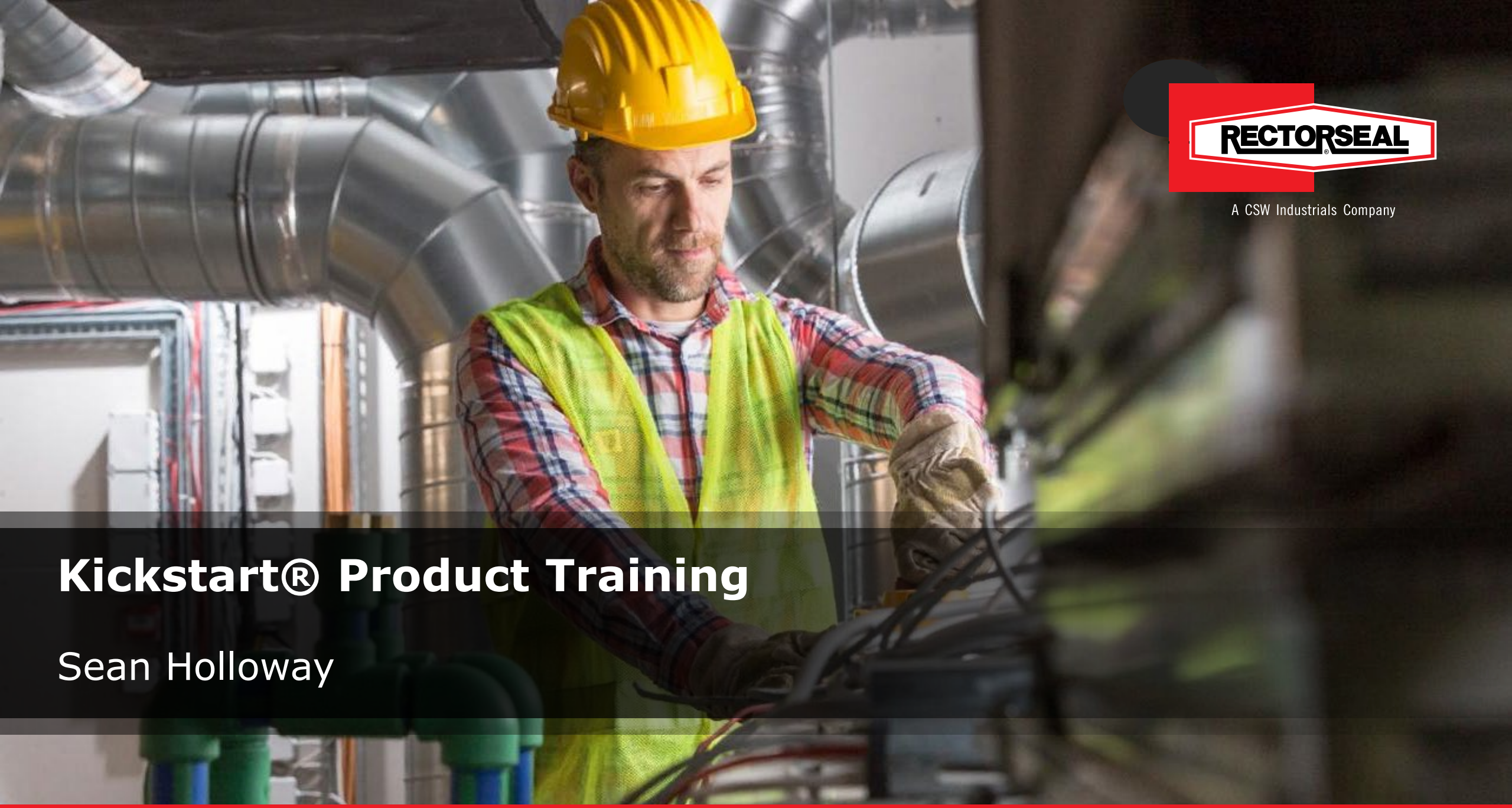

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Kickstart® Product Training

Sean Holloway

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Agenda

- Understanding the Need for Start Capacitors
- Application, Function & Operation
- Understanding Different Types of Start Kits
- Competitors
- Why Kickstart

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Understanding the need for Start Capacitors

Some units will not even start **without** a start capacitor:

- Low supply voltage at peak energy-usage times
- Poor quality of electrical power supply from utility
- Inadequate (undersized) wiring
- Low pressure differential (tight system)
- Very high ambient (outside air) temperature
- Old compressors wear-out and get ‘weak’

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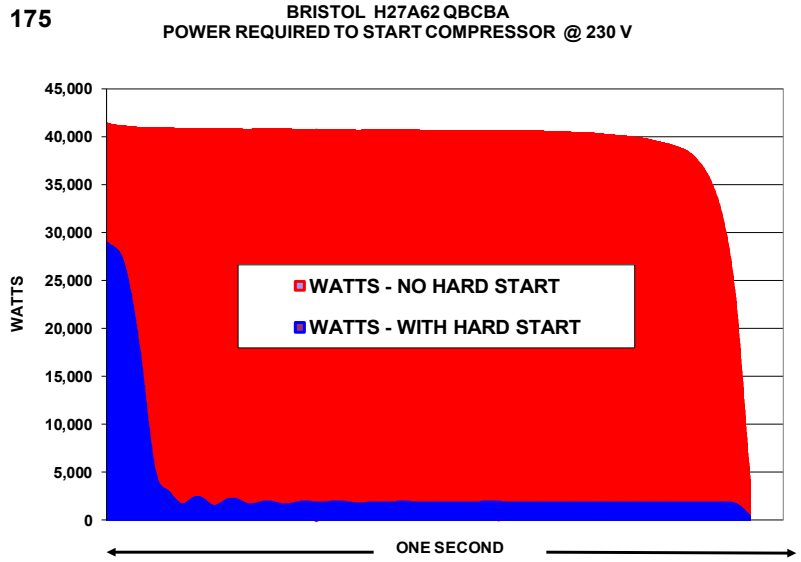
Understanding the need for Start Capacitors *(continued)*

Some units *will* start, but very **inefficiently**

- The longer it takes for a compressor to get to full-speed, the more that the start windings endure excessive **heat**
- This **heat** destroys start windings over time and dramatically shortens the life of a compressor



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What is a Start Capacitor?

- Like a battery, a capacitor stores electrical energy. But a battery discharges its stored energy gradually, unlike a capacitor, which **discharges its stored energy very quickly**, (which is what a compressor needs to start quickly & efficiently).

- A Start Capacitor gives the compressor a **boost** to help it get to full-speed faster, reducing heat on the start windings over thousands of start cycles. This improves the life of the compressor, which is the most expensive part of an air conditioner.

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Why is it important?

- Typical air conditioners (which are usually oversized) in a hot climate will cycle on and off over **10,000 times** during a normal summer!

- Each time the compressor starts, over 15,000 Watts of electrical power surge into the compressor for a split second. If we can shorten the time that it takes a compressor to go from zero to full-speed by a fraction of a second, then we decrease the amount of *inrush current* and therefore, the amount of heat on the compressor's start windings.

- Over time, a hard start product greatly improves the longevity of the compressor

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Don’t be confused - - RUN Capacitor vs. START Capacitor

- A run capacitor stays in the electrical circuit as long as the compressor is running
- A start capacitor is only in the circuit for a fraction of a second, while the compressor is *starting*. Then, a *relay* acts as a switch, causing the start capacitor to ‘drop-out’ of the circuit until the next start.
- There is a patent-protected “universal RUN capacitor” on the market (AMRAD’s “Turbo 200”). We don’t currently make **run** capacitors of any kind.

Start Cap

Run Cap

Universal Run Cap

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Where Kickstart can be used

Single Stage Compressors
- Rotary Compressors
- Scroll Compressors
- Reciprocating Compressors

The above represent 80% of all new unit sales and an even higher percentage of existing, installed units.

Kickstart is <u>not</u> used on: Inverters, Variable Speed, "soft start" or two-stage compressors

Some Air Conditioners are required to have a Hard Start Kit (HSK) in order to achieve regional efficiencies – currently Goodman with rotary compressors

AHRI CERTIFIED® www.ahridirectory.org

Certificate of Product Ratings

AHRI Certified Reference Number : 201413853 Date : 01-28-2019 Model Status : Active

Old AHRI Reference Number : 8638976

AHRI Type : RCU-A-C

Series : GSX14

Outdoor Unit Brand Name : GOODMAN

Outdoor Unit Model Number (Condenser or Single Package) : GSX140181L*

Indoor Unit Model Number (Evaporator and/or Air Handler) : CA*F3137*6A*+EEP+TXV+HSK

Region : Southeast and North (AL, AR, DC, DE, FL, GA, HI, KY, LA, MD, MS, NC, OK, SC, TN, TX, VA, AK, CO, CT, ID, IL, IA, IN, KS, MA, ME, MI, MN, MO, MT, ND, NE, NH, NJ, NY, OH, OR, PA, RI, SD, UT, VT, WA, WV, WI, WY, U.S. Territories)

Region Note : Central air conditioners manufactured prior to January 1, 2015 are eligible to be installed in all regions until June 30, 2016. Beginning July 1, 2016 central air conditioners can only be installed in region(s) for which they meet the regional efficiency requirement.

The manufacturer of this GOODMAN product is responsible for the rating of this system combination.

Rated as follows in accordance with the latest edition of ANSI/AHRI 210/240 with Addenda 1 and 2, Performance Rating of Unitary Air-Conditioning & Air-Source Heat Pump Equipment and subject to rating accuracy by AHRI-sponsored, independent, third party testing:

Cooling Capacity (A2) - Single or High Stage (95F), btuh : 18000

SEER : 14.50

EER (A2) - Single or High Stage (95F) : 12.00

†"Active" Model Status are those that an AHRI Certification Program Participant is currently producing AND selling or offering for sale; OR new models that are being marketed but are not yet being produced."Production Stopped" Model Status are those that an AHRI Certification Program Participant is no longer producing BUT is still selling or offering for sale.
Ratings that are accompanied by WAS indicate an involuntary re-rate. The new published rating is shown along with the previous (i.e. WAS) rating.

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The “3-wire” (original) Method

The 3-Wire hard start assembly that has been used in mechanical refrigeration and air conditioning systems for the last 60 years. Manufacturers have **HUNDREDS** of combinations. They are expensive!

With this type of assembly, each wire is dedicated and has only one place within the circuit in which it can be correctly connected. (look at ALL those wires)! Many technicians have difficulty with this.

Service contractors often don’t have the right combination on the truck or at the shop, so they have to ‘make a special run’ to the wholesaler (who often doesn’t have the needed combo)!

The above reasons inspired HVAC contractor / electrical engineer Fritz Schroeder to invent the Kickstart and start the category

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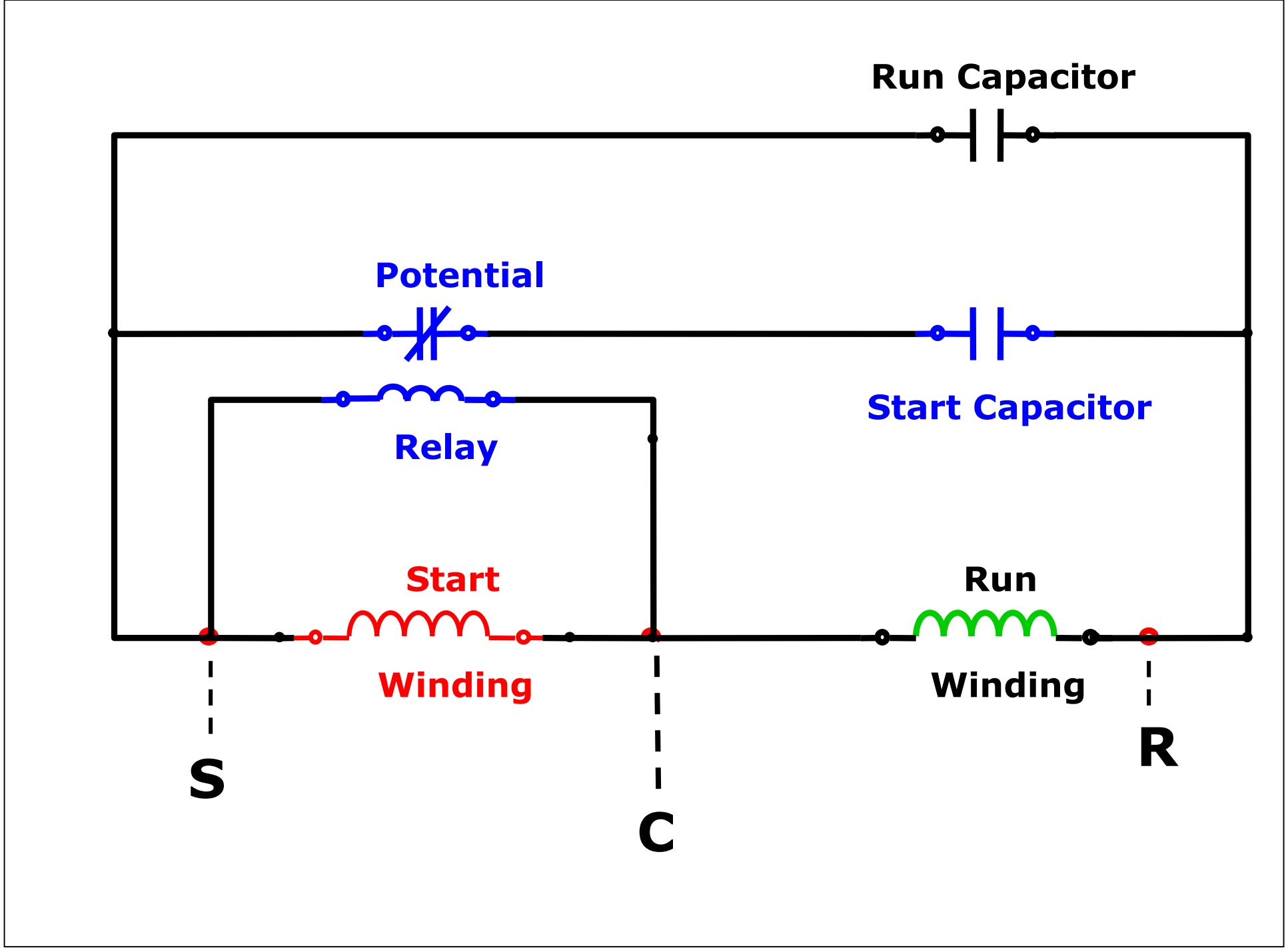

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Air Conditioning | Heating | Refrigeration

the NEWS

THE HVACR CONTRACTOR'S WEEKLY NEWSMAGAZINE SINCE 1926

June 18, 2012 | www.achrnews.com, Twitter, Facebook + LinkedIn

A bnp PUBLICATION

Mismatched Kits Cause Failures

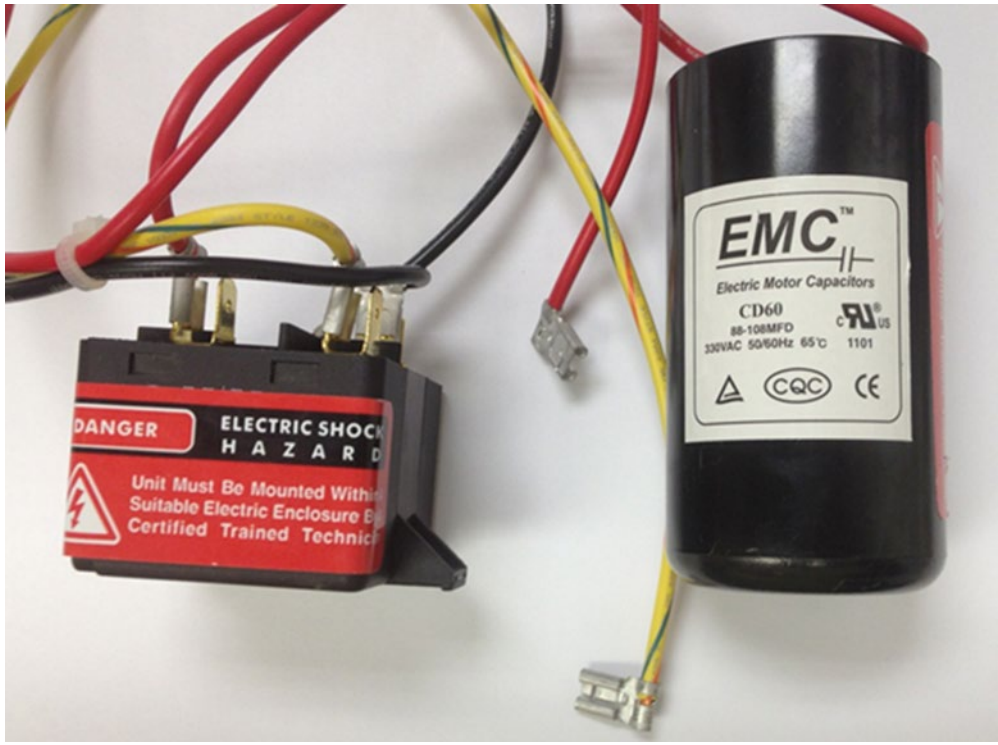
"Some compressor manufacturers claim nearly 40 percent of compressor warranty returns are attributed to burned-out start windings from incorrect hard start devices installed by service technicians," said Riley Archer, national technical manager, RectorSeal® Corp., who recently presented a session on compressor starting problems as part of the Ohio Construction Industry Licensing Board's HVAC Continuing Education Units Program.

Archer, who conducts free HVACR training classes upon request for contractors and distributors nationwide, spoke to 40 service techs at the Dayton, Ohio, branch of HVACR contractor Service Experts, and 15 techs and countermen at the Dayton branch of nationwide wholesale chain R.E. Michel Co. in April. The North American Technician Excellence (NATE) certified class addressed the harmful effects of heat on compressor motor windings, the benefits of hard start devices, and the dangers of incorrect start devices.

"All service techs should realize the impor-

Shown to the left of the installer's left hand is a Kickstart hard start device.

Competitor “5-2-1” claims to be a “universal” 3-wire hard-start. *However…*



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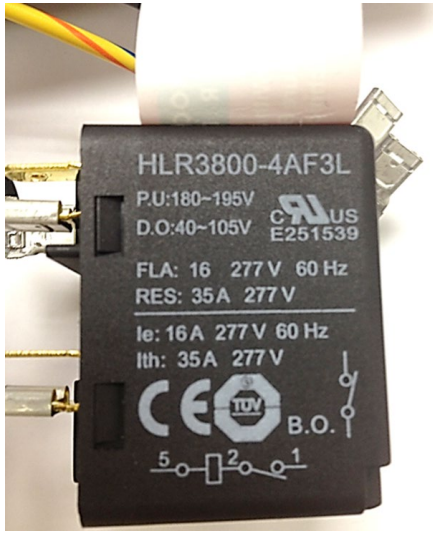
The 3-wire method works, but **only** when done right!

- The 5-2-1 “Compressor Saver” uses 3-wires, but does not “drop-out” at the right time because in order to be accurate, you need to have 80 different **combinations** of start capacitor and potential relay

- 5-2-1 only uses three combinations. You cannot have a *“universal”* 3-wire hard-start kit - - because of the way the circuitry works



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Two-wire PTCR and Electronic Timing Devices

Supco
SPP6

Supco
SPP6E

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Two-wire PTCR and Electronic Timing Devices

- PTCR means ‘Positive Temperature Coefficient Resistor’
  it uses a thermal disc to determine when to take the start capacitor out of the circuit. These don’t work in extreme heat (until the sun goes down)!

- Electronic Timing Devices use a timer, which is arbitrary and not related to anything going-on with the compressor’s speed.

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The Kickstart Method: Two Wire Universal with Mechanical Potential Relay

- Originally, there was just one Kickstart: the T0-5. It meant "Torque for ACs up to five tons." Now, it is suitable for units from 1 to 3 tons.

- Equipment manufacturers created the need for a bigger Kickstart, as they improved the efficiencies of their units by (in part) reducing starting torque; The KS-1 was born. The KS-1 is for 3.5 to 5 ton units

Old-look T0-5

Current T0-5 and KS-1

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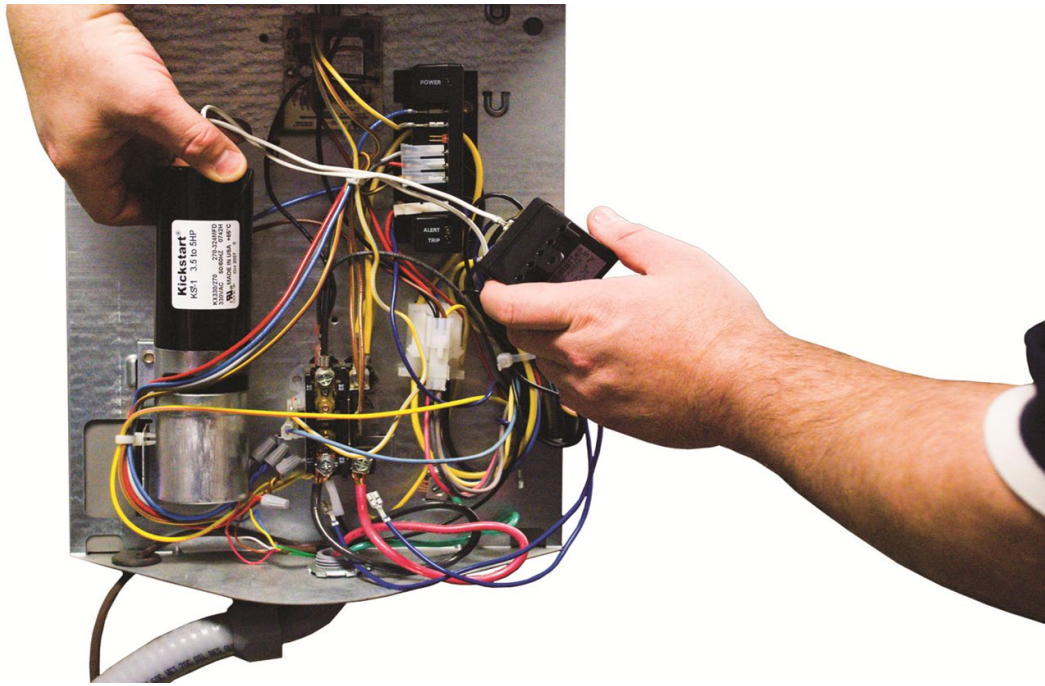
The Kickstart Method

- Our potential relay is connected between the Start and Run terminals of the Run Capacitor
- We don’t connect to the common terminal
- Because of our patented wiring method, we sense the actual counter / back EMF (electro motive force), which allows for perfect drop-out timing



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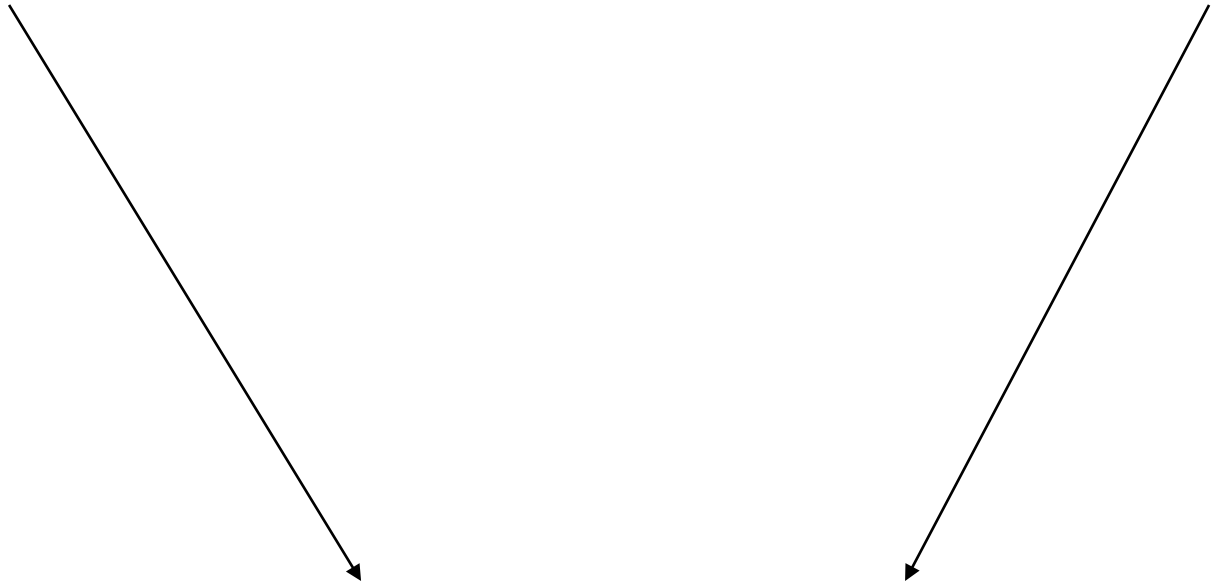
The Kickstart Way to Read Counter-EMF

Run **Common** **Start**



The counter EMF is always + / - 10s of Volts
(which is very close), using this method

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Review of the different Types of Start Kits

- 3-wire O.E.M. method
- 3-wire supposed ‘universal’ product
- 2-wire PTCR
- 2-wire Electronic Timing Device
- 2-wire Kickstart Method with Mechanical Potential Relay

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Competitors in the ‘Hard-Start Kit’ Space

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Kickstart Co

- 20– 25%
- Kickstart is the leader in universal hard-start kits with a *mechanical* potential relay

5-2-1 COMPRESSOR SAVER®

- 20 – 25%
- 5-2-1 has a group of 3-wire Kits which they call ‘universal’
- Owned by CPS
- We are targeting this business

Supco

- 40 – 45%
- Lead in the price **fighter** space
- PTCR and Electronic Timing Device
- Have had trouble gaining traction with their Kickstart knockoff

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Competitors in the ‘Hard-Start Kit’ Space

DIVERSITECH®

- 4 – 7 %
- Minor players in hard starts
- Copied our *old* Kickstart look
- Do well in run capacitors

Packard ICM CONTROLS

- 3 – 5 %
- Packard is one of their master distributors
- ICM is the manufacturer

mars® Delivering Confidence

- Rebranded hard start kits
- 2 – 5 %
- Master Distributor

AM RAD Engineering, Inc.
INNOVATIVE CAPACITOR SOLUTIONS

- 2 – 5 %
- Struggle with start cap share
- They lead the *universal* RUN cap space
- Master-distributed by Global, the Source
- Made in the U.S.A.

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Features of our Kickstart® product

- Reduces inrush current, extending the life of the compressor
- Simple to wire *"Two wires, hook it up. Three wires, screw it up!"*
- "Picks-up" and "drops-out" at the perfect time. This means there is no chance of "dropping-out too soon" or "staying in too long."

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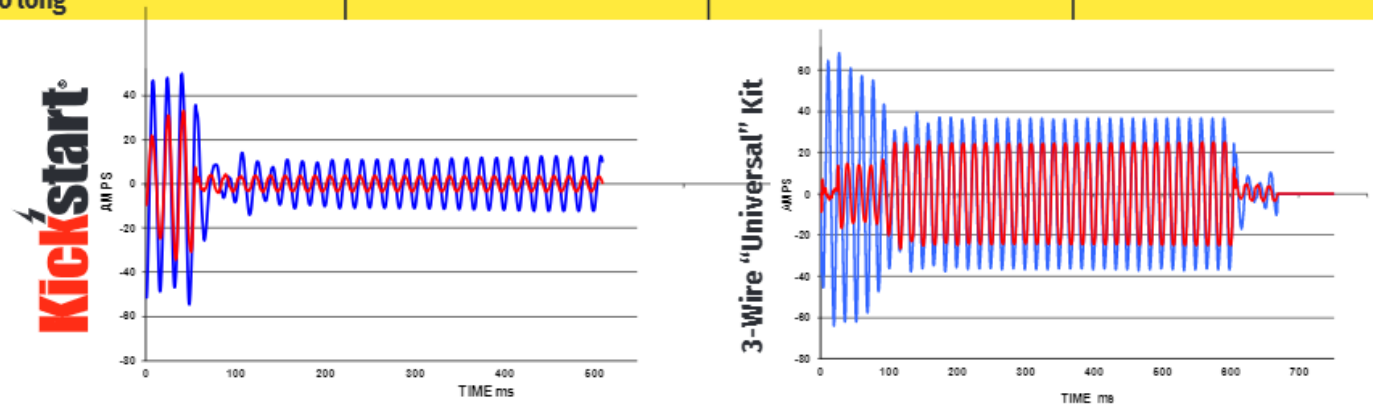
Kickstart® vs. “O.E.M. 3-Wire” and “CPS’s 5-2-1 Compressor Saver”

Available for order for usage at the counter

	Kickstart	Conventional 3-Wire Relay Capacitor Kit	3-Wire “Universal” Kit
Two wires, non polarized	✔	✖	✖
Senses when motor reaches full speed	✔	✔	✖
Relay drops out start capacitor at optimum time to avoid excessive heat	✔	✔	✖
Approved by Select OEMs	✔	✔	✖
Correctly replaces over 60 different OEM combinations of start capacitors and potential relays	✔	✖	✖
Voltage Pick Up is exactly matched to counter-EMF	✔	✔	✖
Avoids potential damage to compressor by NEVER staying in the circuit too long	✔	✔	✖



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Features of our Kickstart product

- Only two SKUs to handle 1 to 5 ton units
    - Reduced Truck Stock
- Fewer emergency trips to the supply house because you always ‘have what you need’ when two SKUs does it all

The space on a service van is very valuable

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Kickstart is a great after-market service sale for contractors

The installation of the Kickstart hard-start kit provides a valuable service to the homeowner and can be a profitable addition to a service contractor’s business.

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NATE* Recognized Technical Presentation

RectorSeal® - makers of Kickstart, "the Original Two Wire Start Device" - gives a technical presentation for FREE to contractor groups, RSES and ACCA members, wholesalers, vocational schools, etc. This technical presentation, a one-hour course, provides each attendee with NATE or CEU recertification credit (CEU credits applicable by state.)

Titled "Compressor Starting Problems", this presentation looks at the electrical and mechanical dynamics that occur in the first second of a compressor motor start-up.

The goal of this presentation is to educate the HVAC contractor in technical skills that can reduce no defect warranty compressor returns.

Learn about:

- Counter EMF
- Mechanical potential relays
- 3-wire & 2-wire hard start devices
- How to test run caps
- How to do line load tests

*North American Technician Excellence (NATE) has approved RectorSeal, makers of Kickstart®, as a NATE Teaching Organization (#1063-0001)

For more information, or to schedule a training session, please contact RectorSeal 1-800-231-3345 or email: techservices@rectorseal.com

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The RectorSeal Advantage

- Our Kickstart uses patented, proven 2-wire technology with a truly mechanical potential relay, for perfect operation every time

- Three-wired aftermarket products (CPS 5-2-1) are not universal, and must be matched perfectly with the exact combination of start capacitor and potential relay in order to work

- Inexpensive PTCR and Electronic Timing Devices (Supco) use only 2-wires, but they sell start capacitors which do not perform consistently and worse, they use very ineffective potential relays (PTCR and Electronic timers), which are not capable of correctly dropping-out the start capacitor at the correct time, causing either ‘too much heat’ or ‘not enough torque’

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Challenges to Overcome

- Our competitors will tell our customers that we don’t have a full line (because we don’t have the cheap PTCR or Electronic Timing devices - - products which do not serve the tradesman well and which offer a disservice to the home owner)

- Our selling price to the distributor is higher than CPS (5-2-1), Supco and others

- CPS (5-2-1) and Supco typically have a program for distributors whereby they credit the distributor $1 per unit purchased

- CPS (5-2-1) will sporadically run spiffs of $2 per unit for the counter personnel at various times throughout the year

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Use your Merchandising Materials

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