

## Air-oil lubrication unit

### Series ZFX with electronic control

*MQL System (Minimal Quantity Lubrication)*

 European Patent Office Certificate N°2427301

- Preassembled MQL unit ready for use
- From 1 up to 6 lubrication points
- Oil-air mixture control by optical sensor (*European Patent*)
- 100% safe lubrication SL PRO
- Air flow rate adjustable for each line
- Minimum lubricant level electric control
- Oil filtration: 3  $\mu\text{m}$ ,  $\beta_3 = 200$  target ISO 4406: 15/13/10
- Connection of electrical accessories with multipolar connectors: M8, M12, M23.
- Equipped with control unit F36 with integrated PLC for cycle programming and lubrication control

### Application:

Minimal quantity oil-air lubrication for high-speed bearings, for example in electrospindles, for teeth of high speed gears, linear guides e ball circulation screws in machine tools, etc. In all applications where a pressurization is required as protection against infiltration of harmful dust, water or gas. For all moving parts (chains). No polluting lubrication, without fog formation.

### Technical data:

Working temperature:	0 ÷ +50 °C
Oil viscosity at 40°C:	50÷1000 cSt
Filtering:	
oil filter element:	3 $\mu\text{m}$
Oil tank capacity:	3 l
External dimensions assembly plate:	
1 to 6 pts (HxWxD):	490 x 430 x 200 mm
PLC supply voltage:	24 VDC
Power consumption max:	8 W
Min air supply pressure:	4 bar
Max air supply pressure:	6 bar
Min air flow per lubrication point:	1200 l/h

- Subject to changes without notice -

Components of ZFX Oil + Air Unit with mixer MVF-AX

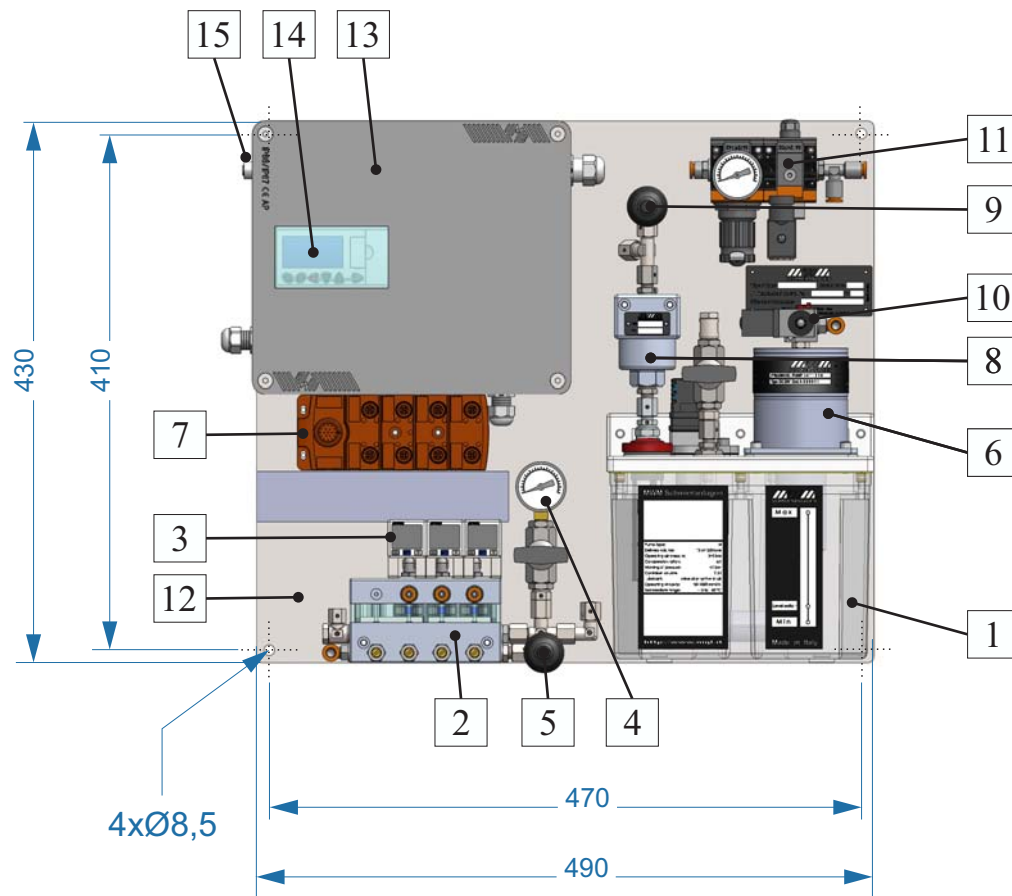


Fig. 3

- |  |                                  |
|--|----------------------------------|
| 1 Oil tank   | 9 Oil pressure switch            |
| 2 Oil + air mixer with optical sensors (Oil+air mixture control) | 10 Pump driving solenoid valve   |
| 3 Oil+air pressure sensor  | 11 Air treatment unit (type A)   |
| 4 Oil pressure gauge   | 12 Assembly plate                |
| 5 Compressed air pressure switch                                 | 13 Control unit protection box   |
| 6 Pump unit with pneumatic drive                                 | 14 Control unit                  |
| 7 Splitter box   | 15 Electrical connections IN/OUT |
| 8 Oil filter 3 µm  |                                  |

**Supply condition:**

All components are installed on a metallic assembly plate and are supplied as a complete system. Each unit is provided with instruction manual. The lubrication unit can be assembled in different versions with outlets from 1 up to 6. Each unit has been submitted to functional test.

The lubrication unit should be used as component, so it is not provided with energy isolation devices. It is equipped with a solenoid valve placed on the air feeding line. An electric general switch is available by request.

For further information concerning components have a look at the specific technical leaflets, ask for full catalogue or check on the web site MWM Schmieranlagen: [www.mql.it](http://www.mql.it).

Components of ZFX Oil + Air Unit with mixer MVE-A

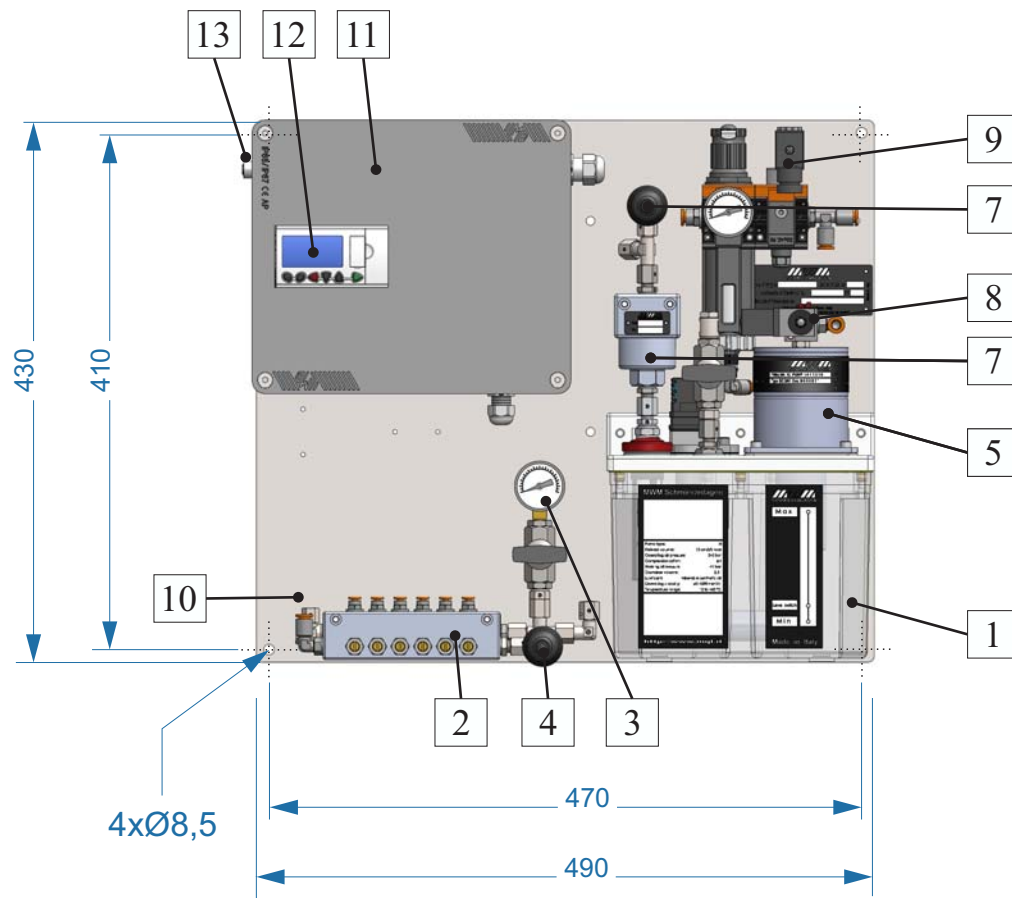


Fig. 4

- |  |   |
|--|---|
| <b>1 Oil tank</b>                              | <b>8 Pump driving solenoid valve</b>    |
| <b>2 Oil+air mixer without optical sensors</b> | <b>9 Air treatment unit (type B)</b>    |
| <b>3 Oil pressure gauge</b>                    | <b>10 Assembly plate</b>                |
| <b>4 Compressed air pressure switch</b>        | <b>11 Control unit protection box</b>   |
| <b>5 Pump unit with pneumatic drive</b>        | <b>12 Control unit</b>                  |
| <b>6 Oil filter 3 µm</b>                       | <b>13 Electrical connections IN/OUT</b> |
| <b>7 Oil pressure switch</b>                   |   |

**Supply condition:**

All components are installed on a metallic assembly plate and are supplied as a complete system. Each unit is provided with instruction manual. The lubrication unit can be assembled in different versions with outlets from 1 up to 6. Each unit has been submitted to functional test.

The lubrication unit should be used as component, so it is not provided with energy isolation devices. It is equipped with a solenoid valve placed on the air feeding line. An electric general switch is available by request.

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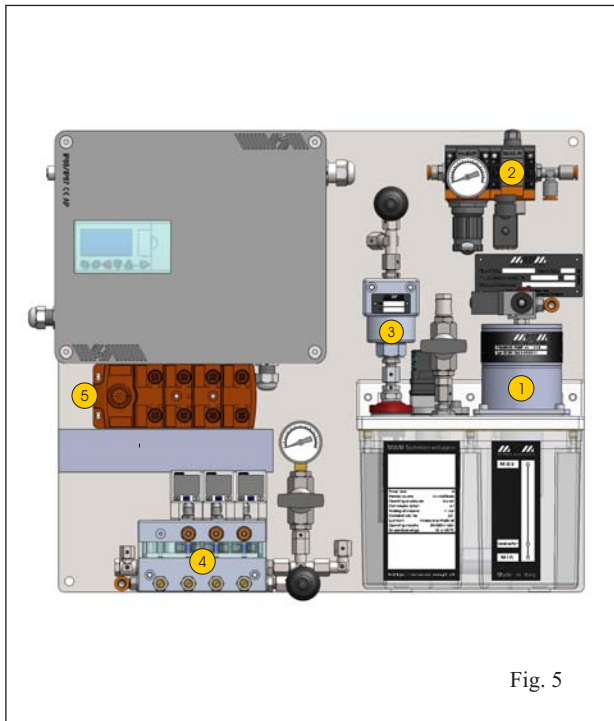


Fig. 5

**Working description:**

The ZFX units are complete systems which produce oil-air mixture dosing small amount of oil per each cycle in a continuous air flow. The system has a driving and control unit. The ZFX unit in the example shown beside has 3 outlets managed by a programmable control unit. The pump (1) with pneumatic drive has a 3 liters capacity reservoir. The unit is connected to the compressed air network through an air treatment group complete of a main solenoid valve (2) and to the electric power supply. The oil volumes fed to the lubrication points depend on the dosing elements and on cycle frequency. Oil in pressure passes through the filter (3) to reach the oil mixer (4). The right amount of oil is distributed by dosing elements and mixed with air, the oil-air flow rate can be adjusted by screws placed on each outlet. The air-oil mixture is controlled by an optical sensor, in case of use of the mixer MVF-AX, which verifies also the minimum flow rate level. The driving unit is connected to the hydraulic unit by a passive electric connection splitter box (5). The PLC manages pump levelswitch signal as well as signals from the control sensors. The pump driving is managed by PLC so that the amount of oil is related to the number of controlled drives.

**Available oil+air mixers**

**MVF-AX mixer with internal optical sensors (fig.6-a)**

The optical sensor IFX (with manometer P by request) is mounted inside the oil-air mixer, close to oil-air mixing point, giving a quick and reliable signal out to the system. Any image variation caused by air+oil mixture passage is detected and processed according to a patented and advanced control technology. The pre-set value which refers to a standard-normal run causes the green LED to flash; in case of a system stop or lack of lubricant, an alarm output with lighting red LED is provided.

**MVF-AX mixer with digital pressure sensors: Feature SL PRO - 100% Safe Lubrication Process (fig.6-b)**

The combination of the MVF-AX mixer and digital pressure sensors N200110 sets new safety standards for oil+air lubrication of high speed spindles; the ZFX unit with SL PRO feature ensures 100% reliability.

The pressure sensors are mounted directly on MVF-AX mixer, and allow to control that the working pressure is between a pre-set value range. In case of under-pressure (interruption of the air feeding) or over-pressure (obstruction of the lubrication line), the sensor gives a visual feedback (colour changes on the integrated display) and an electronic signal to the PLC.

**MVE-A mixer without optical sensors (fig.6-c)**

For further information please refer to the technical leaflets: IFX-S08, MVF-AX, MVE-A and N200110.

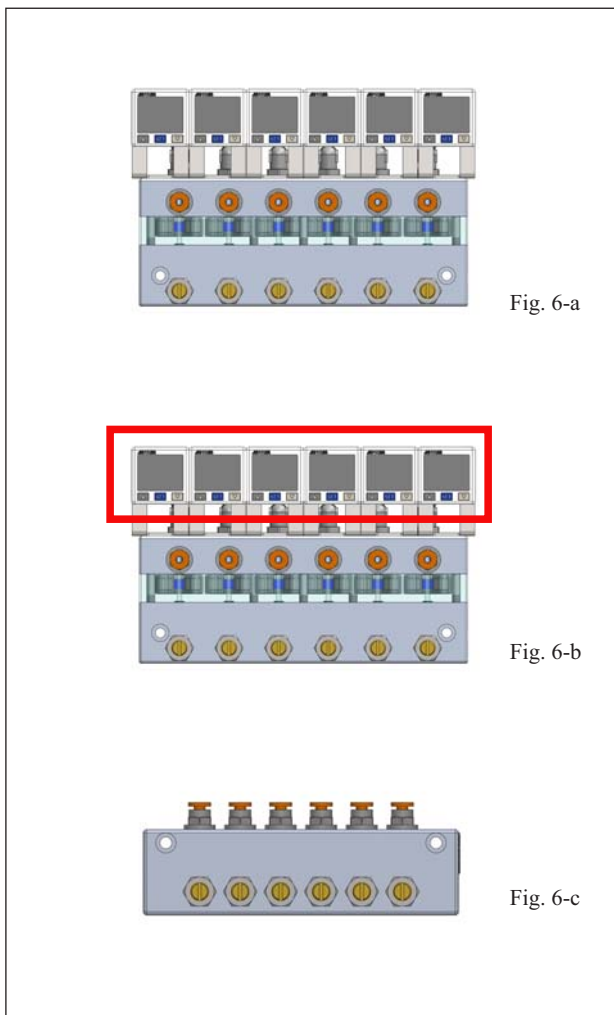


Fig. 6-a

Fig. 6-b

Fig. 6-c

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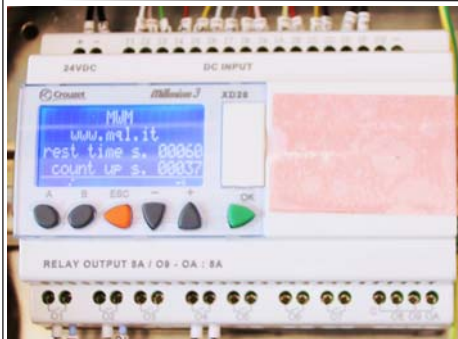


Fig. 7

**Standard components:**

**Programmable control unit  
Type F301 with LCD graphic display**

PLC programmed with dedicated software to control and monitor lubrication systems and equipments. Supplied with specific programming for any single application.  
Certifications: CE, UL, CSA  
Compliance with international rules: EN61131-2, EN61000-6-2,3,4



Fig. 8

**Pressure control with digital pressure sensor N20 with display:**

Pressure sensors with display are provided to monitor pressure in air+oil pipe outlets.  
Measuring range: 0÷10 bar, code N 200110  
2 thresholds (min / max pressure monitoring) for each sensor, high accuracy and fast response time.



Fig. 9

**Single line pump Type I4 (pneumatic drive)  
Tank 31 with oil filter N377**

Filtering element 3 µm target ISO 4406: 15/13/10.  
Beta ratio  $\beta_3=200^*$ , grant a complete and quick de-aeration of the filter body. Built with a special inside filter cartridge in order to make air bubbles- going out easier.  
Particularly fit for coupling of air+oil mixers with minimal metering. Fit for a compact plate fixing, it is also right for being used in centralized lubrication system. Suitable to mineral and synthetic oils.  
Made in aluminium, it is a light and compact solution in many different applications.

\*  $\beta_3$  is defined as the number of entering particles divided the number of particles going out of the filtering element; the index 3 means the dimensions of such particles.

**Standard components :**

M12 Male

4 poles + earth

- PIN1 +24VDC
- PIN2 OUT2 (general alarm)
- PIN3 0VDC
- PIN4 OUT1 (oil pre-level)
- PIN5 Earth



Fig. 10

**Electrical Connections:**

Connector M12 4 poles + earth for electrical supply and alarm signal output.

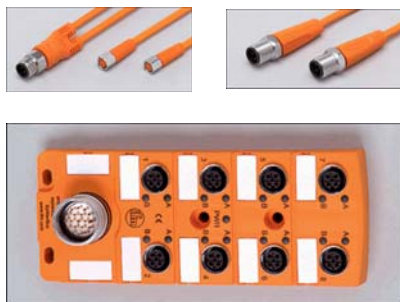


Fig. 11

**Splitter Box:**

All electrical connections are gathered through a splitter box, which transmit signals through a multi-wire cable, in order to reduce wiring and installation complexity.

**Electrical connectors:**

All sensors are connected with multipolar connection M8x1 or M12x1

For further information concerning accessories, please have a look at the specific technical leaflets.

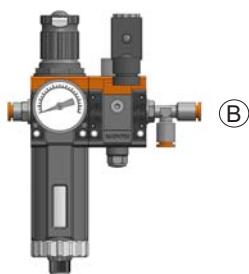


Fig. 12

**Air treatment unit:**

A: Pressure regulator complete with sectioning solenoid valve

B: Filter - pressure regulator complete of sectioning solenoid valve

- Subject to changes without notice -

Order designation:

Oil-air minimal lubrication unit:

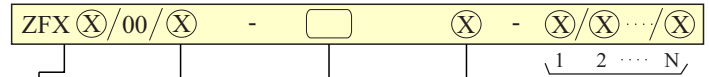
With oil-air mixer:

**Esempio for oil-air unit with 3 outlets, with filter-regulator + solenoid valve, with mixer MVF-AX, with outlets Ø4 and different metering elements**

• ZFX3/00/B - B41-331

Control functions in ZFX units with mixer MVF-AX:

- Levelswitch in oil tank
- Oil pressure switch
- Air pressure switch
- Optical sensor IFX for each air-oil outlet
- Pressure sensors for each air-oil outlet



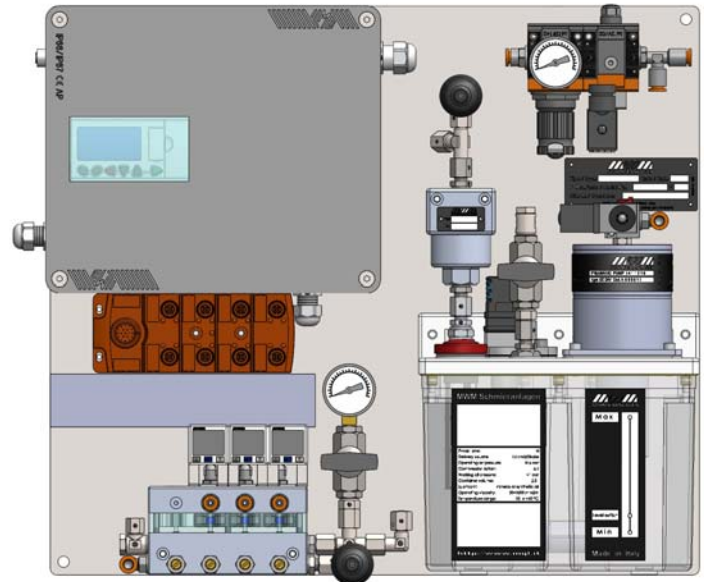
Outlets no.	Air treatment unit	Mixer Type	Ø pipe for oil-air outlets	Metering elements [mm <sup>3</sup> ]
① ⋮ ⑥	Ⓐ Regulator + Solenoid v.	MVF-AX [B4]	① Ø 4 [mm]	① without ② 10 ③ 20 ④ 30
	Ⓑ Filter-regulator + Solenoid v.	MVE-A [B5]	② Ø 6 [mm]	

**Esempio for oil-air unit with 4 outlets, c with regulator + solenoid valve, with mixer MVE-A, with outlets Ø6 and same metering elements:**

• ZFX4/00/A - B52-2222

Control functions in ZFX units with mixer MVE-A:

- Levelswitch in oil tank
- Oil pressure switch
- Air pressure switch



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