LEVITON

# X Series Surge Protective Devices

Cat. No. X2120 - Ratings: 120/240VAC, 60 Hz

Cat. No. X3120 - Ratings: 208Y/120VAC WYE, 60 Hz

Cat. No. X3277 - Ratings: 480Y/277VAC WYE 60 Hz

## Installation Manual




WEB VERSION

# 1 WARNINGS AND CAUTIONS

**READ THESE INSTRUCTIONS BEFORE INSTALLING.**

**WARNINGS:**

- **TO AVOID FIRE, SHOCK OR DEATH, disconnect power and test that power is OFF before installing or servicing product.**
- **CAREFULLY READ AND FOLLOW INSTRUCTIONS to avoid injury, death or property damage.**
- Must be installed and serviced by an electrician.
- Hazardous voltages exist within SPDs.
- Use appropriate safety precautions including Personal Protection Equipment.
- Failure to follow these instructions can result in death, serious injury, and/or equipment damage.

**Bonding and Grounding Hazard**

Verify that the neutral conductor in the service entrance equipment is bonded to ground in accordance with the National Electric Code (NEC®) and all applicable codes. During installation into an electrical system the SPD must not be energized until the electrical system is completely installed, inspected and tested. All conductors must be connected and functional including the neutral (if required).

The voltage rating of the SPD and system must be verified before energizing the SPD. Failure to follow these guidelines can lead to abnormally high voltages at the SPD. This may cause the SPD to fail. The warranty is voided if the SPD is incorrectly installed and/or if the neutral conductor in the service entrance equipment or downstream of separately derived systems is not bonded to ground in accordance with the NEC.

**Do Not Hi-Pot Test SPDs**

Any factory or on-site testing of power distribution equipment that exceeds normal operating voltage such as high-potential insulation testing, or any other tests where the suppression components will be subjected to higher voltage than their rated Maximum Continuous Operating Voltage (MCOV) must be conducted with the SPD disconnected from the power source. For 4-wire systems, the neutral connection at the SPD must also be disconnected prior to performing high-potential testing. Failure to disconnect the SPD and associated components during elevated voltage testing will damage the SPD and will void the warranty.

**CAUTIONS:**

**SPDs on Ungrounded Systems**

Ungrounded systems are inherently unstable and can produce excessively high line-to-ground voltages during certain fault conditions. During these fault conditions, any electrical equipment, including an SPD, may be subjected to voltages which exceed their designated ratings. An SPD designated specifically for ungrounded systems should be used.

**Unpacking and Preliminary Inspection**

Inspect the entire shipping container for damage or signs of mishandling. Remove the packing materials and further inspect the unit for any obvious shipping damages. If any damage was found, and is a result of shipping or handling, immediately file a claim with the shipping company and forward a copy to Leviton.

**Storage Environment**

This SPD should be stored in a clean, dry environment. Storage temperature range is -31°F to +167°F (-35°C to +75°C). Avoid exposure to high condensation.

# 2 PRE-INSTALLATION

## 2.1 Operating Environment

The standard unit uses a Type 4 enclosure. Flush-mount kits are available as options. Before installing, ensure that your enclosure type and application are appropriate with regard to moisture, dirt, excessive dust, flammable materials or atmospheres, corrosive vapors, etc. This SPD is designed in an ambient temperature range of -31°F to +167°F (-35°C to +75°C) with a relative humidity of 0% to 95% (noncondensing). Excessive temperature may inadvertently operate internal thermal over-temperature protectors.

## 2.2 Line Side versus Load Side Installation

The X Series SPDs carry either a Type 1 or Type 2 rating, as defined in UL 1449 and the National Electrical Code. Type 1 SPDs are intended to be installed on the line side of the service disconnect overcurrent device but may also be installed on the load side. Type 2 SPDs are intended to be installed on the load side of the service disconnect overcurrent device.

**NOTE:** Devices with UL1293 Filtering are qualified to the same standards, but can only be installed as Type 2 devices per UL specification.

## 2.3 Audible Noise

SPD background noise is negligible or non-existent, and does not restrict the location of installation.

## 2.4 Lead Lengths and Maximizing SPD Performance

SPDs must be located as close to the circuit breakers as possible to minimize parasitic losses. Use the shortest and straightest possible leads for pre-plan installations and ensure that nearest breaker positions are used. If new construction, adjust breaker locations as appropriate. When longer leads are unavoidable, gently twist leads together (one to two twists per foot), or tie-wrap leads together.

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# 2 PRE-INSTALLATION

## 2.5 Voltage Rating

Before installing the SPD, verify that it has the same voltage rating as the power distribution system. Compare the SPDs nameplate voltage or model number and ensure that SPD configuration matches the intended power source.

## 2.6 Circuit Breaker Connected

When connected on the load side of the main disconnect, we suggest connecting via a circuit breaker. The circuit breaker is the intended disconnect switch and provides short circuit protection to the connecting conductors. These SPDs have internal overload protection elements within the product. These SPDs have demonstrated 200kA Short Circuit Current Ratings (SCCRs).

## 2.7 System Grounding

An equipment grounding conductor must be used on all electrical circuits connected to the SPD. For the best performance, use a single point ground system where the service entrance grounding electrode system is connected to and bonded to all other available electrodes, building steel, metal water pipes, driven rods, etc. (For reference see, IEEE Std 142-2007.) For sensitive electronics and computer systems, we recommend that the ground impedance measurement be as low as possible.

When metallic raceway is used as an additional grounding conductor, an insulated grounding conductor should be run inside the raceway. Adequate electrical continuity must be maintained at all raceway connections. A separate isolated ground for the SPD is NOT recommended. Proper equipment connections to the grounding system and ground grid continuity should be verified via inspections and testing on a regular basis, as part of a comprehensive electrical maintenance program. On 4-Wire Power Systems, neutral to ground bonding (Main Bonding Jumper) must be installed per the NEC. Failure to do so WILL damage SPDs.

## 2.8 UL 1283 Required Language Concerning the Installation of EMI Filters

**a.** An insulated grounding conductor that is identical in size and insulation material and thickness to the grounded and ungrounded circuit supply conductors, except that it is green with or without one or more yellow stripes, is to be installed as part of the circuit that supplies the filter. Reference should be made to Tables 250-122 of the National Electrical Code regarding the appropriate size of the grounding conductor.

**b.** The grounding conductor mentioned in item **a** is to be grounded to Earth at the service equipment or other acceptable building Earth ground, such as the building frame in the case of a high-rise steel-frame structure.

**c.** Any attachment-plug receptacles in the vicinity of the filter are to be of a grounding type, and the grounding conductors serving these receptacles are to be connected to Earth ground at the service equipment or other acceptable building Earth ground, such as the building frame in the case of a high-rise steel-frame structure.

**d.** Pressure terminal or pressure splicing connectors and soldering lugs used in the installation of the filter shall be identified as being suitable for the material of the conductors. Conductors of dissimilar metals shall not be intermixed in a terminal or splicing connector where physical contact occurs between dissimilar conductors unless the device is identified for the purpose and conditions of use.

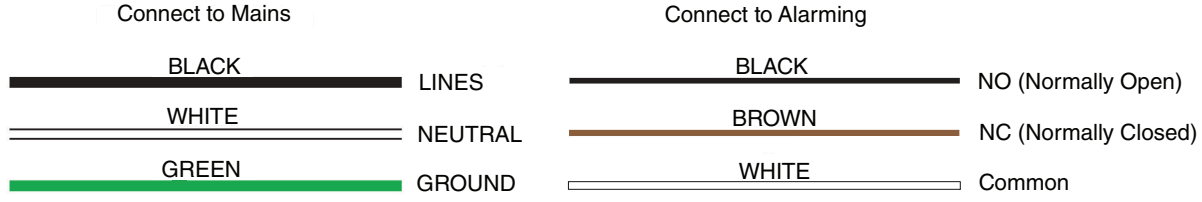
## 2.9 Retrofit into Existing Panel with No Available Breaker Positions

**Follow all applicable codes:** Consider consolidating loads that might free breaker positions. A 10 ft tap rule in NEC 240.21(B)(1), allows you to tap the bus as long as the tap conductors are rated at least 10% of the ampacity of the panel. In the case where the ampacity of the panel is larger than the wires of the SPD, consider tapping the bus per NEC 240.21(B)(1) and running appropriate size conductors to a safety switch fused to 20A. Mount the SPD immediately adjacent to the safety switch.

# 3 INSTALLATION

## 3.1 Pre-Plan Your Installation

- Meet all National and Local codes (NEC Article 285 addresses SPDs).
- Mount SPD as close to panel or equipment as possible to keep leads short.
- Ensure leads are as short and straight as possible, including neutral and ground.
- Consider a breaker position that is closest to the SPD and the panel's neutral and ground wires.
- Suggested breaker size is 20A.
- Make sure system is grounded per NEC and clear of faults before energizing SPD.




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# 3 INSTALLATION

## 3.2 Installation Instructions

**1.** Use a voltmeter to check all voltages to ensure correct SPD.

**2.** If SPD has Dry Contact, pre-plan its installation.

**3.** Turn OFF power at panel. Confirm panel is de-energized.

**4.** Identify connection and breaker locations and SPD location.

**5.** Make sure leads are short.

**6.** Remove an appropriately-sized knockout from panel.

**7.** Mount SPD. Connect to equipment using an approved wiring method, including seals appropriate for the enclosure rating.

**8.** Connect conductors as appropriate – short and straight as possible.

**NOTE:** Hi-Legs are Phase B.

**9.** Label or mark conductors, as appropriate.
Energized: BLACK
Neutral: WHITE
Ground: GREEN
Hi-Leg (Delta units only): ORANGE

**10.** Make sure system is bonded per NEC and is clear of hazards or faults before energizing. (N-G bonding, not per NEC, will fail SPDs.)

**11.** Energize and confirm proper operation of indicators and/or options. If RED LED flashes and Audible Alarm cycles, turn OFF power immediately and call for help.

# 4 OPERATION

## 4.1 LED Operation

- Each SPD contains two dual color LEDs per phase shown in the appropriate voltage configuration.
- When the LEDs are GREEN complete protection is present.
- During partial MOV stack failure, the LED will change state to AMBER.
- Upon full MOV stack failure, the LED will change state to RED.
- During any failure, the RED Service LED will illuminate. (For optional Advanced Diagnostics, LED will illuminate during Temporary Over-Voltage (TOV) and Surge Events.)

## 4.2 Audible Alarm

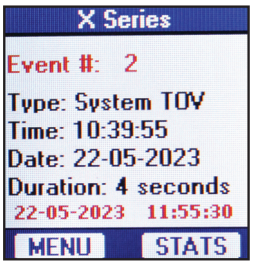
Similar to the LEDs, the audible alarm will sound upon a suppression element failure.

## 4.3 LCD Panel Operation

**Screen Saver -** Immediately, on power-up, the SPD scrolling screen saver appears. When any of the buttons are pressed, the SPD stops showing the screen saver, and advances to the Main Screen. The screen saver re-appears after 2 minutes and turns off after 5 minutes. Press any button to wake up the display.



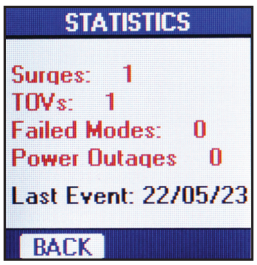

**Main Screen -** The Main screen is the starting point for navigating through the SPDs menus. It also shows the logged data for the most recent event and the current time and date. Press the right button (STATS) to go to the Statistics screen. Press the left button (MENU) to go to the Main Menu screen.




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# 4 OPERATION

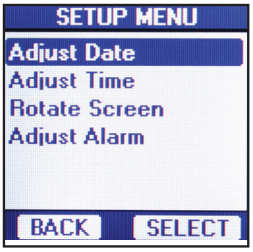
## 4.3 LCD Panel Operation



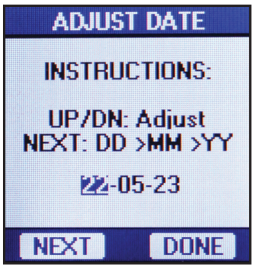

**Statistics Screen -** From the Main screen, press the right button (STATS). The Statistics screen shows the total number of surges, TOVs, failed modes, and power outages. It also shows you when the last event occurred. Press the left button (BACK) to return to the Main screen.



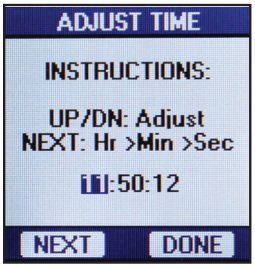

**Main Menu Screen -** The Main Menu screen allows you to navigate to the Setup Menu, Event Menu, About Screen, and the System Screen. Use the UP and DOWN buttons to highlight the desired menu or screen, and then press the right button (SELECT). Press the left button (BACK) to return to the Main Screen.



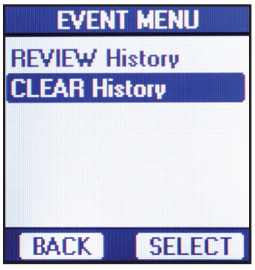

**Setup Menu Screen -** The Setup Menu screen allows you to set the time and date on the SPD. Accurately setting the date and time is **important**. All events are recorded with a timestamp. Use the UP and DOWN buttons to select the time or date, and press the right button (SELECT). Press the left button (BACK) to return to the Main
Menu Screen.




**Adjust Date Screen -** The Adjust Date screen allows you to set the date of the SPD. Use the UP and DOWN buttons to adjust the value in the selected field until you have the correct value. Press the left button (NEXT) to advance the cursor to the next date field. Press the right button (DONE) to finalize and save your changes to the SPD memory. The Setup Menu screen automatically appears.




**Adjust Time Screen -** The Adjust Time screen allows you to set the time of the SPD. Use the UP and DOWN buttons to adjust the value in the selected field until you have the correct value. Press the left button (NEXT) to advance the cursor to the next time field. Press the right button (DONE) to finalize and save your changes to the SPD memory. The Setup Menu screen automatically appears.

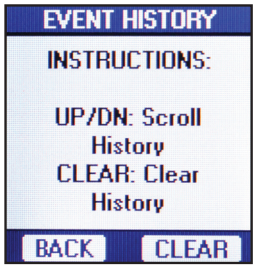



**Event Menu Screen** - The Event Menu screen allows you to review the SPD's event history or clear it. Use the UP and DOWN buttons to select which operation to perform. Press the left button (BACK) to return to the Main Menu screen. Press the right button (SELECT) to advance to the screen you have selected.

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# 4 OPERATION

## 4.3 LCD Panel Operation




**Event History Screen -** The Event History screen allows you to review each event the SPD has on record. Use the UP and DOWN buttons to scroll through the event log. Press the left button (BACK) to return to the Event Menu screen. Press the right button (CLEAR) to advance to the Clear Event
History screen.

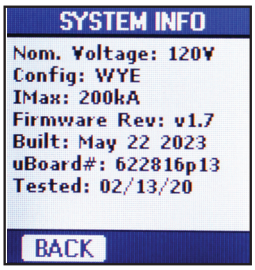
**Event Memory Screen (Not Shown) -** The Event Memory screen shows the remaining memory for event recording.




**Clear Event History Screen -** The Clear Event History screen allows you to clear the SPD's event log. Press the left button (YES) to clear the event log. Press the right button (NO) to keep the current event log. Either operation returns you to the Event History screen.

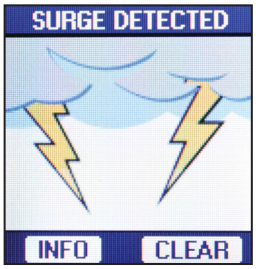



**About Screen -** From the Main Menu screen, you can access the About screen to display the manufacturer's information, the model number, and the serial number for this specific SPD. Press the left button (BACK) returns you to the Main Menu screen.

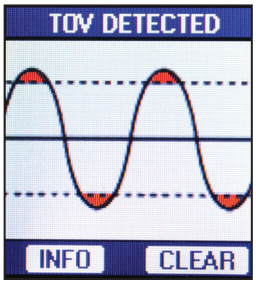



**System Info Screen -** The System Info screen displays the important electrical information for this system. This includes the nominal operating voltage, system configuration (e.g., Wye, Delta, Single-Phase), and maximum current rating for each mode on the SPD. The processor serial number, firmware edition, build and test dates are also shown on this screen. Press the left button (BACK) to return to the Main Menu screen.

### System Event Alarms




**Surge Event -** When the SPD detects a surge event the "Surge Detected" animation appears on the screen. It remains on the screen until it is acknowledged by an operator. Any subsequent events that occur while the Surge event animation appears on the screen, are registered and queued for acknowledgement. In addition, when the Surge animation appears on the screen, the Audio alarm sounds. Press the left button (INFO) to display additional information about the event. Press the right button (CANCEL) to acknowledge the event and silence the alarms.

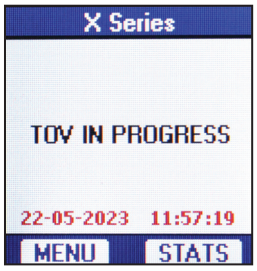



**Temporary Over Voltage Event -** When the SPD detects a TOV event the "TOV Detected" animation appears on the screen. It remains on the screen until it is acknowledged by an operator. Any subsequent events that occur while the TOV event animation appears on the screen, are registered and queued for acknowledgment. In addition, when the TOV animation appears on the screen, the Audio alarm sounds. Press the left button (INFO) to display additional information about the event. Press the right button (CLEAR) to acknowledge the event and silence the alarms.

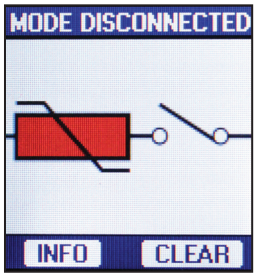
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# 4 OPERATION

## 4.3 LCD Panel Operation



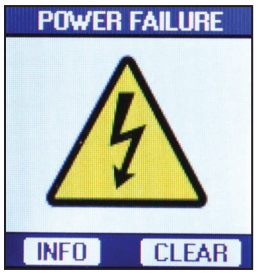

**Extended TOV Event -** If an operator attempts to clear a “TOV Detected” event while a TOV event is still in progress, the “TOV IN PROGRESS” screen appears.




**Mode Disconnection -** When the SPD detects a MOV disconnection, the “Mode Disconnected” animation appears on the screen. It remains on the screen until it is acknowledged by an operator. Any subsequent events that occur while the disconnection event animation is on screen, are registered and queued for acknowledgment. In addition, when the MOV disconnection animation screen appears, the the Audio alarm sounds and the “Form C” dry contacts change state. A corresponding LED also changes state during an MOV disconnection event. Press the left button (INFO) to display additional information about the event. Press the right button (CLEAR) to acknowledge the event and silence the alarms.




**Power Outage -** If the SPD is subjected to a power outage, the “Power Failure” animation displays on the screen. It remains on the screen until it is acknowledged by an operator. Any subsequent events that occur while the power outage event animation is on screen, are registered and queued for acknowledgment. In addition, when the Power Failure animation appears on the screen, the Audio alarm sounds and the “Form C” dry contacts change state. Press the left button (INFO) to display additional information about the event. Press the right button (CANCEL) to acknowledge the event and silence the alarms.




This SPD’s timekeeping is equipped to survive several days of a power outage. When power returns, the SPD records the date and time of the power loss and when power was restored. Should the SPD be exposed to an extended power outage, the SPD’s time and date should be checked for accuracy.

On initial installations where power may be cycled several times, the power outage alarm is designed to be suspended unitl the SPD has been energized for at least 1 hour.

## 4.4 Dry Contacts

Three, #22 AWG wires are included through the nipple as dry contacts.

**NOTES:**

- Dry contacts are designed for low-voltage or control signals only.
- Maximum switching current is 2A.
- Maximum switching voltage is 240V DC or AC.
- Higher energy applications require additional relay implementation outside the SPD.
- WHITE is Common, BLACK is Normally Open, and BROWN is Normally Closed.
- If the dry contacts are not used, insulate the lead ends, coil, and secure.

## 4.5 Maintenance

SPDs require minimal maintenance. We recommend periodic inspection of diagnostic indicators to ensure proper operation. We also recommend keeping the SPD clean, as appropriate.

## 4.6 Troubleshooting

Please contact Leviton for any service-related issues.

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# 5 STANDARD STATEMENTS AND WARRANTY

**FCC STATEMENT:**
This device complies with Part 15 of the FCC Rules and ISED License-exempt RSS standard(s). Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation. Changes or modifications not expressly approved by Leviton could void the user's authority to operate the equipment.
These limits are designed to provide reasonable protection against harmful interference in a commercial installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This Class A digital apparatus complies with Canadian CAN ICES-3(A)/NMB-3(A).

**FCC SUPPLIER'S DECLARATION OF CONFORMITY:**
Model X Series Surge Protective Devices are sold by Leviton Manufacturing Inc. 201 N. Service Rd, Melville, NY 11747. This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

**TRADEMARK DISCLAIMER:**
Use herein of third party trademarks, service marks, trade names, brand names and/or product names are for informational purposes only, are/may be the trademarks of their respective owners; such use is not meant to imply affiliation, sponsorship, or endorsement.

Leviton Manufacturing Co., Inc.

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Telephone : 1-800-824-3005

Visit Leviton's Web site at http://www.leviton.com.

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Specifications and price are subject to change at any time without notice.

**FOR CANADA ONLY.**
For warranty information and/or product returns, residents of Canada should contact Leviton in writing at **Leviton Manufacturing of Canada ULC** to the attention of the **Quality Assurance Department, 165 Hymus Blvd, Pointe-Claire (Quebec), Canada H9R 1E9 or by telephone at 1-800-405-5320.**

**CONNECTED EQUIPMENT WARRANTY**

Leviton provides a connected equipment warranty for select catalog numbers of Surge Protective Devices. For a copy of Leviton's connected equipment warranty and list of applicable catalog numbers, visit www.leviton.com/warranties. For a printed copy of the connected equipment warranty you may call 1-800-824-3005.

**LIMITED 10 YEAR WARRANTY AND EXCLUSIONS**

Leviton warrants to the original consumer purchaser and not for the benefit of anyone else that this product at the time of its sale by Leviton is free of defects in materials and workmanship under normal and proper use for ten years from the purchase date. Leviton's only obligation is to correct such defects by repair or replacement, at its option. **For details visit www.leviton.com or call 1-800-824-3005.** This warranty excludes and there is disclaimed liability for labor for removal of this product or reinstallation. This warranty is void if this product is installed improperly or in an improper environment, overloaded, misused, opened, abused, or altered in any manner, or is not used under normal operating conditions or not in accordance with any labels or instructions. **There are no other or implied warranties of any kind, including merchantability and fitness for a particular purpose**, but if any implied warranty is required by the applicable jurisdiction, the duration of any such implied warranty, including merchantability and fitness for a particular purpose, is limited to ten years. **Leviton is not liable for incidental, indirect, special, or consequential damages, including without limitation, damage to, or loss of use of, any equipment, lost sales or profits or delay or failure to perform this warranty obligation**. The remedies provided herein are the exclusive remedies under this warranty, whether based on contract, tort or otherwise.

**For Technical Assistance Call: 1-800-824-3005 (USA Only) or 1-800-405-5320 (Canada Only) www.leviton.com**

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