

AIRTEMP INC.
MECHANICAL CONTRACTORS
11 WALLACE AVE.
S. PORTLAND ME 04106
207-774-2300
207-871-1345 FAX

A COMFORT SYSTEMS USA COMPANY
QUALITY PEOPLE – BUILDING SOLUTIONS

SUBMITTAL

JOB: BOILER REPLACEMENT PROJECT
DATE: 8/9/13
LOCATION: 100 STATE STREET, PORTLAND, MAINE
MECHANICAL CONTRACTOR: AIRTEMP INC.
ENGINEER: COLBY COMPANY ENGINEERING
47A YORK ST.
PORTLAND, MAINE 04101

AIRTEMP JOB NUMBER: 500

AIRTEMP IS PLEASED TO SUBMIT THE FOLLOWING ITEMS FOR APPROVAL:

235216 CONDENSING BOILERS

PLEASE RETURN .PDF OF REVIEWED SUBMITTALS TO US



Submittal Cover Sheet

250 Richmond Street
Raynham, MA 02767

Phone # 508-822-3939

Fax # 508-822-0553

Submitted To:
Colby Co.

Date	Submittal No.
8/12/2013	19380

Job Name / Location	Location	Engineer	P.O. No.	Manufacturer	Sales Rep
100 State St	Portland ME	Colby Co, Emily Pi...	Pending	HT	RLW

Tag	Item	Description	Quantity	U/M
B-1	BM-1036	KN-16 Hydrotherm w/ HeatNet Integrated Control System. Natural Gas, 75# Relief Valve as specified. 1600MBH input max. Fully modulating condensing. Direct Vent 7" Flue. Note : Must be vented with Stainless Steel equivalent to AL29-4C. All venting and condensate neutralization materials supplied by others.	1	
B-2	BM-1044	KN-20 Hydrotherm w/ HeatNet Integrated Control System. Natural Gas, 75# Relief Valve as specified. 1999MBH input max. Fully modulating condensing. Flue Dia. 8". Note : Must be vented with Stainless Steel equivalent to AL29-4C. All venting and condensate materials supplied by others.	1	
Optional	HNSensors	02-4280 Outdoor Air Sensor, 02-4283 Supply Header Sensor w/ 02-4285 Well	1	
	02-4351 NT25	Bacnet or LonWorks ProtoCessor Axiom Industries Condensate Neutralization Tank	1	
	START UP	Start Up Plus Any Applicable Tax	1	

Prepared By:	TBC
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Subject to repricing if not released in 60 days from Submittal date



PRODUCT DATA

COMMERCIAL KN SERIES

Control and Communications Distributed Modulating Boiler Control

HeatNet, Hydrotherm's proprietary integrated boiler management system is the driving force behind Hydrotherm's energy optimization philosophy for its high efficiency equipment and is standard equipment on all Commercial KN Series Air-Fuel coupled products. Designed for precise system control, HeatNet provides repeatability and feedback thru digital communication. The control monitors boiler temperatures and circuit limit inputs, maintains space heating and domestic hot water requirements, supports boiler room components including system/domestic pump, boiler pump, combustion air damper and modulates boiler firing rate to maximize turndown ratios in order to maintain peak efficiency.

Developed and manufactured by Hydrotherm's sister company Mestek Technologies, HeatNet provides an intuitive interface with plug-and-play connections to speed the set-up and diagnostic process for installing contractors. HeatNet is capable of operating Hydrotherm units as a stand-alone boiler, multi-boiler Master/Member network protocol of up to 16 boilers or to a Boiler Management System. The network can incorporate mixing of condensing, non-condensing boilers or base loading an existing boiler based on conditional and priority firing – all of which eliminate the need for an additional third party wall-mounted control platform.

The control configuration "learns" the applications optimal firing rates by using microprocessor electronics to monitor time-average responses based on actual usage to determine the load for the system for optimal energy efficiency. Standard HeatNet controls use a Modbus protocol with optional processor boards for BACnet and LonWorks based building management systems, which eliminates the need for analog control signals. The use of analog control signals is still supported, but a higher level of control precision, repeatability, and feedback is gained with digital communications control. Typical master/member systems using 2, 3 or 4 boiler configurations can see a total turndown ratio of 10, 15 or even 20:1!

Variable control settings for Mod/Max firing rates allow adjustable maximum firing rates (factory pre-set at 70%) enabling all boilers to run at extremely efficient levels until all units in the sequence have fired at which time firing rates can increase above the standard setting to meet system demands. Firing rate is kept as low as possible to take advantage of increased efficiency at lower inputs. Boiler firing rotations can be programmed for first on/first off, first on/last off or "True Rotation" which rotates boiler run-times so that all units run for the same amount of time.

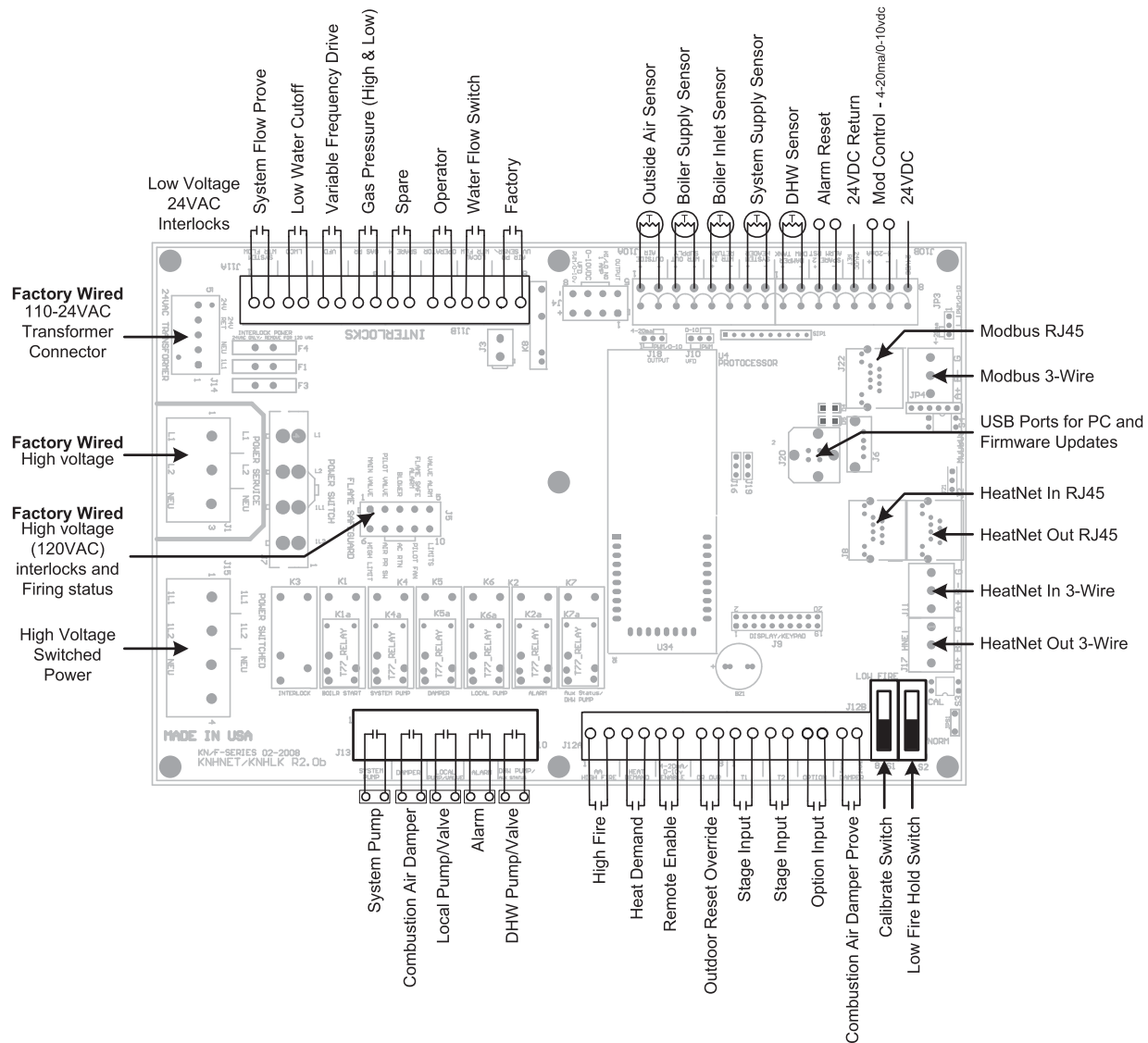
HeatNet's proprietary design allows for seamless flash drive or laptop driven updateable firmware adding continuous value and boiler system control without the need for physical control platform updates that can make some equipment obsolete. Electronics are located in control cabinet through which all internal components and terminal blocks are easily accessed via a hinged, swing open door panel on the front of all units.

CONTROL FEATURES

- A. Boiler to Boiler Communication – HeatNet Protocol for up to 16 Boilers
- B. Modbus Protocol for BMS Interface
- C. BACnet IP/MSTP and LonWorks Protocol (Optional)
- D. Menu Driven Calibration and Setup Menus with Bright (Adj.) 4-Line Vacuum Fluorescent Display
 - Set Point Control
 - Outdoor Reset
 - Night Setback
 - Domestic Hot Water (Priority/Non Priority)
 - Digital/Analog Communication
 - System/Local Pump Control
 - Combustion Air Damper
 - Monitor Min Return Temp – Copper Fin
 - Heat Exchanger Delta T (Limits to Half Fire)
 - Firmware Loading – Flash Drive or USB Cable
 - Fail Safe Mode – Member Boilers
 - First Boiler ON – Venting
 - Min Boiler Off Time
 - Add Boiler Delay Timing
 - Shed Boiler Delay Timing
 - Adaptive Modulation – Prevents Short Cycling
 - Modulate Delay Time (Low Fire Hold)
 - (5) Dedicated Temperature Sensor Inputs for: Outside Air Temp., Supply (Outlet) Temp., Return (Inlet) Temp., Header Temp. and DHW
 - Min/Max VFD – Load Match (low fire); Input Adjustment (Elevation, Direct Vent)
 - Log Entry – Troubleshoot and Diagnostic Tool – Records Major Activity of Boiler Operation
 - Five levels of External Control Inputs: On/Off, Staging, RS485 Digital Comm, BMS (4-20 mA) and HeatNet Heat Demand
 - Priority Levels for Condensing and Non Condensing Boilers in a Common System
 - Base Load Boiler Control



Typical Wiring Diagram



SPECIFICATIONS

Boiler-to-Boiler:

HeatNet™

Control:

Microprocessor based PID modulating control
(NOT a safety limit)

Environment:

-40°F to 140°F, <90% RH
non-condensing

Input Power:

24 VAC, 250 ma

Switched Line:

120 VAC single phase, 240 VAC single phase

Relays:

Stage, Circulator, Alarm 8A
250 VAC

AC Interlocks:

24 VAC – 120 VAC input

Approvals:

CSA Approved as integral part of boiler

USB - 1.0

RS485 Modbus Communication:

Modbus RTU, 19200 baud, 8 bits, Even Parity, 1 Stop Bit

Temperature Sensors:

NTC thermistor, 10K @ 77°F, 335.67K @ -40°F, 185 @ 150°F, +/- 1°F

- Return, Supply and Common Header Sensors (10k) supplied as standard
- Outside Air Sensor (10k) with housing is optional
- DHW Sensor 10K

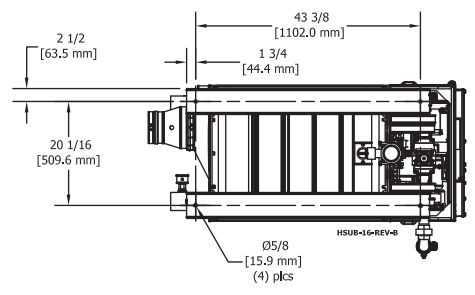
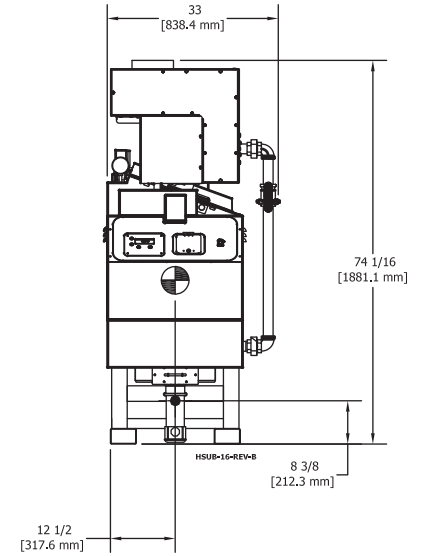
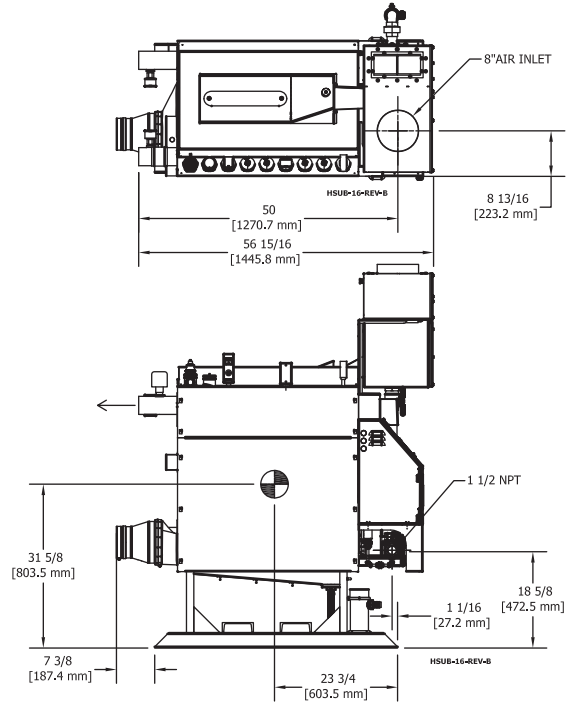
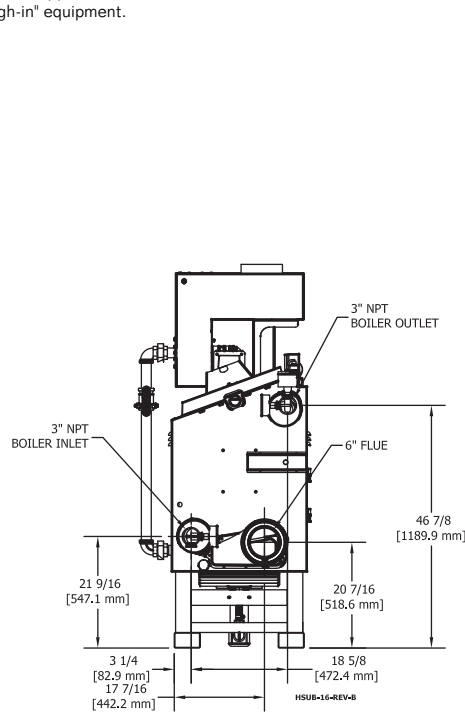
Communications Environment:

-40°F to 140°F, <90% RH
non-condensing

CODE OPTIONS

CSD-1	STANDARD
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NOTE: Dimensions are approximate and should not be used to "rough-in" equipment.



REP FIRM _____
SUBMITTED BY _____
JOB NAME _____
ARCHITECT _____
ENGINEER _____
CONTRACTOR _____
DATE _____

KN-16

Category II or Category IV Appliance
(see Installation and Operation Manual for venting information)

HydroTherm[®]
A Division of Mestek, Inc.
Westfield, MA 01085
(413) 564-5515



A.G.A. CERTIFIED RATINGS & CAPACITIES

Fuel Type	Natural/LP Gas	Boiler FLA	6.5 AMPS
Input BTU/hr.	1600 MBH/ 469 KW	Min. Gas Pressure Required	3" W.C.
Output BTU/hr.	1483 MBH/ 435 KW	Max. Gas Pressure Allowed	14" W.C.
Boiler HP	44.3	Water Volume	22.4 gal.
Electrical Requirements	208/230VAC60hz/1PH (with neutral)	Operating Weight	2360 lbs. / 1070 kg.

BOILER TRIM & CONTROLS

Main Gas Valve	Dungs MBC	Manual Pilot Valve	Honeywell V8046C
Firing Valve	1 1/2" Apollo	Air Switch	Huba Type 605
Ignition Control	Honeywell RM7800	Blower Motor	Ametek
Operating Control	HeatNet™	L.W.C.O.	750P-MT-120
High Limit	Honeywell L4006E	Relief Valve	30, 50, 75 & 100 PSI
Main Ball Valve	1 1/2" Apollo	Pilot Regulator	Maxitrol RV12LT
Pilot Cock	1/4" Conbraco		

TEMPERATURE RISE / PRESSURE DROP (Based on Full Input)

20° F / 11.1° C		40° F / 22.2° C		60° F / 33.3° C		80° F / 44.4° C		100° F / 55.5° C			
Flow Rate	Pressure Drop	Flow Rate	Pressure Drop	Flow Rate	Pressure Drop	Flow Rate	Pressure Drop	Flow Rate	Pressure Drop		
GPM	L/s	Ft	kPa	GPM	L/s	Ft	kPa	GPM	L/s	Ft	kPa
145.1	9.15	1.9	5.59	75	4.73	.51	1.50	50	3.16	.23	.68
		37	2.33	.12	.35	24	1.87	.08	.24		

Flow GPM		Temp. Rise** (°F)		Vent Length (Equiv. Ft.)		Air Inlet Length (Equiv. Ft.)	
Min	Max	Min	Max	Min	Max	Min	Max
24	240	20	100	6	120	0	120

** Min/Max delta t reflects boiler operation at full input. For applications requiring operation above/below these parameters please consult factory.

A.S.M.E.

ASME Sect IV Fire Side Htg Surface	92.64 Sq. Ft. / 8.61 Sq. M.	Design Data	100 PSI & 250° F
ASME Sect IV Water Side Htg Surface	38.72 Sq. Ft. / 3.60 Sq. M.		
CV. GPM (1PSID)	160		

UNBALANCED FLUE LIMITATIONS

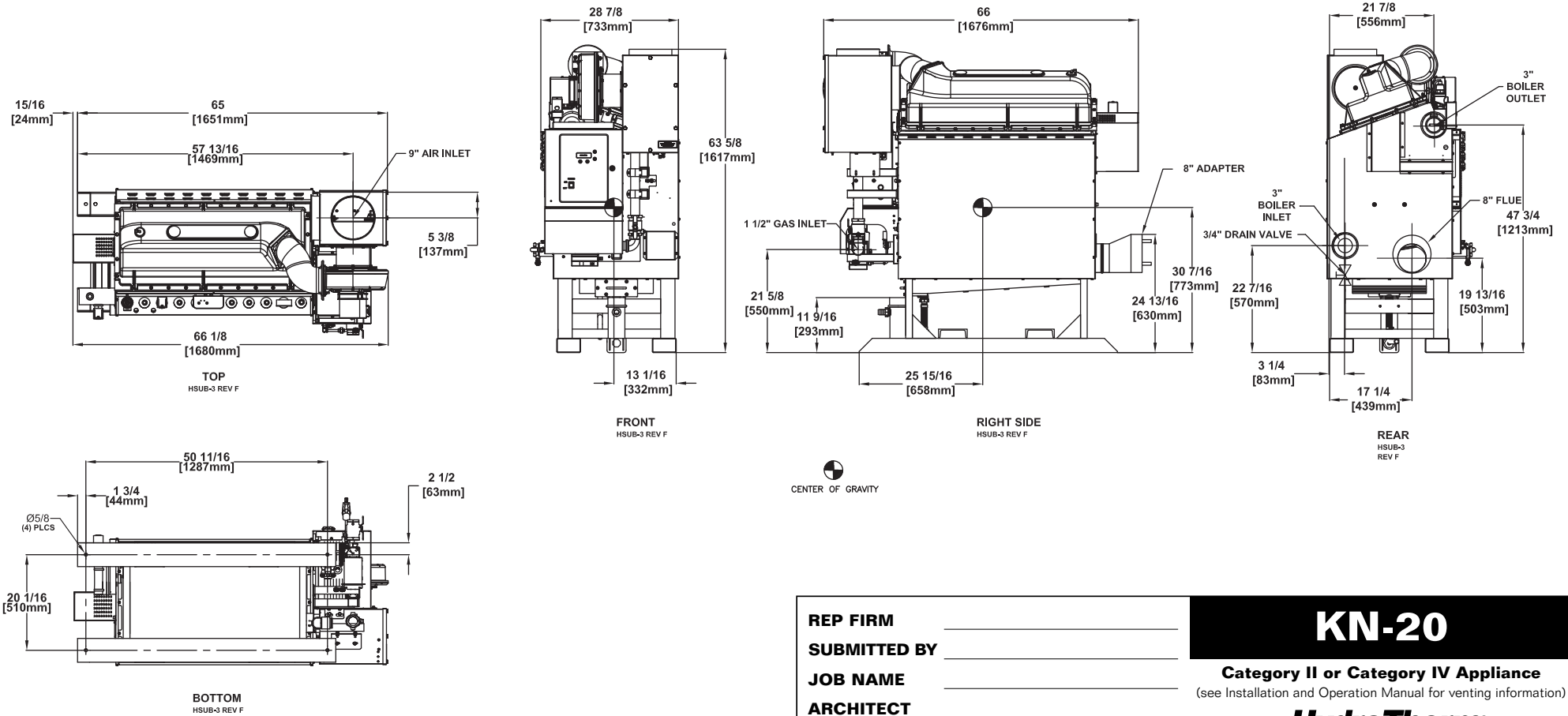
Negative Flue Pressure	-0.2" W.C.
Positive Flue Pressure	0.9" W.C.

KN-16

CODE OPTIONS

CSD-1	STANDARD
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NOTE: Dimensions are approximate and should not be used to "rough-in" equipment.



REP FIRM _____
SUBMITTED BY _____
JOB NAME _____
ARCHITECT _____
ENGINEER _____
CONTRACTOR _____
DATE _____

KN-20

Category II or Category IV Appliance
(see Installation and Operation Manual for venting information)

HydroTherm[®]
A Division of Mestek, Inc.
Westfield, MA 01085
(413) 564-5515



A.G.A. CERTIFIED RATINGS & CAPACITIES

Fuel Type	Natural/LP Gas	Boiler FLA	11 AMPS
Input BTU/hr.	1999 MBH/ 586 KW	Min. Gas Pressure Required	2" W.C.
Output BTU/hr.	1853 MBH/ 543 KW	Max. Gas Pressure Allowed	14" W.C.
Boiler HP	55.4	Water Volume	28 gal.
Electrical Requirements	208/230VAC60hz/1PH (with neutral)	Operating Weight	2714 lbs. / 1232 kg.

BOILER TRIM & CONTROLS

Main Gas Valve	Dungs DMV	Manual Pilot Valve	Honeywell V8046C
Firing Valve	1 1/2" Apollo	Air Switch	Huba Type 605
Ignition Control	Honeywell RM7800	Blower Motor	AC Tech 1 1/2 HP
Operating Control	HeatNet™	L.W.C.O.	750P-MT-120
High Limit	Honeywell L4006E	Relief Valve	30, 50, 75 & 100 PSI
Main Ball Valve	1 1/2" Apollo	Variable Speed Drive	AC TECH 1HP
Pilot Cock	1/4" Conbraco	Pilot Regulator	Maxitrol RV12LT

TEMPERATURE RISE / PRESSURE DROP (Based on Full Input)

20° F / 11.1° C		40° F / 22.2° C		60° F / 33.3° C		80° F / 44.4° C		100° F / 55.5° C			
Flow Rate	Pressure Drop	Flow Rate	Pressure Drop	Flow Rate	Pressure Drop	Flow Rate	Pressure Drop	Flow Rate	Pressure Drop		
GPM	L/s	Ft	kPa	GPM	L/s	Ft	kPa	GPM	L/s	Ft	kPa
185.5	11.71	2.2	6.48	92.7	5.85	.55	1.62	61.8	3.90	.34	.84
		46.4	2.93	.14	.41	30	2.34	.09	.27		

Flow GPM		Temp. Rise** (°F)		Vent Length (Equiv. Ft.)		Air Inlet Length (Equiv. Ft.)	
Min	Max	Min	Max	Min	Max	Min	Max
30	300	20	100	6	80	0	80

** Min/Max delta t reflects boiler operation at full input. For applications requiring operation above/below these parameters please consult factory.

A.S.M.E.

ASME Sect IV Fire Side Htg Surface	115.91 Sq. Ft. / 10.77 Sq. M.	Design Data	100 PSI & 250° F
ASME Sect IV Water Side Htg Surface	48.40 Sq. Ft. / 4.50 Sq. M.		
CV. GPM (1PSID)	190		

UNBALANCED FLUE LIMITATIONS

Negative Flue Pressure	-0.2" W.C.
Positive Flue Pressure	0.25" W.C.

KN-20



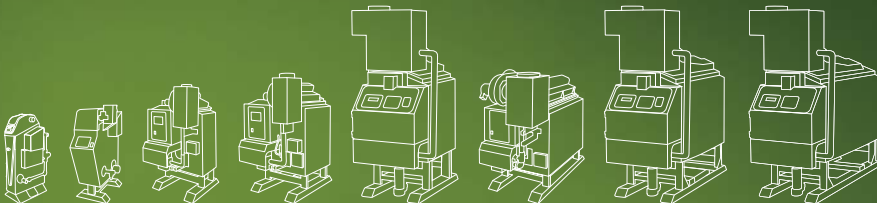
GET MORE

KN-SERIES GAS-FIRED CONDENSING CAST-IRON BOILERS WITH HEATNET INTEGRATED BOILER MANAGEMENT SYSTEM DELIVER ENVIRONMENTALLY FRIENDLY SOLUTIONS FOR ANY SIZE COMMERCIAL CHALLENGE, WITH INDUSTRY-PROVEN DURABILITY, RELIABILITY AND PERFORMANCE.



AND LEAVE LESS

HydroTherm®
KN SERIES



Installing KN-fidence

with Our Complete Line of Gas-Fired High-Efficiency Condensing Cast-Iron Boilers

In today's commercial hydronics market, size does matter—the volume of the public space in a building; the boiler's mechanical room footprint; and the level of emissions a unit releases all have to be considered. So how do architects, engineers, contractors, and building owners get the big-time performance needed to tackle any size commercial application while reducing their impact on the environment?

The KN-Series is purposefully engineered to be big and little where it matters most. Our boilers are specially designed to generate 200,000 – 3,000,000 BTUs and adapt to changes in the operating environment—with minimal moving parts and a small footprint—while retaining high efficiency. The HeatNet Integrated Boiler Control Platform constantly monitors performance, allowing our boilers to operate at up to 99% efficiency with high system turndown. Coupled with low NO_x and CO₂ emissions, as well as significant reduction in energy consumption, the KN-Series' complete line of condensing, cast-iron boilers is an environmentally friendly, cost-effective option for every application.



Tru-Flow™ Fuel/Air Coupling



Greener Way to Go

Fabrication to application, KN-Series boilers are an environmentally friendly option for your light commercial and commercial installations. Our specially designed cast-iron heat exchangers are manufactured utilizing over 90% post-consumer recycled materials and are completely recyclable themselves! Once installed, boilers operate at up to 99% efficiency, while producing low NO_x and CO₂.

- **Completely assembled boilers in total use over 80% post-consumer recycled materials**
- **Plastic components made from 40% post-consumer recycled materials**
- **LEED Certified**
- **92.7% AHRI Certified thermal efficiency on all models with up to 99% maximum at full turndown**

Cast-Iron Revival

Cast-iron brings more to the table than you'd expect. The key to the KN-Series revolutionary design is our high-mass, durable, cast-iron heat exchanger, which holds heat energy longer than traditional materials used in condensing boilers. Its superior longevity and reliability helps increase its cost effectiveness, in terms of installation, maintenance and energy consumption.

- **5 times the wall thickness of stainless steel and aluminum**
- **Accepts 10:1 range of water flows (Variable Volume Systems)**
- **100 PSI maximum working pressure**



Responsive to changing conditions and able to adapt to the unexpected, Tru-Flow™ Fuel/Air Coupling helps keep KN-Series boilers running cleanly and efficiently. This unique control system constantly measures the combustion air and fine-tunes the amount of fuel being released to match, ensuring the proper mixture at all firing rates.

Working in conjunction with the integrated HeatNet boiler management system, Tru-Flow helps match load conditions to boiler output, providing efficiencies of up to 99% with full burner modulation. Tru-Flow constantly regulates the flow of both fuel and air to achieve an optimal one-to-one fuel mixture, and automatically adjusts itself if one of the flows is compromised, ensuring continuous safe and reliable operation.

Made in the USA



From raw materials to the state-of-the-art digital control system, the complete KN-Series product offering is proudly manufactured at our facility in Boyertown, Pennsylvania. Utilizing decades of foundry and manufacturing expertise, KN-Series boilers are cast, machined, wired, and assembled to the tightest tolerances possible, resulting in a finished product that's all American in terms of innovation, reliability, and craftsmanship.



Integrated Boiler Management System

Intelligence Built In

HeatNet, Hydrotherm's proprietary integrated boiler management system, is the driving force behind Hydrotherm's energy optimization philosophy for its high-efficiency equipment. HeatNet is designed for precise system control and is standard on all KN-Series boilers.

Through continuous monitoring of several system characteristics, including boiler temperatures, limit circuit inputs, and overall system demands, HeatNet modulates boiler firing rates to maximize turndown ratios to maintain peak efficiency regardless of the load.

Versatile

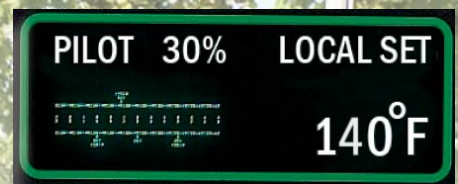
In addition to maintaining peak efficiency in our stand-alone boilers, HeatNet can operate as part of a multi-boiler Master/Member network of up to 16 boilers, where typical Master/Member systems using 2, 3, 4 or 5 boiler configurations can see total turndown ratio of 10, 15, 20, or even 25:1 or more depending on the number of units in the application.

HeatNet can also function as a boiler management system, incorporating a mix of both condensing and non-condensing boilers, or in base-load applications with existing boilers, eliminating the need for costly additional third-party, wall-mounted control platforms.

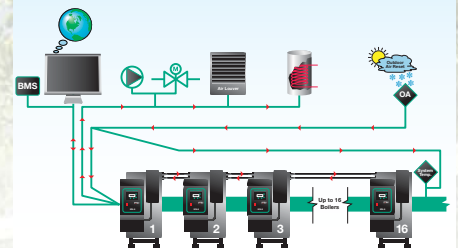
HeatNet "learns" the optimal firing rates of a given application, thereby determining the system's load for maximum energy efficiency. The variable control settings for Mod/Max firing rates allow technicians to adjust the maximum firing rates, enabling all boilers to run at extremely efficient levels until all units in the sequence have fired. HeatNet keeps the firing rate as low as possible, taking advantage of increased efficiencies at lower inputs. Boiler firing rotations can be programmed for First On/First Off, First On/Last Off or "True Rotation." HeatNet also modulates the local boiler pump for Primary/Secondary systems, ensuring optimum boiler Delta T.

Straightforward

HeatNet's intuitive interface, with plug-and-play connections, speeds the installation, set-up, and diagnostic process for technicians. HeatNet's electronics are conveniently located in a self-contained control enclosure, with all internal components and terminal blocks easily accessible. The standard HeatNet control uses a Modbus protocol with optional processor boards for BACnet- and Lon Works-based building management systems. Its proprietary design allows for seamless flash drive or laptop-driven updateable firmware, adding continuous value and boiler system control without physical control platform updates that can make some equipment obsolete.



HeatNet 'On Board' Control, working in conjunction with the BMS, provides multi-function control of KN-Series boilers, circulator pumps, motorized or on/off isolation valves, combustion air louvers/dampers, domestic hot water storage tanks and outdoor air reset.



Case Study

Made With Savings in Mind

The KN-Series is engineered to make installation and maintenance simple, straightforward, and fast—saving you both time and money. KN boilers come factory packaged, ready to perform at their peak right out of the box.

- **Compact footprint accommodates standard doorways; smaller mechanical rooms**
- **Down-fire design for easy access to all components**
- **HeatNet's simple menu and plain text display speed diagnostics and set-up**
- **CO₂ levels adjust with turn of a metric allen key (low fire) and slide damper (high fire)**
- **Self-contained 8,000 BTU pilot with interrupted spark ignition and air-cooled UV sensors; requires no field adjustment**
- **21-year thermal shock warranty**

Versatility by Design

Modern applications call for flexibility. The KN-Series was designed to accommodate real-world challenges, providing versatility in configurations, piping, and ventilation.

- **Operate as a single unit or part of larger Master/Member network (up to 16)**
- **Flexible modulation of 10, 15, 20 or even 25:1 based on 2, 3, 4 or 5 boiler unit networks; up to 16 units**
- **Ideal for front-end loading configurations**
- **Variable volume water flow, up to 10:1 range, minimizing piping**
- **No inlet water temperature limitations**
- **Low pressure drops through heat exchanger capable of Delta Ts of 20 – 100° with single-pump system piping (reverse return) or primary/secondary piping**
- **Accommodates numerous venting configurations, including Category II and IV**
- **Combustion air obtained from fresh air intake or mechanical room**

Seattle University

**Case study compliments of:
Columbia Hydronics Company – Vancouver, WA**

At Seattle University, sustainability is serious business.

You won't find plastic water bottles on their campus – they are banned. You will find over 200 compost bins that turn 52,000 pounds of pre-consumer food waste into

compost annually. 100% of campus natural gas use is offset through a manure-to-power project which captures methane gas from a Washington dairy farm and burns it in an on-site generator to produce electricity.

The University is dedicated to the design, construction, and operation of green resource-efficient buildings that meet LEED Gold standards. All buildings are carbon neutral. They have completely shed their carbon footprint.

One boiler plant consists of (7) KN-20 boilers that have reduced their carbon output by a substantial 18 percent and have saved an estimated \$138,000 per year in energy expenses.

With this new KN boiler heating loop, the university has cut their carbon footprint by two million pounds annually. An equivalent alternative would be to cover their soccer field with solar panels 8.6 times to get the same reductions in carbon at a cost of \$11 million – about eight times the new heating loop's cost.

Hydrotherm is proud to contribute to Seattle University's effort to be a leader in our nations sustainability cause.





The Energy Star-rated KN-2 boiler is ideally suited for residential and light commercial needs, including new construction and retrofits. With a maximum of 200,000 BTUs and modulation down to 40,000 BTUs minimum, the KN-2 can be used for a variety of applications—such as hydronic space heat, radiant heat and snow melt—with the same levels of efficiency and durability as the larger units.



Case Study



St. Peter's Church Case study compliments of: TLA, Inc - Richmond VA

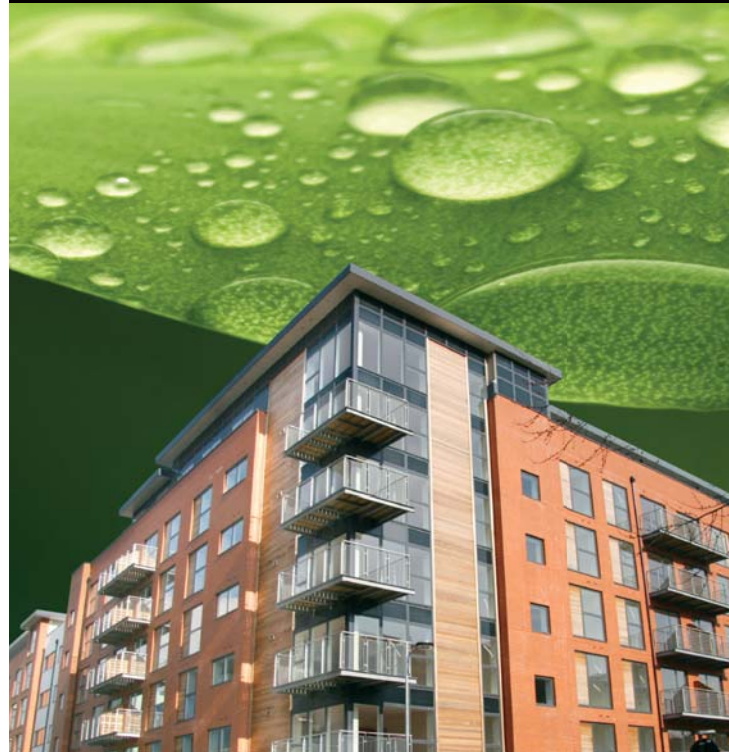
It seems only fitting that one of America's oldest and most historically significant churches choose a boiler with such commitment to American manufacturing. Built in 1701, St. Peter's Church of New Kent County, Virginia is designated the "First Church of the First First-Lady." It is the church in which Martha Custis was baptized, confirmed and married to Colonel George Washington. Looking to replace 50-year-old boilers, the still active and thriving parish, was immediately impressed by the high efficiency and longevity offered by the cast-iron KN-Series boilers. Two KN-2 boilers provide ample heat for the church, offices and parish hall while allowing better system turndown for the low load conditions typical with the fluctuating use of the buildings throughout the week.

KN-2 Specifications

	Nominal	Min	Max
Gas pressure, inches W.C.	7	2	14
Voltage, 120 V			
Flow, GPM		3.6	36
Temperature rise, °F		20*	100
Flue length, equiv. ft		6	100
Air inlet length, equiv. ft		0	100
Water volume, gals	2.8		
Flue diameter, in	3		
Current, amps	2.5		
Cv, GPM @ 1psid	20		
Boiler HP	5.5		
Input MBH	199		
Output MBH	185		
Fuel type	Nat. Gas / LP		
ASME design data max	100PSI / 250°F		
Supply/Return Pipe Size	1 1/4"		
Height	51 1/8"		
Length	17 3/16"		
Width	28 3/8"		
LBS (Shipping)	540 lbs		

* Min/Max delta t reflects boiler operation at full input. For applications requiring operation above/below these parameters please consult factory.

The KN-4's Delta T capabilities and fully modulating 400,000 BTUs make this unit ideal for addressing the challenges of the growing radiant heat and snow melt markets. KN-4's small vent size allows you to utilize existing vent work as a chase for the new equipment in retrofit applications. And its small footprint makes incorporating its power into the design of new constructions simple.



KN-4 Specifications			
	Nominal	Min	Max
Gas pressure, inches W.C.	7	2	14
Voltage, 120 V			
Flow, GPM		7.2	72
Temperature rise, °F		20*	100
Flue length, equiv. ft		6	100
Air inlet length, equiv. ft		0	100
Water volume, gals	5.6		
Flue diameter, in	4		
Current, amps	5		
Cv, GPM @ 1psid	40		
Boiler HP	11		
Input MBH	399		
Output MBH	369		
Fuel type	Nat. Gas / LP		
ASME design data max	100PSI / 250°F		
Supply/Return Pipe Size	1 1/4"		
Height	51 29/32"		
Length	22"		
Width	35 7/16"		
LBS (Shipping)	780 lbs		

*Min/Max delta t reflects boiler operation at full input. For applications requiring operation above/below these parameters please consult factory.

Case Study



Gordon H Mansfield Veterans Community Case study compliments of: Sweeney Rogers Geraghty Corporation – Raynham, MA

KN-Series boilers are an integral part of a plan to help veterans go from homeless to homeowner. In a first-of-its-kind project by Soldier On, a nonprofit organization working with veterans, money usually paid as debt service on the housing loan for the debt-free limited equity cooperative is instead deposited into an owner account. Each veteran then receives his share of any money left over after the cooperative center pays for all bills. The village, which is LEED-certifiable, utilizes 5 Hydrotherm KN-4 boilers for their heat and domestic hot water. The KN-Series boilers are so efficient that the veterans are able to receive back about 40% of their monthly payment. The veterans can then choose to invest or place that money into a savings account to help them get their lives back on track.



In addition to 600,000 BTUs in a compact footprint, the KN-6's fully modulating cast-iron design and condensing efficiency make it ideally suited to handle the modern demands of today's commercial building applications, including corporate office facilities. With its low fuel consumption and intelligent onboard controls, the KN-6 is an environmentally friendly choice for your next project.



Case Study



Missouri Air National Guard, 139th Air Lift Wing – St. Joseph, MO Case study compliments of: Comfort Sales Agency - Edwardsville, MO

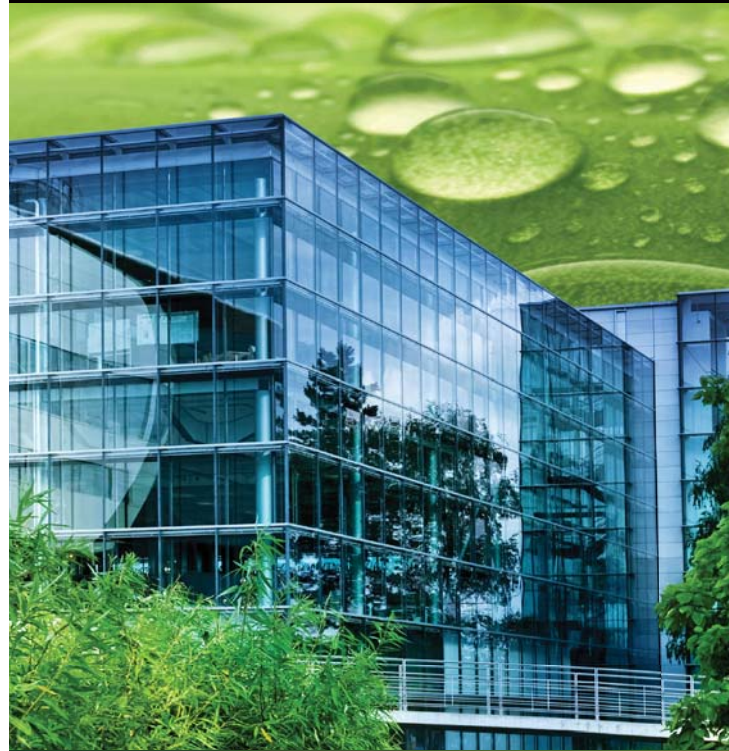
The Missouri Air National Guard has a long-standing history with the quality and reliability of Hydrotherm boilers. Hydrotherm was first chosen to replace the boilers after the flood of 1992 which required all the equipment on base to be replaced. After nearly two decades of solid performance the Missouri Air National Guard chose to update their equipment once again with Hydrotherm. This time, three KN-6 boilers were selected for space heat of Building 25 which houses the dining hall, medical and security forces. The boilers communicate via Hydrotherm's integrated HeatNet control platform through a BacNet Building Management System which monitors and controls the entire base including over twenty other KN-Series boilers. The Missouri Air National Guard has relied on Hydrotherm boilers for two decades, thanks to the product support, quality and reliability of the product.

KN-6 Specifications

	Nominal	Min	Max
Gas pressure, inches W.C.	7	2	14
Voltage, 120 V			
Flow, GPM		10	100
Temperature rise, °F		20*	100
Flue length, equiv. ft		6	80
Air inlet length, equiv. ft		0	80
Water volume, gals	8.4		
Flue diameter, in	5		
Current, amps	5		
Cv, GPM @ 1psid	60		
Boiler HP	16.6		
Input MBH	600		
Output MBH	556		
Fuel type	Nat. Gas / LP		
ASME design data max	100PSI / 250°F		
Supply/Return Pipe Size	3"		
Height	59 1/8"		
Length	36 3/4"		
Width	29 1/2"		
LBS (Shipping)	1080 lbs		

* Min/Max delta t reflects boiler operation at full input. For applications requiring operation above/below these parameters please consult factory.

Producing 1,000,000 BTUs, the KN-10 is engineered to meet the low fuel use, low installation cost, and small footprint demands of today's commercial boiler market. Like all boilers in the KN-Series, the KN-10 combines the condition-tolerant and heat-retaining characteristics of cast iron with the fuel savings of full-modulation condensing performance, resulting in one of the most innovative boilers on the market.



KN-10 Specifications			
	Nominal	Min	Max
Gas pressure, inches W.C.	7	2	14
Voltage, 120 V 1 ph 60hz			
Flow, GPM		15	150
Temperature rise, °F		20*	100
Flue length, equiv. ft		6	80
Air inlet length, equiv. ft		0	80
Water volume, gals	14		
Flue diameter, in	6		
Current, amps	8		
Cv, GPM @ 1psid	100		
Boiler HP	27.7		
Input MBH	1000		
Output MBH	927		
Fuel type	Nat. Gas / LP		
ASME design data max	100PSI / 250°F		
Supply/Return Pipe Size	3"		
Height	58 25/32"		
Length	43 11/16"		
Width	29 7/16"		
LBS (Shipping)	1440 lbs		

*Min/Max delta t reflects boiler operation at full input. For applications requiring operation above/below these parameters please consult factory.

Case Study



Madison YMCA

Case study compliments of:
Roberts Mechanical Equipment Co. – Garfield Heights, OH

The top priority in updating the heating system at the Madison YMCA was clear - low maintenance with the highest possible efficiency and rugged durability.

A single KN-10 along with a larger KN-20 and a simple pump package met their needs perfectly. Fully utilizing HeatNet, the loads of four very dissimilar zones – air handler, baseboard, pool heat and reheat – with drastically different seasonal requirements, are easily satisfied. Critical to the success of the application was the KN's system flexibility especially its 10:1 system modulation and its ability to handle variable volume flows. The quick delivery, ease of installation and high system efficiency allowed the YMCA to realize energy savings of nearly 40% in their first season.



The latest addition to the KN-Series of boilers, the KN-16 produces 1,600,000 BTUs, while maintaining the features that have made the KN-Series boiler the most recognized appliance in the commercial boiler industry – long lasting durability and ultra-high condensing efficiencies all in a compact footprint.

The KN-16 is built to meet the most challenging demands of today's condensing commercial boiler market.



The KN-16 joins the proven foundation of KN-Series boilers, combining superior longevity and reliability with maximum efficiencies and serviceability. Hydrotherm's engineers have streamlined the KN's powerful design, producing the most versatile boiler available today.

Built on the rock solid foundation of a high efficiency, fully condensing cast-iron heat exchanger, KN-Series boilers address the wants and needs of today's demanding system applications. Its state-of-the art HeatNet control platform and Tru-Flow "whirlwind" blower and gas valve package replace traditional expensive VFD's while delivering pinpoint modulation insuring maximum performance at all firing rates.

KN-16 Specifications

	Nominal	Min	Max
Gas pressure, inches W.C.	7	3	14
Voltage, 208/230 V 1ph			
Flow, GPM		24	240
Temperature rise, °F		20*	100
Flue length, equiv. ft		6	120
Air inlet length, equiv. ft		0	120
Water volume, gals	22.4		
Flue diameter, in	6		
Current, amps	6.5		
Cv, GPM @ 1psid	160		
Boiler HP	44.3		
Input MBH	1600		
Output MBH	1483		
Fuel type	Nat. Gas / LP		
ASME design data max	100PSI / 250°F		
Supply/Return Pipe Size	3"		
Height	74 1/16"		
Length	56 15/16"		
Width	33"		
LBS (Shipping)	2160 lbs		

* Min/Max delta t reflects boiler operation at full input. For applications requiring operation above/below these parameters please consult factory.

At 2,000,000 BTUs, the KN-20 can perform in some of the harshest environmental conditions, including the Barrow Observatory, just outside Barrow Point, AK. Its durable, reliable, cast-iron design and full-modulation condensing performance, coupled with low fuel consumption, low installation cost, and small footprint, make this boiler ideally suited for your next big project.



KN-20 Specifications

	Nominal	Min	Max
Gas pressure, inches W.C.	7	2	14
Voltage, 208/230 V 1ph			
Flow, GPM		30	300
Temperature rise, °F		20*	100
Flue length, equiv. ft		6	80
Air inlet length, equiv. ft		0	80
Water volume, gals	28		
Flue diameter, in	8		
Current, amps	11		
Cv, GPM @ 1psid	190		
Boiler HP	55.4		
Input MBH	1999		
Output MBH	1853		
Fuel type	Nat. Gas / LP		
ASME design data max	100PSI / 250°F		
Supply/Return Pipe Size	3"		
Height	63 5/8"		
Length	66"		
Width	28 7/8"		
LBS (Shipping)	2480 lbs		

*Min/Max delta t reflects boiler operation at full input. For applications requiring operation above/below these parameters please consult factory.

Case Study



Knoxville Convention

Case study compliments of:
W.C. Rouse & Son, Inc – Greensboro, NC

Knoxville, Tennessee is known for its hospitality. After The Knoxville Convention Center recently went through a multiple phase energy upgrade including water, lighting, and a complete renovation of the central energy plant, the city just got even friendlier. The 500,000 square-foot facility offers 120,000 square feet of exhibit space and meeting rooms and can host up to 1,850 people at one time. Nationally acclaimed energy management company, Ameresco replaced their old hydronic system which consisted of two 500hp firetube boilers with ten KN-20 Series units with HeatNet controls. Utilizing outdoor reset with the HeatNet control system, the convention center can now bring on as few or as many boilers needed to maintain comfort throughout the building. Gas usage at the Knoxville Convention Center is now kept to a minimum, while guest's comfort and energy savings are maximized.



The KN-26 takes all of the successful attributes of the KN-30 boiler and incorporates them into a smaller size. The same tried and true system versatility and durability seen on all KN-Series boilers holds true for the KN-26. From single boiler applications to multiple boiler master/member networks controlled thru the HeatNet integrated control platform the KN-Series is the most versatile boiler for all types of applications including today's variable volume systems.

Premium efficiencies with high system turndown and low emissions make the KN-Series line of condensing cast-iron boilers the most cost effective option for every application.

Joining the KN-16 as the latest addition to the growing family of the KN-Series boilers, the KN-26 produces 2,600,000 BTUs, while maintaining the features that have made the KN-Series boiler the most recognized appliance in the commercial boiler industry – long lasting durability and ultra-high condensing efficiencies all in a compact footprint.

The KN-26 puts the final piece into the most complete line of condensing boilers on the market. KN-Series boilers are built to meet the most challenging demands of today's condensing commercial boiler applications.



KN-26 Specifications

	Nominal	Min	Max
Gas pressure, inches W.C.	7	3	14
Voltage, 208/230 V 3ph			
Flow, GPM		38	380
Temperature rise, °F		20*	100
Flue length, equiv. ft		6	120
Air inlet length, equiv. ft		0	120
Water volume, gals	36.4		
Flue diameter, in	8		
Current, amps	5.8		
Cv, GPM @ 1psid	240		
Boiler HP	72		
Input MBH	2600		
Output MBH	2410		
Fuel type	Nat. Gas / LP		
ASME design data max	100PSI / 250°F		
Supply/Return Pipe Size	4"		
Height	74 1/32"		
Length	79 3/4"		
Width	34"		
LBS (Shipping)	3120 lbs		

* Min/Max delta t reflects boiler operation at full input. For applications requiring operation above/below these parameters please consult factory.

The largest of the KN-Series of boilers, the KN-30 produces 3,000,000 BTUs, while maintaining the features that KN boilers are recognized for— the long-lasting durability of cast-iron and the efficiency of condensing boilers, all in a compact footprint.

The KN-30 is built to meet the largest, most challenging demands of today's condensing commercial boiler market.



KN-30 Specifications			
	Nominal	Min	Max
Gas pressure, inches W.C.	7	3	14
Voltage, 208/230 V 3ph			
Flow, GPM		45	450
Temperature rise, °F		20*	100
Flue length, equiv. ft		6	120
Air inlet length, equiv. ft		0	120
Water volume, gals	42		
Flue diameter, in	8		
Current, amps	6.5		
Cv, GPM @ 1psid	278		
Boiler HP	83.1		
Input MBH	3000		
Output MBH	2781		
Fuel type	Nat. Gas / LP		
ASME design data max	100PSI / 250°F		
Supply/Return Pipe Size	4"		
Height	74 1/32"		
Length	87 1/8"		
Width	34"		
LBS (Shipping)	3500 lbs		

*Min/Max delta t reflects boiler operation at full input. For applications requiring operation above/below these parameters please consult factory.

Boiler Overview



Sun Valley Resort

Case study compliments of:
Columbia Hydronics Company – Vancouver, WA

Overlooking the beautiful Big Wood River, the River Run Day Lodge and nearby River Run Plaza Idaho's Sun Valley Resort is surrounded by nearly 64,000 square feet of walkway. Operating 24 hours a day, seven days a week, the energy usage alone for the snowmelt system is massive. Add the lodge with its soaring 40 foot ceilings and shopping plaza, and it is no surprise that they were looking to replace their old inefficient boilers with ultra-efficient KN-Series boilers. Three KN-30 boilers supply the 9 million BTU's required for the entire area. Replacing their older boiler system with efficiencies in the range of 75%, it is estimated that the KN boilers are providing an hourly savings of 3,364 MBTU/h. At an average of \$1.10 per therm, the resort is saving \$888 per day or \$26,664 per month during peak season.

Hybrid Boiler Systems

The concept of “hybrid”, “base-load” or even “mixed-boiler” configurations is simple. Lower the upfront equipment cost of a condensing boiler plant by incorporating less expensive conventional equipment while optimizing the operational range of both in a specific application.

Of critical importance for any hybrid system is the sizing of the units. Meeting total BTU requirements with a combination of condensing and non-condensing units optimizes overall system performance by allowing condensing units to run exclusively on warmer days minimizing fuel usage with the non-condensing units running on high-load colder days.

Geographic location and the use of BIN hour temperature charts would ultimately determine the appropriate sizing of your condensing versus non-condensing boiler equipment.

Sizing

There are 2 key components that must play a part in optimizing a hybrid system application: outdoor reset control and the understanding of the performance band of condensing boilers (flue gas and return water temperatures below dew point of 130°) versus non-condensing boilers with varying boiler water loop temperatures.

Using BIN hour temperature charts we can determine that on average properly sized condensing units will run 74% of the time in full condensing mode which covers 40% of the buildings “Design Heating Load” thus leaving only 26% of run time in non-condensing mode**.

The highest efficiency units will run in condensing mode 74% of the time, maximizing efficiency while still providing equipment redundancy at a substantially reduced cost.

How to Control

HeatNet, Mestek’s proprietary integrated boiler control platform makes boiler to boiler communication in all types of applications including hybrid designs with both high mass and low mass units seamless while optimizing system efficiency by prioritizing the firing rotation of all boilers in the sequence (up to 16 units) both condensing and non-condensing.

** Hypothetical scenario assuming a 4,500 MBH design load from which 40% (1800 MBH) can be concluded to be condensing with the remaining 2700 MBH being non-condensing. Varies depending on specific BIN data per geographic region.

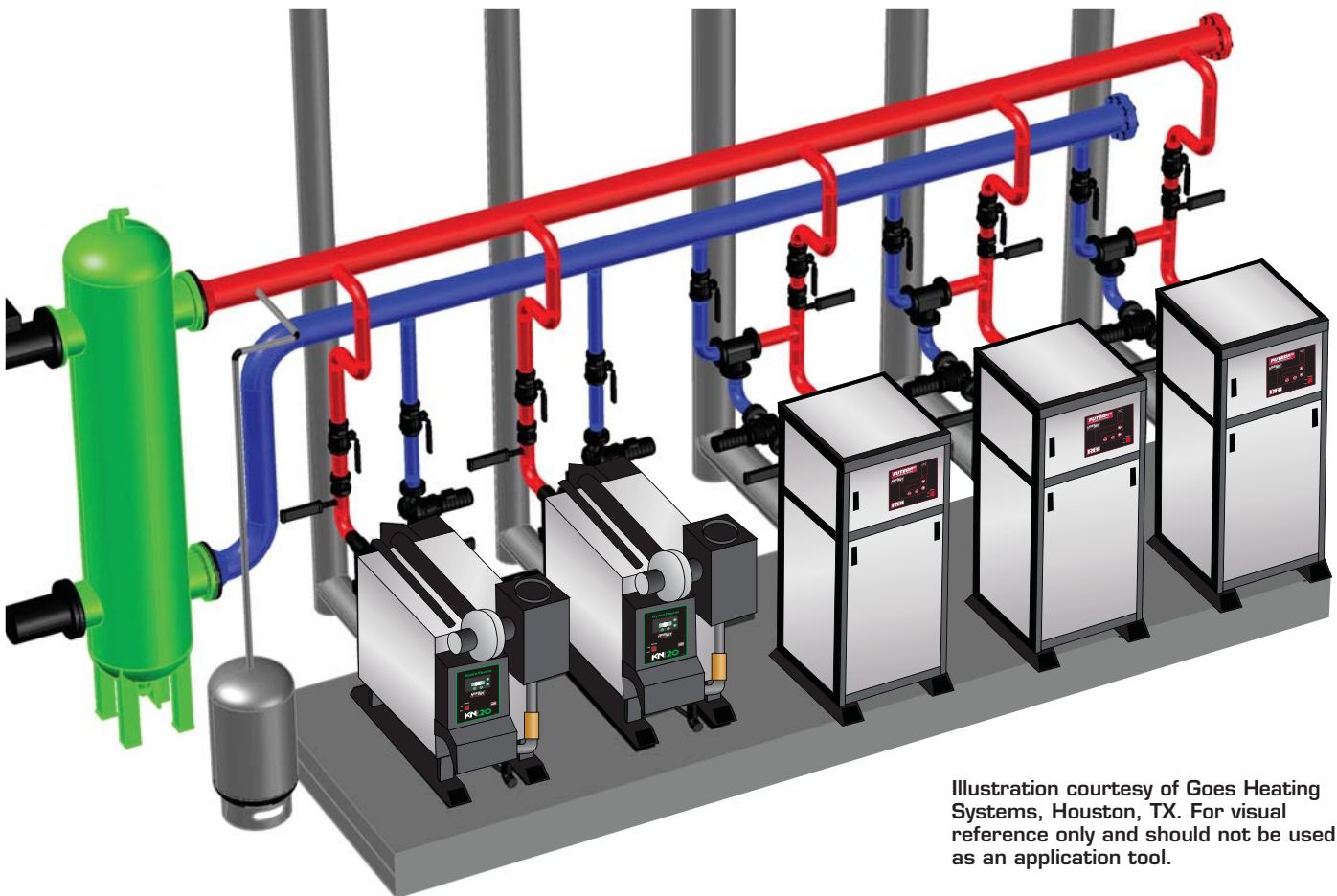
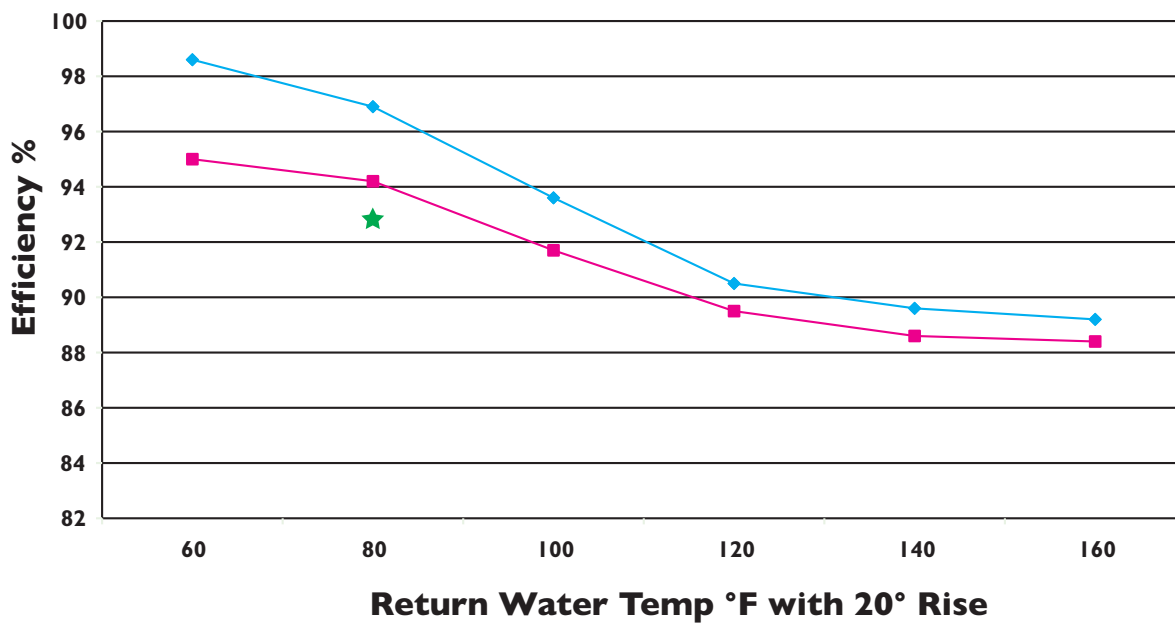


Illustration courtesy of Goes Heating Systems, Houston, TX. For visual reference only and should not be used as an application tool.



KN Series Annual Mean Thermal Efficiency



- ★ - AHRI Certified 92.7% Efficient
- - Annual Mean Thermal Efficiency is a calculated average utilizing cumulative run hours and corresponding load. (ASHRAE Degree Day & BIN Method/Fundamentals 19.17)
- ◆ - Maximum Modulation Efficiency (Low Fire)

Contact Info:

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MODEL NT25 CONDENSATE NEUTRALIZATION TANK

The NT25 is ideal for neutralizing condensate from condensing boilers and furnaces operating on natural gas or propane.

The condensate produced by these appliances is acidic and has the potential to harm the environment and the sewer system. The NT25 will neutralize the condensate to a more neutral pH level before it is discharged to drain.

**FEATURES and BENEFITS**

- **45 Gal/hr (170 l/hr)***
- *NeutraPro prevents acidic condensate from corroding drains and sewer systems*
- *Neutralized condensate is more environmentally friendly*
- *Two 1" NPT inlet/outlet connections with unions for fast and versatile installation*
- *Low profile design for appliances with near floor condensate drain*
- *Tank and lid made from durable and corrosion resistant Polypropylene*
- *18 liter (4.8 US gallon) tank with baffles designed to channel flow through LipHter media for complete neutralization*
- *Integral bypass feature prevents condensate backflow into appliance*
- *Includes initial charge of Axiom's special LipHter neutralizing media*

NeutraPro™

* Check with the appliance manufacturer for condensate flowrate or go to our website and use the sizing calculator. As a guideline 7,000,000 BTU/hr at 96% efficiency will produce approximately 45 Gal/hr (170 L/hr).



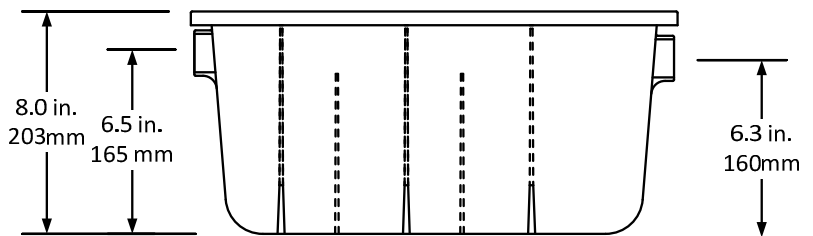
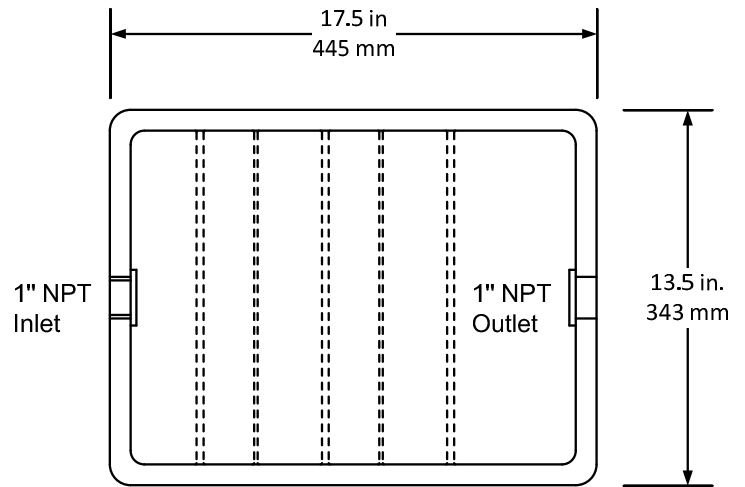
INDUSTRIES LIMITED

**NT25 CONDENSATE NEUTRALIZATION TANK
TECHNICAL INFORMATION**

WEIGHT – 20 kg, 45lbs. (full)

SPECIFICATION

The condensate neutralization tank shall be AXIOM INDUSTRIES LTD. Model NT25. System shall include 18 litre (4.8 U.S. gallon) tank and lid made from polypropylene construction with two 1” FNPT inlet/outlet connections, two 1” NPT PVC unions, and two 1” NPT PVC close nipples. Comes with 18kg (40lbs) of Axiom’s *LipHter* neutralization media.



ACCESSORIES

- NM-25** – replacement *LipHter* neutralization media



Project _____

Location _____

Consultant _____

Contractor _____

Unit Tag _____

Sales Agent _____