

Air/oil Modular Minimal System



User Operating and Maintenance Manual

Original Instructions





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C2159IE - WK 16/21

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1. INTRODUCTION

This user and maintenance manual relates to the **MiQueL** air/oil modular minimal system.

The latest version may be obtained from the Technical-Commercial Office, or by consulting our website http://www.dropsa.com.

This user and maintenance manual contains important information about protecting the health and safety of the personnel who intend to use this apparatus. You must read and look after it carefully, making sure that it is available at all times for the operators who intend to consult it.

2. GENERAL DESCRIPTION

MiQueL is an Air/oil modular minimal system available in 3 versions:

- PRO: module with solenoid valve
- BASE: module without solenoid valve
- CART: module without solenoid valve, without oil adjustment and fixed flow rate.
- BASE NO-EV: module with pneumatic valve activation

All versions can be equipped with solenoid valve for independent control of each module, "-4" VERSION.

Operation

The system consists of a pressurised lubricant tank, one or more mixture regulation modules, pipes and spray nozzles (see hydraulic diagram below).

The lubricant contained in the tank ① is pressurised by the air and sent to the mixing modules ② through a pipe inside the tank.

Each module has oil ③ (NO CART version) and air ④ check valves that are controlled manually by the operator. The outward oil and air flow can be managed independently between the different modules using a mini solenoid valve ⑤ ("- \cdot "version only) or a pneumatic valve ("*NO-EV*" version only) that activates the control valves ⑥ on the module. The module has a compensation valve ⑦ ("*PRO*" version only) which is able to keep the flow rate constant as the inlet tank pressure and outlet counter-pressure varies.

The lubrication pipes can be traditional or coaxial. In the latter case, the lubricant and nebulisation air are transported separately to the nozzle. The piston B keeps the oil from dripping from the nozzle when the lubrication operation is complete.

Hydraulic diagram





If coaxial pipes are used, the nozzle mixes the air and oil at the point to be lubricated. The lubricant is atomised in minuscule particles by the air flow that passes in front of the oil outlet hole.

The geometry of the nozzle is designed based on the type of spray to be obtained (conic, blade-shaped, etc.).

Advantages

- Easy to install on the machine •
- Reduction in tool wear
- Improved surface finish on the part •
- No lubricant residuals left on the part when the work is complete •
- The nozzles do not drip after being turned off •
- Large spray range (up to 300 mm) •
- Greater safety and environmental hygiene at the workplace •

Application

- Machine tools
- Machines for cutting and bending plate
- Steelworks

3. PRODUCT IDENTIFICATION

There is a plate on the side of the unit that displays the product code, the power supply voltages and the basic characteristics.

4. TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS				
Reservoir capacity		1 <i>lt</i> – 3 <i>l</i> t		
Maximum number of modules		8		
Air inlet pressure		4bar ÷ 7bar		
Maximum air consumption at the outle	et	~50NI/min (per module)		
Air inlet pipe		Ø10mm		
Air outlet pipe		Ø6mm		
Oil outlet pipe		Ø3mm		
	PRO	0.1 ÷ 2.7 cc/min (oil 10cSt) 0 ÷ 1 cc/min(oil 32cSt) 0 ÷ 0.2 cc/min (oil 100cSt)		
Oil flow rate per element	BASE	0.3 ÷ 8 cc/min(oil 10cSt) 0.1 ÷ 3 cc/min(oil 32cSt) 0 ÷ 0.6 cc/min (oil 100cSt)		
	CART	cc/min = (P x 8.16)/V P = Operating pressure in [bar] V = viscosity [Engler] at operating temperature		
Lubricating oil		10cSt ÷ 100cSt		
Drotostion grade of module ", "	Standard	IP 00		
Protection grade of module -	On request (special)	IP 65		
Protection grade of reservoir	•	IP 65		
Pressure switch calibration (optional)		6bar		
Maximum pressure switch load (option	nal)	Voltage free contact maximum voltage 250V Maximum power 100W		
Maximum minimum level load		⁽¹⁾ 0,25A @ 48V ⁽²⁾ 0,5A @ 48V		
Element solenoid valve power supply		24Vdc		
Operating temperature		+5°C ÷ +50°C		
Storage temperature		-10°C ÷ +80°C		
Max. relative humidity without operat	ing condensate	90%		
Sound pressure level		< 70 dB(A)		
Net weight		~5Kg (mod. 1lt) – ~7Kg (mod. 3lt)		

⁽¹⁾ Models with only minimum level

⁽²⁾ Models with minimum and maximum level





6. UNPACKING AND INSTALLING

6.1 UNPACKING

Once the suitable location for installation has been identified, open the package and remove the unit. Check that it was not damaged during transport or storage.

The packaging material does not require special disposal precautions as it is not in any way dangerous or polluting.

6.2 INSTALLATION

Allow a sufficient amount of space for installation, leaving a minimum perimetric space of 100 mm (3.93 in.).

Install the unit at "shoulder height" to prevent abnormal positions or the possibility of impacts.

Use the brackets with the holes (see chap. 12) to fix the unit properly. It is also possible to disassemble the brackets from their current position and reassemble them in the prepared threaded holes for side or corner installation.

It is prohibited to use the unit if submersed in fluids or in a particularly aggressive or explosive/inflammable environment if not previously prepared for that purpose by the supplier.

Use safety gloves or glasses as specified in the safety sheet for the lubricant.

Do not use aggressive lubricants with NBR gaskets. In the case of doubt, contact the Dropsa SpA technical office to receive a detailed card about the recommended oils.

Do not ignore the hazards to health and comply with the health regulations.

6.3 PNEUMATIC CONNECTIONS

Before making the connection, check that the valve for the main air, the manual sliding valve and the check valves (air and oil) are closed. Make sure that the inlet pressure does not exceed 7bar.

Use fittings and pipes that are suitable for the operating pressures, push-in connection for Ø10 mm pipe.

For "NO-EV" version use suitable pipe for operating pressure, push-in for Ø4 mm pipe.



ATTENTION! Always install a regulator filter with condensate recovery on the air inlet. Any unfiltered deposits or sediments could irreparably damage the product.

6.4 ELECTRIC CONNECTIONS

Connect the minimum level as shown in the diagram below and indicated on the plate on the reservoir.

Connect the (optional) "NO" pressure switch, precalibrated to 6 bar, by passing the cables from the protective cover using a 6.3 mm fasten.

6.5 FILLING THE TANK

Make sure there is no residual pressure in the tank (pressure gauge indicator: "0"). The oil is transferred to the tank through the loading cap with a filter. The "maximum" sign on the filling indicator must never be exceeded.

6.6 AIR/OIL HYDRAULIC CONNECTIONS TO THE LUBRICATION NOZZLE

Using coaxial pipes, connect the Ø3mm pipe ① to the oil outlet push-in ② on the module, slide the Ø6mm tube ③ outside the Ø3mm tube until connect it to the air outlet push-in ④.



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Then connect the same coaxial pipes to the lubrication nozzle push-in as shown below:

1. Insert the Ø6 air pipe in the push-in on the nozzle connection.



2. Remove the nozzle head from the articulated pipe, through which the Ø3 oil tube should pass, making it protrude approx. 20/25 mm.



3. Insert the Ø3 oil pipe in the push-in on the nozzle head.



4. Replace the nozzle head on the articulated pipe.



To make it easier to remove the pipes exiting the module, use the device to remove Ø3 tube (code 1525475) not supplied: unscrew the Ø6 push-in, insert the device in the Ø3 pipe, push the device on the collar of the Ø3 push-in, push and pull the Ø3 pipe.

7. OPERATING INSTRUCTIONS

Operations to perform before start-up.

- Check the integrity of the unit;
- Check the power supply pressure;
- Check that the electric connection was carried out correctly;
- Check that the unit is at the operating temperature.

7.1 **USE**

- Open the manual cursor valve;
- Press the start button on the machine to which the unit is connected or start it;
- Check that the solenoid valves on the elements are correctly activated;
- At the first start-up, it may be necessary to fill the oil pipes, wait until the lubricant exits;
- Check that the lubrication is suitable (if there are doubts about correct operation, the Dropsa SpA technical office can be contacted to request the inspection procedure).

7.2 ADJUSTMENT

- The modular elements are normally supplied with the oil (NO CART version) regulation and the air regulation completely closed. To regulate the air/oil mixture for the individual elements, proceed as follows:
- Turn the oil regulation knob (NO CART version) anticlockwise to increase the flow rate or clockwise to decrease the flow rate. Following an orientation reference diagram for flow adjustment.





Use a screwdriver to turn the air regulation pin anticlockwise to increase the flow rate or clockwise to decrease the flow rate, until the desired spray is obtained, normally the adjustment is made by max 3 revs.

ATTENTION! Do not over unscrew the air regulation pin as it may come free of its housing.

7.3 TANK AIR VENT

On the lid there is a cap for the tank air vent.

Unscrew the vent cap by a couple of turns to allow the notch on the lid to drain the air.



8. TROUBLESHOOTING

ATTENTION! The unit may only be opened and repaired by authorised Dropsa personnel.

A diagnostics table is provided below that indicates the main anomalies, the probable causes and the possible solutions. If you were not able to solve the problem after consulting the diagnostics table, do not try to find the fault by disassembling machine parts but contact the Dropsa technical office and report the discovered anomalies, with a detailed description.



DIAGNOSTICS TABLE			
ANOMALY	CAUSE	SOLUTION	
Lubrication door not take place	Solenoid valve broken.	Replace the solenoid valve.	
activating the solenoid valve.	The air supply pressure is below 4 bar.	Increase the supply pressure up to a minimum of 4 bar.	
The lubricant exits irregularly and	Lubricant below the minimum level in the tank.	Top up the tank with new lubricant.	
d2 oil pipo	The Ø3 oil pipe is not perfectly engaged	Insert the pipe, making sure to insert it	
	in the module push-in.	to the end.	



9. MAINTENANCE PROCEDURE

Le unità sono state progettate e costruite in modo da richiedere la minima manutenzione.

Per semplificare la manutenzione, si consiglia il montaggio delle stesse in una posizione facilmente raggiungibile (vedi paragrafo 6.2).

- Controllare periodicamente i giunti delle tubazioni per rilevare eventuali perdite.
- Controllare periodicamente il livello dell'olio ed eventualmente procedere al riempimento tramite il tappo di carico.
- Mantenere sempre puliti i moduli per poter rilevare prontamente eventuali perdite.

La macchina non richiede attrezzature speciali per nessuna attività di controllo e/o manutenzione. Si raccomanda di utilizzare attrezzi e protezioni personali idonei all'uso in rif. al D. Lgs. 81/2008, ed in buone condizioni (secondo la normativa vigente) onde evitare danni a persone o parti della macchine.

10. DISPOSAL

During machine maintenance, or if it is demolished, do not dispose of the polluting parts in an improper manner. Refer to the local regulations for their correct disposal. When demolishing the machine, the identification plate and all other documents must be destroyed.



11. ORDERING INFORMATION

VERSION	DESCRIPTION	Modules	Reservoir capacity 1lt.	Reservoir capacity 3lt.
		1	3135501	3135541
		2	3135502	3135542
	Air/Oil modular minimal system	3	3135503	3135543
MiQual DPO	with compensation valve	4	3135504	3135544
IVIIQUEL PRO	without a solenoid valve for	5	3135505	3135545
	independent control	6	3135506	3135546
		7	3135507	3135547
		8	3135508	3135548
		1	3135511	3135551
		2	3135512	3135552
	Air/Oil modular minimal system	3	3135513	3135553
MiQuel PRO - /	with compensation valve	4	3135514	3135554
Milquee I no - c	with solenoid valve for independent	5	3135515	3135555
	control	6	3135516	3135556
		7	3135517	3135557
		8	3135518	3135558
		1	3135521	3135561
		2	3135522	3135562
	Air/Oil modular minimal system	3	3135523	3135563
MiQuel BASE	without compensation valve	4	3135524	3135564
	without a solenoid valve for	5	3135525	3135565
	independent control	6	3135526	3135566
		7	3135527	3135567
		8	3135528	3135568
		1	3135531	3135571
		2	3135532	3135572
	Air/Oil modular minimal system	3	3135533	3135573
MiQueL BASE - ¿	without compensation valve	4	3135534	3135574
	with solenoid valve for independent	5	3135535	3135575
	control	6	3135536	3135576
		/	3135537	3135577
		8	3135538	3135578
		1	3135681	3135621
	Air/Oil modular minimal system	2	3135682	3135622
	without compensation valve	3	3135683	3135623
	with solenoid valve for independent	4	3135684	3135624
1202	control	5	3135685	3135625
	Protection grade IP65		3135686	3135626
		/	3135687	3135627
		<u>8</u>	3133088	3135028
		2		2125642
	Air/Oil modular minimal system	2		3135643
	without compensation valve and oil	4	-	3135644
MiQueL CART - ¿	adjustment	5	-	3135645
	with solenoid valve for independent	6	-	3135646
	control	7	-	3135647
		8	-	3135648
		1	3135441	3135451
		2	3135442	3135452
	Air/Oil modular minimal system	3	3135443	3135453
MiQueL BASE	without compensation valve	4	3135444	3135454
NO-EV	with pneumatic valve for independent	5	3135445	3135455
	control	6	3135446	3135456
		7	3135447	3135457
		8	3135448	3135458



11.1 ACCESSORIES AND SPARE PARTS

CODE	DESCRIPTION	CODE	DESCRIPTION
1525430	MiQueL PRO- 🖌 - Modular element	0020566	Tank pressure gauge
1525440	MiQueL PRO - Modular element	5717232	Ø3 OIL outlet pipe
1525450	MiQueL BASE- 🦸 - Modular element	5717301	Ø6 AIR outlet pipe
1525460	MiQueL BASE - Modular element	3226664	Oil MK 150 20 lt.
1525456	MiQueL BASE- 🕻 - IP65 - Modular element	3226665	Oil MK 100 25 lt.
1525688	MiQueL CART- 🤅 - Modular element	3226666	Oil MK High Performance 29 lt.
1525871	MiQueL CART- 2 - Without SV - Modular element	3225465	Oil MK Stainless 20 lt
1526013	MiQueL BASE- 🦸 - NO-EV - Modular element	3132768	Kit FULL cone coaxial nozzle
3133559	AIR inlet solenoid valve kit	3133455	FULL cone coaxial nozzle
0020694	Pressure gauge for module AIR outlet (- 🗘	3133558	65° FLAT jet coaxial nozzle
1525446	Module solenoid value connector (- 🎝 with 600mm cable	3133564	FULL cone single pipe nozzle
1525476	Module solenoid valve connector (-i) with M8 connector	3133565	65° FLAT jet single pipe nozzle
1525442	Module solenoid valve (-i)	1525050	Single pipe nozzle for 50mm BLADE
1525431	Minimum electric level sensor	1525051	Single pipe nozzle for 70mm BLADE
0039841	Connector for minimum electric level	1525475	Device to remove Ø3 tube
3291028	Pressure switch calibrated to 6 bar (optional)	3135767	KIT MiQueL (Block + OR)

* For more information about accessories and spare parts, contact our technical sales office.



12. DIMENSIONS









13. HANDLING AND TRANSPORTATION

Before shipping, the units are carefully packed inside cardboard boxes. When transporting and storing the equipment, pay attention to the direction indicated on the boxes themselves.

Upon receipt, check that the package has not been damaged and store the equipment in a dry location.



Lift the equipment according to the direction shown on the cardboard package. The machine components can be stored at temperatures between -30 and + 80 °C; however, to prevent damage, it must only be started up after the machine has reached a temperature of +5 °C.

14. PRECAUTIONS

The warnings about the risks involved in using a unit for lubricants must be read.

The operator must understand its operation and clearly understand the hazards connected to pumping pressurised oils. Therefore we recommend the following:

- Check the chemical compatibility of the material with which the unit is built with the fluid to be pumped (see chap. 4). An incorrect selection could cause, in addition to damaging the units and pipes, serious risks for people (spillage of irritating products that are harmful to health) and for the environment.
- Never exceed the maximum operating pressure permitted for the unit and the components connected to it. In the case of doubt, refer to the data specified on the machine plate.
- Only use original spare parts.
- If components must be replaced with others, make sure they are suitable for operating at the unit's maximum operating pressure.



ATTENTION!

Never try to stop or deviate any leaks with your hands or other body parts.

Note: Personnel must use protective devices, garments and tools in compliance with current standards with regard to the location and the use of the unit both during work as well as during maintenance operations.

Electric current

Do not carry out any work on the machine before disconnecting it from the electrical power supply and making sure that no one can reconnect it during the operation. All the installed equipment (electric and electronic), tanks and basic structures must be connected to the ground line.

Inflammability

The lubricant used in the lubrication circuits is normally not an inflammable liquid. It is however necessary to adopt all the possible measures to prevent that it comes into contact with very hot parts or open flames.

Pressure

Before each operation, make sure there in every branch of the lubrication circuit that there is no residual pressure that could cause oil to spray when disassembling fittings or components. After long periods of inactivity, check the seal of all the parts subject to pressure. Do not subject the fittings, pipes and pressurised parts to violent impacts. Damaged flexible pipes or fittings are DANGEROUS and must be replaced. Only original spare parts should be used.

Noise

Under normal operating conditions, noise emission **does not exceed 70 dB "A"** at a distance of 1 metre (39.3 inches) from the unit.

For further information about the technical specifications and the safety measures to adopt, refer to the product safety sheet (Directive 93/112/EEC) relative to the type of lubricant selected and supplied by the manufacturer.



15. OPERATING HAZARDS

Compliance with the essential safety requirements and the provisions specified in the machine directive was checked by filling out prepared check lists that are contained in the *technical file*.

Two types of lists were used:

• Risk assessment (UNI EN ISO 14121-1).

• Compliance with the essential safety requirements Machine Directive –EC 06/42).

The risks that were not completely eliminated, but considered acceptable, are specified below:

- During maintenance, sprays of oil at low pressure are possible (for this purpose, suitable PPE must be worn during maintenance activities).
- Electrocution: This can only occur in the case of serious user incompetence, but the user must be qualified.
- Unsuitable postures: The correct dimensions and installation methods are described in this manual.
- Use of unsuitable lubricant: The specifications of the lubricant are indicated both on the unit as well as in this *User and* maintenance manual (in the case of doubt, contact the Dropsa S.p.A technical office.).

FLUIDS THAT ARE NOT PERMITTED		
FLUIDS	FLUIDS	
Lubricants with abrasive additives.	Lubricants with abrasive additives.	
Lubricants with silicone additives.	Lubricants with silicone additives.	
Petrol – solvents – inflammable liquids.	Petrol – solvents – inflammable liquids.	
Corrosive products.	Corrosive products.	
Water.	Water.	
Food substances.	Food substances.	





DropsA S.p.A.

Via Benedetto Croce,1 20055 Vimodrone (MI) Tel: +39 02 250 79 1 Fax: +39 02 250 79 767 www.dropsa.com

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