SONNENKRAFT®

FWM15i/30i-CU/VA MODULE

All new module

PLUS X AWARD®
achieved for:
Innovation
High Quality
Functionality
Ecology

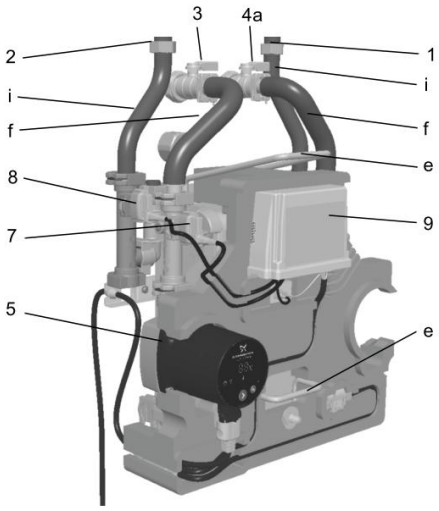
EXTENDED DATASHEET

SONNENKRAFT™

www.sonnenkraft.com

Main components

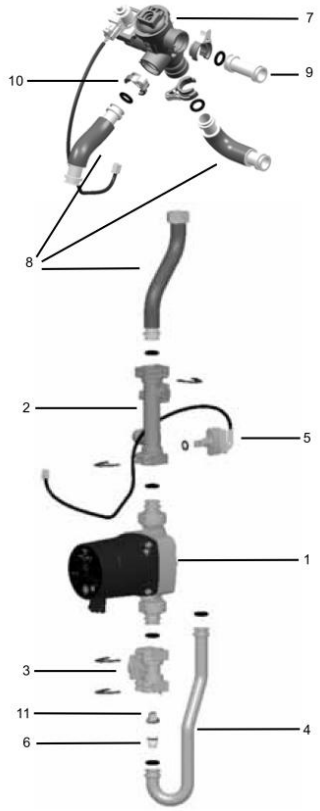
Fresh Water Module FWM15/30i-CU/VA



Main components
5 = ALPHA FWM pump
(6) = Plate heat exchanger, PHE (not visible)
7 = Temperature sensor
8 = Flow and temperature sensor
9 = Sensor box
e = Handle bars
f = Flexible hoses - storage tank
i = Flexible hoses - fresh water

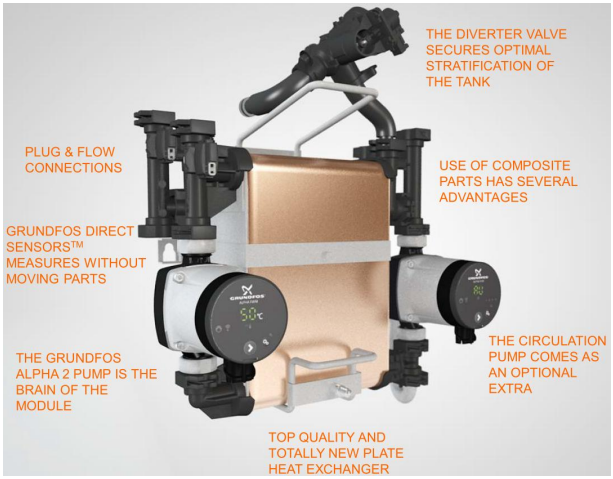
Connections
1 = Cold fresh water in
2 = Hot fresh water out
3 = Hot storage tank water in
4a = Storage tank water out

DHW recirculation pump FWM15i-CFK/FWM30i-CFK



Main components
1 = ALPHA DHW pump
2 = Recirculation fitting
3 = Adapter
4 = Recirculation pipe
5 = Temperature sensor
6 = Non-return valve
7 = Three-way valve
8 = Stainless-steel pipe
9 = Stainless-steel pipe section
10 = Special-purpose locking clips
11 = Mesh filter

Detailed technical specification & material overview



FWMi

Rated voltage	V	AC 230
Rated frequency	Hz	50
Rated power input	W	Overall power consumption max. 100 (incl. recirculation), standby by mode = 3 W
Class		I
Degree of protection		IPX2
Max. ambient temperature	°C	40
Heat losses		-
Main materials		Composite parts, VA- or CU heat exchangers etc.
Emergency duty		✓
Disinfection mode		✓

Insulation

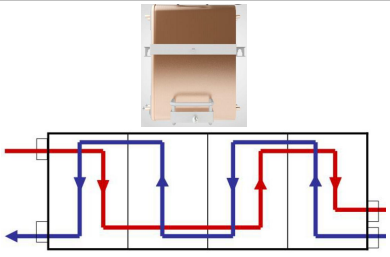
Insulation material		EPP
Insulation removable		Yes
Specific weight raw material	g/l	60
Fire class		-
Color		black

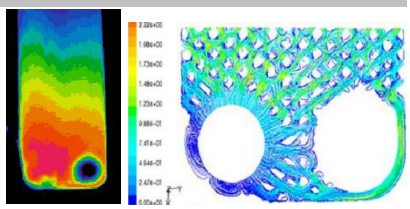
FWMi Cascade

Module running time		Balanced running time of all modules

Heat exchanger

Heat exchanger configuration	
3 over 4 pass execution	• The result is a Plate Heat Exchanger execution that has a high degree of turbulent flow and that provides a higher degree of resistance to corrosion and scaling than normal executions. • The Flipper-configuration improves the cleanliness and efficiency of the Plate Heat Exchanger dramatically at both high temperatures and small mass flows.



SWEP CPP- Corner Passage Pattern		
CCP allows	• flow around ports • This enables for a better temperature distribution over the plate width, lower channel pressure drop and more even temperature • The CPP geometry forces more flow into the connection area than a traditional plate heat exchanger and the risk of "dead zones" with increased risk of corrosion and scaling are dramatically reduced.	
Technical Data	Measurements Materials Heat exchanger surface Performance data	

GF Direct Sensors

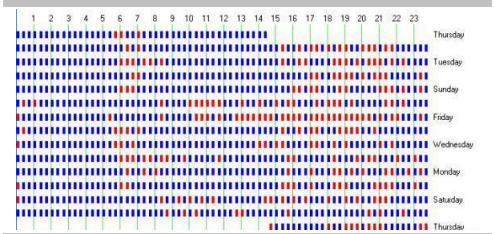
Sensors in the Module		
3 sensors:	• One Vortex Sensor measuring flow and temperature in the Domestic Hot Water pipe of the module • One temperature sensor in the Central Heating in pipe of the module • One optional temperature sensor in the recirculation return pipe of the module (only if the module is adjusted with a Domestic Hot Water comfort set)	 Flow and Temperature Sensor Domestic Hot Water Temperature Sensor Central Heating  Temperature Sensor Domestic Hot Water Recirculation
Sensor functions	• Measurement of pressure • Measurement of differential pressure • generating a temperature signal (at the same time)	

Main advantages	• Measurement technique without any moving parts which could affect operational reliability
	• Perfect smooth sensor nano surface coating of amorphous metallic glass which protects the sensor chip over a long period – even in aggressive media (pH 2-11) (Conventional sensors are either elaborately encapsulated or without protection).
	• Quasi-direct contact with the medium, which results in
	  • fast response time
	  • accurate measurement with wide bandwidth as well as high reproducibility
		

Circulation pump

Main functions / operation modes		
	Based on input data from all sensors, the sensor box and the Alpha DHW recirculation pump, the circulation pump steers all basic functions in the Fresh Water Module. **Two modes** • Normal Mode – Set desired hot water temperature in an area from 30°C to 65°C – Display Set point temperature as well as status of functionalities • Installer mode – Set max temperature for hygienic reasons (80°C) – Set recirculation on or off (for hygienic reasons) **Less wiring** • Wireless communication to the sensor box and to the Alpha DHW recirculation pump (optional installation)	

Recirculation pump (optional)

Pump speed	6 speed settings	
Delivery height	varies from approx. 1m in setting one to approx. 6m in setting six	
Operation modes		
	Set Mode • ON = always on (24hrs) • tE = always on, thermostatic controlled • t5 = tap + five; after each tapping the Domestic Hot Water recirculation pump is running as long as either the set point temperature has been reached or 5 minutes are over • AU = automatic timer programming ATP (self-learning recirculation pump) • Of = recirculation always off • In = manual programming of intervals → Manual timer programming (MTP) Service Mode • Setting the required pump speed Hidden Mode • Setting the clock • Manual timer programming MTP	
Automatic timer programming ATP		
	The state of the art technology ATP will learn when your household needs hot fresh water, and it will supply you with the obedient quantity right on time. Compared to the old fashioned hot-water tank this will give the household substantial savings on the energy account. • Stored calendar information • Day and time estimation for correct weekend control	
Recirculation stop	The pump comes with an empty tank stop function. It stops as soon as the tank temperature drops to a level close to the set point temperature on the secondary side. Steps: 1. Stepwise reduction of hot water set temperature in the case the tank temperature decreases (hot water temperature < 5°C < tank temperature) 2. < 30°C → general stop of recirculation	

Diverter valve (optional, delivered with recirculation pumps)

Main functions		
	If the recirculation pump isn't running, the water in the return pipe is cold (approx. +5°C of the Domestic Cold Water inlet temperature) and the diverter valve stratifies the cold water to the bottom of the tank. If the recirculating pump is running, the water in the return pipe is warm (approx. 35 - 45°C) and the diverter valve stratifies the warm water to the middle of the tank. The advantage of the diverter valve is that the stratification of the tank is not destroyed by warm water coming back in the Central Heating pipe to the bottom of the tank.	

Installation and maintenance

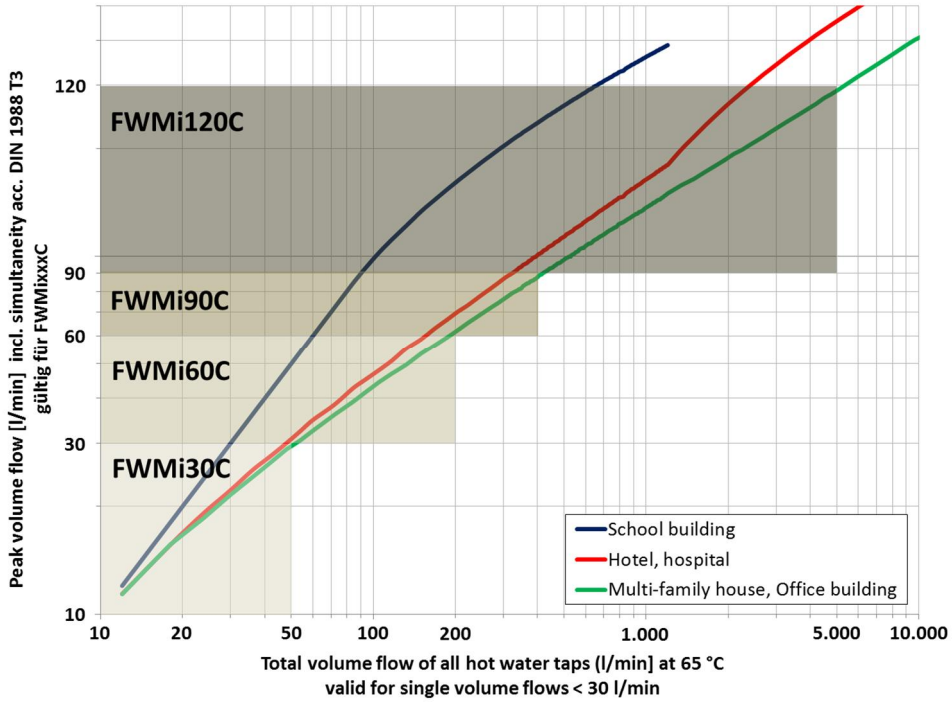
Installation	Installation and operation should be executed in accordance with the locally applicable specifications and standard practices. Only qualified technical personnel should carry out the assembly, maintenance and cleaning of the module. This personnel (facility) will also take on the responsibility for correct installation and commissioning Unauthorized modifications or changes are not permitted for safety reasons and will inevitably lead to the voiding of the warranty for the machine. The operating pressures provided may not be exceeded! A dry, frost-free room that provides sufficient space for maintenance work is required as the installation site. The module must be installed so that it is protected from splashing water and should be run only at room temperatures below 40°C.
Maintenance	Yearly check recommended

Performance diagrams

Selecting fresh water module sizes

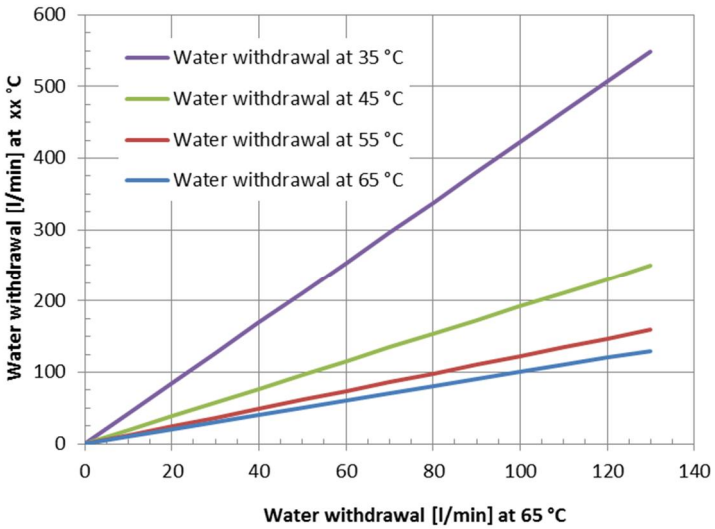
When sizing HW production in continuous flow, the maximum occurring peak flow is relevant. In contrast, daily HW consumption is used for sizing HW production with the hot water tank principle. The total flow (= sum of all individual flows) can be determined by taking into account the application-specific concurrent usage factors with the following table of peak flows. This can be used to determine the necessary module size. The individual flow describes the flow volume at a sampling point.

Selecting Fresh Water Module configuration of school buildings, hotels, hospitals, multi-family houses and office buildings



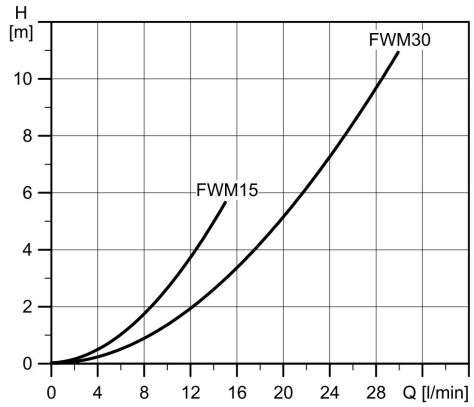
Note: As with all domestic water systems with circulation systems, a suitable excess pressure or expansion device must be provided; otherwise, impermissibly high pressure increases in the HW line system during circulation without dispensing would occur. The use of additional expansion tanks for drinking water impedes constant leakage at the safety valve and thereby increases the operational safety of larger systems.

Conversion of the amount of hot water withdrawal when changing tap temperature



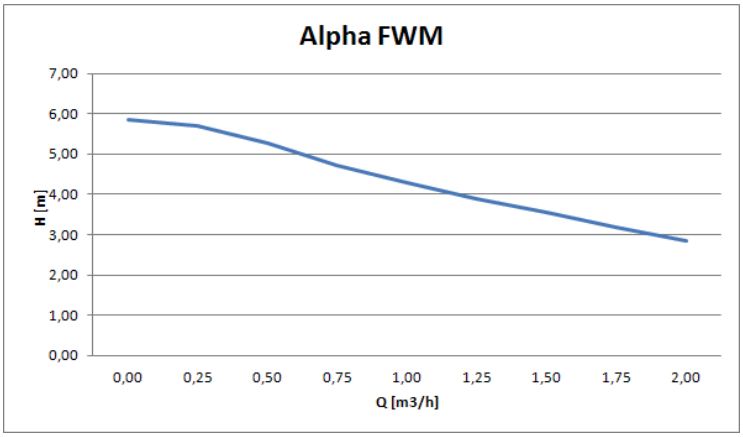
Pressure losses

FWMi, secondary side

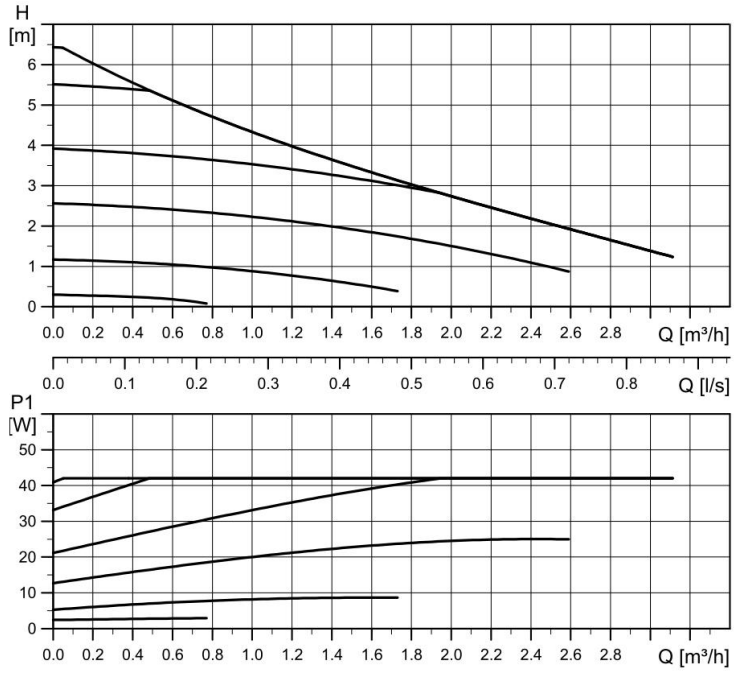


Pump performance curves

FWMi



FWM15i-CFK/FWM30i-CFK



Version nº: 2013/03.

Heat Exchanger – detailed data (FWM30i)

Counter-current part of heat exchanger

Fluid primary / secondary = water, flow type = counter-current				
DUTY REQUIREMENTS		**Primary side**		**Secondary side**
Heat load	kW		41,75	
Inlet temperature	°C	40,00		10,00
Outlet temperature	°C	14,91		30,00
Flow rate	l/min	24,07		30,00
Max. pressure drop	kPa			
Thermal length		3,51		2,80
PLATE HEAT EXCHANGER				
Total heat transfer area	m²		1,46	
Heat flux	kW/m²		28,7	
Mean temperature difference	K		7,15	
H.T.C. (available/required)	W/m²,°C		4040/4010	
Pressure drop - total	kPa	9,67		14,9
Pressure drop - in ports	kPa	0,368		0,578
Port diameter	mm	24,0		24,0
Number of channels		12		12
Number of plates			49	
Oversurfacing	%		1	
Fouling factor	m²,°C/kW		0,002	
PHYSICAL PROPERTIES				
Reference temperature	°C	27,45		20,00
Dynamic viscosity	cP	0,843		1,00
Dynamic viscosity - wall	cP	0,915		0,926
Density	kg/m³	996,4		998,2
Heat capacity	k//kg,°C	4,179		4,182
Thermal conductivity	W/m,°C	0,6113		0,5984
Min. fluid temperature at wall	°C	12,58		
Max. fluid temperature at wall	°C			34,26
Reynolds number		696		734
Film coefficient	W/ m²,°C	8520		9490
Average wall temperature	°C	23,82		23,33
Port velocity	m/s	0,883		1,11
Channel velocity	m/s	0,147		0,184
Shear stress	Pa	19,1		29,5

Co-current part of heat exchanger

Fluid primary / secondary = water, flow type = co-current				
DUTY REQUIREMENTS		**Primary side**		**Secondary side**
Heat load	kW		16,60	
Inlet temperature	°C	50,00		30,00
Outlet temperature	°C	40,00		38,00
Flow rate	l/min	24,07		30,00
Max. pressure drop	kPa			
Thermal length		1,28		1,02
PLATE HEAT EXCHANGER				
Total heat transfer area	m²		0,620	
Heat flux	kW/m²		26,8	
Mean temperature difference	K		7,82	
H.T.C. (available/required)	W/m²,°C		4890/3430	
Pressure drop - total	kPa	5,52		10,0
Pressure drop - in ports	kPa	0,370		0,575
Port diameter	mm	24,0		24,0
Number of channels		11		10
Number of plates			22	
Oversurfacing	%		43	
Fouling factor	m²,°C/kW		0,084	
PHYSICAL PROPERTIES				
Reference temperature	°C	45,00		34
Dynamic viscosity	cP	0,597		0,735
Dynamic viscosity - wall	cP	0,660		0,670
Density	kg/m³	990,3		994,4
Heat capacity	k//kg,°C	4,180		4,178
Thermal conductivity	W/m,°C	0,6374		0,6217
Min. fluid temperature at wall	°C	39,05		
Max. fluid temperature at wall	°C			38,81
Reynolds number		1070		1200
Film coefficient	W/m²,°C	10200		12100
Average wall temperature	°C	39,52		38,65
Port velocity	m/s	0,887		1,10
Channel velocity	m/s	0,161		0,221
Shear stress	Pa	21,2		38,9

Version nº: 2013/03.

SONNENKRAFT
SOLAR • ENERGY MADE BRIGHTER

Dimensioned drawings of different mounting options

Fresh Water Module Cascade

Wall Mounted

Insert top view and frontal view of 4 modules wall mounted, incl pipes, circ. Pipe to all modules, all pipes with recommended diameter

Tank Mounted, PSC

Insert top view and frontal view of 4 modules on PSC800 tanks

Notes below the drawings:

Note: Recommended pipe diameters see “Fresh Water Module Cascade – Wall Mounted”

Combination Wall-/Tank-Mounting (PSC)

A mixed wall-/tank-installation is possible. Measurements see drawings above.

Overview of available documentation

Product Data Sheets	Content	Available on (partner login) www.sonnenkraft.com
FWM15i/30i-CU/VA MODULE	• General product information • Technical data	X
FWM30i-CU/VA-C2-4 FRESH WATER MODULE CASCADE	• Product benefits • Drawings	X

Manuals	Content	Available on (partner login) www.sonnenkraft.com
FWM15i/30i-CU/VA	Installation and operating instructions for FWMi Fresh Water Modules • Declaration of conformity • Standards • Delivery • General description • Installation • Start-up • Communication • Control panel • Accessing the pump functions • FWMi performance • Technical data • Fault finding charts • Maintenance • Spare parts, overview • Disposal	X
FWM15/30-CU/VA COMFORT (FWM15i-CFK/FWM30i-CFK)	Installation and operating instructions for FWMi Recirculation pump units • Declaration of conformity • Delivery • General description • Installation • Communication • Control panel • Accessing the pump functions • Technical data • Fault finding • Maintenance • Spare parts • Disposal	X
FWMi-WMS FWMi-WMS-CFK	Installation manual for FWMi wall mounting sets for FWMi modules without (FWMi-WMS) and with (FWMI-WMS-CFK) recirculation pump	X
FWM-C FWMI-C-CFK	Installation manual for FWMi cascade sets for FWMi modules without (FWMi-C) and with (FWMI-C-CFK) recirculation pump	X
FWM15i/30i-CU/VA Mounting Poster	Quick guide for installation and commissioning based on pictures	X

Various	Content	Available on (partner login) www.sonnenkraft.com
Drawings / CAD / ..	• Symbols for system drawings	X
Product Pictures	• Product pictures	X
Planners guide	• General guide for planning SONNENKRAFT solar systems	X
Diagram manual, diagrams	• Diagrams for all main SONNENKRAFT solar system solutions	X
Online spare part catalog	• Spare part catalog for all main SONNENKRAFT products	X
Solar Calculator	• Solar calculator for all main SONNENKRAFT solar system solutions	X
Price catalogue	• Price catalogue for current product range	X
Tender texts	• Tender Texts	X
Various	-	-

Version nº: 2013/03.

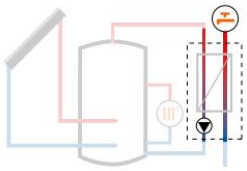
SONNENKRAFT
SOLAR • ENERGY MADE BRIGHTER

Certificates	Certificate No.	Certificate	Effective date	Available on (partner login) www.sonnenkraft.com
FWM15i-CU, FWM30i-CU FWM15i-VA, FWM30i-VA	11 ACC NY 170	ATTESTATION DE CONFORMITE SANITAIRE	07.07.2011	X
FWM15i-CU, FWM30i-CU FWM15i-VA, FWM30i-VA FWM15i-CFK/FWM30i-CFK	1106 – 5890	SVGW certificate acc. SVGW W/TPW 131 (11/08), W3/E1 (2000)	19.03.2012	X
FWM15i-CU, FWM30i-CU	VDE-REG.-Nr. D749	VDE Certificate of conformity with factory surveillance acc. DIN EN 60335 (-1, -2-51), DIN EN 62233, DIN EN 62233 Ber.1	28.11.2011	X
FWM15i-CU, FWM30i-CU FWM15i-VA, FWM30i-VA	1201080	Water Regulations Advisory Scheme WRAS	02.08.2012	X
EC declaration of conformity	-	We, General Solar Systems GmbH, declare under our sole responsibility that the product FWM, to which this declaration relates, is in conformity with these Council directives on the approximation of the laws of the EC member states: • Low Voltage Directive (2006/95/EC). Standards used: EN 60335-2-51: 2003 / A1: 2008, A2: 2010. • EMC Directive (2004/109/EC). Standards used: EN 55014-1: 2006 and EN 55014-2: 1997. • R&TTE Directive (1999/5/EC). Standard used: EN 60950.	-	
Various Standards taken into account	-	Besides local regulations, observe these standards: DIN 1988, Drinking water supply systems (DVGW code of practice) DIN 4708, Central heating-water installations ISO 9459-1, Solar heating and solar thermal installations. Solar heating - Domestic water heating systems - Part 1: Performance rating procedure using indoor test methods. ISO 9459-2, Solar heating - Domestic water heating systems - Part 2: Outdoor test methods for system performance characterization and annual performance prediction of solar-only systems. DIN 4753, Water heaters and water heating installations for drinking water and service water. DIN 4757, Solar heating plants operating on organic heat transfer media. DIN 18380, German construction contract procedures (VOB): Installation of central heating systems and hot-water supply systems. DIN 18381, German construction contract procedures (VOB): Installation of gas, water and drainage pipework inside buildings. BS 8580, Standard for Legionella.		

Overview of available accessories

Article	Article No.	Description	FWMi	FWMi Cascade	Available on (partner login) www.sonnenkraft.com
FWM15i-CFK/FWM30i-CFK	130 456-C-VM	Recirculation pump unit for all FWMi versions, perfect integration and with wireless communication to the FWMi-module, operating modes: self learning mode, 24h on, thermostatic controlled tapping + 5 min, manual timer programming. Delivery height adjustable in 6 steps from 1 to 6 m	X		X
FWMi-WMS	130 501	Wall mounting set for FWM15i/30i without recirculation pump, consisting of wall insulation, wall mounting bracket and corrugated pipe connectors	X	X	X
FWMi-WMS-CFK	130 572	As FWMi-WMS (130 501) but for FWMi-modules containing a recirculation pump	X	X	X
FWMi-C-EXT	130 580	Wall mounting extension set, for upgrading existing wall mounted FMW15i/30i (131 117-C – 131 120-C) modules with a recirculation pump (order recirculation pump 130456 separately)		X	X
FWMi-C	130 570	Cascade set consisting of cascade valve, mounting rail, ball valves and accessories for mounting one FWM30i without recirculation pump		X	X
FWMi-C-CFK	130 571	As FWMi-C (130 570) but for FWMi-modules containing a recirculation pump		X	X
FWMi-C-V	130 589	Cascade valve (1 pc. per FWM30i, for cascade self-installation without wall mounting sets and cascade sets, max. 4 FWM30i per cascade)		X	X

Overview mounting options, available sets and part lists



FRESHWATER MODULES	DHW	PSR-E	PSC-E	PS-E	WALL MOUNTING POSSIBLE
FWM15i-CU FWM30i-CU		✓	✓		✓***
FWM15i-VA FWM30i-VA		✓	✓		✓***
FWMi Cascade		✓**	✓**	✓**	✓**

✓**..... wall- or tank-installation or mixed installation, fits to system solutions with PSR-E, PSC-E and PS-E
✓*** ... with wall mounting kit

FWMi Cascades – Part lists

FWM30i-CU Cascade - WALL Mounted

		FWM30i-CU	FWMI-CFK	FWMI-WMS	FWMI-WMS-CFK	FWMI-C	FWMI-C-CFK
Match Code	**Set article number**	**131118-C**	**130456-C**	**130501**	**130572**	**130570**	**130571**
FWM30i-CU-C2-WM	131124	2	0	2	0	2	0
FWM30i-CU-C2-CFK1-WM	131121	2	1	1	1	1	1
FWM30i-CU-C2-CFK2-WM	*)	2	2	0	2	0	2
FWM30i-CU-C3-WM	131125	3	0	3	0	3	0
FWM30i-CU-C3-CFK1-WM	131122	3	1	2	1	2	1
FWM30i-CU-C3-CFK2-WM	*)	3	2	1	2	1	2
FWM30i-CU-C3-CFK3-WM	*)	3	3	0	3	0	3
FWM30i-CU-C4-WM	131126	4	0	4	0	4	0
FWM30i-CU-C4-CFK1-WM	131123	4	1	3	1	3	1
FWM30i-CU-C4-CFK2-WM	*)	4	2	2	2	2	2
FWM30i-CU-C4-CFK3-WM	*)	4	3	1	3	1	3
FWM30i-CU-C4-CFK4-WM	*)	4	4	0	4	0	4

FWM30i-VA Cascade - WALL Mounted

		FWM30i-VA	FWMI-CFK	FWMI-WMS	FWMI-WMS-CFK	FWMI-C	FWMI-C-CFK
Match code	**Set article number**	**131117-C**	**130456-C**	**130501**	**130572**	**130570**	**130571**
FWM30i-VA-C2-WM	*)	2	0	2	0	2	0
FWM30i-VA-C2-CFK1-WM	*)	2	1	1	1	1	1
FWM30i-VA-C2-CFK2-WM	*)	2	2	0	2	0	2
FWM30i-VA-C3-WM	*)	3	0	3	0	3	0
FWM30i-VA-C3-CFK1-WM	*)	3	1	2	1	2	1
FWM30i-VA-C3-CFK2-WM	*)	3	2	1	2	1	2
FWM30i-VA-C3-CFK3-WM	*)	3	3	0	3	0	3
FWM30i-VA-C4-WM	*)	4	0	4	0	4	0
FWM30i-VA-C4-CFK1-WM	*)	4	1	3	1	3	1
FWM30i-VA-C4-CFK2-WM	*)	4	2	2	2	2	2
FWM30i-VA-C4-CFK3-WM	*)	4	3	1	3	1	3
FWM30i-VA-C4-CFK4-WM	*)	4	4	0	4	0	4

Version nº: 2013/03.
Subject to typesetting and printing errors.
Technical changes may be made without prior notice.

SONNENKRAFT
SOLAR • ENERGY MADE BRIGHTER

FWM30i-CU Cascade - TANK Mounted

		FWM30i-CU	FWMI-CFK	FWMI-C-V	PVS40 **)
Match code	**Set article number**	**131118-C**	**130456-C**	**130589**	**120026**
FWM30i-CU-C2	131130	2	0	2	4
FWM30i-CU-C2-CFK1	131127	2	1	2	4
FWM30i-CU-C2-CFK2	*)	2	2	2	4
FWM30i-CU-C3	131131	3	0	3	8
FWM30i-CU-C3-CFK1	131128	3	1	3	8
FWM30i-CU-C3-CFK2	*)	3	2	3	8
FWM30i-CU-C3-CFK3	*)	3	3	3	8
FWM30i-CU-C4	131132	4	0	4	12
FWM30i-CU-C4-CFK1	131129	4	1	4	12
FWM30i-CU-C4-CFK2	*)	4	2	4	12
FWM30i-CU-C4-CFK3	*)	4	3	4	12
FWM30i-CU-C4-CFK4	*)	4	4	4	12

FWM30i-VA Cascade - TANK Mounted

		FWM30i-VA	FWMI-CFK	FWMI-C-V	PVS40 **)
Match code	**Set article number**	**131117-C**	**130456-C**	**130589**	**120026**
FWM30i-VA-C2	*)	2	0	2	4
FWM30i-VA-C2-CFK1	*)	2	1	2	4
FWM30i-VA-C2-CFK2	*)	2	2	2	4
FWM30i-VA-C3	*)	3	0	3	8
FWM30i-VA-C3-CFK1	*)	3	1	3	8
FWM30i-VA-C3-CFK2	*)	3	2	3	8
FWM30i-VA-C3-CFK3	*)	3	3	3	8
FWM30i-VA-C4	*)	4	0	4	12
FWM30i-VA-C4-CFK1	*)	4	1	4	12
FWM30i-VA-C4-CFK2	*)	4	2	4	12
FWM30i-VA-C4-CFK3	*)	4	3	4	12
FWM30i-VA-C4-CFK4	*)	4	4	4	12

xxx xxx Art.No. In Navision available
*) FWMi-Cascade set to be ordered via single articles
**) not included in set / has to be orderes separately