

# METROPOLITAN NY CHAPTER Refrigeration Service Engineers Society

Continuing Education for the HVAC/R Industry

“Better Service Through Knowledge”

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December 2014

[WWW.METRONYRSES.ORG](http://WWW.METRONYRSES.ORG)



## TROUBLESHOOTING A DEFECTIVE COMPRESSOR

Replacing a compressor on a refrigeration system is never an easy nor inexpensive task. If a compressor is found to be defective, every effort should be made to verify that a correct diagnosis was made. Frequently, compressors that have been changed out in the field are later found to be fully operational.

Compressor problems can be divided into two groups: mechanical or electrical. Mechanical defects are problems which affect the operation of the mechanical pump inside the compressor, such as a broken valve, a broken crankshaft, or worn pistons. These defects will either cause a compressor not to pump any refrigerant or pump below its rated capacity.

A compressor that is not pumping is normally easy to determine. At start-up verify that the compressor is electrically energized, then measure its amperage draw. It will be lower than normal. Next, monitor the compressor's suction and discharge pressures. Neither the suction nor the discharge pressure will necessarily change dramatically. There may be a very slight change in pressure or the suction pressure will stay very high and the discharge will stay low.

Compressors can fail to start as a result of either an electrical defect or a mechanical defect. Mechanically, the piston(s) within the compressor can become locked and will not move. The compressor will attempt to start, but since the piston(s) do not move, the compressor draws high amperage causing it to shutdown on its overload.

There are three major electrical defects that will cause a compressor not to operate. One possibility is the motor windings of the compressor are open, shorted, or grounded. Another possibility is that the starting components (start relay and/or capacitors) of the compressor are defective. The third possibility is the incorrect voltage is being applied to a compressor.

To check the condition of the compressor's motor windings, a technician will need to measure the resistance of the windings using a standard ohmmeter. For single phase compressors, measure the individual resistance value of both the run and start windings (C to R & C to S). The resistance from R to S should be the sum of the previous two individual readings. For three phase compressors, all three windings should have the same resistance. If the correct resistance value is measured across the compressor's windings and an

infinite resistance is measured from each winding to ground, then the windings are electrically okay.

There is a common scenario where a compressor may appear to be defective when, in fact, it is not. If a compressor has an *internal overload* and has overheated, it will not even try to start. If a technician arrives on the job when the compressor has opened on its internal overload and he performs a resistance check on the compressor, he will find that the resistance from common to run and common to start to be infinite, and he may interpret this to be an open winding in the compressor. However, if the compressor was allowed to cool down and the internal overload reset, the technician may find the compressor will start normally and will not need to be replaced. The real problem as to why the compressor overheated will need to be identified and resolved.



If a compressor incorporates a run capacitor and it is defective, it could cause the compressor to draw higher than normal amperage and cycle off on its overload or not start at all. If a compressor incorporates a start relay and start capacitor and either one is defective, the compressor will most likely not start.

If incorrect voltage is applied to a compressor, it could also cause the compressor to run for a brief time then cycle off on its overload, or not start at all. A service technician must first verify the correct voltage for the compressor and then measure to see what voltage is actually applied. Most compressors are rated with a tolerance of  $\pm 10\%$ . If the applied voltage is outside these limits or those stated by the manufacturer, it must be corrected before the compressor can be properly diagnosed.

Determining if a compressor is not pumping to its rated capacity is not quite as easy. A technician must compare the compressor's actual amperage draw to the amperage draw as stated by the manufacturer. The amperage should be within  $\pm 5\%$  of the manufacturer's stated value. If it is drawing less than 5% below its rated amperage draw, it may not be pumping to its rated capacity. Remember that other factors can also affect compressor load, such as improper refrigerant charge, coil conditions and loading, etc.

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# Metro NY Chapter RSES HVAC Training Courses

The Metropolitan New York Chapter RSES will offer the RSES Technical Institute Courses – 1, 2 & 3 on Tuesday & Thursday evenings, starting January 13<sup>th</sup>, 2015 in Long Island City, New York

**Dates\*:** For 11 weeks on Tuesdays & Thursdays

1/13 & 1/15    1/20 & 1/22    1/27 & 1/29

2/3 & 2/5    2/10 & 2/12    2/17 & 2/19

2/24 & 2/26    3/3 & 3/5    3/10 & 3/12

3/17 & 3/19    3/24 & 3/26

*\*Dates Tentative – Subject to Change*

**Time:** 6:00 PM – 10:00 PM

**Location:** Long Island City High School  
14-30 Broadway  
Long Island City, NY 11106

**Cost for Course 1, 2 or 3:**

\$849.00 for RSES members

\$949.00 non-RSES members (also includes 1 year membership in RSES)

**Includes:** Technical Institute course manual, course tuition, Certificate of Completion after passing final exam, 72 hours toward NATE Recertification, for those eligible.

Register by January 5<sup>th</sup> by calling, mailing or Emailing the form below

FOR ADDITIONAL INFORMATION VISIT:

<http://www.metronvrse.org>

or Email: [school@metronvrse.org](mailto:school@metronvrse.org)

or Phone Stan Hollander: 718 232-6679

by Mail: Metro NY Chapter RSES

Attn: Stan Hollander, 1837 61<sup>st</sup> Street, Brooklyn, NY 11204

–Checks and Charge Cards Welcome –

Please make checks payable to "Metro NY RSES"



## TRAINING COURSE OVERVIEWS

### TECHNICAL INSTITUTE COURSE 1

This course begins with a comprehensive introduction to refrigeration and air conditioning. Topics covered include: basic physics, major system components including hermetic, semi-hermetic and open compressors, condensers, evaporators and refrigerant metering devices. It also covers the fundamental concepts of electricity and magnetism as they pertain to resistors, resistance, conductors, power supplies, circuit protection devices and transformers. Detailed information on lessons and content for Course 1 can be found at:

<http://metronvrse.org/ti1.html>

### TECHNICAL INSTITUTE COURSE 2

Beginning with tools-of-the-trade this course covers refrigeration system accessories, desiccants and driers, defrosting methods, refrigeration system controls and piping. It also includes instruction on compressor replacement and system evacuation, electric motors in refrigeration systems, motor capacitors and protectors, thermostats, relays, contactors and starters, test equipment and troubleshooting, pressure and enthalpy diagrams, psychrometrics, heat transfer and estimating heat loads, residential air conditioning, humidification and a review of safety codes. Detailed information on lessons and content for Course 2 can be found at:

<http://metronvrse.org/ti2.html>

### TECHNICAL INSTITUTE COURSE 3

Begins with comprehensive introduction to heat pump theory, including water-source heat pumps. Topics covered include computer-room environmental control, economizers, fans and blowers, air filtration and distribution evaporative condensers and cooling towers, water treatment, multiple-rack systems, hydronics, troubleshooting, controls and controls components, pneumatic relays, typical control applications, and control maintenance. Detailed information on lessons and content for Course 3 can be found at:

<http://metronvrse.org/ti3.pdf>

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Are you a current RSES Member. If Yes, RSES Membership Number: \_\_\_\_\_

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Make check to "Metro NY RSES" and mail w/ registration to: Metro NY RSES, Attn: Stan Hollander, 1837 61<sup>st</sup> Street, Brooklyn, NY 11204

To register by Email submit this form with Credit Card information to [school@metronvrse.org](mailto:school@metronvrse.org)

# METROPOLITAN NEW YORK CHAPTER, RSES

For Information Call: Stan Hollander, CMS (718) 232-6679

## Annual Holiday Dinner (December Meeting)

Starting at 6:00pm

Join us for our Holiday Buffet. Bring nothing but yourselves and your appetites. Riccardo's puts out a great table for us to enjoy. Did I say "bring nothing but"? You can certainly bring a friend or colleague. They can enjoy a fine meal with us, and then partake of the educational opportunities which we have to offer, as well as our friendship and camaraderie. Who knows? They may even want to become a part of this great organization of ours.

The Officers of The Metropolitan NY Chapter RSES wish all our members, friends & their families  
a very

\*\*\*Happy, Healthy, and Safe Holiday & Holiday Season\*\*\*

In the unlikely event of meeting cancellations,  
announcement will be posted on our web site

# HOLIDAY BUFFET— 6:00 pm

Wednesday December 10th, 2014 at 6:00pm

at

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By

Daniel Maciel—FireIce Mechanical

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**Wednesday December 10th, 2014**

