

User Manual



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1 GENERAL INFORMATION

1.1 PRECAUTIONS BEFORE STARTING



Before beginning work on site, please take the following material with you:

- One screwdriver No. 1.
- One battery 9 V 6LR61.
- Adjustable wrench (Spanner).



Before use, please connect to our website www.cla-val.ch to:

- Download and install the USB driver on your PC [Refer to the driver USB installation manual (LIN006UE)]
- Download and install the latest version of the product software on your PC
- Check that the product has the latest firmware version

1.2 SAFETY WORK ON ELECTRICAL BOX



Before making any wiring connections in the electrical box, ensure that the isolating valve on the bypass is closed so that the turbine cannot be engaged. Confirm that the battery is disconnected. Confirm that the LED on the PCB is not blinking.



Never open the isolating valve on the valve bypass before connecting the battery to the PCB.

1.3 DIAGNOSTIC FOR THE LED

The LED is located on the PCB in the electrical box.



Green blinking: Battery is discharging, Turbine OFF, Solenoid state = 0



Red blinking: Battery is discharging, Turbine ON, Solenoid state = 1



Red solid: PCB error, default, contact CLA-VAL

1.4 GENERAL DISCLAIMER

In accordance with our policy of continuous development and improvement, CLA-VAL Europe reserves the right to modify or improve these products at any time without prior notice. CLA-VAL Europe assumes no liability or responsibility for any errors or omissions in the content of this document.

1.5 ENVIRONMENTAL PROTECTION

Help to preserve and protect the environment. Recycle used batteries and accessories.

1.6 TYPOGRAPHY

Through this manual, the following typographical conventions and symbols have been adopted to help readability:

- a. **"Bold"**: Menu, command, tab and button.
- b. ***BOLD ITALIC***: Important information.
- c. **(1)**: Number of the reference marks on image.
- d. www.cla-val.ch: Internet address.



- e. : Some tips.



- f. : Warning!

1.7 BASIC CALCULATION RULES

Conversion of the power depending on the voltage:

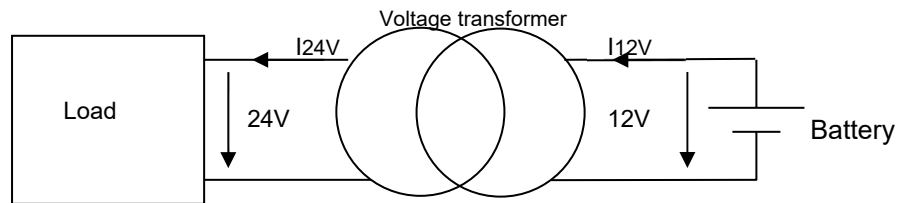
$$P_{24V} = 24V \cdot I_{24V}$$

$$P_{12V} = P_{24V}$$

$$P_{12V} = \left(\frac{24V}{2} \right) \cdot (I_{24V} \cdot 2)$$

$$P_{12V} = 12V \cdot I_{12V}$$

$$\underline{I_{12V} = I_{24V} \cdot 2}$$



The electric current on the load is 2x higher at 12V than at 24 V, for the same power.

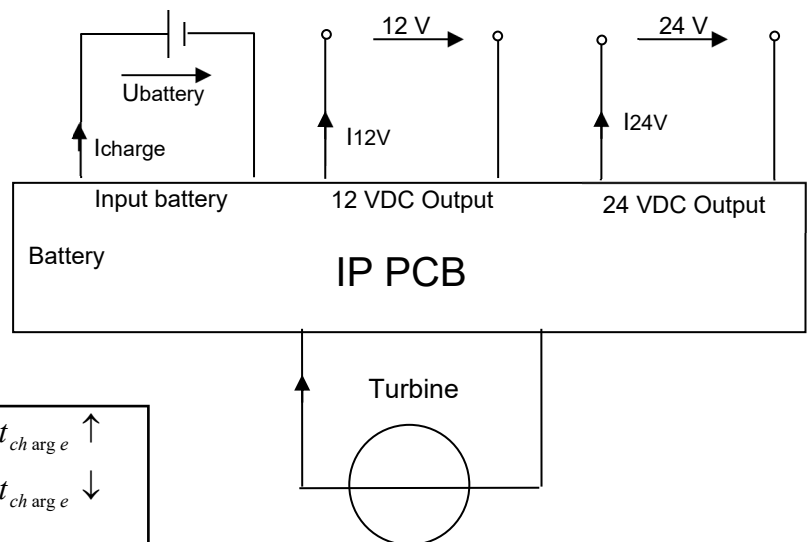
Power balance:- Power balance = Power generated - Power supplied

$$P_{generated} = U_{battery} \cdot I_{charge}$$

$$P_{supplied} = \Sigma P_{supplied}$$

$$P_{supplied\ 12V} = U_{battery} \cdot I_{12V}$$

$$P_{supplied\ 24V} = U_{battery} \cdot I_{24V} \cdot 2$$



Power balance ↓ : Autonomy ↓ t_{charge} ↑
Power balance ↑ : Autonomy ↑ t_{charge} ↓

2 E-POWER IP PROPERTIES

Thank you for purchasing a CLA-VAL turbine. With appropriate care, this CLA-VAL e-Power IP will provide power for your valve for many years. The CLA-VAL e-Power IP is built with the latest technology together with very high quality components.

The CLA-VAL e-Power IP is an electrical generator using available hydraulic energy directly from the water distribution network. The e-Power IP is typically installed into the bypass of the CLA-VAL valve.

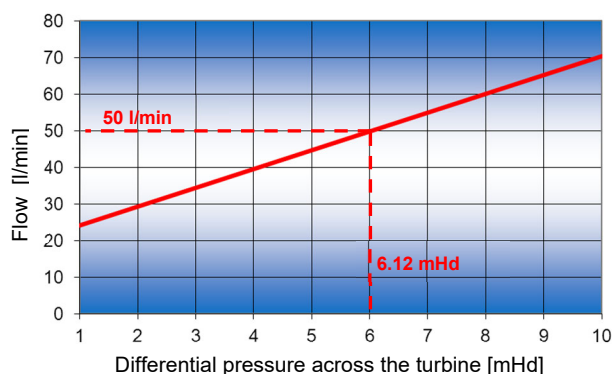
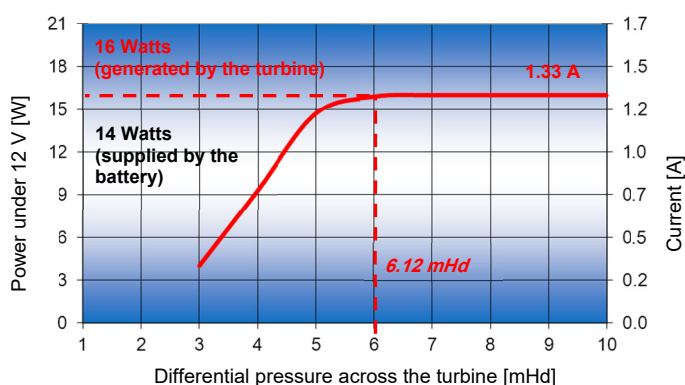
The e-Power IP powers various devices located within close proximity of the valve or on the valve itself, e.g. motorized pilots, sensors, telemetry, PLC or HMI interfaces.

2.1 PERFORMANCE

At the optimum operating point of the turbine, (differential Pressure (DP) = 6.12 mHd and Flow (Q) = 50 l/min). The rechargeable battery delivers the following output voltage, current and power:

Output voltages	Amps continuous (60 min)	Amps peak (1 min)
12 V	1.16 A 14 W	5 A 60 W
24 V (step-up)	0.58 A 14 W	2.0 A 48 W

The electrical power produced by the e-Power IP charges the battery. The power (W) to charge the battery is the multiplication of the current (A) and voltage (V). The efficiency between the power supplied by the battery and the power generated by the turbine is 88%.



Note: The power supplied in the graph above is achieved by optimizing the power supplied by the turbine for each differential pressure.

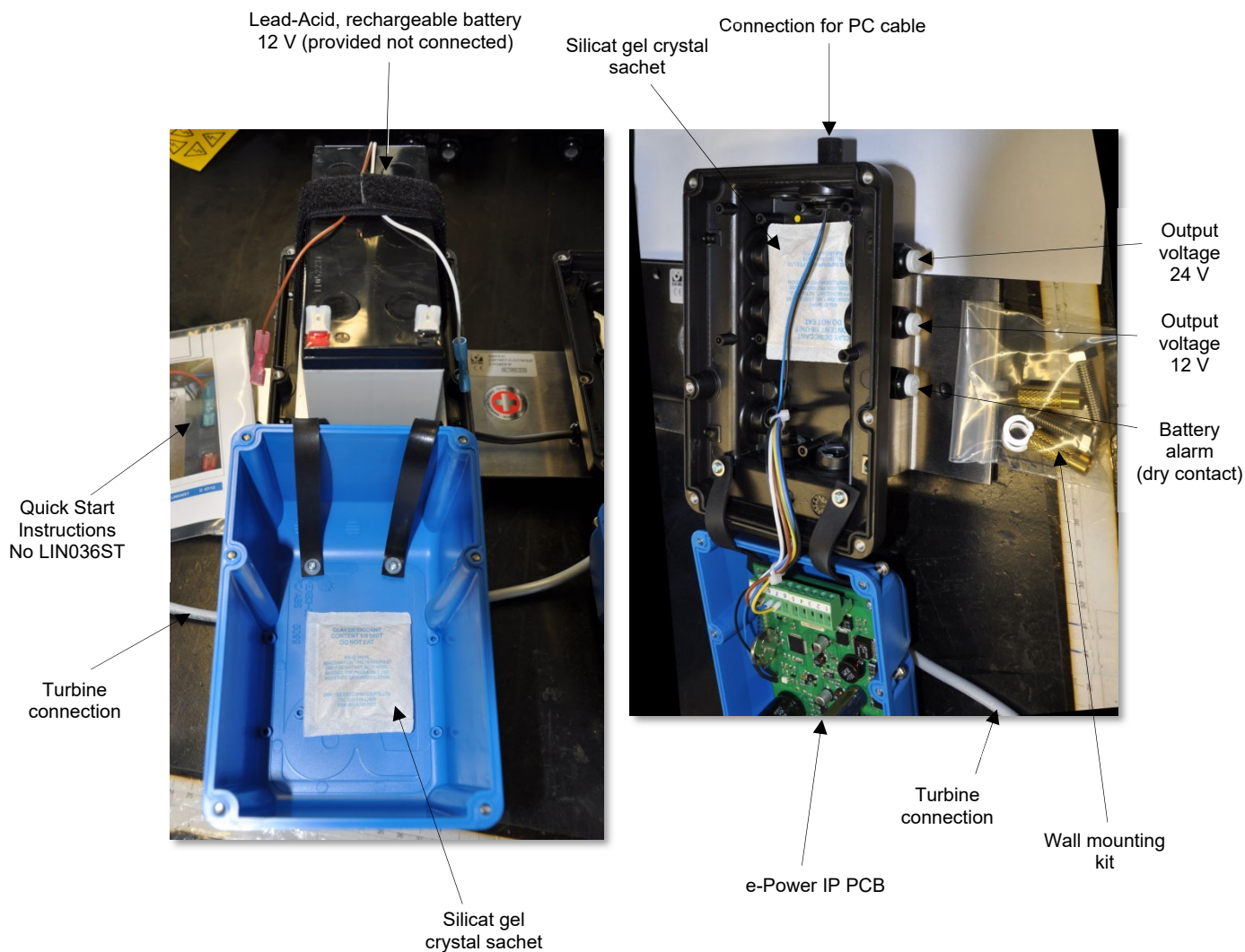
Mounting	Bypass size	Head loss
Factory mounting FM	1"	3 mHd
Retrofit mounting RM	3/4"	6 mHd
Wall mounting WM (for 2x 2 m pipes)	1"	4 mHd
	3/4"	9 mHd

Note: Example: For an FM mounting with a body tapping 1" and a bypass pipe 1": 3 m + 6 mHd = total of 9 mHd differential pressure (inlet - outlet of the valve) to generate 16 W of power by the turbine.

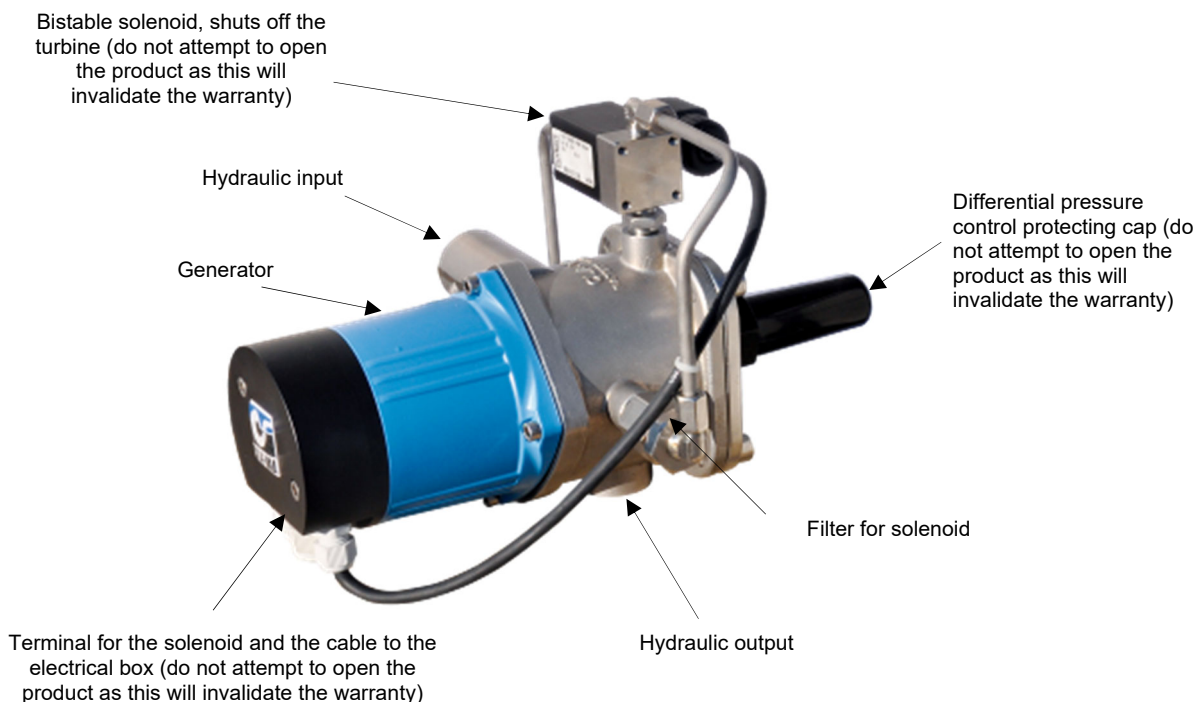
2.2 DESCRIPTION

Electrical box

(factory supplied)

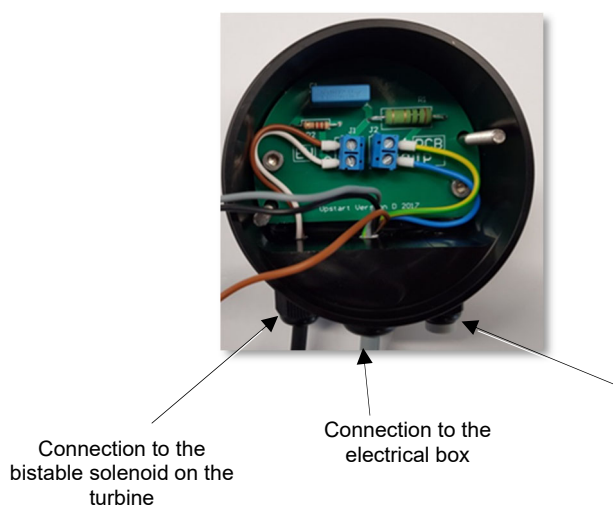


e-Power IP

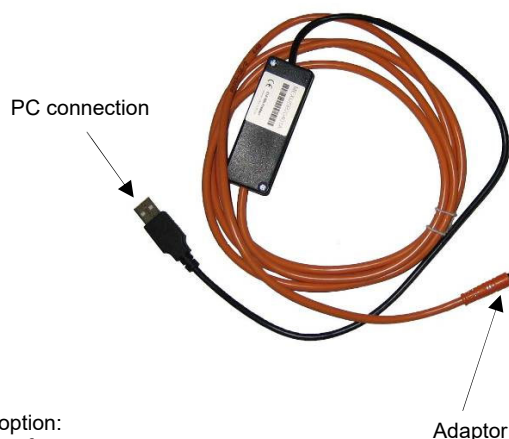


Inside the terminal

(Do not attempt to open the product as this will invalidate the warranty)



USB connection cable



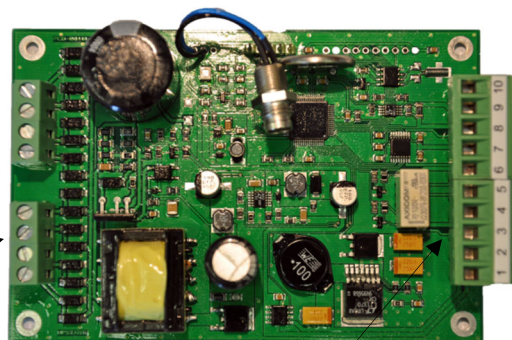
2.3 TECHNICAL DATA

	Electrical Specification
Battery:	• 12 V • Capacity 7.0 Ah • Lead-Acid waterproof battery VRLA, maintenance free • Battery fully recyclable • Maximum operating temperature 55°C
Power protection:	• Reverse polarity & short circuit • 80°C stop high temperature
Output 12 VDC:	• A continuous 60 min 1.16 A (14 W) • A peak 1 min 5 A (60 W)
Output 24 VDC: (step-up)	• A continuous 60 min 0.58 A (14 W) • A high peak 1 min 2.0 A (48 W)
Battery alarm output:	• Dry contact switch
Operating display:	• Charging: LED flashes red • Discharging: LED flashes green
Electrical connection:	Moulded 3 meters cable
Temperature range:	- 10°C to + 80°C (PCB only)
	Other Specifications
Maximum Operating pressure:	PFA 10 bar
Valve size and model (mm): (Piping 3/4" : P- 3/4") (Piping 1" : P- 1")	• NGE DN 100 bosses tapped Rp 1/2" - P 3/4" • NGE DN 125-200 bosses tapped Rp 3/4" - P 3/4" • NGE DN 250-600 bosses tapped Rp 1" - P-1" • GE/AE DN 65-80 bosses tapped Rp 1/2" - P 3/4" • GE/AE DN 100-150 bosses tapped Rp 3/4" - P 3/4" • GE/AE DN 200-400 bosses tapped Rp1" - P 1"
Software interface:	Plug & play / Windows 10 / -11
Protection:	IP 68 (excluding solenoid)
Strainer:	For solenoid, Screen 0.2 mm

2.4 PCB

⚠ THE GENERATOR VOLTAGE REACHES 200 VAC. BE CAREFUL TO SHUT OFF THE ISOLATING VALVE ON THE BYPASS BEFORE OPENING THE ELECTRICAL BOX.

Terminal Turbine 2 (option)		
Terminal No	Code	Function
1	L1	Phase 1
2	L2	Phase 2
3	L3	Phase 3
4		No connection



Terminal Turbine 1			
Terminal No	Code	Function	Color
1	L1	Phase 1	Black
2	L2	Phase 2	Brown
3	L3	Phase 3	Grey
4		No connection	



- The connection order of the phases has no effect on the turbine use
- For the wiring diagram, see the Quick Start Instruction LIN036ST.

Terminal 1		
Terminal No	Code	Function
1	+ 12 VDC	Output voltage 12 VDC
2	- 0 VDC	0 V for 12 VDC output voltage
3	+24 VDC	Output voltage 24 VDC
4	- 0 VDC	0 V for 24 VDC output voltage
5	Alarm	Dry contact battery alarm
6	Alarm	Dry contact battery alarm
7	EV+	Output solenoid +
8	EV -	Output solenoid -
9	Batt +	Input battery 12 V +
10	Batt -	Input battery 12 V -

2.5 BATTERY PROPERTIES

The lead-acid waterproof battery VRLA (Valve Regulated Lead Acid) is build according to IEC 60896-2 standard for trouble-free transportation including rail, road, sea and air transportation in accordance with IATA, DGR clause A67.

Lifetime (20°C) is between 5 and 7 years according to the type of use (after 2000 cycles remaining capacity is 80%). Shipped from factory fully charge. The discharge rate is approximately 2% per month for a period of 24 months (20°C) allowing prolonged storage prior use. The battery 12 V / 7.0 Ah is completely recyclable.

2.6 BATTERY ALARM

The dry contact battery alarm on connections 5 and 6 of terminal 3 allows transmission via a SCADA system.

The dry contact is open when the battery voltage reaches the level « Alarm Battery Level (V) », preset by the factory at 11.0 V.

If the battery voltage remains below the minimum level « Alarm Battery Level (V) » for 5 minutes, the 12 V and 24 V voltage outputs are disconnected.

To reconnect the 12 V and 24 V voltage outputs, the battery voltage must reach the factory set value of 13.0 V « Start Tempo @ High Battery level (V) ».

3 COMMISSIONING

3.1 MOUNTING INSTRUCTIONS

- 1- The e-Power IP mounting must be horizontal.



- 2- Installation, adjustment and maintenance should be carried out by a competent electrician.
- 3- The electrical connections should be made as described in the user's manual.
- 4- Before performing any maintenance operation, the main power should be turned off.

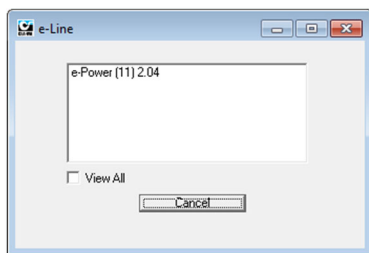


Do not attempt to open the product as this will invalid the warranty!

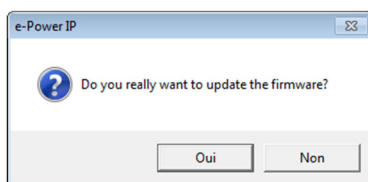
4 SOFTWARE AND FIRMWARE

4.1 FIRMWARE UPDATE (INTERNAL SOFTWARE)

1. Connect the e-Power IP battery, wait 1 minute for the cycle « Turbine Check Cycle » to finish.
2. Connect the e-Power IP to the computer with the USB cable.
3. Double click on the e-Power IP icon to start the program.
4. If the connection with the e-Power IP is successful, the e-Power IP appears in the window. Click on the text.



5. Select **"Firmware update"** in **"Parameters"**, the following window appears :



6. Click **"Yes"**. Open the corresponding file « .hex ».
7. Select **"Read Parameters"** to check that the Firmware is updated.

4.2 SOFTWARE

⚠ All values rated «Default value» are initialized by clicking **"Factory Values"** and then **"Read Parameters"**.

It is strongly recommended not to change the values « Factory Values » according the table below. Otherwise, the proper use of the e-Power IP cannot be guaranteed.

⚠ When the computer connection cable to the PCB is disconnected, the e-Power IP will initialize. The system reads the battery voltage. The system goes in charging mode (turbine ON) if the voltage is below 12 V, or in discharging mode (turbine OFF) if the voltage is greater than 12 V.

⚠ Each time you connect the computer to the PCB, please wait until the « Turbine Check Cycle » is complete. Only after the cycle is complete can you make the connection with the e-Power IP.

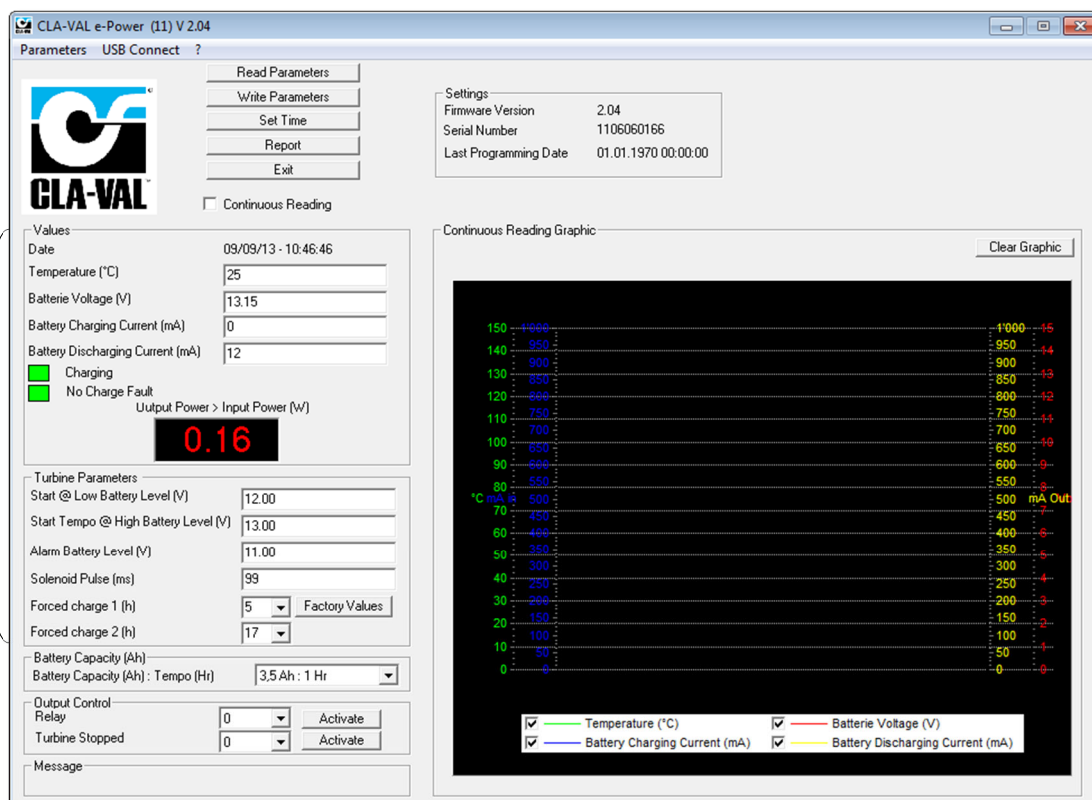
4.3 SOFTWARE DESCRIPTION

The description is according to the software picture below.

DESCRIPTION	FUNCTION	FACTORY VALUE	TYPE OF VALUE
Temperature (°C)	Electrical box temperature	Depends on the environment	Automatic
Battery Voltage (V)	Battery voltage	Depends on the charging state	Automatic
Battery Charging Current (mA)	Battery charging current	Depends on the battery charging state and the power consumption on the output voltage 12 V and 24 V (0 mA if the turbine don't charge the battery)	Automatic

DESCRIPTION	FUNCTION	FACTORY VALUE	TYPE OF VALUE
Battery Discharging Current (mA)	Battery discharging current	Depend on the power consumption on the output voltage 12 V and 24 V (0 mA if the turbine is charging the battery)	Automatic
Input Power > Output Power (W)	Live power consumption of the battery	- If green: Battery charging (power) - If red: Battery discharging (current)	Automatic
Start turbine @ Low Battery Level (V)	Low level battery Used to restart the turbine	12.0 V	Default value
Start Temporisation @ High Battery level (V)	High battery level is used to start the temporization. At the end of the temporization, the turbine shuts off automatically	13.0 V	Default value
Alarm Battery Level (V)	Alarm battery level dry contact (terminal 3 connections 5 and 6) = 1 if alarm battery level	11.0 V	Default value
Solenoid Pulse Milliseconds (ms)	Pulse duration to switch the solenoid	99 ms	Default value
Forced charge 1 Hour (h)	Forced charge (available if the system is not charging)	05:00 h	Default value
Forced charge 2 Hour (h)	Forced charge (available if the system is not charging)	17:00 h	Default value

See column « Description » in the table above



4.4 CHANGING THE BATTERY CAPACITY

To install a new battery for your e-Power IP system, please follow the procedure to change the battery capacity with the help of the software.

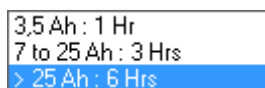
The charging time changes according to the battery capacity.

1. Click on the dropdown menu "**Battery Capacity (Ah)**".



Battery Capacity (Ah)
Battery Capacity (Ah) : Tempo (Hr) 3,5 Ah : 1 Hr

2. In the dropdown menu, choose according to the battery capacity.



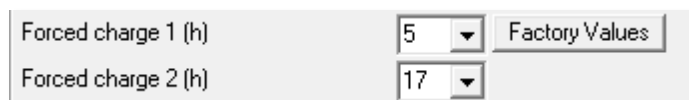
3,5 Ah : 1 Hr
7 to 25 Ah : 3 Hrs
> 25 Ah : 6 Hrs

3. Click "**Write parameters**".
4. The battery capacity change is completed.

4.5 FORCED CHARGE MODIFICATION

The forced charge period can be modified to allow for periods where there is no water or poor differential pressure.

Factory default settings are at 5 AM and 5 PM.

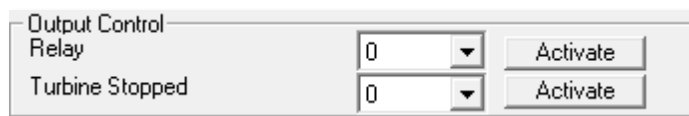


Forced charge 1 (h) 5 Factory Values
Forced charge 2 (h) 17

4.6 MANUAL TURBINE OPERATION

Two dropdown windows allow either a '0' or '1' command to allow manual switching of the solenoid to start/stop the turbine and also the « Alarm Battery Level (V) » dry contact.

- The dropdown menu « Relay » enables a switch to the dry contact position « Alarm Battery Level (V) ».
- The dropdown menu "Turbine Stopped" enables the solenoid to start the turbine (= 1 to activate the turbine).



Output Control
Relay 0 Activate
Turbine Stopped 0 Activate



Do not click "**Dynamic reading**" while using the manual operations.

5 ASSISTANCE

If you have trouble charging the battery, the battery alarm is active and your electronic device connected to the e-Power IP is not powered because the battery voltage is too low. Please follow the procedure below:

1. Please follow the procedure « Turbine Check Cycle » (see chapter « How do you check if the e-Power IP runs properly? » in the LIN036ST Quick Start Guide).
 - a. If the turbine does not provide enough AC voltage, please follow the point 2 below.
 - b. If the solenoid does not activate, please contact CLA-VAL.
2. Please follow the procedure of chapter « What is the differential pressure across the turbine » in the LIN036ST Quick Start Guide).
 - a. If you do not reach 6 meters differential pressure across the turbine (185 VAC), please read on the graph (chapter « What is the differential pressure across the turbine » in the LIN036ST Quick Start Guide) the real power provided by the turbine and finally check that your power balance is positive.
 - b. If the turbine provides no AC voltage, please follow the point 3 below.
3. Close the bypass ball valve, disconnect the 2 removable terminals at the same time by pulling with 2 fingers (see page 1 in the LIN036ST Quick Start Guide), With the help of the ohmmeter, measure the resistance of the 3 phases of 210 ± 10 ohm on the terminal of the PCB (see chapter 2.4 PCB).  **3 measurements must be taken: between the cable pairs: Brown and Black / Brown and Grey / Black and Grey.**
 - a. If you don't measure 210 ± 10 ohm, the connection between the generator and the PCB is wrong. Contact CLA-VAL
 - b. If you measure the good value, proceed to point 4.
4. If during point 1 and 2, the turbine does not provide any voltage, you measure 3 times 210 ohm and you are sure that the inlet/ outlet ball valves are open, isolate the e-Power IP, purge through the Serto connection of the solenoid on the e-Power IP. Unscrew the 4 screws M5 of the generator to the body of the turbine.

When the generator is separated from the body, you have the opportunity to check the turbine wheel as shown on the picture below. It is possible that the wheel does not rotate, due to the dirt etc. Clean the wheel to be sure that the water can flow properly through the turbine.



If other troubles occur, please contact the technical support through the internet website: www.cla-val.ch

6 MAINTENANCE

6.1 BATTERY REPLACEMENT



If you use your own Lead-Acid rechargeable battery 12 V:

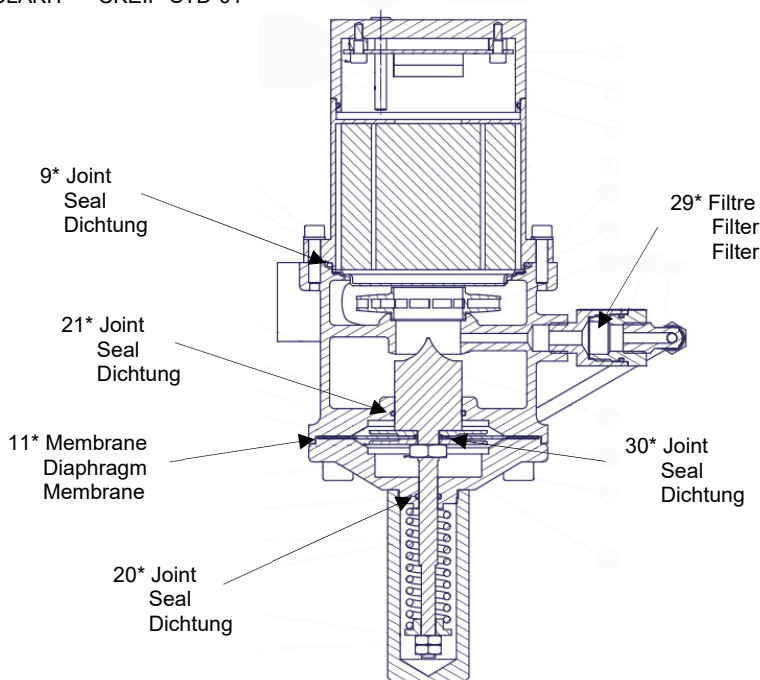
- Please mount externally if there is not enough space inside the electrical box then use the correct procedure for connecting the battery to the PCB (see chapter 2.4)
- The maximum capacity of the battery is 50 Ah.

- 1- Ensure that the isolating valve on the bypass is closed.
- 2- Open the battery electrical box (on the left).
- 3- Shut down the system by disconnecting the wires connected to the battery.
- 4- Open the velcro to remove the battery.
- 5- Replace the battery.
- 6- Close the velcro to fix the new battery.
- 7- Connect the wires from the PCB to the battery. Red wire to the "+" terminal. Blue wire to the "-" terminal. The LED will start to blink.
- 8- Wait 1 minute to finish the « Turbine Check Cycle ».
- 9- If the battery capacity was changed, use the software (see chapter 4.4).
- 10- Click **"Write Parameters"** and wait for 1 minute.
- 11- Disconnect the battery and reconnect it to check the proper operation of the « Turbine Check Cycle » (see chapter « How do you check if the e-Power IP runs properly? » section in the LIN036ST Quick Start Instruction).

6.2 REPAIR KIT USE

Every 5 years, it is advisable to maintain the e-Power IP with the help of the repair kit *CKEIP-STD-01.

* CLAKIT = *CKEIP-STD-01



When changing the diaphragm, please pay attention to its orientation during the assembly. The diaphragm is drilled to allow the water to pass through. Please align the hole drilled in the body, the hole drilled in the cover and the hole in the diaphragm.



⚠ Once the maintenance is complete, please proceed to the « Turbine Check Cycle » (see chapter « How do you check if the e-Power IP runs properly? » section in the LIN036ST Quick Start Instruction).