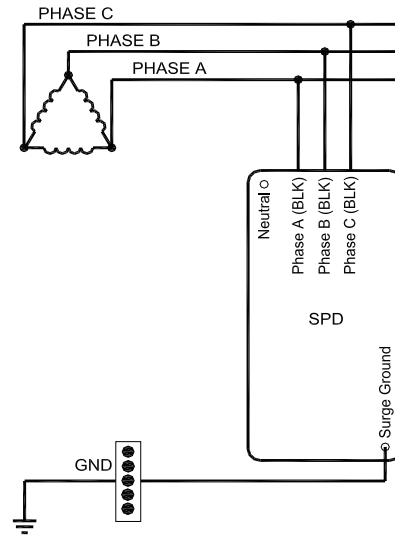


Figure 6. 3-phase, delta units

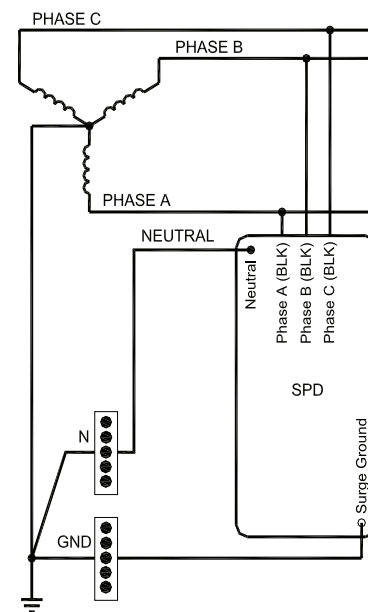


Figure 7. 3-phase, Wye units

3.0 Operating features

3.1 General

The BSPD SPDs are available in three configurations:

- Basic
- Standard
- Standard with surge counter

Each configuration is described below.

The BSPD SPDs require no operator involvement other than to monitor the display panel to determine SPD status.

After installation and system power is applied, the SPD automatically begins protecting downstream electrical equipment from voltage transients.

Some SPD units have a Form C contact relay that allows for the remote monitoring of SPD status. Form C contact relay wires are permanently connected to the SPD.

3.2 Displays and indicators

All BSPD configurations have a system status display panel. The display panel is slightly different for each.

All display panels have green and red Light Emitting Diodes (LEDs) on each phase to indicate the protection status. Green indicates the phase is protected. Red indicates a loss of protection. Units for Wye electrical system have an additional set of green/red LEDs to indicate Neutral-to-Ground protection status.

standard and *standard with surge counter* units have an audible alarm will sound when any red LED illuminates.

Specific operating conditions displayed for each configuration are described below.

3.2.1 Basic

The *basic* configuration display panel is shown in Figure 7.



Figure 7. Basic configuration display

The *Basic* configuration is a Type 1 SPD that can be installed on the lineside or loadside of the service entrance overcurrent protective device and has the following features:

- Green LEDs: Illumination indicates the phase is fully protected, and operating normally. **Note:** An illuminated green LED on a phase does NOT indicate power ON/OFF status, just the surge protection status of that phase. On Wye units with a Neutral wire, an additional illuminated green LED indicates the Neutral-to-Ground is fully protected, and operating normally.
- Red LEDs: Illumination indicates a loss of protection, and that one or more protective devices are inactive and unavailable for that phase. **Note:** Red LEDs do NOT indicate power ON/OFF status, just the surge protection status of that phase. On Wye units with a Neutral wire, an additional illuminated Red LED indicates loss of Neutral-to-Ground protection.

3.2.2 Standard

The *Standard* configuration display panel is shown in Figure 8.



Figure 8. standard configuration display

The *standard* configuration is a Type 2 SPD that can only be installed on the loadside of the service entrance overcurrent protective device and has the following features:

- All features of the *basic* configuration
- One Form C contact relay rated at 150Vac/125Vdc @1A. max
 - Normal operating conditions; N.O. = OPEN, N.C. = CLOSED
 - Loss of protection on any phase or loss of power; N.O. = CLOSED, N.C. = OPEN
- Audible alarm with reset push button
- EMI/RFI filtering up to 50dB from 10kHz to 100MHz

3.2.3 Standard with surge counter

The *standard with surge counter* configuration display panel is shown in Figure 9.

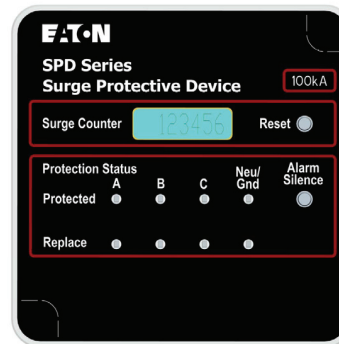


Figure 9. standard with surge counter configuration display

The *standard with surge counter* configuration is a Type 2 SPD that can only be installed on the loadside of the service entrance overcurrent protective device and has the following features:

- All features of the *standard* configuration
- Surge counter with LCD screen
- Counter reset push button to RESET the surge counter to zero

3.2.4 SPD display rotation

Regardless of any configuration’s mounting position, best display panel visibility can be accomplished by rotating the display 180 degrees, 90 degrees clockwise or 90 degrees counterclockwise.

NEMA 1 enclosures

1. Follow all prescribed safety procedures and deenergize the electrical system to remove power from the unit.
2. Remove and discard the perforated overlay material at the two opposite corners of the display panel.
3. Remove the two phillips head screws that hold the display panel onto the SPD enclosure.
4. Being careful not to overstress the display panel’s ribbon cable, rotate the display to the desired position.
5. Place the display back onto the SPD enclosure. Again, be careful not to overstress or crimp the ribbon cable.
6. Replace the two phillips head screws and tighten to 1.35 N•m (12 lb-in).
7. Follow all prescribed safety procedures to restore power to the electrical system.

NEMA 4X Enclosures

1. Follow all prescribed safety procedures and deenergize the electrical system to remove power from the unit.
2. Open the enclosure’s door.
3. Remove and discard the perforated overlay material at the two opposite corners of the display panel.
4. Remove the two phillips head screws that hold the display panel onto the SPD deadfront.
5. Being careful not to overstress the display panel’s ribbon cable, rotate the display to the desired position.
6. Place the display back onto the SPD deadfront. Again, be careful not to overstress or crimp the ribbon cable.
7. Replace the two phillips head screws and tighten to 1.35 N•m (12 lb-in).
8. Close and secure the enclosure’s door so that its NEMA 4X rating is reestablished.
9. Follow all prescribed safety procedures to restore power to the electrical system.

4.0 Troubleshooting

Many SPD failures result from improper installation. Once the SPD is properly installed, it is a highly reliable unit. If the SPD does not function properly, first confirm that the SPD is correct for the system voltage and type (Wye/Delta) and is properly installed (See Section 2, *Installation*).

If the SPD malfunctions after it has been routinely operating, refer to Table 2, *Troubleshooting Chart*. This troubleshooting chart lists conditions, probable causes and solutions. Further assistance may be obtained by calling our Application Engineering Team between 7:00 a.m. and 5:00 p.m. Central Time, at 1-855-287-7626 or sending an e-mail to fusetech@eaton.com.

Table 2. Troubleshooting Chart

Condition	Probable Cause	Solution
Green LEDs ON (1 per phase) and one Green LED ON for Neutral/Ground Protection	Normal operation	N/A
Audible Alarm OFF; Form C (N.C.) contact in the CLOSED state	Normal operation	N/A
Phase Green LED is OFF, same Phase Red LED is ON, Audible Alarm is ON	Phase protection compromised or lost	Replace SPD
	Extended Temporary Overvoltage (TOV) Significant surge event	Check electrical system for TOV sources, correct, replace SPD Replace SPD
Neutral/Ground Green LED is OFF, Neutral/Ground Red LED is ON, Audible Alarm is ON (for models with Neutral connections)	Neutral/Ground protection is compromised or lost	Replace SPD
	Significant surge event	Replace SPD
All Phase Green LEDs OFF, all phase RED LEDs ON, Audible Alarm is ON	All phase protection is compromised or lost	Replace SPD
	SPD rated voltage is less than system voltage	Replace SPD with correct voltage model
	Extended Temporary Overvoltage (TOV) Significant surge event	Check electrical system for TOV sources, correct, replace SPD Replace SPD
One of the display panel Red LEDs is ON. Audible Alarm is OFF	Audible Alarm Silence button has been depressed and Alarm is silenced	Normal operation
		If power is cycled and a fault condition still exists, the Audible Alarm will reactivate
All Green and Red LEDs are OFF, LCD display (on Surge Counter models) is OFF	SPD is not connected to a an energized system	Check system voltage at SPD connection
	Power is OFF on two phases	Check SPD connections

5.0 Specifications

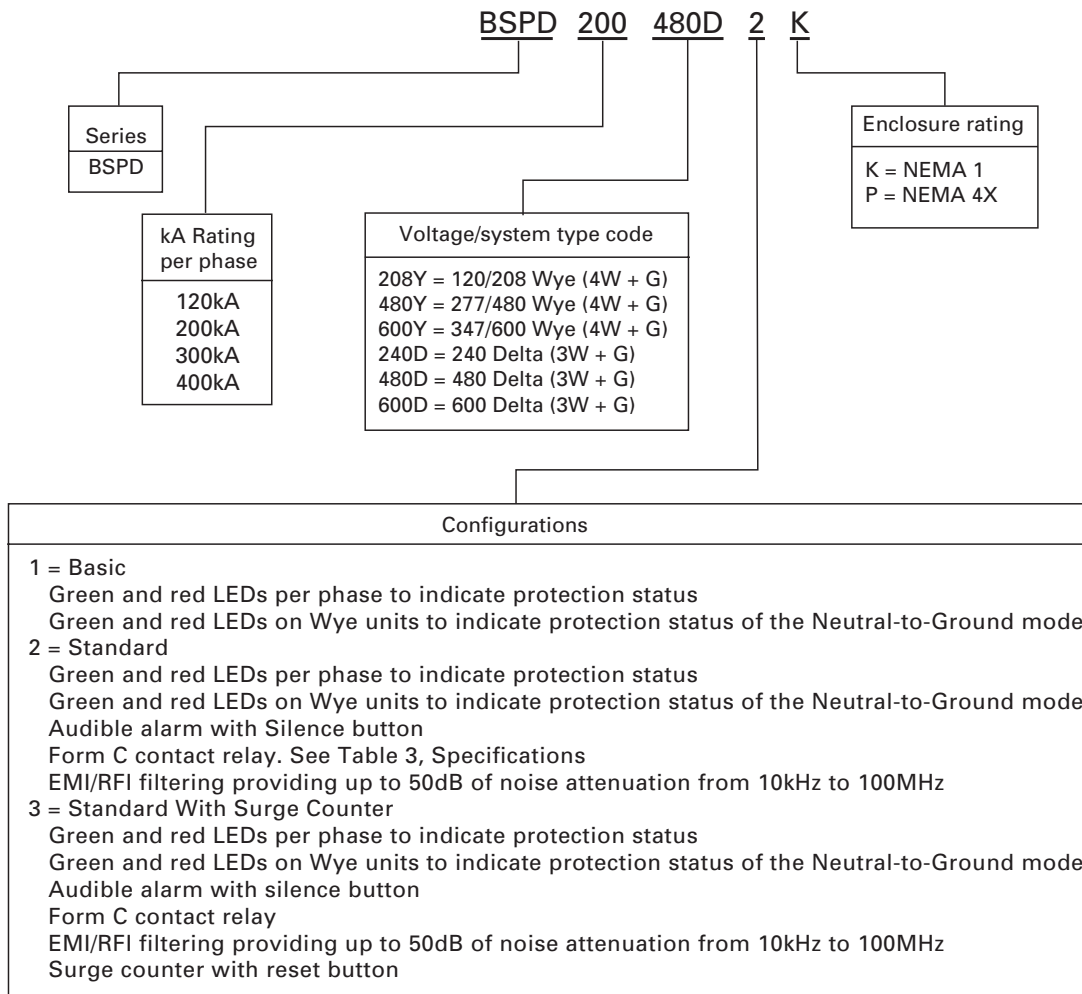
Table 3. Specifications

Description	Specification
Available system voltages	
Three-phase Wye	120/208, 277/480 and 347/600
Three-phase Delta	240, 480 and 600
Input power frequency	50/60Hz
Maximum Continuous Operating Voltage (MCOV)	
208Y, and 240D voltage/system type codes	150 L-N, 150 L-G, 150 N-G, 300 L-L
480Y Voltage/system type code	320 L-N, 320 L-G, 320 N-G, 640 L-L
600Y Voltage/system type code	420 L-N, 420 L-G, 420 N-G, 840 L-L
480D Voltage/system type code	640 L-G, 640 L-L
600D Voltage/system type code	840 L-G, 840 L-L
Short-Circuit Current Rating (SCCR)	200kA
Nominal discharge current (I_n)	20kA
Surge current capacity per phase (I_{max})	120kA, 200kA, 300kA and 400kA ratings available
SPD types	Type 1 (<i>Basic</i> configuration, can also be used in Type 2 applications) Type 2 (<i>standard</i> and <i>standard with surge counter</i> configurations)
Enclosure types	NEMA 1, NEMA 4X
Ports	1
SPD Conductor length/gauge	48" (1.22m) 10AWG stranded copper
Form C contact relay (<i>standard</i> and <i>standard with surge counter</i> configurations only)	
Contact ratings	150Vac or 125Vdc, 1A maximum
Lead length/gauge	48 inches (1.22m) / 14AWG
Contact logic	Power ON, normal state; N.O. contact = OPEN, N.C. contact = CLOSED Power OFF, fault state; N.O. contact = CLOSED, N.C. contact = OPEN
Power consumption	
Basic configuration	
208Y and 240D voltage/system type codes	0.5W
480Y and 480D voltage/system type codes	1.1W
600Y and 600D voltage/system type codes	1.3W
Standard and standard with surge counter configurations	
208Y and 240D voltage/system type codes	0.6W
480Y, and 480D voltage/system type codes	1.7W
600Y and 600D voltage/system type codes	2.1W
Protection modes	Three-phase Delta; L-G, L-L Three-phase Wye; L-N, L-G, N-G, L-L
Operating temperature / humidity	-40 to +50°C (-40 to +122°F) / 5% to 95%, non-condensing
Operating altitude - ft (m)	16,000 (5000)
EMI/RFI filtering attenuation	Up to 50dB from 10kHz to 100MHz (<i>standard</i> and <i>standard with surge counter</i> configurations)
Weight - lbs (kg)	NEMA 1: 120kA-200kA - 6.8 (3.1), 30- 400kA -13.5 (6.1) NEMA 4X: 120-200kA - 14.6 (6.6), 300-400kA - 21.0 (9.5)
Agency information	- <i>Basic, standard</i> and <i>standard with surge counter</i> configurations UL Listed 1449 3rd Edition File E316410 Guide VCZA, CSA Certified Notice 516 File 243397 - <i>Standard</i> and <i>standard with surge counter</i> configurations are also UL Recognized 1283 5th Edition File E316410 Guide VCZA2, CSA Component Acceptance Std. C22.2 No. 8-M1986 File 243397
Seismic withstand capability	Meets or exceeds the requirements specific to I.B.C. 2006, C.B.C 2007 and U.B.C Zone 4
Warranty	10 Years (see warranty statement 3A1502 for details at www.cooperbusmann.com/Surge)

6.0 Catalog number system

Table 4. BSPD product build-a-code

The build-a-code catalog numbering system permits specifying any configuration to meet requirements.



7.0 Warranty

The BSPD surge protective devices are warranted to each individual buyer for a period of 10 years. For details, see limited warranty statement 3A1502 online at www.eaton.com/cooperbusmannseries.



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