Eurocard System building components for motion control

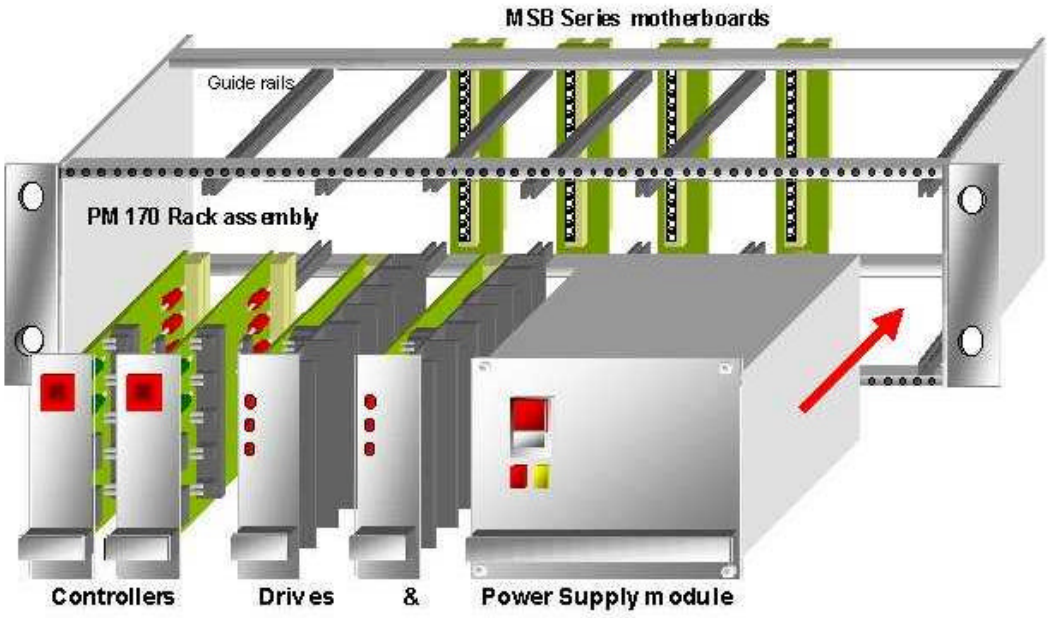
Mclennan stepper motor & dc servo drive and control modules are ideal for use by system integrators to construct a wide range of systems. They provide a combination of high performance and flexible control to meet a wide range of motion control applications ..

Packaged Systems for system integration

Units supplied in this form can be specified with a combination of stepper or servo drives mounted in 19in racks, either 3U or 6U high for fitment in customer's 19in cabinets. The units are based on the PM 170 series racked power supplies and utilise the 'in-service proven' PM series drive and control modules. The units are fitted with the appropriate motherboard at the rear of the rack so that all connections to the system are made via plug-in screw terminals suitable for direct connection to the customer's wiring loom.

Modular design for maximum flexibility & serviceability

The wide choice of drives and controls can be combined to provide single or multi-axis systems with each drive & control axis optimally matched to the system requirement. With stepper motor drive ratings from as little as 80 mA through to 6 amps, & servo drives that provide up to 700 watts output power the PM 170 based rack units offer a cost effective solution to high precision motion control for integration in customer's systems



Typical modular assembly of rack systems

The following pages provide information on:

- PM series Stepper motor & dc servo drive modules
- PM series Digital controllers
- PM series Racked Power supplies
- PM series digital Position displays
- MSB motherboards for use with the above modules

PM series Eurocard Stepper motor drives

The following overview shows the range of stepper motor drive modules that are available for system integration. Full details of each module are provided in 'Stepper motor, drives & controls' section of our data.




Model without front panel		MSE422	MSE542	MSE570	
Model with front panel		**PM 422**	**PM 542**	**PM 570**	**PM 546**
Drive type		Bi-polar			
Power stage		Chopped constant current output for maximum efficiency			
Range of current settings	Amps	0.08 to 0.6	0.5 to 2.0	0.5 to 3.5	2.5 to 6.0
Typical supply voltage	Vdc	24	24	24-36	48-80
Number of motors per module		4	1	1	1
Digital step control inputs		Clock /direction per axis	Clock /direction	Clock /direction	Clock /direction
Alternative control inputs Using on-board oscillator			Proportional speed control		Proportional speed control
Current reduction @ standstill		Via external signal	Via external signal	Via external signal	Via external signal or automatic
Output current settings		Via on-board DIL switch or proportional control using external signal			
Step size		Selectable Full step or half step			
Main selection criteria		Most Compact solution for multi- axis instrument drives	Compact solution for maximum rack density using size 17 & 23 hybrids	Low cost medium power	High performance offering maximum rack density
Suitable motherboard		MSB423	MSB543	MSB630	MSB543
Suitable Power supply depending on number & combination of drives required		PM171 PM172 PM173	PM171 PM172 PM173	PM171 PM172 PM173 PM562	PM173 PM174 PM175

PM series Eurocard dc servo motor drives

The following overview shows the range of dc servo motor drive modules that are available to the system integrator. Full details of each module are provided in the 'dc servo motor, drives controls' section of our data.




Model without front panel		MSE421	DCD60-3/6	DCD60-7/14	DCD60-10/20
Model with front panel		**PM 422**	**PMD60 3/6**	**PMD60 7/14**	**PMD60 10/20**
Drive type		4 Quadrant Servo drive module			
Power stage		Linear		PWM	
Maximum continuous current	Amps	2	3	7	10
Maximum Peak current	Amps	4	6	14	20
Typical supply voltage	Vdc	24	24-60	24-60	24-60
Current settings		Adjustable by means of motor personality header			
Servo loop constants		Adjustable by means of motor personality header			
Number of motors per module		1	1	1	1
Control signal	Volts	± 10			
Alternative control modes		Proportional speed control or torque control			
Suitable Motherboard		MSB520			
Suitable power supplies depending on number of drives		PM171 PM172 PM173	PM171 PM172 PM173	PM172 PM173 PM174	PM173 PM174

Digiloop motor controller PM600

- Digital output signals for stepper motor drives
- Analogue control signal for servo motor drives
- Advanced algorith provides increased control accuracy
- Eurocard format for simple system integration
- RS232 interface controls up to 99 axes.

Low unit cost facilitates economic & accurate control

Unlike many other motion controllers the processor is used to control the motion of a single motor rather than being required to manage simultaneous motion of a multi-axis system. Since the controller only has one motion to supervise it is able to achieve much tighter loop control resulting in zero error. This, combined with the *digiloop* algorithm results in superior smoothness, stability and positional accuracy, even when remotely mounted high resolution encoding is employed. The compact size and low unit cost of ***digiloop*** ensures that where the control of multi-axis systems is required the PM600 remains a space efficient and economic solution. In such systems the required number of controllers are simply linked together thereby providing the ultimate flexibility and maximum up-grade potential.

Major motion control features

- Analogue output to control servo motors using '*digiloop algorithm'* for increased accuracy.
- Digital output for use with stepper & digital servo drives
- Auto-tune and self optimisation of servo constants
- Digital control with maximum operating speeds $\geq$ 409,600 counts/sec. for use with 6,000 rpm servo motors equipped high resolution encoder or resolver feedback.
- Maximum acceleration rate $\geq$ 20,480,000 cps./s for 20 msec. motor time constant
- Programmable base speed and independent creep/distance to target position
- Maximum positioning range $\pm$ 2,000 Million counts
- Programmable application functions include:
- Stable positioning using direct monitoring of high resolution encoders equate to rotary resolutions and repeatability of 0.05 milli degrees or linear resolutions of 0.01µm.
- Alternative constant velocity operation
- Electronic gearbox
- Electronic cam
- Flying shears

Programmable I/O

- User definable programmable optically isolated 16 digital I/O
- Analogue I/O for use with load cells, temperature and volumetric transducers etc.
- Manual jog inputs with programmable jog, slow and fast rate control and optional joystick interface
- Direction sensitive limits
- Datum inputs for accurate zero positioning with high speed datum acquisition hardware
- Emergency stop input

Communication & Programming

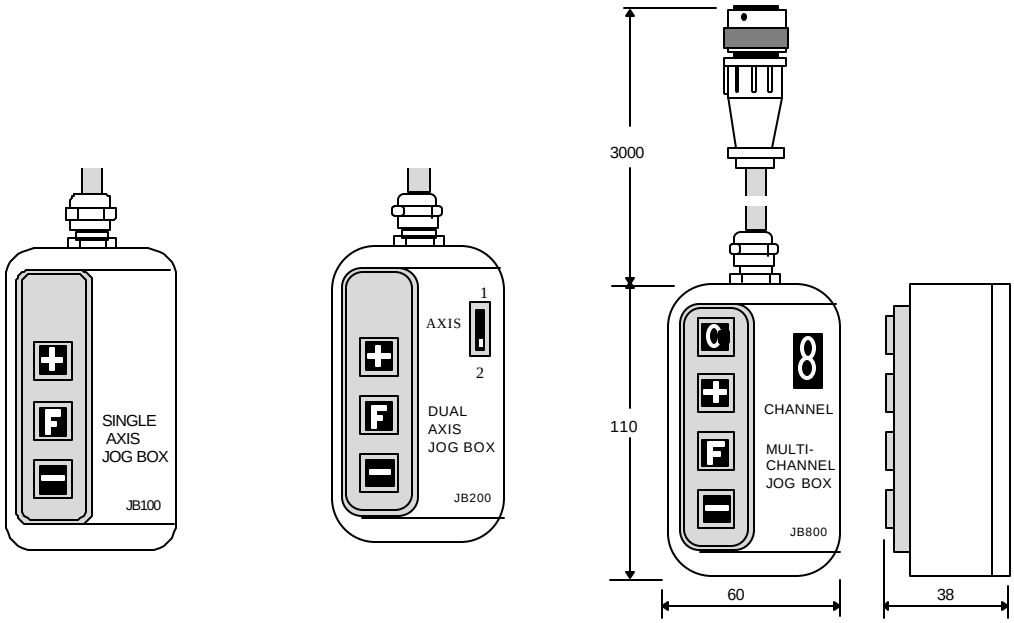
- Multi Axis communication
- RS232 daisy chain
- Optional CAN Bus & Ethernet interface
- Optional local display panel of position or speed
- Simple control language needs no additional software
- Standard screen editor for developing motion programme
- Multi-sequence capability for off-line operation

Full information on PM600 is shown in both the 'Stepper motor, drives & controls' & 'dc servo motor drives & controls' sections of the data

Intelligent Control System manual Jog Box **JB Series**

JB Series Jog boxes provide a convenient way to manually control motor control systems which are equipped with Mclennan PM600 series intelligent control system.
Four models are available which provide the following manual control functions:

- Bi-directional single step (jog) function by momentary depression of '+' or '-' buttons.
- Bi-directional course jog (10 step option) by momentary depression of '+' or '-' button in conjunction with fast button when used with *PM600* controller.
- Slow speed continuos operation in desired direction, programmable during commissioning to meet the user's exact requirements. (programmed in the controller using 'sj' command)
- Fast speed continuos operation in desired direction, programmable during commissioning to meet the user's exact requirements. (programmed in the controller using 'sf' command)



single axis unit	**dual axis unit**	**multi 3-8 axis unit**
JB100	**JB200**	**JB808**
used with PM600	PM600	PM600

When used with PM600 controller the JB series jog box may be used to manually acquire a desired position. Even when the system is operated manually the intelligent controller memorises the position of each axis. Consequently, JB series jog boxes may be used as part of a teach and learn routine.

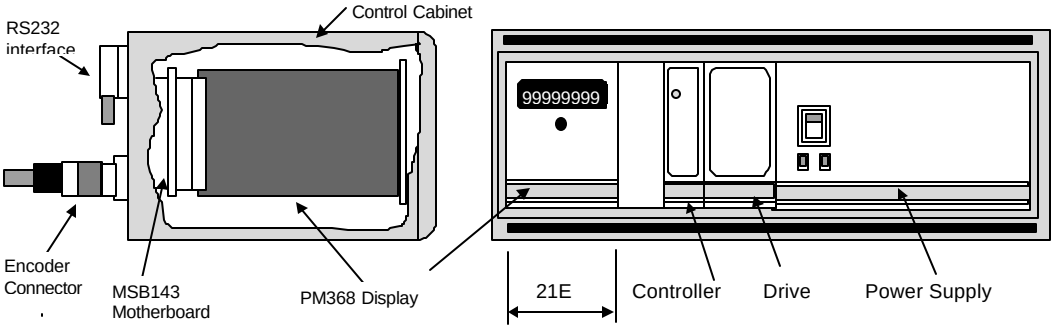
Position Display module PM368 Series

The PM368 Display module is designed for incorporation in 19 in Standard rack Systems. It may be used with encoders equipped with a dual track output such as those fitted to the 'HS' series stepper motors or servo motors.

Features

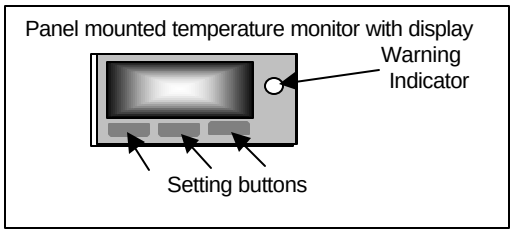
- Visual display of position from -9,999,999 to +9,999,999.
- RS232 Interface enables
- Up-load of positions and download of parameters
- Scaled position display via programmable scaling factors
- Rest button on front panel with delayed action, disabled via RS232 or external input.
- Programmable reset position suitable for use with datum input signals
- Programmable Output signal at desired set-point position
- Decimal Point set
- Retention of last known position in event of power supply interruption
- All parameters retained in on-board battery backed memory
- Single Axis unit (type PM368S) and Double axis unit (type PM368D) on 21E Panel width enable up to 8 axis of motion to be displayed in a single 19 in rack installation.
- Standard 220 mm long by 100 mm high (3U) Eurocard.
- Up to 16 units may be daisy chained to RS232 Port with user definable RS232 communication format.
- Up to 64 units may be daisy chained to a single Port when RS232 communication format is defined at time of order.
- Solder-free connections when using associated motherboard MSB143

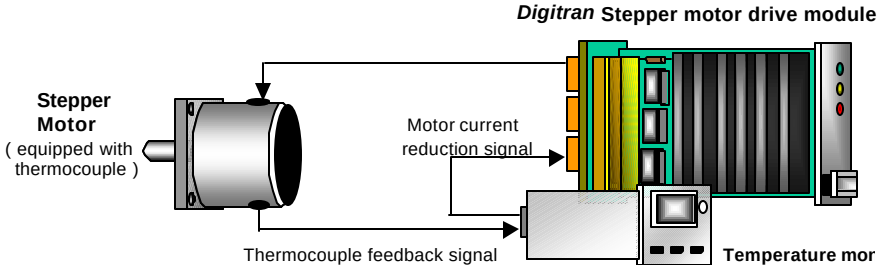
Typical Display installation



Temperature monitoring system

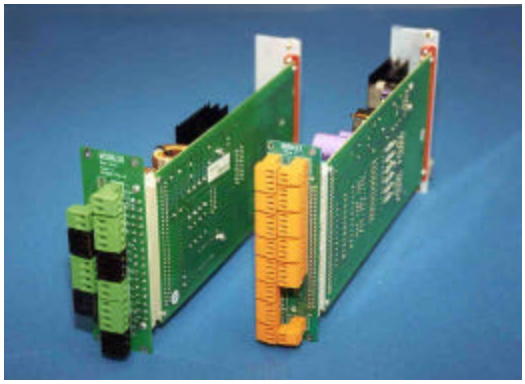
When motors are to be used in adverse environmental conditions, such as high vacuum where they may overheat, the control systems can be fitted with temperature protection control. A thermocouple fitted to the motor provides a signal to a monitoring module which can be pre-set to the maximum acceptable motor temperature. If this is exceeded a warning indicator is illuminated, a display showing the actual motor temperature. An output signal from the monitor may be connected to the current control input terminal of the *digitran* drive so that the output phase current is reduced to avoid over-heating of the motor.





System motherboards MSB series

To simplify the interconnection of the eurocard modular drive and control modules featured in this catalogue a range of printed circuit motherboards has been developed. These provide a convenient means of connecting the motor, external signals and the interconnection of drive and control signal lines using solder-free screw terminals.



The MSB Series motherboards are fitted to the back rails of standard 19in x 3U high euroracks such as the PM170 series rack mounted power supplies. They incorporate the mating connector for the appropriate drive or control module together with plug-in screw terminal blocks mounted to the rear of the motherboard to which the system's wiring loom may be connected. The use of the appropriate MSB motherboard reduces the possibility of errors in interconnection of the drive and control modules resulting in increased system reliability and reduced commissioning time. Below is shown a table of the most popular motherboard options. Additionally, custom designed motherboards can be produced for OEM users who require a special combination of modules for use in systems that are regularly purchased.

Standard MSB series motherboards

motherboard	**associated modules**		
	drives	**controllers**	**power supplies**
MSB 107			MSE171 MSE174 & MSE175
MSB 108	TM164C or TM165C or EM162		
MSB 133	TM162C		
MSB 142		PM381 & PM342	
MSB 143		PM368 series	
MSB 301		PM301 or PM341	
MSE 360		MSB 301 **	
MSB 423	MSE 422 four axis drive module		
MSB 543	MSE 542 & PM 546		
MSB 603		PM600	
MSB 630	MSE 570		
MSB 633			MSE562

Notes: Motherboards shown for use with TM, MSE and EM series units may also be used with the PM series equivalents.

** Use MSE360 with PM341 & MSB301 when the motor is equipped with an encoder featuring a line driver output such as 23HS-108 CI 500**L**.

Rack Mounting Power Supplies 170 Series

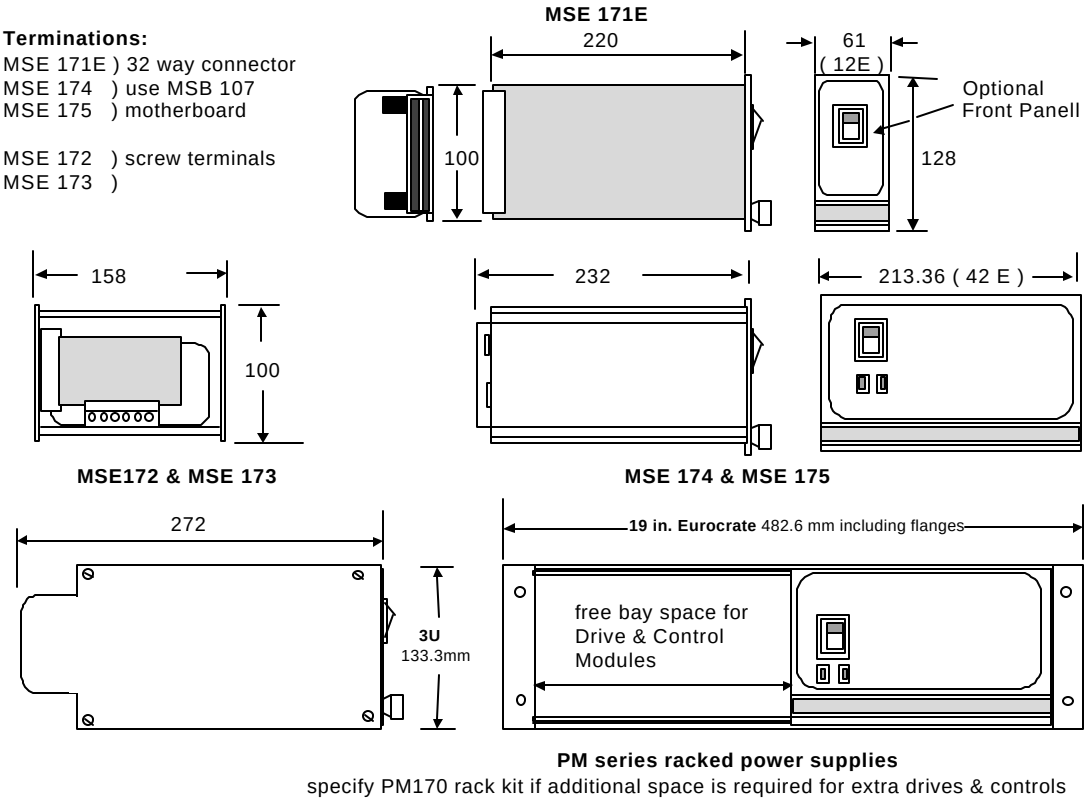
MSE & PM170 series power supplies have been developed specifically for motor drive applications. The output characteristics are ideally suited to stepper motor drive applications since the rail voltage automatically increases with motor speed. The high voltage MSE 174 & 175 series are provided with an auxiliary dc logic supply for use with & PM546 ***digitran*** drives and associated PM600 series controllers.

MSE series power supplies are designed to be mounted in standard 19in x 3U high rack systems.
PM series are supplied as 19 in. by 3U high racked units with sufficient space alongside the power supply to fit additional drive and control modules to provide a self contained drive system.

dimensions: mm

Terminations:
MSE 171E) 32 way connector
MSE 174) use MSB 107
MSE 175) motherboard

MSE 172) screw terminals
MSE 173)



PM series racked power supplies
specify PM170 rack kit if additional space is required for extra drives & controls

specification

Suitable supplies, all models: 110, 220, 240 Vac-50 or 60 Hz.
Output characteristics:

MODULAR POWER SUPPLY TYPES **RACKED POWER SUPPLY VERSIONS** Front Panel, Switch & fuse kit	**MSE171** **PM 171** FP12-PSU	**MSE172** **PM 172** FP35-PSU	**MSE173** **PM 173** FP35-PSU	**MSE174** **PM 174** included	**MSE175** **PM 175** included
Output voltage @ no-load (Vdc)	31	27	28	54	75
Output voltage @ full load (Vdc)	26	24	24	46	70
Voltage tolerance (±Vdc)	1.5	1.0	1.0	3.0	3.0
Max peak / peak ripple (Vdc)	3.0	3.0	2.6	4.8	4.8
Full load current (Amps)	3.0	6.0	12	8.0	6
Auxiliary logic supply (Vdc)	**	**	**	18	18
Logic supply current rating (Amps)	**	**	**	2	2
Note ** Use 24 Vdc motor rail as reqd.					

Human Machine Interface HMI series

The HMI series are designed as an interface for the PM300 & PM600 range of motion controllers to provide a completely stand alone system capability:.

Features:

- A range of control panels that offer the choice of sophistication required.
- Highly versatile and flexible control capability
- Robust construction protected to IP65, ideally suited for use in industrial environments.
- Powerful 16 bit *Intel* processor with 'watchdog' protection
- Windows based development software to tailor operating parameters to exact system requirements

CL series

Even the entry model enables the user operating parameters to be developed on a PC using the powerful Windows development software. The backlit LCD display on the operators keypad is readable in all conditions while a range of keyboard configurations can be specified to provide the level of control sophistication required. The CL series offer:

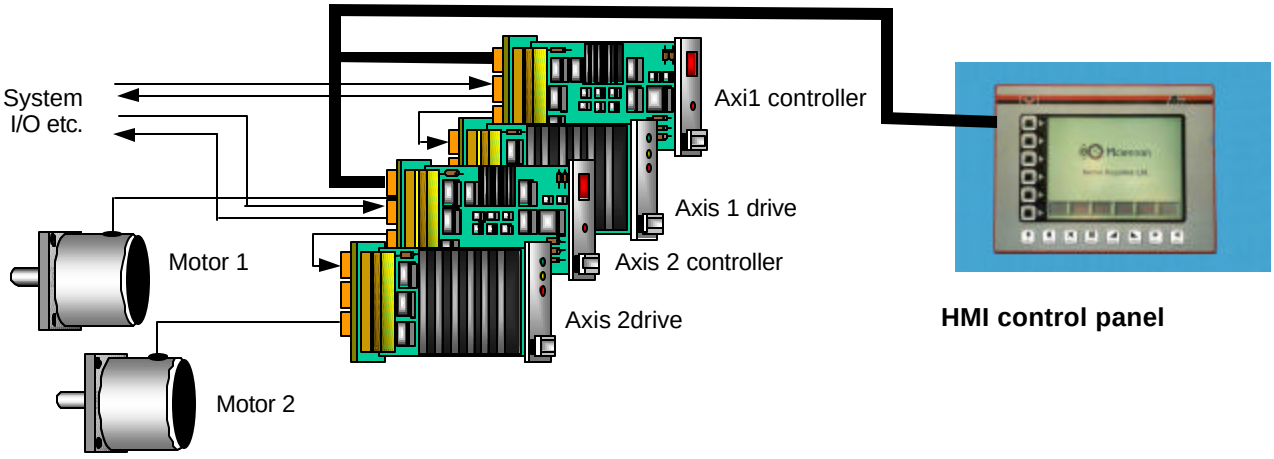
- Wipe-clean keypad with user-definable function keys
- Battery backed memory of operating parameters
- Menu driven software enables multi-programme storage for total flexibility in production control processes.
- RS232 or RS485 serial ports for connection to PC's, printers/ modems etc.
- Data acquisition for process analysis

GL series

The GL range of graphical interface terminals are fitted with 256 – 128 pixel LCD displays with CCFL backlighting for maximum readability. Support multi-line page formats enable full use of the powerful Windows based programme development software to be achieved. The GL series offers all the features of the CL range plus:

- On-screen graphics which may be developed to fully mimic individual applications
- Powerful software trending system to graphically illustrate historical process information
- Data and event logging facilities.

Typical HMI based system block diagram



HMI control panel