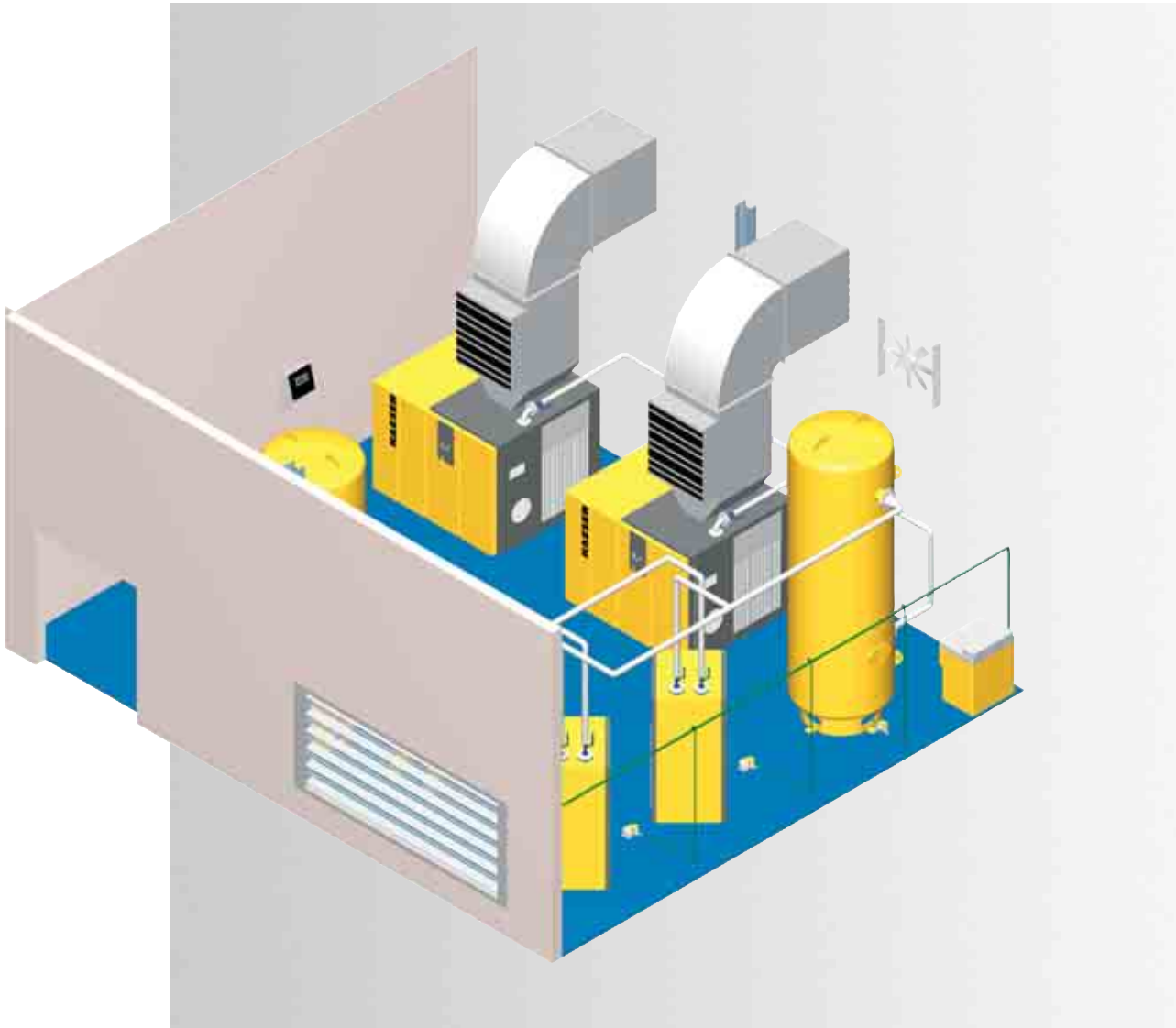
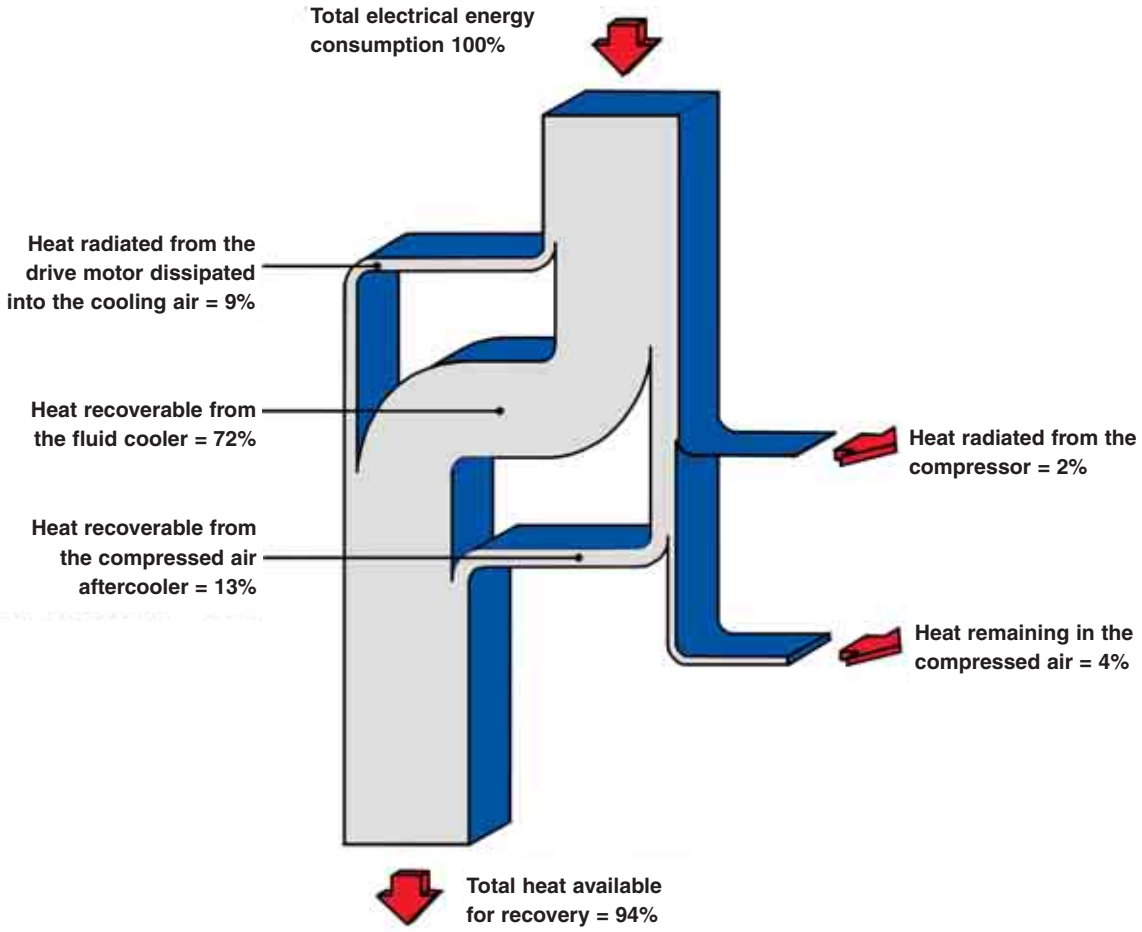
KAESER COMPRESSORS

Built for a lifetime.™

Heat Recovery Systems



Heat Flow Diagram



Almost all the electrical energy consumed by a compressor is changed into heat. On screw compressors, approximately 94% of this heat is given up to the cooling system, approximately 4% remains in the compressed air and approximately 2% is radiated from the compressor into the immediate surroundings.

Because the low cost of electricity was only a small part of operating costs in former years, waste was of no great concern and few considered making practical use of the heat produced by compression. Only since the dramatic increase in electricity costs has compressor heat recovery become an important factor in planning an efficient air system.

The basic principle lies in transferring of the heat into a medium and then transporting it to where the heat can be utilized.

The theoretical available heat of a screw compressor is 94% of the overall electrical energy consumption. It consists of heat dissipated in the fluid cooler (72%), the aftercooler (13%) and heat radiated from the drive motor (9%).

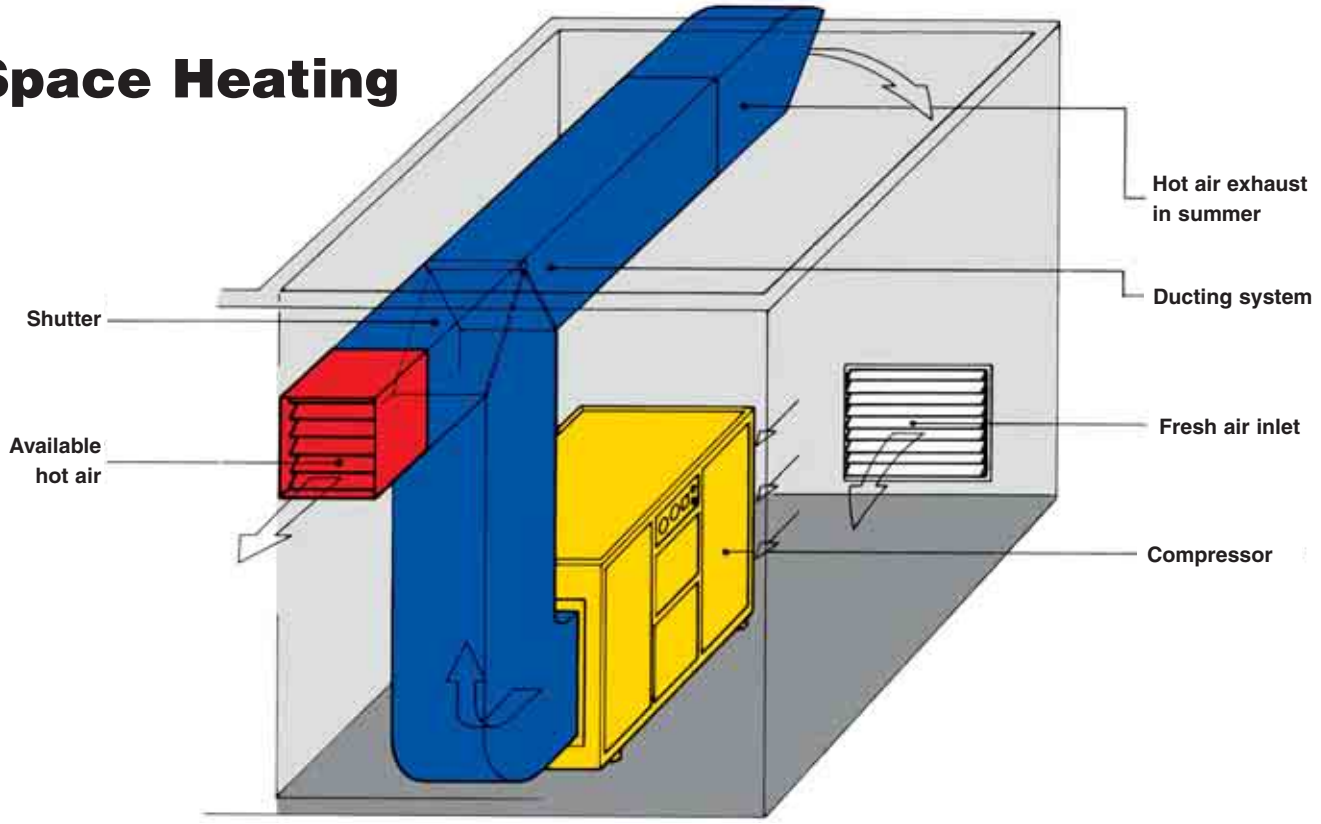
An enclosed, air-cooled screw compressor with a precisely defined cooling air outlet would transfer the total amount into the cooling air for space heating.

If water is to be heated, the oil in the fluid cooler is chosen as the transfer medium so that only 72% of the overall power consumption is available for water heating.

If a combination of hot water and space heating is chosen then a maximum of 72% is available for water heating and at least 22% for space heating.

The PTG and SWT systems are available as factory options shipped with your Kaeser compressor. Field retrofit kits are also available. Please contact your local Kaeser distributor for more information on these great energy saving systems.

Space Heating



With their compact footprint and standard enclosure, Kaeser's rotary screw compressors are ideally suited for heat recovery applications. Up to 94% of the overall energy consumption from the cooling air can be ducted and redirected.

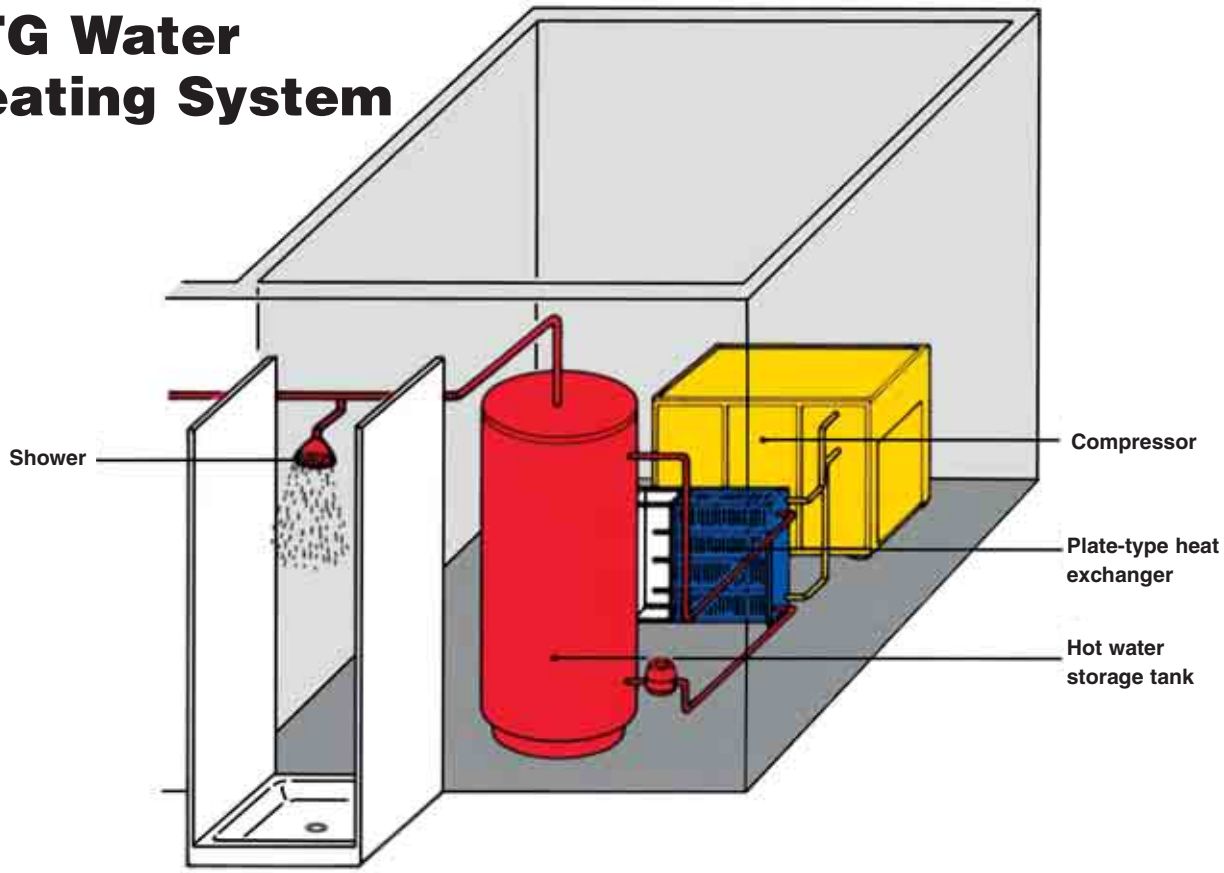
By applying conventional HVAC ductwork and controls, warm air from compressors can be channeled to remove or provide heat in the compressor room and adjacent areas as desired. Applications include auxiliary or primary heating for warehouses and workshops, drying air for paint spraying or washing, air curtains, and improving oil burner efficiency by heating the combustion air.

Screw Compressor Model	Motor (hp)	Typical Available [1] (Btu/h)	Typical Available Air Flow (cfm)	Typical Savings [2] ($)
SX 3	3	8,652	650	290
SX 4	4	11,856	880	397
SX 6	5	15,702	880	526
SX 7	7.5	21,181	880	709
SM 8	7.5	21,149	880	708
SM 11	10	28,519	880	955
SK 15	15	43,260	1530	1448
SK 20	20	53,193	1648	1781
AS 20	20	62,807	2118	2103
AS 25	25	75,304	2118	2521
ASD 25	25	73,157	2649	2449
ASD 30	30	86,616	2649	2900
ASD 40S	40	106,098	2649	3552
ASD 40	40	122,281	3120	4094
BSD 40	40	121,063	4826	4053
BSD 50	50	148,269	4826	4964
BSD 60	60	182,011	4826	6094
CSD 60	60	180,409	5720	6040
CSD 75	75	217,580	5720	7285
CSD 100S	100	269,171	6474	9012
CSD 100	100	319,801	7652	10,708
CSD 125	125	360,177	7652	12,060
DSD 100	100	304,228	6500	10,186
DSD 100S	100	270,069	6500	9042
DSD 125	125	400,969	9400	13,425
DSD 150	150	477,363	9400	15,983
DSD 200	200	581,763	10,600	19,479
ESD 250	250	764,255	16,500	25,589
ESD 300	300	830,394	18,800	27,803
FS 440	335	877,807	20,000	29,391
FS 460	350	920,662	20,000	30,826
GS 525	400	118,471	8,828	3967
GS 590	425	125,213	8,828	4192
GS 620	450	132,578	8,828	4439
GS 650	475	139,944	8,828	4686
HS 670	500	146,538	17,657	4906
HS 690	535	156,796	17,657	5250
HS 760	605	176,387	17,657	5906

[1] Convection and internal heat losses are not accounted for
[2] Based on 2000 hours compressor operation,
Heating value of fuel oil: 128,000 Btu/gal
Heating efficiency: 0.70
Heating oil costs: $1.50/gal

1 hp = 2545 Btu/h

PTG Water Heating System



The PTG heat exchanger consists of a stack of up to 200 individually stamped stainless steel plates. The plate profile generates a highly turbulent flow within the channels to ensure efficient heat transfer. Every alternate plate is fitted at 180° to the next, providing innumerable contact points right across the heat exchanging surface. The heat exchanger is brazed in a vacuum oven using 99.9% pure copper.

Because of the high temperatures possible (around 180°F) the system is enclosed in a frame to prevent injury through contact.

If little or no hot water is needed, the compressor cooling fluid flow is automatically directed through the standard fluid cooler. Constant compressor cooling is ensured whether hot water is required or not.

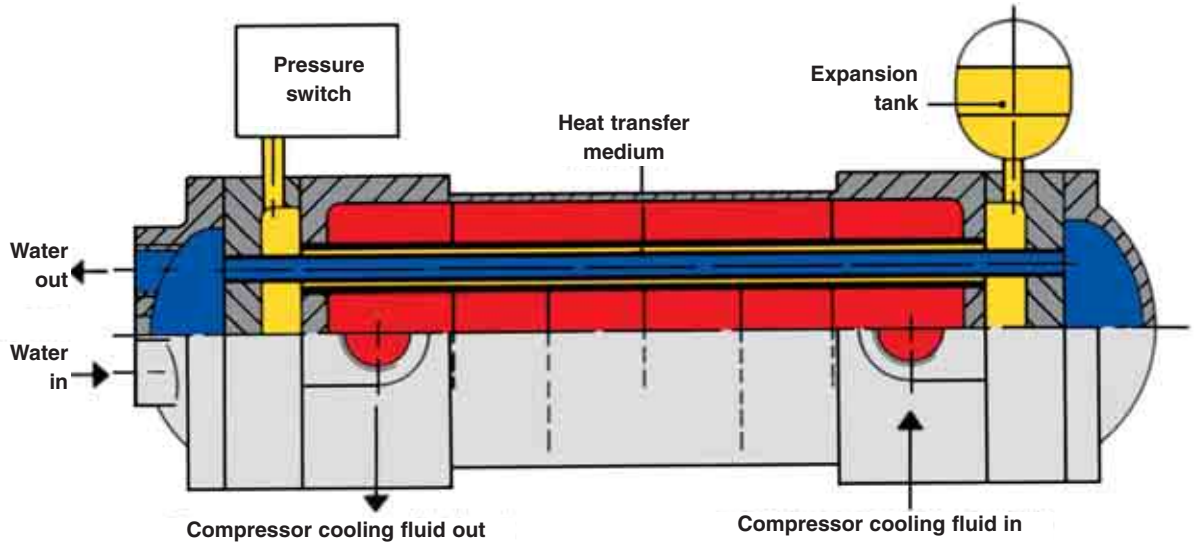
The system can be easily integrated in any hot water supply plant, especially where it is desirable to avoid mixing water and cooling fluid.

Screw Compressor Model	Motor (hp)	Available Heat (Btu/h) [1]	Water volume heated to 158°F (ΔT = 45°F) Also usable for SWT system (gal/h)	Typical Savings [2] ($)
ASD 25	25	54,816	146	1835
ASD 30	30	65,725	175	2201
ASD 40S	40	81,542	217	2730
ASD 40	40	94,087	251	3150
BSD 40	40	91,360	244	3059
BSD 50	50	113,450	302	3799
BSD 60	60	154,903	413	5186
CSD 60	60	139,086	371	4657
CSD 75	75	168,539	449	5643
CSD 100S	100	209,992	560	7031
CSD 100	100	249,263	664	8346
CSD 125	125	285,534	761	9560
DSD 100	100	220,355	587	7378
DSD 100S	100	262,626	700	8793
DSD 125	125	316,897	845	10,610
DSD 150	150	379,076	1010	12,692
DSD 200	200	468,800	1249	15,696
ESD 250	250	612,249	1632	20,499
ESD 300	300	670,338	1787	22,444
FS 440	335	711,791	1897	23,832
FS 460	350	712,320	1897	23,850
GS 525	400	814,080	2168	27,257
GS 590	425	864,960	2304	28,961
GS 620	450	915,840	2439	30,664
GS 650	475	966,720	2575	32,368
HS 670	500	1,017,600	2710	34,071
HS 690	535	1,088,832	2900	36,456
HS 760	605	1,231,296	3279	41,226

[1] Heat exchanger efficiency is not considered
[2] Based on 2000 hours compressor operation,
Heating value of fuel oil: 128,000 Btu/gal
Heating efficiency: 0.70
Heating oil costs: $1.50/gal

1 hp = 2545 Btu/h

SWT Water Heating System



In the SWT fail-safe heat exchanger one tube is fitted into another such that a space still exists between the two tubes. Both tubes are individually pressed into separate tube end plates. The space is filled with a harmless heat transfer medium kept at a constant pressure by the expansion tank. This pressure is continuously monitored by a pressure switch.

In case of breakage or corrosion, either water or compressor cooling fluid mixes with the heat transfer medium and the pressure increases, actuating the pressure switch, giving an alarm or shutting down the compressor. Contamination of either fluid or water is impossible. The fail-safe heat exchanger is piped exactly the same as the PTG plate-type heat exchanger and can produce hot water at about 158°F.

If little or no hot water is needed, the cooling fluid flow is automatically directed through the standard cooler of the compressor. Constant compressor cooling is ensured whether hot water is required or not.

Screw Compressor Model	Motor (hp)	Typical Available Heat [1] (Btu/h)	Water volume heated to 158° (ΔT = 99°F) Also usable for PTG system (gal/h)	Typical Savings [2] ($)
ASD 25	25	54,816	66	1835
ASD 30	30	65,725	80	2201
ASD 40S	40	81,542	99	2730
ASD 40	40	94,087	114	3150
BSD 40	40	91,360	111	3059
BSD 50	50	113,450	137	3799
BSD 60	60	154,903	188	5186
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[1] Heat exchanger efficiency is not considered
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Kaeser's U.S. headquarters in Fredericksburg, Virginia

Mission Statement

We strive to earn our customer's trust by supplying high quality Kaeser air compressors, related compressed air equipment and premium blower systems. Our products are designed for reliable performance, easy maintenance, and energy efficiency. Prompt and dependable customer service, quality assurance, training, and engineering support contribute to the value our customers have come to expect from Kaeser. Our employees are committed to implementing and maintaining the highest standards of quality to merit customer satisfaction. We aim for excellence in everything we do.

Our engineers continue to refine manufacturing techniques and take full advantage of the newest machining innovations. Extensive commitment to research and development keeps our products on the leading edge of technology to benefit our customers.

KAESER COMPRESSORS

Built for a lifetime.™

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The Air Systems Specialist

With over 85 years of experience, Kaeser is the air systems specialist. Our extensive 100,000 square foot facility allows us to provide unequaled product availability. With service centers nationwide and our 24-hour emergency parts guarantee, Kaeser customers can rely on the best after-sales support in the industry. Kaeser stands committed to providing the highest quality air system for your specific compressed air needs.

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