BFS-A1

Installation Manual

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For the latest version of specification, please refer to www.beny.com or contact to benyi@zjbeny.com

We reserve the right to explain the terms of specification.

Importer Information

Importer: XXXXXXX
Address: XXXXXXX

Installation Manual

SAVE THESE INSTRUCTIONS - This manual contains important instructions for ZJBENY Rapid Shutdown System Equipment that shall be followed during installation and maintenance of the Rapid Shutdown System Equipment,BFS-A1,BFS-MH-01,BFS-MH-02.

DISCLAIMER

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SAFETY SYMBOLS

Please contact the below concerning technical questions about this product:

Warning - Failure to heed this the information indicated by this symbol may lead to dangerous conditions, possibly resulting in death or serious bodily injury.

Warning - Equipment with double insulation or enhanced insulation protection

Warning - Shell hot surface

Warning - Shock hazard

Caution - Failure to heed this the information indicated by this symbol may lead to dangerous conditions, possibly resulting in minor or light bodily injuries and/or substantial property damage.

Information - Denotes important information about safety issues.

Note - Denotes additional information.

SAFETY INSTRUCTIONS

Warning - The rapid shutdown device(BFS) must be installed in a well-ventilated environment: The BFS should be 8-30cm away from the roof and not stick close to the PV panel, so as to meet the ambient temperature required by the specification (less than 85℃), there is a risk of product damage if the temperature is higher than 85℃.We are not responsible for the warranty if any damage by using in a poor installation environment.

Please do not connect the PV modules in parallel to the inverter input.
If there are multiple PV strings per MPPT on the inverter, all Rapid Shutdown Devices(BFS) from the same MPPT must be connected to the same emergency button switch.

The BFS is an electrical product and should only be installed by a suitably qualified person, in accordance with local regulations such as BS7671 (UK) and ANSI/NFPA70 (USA).

When modifying and existing installation, isolate the inverter from the PV array by turning OFF the DC isolator / switch disconnect or turn OFF the inverter and the AC switch.

PV Panel input and output connectors are not environmentally sealed until they are mated. Disconnected connectors should be plugged into an appropriate mating part or used with suitable watertight caps.

BFS DC input and output connectors are not environmentally sealed until they are mated. Disconnected connectors should be plugged into an appropriate mating part or used with suitable watertight caps.

The ZJBENY BFS is fitted with Multi Contact MC4（KBT4/KST4） connectons and to maintain UL connector approval listings these should only be mated with their counterpart connector. PV connectors should not be connected or disconnected under load.

Incorrect connections to the BFS may cause failure.

Installation Manual

CAUTIONS

Installation of the ZJBENY BFS without ensuring compatibility of the module\inverter connectors with the BFS connectors may be unsafe and cause operational problems. For mechanical compatibility of the modules\inverter and the BFS, use identical connectors from the same manufacturer on both the BFS and modules, or obtain verification that the connectors to be used are compatible.

If the ZJBENY BFS is to be mounted directly to the PV frame or module, obtain guidance from the module manufacturer regarding it's location and also verify the impact on the module warranty.

INTRODUCTION

The ZJBEN BFS product is Rapid Shut Down Equipment for connecion to PV panel arrays in order to achieve compliance to 2014 NEC 690.12 and 2017 NEC 690.12.

The BFS automatically shuts down array output to the PV inverter when it detects a temperature in excess to 100℃(BFS-A1).

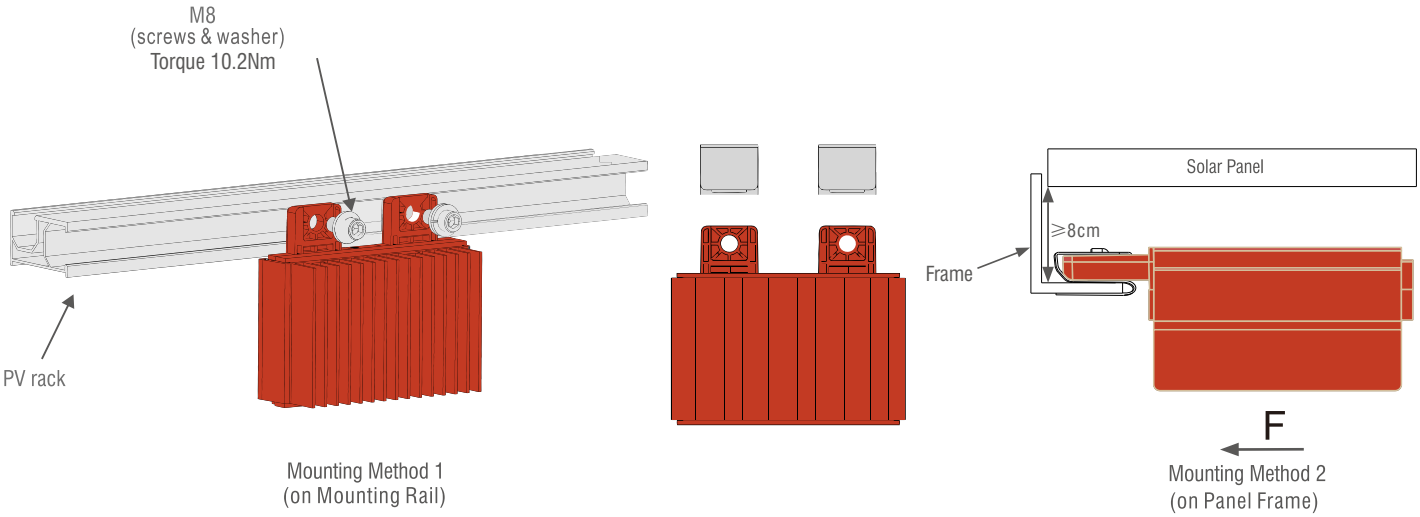
The BFS can be installed without any set-up and with any string inverter as its functionality is completely independent. "Plug & Play" style installation using industry standard connectors makes the ZJBENY BFS for new installations as well as retro-fit; and its mains powered independent DC power supply and emergency switch unit allows flexibility for positioning for user convenience giving Manual Emergency Shutdown, as well responding to local or area grid shutdown.

PARTS

BFS-A1	BFS Rapid Shutdown System Unit
BFS-MH-01	Rapid Shutdown Monitoring Device (for BFS-A1) - includes 24VDC power supply(100-240VAC power input)
BFS-MH-02	Rapid Shutdown Monitoring Device (for BFS-A1) - Includes 24VDC power supply(200-480VAC power input)

INSTALLATION & CONNECTION

One BFS will control two solar panels and for compliance with 2017 NEC it should be mounted within the array boundary of the two panels, where the two panels are no greater than 1' (foot) /30cm apart from each other.
Determine the mounting location of the BFS-A1 and fix as shown below.



Do not drill through the BFS as this will damage the unit and prevent operation.

BFS mount directly onto module frames with spring clips and the clearance between the frame edge and the module glass is≥8cm.If using frameless modules, remove the clips and bolt the BFS directly to the PV rail with M8bolts and torque to 10.2Nm. No additional grounding is required.

The BFS is housed in a plastic enclosure therefore grounding of the product is unnecessary

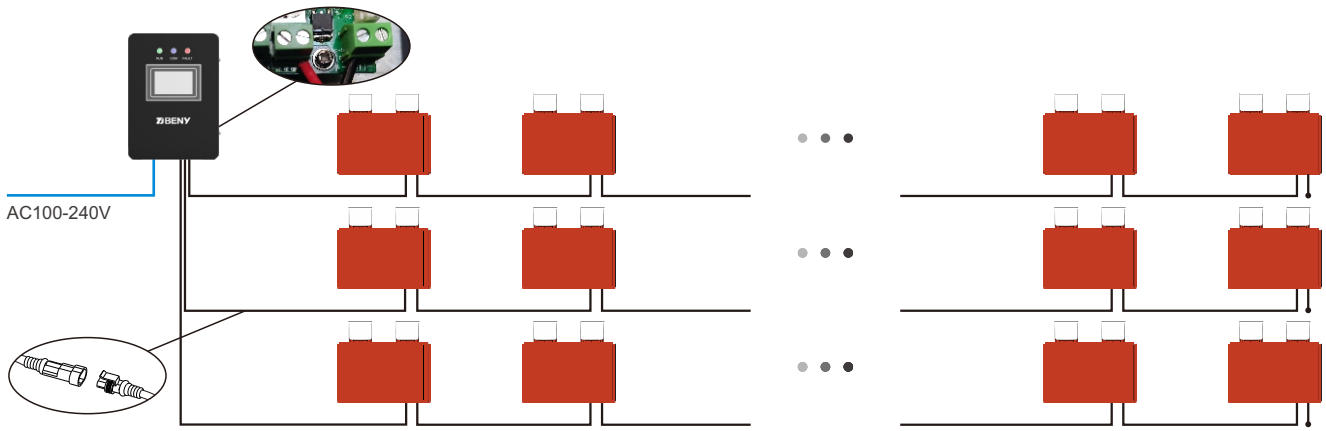
Rapid Shutdown Monitoring Device Installation

The Rapid Shutdown Monitoring Device (BFS-MH-01/BFS-MH-02) hereater referred to as BFS-MH-01,for installation:can be conveniently located anywhere for emergency acess and is supplied with an internal 24VDC power supply to interface with the BFS units.

Locate a convenient position for mounting the BFS-MH-01 unit ensuring that mains power connection is also available.Before mounting ensure that the cable entry/exit gland positions are accessible.

POWERBUS communication adopts a ring topology wiring method, and the user needs to connect the end cable of the monitoring device to the corresponding end cable of the rapid shutdown device.

The max distance allowed from monitoring device toRSD:150m.



Using appropriate fixings attach the BFS-MH-01 unit vertically to the chosen surface.

Connect the mains supply wire to the BFS-MH-01 power supply L and N(Live and Neutral)termainals using suitably rated 2-core cable(refer Technic for electrical details)ensuring correct polarity of connections.Verify secureness of cables.

Strip AC mains wire length 4-5mm. Terminal tightening torque 0.5Nm (4.5lb-in).

Strip 24V DC wire length 10mm. DIN terminal tightening torque 0.5Nm (4.5lb-in).

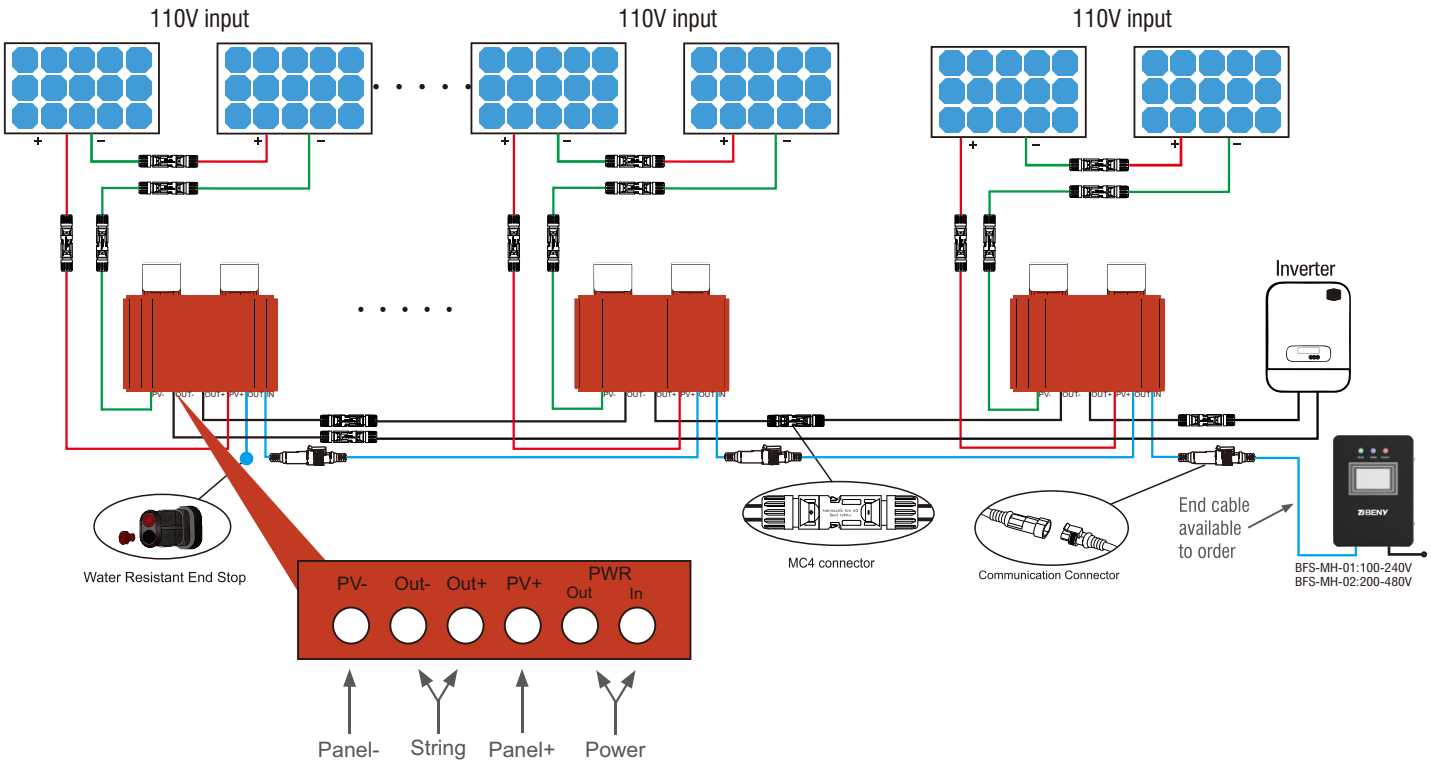
Do not remove wire links connected within the BFS-MH-01.Verify screw tightness in case of loosening in transit.

Warning – When the PV array is exposed to light, it supplies a DC voltage to this equipment. Connect and disconnect DC input and DC output circuits individually. Do not turn ON mains voltage until installation of BFS-MH-01 is completed and verified.

When wiring the BFS-MH-01,the waterproof plug must be installed.

BFS-A1 INSTALLATION DIAGRAM DETAILS

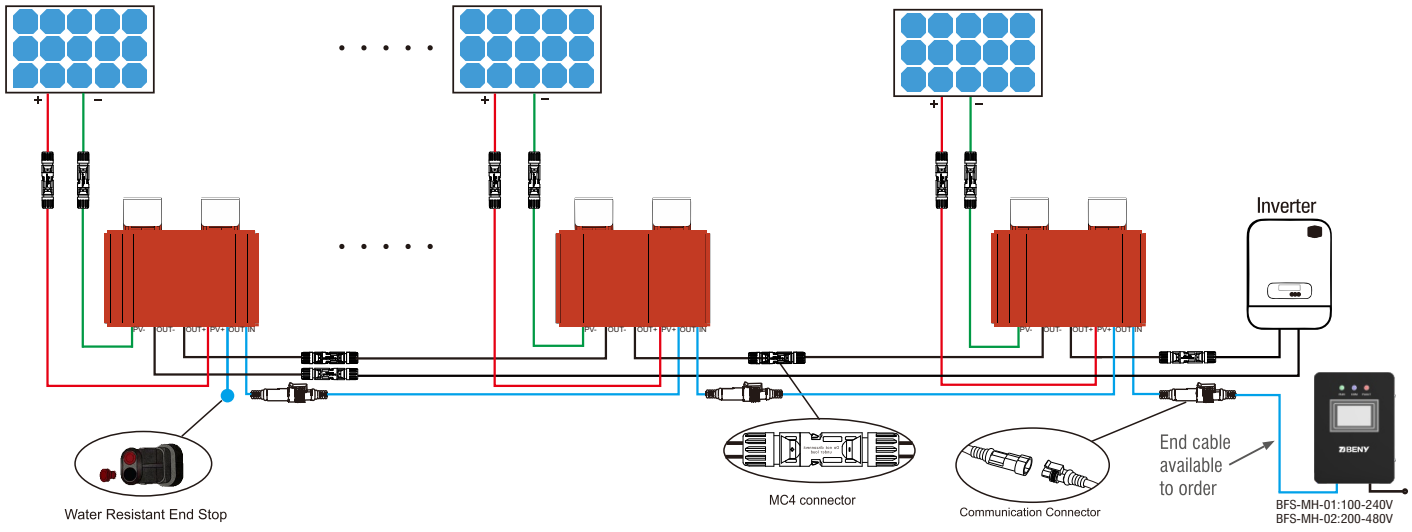
One BFS-A1 will control two solar panels and by series connection of the BFS,multiple solar panel pairs can be connected to form a greater capacity system.
The diagram below illustrates a typical example of a BFS protected installation using six solar panels and three BFS-A1.



For illustrative purposes only

If the array has an odd number of panels, a single panel can be connected directly to the positive (+) and negative (-) panel cables of the BFS.

For NEC 2017/2020 compliance, if the PV panel >40V, 1-to-1 configuration shuold be required in order to meet regulatory compliance.
The diagram below illustrates a typical 1-to-1 configured BFS protected installation using three solar panels and three BFS-A1.



INSTALLATION SEQUENCE GUIDE

1.As shown in the figure, connect the PV+ and PV- of one or multiple PV panel(s) to the PAN+ and PAN- of the BFS.

2.As shown in the figure,connect the STG+ and STG- of the BFS to each other in sequence,the remaining STG+ and STG- of the first and last BFS are connected to the inverter.

3.As shown in the figure, connect the PWR in and PWR out of the BFS to each other in sequence, the remaining two ends of BFS, PWR in is connected to the monitoring device (with male communication connector of the BFS connects to the female communication connector on the BFS-CCABLE end cable), and the PWR out is connected to the water resistant end stop.

4.Power on the 220VAC power supply of the monitoring device, turn on the emergency stop button, and the entire PV system starts to operate.

*Water resistant end stop - Insert the two red sealing plugs in to the Communication Superseal plug(supplied) and connect to the DC output connector of the last BFS-A1 in the series in stallation.If only a single BFS-A1 is used then this part is still used to seal the DC output connector.

*A 1.8m flying lead terminated at one end with a female communication connector is available to order under part number BFS-CCABLE.

OPERATION

Upon correct mounting and connection of the BFS to the solar panels and the RSD Monitoring Device;and the turning ON of the mains supply,the BFS will be operational.

1. Manual Shutdown

   Upon the user operating the red push button switch located in the Monitoring Device,the BFS performs a Rapid Shutdown,disabling the PV array output.

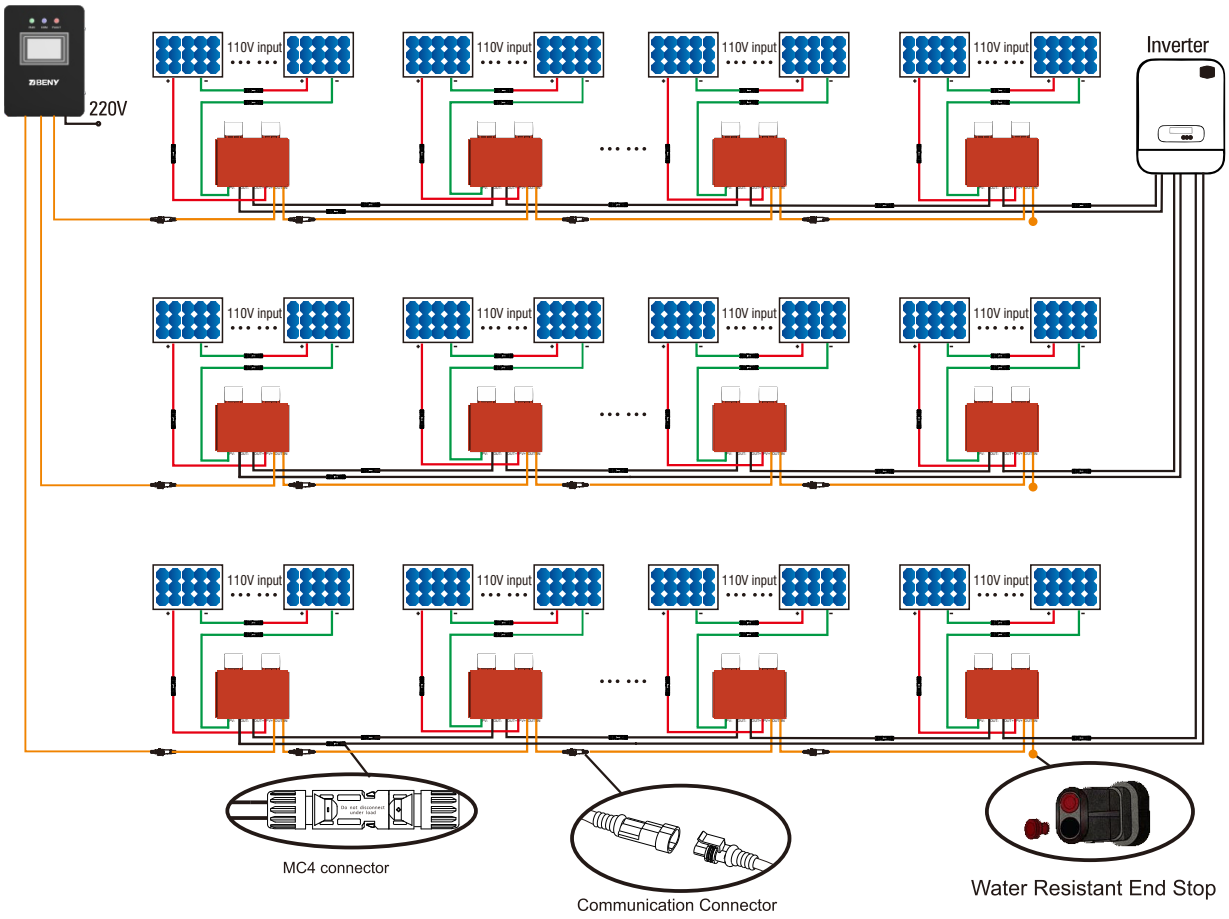
2. AC Supply Cut Off Shutdown

   Should there be a necessity by the emergency services for local or area utility grid shutdown, disconnection of the external AC supply, by whatever means, will cause the ZJBENY BFS to perform a Rapid Shutdown disabling the PV array output.

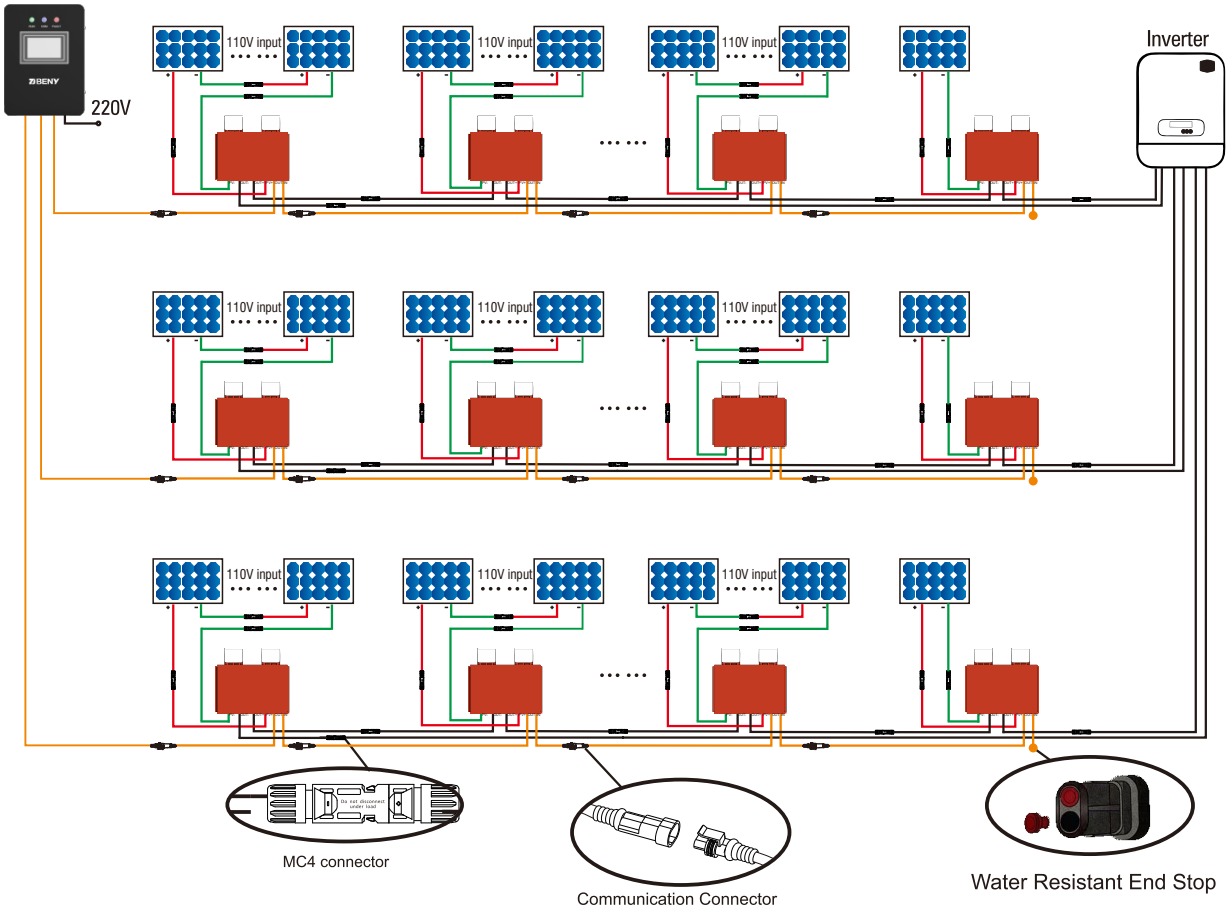
3. Automatic Emergency Shutdown

   Should the BFS-A1 onboard temperature sensor detect a temperature in excess of 100℃ then the BFS will instigate an Automatic Rapid Shutdown, thereby disabling the PV module's output. Should the detected temperature then drop back to below 85℃,the BFS will re-engage the PV module's output.

BFS-A1 MULTI-STRING INSTALLATION DIAGRAM(Even number per string)



BFS-A1 MULTI-STRING INSTALLATION DIAGRAM(Odd number per string)



TECHNICAL SPECIFICATION

	BFS-A2
DC Power Supply	14V~28V
Maximum Control Current	15mA
Maximum Control Power	0.2W
Singal Cable Type	2*0.823mm² (18AWG) Signal Cables + Signal Connectors
Singal Cable Length	1800mm
Maximum Input Voltage	110V
Maximum Input Current	20A
Maximum Power	2200W
PV Input and Output Cable	4.0mm² (12AWG) Cables + MC4 Connectors
PV Input Cable Length	180mm
PV Output Cable Length	1800mm
IP Class Protection	IP68
Operating Temperature	-40℃ to +85℃
Storage Temperature	-40℃ to +85℃
Maximum altitude	2000m
Overvoltage category	II
PV Casing	Flame retardant PC-UL94-V0
Standard compliance	EN 62109-1:2010, EN 61058-1:2018
PV connectors	Staubli MC4 (Standard)
	Jinko and QC connectors for option
Communication Mode	POWERBUS

* Please refer to the open circuit voltage (Voc) and the short circuit current (Isc) of the PV module.

Product Model	BFS-MH-01	BFS-MH-02
Rated Working Voltage	100V-240VAC	200V-480VAC
Interactive Mode	Touch screen and indicator light	
Maximum Power consumption	180W	
Operating Temperature	-25℃~55℃	
Storage Temperature	-30℃~80℃	
IP Class Protection	IP65	
Overvoltage Category	II	
Maximum Altitude	2000m	
Communication Mode	POWERBUS	
The Maximum Distance: (From the First RSD to the Monitoring Device)	150m	
The Maximum Number of Circuit	3	
The Maximum Number of Strings Per Circuit	4	
The Maximum On-load Per String	BFS-A1:40	
	BFS-A2:20	
Total maximum number of standby	BFS-A1:3*4*40=480	
	BFS-A2:3*4*20=240	