COMPRESSOR OPERATION MANUAL

RX371 COMPRESOR CONTROL PANEL (CCP)
NG**50, NG**150, NG300, NG600 COMPRESSORS

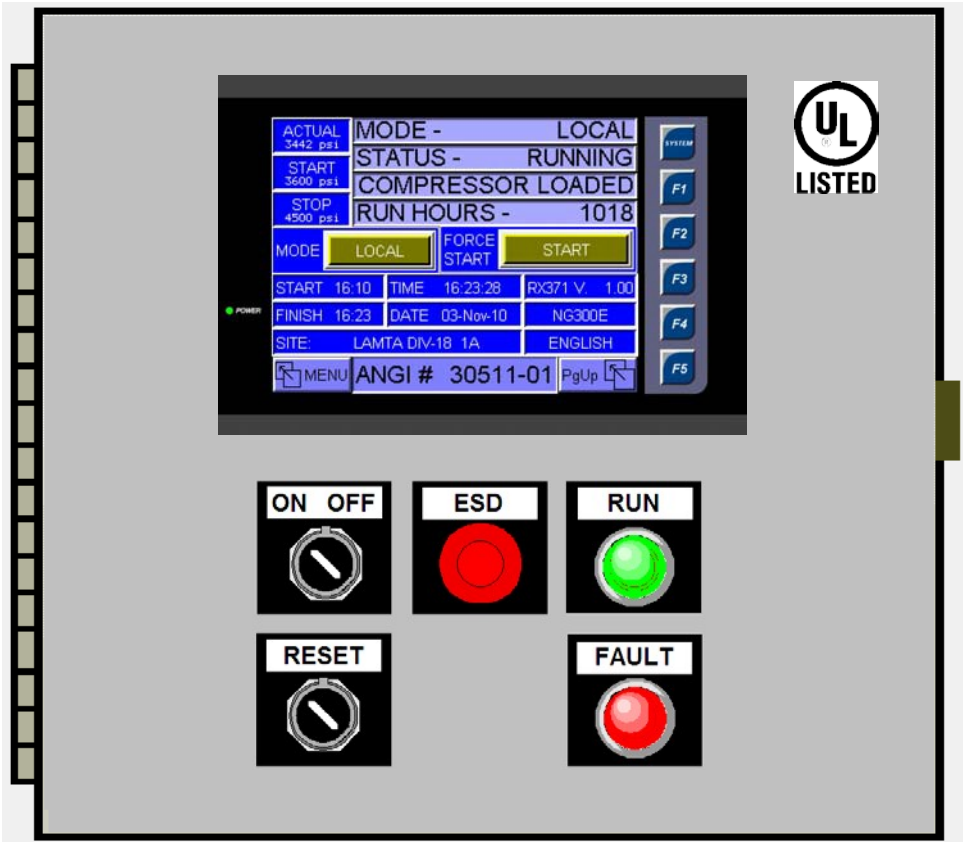

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TABLE OF CONTENTS

1. SPECIFICATIONS

Compressor Control Panel

Control System	ANGI CCP RX371 Control System
Power Supply Input	100-240 VAC, 50/60 Hz
Power Supply Output	24 VDC @ 10.0 Amps
Temperature Range	-30 to 60°C
Humidity Range	5 to 95% non-condensing
Approvals	UL File#328888, Control Panels for Hazardous Locations, Class 1 Division 2
Environment	Type 12, 3R, 4, 4X
Standard Panel Size	36”H x 30”W x 10”D

RX371 Controller Parameters

Display Type	5.7” QVGA TFT Color Touch Screen
Display Resolution	320 x 240 pixels
Display Brightness	700 NIT
User Keys	5 Function Keys & System Key
Panel Size	6.0”H x 7.7”D x 2.4”W
CAN Network	CsCAN™
Serial Ports	MJ1 / MJ2, S232 and RS485
Ethernet Port	LAN 10/100 Mbps
USB Port	communication with PC
Smart Stack Modules	mounts up to 4 cards
Removable Media	MicroSD⇔ Flash card

RX371 Software Parameters

Software Package	Cscape™
ANGI Program	ANGI CCP RX371

Electrical Drawing Reference

Control Panel & Electrical Schematic	A80-30-XXXXX
Inter-connection Drawing	A80-50-XXXXX

RX371 Program Outline

Setup Screens	machine setup parameters (password protected)
Networks	controller communications
Operator Screens	machine screen displays
Analog Input Monitor	read/scale analog inputs
Digital Input Monitor	read digital inputs
Compressor	compressor control
Lead-Lag	master compressor control
Priority Panel	priority control
Time Fill	time fill control
Time Scheduler	start-stop times for compressor
Digital Outputs	digital outputs & display lamps
Alarm Display	fault code & type with time & date stamp
Alarm Log Display	fault log history
Warning Log Display	warning log history
Flash Memory	save/restore program and setpoints

2. IMPORTANT INFORMATION

USER MODIFICATION
ANGI must authorize all modification to this equipment. Any unauthorized modification to this equipment and or software will void the warranty. Modification may damage the equipment and cause bodily injury.

DISCLAIMER
ANGI disclaims any responsibilities whatsoever to the customer or to any person for injury or damage to, or loss of, property or value resulting from the use of its products which have been subjected to misuse, accidents, misapplied, repaired by unauthorized person, or improperly installed.

NOTICE: This manual is as current as possible at the time of printing and is subject to change without notice. For information not covered in this manual or further clarification, contact ANGI Customer Service.

CONTRACTOR OR INSTALLER: Leave this manual with the Unit station after installation is complete.

CUSTOMER: Retain this manual for future reference.

3. INTRODUCTION

This manual contains information on the operation and maintenance of ANGI RX371 Compressor Control Panel, CCP, used in vehicle re-fueling applications. ANGI CNG Compressor Stations are designed for continuous duty, unattended operation. This compressor station compresses natural gas to a discharge pressure of 4500 psig at the specified inlet pressure.

The Compressor Control Panel is controlled by an ANGI RX371 control system. It provides automated compressor operation, sequence valve operation, shut down limit monitoring, fault annunciation, and remote paging annunciation.

The ANGI RX371 includes a graphical screen display and Smart Stack I/O modules. The RX371 provides controller, networking, I/O and operator interface capabilities in one unit using a visual graphic color touch screen display. The RX371 has Serial and CAN (Controller Area Network) communication ports. The controller includes embedded features such as Ethernet, MicroSD⇔ Flash and Web Server. The units contain an USB port for programming, debugging, monitoring and network administration from an IBM-compatible PC.

Cscape Software is used with the Graphical RX371. The Windows - based software package aids in the integration of a CAN-based Distributed Control System. The program is used for configuring controllers. Cscape is also used for RX371 ladder logic, user displays, network configuration for global digital and analog data, setting system-wide security and monitoring other controllers in the system. The operator can upload, download, monitor and debug to any node on the network.

4. NETWORKS

The RX371 Controller has several network options to allow remote communications.

CsCAN is a peer-to-peer network developed by Horner Electric. CsCAN is similar to RS485 with multi-drop Nodes on the network. Networks exceeding the maximum total cable length must make use of repeaters. For example, a 125KBaud network running on Belden 3084A Cable can be extended from 500 meters. The two nodes at the physical end-points need to have 121 ohm, 1%, ¼ Watt terminating resistors connected across the CN_L and CN_H terminals.

Ethernet is built into RX371 controllers to provide advanced Ethernet communication capabilities. The Ethernet port Module uses a standard TCP/IP protocol. The RJ45 connector with a CAT5 or CAT6 cable can connect to a network hub/switch. It can communicate beyond the local network and onto the Internet. To do so, the Ethernet must be configured with the IP Address of a Network Gateway server, which allows communication outside the local network.

Modbus TCP is a Master/Slave protocol, which allows a remote Modbus TCP Master (client) to request services from a Modbus TCP Slave (server). All Modbus requests that contain the Ethernet Module's IP Address are serviced. Each Ethernet Module must have its own unique IP Address. The method uses Modbus Reference Table Shown here,

RX371 Reference	Maximum Range	Modbus Reference	Modbus Command(s)
%Q	2048	00001	Read Coil Status
%M	2048	03001	
%QG	256	09001	
%I	2048	10001	Read Digital Input Status
%IG	256	13001	
%AI	512	30001	Read Analog Input Register
%AIG	32	33001	
%AQ	512	40001	Read Analog Output Register
%AQG	32	46001	
%R	2048	43001	Read Holding Register

5. CONTROL SYSTEM OVERVIEW

The Compressor Control Panel, CCP, was developed by ANGI to provide complete compressor control functions required to allow fully automatic, unattended operation. The RX371 controller provides fault code annunciation and log for quick fault recovery.

The Compressor System contains the reciprocating compressor, safety relief valves, inter-stage cooling, and coalescing filters. The gas is compressed to the specified discharge pressure in multiple stages of compression. An on-skid automatic inlet valve allows gas flow to the compressor. The inlet valve is open when the compressor is warming-up, running loaded, and cooling down. This valve remains closed when the compressor is off or in stand-by modes. After the final stage filtration, the discharge pressure is monitored by the RX371 control system to determine if the compressor should start, continue running, or stop compressing gas. The Re-circulation System includes tubing lines and valves are installed between the 3rd and 4th stage filters and the receiver tank. During warm-up and cool-down and at pre-determined intervals during loaded operation, gas is allowed to flow through these lines. During these times, the compressor is operating unloaded which allows smooth starts and stops.

The Emergency Shutdown, ESD, is monitored by the ESD control relay located in the Compressor Control Panel. ESD is active when the ESD relay is de-energized. The ESD pushbutton, located on the panel, may activate an ESD. Also Gas Detectors that sense a High Gas Alarm will activate an ESD. Once ESD is active, the Emergency Shutdown stops all compressor operations. The RX371 activates an ESD fault screen and may illuminate an ESD lamp. Activate the Reset pushbutton to return the controller to normal operation.

6. MASTER CONTROL OPERATION

One CCP may be selected as the Master by setting Node ID = 1. The CCP with Master Control provides a coordinated lead-lag start/stop control for multiple compressor stations. Monitoring all controllers on each compressor station provides remote compressor sequence control and fault monitoring and annunciation. The Master Controller monitors the discharge or storage pressure as well as the RUN HOURS of each compressor via a network connection. The Master calls the required number of compressors to satisfy the filling demands. The Lead-Lag control determines which compressors will run to complete the filling sequence. Each compressor is assigned Lead, Lag#1, or Lag#2 based on total run hours. For any/all compressors to be available the following conditions must occur.

- CsCAN Network is OK.
- One Compressor selected in Master.
- ON Key Switch is selected
- REMOTE HMI Switch is selected.
- CCP not Faulted

The Lag compressors have a wait Start Time that allows each compressor to wait 30 seconds before starting the next lag compressor.

Power Generators may limit the number of compressors allowed to run and is setup in the Master. Also the Soft-Start Drive may require parameter changes to improve total power efficiency.

7. REMOTE COMPRESSOR OPERATION

All multiple compressors shall operate in REMOTE mode. The REMOTE HMI Switch is selected and the ON/OFF key switch placed in the ON position. The DEMAND START signal from the Master will automatically start and stop each compressor. The compressor will sequence through each of the following operating modes. These modes of operation are:

CONTROLS & INSTRUMENTATION

MODE	ELECTRIC DRIVE	ENGINE DRIVE
REMOTE	HMI Switch Select	HMI Switch Select
STANDBY	Key Switch ON	Key Switch ON
DEMAND START	Start Command from Master	Start Command from Master
WARMUP	Start Pre-Lube Start Fan Motor Lube Pressure OK	Run Starter Engine Temp OK Lube Pressure OK
RUNNING	Start Comp Motor Close Load Valve	Full Throttle Close Load Valve
DEMAND STOP	Stop Command from Master	Stop Command from Master
COOLDOWN	Open Load Valve Stop Comp Motor Stop Fan Motor	Open Load Valve Stop Engine

8. LOCAL COMPRESSOR OPERATION

As a stand alone or back-up mode of operation, the compressor can operate in LOCAL mode. Local mode ignores any remote RUN signals from the Master, and will automatically start and stop based on the final discharge pressure measured by the CCP. In LOCAL mode the compressor will start and run when all of the following conditions are met:

The COMPRESSOR ON/OFF key switch located on the front panel of the CCP is turned ON. The REMOTE/LOCAL HMI switch on the Main Screen Display is set to LOCAL mode. The CCP is not faulted. The final discharge pressure is less than the START PRESSURE setpoint in the CCP. The compressor continues to run until the final discharge pressure becomes greater than the STOP PRESSURE setpoint in the CCP, or the compressor is turned OFF or is FAULTED.

In LOCAL mode, each CCP will start and stop independent of the run hours and each machine will operate independent on of the status of the MCP or other CCP's. With power supplied to the station and the ON/OFF key switch placed in the ON position, the RX371 control system will sequence through each of the following operating modes,

MODE	ELECTRIC DRIVE	ENGINE DRIVE
LOCAL	HMI Switch LOCAL	HMI Switch LOCAL
STANDBY	1. Key Switch ON	1. Key Switch ON
START	2. Final < Start Pressure Setpoint	2. Final < Start Pressure Setpoint
WARMUP	3. Start Pre-Lube 4. Start Fan Motor 5. Lube Pressure OK	3. Run Starter 4. Engine Temp OK 5. Lube Pressure OK
RUNNING	6. Start Comp Motor	6. Full Throttle
LOAD	7. Close Load Valve	7. Close Load Valve
SHUTDOWN	Final > Stop Pressure Setpoint	Final > Stop Pressure Setpoint
COOLDOWN	8. Open Load Valve 9. Stop Comp Motor 10. Stop Fan Motor	8. Open Load Valve 9. Stop Engine
STANDBY	Final > Start Pressure Setpoint	Final > Start Pressure Setpoint

Stand-By Mode

In Stand-by mode the storage is full and the compressor is stopped. The control system monitors the discharge pressure against a START pressure limit. The compressor will remain in this mode until the storage is falls below the START pressure limit.

Warm-Up Mode

In Warm-Up mode the compressors have staged lubrication and warm-up times. The different applications have specific warm-up modes. Motor driven compressors require a Pre-Lubrication Time. The Pre-Lube may restart if lubrication pressure is not achieved within the timer setup. Up to three restarts may occur before a Pre-Lube Time Out alarm is annunciated.

Engine driven compressors require an Engine Warm-Up Time. The Engine Starter is cranked to start the engine. The engine may restart up to 5 tries after failed starts and a Max Starts Exceeded alarm is annunciated. Once started the engine accelerates to warm speed. The engine remains at warm-up speed until the coolant temperature rises above the minimum temperature setpoint. Engine Warm-Up parameters are set at the factory.

Once the control system detects that the gas storage has fallen below the START pressure limit, the inlet valve opens and the compressor drive motor is started. During this warm-up period the load valve is open so that gas is simply re-circulated through the captive receiver tank.

Load Mode

After a preset warm-up time period, the control system switches to loaded operation. To transition from the warm-up mode, while the compressor motor continues to run, the load valve is closed forcing the gas to flow into to the discharge piping rather than re-circulate. In this mode the load valve is opened at pre-determined timed intervals to drain the filter bowls of accumulated fluids. The control system will continue to run in this mode until the discharge pressure reaches the STOP pressure setpoint defined in the RX371 controller (or a REMOTE RUN signal is turned OFF by the MCP if the CCP is in REMOTE Mode).

Run Hours accumulate a totalized count during running operation. The hour count may be used for maintenance schedules and Master Lead-Lag control.

Cool-Down Mode

Once the controller determines storage pressure is above the STOP pressure setpoint, the load valve opens and the compressor motor continues to run for a period of time (Cool Down #1 Timer). The compressor cools with the fan running for a period of time (Cool Down #2 Timer). After the Cool-Down timers expire, the control system returns to STAND-BY mode. (or the MCP turns OFF a DEMAND RUN signal if the CCP is in REMOTE Mode).

Faulted

During any of the modes of operations, the control system may detect a shutdown condition and the machine will be placed in FAULTED mode. In this mode the inlet suction valve is closed and compressor motor is stopped. The fault code and type of alarm are displayed on the RX371 Alarm Screen.

9. STARTUP SEQUENCE

The Startup Sequence outlines the Timers and Sequence of operation. All Timers are site specific and do not reflect the settings in this chart. Refer to Warm-Up Timers function and description.

STANDBY: The ON/OFF Key switch is set to ON.

LOCAL START: The Final Discharge Pressure falls below the Start Setpoint pressure.

REMOTE START: The Master Controller sends a Demand Start signal to ON.

INLET VALVE: The Inlet Valve is set to OPEN.

START DELAY #1 is the time between the inlet valve opening and the pre-lube pump start.

PRELUBE MOTOR: The Start Delay #1 timer is complete and sets the Pre-Lube to RUN.

START DELAY #2 is the time between the pre-lube pump start and cooling fan start.

FAN MOTOR: The Start Delay #2 timer is complete and sets the Fan Motor to RUN.

LUBE OK: The lube oil pressure is above minimum lube pressure setpoint.

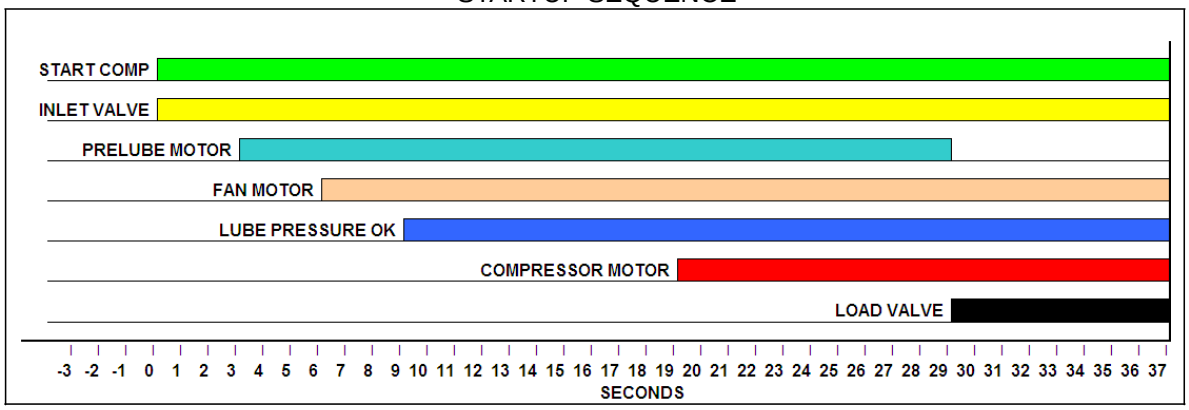
START DELAY #3 is the time between the Lube pressure reaching minimum lube pressure and the compressor motor start.

COMPRESSOR MOTOR: The Start Delay #3 timer is complete and sets the Compressor Motor to RUN.

WARM-UP DELAY is the time between the compressor motor starting and the load valve closing.

LOAD VALVE: The Warm-Up Delay timer is complete and set the Load Valve to CLOSE. The Pre-Lube Motor will stop.

STARTUP SEQUENCE



10. SHUTDOWN SEQUENCE

The Shutdown Sequence, Cool-down, outlines the Timers and Sequence of operation. All Timers are site specific and do not reflect the settings in this chart. Refer to Cool-Down Timers function and description.

LOCAL STOP: The Final Discharge Pressure rises above the Stop Setpoint pressure.

REMOTE STOP: The Master Controller sends a Demand Stop signal to OFF.

INLET VALVE: The Inlet Valve is set to CLOSE.

LOAD VALVE: The Load Valve is set to OPEN.

COOL-DOWN DELAY #1 is the time between the Load Valve opens and stopping the compressor motor. The compressor runs in Recirculation Mode.

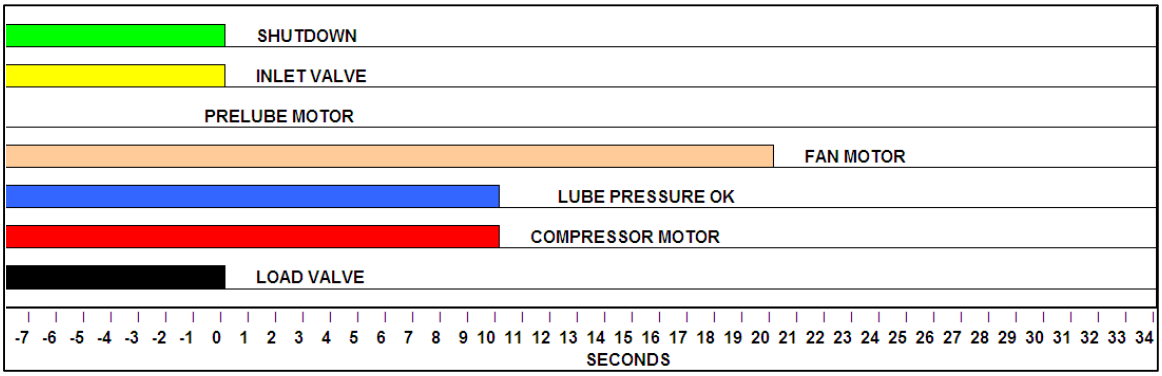
COMPRESSOR MOTOR: The Cool-Down Delay #1 timer is complete and sets the Compressor Motor to STOP.

COOL-DOWN DELAY #2 is the time between the Compressor Motor stop and the Cooling Fan Motor stop.

FAN MOTOR: The Cool-Down Delay #2 timer is complete and sets the Fan Motor to STOP.

STANDBY: The controller goes into Standby Mode after the Fan Motor stops.

SHUTDOWN SEQUENCE DIAGRAM



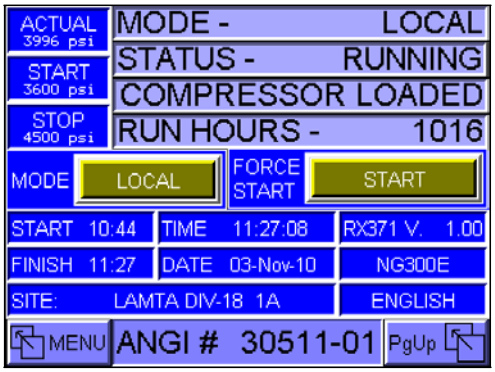
11. OPERATOR SCREENS

The controllers contain operator screens that allow the User and Alarm screen numbers to be read. The following is a definition of the two types of screens:

Alarm Screen - These screens are forced to display faults generated in ladder logic. Follow the screen instructions to acknowledge and clear alarms.

User Screen – These screens display the CNG process. The operator can switch between screens by using the global keys or by using the NEXT (UP) and PREVIOUS (DOWN) touch keys on the controller.

11.1. MAIN SCREEN



START TIME – The time compressor starts in Hour: Minute (24 Hour Clock).

FINISH TIME – The time compressor stopped in Hour: Minute (24 Hour Clock).

SITE – Displays the customers name and location.

TIME – The controllers real time clock in Hour: Minute: Second (24 Hour Clock).

DATE – The controllers real time clock in Day: Month: Year (real time clock).

CONTROLLER – Displays the controller type and software revision level.

COMPRESSOR – Displays the model # for the compressor.

LANGUAGE – Displays the language used for all operator screens.

The MAIN Screen displays the current operation for the compressor. The F5 key is a short cut and directs the “MAIN” screen to display.

MODE - The front panel key switches establish the active operating mode. The modes of operation are:

- OFF = Key Switch set to OFF
- LOCAL = HMI Switch set to Local
- REMOTE = HMI Switch set to Remote

STATUS - The control system displays the current status and sequence. The Step Sequence and Status modes are:

0. OFF
1. STANDBY
2. START PRELUBE MOTOR (Note 1)
3. START FAN MOTOR
4. PRELUBE < MIN. PRESSURE
5. LUBE PRESSURE OK
6. START COMP. MOTOR
7. COMP. LOADED
8. COMP. UNLOADED
9. STOP COMP MOTOR
10. STOP FAN MOTOR

RUN HOURS – The total hours accumulated while running in Load mode.

ACTUAL – Displays the current pressure, final discharge, measured by the CCP.

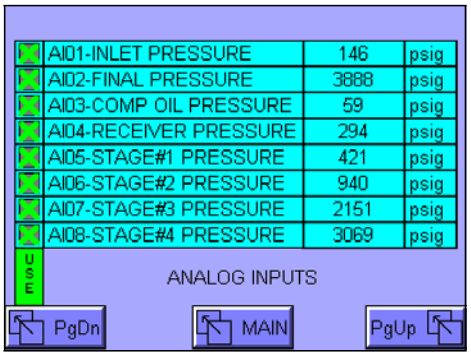
START – Displays the target start pressure.

STOP – Displays the target stop pressure.

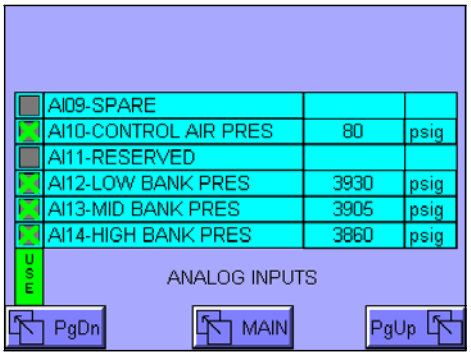
(Note*1) The Pre-Lube Motor/Pump shall restart if minimum pressure is not achieved. Up to 3 restarts may occur. The 4th attempt will annunciate a fault.

11.2. ANALOG INPUT SCREENS

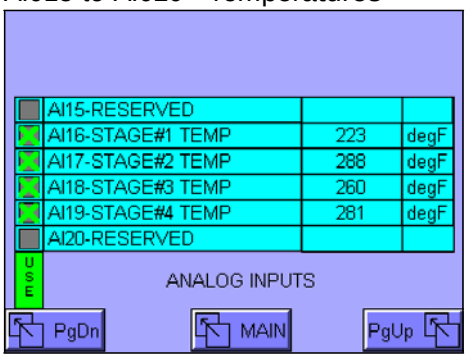
AI001 to AI008 - Pressures



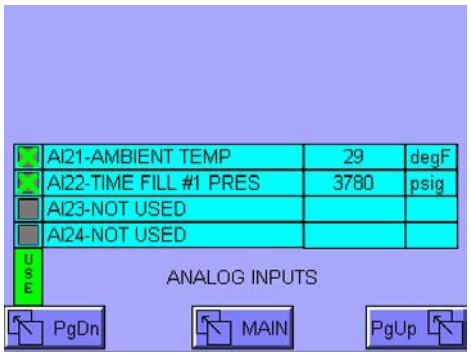
AI009 to AI014 - Pressures



AI015 to AI020 - Temperatures



AI021 to AI024 – Time Fill



The Analog Input %AIxxx is associated with a SmartStack™ I/O module. The Analog Inputs are monitored in engineering units. The inputs are configured 4 to 20 mA signal = 6400 to 32000 count.

USE SIGNAL - Signal is configured in Setup screen.

= The controller enables "USE" the signal.

= The controller disables the signal.

The values are scaled and displayed to their respective engineering units. Refer to ANGI P&ID drawings for proper transducer scaling. Display options for pressure include psig, bar, or MPa. Display options for temperatures include °F or °C.

SmartStack™ I/O is a module that is snapped onto the RX371 controller. Analog Inputs have a range of 0 to 20 mA.

<u>Compressor</u>
AI001 – Inlet suction pressure (after inlet valve).
AI002 – Final discharge pressure (after cooler).
AI003 – Lube oil pressure (after oil pump).
AI004 – Receiver tank pressure.
AI005 to AI008 – Inter-stage cylinder discharge pressures.
AI010 – Control air pressure (air/gas operated solenoid valves).

<u>Gas Detector (Option)</u>
AI011 – Reserved for on skid Gas Detector, %LEL.

<u>Priority Panel (Option)</u>
AI012 – reserved for Low Bank Pressure
AI013 – reserved for Mid Bank Pressure
AI014 – reserved for High Bank Pressure

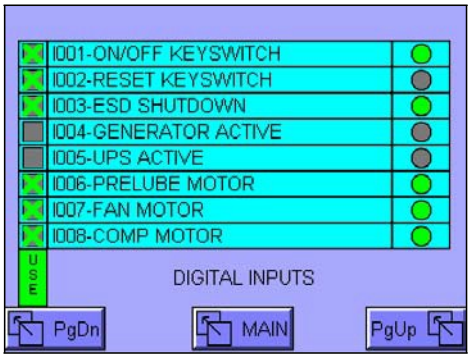
<u>Time Fill (Option)</u>
AI021 – reserved for Ambient Temperature
AI022 – reserved for Time Fill Pressure

Pressure transducers are bonded strain gauges that provide 4-20 ma current output over the full pressure range.

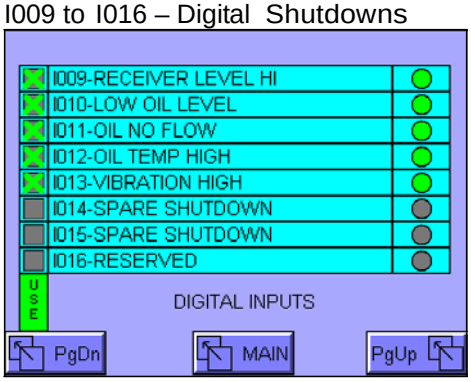
RTD'S are 100 ohm platinum tip sensing element whose resistance changes with temperature.

11.3. DIGITAL INPUT SCREENS

I001 to I008 – Control Panel



I009 to I016 – Digital Shutdowns



The Digital Input %Ixxx is associated with a Smart Stack™ I/O module. 1-bit memory stores the state of one of the digital inputs.

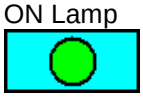
USE SIGNAL - Signal is configured in Setup screen.

= The controller enables "USE" the signal.

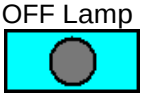
= The controller disables the signal.

The Digital Inputs are displayed with Lamps. Input Lamps are GREEN when ON (active), and GRAY when OFF (inactive). Refer to section "Digital Input Setup" for configuration settings.

ON Lamp



OFF Lamp



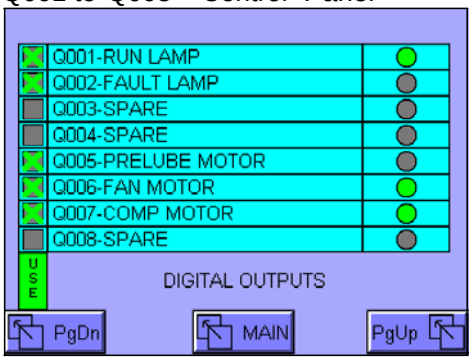
SmartStack™ I/O is a module that is snapped onto the RX371 controller. Digital Input bits are set to 0 = OFF or 1 = ON.

Digital Inputs

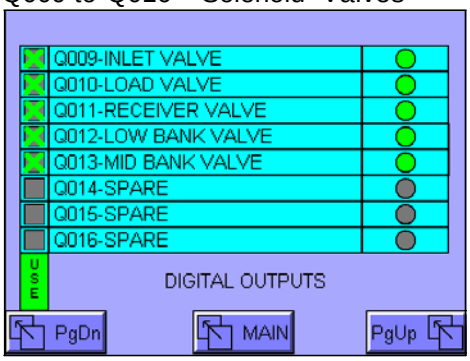
%I001…ON-OFF key switch, operator activates selection (maintained).
%I002…RESET key switch used to reset alarms and warnings (spring return).
%I003…ESD Shutdown stops compressor and closes inlet valve.
%I004…Generator Active indicates Gen-set is running and transfer switch is engaged.
%I005…UPS, Uninterruptible Power Supply, indicates AC line power is off and controller is on battery power.
%I006…Prelube Motor indicates the motor is running (motor starter auxiliary contact).
%I007…Cooling Fan Motor indicates the motor is running (motor starter auxiliary contact).
%I008…Compressor Motor indicates the motor is at speed and running (soft starter bypass contact).
%I009…Receiver Tank Liquid Level is High and compressor stops on alarm.
%I010…Low Oil Level, indicates the crankcase oil level is low and causes compressor to stop and alarm.
%I012…Oil Temperature is High and causes the compressor to stop and alarm.
%I013…Vibration is High and contact is set causing the compressor to stop and alarm. Vibration switch must be reset.

11.4. DIGITAL OUTPUT SCREENS

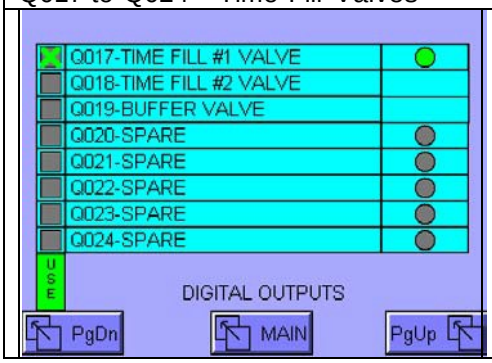
Q001 to Q008 – Control Panel



Q009 to Q016 – Solenoid Valves



Q017 to Q024 – Time Fill Valves



The Digital Output Q0xx is associated with a Smart Stack™ I/O module. 1-bit memory stores the state of one of the digital outputs.

USE SIGNAL - Signal is configured in Setup screen.

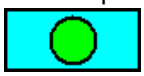
= The controller enables "USE" the signal.

= The controller disables the signal.

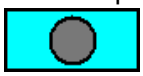
This screen monitors the Digital Outputs. Output Lamps are GREEN when ON (active), and GRAY when OFF (inactive).

SmartStack™ I/O is a module that is snapped onto the RX371 controller. Digital Output bits are set to 0 = OFF or 1 = ON.

ON Lamp



OFF Lamp

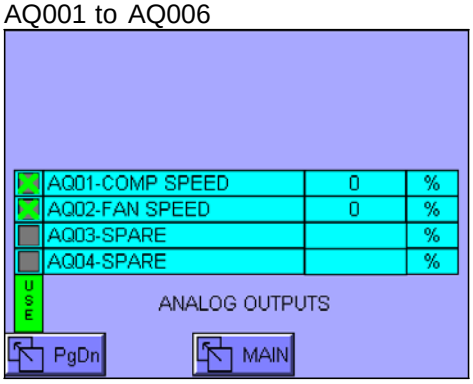


Digital Outputs

%Q001…Run Lamp indicates the compressor is running.
%Q002…Fault Lamp indicates the compressor is stopped and annunciates an alarm.
%Q005…Prelube Motor Run is a command that starts the motor (Motor Starter Panel).
%Q006…Fan Motor Run is a command that starts the motor (Motor Starter Panel).
%Q007…Compressor Motor Run is a command that starts the motor (Motor Starter Panel).
%Q009…Inlet Valve is a command that opens the valve (N.C.).
%Q010…Load Valve is a command that closes the valve (N.O.).
%Q011…Receiver Valve is a command that opens the valve (N.C.).
%Q012…Low Bank Valve is a command that closes the valve (N.O.) in Priority Panel.
%Q013…Mid Bank Valve is a command that closes the valve (N.O.) in Priority Panel.
%Q017…Time Fill Valve is a command that opens the valve (N.C.) in Time Fill Panel.

12. ANALOG OUTPUT SCREENS

AQ001 to AQ006



The Analog Output AI0xx is associated with a SmartStack™ I/O module. The Analog Outputs are monitored in engineering units. The inputs are configured 4 to 20 mA signal = 6400 to 32000 count.

USE SIGNAL - Signal is configured in Setup screen.

= The controller enables "USE" the signal.

= The controller disables the signal.

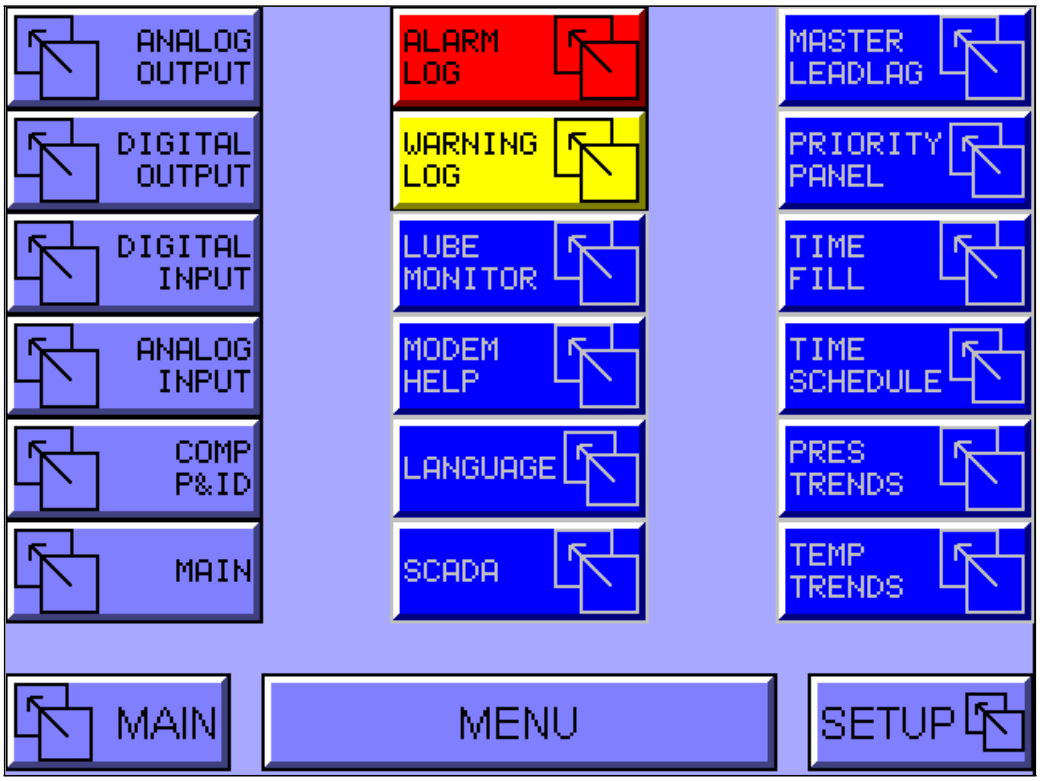
The values are scaled and displayed to their respective engineering units. Refer to ANGI P&ID drawings for proper scaling. Display options for outputs include percent, or 4-20mA.

SmartStack™ I/O is a module that is snapped onto the RX371 controller. Analog Outputs have a range of 0 to 20 mA.

Analog Outputs

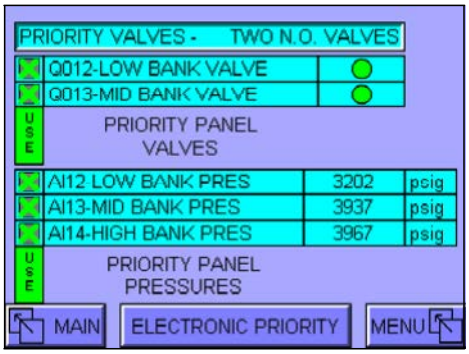
%AQ001…Compressor Speed sends signal to VFD (0 – 1800 rpm).
%AQ002…Fan Speed sends signal to VFD (0 – 1800 rpm).
%AQ003…Recirculation Valve (0 – 100% Open).

13. MENU



Access this screen from the “MAIN” screen by selecting “MENU” Touch Key. The Menu Screen provides quick access to the all operator screens. Press the Touch Key associated with the specific screen.

14. ELECTRONIC PRIORITY PANEL



The Master Compressor Station can monitor the Electronic Priority Panel mounted on the skid. Storage pressures are displayed and may be selected to Start/Stop the compressor. The Priority Panel is controlled by an RX371 control system.

The pressures are displayed to their respective engineering units. Refer to ANGI P&ID drawings for proper transducer scaling. Display options for pressure include psig, bar, or MPa.

ON Lamp 

OFF Lamp 

Priority Valve Panel

The Priority Valve Panel system provides fill sequencing to a three-bank storage system. The electronic priority system includes unloader valves, pressure gauges, and check valves. Gas is initially delivered to the 'HIGH' bank storage tank and direct vehicle fill line. After 'HIGH' bank storage tank is full gas diverts to 'MID' bank storage tank. When both the 'HIGH' and 'MID' tanks are full, gas delivers to the 'LOW' bank storage tank.

Priority Operation

The RX371 control system will sequence through each of the following operating modes.

a) The Priority Panel is enabled in the setup screen.

b) The Priority Panel is not faulted.

c) The High Bank Pressure is less than the RESET PRESSURE setpoint (setup screen).

d) The compressor fills High Bank until the pressure becomes greater than the SWITCH PRESSURE setpoint (setup screen) and opens the Mid Bank Valve.

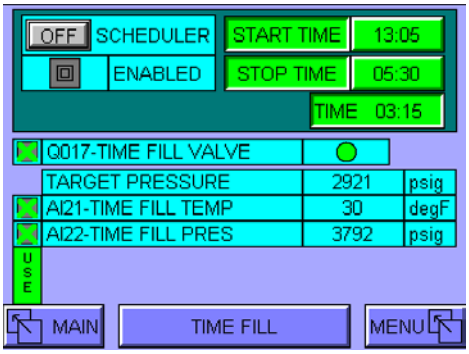
e) The compressor fills Mid Bank until the pressure becomes greater than the SWITCH PRESSURE setpoint (setup screen) and opens the Low Bank Valve.

f) The compressor fills Low Bank until the Final pressure is achieved.

Priority Faults

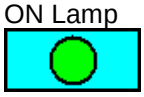
During any of the modes of operations, the control system may detect an alarm and the controller will be placed in FAULTED mode. The fault code and type of alarm are displayed on the Alarm Screen.

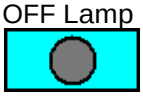
15. TIME FILL PANEL



The Master Compressor Station can monitor the Time Fill Panel mounted on the skid. Time Fill pressure is displayed and may be selected to Start/Stop the compressor. The Time Fill is controlled by the RX371 control system.

The pressures are displayed to their respective engineering units. Refer to ANGI P&ID drawings for proper transducer scaling. Display options for pressure include psig, bar, or MPa.

ON Lamp 

OFF Lamp 

Time Fill Panel

Time Fill Panels are designed to temperature compensate fueling of CNG transit vehicles. The RX371 controller provides the means to open and close a fill valve. The vehicles are filled to a target fill pressure. The target pressure is temperature compensated when filling of CNG vehicles that are connected to Time Fill Posts through the Time Fill Panel.

TARGET PRESSURE: the setpoint pressure is temperature compensated and defines the target pressure as related to ambient temperatures.

TIME FILL PRESSURE: the current pressure reading from the time fill line to hose pole.

TIME FILL TEMPERATURE: the current ambient probe temperature reading.

FILL VALVE: the normally closed valve status.
ON = valve opens when Fill Pressure is below Target Pressure minus 500 psig.
OFF = valve closes when Fill Pressure is above Target Pressure.

Time Fill Operation

With power supplied to the station, the control system will sequence through each of the following operating modes.

a) The Time Fill Panel is enabled in the setup screen.
b) The panel is not faulted.
c) When Fill Pressure is less than the TARGET PRESSURE minus 500 psig the Fill Valve OPENS.
d) The compressor directly fills the transit vehicle until the pressure becomes greater than the TARGET pressure setpoint and CLOSES the Time Fill Valve.

Time Fill Faults

During any of the modes of operations, the control system may detect an alarm and the controller will be placed in FAULTED mode. The fault code and type of alarm are displayed on the Alarm Screen.

Time Fill Scheduler

The Time Scheduler sets the time window that allows the Time Fill to operate and fill vehicles. This feature is useful when filling vehicles during low peak energy periods. Filling is disabled when current time is outside of the time window. Example,

Start Time = 22:30 (10:30PM)
Stop Time = 06:00 (6:00AM)

The Time Scheduler is Enabled/Disabled from the SCHEDULE HMI switch. Times are edited in the Setup Screen.

SCHEDULER: selects the operating mode,
OFF = Disabled
ON = Enabled (Fill between Start and Stop Time)

ACTIVE: displays the current Scheduler Status.

OFF – current time is outside of Scheduler Start ↔ Stop times and fill operations are prohibited.

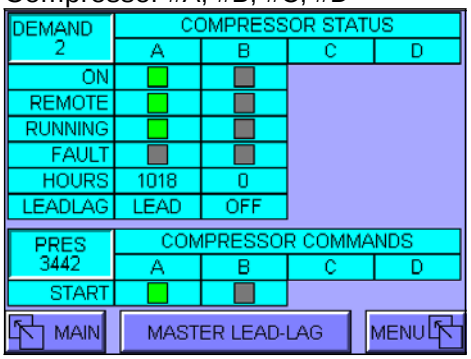
ON – current time is within the Scheduler Start ↔ Stop times and fill operations are allowed.

START: displays the start time setpoint hour: minutes.

STOP: displays the stop time setpoint hour: minutes.

16. MASTER LEAD-LAG

Compressor #A, #B, #C, #D



The Master Compressor Station can remotely monitor the Slave Compressors B, C, and D. Compressor A is selected as the Master. Status is displayed for each compressor. Only compressors that are enabled are shown on screen.

Lamps are GREEN when ON (active), and GRAY when OFF (inactive).

ON Lamp

OFF Lamp

The Master controller monitors all Compressor Controller Panels (CCP) via a CsCAN network connection. The Master provides remote Start/Stop control and fault monitoring and annunciation. The Master calls the required number of compressors to satisfy the fueling and storage filling demands. The Lead-Lag control determines which compressors will run by monitoring the RUN HOURS. Total hours determine which compressor is LEAD or LAG. The Master Control Panel determines which compressors are available. The compressor with the least amount of run hours is selected LEAD. The remaining compressors are selected as LAG#1, LAG#2, and LAG #3 respective to least to most run hours. LEAD-LAG selection is active at all times.

Compressor Status

The CsCAN Network monitors the status for the Compressors on the network. The Master sends a heartbeat signal to each node and determines if the node is active. Each unit has a specific Node Address and is assigned below.

NODE	UNIT
1	Compressor Control Panel “A”
2	Compressor Control Panel “B”
3	Compressor Control Panel “C”
4	Compressor Control Panel “D”

The Master monitors the compressors status for nodes that are active. The Master displays the current status for each compressor. Nodes that are inactive are hidden from display.

STATUS	UNIT STATUS
DEMAND	Compressors needed to run
ON	Key Switch is ON
RUNNING	Running and Loaded
REMOTE	Key Switch is REMOTE
FAULT	Alarmed & Faulted
HOURS	Total Run Hours
LEADLAG	Lead-Lag Status

MASTER SEQUENCE - COMPRESSORS

The Master adds the number of compressor available and READY. Generator power may also limit the number of compressors available to run. The DEMAND request may equal but not exceed the number of compressors that are READY. The following conditions are required for the Compressor to run.

Compressor Initial Requirements

- CsCAN Network is OK.
- Compressor selected in Master setup.
- Key Switch set to ON.
- HMI Switch set to REMOTE.
- Compressor is not FAULTED.

The START and STOP pressures monitored by the Master, and default mode selects the final discharge pressure. Options to select Low bank pressure or High bank pressure are available. The Start Modes are selected from the Master Setup.

MODE	START/STOP PRESSURES
1	Final Discharge Pressure (default)
2	Low Bank Pressure
3	High Bank Pressure

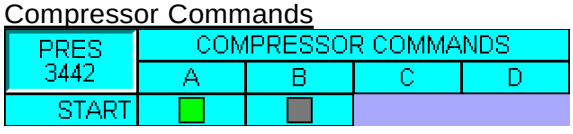
The DEMAND value determines the number of compressors needed to run for the CNG fueling process. The number of compressors allowed running is factored into the demand value.

- Main Electrical Grid (KVA).
- Generator Power (KVA).
- Time Scheduler, Number of compressors allowed running during “Off Time”.

The LEAD compressor shall start immediately. The LAG#1 compressor has a time delay before starting the second compressor. The LAG#1 compressor shall be the first compressor to stop. The LEAD compressor shall be the last compressor to stop. This approach provides energy savings during peak electrical rate charges.

LEAD = least number of run hours
LAG#1 = second least number of run hours
LAG#2 = third least number of run hours
LAG#4 = fourth least number of run hours

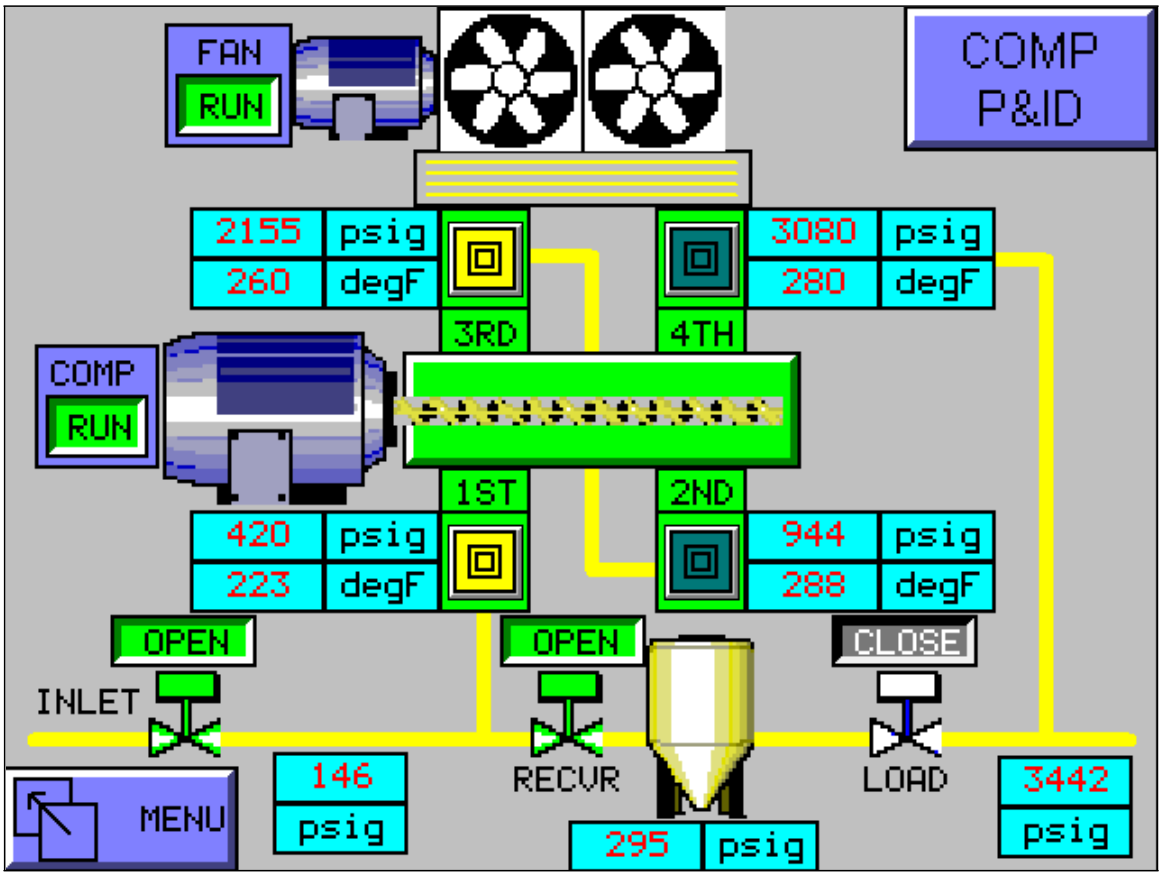
Compressor Commands



The selected pressure used as process value is shown in PRES display. This pressure is used to Start-Stop the Lead-Lag compressors.

The START command uses the CsCAN Network to Start-Stop remote compressors. The Master sends a START command signal to each compressor on the network.

17. COMPRESSOR P&ID



The Compressor P&ID screen shows a reciprocating compressor with motor, inter-stage pressures and temperatures, control valves, and fan cooling. The gas is compressed to the specified discharge pressure in multiple stages of compression. An on-skid automatic inlet valve allows gas flow to the compressor. The inlet valve is open when the compressor is warming-up, running loaded, and cooling down. This valve remains closed when the compressor is off or in stand-by modes. The final stage discharge pressure is monitored and determines if the compressor should start, continue running, or stop compressing gas. The Re-circulation System includes a Load valve, when opened feeds into the Receiver Tank. During warm-up and cool-down and at pre-determined intervals during loaded operation, gas is allowed to flow through these lines. During these times, the compressor is operating unloaded which allows smooth starts and stops.

18. LUBE MONITOR

The Proflo Jr. is a battery-powered microprocessor supplied with Ariel compressors. The Proflo switch senses low flow or no-flow conditions in the compressor cylinder force feed lubrication system to facilitate alarm and shutdown. Loss of battery causes an alarm condition. Compressor cannot restart until battery is replaced.

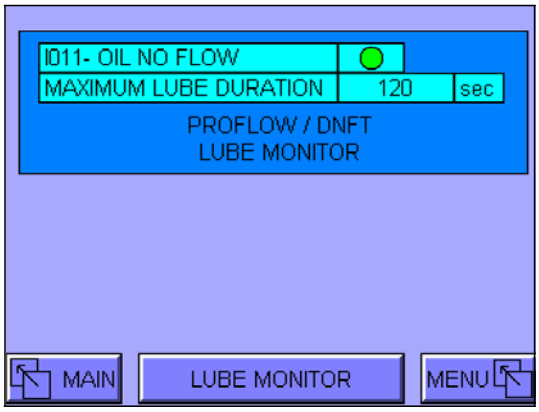
Determine Proflo Jr. Configuration for correct Lube Monitor.

- Orange Wires: Normally Closed (N/C). Contact opens and sends alarm to the RX371.

.

- Yellow Wires: Send a switch closure output with each divider valve cycle to the RX371.

LUBE MONITOR with Proflo or DNFT switch contact

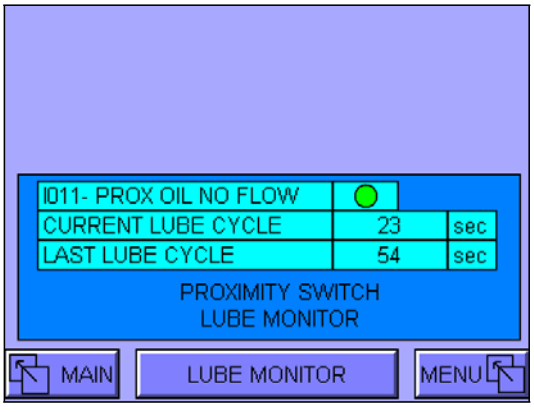


Proflo - Orange Wires
Use this screen display.

DNFT N/C Contact
Use this screen display

Alarm/Shutdown
Contact opens and sends an alarm to RX371.

LUBE MONITOR with PROXIMITY SWITCH



The Proflo Jr. has the option that uses a proximity switch that senses the position of the divider block piston and sends a pulse every time the piston pin completes one lube cycle. The system monitors divider block pulses and totalizes lube oil consumed.

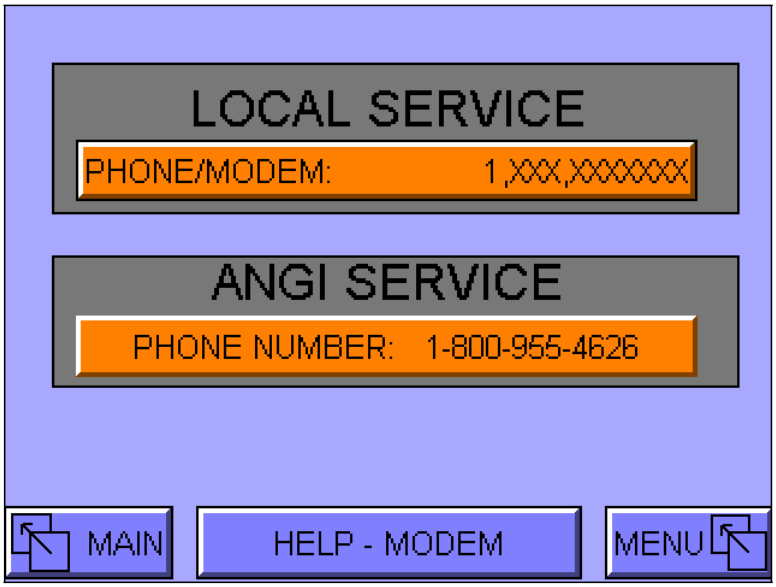
NO OIL FLOW ALARM - There is a machine shutdown with low or no lubrication. The alarm is disable during startup and after the lube delay timer has timed out. The cycle times will vary slightly from cycle to cycle. The shutdown time is calculated:

ALARM LIMIT = (2 x cycle time + 30 seconds)

19. MODEM / HELP

The Industrial Modem is a rugged telephone modem designed for operation in harsh environments. The modem allows the controller to call the “Phone Number” when a compressor has faulted. In addition, the modem allows the ANGI programmer/technician to monitor the RX371 program from a remote computer terminal running Cscape or Envision.

The modem operates at 9600 baud or higher and allows real-time data monitored in the controller ladder program. The user can dial up the site and monitor any controller connected to the CsCAN network.



LOCAL SERVICE PHONE NUMBER - In this box, enter the number to be dialed. Do not use spaces, dashes, or any other punctuations except those required by the modem. Also include any special commands in the dial string, such as those necessary to insert a pause or to defeat Call Waiting. The comma "," is often added to insert a pause to obtain an outside line, or the string *70 is included to defeat Call Waiting.

ANGI SERVICE PHONE NUMBER – Refer to this phone number when contacting the ANGI USA Service. The modem does not use this phone number.

20. LANGUAGES

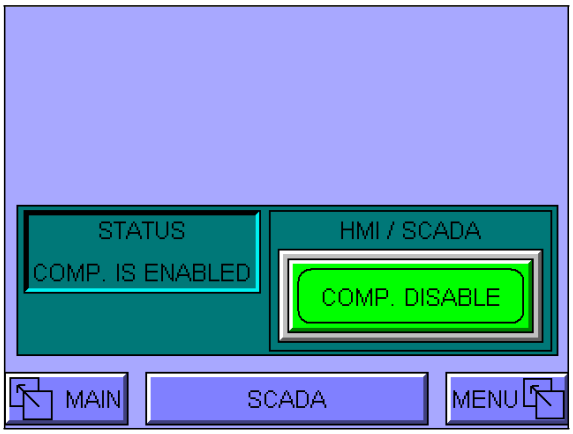
Customized Operator Screens for selected languages (available in future).

The RX371 can display multiple languages (character sets). Currently, however, limitations occur when these character sets include both English characters and Unicode characters, which include the Chinese language. This is due to the large size of the fonts that need to be imported and how the controller needs to compress and fit into font memory.

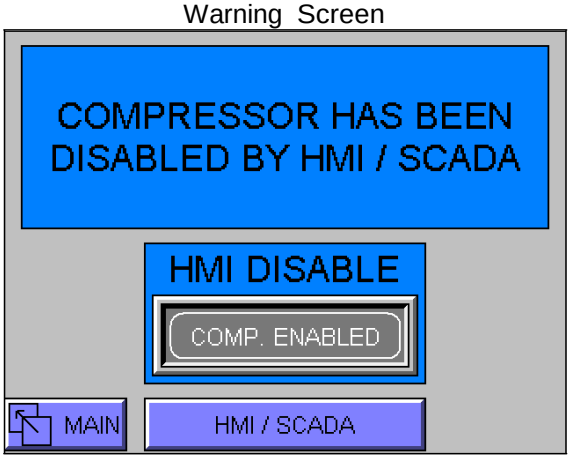
21. SCADA

The SCADA system or HMI may “Disable” a compressor when deemed unsafe to operate. The Warning Screen will be displayed. Once safe to operate the operator or SCADA may place the compressor to “Enabled” and back into service.

MENU – HMI Screen



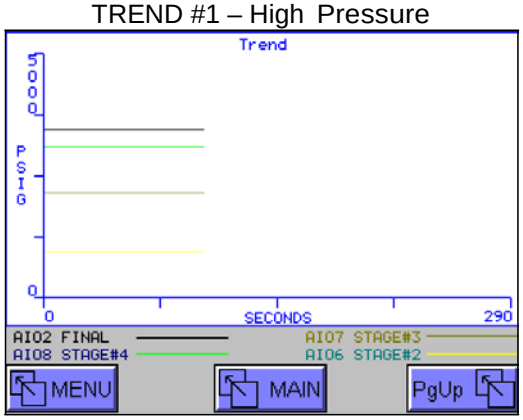
Warning Screen



22. TRENDS - PRESSURE/TEMPERATURE

The trigger plots the defined pens is sampled at the specified sample rate and plotted to the display. Trigger is active while the trigger is ON. The trending will cease when the trigger is OFF. On the detection of a low-to-high transition of the trigger, the previous trend data will be cleared before the new trace begins.

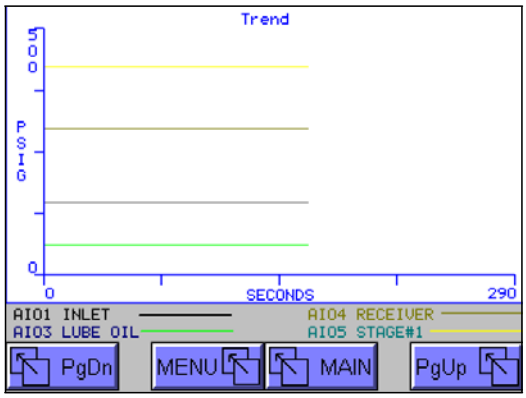
TREND #1 – High Pressure



Trend Setup
Rate = 1 sample per second
Trigger = Compressor Motor Run Command
Y Axis = 0 to 5000 psig
X Axis = 0 to 290 seconds

Pen #1 = AI02 Final Pressure
Pen #2 = AI08 Stage #4 Pressure
Pen #3 = AI07 Stage #3 Pressure
Pen #4 = AI06 Stage #2 Pressure

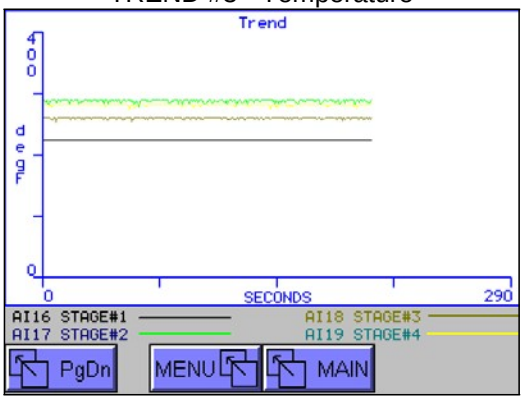
TREND #2 – Low Pressure



Trend Setup
Rate = 1 sample per second
Trigger = Compressor Motor Run Command
Y Axis = 0 to 500 psig
X Axis = 0 to 290 seconds

Pen #1 = AI01 Inlet Pressure
Pen #2 = AI03 Lube Oil Pressure
Pen #3 = AI04 Receiver Pressure
Pen #4 = AI05 Stage #1 Pressure

TREND #3 - Temperature

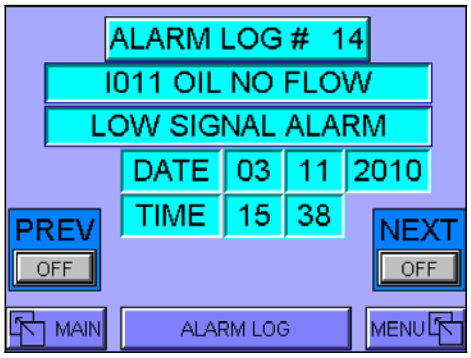


Trend Setup
Rate = 1 sample per second
Trigger = Compressor Motor Run Command
Y Axis = 0 to 400 °F
X Axis = 0 to 290 seconds

Pen #1 = AI16 Stage #1 Temperature
Pen #2 = AI17 Stage #2 Temperature
Pen #3 = AI18 Stage #3 Temperature
Pen #4 = AI09 Stage #4 Temperature

23. ALARM LOG SCREEN

Access the Alarm Log Screen from the Menu screen. The Alarm Log places a time and date stamp to each log entry. The last 100 alarms are logged and stored.



ALARM LOG#: The alarm log number identifies which of the last 100 alarms is being viewed. Enter a number 1 – 99 for a direct access to view an existing Alarm Log.

NEXT: Increase the Alarm Log Number by pressing the NEXT key. When the Alarm Log Number reaches 100, it will advance the Alarm Log Number to 1.

PREVIOUS: Decrease the Alarm Log Number by pressing the PREV key. When the Alarm Log Number reaches 1, it will revert back to Alarm Log Number 99.

ALARM CODE: This displays the current alarm log. All alarms are annunciated and logged with IO Address and short Description. The following table lists the Alarm Codes,

TABLE	ALARM CODE
1- 24	AI001 – AI024 Analog Inputs
46 – 64	I006 – I024 Digital Inputs
97	Dirty Filter
98	Max Starts / Hour
99	Prelube Fail or Engine Starter Fail

ALARM TYPE: The alarm type identifies which condition the alarm was activated. The following table lists the Types of Alarms,

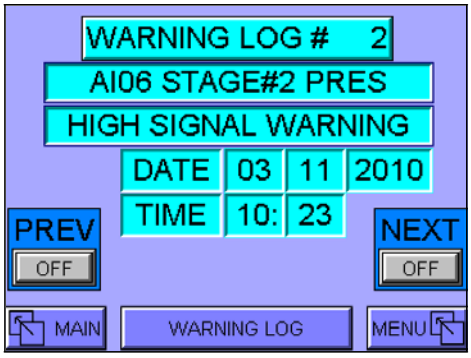
TABLE	ALARM TYPE
0	No Fault
1	Broken Wire (Analog)
2	Low Signal Fault (Analog/Digital)
5	High Signal Fault (Analog)
6	Input Tripped (Internal)
12	Max Starts Exceeded
13	Timed Out

TIME & DATE: Each alarm is tagged with a Time and Date stamp. The time is based on an hour clock 0 – 24 hours. Make sure the System Time is current to provide an accurate alarm time log.

HOUR:	MINUTE	DAY /	MONTH /	YEAR
15	38	03	11	2010

24. WARNING LOG SCREEN

Access the Warning Log Screen from the Menu Screen. The Warning Log places a time and date stamp to each log entry. The last 100 warnings are logged and stored.



WARN LOG#: The warning log number identifies which of the last 100 warnings is being viewed. Enter a number 1 – 99 for a direct access to view an existing Warning Log.

NEXT: Increase the Warning Log Number by pressing the NEXT key. When the Warning Log Number reaches 100, it will advance the Log Number to 1.

PREVIOUS: Decrease the Warning Log Number by pressing the PREV key. When the Warning Log Number reaches 1, it will revert back to Log Number 99.

WARNING CODE: This displays the current warning log. All warnings are annunciated and logged with IO Address and short Description. The following table lists the Warning Codes,

TABLE	WARNING CODE
1- 24	AI001 – AI024 Analog Inputs
46 – 64	I006 – I024 Digital Inputs
97	Dirty Filter

WARNING TYPE: The warning type identifies which condition the warning was activated. The following table lists the Types of Warnings,

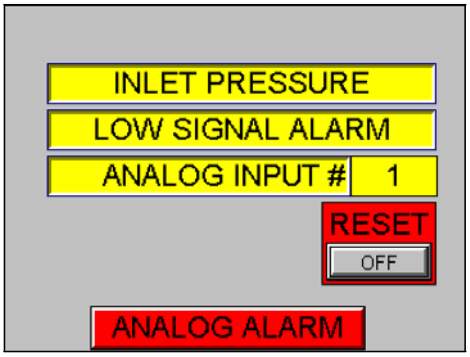
TABLE	WARNING TYPE
0	No Fault
3	Low Signal Warn (Analog)
4	High Signal Warn (Analog)

TIME & DATE: Each warning is tagged with a Time and Date stamp. The time is based on an hour clock 0 – 24 hours. Make sure the System Time is current to provide an accurate warning time log.

HOUR:	MINUTE	DAY /	MONTH /	YEAR
10	23	03	11	2010

25. FAULT SCREENS

The alarm screen is annunciated when a machine fault occurs. A shutdown condition places the machine in FAULT mode and displays the active alarm. The fault is displayed as long as the fault condition exists. The description for the fault and type of fault is displayed.



ANALOG MACHINE FAULT – Analog Inputs
Transducers for pressure, temperature
DIGITAL MACHINE FAULT – Digital Inputs
Devices for level, flow, temp, vibration
MACHINE FAULT – Internal Alarms
Internal for start attempts
NETWORK FAULT – CAN Network
Networks for CsCAN, Ethernet

ALARM CODE: A number of digital inputs and analog transducers are monitored by the control system. This alarm annunciates Code and Type with IO Address. The following table lists the Alarm Codes,

TABLE	ALARM CODE
1- 24	AI001 – AI024 Analog Inputs
46 – 64	I006 – I024 Digital Inputs
98	Max Starts / Hour (Internal)
99	Prelube Fail or Starter Fail (Internal)

NETWORK ALARM CODE: The Nodes that communicate over the CAN Network are monitored by the control system. This alarm annunciates Code and Type with Node Address.

TABLE	NETWORK ALARM CODE
71- 78	Node 1 – Node 8 CsCAN
81 – 88	Node 1 – Node 8 Ethernet

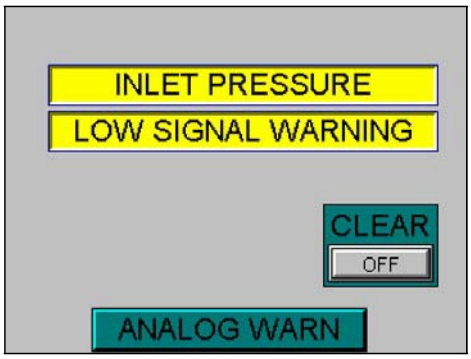
ALARM TYPE: The alarm type identifies which condition the alarm was activated. The following table lists the Types of Alarms,

TABLE	ALARM TYPE
0	No Fault
1	Broken Wire (Analog)
2	Low Signal Fault (Analog/Digital)
5	High Signal Fault (Analog)
6	Input Tripped (Internal),(Comm. Link)
12	Max Starts Exceeded
13	Timed Out

Activate the RESET Key to Acknowledge and Clear the active fault.

26. WARNING SCREENS

The warning screen is annunciated when a machine warning level occurs. A Low or High Warning condition allows the machine to continue running.



ANALOG MACHINE WARNING – Analog Inputs
Transducers for pressure, temperature

MACHINE WARNING – Internal Warnings
Internal for dirty filters

WARNING CODE: A number of analog transducers are monitored by the control system. This Warning annunciates Code and Type with IO Address. The following table lists the Warning Codes,

TABLE	WARNING CODE
1- 24	AI001 – AI024 Analog Inputs
97	Dirty Filter (Internal)

WARNING TYPE: The warning type identifies which condition the warning was activated. The following table lists the Types of Warnings,

TABLE	WARNING TYPE
0	No Fault
2	Low Signal Warning (Analog)
5	High Signal Warning (Analog)
6	Input Tripped (Internal)

Activate the CLEAR Switch or RESET Switch to Acknowledge and Clear the active warning.

27. TROUBLESHOOTING

During the CNG operations, the control system may detect a shutdown condition and the controller will be placed in FAULTED mode. The fault condition must be verified with an on unit gauge or separate test device prior to carrying out any mechanical repairs. This is to insure that the fault indicated is due to the mechanical equipment not the monitoring system.

If the fault can be verified without the unit running, do so. Correct the fault if needed.

- Clear the fault code using the FAULT RESET key switch.

If the fault can only be verified with the unit running, follow the steps below.

- Clear the fault code using the FAULT RESET key switch.
- Turn the ON/OFF key switch to the ON position.
- Verify the fault, correct if needed.
- Clear the fault code using the FAULT RESET key switch.

Compressor Will Not Start

- Verify the compressor is not faulted. Clear any existing fault.
- Verify the key switch is in the ON position.
- Verify the thermal overload on the motor starter located in the control panel is not tripped.
- Verify the Soft-Starter is not faulted, or overload condition.
- Read fault lamps.

27.1. TRANSDUCER FAULTS

The transducer faults are analog fault conditions and must be verified with pressure gauge or separate test device prior to carrying out any mechanical repairs. This is to insure that the fault indicated is due to the mechanical equipment not the monitoring system.

The ESD and Site Shutdowns are digital fault conditions. Check the all controllers to determine the location of the ESD or Site fault condition.

If the fault can be verified without the unit running, do so. Correct the fault if needed. Clear the fault code using the FAULT RESET key switch. Check the faulted transducer for possible causes,

□ Verify the transducer wiring is properly terminated and remedy any loose terminals/wires that may have vibrated loose during operation.

□ Verify the transducer is properly scaled and delivers a 4-20 mA signal to the controller.

□ Verify the transducer is properly mounted and cable runs do not interfere with rotating equipment.

□ Verify all electrical boxes and connections are free of moisture/water.

27.2. CONTROLLER FAULTS

Verify the RX371 Controller for possible causes that inhibit operation. Check the following RX371 items and refer to System Menu Section for additional details,

□ Verify the RX371 controller is in RUN mode via System Menu/Status/Mode = RUN.

□ Verify the RX371 controller is in RUN:
IDLE indicates RX371 is in STOP mode.
DO/IO indicates ladder program does not execute.
RUN indicates ladder program is running.

□ Verify the RX371 controller CAN LED indication:
CAN is OK when randomly flashes during CAN communications.

□ Verify the RX371 controller has no errors via System Menu/Diagnostics.
All parameters = OK.

□ Verify the RX371 display is visible. Adjust the contrast for best visibility via,
System Menu/Set Contrast.

□ Power cycle the RX371 controller and verify the Self-Test passed.

□ Verify the RX371 controller is not in direct sunlight. If required, add a bezel to protect the controller.
□ Verify the internal cabinet temperature does not exceed 60°C. The RX371 controller may suspend operating at high temperatures.

□ Verify the RX371 controller has the correct time and dates via System Menu/Time-Date.

□ Verify the RX371 controller CsCAN Network is functional via,
System Menu/Network ID/Network = OK.

27.3. PANEL FAULTS

The Control Panel may not operate due to a faulty component. Check the panel for possible causes,

□ Verify fuses are not blown and supply 120/240 VAC power circuits. Replace with correctly sized fuse per electrical drawing.

□ Verify fuses are not blown and supply 24VDC power circuits. Replace with correctly sized fuse, per electrical drawing.

□ Verify the electrical wiring is properly terminated and remedy any loose terminals/wires that may have vibrated loose during operation.

□ Verify the panel is free of moisture/water.

□ Verify relay contacts properly open or close when the relay coil is energized.

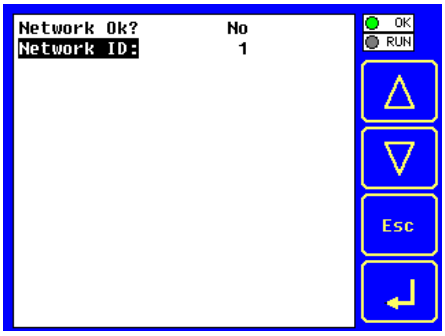
28. SYSTEM MENU

The System Menu is used to access and edit information using the RX371 front panel. To enter the System Menu, press both ↑ and ↓ keys (Up and Down arrows) on the front panel of the RX371. Press the ↑ and ↓ keys to scroll up or down through the menu options. The following list contains parameters that can be set or monitored while using the System Menu:

Set Network ID Æ
Set Network Baud Æ
View Status Æ
View Diags Æ
View I/O Slots Æ
View Protocols Æ
Set Fkeys Mode Æ
Set Serial ports Æ
Set Time/Date Æ
Set Beeper Æ
Set Screen Æ
Removable Media Æ
Fail-Safe System Æ
Clone Unit Æ
(Press ESC to Exit)

Navigating through the System Menu by pressing the ↑ and ↓ keys scroll up or down through the menu options. Pressing the Enter key selects the system screen that the indicator arrow is pointing to. Once in a system screen, press ESC (if not currently modifying a field) to return to the main System Menu.

Set Network ID Æ

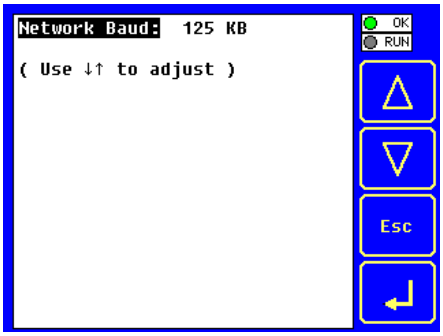


Network OK contains the current network status.

Network ID contains the current Node Address of the controller. Each unit on the network needs a unique ID number. Enter the correct ID number before physically attaching the unit to the network.

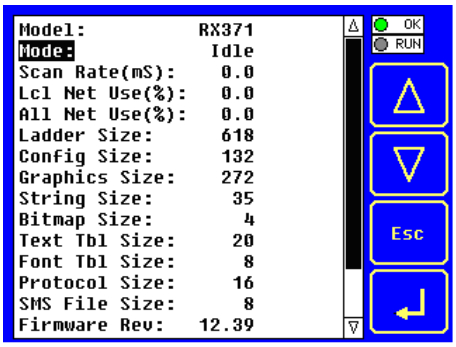
Node 01 = Master/Compressor “A”	Node 10 = Electronic Priority Panel
Node 02 = Compressor “B”	Node 12 = Electronic Time Fill
Node 03 = Compressor “C”	Node 14 = Electronic Defueling Panel
Node 04 = Compressor “D”	Node 20 = Trailer Fill “A”
Node 05 = Dryer	Node 21 = Trailer Fill “B”
Node 06 = Booster “A”	Node 22 = Trailer Fill “C”
Node 07 = Booster “B”	Node 23 = Trailer Fill “D”

Set Network Baud Æ



This screen allows the user to select the current baud rate of the network. Note all devices on the network must be at the same baud rate. CsCAN model: [125K, 250K, 500K, 1M]. Default set to 125K Baud.

View Status Æ



Refer to Horner Manual for complete setting descriptions.

This screen contains an editable field that sets the RX371 scan mode and status fields that display information about the internal state of the RX371.

Model: the controller model i.e. RX371.

RX Mode: the current scanning mode (Idle, Run, DoIO).

- IDLE - program does not execute.
- RUN - ladder program executes.
- DoIO - except logic is not solved.

Scan-Rate (ms.): milliseconds for program scan cycle.

Firmware Rev: Current firmware version

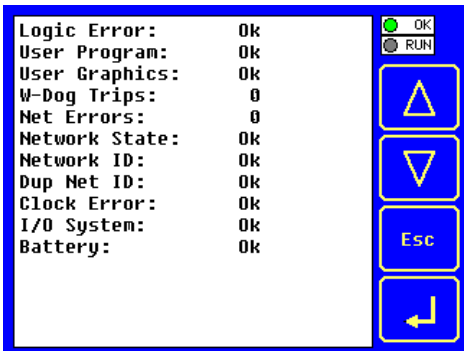
BIOS Rev: Current BIOS (Basic Input/Output System) version

FPGA Rev: Current FPGA (Field Programmable Gate Array)

Self-Test:

- Ok = All power-on self-tests passed
- Fault = One or more power-on self-tests failed

View Diags Æ



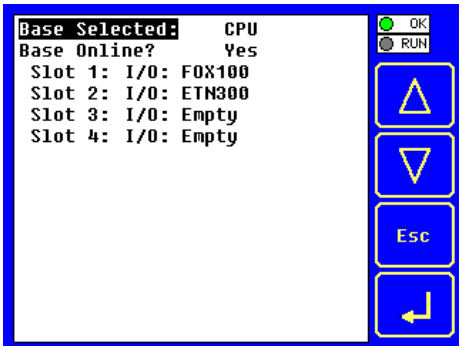
Refer to Horner Manual for complete setting descriptions.

The System Diagnostics, none of which are editable. The first two System Diagnostics are critical. If any of them indicate a Fault condition, the RX will not enter or remain in Run mode, and the problem must be investigated and corrected.

Logic Error:
- Ok = All ladder instructions are legal.
- Fault = A ladder instruction not supported.

User Program:
- Ok = Ladder program and I/O config. is OK.
- Fault = Ladder program or I/O config. Failed.

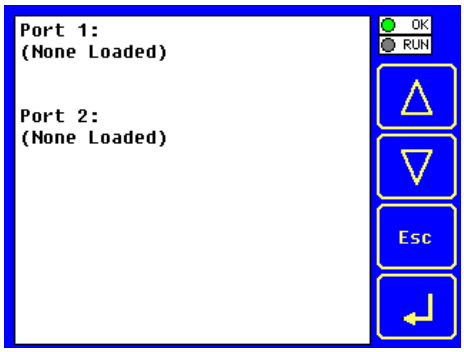
View I/O Slots Æ



This screen displays information about SmartStack modules that are currently connected to the RX371. Note that in the menu displays Slot #, and SmartStack I/O module number such as MIX902 or ADC920.

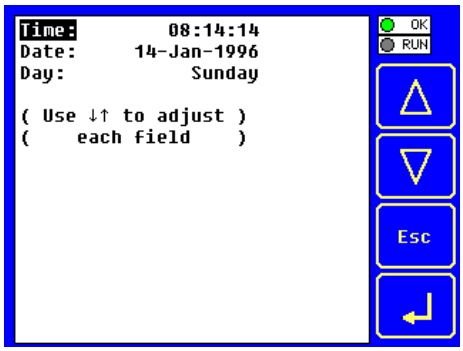
Some systems have multiple I/O bases using a FOX (Fiber Optic Expansion) interface. For these models, the View I/O Slots screen also allows selection of the I/O base to be displayed and indicates whether the I/O base is online, offline, or duplicated.

View Protocols Æ



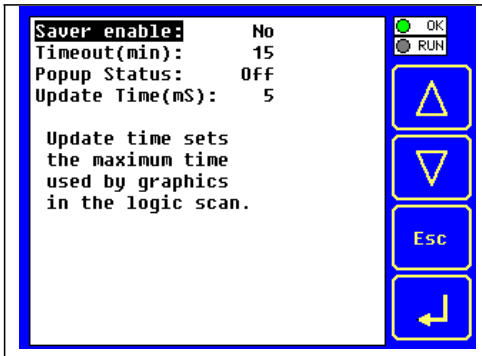
This screen displays protocol drivers assigned to Ports 1 & 2 loaded by the applications and their current revisions.

Set Time/Date Æ



This screen contains two editable enumerated fields for displaying and modifying the time and date. Time is based on a 24-hour clock.

Set Screen Æ



The Set Screen displays four settings, all of which are editable. Screen saver activates a black screen.

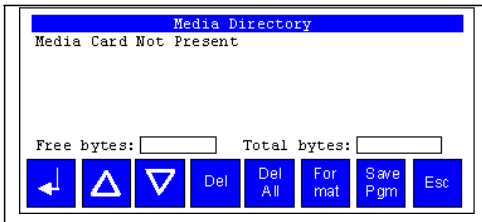
Saver enable: Yes = Enable, No = Disable (default)

Timeout (min): 5 - 1200 minutes to expire with NO touch activity before activating screen saver.

Popup Status: Off = Disable, Warning = NOT Run mode. ON = any controller status change.

Update Time (mS): 2 - 50 msec screen update/scan.

Removable Media Æ



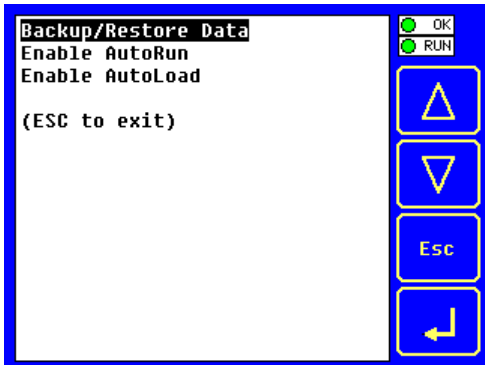
The controller supports Removable Flash Memory. This gives the program the ability to store information to the Flash card and also read information back into the program. Setpoints are stored in a Comma Separated Value (CSV) format.

- Delete File
- Delete ALL Files
- Format Flash
- Save Program to Flash

Fail Safe System Æ

1. Fail-Safe System

Allows an application to continue running in the event of “power loss” and “battery failure”.



2. Backup/Restore Data

Backup = Copies Battery Backed RAM contents on to the onboard FLASH memory of the OCS.

Restore = Copies the backed up data from onboard FLASH to the battery backed RAM.

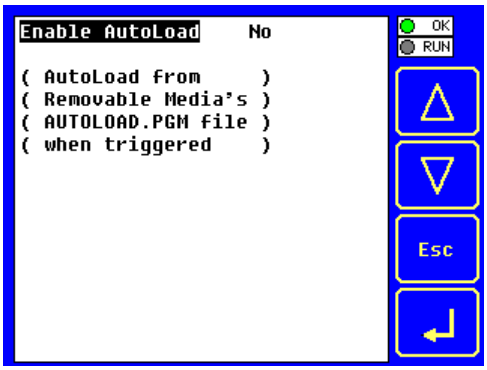
Clear Backup = The backup data will be erased from the onboard FLASH.

Exit = Goes back to previous menu

3. Enable AutoLoad

No = Does not load AUTOLOAD.PGM automatically when application program is absent or corrupted.

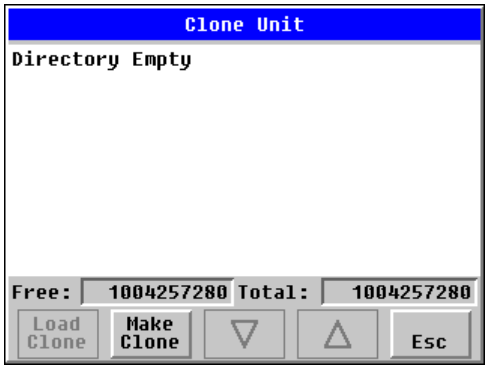
Yes = Loads AUTOLOAD.PGM file automatically from flash memory when application program is absent or corrupted.



Clone Unit Æ

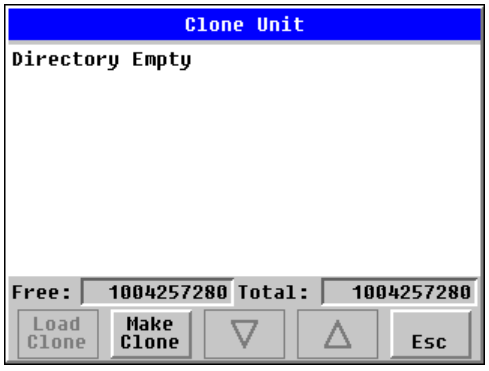
1. Clone Unit

Allows the user to “clone” the RX371 of the exact same model. This feature “clones” application program and unit settings stored in Battery backed RAM of an RX371 into the on board Flash Removable Memory. It can be used to clone a different RX371 (exact same model).



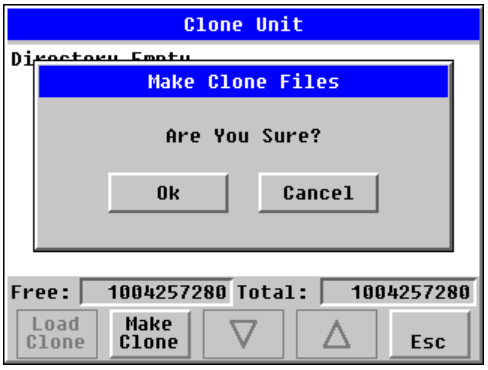
2. Clone Unit

Selecting “Clone Unit” menu will open this screen and display any files on Flash Removable Memory.



3. Make Clone Files

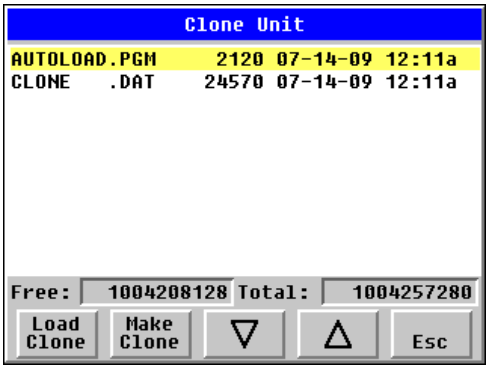
Selecting Make Clone brings up the screen below for the user:



OK - create two new files in the root directory of the Removable Media Drive as shown:

AUTOLOAD.PGM Application file

CLONE.DAT File having all unit settings and register values from Battery Backed RAM.



4. Esc – returns screen to System Menu