

# Tel.X-Plus Ni-Cd Batteries

## TLX+80, 100, 150, and 180 Range (48VDC, 40 cell string) Installation and operating instructions



### 1 Safety

- Never allow an exposed flame or spark near the batteries, particularly while charging.
- Never smoke while performing any operation on the battery.
- Wear appropriate personal protection equipment (PPE), safety shoes, gloves, and eye protection. Additional PPE (i.e. aprons, face shield) may be required in case of accidental ruptured module and exposed electrolyte.
- The electrolyte is harmful to skin and eyes. In the event of contact with skin or eyes, wash immediately with plenty of water. If eyes are affected, flush with water for 15 minutes and obtain immediate medical attention.
- Remove all rings, watches, and other electrically conductive items before working on the battery.
- Use insulated tools.
- Avoid static electricity and take measures for protection against electric shocks.
- Discharge any possible static electricity from clothing and/or tools by touching an earth-connected part "ground" before working on the battery.

### 2 Important notice

- Only Saft trained and certified personnel should assemble and install Tel.X-Plus battery strings (contact your Saft representative).
- Local regulations related to battery compartment ventilation (e.g. Telcordia GR-487-CORE) should be carefully observed. **Saft will not be responsible for the non-observance of these regulations.**
- Refer to Saft's Installation and Operation manual for complete instructions.

### 3 Unpacking and inspection

Tel.X-Plus batteries are shipped filled with electrolyte, a connection kit, and supportive documentation.

- Make sure all items are received by checking the material list included on each string layout sheet.
- Check for damage or electrolyte spillage. Report any abnormalities to the shipping company as well as to Saft.

### 4 Storage

Store the batteries in standard warehouse conditions.

- Do not stack modules. Use original packaging for storage. Do not stack boxes more than 3 high.
- Do not store in direct sunlight or expose to excessive heat.
- Store the batteries in a temperature range of -20°C (-4°F) to +35°C (+95°F).
- **Tel.X-Plus batteries may be stored for up to one year without special maintenance.**

- If **fully charged**, the battery strings should not be stored for more than **2 months** (if long storage is required, discharge the string to 10% state of charge).

### 5 Preparation for transportation

- Make use of original packing cases if possible. Otherwise, protect the batteries from being damaged and short-circuited.
- **Transport batteries upright** and secured to prevent tipping.
- For transportation over public roads, each box or pallet must carry a "hazardous material" label and any other indication required by local transport authorities (DOT classification; Batteries, Wet, Filled with Alkali, **Class 8, UN2795, PG III**).
- Safety Data Sheet (SDS) is provided with each shipment and is available online at [www.saftbatteries.com](http://www.saftbatteries.com).

### 6 Installation

#### 6.1 General

Tel.X-Plus batteries are delivered filled with electrolyte and at 10% State of Charge (SOC).

- **Do not top up batteries with DI water before**, during, or after initial installation.
- Charge the battery (according to chapter 6.6).

#### 6.2 Operating environment

- For tight spaces and to use a front accessible connection, make sure to install all back connections first, while blocks are staged outside.
- Tel.X-Plus should never be installed in a sealed space without ventilation. Refer to Table A for ventilation guidelines.
- To prevent inadvertent short circuit, make sure the connector ends are insulated.

#### 6.3 Recommended tools

The following tools will facilitate installation:

- Insulated torque wrench capable of 10±1N.m (9± 9in.lbs).
- Insulated 10mm socket
- Digital Multi Meter (DMM), with an accuracy of +/-10mVDC.
- Clamp-on current meter, with an accuracy of ±25mA.

#### 6.4 String assembly

Battery configurations vary depending on the application. A battery string layout is provided with each string. The step by step procedures may vary with application and layout.

- Measuring the cell Open Circuit Voltage (OCV) is recommended to check for normal cell condition (according to chapter 8). Before installation, measure the OCV of each battery cell and note the values (refer to Table B for record keeping). The sum of the individual cell voltages will be used to compare with the assembled battery string voltage.

- Temporarily position the battery modules in final position in accordance with the provided layout diagram. Make sure to orient the positive and negative terminals correctly (when applicable place barcode bearing block on the (+) end of the battery string).
  - Use only the parts provided.
  - Use "labels numerical" provided to identify each cell of the battery string. Starting with battery string positive end as cell number one, subsequently serialize the cells following the electrical path resulting in numbering battery string negative end cell as #40.
  - Apply a light coat of No-Ox (provided) to all terminal connections made before and after applying torque.
  - When making an electrical connection, torque the terminal bolts to 10±1N.m (9±9in.lbs).
  - Install all back connections first while blocks are staged outside.
  - After completing terminal connections, install the battery top cover(s) (if applicable).
  - To prevent inadvertent short circuit, make sure the connectors' exposed ends are insulated.
  - The modules can then be slid into place and all front connections, back-to-front connections can be made.
  - At this stage, **DO NOT connect the system's power cables.**
- #### 6.5 Connecting power
- Measure the battery string's overall voltage and compare this with the sum of individual OCV's previously measured in chapter 6.4. If the compared value shows a discrepancy greater than 1.0VDC, verify the polarity, position, and connection of each module. Re-assemble if required.
  - If a battery needs to be connected to a live system, it may be necessary to pre-charge the battery prior to installation (to minimize the inrush current).
  - Ensure the output of the rectifier is adjusted to 1.43VDC per cell; i.e., the DC bus voltage should be set to **-57.2VDC** for a 40 cell Tel.X-Plus string.

- Disable rectifier Temperature Compensation Voltage (TCV) control. Tel.X-Plus complies with all Telcordia GR3020 requirements. The technology will not enter thermal runaway, even under abusive conditions (i.e. electrolyte dry out).
  - Affix label “-57.2VDC & TCV disabled” (provided) onto or near to Tel.X-Plus string and rectifier to inform that the float voltage has been set to -57.2VDC and the TCV has been disabled.
  - Using a DMM, verify the polarity of the power cables before connecting them to the battery. **DO NOT color match.**
  - Make sure that the cables are properly secured and supported.
  - Apply a light coat of No-Ox (provided) to the main power terminal connections before and after applying torque.
  - When making an electrical connection, torque the terminal bolts to 10±1N.m (96±9in.lbs).
- 6.6 Charging**
- Constant voltage charging is recommended and should be set to 1.43VDC (-57.2VDC per 40 cell string). Lower voltage setting will result in undercharge level, higher voltage setting to excessive electrolyte consumption.
  - In order to fully re-charge in 24 hours, the minimum current available for each battery string should be  $C_8/10$  (Table A). Charging at lower current than prescribed in Table A will result in longer charging time.
  - Disable rectifier TCV control (if equipped).

**Table A**

TLX+ Type	Nominal capacity C8 (Ah)	24hr Recharge current C <sub>8</sub> /10 (A)	Max Float Charging Current (mA)	Force Ventilation at 25°C / 77°F
80	75	7.5	380	0.1 m <sup>3</sup> /hr or 4 (ft <sup>3</sup> /hr)
100	97	9.7	490	
150	140	14.0	700	
180	172	17.2	870	

**7 Maintenance and Inspection**

**7.1 Watering**

Watering is not required over the operational life of the Tel.X-Plus.

**7.2 Cleaning**

It is good practice to visually inspect the string during periodic site visits. Vacuuming or dusting with a soft brush is adequate if the string is dirty. A wet rag may be used, but **do not use any detergent, chemicals, or cleaning aids. Do not use metal brushes.**

**7.3 Routine inspection**

- Confirm rectifier output voltage and make sure it is adjusted correctly (see chapter 6.6).
- **Re-torquing** the terminal bolts is **not required** (the hardware is constructed from nickel-plated steel, nickel-plated copper, and stainless steel, which are hard metals that remain stable over time and require no re-torquing maintenance).
- **Check the float charging current:**
  - Using a clamp-on current meter, measure the float current at either power cable.
  - The battery requires action only if the float current is **higher than 5mA per Ah** while float charging at 1.43VDC per cell (see Table A).
  - To confirm the battery was not recharging following a power outage and to prevent a false reading, **repeat** the float current measurement **after a week of float charge.**
  - If the float current remains at 5mA per Ah or higher, schedule the battery **replacement within the next 3 months.**

**8 Commissioning and troubleshooting**

Measure the cell **OCV** (use Table B for record keeping):

- Gain access to the cell terminals by removing the battery top cover(s).
- Using a DMM measure each cell. Cell voltage should be greater than or equal to 1.10VDC.
- **If a cell is below 1.10VDC, set the battery module aside and call Saft for further instructions.**

**Float charge voltage (V<sub>f</sub>) measurement** (use Table B for record keeping):

- Safely gain access to the cell terminals by removing the battery top cover(s). Precaution should be taken not to short circuit the battery terminals to conductive parts of the cabinet.
  - **While on float charge, measure each cell V<sub>f</sub> using a DMM.**
  - **Cells V<sub>f</sub> should be between V<sub>f</sub>-0.10VDC and V<sub>f</sub>+0.05VDC of each other. Contact Saft for further instructions if V<sub>f</sub> are beyond these specifications.**
  - **Battery block Ohmic value measurement is not required.**
- 9 Removal and recycling**
- Make sure appropriate packing materials are available.
  - Make sure each cell cap is installed to prevent spillage.
  - All local laws and regulations must be respected when removing, transporting and storing used batteries.
  - Contact your local Saft representative for instructions on recycling.

**Table B**

Date	/ /	/ /	/ /
Cell #	OCV (X.XX VDC)	Float voltage (X.XX VDC)	Float voltage (X.XX VDC)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			
String			
Min	___ (1.10)	___ (V <sub>f</sub> -0.10)	___ (V <sub>f</sub> -0.10)
Max	-	___ (V <sub>f</sub> +0.05)	___ (V <sub>f</sub> +0.05)



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Doc No: 22008-1219-2  
Edition: December 2019  
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