AGILITY CONTROLLER USER GUIDE

INTRODUCTION

The Agility Controller is a powerful yet easy to use controller family based on the proven Logix Axiom platform. Since it is Web-Based, virtually any smartphone, tablet, PC or laptop can be used to monitor and configure the Agility Controller. The controller is highly field-configurable using simple screens and requires no expensive custom programming. And help and documentation is built-in and always available.

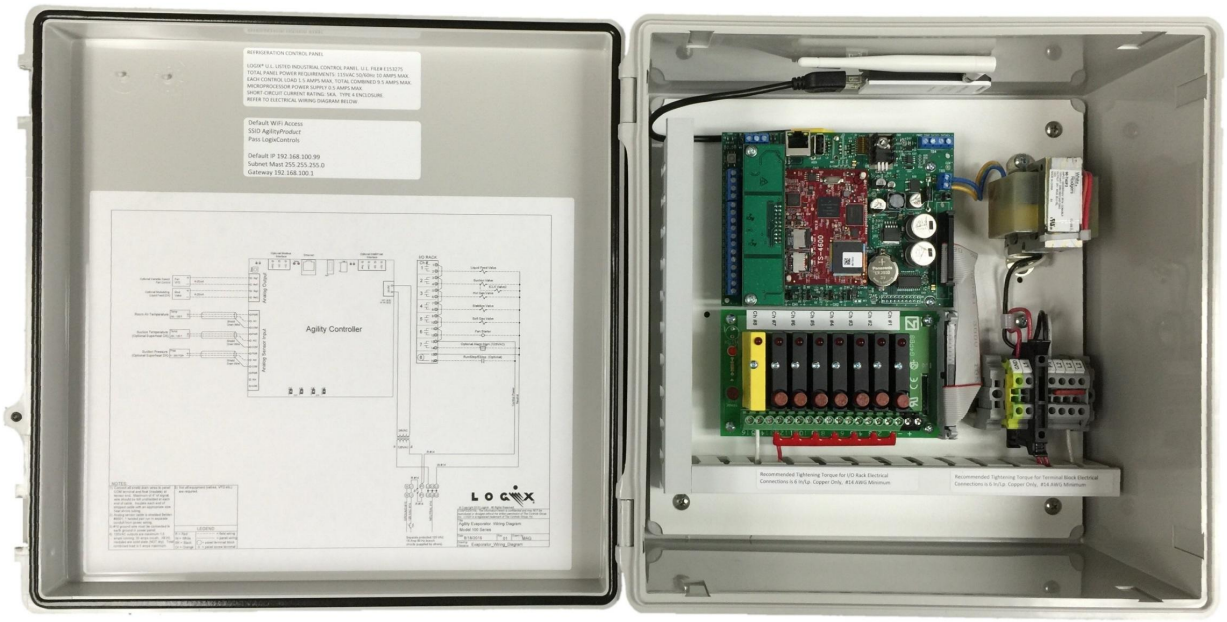


FIGURE 1- TYPICAL AGILITY CONTROLLER PANEL

KEY FEATURES

1. Universal Web-Based Operator Interface
    a. Graphical Web-Browser access from any smartphone, tablet, laptop or PC.
    b. Built-in online help system and documentation
2. Agility Controller Platform
    a. Up to 4 Analog Sensor Inputs for measuring Temperature, Pressure, Humidity etc.
    b. Up to 2 fully-isolated Analog Outputs to drive VFDs and valve positioners.
    c. Up to 8 (optionally 16) isolated line voltage digital input or outputs
    d. 10/100 Isolated Ethernet Port
    e. Flexible WiFi access allows operation as either an access point or as a client connection to an existing WiFi network.
    f. Open-Standard Modbus through both Ethernet and an Isolated Serial Port allows easy 3rd-party integration into most any control system.
    g. USB slot for field program updates and for saving/restoring settings
    h. LEDs provide direct indication of Agility Controller status.
    i. Powerful Open-Source ARM Linux Operating System

j. "Watchdog" timer insures reliable operation and resets the Agility controller in the unlikely event of a malfunction.

3. Rugged Type-4X Enclosure withstands indoor, outdoor and washdown environments.
4. Evaporator Application
    a. Field Configurable for a wide variety of applications
        i. Low Temp, High Temp, Dock Heat/Cool, User-Defined
        ii. Up to 5 valves outputs with support for newer valve technology (CK6D, ICLX etc.)
        iii. 1 fan output
        iv. 1 alarm output for annunciators or alerting systems
        v. 1 input configurable as Run/Stop or Emergency Stop (ex. Ammonia Sensor shutdown).
    b. Fan can be a single speed or Variable Speed with the 4-20mA Analog Output option.
    c. Precise platinum temperature sensor for accurate, reliable operation.
    d. Flexible temperature control, high and low alarm setpoints
    e. Flexible defrost sequencing: Pump Out, Pre Defrost, Soft Gas, Defrost, Stabilize, and Coil Cool
    f. Defrost initiation on cooling runtime and/or time of day+day of week.
    g. IntelliFrost compatible for true demand defrost initiation.
    h. History log of alarms and warnings
    i. Optional Superheat and Modulating DX valve control
5. Condenser Application
    a. Field Configurable for a wide variety of applications
        i. Up to 6 fans or pumps in any combination.
        ii. 1 alarm output for annunciators or alerting systems
        iii. 1 fan fault alarm input.
    b. Fans can be a single speed or Variable Speed with the 4-20mA Analog Output option.
    c. Powerful stager maintains accurate pressure control.
    d. Alternate cold weather operating sequence
    e. Floating Pressure Setpoint based on ambient temperature and relative humidity conditions maximizes energy conservation.
    f. History log of alarms and warnings
6. EPCS Application
    a. Designed to comply with IIAR-2 requirements
    b. Supports up to two zones of pressure relief control
    c. Support for 250# or 300# rated vessels

AGILITY CONTROLLER INSTALLATION

SAFETY NOTIFICATION

Important Safety Considerations

It is very important for the user to consider the adverse effects of power, wiring, component, sensor, or software failures in designing any type of control or monitoring system. This Agility Controller is not designed for applications in which a malfunction of the Agility Controller could result in a hazardous and or dangerous condition. In no circumstance may this Agility Controller be used to limit any piece of equipment to a safe mode of operation. This is especially important where economic loss or human life is involved. It is important that the user employ satisfactory overall system design. It is agreed

between the buyer and Logix that this is the buyer's responsibility. It is the responsibility of the installer to ensure that the installation is in compliance with all national and local codes. Installation should only be attempted by a licensed electrician familiar with codes, standards, and proper safety procedures for line-voltage installations.

Caution

Read this Entire Document Prior to Installation and Operation of this Unit.

Warning

Risk of Electrical Shock. Severe injury or death can result from electric shock during contact with line voltage wiring and equipment. Disconnect and lock-out all power sources during installation and service.

Mounting Location Considerations

1. Overall Dimensions - 13.4"W x 13.0"H x 7.1"D
2. Environmental
    a. Temperature
        i. Operating Temperature -22°F - +122°F (-30°C - +50°C)
        ii. Protect from direct sunlight which can cause the enclosure to exceed its operating temperature limit.
    b. Humidity
        i. Maintain operating and storage relative humidity between 10% and 95%, non-condensing.
    c. Mechanical Considerations
        i. The UL-Rated Type 4X enclosure allows mounting in indoor or outdoor locations.
        ii. Mount in a low vibration location.
        iii. Mount in a location providing protection from damage.
        iv. Mount in a location providing easy access for servicing.
        v. Mount in proximity to controlled or monitored equipment to reduce installation costs.
3. Networking Considerations
    a. WiFi signal range is diminished by walls, metal objects, etc.
    b. Ethernet (CAT5e) network cabling is limited to 328 feet. Longer distances require additional equipment (not provided) such as a repeater or fiber-optic link.
    c. Modbus RTU twisted pair cabling is limited to 4000 feet total.

Power Requirements

1. The Agility Controller requires 100VAC – 125VAC, 50/60Hz power and consumes up to a total of 10 Amps (including controller and controlled devices). The controller itself requires 0.5 Amps leaving 9.5 Amps available for controlled devices.
2. Do not "tap in" to the Agility Controller to power other equipment or otherwise alter the intended function of the Agility Controller.

Security Considerations

1. Network Security Considerations - Agility is not designed to be connected directly to the public Internet. Rather it should reside behind a firewall on a private network. Remote access, if any, should be implemented through a secure VPN connection.
2. The Agility Controller's WiFi network name and password are field configurable. At a minimum, the WiFi Access Point password should be changed.

3. Agility Password Protection - the Agility Controller features a built-in password mechanism to prevent unauthorized changes to the controller's settings. The Agility Controller supports up to ten unique user names and passwords. Although setting up passwords is not required, it is strongly recommended.

Wiring and Installation

1. Consult the application-specific Wiring Diagram supplied with your Agility Controller for specific wiring details.
2. Water and debris can and will find its way through conduit connections. **Do Not Drill/Puncture the Top of the Enclosure or the Warranty Shall Be Void.**
3. Controller 120VAC Power Wiring – a dedicated 15 Amp branch circuit is required.
4. Sensor Analog Inputs – shielded wire is required. A good choice is Belden 9501 or equal. Connect the shield at the Agility Controller end of the cable only. Refer to the Wiring Diagram for more details.
5. Variable Analog Outputs (Optional) – shielded wire is required. A good choice is Belden 9501 or equal.
6. Digital Inputs and Outputs – keep all line voltage wiring away from low voltage (sensor, network etc.) wiring. 120VAC outputs are maximum 1.5 amps running, 30 amps inrush. All I/O modules are solid state (NOT dry contacts). Total combined load is 9.5 amps maximum.
7. Wired Ethernet (Optional) – use standard CAT5 or better cable with high quality end terminations. Avoid kinks and tight bends which can degrade network performance. Limit individual network cable length to 100 meters or 328 feet.
8. Modbus RTU (Optional) – high quality shield twisted-pair cable is required. A good choice is Belden 9841 or equal. Limit total network cabling length to 4000 feet.

Quick Start Overview

1. Install the Agility Controller following the provided installation instructions and wiring diagrams. At a minimum, wire the 120VAC power supply connections.
2. Power on the Agility Controller.
3. Access the Agility Controller's web pages using one of the following methods. Note that once a smartphone, tablet laptop or PC is connected to the Agility Controller, the controller's network and WiFi configuration can (and should) be altered.
    a. Method 1: **WiFi Access** (preferred method)
    b. Once the Agility Controller has been powered-up for more than 30 seconds, connect a smartphone, tablet or laptop to the Agility-xxxx WiFi hotspot (xxxx varies by Agility application). The default password is LogixControls.
    c. Access agility.com using the smartphone, tablet or laptop's web browser.
    d. Method 2: **Ethernet Access** (alternate method)
    e. Using CAT5 cabling, connect both the Agility Controller and a PC or laptop into a suitable network switch (not provided).
    f. The Agility Controller's default IP address is 192.168.100.99 and its net mask is 255.255.255.0. Configure the laptop or PC with a compatible (but different) IP address.
    g. Once the Agility Controller has been powered-up for 30 seconds or longer, access 192.168.100.99 with the PC or laptop's web browser.
4. The Main Status web page displays an animated graphical indication of equipment operation in real-time.
5. Accessing menus and changing settings.
    a. The application menu is accessed by selecting the menu ☰ symbol displayed in the upper left corner.
    b. The menu tree expands where the > symbol is shown and contracts where the V symbol is shown.
    c. Navigate to the desired page.
    d. On settings pages, select either Save Settings or Cancel to discard any changes.

6. Safety Status and Acknowledgement
    a. A green checkmark icon is displayed when no alarm or warning conditions exist.
    b. A red flashing beacon icon is displayed when any unacknowledged alarm or warning condition exists. Select the icon to display and acknowledge the alarm or warning.
    c. A dormant orange beacon icon is displayed when an acknowledged but still active alarm or warning condition exists.
7. Accessing Online Documentation and Help
    a. Wiring Diagram and Troubleshooting Guides are available through the *Configuration & Diagnostics>Agility Documentation* sub-menu.
    b. When accessing Agility setpoint pages, specific help is available by selecting the help icon in the upper left corner.

NETWORK CONFIGURATION

The Agility Controller features both wired Ethernet and Wireless WiFi access to its graphical user interface. Both the Ethernet and WiFi networks can be configured for each site's specific network requirements. Since the Agility Controller has its own Web Server it utilizes a fixed “Static” IP address.

WIFI NETWORK CONFIGURATION

The WiFi network can be configured to operate in three (3) distinct modes:

1. **Local Access Point** - The WiFi acts similar to a Hot Spot allowing direct access to the Agility Controller's graphical web interface. This is the easiest method to configure and is the default configuration.
2. **Connect to Existing** - The WiFi is a client and connects to an existing WiFi network. This will require additional IT support to determine the Agility Controller's IP address obtained from the existing WiFi Access Point.
3. **Disable WiFi Access** - The WiFi interface is disabled.

WIFI NETWORK SETTINGS PAGE

1. **WiFi Network Type** - Enter the desired WiFi network type: Local Access Point (create a Local WiFi network), Connect to Existing (join an existing WiFi network) or Disable WiFi Access.
2. **Access Point Channel** - Enter the WiFi Access Point channel. This is only utilized for Local Access Point WiFi networks. Typical values are 1, 6 and 11. Other values may result in poor performance and/or a malfunctioning network.
3. **WiFi Network Name (SSID)** - Enter the name of the WiFi network.
    a. For **Local Access Point** WiFi networks this should be a name unique to other WiFi networks. For example this could be "Agility-F4" for Freezer 4's Agility Controller.
    b. For **Connect to Existing** WiFi networks, enter the name of the existing WiFi network.
4. **WiFi Network Password** - Enter the password for the WiFi network.
    a. For **Local Access Point** WiFi networks this is the password required to connect to the WiFi network. The password must be between 8 and 63 characters in length and can contain any combination of letters and numbers (no spaces).
    b. For **Connect to Existing** WiFi networks, enter the password of the existing network.

The Agility Controller’s WiFi network can be enabled or disabled by installing or removing the W-ON jumper located on the Agility Controller board. To enable the WiFi network, place the jumper over both pins and allow 30 seconds for the WiFi network to appear. To disable the WiFi network, place the jumper over a single pin.

Ethernet Network Configuration

Before attempting to alter the Ethernet settings you should have a firm understanding of how networks function and how each setting affects the network. It is beyond the scope of the document to provide the required documentation or training for this complicated topic. If you are unfamiliar with network configuration, have a network professional or IT department configure this device. **Warning:** Improper network settings can affect an entire network, possible rendering it inoperable. This behavior applies to any device attached to an Ethernet network, not just an Agility Controller.

Ethernet Network Settings Page

1. The Default button forces the network configuration back to the factory-configured settings.
2. The Agility Controller's MAC Address is shown at the bottom of the page. This is sometimes needed by IT personnel.
3. Ethernet Settings
    a. **Eth0 IP Address** - Enter the unique IP address for this device. For example, 10.0.100.200. The default IP address is 192.168.100.99.
    b. **Eth0 Subnet Mask** - Enter the Subnet Mask for this device. For example, 255.0.0.0. The default Subnet Mask is 255.255.255.0.
    c. **Eth0 Broadcast Mask** (optional) - Enter the Broadcast Mask for this device. If unknown or not required, enter 0.0.0.0
    d. **Eth0 Gateway** - Enter the Gateway address for this device. For example, 10.0.100.1. The default Gateway address is 192.168.100.1.

Modbus Support

Modbus is a de facto standard of communications commonly available in industrial control products. The Agility Controller functions as a Modbus slave simultaneously on both the Ethernet and the isolated Com 1 RS-485 serial port.
Modbus/TCP is available on the Ethernet port on the standard port 502.
Modbus RTU is available on Com 1 isolated RS-485 serial port.

a. The serial port is configured as 9600 BPS, 8N1.
b. The ID is determined by the DIP switch settings.

The Modbus Register Map is available in the Agility Controller's Documentation sub-menu.

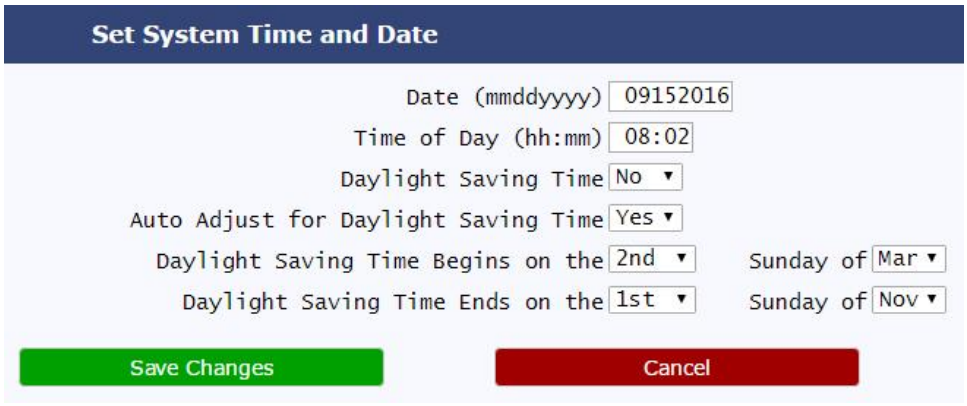
Specifications

1. Environmental
    a. Operating Temperature -30°C - +50°C (-22°F - +122°F)
    b. Operating Humidity 10% – 95% Non-Condensing
    c. Dimensions 13.4"W x 13.0"H x 7.1"D
2. Power 100VAC – 125VAC, 50/60Hz 10 Amps max.
    a. Agility processor – 0.5 Amps max.
    b. Individual digital outputs – 1.5 Amps max.
    c. Combined total digital Input/Outputs - 9.5 Amps maximum.
3. WiFi Network
    a. Secure WPA2 Encryption
    b. WiFi Mode:
        i. Local Access Point (Hotspot) allowing access to the Agility Controller only.
        ii. Client (Connect to existing WiFi network). Access is dependent on the existing network's configuration.

    c. Type/Speed
        i. Up to 150Mbps data rate.
        ii. IEEE 802.11n,g,b is compatible with a wide range of WiFi devices.
4. Ethernet Network
    a. 10/100 BaseT
    b. TCP/IP Protocol

Agility Configuration Setpoints

Set Time and Date



Date (mmddyyyy)

Enter the desired date in the mmddyyyy format. For example, December 9th, 2016 would be entered as **12092016**.

Time of Day (hh:mm)

Enter the desired time of day using the 24 hour hh:mm format. Note the : is required.

Daylight Saving Time

Enter **Yes** if Daylight Saving Time is currently in effect in your area. Enter **No** if Daylight Saving Time is not in effect in your area or if your area does not have Daylight Saving Time.

Auto Adjust for Daylight Saving Time

Enter **Yes** to allow automatic adjustments for Daylight Saving Time. Enter **No** if you wish to manually adjust the time and/or date.

Daylight Saving Time Beginning Date

Daylight Saving Time Ending Date

Starting in March of 2007, daylight time in the United States began on the second Sunday in March and end on the first Sunday in November. The **Daylight Saving Time Beginning and Ending Date** settings allow modification of the date at which Daylight Saving Time begins and ends. **These settings should be adjusted cautiously**.

Network Configuration

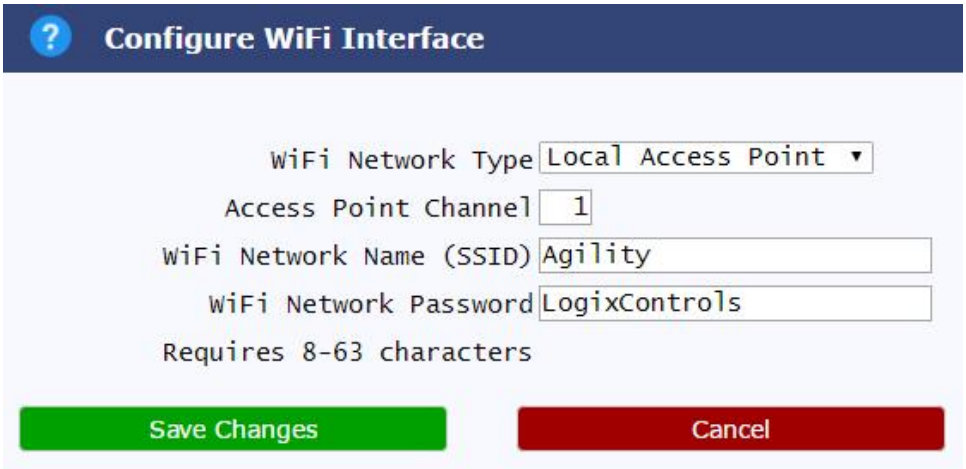
Network Configuration Overview

The Agility Controller features both wired Ethernet and Wireless WiFi access to its graphical user interface. Both the Ethernet and WiFi networks can be configured for each site's specific network requirements. Since the Agility Controller has its own Web Server it utilizes a fixed "Static" IP address.

Configure WiFi Interface

The Agility Controller's wireless WiFi network configuration is setup on this page. The WiFi network can be configured to operate in three (3) distinct modes:

1. **Local Access Point** - The WiFi acts similar to a Hot Spot allowing direct access to the Agility Controller's graphical web interface. This is the easiest method to configure and is the default configuration.
2. **Connect to Existing** - The WiFi is a client and connects to an existing WiFi network. This will require additional IT support to determine the Agility Controller's IP address obtained from the existing WiFi Access Point.
3. **Disable WiFi Access** - The WiFi interface is disabled.



WiFi Network Type

Enter the desired WiFi network type: **Local Access Point** (create a Local WiFi network), **Connect to Existing** (join existing WiFi network) or **Disable WiFi Access**.

Access Point Channel

Enter the WiFi Access Point channel. This is only utilized for **Local Access Point** WiFi networks. Typical values are 1, 6 and 11. Other values will result in poor performance and/or a malfunctioning network.

WiFi Network Name (SSID)

Enter the name of the WiFi network.

For **Local Access Point** WiFi networks this should be a name unique to other WiFi networks. For example this could be "Agility-F4" for Freezer 4's Agility Controller.

For **Connect to Existing** WiFi networks, enter the name of the existing WiFi network.

WiFi Network Password

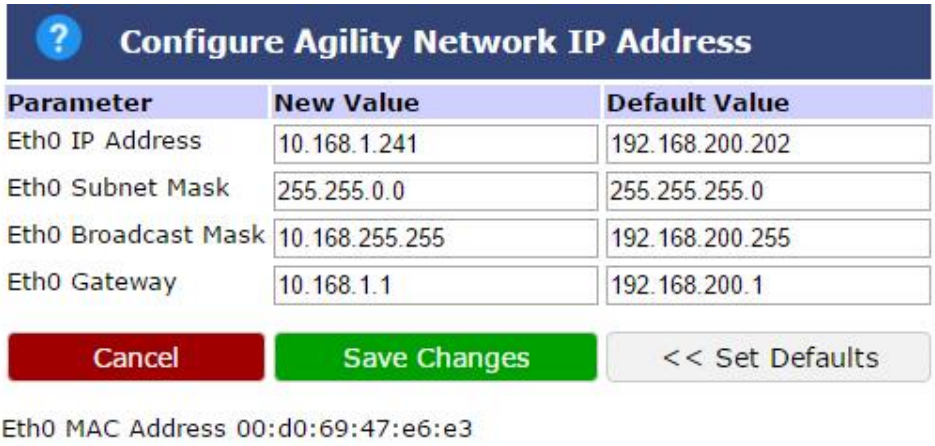
Enter the password for the WiFi network.

For **Local Access Point** WiFi networks this is the password required to connect to the WiFi network. The password must be between 8 and 63 characters in length and can contain any combination of letters and numbers (no spaces).

For **Connect to Existing** WiFi networks, enter the password of the existing network.

Configure Ethernet Network IP Address

The Agility Controller's Ethernet network is configured on this page. Before attempting to alter these settings you should have a *firm* understanding of how networks function and how each setting affects the network. It is beyond the scope of the document to provide the required documentation or training for this complicated topic. If you are unfamiliar with network configuration, have your IT department configure this device.



The **Default** button forces the network configuration back to the factory-configured settings.

The Agility Controller's MAC Address is shown at the bottom of the page. This is sometimes needed by IT personnel.

Eth0 IP Address

Enter the unique IP address for this device. For example, 10.0.100.200

Eth0 Subnet Mask

Enter the Subnet Mask for this device. For example, 255.0.0.0

Eth0 Broadcast Mask (optional)

Enter the Broadcast Mask for this device. If unknown or not required, enter 0.0.0.0

Eth0 Gateway

Enter the Gateway address for this device. For example, 10.0.100.1

Agility Password Setpoints

Password Security Overview

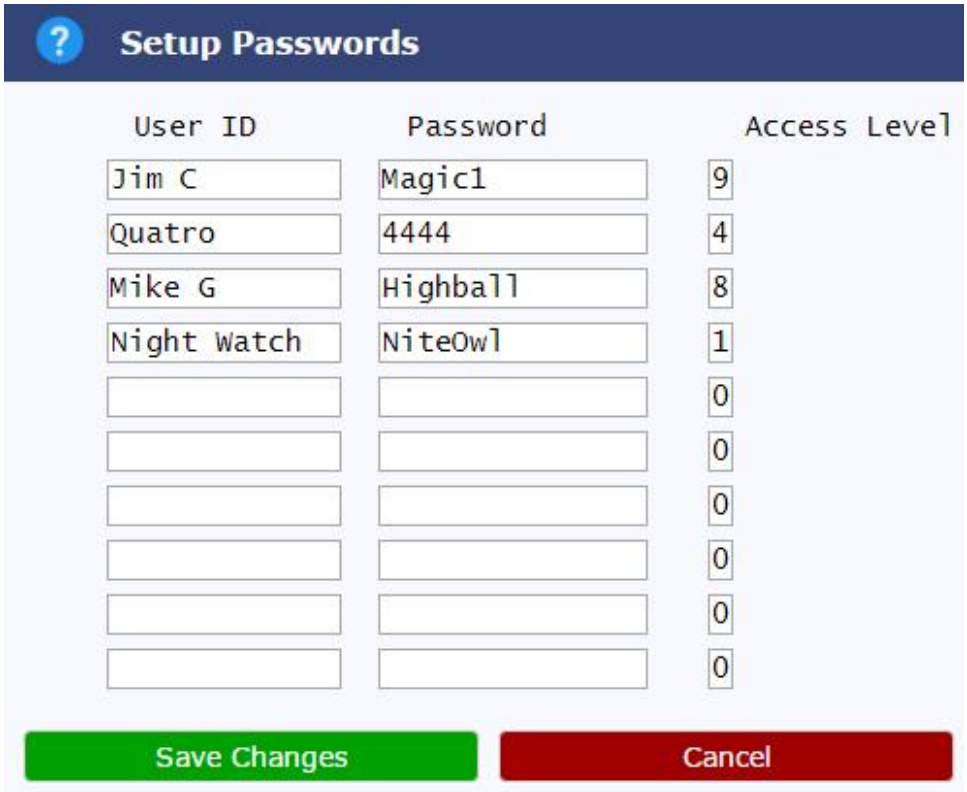
The Agility Controller features a built-in password mechanism to prevent unauthorized changes to the controller. The controller supports up to ten unique user names and passwords. While setting up passwords is not required, it is strongly recommended. Password protection is enabled when at least one user is set up. This requires a user to be signed in with the appropriate level password to change setpoints or acknowledge safeties.

Setpoint Page Password Security

Each setpoint page is pre-configured with a unique minimum password access level required to modify the settings. When a setpoint page or menu selection is accessed, Agility will prompt the user to sign in, if not already. If a valid user name and password is not entered, the page's settings will still be displayed, allowing observation but not modification.

Setup Passwords

To access the Setup Passwords page, from the **Secure Access** menu, select **Setup Passwords** and provide a top level password when prompted.



The **User ID** field contains the user's public name and/or ID. The **Password** field contains the user's secret password required to access the system. The **Access Level** field contains the user's system access level with **1** as the most restrictive through **8** as the least restrictive. Passwords can be any combination of letters, numbers and/or punctuation with a maximum of **15** and minimum of **4** characters in length. Similarly, the **User ID** can be any combination of letters, numbers and/or punctuation up to a maximum of **12** characters in length.

Signing In and Out

From the **Secure Access** menu, select **Sign In** or **Sign Out**. A user will be automatically signed out after there has been no activity in the Agility page for longer than 10 minutes.

EPCS - Emergency Pressure Control System

EPCS Overview

The Emergency Pressure Control System (EPCS) continuously monitors refrigerant pressure and opens a crossover valve if an over-pressure situation is detected. The crossover valve attempts to relieve the zone's high-pressure refrigerant by transferring the refrigerant from the high-pressure zone to a low-pressure zone. In addition to the pressure sensors, a digital "trip" input is provided to remotely trip the zone or test the EPCS functionality.

EPCS Interface

Zone Pressure Analog Sensors

Each EPCS zone is monitored by a pressure sensor. When the zone's pressure exceeds either the user adjustable setpoint or the fixed setpoint, the zone is tripped, the crossover valve is opened and the EPCS goes in to an alarm condition.

Zone Crossover Valve Digital Output

Each EPCS zone has a crossover valve control output. When energized, the digital output will open the crossover valve to transfer the high-pressure refrigerant to a lower pressure vessel.

EPCS Functional Digital Output

When energized, the digital output will indicated the EPCS is functional - even if a zone has tripped on a high pressure condition. The Functional output will de-energize on loss of control power, EPCS malfunction, pressure sensor fault or pressure sensor wiring fault.

EPCS Emergency Stop Digital Output

The EPCS Emergency Stop Digital Output is normally de-energized. When energized, the digital output should be wired to shutdown all associated refrigeration equipment such as compressors. The EPCS Reset input will reset the Emergency Stop output back to the de-energized state provided all EPCS zones are in normal condition.

EPCS Alarm Annunciator Digital Output

When energized, the digital output indicates and over-pressure event or sensor malfunction has occurred. The EPCS Reset input will reset the Alarm Annunciator output back to the de-energized state as long as all pressure sensors are functional.

EPCS Reset Digital Input

When EPCS Reset input is energized, the EPCS will reset any crossover valves which no longer have an over-pressure condition. The Alarm Annunciator will also be de-energized as long as all pressure sensors are functional.

EPCS Test/Trip Digital Input

Each EPCS zone has a Test/Trip input. When a EPCS Zone Test/Trip input is energized the zone is tripped just as if the pressure exceeded the setpoint (ex. the crossover valve is opened and the Alarm & Emergency Stop outputs are energized).

EPCS Configuration Setpoints

WARNING: These setting can affect the functionality of the EPCS and should only be modified if you are absolutely certain how these changes will impact your refrigeration system.

Zone Trip Pressure

When the zone pressure exceeds either the **Zone Trip Pressure** or the fixed setpoint, the zone is tripped and the crossover valve is opened.

Select Zone Type

Each EPCS zone must be configured to its vessel's pressure rating. Select **250 PSIG Rated Vessel** or, if you are certain the vessel is rated for 300 PSIG, select **300 PSIG Rated Vessel**. Under no circumstance should a value be selected which is higher than the vessel's rating.

Agility Controller Troubleshooting Guide

Warning:

Risk of Electrical Shock. Severe injury or death can result from electric shock during contact with line voltage wiring and equipment. Disconnect and lock-out all power sources during installation and service.

Caution:

Before any work is performed either inside an Agility panel or to any devices interfaced to an Agility panel, all sources of hazardous voltage, both into and out of the panel must be disconnected. The circuit protectors and/or circuit breakers installed in the Agility panel may not disconnect all sources of power. As Logix cannot verify the actual installation and any modifications of the control panel, Logix recommends that, at a minimum, all circuits both inside the panel and interfaced to the panel be thoroughly verified as disconnected and safe with a high quality electrical meter, which is tested to be functional before and after the verification procedures, before any work is performed on the panel or interfaced devices. Even if all known circuits are disconnected, it is still possible a circuit may become inadvertently energized from another source.

All work must be performed by personnel who are fully qualified to work on industrial control panels.

Troubleshooting Guide

This Troubleshooting Guide is divided into the following sections:

1. Status LEDs
2. Agility LED Error Codes
3. Power and Circuit Protection
4. Analog Sensors
5. Analog Sensor Calibration
6. Analog Outputs
7. Digital Outputs
8. Networking
9. Restoring Default Settings

Refer to the Agility Panel Layout Drawing to assist in locating components.

Status LEDs

The Agility Controller has multiple LEDs indicating its operational status.

Both the red and the green LEDs, labeled Status, indicate the general condition of the controller. The behavior of these LEDs differs during initial power-on and normal operation.

During power-on, both LEDs should immediately illuminate. Within a few seconds the red LED should turn off. This indicates the processor is operational. If an abnormal condition exists during the self-test phase, the red LED will issue a unique blink code to indicate the source of the error. Refer to the next section for details. No LEDs will illuminate if there are power supply issues (ex. a blown fuse).

Several seconds later during a normal power-on cycle, the green LED should begin flashing in a consistent one second on then one second off blinking pattern. This indicates the "heartbeat" of normal Agility Controller operation.

Each of the two serial communication ports has a pair of LEDs indicating transmission and reception of serial data. The TX LED indicates the Agility Controller has sent a message. The RX LED indicates the Agility Controller has received a message.

The Ethernet jack has a green LED which indicates a basic connection to the network. It does not indicate that the network settings are correctly set.

Agility Power On Self Test (POST) Codes

During power-up, the Agility microcontroller performs a Power On Self Test (**POST**). Any abnormal conditions are reported by the Red Status LED: A long blink (a one second On period followed by a one second Off) followed by a number of short blinks. The number of short blinks indicates the POST error code. For example, one long blink followed by four (4) short blinks would indicate POST code four (4) which indicates "EEPROM Memory Failure". Multiple errors are flashed sequentially, one after another with a long blink between each code.

Agility POST Code List (may vary by application; refer to online error code list)
1 Unrecoverable Error
2 Program Recovery Mode
3 NBus Failure
4 EEPROM Memory Failure
5 Digital I/O Driver Fault
6 Analog Output Module Error
7 COM-1 Failure
8 COM-2 Failure
9 Device Initialization Chain Failure
10 Task Initialization Chain Failure
11 Invalid Library Function
12 Factory Defaults Error
13 WebServer Fault

Power and Circuit Protection

The Agility Controller requires a dedicated 120VAC power circuit. The Agility Controller contains a 10 amp fuse to protect both itself and any controlled devices. Each digital output is also individually fused with a 4 amp fuse. Each digital output is rated for a maximum of 1.5 amps for a combined total of 9.5 amps.

Additionally the analog sensor +24V and Com 2 +24V are protected with a self-resetting polymer fuses rated at 1/10th amp. When a polymer fuse is exposed to over-current conditions, power must be removed before the fuse will reset.

Analog Sensor Troubleshooting

The safety message "Sensor Under-Range" indicates at least one sensor is sending an excessively low signal (under the normal operating range) to the Agility panel. Typically causes of a low signal are a broken wire or damaged sensor.

The safety message "Sensor Over-Range" indicates at least one sensor is sending an excessively high signal (over the normal operating range) to the Agility panel. Typically causes of a over-range signal are a shorted wire or damaged sensor. A faulty sensor will display a series of question marks instead of a normal sensor reading. View I/O Status to ascertain which sensor is faulting. Moisture penetration into a sensor's enclosure is the most common source of sensor failure. Refer to the sensor installation wiring diagrams for installation information.

Problem	Test	Possible Solution	Comments
"Sensor Under-Range" safety message.	Measure +24VDC supply at the sensor. The voltage should be near +24VDC.	1. The +24VDC Power wire is shorted to the Common (shield) wire. An Automatically Resettable fuse protect the sensor's +24VDC power. The cause of the short must be removed before +24VDC power will be restored. In some cases, the Agility controller must be powered-down for approximately 5 seconds. 2. Break in supply wire to sensor. 3. The sensor supply is wired incorrectly. The sensor should be supplied by +24VDC power from the "Pwr" terminal. Review the wiring diagram and correct any wiring errors. 4. The Agility +24VDC supply is faulty. Replace the Agility controller assembly.	Refer to the Sensor Diagnostics Diagram
"Sensor Under-Range" safety message (continued).	Measure the signal wire from the sensor. It should be between +0.5VDC and +3VDC (approximately).	1. Sensor is bad if voltage is not between +0.5VDC and +3VDC, often from water damage. Replace Sensor if signs of corrosion are present. 2. Signal wire is broken or disconnected if voltage is near zero.	Refer to the Sensor Diagnostics Diagram

"Sensor Over-Range" safety message.	Measure the signal wire from the sensor. It should be between +0.5VDC and +3VDC (approximately).	1. Sensor's probe is disconnected from sensor transmitter if voltage is above +3VDC. 2. A wiring short is shorting the +24VDC Power wire to sensor's Signal wire. 3. The sensor supply is wired incorrectly. The sensor should be supplied +24VDC power from the Agility "Pwr" terminal.	Refer to the Sensor Diagnostics Diagram
Sensor reading fluctuates.	Verify cable is shielded and grounded at Agility panel end only.	1. Use shielded twisted-pair cable such as Belden #9501 and connect the shield at the Agility Common (COM) terminal only. 2. Sensor is faulty or wet and needs replacing. 3. Sensor cannot support an extremely long probe wire lead length.	Refer to the Sensor Diagnostics Diagram
Sensor reading is too high or too low.	Compare reading against a **known**, **accurate** sensor.	1. Use the Calibration routine for normal (up to 5%) sensor deviation. 2. Sensor is being affected by external sources (unusual air flow, lights, moisture). If moisture is observed inside sensor enclosure dry completely and retest. Drill a weep hole at the lowest point to limit moisture related problems. 3. Sensor is damaged or faulty and needs replacing.	

Analog Sensor Calibration

The Sensor Calibration routine permits small adjustments to fine-tune sensor readings. Most sensors deployed with the Agility Control System are accurate to within 1% - calibrating beyond 1% would indicate a malfunctioning sensor, faulty wiring or an inaccurate calibration device (very common) or calibration methodology (also very common). Sensor calibration is limited to within 5% of the sensor's pre-programmed range.

A Sensor should only be calibrated against a device *known to be accurate under identical conditions*.

To obtain reliable results, it is very important to use a high precision reference device (i.e. a lab thermometer or pressure gauge), preferably one traceable to a NIST reference standard. Note that thermocouple-based digital thermometers are designed for a wide range of temperature measurement and therefore make a poor choice as a calibration instrument.

When calibrating a temperature sensor, the probe and calibrating device should be as close as possible to one another, preferably in direct contact. A surprising large amount of heat is given off by the human body, so make sure to keep well away from the temperature sensor during calibration. Also, be sure to calibrate

a sensor at the exact same location. For example do not attempt to calibrate a ceiling mounted temperature sensor by measuring air temperature near the floor. The calibration may be off by ten (10) degrees or more.

Sensor Calibration Procedure

To calibrate a sensor:

1. From the **Configuration and Diagnostics** menu, select **Calibrate Sensors**.
2. Select the desired sensor to display its calibration settings.
3. Type in the new, accurate reading in the **Enter Correct Value** setpoint and then select **Save Changes**.

The **Span** and **Offset** adjustments are automatically recalculated and permanently saved to the Agility unit. **Span** describes the pre-programmed range in proportion to the electrical signal (typically 4-20ma). **Offset** defines the "starting point" by comparing the minimum range value with the electrical signal. Because both factors are dynamically adjusted, calibration is most effective when the sensor is close to either extreme of its sensing range, i.e. calibrate a 0 - 300 PSIG pressure sensor when the pressure is at or near 0 PSIG then again at or near 300 PSIG.

Analog Output Troubleshooting

The Agility Controller's two analog outputs generate an active 4-20mA signal to control variable speed or position devices including modulating valves and variable speed motors. Since the Agility Controller *actively* generates the control signal, **no other source of power should be connected to the current loop**. Additionally, each 4-20mA current loop is optically isolated to eliminate troublesome ground loop conditions.

The surest method to determine if the analog output is functional is to entirely remove the field wiring from the pair of analog output terminals and, using a high quality digital DC milliamp meter, directly measure the signal. A reading between 4mA and 20mA indicates a functional analog output.

Digital Output Troubleshooting

Digital Outputs are solid state relays driven by an isolated low voltage signal from the Agility microcontroller. Some sections also apply to a faulty Input module.

Problem	Test	Possible Solution	Comments
Digital Output fails to **energize**.	Verify that the microcontroller is trying to energize the output by viewing View I/O Status.	Enable (or disable) the control mechanism that energizes the output.	Some outputs, such as suction pilot valves or compressor unloaders may be energized when the control routine is off ("Reverse Logic").

Digital Output fails to **energize** (continued).	Verify Red LED is illuminated for the Digital Output.	1. I/O Module is faulty. 2. I/O Rack cable is loose or faulty. 3. Agility Controller board is faulty 4. Agility Controller power is off.	This also applies to Inputs.
Digital Output fails to **energize**(continued).	Verify 120VAC is present on digital output line side.	1. The fuse in Agility panel is disconnected or blown. 2. Power is disabled at external main breaker. 3. 4 Amp fuse is blown - determine cause **first** then replace fuse. 4. The load device is a loose neutral connection.	Also applies to Inputs.
Digital Output fails to **de-energize**.	Verify LED is not illuminated for the Digital Output.	1. Enable (or disable) the control mechanism that is keeping the output energized.	Some outputs, such as suction pilot valves or compressor unloaders may be energized when the control routine is off.
Digital Output fails to **de-energize** (continued).	Measure output voltage with a load connected.	1. Connected load is very small (less than 25mA) and leakage current is causing the output to stay at or near 120VAC. 2. Connect a larger load and re-measure output voltage.	Refer to the Digital Input Output Schematic.

Network Troubleshooting

WiFi Troubleshooting

Review the Agility WiFi configuration section of the installation guide. Verify the W-ON jumper is installed across both pins. If it is missing or only on a single pin, the WiFi network will be disabled. Verify your device (smartphone, tablet, laptop etc.) is not in “Airplane Mode”.

For Local Access Point (hot spot) configurations, verify the Agility’s network SSID (name) is shown on your device’s WiFi connection screen. If it is not shown, the Agility’s WiFi network may be off (W-ON jumper removed) or may be misconfigured as **Connect to Existing** or **Disable WiFi Access**.

Verify the correct password is entered on your device. Try forgetting the WiFi network on your device and reconnecting to the Agility WiFi network.

Try resetting the Agility network configuration (see Restoring Default Settings below) and carefully reconfiguring it.

Ethernet Troubleshooting

Verify the green link LED on the Ethernet jack is illuminated. If the LED is dark there is likely cabling issue (broken and disconnected) or equipment issue (network switch or router malfunctioning or powered off).

If the green link LED on the Ethernet jack is illuminated and you can't connect to the device, the Agility network settings are likely misconfigured. A misconfigured Ethernet device (not just Agility but any networkable device) can conflict with other devices and/or cause an entire network to malfunction. Before attempting to alter the Ethernet settings you should have a firm understanding of how networks function and how each setting affects the network. It is beyond the scope of the document to provide the required documentation or training for this complicated topic. If you are unfamiliar with network configuration, have a network professional or IT department configure this device.

Verify if another device is misconfigured and is corrupting the Ethernet network. For example, a newly-installed web-camera was improperly configured with the same IP address as the Agility Controller, resulting in an address conflict. The symptoms include intermittent and/or no connectivity.

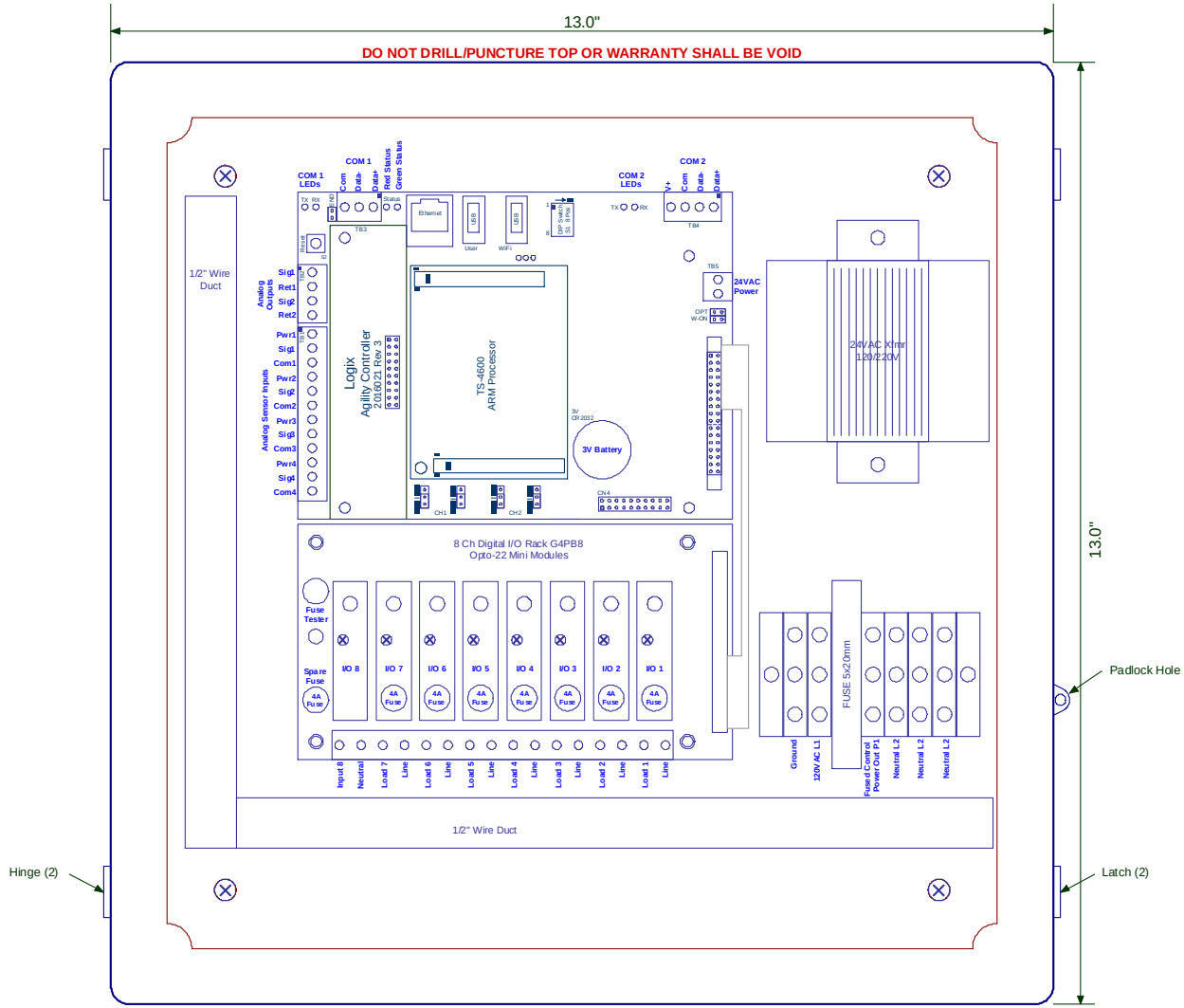
Try resetting the Agility network configuration (see Restoring Default Settings below) and carefully reconfiguring it.

Restoring Default Settings

To restore default settings to the Agility Controller, install the OPT jumper over both pins and set DIP switches 8 On, switch 7 Off. DIP switches 1-6 determine type of operation as follows:

1) Set switches 1-6 On to set Factory Default Setting. This will reset all setpoints and the WiFi configuration back to factory defaults. This will not reset the Ethernet IP address and netmask (see below).
2) Set switch 1 Off, switches 2-6 On to clear all analog sensor calibrations.
3) Set switches 1 and 3 Off, switches 2, 4-6 On to set default WiFi (SSID name and password) and Ethernet (IP Address, Netmask and Gateway) network settings.

Once the DIP switches are set, reset the Agility Controller and wait a minimum 15 seconds before setting DIP switches back off. Default Settings have now been restored.



Enclosure Overall Dimensions
13.4"W x 13.0"H x 7.1"D

Agility 8 I/O Panel Layout

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Rev 3 2016/8/29 MAG

Not to Scale

Figure 1- Agility Panel Layout

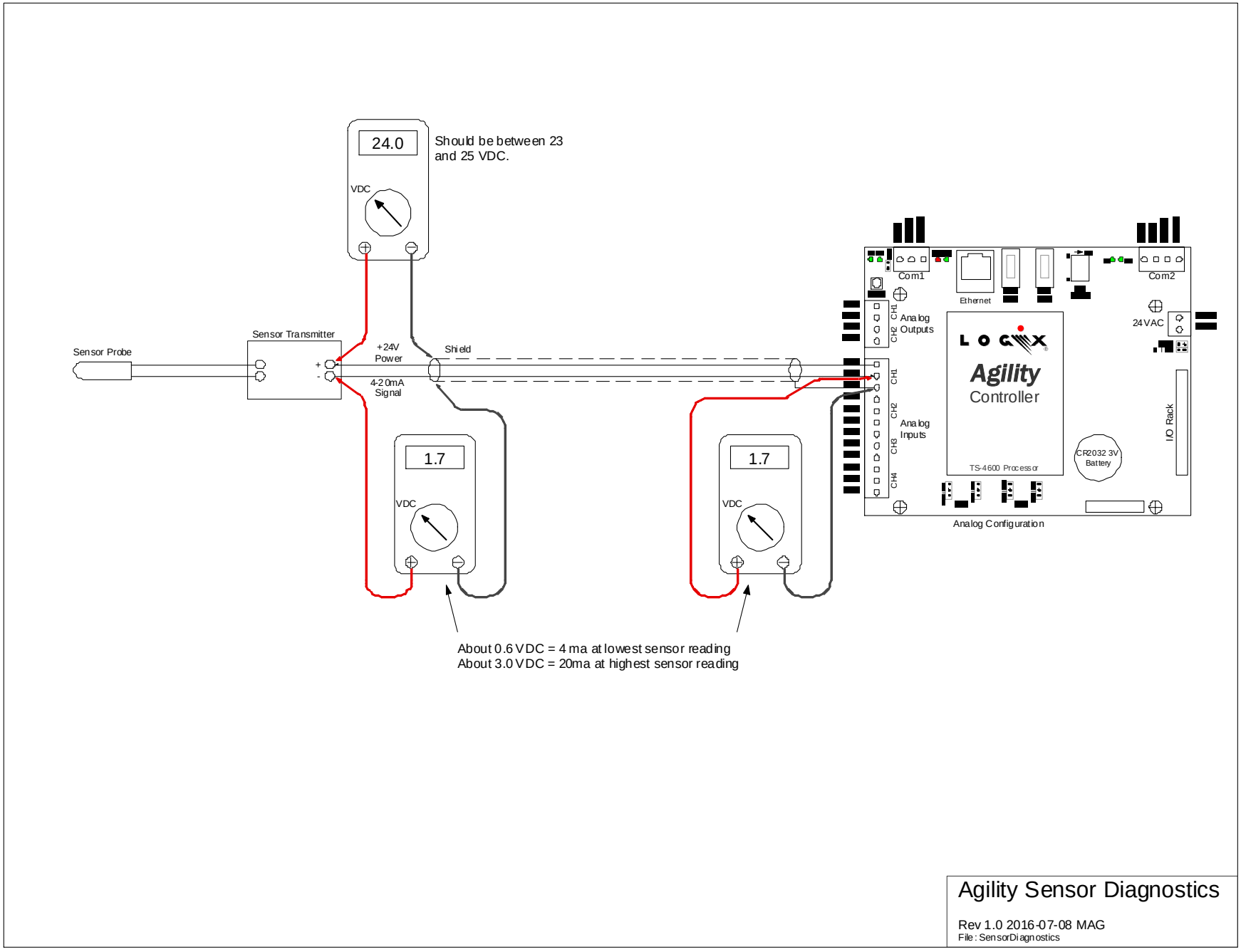
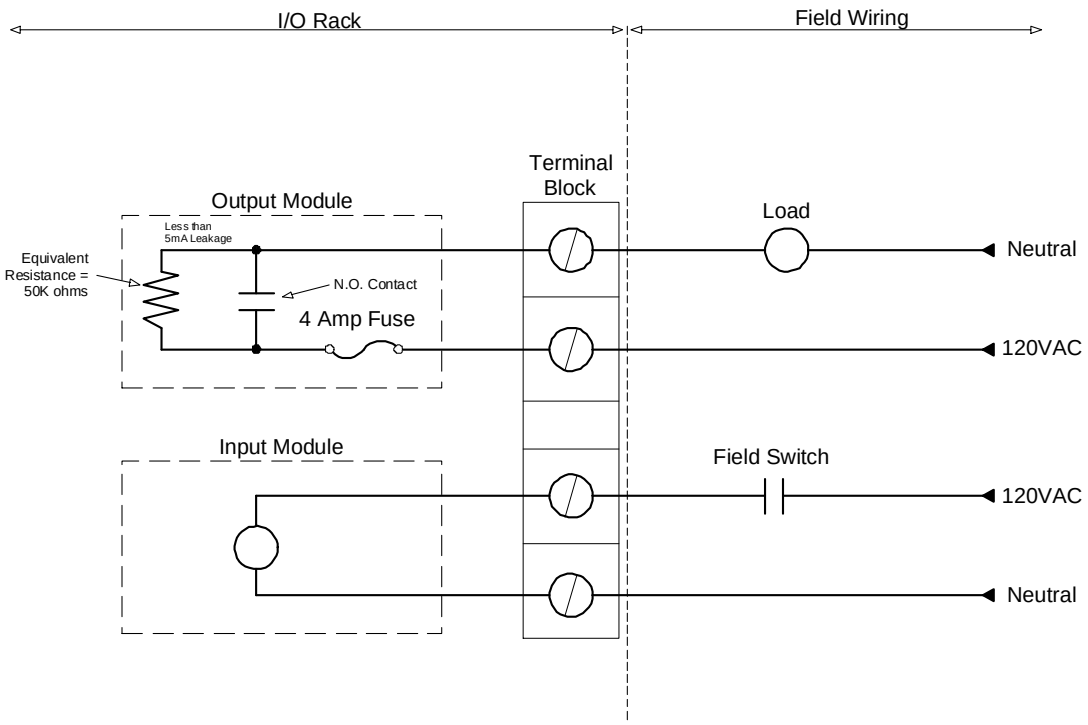


Figure 2- Agility Sensor Diagnostics Diagram



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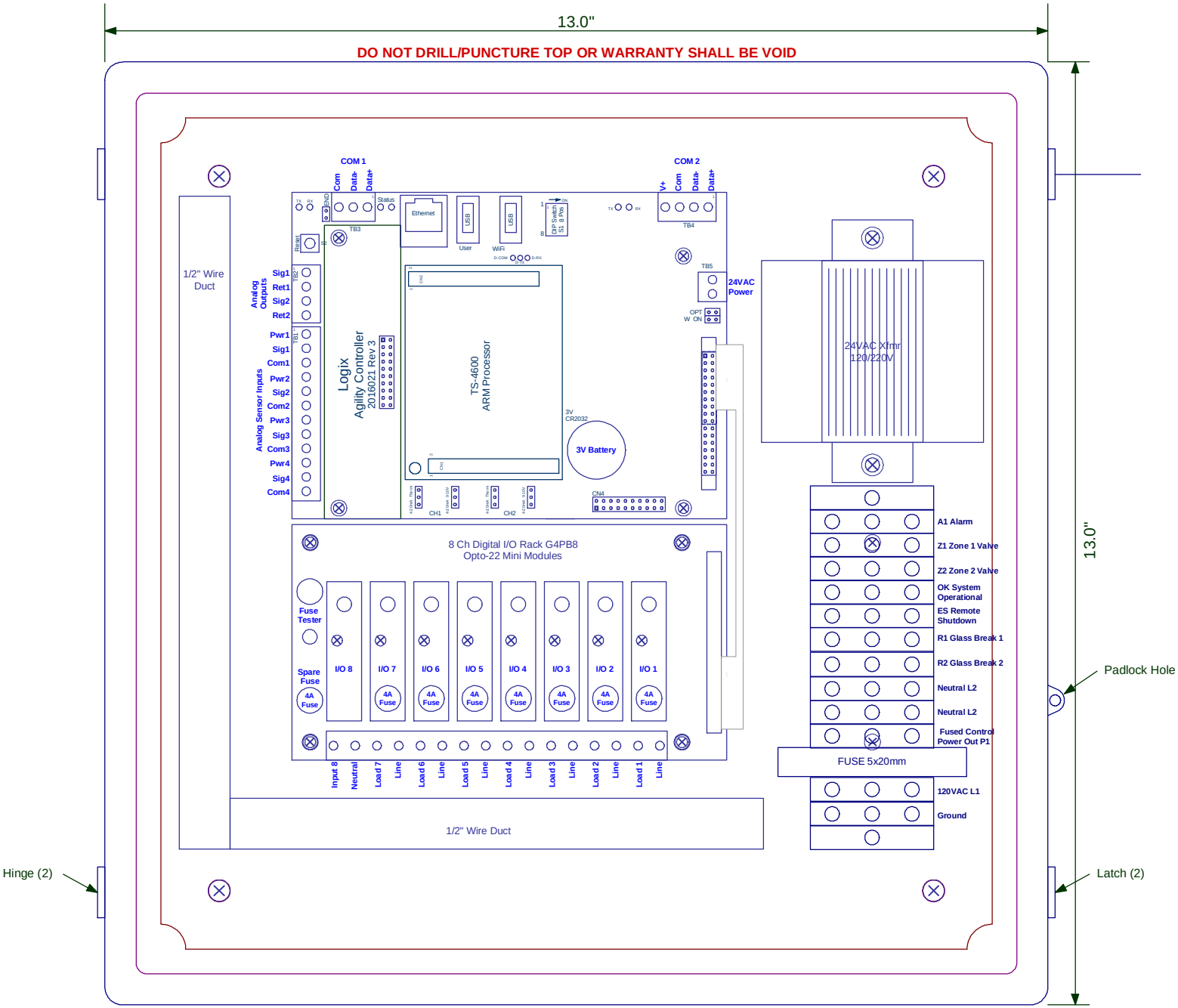
Title: Agility Digital Input Output Schematic		
Date: 07/11/2016	Rev: 01	Drawn by: MAG
Drawing Filename: AgilityDigInOutSchem.axd		

Figure 3- Agility Digital Input/Output Schematic



Enclosure Overall Dimensions
13.4"W x 13.0"H x 7.1"D

Agility EPCS Panel Layout

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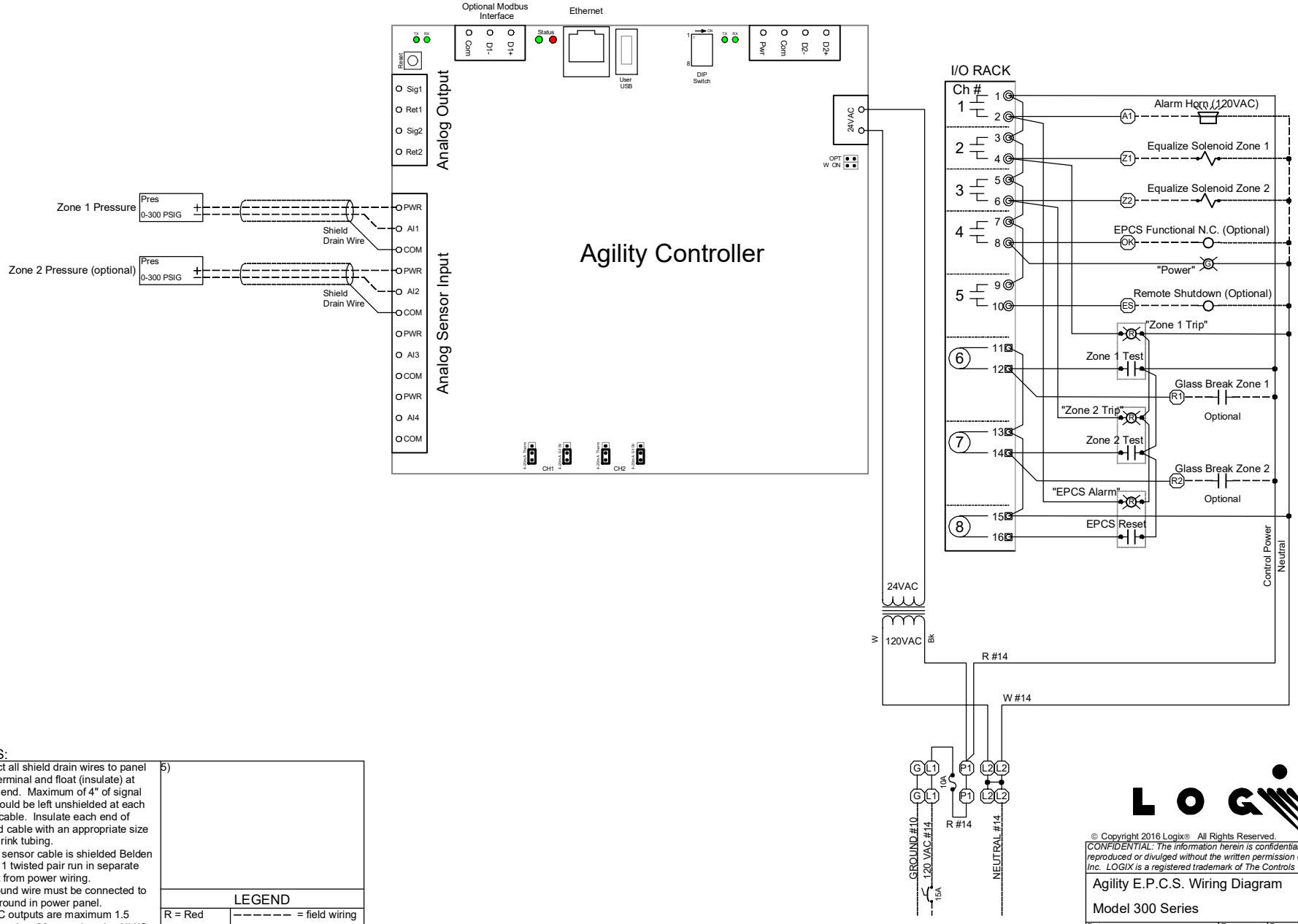
Not to Scale



NOTES:

1) Connect all shield drain wires to panel COM terminal and float (insulate) at sensor end. Maximum of 4" of signal wire should be left unshielded at each end of cable. Insulate each end of stripped cable with an appropriate size heat shrink tubing.
2) Analog sensor cable is shielded Belden #9501, 1 twisted pair run in separate conduit from power wiring.
3) #10 ground wire must be connected to earth ground in power panel.
4) 120VAC outputs are maximum 1.5 amps running, 30 amps inrush. All I/O modules are solid state (NOT dry). Total combined load is 9.5 amps maximum.
5)

LEGEND	
R = Red	——— = field wiring
W = White	——— = panel wiring
BK = Black	◯ = panel terminal block
Or = Orange	o = panel screw terminal

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Agility E.P.C.S. Wiring Diagram

Model 300 Series

Date	Rev	Drawn by
	01	MAG

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