

ASGC 34.5TL-4P4W User Installation Manual



About this Manual

Purpose

The purpose of this User Installation Manual is to provide explanations and procedures for installation and operation for the AIT Smart Grid Converter.

Scope

The Manual provides safety information and guidelines, setup information, procedures for installing the AIT Smart Grid Converter, as well as information about operating the converter.

Organization

This manual is organized into the following chapters.

Chapter 1, "Introduction" provides information about AIT Smart Grid Converter.

Chapter 2, "Installation and Configuration" provides information and procedures for installing and configuring the converter.

Chapter 3, "Operation" contains information on the basic operation of the converter.

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1 Introduction

1.1 Description of the AIT Smart Grid Converter

AIT Smart Grid Converter is a four phase four wire converter designed for today's Smart Grid and emerging Low Inertia Micro Grid applications. With seamless transition between Grid Forming, Off-Grid and Grid Supporting modes, its highly reliable cooling concept designed to ensure long life time, broad range of connectivity options: IEC61850, ModBus TCP, SunSpec, and modular and stackable concept of increased power handling capability, the AIT Smart Grid Converter presents a perfect Smart Grid fit.

1.2 Key features

- Superb handling of arbitrarily unbalanced grid current, voltage and load conditions
- Grid forming modes: Droop, Virtual Synchronous Machine with Virtual Inertia
- Grid Support modes: PV, BESS, Battery simulator, Grid Currents balancer, Active Front End, Back-2-Back,
- Off-grid
- Full four quadrant operation
- Active/Reactive power: full circular capability
- Immediate control: P, Q, PF
- Grid functions: Frequency-Watt/P(f), Volt-Var/Q(U), Volt-Watt/P(U)
- Anti-islanding
- Low/High Voltage ride through with Fast Reactive Current Response
- Grid code and safety standards compliance

1.3 Physical Features

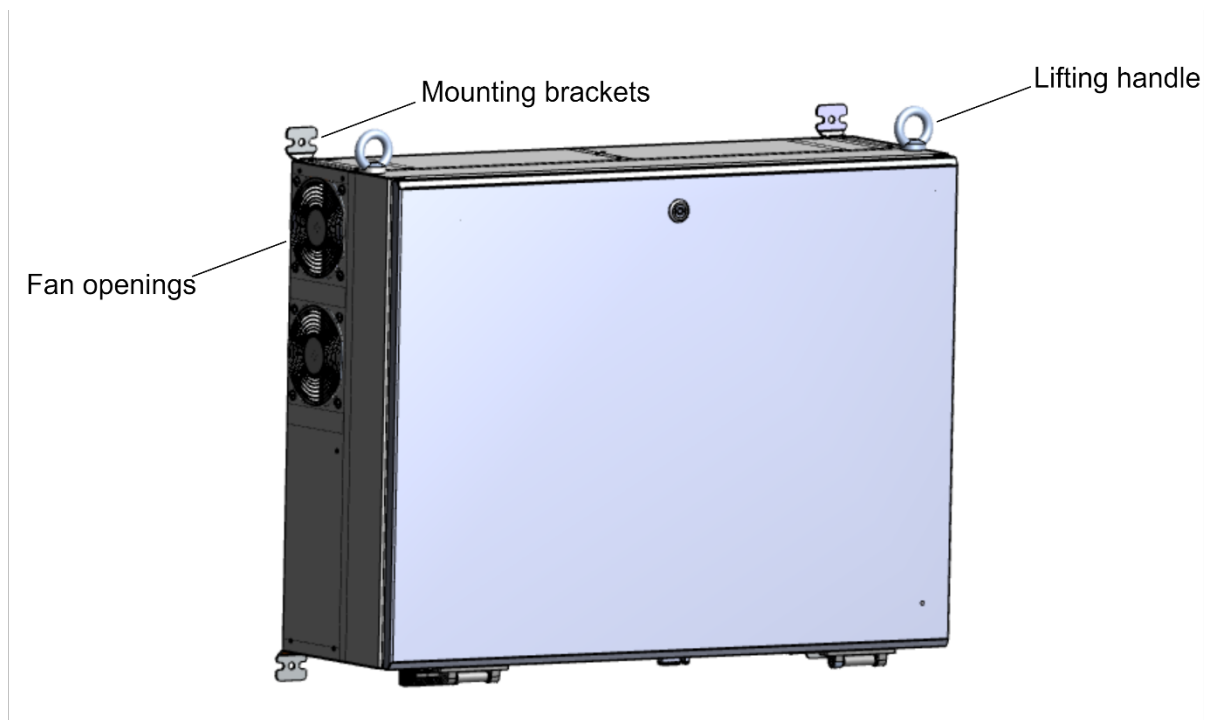


Figure 1 Location of physical features of the converter - side view

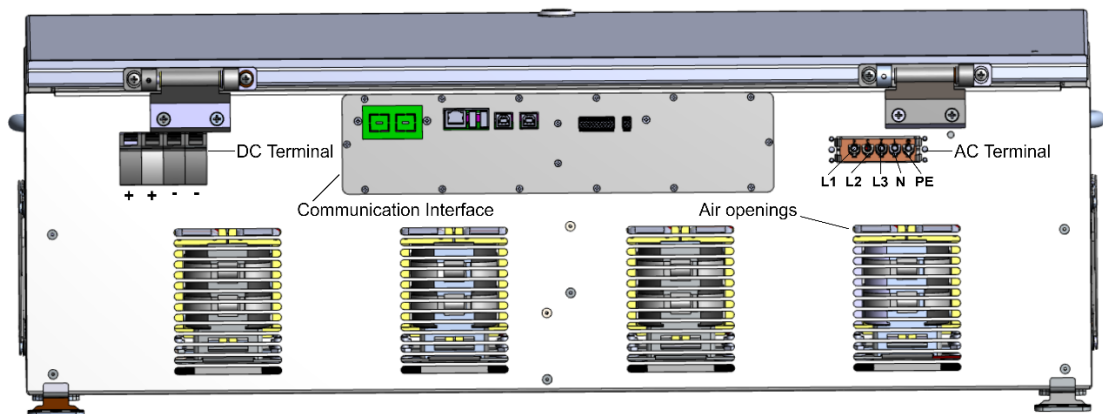


Figure 2 Location of physical features of the converter - bottom view

2 Installation and Configuration

2.1 Package Inspection

Scope of delivery

Item	Quantity
Smart Grid Converter	1
AC plug	1
USB 2.0 cable	1

Nameplate

The nameplate is affixed to the converter and provides the following information:

- Model name
- DC input data
- AC output data
- Certification

2.2 Mounting

Requirements for the mounting location

- A solid support surface must be available for mounting.
- The mounting location must be suitable for the weight and dimensions of the converter.
- The mounting location should be freely and safely accessible at all times.
- Climatic conditions must be met.

Permitted mounting positions

- The unit can be wall-mounted or put horizontally on a flat surface like a desk or a workbench.

Recommended clearances

- Maintain the recommended clearances to walls as well as to other objects to ensure adequate heat dissipation.
- Minimum 25 cm from the air openings on the bottom and on the side of the converter.

Mounting the converter

CAUTION

Risk of injury when lifting the converter, or if it is dropped

The Smart Grid Converter weighs 45 kg. There is risk of injury if the converter is lifted incorrectly or dropped while being transported or when attaching it to or removing it from mounting surface.

- Transport and lift the converter carefully.
- The service person should be equipped with appropriate PPE.
- Lift the converter with the help of another person or a crane.

Tools:

- 4 screws (M6 or M8)
- 4 washers (M5), suitable for the screws
- Screwdriver and wrench (M5)

Procedure:

1. Select a wall or a suitable flat surface capable of supporting the weight of the converter.
2. Maintain a minimum clearance of 25 cm from converter air openings to surrounding objects.
3. Use two lifting handles on top of the converter to lift the converter and adjust its position.

4. Using four M6/M8 screws, securely attach the converter mounting brackets to the mounting surface.
5. Once the converter is securely tightened with screws to the wall, release it from the lifting handles.

2.3 DC Connection

DANGER

Hazard of electric shock

- Test using a meter to make sure all the circuits are de-energized. Follow a lock-out tag-out procedure.

Ensure that the following requirement is met for installation:

- All the components installed between the DC Source and the converter shall be rated for at least 1000 VDC and as per the applicable installation codes.

Table 1 PV input parameters

Parameter	ASGC 34.5TL-4P4W
Maximum input voltage	1000 VDC
Maximum input current	60 A
Maximum MPP voltage	950 V
Minimum MPP voltage	570 V

Assembling DC connector

Cable requirements:

- Cable type: stranded, copper wire
- Cross section: 10 mm² to 16 mm²
- Nominal voltage: UL/SCA/ICE 1000 V
- M5 16mm² or M6 16mm² cable lugs (e.g. Klauke 3R5)

Procedure:

- Strip cable insulation (e.g. 13mm for Klauke 3R5)
- Insert the stripped cable into the cable lug.
- Press the cable lug down with a crimping tool.

Connecting the converter

1. Ensure that the constant DC voltage source or the PV Array simulator have sufficient rating.
2. Use a bi-directional DC source for the battery mode applications.
3. Connect the assembled DC cables according to the pin assignment shown in *Figure 2*.
4. Tighten the screws on the DC terminal block with 2.5 Nm to 3 Nm torque in order to secure the DC cables.

2.4 AC Connection

The converter can be connected either to a grid simulator or directly to the grid. An AC breaker is to be used to protect the grid side of the converter. Use a three phase, four pole MCCB breaker rated at 63 A (e.g. Lovato Miniature Circuit Breaker 4P, 63 A, 10 kA, Curve B).

Assembling AC plug

AC cable between the converter and the breaker should be no longer than 2 m.

Cable requirements:

- Cable type: jacketed with five insulated conductors (e.g. Lapp Ölflex Classic 110 5 G 10 mm²) or suitable substitute
- Cross section per conductor: 10 mm²
- 5 x 10 mm² ferrules
- Phoenix Contact contact insert Mnf Part Number: 1607474
- Phoenix Contact sleeve housing Mnf Part Number: 1855120

Procedure:

1. Remove the sleeve from the AC cable by 200 mm.
2. Strip the insulation of L1, L2, L3, N and the grounding conductor (PE) by 14 mm.
3. Conductors L, N and the grounding conductor (PE) should each be fitted with appropriate size ferrules.
4. Insert the conductors according to *Figure 2* and tighten the screws with $1.5 \text{ Nm} \pm 0.3 \text{ Nm}$ torque.
5. Place the contact insert into the sleeve housing.
6. Tighten the four screws on the front side of the contact insert with $1.5 \text{ Nm} \pm 0.3 \text{ Nm}$ torque.
7. Secure the sleeve housing with a cable gland.

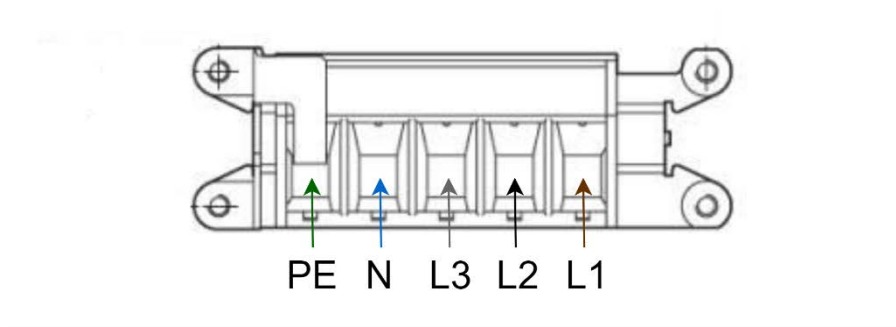


Figure 3 AC conductors connection

NOTICE

Risk of equipment damage

- Ensure that L1, L2, L3, N and PE connections are done correctly.
- AC plug openings are labelled 1, 2, 3, 4 and ground, however L1 conductor must be inserted into opening 4, L2 conductor into opening 3 and L3 conductor into opening 2, N into opening 1.

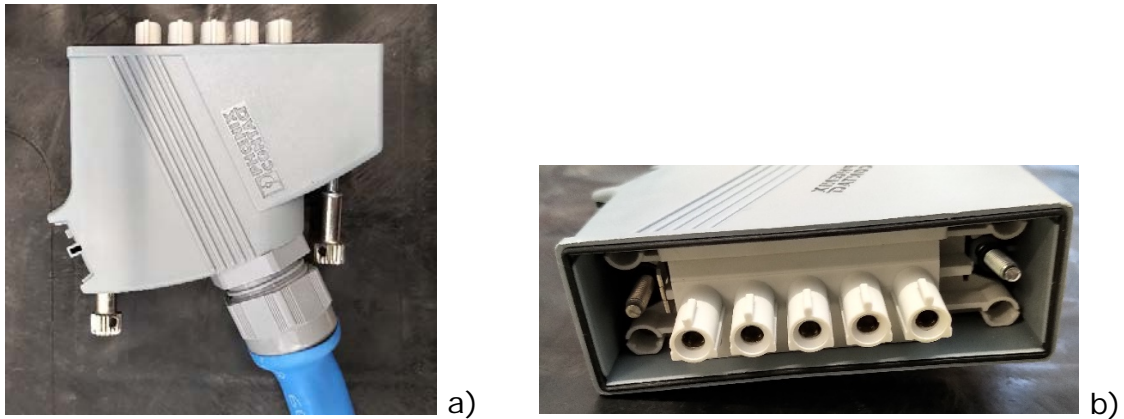


Figure 4 Assembled AC plug a) side view b) front view

Connecting the converter

1. Ensure that there is a circuit breaker connected between the AC source and the converter.
2. Insert the assembled AC plug into the converter AC terminal shown in *Figure 2*.
3. Tighten mounting screws of the AC plug with 1.5 Nm \pm 0.3 Nm torque.

2.5 Communication Interface

The communication interface resides on Safety Extra Low Voltage (SELV) potential.

The communication interface is shown in *Figure 5*.



Figure 5 Communication interface

SGC Power Sharing and Stacking Port

SFP+1 – Small Form-factor Pluggable Plus Transceiver 1

SFP+2 – Small Form-factor Pluggable Plus Transceiver 2

ModBus/SunSpec and TCP/IP Server Port

Ethernet Port

SGC GUI Port

SCI – Serial Communications Interface

DIOs connector – Digital Inputs and Outputs

DIO.1	Digital Input 1
DIO.2	Signal Ground
DIO.3	Digital Input 2
DIO.4	Signal Ground
DIO.5	Digital Input 3
DIO.6	Signal Ground
DIO.7	Digital Input 4
DIO.8	Signal Ground
DIO.9	Digital Output 1 Open Collector
DIO.10	Digital Output 1 Common
DIO.11	Signal Ground
DIO.12	Digital Output 2 Open Collector
DIO.13	Digital Output 2 Common
DIO.14	Signal Ground
DIO.15	Digital Output 3 Open Collector
DIO.16	Digital Output 3 Common
DIO.17	Signal Ground
DIO.18	Digital Output 4 Open Collector
DIO.19	Digital Output 4 Common
DIO.20	Signal Ground

CAN connector – Controller Area Network

CAN.1	HIGH level CAN bus line
CAN.2	HIGH level CAN bus line
CAN.3	LOW level CAN bus line
CAN.4	LOW level CAN bus line

3 Operation

3.1 Setup

1. Complete the wiring as described in *chapter 2*.
 - DC wiring
 - AC wiring
2. Connect the USB cable between PC and the converter SCI port for communication. COM port can be validated in the Device Manager.

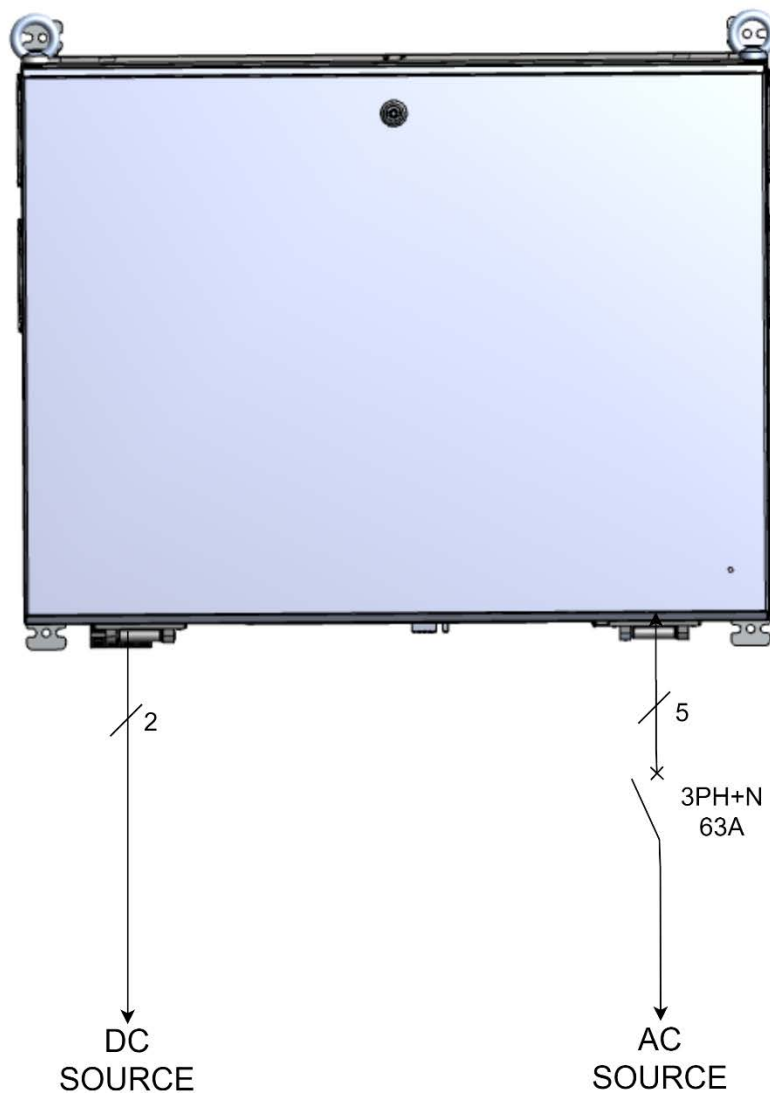


Figure 6 Typical setup

3.2 User Interface

3. Download Typhoon HIL Control Center from the [link](#). Sign up if you don't have an account. For more information on how to use Typhoon HIL Control Center refer to Typhoon HIL Documentation.
4. In Windows Search look for Standalone HIL SCADA which is provided as a part of Typhoon HIL Control Center.
5. Load the latest SGC GUI. *Figure 7* shows a typical SGC GUI (appearance of the latest SGC GUI might be somewhat different) .

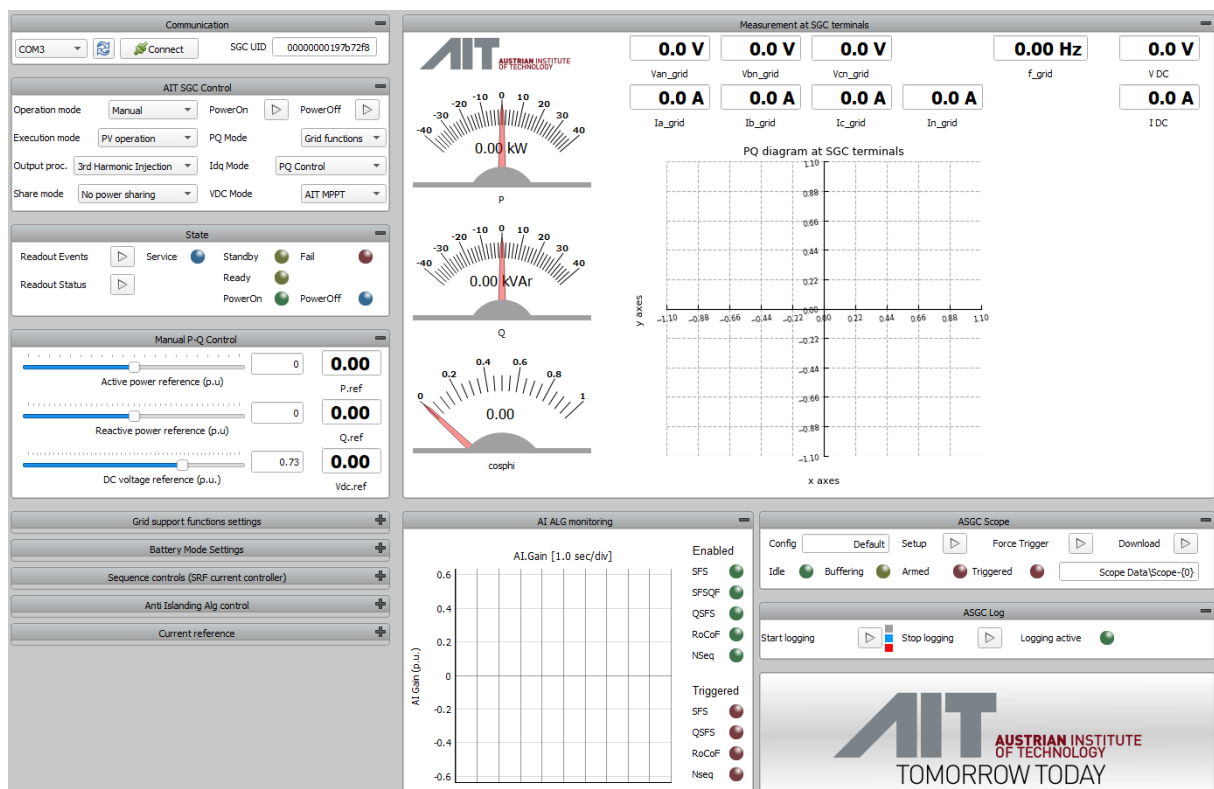


Figure 7 SGC GUI