NOVARIS

The Lightning and Surge Protection Company

SFM MEDIUM CURRENT FILTER

Installation Manual

(0032-D16V2)

CONTENTS

Introduction

Novaris power line surge filters are designed for the protection of sensitive equipment from the damaging effects of lightning surges, power transients and other higher frequency powerline interference.

Novaris hardwire filters comprise MOV surge protection plus LC low pass filters for both single and three phase applications. The prime surge diverting elements are metal oxide varistors of a rating chosen to suit the application. This is primarily based upon surge current rating of the filter, high surge rating options are available for high exposure sites.

Three stages of protection include metal oxide varistors, inductors and capacitors forming a low pass filter and a final stage of metal oxide varistors to clamp the equipment side.

The first stage of protection consists of the metal oxide varistors. MOVs are connected between each phase and neutral to absorb transverse mode surges usually generated by load switching and other power system disturbances. These MOVs, in conjunction with the gas tube arrestor between neutral and ground, absorb common mode surges most often caused by lightning induced disturbances or power system earth faults.

The L-C filter and third stage of MOV's reduce the voltage let-through voltage to the equipment even further.

For further details of the performance benefits of surge filters and comparison with surge diverters please see the Novaris Application note 0015-D39V2.

Novaris surge filters use electronic alarms to monitor the health and status of the surge protection elements inside the filter. These take the form of LED displays on the individual SPD elements inside the filter and these are repeated to internal alarm relays which are used to operate voltage free contacts. These contacts are connected inside the filter to provide an overall external alarm provision which is available via terminals on the filter backplane. Please note that the alarm relay contacts are labelled for the non-energised condition.

Available Models

Novaris medium current surge filters are available in single and three phase formats, with current ratings from 40 to 125A. All filters are available in either 50, 100 or 200kA surge ratings, see tables below for full model listing and data sheet reference guide.

Medium Current Single-Phase Surge Filters

LOAD CURRENT / SURGE RATING	40A	63A	125A
500kA	SFM1-40-50-275	SFM1-63-50-275	SFM1-125-50-275
200kA	SFM1-40-200-275	SFM1-63-200-275	SFM1-125-200-275

Medium Current Three-Phase Surge Filters

LOAD CURRENT / SURGE RATING	40A	63A	125A
500kA	SFM3-40-50-275	SFM3-63-50-275	SFM3-125-50-275
200kA	SFM3-40-200-275	SFM3-63-200-275	SFM3-125-200-275

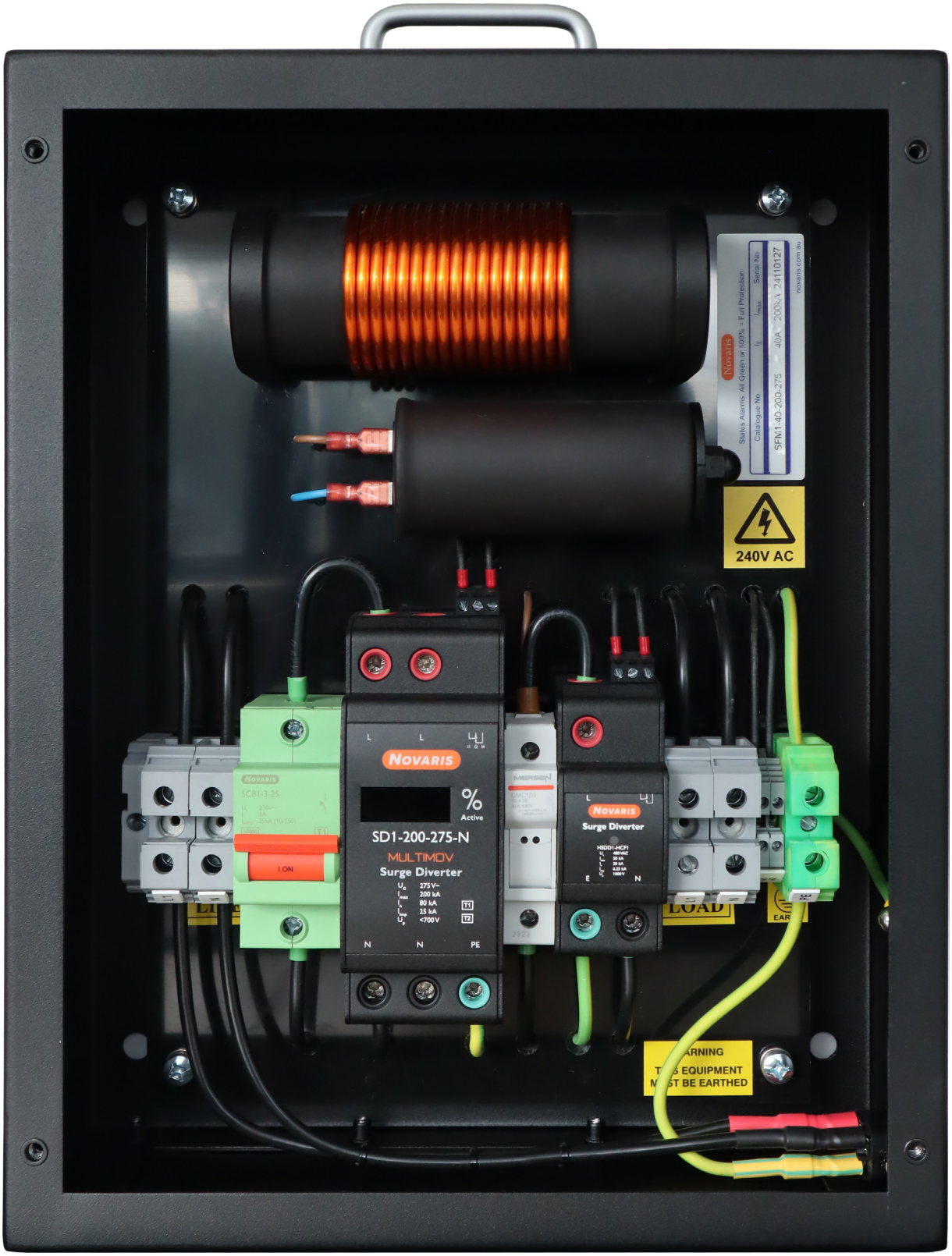
Product Data Sheet Reference Guide

Product	Data Sheet Number
SFM1-40-50-275	NDS1.2481
SFM1-40-200-275	NDS1.1640
SFM1-63-50-275	NDS1.1667
SFM1-63-200-275	NDS1.2238
SFM1-125-50-275	NDS1.2552
SFM1-125-200-275	NDS1.2022

Product	Data Sheet Number
SFM3-40-50-275	NDS1.2179
SFM3-40-200-275	NDS1.2348
SFM3-63-50-275	—
SFM3-63-200-275	NDS1.2271
SFM3-125-50-275	NDS1.2018
SFM3-125-100-275	NDS1.2089
SFM3-125-200-275	NDS1.1594

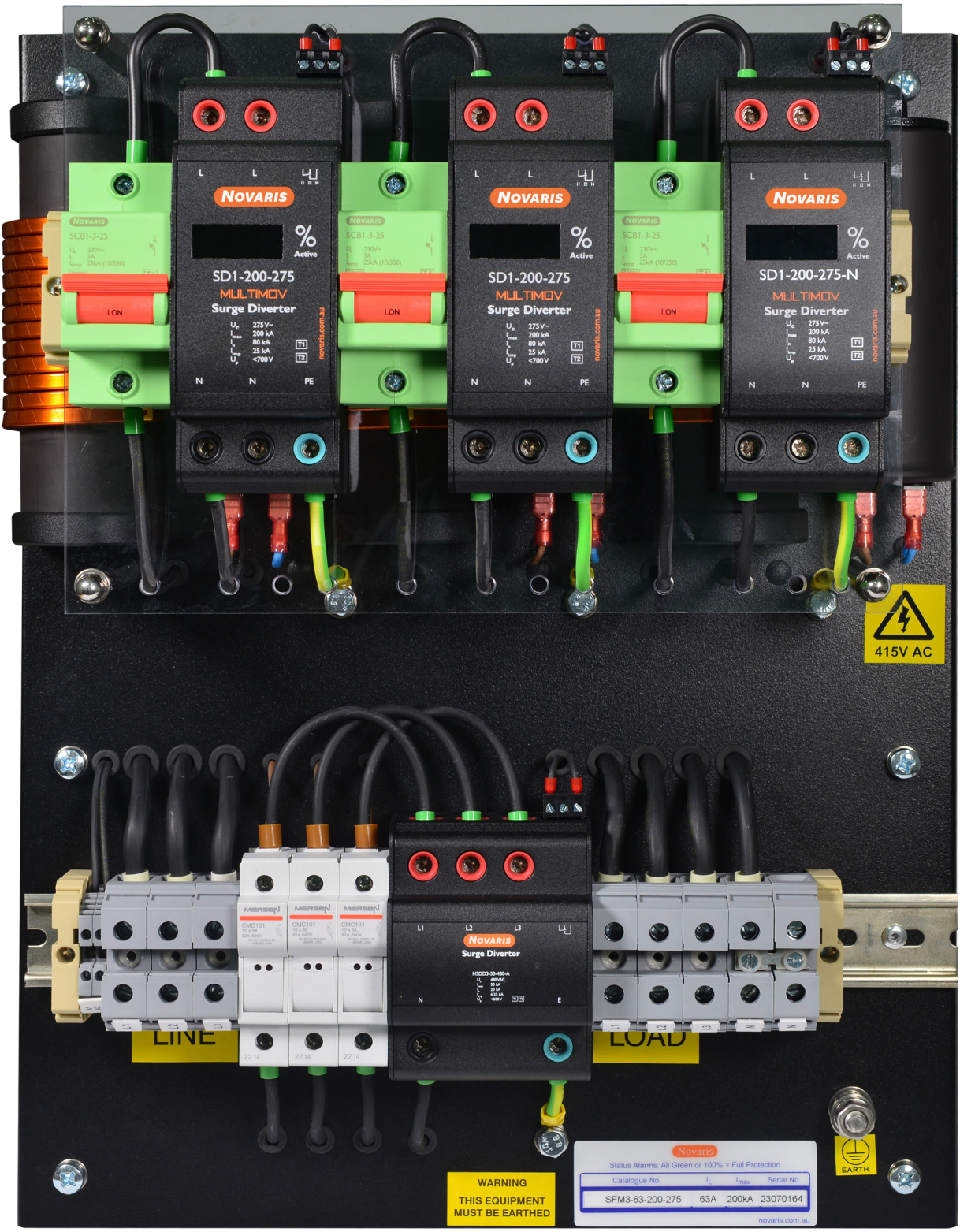
Product Photos

SFM1-XXX-XXX (Single Phase Medium Current Filter)



Product Photos

SFM3-XXX-XXX (Three Phase Medium Current Surge Filter)



Installation

It is mandatory that Novaris filters be installed by a licensed electrician in accordance with Australian Standard AS3000 or the relevant country wiring rules. To meet these standards the filter must be protected by a circuit breaker or fuses of rating equal to the current rating of the filter. If these are not included the filter must be preceded by external fuses or a circuit breaker no greater than the current rating of the filter.

Ideally the filter should be installed as close to the main incoming switch board or meter box as possible noting the need for wiring segregation and earthing.

For optimal system protection, the surge filter should be connected to a substantial earth point, such as a site main earth bar or switchboard earth bus with the shortest possible cable run. It is also recommended to run the cable as straight as possible, with the minimum number of sharp bends.

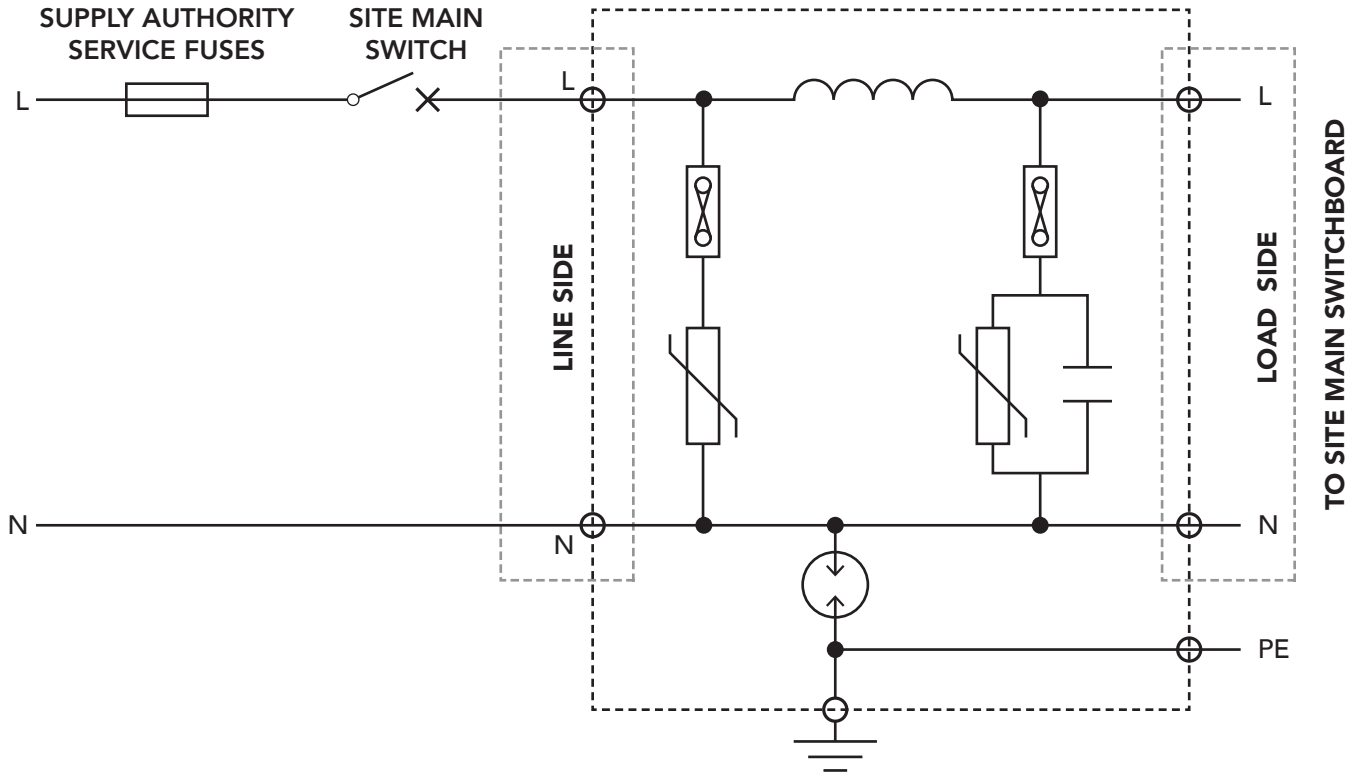


Figure 1. *Typical schematic for SFMX-XXX- XXX*

To ensure correct performance, the line side of the filter must be connected to the incoming mains side, with the load side connected to the loads to be protected. In the case of protecting a main switchboard, the line side must be connected to the incoming mains, with the load side output connected to the switchboard, as shown in Figure 1. Line and load side terminals are clearly labelled on all filters.

If the surge filter is to protect a distribution board, the filter is to be installed as close to the DB as possible, with the filter earth connected to the DB earth bar. The line side of the filter is to be connected to the incoming supply to the DB, and the load side output is to be connected to the distribution board.

The installation process can be broken down into the following steps:

1. Locate filter earthing point (Switchboard earth bar or site main earth bus) and install filter as close as possible, allowing for the straightest and shortest earth cable run.
2. Run earth conductor from filter earth terminal to designated earthing point.

3. Run line conductors to the bottom left of the filter enclosure and terminate in the provided terminals. Tighten to recommended torque setting, as per the product datasheet.
4. Run load conductors to the bottom right of the filter enclosure and terminate in the provided terminals, ensuring separation from incoming line side cables. Tighten to recommended torque setting, as per the product datasheet.
5. Connect the external alarm if necessary. A voltage free change-over contact is provided. Maximum conductor size is 2.5mm^2. The contact descriptions relate to the power on condition. Under normal operating conditions the relay is energised (N/O).
6. After installation, the filter may be tested for continuity and insulation with a handheld multimeter. A megger test will indicate excessive leakage, as it will cause the surge suppression components to operate.

Wiring Recommendations

Wiring must be completed by a licensed electrician and in accordance with AS3000 or the relevant country wiring standard.

Correct earthing is essential. Run an earth conductor of size specified in AS3000 or the relevant wiring rules to the nearest earth bar or site main earth bus. Avoid sharp bends and keep the earth conductor as short as possible. The best earth connection is made with 25 x 3mm copper strap, otherwise at least a minimum 16mm^2 conductor is recommended.

All input and output conductors must be sized as per relevant wiring rules, in co-ordination with up/down-stream overcurrent protection. For optimal performance, the incoming line side cables should be run to the bottom left hand side of the filter enclosure, with the output load side cables being run to the bottom right hand side. Maximum conductor size is 35mm^2.

As the purpose of the filter is to remove surges and other transient overvoltage disturbances which may be caused by induction or direct injection, it is vital to segregate input and output cabling. Do not run these cables in a common duct. Treat the input cabling as “dirty”.

Filter Overcurrent Protection

The SFM filter is fitted with both fuses and Novaris Surge Circuit Breakers (SCB). The SD1 modules installed in the surge filter are protected by surge circuit breakers. Under normal operating conditions an SPD draws no more than a few milliamps of AC current from the supply but in the event of a transient disturbance it must instantly pass many thousands of amps. The SCB is able to pass the surge current through to the surge diverter, while also protecting the diverter from any overcurrent damage. The SCB will trip at AC currents over 3A but will also pass very large impulse currents. Fuses are also included to protect the HSDD module.

In the event an SCB trips or a fuse blows, the electronic alarm on either the SD1 or HSDD unit will trigger due to a loss of supply. The SCB can simply be reset to the on position, while the blown fuse will require replacement. The HSDD unit will also indicate a loss of supply through the LEDs; if an LED is off, the unit has lost supply to the corresponding phase and the fuse may have blown.

Alarms and indicators

In the event of a large lightning strike internal protection MOVs may sustain damage, compromising the protection capability of the filter.

The SD1 diverter modules monitor the integrity of their internal MOVs and indicate the status. Each of the SD1 modules displays the protection level available as a percentage, with '100%' being normal. If any of the protection modules indicates reduced protection, it should be replaced as soon as possible. Supplementary to the percentage display, the inbuilt alarm circuitry will provide notification under the event of MOV degradation. It is recommended to check the status of the SCB as an initial fault-finding measure.

The HSDD units feature phase status LEDs, under normal operation all LEDs should be lit. Under fault conditions, the LED will be off. This may indicate phase failure, thermal overload, or component failure. Under these fault conditions, the inbuilt alarm will also be triggered. It is recommended to check the status of the fuse/s as an initial fault-finding measure.

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