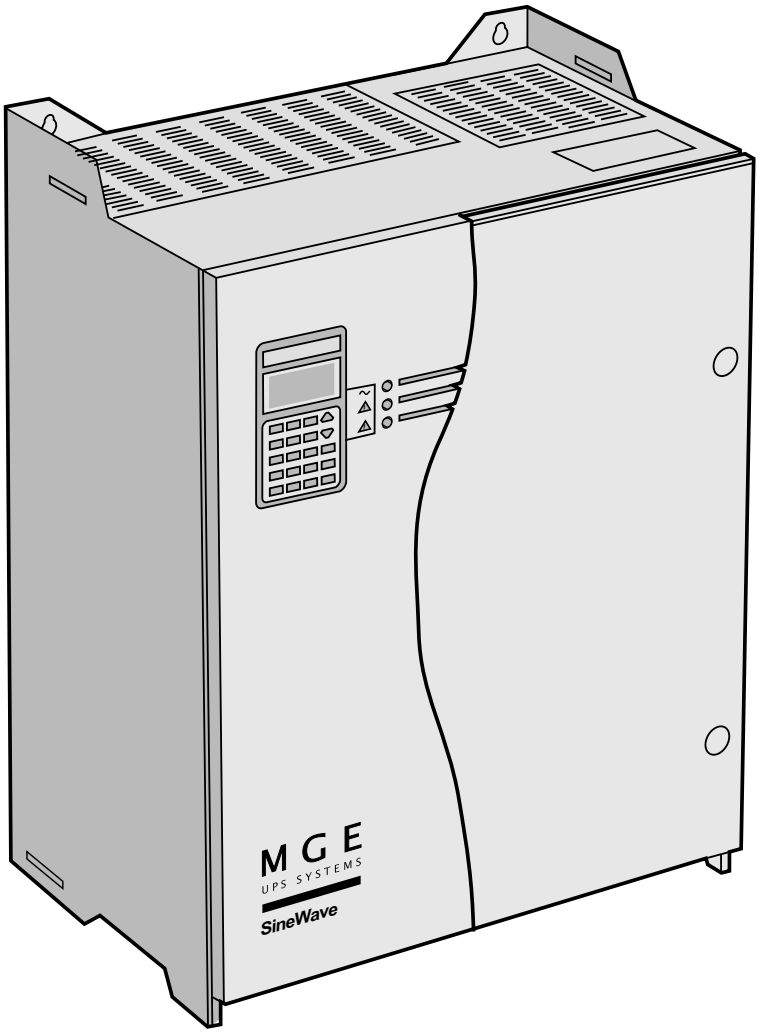
SineWave™
20 - 480 A
Autotransformer for 208 volt mains

Installation manual



THE UNINTERRUPTIBLE POWER PROVIDER

MGE
UPS SYSTEMS

To the user

We would like to thank you for choosing the **SineWave™** active harmonics conditioner and welcome you to the ever increasing world-wide family of satisfied MGE UPS SYSTEMS product users.
This manual has been written to provide you with all the information necessary to install and operate your **SineWave™** active conditioner.

We remain at your entire disposal should you require any further details.

MGE UPS SYSTEMS

Danger

Hazardous voltages are present inside the autotransformer.
Work on this equipment should only be carried out by qualified personnel.

- **the autotransformer must be earthed;**
- **do not install the autotransformer near liquids or in excessively damp environments;**
- **do not obstruct the air vents;**
- **do not place the autotransformer in direct sunlight or near sources of heat;**
- **if the autotransformer is to be stored before use, it must be kept in a dry, dust-free location.**

Storage temperature: between -20+C and +45+C.

Pictograms

Important instructions that must be followed

Information, advice, help

Contents

Installation of the **SineWave™** active harmonics conditioner, its autotransformer for a 208 volt mains, checking of its operation and certain repairs should only be carried out by qualified personnel trained to deal with electrical hazards.
Other operations may be carried out by any other persons with the help of this manual.

All **SineWave™** range products are protected by patents; they implement original technology which cannot be used by any competitor of MGE UPS SYSTEMS.

Autotransformer for 208 volt mains installation manual

Presentation

This document is complementary to the **SineWave™** installation and operation manual. It provides additional information required for the installation and connection of the autotransformer for adaptation to a 208 volt mains.

Typical diagram

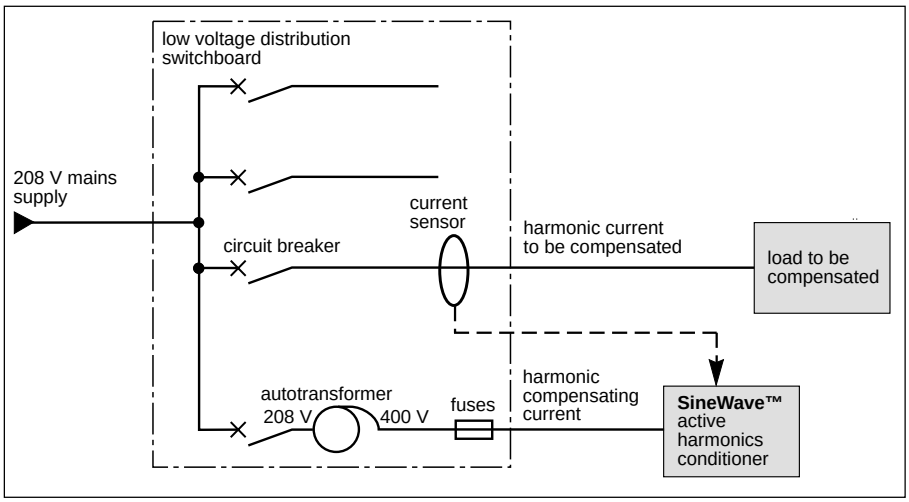
The autotransformer must be connected between the mains and the **SineWave™** active harmonics conditioner.

The position of the sensors and the connection point of the **SineWave™** active harmonics conditioner may vary from one installation to another depending on the type of problem to be solved.
The optimum locations are determined from the information gathered during the assessment carried out on the site before installation.

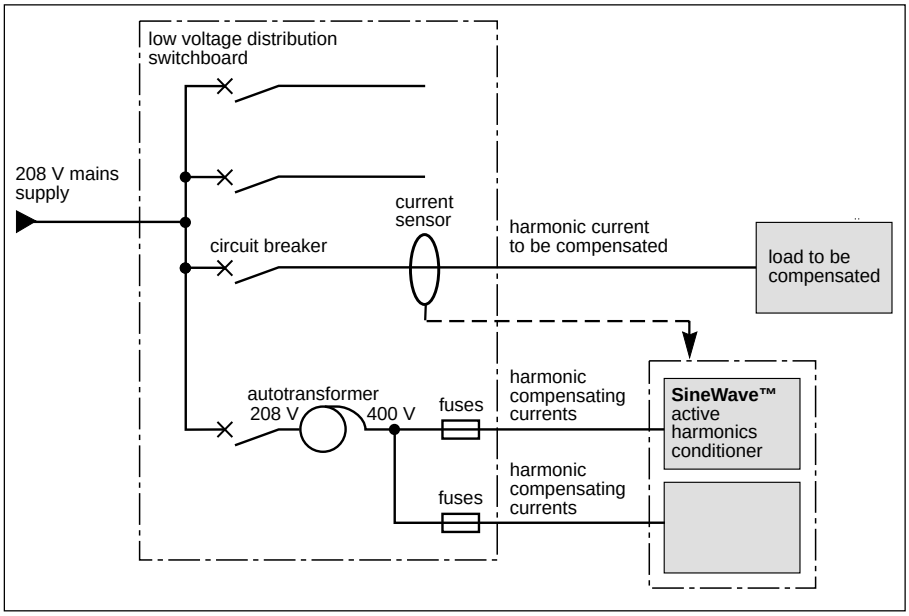
The autotransformer and the **SineWave™** unit are connected in parallel with the load.

The **SineWave™** active harmonics conditioner must be powered by a special circuit.
The autotransformer should be protected by a circuit breaker and the line supplying the **SineWave™** unit by fuses. The **SineWave™** unit uses this line to send harmonics intended to compensate the load harmonics back into the mains.

Case of a single 20, 30, 45 or 60 A SineWave™ conditioner unit

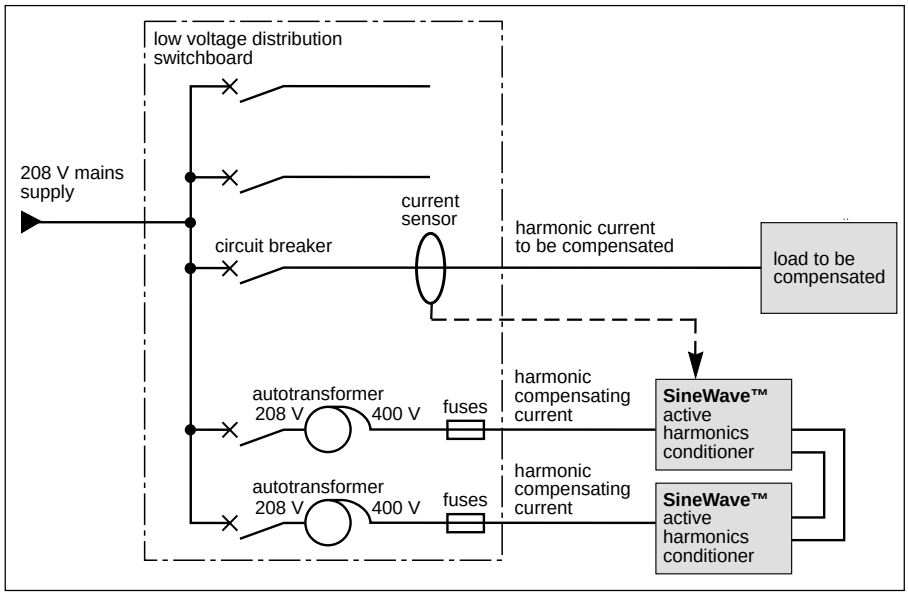


Case of a single 90 A or 120 A SineWave™ conditioner unit

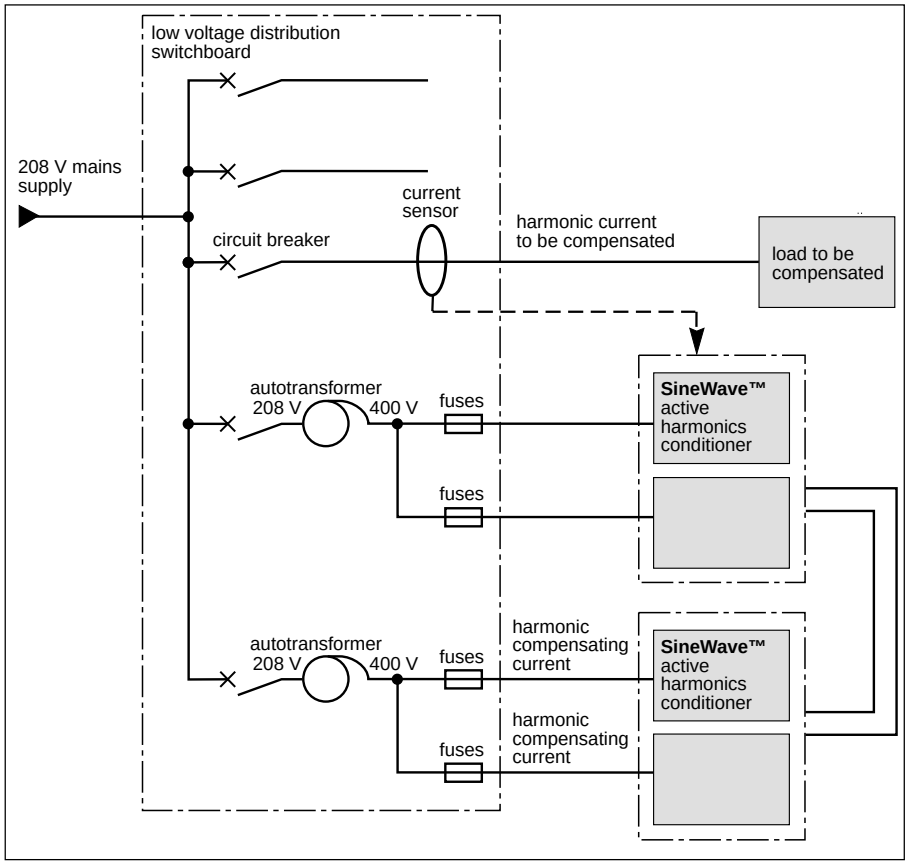


- each power circuit remains independent and has is own protective device (not supplied);
- it is possible to connect up to 4 conditioners in parallel to compensate a given load or group of loads.

Case of a two 20, 30, 45 or 60 A SineWave™ conditioner units in parallel



Case of a two 90 A or 120 A SineWave™ conditioner units in parallel

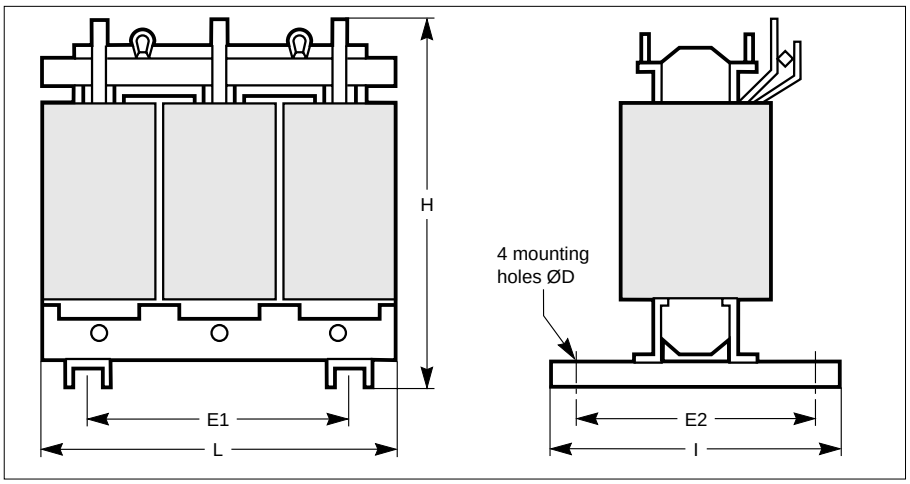


Autotransformer for 208 volt mains installation manual (continued)

Installing the autotransformer

Mechanical characteristics

The autotransformer is supplied without a protective cover.



Dimensions (mm)			Distances between hole centres (mm) (mm)		Hole diameters (kg)	Weight
Height H	**Length L**	**Width l**	**Lengthway E1**	**Widthways E2**	**D**	
◗ autotransformer for 20 and 30 A conditioner						
370	360	200	240	165	11	70
◗ autotransformer for 45 and 60 A conditioner						
415	420	220	280	185	11	115
◗ autotransformer for 90 and 120 A conditioner						
590	590	560	400	520	13	195

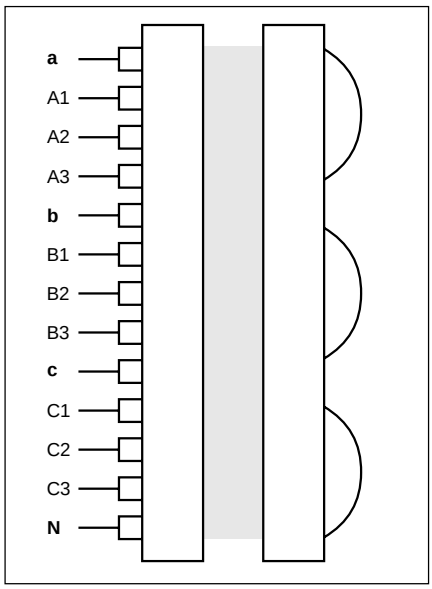
Power connections

Terminal block

Key:

a-b-c :	secondary	400 V
A3-B3-C3 :	primary	208 V
A2-B2-C2 :	primary	220 V
A1-B1-C1 :	primary	240 V

Top view of autotransformer terminal block



autotransformer primary and secondary connections:

Rating	A - B - C	a - b - c
20 - 30 A	M6 terminals	
45 - 60 A	AI 15x3 ø7 terminals	
90 - 120 A	AI 20x5 ø9 terminals	

connection of the exposed conductive parts and the neutral common to the primary and secondary:

Rating	N	Exposed conductive parts
20 - 30A	M6 terminals	M6 terminals
45 - 60 A	AI terminals 15x3 ø7	M8 terminals
90 - 120 A	AI terminals 20x5 ø 9	M10 terminals

Cables (not supplied)

The cross-sectional areas of the cables should be determined in compliance with applicable standards using the information in the table opposite and the tables indicating the recommended protective devices for the various **SineWave™** ratings.
If the neutral is distributed, it should be sized to take into account the predominant presence of the 3rd harmonic that can lead to a current in the neutral three times that of the current in the phases.

The minimum cable cross-sectional area can be determined from the sizing current (Is) given in the tables below.

If the neutral is distributed, it should be connected.

SineWave™ rating (A)	**Recommended cross-sectional areas of cables (mm^2)**				**Maximum length of power cables (m)**	
	primary (208 V)		secondary (400 V)		primary (208 V)	secondary (400 V)
	phases	neutral	phases	neutral		
20	10	35	2,5	16	10	20
30	16	70	4	25	10	20
45	25	120	10	50	10	20
60	35	2x70	16	70	10	20
90	70	2x120	10 per cubicle	50 per cubicle	10	20
120	95	3x95	16 per cubicle	70 per cubicle	10	20

Protective devices (not supplied)

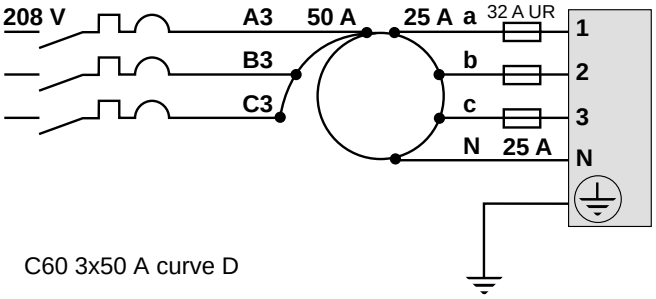
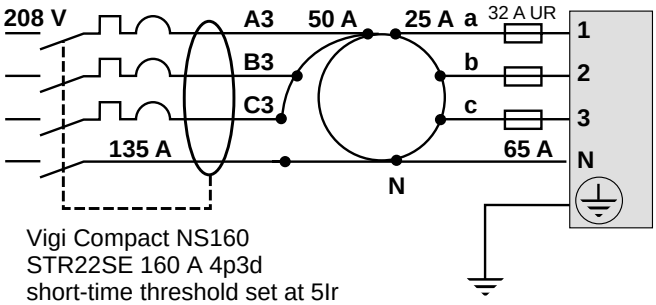
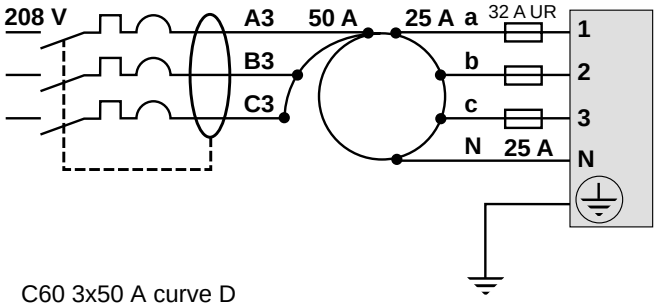
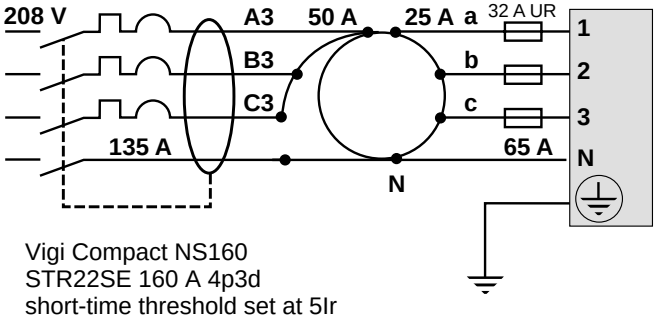
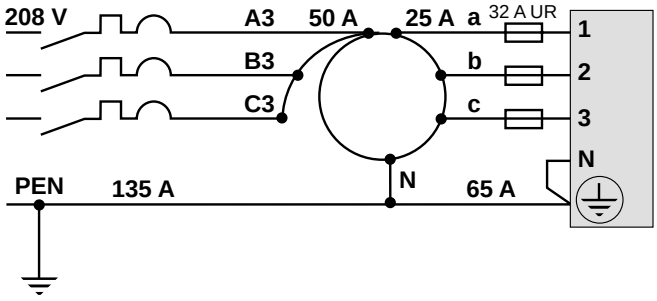
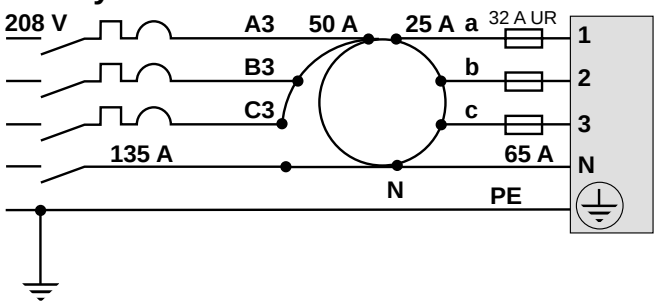
The protective devices to be used should be determined in compliance with applicable standards using the information below and respecting discrimination constraints. Specific models are cited only as a general indication and do not engage the responsibility of MGE UPS SYSTEMS.

If protection is provided by fuses, the fuse holder must be of the open type to allow for fuse cooling.

Autotransformer for 208 volt mains installation manual (continued)

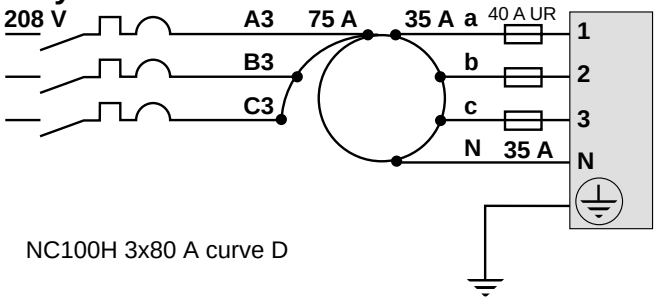
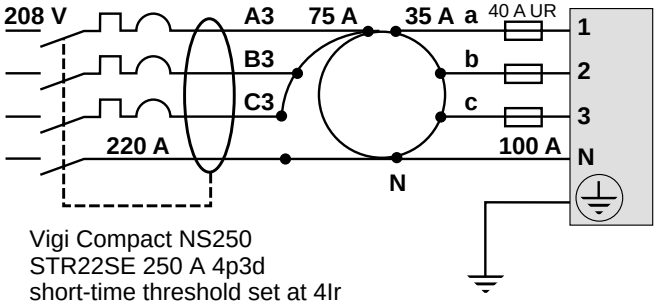
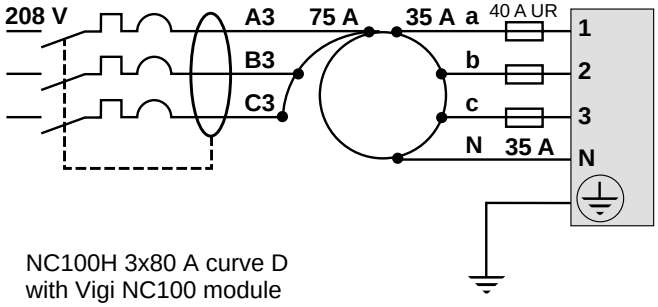
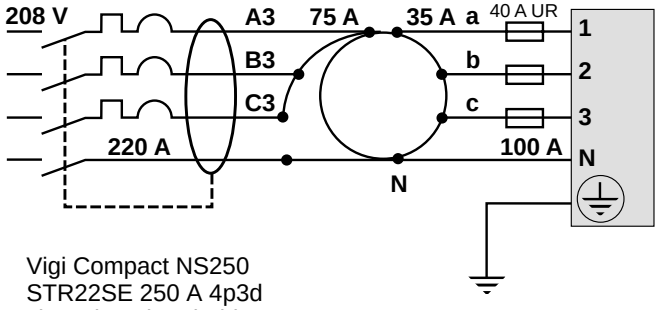
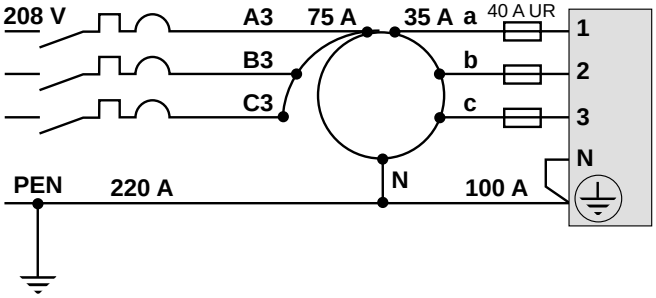
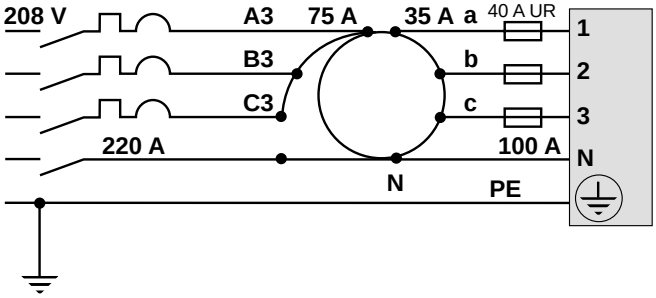
SineWave™ 20 A

Recommended protective devices connection to SineWave™ terminal block where Pcu = function of Isc

Non-distributed neutral	Distributed neutral
IT system  C60 3x50 A curve D	**IT system**  Vigi Compact NS160 STR22SE 160 A 4p3d short-time threshold set at 5Ir neutral protected by Vigi module sensitivity: 10 A
TT system  C60 3x50 A curve D with Vigi C60 module	**TT system**  Vigi Compact NS160 STR22SE 160 A 4p3d short-time threshold set at 5Ir sensitivity: depending on installation
208V / 400V autotransformer **Key**: Id = sizing current Pcu = breaking capacity Isc = short-circuit current	**TNC system**  C60 3x50 A curve D **TNS system**  NS160 STR22SE 160 A 4p3d short-time threshold set at 5Ir

SineWave™ 30 A

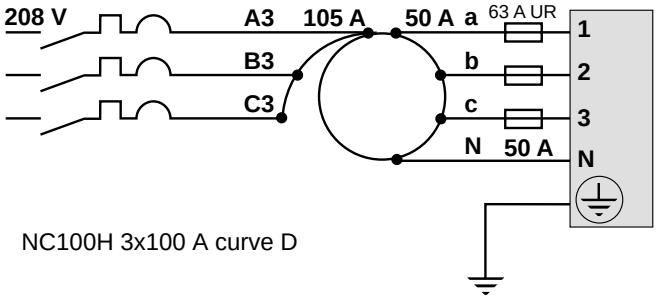
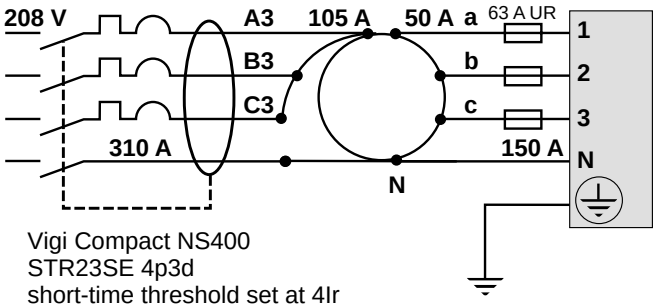
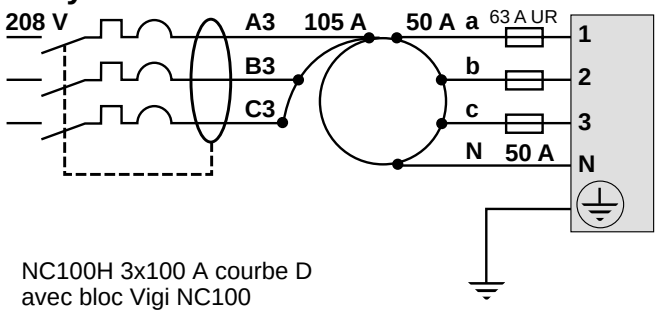
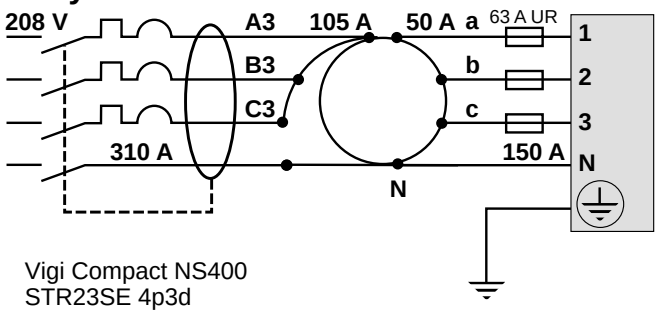
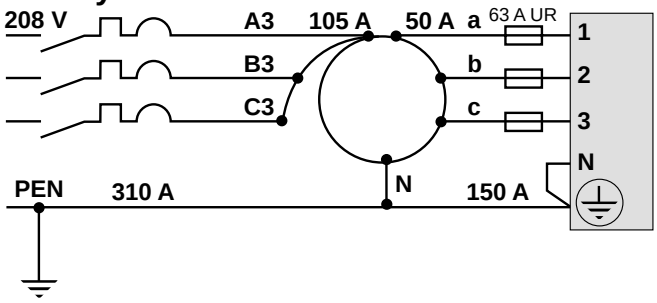
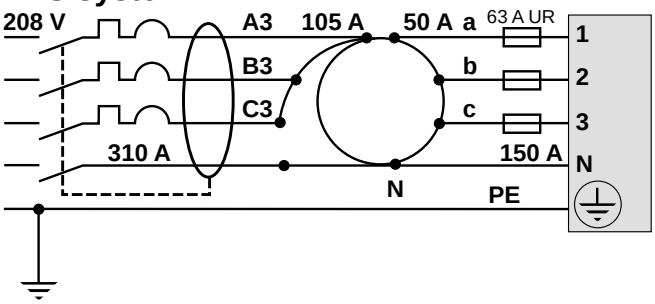
Recommended protective devices connection to SineWave™ terminal block where Pcu = function of Isc

Non-distributed neutral	Distributed neutral
IT system  NC100H 3x80 A curve D	**IT system**  Vigi Compact NS250 STR22SE 250 A 4p3d short-time threshold set at 4Ir neutral protected by Vigi module sensitivity: 10 A
TT system  NC100H 3x80 A curve D with Vigi NC100 module	**TT system**  Vigi Compact NS250 STR22SE 250 A 4p3d short-time threshold set at 4Ir sensitivity: depending on installation
208V / 400V autotransformer **Key**: Id = sizing current Pcu = breaking capacity Isc = short-circuit current	**TNC system**  NC100H 3x80 A curve D **TNS system**  NS250 STR22SE 250 A 4p3d short-time threshold set at 4Ir

Autotransformer for 208 volt mains installation manual (continued)

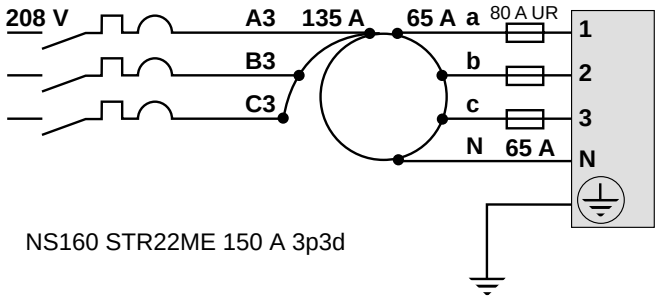
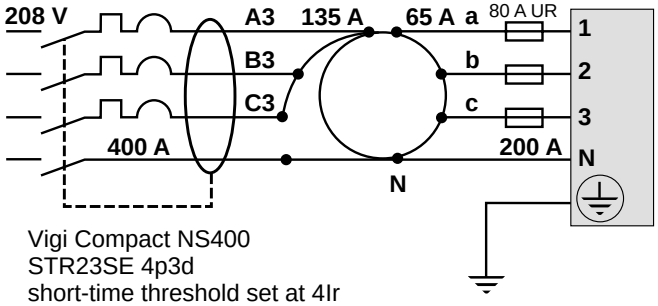
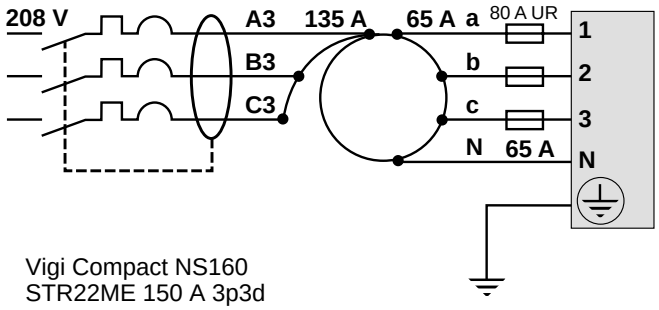
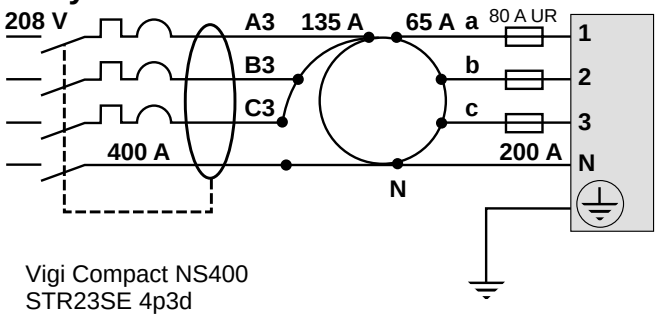
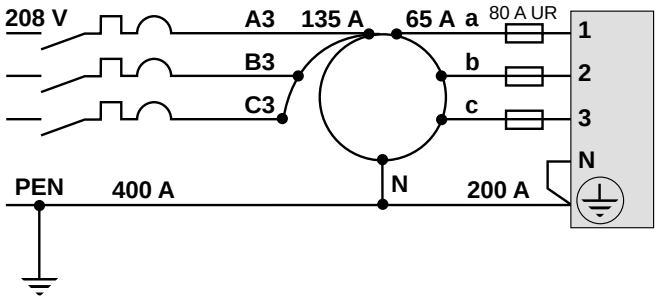
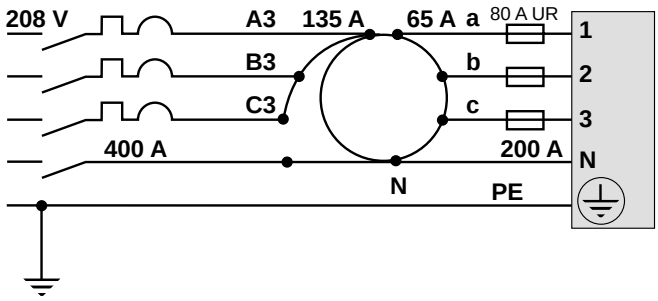
SineWave™ 45 A

Recommended protective devices connection to SineWave™ terminal block where Pcu = function of Isc

Non-distributed neutral	Distributed neutral
IT system  NC100H 3x100 A curve D	**IT system**  Vigi Compact NS400 STR23SE 4p3d short-time threshold set at 4Ir neutral protected by Vigi module sensitivity: 10 A
TT system  NC100H 3x100 A courbe D avec bloc Vigi NC100	**TT system**  Vigi Compact NS400 STR23SE 4p3d short-time threshold set at 4Ir sensitivity: depending on installation
208V / 400V autotransformer	**TNC system**  NC100H 3x100 A curve D
Key: Id = sizing current Pcu = breaking capacity Isc = short-circuit current	**TNS system**  NS400 STR23SE 4p3d short-time threshold set at 4Ir

SineWave™ 60 A

Recommended protective devices connection to SineWave™ terminal block where Pcu = function of Isc

Non-distributed neutral	Distributed neutral
IT system  NS160 STR22ME 150 A 3p3d	**IT system**  Vigi Compact NS400 STR23SE 4p3d short-time threshold set at 4Ir neutral protected by Vigi module sensitivity: 10 A
TT system  Vigi Compact NS160 STR22ME 150 A 3p3d	**TT system**  Vigi Compact NS400 STR23SE 4p3d short-time threshold set at 4Ir sensitivity: depending on installation
208V / 400V autotransformer	**TNC system**  NS160 STR22ME 150 A 3p3d
	TNS system  NS400 STR23SE 4p3d short-time threshold set at 4Ir

Key: Id = sizing current
Pcu = breaking capacity
Isc = short-circuit current

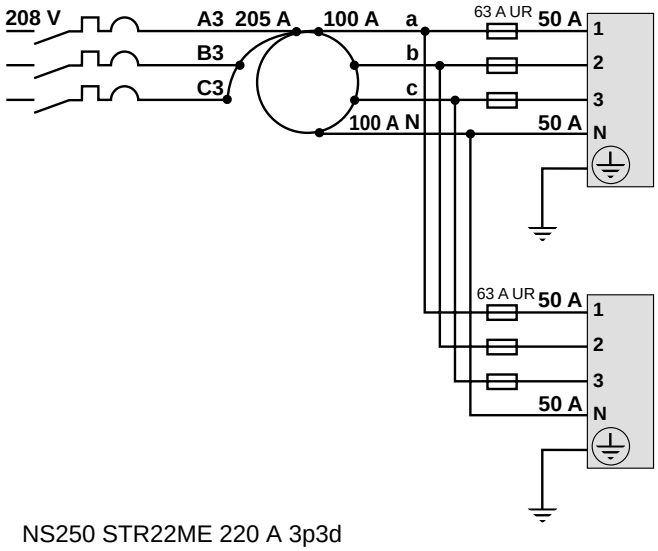
Autotransformer for 208 volt mains installation manual (continued)

SineWave™ 90 A

Recommended protective devices connection to SineWave™ terminal block where Pcu = function of Isc

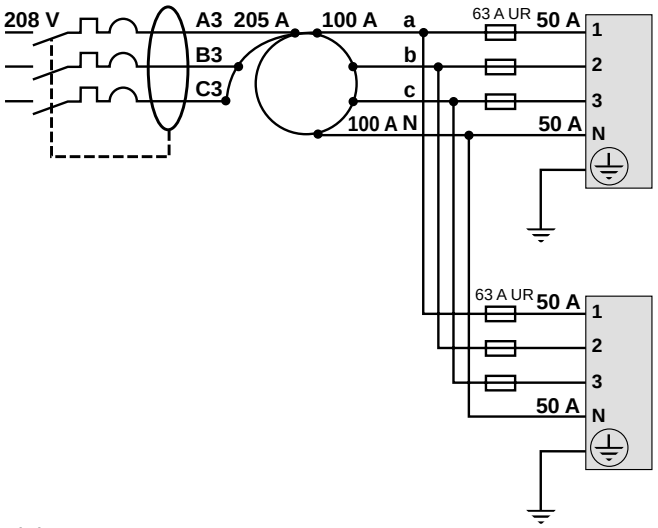
Non-distributed neutral

IT system



NS250 STR22ME 220 A 3p3d

TT system



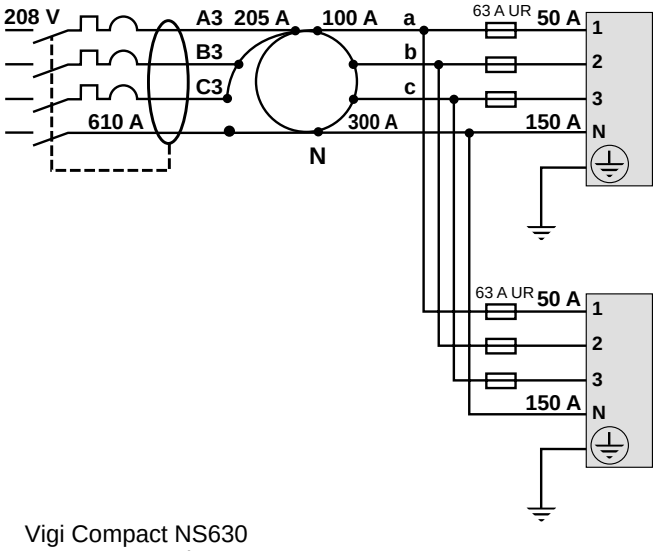
Vigi Compact NS250
STR22ME 220 A 3p3d

208V / 400V autotransformer

Key: Id = sizing current
Pcu = breaking capacity
Isc = short-circuit current

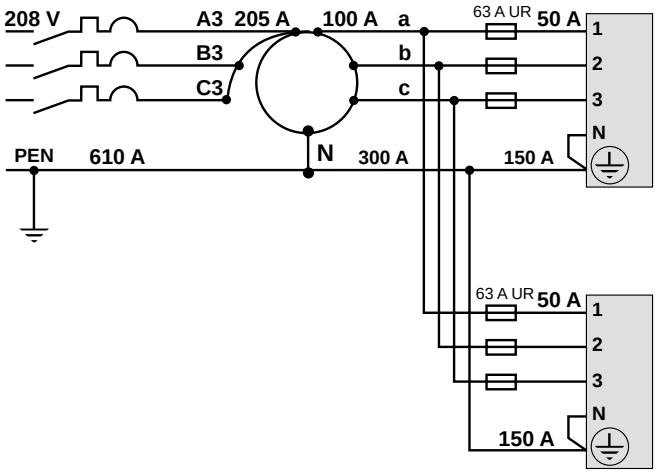
Distributed neutral

IT system



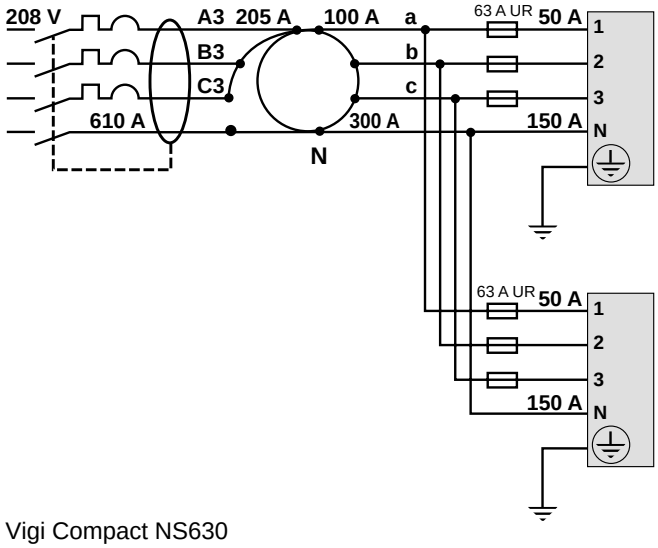
Vigi Compact NS630
STR23SE 4p3d
short-time threshold set at 5Ir
neutral protected by Vigi module
sensitivity: 10 A

TNC system



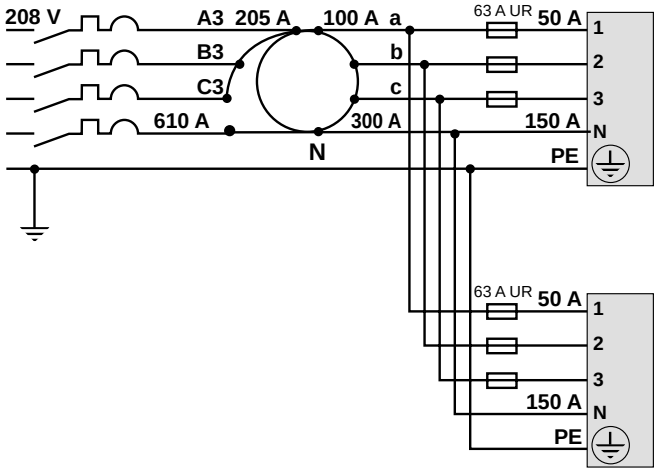
NS250 STR22ME 220 A 3p3d

TT system



Vigi Compact NS630
STR23SE 4p3d
short-time threshold set at 5Ir
sensitivity: depending on installation

TNS system

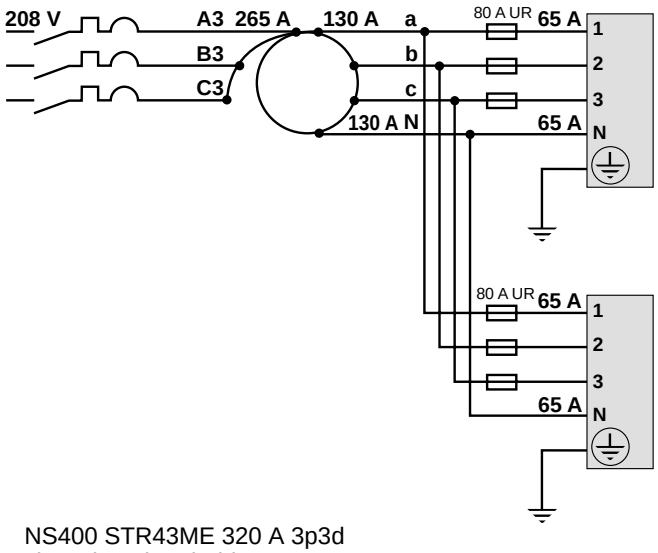
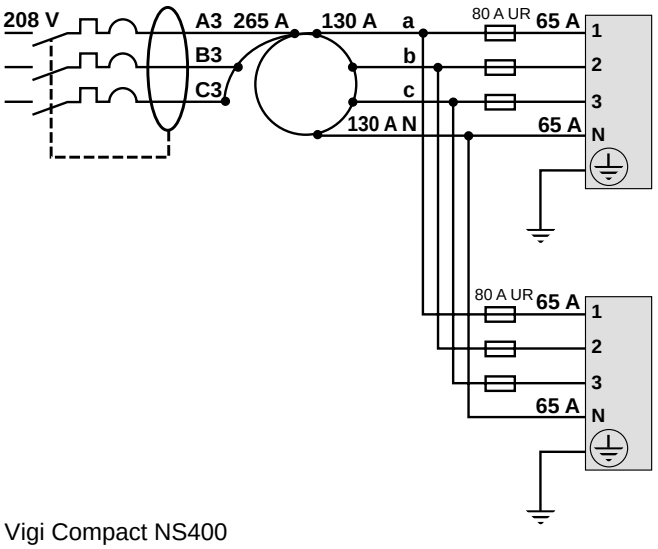


NS630 STR23SE 4p3d
short-time threshold set at 5Ir

Autotransformer for 208 volt mains installation manual (continued)

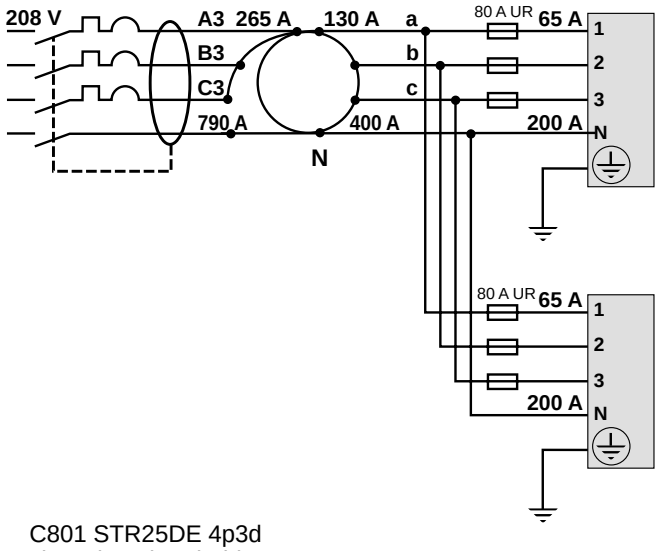
SineWave™ 120 A

Recommended protective devices connection to SineWave™ terminal block where Pcu = function of Isc

Non-distributed neutral	
	IT system  NS400 STR43ME 320 A 3p3d short-time threshold set at 9Ir
208V / 400V autotransformer **Key**: Id = sizing current Pcu = breaking capacity Isc = short-circuit current	**TT system**  Vigi Compact NS400 STR43ME 320 A 3p3d short-time threshold set at 9Ir

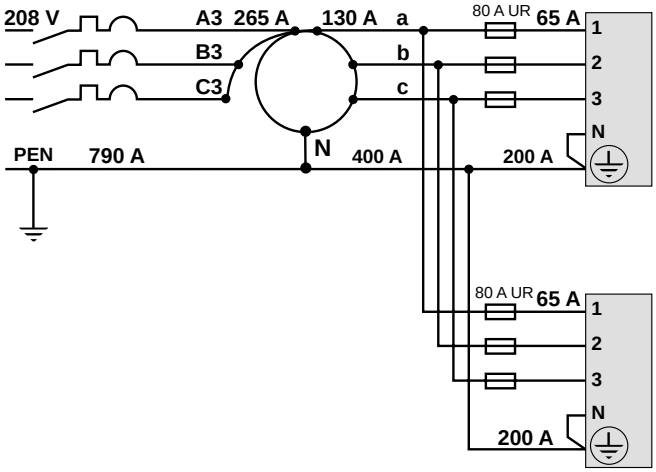
Distributed neutral

IT system



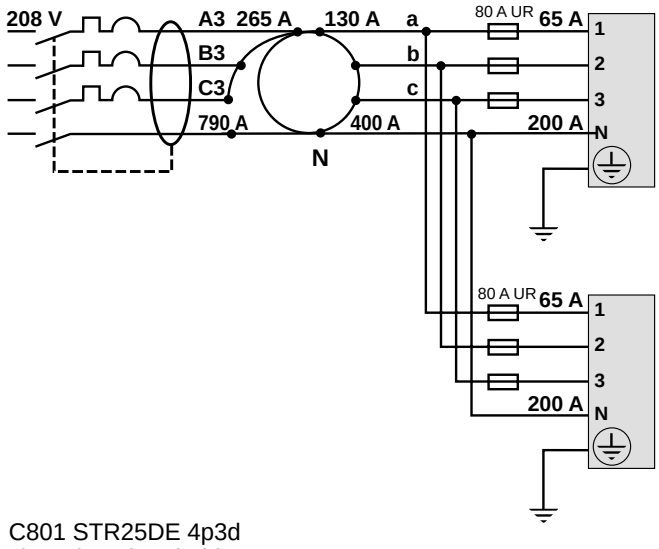
C801 STR25DE 4p3d
short-time threshold set at 4Ir
neutral protected by Vigirex relay + toroid + MX
sensitivity: 10 A

TNC system



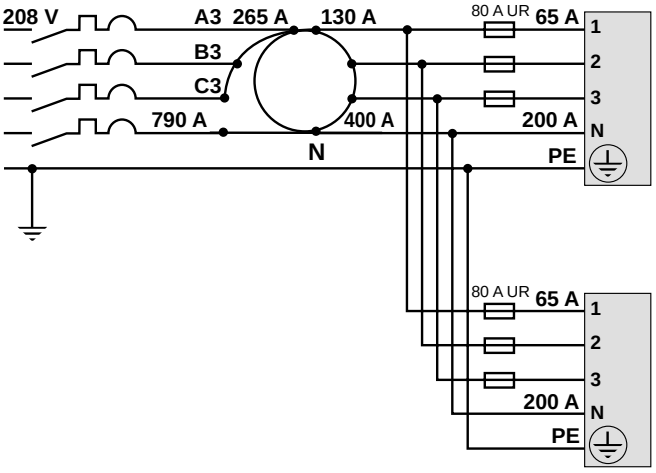
NS400 STR43ME 320 A 3p3d
short-time threshold set at 9Ir

TT system



C801 STR25DE 4p3d
short-time threshold set at 4Ir
Vigirex relay + toroid + MX
sensitivity: depending on installation

TNS system



C801 STR25DE 4p3d
short-time threshold set at 4Ir

Autotransformer for 208 volt mains installation manual (continued)

Connection procedure

Connection operations must be carried out with the equipment de-energised. For the protection of persons, always connect the PE or PEN conductor first.

Earthing arrangement: **SineWave™** is suitable for all types of earthing arrangements.

Procedure :

- make sure that the circuit breaker on the circuit supplying the **SineWave™** unit is in the "off" position (O);
- connect the PE or PEN conductor first;
- connect the other conductors, taking care to respect the phase rotation direction.

The connecting cables must be mechanically secured near the terminal block to prevent any mechanical forces from being exerted on the connections .

Note: If the cables are pulled, the PE or PEN connection should be the last to be subjected to the applied force.

To avoid interference, control wires connected to the **SineWave™** unit (connections with current sensors, communications cables, relay contact wiring) should never be run near the power cables or the autotransformer. For the same reason, the power cables connected to the outputs of the **SineWave™** conditioner or the autotransformer should not be run near other power cables.

Autotransformer characteristics

Unless otherwise stipulated, the performance data given in the table below are typical values corresponding to use under a nominal 3-phase 50 Hz mains voltage of 208 volts and rated current.

Input	◗ nominal voltage	▷ 208V -20% +15%
	◗ nominal frequency	▷ 50Hz, 60HZ ± 5%
	◗ number of phases	▷ 3 phases with or without neutral
Technical characteristics	◗ inrush current	▷ < 10 times the rated peak current
	◗ losses	▷ < 510W for ratings 20A to 30A ▷ < 1000W for ratings 45A to 60A ▷ < 1250W for ratings 90A to 120A
	◗ ventilation	▷ natural convection
Environmental conditions	◗ ambient temperature	▷ < 25°C recommended ▷ 0 à 40°C permanently
	◗ relative humidity	▷ 0 to 95 % relative humidity without condensation
	◗ operating altitude	▷ < 1000 m
Dimensions and weight	◗ height	▷ 370 mm - 20A, 30A ▷ 415 mm - 45A, 60A ▷ 590 mm - 90A, 120A
	◗ length	▷ 360 mm - 20A, 30A ▷ 420 mm - 45A, 60A ▷ 590 mm - 90A, 120A
	◗ width	▷ 200 mm - 20A, 30A ▷ 220 mm - 45A, 60A ▷ 560 mm - 90A, 120A
	◗ weight	▷ 70 Kg - 20A, 30A ▷ 115 Kg - 45A, 60A ▷ 195 Kg - 90A, 120A