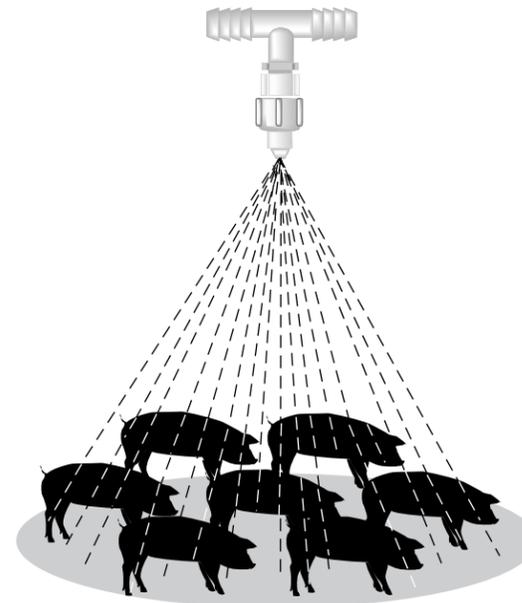


Edstrom Drip-Cool Spray-Cool Systems



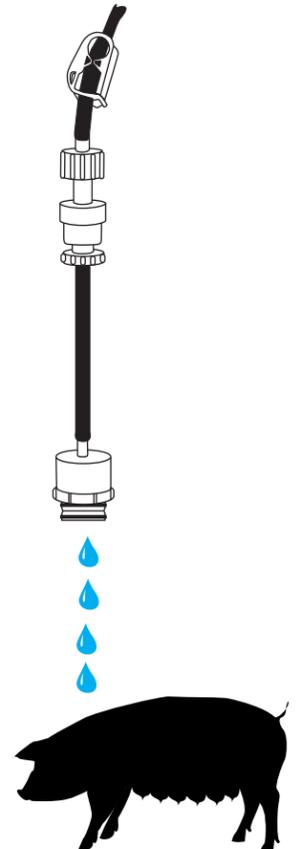
C-400 Controller

Operates up to four electric valves in sequence.
Ideal for Spray-Cooling large finishing facilities



C-100 Controller

Operates one electric valve.
Ideal for Drip-Cooling farrowing rooms



Edstrom INDUSTRIES, INC.

819 Bakke Avenue • Waterford, WI 53185 • USA
262-534-5181 • 800-558-5913
FAX 262-534-5184
www.edstrom.com • edstrom@edstrom.com

Made in USA Printed in USA Edstrom Industries, Inc. 2002

4210-OP5134 2/2002

Edstrom INDUSTRIES, INC.

2-year Warranty

Edstrom Industries warrants its Controller unit against defects in material and workmanship for two years from date of purchase as follows:

If a defect is found in the Controller unit or any component part of the System during the first two years from date of purchase, return the unit or part, prepaid, and it will be repaired or replaced at no cost to you.

This warranty does not apply to damage caused by misuse, neglect, accident, or improper application of installation.

The warranty label on the unit indicates the Date of Manufacture. Unless additional proof of date of purchase is provided, the warranty coverage will be computed using the Date of Manufacture. For your records, write down your Date of Purchase and Serial Number from your Controller unit (located on the bottom of the front panel).

Model: _____ Serial No. _____

Date of Purchase _____

The Warranty is valid regardless of original point of purchase (dealer or factory direct). To eliminate delays, all warranty claims should be filed directly with Edstrom Industries, Inc. Any product repaired or replaced under this warranty will, itself, be warranted only for the remainder of warranty period of the original product being repaired or replaced.

NOTE

For emergency replacement of a defective sequencer, contact Edstrom Industries and a replacement Controller will be sent to you immediately.

Edstrom Industries Inc.
819 Bakke Avenue
Waterford, WI 53185-4299
262-534-5181 • 800-558-5913 • Fax 262-534-5184
www.edstrom.com/ag • email: ag@edstrom.com

How To Contact Edstrom Industries

Sometimes problems or questions may arise concerning the operation of the Cooling System or Controller. If you cannot resolve the problem after referring to this manual, feel free to contact Edstrom Industries' technical support at 800-558-5913 or Fax 262-534-5184. During working hours, 8:00 am to 4:30 pm Central Time, ask to speak directly to an agricultural customer service representative. After hours, you may leave a recorded message in the customer service mailbox, extension 240.

Whenever you call Edstrom Industries, do the following:

1. Have this manual for reference.
2. Locate yourself near the electronic Controller so the technical support representative can direct you through the necessary operations.

For service information contact:

Edstrom Industries Inc.
819 Bakke Avenue
Waterford, WI 53185-4299
262-534-5181 • 800-558-5913 • Fax 262-534-5184
www.edstrom.com/ag • e-mail: ag@edstrom.com

Contents

How To Contact Edstrom Industries	1
What It Does	2
Drip-Cool System	4
Spray-Cool System	9
Installing the Controller	13
How The Controller Works	16
System Start-Up	20
Operating Settings	21
Maintenance	22
Troubleshooting	23
Drip-Cool Parts List	24
Spray-Cool Parts List	25-26
Optional Parts	27
2-year Warranty	28

What It Does

Cooling By Intermittent Wetting Of The Animals

The Edstrom Drip-Cool System and Spray-Cool System together with their respective Add-on Kits provide all components needed to install an efficient cooling system in a swine production facility. Both achieve the cooling effect by intermittently applying water on the skin of the animal, and then turning off the water flow and letting the animals cool by the evaporation of the water from their skin. The cycle is repeated continuously until the ambient room temperature falls below the thermostat setting on the Controller.

The Drip-Cool System is used in farrowing, gestation and breeding facilities where animals are housed in individual stalls. Here it is critical that the water be directed onto the animal's neck and shoulder area to provide maximum cooling effect on the sow; and not cause wetting of the surrounding floor area. To accomplish this, small Drip Nozzles are provided which are easily installed directly over each animal's stall. When operating, these nozzles discharge a gentle trickle of water - a flow rate of approximately 1 gallon per hour.

The Spray-Cool System is used in finishing and gestation facilities where animals are housed in group pens. A single high capacity spray nozzle is mounted over the dunging area of the pen. The nozzles deliver a high capacity, coarse droplet shower which wets the skin of the animals. The nozzle is normally mounted 6 ft. to 8 ft. above the floor and discharges a spray pattern that covers an 8 ft. to 10 ft. diameter circle. Each Spray Nozzle discharges approximately 0.4 gallons per minute.

Two Models of electronic Controllers are available to operate your cooling system

C-100: The economical C-100 Controller is designed to operate a single hi-capacity electric water valve. The electric water valve can be mounted remotely from the Controller; and because it is low voltage, 24 VAC, there are no dangerous line voltage connections required for installation. The C-100 Controller is ideal for use with the Drip-Cool cooling system, where only one electric valve is required. See Fig 1a.

C-400: The C-400 Controller has the ability to operate up to four electric water valves in sequence. The C-400 is ideal for use with the Spray-Cool cooling system requiring many Spray nozzles. By using multiple electric valves the plumbing can be divided into zones; each zone being serviced by a separate electric valve as shown in Fig. 1b. Because the valves are activated in sequence by the C-400 Controller, the water flow demand on the facility's water system is reduced.

Both electronic Edstrom Controllers are fully operator programmable to activate the electric solenoid water valve, which starts and stops the flow of water to the nozzles at the temperatures and cycle times desired.

Edstrom Controller Initiates Cooling Cycles When Room Temperature Rises to Thermostat Setting

The Edstrom C-100 and C-400 Controller will initiate a cooling cycle when the room air temperature rises to the desired Activation Temperature which is programmed into the electronic thermostat by the user.

C-100: The cooling cycle is set on the C-100 by programming the length of Shower Time - the period of time the single electric valve is energized and allows water to flow; and the length of the Interval Time - the length of time the electric valve is closed and no water is flowing.

C-400: The cooling cycle is set on the C-400 in an identical manner to the C-100, but because the C-400 has the ability to operate up to four electric water valves, it permits you to individually program the Shower Time for each electric valve separately. This permits you to adjust the cooling results in each zone of your facility. In addition, an Interval Time period can be programmed into the cycle as desired to control the frequency of the of cooling water on the animals.

Two Stage Programmability

Both model Controllers can be programmed to initiate operation of a more intensive cooling cycle when the room air temperature rises to a higher Activation Temperature. This ability to enter two different operating programs allows you to have the Controller automatically switch to more frequent and/or longer cooling times when the temperatures rise and the animals are subjected to increased heat stress.

Optional Parts



Barb Adaptor, 5/32" barb x 10-32 thread
1610-5538-000

Used with Drip-Cool System to connect nozzle line (5/32" ID, black tubing) to a rigid plastic pipe distribution line. To install, a 5/32" diameter hole must be drilled in rigid pipe and then tapped with a 10-32 thread tap.



Nozzle Shut-Off Cap
2320-4299-000

Used in Spray-Cool System to shut off the flow from an individual nozzle. The spray tip and cap are removed and the shut-off cap screws on in their place.



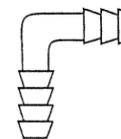
Spray Nozzle Tip, Small Pattern
2320-2204-030

This Spray Nozzle Tip has a smaller spray angle than our standard tip, 2320-5316-050, which is included with the Spray-Cool System. This nozzle will discharge a 5 foot to 6 foot diameter solid circle when mounted 8 feet high.



Fogger Nozzle Tip, 6 gallons per hour
2320-2204-010

This Fogger Nozzle Tip can be used in any fogging system that used standard interchangeable tips. (Not normally used with Spray-Cool System.)



Barb Elbow, 1/2" barb x 1/2" barb
1610-5359-005

Used with either Drip-Cool or Spray-Cool System to connect the 1/2" ID blue tubing distribution lines.



In-Line Shut-Off Valve, 1/2" barb x 1/2" barb
2000-4510-003

For use with either Drip-Cool or Spray-Cool System for installation in the 1/2" ID blue tubing distribution line. Provides shut-off of flow in one direction only.



Clamp-On Spray Nozzle Assembly
2320-6827-050

Permits easy attachment of spray nozzle to rigid PVC pipe. Has built-in shut-off valve. Equipped with standard 0.5 gpm tip. Other tips available.

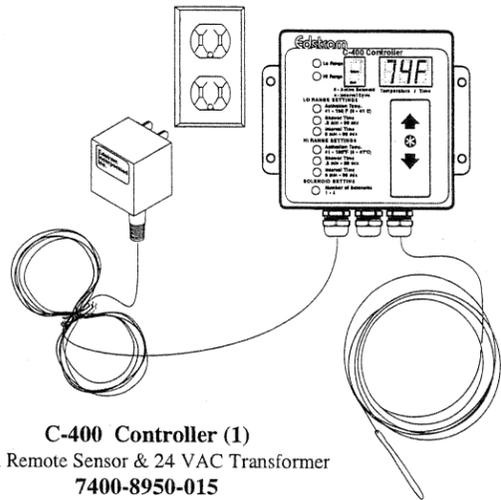


Spray Nozzle Assembly, 1/2" MPT
2320-6004-050

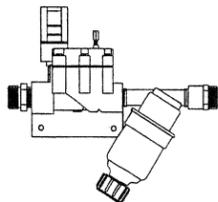
Complete Spray Nozzle Assembly with 1/2" MPT connection for installing in standard threaded fittings. Equipped with standard 0.5 gpm tip. Other tips available.

Spray-Cool System Parts List

7400-5240-541 with C-400 Controller

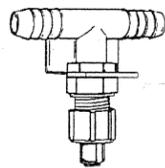


C-400 Controller (1)
with Remote Sensor & 24 VAC Transformer
7400-8950-015



24 VAC Electric Valve and Filter (1)
7400-8945-550*

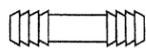
(NOTE: If additional Valves are needed,
order 7400-8945-140, Electric Valve/Filter
Kit for Spray-Cool. Kit includes all * items)



Spray Nozzle
Assemblies (8)
2320-3145-050



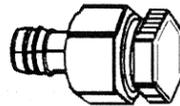
Nylon Loop Clamp (30)
1200-1713-016



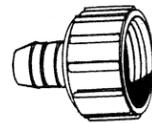
Barb Connector
1/2" barbs (1)
1610-0845



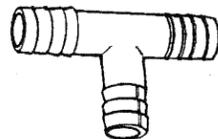
Hose Clamp
stainless steel (2)
1200-1906-002*



Drain Plug
1/2" barbs (2)
2020-4678-001



Barb Swivel Adaptor*
1/2" barbs x FGHT (3)
1610-3299-003



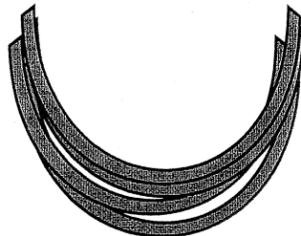
Barb Tee
1/2" barbs (1)
1610-0841



50 ft. Cable
18 gauge -2 conductor
wire
6400-8442-050*



Nylon Tie
7" long (30)
6600-1727



Blue Tubing, 1/2" ID,
100 ft. roll (1)
1600-3304-100



Screw, self-tap, #10 x 3/4"
stainless steel (40)
3010-0833

7400-5245 Spray-Cool Add-On Kit		
Part No.	Description	Qty.
2320-3145-050	Spray Nozzle, Tee Assembly	6
1600-3304-100	Blue Tubing, 1/2" ID, 100 ft. roll	1
1610-0845	Barb Connector, 1/2" barbs	1
1610-0841	Barb Tee, 1/2" barbs	1
2020-4678-001	Drain Plug, 1/2" barb	2
1200-1713-016	Nylon Loop Clamp	30
6600-1727	Nylon tie, 7" long	30
3010-0833	Screw, self-tap, #10 x 3/4", stainless steel	40

Cooling Kits Available

The Edstrom C-100 and C-400 Controllers are available in kits which include everything you need to install a complete new Drip-Cool or Spray-Cool System in your facility. Or the Controllers can be ordered individually to update your current system, refer to parts lists on pages 24-26.

✓ **Drip-Cool System, 7400-5250-105,**
with C-100 Controller includes:
1 Electric Valve/Filter/Reducer Assembly
(max capacity-480 Drip Nozzles)
20 Drip-Nozzles, 20 Drip-Line check valve assemblies
100 ft of Blue Distribution Tubing
and all installation hardware

✓ **Drip-Cool Add-On Kit, 7400-5255-005, includes:**
20 Drip Nozzles, 20 Drip-Line check-valve assemblies
100 ft Blue Distribution Tubing
and all installation hardware

✓ **Spray-Cool System, 7400-5240-100,**
with C-100 Controller includes:
1 Electric Valve/Filter Assembly
(max capacity - 20 Spray Nozzles)
8 Spray Nozzles
100 ft of Blue Distribution Tubing
and all installation hardware

✓ **Spray-Cool System, 7400-5240-541,**
with C-400 Controller includes:
1 Electric Valve/Filter Assembly
(additional valves must be ordered separately)
8 Spray Nozzles
100 ft of Blue Distribution Tubing
and all installation hardware

✓ **Spray-Cool Add-On Kit, 7400-5255, includes:**
6 Spray Nozzles
100 ft of Blue Distribution Tubing
and all installation hardware

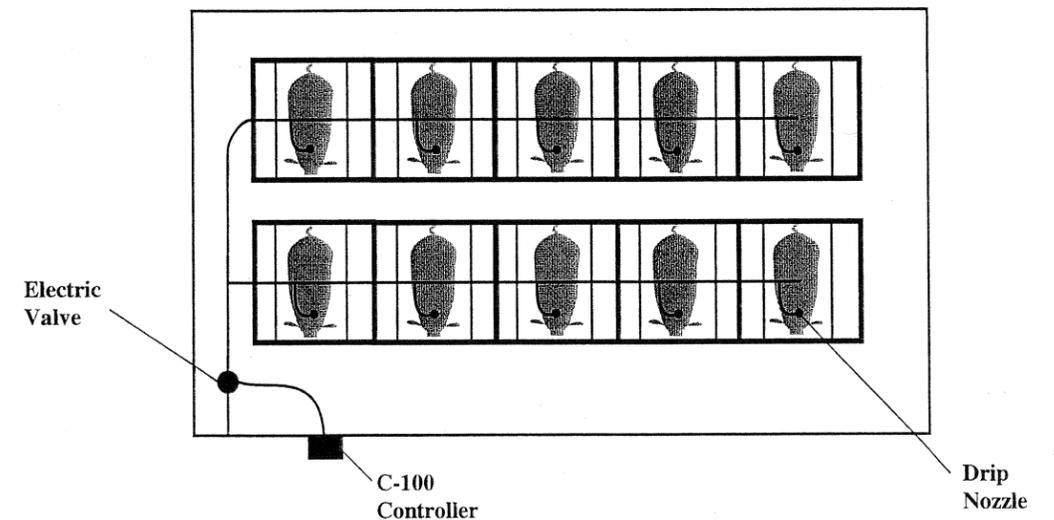


Fig. 1a

Drip Cooling using a C-100 Controller to operate a single electric valve

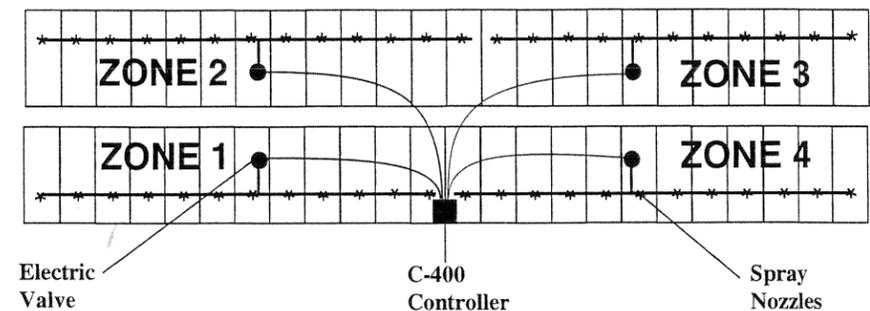


Fig. 1b

Spray-Cooling using a C-400 Controller to operate up to 4 electric valves

Drip-Cool System

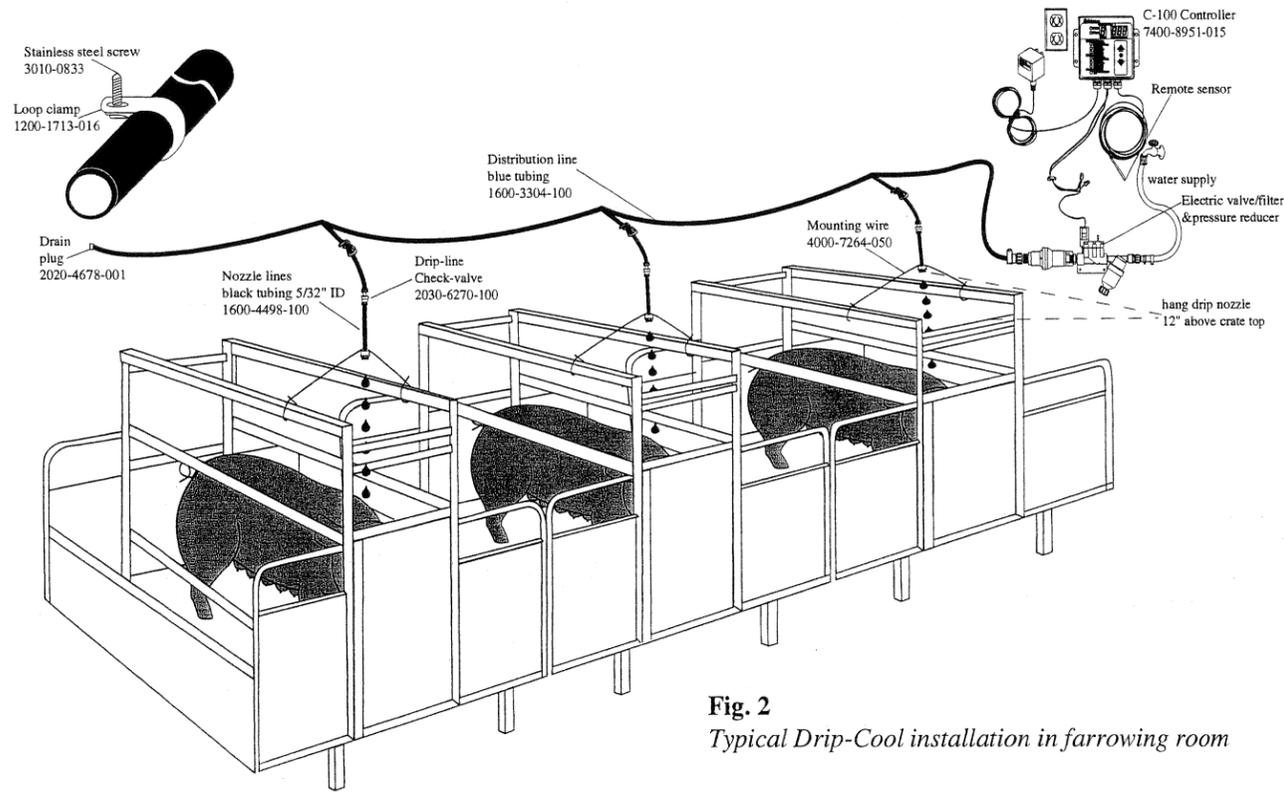


Fig. 2
Typical Drip-Cool installation in farrowing room

Drip-Cool System, 7400-5250-105, includes:

- 20 Drip Nozzles, 20 Drip-Line check-valve assemblies
- 100 ft of Blue Distribution Line Tubing, 1600-3304-100
- 100 ft of Nozzle Line Black Tubing, 1600-4498-100
- C-100 Controller
- One Electric Valve/Filter/Pressure Reducer Assembly
- and all installation hardware.

See page 24 for itemized parts list of all kits.

If additional Drip Nozzles are needed for an installation you can use the **Drip-Cool Add-On Kit**.

- Drip-Cool Add-On Kit, 7400-5255-005, includes:
- 20 Drip Nozzles, 20 Drip-Line check-valve assemblies
 - 100 ft of Blue Distribution Line Tubing, 1600-3304-100
 - 100 ft of Nozzle Line Black Tubing, 1600-1498-100
 - and all installation hardware.

Simple Piping and Electrical Connection Make Installation Easy

The connections required for the water piping are easily made by cutting the distribution line blue tubing with a knife to desired length and pushing it over the 1/2" barb fittings. To facilitate pushing the tubing onto the barb fitting, dip the end of the blue tubing into hot water first.

The electrical output from the C-100 Controller to the electric valves is low voltage 24 VAC. You can safely

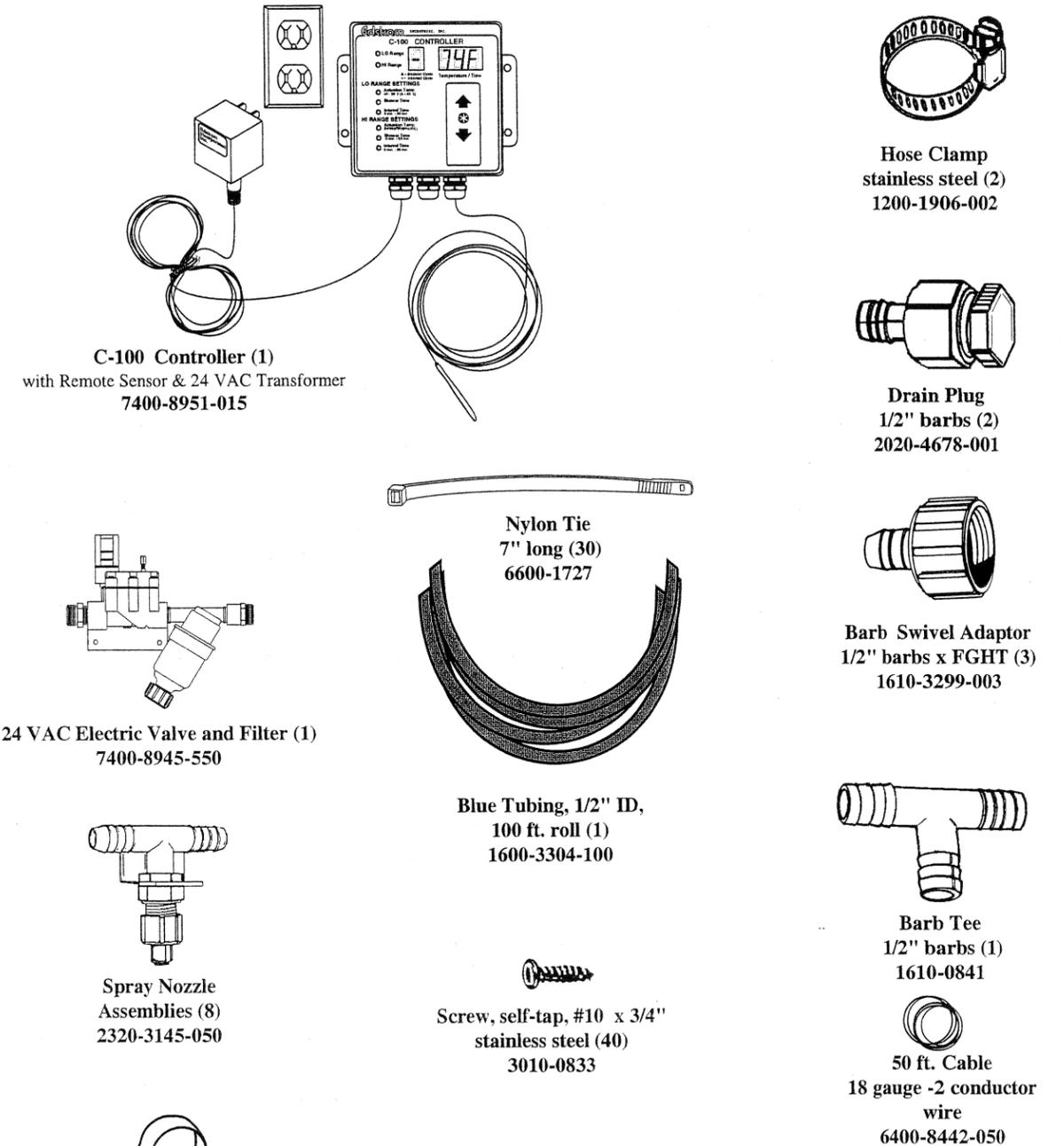
install the wiring between the C-100 Controller and the remotely mounted electric valves.

Installation and Plumbing Arrangement and Guidelines

- The C-100 Controller should be located where it will be convenient to access and view. The Electric Valve/Filter/Pressure Reducer Assembly can be mounted remotely from the Controller; 50 ft. of low voltage bell wiring is provided to make the connection between them. The electric valve should be located where convenient to the water supply line and to the line of Drip Nozzles being supplied.
- Up to 480 drip nozzles can be supplied by a single Electric Valve/Filter/Pressure Reducer Assembly.
- Keep the length of the distribution lines as short as possible. The maximum recommended length of branch distribution line is 100 ft. - from Electric Valve/Filter/Pressure Reducer to end of line.
- In large facilities requiring multiple branches of Distribution Lines, mount the Electric Valve/Filter/Pressure Reducer Assembly centrally and branch out from it.
- All distribution lines in a system should be level and installed at equal heights.

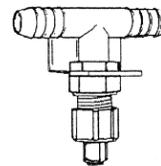
Spray-Cool System Parts List

7400-5240-100 with C-100 Controller



C-100 Controller (1)
with Remote Sensor & 24 VAC Transformer
7400-8951-015

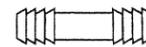
24 VAC Electric Valve and Filter (1)
7400-8945-550



Spray Nozzle Assemblies (8)
2320-3145-050



Nylon Loop Clamp (30)
1200-1713-016



Barb Connector 1/2" barbs (1)
1610-0845



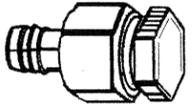
Nylon Tie 7" long (30)
6600-1727

Blue Tubing, 1/2" ID, 100 ft. roll (1)
1600-3304-100

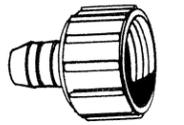
Screw, self-tap, #10 x 3/4" stainless steel (40)
3010-0833



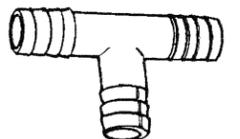
Hose Clamp stainless steel (2)
1200-1906-002



Drain Plug 1/2" barbs (2)
2020-4678-001



Barb Swivel Adaptor 1/2" barbs x FGHT (3)
1610-3299-003



Barb Tee 1/2" barbs (1)
1610-0841

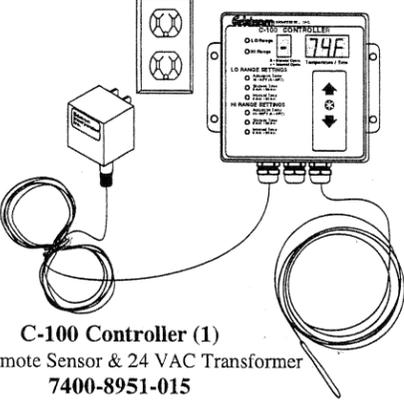


50 ft. Cable 18 gauge -2 conductor wire
6400-8442-050

7400-5245 Spray-Cool Add-On Kit		
Part No.	Description	Qty.
2320-3145-050	Spray Nozzle, Tee Assembly	6
1600-3304-100	Blue Tubing, 1/2" ID, 100 ft. roll	1
1610-0845	Barb Connector, 1/2" barbs	1
1610-0841	Barb Tee, 1/2" barbs	1
2020-4678-001	Drain Plug, 1/2" barb	2
1200-1713-016	Nylon Loop Clamp	30
6600-1727	Nylon tie, 7" long	30
3010-0833	Screw, self-tap, #10 x 3/4", stainless steel	40

Drip-Cool System Parts List

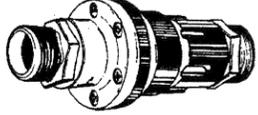
7400-5250-105



C-100 Controller (1)
with Remote Sensor & 24 VAC Transformer
7400-8951-015



Nylon Loop Clamp (30)
1200-1713-016



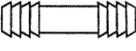
Pressure Reducer
15 psi, FGHT x MGHT (1)
2100-5234-015



Hose Clamp
stainless steel (2)
1200-1906-002



Drip Nozzle, 1 gph (20)
2320-4491-110



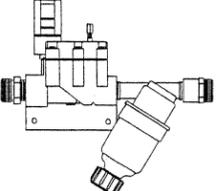
Barb Connector
1/2" barbs (1)
1610-0845



Barb Connector
5/32" barbs (20)
1610-4496



Close-Off Pinch Valve (20)
2000-5247-100



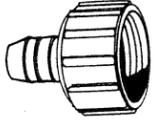
24 VAC Electric Valve and Filter (1)
7400-8945-550



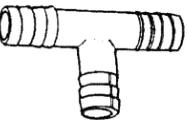
Barb Hole Plug
5/32" barb (2)
1610-4493



Black tubing, 5/32" ID
100 ft. roll (1)
1600-4498-100



Barb Swivel Adaptor
1/2" barbs x FGHT (3)
1610-3299-003



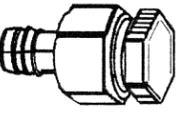
Barb Tee
1/2" barbs (1)
1610-0841



Screw, self-tap, #10 x 3/4"
stainless steel (40)
3010-0833



Mounting Wire, 14 gauge
50 ft. roll (1)
4000-7264-050



Drain Plug,
1/2" barbs (2)
2020-4678-001



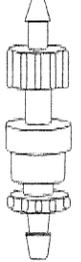
Blue Tubing, 1/2" ID
100 ft. roll (1)
1600-3304-100



50 ft. Cable
18 gauge -2 conductor
wire
6400-8442-050



Hole Punch (1)
4500-4492



Drip-Line Check-Valve (20)
2030-6270-100



Nylon Tie
7" long (30)
6600-1727

7400-5255-005 Drip Cool Add-On Kit		
Part No.	Description	Qty.
2320-4491-110	Drip Nozzle, 1 gph	20
1610-4496	Barb Connector, 5/32" barbs	20
2000-5247-100	Close-Off Pinch Valve for Drip Nozzle	20
4500-4492	Hole Punch	1
1600-4498-100	Black Tubing, 5/32" ID, 100 ft. roll	1
4000-7264-050	Mounting Wire, 14 gauge, 50 ft. roll	1
1600-3304-100	Blue Tubing, 1/2" ID, 100 ft. roll	1
1610-0845	Barb Connector, 1/2" barbs	1
1610-0841	Barb Tee, 1/2" barbs	1
2020-4678-001	Drain Plug, 1/2" barbs	2
1200-1713-016	Nylon Loop Clamp	30
6600-1727	Nylon Tie, 7" long	30
3010-0833	Screw, self-tap, #10 x 3/4", stainless steel	40
1610-4493	Barb Hole Plug, 5/32" barb	2
2030-6270-100	Drip-Line Check-Valve Assembly	20

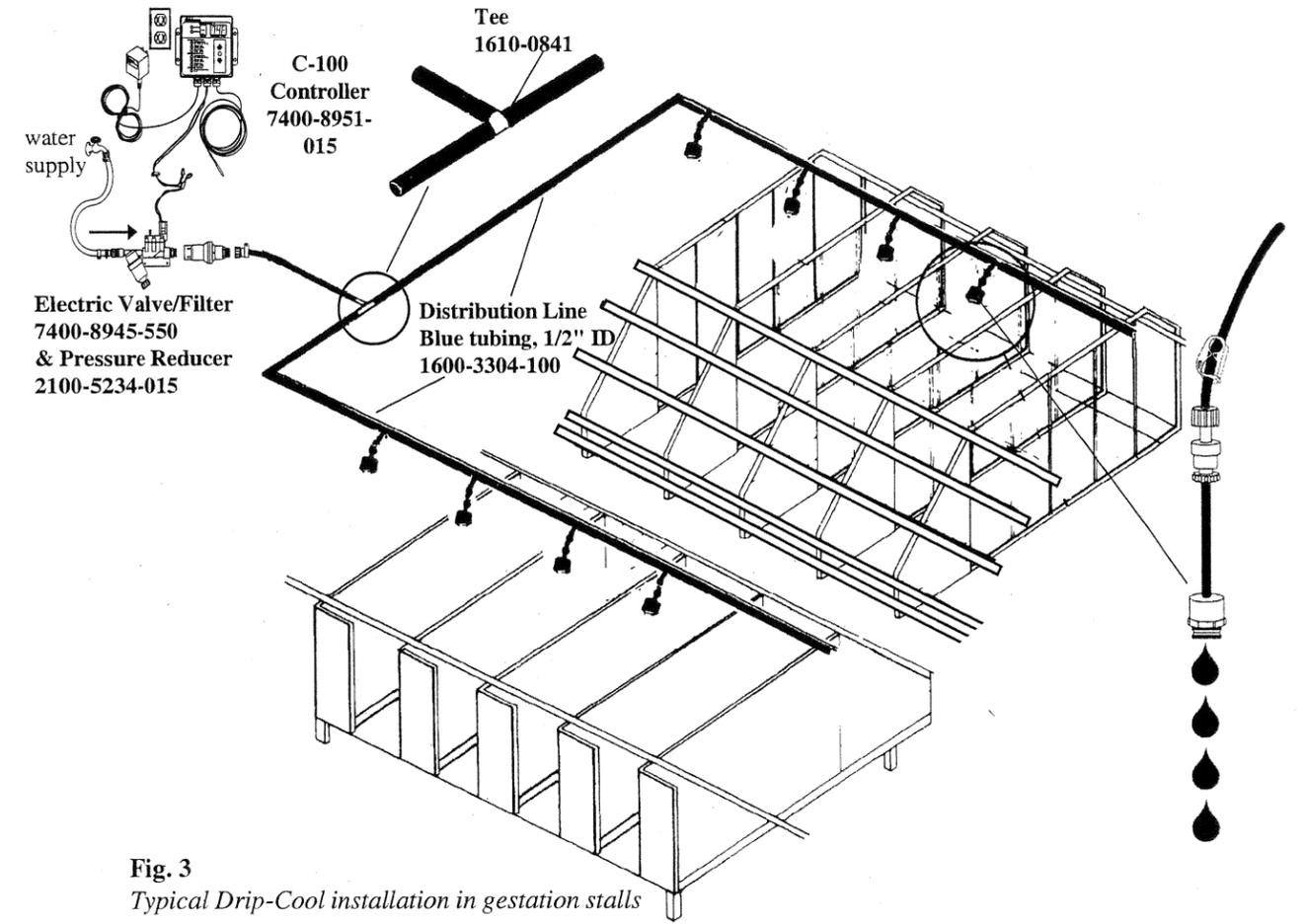


Fig. 3
Typical Drip-Cool installation in gestation stalls

Typical Drip-Cool Installations

A typical installation in a farrowing room is shown in Fig. 2. The blue distribution line tubing, 1600-3304-100, is mounted on the ceiling above the crates or aisle. The nozzle lines, black tubing, 1600-4498-100, extends down from the distribution line to just above the top of the crates, with the drip nozzles mounted at the end of the line.

A typical installation in a facility with gestation stalls is shown in Fig. 3. The distribution lines are mounted on the ceiling, with short (6" to 12") nozzle lines down. (The use of the close-off pinch clamp is optional for gestation stalls.)

Drip Nozzle Location

The drip nozzle should be located over the farrowing crate so that it will discharge on the sow's neck and shoulder area, see Fig. 4. It should be located far enough back so there is no chance of getting water in the sow's ear while she is lying down.

Care should be taken to mount the nozzle so the sow cannot reach it with her mouth. This can be accomplished by suspending the drip nozzle approximately 12" above the top of the crate, see Figs. 3 & 4.

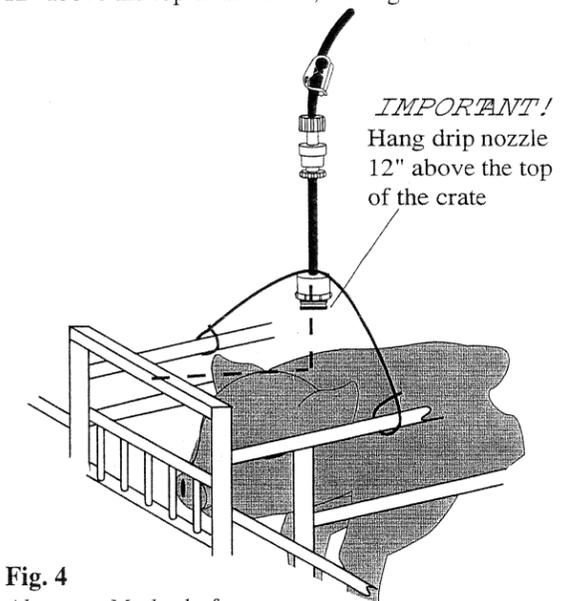


Fig. 4
Alternate Method of
Anchoring Drip Nozzles

Drip Nozzle Features

Gentle, 1-Gallon Per Hour Flow

The Edstrom Drip Nozzles are designed to discharge a low flow of 1 gallon per hour (based on continuous flow) in a gentle stream or trickle; at a reduced supply pressure of 15 psi.

To demonstrate how to calculate the total amount of water actually discharged from a single Drip Nozzle in a normal cooling operation, let's assume that the Drip Cycle is set for minutes and the Interval Time is set for 10 minutes on the Controller. This would mean that the unit is turned ON slightly less than 12 minutes each hour and therefore, the total amount of water discharged from a nozzle is approximately 2/10 of gallon per hour (about 1 quart every hour).

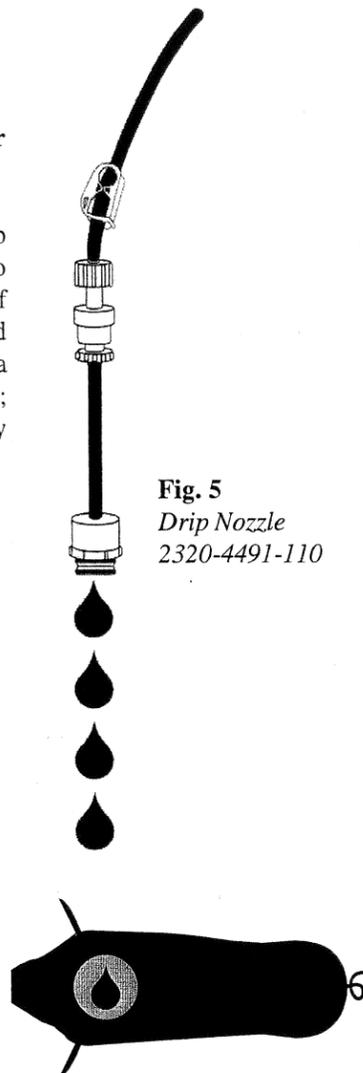


Fig. 5
Drip Nozzle
2320-4491-110



Fig. 6
Location of Drip Nozzle
over sow

Close-Off Pinch Valve

A simple to use Close-Off Pinch Valve is provided for each Drip Nozzle. When installed on the Nozzle Line as shown in Fig. 5, the flow to an individual crate can be easily turned off by simply pinching the valve closed.



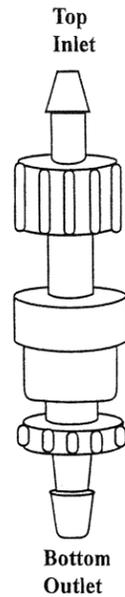
Close-Off Pinch Valve
2000-5247-100

Drip-Line Check-Valve Assembly

A drip-line check-valve assembly is included for each drip nozzle line to prevent the water in the lines from draining out between cooling cycles. With the drip-line check-valve assembly properly installed, the distribution lines and drip nozzle lines will remain fully charged between cooling cycles. This will ensure consistent application of water throughout the facility, and maximize the performance of the Edstrom Drip-Cooling System.

IMPORTANT!

Install the drip-line check-valve assembly with the wider knurled inlet fitting on top, and the narrow-knurled outlet fitting on the bottom. (The visible female threads on the inside of the transparent drip-line check-valve are on the bottom—outlet end.) If the drip-line check-valve is installed the wrong way water will not get through to the drip nozzle.



Open for Cleaning

The Edstrom Drip Nozzle can be opened for cleaning should it become clogged with algae or minerals. Simply turn the bar on the outlet and pull out the core of the Drip Nozzle. On the side of the core is the flow control orifice and flow path which can be cleaned and then reassembled, see Fig. 7.

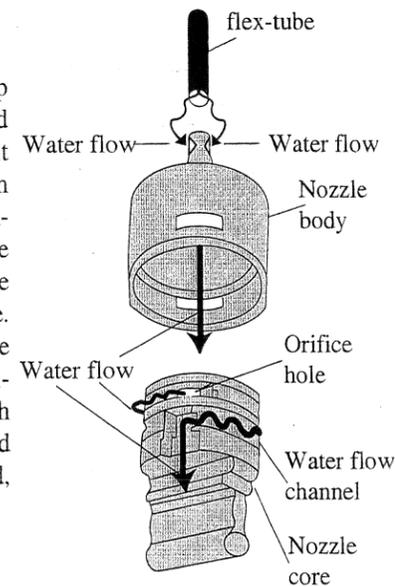


Fig. 7
Drip Nozzle - exploded view

Troubleshooting the Edstrom Controllers C-100 & C-400

Problem	Possible Cause	Solution
C-400 does not activate all the electric solenoid valves	C-400 is not set for the correct number of electric solenoid valves	Reset the "Number of Solenoid Valves" setting for the number of electric solenoid valves connected to the C-400
The HI Actuation Temp will not go below a certain degree	The Controller will not allow setting the HI actuation Temp any lower than one degree more than the LO Actuation Temp	Lower the LO Actuation Temp to one degree less than the desired HI Actuation Temp before setting the HI Actuation Temp
The LO actuation temp will not go above a certain degree	The controller will not allow setting the LO Actuation Temp any higher than one degree less than the HI Actuation Temp	Raise the HI Actuation Temp to one degree more than the desired LO Actuation Temp before setting the LO Actuation Temp
Display windows blank	Power supply wire from transformer not properly connected	Check wiring at screw terminal inside the Controller's front panel
The word "Prob" appears in the temp/time display window	Bad temperature probe or connection polarity is reversed	Check the wiring at screw terminal strip for proper polarity. Order a replacement Temp Sensor Cable (see below)

Operating Without a Temperature Sensor

If you have a Temperature Sensor Cable failure, (as indicated in chart above, the Controller will flash the word "Prob" in the window display) it is possible to program the Controller to keep operating and putting cooling water on your pigs until such time as you can replace the failed Temperature Sensor Cable. This is done by decreasing the LO RANGE Actuation Temp setting to the bottom of the scale, when it will display "ON". The Controller will then cycle continuously using the LO Range cooling cycle settings. While operating, it will continue to flash the word "Prob" in the window.

Once programmed to this continuous ON mode, the Controller can be stopped by either unplugging the power or by increasing the setting of the LO Range Actuation Temperature from ON up to a temperature setting.

Changing Temperature Scale °F/°C

To force the Controller to the factory setting values with temperature display in Fahrenheit, hold down the ↑ button while plugging in the power.

To force the Controller to the factory setting values with temperature display in Celsius, hold down the ↓ button while plugging in the power.

Memory Retained During Power Failure

The Controller stores all the programmed setting values in a non-volatile microprocessor memory. If power is interrupted to the Controller, it will retain all settings until power is restored. In addition, if power is interrupted while the Controller is performing a cooling cycle, it will immediately begin operation continuing with the cooling cycle exactly where it left off once power is restored. Theoretically this could mean that if power was restored after the room temperature had cooled off, the Controller would come back on completing a cooling cycle, regardless of the room temperature. Once the cooling cycle was finished the Controller would detect the cool room temperature and go into the Temperature Monitor Mode.

Maintenance

The Edstrom Controller's electronics is factory sealed in the removable door of the enclosure. Do **NOT** open this sealed assembly under any conditions. If you do, you will void the warranty. If you have any problems with the Controller, contact Edstrom Industries (see How to Contact Edstrom Industries located inside the front cover of this manual). In most cases only the door of enclosure will need to be returned for repair.

The Controller should be kept clean for easy readability and proper functioning of the temperature sensor. The unit can be washed off, but high pressure sprayers should not be used directly on the unit.

Winterize

To avoid possible damage to the plumbing and Electric Valve/Filter Assemblies by freezing temperatures, turn off the water supply and drain the lines and Electric Valve/Filter assemblies.

The Controller can be left plugged in to serve as an easy-to-read digital thermometer in your farrowing room. In facilities that are subject to freezing temperatures, the Controller should be removed and stored at above-freezing temperatures.

Electronic Repair

Should the electronics of your Controller become damaged or fail, you will need to contact the factory to obtain a Return Authorization for the return and repair of your unit.

The entire electronic circuitry of the Controller is sealed in the door of the unit. This door can be easily removed and replaced, without having to disconnect any of the wiring to the unit and without having to unscrew the enclosure from the wall! See Fig. 15a or 15b.

To Remove the Door Containing Electronics

1. Loosen the two locking screws near the top corners. See Fig. 15a or 15b.
2. Unplug the Screw Terminal Strip from the back side of the door. The individual wires DO NOT need to be removed from the terminal connections. The whole terminal strip unplugs in one piece!
3. Swing door to a position perpendicular to the wall, and push it towards the hinge. The plastic hinge will snap off the hinge pin of the enclosure box.

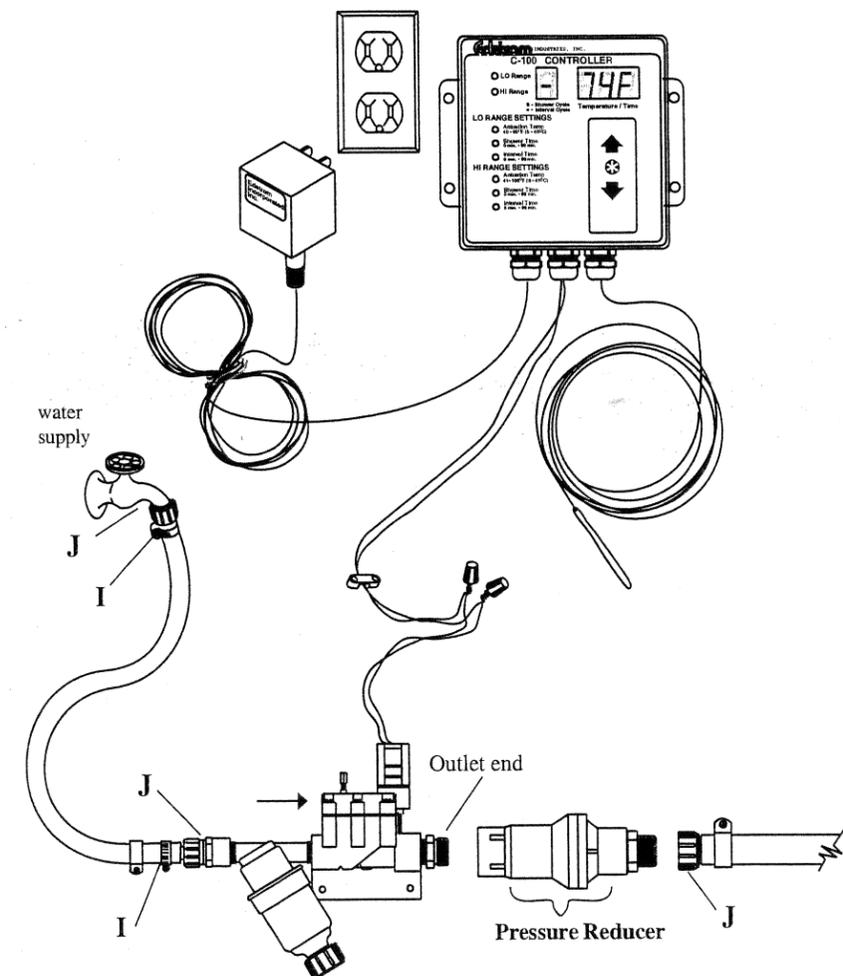


Fig. 8
 C-100 Controller, 7400-8951-015
 Electric Valve/Filter, 7400-8945-550
 Pressure Reducer, 2100-5234-015

After deciding which plumbing arrangement will work best for your facility and selecting appropriate locations for the C-100 Controller and the Electric Valves, you are ready to begin the installation.

Supply Line/Distribution Lines

Mount the Electric Valve/Filter Assembly, 7400-8945-550, in a horizontal position on wall using the 2 stainless steel screws provided. Cut the Blue Tubing to length to reach from inlet of the Electric Valve/Filter Assembly (the filter end) to the nearest water source connection. Two Barbed Garden Hose Thread Swivel Adaptor fittings

(J), 1610-3299-003, are provided for inserting in each end of the tubing. Use the two Hose Clamps (I), 1200-1906-002, provided, to clamp the fittings securely in the tubing. With the fitting attached, you can connect one end of the tubing to inlet fitting of the Electric Valve/Filter Assembly and the other end to the water supply hydrant or faucet.

Install the Pressure Reducer, 2100-5234-015, on the outlet side of the Electric Valve Assembly.

Using a Barbed Garden Hose Thread Swivel Adaptor fitting (J), 1610-3299-003, connect the Blue Tubing Distribution Line to outlet of the Pressure Reducer.

- Install the blue distribution tubing line along route selected and cut to length. Support and/or anchor the tubing as necessary with loop clamps and screws or nylon ties provided, see Fig. 8a.
- If the distribution line needs to be branched into two directions, install the barb tee, 1610-0841. See Fig. 8b.
- At the terminal end of branch of the distribution line, install a drain plug, 2020-4678-001, see Fig 8c. (Two are provided with each system) **HINT:** Install drain plug into the end of the blue tubing prior to securing to the ceiling.



Fig. 8a

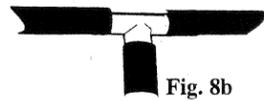


Fig. 8b

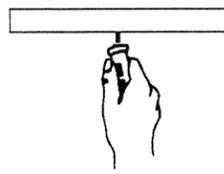


Fig. 8c

Install the drain plug in the end of the distribution line.

Drip Nozzle Lines

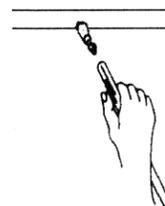
- After installing the distribution line, use the hand punch, 4500-4492, to punch a hole in the blue tubing at each point where you want to connect a drip nozzle line, see Fig. 9a.
- Using a pliers to hold the sides of the 5/32" connector, 1610-4496, push the barb end of the connector into the punched hole. The barb end will snap through the hole and lock into position, see Fig. 9b.
- Push the 5/32" black tubing, 1600-4498-100, over the exposed barb end of the connector, see Fig. 9c. Then cut the black tubing to the length required to reach the desired location of the drip nozzle over the crate.
- Slip the pinch valve, 2000-5247-100, over the end of the black tubing and slide it up to a convenient position on the drip nozzle line, see 9e. Before installing the drip nozzle, 2320-4491-110, in the end of the black tubing, first slip the close-off pinch valve, 2000-5247-100, over the tubing, see Fig. 9d. The close-off valve can be located at any convenient position along the drip nozzle line.
- Next the drip-line check-valve assembly should be installed in the drip nozzle line. Locate it within three feet of the overhead distribution line. Cut the black tubing at the desired location and slide the ends of the tubing over the proper ends of the drip-line check-valve assembly, see 9e. If the check valve assembly is installed more than 3 feet below the distribution line, it may not close properly during the interval time period, allowing water to drain out of the lines.
- Finally, install the drip nozzle, 2320-4491-110, in the end of the black tubing. See 9g.
- Use the mounting wire, 4000-6269-050, to anchor the drip nozzle in the desired position over the crate. The mounting wire can be secured to the top bars of the crate as shown in Figs. 3 and 4.



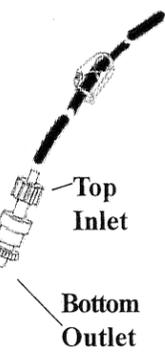
9a. Punch hole in blue tubing



9b. Insert 5/32" barb connector



9c. Push black tubing over barb



9d. Cut black tubing no more than 3 feet below the supply line.

9e. Slip close-off pinch valve on tubing, then connect drip-line check-valve.

9f. Insert the top of the drip-line check-valve into the drip nozzle line being sure the top points toward the pinch valve. Location and direction are critical.

9g. Attach remaining length of black tubing and drip nozzle.

Fig. 9

Connecting Drip Nozzles to Blue Tubing Distribution Line

Operating Settings

Whether you are using the Edstrom Controller to control a Drip-Cool System in a farrowing or gestation facility or a Spray-Cool System in a finishing facility, the operating settings you enter into the Controller will be dependent on the following:

- Size and age of the animals
- Facility layout
- Normal weather conditions in your area
- Your particular management practices

Your own observations of your animals and their performance will be the final guide for determining the optimum settings for your swine production facility.

It is important to remember that the basic principal of either type cooling system is to have the water running on the animals just long enough to wet their hide, and not so long that wet, slippery floors with water runoff are caused. The water should be off for a period of time long enough to allow the animals' hide to dry. The primary cooling of the animals occurs during this period - when the water is evaporating off the skin - not while the water is being sprayed or dripped on the animals.

Interval Time Setting for C-400 with Multiple Electric Valves

When entering your Shower Times and Interval Times into the C-400 Controller, you must remember that when multiple electric valves are being serviced, the Interval Time value entered does not represent the actual OFF time for each valve. This is because the C-400 first cycles through each of the valves for their respective ON times before beginning the Interval Time cycle.

To compute the length of time a particular electric valve will be OFF, add up the Shower Times of the other Electric Valves, and then add the Interval Time to that total. The following formula shows the calculation required:

$$\text{Actual OFF time of Electric Valve "A"} = (\text{Sum of the Shower Times of Valves "B" + "C" + "D"} + \text{Interval Time})$$

Spray-Cooling

The optimum temperature at which to begin spray cooling pigs depends in part on the size of the animals. Heavier, older animals have more body heat and will begin suffering from heat stress sooner than younger, smaller ones. Because of this and other factors, LO Range Actuation Temperatures of 70°F through 85°F, and HI Range Actuation Temperatures of 85°F through 90°F are commonly used.

Shower Times of 1 to 3 minutes are commonly used with off times of 15 to 30 minutes. Other producers report using Shower Times of 5 to 6 minutes with longer Interval Times of 40 to 60 minutes.

As explained previously, the effects of Shower Time and Interval Time are directly related. The goal is to wet all the animals in the pen and then turn off the spray nozzles long enough to let the water evaporate from their hide. The number of animals in a pen will also affect the time settings required.

Spray-Cool for Dung Training

If you wish to use your Spray-Cool System to help promote the good dunging habits of your animals in the cooler months, you will need to change the settings. Normally, you will set the LO Range Actuation Temperature at 50°F. This will prevent the Controller from spraying at temperatures below 50°F. The LO Range Shower Times should be set to 2 minutes or less and the LO Interval Time set to 60 minutes or more.

Drip-Cooling

Research has found that sows begin to feel heat stress at about 70°F. Therefore, Lo Range Actuation temperature settings of 70° - 80°F and Hi range Actuation Temperatures of 85° - 90°F are commonly used.

The length of time the drip nozzles are ON should be adjusted to produce as little run-off from the sow's body as possible. This is particularly critical if the sows are on partially solid flooring where water could collect. This wet area can cause a potential health problem for the baby pigs. Shower times of 3 - 5 minutes are normally used on sows on wire flooring.

The length of the OFF time, when the drip nozzles are not operating, should be long enough to permit the water to evaporate from the sow's skin. OFF times of 10 - 20 minutes are commonly used.

System Startup

After installing the Controller and electric valves and completing the installation of either the Drip-Cool or Spray-Cool plumbing and nozzles as previously described, you are ready to perform the initial start-up of your system as described below:

1. Prior to activating the cooling system with the Controller, you should first manually operate the Electric Valve(s) to confirm that there are no leaks in the plumbing and that the nozzles are discharging the water to the desired location. This can be done by rotating the Coil of the electric valve 1/4 turn counter-clockwise.
2. Test the operation of the Controller by plugging in the transformer to the 120 VAC electrical outlet. The Controller should energize immediately, displaying the room temperature in the large display window. A new unit from the factory will start up with the factory program settings shown in tables below:
3. If the air temperature in the room where your temp sensor is located is 80°F or above (assuming the unit is still set in factory settings), the unit will immediately initiate a cooling cycle. (If the room temperature is cooler than the 80°F, then you will need to change the Actuation Temperature setting to a value lower than room temperature to cause the Controller to begin a cooling cycle. Refer to Viewing and Changing Setting Values, page 17.
4. As the Controller activates the Electric Valve, check that each valve is opening when energized, allowing water to flow and closing when power is removed.
5. After confirming that the system is operating correctly, adjust the Controller to the desired operating settings for your facility (see next section).

Factory Settings for C-100 Controller

LO Range Actuation Temperature	80°F (27°C)
LO Range Shower Time	3 minutes
LO Range Interval Time	10 minutes
HI Range Actuation Temperature	90°F (33°C)
HI Range Shower Time	3 minutes
HI Range Interval Time	5 minutes

Factory Settings for C-400 Controller

LO Range Actuation Temperature	80°F (27°C)
LO Range Shower Time- Electric Valve #1	3 minutes
LO Range Shower Time- Electric Valve #2	3 minutes
LO Range Shower Time- Electric Valve #3	3 minutes
LO Range Shower Time- Electric Valve #4	3 minutes
LO Range Interval Time	10 minutes
HI Range Actuation Temperature	90°F (33°C)
HI Range Shower Time- Electric Valve #1	3 minutes
HI Range Shower Time-Electric Valve #2	3 minutes
HI Range Shower Time-Electric Valve #3	3 minutes
HI Range Shower Time-Electric Valve #4	3 minutes
HI Range Interval Time	5 minutes
Number of Solenoid Valves	4

Spray-Cool System

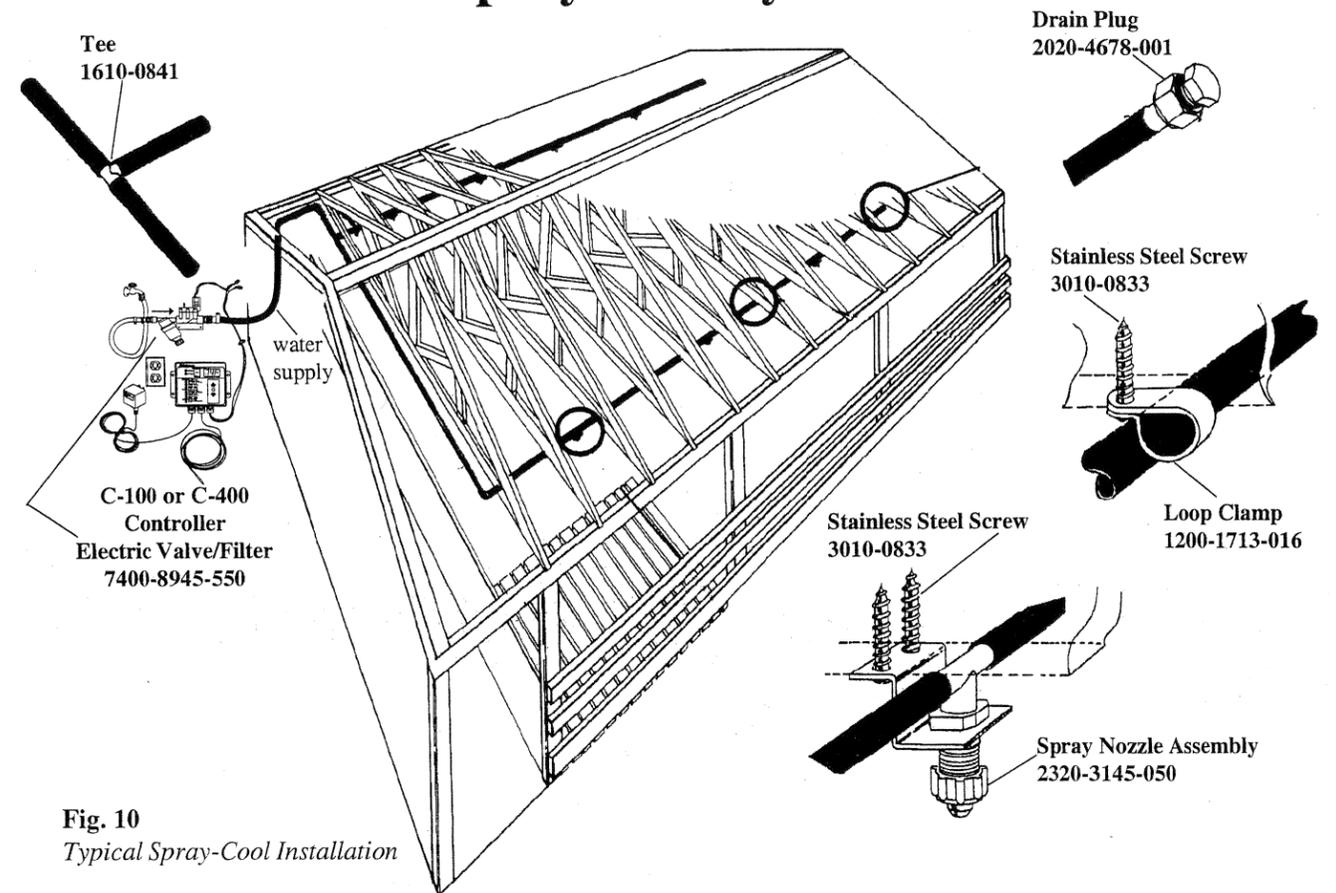


Fig. 10
Typical Spray-Cool Installation

Select the Spray-Cool System to fit your facility. Two model Spray-Cool Systems are available:

Spray-Cool System, 7400-5240-100, with C-100 Controller
Spray-Cool System, 7400-5240-541, with C-400 Controller

Both systems also include:
 8 spray nozzles
 100 ft blue distribution line tubing
 1 Electric Valve/Filter Assembly
 and all installation hardware

Refer to pages 25-26 for itemized lists.

Select the system based on the size of your facility, the total number of spray nozzles you will be operating, and the number of electric valves you need to use.

An Electric Valve/Filter Assembly can normally supply up to 20 spray nozzles, as explained in the following guidelines. The C-100 Controller operates a single electric valve. Therefore if your system requires no more than 20 spray nozzles, the Spray-Cool System with C-100 Controller, 7400-5240-100, can be used.

If your facility requires more than 20 nozzles, you will want to divide the plumbing into zones of 20 nozzles or less each served by an individual Electric Valve/Filter Assembly. The C-400 Controller must be used to operate multiple Electric Valves; it will actuate them in sequence thereby reducing the momentary water demand. The Spray-Cool System, 7400-5240-541, is used to operate multiple valves.

Spray-Cool System, 7400-5240-541, includes:
 One electric valve
 additional valves required and must be ordered separately.

Electric Valve/Filter Kit, 7400-8945-140, includes:
 One electric valve
 50 ft wire
 and all installation hardware

Additional spray nozzles and plumbing required for your installation are available individually or in Add-On Kits.

Spray-Cool Add-On Kit, 7400-5245, includes:
 6 spray nozzles
 100 ft of blue distribution line tubing
 and all installation hardware
 Refer to pages 25-26 for itemized list.

C-400 Controller Settings

Simple Piping and Electrical Connection Make Installation Easy

The connections required for the water piping are easily made by cutting the distribution line blue tubing with a knife to desired length and pushing it over the 1/2" barb fittings. To facilitate pushing the tubing onto the barb fitting, dip the end of the blue tubing into hot water first.

The electrical output from the Controller to the electric valves is low voltage 24 VAC. You can safely install the wiring between the Controller and the remotely mounted electric valves.

Installation and Plumbing Arrangements and Guidelines

Use the following guidelines when laying out your Spray-Cool plumbing:

- The Controller should be located where it will be convenient to access and view. The Electric Valve/Filter Assembly can be mounted remotely from the Controller; 50 ft. of low voltage bell wiring is provided to make the connection between them. The electric valve should be conveniently located to the water supply line and to the zone of spray nozzles being supplied.
- Up to 20 spray nozzles can be controlled by a single Electric Valve/Filter Assembly, and requires a strong 8 gpm water supply.

- Keep the length of the distribution lines as short as possible. Mount the electric valve near the center and run multiple branch lines from it, see Fig. 10.
- The maximum recommended length of any branch distribution line (from electric valve to end of line) is 100 ft.
- Mount the spray nozzles over the dunging area of the pen.
- If the pen area to be sprayed is under a roof, the spray nozzles and distribution line can normally be mounted on the ceiling or the lower cord of the trusses with the clamps and screws provided as shown in Fig. 10.
- If the nozzles are to be mounted over outdoor pens, a support structure will be needed on which to hang the nozzles and distribution line. The nylon ties provided can be used to tie the blue tubing to the support structure, see Fig. 11a.

Spray Nozzle Location

The spray nozzles should be located over the manure collection area of the pen, away from the feeders, see Fig. 10 & 11. Spray nozzles are normally installed one per pen at the height required to produce a spray pattern large enough in diameter to cover approximately the width of the pen; refer to Fig. 12 to determine spray diameter in relation to nozzle height. For narrow pens with fewer pigs per pen, one spray nozzle can be mounted over the pen partition to spray two pens.

Settings	Description	Range	Comments
LO RANGE Actuation Temp	Temperature at which LO RANGE cooling cycle will trigger	40 - 99°F (5 - 40°C)	The LO RANGE Actuation Temp must be 1° below the HI RANGE Actuation Temp setting
LO RANGE Shower Time Solenoid #1	Length of Time Electric Solenoid Valve #1 is energized - LO RANGE	0 - 99.5 min.	If the Shower time of any solenoid is set to zero, it will be skipped in the cycle.
LO RANGE Shower Time Solenoid #2	Length of Time Electric Solenoid Valve #2 is energized - LO RANGE	0 - 99.5 min.	
LO RANGE Shower Time Solenoid #3	Length of Time Electric Solenoid Valve #3 is energized - LO RANGE	0 - 99.5 min.	
LO RANGE Shower Time Solenoid #4	Length of Time Electric Solenoid Valve #4 is energized - LO RANGE	0 - 99.5 min.	
LO RANGE Interval Time	Length of Time in cooling cycle when no electric valves are energized in LO RANGE	0 - 99.5 min.	
HI RANGE Actuation Temp	Temp at which HI RANGE cooling cycle will trigger	40 - 99°F (5 - 40°C)	HI RANGE Actuation Temp must be 1° above LO RANGE Actuation Temp setting
HI RANGE Shower Time Solenoid #1	Length of Time Electric Solenoid Valve #1 is energized - HI RANGE	0 - 99.5 min.	
HI RANGE Shower Time Solenoid #2	Length of Time Electric Solenoid Valve #2 is energized - HI RANGE	0 - 99.5 min.	
HI RANGE Shower Time Solenoid #3	Length of Time Electric Solenoid Valve #3 is energized - HI RANGE	0 - 99.5 min.	
HI RANGE Shower Time Solenoid #4	Length of Time Electric Solenoid Valve #4 is energized - HI RANGE	0 - 99.5 min.	
HI RANGE Interval Time	Length of Time in cooling cycle when no electric valves are energized in HI RANGE	0 - 99.5 min.	
Number of Solenoid Valves	Quantity of Electric Solenoid Valves being controlled	1 - 4	This setting controls how many solenoid valves are activated before pausing for the Interval Time.

C-400 Operation

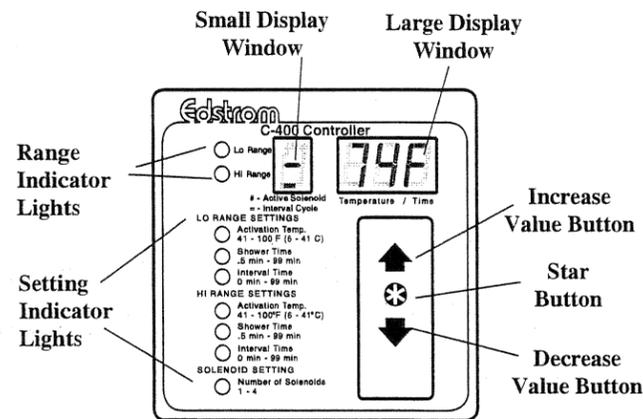


Fig. 16b
C-400 Control Panel

The control panel of the C-400 Controller is shown in Fig. 16b. Digital displays and indicator lights indicate the operating status of the unit. Three programming buttons are used for viewing all the programmed setting values and for making any desired changes to the settings.

Temperature Monitoring Mode

When the room temperature is below the programmed Actuation Temperature, the C-400 will be in the temperature monitoring mode. The room temperature is displayed in the large window; the small window will have no display and all indicator lights will be off.

LO Range Cooling Cycle

When the room temperature rises to the LO Range Activation Temperature setting, the C-400 will initiate the LO Range cooling cycle. The LO RANGE Indicator Light will be ON. The C-400 will begin energizing the electric valves in sequence, each being on for the length of its LO Range Shower Time setting. As each electric Valve is being energized, its number is displayed in the small window.

After activating all Electric Valves the C-400 will pause for the length of the Lo Range Interval Time and displays "=" in the Small Window. When the interval cycle is finished the Lo Range Cooling Cycle is complete, and the C-400 will perform a Room Temperature Check/Decision.

Room Temperature Check/Decision

After completing a cooling cycle the C-400 will check the current room temperature. If the room temperature has cooled below the LO Range Activation Temperature setting, the C-400 will return to the Temperature Monitoring Mode. If the room temperature is still at or above

the LO Range Activation Temperature setting, but is not up to the HI Range Activation Temperature setting, then the C-400 will immediately begin another LO Range Cooling Cycle.

If the C-400 detects that the room temperature has risen to or above the HI Range Activation Temperature setting, the Controller will initiate a HI Range Cooling Cycle.

HI Range Cooling Cycle

When the HI Range Cooling Cycle is initiated as described above, the HI RANGE Indicator Light will be ON. The electric valves will be energized in sequence each for the length of the Shower Time setting programmed into the HI Range. As each electric valve is being energized, its number is displayed in the small window.

After activating all electric valves the C-400 will pause for the length of the HI Range Interval Time and displays "=" in the small window. When the interval cycle is finished, the HI Range Cooling Cycle is complete and the C-400 will perform a Room Temperature Check/Decision as described above.

Viewing and Changing Setting Values

All of the setting values can be easily checked and/or changed at any time by using the 3 programming buttons on the C-400 control panel. By pressing the * button, the first setting value will appear in the large display window. The setting Indicator Light in front of the LO Range Actuation Temp lights to indicate that this is the value being displayed. With each additional push of the * button the next setting value will be displayed in the large display window and the appropriate setting Indicator Light will light.

Any setting value can be adjusted at the time it is being displayed in the large display window. Press the ↑ button to increase the value of the setting or the ↓ button to decrease the setting. The new value entered will be saved into the permanent memory of the Controller ten seconds after the * button is last pushed.

The following table lists each of the setting values in the order that they will appear with each sequential push of the * button.

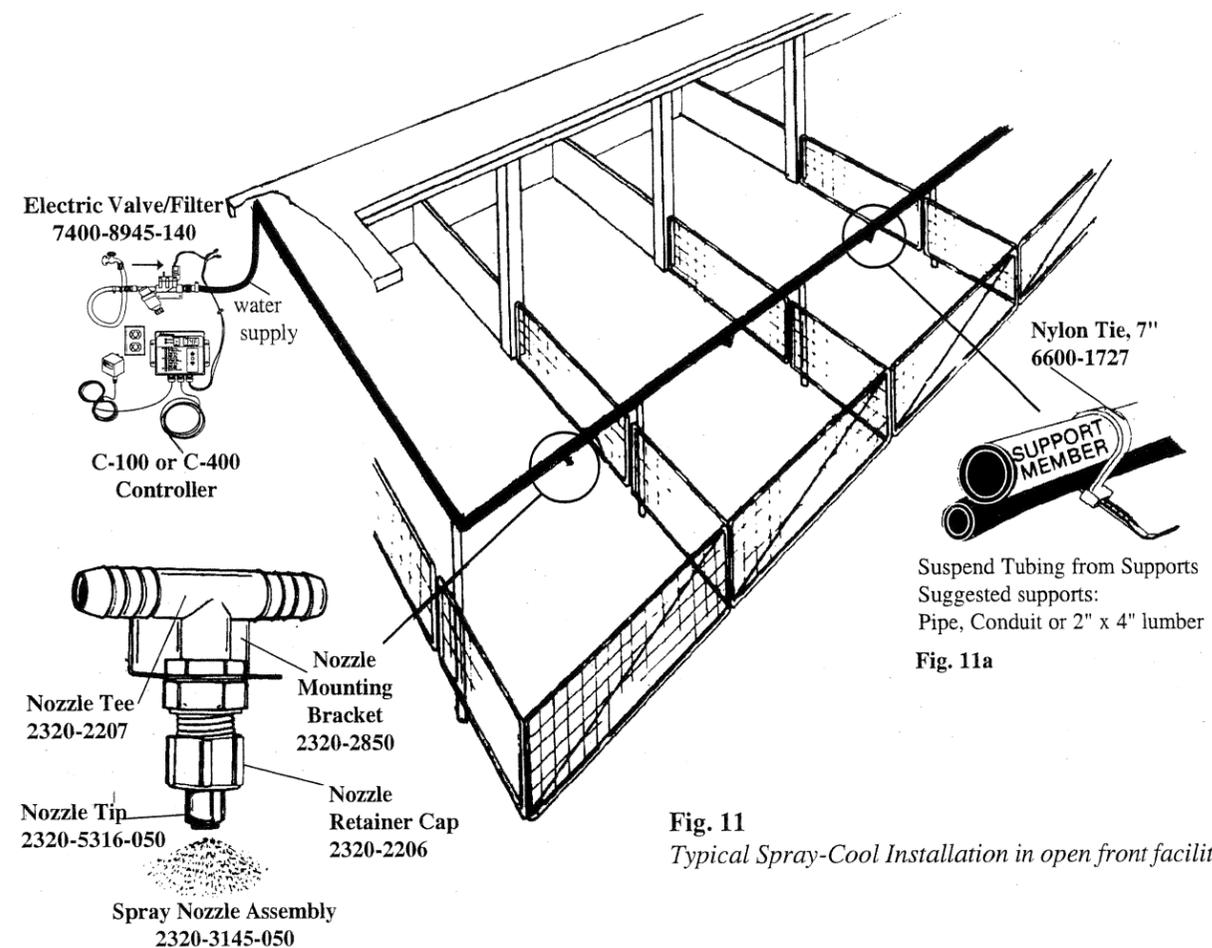


Fig. 11
Typical Spray-Cool Installation in open front facility

Spray Nozzle Features

The spray nozzles provided with the Edstrom Spray-Cool System produce a coarse droplet spray (not a mist or fog) and deliver an even distribution over a circular area. The diameter of this circular area varies according to the height of the nozzle, see Fig. 12.

The spray nozzle has a large orifice, approximately 1/16" diameter, which does not plug easily with particles or minerals in the water. The spray nozzle delivers approximately 1/2 gallon per minute at 20 psi pressure. The discharge flow will vary slightly from this amount according to the water pressure.

To compute the total amount of water being used with the intermittent Spray-Cool System in operation, the following calculation must be made to allow for cycle times.

As an example, with a pen of 25 pigs, the average cycle times might be 2 minutes ON and 30 minutes OFF. Since the intermittent cooling system will actually only be spraying a total of 4 minutes each hour, the total water discharge from a single nozzle is:

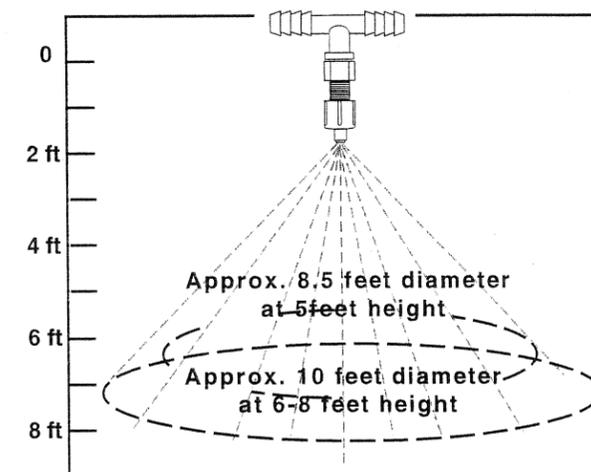


Fig. 12
Spray Nozzle Pattern

4 min. x 1/2 gpm = 2 gallons per hour per pen.
(This is actually less water volume than some fogging nozzles discharge when spraying continuously.)

The maximum number of spray nozzles that can be connected to one Controller is normally limited by the water supply system of the facility and not by the

Controller nor the electric valves. (NOTE: The Electric Valve/Filter has the capacity to handle over 20 gpm, or 40 nozzles.) Because many facility water supply systems have limited pressure or flow capacities due to long and/or small diameter supply lines to a building, the normal maximum number of nozzles that can be supplied in one zone is 20 Spray Nozzles (10 gpm).

If additional spray nozzles are required in the facility, then the plumbing should be broken into multiple zones of spray nozzles, with each zone controlled by a separate Electric Valve/Filter Assembly, 7400-8945-140, and a C-400 Controller used to activate the electric valves in sequence. Up to 4 electric valves can be connected to the C-400 Controller, see Fig. 1b on page 3.

To avoid excessive pressure loss in the blue tubing distribution lines, the length of the distribution lines should not exceed 100 ft. from the electric valve to the last spray nozzle. If longer lines are required, you can use larger diameter PVC pipe for the distribution line in place of the blue tubing. A 1/2" mpt spray nozzle assembly, 2320-6004-050, is available for use with PVC pipe lines, see page 27.

Spray-Cool System Installation

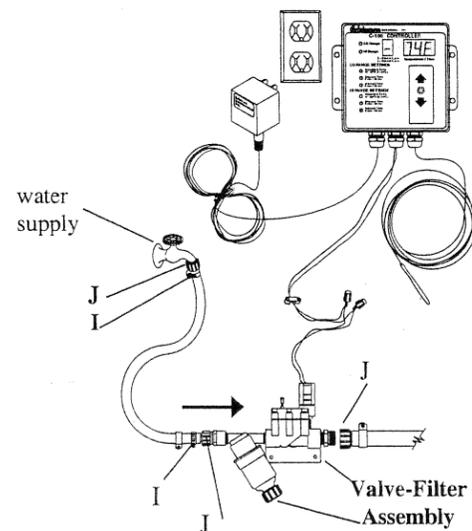


Fig. 13
C-100 or C-400 Controller
Electric Valve/Filter, 7400-8945-140

After selecting a plumbing arrangement that will work best for your facility and selecting appropriate locations for the Controller and the electric valves, you are ready to begin the installation.

Mount the Electric Valve/Filter Assembly, 7400-8945-140, in horizontal position on wall using the 2 stainless steel screws provided. Cut the blue tubing to length to reach from inlet of the Electric Valve Assembly

(the filter end) to the nearest water source connection. Two threaded swivel adaptor fittings (J), 1610-3299-003, are provided for inserting in each end of the tubing. Use the two hose clamps (I), 1200-1906-002, provided, to clamp the fittings securely in tubing. Now you can easily connect one end of the tubing to the inlet fitting of the electric valve assembly and the other end to the water supply hydrant or faucet.

- Mount the spray nozzle tee assemblies, 2320-3145-050, over the desired location in the pens using the stainless steel screws, 3010-0833, provided, see Fig. 10 & 11.
- Using a barbed garden hose thread swivel adaptor fitting, (J) 1610-3299-003, connect the blue tubing distribution line to the outlet and the electric valve.
- Cut the blue tubing distribution line to length and install between spray nozzle tees. Secure the tubing as necessary with loop clamps and screws or nylon ties provided, see Fig. 10.
- If the distribution line needs to be branched into two directions, install the barb tee, 1610-0841.
- At the terminal end of a distribution line, install a short length of tubing to the last spray nozzle and then insert one of the two drain plugs, 2020-4678-001, see Fig. 10.

Viewing & Changing Setting Values

All of the setting values can be easily checked and/or changed at any time by using the 3 programming buttons on the C-100 control panel. By pressing the * button, the first setting value will appear in the Large Display Window. The setting Indicator Light in front of the LO Range Actuation Temp lights to indicate that this is the value being displayed. With each additional push of the * button the next setting value will be displayed in the large display window and the appropriate setting Indicator Light will light.

Any setting value can be adjusted at the time it is being displayed in the large display window. Press the ↑ button to increase the value of the setting or the ↓ button to decrease the setting. The new value entered will be saved into the permanent memory of the Controller ten seconds after the * button is last pushed.

The following table lists each of the setting values in the order that they will appear with each sequential push of the * button.

C-100 Controller Settings

Settings	Description	Range	Comments
LO RANGE Actuation Temp	Temperature at which LO RANGE cooling cycle will trigger	40 - 99°F (5 - 40°C)	The LO RANGE Actuation Temp must be 1° below the HI RANGE Actuation Temp setting
LO RANGE Shower Time	Length of time the electric valve is energized in LO RANGE	0 - 99.5 min.	
LO RANGE Interval Time	Length of Time in cooling cycle when electric valve is closed in LO RANGE	0 - 99.5 min.	
HI RANGE Actuation Temp	Length of Time the electric valve is energized in HI RANGE	40 - 99°F (5 - 40°C)	
HI RANGE Shower Time Solenoid #1	Temp at which HI RANGE cooling cycle will trigger	0 - 99.5 min.	HI RANGE Actuation Temp must be 1° above LO RANGE Actuation Temp setting
HI RANGE Interval Time	Length of Time in cooling cycle when electric valve is closed in HI RANGE	0 - 99.5 min.	

How The Controller Works

Both the model C-100 and the C-400 Controllers operate on low voltage, 24 VAC. An external transformer is provided to plug into a 120 VAC outlet. This offers protection to the electronic circuitry from power surges and spikes on the 120 VAC power supply line. **NOTE:** Contact factory for optional voltage transformers - 220V or 100V.

The output power to the electric valves is also 24 VAC. This makes the installation of the interconnecting wiring

between the electric valve and the Controller both easy and safe. **NOTE:** Low voltage "doorbell" type wire can be used.

The operation and programming of both model Controllers is very simple and very similar - the operation of each model is described in detail below.

C-100 Operation

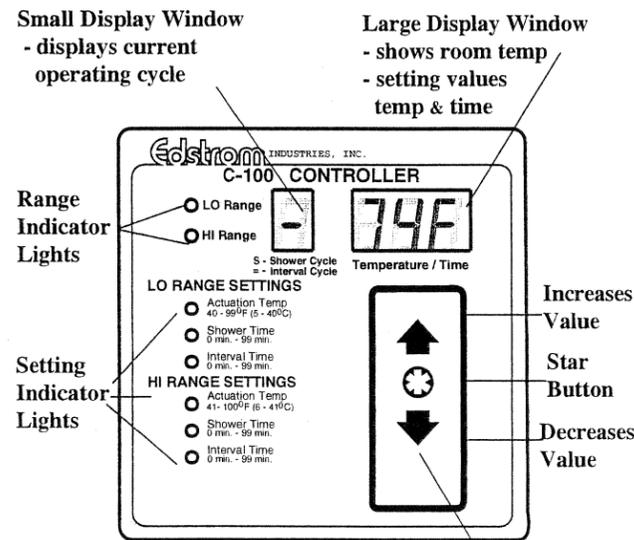


Fig. 16a
C-100 Control Panel

The control panel of the C-100 Controller is shown in Fig. 16a. Digital displays and indicator lights indicate the operating status of the unit. Three programming buttons are used for viewing all the programmed setting values and making any desired changes to the settings.

Temperature Monitoring Mode

When the room temperature is below the programmed Actuation Temperature, the C-100 will be in the temperature monitoring mode. The room temperature is displayed in the large window, the small window will have no display and all indicator lights will be off.

LO Range Cooling Cycle

When the room temperature rises to the LO Range Activation Temperature setting, the C-100 will initiate the LO Range cooling cycle. The LO RANGE Indicator Light will be ON. The C-100 will energize the electric valve for the length of the LO Range Shower Time setting, and the letter "S" is displayed in the small window.

Upon completion of the Shower time period, the C-100 turns off the Electric Valve and pauses for the length of the Lo Range Interval Time and displays "=" in the Small Window.

When the interval time has elapsed the Lo Range Cooling Cycle is complete, and the C-100 will perform a Room Temperature Check/Decision.

Room Temperature Check/Decision

After completing a cooling cycle the C-100 will check the current room temperature. If the room temperature has cooled below the LO Range Activation Temperature setting, the Controller will return to the Temperature Monitoring Mode. If the room temperature is still at or above the LO Range Activation Temperature setting, but is not up to the HI Range Activation Temperature setting, then the Controller will immediately begin another LO Range Cooling Cycle.

If the C-100 detects that the room temperature has risen to or above the HI Range Activation Temperature setting, it will initiate a HI Range Cooling Cycle.

HI Range Cooling Cycle

When the HI Range Cooling Cycle is initiated as described above, the HI RANGE Indicator Light will be ON. The electric valve will be energized for the length of time programmed into the HI Range Shower Time setting and the letter "S" is displayed in the small window.

Upon completion of the HI Range Shower Time period, the C-100 turns off the electric valve and pauses for the length of the HI Range Interval Time and displays "=" in the small window.

When the interval time is elapsed, the HI Range Cooling Cycle is complete and the Controller will perform a Room Temperature Check/Decision as described above.

Installation of Edstrom Controller C-100 or C-400

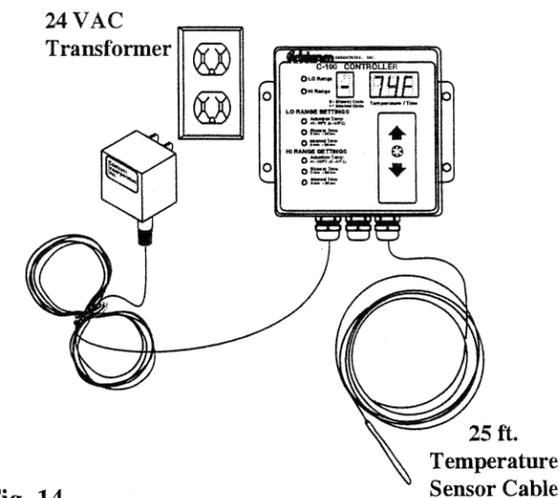


Fig. 14
C-100 or C-400 Controller

You are now ready to install the Controller and connect it to the system. Whether you are using the C-100 or the C-400 mode Controller, the installation is the same. It should be located where it is readily visible to easily monitor the room temperature readout and easily accessible for programming.

25 ft. Temperature Sensor Cable

The Edstrom Controller comes standard with a 25 foot temperature sensor cable, which should be extended to a point in the room which will be representative of the environment the pigs are in. Many users install the Controller in an office or hallway and route the temperature sensor cable into the room of animals being cooled.

Transformer Plugs Into 120 VAC Receptacle

A 120 VAC wall receptacle must be located within 5 feet of the Controller location to permit connection of the 24 VAC transformer (optional transformers are available to permit operation on 220 VAC or 100 VAC power). **NOTE:** To avoid any potential interference or damage to the electronics, **DO NOT** plug the Controller into the same electrical circuit supplying large electrical motors, electric fencers, etc.

WARNING!

Do not plug in the transformer until you have finished with the entire installation procedure!

Install your Controller according to the following steps:

1. Mount the Controller on the wall by installing the four stainless steel screws provided through the mounting tabs on the sides of the enclosures.
2. After securing the Controller to the wall, loosen the two screws at the top of the enclosure door allowing the door to open and swing down. (The two door screws are captured in the door and will not fall out, see Fig. 15a and 15b page 14 & 15).
3. Pull the black power cord from the transformer through the cord-grip fitting at the bottom of the enclosure. Approximately 12 inches of cord must be pulled into the box to permit easy connection to the screw terminal strip on the back of the door. Lock the cord in position by turning the outer nut of the cord-grip fitting clockwise until it tightens securely on the cord.

Before proceeding, check that the transformer at the end of the power cord will reach the 120 VAC receptacle. **DO NOT PLUG IT IN YET**

4. Connect the black and red wires of the power cord to the two screw terminals on the back of the door which are labeled "24 VAC". (It is not important which of the two terminals the red and black wire are connected to; there is no polarity.) See wiring diagram Fig. 15a and 15b.
5. The temperature sensor cable comes pre-installed on the Controller, with the red and black leads connected to the respective screw terminals. (For the temperature sensor, it is critical that the red and black wires be connected to the correct terminal. **Polarity is critical!** Connecting them in reverse will cause the Controller to display the message "Prob" instead of the correct room temperature.) Extend the temperature sensor to a location in the room which will be representative of the environment to which the pigs are exposed.
6. Run the low voltage electrical cable from the Controller to each of the electric valves to be activated. A 50 foot roll of 18 gauge 2-conductor cable is included with each Electric Valve Kit. The maximum distance that should be run with this 18 gauge wire is 250 feet. For longer distances, heavier gauge wire must be used. Contact Edstrom Industries for recommendations.

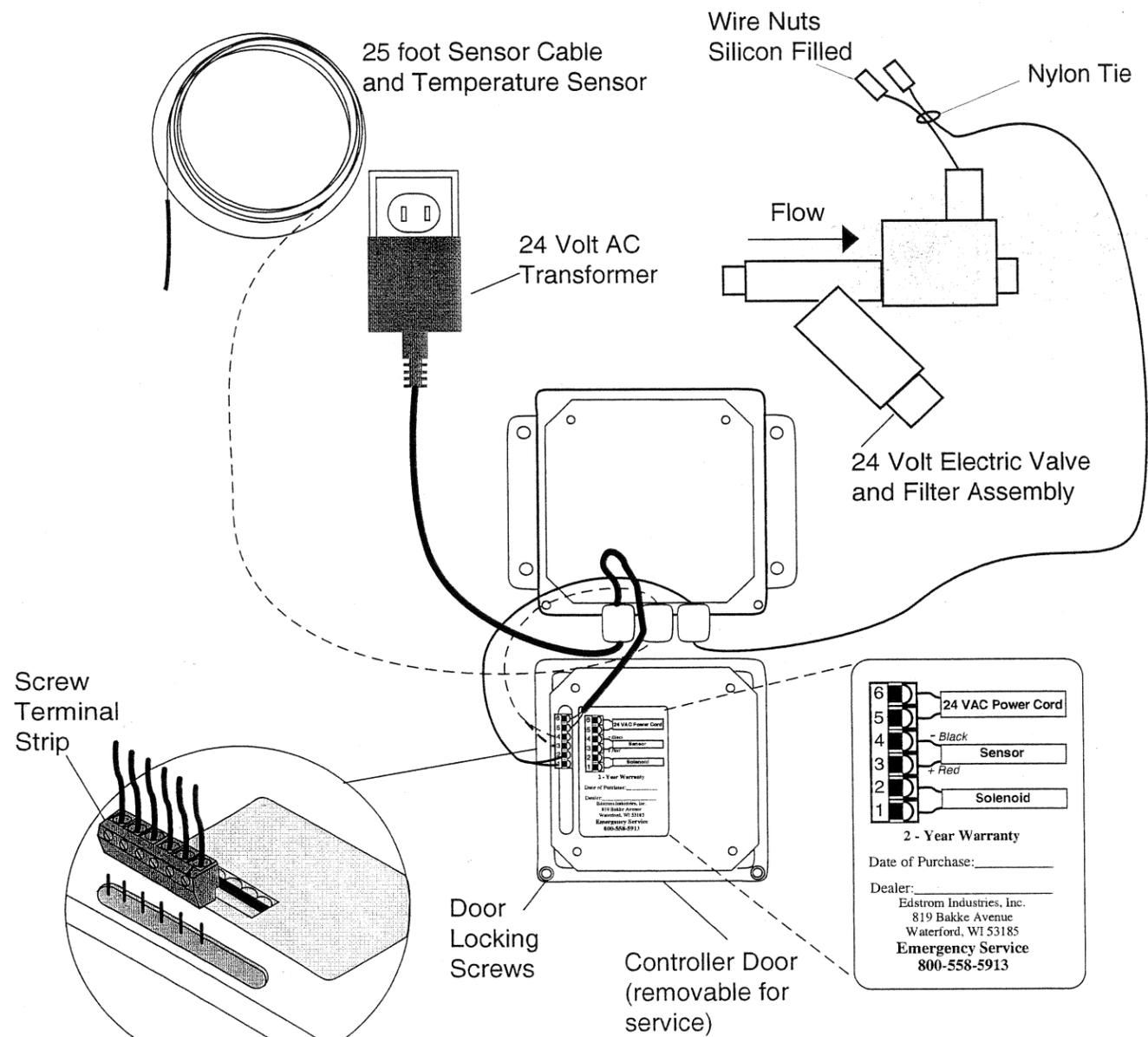


Fig. 15a
C-100 with door open showing wiring

- Pull the cable for each electric valve into the enclosure at least 12 inches, and then tighten the cord-grips securely on to the cable. **NOTE:** The C-400 has six individual cord-grips along the bottom of the Controller. Four of these grips are for entry of these cables. Three of the four have plugs in them which can be easily removed to permit wire entry by simply loosening the cord-grip nut.

Connect the two wires from each electric valve cable to the appropriate screw terminals. The wires have no polarity. It is not important which color wire of the pair goes to which terminal.

- At the electric valve end of the cable, make the connection to the two lead wires of the electric valve with the wire nuts provided with the electric valve Kit. **NOTE:** The wire nuts are filled with silicone to prevent corrosion of the wire connection.
- After all the connections have been made to the screw terminal strip on the back of the Controller door, the door should be carefully closed with all the wires folded neatly back into the enclosure box as the door is raised and screwed closed with the two locking screws

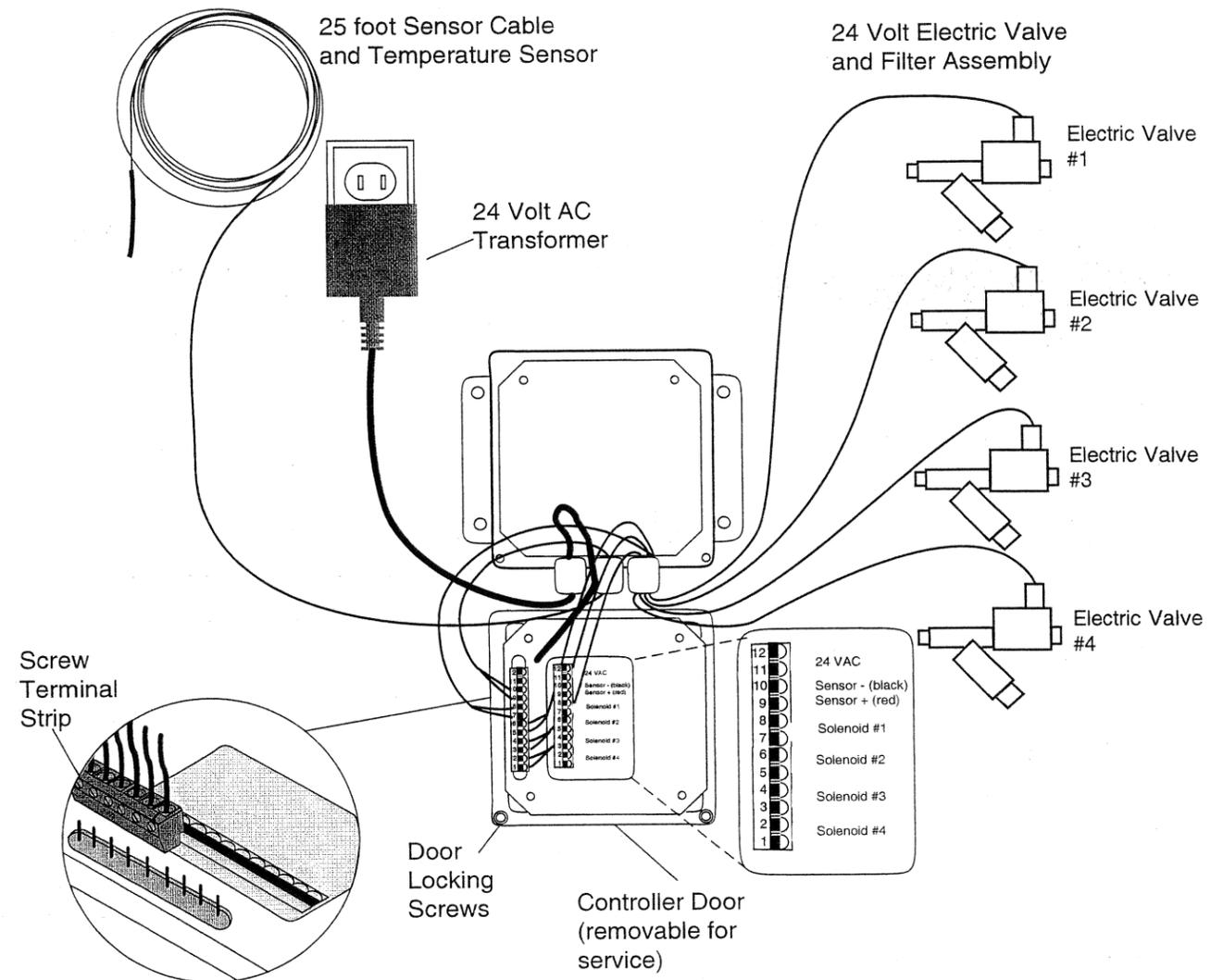


Fig. 15b
C-400 with door open showing wiring