

# FlexiMix

## The modular injection system



The new **FlexiMix** injection system extends the solutions offered by ISOIL IMPIANTI in the field of the additive management.

The use of additives is dramatically rising in the distribution of fuels, driven by a number of factors and needs, as:

- dyeing and marking for fiscal reasons
- enhancing the engine performances modifying the chemical and physical properties (anti static, anti foaming, anti icing additives, anti-detonating, odorizing)

Since more needs can be present at the same time a combination of additives has to be injected, according to different recipes.

This scenery is in continuous evolution, even for the growing importance of bio-fuels.

To give the maximum operational flexibility it is necessary to reduce the storage requirements and, as possible, to avoid product-dedicated delivery points. The only solution is to create the mixing of fuel and additives at the load rack, as closest as possible to the delivery point.

For the above reasons the ISOIL's design born with the following focal points:

- to be interfaced with ISOIL's as well with 3rd party equipments
- be modular in order to locate the units where necessary reducing piping and wirings
- be flexible in order to follow further needs of injection points
- to facilitate the installation in existing gantries through small dimensions and modular architecture
- to allow easy and safe configuration locally and by remote communication



## The architecture

The **FlexiMix** can manage from one to six additives simultaneously injected. Typical installation is in a loading gantry; the architecture is modular:

- one **Injection Controller Main Unit (IC-M)** can be connected to the pulses coming from one or two meters of the main product and can drive directly one or two **Injection Blocks (IB)**, mounted and wired on a stainless steel back plate.
- one or two **Injection Controller Extension Unit (IC-E)** can be linked to the IC-M; each IC-E can drive up to four IB, mounted and wired on a stainless steel back plate

Such a modular architecture allows FlexiMix to be installed close to the injection points, to chose IB of different size according to the additive/product ratio are requested.

## The components

### Injection Controller Main Unit (IC-M)



**IC-M** is a micro-processor based controller with a software dedicated to insure a highly accurate and reliable injection of additive according to the customer specifications (recipes).

IC-M receives pulses corresponding to the main product flow and opens a solenoid valve, located on the Injection Block (IB), allowing the additive to be injected. The additive flow is measured by a small PD meter and continuously compared with the main flow. IC-M controls the solenoid valve in order to maintain the additive/product ratio at the specified value.

By means of four digital inputs IC-M can manage interlocks or change the injection features according to the programming parameters, as well can drive the additive pumps.

Abnormal conditions will be recognised and an alarm signal is generated.

IC-M can communicate with a TAS system or other field devices via serial communication lines.

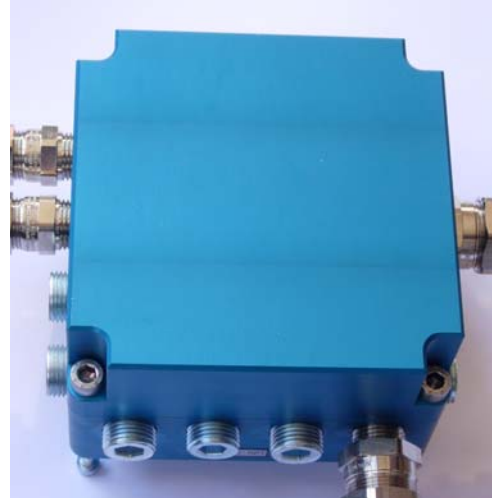
IC-M, can receive pulses from one or two PD-meters, and control directly one or two IB for simultaneous injections; if more additives are requested one or two Injection Controller Extension (IC-E) can be linked via Can-bus channel.

IC-M's electronics is full contained in an explosion proof ATEX and IP66 approved enclosure; the cover is fixed to the base with four screws only and provided with hinges.

The process quantities as current and total volume of main product and additive, as well alarms or status messages can be read on the graphical display.

The setting of parameters, alarms acknowledge and resetting, calibration of the injector can be easily done by four button keypad externally operable, besides by communication serial interface.

### Injection Controller Extension Unit (IC-E)



**IC-E** is a microprocessor based unit that act as logical and electrical interface to enhance the injection capability of the IC-M up to 6 additives. IC-E is fed by IC-M and communicates with it via a Can-bus channel; it is able to interface up to four Injection Blocks, can drive 4 additive pumps and 4 additional digital outputs.

The electronics is full contained in the "blind" version of the IC-M's explosion proof enclosure.

### Injection Block (IB)



**IB** is the device that carry out the control and the measure of the additive flow. The all stainless steel leak proof block design includes a precision oval gear flow meter, a solenoid control valve, a fine mesh strainer, flow regulating needle valves and outlet check valve.

The standard o-ring material is Teflon™.

The flow meter can be sized in two models:

- considering a typical loading flow rate of 2200 L/min the standard flow meter size allows injection applications of 50÷3000ppm (parts per million) with 10÷250cc per shot.
- for lower injection rates (15÷500ppm with 3÷50cc per shot) the low flow size meter can be chosen.

All valve assembly and the meter are detachable, inlet and outlet elbows can be oriented in three directions.

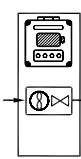
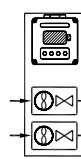
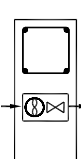
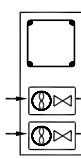
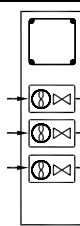
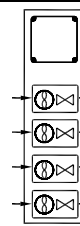
The block is complete with a 1/8" male quick release coupler as test point for calibrations.

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## Assemblies and configurations

						
Overall dimensions (mm)	300x550x170	300x550x170	300x550x170	300x550x170	300x850x170	300x850x170
Assembly	M1	M2	E1	E2	E3	E4
FlexiMix1- M1	☐					
FlexiMix2- M2		☐				
FlexiMix2- M1+E1	☐		☐			
FlexiMix3- M2+E1		☐	☐			
FlexiMix3- M1+E2	☐			☐		
FlexiMix3- M1+E1+E1	☐		☐ 2			
FlexiMix4- M2+E2		☐		☐		
FlexiMix4- M1+E3	☐				☐	
FlexiMix4- M1+E2+E1	☐		☐	☐		
FlexiMix4- M2+E1+E1		☐	☐ 2			
FlexiMix4- M1+E1+E2	☐		☐	☐		
FlexiMix5- M2+E3		☐			☐	
FlexiMix5- M1+E2+E2	☐			☐ 2		
FlexiMix5- M1+E3+E1	☐		☐		☐	
FlexiMix5- M2+E2+E1		☐	☐	☐		
FlexiMix6- M2+E4		☐				☐
FlexiMix6- M1+E3+E2	☐			☐	☐	
FlexiMix6 M2+E2+E2		☐		☐ 2		
FlexiMix6- M2+E1+E3		☐	☐		☐	

## Functions:

- Stand alone or remotely controlled working
- Pulse inputs scaling from main product and additive flow meters
- Digital inputs managing for permissives, additive selection, recipes, line flushing signal, flow switch,
- Additive solenoid valves driving
- Additive pump start/stop driving
- Digital outputs managing: block valves, alarms, interlocks
- Display: load main product and additive totals, batch totals, operative additives and ratio, solenoid valve & pump status, alarms
- Alarms and errors diagnosis: additive no flow; additive over or under tolerance; unauthorized flow of additive; no main product flow when expected; communication time out, microprocessor watch dog
- Autocalibration procedure
- Line cleaning – flushing function
- Data sending/receiving via communication serial line
- Communication towards Extension Units via Can-Bus channel

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## Technical specifications

Electrical	IC- M	IC- E	IB
<b>Main power</b>	115/230VAC (self adjusting) -10W or 24VDC-10W	Fed by IC-M	Solenoids: as mains
<b>Display</b>	Graphic 128x64		
<b>Counting inputs</b>	N° 2 from main product flow meters N°2 from IB flow meters	N° 4 from IB flow meters	
<b>Additional inputs</b>	N°4 D/I	N°4 D/I	
<b>Power outputs</b>	N° 2 SSR to solenoids N° 2 Relays for additive pumps N°4 D/O	N° 4 SSR to solenoids N° 4 Relays for additive pumps N°4 D/O	
<b>Communications</b>	N°2 RS485 N°1 CAN-bus N° 1 IR receiver	N°1 CAN-bus	
<b>Keypad</b>	N° 4 buttons solid state activated		
<b>Cable entries</b>	N° 12x1/2"NPT	N° 12x1/2"NPT	1/2"NPT
Mechanical			
<b>Dimensions</b>	148x148x94 mm	148x148x94 mm	148x107x125mm
<b>Materials</b>	Anodised aluminium alloy (enclosure)	Anodised aluminium alloy (enclosure)	- 316 Stainless Steel (meter, valves, strainer) - 303 Stainless Steel (block) - PTFE (Teflon™) o-rings
<b>Materials (Backplate)</b>	304 Stainless Steel	304 Stainless Steel	
<b>Process Inlet/Outlet</b>			3/8"NPT
Environment			
<b>Temperature/Humidity</b>	-20÷+55°C /95%without condensation	-20÷+55°C /95%without condensation	-20÷+65°C
<b>Protection class</b>	IP66	IP66	IP66
<b>Ex protection</b>	Ex-d IIB T6	Ex-d IIB T6	EEx dm IICT4 (solenoid valve) EEx-d IIB T6 (meter)
<b>Approvals</b>	INERIS 09ATEX0022	INERIS 09ATEX0022	SIRA 05ATEX1296X (meter) LCIE 03ATEX 6451X (solenoid valve)
Metering			
<b>Meter accuracy @3cp</b>			±0,5%
<b>Meter repeatability</b>			±0,25%
<b>Flow rate standard model</b>			0,25÷10 l/min max (7,5L/min pulsating)
<b>Flow rate low flow model</b>			0,03÷1,65 l/min max 1,25L/min (pulsating)
<b>Max pressure</b>			20 Bar for AC solenoids 10 Bar for DC solenoids
<b>Min differential pressure</b>			3 Bar (between upstream elbow and main product)

### Order codes

#### • FlexiMix **N-A-MXX-EXXXX-EXXXX**

▲                    ▲                    ▲  
 (IC-M)    (IC-E)    (IC-E)

**N**= total n° of additives/injection blocks ( 1 ÷ 6)

**A**= voltage for ICM and solenoids = **5** (230VAC) ; **6** (115VAC) ; **7** (24VDC)

**X**= flow meter: **S**=Standard (0,25÷7,5L/min) **L**=LowFlow (0,03÷1,25L/min) **0**=None

**Example : FlexiMix 4-5-MSS-ESS00-E0000**

#### • **IB-A-X**

**A**= voltage for solenoids = **5** (230VAC) ; **6** (115VAC) ; **7** (24VDC)

**X**= flow meter: **S**=Standard (0,25÷7,5L/min) **L**=LowFlow (0,03÷1,25L/min)

## Example : IB-5-S

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