A nossa gama de produtos
Our range of products
Notre gamme de produits

SIRE
CHILLERS

NEW WECOSPAR FOR LIFE!
NEW CONCEPT!

ONLY NATURE
CAN COMPETE WITH US

www.sire.pt

The WecoSpar for life!

New concept !

Standard and Customized chillers

2020

Why WecoSpar series?

because we produce a chiller that has a condenser **delta t** that nobody uses in the chillers market.
Because we can guarantee that this chiller withstands desert temperatures.
because we can start the equipment at high water temperatures, ambiguous ambient temperatures
because our electrical components are always below temperature, ambient when it is high
because our compressors have a response in high temperature conditions, which is difficult to verify in equipment of this kind.
because their durability is huge, above the expectations of our customers
because we have customers in many countries who have opted for our quality over price
because SIRE is thinking about its customers and the most important thing was to guarantee the longevity of the equipment, which is definitely related to the construction of an equipment, the analysis of its application, the application area, the external conditions, the environmental aggressiveness. , material strength and fatigue, SIRE has scrupulously selected for its WecoSpar groups the best that the new cold technology can give you.
Durability, endurance, thermal efficiency, energy efficiency
are key points in the construction of our equipmentessentially SIRE thinks, in the reduction of energy consumption, durability of its equipments, and longevity of its equipments.

economizer

heat recover (optional)

shell and tube evaporator

screw compressor
prepared for condensation temperatures
above 65 ° C air 53ºC

inverter compressor (optional)

internal or external speed variators
normally, used Danfoss (optional)

air condensers
low Δt for aggressive, hot work with
protection on its aluminum fins
the lower Dt used in the chillers by any brand
refrigeration dt

EC fans
best performance at your service

selection of the best drivers with carefully selected SIRE programs

we can be standing by ourselves when we are away
real time equipment monitoring
modbus
bacnet
ethernet

individual control of electronic expansion valves

electronic expansion

Size filters designed for reduced pressure drop and optimum performance

valves of various type selected by the best quality

individual protections for each motor by thermals

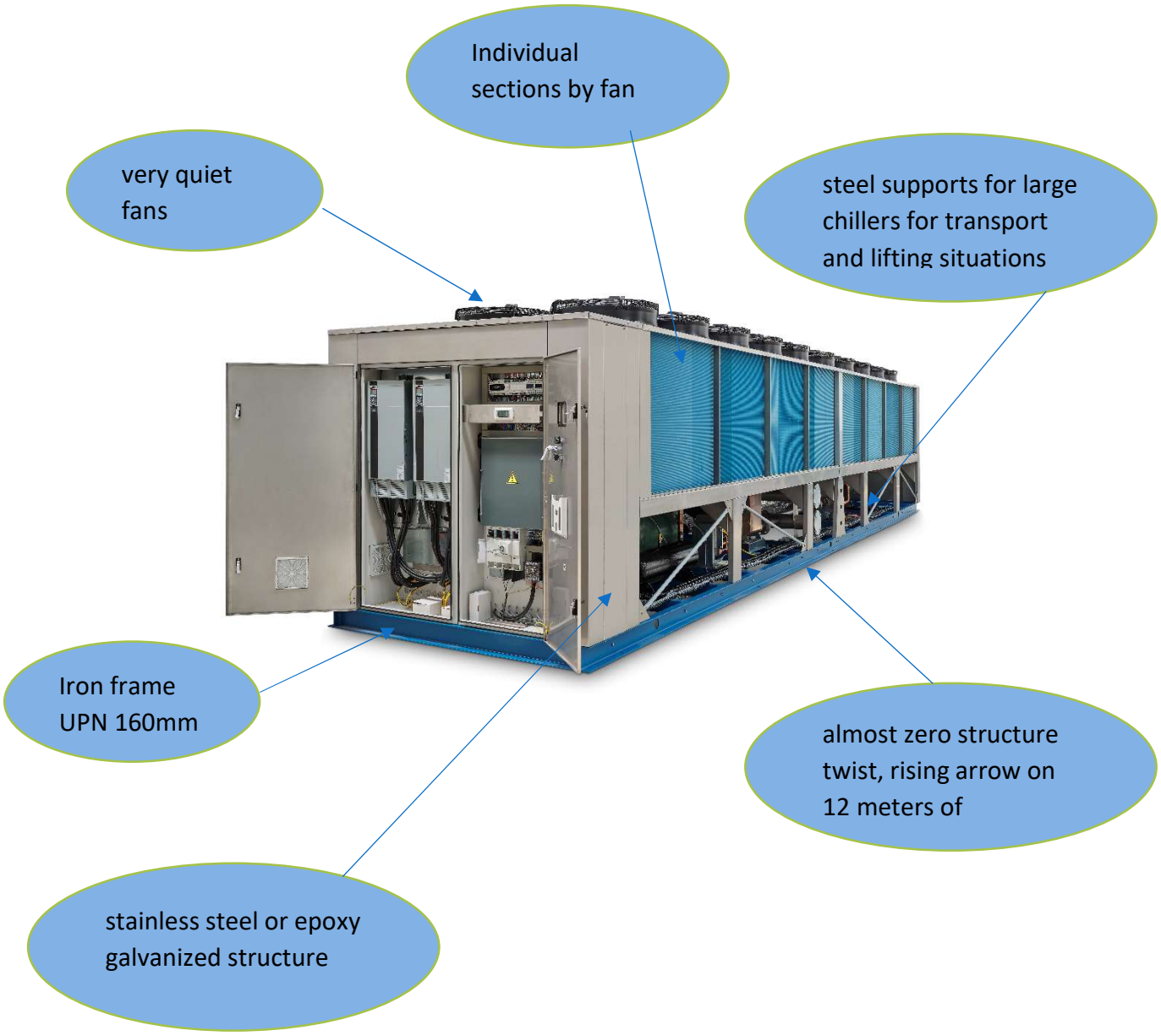
carefully selected contactors for power areas and top brands

individual protections of compressors by thermistors and magnetometers

pressure transducers

R134a or 1234ze

Individual and closed zones by fan and condenser section, to avoid torque, or short circuit in the air as well as loss of thermal transfer in the fan area


Individual sections by fan
very quiet fans
steel supports for large chillers for transport and lifting situations
Iron frame UPN 160mm
almost zero structure twist, rising arrow on 12 meters of
stainless steel or epoxy galvanized structure

protection of conduit by epoxy coat or anodizing fins

control panel cooling system by ideally cooled

wiring dimensioning above necessary

scrupulously considered details

zones for extensive service

WecoSpar	1200BCH	1600BCH	1800BCH	2200BCH	2500BCH	3000BCH	3500BCH
cooling capacity KW	122	144	179	238	264	310	366
cooling capacity Tr	35	41	51	68	75	88	104
power absorbed kW	36.8	44.1	53.5	70.5	72.7	90.6	103.6
EER	3.32	3.27	3.35	3.38	3.63	3.42	3.53
ESEER	4.59	4.39	4.79	3.57	4.94	4.87	4.99
Efficiency Class (factory)	A	B	B	A	A	A	A
Sound Standard	89	89	91	91	92	87	88
modo eco	Y	N	N	Y	y	Y	Y
compressor							
compressors nº	1	2	2	2	2	2	2
model	7553.50	6553.35	6563.40	7553.50	6593.63	7573.70	7583.80
power absorbed kW	34.5	41.8	51.2	68.2	70.4	86	99
Current A	52.9	87.3	91,8	117,6	124.6	172	170
evaporator							
evaporator nº	1	1	1	1	1	1	1
evaporator flow m3/h	21	25	31	41	45	53.5	63
evaporator Kpa loss charge	28	54	54	30	46	55	62
evaporator nº of passes	2	2	2	2	2	2	2
fouling factor ff m2*K/KW	0.000043	0.000043	0.000043	0.000043	0.000043	0.000043	0.000043
condensers							
facial air flow m3/h	4,6	4,6	4,6	4,6	4,6	4,6	4,6
nº	2	2	2	2	2	4	4
quantity	2	2	4	4	4	6	6
fans diameter / mm	800	800	800	800	800	800	800
Rpm	925	925	925	925	925	925	925
current A	1.85	1.85	1.85	1.85	1.85	1.85	1.85
Power absorbed	1.15	1.15	1.15	1.15	1.15	1.15	1.15
operation limits							
Maxi. ambient temp. ºC	55	55	55	55	55	55	55
Min ambient temp. ºC	-20	-20	-20	-20	-20	-20	-20
sound level 10 meters	79	78	81	81	81	81	80
Power and current Max.							
Power absorbed kW	52	68	82	104	112	156	176
current A	79	77.8	122	158	216	248	288
Power factor	80	0.88	0.88	0.88	0.88	0.88	0.88
Switch size A	100	100	125	200	250	250	250
Rating kA short circuit	35	35	35	35	35	35	35
Chillers Data							
water connections inch	3	3	4	4	4	5	5
Weight kg	1312	1477	1912	2101	2890	3102	3570
Width mm	2170	2170	2270	2270	2270	2270	2270
Length mm	2700	2700	3100	3200	3200	4360	4360
Height mm	2496	2496	2496	2496	2496	2496	2496
refrigerant gas kg R134A	18 x 2	22 x 2	24 x 2	27 x 2	31 x 2	44 x2	47 x 2
air operation limits ºC	+55	+55	+55	+55	+55	+55	+55

Evaporator Water temperature 12ºC/º7C air +35ºC according EN 145111- 2013

Range of application: Water -15ºC at + 25ºC

Max. application in air +55ºC

we reserve the right to modify or alter design or any equipment without prior notice

WecoSpar	4000BCH	4500BCH	5000BCH	5500BCH	6200BCH	6500BCH	7000BCH
cooling capacity KW	408	462	500	561	626	662	726
cooling capacity Tr	116	131	144.4	160	178	188	197
power absorbed kW	119	131	144	160	172	191	209
EER	3.44	3.52	3.48	3.51	3.64	3.47	3.47
ESEER	4.69	4.73	3.88	5.27	5.45	5.34	5.11
Efficiency Class (factory)	A	A	A	A	A	A	A
Sound Standard	88	89	91	92	87	92	89
modo eco	Y	Y	N	Y	Y	Y	y
compressor							
compressors nº	2	2	2	2	2	2	2
model	858380	856390	85110125	85110125	85125140	85140140	95140160
power absorbed kW	109.4	122.2	132.2	148.5	158.2	177	193
Current A	173	199.2	230	253	286	301	323
evaporator							
evaporator nº	1	1	1	1	1	1	1
evaporator flow m3/h	71	80	86	97	108	114	125
evaporator Kpa loss charge	51	46	67	85	52	52	52
evaporator nº of passes	2	2	2	2	2	2	2
fouling factor ff m2*K/KW	0.000043	0.000043	0.000043	0.000043	0.000043	0.000043	0.000043
condensers							
facial air flow m3/h	4,6	4,6	4,6	4,6	4,6	4,6	4,6
nº	4	4	8	8	8	8	8
quantity	8	8	10	10	12	12	14
fans diameter / mm	800	800	800	800	800	800	800
Rpm	925	925	925	925	925	925	925
current A	1.85	1.85	1.85	1.85	1.85	1.85	1.85
Power absorbed	1.15	1.15	1.15	1.15	1.15	1.15	1.15
operation limits							
Maxi. ambient temp. ºC	55	55	55	55	55	55	55
Min ambient temp. ºC	-20	-20	-20	-20	-20	-20	-20
sound level 10 meters	82	82	82	81	82	82	82
Power and current Max.							
Power absorbed kW	176	192	242	230	251	262	286
current A	288	310	398	378	437	428	494
Power factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Switch size A	400	250	250	400	400	400	400
Rating kA short circuit	35	35	35	35	35	35	35
Chillers Data							
Water connections	5	5	6	6	6	6	6
Weight kg	4050	4460	4940	5532	6462	6787	7210
Width mm	2270	2270	2270	2270	2270	2270	2270
Length mm	5400	5400	6500	6500	6900	7100	7600
Height mm	2496	2496	2496	2496	2496	2496	2496
refrigerant gas kg R134A	99 x 2	107 x 2	110 x 2	110 x 2	118 x 2	120 x2	123 x 2
air operation limits ºC	+55	+55	+55	+55	+55	+55	+55

Evaporator Water temperature 12ºC/º7C air +35ºC according EN 145111- 2013

Range of application: Water -15ºC at + 25ºC

Max. application in air +55ºC

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WecoSpar	7500BCH	8000BCH	8500BCH	9000BCH	9500BCH	10000BCH	11000BCH
cooling capacity KW	735	791	848	910	972	1034	1114
cooling capacity Tr	208	225	220	258	276	290	316
power absorbed kW	214.3	229.4	261.8	263.7	278.7	297	337
EER	3.43	3.45	3.24	3.45	3.49	3.48	3.31
ESEER	5.27	4.64	5.18	5.24	5.31	5.44	4.83
Efficiency Class (factory)	B	B	A	A	B	B	B
Sound Standard	88	89	86	89	84	81	87
modo eco	**N**	**N**	**Y**	**N**	**N**	**N**	**N**
compressor							
compressors nº	2	2	2	2	2	2	2
model	5160.180	9573180	180.210	9583210	210.240	9593240	280.280
power absorbed kW	198.2	211	243.4	243	258	274	314
Current A	327	338	360	410	434	458	462
evaporator							
evaporator nº	1	1	1	1	1	1	1
evaporator flow m3/h	127	136	146	156.5	168	178	192
evaporator Kpa loss charge	62	48	68	91	91	91	76
evaporator nº of passes	2	2	2	2	2	2	2
fouling factor ff m2*K/KW	0,000045	0.000043	0.000043	0.000043	0.000043	0.000043	0.000043
condensers							
facial air flow m3/s	4,6	4,6	4,6	5.1	5.1	5.1	5.1
nº	8	8	8	8	8	8	8
quantity	14	16	16	18	18	20	20
fans diameter / mm	800	800	800	800	800	800	800
Rpm	925	925	925	925	925	925	1020
current A	1.85	1.85	1.85	1.85	1.85	1.85	1.85
Power absorbed	1.15	1.15	1.15	1.15	1.15	1.15	1.15
operation limits							
Maxi. ambient temp. ºC	55	55	55	55	55	55	55
Min ambient temp. ºC	-20	-20	-20	-20	-20	-20	-10
sound level 10 meters	81	83	83	81	81	83	84
Power and current Max.							
Power absorbed kW	330	350	330	408	426	444	508
current A	590	620	590	640	680	720	826
Power factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Switch size A	400	400	630	630	630	630	630
Rating kA short circuit	35	35	35	35	35	35	35
Chillers Data							
water connections	6	6	8	8	8	8	8
Weight kg	7907	8018	8110	8239	8554	8712	8910
Width mm	2270	2270	2270	2270	2270	2270	2270
Length mm	7500	9500	9500	10300	10300	11000	11000
Height mm	2496	2496	2496	2496	2496	2496	2496
refrigerant gas kg R134A	129 x 2	138 x 2	139 x 2	145 x 2	147 x 2	153 x 2	155 x 2
air operation limits ºC	+55	+55	+55	+55	+55	+55	+55

Evaporator Water temperature 12ºC/º7C air +35ºC according EN 145111- 2013

Range of application: Water -15ºC at + 25ºC

Max. application in air +55ºC

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WecoSpar	12500BCH	13500BCH	14000BCH	15000BCH	15500BCH	18000BCH	19000FHX
cooling capacity KW	1252	1361	1468	1584	1700	1820	1924
cooling capacity Tr	344	390	418	450	483	520	547
power absorbed kW	316	388.6	428.6	449.9	482.5	486	577.8
EER	3.96	3.50	3.43	3.52	3.49	3.75	3.62
ESEER	5.55	5.76	5	5.81	5.07	5.17	5.77
Efficiency Class (factory)	A	A	B	B	A	B	B
Sound Standard	85	88	89	89	91	89	97
modo eco	Y	Y	N	N	Y	N	N
compressor							
compressors nº	2	2	4	4	4	4	4
model	103.280	113320	210210F	9573180	180.210	210210	280810
power absorbed kW	293	361	401	420	452	486	492
Current A	566	568	711	684	752	820	897
evaporator							
evaporator nº	1	1	2	2	2	2	2
evaporator flow m3 /h	216	234	255	272	293	313	331
evaporator Kpa loss charge	80	88	2 x 68	71	77	68	69
evaporator nº of passes	2	2	2	1 + 1	1 + 1	1 + 1	1 + 1
fouling factor ff m2*K/KW	0.000043	0.000043	0,000043	0.000043	0.000043	0.00043	0.00043
condensers							
facial air flow m3/s	5,1	4,6	4.6	4.6	4,6	4,6	4,6
nº	8	8	16	16	8	8	8
quantity	20	24	24	26	26	28	28
fans diameter / mm	800	800	800	800	800	800	800
Rpm	1020	1020	1020	1020	1020	1020	1020
current A	1.85	1.85	1.85	1.85	1.85	1.85	1.85
Power absorbed	1.15	1.15	1.15	1.15	1.15	1.15	1.15
operation limits							
Maxi. ambient temp. ºC	55	55	55	55	55	55	55
Min ambient temp. ºC	-10	-10	-10	-10	-10	-10	-10
sound level 10 meters	83	86	89	89	88	88	89
Power and current Max.							
Power absorbed kW	508	602	984	800	758	816	816
current A	826	1020	1480	1332	1260	1280	1424
Power factor	0.88	0.88	0.88	0.88	0.88	0.88	0.88
Switch size A	630	1250	1500	1500	1500	1500	1500
Rating kA short circuit	35	35	35	35	35	35	35
Chillers Data							
water connections	8	10	10	10	10	12	12
Weight kg	10225	10789	12010	13620	11600	13250	14210
Width mm	2270	2270	2270	2270	2270	2270	2270
Length mm	11500	12000	12500	13500	15900	16700	17900
Height mm	2496	2496	2496	2496	2496	2496	2424
refrigerant gas kg R134A	187 x 2	205 x 2	212x4	131x4	241 x 4	252 x 4	272 x4
air operation limits ºC	+55	+55	+55	+55	+55	+55	+55

Evaporator Water temperature 12ºC/º7C air +35ºC according EN 145111- 2013

Range of application: Water -15ºC at + 25ºC

Max. application in air +55ºC

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INFORMATION

Thank you very much for choosing SIRE

Sire produces a high energy efficiency chiller, in fact this is one of the fundamental points of our construction, there is a huge concern in the construction of our air condensers, reducing your Dt to the maximum in order to reduce the discharge temperatures in your compressors.
the use of inverters in both fans and compressors, bring exceptional energy efficiency with enormous results in their efficiency, from the standard chiller to the high efficiency chiller (the latter full inverter)

points to consider in your WEcoSpar:
interface system, Modbus and BACnet
and distance interaction
lines or touch screen
visualization of high and low pressures on the monitor avoiding pressure gauges that cause leakage due to material wear
intuitive menus with time-based monitoring of equipment behavior in general, pressures, consumption, phases, overheating, undercooling, expansion valve control with constant monitoring, speed control for ventilation and compressors, when using inverters
control of water pumps
air temperature readings, and water

Condensers, with a shorter Delta t, thus reducing discharge pressures and drastically reducing device consumption
protection of air condensers, not to aluminum and aluminum copper whenever necessary
very careful and low sound system
compressor enclosure whenever necessary
variable speed to ERp21 fans
Variable speed whenever requested for compressors
adiabatic system whenever necessary
ventilation collars with noise reduction
piping insulation

Gaz refrigerant according to EU F Gas standards, with low GWP, and low refrigerant charge
use of gases such as R134a,1234ze
Drastic reduction of leakage potential, using piping without welds, whenever possible
use of microchannel vibration eliminators to prevent any pipeline degradation and leakage
chillers are tested at the factory, with close supervision and certification concepts in progress by certified bodies, from construction to consumption and refrigeration power

The working operation of standard chillers is ensured between + 25ºC and -10ºC in the water and - 10ºC in the air and + 47ºC in the air for special chillers for Middle East or desert, between 0 ° C to + 55 ° C in the air.

Any other situation can be revised and changed at the factory according to the customer's wishes and whenever possible

Chillers are also designed using shell and tube evaporators in semi-flooded or flooded regime
In the EcoSpar and WecoSpar class the evaporator is of shell and tube construction
In the Spar class, the heat exchanger is made of welded plates made of stainless steel and copper.
Compressors are critically chosen at SIRE for their consumption and their durability and efficie

Series Chiller Arrangements

Another energy-saving strategy is to design the system around chillers arranged in series. The actual savings possible with such strategies depends on the application dynamics and should be researched by consulting your SIRE chiller. Systems Solutions Representative and applying the SIRE System analyzer program. It is possible to operate a pair of chillers more efficiently in a series chiller arrangement than in a parallel arrangement. It is also possible to achieve higher entering-to-leaving chiller differentials, which may, in turn, provide the opportunity for lower chilled water design temperature, lower design flow, and resulting installation and operational cost savings. The SIRE screws compressor also has excellent capabilities for "lift," which affords an opportunity for savings on the evaporator water loop.

Housing

The structure base of the chiller is made in UPN steel with 160mm x 6mm thickness
The unit housing shall consist of a frame construction of galvanized our **stainless steel**, profiles at least 1,5mm and 2 mm thickness assembled with bolts and cast stainless steel, our galvanized corner joints. The outer panels shall be galvanized our stainless steel and internally noise insulated in the compressors department (when demanded).
Frame panels shall be finished in stainless steel or dry powder epoxy resin paint, our stainless steel to provide an additional weather-proof protection.

Electrical panel

The package shall include an electrical panel in a water proof enclosure, mounted inside the Unit. It shall contain:
-Compressor and fan motors contactors;
-Auto-fuse for the control circuit, magnetic break circuits in every compressor;
-Low- and high-pressure switches; pression transducers
-Phase asymmetry and under-voltage relay;
-Selection for summer or winter operations (in heat pumps);
-Terminals for external electric heater (in heat pumps);
-Indicating lamps for crankcase heater;
-Indicating lamps for phase asymmetry and under voltage;

Microprocessor based controller

The package shall include microprocessor-based controller, which should provide the following functions:
-Temperature control (heating, cooling);
-Freeze-up protection;
-Compressor starting delay;
-Operation of the fans and of the water pump;
-Selection of the compressor starting order;
-Protection against high and low refrigerant pressure as well as low flow (connection with relevant switches);
The electric panel board, contain; contactors, phase asymmetries and under voltage relay, (in some models) thermal protections, fuses, control circuit breakers, INT relays, switch breaker, and the microprocessor our PLC controller. The electrical panel is in a water proof enclosure system.

MICROPROCESSADOR /PLC

The most advanced chiller program at the moment worldwide
created in partnership with the largest manufacturers of refrigeration compressors
SIRE has as control equipment, one of the most advanced types of Microprocessor (several).
This equipment in the series is based on some of the following items:
The controller, checking all the parameters, control systems, and functions of the unit, and protects whenever it is necessary.
The same where necessary provides all the functions of alarm that you are against it, the figures are usually visible on their monitors.
The programming system provides sophisticated means, for some of the functions described below:

System P + I or P

Control of adjustable temperature…
Several step points…
Control of water pumps…
Delays to the start of compressors (part. wending) conform capacity…
Starting in empty…
Control of capacity…
Selection of variable start of compressors…
Protection against high and low pressure, oil, ice, etc.…
Display for reading codes, errors, failures…
remote controls when requested
Modbus system is possible
All kind of diagnostic codes
Monitoring of fazes control
And yet for some more advanced microprocessors, various types of connections including modems and other external systems (options)
all this facility depending for the kind of chiller selected.
SIRE provide to our costumer the possibility of cooperation to building all kind of chiller situation by client design and by their demand

The cop of these equipment's, high, is due to the low **Δt** in the condenser, the fact of the inclusion of more fans, is not synonymous with more consumption, because derived from the low **Δt** in the condenser, the fans not only do not reach maximum speeds, and they remain at around 50% of their consumption, as the compressors have proven to consume less energy, so the advantage of a high surface capacitor is a direct synonym for reduced energy costs.

The sub-cooling in the liquid line also allows for reductions of more than 15% in energy and an increase in capacity in the equipment.

Chillers up to 5 years warranty

SIRE has a warranty system, up to 5 years, that covers the equipment in mechanical areas, ask your dealer or SIRE agent

Compressor management

SIREmSCHE manages screw type compressors with step or stepless modulation. There can be a maximum of 2 screw compressors, each managing up to 4 modulation valves on the power control slide. The flow diagram below shows the process for calculating the request to the compressors:

The choice of a certain type of compressor sets the following parameters depending on the technical specifications of the compressor manufacturers:

1. Valve data

• Number of valves

• Intermittent valve time

• Impulse time for increase valves, for stepless modulation

• Impulse time for decrease valves for stepless modulation

• Valve behavior during startup, control and shutdown.

2. Step modulation compressor data:

• Step number

• Starting procedure duration

• Shutdown procedure duration

• Power of the various steps

• Steps activation delay

• Minimum safety time limits

3. Stepless modulation compressor data:

• First startup procedure phase duration Acoustic Insulation when need it

Techno a textile fiber of polyester vane covers each compressor.

The vanes are made by metal sheet powdered in the same color of the chiller.

The vane allows the complete access to the compressors electrical box.

The choice of a certain type of compressor sets the following parameters depending on the technical specifications of the compressor manufacturers:

1. Valve data

• Number of valves

• Intermittent valve time

• Impulse time for increase valves, for stepless modulation

• Impulse time for decrease valves for stepless modulation

• Valve behavior during startup, control and shutdown.

2. Step modulation compressor data:

• Step number

• Starting procedure duration

• Shutdown procedure duration

• Power of the various steps

• Steps activation delay

• Minimum safety time limits

3. Stepless modulation compressor data:

• First startup procedure phase duration

Second startup procedure phase duration

First shutdown procedure duration

Second shutdown procedure duration

Minimum power Time to reach maximum power

Time to reach minimum power

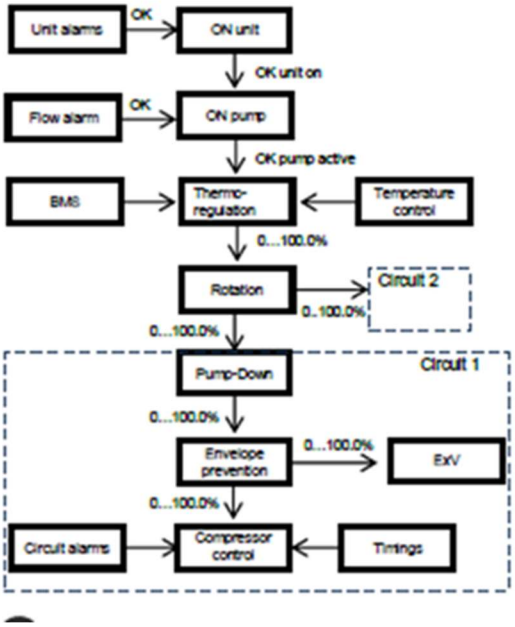
Minimum safety time limits

4. Compressor envelope:

All characteristics of the compressor envelope shape

Maximum discharge temperature

Minimum discharge temperature



The choice of a certain type of compressor sets the following parameters depending on the technical specifications of the compressor manufacturers:

1. Valve data

• Number of valves

• Intermittent valve time

• Impulse time for increase valves, for stepless modulation

• Impulse time for decrease valves for stepless modulation

• Valve behavior during startup, control and shutdown.

2. Step modulation compressor data:

• Step number

• Starting procedure duration

• Shutdown procedure duration

• Power of the various steps

• Steps activation delay

• Minimum safety time limits

3. Stepless modulation compressor data:

• First startup procedure phase duration

Second startup procedure phase duration

First shutdown procedure duration

Second shutdown procedure duration

SIRE Chiller capacity control

The system is prepared to give different work conditions in the chiller

Stepped capacity control with control at inlet

All compressors and the relevant capacity control steps will be proportionally positioned in the band. Increasing temperature values will cause the control steps to be

subsequently input. Each step will be input according to the set delay times. The compressors will be started at the first entered capacity control stage. If special

management of the first capacity control stage was selected, control will be affected according to the description in the dedicated section. In any event, the times for

the capacity controls will be applied as described.

Stepped capacity control with control at outlet

A description of stepped capacity control of 4 compressors with four capacity control steps each:

Activation of compressors

if the water temperature measured by the probe located at the evaporator outlet exceeds the threshold of Control Set-point + Control Band the number of

power stages will be increased - the power stages were input according to the set parameter known as "delay between power-up of different devices

Continuous capacity control

A maximum number of four compressors are managed, with continuous capacity control. The compressor's capacity is controlled by two relay outputs, which, when

suitably controlled, enable compressor power to be increased or reduced, varying the capacity of the compression chamber. Compressor power is controlled by

sending impulses to the outputs of the capacity control relays. These impulses command the compressor to be charged or discharged. These impulses are at a

constant frequency, settable, and of variable duration between two minimum and maximum limits, also settable. As there is no acquisition regarding the absolute

position of the compressor 's capacity control valve, and, consequently, as no direct verification is possible of the power percentage input in the circuit, a time based

control is run. With this control, when a set time threshold is reached, the compressor is considered fully charged/discharged and thus control of the capacity control

impulses are suspended.

Inverter variable speed control

110….. 1,156 m^3/h based on variable speed

Semi-hermetic compact with integrated frequency inverter CSV or outside module inverter

Minimum power Time to reach maximum power
Time to reach minimum power
Minimum safety time limits
4. Compressor envelope:
All characteristics of the compressor envelope shape
Maximum discharge temperature
Minimum discharge temperature

These times are in the Compressor menu and can be changed by accessing with Service password. The lower limit for changing the mentioned timings is pre-set according to the specifications of the compressor manufacturer. As described in the previous paragraph, these limits are set by default by the type of compressor and can be changed only after selecting a Custom type compressor.

Stepped capacity control with control at inlet

All compressors and the relevant capacity control steps will be proportionally positioned in the band. Increasing temperature values will cause the control steps to be subsequently input. Each step will be input according to the set delay times. The compressors will be started at the first entered capacity control stage. If special management of the first capacity control stage was selected, control will be affected according to the description in the dedicated section. In any event, the times for the capacity controls will be applied as described.

Stepped capacity control with control at outlet

A description of stepped capacity control of 4 compressors with four capacity control steps each:

Activation of compressors if the water temperature measured by the probe located at the evaporator outlet exceeds the threshold of Control Set-point + Control Band the number of

power stages will be increased - the power stages were input according to the set parameter known as "delay between power-up of different devices

Continuous capacity control

A maximum number of four compressors are managed, with continuous capacity control. The compressor's capacity is controlled by two relay outputs, which, when suitably controlled, enable compressor power to be increased or reduced, varying the capacity of the compression chamber. Compressor power is controlled by sending impulses to the outputs of the capacity control relays. These impulses command the compressor to be charged or discharged. These impulses are at a constant frequency, settable, and of variable duration between two minimum and maximum limits, also settable. As there is no acquisition regarding the absolute position of the compressor 's capacity control valve, and, consequently, as no direct verification is possible of the power percentage input in the circuit, a time-based control is run. With this control, when a set time threshold is reached, the compressor is considered fully charged/discharged and thus control of the capacity control impulses are suspended.

Inverter variable speed control

Semi-hermetic compact with integrated frequency inverter CSV or outside module inverter

Chilled Water Pump Control — Unit controls provide an output to control the chilled water pump(s). One contact closure to the chiller is all that is required to initiate the chilled water system.

Step modulation

SIRE program manages the step modulation of the screw compressors: divides the percentage request generated by the thermoregulation between the various compressors depending on the rotation logic and controls the compressor steps according to the below described parameters.

Step number

This parameter determines the number of steps that can be activated. These change according to the type of compressor.

Power of the various steps

Each step is characterized by a parameter that specifies its power. This allows fine control of the power requested by the thermoregulation according to the effective power of each step of the compressor. If the cooling power of the machine is not consistent with the power expressed by the compressor, the CUSTOM compressor can be set and

Startup procedure duration

This parameter specifies the duration of the compressor startup phase in which the valves have a preset behavior to allow the compressor to reach the operating conditions.

Shutdown procedure duration

This parameter specifies the duration of the compressor shutdown phase in which the valves have a preset behavior to allow the compressor to reach the minimum power. Respecting this phase, on the next compressor startup, the slide will be at the minimum power and thus startup will be less heavy for the motor.

Step activation delay

To allow proper management of the compressor control slide, there are delays between the various steps in the power increase phase. These parameters are dictated by the technical features of the compressors and are thus independent of the plant control.

To slow down the steps activation it is possible to set the parameter

To slow down or speed up the activation or shut down of the compressors according to the temperature, the PID parameters and delays between the compressors must be changed in the Plant ad Compressor menus.

Step deactivation delay

To allow proper management of the compressor control slide, there are 20s fixed delays between the various steps in the power decrease phase. These delays are dictated by the technical features of the compressors and are thus independent of the plant control.

Valve management

SIRE program makes it possible to have different valve management depending on the compressor phase. The following controller phases exist:

1. Startup

2. Step 1

3. Step 2

4. Step 3 (if present)

5. Step 4 (if present)

6. Shutdown or compressor off

Control procedure

The previously described parameters make the compressor perform an activation procedure according to the compressor manufacturer's specifications. The graph below shows how the request from the control interacts with the control of the compressor during startup. In the example, the compressor has 3 steps of equal power (33%-66%-100%).

Minimum power

This parameter expresses the minimum power percentage that the compressor can deliver. When the request reaches this value, the compressor can begin the startup phase.

First starting procedure phase duration

This specifies the duration of the compressor startup phase in which the valves have a preset behavior to allow the compressor to reach the operating conditions.

Second starting procedure phase duration

Some compressors have two startup phases with two distinct behaviors of the valves during those phases. The first phase is needed to bring the compressor to the minimum deliverable power (generally 25%) while the second phase is needed to bring the compressor to the power from which it can start to regulate (generally 50%).

First shutdown procedure duration

This parameter expresses the time that the compressor uses to reach the minimum power in control (generally 50%). Respecting this phase, the compressor can turn off in ramp using the second shutdown phase.

Second shutdown procedure duration

This parameter

specifies the duration of the compressor shutdown phase in which the valves have a preset behavior to allow the compressor to reach the minimum deliverable power (generally 25%). Respecting this phase, on the next compressor startup, the slide will be at the minimum power and thus startup will be less burdensome for the motor.

Time to reach maximum power

In screw compressors with stepless modulation the position of the slide cannot be defined through direct measurement thus the power delivered by the compressor must be estimated. For this reason, SIRE control implements a calculation logic for the power delivered by the compressor based on the **time to reach the maximum power**

This parameter indicates the time needed for the slide to move from the minimum power position to the maximum one (100%) keeping the charge valve active.

Since the valve is impulse controlled, the algorithm calculates the percentage of variation of the screw compressor capacity at each activation of the pulsating valve for increase. The valve will then continue to pulse until the percentage requested by the thermoregulation is reached (see following graph). Before re-activating the valve, the algorithm checks if activation could cause over delivery of the power and in this case the compressor goes into stand-by.

When the calculated power arrives at 100%, the stepless increase valve continues to load in order to keep the slide at the limit switch. Due to the number of activations resulting from management of the pulsating valves, the use of controllers with SSR relays is recommended

Time to reach minimum power

Along with the time to reach the maximum power, there is also the time to reach the minimum power. This parameter indicates the time needed at the slide to switch from the maximum power position (100%) to the minimum one, keeping the charge valve active. The time to reach the minimum power from reaching the maximum power must be distinguished as some compressors use less time for the discharge phase.

Since the valve is impulse controlled, the algorithm calculates the percentage of variation of the screw compressor capacity at each activation of the pulsating valve for decrease. The valve will then continue to valve, the algorithm checks if activation could cause under delivery of the power and in this case the compressor goes into stand-by.

When the calculated power reaches the minimum, the stepless decrease valve continues to discharge to keep the slide in the minimum position. Due to the number of activations resulting from management of the pulsating valves, the use of controllers with SSR relays is recommended pulse until the percentage requested by the thermoregulation is reached. Before re-activating the

Pulsing valve management

As previously described, to increase or decrease the compressor capacity, the charge or discharge valves must be pulsed.

The parameters for managing these valves are as follows:

1. Increase valve impulse time

2. Decrease valve impulse time

3. Minimum valve rest time

4. Maximum valve rest time

The valve impulse times are defined by the compressor model and are constant for the entire compressor control phase. These times can be set only with the CUSTOM compressor type.

The minimum and maximum rest times for the valves are parameters that can be changed in the Compressors menu. The rest time varies according to the distance of the percentage value requested from the power delivered.

The following is a rest time modulation example of the increase valve:

Control procedure

The previously described parameters make the compressor perform an activation procedure according to the compressor manufacturer's specifications. The graph below shows how the regulation request interacts with the control of the compressor during startup. In the example, the compressor has a minimum power of 33%.

Optional

Inverter modulation

SIRE control manages the modulation of the screw compressors with integrated frequency inverter. The percentage request generated by the thermoregulation is divided between the various compressors depending on the rotation logic, then each compressor is modulated according to the parameters described below.

Minimum frequency

This parameter expresses the minimum frequency the inverter can deliver. When the request reaches this value, the compressor can begin the startup phase.

Maximum frequency

This parameter expresses the maximum frequency the inverter can deliver. It’s the delivered frequency when the request reach 100%.

The following is an example of inverter compressor modulation:

THE COMPRESSOR IS COMPLETE PROTECTED BY INVERTER AND PROTECTIONS

In opinion with inverter

Inverter modulation

•FLSTDmSCHESIRE manages the modulation of the screw compressors with integrated frequency inverter. The percentage request generated by the thermoregulation is divided

•between the various compressors depending on the rotation logic, then each compressor is modulated according to the parameters described below.

•Minimum frequency

•This parameter expresses the minimum frequency the inverter can deliver. When the request reaches this value, the compressor can begin the startup phase.

•Maximum frequency

•This parameter expresses the maximum frequency the inverter can deliver. It’s the delivered frequency when the request reach 100%.

SOFTSTAR WALFASPAR CHILLER

(BY SERIE) for industry a large chiller with large capacity

Altistart soft start/soft stop units support the controlled starting and stopping, via voltage and torque, of three-phase squirrel cage asynchronous motors for power ratings ranging from 4 to 400 kW. They are supplied ready for use in standard applications with class 10 motor protection. Altistart soft start/soft stop units have been designed to meet the performance requirements of applications where ruggedness, security of personnel and equipment, and ease of setup are a priority. The bypass function (based on a bypass contactor) has been made easier to use by integrating it into the starter. This approach suits applications where it may be necessary to bypass the starter at the end of starting in order, for example, to limit the starter's heat dissipation. Altistart soft start/soft stop units have an integrated display terminal that allows the user to change both the programming and the adjustment or monitoring parameters in order to adapt and customize the application in line with customer needs. They also feature an integrated thermal motor protection function as well as machine monitoring functionality, and offer immediate installation setup capability using So Move setup software. Applications The integrated functions of Altistart soft start/soft stop units are compatible with the more common types of application found in the construction, infrastructure, or industrial sectors: b centrifugal pumps, piston pumps b fans b screw compressors b material handling (conveyors, etc.) b specialist machinery (agitators, mixers, centrifuges) Altistart soft start/soft stop units offer a truly cost-effective solution by providing: b a reduction in installation costs through optimum product sizes, integrated bypass function, and faster wiring time b a reduction in the stress associated with electrical distribution through fewer current peaks and line voltage drops caused by motor starting b a reduction in machine running costs through reduced mechanical stress The three phases of the motor windings

are controlled to help maintain performance, whatever the situation (with or without load, any voltage or power range, etc.).

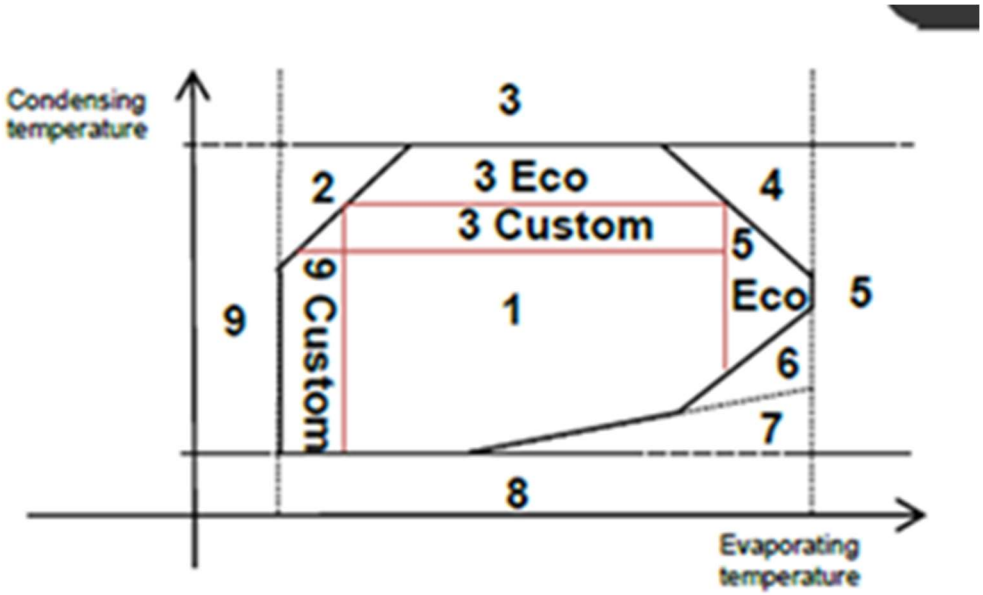
Eco control and liquid injection

The controller manages two distinct digital outputs for controlling the Eco valve and the injection of liquid in the compressor. Both outputs are active only with the compressor on.

Eco valve

The Eco valve allows the cooling power to be increased and the compressor performance to be improved through a sub cooling circuit or a two-stage refrigerant expansion. Its efficiency is at a maximum especially with high condensing temperatures.

Thus, the condensing temperature and the compressor power are controlled, as shown in the graph below:



SOUND ATTENUATION

Low Noise Kits – The standard chiller configuration is equipped with low sound fans. There are several sound attenuation options available to further reduce sound at its source thereby meeting local sound level regulations.

Silentnight™ - Due to time-of-day based sound regulations in some locations, it may be desirable to force the chiller to a lower sound level **on demand**

Electrical panel
The package includes an electrical panel in a water proof enclosure, mounted inside the Unit. It shall contain:
-Compressor and fan motors contactors;
-Auto-fuse for the control circuit, magnetic break circuits in every compressor;
-Low- and high-pressure switches; pression transducers
-Phase asymmetry and under-voltage relay;
-Selection for summer or winter operations (in heat pumps);
-Terminals for external electric heater (in heat pumps);
-Indicating lamps for crankcase heater;
-Indicating lamps for phase asymmetry and under voltage;
Microprocessor based controller
The package includes microprocessor-based controller, which should provide the following functions:
-Temperature control (heating, cooling);
-Freeze-up protection;
-Compressor starting delay;
-Operation of the fans and of the water pump;
-Selection of the compressor starting order;
-Protection against high and low refrigerant pressure as well as low flow (connection with relevant switches);
-compressors soft start systems, PW, Star delta, or inverter.
The electric panel board, contain; contactors, phase asymmetries and under voltage relay, (in some models) thermal protections, fuses, control circuit breakers, INT relays, switch breaker, and our PLC controller. The electrical panel is in a water proof enclosure system.

ELECTRICAL OPTIONS
Power Supply Connection
Units are available with either single point or multi point power supply connections:
Single Point - System Fused Disconnect Switches
A non-fused disconnect switch in the common input section of the panel for connection of the customer provided single power supply. Internal factory wiring to two doors interlocked fused disconnect switches mounted
in the power sections. The control supply is derived internally from the terminal block.

Single Point - System Circuit Breakers
A terminal block in the common input section of the panel for connection of the customer provided single power
supply. Internal factory wiring to two doors interlocked circuit breakers, mounted in the power sections. The
control supply is derived internally from the terminal block.

Multi-Point - System Circuit Breakers

Two door interlocked circuit breakers, mounted in the power sections, for connection of the customer

provided power supplies. A non-fused disconnect switch emergency stop device (QCSD/ESD) in the common

input section with termination for the customer (400 V x 3 x 50 Hz) control supply.

Building Automation Interface

Provides a means to reset the leaving chilled liquid temperature and from the BAS / EMS (Factory Mounted): Printed circuit board to accept 4 to 20 mA, 0 to 10 Vdc,

or dry contact closure input from the BAS / EMS. Note: SIRE Building Automation System can

provide a Pulse Width Modulated (PWM) signal direct to the standard control panel via the standard on-board RS485 port.

E-Link Gateway

Interface to enable communication with building control

systems using BACnet, MOD BUS, LON or N2 protocols.

ACCESSORIES

Anti-Vibration Mounts

Optional, 25mm deflection, open spring, anti-vibration mounts with levelling screw. Supplied loose for field

installation. Optional floor mounting kit with 25 mm neoprene pads. Supplied loose for field installation.

Flow Switch

Switch with 1-inch BSP thread suitable for 10 barg DWP and having gold contacts for low voltage/current, to

protect unit from loss of water flow. Supplied loose for field installation, or Factory fitted pressure differential switch on cooler.

Suction Shut-off Valves

A ball valve in the low pressure (suction) pipework per refrigerant circuit for isolation.

Evaporator Kits

Victaulic couplings or Flange connections

Low temperature Evaporator Kits

Low temperature evaporator configurations are identical to the standard or options detailed above.

Pressure Relief Valves Options

• Pressure Relief (CE/PED) Serviceable Valve & Dual Kit. High & Low side vessels' dual relief valves fitted with 3-way changeover valves and compressors' single relief valves fitted with ball valves, to assist valve

replacement during maintenance without loss of refrigerant charge.

• Pressure Relief (CE/PED) Serviceable Valve & Dual Kit & Burst. High & Low side vessels' dual relief valves fitted with

bursting disks and 3-way changeover valves and compressors' single relief valves fitted with bursting

disks and ball valves, to assist valve replacement during maintenance without loss of refrigerant charge

Dual Pressure Switch

Dual HP pressure cut-outs on both circuits.

Closed Transition Star/Delta (SOFT START)

With the addition of closed transition contactors and resistors, the changeover spike during starting can be reduced to nearer the star inrush level thus reducing the risk of electrical interference during compressor start.

Mechanical Gauge Kit

Factory fitted mechanical gauges for display of suction and discharge pressures, one complete set per system.

Double Thickness Insulation

Condenser extension / Manifold kits

Condenser extension kit simplifies connections to customer pipework. Both options come with either Victaulic coupling or welded Flange/companion flange kit. IP55 Panel enclosure designed to IP55.

Language LCD and Keypad

Standard display language and keypad is English. French, German, Italian, Spanish, Portuguese and Spanish are available as options.

Sequence Controller:

Monitors mixed leaving chilled water or glycol temperature from two to four units and controls to maintain required

mixed temperature whilst running the minimum number of units.

Printer

Hand held printer for obtaining printout of unit operating data and history data.

Paint Overspray

Complete unit finish in Blue and white.

Lifting Lug Kit

Come with locks to enable safe and easy unit handling.

Factory Witness Test:

To perform a customer functional witness test of cooling

capacity only, test is carried out in factory test area.

Guarantee

Sire gives its customers 24 months of full warranty as long as the customer follows the maintenance plan as it is presented. The plan for 60 months can be also provided by special conditions and payment

Chiller components

Filter-drier

Consisting of a blend of highly effective desiccants. The quality features built into it assure years of service on any refrigeration system.

Rota lock Valves

Side galss

Solenoid valves

Electronic expansion valves

Economizer (when need it)

Oil control level

Hp and Lp pressostats and transductors

PLC

SIRE has as control equipment, one of the most advanced types of Microprocessor (several).

This equipment in the series is based on some of the following items:

The controller, checking all the parameters, control systems, and functions of the unit, and protects whenever it is necessary.

The same where necessary provides all the functions of alarm that you are against it, the figures are usually visible on their monitors. The programming system provides sophisticated means, for some of the functions described below:

System P + I or P

Control of adjustable temperature…

Several step points…

Control of water pumps…

Delays to the start of compressors (part. wending) conform capacity…

Starting in empty…

Control of capacity…

Selection of variable start of compressors…

Protection against high and low pressure, oil, ice, etc.…

Display for reading codes, errors, failures…

remote controls when requested

Modbus system is possible

All kind of diagnostic codes

Monitoring of fazes control

External monitorization

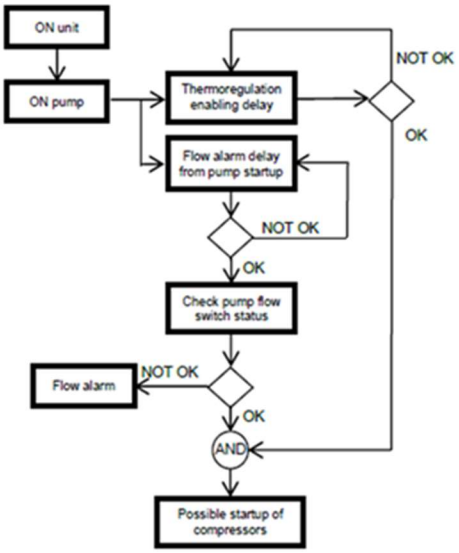
And yet for some more advanced microprocessors, various types of connections including modems and other external systems (options)

all this facility depending for the kind of chiller selected.

SIRE provide to our costumer the possibility of cooperation to building all kind of chiller situation by client design and by their demand

Evaporator pumps

SIRE Program manages up to two pumps on evaporator side and condensers side. A delay can be set between the pump startup and thermo-regulation enabling. A delay can also be set between the shutdown of the last compressor and pump shutdown. If on unit shutdown the compressors are off for at least the pump off delay time then the pump shuts down immediately



Note: that the thermoregulation is not enabled until stable flow conditions are detected after the flow alarm delay from pump startup. This is to prevent the starting up of compressors when there is not yet certainty of the water flow presence.

Up to two evaporator pumps can be enabled. SIRE Program has the following functions:

• With two pumps, automatic alternating between the pumps to ensure the circulation of the fluid and equalize the hours of operation. Automatic alternation is generated:

o After a period of time that can be set in hours

o with pump overload active.

• Management of the pump overload. Signaling of the anomaly and immediate shutdown of the pump.

• Management of the flow switch that controls the circulation of the fluid in the system.

• Management of the antifreeze with the unit off through startup of the pump to activate the circulation of the fluid (with the unit on, the function is disable).

Antifreeze control

Antifreeze alarm

The antifreeze control is performed by the evaporation probe, as it gives a direct reading of the evaporator conditions. The water output probe is not taking into consideration for the antifreeze since it does not precisely measure the possibility or presence of ice inside the evaporator. When the circuit evaporation goes into antifreeze conditions, it is shut down for alarm. Each circuit manages its own evaporation pressure probe, so even the evaporator antifreeze alarm is divided between the circuits.

The evaporating temperature values is filtered according to the exponential distribution formula to consider the thermal mass of the evaporator and avoid timely alarms during startup. A specific

algorithm uses this filtered value and intervenes when the antifreeze threshold is exceeded. The following is an operation diagram of the filter of the evaporation temperature, filtered according to the exponential distribution formula.

When the control temperature goes below the set, a counter is activated and the time-out for that counter is changed depending on the evaporating temperature distance from the antifreeze threshold, down to zero at the maximum delta following a hyperbolic curve. This curve imitates the actual behavior of the icing, allowing better protection

Antifreeze prevention

If envelope management is enabled, the antifreeze set on the evaporator temperature is used as a threshold for the minimum evaporating temperature in the envelope for prevention purposes. In fact, the management of the envelope limits the power of the compressor if the threshold is exceeded

Also, the antifreeze prevention is performed using the evaporating pressure probe.

Evaporator antifreeze management

When the unit is off, SIREmSCHE manages the evaporator antifreeze (and the condenser one for Water/Water units) with a configuration parameter that prevents the icing of the water by means of a pump and/or antifreeze heater. When the water temperature in the evaporator (or condenser) reaches the activation threshold (A026), the antifreeze device is activated (the measurement probe is the one located in output of the exchanger).

The devices can be configured as follows:

• Antifreeze with heater (through antifreeze heater that turns on only when the pump is off);

• Antifreeze with pump (the evaporator pump is turned on with antifreeze condition, while the heater is not managed);

• Antifreeze with pump and heater (both devices are turned on).

The system is prepared to give different work conditions in the chiller

Rotation for alarm

In the event of an alarm for one compressor, the next available compressor will be turned on as a replacement if the request is high enough.

For units with two circuits and prevention active in one circuit, the rotation will compensate for the limited compressor by increasing the request on the available compressor.

Forced rotation

Some compressor manufacturers specify that in units with two compressors, they must be rotated after a certain amount of time in which one only is on, even if control has reached a stable point.

Besides keeping the hours of operation equalized, this procedure avoids the migration of refrigerant during long pause periods and keeps the compressor in temperature.

Types of rotation SIREmSCHE turns the compressors on in order to match the hours of operation and the peaks. For this reason, there are two types of rotation. Below we describe the possibilities and characteristics of the various types of rotation. They do not vary by type of compressor modulation, whether stepless or step.

FIFO rotation

In FIFO (First In First Out) rotation, the first compressor to turn on will be the first one to shut down. This type of rotation is the most common but it penalizes the compressors that are shut down for maintenance or alarms since it simply controls the startup and shutdown sequence.

Timed rotation

In timed rotation, the first compressor to turn on will be the one with fewer hours of operation while the first one to shut down will be the one with more hours of operation. Thus, the rotation logic controls the hours of operation of the compressors. This information can be verified in the compressor screens in the I/O menu. If the hours of operation of the compressors are equal, the FIFO rotation described previously will be substituted for timed rotation.

LIFO rotation

In LIFO (Last in First Out) rotation, the first compressor to turn on will be the last one to shut down. This type of rotation is rarely used because it does not equalize the hours of operation of the compressors but keeps the first compressor on as long as possible while the second compressor is turned on only with full cooling demand. The first compressor will need more maintenance than the second.

Stepped capacity control with control at inlet

All compressors and the relevant capacity control steps will be proportionally positioned in the band. Increasing temperature values will cause the control steps to be subsequently input. Each step will be input according to the set delay times. The compressors will be started at the first entered capacity control stage. If special management of the first capacity control stage was selected, control will be affected according to the description in the dedicated section. In any event, the times for the capacity controls will be applied as described. Stepped capacity control with control at outlet description of stepped capacity control of 4 compressors with four capacity control steps each: activation of compressors if the water temperature measured by the probe located at the evaporator outlet exceeds the threshold of Control Set-point + Control Band the number of

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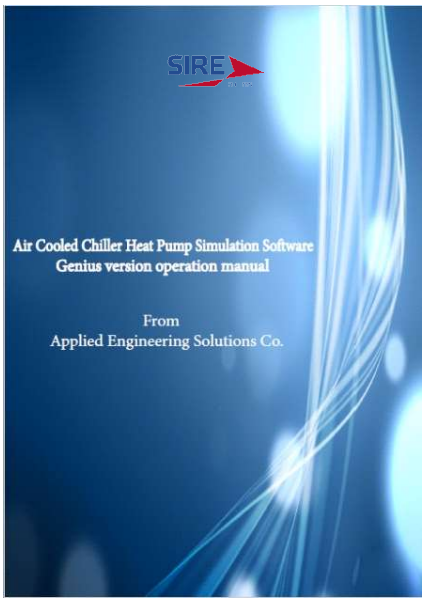
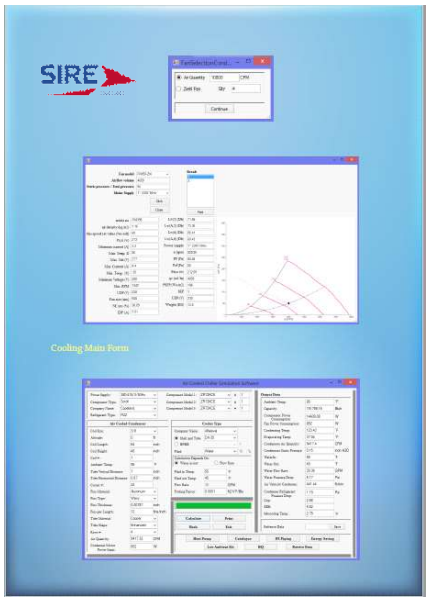
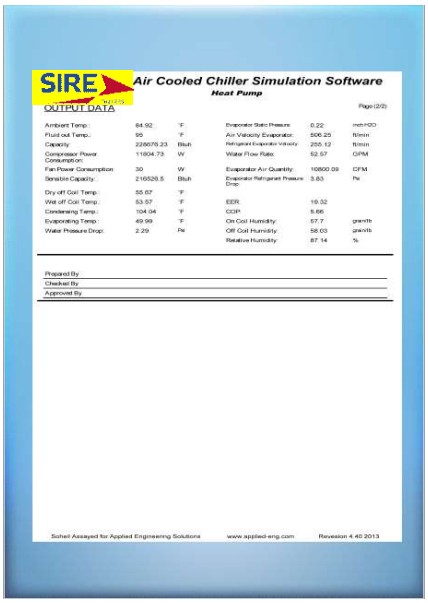
Software design SIRE







NOTES

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