



E32T21 controller

vekon



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1.INTRODUCTION

1.1 ABOUT THIS DOCUMENTATION

PURPOSE OF THIS DOCUMENTATION

This Manual contains all the information you need for commissioning and using the controller. They are intended for use by electrically skilled persons who commissioning the device.

SCOPE OF VALIDITY OF THIS DOCUMENTATION

This documenta tion is valid for all components of the E32T21 controller specified in this Manual

THIS PRODUCT IS BASED ON THE IEC 61851 AND SAE J1772 INTERNATIONAL STANDARDS



2.SAFETY INSTRUCTIONS

2.1 CAUTIONS & DANGERS

CAUTION: PLEASE OBSERVE THE SAFETY INSTRUCTIONS AND LEGAL NOTES

Installation requirements for electrical equipment and EVSE vary by country and jurisdiction. It is the responsibility of the installer/user of this product to ensure that legal installation requirements are met. In the UK, this product must be installed and used by a competent and qualified person who will ensure the equipment adheres to the IEE wiring regulations BS7671 (18th Edition or later) and current Building regulations. This device has safety features that enable and help with meeting these regulations.

DANGER: VOLTAGE HAZARDS

Contact with live components can result in serious injuries. Disconnect the system and all devices from the power supply before starting work.

2.2 FUSES

WARNING: UNDESIRABLE HEAT GENERATION OR FIRE DUE TO INADEQUATE FUSING.

The internal fuses are designed only to protect the device itself. The system installer and plant operator are responsible for the necessary line protection.

The relay outputs are not fused within the device. Without appropriate protection of the relay outputs, overloading can cause undesirable heat generation or even fire. The relay outputs are to be fused externally by the plant constructor.

2.3 REPAIRS

Repairs are not permitted. Defective devices must be disposed of in compliance with environmental requirements.

WARNING: DANGERS ASSOCIATED WITH UNAUTHORIZED OPENING OF THE DEVICE.

Unauthorized opening of the device might place the user in danger or result in substantial damage to property.

CAUTION: INVALIDATION OF THE MANUFACTURER' S WARRANTY DUE TO UNAUTHORIZED ALTERATIONS TO THE DEVICE

Alterations to the devices are not permitted. Failure to observe this requirement shall constitute a revocation of the manufacturer' s warranty.

3.DESCRPTION

3.1 OVERVIEW OF THE CONTROLLER

The controller is a DIN rail mounted control module for IEC 61851 compatible EV charge points. Key features include RCM and DLB, helping charge point manufacturers and installers meet regulations in a cost-effective way and protect against electric shock in the unlikely event of an earth fault problem.

3.2 E32T21 FEATURES

DEVICE VERSIONS	1. Basic: E32T21-B 2. DLB: E32T21-D 3. RCM: E32T21-R 4. DLB&RCM: E32T21-D&R
SUPPLIED PARTS	E32T21 module, Current Transformer (CT), RCM; (when selected; optional part CT/RCM/CT+RCM)
AREAS OF APPLICATION & USE	- Controlling the charging procedure of electric vehicles in accordance with IEC61851 mode 3 - For communication with the electric vehicle according to IEC62196-2 or SAE J1172
MOUNTING	Mounting onto standard rail according to DIN EN 60715
CONNECTION ELEMENTS	- Main input (207—257V @ 50Hz AC) 1 Relay contacts (230V AC) for switching the load - Solenoid or motor interlock drive for socket (Configuration dependant) - Current Transformer (DLB)and RCMU - Vehicle interface / Signalling contacts - External LED support
INTEGRATED LED	Displays the operating state of EVSE
OPERATING TEMP	-25 to 50°C
CONFIGURABLE OPTIONS	- Tethered or Socket outlets 16A or 32A maximum operating currents depending on fitted system contactor - Solenoid or motor locking systems - Interlock Feedback for status of motorised locks - RCM and DLB support enable / disable

3.3 RCM OPERATION

The controller has a residual current monitor function to monitor currents in the system which protects the system in the event of fault current being detected. The unit is Factory set to trigger at 6mA DC or greater . If this condition arises the controller will disable charging and indicate a fault condition (see table below) .

In order to reset the fault state, the EV and the EVSE need to be disconnected and reconnected.

If the fault current is still present then the device will return to a fault state and disable charging. If this persists then consult troubleshooting guide.



Important note: RCM not installed

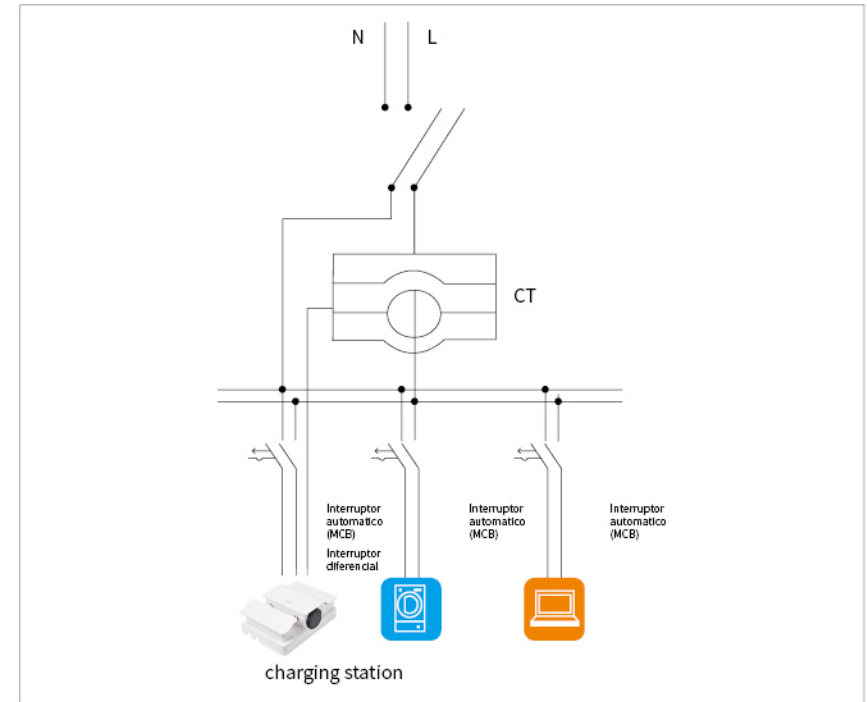
If no RCM device is being used in the EVSE then this functionality needs to be disabled as per the configuration table in this document, reference section .

3.4 DLB

Electric safety is always the primary matter of daily electricity use, and one of major factors of electric safety is to have the power load limited at its proper range. Nowadays, our houses are filled with electric appliances and electronic devices, the household power consumption is increasing consequently. When we are coming to the era of renewable energy car, EV charging power consumption is becoming a new challenge for household power load management.

In this way, Dynamic Load Balance (DLB) is a significant feature of smart EV charger, which allows the EV charger automatically adjust charging power against the variation of max power load, and instant power consumption. It helps to contain the total power consumption below the max capacity of main system load, and avoid the unexpectedly tripping of main circuit breaker due to overload.

The length of cable for Current Transformer and charger connection should below 200m.



3.5 SEQUENCE OF CHARGING PROCESS

INITIALIZATION

After the operating voltage is applied, the module carries out initializations and function tests indicated and then waits for vehicle connection (indicated by pulsing blue LED).

Tethered version:indicated by pulsing blue LED

Socket outlets version:indicated by steady blue LED

CHARGING PROCESS

The module waits for a charging cable or vehicle to be connected (state A) indicated . If an approved connecting cable has been connected and state B is indicated by the vehicle.

Tethered version:indicated by steady blue LED

Socket outlets version:indicated by pulsing blue LED

After interlocking, the charge-enable relays are activated if the vehicle is signalling state C. The

charging process is activated, and the LED is changed to steady-green(Tethered version)or pulsing-green(Socket outlets version). If state D is indicated (ventilation required) then charging and interlock are deactivated as the E32T21 does not provide a fan-enable mechanism, and the LED is changed to steady-red.

3.6 VENTILATION REQUIREMENT

WARNING: SUFFOCATION HAZARD WHEN CHARGING INDOORS

Without ventilation, a danger of suffocation can arise due to gas build-up with some battery types when charging indoors. If the charging process takes place indoors, forced-air ventilation should be installed. The E32T21 does not monitor the functionality of the forced-air ventilation systems and so are not compatible.

CONTROL PILOT

The pilot circuit is used for the bi-directional exchange of information between the charging station and the vehicle. Via this signal, the charging station indicates to the vehicle the maximum permitted charging current which the vehicle can call up. The operational readiness of the charging station is also indicated. Via this signal, the vehicle indicates to the charging station its current state of charging readiness.

WARNING

Via the pilot signal, the E32T21 module specifies the maximum charging current that can be drawn by the vehicle. This specified current must be consistent with the line protection configured for the charging device and the rest of the plant configuration. Failure to observe this notice can result in injury to persons or property damage.station is also indicated. Via this signal, the vehicle indicates to the charging station its current state of charging readiness.

PROXIMITY

With free cable installations the charging device detects the maximum current carrying capacity of the connected charging cable via the proximity signal. The activated charging output coded in the pilot signal is no greater than the current carrying capacity of the charging cable.

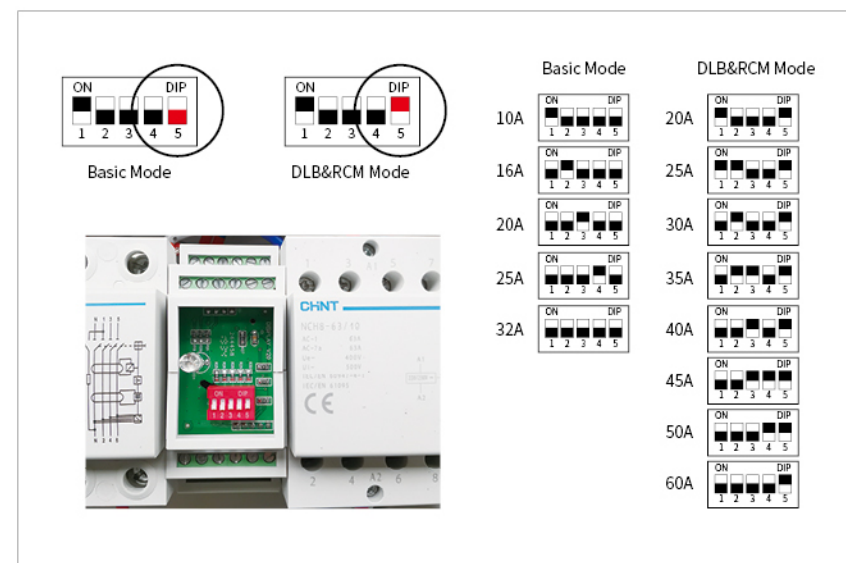
The E32T21 is designed to operate with available charging current signals of 16A and 32 A ,depending on the current carrying capacity of the cable that is detected. Note : The advertised current from the EVSE maybe downgraded depending on the current carrying capacity of the cable detected. The charging circuit that is activated must be designed with a suitable line protection for 16A for the installed system .For charging cables that have a current carrying capacity of 32A according to IEC 61851 the system must be designed with a suitable line protection .

4.CONFIGURATION

4.1 DIP SWITCH

Configurable features are selected on a 5-way DIP switch located on the top of the controller.The device will be provided with the default configuration of the DIP switch (see table) . The Unit will be supplied with the push fit lid to fit after.

This lid can carefully be removed in future by using a small flat blade screwdriver , placing this at the base of the slot and pushing into the device to press in each clips until it releases upward .



4.2 LED DISPLAY & TROUBLESHOOTING

LED DISPLAY

The E32T21 has a 3-color LED for displaying operating states and fault conditions. The LED can be lit in blue, green, red. The meaning of the individual displays is shown in the following tables:

Tethered

LED	DESCRIPTION OF OPERATING STATE	
COLOUR	STATUS	
NOT LIT	NOT LIT	The controller is not active, switched off • No power supply • Device defective
BLUE	PULSING	The controller is waiting for the electric vehicle to be connected to the EVSE (State A)
BLUE	STEADY	Electric vehicle connected, electric vehicle is not ready for charging (State B)
GREEN	STEADY	Charging process active (State C)
RED	STEADY	Electric vehicle requires ventilation, charging deactivated (State D) - E32T21 does not support this functionality so charging discontinued
RED	PULSING	EVSE Fault detected. Charging deactivated (Status F) See Troubleshooting guide.

Socket outlets

LED	DESCRIPTION OF OPERATING STATE	
COLOUR	STATUS	
NOT LIT	NOT LIT	The controller is not active, switched off • No power supply • Device defective
BLUE	STEADY	The controller is waiting for the electric vehicle to be connected to the EVSE (State A)
BLUE	PULSING	Electric vehicle connected, electric vehicle is not ready for charging (State B)
GREEN	STEADY	Charging process active (State C)
GREEN	PULSING	Charging completed
RED	STEADY	Electric vehicle requires ventilation, charging deactivated (State D) - E32T21 does not support this functionality so charging discontinued
RED	PULSING	EVSE Fault detected. Charging deactivated (Status F) See Troubleshooting guide.

GENERAL TROUBLESHOOTING

To test if the EVSE built with the E32T21 is functioning as intended it is suggested to initiate a charging session and check the operation of the unit by following the sequence below:

- With nothing connected check that E32T21 LED is flashing blue .
- Connect the connector to the vehicle - Check that E32T21 LED turns to solid blue .
- Start a charging session on the vehicle - Check that E32T21 LED turns green and chosen contactor is energised.
- Stop a charging session from within vehicle (Type 2) or by pressing the switch to remove the connector from the vehicle (Type 1) - Check that E32T21 LED turns to solid blue and contactor is de-energized.
- Remove connector from vehicle - Check that E32T21 LED is now flashing blue.

TROUBLESHOOTING FOR QUALIFIED PERSONNEL ONLY

To test if the EVSE built with the E32T21 is functioning as intended it is suggested to initiate a charging session and check the operation of the unit by following the sequence below:

- Is the E32T21 and socket/tethered cable correctly earthed? The 0V terminal on the E32T21 should be connected to Protective Earth in order for the system to operate correctly.
- Ensure all connections in the EVSE are tightened to the correct Torque setting. For M3 terminals on the E32T21: 0.6-1.2Nm . Consult relevant manufacturer documentation for other parts used.
- Check for correct operation of RCBO & Contactor .
- Check for a short between the CP and 0V terminal on E32T21 .

5.TROUBLESHOOTING

5.1GENERAL TROUBLESHOOTING

LED	DESCRIPTION OF OPERATING STATE	
COLOUR	STATUS	
Red	Pulsing	State E • Communication or Power fault to EV • EVSE Fault—Maintenance or repair required QUALI- FIED PERSONNEL
Red + green (Yellow)	Steady	• RCM Fault: 6mA DC current detected
Red+green+blue (White)	Steady	• DLB Stop charging

TROUBLESHOOTING FOR QUALIFIED PERSONNEL ONLY Follow commissioning guide to determine the nature of the fault.

- Is the E32T21 and socket/tethered cable correctly earthed? The 0V terminal on the controller should be connected to Protective Earth in order for the system to operate correctly.
- Ensure all connections in the EVSE are tightened to the correct Torque setting. For M3 terminals on the E32T21: 0.6-1.2Nm - (factory setting of 1nm). Consult relevant manufacturer documentation for other parts used.
- Check for correct operation of RCBO & Contactor.
- Check for a short between the CP and OV terminal on E32T21.
- Interlock does not action : Check FB , ML and MU connections .

6.CONNECTION

WARNING: UNDESIRABLE HEAT GENERATION OR FIRE DUE TO INADEQUATE FUSING

The internal fuses are designed to offer dual protection only for the device itself. The system installer and plant operator are responsible for the necessary line protection. The relay output control signal is not fused within the device.

The 16A/32A relay contactor outputs are to be fused externally by the plant constructor. Without appropriate protection of the relay outputs, overloading can cause undesirable heat generation or even fire.

WARNING: VIA THE PILOT SIGNAL, THE EV E32T21 CHARGING CONTROLLER SPECIFIES THE MAXIMUM CHARGING CURRENT THAT CAN BE CALLED UP BY THE VEHICLE.

This specified current must be consistent with the line protection configured for the charging device and the rest of the plant configuration. Failure to observe this notice can result in injury to persons or property damage.

WARNING: THE CONDUCTOR CROSS-SECTIONS MUST BE DESIGNED CORRESPONDING TO A STANDARD-COMPLIANT SYSTEM CONFIGURATION.

The cables that are to be connected must be designed according to the respective type of circuit. Failure to observe this notice can result in injury to persons or property damage.

Depending on the device version the EV E32T21 charging controller is connected to the EVSE in the following methods.

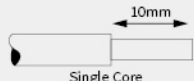
6.1 CONNECTING TERMINALS & TERMINAL ASSIGNMENT

TETHERED CABLE VERSION

"Tethered" means that the charging cable is permanently connected to the EVSE.. The RCBO should be rated at the maximum current (16A/ 32A) set via the DIP switch .

FREE CABLE / SOCKET VERSION

"Free" means that the charging cable is not permanently connected and that the user is expected to provide their own.

STRIPPED LENGTH	AWG	TORQUE
 Single Core	0,5....2.5 mm ² / 20-14 AWG	0.5 Nm
 Multi Core	Without core ends prepared: 0.5....2.5mm ² We advise using 0.25mm ² bootlace ferrules on smaller gauge wire.	0.5 Nm

NOTICE

The temperature stability of the cable used must be designed for at least for 75 °C . Failure to observe this can result in injury to persons or property damage.

6.2 E32T21 TERMINAL ASSIGNMENT

ALL VERSIONS

To test if the EVSE built with the E32T21 is functioning as intended it is suggested to initiate a charging session and check.

The operation of the unit by following the sequence below:

- With nothing connected check the E32T21 LED is flashing blue.
- Connect the connector to the vehicle-check that E32T21 LED turns to solid blue .
- Start a charging session on the vehicle-check that E32T21 LED turns green and chose contactor is energised.Stop a charging session form within vehicle (TYPE2)or by pressing the switch to remove the contactor form the vehicle(type1)-check that E32T21 LED turns to solid blue and contactor is de-energised .
- Remove connect or form vehicle -check that E32T21 LED is now flashing blue .

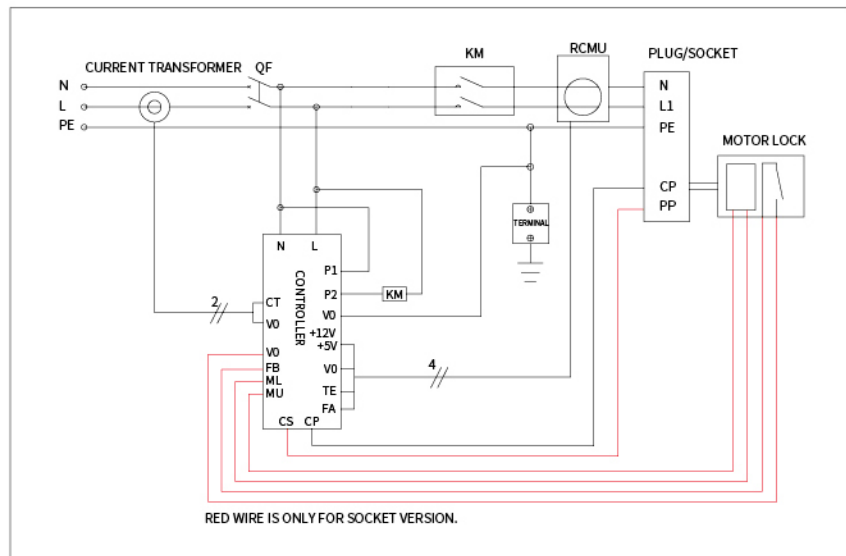


E32T21 TERMINAL ASSIGNMENT

TERMINAL	DESCRIPTION
L (LINE)	This is where the AC 'live' or 'line' connection is made (207-257V @ 50Hz AC)*
N (NEUTRAL)	This is where the AC 'neutral' connection is made (207-257V @ 50Hz AC)*
V0 (PE)	This is where the Protective Earth (ground) and 0v connections for the RCM and IC resistor circuits are made*
ML	Configuration is dependent. • Provides a drive current to continuously energise the solenoid interlock. • Provides a drive current to change the motorised interlock state to locked (The signal is activated for 500ms and changes to pulsed 500ms intervals until the lock is engaged. Rating 12V 300mA.
MU	Configuration is dependent. • Provides a return path for the solenoid interlock drive current ML. • Provides a drive current to change the motorised interlock state to unlocked. Rating 12V 300mA.
FB	lock feedback
P1	Relay 1 to coil on the EVSE (16A / 32A) Contactor
P2	Relay 2 to coil on the Auxiliary Contactor
CS (Proximity Pilot)	Connection for the IEC61851 / J1772 EVSE Connector (see Proximity)
CP (Control Pilot)	Connection for the IEC61851 / J1772 EVSE Connector (see Pilot Circuit)
12V(5V)	12V(5V) Supply to provide power to the RCM
FA	Connects to RCM ' Fault out' . The E32T21 reads if fault condition reported by the RCM
TE	Connects to RCM ' Test' . The E32T21 uses this to check the operation of the RCM before each charging session commences.
CT	Connection for the other side of current transformer (DLB)
BL	Blue led
RD	Red led
GN	Green led

6.3 230 V AC POWER SUPPLY

WIRING EXAMPLE:



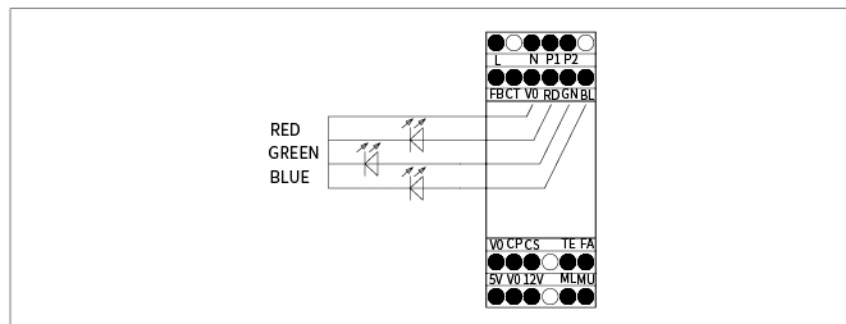
WARNING: THE EXTERNAL CONTACT BLOCKS USED MUST BE FLOATING AND SAFELY SEPARATED FROM UNSAFE CIRCUITS.

Failure to observe this can result in injury to persons or property damage

6.4 EXTERNAL LED CONNECTOR

An external RGB LED can be driven by the E32T21.

External LED Connector



6.5 FUNCTIONAL GROUNDING



VEHICLE INTERFACE ACCORDING TO IEC 61851

1. Connect the terminals “CP” and “CS” (on free cable versions only) directly to the EVSE socket.
2. First connect the ground connection of the vehicle interface to the 0V reference point and then route this potential from there.

DANGER: NEVER USE THE TERMINALS OF THE E32T21 CHARGING CONTROLLER AS A 0V REFERENCE POINT.

Always route this externally from the device! The 0V reference point within the plant must be.

6.6 SHUTDOWN OF POWER BRANCH



According to IEC 61851, a shutdown of the power branch on completion of the charging process within 3 s is required. A shutdown of the power branch on transition from state C to state A is required within 100 ms. The E32T21 deactivates the relay output within this requirement after detecting the shutdown criterion.

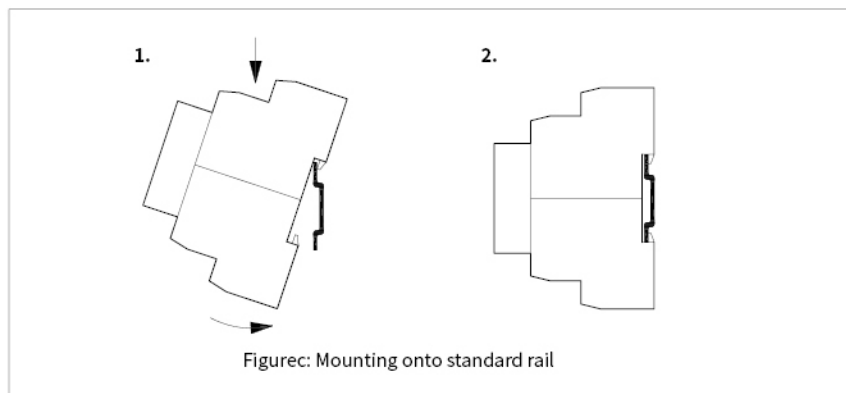
WARNING: THE SHUTDOWN OF THE POWER BRANCH, IN PARTICULAR THE POWER CONTACTOR, IS TO BE DESIGNED IN SUCH A WAY THAT THE ENTIRE IMPACT CHAIN DOES NOT EXCEED THE REQUIRED 100 MS.

Failure to observe this notice can result in death or serious physical injury.

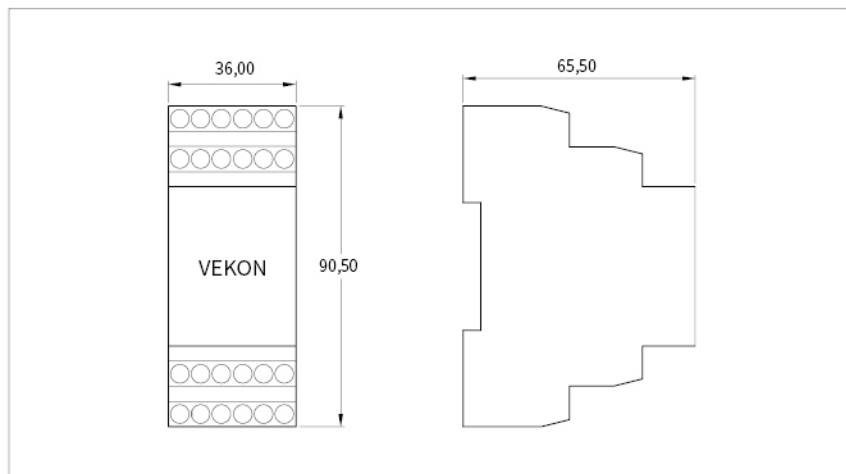
7.MOUNTING

7.1 MOUNTING ONTO STANDARD RAIL

1. Clip the device (a) vertically onto the horizontal DIN rail (b).
2. Swing the device downward until the unlocking slider on the DIN rail clicks into place.



7.2 DIMENSIONAL DRAWINGS



8.SERVICE & MAINTENANCE

8.1 REPLACING THE DEVICE

MAINTENANCE

The E32T21 charging controller is maintenance-free.

WARNING: THERE ARE NO USER-REPLACEABLE FUSES WITHIN THE E32T21 E32T21 REPLACEMENT

REQUIREMENT: Ensure that the plant and the device itself are de-energized.

DANGER: VOLTAGE HAZARDS

Contact with live components can result in serious injuries. Disconnect the system and all devices from the power supply before starting work.

PROCEDURE:

- 1.Disconnect the wiring from all controller connector terminals.
- 2.Disassemble the device by pulling the locking slider on the back of the device down and swivel the device away from the DIN rail and remove it.
- 3.Install the new device by clipping the top locking guide onto the DIN rail and swinging it down until the locking slider clicks into place.
- 4.Reconnect the wiring.
- 5.Switch on the power supply for the device and the main power for the unit feeder again.

8.2 CLEANING

Cleaning of the device is not intended or permissible.