

FAT POWER SYSTEMS FOR ASYNCHRONOUS MOTORS

Intended for the following industries:



PIC. FAT in industrial cabinet

A special type of inverters are asynchronous motors power supply systems - FAT. The inverters are characterized by the ability to adjust the output voltage frequency. Start-up of the electric motor power supplied by FAT is carried out smoothly by frequency adjustment of the motor speed. The systems can operate with a local control, remotely, as well as in a feedback loop, adjusting the motor (pump) parameters to the preset operating conditions (pressure, flow). Motors speed adjustment is a major source of energy savings in many pumping systems. FAT type inverter as one of the few on the market can operate using a DC voltage source (power supply from DC switching station or own battery), or alternating power supply (power supply from R-04 switching station or DC uninterruptible voltage switching station), which increases the reliability of the motors power supply. For this reason, FAT systems are used to power supply emergency, cooling, water, or oil and lubricant pumps in power plants and heating plants.

FAT SYSTEM ALLOWS FOR MOTOR OPERATING PARAMETERS SETTINGS:

- Motor rated current;
- Motor rated voltage;
- Acceleration time;
- Braking time;
- Preset frequency;
- Preset pressure;
- Power supply frequency:
 - a) constant, e.g., 50 Hz;
 - b) variable as a function, e.g., of pressure;
- Rotations direction.

INVERTERS VERSIONS:

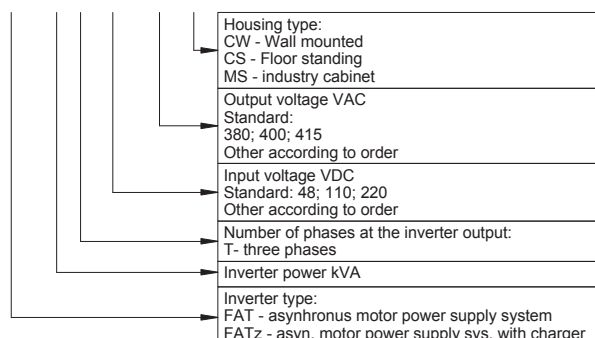
- FAT – basic version - an inverter designed to operate using battery or other DC power supply,
- FATz – an inverter designed to operate using DC power supply (e.g. battery) and AC network power supply.

FAT CHARACTERISTICS

- Motor rotation frequency adjustment
- Motor soft (frequency) start-up
- Low pulsation and low level of higher harmonics of the current drawn from the battery (long battery life) ;
- Uninterruptible switching to battery operation
- Modular or free design, in industrial cabinets
- Monitoring by Automatic Monitoring System - SAN 7, which provides monitoring, recording of all states of the device operation and alarming in the event of an alarm state
- Protections against overvoltage, overcurrent, short circuit, etc.
- Alarm states remote signaling (potential-free relay contacts)

FAT MARKING

FATz 15 T 110/400 MS
 FAT□ □ T □ / □ □



FAT AND FATz DRIVE INVERTERS

FAT and Fatz inverters are dedicated to operating in systems that require high reliability. Compact CW type FAT drive inverters are mounted to the wall, and their CS version is mounted to the floor. FAT MS and FATz MS inverters with power ratings up to 10 kW can be made in the form of modules

embedded in industrial cabinets or as pluggable industrial modules. FAT and FATz inverters with power ratings exceeding 10 kW are executed as free installations in industrial cabinets. The inverters operate in an online system.

TAB. ASYNCHRONOUS MOTORS POWER SUPPLY SYSTEM, FAT AND FATz CW/CS TYPE 1÷5 kW
(CW - wall-mounted version, CS - floor-standing version)

Inverter power	Nominal input voltage DC	Nominal input voltage AC	Nominal output voltage AC	Type	Dimension (W x H x D)
1 kW	220 VDC	3x400 VAC	3x400 VAC	FATz 1 T 220/400	CW6/CS6
2,2 kW				FATz 2.2 T 220/400	CW6/CS6
5 kW				FATz 5 T 220/400	CW6/CS6
1 kW		N/A	3x400 VAC	FAT 1 T 220/400	CW6/CS6
2,5 kW				FAT 2.2 T 220/400	CW6/CS6
5 kW				FAT 5 T 220/400	CW6/CS6

Catalog No: FAT 80-110

*) CW6: 500 x 700 x 250; CS6: 500 x 1400 x 250;

TAB. ASYNCHRONOUS MOTORS POWER SUPPLY SYSTEM, FAT MS TYPE 1÷100 kW
(Free installation in industrial cabinet)

Inverter power	Nominal input voltage DC	Nominal input voltage AC	Nominal output voltage AC	Type	Dimension (W x H x D)
1 kW	220 VDC	N/A	3x400 VAC	FAT 1 T 220/400 MS	600x2000x800
2,2 kW	220 VDC			FAT 2.2 T 220/400 MS	
5 kW	220 VDC			FAT 5 T 220/400 MS	
7,5 kW	220 VDC			FAT 7.5 T 220/400 MS	
10 kW	220 VDC			FAT 10 T 220/400 MS	
15 kW	220 VDC			FAT 15 T 220/400 MS	
20 kW	220 VDC			FAT 20 T 220/400 MS	800x2000x800
30 kW	220 VDC			FAT 30 T 220/400 MS	
45 kW	220 VDC			FAT 45 T 220/400 MS	
55 kW	220 VDC			FAT 55 T 220/400 MS	
55 kW	400 VDC			FAT 55 T 400/400 MS	
60 kW	400 VDC			FAT 60 T 400/400 MS	
75 kW	400 VDC			FAT 75 T 400/400 MS	1200x2000x800
90 kW	400 VDC			FAT 90 T 400/400 MS	
100 kW	400 VDC			FAT 100 T 400/400 MS	

Catalog No: FAT 80-120

TAB. ASYNCHRONOUS MOTORS POWER SUPPLY SYSTEM, FATz MS TYPE 1÷100 kW
(Free installation in industrial cabinet)

Inverter power	Nominal input voltage DC	Nominal input voltage AC	Nominal output voltage AC	Type	Dimension (W x H x D)
1 kW	220 VDC	3x400 VAC	3x400 VAC	FATz 1 T 220/400 MS	600x2000x800
2,2 kW	220 VDC	3x400 VAC	3x400 VAC	FATz 2.2 T 220/400 MS	
5 kW	220 VDC	3x400 VAC	3x400 VAC	FATz 5 T 220/400 MS	
7,5 kW	220 VDC	3x400 VAC	3x400 VAC	FATz 7.5 T 220/400 MS	
10 kW	220 VDC	3x400 VAC	3x400 VAC	FATz 10 T 220/400 MS	
15 kW	220 VDC	3x400 VAC	3x400 VAC	FATz 15 T 220/400 MS	
20 kW	220 VDC	3x400 VAC	3x400 VAC	FATz 20 T 220/400 MS	800x2000x800
30 kW	220 VDC	3x400 VAC	3x400 VAC	FATz 30 T 220/400 MS	
45 kW	220 VDC	3x400 VAC	3x400 VAC	FATz 45 T 220/400 MS	
55 kW	220 VDC	3x400 VAC	3x400 VAC	FATz 55 T 220/400 MS	
55 kW	400 VDC	3x400 VAC	3x400 VAC	FATz 55 T 400/400 MS	
60 kW	400 VDC	3x400 VAC	3x400 VAC	FATz 60 T 400/400 MS	
75 kW	400 VDC	3x400 VAC	3x400 VAC	FATz 75 T 400/400 MS	1200x2000x800
90 kW	400 VDC	3x400 VAC	3x400 VAC	FATz 90 T 400/400 MS	
100 kW	400 VDC	3x400 VAC	3x400 VAC	FATz 100 T 400/400 MS	

Catalog No: FAT 80-130

Inverters

Static Switch

Converter Hz/Hz

Rectifiers

Converter DC/DC

Control Systems

Special Systems

FAT TYPE UPS POWER SUPPLY SYSTEM DESIGN

1. MAIN DRIVE INVERTER - FAT TYPE INVERTER INCLUDING

Double conversion power system AC/DC/AC, converting alternating current into direct current, power supplying a DC intermediate voltage bus and then generating voltage with variable frequency. The inverter is controlled by a microprocessor (DSP) based on IGBT transistors with PWM pulse width modulation.

2. AUXILIARY CONVERTER FOR CONTROL CIRCUITS POWER SUPPLYING

Condition 1. Power supplying control circuits with AC voltage - BFI Inverter: The control circuits are powered from BFI type inverter.

Condition 2. DC control power supplying: control circuits power supplied by battery rectifier (220VDC), or EPI MC type DC/DC converter in the case of other required DC voltages, e.g. 24 VDC.

3. BATTERY RECTIFIER

Independent, dedicated battery pulse, PBI type transistor rectifier ensures the ideal parameters of charging and battery handling.

4. BYPASS SYSTEM

Internal system of connections together with manual mechanical bypass allowing for supply of voltage from power supplying line to motor circuit, excluding FAT inverter. The switch is used for technical reviews or other maintenance operations.

5. BATTERY PACK

Battery pack is a backup energy source of FAT system. The most commonly used batteries are VRLA type sealed and maintenance free batteries in 12 volt blocks. In the industrial BFI type Uninterruptible Power Systems it is possible to use most types of batteries: (AGM, GEL, liquid electrolyte, lead-acid, Ni-Cd, etc.). Battery pack can be placed in a cabinet with a rectifier and an inverter or in a separate cabinet.

6. OUTPUT CONTROL CIRCUITS SWITCHGEAR

In FAT system housing, uninterruptible AC or DC voltages distribution panel (depending on transducer used) equipped with protections for separated output circuits for control systems power supplying is embedded (optionally).

7. SAN 7 AUTOMATED MONITORING SYSTEM

SAN 7 monitoring section provides for monitoring, registration and visualization of all system operating states, and alarming in case of alarm states occurrence. Alarm states signaling is provided by volt-free contacts, while data transfer is provided via RS, LAN communication ports, using transmission protocols. The communication console display shows current parameters of output voltages and currents, forecaster for the system operation, the primary network voltages, battery current and voltage, ambient temperature and other data important for the system reliability.

8. CONNECTORS TERMINAL

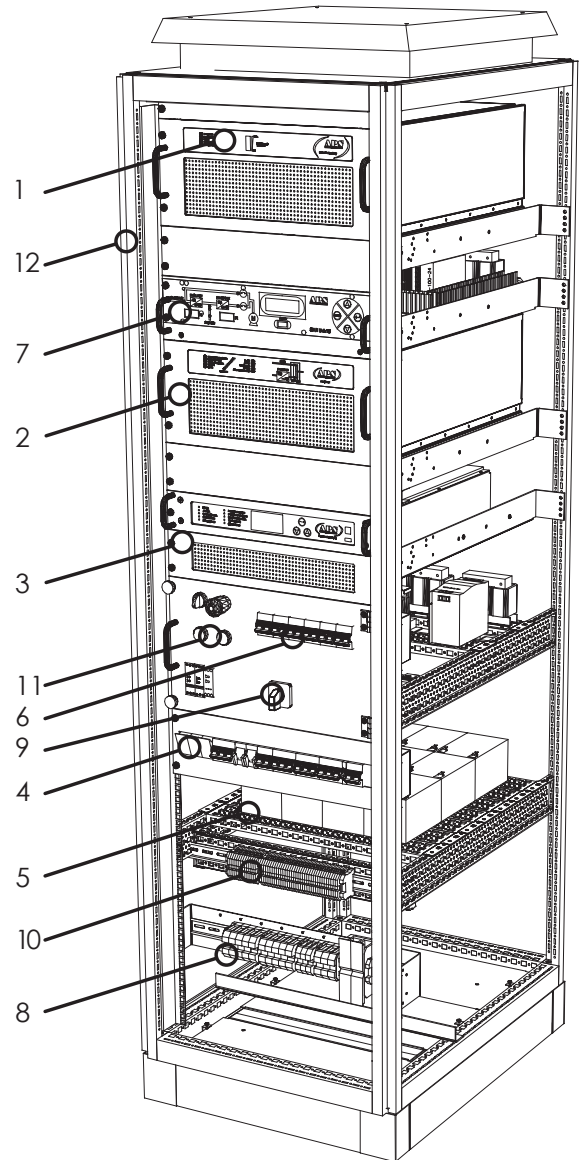
It includes connectors of power supply lines and output circuits depending on the proposed current and wiring.

9. PROTECTIONS FIELD

Include overcurrent and overvoltage protections.

10. BATTERY PACK VOLTAGE TERMINAL

Voltage of each cell is led to the battery voltages terminal to facilitate the assessment of the battery state, and in case of damage, to localize the damaged cell. The terminal enables for fast measurement of voltage of each cell.



11. START/STOP SWITCHES

Main power supply switch - operation signaled by backlight.

12. HOUSING

Industrial cabinet (one or more). The cabinets structure is welded and protected against corrosion with metallic coatings and powder paint.

BINARY INPUTS FIELD

FAT system inverter and rectifier are equipped with binary inputs and auxiliary voltage sources for their support. Different functions that cause operation of the inverter and rectifier can be assigned to the binary inputs.

PROTECTIONS

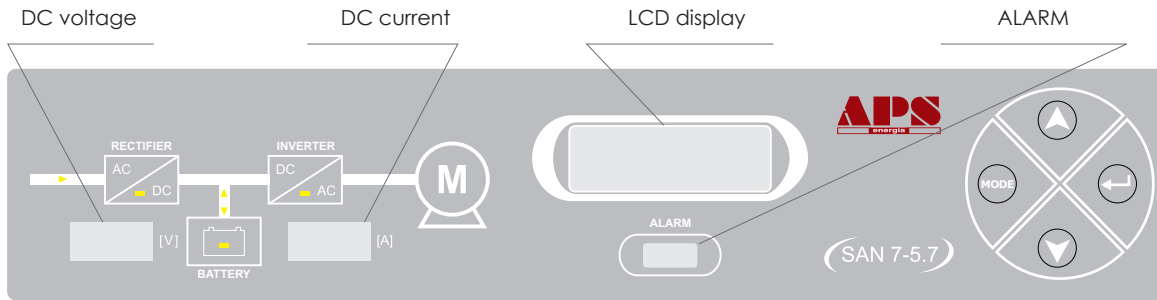
- Protections against overvoltage, overcurrent, short circuit, etc.
- Protection against excessive discharge of the power supplying battery
- Protection of internal systems against:
 - power circuits overheating;
 - voltage increase in transistors;
 - overvoltage caused by dynamic load changes;
 - internal short circuits;

COOLING SYSTEM

The systems are cooled by circulation of air forced by roof fans, which enters through the air intake situated in the bottom of the housing. Air filters are situated directly behind it. Multiple rotation speed is adjusted in function of the device internal temperature. In addition to the cabinet ventilation each module is cooled independently by it's own fans.

EMI FILTERS

One or multi-stage filters at the input and output of each of the system components reduce the level of conducted interferences, reduce UPS interferences emissions and increase resistance to interference of the device itself



PIC. FAT system console

TAB. FAT - TECHNICAL PARAMETERS

INVERTER POWER SUPPLY	
Nominal DC supply voltage	220 VDC or 400 VDC
DC voltage tolerance	VDC nom. $\pm 15\%$
Nominal AC supply voltage	3 x 400 VAC $\pm 15\%$
Supply voltage frequency	50 Hz $\pm 10\%$
INVERTER OUTPUT	
Output voltage (Un)	3 x 380 / 3 x 400 VAC
Output voltage frequency (fn)	50 Hz
Output voltage frequency regulation range	From 0 Hz to 50 Hz
Motor start-up	Frequency type
Overload	2 In within 5 s
cos Φ	0.6 to 1
Efficiency	>90%
Over-current protection	3xIn
ENVIRONMENT	
Operating temperature (EN 50178 class 3K3)	0 to +40 °C
Storage temperature	-15 to +55 °C
Humidity (EN 50178 klasa 3k3)	max. 95% (without condensation)
Access	Service and maintenance access from the front
Cable entry	From the bottom
Alltitude (maximum level without power derating)	1000 m (amsl)

TAB. SPECIAL VERSIONS

Special versions:	<p>On demand, it is possible to adapt the equipment to the specific design requirements:</p> <ul style="list-style-type: none"> • Higher power FAT inverter; • DC battery rated voltage range; • AC current voltage and frequency standard: <ul style="list-style-type: none"> ◦ inverters: 3x190 V, 3x200 V, 3x208 V, 3x220 V, 50/60 Hz; • Extending the scope of AC input voltages; • Environmental requirements in the ambient temperature range (-20 °C to + 55 °C), presence of aggressive factors, etc.; • Housing construction, including seismically resistant constructions, IP protection degree, construction of busbars, cables access from the top, paint color, etc.; • Measurement and communication: appropriate class digital or analog meters, fault indication, operating modes visualization, synoptic connections, communication protocols, etc. • Cable entry from the top.
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Inverters

Static Switch

Converter Hz/Hz

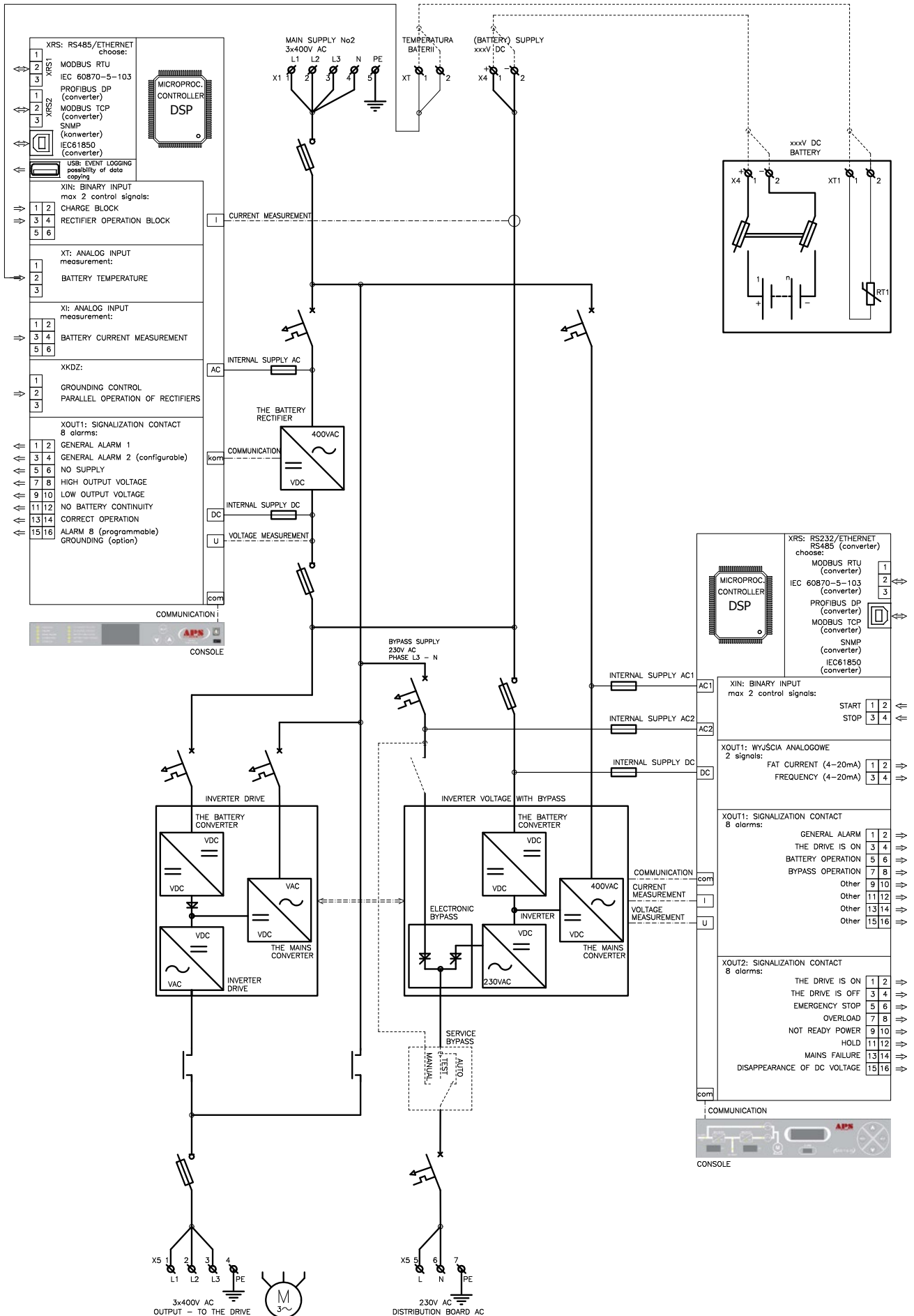
Rectifiers

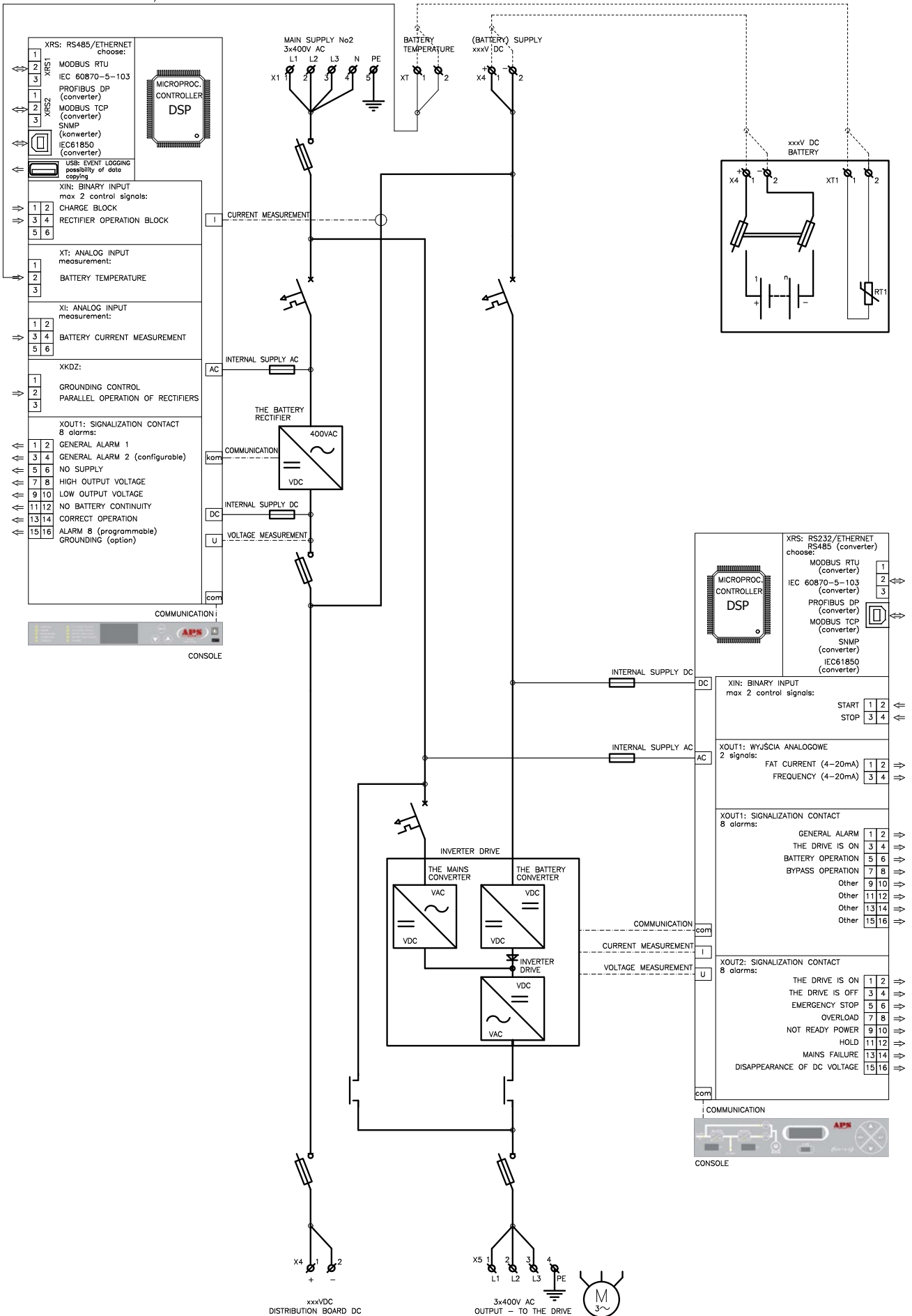
Converter DC/DC

Control Systems

Special Systems

PIC. FATz ASYNCHRONOUS MOTORS POWER SUPPLY SYSTEMS WITH ADDITIONAL CONTROL AC VOLTAGE





- Inverters
- Static Switch
- Converter Hz/Hz
- Rectifiers
- Converter DC/DC
- Control Systems
- Special Systems