Description

Metrosil is a semi-conducting material with the property that its electrical resistance depends on the applied voltage. Resistors made from Metrosil are thus termed "voltage dependent resistors" or varistors.

Metrosil varistors are made by mixing silicon carbide with ceramic binder, pressing in a mould to the required shape, usually a disc, then firing at a high temperature, in closely controlled conditions. After firing , the faces of the disc are metal sprayed to give good electrical contact, and connection is made by either clamping the disc between the metal plates, or (in smaller sizes) by soldering wires to the metal sprayed faces.

Metrosil Specification

By varying the composition and processing conditions involved in the manufacture of Metrosil discs, a broad spectrum of electrical characteristics can be achieved.

Metrosil Identification

Each Metrosil resistor type is identified by a series of letters and numbers, thus: A-B/C/D/E, where:

- A refers to the nominal disc diameter in inches
  - 37 = 0.37 inches (10 mm)
  - 100 = 1.00 inches (25 mm)
  - 175 = 1.75 inches (45 mm)
  - 300 = 3.00 inches (75 mm)
  - 600 = 6.00 inches (150 mm)
- B refers to the type of disc
  - A = annular
  - P = plain
  - E = embossed
  - D = dished
- C refers to the type of mounting and number of discs per assembly
  - S = Standard stud mounting
  - F = Standard stud mounting with cooling fins (300-A)
  - ES = stud mounting electronic type (100-A and 175-A)
  - W = Wired disc
- D indicates the type of connection in the assembly
  - S = all discs in series
  - P = all discs in parallel
  - I = all discs insulated from each other
  - CT = centre tapped
  - E is the electrical specification number

Item D may be omitted for single disc assemblies and items C and D will not be needed for loose discs.

Example: 300-A/S3/P/860 Specifies three 3 inch (75 mm) diameter annular discs stud mounted and connected in parallel, each disc to specification no. 860.

[sc_7XG14, 1, --_--]

Figure 6.3/1 7XG14 Metrosil Non Linear Resistor for High Impedance Schemes

Series 300-A and 600-A

This data sheet describes the largest Metrosil voltage dependent resistor discs, having diameters up to 150 mm. The product range is concentrated on two basic discs: the 300-A, an annual disc with our outer diameter of 75 mm; and the 600-A, with outer diameter of 150 mm. In addition a range of 400-A (100 mm) series discs is available to special order.

Both 300-A and 600-A types are supplied discs assemblies. The standard assembly utilities a central stud which holds the discs and their contact plates as necessary for connections, and the whole assembly is carefully tightened to a torque which gives good electrical contract without damaging the discs.

Applications

Most of the applications of Metrosil make use of its nonlinear properties to provide an "electric safety valve" for protecting equipment and insulation from the effects of overvoltages.

Protection of field coils, contactor coils, relay coils and solenoids.

When an inductive DC current is broken suddenly, there is a transient rise in voltage across the inductance which can be 10 to 20 times the supply voltage and may damage insulation or circuit components. The source of this overvoltage is the energy which is stored in the magnetic field of the inductance at the moment of switching off.

It is therefore essential to provide some means for this energy to dissipate itself harmlessly. This can be achieved by connecting a discharge resistor across the inductive coil. At the instant when the circuit is broken, the current, briefly held constant by the inductance of the coil, is diverted through the resistor and rapidly decays to zero. The voltage across the coil is therefore limited to the voltage necessary to pass the coil current through the resistor, the value of which is so chosen that the voltage is a safe one. This transient voltage reduction is illustrated by the oscillograms. If an ordinary linear resistor is used and it is permanently connected across the coil, there will be a continuous waste of power at normal voltage. If the resistor is inserted just before the circuit is broken, additional contacts and wiring

will be required. A Metrosil resistor on the other hand can be permanently connected across the coil, and yet will consume at normal voltages only a fraction of the power taken by the ordinary resistor.

Metrosil discharge resistors can be supplied for all AC and DC voltages and for use with almost any inductive device such as contactor, clutch and brake coils, relay coils and solenoids, electromagnets and the fields of motors, generators and alternators of all sizes.

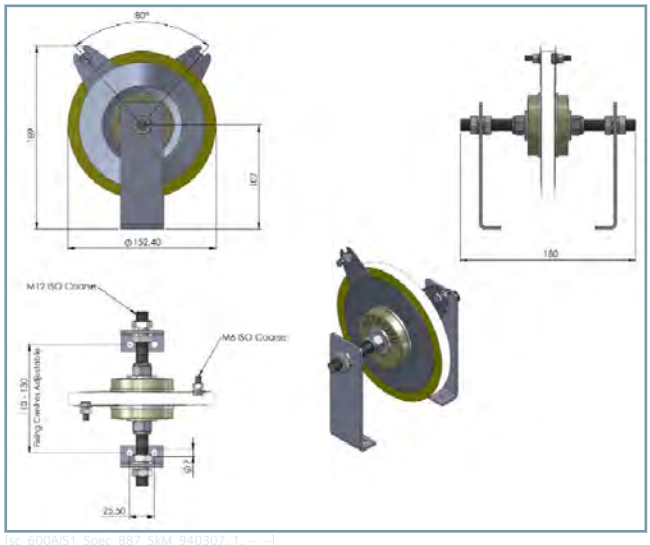
Dimension Drawings

Single Phase	
MLFB No.	Reference and Drawing
7XG1430-3AA00-0AA0	600A/S1 Spec 887 SkM 940307
7XG1410-3AA00-0AA0	300A/S1 Spec 646 SkM 900926
7XG1410-2AA00-0AA0	300A/S1 Spec 3198 SkM 900926
7XG1410-1AA00-0AA0	300A/S1 Spec 431 SkM 900926
7XG1430-1AA00-0AA0	600A/S1 Spec 256 SkM 940307
7XG1430-2AA00-0AA0	600A/S1 Spec 1088 SkM 940307

Table 6.3/1 Reference Table

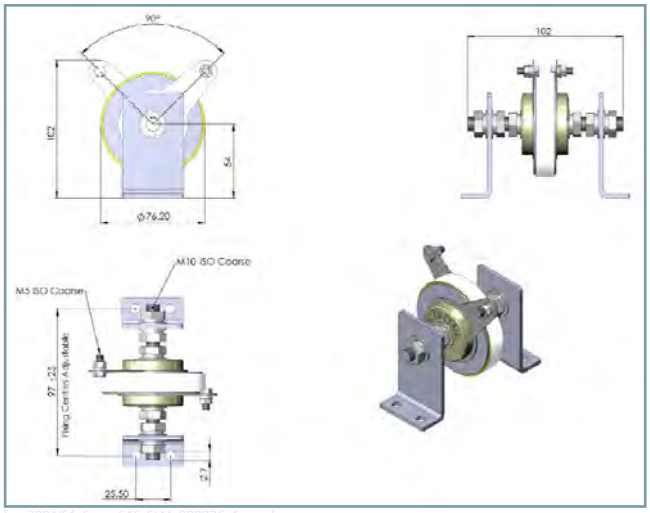
Three Phase	
MLFB No.	Reference and Drawing
7XG1440-3AA00-0AA0	600A/S3/I Spec 887 A3_3398410
7XG1420-3AA00-0AA0	300A/S3/I Spec 3063 SkM 800730
7XG1420-2AA00-0AA0	300A/S3/I Spec 3152 SkM 800730
7XG1420-1AA00-0AA0	300A/S3/I Spec 1030 SkM 800730 but 152 mm stud length
7XG1440-1AA00-0AA0	600A/S3/I Spec 802 A3_3398410
7XG1440-2AA00-0AA0	600A/S3/I Spec 1195 A3_3398410

Table 6.3/1 Reference Table



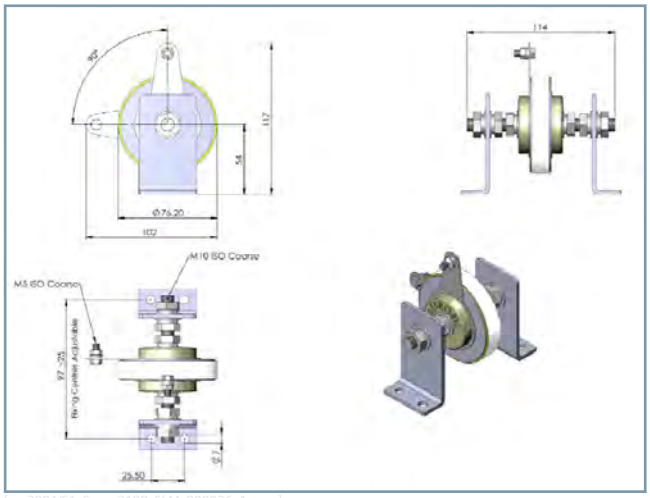
[sc_600A/S1_Spec_887_SkM_940307, 1, –, –]

Figure 6.3/2 600A/S1 Spec 887 SkM 940307



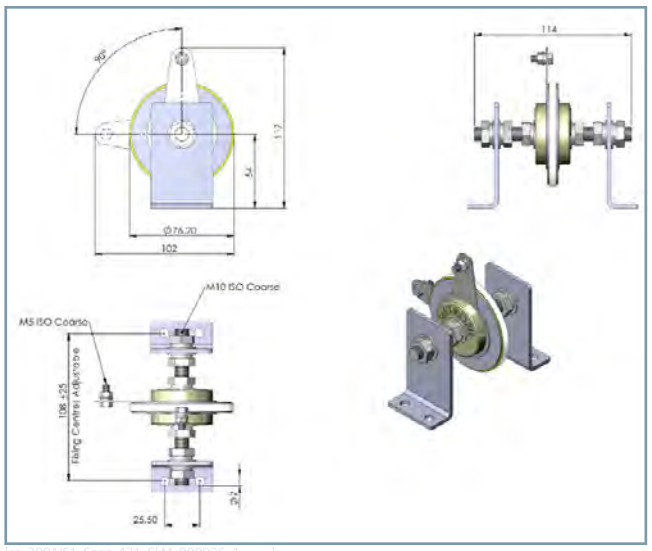
[sc_300A/S1_Spec_646_SkM_900926, 1, –, –]

Figure 6.3/3 300A/S1 Spec 646 SkM 900926



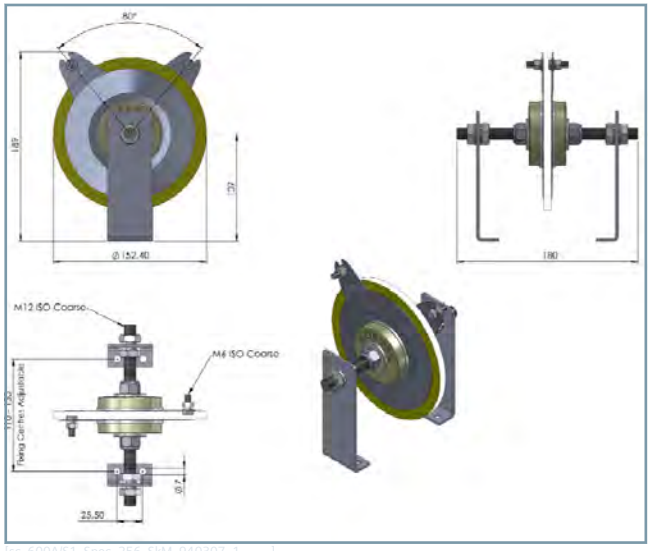
[sc_300A/S1_Spec_3198_SkM_900926, 1, –, –]

Figure 6.3/4 300A/S1 Spec 3198 SkM 900926



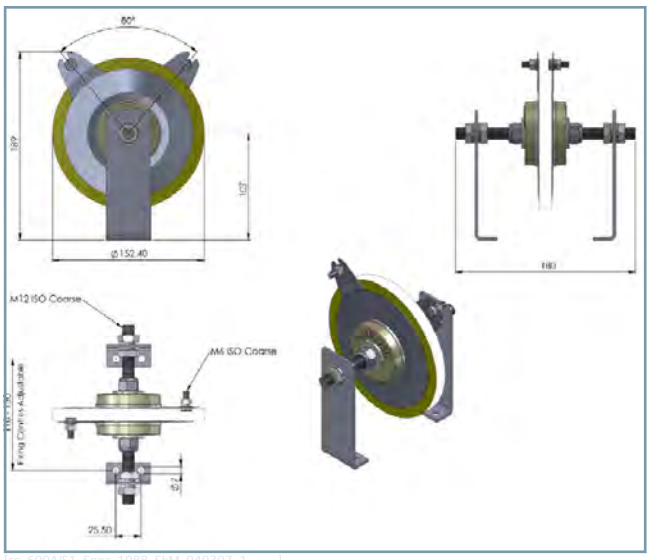
[sc_300A/S1_Spec_431_SkM_900926; 1; –_–]

Figure 6.3/5 300A/S1 Spec 431 SkM 900926



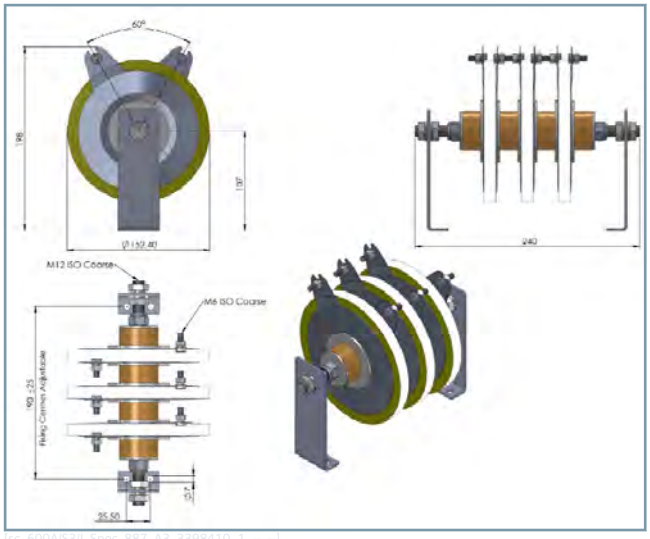
[sc_600A/S1_Spec_256_SkM_940307; 1; –_–]

Figure 6.3/6 600A/S1 Spec 256 SkM 940307



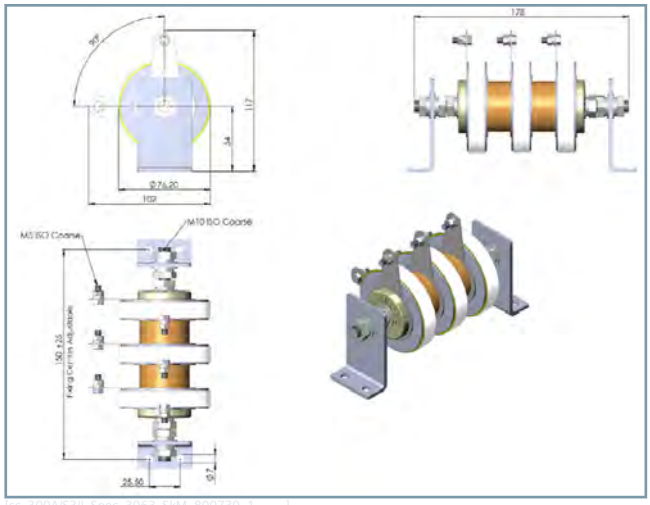
[sc_600A/S1_Spec_1088_SkM_940307; 1; –_–]

Figure 6.3/7 600A/S1 Spec 1088 SkM 940307



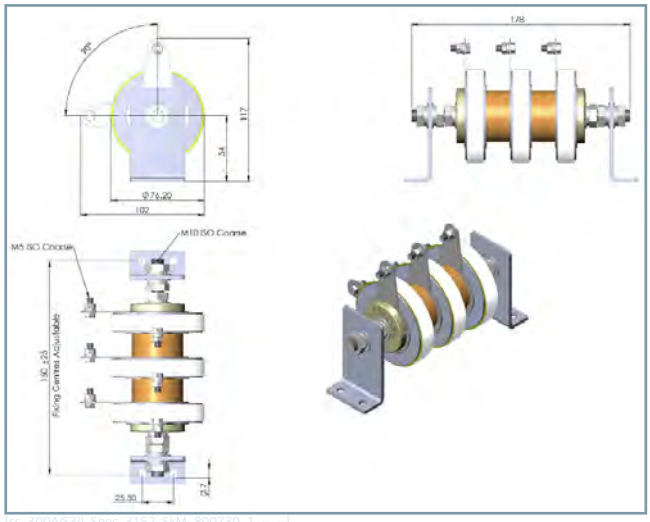
[sc_600A/S3/I_Spec_887_A3_3398410; 1; –_–]

Figure 6.3/8 600A/S3/I Spec 887 A3 3398410



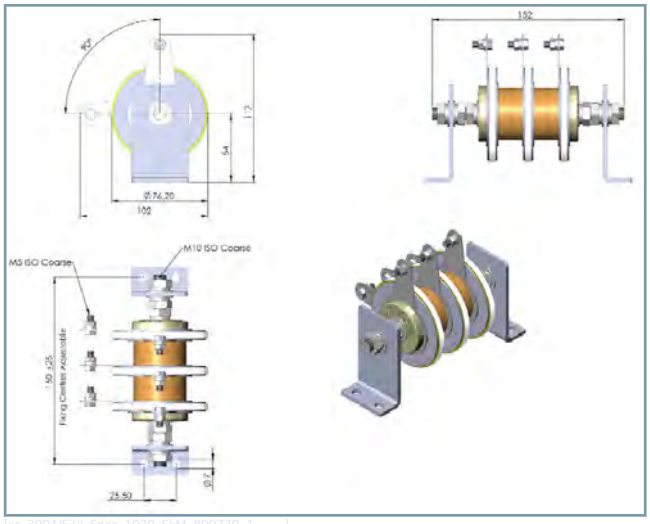
[sc_300A/S3/I_Spec_3063_SkM_800730, 1, --_--]

Figure 6.3/9 300A/S3/I Spec 3063 SkM 800730



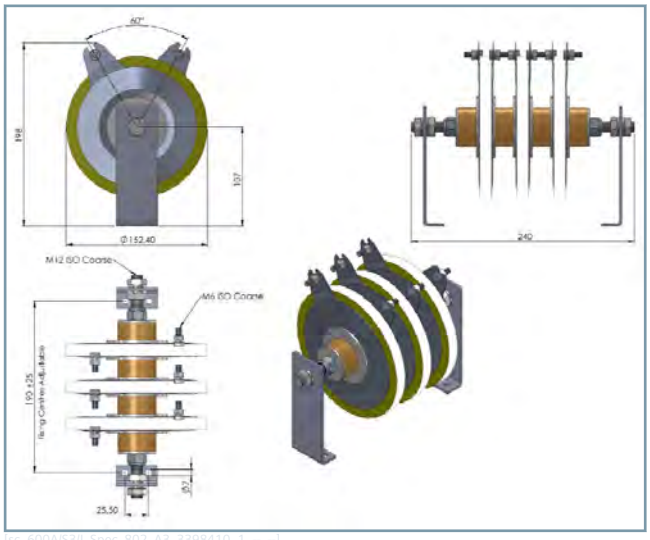
[sc_300A/S3/I_Spec_3152_SkM_800730, 1, --_--]

Figure 6.3/10 300A/S3/I Spec 3152 SkM 800730



[sc_300A/S3/I_Spec_1030_SkM_800730, 1, --_--]

Figure 6.3/11 300A/S3/I Spec 1030 SkM 800730 but 152 mm stud length



[sc_600A/S3/I_Spec_802_A3_3398410, 1, --_--]

Figure 6.3/12 600A/S3/I Spec 802 A3 3398410

High Impedance Protection Accessories

Metrosils – Metrosil 7XG14

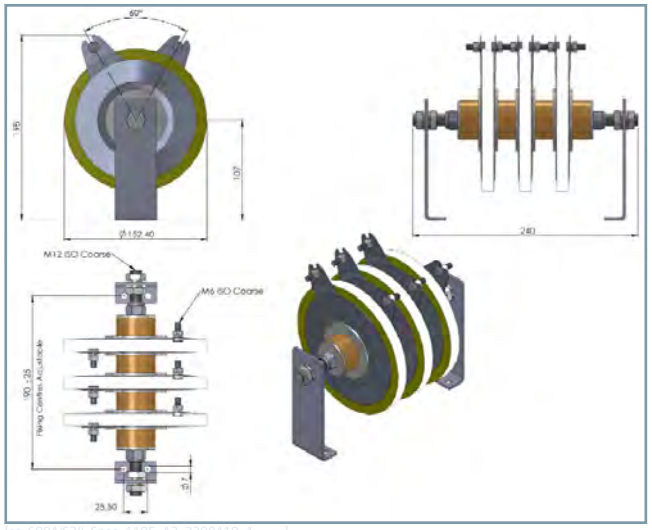


Figure 6.3/13 600A/S3/I Spec 1195 A3 3398410

Ordering Information - 7XG14 Metrosil

Product Description	Order No.																	
	1	2	3	4	5	6	7	-	8	9	10	11	12	-	13	14	16	18
Non-linear Resistor for High Impedance Schemes	7	X	G	1	4	□	□	-	□	A	A	0	0	-	0	A	A	0
						|	|		|									
Disc size, number of phases						|	|		|									
3 inch, single phase						1	|		|									
3 inch, 3 phase						2	|		|									
6 inch, single phase						3	|		|									
6 inch, 3 phase						4	|		|									
							|		|									
B value							|		|									
0.22 to 0.25							0		|										
									|										
C value									|										
450									1										
900									2										
1000									3										