

Easily Adapted to Many Non-Pressurized HVAC Systems

Constructed of sturdy 0.430 in. (11 mm) diameter WATROD™ heating elements mounted to a 1/4 in. (6 mm) thick steel flange, duct heaters are easily adapted to many non-pressurized air-heating systems.

They are easily installed in applications requiring a wide range of temperature versus air flow combinations.

The modular duct heater offers increased reliability. The individual modules are removable through the housing of the assembly, which eliminates the need to pull the complete heater from the duct work. This reduces downtime costs because the heating elements can be replaced individually. Performance improvements include quicker response time and reduced infiltration from the air stream being heated into the electrical enclosure.

Watlow® duct heaters offer advantages over gas or oil fired and open coil electric units with:

- Installation flexibility—no flues or fuel lines
- 100% energy efficient—no energy loss up the flue
- Universal availability of electricity
- Resistance coil in sheath is protected from corrosive environments

Performance Capabilities

- Watt densities up to 40 W/in² (6.2 W/cm²)
- Recommended process temperatures from -20 to 1200°F (-29 to 650°C)
- Catalog P/N wattages to 225kW
- Voltages up to 600VAC

Features and Benefits

Long life alloy 840 sheath

- Resists corrosion/oxidation while protecting resistance coils against contamination

MgO insulation filled elements compacted to rock hard density

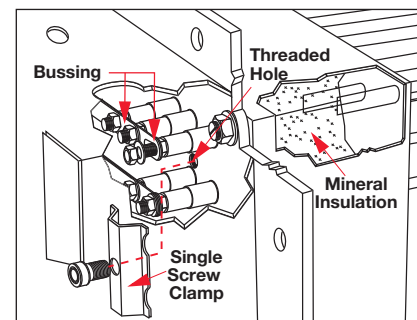
- Maximizes dielectric strength, heat transfer and life

Field replaceable heating elements

- Permits easy service and reduces downtime. Element change-out is made simple by a single screw clamp (D SERIES only)

3 1/2 in. (90 mm) thick mineral insulation

- Keeps wiring cooler and reduces heat loss



Silicone resin seals rated to 221°F (105°C)

- Protects elements against moisture and other contaminants

General purpose terminal enclosure

- Offers easy access to wiring

1/4 in. (6 mm) inside diameter thermowell

- Accepts an optional Type J or K thermocouple for accurate sheath temperature sensing (D SERIES only)

Rigid stainless steel supports

- Prevents element sagging or deformation in various mounting positions

1/4 in. (6 mm) thick steel flange with 3/8 in. (9.5 mm) diameter mounting holes

- Easily bolts to the duct wall

WATROD hairpins are repressed (recompacted) after bending to assure MgO density

- Eliminates hot spots and electrical insulation voids

Stock heaters feature from three to 60 elements

- Meets a wide variety of kilowatt demands

One or three phase voltages

- Meets local power supplies

Maximum 48 amperes per circuit

- Complies with National Electrical Code (NEC)

Duct heaters with general purpose enclosures meet UL® and CSA component recognition to 480 and 600VAC maximum respectively—UL® and CSA file numbers are E52951 and 31388



Duct Heaters

LDH SERIES and D SERIES

Typical Applications

- Drying ovens
- Autoclaves
- Furnaces
- Load banks
- Heat treating
- Reheating
- HVAC
- Paint drying

Choosing a Duct Heater

The English and metric graphs, shown on the following pages, will help you to select the correct duct heater. These graphs include: *Watt Density vs. Air Temperature/Velocity*, *Watt Density vs. Sheath Temperature and Pressure Drop vs. Air Velocity*.

These graphs, with the quick formulas on this page, along with information specific to your application, will determine the correct duct heater specifications. However, if engineering assistance is needed, contact your Watlow representative.

Required Application Information

- Desired outlet air temperature
- Inlet air temperature
- Delta T—the temperature difference between inlet and desired outlet temperature
- Air volume (CFM/CMM) measured at both inlet temperature and pressure
- Air velocity in feet per minute (FPM); meters per minute (MPM) which equals:

English	
$\text{FPM} = \frac{\text{CFM measured at standard conditions}}{\text{Duct cross section area at heater in ft}^2}$	
Metric	
$\text{MPM} = \frac{\text{CMM measured at normal conditions}}{\text{Duct cross section area at heater in m}^2}$	

- Minimum duct heater wattage (kW). This can be determined by:

English	
$\text{kW} = \frac{\text{CFM} \times \text{Delta T (}^\circ\text{F)} \times 1.1 \text{ (safety factor)}}{3000}$	
Metric	
$\text{kW} = \frac{\text{CMM} \times \text{Delta T (}^\circ\text{C)} \times 1.1 \text{ (safety factor)}}{48}$	

Note: The duct heater, or combination of duct heaters, used for the process should be equal to or exceed the minimum wattage calculation.

Air Heaters



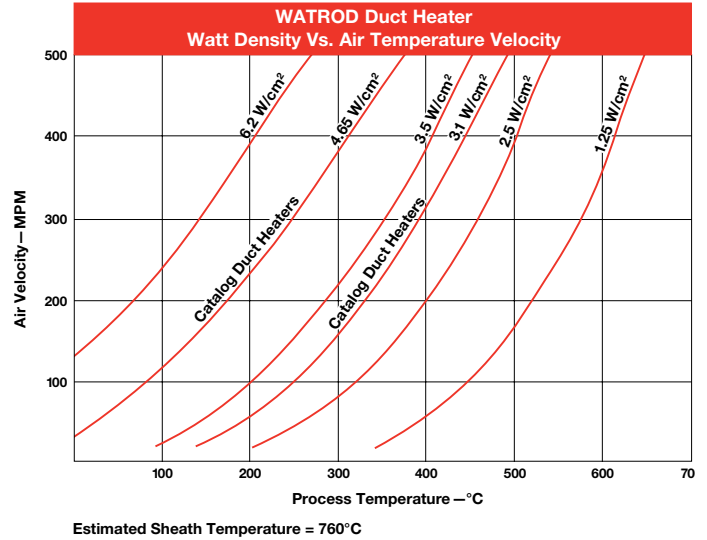
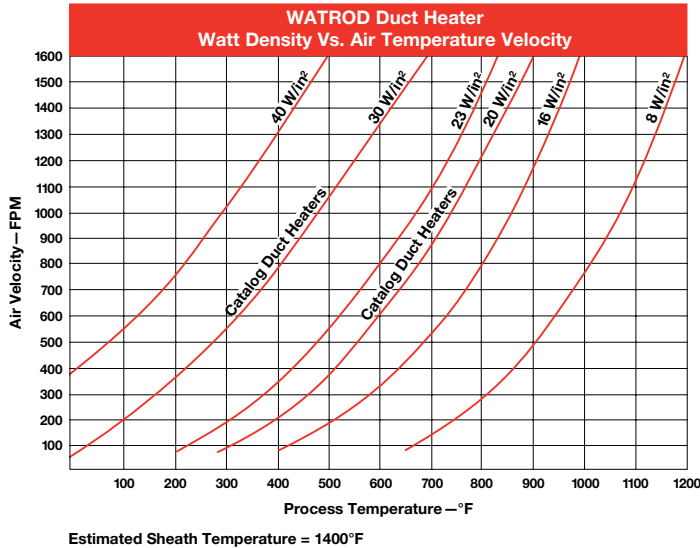
Duct Heaters

LDH SERIES and D SERIES

Watt Density vs. Air Temperature/Velocity

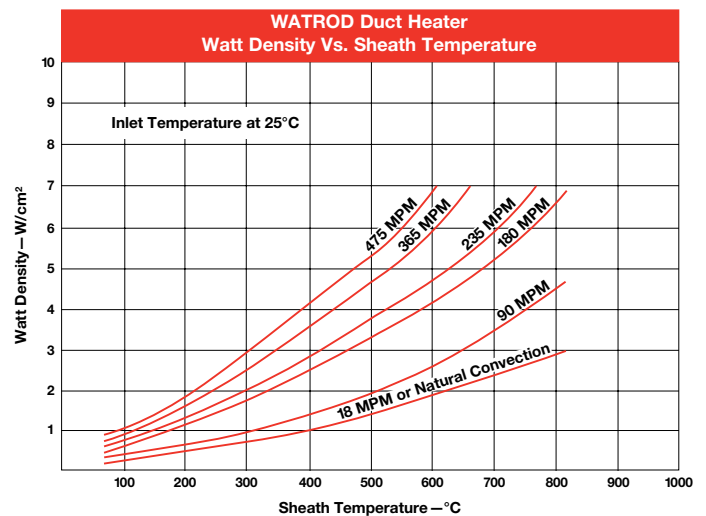
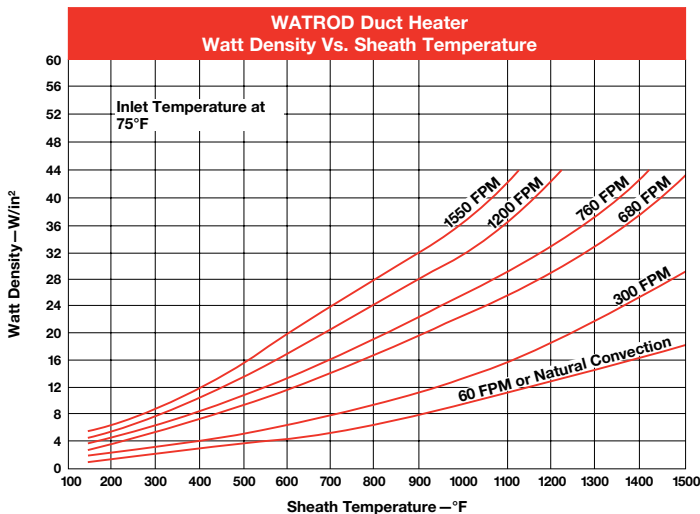
To decide watt density requirements, first determine the desired outlet air temperature and velocity in feet per minute. Then, follow the lines on the graph for velocity and process temperature to the watt density

curve's intersecting point. This shows the recommended watt density based on a maximum sheath temperature of 1400°F (760°C). **For longer heater life, lower watt densities should be chosen.**



Watt Density vs. Sheath Temperature

The *Watt Density vs. Sheath Temperature* graph shows the air velocity (FPM or MPM) required to operate a WATROD duct heater at specific watt densities or sheath temperatures. Also depicted is the appropriate watt density vs. sheath temperature at a specified air flow.





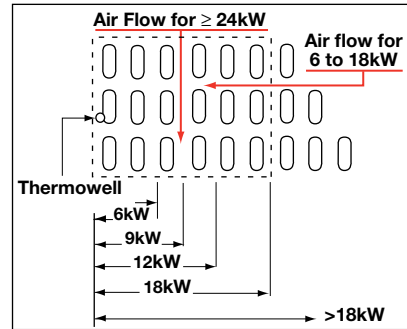
Duct Heaters

LDH SERIES and D SERIES

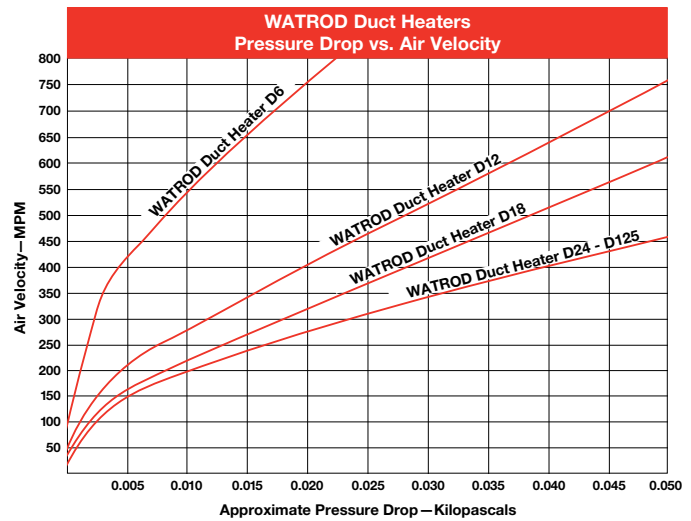
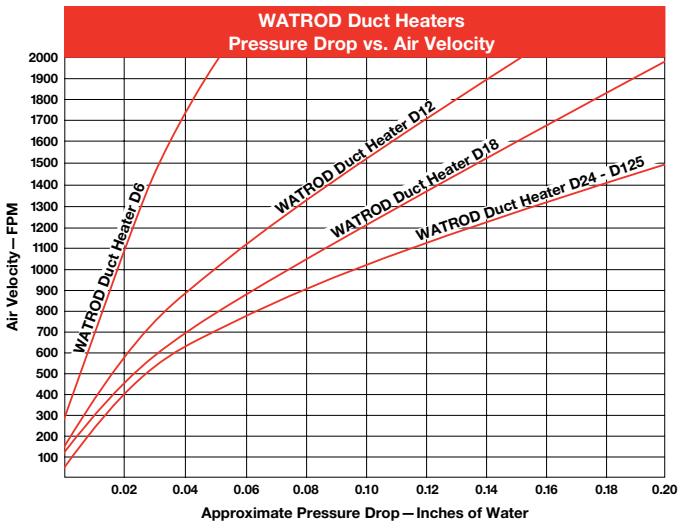
Pressure Drop vs. Air Velocity

The rate at which pressure drops through the duct heater is critical for properly sizing blowers and pumps. *The Pressure Drop vs. Air Velocity* graph gives recommended maximum velocities in feet per minute and meters per minute according to the air velocity and duct heater size.

To determine the pressure drop through the duct heater, follow the air velocity (FPM or MPM) over to the appropriate curve, which identifies the duct heater size. Then, take the intersecting point down to the approximate pressure drop value.



Note: Viewing from the element ends—the recommended air flow direction through element bundle changes at >18kW.



Air Heaters



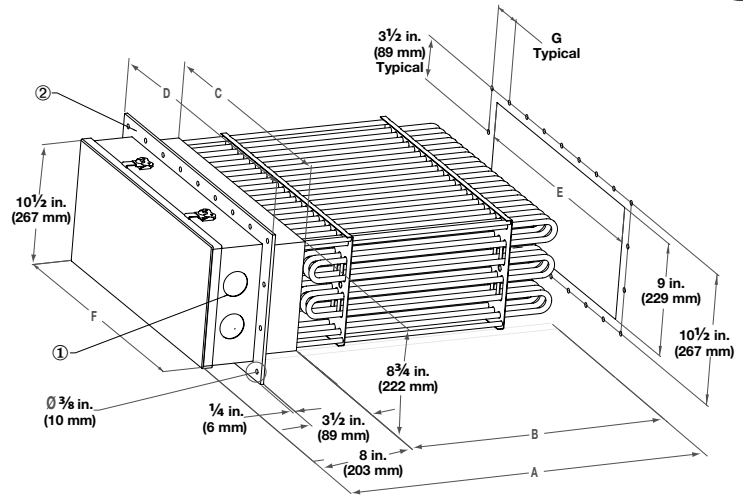
Duct Heaters



LDH SERIES

Application: High Temperature Air 800°F (427°C)

- Welded alloy 840 WATROD elements
 - Without thermostat
 - General purpose enclosure
 - Steel flange
- ① 3 and 6 element heaters have (1) 1 inch NPT conduit opening; 9, 12 and 15 element heaters have (2) 1 inch NPT conduit openings; 18 element heaters have (2) 1 1/2 inch NPT conduit openings; 21 element (B= 20 1/4 in.) heaters have (2) 1 1/2 inch NPT conduit openings; remaining 21 and 24 element heaters have (3) 1 1/2 inch NPT conduit openings
- ② All flanges are 12 inches wide



# of Elem	Volts	kW	Ph	# Circ	Part Number	WATCONNECT P/N		Ship Wt. lbs (kg)	"A" Dim.	"B" Dim.	"C" Dim.	"D" Dim.	"E" Dim.	"F" Dim.	"G" Dim.
						J T/C	K T/C		in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)
20 W/in² (3.1 W/cm²)															
3	240	9.0	1	1	LDH9S10S	C/F	C/F	55 (25)	28 1/4 (718)	20 1/4 (514)	3 3/4 (95)	7 1/2 (191)	4 (102)	4 5/8 (117.5)	3 (76)
3	240	9.0	3	1	LDH9S3S	C2-50	C2-92	55 (25)	28 1/4 (718)	20 1/4 (514)	3 3/4 (95)	7 1/2 (191)	4 (102)	4 5/8 (117.5)	3 (76)
3	480	9.0	1	1	LDH9S11S	C/F	C/F	55 (25)	28 1/4 (718)	20 1/4 (514)	3 3/4 (95)	7 1/2 (191)	4 (102)	4 5/8 (117.5)	3 (76)
3	480	9.0	3	1	LDH9S5S	C2-43	C2-35	55 (25)	28 1/4 (718)	20 1/4 (514)	3 3/4 (95)	7 1/2 (191)	4 (102)	4 5/8 (117.5)	3 (76)
6	240	18.0	1	2	LDH18S10S	C/F	C/F	65 (30)	28 1/4 (718)	20 1/4 (514)	6 3/4 (171)	10 1/2 (267)	7 (178)	7 5/8 (193.7)	3 (76)
6	240	18.0	3	1	LDH18S3S	C2-236	C2-214	65 (30)	28 1/4 (718)	20 1/4 (514)	6 3/4 (171)	10 1/2 (267)	7 (178)	7 5/8 (193.7)	3 (76)
6	480	18.0	1	1	LDH18S11S	C/F	C/F	65 (30)	28 1/4 (718)	20 1/4 (514)	6 3/4 (171)	10 1/2 (267)	7 (178)	7 5/8 (193.7)	3 (76)
6	480	18.0	3	1	LDH18S5S	C2-43	C2-35	65 (30)	28 1/4 (718)	20 1/4 (514)	6 3/4 (171)	10 1/2 (267)	7 (178)	7 5/8 (193.7)	3 (76)
9	240	27.0	1	3	LDH27S10S	C/F	C/F	120 (55)	28 1/4 (718)	20 1/4 (514)	9 3/4 (248)	13 1/2 (343)	10 (254)	10 5/8 (269.9)	3 (76)
9	240	27.0	3	3	LDH27S3S	C4-143	C4-142	120 (55)	28 1/4 (718)	20 1/4 (514)	9 3/4 (248)	13 1/2 (343)	10 (254)	10 5/8 (269.9)	3 (76)
9	480	27.0	1	3	LDH27S11S	C/F	C/F	120 (55)	28 1/4 (718)	20 1/4 (514)	9 3/4 (248)	13 1/2 (343)	10 (254)	10 5/8 (269.9)	3 (76)
9	480	27.0	3	1	LDH27S5S	C2-225	C2-226	120 (55)	28 1/4 (718)	20 1/4 (514)	9 3/4 (248)	13 1/2 (343)	10 (254)	10 5/8 (269.9)	3 (76)
12	240	36.0	1	4	LDH36S10S	C/F	C/F	135 (62)	28 1/4 (718)	20 1/4 (514)	12 3/4 (324)	16 1/2 (419)	13 (330)	13 5/8 (346.1)	3 (76)
12	240	36.0	3	2	LDH36S3S	C2-218	C2-224	135 (62)	28 1/4 (718)	20 1/4 (514)	12 3/4 (324)	16 1/2 (419)	13 (330)	13 5/8 (346.1)	3 (76)
12	480	36.0	1	2	LDH36S11S	C/F	C/F	135 (62)	28 1/4 (718)	20 1/4 (514)	12 3/4 (324)	16 1/2 (419)	13 (330)	13 5/8 (346.1)	3 (76)
12	480	36.0	3	1	LDH36S5S	C2-225	C2-226	135 (62)	28 1/4 (718)	20 1/4 (514)	12 3/4 (324)	16 1/2 (419)	13 (330)	13 5/8 (346.1)	3 (76)
15	240	45.0	3	5	LDH45S3S	C4-144	C4-145	195 (89)	28 1/4 (718)	20 1/4 (514)	15 3/4 (400)	19 1/2 (495)	16 (406)	17 7/8 (454.0)	3 (76)
15	480	45.0	1	3	LDH45S11S	C/F	C/F	195 (89)	28 1/4 (718)	20 1/4 (514)	15 3/4 (400)	19 1/2 (495)	16 (406)	17 7/8 (454.0)	3 (76)
15	480	45.0	3	5	LDH45S5S	C4-150	C4-151	195 (89)	28 1/4 (718)	20 1/4 (514)	15 3/4 (400)	19 1/2 (495)	16 (406)	17 7/8 (454.0)	3 (76)
18	240	54.0	3	3	LDH54S3S	C4-144	C4-145	205 (93)	28 1/4 (718)	20 1/4 (514)	18 3/4 (476)	22 1/2 (572)	19 (483)	20 7/8 (530.2)	3 (76)
18	480	54.0	1	3	LDH54S11S	C/F	C/F	205 (93)	28 1/4 (718)	20 1/4 (514)	18 3/4 (476)	22 1/2 (572)	19 (483)	20 7/8 (530.2)	3 (76)
18	480	54.0	3	2	LDH54S5S	C2-229	C2-230	205 (93)	28 1/4 (718)	20 1/4 (514)	18 3/4 (476)	22 1/2 (572)	19 (483)	20 7/8 (530.2)	3 (76)
21	240	63.0	3	7	LDH63S3S	C4-148	C4-149	235 (107)	28 1/4 (718)	20 1/4 (514)	21 3/4 (552)	25 1/2 (648)	22 (559)	23 7/8 (606.4)	3 (76)
21	480	63.0	1	3	LDH63S11S	C/F	C/F	235 (107)	28 1/4 (718)	20 1/4 (514)	21 3/4 (552)	25 1/2 (648)	22 (559)	23 7/8 (606.4)	3 (76)
21	480	63.0	3	7	LDH63S5S	C4-154	C4-155	235 (107)	28 1/4 (718)	20 1/4 (514)	21 3/4 (552)	25 1/2 (648)	22 (559)	23 7/8 (606.4)	3 (76)
21	240	79.0	3	7	LDH79S3S	C/F	C/F	260 (118)	33 (838)	25 (635)	21 3/4 (552)	25 1/2 (648)	22 (559)	23 7/8 (606.4)	3 (76)
21	480	79.0	1	7	LDH79S11S	C/F	C/F	260 (118)	33 (838)	25 (635)	21 3/4 (552)	25 1/2 (648)	22 (559)	23 7/8 (606.4)	3 (76)
21	480	79.0	3	7	LDH79S5S	C4-156	C4-157	260 (118)	33 (838)	25 (635)	21 3/4 (552)	25 1/2 (648)	22 (559)	23 7/8 (606.4)	3 (76)
21	240	105.0	3	7	LDH105S3S	C/F	C/F	290 (132)	40 1/2 (1029)	32 1/2 (826)	21 3/4 (552)	25 1/2 (648)	22 (559)	23 7/8 (606.4)	3 (76)
21	480	105.0	1	7	LDH105S11S	C/F	C/F	290 (132)	40 1/2 (1029)	32 1/2 (826)	21 3/4 (552)	25 1/2 (648)	22 (559)	23 7/8 (606.4)	3 (76)
21	480	105.0	3	7	LDH105S5S	C4-156	C4-157	290 (132)	40 1/2 (1029)	32 1/2 (826)	21 3/4 (552)	25 1/2 (648)	22 (559)	23 7/8 (606.4)	3 (76)
21	480	131.0	3	7	LDH131S5S	C4-156	C4-157	310 (141)	49 1/2 (1257)	41 1/2 (1054)	21 3/4 (552)	25 1/2 (648)	22 (559)	23 7/8 (606.4)	3 (76)
24	480	150.0	3	4	LDH150S5S	C4-156	C4-157	330 (150)	49 1/2 (1257)	41 1/2 (1054)	24 3/4 (629)	28 1/2 (724)	25 (635)	26 7/8 (682.6)	3 (76)

Notes:

- See Watt Density vs. Air Temperature/Velocity charts on page 379 to confirm suitability in the application.

C/F - Contact factory, go to www.watlow.com/en/contact-us

Air Heaters



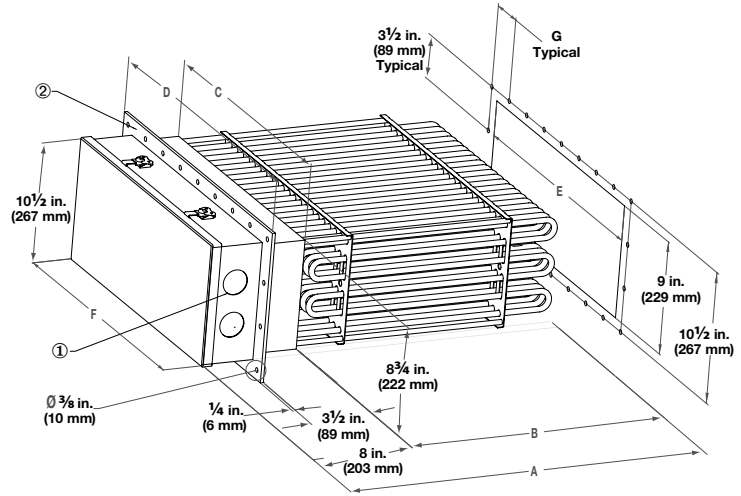
Duct Heaters



LDH SERIES

Application: Medium Temperature Air 750°F (399°C)

- Welded alloy 840 WATROD elements
 - Without thermostat
 - General purpose enclosure
 - Steel flange
- ① 3 and 6 element heaters have (1) 1 inch NPT conduit opening; 9, 12 and 15 element heaters have (2) 1 inch NPT conduit openings; 18 element heaters have (2) 1 1/2 inch NPT conduit openings; 21 element (B= 20 1/4 in.) heaters have (2) 1 1/2 inch NPT conduit openings; remaining 21 and 24 element heaters have (3) 1 1/2 inch NPT conduit openings
- ② All flanges are 12 inches wide



# of Elem	Volts	kW	# Ph	# Circ	Part Number	WATCONNECT P/N		Ship Wt. lbs. (kg)	"A" Dim.	"B" Dim.	"C" Dim.	"D" Dim.	"E" Dim.	"F" Dim.	"G" Dim.
						J T/C	K T/C		in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)	in. (mm)
30 W/in² (4.7 W/cm²)															
3	240	14.0	1	3	LDH14SX10S	C/F	C/F	55 (25)	28 1/4 (718)	20 1/4 (514)	3 3/4 (95)	7 1/2 (191)	4 (102)	4 5/8 (117.5)	3 (76)
3	240	14.0	3	1	LDH14SX3S	C2-236	C2-214	55 (25)	28 1/4 (718)	20 1/4 (514)	3 3/4 (95)	7 1/2 (191)	4 (102)	4 5/8 (117.5)	3 (76)
3	480	14.0	1	1	LDH14SX11S	C/F	C/F	55 (25)	28 1/4 (718)	20 1/4 (514)	3 3/4 (95)	7 1/2 (191)	4 (102)	4 5/8 (117.5)	3 (76)
3	480	14.0	3	1	LDH14SX5S	C2-43	C2-35	55 (25)	28 1/4 (718)	20 1/4 (514)	3 3/4 (95)	7 1/2 (191)	4 (102)	4 5/8 (117.5)	3 (76)
6	240	27.0	1	3	LDH27SX10S	C/F	C/F	65 (30)	28 1/4 (718)	20 1/4 (514)	6 3/4 (171)	10 1/2 (267)	7 (178)	7 5/8 (193.7)	3 (76)
6	240	27.0	3	2	LDH27SX3X	C2-218	C2-224	65 (30)	28 1/4 (718)	20 1/4 (514)	6 3/4 (171)	10 1/2 (267)	7 (178)	7 5/8 (193.7)	3 (76)
6	480	27.0	1	2	LDH27SX11S	C/F	C/F	65 (30)	28 1/4 (718)	20 1/4 (514)	6 3/4 (171)	10 1/2 (267)	7 (178)	7 5/8 (193.7)	3 (76)
6	480	27.0	3	1	LDH27SX5S	C2-225	C2-226	65 (30)	28 1/4 (718)	20 1/4 (514)	6 3/4 (171)	10 1/2 (267)	7 (178)	7 5/8 (193.7)	3 (76)
9	240	41.0	3	3	LDH41SX3S	C4-144	C4-145	120 (55)	28 1/4 (718)	20 1/4 (514)	9 3/4 (248)	13 1/2 (343)	10 (254)	10 5/8 (269.9)	3 (76)
9	480	41.0	1	3	LDH41SX11S	C/F	C/F	120 (55)	28 1/4 (718)	20 1/4 (514)	9 3/4 (248)	13 1/2 (343)	10 (254)	10 5/8 (269.9)	3 (76)
9	480	41.0	3	3	LDH41SX5S	C4-150	C4-151	120 (55)	28 1/4 (718)	20 1/4 (514)	9 3/4 (248)	13 1/2 (343)	10 (254)	10 5/8 (269.9)	3 (76)
12	240	54.0	3	4	LDH54SX3S	C4-148	C4-149	135 (62)	28 1/4 (718)	20 1/4 (514)	12 3/4 (324)	16 1/2 (419)	13 (330)	13 5/8 (346.1)	3 (76)
12	480	54.0	1	3	LDH54SX11S	C/F	C/F	135 (62)	28 1/4 (718)	20 1/4 (514)	12 3/4 (324)	16 1/2 (419)	13 (330)	13 5/8 (346.1)	3 (76)
12	480	54.0	3	2	LDH54SX5S	C2-229	C2-230	135 (62)	28 1/4 (718)	20 1/4 (514)	12 3/4 (324)	16 1/2 (419)	13 (330)	13 5/8 (346.1)	3 (76)
15	240	68.0	3	5	LDH68SX3S	C/F	C/F	195 (89)	28 1/4 (718)	20 1/4 (514)	15 3/4 (400)	19 1/2 (495)	16 (406)	17 7/8 (454.0)	3 (76)
15	480	68.0	1	3	LDH68SX11S	C/F	C/F	195 (89)	28 1/4 (718)	20 1/4 (514)	15 3/4 (400)	19 1/2 (495)	16 (406)	17 7/8 (454.0)	3 (76)
15	480	68.0	3	5	LDH68SX5S	C4-152	C4-153	195 (89)	28 1/4 (718)	20 1/4 (514)	15 3/4 (400)	19 1/2 (495)	16 (406)	17 7/8 (454.0)	3 (76)
18	240	80.0	3	6	LDH80SX3S	C/F	C/F	205 (93)	28 1/4 (718)	20 1/4 (514)	18 3/4 (476)	22 1/2 (572)	19 (483)	20 7/8 (530.2)	3 (76)
18	480	80.0	1	6	LDH80SX11S	C/F	C/F	205 (93)	28 1/4 (718)	20 1/4 (514)	18 3/4 (476)	22 1/2 (572)	19 (483)	20 7/8 (530.2)	3 (76)
18	480	80.0	3	3	LDH80SX5S	C4-152	C4-153	205 (93)	28 1/4 (718)	20 1/4 (514)	18 3/4 (476)	22 1/2 (572)	19 (483)	20 7/8 (530.2)	3 (76)
21	240	95.0	3	7	LDH95SX3S	C/F	C/F	235 (107)	28 1/4 (718)	20 1/4 (514)	21 3/4 (552)	25 1/2 (648)	22 (559)	23 7/8 (606.4)	3 (76)
21	480	95.0	1	7	LDH95SX11S	C/F	C/F	235 (107)	28 1/4 (718)	20 1/4 (514)	21 3/4 (552)	25 1/2 (648)	22 (559)	23 7/8 (606.4)	3 (76)
21	480	95.0	3	7	LDH95SX5S	C4-156	C4-157	235 (107)	28 1/4 (718)	20 1/4 (514)	21 3/4 (552)	25 1/2 (648)	22 (559)	23 7/8 (606.4)	3 (76)
21	240	120.0	3	7	LDH120SX3S	C/F	C/F	260 (118)	33 (838)	25 (635)	21 3/4 (552)	25 1/2 (648)	22 (559)	23 7/8 (606.4)	3 (76)
21	480	120.0	1	7	LDH120SX11S	C/F	C/F	260 (118)	33 (838)	25 (635)	21 3/4 (552)	25 1/2 (648)	22 (559)	23 7/8 (606.4)	3 (76)
21	480	120.0	3	7	LDH120SX5S	C4-156	C4-157	260 (118)	33 (838)	25 (635)	21 3/4 (552)	25 1/2 (648)	22 (559)	23 7/8 (606.4)	3 (76)
21	480	160.0	3	7	LDH160SX5S	C/F	C/F	290 (132)	40 1/2 (1029)	32 1/2 (826)	21 3/4 (552)	25 1/2 (648)	22 (559)	23 7/8 (606.4)	3 (76)
21	480	200.0	3	7	LDH200SX5S	C/F	C/F	310 (141)	49 1/2 (1257)	41 1/2 (1054)	21 3/4 (552)	25 1/2 (648)	22 (559)	23 7/8 (606.4)	3 (76)
24	480	225.0	3	8	LDH225SX5S	C/F	C/F	330 (150)	49 1/2 (1257)	41 1/2 (1054)	24 3/4 (629)	28 1/2 (724)	25 (635)	26 7/8 (682.6)	3 (76)

Notes:

- See *Watt Density vs. Air Temperature/Velocity* charts on page 379 to confirm suitability in the application.

C/F - Contact factory, go to www.watlow.com/en/contact-us

Air Heaters



Duct Heaters

LDH SERIES and D SERIES

Part Number

Stock Duct Part Number	Optional Terminal Enclosures	Optional Process Sensors	Sheath Limit Sensors

Stock Duct Part Number

Note: Catalog part numbers include optional enclosures. To order optional enclosures or sensors, substitute the appropriate suffix.

Optional Terminal Enclosures

S = General purpose enclosure

W = Moisture resistant enclosure

Note: Catalog listing is a general purpose enclosure. Substitute enclosure options are noted.

Optional Bulb & Capillary Thermostats or Thermocouple Process Sensors

PJ = Type J process thermocouple in thermowell

PK = Type K process thermocouple in thermowell

Sheath Limit Sensors

HJ = Type J high-limit thermocouple

HK = Type K high-limit thermocouple

Example Part Number: D6SX10 S J HJ