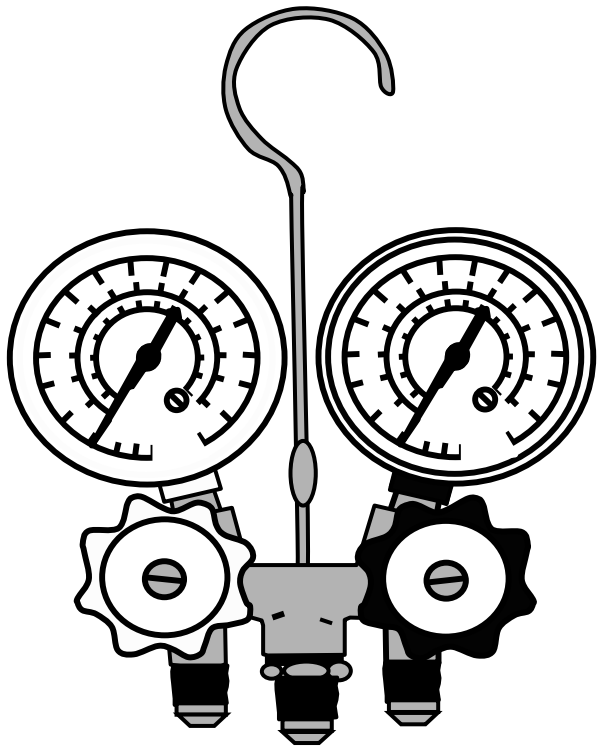
Service Excellence Training

Refrigerant Measuring Techniques for Charging Reciprocating and Scroll Equipment



Service Excellence Training

THE FOLLOWING INDICATORS ARE USED AS CHARGING METHODS IN THE FIELD. SOME OF THESE INDICATORS (METHODS) ARE NOT TOO RELIABLE

- **Place Your Hands on the Suction and Discharge Lines and Feel if They are Hot or Cold.**
- **Look for Bubbles in the Sight Glass.**
- **Look at the Pressure Gauges.**
- **Look at the Motor Amperage.**
- **Compute the Superheat.**
- **Compute the Subcooling.**
- **Take a Delta t^o Across the Coils.**
- **Look for Frost on the Suction Line.**
- **Weigh in the Charge.**

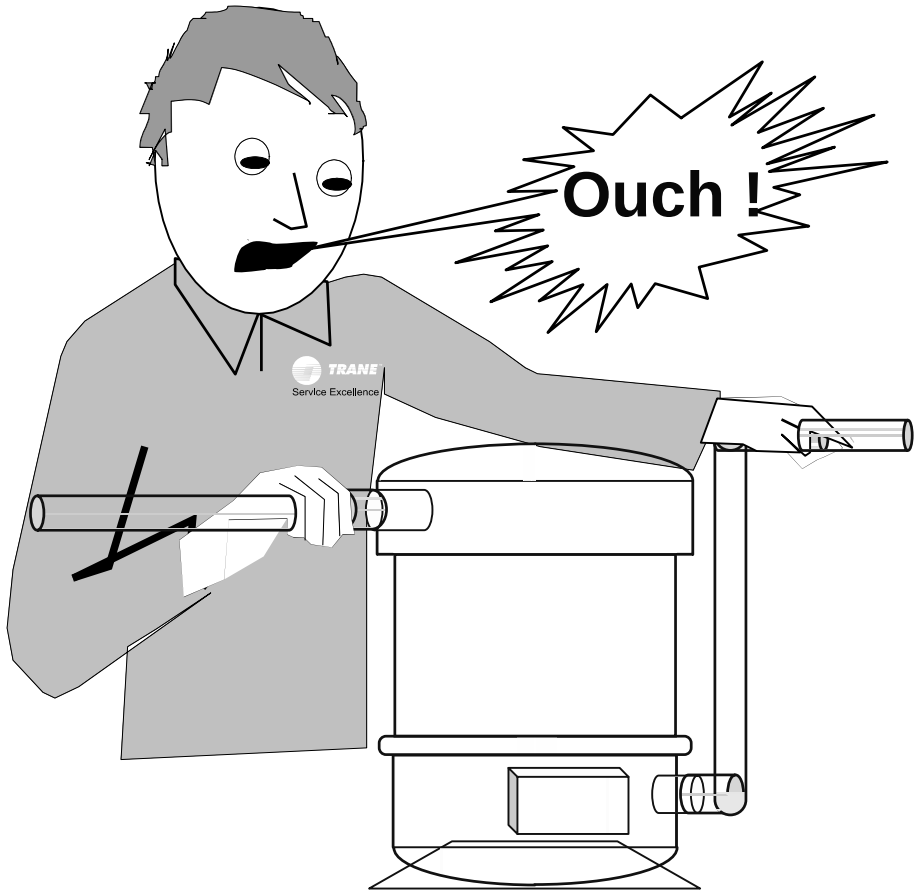
THESE INDICATORS ARE ALL COMMONLY USED

BUT IF INDIVIDUALLY USED THEY ALL HAVE

“PITFALLS”

Service Excellence Training

PLACE YOUR HANDS ON THE SUCTION / DISCHARGE LINES AND FEEL IF THEY ARE HOT OR COLD



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WHAT'S WRONG WITH THIS INDICATOR?

- **How Good is His Feel ? (Callused Hands)**
- **Body Feels Hot from 98°F (36°C) and Up (Max Skin Temperature 120°F (49°C)**
- **Is a Hot gas Temperature Good?**

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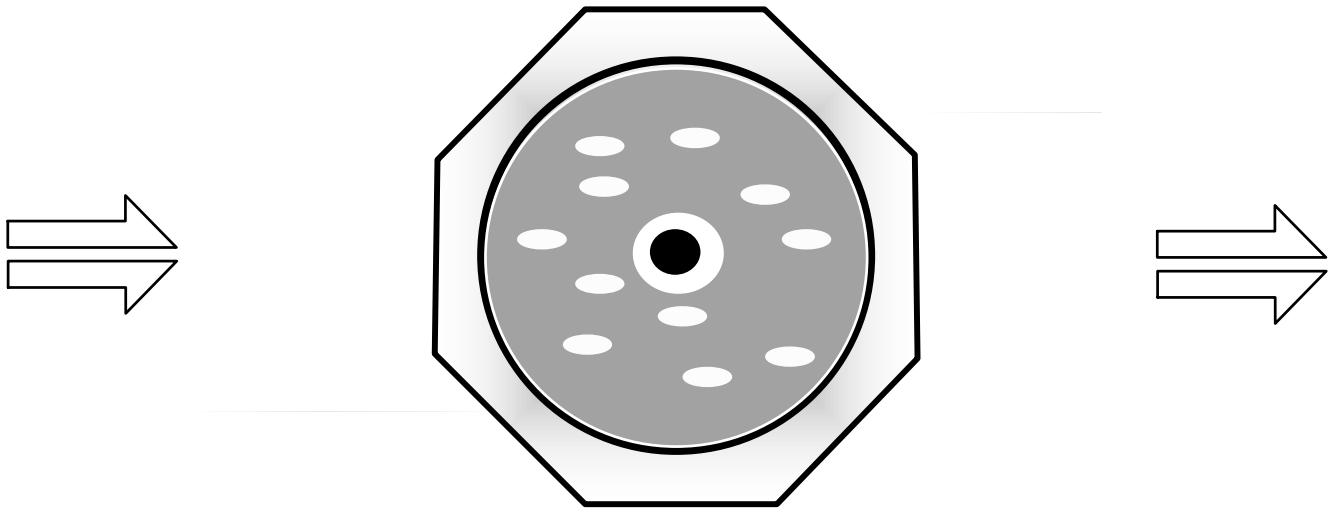

LOOK FOR BUBBLES IN THE SIGHT GLASS

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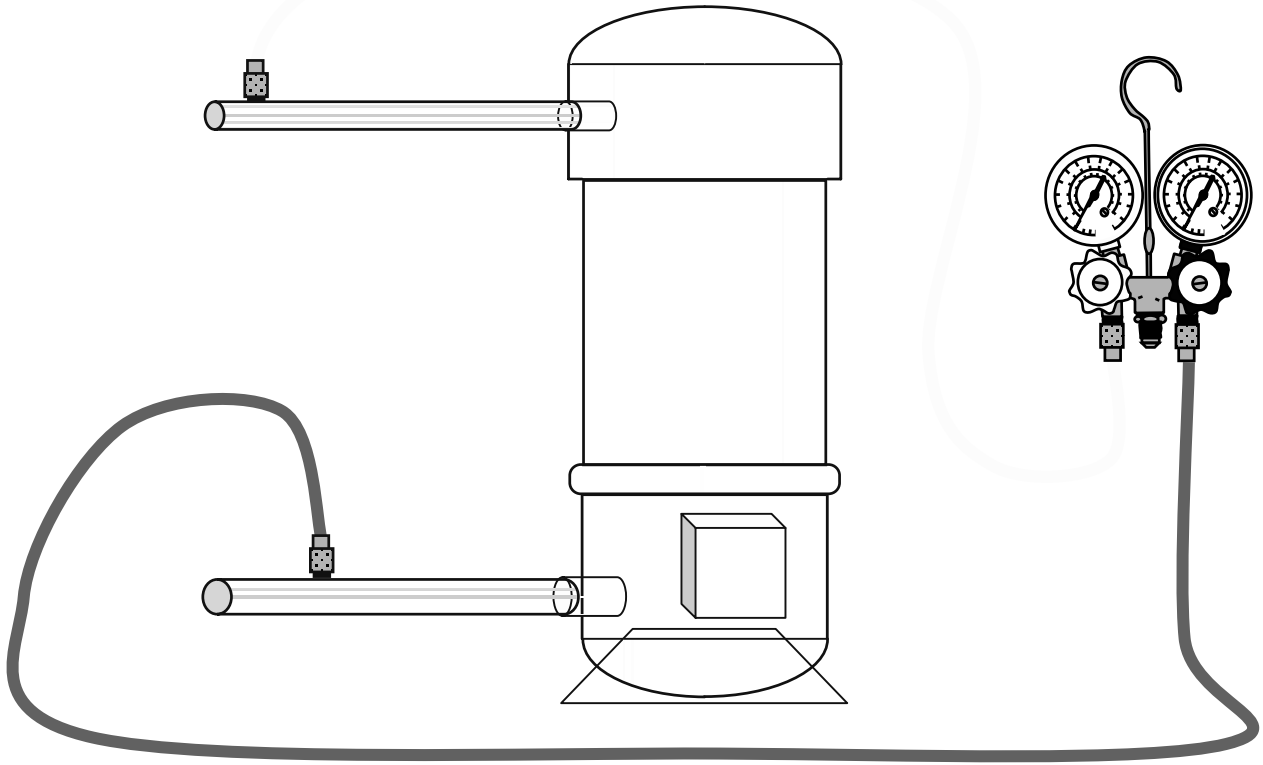
WHAT'S WRONG WITH THIS INDICATOR?

- **Excessive Liquid Line Pressure Drop**
- **Unit Working at Part Load**
- **Blocked Condenser**
- **No Subcooling?**

Service Excellence Training



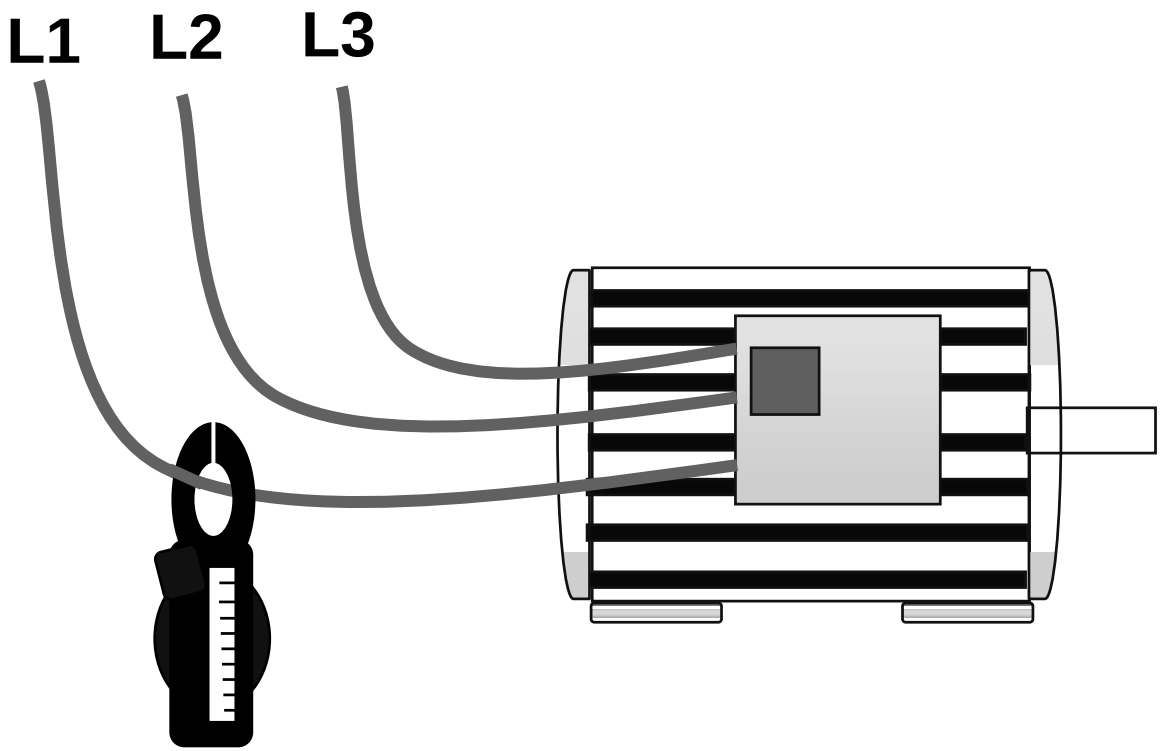
LOOK AT THE PRESSURE GAUGES

Service Excellence Training

WHAT'S WRONG WITH THIS INDICATOR?

- Dirty Condenser Coil
- Dirty Evaporator Coil
- Dirty Filters
- Incorrect RPM (Evaporator Section)
- Incorrect Fan Blade (Condenser Section)

Service Excellence Training



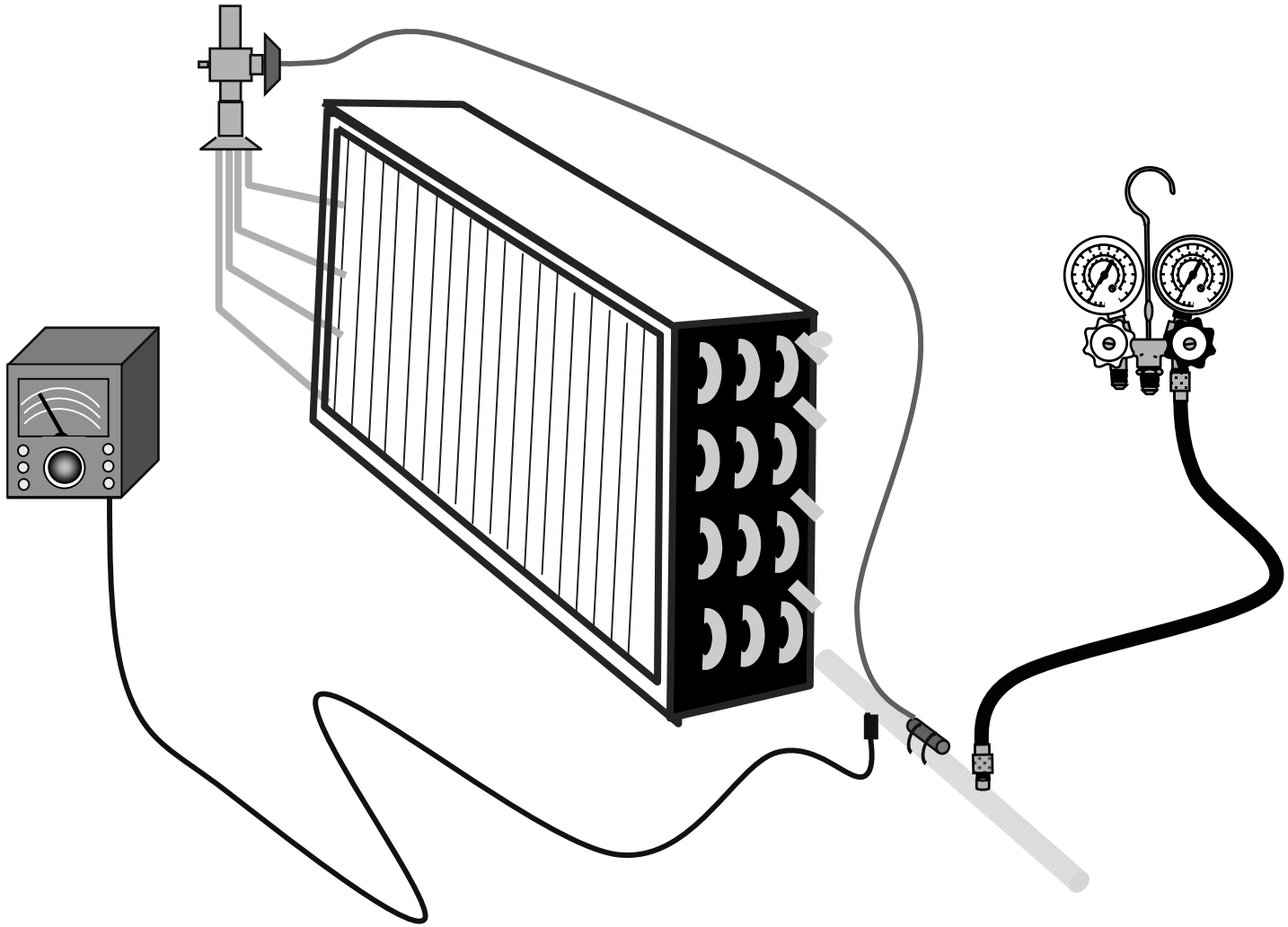
LOOK AT THE MOTOR AMPERAGE DRAW

Service Excellence Training

WHAT'S WRONG WITH THIS INDICATOR?

- Cool Day Charging
- Hot Day Charging
- Clean or Dirty Coils
- Dirty Filters
- Motor Bearing Wear
- Low Voltage (Supply)
- High Voltage (Supply)

Service Excellence Training



COMPUTE THE SUPERHEAT

Service Excellence Training

WHAT'S WRONG WITH THIS INDICATOR?

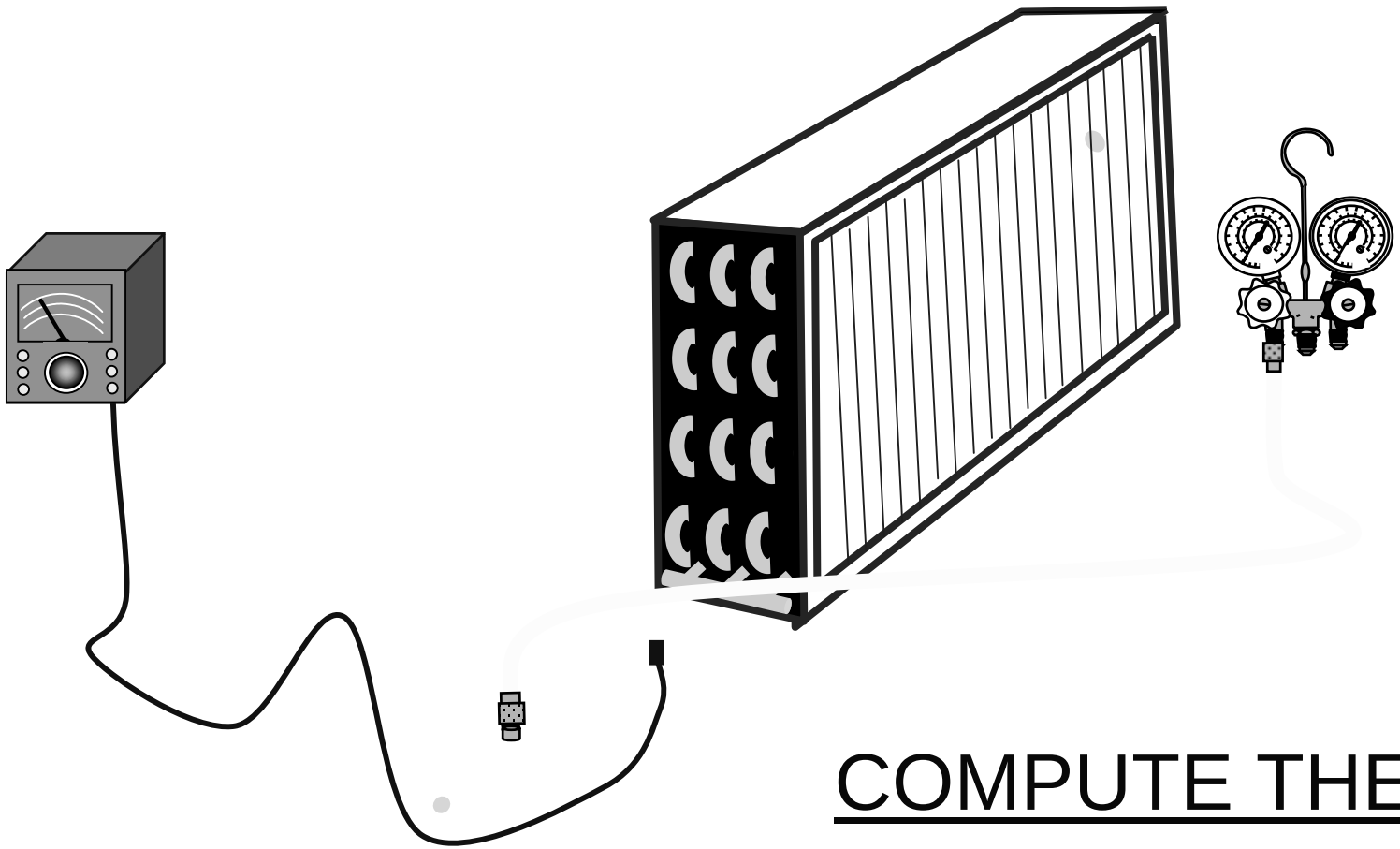
CAPILLARY SYSTEM

- **Hot Day**
- **Cold Day**
- **Latent Load**

THERMAL EXPANSION VALVE SYSTEM

- **Condenser Flooding**

Service Excellence Training



COMPUTE THE SUBCOOLING

Service Excellence Training

WHAT'S WRONG WITH THIS INDICATOR?

- **How Much Subcooling**
- **Winter Conditions**
- **Summer Conditions**

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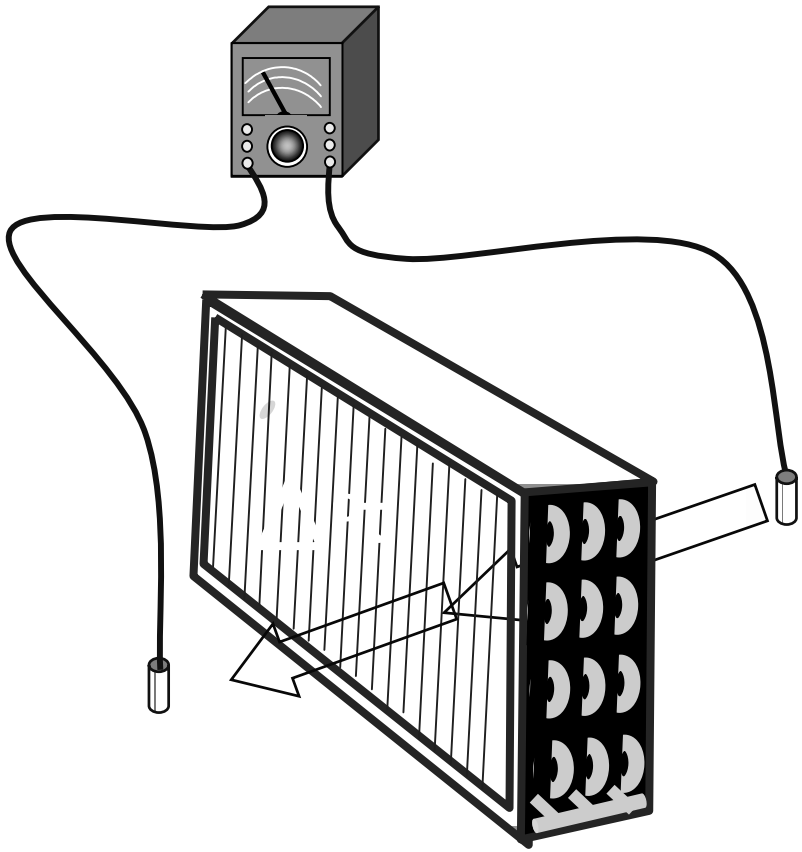
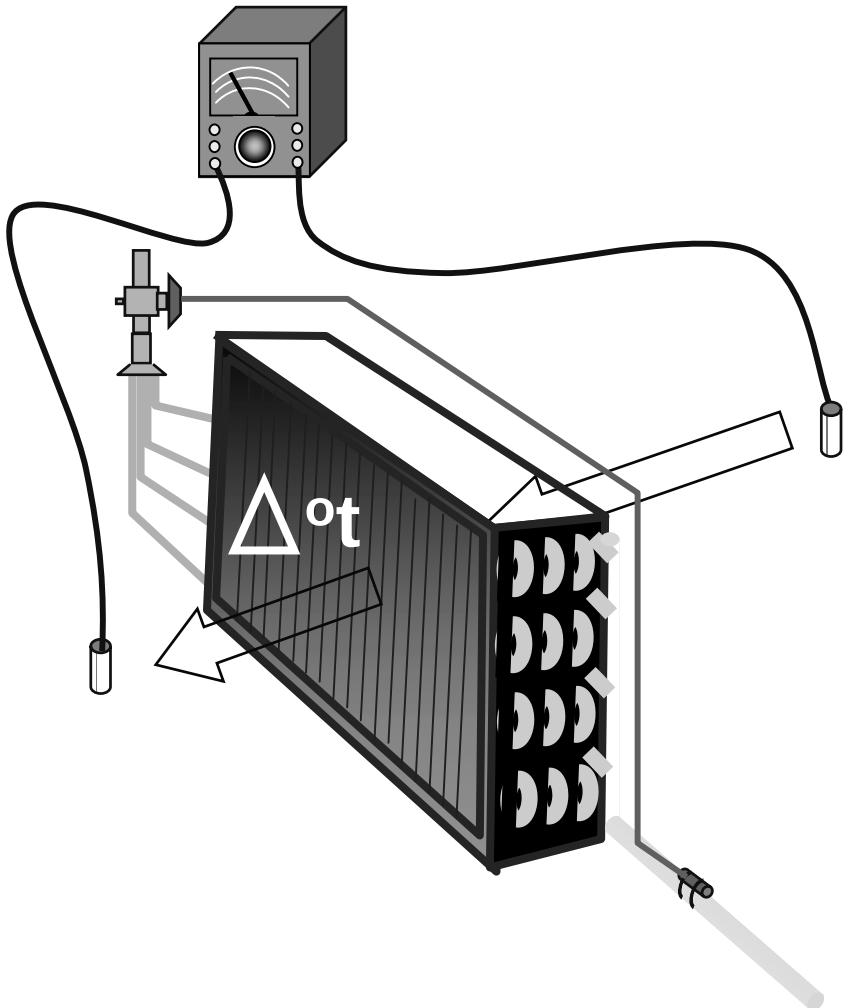
TAKE A DELTA ^{o}T ACROSS THE COILS





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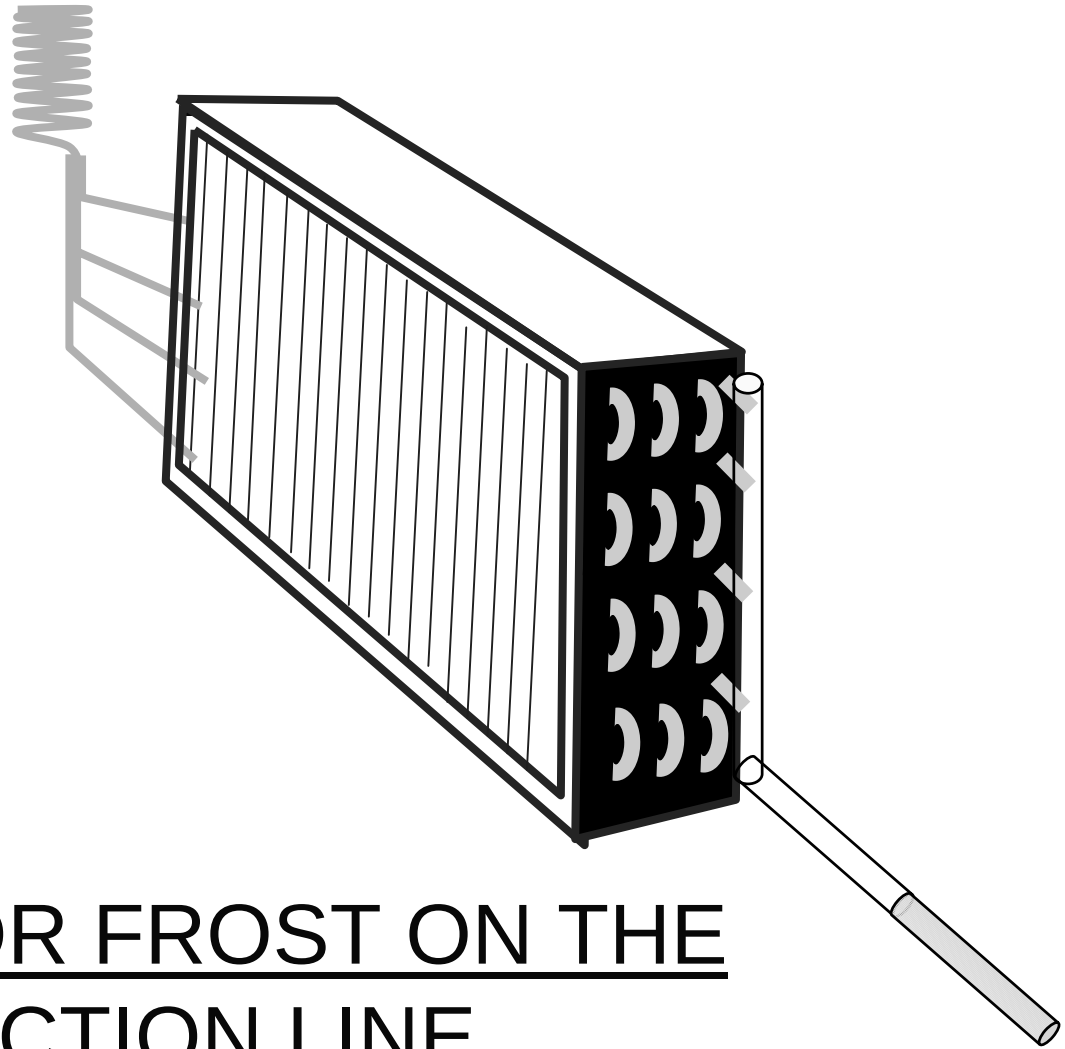
WHAT'S WRONG WITH THIS INDICATOR?

- **What is the Proper Condenser Delta "T"**
- **What is the Proper Evaporator Delta "T"**
- **High Latent Load Conditions**
- **Proper Evaporator Fan RPM**
- **Filter Clean**
- **Duct System Static Pressure**
- **Condenser Clean**



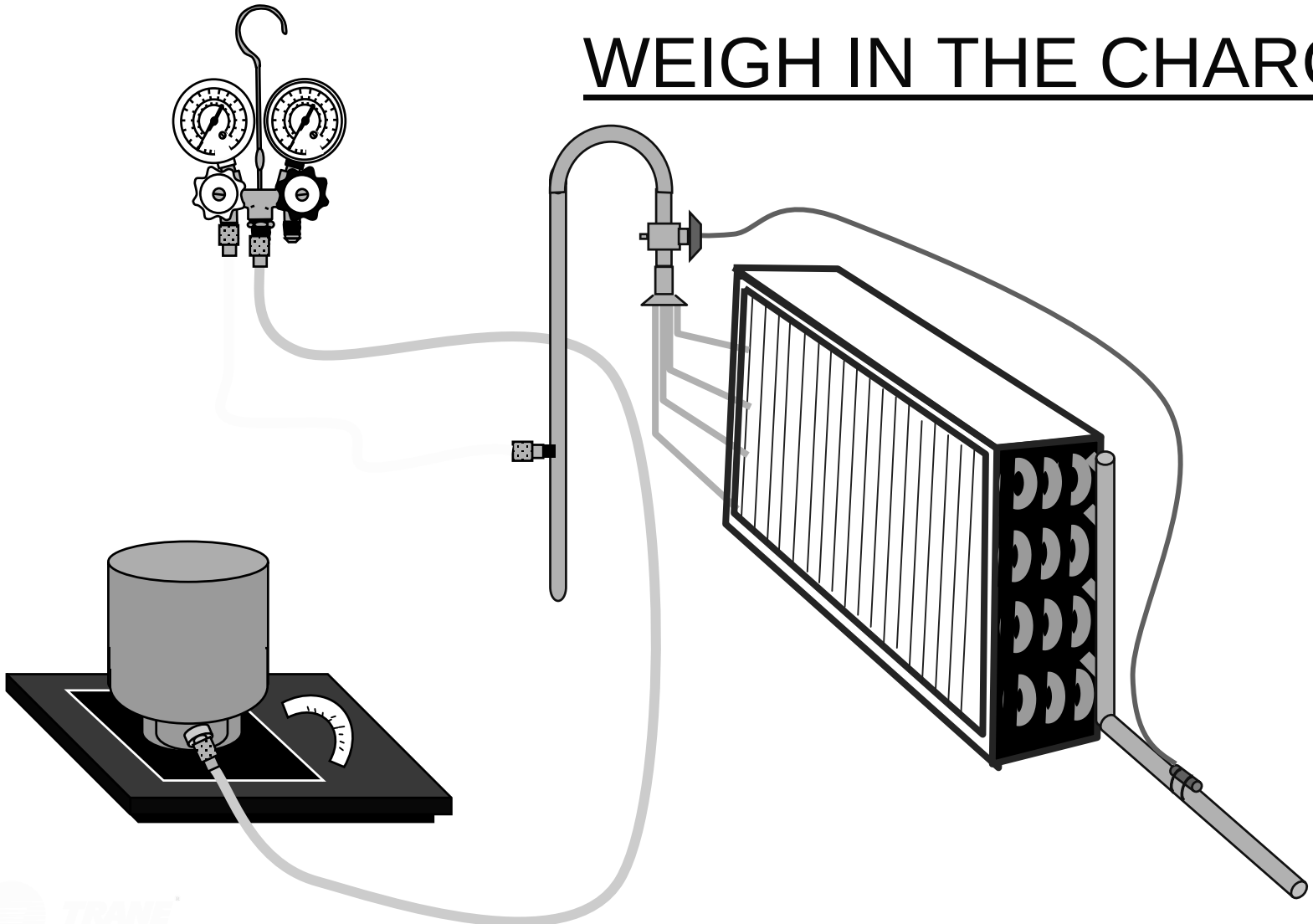
LOOK FOR FROST ON THE SUCTION LINE

Service Excellence Training

WHAT'S WRONG WITH THIS INDICATOR?

- Thermal Expansion Valve System
- Capillary Systems
- Air Flow
- Frost Point
- High Load
- Low Charge

WEIGH IN THE CHARGE



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WHAT'S WRONG WITH THIS INDICATOR?

- **Correct Charging Data**
- **Good Quality Scale**

EITHER REMOVE THE EXISTING CHARGE AND WEIGH IT BACK IN

OR

USE THE FOLLOWING METHOD

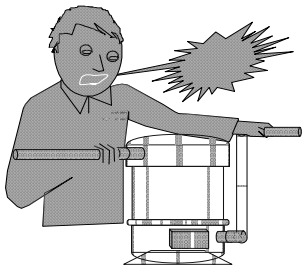
Service Excellence Training

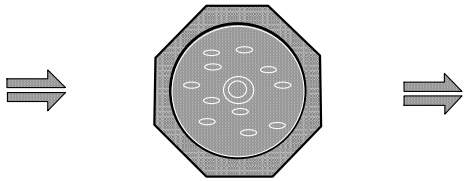
MEASURING AND RECORDING ALL OF THE FOLLOWING INDICATORS ACHIEVES AN ALTERNATE METHOD TO WEIGHING IN A CHARGE

- Superheat and Subcooling.
- Delta “T” Coil Readings.
- Suction and Discharge Pressures.
- Bubbles in the Sight Glass.
- Compressor Amp Draw.

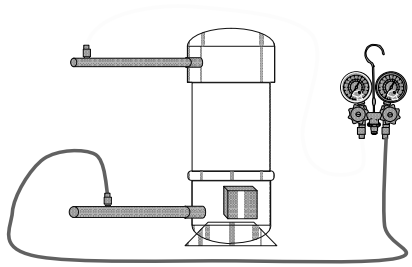
Service Excellence Training

PLACE YOUR HANDS ON THE SUCTION / DISCHARGE LINES AND FEEL IF THEY ARE HOT OR COLD

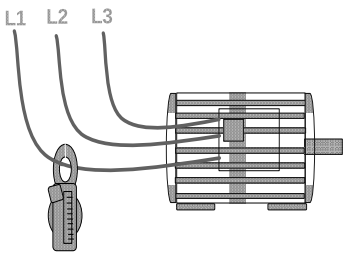




LOOK FOR BUBBLES IN THE SIGHT GLASS

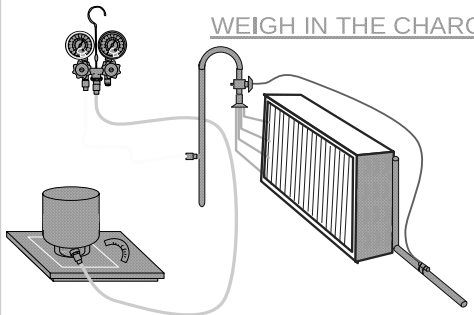


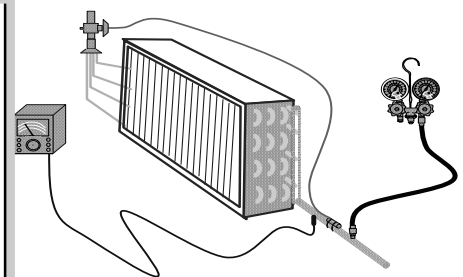
LOOK AT THE PRESSURE GAUGES



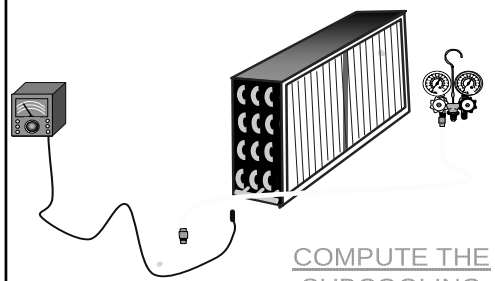
LOOK AT THE MOTOR AMPERAGE DRAW

WEIGH IN THE CHARGE



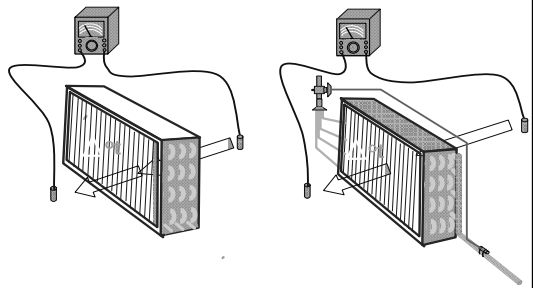


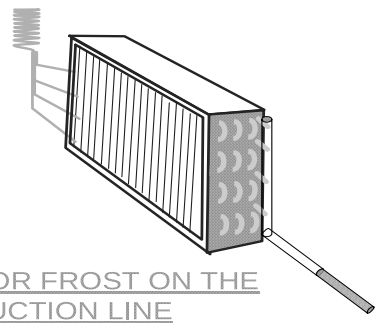
COMPUTE THE SUPERHEAT



COMPUTE THE SUBCOOLING

TAKE A DELTA°T ACROSS THE COILS





LOOK FOR FROST ON THE SUCTION LINE

Service Excellence Training