The Digital MMC Family for Machine, Motion & Servo Control

DANAHER
MOTION

Helping you build a better machine, **faster.**

The Digital MMC Family contains everything you need for a complete, high performance machine and motion control solution.

Servo Amplifiers – MMC Smart Drive amplifiers provide 500W to 65kW continuous output power in a compact, easy-to-apply package. Available in 230V single phase and 460V three phase versions, the MMC Smart Drives feature an integral power supply, standard auxiliary feedback, plug and play power and feedback cables to standard Danaher Motion motors.

Servo Motors - MMC Smart Drives connect with plug-and-play power and feedback cables to Danaher Motion's AKM, Goldline DDR and Cartridge DDR motor families. Use Motion Solutions Sizing Software to select a motor and drive combination for your machine's mechanical configuration.

www.danahermotion.com

A complete system solution

Digital MMC Controls – The Digital MMC family of controls includes a drive-resident control card for applications up to 16 axes and a stand-alone control for applications up to 64 axes. The drives are daisy-chained to the control card using shielded CAT5 Ethernet cable. Up to 16 drives can be daisy-chained on one network branch.
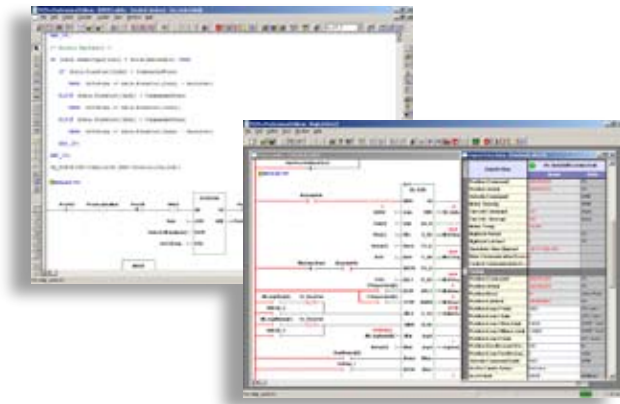
PiCPro Software – PiCPro is used for IEC61131 application program development, and drive setup and tuning. Through a single point connection to the Digital MMC Control, a virtual connection is made to every drive on the Digital network. Use the PiCPro oscilloscope and drive list to monitor and tune the drives on the network. Download parameters and firmware to all drives at once with a single click of the mouse. At the same time, use PiCPro for application program development with IEC61131 ladder logic, function block and structured text languages. PiCPro provides all of the tools you need for high-performance integrated machine and motion control applications.

Cimrex and Exter HMI – Use the Cimrex and Exter family of HMI terminals to provide machine status and feedback to the operator. With a complete family of Terminals including compact 2-line displays up to 15" color touch screens, and a tag-name database scheme to communicate to the Digital MMC Controls, these HMI terminals are the final piece to form a complete Digital MMC System.

IEC61131 Application programming
Software with powerful features

PiCPro lets you choose between graphical ladder logic and function block or structured text programming to solve your machine logic and motion control application. Use on-line edit, animation, forcing and cut-and-paste examples to quickly implement your application. Drive setup and tuning is also integrated into PiCPro. Through a single serial or Ethernet connection, a virtual connection is established to all of the drives on the network.
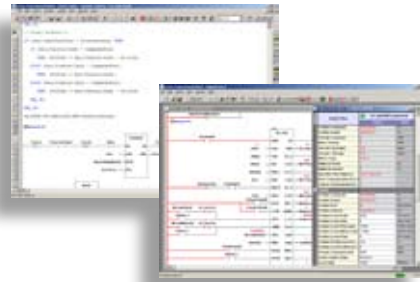
Expand Via Our Block I/O

Applications that require I/O beyond what is available on the control and the drives are easily expanded using Block I/O. A simple four-wire connection provides access to up to 77 I/O blocks that can be mounted locally or up to 200 feet apart. Select from our family of Block I/O modules including discrete I/O, analog I/O and motion I/O.
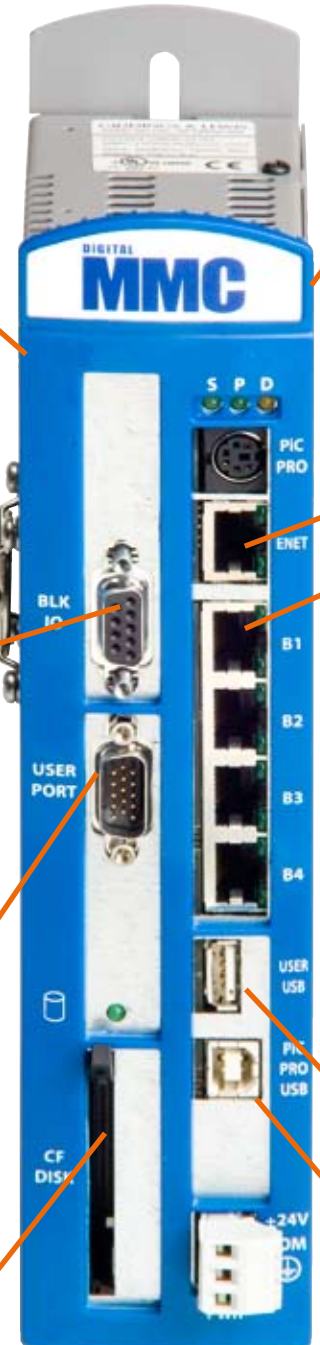
User Serial Port Provides Application
Flexibility

Whether your application requires a local operator interface or a serial link to another control device, the Digital MMC's RS232/RS485 serial communications port will make the connection.

CF Disk

Compact Flash disk to store your application program (future).

for applications up to 64 axes

Expansion Capability

The D32 and D64 controls are expandable. Up to four field-installable option modules can be used in a system. Use the 32 Input / 32 Output module to expand the I/O capability beyond what is available on the drives alone. Use the optional DeviceNet or Profibus module to control intelligent I/O devices.

10/100 Ethernet for Device Connectivity

The built-in 10/100 Ethernet port provides a wide variety of connectivity options. Connect to third-party devices using our OPC Server, Modbus TCP or other control protocols, transfer recipe or data files to and from the RAMDISK using TFTP file transfer, share data between controls using UDP packets, and access your plant network. You can also simultaneously run PiCPro over Ethernet either directly or remotely.

Digital Motion Control Network

Daisy-chain up to 16 Digital MMC Smart Drives off each branch with a simple RJ45 connection and readily available CAT5 cable. 230V and 460V versions of the drives are available in power ranges from 500W to 65kW. Real-time data from the drives such as torque, current and fault history is available to the application program over the Digital Link. Download firmware or parameters to all of the drives on the network at once with a single click of the mouse using PiCPro.

User USB

USB Port – Accessible from the application program, this port allows you to communicate with other USB devices (future)

PiCPro USB

USB Port – Allows you to run PiCPro over USB, instead of serially or over Ethernet (future)

PiCPro Drive Setup and Motion Programming

PiCPro provides single point programming for logic, motion, drive commissioning, tuning, process, data management and communications. A virtual connection is established through this single point to allow you to access all of the drives on the network.

Motor Feedback

Use Danaher Motion's AKM conventional rotary servomotors, or direct drive Goldline DDR or Cartridge DDR motors.

Auxiliary Feedback

Wire your master encoder to this connector for use in master/slave motion applications.

Drive I/O

Each MMC Smart Drive has 8 DC inputs, 4 DC outputs and 1 analog input that can be used in the application program. Two of the inputs are high speed for position capture and registration. The states of the drive I/O are available to the application program over the Digital Network.

Machine Control I/O

Drive-Resident Digital MMC has 8 DC Inputs and 8 DC Outputs for use in your application program. The outputs may be used as PLS outputs.
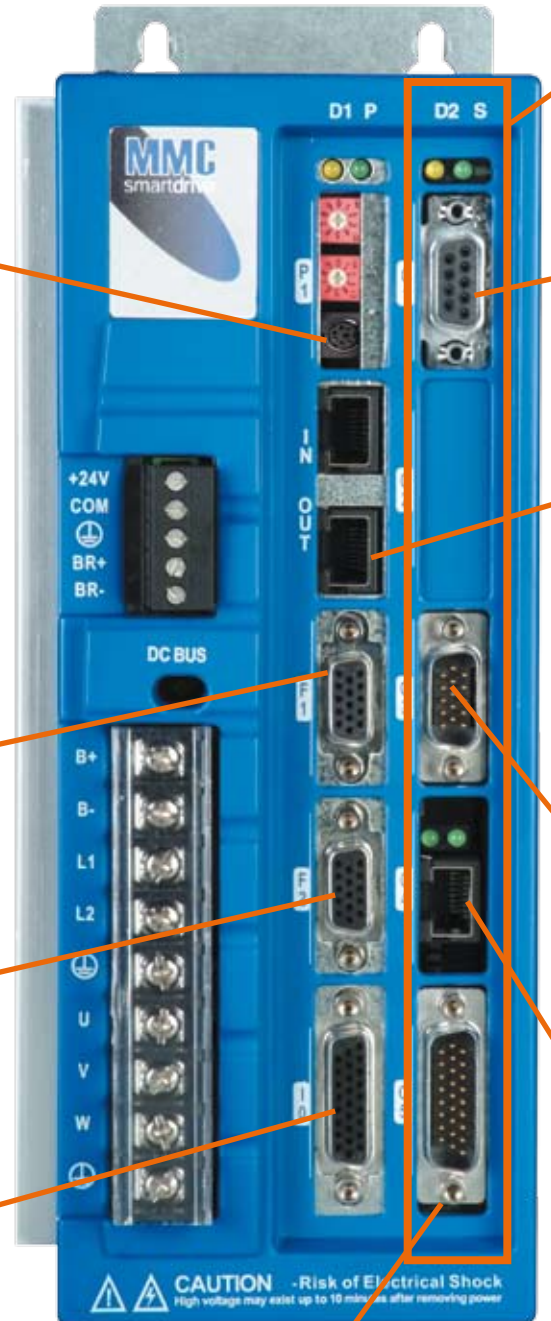
plications from 1 to 16 axes of control

Digital MMC Controller
Resides inside first Digital MMC Smart Drive. It can control the drive it is installed in and up to 15 additional drives.

Block I/0 Options
Applications that require I/O beyond what is available on the control and the drives are easily expanded using Block I/O. A simple four-wire connection provides access to up to 77 I/O blocks that can be mounted locally or up to 200 feet apart. Select from our family of Block I/O modules including discrete I/O, analog I/O and motion I/O.

MMC Multi-Smart Drive Control Scheme
A total of 16 MMC Smart Drives with 16 axes of control can be configured via a simple RJ45 cable connection

HMI Serial Port Connection
The serial port allows you to connect to our Cimrex and Exter operator interfaces, or a third-party serial device.

10/100 Ethernet for Device Connectivity
The built-in 10/100 Ethernet port provides a wide variety of connectivity options. Connect to third-party devices using our OPC Server, Modbus TCP or other control protocols, transfer recipe or data files to and from the RAMDISK using TFTP file transfer, share data between controls using UDP packets, and access your plant network. You can also simultaneously run PiCPro over Ethernet either directly or remotely.
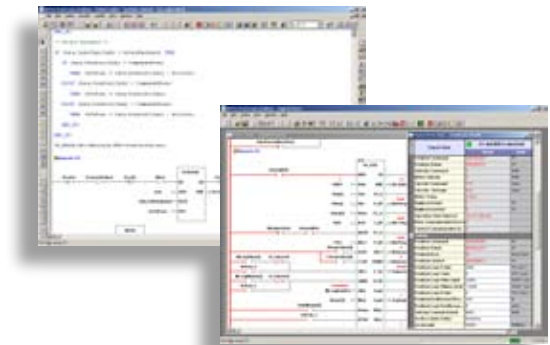
PiCPro - Programming Software

PiCPro - A Single-Point Programming Solution for Total Machine Control

PiCPro offers the most flexible tool set for motion application programming available. Motion instructions are as simple to use as ladder logic counters and timers. Sophisticated functions like multi-tasking provide the headroom to solve the toughest applications.

PiCPro Offers:

- Single-point programming for logic, motion, process, data management and communications.

- Complete ladder logic instruction set to make machine control easy.

- Drive setup and optimized tuning, integrated with application programming.

- Structured text programming for higher level operations.

- Powerful and robust motion instruction set including positioning, indexing, gearing, cam profiling and linear/circular interpolation.

- User-developed instruction (UDFBs) to create programs that can be reused in application after application.

- Powerful diagnostic functions including logic monitoring, data viewing, data forcing, servo tuning, and oscilloscope for quick start-up and maintenance.

- On-line edit of logic and motion to speed application development and troubleshooting.

- Real-time preemptive multi-tasking to solve high performance applications.

- Ethernet TCP/IP support for plant integration and remote application programming and debugging over the internet.

IEC 61131 Application Programming

PiCPro provides ladder logic programming for machine logic control, function block programming for motion control and structured text programming for high level operations, all in a fully-integrated environment. Based on the IEC 61131 standard for programming languages, PiCPro provides a rich standard instruction set with all the tools you'll need to solve your entire machine and motion control application.

Powerful tools for the application engineer include over 200 standard functions, the ability to develop your own functions as well as time-tick, event-driven and servo-synchronous tasks.

Tools for maintenance include program logic animation, on-line edit of motion and logic instructions, variable forcing, and view lists. Servo tuning and view are built into the PiCPro environment to simplify start-up and maintenance.

Using universally understood ladder logic for machine control complemented by powerful function block programming for motion control, PiCPro provides the simplest yet most powerful tool for solving your motion application.

Successful Motion Control Applications

Single-Point Solution

PiCPro provides a fully-integrated programming environment for your entire application.

- Motion Control
- Process Control
- Logic Control
- Drive Setup
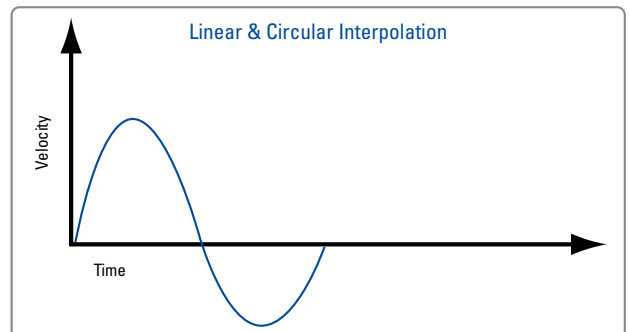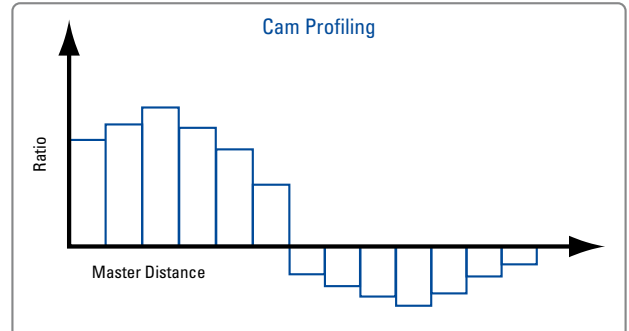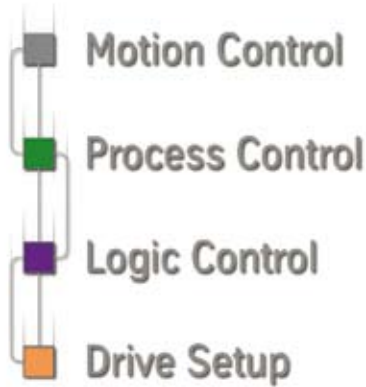
Cam Profiling

## Motion Capabilities To Handle Any Application Challenge

PiCPro's motion control capabilities include positioning, indexing, gearing, cam profiling, and interpolation.

Solve applications such as printing, packaging and converting using the complete master/slave motion instruction set. Sophisticated continuous registration algorithms will adjust your motion profiles providing quality production at all machine speeds. For metal-cutting, welding, pick-and-place and glue-laying, use the interpolated motion instructions.

With up to 64 axes of digital interfaced motion control, PiCPro has the capabilities to solve your application.

Linear & Circular Interpolation

Gearing

Real-Time Multi-Tasking To Solve Your Most Difficult Applications

PiCPro application programs are structured to keep simple applications simple while offering the performance to solve the most challenging problems. True preemptive multi-tasking lets you focus the control's processing power on your application's highest priority process. User logic can execute in real-time synchronously with the servo update loop.
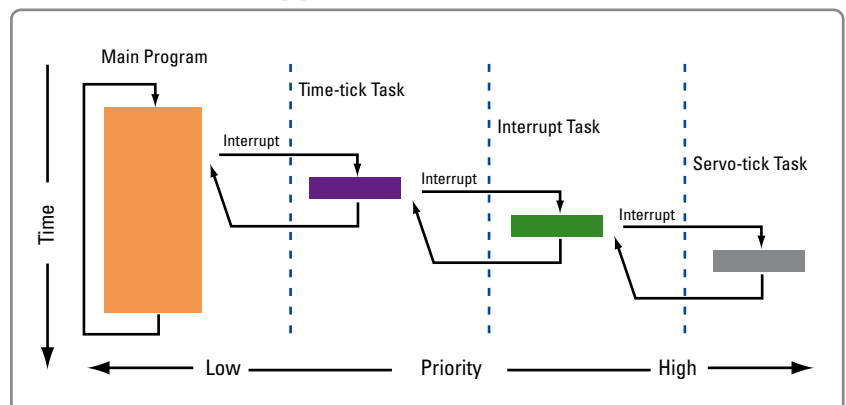
MMC Smart Drive Servo Amplifiers

Danaher Motion's MMC Smart Drive servo amplifiers provide 500W to 65kW continuous output power in a compact, easy-to-apply package. Available in both 230VAC and 460VAC systems, MMC Smart Drives operate over wide line voltage range.

Application of MMC Smart Drives is simple. The integral power supply and plug-and-play cable sets simplify installation. Configuration, tuning and maintenance are intuitive using PiCPro software with features including basic and expert parameter views, a software storage oscilloscope and auto-tune.

Use PiCPro's ladder logic. function block and structured text programming languages to develop complete multi-axis motion control solutions using the Digital MMC Family of Controls.
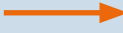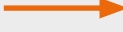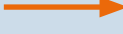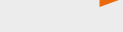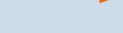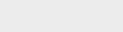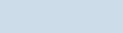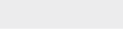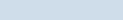
MMC Smart Drive Family

Model	Package	Cont. Current (Amps: 0-peak)	Peak Current (Amps: 0-peak)	Dimensions inches (mm) W x H x D
MMC-SD-0.5-230	Micro	2.5	7.5	3.69(94) x 10.13(257) x 6.12(156)
MMC-SD-1.0-230	Micro	5.0	15.0	4.69(119) x 10.13(257) x 6.12(156)
MMC-SD-2.0-230	Micro	10.0	30.0	4.69(119) x 10.13(257) x 6.12(156)
MMC-SD-1.3-460	Size 1	3.0	6.0	4.14(105) x 13.66(347) x 8.35(212)
MMC-SD-2.4-460	Size 1	5.5	11.0	4.14(105) x 13.66(347) x 8.35(212)
MMC-SD-4.0-460	Size 2	9.0	18.0	4.15(106) x 16.85(428) x 11.35(288)
MMC-SD-6.0-460	Size 2	13.5	27.0	4.15(106) x 16.85(428) x 11.35(288)
MMC-SD-8.0-460	Size 2	18.0	36.0	4.15(106) x 16.85(428) x 11.35(288)
MMC-SD-12.0-460	Size 3	27.5	55.0	6.1(155) x 21.65(550) x 11.36(288)
MMC-SD-16.0-460	Size 3	36.5	73.0	6.1(155) x 21.65(550) x 11.36(288)
MMC-SD-24.0-460	Size 3	55.0	110	6.1(155) x 21.65(550) x 11.36(288)
MMC-SD-30.0-460	Size 4	69.3	110	7.5(190) x 26.18(665) x 12.71(322.63)
MMC-SD-42.0-460	Size 4	93.3	147	7.5(190) x 26.18(665) x 12.71(322.63)
MMC-SD-51.0-460	Size 4	117.4	189	7.5(190) x 26.18(665) x 12.71(322.63)
MMC-SD-65.0-460	Size 4	152.7	209	7.5(190) x 26.18(665) x 12.71(322.63)

MMC Smart Drive Features

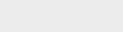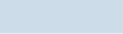| Feature	Description
Assignable Digital Inputs	8 24V DC optically isolated inputs
Assignable Digital Outputs	4 24V DC optically isolated outputs, short circuit protected
Assignable Relay Output	1 Relay Output (typically used for brake control)
Analog Input	1 Analog Input - 12-bit resolution
Feedback One (F1)	Motor feedback - incremental encoder, high resolution encoder, resolver (resolver interface option module required)
Feedback Two (F2)	Secondary feedback - incremental encoder
Drive Control Power	24V DC input for control power, independent of power section line voltage input

Feature	→	Benefit
Auto Tune	→	Automatically detect load inertia for simple servo tuning
Digital Design	→	Digital Signal Processor control for reliable, repeatable setup
High Bandwidth Control Loops	→	Accommodates changing load conditions found in industrial machinery applications
Plug-and-Play Cable Sets	→	Engineered motor power and motor feedback and control interface cable sets for noise-immune easy installation.
Software Protection	→	Over Voltage, Over Current and Over Temperature detection to protect the drive, motor and application.
Hardware Protection	→	Phase-to-phase and phase-to-ground short circuit protection
Complete Motor Family	→	Choose from three standard motor families to get an exact fit for your application
Integral Power Supply	→	Built-in Power Supply for simple installation
24V DC Drive Control Power	→	Maintain Drive Control power while line voltage is removed for troubleshooting and feedback tracking
Feedback Support	→	Select feedback technology appropriate to your application: incremental encoder, high resolution encoder or resolver
Industrial I/O	→	Optically isolated I/O for noise immunity
PiCPro Software	→	Drive setup and application motion programming using a single easy-to-navigate Windows program
Software Oscilloscope	→	Graphical real-time view of servo system performance
Agency Approval	→	UL, cUL and CE Mark allow worldwide application

Operator Interface Terminals

Whatever your application requirements, we have an operator interface terminal that fits.

From economical data entry/display terminals to sophisticated full color graphics touchscreens… all with a rich set of standard functions to make your next application the easiest yet.

Our Operator Interfaces Offer:

- A complete operator interface family ranging from simple text terminals to full color graphics touchscreens.

- Easy-to-use Information Designer configuration software programs both Exter and Cimrex terminals.

- Name-based communications allowing identical tag names in the control and Information Designer.

- Rugged packaging providing IP65 and NEMA 4 environmental ratings.

- A full set of functionality including recipe handling, event scheduling, password protection, report generation and more.

- Networking capability allowing multiple terminals per control... or multiple controls per terminal.

- Dual driver mode letting your operator terminal interface with two different controls per terminal.

- A complete set of standard graphic symbols and the ability to define custom graphics.

- Two families of operator interfaces to address all of your applications.

Exter™ T60c

A compact, full-featured touch screen with a 5.7" display and 320 x 240 pixels.

Exter™ T150

Provides a high-end 15.1" color touch screen with 1024 x 768 pixels.

Exter™ K70

A keypad unit with 6.5", 640 x 480 pixel resolution display.

Exter™ K100

A keypad unit with 10.4" display and 800 x 600 pixels.

Cimrex 12

A simple data entry/display terminal ideal for basic applications, provides 2 x 20 character backlit LCD display and full keypad for data entry.

Cimrex 41

A full graphics touchscreen display providing 220 x 240 pixels with built-in ethernet.

Cimrex 20

Provides a 4 x 20 character backlit LCD display and five function keys with slide-in labels.

Cimrex 60

A full graphics terminal providing 240 x 128 pixels with a bright monochrome display.

Cimrex 30

For simpler applications that will benefit from graphics as well as text display with 240 x 64 pixels.

Cimrex 67 & 69

An economical gray scale or color graphics touchscreen with a 320 x 240 pixel passive color display and software selectable landscape or portrait display.

Operator Interface Terminal Specifications

Feature	Cimrex 12	Cimrex 20	Cimrex 30	Cimrex 41	Cimrex 60	Cimrex 67/69
Display Type	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD	Backlit LCD C67 - 16 Gray Scale C69 - 256 Colors
Display Resolution	2 x 20 character text only	4 x 20 character text only	240 x 64 pixels	320 x 240 pixels 3.8"	240 x 128 pixels 5.6"	320 x 240 pixels 5.7"
Function Keys/ LED's	3/0	5/5	8/16	NO	16/16	No
Touchscreen	No	NO	No	Yes	No	Yes
Memory	64K Flash	64K Flash	400K Flash	400K Flash	400K Flash	400K Flash
Memory, Expansion	No	No	Option	No	Option	Option
Communication Options	No	No	Ethernet Optional	Ethernet Standard	Ethernet Optional	Ethernet Optional
Power	24VDC	24VDC	24VDC	24VDC	24VDC	24VDC
Cut-Out Dimensions	5.6"w x 3.5"h	5.8"w x 6.4"h	8.3"w x 7.8"h	5.6"w x 3.5"h	8.4"w x 9.1"h	7.85"w x 5.9"h
Mounting Depths	1.8"	1.5"	2.7"	1.9"	3.4"	2.8"

All terminals feature 2 communication ports (RS-232C and RS-422/485), Real Time Clock, Recipe Handling, Event Scheduling, Passwords, Report Generation, Bar Graphs, Dual Driver Capability, Time Channels, Message Libraries and Macros.

All terminals feature Alarm Processing and Management except the Cimrex 12. All terminals feature Alarm Groups except the Cimrex 12 and the Cimrex 20.

All terminals feature Trending, Graphic Symbols, Multi-Drop RS-485 Communications, Ethernet communications, Dynamic Objects and Multiple Languages except the Cimrex 12 and the Cimrex 20.

The Exter terminals all feature Standard Windows Fonts, Data Logger, Internal Variables, and IO Time Groups.

Feature	Exter K30m	Exter T40m/T40t	Exter T60m/T60c	Exter K60c	Exter T70	Exter T100	Exter T150	Exter K70	Exter K100
Display Type	Backlit LCD	T40m - 16 Greyscale T40t 64K Color	STN-LCD T60m - 16 Greyscale T60c 64K Color	STN-LCD 64K Color	TFT 64K Color	TFT 64K Color	TFT 64K Color	TFT 64K Color	TFT 64K Color
Display Resolution	240 x 264 pixels 3.5"	320 x 240 pixels 3.5"	320 x 240 pixels 5.7"	320 x 240 pixels 5.7"	640 x 480 pixels 6.5"	800 x 600 pixels 10.4"	1024 x 768 pixels 15.1"	640 x 480 pixels 6.5"	800 x 600 pixels 10.4"
Function Keys/ LED's	8/16	No	No	16/16	No	No	No	16/16	22/20
Touchscreen	No	Yes	Yes	No	Yes	Yes	Yes	No	No
Memory	32M Flash, 64M RAM	32M Flash, 64M RAM	32M Flash, 64M RAM	32M Flash, 64M RAM	32M Flash, 64M RAM	32M Flash, 64M RAM	32M Flash, 64M RAM	32M Flash, 64M RAM	32M Flash, 64M RAM
Memory, Expansion	No	No	No	No	Option	CompactFlash slot available for adding optional cards for expansion of memory, data back-up, data storage and transfer of data and projects			
Communication Options	Ethernet, USB Host				Ethernet 10/100, USB Host, USB Device				
Power	24VDC	24VDC	24VDC	24VDC	24VDC	24VDC	24VDC	24VDC	24VDC
Cut-Out Dimensions	6.54" w x 5.87 h"	5.47"w x 4.13"h	7.09"w x 5.12"h	9.45"w x 5.12"h	7.44"w x 5.4"h	10.4"w x 8.1"h	14"w x 11"h	9.7"w x 5.5"h	13.5"w x 8.3"h
Mounting Depths	2.2"	2.2"	2.2"	2.2"	2"	2.1"	2.2"	2.2"	2.1"

Digital MMC Control Family

	Family Member	Description	Dimensions: Inches (mm) W x H x D
Controls	MMC-D1	1 1/2 Axis	Installs inside Digital MMC Smart Drive
	MMC-D2	2 Axis	Installs inside Digital MMC Smart Drive
	MMC-D4	4 Axis	Installs inside Digital MMC Smart Drive
	MMC-D16	16 Axis	Installs inside Digital MMC Smart Drive
	MMC-D32	32 Axis	2.25" (57.15) x 9.6" (243.84) x 5.3" (134.52)
	MMC-D64	64 Axis	2.25" (57.15) x 9.6" (243.84) x 5.3" (134.52)
Option	MMC-32 in / 32 Out	32 DC Inputs and 32 DC outputs	1.28 (35.21) x 9.59 (243.59) x 5.25 (133.3)
	MMC-AIO	4 1/2 Axis Interface Expansion Module*	1.28 (35.21) x 9.59 (243.59) x 5.25 (133.3)
	MMC-D	DeviceNet Module	1.28 (35.21) x 9.59 (243.59) x 5.25 (133.3)
	MMC-P	Profibus Module	1.28 (35.21) x 9.59 (243.59) x 5.25 (133.3)

* Future Option

Digital MMC Control Feature

Feature	MMC-D1	MMC-D2	MMC-D4	MMC-D16	MMC-D32	MMC-D64
Closed Loop Axes	1	2	4	16	32	64
Digitizing (Read-Only or Half) Axes	1	2	4	16	32	64
Processor Speed	64 MHz	64 MHz	64 MHz	96 MHz	400 MHz	400 MHz
Application Memory	1.3 MBytes	1.3 MBytes	1.3 MBytes	1.3 MBytes	3 MBytes	3 MBytes
General Purpose Inputs (24VDC)	8	8	8	8	0	0
General Purpose Outputs (24VDC)	8	8	8	8	0	0
Drive I/O	8 Input; 4 Outputs, 1 Analog Input (12-bit) per drive in the system					
User Serial Port	Yes	Yes	Yes	Yes	Yes	Yes
Block I/O Capability	No	Yes	Yes	Yes	Yes	Yes
On-Board Ethernet Capability	No	Yes	Yes	Yes	Yes	Yes
Option Module Support	No	No	No	No	Yes - up to 4	Yes - up to 4
32 I/O, Ethernet, DeviceNet, Profibus	N/A	N/A	N/A	N/A	Optional	Optional

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