RYKER

INSTALLATION & OPERATION INSTRUCTION

ISSUED – JANUARY 2020

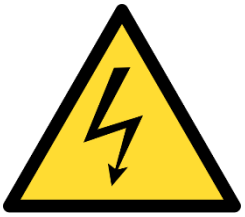
INSTALLATION & OPERATION INSTRUCTION

GH SERIES CONDENSING UNITS WITH MANEUROP HERMETIC COMPRESSOR

INDEX

This document should be kept with the installed GH series unit.

1. SAFETY WARNINGS FOR END USERS, INSTALLATION AND MAINTENANCE PERSONNEL



DANGER - High Voltage - this condensing unit contains electrical parts, isolate the power supply before working on this unit. All field wiring must be carried out by a licensed electrical contractor and all wiring must be in accordance with the equipment specification, local and national codes.

DANGER - Moving Machinery – this condensing unit has moving parts which may start and stop without warning.

CAUTION - Auto Start – this unit and its moving parts can start automatically without warning.

CAUTION - High Pressure – this condensing unit contains high pressure refrigerant and oil.

CAUTION - High and Low Temperature Surfaces – during normal operation and during fault conditions some components will reach high and/or low temperatures.

CAUTION - Sharp Edges – this condensing unit contains parts with sharp edges, appropriate personal safety equipment must be worn.

Only fully qualified licensed personnel should install service or carry out maintenance to this condensing unit.

2. END USER INFORMATION

DESIGN USAGE

This condensing unit is designed for commercial refrigeration duty within the limits of the published application data, ambient temperature range, refrigerant type or types and electrical specification. This unit is not intended for environments that are corrosive or flammable including marine environments. If subjected to corrosive environments this unit should receive additional protection/s.

MAINTENANCE INTERVALS

It is good practice to have regular preventative maintenance performed to ensure this condensing unit continues to perform efficiently.
Only fully qualified licensed personnel should carry out maintenance to this condensing unit.

3 to 6 monthly – dependent on location and duty

Air cooled condenser check, clean as required

- Operational checks including but not limited to electrical connections, voltages, amperages, pressures, temperatures including compressor superheat, discharge temperature, unit sub-cooling, refrigerant leak check, moisture indicator check and compressor oil level.

Use of genuine spare parts from Actrol is recommended.

DECOMMISSIONING

This condensing unit contains refrigerant and oil that is harmful to the environment; these must be recovered and returned to an approved recycling or destruction facility.
Only fully qualified and licensed personnel should carry out decommissioning of this unit. It is illegal to vent some types of refrigerant to the atmosphere.

3. INSTALLATION INSTRUCTIONS

SAFETY FIRST

- All refrigeration and electrical work must be carried out by fully qualified and licensed personnel.
- Personal safety protection equipment must be worn when working with this condensing unit.
- Refer to the safety warnings in “Section 1” of this instruction.

Initial inspection and damage notification

This unit must be inspected for damage **‘before’** installation and any damage found reported to Actrol so appropriate action can be taken.

LIFTING AND HANDLING OF UNIT

Ensure this condensing unit is balanced when lifting as the weight is not central.

DESIGN CONDITIONS AND REFRIGERANT TYPE

Confirm the application is to operate within the published design limits before installing this unit. Ensure the refrigerant type matches the published data, **'flammable refrigerants or ammonia refrigerant must not be used'**.

OIL TYPE

POE (Polyol-ester) oil is used to lubricate this compressor. Only use POE oil of the correct viscosity as listed in the compressor data when adding or replacing oil.

POSITIONING AND MOUNTING OF UNIT

Clearance dimensions

- Avoid short cycling the condenser air by ensuring no obstruction of the discharged air.
- A minimum of one fan diameter clearance must be allowed between the condenser coil and a wall on the inlet air side/s for correct air flow.
- Safe access for service and maintenance must be provided including clear access to all serviceable components within the unit
- A minimum of 800mm clearance should be provided around this unit.

Noise considerations

- Consideration should be given to ensure noise from this unit will not be of concern to surrounding sound sensitive environments. Information on noise control is available from Actrol.

Mounting and fixing

- This condensing unit must be installed level on the horizontal plane.
- The unit is to be fixed to a solid base using anti vibration mounts or rubber pads.

SYSTEM PIPE SIZING AND DESIGN

Pipe Sizing

Every installation is different so the field pipe sizes may differ from the unit connection sizes. Please select appropriate pipe sizes using published pipe sizing information or contact Actrol for advice.

Holding pressure

This unit has a holding charge of nitrogen which must be released in a safe manner.

Maximum design and test pressure

This condensing unit is designed for a maximum design pressure (PS) of 31bar.
Test pressure of the suction side must not exceed 20.5bar as indicated on the compressor name plate. Provision for a pressure relief device is provide, if a PRV is field fitted it should be selected at 31bar (1 x PS) in accordance with AS/NZS-5149.2:2016.

Oil return

Pipe design must allow for adequate oil return to this condensing unit, the use of "P" traps and double risers may be required; all horizontal sections of the suction line must fall towards the condensing unit.

Soldering

Nitrogen must be used when soldering the field pipe work to stop the formation of copper oxides.

PRESSURE TESTING

The entire system must be pressure tested and any leaks repaired prior to charging with refrigerant.

Pipe insulation

The suction line must be adequately insulated to minimize heat absorption into the return vapour.

ELECTRICAL CONNECTION

- A licensed electrical contractor must carry out all electrical work.
- All electrical work must meet local and national requirements.
- Care must be taken to ensure no damage is done to internal unit components when mounting the electrical isolator.
- An electrical diagram is attached to the inside of the service panel.
- The control safety circuit must not be bypassed.

COMMISSIONING AND START-UP

Visual pre-start check

A visual check must be carried out to ensure the unit has been installed with the correct companion equipment and in the correct location.
All pipe work and electrical work must be complete and safe.
All electrical connections must be checked for tightness as connections can loosen during transport.
The yellow compressor anti vibration transport mounts must be removed before starting the compressor.

Crank case heater

The crankcase heater must have power applied for a minimum of 12 hours prior to starting the compressor.

Evacuation

A vacuum of less than 500 microns must be achieved and held before breaking the vacuum with liquid refrigerant into the liquid line.

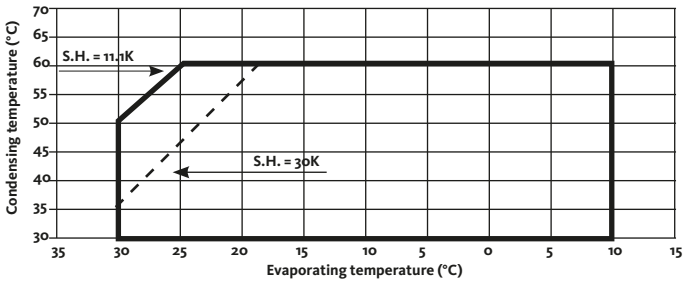
Safety pressure switch settings

Use a temperature pressure chart to determine the pressures to set the high and low safety pressure switches on this condensing unit. The pressures must be set within the limits shown in the compressor application envelope.

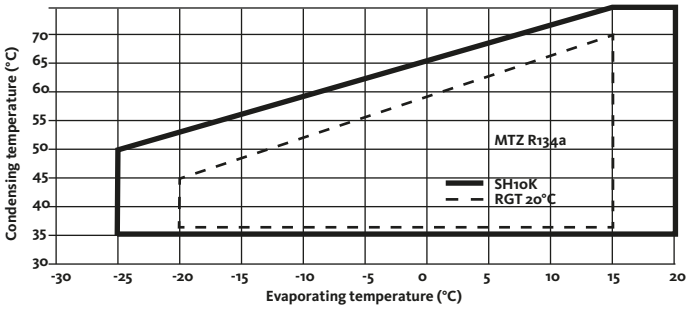
The HP safety switch must set no greater than 0.9 x PS (0.9 x 31 bar = 27.9 bar).

The compressor must never operate in a vacuum as internal parts will overheat and arcing between the electrical terminals will occur within the compressor.

R404A



R134a



Fan speed control setting and operation

The two condenser fans in the unit are designed to operate over a wide speed range to maintain the condensing pressure to the set-point of the fan speed control.

The single-phase fan supply is switched via the fan contactor auxiliary contacts which operate with the compressor. The fans are speed controlled by a Carel fan speed control connected to the liquid line via a pressure transducer.

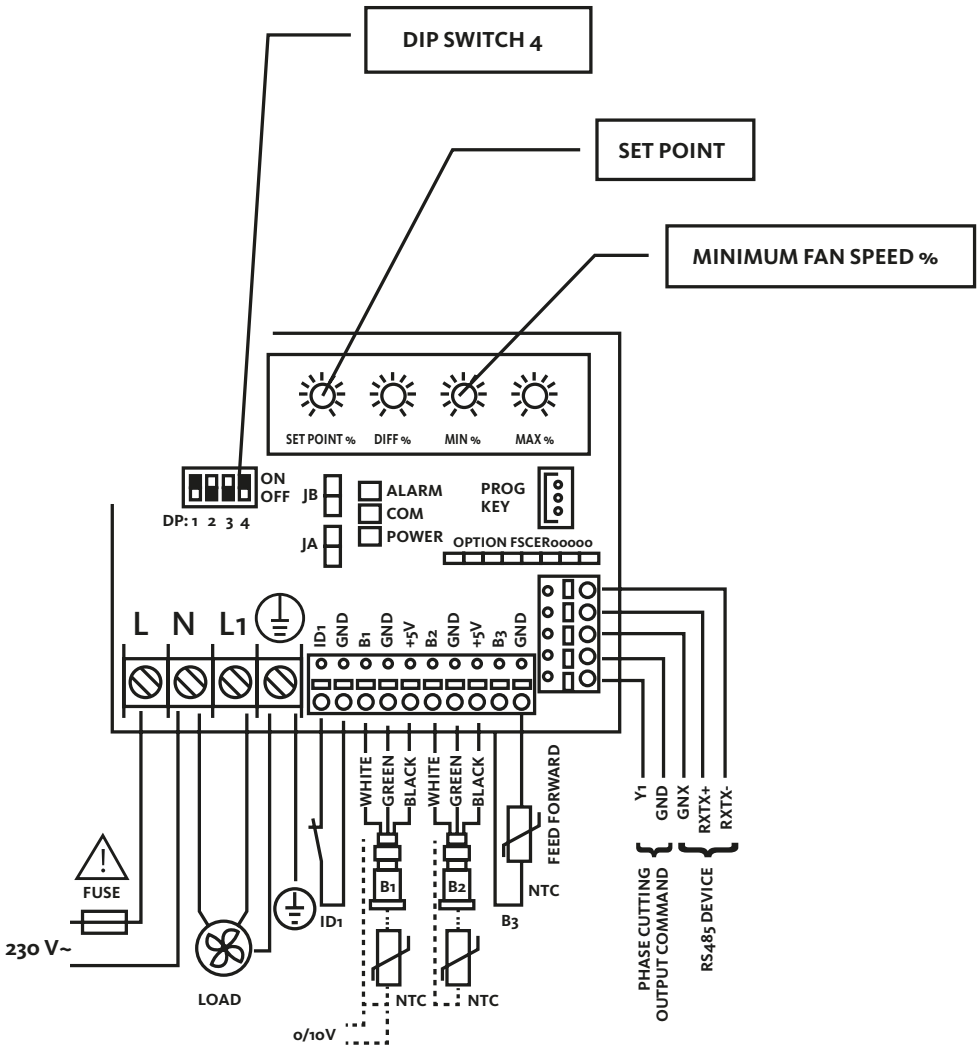
1. Adjust the set point

a. Set point to maintain approximately 40°C SCT for R134a = 25%

b. Set point to maintain approximately 40°C SCT for R404A =50%

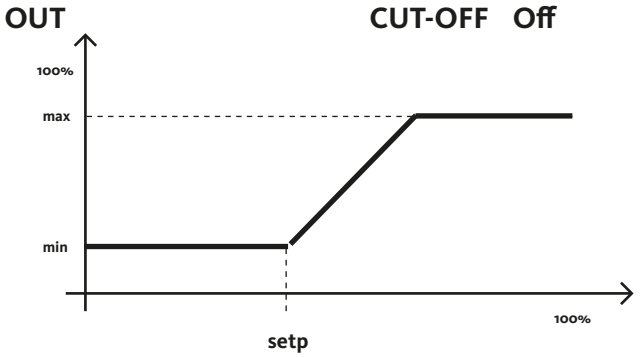
SCT = Saturated Condensing Temperature

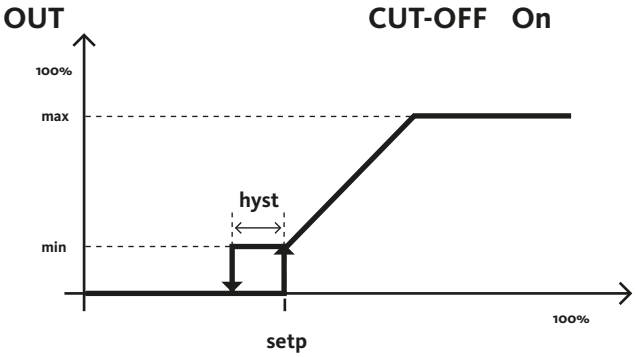
2. Diff % should be set to 10%. **(Increasing the Diff % will further stabilize the fan speed)**
3. Min % should be set to 30%. **(Prolonged operation below 30% will overheat the fan motor/s)**
4. Max% should be set to 100%.



Approximate fan speed control set point %					
Desired SCT	30	35	40	45	50
RA134a	19%	23%	27%	31%	35%
R404A	38%	44%	50%	56%	64%

1. The fan speed control is factory set to cycle the fan/s OFF when the condensing pressure falls below the set point.
2. To operate the fan/s whenever the compressor is operating set DIP switch 4 to the OFF position.





When dip switch 4 is set to the ON position (default) the fans will cycle based on the pre-set hysteresis. The pre-set hysteresis is 2% of the pressure transmitter span (3450kPa) = 69kPa.

- 69kPa using R134a is approximately 3K

Therefore, on R134a when set at 40° SCT the fans will cycle off at approximately 37°C and on at 40°C

- 69kPa using R404A is approximately 1.5K

Therefore, on R404A when set at 40° SCT the fans will cycle off at approximately 38.5°C and on at 40°

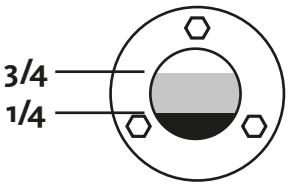
System charging

The vacuum should be broken by charging liquid refrigerant into the liquid line.
Fine tuning the refrigerant charge can be achieved by adding small quantities of liquid into the suction service valve port while the compressor is running.
Under no circumstances should excessive liquid refrigerant enter the compressor.

UNIT OPERATIONAL CHECKS

Operation checks include but are not limited to the following:

- Voltages of all phases
- Amperages of compressor and fans
- Suction and discharge pressures
- Compressor suction superheat*****
- Evaporator suction superheat *****
- Liquid sub-cooling
- Liquid line moisture indicator colour and sight glass clearness
- Compressor discharge temperature
- Compressor oil sight glass level
- Confirm oil is returning to compressor
- Refrigerant charge
- Vibration and noise
- Observe on/off cycle after reaching design temperature and ensure;
- No liquid slugging at compressor start-up
- Pump down pressure is within published operating envelope (if pump down is used)
- Cycle times (no more than 8 compressor starts per hour)



Correct Compressor Oil Level

* When refrigerated space or product is at or near design temperature

HANDOVER TO END USER

When the commissioning is complete the contractor should provide a full explanation of system usage to the end user. Section 6 of this instruction should be completed, and this instruction left with the end user to keep so the unit base data is known.

4. MAINTENANCE AND DECOMMISSIONING GUIDELINES

MAINTENANCE GUIDELINES

It is good practice to have regular preventative maintenance performed to ensure this condensing unit continues to perform efficiently.

- 3 to 6 monthly – Air cooled condenser check, clean as required
- 3 to 6 monthly – Operational check including but not limited to electrical connections, voltages, amperages, pressures, temperatures including compressor superheat, unit sub- cooling and discharge temperature, refrigerant leak check, moisture indicator check and correct compressor oil level.

Use of genuine spare parts from Actrol is recommended.

DE-COMMISSIONING GUIDELINES

- This condensing unit contains refrigerant and oil that is harmful to the environment; these must be recovered and returned to an approved recycling or destruction facility.
- Only fully qualified licensed personnel should carry out decommissioning of this unit.
- It is illegal to vent some types of refrigerant to the atmosphere.
- Disconnection of electricity supply wiring must be carried out by fully qualified and licensed personnel.
- This unit should be disposed of in a responsible manner.

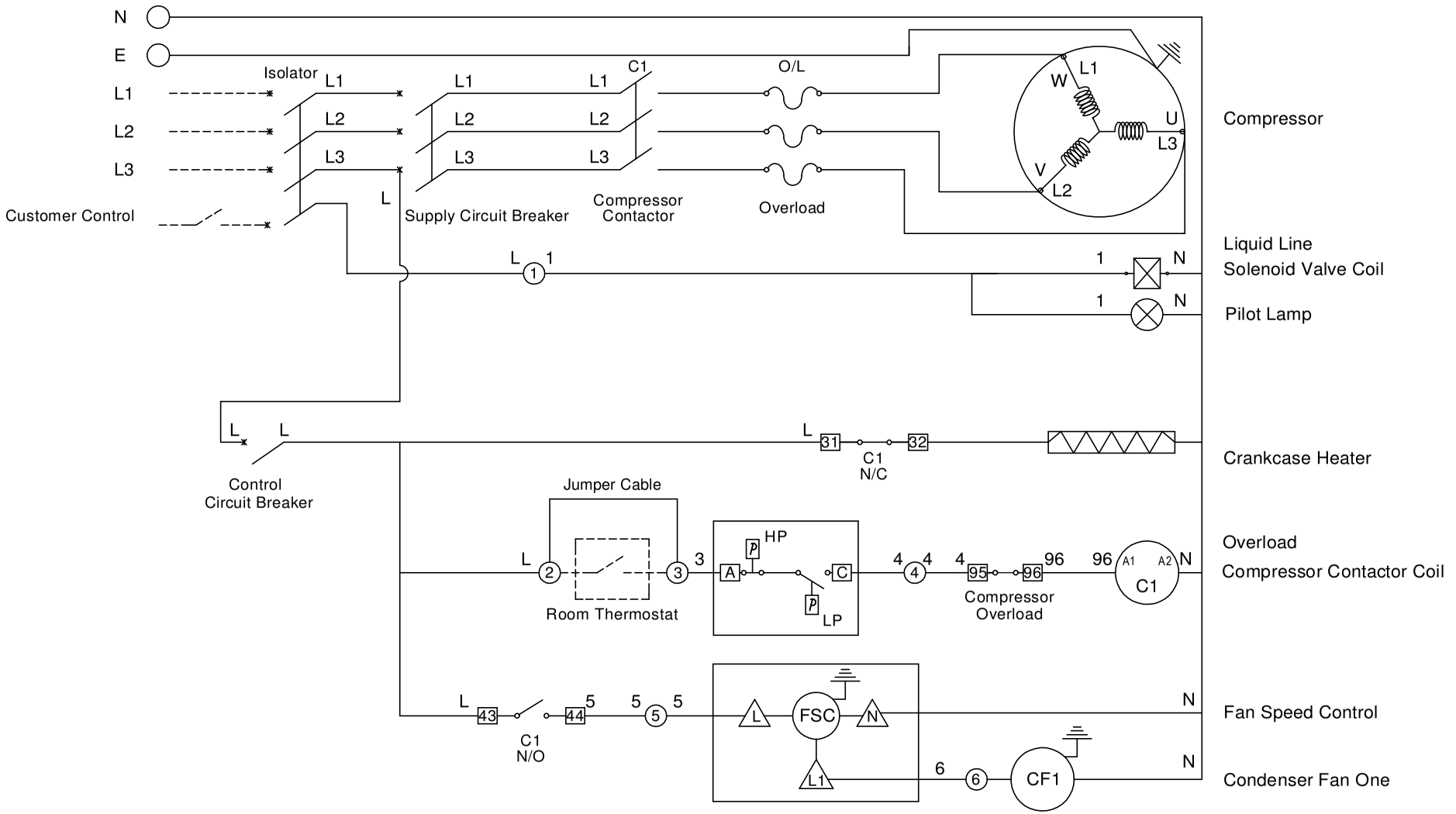
CAUTION - This unit contains high pressure refrigerant and oil.

GLOSSARY OF TERMS

- Condensing unit - unit comprising compressor, condenser with associated components to recirculate refrigerant via external components and back through the condensing unit.
- HFC refrigerant – hydro-fluoro-carbon fluid circulated around a refrigeration system used to transfer heat energy by changing phase from vapour to liquid and back to vapour.
- Ambient temperature – the air temperature surrounding the equipment.

ONGOING PRODUCT IMPROVEMENT

Due to ongoing product improvement Actrol reserves the right to change equipment specification without notice.

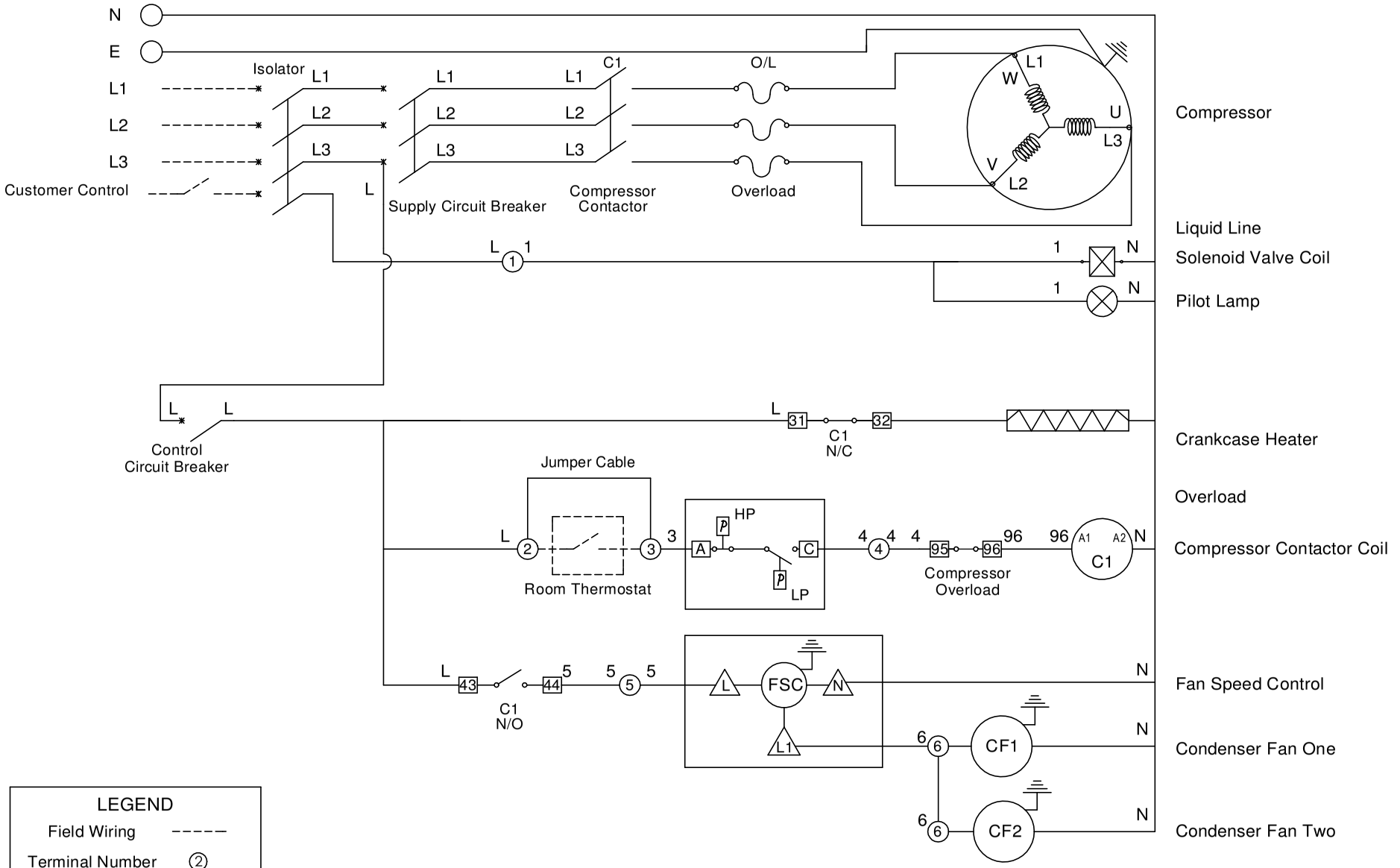


LEGEND	
Field Wiring	-----
Terminal Number	②
Connection Number	43
Fan Speed	③

WARNING

THE ELECTRICAL CONNECTION OF THIS UNIT MUST BE PERFORMED BY QUALIFIED PERSONNEL AND MUST COMPLY WITH LOCAL ELECTRICAL STANDARDS

GH 1 Fan Wiring Diagram			RYKER
Diagram for 3 phase 415 Volt 50 Hz Package Unit			
Drawn By	Checked by : R. Stringer	7684494 Index E	Last Update 4 May 2020



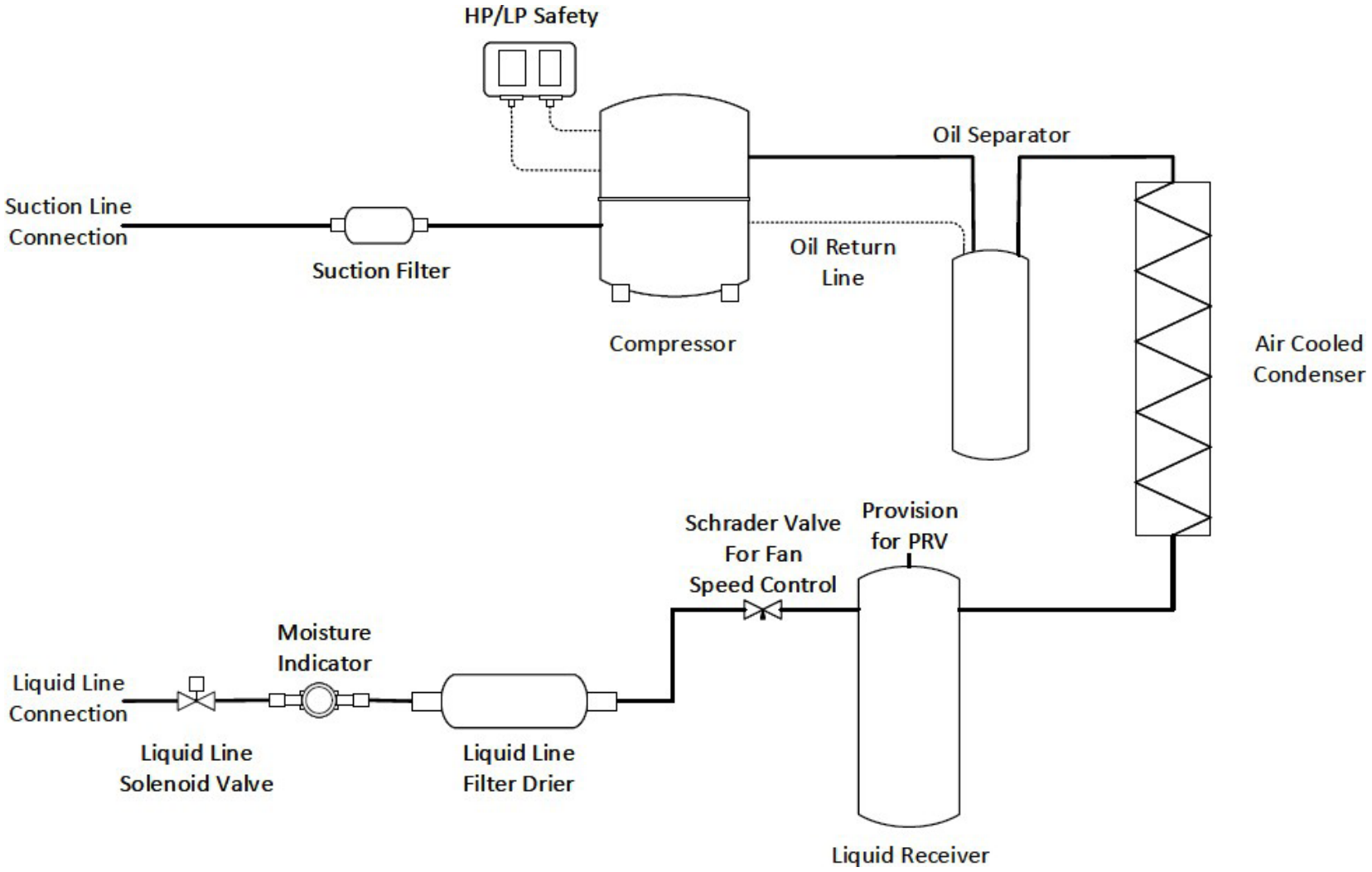
LEGEND	
Field Wiring	-----
Terminal Number	②
Connection Number	43
Fan Speed	△3

WARNING

THE ELECTRICAL CONNECTION OF THIS UNIT MUST BE PERFORMED BY QUALIFIED PERSONNEL AND MUST COMPLY WITH LOCAL ELECTRICAL STANDARDS

GH 2 Fan Wiring Diagram			RYKER
Diagram for 3 phase 415 Volt 50 Hz Package Unit			
Drawn By	Checked by : R. Stringer	7684495 Index F	Last Update 4 May 2020

Unit piping schematic diagram



6. ELECTRICAL WIRING AND UNIT PIPING SCHEMATIC DIAGRAMS

Note: Some models have one condenser fan only.

COMMISSIONING AND OPERATION DETAILS

CUSTOMER/SITE: **DATE:**

SERVICE TECHNICIAN: **JOB#**

Application Unit ID Code

(Coolroom, Freezer Room, Air Conditioning, Chiller, Process Cooling, Etc) (i.e. Coolroom # 2.1)

Ambient Temperature (°C) Application Temperature (°C)

Equipment Details

Compressor / Unit Model # Refrigerant

Evaporator (Make & Model)

Condenser / Condensing Unit (Make & Model)

Pipe Run & Sizes (Equivalent Length)

(Add Approx 1m to Length per Elbow)

SYSTEM OPERATIONAL OBSERVATIONS

Refrigerant Type Charge Quantity

Charge Condition

(Liquid Level, Sight Glass –Full Head of Liquid, Some Flash Gas, etc)

Suction Pressure (Gauge)

(Measured at Evap) (At Stabilised Conditions)

Suction Vapour Temperature (°C) (B)

(Measured at Evap Before Liquid/Suction Heat Compressor)

Suction Pressure (Gauge)

(Measured at Compressor)

Suction Vapour Temperature (°C) (E)

(Measured at Compressor Button Line 150mm from Compressor)

Discharge Pressure (Gauge)

(Measured at Compressor) (At Stabilised Conditions)

Discharge Line Temperature (°C) (F)

(Measured 50mm from Compressor) (At Stabilised Conditions)

Liquid Pressure (Gauge)

(Measured 50mm from Compressor) (At Stabilised Conditions)

Liquid Line Temperature (°C) (J)

(Measured 100mm from Receiver Outlet)

Measured Suction Pressure After Defrost

(Applicable to Freezers Only – CPR or MOP TX Valve Fitted)

Compressor Oil Level

Equivalent Saturated Suction Temp. (°C) (A)

(Use a Pressure Temperature Chart)

Calculated Evaporator Superheat (K) (B-A)

(Measured Suction Line Temp (B) – Saturated Refrigerant Temp (A))

Equivalent Saturated Suction Temp. (°C) (D)

(Use a Pressure Temperature Chart)

Calculated Superheat at Compressor (K) (E-D)

(Measured Suction Line Temp (E) – Saturated Refrigerant Temp (D))

Equivalent Saturated Suction Temp. (°C) (G)

(Use a Pressure Temperature Chart)

Calculated Discharge Superheat (K) (F-G)

(Measured Suction Line Temp (F) – Saturated Refrigerant Temp (G))

Equivalent Saturated Liquid Temp. (°C) (H)

(Use a Pressure Temperature Chart)

Calculated Liquid Subcooling (K) (J-H)

(Measured Suction Line Temp (J) – Saturated Refrigerant Temp (H))

Oil Condition

(Clean, Clear, Honey, Brown, Black, Carried Out Acid Test)

Sump Heater Current Draw During Off Cycle (& Operational During Compressor off Cycle) (Measured Current Draw)

CONDENSER

AIR ON TO COIL (TEMP °C)

AIR OFF TO COIL (TEMP °C)

EVAPORATOR

AIR ON TO COIL (TEMP °C)

AIR OFF TO COIL (TEMP °C)

CONTROLS – Pressure Controls

L.P. Cut In L.P. Cut Out

H.P. Cut In H.P. Cut Out

Temperature Control – Make & Model

Set Point

Differential

# of Defrosts/24hrs Defrost Period

Termination Temp.

ELECTRICAL

Supply Requirement	Volts	Hz	Phase
Measured Volts	L1	L2	L3
Measured Current	L1	L2	L3

(Maximum 8 Starts per Hour)

(Maximum 2% Imbalance)

(Maximum 10% Imbalance)

Anti-Cycle Timer Fitted Duration

(Maximum 8 Starts per Hour)

Full Name

Signature

Other Observations (Make further notes on back)

NOTES

NOTES

NOTES

STRONG. SUPERIOR. STEADFAST.

RYKER