

TECHNICAL DETAILS

Pos. A) 2 x MA-2B / R717

Single-stage screw compressor package GEA Grasso M, type MA-2B for economizer operation with two-stage expansion

1. Technical data screw compressor unit

	Cond. 1	
Refrigerant	R717	
Rated cooling capacity	360	kW
EER - Energy Efficiency Ratio (shaft)	2.84	
Shaft power	126	kW
Maximum operating speed (unit)	3000	min ⁻¹
Minimum operating speed (unit)	1000	min ⁻¹
Evaporation temperature	-20.0	°C
Condensation temperature	35.0	°C
Condensation temperature (winter)	25.0	°C
Evaporation pressure	1.91	bar(a)
Condensation pressure	13.51	bar(a)
External pressure lost on suction side (customer)	0.00	bar
External pressure lost on discharge side (customer)	0.00	bar
Superheat (useful)	0.0	K
Superheat (non-useful)	2.0	K
Superheat (total)	2.0	K
Subcooling (external)	0.0	K
Discharge temperature (full load)	80.0	°C
Discharge temperature (min. part load)	58.5	°C
Total oil flow	73.4	l/min
Functional oil flow	40.1	l/min
Injection oil flow	33.3	l/min
Oil inlet temperature	50.0	°C
Oil cooling rating	68.6	kW
Oil cooling rating (min. part load)	19.0	kW
Subcooling rating (external)	0.0	kW
Intermediate temperature	-10.0	°C
Temperature diff. economizer	0.0	K
Economizer rating	59.4	kW
Design pressure	23	bar(g)
Min. control slide position	22	%

2. Dimensions

The following values for dimensions, weights and charges are preliminary. Final binding data according to the latest version of the general drawing only.

Length	2200	mm
Width	1150	mm
Height	1950	mm
Oil charge	124	l
Total transport weight	3100	kg

3. General declarations

Performance data and tolerances acc. to EN 12900 and DIN 8976; selection of oil according to GEA Refrigeration's data-sheets. The selection of oil has to guarantee a min./ max. viscosity of 7/ 70 cSt for functional oil.

The screw compressor unit is designed according to the operating conditions written in this document and the factory selected P&I diagram. Deviations have to be agreed with GEA Refrigeration.

Min ambient temperature	5	°C
Max ambient temperature	40	°C
Max relative air humidity	70	%
Max elevation	1000	m
Installation conditions	Indoor	
Power supply (from net)	400 V / 50 Hz ± 5%	
Recommended oil type	GEA PR OLEO C MH68A (for alternatives please contact GEA Berlin)	

4. Description of GEA Grasso screw compressor type MMR-M36S-28

GEA Grasso M series screw compressor with adapted fixed internal volume ratio and continuous capacity control.

This compressor is executed and calculated for a single stage unit design.

Scope of supply in detail:

Flanged solenoid valves for the internal oil management.	
Linear displacement sensor (LDS) for the capacity control.	
Prepared for gas pulsation protection for high pressure ratios.	
Solenoid valves specification	3 coils for solenoid valves DC 24V
Slide Position Indicator	4...20 mA; IP65
O-ring material	CR
Grey cast iron casing	GJL 200 acc. DIN EN 1561 or higher quality
Bearings arrangement	Standard
Without oil pump	

5. Screw compressor package components

Electric drive motor

Manufacturer	WEG	
Number of poles	2	
Degree of protection	IP 23	
Efficiency class	IE4	
Voltage	400	V ± 5%
Frequency motor windings	variable	
Drive motor rating	200	kW
Nominal motor current	340	A
Maximum speed (for the component motor)	3600	min ⁻¹
Minimum speed (for the component motor)	1000	min ⁻¹
Winding Protection	3 x PTC	
Maximum installation height above sea level	1000	m

Including Common Mode Filter. Mounted in the power panel.

Screw cable connections

3 x PTC	1 x M20
Main cable	4 x M63
Maximum clamping range	48.0 mm
Material	Brass

The drive motor has to be operated by a frequency inverter.

Please take into account for the correct wiring and shielding of the inverter motor - inverter system the "Project planning information for speed controlled-motors" (O_015511_ti_Motor_FU_gbr_1-A4_man.pdf).

Flanged coupling casing

Oil filter

Single oil filter with filter fineness 20 micron and stop valves.

Suction filter

Integrated suction filter with filter fineness 100 micron.

Including commissioning mesh filter (delivered loosely) for the protection of the suction filter and compressor against possible debris in the pipework after the installation at commissioning. With O-rings sets for the filter change.

NOTE:

The mesh filter needs to be installed into the suction filter before the first start and removed latest after 150 operating hours. Improper handling can cause damages.

Oil separator

Oil separator horizontal with fine separation stage. Oil return to the compressor with orifice.

The oil carry over is < 5 ppm liquid when using the specified oil type.

2 pcs. oil heater (temperature regulation by controller), with safety limiter.

Electrical data	400 V ; 2 Ph ;500 W
	Heater mounted in protective pipe

Economizer suction line

Economizer connection with check valve, strainer, stop valve and service valve.

Extended monitoring (1 pressure sensor, 1 temperature sensor).

Adjustable constant pressure regulation valve with solenoid valve DC 24V.

Thermosyphon oil cooler

Complete with sight glass and service valve.

Thermosyphon oil cooler (tube evaporation).

	Cond. 1
Refrigerant supply temperature	35.0 °C
Refrigerant pressure drop	0.00020 bar

Oil temperature control

Additional 3-way-valve in the oil circuit for oil temperature control.

Main valves

Suction side	1 x stop valve 1 x check valve integrated in the compressor
Discharge side (after oil separator)	1 x stop valve 1 x suction pressure-controlled check valve

6. Package control system GEA Omni with control panel (Siemens HMI)

Industrial panel PC.

Implementation of a defined start and stop procedure.

Compressor capacity adjustment (suction pressure or process temperature are selectable as reference values).

The safety of the unit is guaranteed by continuous monitoring and displaying of all important operating data and motor current limitation.

Physical sequence control with a master (supplied and provided by customer!) is possible by use of hardwired signals or control via network communication (see communication guideline for details).

All sensors and actuators (stipulated by GEA) are fully wired to the compressor controller.

The touch screen (installed at eye-level 170 cm height) and input devices are integrated in a standard enclosure with door.

System control mounted on the package.

Continuous monitoring and displaying of all important operating data. In case safety limits are exceeded the unit will shut down. Limitations for high motor current, low suction pressure, high discharge pressure and low outlet temperature (if available) help to reduce the risk of a complete shut down in case of critical operation conditions.

Capacity control possible according to all standard process values, the control variable is adjustable and alterable.

Voltage AC 230V

Display language

English

Protection class

IP 54

Communication via EtherNet/IP or Modbus TCP.

Set of standard temperature sensors

1 x suction temperature

1 x discharge temperature

1 x oil temperature

1 x oil separator sump temperature

1 x at eco/intercooler connection

Set of standard pressure sensors with stop valve

1 x suction pressure

1 x discharge pressure

1 x oil pressure

1 x at eco/intercooler connection

7. Power supply cabinet

Power panel with IP23 protection completely mounted, wired and tested. Includes frequency converter for drive motor, main switch, emergency switch, contactors for oil heater, thermal over current release, safety fuses and power fuses.

High-efficient frequency drive executed as refrigeration drive and sized according motor requirements. Frequency drive and its harmonic distortion complies to requirements of industrial environment specified by EN 55011 (class A1) and EN61800-3 (class C2).

The maximum cable length for the motor-inverter connection is 25m, and the cable has to be shielded.

The power panel cabinet is delivered separately, not mounted on the base frame, and without motor connection cables.

Voltage	3~/400V/50Hz
Color	RAL 7035
Cable input	Below

The following values for dimensions and weight are preliminary. Final binding data according to the latest version of the general drawing only.

Width	1800	mm
Depth	500	mm
Height	2200	mm
Weight	435	kg

The following values are preliminary. Final binding data according to the latest version of the electrical diagram only.

Designed for nominal current	360	A
Size of main switch	400	A
Maximum back-up fuse for the inserted main switch	630	A
Short-circuit resistance	25	kA

8. Safety devices

Max. allowable pressure (PS)	23.0	bar(g)
Overflow valve between discharge and suction side at the compressor.		
Overflow valve opening pressure	22.0	bar(g)
Safety valve at the oil separator.		
Safety valve opening pressure	23.0	bar(g)
1x safety pressure limiter KP7 ABS with two separate locks.		

9. Options (included)

1 pcs. spare oil filter element plus O-ring for the first maintenance.
Commissioning suction mesh filter with O-rings (delivered loosely).

10. Painting

Paint system according to DIN EN ISO 12944-2/C2	
Degree of cleanliness	Sa 2 1/2 acc. to DIN EN ISO 8501-1 and DIN EN ISO 12944-4
Type of coating	C2.05 DIN EN ISO 12944-5
Color	RAL 5014, pigeon blue
Primer	2 K-EP 60 µm
Top coat	2 K-EP 60 µm
Minimum dry film thickness	120 µm

11. Approval and certificates

CE certificate for pressure vessels only acc. to Pressure Equipment Directive (PED) 2014/68/EU.
Calculated and manufactured acc. "AD 2000". Documentation acc. to CE rules.

1 set(s) of approval and certificates on USB flash drive.	
1 set of approval and certificates allocated on GEA file sharing server.	
1 set(s) of approval and certificates as hardcopy.	
Language	English

12. Documentation

1 set(s) of documentation on USB Drive.

1 set of documentation allocated on GEA file sharing server.

1 set(s) of documentation as hardcopy.

Language

English

13. Packing

Without packing, transport in closed systems only.

EXCLUSIONS

The items or services listed below have been excluded from the scope of this quotation.

- All government approvals;
- Custom duty, VAT, clearance costs, government fees, embassy/ government legalization & its related costs and transportation from port to the job site and or any destination charges;
- Costs for inspection by third party (like S.G.S., Lloyds or Verities);
- Any kind of certifications apart of our standard certificates;
- Installation, startup and commissioning;
- Supervision of installation and/or commissioning;
- Any kind of engineering works;
- All Mechanical & Electrical installation materials;
- Equipment sound and vibration isolation;
- Provision of incoming mains electrical supply, transformers, isolators, fuses or distribution board;
- Operation and maintenance of the plant and equipment;
- Ammonia and oil charge for the refrigeration system;
- Foundations, spare parts, valves and special tools
- PLC/ Scada
- Pipe work and cabling
- Economizer
- Water supply and drain piping;
- Equipment storage due to customer/ site delays
- All kind of insulation works and materials;
- Structures, platforms, foundations, spare parts/special tools;
- Alarm system or any special safety requirements;
- Any item/service not explicitly mentioned in this quotation;