

“ECOPlus” SERIES OF HIGH-PRESSURE METERING MACHINES

The OMS ECOPlus series of high-pressure metering units provides the ideal solution for every PU application. Reliability, ease of operation and attractive price-performance ratio are the key benefits of this new model series.

During development of the ECOPlus, we paid particular attention to incorporating up-to-date design and technology, including:

- * Reliability of all elements.
- * Reduced maintenance operations.
- * Easy access to all elements.
- * Compact overall dimensions.
- * No need for solvent or head cleaning agents.
- * Simple, user-friendly setting of machine and operating parameters.
- * Reduced materials consumption and elimination of contaminated waste.
- * Maximum flexibility.



The OMS design concept for the control system, adopted for this new series of high-pressure machine, is based on Allen-Bradley MicroLogix series PLC interfaced with an operator panel through which all machine variables and working parameters are set and displayed.

The standard configuration for this series of high-pressure machine is equipped with fixed output, Rotary Power (RHL) axial rotary piston pumps driven by a three-phase electric motor with variable speed inverter, which allows output variation without any manual intervention on the pumps. This solution also permits the chemical components to be kept in constant recirculation through the mix head at a pre-set lower output avoiding sudden pressure peaks.

The installation of optional modulating nozzles will, in addition to providing automatic self-adjustment of pouring pressures, also permit the recycle of chemical components through the mixing head at a preset lower output, thus avoiding sudden pressure peaks.

Another characteristic of the ECOPlus is that the machine day tanks are of the pressurized type with jacket and low speed agitator to keep the chemical components thermoregulated and agitated without running the metering pumps resulting in energy savings, less wear, fewer maintenance operations and higher safety level.

The ECOPlus series consists of several model groups, each of which has main characteristics as illustrated in the following table.

Technical Data of Each Model Group

Model	15	35	100	200	10F	25F	50F	100F
Base Ratio	1:1 variable				2:1 variable			
Ratio adjustment	Variable through inverter							
Output (lb/min) with Rotary Power pumps fitted, SG 1.0	R 1:1	R 2:1	R 1:1	R 2:1	R 1:1	R 2:1	R 1:1	R 2:1
	44-13	33-20	86-25	66-38	250-73	186-108	475-132	358-198
					22-9	15-11	66-20	44-24
							132-37	86-53
								358-110
								252-132
Iso Motor Speed –RPM	1750/500 infinity variable							
Pol Motor Speed –RPM	1750/500 infinity variable							
Iso Pump Capacity (RHL)	6 cc	11.5 cc	33 cc	62 cc	2 cc	6 cc	11.5 cc	33 cc
Pol Pump Capacity (RHL)	6 cc	11.5 cc	33 cc	62 cc	6 cc	11.5 cc	33 cc	62 cc
Working Pressure	120 – 180 bar depending on the raw materials							
Min. Cycle Time	Time between end of pouring and start of next pouring 10 sec.							
Minimum Time	Minimum pouring time 0.5 sec.							
Metering Accuracy	1% for minimum 1 second pouring							
Calibration	In head with suitable cycle							
Tank Capacity, Gallons	26			66	26			66
Tank Working Pressure	4 bar. – PED tested							
Manufacturing material	Carbon steel with external insulation in Armaflex							
Temperature Conditioning	Jacketed component tanks with integral electrical resistance heaters and cooling water solenoid valves within the tank jacket							
Hydraulic Motor Power	10 HP							
Hydraulic Unit Output	4.2 GPM							
Hydraulic Unit Tank Capacity	21 Gallons							
Oil Accumulator Volume	1.5 Gallon							
Working Pressure	200 bar							
Logic Control	Allen Bradley MicroLogix							
Operator panel	6" Touch screen							
Installed Power Excluded Chiller & Optional Items	23 kW	25 kW	38 kW	55 kW	21 kW	24 kW	31 kW	46 kW
Gross Weight (LB)	2500			3000	2500			3000
Working Voltage	240 or 460VAC; 60 Hz; 3-phase + neutral + earth							
Compressed Air	Pressure: dry industrial air at 6- 8 bar Duty: 200 NI/min duty							
Working Temperature	+10°C - +35°C							

Note: all output data assumes raw material viscosity between 50cps and 2000cps at 20°C.



The ECOPlus high-pressure machine is composed of the following main elements:

1. **Polyol metering line**
 - 1.a Tank
 - 1.b Metering pump
2. **Isocyanate metering line**
 - 2.a Tank
 - 2.b Metering pump
3. **Hydraulic unit**
4. **Control panel**
5. **Framework**
6. **Head support boom**
7. **Mixing head**
8. **Accessories**

1. POLYOL METERING LINE

1.a Tank

- * Vertical, jacketed cylindrical tank with removable lid pressurized according to PED European Standard (working pressure 4 bar), complete with Armaflex insulation.
- * Heating by means of electric resistance inside the tank jacket and on/off solenoid valve for cooling by cold water. (**NOTE:** Water compressor chiller is not included.)
- * PT 100 probe for temperature control.
- * Slow-speed agitator driven by a motor reducer.
- * Visual level.
- * Pressurization system with dry air, complete with pressure regulation valve and manometer (air dryer not included).
- * Safety relief valve for maximum tank pressure.
- * Outlet relief valve for dry air during filling.
- * Connection piping to the metering pump.

1.b Metering Pump

- * (1) Rotary Power fixed output axial piston pump equipped with safety pressure relief valve on the feed line and by-pass on the return line.
- * Pump horizontally mounted and coupled with a dedicated a.c. motor (one motor for each pump).
- * Pump output variation through motor speed variation with inverter controlled by PLC.
- * Double seal pump and relative lubricating circuit.
- * (1) cartridge filter on the suction side of the pump.
- * Digital pressure gauge, double contact type, on delivery side of the metering pump to control the mixing pressure.
- * Digital pressure gauge, single contact type, to control minimum feeding pressure to the suction side of the metering pump.

2. ISOCYANATE METERING LINE

2.a Tank

- * Vertical, jacketed cylindrical tank with removable lid pressurized according to PED European Standard (working pressure 4 bar), complete with Armaflex insulation;
- * Heating by means of electric resistance inside the tank jacket and on/off solenoid valve for cooling by cold water. (*NOTE: Water compressor chiller is not included.*)
- * PT 100 temperature probe for temperature control.
- * Slow-speed agitator driven by a motor reducer.
- * Visual level.
- * Pressurization system with dry air complete with pressure regulation valve and manometer.
- * Safety relief valve for maximum tank pressure.
- * Outlet relief valve for dry air during filling.
- * Connection piping to the metering pump.

2.b Metering Pump

- * (1) Rotary Power fixed output axial piston pump equipped with safety pressure relief valve on the feed line and by-pass on the return line.
- * Pump horizontally mounted and coupled with a dedicated a.c. motor (one motor for each pump).
- * Pump output variation through motor speed variation with inverter controlled by PLC.
- * Double seal pump and relative lubricating circuit.
- * (1) cartridge filter on the suction side of the pump.
- * Digital pressure gauge, double contact type, on delivery side of the metering pump to control the mixing pressure.
- * Digital pressure gauge, single contact type, to control minimum feeding pressure to the suction side of the metering pump.

3. HYDRAULIC UNIT

- (1) 10 HP hydraulic unit for opening and closing the cleanout and dispense pistons of the self-cleaning head, positioned on the machine frame and including:

- * Oil reservoir, 21 Gallon capacity.
- * Hydraulic solenoid valves.
- * Heat exchanger for cooling with central water refrigeration.
- * Oil electric-distributors.
- * Hydraulic accumulator, 1.5 Gallon capacity.
- * Filter on the suction side of the pump.
- * Manometer to measure working pressure.
- * Pressure gauge with contact for switching off the hydraulic unit once the working pressure is reached.

4. CONTROL PANEL

The OMS design concept for the control system adopted for the new ECOPlus series of high-pressure machine is innovative and is based on Allen-Bradley MicroLogix series PLC for reliability and world wide service and parts availability.

All machine variables and working parameters are set through a monochromatic touch screen operator panel functioning as an interface between the PLC and the operator.

The main difference relates to the control system; in fact, the machine is self-diagnostic and checks that all variables are within their pre-set working range. Should a variable exceed pre-set limits, the machine itself will signal an alarm status by triggering a clear text message and, at the same time, all the necessary interventions (depending on the type of alarm) to ensure safe working conditions. All data will be displayed and a working page can be retained during the working process should the operator decide so.

MAIN FUNCTIONS

- * Timers: set and display the status of the machine handling and controlling timers;
- * Meters: set and display the status of the machine handling and controlling meters;
- * Cycle mode selection: Working - Iso calibration - Polyol calibration - High pressure recycle
- * Pouring mode selection: Time mode - Start/Stop from external unit (optional);
- * Head cleaning mode selection: ON/OFF (in case of nozzle extension provided with air cleaning);
- * Head lubricating mode selection: ON/OFF;
- * Set up of automatic loading levels (optional);
- * Set up of either of PID temperature control point values on working temperature;

***NOTE:** The control panel also handles a series of settings, depending on the optional equipment fitted.*

Commands

All machine variables and working parameters are set directly on the mix head display through the monochromatic touch screen panel. The particular arrangement of this panel allows the operator to carry out all operations without leaving the working site.

In case of two mixing heads, the panel will be positioned on the main control panel.

The following commands are handled:

- * Start pouring button.
- * Selection and display of the pouring program through touch screen (in case of two mixing head will be through a selector on each mixing head).
- * Emergency stop button.
- * Auxiliary start button.
- * Main switch.
- * Start temperature conditioning of the components – agitator will automatically start (through touch screen).
- * Start metering pumps (through touch screen).
- * Start tanks loading (through touch screen).
- * Switch off warning alarm (through touch screen).
- * Working cycle selection (through touch screen).
- * Alarm reset (through touch screen).

MAIN FUNCTIONS AND DISPLAY

All machine variables and working parameter settings are displayed on the touch screen operator panel.

All working pages are retrieved by suitable commands or in automatic mode (i.e.: in case of alarm or malfunction warning).

- * General data settings.
- * 19 standard working programs (in case of two mixing heads: 12 working programs).
- * Automatic loading level parameters (optional).
- * Component thermoregulation parameters.
- * Pouring data display.
- * Alarm readout.
- * Alarm record readout and maintenance warning message.
- * Programmable maintenance warning message readout.

NOTES

1. All numerical point values are set within a fixed pre-set range by the manufacturer.
2. The pouring times are set within a range from 0.4 to 99.9 sec.
3. The displayed values in grams/second are only approximate, because they are based on the pump speed. These values will be more accurate only if the machine is equipped with volumetric flow meters.

Four levels of password protection are provided:

- a) No limit except for the pre-set range fixed by the manufacturer.
- b) Working parameters changeable by the operator through a first level password.
- c) Working parameters changeable by the head of production through a second level password.
- d) Working parameters changeable by the manufacturer only.

ALARMS

Full control and operation of all machine functions is by a PLC which, in case of anomalies, gives an acoustic warning with a clear text message display identifying the related problem and possible solution.

All functions controlled by the PLC are constantly monitored through pre-set minimum and maximum alarm set point values.

- * Iso minimum level *;
- * Pol minimum level *;
- * Iso maximum level *;
- * Pol maximum level *;
- * Thermal overload on agitators;
- * Iso minimum temperature;
- * Iso maximum temperature;
- * Pol minimum temperature;
- * Pol maximum temperature;
- * Iso maximum recycle pressure;
- * Pol maximum recycle pressure;
- * Iso minimum recycle pressure;
- * Pol minimum recycle pressure;
- * Thermal overload on pump motors;
- * PLC battery alarm;
- * Head does not open;
- * Head does not close;
- * Plunger does not open;
- * Plunger does not close;
- * Thermal overload on hydraulic unit motor;
- * Iso minimum pouring pressure;
- * Iso maximum pouring pressure;
- * Pol minimum pouring pressure;
- * Pol maximum pouring pressure;
- * Problem on Pol loading circuit;
- * Problem on Iso loading circuit;

() These alarms are related to the utilization of some optional items.*

PROGRAMMED MAINTENANCE OPERATION MESSAGE

The system automatically controls the status of the machine by signalling appropriate maintenance operations. Each main element of the machine is identified by a color code depending on the number of working hours or working cycles the machine has completed.

Some maintenance operations can be re-set through a second level password only, bringing back to normal the status of maintenance and preventing the stop of production.

Below is an example of some text messages handled by the ECOPlus series of high-pressure machine:

- * Discharge condensed air out of the compressor;
- * Check pump seal and lubrication unit;
- * Carry out component calibration and fill in related card;
- * Check water level of the chiller unit;
- * Check condition of tanks and clean them if needed;
- * Check condition of pipes and hoses;
- * Check air filter;

- * Check filters fitted on the component lines;
- * Accurate cleaning of the mixing head;
- * Replace mixing head seals;
- * Clean motor and chiller cooling fans;
- * Check security of wiring connection;
- * Clean electric control panels and related junction boxes;
- * Call for programmed maintenance

OVER NIGHT CYCLE

When enabled, this cycle maintains the materials at the right temperature and moving through the machine piping circuit.

It is possible to select the following functions:

- tank temperature control
- material recycle up to the flow valve (if fitted)
- material recycle up to the mixing head

All functions will have a dedicated timer in order to be able to control for how long the function must be performed.

5. FRAMEWORK

This brand new series of high-pressure machine has a compact framework, which simplifies access to all elements needing service and minimizes maintenance operations. The compact design of this machine allows easy fork-lift truck transportation.

The frame includes two (2) separate drip trays to collect any leakage from the metering lines; tanks, filters, pumps and pressure relief valves. Everything possible is assembled above the drip trays.

6. HEAD SUPPORT BOOM

One (1) standard boom, about 1.9m long, supports the mixing head and allows a working radius of 120° and a vertical movement of 500mm. The boom is positioned onboard the machine and includes relevant flexible connecting hoses.

In case of a non-standard boom or a machine supplied without a boom, the relevant piping group will be quoted separately.

7. MIX HEAD

(1) Y2K self cleaning, laminar flow mixing head.

These L-shaped mix heads are equipped with double pistons to guarantee good quality mixing with laminar outlet flow and minimum “splash” when pouring into an open mould.

All our Y2K mixing heads include reverse angle nozzles to increase the mixing efficiency. Moreover all models, except the Y2K 16/24, are equipped with a stroke reducer to obtain additional mixing using the passage area between the two chambers.

To prevent contamination, the mix head separates the oil and polyurethane systems. In case of power failure, the hydraulic system will only shut the mixing piston to avoid erroneous operating sequences and damage to the components lines.

The mix head is supplied with:

- * Proximity sensors (one for each plunger)

- * Nozzles
- * Oil electric distributor
- * Head positioning: vertical

8. CHOICE OF ACCESSORIES - NOT INCLUDED IN BASIC MACHINE

- * 66 Gallon capacity tanks in lieu of 26 gallon
- * 130 Gallon capacity tanks
- * Horizontally mounted mixing head
- * Head movement to pour in horizontal/vertical
- * Start/stop pouring from external signal
- * Acquisition pouring codes from external source
- * Chiller unit for closed loop control of water circulation;
- * High-pressure color dosing unit;
- * Pneumatic pump for refilling from drum;
- * Diaphragm pneumatic pump for refilling from drum;
- * Jib type boom;
- * Recycle flow-valves (necessary in case of more than 5 m. of piping)
- * Additional programmable pouring module – 99 programs (in case of machine with two heads, it must be considered for each head);
- * Up to 12 pouring program on pre-set sequence (it must be considered for each head);
- * Operator panel positioned on machine panel and head push buttons keyboard with selection of 12 pouring programs
- * Sensor-type levels with control of: minimum, start/stop loading and maximum level
- * Electro-pneumatic loading valves actuated by the automatic levels;
- * Manually operated self-cleaning filters (via hand-wheel);
- * Additional heat exchanger on the component recycle line;
- * Output readout by means of volumetric flow-meter with relative display (for each line)*;
- * Compressed air dryer;
- * Pneumatic modulating nozzles
- * Closed loop output control
- * Head extension provided with air cleaning;
- * Magnetic pump couplings (eliminates shaft seals);
- * Fast pouring sequence;
- * Machine without head boom but with 10 metre in total of rigid and flexible piping;
- * Jollymatic;
- * Recycle flow-valves (necessary for piping more than 5 m long)
- * Power variation
- * Electrical control panel pre-arrangement for second mixing head
- * Accessories for second mixing head
- * Manual emulsifier with timer
- * Instruction manual (paper hard copy version)
- * Extended warranty contract