INTRODUCTION

This document explains how to install Furse ESP 240CDT2 Type 2 Surge Protective Devices (SPDs) for three phase TN-S/TN-C-S and TT mains supplies and power distribution boards: ESP 240CDT2/40/TNS, ESP 240CDT2/40/TT

1. Safety note:

Warning! Installation by person with electrotechnical expertise only.

Warnung! Installation nur durch elektrotechnische Fachkraft.

Avvertenza! Fare installare solo da un elettricista qualificato.

Avertissement! Installation uniquement par des personnes qualifiées en électrotechnique.

Advertencia! La instalación deberá ser realizada únicamente por electricistas especializados.

2. Application

2.1 Furse ESP 240CDT2/XXX Type 2 SPDs are suitable for use on single and three phase mains supplies & power distribution boards to prevent transient overvoltages (surges) damaging equipment.

In accordance with BS EN/IEC 62305 standards, Type 2 SPDs form one part of a coordinated SPD system where typically an upstream Type 1 SPD is installed at the service entrance (main distribution panel board), Type 2 SPDs are installed on the sub-distribution panel boards and Type 3 SPDs are installed at final distribution panel boards or socket outlets feeding electronic equipment.

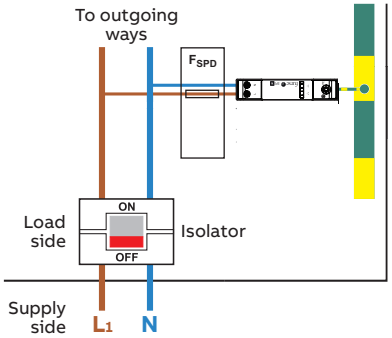


Figure 1:
ESP 240CDT2/XXX SPD mounted within a distribution board connected to the incoming supply on the load side (i.e. downstream) of the isolator.

ABB Furse have a full range of SPDs including combined Type SPDs (Type 1+2+3 within one housing).

Contact ABB Furse for further information about Full Mode SPDs, such as our ESP D1 and ESP M1 Series SPDs.

3. Before installation

3.1 Check that the voltage between neutral and earth does not exceed 10 Volts. If this voltage does exceed 10 Volts, the installation is unsafe. Find and rectify the cause of this fault before proceeding.

3.2 Make sure that the supply voltage is suitable for the SPD.

	Supply Rated Voltage (V_{RMS})	Supply Rated Voltage (V_{RMS})
ESP 240CDT2/XXX SPDs	220/230/240	200-275

4. Installation

4.1 Location

ESP 240CDT2/XXX SPDs need to be installed very close to the power supply to be protected. The ESP 240CDT2/XXX SPD will be installed at a main power distribution board, either inside it (Figure 1) or right next to it in an enclosure (Figure 2). The SPD includes a DIN foot for mounting onto 35 mm top hat DIN rails.

4.2 Enclose the SPD

The SPD has exposed terminals. For electrical safety, the SPD must be installed within a distribution board or enclosure. Where possible, install the SPD in the main distribution board behind a suitable viewing window.

If it is not possible to install the SPD within the distribution board, it should be mounted in a separate enclosure, as close as possible to the distribution board (see 4.9 - Length of connecting leads). Gland the enclosure onto the power distribution board. Suitable enclosures are available from Furse. When mounting in an existing metal panel or enclosure, ensure that the enclosure is securely bonded to the earth bar to which the SPD will be connected.

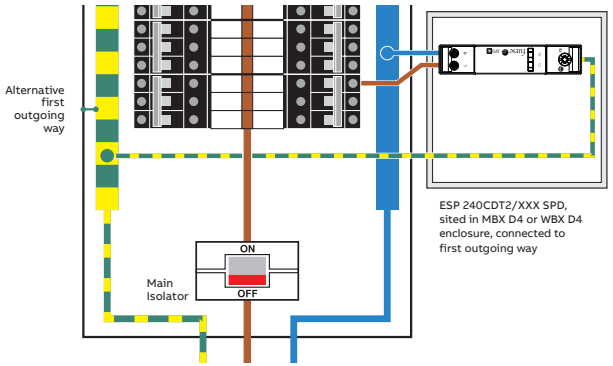


Figure 2:
ESP 240CDT2/XXX SPD connected to the nearest available outgoing (MCB) way to the incoming supply. Since there is insufficient space within the distribution board the SPD has been mounted within a separate enclosure, directly alongside the board.

4.3 Parallel connection

ESP 240CDT2/XXX SPDs are connected in parallel with the supply to be protected. The connecting leads do not carry the load current of the supply, only the current associated with suppressing the transient overvoltage. Connecting leads to the SPD need to be kept short in order to minimise additive inductive voltages.

4.4 Connection to phase, neutral and earth

Connections are made to each supply conductor including earth.
Terminals marked L1, L2, L3, N, ⏚ must be connected to phase/live, neutral and earth respectively. See Figures 3 for connection per system type (TN-S, TN-C or TT).

4.5 Connection point

(a) Protecting supplies feeding equipment in the building

The SPD is typically connected to the power supply at the main power distribution board, either:

(i) on the load side of the incoming isolator (Figure 1).

(ii) on the closest available outgoing way to the incoming supply (i.e. the incoming isolator).

The SPD can be connected via one of the distribution board's outgoing fuseways or circuit breakers.

Ideally, the SPD should be connected to the outgoing way which is nearest to the incoming supply (or isolator).

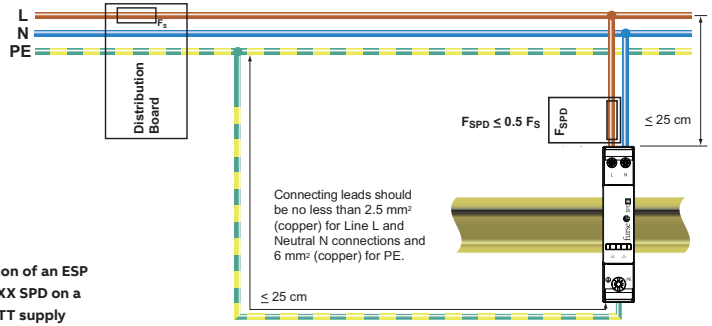


Figure 3:
Parallel installation of an ESP ESP 240CDT2/XXX SPD on a TN-S, TN-C-S or TT supply

... continued overleaf

On small, compact, metal cased distribution boards, (such as small MCB boards) the first way is preferable, although any outgoing way is suitable. On a large board (e.g. cubicle switchboard), it is better to install the SPD on the load side of the incoming isolator (e.g. in the metering section) for optimal protection.

(iii) directly to the busbars via suitable HRC fuses, switchfuses, MCBs or MCCBs - See 4.7.

(b) Protecting supplies going out of the building

The connection methods 4.5a (i to iii) are not suitable for protecting a distribution board which provides a supply to outside the building either to a separate building or some other external load (e.g. site lighting).

To protect the equipment inside the building from transient overvoltages entering the board on the outgoing feed, protection should be installed close to the external load.

4.6 Isolation

It is good practice to be able to isolate or disconnect the SPD from the supply.

The supply to the entire distribution board should not be switched off on many computer power supplies and other critical loads.

The means of isolation should therefore be installed in the connection to the SPD (see 4.7 - Fuse connecting leads).

4.7 Fuse connecting leads

The connecting leads to the phase/live terminals of the SPD should be fused. This is to protect the connecting leads in the event of a short circuit. The fuse to the SPD (F_{SPD}) should be lower than the upstream supply fuse F_S by a sufficient enough factor to ensure fuse discrimination.

As a general guide a factor of at least 2 could be used ($F_{SPD} \leq 0.5\ F_S$), where the maximum fuse to the 240CDT2/40/XXX SPD is 100 A (if the supply fuse is 200 A or greater). Refer to the fuse manufacturer's operating characteristics to ensure discrimination, particularly where an installation includes a mixture of types of fuse, or of fuses and circuit breakers.

Live/phase connecting leads can be fused by either:

(a) installing appropriate high rupture capacity (HRC) fuses or switchfuses in the connecting leads at the supply end of the lead, or

(b) installing an appropriate MCB, MCCB where the SPD is installed via an outgoing way (4.5b earlier), this should incorporate an appropriate HRC fuse, MCB, MCCB.

4.8 Size of connecting leads

The connecting leads between the terminals of the SPD and the power supply, should be multi stranded conductor no less than 2.5 mm² (copper) for Line L and Neutral N connections and 6 mm² (copper) for Protective Earth PE connection. If required, the terminals on the SPD will accept connecting leads of up to 6 mm² (flexible) for L/N for or 25mm² (flexible) for PE.

4.9 Length of connecting leads

The connecting leads should be kept as short as possible and ideally should not exceed 25 cm (10 inches) from the busbars to the SPDs terminals.

SPDs can be mounted upside down or on their side if this facilitates shorter connecting leads.

WARNING: The longer the connecting leads (between the mains cable or busbars and the terminals of the SPD) the greater the additive voltage let-through by the installed SPD. High additive voltages will place greater strain on coordinated downstream Type 3 SPDs and impair their performance or lower the lifespan of these protectors.

4.10 Bind connecting leads

Connecting leads should be tightly bound together using Ty-Raps®, tape or spiral wrap. This should be done for the entire length of the cable or as far as is possible.

5. SPD Protector operation/status indication

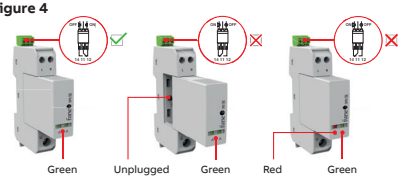
5.1 The SPD includes an internal thermal supervision device which continually monitors its operation. Status is displayed via the front facing window.

During normal operation the status display is clear. Should a fault occur, the supervision device disconnects the SPD from the mains supply and displays a red indicator in the status window. **Note: After the supervision device has disconnected surge protection, the ESP SPD module should be replaced (see 7.2) to prevent the risk of equipment damage.**

6. Remote indication

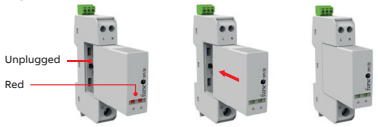
6.1 A remote indication facility is provided for linking the 240CDT2/XXX SPD to a management system/remote alarm. A volt free contact on the SPD allows a remote alarm to be tripped if a fault develops within the SPD. When a fault occurs (or the protective module is removed) terminals 11-12 (12 is Normally Closed NC) break contact and terminals 11-14 (14 is Normally Open NO) make contact – see Figure 4.

Figure 4



6.2 The terminal for the volt free contact accepts solid cable from 0.25mm² up to 1.5 mm² and is located on the bottom of the SPD. The SPDs remote indication is rated at 0.5 Amp, 250 V AC. Note: For reliable contact operation, the minimum permissible load is 10 mA, 5 V DC.

Figure 5



7. Maintenance

7.1 Maintenance should be conducted at least once a year and also following lightning activity. Visually check:

- Status indication window (green = ok, red = fault/disconnected)
- Condition of connecting leads and terminations

7.2 Figure 5 illustrates how to replace an ESP 240CDT2/XXX SPDs protection module (spares available from ABB Furse). First disconnect the power to the SPD. The module can then be withdrawn. The replacement protection module can then be inserted until it is fully seated. Power to the SPD can then be reinstated.

8. Application notes

8.1 ESP coordination

ESP 240CDT2/XXX SPDs are designed to fully co-ordinate with upstream and downstream SPDs of equivalent system voltage.

For example an ESP 415T1/XXX SPD located at the main distribution board would coordinate effectively with an ESP 240CDT2/XXX, ESP 240 M1 or ESP 240 D1 SPD typically located at sub-distribution boards.

No additional decoupling elements such as inductors are needed to ensure ESP SPDs achieve coordination.

Always ensure SPDs of the same manufacturer are used on the same installation to ensure coordination.

Mixing SPDs from alternative manufacturers' SPDs could result in damage to both SPDs and connected equipment through poor coordination.

8.2 RCD units

SPDs should ideally be installed before (or upstream of) residual current devices (RCDs) and not on the load side. SPDs should only be installed on the load side of the RCDs if the load in question is external to the building.

This should help to reduce any spurious tripping of such devices due to transient overvoltages. Special transient hardened RCDs (type 'S') can be obtained from a number of manufacturers.

8.3 Insulation tests (flash testing)

The SPD should be fully disconnected from the circuit before testing. Otherwise the SPD will treat the insulation test as transient overvoltage and control the voltage to a low level - thereby defeating the object of the test.

8.4 Use of powered screwdrivers

The use of powered screwdrivers is not recommended. Hand tighten connections only. (Maximum torque value for power terminals is 1.2 Nm (L and N terminals) and 2 Nm (PE terminal). The wire stripping length is 13 mm. The volt-free contacts has a wire stripping length 5 mm.

Environment

Consider the protection of the environment! Used electrical and electronic equipment must NOT be disposed of with domestic waste. The device contains valuable raw materials which can be recycled. Therefore, contact ABB for disposal of this equipment.

for mains wire-in Surge Protective Devices (SPDs)

ESP 240CDT2 Compact Surge Protection Series

INSTALLATION INSTRUCTIONS

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