

Installation, Operation and Maintenance Manual

Smart Heat Pump Expansion 291EXP



⚠ WARNING



Please read carefully before proceeding with installation. Your failure to follow any attached instructions or operating parameters may lead to the product's failure.

THINK SAFETY FIRST

Keep this Manual for future reference.

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Important Safety Information

WARNING

It is your responsibility to ensure that this control is safely installed according to all applicable codes and standards. tekmar® is not responsible for damages resulting from improper installation and/or maintenance.

To avoid serious personal injury and damage to the equipment:



- Read Manual and all product labels BEFORE using the equipment. Do not use unless you know the safe and proper operation of this equipment.
- Keep this Manual available for easy access by all users.
- Replacement Manuals are available at tekmarControls.com



This is a safety-alert symbol. The safety alert symbol is shown alone or used with a signal word (DANGER, WARNING, or CAUTION), a pictorial and/or a safety message to identify hazards.

When you see this symbol alone or with a signal word on your equipment or in this Manual, be alert to the potential for death or serious personal injury.



This pictorial alerts you to electricity, electrocution, and shock hazards.



Double insulated.

WARNING

This symbol identifies hazards which, if not avoided, could result in death or serious injury.

CAUTION

This symbol identifies hazards which, if not avoided, could result in minor or moderate injury.

NOTICE

This symbol identifies practices, actions, or failure to act which could result in property damage or damage to the equipment.

WARNING

- It is the installer's responsibility to ensure that this control is safely installed according to all applicable codes and standards.
- Improper installation and operation of this control could result in damage to the equipment and possibly even personal injury or death.
- This control is not intended for use as a primary limit control. Other controls that are intended and certified as safety limits must be placed into the control circuit.

NOTICE

Do not attempt to service the control. There are no user serviceable parts inside the control. Attempting to do so voids warranty.

Radio Frequency Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This device complies with part 15 of the FCC Rules and with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The antenna used for this radio must be properly installed and maintained and must provide a separation distance of at least 7.9 inches (20 cm) from all persons.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

(1) l'appareil ne doit pas produire de brouillage, et

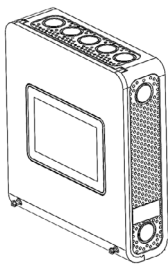
(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Installation

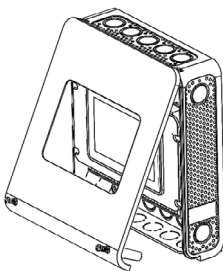
Installation Location

When choosing the location for the control, consider the following:

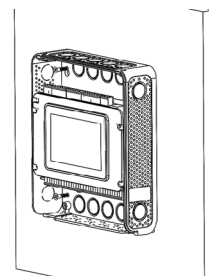
- Keep dry. Avoid potential leakage onto the control.
RH $\leq$ 90% to 104°F (40°C).
Non-condensing environment.
- Do not expose to operating temperatures beyond 32-104°F (0-40°C)
- Provide adequate ventilation.
- Keep away from equipment, appliances or other sources of electrical interference.
- Provide easy access for wiring, viewing, and adjusting the display screen.
- Mount approximately 5 ft. (1.5 m) off the finished floor.
- Locate the control near pumps and/or zone valves if possible.
- Provide a solid backing to mount the enclosure to. For example: plywood, studs, etc
- Use the conduit knockouts provided on the upper, lower, back and sides of the enclosure.



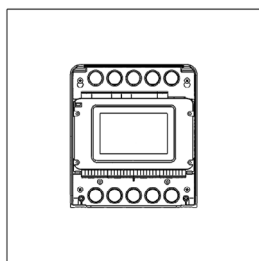
Use a Phillips screwdriver to loosen the two screws on the cover.



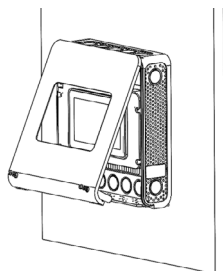
Pull the front cover towards you. The top of the cover will pivot on a hinge. Remove the cover by releasing the pivot hooks on the underside of the control.



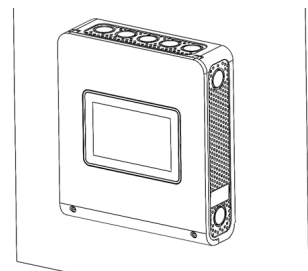
Mount the enclosure to a wall using #6 wood screws in the four mounting holes. Use screw anchors if drilling into masonry.



Use the 24 knock-outs to install connecting conduits and cabling to the control.



To install the cover, hook the top of the cover to the enclosure, then pivot the bottom to shut.



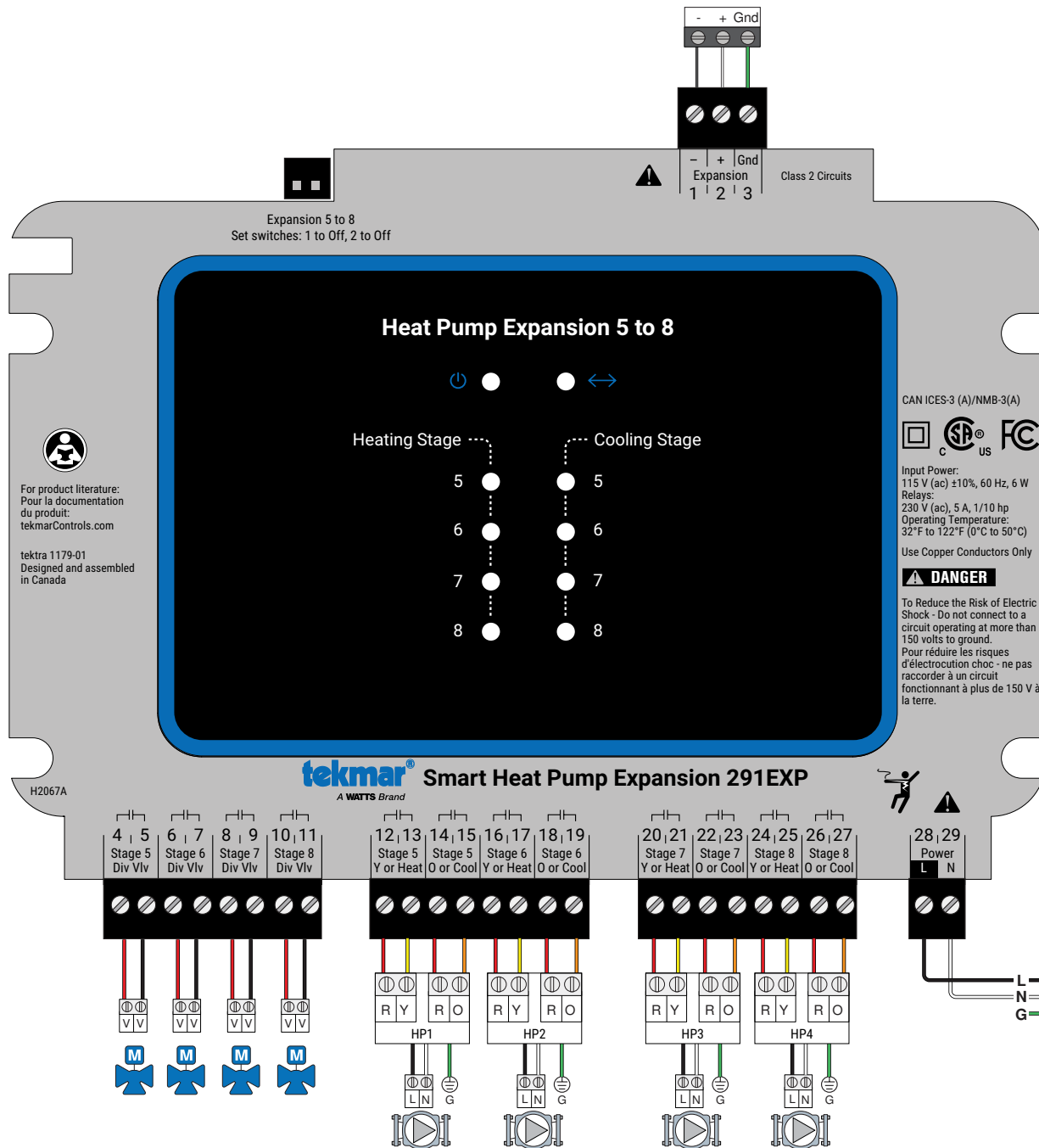
Use a Phillips screwdriver to fasten the two bottom screws.

Wiring Schematic

This section provides a wiring schematic for the control.

⚠ WARNING

- Before wiring, ensure all power is turned off and take all necessary precautions.
- Sensor wiring may be extended to a total length of 500 feet (152 m) using 18 AWG solid conductor wire.
- Strip all wiring to a length of $\frac{3}{8}$ in. or 10 mm for all terminals.
- A circuit breaker or power disconnect that provides power to the control should be located nearby and clearly labeled.
- Refer to the current and voltage ratings at the back of this brochure before connecting devices to this control.
- Only qualified personnel should install or service the control.



Wiring Instructions

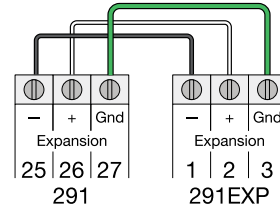
This section explains how to wire individual devices to the Smart Heat Pump Expansion 291EXP.

Expansion Modules (Terminals 1, 2, 3)

The Smart Heat Pump Control 291 operates 4 on/off Heat Pumps and is expandable in groups of 4 up to a maximum of 16 using the Smart Heat Pump Expansion 291EXP.

The 291 connects to the expansion through a wired three-wire connection. The maximum bus cable length is 100 feet (30 m) using 18 AWG solid conductor cable.

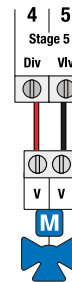
- Connect terminal 25 (-) of the 291 to the expansion terminal 1 (-).
- Connect terminal 26 (+) of the 291 to the expansion terminal 2 (+).
- Connect terminal 27 (Gnd) of the 291 to the expansion terminal 3 (Gnd).



Diverting Valves (Terminals 4 to 11)

A 4-pipe system utilizes diverting valves to direct the flow of water from the Heat Pump to either the Hot or Cold Tanks. There is 1 Diverting Valve output for each Heat Pump. The Diverting Valve can be a dry contact or up to 24 V (ac).

- Connect the Diverting Valve terminals 4 and 5, 6 and 7, 8 and 9, 10 and 11 to the corresponding diverting valve.



Heat Pumps (Terminals 12 to 27)

The control supports support heat pumps with a compressor enable (Y terminal) and reversing valve (O or B terminal), or air source heat pumps with a heat and cool enable. Please consult your heat pump manual to determine its requirements. The contacts are compatible with heat pump inputs that are rated up to 230 V(ac), 5 A.

For 2-stage heat pumps, the second stage must follow the first stage. Example: Stage 5 and Stage 6.

Compressor and Reversing Valve

Stage 5

- Connect heat pump 5 compressor run to the Stage 5 Y terminals 12 and 13.
- Connect heat pump 5 reversing valve to the Stage 5 O terminals 14 and 15.

Stage 6

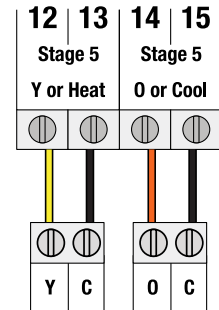
- Connect heat pump 6 compressor run to the Stage 6 Y terminals 16 and 17.
- Connect heat pump 6 reversing valve to the Stage 6 O terminals 18 and 19.

Stage 7

- Connect heat pump 7 compressor run to the Stage 7 Y terminals 20 and 21.
- Connect heat pump 7 reversing valve to the Stage 7 O terminals 22 and 23.

Stage 8

- Connect heat pump 8 compressor run to the Stage 8 Y terminals 24 and 25.
- Connect heat pump 8 reversing valve to the Stage 8 O terminals 26 and 27.



Heat and Cool

Compressor and Reversing Valve

Stage 5

- Connect heat pump 5 heat to the Stage 5 heat terminals 12 and 13.
- Connect heat pump 5 cool to the Stage 5 cool terminals 14 and 15.

Stage 6

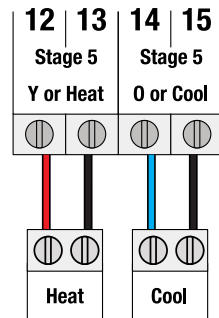
- Connect heat pump 6 heat to the Stage 6 heat terminals 16 and 17.
- Connect heat pump 6 cool to the Stage 6 cool terminals 18 and 19.

Stage 7

- Connect heat pump 7 heat to the Stage 7 heat terminals 20 and 21.
- Connect heat pump 7 cool to the Stage 7 cool terminals 22 and 23.

Stage 8

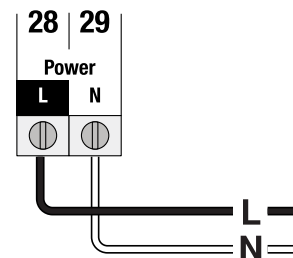
- Connect heat pump 8 heat to the Stage 8 heat terminals 24 and 25.
- Connect heat pump 8 cool to the Stage 8 cool terminals 26 and 27.



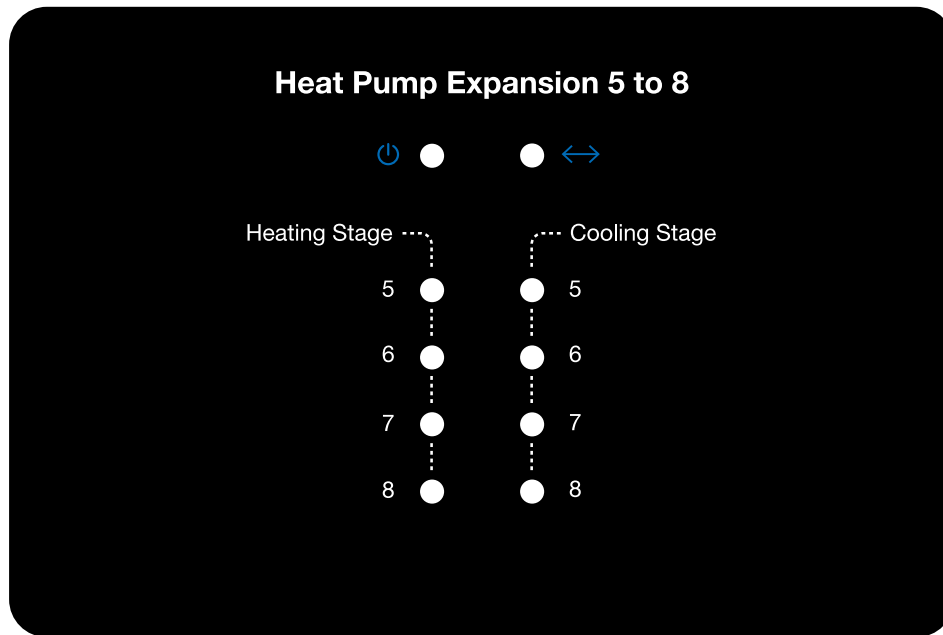
Input Power (Terminals 28, 29)

Provide a 15 Amp circuit for the input power.

- Connect the 115 V (ac) line wire (L) to terminal 28.
- Connect the neutral wire (N) to terminal 29.



User Interface

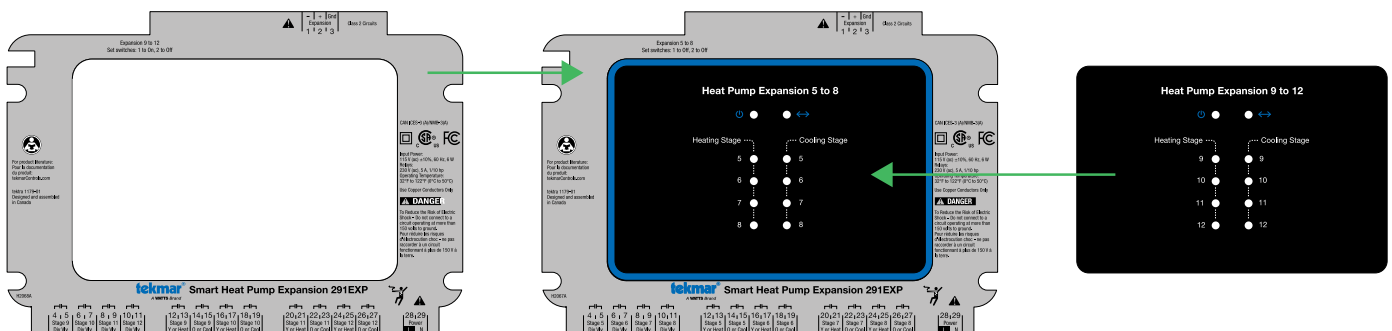


Status Icons

	POWER LED is on when powered.		COMMUNICATION LED is on when communicating to 291.
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Labels for Heat Pumps 9 to 12 or 13 to 16

The 291EXP is assembled from the factory with labels to operate heat pumps 5 through 8. Included in the packaging are labels for heat pumps 9 to 12 and another set for heat pumps 13 to 16. If operating one of these heat pump groups, locate the correct label, peel the label from the backing, and using the plastic oval shape as a guide, apply the label on top of the existing label.



Sequence of Operation

DIP Switches

Two DIP switches are located on the top left side of the control. The DIP switch positions determine the heat pump groups that the Smart Heat Pump Expansion 291EXP operates.

Call customer service if you need assistance with technical details.

Heat Pumps	DIP Switch 1	DIP Switch 2
5 to 8	Off	Off
9 to 12	On	Off
13 to 16	Off	On

Power On LED

The power LED operates as follows.

LED	Operation
On	Power applied and control is operating correctly
Off	No power or the control is faulty

Communication LED

When powered on, the Smart Heat Pump Expansion 291EXP communicates to the Smart Heat Pump Control 291. The communication LED operates as follows.

LED	Operation
On	Communication with 291
Off	No communication with 291

Heat Pump Output Operation

All Heat Pump relays are normally off. The Smart Heat Pump Expansion 291EXP responds to commands from the 291 to turn on a Heat Pump. The status on the 291EXP display will match the 291 Heat Pump menu.

Output	LED	Operation
Heating Stage 5, 9, 13	On	Heat Pump 5, 9, 13 is in heat mode and the compressor is on.
	Off	Heat Pump 5, 9, 13 is not heating.
Heating Stage 6, 10, 14	On	Heat Pump 6, 10, 14 is in heat mode and the compressor is on.
	Off	Heat Pump 6, 10, 14 is not heating.
Heating Stage 7, 11, 15	On	Heat Pump 7, 11, 15 is in mode heat and the compressor is on.
	Off	Heat Pump 7, 11, 15 is not heating.
Heating Stage 8, 12, 16	On	Heat Pump 8, 12, 13 is in heating mode and the compressor is on.
	Off	Heat Pump 8, 12, 16 is not heating.
Cooling Stage 5, 9, 13	On	Heat pump 5, 9, 13 is in cooling mode and the compressor is on.
	Off	Heat pump 5, 9, 13 is not cooling.
Cooling Stage 6, 10, 14	On	Heat pump 6, 10, 14 is in cooling mode and the compressor is on.
	Off	Heat pump 6, 10, 14 is not cooling.
Cooling Stage 7, 11, 15	On	Heat pump 7, 11, 15 is in cooling mode and the compressor is on.
	Off	Heat pump 7, 11, 15 not cooling.
Cooling Stage 8, 12, 16	On	Heat pump 8, 12, 16 is in cooling mode and the compressor is on.
	Off	Heat pump 8, 12, 16 is not cooling.

Troubleshooting

Symptom	Description
Power LED Off	Using an electrical meter, check that the supply voltage is between 103.5 and 126.5 V (ac). If the supply voltage is correct and the Power LED remains off the control may be faulty.
Communication LED Off	Check that the heat pump expansion on wiring terminals 1, 2, and 3 are connected using 3-conductor 18 AWG LVT wire if connections are less than 100 feet (30 m). Connections exceeding 100 feet (30 m) or installed in high radio-frequency environments should use 3-conductor, 22 AWG shielded-twisted pair. The heat pump expansion wiring is polarity sensitive so it is important to check that the wire color codes are in the correct terminal locations.

Technical Data

Smart Heat Pump Control 291EXP	
Literature	IOM-T-291EXP, ES-T-291EXP
Packaged weight	2.4 lbs (1.10 kg)
Dimensions	9" H x 8" W x 2 1/16" D (229 x 203 x 60 mm)
Enclosure	Blue ABS plastic, NEMA type 1
Approvals	CSA C US, FCC Part 15B, CAN ICES-3 (B)/NMB-3(B)
Ambient conditions	Indoor use only, 32 to 122°F (0 to 50°C), < 90% RH non-condensing, Installation Category II, Pollution Degree 2
Power supply	115 V (ac) ±10%, 60 Hz, 6 W
Staging Relays	230 V (ac), 5 A, 1/10 hp
Calls	24 V (ac) or Short
Warranty	Limited 3 Year

Limited Warranty and Product Return Procedure

Limited Warranty *The liability of tekmar under this warranty is limited. The Purchaser, by taking receipt of any tekmar product ("Product"), acknowledges the terms of the Limited Warranty in effect at the time of such Product sale & acknowledges that it has read & understands same.*

The tekmar Limited Warranty to the Purchaser on the Products sold hereunder is a manufacturer's pass-through warranty which the Purchaser is authorized to pass through to its customers. Under the Limited Warranty, each tekmar Product is warranted against defects in workmanship & materials if the Product is installed & used in compliance with tekmar's instructions, ordinary wear & tear excepted. The pass-through warranty period is for a period of twenty-four (24) months from the production date if the Product is not installed during that period, or twelve (12) months from the documented date of installation if installed within twenty-four (24) months from the production date.

The liability of tekmar under the Limited Warranty shall be limited to, at tekmar's sole discretion: the cost of parts & labor provided by tekmar to repair defects in materials &/or workmanship of the defective product; or to the exchange of the defective product for a warranty replacement product; or to the granting of credit limited to the original cost of the defective product, & such repair, exchange or credit shall be the sole remedy available from tekmar, &, without limiting the foregoing in any way, tekmar is not responsible, in contract, tort or strict product liability, for any other losses, costs, expenses, inconveniences, or damages, whether direct, indirect, special, secondary, incidental or consequential, arising from ownership or use of the product, or from defects in workmanship or materials, including any liability for fundamental breach of contract.

The pass-through Limited Warranty applies only to those defective Products returned to tekmar during the warranty period. This Limited Warranty does not cover the cost of the parts or labor to remove or transport the defective Product, or to reinstall the repaired or replacement Product, all such costs & expenses being subject to Purchaser's agreement & warranty with its customers.

Any representations or warranties about the Products made by Purchaser to its customers which are different from or in excess of the tekmar Limited Warranty are the Purchaser's sole responsibility & obligation. Purchaser shall indemnify & hold tekmar harmless from & against any & all claims, liabilities & damages of any kind or nature which arise out of or are related to any such representations or warranties by Purchaser to its customers.

The pass-through Limited Warranty does not apply if the returned Product has been damaged by negligence by persons other than tekmar, accident, fire, Act of God, abuse or misuse; or has been damaged by modifications, alterations or attachments made subsequent to purchase which have not been authorized by tekmar; or if the Product was not installed in compliance with tekmar's instructions &/or the local codes & ordinances; or if due to defective installation of the Product; or if the Product was not used in compliance with tekmar's instructions.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, WHICH THE GOVERNING LAW ALLOWS PARTIES TO CONTRACTUALLY EXCLUDE, INCLUDING, WITHOUT LIMITATION, IMPLIED WARRANTIES OF MERCHANTABILITY & FITNESS FOR A PARTICULAR PURPOSE, DURABILITY OR DESCRIPTION OF THE PRODUCT, ITS NON-INFRINGEMENT OF ANY RELEVANT PATENTS OR TRADEMARKS, & ITS COMPLIANCE WITH OR NON-VIOLATION OF ANY APPLICABLE ENVIRONMENTAL, HEALTH OR SAFETY LEGISLATION; THE TERM OF ANY OTHER WARRANTY NOT HEREBY CONTRACTUALLY EXCLUDED IS LIMITED SUCH THAT IT SHALL NOT EXTEND BEYOND TWENTY-FOUR (24) MONTHS FROM THE PRODUCTION DATE, TO THE EXTENT THAT SUCH LIMITATION IS ALLOWED BY THE GOVERNING LAW.

Product Warranty Return Procedure All Products that are believed to have defects in workmanship or materials must be returned, together with a written description of the defect, to the tekmar Representative assigned to the territory in which such Product is located. If tekmar receives an inquiry from someone other than a tekmar Representative, including an inquiry from Purchaser (if not a tekmar Representative) or Purchaser's customers, regarding a potential warranty claim, tekmar's sole obligation shall be to provide the address & other contact information regarding the appropriate Representative.



A WATTS Brand

