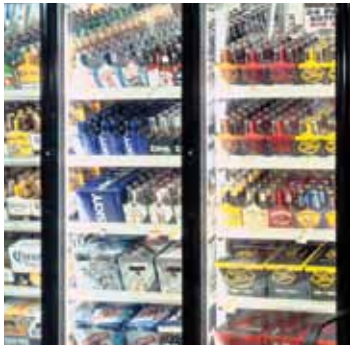


aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding



Sporlan iSpeed™ Inverter Series

Drive Systems for Refrigeration Compressors,
Condenser Fans and Pumps

BULLETIN 100-80ME



ENGINEERING YOUR SUCCESS.

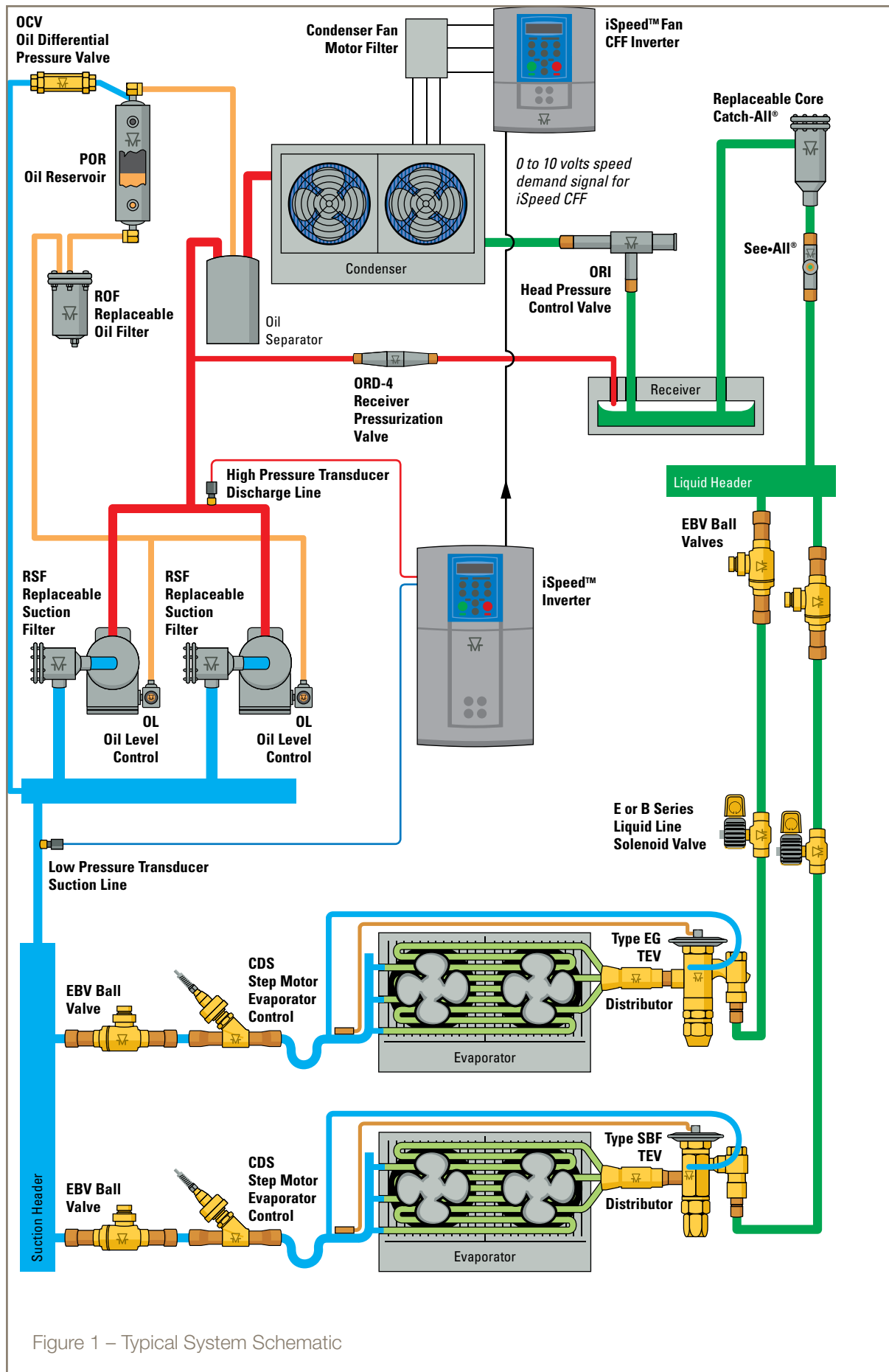


Figure 1 – Typical System Schematic

Sporlan iSpeed™

Intelligent Inverters

For Refrigeration and Air Conditioning Systems

Conventional refrigeration and air conditioning systems consist of one or more compressors that are simply staged in an on-and-off manner to approximately meet the refrigeration needs of the system. Although some systems use compressors of differing sizes in an attempt to more accurately tailor capacity, even these systems are step-control and can lead to overcooling, rapid compressor cycling, system instability, loss of control, and wasted energy.

Sporlan iSpeed Inverter systems overcome these limitations and save up to 40% of the energy used in traditional systems. The Sporlan system is not just an add-on set of hardware, it is a total system solution consisting of hardware, specifically designed and proven software, and guidelines for designing the most efficient system possible. Thousands of field installations and over 10 years of experience have supported the energy savings described. Years of consulting with major compressor manufacturers allow specific recommendations of models for each application.

Software packages include: supermarket rack refrigeration, chillers, glycol coolers, heat pumps, transcritical and subcritical CO₂, drycoolers, condensers and pumps. The iSpeed Inverters can also be used in conjunction with existing controllers to increase energy efficiency.

The Sporlan iSpeed drive family is designed to meet the demands



In its simplest form, iSpeed is a refrigeration rack inverter that operates as a slave to an external compressor rack controller.

In its most advanced form, iSpeed is an intelligent refrigeration rack controller that can take complete control of the compressor rack and condenser fans.

of the refrigeration, air conditioning and heat-pump markets.

Dedicated refrigeration compressor software, guarantees high starting torque, to ensure the compressors start first time, even when used in CO₂ applications, and just in case the compressor fails to start first time, because of an external system fault, the iSpeed is intelligent enough to know if and when the compressor has failed to start, and automatically switches off the compressor to avoid any damage. Before attempting a

restart, iSpeed waits to allow the compressor to cool down. With its built in intelligence, it counts the number of starts, and does not allow the compressor to exceed the safe number of starts per hour, as recommended by the compressor manufacturer. The iSpeed's built-in intelligence also monitors the exact pressure in the evaporating and condensing line. With this information it alters the compressor speed to protect the system, so that it works within the manufactures safety limits, and avoids high pressure trips.

Why choose Sporlan iSpeed™ Intelligent Inverter Systems?



- Save up to 40% of energy usage in refrigeration systems
- Assures product integrity and shelf life by reducing dehydration and shrinkage
- Increased efficiency of the evaporator, results in fewer defrost cycles
- Reduces compressor failure rates
- Designed to meet the demanding EMC Directives
- Suitable for single or multiple compressor racks
- Energy Saving by matching load requirements to compressor speed
- Increased speed range, provides more capacity and better control of the suction pressure from the existing compressor
- Intelligent monitoring of key compressor safety limits avoids trips
- Easy set-up, reduces commissioning time
- Multi Language LCD display available to global customers
- Software selectable refrigeration & air conditioning applications, faster start up
- Produces high starting torque, ensuring compressors start first time, even in CO₂ applications

Compressor Envelope Control (C.E.C.)

iSpeed monitors the following conditions to ensure the compressor always operates within its safe area, avoiding high pressure trips:

- Discharge pressure
- Discharge gas temperature
- Suction pressure
- Maintains minimum condensing pressure, even at low ambient temperature

Automatic Frequency Control (A.F.C)

- Automatic adaptation of speed range, providing widest possible operating area
- Stable suction pressure, results in further energy savings
- Improved low-capacity performance, resulting in less stop and starts
- Increased compressor life, due to less stop and starts

Automatic Compressor Motor Fluxing (A.C.M.F)

- iSpeed adapts to supply voltage without the need to make any parameter adjustments
- Ensures best possible starting conditions, even on weak power supplies
- Energy saving by magnetic flux optimisation

Energy Savings

Load Matching

- Energy saving by stepless control of refrigeration capacity:
 - Up to 40% with refrigeration installations using a single compressor
 - Up to 25% with conventional multi-stage compressor racks
- Operation at a higher evaporation temperature with the same refrigeration capacity
- Higher COP factor under partial load conditions

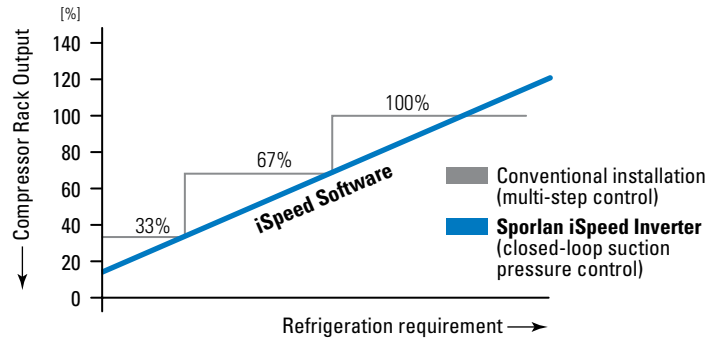


Figure 2

Refrigeration and air conditioning systems are sized for the largest total load expected under extreme conditions. The compressor and condenser fans are then chosen to meet this maximum capacity need.

However, almost 95% of system run time is at a reduced load,

and fixed speed compressors must be cycled to attempt to meet the load. Since the compressors and fans run at fixed speeds, their energy use is higher than needed to satisfy system requirements. Sporlan iSpeed Inverters with onboard software, efficiently tailor compressor and fan speed to match

the exact load. Since motor current draw is linear to motor speed, reduced speed means reduced energy use.

Figure 2 shows how iSpeed Software enables the system to match capacity better than conventional step control.

Higher Evaporating Temperatures

Sporlan iSpeed Inverters provide very stable suction pressures that ensure proper product temperature even at higher suction pressures.

A 5°F or 2.5 K raise in suction pressure can yield a 10.2% increase in EER (Energy Efficiency Ratio). The steadiness of the suction pressure also allows

Comparison based on a 3 Compressor Multi-stage rack with 50 kW (14.3 tons) total refrigeration capacity

Frequency Inverter	Without		With	
	kW	Tons	kW	Tons
Q _{min}	17	4.8	6-8*	1.7-3.2*
Q _{max}	50	14.3	53-55*	15.1-15.7*

* depending on compressor

Table 1 – Power Savings

the TEV (Thermostatic Expansion Valve) or EEV (Electric Expansion Valve) to be run at lower superheats, adding to coil and system efficiency. Table 1

shows representative operating range based on a 3 compressor rack with 50 kW (14.3 tons) total refrigeration capacity.

Energy Savings

Smooth Starts

- Reduction of switch-on current surges
- Lower number of compressor starts – in particular at low refrigeration capacity
- Smooth build-up of supply current
- Smooth start reduces stress on pipes and fittings

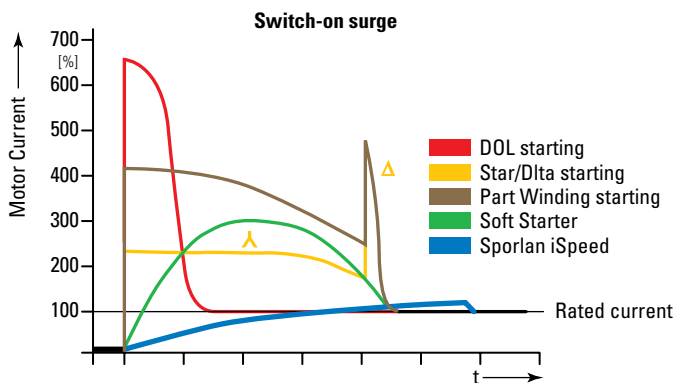


Figure 3

Many power utility companies impose higher electrical rates based on “demand” or surge currents. Ordinary fixed speed compressors are started by Direct-on-Line (DOL) or Across the Line wiring. The inrush current can be 5 to 6 times normal running current.

This surge may trigger higher electrical costs and stress the installation and possibly the electrical grid infrastructure. Sporlan iSpeed Inverters smoothly increase starting current and limit the power used to that required by the system at that moment. Electrical costs

are minimized and electrical supplies are not stressed.

Soft starting also reduces stress on the motor winding and prolongs working life.

Figure 3 illustrates typical starting currents.

Product Integrity

- Almost ideal constant pressure characteristics in the suction line even with the changing requirements of the refrigeration installation
- Reduced temperature deviation
- Higher relative humidity
- Less evaporator icing

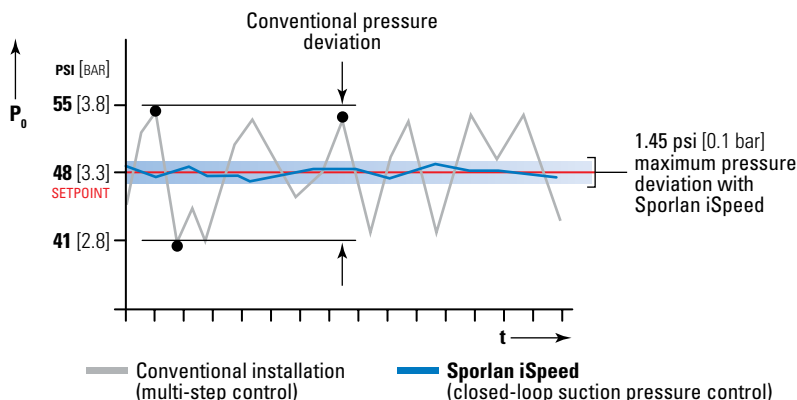


Figure 4

Air conditioning systems are designed to provide comfort cooling and humidity control for building occupants and while these are important, slight variations of either are generally acceptable. Sporlan iSpeed Inverters minimize variations in

these systems. Food storage and process cooling have more critical temperature control requirements. According to ASHRAE, temperature variations of only 2-3°F or 1-2 K is enough to damage most products. Variations and lowering of humidity levels

leads to “shrinkage” and further product loss. Sporlan iSpeed Inverters, due to their smooth suction pressure control, prevent spoilage and shrinkage. Figure 4 is a graph of an actual installation showing the improvement of suction pressure stability.

Installation Savings & Ease of Use

- Properly sized systems may require fewer compressors to match load.
- Fewer start/stop cycles
- Lower compressor running current
- Selection assistance and technical support always available.

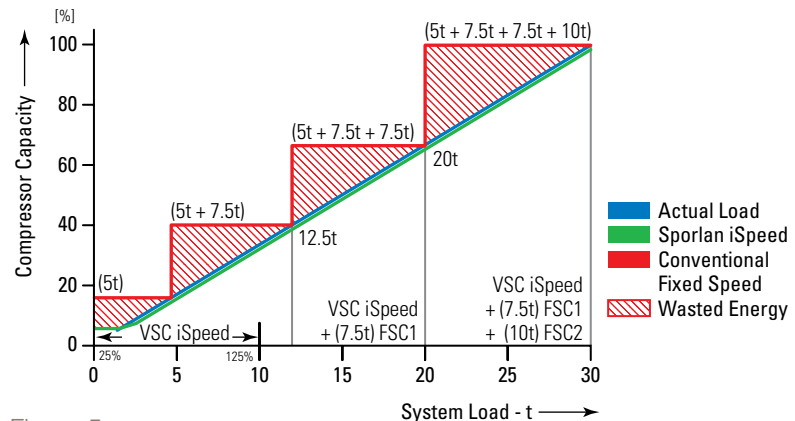


Figure 5

Installation Savings Example

Figure 5 illustrates the use of four compressors for a maximum 30 ton load on a conventional compressor rack vs. three compressors with a Sporlan iSpeed Inverter.

A 30 ton compressor rack without a Sporlan iSpeed Inverter may use four compressors; a 10 ton, two 7.5 ton and a 5 ton compressor. The same rack, installed with a Sporlan iSpeed Inverter, may use a 10 ton variable speed compressor (VSC), with one 7.5 ton and one 10 ton fixed speed compressor (FSC).

A 10 ton compressor, with a frequency range of 15 to 72 hertz, will have a range of control from 25 to 120 percent of rated capacity. Therefore, the 10 ton compressor, equipped with the Sporlan iSpeed Inverter, has an operating capacity range of 2.5 to 12.5 tons. Using this compressor in conjunction with the 7.5 ton and 10 ton fixed speed compressors, the overall refrigeration load demand is precisely matched from 2.5 (8%) to the full 30 tons of required system capacity. Using the Sporlan iSpeed Inverter with this configuration will make installation less expensive in terms

of compressor size, quantity, piping and wiring, and certainly reduces running costs due to the reduction in energy required when using the Sporlan iSpeed Inverter. In this example, four compressors can be replaced by three compressors simply by using a Sporlan iSpeed Inverter. Results vary, and are dependent upon the proper compressor selection, but real world applications have illustrated comparable savings.

Compressor specific selection tables can be provided for:

- Bitzer
- Dorin
- Carrier
- Carlyle
- DWM - Copeland
- others

Fast and simple commissioning without prior knowledge of Frequency Inverter Technology:

- No programming required
- Quick setup guide and detailed technical literature

Plain-language display on user keypad:

- Suction pressure set-point
- Motor operating data (current, frequency, etc.)
- System test or system charging without a pressure sensor

Universal setpoint of suction pressure:

- Two selectable internal adjustable setpoints
- External setpoint (analog, field bus system etc.)

Suitable for almost all compressor types:

- Semi-hermetic reciprocating compressors
- Screw compressors
- Fully hermetic reciprocating compressors of some manufacturers
- Scroll compressors of some manufacturers
- Open-type compressors

Controls variable speed compressor and stages up to 7 additional fixed speed compressors:

- Can be used with compressors with cylinder bank off-loading (capacity control)

Increased Compressor Life

Sporlan iSpeed Inverters keep lead compressors running smoothly and proprietary software limits cycling of the fixed speed compressors - reducing compressor wear.

Control of multi-stage compressor racks:

- Adjustable timers for optimum operation of the compressors without unnecessary cycling

Special functions of the speed-controlled compressor:

- Skip frequencies to prevent mechanical resonances
- Adjustable minimum and maximum speed of the speed-controlled compressor
- Control of oil pressure switch or crankcase heater, unloaded start, or condenser fans

High system pressure limiting by reducing the speed of the variable-speed master compressor.

Fault processing:

- Processing of thermistor winding protection
- Detection of pressure sensor failure
- Processing of safety trip circuit (e.g. with HP/LP pressure cut-out switches)

Automatic delayed autostart following a supply or installation fault, 10 start attempts.

Available electronic soft starters for the smooth starting of the fixed-speed compressors:

- Prevention of current and pressure surges on starting

Generally motors have the longest service life if the number of starts and stops is limited. Compressor life is even more compromised by frequent

cycling because of the high torque needed to start, the heat of inrush current, and poor lubrication flow. Sporlan iSpeed Inverter systems not only keep the lead compressor smoothly running as much as possible, but the proprietary software limits cycling of the fixed speed compressors, where fitted. The ability of the Sporlan iSpeed Inverters to safely increase the speed of the compressor adds up to 20% capacity, helping to prevent unnecessary starts of the fixed speed compressors.

The variable speed compressor current is smoothly ramped up to avoid excessive current surges and heating of the windings. Available Sporlan iSpeed Soft Start Kits can add this benefit to the fixed speed compressors as well. Contact Sporlan for more information, sizing and model numbers.

EMC Compliance




EMC Directive	Low-Voltage Directive	Machinery Directive
EG Declaration of Conformity with CE marking based on: <ul style="list-style-type: none"> • RF interference EN 50081-1/-2 • Immunity EN 50082-1/-2 Class B interference limit – suitable for unrestricted operation on public electricity supplies	EG Declaration of Conformity with CE marking: Standards used: <ul style="list-style-type: none"> • EN 50178 	Manufacturer's Declaration available Installation to: <ul style="list-style-type: none"> • EN 60204-1
UL Standards		
UL c-UL   	Standards used: <ul style="list-style-type: none"> • UL508C • UL840 • UL873 	



Table 2 – Product Conformity

The iSpeed Family

iSpeed Economy

- 5.5 to 73 amps maximum continuous current
- 4 physical frame sizes
- 380 to 480 volts three phase
- Single or twin compressor racks
- LP & HP (condenser) control
- Selectable applications:
 - Refrigeration, Air Conditioning, External set-point control from remote supermarket controller

iSpeed Economy (iSE) RCFE for Use with an External Compressor-Rack Controller

Designed for refrigeration specialist OEMs, iSpeeds' physical design reduces the area required for panel mounting. There are 2 physical frame sizes, covering 5.5 to 16 A continuous current. The standard supply voltage is 380 to 480 volts, three phase (others voltages available on request).

The iSE RCFE, is designed to control a single compressor with a speed demand signal (typically 0 to 10 V) from an external controller.

iSpeed Economy (iSE) RCF Provides Integrated Control of 2 Compressors

Designed for OEMs, and refrigeration installation specialists, iSpeeds' physical design reduces the area required mounting. There are 4 physical sizes, covering 5.5 to 73 A continuous current. The standard supply voltage is 380 to 480 volts three phase (others available on request).

The iSE RCF is an intelligent refrigeration drive. The refrigeration operating point of a single or twin compressor rack and also the speed of condenser fans can be controlled using the iSE RCF.

There are 2 dedicated pressure transducer inputs, one measuring the suction pressure and the other the condensing pressure (See figure 6). iSpeed compares the 2 input pressures to the configurable set-points within the iSE, then automatically adjusts the speed of the compressor and condenser fans to match the cooling demand, thereby maintaining constant pressure.

When used with a 2 compressor rack, iSpeed automatically controls the speed of the variable speed compressor (VsC), running it up to the maximum permissible compressor speed, as determined by the compressor manufacturer. iSpeed allows the

compressor to be run at speeds greater than the fixed supply frequency, providing increased cooling capacity. If the cooling load is not satisfied by running the VsC at maximum speed, the iSpeed will automatically switch on the fixed speed compressor (FsC). The speed of the VsC is then reduced until the total compressor capacity (VsC + FsC) matches the load. When the cooling load decreases, iSpeed will switch off the FsC and adjust the speed of the VsC to match the system requirement.

Using iSpeed ensures smooth control of the compressor and condenser fan speeds, which results in reduced mechanical stress on the system, therefore providing longer life. Maintaining constant pressure within the system, allows the expansion valves to operate more efficiently. This results in less ice build up within the evaporator, reducing the frequency and duration of required defrost cycles. The increased efficiency of the evaporator, and the ability to evaporate at higher temperatures, matched to the cooling demand combined with fewer defrosts, results in a considerable energy saving. Leading evaporator manufacturers have proven that for every 1K increase in evaporating temperature, a 4% saving in energy costs is achieved.

The iSpeed Family

iSpeed Plus

- 9.5 to 650 amps maximum continuous current
- 8 physical frame sizes
- 380 to 480 volts three phase
- Single to maximum 8 compressors
- Control output for capacity control
- Advanced LP & HP (condenser) control:
 - Floating control
 - Automatic Speed Range Adaptation
 - Integrated Advanced stage controller (up to 8 compressors)
- Selectable software applications (Macros):
 - Refrigeration, Air Conditioning, Chiller, CO₂ Heat Pump, Condenser, Dry Cooler, Special OEM requirements
- Improved performance over conventional “Deadband + Inverter” systems
- Intelligent selection of compressor to be started and stopped next
- Better control performance because compressor inhibit times better managed
- Integrated control of Capacity Control solenoid: Intelligent recovery timing
- Monitoring of rack operation:
 - Running time (VsC and FsC)
 - Number of starts (VsC and FsC)
 - Electrical Power (VsC and rack)
- Number of controllable compressors:
 - Up to 3 FsC standard with rotation
 - Up to 4 FsC possible with rotation (external relays required)
 - Up to 7 FsC possible without rotation
- Integrated capacity meter to control optimized floating control of condensing temperature

iSpeed Plus (iSP) RCF Provides Integrated Control of Up to 8 Compressors

Designed for refrigeration specialist End Users and OEMs. The iSP is available in 8 physical sizes, covering 9.5 to 650 A continuous current. The standard supply voltage are 380 to 480 volts three phase and 220 to 240 volts three phase.

The iSP RCF is an intelligent refrigeration drive which can control up to 8 compressors. There are 2 dedicated pressure transducer inputs, one measur-

ing the suction pressure and the other the condensing pressure (See figure 7). iSpeed compares the 2 input pressures to the configurable set-points within the iSP, then automatically adjusts the speed of the compressor and condenser fans to match the cooling demand, thereby maintaining constant pressure. For special applications such as, chillers and heat pumps, there are additional inputs available, which can be used to monitor the water temperature after it exits the heat exchanger and also the ambient outside tempera-

ture (See figure 7). Measuring both the ambient and exit water temperature allows the iSP RCF to determine the correct cooling requirements of the system.

When used with multiple compressors, iSpeed automatically controls the speed of the variable speed compressor (VsC), running it up to the maximum permissible compressor speed, as determined by the compressor manufacturer. iSpeed allows the compressor to be run at speeds greater than the fixed supply frequency, providing increased cooling capacity.

If the cooling load is not satisfied by running the VsC at maximum speed, the iSpeed will automatically switch on the fixed speed compressor (FsC). The speed of the VsC is then reduced until the total compressor capacity (VsC + FsC) matches the load. When the cooling load decreases, iSpeed will switch off the FsC and adjust the speed of the VsC to match the system requirement.

The integrated refrigeration/cooling software includes the following features to achieve optimum performance and compressor life time:

- Capacity control (cylinder off-loading with reciprocating compressors) to minimize pressure deviations when switching compressors
- Intelligent rotation of FsC compressors based on running and idling times.

Using iSpeed ensures smooth control of the compressor and condenser fan speeds, which results in reduced mechanical stress on the system, therefore

The iSpeed Family

iSpeed Plus

providing longer life. Maintaining constant pressure within the system, allows the expansion valves to operate more efficiently. This results in less ice build up within the evaporator, reducing the frequency and

duration of required defrost cycles. The increased efficiency of the evaporator, and the ability to evaporate at higher temperatures, matched to the cooling demand combined with fewer defrosts, results in a consider-

able energy saving. Leading evaporator manufacturers have proven that for every 1K increase in evaporating temperature, a 4% saving in energy costs is achieved.

iSpeed CFF - Control of Condensers Fans or Dry Coolers

Designed for refrigeration specialist End Users and OEMs. The CFF range of drives are available in 3 physical sizes, covering 5.5 to 37 A continuous current. The standard supply voltage are 380 to 480 volts three phase.

High efficiency operation of the expansion valves in refrigeration and cooling systems is only possible if the condensing pressure

is maintained at a constant set level. The CFF is an intelligent refrigeration drive which can also be used to control variable-speed fans on the condenser or dry cooler. The CFF can be operated in one of the following control modes:

- Control of condensing pressure to an adjustable set-point utilizing a dedicated pressure transducer
- Control of condensing pressure

based on a 0 to 10 V control signal received from the iSpeed controlling the compressor (See figure 8)

- Floating control of condensing pressure based on the outdoor ambient temperature

In dry cooler applications, the circulation pumps may also be controlled.

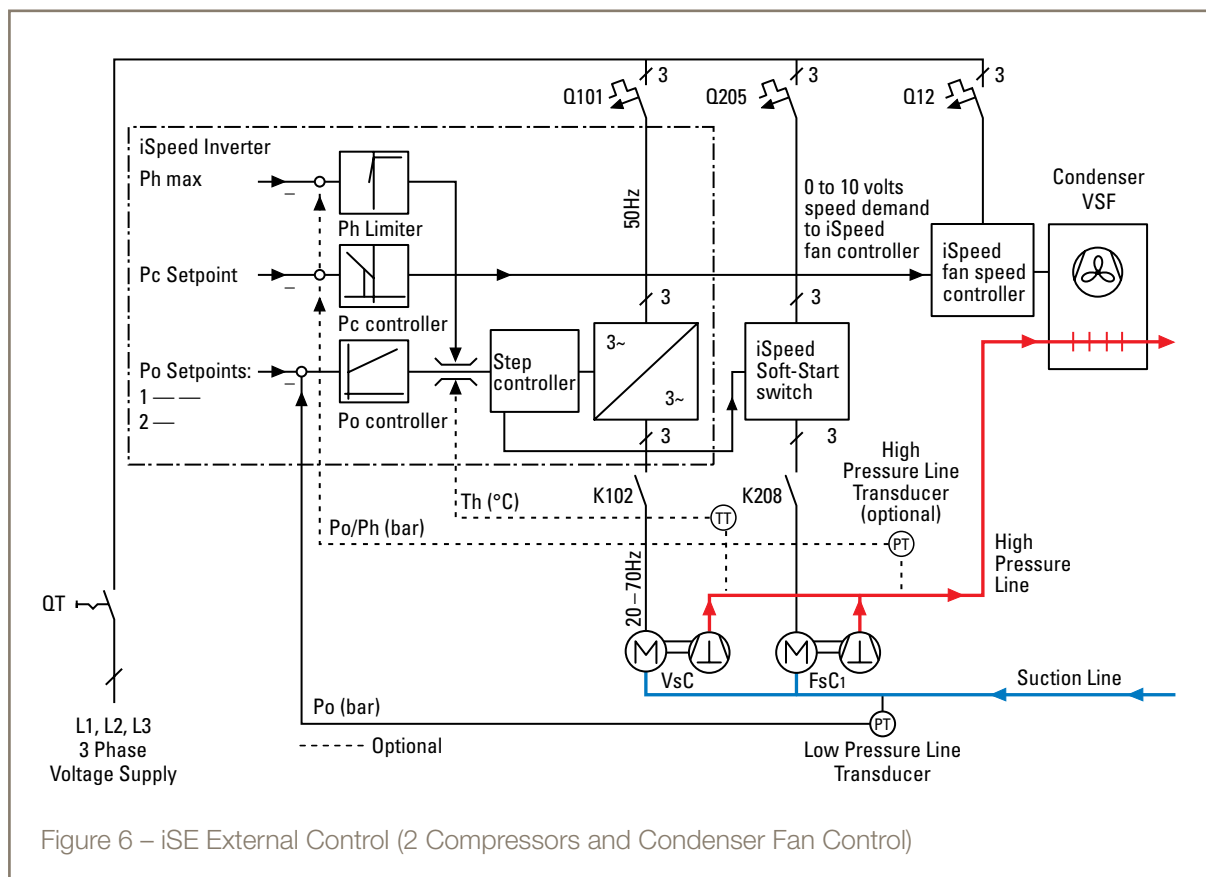


Figure 6 – iSE External Control (2 Compressors and Condenser Fan Control)

The iSpeed Family

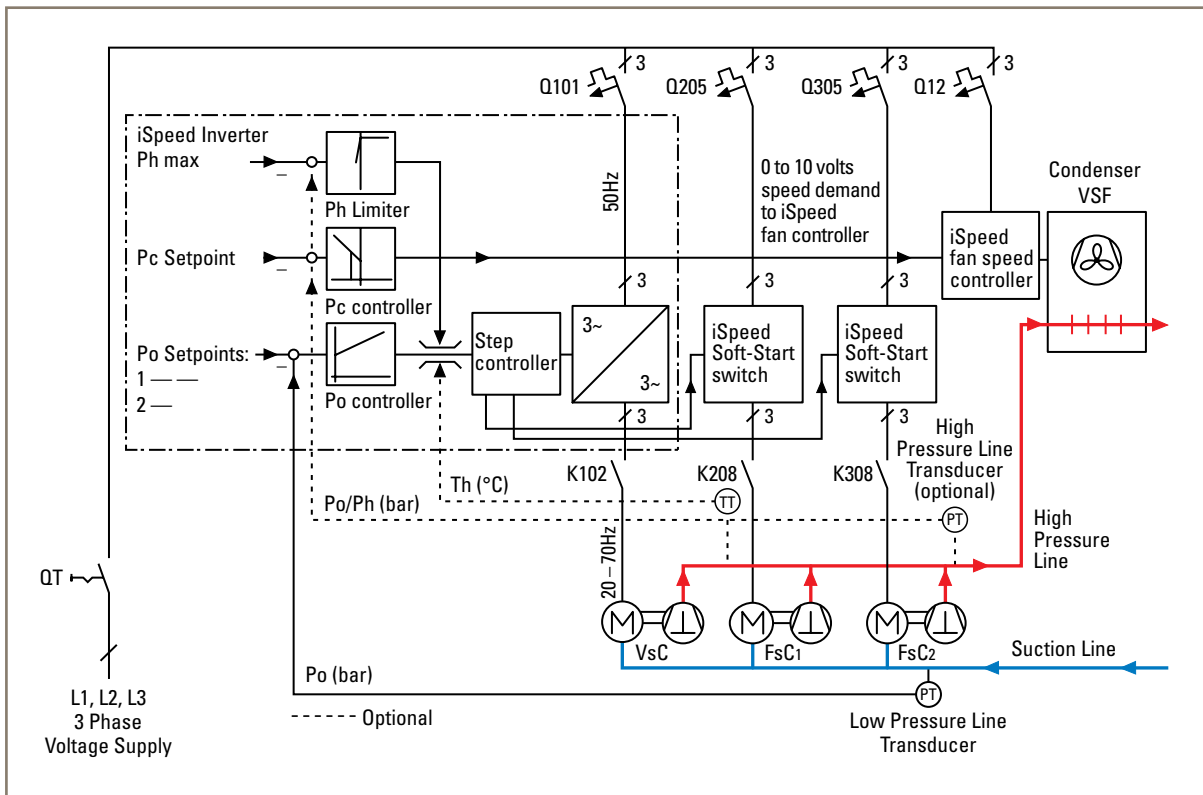


Figure 7 – iSP Integrated Control (3+ Compressors and Condenser Fans Control)

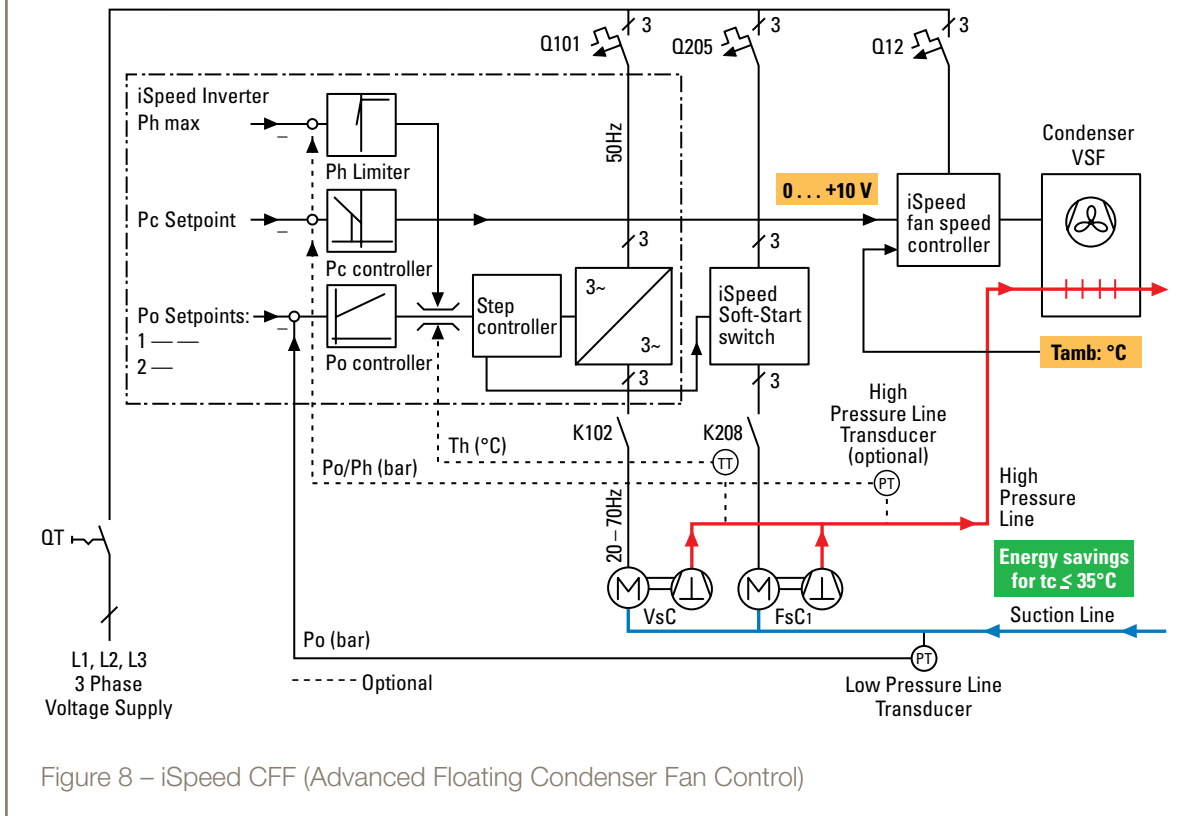


Figure 8 – iSpeed CFF (Advanced Floating Condenser Fan Control)

Connections

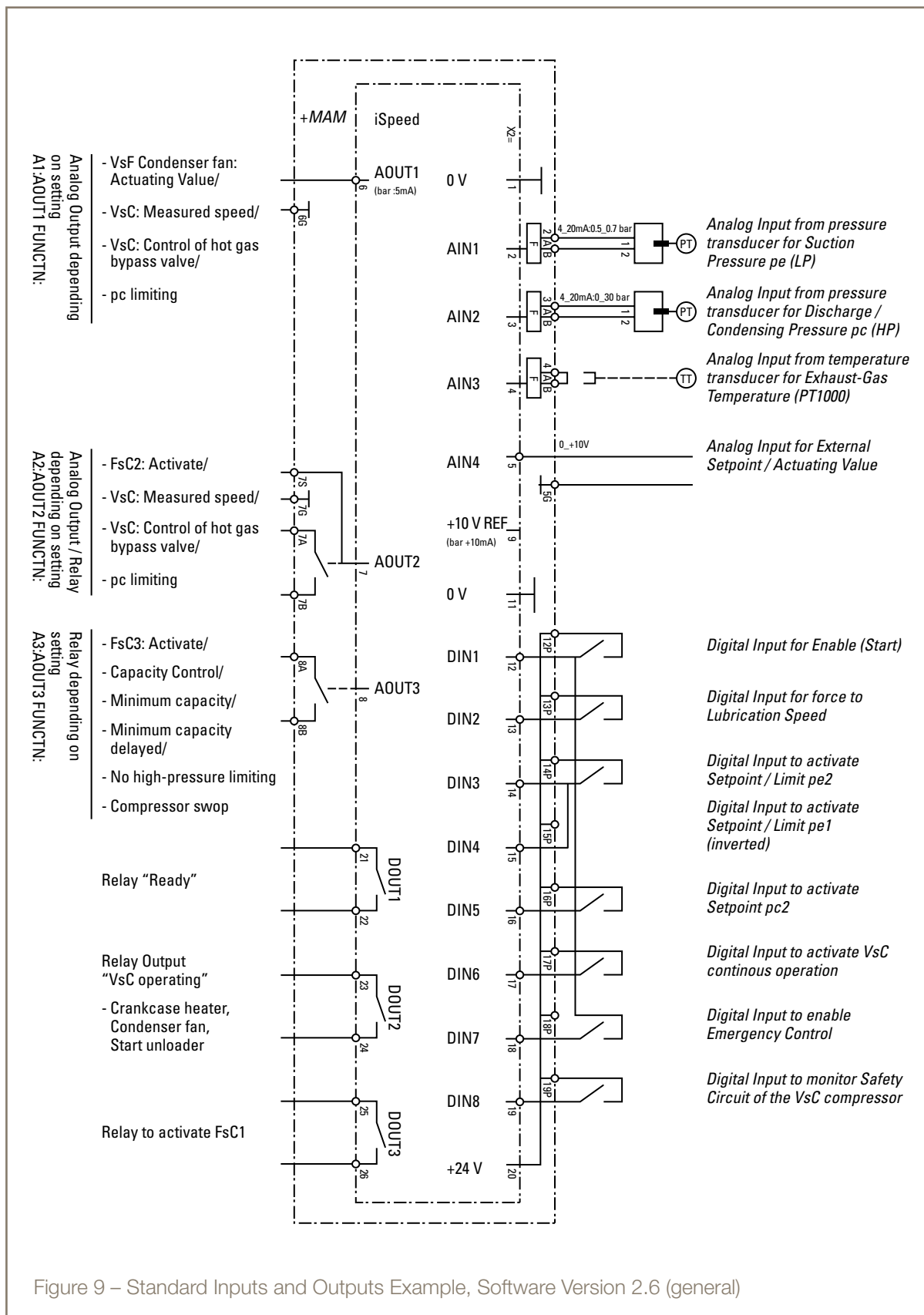


Figure 9 – Standard Inputs and Outputs Example, Software Version 2.6 (general)

Selection

iSpeed External Control

Table 3

iSE and iSP range of RCFE drives are designed to work as slave to External Rack controllers, and are pre-engineered to accept a speed demand signal, 0 to 10 volts, which will work between minimum and maximum speed settings. Switching on & off of other fixed speed compressor in system, via Rack controller.

iSpeed External Control	Supply Voltage U _R (V)	Rated Current I _H (A)	Starting Current I _H (A)	Dimensions W x H x D mm	Frame	Weight kg	Description
iSE RCFE 5.5M/14	3AC 380-480	5.5	8.3	73 x 205 x 172	2	1.52	IP20 with Class B RFI Filter
iSE RCFE 6.8M/14	3AC 380-480	6.8	10.0	96 x 262 x 202	3	3.3	IP20 with Class B RFI Filter
iSE RCFE 9.0M/14	3AC 380-480	9	14	96 x 262 x 202	3	3.3	IP20 with Class B RFI Filter
iSE RCFE 12M/14	3AC 380-480	12	18	96 x 262 x 202	3	3.3	IP20 with Class B RFI Filter
iSE RCFE 16M/14	3AC 380-480	16	24	96 x 262 x 202	3	3.3	IP20 with Class B RFI Filter

iSpeed Integrated Control

Table 4

iSE and iSP range of RCF drives are designed to work with high and low pressure transducer input, which combined with iSpeed Intelligent Refrigeration software, automatically determines the correct compressor and fan condenser speeds to match the system load requirement, avoiding high pressure trips. iSE maximum number compressor 2. iSP maximum number compressor 7.

iSpeed External Control	Supply Voltage U _R (V)	Rated Current I _H (A)	Starting Current I _H (A)	Dimensions W x H x D mm	Frame	Weight kg	Description
Single Phase AC 220-240VAC							
iSE RCF 4.0S230M/14	1AC 220-240	4	6	73 x 145 x 142	1	1	IP20 with Class B RFI Filter
iSE RCF 7.0S230M/14	1AC 220-240	7	10.5	73 x 205 x 172	2	1.5	IP20 with Class B RFI Filter
3 Phase AC 380-480VAC Supply							
iSE RCF 5.5C2M/14	3AC 380-480	5.5	8.3	73 x 205 x 172	2	1.52	IP20 with Class A RFI Filter
iSE RCF 6.8C2M/14	3AC 380-480	6.8	10.0	96 x 262 x 202	3	2.8	IP20 with Class A RFI Filter
iSE RCF 9.0C2M/14	3AC 380-480	9	14	96 x 262 x 202	3	2.8	IP20 with Class A RFI Filter
iSE RCF 12C2M/14	3AC 380-480	12	18	96 x 262 x 202	3	2.8	IP20 with Class A RFI Filter
iSE RCF 16C2M/14	3AC 380-480	16	24	96 x 262 x 202	3	2.8	IP20 with Class A RFI Filter
iSE RCF 5.5M/14	3AC 380-480	5.5	8.3	73 x 205 x 172	2	1.52	IP20 with Class B RFI Filter
iSE RCF 6.8M/14	3AC 380-480	6.8	10.0	96 x 262 x 202	3	2.8	IP20 with Class B RFI Filter
iSE RCF 9.0M/14	3AC 380-480	9	14	96 x 262 x 202	3	2.8	IP20 with Class B RFI Filter
iSE RCF 12M/14	3AC 380-480	12	18	96 x 262 x 202	3	2.8	IP20 with Class B RFI Filter
iSE RCF 16M/14	3AC 380-480	16	24	96 x 262 x 202	3	2.8	IP20 with Class B RFI Filter
iSE RCF 23E/14	3AC 380-480	23	30	210 x 348 x 208	C	11.9	IP20 with Class B RFI Filter
iSE RCF 30E/14	3AC 380-480	30	39	210 x 348 x 208	C	12.1	IP20 with Class B RFI Filter
iSE RCF 37E/14	3AC 380-480	37	48	210 x 348 x 208	C	12.5	IP20 with Class B RFI Filter
iSE RCF 59E/14	3AC 380-480	59	77	252 x 453 x 245	D	22	IP20 with Class B RFI Filter
iSE RCF 73E/14	3AC 380-480	73	95	252 x 453 x 245	D	23	IP20 with Class B RFI Filter
Single Phase AC 220-240VAC							
iSP RCF 10.5S230E/14	1AC 220-240	10.5	16	177 x 233 x 181	B	4.6	IP20 with Class B RFI Filter
3 Phase AC 220-240VAC Supply							
iSP RCF 16.5T230E/14	3AC 220-240	16.5	25	177 x 233 x 181	B	4.7	IP20 with Class B RFI Filter
iSP RCF 42T230E/14	3AC 220-240	42	55	201 x 348 x 208	C	12.5	IP20 with Class B RFI Filter
iSP RCF 54T230E/14	3AC 220-240	54	70	252 x 453 x 245	D	22	IP20 with Class B RFI Filter
iSP RCF 68T230E/14	3AC 220-240	68	88	252 x 453 x 245	D	23	IP20 with Class B RFI Filter
iSP RCF 104T230E/14	3AC 220-240	104	135	252 x 453 x 245	E	40	IP20 with Class B RFI Filter
iSP RCF 130T230E/14	3AC 220-240	130	169	257 x 689 x 312	F	56	IP20 with Class B RFI Filter
iSP RCF 192T230E/14	3AC 220-240	192	250	257 x 720 x 355	F	60	IP20 with Class B RFI Filter
3 Phase AC 380-480VAC Supply							
iSP RCF 9.5E/14	3AC 380-480	9.5	14	177 x 233 x 181	B	4.4	IP20 with Class B RFI Filter
iSP RCF 14E/14	3AC 380-480	14	21	177 x 233 x 181	B	5.1	IP20 with Class B RFI Filter
iSP RCF 23E/14	3AC 380-480	23	30	201 x 348 x 208	C	12.1	IP20 with Class B RFI Filter
iSP RCF 30E/14	3AC 380-480	30	39	201 x 348 x 208	C	12.3	IP20 with Class B RFI Filter
iSP RCF 37E/14	3AC 380-480	37	48	201 x 348 x 208	C	12.5	IP20 with Class B RFI Filter
iSP RCF 59E/14	3AC 380-480	59	77	252 x 453 x 245	D	22	IP20 with Class B RFI Filter
iSP RCF 73E/14	3AC 380-480	73	95	252 x 453 x 245	D	23	IP20 with Class B RFI Filter
iSP RCF 87E/14	3AC 380-480	87	113	257 x 669 x 312	E	39	IP20 with Class B RFI Filter
iSP RCF 105E/14	3AC 380-480	105	137	257 x 669 x 312	E	40	IP20 with Class B RFI Filter
iSP RCF 145E/14	3AC 380-480	145	189	257 x 720 x 355	F	56	IP20 with Class B RFI Filter
iSP RCF 165E/14	3AC 380-480	165	215	257 x 720 x 355	F	58	IP20 with Class B RFI Filter
iSP RCF 205E/14	3AC 380-480	205	267	257 x 720 x 355	F	60	IP20 with Class B RFI Filter
iSP RCF 260C3E/14	3AC 380-480	260	338	569 x 1384 x 465	G	158	IP20 with Class A RFI Filter
iSP RCF 302C2E/14	3AC 380-480	302	393	569 x 1384 x 465	G	162	IP20 with Class A RFI Filter
iSP RCF 420C3E/14	3AC 380-480	420	546	569 x 1384 x 465	G	170	IP20 with Class A RFI Filter
iSP RCF 480C3E/14	3AC 380-480	480	624	684 x 1517 x 465	H	235	IP20 with Class A RFI Filter
iSP RCF 590C3E/14	3AC 380-480	590	767	684 x 1517 x 465	H	235	IP20 with Class A RFI Filter
iSP RCF 650C3E/14	3AC 380-480	650	845	789 x 1629 x 465	J	289	IP20 with Class A RFI Filter

Note: All drives come with class "B" RFI filters (unless indicated otherwise) and operator keypad.

Selection

iSpeed Condenser Fan Control

Table 5

The CFF range of drives are designed to control the speed of condensing fans. They are designed to work with a remote 0 to 10 volts speed demand input. In an intelligent system, where iSpeed is the master, the speed demand signal for the CFF is generated by the iSpeed controlling the compressor rack. Some condenser fans are not suitable for control from PWM drives, and require a motor sine wave filter to be fitted, to avoid fan motor damage. Parker RACE has a full range of filters to protect fans, please ask for details.

iSpeed Condenser Fan	Supply Voltage U _R (V)	Rated Current I _H (A)	Starting Current I _H (A)	Dimensions W x H x D mm	Frame	Weight kg	Description
3 Phase AC 380-480VAC Supply							
iSE CFF 5.52CM/12	3AC 380-480	5.5	8.3	73 x 205 x 172	2	1.9	IP20 with Class A RFI Filter
iSE CFF 9.02CM/12	3AC 380-480	9	14	96 x 262 x 202	3	3.2	IP20 with Class A RFI Filter
iSE CFF 162CM/12	3AC 380-480	16	24	96 x 262 x 202	3	3.2	IP20 with Class A RFI Filter
iSE CFF 5.5M/12	3AC 380-480	5.5	8.3	73 x 205 x 172	2	1.9	IP20 with Class B RFI Filter
iSE CFF 9.0M/12	3AC 380-480	9	14	96 x 262 x 202	3	3.2	IP20 with Class B RFI Filter
iSE CFF 16M/12	3AC 380-480	16	24	96 x 262 x 202	3	3.2	IP20 with Class B RFI Filter
iSE CFF 30E/12	3AC 380-480	23	30	209 x 348 x 208	C	12.0	IP20 with Class B RFI Filter
iSE CFF 23E/12	3AC 380-480	30	39	210 x 348 x 208	C	12.3	IP20 with Class B RFI Filter
iSE CFF 37E/12	3AC 380-480	37	48	209 x 348 x 208	C	12.5	IP20 with Class B RFI Filter

iSpeed Options

Table 6

Product Code iSpeed Options	Description
A-REFR-P-TRANSD- LP7+LP	Pressure Transducers -0.5 to 7 bar
A-REFR-P-TRANSD- HP30+LP	Pressure Transducers 0 to 30 bar
A-REFR-P-TRANSD- HP40+LP	Pressure Transducers 0 to 40 bar
A-REFR-P-TRANSD- C100+LP	Pressure Transducers 0 to 100 bar
A-REFR-P-TRANSD- C160+LP	Pressure Transducers 0 to 160 bar
A-REFR-P-TRANSD- DP6+LP	Differential Pressure Transducer 0 to 6 bar
A-REFR-P-TRANSD- DP10+LP	Differential Pressure Transducer 0 to 10 bar
A-REFR-T-SENSOR=PT1000	Temperature Sensor PT1000
A-iSP-MAM-PT1000-12	Extended Function Card for PT1000
iSP PROG1-S	Keypad iSP
iSE PROG-RS232-S	Keypad iSE
A V-B	IP40 / NEMA1 covers Frame B
A V-C	IP40 / NEMA1 covers Frame C
A V-D	IP40 / NEMA1 covers Frame D
A V-E	IP40 / NEMA1 covers Frame E
iSP 0-RS485/422-B	Modbus 485/422 Tech Box (Frame B only)
iSP 0-RS485/422-C	Modbus 485/422 Tech Box (Frame C to F)
iSE 0-RS232/485	Modbus 485/422 Tech Box (Frame 1 to 3)
A-PROG-PM-S	Remote Panel Mounting Kit iSP
A-PROG-CC-2cm	Computer Plug
A D-F	Duct Kit Size Frame F
A-2.2PE+5.5	Condensor Fan Motor Filters 3AC 400- 6A
A-4.0PE+10	Condensor Fan Motor Filters 3AC 400- 10A
A-7.5PE+16	Condensor Fan Motor Filters 3AC 400- 16A
A-11PE+24	Condensor Fan Motor Filters 3AC 400- 24A
A-15PE+32	Condensor Fan Motor Filters 3AC 400- 32A

**European Product
Information Centre**
Free phone: 00 800 27 27 5374
(from AT, BE, CH, CZ, DE, EE, ES,
FI, FR, IE, IL, IS, IT, LU, MT, NL,
NO, PT, SE, SK, UK)



Parker Hannifin Ltd
Climate and Industrial Controls Group
Refrigeration and Air Conditioning Europe
Cortonwood Drive, Brampton
South Yorkshire S73 0UF
United Kingdom
phone +44 (0) 1226 273400
fax +44 (0) 1226 273401
www.parker.com/race