



## Moulded Case Circuit Breaker Zs Values

The Zs values are based on disconnection times of either 0.4 or 5 seconds.

If the Micrologic 6.2 or 6.3 trip units are used the earth fault Zs are also shown as "EF on" figures.

However if the earth fault is set to the Off position, the 0.4 or 5 second Zs values apply.

The electronic trip units are shown with either all the settings at minimum values (min) or all of the settings at maximum (max). Time delay tsd must not be set higher than 0.3 for 0.4 second disconnection time

All Zs values are based on a system voltage of 230V to earth

The Zs values in this document do not take into account the requirements of Appendix 14 of BS7671: 2008.

## NSX 100 - 250 Distribution Trip Units

| THERMAL MAGNETIC (DISTRIBUTION) TRIP UNITS |        |        |              |         |       |
|--------------------------------------------|--------|--------|--------------|---------|-------|
| MCCB                                       |        |        | Trip Unit    | Zs 0.4s | Zs 5s |
| NSX100                                     | NSX160 | NSX250 | TM16D        | 1.01    | 1.26  |
| NSX100                                     | NSX160 | NSX250 | TM25D        | 0.64    | 0.97  |
| NSX100                                     | NSX160 | NSX250 | TM32D        | 0.48    | 0.77  |
| NSX100                                     | NSX160 | NSX250 | TM40D        | 0.38    | 0.61  |
| NSX100                                     | NSX160 | NSX250 | TM50D        | 0.38    | 0.58  |
| NSX100                                     | NSX160 | NSX250 | TM63D        | 0.38    | 0.46  |
| NSX100                                     | NSX160 | NSX250 | TM80D        | 0.30    | 0.30  |
| NSX100                                     | NSX160 | NSX250 | TM100D       | 0.24    | 0.24  |
|                                            | NSX160 | NSX250 | TM125D       | 0.15    | 0.15  |
|                                            | NSX160 | NSX250 | TM160D       | 0.15    | 0.15  |
|                                            |        | NSX250 | TM200D (Min) | 0.19    | 0.19  |
|                                            |        | NSX250 | TM200D (Max) | 0.10    | 0.10  |
|                                            |        | NSX250 | TM250D (Min) | 0.15    | 0.15  |
|                                            |        | NSX250 | TM250D (Max) | 0.08    | 0.08  |

| MICROLOGIC (DISTRIBUTION) TRIP UNITS |        |        |                    |         |       |        |
|--------------------------------------|--------|--------|--------------------|---------|-------|--------|
| MCCB                                 |        |        | Micrologic         | Zs 0.4s | Zs 5s |        |
| NSX100                               | NSX160 | NSX250 | 2.2 40A (min)      | 8.60    | 8.60  |        |
| NSX100                               | NSX160 | NSX250 | 2.2 40A (max)      | 0.52    | 0.52  |        |
| NSX100                               | NSX160 | NSX250 | 2.2 100A (min)     | 3.87    | 3.87  |        |
| NSX100                               | NSX160 | NSX250 | 2.2 100A (max)     | 0.21    | 0.21  |        |
|                                      | NSX160 | NSX250 | 2.2 160A (min)     | 2.46    | 2.46  |        |
|                                      | NSX160 | NSX250 | 2.2 160A (max)     | 0.13    | 0.13  |        |
|                                      |        | NSX250 | 2.2 250A (min)     | 1.55    | 1.55  |        |
|                                      |        | NSX250 | 2.2 250A (max)     | 0.08    | 0.08  |        |
| NSX100                               | NSX160 | NSX250 | 5.2 A/E 40A (min)  | 8.60    | 8.60  |        |
| NSX100                               | NSX160 | NSX250 | 5.2 A/E 40A (max)  | 0.52    | 0.52  |        |
| NSX100                               | NSX160 | NSX250 | 5.2 A/E 100A (min) | 3.87    | 3.87  |        |
| NSX100                               | NSX160 | NSX250 | 5.2 A/E 100A (max) | 0.21    | 0.21  |        |
|                                      | NSX160 | NSX250 | 5.2 A/E 160A (min) | 2.46    | 2.46  |        |
|                                      | NSX160 | NSX250 | 5.2 A/E 160A (max) | 0.13    | 0.13  |        |
|                                      |        | NSX250 | 5.2 A/E 250A (min) | 1.55    | 1.55  |        |
|                                      |        | NSX250 | 5.2 A/E 250A (max) | 0.08    | 0.08  |        |
|                                      |        |        |                    |         |       | E/F On |
| NSX100                               | NSX160 | NSX250 | 6.2 A/E 40A (min)  | 8.60    | 8.60  | 13.07  |
| NSX100                               | NSX160 | NSX250 | 6.2 A/E 40A (max)  | 0.52    | 0.52  | 5.23   |
| NSX100                               | NSX160 | NSX250 | 6.2 A/E 100A (min) | 3.87    | 3.87  | 10.45  |
| NSX100                               | NSX160 | NSX250 | 6.2 A/E 100A (max) | 0.21    | 0.21  | 2.09   |
|                                      | NSX160 | NSX250 | 6.2 A/E 160A (min) | 2.46    | 2.46  | 6.53   |
|                                      | NSX160 | NSX250 | 6.2 A/E 160A (max) | 0.13    | 0.13  | 1.31   |
|                                      |        | NSX250 | 6.2 A/E 250A (min) | 1.55    | 1.55  | 4.18   |
|                                      |        | NSX250 | 6.2 A/E 250A (max) | 0.08    | 0.08  | 0.84   |

## NSX 100 - 250 Motor Protection Trip Units

| MAGNETIC ONLY (MOTOR) TRIP UNITS |        |        |              |         |       |
|----------------------------------|--------|--------|--------------|---------|-------|
| MCCB                             |        |        | Trip Unit    | Zs 0.4s | Zs 5s |
| NSX100                           | NSX160 | NSX250 | MA2.5 (max)  | 5.48    | N/A   |
| NSX100                           | NSX160 | NSX250 | MA6.3 (max)  | 2.17    | N/A   |
| NSX100                           | NSX160 | NSX250 | MA12.5 (max) | 1.10    | N/A   |
| NSX100                           | NSX160 | NSX250 | MA25 (max)   | 0.55    | N/A   |
| NSX100                           | NSX160 | NSX250 | MA50 (max)   | 0.27    | N/A   |
| NSX100                           | NSX160 | NSX250 | MA100 (max)  | 0.14    | N/A   |
|                                  | NSX160 | NSX250 | MA150 (max)  | 0.09    | N/A   |
|                                  |        | NSX250 | MA220 (max)  | 0.06    | N/A   |

| MICROLOGIC (MOTOR) TRIP UNITS |        |        |                    |         |       |        |
|-------------------------------|--------|--------|--------------------|---------|-------|--------|
| MCCB                          |        |        | Micrologic         | Zs 0.4s | Zs 5s |        |
| NSX100                        | NSX160 | NSX250 | 2.2 M 25A (min)    | 3.33    | 3.33  |        |
| NSX100                        | NSX160 | NSX250 | 2.2 M 25A (max)    | 0.62    | 0.68  |        |
| NSX100                        | NSX160 | NSX250 | 2.2 M 50A (min)    | 1.60    | 1.60  |        |
| NSX100                        | NSX160 | NSX250 | 2.2 M 50A (max)    | 0.31    | 0.34  |        |
| NSX100                        | NSX160 | NSX250 | 2.2 M 100A (min)   | 0.80    | 0.80  |        |
| NSX100                        | NSX160 | NSX250 | 2.2 M 100A (max)   | 0.15    | 0.17  |        |
|                               |        | NSX250 | 2.2 M 150A (min)   | 0.57    | 0.57  |        |
|                               |        | NSX250 | 2.2 M 150A (max)   | 0.10    | 0.11  |        |
|                               |        | NSX250 | 2.2 M 220A (min)   | 0.40    | 0.40  |        |
|                               |        | NSX250 | 2.2 M 220A (max)   | 0.07    | 0.08  |        |
|                               |        |        |                    |         |       | E/F On |
| NSX100                        | NSX160 | NSX250 | 6.2 E-M 25A (min)  | 3.33    | 3.33  | 13.94  |
| NSX100                        | NSX160 | NSX250 | 6.2 E-M 25A (max)  | 0.62    | 0.62  | 8.36   |
| NSX100                        | NSX160 | NSX250 | 6.2 E-M 50A (min)  | 1.60    | 1.60  | 13.94  |
| NSX100                        | NSX160 | NSX250 | 6.2 E-M 50A (max)  | 0.31    | 0.31  | 4.18   |
| NSX100                        | NSX160 | NSX250 | 6.2 E-M 80A (min)  | 1.14    | 1.14  | 13.07  |
| NSX100                        | NSX160 | NSX250 | 6.2 E-M 80A (max)  | 0.19    | 0.19  | 2.61   |
|                               |        | NSX250 | 6.2 E-M 150A (min) | 0.57    | 0.57  | 6.97   |
|                               |        | NSX250 | 6.2 E-M 150A (max) | 0.10    | 0.10  | 1.39   |
|                               |        | NSX250 | 6.2 E-M 220A (min) | 0.40    | 0.40  | 4.75   |
|                               |        | NSX250 | 6.2 E-M 220A (max) | 0.07    | 0.07  | 0.95   |

## NSX 100 - 250 Generator Protection Trip Units

| THERMAL MAGNETIC (GENERATOR) TRIP UNITS |        |        |           |         |       |
|-----------------------------------------|--------|--------|-----------|---------|-------|
| MCCB                                    |        |        | Trip Unit | Zs 0.4s | Zs 5s |
| NSX100                                  | NSX160 | NSX250 | TM16G     | 2.99    | 2.99  |
| NSX100                                  | NSX160 | NSX250 | TM25G     | 2.40    | 2.40  |
| NSX100                                  | NSX160 | NSX250 | TM40G     | 2.40    | 2.40  |
| NSX100                                  | NSX160 | NSX250 | TM63G     | 1.52    | 1.52  |

| MICROLOGIC (GENERATOR) TRIP UNITS |        |        |                  |         |       |
|-----------------------------------|--------|--------|------------------|---------|-------|
| MCCB                              |        |        | Micrologic       | Zs 0.4s | Zs 5s |
| NSX100                            | NSX160 | NSX250 | 2.2 G 40A (min)  | 8.60    | 8.60  |
| NSX100                            | NSX160 | NSX250 | 2.2 G 40A (max)  | 0.75    | 2.49  |
| NSX100                            | NSX160 | NSX250 | 2.2 G 100A (min) | 3.87    | 3.87  |
| NSX100                            | NSX160 | NSX250 | 2.2 G 100A (max) | 0.30    | 1.00  |
|                                   | NSX160 | NSX250 | 2.2 G 160A (min) | 2.46    | 2.46  |
|                                   | NSX160 | NSX250 | 2.2 G 160A (max) | 0.19    | 0.62  |
|                                   |        | NSX250 | 2.2 G 250A (min) | 1.55    | 1.55  |
|                                   |        | NSX250 | 2.2 G 250A (max) | 0.12    | 0.40  |

## NSX 400 - 630 Distribution Trip Units

| MICROLOGIC (DISTRIBUTION) TRIP UNITS |        |                    |         |       |        |
|--------------------------------------|--------|--------------------|---------|-------|--------|
| MCCB                                 |        | Micrologic         | Zs 0.4s | Zs 5s |        |
| NSX400                               | NSX630 | 2.3 250A (min)     | 2.213   | 2.213 |        |
| NSX400                               | NSX630 | 2.3 250A (max)     | 0.084   | 0.084 |        |
| NSX400                               | NSX630 | 2.3 400A (min)     | 0.968   | 0.968 |        |
| NSX400                               | NSX630 | 2.3 400A (max)     | 0.052   | 0.052 |        |
|                                      | NSX630 | 2.3 630A (min)     | 0.620   | 0.620 |        |
|                                      | NSX630 | 2.3 630A (max)     | 0.033   | 0.033 |        |
| NSX400                               | NSX630 | 5.3 A/E 400A (min) | 0.968   | 0.968 |        |
| NSX400                               | NSX630 | 5.3 A/E 400A (max) | 0.052   | 0.052 |        |
|                                      | NSX630 | 5.3 A/E 630A (min) | 0.620   | 0.620 |        |
|                                      | NSX630 | 5.3 A/E 630A (max) | 0.033   | 0.033 |        |
|                                      |        |                    |         |       | E/F On |
| NSX400                               | NSX630 | 6.3 A/E 400A (min) | 0.968   | 0.968 | 2.614  |
| NSX400                               | NSX630 | 6.3 A/E 400A (max) | 0.052   | 0.052 | 0.523  |
|                                      | NSX630 | 6.3 A/E 630A (min) | 0.620   | 0.620 | 1.661  |
|                                      | NSX630 | 6.3 A/E 630A (max) | 0.033   | 0.033 | 0.332  |

## NSX 400 - 630 Motor Protection Trip Units

| MICROLOGIC (MOTOR) TRIP UNITS |        |                    |         |       |        |
|-------------------------------|--------|--------------------|---------|-------|--------|
| MCCB                          |        | Micrologic         | Zs 0.4s | Zs 5s |        |
| NSX400                        | NSX630 | 1.3 M 320A (min)   | 0.125   | 0.125 |        |
| NSX400                        | NSX630 | 1.3 M 320A (max)   | 0.048   | N/A   |        |
|                               | NSX630 | 1.3 M 500A (min)   | 0.080   | 0.080 |        |
|                               | NSX630 | 1.3 M 500A (max)   | 0.031   | N/A   |        |
| NSX400                        | NSX630 | 2.3 M 320A (min)   | 0.250   | 0.250 |        |
| NSX400                        | NSX630 | 2.3 M 320A (max)   | 0.048   | 0.053 |        |
|                               | NSX630 | 2.3 M 500A (min)   | 0.160   | 0.160 |        |
|                               | NSX630 | 2.3 M 500A (max)   | 0.031   | 0.034 |        |
|                               |        |                    |         |       | E/F On |
| NSX400                        | NSX630 | 6.3 E-M 320A (min) | 0.250   | 0.250 | 3.267  |
| NSX400                        | NSX630 | 6.3 E-M 320A (max) | 0.048   | 0.048 | 0.653  |
|                               | NSX630 | 6.3 E-M 500A (min) | 0.160   | 0.160 | 2.091  |
|                               | NSX630 | 6.3 E-M 500A (max) | 0.031   | 0.031 | 0.418  |

## NS 630b - 3200 MCCB's

The Zs value for all Circuit Breakers is calculated by dividing the current required to trip the Circuit Breaker at the required tripping time (0.4 or 5 s) into the phase to earth voltage of the system. The current required to trip the circuit breaker can be found by consulting the tripping curve.

For Micrologic 5, 6 or 7 the following calculation can be used If the tripping curve cannot be consulted. The current required to trip the circuit breaker can be calculated if the trip unit settings are known. This method can **only** be used to calculate the Zs for 0.4s disconnection time and provided the tsd time delay is 0.3s or lower.

$$\frac{230}{I_n \times I_r \times I_{sd} \times 1.1}$$

Where  $I_n$  = rating of the device

$I_r$  =  $I_r$  dial setting

$I_{sd}$  =  $I_{sd}$  dial setting

1.1 = 10% tolerance for the  $I_{sd}$  setting

If a Micrologic 6.0 or 7.0 is used, the earth fault/leakage element of the trip unit may reduce the current required to trip the circuit breaker on earth faults. This may be taken into account depending if design regulations permit it

## NS 80 Motor Protection MCCB's

| MAGNETIC ONLY (MOTOR) TRIP UNITS |           |         |       |
|----------------------------------|-----------|---------|-------|
| MCCB                             | Trip Unit | Zs 0.4s | Zs 5s |
| NS80                             | MA1.5     | 9.13    | N/A   |
| NS80                             | MA2.5     | 5.48    | N/A   |
| NS80                             | MA6.3     | 2.17    | N/A   |
| NS80                             | MA12.5    | 1.10    | N/A   |
| NS80                             | MA25      | 0.55    | N/A   |
| NS80                             | MA50      | 0.27    | N/A   |
| NS80                             | MA80      | 0.17    | N/A   |

## NSC 100 Thermal Magnetic MCCB's

| NSC THERMAL MAGNETIC TRIP UNITS |           |         |       |
|---------------------------------|-----------|---------|-------|
| MCCB                            | Trip Unit | Zs 0.4s | Zs 5s |
| NSC100                          | TM16D     | 0.32    | 1.94  |
| NSC100                          | TM20D     | 0.32    | 1.55  |
| NSC100                          | TM25D     | 0.32    | 1.24  |
| NSC100                          | TM32D     | 0.32    | 0.97  |
| NSC100                          | TM40D     | 0.19    | 0.78  |
| NSC100                          | TM50D     | 0.19    | 0.82  |
| NSC100                          | TM63D     | 0.19    | 0.65  |
| NSC100                          | TM70D     | 0.19    | 0.59  |
| NSC100                          | TM80D     | 0.19    | 0.51  |
| NSC100                          | TM100D    | 0.15    | 0.33  |