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**SERVICE
BULLETIN
SR-004 Rev. 1
SUPERCEDES SR-004**

DATE: October 13, 2005
TO: All Service and Parts Managers
SUBJECT: Hard Start Kit Information

As the majority of products supplied by Goodman are matched to achieve their ratings with flowrator expansion devices, those products do not come equipped with any "Start Components". Should a Goodman product be installed on an expansion valve indoor coil in which the pressures do not equalize within two (2) minutes, a supplemental start kit may be required to prevent non-starting and internal overload trips. Per Copeland® application bulletin AE4-1329, pressure differentials as low as 2 PSIG can prevent compressors from starting without start assist.

Low voltage, slow equalization of high to low side pressures, or a tight compressor are the most common causes for a starting problem. Compressors that are rated 230/208 V. have an operating range of 253 VAC to 197 VAC. However, during start-up, the voltage can drop 10-15 volts due to high start up current draw. Units can not be operated and should not be installed where the supply voltage exceeds 253 V. or the lock rotor voltage is less than 197 V. Contact the local power company and request a correction of the supply voltage if necessary.

Note: Start assist components are not a cure for low voltage applications and will not prevent compressor failure due to continuous operation on low voltage supplies.

Start problems created by a tight fitting compressor will normally be corrected after a run in period and permanent start assist is not necessary.

Field installed Hard Start kits are considered accessory items, and should be purchased as such. Therefore, attached is a start capacitor and start relay cross-reference chart as they pertain to Copeland compressors.

As a supplement to this, Goodman offers the following "Compressor Saver" start kits for use on its HVAC products:

CSR-U-1	1 to 3 Ton
CSR-U-2	3 to 5 Ton
CSR-U-3	4 to 5 Ton Scroll

The specifications for these kits is attached. Use of these kits will NOT void any Goodman warranties. The CS "Compressor Saver" kits may be purchased through our Goodman Service Parts department.



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Unit	Compressor	Capacitor MFD / Volts		Relay Pick-up Volts	Relay Drop-out Volts	Relay Coil Voltage
CKLB18-1L	CR16KFPFV230	145-174	250	190-200	40-105	375
CKLB24-1L	CR22KFPFV230	145-174	220	190-200	55-115	383
CKLB30-1L	CR28K6PFV220	145-174	220	190-200	55-115	383
CKLB36-1L	CR34K6PFV220	189-227	330	190-200	40-105	375
CKL18-1L	CR16KFPFV230	145-174	250	190-200	40-105	375
CKL24-1L	CR22KFPFV230	145-174	220	190-200	55-115	383
CKL30-1L	CR28K6PFV220	145-174	220	190-200	55-115	383
CKL36-1L	CR34K6PFV220	189-227	330	190-200	40-105	375
CKL42-1L	CR38K6PFV220	189-227	330	190-200	55-115	383
CKL49-1L	CR42K6PFV223	189-227	330	240-260	60-121	420
CKL60-1L	ZR57KCPFV250	270-324	330	170-180	40-90	332
CKL62-1L	ZR61KCPFV250	270-324	330	170-180	40-90	332

CLJ18-1C	CR16K6PFV220	145-174	250	190-200	40-105	375
CLJ24-1C	CR18K6PFV220	145-174	250	190-200	40-105	375
CLJ30-1C	CR24K7PFV230	189-227	330	190-200	40-105	375
CLJ36-1C	CR30K6PFV223	145-174	250	190-200	40-105	375
CLJ42-1C	CR34K6PFV220	189-227	330	190-200	40-105	375
CLJ48-1C	ZR42K3PFV230	88-108	330	170-780	40-90	332
CLJ60-1C	ZR54K3PFV230	270-324	330	170-180	40-90	332

CLT24-1B	ZR18K4PFV230	88-108	330	170-180	40-90	332
CLT30-1B	ZR24K4PFV230	88-108	330	170-180	40-90	332
CLT36-1B	ZR32K3PFV230	88-108	330	170-180	40-90	332
CLT42-1B	ZR36K3PFV230	88-108	330	170-180	40-90	332
CLT48-1B	ZR40K3PFV230	88-108	330	170-180	40-90	332
CLT60-1B	ZR48K3PFV235	88-108	330	170-180	40-90	332

CLQ24-1B	ZR18K4PFV230	88-108	330	170-180	40-90	332
CLQ30-1B	ZR24K4PFV230	88-108	330	170-180	40-90	332
CLQ36-1B	ZR28K3PFV230	88-108	330	170-180	40-90	332
CLQ42-1B	ZR34K3PFV230	88-108	330	170-180	40-90	332
CLQ48-1B	ZR40K3PFV230	88-108	330	170-180	40-90	332
CLQ60-1B	ZR48K3PFV235	88-108	330	170-180	40-90	332

CPLE18-1C	CR18K6PFV260	145-174	250	190-200	40-105	375
CPLE24-1C	CR22KFPFV270	145-174	220	190-200	55-115	383
CPLE30-1C	CR28K6PFV260	145-174	220	190-200	55-115	383
CPLE36-1C	CR35K6PFV260	189-227	330	190-200	40-105	375
CPLE42-1C	CR38K6PFV260	189-227	330	190-200	55-115	383
CPLE48-1C	CR42K6PFV260	189-227	330	240-260	60-121	420
CPLE60-1C	ZR57KCPFV250	270-324	330	170-180	40-90	332

CPLJ18-1B	CR16K6PFV260	145-174	250	190-200	40-105	375
CPLJ24-1B	CR20K6PFV260	145-174	220	190-200	55-115	383
CPLJ30-1B	ZR28K3PFV230	88-108	330	170-180	40-90	332
CPLJ36-1B	ZR32K3PFV230	88-108	330	170-180	40-90	332
CPLJ42-1B	ZR36K3PFV230	88-108	330	170-180	40-90	332
CPLJ48-1B	ZR42K3PFV230	88-108	330	170-180	40-90	332
CPLJ60-1B	ZR54K3PFV230	270-324	330	170-180	40-90	332

CPLT24-1B	ZR22K4PFV230	88-108	330	170-180	40-90	332
CPLT30-1B	ZR28K3PFV230	88-108	330	170-180	40-90	332
CPLT36-1B	ZR32K3PFV230	88-108	330	170-180	40-90	332
CPLT42-1B	ZR36K3PFV230	88-108	330	170-180	40-90	332
CPLT48-1B	ZR42K3PFV230	88-108	330	170-180	40-90	332
CPLT60-1B	ZR48K3PFV235	88-108	330	170-180	40-90	332

Unit	Compressor	Capacitor MFD / Volts	Relay Pick-up Volts	Relay Drop-out Volts	Relay Coil Voltage
VCA18C2C	CR16KFPFV230	145-174 250	190-200	40-105	375
VCA24C2C	CR22KFPFV230	145-174 220	190-200	55-115	383
VCA30C2C	CR28K6PFV220	145-174 220	190-200	55-115	383
VCA36C2C	CR34K6PFV220	189-227 330	190-200	40-105	375
VCA42C2C	CR38K6PFV220	189-227 330	190-200	55-115	383
VCA48C2C	CR42K6PFV223	189-227 330	240-260	60-121	420
VCA60C2C	ZR57KCPFV250	270-324 330	170-180	40-90	332

VCC18C2C	CR16K7PFV230	145-174 250	190-200	40-105	375
VCC24C2C	CR20K6PFV220	145-174 220	190-200	55-115	383
VCC30C2C	CR24K6PFV220	145-174 250	190-200	40-105	375
VCC36C2C	CR30K6PFV223	145-174 250	190-200	40-105	375
VCC42C2C	ZR36K3PFV230	88-108 330	170-180	40-90	332
VCC48C2C	ZR42K3PFV230	88-108 330	170-180	40-90	332
VCC60C2C	ZR54K3PFV230	270-324 330	170-180	40-90	332

VHA18C2C	CR18K6PFV260	145-174 250	190-200	40-105	375
VHA24C2C	CR22K6PFV260	145-174 220	190-200	55-115	383
VHA30C2C	CR28K6PFV260	145-174 220	190-200	55-115	383
VHA36C2C	CR34K6PFV260	189-227 330	190-200	40-105	375
VHA42C2C	ZR40KCPFV230	88-108 330	170-180	40-90	332
VHA48C2C	CR42K6PFV260	189-227 330	240-260	60-121	420
VHA60C2C	ZR57KCPFV250	270-324 330	170-180	40-90	332

VHC18C2C	CR18K6PFV260	145-174 250	190-200	40-105	375
VHC24C2C	CR20K6PFV260	145-174 220	190-200	55-115	383
VHC30C2C	ZR28K3PFV230	88-108 330	170-180	40-90	332
VHC36C2C	ZR34K3PFV230	88-108 330	170-180	40-90	332
VHC42C2C	ZR40K3PFV230	88-108 330	170-180	40-90	332
VHC48C2C	ZR42K3PFV230	88-108 330	170-180	40-90	332
VHC60C2C	ZR54K3PFV230	270-324 330	170-180	40-90	332

RCB18C2C	CR16KFPFV230	145-174 250	190-200	40-105	375
RCB24C2C	CR22KFPFV230	145-174 220	190-200	55-115	383
RCB30C2C	CR28K6PFV220	145-174 220	190-200	55-115	383
RCB36C2C	CR34K6PFV220	189-227 330	190-200	40-105	375
RCB42C2C	CR38K6PFV220	189-227 330	190-200	55-115	383
RCB48C2C	CR42K6PFV223	189-227 330	240-260	60-121	420
RCB60C2C	ZR57KCPFV250	270-324 330	170-180	40-90	332

RCC18C2C	ZR18K4PFV230	88-108 330	170-180	40-90	332
RCC24C2C	ZR22K4PFV230	88-108 330	170-180	40-90	332
RCC30C2C	ZR24K4PFV230	88-108 330	170-180	40-90	332
RCC36C2C	ZR30K3PFV230	88-108 330	170-180	40-90	332
RCC42C2C	ZR36K3PFV230	88-108 330	170-180	40-90	332
RCC48C2C	ZR42K3PFV230	88-108 330	170-180	40-90	332
RCC60C2C	ZR54K3PFV230	270-324 330	170-180	40-90	332

Unit	Compressor	Capacitor MFD / Volts		Relay Pick-up Volts	Relay Drop-out Volts	Relay Coil Voltage
RCE24C2C	ZR22K4PFV230	88-108	330	170-180	40-90	332
RCE30C2C	ZR24K4PFV230	88-108	330	170-180	40-90	332
RCE36C2C	ZR30K3PFV230	88-108	330	170-180	40-90	332
RCE42C2C	ZR36K3PFV230	88-108	330	170-180	40-90	332
RCE48C2C	ZR40K3PFV230	88-108	330	170-180	40-90	332
RCE60C2C	ZR48K3PFV235	88-108	330	170-180	40-90	332

RHA18C2C	CR18K6PFV260	145-174	250	190-200	40-105	375
RHA24C2C	CR22K6PFV260	145-174	220	190-200	55-115	383
RHA30C2C	CR28K6PFV260	145-174	220	190-200	55-115	383
RHA36C2C	CR34K6PFV260	189-227	330	190-200	40-105	375
RHA42C2C	ZR40K3PFV230	88-108	330	170-180	40-90	332
RHA48C2C	CR42K6PFV260	189-227	330	240-260	60-121	420
RHA60C2C	ZR57K3PFV250	270-324	330	170-180	40-90	332

RHE18C2C	ZR18K4PFV230	88-108	330	170-180	40-90	332
RHE24C2C	ZR24K4PFV230	88-108	330	170-180	40-90	332
RHE30C2C	ZR28K3PFV230	88-108	330	170-180	40-90	332
RHE36C2C	ZR34K3PFV230	88-108	330	170-180	40-90	332
RHE42C2C	ZR40K3PFV230	88-108	330	170-180	40-90	332
RHE48C2C	ZR47K3PFV235	88-108	330	170-180	40-90	332
RHE60C2C	ZR57K3PFV250	270-324	330	170-180	40-90	332

RHF24C2C	ZR22K4PFV230	88-108	330	170-180	40-90	332
RHF30C2C	ZR26K3PFV230	88-108	330	170-180	40-90	332
RHF36C2C	ZR32K3PFV230	88-108	330	170-180	40-90	332
RHF42C2C	ZR36K3PFV230	88-108	330	170-180	40-90	332
RHF48C2C	ZR42K3PFV230	88-108	330	170-180	40-90	332

RSC24C2C	ZP20K3EPFVB30	88-106	330	170-180	40-90	332
RSC30C2C	ZP26K3EPFVB30	88-106	330	170-180	40-90	332
RSC36C2C	ZP32K3EPFV230	88-106	330	170-180	40-90	332
RSC42C2C	ZP36K3EPFV	88-106	330	170-180	40-90	332
RSC48C2C	ZP41K3EPFV230	88-106	330	170-180	40-90	332
RSC60C2C	ZP54K3EPFV	270-324	330	170-180	40-90	332

RSG36C2C	ZPS30K4EPFV	88-108	330	170-180	40-90	332
RSG48C2C	ZPS40K4EPFV	88-108	330	170-180	40-90	332
RSG60C2C	ZPS51K4EPFV	270-324	330	170-180	40-90	332

RTC24C2C	ZP23K3EPFV230	88-106	330	170-180	40-90	332
RTC30C2C	ZP26K3EPFV230	88-106	330	170-180	40-90	332
RTC36C2C	ZP32K3EPFV230	88-106	330	170-180	40-90	332
RTC42C2C	ZP36K3EPFV	88-106	330	170-180	40-90	332
RTC48C2C	ZP41K3EPFV230	88-106	330	170-180	40-90	332
RTC60C2C	ZP54K3EPFV	270-324	330	170-180	40-90	332

RTG36C2C	ZPS30K4EPFV	88-108	330	170-180	40-90	332
RTG48C2C	ZPS40K4EPFV	88-108	330	170-180	40-90	332
RTG60C2C	ZPS51K4EPFV	270-324	330	170-180	40-90	332

5-2-1 Compressor Saver™



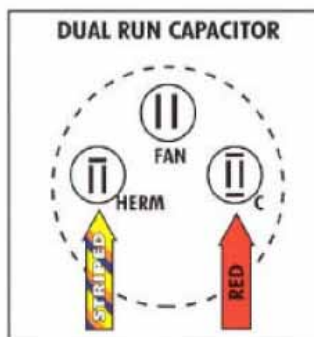
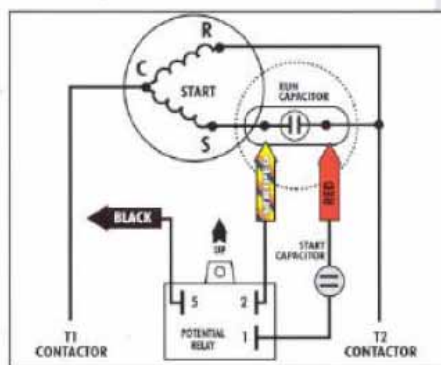
CSR-U-1
For 1 – 3 Tons
88 - 108 Mfd



CSR-U-2
For 3 – 5 Tons
189 - 227 Mfd



CSR-U-3
For Scroll 4 – 5 Tons
270 - 324 Mfd



The 5-2-1 Compressor Saver™ has been pre-wired for your convenience. There are only 3 color coded wires which need to be connected. The Black wire will be connected to the Common side of the compressor. The Striped wire will be connected to the Start winding of the compressor and the Red wire will be connected to the Run winding of the compressor. Remember – 5, 2, 1, = Common, Start, Run.



Figure 1.