

METROPOLITAN NY CHAPTER Refrigeration Service Engineers Society

Continuing Education for the HVAC/R Industry

“Better Service Through Knowledge”

May 2018

WWW.METRONYRSES.ORG



Find us on
Facebook



Starting a Stuck Reciprocating Compressor

One of the common problems found while troubleshooting reciprocating compressors is that they simply fail to start. This could be the result of many different causes, both electrical and mechanical. One common mechanical cause is a stuck piston. Mechanically the piston cannot overcome an internal resistance to move. **Normally** when this is found to be the problem, the compressor will need to be replaced. However there are some “tricks of the trade” which a technician can use to try to free a stuck piston. If any of these tricks solve the problem, it may be only a temporary fix as the defect within the compressor can cause it to lock up once again.

On single-phase compressors with a permanent split capacitor motor, a hardstart kit can be added to the compressor’s motor wiring. This kit consists of a starting relay and start capacitor. This will give the motor additional torque at startup and may allow the compressor to start. It is normally best to contact the compressor manufacturer to determine the correct size start relay and start capacitor to use. There are universal hard-start kits available which can be used on multiple size and style compressors. Check with the manufacturer or local supplier of these universal hardstart kits for the right size to use.



Another “trick” which can be used on single-phase compressors is to reverse the start and run leads of the compressor and **momentarily** energize the compressor. This may also help to free the piston. Only do this for a few seconds and then switch both the run and start leads back to their original position. Applying continuous voltage to a compressor in this fashion will damage it.

Another procedure can be used on three-phase reciprocating compressors. Switching any two leads may help to free up the piston or pistons. On a three-phase compressor you do not need to switch the leads back. They can be left reversed. Do not use this technique on scroll compressors as they are not designed to operate in this fashion.

If you are working a 120 volt compressor you can try to energize the compressor with 220 volts. This may help free the piston. Do this for only one or two seconds as it could further damage the compressor’s motor.

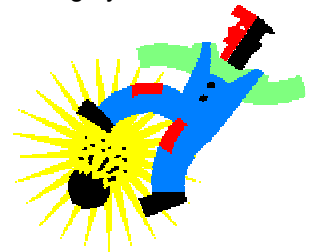
One other method to try is to simply strike the top of the

compressor with a hammer while starting the compressor. If you are lucky maybe it will start. More than likely it will not, but it certainly is worth a try.

Trying to free a stuck compressor does not always yield positive results, but occasionally it will allow a technician to get a compressor started. Again, if any of these tricks do solve the problem, it **might** only be a temporary, as it is possible that the defect will once again cause the compressor to lock up.

Safeties

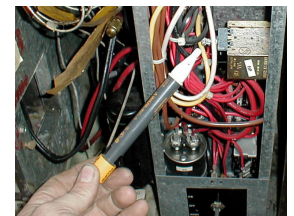
Refrigeration, heating and air conditioning systems contain various types of safety devices which are designed to protect both the equipment and the people operating the equipment. Never leave a safety device bypassed. This could present a very dangerous situation and could easily lead to serious personal injury or equipment damage.



If, while inspecting a system, you notice that a safety device has been bypassed, notify the owner of the system. This dangerous situation should not continue—the safety device should be placed back in operation.

Electrical Safety

When replacing or repairing any electrical components, always verify that the voltage source is truly disconnected from the circuit. Test the circuit for the presence of voltage with some type of voltmeter or voltage indicator **AT THE COMPRESSOR**. Do not solely rely on the electrical disconnect to ensure the voltage is disengaged. Always verify this yourself.



It is possible that the disconnect may be defective or may have been bypassed by others. It is also possible that there may be another voltage source supplying the circuit not controlled by the disconnect shut down.

**LET'S BE SAFE
OUT THERE**

Airflow Formulas

CFM = Duct Area (sq. ft.) x Velocity Air Changes/hr. = $\frac{\text{CFM} \times 60}{\text{Room Volume cu.ft.}}$ Standard Air = 70°F 50% @ 29.92" Hg
 1 cu. ft. = 0.075 pounds
 1 pound = 13.33 cu. ft.

$VP = \left(\frac{V}{4005} \right)^2$

CFM = Room Volume (cu. ft.) x $\frac{\text{Air Chnages/hr}}{60}$

Velocity = 4005 x \sqrt{VP} Density = 0.075 x $\frac{530}{460 + \text{Temp}}$ x $\frac{\text{Bar.}}{29.92}$ Velocity = 1096.7 x $\sqrt{\frac{VP}{\text{Den}}}$

Sensible Heat Formula

$$\text{BTU sensible} = \text{CFM} \times 1.08 \times \text{delta T} \times \frac{\text{Density}}{0.075}$$

Total Heat Formula

$$\text{BTU total} = \text{CFM} \times \text{Enthalpy in BTU per pound} \times 4.5 \times \frac{\text{Density}}{0.075}$$

Economizer Settings

$$\%OA = \frac{\text{RAT} - \text{MAT}}{\text{RAT} - \text{OAT}} \times 100$$

$$\text{MAT} = \frac{(\%OA \times \text{OAT}) + (\%RA \times \text{RAT})}{100}$$

$$\text{OAT} = \frac{(\text{MAT} \times 100) - (\%RA \times \text{RAT})}{\%OA}$$

$$\text{RAT} = \frac{(\text{MAT} \times 100) - (\%OA \times \text{OAT})}{\%RA}$$

O = Outside • R = Return • T = Temperature • A = Air • M = Mixed

Motors

New Motor Sheave Size Max. Fan Sheave Dia. = $\frac{\text{Esting Fan Sheave Dia.}}{\sqrt[3]{\frac{\text{Max. BHP}}{\text{Existing Est. BHP}}}}$

$$\text{Dia. new} = \text{Dia. old} \times \frac{\text{RPM new}}{\text{RPM old}}$$

Max. Motor Sheave Dia. = Existing Motor Sheave Dia. x $\sqrt[3]{\frac{\text{Max. BHP}}{\text{Existing Est. BHP}}}$

New Fan Sheave Size $\frac{\text{RPM Fan}}{\text{RPM Motor}} = \frac{\text{Pitch dia. motor sheave}}{\text{Pitch dia. fan sheave}}$ Estimated BHP = $\frac{\text{Am} \times \text{Vm}}{745.7}$

$$\text{Dia. new} = \text{Dia. old} \times \frac{\text{RPM old}}{\text{RPM new}}$$

Three Phase BHP = $\frac{1.732 \times \text{Am} \times \text{Vm} \times \text{Eff.} \times \text{PF} \times \text{L}}{745.7}$ Single Phase BHP = $\frac{\text{Am} \times \text{Vm} \times \text{Eff.} \times \text{PF}}{745.7}$

Fan Laws

$\frac{\text{CFM new}}{\text{CFM old}} = \frac{\text{RPM new}}{\text{RPM old}}$	$\text{CFM new} = \text{CFM old} \times \frac{\text{RPM new}}{\text{RPM old}}$	$\text{RPM new} = \text{RPM old} \times \frac{\text{CFM new}}{\text{CFM old}}$
$\left(\frac{\text{CFM new}}{\text{CFM old}} \right)^2 = \frac{\text{SP new}}{\text{SP old}}$	$\text{CFM new} = \text{CFM old} \times \sqrt{\frac{\text{Sp new}}{\text{SP old}}}$	$\text{SP new} = \text{SP old} \times \left(\frac{\text{CFM new}}{\text{CFM old}} \right)^2$
$\left(\frac{\text{RPM new}}{\text{RPM old}} \right)^2 = \frac{\text{SP new}}{\text{SP old}}$	$\text{RPM new} = \text{RPM old} \times \sqrt{\frac{\text{Sp new}}{\text{SP old}}}$	$\text{SP new} = \text{SP old} \times \left(\frac{\text{RPM new}}{\text{RPM old}} \right)^2$
$\left(\frac{\text{CFM new}}{\text{CFM old}} \right)^3 = \frac{\text{BHP new}}{\text{BHP old}}$	$\text{CFM new} = \text{CFM old} \times \sqrt[3]{\frac{\text{BHP new}}{\text{BHP old}}}$	$\text{BHP new} = \text{BHP old} \times \left(\frac{\text{CFM new}}{\text{CFM old}} \right)^3$
$\left(\frac{\text{RPM new}}{\text{RPM old}} \right)^3 = \frac{\text{BHP new}}{\text{BHP old}}$	$\text{RPM new} = \text{RPM old} \times \sqrt[3]{\frac{\text{BHP new}}{\text{BHP old}}}$	$\text{BHP new} = \text{BHP old} \times \left(\frac{\text{RPM new}}{\text{RPM old}} \right)^3$

JOHNSTONE **HVAC/R**
Supplies
Equipment

27-01 BROOKLYN QUEENS
EXPRESSWAY WEST
WOODSIDE, NY 11377

FAX (718) 274-4972

Large
Local
Stock
Free Catalogue

718-545-4896
WHOLESALE ONLY

Supco

**SEALED UNIT
PARTS CO., INC.**

P.O. BOX 21
2230 LANDMARK PLACE
ALLENWOOD, NJ 08720 USA
(732) 223-6644
FAX: (732) 223-1617

H&L
HEATING SUPPLY, Inc.
COMMERCIAL / INDUSTRIAL /
RESIDENTIAL

AUTHORIZED DEALER OF

- HONEYWELL • McDONNELL MILLER •
- FIREYE • HEAT TIMER •
- FUEL WATCHMAN •
- BELL AND GOSSETT • ASCO •
- POWERFLAME BURNERS •
- T.A.C. BUILDING AUTOMATION •
- ECLIPSE GAS BOOSTER •
- SIEMENS GAS TRAINS •
- GRUNDFOS •

BRIAN T. O'NEILL
BRIAN@HLHEATINGSUPPLY.COM

1100 CONEY ISLAND AVENUE
BROOKLYN, NY, 11230
(718) 859-2424
FAX (718) 859-5727

UR
**UNITED
REFRIGERATION INC.**
Refrigeration, Air
Conditioning, Heating,
Supplies, Equipment & Parts

Jim Herlinger
Branch Manager
51-05 59th Place
Woodside, NY 11377-7408

Tel: 718 476-2600
Fax: 718 476-2648
Branchv2@uri.com

HALSEY SUPPLY
CO., INC.

FOR ALL YOUR
•
AIR CONDITIONING
REFRIGERATION
•
EQUIPMENT
PARTS SUPPLIES
•
EPA-CERTIFICATION TESTING

241 HALSEY STREET
BROOKLYN, NY 11216

(718) 574-4774
FAX (718) 574-4778

RA
RATHE
ASSOCIATES

**EXPECT MORE
& GET IT.**

REPRESENTING THE
INDUSTRY'S FINEST
MANUFACTURERS

**CERTIFIED FACTORY
TRAINING BY
INDUSTRY EXPERTS**

LOOK TO US FOR ALL YOUR
PLUMBING, HEATING & HVAC NEEDS

NY 631.822.1200
NJ 908.753.4686 • fax 631.822.1400
ratheassoc.com

COMING TOPICS

*Identifying and Correcting Voltage Leak-
age Problems w/VFD Motors & Drives*


*What Else is New in Motor Technology
for the HVAC Industry*

The Latest in Compressor Technology

*New Technology for
Controlling Humidity*

If you have any suggestions or requests for **FUTURE
EDUCATIONAL PROGRAMS**, please let us know!

JUST ICE



Suppliers of Food-Grade Ice Blocks
11 lb • 25 lb • 75 lb
300 lb Carving Blocks

Just Ice NY Corp.
110-90 Dunkirk Street, St. Albans, NY 11435

www.justiceony.net • Email: kurt@justiceony.net
Phone: 718-864-9000 • Fax: 718-864-9001

SEE US 1st

Harvey's

WHOLESALE DISTRIBUTORS
Refrigeration/AC/Heating

BROOKLYN (718) 257-3347
10720 Avenue D

JAMAICA (718) 526-0330
139-29 Queens Blvd.

MT. VERNON (914) 688-3631
551 S. Columbus Ave.

DUPONT

**Fire Ice
Mechanical Inc.**

HVAC/R Service Contractors

KURT J. EGGERT

Vogt Tube-Ice Authorized Dealer/
Sales & Factory Certified Technicians
Goldenrod Distributor,
The Newest in Water Treatment Technology
Air Conditioning & Refrigeration

Tel (718) 631-1503
Fax (718) 279-4686

Thermatix Supply
Plumbing, Heating, and Air
Conditioning Supplies

"We keep you supplied
7 days a week!"



73 Broadway, Hicksville, NY 11801
toll free: (877) 390-9421
tel: (516) 513-0985 / 0986
fax: (516) 620-5942
email: sales@thermatixsupply.com

ABCO

49-70 31st STREET
L.I.C., NY 11101
Phone: 718-937-9000
Fax: 718-392-1296
1-800-937-9000

DUPONT
Suva

Centrotherm
solutions beyond



The only
UL-1738
polypropylene
vent pipe
approved in NYC

ETL
Intertek

518.434.3400
www.centrotherm.us.com

METROPOLITAN NEW YORK CHAPTER, RSES
For Information Call: Stan Hollander, CMS (718) 232-6679

INTERESTING BUT USELESS FACTS WHICH MAY INTEREST TO YOU

- A cat has 32 muscles in each ear.
- A dime has 118 ridges around the edge.
- A dragonfly has a life span of 24 hours.
- A duck's quack doesn't echo, and no one knows why.
- A goldfish has a memory span of three seconds.
- A shark is the only fish that can blink with both eyes.
- Al Capone's business card said he was a used furniture dealer.
- All 50 states are listed across the top of the Lincoln Memorial on the back of the \$5 bill.
- All porcupines float in water.
- An ostrich's eye is bigger than its brain.
- Blueberry Jelly Bellies were created especially for Ronald Reagan.
- Cats have over one hundred vocal sounds, while dogs only have about ten.
- A cat's urine glows under a black light.

Wednesday May 9th, 2018

at 7:30pm

at

RICCARDO'S
21-01 24th Avenue, Astoria NY 11102

***Identifying and Correcting Voltage Leakage
Problems w/VFD Motors & Drives***

Andy Kressbach - Aegis

PRESIDENT'S MESSAGE

Where did the year go? More importantly where is Spring?

Hopefully warm, if not hot weather is just around the corner. I hope you have learned something at our meetings. Stan Hollander CMS and Rich Bruno have scheduled some very informative speakers and if you missed them, then that is your loss. It is not only the speaker and educational portion you missed but the contacts and relationships you can establish with the speaker. We can only provide the educational opportunity, we cannot make you come. Perhaps we are not covering topics of interest to you. If so, let us know by emailing any suggestions to Stan at EducationalDirector@metronyrses.org. He is working on setting up next year's educational speakers and is interested in any suggestions you may have. Remember, as you do your servicing this summer, keep your eyes open for new topics & applications that you think would be of interest to your fellow members.

On behalf of the Board of Directors and myself,
Have a Great, Prosperous and Safe Summer