



Codes

E1324I-T1000ADE

E1332I-T1000ADE

Fegen Solar Modules SM series are All-in-One, Plug & Play, Outdoor, Scalable enclosures that incorporate all solar thermal and solar electric distribution gear for buildings in one device.

- No need of a conventional indoor boiler room
- No on-site labor cost
- Immediate start-up
- No responsibility conflicts
- Easy control and maintenance
- Scalable for infinite combinations

- **Tight triple door dimensions**
- **1000 liters water storage**
- **Integrated heating element**
- **Robust AC pump design**
- **Solar back up system for redundancy**
- **Defrost system for reliability**
- **Solar pool gear option (P extension coded)**
- **Robust protected-ventilated 3ph 24-32kWdC inverter**

CABIN GENERAL CHARACTERISTICS

	Thermal Part	Electrical Part
Type	RITTAL TS 8	
External dimensions W x H x D (front view)	1200 x 2000 x 800 mm 47,2 x 78,74 x 31,50 inch	800 x 2000 x 400 mm 31,5 x 78,74 x 15,75 inch
Material	Sheet steel	
Mounting plate W x H	1099 x 1896 mm / 43,3 x 74,65 inches	699 x 1896 mm / 27,5 x 74,65 inches
Weight/pack	203 kg	124 kg
Cold / Hot Supply - Brass	1 ¼ inch	
Color	RAL 7035	
Protection category IP to IEC 60 529	IP 55	
Doors	2	1
Light	Auto door power On/Off - 600 lumens	
Scalability	Unlimited	
Protection	Over-temperature, Anti-freeze control	
Approvals	Bureau Veritas, CSA, TÜV, DNV-GL, Lloyds Register of Shipping, Russian Maritime Register of Shipping, UL + C-UL	
Certificates	EAC,IK-Code, Protection category	
Declarations	Declaration of conformity, Manufacturer's declaration	

CABIN LIGHTING SYSTEM-TECHNICAL SPECIFICATIONS

	General Data
Type	RITTAL LED system light
Material	Light body: Extruded aluminium Light cover: Polycarbonate (halogen-free) Light ends: PC-ABS (halogen-free)
Color	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

VENTILATION - TECHNICAL SPECIFICATIONS

	Fan	Thermostat
Type	RITTAL TopTherm	RITTAL internal thermostat
Color	RAL 7035	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	24 V - 230 V, 1~24 V - 60 V (DC)
Dimensions	Width: 255 mm Height: 255 mm	Width: 71 mm Height: 71 mm Depth: 33.5 mm
Build depth	25 mm	
Installation depth	107 mm	
Temperature range:	Bearing: -30°C...+70°C Operation (environment): -30°C...+55°C	Setting range: +5°C...+60°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	0.1 kg
Approvals	Approval overview CSA UL + C-UL - FTTA UR + C-UR	UL + C-UL VDE
Certificates	EAC	EAC
Declarations	Declaration of conformity	Declaration of conformity

SOLAR TANK CHARACTERISTICS

General Data	
Type	TESY EV
Solar tank capacity	500 lt / 132 gal
External dimensions W x H x D	750 x 1674 mm / 29,5 x 66 inch
Weight	145 kg / 320 lb
Number of boilers	2
Max pressure primary circuit	8 bar
Max pressure secondary circuit	6 bar
Electric Resistance	1.50 – 4.00 KW (UL Ready) - not included
Anti-corrosion protection	2 x magnesium anodes
Certification	Solar Keymark, CE

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/m3
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° $\Delta T \pm 1^\circ \Delta T$ (1 °K $\pm 5^\circ \Delta T$)
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)
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

TECHNICAL DATA AND TYPES

Fimer type code

TRIO-20.0-TL-OUTD

TRIO-27.6-TL-OUTD

Input side

Absolute maximum DC input voltage ($V_{max,abs}$)	1000 V	
Start-up DC input voltage (V_{start})	430 V (adj. 250...500 V)	
Operating DC input voltage range ($V_{dcrmin} \dots V_{dcrmax}$)	0.7 x V_{start} ...950 V (min 200 V)	
Rated DC input voltage (V_{dcr})	620 V	
Rated DC input power (P_{dcr})	20750 W	28600 W
Number of independent MPPT	2	
Maximum DC input power for each MPPT ($P_{MPPTmax}$)	12000 W	16000 W
DC input voltage range with parallel configuration of MPPT at P_{acr}	440...800 V	500...800 V
DC power limitation with parallel configuration of MPPT	Linear derating from max to null [800 V ≤ VMPPT ≤ 950 V]	
DC power limitation for each MPPT with independent configuration of MPPT at P_{acr} max unbalance example	12000 W [480 V ≤ VMPPT ≤ 800 V] the other channel: P_{dcr} -12000 W [350 V ≤ VMPPT ≤ 800 V]	16000 W [500 V ≤ VMPPT ≤ 800 V] the other channel: P_{dcr} -16000 W [400 V ≤ VMPPT ≤ 800 V]
Maximum DC input current (I_{dcrmax}) / for each MPPT ($I_{MPPTmax}$)	50.0 A / 25.0 A	64.0 A / 32.0 A
Maximum input short circuit current for each MPPT	30.0 A	40.0 A
Number of DC input pairs for each MPPT	1 (4 in -S2X, -S2F, -S1J, -S2J versions)	1 (5 in -S2X and -S2F versions, 4 in -S1J and -S2J)
DC connection type	PV quick fit connector ¹⁾ / Screw terminal block on Standard and -S2 versions	

Input protection

Reverse polarity protection	Yes, from limited current source	
Input over voltage protection for each MPPT-varistor	Yes, 4	
Input over voltage protection for each MPPT - plug In modular surge arrester (-S2X, -S1J and -S2J versions)	-S2X: Type 2; -S1J, -S1J: Type 1+2	
Photovoltaic array isolation control	According to local standard	
DC switch rating for each MPPT (version with DC switch)	40 A / 1000 V	
Fuse rating (versions with fuses)	15 A / 1000 V	

Output side

AC grid connection type	Three-phase 3W+PE or 4W+PE	
Rated AC power (P_{acr} @cosφ=1)	20000 W	27600 W
Maximum AC power (P_{acmax} @cosφ=1)	22000 W ²⁾	30000 W ³⁾
Maximum apparent power (S_{max})	22200 VA ⁴⁾	30670 VA ⁴⁾
Rated AC grid voltage (V_{acr})	400 V	
AC voltage range ²⁾	320...480 V ⁵⁾	
Maximum AC output current ($I_{ac,max}$)	33.0 A	45.0 A
Contributory fault current	35.0 A	46.0 A
Rated output frequency (f) ³⁾	50/60 Hz	
Output frequency range ($f_{min} \dots f_{max}$) ³⁾	47...53 Hz / 57...63 Hz ⁶⁾	
Nominal power factor and adjustable range	> 0.995, adj. ± 0.9 with P_{acr} = 20.0 kW, ± 0.8 with max 22.2 kVA	> 0.995, adj. ± 0.9 with P_{acr} = 27.6 kW, ± 0.8 with max 30 kVA
Total current harmonic distortion	< 3%	
AC connection type	Screw terminal block, cable gland PG36	

Output protection

Anti-islanding protection	According to local standard	
Maximum external AC overcurrent protection	50 A	63 A
Output overvoltage protection - varistor	4	
Output overvoltage protection - plug in modular surge arrester (-S2X version)	4 (Type 2)	

User interface

Fimer Type code

TRIO-20.0-TL-OUTD

TRIO-27.6-TL-OUTD

Operating performance

Maximum efficiency (η_{max})	98.2%
Weighted efficiency (EURO/CEC)	98.0% / 98.0%
Feed in power threshold	40 W
Night consumption	< 0.6 W

Communication

Wired local monitoring	PVI-USB-RS232_485 (opt.)
Remote monitoring	VSN300 Wifi Logger Card (opt.), VSN700 Data Logger (opt.)
Wireless local monitoring	VSN300 Wifi Logger Card (opt.)
User interface	Graphic display

Environmental

Ambient temperature range	-25...+60°C / -13...140°F with derating above 45°C/113°F
Relative humidity	0...100 % condensing
Sound pressure level, typical	50 dBA @ 1 m
Maximum operating altitude without derating	2000 m / 6560 ft

Physical

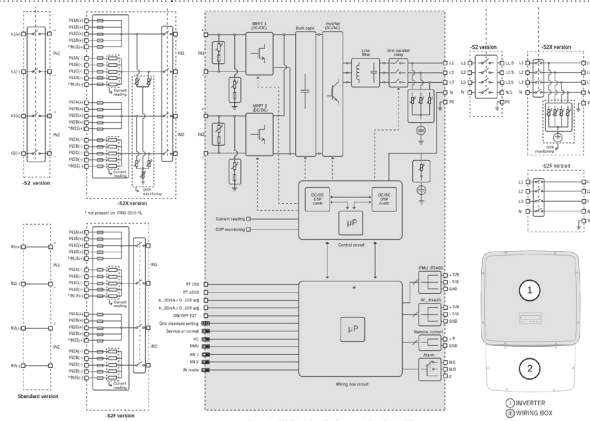
Environmental protection rating	IP 65
Cooling	Natural
Dimension (H x W x D)	1061 mm x 702 mm x 292 mm / 41.7" x 27.6" x 11.5"
Weight	< 70.0 kg / 154.3 lbs (Standard version) < 75.0 kg / 165.4 lbs (Standard version)
Mounting system	Wall bracket

Safety

Isolation level	Transformerless
Marking	CE (50 Hz only), RCM
Safety and EMC standard	EN 50178, IEC/EN 62109-1, IEC/EN 62109-2, AS/NZS 3100, AS/NZS 60950.1, EN 61000-6-2, EN 61000-6-3, EN 61000-3-11, EN 61000-3-12
Grid standard (check your sales channel for availability)	CEI 0-21, CEI 0-16, DIN V VDE V 0126-1-1, VDE-AR-N 4105, G59/3, C10/11, EN 50438 (not for all national appendices), RD 1699, RD 413, RD 661, P.O. 12.3, AS 4777, BDEW, NRS-097-2-1, MEA, IEC 61727, IEC 62116, Ordinul 30/2013, VFR 2014

Available products variants

Standard	TRIO-20.0-TL-OUTD-400	TRIO-27.6-TL-OUTD-400
With DC+AC switch	TRIO-20.0-TL-OUTD-S2-400	TRIO-27.6-TL-OUTD-S2-400
With DC+AC switch and fuse	TRIO-20.0-TL-OUTD-S2F-400	TRIO-27.6-TL-OUTD-S2F-400
With DC+AC switch, fuse and surge arrester	TRIO-20.0-TL-OUTD-S2X-400	TRIO-27.6-TL-OUTD-S2X-400
With DC+AC switch, fuse and 1 DC surge arrester Type 1 + 2	TRIO-20.0-TL-OUTD-S1J-400	TRIO-27.6-TL-OUTD-S1J-400
With DC+AC switch, fuse and 2 DC surge arrester Type 1 + 2	TRIO-20.0-TL-OUTD-S2J-400	TRIO-27.6-TL-OUTD-S2J-400



TRIO-20.0/27.6-TL-OUTD string inverter block diagram

Models using other branded solar thermal or solar electric gear upon demand.