



Foundry Machinery and Spares Limited

## MIXER CONTROL SYSTEMS







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## GENERAL SPECIFICATION

Foundry Machinery and Spares (FMS) working alongside Mitsubishi Electric have developed a new range of control systems for their range of continuous sand mixers, FMS discussed with Mitsubishi about the latest technology that could be used in our new systems.

Mitsubishi came up with an affordable solution using the GOT1000 range of colour HMIs, using its powerful FX3 range of PLC and direct communications to the inverter drives with 485 communications.

This technology created a powerful system with lots of features, also giving greater control over the pumps using its direct communications from the PLC system.

FMS introduced the Intelligent Blending System (IBS) and the Intelligent Control System (ICS). The IBS is a fully featured automatic chemical blending system with temperature control and the ICS is a chemical control system. Both systems have the latest technology inside them with the only difference being that the ICS does not have the temperature control feature.

### General specification

The unit consists of a steel enclosure mounted on our improved pump enclosure; FMS increased the width by 200mm giving you extra room for maintenance around the pumps.

The lower enclosure normally contains 3 positive displacement pumps, this can be increased if other pumps are required, such as water addition or extra catalyst/hardener pumps are required.

The pumps used are a very reliable and accurate Tuthill geared Resin/Binder pump and magnetically couple leak free Catalyst / Hardener pumps, these are coupled with variable speed AC drive motors. The resin pump is a cast iron type with Viton seals, the catalyst / hardener pumps are made from stainless steel or PVC and fitted with seals compatible with the substances that are being used.

The top enclosure houses the pump drive inverters and PLC system. The pumps are controlled by the Mitsubishi D700 range of inverters coupled to the PLC system for advanced control.

The upper enclosure contains all electrical components, which are controlled from the Mitsubishi FX3 PLC, this is linked to a 6 inch full colour GOT1000 type HMI Screen, this touch operated interface displays all the required adjustable components within the PLC program such as sand Gates, mixer operation and chemical controls.



An operator panel connected at the front of the mixer contains the controls for; Start, Pause & Discharge, it also contains an emergency stop, sand programme selection that suits the customer requirements, 5 set time selection switch giving you; very fast, fast, normal, slow and very slow cure times, auto or manual blend switch, this allows temperature to control cure time







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## MIXER CONTROL & TIMERS

The control circuit has full shutdown safety circuit only allowing the plc and screen functions upon power up and in the case the emergency stop button pressed, this ensures a high level of safety for the customer, we have also removed the standard contactors from the control circuit, the new Schneider contacts don't allow override starting as previous contacts did, again adding to the safety features.

The screen has full system monitoring, this checks the sand levels and air pressure, if any fail the system will go into auto discharge if the mixer is operating or not allowing it to start before it becomes a problem, this will then be logged in the faults log. Proximity switches for each of the sands and an air pressure switch are included.

Upon power up the system the last screen will be displayed, normally the first screen would be language selection, by pressing the flag of the required country this will then take you to the machine operation screen in the required language.



The machine operation screen displays all the setting that have been calibrated into the system and also displays working items with blue lamps.



Easy to follow menu system

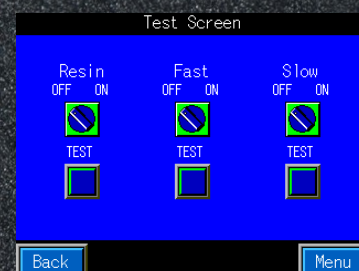
Timer Settings			
Start	Pause	Re-Start	Discharge
Resin	3456.0	3456.0	3456.0
Fast	3456.0	3456.0	3456.0
Slow	3456.0	3456.0	3456.0

Timer Settings			
Start	Pause	Re-Start	Discharge
Mixer Screw	3456.0	3456.0	3456.0
Primary Arm	3456.0	3456.0	3456.0
Sand	3456.0	3456.0	3456.0
Pause Alarm	3456.0		

Timers that cover every aspect of the machine.

Start, Pause, Pause Alarm, Re-start and Discharge.





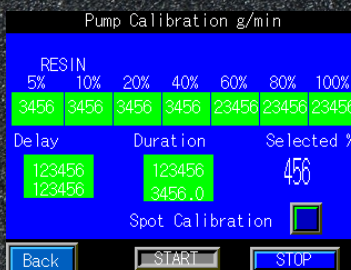
Operation and Test all aspects of the machine.



Sand calibration that cover all required sand programmes.

Easy to operate with delay and duration timers.

Simple start operation button does it all, then enter weight in required sand program.



Easy to operate with delay and duration timers.

Pump calibration is straight forward, select required percentage, press start.

Put weight in that percentage, do all percentages, pump curve is created.

Spot calibration to check correct requirement.





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## CHEMICAL SETTINGS

Resin Settings			
	LOW	%	HI
Prog 1	456.00		456.00
Prog 2	456.00		456.00
Prog 3	456.00		456.00
	%		g/min
CURRENT P 6	456.00		23456.00
Back			

Resin Setting, just enter required percentage per sand program.

Manual Catalyst			
	Fast %		Slow %
P1	56.0		56.0
P2	56.0		56.0
P3	56.0		56.0
P4	56.0		56.0
P5	56.0		56.0
Back			

Catalyst percentage settings.

5 settings per sand program.

P1 Catalyst Settings					
Min Temp. %	Mid Temp. %		Max Temp. %		
FAST					
456.00	456.00	456.00	456.00	456.00	456.00
SLOW					
456.00	456.00	456.00	456.00	456.00	456.00
Back					

Catalyst temperature settings, enter min, mid and max temperature.

Enter required percentage at the required temperature.

System automatically adjusts blend rates to temperature. (IBS ONLY)

Setting Times				
	Fast Set °C		Slow Set °C	
	Cure 1	Cure 2	Cure 4	Cure 5
Prog 1	56.0	56.0	56.0	56.0
Prog 2	56.0	56.0	56.0	56.0
Prog 3	56.0	56.0	56.0	56.0
Back		More		

Setting times offset temperature to speed up or slow down cure times.

5 setting giving you 2 faster programs, 1 normal and 2 slower programs. (IBS ONLY)





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## FAULTS & DATA LOGGING

Calibration		
New Sand	Actual Temp	Adj. Temp
56.0	56.0 °C	56.0
Rec Sand		
56.0	56.0 °C	56.0
Ambient		
56.0	56.0 °C	56.0

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Temperature probe calibration, gives better control of temperature settings. (IBS ONLY)

1: INSERT USB STICK INTO FRONT SLOT  
2: MAKE SURE LIGHTS FLASH ON USB  
3: WHEN LIGHTS STOP - PRESS WRITE FILE TO CSV

CREATE CSV

4: WHEN FILE WRITE IS FINISHED PRESS WRITE TO USB

WRITE TO USB

5: WAIT UNTIL LIGHT ON USB STICK STOPS FLASHING

Personal Computer data download.

Collects machine usage date and stores to CF card.

Download to USB (optional extra)

Mixer Log						
	Duration	Sand Program	Cure	Low Temp	High Temp	Manual
1	3456	56	56	56.00	56.00	6
2	3456	56	56	56.00	56.00	6
3	3456	56	56	56.00	56.00	6
4	3456	56	56	56.00	56.00	6
5	3456	56	56	56.00	56.00	6
6	3456	56	56	56.00	56.00	6
7	3456	56	56	56.00	56.00	6
8	3456	56	56	56.00	56.00	6
9	3456	56	56	56.00	56.00	6

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Material Usage					
	USED	REMAINING	LOW	HIGH	
New	123456.00	123456.00	123456.00	3456.00	<input type="checkbox"/>
Rec	123456.00	123456.00	123456.00	3456.00	<input type="checkbox"/>
Resin	123456.00	123456.00	123456.00	3456.00	<input type="checkbox"/>
Fast	123456.00	123456.00	123456.00	3456.00	<input type="checkbox"/>
Slow	123456.00	123456.00	123456.00	3456.00	<input type="checkbox"/>

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Reset Used

Reset Remain

Mixer run duration, sand program, cure setting, temperature and manual program log.

Material Usage and alarms levels.

Enter amount of sand/chemical delivered, enter low level warning value, machine usage will decrease available sand/chemical value as used, once low level is reached a warning strobe will illuminate.

Active Faults	
Inverters	General Alarms
Resin Alarm <input type="checkbox"/>	Mr Fault <input type="checkbox"/>
Resin Error <input type="checkbox"/>	Air Pressure <input type="checkbox"/>
Fast Alarm <input type="checkbox"/>	Low Sand Level 1 <input type="checkbox"/>
Fast Error <input type="checkbox"/>	Low Sand Level 2 <input type="checkbox"/>
Slow Alarm <input type="checkbox"/>	Primary Arm Sensor <input type="checkbox"/>
Slow Error <input type="checkbox"/>	Machine Blocked <input type="checkbox"/>
Machine Blocked Delay (enter in seconds) 123456	

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Faults Log		
OCCURRED	MESSAGE	RESET
18/03/08 12:06:25	Low Sand Level 1	12:00
18/03/08 12:06:25	Low Sand Level 2	12:00
18/03/08 12:06:25	MR or Motor fault	12:00
18/03/08 12:06:25	Low Air Pressure	12:00
18/03/08 12:06:25	Fast Inverter Alarm	12:00
18/03/08 12:06:25	Fast Inverter Error	12:00
18/03/08 12:06:25	Medium Inverter Alarm	12:00
18/03/08 12:06:25	Medium Inverter Error	12:00
18/03/08 12:06:25	Slow Inverter Alarm	12:00
18/03/08 12:06:25	Slow Inverter Error	12:00
18/03/08 12:06:25	Resin Inverter Alarm	12:00
18/03/08 12:06:25	Resin Inverter Error	12:00
18/03/08 12:06:25		12:00
18/03/08 12:06:25		12:00

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Active Faults and Faults Log.

Active Faults display green lamps when health and red when fault is present.

Faults Log records faults and time of reset.