SV SISTEMI DI SICUREZZA

ITALIA

EXFIRE360

DESIGN SPECIFICATION

TECHNICAL SPECIFICATION
REVISION 07 DTD. 23/03/2012
TS-0002-EN-REV.07

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REVISION INDEX

Revision index	Description	Date
Revision 01	Preliminary version	17/01/2010
Revision 02	Revised for certification	08/03/2010
Revision 03	Revised for certification	10/10/2010
Revision 04	Revised for certification	20/07/2011
Revision 05	Revised for certification	26/01/2012
Revision 06	Revised for certification	20/02/2012
Revision.07	Revised for certification	23/03/2012

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1   GENERAL INFORMATION

1.1   CODES AND STANDARDS

Reference standards
Design of hardware and software has been developed according to the following reference standards.

Construction Products Directive (CPD) – Directive 89/106/EEC
"Council Directive 89/106/EEC of 21 December 1988 on the approximation of laws, regulations and administrative provisions of the Member States relating to construction products."

EN 54-2:1997 + A1:2006
"Fire detection and fire alarm systems - Part 2: Control and indicating equipment"

EN 54-4:1997 + A1:2002 + A2_2006
"Fire detection and fire alarm systems - Part 4: Power supply equipment)"

EN 12094-1:2003
"Fixed firefighting systems - Components for gas extinguishing systems - Part 1: Requirements and test methods for electrical automatic control and delay devices (only for EX6EV-C card)"

1.2   DESIGN REQUIREMENTS

Mechanical requirements

Environmental classification	Class A -5° +40° C.
Enclosure type	19" rack-mounted units, 40U cabinet with IP30 protection degree.

Components of the extinguishing modules were selected on the basis of the performance required and are suitable to operate when the ambient conditions on the external surface of the cabinet are of 3K5 class as per EN 60721-3-3.

Manual controls
Manual controls are identified for their specific purpose. Master display is equipped with a graphical symbol to provide access to the menu. By pressing "menu" key, the operator will read the electrical parameters of each channel as well as the diagnostics of the modules.

Visible indications
Alarm, fault and other supervisory or monitoring indications are visible on the Master display, light emitting indicators adjacent to the display and on ModLcd displays installed on each module.
Touch-screen operations on Master display give access to the panel functions (at access levels 1/2/3).
Visible indications are clearly identified at access level 1 for their specific function.

Distinct light indications
Mandatory visible indications could be fully tested through "Test LED" function available at level 1 or 2.
Visible indications are clearly identified at access level 1 for their specific function.

Indications shown on alphanumeric displays
EXFIRE360 panel is designed with an alphanumeric display, which shows system information, and a set of light emitting indicators that provide the following conditions: "Power", "Alarm", "Fault", "Isolate", "Test", "Supervisory", "Output activated", etc.
The same conditions are repeated on the module's Lcd displays.

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1.3   PRECAUTIONS

- All dry contacts provided with the panel shall be connected to SELV circuits only.
- Battery enclosure shall have a flammability class equal to HB or higher.
- 230 Vac wiring shall be arranged so that wires are routed inside the dedicated tray (on the right-hand side of the mounting plate) and connected to TB-230V terminal board. Screw-type terminal blocks and wire terminals shall be used. Wiring shall be performed by professional fire alarm installers.
- Lithium batteries mounted on FRTOUCH and CPU360 shall not be replaced with batteries of different type in order to avoid explosion. Please contact the manufacturer for any enquiry.
- Wire terminations shall not be welded where the conductors are subjected to a contact pressure.
- A trip/thermal magnetic circuit breaker shall be installed to provide power to the control panel and shall be easily accessible to the authorized personnel. Rating: 230 Vac -16A.
- Requirements of the national codes and guidelines for electrical systems applicable to the Country where the panel is installed shall be complied with.

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2   MAIN TECHNICAL SPECIFICATIONS

Model: EXFIRE360
Primary power supply: 230 Vac, 50/60 Hz
24Vdc power: power supply unit certified according to EN 54-4 standard (ref. technical documents of PSU); mod.: TDK-Lambda FPS1000-24
Battery controller: EN 54-4 certified (ref. technical documents of PSU) ; mod. : TDK-Lambda LE-RA-SBC-24
Maximum current required: 10 A @230 Vac
Maximum output current: 40A (redundant), to be supplied to the panel and the load.
Maximum charging current (to standby batteries): 40 A
Rated output voltage: 27,7 Vdc
Output voltage interval: 23 ÷ 29 Vdc
Minimum voltage without primary power: 20 Vdc
Maximum battery resistance: 60mΩ
Maximum battery capacity: 2x12 V, 150Ah
Output float voltage: 30mV (0.1%, measured)
Operating temperature: from -5 to +40°C
Maximum number of CPUs: 16 remote CPUs
Maximum number of I/O modules per cabinet: 60 I/O modules
Maximum number of fire suppression modules: 29 EX6EV-C modules, 19 EX6EV-C with "FULL" configuration (8SI+6EV+6SO)
Maximum number of remote displays: 16
Maximum number of remote chassis: 16
Number of programmable zones: 255 fire alarm zones
Maximum number of detectors for each zone: 32
Maximum number of actuators for each zone: 32
Maximum number of rules (or equations) for each zone: 255 rules
Maximum number of manual release stations that can be connected to the EX6EV-C module (to manual release input line): 32
Maximum number of emergency hold devices that can be connected to the EX6EV-C module (to "hold" input): 32
CPU redundancy: yes, from 2 to 16
Redundancy of CAN communication channels: yes, two CAN controllers available
Redundancy of I/O modules: yes
Hot replacement of I/O modules: yes
Communication protocols available: TCPIP, CANbus, RS-485, 1019E, Modbus.
Graphical monitoring software: SV Enterprise, graphical user interface for stand-alone or networked panels.
Communication interfaces: n.1 RS-232, n. 1 100 Mbps Ethernet with RJ45 connector o F.O. connector available with additional EXMultibus module.
Default outputs: available on primary EX6SO module.
Modules for initiating device circuits: EX8SI, EX2GSI (for analogue fire detectors), EXLOOP-E.
Default inputs: 8 opto-isolated inputs, programmable.

NOTES:
1) Setting of LOW VOLTAGE THRESHOLD (20 V), CELL CAPACITY (150 Ah), CURRENT CHARGE (C/25) parameters of battery controller (LE-RA-SBC-24) shall not be changed for any reason;
2) LEDs on MasterLcd display, except for "GAS ON" and "SECURITY ON", are activated only in case of fire events. "Supervisory" LED is operated when supervisory initiating devices are triggered.
3) Gas alarm, intruder and supervisory conditions are shown on MasterLcd display by selecting the relevant menus.
4) Connection of I/O devices is described in the technical manuals of the modules, while sounder outputs classified as type E and type G are defined in the manual of EX6SO module.

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2.1   AVAILABLE OPTIONS WITH REQUIREMENTS (AS PER EN 54-2)

Output to fire alarm devices
Output to fire alarm routing equipment
Output to fire protection equipment
Delays to outputs
Dependency on more than one fire alarm signal (type C)
Alarm counter
Fault signal from initiating/notification devices
 Output to fault warning routing equipment
DIsabled condition of addressable devices
Test condition
Normalised input/output interface.

2.2   AVAILABLE OPTIONS WITH REQUIREMENTS (AS PER EN 12094)

Delay on extinguishing signal
Signal representing the flow of extinguishing agent
Monitoring of the status of components
Emergency hold device
Manual only mode
Triggering of equipment within the system
Triggering of equipment outside the system
Extinguishing signal to reserve cylinders
Discharge inhibition.

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3   MARKING

Modello/Model	:	EXFIRE360
Commessa/Job n.	:	
Anno/Year	:	
Cliente/Customer:	:	
ID Centrale/Panel ID	:	
Numero di Serie/Serial No.	:	
Tensione/Supply Voltage	:	230 V ~
Frequenza rete/Frequency	:	50/60 Hz
Corrente Max./Max Current	:	10 A
Grado IP/Prot. Degree	:	IP30
N° Certificato/Certificate No.:		0051-CPD-0369

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CE   12

0051

EN 54-2 - Fire detection and fire alarm systems - Part 2: Control and indicating equipment

EN 54-4 - Fire detection and fire alarm systems - Part 4: Power supply equipment

Provided options:
Output to fire alarm devices
Control of fire alarm routing equipment
Outputs to fire protection equipment
Dependencies on more than one alarm signal (Type C dependency)
Alarm counter
Fault signals from points
Output to fault warning routing equipment
Disablement of addressable points
Delays to outputs
Test condition
Standardized input/output interface
Other technical data: see documentation held by the manufacturer

Panel S/N:		SW S/N :		HW S/N :	

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Modello/Model:	EX6EV-C
Commessa/Job n.	
Anno/Year	
Cliente/Customer:	
ID Centrale/Panel ID	
Numero di Serie/Serial No.	
Tensione/Supply Voltage	230 V ~
Frequenza rete/Frequency	50/60 Hz
Corrente Max/Max Current	10 A
Grado IP/Prot. Degree	IP30
N° Certificato/Certificate No.	0051-CPD-0370

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CE 12
0051

EN 12094-1 - Fixed firefighting systems - Components for gas extinguishing systems - Part 1: equirements and test methods for electrical automatic control and delay devices

Only EX6EV-C card, installed in EXFIRE360 fire alarm control panel
Environmental class: A
Flooding zones: 1 ÷ 29
Flooding zones type: CO_2, inert gas, halogenated hydrocarbons
Delay time on extinguishing signal: 2 s
Delay time on outputs activation: 1 s
Provided options:
Delay on extinguishing signal
Signal representing the flow of extinguishing agent
Monitoring of the status of components
Emergency hold device
Manual only mode
Triggering of equipment within the system
Triggering of equipment outside the system
Extinguishing signal to reserve cylinders
Discharge inhibition
Other technical data: see documentation held by the manufacturer

Panel S/N:		SW S/N		HW S/N	

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4   PANEL DESCRIPTION AND ARCHITECTURE

4.1   INTRODUCTION

The EXFIRE360 control system is a dual-CPU, programmable and versatile control panel developed to perform integrated functions related to fire alarm management and fire suppression actuation. EXFIRE360 can be manufactured according to the safety requirements and is easily configurable using "Protection" software. EXFIRE360 panels can be networked via TCP/IP, RS-485, RS-232 and fiber optics, making it possible to design a network system with remote chassis. All communications are redundant, while Enterprise software (if required) provides central or supervising station capabilities. The panel is modular, consisting of 19-inch racks with I/O cards for fire detection and/or suppression and/or building automation. The cards are located inside the panel, while the displays (with RS-485 redundant communication) are installed at the front.

In case of failure, cards can be replaced quickly without having to operate on the terminals. In fact, terminals of the cards are accessible from the rear side of the panel. EXFIRE360 offers a series of cards (with hot swapping capability) for monitoring analogue addressable detectors, conventional lines, analogue/digital inputs and outputs and for the control of fire suppression systems. All card displays are touch-screen with command keys (password protected) for various functions, such as viewing events or perform advanced diagnostics on inputs and outputs. Communication between the displays and the cards is through a redundant RS-485 link.

Fire suppression is controlled by dedicated modules that monitor the status of the electrical equipment (pressure switches, solenoid valves, etc.) according to the requirements of EN 12094 standard.

Line monitoring is a common feature of the panel, except for the relay outputs.

Panel configuration is downloaded to the panel via the USB interface, while the operator can have access to the panel functions both locally (through the panel display) or remotely (using a personal computer).

The minimum composition of the panel consists of a dual CPU architecture (with hot stand-by), a touch-screen display, a BUSCPU card and a EX6SO module for the mandatory EN 54 requirements.

Alarm and trouble indicators are shown both on the display and on dedicated light emitting indicators. Although EXFIRE360 is mainly a fire alarm control panel, it can also control supervisory signals from valves or third-party systems without interfering with the parameters of EN 54-2 standard.

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4.2   19" RACK CABINETS: MECHANICAL DESCRIPTION

Standard EXFIRE360 fire&gas control panel is provided with a self standing cabinet, with front access and predetermined size 2100 (h) x 800 (W) x 800 (D) mm (including 100 mm of cabinet base).
The panel consists of the following components:

-    a main base rack with a touch-screen display (with integrated keyboard) and two CPUs;
-    additional racks for I/O modules (installed on the rear side of the panel);
-    a series of chassis for housing the card displays;
-    a power supply unit (two front-end 40 A units);
-    battery controller for monitoring primary and secondary power supplies;
-    battery package designed to meet the requirements of secondary power supply.

Main base rack and the chassis for the card displays are mounted on the swing frame, thus rotating with it (if necessary) to give access to the racks for the I/O modules (located on the rear side of the cabinet).
DIN-rail terminal boards are provided on the mounting plate, so that wiring and maintenance are greatly simplified.
The panel shall be assembled, wired and programmed by competent personnel (factory trained), who shall be fully aware of the composition of the panel and the specific requirements of the manufacturer.
EXFIRE360 is delivered with an installation and an operator's manual and with a set of technical datasheets for each module.

4.3   EXFIRE360'S INTERNAL ARCHITECTURE

EXFIRE360 fire&gas control panel is equipped with the following basic components:

- n.1 power supply unit with two redundant 40 A units and a 40 A battery charger (TDK-LAMBDA mod. FPS1000-24);
- n.1 battery controller with seven relay outputs associated with different trouble conditions (TDK-LAMBDA mod. LE-RA-SBC-24);
- n.1 bay for the CPUs and the BUSCPU board
- n.1 bay for master display;
- n.1 chassis for CANBUS card;
- n.1 BUSCPU controller;
- n.2 CPUs with hot standby and replacement;
- n. 1 EXFRLCD module with touch-screen display and keyboard;
- n. 1 CANBUS card with ten connectors for plugging the I/O modules;
- n.1 EX6SO module (required by EN 54-2 standard);
- n.1 BUSLCD board for the installation of the touch-screen displays of each I/O module;
- n.1 software license of Protection 7.0;
- n.1 USB dongle key for Protection software.

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4.4   SET OF INPUT AND OUTPUT MODULES

Up to six subracks for the I/O modules can be installed in the EXFIRE360 panel. Each subrack is designed for a maximum of ten modules; the maximum number of modules for a single panel is therefore equal to sixty.
Following is the list of modules available to perform fire detection, fire alarm and suppression functions:

CPU360   CPU, up to 16 (redundant)
EX8SI   module with eight supervised inputs
EX2GSI   module with two 4-20 mA analogue input lines
EX8RO   module with eight SPDT relay outputs
EXLOOP-E   analogue addressable module for Hochiki ESP devices
EX6SO   module with six supervised 24 V outputs
EX8D I/O   module with eight digital inputs and outputs
EX6EV   module for the activation of solenoid valves (to be combined with EX8SI for fire suppression
                  purposes)
MULTIBUS   module for the communication with third-party systems
EX6EV-C   EN 12094-1 certified fire extinguishing control module (combines EX6EV and EX8SI). Provides ten
                  supervised inputs, four supervised outputs, two SPDT relays and fourteen open collector outputs.

Every I/O module is equipped with seven open collector outputs (except for EX8RO).

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4.5   EXFIRE360'S FUNCTIONAL ARCHITECTURE

The following block diagram shows the functional architecture of the panel, which is based on the concept of dual redundant CPUs. Each CPU provides two RS485 ports, one USB interface for programming purposes and one TCP/IP port. The I/O map of the CPU contains a series of predefined addresses for ensuring read/write access to the different functions of the panel. CAN Bus protocol establishes the communication between the CPUs and the peripherals (CAN Bus is also redundant).

Central Unit Architecture

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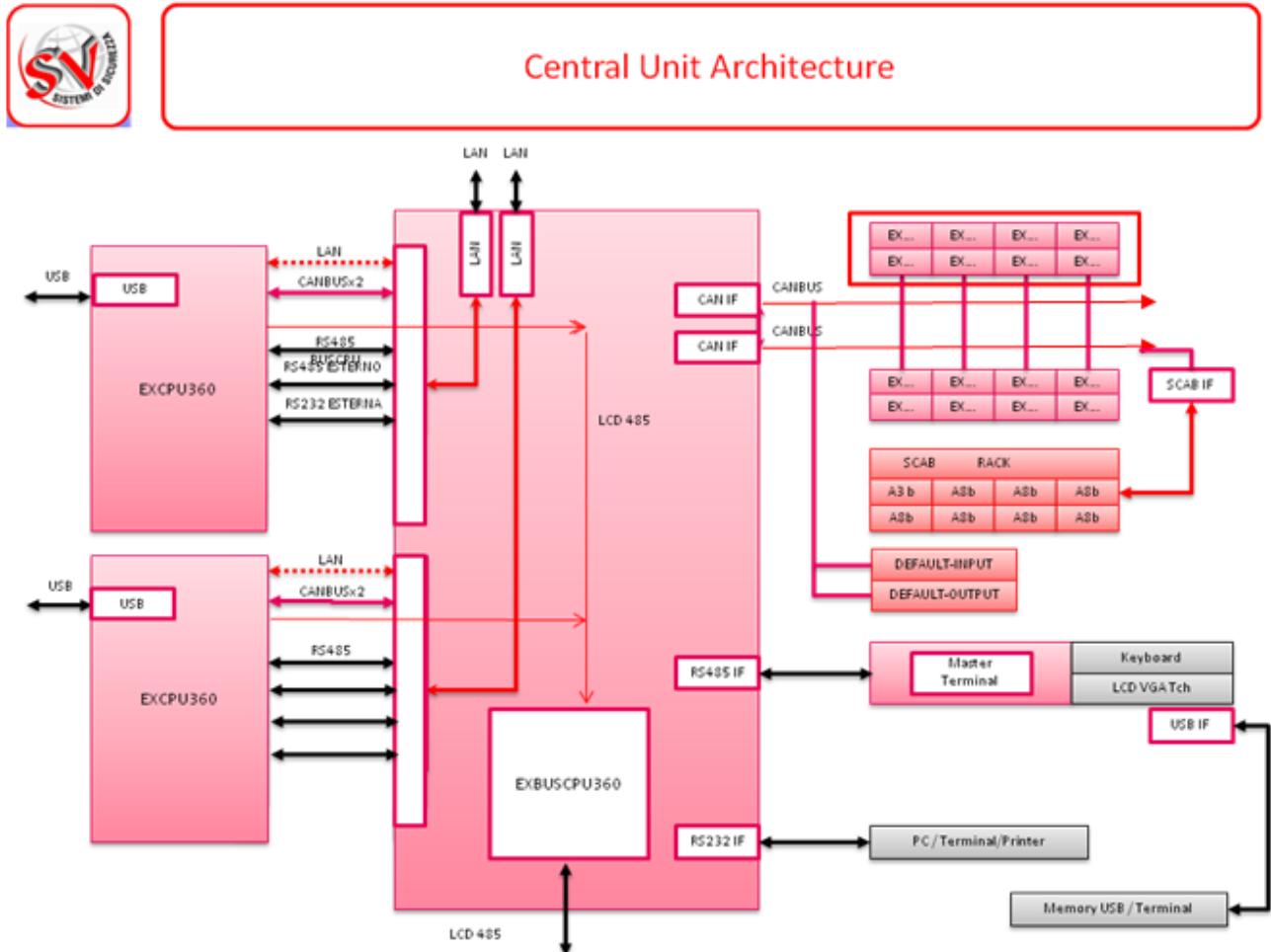
5   MASTERLCD CARD

MasterLcd is the main panel display with touch-screen capability. In addition to the LCD interface, this module has 22 light indicators, 24 keys and a USB port for the configuration of the display. MasterLcd shows the status of the entire fire alarm system, including system information.

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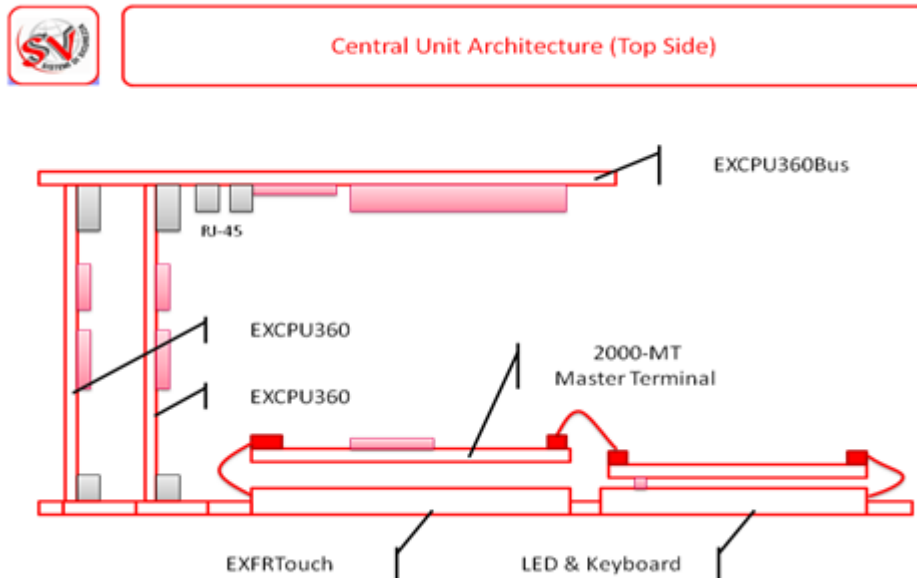
5.1 TECHNICAL DATA

- Self diagnostics of 13 hardware blocks
- Automatic addessing
- n.1 7" touch-screen LCD with 800x480 resolution
- n.22 light indicators (for alarm/trouble indication)
- n.24 keys
- n.1 humidity sensor
- n.1 temperature sensor
- n.2 RS485 ports for the connection of BUSCPU and remote MasterLcds
- n.1 CAN Bus port for the connection to one of the two CAN bus links
- n.1 4-pole connector (two positive and two negative) for power supply
- n.1 14-pole audio connector
- n.1 8-pole connector for a local speaker
- n.1 6-pole connector for the connection of a microphone
- n.1 15-pole connector for the connection of the LCD module and the keyboard
- n.1 Ethernet port
- n.1 buzzer
- n.1 USB port (type A)
- n.1 24 V input (fuse protected)
- Monitoring of card temperature during operation
- Monitoring of card humidity during operation
- Real time supervision of CAN Bus communication
- Monitoring of 24 Vdc/5 Vdc/3.3 Vdc voltages
- RS485 connection to a remote chassis (up to 1 km)
- Power supply voltage: 21-30 Vdc
- Quiescent current draw at 24 Vdc: 100 mA
- Operating temperature: from -5 to +40°C
- Storage temperature: from -10 to +50°C
- Relative humidity: <= 95% (non condensing)

6   CPU360 MODULE

6.1   GENERAL DESCRIPTION

EXFIRE360 panel is controlled by two redundant CPUs. An LPC2468 processor is mounted onboard the EXCPU360 modules, which is also equipped with two RS485 ports, two CAN Bus interfaces, 1 USB port for local programming and 1 Ethernet interface.

The interface between the CPU and the panel functions is executed through a series of read/write instructions at predefined addresses in the I/O memory map of the CPU. The following block diagram defines the interfaces between the CPU and the peripherals.
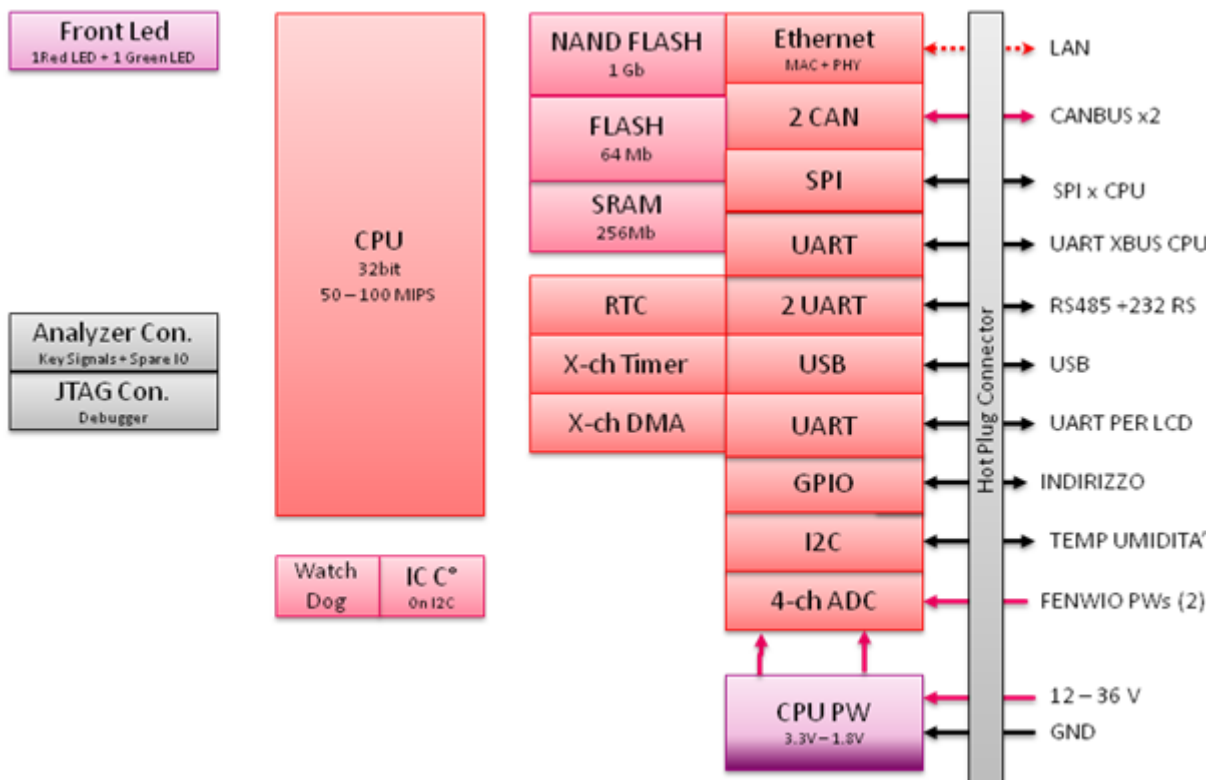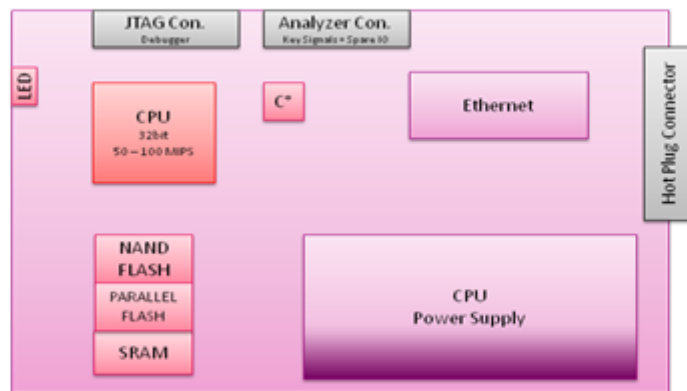
6.2   TECHNICAL DATA

- Self diagnostics of 13 hardware blocks
- 72-pole connector with hot plug capability
- Plugged into a mating connector on BUSCPU backplane
- 32 bit microprocessor
- 1 Ethernet port
- 1 USB port for panel programming with "Protection" application
- Status information with high-intensity light emitting indicators
- Monitoring of card temperature during operation
- Monitoring of card humidity during operation
- Real time supervision of CAN Bus communication
- Monitoring of 24 Vdc/5 Vdc/3.3 Vdc voltages
- Operating modes programmable by software
- Power supply voltage: 21-30 Vdc
- Quiescent current draw at 24 Vdc: 200 mA
- Maximum load of O.C. outputs: 500 mA
- Operating temperature: from -5 to +40°C
- Storage temperature: from -10 to +50°C
- Relative humidity: <= 95% (non condensing)
- Eurocard size: 160mmx100mm

6.3   DESCRIPTION OF LEDS

EXCPU360 front panel has six Leds with the following functions:

DL1 (green color): CPU is powered on

DL2 (green color): CPU is identified as "Master"

DL3 (yellow color, on steadily): CPU has detected a fault in any I/O module of the panel

DL4 (red color): the CPU is being initialized

DL5 (green color): Ethernet link is operating normally

DL6 (green/red color): indicates if the CAN Bus communication is operating (green) or not (red)

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7   BUSCPU CARD

BUSCPU is designed to control redundant communications, from CPU switchover to TCP/IP, RS485 and RS232 links. Communication parameters are display on the panel, in order to provide full supervision to the operator.
BUSCPU has also the specific function of a backplane card which connects the CPUs.

BUSCPU is protected from mechanical damage as well as from electromagnetic interference, and is mounted on the rear side of the subrack.

The card is supplied with two 72-pole connectors for installing EXCPU360 units, n.36 terminals for input/output signals, n.2 RJ45 Ethernet ports, one 20-pole audio connector, n.2 RJ45 CAN Bus ports, n.2 RJ11 I/O ports for connecting remote displays and n.2 9-pole connectors for printers.
Separation of power supply circuits and overcurrent protection is ensured. Four 0 Vdc output terminals and four 24 Vdc output terminals are provided.
Two outputs for sounders and one outputs to voice alarm systems are also available.
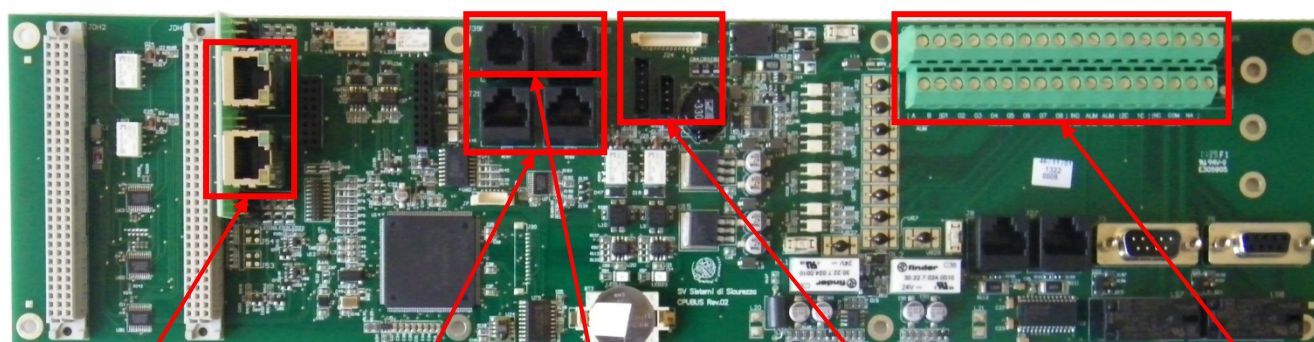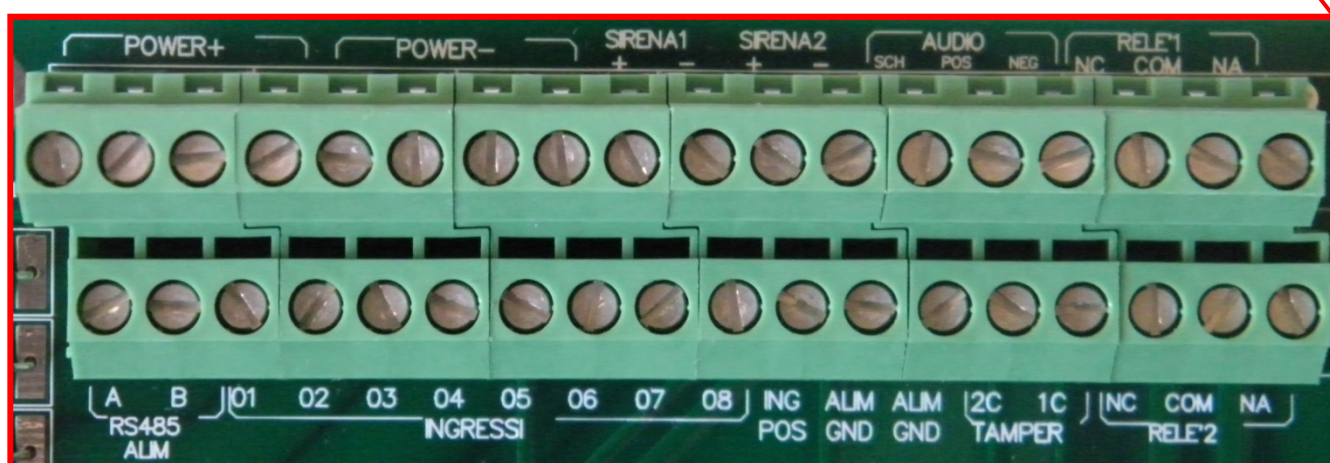

ETHERNET   CANBUS   RS485   AUDIO

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7.1 TECHNICAL DATA

- Self diagnostics of 13 hardware blocks;
- Installed on the backplane (which can be opened for inspection) of a 19" subrack;
- n.2 outputs for sounder circuits;
- n.2 72-pole connectors for EXCPU units in hot standby configuration;
- n.36 terminals for input/output connections (maximum wire size: 1.5 mm^2);
- n.2 RJ45 TCP/IP ports;
- n.1 audio connector (20 poles);
- n.2 RJ45 CAN Bus ports;
- n.2 RJ11 serial ports for connection of remote displays (in/out);
- n.2 RS232 connectors for serial printers;
- n.7 digital inputs;
- Monitoring of card temperature during operation;
- Monitoring of card humidity during operation;
- Real time supervision of CAN Bus communication;
- Monitoring of 24 Vdc/5 Vdc/3.3 Vdc voltages;
- Status of input lines is shown on the panel display;
- CAN Bus connection of remote subracks, up to 1 km;
- Operating modes programmable by software;
- Power supply voltage: 21-30 Vdc
- Quiescent current draw at 24 Vdc: 200 mA
- Operating temperature: from -5 to +40°C
- Storage temperature: from -10 to +50°C
- Relative humidity: <= 95% (non condensing)
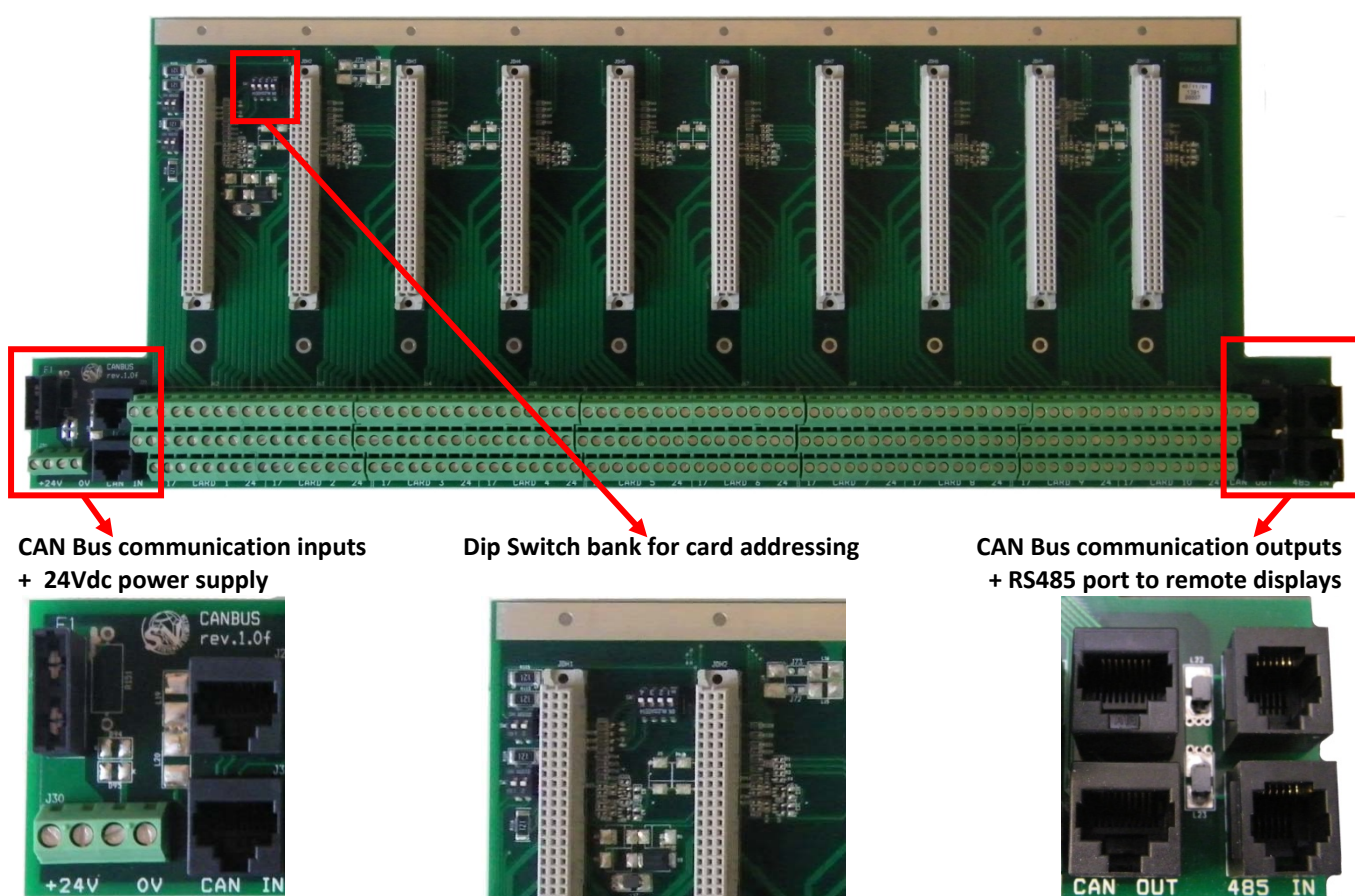- Card size: 420mmx100mm.

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8   CANBUS CARD

CANBus card is used to connect EXFIRE's I/O modules and transmits signals from/to the CPUs. CAN Bus dual redundant network establishes the communication between CANBus card and BUSCPU card, which, in turn, connects EXCPU360 units.
CAN Bus (redundant) communication interface permits the remote installation of the CANBus card (and, therefore, of I/O modules) up to 1 km from the CPUs. CAN Bus over fiber optics could further extend this distance up to 5 km.

CANBus card is mounted on the backplane of a subrack and consists of ten female connectors for I/O modules. Four power supply terminals are provided (two positive and two negative) with 20 A overcurrent protection fuses. RJ45 ports are used for CAN Bus communication, while a RS485 connection is available for connecting remote displays.

Binary address of CANBus card is set by means of four dip switches located on top left-hand side of the card.

CAN Bus communication inputs   **Dip Switch bank for card addressing**   **CAN Bus communication outputs**
+ 24Vdc power supply   **+ RS485 port to remote displays**

8.1   TECHNICAL DATA

CANBus card consists of the following main components:

Component	n.
Terminals (for 1.5 mm^2 wires)	240
20 A fuses	2
Terminals for 24 Vdc power supply (max wire cross section: 1.5 mm^2	4
RJ45 input ports for CAN Bus communication	2
RJ45 output ports for CAN Bus communication	2
RJ11 ports for serial in/out RS485 connection of remote displays	2

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9   BUSFR CARD

This card provides the connection of MODLCD touch-screen displays, which represent the operator's interfaces to each input and output module. It is connected to CANBUS through two redundant RS485 links.
Each CANBUS card shall have its correspondent BUSFR card, even though the operation of the I/O modules is not affected by BUSFR card (whether connected or not).

As for BUSCPU, BUSFR is protected from mechanical damage as well as from electromagnetic interference, and is mounted on the rear side of the subrack (which can be inspected by opening the hinges on the rear side of the subrack).

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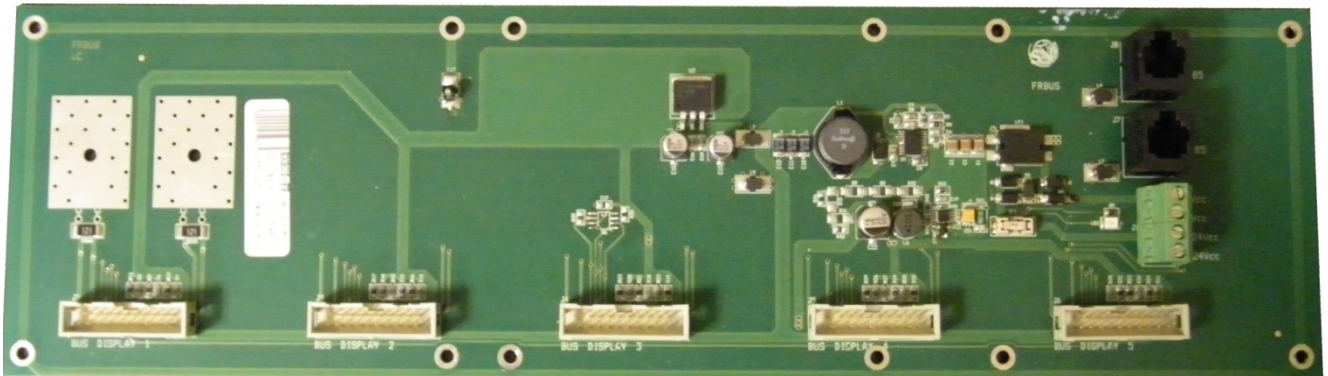
9.1 TECHNICAL DATA

BUSFR card consists of the following main components:

Component	n.
Terminals for power supply – 24 V positive (max wire cross section: 1.5 mm^2)	2
Terminals for power supply - 0 Vdc (max wire cross section: 1.5 mm^2)	2
RJ11 ports for serial in/out RS485 connection of displays	2
Connectors for MODLCD displays	5

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