

ENSTO PHASE BALANCER

PB50A-3P-200STD
PB50A-3P-200STD-UP
PB50A-3P-200ADV

GENERAL INFORMATION

- Check that the product is suitable for the cable type.
- Check the materials listed in the bill of materials for completeness.
- Read the installation instructions carefully before starting the installation.
- Install carefully and make sure the materials are clean during the installation.
- Clean the installation location after the installation.

LEGAL NOTICE

The product must be installed only by a competent person with sufficient training in installation practices and with sufficient knowledge of good safety and installation practices in respect of electrical equipment. If local legislation contains provisions in respect of such training or sufficient knowledge in respect of installation of electrical equipment such provisions shall be fulfilled by the said person. Ensto accepts no liability concerning claims resulting from misuse, incorrect installation or ignored national safety regulations or other national provisions.

WARNING: Failure to follow the installation instructions may result in damage to the product and serious or fatal injury.



DANGEROUS VOLTAGES ARE EXPOSED WITHIN ENSTO PHASE BALANCER. ONLY A COMPETENT ELECTRICIAN IS ALLOWED TO CARRY OUT THE ELECTRICAL INSTALLATION!

Bill of materials

Part	PCS
Phase balancer	1
Counterpart for pole adaptor	2
Manual	1
Triangular key	1
Bolt SOT4.7	2
Washer M20	4
Nut M20 4	4
Clampo Pro terminal shroud	1
Additional parts -ADV version	
Molex Receptacle Housing	1
18-24AWG Female Crimp Terminal	5

Technical Characteristics

1 GENERAL CHARACTERISTIC

Type	PB50A-3P-200STD / PB50A-3P-200STD-UP / PB50A-3P-200ADV
Rated voltage (Un)	400 / 230 VAC
Operating voltage range	400 / 230 VAC, -20% ... + 20%
Rated frequency (fn)	50 Hz
Rated neutral current (In)	50 A
Rated phase current (In)	35 A
Maximum neutral current (<10 min.)	100 A
Maximum single phase short circuit current increase (depends on the network conditions)	160%
Electrical wiring	3-phase, 4-wire
Earthing system	TN / TT
IP class	IP55
Cable connections	Cu 16 – 95 mm ² Al 16 – 95 mm ²
Weight	PB50A-3P-200STD - 125 kg PB50A-3P-200STD-UP - 125 kg PB50A-3P-200ADV - 130 kg
Dimensions (W x H x D)	435 x 785 x 430 mm
Communication	Modbus RTU (PB50A-3P-200ADV version only and available from SW1.5)

2 SERVICE CONDITIONS

Ambient air temperature	- 35 °C + 40 °C
Humidity conditions for outdoor installation	100% (+25 °C)
Max installation altitude	≤ 1000 m

3 FUSES

Main fuses	gG 000 35A 500V
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4 THERMAL PROTECTION

Transformer module hardware limit	STD/STD-UP version: Transformer: Thermostat, 100°C
Transformer module software limit	ADV version: Transformer NTC, 90°C

5 STORAGE AND HANDLING

Ambient storage temperature (indoor storage)	- 40 °C + 40 °C
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6 PACKING DETAILS

Weight including package	160-165 kg
Dimensions (W x H x D)	800 x 1200 x 600 mm

7 STANDARDS

Safety:	EN 61439
EMC:	
Emissions:	EN 61000-6-3
Immunity:	EN 61000-6-2
Harmonics:	EN 61000-3-2
Flicker:	EN 61000-3-3

Ensto Phase Balancer Installation Guide

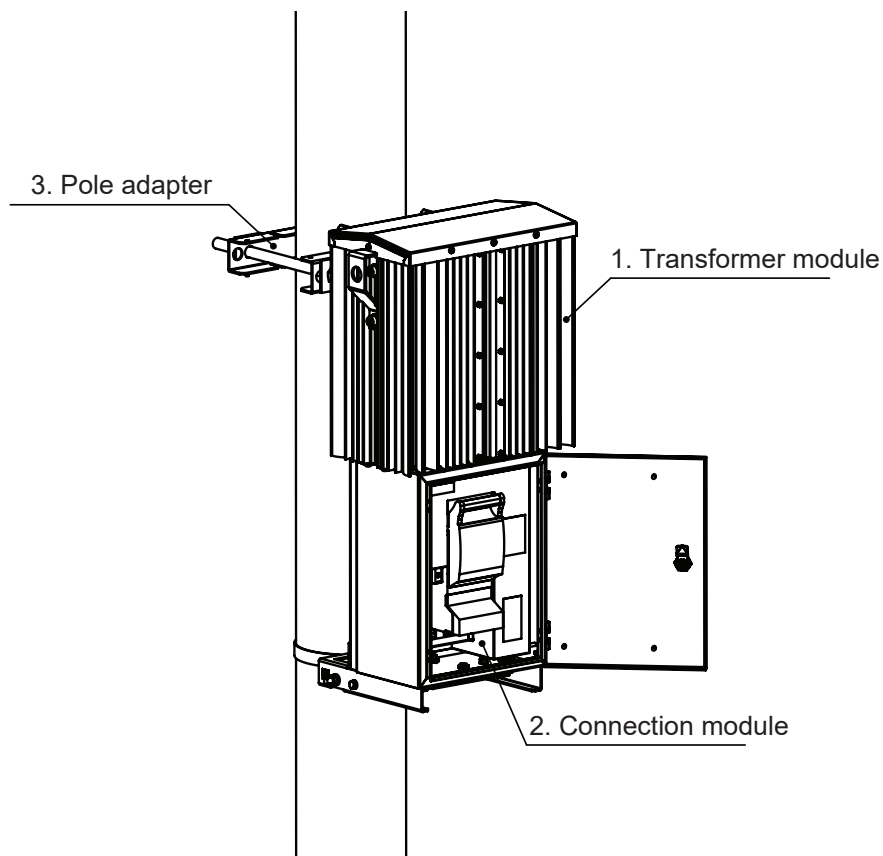
1 GENERAL

This guide gives basic information about mechanical and electrical installation of Ensto Phase Balancer. All mechanical installation equipment is based on standard Ensto components.

2 INTRODUCTION

Ensto Phase Balancer's internal and external parts are shown in Picture 1. Following components can be found from this picture.

- [1] Transformer Module
- [2] Connection Module
- [3] Pole Adapter

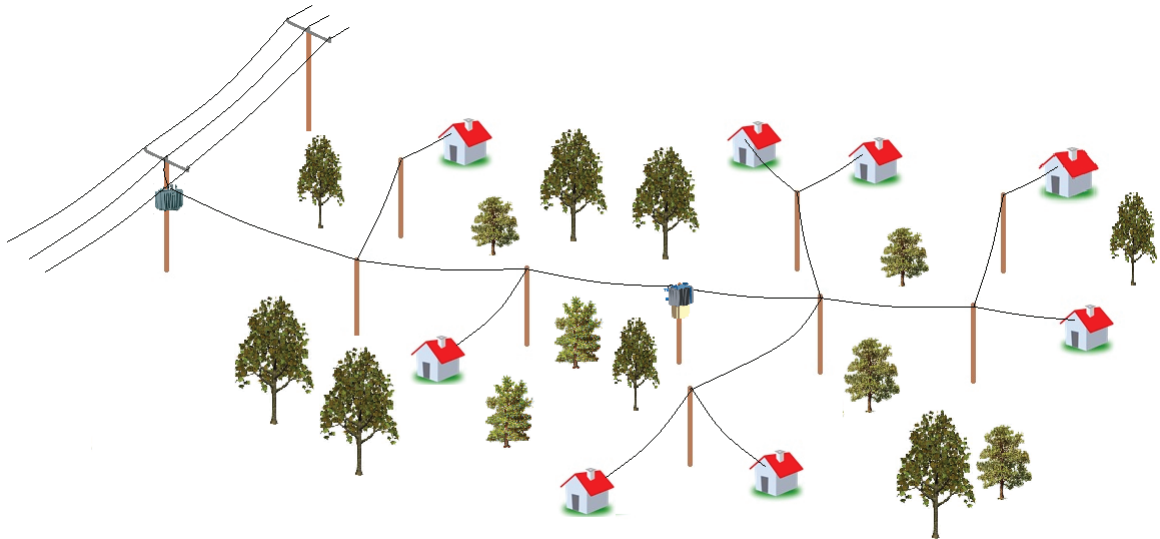


Picture 1. Ensto Phase Balancer's internal and external parts.

3 INSTALLATION LOCATIONS

Case 1

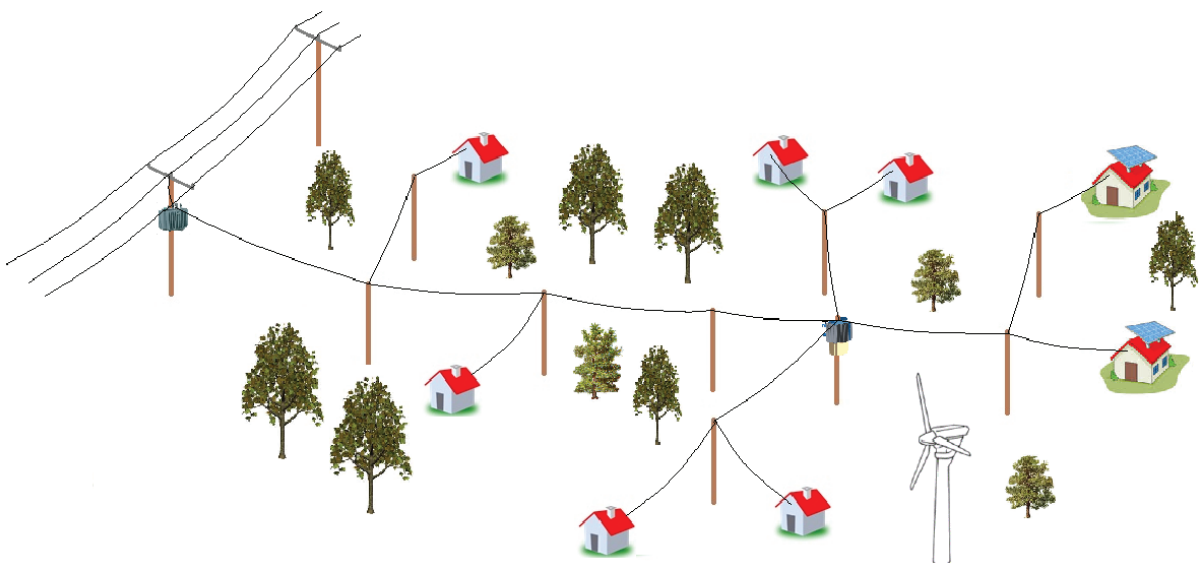
Problem: Line is heavily asymmetrically loaded in extreme conditions. This results one phase fuse to blow at the distribution transformer's secondary.



Solution: Ensto Phase Balancer is installed near the end customers to balance the loading of the line.

Case 2

Problem: There is a lot of single phase renewable energy generation at the line. This results in overvoltage at one phase.

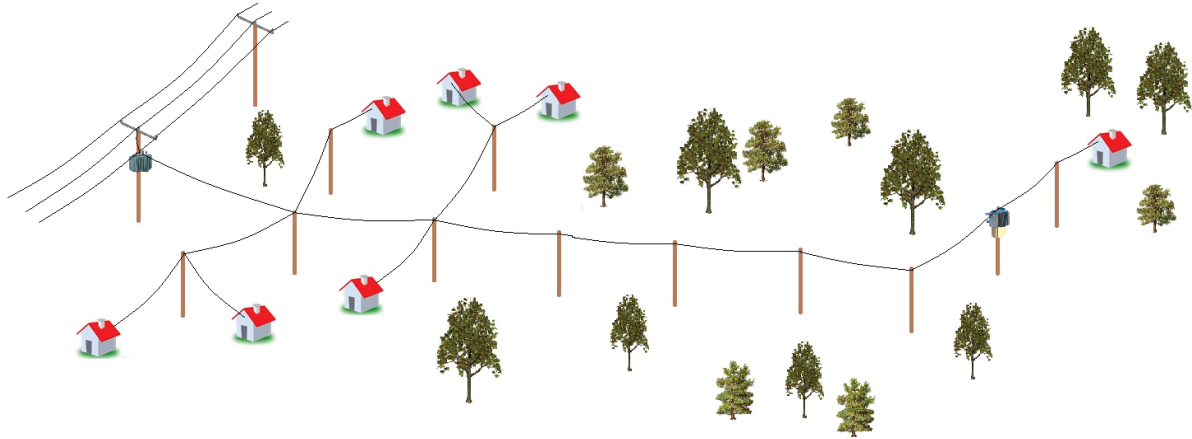


Solution: Ensto Phase Balancer is installed near renewable energy generation to distribute the current to two other phases.

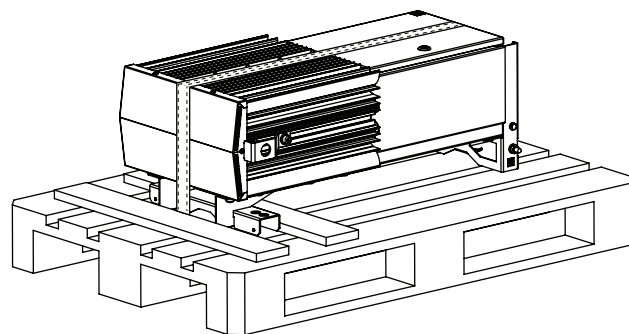
Case 3

line.

Problem: Customer suffers from flicker and low short circuit current at the end of the

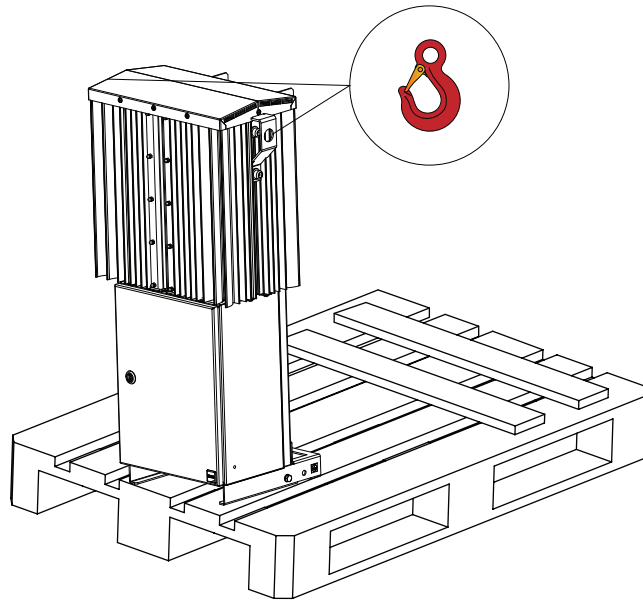


Solution: Ensto Phase Balancer is installed near the customer to raise the short circuit current levels and reduce the flicker.

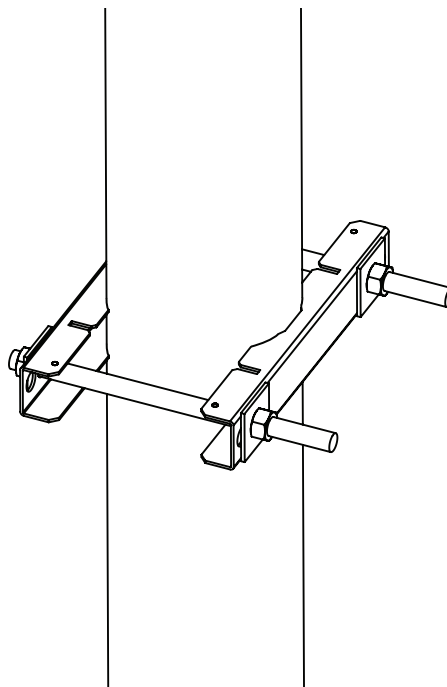
4 TRANSPORTATION

1. Ensto Phase Balancer is transported back down to the installation location. Phase Balancer must be attached properly while transporting it to the installation location

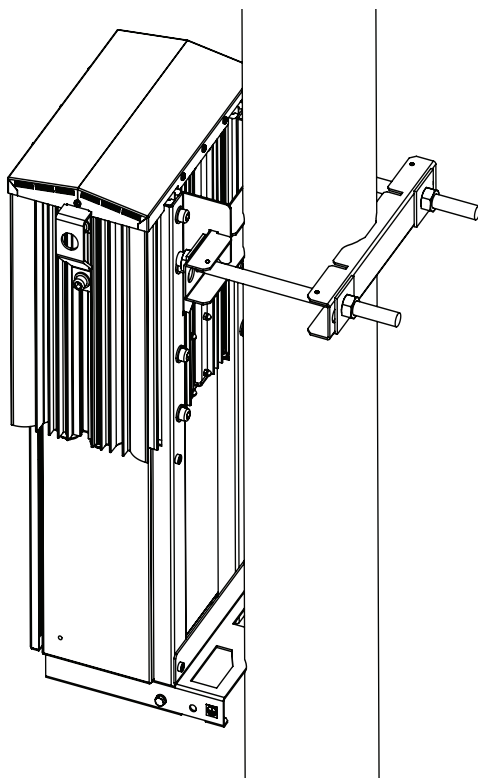
5 INSTALLATION



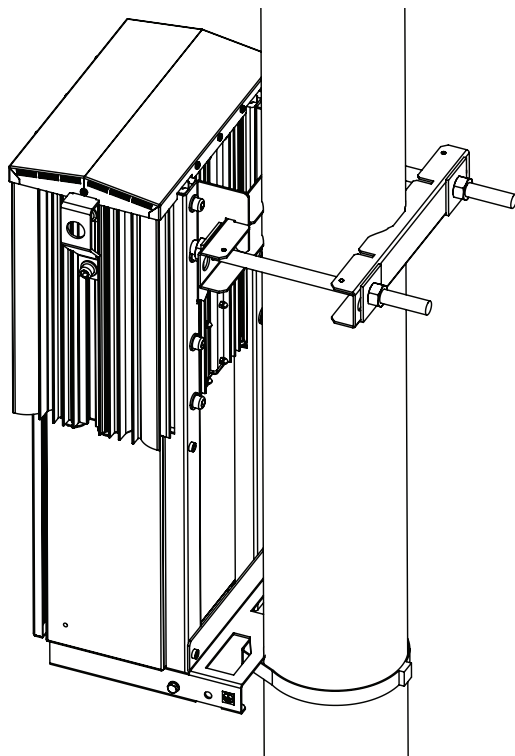
1. Lift Ensto Phase Balancer to upright position by using the indicated lifting holes.



2. Install the upper pole bracket of the pole adapter with bolt SOT4.7 and proper washers and nuts.



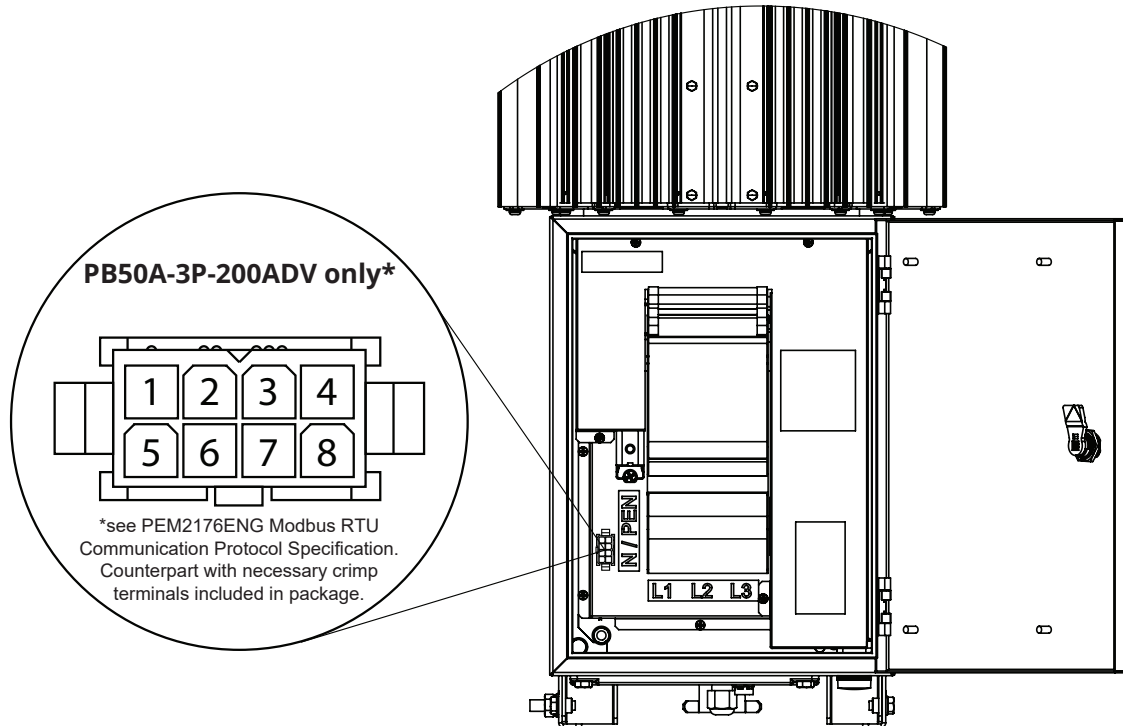
3. Lift Ensto Phase Balancer to the pole adapter and tighten the screws.



4. Recommendation: attach the lower pole adaptor with a buckle COT36 and steelband COT37 using a tightening tool CT42 or with a coach screw.

6 ELECTRICAL INSTALLATION

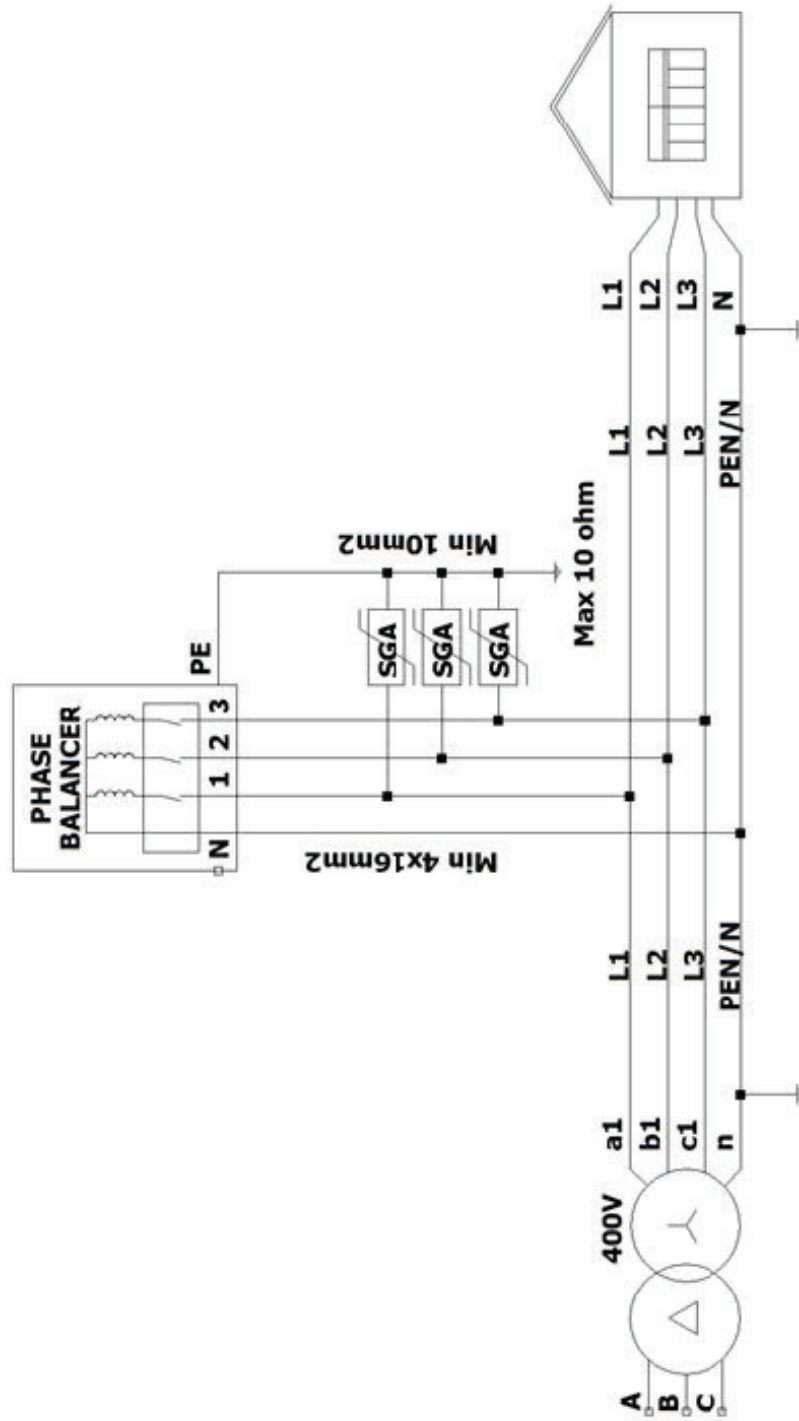
For your own safety, cut the line power before mounting and starting electrical installation. Phase Balancer is connected in parallel to the feeding line!



1. Select the installation location.
2. Measure and prepare jump wires that are connected between existing line and the balancer.
3. Mount Ensto Phase Balancer to the pole or wall.
4. Connect a wire between the PE-stud and earthing system.
5. Install three surge arresters** between input phase and earth and between neutral and earth.
6. Connect the neutral jump wire to the neutral-terminal.
7. Connect the phase wires to the terminals.
8. Check that everything is properly installed before switching power on.
9. Switch power on to the main line.
10. Check indicators at the bottom of the balancer (see Section 8 and 9 for LED indicators).
11. Close the door, installation is ready.
12. Seal the door if necessary.

** *External surge arresters are recommended if the Balancer is connected to overhead line. Not included to the delivery.*

7 ENSTO PHASE BALANCER GRID CONNECTIONS



8 LED INDICATORS – PB50A-3P-200STD

Starting sequence – PB50A-3P-200STD

When the Phase Balancer is connected to the network, the starting sequence is as follows:

1. The red indicator blinks once.
2. The main contactor closes and the device connects to the network.
3. The green indicator turns on.

Fault cases – PB50A-3P-200STD

The led indicators at the bottom of the Phase Balancer indicate the state of the device.

- The green indicator indicates that the main contactor is closed and the device is working properly.
- The red indicator indicates that the main contactor is open due to over temperature error or too low phase voltage in phase L1.

9 LED INDICATORS – PB50A-3P-200ADV

Starting sequence – PB50A-3P-200ADV

When the Phase Balancer is connected to the network, the starting sequence is as follows:

1. The red indicator blinks five times.
2. The green indicator blinks five times.
3. The main contactor closes.
4. The green indicator stays on.

Fault cases – PB50A-3P-200ADV

The led indicators at the bottom of the Phase Balancer indicates the state of the device. Table below explains the working principle. Each series of red blinks is separated with a green blink, unless otherwise specified in the table. Behavior of the contactor during each fault is described in the table below, and there is five minutes recovery time after all faults which caused contractor to open.

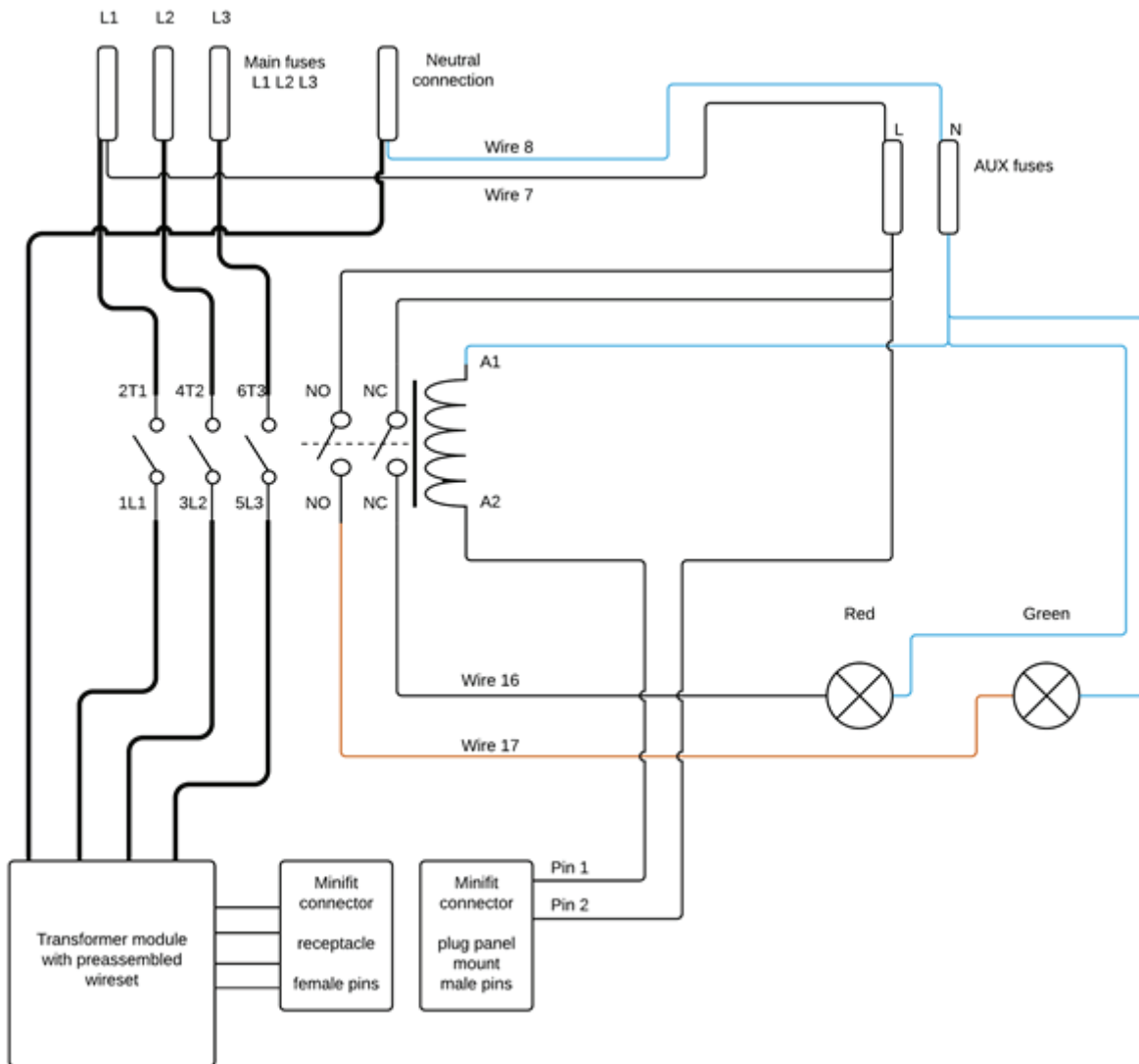
Multiple active faults are separated with a green blink as well, for example simultaneous over temperature fault and gateway error are indicated as 8 red blinks, 1 green blink, 3 red blinks, 1 green blink, etc.



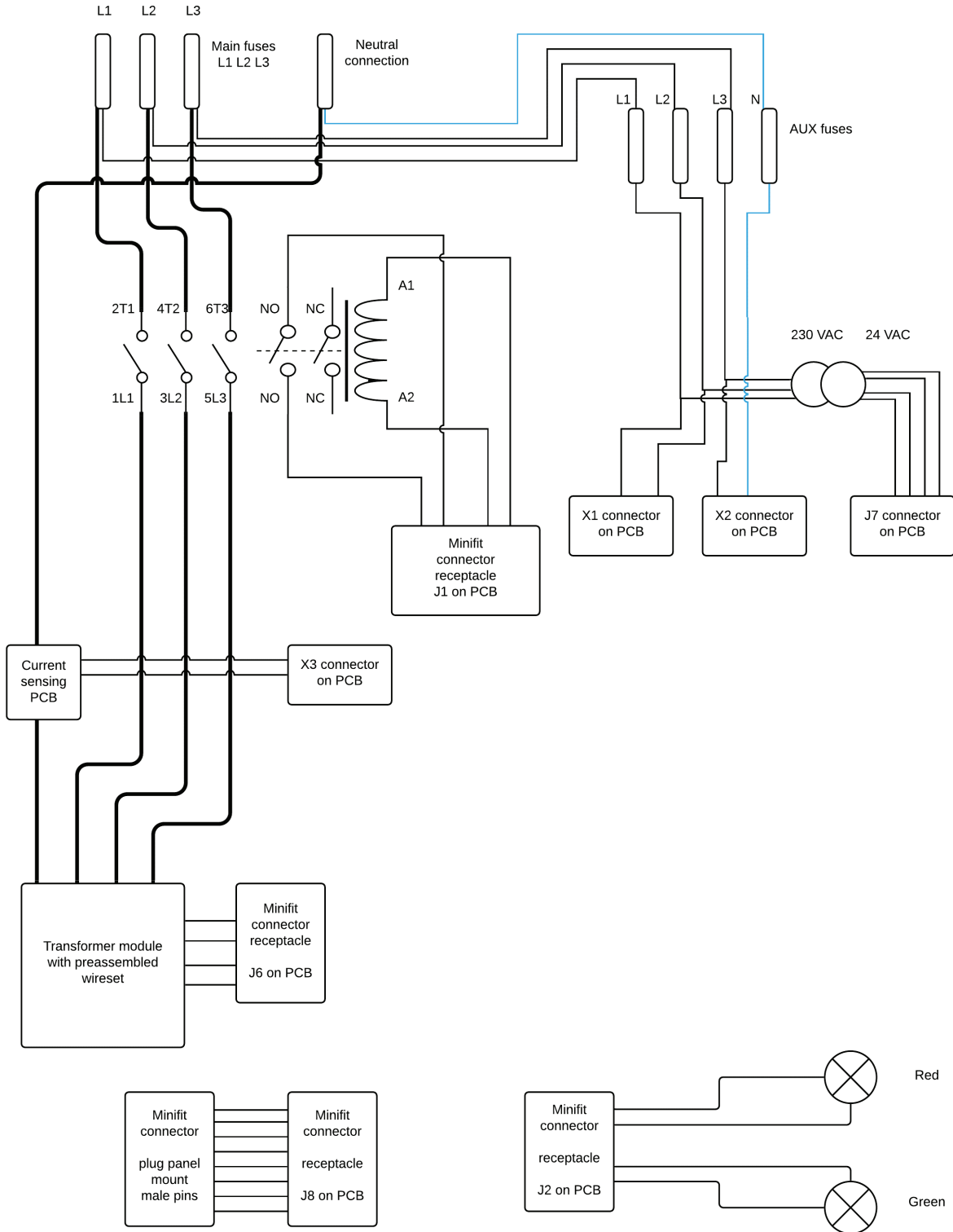
Lights	Contactor position	State
Green light on	Closed	Device is working and connected to the network
Red light on	Open	Device is in error state
Green light blinking	Open	Fault(s) cleared, recovery timer (5 min)
8 red blink	Open	Over temperature
7 red blink	Open	Network fault
6 red blink	Open	Main switch error
5 red blink	Open	Critical internal error
4 red blink*	Closed	Internal error
3 red blink*	Closed	Gateway error (communication)

*Separated with two green blinks unless multiple faults are active.

10 CIRCUIT DIAGRAM - PB50A-3P-200STD / PB50A-3P-200STD-UP



11 CIRCUIT DIAGRAM - PB50A-3P-200ADV



Modbus RTU CONNECTOR

ENSTO

ENSTO FINLAND OY
ENSIO MIETTISEN KATU 2, P.O.BOX 77
06101 PORVOO, FINLAND
TEL. +358 204 76 21
EMAIL: ENSTO@ENSTO.COM

WWW.ENSTO.COM