TSA1
BESS Solutions

Addressable fire detection and extinguishing systems

Tecnofire® DETECTION
by Tecnoalarm®

Edition 2 - 2026

Tecnofire DETECTION
BESS SOLUTIONS

BESS SOLUTIONS

EN 54
EN 12094-1

BESS Systems

BESS (Battery Energy Storage Systems) are now an indispensable technology for the energy transition, as they stabilise the electricity grid by efficiently integrating renewable sources. However, the very nature of lithium batteries introduces specific risks that require a multi-level safety approach.
The main danger is **thermal runaway**, a chemical chain reaction capable of generating extreme heat and releasing gas, with a consequent risk of fire or explosion. To prevent such scenarios, the design must comply with strict international standards such as UL 9540 and NFPA 855, as well as the recent Italian directives defined by Circular V.V.F. No. 21021 of December 2024 in the case of installations in Italy.

In this context, **Tecnofire offers a range of advanced system solutions** designed to adapt to any scale of extension: from single units, **SINGLE BESS**, to solutions with multiple units, **MULTI BESS**, to large unit installations for large-scale systems, **LARGE** and **GIGA BESS**.

Regardless of the size of the system, the core of the protection lies in an active protection system certified according to EN 54 and EN 12094 standards.
The technologies offered by Tecnofire cover any solution and are not limited to detection alone, but intervene promptly through the control of fixed extinguishing devices, such as aerosols, designed to saturate the environment and block the spread of uncontrolled chemical phenomena from the moment they first appear.

The effectiveness of the system is guaranteed by **constant and intelligent monitoring**. Through the **TSA1** system, the protected environment is analysed in real time to detect sudden changes in temperature or the presence of smoke and gases (off-gases). In the event of an anomaly, the control panel coordinates an automatic response that includes the activation of alarms, the release of DC/AC emergency electrical disconnectors and communication with ventilation systems. For more complex installations, the security architecture provides for **centralised supervision** via **SCADA** or **EMS**, which integrates data from the various **BMS** (Battery Management Systems) into a single interface, ensuring redundancy and operational continuity even in the event of individual failures.

In addition to the technological component, **regulatory compliance** requires strict management of documentation and emergency procedures. Each system must be accompanied by detailed operating manuals, updated diagrams and clear safety signage in accordance with the regulations in force in each country.
Finally, long-term safety is ensured by mandatory periodic maintenance, carried out in accordance with local regulatory criteria, and by the retransmission of alarms to the fire brigade's operations rooms. Thanks to the integration of these measures, **Tecnofire ensures a complete protection ecosystem**, capable of safeguarding both technological investment and public safety.

	SCALABILITY OF BESS SYSTEMS MANAGED BY TECNOFIRE TSA1			
	SINGLE BESS	**MULTI BESS**	**LARGE BESS**	**GIGA BESS**
Managed BESS Units	**1 unit**	**Up to 10 units**	**Up to 150 units**	**Up to 1000 units**

Addressable fire detection and extinguishing control panel 1 Loop

Addressable fire detection and extinguishing control panel. The characteristics listed refer to the TSA1 EXTENDED set-up. Equipped with a detection loop and an Extinguish Device Unit (EDU).
The detection loop can handle up to 199 detectors, 99 modules and 9 TSM1 modules (peripheral EDU extinguishing channels).
2 RS485 serial buses for expansion device connection, up to 5 devices chosen from: repeater panels and/or communication devices. Serial buses also allow you to connect the unit in a network of Tecnofire control panels.
The control panel manages 150 detection zones associated with 100 alarm plans, 8 time ranges. Advanced management with logic based on the application of formulas that dynamically relate the operating status of the system devices.
100 formulas. 100 Virtual detection zones. The control panel is equipped with 3 specialist signal outputs and 2 openly programmable signal outputs. The integrated EDU is equipped with: 3 conventional detection zone inputs, 7 controlled inputs for the management of the actuating and control devices, 2 controlled outputs for the management of the extinguishing valves, 2 controlled outputs for the management of the optical-acoustic alarm devices, 5 specialist signal outputs. Automatic or manual operating mode.
Extinguishing cycle with 5 execution modes. Centralised or local management of 10 independent EDU, with local or centralised extinguishing cycle control, also in switching execution mode. User interface: 4.3"colour display, soft touch programming and management keyboard, 33 signal LEDs. Multifunctional acoustic warning buzzer. System RSC® management: programming, remote management and control. Customisable or permanent four-year calendar management. Event memory managed in FIFO logic capacity 8.192 events. Modular 2.7A switching power supply unit. Battery capability: 2 x 12V-7Ah. ABS and steel cabinet. Surface mounting or via optional adapters in 19" rack cabinet. Protection rating IP3x.
Available in the following colours: White, Grey, Red, Yellow. Dimensions (L x H x D) 440 x 345 x 146mm.
Approved EN 54-2: 1997+ A1:2006 - EN 54-4: 1997+ A2:2006 - EN 12094-1: 2003.
Certification 0051-CPR-2816.

MODELS			RSC	EN 54-2 54-4	EN 12094-1	1 LOOP	EDU EXTINGUISHING DEVICE UNIT	3 CONVENTIONAL ZONES Z1 Z2 Z3 32 32 32	COLOR DISPLAY 4.3"	24V 2.7A 2.7A POWER SUPPLY	STEEL ABS BOX
Name	**Item no.**	**Colour**									
TSA1	**TF1TSA1-UK**	White									
	TF1TSA1Y-UK	Yellow									
	TF1TSA1R-UK	Red									
	TF1TSA1G-UK	Grey									

TSM1

Addressable fire detection and extinguishing module for TSA1 control panel

Addressable fire detection and extinguishing module. Complete management of a decentralised extinguishing channel.
Operating mode: autonomous or following the extinguishing logic given by the TSA1 control panel.
The integrated EDU is equipped with: 3 conventional detection zone inputs, 7 controlled inputs for the management of the actuating and control devices, 2 controlled outputs for the management of the extinguishing valves, 2 controlled outputs for the management of the optical-acoustic alarm devices, 5 specialist signal outputs, 2 openly programmable signal outputs.
Automatic or manual operating mode. Extinguishing cycle with 4 execution modes.
RS485 serial bus for connecting TFT-4.3C repeater panels. Connection on detection loop, double line isolator.
Power from external source, rated voltage 24V DC. User interface: 2.4" capacitive colour touch screen display, 18 signal LEDs.
Multifunctional acoustic warning buzzer.
Detection logic of the three conventional zones determined by the associated detection formula.
The three conventional zones can be replaced with other analogue detection zones operated by the TSA1 unit.
RSC® management of the device: programming, remote management and control of all operating parameters.
Surface mounting or direct coupling to DIN omega bar. ABS housing. Protection rating IP3x. White colour.
Dimensions (L x H x D) 189 x 117 x 61mm.
Module conforming to EN 54-18:2005/AC:2007 - EN 54-17:2005 - EN 12094-1: 2003.
Certification 0051-CPR-2816.

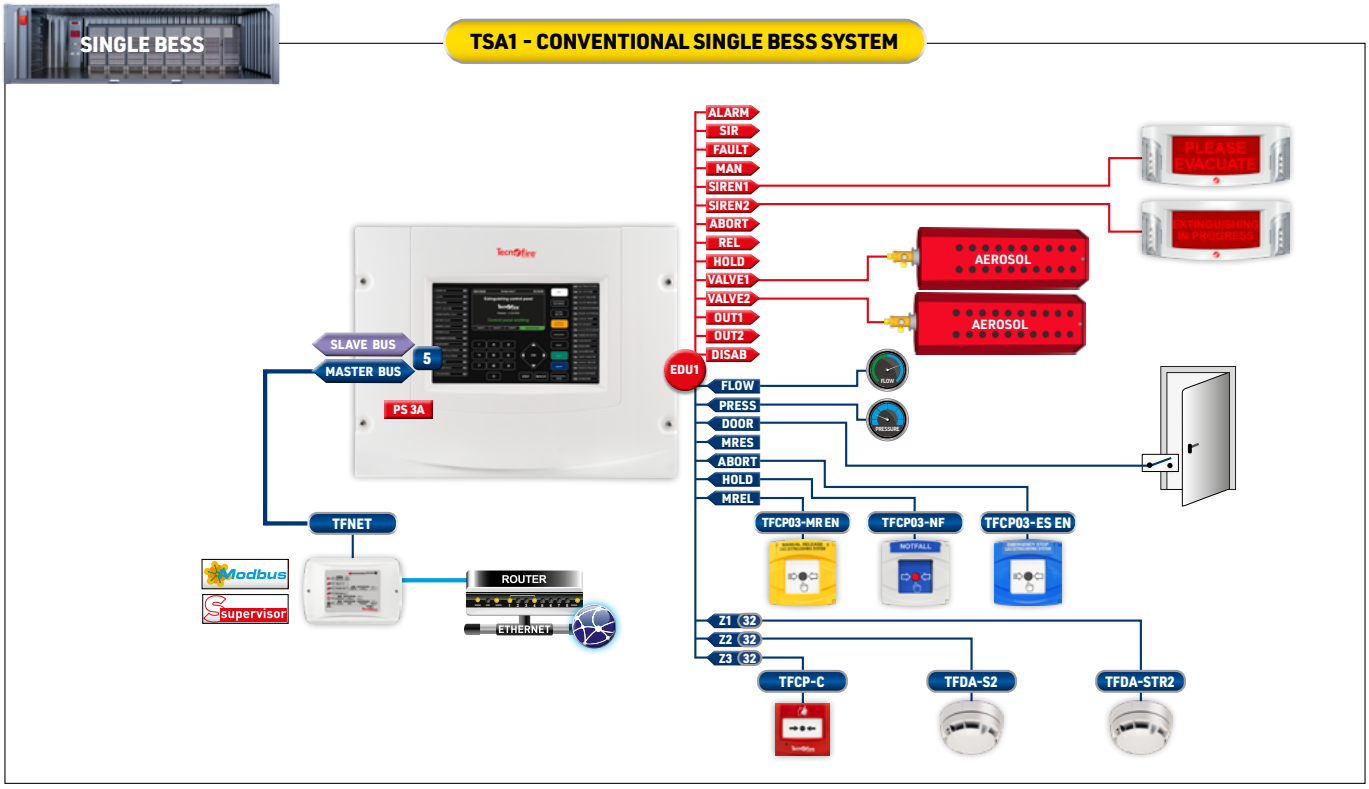
MODELS										
Name	Item no.		RSC®	EN 54-18 54-17	EN 12094-1	EDU EXTINGUISHING DEVICE UNIT	3 CONVENTIONAL ZONES Z1 Z2 Z3 32 32 32	TOUCH SCREEN 2.4"	DIN RAIL MOUNT	ABS BOX
TSM1	TF4TSM1-UK									

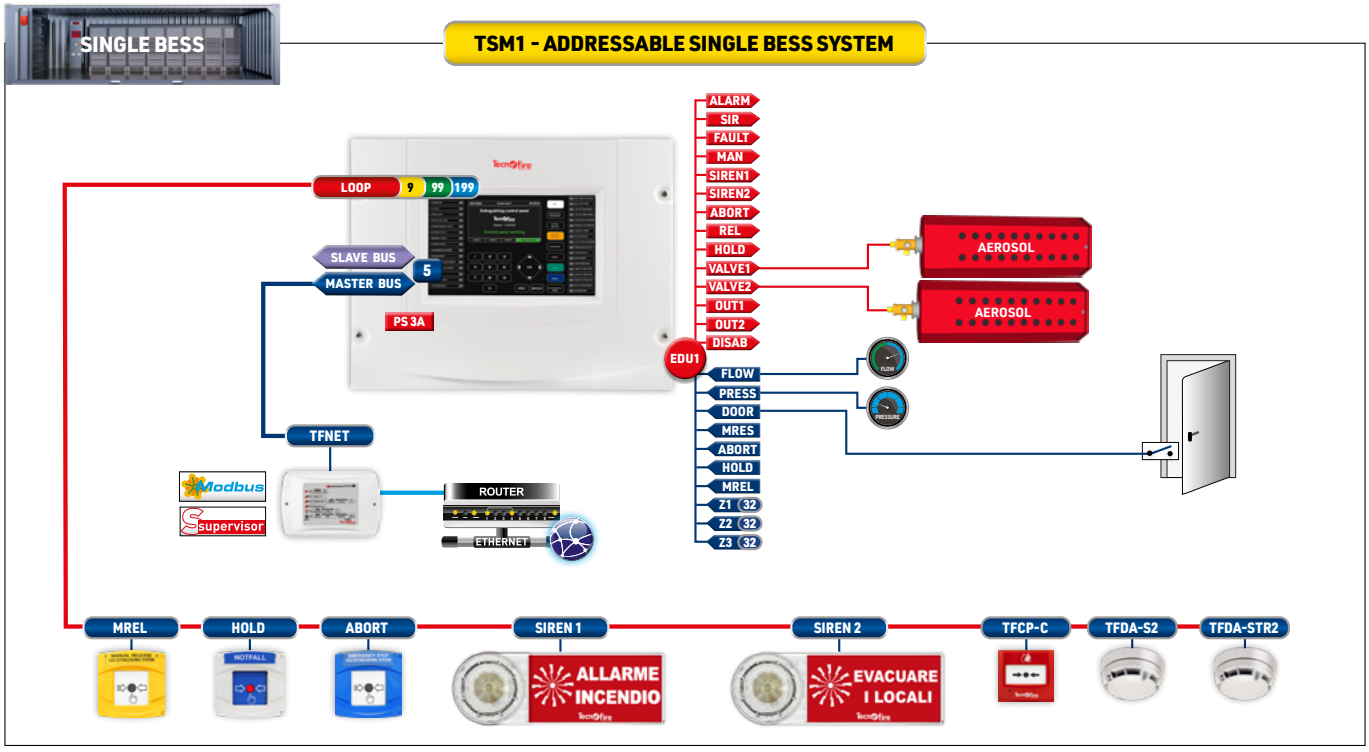
TYPICAL COMPONENTS OF A FIRE DETECTION AND EXTINGUISHING SYSTEM FOR A BESS UNIT					
A	TSA1 detection and extinguishing control panel	**B**	Optical and acoustic alarm device	**C**	Manual command call points
D	Input and output interface modules	**E**	Optical and thermovelocimetric detectors	**F**	ATEX gas detector

SINGLE BESS SYSTEM

A SINGLE BESS system with a TSA1 control panel can be implemented with either conventional or addressable devices. In conventional systems, the detection, signalling and management devices are connected to the conventional inputs and outputs of the control panel; in addressable systems, all devices are connected to the detection line.

SINGLE BESS - 1 unit	MULTI BESS - Up to 10 units	LARGE BESS - Up to 150 units	GIGA BESS - Up to 1000 units



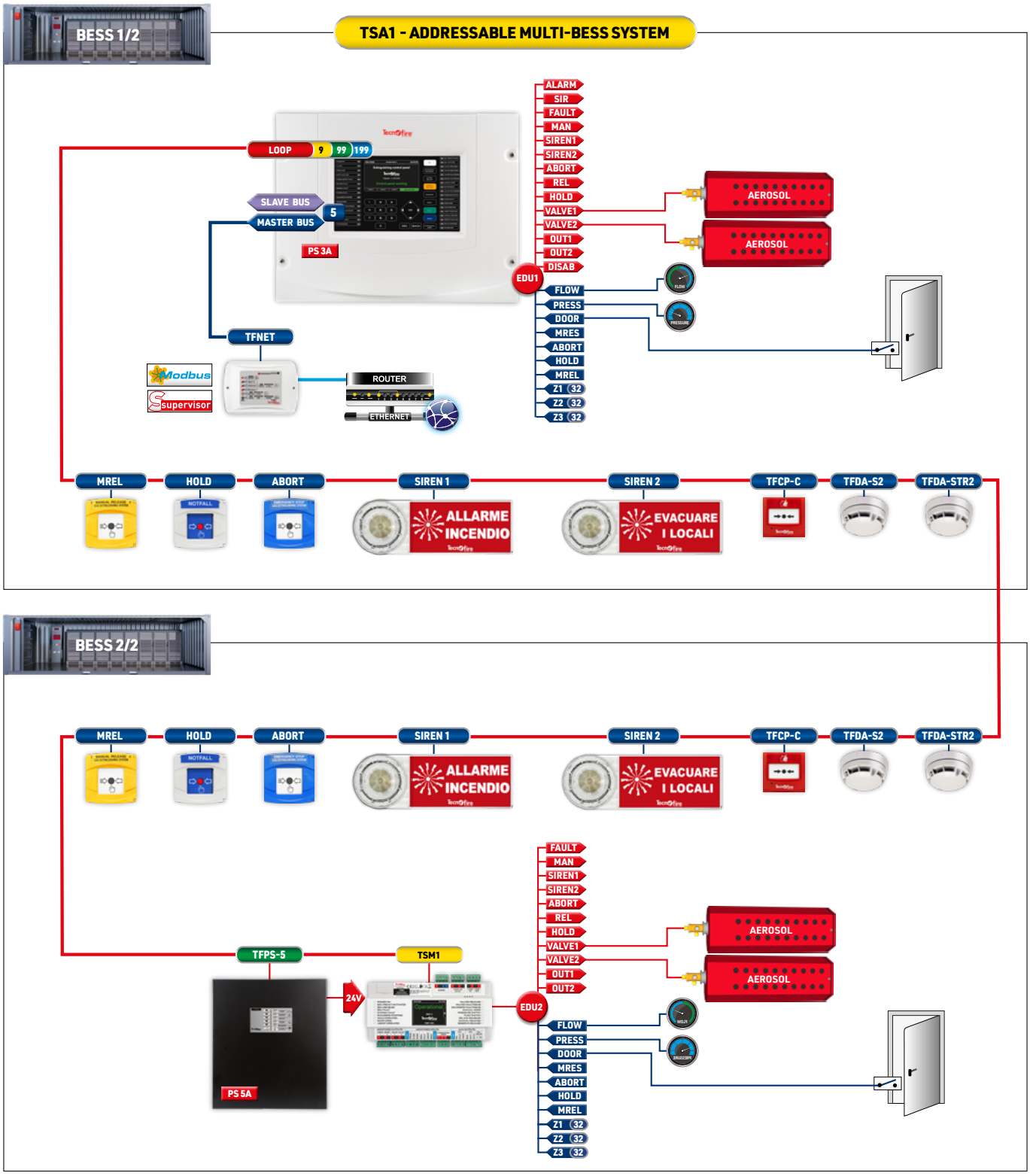


MULTI BESS

MULTI BESS SYSTEM

Multi BESS systems are made up of a TSA1 control panel and one or more TSM1 extinguishing modules (up to a maximum of nine), connected to the control panel's detection line. A MULTI BESS system can protect up to ten BESS units.

SINGLE BESS - 1 unit	**MULTI BESS - Up to 10 units**	LARGE BESS - Up to 150 units	GIGA BESS - Up to 1000 units



LARGE BESS

LARGE BESS SYSTEM

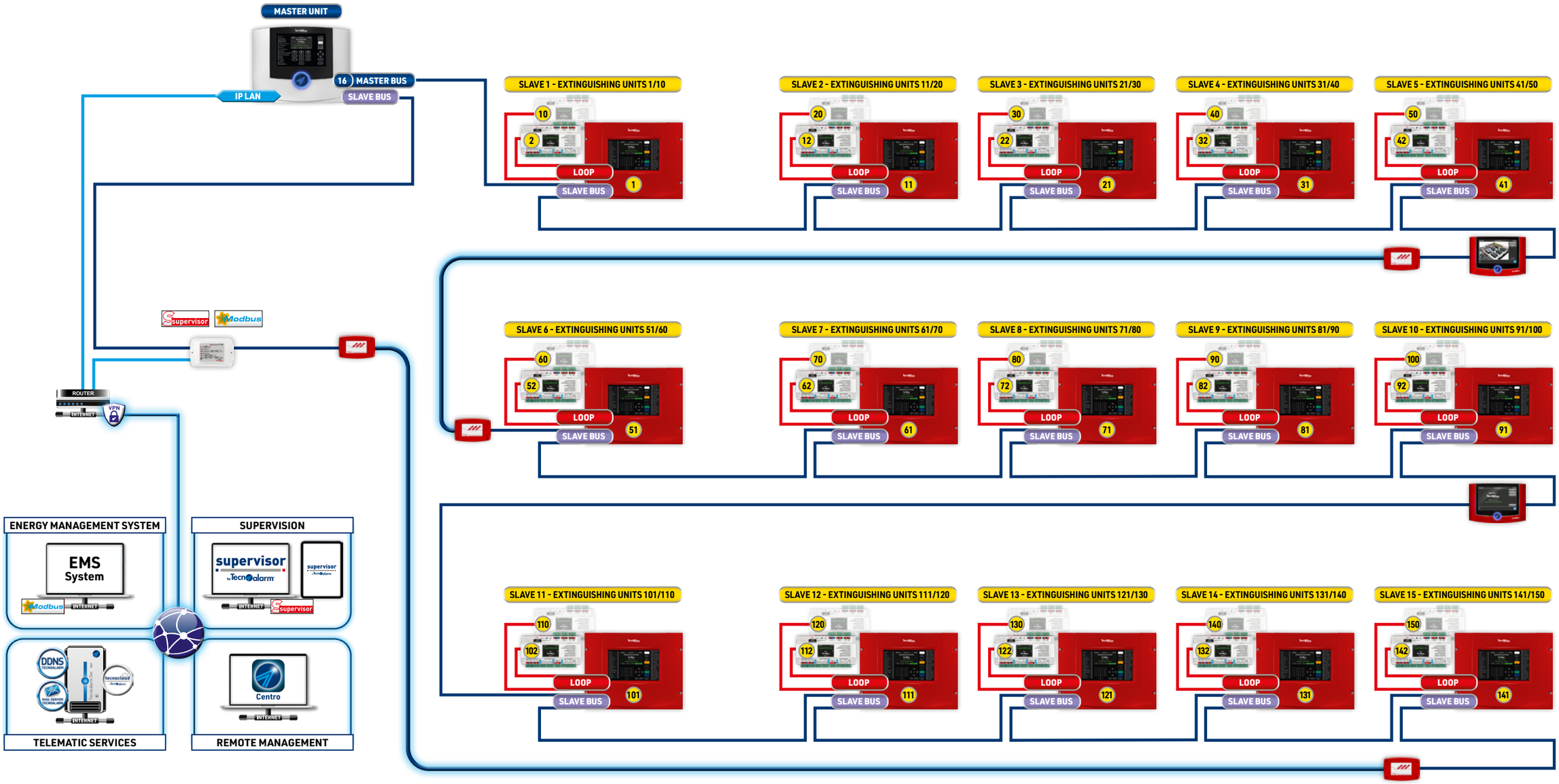
A LARGE BESS system, configured as a network of control panels, consists of one Master TFA2-596 panel and up to 15 Slave TSA1 panels. Specifically, the architecture is structured as follows:

- **Extinguishing Capacity:** each TSA1 unit can manage up to 9 extinguishing modules, allowing the system to reach a total of 135 controlled modules (or up to 150 total units, depending on the network configuration);
- **Network Infrastructure:** the connection between control panels can be established via copper or fiber optics; in the latter case, the TFSFC01 RS485/Fiber converter is used;
- **Hierarchy and Supervision:** the Master panel fully controls the Slave units and receives all signals and operational statuses; the collected data is sent to the TFNET interface which, in turn, forwards notifications to the SUPERVISOR software for centralized monitoring.

SINGLE BESS - 1 unit	MULTI BESS - Up to 10 units	**LARGE BESS - Up to 150 units**	GIGA BESS - Up to 1000 units

TSA1 - BESS Solutions

Device	Role	Function	Functional Description
TFA2-596 or TFA4-1192	Master Control Panel	Master Unit (1 unit)	Coordinates the entire system, receives signals from Slave units, and manages data transmission to the TFNET interface.
TSA1	Slave Control Panel	Slave Units (Up to 15 units)	Manages detection and extinguishing for its local EDU unit. It can support up to 9 additional EDU units (via TSM01 modules).
TSM1	EDU Expansion module	Extinguishing module	Manages detection and extinguishing for the EDU unit.
TFNET	IP Interface	Communication Gateway	Connects the Master control panel to the SUPERVISOR software via LAN/WAN networks.
TFSFC01 Converter	Physical transmission medium	Network infrastructure	Copper or fiber optic network infrastructure for communication between networked control panels.
SUPERVISOR Software	Supervision	Monitoring	Supervision software for the monitoring and management of the control panel network.

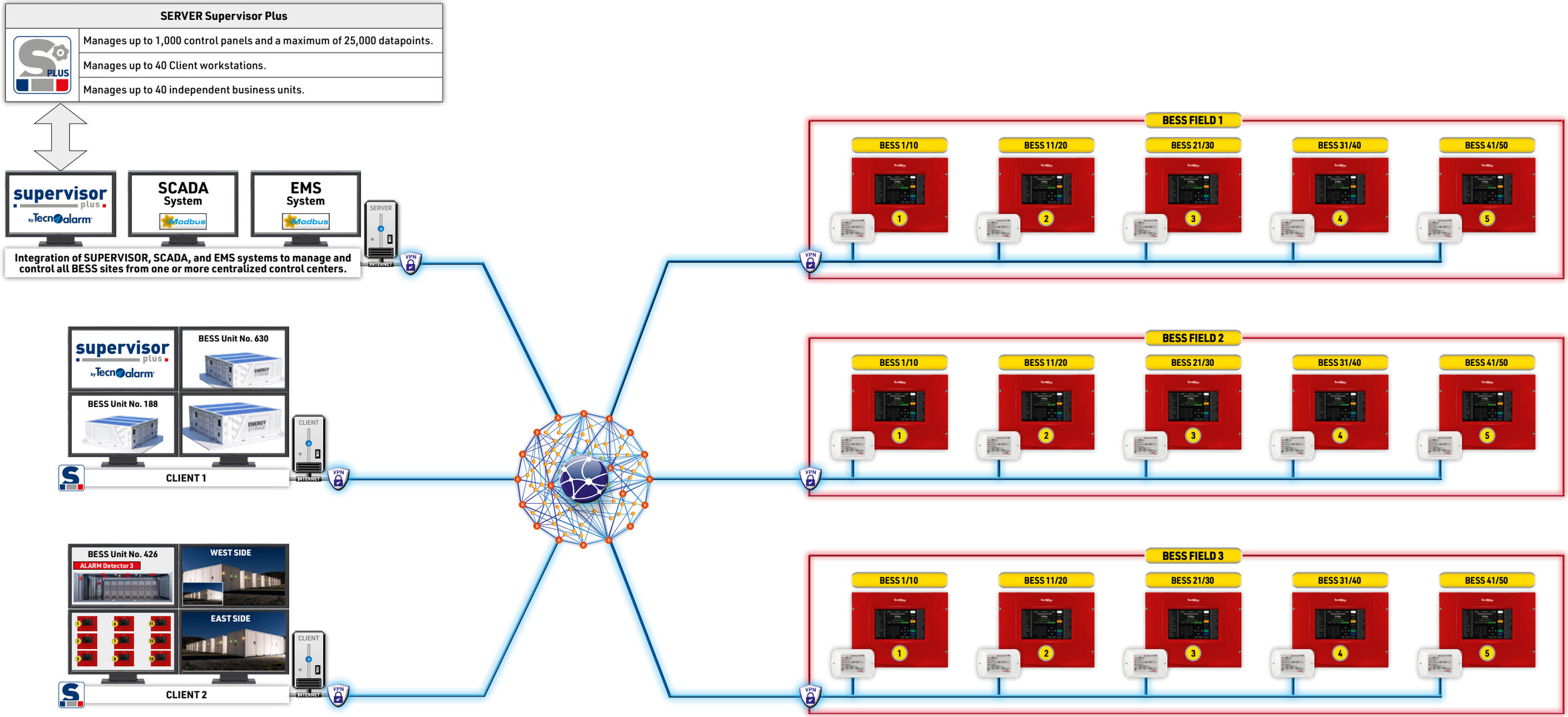


GIGA BESS

GIGA BESS SYSTEM

A GIGA BESS system can be composed of an unlimited number of TSA1 addressable fire detection and extinguishing control panels, connected via the TFNET communication interface to the supervision center managed by the Supervisor Plus software. The TFNET interface manages data traffic and, thanks to the support of the MODBUS protocol, ensures integration with third-party systems such as SCADA and EMS. The Supervisor Plus software offers maximum versatility and scalability for the management and control of large-scale distributed security architectures. The platform can monitor and coordinate up to 1,000 TSA1 control panels.

SINGLE BESS - 1 unit	MULTI BESS - Up to 10 units	LARGE BESS - Up to 150 units	**GIGA BESS - Up to 1000 units**



SUPERVISOR PLUS SOFTWARE

The Supervisor Plus supervision software is the core of a high-performance centralized control system capable of managing up to 1,000 control panels from the Tecnofire and Tecnoalarm ranges.
The platform can be controlled by up to 40 client stations and allows the management architecture to be divided into 40 independent business units.
The system offers unlimited operator profiling, interacting through interactive graphic maps, HTML page links, and video sources. The platform ensures full integration of fire detection, intrusion, EVAC emergency systems, and Konnex automation, supporting up to 25,000 datapoints.
Device configuration is streamlined by assisted mapping, including automatic download of points and descriptions.
Regarding the video sector, the software manages an unlimited number of IP cameras with standard RTSP video streams.
Operation is optimized by a dynamic event manager that, for each signal, automatically activates emergency plans, video verification, information tables, and email notifications. Client stations support multi-monitor configurations (up to four displays) with preset layouts.

21ISTR15903

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IMQ CERTIFIED
QUALITY MANAGEMENT SYSTEM
ISO 9001:2015

IQNET
RECOGNIZED CERTIFICATION

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