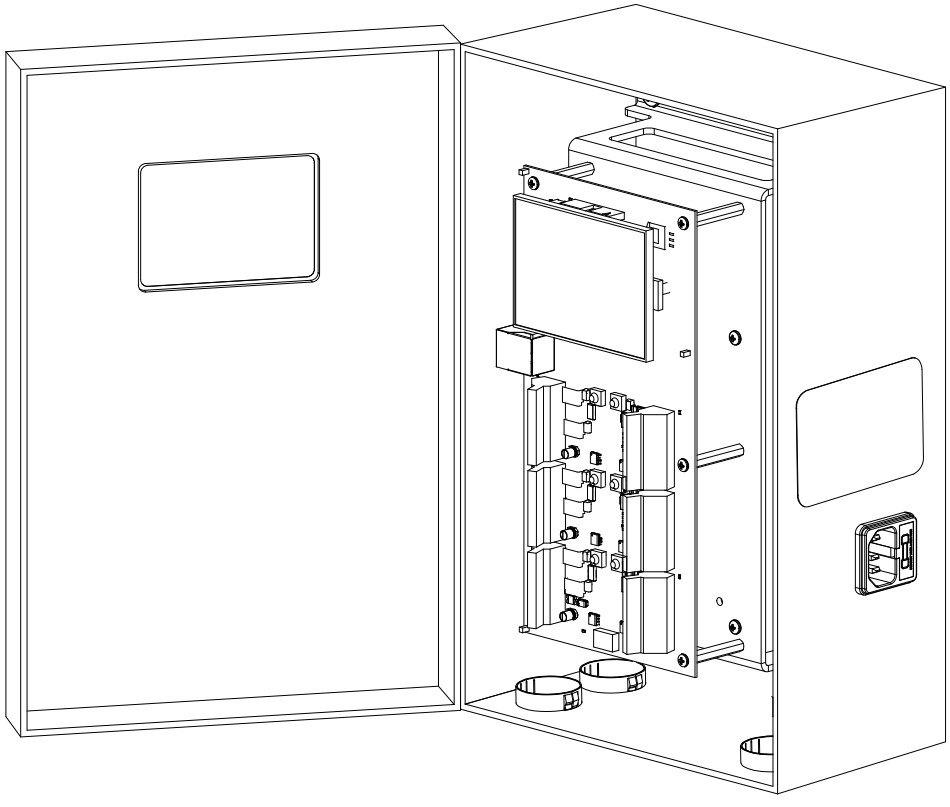
AFCS Enterprise controller

Model 343530



Date of issue	**August 2021**
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Version	**3**

Contents

⚠ DANGER

Disconnect all power supplied to system before performing any installation or maintenance.

Failure to comply will result in death or serious injury.

⚠ DANGER

All electrical wiring must be performed by a fully certified electrician.

Failure to comply will result in death or serious injury.

NOTE

Failure to comply with any danger, warning or caution, and any unintended use or misuse, will result in loss of claim for warranty or liability for equipment.

Explanation of safety signals

⚠ DANGER

Indicates a hazardous situation that will result in death or serious injury if not avoided.

⚠ WARNING

Indicates a hazardous situation that may result in death or serious injury if not avoided.

⚠ CAUTION

Indicates a hazardous situation that may result in minor or moderate injury and/or damage to equipment if not avoided.

NOTE

Emphasizes useful hints and recommendations as well as information for efficient and trouble-free operation.

Safety

Read and carefully observe installation instructions before installing, operating or troubleshooting referenced equipment. Equipment must be installed, maintained and repaired exclusively by persons familiar with instructions.

While unpacking, verify unit is complete and free from any damage. Install unit with power supply cords and wiring secured away from vehicle and other types of contact. Do not place unit near or over radiator or heat register. Verify unit is properly grounded

AFCS Enterprise controller must be equipped with plug having third (grounding) pin fitting only into grounding type outlet.

Remove power from controller unit before attempting to clean or decontaminate. External cleaning can be done with moist towel. Use compressed air to remove dust or other contaminants from inside enclosure.

NOTE

Do not use AFCS Enterprise controller without properly grounded outlet.

Failure to properly ground controller may cause damage to unit or data stored.

NOTE

Place locking device on eyelet of enclosure to prevent unauthorized users from accessing controller.

NOTE

Unplug controller from AC Voltage source before servicing fuse. Verify fuse holder is fully inserted before plugging controller back into AC voltage source.

Introduction

AFCS Enterprise controller model 343530 controller integrates with other AFCS Enterprise components over system network, allowing precise control and tracking of oil dispense points.

Network configuration is performed directly through LCD touchscreen interface. This guide provides mounting, wiring and configuring instructions and other helpful information for AFCS Enterprise controller model 343530 installation and maintenance.

⚠ WARNING

For indoor use only.

Failure to comply may result in serious personal injury and/or damage to equipment.

Table 1

Product specification

Temperature range	32 to 122 °F *(0 to 50 °C)*
Net weight	5.25 lbs. *(2,38 kg)*
Input voltage	100-240 V AC, 50-60 Hz
Minimum current	0.1 A
Maximum current	4.5 A
Pulse switch voltage	24 V ⎓
Pulse switch current	30 mA
Analog input voltage range	0-10 V
Analog input current range	0-20 mA
Valve output voltage	24 V ⎓
Maximum valve output current	1.85 A
Fuse	250V 6A medium-acting glass/ceramic 5 x 20mm[1)]
Altitude	Up to 2000 m
Humidity	Maximum RH 80% for temperatures up to 31 °C decreasing to 50% RH at 40 °C
Transient over-voltage	Category II
Mains supply voltage	+/-10% of nominal voltage

[1)] Reference: Littelfuse 0234006MXP.

⚠ WARNING

Only use product under conditions specified in document.

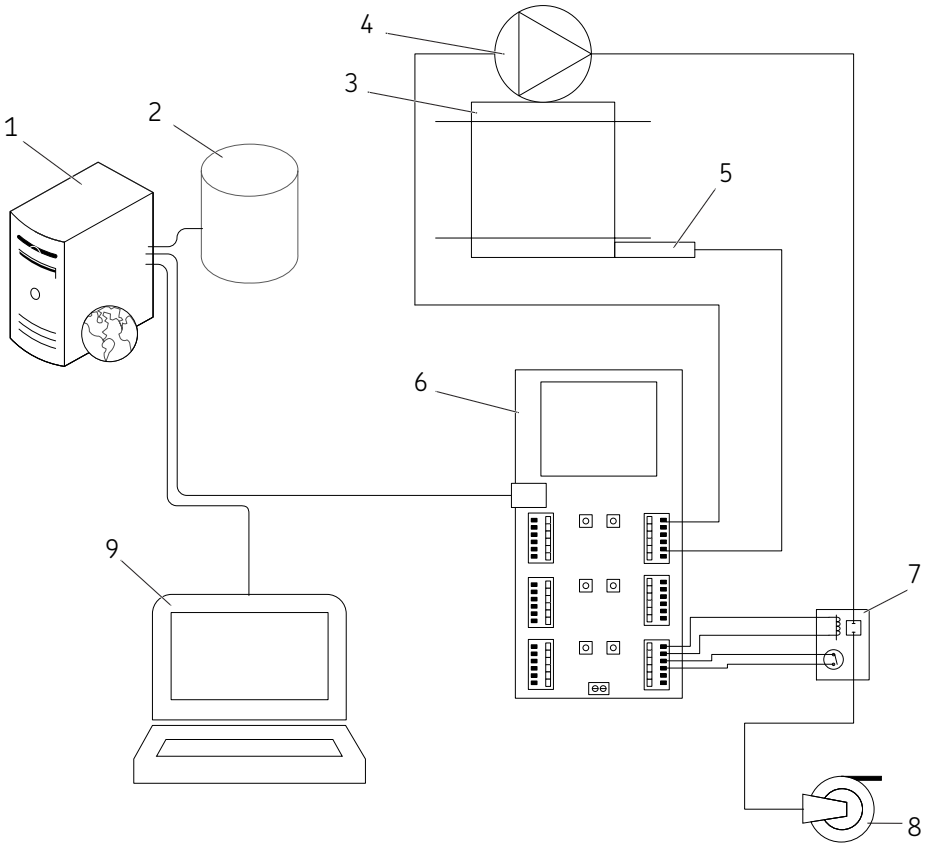
Failure to comply may result in death or serious personal injury.

NOTE

Install socket-outlet near equipment in a place that is easily accessible. Mains plug is disconnect device.

Fig. 1

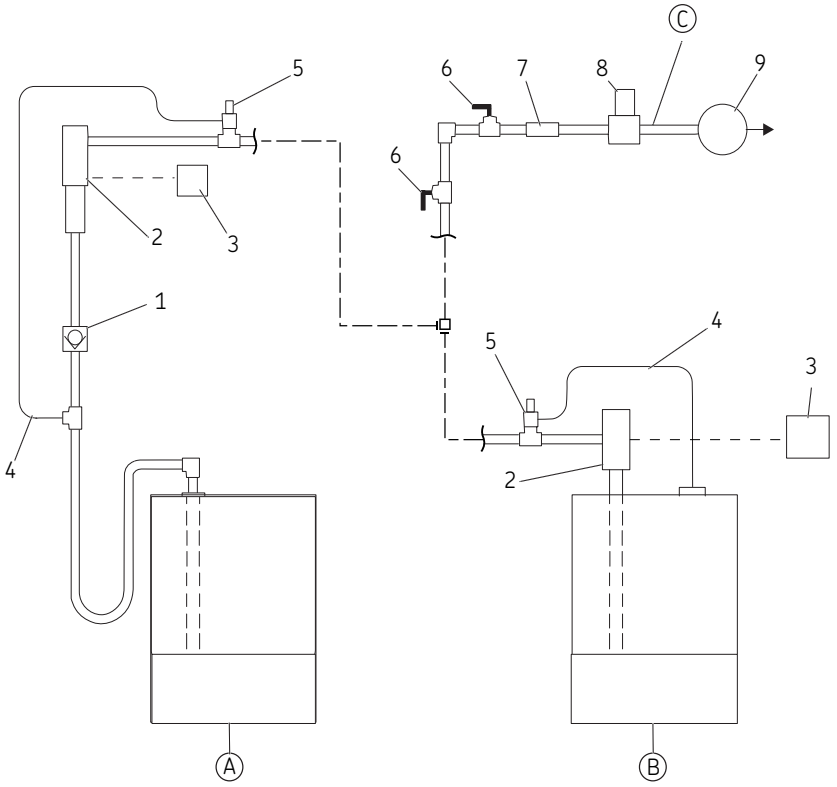
AFCS Enterprise network



Item	Description
1	AFCS Enterprise web server
2	AFCS Enterprise database
3	Oil tank
4	Pump
5	Tank level sensor
6	AFCS controller
7	Combo unit
8	Hose reel
9	PC/web browser

Fig. 2

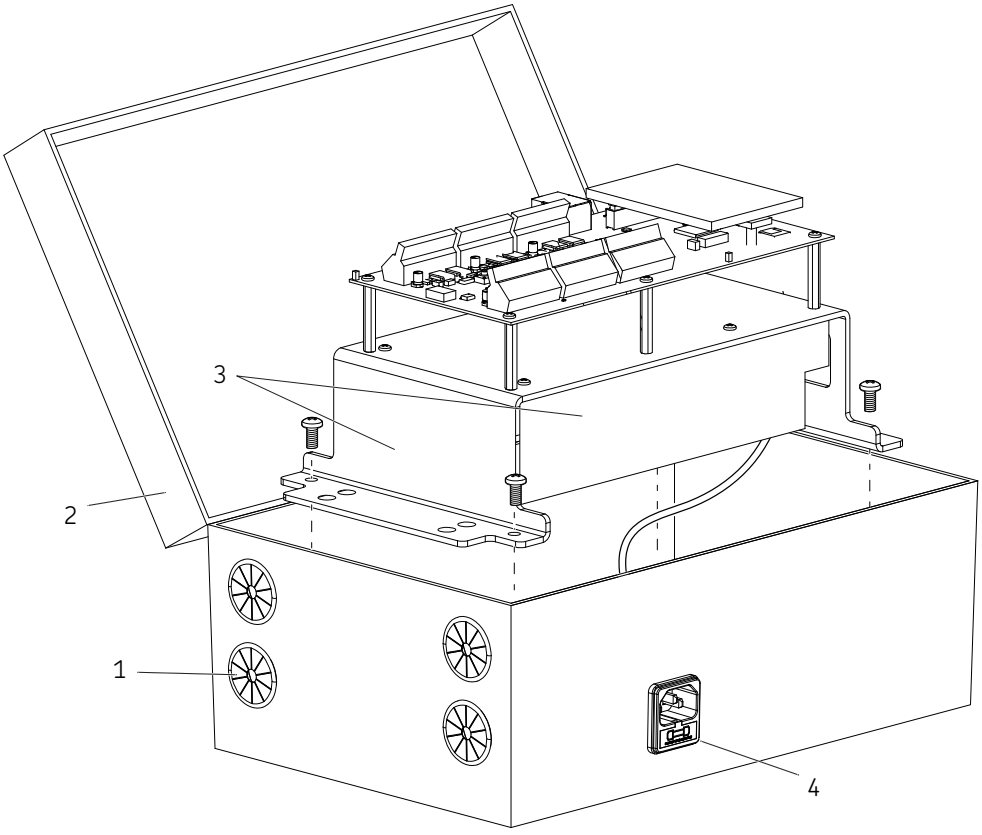
AFCS Enterprise Hardware

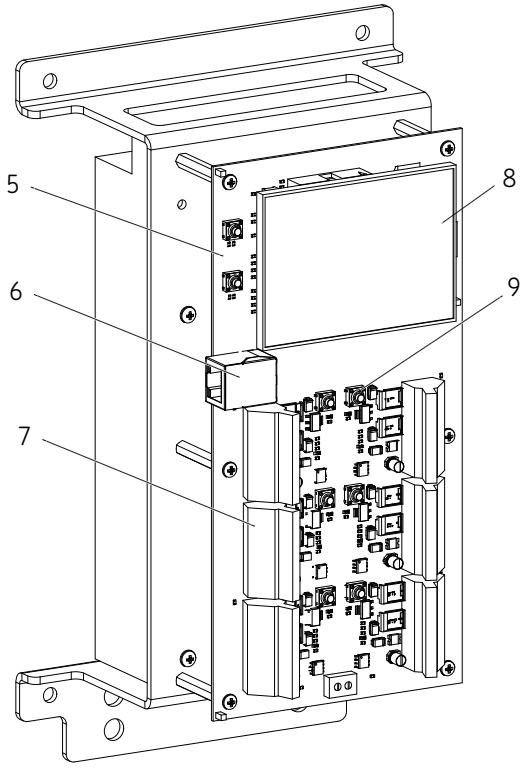


Item	Description
A	System line with wall-mounted pump
B	System line with tank-mounted pump
C	Line to hose reels
1	Check valve
2	Pump (wall or pump mounted)
3	Air supply
4	Tank return line located below check valve
5	Pressure relief valve
6	Shut off valve
7	Filter
8	Fluid solendoid
9	Pulse meter

Controller overview

Fig. 3



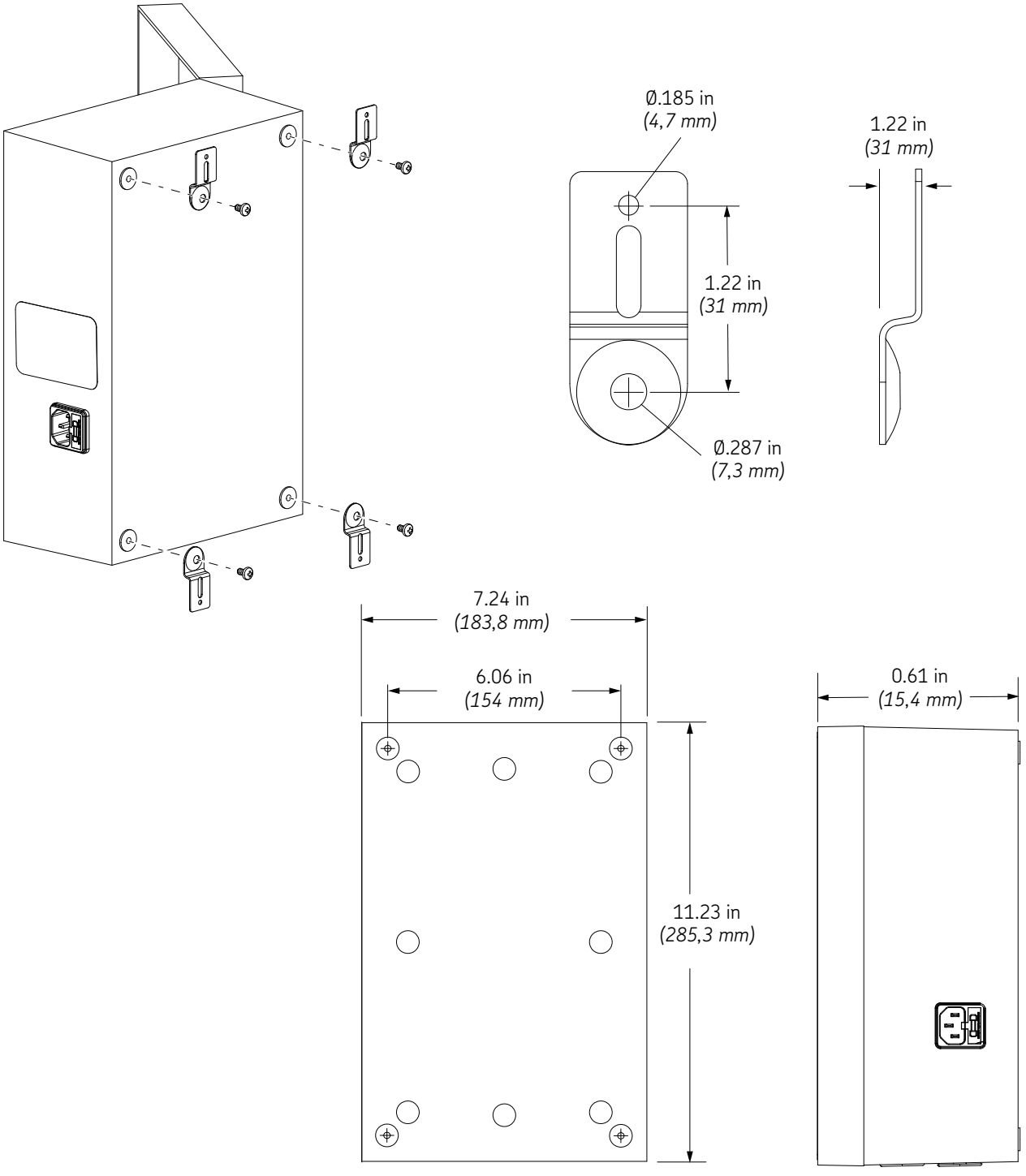


Item	Description	Quantity
1	1/2 in universal bushing	4
2	Electrical enclosure	1
3	PCB mounting bracket and power supply	1
4	AC power entry module with fuse	1
5	Controller PCB	1
6	Ethernet port	1
7	PCB wire terminal	6
8	Touchscreen LCD display	1
9	Solenoid test button	6

Mounting dimensions

Fig. 4 shows unit dimensions and wall mounting hardware.

Fig. 4

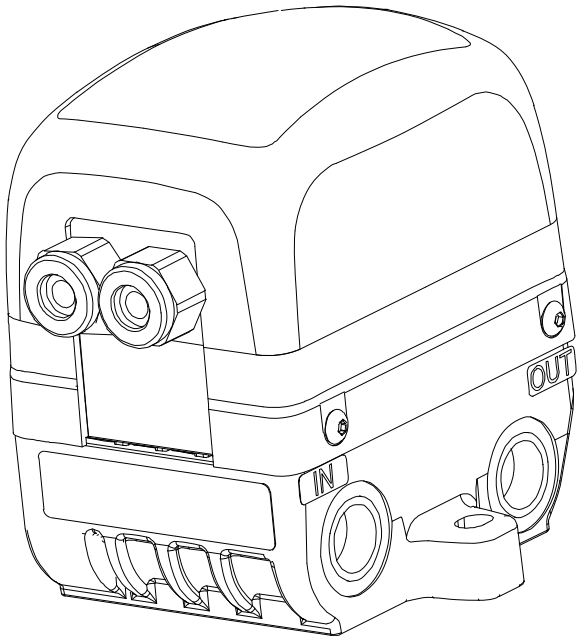


Combo unit - 343539

Model 343539 all in one combo unit includes solenoid, pulse meter and 150 micron filter. Refer to form **671102** for further specifications.

Fig. 5

Combo unit

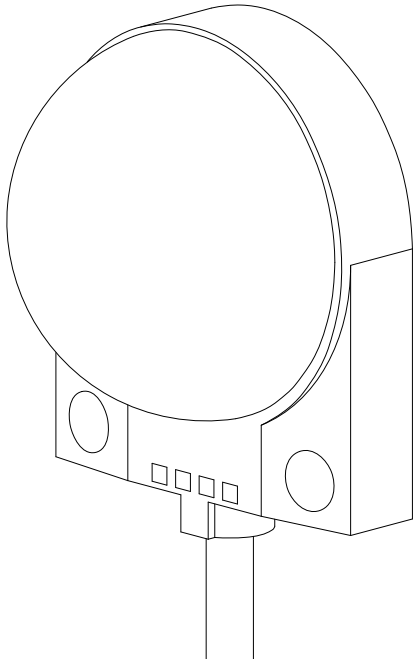


Ready light – 343546

Optional ready light illuminates when fluid solenoid is open and station is ready to dispense. Ready light is hard wired into combo unit. Refer to **671042** wiring diagram and instructions. Mount ready light near combo unit, reel or work bench to be easily seen by mechanic. Includes 2 ft. *(0,6 m)* wire that connects from ready light to combo unit.

Fig. 6

Ready light



Tank monitor probe - 343540

NOTE
2 in dimension must remain 2 in or less. Moving sensor tip further from threaded end of adapter can cause sensor to work improperly.

Use 2 in NPT mounting assembly to mount sensor to standard 2 in bung for optimal results. Sensor assembly comes configured for mounting solution and can be mounted to standard 2 in NPT tank bung directly out of box. Default settings in controller are setup and sensor settings require no adjustment.

In cases where 2 in NPT bung is not available and 3/4 in bung is available, there is an option to disassemble 2 in NPT mounting solution and use 3/4 in NPT portion of fitting. Adjust sensor so that tip is above bottom of 3/4 in NPT fitting and adjust sensor configuration settings on controller.

1 Use wrench to disconnect 3/4 in NPT fitting from larger assembly.
2 Loosen lock nut from sensor and thread back sensor so that tip of sensor is recessed a maximum of 1/2 in above bottom of 3/4 in NPT fitting (**Fig. 9**).
3 Tighten lock nut.
4 Adjust tank standoff value in tank settings on controller.

Fig. 7

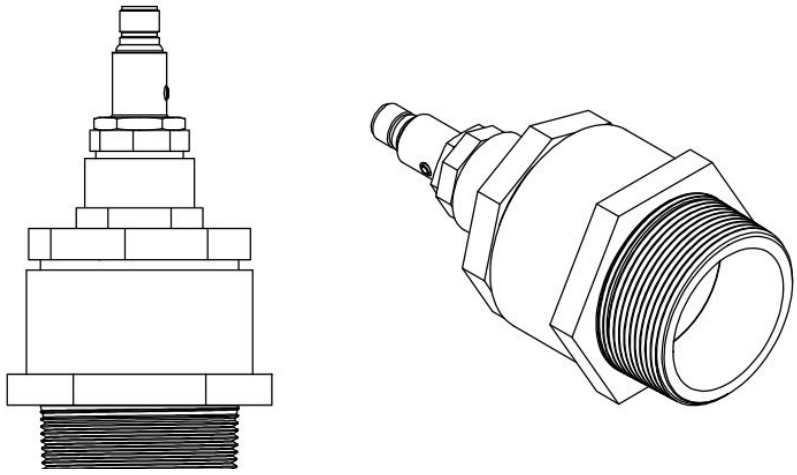
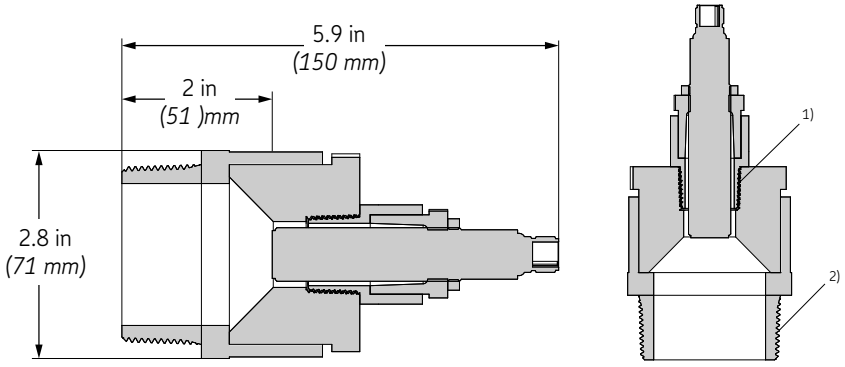


Fig. 8



1) 3/4 in NPT thread
2) 2 in NPT thread

Fig. 9

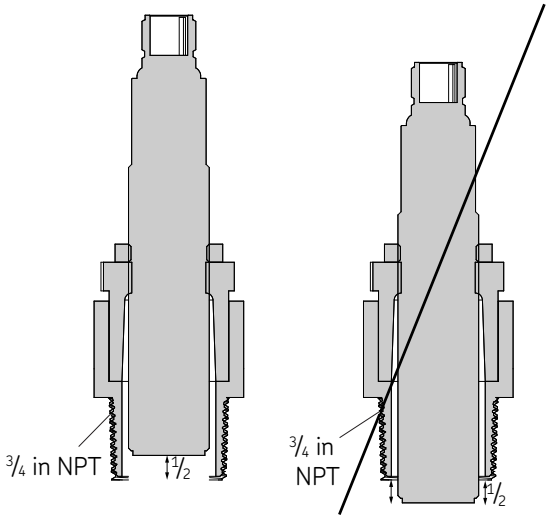


Fig. 10

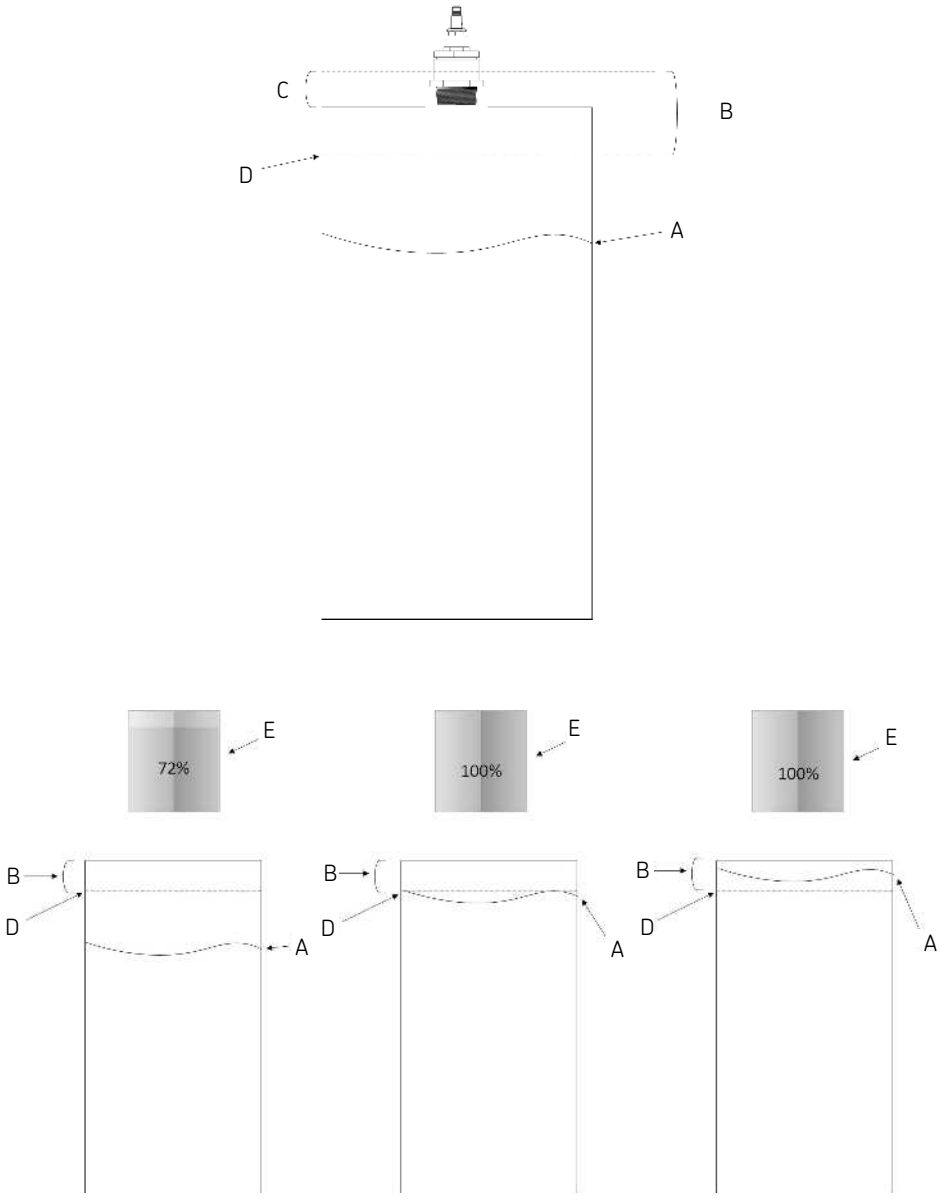


Fig. 10 shows if fluid level is at or above blind zone, tank monitor system will read it as 100% full.

A - Fluid level in tank
B - Blind zone for ultrasonic sensor - All non-contact ultrasonic sensors have an area close to the sensor that is unable to be measured, known as the blind zone.
C - Tank standoff value
D - Maximum fluid level sensor can read
E - Tank monitor reading

NOTE
Sensor range: 86 in *(2 200 mm)* to 8 in *(200 mm)* from tip of sensor.

Configuration of tank monitor

To fully configure AFCS Enterprise controller tank monitor features connect to computer that is on same network as controller and type IP address into browser URL.

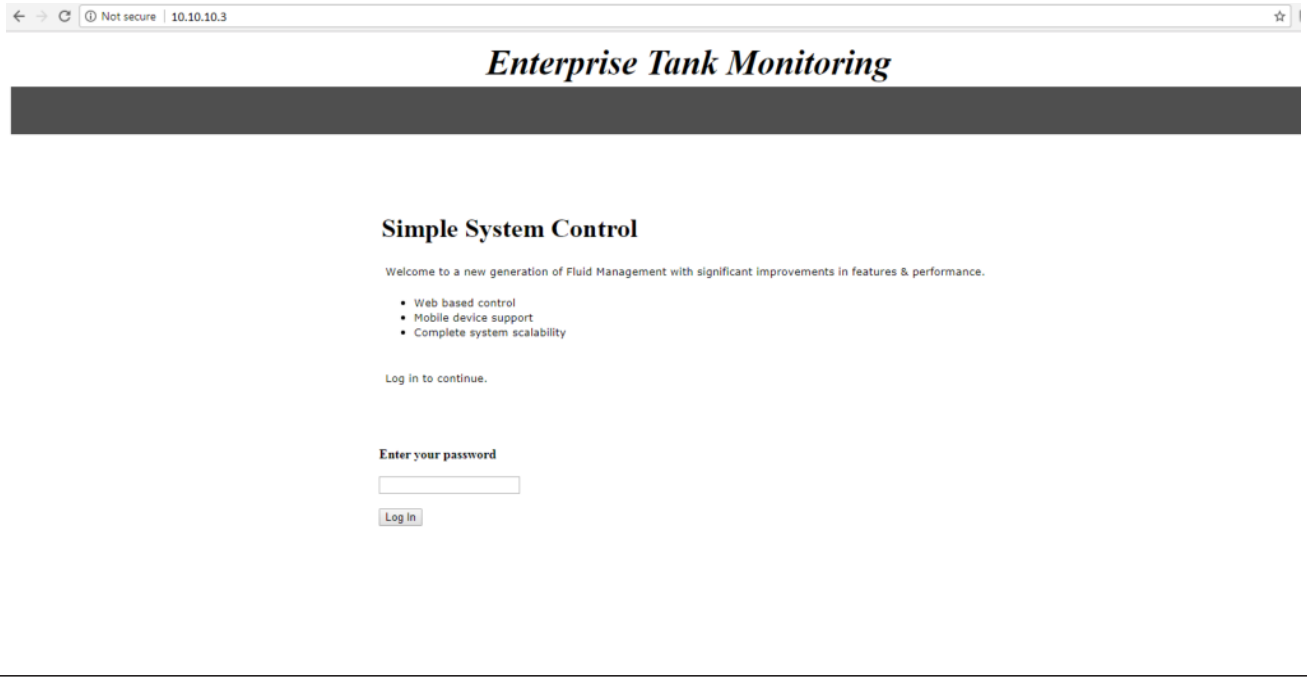
NOTE

If AFCS Enterprise controller is using static IP addressing, computer must have same base IP address (first three numbers in IP address) as controller, and last number must be unique to network. No other controllers or computer can have it.

NOTE

Password is pin number used to log into menu system accessible from LCD screen on controller (Default: **5148**).

Fig. 11



For configuration options, go to **Configure** tab on navigation banner at top of page. Select tank to configure. Configure tanks individually or all the same. Refer to **Fig. 12**, **page 12**.

- **Save changes**

NOTE
Do not forget to save changes before leaving configuration screen. If you leave screen without saving, configuration parameters will be lost.

- **Enable Monitoring** - Enables or disables tank monitor for chosen port. Only enabled ports will have results displayed in **Monitor** tab and Enterprise software.
- **Fluid Type** - **New Fluids** and **Used Fluids** have different warning levels because new fluid tanks are being emptied by pumps and used fluid tanks are being filled by pumps.
- **Tank Volume Units** - Tank volume units can be measured in **Gallons** and **Liters**.
- **Tank Dimension Units** - Units used when configuring tank dimensions. Available options are **Inches**, **Feet**, **Millimeters** and **Meters**.
- **Tank Shape** - Shape of tank is important to calculate volume of tank. Choose tank shape closest to tank. If tank that is desired to be monitored has an irregular shape, irregular shape tank option can be selected. This presents option to fill in a "look-up table" that corresponds a fluid height to a percentage and volume.
- **Tank Dimensions** - Only required tank dimensions for given tank shape will be displayed for entry. Please reference tank shape diagram to find the fields corresponding to values.

NOTE
Measurements should be taken from inside of tank if tank has double wall.

- **Warning Level** - Volume of initial warning level that alerts user that tank level needs attention.
- **Stop Level** - Volume of stop level that will prevent Enterprise software from allowing further fluid dispensing from tank.
- **Sensor Standoff** - Distance between tip of fluid sensor and top of tank.
- **Maximum Fluid Height** - Maximum height of fluid in tank. By default this is assumed to be maximum height of tank as entered in **Tank Dimensions** section.
- **Calibration Settings** - Controller comes with factory default calibration settings for Tank Monitor probe kit. Default settings are accurate within 1/2 in. If maximum accuracy is needed, further calibration can be accomplished on system by taking two point measurement and entering precise distances and raw analog value measured by sensor. Two point measurement calibration procedure is available from touchscreen menu and described in further detail there.
- **Advanced Features**
- **Sensor Maximum Range** - Sensor maximum range and inversion options are for people not using Alemite tank monitor sensor. In this case, maximum range and inversion option for sensor being used must be entered here.

NOTE
Do not attempt to calibrate sensors arbitrarily. Calibrating sensors to be more accurate than default values require extreme precision.

NOTE
Do not use **Calibration Settings** or **Advanced Features** unless you have been through AFCS Enterprise training.

Enterprise Tank Monitoring

Log Out | Network | Configure | Monitor

Save Changes

Choose a Tank Monitor to Configure

○ Port 1 Tank ○ Port 2 Tank ○ Port 3 Tank ○ Port 4 Tank ○ Port 5 Tank ○ Port 6 Tank ◉ Configure all Tanks the Same

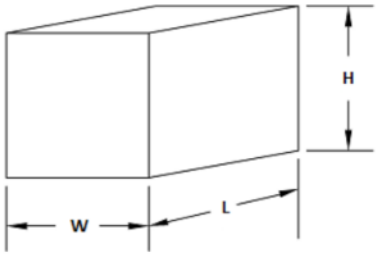
Enable Monitoring ◉ Enable ○ Disable

Fluid Type ◉ New Fluid ○ Waste Fluid

Tank Volume Units ◉ Gallons ○ Liters

Tank Dimension Units ◉ Inches ○ Feet ○ Millimeters ○ Meters

Tank Shape
◉ Rectangular ○ Irregular Shape
○ Horizontal Cylinder ○ Horizontal Oval ○ Horizontal Capsule
○ Vertical Cylinder ○ Vertical Oval ○ Vertical Capsule



Tank Dimensions: **Length (L)** 0.00 inches **x** **Width (W)** 0.00 inches **x** **Height (H)** 0.00 inches

Warning Level 0.00 gallons **Stop Level** 0.00 gallons

Sensor Standoff 2.00 inches **(Maximum Fluid Height** 0.00 inches ◉ Same as the tank height ○ Different from the tank height **)**

Current Calibration Setting: Near: 33 @ 7.87 " Far: 3300 @ 86.61 " = (gain: 0.0241, offset: 7.08")
Factory Default Calibration: Near: 33 @ 8.68 " Far: 3666 @ 86.61 " = (gain: 0.02145, offset: 7.97") Revert to the Factory Default Calibration

Advanced Features

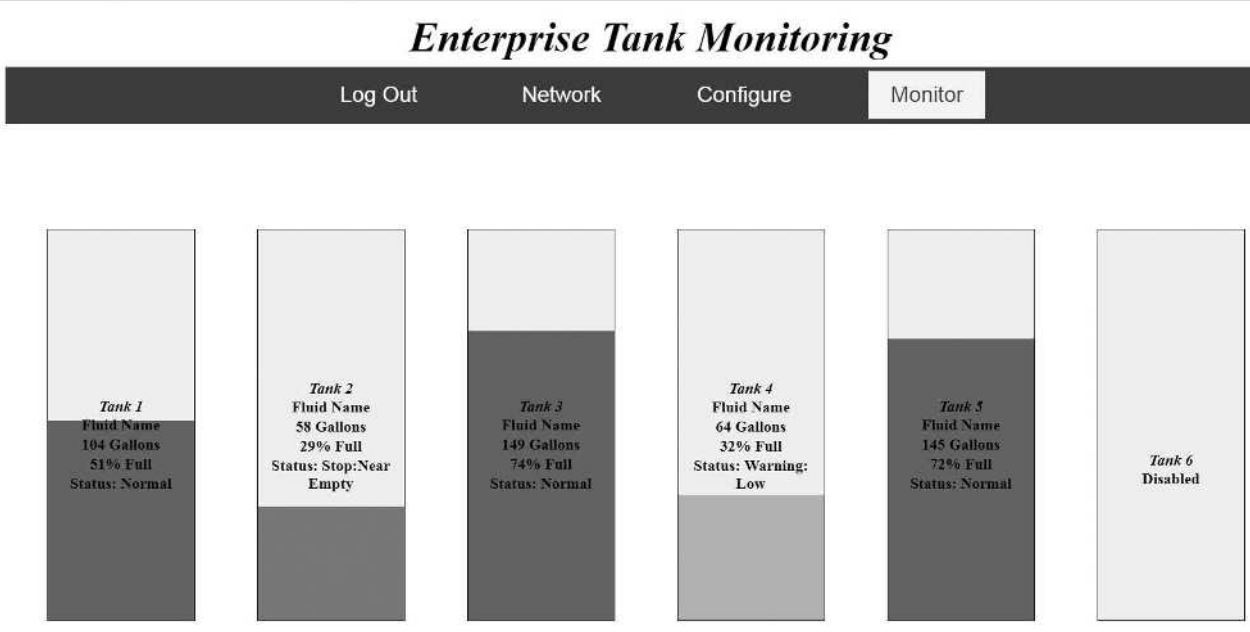
Warning: The sensor settings below should not be changed unless you are using a nonstandard sensor !
Sensor Maximum Range 86.61 *inches* ◉ *Normal* ○ *Invert Sensor Readings*

Fig. 12

Monitor

If you are an Enterprise software customer, all configuration options will be automatically sent to Enterprise software.

Fig. 13



Cat 5 or 6 ethernet network wiring for networking controllers

Table 2

RJ45 PIN #	Wire color (T568B)	Wire diagram (T568B)	10 base–T signal 100 base TX signal	1000 base–T signal
1	White/orange		Transmit+	BI_DA+
2	Orange		Transmit –	BI_DA–
3	White/green		Receive +	BI_DB+
4	Blue		Unused	BI_DC+
5	White/blue		Unused	BI_DC –
6	Green		Receive-	BI_DB–
7	White/brown		Unused	BI_DD+
8	Brown		Unused	BI_DD–

Fig. 14

Pin positions

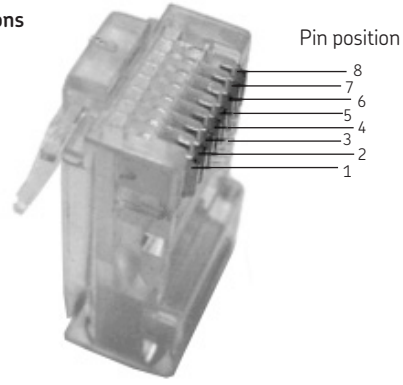
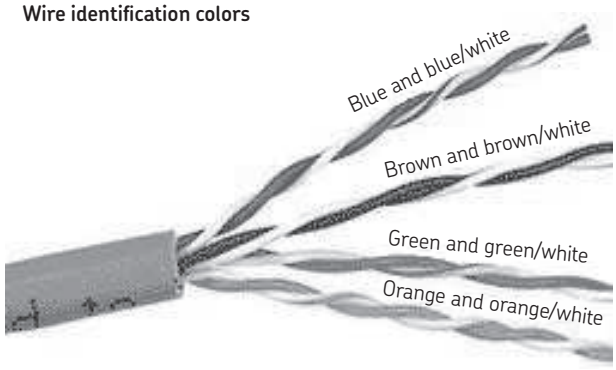


Fig. 15

Wire identification colors



1 Pull cable off reel to desired length and cut. It is easier to attach RJ-45 plugs after cable is pulled if pulling cable through holes. Total length of wire segments between two points cannot exceed 328 ft. *(100 m)*.

2 Start on one end and strip cable jacket off (about 1 in *(25 mm)*) using stripper or knife.

3 Spread, untwist pairs, and arrange wires in order of chart above.

4 Flatten end between thumb and forefinger. Trim ends of wires evenly, leaving only 1/2 in *(13 mm)* in wire length. If longer than 1/2 in *(13 mm)* it will be out of specification and susceptible to crosstalk.

5 Flatten and ensure there are no spaces between wires.

6 Hold RJ45 plug with clip facing down, away from body.

7 Push wires firmly into plug.
- Inspect each wire is flat at front of plug.
- Confirm order of wires. Double check again.
- Verify jacket is fitted flush against stop of plug.

8 Carefully hold wire and firmly crimp RJ45 with crimper.

9 Analyze color orientation, verifying crimped connection will not come apart, and make sure wires are flat against front of plug. Must start over if one requirement is incorrect.

10 Test ethernet cable.

NOTE
Do not damage wire during stripping process or wire will be need to be replaced.

Ethernet cable tips

- Odd numbered pins are always striped; even numbered pins are always solid colored.
- Looking at RJ45 with clip facing away, brown is always right, and pin 1 is left.
- No more than 1/2 in *(13 mm)* of ethernet cable should be untwisted otherwise it will be susceptible to crosstalk.

NOTE
When handling ethernet cables:
- Do not deform.
- Do not bend.
- Do not stretch.
- Do not staple.
- Do not run parallel with power cables.
- Do not run near noise inducing components.

Wiring diagram

Fig. 16 shows wiring connections from hardware to controller wiring terminals.

Four conductor 18AWG shielded cable (**A**) is recommended.

NOTE

Apply power and configure controller before connecting to network via ethernet networking cable.

⚠ DANGER

Disconnect all power supplied to controller before performing installation or wiring.

Failure to comply will result in death or serious injury.

Configure controller

Once controller wiring connections are complete, assign each controller unique unit number for each site and site number, then configure each controller to network.

- Assign unit number and site number.
- Obtain MAC address. This is based on unit number and site number.
- Assign IP mode (static or DHCP).
- Configure network settings (static mode only).

NOTE

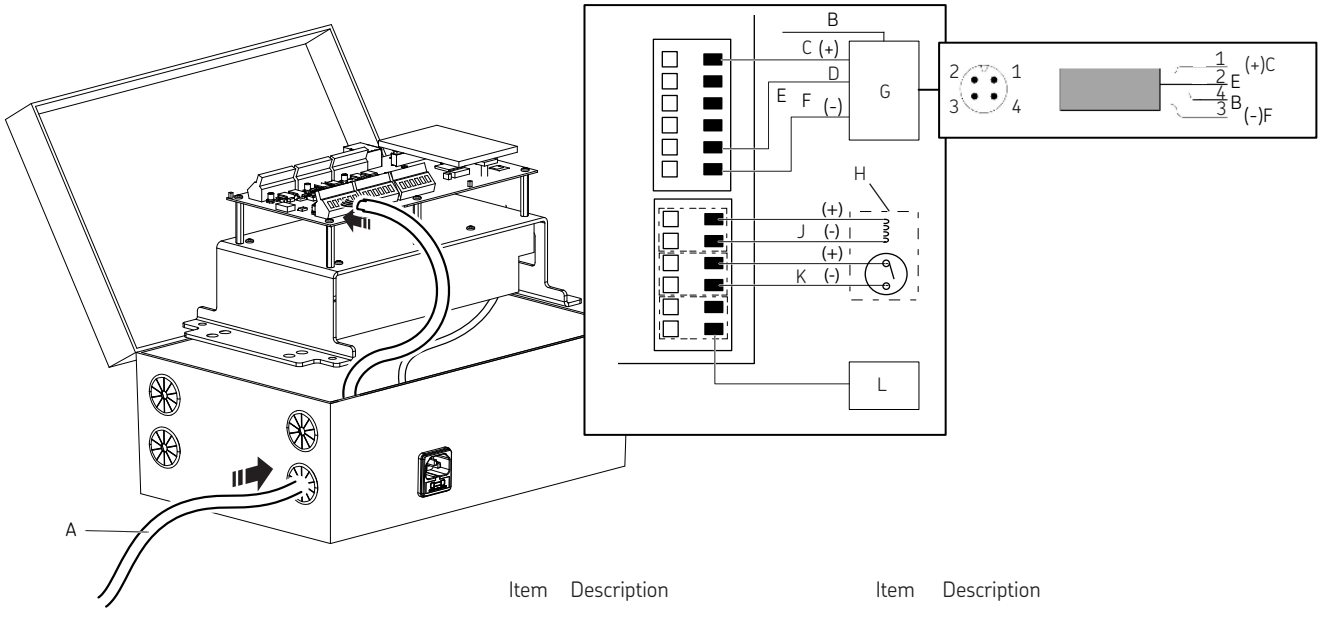
Do not exceed 200 ft. *(60,96 m)* with 18 AWG cable when connecting solenoid and pulse meters. Individual cable lengths should be 100 ft. *(30,48 m)* or less.

NOTE

Assign each controller unique unit number for each site.

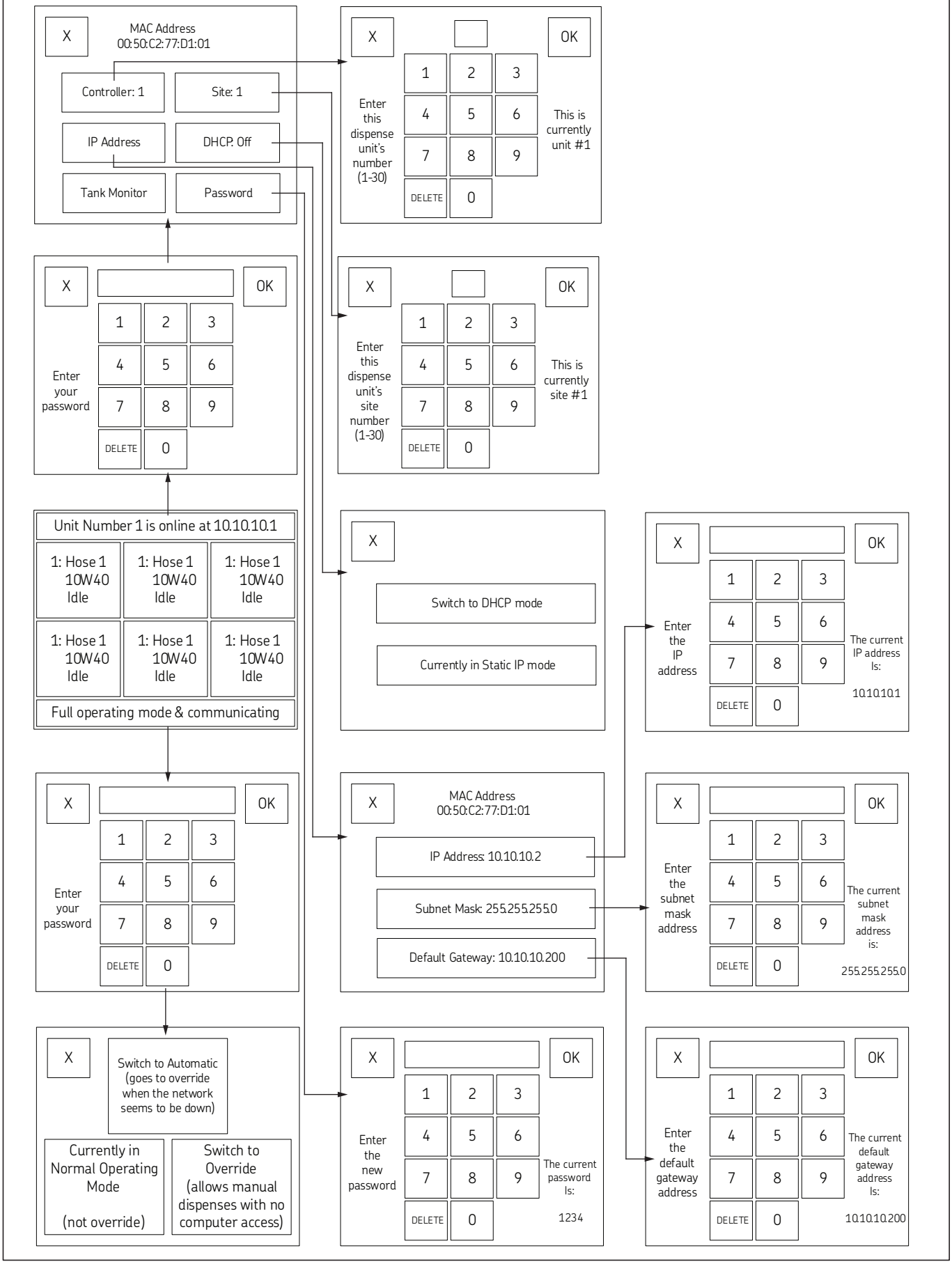
Unit and site numbers are used to generate a unique MAC address for each controller.

Fig. 16



Item	Description	Item	Description
A	Conductor 18 AWG shield cable (4) 343533-100 ft. *(30,48 m)* 343533-250 ft. *(76,2 m)* 343533-500 ft. *(152,4 m)*	E F G	Analog signal Blue wire Tank sensor
B C D	Black wire (not used) Brown wire White wire	H J K	Combo unit (refer to service page **671102**) Solenoid valve cable connection (+ and -) Pulse switch cable connection (+ and -)
		L	Cable shield ground connection

Fig. 17


X
MAC Address
00:50:C2:77:D1:01
Controller: 1
Site: 1
IP Address
DHCP: Off
Tank Monitor
Password
OK
Enter your password
Enter this dispense unit's number (1-30)
This is currently unit #1
Enter this dispense unit's site number (1-30)
This is currently site #1
1 2 3
4 5 6
7 8 9
DELETE 0
Unit Number 1 is online at 10.10.10.1
1: Hose 1 10W40 Idle
Full operating mode & communicating
Switch to DHCP mode
Currently in Static IP mode
Enter the IP address
The current IP address is:
10.10.10.1
IP Address: 10.10.10.2
Subnet Mask: 255.255.255.0
Default Gateway: 10.10.10.200
Enter the subnet mask address
The current subnet mask address is:
255.255.255.0
Switch to Automatic (goes to override when the network seems to be down)
Currently in Normal Operating Mode
(not override)
Switch to Override (allows manual dispenses with no computer access)
Enter the new password
The current password is:
1234
Enter the default gateway address
The current default gateway address is:
10.10.10.200

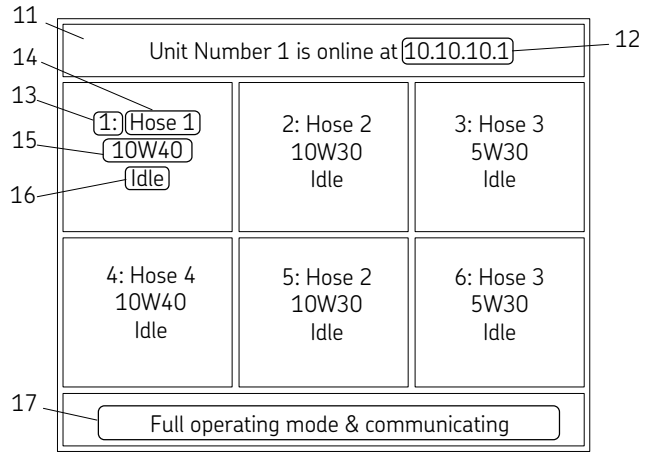
To configure controller:

1 Power on controller and wait for start up screen to display (**Fig. 18**).
2 Select top screen button (**11**).
3 Enter password. Default password is **1234** or **5148**.
4 Select **Unit** or **Site** to assign controller unit number and site number (**Fig. 17, page 16**).
5 Select **IP mode** (static or DHCP) for network. Controller default is static.
6 Select **Unit Network Settings.** **MAC Address** is displayed at top.

MAC address

IT network administrator may require MAC address of each controller. MAC addresses are used for network identification and for issuing IP addresses on DHCP-enabled networks.

Fig. 18



Item	Description	Item	Description
11	Unit configuration access	15	Tank fluid
12	IP address	16	Hose status
13	Terminal block	17	Operating mode
14	Hose		

Unit network settings (static mode)

If network is running in static mode, enter network settings for each controller.

- Fixed IP address
- Subnet mask
- Default gateway

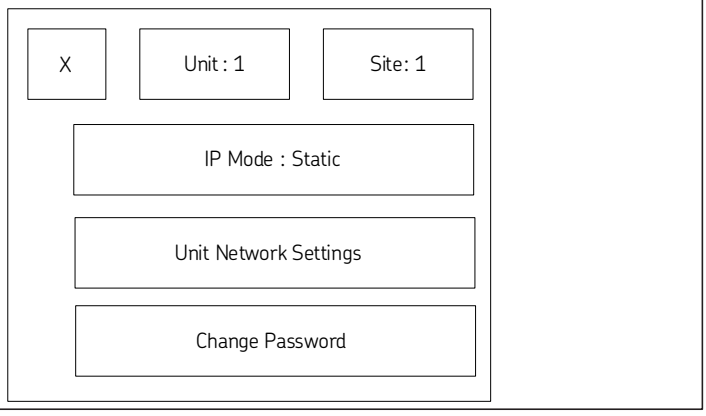
To enter unit network settings:

1 Power on controller and wait for start up screen to display (**Fig. 18, page 17**).
2 Select top screen button (**11**).
3 Enter password. Default password is **1234** or **5148**.
4 Select **Unit Network Settings (Fig. 19)**. Enter **IP address**.
5 Enter **Subnet Mask address**.
6 Enter **Default Gateway address**.

NOTE

Controllers function by default in static mode.

Fig. 19



DHCP mode

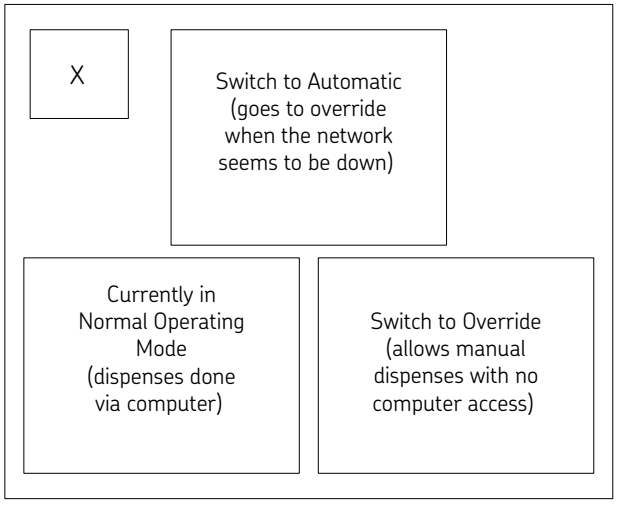
For networks in DHCP (Dynamic Host Configuration Protocol) mode, IP addresses, subnet masks and default gateways are automatically assigned to controllers.

Operating modes

There are three operating mode options for controllers:

- **Normal operating mode** - Controller is operating normally. Fluid dispensing is controlled by requests made through AFCS Enterprise software.
- **Switch to override** - Manually initiates override mode in event of network outage.
- **Automatic mode -** In event of network outage exceeding 10 minutes, controller switches automatically into override mode.

Fig. 20



NOTE

Controller override mode is an operating mode where all outputs are turned on and all hoses can be used.

AFCS Enterprise system captures total dispensed fluid volumes and sends report to AFCS Enterprise software when controller returns to normal operating mode while mode is active.

Tank monitor functions

Fig. 21

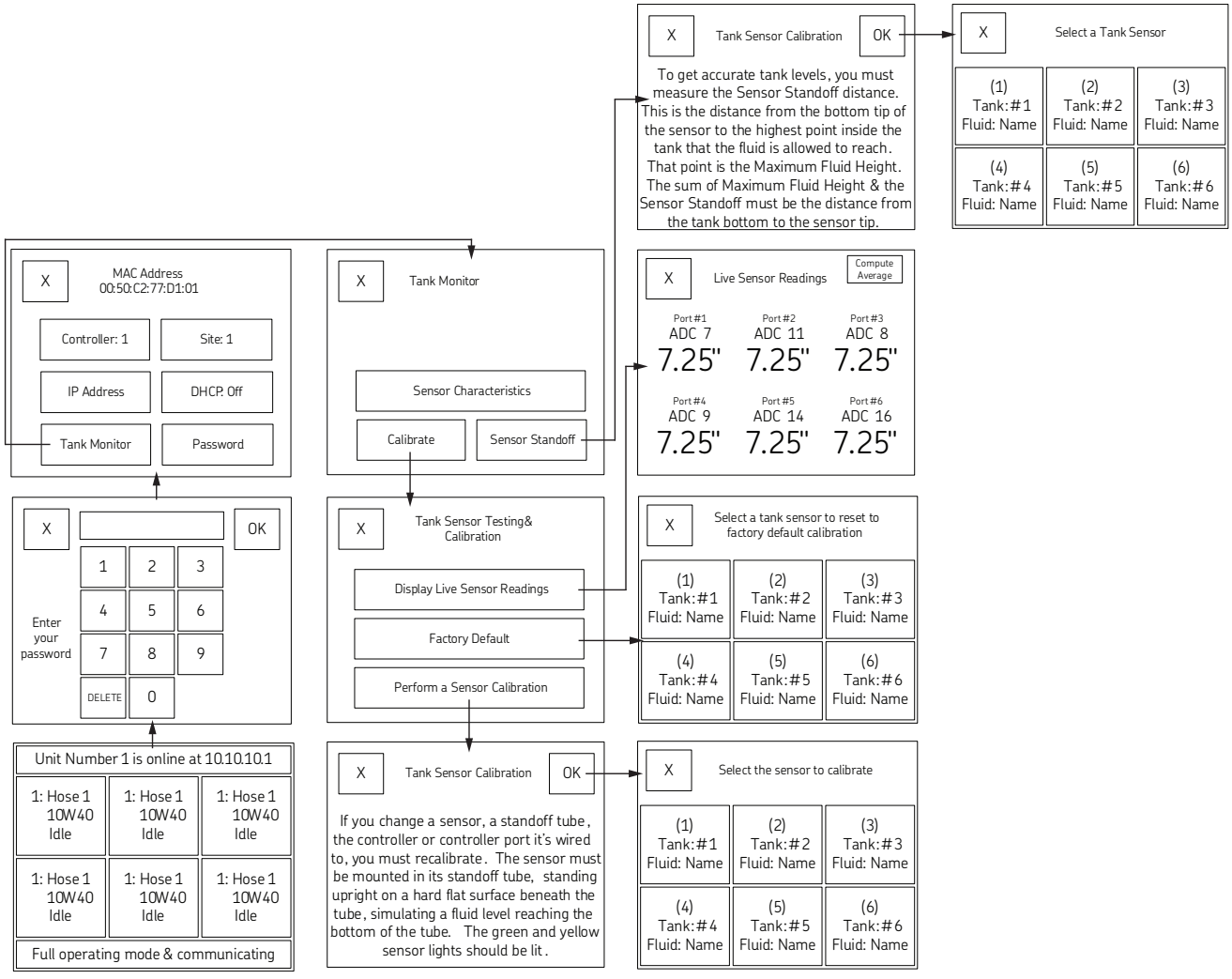


Table 3

AFCS Enterprise controller parts/kits

Part number	Description
343531	AFCS Enterprise ethernet switch kit
343533-100	AFCS Enterprise combo unit cable 100 ft. *(30,48 m)*
343533-250	AFCS Enterprise combo unit cable250 ft. *(76,2 m)*
343533-500	AFCS Enterprise combo unit cable 500 ft. *(152,4 m)*
343540	AFCS tank monitor probe with cable 47 ft. *(14,3 m)*

Troubleshooting

Condition	Cause	Solution
Fluid will not come out of meter.	Master air solenoid is not opening.	Check if air solenoid opens after dispense is initiated. Red light will be visible on controller board for port assigned to air solenoid. Air solenoid will make easily detectable air release sound when solenoid shifts from open to close.
	No air supplied to pump.	Check that ball valves to pump are open for air and any ball valves for fluid are open in tank room and by reel.
	Fluid solenoid will not open.	Check if ready light and red solenoid light on controller board are activated. Wiring is presumably wrong if red LED is activated on DU but not on ready light. Solenoid is possibly bad if both lights are on and action items 1 and 2 are good.
	Pump does not run or needs repair.	Check to see if pump cycles if air is supplied. Pump needs to be repaired if it does not.
Ready light is always on/fluid can always dispense.	Timeout setting for system is set very high.	Change timeout setting to more reasonable time.
	Controller unit in **Override Mode**. This can be done if settings have been configured for automatic override or via touchscreen. Occurs if computer network is not functioning for longer than 10 minutes.	If override has been activated manually return controller to normal operating mode via touchscreen. If automatic override has been activated inform network administrator of network outage.
	Dispense unit is not working properly.	Replace unit.
Pulse meter will not work but fluid is flowing.	Pulse meter is not hooked up to DU.	While dispensing, yellow indicator light should flash very fast, appearing almost as if it is on. Replace wiring and/or pulse meter if unit is not flashing.
	Pulse meter needs replaced.	
Device not communicating.	Multiple devices with same unit number/site number combination or same static IP address assigned.	Verify device has unique unit number/site number combination and/or unique static IP address assigned.
	Network cable is not correct.	Check network cable to make sure all device are plugged in and network wire checks out with network analyzer tool. **Note:** Network analyzer can be purchased from any hardware store. Device will connect to both end of wires to alert if terminals are correct.
	Device is not plugged in.	Plug in network cable to device.
	Power is not turned on.	Plug in device to power.
Unit is dispensing more or less than expected.	PPU settings not correct for specific unit.	Measure unit several times with calibrated measuring device like Seraphin tank to find exact PPU for fluid and pulse meter. Refer to PC software manual for further instructions.
PC can not find any devices.	PC software is not setup correctly.	Analyze PC software to ensure device is checked under hardware tab. Refer to PC software manual for further instructions.
Tank level sensor reads **full tank** despite tank level not being full	Sensor detects something in blind zone.	Check to make sure sensor tip is mounted no more than 2 in from top of open tank, and there are no obstructions in sensor path. Tank fluid level must also be out of sensor blind zone to begin registering levels below **full**. Sensor blind zone is 8 in closest to tip of sensor.

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