

## FDS SERIES INSTALLATION INSTRUCTIONS

### 1. PREPARATION

#### **⚠ DANGER** DANGER:

*Electrical shock or burn hazard. Qualified personnel should only install this product. Failure to lockout electrical power during installation or maintenance can result in fatal electrocution or severe burns. Before making any connections to this electrical panel please ensure that power has been removed from all associated wiring, electrical panels, and other electrical equipment.*

#### **⚠ CAUTION** CAUTION NOTES:

1. *The installation of this Frequency Discriminating Surge Diverter (FDS) should follow all applicable national electrical codes.*
2. *Check to ensure that the power frequency line voltage does not exceed the maximum continuous operating voltage (Uc) of the FDS.*
3. *Prior to installation, ensure that the FDS is of the correct voltage, current, and frequency.*
4. *The ground (earth) terminal must be connected to a low impedance earth (<10 ohms) for correct operation.*
5. *Do not perform a "Flash Test" or use a Megger to test circuits that are protected with these FDS units. This may damage the FDS(s) and affect the insulation readings being performed.*
6. *Follow all instructions to ensure correct and safe operation and observe nationally recognized codes of authorities having jurisdiction.*
7. *Do not attempt to open or tamper with the FDS unit in any way as this may compromise performance and will void warranty.*

### 2. INTRODUCTION

The Frequency Discriminating Surge Diverter (FDS) series has been designed to provide one mode of protection to single-phase power distribution systems (FDS150 or FDS1100); multi-modes in a split phase distribution system (FDS50) or in a three-phase distribution system (FDS350). Units can be connected (L-N), (L-G) or (N-G) depending on the type of power distribution system.

Multiple FDS units can be used to provide multi-modes of protection or to protect three-phase distribution systems.

FDS units are available with maximum continuous operating voltages (Uc) of: 170V, 275V, 320V and 610V for the protection of distribution systems with nominal RMS voltages of 120Vac, 220Vac, 240Vac and 480Vac, respectively. FDS units may also be used to protect DC power systems – ref. Table 1.

### 3. QUICK INSTALLATION OVERVIEW

Please follow the sequence indicated:

- First, ensure that power is removed from the area and the circuits to be connected.
- Install earth leakage protection (RCD) if appropriate or where required by national codes and authorities having jurisdiction. Note: When connecting surge protection L-G it is preferable to install the device before the RCD to avoid "nuisance tripping" which may occur when the SPD operates.
- Connect wiring to the two primary terminals indicated.
- Connect the alarm terminals if remote monitoring is required.
- Apply power and observe correct operation of the FDS and status indication is not tripped.

### 4. MOUNTING

FDS units are designed to clip to 35mm (top hat) DIN rails (standard EN50022) set in the horizontal position with the FDS securing clips towards the bottom of the rail and the label text facing the correct way up.

**NOTE:** FDS modules must be installed in an enclosure or switch board panel in such a way that:

- The location of this enclosure prevents the temperature of the FDS unit(s) from exceeding its maximum specified rating.
- Adequate electrical and safety protection is provided by the enclosure to all exposed terminals.
- The location and type of enclosure meets the specified environmental requirements and prevents the ingress of moisture and water.
- The indicator status of the FDS can be readily inspected.

### 5. ELECTRICAL CONNECTION

When connecting the FDS on the input side of the distribution panel wiring, it is usual to wire the FDS L-N (L1, L2, L3 to N on 3 phase systems). When connecting the TDS to the output side of the panel wiring, it is usual to wire it L-PE/PEN.

- On TN-C networks, three FDS units are required. L1, L2, L3 should be protected to PEN.
- On TN-S networks, four FDS units are required. L1, L2, L3 should be protected to N, and N should be protected to PE.
- On TT networks, three FDS units and a SGD unit are required. L1, L2, L3 should be protected to N using the FDS units, and N should be protected to PE using the SGD unit.
- On IT networks, four FDS units are required. L1, L2, L3, N should be protected to PE using 440V FDS units on a normal 230V system.
- On the FDS1100 series, a "Kelvin" type connection can be made using separate input and output terminal pairs. This configuration helps reduce the effects of lead length. The maximum load current under such a configuration should be limited to 125A.

### 6. WIRING

The interconnecting wiring should:

- Be as short as possible - not exceeding 300mm (12").
- Avoid sharp bends >100mm radius is recommended.
- Have the conductors twisted together where possible.
- Terminals will allow connection of 25mm<sup>2</sup> (#4AWG) multi-strand wiring or 35mm<sup>2</sup> (#2AWG) solid – ref. Table 1. The wire insulation should be stripped back 8mm (5/16").

### 7. RESIDUAL CURRENT DETECTORS (RCD)

When an RCD is used, it is preferable that the FDS modules be installed prior to (upstream of) this device to avoid nuisance tripping which may occur during transient activity.

### 8. FUSING AND ISOLATION

Over current protection must be installed in the upstream circuit of every FDS unit if the mains supply is > 100A. This is to provide protection to the FDS, the load and the wiring in the case of a fault – ref. Table 1 for suitable fuse ratings.

**NOTE:** Operation of this over-current protection under excessive surge conditions may occur, removing protection from the circuit. The Remote Status contacts should be monitored for this possibility.

## 9. STATUS INDICATION

FDS modules incorporate an internal thermal disconnect element, which automatically disconnects the varistor from the network in the event of a thermal overload. Should the internal disconnect operate, a red flag appears in the transparent window of the Status Indicator(s) on the front of the FDS.

## 10. MAINTENANCE & TESTING

Before removing a FDS module from service, ensure that the power has been removed and if possible "locked out". Qualified personnel should only undertake replacement of FDS modules. Replacement plug-in modules are available.

**NOTE:** It is very important to ensure that the new module is of the same type and voltage as that being replaced.

**NOTE:** FDS units should be inspected periodically, and also following any periods of lightning or transient voltage activity. Check the Status Indicator and replace the module if required.

## 11. REMOTE STATUS

The FDS provides remote status monitoring via voltage-free contacts. Failure of the FDS is signified by the N/C contacts (11,14) opening and the N/O contacts (11,12) closing. Ensure that the voltage and current ratings of the contacts are not exceeded.

**NOTE:** The FDS contacts are independent of whether power is supplied, or not, to the FDS module. The status of the contacts is given solely by the failure status of the FDS module.

**Table 1. FDS operating specifications**

Max. continuous operating voltage, $U_c$ (AC)	170, 275, 320, 610 Vac  (Important: ensure correct FDS is selected, $U_c$ must be higher than power frequency voltage).
Max Torque	4.5N.m./40in-lbs
Main terminals – wire cross section / backup fuse	multi-strand 25 mm <sup>2</sup> (#4AWG) (single-strand 35 mm <sup>2</sup> (#2AWG)) / max. 125 AgL
Remote status contacts	0.5 A / 250 VAC; 3 A / 125 VAC 1.5 mm <sup>2</sup> wire cross section

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