

1943

**THE DUNHAM**  
*Victory Line*

**VAPOR AND VACUUM  
HEATING SPECIALTIES**

**Radiator Traps • Radiator Valves**

**Float and Thermostatic Traps**

**Closed Float Traps • Return Traps**

**Strainers • Unit Heaters**

**Vacuum and Condensation Pumps**

*The Dunham Differential  
Steam Heating System  
Circulating Sub-Atmospheric Steam*

**C. A. DUNHAM COMPANY**

**450 E. OHIO STREET, CHICAGO, ILL.**

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The "Victory Line" Vapor and Vacuum Heating Specialties meet Government wartime specifications. Sub-atmospheric Steam Heating Systems using "Victory Line" products are available.

"Dunham Heating Service" is available through the telephone in principal cities, or by correspondence to C. A. Dunham Co., 450 E. Ohio St., Chicago

### THE DUNHAM "VICTORY" THERMOSTATIC RADIATOR TRAP

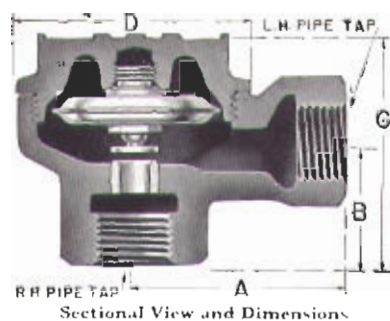
For Operating Pressures Up to 15 Lbs. Gage

Cast iron body and cap. Thermostatic element is phosphor bronze. Valve and valve seat are cuprous alloys. Thermostatic elements are interchangeable in covers without gages. "Victory Line" covers and disc assemblies are interchangeable with standard traps.

Connections are female left-hand threaded inlet and female right-hand threaded outlet.



Type V1-A Radiator Trap



Type No.	Catalog No.	Size In.	Patt. No.	Cap. Sq. Ft. EDR	Net Wgt. Lbs.	Dimensions in Inches			
						A	B	C	D
V1-A	ITL2A	1/2	AP	200	1 3/4	2 1/4	1 1/2	2 3/4	2 7/8
V2-B	ITL4A	3/4	AP	400	2 1/4	2 3/4	1 3/4	2 3/4	3 1/8
V3-A	ITL7A	1	AP	700	2 3/4	2 3/4	1 3/4	2 3/4	3 1/8



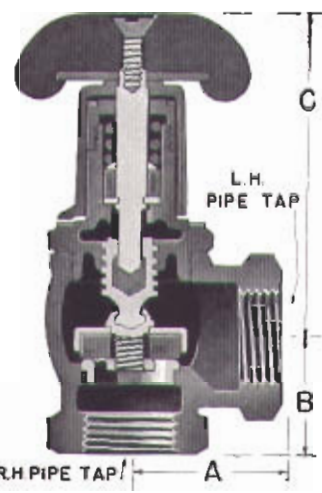
Type V-740 Radiator Valve

### THE DUNHAM "VICTORY" RADIATOR VALVE (SPRING PACKED)

Especially adaptable for radiators with top inlet connection because of its non-rising handle and low bonnet. The body and bonnet are cast iron, handle is non-breakable, heat resisting composition. Other construction features: Quick opening with less than one turn of handle; heat-resisting graphited asbestos ring with metal core. Held under compression by heavy coil spring to maintain tight seal around valve stem; ball joint insures perfect seating when valve is closed on rounded valve seat; high quality renewable composition disc.

Made in 3/4 and 1-in. sizes angle pattern only with tapped right-hand female inlet, left-hand female outlet.

Type No.	Catalog No.	Size Inches	Dimensions in Inches			Net Weight in Lbs.
			A	B	C	
V-740 3/4	ISW1 3/4	3/4	1 3/4	1 1/2	3 3/8	1 1/2
V-740 1	ISW1 1	1	1 3/4	1 3/8	3 3/8	2 3/8



Sectional View and Dimensions

### THE DUNHAM "VICTORY" FLOAT AND THERMOSTATIC TRAP

V-30 Series For Operating Pressures Up to 15 Lbs. Gage

The trap is comprised of a cover and mechanism assembly and a body. Thermostatic disc and valve controls flow through a cored passage between the trap body and the discharge tapping for the release of air. The float is cuprous material. The float valve and seat are monel metal. Thermostat elements are interchangeable. The trap body can be readily removed without disturbing piping connections to fully expose the working parts for inspection. "Victory Line" covers and disc assemblies are interchangeable with standard traps. All traps are tapped so that gage

glass set may be applied, but traps are shipped plugged, and bottom plug can be used for flushing out trap.

Capacities are based on a rate of 1/4 lb. condensate per sq. ft. of EDR per hour, at a pressure difference between inlet and outlet of 2 lb. gage. Where the pressure difference is constantly maintained greater than 2 lb., the capacity is increased. Table of capacities at various pressure differences furnished on request.

Connections are female right-hand threaded inlet and outlet.

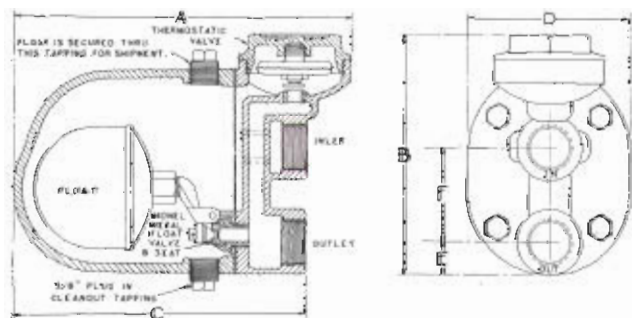


Fig. 1656B—Traps 30-1 to 30-4 inclusive

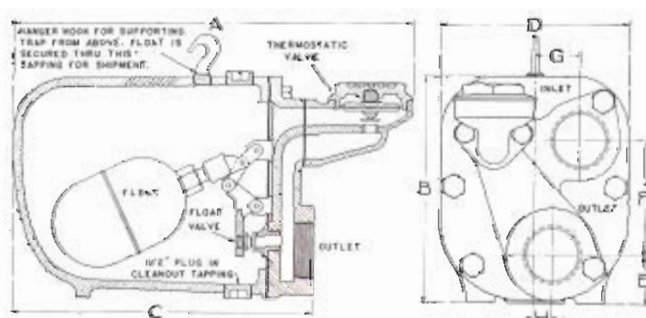


Fig. 1162D—Traps 30-5 to 30-8 inclusive

**CAPACITY TABLE V-30 SERIES**

Type No.	Catalog No.	Capacity Sq. Ft. EDR	Size Connection Inches	Net Weight Lbs.	Dimensions in Inches							
					A	B	C	D	E	F	G	H
V30-1	IFT8 1/2	800	1 1/2	6 3/4	7 1/4	6 1/4	6 3/4	3 1/2	11 3/8	2	On Center Line	On Center Line
V30-2	IFT8 3/4	800	3/4	6 3/4	7 1/4	6 3/4	6 3/4	3 1/2	11 3/8	2	On Center Line	On Center Line
V30-3	IFT28 1/2	2,800	1 1/2	9 1/4	8 3/4	6 1/4	7 3/4	4 1/2	15 3/8	2 1/2	On Center Line	On Center Line
V30-4	IFT28 3/4	2,800	3/4	9 1/4	8 3/4	6 1/4	7 3/4	4 1/2	15 3/8	2 1/2	On Center Line	On Center Line
V30-5	IFT481 1/2	4,800	1 1/2	17 1/4	12	6 3/4	9 1/4	5 1/2	1 3/8	3 1/4	1 3/8	On Center Line
V30-6	IFT481 3/4	4,800	3/4	20	12	6 3/4	9 1/4	6	1 3/8	3 1/4	1 3/8	On Center Line
V30-7	IFT961 1/2	9,600	1 1/2	36	15 1/4	11	12 1/4	7 1/4	3 3/4	4 1/4	1 3/8	On Center Line
V30-8	IFT2002	20,000	2	60	19	12	15 3/8	9 1/2	2 1/4	6 3/8	1 3/8	On Center Line

**THE DUNHAM "VICTORY" CLOSED FLOAT TRAP**

V-31 Series For Operating Pressures Up to 15 Lbs. Gage

This trap is designed to release water only from low pressure steam installations. It may be used for dripping rise in steam main, and other applications where no air is to be banded. These traps

are similar in design to the Float and Thermostatic Trap except the thermostatic feature is omitted.

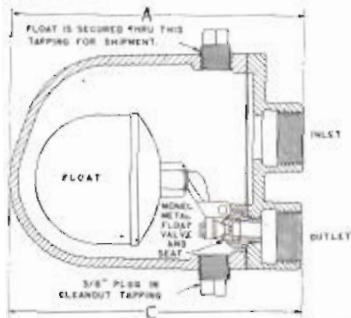


Fig. 1698B

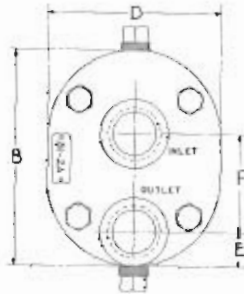


Fig. 1725A

Type No.	Catalog No.	Size of Connection Screwed	Capacity Sq. Ft. EDR	Net Weight Lbs.	Dimensions in Inches							
					A	B	C	D	E	F	G	H
V31-1A	IFC8 1/2	3/4	800	6 1/2	6 3/4	5 1/2	5 3/4	4 1/4	1 3/8	2 1/2	On Center Line	On Center Line
V31-2A	IFC8 3/4	3/4	800	6 1/2	6 3/4	5 1/2	5 3/4	4 1/4	1 3/8	2 1/2	On Center Line	On Center Line
V31-3	IFC28 1/2	1 1/2	2,800	8 1/2	7 3/4	5 1/2	7 3/4	4 1/4	1 3/8	2 1/2	On Center Line	On Center Line
V31-4	IFC28 3/4	3/4	2,800	8 1/2	7 3/4	5 1/2	7 3/4	4 1/4	1 3/8	2 1/2	On Center Line	On Center Line
V31-5	IFC481 1/2	1 1/2	4,800	15	11	6 3/4	9 1/4	5 1/2	1 3/8	3 1/4	1 3/8	On Center Line
V31-6	IFC481 3/4	3/4	4,800	17	11	6 3/4	9 1/4	6	1 3/8	3 1/4	1 3/8	On Center Line
V31-7	IFC961 1/2	1 1/2	9,600	31	19	11	12 1/4	7 1/4	3 3/4	4 1/4	1 3/8	On Center Line
V31-8	IFC2002	2	20,000	40	19	12	15 3/8	9 1/2	2 1/4	6 3/8	1 3/8	On Center Line

**THE DUNHAM "VICTORY" RETURN TRAP**

For Operating Pressures Up to 15 Lbs. Gage



Return Trap

Made in five (5) sizes. The operating principle of all of these is similar. On lifting service they may be used for pressure differences up to the equivalent of 15 lbs.

Size No.	Catalog No.	Tapping, Inches				Net Weight Lbs.	Dimensions in Inches				
		I	II	III	IV		A	B	C	D	Width Overall
8	FR15	1 1/4	1 1/4	3/8	3/2	50	10 1/4	8 7/8	16 1/4	16 1/2	6 3/4
9	FR30	2	1 1/2	1/2	1	125	12 1/4	13 3/8	23 3/4	20	9 1/4
10	FR50	3	2	1/2	1	155	13 1/4	14 1/8	25 3/4	21 3/4	9 1/4
11	FR80	3	2 1/2	3/4	1 1/2	230	16 1/4	14 1/2	27 1/4	21 1/4	12 1/4
12	FR130	4	3	3/4	1 1/2	400	23 1/4	14 1/2	35 3/4	21 1/4	19

Capacities EDR at 6 in. between BWL and bottom of trap FR15—1500 ft.; FR30—3000 ft.; FR50—5000 ft.; FR80—8000 ft.; FR130—13,000 ft.

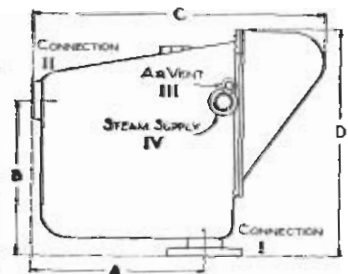


Fig. 863A

**THE DUNHAM "VICTORY" STRAINER**

For Operating Pressures Up to 200 Lbs. Gage



Strainer

This strainer is iron casting with removable cover and sieve. The sieve is formed of perforated brass sheet of the proper fineness for thorough straining of condensate. The sieve is inserted from the bottom and held in position by recesses in the body casting and cover. All sizes have right-hand female pipe tapings.

Type No.	Cat. No.	Con-nection	Net Wgt. Lbs.	Dimensions in In.			
				A	C	E	Over. Width
V211-1 1/2	SS 1 1/2	Screwed	1 1/2	5 1/2	3 1/2	2 1/2	2 1/4
V211-1 3/8	SS 1 3/8	Screwed	3	3 1/2	4 1/2	3 1/2	2 1/4
V211-1 1/4	SS 1 1/4	Screwed	3 1/2	1	4 1/2	3 1/2	2 1/4
V211-1 1/8	SS 1 1/8	Screwed	5	1 1/2	5 1/2	4 1/2	3 1/4
V211-1 1/2	SS 1 1/2	Screwed	10	1 1/2	6 1/2	5 1/2	4 1/4
V211-2"	SS 2"	Screwed	10	2	6 1/2	5 1/2	4 1/4

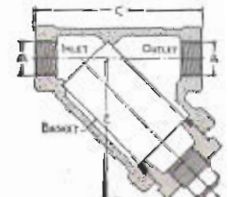


Fig. 3331

**DUNHAM "VICTORY" UNIT HEATERS TYPE V MODEL F**

Ferrous Coil

**Small Propeller Fan Type**

The Type V Model F Dunham Heater provides concentrated and sustained heating capacity in a rugged assembly designed for efficient handling of air with minimum resistance and air hum. The casing, finished standard in a rich gray, is neat, well-dressed and good looking. Its construction incorporates vibration-dampening features which contribute to the unusually quiet operation of the unit.



Front View

**THE CASING ASSEMBLY**—Heavy furniture steel, pressed to shape, is used throughout. The roll given the sides and the electric welding of sides to bottom contribute to the rigidity as well as to the pleasing appearance of the unit. The louvers are assembled in a form which permit individual adjustments as may be desired to direct the flow of heated air. The fan shroud is a one-piece steel tunnel which directs the air flow against the heating element and reduces noise and resistance. The motor, with fan mounted directly on its shaft, is attached to a heavy steel plate sub-base through a special resilient mounting which insulates the rest of the assembly from motor hum or vibration.

Fan blades are shaped and set to the proper pitch. Hubs are a one-piece casting. Blades are securely riveted to the hubs, and, after assembly, the fans are accurately balanced.

**APPLICATIONS**—Best performance from unit heaters can be assured by careful attention to selection and application with respect to (1) capacity and quietness requirements and (2) to location in space to be heated. The unit numbers indicate EDR capacities at "Normal" speed. Quietness requirements may sometimes make it desirable to select heaters on the basis of their "Medium"

or "Low" speed capacity, available with multispeed units which may be switched to "Medium" or "Low" after the heating-up period. We will gladly cooperate in determining your requirements.

**HANGING**—Type V Model F Heaters are provided with eye-bolts at the top of the casing to which hangers may be attached.

**HEATING ELEMENT**—The heating element which consists of round steel tubes welded to steel headers is constructed entirely of these ferrous materials. Deep ferrules in the header tube sheet provide a deep welding surface which assures tight joints at maximum pressures. Heavy steel fins are pressed tightly on the tubes in such a manner as to provide high heat conduction. The method of attaching tube and fin is unique in that each fin maintains mechanical pressure on the adjoining fin and thus provides a tight mechanical joint.

To equalize steam travel through the heating element, the supply and return tapings are located at opposite corners. The supply end of each tube is fitted with a restricting orifice to distribute the flow of steam uniformly and evenly throughout the supply header.

Heating elements withstand hydrostatic pressures of 500 lbs. per sq. in. and are suitable for working pressures up to 200 lbs. per sq. in.

When so ordered the Type V Model F units can be supplied with recirculating ducts extending to the floor.

**MOTORS**—Totally enclosed, unit heater type, resilient mounting, waste packed sleeve bearings.

**Single Phase Motors**—Constant speed "Normal" operation; no switch is supplied. Two speed "Normal" and "Low," two-speed switch supplied. Three speed operation, "Normal," "Medium" and "Low," speed controller supplied.

**Polyphase Motors**—Essentially constant speed. No switch is supplied.

**D. C. Motors**—Constant speed; no switch is supplied. Variable speed, speed controller supplied.

**CAPACITY TABLE TYPE V MODEL F UNIT HEATER  
(Ferrous Coil)**

**MOTOR DATA AND CAPACITIES AT STANDARD CONDITIONS—2 Pounds Steam and 60° Entering Air**

Unit Catalog No. and EDR. at Normal Speed	Motor H. P. at Normal Speed	Motor Data		Normal Speed					Low Speed					Approx. Shipping Weight Lbs.	
		Rev. per Min. (R.P.M.)		Btu.	C.F.M. at 70°	Cond.	F.T.	Outlet Vel.	Btu.	EDR.	C.F.M. at 70°	Cond.	F.T.		Outlet Vel.
		Normal	Low												
*V65F	1/50	1600	1260	15600	247	16.3	118.2	379	14640	61	198	15.3	128.2	304	90
*V95F	1/50	1600	1260	22800	316	23.8	122.6	514	20640	86	268	21.5	131.0	410	90
*V130F	1/30	1600	1260	31200	508	32.5	116.6	568	27840	116	406	29.0	123.2	453	113
*V155F	1/30	1600	1260	37200	588	38.8	118.3	657	30480	127	470	31.8	119.8	525	113
V190F	1/20	1140	570	45600	738	47.5	117.0	638	28560	119	370	29.8	131.2	320	170
V230F	1/12	1140	570	55200	1000	57.5	110.9	676	34320	143	500	35.8	123.3	338	190
V280F	1/12	1140	570	67200	1101	70.0	116.3	610	38800	162	550	40.5	125.5	305	190
V335F	1/12	1140	570	80400	1295	83.8	117.2	665	50160	209	648	52.3	131.4	332	215
V395F	3/8	1140	570	94800	1570	98.8	115.6	805	59520	248	785	62.0	129.9	402	225
V460F	1/6	1140	570	110400	1845	115.0	115.2	715	67200	280	922	70.0	127.2	358	250
V525F	1/4	1140	570	126000	2315	131.3	110.2	895	78480	327	1158	81.8	122.5	448	260
V600F	1/4	1140	570	144000	2465	150.0	113.9	760	90480	377	1232	94.3	127.7	380	308
V675F	3/8	1140	570	162000	2720	168.8	114.9	839	99840	416	1360	104.0	127.8	420	343
V785F	1/2	1140	570	188400	2982	196.3	118.3	740	120960	504	1490	126.0	134.8	370	357
V895F	1/2	1140	570	214800	3400	223.8	118.2	845	135840	566	1700	141.5	133.7	422	402

\*Available only with constant or three speed single phase and D. C. motors.

All units not marked thus \* are available with constant speed or two speed single phase motors; also with constant speed polyphase motors and constant or variable speed D. C. motors. Three speed single phase motors available on special order.

- 1 Btu. — total heat in discharged air.
- 2 Cond. — steam condensed in pounds per hour.
- 3 F. T. — temperature Fahrenheit of discharged air with free inlet and discharge.
- 4 cfm. at 70° — air delivery in cubic feet per minute measured at 70° F. and 29.22" of mercury barometric pressure, with entering air at 60° F. and steam at 2 pounds gage pressure in the heating element.

5 Capacities are based on recirculated air with free inlet and discharge.

6 Steam pressure referred to is gage pressure maintained in the heating element. Allowance must be made for line drop between boiler and unit.

7 When entering temperature is below freezing, steam connections must be made to prevent any accumulation of water in the heating element. A safety control should be provided to stop the fan when there is an insufficiency of steam in the heating element. Consult your nearest Dunham representative for advice in this connection.

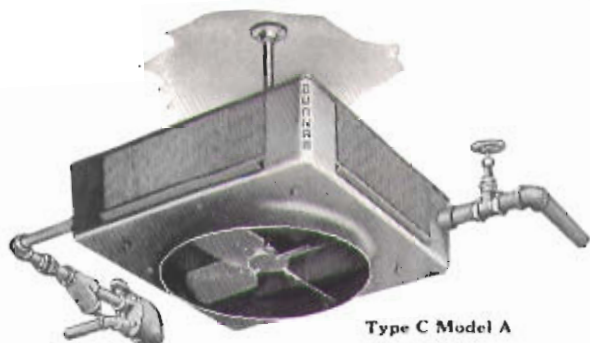
8 Outlet velocity (fpm.) refers to the velocity in feet per minute of the heated air leaving the unit.

9 EDR, equivalent direct radiation, is expressed in square feet, and all capacities listed have been determined in the manner recommended by the American Society of Heating & Ventilating Engineers; viz.: by dividing the Btu. output of the heater when supplied with steam at 2 pounds gage and air entering at 60° F. by 240 (240 Btu. being taken as the heat output of one square foot of radiation under these conditions). For capacities at other steam pressures and entering air temperatures use proper conversion factor.

10 Type V heaters can be applied to hot water systems where mechanical circulators are used. Consult your nearest Dunham representative for capacities and installation details for this service.

## TYPE C, MODEL A, "DOWNFLO" UNIT HEATERS (Ferrous Coil)

Standard "Diffusers" for Type C, Model A



Type C Model A



Double Louvre Assembly (Adjustable)  
Fig. 3237



Cone Assembly  
Fig. 3238



Four-Way Louvre Assembly (Adjustable)  
Fig. 3239

Anemostat "Diffuser" available on special order.

Fan blades are of an improved design. They are securely riveted to the hubs, and, after assembly, the fans are accurately balanced.

**HANGING**—Type C Model A Heaters are arranged for two methods of support (1) for central support from a single hanger by a formed spider for Sizes 136 to 533 inclusive. Pipe hangers of 3/4" or 1" pipe, depending upon size of the heaters, can be used. (2) Sizes C642A to C2000A inclusive are arranged for 4 point suspension.

**STEAM TRAVEL**—The heater is constructed to equalize the distance of steam travel, and the steam flow into each of the tubes.

**MOTORS**—The motors are ball-bearing and resiliently mounted to the casing of the unit. The operating speeds of the motors are 1140 rpm maximum with the exception of the smallest unit which operates at a maximum speed of 1600 rpm. Motors can be arranged for single or multiple speed operation.

No pipe, fittings, valves, or traps are furnished with the heaters.

**HEATING ELEMENT**—The heating element which consists of round steel tubes welded to steel headers is constructed entirely of these ferrous materials. Deep ferrules in the header tube sheet provide a deep welding surface which assures tight joints at maximum pressures. Heavy steel fins are pressed tightly on the tubes in such a manner as to provide high heat conduction. The method of attaching tube and fin is unique in that each fin maintains mechanical pressure on the adjoining fin and thus provides a tight mechanical joint.

Heating elements withstand hydrostatic pressures of 500 lbs. per sq. in. and are suitable for working pressures up to 200 lbs. per sq. in.

The Dunham Type C Model A "Downflo" heater is a unit arranged to discharge its air stream vertically downward. The outlet temperatures of the heaters are relatively low. The volume of air circulated is kept high to promote uniform heat distribution horizontally as well as to equalize temperature differences between the floor and the ceiling. Air volume and temperature adjustment is provided by means of adjustable dampers. Adjustment is readily made and retained in place.

**THE CASING ASSEMBLY**—The casing is streamlined, designed to give a maximum of rigidity and freedom from vibration while retaining accessibility and ease of installation. The motor and fan assembly may be removed for inspection or service without the necessity of removing the heater from its hanger or disconnecting the pipes. Heavy furniture steel, pressed to shape, is used throughout.

**THE MOTOR MOUNTING**—The motor, with fan mounted directly on the shaft, is attached to spring members which grip the special resilient mounting, which, in turn, is mounted on the conical air guide. The entire motor mounting and air guide is removable. The resilient mounting insulates the motor hum or vibration from the remainder of the assembly so that vibrations are isolated at their source and do not carry through the building by way of the piping.

### CAPACITY TABLE—TYPE C, MODEL A, "DOWNFLO" UNIT HEATERS

Unit No. and EDR at Normal Speed	Motor Data (60 Cycle and DC)		Rating with 2 Lb. Steam Pressure and 60° Entering Air Temperature									Mounting Height in Feet		Floor Spread Circle Diameter in Feet		Shipping Weight Pounds Approx.	
	HP at Normal Speed	RPM at Normal Speed	Normal Speed			Medium Speed			Low Speed			Max.	Min.	Max.	Min.		
			Btu./Hr.	Cfm at 70°	F. T.	Outlet Velocity	Btu./Hr.	Cfm at 70°	F. T.	Btu./Hr.	Cfm at 70°						F. T.
*C136A	1/40	1600	32,640	557	114	991	30,500	488	117.6	29,000	448	119.7	10	8	18	10	140
C211A	1/20	1140	50,640	881	113	783	44,000	734	116.0	36,500	585	117.5	12	10	20	15	174
C319A	1/12	1140	76,560	1534	106	1346	66,500	1114	115.0	51,000	723	125.0	15	10	30	25	228
C415A	3/4	1140	99,600	1732	113	1538	86,000	1250	123.5	58,000	704	136.0	18	12	40	30	294
C533A	3/4	1140	127,920	2267	112	1136	102,100	1587	119.3	72,000	973	128.2	20	15	45	35	333
C642A	1/6	1140	154,080	2680	113	1343	133,000	1666	122.5	99,500	1226	134.8	22	15	45	35	421
C809A	3/4	1140	194,400	3500	111	1731	169,800	2574	120.8	138,500	1749	133.0	25	20	50	40	454
C1040A	1/2	1140	249,600	3899	119	1289	209,800	2875	127.0	163,000	1926	138.0	30	20	55	40	506
**C1530A	3/4	1140	367,200	4508	112	2124	305,900	4484	122.8	223,300	2726	135.5	35	20	70	55	586
**C2000A	1	1140	480,000	8044	115	2638	411,600	5891	124.4	334,000	4050	136.0	45	25	75	60	877

All units available with standard motors in constant or two speed single phase constant speed three phase, and constant or variable speed DC, except as noted below. Units with motors of other characteristics available on special order only.

\*Not available in two speed single phase (substitute three speed).

\*\*Not available in two or three speed single phase.

\*\*\*Not available in single phase.

1. Dunham Unit Heaters are tested and rated in accordance with the code adopted by the American Society of Heating and Ventilating Engineers.

2. Ratings apply only to free inlet and discharge.

3. Btu. denotes heat emission in Btu. per hour with 2 lb. steam and 60 deg. F. entering air. For capacities at other steam pressures and entering air temperatures, refer to conversion table on draw-thru type units for conversion factor.

4. EDR denotes equivalent direct radiation—(Btu. divided by 240).

5. FT denotes final temperature of the air.

6. Cfm. at 70 deg. denotes cubic feet of air per minute measured at 70 deg. F.

and 29.92" of mercury barometric pressure, with entering air at 60 deg. F.

To determine Cfm. at final temperature (FT), use the following formula:

$$Cfm. @ FT = cfm. @ 70° \left( \frac{FT + 460}{530} \right)$$

7. Outlet velocity refers to the velocity in feet per minute of the heated air leaving the unit.

8. To determine condensate in pounds per hour, divide Btu. hr. by 966.

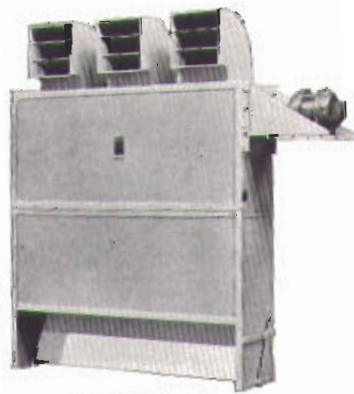


Fig. 1439-A—Floor Type with Mixing Damper

## DUNHAM TYPE R UNIT HEATERS Built in Either Direct-drive or Belt-drive

Type R Heaters are blower type units equipped with centrifugal housed fans. Their capacities range from 90,000 Btu. to over 1,400,000 Btu. at standard conditions. Used in industrial buildings where large capacity and high outlet velocity are required. At low fan speeds the units are often used for heating of showrooms, gymnasiums, or auditoriums with heater located in adjoining rooms so that only evidence in heated space is air inlet and outlet grilles. All parts are easily accessible. Complete heating element and fan and shaft assembly may be removed through either end of the heating casing. Lower section of floor type is separate piece. Heater section fits snugly over flange on lower section which eliminates necessity of bolting sections together.

### Wall Types

The wall type heater with its air intake only a few feet above the floor insures a circulation of warm air in the lower part of the room. It leaves the floor free and unobstructed.

It is sometimes necessary to locate heaters at a considerable distance from the floor. The inverted wall type is ideally suited to this condition. The heated air may be discharged directly at the floor or may be diverted with nozzle, as required.

For rooms with relatively low ceilings, the ceiling type is ideal. It fits snugly against the ceiling, leaving maximum head room beneath it. It is regularly furnished with discharge nozzles pitched downward at an angle of 45 degrees. But special nozzles are available.

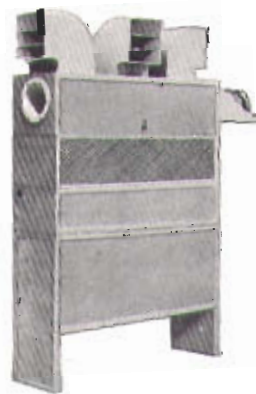
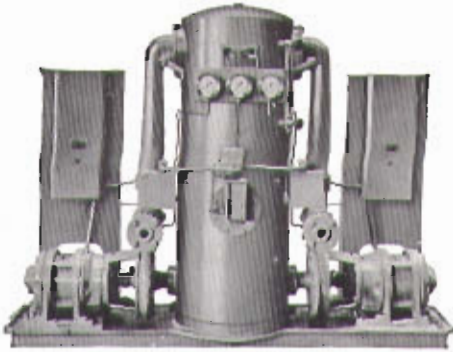


Fig. 1440 Floor Type with By-pass Damper

## DUNHAM VACUUM PUMPS

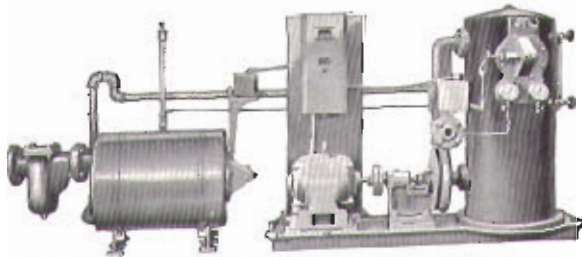
Tested and Rated with A.S.H.V.E. Code of Vacuum Return Line Heating Pump Manufacturers' Section of Hydraulic Institute



Types VRD-DVD, 9 Sizes

The top illustration is the Type VR pump with its Accumulator Tank. Installation can be made with single or with duplex pump connected to the one Accumulator Tank. Built in sizes 2500, 5000, 10,000, 15,000, 20,000, 25,000, 30,000, 40,000 and 65,000 sq. ft. EDR.

Each VR Pump unit is an assembly on a cast iron grid base, and includes an electric control panel with wiring connections completed to the motor. Power is delivered in a straight line from the motor through a ball bearing supported shaft to the impeller. The Centrifugal Pump stuffing box is under a positive pressure, consequently there is no opportunity for air leaks.



Type VR, with Accumulator Tank and Strainer—11 sizes

To meet requirements for a duplex pump completely assembled on one base, the VRD (or in Differential Heating, the DVD) Pump is offered. The Vacuum Pump on each side has the full rated capacity and these assemblies are offered in the 2500, 5000, 10,000, 15,000, 20,000, 25,000, 30,000, 40,000, and 65,000 sq. ft. EDR capacities. There are times when an Accumulator Tank placed at low level is a distinct advantage in providing proper float control, and can be furnished for installation ahead of the VRD Pump. In this case the installation is referred to as Type VRDA, or DVDA.

Standard Water and Air Capacities  
Water in G.p.m. at 160° F. from 5.5" Vacuum to Required Discharge Pressure. Air in C.f.m. at 160° F. and 5.5" Vacuum.

Radiation	Sq. Ft.	2500	5000	10000	15000	20000	25000	30000	40000	65000
Water Only	Water	3.8	7.5	15.0	22.5	30.0	37.5	45.0	60.0	97.5
	Air	1.3	2.5	5.0	7.5	10.0	12.5	15.0	20.0	32.5
Simultaneous Air and Water	Water	1.3	2.5	4.0	5.4	6.8	8.3	9.7	12.6	19.8
	Air	1.3	2.5	4.0	5.4	6.8	8.3	9.7	12.6	19.8

## DUNHAM CONDENSATION PUMPS

These pumps provide automatic return of water of condensation to boilers for gravity systems or steam process equipment. Pump and motor assembled on rigid cast iron base. Bronze fitted centrifugal pump has non-corrosive shaft. Enclosed type Impeller. Liberal size ball bearings. Receiver Tank equipped with float switch and push button starting switch with over-load protection.

**Type CH, Model B**—Available in single and duplex units in following capacities: 2000, 6000, 8000, 10,000, 15,000, 20,000, 25,000, 30,000, 40,000, and 50,000 sq. ft. EDR and in discharge pressures from 10 to 50 lb. 60 cycle d-c. or a-c. 1750 r.p.m.; 25 or 50 cycle a-c., 1450 r.p.m.

**Type CHH, Model B** Capacities same as Type CH. Discharge

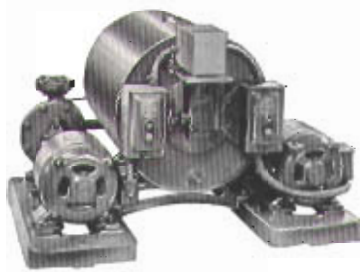
pressures 20 lb. for pumps 15,000 sq. ft. and larger, 20, 30, 40, 50, and 70 lb. discharge in all sizes. 60 cycle d-c. or a-c. 3450 r.p.m.; 25 or 50 cycle a-c., 2850 r.p.m.

**Type CH, Model A** Available in single and duplex units. Capacities same as Type CH, Model B and in discharge pressures from 10 to 70 lb. 60 cycle d-c. or a-c., 1750 r.p.m.; 25 or 50 cycle a-c., 1425 r.p.m.

**Type CV**—Capacities 2000, 4000, 6000, 8000, 10,000, 15,000, 20,000, and 25,000 sq. ft. EDR and in discharge pressures 10 to 50 lb. Motor shaft through cover in liberal size packing gland eliminates possibility of moisture rising into motor. Float mechanism also packless type.



Type CH, Model B, Single



Type CH, Model B, Duplex

Type CHH, Model B. Similar Construction to CH Model B. Available in Both Single and Duplex



Type CH, Model A Available in Both Single and Duplex

## The DUNHAM Coordinated Heating "System"

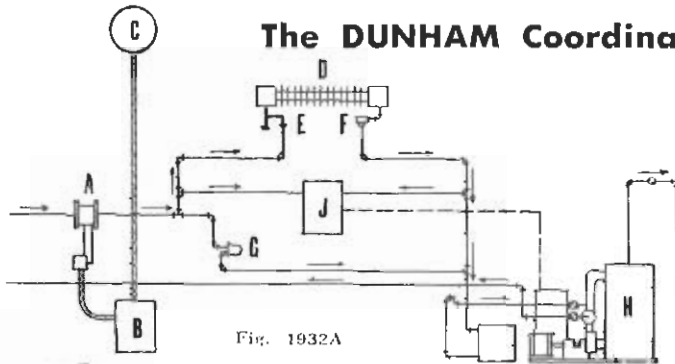


Fig. 1932A

### The Steam Control Equipment

#### A—Control Valve

The Control Valve regulates the admission of a continuous flow of steam into the heating main as called for by the thermostatic controls. It provides smooth increments of steam flow and prevents sudden surges in this flow. Modifications in the rate of heat supply are made in accord with the building heat requirements. The steam admitted is expanded by the heating system into larger volume to insure all steam piping being filled and equal distribution to all radiators.



Control Valve

#### B—Control Panel

The Control Panel is the centralized operating station at which all control adjustments and settings are made and from which remote readings of room temperatures and control valve openings may be obtained.



Control Panel

#### C—Temperature Control Equipment

The Temperature Control Equipment appraises the heat demand of the building utilizing the Resistance Thermometer principle of operation. Resistance Thermometers comprise coils of metal conductors whose electrical resistance varies with variations in their temperature connected in a Wheatstone Bridge circuit. Such temperature sensitive elements have no moving parts, nothing to wear out, clog, or to require—or get out—of adjustment. Room temperature levels vary the resistance of the temperature sensitive coil of the Room Resistance Thermometer Unit, heat demand varies the resistance of the temperature sensitive coil of the Selector and heat supply varies the resistance of the temperature sensitive coils of the Heat Balancer to secure the thermostatic action and the Panel operates the Control Valve to provide the regulation.

The Room Resistance Thermometer Unit comprises a resistance coil mounted on a base with a protecting screen provided with an indicating thermometer. The unit is mounted in the usual manner, and subjected to the same conditions, as conventional room thermostats. Through its resistance coil it serves the dual purpose of a remote reading resistance thermometer and a thermostat.

The Selector (Window Mounted Thermometer Unit) is similar to the Room Thermometer Unit except that it is constructed so the sensitive element can be placed against the inside surface of a window.

The Heat Balancer (Heat-rate Thermometer Unit) comprises two temperature sensitive coils, a copper convector, and enclosing case. The two resistance coils are mounted so as to measure the average temperature of the air entering and leaving the convector heating element. The difference in these air temperatures serves as a measure of the heat output.

Various combinations of this equipment are available to meet specific requirements.

Type RT Model RST Control Equipment utilizes all three thermometers and provides the most complete temperature controlling and indicating means available for the heating of buildings. Its application is almost unlimited.

Type RT Model TR Control Equipment utilizes the Room Thermometer only and provides proportioning control of the steam supply as demanded by room temperatures. It is adapted to buildings where a room is available which is continuously representative of heating conditions.

### The Heating Equipment

#### D—Radiators

Radiation and piping may be any of the types and sizes in common use with other steam heating systems.

#### E—Packless Radiator Inlet Valve

Radiator Inlet Valves with externally adjustable or internally fixed orifices at each radiator inlet give balanced steam distribution throughout the building. Sub-atmospheric steam makes the orifice most effective because of the relatively constant differential. Illustration shows Regulating Plate (orifice) installed in valve seat, which proportions steam flow to each radiator.



Radiator Inlet Valve

#### F—Thermostatic Radiator Trap

Radiator Traps allow air and water to leave radiators and prevent steam from entering the returns under the entire range of sub-atmospheric pressure employed. The thermostatic disc is at all times exposed to and controlled by the conditions of pressure and temperature within the radiator whether trap is open or closed.



Radiator Trap

and temperature within the radiator whether trap is open or closed.

#### G—Drip Trap

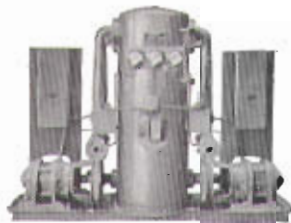
The trap is a combination of a thermostatic trap and a float trap. It keeps steam mains and risers free from water and air and return mains free from steam thus making circulation rapid and noiseless. It has high water handling and air venting capacity for heating up periods.



Drip Trap

#### H—Differential Pump

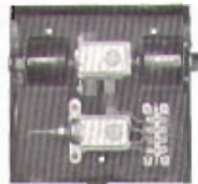
The Differential Pump is specially designed to create and maintain steam circulation under sub-atmospheric pressures. It also operates to handle the condensate from the system. This water gravitates to an accumulator or receiver tank from which it is lifted and returned to the boiler by the pump.



Differential Pump

#### J—Differential Controller

The Differential Controller governs pump operation to maintain return line pressures lower than supply line pressures (by a fixed range) for all rates of steam supply through Control Valve, thus insuring equalized circulation which is positive and continuous.



Differential Controller

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Reading Down (left)—Dunham Bldg., Chicago; General Offices and Plant, Toronto.  
Reading Down (right)—Marshalltown Plant; Brass Foundry, Marshalltown; Pump and Unit Heater Plant, Michigan City; London, England Plant