

Standard Duct Heaters

Open Coil

QUA Slip-In and QUZ Flanged Heaters

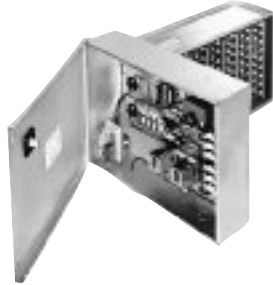


Figure 44.

INDEECO has developed QUA (Figure 44) and QUZ (Figure 46) heater lines to satisfy most typical space heating requirements, simplifying specification, ordering and delivery.

Both standard and quick ship delivery programs are available for the full line of QUA and QUZ heaters.

KW Ratings

QUA and QUZ heaters are available up to 456 KW. The KW ratings are limited both by frame size and electrical characteristics. Heater availability can be determined by contacting an INDEECO representative, who can provide a computerized heater selection with exact heater dimensions in minutes.

Frame Sizes

The use of a standard open coil QUA slip-in heater will both reduce cost and permit rapid shipment. QUA frame sizes range from the smallest at 8" wide by 6" high to the largest 48" wide by 40" high or 72" wide by 30" high. The QUA offering has been opened up to allow for any duct size in between these sizes and includes fractional widths and heights dimensions (i.e. 24.625" by 17.25"). INDEECO can manufacture a custom slip-in frame size if your requirements exceed the QUA offering.

The 80% Rule – INDEECO recommends the heater should occupy at least 80% of the actual inside area of the duct, as shown in Figure 45. Only small amounts of air will bypass the heater around its perimeter and normal turbulence will rapidly mix this unheated air with heated air downstream.

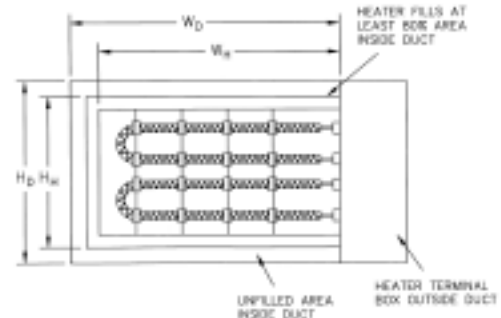


Figure 45.

All QUA heaters may be installed in ducts with up to 1" of interior lining, but the heater must be selected to fit the inside duct dimensions. For example, to fit a duct with 36" x 16" outside dimensions, but with 1" of interior insulation, specify a 35" x 14" heater.

QUZ flanged open coil heater frame sizes range from the smallest at 8" wide by 6" high to the largest at 48" wide by 38" high or 72" wide by 28" high or any duct size in between these sizes (i.e. 35.75" by 27.75"). QUZ cannot be used with interior lined ducts. If you require a frame size not offered by the QUZ then INDEECO can manufacture a custom frame size to meet virtually any application.



Figure 46.

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Table VII

Commonly used duct widths and heights are shown in the charts below, in-between widths and heights are also available as standard QUA (slip-in) and QUZ (flanged) duct heaters.

Sizes and Maximum KW Ratings

		Duct Height											
		6"	8"	10"	12"	14"	16"	18"	20"	24"	30"	36"	40"
Duct Width	8"	6	9	12	16	19	22	25	28	35	45	54	61
	10"	8	12	16	20	24	28	33	37	45	57	70	78
	12"	10	15	20	25	30	35	40	45	55	70	85	96
	14"	11	17	23	29	35	41	47	53	65	83	101	113
	16"	13	20	27	34	41	48	55	62	75	96	117	131
	18"	15	23	31	39	46	54	62	70	85	109	132	148
	20"	17	26	34	43	52	61	69	78	96	122	148	165
	22"	19	28	38	48	57	67	77	86	106	135	164	183
	24"	21	31	42	52	63	74	84	95	116	148	179	200
	26"	22	34	45	57	68	80	91	103	126	160	195	218
	28"	24	37	49	62	74	86	99	111	136	173	211	235
	30"	26	39	53	66	79	93	106	119	146	186	226	253
	32"	28	42	57	71	85	99	114	128	156	199	242	270
	34"	30	45	60	75	91	106	121	136	166	212	257	288
	36"	32	48	64	80	96	112	128	144	176	225	273	305
	38"	34	51	68	85	102	119	136	153	187	238	289	323
	40"	35	53	71	89	107	125	143	161	197	251	304	340
	42"	37	56	75	94	113	131	150	169	207	263	320	358
44"	39	59	79	98	118	138	158	177	217	276	336	375	
48"	43	64	86	108	129	151	172	194	237	302	367	410	
54"	48	73	97	121	146	170	194	219	268	341	—	—	
60"	54	81	108	135	162	189	216	244	298	379	—	—	
66"	59	89	119	149	179	209	239	268	328	418	—	—	
72"	65	97	130	163	195	228	261	293	359	456	—	—	

Type QUA Slip-in Heater

Maximum KW ratings in available frame sizes shown at left.

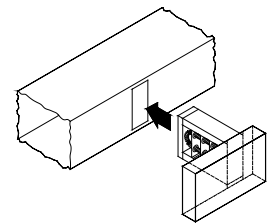


Figure 47.
Installation of Slip-in Heater

		Duct Height											
		6"	8"	10"	12"	14"	16"	18"	22"	28"	30"	34"	38"
Duct Width	8"	11	14	18	22	25	29	33	40	51	55	62	69
	10"	13	18	22	27	32	36	41	50	64	68	78	87
	12"	16	22	27	33	38	44	49	60	77	82	93	104
	14"	19	25	32	38	45	51	57	70	90	96	109	122
	16"	22	29	36	44	51	58	66	80	102	110	125	139
	18"	24	33	41	49	57	66	74	91	115	124	140	157
	20"	27	36	45	55	64	73	82	101	128	137	156	174
	22"	30	40	50	60	70	80	91	111	141	151	171	192
	24"	33	44	55	66	77	88	99	121	154	165	187	209
	26"	35	47	59	71	83	95	107	131	167	179	203	227
	28"	38	51	64	77	90	102	115	141	180	193	218	244
	30"	41	55	68	82	96	110	124	151	193	206	234	262
	32"	44	58	73	88	102	117	132	161	205	220	250	279
	34"	46	62	78	93	109	125	140	171	218	234	265	296
	36"	49	66	82	99	115	132	148	182	231	248	281	314
	38"	52	69	87	104	122	139	157	192	244	262	296	331
	40"	55	73	91	110	128	147	165	202	257	275	312	349
	42"	57	77	96	115	135	154	173	212	270	289	328	366
44"	60	80	101	121	141	161	182	222	283	303	343	384	
48"	66	88	110	132	154	176	198	242	308	331	375	419	
54"	74	99	124	148	173	198	223	273	347	—	—	—	
60"	82	110	137	165	193	220	248	303	386	—	—	—	
66"	91	121	151	182	212	242	273	333	424	—	—	—	
72"	99	132	165	198	231	264	297	364	463	—	—	—	

Type QUZ Flanged Heater

Maximum KW ratings in available frame sizes shown at left.

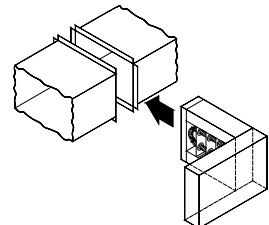


Figure 48.
Installation of Flanged Heater

Note: Maximum KW ratings may vary based on voltage and phase combination.

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Detail Dimensions

The wide variety of QUA and QUZ (Figures 47 and 48) heaters makes it impractical to list the exact heater dimensions for every possible heater. For dimensional details, contact your local INDEECO representative.

Voltage and Phase

Heaters are available in the voltage and phase combinations shown below. All are for operation at 50 or 60 Hz.

When three-phase is specified, each heating stage will be furnished with a multiple of three elements to give a balanced three-phase load.

Voltage	120 208 240 277	208 240 380 400 415 480 600
Phase	1	3

Control Circuit Options & Special Features

QUA and QUZ heaters are available with Control Options G, J and K and a full range of Special Features. These are described briefly in **Table VIII** and in more detail in the standard Control Options section of this catalog, pages 10 and 11.

Number of Heating Stages

Single and three-phase QUA and QUZ heaters are available with multiple heating stages. To comply with our UL and NEC maximum circuit sizes, no stage is rated at more than 48 amps.

Table VIII
Control Options

Control Option	Disconnect Switch	Thermal Cutouts	Airflow Switch	Contactors	Control Transformer	Fuses	PE Switches	SCR	Thermostat
G Basic	■	■	■	■	■	■ ¹			
J Pneumatic	■	■	■	■ ²	■ ³	■ ¹	■		
K Proportional	■	■	■	■ ²	■	■ ¹		■	■ ⁴

Notes: 1. Fuses supplied only on heaters over 48 amps.
 2. Contactors supplied only when other devices cannot carry heater load.
 3. Transformer only supplied on heaters rated higher than 277 volts.
 4. Choice of room or duct thermostat, 135 ohms, 2200 ohms, 0-10 VDC or 4-20 mA inputs.
 See pages 12 and 13 for full description of thermostats.



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Special Features

While QUA slip-in and QUZ flanged heaters may be specified with one of the standard control circuit options, individual job requirements may demand slight variations from the standards. The most common variations are covered by INDEECO's set of Special Features which may be used to

modify QUA/QUZ heaters both mechanically and electrically. These are listed in **Table IX** with a brief description, availability, and notes on any limitations of their use.

Table X provides a summary of thermostats offered with INDEECO QUA/QUZ heaters. See pages 12 and 13 for more detailed descriptions.

Table IX

Special Features	Special Feature Code	Description	Page Ref.	Availability & Limitations
Mechanical				
Horizontal Airflow	U8	Allows heater to be used in applications where airflow is either right (U4) or left (U6)	23	Available on all heaters.
Vertical Airflow	U9	Allows heater to be used in applications where airflow is either vertical up (U3) or vertical down (U5.)	23	Available on all heaters.
Pressure Plate	V1	40% open perforated plate installed onto the inlet side of the heater frame to help even out irregular airflow patterns.	35	Available on all heaters. Exact airflow direction must be specified U3, U4, U5 or U6.
Protective Screen	V/V2	Wire mesh screen for attachment to the heater frame. Can be furnished for one or both sides.	36	Available on all heaters. Screens are shipped loose for field installation.
Stainless Steel Frame and Terminal Box	H2	Heater frame and terminal box constructed of 304 stainless steel.		Available on all heaters.
Aluminized Steel Frame and Terminal Box	H1	Heater frame and terminal box constructed of aluminized steel.		Available on all heaters.
Insulated Duct Construction for Slip-in Heaters	GG2	Used in ducts lined with more than 1" thick interior insulation. Inside duct dimensions and insulation thickness must be specified. Maximum 6" thick lining.	36	Available with QUA heaters only.
Unheated Sections	G2	Extended terminal pins to provide an unheated section adjacent to the heater terminal box. Maximum extended terminal pin length of 6".	36	Available on all heaters.
Substitute Negative Pressure Switch	Q5/Q6	Allows heater to be used on inlet side of fan.	15	Available on all heaters.



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Table IX (continued)

Special Features	Special Feature Code	Description	Page Ref.	Availability & Limitations
Mechanical (cont.)				
Right/Down Terminal Box Overhang	L4/L5	Heater will be supplied with terminal box overhang on right (if horizontal airflow installation) or downward (if vertical airflow installation).	23	Available on all heaters.
Insulated Terminal Box	B2	Prevents condensation inside terminal box when heater is installed in air conditioning duct running through un-airconditioned area.	35	Available on all heaters.
Dust-Tight Terminal Box	B7	Allows installation in dusty areas and satisfies local codes requiring dust-tight box, if installed in area used as return air plenum.	34	Available on all heaters.
Remote Panelboard	B5	All controls except thermal cutouts, airflow switch and pilot switch will be supplied in a separate NEMA 1 panelboard.	37	Available on all heaters except when transformer and contactors are deleted.
Electrical				
Add "Stage On" Pilot Light(s)	P1	To indicate when each heating stage is producing heat.	17	Available on all heaters except Option K SCR stages.
Add "Low Airflow" and "Heater On" Pilot Lights	P2, P3	Separate pilot lights to indicate that power has been supplied to the heater, that it is ready for operation, and whether airflow has been interrupted.	17	Available on all heaters. When fan relay has been substituted for airflow switch, only "Heater On" will be supplied.
Fan Relay	N(000)	When static pressure in the duct is too low (below .07" WC) to operate the airflow switch or when airflow switch is not desired. (000) denotes holding coil 24, 120, 208, 240, or 277 volts.	15	Available on Option G & K heaters except Option G heaters where deletion of contactors and transformers is specified.
Add INDEECO Electronic Step Controller	S	Allows better temperature control of high capacity heater by using multiple stages controlled by electronic thermostat and step controller.	19-20	Only available on Option G heaters with 2 or more heating stages.
Low Watt Density Coils	D3, D4	To meet specifications which call for low watt density coils.		Available on all heaters.
Add Built-in PE Transducer	E32, S19	To allow for pneumatic control.	13	Available on Option K heaters or Option G heaters with step controller and 5 or more stages.
Transformer Primary Fusing	T1	Add transformer primary fusing.		Available with all heaters with built-in transformer.

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Table IX (continued)

Special Features	Special Feature Code	Description	Page Ref.	Availability & Limitations																					
Electrical (cont.)																									
Delete Transformer		Allows control circuit to be obtained from source outside the heater or, when line voltage is equal to control voltage, directly from power lines within the heater.	16	Only available on Option G heaters. Must be specified if control voltage is not 120 or 24 volts. Customer must specify control volts.																					
Delete Transformer & Contactors		Allows for control of heater directly using load carrying thermostats.	16	Available only on single stage, single-phase, Option G heaters with KW not exceeding the following. <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">Voltage</td> <td style="text-align: center;">120</td> <td style="text-align: center;">277</td> </tr> <tr> <td style="text-align: center;">Max. KW</td> <td style="text-align: center;">1.8</td> <td style="text-align: center;">4.1</td> </tr> </table>	Voltage	120	277	Max. KW	1.8	4.1															
Voltage	120	277																							
Max. KW	1.8	4.1																							
Transformer Secondary Fusing	T3	External fused and grounded transformer secondary for Class II 24 volt control circuits.		Available on all heaters.																					
Additional User Control Circuit Voltage		Heater control circuit transformer sized for additional user VA. A control terminal block is furnished for field connection.		Available on all heaters. Consult factory for 1 week or 72 hour heater availability.																					
Delete Disconnect		Allows for use of field installed disconnecting means. (Must be within sight of the heater.)	16	Available on all heaters.																					
Fused Disconnect Switch	Q1	Door interlocking disconnect with line fusing for heaters loads up to 48 amps or less.	16	Available on all heaters.																					
Linear Limit Automatic Reset Thermal Cutout	Z/Z1	Automatic reset linear limit thermal cutout wired in series with the disc type automatic reset to provide redundant primary over temperature protection.	14	Available on all heaters. Exact airflow direction must be specified U3, U4, U5 or U6.																					
Add Fuses for Heaters Rated 48 Amps or Less	F1	Allows for addition of one set of fuses to low amperage heaters that do not need internal fusing to meet UL and NEC requirements	16	Available on all heaters whose KW is lower than or equal to the following. (Other heaters include fusing as standard): <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Line Volts</th> <th colspan="2" style="text-align: center;">KW (at 48 amps)</th> </tr> <tr> <th></th> <th style="text-align: center;">1 Phase</th> <th style="text-align: center;">3 Phase</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">120</td> <td style="text-align: center;">5.7</td> <td style="text-align: center;">-</td> </tr> <tr> <td style="text-align: center;">208</td> <td style="text-align: center;">9.9</td> <td style="text-align: center;">17.2</td> </tr> <tr> <td style="text-align: center;">240</td> <td style="text-align: center;">11.5</td> <td style="text-align: center;">19.9</td> </tr> <tr> <td style="text-align: center;">277</td> <td style="text-align: center;">13.2</td> <td style="text-align: center;">-</td> </tr> <tr> <td style="text-align: center;">480</td> <td style="text-align: center;">23.0</td> <td style="text-align: center;">39.9</td> </tr> </tbody> </table>	Line Volts	KW (at 48 amps)			1 Phase	3 Phase	120	5.7	-	208	9.9	17.2	240	11.5	19.9	277	13.2	-	480	23.0	39.9
Line Volts	KW (at 48 amps)																								
	1 Phase	3 Phase																							
120	5.7	-																							
208	9.9	17.2																							
240	11.5	19.9																							
277	13.2	-																							
480	23.0	39.9																							

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Table X

Summary of Thermostats Available with Option G or K Heaters (No Thermostats are supplied on Option J Heaters)

Type of Thermostat		Used with Control Option	Catalog Number	Comments	
ROOM	Pilot Duty	1 Stage	G	1006998 (Fig.11)	Rated for 30 volts max. Offered with Duct Heater Selection
		1 Stage	G	1023721 (Fig. 12)	Digital Display, Rated for 30 volts max. Special Ordered
		2 Stage	G	1007030 (Fig. 13)	Digital Display, Rated for 30 volts max.
		2 or 3 Stage	G	1023723 (Fig. 14)	Programmable with Digital Display, Rated for 30 volts max.
	† Proportional Electronic		G or K	SCR Controlled or 2-4 Stages 1016941 (Fig. 16) Vernier Controlled or over 4 Stages 1007101 (Fig. 15)	With Option G, can be used only when step controller is also specified
DUCT	Pilot Duty	1 Stage	G	1023953 (Fig. 18)	Rated for 277 volts max.
		2 Stage	G	1007044 (Fig. 19)	Rated for 277 volts. max.
	† Proportional Electronic		G or K	SCR Controlled or 2-4 Stages 1016942, 1016941 (Fig. 21) Vernier Controlled or over 4 Stages 101083, 101068 (Fig. 20)	With Option G, can be used only when step controller is also specified.
† No Thermostat (Special inputs for controller or SCR when customer supplied thermostat is used)		G or K	— — —	2200 ohm Input 135 ohm Input 4-20 mA Input 0-10 VDC Input	



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QUA/QUZ – Sample Specification

A job specification can be prepared by using the following information. Simply darken the applicable circles. Material which is part of the basic specification has already been darkened. Additional copies of this specification guide are available from your local INDEECO representative.

- 1. Duct heaters shall be INDEECO
 - Type QUA Standard Slip-in Heaters
 - Type QUZ Standard Flanged Heaters
- 2. Approvals – Heaters and panelboards (if required) shall meet the requirements of the National Electrical Code and shall be listed by Underwriters Laboratories for zero clearance to combustible surfaces and for use with heat pumps and air conditioning equipment.
- 3. Heating elements shall be open coil, 80% nickel, 20% chromium, Grade A resistance wire. Type C alloys containing iron or other alloys are not acceptable. Coils shall be machine crimped into stainless steel terminals extending at least 1" into the airstream and all terminal hardware shall be stainless steel. Coils shall be supported by ceramic bushings staked into supporting brackets.
- 4. Heater frames and terminal boxes shall be corrosion resistant steel. Unless otherwise indicated, the terminal box shall be NEMA 1 construction and shall be provided with a hinged, latching cover and multiple concentric knockouts for field wiring.
- 5. All heaters shall be furnished with a disc type, automatic reset thermal cutout for primary over-temperature protection. All heaters shall also be furnished with disc type, load carrying manual reset thermal cutouts, factory wired in series with heater stages for secondary protection. Heat limiters or other fusible overtemperature devices are not acceptable.
- 6. Heaters shall be rated for the voltage, phase, and number of heating stages indicated in the schedule. All three-phase heaters shall have equal, balanced, three-phase stages. All internal wiring shall be stranded copper with 105°C insulation and shall be terminated in crimped connectors or box lugs.
- 7. Terminal blocks shall be provided for all field wiring and shall be sized for installation of 75°C copper wire rated in accordance with NEC requirements.
- 8. Heaters shall be furnished, either with the Control Option specified in the schedule and described below, or with the specific components listed in the schedule.
 - Option G – Thermal cutouts, airflow switch, contactors, fuses (if over 48 amps), control circuit transformer (where required) and built-in, snap-acting, door interlocked disconnect switch.
 - Option J – Thermal cutouts, airflow switch, PE switches, contactors (where required), fuses (if over 48 amps), control circuit transformer (where required), and built-in snap-acting door interlocked disconnect switch.
 - Option K – Thermal cutouts, airflow switch, contactors (where required), SCR (with step controller if heater draws over 96 amps three-phase or 192 amps single-phase), fuses (if over 48 amps), control circuit transformer, and built-in snap-acting door interlocked disconnect switch.
- 9. When specified in the schedule, or below, heaters will be supplied with the following Special Features:
 - Airflow switch for negative pressure operation
 - Insulated terminal box
 - Dust-tight terminal box
 - Stainless steel frame and terminal box
 - Aluminized steel frame and terminal box
 - Insulated duct construction for slip-in heaters (>1" ≤6" thick lining)
 - Unheated section (≤6" terminal pin)
 - Pressure plate
 - Protective screen(s); ○ one side ○ both sides
 - Controls mounted in NEMA 1 remote panelboard
 - Deletion of transformer
 - Deletion of transformer and contactor
 - Transformer primary fusing
 - Transformer secondary fusing (Class II)
 - Additional user control circuit voltages (specify user VA)
 - Deletion of disconnect switch
 - Fused disconnect switch (≤ 48 amps)
 - Fusing for heaters rated 48 amps or less
 - "Low Airflow" pilot light
 - "Heater On" pilot light
 - Each "Stage On" pilot light(s)
 - Fan relay (instead of airflow switch)
 - Fan relay (in additional to airflow switch)
 - Step controller
 - Linear limit automatic reset thermal cutout
 - 25 watts per square inch resistance coils
 - 35 watts per square inch resistance coils
 - Built-in PE transducer
- 10. When specified in the schedule, or below, heaters shall be supplied with the following thermostats:
 - Pilot duty single stage room thermostat
 - Pilot duty digital display single stage room thermostat
 - Pilot duty two stage digital display room thermostat
 - Pilot duty two or three stage programmable with digital display room thermostat
 - Proportional electronic room thermostat
 - Pilot duty single stage duct thermostat
 - Pilot duty two stage duct thermostat
 - Proportional electronic duct thermostat with set point adjuster
 - Special inputs (135 ohms, 2200 ohms, 4-20 mA, 0-10 VDC)