



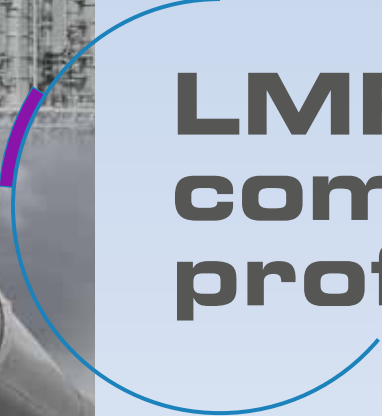
API 618 - process gas compressors



www.lmf.at



your high pressure solution



LMF company profile

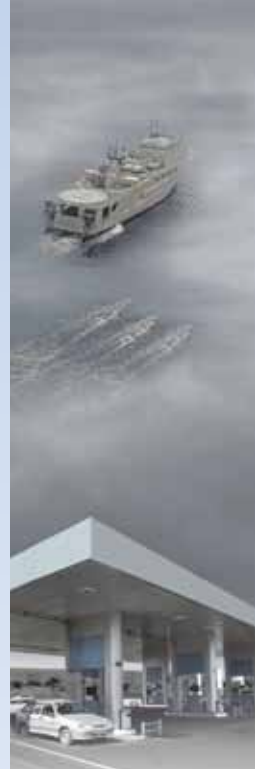
MAIN PRODUCT LINES

- Air- and water-cooled high pressure piston compressors
- Water-cooled compressors according to API 618, with vertical and balanced-opposed cylinder arrangements, lubricated or non-lubricated
- High speed balanced-opposed compressors
- High pressure compound units
- Compound units with integrated nitrogen separation system
- Special compressor units, produced according to customer specifications

GEOGRAPHICAL POSITION

Leobersdorf is located approx. 30 km south of the capital of Austria, Vienna, and has direct access to the freeways, both to the city of Vienna and to the Vienna International Airport.

LMF Headquarters in Leobersdorf, Austria





content

COMPANY PROFILE	02
PRODUCT RANGE	04
PROVEN FEATURES	06
SOPHISTICATED	
ENGINEERED SOLUTIONS	08

APPLICATIONS

Hydrogen	12
Carbon Monoxide	13
Carbon Dioxide	14
Ethylene/ Propylene	15
Nitrogen/ technical gases	16
Gas Mixtures including H ₂ S	17
Hydrocarbon Gas Mixtures	18
Natural gas/ gas mixtures	19

COMPANY PROFILE

LMF is the leading Austrian manufacturer of high-pressure piston compressor systems for air, natural gas, technical and industrial (process) gases. These systems, with power rates from 20 to 6,200kW (30 to 8,300hp) and for pressures of up to 700 bar (10,150psi), are designed and manufactured in accordance with internationally applicable standards.

LMF has a long experience of over 60 years in the production of compressors and offers its customers the benefits of the latest developments in design engineering, proven manufacturing methods, testing under full load, installation and after sales service, all from a single source.

www.lmf.at



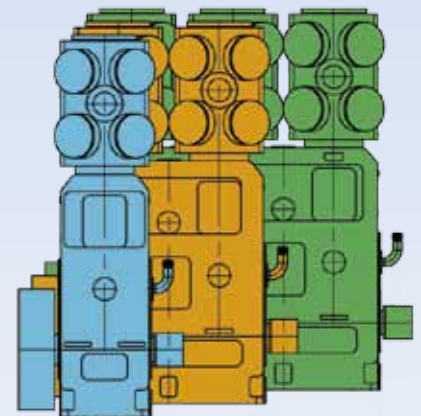


API 618 process gas compressors product range

COMPRESSOR TYPES & SIZES

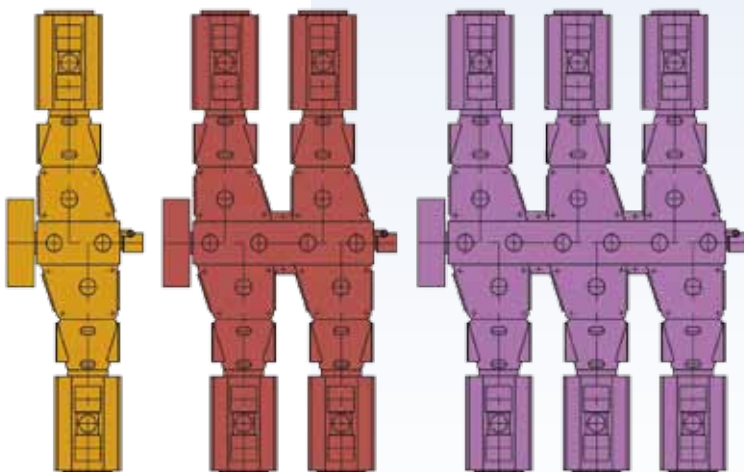
LMF process gas compressors meet the API 618 requirements and are used for gases and gas compositions in chemical and petrochemical processes as well as for boil-off gases and in low-temperature applications.

T-TYPE COMPRESSORS



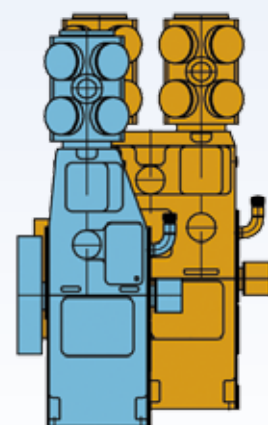
T 91-181 T 92-182 T 93-183

B-TYPE COMPRESSORS

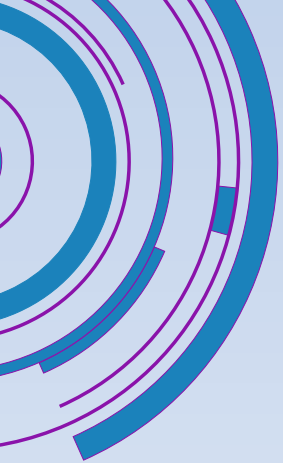


B 92-362 B 154-364 B 256-366

T-TYPE FULLY-BALANCED



T 91 B - T 121 B T 92 B - T 122 B



HIGH POWER RANGES

Up to six compression stages, inlet capacities from less than 100 to 115,000 Nm³/h (72,000 cfm) and final pressure rates up to 250 bar (3,625 psi) with oil-free compression, 450 bar (6,525 psi) with oil lubricated cylinders can be realized.

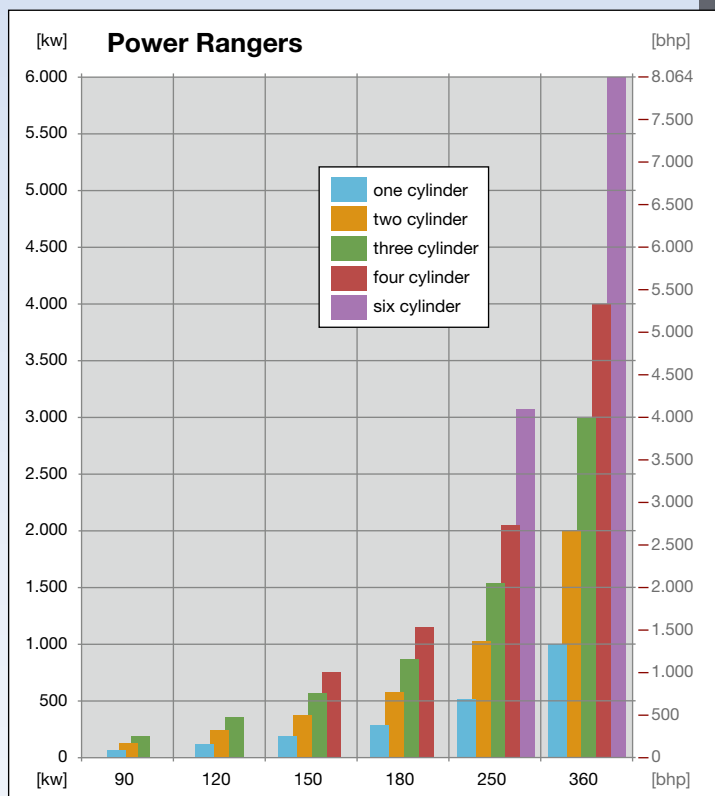
Power ranges between 65 kW (85 hp) – model 90 – and 1,000 kW (1,360 hp) – model 360 – per cylinder can be achieved up to a total of 6,000 kW (6 x 1,000 kW or 8,160 hp).

Balanced-opposed type ("B") as well as vertical in-line type ("T") compressors are available.

In addition, vertical in-line types are available with zero inertial forces achieved by counteracting balancing masses, for "foundation-free" installation, e.g., on offshore platforms.

PROCESS GAS COMPRESSORS (ACCORDING TO API 618)

This series is of modular design with six crankcase sizes, strokes of 90, 120, 150, 180, 250 and 360 mm respectively. One to six cylinders are arranged either vertically (in-line) or horizontally (balanced-opposed design).



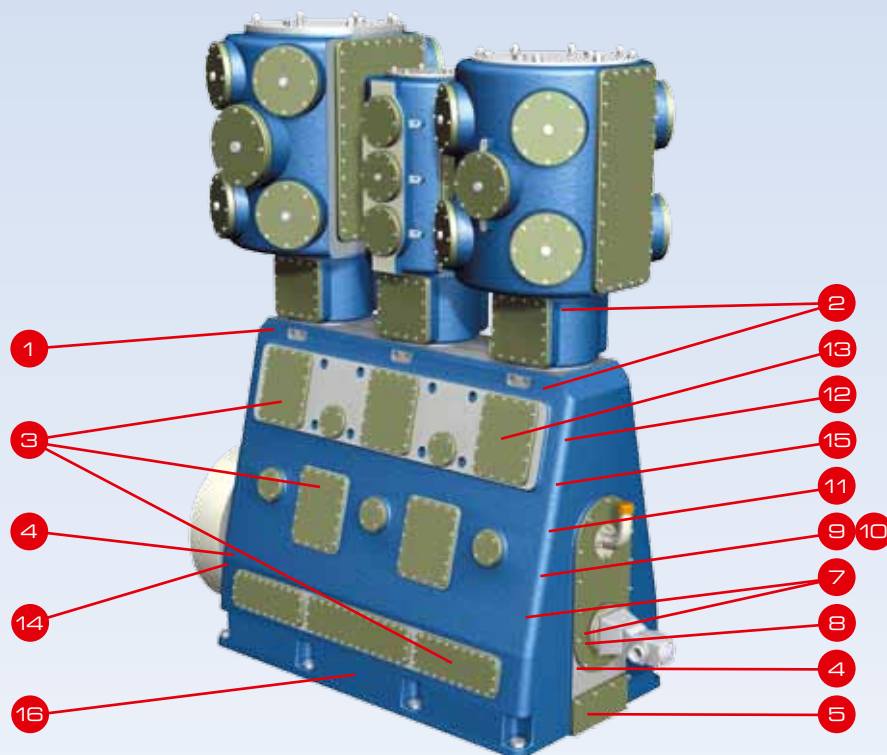
www.lmf.at





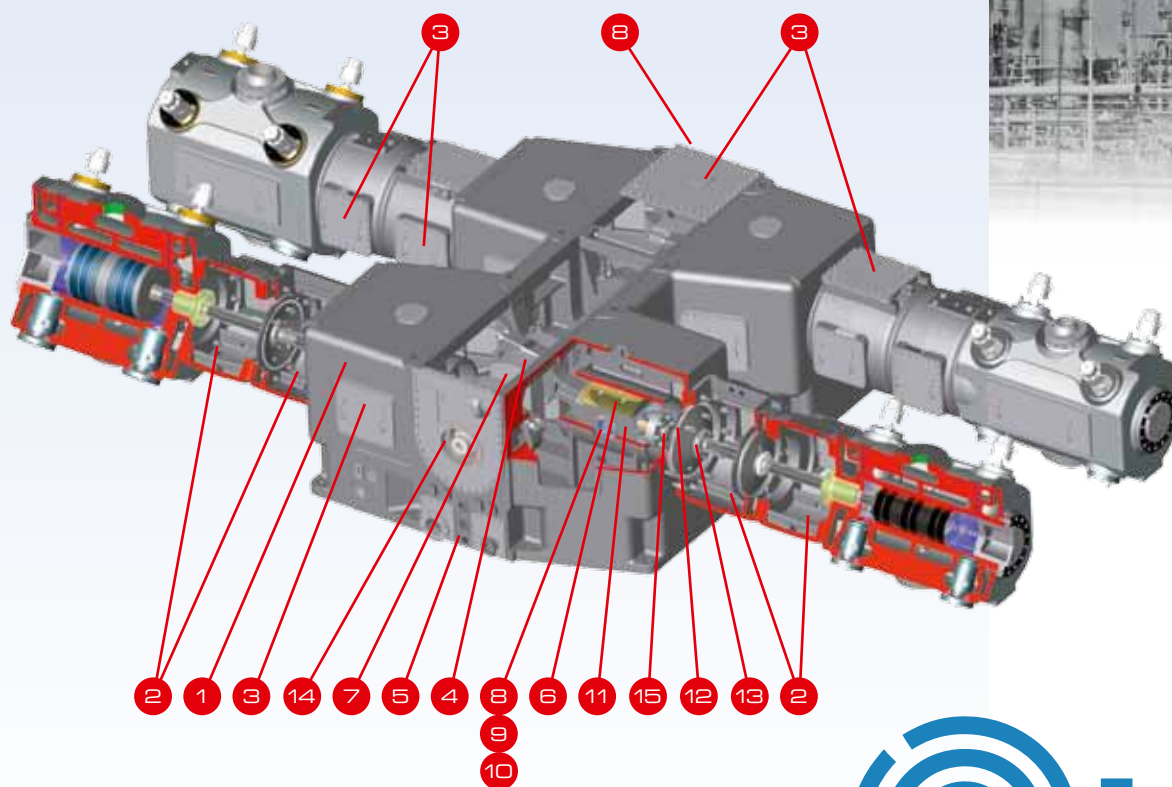
API 618 process gas compressors

proven features



1. Extremely sturdy frames with integrally cast crosshead guides give optimum stiffness for transferring gas and mass forces.
2. Distance pieces are available as appropriate, either single long (full stroke), two-compartment long/short according to API 618/ISO at latest edition.
3. Large inspection openings allow easy access to all major frame elements.
4. Bolts for large main bearings and connecting rods are prestressed with appropriate nuts; no special tools are needed.
5. Generous capacity of the crankcase oil reservoir leads to low oil circulation frequency, optimum defoaming and bubble-free bearing oil supply.
6. Forced oil feed from the crosshead, small-end and large-end connecting rod bearings avoids weakening of the crankshaft with oil passages.
7. Identical, interchangeable main and crankpin bearing sleeves reduce and simplify spare parts requirements.
8. Axial crankshaft loads are carried by a separate bearing and the connecting rods are axially guided in the crossheads. Only cylindrical, hydro-dynamically optimized main and crankpin bearing surfaces without shoulders and circumferential grooves are used.

9. Generously sized, low stressed cross-head pin bearings, positively flooded by pressurized oil for lubrication and cooling are combined with special oil groove design for minimum wear under severest conditions, even without rod load reversal.
10. Crosshead pins are securely fixed in place by a special integral expansion device. They are easily extracted or reinserted with standard tools.
11. The cast steel crossheads with exchangeable shoes have white metal faces and are adjustable by shims, in accordance with API 618.
12. Large free passages between cross-heads and oil wiper packings minimize pulsations and prevent force oil carry-over into the oil wiper packings.
13. Bell-shaped oil wiper hoods with large integral channels are used for unobstructed return of the scraped-off oil into the oil sump.
14. Crankshaft and crankcase are sealed to atmosphere by an oil slinger ring, forming a labyrinth system with the housing and a PTFE profile ring. The shaft seals are oil- and dust-tight without any significant wear.
15. Crosshead and piston rod are connected by the unique **LMF** crosshead coupling without thread on the piston rod.
16. Fully balanced types with zero inertial forces (T91B, T92B, T121B and T122B) are available.



www.lmf.at





API 618 process gas compressors

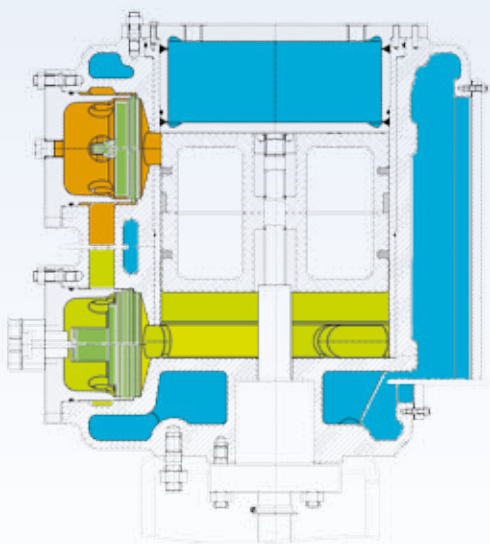
sophisticated engineered solutions



CYLINDER SYSTEMS

LMF has extensive and long-time experience with the selection of the best-suited cylinder system for each application. Depending on numerous parameters the optimum combination of a large variety of designs and materials is selected.

- The best-suited cylinder material for each application, ranging from spheroidal cast iron or ni-resist to forged steel.
- Compression compartments, valve chambers and piston rod packing areas designed for optimum liquid coolant circulation.
- Large valve chamber volumes minimize pulsations.
- Field-replaceable cylinder liners needing no special tools, different materials and coatings are available.
- Cylinder valves with friction-free guided valve plates or aerodynamically profiled valve rings.
- Pistons in welded design, cast iron or steel, solid forged steel.
- Piston rods from high-chromium steel, flame-hardened and super-finished, or with metal-oxide ceramic surface.
- Suction valve unloading systems (closed / open or stepless) for capacity control and start-up / shut-down of the compressor.



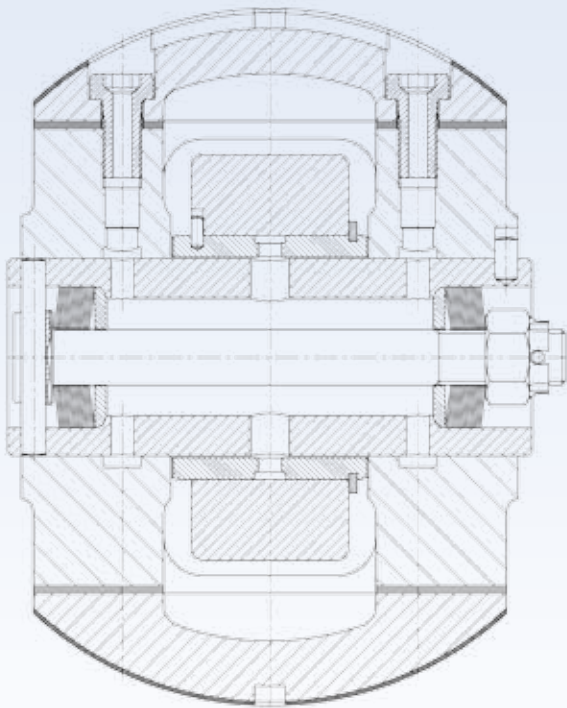
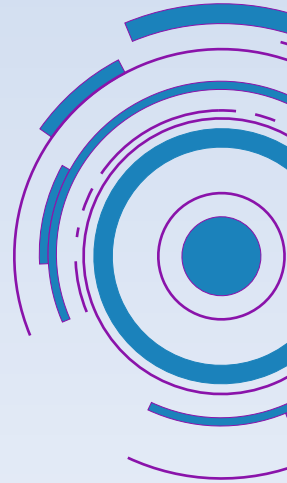
THE FOLLOWING LIST MAY GIVE A FIRST IMPRESSION OF THE CHOICES AVAILABLE:

Piston and rod sealing elements selected to match optimally the operating parameters:

- Materials like PTFE with various fillers, PEEK compounds, polyamid, alloyed steel and bronze, for non-lubricated to fully lubricated operation.
- Contact rings with or without expander springs, with open or gastight joints.
- Flexible labyrinth sealing system with "trapped" piston rings, with T-shaped or trapezoidal sections and expander springs with special geometry for optimized running-in and labyrinth action.

Low loaded, exactly dimensioned guide elements, either as tight-fit or pressure-relieved guide rings:

- Rod packings either indirectly cooled, or with internal coolant passages for direct liquid cooling.
- Packing elements as throttle rings, seal rings or labyrinth elements, with or without support rings in single piece or segmented design.
- Packings can be designed for lubricated or non-lubricated services; additional vent and buffer gas types are available.



CROSSHEAD PIN

- Made from case-hardened special steel.
- Super-finished cylindrical surface, without any recesses or tapered sections.
- Optimum dissipation of the frictional heat by forced tube oil supply from the crosshead.
- Reliable press fit in the crosshead by means of the radial expansion of ground disc spring packs.
- One single tightening element: a castle nut.
- No special tools for tightening/loosening: a torque wrench is sufficient.
- Effortless insertion and extraction by a finger push available.

www.lmf.at





PROCESS APPLICATIONS

- refinery services
- chemical plants
- petrochemical plants
- gas injection/dual fuel engines
- gas turbine feeding
- gas lifting
- gas gathering
- natural gas storage
- CO₂ underground storage (CCS)
- BOG ethylene
- liquified natural gas (LNG)
- offshore-platforms and FPSOs
- flare gas recovery

GAS APPLICATIONS

- hydrogen
- carbon monoxide
- carbon dioxide
- ethylene/propylene
- nitrogen/technical gases
- gas mixtures including H₂S
- hydro carbon gas mixtures
- natural gas/gas mixtures



API 618 PROCESS GAS COMPRESSOR APPLICATIONS

applications

API 618 - process gas compressors



www.lmf.at



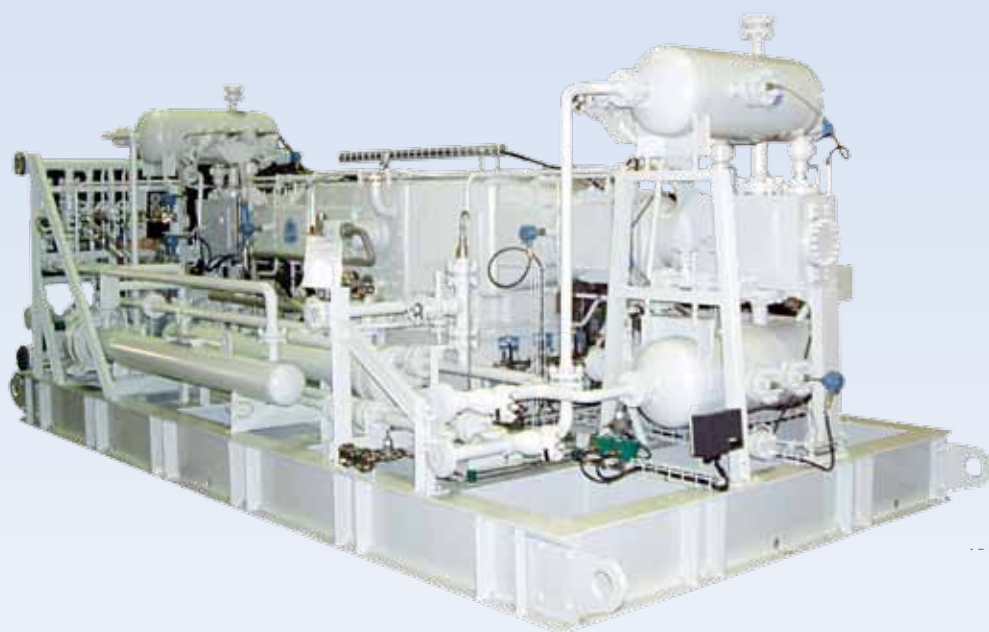
11

ssure solution



API 618 - applications

hydrogen



HIGH PRESSURE COMPRESSOR UNIT IN A PETROCHEMICAL PLANT

B 182-212 N 16.3

Two stages, non-lubricated, direct driven, for compressing hydrogen, capacity of 1,700 Nm³/h (1,060 scfm) in the 1st stage, with additional feed of up to 3,700 Nm³/h (2,300 scfm) in the 2nd stage, working pressure 163 bar (2,360 psi).

HYDROGEN UNIT FOR A GASOLINE DESULFURIZATION PLANT

B 222-132 S 4.6

One stage, min-lubricated, direct driven, for compressing hydrogen, capacity of 40,000 Nm³/h (25,000 scfm), working pressure 46 bar (660 psi).



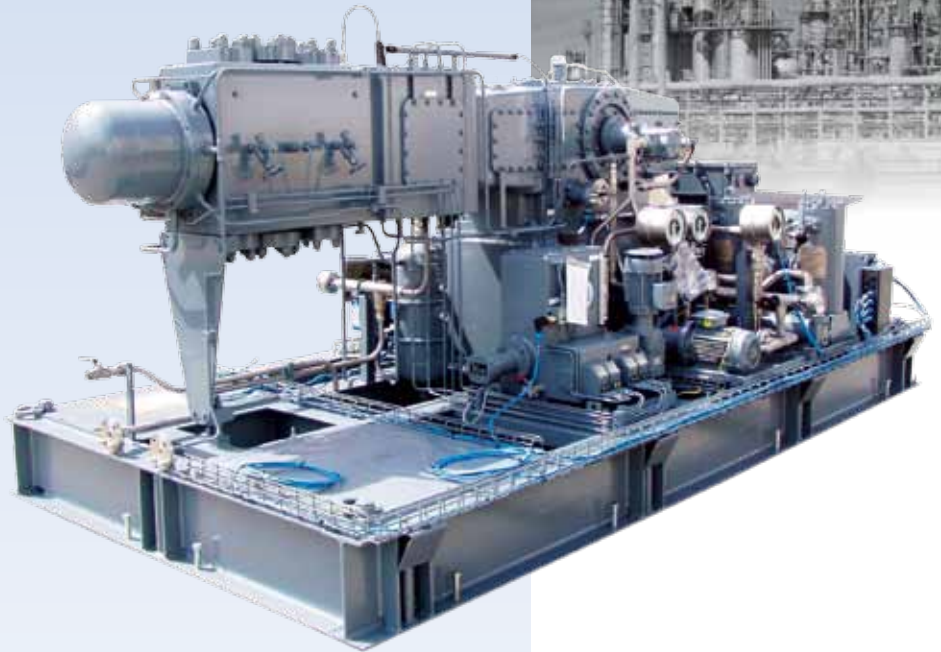
API 618 - applications

carbon monoxide

HIGH PRESSURE COMPRESSOR PACKAGE

B 121-114 S 26.1

One stage, min-lubricated, stationary belt driven, for compressing carbon monoxide, capacity 9,200 Nm³/h (5,750 scfm), working pressure 132 bar (1,915 psi).



VERTICAL COMPRESSOR PACKAGE

T 183-357 N 1.1

Three stages, non-lubricated, direct driven, for compressing carbon monoxide, capacity 3,325 Nm³/h (2,070 scfm), working pressure 11 bar (160 psi).

www.lmf.at





API 618 - applications

carbone dioxide



HIGH PRESSURE COMPRESSOR UNIT

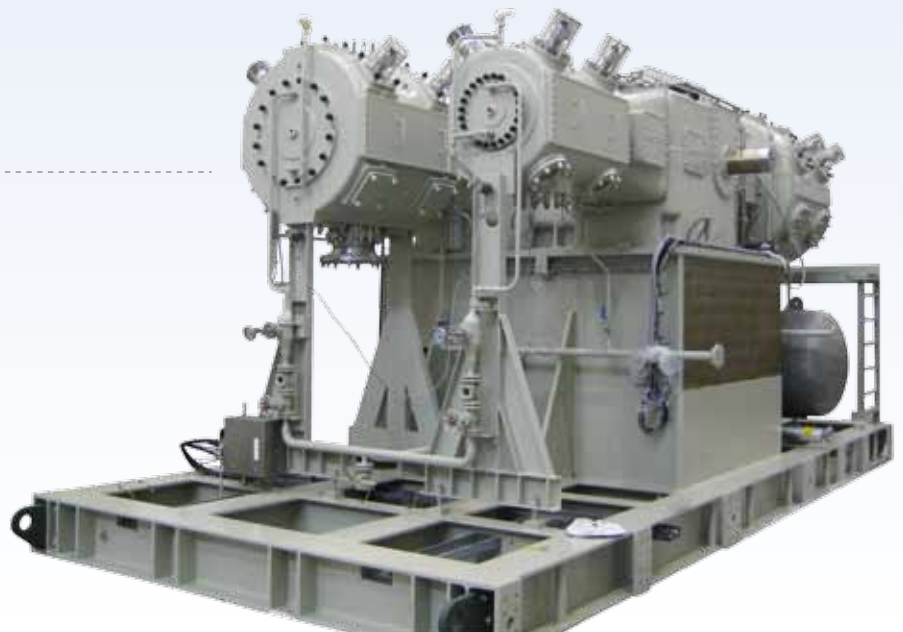
B 264-499 N 17

Four stages, non-lubricated, direct driven,
for compressing carbon dioxide, capacity
5,050 Nm³/h (3,156 scfm), working pressure
170 bar (2,465 psi).

HIGH PRESSURE COMPRESSOR UNIT FOR CARBON CAPTURE AND STORAGE (CCS)

B 224 - 380 N 2.8

Three stages, non-lubricated, direct driven,
for compressing carbon dioxide, capacity
5,850 Nm³/h (3,656 scfm), working pressure
28 bar (405 psi).



API 618 - applications ethylene

BOIL-OFF / ETHYLENE TWO STAGE COMPRESSOR UNIT

B 222-274 N 1.6

For reliquification of Boil-Off Ethylene,
balanced-opposed cylinder arrangement, non-lubricated, capacity
3,800 Nm³/h (2,375 scfm), working
pressure 16 bar (230 psi).



API 618 - applications propylene



COMPRESSOR PACKAGE IN CHEMICAL INDUSTRY

T 182-123 N 4.7

One stage, non-lubricated, direct driven,
for compressing a propylene gas mixture,
capacity 7,800 Nm³/h (4,875 scfm),
working pressure 47 bar (680 psi).

www.lmf.at





API 618 - applications

nitrogen/ technical gases

VERTICAL HIGH PRESSURE COMPRESSOR UNIT

T 123-325 N 4.6

Three stages, non-lubricated, direct driven, for compressing nitrogen, capacity 1,160 Nm³/h (720 scfm), working pressure 46 bar (667 psi).



HIGH PRESSURE COMPRESSOR UNIT FOR REFINERY PURPOSES

B 152-132 N 1.0

One stage, non-lubricated, direct driven, for compressing nitrogen, capacity 8,360 Nm³/h (5,225 scfm), working pressure 10 bar (145 psi).



API 618 - applications

gas mixtures including H_2S

FLARE GAS COMPRESSOR UNIT

B 152-260 N 0.8

Two stages, non-lubricated, direct driven, for compression a gas mixture including hydrogen, hydrocarbon gases and H_2S , capacity 2,300 Nm^3/h (1,438 scfm), working pressure 8 bar (116 psi).



RECYCLE COMPRESSOR PACKAGE FOR FPSO USE

B 154-255 S 2.1

Two stages, min-lubricated, direct driven, for compressing a hydrocarbon gas mixture, including H_2S , capacity 9,780 Nm^3/h (6,112 scfm), working pressure 21 bar (305 psi).

www.lmf.at





API 618 - applications

hydro carbon gas mixtures



FEED COMPRESSOR UNIT FOR REFINERY PURPOSE

B 254-360 N 3.3

Three stages, non-lubricated, direct driven,
for compressing a HC gas mixture, capacity
10,900 Nm³/h (6,780 scfm), working pressure
33 bar (480 psi).



API 618 - applications

natural gas/ gas mixtures

GAS TURBINE FEEDING/ ONE-STAGE COMPRESSOR UNIT

B 222-128 N 6.1

For compressing natural gas, feeding a Rolls-Royce Trend turbine, with stepless flow control, balanced-opposed cylinder arrangement, non-lubricated, capacity 32,630 Nm³/h (20,400 scfm), working pressure 61 bar (885 psi).



OFFSHORE PLATFORM/ FOUR-STAGE COMPRESSOR UNIT

B 254-462 S 12

For disposing CO₂ / H₂S into dedicated gas injection valves on the sea bed, with stepless flow control, balanced-opposed cylinder arrangement, min-lubricated, direct driven, capacity 5,430 Nm³/h (3,395 scfm), working pressure 120 bar (1,740 psi).



www.lmf.at



**Austria
Headquarter**

**Leobersdorfer Maschinenfabrik
GmbH & Co.KG**

Suedbahnstr. 28
A - 2544 Leobersdorf
phone: +43 - 2256 - 9001
fax: +43 - 2256 - 9002
api - sales@LMF.at
cng - sales@LMF.at
ia - sales@LMF.at
ms - sales@LMF.at
service@LMF.at

France

LMF Office France
france@LMF.at

Germany

**LMF Office Germany South/
Switzerland**
Bellinger Str. 39e
D - 86316 Friedberg - Stättling
phone: +49 - 821 - 15 33 38
fax: +49 - 821 - 15 33 53
germany - south@LMF.at

**LMF Office Germany North/
Northern Europe**
Apfelgarten 2
D - 24235 Laboe
phone: +49 - 43 - 49 64 83
fax: +49 - 4343 - 49 64 87
germany - north@LMF.at

Russia

LMF Office Russia
1 - st Golutvinsky Pereulok
Bld. 6, Floor 6
119180 Moscow
phone: +7 - 495 - 737 08 73/74
fax: +7 - 495 - 737 08 71
russia@LMF.at

**Argentina
Subsidiary**

LMF Argentina
Manuel Estévez 1356 - B1871CXJ
Dock Sud - Buenos Aires
phone: +54 - 11 - 42 22 46 62
fax: +54 - 11 - 42 22 19 85
argentina@LMF.at

China

LMF Office China
china@LMF.at

India

LMF Office India
india@LMF.at

Iran

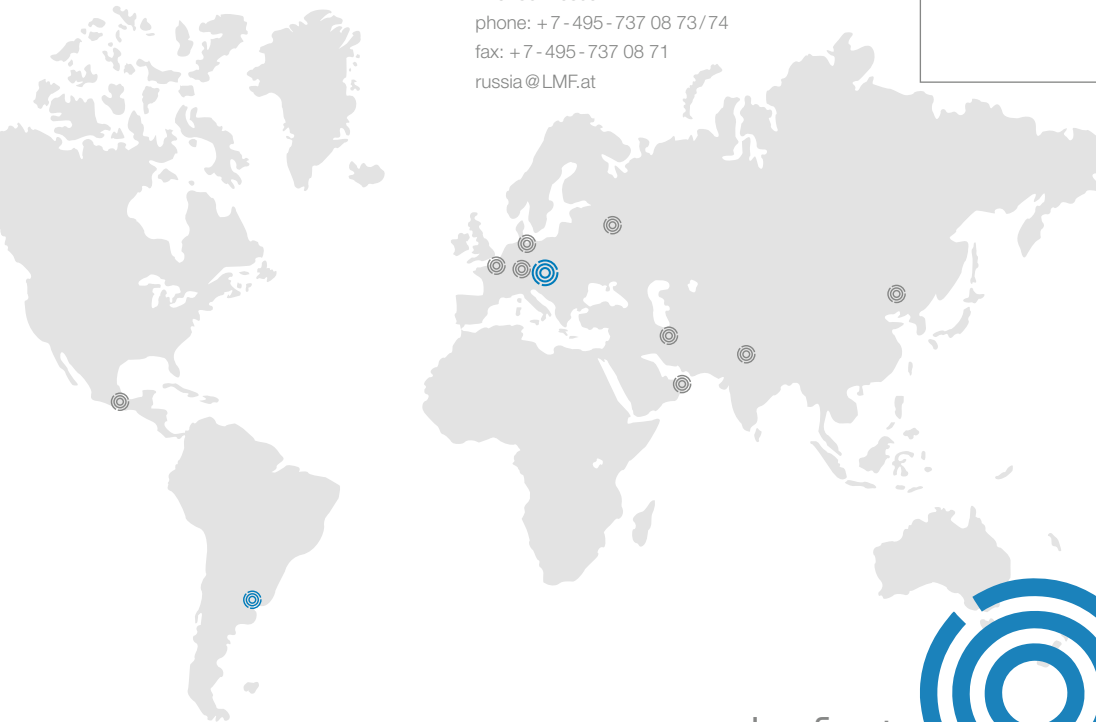
LMF Office Iran
iran@LMF.at

Mexico

LMF Office Mexico
mexico@LMF.at

**United Arab
Emirates**

**LMF Office United Arab Emirates/
Middle East**
uae@LMF.at



www.lmf.at



your high pressure solution