verve living systems

Installation Guide

VTST-24V WiSPER Thermostat
24V / Low Voltage

Application:
This thermostat is a 24 volt heating and cooling digital temperature control designed to operate either 2 or 4-pipe fan coil systems, but it can also be configured to operate 24VAC PTHP/PTAC systems. This thermostat also has the capability to receive and transmit to EnOcean enabled wireless products. Please see programming instructions for more details. Switching of load circuits is through relay contacts. The fan cycles on/off with calls for heating or cooling or can be on continuously in either low or high speed when configured as a heat pump or on continuously in either low, medium or high speed when configured as a fan coil. The control can be placed in economy mode or stop mode with 40°F freeze protection. This thermostat operates on a single setpoint with automatic changeover.

Specifications:
Temperature Monitor Range: 32.2°F to 99.9°F (0.0°C to 37.7°C)
Setpoint Range: 60.0°F to 85.0°F (15.5°C to 29.5°C)
***Setpoint:** 72.0°F (22.0°C)
***Comfort Limits:** 65.0°F (18.5°C) cooling
85.0°F (29.5°C) heating
Display Format: Liquid Crystal Display (LCD)
Backlight: EL blue green
Sampling Rate: Every 15 seconds
Accuracy: ± 1°F (0.5°C)
Power Source: 24VAC (20 minimum to 32 maximum)
Load Rating: 1.5 amps per load circuit
***Fan Control:**
Fan Coil - Selectable: Auto cycle, Low, Medium, High, Economy, Stop
Heat Pump - Selectable: Auto cycle, Low, High, Economy, Stop
Heat/Cool Control:
Fan Coil: 1 heat and 1 cool circuit
Heat Pump: 2 heat and 1 cool circuit
***Economy Limits:**
Maintains room temperature between 60.0°F and 85.0°F (15.5°C and 29.5°C) when thermostat is in economy (ECON) mode
***Fan Purge Timer:** 30 seconds
Anti-short Cycle: 3 minute hold in no call state at all times
***Cycle Rate:**
Fan Coil: 8 cycles per hour
Heat Pump: 6 cycles per hour

* **Differential:** 0.4°F
* **Display Mode:** Setpoint temperature
* **System Function:** Heat and Cool

***See Field Programming Instructions**

INSTALLATION:

This device should be installed and serviced by a qualified technician. Junction box mounting is highly recommended.

1. ⚠ **Caution:** Make sure that power has been disconnected.
2. All wiring must comply with applicable codes and ordinances.
3. A thorough check-out of the system should be made after installation is complete.
4. If retrofitting old thermostat, remove old thermostat from the junction box, carefully noting the wire connections on the old unit. Record wire color and terminal legends in spaces provided.

Disconnect old thermostat and remove any existing backplate or mounting plate.

Old thermostat wire function	Cable wire color
Power Feed	_____
Load Feed	_____
Common	_____
Heat	_____
Cool	_____
Low Fan	_____
Medium Fan	_____
High Fan	_____
Reverse Valve	_____

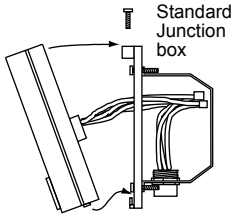
5. Install the mounting bracket to the junction box with the two long mounting screws provided.
Note: If application involves a double ganged junction box, a backplate will be required for a complete installation. Please consult your supplier.

6. From the wire chart found in step 4, assign, according to function, the cable wire colors to the thermostat wire legend provided below. Please refer to the connection diagrams on the following page.
Note: The control feed and the load feed will be connected together for the 4-pipe installation. If this is a new installation, record the cable wire colors in the thermostat legend provided below.

New Stat Wire Function	New Stat Wire Color	Cable Wire Color
Control Feed	Red	_____
Load Feed	Orange	_____
Common	Black	_____
Heat	White	_____
Cool	Yellow	_____
Low Fan	Green	_____
Medium Fan	Blue	_____
High Fan/Reverse Valve	Violet	_____

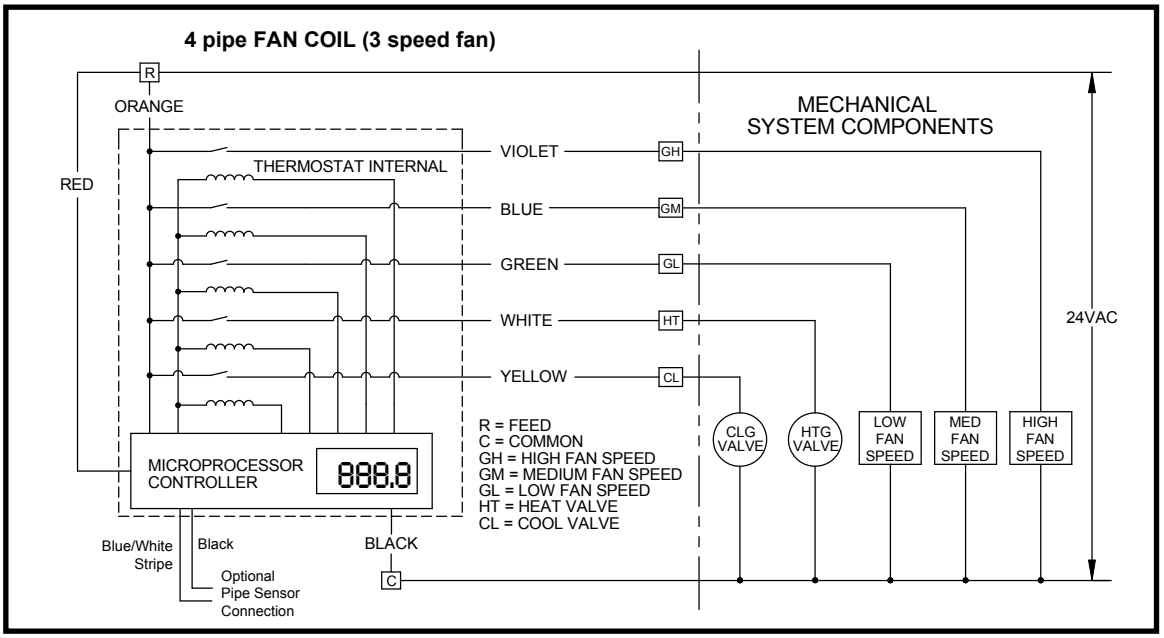
7. Connect the thermostat wires to the cable wires recorded in step 6.

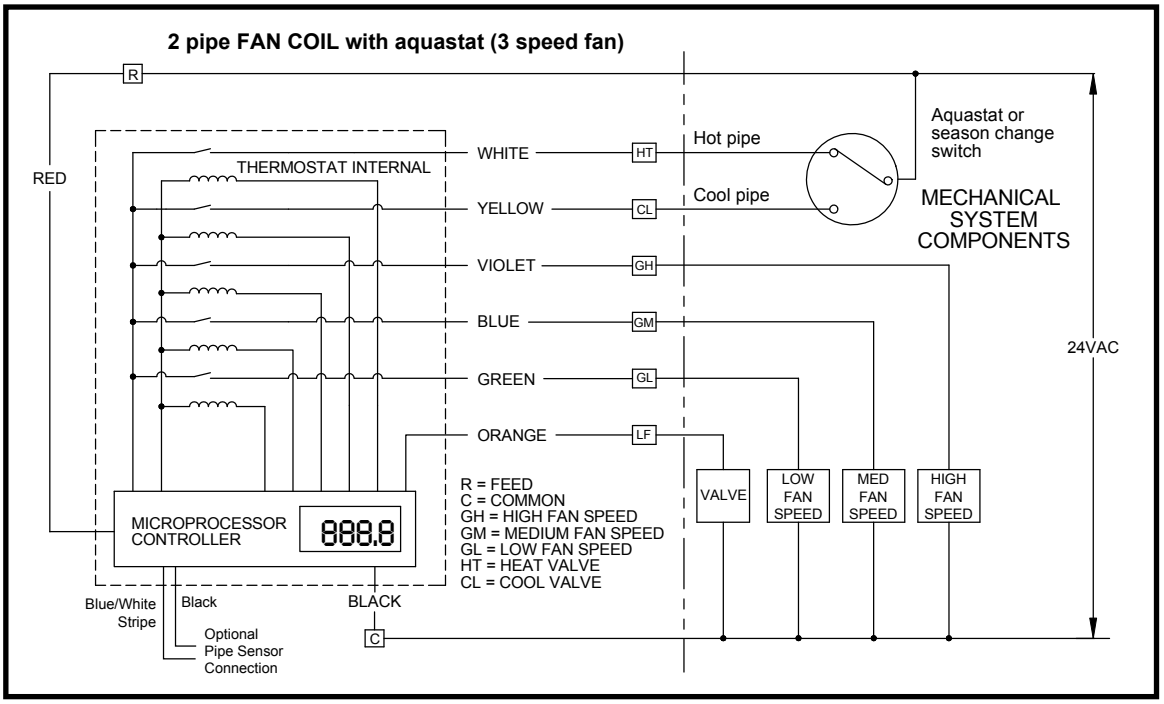
8. Push the wires into the junction box. Tilt the thermostat so that the bottom of the thermostat is resting on the mounting tabs of the mounting plate. Push the top of the thermostat towards the wall and secure into place with the self-tapping screw as shown to the right.

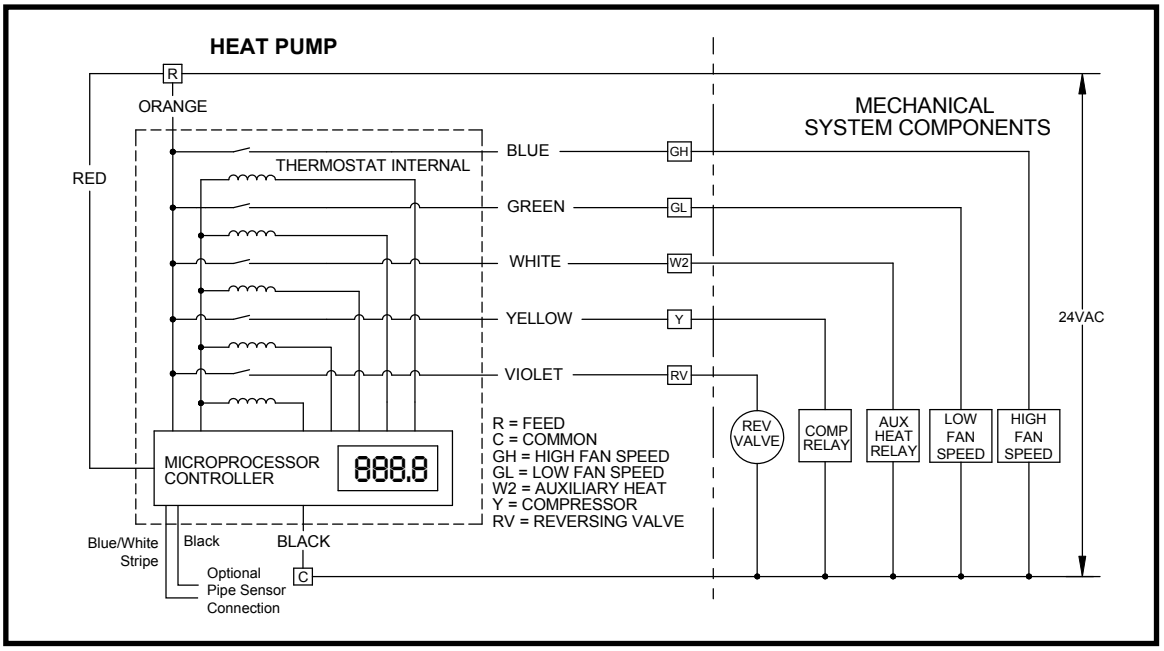


9. Turn power on.
At start up, the low fan will automatically run for three minutes to cycle room air.
If cooling or heating is required, it may become active after the first 30 seconds of fan run time

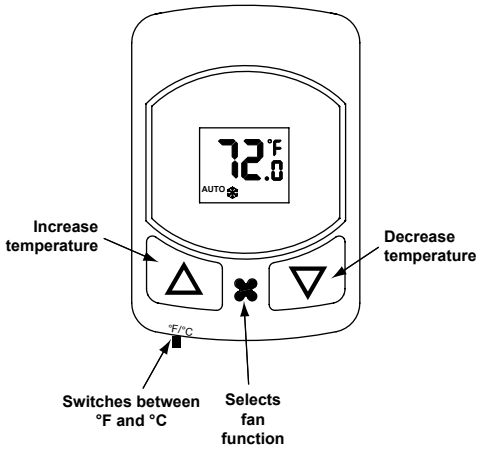
User Note: The top of this unit will become warm to the touch. This is a normal operation. Internal heating is employed to continuously convect air upward through the thermostat, thereby improving room air temperature measurement. Direct conflict with a downward ceiling fan or system fan air flow may result in false temperature reading. Locate thermostat to avoid interference.







Fan Coil Note:
If the mechanical system has only two fan speeds -
Green - low fan
Blue - high fan
Violet - not used



Installation Notice:
This high performance digital thermostat is designed to provide many years of superior comfort control when properly installed and maintained To achieve maximum performance, this device is designed to draw room air into itself continuously. Reasonable care must therefore be taken with regard to air quality at the time of installation as well as during periods of normal use, see operating conditions below.

Operating Conditions:
The electronic mechanisms incorporated within this unit REQUIRE operating conditions similar to other electronic devices intended for INDOOR USE ONLY, such as would be acceptable for TV and similar household appliances. Relative humidity must be less than 95% and the atmosphere must be non-condensing. Air quality must be maintained FREE of heavy dust or debris which may infiltrate the interior of this device. Installation in any space which is unfinished or undergoing repainting or general rehabilitation is also considered product abuse. This device should be removed from service during any local construction activity.

Cleaning:
This device incorporates a high impact polycarbonate enclosure which is easily cleaned with a dry cloth or vacuum brush. Occasional soiling may be cleaned with a soft cloth lightly dampened with water and/or mild cleaning solution. IN NO CASE should this device be directly sprayed with or exposed to free flowing liquids, including water, which could penetrate its interior.

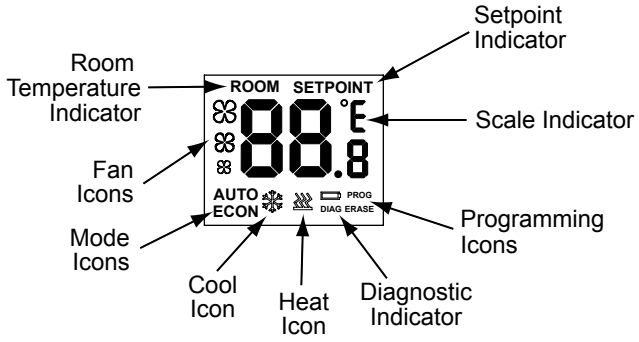
FAILURE TO OBSERVE ANY OF THE ABOVE CONDITIONS OF USE WILL COMPLETELY VOID THE SUPPLIER WARRANTY.

CAUTION

MAKE SURE UNIT IS PROPERLY CONNECTED. DAMAGE TO THE DIGITAL CONTROL CAN BE CAUSED BY MISWIRING, WHICH WILL VOID THE WARRANTY. FOR SAFETY REASONS ALWAYS USE WIRE NUTS ON ALL WIRE CONNECTIONS!!!

User Note: The top of this unit will become warm to the touch. This is a normal operation. Internal heating is employed to continuously convect air upward through the thermostat, thereby improving room air temperature measurement. Direct conflict with a downward ceiling fan or system fan air flow may result in false temperature reading. Locate thermostat to avoid interference.

BASIC FUNCTIONS



Adjust Temperature Setpoint:
Press up button (▲) to raise the temperature (warmer)
Press down button (▼) to lower the temperature (cooler)

Select Fan Operation:
Press fan button (✖) to select the following fan functions
AUTO - auto on/off with automatic speed change
Small fan icon -continuous LOW speed fan
Medium fan icon (if available) - continuous MEDIUM speed fan
Large fan icon - continuous HIGH speed fan
ECo ECON - maintains room temperature between 60.0°F and 85.0°F or 15.5°C and 29.5°C)
Stp - heating and cooling controls are disabled and the fans are off

Change Scale Units:
Slide the °F/°C switch to the left to display °F
Slide the °F/°C switch to the right to display °C

Cycle Timing: (Anti-short cycle protection)
3 minute (minimum) dwell time in no-call states (both heat and cool).
1 minute (minimum) dwell time in call states (both heat and cool).
Temperature is sampled every 15 seconds.

SYSTEM CHECK:

Check Low Fan Function:
Press the fan button until the fan indicator on the LCD moves to the LOW fan position.
Low speed fan will turn on immediately.

Check Medium Fan Function (if applicable):
Press the fan button until the fan indicator on the LCD moves to the MEDIUM fan position.
Medium speed fan will turn on immediately.

Check High Fan Function:
Press the fan button until the fan indicator on the LCD moves to the HIGH fan position.
High speed fan will turn on immediately.

Check Heating:
Press and hold the up button until the heat symbol appears on the LCD. Within 3 minutes heating will be activated.
Note: Room temperature must be below the Comfort Heating Limit 85.0°F (29.5°C) for heating to become active.

Check Cooling:
Press and hold the down button until the cool symbol appears on the LCD. Within 3 minutes cooling will be activated.
Note: Room temperature must be above the Comfort Cooling Limit 65.0°F (18.5°C) for cooling to become active.

Press “UP” or “DOWN” button to set temperature.

Cooling: Cooling and low fan turn on automatically when temperature rises 2°F above setpoint. Fan will switch to medium speed if temperature continues to rise to 2°F above setpoint. Fan will switch to high speed if temperature continues to rise to 4°F above setpoint. High fan will turn off when temperature changes to 3°F above setpoint. Medium fan will turn off when temperature changes to 1°F above setpoint. Cooling will turn off when temperature drops 0.4°F below setpoint. After first cooling call, cooling and low fan will turn on automatically when temperature rises 0.4°F above setpoint. Cooling will turn off when temperature drops 0.4°F below setpoint.

Heating: Heating and low fan turn on automatically when temperature drops 2°F below setpoint. Fan will switch to medium speed if temperature continues to drop to 2°F below setpoint. Fan will switch to high speed if temperature continues to drop to 4°F below setpoint. High fan will turn off when temperature changes to 3°F below setpoint. Medium fan will turn off when temperature changes to 1°F below setpoint. Heating will turn off when temperature rises 0.4°F above setpoint. After first heating call, heating and low fan will turn on automatically when temperature drops 0.4°F below setpoint. Heating will turn off when temperature rises 0.4°F above setpoint.

Heat Pump: If system is set up to function as a heat pump the reverse valve (yellow with red stripe wire) will engage with the compressor during cooling if the thermostat is set to type ”O”. The reverse valve (yellow with red stripe wire) will engage with the compressor during heating if the thermostat is set to type “B”.
The reverse valve will de-energize 3 minutes after a compressor call.

Automatic Changeover: When thermostat is currently in cooling mode and the temperature drops to 2°F plus the differential below the setpoint, the mode will automatically switch to heating. When thermostat is currently in heating mode and the temperature rises to 2°F plus the differential above the setpoint, the mode will automatically switch to cooling.

Motion Detection: If the thermostat is equipped with an onboard motion detector or is using a remote motion detector use programming parameters Setback Ramping (Sbr) to Economy Heating Limit (EH). See page 3 of programming instructions to set up function and time delays. If using a motion detector with a door switch, see Entry Door Switch (Ed) below. Otherwise see Without Entry Door Switch.

Entry Door Switch (Ed): When the door is opened, the thermostat will go into a temporary occupied mode. If, after a period of time defined by the Open Door Timer (Odt), no motion is detected the thermostat will go into unoccupied mode. If Setback Ramping (Sbr) is disabled, the thermostat will now be controlled by the Economy Cooling Limit (EC) or the Economy Heating Limit (EH). If Setback Ramping (Sbr) is enabled, the thermostat will ramp back to the Economy Cooling Limit (EC) or the Economy Heating Limit (EH). If motion is detected at any time the thermostat will latch into occupied mode and remain there until the door is opened again.

Without Door Switch: If, after a period of time defined by the Ramping Setback Timer (rSt), no motion is detected the thermostat will go into unoccupied mode. If the Setback Ramping (Sbr) is disabled, the thermostat will now be controlled by the Economy Cooling Limit (EC) or the Economy Heating Limit (EH). If Setback Ramping (Sbr) is enabled, the thermostat will ramp back to the Economy Cooling Limit (EC) or the Economy Heating Limit (EH). If motion is detected at any time the thermostat will return to occupied mode.

Trouble Shooting Tests:

All measurements taken with a voltmeter set to read volts AC. One lead of the voltmeter should be on the common (black wire) of the thermostat. The voltmeter should read 24VAC when the other lead is connected to the wire colors stated below.

A. Red (control feed): this wire will have power at all times when power is applied to the thermostat.

B. Orange (load feed): In a two pipe fan coil with aquastat configuration this wire will have power during a heating or cooling call.
In any other configuration this wire will have power at all times when power is applied to the thermostat.

C. White (heat): In a heat pump configuration this wire will have power during an auxiliary heating call.
In a two pipe fan coil with aquastat configuration this wire will have power during a heating call if the aquastat is set to heating.
In any other configuration this wire will have power during a heating call.

D. Yellow (cool/compressor): In a heat pump configuration this wire will have power during a first stage heating or cooling call.
In a two pipe fan coil with aquastat configuration this wire will have power during a cooling call if the aquastat is set to cooling.
In any other configuration this wire will have power during a cooling call.

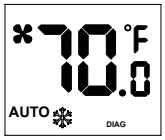
E. Green (low fan): this wire will have power at all times when the thermostat is calling for low fan.

F. Blue (medium fan): In a heat pump configuration this wire will have power at all times when the thermostat is calling for high fan.
In any other configuration this wire will have power when the thermostat is calling for medium fan.

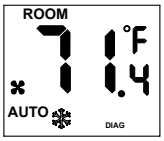
G. Violet (high fan/reverse valve): In a heat pump configuration this wire will be the reverse valve and will have power if the thermostat is set to a type “O” and in a cooling call or if the thermostat is set to a type “B” and in a heating call.
In any other configuration this wire will have power when the thermostat is calling for high fan and set for three speed operation.

Diagnostic Mode:

Press and hold the "up" and "down" buttons together until "DIAG" appears on the display.
Release the buttons.
Diagnostic mode will alternately display setpoint and room temperature every 5 seconds.

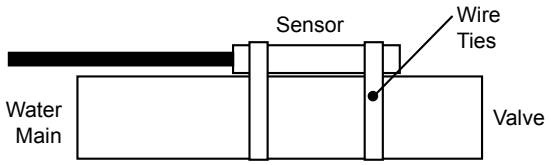


The room temperature is displayed "ROOM".
Both setpoint and room temperature displays will indicate the fan speed activity and "DIAG".

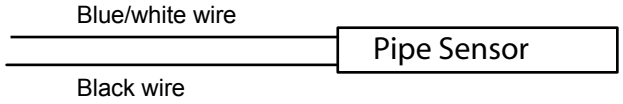


Diagnostic mode can be deactivated by changing the °F/°C slide switch.

Pipe Sensor:
A pipe sensor can be used to determine whether there is hot or cold water in a two pipe system. To activate the pipe sensor, install as shown and then see programming instructions.



Mount the pipe sensor to the water pipe. The best location is to be as close to the main pipe as possible and attached before the water valve connection.



Refer to the programming instructions for selecting the pipe sensor function, temperature changeover settings, output configurations, purge frequency and purge time duration. The thermostat will monitor pipe temperature every 5 seconds. For a valveless systems, select the **2Pn** configuration setting since this will bypass the valve purge functions and provide heating or cooling based on pipe temperature alone.
The **2PS** and **2PE** configurations operate with a valve purge function to prevent incorrect temperature readings from static or standing water in the pipe. The valve purge operates on a programmed interval (purge frequency) for a programed duration (purge time duration) in the event of low activity over an extended period of time.
If the heat or cool call has lasted for more than three minutes, the pipe temperature heat or cool mode is rechecked to verify proper operating mode.

Contains FCC ID: SZV-STM300U
Contains IC: 5713A-STM300U
The enclosed device complies with Part 15 of the FCC Rules.
Operation is subject to the following two conditions: (i.) this device may not cause harmful interference and (ii.) this device must accept interference received, including interference that may cause undesired operation.

Verve LS & PSG Controls, Inc.
LIMITED WARRANTY POLICY

PSG Controls, Inc. (Hereinafter referred to as "PSG") warrants the following:
Only cataloged products sold to distributors are warranted to the original purchaser, to conform with specifications furnished or approved by PSG, and to be free from defects in material and workmanship, for a period of one (1) year from the date of purchase, unless specified in writing for a different period.
Any PSG product that proves defective within the above described warranty period will be repaired or replaced (at PSG's option) free of any charge if returned to the PSG factory at 1225 Tunnel Road, Perkasie, PA. 18944 with transportation charges prepaid. Prior to returning this product to PSG, the purchaser shall give PSG notice in writing stating how this product fails to fulfill this warranty. No product shall be accepted for repair or replacement without a required written notice and without prior written authorization and shipping instructions having been received by the purchaser from PSG. Only PSG's factory is authorized to perform services under this warranty.
This warranty does not extend to any product that has been subjected to misuse, abuse, neglect, accidents, alterations, improper installation or use in violation of the printed instructions furnished by PSG. This warranty neither applies to batteries nor deterioration of, nor damage to the product caused by the use of faulty batteries. Final determination as to whether any product is actually defective rests solely with PSG.
This warranty is expressly in lieu of all other agreements and warranties, expressed, implied, or statutory and PSG has no other obligations or liabilities in connection with this product. In no event shall PSG's obligation or liability hereunder exceed the purchase price of this product. PSG SHALL NOT IN ANY EVENT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES. This warranty gives you specific legal rights, and you also have other rights which vary from state to state. Some states do not allow the exclusion or limitation of incidental or consequential damages, or implied warranties, so the above limitations or exclusion may not apply to you.

Toll free technical assistance is available
via our technical hotline: 1-800-523-2558
Mon-Fri, 8:00 A.M. to 4:30 P.M. Eastern Standard Time

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