Kickstart® Product Training

Sean Holloway
Agenda

- Understanding the Need for Start Capacitors
- Application, Function & Operation
- Understanding Different Types of Start Kits
- Competitors
- Why Kickstart
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’
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.
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.
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.
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 **not 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.
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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
Run Capacitor

Start Capacitor

Potential

Relay

Start Winding

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

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 is 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 importance...
Competitor “5-2-1” claims to be a “universal” 3-wire hard-start. However...
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.
Two-wire PTCR and Electronic Timing Devices

Supco SPP6

Supco SPP6E
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.
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.
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 (electromotive force), which allows for perfect drop-out timing
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.
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

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

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

- **40–45%**
  - Lead in the price *fighter* space
  - PTCR and Electronic Timing Device
  - Have had trouble gaining traction with their Kickstart knockoff
Competitors in the ‘Hard-Start Kit’ Space

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

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

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

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

<table>
<thead>
<tr>
<th>Feature</th>
<th>Kickstart®</th>
<th>Conventional 3-Wire Relay Capacitor Kit</th>
<th>3-Wire “Universal” Kit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two wires, non polarized</td>
<td>✔</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Senses when motor reaches full speed</td>
<td>✔</td>
<td>✔</td>
<td>✗</td>
</tr>
<tr>
<td>Relay drops out start capacitor at optimum time to avoid excessive heat</td>
<td>✔</td>
<td>✔</td>
<td>✗</td>
</tr>
<tr>
<td>Approved by Select OEMs</td>
<td>✔</td>
<td>✔</td>
<td>✗</td>
</tr>
<tr>
<td>Correctly replaces over 60 different OEM combinations of start capacitors and potential relays</td>
<td>✔</td>
<td>✗</td>
<td>✗</td>
</tr>
<tr>
<td>Voltage Pick Up is exactly matched to counter-EMF</td>
<td>✔</td>
<td>✔</td>
<td>✗</td>
</tr>
<tr>
<td>Avoids potential damage to compressor by NEVER staying in the circuit too long</td>
<td>✔</td>
<td>✔</td>
<td>✗</td>
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</tbody>
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Available for order for usage at the counter
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
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.
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
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’
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
Use your Merchandising Materials

AVOID POTENTIAL COMPRESSOR DAMAGE:

CHOOSE the RIGHT

Hard Start Device

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Product Training

Sean Holloway  281-773-9552 cell