

Wizard

Refrigeration Control System



**Single Reciprocating Compressor
Control (WSCC)**

CONTROL OF A LARGE COMPRESSOR WITH MULTIPLE UNLOADING STEPS

PURPOSE

The Wizard Single Compressor Control is designed to operate a large, multiple cylinder reciprocating compressor utilizing ammonia and most halocarbon refrigerants.

SUCTION PRESSURE CONTROL

The WSCC will maintain the suction pressure as close as the Suction Pressure Setpoint by turning on/off the compressor and the unloaders.

The WSCC will initially start the compressor in the fully unloaded (lowest capacity) configurations. Should additional capacity be required, the WSCC, after a calculated delay, will turn off (add capacity) the next available unloader. Each unloader will be staged sequentially, in a First On-Last Off (FILO) sequence.

Once the suction pressure drops below the suction pressure setpoint, the WSCC will turn on Unloader stages, thus reducing the compressor capacity until the compressor is fully unloaded. Only then, should the pressure continue to be lower than the setpoint, will the WSCC shut off the compressor.

The compressor will not be restarted until after a user configurable compressor restart delay expires. Restart of the compressor will consist of the compressor fully unloaded.

CONDENSER CONTROL

The WSCC operates a single condenser circuit based upon a fixed head pressure setpoint. The WSCC activates this control scheme whenever the compressor is running.

The WSCC will start the condenser when the head pressure exceeds the setpoint by three percent of the setpoint value (ie. Setpoint = 200 psi, Condenser start value = 206 PSI). The WSCC will shut off the condenser when the head pressure drops below the setpoint by 1.5 percent of the setpoint.

The condenser operates on a 30 sec minimum run-time and off time delay.

COMPRESSOR CYLINDER COOLING

The WSCC monitors the temperature of the compressor head, cycling a relay to start head cooling should the temperature exceed a user configurable setpoint.

This relay can be used for a head fan, liquid injection, or a water cooling system.

MONITORING AND ALARMING

The WSCC monitors seven separate sensors and activates alarms based upon user definable alarm setpoints. These alarms include:

Low Suction Pressure - The WSCC will shutdown all compressor operations and activate alarms when the suction pressure is below the Low Suction Alarm Setpoint for a user defined delay period

High Suction Pressure - The WSCC will shutdown all compressor operations and activate alarms when the suction pressure exceeds the High Suction Alarm Setpoint for a user defined delay period

High Head Pressure - The WSCC monitors the Head/Discharge Pressure Transducer and will shutdown the compressor operation and activate an alarm when the head pressure exceeds the High Head Pressure Alarm Setpoint for a user defined delay period

Low Head Pressure - The WSCC monitors the Head/Discharge Pressure Transducer and activates an alarm when the head pressure is below the Low Head Pressure Alarm Setpoint for a user defined delay period

High Suction Temperature - The WSCC monitors a suction temperature sensor mounted to the suction line. The WSCC activates an alarm when the suction temperature exceeds the high suction temperature alarm setpoint for a user defined delay period

Low Suction Temperature - The WSCC monitors a suction temperature sensor mounted to the suction line. The WSCC activates an alarm when the suction temperature goes below the low suction Temperature alarm setpoint for a user defined delay period.

High Discharge Temperature - The WSCC monitors a high temperature sensor mounted to the discharge manifold. The WSCC activates an alarm when the discharge temperature exceeds the High Discharge Temperature Alarm Setpoint for a user defined delay period

Low Discharge Temperature - The WSCC monitors a high temperature sensor mounted to the discharge manifold. The WSCC activates an alarm when the discharge temperature goes below the Low Discharge Temperature Alarm Setpoint for a user defined delay period.

Low Oil Pressure Differential - The WSCC monitors an oil pressure transducer and calculates the pressure differential. The WSCC will shutdown the compressor operation and activate an alarm when the differential is below the Low Oil Pressure Differential Alarm Setpoint for a user defined delay period.

High Oil Temperature - The WSCC monitors a high temperature sensor measuring the oil chamber of the compressor. The WSCC activates an alarm when the discharge temperature exceeds the High Oil Temperature Alarm Setpoint for a user defined delay period

Low Oil Temperature - The WSCC monitors a high temperature sensor measuring the oil chamber of the compressor. The WSCC activates an alarm when the discharge temperature goes below the Low Oil Temperature Alarm Setpoint for a user defined delay period

High / Low Head Temperature - The WSCC monitors a temperature sensor mounted to the compressor head. The WSCC activates an alarm when the head temperature goes below the Low Head Temperature Alarm Setpoint or exceeds the High Head Temperature Alarm Setpoint for a user defined delay period. It will cycle the low head temperature cycle solenoid valve based on the preset setpoint.

SYSTEM STANDBY

The WSCC can be utilized as a sub-controller for a larger refrigeration control system. A closed signal to the STANDBY input will shut down all compressor operations. The system will remain in this standby mode until the input receives an open signal.

RELAY OUTPUTS

The compressor output will be assigned to the first relay. The the unloader outputs will be assigned to next relays two through five.

The Low Head Temp-Cycle Solenoid Valve cylinder cooling equipment is assigned to relay 6. The condenser fan control is assigned to relay 7.

The system alarm relay is always at relay 8. Note that alarm relay uses normally closed fail-safe logic. The relay is energized when the control is not in alarm.

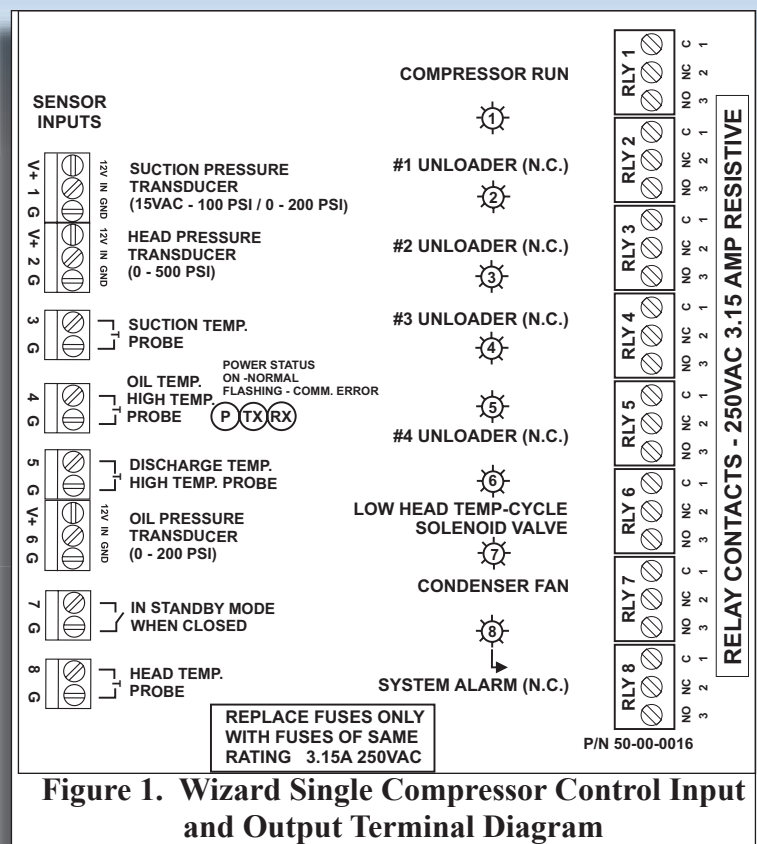


Figure 1. Wizard Single Compressor Control Input and Output Terminal Diagram

"MASTER / SLAVE" WSCCM Feature

Multiple WSCC controls can be linked together using the 2 wire communications input on the control board. One control is configured as the "Master" and the rest as "Slave" controls. The main "Master" control will stage all of the linked controls Compressors and Unloaders using the "Master" control's suction setpoint for up to one "Master" and five "Slaves". The WSCC "Master / Slave" configuration has a built in protection. If for any reason the "Slave" Control loses communication with the "Master" control, the "Slave" will display the alarm message "MASTER COMM ERROR" and take over individual control of its specific Compressor / Unloader Routine using its own individual suction setpoint.

Please Note: The Genesis International Software systems "GenCom For Windows" and "GenCom 3000 Supervisory and Alarming System" can not be used when the WSCC Master and Slave networking configuration is selected.

CONTROL SYSTEM

Control

Microprocessor based Program logic stored within non-volatile EPROM memory. Set points and system configuration stored within EEPROM. Logged Data stored within Battery Backed Memory chip, minimum of 10 years storage life. Menu driven controls with all operating sequences and control algorithms included. The control has non-volatile program memory and a capacitor backed clock in the event of power outage. All programmable options are installed via a "Yes" or "No" question.

Keypad

Front panel accessible with 5 tactile key switches. Key assignments -- UP, DOWN, SELECT/ENTER, EXIT, ALARM RESET.

Display

2 x 20 character LCD Back Lighted Display. Eight control status lights.

Power

Input -- 100-250 VAC, 50/60 HZ, 2.5 Amp.

INPUTS

All inputs use un-pluggable screw terminals.

Suction Transducer, 0 - 200PSIG
or 14.7in VAC - 100 PSIG

Oil Pressure Transducer, 0 - 200PSIG

Head Pressure Transducer, 0-500PSIG

Suction Temperature Sensor -- 2-wire thermistor, -40 to 150 °F

Discharge Temperature Sensor -- 2-wire thermistor, -40 to 150 °F

Head Temperature Sensor -- 2-wire thermistor, -40 to 350 °F

Oil Temperature Sensor -- 2-wire thermistor, -40 to 350 °F

OUTPUTS

Control Relays

All outputs use screw terminals

All Relay Outputs are 1 Form C SPDT rated for 250 VAC and 3 Amp per circuit Each relay circuit is fused with a 3.15 Amp slow blow fuse on the common leg.

LISTINGS

ETL, Conforms to UL Std. 3111-1

Certified to CAN/CSA

C22.2 Std. No. 1010.1



NEMA 1 Compliant Enclosure - This enclosure is intended for indoor use only primarily to provide a degree of protection against contact with the enclosed equipment. The enclosure is not designed to provide protection from water or to be placed in a hazardous environment. Mount only in Pollution Level 2 environments, ie. environmentally controlled offices, control rooms, or environmentally controlled machine rooms.

Dimensions Inches (mm)

12.0 x 9.5 x 5.0 (305 x 241 x 127)



NEMA 4X Compliant Enclosure - This enclosure is intended for either indoor or outdoor use, 0 to 50 °C, to provide a degree of protection against corrosion, windblown dust and rain, splashing water, and hose directed water.

Dimensions Inches (mm)

14.0 x 15.0 x 8.2 (312 x 381 x 208)

NEMA 1 Panel Mount Option - The control and display assemblies must be suitably mounted in an enclosure. The Faceplate may be surface mounted onto a Nema 1 enclosure. The IO Board Assembly must be mounted within an enclosure providing at least Nema 1 protection.

Dimensions Inches (mm)

Faceplate -

10.2 x 8.5 x 2.0 (259 x 216 x 51)

Backplate -

10.6 x 8.5 x 3.0 (269 x 216 x 76)



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