

MAXIMA[®]

ONLY FOR REAL PROFESSIONALS



AEROSOL GENERATOR MX2
Use and maintenance manual

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1 INTRODUCTION

This document contains information needed to use and to maintain device Aerosol Generator MX2 (so called MX2).

Device *MX2* is designed and produced by Maxima S.p.A..

For all devices or semi-devices and in general for all machines composing *MX2*, the present UMM refers to their own producing companies' UMM.

Current manual contains information on device MX2 safety dispositions and usage.

This document gives information also about maintenance program in order to keep device usage within safety levels, and it gives indication regarding device start up, switching on and cleaning operation.

Finally this document contains information about how to keep device safely insulated from energy sources.

This document has been draft accordingly to Machinery Directive, Specification UNI EN 12100-2 and all other Specifications quoted into Conformity Declaration released by producer itself.

2 DEVICE DESCRIPTION

MX2 has been designed and realized to add a small quantity of water in a line of compressed air, in a very accurate and controlled way, in order to obtain a water vapour aerosol as fluid.

The aerosol obtained, used as drilling fluid, reduces drilling tools temperature in a more efficient way, if compared to compressed air, keeping the compressed air characteristic of drilling debris evacuation.

MX2 can add small quantities of water with high precision, giving to operator possibility to obtain a drilling fluid practically dry, preventing water leakage into drilled hole.

2.1.1 Technical Data

Power




kind:	AC Three Phase Electric Energy + Ground
Voltage:	230 or 110 V
Auxiliary Voltage (commands):	230 or 110 V
Auxiliary Voltage (buttons and lamps):	n.a.
Frequency:	50 V
Residual Current Circuit Breakers Voltage:	0,03 A

Dimension and Weight

Dimension:	37 x 27 x 28
Weight:	13 Kg at empty tank
Max Pressure	10 bar
Tank Max Capacity	8 liter
Tank Max Useful Capacity	6 liter
Max Water Use at 4 bar (position: 100)	6 liter/hour
Min Water Use at 4 bar (posizion: 10)	0,6 liter/hour
Max Water Use at 12 bar (posizion: 100)	4 liter/hour

2.2 USE INTENDED




2.2.1 General









2.2.1.1		Device MX2 has its own power cable with shuco connection 220 V (or US pin for 110 V), which can be connected to home power line.
2.2.1.2		Device MX2 is supplied with empty tank, for safety reasons during transport.
2.2.1.3		Don't use MX2 without Maxima S.p.A. Water/Air Rotational Joint GR1, in particular without safety valve mounted on GR1.
2.2.1.4		To use device MX2 a clean plastic tank of 5-10 liters should be available, to fill up device MX2 tank with clean water.
2.2.1.5		Optimal application conditions for MX2 usage are: compressor with breadth between 600 and 5000 lt/min according to drilling depth, diameter, and material nature to be drilled; compressed air transmission line with inner diameter not less than 16-18 mm, certified at 10 bar; 2 connectors 3/4" to connect compressed air line to MX2 device air in and out; GR1 with its safety valve; diamond tools for aerosol drilling; device for dust (drilling debris) captation at the wellhead.

2.2.1.6		Maxima S.p.A. technical staff could support you to choice the right compressor indicated for the specific application, with needed pressure and breadth.
2.2.1.7		Maxima S.p.A. technical staff could also support you to choice right diamond tool technology to use, accordingly to material nature to be drilled and drilling engine used too.
2.2.1.8		MX2 power absorption is 220 V 0,11 A. Also available version 110 V 0,11 A.
2.2.1.9		MX2 water tank capacity is 7 liters. In application with air pressures around 3-4 bar, and by selection of maximum water dosage (position 100), at maximum number of impulse per minute (position 100), water use is around 3-4 liters per hour.
2.2.1.10		MX2 has a first small regulator for water dosage, with graduated scale from 10 to 100 units, and it has a bigger regulator with graduated scale from 10 e 100 units too (see pictures). With both regulators on position 100, MX2 doles out maximum possible water quantity at the specific air pressure which the compressed air line is.
2.2.1.11		On upper MX2 part, is a T shake mitt for compressed air line regulation (see picture), with which it can be regulated air pressure into the drilling system.





2.2.2 MX2 Device Installation

2.2.2.1		Wear all personal safety devices like: dust mask, glasses, safety shoes, gloves and noise reduction headphones.
2.2.2.2		Only operators, who has received specific instructions about MX2 device safe usage at high air pressures, are allowed to utilize MX2 device.
2.2.2.3		Put MX2 close to drilling site (1-2 m far max), so that front side is visible and also MX2 commands can be reached easily by operator during drilling.
2.2.2.4		Put MX2 on a flat ground so that no water leakage can occur.









2.2.2.5		ATTENTION: verify that air compressor is switched off.
2.2.2.6		Connect compressed air tube coming from compressor to MX2 fast connection 3/4" with label "air in" (looking at MX2 front, the connection on right side).
2.2.2.7		Cut a small piece of compressed air tube to cover distance between MX2 device, and GR1 device mounted on drilling engine. Apply a fast connector 3/4" on one side of cut tube and connect it with MX2 fast connection with label "air out" (looking at MX2 front, the connection on left side).
2.2.2.8		Connect then the other tube side to the GR1 tap.
2.2.2.9		Open water cap on top of MX2 device.
2.2.2.10		Don't touch cables and tubes into the tank.
2.2.2.11		Put water into tank and stop at few cm from the top of the tank.
2.2.2.12		ATTENTION: don't leak water out of tank. In case of leakage of water out of tank, dry leakage before connecting MX2 device to power line.
2.2.2.13		Close tank cap.
2.2.2.14		In case of ambient temperature close to 0° C, add some antifreeze liquid to water put into MX2 tank.
2.2.2.15		ATTENTION: choose antifreeze liquid which is safe and not toxic.
2.2.2.16		ATTENTION: connect MX2 to a power line protected by residual current circuit breakers at 0,03 A, to prevent operator electric shock.




2.2.3 Device MX2 Start Up

2.2.3.1		Set up drilling system (rods, connections and tools), having care to contact technical qualified people for the right diamond tool choice.
2.2.3.2		On power cable there is a safety switch which must be armed, pushing green button. ATTENTION: keep switch in dry and elevated place from ground.
2.2.3.3		On NX" front, on black control panel, verify that led on right is switched off.
2.2.3.4		If led is switched on, push safety switch black button, disconnect MX2 from power line, and verify water tank is full. Eventually fill it up.

2.2.3.5		Verify no water leakages out of tank occurred and eventually dry it.
2.2.3.6		Connect MX2 to power net and push safety switch green button. Verify that led on command panel is switched off.

2.2.4 MX2 Device Usage

2.2.4.1		Be sure that tap on GR1 is closed. Then switch on air compressor and read air pressure on manometer on front of MX2 device.
2.2.4.2		Read table A at the end of this document to set up indicated maximum air pressure for the diamond tool diameter in use, and according to which kind of pushing system used on your drilling engine. Mind that on GR1 device safety valve mounted is for maximum 4 bars.
2.2.4.3		If higher air pressures are needed, GR1 safety valve should be changed with another one with appropriate maximum air pressure level.
2.2.4.4		Once verified that all these indications are satisfied, open air tap on GR1 device slowly.
2.2.4.5		Push button ON/OFF on MX2 device command panel and select both water control knob on 70.
2.2.4.6		Keeping diamond tool at 10 cm far away from surface to be drilled, put one hand in front of diamond tool and verify that drilling fluid is added of small quantity of water.
2.2.4.7		If no water vapour is in drilling fluid, repeat all start up operations. If problem persists, contact Maxima S.p.A. technical staff.
2.2.4.8		Push button ON/OFF to stop water addition to compressed air line, and close up GR1 tap.
2.2.4.9		Start drilling in the wall, with reduced rotational speed and no drilling fluid.
2.2.4.10		Select position 20 on small selector on MX2 control panel.
2.2.4.11		Open carefully tap on GR1, being sure to keep tightly in the hands drilling engine enhancement steering wheel.
2.2.4.12		Push button ON/OFF on MX2 control panel and switch on drilling engine. Start to push on drilling engine handlebar.
2.2.4.13		Working with compressed air higher than 2 bars, a certain reaction force against operator force applied on drilling engine handlebar could occur. If such this reaction force, which tends to take out diamond tool from the hole, is too high, reduces compressed air pressure, by means of air pressure regulator on top of MX2.
2.2.4.14		ATTENTION: don't put hands or objects on drilling engine guide support. Compressed air in the drilling system could cause sudden drilling engine self movement.
2.2.4.15		During drilling record air pressure value read on MX2 manometer, and verify it remains always stable.
2.2.4.16		ATTENTION: if air pressure increases during drilling, even 0,5 bar, reduces water quantity added to drilling fluid, selecting with the small selector on MX2 control panel at 10. Infect air pressure increase could be due to high water level which creates mud with drilling debris. Mud with drilling debris can deposit on diamond tool outside diameter obstructing compressed air way out.
2.2.4.17		This occurrence is very dangerous, since high pressure into drilling system would realize a pushing force which could through drilling system and drilling engine out

		of the hole. Also drilling engine detachment from anchorage could occur with great danger for operator.
2.2.4.18		In case of air line pressure increase, close up immediately tap on GR1, and take back diamond tool of 10-20 cm, keeping diamond tool in rotation.
2.2.4.19		Verify that air way out is free and open. Push and pull diamond tool into the hole of 10-20 cm several times and then open air tap continuing to push and pull diamond tool into the hole, to clean properly hole.
2.2.4.20		Be sure that air way out is open and then continue drilling.
2.2.4.21		If problem persists, take out diamond tool from hole and verify diamond tool condition.
2.2.4.22		ATTENTION: generally during drilling pay attention if any of following possible phenomenon occur: sensitive drilling fluid quantity reduction at wellhead; high drilling speed reduction; increase of pressure on drilling system in direction of taking drilling system out of hole.
2.2.4.23		In these case it could happen that air way out is going to be obstructed. Then stop drilling and operates like air way out is obstructed, as described before.
2.2.4.24		After first 2 minutes of drilling, push button ON/OFF on MX2 control panel, close up tap on GR1 and take out diamond tool from hole.
2.2.4.25		Touch diamond tool with naked hand and verify that hotness is still not so high and you can keep hand on it. It means diamond tool is still below 60° C and drilling can continue with the MX2 current set up.
2.2.4.26		Put diamond tool into the hole, open tap on GR1 and push button ON/OFF on MX2.
2.2.4.27		Drill for 5 minutes.
2.2.4.28		After 5 minutes drilling take out again diamond tool from the hole.
2.2.4.29		Verify diamond tool temperature with naked hand. If it is still under control, continue drilling.
2.2.4.30		If diamond tool temperature is higher than at the first stop, move small selector on MX2 control panel from 20 to 30.
2.2.4.31		Put again diamond tool into the hole.
2.2.4.32		Continue drilling for 10 minutes.
2.2.4.33		If diamond tool temperature is under control, it means you have found right device MX2 set up.
2.2.4.34		During drilling monitor air pressure on manometer.
2.2.4.35		Increase water quantity moving up small selector on MX2 control panel of 10 units each 2-3 m of depth. Once arrived at 100 with smaller selector, start to increase bigger selector of 10 units each 2-3 m of depth. Mind that for the bigger selector, first you have to push the selector and keeping pushed you have to turn it.
2.2.4.36		In general during drilling, increase water into drilling fluid – putting MX2 selectors on higher values – when diamond tool temperature increases, specially on harder materials. And decreases water quantity, when air pressure increases on manometer.
2.2.4.37		When red led on right of MX2 control panel, it means that water is below working level into the tank.
2.2.4.38		Switch off MX2 pushing button ON /OFF on control panel, and close tap on GR1. Then switch off drilling engine.
2.2.4.39		Push black button on MX2 safety switch and disconnect device MX2 from power line.




2.2.4.40		Open MX2 tank cap and fill up tank with new water. Please use only clean water with clean pails.
2.2.4.41		Close tank cap and clean up eventual water leakages out of tank.
2.2.4.42		Connect device MX2 to power line and push MX2 green button safety switch.
2.2.4.43		Push button ON/OFF on MX2 control panel and continue drilling.
2.2.4.44		Every time that drilling must be stopped, follows following procedure.
2.2.4.45		Switch off drilling engine.
2.2.4.46		Push button ON/OFF on MX2 control panel.
2.2.4.47		Close up tap on GR1.
2.2.4.48		If tap on GR1 is closed before MX2 button ON/OFF is switched off, water could deposit into air line and once drilling starts again, drilling fluid could be with too high content of water. It could create mud and close up the air pressure way out.
2.2.4.48		In case of passing through holes, once arrived closed to the opposite side of the wall, (around 5 – 10 cm) reduces air pressure drastically by means of air pressure regulator on MX2.
2.2.4.48		ATTENTION: once ended the hole, core could be thrown out from the opposite side of the wall, pushed by the air in pressure. It could be very dangerous.

Table A
Manual Enhancement

Tool Diameter (mm)	Max Air Pressure (bar)	Pushing Force Applied on Tool @ Max Air Pressure (Kg)
20-64	10	40-400
65-100	5-10	400
101-120	3,5-5	400
121-150	2-3,5	400
151-180	2	400-500
181-220	2	500-750
221-260	2	750-1050
261-300	2	1050-1400
301-400	2	1400-2500






Automatic Electric/Hydro Enhancement

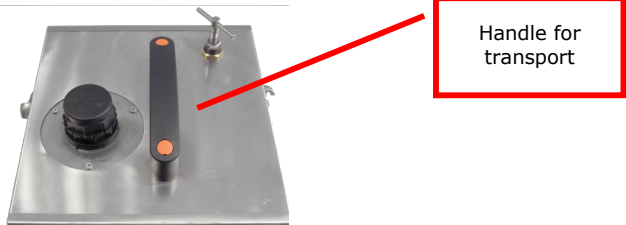
Tool Diameter (mm)	Max Air Pressure (bar)	Pushing Force Applied on Tool @ Max Air Pressure (Kg)
20-64	10	40-600
65-100	7-10	600
101-120	5,5-7	600
121-150	4-5,5	600
151-180	2	600

181-220	2	760
221-260	2	760-1060
261-300	2	1000-1400
301-400	2	1400-2500

Red lines are application conditions at which potential force produced on tool by air in pressure is higher than the one produced by enhancement system. And then it is higher than safety level

Maintenance and Device MX2 Transport

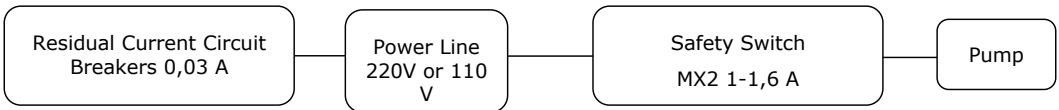
2.2.5.1		Once finished MX2 use, disconnect compressed air tubes and power line.
2.2.5.2		Open tank cap and put MX2 up side down to take out water still into tank, having care not to pour water on elements under voltage.
2.2.5.3		Close tank cap and put MX2 in flat and dry place.
2.2.5.4		To carry MX2 device uses its handle. On transport always carry MX2 device disconnected by power line and compressed air line, on flat ground.
2.2.5.5		Don't leave water into tank for long time.
2.2.5.6		If months are passed from last usage, at the beginning once switched on MX2, it could be needed few minutes to allow water to arrive to compressed air line from tank.
2.2.5.7		MX2 doesn't need any ordinary maintenance.
2.2.5.8		In case of damage, only Maxima S.p.A. technical staff is allowed to open and repair device.



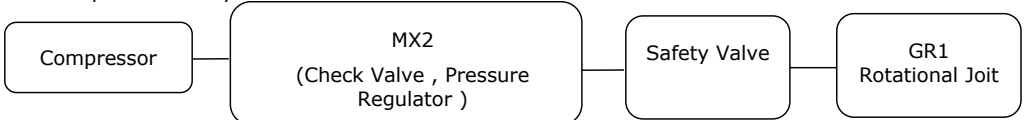
2.2.6 Systems

Device MX2 is composed by following systems:

- Electric System:



- Compressed Air System:



Safety



MX2 device can be used only by operators with personal safety devices like: dust mask, glasses, safety shoes, gloves and noise reduction headphones.



Connecting and disconnecting air compressed tubes operations must be done with air compressor switched off and device MX2 disconnected by power line.



MX2 device must be disconnected by power line when water tank is full filled or water is taken out from tank.



When an automatic enhancement is used to drill, an operator must be always beside drilling machine to monitor drilling and aerosol generator parameters.



Refer to safety dispositions content into drilling machine and GR1 device Use and Maintenance Manual to complete the safety contest of MX2 use.



Whenever MX2 is connected to compressed air line, the system composed by, MX2 device, GR1 device, diamond tool with all its core barrel, and drilling engine with its anchoring support, is a system submitted to a fluid in pressure. Then the use of so composed drilling system exposes operators and other people in the working area of drilling system, to dangers and residual risks connected to systems in pressure.



Operators must receive specific training about the advises contained in this document, which must be adopted to avoid risks and dangers.



In specific verify that MX2 device has CE label and that package contains the present document.



Use at high pressures can produce a reaction force on drilling engine, which pushes drilling engine back on the engine support.



In case of drilling engine manual enhancement, such this reaction force, could provoke an expected handlebar rotation and an expected drilling engine movement on drilling engine support.



Air Pressure should be always set up at the indicated value for the specific application, by means the MX2 pressure regulator.



Open GR1 air tap slowly and always with hands keeping tightly the drilling engine handlebar.



It is not allowed to put hands on drilling engine support, danger of crush due to unexpected drilling engine movement.



It is not allowed to leave objects on drilling engine support.



In case of drilling stop, switch off first MX2 device, then switch off drilling engine, close up air tap on GR1 device, and then when drilling system has stopped it is allowed to touch core barrel and its elements.

Diamond tool or any drilling system in use, is generally one part or a composed part, but in any case a closed part. Whenever it can occur any obstruction on drilling fluid way out, due for instance to a wrong high quantity of water added to compressed air, the drilling system becomes a part in pressure. Pressure can provoke a reaction force which pushes drilling system out of the hole, and then drilling engine back on its basement, which can be dangerous for operator.

To prevent such this risk, there is a safety valve on GR1 device, which opens when a certain safety value of pressure is exceeded. GR1 is supplied with a safety valve for max 4 bars pressure.

Moreover MX2 has a pressure regulator to impose a safety value of drilling fluid pressure.



4 bar is an indicative pressure and it represents typical working pressure for main applications.



Maximum pressure allowed to work safe, must be calculated according to drilling diameter, which gives the total surface on which the potential maximum pressure insists and then produces a potential maximum reaction force.

To calculate safety valve maximum pressure, according to application, refers to Table A at the end of "MX2 Use" paragraph.



Obstruction of drilling fluid way out generally is announced by one or more of these following phenomenon: 1) loss of drilling fluid quantity at wellhead; 2) increase of reaction force on drilling engine due to pressure into drilling system; 3) drastic drilling speed reduction;



Whenever one of these phenomenon occurs, close immediately air tap on GR1 device, move back drilling system of 10-20 cm, and verify that drilling fluid way out is open.

Even if drilling fluid way out obstruction is a rare phenomenon, following further safety dispositions should be applied:



Use of drilling tools with slots or holes on steel support;



Use of automatic drilling engine pushing systems which allow operator to stay at 2-3 m far away from drilling engine itself.

MX2 device assembled with GR1 device, drilling devices and drilling engine compose a system which can be used by only one operator.

Sometimes an adding operator is employed to screw and unscrew drilling rods.



For both operators dangerous areas are: behind drilling engine, closet o drilling engine basement, around drilling engine handlebar, drilling system rotational axes on the drilling engine back and also in front of the drilling engine, in case of passing through drilling.



It is not allowed to stay in proximity of drilling engine handlebar to anybody apart of drilling operator. To anybody is not allowed to stay behind drilling engine, besides drilling engine basement, and on the drilling system rotational axes on the drilling engine back and also in front of the drilling engine, in case of passing through drilling.



Don't fall over the compressed air tubes connected to MX2.



MX2 should be put in a well lighted place.



Don't put in MX2 Tank other fluids apart water. Can be used antifreeze liquid if it is not toxic.




Don't apply to MX2 pressures higher than 10 bars.





Don't use MX2 device without GR1 device. In particular don't use MX2 device without a safety valve on the compressed air line, well dimensioned using table A in this document.




Don't put on MX2 weights higher than 30 Kg;

 MX2 doesn't need any ordinary maintenance. Be sure only that tank is empty when a long time stop is forecast.

 Don't open MX2 device.

 Extraordinary Maintenance or damages evaluation must be conducted at Maxima S.p.A. SS Giovi 44, 22073 Fino Mornasco (Co), Italy.

 Substitution of MX2 parts is allowed only with equivalent components. But such this operation must be conducted at Maxima S.p.A., via Matteotti, 6, Poviglio (RE).

2.3 MARKING AND CONFORMITY DECLARATION

(Rif.: Directive 2006/42/CE: Annex VII, part A, par. 1, letter a), 8°, 9° e 10°).

Original copy of Conformity Declaration is enclosed with MX2 device.

3 DEVICE HANDLING, TRANSPORT AND STORAGE INFORMATION

3.1 DEVICE STORAGE

Keep MX2 in dry and flat ground, with water tank empty.

3.2 INSTRUCTION FOR CONNECTING DEVICE TO ENERGY SOURCES

For safety reasons MX2 must be connected to a 220 V or 110 V, power line protected by residual current circuit breaker fixed on 0,03 A.

3.3 TRAINING AND INFORMATION

Information to Operators:

Operators must receive information and training about:

- Risks using MX2 in usual and standard operational conditions;
- Risks using MX2 damaged or in failure conditions, described in this document.

Training:

MX2 device must be used only by operators who received a specific training on contents of this Manual, and on drilling engine and GR1 device manuals too.

Operators training must embody:

- All devices involved in drilling Use and Maintenance manuals at operators hand;
- Training on risks linked to MX2 device use;

Operators must be trained to:

- Risks linked to use of device MX2 with fluids in pressure;
- Correct use of Personal Safety Devices;
- Management of risky situations linked to MX2 use.

3.4 PERSONAL SAFETY DEVICES

Here in following table Personal Safety Devices that operators should wear and when they should wear them, during usage of MX2 device.

These information come from risk evaluation (cfr. document "Method Suva for Risk Evaluation of technical device installation").

Device	Operation	Danger Kind	Personal Safety Device
MX2	Trasport MX2	crush	Gloves safety shoes.
Electric System	Electric system Control and Maintenance	Electric Shock	Insulating Gloves;
Compressed Air System	Drilling	Eyes Graze, Respiratory Irritation by dust	Glasses and dust mask.

Personal Safety Devices used must be conformed to legal Regulations and Specification in force.

4 DEVICE DEMISE AND DISPOSAL INFORMATION:

MX2 parts are mostly steel.

MX2 demise can be done after removal of frontal and rear repairs by means unscrew of fixing screws.

Then:

removal of upper and lateral steel parts;

removal of pump from steel basement by means of unscrew of fixing screws;

removal of pressure regulator;

steel parts and tubes must be recycled with iron;

safety switch and pump must be put with electric devices;

pump plastic tubes must be recycled like plastic;

valve must be recycled as brass;

box pins and pressure regulator can not be recycled because composed of steel and plastic.



DICHIARAZIONE DI CONFORMITA'
(ex All. II, punto A della direttiva europea 2006/42/CE)
Il fabbricante

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Dichiara che la macchina

Vaporizzatore

Denominazione commerciale

Generatore aeromax MX2 per carotaggio continuo

Denominazione generica

Addiziona alla linea d'aria compressa dell'acqua in modo controllato, per ottenere una sorta di aerosol come fluido di perforazione

Funzione

MX2

MX02 - 045

Modello

Tipo

Numero di serie

è conforme a

tutte le disposizioni pertinenti della direttiva 2006/42/CE, e in particolare alle norme:

UNI EN ISO 12100-1:2009 Sicurezza del macchinario - Concetti fondamentali, principi generali di progettazione - Parte 1: Terminologia di base, metodologia

UNI EN ISO 12100-2:2009 Sicurezza del macchinario - Concetti fondamentali, principi generali di progettazione - Parte 2: Principi tecnici

UNI EN ISO 14121:2007 Sicurezza del macchinario - Valutazione del rischio - Parte 1: Principi

Poviglio (RE)

08/03/2022

Luogo

Data

per Maxima S.p.A.
il Presidente

Dichiarazione di Conformità

