

TRANSCRITICAL CO₂ GAS COOLERS



ECO[™] heat transfer
coolers

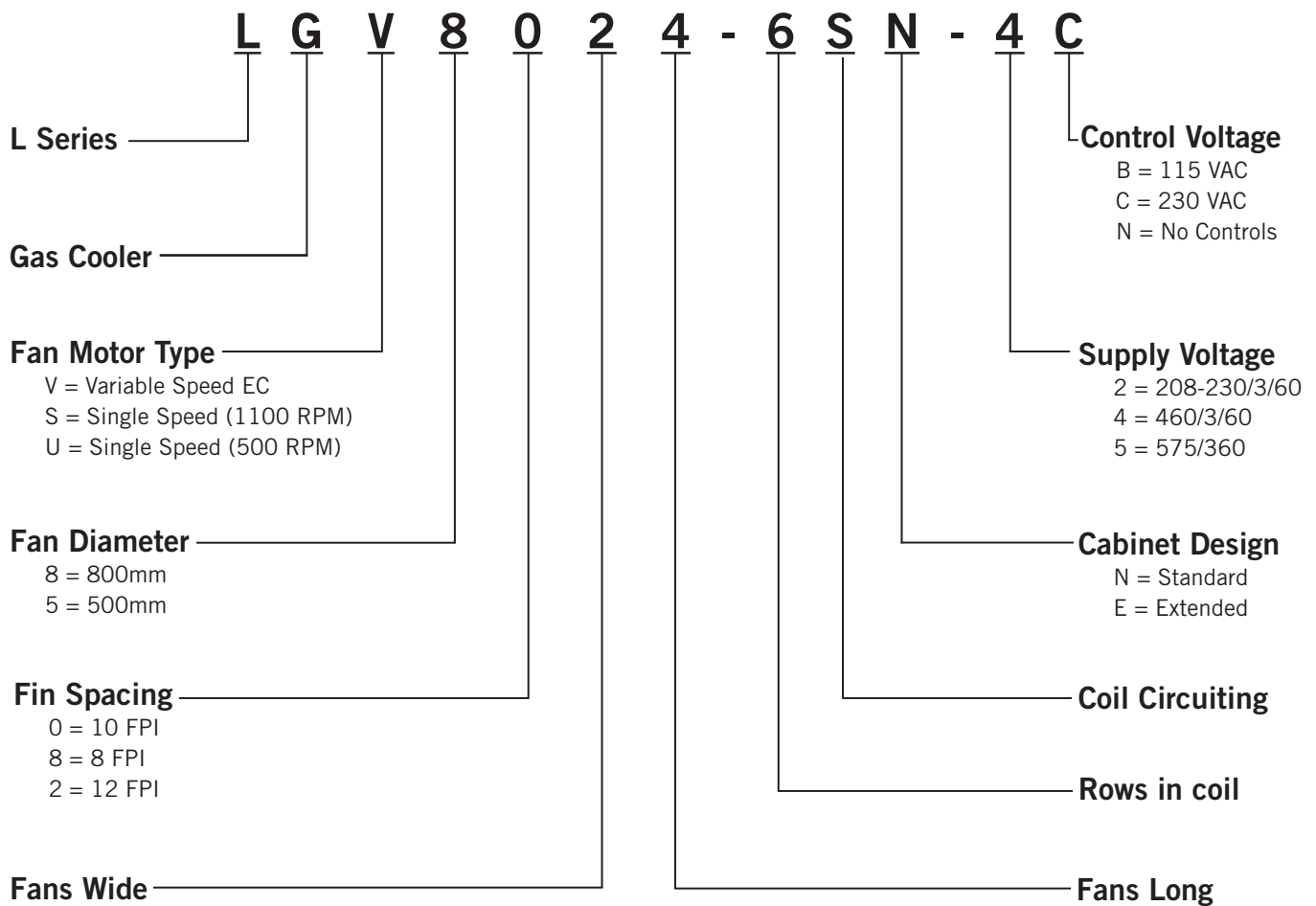


CONTENTS & NOMENCLATURE

CONTENTS

Nomenclature.....	2
Overview.....	3
No Compromise Standard Features.....	4
Performance Range.....	5
LGV8 Specifications.....	6
LGS8 Specifications.....	7
LGU8 Specifications.....	8
Wiring Diagrams.....	9
LG*8 Dimensional Data.....	10
Example of Fans.....	11

NOMENCLATURE



All specifications subject to change without notice.

TRANSCRITICAL CO₂ GAS COOLERS

CO₂

The world has spoken. In the near future halogenated refrigerants will be replaced by low environmental impact alternates. Building an installation today that uses increasingly expensive and regulated old generation refrigerants exposes the owner to a future of rapidly rising maintenance and operating cost. Today, there is one solution that stands out – R744 (CO₂). The business case for CO₂ is clear – Zero ozone depletion potential, 100 year global warming potential (GWP) of 1, non-toxic/non-flammable, chemically inert with no risk of corrosion, readily available, inexpensive, increasing energy efficiency. Based on decades of experience with CO₂ and thousands of successful worldwide installations, Modine Commercial and Industrial Solutions is pleased to offer a broad range of transcritical CO₂ gas coolers in the same uncompromising fashion as our other commercial and industrial products.

NO COMPROMISE

At Modine, we are not very good at compromise – not when it comes to product performance and quality anyway. With over 30 years experience designing, producing, and enhancing commercial and industrial coolers, we have learned that compromise is not needed to exceed market expectations. Rather, we have selected the highest quality, most technologically advanced materials and combined them with our expertise in engineering and manufacturing to produce startling performance results with unsurpassed quality and reliability.

Typical Performance Results (per 800mm diameter fan motor)

	LGV8 Models (VSEC*)	LGS8 Models (1100 rpm)	LGU8 Models (500 rpm)
Energy Consumption (kW)	1.4	1.5	0.4
Sound Pressure Level (dBA @ 3m)	58.5	62.5	43.5

De-Superheaters

Whether your need for a De-Superheater is for use in a CO₂ cascade system to protect the plate heat exchanger from thermal shock or for use on the low stage discharge of a booster system to protect the high stage compressors from overheating, Modine offers a broad range of de-superheaters to meet your needs.

Heat Reclaim

There is no need to compromise on your heat reclaim requirements either. Modine will custom design a CO₂ coil to meet your specifications and fit inside your air handler. Contact your Modine Sales Engineer to have one designed for you.

TRANSCRITICAL CO₂ GAS COOLERS

NO COMPROMISE STANDARD FEATURES

Direct drive external rotor fan motors offer uncompromised energy efficiency, low sound, and the longest trouble-free life available.

Swept fan blades are designed as part of the fan motor, not an addition to it. Dynamically balanced as a set, vibration is reduced to unprecedented levels.

Available in single speed AC or advanced variable speed EC designs for ultimate system control. Single speed fans are dual voltage and can be easily adjusted in the field.

Large, weatherproof electrical enclosure is amply sized to fit even the most advanced controls. Standard equipment includes a main disconnect switch (non-fused) with door interlock and main terminal block for motor lead termination. Standard control panels are rated at 5 kA SCCR.

Tall venturi fan panels add to the uncompromised energy efficiency and low sound.

Fully enclosed motor lead raceways to protect wiring.

Heavy gage galvanized steel cabinet provides years of durable surface protection.

Fully baffled fan cells designed for superior performance and reduced "wind milling".

Heavy wall copper tubing and advanced sinusoidal fin design for optimal performance. Coils are UL Certified to 2000 PSIG design pressure (MAP).

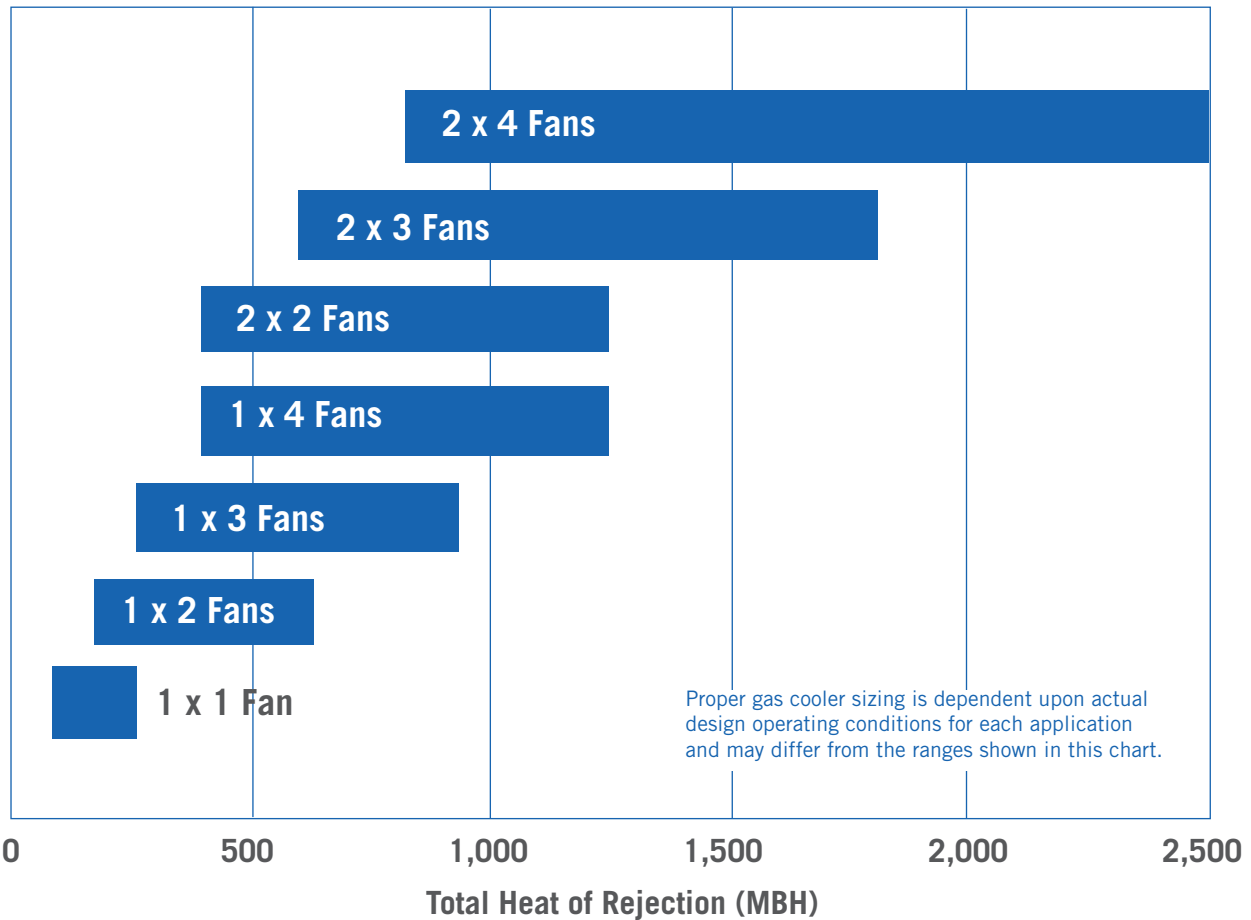


Intertek
4002117

Conforms to UL Std. 1995
Certified to CAN/CSA Std. C22.2 No. 236-05

TRANSCRITICAL CO₂ GAS COOLERS

TRANSCRITICAL CO₂ GAS COOLER PERFORMANCE RANGE



CO₂ Gas Cooler Selection

Unlike conventional direct expansion system condensers, CO₂ gas coolers do not control head pressure. Rather, this is performed by other components in the refrigeration system. As such, the method for sizing gas coolers is quite different and more complex than that used for air-cooled condensers and requires the use of computer simulations. Modine is ready to assist you with your CO₂ gas cooler selections and has developed software supported by many years of research and experience working with CO₂. The design conditions required to complete this analysis are as follows:

- Ambient air temperature (F).
- Entering CO₂ gas temperature (F).
- Gas cooler operating pressure (PSIG or PSIA).
- CO₂ mass flow (Lbs/Hr).
- Target leaving CO₂ gas temperature (F).
- Total heat of rejection required (BTU/Hr).

TRANSCRITICAL CO₂ GAS COOLERS

LGV8 Specifications

Variable Speed EC, 800mm Fan Diameter														
Model	Fans	CFM	Volume (in ³)	dBA @ 3M	Power (kW)	208-230/3/60			406/3/60			575/3/60		
						FLA	MCA	MOPD	FLA	MCA	MOPD	FLA	MCA	MOPD
Single Wide Models														
LGV8011-2IN	1 X 1	13,710	669	58.5	1.2	5.7	7.1	15	2.9	3.6	15	Variable Speed EC fan motors are not available in 575/3/60 VAC.		
LGV8011-3IN		13,510	973		1.3									
LGV8011-4QN		13,310	1,278		1.3									
LGV8012-2QN	1 X 2	26,040	713	61.5	2.6	11.4	12.8	15	5.7	6.5	15			
LGV8012-3QN		25,040	1,038		2.7									
LGV8012-4HN		24,120	1,366		2.8									
LGV8012-6GN		22,510	2,017		3.0									
LGV8013-2EN	1 X 3	39,050	1,010	63.3	3.9	17.1	18.5	20	8.6	9.4	15			
LGV8013-3HN		37,560	1,486		4.1									
LGV8013-4LN		36,180	1,962		4.2									
LGV8013-6LN		33,770	2,909		4.3									
LGV8014-2HN	1 X 4	52,070	1,310	64.5	5.2	22.8	24.2	25	11.4	12.3	15			
LGV8014-3LN		50,070	1,936		5.4									
LGV8014-4SN		48,240	2,562		5.6									
LGV8014-6SN		45,020	3,803		5.9									
Double Wide Models														
LGV8022-2QN	2 x 2	51,760	1,360	64.5	5.3	22.8	24.2	25	11.4	12.3	15	Variable Speed EC fan motors are not available in 575/3/60 VAC.		
LGV8022-3EN		49,640	1,984		5.5									
LGV8022-4HN		47,720	2,613		5.7									
LGV8022-6GN		44,360	3,859		6.0									
LGV8023-2EN	2 x 3	77,640	1,932	66.3	7.9	34.2	35.6	40	17.1	18.1	20			
LGV8023-3HN		74,470	2,843		8.2									
LGV8023-4GN		71,580	3,754		8.5									
LGV8023-6SN		66,540	5,576		9.0									
LGV8024-2HN	2 x 4	103,520	2,505	67.5	10.5	45.6	47.0	50	22.8	23.9	25			
LGV8024-3LN		99,290	3,703		10.9									
LGV8024-4SN		95,440	4,902		11.3									
LGV8024-6SN		88,730	7,279		12.0									

Variable Speed Electronically Commutated (VSEC) fan motors offer the optimum combination of system control, energy efficiency, and low sound. These fan motors maintain leaving CO₂ temperature by varying the speed of the fan, and thus the airflow (CFM). VSEC fan motors also offer many advanced features such as over/under voltage protection, phase monitoring, and RS485 communication and control capabilities.

TRANSCRITICAL CO₂ GAS COOLERS

LGS8 Specifications

Single Speed, 1100 RPM, 800mm Fan Diameter														
Model	Fans	CFM	Volume (in ³)	dBA @ 3M	Power (kW)	208-230/3/60			406/3/60			575/3/60		
						FLA	MCA	MOPD	FLA	MCA	MOPD	FLA	MCA	MOPD
Single Wide Models														
LGS8011-2IN	1 X 1	12,670	669	62.5	1.4	6.8	8.5	15	3.6	4.5	15	3.1	3.9	15
LGS8011-3IN		12,530	973		1.4									
LGS8011-4QN		12,400	1,278		1.4									
LGS8012-2QN	1 X 2	24,380	713	65.5	2.8	13.6	15.3	20	7.2	8.1	15	6.2	7.0	15
LGS8012-3QN		23,680	1,038		2.9									
LGS8012-4HN		23,030	1,366		2.9									
LGS8012-6GN		21,860	2,017		3.1									
LGS8013-2EN	1 X 3	36,570	1,010	67.3	4.2	20.4	22.1	25	10.8	11.7	15	9.3	10.1	15
LGS8013-3HN		35,520	1,486		4.3									
LGS8013-4LN		34,550	1,962		4.4									
LGS8013-6LN		32,800	2,909		4.5									
LGS8014-2HN	1 X 4	47,770	1,310	68.5	5.6	27.2	28.9	35	14.4	15.3	20	12.4	13.2	15
LGS8014-3LN		47,360	1,936		5.8									
LGS8014-4SN		46,060	2,562		5.9									
LGS8014-6SN		43,730	3,803		6.1									
Double Wide Models														
LGS8022-2QN	2 X 2	48,550	1,360	68.5	5.7	27.2	28.9	35	14.4	15.3	20	12.4	13.2	15
LGS8022-3EN		47,060	1,984		5.8									
LGS8022-4HN		45,690	2,613		5.9									
LGS8022-6GN		43,240	3,859		6.2									
LGS8023-2EN	2 X 3	72,830	1,932	70.3	8.5	40.8	42.5	45	21.6	22.5	25	18.6	19.4	20
LGS8023-3HN		70,600	2,843		8.7									
LGS8023-4GN		68,530	3,754		8.9									
LGS8023-6SN		64,860	5,576		9.3									
LGS8024-2HN	2 X 4	97,100	2,505	71.5	11.3	54.4	56.1	60	28.8	29.7	30	24.8	25.6	30
LGS8024-3LN		94,130	3,703		11.6									
LGS8024-4SN		91,380	4,902		11.9									
LGS8024-6SN		86,470	7,279		12.4									

The industry standard for many decades, these 1100 rpm fan motors maintain leaving CO₂ temperature by cycling the fans on and off. Very reliable and dependable in transcritical CO₂ applications, these fan motors generate equal or lower sound pressure and power consumption than most competitive 830 rpm fans. These fan motors are offered as dual voltage 208-230 and 460 volts that can be easily changed in the field. 575 VAC models are single voltage.

TRANSCRITICAL CO₂ GAS COOLERS

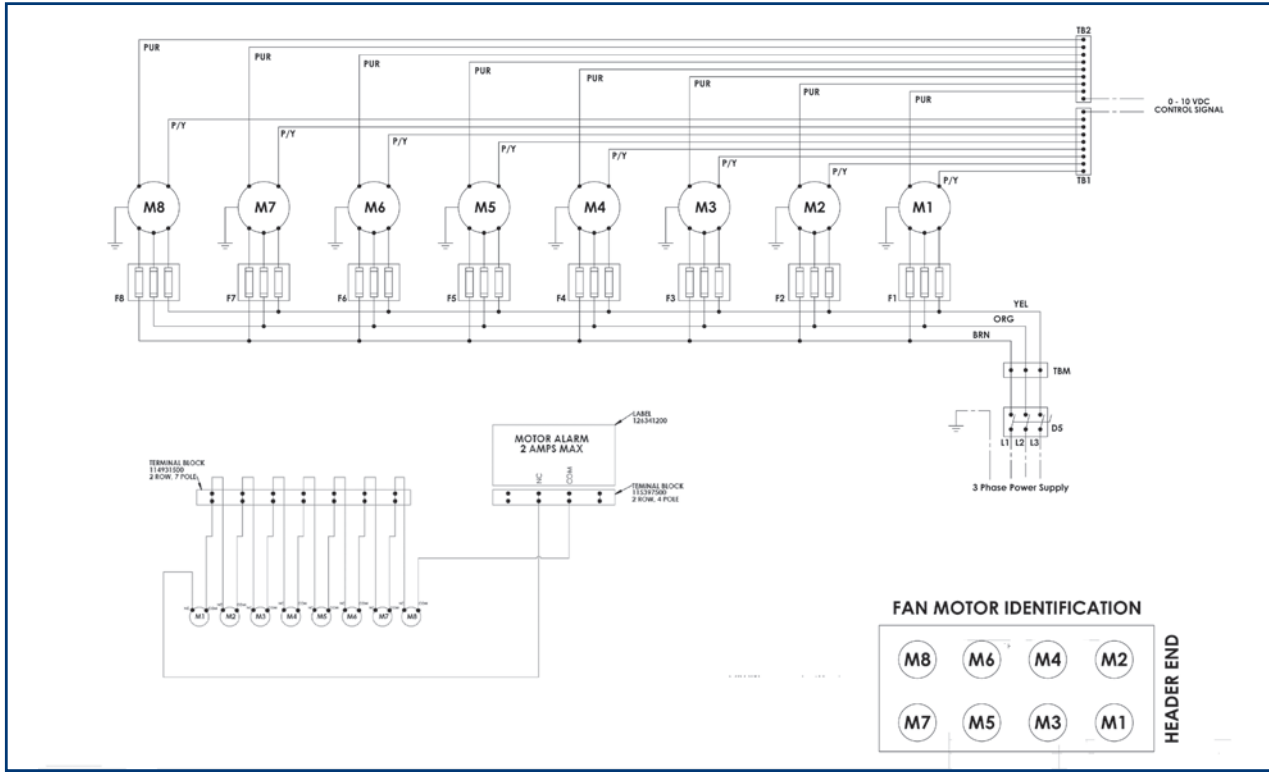
LGU8 Specifications

Single Speed, 500 RPM, 800mm Fan Diameter														
Model	Fans	CFM	Volume (in ³)	dBA @ 3M	Power (kW)	208-230/3/60			406/3/60			575/3/60		
						FLA	MCA	MOPD	FLA	MCA	MOPD	FLA	MCA	MOPD
Single Wide Models														
LGU8011-2IN	1 X 1	6,940	669	43.5	0.4	2.1	2.6	15	1.2	1.5	15	0.8	1.0	15
LGU8011-3IN		6,860	973		0.4									
LGU8011-4QN		6,510	1,278		0.4									
LGU8012-2QN	1 X 2	14,310	713	46.5	0.8	4.2	4.7	15	2.4	2.7	15	1.6	1.8	15
LGU8012-3QN		13,420	1,038		0.8									
LGU8012-4HN		12,660	1,366		0.8									
LGU8012-6GN		12,020	2,017		0.8									
LGU8013-2EN	1 X 3	20,620	1,010	48.3	1.0	6.3	6.8	15	3.6	3.9	15	2.4	2.6	15
LGU8013-3HN		20,030	1,486		1.1									
LGU8013-4LN		18,830	1,962		1.2									
LGU8013-6LN		17,370	2,909		1.3									
LGU8014-2HN	1 X 4	26,940	1,310	49.5	1.5	8.4	8.9	15	4.8	5.1	15	3.2	3.4	15
LGU8014-3LN		26,710	1,936		1.5									
LGU8014-4SN		25,100	2,562		1.6									
LGU8014-6SN		23,830	3,803		1.7									
Double Wide Models														
LGU8022-2QN	2 x 2	28,130	1,360	49.5	1.5	8.4	8.9	15	4.8	5.1	15	3.2	3.4	15
LGU8022-3EN		36,300	1,984		1.5									
LGU8022-4HN		24,660	2,613		1.6									
LGU8022-6GN		23,340	3,859		1.7									
LGU8023-2EN	2 x 3	40,590	1,932	51.3	2.3	12.6	13.1	15	7.2	7.5	15	4.8	5.0	15
LGU8023-3HN		39,350	2,843		2.3									
LGU8023-4GN		36,770	3,754		2.3									
LGU8023-6SN		34,800	5,576		2.4									
LGU8024-2HN	2 x 4	54,130	2,505	52.5	3.0	16.8	17.3	20	9.6	9.9	15	6.4	6.6	15
LGU8024-3LN		52,470	3,703		3.1									
LGU8024-4SN		49,030	4,902		3.1									
LGU8024-6SN		46,400	7,279		3.2									

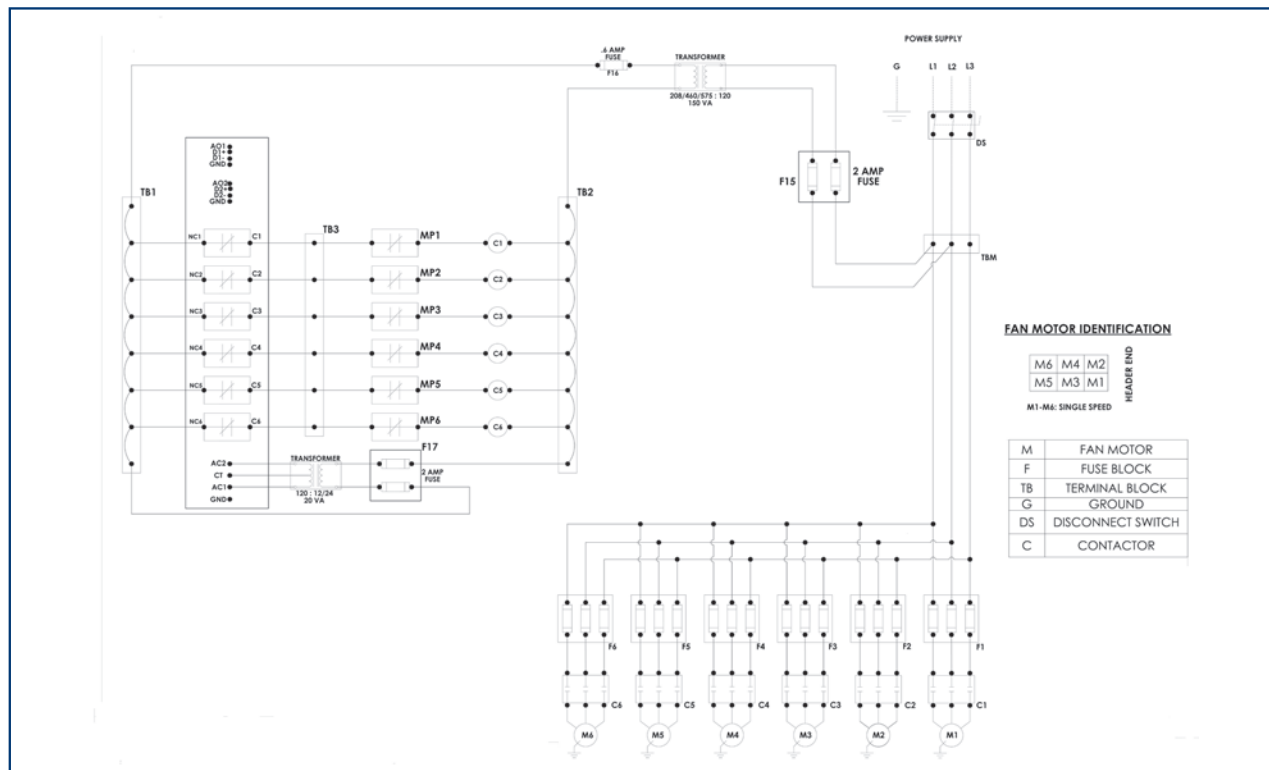
Offering ultra low sound pressure, these 500 rpm fan motors are typically 19 dBA (sound pressure at 3 meters) quieter than our standard 1100 rpm models and consume only a fraction of the power. Also single speed design, these fan motors maintain leaving CO₂ temperature by cycling the fan on and off. 208-230 and 460 volt models are dual voltage that can be easily switched in the field. 575 volt models are single voltage.

TRANSCRITICAL CO₂ GAS COOLERS

Typical Wiring Diagram - Variable Speed EC Fan Motors



Typical Wiring Diagram - Single Speed Fan Motors



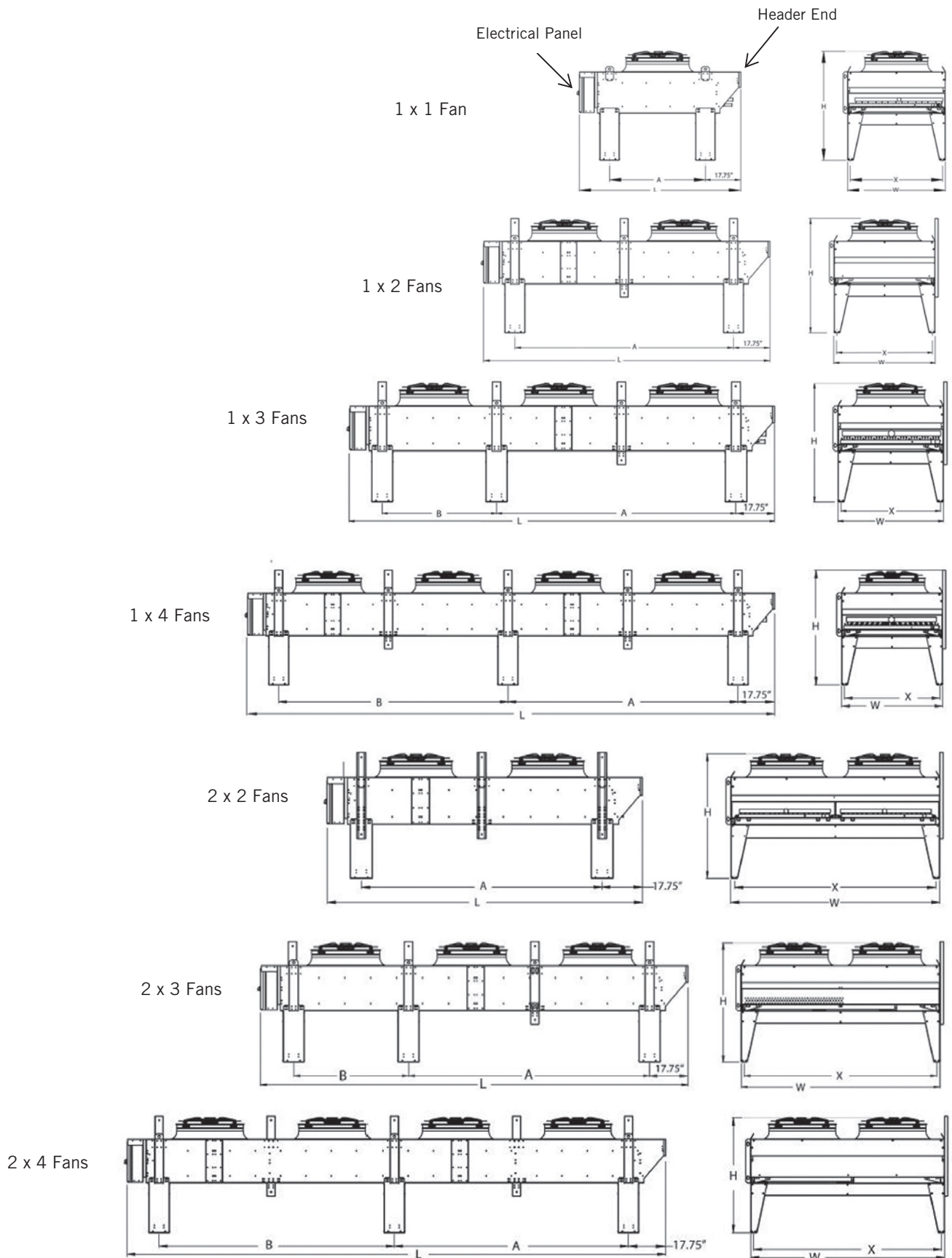
TRANSCRITICAL CO₂ GAS COOLERS

LG*8 Dimensional Data

Model	Overall Length	Mounting Dimensions					Connections		Approx. Net Weight (Lbs)
		A	B	H	X	W	Inlet	Outlet	
Single Wide Models									
LG*8011-2IN	80.9	48.1	---	54.12	46.24	48.91	1 3/8" Copper/Iron Alloy	1 3/8" Copper/Iron Alloy	555
LG*8011-3IN									595
LG*8011-4QN									630
LG*8012-2QN	138.9	106.2	---	54.12	46.24	48.91	1 3/8" Copper/Iron Alloy	1 3/8" Copper/Iron Alloy	865
LG*8012-3QN									945
LG*8012-4HN									1,045
LG*8012-6GN									1,220
LG*8013-2EN	196.9	111.1	53.1	54.12	46.24	48.91	1 3/8" Copper/Iron Alloy	1 3/8" Copper/Iron Alloy	1,110
LG*8013-3HN									1,225
LG*8013-4LN									1,345
LG*8013-6LN									1,595
LG*8014-2HN	254.9	111.1	111.1	54.12	46.24	48.91	1 3/8" Copper/Iron Alloy	1 3/8" Copper/Iron Alloy	1,400
LG*8014-3LN									1,555
LG*8014-4SN									1,710
LG*8014-6SN									2,020
Double Wide Models									
LG*8022-2QN	138.9	106.2	---	54.12	89.27	91.95	1 3/8" Copper/Iron Alloy	1 3/8" Copper/Iron Alloy	1,620
LG*8022-3EN									1,770
LG*8022-4HN									1,920
LG*8022-6GN									2,300
LG*8023-2EN	196.9	111.1	53.1	54.12	89.27	91.95	1 3/8" Copper/Iron Alloy	1 3/8" Copper/Iron Alloy	1,920
LG*8023-3HN									2,140
LG*8023-4GN									2,375
LG*8023-6SN									2,800
LG*8024-2HN	254.8	111.1	111.1	54.12	89.27	91.95	1 3/8" Copper/Iron Alloy	1 3/8" Copper/Iron Alloy	2,695
LG*8024-3LN									2,990
LG*8024-4SN									3,290
LG*8024-6SN									3,885

All Modine Transcritical CO₂ gas coolers are suitable for mounting for horizontal air flow. Simply delete the leg kits shown in the drawings and use the included shipping brackets (shown on the right side of the coolers) to mount the cooler.

TRANSCRITICAL CO₂ GAS COOLERS





Modine Grenada LLC
Tel: 800-225-4328
Fax: 662-229-4212
Grenada, MS
Email: coils@modine.com