

## REFRIGERATING COMPRESSOR UNITS type W92MARS



*Dębica 2017*

## CONSTRUCTION AND EQUIPMENT

Construction of the units and a wide range of the factory-set accessories enable the units to operate in a manual regulation mode or an automatic one, after having applied in the units the supplementary thermostats or low pressure controls.

The construction of compressors and compressor units designed for operating in marine systems meets requirements of the following marine classification societies:

- Polish Register of Shipping S.A.
- Lloyd's Register of Shipping
- Det Norske Veritas

The compressor units are of a block construction and they are equipped with the following main assemblies:

- \* **single-stage return flow piston compressor** with cylinders placed in "W" arrangement and with a crankshaft gland packing,
- \* **electric motor**; a squirrel cage one or a slip ring one of enclosed construction for land applications; and a squirrel cage one of drip tight construction or stream tight construction for marine versions, with synchronous rotational speed 1000 or 1500 r.p.m. at current frequency 50 Hz,
- \* **flexible coupling** connecting the electric motor with the compressor; it attenuates rapid load changes and simultaneously it serves as a flywheel, ensuring a high stability of running and low vibration level of the whole unit,
- \* **unit supporting frame**,
- \* **oil separator** with a system of self-acting oil return to the compressor,
- \* **panel with automatics** for protecting and controlling.

Apart from that the unit equipment includes:

- \* **set of mechanisms** for manual and automatic compressor capacity regulation,
- \* **unloading mechanism** of the compressor while starting up,
- \* **lubrication system**,
- \* **stop valves** enabling individual or central filling the compressor with oil when the machine is running,
- \* **water system** for cooling cylinder heads, protected against corrosion by zinc protectors.

## OPERATION

Manual or automatic start up is done at the lowest unit capacity thanks to action of compressor unloading mechanism.

When starting up period is over, the unit can operate at its full or reduced capacity after lifting mechanisms of suction working valve plates are deactivated.

In case the evaporating pressure should decrease, e.g. as a result of drop of evaporator heat load, the unit, equipped with automatic capacity regulation, reduces its capacity automatically and then stops the operation. The renewed start of the unit takes place automatically at evaporating pressure increase. The oil which is forced out of compressor together with refrigerant vapour is recovered in the oil separator at discharge stub pipe.

The oil collecting at the bottom is automatically drained in into the crankcase thanks to the applied automatic float valve. The compressor automatic protection consists of a safety valve and low and high pressure controls in the refrigerant circuit and a differential pressure control in the oil circulation line.

**CAPACITY REGULATION**

The capacity regulation system, which also performs the function of unloading the compressor while starting up, operates on the principle of throwing out of work the correspondent cylinders by lifting the working suction valve plates to opening position. The lifting piston device, acting directly on the valve plates, is fed with the refrigerant vapour at the condensing pressure.

Operation of capacity regulation system can be controlled by hand with the adequate switches as well as automatically.

The compressors have got the following capacity rate regulation:

3W92MA, 3W92MS, 3W93MR – 33%, 66% and 100%

6W92MA, 6W92MS, 6W92MR – 33%, 66% and 100%

10W92MA, 10W92MS, 10W92MR – 20%, 60% and 100% or other customised.

The present information goes for refrigerating compressor units in standard executions, however upon individual customer's wish the Maker can deliver units in special executions, for instance: with an electric motor on voltage of 440V and frequency 60 Hz.

The units can be equipped with the microprocessor control system.

In the W92 compressor unit type-series, modifications were introduced to increase their durability (long life). The modifications consist in enlargement of supporting surface of bearings and introduction of special lubrication pockets to improve lubrication conditions of bearings.

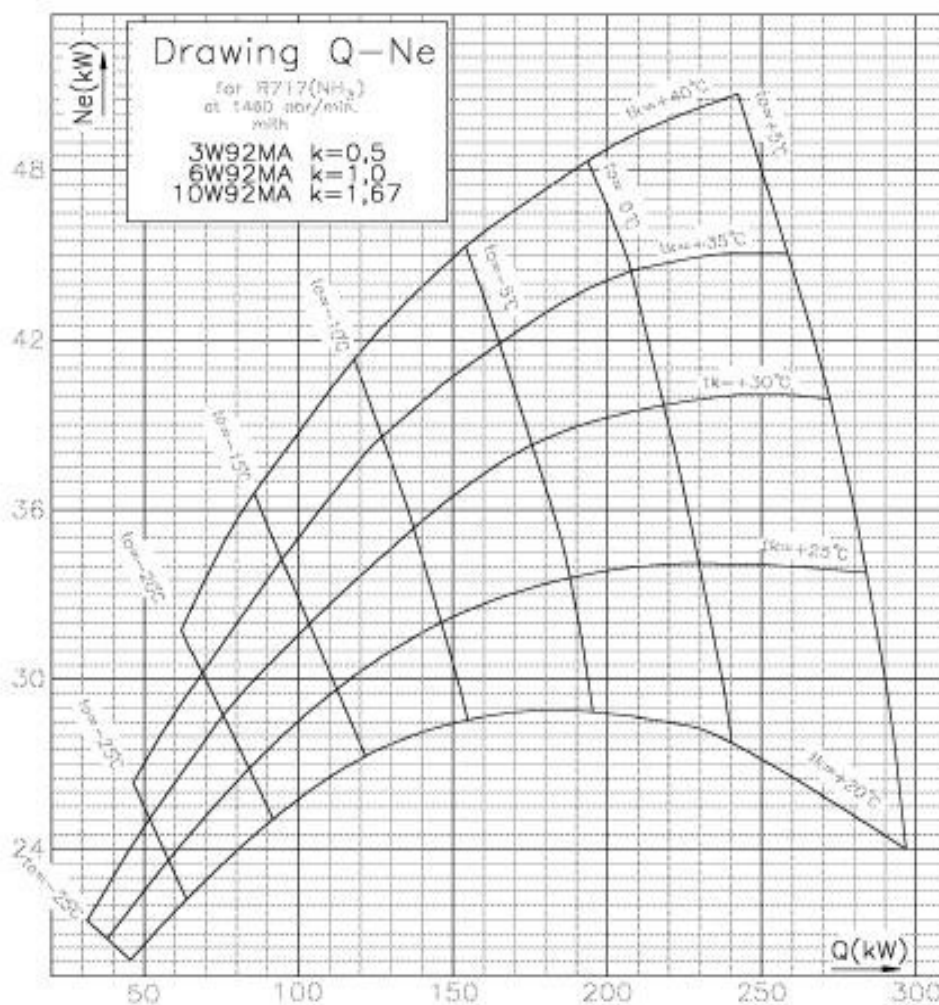
**DANE TECHNICZNE AGREGATÓW W92MARS**

Characteristic quantities		Unit.	Type of unit					
			3W92MARS		6W92MARS		10W92MARS	
COMPRESSOR UNIT	Refrigerant	-	R717 (NH <sub>3</sub> ) – symbol A in designation					
			R22- symbol R in designation					
			R404A – symbol S in designation					
	Synchronous rotational speed of motor	obr/min	1000	1500	1000	1500	1000	1500
	Level of sound intensity	dB	max 83		max 85		max 88	
	Nominal diameter of suction conduit	mm	65		80		100	
	Nominal diameter of discharge conduit	mm	50		65		80	
	Average oil consumption	dm <sup>3</sup> /h	0,055	0,080	0,067	0,102	0,090	0,133
Water consumption for cooling the oil	m <sup>3</sup> /h	0,5		0,5		0,5		
Water consumption for cooling the heads *)	m <sup>3</sup> /h	0,9		0,9		1,3		
COMPRESSOR	Number of cylinder	-	3		6		10	
	Cylinder diameter	mm	92		92		92	
	Piston stroke	mm	75		75		75	
	Swept volume	m	88	131	176	262	294	435
	Volume of oil in crankcase	dm <sup>3</sup>	13		24		27	

Specification		Unit.	Limiting values
Water for cooling compressor heads *) and oil cooler	max. temperature at inlet	°C	+35
	max. pressure at inlet	MPa	0,4
Oil pressure (difference between indications of oil manometer and suction manometer )		MPa	0,05 to 0,2
Ambience temperature	without water cooling systems	°C	-15 to +45
	with water cooling system	°C	+5 to +45

\*) in executions with water cooling of compressor heads

**TECHNICAL CHARACTERISTICS OF THE W92MA UNITS**



Drawing 1

Discharge temperature when operating insingle-stage and at the high stage of „booster” system;  $t_{dis}$  max 130°C.

**Description for characteristics of the W92M units**

Q - refrigerating capacity (kW),

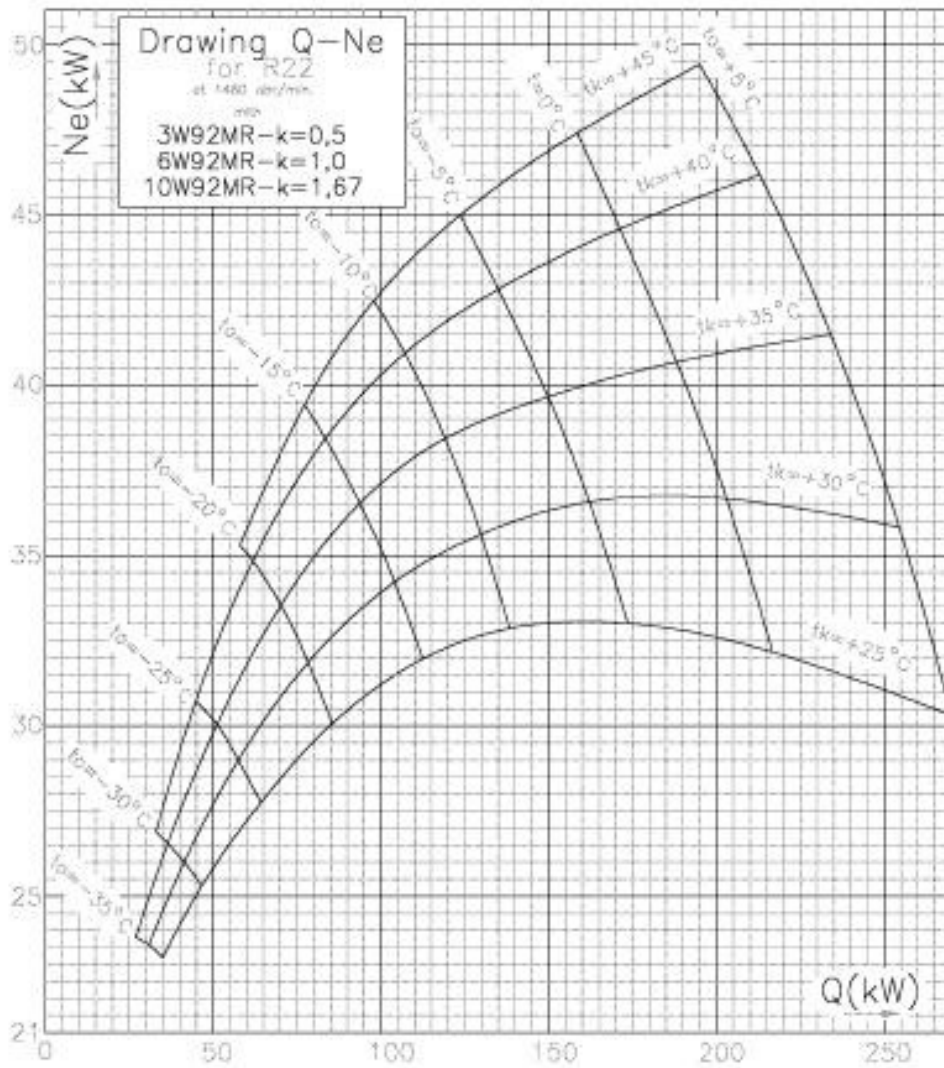
Ne - effective power of compressor (kW),

$t_o$  - evaporating pressure (°C) ,

$t_k$  - condensing pressure (°C)

$n_1$  - 1500 r.p.m. - synchronous rotational speed of motor

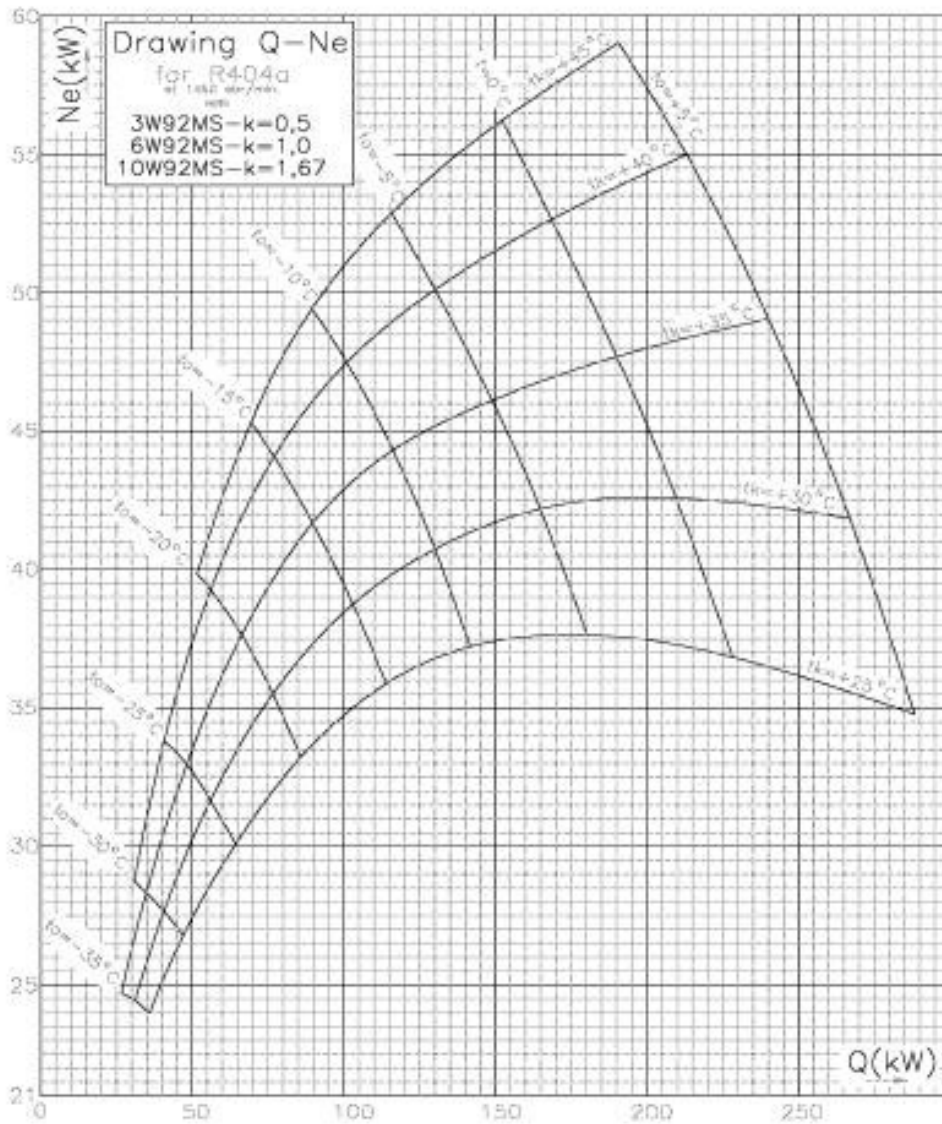
TECHNICAL CHARACTERISTICS OF THE W92MA UNITS



Drawing 2

Discharge temperature when operating in single-stage and at the high stage of „booster“ system;  $t_{dis}$  max  $125^\circ\text{C}$

TECHNICAL CHARACTERISTICS OF THE W92MS



Drawing 3

Discharge temperature when operating in single-stage and at the high stage of „booster“ system;  $t_{dis} \max 125^{\circ}\text{C}$

OVERALL DIMENSIONS

