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This unit can mount to a tripod, where temperature data can be measured over an extended period of time and output directly to a chart recorder, printer, or PC. This 3M Infrared Thermometer comes standard with an RS232 cable, Windowsbased software, power supply, hard plastic case, wrist strap and contact probe. 100 points in memory Display hold 601 distancetospot ratio 3 dot laser sighting locking trigger low battery indicator 2 x 1.5V Alkaline Type AA Battery 25degree F to 1600 degree F temperature range. The TPS31 is most suited for rooms where a timer unit is not required, or to provide floor temperature limitation when the heating is being controlled by a home automation system. The hidden functions include a heating schedule which can be turned on if desired providing the controller with full Lot20 compliance due to its increased energy efficiency. A blanking plate is supplied with the controller to hide the display if you would prefer not to see it. When you choose the ambient temperature the floor sensor still ensures the floor doesn't overheat. As standard this function drops the temperature by 5oC, but it can be set to anywhere between 28oC. The signal is usually sent from an external timer or building management system BMS, but in the case of hotels, can be a signal sent from reception when the room is unoccupied. This mode can be used in hotels to effectively turn off the rooms heating. This signal can be sent from an external timer, a BMS or simple wired switch. Set your room or floor temperature to operate the thermostat. The floor temperature limit should be set when you first switch on your thermostat. The standard preset heating schedule is as follow Company registration number 4905464 VAT no GB 307 5500 28 In the case of membership of or affiliation with organisations please see our partner section for further details. Just swab the surface, click the activation solution and incubate in this heating block for 15 minutes.

Interpret the results by a color change of clean or dirty. How We are a singlesource food, dairy and beverage plant supplier with a diverse product line, so you can findWe represent over 850 manufacturers, so you only have one vendor to contact—us. Youll appreciate ourGive us a try—youll be glad you did. At this time, this product is Outside of this range, the instrument will show dashes in the display for the Heat Index.The unit will DOWN ARROW recognize the cable plugged in and configure itself for serial or parallel. If no Changes items appearing in the display. Scrolls down. cable is plugged in it will default to serial. Slots in the housing allow air to circulate around the sensor.SPECIFICATIONS accessed by removing the screws from the bottom panel of the unit. Measurements The 2position switch located in the battery compartment must be set by the user Globe, dry bulb, wet bulb, WBGTin, WBGTout, WBGT weighted average if the power supply method is changed. APPENDIX A HEAT EXPOSURE TABLES 2 additional sensor bars by using remote cables up to 200 feet 61m. The top sensor bar can also be remote with a cable. Sensor array with 2 inch globe 56795 A time of 401 indicates greater than 4 hours. Sensor array with 6 inch globe 56780 6 Foot shielded remote sensor cable 53924. For Service Information U.S.A. customers, we will replace or repair our option defective instruments at no Congratulations. Paladin is suitable for installation on the outside of both metallic and nonmetallic pipes and carries approvals for both direct earth burial and wet locations. As a result Paladin for Pipe can be installed both indoors and outdoors. Paladin being a very versatile product can also be installed inside most nonpressurized, nonpotable pipes and drains as HeatLine offers the only external heating cables on the market that are wet location certified by cCSAus.

This includes but is not limited to copper, PEX, polyethylene, ABS, PVC, galvanized, stainless, ductile iron, rubber, vinyl and more. Even in applications where pipes are intended to be dry for short or extended periods of time, Paladin will never overheat or melt the pipe due to its advanced selfregulating technology. The need for an electrician to provide onsite power and complex terminations is eliminated. Paladin is the only known heat tracing cable available on the market that carries direct earth burial and wet location approvals making it suitable to install in a variety of applications like never before. Constructed of selfregulating heat cable technology the Paladin can effectively increase heat and energy output to sections along its length which are cold and

simultaneously reduce heat and energy output to sections which are warm. You never have to worry about the Paladin pipe warmer system overheating causing risk of melting and fire because of the selfregulating heat trace cable technology. Paladin gives you the peace of mind of reliable pipe freeze protection without the risk. It has become an essential product for farmers and barn managers to provide safe and reliable freeze protection in barns and stables. The additional thermal insulation works to reduce heat loss, and the thermostat allows you to duty cycle your Paladin system based on external pipe temperature. Both accessories combined can increase energy efficiency by as much as 80%. Examples include but are not limited to Examples include but are not limited to Other hardware store heat tape products must be pitched or spiraled around the pipes in order to apply the adequate amount of heat to uninsulated pipes, making them very high in energy consumption. With Paladin, the heating cable is simply applied on to the pipe in a single run in most applications; reducing overall length of product by as much as 60%. see Measuring Recommendations.

If you feel you have a special or unique application for Paladin please contact HeatLine directly and speak with one of our knowledgeable product specialists. No extra electrical work is required Cord set hard wire connected Paladin models available upon request Do not assume or estimate the length required as the HeatLine Paladin for Pipe heating cable system cannot be extended. For example, if an 18 ft. 5.5m system was required, round up to a 20 ft. 6m system. There is no way to lengthen the Paladin for Pipe product when on site. For custom or nonstock orders Paladin can generally be shipped out within 13 days from time of order. Please call for current availability and lead times. For a quotation on this product and more CLICK HERE. The Paladin system though however carries an additional certification designation that the EXT5R does not which makes the Paladin product certified for use in Roof and Gutter deicing applications. The advance selfregulating technology employed in the Paladin product renders it safe on plastic pipes even when dry as it can never overheat and damage the pipes. This unique ability means that the overall length of heating cable required greatly reduced, decreasing overall operating costs. Depending on system applications, or where automatic operation is preferred, a thermostat can be used to switch the system on and off to help conserve power or to duty cycle the system. When combined with insulation thermostats can substantially increase energy efficiency. As a result, most HeatLine systems, including Paladin can be installed by homeowners; however, HeatLine commonly recommends that a qualified tradesperson complete the installation process If needed it is safe for the heating cable to overlap as it is selfregulating and will not overheat. As a result, HeatLine brand products are very energy efficient to operate, but do not completely shut off as they can only idle their output to a minimum amount.

To completely shut off the system it must be unplugged or installed with a thermostat. HeatLine brand systems should be unplugged or shut off when not required summer months and tested each year before use. We pay for the energy in watts, not in volts. Years ago the term more efficient was attached to 240 volt systems because you can put more load or amperage on a 240 volt circuit. Unfortunately, the term more efficient somehow became misinterpreted to mean more energy efficient which is not the case. Once reenergized the Paladin system has the ability to increase its output to immediately begin to defrost any section of the pipe that has or was close to freezing during the power outage. In many instances defrosting the pipe can take as little as an hour or less. While the overall amount of energy consumed depends on multiple factors you can be assured that you are installing the most energy efficient heating cable system available. If you would like to reduce your energy consumption further you can investigate the addition of a thermostat, timer, and or other control device. For applications that require longer lengths please see EXT5R. Once you have the required information collected including pipe type metallic or nonmetallic, pipe diameter, pipe length, lowest outdoor ambient temperature, number of valves or external spigots, and potential insulation thickness you employ the Paladin length selection chart or contact HeatLine

directly to speak with a product specialist. As such the Paladin system cannot be spliced together in the field. If greater length of the Paladin is required you may purchase a single continuous product of the proper length, and or relocate a second power source and install an additional Paladin system to complete the required freeze protection. A common type of insulation employed with Paladin heating cables is fire resistance water proof pipe foam insulation sleeves.

You are also able to implement fiberglass insulation provided it is properly weatherproofed based on the environment. For 12 volt or 24 volt DC applications see Kompensator. It also helps keep the heating cable in consistent contact with the pipe and works as a form of protection to prevent damage to the heating cable. Spare equipment should also be available at the owner s site. Equipment manufactured by the manufacturer is protected against normal line surges. High surges caused by thunder storms or power supply equipment may damage this equipment. For added security against line voltage surges it is recommended that surge and noise suppression devices be installed at the electrical distribution panel. Use of shielded cable for probes is recommended for protection against lightning. These devices are available from most electrical supply distributors. RECOMMENDATIONS The manufacturer recommends that all installation procedures described herein be performed by a qualified electrician or installation technician. Further more the manufacturer recommends to test all the functions and equipment connected to the ECS, including the alarm system and backup devices, after installation, after changes to the installation and every month after that. Fuse verification and replacement, as well as the proper setting of control values shall be the responsibility of the owner of this equipment. It is organized as follows Introduction Installation User s Guide Appendix 1.1 DESCRIPTION Congratulations on the purchase of your ECS3M environmental control system. The ECSM product line provides you with full control over temperature, humidity, air flow, and heat, resulting in a comfortable environment for your livestock. The ECSM product line offers a number of added features over existing ECS controls, such as Compatibility with DIP1 control. Automatic temperature reduction ramping. Adaptable variable speed outputs for a wide selection of fan model types. Humidity probe.

Full torque fan start to prevent motor damage. The ECS3M provides microprocessor control over a three stage output. The first stage controls a variable speed fan which can operate at a continuous low speed to ensure good quality of air when room temperature is below the main set point. In addition, the first stage may be programmed to cycle ON and OFF. When room temperature rises above the main set point, the fan accelerates to increase the airflow. Page 5 6 ECS3M DESCRIPTION CONTINUED. The second stage provides control over a second variable speed fan to help the first fan when higher room temperatures require increased airflow. This second stage is also fully programmable for settings, such as minimum speed, relative set point, etc. The third stage controls either a heater for colder climates, or a third fan where additional cooling is required. The ECS3M provides you with full control over all three stages via the use of an easy to follow display panel. All programmable features can be customized to meet your requirements. The ECS3M keeps you constantly informed by displaying the status of all of its outputs as well as the room temperature. With an optional humidity probe, the ECS3M displays current humidity levels. Safety of livestock is ensured by the continuous control of climate and timely alarm notification, should environmental conditions exceed alarm set points. Further security may be obtained by connecting all ECS controls in a network configuration to a computer via the use of an optional RCM 40 remote monitoring unit. This provides remote control monitoring of each room. All control panel variable outputs are fused, and all programmable settings are maintained, whether the ECS3M is powered or not. The ECS3M provides an automatic constant temperature reduction ramping feature for your maturing livestock. A builtin low temperature safety factor prevents temperatures from reaching dangerous limits.

With an ECS3M in control of your climate, you are assured of optimal living conditions for your

livestock. Page 6 7 DEFINITION OF TERMS DEFINITION OF TERMS MAIN SET POINT The desired room temperature. Other temperature settings on the ECS3M are relative to the main set point temperature. RELATIVE TEMPERATURE A value added to, or subtracted from the main set point, which results in a new temperature at which a desired action starts or stops. ROOM TEMPERATURE The actual temperature in a closed area. ROOM HUMIDITY The actual humidity level of a closed area. MINIMUM FAN SPEED The desired minimum speed for variable speed fans. RAMPING An automatic daily reduction in the main set point and all temperature settings relative to this. Range of temperature where two conditions are possible. The output depends on whether the temperature was increasing or decreasing when it enters that range. VARIABLE. Bandwidth Temperature range where a variable fan speed fan accelerates, as the temperature increases. Page 7 8 ECS3M Page 8 9 CHAPTER 2 INSTALLATION Chapter 2 describes the installation of the ECS3M control panel. The manufacturer recommends that the following instructions be adhered to as closely as possible, and that all work be performed by a certified electrician. Failure to do so may void the warranty! 2.1 UNPACKING Unpack the ECS3M and inspect contents for damage. Should the contents appear to be damaged, contact your local distributor for return procedures. The package should contain the following standard items 1 ECS3M control. 1 installed temperature probe model number K. 3 cable fasteners or fuses. 1 Instruction manual. The following optional items may be added 3 additional temperature probes for temperature averaging, 1 humidity probe. The ECS3M requires the RHT1 humidity probe for maximum accuracy of monitoring and control of humidity levels. Page 9 10 ECS3M 2.2 MOUNTING Use a screwdriver to remove the faceplate and the plate on the power compartment.

To limit the unit s exposure to noxious gases, install the unit in a hallway. Make sure the unit is mounted right side up with the cable entry holes facing down. The ECS3M operates in a temperature range of 32 F F 0 C 50 C. The enclosure is watertight, it is not splash proof or immersion proof. DO NOT WATER the control. Once both faceplates are off, install the mounting screw on the wall and install the unit on it. Use two more screws to secure the ECS3M in place using the bottom mounting holes. Mounting hardware is not shipped with the unit. 2.3 SWITCH SETTINGS The ECS3M is configured for a variety of options via two switches as follows Line Voltage 230V Selector Switch This switch is located on the surface of the main bottom board and 115V adapts the control panel for 115 VAC or 230 VAC line voltage. Page 10 11 CHAPTER 2 INSTALLATION Software Settings Switch This switch is located at the rear of the control panel faceplate and adjusts the following options. All settings except for main set point, record low, and record high are locked when this switch is OFF. Selects between a Heater or Fan control on stage three of the control panel. Make certain that the line voltage selector switch is set to 115 VAC. Connect the power cable to terminals 7 and 8 on the main bottom board and connect the ground wire to terminal 9 on the main board. Page 11 12 ECS3M VAC Make certain that the line voltage selector switch is set to 230 VAC. Connect the power cable to terminals 7 and 8 on the main bottom board and connect the ground wire to terminal 9 on the main board Fan 1 terminals 5 and 6 Stage 1 of the ECS3M controls the operation of the primary fan. Connect the two leads from fan 1 to terminals 5 and 6 on the main bottom board Fan 2 terminals 3 and 4 Stage 2 of the ECS3M controls the operation of the secondary fan. This contact closure is voltage rated to 230 VAC. The current rating of the dry contact is 10 Amps resistive for a heater and 6 Amps inductive for a fan.

Set the software settings DIP switch at the rear of the control panel faceplate to ON for a fan or OFF for a heater. These cables can be extended to a distance of 150 meters 500 feet. Single probe temperature and humidity connections are illustrated in figure 4, while temperature probe averaging connections are illustrated in figure 5. Page 12 13 CHAPTER 2 INSTALLATION Use shielded cabling for probes. Connect the shields to the SHLD terminal. Failure to do so may result in inaccurate readings. Single Temperature Probe Install a single temperature probe in the area that best reflects the overall room temperature. Connect the two leads and the shield of the temperature

probe to the control panel terminals labeled Probe, as indicated in figure Averaging optional Four temperature probes are required if temperature averaging is desired in larger rooms. Place the probes in appropriate locations to best average room temperature. Refer to figure Humidity Probe optional Install one humidity probe in the area that best reflects the overall room humidity. Connect the humidity probe to the control panel terminals labeled Probe, as indicated in figure ALARM The ECS3M provides a normally open and normally closed dry contact for alarming low or high temperature conditions. In addition, this same contact can be used to signal a power failure. Make normally open or normally closed connections as indicated in figure 4. Momentary power interruptions may trigger false alarms! To avoid them, when the ECS3M is connected to an alarm system, install a time delay relay between Page 13 14 ECS3M 2.7 POWERING UP Before powering up the ECS3M, install the faceplate to the control s enclosure using the six screws previously removed. Set Selector knob to position 12. Upon power up, the unit will test its display by briefly lighting all the segments of its LED. Make certain that all segments light up. Following the LED display test, the unit displays the room temperature.

If the temperature does not appear, refer to the Troubleshooting section in the appendix of this document. Fig. 1 Two Fans 115V and One Heating Unit 115V Page 14 15 CHAPTER 2 INSTALLATION Fig. 2 Three Fans 230V Fig. 3 Two Fans 230V and One Heating Unit 115V Page 15 16 ECS3M Notes for Figures 1, 2 and Power cut and protection devices in case of overload. Only use fans that have thermal protection devices. It is therefore strongly recommended to install backup devices and alarm or warning devices see example fig. 7. BACKUP THERMOSTAT. If the control is defective, then the thermostat will start the dedicated fan at full speed when the temperature will reach the T15WD set value.The relay shall be chosen to support the load connect to it. ALARM CIRCUIT. In normal operation, the alarm circuit of the Varifan control is a short circuit. But if the control is defective or if there is no power applied to it, then the alarm circuit of the control will be an open circuit. Page 18 19 CHAPTER 2 INSTALLATION Fig 7. Recommended control backup Page 19 20 ECS3M CHAPTER 3 USER S GUIDE The ECS3M front panel shown previously features a LED status window and two control dials which are used respectively to select a function and adjust a setting. LED STATUS WINDOW The LED status window features a 3 digit LED readout for the display of temperature in Fahrenheit or Celsius, humidity level, and programmable settings. In addition, the LED status window displays the operational status of Fans 1, 2, and Fan 3 or a heater via four additional LEDS shown above in LED window. When ON, each LED indicates that its associated fan or heater is operating. The fourth LED lights up to indicate a low or high temperature alarm condition. CONTROL DIALS The center dial is the Selector dial and is used to select one of the control panel s 12 primary or 10 secondary functions.

The dial located to the right of the Selector dial is the Adjuster dial and is used to enter secondary function mode and to adjust the setting of each function. When primary functions 1 through 11 are selected, the LED status window displays a blinking value. Function 12 displays ambient temperature. Then rotate the selector dial from function 12 to any other function. When secondary functions 1 through 4, 6, and 8 through 11 are selected the status window displays a flashing value along with a scrolling LED display. Selection of function 12 takes the ECS back to primary mode. Page 22 23 CHAPTER 3 USER S GUIDE PRIMARY FUNCTIONS MAIN SET POINT 1 The main set point establishes the target temperature in the building. This value is used as the reference point for other settings. The main set point temperature is adjusted in 0.5 degree increments from a minimum setting of 9.5 C 13.5 F to a maximum setting of 41.0 C 105.0 F. Adjusting the main set point temperature rotate the Selector dial to position 1, rotate the Adjuster dial counterclockwise to decrease the temperature setting, clockwise to increase it. The main set point temperature is displayed on the ECS. Note The reduction per day feature primary function 9 must be OFF to Page 23 24 ECS3M FAN 1 DIFFERENTIAL 2 The Fan 1 differential setting establishes the temperature at which Fan 1 reaches maximum speed. The value is a temperature difference from the main set point.

The Fan 1 differential is adjusted in 0.5 degree increments from a minimum setting of 2.0 F 1.0 C to a maximum setting of 18.0 F 10.0 C. Adjusting the Fan 1 differential rotate the Selector dial to position 2, rotate the adjustment dial counterclockwise to decrease the temperature setting, clockwise to increase it. The Fan 1 Differential setting is displayed on the ECS. Example A main set point temperature of 70 F along with a Fan 1 differential setting of 5 F is set. When the temperature of the room reaches 75 F, Fan 1 operates at its maximum speed.

Page 24 25 CHAPTER 3 USER S GUIDE FAN 1 MINIMUM SPEED 3 This function sets the minimum speed of Fan 1 when room temperature is below the main set point. This value is entered as a percentage of a fan s maximum speed. The Fan 1 minimum speed is adjusted in 2% increments from a minimum setting of 12% to a maximum setting of 100%. Adjusting the minimum speed of Fan 1 rotate the Selector dial to position 3, rotate the Adjuster dial counterclockwise to decrease fan speed, clockwise to increase it. The minimum fan speed is displayed on the ECS. NOTE Upon startup, Fan 1 will run at its maximum speed for 4 seconds. This feature helps to minimize the risks of jams caused by ice. Page 25 26 ECS3M FAN 1 DUTY CYCLE 4 As long as the actual temperature is below the main set point, Fan 1 operates at the minimum speed set by Fan 1 Minimum Speed primary function 3. The Fan 1 duty cycle sets the percentage of time the fan is ON versus the percentage of time the fan is OFF. The ON time is entered as a percentage of the total time which is known as the period. The Fan 1 duty cycle is adjusted in 5% increments from a minimum setting of OFF, 5%, 10% etc., up to a maximum setting of ON corresponding to continuous operation. Adjusting the duty cycle of Fan 1 rotate the Selector dial to position 4, rotate the Adjuster dial counterclockwise to decrease the duty cycle, clockwise to increase it. The duty cycle is displayed on the ECS. Example The period of Fan 1 is set to 8 minutes by secondary function 4, while the duty cycle is set to 50%. As long as the main set point temperature of the room has not been reached, the fan operates at a minimum speed for 4 minutes, and OFF for 4 minutes. Page 26 27 CHAPTER 3 USER S GUIDE FAN 2 RELATIVE SET POINT 5 The Fan 2 relative set point establishes the temperature above the main set point at which Fan 2 begins to operate at its minimum speed. The Fan 2 relative set point is adjusted in 0.5 degree increments from a minimum setting of 0.0 C 0.