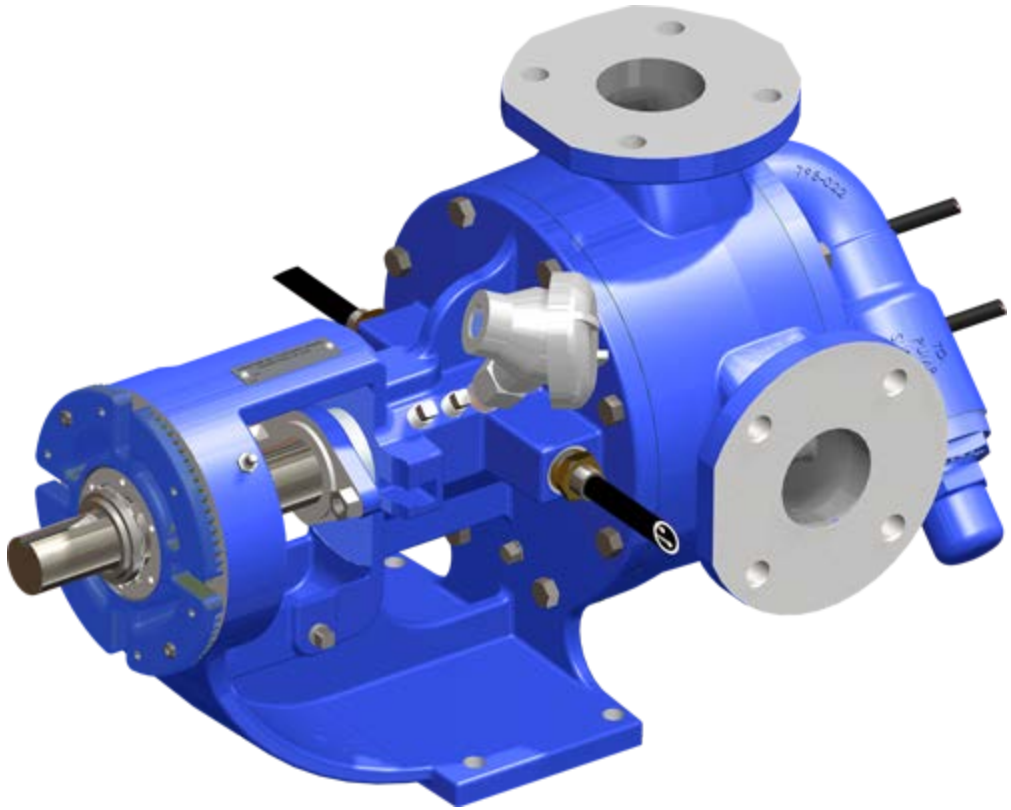
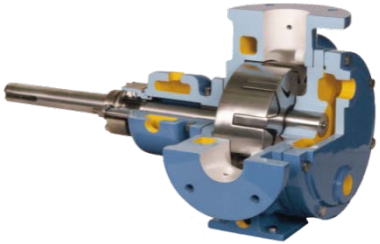
Electrically Heated Pumps for Asphalt / Bitumen



VIKING PUMP

Jacketed Pumps for Asphalt/Bitumen

- Viking offers a complete line of jacketed pumps for heating
- Options include jacketed brackets, heads, and casings

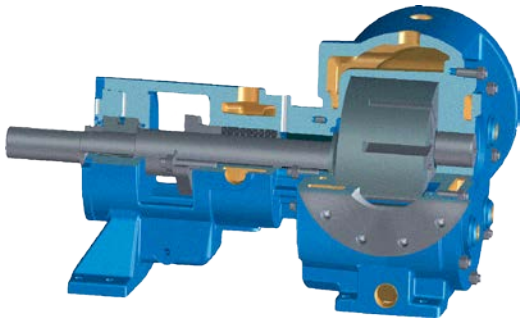


34 Series

224A Series

324A Series

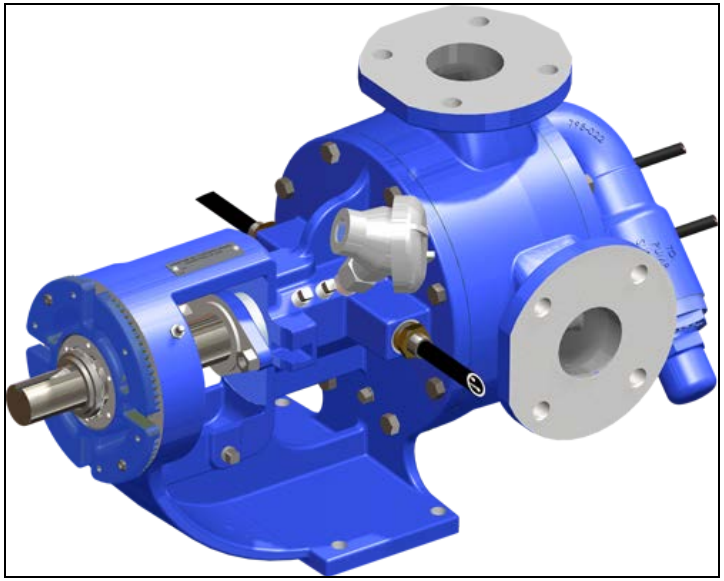
Fully Jacketed Casing



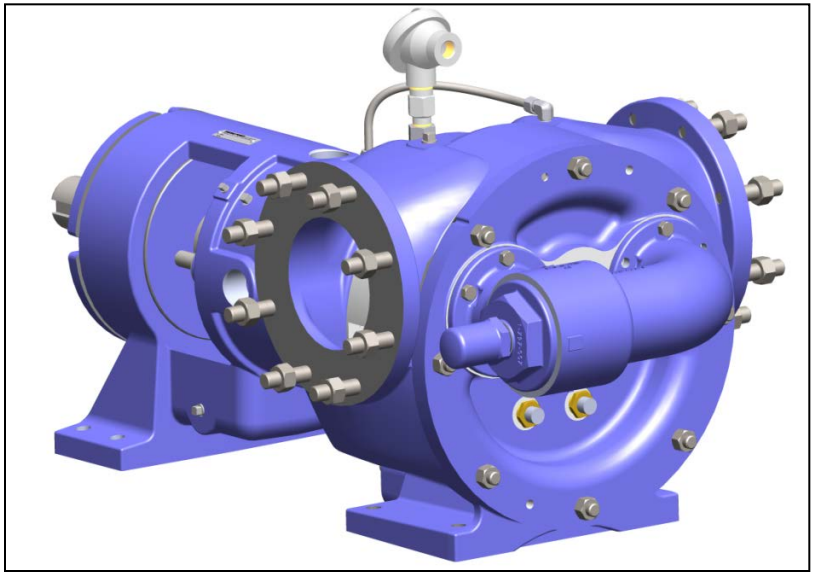
Fully Jacketed Casing

Electrically Heated Pump

Newly added option for asphalt/bitumen applications



LQ124E



N324E

Why Electric Heat?

- Reduce energy consumption
- Remote installation
- Don't have steam available
- Don't have another use for a hot oil system
- Heating for a mobile application (generator required)
- Reduce hazard of leaks (safety)
- Reduce clean-up of hot oil (environmental)
- Heat tracing not meeting requirements (takes to long)

Jacketed Pumps for Asphalt/Bitumen
NEW Electrically Heated Pump
Why Electric Heat?
Model Number
How does it work?
Controller Kits
Specifications
Potential Savings

Model Number

KK 1 2 4 A

- **KK**
  - *H, HL*
  - *K, KK*
  - *L/LQ, LL, LS*
  - *Q, QS*
  - *N*
- **1**
  - *1 = No jacketing*
  - *2 = Jacketed*
  - *3 = Foot mount casing with jacketed bracket*
- **2**
- **4**
  - *4 = Cast Iron*
- **A**
  - *A = Universal Seal*

Jacketed Pumps for Asphalt/Bitumen
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KK 1 2 4 E

- **KK**
  - *H, HL*
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  - *Q, QS*
  - *N*
- **1**
  - *1 = No jacketing*
  - *2 = Jacketed*
  - *3 = Foot mount casing with jacketed bracket*
- **2**
- **4**
  - *4 = Cast Iron*
- **E**
  - *E = Electric Heating*

Jacketed Pumps for Asphalt/Bitumen
NEW Electrically Heated Pump
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Model Number

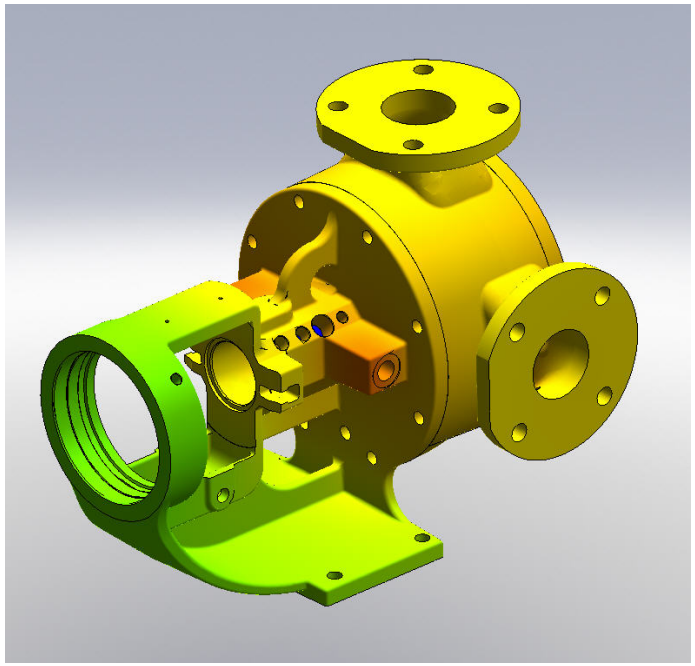
KK 1 2 4 EH

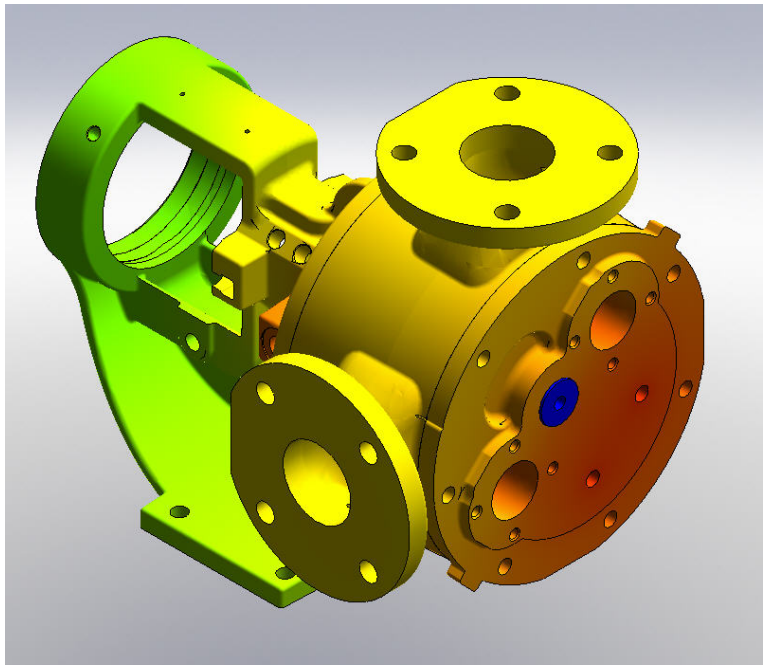
- **KK**
  - *H, HL*
  - *K, KK*
  - *L/LQ, LL, LS*
  - *Q, QS*
  - *N*
- **1**
  - *1 = No jacketing*
  - *2 = Jacketed*
  - *3 = Foot mount casing with jacketed bracket*
- **2**
- **4**
  - *4 = Cast Iron*
- **EH**
  - *E H= Electric Heating & High Flow*

Development

How was the Electrically Heated Pump Developed?

- First, simulated heater performance as illustrated below
- Watt densities, heater location, thermocouple location, etc
- Second, validated with data and actual testing



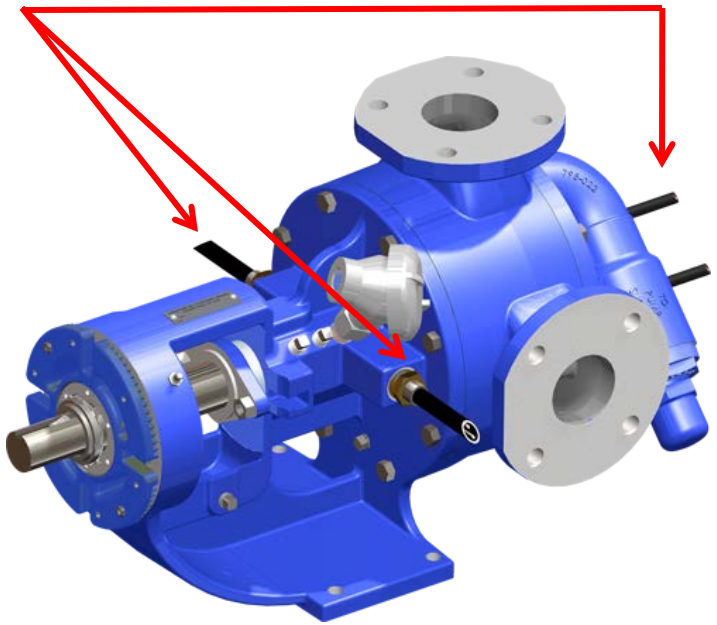


Electrically Heated Pump

How does it work?

- Pump is heated by electric heat cartridges vs. heating jackets
- Non-jacketed Universal Seal pump

  Note: *Bracket on N-size pump is jacketed*
- Heat cartridges are mounted in solid metal areas added to the head and bracket (casing on N-size)



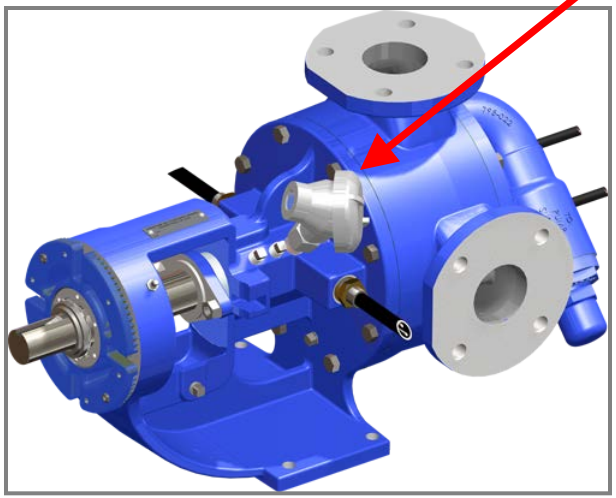
LQ124E

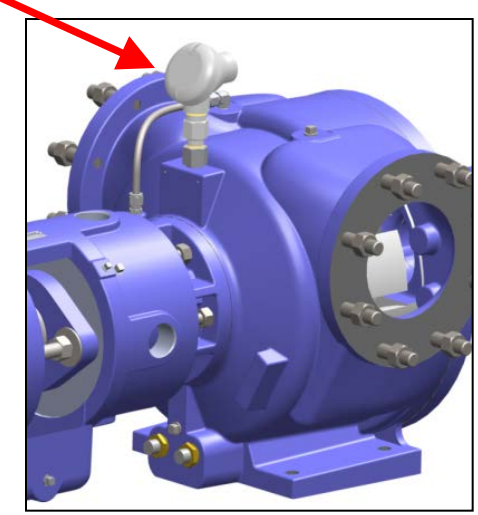
Example of heat cartridge. Will vary by pump size and location (head or bracket/casing).

How does it work?

- A temperature set point is established and monitored with control system
- The electric heat cartridges heat the pump to the desired set point
- Thermocouple, located by the stuffing box, signals when the pump has reached set point
- Once set point reached, the asphalt/bitumen is in a liquid state so the pump can be operated

Thermocouple with thermowell





Jacketed Pumps for Asphalt/Bitumen
NEW Electrically Heated Pump
Why Electric Heat?
Model Number
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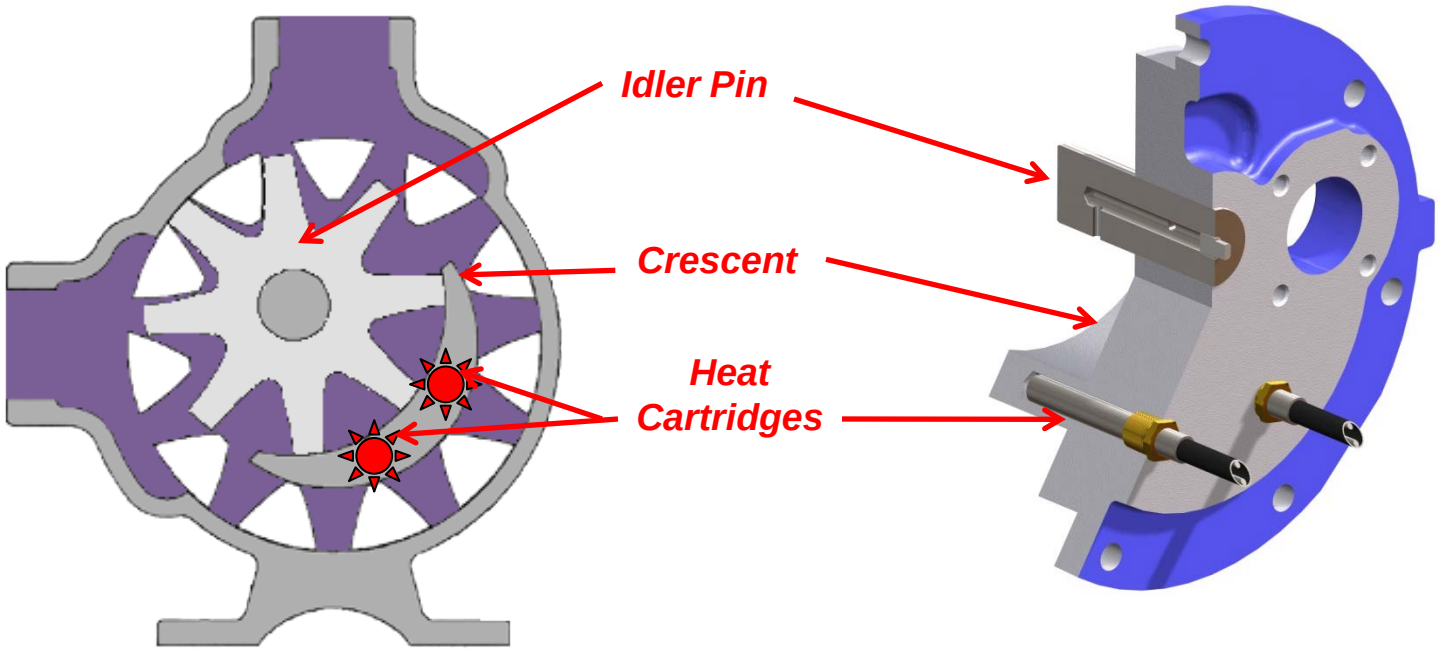
Location of Heat Cartridges

- Viking's patent pending design uses multiple heat cartridges installed into the head and extends into the crescent (H-sizes at crescent base). 1, 2 or 3 cartridges in the head depending on the pump size.
- Crescent is located in middle of pump casing transferring more of the heat directly to the liquid



Jacketed Pumps for Asphalt/Bitumen
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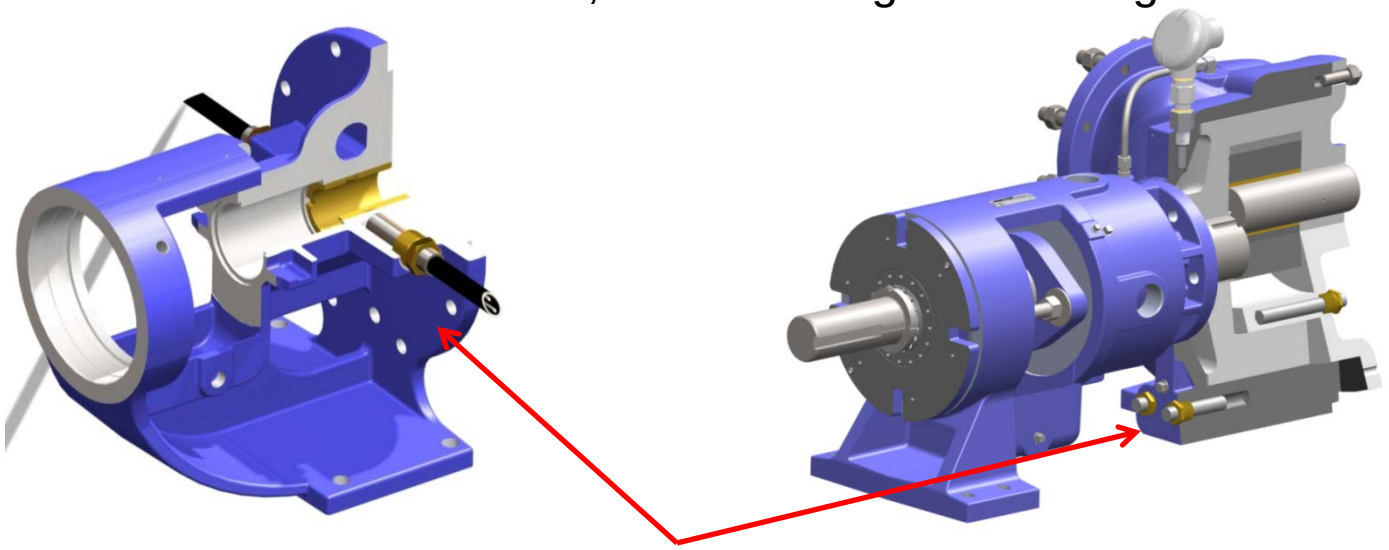
Location of Heat Cartridges

Heaters in the bracket or casing

- Two heat cartridges are located on the bracket flange (H-QS)
  - N-Size are located on the casing
  - Two casings available for the N324E: 180° and 90°
- Heats area behind the rotor, shaft bushing and stuffing box



Heat cartridges

Jacketed Pumps for Asphalt/Bitumen
NEW Electrically Heated Pump
Why Electric Heat?
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Controlling the Temperature

Temperature control can be accomplished by using either:

1. Plant-standard controllers
2. Viking's simple and effective control system

Viking's control system

• Uses a controller & thermocouple with thermowell to control the temperature of the heat cartridges on the pump

• N-size pump requires a separate 40-amp relay (not shown)

Controller

Thermocouple

Thermowell

Jacketed Pumps for Asphalt/Bitumen
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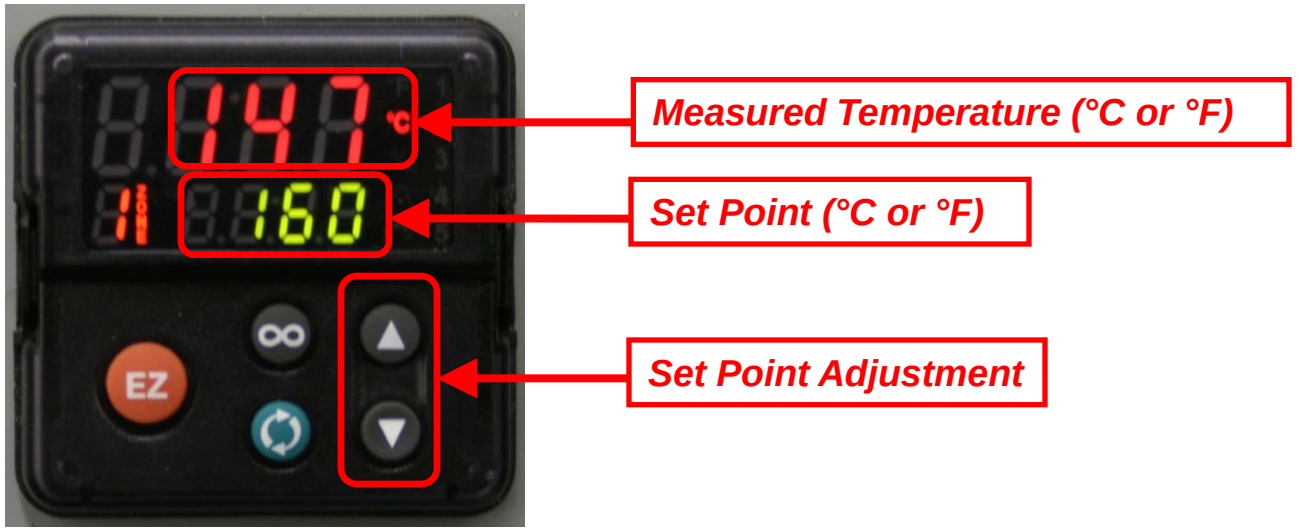
Controller

Controller

- Powers all the heat cartridges on one pump
- Monitors the temperature of the pump with thermocouple
- User-adjustable temperature set point, up to a preset maximum
- Has a relay output available that changes state when set point is reached. Can be wired to alert operator, or prevent a pump from being started until asphalt/bitumen is melted.

Front of controller



Jacketed Pumps for Asphalt/Bitumen
NEW Electrically Heated Pump
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Controller Kits

Controller Kits

- Kit includes the controller, thermocouple and thermowell
  - For N-size pump, separate 40-amp relay included with kit
- Available with preset maximum temperatures (chart below)
- If controller is required from Viking, the maximum temperature ***must*** be specified on order

H-QS Controller Kits	N-Size Controller Kits[1]	Temperature Range
3-E81-200-999-00	3-E81-208-999-00	Up to 150° F
3-E81-201-999-00	3-E81-209-999-00	Up to 250° F
3-E81-202-999-00	3-E81-210-999-00	Up to 350° F
3-E81-203-999-00	3-E81-211-999-00	Up to 450° F
H-QS Controller Kits	**N-Size Controller Kits[1]**	**Temperature Range**
3-E81-204-999-00	3-E81-212-999-00	Up to 65° C
3-E81-205-999-00	3-E81-213-999-00	Up to 120° C
3-E81-206-999-00	3-E81-214-999-00	Up to 175° C
3-E81-207-999-00	3-E81-215-999-00	Up to 230° C

[1]Includes 40-amp relay

Jacketed Pumps for Asphalt/Bitumen
NEW Electrically Heated Pump
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Specifications-Wattage by Pump Size

Pump Model		Head Cartridges	Bracket/Casing Cartridges	Total Watts
H124E	---	1	2	275
HL124E	HL124EH	1	2	275
K124E	K124EH	3	2	690
KK124E	KK124EH	3	2	690
L/LQ124E	L/LQ124EH	2	2	1,200
LL124E	---	2	2	1,250
LS124E	LS124EH	2	2	1,250
Q124E	---	3	2	2,200
QS124E	---	3	2	2,200
N324E	N324EH	2	2*	2,500

**Cartridges are located on the casing*

Standard Clearances in 124E/EH & 324E/EH pumps:

Same as 224A/AH, up to 450°F / 230°C

Jacketed Pumps for Asphalt/Bitumen
NEW Electrically Heated Pump
Why Electric Heat?
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Specifications – Heat Cartridges

Heat Cartridges

- **Power:**
  - 240VAC, 1 phase, 50/60 Hz
- **Materials:**
  - Incoloy® outer sheath
  - PFE Seal for moisture resistance
  - Brass NPT fitting

Leads:

- Two –fiberglass insulation leads rated to 842°F/450°C for temperature resistance
  - H-QS sizes, 36" lead length
  - N-size, 72" lead length
- Leads in flexible stainless steel hose for abrasion resistance
- Two leads extend 12" past end of SS hose
- Normal practice is to wire all cartridges to local junction box at pump, with one cable to controller

Agency Approvals:

- UL, CSA, VDE, CE

Jacketed Pumps for Asphalt/Bitumen
NEW Electrically Heated Pump
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Specifications - Controller

Controller

Enclosure: 1/16 DIN, NEMA 4X / IP66 for panel mount

Mains power: 240 VAC, 1 phase

Heater output: 15A NO-ARC, Form A

Control Algorithm: PID

Set point Achieved Relay Output: Mechanical relay, 5A, Form A

Agency Approvals: UL, CSA, CE, RoHS, W.E.E.E., FM

N-size requires separate 40-amp relay

Wiring diagrams: available in TSM630.4

Jacketed Pumps for Asphalt/Bitumen
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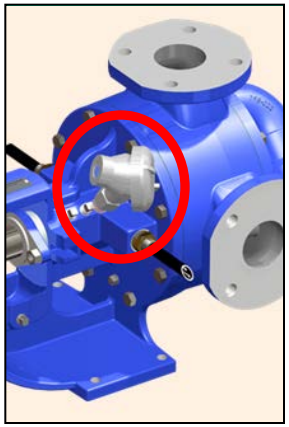
Specifications - Thermocouple

Thermocouple

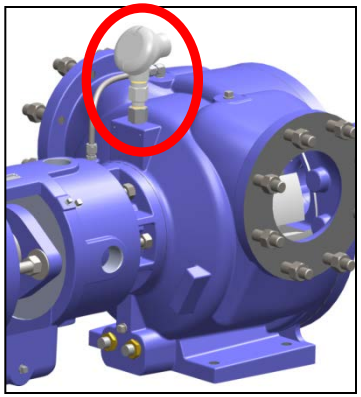
- Type J thermocouple with thermowell
- Weather resistant housing
- ½" MNPT fitting to mount to pump bracket (casing on the N-size)

Thermocouple

Thermowell



LQ124E



N324E

Jacketed Pumps for Asphalt/Bitumen
NEW Electrically Heated Pump
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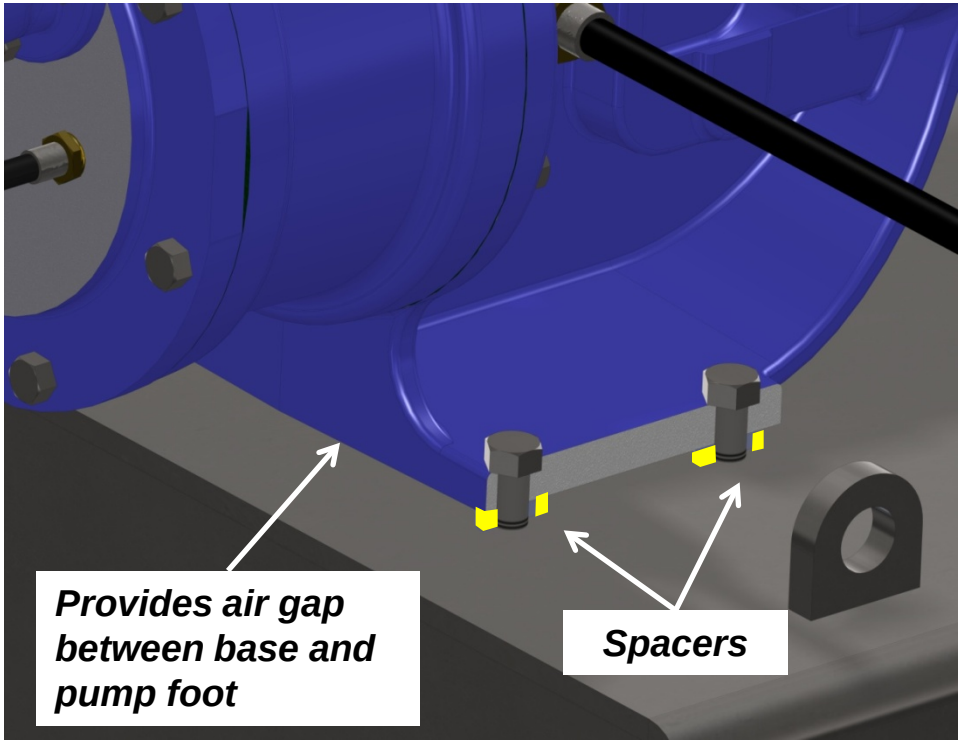
Insulating Pump

- **To maximize heating, it is good practice to:**
  - Insulate pump
  - Place spacers between the pump foot and base



Jacketed Pumps for Asphalt/Bitumen
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Assembled Pump

Photos of LS-Size assembled pump

Jacketed Pumps for Asphalt/Bitumen
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Potential Savings – Remote Location

Possible Advantage of Electric Heat	Benefit
Can install in remote locations without buying dedicated hot oil system or making long pipe runs	Reduced installation costs

Additional Installation Cost - Steam or Hot Oil Heating		Example
Material	Cost/ft of insulated pipe & hangers x length of pipe	$110/foot x 200 ft = **$22,000**
Labor	Labor rate/hour x number of hours *(installation of pipe)*	$100/hour x 40-hours = **$4,000** *(one 40-hour week)*
Hot Oil System *(if applicable)*	Purchase price of new (or used) hot oil system	*Not included for this example*

Additional Installation Cost - Electrically Heated Pump		Example
Material	Cost/ft for SJ cord in conduit x number of feet	$4/foot x 200 ft = **$800**
Labor	Labor rate/hour x number of hours	$100/hour x 8 hours = **$800** *(one 8-hour day)*

Installation Cost Savings	Totals
Additional Cost for Steam or Hot Oil Heating	$22,000 + $4,000 = $26,000
Additional Cost for Electrically Heated Pump	$800 + 800 = $1,600
Potential savings using Electrically Heated Pump	**$24,400**

Jacketed Pumps for Asphalt/Bitumen
NEW Electrically Heated Pump
Why Electric Heat?
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Potential Savings – Hot Oil Spills

Possible Advantage of Electric Heat	Benefit
Doesn't use hot oil to heat pump, so it eliminates the potential of a spill from the pump	Reduces environmental clean up costs

Clean-Up Cost from Spill/Leak of Pump Heated by Hot Oil		Example
Clean-up Cost	Number of hours to clean up spill/leak x labor rate/hour	16 hours x $100/hour = **$1,600**
Fine	Dollar amount of fine	**$5,000**

Does not apply to Electrically Heated Pump		Example
Clean-up Cost	Does not apply	**$0**
Potential Fine	Does not apply	**$0**

Savings from Environmental Clean-Up	Totals
Additional Cost of Hot Oil Heating	$1,600 + 5,000 = $5,600
Additional Cost of Electrically Heated Pump	$0
TOTAL SAVINGS using Electrically Heated Pump	**$5,600**

Jacketed Pumps for Asphalt/Bitumen
NEW Electrically Heated Pump
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Other Possible Advantages

Other Possible Advantages	Benefit
Eliminate heat loss through piping (especially long pipe runs)	Energy Savings
Prevents hazardous leaks of hot oil or steam	Improves safety for employees
Don't need hot oil	No need to change oil and dispose of oil
Typically only turned on to heat up pump; Asphalt/bitumen is typically pumped at higher temperatures than heat cartridges set point	Reduce energy costs
Provides expansion flexibility (if current system lacks capacity to add additional pumps/equipment)	Reduces cost of future expansions

NEW – Electrically Heated Pump

Thank you!!