FireRaptor

IMO

Solar Panel
Safety Shutdown Solution

LOW COST

COMPLETE SAFETY

PEACE OF MIND

FireRaptor

The Ultimate Emergency Solar Panel Rapid Shutdown Safety Solution

The FireRaptor from IMO is an innovative solar panel rapid shutdown safety solution which takes your safety seriously. Offering three ways to shut down your solar panels to ZERO volts, a 20 YEAR WARRANTY, and compatibility with ALL string inverters, the FireRaptor is the safety product of choice.

Easy to install and operate and fully compliant with NEC2017, the FireRaptor is also available with temperature monitoring and hardwire or mobile communication alarm signalling (SMS, email etc.).

"The IMO FireRaptor is a great product, cost-effective, easy to install and performs as described. I would highly recommend it. We will continue using the IMO FireRaptor on our PV projects."

David Christenson
Managing Director, PVDb Ltd

FireRaptor Solar Panel Safety Shutdown Solution

MADE IN EUROPE

- Manual Shutdown to 0V within 1 second
- Automatic Shutdown to 0V on AC Supply Cut-Off
- Automatic Shutdown to 0V at >85°C (185°F) Temperature
- Compatible with ALL String Inverters
- Hardwire or Mobile Communication Alarm Signalling
- Compliant with NEC 2017 & NEC 2014
- Suitable for New Installations or Retro-Fit

PATENT PENDING

See https://downloads.imopc.com/fireraptor-limited-warranty.pdf for terms

FireRaptor Overview

The IMO FireRaptor is designed to be installed at solar panel level and provides safety shutdown of the DC supply to ZERO VOLTS in case of emergency. Shutdown is initiated in 3 ways - Manual Operation, AC Supply Cut-Off or Temperature Rise Trigger as follows:

• MANUAL OPERATION

Manual shutdown is initiated within less than 1 second of operation by pressing the emergency pushbutton on the Emergency Rapid Shutdown Switch (Part no FRS-ESWx). The Emergency Switch can be conveniently located at ground level for easy access or multiple switches can be installed in different multi-level building zones.

• AC SUPPLY CUT-OFF

Disconnection of the external AC supply, by whatever means, causes automatic remote operation of the Emergency Rapid Shutdown Switch and solar panel shutdown.

• TEMPERATURE RISE TRIGGER

Automatic shutdown occurs if the temperature sensor onboard the FireRaptor detects an ambient temperature rise above its programmed trigger level. The two FireRaptor versions available shutdown in different ways.

The **FRS-01** shuts down only the panel(s) connected to it upon sensing an ambient temperature rise above 85˚C (185˚F). Provided the temperature does not exceed 92˚C (198˚F), the unit will re-engage the panel(s) if the temperature drops back below 85˚C (185˚F), otherwise a manual reset of the Emergency Switch is required.

The **FRS-02** shuts down the entire string connected to it upon sensing an ambient temperature rise above 92˚C (198˚F) and resetting of the Emergency Switch by a professional installer is then required. The shut-down signal can be configured to provide connection to the building's central alarm system or notification via mobile communication (SMS, email etc.).

Inverter Compatibility

The FireRaptor operates in the same way as an isolator/disconnect switch but is located at solar panel level. Like an isolator/disconnect, the FireRaptor is compatible with all string inverters and does not affect their operation or performance in any way.

Fail-Safe Operation

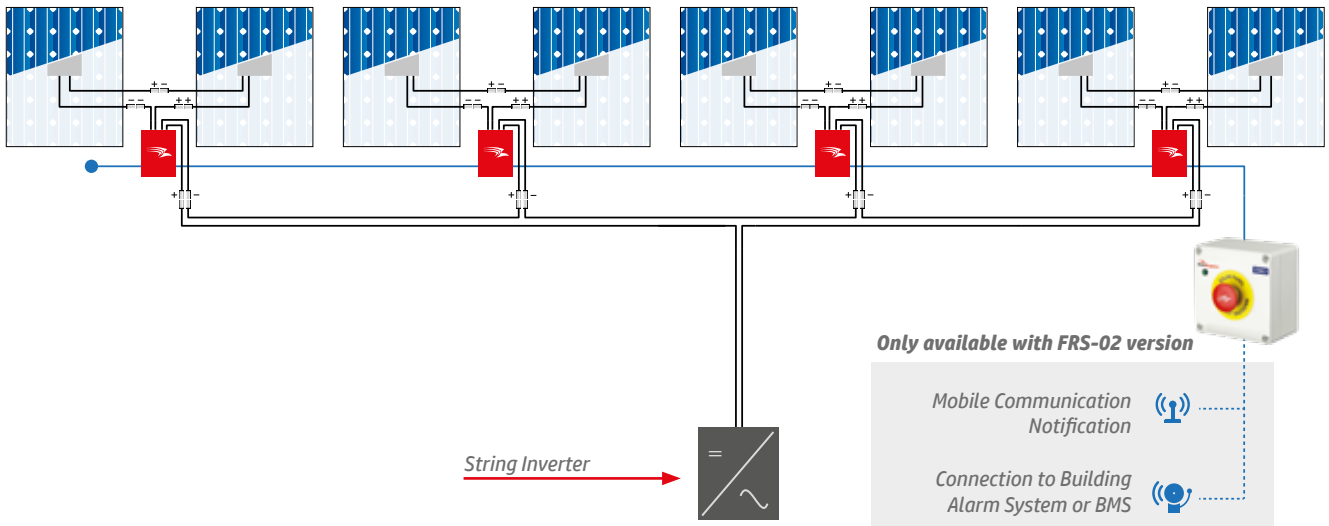
The FireRaptor is designed for fail-safe operation ensuring that, once operated, subsequent damage to the FireRaptor (e.g. by fire) will not compromise the solar panel isolation and shutdown status. Indeed, the FireRaptor has been tested to destruction by TUV in Germany, maintaining full zero volt isolation throughout the test procedure. A copy of the TUV test report is available to view on our website.

Installation

The FireRaptor is easy to install, requires no set-up and is suitable for both new and retro-fit installations. It is designed to shutdown two panels or it can be mounted in single panel configuration if preferred. The diagrams below show typical two-panel installations.

The FireRaptor is manufactured using original MC4 connectors on the DC cables ensuring high quality integration and compatibility. The Emergency Switch control cable is fitted with Tyco SuperSeal connectors ensuring quick and easy (plug & play) installation.

FRS-01 & FRS-02 (Series Connection)



NOTE: If two panel installation is used in accordance with NEC 2017, each panel must be <40V.
For strings with an odd number of PV panels, single panels can also be connected to IMO FRS-01/02 units.

Emergency Shutdown Switches

The Emergency Shutdown Switches for both the FRS-01 and the FRS-02 are supplied with a 24VDC power supply suitable for up to 40 panel operation. They are available with either a “twist-to-release”pushbutton or keylock pushbutton, both with LED indicator to signal FireRaptor supply status (ON indicates the 24VDC supply is live).

For larger installations, the Emergency Shutdown Switch is available in custom format with:

- Various power supply options for increased number of panels
- Multi connection terminals for increased number of strings
- Temperature monitoring unit with hardwire or mobile communication alarm signalling (FRS-02)

Contact IMO for further information on any of these options.

Technical Specification

	FRS-01 / FRS-02
Emergency Shutdown Cable	2x1mm² cable + Tyco SuperSeal 2-pole plug/connector (male/female)
DC Power Supply*	24VDC - See ordering information overleaf
Maximum System Input Power	700W single panel or 350W per panel (two panels in series)
Maximum System Input Voltage	150V single panel or 75V per panel (two panels in series)
Maximum System Input Current	12A
Maximum Isolation Voltage	1500V
Input Protection	Over voltage & transient voltage supression
Maximum System Output Current	12A (99.5% efficiency)
Breakdown Voltage	1500VAC for 1 minute
Maximum System Output Voltage	150V single panel or 75V per panel (two panels in series)
Output Protection	Over voltage, over current & transient voltage suppression
Max. Input Short Circuit Current	15A
Operating Temperature	-30°C to +95°C
Ambient Operating Temperature	-30°C to +55°C
IP Class Protection	>IP68 (NEMA 4X)
PV Casing	Flame retardant ABS - UL94-V0
Limited Warranty	FRS-0(X) : 20 Years, FRS-ESW(X)(-K) : 5 Years (See https://downloads.imopc.com/fireraptor-limited-warranty.pdf for terms)
Weight (without cables)	400g
Panel Cable Length	120mm
String & Signal Cable Length	1800mm
Standard Compliance	EN 61000, EN 61646, EN 61215, IEC 62716 draft C (NH_3 resistant), VDE-AR-E 2100-712, BS 7671-712, UL 1741
PV Connectors	Multi contact MC4

Ordering Information

Part Number	Description
FRS-01	FireRaptor Rapid Shutdown Unit for connection to 2 solar panels
FRS-02	FireRaptor Rapid Shutdown Unit with Temp Alert for connection to 2 solar panels

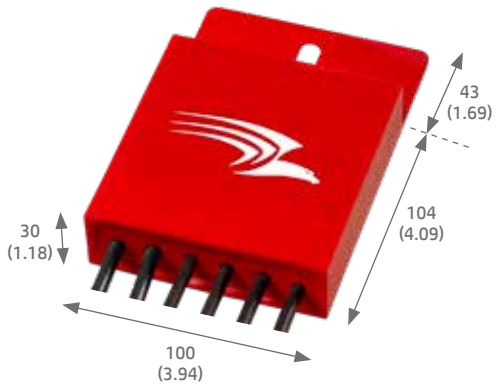
FRS-ESW1	Emergency Rapid Shutdown Switch for FRS-01, max 40 solar panels (UL)
FRS-ESW1-24	Emergency Rapid Shutdown Switch for FRS-01, max 100 solar panels (UL)
FRS-ESW1-310	Emergency Rapid Shutdown Switch for FRS-01, max 150 solar panels (UL)
FRS-ESW1-610	Emergency Rapid Shutdown Switch for FRS-01, max 250 solar panels (UL)
FRS-ESW1-K	Emergency Rapid Shutdown Switch with Key Lock for FRS-01, max 40 solar panels (UL)
FRS-ESW1-24-K	Emergency Rapid Shutdown Switch with Key Lock for FRS-01, max 100 solar panels (UL)
FRS-ESW1-310-K	Emergency Rapid Shutdown Switch with Key Lock for FRS-01, max 150 solar panels (UL)
FRS-ESW1-610-K	Emergency Rapid Shutdown Switch with Key Lock for FRS-01, max 250 solar panels (UL)

FRS-ESW2	Emergency Rapid Shutdown Switch for FRS-02, max 40 solar panels (UL)
FRS-ESW2-24	Emergency Rapid Shutdown Switch for FRS-02, max 100 solar panels (UL)
FRS-ESW2-310	Emergency Rapid Shutdown Switch for FRS-02, max 150 solar panels (UL)
FRS-ESW2-610	Emergency Rapid Shutdown Switch for FRS-02, max 250 solar panels (UL)
FRS-ESW2-K	Emergency Rapid Shutdown Switch with Key Lock for FRS-02, max 40 solar panels (UL)
FRS-ESW2-24-K	Emergency Rapid Shutdown Switch with Key Lock for FRS-02, max 100 solar panels (UL)
FRS-ESW2-310-K	Emergency Rapid Shutdown Switch with Key Lock for FRS-02, max 150 solar panels (UL)
FRS-ESW2-610-K	Emergency Rapid Shutdown Switch with Key Lock for FRS-02, max 250 solar panels (UL)

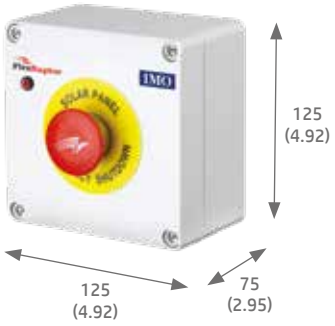
FRS-SIGCAB1.8-F	1.8m (71") cable with Tyco female connector for end of string

Dimensions mm (inches)

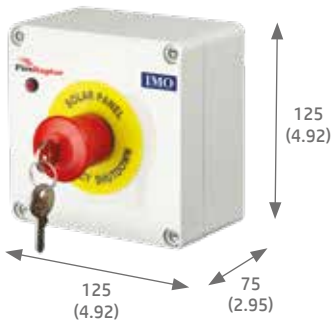
Tolerance ±0.5mm (±0.03")



FRS-0(X)



FRS-ESW1 & FRS-ESW2



FRS-ESW1-K & FRS-ESW2-K

Emergency Shutdown Switches	Dimensions mm (inches) - Height x Width x Depth
FRS-ESW(X)/FRS-ESW(X)-K	125mm x 125mm x 75mm (4.92" x 4.92" x 2.95")
FRS-ESW(X)-24/FRS-ESW(X)-24-K	125mm x 175mm x 75mm (4.92" x 6.89" x 2.95")
FRS-ESW(X)-310/FRS-ESW(X)-310-K	175mm x 250mm x 100mm (6.89" x 9.84" x 3.93")
FRS-ESW(X)-610/FRS-ESW(X)-610-K	175mm x 250mm x 100mm (6.89" x 9.84" x 3.93")

IMO - Leaders In Solar Safety

As a long established leader in the renewable evergy sector, IMO has been pioneering solar energy technology for years. From the first TRUE DC isolator, now used by OEMs and installers around the world, to the first panel level rapid shutdown device offering both manual and automatic temperature shutdown, to the first off-the-shelf solar tracker making precision dual-axis tracking technology simple and accessible - IMO technology keeps renewable evergy moving forwards.

DC Solar Isolators / Disconnects

IMO's range of TRUE DC isolators/ disconnects have been specifically manufactured to ensure the safe and effective isolation of DC voltages within all kinds of solar panels and installations. These high-end DC isolators are fully certified and are developed to UL standards.

With over 5 million installed units worldwide, and ZERO* reported electrical failures, the SI and SIM ranges from IMO are amongst the safest in the world.

** Data: Nov 2018*

Solar Cube

The IMO Solar Cube is an off-the-shelf precision solar tracking solution. Developed as a ground breaking, easy to set up solar tracker and measurement controller with the flexibility to adapt to any installation, the Solar Cube tracks the sun's movement and provides optimum panel (or array) positioning.

The Solar Cube calculates the 'zenith angle' and the 'azimuth angle' to specify the position of the sun in the sky to within 0.01º.

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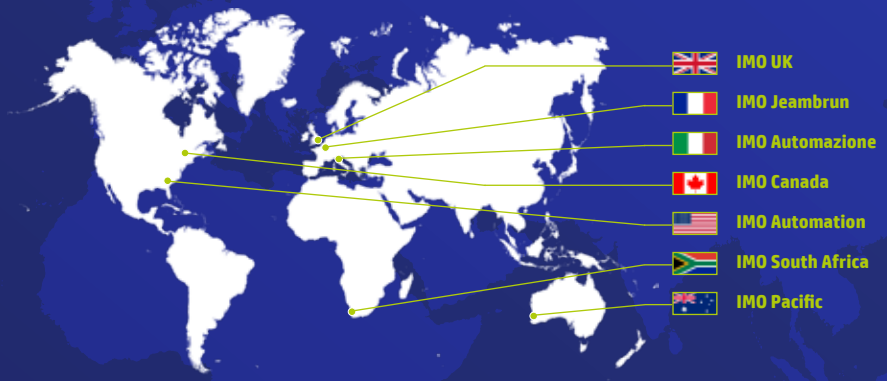

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