




HSM


Instruction & Maintenance Manual


EN


SAFETY PRECAUTIONS

Follow the warnings described in this manual with the symbols shown below.


	<p>WARNING</p> <p>Warns of a risk, which could result in personal injury or material damage.</p>
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	<p>WARNING</p> <p>Indicates that special attention should be paid to a specific point.</p>
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	<p>NOTE</p> <p>Indicates additional information to a specific point.</p>
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	<p>ARROWS</p> <p>Arrows indicate instruction steps or points that should be carried out.</p>
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If you must move the unit for its installation or maintenance, the following should be taken into consideration:

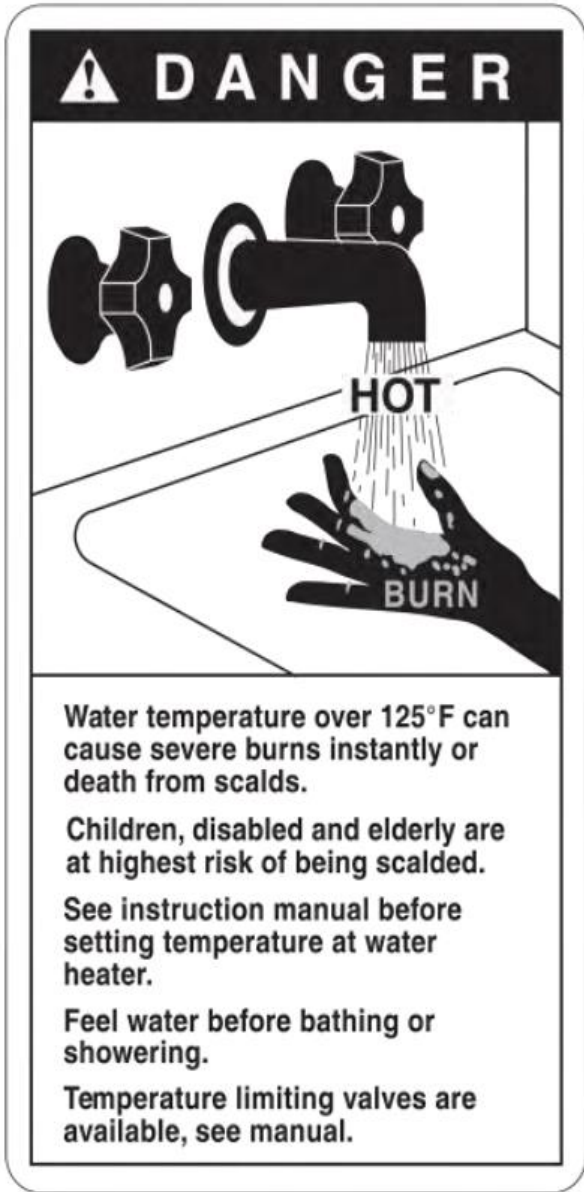
	<p>Incorrect handling or installation of the unit may result in injury to personnel as well as damage to the unit. Read the manual carefully prior to installing the unit. Follow all installation and maintenance instructions throughout the unit's working life.</p>
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	<p>Please read carefully, understand, and follow all the installation and safety instructions in this document before attempting to install, connect, and/or perform maintenance on The device.</p>
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! DANGER!

WATER TEMPERATURE SETTING

Safety and energy conservation are factors to be considered when selecting a water temperature setting of the water heater’s thermostat. Water temperatures above 125°F can cause severe burns or death from scalding. Be sure to read and follow the warnings outlined on the label pictured below.



Time/Temperature Relationship in Scalds

Water Temperature	Time To Produce a Serious Burn
120°F (49°C)	More than 5 minutes
125°F (52°C)	1½ to 2 minutes
130°F (54°C)	About 30 seconds
135°F (57°C)	About 10 seconds
140°F (60°C)	Less than 5 seconds
145°F (63°C)	Less than 3 seconds
150°F (66°C)	About 1½ seconds
155°F (68°C)	About 1 second

Table courtesy of Shriners Burn Institute

The chart shown above may be used as a guide in determining the proper water temperature for your home.

! DANGER

Households with small children, disabled, or elderly persons may require a 120°F or lower thermostat setting to prevent con-tact with “HOT” water.

Notice: Mixing valves are available for reducing point of use water temperature by mixing hot and cold water in branch water lines. Contact a licensed plumber or the local plumbing authority for further information.

The temperature of the water in the heater is regulated by the menu of the controller into the HSM. To comply with safety regulations the thermostat was set at 50°C (120° F) before the water heater was shipped from the factory.

! DANGER


There is a Hot Water SCALD Potential if the thermostat is set too high.

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1. LIMITATION OF LIABILITY

- **FEGEN SOLAR** reserves the right to make modifications to the device or the unit specifications set out in this instruction manual without prior notice, always though compliant with the regulations.
- This manual should not be used for the installation of heat exchangers from other manufacturers.
- No liability will be assumed for damage arising from improper use, wrong assembly or operation and maintenance failure.

	<p>FEGEN SOLAR on its web site, supplies its customers with the latest versions of the device specifications and the most updated manuals.</p> <p style="text-align: center;">http://www.fegensolar.com/</p>
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2. TRANSPORTATION, HANDLING, AND PREPARATION INSTRUCTIONS

2.1. Transportation, handling, and preparation instructions

- The device must always be carried **vertically**.
- The device must be fixed and properly secured on the vehicle, on the wagon or on the ship, in order to avoid any external shocks.
- The unloading and the handling of the device will be done carefully with lifting equipment.
- In case of handling with a crane, the device should be lifted from the relevant hooks using slings.
- In case of handling a forklift truck, the device is placed vertically with care on the forks.

2.2. Verification upon reception

Please check the following points when you receive the device:

- The device meets the specifications described in your order.
- The device has not suffered any damage during transport.
- Perform an external visual inspection of the heat exchanger prior to switching it on.
- After removing the outer packaging, keep the instructions securely and ensure you have all the accessories.

3. PRODUCT DESCRIPTION

HSM It is a **plug & play**, closed loop type device which has integrated all the necessary components for solar hot water production, offering the possibility of various types of back-up traditional energy sources, integrated or attached, while integrates electricity production and storage system, by using a solar inverter and a battery kit as an extension of the device, being this way a complete building renewable energy power pack. No on-site installation work or civil works as piping is required, resulting in minimum installation time, with significantly reduced total investment cost. The device embeds all the necessary connection point for the hot water inlet and outlet, as well as connection point for electricity input and distribution, as an optional feature, for hybrid energy distribution.

The **dimensioning** process of the system is simple as in the thermal side there are only 3 tank sizes, 60, 80 & 130gal, while in the electric side there is the option of any market found UL listed residential or commercial string solar inverter, making the device scalable. Therefore, its extension requires solely the installation of the corresponding number of such devices that meet the requirements of the project.

The device is IP54 waterproof, so it is suitable for indoor or **outdoor installation**. Thus, there is no need of a conventional indoor boiler room, freeing space in the building. In addition, this makes the device's maintenance process more flexible and efficient as there is plenty of space which allows freedom of movements.

Based on efficient **software integrated in the controller** of the device, start-up and trouble detection are instant via the use of multiple sensors integrated in the device.

As there is only one supplier, there are **no responsibility conflicts**. This means immediate response and resolution of each issue without further delay.

HYBRID SOLAR MODULE (HSM)	
THERMAL SIDE	
Cabin General Characteristics	
Type	RITTAL TS 8
External dimensions W x H x D (front view)	1200 x 2000 x 800 / 47,24 x 78,74 x 31,50 inch
Protection	IP55
Door	Double 600mm / 23,62 inch Width each
Light	Auto door power On/Off - 600 lumens
Scalability	Unlimited
Solar Tank General Characteristics	
Type	AO Smith Sun-65
Solar tank capacity	246lt / 65 gal
Electric Resistance	4,5 KW
Certification	UL, CSA
Solar Pump Station General Characteristics	
Type	Caleffi 279 series
External dimensions W x H	334 x 560 / 13,1 x 22,0 inch
Suitable fluids	water, glycol
Maximum working temperature	air separator side supply: 320°F (160°C) pump side return: 230°F (110°C)
Max. working pressure	145 psi (10 bar)
Certification	UL 778, CSA22.2/108
Exterior Piping General Characteristics	
Cold / Hot Supply - Brass	3/4inch
External Supply - Brass	1inch
Circulation - Brass	3/4inch
Solar - Brass	3/4inch
Controller General Characteristics	
Type	Caleffi iSolar
External dimensions W x H x D	171,45 x 111,1 x 50,8 / 6,45 x 4,37 x 2,0 inch
Inputs	4
Outputs	1 or 2 triac or standard relays
Certification	UL 60730-1A, CAN/CSA E60730-1
ELECTRIC SIDE	
Cabin General Characteristics	
Type	RITTAL TS 8
External dimensions W x H x D (front view)	800 x 2000 x 400 / 31,50 x 78,74 x 15,75 inch
Protection	IP55
Air flow	At 50 Hz: 230 m ³ /h At 60 Hz: 250 m ³ /h
Air flow thermostat temperature range	41°F (5°C)... 140°F (60°C)
Door	Single 800mm / 31,50inch Width
Light	Auto door power On/Off - 600 lumens
Scalability	Unlimited
Certification	Bureau Veritas, CSA, TÜV, DNV-GL, Lloyds Register of Shipping RRR, Russian Maritime Register of Shipping, UL + C-UL
Solar Inverter General Characteristics	
Type	SMA
Total Power	Up to 62 KW
Certification	UL 1741, UL 1998, UL 1699B, CSA V22.2107.1-1

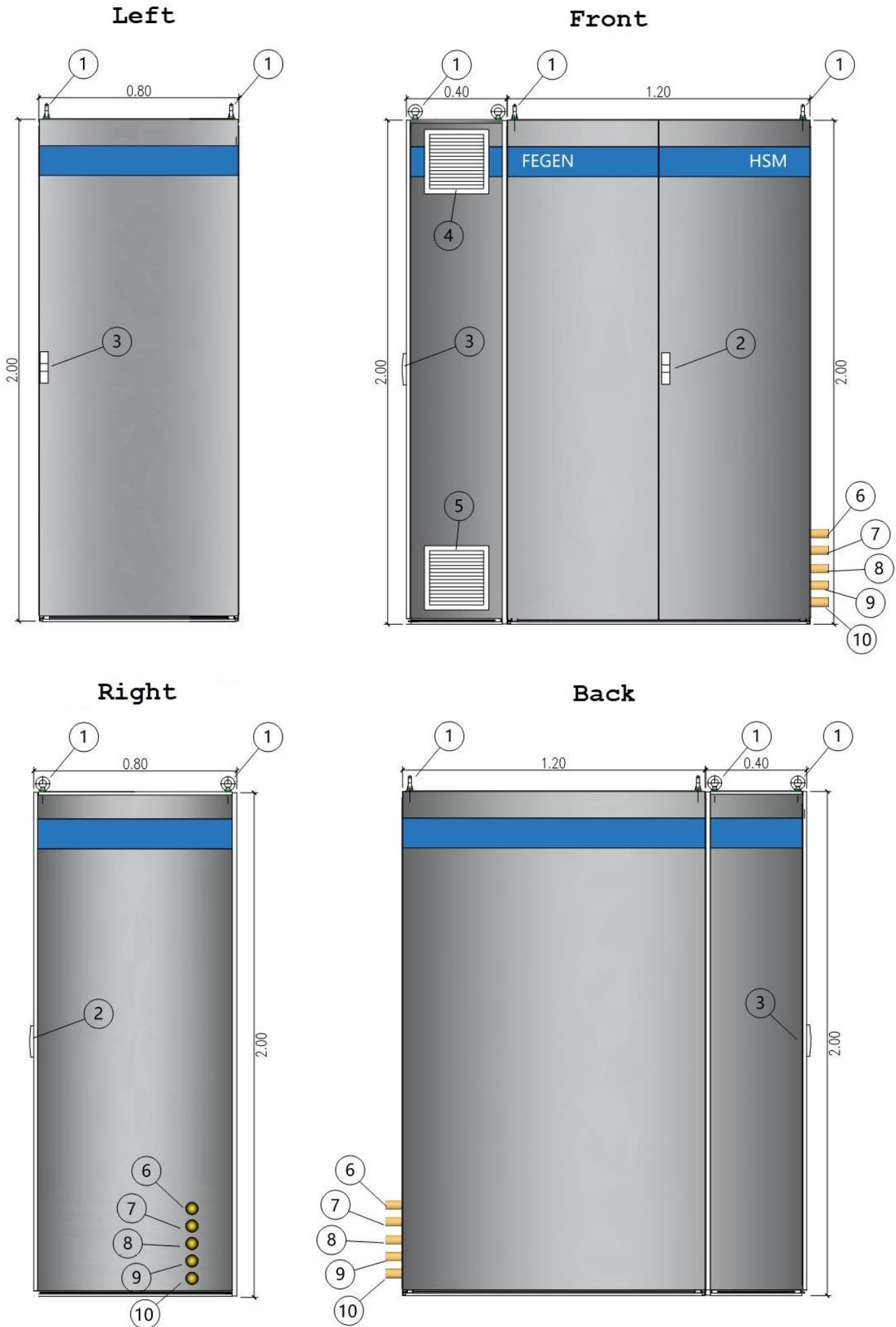


Fig. 1 - HSM Dimensions

No	DESCRIPTION
1	Hooks for transportation
2	Thermal side door lock
3	Electrical side door lock
4	Ventilation system fan
5	Ventilation system filter
6	Inlet for hot water supply (from external supply-optional)
7	Inlet for hot cold supply (from external supply-optional)
8	Outlet for hot water
9	Outlet for circulated water
10	Outlet for cold water

4. BILL OF MATERIALS

4.1. THERMAL SIDE

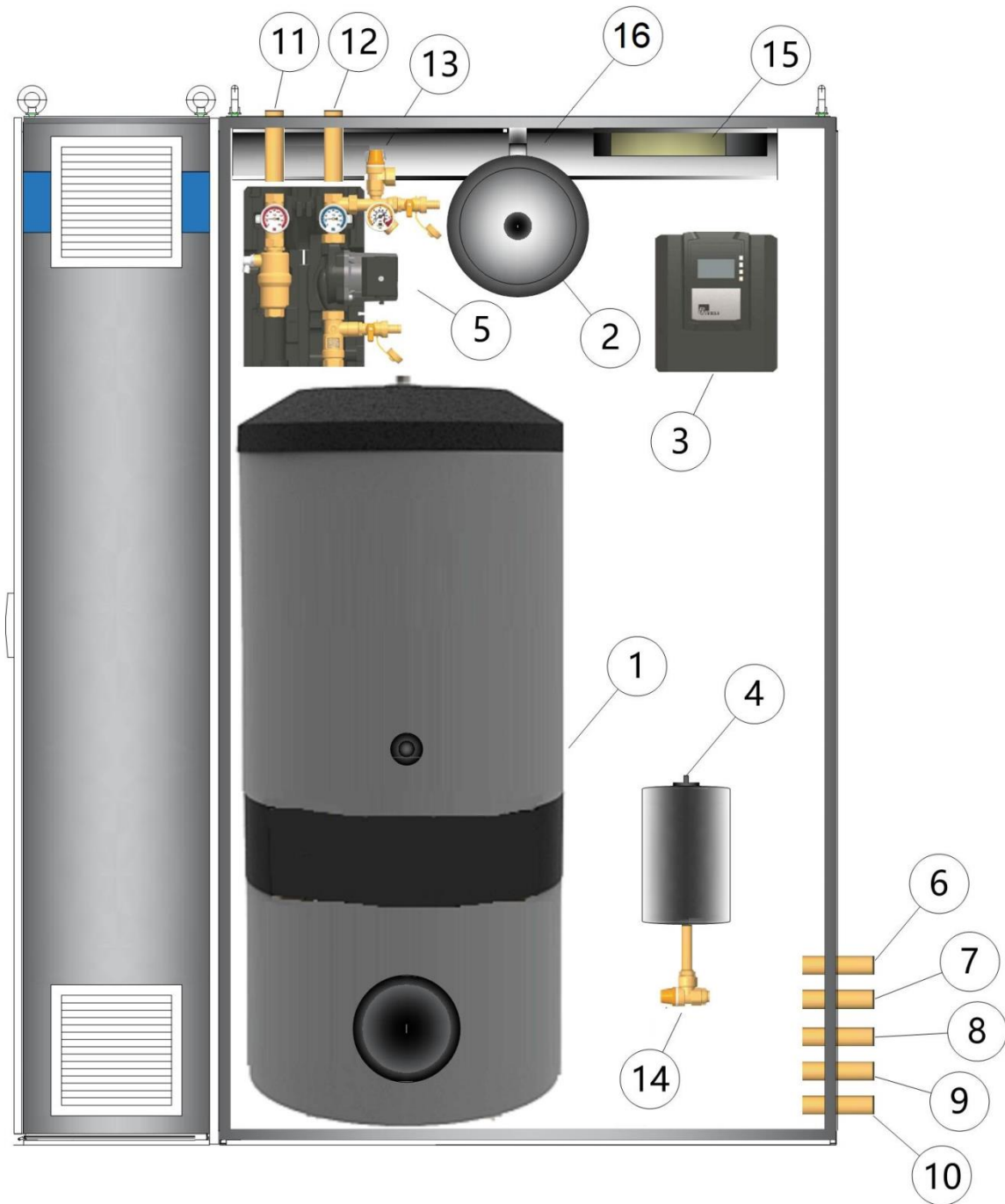
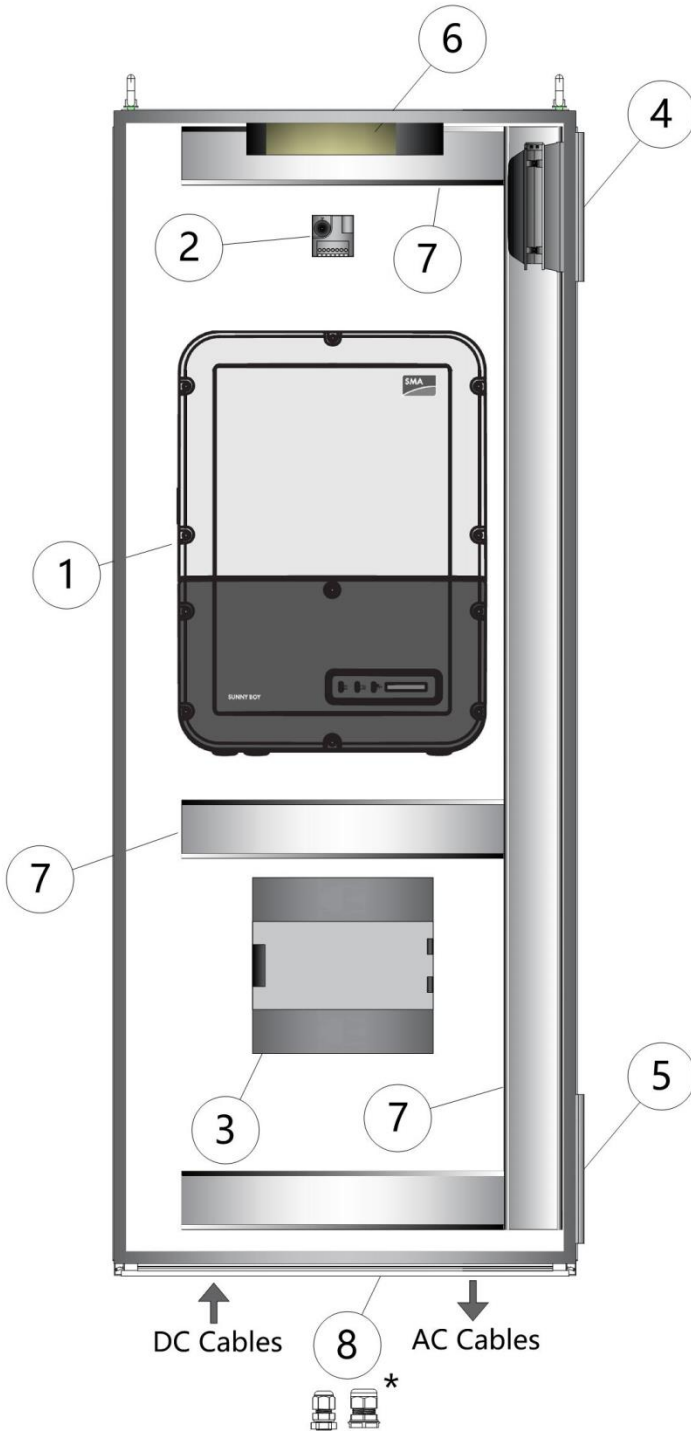


Fig.2- HSM Thermal Part

No	DESCRIPTION
1	DHW tank
2	Expansion tank
3	Controller
4	Solar Expansion tank
5	Solar pump station
6	Inlet for hot water supply (from external supply-optional) / Dimension: 1" / Material: Brass
7	Inlet for hot cold supply (from external supply-optional) / Dimension: 1" / Material: Brass
8	Outlet for hot water / Dimension: ¾ " / Material: Brass
9	Outlet for circulated water / Dimension: ¾ " / Material: Brass
10	Outlet for cold water/ Dimension: ¾ " / Material: Brass
11	Solar hot water Inlet (see par. 5.3)
12	Solar cold water Outlet (see par. 5.3)
13	6 bar pressure valve
14	Pressure safety boiler valve
15	Cabin LED type light system
16	Cables tray (100 mm x 100 mm)

4.2. ELECTRICAL SIDE



No	DESCRIPTION
1	Solar inverter
2	Cabin thermostat
3	Auxiliary panel
4	Ventilation system - fan
5	Ventilation system - filter
6	Cabin LED type light system
7	Cables tray (100 mm x 100 mm)
8	Inlets / Outlets for DC and AC cables*

i * The holes for the cable entry and exit must be made by the installer. The cables glands are included in the HSM package.

Fig. 3 - HSM Electrical Part

5. TECHNICAL FEATURES

5.1. CABIN

Thermal Side Cabin	
Type	RITTAL TS 8
Material	Basic material: Sheet steel Enclosure frame: Sheet steel, 1.5 mm Roof: Sheet steel, 1.5 mm Door: Sheet steel, 2.0 mm Rear panel: Sheet steel, 1.5 mm Gland plates: Sheet steel, 1.5 mm Mounting plate: Sheet steel 3.0 mm
Colour	RAL 7035
Protection category IP to IEC 60 529	IP 55
Protection category NEMA	NEMA 12
IK Code	IK09
Dimensions	Width: 1200 mm Height: 2000 mm Depth: 800 mm
Mounting plate	Width: 1099 mm Height: 1896 mm
Number of doors	2
Weight/pack	203 kg
Frame Max. load	680 kg
Approvals	Bureau Veritas CSA TÜV DNV-GL Lloyds Register of Shipping RRR Russian Maritime Register of Shipping UL + C-UL
Certificates	EAC IK-Code Protection category
Declarations	Declaration of conformity Manufacturer's declaration
Electrical Side Cabin	
Type	RITTAL TS 8
Material	Basic material: Sheet steel Enclosure frame: Sheet steel, 1.5 mm Roof: Sheet steel, 1.5 mm Door: Sheet steel, 2.0 mm Rear panel: Sheet steel, 1.5 mm Gland plates: Sheet steel, 1.5 mm Mounting plate: Sheet steel 3.0 mm
Colour	RAL 7035
Protection category IP to IEC 60 529	IP 55
Protection category NEMA	NEMA 12
IK Code	IK09

Dimensions	Width: 800 mm Height: 2000 mm Depth: 400 mm
Mounting plate	Width: 699 mm Height: 1896 mm
Number of doors	1
Weight/pack	124 kg
Frame Max. load	680 kg
Approvals	Bureau Veritas CSA DNV-GL Lloyds Register of Shipping RRR Russian Maritime Register of Shipping UL + C-UL TÜV
Certificates	EAC IK-Code Protection category
Declarations	Declaration of conformity Manufacturer's declaration
Ventilation	
Fan	
Type	RITTAL TopTherm
Colour	RAL 7035
Protection category IP to IEC 60 529	IP 54 with standard filter and additional fine filter mat: IP 55 with standard filter and hose-proof hood: IP 56
Protection category NEMA	with standard filter: Type 12 with standard filter and additional fine filter mat: Type 12 with standard filter and hose-proof hood: Type 3, 3R, 4, 4X
Air throughput (unimpeded air flow):	At 50 Hz: 230 m ³ /h At 60 Hz: 250 m ³ /h
Air throughput with outlet filter including standard filter mat (output 50/60 Hz)	203/230 m ³ /h
Rated operating voltage:	115 V, 1~, 50 Hz/60 Hz
Dimensions	Width: 255 mm Height: 255 mm
Build depth	25 mm
Installation depth	107 mm
Temperature range:	Bearing: -30°C...+70°C Operation (environment): -30°C...+55°C
Power consumption	At 50 Hz: 40 W At 60 Hz: 42 W
Rated current (max.)	At 50 Hz: 0.52 A At 60 Hz: 0.48 A
Miniature circuit breaker/ fuse	4 A
Noise level	At 50 Hz: 54 dB(A) At 60 Hz: 56 dB(A)

Diagonal fan	Diagonal, self-starting shaded pole motor
Weight/pack	2.26 kg
Approvals	Approval overview CSA UL + C-UL - FTTA UR + C-UR
Certificates	EAC
Declarations	Declaration of conformity
Thermostat	
Type	RITTAL internal thermostat
Colour	RAL 7035
Rated operating Voltage	24 V - 230 V, 1~ 24 V - 60 V (DC)
Dimensions	Width: 71 mm Height: 71 mm Depth: 33.5 mm
Temperature range	Setting range: +5°C...+60°C
Weight/pack	0.1 kg
Approvals	UL + C-UL VDE
Certificates	EAC
Declarations	Declaration of conformity
Cabin Lighting System	
Type	RITTAL LED system light
Material	Light body: Extruded aluminium Light cover: Polycarbonate (halogen-free) Light ends: PC-ABS (halogen-free)
Colour	Enclosure: RAL 7016
Protection category IP to IEC 60 529	IP 20
Dimensions	Width: 337 mm Height: 55 mm Depth: 23 mm
Rated operating voltage	100 V - 240 V, 1~, 50 Hz/60 Hz
Operating temperature	Operation (environment): -20°C...+55°C
Power consumption	7 W
Luminous flux	600 lm
Light colour	4000 K (neutral white)
Protection category	II (all-insulated)
Weight/pack	0.35 kg
Approvals	CCC ENEC
Certificates	EAC

5.2. Electrical Parts

Solar Inverter	
General Data	
Type	SMA Sunny Boy 6.0-US
Dimensions	Width: 535 mm Height: 730 mm Depth: 198 mm
Weight	26 kg
Transport weight	30 kg
Temperature range	-25°C ... +60°C
Storage temperature	40°C... +60°C
Typical noise emission	39 dB(A)
Power loss in night mode	< 5 W
Topology	Transformerless
Cooling principle	Convection
Enclosure type rating in accordance with UL50	NEMA 3R
Protection class	1
Approvals and national standards	UL 1741, UL 1741 SA incl. Rule 21 RSD, UL 1998, UL 1699B, IEEE1547, FCC Part 15 (Class A & B), CAN/CSA V22.2 107.1-1, HECO SRD-UL-1741-SA-V1.1
DC Input	
Maximum usable DC power at 208 V	5500 W
Maximum usable DC power at 240 V	6300 W
Maximum input voltage	600 V
MPP voltage range	100 V ... 550 V
Rated input voltage	220 V ... 480 V
Minimum usable input voltage	90 V
Initial input voltage	125 V
Maximum input current per input	10 A
Maximum short-circuit current per input	18 A
Maximum input source reverse current to input source	114 A peak
Number of independent MPP inputs	3
AC Output	
Rated power at 208 V	5200 W
Rated power at 240 V	6000 W
Maximum apparent AC power at 208 V	5200 VA
Maximum apparent AC power at 240 V	6000 VA
Rated grid voltage	208 V / 240 V
AC voltage range at 208 V	183 V to 229 V
AC voltage range at 240 V	211 V to 264 V
Nominal AC current at 208 V	25 A
Nominal AC current at 240 V	25 A

Maximum output current	25 A
Total harmonic factor of output current	< 4%
Rated power frequency	60 Hz
Operating range at AC power frequency 60 Hz	59.3 Hz to 60.5 Hz
Power factor at rated power	1
Range of the displacement power factor (adjustable)	0.8 overexcited to 0.8 underexcited
Feed-in phases	1
Phase connection	2
Overvoltage category in accordance with UL 1741	IV
Efficiency	
Maximum efficiency at 208 V, η_{max}	97.2%
CEC efficiency at 208 V, η_{CEC}	96.5%
Maximum efficiency at 240 V, η_{max}	97.6%
CEC efficiency at 240 V, η_{CEC}	97.0%

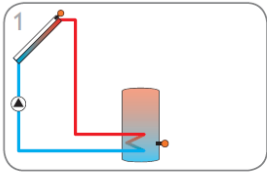
5.3. Thermal Parts

Solar Pump Station	
General Data	
Type	Caleffi 279 series
Dimensions	Height (with controller extension): 381 mm Width (with insulation) : 203,2 mm
Suitable fluids	water, glycol solution
Max. percentage of glycol	50%
Maximum working temperature	air separator side supply: 320°F (160°C) pump side return: 230°F (110°C)
Max. working pressure	145 psi (10 bar)
Safety relief valve working temperature range	-20 to 320°F (-30–160°C)
Safety relief valve setting	90 psi (6 bar)
Check valve min. opening pressure (Dp)	1/4 psi (2 kPa)
Shut-off and check valves working temperature range	-20 to 320°F (-30–160°C)
Flow meter working temperature range	15 to 230°F (-10–110°C)
Flow rate adjustment range	2 to 8 gpm
Flow rate indicator accuracy	±10%
Pressure gauge scale	0 to 145 psi (0–10 bar)
Temperature gauge scale	32 to 320°F (0–160°C)
Connections	3/4" female straight thread
Hose connection	3/4"
Fill/drain connections	with hose connection 9/16" OD (15 mm)

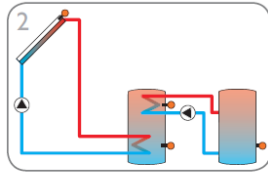
Materials	
Shut-off valve body	Brass
Check valve	Brass
Temperature gauge	steel/aluminum
Air Separator body	Brass
Instrument holder fitting body	Brass
Instrument holder fitting sealing gaskets	EPDM
Instrument holder fitting O-Ring seal elements	EPDM
Flow meter body	Brass
Flow meter transparent level gauge	PS
Flow meter flow indicator	Brass
Insulation material	PP
Insulation average thickness	20 mm
Insulation density	45 kg/m ³
Insulation working temperature	-5...120°C
Insulation thermal conductivity:	0.263 BTU·in/hr·ft ² ·°F 0.037 W/(m·K) at 50°F (10°C)
Insulation reaction to fire (UL94)	class HBF
Controller	
General Data	
Type	Caleffi iSolar
Dimensions	Width: 171.45 mm Height: 111.1 mm Depth: 50.8 mm
Weight	0.4 kg
Housing	PC-ABS
Protection type	Indoor
Display	LCD
Interface	Three soft push buttons
Inputs	4 temperature sensors
Outputs	1 or 2 triac or standard relays
Switching Capacities	1 A - 115 VAC
Power Supply	12V – 24V
Power Consumption	1W, 1.5VA
Data Connection	V-Bus
Performance	
ΔT adjustment range	2-40° ΔT (1-20 °K)
Min. temperature differential	2° ΔT (1 °K)
Hysteresis	2° ΔT ± 1° ΔT (1 °K ± 5° ΔT)
Max. tank temperature range	210 - 375 °F (100 - 190 °C)
Emergency shut down of the collector	230 - 395 °F (110 - 200 °C)
Min. collector temperature option	50 - 195 °F (10 - 90 °C)
Antifreeze temperature option	15 - 50 °F (-10 - 10 °C)
kWh (BTU) flow input	0 – 5 gpm (0 – 20 lpm)

Agency approvals	cTUVus
Temperature Sensors	
Platinum RTD type	1,000 ohm
Collector sensor working range	-58 - 355 °F (-50 - 180 °C)
Tank sensor working range	15 - 175 °F (-10 - 80 °C)
Length of collector black cable	60 in (1.5 m)
Length of tank sensor gray cable	95 in (2.5 m)
Solar Tank	
Type	AO Smith Sun-65
Dimensions	Height: 560 mm Width (with insulation) : 334 mm
Capacity	65 gal
Element wattage	4500 W
Recovery 90°rise	21 gal/hour
Number of elements	1
Insulation R value	16
Certificates	UL, CSA
Glycol (recommended type)	
Type	DOWFROST HD
Recommended temperature range	-46°C...163°C
Freezing Point	-33.5 °C
Boiling Point @ 1 bar	105.6 °C
Freeze protection temperature	-51 °C
Burst protection temperature	-73 °C
Weight % Propylene Glycol	94
Weight % performance additives	6
Specific gravity (15 °C)	1.053 - 1.062
pH of Solution	9.5 - 10.5
Reserve alkalinity	15.0 ml

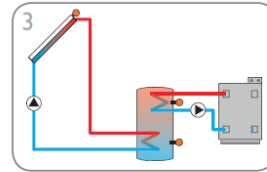
6. SYSTEM OVERVIEW



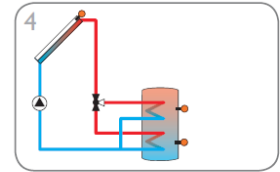
Solar system with 1 store



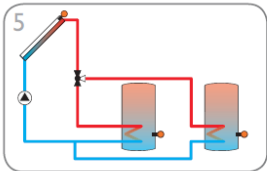
Solar system with 2 stores and heat exchange



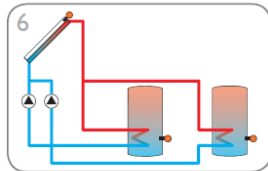
Solar system with 1 store and afterheating



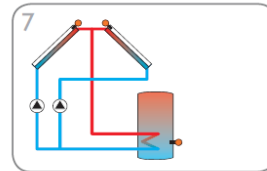
Solar system with 1 store and 3-port valve for store loading in layers



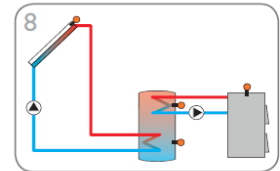
Solar system with 2 stores and valve control



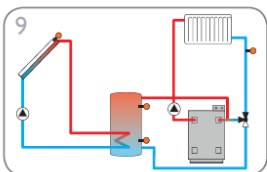
Solar system with 2 stores and pump control



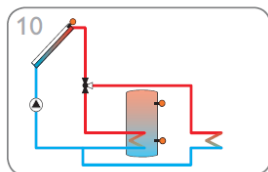
Solar system with east-/west collectors



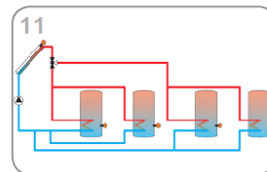
Solar system with 1 store and solid fuel boiler



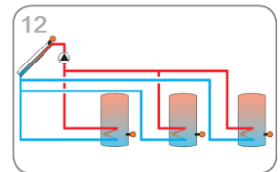
Solar system with 1 store and return preheating



Solar system with 1 store and heat dump



Solar system with 4 stores and valve



Solar system with 3 stores

7. INSTALLATION

7.1. RECOMMENDATIONS

- The device must only be installed by authorized skilled personnel.
- Inspect the packaging for damages.
- The device must be in its original packaging until installation.
- Keep children and unauthorized individuals away from the installation area.



Attention must be paid to the valid local standards, regulations and directives.

Do not install a device with damage.

In order to avoid accidents, install the device in environmental conditions without wind, rain or snow and take appropriate safety measures.


The device must be placed in a flat point.

Avoid installing the device in contact with flammable materials and always adhere to the regulations of fire prevention.

The personnel must wear appropriate clothing and personal protective equipment.


7.2. CODES, STANDARDS AND ORDINANCES


The installation shall conform to all relevant provisions of federal, state and local standards, regulations and codes.

	<p>The contractor must have all the required permits for the installation of the device.</p>
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7.3. INSTALLATION AREA

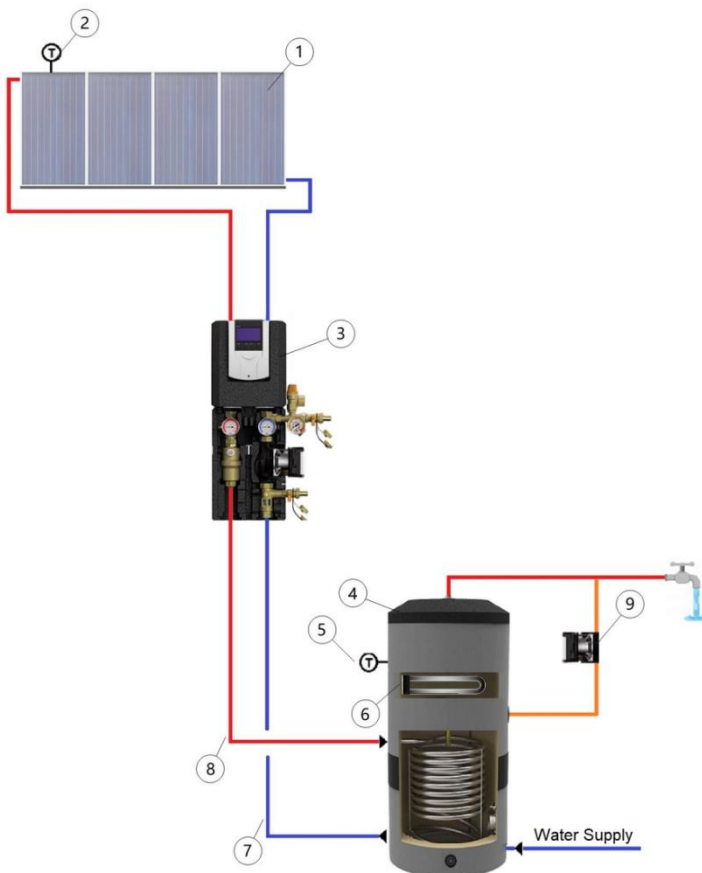
- The device can install in an indoor or outdoor location. The area should be flat, clean, dry and as near as practical to the area of greatest heated water demand.
- Place the device in such a manner so that been easily accessible for maintenance purposes.

	<p>The area must be blocked off during installation procedure.</p>
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	<p>For maintenance and compliance with fire safety regulations reasons, the installation of the device must carried out in areas with minimum safety distance 3 ft.</p>
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7.4. THERMAL SIDE INSTALLATION


7.4.1. Typical Installation Diagram




No	DESCRIPTION
1	Solar collector (or PVT Panels)
2	Solar collector's temperature sensor
3	Solar pump station
4	Solar tank
5	Solar tank temperature sensor
6	Electrical resistance
7	Cold return to solar collector
8	Hot supply from solar collector
9	Circulation pump

Fig.4 – PV System Typical Connection Diagram

	The solar tank storage the hot water produced by the solar collectors and the supplementary electric heating element that maintains consistent water temperature during periods when solar energy is not available.
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	The fluid that circulates to the system is recommended to be glycol (see Technical Features)
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	For optimum PV panel's performance and for comfortable pool conditions ,above 113 F constant ambient temperature conditions, a passive heat dissipation system is recommended to be installed (ONLY for pool solar heating systems). The operation of this system is automatically controlled by HSM's controller. Implementation of this system is not in Fegen's scope of work.
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7.4.2. Connections

- HSM contains all the necessary mechanical / thermal equipment for its operation.
- All the hydraulic connections between the components of the device are pre-installed.
- The contactor has to connect the pipes from the solar collector's side to the solar connection point of HSM.
- For the solar water distribution the contactor has to make the necessary connections to the corresponding inlets or outlets that the HSM provide.

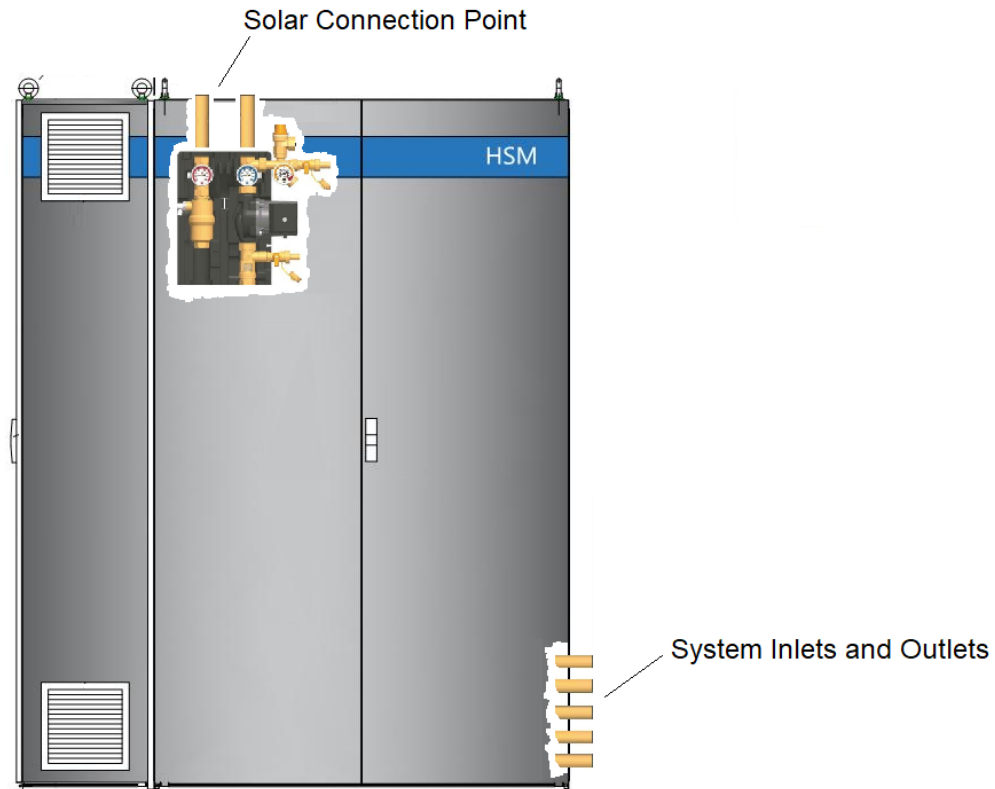




Fig.5 – HSM Connection Points

	<ul style="list-style-type: none"> - All the mechanical equipment / components contained in HSM are UL certified as well as all additional necessary certifications / approvals. - For the connections is using threaded fitting method. - For the connections to the inlets and outlets of the device, all types of pipes are accepted. - To prevent electrolysis it is recommended to use anode in the plumbing network.
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	<p>The piping connected to the device should be insulated. Long uninsulated hot water lines can waste energy and water.</p>
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7.5. ELECTRICAL SIDE INSTALLATION

7.5.1. PV System Installation Diagram

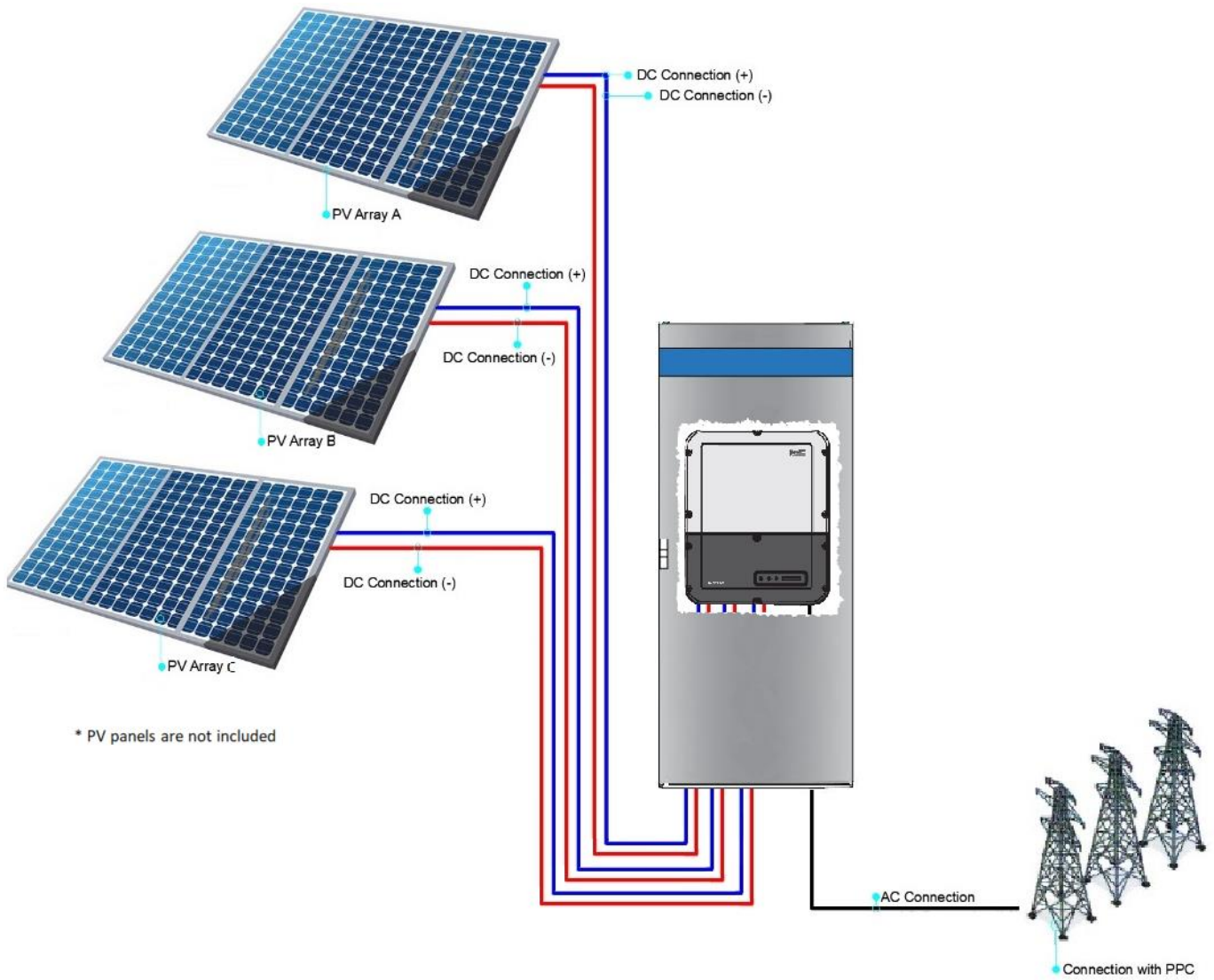


Fig.6 – PV System Typical Connection Diagram

	<p>The connections depicted in the typical diagram are indicative. The number of PV array's may vary.</p>
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7.5.2. Ventilation

Excessive heat, which can cause an enclosure's internal temperature to exceed the manufacturer of the electronic/electrical equipment installed inside the cabin recommended ratings, is removed by using a suitable ventilation system.

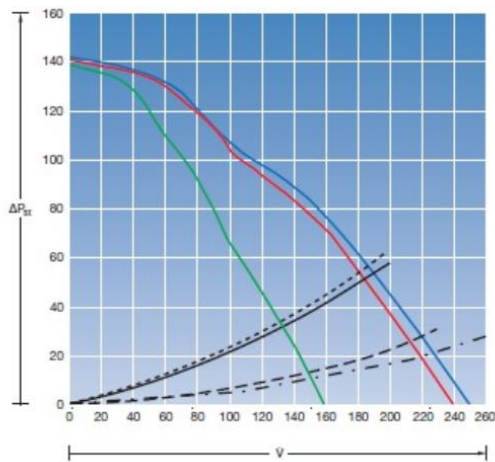
A suitable thermostat is installed inside the *cabin* where the electric/electronic components are paced. The thermostat controls the fan which removes the excessive heat out of the cabin. The operation of the fan depends on the temperature value inside the cabin that the thermostat measures.

When the instantaneous temperature exceeds the setpoint value of the thermostat then a signal is given to the fan to start operating. The fan will stop operating when the temperature inside the cabin returns to the desired set level.



Fig.7 – Air Flow

60 Hz
SK 3241.100, .110, .124, .600



\dot{V} = Volumetric flow (m³/h)
 ΔP_{st} = Stat. pressure difference (Pa)

— = with standard filter
 — = with hose-proof hood
 — = with standard and fine filter

--- = 1 x outlet filter with hose-proof hood
 — = 1 x outlet filter
 --- = 2 x outlet filter
 --- = 1 x roof vent 3138.000 with filter

Fig. 8 - Performance Diagram

	<p>The air supply of the installed ventilation system outweighs the solar inverter manufacturer's requirements (see Technical Features)</p>
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	<p>The ventilation system does not require any installation. The installer only has to set the desired temperature setpoint on the thermostat.</p>
--	--

7.5.3. Electrical Connections

- HSM contains all the necessary electrical equipment for its operation.
- All the electric connections between the components of the device are pre-installed.
- The contactor has to open the necessary holes for the cable entry and exit in the bottom side of HSM.
- The cables glands for the DC and AC cables entry and exit are included in the HSM package.
- DC and AC cables should pass through the pre-installed cable tray. The tray has two individual compartments (one for DC cables and one for the AC cables routing).
- The contractor has to connect the DC and AC cables to the solar inverter's corresponding slots.
- For extra brightness, the HSM has an LED type light system.

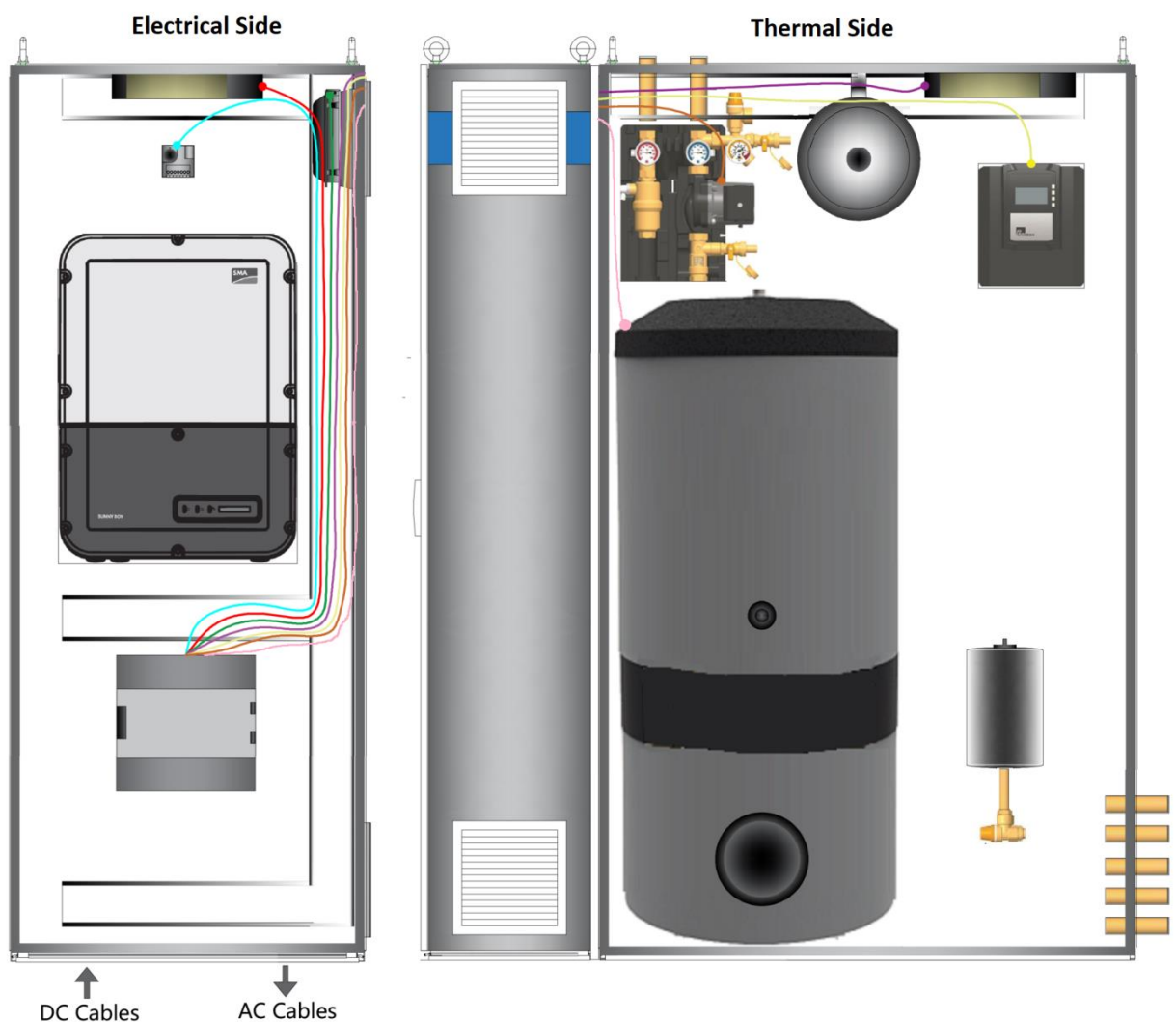











Fig. 9 – Internal Cable Routing (pre-installed)

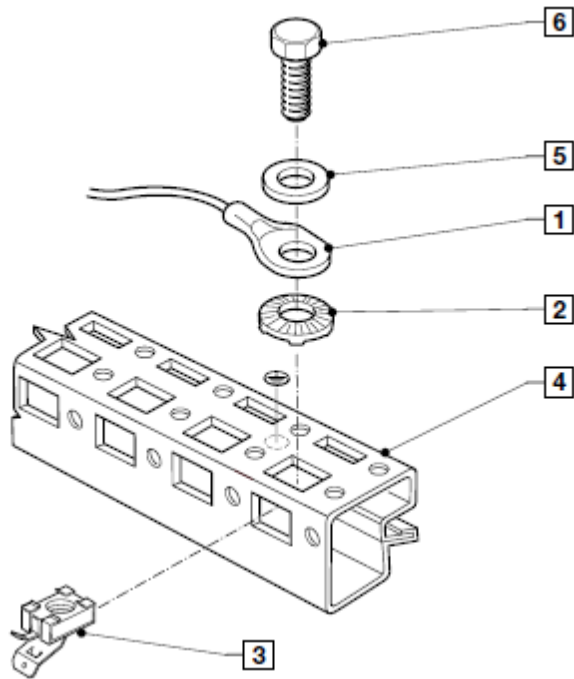
 Thermostat	 Solar Pump Station	 Electrical Resistance
 Ventilation System Fan	 Controller	
 LED Light Electrical Cabin	 LED Light Thermal Cabin	

	<p>All the electrical equipment / components contained in HSM are UL certified as well as all additional necessary certifications / approvals.</p>
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	<p>The solar inverters manufacturer's instructions should be followed carefully.</p> <p>Please refer to the manufacturer's instruction manual for more details. The solar inverter's manual is attached.</p>
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7.5.4. Grounding

The HSM's cabin needs to be grounded in its frame. All the parts of the HSM are grounded to the frame.





No	DESCRIPTION
1	Ring terminal with PE conductor
2	Contact washer
3	Captive nut M8
4	Cabins frame
5	Plain washer
6	Hex screw M8

Fig. 10 – Grounding Method

8. OPERATION

The system controller collects and processes the temperature values of the solar tank as well as the temperature in the solar panels side. When there is demand for hot water, the controller, depending on the temperature measurements, starts the operation in order to cover the needs in the most efficient way.

	<p>The solar pump station manufacturer's instructions should be followed carefully. Please refer to the manufacturer's instruction manual for more details. The solar pump station manual is attached.</p>
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	<p>The operation of the electrical resistance (if is required) automatically controlled from the system controller.</p>
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8.1. Back-up Operation System

In cases of power failure, a backup system which guarantees the uninterrupted circulation of the glycol (from PV side to HSM) is provided.

The system comprises a DC solar pump (capable for glycol circulation) and a PV panel specifically addressed for the pump supply.

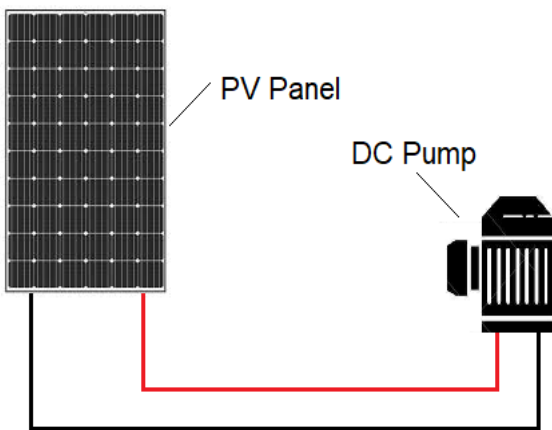


Fig. 11 – Backup System Diagram

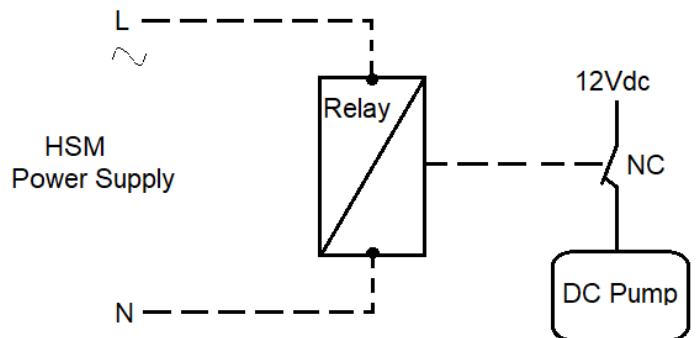



Fig. 12 – Backup System Switching Diagram

	<p>The Backup system will operate ONLY when there is a power failure in HSM device.</p>
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DC Solar Pump	
Maximum PV Panel Output Power	15 W
Nominal Operating Voltage	12 V
Suitable fluids	Glycol, Hot Water

9. MAINTENANCE

- Regular maintenance is required to keep the device clear.
- Every year the glycol system pressure must be checked.
- Every three years the anodium has to be changed and the boiler should be drained and cleaned.
- Avoid the use materials which may damage the device.



The maintenance procedure must only be done by authorized skilled personnel.

10. WARRANTY

- FEGEN guarantees its products against any manufacturing defect for five years after the delivery of the units.
- FEGEN will repair or replace any defective factory product returned during the guarantee period.



No returns will be accepted and no unit will be repaired or replaced if it is not accompanied by a report indicating the defect detected or the reason for the return.

The guarantee will be void if the unit has been improperly used or the storage, installation and maintenance instructions listed in this manual have not been followed. “Improper usage” is defined as any operating or storage condition contrary to the national electrical code or that surpasses the limits indicated in the technical and environmental features of this manual.

FEGEN accepts no liability due to the possible damage to the unit or other parts of the installation, nor will it cover any possible sanctions derived from a possible failure, improper installation or “improper usage” of the unit. Consequently, this guarantee does not apply to failures occurring in the following cases:

- Improper installation and/or lack of maintenance.
- Buyer repairs or modifications without the manufacturer’s authorization.

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