

Motive power batteries for small traction, valve regulated lead acid (VRLA) battery XFC FLEX series: TPPL (Thin Plate Pure Lead) technology

Rating Data












- 1. Nominal capacity C₅ : see type plate
- 2. Nominal voltage : see type plate
- 3. Discharge current : C₅/5h
- 4. Rated temperature : 30°C

Batteries XFC FLEX series are valve-regulated lead-acid batteries. Unlike conventional batteries with liquid electrolyte these batteries have immobilised electrolyte. Instead of a vent plug, a valve is used to regulate the internal gas pressure, preventing the ingress of oxygen from the air and allowing the escape of excess charging gasses should an overcharged condition occur. When operating valve-regulated lead-acid batteries the same safety requirements as for vented batteries apply, to protect against hazards from electric current, from explosion of electrolytic gas and - with some limitations - from the corrosive electrolyte.

Battery valves should never be removed. These batteries do not require topping – up with distilled or demineralised water

Flexible connectors must be used for all monobloc connections. EnerSys approved fasteners must be used.

SAFETY PRECAUTIONS

	<ul style="list-style-type: none"> • Pay attention to the operating instructions and keep them close to the battery. • Work on batteries must only be carried out by skilled personnel! 		<ul style="list-style-type: none"> • Risk of explosion and fire • Avoid short circuits: do not use non-insulated tools, do not place or drop metal objects on top of the battery. Remove rings, wristwatches and articles of clothing with metal parts that might come into contact with the battery terminals.
	<ul style="list-style-type: none"> • Use protective glasses and wear safety clothing when working on batteries. • Adhere to the current accident prevention rules in the country where the battery is used or EN 50272-3, EN 50110-1. 		<ul style="list-style-type: none"> • Electrolyte is highly corrosive. • In the normal operation of this battery a contact with acid isn't possible. If the cell containers are damaged, the immobilised electrolyte (absorbed in the separator) is corrosive like the liquid electrolyte.
	<ul style="list-style-type: none"> • Keep children away from batteries! 		<ul style="list-style-type: none"> • Batteries and monoblocs are heavy. Ensure secure installation! Use only suitable handling equipment. • Lifting hooks must not damage the blocs, connectors or cables.
	<ul style="list-style-type: none"> • No smoking! • Do not expose batteries to naked flames, glowing embers or sparks, as it may cause the battery to explode • Avoid sparks from cables or electrical apparatus as well as electrostatic discharges. 		<ul style="list-style-type: none"> • Do not place batteries in direct sunlight without protection. Discharged batteries can freeze. For that reason, always store in a frost-free zone.
	<ul style="list-style-type: none"> • Acid splashes into the eyes or on the skin must be washed immediately with an abundance of clean water. After abundant flushing consult a doctor immediately! • Clothing contaminated by acid should be washed in water. 		<ul style="list-style-type: none"> • Dangerous electrical voltage! • Avoid short circuits: XFC FLEX batteries are capable of high short circuit currents. • Caution - metal parts of the battery are always live: do not place tools or other objects on the battery!
			<ul style="list-style-type: none"> • Pay attention to the hazards that can be caused by batteries

Ignoring the operating instructions, and repair with non-original parts will render the warranty void. All failures, malfunctions or defaults of the battery, the charger or any other accessories, must be notified to our After Sales Service immediately.

1. Commissioning

The XFC FLEX batteries are supplied in a charged condition. The battery should be inspected to ensure it is in perfect physical condition.

Check:

1. The battery cleanliness. Before installing, the battery compartment has to be cleaned.
2. The battery end cables have a good contact to terminals and the polarity is correct. Otherwise the battery, vehicle or charger could be damaged.

Use special coding systems for maintenance free batteries for the charging plug- and- socket devices to prevent accidental connection to the wrong type of charger. Never directly connect an electrical appliance (for example: warning beacon) to a part of the battery. This could lead to an imbalance of the cells during the recharge, i.e. a loss of capacity, the risk of insufficient discharge time, damage to the cells and voids

THE BATTERY WARRANTY

Charge the battery (see 2.2) before commissioning. Only blocs with the same state of discharge should be connected together.

The specified torque loading for the bolts/screws of the end cables and connectors are detailed in the table below:

Monobloc Type	Terminal torque [Nm]		Terminal torque [Nm]	
	Standard	Terminal	Terminal	Adapter
12XFC25 12XFC35 12XFC48	M6 Female	6.8 Nm	SAE	6.8 Nm
12XFC60	M6 Female	6.8 Nm	SAE	6.8 Nm
12XFC58 12XFC82	M8 Female	9.0 Nm	not applicable	not applicable
12XFC158 12XFC177	M8 Female	9.0 Nm	M6 Front Terminal	9.0 Nm

2. Operation

EN 50272-3 "Traction batteries for industrial trucks" is the standard which applies. The nominal operating temperature is 30°C. The optimum lifetime of the battery depends on the operating conditions (temperature and depth of discharge). The ambient temperature range of use for the battery is between +10°C and +35°C, any use outside of this range must be approved by the EnerSys Technical department. Optimal battery life is obtained with the battery at a temperature of 25-30°C. Higher temperatures shorten the life of the battery (according to IEC1431 technical report), lower temperatures reduce the available capacity. The upper temperature limit is 35°C and batteries should not be operated above this temperature. The capacity of the battery changes with temperature and falls considerably under 0°C. The optimum lifetime of the battery depends on the operating conditions (moderate temperature and discharges equal to or lower than 80% of the nominal capacity C_N). The battery obtains its full capacity after about 3 charging and discharging cycles.

2.1 Discharging

The valves on the top of the battery must not be sealed or covered. Electrical connections (e.g. plugs) must only be made or broken in the open circuit condition. Discharges over 80% of the rated capacity are categorised as deep discharges and are not acceptable as they reduce considerably the life expectancy of the battery. Discharged batteries **MUST** be recharged immediately and **MUST** not be left in a discharged condition.

Note: The following statement only applies to partially discharged batteries.

Discharged batteries can freeze. Limit the discharge to a maximum of 80% DOD. The cycle life of the battery will depend on the DOD, the higher the DOD, the shorter the cycle life. The presence of a discharge limiter on the vehicle is imperative. The following energy cut-off settings must be used:

- 60% DOD set at 1.93 Volts per cell.
- 80% DOD set at 1.88 Volts per cell.

when discharged with currents in the range of I_1 to I_2 . At lower currents please seek advice from the EnerSys Application Engineering Authority.

2.2 Charging

XFC FLEX batteries must be charged using an approved specified EnerSys XFC FLEX charger. An approved charger **MUST** be used on these batteries; failure to do so will affect the performance and life of the battery and invalidate any warranty. The specific charging profile developed for recharging the XFC FLEX batteries allows a rapid recharge in 3 hours from 60% DOD and opportunity charging as often as needed without damaging the batteries. The XFC FLEX batteries have an extremely low gas emission. Nevertheless, provision must be made for venting of the charging gases. Doors, battery container lids and the covers of battery compartments must be opened or removed. With the charger switched off, connect the battery to the charger, ensuring that the polarity is correct. (Positive to positive, negative to negative). Now switch the charger ON.

2.3 Equalising Charge

Equalising charge is not necessary for this technology of battery.

3. Maintenance

The electrolyte is immobilised. The density of the electrolyte can not be measured. Never remove the safety valves from the monobloc. In case of accidental damage to the valve, contact our After Sales Service for replacement.

3.1 Daily

- Recharge the battery after every discharge.
- Check the condition of the plugs, cables and that all insulation covers are in place and in good condition.

3.2 Weekly

- Visual inspection for signs of dirt and mechanical damage to all component parts of the battery, pay particular attention to the battery charging plugs and cables.

3.3 Quarterly

At the end of the charge, carry out end of charge voltage readings, measure and record:

- The voltage of the complete battery
- The voltage of each monobloc

If significant changes from earlier measurements or differences between the monoblocs are found, please contact our Service

Department.

If the discharge time of the battery is not sufficient, check:

- That the required work is compatible with the battery capacity
- The settings of the charger
- The settings of the discharge limiter on the vehicle.

3.4 Annually

Internal dust removal from the charger. Electrical connections: test all connections (sockets, cables, and contacts). Monoblocs having terminals with insert: Check the torque loading of the bolts/screws. In accordance with EN 1175-1 at least once per year, the insulation resistance of the truck and the battery must be checked by an electrical specialist. The tests on the insulation resistance of the battery must be conducted in accordance with EN 1987 part1. The insulation resistance of the battery thus determined must not be below a value of 50 Ω . per Volt of nominal voltage, in compliance with EN 50272-3. For batteries up to 20 V nominal voltage the minimum value is 1000 Ω .

4. Care of the battery

The battery should always be kept clean and dry to prevent tracking currents. Cleaning must be done in accordance with the ZVEI code of practice "The Cleaning of Vehicle Traction Batteries". Any liquid in the battery tray must be extracted and disposed of in the prescribed manner. Damage to the insulation of the tray should be repaired after cleaning, to ensure that the insulation value complies with EN 50272-3 and to prevent tray corrosion. If it is necessary to remove cells it is best to call in our service department for this.

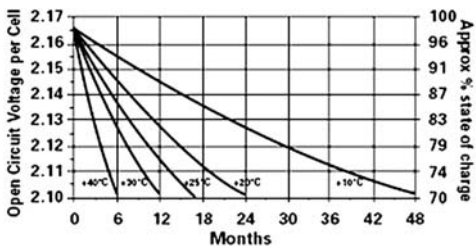
5. Storage

Batteries are despatched from the manufacturer in a fully charged condition. The state of charge will decrease with storage. All batteries lose their stored energy when allowed to stand open-circuit, due to parasitic chemical reactions. The rate of self-discharge is non-linear and decreases with decreasing state of charge. It is also strongly influenced by temperature.

High temperatures greatly reduce storage life.

It is recommended that the fully charged battery should be stored in a cool dry place, ideally below 20°C.

The battery has a maximum inspection-free storage life of 2 years, if stored at or below 20°C, after which a refresh charge should be administered. However, it is advisable to conduct an inspection and open circuit voltage check after 12 months and recharge if the OCV is less than 2.10 Volts per cell. The battery may be stored for up to 5 years without degradation of performance provided that an open circuit voltage (OCV) check is conducted every 12 months. When stored in temperatures in excess of 30°C (86°F), the battery should be OCV checked every 6 months. The graph below shows the relationship between temperature, storage time and OCV.



6. Malfunctions

If malfunctions are found on the battery or the charger our service department should be called in without delay. The measurements taken in point 3.3 will facilitate fault finding and their elimination. A service contract with us will make it easier to detect and correct faults in good time.

7. Disposal

XFC FLEX batteries are recyclable. Scrap batteries must be packaged and transported in accordance with prevailing transportation rules and regulations. Scrap batteries must be disposed of in compliance with local and national laws by a licensed or certified lead acid battery recycler.

Back to the manufacturer!

Batteries with this sign must be recycled.

Batteries which are not returned for the recycling process must be disposed of as hazardous waste!

