

Evolion® 3.9 kWh

Installation and operation instruction sheet



1. Introduction

The Evolion® is a Li-ion battery system that includes large format Li-ion cells and necessary electronics for automatic interruptions or regulated operations when un-safe limit is exceeded and detected.

This sheet is a quick start guide. It describes how to install and operate the Evolion® in a legacy battery mode, i.e., with no RS485/Modbus communication connected. Within this sheet, the necessary tasks are noted with **Ev#s** and they are in order that they should be conducted. Use the Evolion® 3.9 kWh historical data sheet (included) for records. Make sure to read the Evolion® 3.9 kWh Installation and Operation User Manual (**UM**), the Evolion® 3.9 kWh Technical Manual (**TM**) and the Evolion® Toolbox Software User Manual (**CM**). Check with your local Saft Representative for more details.







2. Safety

Misusing the Evolion® may cause an event like cell venting, overheating or igniting.

- **Read these instructions fully before installing and operating the Evolion®.**
- **Do not short-circuit the power terminals.**
- **Do not reverse connect the power cables to the charger.**
- **Do not disassemble the unit.**
- **Do not drop the unit.**
- **Do not immerse the unit.**
- **Do not expose the unit to fire or temperature higher than 80°C (176°F).**
- **Connect only to telecom power systems/rectifiers with a maximum rated output of 60 V.**
- **Refer to the Battery Information Sheet or BIS (included) for emergency response procedures and personal protective equipment in case of an abnormal event.**
- **If smoke is emitted from the module, stay clear of the smoke and evacuate the area immediately.**
- **For normal handling and operation according to this installation and operation sheet, no personal protective equipment is required.**

3. Tools

These tools are needed and are not provided.

Tool	Use
	Voltage and fuse continuity
	Front cover removal/replacement
	Grounding point screw
	Power and fuse terminals
	External case notations
	BMST reset button

4. Unpacking and Inspection

The Evolion® is packaged in accordance with UN3480 Class 9 Group 2. See Figure 1 for lifting instructions.

Ev1	Check that all items are received.	Table 1
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If items were not received or if anything was damaged do not install the module and contact your local Saft representative.

Ev2	Study Evolion® features.	Figure 3
Ev3	Check the state after receiving and before storage or installation.	Figure 1 Figure 4 Table 2

Always keep the Evolion® module and its kit in its original packaging, together.

5. Storage

Store the battery in its original packaging.

- 15°C to 35°C (59°F to 95°F).
- No direct sunlight, rain or flooding
- Up to 1 year without refreshing charge

Ev4	After 6 months, check the state once per month in storage.	Table 2 Figure 4
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IMPORTANT: Never leave the Evolion® ON when it is not in use. The internal electronics will self-discharge the cells to a low voltage alarm level which may render the module un-usable.

6. Transportation

Follow the necessary transportation rules for Li-ion batteries by consulting with your company's standard practice and your local transportation regulations.

- Use the original packaging or equivalent.
- Secure the Evolion® in place
- The Evolion® must be OFF.

7. Installation

Before installing, make sure the right number of Evolion® you will connect to one bus is properly sized. Consult with your local Saft Representative or consult with the Evolion® **TM**.

Ev5	Size the proper number of Evolion® to connect to one bus.	Evolion® TM
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Before installing, double check the state of each Evolion®.

Ev6	Check for a maximum of 2 V difference allowed between modules that will operate on the same bus.	Figure 1 Figure 4
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If modules have more than 2 V difference equalizing the Evolion® modules is necessary, refer to the Evolion® **UM**.

Ev7	For modules that will operate on the same bus, set each with a unique Node ID, manually between 1 to 4 or using the Evolion® Toolbox Software.	Figure 6 (manual) or Evolion® CM (software)
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The Evolion® can be installed and operated in Network Telecommunication Facilities including un-manned OSP. The Evolion® can be placed on shelves or in battery compartments with the following characteristics.

- IP54 (NEMA3) or higher
- -40°C to 75°C (-40°F to 167°F)
- 95% RH max. (non-condensing)
- Up to 3000 meters (9843 feet)
- No blocking the heat sink and vent ports
- Right side up or sideways

Ev8	Connect the Evolion® modules.	Figure 8 Figure 9
Ev9	Power ON	Figure 10

8. Operation/Maintenance

The Evolion® provides un-interrupted standby power anytime the AC power supply is OFF. Continue trouble free operation in accordance with these instructions.

The Evolion® requires no maintenance, but periodically checking it during other site routines is recommended.

- LED state (Table 3 and 9. Troubleshooting)
- SOC and SOH (Table 2)
- Heat sink area un-obstructed
- Clean any excessive dirt build-up using a nonmetallic brush or a dry or damp cloth.
- Do not use any cleaning solvents or soaps.
- Do not immerse, bathe or hose off the Evolion®.

9. Troubleshooting

When the Evolion® is in service, observe the LED's. See Table 3 for operation LED state.

LED state	Refer to
D	Evolion® TM , Appendix E
E	Evolion® TM , Appendix E; Figure 11 IMPORTANT: The Evolion® must be re-charged within 2 weeks after Alarm #36 was activated or the module may be rendered useless.
G	Figure 11

Figure 1. Lifting

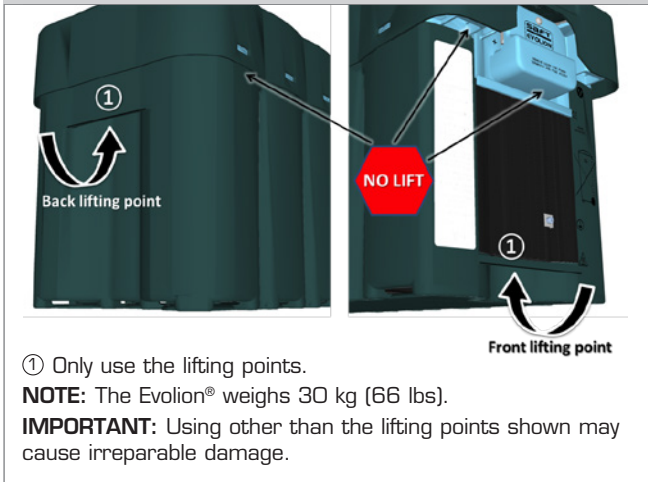


Table 1. Included with the Evolion® kit, 782674 [-11]

P/N	Description	Qty	Illustration
782672- XX (Note 1)	Evolion® 3.9 kWh module	1	
781081	Fuse, replaceable, spare	1	
772516 (Note 2)	Power cable, 8 GA., 1/4" ring lugs, positive, 1 meter	1	
772517 (Note 2)	Power cable, 8 GA., 1/4" ring lugs, negative, 1 meter	1	
772518	Comm. cable, RJ45 male (x2), 1 meter	1	
773455	Resistor cap, RJ45 male	1	

Note 1: The kit variant is indicated by the "-XX". The standard kit is shown in Table 1 is the -11 variant.

Note 2: The power cable assembly and part number may vary based on the kit variant.

Table 2. SOC/SOH LED legend (after pushing button)

#	LED state	SOC (Push < 3 sec.) (LED's steady)	SOH (Push ≥ 3 sec.) (LED's flashing)
1		< 25% SOC charge is necessary	< 25% SOH < 77% Ah avail.
2		≥ 25% SOC Store (7 months) or operate	≥ 25% SOH ≥ 77% Ah avail.
3		≥ 50% SOC Store (13 months) or operate	≥ 50% SOH ≥ 85% Ah avail.
4		≥ 75% SOC Store (20 months) or operate	≥ 75% SOH ≥ 92% Ah avail.

Table 3. Operating LED legend (no push button)

#	LED state	Description
A	 slow blink (0.6 seconds)	Floating or Forbidden Charge Mode (warning alarm #11)
B	 fast blink (0.1 seconds)	Charging in fast charge mode or regulated charge mode
C	 steady	Discharging
D	 [Note 1] steady	Warning alarm (continues normal operation), See 9. Troubleshooting
E	 [Note 1] steady	Major alarm (disconnected), See 9. Troubleshooting
F	 slow blink (0.6 seconds)	Bootloader mode (only when used with Evolion® Toolbox Software)
G		Sleep or OFF

Note 1: To diagnose the alarms, use the Evolion® Toolbox Software available in the Evolion® Communication Kit (772309)

Figure 3. Evolion® features

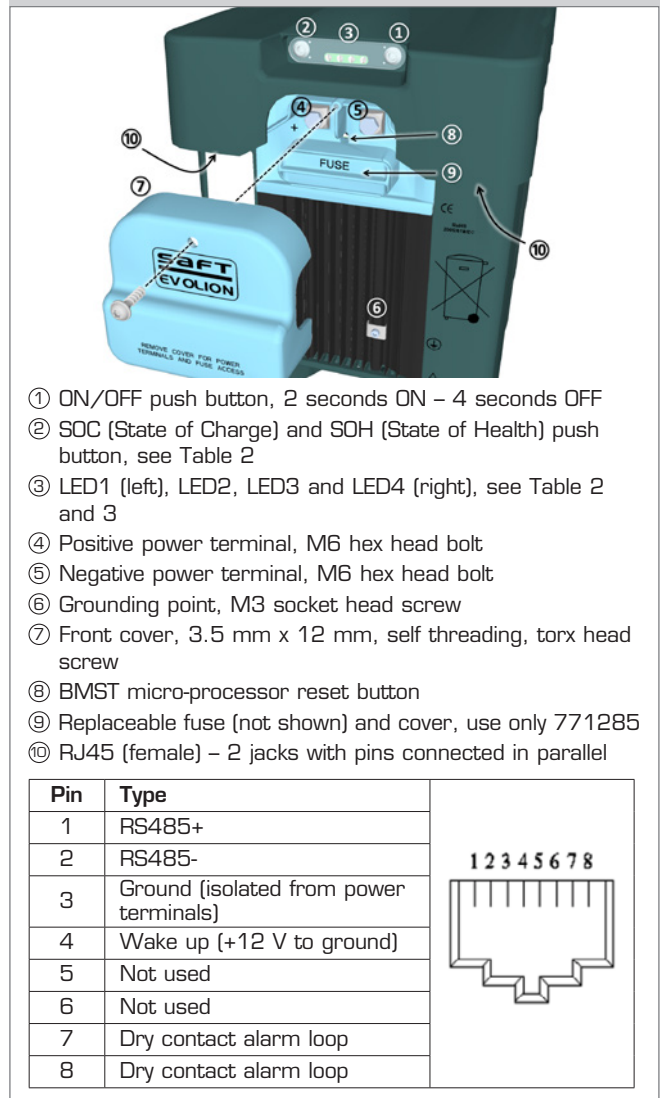


Figure 4. Checking the State

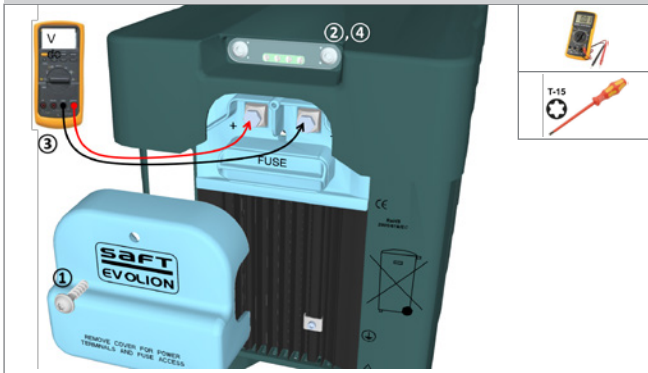


Figure 4 Steps (refer to illustration and tools)

- ① Press ON/OFF button for 2 seconds and allow the self-test to complete. Record the Operating LED state (see Table 3).
 - CAUTION:** When ON, the battery voltage is connected to the power terminals.
 - ② Press the SOC/SOH button (See Table 2).
 - ③ Observe and note the LED state for SOC and SOH (See Table 2).
 - ④ Remove cover and measure and note the terminal voltage. Replace cover.
 - ⑤ Press ON/OFF button for 4 seconds to turn OFF the Evolion®.
- The Evolion® is now ready for continued storage or service.

Figure 5. Refreshing charge

Figure 5 Steps

- ① Connect the power terminals to a telecom rectifier according to Figure 8.
- NOTE:** If the voltage is within 0.5 V between the modules, paralleling and charging more than one module is OK. See Figure 4 to check module voltage.
- ② Before applying power, set the rectifier output voltage according to the Table F5 and the maximum output current to 21 Amps per Evolion®.
- ③ Power ON and start charging according to Figure 10.
- ④ Continue charging for the minimum amount of time according to Table F5.
- ⑤ Turn OFF the rectifier output power and then turn OFF the Evolion®.

The Evolion® is now ready for continued storage or service.

Table F5. Charging guide

To set %SOC	Max. V set-point	Chg hours (Note 1)
45% (1 year more storage)	50.5 V \pm 1.0%	2.5
100% (to put in service)	56.0 V \pm 1.0%	4.5

Note 1: Based on 21 Amps per Evolion® and 0% SOC at the start of charge.

Figure 6. Manual Node ID setting (ID # from 1 to 4)



Figure 6 Steps (refer to illustration and tools)

CAUTION: Make sure to disconnect the power cables before conducting these steps.

- ① Turn OFF the Evolion®
- ② Press and hold the SOC/SOH button and ON/OFF button simultaneously for 2 seconds.
- ③ The current Node ID will be displayed. See Table F6.
- ④ To change the Node ID, press the SOC/SOH button until the LED indicates a Node ID between 1 and 4. See Table F6.
- ⑤ Press the ON/OFF button for 4 seconds to turn OFF; the new Node ID is now set.
- ⑥ Scribe the Node ID on the outside in a visible location.

Table F6. Node ID#

LED				ID#
LED1	LED2	LED3	LED4	1
Yellow	Off	Off	Off	
LED1	LED2	LED3	LED4	2
Off	Green	Off	Off	
LED1	LED2	LED3	LED4	3
Off	Off	Green	Off	
LED1	LED2	LED3	LED4	4
Off	Off	Off	Green	
LED1	LED2	LED3	LED4	> 4 (Note 1)
Yellow	Green	Green	Green	

Note 1: To set a Node ID higher than 4, use the Evolion® Toolbox Software.

The Evolion® is now ready for continued storage or service.

Figure 8. Connections

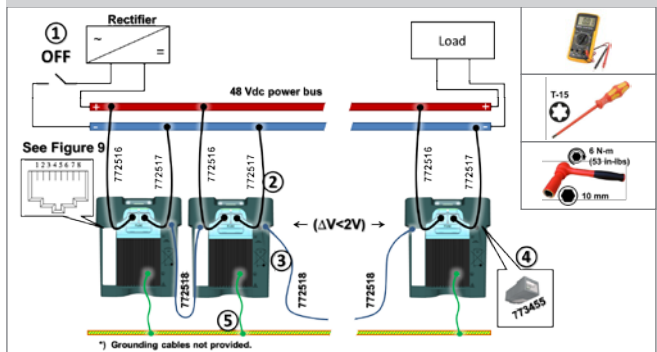


Figure 8 Steps (refer to illustration and tools)

CAUTION: Do not conduct these steps if any Evolion® has more than 2 V difference. The fuse or power board may be overloaded.

IMPORTANT: Make sure all Evolion® modules are OFF before starting.

- ① Make sure the rectifier battery output breakers are open or disconnected so the power bus is not live with power.
- IMPORTANT:** Never turn the Evolion® ON using the ON/OFF button once the power cables are connected to the power bus to avoid breaking a fuse due to pre-charging a capacitor.
- IMPORTANT:** Never connect the Evolion® in series.
- ② Remove the front cover and connect all the Evolion® power cables provided (772516, 772517). Replace the front cover after torquing the terminals.
- NOTE:** The recommended terminal torque is 6 N-m (53 in-lbs) unless otherwise noted on the Evolion®.
- NOTE:** Either power terminal can connect and operate on a Common Bonding Network (CBN) or an Isolated Bonding Network (IBN).
- ③ Connect all communication cables provided (772518) between each Evolion®.
- ④ Connect the RJ45 resistor cap provided (773455).
- ⑤ Connect all grounding points on the heat sink face.

NOTE: It is not necessary to ground the heat sink face to function.

The Evolion® modules are now ready to connect communication according to Figure 9 and Power ON according to Figure 10.

SHUTDOWN procedure:

- a) Open the output breaker (1)
- b) Turn OFF each Evolion® using the ON/OFF button.
- c) Disconnect cables.

Figure 9. Connecting Communication to the Application

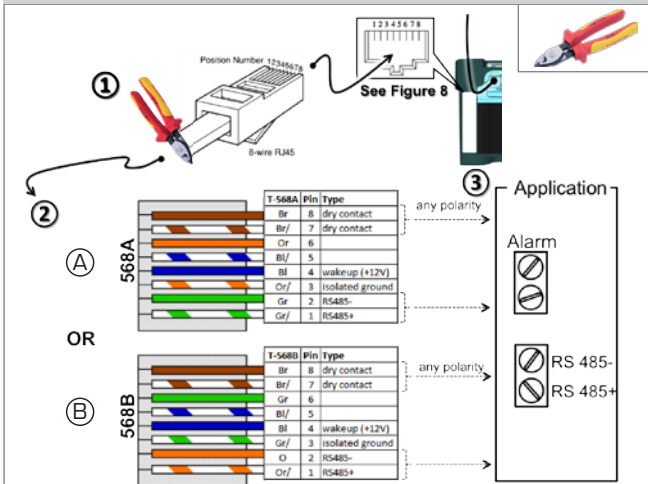


Figure 9 Steps (refer to illustration and tools)

- ① Prepare a communication cable to connect to the application.
- ② Color match the pins according to 568A or 568B cable.
- ③ Connect the prepared cable ends to the application.

The Evolion® is now ready for communication and Figure 10.

Figure 10. Powering ON

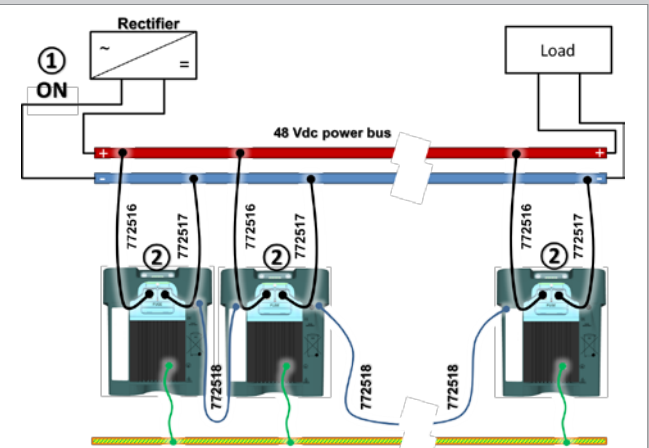


Figure 10 Steps (refer to illustration and tools)

Make sure the AC power is ON and the rectifier controller is operating normally.

Make sure the Evolion® modules are turned OFF.

- ① Turn ON the rectifier output power. The Evolion® modules will automatically wake up and begin charging after a few seconds.

- ② Observe the LED's (see Table 3).

The Evolion® is now in service.

Table 5. Rectifier settings

IMPORTANT: These settings are necessary in order to avoid rendering the Evolion® unusable and requiring a site intervention.

#	Type	Value
a.	Single level charge voltage	56.0 V \pm 0.5% (all charge operations) (Note 1)
b.	Temp. Comp. V. (TCV)	Turned OFF or Disabled
c.	Max. re-charge current	See Table 6
d.	Ramp in voltage	Longest setting up to 3 minutes
e.	Default rectifier voltage	42 V to 46 V
f.	Low Voltage Disconnect	45 V (\leq 12 in parallel) 46 V ($>$ 12 in parallel)

Note 1: The Evolion® operates normally between 49.5 V to 56.0 V. The highest %SOC is reduced by 10% for each 1 V below 56.0 V.

Table 6. Maximum Re-charge Current Settings

Duty		Max. per Evolion® (Note 1)
To avoid overheating	4x cycles per day or more	16 A
	3x to 4x cycles per day	21 A
	2x to 3x cycles per day	24 A
	1x to 2x cycles per day	32 A
To avoid charge regulated mode	1x cycle per day or less	21 A

Note 1: Make sure to always operate at less than 0.85xIMR or less to avoid charge regulated mode (see Evolion® TM).

Figure 11. Fuse Check/Replace and BMST reset

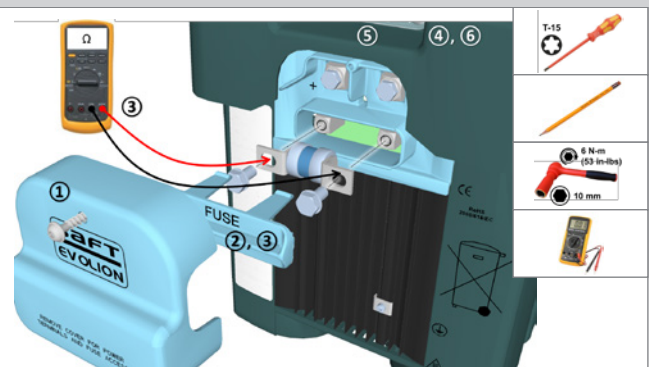


Figure 11 Steps (refer to illustration and tools)

CAUTION: Make sure the Evolion® is OFF and disconnected before conducting these steps.

- ① Remove the front cover.
- ② Remove the fuse cover.
- ③ Check the fuse continuity (close to zero ohms = good fuse); replace fuse (781081) as necessary. Replace fuse cover
- ④ Turn ON the Evolion®
- ⑤ Check LED state (Table 3) and push BMST reset button as necessary to clear alarms.
- ⑥ Turn OFF the Evolion®.

The Evolion® is now ready for storage or service.

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SAFT

Evolion® 3.9 kWh

Historical Data Sheet



Module Label:

P/N	S/N	Manufacturing Date	Software Version	Parameters Version

Receiving and Storage:

Ev1: All items received (Table 1)?

Ev3: Use Figure 4 and log the following information:

Month	Date	Op. LED state (Table 3)	Terminal Voltage (xx.x)	SOC LED state (Table 2)	SOH LED state (Table 2)
	1				
	2				
	3				
	4				
	5				
	6				
	7				
	8				
	9				
	10				
	11				
	12				

Installation Checklist:

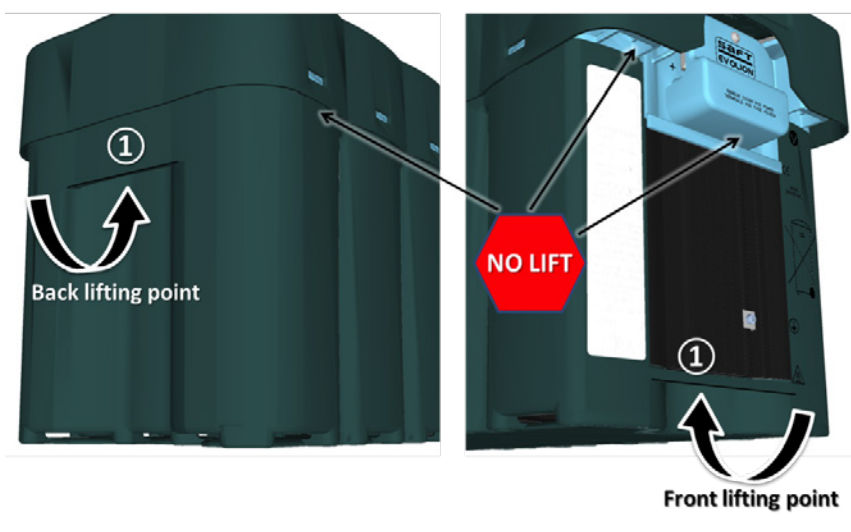
Ev5: Sizing is correct?	Ev6: $\Delta V \leq 2V^a$?	Ev7: Node ID# set?	Ev8: Terminal torque OK?	Ev9: Op. LED's state ^b ?	Installation Date
		#			

^a This check is required if more than one Evolion® will be installed and operated on one bus.
^b See Table 3

INSTALLATION NOTES:

Date	Initials	Node ID# ^a	RS_speed ^b	Factorized IMR ^b	Parameter (btr) ^b	BMST upgrade ^b

^a See Figure 6 or use the Evolion® Toolbox Software.
^b Use the Evolion® Toolbox Software.



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