

EDrive Flexis Pro

User instructions

HIGH-FREQUENCY BATTERY CHARGER

1. Introduction

FLEXIS chargers are designed for industrial use, mainly for charging of traction batteries (Lead-acid, GEL, LiFePo4,...) for electric forklifts or handling and cleaning technology. Chargers are intended for charging of batteries with Unom 12V-96V and current from 25-225A. (Chargers of other power on request). Chargers are modular construction, consist of control unit and power module(s) (input 1ph 230VAC or 3ph 400VAC). Important operating data are displayed on display during the charging. Chargers are fully programmable, parameters of single charging cycles are saved in charging archive.

2. Operational safety

The following requirements must be met when operating the chargers:

- chargers are for indoor use only
- proper ventilation must be insured during charging
- charger can be connected only to a regular main supply
- prevent spark ejection and open flame near the battery, explosion hazard during charging!
- charger must not be operated without the cover
- charge only chargeable batteries
- during the charging do not touch the wires leading to the battery terminals
- do not transfer the charger during the charging
- it is not allowed to disconnect the battery during the charging
- charger may be operated only by qualified staff
- changes of charger parameters may be made only by a service engineer

3. Technical parameters

Technical parameters	see product label	Insul. resistance in-output	4,2 kV DC
Supply voltage	1 N PE 230V ±15% 50/60Hz or 3 N PE 400V +15% / -10% 50/60Hz	Output voltage tolerance	±1%
Input fuse	Single-pole or 3 pole Type C or D circuit breaker	Output current tolerance	±2%
Efficiency	up to 94%	Safety (LVD)	EN 60950-1 33 2000-4-41
Appliance class	I	Electromagnetic compatibility (EMC)	EN 61000-6-2 EN 61000-6-4
Pollution degree	2	Operating environment	-10°C to +40°C, max.rel. humidity 80%, non-condensing
Charger protection/ after opening	IP20 / IP00	Storage	in dry conditions -25°C to +80°C max.rel.humidity 80%, non-condensing

Types of chargers

Nominal output voltage (V)	Output current (A)	Type	Case		Weight (kg)		Mains protection (A)	Nominal input current (A)
			without air pump	with air pump	without air pump	with air pump		
24	60	FLEXIS 24E60	FF130	FF170	13	15	10	8,7
	100	FLEXIS 24E100	FF130	FF170	13	15	16	14,1
	100	FLEXIS 24D100	FF130	FF170	14	16	6	4,9
	200	FLEXIS 24D200	FF250	FF250	25	26	10	9,8
48	50	FLEXIS 48E50	FF130	FF170	13	15	16	14,1
	50	FLEXIS 48D50	FF130	FF170	14	16	6	4,9
	100	FLEXIS 48D100	FF130	FF170	18	20	10	8,0
	150	FLEXIS 48D150	FF250	FF250	27	28	16	12,9
	200	FLEXIS 48D200	FF250	FF250	30	31	20	16,0
80	25	FLEXIS 80E25	FF130	FF250	13	16	16	14,1
	25	FLEXIS 80D25	FF130	FF250	14	17	6	4,9
	50	FLEXIS 80D50	FF130	FF250	17	20	10	8,0
	75	FLEXIS 80D75	FF250	FF330	26	30	16	12,9
	100	FLEXIS 80D100	FF250	FF330	28	32	20	16,0
	125	FLEXIS 80D125	FF330	FF550	37	42	25	20,9
	150	FLEXIS 80D150	FF330	FF550	40	45	32	24,0
	175	FLEXIS 80D175	FF550	FF550	49	54	32	28,9
	200	FLEXIS 80D200	FF550	FF550	52	56	40	32,0
	225	FLEXIS 80D225	FF720	FF720	63	65	40	36,9

4. Charger installation

The charger casing can be positioned:

- on a vertical surface (wall), secured with four Ø5-8mm screws
- on a horizontal surface using a base stand

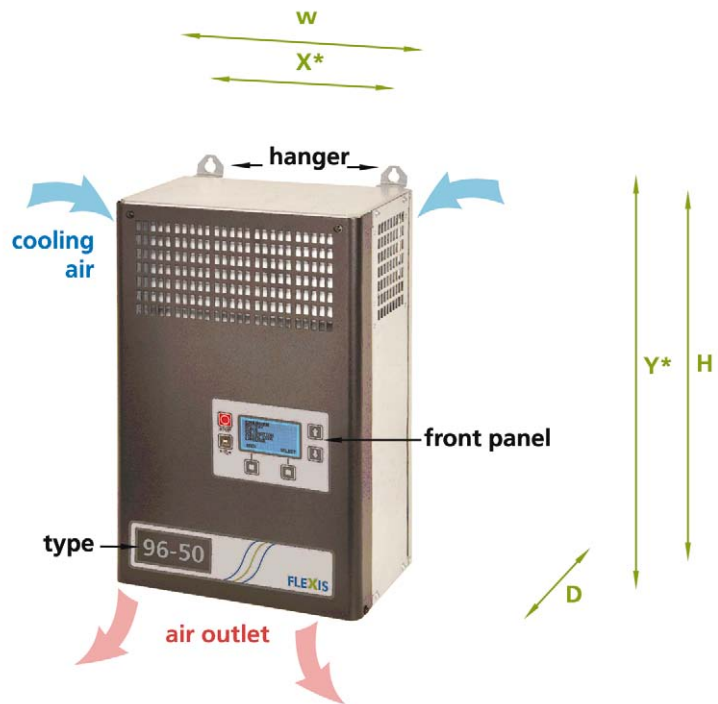
The charger must always be operated in a vertical position.

Dimensions for mounting on a vertical surface

Case	H	W	D	X*	Y*
FF130	477	302	135	230	515
FF170	477	302	169	230	515
FF250	477	302	254	230	515
FF330	477	302	339	230	515
FF550	477	549	339	499	515
FF720	477	717	339	669	515

Dimensions in mm

* position of mounting holes



If chargers are placed in a dusty environment, IP54 housing with a built-in filter must be used. The filter must be regularly cleaned or replaced. If the charger is destroyed due to heavy dustiness, warranty repair cannot be applied.

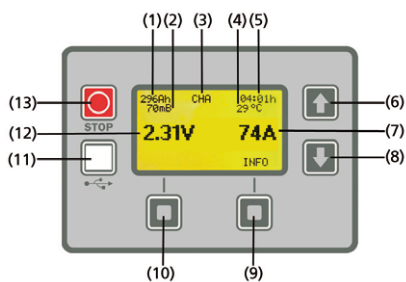
Charger cooling is very important and must be considered during installation. There must be a minimum clearance of 100mm from other devices in order to ensure free air circulation.

5. Charger operation

- prior to mains connection, check the insulation of the wires.
- prior to battery connection – check that battery voltage and capacity corresponds with setting of the charger

For charging (both standard and regeneration modes) the following steps must be followed:

- connect the charger to the mains
- connect the battery to the charger
- the standard charging procedure will start, proceed and end automatically, without pressing any buttons
- regeneration modes, if necessary, can be started by pressing the EQU/DES button
- disconnect the battery when the charging process has been completed (Permanently lighting green display signals this stage)
- if the battery has to be disconnected during the charging process (Yellow lighting display signals this phase), terminate the process by pressing the STOP button and disconnect the battery
- the charger cannot be disconnected from the supply network during running charging process



- (1) Ah supply (2) pressure (3) charging phases (4) battery temperature
- (5) charging time (6) button up (7) charging current (8) button down
- (9) (10) function buttons (11) USB connector (12) battery voltage (V/cell)
- (13) "STOP" button



Display colours:

- blue – standby mode (no battery connected)
- yellow – charging or regeneration modes
- green – battery charged
- red – error

5.1 Charging

Battery charging can be set in several modes – charging of one battery type, manual selection of more battery types, automatic selection according to battery voltage, automatic guidance through the identification module.

Charging one type of battery

If the charger is set for charging of one type of battery, main charging starts automatically after a battery is connected, without press of any button. Battery parameters are read and after 10s charging starts automatically. If the IM is connected, the parameters are read from this module. The main charging proceeds according to charging curve setted in FLEXIS SW.

During charging are displayed:

- number of supplied ampere hours (Ah)
- charging phase code - TST=battery test - CHA=charging - PST=postcharging - FLT=float charging
- - MNT=maintenance charging - EQU=equalization - DES=desulphation
- time from the start of the charging cycle (hh:mm)
- unit voltage per 1 cell (V)
- current flowing to the battery (A)
- error code
- In case temp. sensor is used – temperature of battery.

After chargingn is displayed time from end of charging, duration of last charging cycle, supplied Ahs, battery temperature.

Manual selection of more batteries

After connection of battery is possible to select type of battery, after confirmation charging proceeds like described above.

Automatic selection according to battery voltage

After connection, the battery type is detected automatically on the basis of its voltage. Battery type confirmation and the starting of the charging process can be initiated automatically or by pressing the "START" button. Charging then occurs in the standard aforementioned manner.

Automatically via the identification module

After connection of battery is battery automatically recognized – this has to be confirmed by press of START button, charging proceeds like described above.

5.2 Regeneration modes

Equalisation

If the voltage of individual cells in the battery is different, it is advisable to perform equalization. It can be started manually or automatically.

Manual equalisation

Beginns by press of the EQU/DES button within the 10s waiting time after the battery is connected. The button must be pressed and held up to 3s - the main charging process starts and proceeds. After it is successfully completed, the equalization proceeds. The battery is charged with a current at the value set in the Charging menu for set time. Then the charging mode is finished automatically.

Automatic equalisation and weekend maintenance

If set in setting programme, equalization starts allways, when battery with a voltage lower than 1.96 V/cell is connected to the charger, without press of any button. The main charging process will take place before the equalization, as described in the previous chapter.

Desulphating

Battery sulphation takes a place when lead battery discharge and lead sulphates settles on lead plates of single cells. Sulphated plates leads to reducing of capacity of battery, thats why desulphation takes its place. Charging with very low current degrades sulphates from lead plates and battery reclaims its full capacity.

Desulphation begins by:

- press of the EQU/DES button within the 10s waiting time after the battery is connected. The button must be pressed and held for more than 3s
- automatically, when set, if battery fails during the initial test

Battery is charged with a current whose value is set in the Charging menu.

Desulphating is finished:

- automatically as soon as the voltage of 2.40 V/cell is reached and the calculated number of Ah is filled
- after preset time

5.3 Maintaining batteries in a charged state

If a battery remains connected to a charger after charging has completed, it can be maintained in a charged state via two methods: with maintenance charging or through float phase, depending on the selected charge curve.

Maintenance charging

In case the battery remains connected to the charger after the charging has been successfully finished (i.e. on Sundays and holidays), the battery will be charged periodically. The parameters of the maintaining charging can be modified.

Float phase

If float charging is set in charging curve, voltage on battery, which stays connected after charging, is hold at set value.

5.4 Setting of charging parameters

Two possible parameter setting methods exist – via AXIFF configuration software or via a manual setting using the buttons on the front panel.

Delayed charging

This function allows start of the charging in preset time, i.e. at night time. Time of postponed charging can be set and modified by PC in a menu. The charging will start automatically when the selected time is reached – without press of any button. Charging can be initiated immediately by press of START button.

Menu Structure

battery	voltage	set value
	capacity	set value
	curve	set value
	current	set value
	euw	check if using
	ident. modul	check if using
equalisation	current	set value
	time	set value
	pulse count	set value
	equ once	check if using
desulphation	current	set value
	timed des.	check if using
	time	set value
	auto des.	check if using
postponed start	postponed start	check if using and set time
new password	new password	numeric code setting

6. Optional accessories

- AXIM981 – identification module (IM) – basic version
- AXIM982 – identification module (IM) – with thermal probe
- AXI FF SEN20DM – thermal sensor
- AXI FF SEN37DM – thermal sensor
- EUW, EUW2 – airpump for electrolyte mixing
- AXI FF 2LED – LED column, 2 colours, for external signalling of charging state
- AXI FF 3LED – LED column, 3 colours, for external signalling of charging state
- AXI FF MONO200 – stand FF130-170-250 (2 pieces required)
- AXI FF MONO300 – stand FF330-550-720 (2 pieces required)

7. Storage and delivery

The charger is provided in a pre-assembled state and comes with an Instruction Manual. Each charger is pre-tested for operability.

Items are shipped wrapped in cardboard packaging. During transportation and storage it is crucial to heed information contained in appended labels: protection against extreme weather conditions (rain, snow); protection against knocks and falls; which way up the package must face.

During any kind of additional handling, the charger must be transported in appropriate packaging.

The charger must be stored in a dry interior environment with temperatures ranging from -25°C to +80°C with relative humidity not in excess of 80% (non-condensing).

8. Service



In case of a defective charger contact your dealer for assistance. Never try to repair the charger yourself. Charger service is provided by AXIMA, spol. s r.o., Vídeňská 125, 619 00 Brno, Czech Republic.

Warranty

The charger is covered by a standard two year warranty from time of purchase.

In the event the product develops a fault, please contact your supplier.

Do not under any circumstances attempt to repair a faulty unit.

9. Fault reporting

Code	Failure description	Reason	Steps to remedy
E1x	Incorrect initial conditions, battery failures, high battery, temperatures		
E11	Voltage of battery lower than ..98% of Unom/V/ cell., deep discharged battery.	<ul style="list-style-type: none"> Battery is deeply discharged during operation Wrong setting Wrong calibration of charger 	<ul style="list-style-type: none"> Check electrolyte level Discharge max. to 80% of capacity Check setting of charger Recalibrate the charger
E12	Battery has been disconnected during charging without regular stop of charging by STOP button.	<ul style="list-style-type: none"> Inadmissible interrupt of charging by disconnecting of connector during operation (charging) 	<ul style="list-style-type: none"> To terminate the charging cycle use always STOP button!
E13	Battery temperature >TbatMAX: - if battery is connected to charger and its temperature is higher than set value, charging don't start - If temperature of battery overrun set value during charging, charging current falls to set value of and charging continues. If than temperature increase to (TbatMAX-2)°C, charging current decrease to I _{max} .	<ul style="list-style-type: none"> To high temperature of battery ambient Cycles of charging and discharging proceed with no break – increase of temperature Too high charging current 	<ul style="list-style-type: none"> Lower environment temperature Make longer pauses between charging and discharging cycles Check setting of charger
E14	Temperature of control unit >65°C: - if battery is connected to charger and inner temperature is higher than set value, charging don't start - If inner temperature of charger overrun set value during charging, charging current falls to value set in folder „Charging – Temperature measurement“ and charging continues. If than temperature decrease to (T-5)°C, charging current increase to I _{max} .	<ul style="list-style-type: none"> To high temperature of charger ambient charger exceedingly coated by dust 	<ul style="list-style-type: none"> Lower environment temperature. Clean up the charger If the charger is in IP54 case – clean up or change the filter inserts
E15	Voltage of battery > U _{max} (set in charging curve).	<ul style="list-style-type: none"> Failure of power unit Failure of control unit 	<ul style="list-style-type: none"> Repair/exchange of power unit Repair/exchange of control unit
E2x	Incorrect charging duration		
E21	The constant current charging phase I1 is taking too long; charging terminates and fails.	<ul style="list-style-type: none"> A faulty battery or incorrect charger settings Excessive battery capacity or charger current 	<ul style="list-style-type: none"> Check the battery – electrolyte density, temperature, voltage of single cells Check setting of charger
E22	Constant voltage phase U1 too long, charging goes further to next phase.	<ul style="list-style-type: none"> Defective battery Wrong setting of charger 	<ul style="list-style-type: none"> Check the battery – electrolyte density, temperature, voltage of single cells Check setting of charger
E23	The constant current charging phase I2 is taking too long; charging terminates and fails.	<ul style="list-style-type: none"> Defective battery Wrong setting of charger 	<ul style="list-style-type: none"> Check the battery – electrolyte density, temperature, voltage of single cells Check setting of charger
E24	During charging phase I1+ U1 more than 90% of nominal capacity is supplied.	<ul style="list-style-type: none"> A completely battery Incorrect charger settings 	<ul style="list-style-type: none"> Check the battery – electrolyte density, temperature, voltage of single cells Checking de-charging circumstances Checking charger setting
E3x	Deviations charging current		
E31	Charging current I1 <80% of set value.	<ul style="list-style-type: none"> One phase of three phase mains is missing Defective power unit Wrong calibration of charger 	<ul style="list-style-type: none"> Check the mains Check power units of charger Recalibrate the charger
E32	Charging current I1 >110% of set value.	<ul style="list-style-type: none"> Defective power unit Wrong calibration of charger 	<ul style="list-style-type: none"> Check power units of charger Recalibrate the charger
E5x	Failures of aeration systém		
E51	Low pressure in the aeration systém failure of airpump or aeration piping. If the pressure is not restored and the correct pressure value is not reached within 1 minute, the charging current value decreases to the 80% I _{char} value in the “charging” and the pump is not switched any more.	<ul style="list-style-type: none"> Failure of airpump Pressure loss in piping system 	<ul style="list-style-type: none"> Check the airpump Check piping system of aeration

E52	High pressure in the aeration system, fault in the pump or in hose system. If the pressure is not restored and the correct pressure value is not reached within 1 minute, the charging current value decreases to the 80% Ichar value in the "charging" and the pump is not switched any more.	<ul style="list-style-type: none"> • Clogged piping of aeration system. 	<ul style="list-style-type: none"> • Check piping system of aeration
E53	More than 5 faults of aeration system (pressure too low or too high) during the common charging cycle; the charging current value decreases to the 80% Ichar value in the "charging" and the pump is not switched any more.	<ul style="list-style-type: none"> • Failure of airpump • Pressure loss in piping system • Clogged piping of aeration system. 	<ul style="list-style-type: none"> • Check the airpump • Check piping system of aeration
E54	Leakage in the air system, the pressure goes down too fast.	<ul style="list-style-type: none"> • Pressure loss in piping system 	<ul style="list-style-type: none"> • Check piping system of aeration
E55	Charger blocked due to aeration system failures.	<ul style="list-style-type: none"> • Blockage of charger due to overrun of setted nr. Of failures E51, E52, E54. • Failure of airpump • Pressure loss in piping system • Clogged piping of aeration system. 	<ul style="list-style-type: none"> • Check the airpump • Check piping system of aeration • Charger must be unblocked by service engineer
E9x	Failures of communication		
E91	Failure of communication with IM at battery connecting.	<ul style="list-style-type: none"> • IM is not used • IM is defective • IM is not programmed • Defective wiring or connector 	<ul style="list-style-type: none"> • Connect, change or programme IM • Check connection between IM and charger
E94	Failure at temperature check – temperature sensor or IM.	<ul style="list-style-type: none"> • Defective temp. Sensor • Defective IM • Defective wiring or connector 	<ul style="list-style-type: none"> • Change temperature sensor • Change IM • Check connection between temp. Sensor or IM and charger
F1x	Failures of the starting condition and failures of battery		
F10	Power units with different voltage levels has been connected together.	<ul style="list-style-type: none"> • Power units with different voltage levels • Wrong calibration 	<ul style="list-style-type: none"> • Use right units • Calibrate the power units
F11	Battery with high impedance. Voltage during initial test increase more than 19% of UnomV/cell.	<ul style="list-style-type: none"> • Deeply sulphated battery 	<ul style="list-style-type: none"> • Check battery and its use • Check electrolyte density and voltage of single cells
F12	The initial battery voltage is higher than 135% of UnomV/cell, i.e. not suitable battery.	<ul style="list-style-type: none"> • Battery with higher nominal voltage than is set in charger 	<ul style="list-style-type: none"> • Check battery voltage
F13	Battery voltage >115% Unom, battery charging is initiated only after a rate fall below 115% Unom.	<ul style="list-style-type: none"> • The battery is fully charged 	<ul style="list-style-type: none"> • Disconnect battery • If mains connection is maintained, eventual voltage reduction will trigger automatic recharging
F14	The battery voltage during the charging overruled setted value (Umax) – charging is stopped.	<ul style="list-style-type: none"> • Defective battery • Defective wiring charging cable • Defective connector • Failure of charger 	<ul style="list-style-type: none"> • Check the battery – electrolyte density, temperature, voltage of single cells • Check charging cable • Check functions of charger
F15	Voltage monitors of single modules connected in parallel vary more than 3% of Unom.	<ul style="list-style-type: none"> • Voltage monitor failed 	<ul style="list-style-type: none"> • Exchange of power unit
F16	Battery temperature during charging >(Tbat MAX+5)°C, charging is stopped.	<ul style="list-style-type: none"> • To high temperature of battery ambient • Cycles of charging and discharging proceed with no break – increase of temperature • Too high charging current 	<ul style="list-style-type: none"> • Lower environment temperature • Make longer pauses between charging and discharging cycles • Check setting of charger
F17	Output voltage during charging is lower than Umin (set in charging curve) – longer than 1min.	<ul style="list-style-type: none"> • Voltage monitor failed 	<ul style="list-style-type: none"> • Exchange of power unit
F2x	Incorrect charging duration		
F21	Constant current phase I1 runs too long, charging is stopped.	<ul style="list-style-type: none"> • Defective battery • Wrong setting of charger 	<ul style="list-style-type: none"> • Check the battery – electrolyte density, temperature, voltage of single cells • Check charger setting
F22	Constant current phase U1 runs too long, charging is stopped.	<ul style="list-style-type: none"> • Defective battery • Wrong setting of charger 	<ul style="list-style-type: none"> • Check the battery – electrolyte density, temperature, voltage of single cells • Check charger setting

F23	Maximal duration of phase I2 overrunned.	<ul style="list-style-type: none"> Battery is deeply discharged during operation Wrong setting Wrong calibration of charger 	<ul style="list-style-type: none"> Check electrolyte level Discharge max. to 80% of capacity Check setting of charger Recalibrate the charger
F3x	Deviations of charging current		
F31	The charging current <50% of the desired value, charging is stopped.	<ul style="list-style-type: none"> One phase of three phase mains is missing Defective power unit Wrong calibration of charger 	<ul style="list-style-type: none"> Check the mains Check power units of charger Recalibrate the charger
F32	The charging current >120% of the desired value, charging is stopped.	<ul style="list-style-type: none"> Defective power unit Wrong calibration of charger 	<ul style="list-style-type: none"> Check power units of charger Recalibrate the charger
F33	The charging current >120% of the Inom – value, charging is stopped.	<ul style="list-style-type: none"> Defective power unit Wrong calibration of charger 	<ul style="list-style-type: none"> Check power units of charger Recalibrate the charger
F35	During charging has been charged more than 125% of nominal capacity.	<ul style="list-style-type: none"> Defective battery Wrong setting of charger 	<ul style="list-style-type: none"> Check the battery – electrolyte density, temperature, voltage of single cells Check setting of charger
F4x	Communication of control unit		
F40	Communication with power unit failed.	<ul style="list-style-type: none"> Wrong contact on wiring Defective control unit Defective power unit 	<ul style="list-style-type: none"> Check wiring Repair/exchange control unit Repair/exchange power unit

Module fault reporting

(they are shown in EVENTS folder in program AXIFF)

F1	main error
F2	diodes overheating
F3	transistors overheating
F4	overvoltage on output of power supply unit
F5	output relay error
F6	CAN bus communication error
F7	internal supply error