I&O Manual

Valen Envirox-cel Front Terminal Batteries

Version: 6.0

TO BE INSTALLED BY A SUITABLY QUALIFIED ELECTRICIAN ONLY

VALEN
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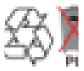
SECTION 1 SAFETY

CAUTION! Please read this manual immediately on receipt of battery before unpacking and installing. Failure to comply with these instructions will render any warranties null and void.

	Observe the written instructions.
	Do not smoke; avoid naked flames, sparks and other sources of ignition.
	Wear eye protection.
	Electrical hazard.
	Danger! Cells and monoblocs are heavy. Always use suitable handling equipment for transportation.
	Recycle scrap batteries. Contains lead.

1.1 Handling

VALEN FRONT TERMINAL ENVIROX-CEL Batteries are supplied in a charged state and must be unpacked carefully to avoid high currents and short circuit between terminals of opposite polarity. Use lifting hooks compatible with the plastic handles on the cell/monobloc.

1.2 Keep Flames Away

In case of accidental overcharge, a flammable gas can leak off the safety vent. Discharge any possible static electricity from clothes by touching a grounded conductive part.

1.3 Tools

Use tools with insulated handles. Do not place or drop metal objects on the battery. Remove all jewellery and articles of clothing with metal parts that may come into contact with the battery terminals.

SECTION 2 TRANSPORT

All VALEN FRONT TERMINAL ENVIROX-CEL Batteries are to be transported in an upright position. To avoid short circuits, the terminals have to be fully insulated. VALEN FRONT TERMINAL ENVIROX-CEL Batteries without any visible damage are not defined as dangerous goods if they are protected against short circuit, slipping, upsetting or damaging and packed in an upright, proper and secure condition onto pallets or in wooden boxes. In case of damaged battery containers, refer to National regulations (Dangerous Goods).

SECTION 3 UNPACKING & CLEANING

It is advised to unpack all the batteries and accessories before commencing to erect and not to unpack and erect cell by cell. All cells/units should be handled carefully, as the plastic contained can be damaged or broken if allowed to fall. Under no circumstances should they be lifted by their terminal pillars.
All items should be carefully checked against the accompanying advice notes to ascertain if any are missing and also inspected to see whether any are damaged or broken. Should this happen, please contact VALEN.
If unit cleaning is needed, use a damp cloth with water or a clean cotton or soft-tissue cloth moistened in clean water only. Never use sprays, chemicals, solvents or feather dusters.

SECTION 4 STORAGE

Store VALEN FRONT TERMINAL ENVIROX-CEL Batteries in a dry, clean and preferably cool location. As the batteries are supplied charged, storage time is limited. In order to easily charge the batteries after prolonged storage, it is advised not to store batteries for more than:

- 6 months at 20°C
- 3 months at 30°C
- 1.5 months at 40°C

A refreshing charge should be performed after this time at 2.27 to 2.29VPC as stated on the Product Specification sheet, at 20°C for 48 to 96 hours. A current limit is not essential, but for optimum charge efficiency the current output of the charger can be limited to 0.2 C10.
The necessity of a refreshing charge can also be determined by measuring the open circuit voltage of a stored battery. A refreshing charge is advised if the voltage drops below 2.10VPC. Failure to observe these conditions may result in greatly reduced capacity and service life.

SECTION 5 INSTALLATION

Install VALEN FRONT TERMINAL ENVIROX-CEL Batteries in a clean, dry and airy area. The VALEN FRONT TERMINAL ENVIROX-CEL Batteries release minimal amounts of gas during normal operation (gas recombination efficiency >98%). Batteries must be installed in accordance with this instruction.

5.1 Temperature

Avoid placing the VALEN FRONT TERMINAL ENVIROX-CEL Batteries in a hot location or in front of a window. The VALEN FRONT TERMINAL ENVIROX-CEL Battery will give the best performance and service life when working at a temperature between 20°C and 25°C. The maximum operating temperature range is between -10°C and +45°C.

5.2 Ventilation

Under normal conditions, gas release is very low and natural ventilation is sufficient. This enables the safe use of VALEN FRONT TERMINAL ENVIROX-CEL Batteries in offices and with electronic equipment. However, care must be taken to ensure adequate ventilation for cooling purposes. VALEN FRONT TERMINAL ENVIROX-CEL Batteries without a degassing system, must not be placed in closed cabinets.

5.3 Mounting

VALEN approved battery racks or cabinets are recommended when installing the cells. Assemble the rack according to instructions. Place the VALEN FRONT TERMINAL ENVIROX-CEL blocs or cells on the rack and arrange the positive and negative terminals for connection according to the wiring diagram. Adjust the positioning of the blocs to the air holes in the trays. Ensure a 10mm air gap between cells and cabinet walls for proper airflow. The space between the units is guaranteed by proper installation of the spacers and connectors provided by VALEN. Check that all contact surfaces are clean and apply the bloc or cell connectors and the terminal screws, only provided by VALEN. Use the provided grease to protect the terminals. Finally, connect the battery terminals and fix the connector covers.

5.4 Torque

Tighten the bolts to the recommended level of 7Nm. A loose connector can cause problems in the rectifier adjustment, low battery performance, possible damage to the battery and/or personal injury. Overtightened bolts can cause battery damage.

SECTION 6 CONNECTING STRINGS IN PARALLEL

To increase VALEN FRONT TERMINAL ENVIROX-CEL Battery capacity, parallel connection is possible, if the strings consist of blocs with the same type and capacity. Using constant voltage IU chargers and ensuring that the connections made between the charger and the batteries have the same electrical resistance. No special arrangements have to be made for batteries in parallel, provided that each string is equipped with a circuit breaker or fuse.

SECTION 7 APPLICATIONS

7.1 Operation at Continuous Float

VALEN FRONT TERMINAL ENVIROX-CEL Batteries are designed for continuous float operation on constant voltage IU chargers in the operating conditions of reliable grid, stable ambient temperature, compensation to float voltage for any temperature fluctuation in the ambient temperature and no or very little cyclic use.

7.2 Operation in Unstable Grid (Cyclic)

VALEN FRONT TERMINAL ENVIROX-CEL Batteries could be used also in not sufficiently reliable grid and ambient temperature. In this case, the number of cycles and depth of discharge shall be on mean level. Anyway at a partial state of charge operation of the VALEN FRONT TERMINAL ENVIROX-CEL Batteries should be carefully monitored.

SECTION 8 CHARGING

8.1 Commissioning Charge

Before use, the VALEN FRONT TERMINAL ENVIROX-CEL Batteries should be charged at a constant charging voltage (with a charging current limited to 0.1 C10) with one of the following methods:

- Charge during 96 hours with the floating voltage between 2.27 and 2.29VPC as stated on the Product Specification sheet in ambient temperature range 20°C to 25°C.
- Boost charge with the 2.40VPC at 20°C boost charge voltage during 24 hours to reduce the commissioning charging period (the battery will then be switched over to float charging, maintain the battery under floating voltage for 24 hours before any discharge test).

If the battery has to be subjected to a discharge test, in this case, the test will be performed imperatively after the commissioning charge has been carried out. Check that the battery is fully charged.

8.2 Float Voltage

The recommended float charge voltage is between 2.27 and 2.29VPC ± 0.5% at 20°C. Usually after 6 months continuous charge at the recommended float voltage, individual cell voltages will stabilize within ± 5% of the mean applied voltage. However, individual cell voltage values outside the above tolerance may be observed without negative effect.

When the average ambient temperature deviates more than ± 5°C from the reference temperature (20°C), it is necessary to adjust the float voltage as follows

Temperature °C	Float Voltage range VPC	Boost Voltage range VPC
-10	2.36-2.38	2.500-2.575
0	2.33-2.35	2.475-2.500
10	2.30-2.32	2.450-2.475
20	2.27-2.29	2.400-2.425
25	2.25-2.27	2.375-2.400
30	2.24-2.26	2.350-2.375
35	2.22-2.24	2.325-2.350
≥40	2.21-2.23	2.300-2.325

Automatic temperature compensation of float voltage requires periodic inspection. For chargers with temperature sensor, temperature correction for float charge must be 3mV/cell/°C, for boost charge 4mV/cell/°C.

8.3 Charging Current

A discharged VRLA battery will accept a high recharge current, but for those seeking a more economical charging system a current limit of 0.1 C10 is adequate. The VALEN FRONT TERMINAL ENVIROX-CEL Batteries accept, without damage, large charging currents so that only under high battery temperature conditions (T>25°C) a current limitation to 0.25 C10 is recommended.

8.4 Fast Recharge

Increasing the charge voltage to 2.40VPC at 20°C with a current limited to 0.1 C10 can reduce recharge times. Fast charge should be stopped after approx. 12 hours. This charge regime, in order to achieve a normal service life, must not be used more than once per month.

8.5 Float Charge Ripple

Excessive ripple on the DC supply across a battery has the effect of reducing life and making performance poorer.

The superimposed AC current left should not exceed a value of 5A AC (rms) per 100Ah C10 cell capacity during float charge and 10A AC (rms) per 100Ah C10 during boost charge.

8.6 State of Charge (SOC)

The battery state of charge can be determined approx. by measuring the open circuit voltage (OCV) after the battery has been at rest for a minimum of 24 hours at 20°C.

OC VPC	SOC
2.14	100%
2.10	80%
2.07	60%
2.04	40%
2.02	20%

Open circuit voltage variation with temperature is 2.5mVPC per 10°C.

SECTION 9 DISCHARGING

The VRLA cells and monoblocs must not be left in a discharged condition after supplying the load, but must immediately return to float recharge mode.

Failure to observe these conditions may result in greatly reduced service life.

9.1 Accidental Deep Discharging

For optimum operation results the minimum discharge voltage should be related to the duty as follows

Duration of Discharge	Recommended End Voltage VPC
5 min ≤ t ≤ 1h	1.65
1h ≤ t ≤ 5h	1.70
5h ≤ t ≤ 8h	1.75
8h ≤ t ≤ 12h	1.80
12h ≤ t ≤ 20h	1.85

In order to protect the battery it is advisable to have system monitoring and low voltage cut-out. Deep discharge will produce a premature deterioration of the battery and a noticeable reduction in the life expectancy of the battery.

9.2 The Effect of Temperature

9.2.1 Battery Capacity

Correction factors of the capacity, according to the temperature, are as follows:

Discharge Time	5 to 59 min	1h to 24h
-10°C	0.66	0.75
0°C	0.77	0.83
10°C	0.87	0.91
20°C	0.96	0.97
25°C	1	1
30°C	1.02	1.02
40°C	1.06	1.04
45°C	1.07	1.05

9.2.2 Battery Life

Operation of valve regulated batteries at temperatures higher than 20°C will reduce their expected life. Life is reduced by 50% for every 10°C rise in temperature.

SECTION 10 MONITORING & MAINTENANCE

VALEN FRONT TERMINAL ENVIROX-CEL Batteries are maintenance free, sealed, lead acid batteries and need no additional water.
The containers and lids should be kept dry and free from dust. Cleaning must be done only with a damp cotton cloth without man-made fibres.

WARNING! Do NOT use any type of oil, solvent, detergent, petroleum-based solvent or ammonia solution to clean the battery containers or lids. These materials will cause permanent damage to the battery container and lid and will invalidate the warranty.
Check monthly that the total voltage at battery terminals is (N x 2.27 to 2.29VPC) for a temperature at 20°C. (N being the number of cells in the battery string). Make annual readings of the voltages of cells making up the string.
Keep a logbook to record values, power outages, discharge tests, etc.

SECTION 11 TECHNICAL DATA WHEN CHARGING WITH A CONSTANT VOLTAGE

If the charger does not permit an adjustment of the float voltage in relation with the temperature, it is possible to set a float voltage value and a recharging voltage value according to the temperature ranges as indicated in the table below:

Temperature	Float Voltage	Recharging Voltage
0°C to 10°C	2.33VPC	2.45VPC
10°C to 20°C	2.30VPC	2.40VPC
20°C to 30°C	2.27VPC	2.35VPC
30°C to 40°C	2.24VPC	2.30VPC

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VALEN ENVIRO-XCEL BATTERY REPORT

Installed By:		Representative	
Operating Company		Date:	Time:
Battery Information			
Type of Battery:		№ of Cells/String:	String Float Voltage:
Installation Date:		№ of Strings/Battery:	
Battery Charge Current:		Battery Code:	Float Current:
Charging Equipment:		Ambient Temp.:	Bloc Temp.:
Battery Charger Information			
Make:		Type:	Current Rating:
Model:		Year of Mfg.	Charging Voltage

INDIVIDUAL CELL READINGS

Cell №	Cell ID	Float Volts	Cell №	Cell ID	Float Volts	Cell №	Cell ID	Float Volts	Cell №	Cell ID	Float Volts	Cell №	Cell ID	Float Volts
1			26			51			76			101		
2			27			52			77			102		
3			28			53			78			103		
4			29			54			79			104		
5			30			55			80			105		
6			31			56			81			106		
7			32			57			82			107		
8			33			58			83			108		
9			34			59			84			109		
10			35			60			85			110		
11			36			61			86			111		
12			37			62			87			112		
13			38			63			88			113		
14			39			64			89			114		
15			40			65			90			115		
16			41			66			91			116		
17			42			67			92			117		
18			43			68			93			118		
19			44			69			94			119		
20			45			70			95			120		
21			46			71			96			121		
22			47			72			97			122		
23			48			73			98			123		
24			49			74			99			124		
25			50			75			100			125		

Remarks and Recommendations:
Signed:

VALEN ENVIRO-XCEL MAINTENANCE REGISTER

Date	Maintenance Description

VALEN Power | Powering Potential

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