



SYSTEM MANUAL

**TSI Manual Bypass Rack 20A -1U
T306730001**

TSI_MBP Rack User Manual_Rev06-Sept-2015



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The present equipment is protected by several international patents and trademarks.**

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0 Safety Recommendations

Your safety is our major concern.

Read carefully all safety aspects listed in this manual prior any intervention on the appliance.

The manufacturer declines all responsibilities if equipment has not installed by skilled technician and in a proper way according to local safety regulation and as it is described herein.

TSI Manual Bypass Rack is not supplied with internal disconnect devices.
Refer to Installation Manual - chapter 3 for safe installation and access to the system.

TSI rack can reach hazardous leakage currents if grounding is not made according to safety recommendations. Refer to Installation Manual –§ 3.4.2.



Caution:

Installation and commissioning must be done and conducted by trained people fully authorized to act on installation.

It is prohibited perform any isolation test without instruction from manufacturer.



Caution:

For your easiness, the following picto will appear to highlight safety advices

Prior any handling of the shelf, wait a few minutes (min 5 minutes) for complete discharge of internal capacitors that have been energized



Caution:

The TSI Manual Bypass Rack does not include any protecting and/or disconnecting devices on AC input.

THESE WOULD BE INSTALLED OUTSIDE THE SHELF.

Before any intervention on the TSI Rack, operator has to make sure that power is removed from AC input mains.

All breakers, cables and wires must be CE and classified for min 90°C (194°F) operation

All DC cables and alarm cables as well must be kept minimum 10mm away AC cables

Some safety labels are stuck on the TSI rack. They must not be removed.

Respect Line and Neutral connection.

1 Introduction

This document applies to the TSI System. For product description, please refer to related document.

The information provided in this manual covers single phase Manual Bypass Rack 20A 1U Unit, their basic functions, operating procedures, options available and emergency situations. It also includes information on electrical connections, cabling, mechanical installation, Commissioning and troubleshooting the equipment. Only detailed requirements of the MBP units are described herein, and installation must be carried out in accordance with this manual.

Refer to the associated TSI manual for Inverter operating instructions. Electrical installation must also carefully follow local legislation and regulations. Only qualified personnel should conduct these installations as failure to acknowledge electrical hazards could prove to be fatal.

1.1. Overview:

1.1

Many different kinds of sensitive electrical equipment can be protected by an Uninterruptible Power Supply (UPS)/Inverter including computers, workstations, process control systems, telecommunications systems etc. The purpose of the MBP unit is to provide an extra level of protection in allowing for the replacement of a Inverter without powering down the loads connected. The MBP can work with single phase TSI INVERTER.

To prevent power line problems from reaching critical systems causing damage to software, hardware, and equipment malfunctions, the UPS maintains constant voltage, isolating critical load output and cleaning the utility AC power. When a UPS fails or needs maintenance, many times it is necessary to turn off the UPS and disconnect it from incoming electrical circuits. With the MBP installed between the incoming Utility and the UPS, you can replace the UPS and/or Batteries without dropping the load. You simply switch the MBP Unit from UPS power to Utility power and remove the UPS while the load connected to the MBP Unit continues to operate temporarily from Utility power.

1.2 Product Description:

1.2

The Manual Bypass Rack Unit (MBP) is designed to operate with a single phase TSI Inverter/UPS up to 20Amps in output capacity.

The MBPU allows you to:

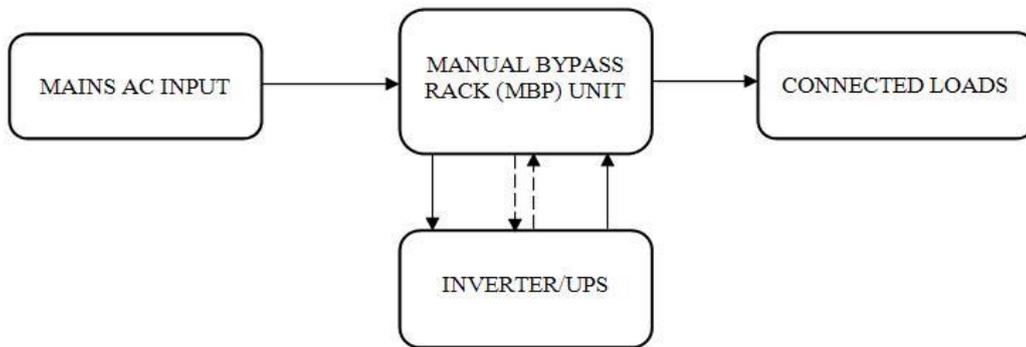
- Replace or upgrade the Inverter/UPS without losing power to the protected equipment
- Provide emergency stop protection if the Inverter is not present
- Provide extra alarm protection when the Inverter is present.

Key Features :

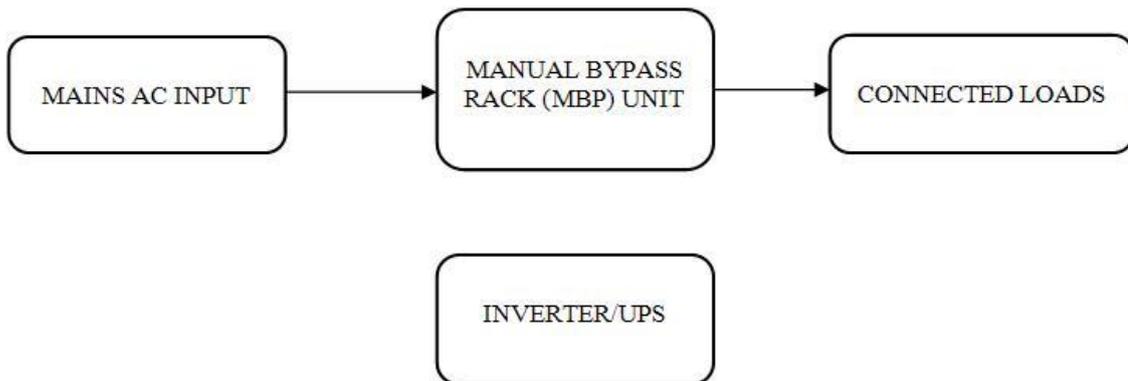
- Design for 19 "rack mount, 1U space requirements.
- The MBP unit is equipped with 20A rated Cam Rotary Switch of S1, S2 S3.
- An Emergency stop push button to shut down the output.
- The MBP sequence to Switch ON/OFF is explained in the Front plate
- Terminal connectors for Alarms, External emergency stop provided at Back panel.
- Input/output Cabling fitted with Wago connector for connection without tools.
- The MBP unit comes with complete cabling kit.
- Enclosure IP 20
- CE approval of the Rack.

The MBP unit provides an isolation path of power for Inverter system for preventive maintenance or service. There are both normal and Bypass modes of operation as described as below

1. Under normal operation, the Mains AC Input flows through the MBP unit to the Inverter/UPS and then out to the Connected Loads.



2. Under maintenance operation, the Mains AC Input flows through the MBP unit to the connected Loads – the UPS is not in the circuit.



2 Product Constitution

Please check that operating manual version you are reading is corresponding to TSI version running in your installation.

TSI Manual Bypass Rack for the Bypass of UPS/TSI Inverter.

Part Description and Number:

TSI Manual Bypass Rack 20A – 1U

T306730001

2.1 TSI MBP Rack Identification Plate

2.1



2.2 Package Includes

2.2

- TSI Manual Bypass Rack 20A-1U
- Cable kit
- Electrical Schema.



The Cable kit consists of



- | | |
|--|--------|
| • TSI Inverter output Cable (C-C1) | - 1 No |
| • TSI Mains Input Cable (D-D1) | - 1 No |
| • Wago Connector set | - 2 No |
| • Phoenix Connector for Alarms with cable (F-F1) | - 1 No |
| • Phoenix Connector for R I/O with cable (E-E1) | - 1 No |
| • Phoenix Connector for Remote Emergency Stop. | -1 No |

The DESCRIPTION and PART NUMBER are essential information when you contact Manufacturer to get help in commissioning or in troubles or when item is sent back for repair.

3 Installation



Caution:

Installation and commissioning must be done and conducted by trained people fully authorized to act on installation.

3.1 Overview

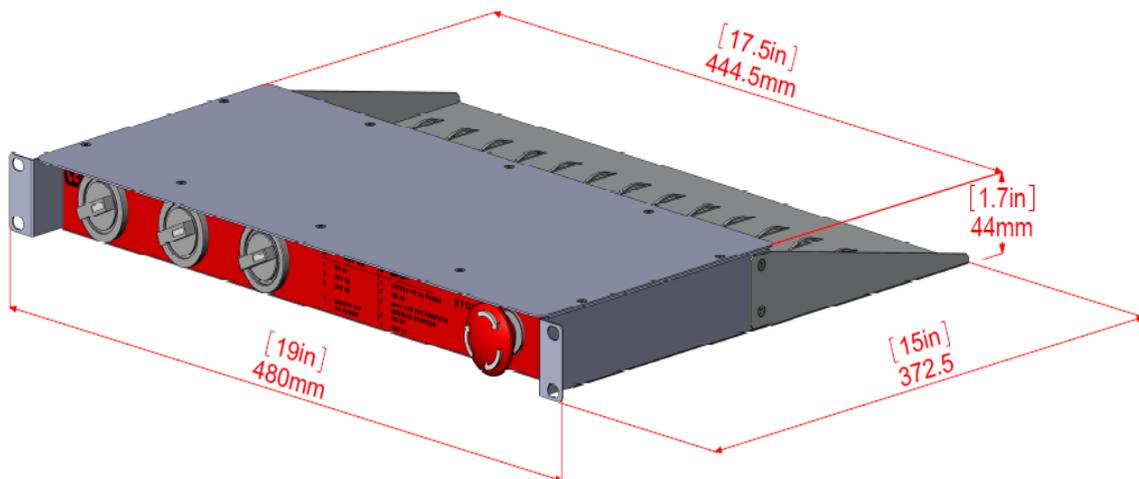
3.1

The Manual Bypass Racks are foreseen to be recessed into an electrical cabinet of 19" standard.

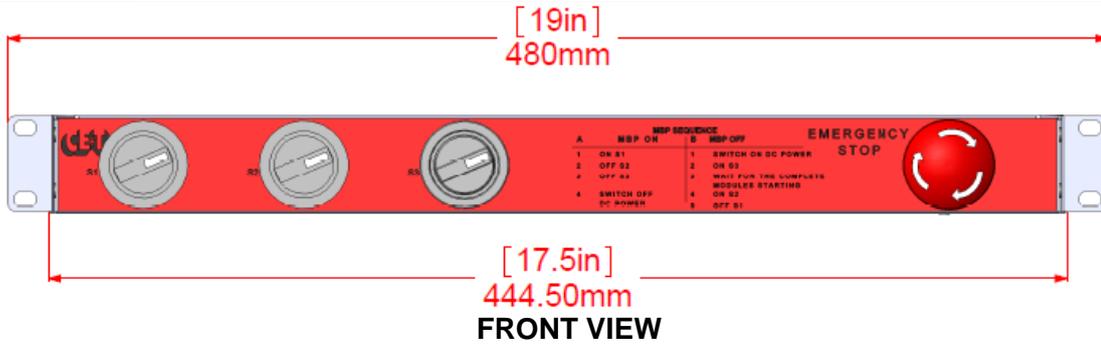
3.2 System dimensions

3.2

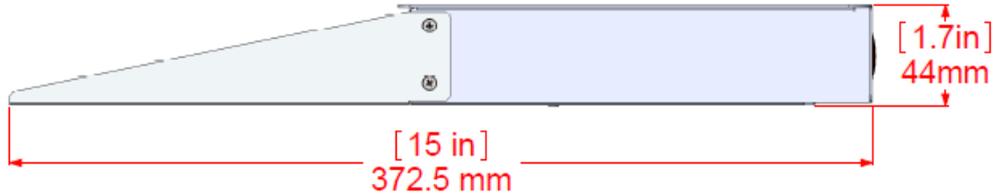
The picture shows the front, side and rear view of the MBP Rack.



ISOMETRIC VIEW WITH DIMENSIONS



FRONT VIEW



SIDE VIEW



REAR VIEW

3.3 Fixing

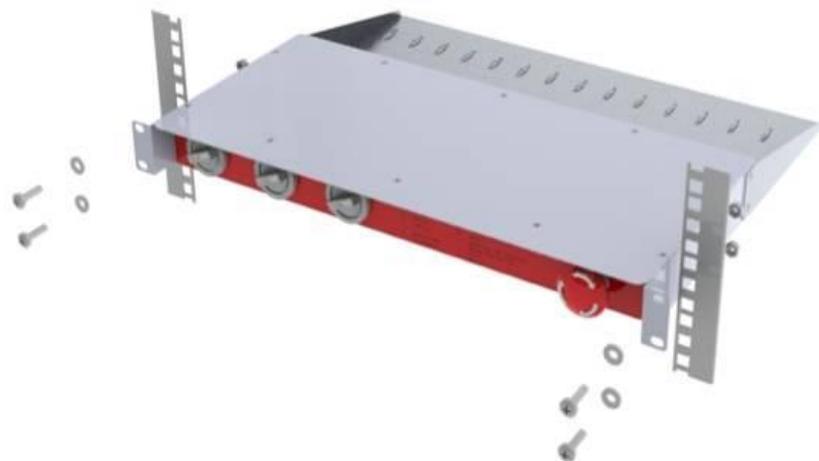
3.3

A full range of accessory is ready made to allow easy integration of the TSI MBP in almost any kind of standard cabinets. Among other we provide fixing set for:

- 19" – 600mm depth cabinets (most standard solution, which is supplied by default)
- 19" – 800mm depth cabinets
- ETSI – 600 mm depth cabinets

Mounting Steps:

1. Install the MBP in a suitable horizontal location in the rack rail using four (4) user-provided mounting screws set.



3.4 Wiring

3.4



Caution:

The TSI MBP Rack does not include any protecting and/or disconnecting devices on AC input. Before any intervention on the TSI MBP Rack, operator has to make sure that power is removed from AC input mains.

All breakers, cables and wires must be CE and classified for min 90°C (194°F) operation

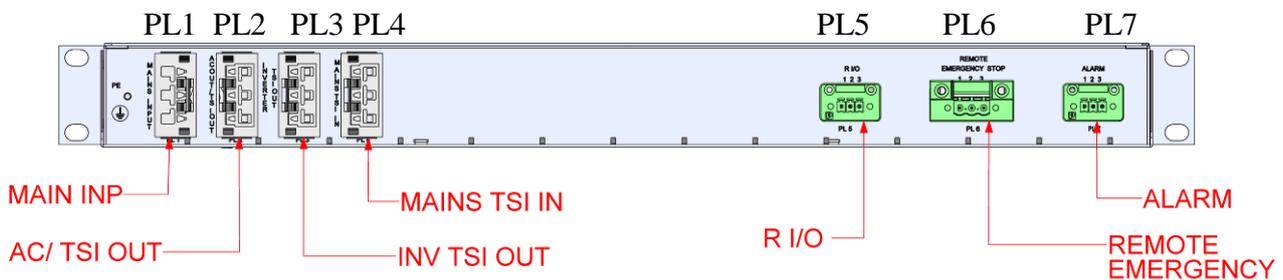
All DC cables and alarm cables as well must be kept minimum 10mm away AC cables

Some safety labels are stuck on the TSI rack. They must not be removed.

Respect Line and Neutral connection.

The insulation cover of conductors must meet the local and international standards and the cross section must be related to the upstream protections.

CONNECTOR DETAILS OF MANUAL BYPASS RACK



3.4.1 Disconnecting and protecting devices

3.4.1

3.4.1.1. DC input connection of TSI Inverter

Integrator must provide branch circuit protection with breaking capacity related to short circuit capacity of upstream DC source.

- It must be installed close enough to permit easy “Break before Make”.
- Appropriate type can be chosen within the table here below.
- TSI is supplied with safety labels, which must be applied to the breaker in a visible way.

The insulation cover of connecting cables must meet the local and international standards and the cross section related to the upstream protections.

DC input current at 40VDC	DC breaker	Cable size	Screws size
59A (TSI INVERTER shelf)	63A C curve by shelf	16 mm ²	M4 X 10mm

Adapt the breaking capacity of your breaker in relation to your installation (length cable, battery capacity).

3.4.1.2. AC input connection of TSI Inverter

For single-phase equipment, the disconnect device shall disconnect both poles simultaneously. Except that a single-pole disconnect device can be used to disconnect the line conductor where it is possible to rely on the identification of the neutral in the AC MAINS SUPPLY.

230 Vac model	AC breaker	Cable size	Screws size
9,7A (TSI INVERTER shelf) @ nominal power (W)	16A C curve by shelf	3 x 2,5 mm ²	M4 X 10mm

AC input connection only exists whenever TSI system has been foreseen with static transfer switch function (EPC mode).

Note: To be EMC A class, ferrite must be installed on the AC input connection of TSI Inverter, which is made inside the TSI MBP Rack unit. No need to install additional filter with MBP Rack.

3.4.1.3 AC output connection of TSI Inverter



Caution:

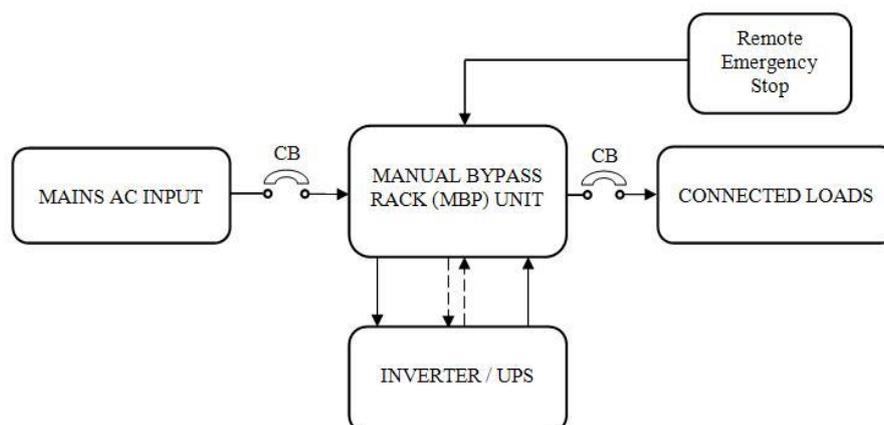
The TSI Rack does not include any disconnect or protecting devices for AC output. Prior any intervention on AC output make sure DC input has been actually disconnected.

The shelf is not hot plug device
 → Prior any handling of the shelf, wait a few minutes (min 5 minutes) for complete discharge of internal capacitors that have been energized

230 Vac model	Cable size	Screw size
13A (TSI INVERTER shelf) @ nominal power (VA)	3 x 2,5 mm ²	M4 X 10mm

TSI rack is supplied with screw terminal: Neutral, Line and Ground.

Recommended wiring with breakers:



3.4.1.4. AC Connection of MBP

Four wago connectors available for the AC Connection

- 1) The AC Mains Input to Manual Bypass Rack (PL1) will be connected directly through AC Breaker.
- 2) The AC/TSI OUT (PL2) is the output for the load from the MBP.
- 3) The Inverter TSI Out (PL3) in the MBP will be connected to TSI Inverter (AC OUT).
- 4) The AC TSI IN (PL4) in the MBP will be connected as the Mains Input to the TSI Inverter Shelf (AC IN).

230 Vac model	AC breaker	Cable size	Connector	Cable kit
Mains input (PL1)	32A C curve by shelf	3 x 2,5 mm ²	Wago Connector	-
AC / TSI Output (PL2)	-	3 x 2,5 mm ²	Wago Connector	-
INV TSI Output (PL3)	-	3 x 2,5 mm ²	Wago Connector	Availabe (C1)
AC TSI Input (PL4)	-	3 x 2,5 mm ²	Wago Connector	Availabe (D1)

3.4.1.5 AC output distribution of MBP



Caution:

The TSI Rack does not include any disconnect or protecting devices for AC output. Prior any intervention on AC output make sure DC input has been actually disconnected.

The shelf is not hot plug device
 → Prior any handling of the shelf, wait a few minutes (min 5 minutes) for complete discharge of internal capacitors that have been energized

MBP Supplied with WAGO connector in the cable kit for output connection.

3.4.2 Grounding

3.4.2



Caution:

Current leakages can reach hazardous values.
 For your personal, SAFETY earth connections must be done before energizing the system.

Earth connection must be done to the point referenced with symbol



Input ground must be connected to the appropriate terminal

3.5 Remote Monitoring and control

3.5

TSI inverters are equipped with T1S or T2S. TSI Monitoring of inverters is in standard “T1S” model or “T2S” model. Please refer to specific T1S or T2S manual for details.

4 Use of Manual Bypass



Caution
 Before connecting any power DC or AC to the system, Make sure you have followed instructions of previous section "Installation".

Equipment does not require any particular maintenance, but when environment is dirty, before cleaning, inverters can be removed only after action on Manual By-Pass.

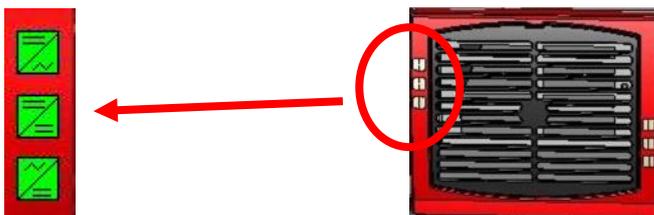


Caution:
 -Commercial AC must be present and in phase before operating MBP
 -The inverter will be in overloaded while MBP procedure, depending on voltage network and output inverter voltage setting. Power will reactive.

MBP SEQUENCE		EMERGENCY STOP	
A	MBP ON	B	MBP OFF
1	ON S1	1	SWITCH ON DC POWER
2	OFF S2	2	ON S3
3	OFF S3	3	WAIT FOR THE COMPLETE MODULES STARTING
4	SWITCH OFF DC POWER	4	ON S2
		5	OFF S1

MBP OFF (to disable the MBP and return on normal operation) :

1. Check that both AC input and output breakers are switched off.
2. Check that maintenance by-pass switch, is in position "MBP ON sequence"
3. Switch ON DC power -Inverter starts up initially
4. Switch ON the AC input Breaker. Output of MBP is available with this main input supply.
5. Switch ON S3 -Mains AC input is connected to Inverter.
6. Wait for the complete module starting .After starting TSI OUTPUT is ready for connecting to the load. All module LEDs in the left should be Green



7. Switch ON S2 - Output of MBP is connected to TSI OUTPUT Supply
8. Switch OFF S1 -.to remove the MBP switch.

MBP ON:

1. Switch ON S1 - Mains input is ready for connecting to the output
2. Switch OFF S2 - TSI OUTPUT available at the output connector is diverted to the Mains Input supply
3. Switch OFF S3 - AC Supply to the inverter is cut off.(Inverter may be ON due to DC SUPPLY)
4. Switch OFF DC Supply - Inverter shut downs.

Now the output is from MAINS input, so protection required for this supply has to be carried out.



Caution:
Follow the correct sequence mentioned in the front sticker of MBP Switch



Caution:
MANUAL BY_PASS RACK disconnects all AC voltage on the shelves but has no action on the DC feeding on inverter and on remote alarm terminal.

The purpose of the BYPASS Unit is to allow servicing of the Inverter/UPS so as not to affect the LOADS connected and protected. To transfer between Inverter/UPS and utility sources, swiftly actuate the switch to the position as per the sequence. Both the Inverter/UPS, and Utility lights available must be illuminated to prevent transferring to a non-powered source.

EMERGENCY STOP PUSH BUTTON:

The purpose of emergency stop push button is to switch off the output of the inverter under the emergency conditions. This controls only the TSI INVERTER output. This will not work when MBP is in ON sequence .This condition executes only when the MBP is on OFF sequence.



Caution:
Emergency stop executes output disconnection only when the MBP is in OFF sequence.

REMOTE EMERGENCY Connector (PL6):

- Check if Manual By-Pass sequence is not engaged
- Check if output Manual By-Pass switch (S2) is ON
- Check if the AC output breaker is ON
- Check if no short circuit is present on the output
- Check status on inverter
- Refer T2S or T1S operating manual for additional troubleshooting

6

6 Commissioning



Caution:

Installation and commissioning must be done and conducted by trained people fully authorized to act on installation.

It is prohibited to perform any isolation test without instruction from manufacturer.

Care must be taken to prevent dust, which can damage electronic components, by reducing the ESD distances. If necessary, remove dust by using industrial tools such as industrial vacuum cleaner.

DO NOT use any cleaning equipment using any liquid or insert metallic tools inside the equipment.

6.1

6.1 Installation control

The following certificate has to be left to the customer

The scope of this document is to provide a general guide for the contractor person that install and start up one TSI inverter System. Please refer to the operation manual for more details. Specific Manuals for inverters, T2S monitor, Display and TCP/IP are available on request.

Write OK or N/A (Not Available) in the column	OK or N/A
Cabinet is properly placed and stable	
Cabinet is installed in a dry area or protected against water	
Cables support are properly fixed	
AC Mains input connected to the input through AC Breaker unit	
Positive wire « + » connected to DC input + terminal (check individual connection)	
Negative wire « - » connected to DC input – terminal	

(check individual connection)	
Check cross section and breaker protection for AC input and output cables	
AC input connection properly done (L+N+PE) on input terminal of Inverter and other end connected to PL4 connector of MBP Rack (use cable D1)	
AC output connection properly done (L+N+PE) on output terminal of Inverter and other end connected to PL3 connector of MBP Rack (use cable C1)	
PE connection properly done even if mains is not connected	
AC/TSI Inverter output (PL2) of the MBP Rack connected to the load output through AC Breaker unit	
Remote emergency stop connector connected to the remote place for user (if required)	
R I/O(PL5) connected to the remote on/ff connector of the Inverter	
Alarm Connector(PL7) connected to the corresponding T2S connectors	
Inverter module are correctly installed and fixed into the rack	
Inverter cabinet is correctly connected to EARTH	
Neutral N is connected to EARTH (If required!)	
Check or turn OFF all manual by pass switches(S1,S2,S3)	

6.2 Commissioning

6.2

Unplug all inverters except one inverter per phase (Just pull off the inverter from the shelf, to interrupt electrical contacts)	
Check the commercial AC before close breaker .Switch ON the commercial AC	
Turn ON S3 Manual by-pass (Main AC IN)	
Check if inverters are working (Green led)	
Turn ON S2 Maintenance by-pass (TSI AC OUT)	
Check the DC power supply and switch ON the DC breakers	
Plug in all inverters one by one	
Check output voltage (on bulk output or on breaker)	
Check if inverters are working properly	
Check if system has no alarm (Disable the alarm if any)	
Read configuration file and review all parameters. Some parameters must be adapted according to the site (LVD, load on AC, AC threshold level)	
Switch OFF AC and check if system is working on DC	
Switch ON AC and check if system correctly transferred load on AC	
Switch OFF system and start on AC only	

Switch OFF system and start on DC only	
Test on load (if available)	

6.3 Alarm test

6.3

DEFAULT	
Switch ON AC input and DC input and check that no alarm are present	
Switch ON S1 Manual by-pass (AC IN)	
Switch OFF AC input (commercial power failure) and check the alarm according to the configuration	
Switch OFF DC input (DC power failure) and check that the alarm according to the configuration	

7 Technical Data sheet

GENERAL

Connection I/O	Wago connector
Protected against inversion of polarity	
Enclosure	IP20

AC INPUT SPECIFICATIONS

Nominal voltage (AC)	230V 1P
Voltage range (AC)	200-240 V
Frequency	50 Hz
Connector	Wago
Connections	3Core 2.5mm ²

AC OUTPUT SPECIFICATIONS

Nominal voltage (AC)	230 V
Voltage range (AC)	200-240 V
Frequency	50 Hz
Nominal current	20 A
Connector	Wago
No. of outputs	1
Connections	3Core 2.5mm ²

ENVIRONMENT

Altitude above sea	<1500m
Ambient temperature (**)	n x 1500VA -20 to 50 °C Pmax at 100% LOAD Derating up to 65°C
Storage temperature	-40 to 70 °C
Relative humidity	95% , non condensing

Performance

Transfer Switch type	Cam Rotary type, Break Before Make, Rated at 20A.
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SIGNALING

Alarms	Dry connector on Rack
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WEIGHT & DIMENSIONS

Width	19" Cabinet
Depth(without cable tray)	209mm
With cable tray	372.5mm
Height	44mm → 1 U
Weight	2.5 Kg
Material (casing)	Coated steel

SHIPPING LIST

1. MBP with Cable Kit
2. Standard 19" rack mounting hardware
2. User Manual

8 Schematic Drawing

