

Air-cooled water chillers

3FA is a super-compact, modular, industrial grade high efficiency chiller family.

These units have been specially design to build complete systems with multiple chillers, either connecting them in series or in parallel.

Each unit is equipped with a single refrigeration circuit, with screw compressor (optional inverter), stainless steel brazed plate evaporator, electronic thermostatic control valve and onboard digital controller.

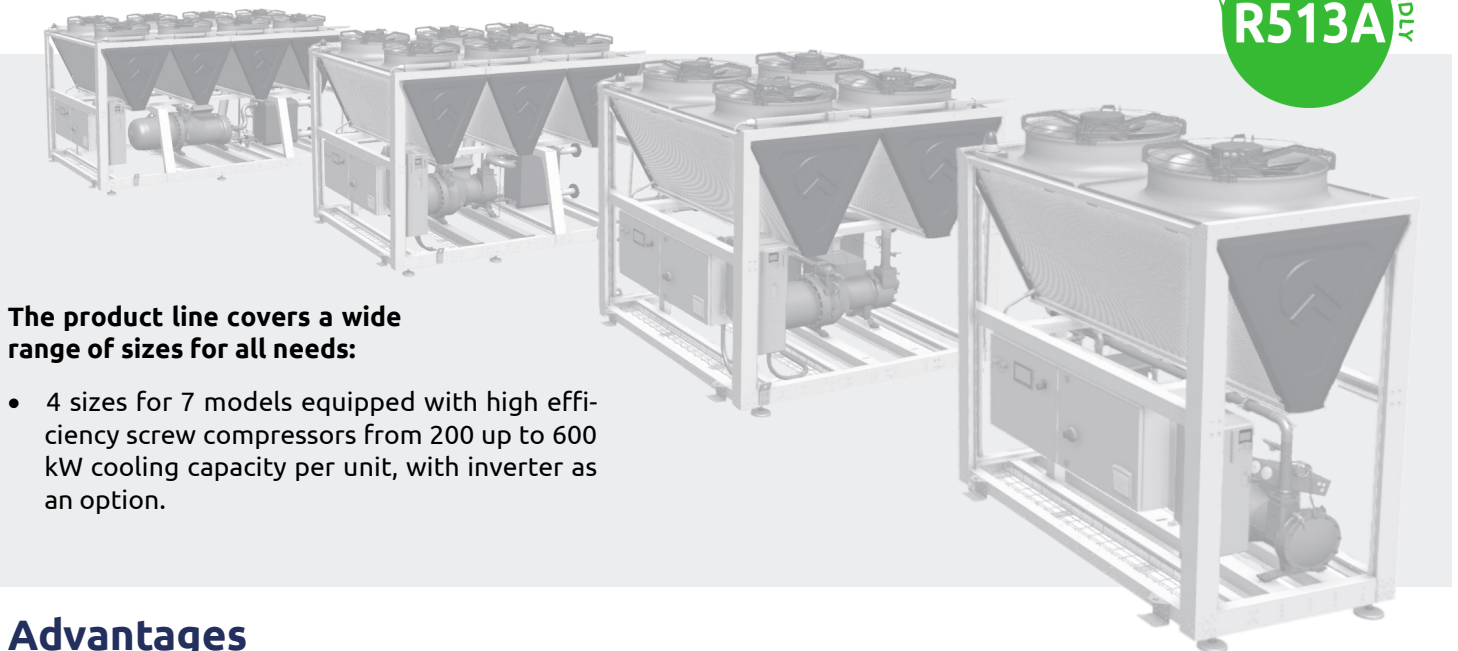
The condensers are mounted directly on the frame and consist of micro-channel aluminum alloy coils with very high efficiency and low weight.

All models are equipped with high-efficiency axial fans with automatic partialization (brushless motors).

These packaged units therefore do not require any on-site assembly and are the perfect combination of power, efficiency and ease of positioning.



High efficiency industrial modular chiller



The product line covers a wide range of sizes for all needs:

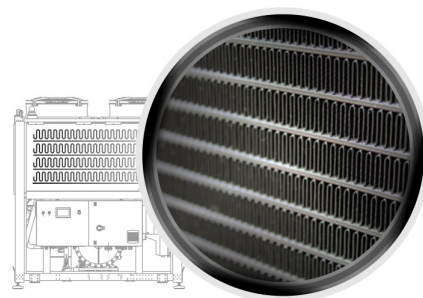
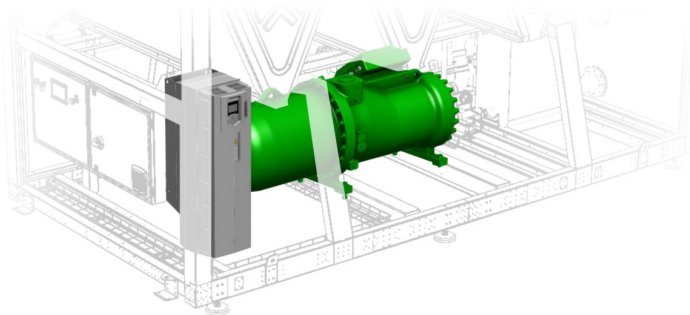
- 4 sizes for 7 models equipped with high efficiency screw compressors from 200 up to 600 kW cooling capacity per unit, with inverter as an option.

Advantages

- Super compact: highest rate cooling capacity vs footprint
- Resistant to extreme weather conditions thanks to the frame made entirely of RAL 7040 painted and galvanized steel with special coating as per ISO 12944 Class C-4M equivalent (7/15 years durability in industrial harsh ambients) AISI 304 frame is available on request
- High efficiency: highest EER in all working conditions
- Low operating noise levels
- High reliability: units are factory built and pre-tested
- Self-diagnosing microprocessor controls
- Modular units designed to create systems
- Easy to install and expand
- Industry 4.0 ready: Able to connect to factory digital infrastructure
- Remote interface via **MiND**® supervision system

Main features

- Optional inverter driven screw compressors (stepless modulation from 25% to 100%)
The **INVERTER TECHNOLOGY** (optional) works on the principle of variable compressor speed to match cooling capacity with actual thermal loads, providing chilled water with unbeatable energy efficiency, particularly under partial load conditions, and, therefore, the best ESEER/IPLV and SCOP ratings.
- Oversized stainless steel brazed plate evaporators
- Extremely low charges of ecological refrigerant gas: R513A (HFO Blend) or R134a, factory pre-charged
- Microchannel condensers: made of aluminum alloy to ensure lighter weight and higher efficiency with the same surface area



Systems

Modularity

Allows to easily build large systems, rating cooling capacities from 150 to 3.500 kW.

Configurations

There are two main system configurations:

- Modular Central Cooling Systems: units connected in parallel designed to add capacity as the thermal loads increase;
- MultiStage Cascade Cooling Systems: units connected in series designed for cascade cooling.

Accessories

In both parallel and cascade configurations, are integrated with a full variety of accessories, such as modular recirculating and process pumping stations, stainless steel tanks, filtration systems and a remote control system that automatically manages capacity control, energy consumption optimization, working hour equalization, alarms and all operating parameters.



Options

All 3FA chillers can be controlled with the remote monitoring panel.

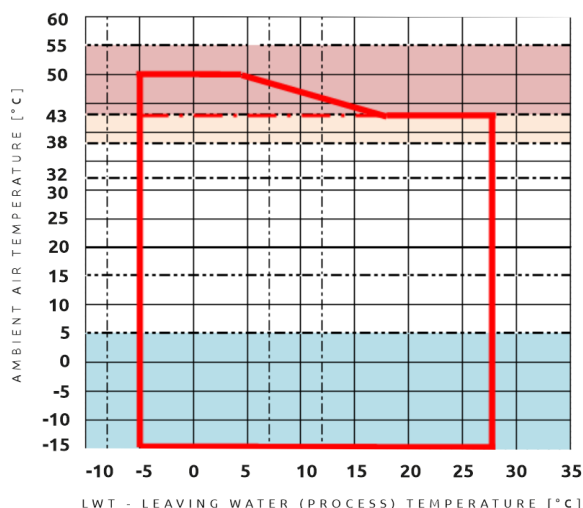
Technical data - 3FA screw compressor

50Hz

Modular chillers - 3FA Screw Compressor "S" (ModularChiller family)

Modello			180	230	280	325	400	475	575
Power supply voltage and frequency			400V±10%/3/50Hz						
Cooling capacity (R134a)	15°C/25°C (*)	kW	167	231	284	342	427	512	587
	10°C/35°C	kW	127	177	217	260	325	389	448
Cooling capacity (R513A)	15°C/25°C (*)	kW	169	237	280	333	420	511	578
	10°C/35°C	kW	129	181	214	253	320	387	439
SEPR	R134a		5,74	5,83	6,00	5,44	5,60	5,58	5,70
	R513A		5,65	5,75	5,82	5,23	5,56	5,51	5,54
Max set point temp.		°C	28	28	28	28	28	28	28
Min set point temp. (with glycol)		°C	-5	-5	-5	-5	-5	-5	-5
Min set point temp. (no glycol)		°C	7	7	7	7	7	7	7
Max ambient temp	(**)	°C	43	43	43	43	43	43	43
Min ambient temp	(**)	°C	-15	-15	-15	-15	-15	-15	-15
Refrigerant circuit/s	N°		1	1	1	1	1	1	1
Air condenser	Type		Microchannel						
	Material		Aluminium						
	Nominal flow	m³/h	49.752	74.628	99.503	99.503	124.379	149.255	174.131
Axial fans	N°		2	3	4	4	5	6	7
	kW each fan		2,30	2,30	2,30	2,30	2,30	2,30	2,30
Compressor	Type		Screw						
	N°		1	1	1	1	1	1	1
	Capacity control		Stepless mechanical slide control (from 25 to 100% continuous)						
Nom power	HP		60	80	90	110	140	160	180
Evaporator	Type		Brazed plates						
	Material		Brazed stainless steel						
	Flow rate	m³/h	21,8	30,5	37,4	44,8	56,0	67,0	77,0
	Delta P	bar	0,25	0,31	0,29	0,31	0,32	0,31	0,32
Process water connections	Type		Victaulic						
	In/out		DN50 Ø60,3 (2") PN 10/16	DN50 Ø60,3 (2") PN 10/16	DN65 Ø76,1 (2½") PN 10/16	DN65 Ø76,1 (2½") PN 10/16	DN80 Ø88,9 (3") PN 10/16	DN80 Ø88,9 (3") PN 10/16	DN100 Ø114,3 (4") PN 10/16
Expansion valve	Type		Electronic						
UFCC (Hot Gas Bypass)			No	No	No	No	No	No	No
Liquid injection			Yes	Yes	Yes	Yes	Yes	Yes	Yes
Unit Full Load Ampere (FLA)	A		93,6	127,3	144,6	178,2	227,5	256,2	283,9
Sound level	dB(A) 10 m		61,5	62,5	62,5	66,0	66,5	67,2	67,5
Refrigerant Charge	kg		20	34	39	59	68	72	89
Weight (without refrigerant)	kg		1.056	1.502	1.619	1.969	2.354	2.888	3.213
Operating weight	kg		1.214	1.660	1.777	2.127	2.512	3.046	3.371
Protection level			IP54						

- (*) Nominal Cooling capacity (chilled water temp. / ambient temperature °C)
- The weights are indicative and do not take into account the water in the pipes and exchangers
- Available supply voltage: 400V±10%/3/50Hz; 460V±10%/3/60Hz; 380V±10%/3/60Hz;
- On request: UL electrical panel for 60 Hz versions
- Capacity with process water temperature DeltaT = 5°C
- Not suitable for demi-water
- Altitude limit: 2.000 m a.s.l.
- Max water working pressure: 8 bar
- Glycol percentage: 20% glycol in weight -> from 0°C to the minimum set point temperature 25% glycol in weight -> from -5°C to 0°C
- Ref. Cod. N3FA__SC-1/5-0/1-0



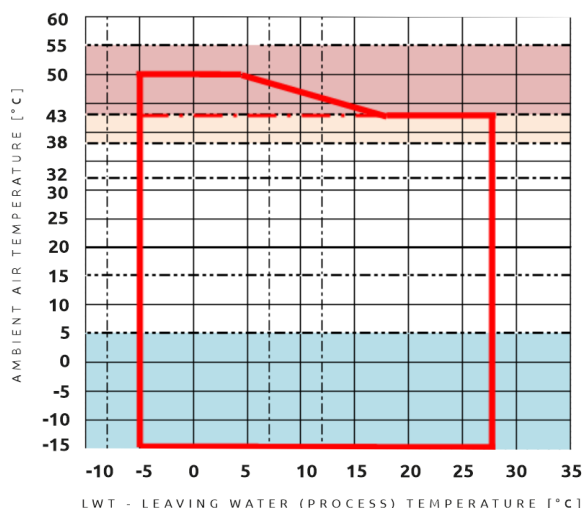
Technical data - 3FA screw compressor

60Hz

Modular chillers - 3FA Screw Compressor "S" (ModularChiller family)

Modello			180	230	280	325	400	475	575
Power supply voltage and frequency			460V±10%/3/60Hz						
Cooling capacity (R134a)	15°C/25°C (*)	kW	175	240	297	333	415	519	600
	10°C/35°C	kW	133	181	227	253	316	395	458
Cooling capacity (R513A)	15°C/25°C (*)	kW	177	246	292	326	410	516	595
	10°C/35°C	kW	135	185	223	249	310	392	452
SEPR	R134a		5,62	5,14	5,98	5,96	5,45	5,63	5,49
	R513A		5,52	5,15	5,79	5,76	5,28	5,62	5,38
Max set point temp.		°C	28	28	28	28	28	28	28
Min set point temp. (with glycol)		°C	-5	-5	-5	-5	-5	-5	-5
Min set point temp. (no glycol)		°C	7	7	7	7	7	7	7
Max ambient temp	(**)	°C	43	43	43	43	43	43	43
Min ambient temp	(**)	°C	-15	-15	-15	-15	-15	-15	-15
Refrigerant circuit/s	N °		1	1	1	1	1	1	1
Air condenser	Type		Microchannel						
	Material		Aluminium						
	Nominal flow	m³/h	49.752	74.628	99.503	99.503	124.379	149.255	174.131
Axial fans	N °		2	3	4	4	5	6	7
	kW each fan		2,30	2,30	2,30	2,30	2,30	2,30	2,30
Compressor	Type		Screw						
	N °		1	1	1	1	1	1	1
	Capacity control		Stepless mechanical slide control (from 25 to 100% continuous)						
	Nom power	HP	50	70	80	90	110	140	160
Evaporator	Type		Brazed plates						
	Material		Brazed stainless steel						
	Flow rate	m³/h	22,9	31,2	39,0	43,6	54,3	68,0	78,9
	Delta P	bar	0,27	0,33	0,31	0,29	0,30	0,32	0,34
Process water connections	Type		Victaulic						
	In/out		DN50 Ø60,3 (2") PN 10/16	DN50 Ø60,3 (2") PN 10/16	DN65 Ø76,1 (2 1/2") PN 10/16	DN65 Ø76,1 (2 1/2") PN 10/16	DN80 Ø88,9 (3") PN 10/16	DN80 Ø88,9 (3") PN 10/16	DN100 Ø114,3 (4") PN 10/16
Expansion valve	Type		Electronic						
UFCC (Hot Gas Bypass)			No	No	No	No	No	No	No
Liquid injection			Yes	Yes	Yes	Yes	Yes	Yes	Yes
Unit Full Load Ampere (FLA)	A		85,4	113,9	131,6	145,3	182,7	232,2	260,9
Sound level	dB(A) 10 m		61,5	62,5	62,5	66,0	66,5	67,2	67,5
Refrigerant Charge	kg		20	34	39	59	68	72	89
Weight (without refrigerant)	kg		1.056	1.492	1.614	1.659	2.334	2.478	3.203
Operating weight	kg		1.076	1.526	1.653	1.718	2.402	2.550	3.292
Protection level			IP54						

- (*) Nominal Cooling capacity (chilled water temp. / ambient temperature °C)
- (**) The weights are indicative and do not take into account the water in the pipes and exchangers
- Available supply voltage: 400V±10%/3/50Hz; 460V±10%/3/60Hz; 380V±10%/3/60Hz;
- On request: UL electrical panel for 60 Hz versions
- Capacity with process water temperature DeltaT = 5°C
- Not suitable for demi-water
- Altitude limit: 2.000 m a.s.l.
- Max water working pressure: 8 bar
- Glycol percentage: 20% glycol in weight -> from 0°C to the minimum set point temperature 25% glycol in weight -> from -5°C to 0°C
- Ref. Cod. N3FA___SC-1/5-0/1-1/5



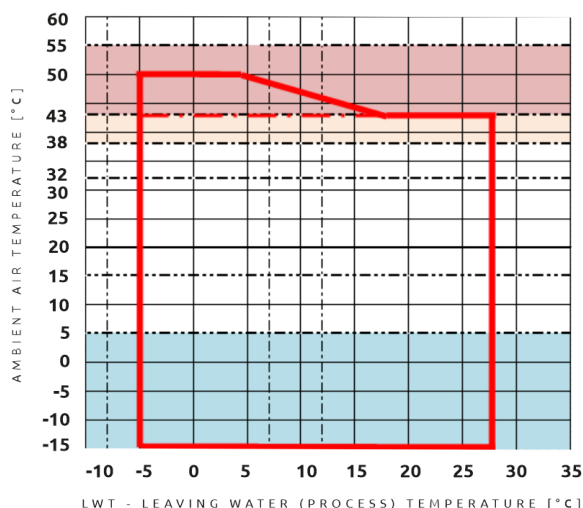
Technical data - 3FA Inverter+screw compressor

50/60Hz

Modular chillers - 3FA VFD Screw Compressor "V" (ModularChiller family)

Modello			180	230	280	325	400	475	575
Power supply voltage and frequency			380-480±10%/3/50-60Hz						
Cooling capacity (R134a)	15°C/25°C (*)	kW	175	240	297	333	415	519	600
	10°C/35°C	kW	133	181	227	253	316	395	457
Cooling capacity (R513A)	15°C/25°C (*)	kW	177	246	292	326	410	516	595
	10°C/35°C	kW	135	185	223	249	310	392	452
SEPR	R134a		5,66	5,54	5,99	5,95	5,8	5,79	5,56
	R513A		5,57	5,51	5,74	5,7	5,85	5,87	5,58
Max set point temp.		°C	28	28	28	28	28	28	28
Min set point temp. (with glycol)		°C	-5	-5	-5	-5	-5	-5	-5
Min set point temp. (no glycol)		°C	7	7	7	7	7	7	7
Max ambient temp	(**)	°C	43	43	43	43	43	43	43
Min ambient temp	(**)	°C	-15	-15	-15	-15	-15	-15	-15
Refrigerant circuit/s	N°		1	1	1	1	1	1	1
Air condenser	Type		Microchannel						
	Material		Aluminium						
	Nominal flow	m³/h	49.752	74.628	99.503	99.503	124.379	149.255	174.131
Axial fans	N°		2	3	4	4	5	6	7
	kW each fan		2,30	2,30	2,30	2,30	2,30	2,30	2,30
Compressor	Type		VFD screw						
	N°		1	1	1	1	1	1	1
	Capacity control		Stepless VFD control (from 25 to 100% continuous)						
	Nom power	HP	50	70	80	90	110	140	160
Evaporator	Type		Brazen plates						
	Material		Brazen stainless steel						
	Flow rate	m³/h	22,9	31,2	39,0	43,6	54,3	68,0	78,9
	Delta P	bar	0,27	0,33	0,31	0,29	0,30	0,32	0,34
Process water connections	Type		Victaulic						
	In/out		DN50 Ø60.3 (2") PN10/16	DN50 Ø60.3 (2") PN10/16	DN65 Ø76.1 (2½") PN10/16	DN65 Ø76.1 (2½") PN10/16	DN80 Ø88.9 (3") PN10/16	DN80 Ø88.9 (3") PN10/16	DN100 Ø114.3 (4") PN10/16
Expansion valve	Type		Electronic						
UFCC (Hot Gas Bypass)			Yes	Yes	Yes	Yes	Yes	Yes	Yes
Liquid injection			Yes	Yes	Yes	Yes	Yes	Yes	Yes
Unit Full Load Ampere (FLA)	A		102,6	147,0	164,2	181,2	232,0	288,2	329,0
Sound level	dB(A) 10 m		61,5	62,5	62,5	66,0	66,5	67,2	67,5
Refrigerant Charge	kg		20	34	39	59	68	72	89
Weight (without refrigerant)	kg		1.085	1.535	1.670	1.715	2.390	2.555	3.280
Operating weight	kg		1.105	1.569	1.709	1.774	2.458	2.627	3.369
Protection level			IP54						

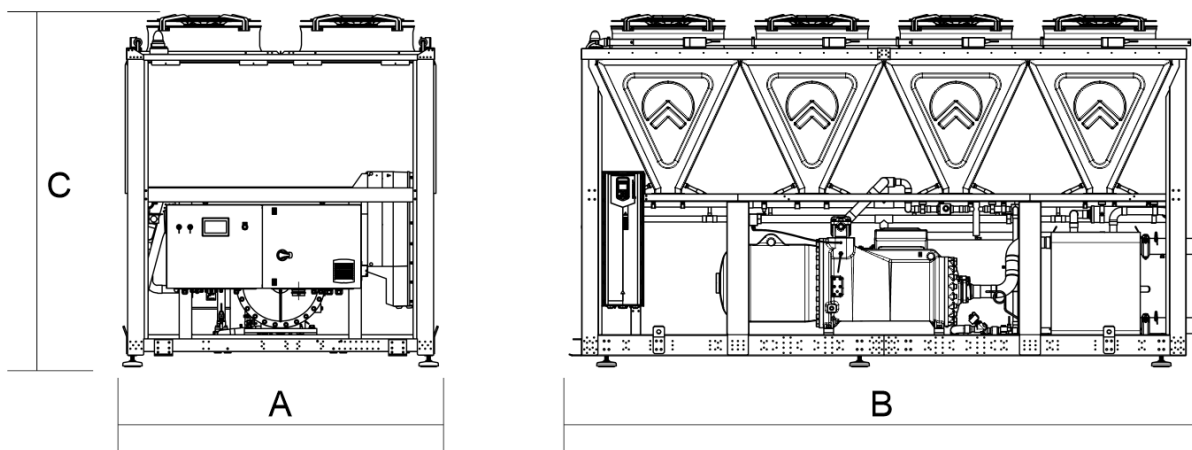
- (*) Nominal Cooling capacity (chilled water temp. / ambient temperature °C)
- The weights are indicative and do not take into account the water in the pipes and exchangers
- Available supply voltage: 400V±10%/3/50Hz; 460V±10%/3/60Hz; 380V±10%/3/60Hz;
- On request: UL electrical panel for 60 Hz versions
- Capacity with process water temperature DeltaT = 5°C
- Not suitable for demi-water
- Altitude limit: 1.000 m a.s.l. (2.000 m a.s.l. only using oversized VFD)
- Max water working pressure: 8 bar
- Glycol percentage: 20% glycol in weight -> from 0°C to the minimum set point temperature 25% glycol in weight -> from -5°C to 0°C
- Ref. Cod. N3FA___SC-1/5-0/1-8



Dimensional technical data

Modular chillers - 3FA (ModularChiller family)								
Model		180	230	280	325	400	475	575
A	mm	2.265	2.265	2.265	2.265	2.265	2.265	2.265
B	mm	1.360	2.400	2.400	2.400	3.465	3.465	4.526
C	mm	2.470	2.470	2.470	2.470	2.470	2.470	2.470

Dimensions refer to units in basic configuration, without added options



Order code

Code	Description
N	Frigel 'Product' Category
2-3-4	GAMMA
3FA	Aircooled Modular Chillers (Central Chiller)
5-6-7	SIZE
999	Digits to define the size
8	COMPRESSOR TYPE
S	Screw type compressor
V	Screw type compressor driven by inverter
9	MACHINE TYPE
C	EC Fans - ST Version (Ambient temp. < +43°C)
10	REFRIGERANT
1	R134a
5	R513A
11	FRAME / COATING
0	AISI 304 / Natural finish
1	Galvanized Steel / C3H (C4M) Coating EN ISO 12944 Equiv.
12	POWER SUPPLY
0	V. 400 /3 Ph./50 Hz.
1	V. 460 /3 Ph./60 Hz.
5	V. 460 /3 Ph./60 Hz. UL
8	V. 380-480 /3 Ph./50-60 Hz. (VFD Compressor Type only)