HEATEFLEX® by White Knight

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Immersion Tank Heaters Owner's Manual

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Version 1.0.2 | 24 Nov 2020
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Materials Warranty

Heateflex® warranties the equipment offered to be free from defects in material and workmanship, under normal handling and proper usage, for a period of one year from the date of shipment. All products purchased from manufacturers by Heateflex® will carry that manufacturer's warranty period. This expressed warranty is in lieu of, and excludes all other representations made by advertisements or by agents. There are no implied warranties for the equipment.

Heateflex® agrees to correct any defect in workmanship or material which may develop under normal handling and proper usage during a period of one year from the date of shipment or, by its option, to repair or replace the defective equipment F.O.B. Kamas, UT, USA. Purchaser's remedies shall be limited exclusively to the right of repair or replacement.

Heateflex® shall not be liable for any expenses incurred by the purchaser or any other person by reason of the use, misuse, sale, or fabrication of the equipment regardless of whether the equipment conforms to the specifications.

Items returned for warranty repair must be prepaid and insured for shipment. Warranty claims are processed on the condition that prompt notification of a defect is given within the warranty period. Heateflex® shall have the sole right to determine whether, in fact, a warranty situation exists.

Declaration of Conformity to CE

We, Heateflex®, declare under our sole responsibility that our semiconductor fabrication equipment (models listed below), as delivered, are in conformity with the following European Directives:

Application of Council Directive:	2006/95/EC Low Voltage Directive
	2006/42/EC Machinery Directive
	2004/108/EC Electromagnetic Compatibility (EMC) Directive
Standards to which Conformity is Declared:	IEC 60335-1 ed5.0 Household and similar electrical appliances - Safety - Part 1: General requirements
	IEC 60335-2-35 ed5.0 Household and similar electrical appliances - Safety - Part 2-35: Particular requirements for instantaneous water heaters
	Directive 2006/95/EC Low Voltage Directive, Annex 1
	Directive 2006/42/EC Machinery Directive, Annex 1
	Directive 2004/108/EC Electromagnetic Compatibility (EMC) Directive, Essential Requirements
	EN61000-6-2 Electromagnetic Compatibility (EMC) - Part 6-2: Generic Standards - Immunity for Industrial Environments
	EN61000-6-4 Electromagnetic Compatibility (EMC) - Part 6-4: Generic Standards – Emission Standard for Industrial Environments
Type of Equipment:	Heater
Manufacturer's Trade Name:	Heateflex® Heater
Manufacturer's Model or Type Designation:	All Series Grid, Frame, and Fence Heaters
Year CE Mark was affixed:	2019
Any modification or alteration of the above product(s) unwarranted by Heateflex® will nullify this declaration.	
Authorized representative located within the European Community:	SPS-Europe, B.V. Midden Engweg 41 3882 TS Putten, The Netherlands Phone: +31 341-360-590 Fax: +31 341-360-589
CE	VP of Engineering

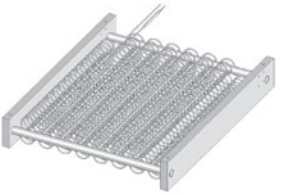
1. Product Information

Having over 2,000 different designs with size, kW rating, and voltage, Heateflex® provides the widest range of immersion heaters to meet your needs. We provide the best fit to your process by offering a variety of grid heaters, frame heaters, and fence heaters.

1.1 Product Models

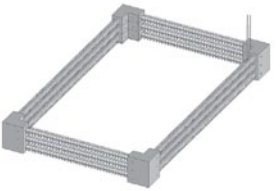
Grid Heaters

A single layer of PFA jacketed heating coils affixed to a PTFE grid. Height is ~3/4 inches.



Frame Heaters

Multiple layers of PFA jacketed heating coils affixed to a PTFE frame to keep the center of a tank empty and to run the heater around the inner side of the tank. Height is adjustable on number of coil layers. Height is ~1-1/2 inches



Fence Heaters

Multiple layers of PFA jacketed heating coils affixed to a PTFE fence to keep the center of a tank empty and to run the heater around the inner side of the tank. Height is adjustable on number of coil layers.

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2. Receiving Inspection Procedure

This shipment was carefully inspected, checked, and properly packaged at our company, and delivered to the carrier in good condition. We fully expect your merchandise to arrive in your hands in good condition.

ALL PRODUCTS ARE SHIPPED F.O.B. FACTORY; THEREFORE, WHEN IT IS DELIVERED TO THE CARRIER, IT BECOMES YOUR PROPERTY. THUS, IT IS IMPORTANT THAT YOU TAKE NOTE OF ANY DAMAGE, WHETHER OBVIOUS OR HIDDEN, AND REPORT SAME TO THE TRANSPORTATION COMPANY WITHIN FIVE (5) DAYS OF RECEIPT OF THE SHIPMENT AT YOUR PREMISE TO AVOID FORFEITING CLAIMS FOR DAMAGE.

2.1 What To Do If Your Shipment Is Damaged:

Leave the items, packing material, and carton "as is". Notify your carrier's local office and ask for immediate inspection of the carton and its content.

After inspection has been made by the carrier, and you have received acknowledgment in writing as to the damage, please contact our Customer Service Department at (626) 599-8566 for return authorization. If writing for return authorization, please indicate your purchase order number.

We will either repair or replace the merchandise depending upon the extent of the damage.

It is your responsibility to follow the above instructions, or the carrier will not honor any claims for damage. If there are any shortages or questions regarding this shipment, please notify us within ten (10) days.

2.2 Handling Guidelines

The possibility of heater damage during installation has prompted Heateflex® to develop handling guidelines on PFA products for the OEM and end user market.

The heater is shipped inside of a sealed plastic bag, wrapped in bubble wrap and placed inside of a box. Do not open the sealed plastic bag until the work surface and tank has been cleaned to provide some protection against physical damage to the element before installation. Sharp objects in the tank are serious risks to the heater. Thus, common equipment such as drills, scrapers, screwdrivers, and metal shavings are all potential hazards to PFA products.

During installation, be cautious to not cut wire coatings to prevent exposing the conductor as it is pulled through holes, fittings, cracks, or gaps that may have sharp edges.

Our product is durable and reliable, but exposure to fabrication process tools greatly increases the possibility of damage. Awareness is your best protection.

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3. Precautions & Safety Warnings

Label	Safety Warning
	High-Voltage Electrical Equipment
	Electric immersion heaters subject personnel to shock hazard if not properly installed and maintained.
	Electric immersion heaters may ignite many plastic tanks such as polypropylene and polyethylene.
	All heaters should be equipped with a thermal over-temperature device and the tank should have a liquid level control to reduce the potential of fire. It is the customer's responsibility to purchase thermal and liquid level control protection.
	Do NOT lift by lead wires

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4. Heater Operating Instructions

Verify heater has the following safeties and are properly interlocked to prevent unsafe heater conditions.

- Hi-Limit
- Liquid Level
- Thermal Cut-Off
- Process Fluid Over Temperature

Non-compliance to the Heater Operating Instructions will void warranty. See safety connections and drawings for recommended wiring and installation. Suggested wiring of these safeties are located in the "Recommended Wiring Schematic". (See Section 5.1)

4.1 Hi-Limit

The Hi-limit safety consists of a thermocouple used to monitor the temperature at the heater and is connected to a Hi-limit controller which signals when the heater exceeds the Hi-limit set point to prevent the heating element from getting to an unsafe condition.

1. Connect the thermocouple bundled with the lead wire to the Hi-limit controller. This thermocouple now becomes the Hi-limit or over-temperature thermocouple.

    1.1. If the supplied heater does not have a Hi-limit or over-temperature thermocouple, we highly recommend that you purchase one on future units. The purpose of this safety is to protect the heater and your equipment from a boil-dry situation. This is a redundant safety backup in case the process over temperature and liquid level safeties fall.

2. Connect the thermocouple that is by itself on the output port of the heater to the process temperature controller. This thermocouple now becomes the process thermocouple.

    2.1. If the supplied heater does not have a process thermocouple, we highly recommend that you purchase one on future units. The purpose of this safety is to protect the heater and your equipment from an over-temperature situation.

3. Set the process temperature controller to desired operating temperature. (Example: Process set point = 60°C.)

4. Temporarily the Hi-limit controller set point at 150°C.

5. When the process temperature reaches about 80% of the process set point (Example: About 48°C), bring down the Hi-limit temperature set point until the control relay trips the heater. (Note the Hi-Limit set point). At this point, add 5°C to 10°C to the Hi-limit temperature controllers. This is the Hi-limit safety set point for the heater.

    5.1. Example: Hi-limit control set point (110°C + 10°C = 120°C)

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4.2 Liquid Level

Your Heateflex® immersion heater should always be under liquid when operating. Operating heater in air or with a crystalline or precipitate solution that may coat the heater or sensors may result in damage to the heater and severely damage your equipment.

Utilizing proper liquid level monitoring will guard against unsafe dry run conditions. Remember to set the liquid level monitoring so that the heater is adequately submerged.

4.3 Thermal Cut-Off

A mechanical one-shot sensor which opens when process fluid exceeds set temperature.

The thermal cut-off rating is dependent on the user's process fluid and must be determined by the user at time of order.

Available Thermal Cut-Off Sensor Temperatures		
72°C	109°C	167°C
77°C	117°C	184°C
84°C	121°C	192°C
93°C	128°C	216°C
98°C	141°C	228°C
104°C	152°C	240°C

4.4 Process Fluid Over Temperature

The process over temperature set point should be set at 5°C above the process set point.

For questions, please contact Heateflex's customer service department at (626) 599-8566.

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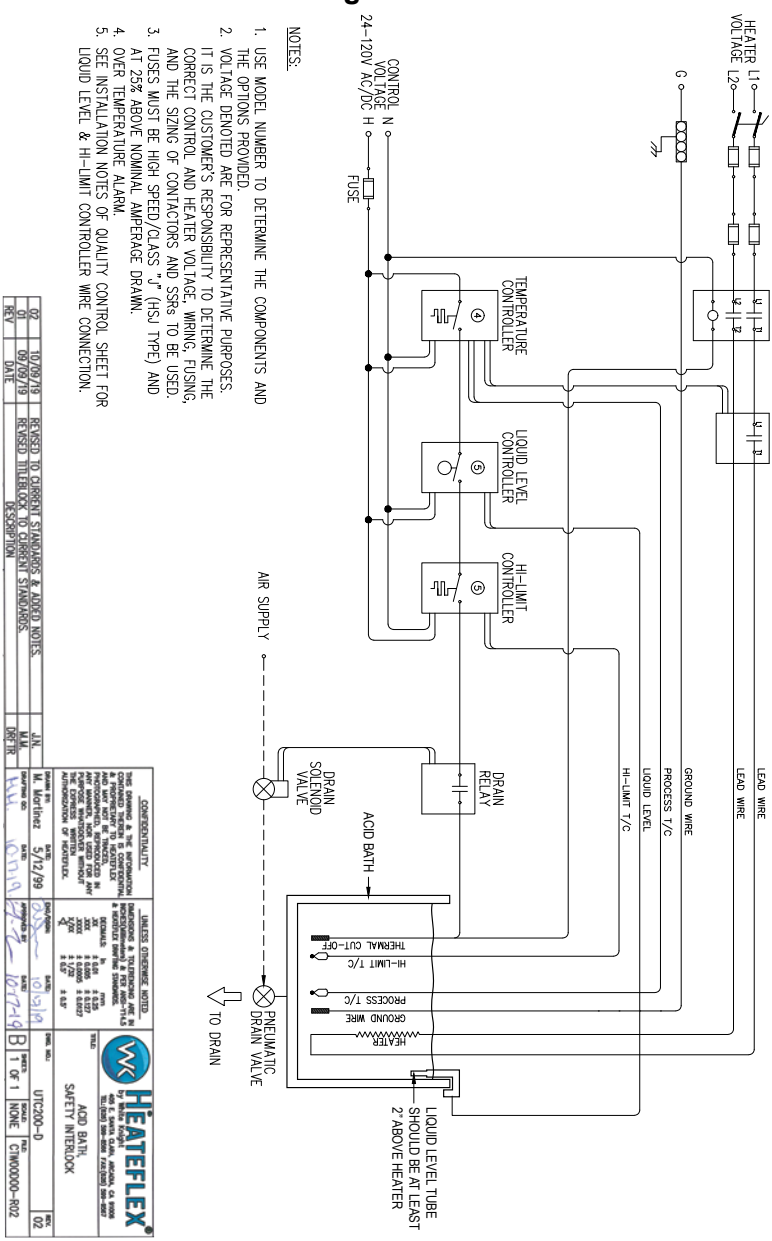
5. Drawings

5.1 Recommended Wiring Schematic



NOTES:

1. USE MODEL NUMBER TO DETERMINE THE COMPONENTS AND THE OPTIONS PROVIDED.
2. VOLTAGE DENOTED ARE FOR REPRESENTATIVE PURPOSES. IT IS THE CUSTOMER'S RESPONSIBILITY TO DETERMINE THE CORRECT CONTROL AND HEATER VOLTAGE, WIRING, FUSING, AND THE SIZING OF CONTACTORS AND SSRs TO BE USED.
3. FUSES MUST BE HIGH SPEED/CLASS "J" (HSJ TYPE) AND AT 25% ABOVE NOMINAL AMPERAGE DRAWN.
4. OVER TEMPERATURE ALARM.
5. SEE INSTALLATION NOTES OF QUALITY CONTROL SHEET FOR LIQUID LEVEL & HI-LIMIT CONTROLLER WIRE CONNECTION.

REV	DATE	DESCRIPTION	DR'N	APP'R
02	10/09/19	REVISED TO CURRENT STANDARDS & ADDED NOTES.	J.N.	
01	09/09/19	REVISED TITLEBLOCK TO CURRENT STANDARDS.	M.M.	

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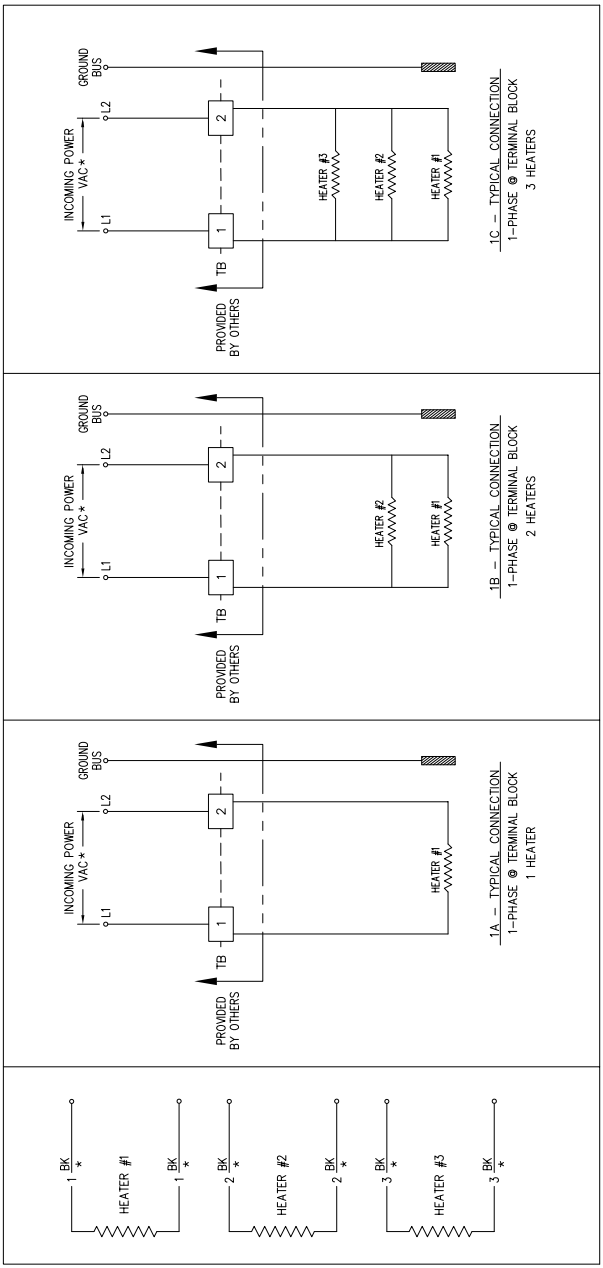
DECIMALS: in .XX ± 0.03, .XXX ± 0.005, mm X.X ± 0.8, X.XX ± 0.13
ANGLES ± 0.5°

DRAWN BY: M. Martinez DATE: 5/12/99
CHECKED BY: DATE:
APPROVED BY: DATE:

HEATEFLEX by WHITE KNIGHT FLUID HANDLING
A GRACO COMPANY
1053 E. ARROW HWY., AZUSA, CA 91702
TEL (626) 599-8566 FAX (626) 334-6967

TITLE: ACID BATH SAFETY INTERLOCK
DWG. NO.: UTC200-D
REV.: 02
SIZE: B
SCALE: 1 OF 1
WEIGHT: NONE
CAD FILE: CWK0000-R02

5.2 Typical Single Phase Wiring



NOTES:
1. ✱ - SEE ENGINEERING SPECIFICATIONS SHEET FOR LEAD WIRE GAUGE & VOLTAGE DETAILS.
2. IT IS THE CUSTOMERS RESPONSIBILITY TO DETERMINE THE CORRECT CONTROL & HEATER VOLTAGE, WIRING, FUSING & THE SIZING OF ALL CONTACTORS USED FOR THIS UNIT.

REV	DATE	DESCRIPTION	DR/CHK
01	09/05/19	REVISED TITLE BLOCK	J.N.

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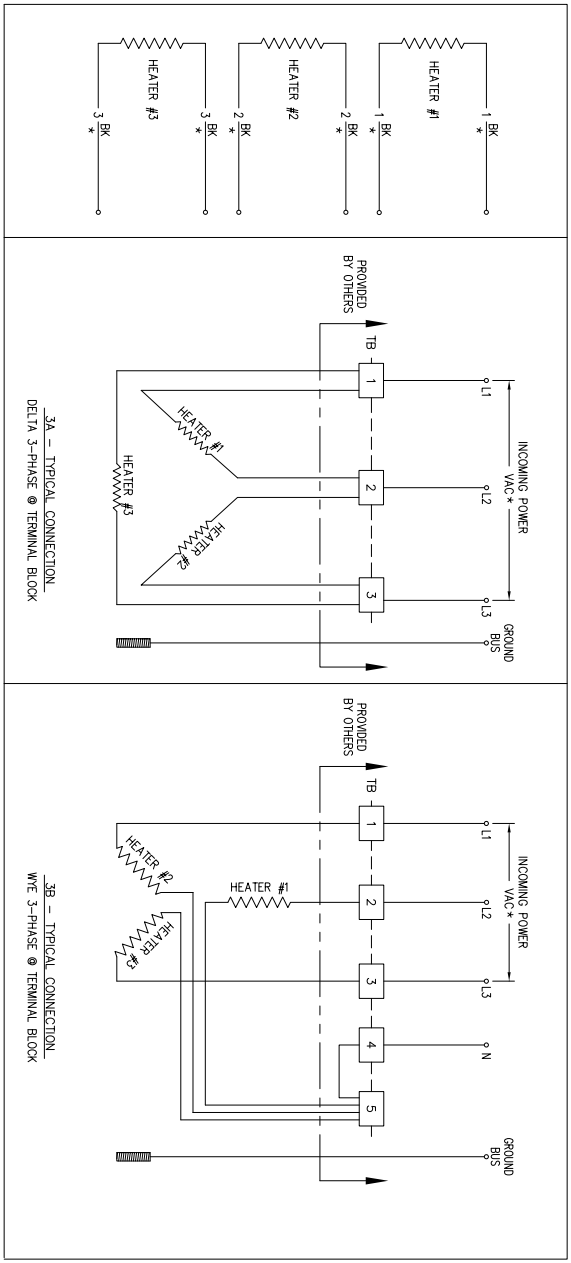
DECIMALS:	in	mm
.XX	± 0.03	± 0.127
.XXX	± 0.005	± 0.127
.XXXX	± 0.0005	± 0.0127
∠	± 1°	± 1°
	± 0.5"	± 0.13"

HEATEFLEX
by White Knight
9 Technology Drive, Irvine, California, CA 92618
TEL: (626) 968-8566 FAX: (626) 359-9567

TITLE: TYPICAL CONNECTION FOR 1-PH HEATER LEADS

DRAWN BY:	DATE:	ENG/DSGN:	DATE:	DWG. NO.:	REV:
M. TOGOO	10/15/07			LH1PH	01
DRAFTING NO.	DATE:	APPROVED BY:	DATE:	SHEET: 1 OF 1	SCALE: NONE
					FILE: LH1PH-R01

5.3 Typical Three Phase Wiring



NOTES:

1. * SEE ENGINEERING SPECIFICATIONS SHEET FOR LEAD WIRE GAUGE & VOLTAGE DETAILS.
2. IT IS THE CUSTOMERS RESPONSIBILITY TO DETERMINE THE CORRECT CONTROL & HEATER VOLTAGE, WIRING, FUSING & THE SIZING OF ALL CONTACTORS USED FOR THIS UNIT.

REV	DATE	DESCRIPTION	DR'TR
01	09/05/19	REVISED TITLE BLOCK	J.N.

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DIMENSIONS ARE IN INCHES & TOLERANCES ARE PER ANSI Y14.5 & HEATEFLEX DRAFTING STANDARDS.

.XX	± 0.01
.XXX	± 0.005
.XXXX	± 0.0005
ANGULAR	± 1/2°
FRACTIONS	± 1/64"

DRAWN BY: M.Tiongco DATE: 10/15/07
APPROVED BY: DATE:
DRAWING NO:

HEATEFLEX
A GRACO COMPANY
400 E. SMITH CLARK, ARIZONA, CA 85606
TEL (626) 599-8566 FAX (626) 599-8567

TITLE: TYPICAL CONNECTION FOR 3-PH HEATER LEADS
INLINE 3-PHASE
SIZE: B | SHEET: 1 OF 1 | SCALE: 1 : 1 | FILE: LHJPH-R01 | REV: 01

6. Quality Certification

ORDER NUMBER: _____

CUSTOMER: _____

PART NUMBER: _____

QUANTITY: _____ T/C TYPE: _____

WATTS: _____ VOLTS: _____

AMPS: _____ OHMS: _____

ASSEMBLED BY: _____

6.1 Quality Inspection

SERIAL NUMBER: _____

PART NUMBER: _____

Seals	Hi-Pot 10kV	Ground Wire		Thermocouple		
		Ta	Pt	Continuity	2 kV	µ Amp

INSPECTED BY: _____

DATE: _____

!!! WARNING !!!

You are receiving a PFA immersion type heater. It should always be under liquid when operating. Operating Heater in air or in a crystalline or precipitate, that may coat the heater, will result in burning-up the Heater and may cause severe damage to your equipment. Non-compliance to this procedure will void warranty. Also, seals are fragile. Please take caution when working with them.

For added protection to help prevent mechanical damage to the heater use protective floor,

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Heateflex Support

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Heateflex® Heater Patent No.: 4,756,781, 4,835,365, 4,875,957, 2685505 (Japan)

Part No. IM1000-1708

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