

# ProCore<sup>™</sup> Edge Installation, Operation, Service & Maintenance



North America

Rev 09/17/24

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#### A NOTE ABOUT CUSTOMER SUPPORT

Please write down the unit serial number in the Owner's Record below to ensure superior service, and have it available when contacting PosiCharge Customer Service. The serial number can be found on the nameplate rating label on the left side of the unit.

Owner's Record
Model: ProCore™ Edge
Serial Number (SN):
Purchase date:
Output power:

Customer Support:	service@posicharge.com
	1-866-767-4242

Parts: orders@posicharge.com

#### Continued on next page.

#### In addition, please have the following information on hand before you call:

- 1. Failed charger SKU number and serial number
- 2. Failed module SKU number and serial number
- 3. Customer name (for our reference)
- 4. Problem description, including any fault codes
- 5. Data download from the charger, including charge logs and fault logs
- 6. Ship-to contact name
- 7. Ship-to phone number (if possible, include a cell phone number for text messaging) and email address
- 8. Ship-to company address

We also recommend taking pictures using your cell phone in case you need to send them to PosiCharge Customer Support via text message or email – we can use the images to help diagnose any problems.

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## Warnings and Cautions



## DANGER

Only qualified service personnel should remove the DC output power cable panel and service the charger.

This device does not contain any user serviceable parts.



## DANGER

RISK OF ELECTRIC SHOCK

Electric shock can cause death or serious injury.

- Do not touch the uninsulated portion of the output power cable, battery connector or other live electrical parts, or uninsulated battery terminals.
- Disconnect the charger from the input power and battery before servicing.



## DANGER

DO NOT ATTEMPT TO CHARGE NON-RECHARGEABLE BATTERIES.

Fast chargers are designed to be used only for charging rechargeable batteries. Attempting to charge non-rechargeable batteries could lead to death or injury from exploding batteries.



#### DANGER

BATTERIES CAN BE DANGEROUS.

Batteries generate explosive gases during normal charging and usage. Always follow charging instructions and those of the battery manufacturer to reduce the risk of battery explosion.



## WARNING

FLAMMABLE

- · Keep batteries away from fire.
- · Do not smoke, use an open flame, or cause sparks near a battery.



Connecting a high-voltage battery (80 V or higher) to a low-range charger (24 V - 48 V) may damage the charger.

• Use voltage-keyed connectors on the chargers and batteries if your facility has mixed battery voltages.



## CAUTION

Use only copper wires.



## CAUTION

Every ProCore Edge is assembled and programmed for each customer's specific needs. PosiCharge recommends that you contact PosiCharge Technical Support before making any modifications and/or additions (such as modules) to your ProCore Edge.



#### NOTE

- Three- and five-bay cabinets have field wiring terminal blocks that can accept a wire gauge range from 10 to 14 AWG (6–2.5 mm<sup>2</sup>).
- The minimum and maximum screw-tightening torque is 22.2 in-lb (2.5 N-m) and 26.4 in-lb (3 N-m), respectively.
- DC output power cables are provided with the charger.
- Anderson Euro, SB or SBX connectors are used.
- · For more information, please contact PosiCharge Customer Support at

#### 1-866-767-4242

## Installation and Operation



NOTE

Read and understand these manufacturer instructions and all safety practices.



NOTE

This manual provides important information for installing the charger and should be carefully read.

This manual is based on information available at the time of publication. While efforts have been made for the information to be accurate, it does not cover all details of or variations in the hardware or software, nor provide for every possible contingency in connection with installation.

The features described may not be included in all systems.



This manual provides instructions for the installation and operation of the ProCore Edge Charging System, as well the maintenance and service of select components.

The procedures should only be performed by trained and qualified technicians to enhance safety and protect equipment integrity.

Please refer to the Table of Contents on pages 5-6 for the list of procedures included in this manual.



#### NOTE

Always press the STOP button on the ProCore Edge battery display before disconnecting SB cables from a battery. Pressing the STOP button will prevent the possibility of electrical arcing.

## Acronyms, Abbreviations and Symbols

#### Table 1 – Acronyms, Abbreviations and Symbols

Acronym, Abbreviation or Symbol	Meaning
°C	Degrees Celsius
°F	Degrees Fahrenheit
А	Amp(s) / Ampere(s)
AC	Alternating Current
AWG	American Wire Gauge
BMID	Battery Monitor and Identifier
BMS	Battery Management System
CAN	Controller Area Network
СВ	Circuit Breaker
CSA	Canadian Standards Association
D	Depth
DC	Direct Current
Di	Delta Current
Dt	Delta Temperature
EU	European Union
ft	Foot or Feet
GCAN (G-CAN)	Ground Controller Area Network
h	Height
Hz	Hertz (frequency)
<b>I</b> cc	Conditional Short Circuit Current
<i>І</i> ср	Prospective Short Circuit Current
mr	Minimum Required
IEC	International Electromechanical Commission
in.	Inch(es)

Acronym, Abbreviation or Symbol	Meaning
IP	Ingress Protection (Rating)
kg	Kilogram(s)
kW	Kilowatt(s)
L	Length
lb.	Pound(s) by Weight
Max.	Maximum
Min.	Minimum
mm	Millimeter(s)
mm <sup>2</sup>	Square Millimeter(s)
NEMA	National Electrical Manufacturers Association
N-m	Newton-metre/meter
ОК	All Correct
OCV	Open Circuit Voltage
ph.	Phase(s)
PSCCR	Prospective Short Circuit Current Rating
SB®	Storage Battery Connector
SBX®	Storage Battery Connector with Auxiliary Contacts
sic	"Thus it had been written"
SOC	State of Charge
SOOW	Cable type (Service), which features Oil-resistant insulation, an Oil-resistant jacket, and is Water resistant
UL	Underwriters Laboratories
V	Volt(s)
VAC	Volt(s) Alternating Current
VDC	Volt(s) Direct Current
W	Width

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## **Required Tools**

- Hex key, 4 mm, for the filler screws on the charger top panel
- TORX TX30 for the charger top panel
- · Flathead screwdriver for the terminal screws
- TORX TX25 for the DC output power cable panel

# Technical Specifications for 48V and 80V Modules Fitted to Three-Bay and Five-Bay Cabinets

Model	ProC Edg	ore™ je 9	ProCore™ Edge 9		ProCore™ Edge 15		ProCore™ Edge 15	
Number of fitted modules	2	3	2	3	4	5	4	
Max. output power rating <sup>1</sup>	6 kW	9 kw	6.4 kW	9.6 kW	12 kW	15 kW	12.8 kW	16 kW
Module type	48 V 80 V			V	48	V	80 V	
Nominal input voltage			480	) VAC ± 10%	5 3 ph. 50/60	Hz		
Cabinet size		3-E	BAY			5-E	BAY	
Max. input amps (3-phase 480-volt AC)	9 A	14 A	9 A	14 A	19 A	24 A	19 A	24 A
Max. CB size <sup>2</sup>	15 A	20 A	15 A	20 A	25 A	30 A	25 A	30 A
Min. fitted AC input wire size (AWG) per NEC	14	12	14	12	10	10	10	10
Max. output amperage: 24-volt battery @ 2.4 V/cell	128 A	192 A	_	_	256 A	320 A	_	_
Max. output amperage: 36-volt battery @ 2.4 V/cell	128 A	192 A	_	_	256 A	320 A	_	_
Max. output amperage: 48-volt battery @ 2.4 V/cell	104 A	156 A	80 A	120 A	208 A	260 A	160 A	200 A
Max. output amperage: 72-volt battery @ 2.4 V/cell	_	_	76 A	114 A	_	_	151 A	189 A
Max. output amperage: 80-volt battery @ 2.4 V/cell	_	_	69 A	104 A	_	_	139 A	173 A
Max. output amperage: 80-volt battery @ 2.4 V/cell	_	_	56 A	83 A	_	_	111 A	139 A

#### Table 2 – Technical Specifications

<sup>1</sup> The number of modules and module type determine the maximum output power rating.

<sup>2</sup> The circuit breaker ratings (maximum CB size) should be based on the charger maximum input ratings (input amps) for the number of fitted modules, as stated in this section.

Model	ProCore™         ProCore™           Edge 9         Edge 9			ProCore™ Edge 15		ProCore™ Edge 15		
Number of fitted modules	2 3		2	3	4	5	4	5
Max. output power rating <sup>1</sup>	6 kW	9 kw	6.4 kW	9.6 kW	12 kW	15 kW	12.8 kW	16 kW
Module type	48	BV	80	)V	48	3V	80	V
Nominal input voltage			480	VAC ± 10%	3 ph. 50/60	Hz		
Cabinet size		3-E	Зау			5-l	Зау	
Min. DC output wire size (AWG)	1/0	1/0	1/0	1/0	3/0	3/0 or 4/03	1/0	1/0
Protective class								
PSCCR max. (Icc)				3.6	kA			
PSCCR min. (lcp, mr)	320 A							
ocv	11							
Pollution degree	2							
Efficiency and power factor	Efficiency = 94% maximum Power factor = 0.95 maximum							
Output protection	Short circuit protection Reverse polarity protection							
Dimensions (H×W×D)	18.6" × 21" × 14.7"         24.8" × 21" × 14.7"           (473 mm × 534 mm × 374 mm)         (631 mm × 534 mm × 374 mm)							
Weight	51.8 lb. (23.5 kg) without module         64.8 lb. (29.4 kg) without module           9.2 lb. (+4.2 kg) per module         9.2 lb. (+4.2 kg) per module							
Installation	Wall and floor-stand mounting options							
Environment	Operating temperature: -4°F to 113°F (-20°C to +45°C) Storage temperature: -13°F to 149°F (-25°C to +65°C)							
Relative humidity				90%, non-o	condensing			
Enclosure	IP20, NEMA 1–only indoor use							
Operating altitude	Up to 3000 m (9843 ft)							
Certifications	CSA certified to UL1564, C22.2 107.2-01, and CEC							

## Positioning the Charger

The battery charger can be very heavy when fitted with modules. Take precautions to avoid injury when moving the charger.

Use appropriate material handling aids (e.g., a pallet truck) to move the charger into position. It is recommended to use a lifting hoist with straps or chains wherever possible, especially when the charger is raised above ground level.

M8-thread lifting eyebolts can be attached to four locations on the top panel of the charger to aid the process. Use a 4-mm hex key to remove the filler screws before attaching the lifting eyebolts.



#### CAUTION

The battery charger can be very heavy when fitted with modules. Take precautions to avoid injury when moving the charger.

Use appropriate material handling aids (e.g., a pallet truck) to move the charger into position. It is recommended to use a lifting hoist with straps or chains wherever possible, especially when the charger is raised above ground level.

M8-thread lifting eyebolts can be attached to four locations on the top panel of the charger to aid the process. Use a 4-mm hex key to remove the filler screws before attaching the lifting eyebolts.



Fig. 1 – Attaching points for M8 lifting eyebolts, top panel view

#### Choosing to Wall-Mount or Floor-Mount the Charger

Before you set up the ProCore Edge to be operational, you will want to choose whether to install the charger as a wall-mounted unit or a floor-mounted unit.

This will help you to decide your spacing needs and length of cables, etc.

#### Wall Mount Installation

Check with a professional installation professional to determine the proper mounting technique for your facility.



Fig. 2 – Charger, wall, wall mount hanger, bottom bracket and screw with an M6 Thread  Using the bolt hole locations for reference, secure the top bracket to the wall.

> NOTE: Wall anchor bolts are <u>not</u> included in the wall mounting kit.



Fig. 3 – Bolt Hole Locations

 There are two slots on the back of the charger for mounting it to the wall mount bracket – mount the charger onto that top bracket.



Fig. 4 - Bracket Slots

3. After mounting the charger on the wall bracket, secure the underside of the charger with the L bracket, and torque the bolts to 52.22 in-lb (5.9 Nm). Then secure the L bracket to the wall.





#### Floor Mount Installation



Fig. 6 – Floor Mount Stand

1. Secure the floor stand to the floor using the eight bolting points provided.

PosiCharge recommends using M10 (3/8 inch) bolt threads.

NOTE:

Anchor bolts are **not** included in the floor stand kit.



Fig. 7 – Eight floor stand anchor bolting points are provided.



Fig. 8 – Size Reference

2. There are two slots on the back of the charger for mounting it to the top bracket of the floor stand – mount the charger onto that top bracket.



Fig. 9 – Bracket Slots



Fig. 10 – Backside of Floor Mounting Sand

3. After mounting the charger onto the top bracket, secure the underside of the charger with the L bracket. Then secure the L bracket onto the central beam of the floor stand.



Fig. 11 – Charger Underside and L Bracket

## **Remote Battery Connections (Optional)**

A 10-way screw terminal connector (Fig. 12) is provided behind the DC output power cable panel.



Fig. 12 - Ten-Way Screw Terminal Connector

This connector facilitates the connection of battery-related signals (battery communications).

Connect the battery communication wires – the "CAN" bus for battery BMS," "battery monitor," and "pilot" (interlock) – to the screw terminal per Table 1, and tighten the terminal screws with a torque value 5.31 in-lb (0.6 N-m) (Fig. 13).



Fig. 13 - Battery Communication Wires Connected to the Screw Terminal

#### Table 3 – Connection and Description

The table below describes the bare-ended signal connections that can be connected to the charger via this connector.

Connection	Description
Pin 10	CAN1-L/DATA – RED
Pin 9	CAN1-H/DIR (Direction) – WHITE
Pin 8	PILOT – GREEN
Pin 7	PILOT RETURN – BLACK
Pin 6	SWA and SWB (DCT pins 6 and 5, respectively) are for
Pin 5	an external pilot interlock connection. In order to charge, these pins must be shorted either by a normally closed pilot interlock connection or by a jumper. A jumper between these pins is factory installed to ensure the unit operates when it reaches a destination.
Pin 4	Negative lead connecting and controlling the 24-VDC WATERING VALVE
Pin 3	Positive lead connecting the 24-VDC WATERING VALVE
Pin 2	Negative lead to the SPARE RELAY
Pin 1	Positive lead to the SPARE RELAY



# 



Use only copper wires.

#### **Optional Features**

Optional Feature	Function
Watering Relay (24 VDC)	Allows control of a 24-VDC watering valve
Spare Relay	For future use
Pilot Interlock Connection	Stops the charger from charging

For more information, please contact your PosiCharge representative at 1-866-767-4242 on how to how to customize the Remote Battery Connections option.

## **Charger Light Bar**

#### Table 4 – Charger Light Bar

Pattern	Meaning
Flashing red	Fault The charger has a problem. The fault code/description is printed on the display screen.
Walking white	Available The charger is powered ON and available. The light will walk slowly upward. The light intensity is reduced, and the walk is at half speed in Energy Saving mode.
Solid white	Connecting The light bar shows solid white during the initial vehicle connection, while the charger is collecting information.
Walking blue	Offline The charger is not available to charge because the mobile application is configuring it, or because the blockout window is active.
Cascading blue	Charging lead-acid batteries The charger is charging. The height of the cascading blue light on the light bar indicates the battery SOC level from 0% to 100%. (There are 22 lights on a 3-bay charger light bar and 32 lights on a 5-bay charger light bar.)
	For example, if the battery was 75% charged, then the bottom 75% of the bar would be cascading blue, and the top 25% of the bar would be dark (not illuminated).
Solid blue	Not charging (idle) but connected The charger is not charging, or has stopped charging and is idle, but is connected to a vehicle. The height of the solid blue light on the light bar indicates the battery SOC level, from 0% to 100%.

Pattern	Meaning
Cascading orange	Charging lithium-ion batteries The charger is charging. The height of the cascading orange light on the light bar indicates the battery SOC level from 0% to 100%.
	(There are 22 lights on a 3-bay charger light bar and 32 lights on a 5-bay charger light bar.) For example, if the battery was 75% charged, then the bottom 75% of the bar would be cascading orange, and the top 25% of the bar would be dark (not illuminated).
Solid orange	Paused (lithium-ion charge) The lithium-ion BMS has paused the charging.
Walking yellow	Charging is available, but there are module fault(s) which can reduce the charging rate.
Cascading yellow	Equalizing The charger is undergoing equalization of the charger batteries.
Solid yellow	Watering The charger is watering the battery.
Solid green	Completed The charging is 100% completed.

## **Operating Instructions**



Fig. 14 – Status Bar

Table 5 – Operating	Instructions	Indicators	and De	scriptions

Indicator	Description		
Status bar	Indicates whether a vehicle is connected to the charger (Fig. 14).		
	"Connect Vehicle" indicates that there is no vehicle connected to the charger. The charger is idle.		
	NOTE NOTE		
	The buttons have no function if the status bar displays "Connect Vehicle."		
Charger name	Displays the name broadcast to the ProCore™ Mobile Application (App), is sent to PosiLink and the cloud, and used in the charger logs.		
	<ul> <li>You can change the charger name using the mobile app in the Charger Data window.</li> </ul>		

Indicator	Description
Charger Maximum output power	Displays the power rating for the charger
	The value changes as modules are added or removed.
Day and time	The ProCore <sup>™</sup> Mobile App automatically sets this indicator.

#### Battery Display

The graphical battery display (Fig. 15) changes when the charger connects to the battery and shows the parameters of the battery's state of charge (SOC).



Fig. 15 – Graphical Battery Display

Indicator	Descriptio	n	
State-of-charge wheel	The charger estimates the battery charge percentage (or SOC) at the connection. The SOC wheel adds segments as the battery charges. The SOC displayed in the center of the wheel increases in value. As indicated below, the color of the wheel also indicates the SOC, allowing the battery charging state to be monitored at a distance.		
	Color	Charge Percentage	
	Yellow	Less than 80%	
	Blue	80% or greater	
	Green	100% fully charged battery	
Equalization (EQ) schedule indicator	Equalization information is available in voltage mode.		
	Color	Meaning	
	Light gray or no color	No EQ scheduled	
	Black	EQ scheduled	
	Flashing green	EQ charge in progress	
	Solid green	EQ charge completed for the current week	

Indicator	Description
Battery temperature	The temperature reading comes from a temperature sensor installed in the battery. If there is no sensor, then the display grays out.
	The display can be set to °F or °C, using the ProCore™ Mobile App Charger Setup/Display Options window.
	If the battery is overtemperature, then the charger faults and displays the battery temperature window as red.
Status bar	Indicates the charging status with the following displays:
	Charging
	Charge Stopped
	Charge Completed
	Charge Blocked (blockout window)
	• EQ Charging
	Full Charging
	Offline
	Charging is stopped to use the ProCore™ Mobile App to change the configuration.
	• Fault
	Additional information is displayed about the fault or warning.
	Initialization (Phase)

Indicator	Description		
Water level	Drop/Background Color	Indication	
	Blue drop and white background	OK – the battery water level is OK.	
	Blue drop and red background	LOW – the battery water level is low.	
	Grey drop and white background	There is a BMID with a no water level sensor	
	NOTE Note There is no drop if there is no BMID (voltage mode).	s a CAN battery or if there is	
Charge current and voltage	The charger controls the charging current via PosiCharge proprietary charging algorithms.		

## Alternate Battery Display

You can switch the battery graphical display to an alternate tabular battery display showing additional parameters for the charging battery.
Press and hold the **Start** button (Fig. 15) for three seconds to change the graphical battery display to the alternate tabular battery display (Figure 5). Repeat this step to return the display to the graphical battery display.

	CHAF	RGING	
Battery ID	TESTBAT1	TRUCK001	Vehicle ID
Battery Cap	1000 Ah	58.6V/200A	Volts/Amps
Battery Cells	24	Ohr 9min	Charge Dur
Battery Type	1	31 Ah	Charge Ah
Battery SOC	34%	1.9 kWh	Charge kWh
Battery Temp	24 C	v1.336	Charger SW
Water Status	LOW	Yes	EQ Scheduled

Fig. 16 – Alternate Tabular Battery Display



### NOTE

ProCore<sup>™</sup> Edge starts charging automatically when you connect a vehicle. You can disconnect a vehicle safely from ProCore<sup>™</sup> Edge even while charging. You do not need to start or stop the charge with the following buttons.

Table 6 – Buttons and Functions

Button	Function
Start	If the charger is in the Charge Stopped state, then press the <b>Start</b> button (Fig. 15) momentarily to restart the charge.
	Press and hold the <b>Start</b> button for three seconds to switch from the graphical battery display (Fig. 15) to the alternate tabular battery display (Fig. 14). Press and hold the <b>Start</b> button for three seconds again to switch back to the graphical battery display.

Button	Function
Stop	Press the <b>Stop</b> button (Fig. 15) to stop the charge.
	The charge displays "Charged Stopped" on the status bar.
EQ Schedule	Equalization (EQ) is an extended low-current charge performed once per week to maintain battery health. EQ normally is scheduled automatically by settings in the charger or BMID, and it is performed if scheduled after a regular charge to 100% SOC.
	The alternate tabular battery display shows the EQ Scheduled status (Fig. 15).
	At the top, if the alternate battery display shows:
	<ul> <li>"Charging," then press the EQ Schedule button (Fig. 15) to schedule or unschedule an EQ charge.</li> </ul>
	<ul> <li>"Charge Stopped," then press the EQ Schedule button to start an EQ charge.</li> </ul>
	• "Battery Undervoltage," then press and hold the <b>EQ Schedule</b> button to start a recovery charge, which is a low-current charge designed to raise safely the battery voltage. The battery should be able to accept a normal charge after the recovery charge is completed.

# Faults and Warnings – Hardware Diagnostics

#### Table 7 – Faults and Warnings

#### NOTE:

- A "fault" turns the charger **OFF**.
- A "warning" is a displayed message for the operator.

Display Message (Name)	Message type	Description	Action(s)
ADC Reference Low	Fault	The ADC reference power supply is under voltage. Readings cannot be trusted.	Replace the system controller.
BAT OVER VOLTAGE	Fault	The battery voltage is too high (i.e., above the battery table maximum voltage limit) to charge.	Checked the battery parameters for accuracy.
(Battery over voltage)		The BMID number of battery cells setting is incorrect.	Use the ProCore App BMID setup to set the correct number of battery cells.

(Continued)

Display Message (Name)	Message type	Description	Action(s)
BATT UNDER VOLTAGE (Battery under voltage)	Fault	The battery voltage is too low to start the fast charge (the voltage is below the battery table minimum voltage limit). The battery is drained to a voltage below a safe level for charging. Recovery charge is needed.	Press and hold the <b>EQ</b> <b>Schedule</b> button to initiate a recovery charge and raise safely the battery voltage.
		The battery voltage is too low (i.e., below the operational voltage limit) to use on this charger	Use a charger that supports the battery voltage.
		The BMID number of battery cells setting is incorrect.	Use the ProCore <sup>™</sup> App BMID setup to set the correct number of battery cells.
Battery Communication Timeout	Fault	Communication with the battery was lost over the communication bus.	Check the communication wires.
Battery Connection Issue	Fault	Battery initialization failed during connection.	Check the battery communications wiring for damage.
Battery Data Invalid	Fault	The BMID configuration data read from the battery are not valid for the charge.	Use the ProCore App to recheck the battery parameters in the BMID.

Display Message (Name)	Message type	Description	Action(s)
BATTERY TEMP		The batter temperature is too high (i.e., above the battery table maximum temperature) to charge.	Let the battery cool before charging.
(Battery over temperature The battery	Fault	A faulty battery cannot accept a high-charge current.	Service the battery.
temperature is too high.)		An incorrect BMID setting is resulting in a faulty battery overheating.	Use the ProCore App to correct the BMID settings.
Battery Temperature Sensor Failure	Warning	The temperature sensor reading is out of the valid range.	Check the battery temperature sensor wiring for damage.
Battery Voltage Mismatch	Fault	The difference between the battery reported voltage and corrected local voltage exceeds 2 volts.	Check for output cable damage causing an excessive voltage drop.
Battery Voltage Reversed	Fault	Positive and negative terminals are reversed on the battery connection.	Fix the output cable connection polarity.
BMID LOST COMM (BMID Communication is Lost)	Fault	There are damaged BMID communication (comm) wires in the charger output cable or in the vehicle.	Repair the wiring.

Display Message (Name)	Message type	Description	Action(s)
Charger Configuration Access	Fault	The charge could not read charge configuration settings.	Call PosiCharge service.
Current Control	Warning	One or more power modules are not delivering current.	Call PosiCharge service.
DC Line Open	Fault	The difference between the module reported voltage and local battery voltage exceeds 5 volts.	Check the battery voltage sensor wiring for damage.
Duplicate Module IDs	Fault	At least two modules have duplicate CAN IDs on the internal CAN bus.	Call PosiCharge service.
Factory Data Not Set	Fault	The charger factory config- uration is missing.	Call PosiCharge service.
Fan Speed Low	Warning	The fan speed is very low.	Call PosiCharge service.
Fan Speed Too Low	Fault	The fan has stopped or is too low to charge.	Call PosiCharge service.
Module General Fault	Fault	The module faulted with no specific reason reported.	Call PosiCharge service.
Module High Temperature	Warning	The module temperature is very high	Check for obstructed air flow.

Display Message (Name)	Message type	Description	Action(s)
Module Memory Issue	Fault	The module had a memory related error.	Call PosiCharge service.
Module OCP Tripped	Fault	There was an error in the over-current protection module. Check that the battery voltage is within range the charger.	
		The air intake is blocked.	Check for obstructed air flow.
MODULE OVER TEMP	Fault	temperature sensor is above 80° C.	Remove the blockage.
(Module / Charger Over Temperature)	Taun	The module temperature is too high to charge.	
		The module failed.	Replace the power module.
Module OVP Tripped	Fault	There was an error in the over-voltage protection module.	Check that the battery voltage is within range for the charger.
MODULE TYPE ERR		The power module type does not match the factory	Install the correct power module.
(Module Installation Type)	Fault	configuration (cabinet volt- age) settings, or incompat- ible modules were installed together.	Call PosiCharge service.
No Battery Configuration	Fault	The parameters have not been configured for the voltage mode charge.	Configure the voltage mode settings on the charger, using the ProCore mobile app.
No Modules	Fault	No power modules are installed.	Call PosiCharge service.

Display Message (Name)	Message type	Description	Action(s)
OCP Fault			Replace the power module.
(There is a Module Over- current)	Fault	The module failed.	
OVP Fault		The battery became dis-	Wait for the fault to clear.
(There is a Module Over- voltage)	Fault	connected without opening the pilot.	
Power Stage Initialization Error	Fault	There was a CAN bus problem during power stage initialization.	Call PosiCharge service.

# Initial Software Setup

#### Purpose:

The purpose of this procedure is to describe how main application software is installed onto the ProCore Edge charger system board, either by the manufacturer or in the field.

NOTE: This procedure describes the method of loading the firmware using a PC-connected via USB port. Firmware can also be loaded using a smart phone connected via Bluetooth. For the smart phone procedure see PLMS part no. 25129-11 for iOS devices.

#### Scope:

This procedure relies on ProCore Edge Bootloader SW version 1.027 or later.

### Definitions:

Component	Description
ProCore Edge Charger	Industrial opportunity charger
LCD Screen	The graphical interface located on the front of the ProCore Edge charger
System Board	The PCB located inside the charger which controls the LCD screen, stack lights, and power output
USB	Universal Serial Bus – a USB connector is located on the side the unit
PilotTerm	Windows™ application that communicates with the charger via the USB port
AVB File	Loadable binary application file – this refers to the -11 main application loaded using PilotTerm, which has an extension of .avb

#### Table 8 – Components and Descriptions

### **Required Equipment:**

- USB cable type AB
- PC utilizing one of the following Microsoft Windows operating systems:
  64-bit Windows 7, 10
  32-bit Windows 7, 8, 10, 11, Vista, XP
- PilotTerm 1.008 or later installed on the PC (PLMS Part No. 22718-11) The latest version as of this writing is 1.012.



Fig. 17 – USB Cable AB

• The **-11 AVB** file to be loaded to the charger stored somewhere on the PC (see this part number).

### Procedure:

- 1. Turn ON the charger.
- Attach the B-type end of the USB cable to the USB port on the charger. Firmware is updated using the USB connector located in the top left corner of the charger (Fig. 18).



Fig. 18 – USB Connector

- Attach the A-type end of the USB cable to a USB port on the PC running Windows.
- 4. Run PilotTerm on the PC.

5. In the Settings tab, select the COM port that is connected to the USB cable. Then select **Connect COM Port**.

H PilotTerm	- 0 ×
Terminal Update Firmware Settings Auto-Upload	
Setunds Com Port	
Connect COM Port COM3 ~	
Support Email Set where to send application errors	
support@webasto.com	
User Config File Path	
C:Ubern Virzur VepData VLocal VWebado, Darging, Systems VPlictTerm.exe_LH_govAqvamed2injodocoa10e2muzat zqv\1.0.1.2:user.config	
	Fig 19 – Comm Port

6. In the Update Firmware tab, use the **Browse** button to select the location of the AVB file you want to upload.

H PilotTerm				156	1		×
Terminal Update Firm	ware Settin	gs Auto-Upload					
Update Firmw	vare				W	ration:1.0	1.2
		Selected File:					
Update Now	Browse	M:\ENGINEERING\SW_Builds\IPC\	Procore/HMI_Board/1.309/24533	-1309-11_Procore_Relear	ie avb		
Helpful tips and	d sugges	tions			E	Reboo	t First
1. Retry upload. Booti 2. Check cable conne 3. Try some command 4. Connect serial port 5. Powercyle device.	oader may he ections. Is in the Term on PilotTerm then wait 5 s	we missed receiving the messages, inalitab to ensure Pilot Tem is able to talk before connecting to the device, econds before starting upload.	to the device.				
<ol> <li>Disconnect from the 7. Make sure 'Reboot</li> </ol>	e device, clo First' is ched	e Plot Tem and start over. ked.	Fig. 20 – U	pdate Firm	wa	re Ta	ab

- Select the Update Now button you will see a progress bar at the bottom. The message "Upload successful" will appear at the bottom left when the upload is completed.
- 8. If you see the message "Upload Failed," power cycle the charger and select the **Update Now** button again immediately after.

 Select the Terminal tab, then enter ver in Send Data and select Send. The terminal window will display the following information (the version and CRC may vary):



Fig. 21 – Terminal Tab

Confirm the firmware version matches the one that was just loaded, and confirm the Run Mode is Release (for production unit).

10. The loaded application should begin after the firmware load is complete. You may unplug the USB cable after this point.

# Service / Maintenance

# **Preventative Maintenance Schedule**

The table below describes the preventative maintenance activities for the first three years of the system.

### Verify the following activities after five years:

- Monthly Fan air flow at the module intake
- Yearly Power connection torque along the high-current path
- Air Filter Replacement Not yet available

	Maintenance Verification / Action	Schedule					
ProCore™ Edge Component Description		Daily, by User	Monthly	Trimonthly	Yearly	Triennially	
Output Cables	Examine cables and replace any cable that exhibits signs of damage (splits, cracks, tears, exposed conductors, etc., or excessive wear	*		*			
Three Output Cable Connectors	Examine connectors, and replace any connector that exhibits signs of damage (splits, cracks, exposed or pitted power pins, etc.), or excessive wear.	*		*			

### Table 9 – Preventative Maintenance Schedule

ProCore™ Edge Component Description	Maintenance Verification / Action	Schedule					
		Daily, by User	Monthly	Trimonthly	Yearly	Triennially	
Cool Air Intake and Hot Air Exhaust Vents	Inspect the cool-air intake vents at the system back and hot-air exhaust vents at the system lower-front for any reduced airflow or blockage. Remove any airflow obstruction to ensure proper system cooling.	*	*				
ProCore Exterior	Examine the charger exterior for signs of damage or excessive wear. Repair or replace any system that has been damaged in such a way that conductors are exposed, or the cabinet may contact internal conductors.	*			*		
ProCore Interior	Vacuum out dust from the charger interior using a vacuum designed for electronic systems. Pay close attention to electron- ic devices to prevent damage. It may be necessary to vacuum out dust more frequently if the unit is installed in a highly dusty environment.			*	*		
ProCore Interior Harness Connections	Examine for signs of damage or wear in all harness connections.				*		

	Maintenance Verification / Action		Schedule					
ProCore™ Edge Component Description			Daily, by User	Monthly	Trimonthly	Yearly	Triennially	
Check for discoloration: NEGATIVE DC OUTPUT POSITIVE DC OUTPUT	Examine the high-current path for signs of discoloration and replace any discol- ored components, making sure to use the correct torque on all fasteners.					*		
DC Output Fuse	Fuses do not require maintenance until an overcurrent event causes them to open, or if they experience excessive heat due to a loose connection.						*	
Data Contacts on Output Connectors	The data contacts in a life expectancy of 5 cycles.	the output cable has 000 disconnection						
	Disconnections per Day	Replace Contacts (Months)						
	4	40						
	7	24						
	9	18						
	13	12						
	25	6						

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# Replacing a Module

1. Unplug any vehicles connected to the charger.



NOTE

Always press the STOP button on the ProCore Edge battery display before disconnecting SB cables from a battery. Pressing the STOP button will prevent the possibility of electrical arcing.

- 2. Turn OFF the AC power at the breaker and lock it out:
  - a. Remove the AC input by performing a LOTO to safely remove AC input from service.
  - b. Disconnect the battery charger from the input power and battery connections before servicing the unit. Lockout/tagout the input power according to OSHA 29 CFR 1910.147.
  - c. Rest the unit allow 30 minutes to discharge prior to servicing, then test the components to ensure it is properly discharged.



### DANGER

### IMPORTANT

Make sure the charger is completely POWERED OFF and that NO BATTERY IS CONNECTED before opening the charger door and replacing a power module. Power module replacement should only be performed by qualified (service) personnel.

3. Open the charger door.

To unlock the door and open it, use a flathead screwdriver to turn the latch on the side of the charger (Fig. 22).



Fig. 22 – Latch on the Side of the Charger

4. Disconnect the power cables.

Disconnect the DC output cable (Fig. 23, left) and the three-phase AC input cable (Fig. 23,right) from the power module to be replaced by squeezing the clamp releases and pulling.



Fig. 23 - Disconnected Power Cables



5. Use a 7-mm socket wrench to disconnect the ground cable (Fig. 24).

Fig. 24 – Ground Cable Disconnection

6. Disconnect the power module communication cable(s).

The two possible configurations for power module communications are a single-cable connection and a multi-cable connection – see the next two pages for each of these configurations.

### **Single-Cable Connection**

For a single-cable connection, start by disconnecting the end of the cable from the termination block located at the very bottom of the charger. Then unplug the communications, starting from the bottom power module, until the module to be replaced has been disconnected (Fig. 25).



Fig. 25 – Single Cable Connection



### NOTE

The ribbon cable has a red edging to denote Pin 1.

While facing the module, always insert the connectors so the cable red line is on the left.

### Multi-Cable Connection

For a multi-cable connection, only the communication cables from the module to be replaced need to be disconnected (Fig. 26).



Fig. 26 – Multi-Cable Connection

- 7. Loosen the mounting screws and remove the power module.
- Using a flathead screwdriver, turn each mounting screw counterclockwise until the spring ejects and releases the screw from the nut. Carefully pull out the power module (Fig. 27).



Fig. 27 - Power Module Removal

- 9. Insert the replacement power module, and set the module position selector.
- 10. Insert the replacement power module.

Use a flathead screwdriver to tighten the mounting screws by pushing in and turning clockwise (Fig. 28).



Fig. 28 – Replacement Power Module Insertion

11. Using a small flathead screwdriver (ideally with a 0.4-mm × 2-mm tip and no bigger than 0. 7 mm × 3 mm), adjust the power module position selector (Fig. 29) to match the power module position (Fig. 30).



Fig. 29 - Power Module Position Selector



The power module positions are 1 through 3 for the three-bay and 1 through 5 for the five-bay. The Module 1 position always starts at the top slot.

- 12. Reconnect all communication cables that were disconnected in steps 4 through 6.
- 13. Connect the flat cable(s) to the power module (Fig. 31).



Fig. 31 – Flat Cable Reconnection to the Power Module



14. Connect the flat cable to the termination block (Fig. 32).

Fig. 32 – Flat Cable Connection to the Terminal Block

- 15. Reconnect the DC output cable (Fig. 33) and AC input power cable (Fig. 34) that were disconnected in step 4.
- 16. Reconnect the ground cable that was disconnected in step 5 with an M4 flange nut with a torque value of 18.5 in-lb (2 N-m) (Fig. 34).



Fig. 33 – Reconnected DC Output Power Cable



Fig. 34 – Reconnected Ground Cable and AC Input Power Cable

17. Close the charger door and use the flathead screwdriver to turn the latch counterclockwise to lock the door.

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# **Replacing the Output Cable**

#### DC output power cable connection to three- and five-bay cabinets:

1. Unplug any vehicles connected to the charger.



### NOTE

Always press the STOP button on the ProCore Edge battery display before disconnecting SB cables from a battery. Pressing the STOP button will prevent the possibility of electrical arcing.

- 2. Turn OFF the AC power at the breaker and lock it out.
- 3. Wait five minutes for the capacitor voltages to bleed down.
- 4. Remove the TORX TX25 screws from the DC output power cable panel located at the bottom left of the charger (Fig. 35), and pull the panel up and away from the charger cabinet.



Fig. 35 – Torx TX25 Screws Securing the DC Output Power Cable Panel

Within the panel, three- and five-bay cabinets have two DC output power bus bars: one for the positive (red) DC output power cable and one for the negative (black) DC output power cable. (Fig. 36)



Fig. 36 - Three- and Five-Bay Bus Bar Arrangement

 The positive cable connects to the bus bar stud on the right, and the negative cable connects to the bus bar stud on the left, with a torque of 216.83 in-lb (24.5 N-m).

To secure them for strain relief, fasten the provided lower clamp to the DC output power cables with a torque of 53.1 in-lb (6 N-m). (Fig. 36)



Prior to fastening the lower clamp, ensure the gray protective rubber sleeve (Fig. 36) is on the upper side of the DC output power cables.

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# **Replacing the Controller PCBA**

Parts kit # 5910975 contains the following items:

- System Controller PCBA
- Display (attached to the controller PCBA with VHB tape)
- Most recent software uploaded for Light Bar and applications



Fig. 37 - Controller PCBA

(Continued)

#### Procedure:

- 1. Perform the lockout/tagout procedure before servicing the charging station.
- Open the front door and unplug the seven cables (J1 – J7) as shown below.
- 3. Remove the seven screws as shown to the right, then remove the PCBA.
- 4. Install the new/replacement PCBA and tighten the screws with a torque value of 0.44 lb-ft (0.3 Nm).



Fig. 38 - PCBA 3/4 View

5. Plug in cables J1 – J7 as shown below.



# Replacing the Door Panel

### Removal

Special Notes About Door Replacement:

- The replacement door hinge has increased from 1mm to 1.5mm in thickness.
- The hinge itself is <u>riveted to</u> <u>the cabinet side only</u>.



Fig. 40 – Inside Cabinet View Cabinet-Side Rivets

- The door is secured to the hinge using two M4 bolts <u>per hinge</u>.
- The door can be detached from the hinge by unscrewing the bolts.



Fig. 41 – Outside Cabinet View Replacement Door Bolts Door-Side Only

- A single pin helps to properly align the door with the top of the cabinet.
- It also helps to prevent the lock from being detached by excessive movement or jarring during transport.





Fig. 42 – Alignment Pin

- The replacement door can only be installed using the new ProCore Edge cabinet featuring the hinge/pin design.
- The replacement door is <u>not</u> fitted with the System Controller.
- The replacement door does <u>not</u> come with replacement M4 bolts

   it must be installed using the existing M4 bolts on the charger.




- The cable clamp has also been improved.
- The new clamp is made from 3mm steel, and it can accommodate cables from 11 21mm in diameter.
- For 5-bay cabinets, install a 5mm spacer.
- For 3-bay cabinets, a spacer is not necessary.



Fig. 44 – Cable Clamp Inside the Charger Cabinet



#### Installation

To install the replacement door:

1. Unbolt the existing (original) door from the charger cabinet - be sure to retain the M4 bolts as these must be reused in step 3 below.

Fig. 46 - M4 Bolts M4 Bolts

2. Install the replacement door by aligning the pin (circled below).



Fig. 47 – Align the Pin

3. Install the M4 bolts and tighten them with a torque specification of 1.2 N·m.

Fig. 48 – M4 Bolts



# Interface Board Communication Connectors / Replacing the Fuse

1. Remove the TORX TX25 screws from the DC output power cable panel (as shown below), and pull the panel up and away from the charger cabinet.



Fig. 49 – Torx Screws

2. Disconnect the two mating connectors by pulling them from the interface connectors, which are mounted directly onto the interface board.

Do not disconnect the wires from the mating connectors.



Fig. 50 – Mating Connectors

3. Remove the two screws securing the interface board, and remove the interface board from inside the charger cabinet.



Fig. 51 - Interface Board Screws

4. To replace the fuse on the interface board, gently lift it up from the small retainers. To install a new fuse, gently press the new fuse into the retainers as shown to the right.



Fig. 52 - Fuse

5. Installation of the user interface is the reverse order of removal.

Be sure to reconnect the two mating connectors to the interface connectors as shown below.



Fig. 53 - Interface Board

### Firmware Updates

## Software Download, Software Update & Installing Software Using the Mobile Application

**Purpose:** This section describes how to use the Webasto SW Updater mobile application for iOS platforms to load firmware onto an PosiCharge Product over a Bluetooth connection.

**Scope:** This section describes the general procedures as they apply to any PosiCharge device supporting uploads over Bluetooth with the Webasto SW Updater app.

**Installing the Application:** To use the Webasto SW Updater app, it must first be installed on your iOS mobile device. If it is not currently installed, do the following:

- 1. Tap the App Store icon on your iPhone/iPod Touch from the home screen.
- 2. Tap the magnifying glass to perform an app search, and type in "Webasto Updater" to search for the Webasto SW Updater mobile app.

If you have a QR reader on your iPhone, you can also use it to read the QR codes below to open the App Store download page for the Webasto SW Updater and the Webasto PosiCharge ProCore App.



Download the Webasto SW Updater App



Fig. 54 – Software App QR Codes

Download the PosiCharge<sup>™</sup> ProCore App

3. An app with this icon should appear in the results.

- 4. Tap the **GET** button on the result associated with the application the **INSTALL** button will appear tap it.
- 5. Enter your Apple ID password to sign in to the iTunes store to confirm your identity when prompted. The download and installation will continue.
- 6. After the download and installation are complete, you can tap the **OPEN** button in the Play Store listing to open the Updater app. Alternatively, the app can be accessed by locating its icon from the home screen.

#### Adding the AVB File:

The firmware file to load comes in the form of a binary file with extension .AVB. This must be received as an email attachment on your mobile device.

To add the file to the SW Updater App, touch the attachment and hold until you see a list of app icons to select from.

Select the Webasto Updater icon.



NOTE: You may need to click the ellipsis (...) to see it.

When the app opens, you will be directed to the Device List screen with the file you just added selected for upload. If you wish to upload this file immediately, skip to **Selecting Target Devices**.

#### Selecting an AVB File:

If you previously added an AVB file via email attachment, you may load it again by opening the Webasto Updater app directly. You will see the Select File screen as shown to the right.



Fig. 55 – Selecting an AVB File

#### Managing AVB Files:

You can delete a file from the file list by swiping it left – this reveals a delete button you can press to delete the swiped file.

#### Selecting Target Devices:

Once an AVB file is selected, you may enter the Select Device screen as shown to the right.

The Selected file will appear at the top of the screen. A list of nearby PosiCharge devices with Bluetooth advertisement signals will appear below it, along with the signal bar strength of each.

Shown below each device name (as set by the customer) is the version of software currently installed. If the version cannot be obtained, it will appear as "?.???".

You may select and deselect as many devices as you wish, making sure they are the proper device type for the software file being uploaded.

Assuming no interruptions occur, the estimated time required to upload to all devices is printed at the bottom of the screen.



Fig. 56 – Selecting Target Devices

If you want to change the file to be uploaded, use the hamburger menu in the top left corner to navigate back to the Select File screen and make another selection.

When you are finished selecting devices, select Upload to start the upload process.

#### Uploading Software:

When the upload begins, you will see the Upload Progress screen as shown to the right.

The list of selected devices is shown with an individual status indicator and progress bar.

The time left and percent completion of the entire batch job is shown at the bottom of the screen. This screen is designed to run without interruption so you may leave your device unattended while the upload is in progress.

When all uploads have completed, you may select **Stop** to return to the Device Select screen again.

If any of the uploads fail, the app will continue to cycle through them to retry indefinitely until you select **Stop** and confirm you wish to cancel the upload.

If you select **Stop** during the upload, all pending uploads are canceled, but the



Fig. 57 – Uploading Software

current load in progress cannot be interrupted or the equipment will be rendered inoperable until the next upload is performed.

After the current load completes – whether successful or not – the upload will stop. At this point, selecting **Stop** again takes you back to the Device Select screen.

If an upload is interrupted by the app closing, the mobile device going out of range, or the PosiCharge Equipment powering OFF, you can re-try the upload again when conditions are restored. The PosiCharge Equipment will still be listening for the app.

## Voltage Driven vs BMID Communications

#### Default Battery Setup for Voltage-mode Charging

ProCore chargers can operate with or without a BMID.

BMIDs provide the charger specific charging parameters for each vehicle and monitor the battery voltage and temperature during charging. A BMID effectively allows the charger to safely charge each battery at a high rate while preventing overheating.

Some sites do not need these high charging rates and do not use BMIDs. Here the charger uses preset charging parameters that allow a charging rate that is safe for all batteries at the site.

When a charger is new or the system controller is replaced, voltage-mode charging is disabled. The charger will not charge a vehicle without a BMID until the default battery parameters are set. This is done using the ProCore App's Charger Setup menu as shown below.

	3:48	48 🕈 🖘 al 88% 🗎		3:48		si 🕈 ∿∷ 41 88%	Û	3:47		\$ \$ un al 88%
	🖳 🖳 ProCore			🗄 🔽 Charger Seti	up			🗄 🍇 Default Batte	ry Setup	
	MENU	. فعد مر م			Edge Dem		N		Edge Demo	o
	Select Charger			Load Setu	р	Store Setup		24 V	36 V	48 V
	Charger Status			Default Battery	Setup		>	Battery Capacity	,	500 Ahrs 🗹
	Charger Setup			Advanced Opti	ons		^	Battery Type	0-1	None Select 🗹
ς	Charger Data							Start Current Lir	nit	25 A 🕅
	BMID Setup									
	BMID Data							Advanced		^
	Charger Test									
	Service									
		0 <			0				Ō	<



There are separate tabs for 24V 36V, and 48V (or 48V, 72V, 80V, 96V). Each battery voltage tab must be setup individually. Generally, only the battery capacity and battery type need to be changed from the factory defaults.

Someone familiar with the batteries used at the site should determine the smallest capacity battery of each voltage that will be charged. This capacity and battery type should be used to set these values using the ProCore App.

For example, here the 48V tab is set to 765 Ah and Exide Tubular Flooded. The recommended Start Current Limit for voltage-mode charging is 25 A / 100 Ah.

DO NOT FORGET TO SAVE THE SETTINGS!!!



Fig. 59 – Default Battery Setup This page left intentionally blank.

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PosiCharge Ampure 1333 S. Mayflower Ave., Ste 100 Monro via, CA 91016 USA