

# Automation & Control **Modicon M340** automation platform

*Unity*

Catalogue  
June

07



*Simply Smart !*

telemecanique.com



This international site allows you to access all the Telemecanique products in just 2 clicks via comprehensive range data-sheets, with direct links to:

- Complete library: technical documents, catalogs, certificates, FAQs, brochures...
- Selection guides from the e-catalog.
- Product discovery sites and their Flash animations.

You will also find illustrated overviews, news to which you can subscribe, a discussion forum, the list of country contacts...

To live automation solutions every day!



### *Flexibility*

- Interchangeable modular functions, to better meet the requirements for extensions
- Software and accessories common to multiple product families



### *Ingenuity*

- Auto-adapts to its environment, "plug & play"
- Application functions, control, communication and diagnostics embedded in the products
- User-friendly operation either directly on the product or remotely



### *Simplicity*

- Cost effective "optimum" offers that make selection easy for most typical applications
- Products that are easy to understand for users, electricians and automation specialists
- User-friendly intuitive programming



### *Compactness*

- High functionality in a minimum of space
- Freedom in implementation



### *Openness*

- Compliance with field bus, connection, and software standards
- Enabling decentralised or remote surveillance via the web with Transparent Ready products

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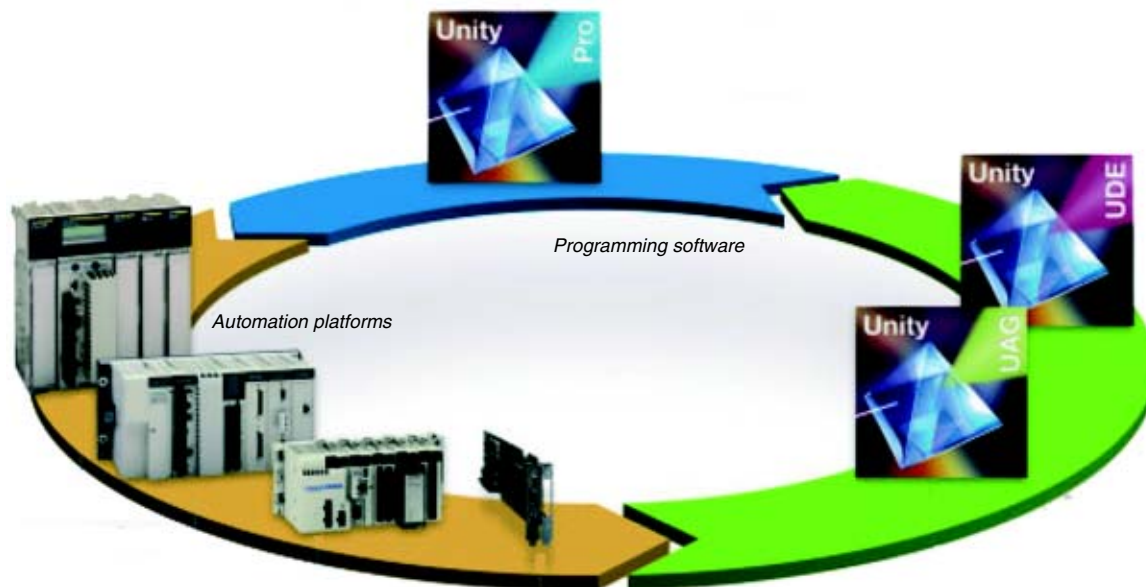
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# Modicon hardware platforms and Unity software

## *A naturally productive pair*

The family of Modicon platforms associated with Unity software offers you ingenuity, flexibility and openness to ever-increasing productivity.

**Modicon M340** concentrates power and innovation, offering the optimum response to the needs of machine manufacturers. It is also the ideal companion for **Modicon Premium** and **Modicon Quantum** to satisfy the need for automation of industrial processes and infrastructures.



## Modicon automation platforms

### *Modicon M340, the ideal solution for machine specialists*

Robust, powerful and compact, the new Modicon M340 PLC is the ideal solution for machine manufacturers in applications such as secondary packaging, materials handling, textiles, printing, food processing, woodworking machines, ceramics, etc. The integration of Altivar and Lexium variable speed drives, Magelis display units and Preventa safety modules has been boosted in order to simplify the setup and use of Telemecanique solutions.

Modicon M340 is also the ideal companion for Modicon Premium and Modicon Quantum to meet the demand for automation of industrial processes and infrastructures, at the heart of Transparent Ready architectures.

### *Modicon Premium, the optimum solution for the manufacturing industry and infrastructures*

Modicon Premium stands out as the specialist in complex machines and manufacturing processes. Its level of performance when processing Boolean, numeric instructions and instructions on tables make it the market reference. Thanks to its ability to integrate distributed architectures, Modicon Premium provides ideal solutions for infrastructure projects, particularly in the water and transport sectors.

In addition, Modicon Atrium, the version of Modicon Premium in PCI format, offers a "PC Based" alternative.

### *Modicon Quantum, the specialist in critical systems in the process industries and infrastructures*

Capable of incredible distributed architectures, with an extensive catalog of modules complemented by several technological partnerships in the context of the Collaborative Automation program, Modicon Quantum offers a perfect response to the needs of continuous or semi-continuous industrial processes, and control of large infrastructure sites.

Capitalizing on more than 25 years' experience in the field of redundancy, Modicon Quantum is the ideal solution for applications requiring very high levels of availability. The offer is therefore suitable in native fashion for critical applications such as petrochemicals, metallurgy, cement, energy, tunnels and airports.

(\*) Smarter and more intelligent, yet even easier to use.



## Unity software

### *An organizer environment for Modicon platforms*

Unity Pro is the common programming, debugging and run-time software for Modicon M340, Premium and Quantum PLCs, and Atrium slot PLCs.

As an IEC 61131-3 program, Unity Pro is based on the acknowledged standards of PL7 and Concept. It opens the doors of a complete set of new functions for increased productivity:

- State-of-the-art functionality
- Optimum standardization enabling re-use of developments
- Numerous tools for testing the program and improving system operation
- New integrated diagnostic services

Migration of existing applications is taken into account. This maximizes your software investment, reduces training costs and offers unrivaled potential for development and compatibility.

The Unity software catalog includes specialist software for even better productivity:

- Openness to developments in C language or in VBA (Visual Basic for Applications)
- Design and generation of batch/process applications with PLC/HMI integration



## Transparent Ready

### *Naturally communicative*

Based on Ethernet TCP/IP and Web technologies, the Modicon Transparent Ready automation platforms offer solutions to optimizing performances in electrical distribution, automation and control.

Web servers, sending e-mail, direct database access, device synchronization, I/O distribution, etc, Modicon offers you the best of Ethernet.

## Collaborative Automation Partner Program



## Collaborative Automation

### *The new world of automation*

- Rather than opting for proprietary systems, Telemecanique has adopted market standards such as IEC languages, Ethernet TCP/IP, Modbus IDA, XML, OPC, IT standards, etc.
- Partnerships with recognized leading hardware and software specialists have been developed within the scope of the Collaborative Automation Partner Program, in an effort to share technology more effectively.
- You will be assured of designing the best solution without compromising on ease of integration.

# Modicon M340 automation platform

## Hardware base



Modicon M340 platform

### New Modicon M340 platform

Equipped with astounding memory and performances, this featherweight version will imbue your applications with new momentum. Designed to operate in total synergy with other Telemecanique devices, Modicon M340 represents pure concentrated power.

#### Performance

- 7 Kinstructions/ms
- 4 MB of program memory
- 256 KB of data

#### Compact design

- 3 communication ports integrated in the processor
- H x W x D = 100 x 32 x 93 mm.
- High-density discrete I/O modules with 64 channels in a 32 mm wide format.

#### Communicative, with its integrated ports

- CANopen machine and installation bus
- Ethernet TCP/IP network - Transparent Ready
- Modbus serial link or character mode
- Remote access via STN, GSM, Radio or ADSL

#### Expert

- Counter modules with ready-to-use functions
- Function block library dedicated to motion control. MFB (*Motion Function Blocks*) to the PLCopen standard
- Advanced library of process control blocks oriented towards control of machinery

#### Innovative

- USB port as standard
- Embedded Web server
- Recipe file management via FTP protocol
- "Plug and Load" SD memory card
- No batteries

#### Ruggedness

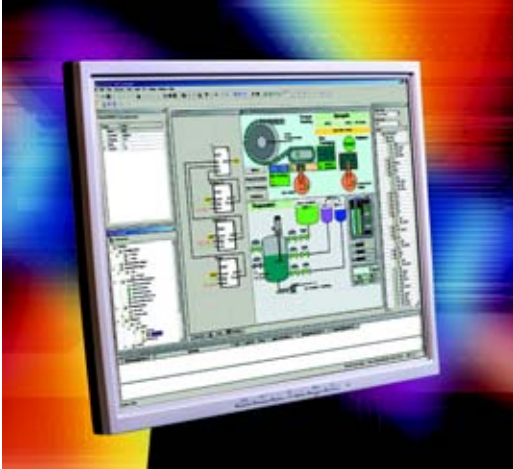
- Rack architecture enabling hot swapping of modules during operation (*Hot-Swap*)
- Exceeds the standards in terms of shocks, vibrations, temperature, altitude and withstand to electrical interference.

*As standard, Modicon M340 has exclusive services normally reserved for PLCs in a higher category.*



# Modicon M340 automation platform

## Unity Pro software



### Unity, software productivity

#### *All-in-one, easy-to-use software*

Unity Pro fully exploits the advantages of the graphic and contextual interfaces of Windows XP and Windows 2000 :

- Direct access to tools and information
- 100% graphics-based configuration
- Customizable toolbar and icons
- Advanced drag & drop and zoom functions
- Integrated diagnostic window

#### *All the advantages of standardization*

Unity Pro provides a complete set of functions and tools for applying the application structure to the structure of the process or machine. The program is divided into hierarchically-organized function modules containing:

- Program sections
- Animation tables
- Operator screens
- Hyperlinks

Basic functions that are used repeatedly can be encapsulated in user function blocks (DFBs) in an IEC 61131-3 language.

#### *Time savings from re-use of modules*

Once they have been tested and qualified, your standards reduce development and installation times on site, thereby optimizing quality and reducing lead times:

- Function modules that can be reused in the application or between projects by XML import/export.
- Function blocks instantiated by dragging and dropping them from the library.
- Instances that can be updated automatically to reflect modifications made in the library (if this option is selected by the user)

#### *Maximum quality assured*

The integrated PLC simulator faithfully reproduces the behavior of the target program on a PC. All the debugging tools can be used during simulation, to enhance quality before installation:

- Step-by-step program execution
- Breakpoint and watchpoint
- Real-time animations for displaying the state of the variables and the logic during operation

#### *Reduced downtime*

Unity Pro features a DFB library for application diagnostics. Integrated into the program, these DFBs can be used (depending on their function) to monitor permanent conditions relating to security and the development of a process over time. A display window provides a clear display of all system and application faults in chronological order (date-stamped at source). From this window, you can simply click to access the editor for the program in which the error occurred (search for missing conditions at source).

Online modifications can be grouped consistently in local mode on a PC and transferred directly to the PLC in a single operation in order to be taken into account in the same scan cycle. A complete range of functions provide the basis for precision control of your operations, to minimize downtime:

- Log of operator actions on Unity Pro in a protected file
- User profile and password protection
- Integrated graphic runtime screens





# 1 - Processors, power supplies and racks

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## 1 - Modicon M340 processors

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# Modicon M340 automation platform

## Modicon M340 processors

1

**Modicon M340 platform for Unity Pro software offer**

**BMX 34 10 Standard processor**



<b>Racks</b>	Number of racks Max. number of slots (excluding power supply module)	1 (4, 6, 8 or 12 slots) 12
<b>Inputs/Outputs</b>	In-rack discrete I/O (1)	512 channels (modules with 8, 16, 32 or 64 channels)
	In-rack analog I/O (1)	128/66 channels (2) (modules with 2, 4, 6 or 8 channels)
	Distributed I/O	Limited depending on the type of medium: Over Ethernet TCP/IP network via network module (63 devices with I/O Scanning function), over Modbus link (32 devices)
<b>In-rack application-specific channels</b>	Max. number of channels (counter and serial link)	20
	Counter (1)	2-channel (60 kHz) or 8-channel (10 kHz) modules
	Motion control	–
	Process control, programmable loops	Process control EFB library
<b>Integrated communication ports</b>	Ethernet TCP/IP network	–
	CANopen Master machine and installation bus	–
	Serial link	1 in RTU/ASCII Modbus master/slave mode or in character mode (non-isolated RS232/RS485, 0.3...19.2 Kbit/s)
	USB port	1 programming port (PC terminal)
<b>Communication modules</b>	Max. number of networks (1)	1 (BMX NOE 0100/0110 network module)
	Ethernet TCP/IP network	1 x 10BASE-T/100BASE-TX (Modbus TCP/IP, BOOTP/DHCP, FDR, Global Data, I/O Scanning, web server (standard, class B30 or configurable, class C30)
<b>Internal memory capacity</b>	Internal user RAM	2,048 Kb
	Program, constants and symbols	1,792 Kb
	Located/unlocated data	128 Kb
<b>Memory card capacity (on processor)</b>	Backup of program, constants and symbols	8 Mb as standard
	Hosting and display of user web pages	– (3)
	File storage	–
<b>Application structure</b>	Master task	1
	Fast task	1
	Event tasks	32
<b>No. of Kinstructions executed per ms</b>	100% Boolean	5.4 Kinstructions/ms
	65% Boolean + 35% fixed arithmetic	4.2 Kinstructions/ms
<b>Rack power supply</b>		24 V $\overline{\text{---}}$ isolated, 24...48 V $\overline{\text{---}}$ isolated or 100...240 V $\sim$ power supply module

**Modicon M340 processor**

**BMX P34 1000**

**Page**

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(1) The maximum values for the number of discrete I/O, analog I/O and counter channels and the number of networks are not cumulative (they are limited by the number of slots in the single-rack configuration, i.e. 11 maximum).  
 (2) The first value is applied to a multi-rack configuration (not available). The second value corresponds to the physical limit with a single-rack configuration.  
 (3) User web pages with FactoryCast module **BMX NOE 0110** (16 Mb available).

**BMX 34 20 Performance processors**



1 (4, 6, 8 or 12 slots)		
12		
1,024/704 channels (2) (modules with 8, 16, 32 or 64 channels)		
256/66 channels (2) (modules with 2, 4, 6 or 8 channels)		
Limited depending on the type of medium: on CANopen bus (63 devices), on Ethernet TCP/IP network via network module (63 devices with I/O Scanning function), on a Modbus link (32 devices)		
36		
2-channel (60 kHz) or 8-channel (10 kHz) modules		
MFB (Motion Function Blocks) library (control of drives or servo drives on the CANopen bus)	–	MFB (Motion Function Blocks) library (control of drives or servo drives on the CANopen bus)
Process control EFB library		
–	1 x 10BASE-T/100BASE-TX (Modbus TCP/IP, BOOTP/DHCP, FDR, class B10 standard web server)	–
1 (63 slaves, 50...1,000 Kbit/s, class M20)	–	1 (63 slaves, 50...1,000 Kbit/s, class M20)
1 in RTU/ASCII Modbus master/slave mode or in character mode (non-isolated RS232/RS485, 0.3...19.2 Kbit/s)	–	–
1 programming port (PC terminal)		
1 (BMX NOE 0100/0110 network module)		
1 x 10BASE-T/100BASE-TX (Modbus TCP/IP, BOOTP/DHCP, FDR, Global Data, I/O Scanning, web server (standard, class B30 or configurable, class C30))		
4,096 Kb		
3,584 Kb		
256 Kb		
8 Mb as standard		
– (3)		
16 Mb (with optional card BMX RMS 008MPF)		
1		
1		
64		
8.1 Kinstructions/ms		
6.4 Kinstructions/ms		
24 V $\equiv$ isolated, 24...48 V $\equiv$ isolated or 100...240 V $\sim$ power supply module		

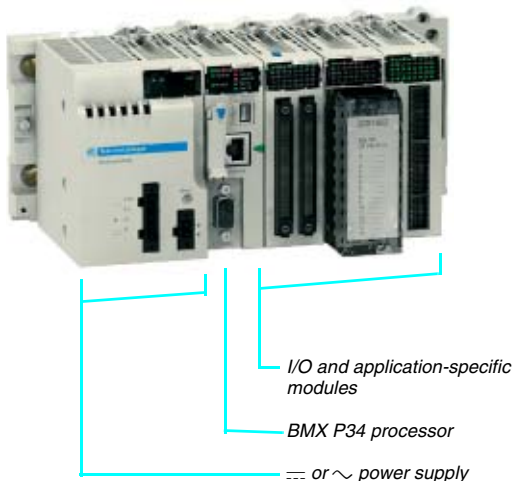
**BMX P34 2010**      **BMX P34 2020**      **BMX P34 2030**

# Modicon M340 automation platform

## Processor modules

1

Modicon M340 automation platform



### Presentation

Standard and Performance processors from the Modicon M340 automation platform manage an entire PLC single-rack station on which a maximum of 11 slots can be equipped with:

- Discrete I/O modules
- Analog I/O modules
- Application-specific modules (counter, Ethernet TCP/IP communication)

The four processors offered have different memory capacities, processing speeds, number of I/O and number and type of communication ports.

In addition, depending on the model, they offer a maximum (non-cumulative) of:

- 512 to 1024 discrete I/O
- 128 to 256 analog I/O
- 20 to 36 counter channels
- 0 to 2 Ethernet TCP/IP networks (with or without integrated port and network module)

Depending on the model, Modicon M340 processors include:

- A 10BASE-T/100BASE-TX Ethernet TCP/IP port
- A CANopen machine and installation bus
- A Modbus serial link
- A USB type TER port (for a programming terminal)

Each processor is supplied with a memory card used for:

- Backing up the application (program, symbols and constants)
- Activating a standard web server for the Transparent Ready B10 class integrated Ethernet port (depending on the model)

This memory card can be replaced by another type of memory card, to be ordered separately, that supports:

- Backing up the application and activating the standard web server (same as other card)
- A 16 Mb storage area for additional data organized in a file system (directories and sub-directories)

### Programming Modicon M340 applications

To set up processors from the Modicon M340 automation platform, you need either:

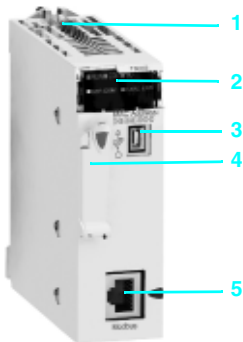
- Unity Pro Small programming software
- Unity Pro Medium, Large or Extra Large programming software identical to that used to set up Modicon Premium and Modicon Quantum automation platforms
- With possibly, depending on requirements:
  - Unity EFB toolkit software for developing EF and EFB libraries in C language
  - Unity SFC View software for viewing and diagnostics of applications written in Sequential Function Chart language (SFC) or Grafcet
  - Unity Dif software for comparison Unity Pro applications, version ≥ 2.1.

The function block software libraries provide Modicon M340 processors with the processing capability required to meet the needs of specialist applications in the following areas:

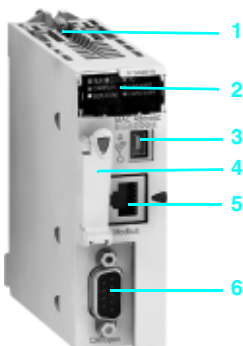
- Process control via programmable control loops (EF and EFB libraries)
- Motion control with multiple independent axis functions (MFB (*Motion Function Blocks*) library). The axes are controlled by Altivar 31/71 variable speed drives or Lexium 05/15 servo drives connected over the CANopen machine and installation bus.

# Modicon M340 automation platform

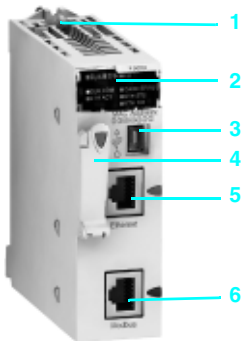
## Processor modules



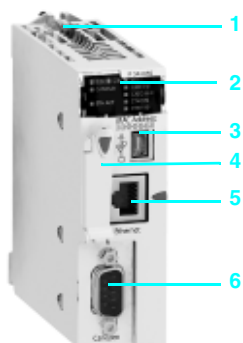
BMX P34 1000



BMX P34 2010



BMX P34 2020



BMX P34 2030

### Description of BMX P34 1000/2010 processors

**BMX P34 1000/2010** Standard and Performance single-format processors have the following on the front panel:

- 1 Safety screw for locking the module in its slot (marked 0) in the rack
- 2 A display block comprising 5 or 7 LEDs, depending on the model:
  - RUN LED (green): Processor running (program executing)
  - ERR LED (red): Processor or system fault
  - I/O LED (red): I/O module fault
  - SER COM LED (yellow): Activity on the Modbus serial link
  - CARD ERR LED (red): Memory card missing or faulty

With, in addition, for model **BMX P34 2010**:

- CAN RUN LED (green): Integrated machine/installation bus operational
- CAN ERR LED (red): Integrated machine/installation bus fault
- 3 A mini B USB connector for a programming terminal (or Magelis XBT GT operator interface)
- 4 A slot equipped with Flash memory card for backing up the application (an LED, located above this slot, indicates recognition of or access to the memory card)
- 5 An RJ45 connector for the Modbus serial link or character mode link (RS 232C/RS 485, 2-wire, non-isolated)

With, in addition, for model **BMX P34 2010**:

- 6 A 9-way SUB-D connector for the CANopen master machine and installation bus

### Description of BMX P34 2020/2030 processors with integrated Ethernet TCP/IP port

**BMX P34 2020/2030** Performance single-format processors have the following on the front panel:

- 1 Safety screw for locking the module in its slot (marked 0) in the rack
  - 2 A display block comprising 8 or 10 LEDs, depending on the model:
    - RUN LED (green): Processor running (program executing)
    - ERR LED (red): Processor or system fault
    - I/O LED (red): I/O module fault
    - SER COM LED (yellow): Activity on the Modbus serial link
    - CARD ERR LED (red): Memory card missing or faulty
    - ETH ACT LED (green): Activity on the Ethernet TCP/IP network
    - ETH STS LED (green): Ethernet TCP/IP network status
    - ETH 100 LED (red): Data rate on the Ethernet TCP/IP network (10 or 100 Mbit/s)
- With, in addition, for model **BMX P34 2030**:
- CAN RUN LED (green): Integrated machine/installation bus operational
  - CAN ERR LED (red): Integrated machine/installation bus fault

Also included, depending on the model:

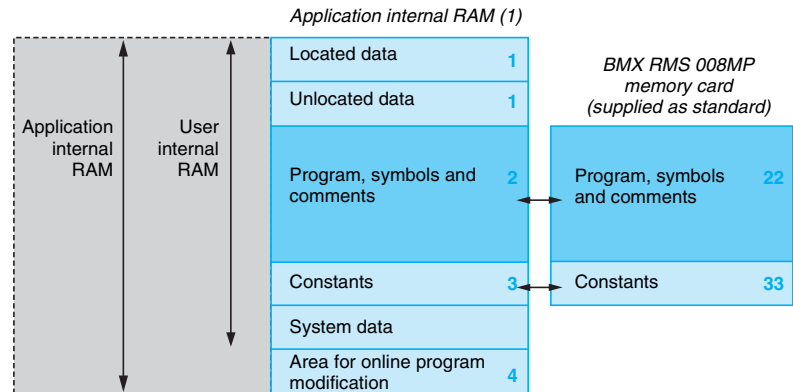
- 6 **BMX P 34 2020** processor: An RJ45 connector for the Modbus serial link or character mode link (RS 232C/RS 485, 2-wire, non-isolated)
- 7 **BMX P 34 2030** processor: A 9-way SUB-D connector for the CANopen master machine and installation bus

On the back panel there are two rotary switches for assigning the IP address. There are three ways to define this assignment:

- Address set by the position of the two switches
- Address set by the application parameters
- Address set by the Ethernet TCP/IP BOOTP server

### Memory structure

BMX P34 1000/2000 processor with memory card supplied as standard



#### Application internal RAM

The application memory is divided into memory areas, physically distributed in the Modicon M340 processor's internal RAM:

- 1 Application data area, which may be one of two 2 possible types:
  - Located data, corresponding to the data defined by an address (for example %MW237) with which a symbol can be associated (for example, Counter\_reject).
  - Unlocated data, corresponding to data defined only by a symbol. The use of unlocated data eliminates the restrictions of managing the memory location since the addresses are assigned automatically and also allows data to be structured and re-used.

This data area is backed up automatically when the PLC is turned off by duplicating its contents in a 256 Kbyte non-volatile internal memory integrated in the processor. It is also possible to back up this memory at any time with a user program.

- 2 Program, symbols and comments area: At program level this area contains the executable binary code and IEC source code.
- 3 Constants area: This area supports the constant located data (%KWi).
- 4 Area for online program modification (see page 1/7)

The user can choose to transfer the source data to the executable program in the PLC. The fact of having the program source in the PLC means that, when an empty programming terminal is connected to the PLC, all the elements needed to debug or upgrade this application can be restored to the terminal. Comments and animation tables can be excluded from the data embedded in the PLC.

#### Memory card

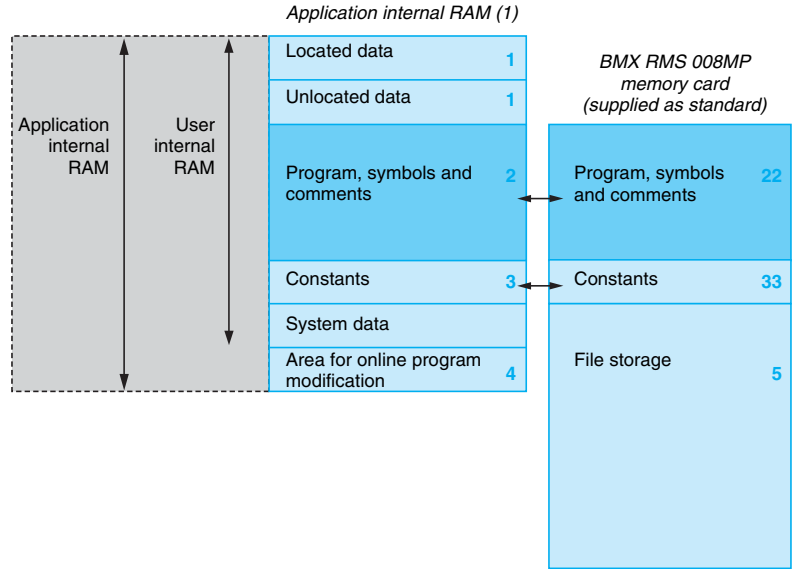
Modicon M340 processors are supplied with an SD (*Secure Digital*) type Flash memory card. This memory card is intended for backing up the program, symbols and comments area 2 and the constants area 3.

Duplication (for areas 22 and 33) and retrieval (on return of power) operations are managed automatically by the system and are therefore transparent to the user.

This card (formatted by Schneider Electric and supplied with each processor) is referenced as a replacement part **BMX RMS 008MP**.

(1) For the size of the different memory areas, see characteristics, page 1/8.

**Memory structure (continued)**  
**BMX P34 2000 processor with BMX RMS 008MPF memory card**



In place of the BMX RMS 008MP memory card (supplied as standard with each processor), **BMX P34 2010/2020/2030** processors can take the **BMX RMS 008MPF** memory card. With the three above-mentioned processors, this card also offers (in addition to the features of the BMX RMS 008MP card supplied as standard described on page 1/6):

- 5 A file storage area (for additional data, such as production data and manufacturing recipes): This area is limited to 16 Mb. These files can be managed from the application program or by any FTP client connected to the Ethernet TCP/IP port integrated in the processor.

For **BMX P34 2020/2030** processors with integrated Ethernet TCP/IP port, the **BMX RMS 008MPF** memory card also offers standard web services (Transparent Ready class B10).

The Unity Pro programming software assists the application designer with managing the structure and memory space occupation of the Modicon M340 automation platform.

**Protecting the application**

If necessary, it is possible to prohibit access to the application (in terms of reading or modifying the program) by only loading the executable code to the PLC. Additionally, a memory protection bit, set in configuration mode, is also available to prevent any program modification (via the programming terminal or downloads).

**Modifying the program in online mode**

As with Modicon Premium and Quantum platforms (with Unity Pro software), the online program modification function is available on the Modicon M340 automation platform with the option of adding or modifying the program code and data in different places in the application in a single modification session (thus ensuring modification is homogenous and consistent with the controlled process).

The application internal RAM memory area 4 authorizes these program modification or addition sessions while observing the recommendation to structure the application program in several, reasonably-sized sections.



# Modicon M340 automation platform

## Processor modules

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Modicon M340 Micro-PLCs have been designed to conform with the main national and international standards relating to electronic devices for industrial control systems (see pages 6/2 to 6/7 “Standards, certifications and environmental conditions”).

### Characteristics and performance

Processor			Standard	Performance		
			BMX P34 1000	BMX P34 2010	BMX P34 2020	BMX P34 2030
<b>Maximum configuration</b>	No. of racks	4, 6, 8 or 12 slots	1			
	Max. number of slots for processor and modules (excluding power supply module)		12			
<b>Functions</b>	Max. no. (1)	Discrete I/O	512	1,024, 704 in single-rack configuration (64 I/O x 11)		
		Analog I/O	128, 66 in single-rack configuration (4I/2Q x 11)	256, 66 in single-rack configuration (4I/2Q x 11)		
		Control channels	Programmable loops (via CONT-CTL process control EFB library)			
		Counter channels	20	36		
		Motion control	–	Independent axes on CANopen bus (via MFB library)	–	Independent axes on CANopen bus (via MFB library)
	Integrated connections	Ethernet TCP/IP	–	1 RJ45 port, 10/100 Mbit/s, with Transparent Ready class B10 standard web server		
		CANopen master bus	–	1 (9-way SUB-D)	–	1 (9-way SUB-D)
		Serial link	1 RJ45 port, Modbus master/slave RTU/ASCII or character mode (non-isolated RS 232C/RS 485), 0.3...19.2 Kbit/s			–
		USB port	1 port, 12 Mbit/s			
	Communication module	Ethernet TCP/IP	1 RJ45 port, 10/100 Mbit/s, with: - Transparent Ready class B30 standard web server with BMX NOE 0100 module - Transparent Ready class C30 configurable web server with BMX NOE 0110 module			
<b>Internal user RAM</b>	Total capacity	<b>Kb</b>	2,048	4,096		
	Program, constants and symbols	<b>Kb</b>	1,792	3,584		
	Data	<b>Kb</b>	128	256		
<b>Memory card</b>	Supplied as standard (reference BMX RMS 008MP)		Backup of program, constants, symbol and data		Activation of standard web server, class B10	
	To be ordered separately (reference BMX RMS 008MPF)		Backup of program, constants, symbol and data		File storage, 16 Mb	
			–		Activation of standard web server, class B10	
			–		–	
<b>Maximum size of object areas</b>	Located internal bits	Maximum	<b>bits</b>	16,250 %Mi	32,634 %Mi	
		Default	<b>bits</b>	256 %Mi	512 %Mi	
	Located internal data	Maximum	<b>Bytes</b>	32,464 %MWi internal words, 32,760 %KW constant words		
		Default	<b>Bytes</b>	512 %MWi internal words, 128 %KW constant words, 1,024 %MWi internal words, 256 %KW constant words		
		Max. unlocated internal data	<b>Kb</b>	128 (2)	256 (2)	
<b>Application structure</b>	Master task		1 cyclic or periodic			
	Fast task		1 periodic			
	Auxiliary tasks		–			
	Event tasks		32 (including 2 with priority)	64 (including 2 with priority)		
<b>Execution time for one instruction</b>	Boolean		<b>µs</b>	0.18	0.12	
	On words or fixed point arithmetic	Single-length words	<b>µs</b>	0.38	0.25	
		Double-length words	<b>µs</b>	0.26	0.17	
	On floating points		<b>µs</b>	1.74	1.16	
<b>No. of Kinstructions executed per ms</b>	100% Boolean	<b>Kinst/ms</b>	5.4	8.1		
	65% Boolean and 35% fixed arithmetic	<b>Kinst/ms</b>	4.2	6.4		
<b>System overhead</b>	Master task	<b>ms</b>	1.05	0.70		
	Fast task	<b>ms</b>	0.20	0.13		
<b>Power consumption</b>		With 24 V $\pm$ voltage	<b>mA</b>	72	90	95   135

(1) Only affects in-rack modules. The remote I/O on the CANopen bus are not included in these maximum numbers.

(2) The size of the located data (internal bits and data) and the size of the configuration data should be deducted from this value.

# Modicon M340 automation platform

## Processor modules

### BMX P34 Modicon M340 processors

Modicon M340 processor modules are supplied with the **BMX RMS 008MP** Flash memory card. This card performs the following actions transparently:

- Backing up the application (program, symbols and constants) supported in the processor internal RAM that is not backed up,
- Activation of the Transparent Ready class B10 standard web server (with **BMX P34 2020/2030** Performance processors).

This card can be replaced by another card featuring a file storage option.



BMX P34 1000



BMX P34 2010/2030



BMX P34 2020



BMX RMS 008MP / MPF



BMX XCA USB H000

I/O capacity (1)	Memory capacity	Max. no. of network modules	Integrated communication ports	Reference (3)	Weight kg
<b>Standard BMX P340 10</b>					
512 discrete I/O 128 analog I/O 20 application-specific channels	2,048 Kb integrated	1 Ethernet TCP/IP network	Modbus serial link	<b>BMX P34 1000</b>	0.200
<b>Performance BMX P340 20</b>					
1,024 discrete I/O 256 analog I/O 36 application-specific channels	4,096 Kb integrated	1 Ethernet TCP/IP network	Modbus serial link CANopen bus	<b>BMX P34 2010</b>	0.210
			Modbus serial link Ethernet TCP/IP network	<b>BMX P34 2020</b>	0.205
			Ethernet TCP/IP network CANopen bus	<b>BMX P34 2030</b>	0.215

### Memory card

Description	Use	Processor compatibility	Reference	Weight kg
<b>Memory card 16 Mb</b>	As replacement for the memory card supplied as standard with each processor, used for: <ul style="list-style-type: none"> <li>- Backup of program, constants, symbol and data</li> <li>- File storage, 16 Mb</li> <li>- Activation of class B10 web server</li> </ul>	BMX P34 20●0	<b>BMX RMS 008MPF</b>	0.002

### Separate parts

Description	Use		Length	Reference	Weight kg
	From	To			
<b>Terminal port/USB cordsets</b>	Mini B USB port on the Modicon M340 processor	PC terminal type A USB port	1.8 m	<b>BMX XCA USB H018</b>	0.065
			4.5 m	<b>BMX XCA USB H045</b>	0.110

### Replacement parts

Description	Use	Processor compatibility	Reference	Weight kg
<b>Memory card 8 Mb</b>	Supplied as standard with each processor, used for: <ul style="list-style-type: none"> <li>- Backup of program, constants, symbol and data</li> <li>- Activation of class B10 web server</li> </ul>	BMX P34 1000 / 20●0	<b>BMX RMS 008MP</b>	0.002

(1) For I/O capacity in single-rack configuration, see characteristics, page 1/8.

### Presentation

**BMX CPS ●●●0** power supply modules provide the power supply for each **BMX XBP ●●00** rack and the modules installed on it.

There are two types of power supply module:

- Power supply modules for AC supplies
- Power supply modules for DC supplies

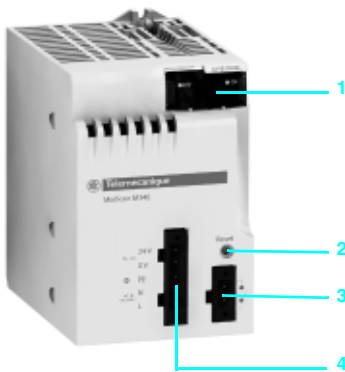
### Description

The power supply module is selected according to:

- The electrical line supply: 24 V  $\equiv$ , 48 V  $\equiv$  or 100...240 V  $\sim$
- The required power (see the power consumption table on page 6/8) (1)

**BMX CPS ●●●0** power supply modules have the following on the front panel :

- 1 A display block comprising:
  - OK LED (green), lit if rack voltages are present and correct
  - 24 V LED (green), lit when the sensor voltage is present (for BMX CPS 2000/3500 AC power supply modules only)
- 2 A pencil-point RESET pushbutton for a cold restart of the application
- 3 A 2-way connector that can take a removable terminal block (screw or spring-type) for connecting the alarm relay
- 4 A 5-way connector that can take a removable terminal block (screw or spring-type) for connecting the following:
  - $\equiv$  or  $\sim$  line supply
  - Protective earth
  - Dedicated 24 V  $\equiv$  power supply for the input sensors (for BMX CPS 2000/3500 AC power supply modules only)



#### Included in the power supply modules:

Pack of two removable terminal blocks:

- Screw clamp **BMX XTS CPS10**
- Spring-type **BMX XTS CPS20**

(1) This power consumption calculation for the rack can also be performed by the Unity Pro programming software.

### Functions

#### Alarm relay

The alarm relay located in each power supply module has a volt-free contact accessible from the front of the 2-way connector.

The operating principle is as follows:

In normal operation, with the PLC in RUN, the alarm relay is activated and its contact is closed (state 1).

The relay de-energizes and its associated contact opens (state 0) whenever the application stops, even partially, due to any of the following:

- Occurrence of a blocking fault
- Incorrect rack output voltages
- Loss of supply voltage

#### RESET pushbutton

The power supply module in each rack has a RESET button on the front panel; when activated, this triggers an initialization sequence for the processor and the rack modules it supplies.

Pressing this pushbutton triggers a sequence of service signals, which is the same as that for:

- A power break when the pushbutton is pressed
- A power-up when the pushbutton is released

In terms of the application, these operations represent a cold start (forcing the I/O modules to state 0 and initializing the processor).

#### Sensor power supply

The **BMX CPS 2000/3500** AC power supply modules have an integrated 24 V  $\overline{\text{---}}$  voltage supply for powering the input sensors. Connection to this sensor power supply is via the 5-way connector on the front panel.

The power available on this 24 V  $\overline{\text{---}}$  voltage depends on the power supply model (0.45 or 0.9 A) (see characteristics on page 1/12).

Characteristics								
☐ power supply module								
Primary	Voltage	Nominal	V	24 ☐ isolated	24...48 ☐ isolated			
		Limit (ripple included)	V	18...31.2 ☐	18...62..4 ☐			
	Current	Input nominal I rms	A	1 at 24 V ☐	1.65 at 24 V ☐; 0.83 at 48 V ☐			
		Initial power-up at 25°C (1)	I inrush	A	30	30	60	
		I <sup>2</sup> t on activation	A <sup>2</sup> s	≤ 0.6	≤ 1	≤ 3		
			It on activation	As	≤ 0.15	≤ 0.2	≤ 0.3	
			Micro-break duration	Line (accepted)	ms	≤ 1		
	Integrated protection			With internal fuse (not accessible)				
	Secondary	Useful power	Max.	W	16,8	31,2		
		3.3 V ☐ voltage (2)	Nominal voltage	V	3.3			
Nominal current			A	2.5	4.5			
Typical power			W	8.3	15			
24 V ☐ output (3)		Nominal voltage	V	24 ☐				
		Nominal current	A	0.7	1.3			
		Typical power	W	16.8	31.2			
Integrated protection on the voltages (4)			Yes, against overloads, short-circuits and overvoltages					
Max. dissipated power			W	8.5				
Max. length of power supply cable	Copper wires with 1.5 mm <sup>2</sup> cross-section		m	20	10			
	Copper wires with 2.5 mm <sup>2</sup> cross-section		m	30	15			
Insulation	Dielectric strength	Primary/secondary and primary/ground	V rms	1,500 - 50 Hz for 1 min at an altitude of 0...4,000 m				
	Insulation resistance	Primary/secondary and primary/ground	MΩ	≥ 10				
~ power supply module								
Primary	Voltages	Nominal	V	100...240 ~				
		Limit (ripple included)	V	85...264 ~				
	Frequencies	Nominal/limit	Hz	50-60/47-63				
	Power	Apparent	VA	70	120			
	Current	Input nominal I rms	A rms	0.61 at 115 V ~; 0.31 at 240 V ~				
		Initial power-up at 25°C (1)	I inrush	A	120 ~	240 ~	120 ~	240 ~
		I <sup>2</sup> t on activation	A <sup>2</sup> s	≤ 0.5	≤ 2	≤ 1	≤ 3	
			It on activation	As	0.03	0.06	≤ 0.05	≤ 0.07
			Micro-break duration	Line (accepted)	ms	≤ 10		
	Integrated protection			With internal fuse (not accessible)				
Secondary	Useful power	Max. overall	W	20	36			
		Max. on 3.3 V ☐ and 24 V ☐ rack output voltages	W	16.5	31.2			
	3.3 V ☐ voltage (2)	Nominal voltage	V	3.3				
		Nominal current	A	2.5	4.5			
		Power (typical)	W	8.3	15			
	24 V rack ☐ voltage (3)	Nominal voltage	V	24 ☐				
		Nominal current	A	0.7	1.3			
		Typical power	W	16.8	31.2			
	24 V ☐ sensor voltage (4)	Nominal voltage	V	24 ☐				
		Nominal current	A	0.45	0.9			
Typical power		W	10.8	21.6				
Integrated protection on the voltages (5)			Yes, against overloads, short-circuits and overvoltages					
Maximum dissipated power			W	8.5				
Insulation	Dielectric strength	Primary/secondary (24 V/3.3 V)	V rms	1500				
		Primary/secondary (sensor 24 V)	V rms	2300				
		Primary/ground	V rms	1500				
		24 V sensor output/ground	V rms	500				
	Insulation resistance	Primary/secondary and primary/ground	MΩ	≥ 100				

(1) These values should be taken into account when starting several devices simultaneously and when sizing protection devices.  
 (2) 3.3 V ☐ voltage for the I/O module logic power supply  
 (3) 24 V ☐ voltage for the I/O module power supply and the processor  
 (4) 24 V ☐ sensor output for the sensor power supply  
 (5) Protected by a fuse that cannot be accessed

# Modicon M340 automation platform

## Power supply modules



BMX CPS 2010 / 3020



BMX CPS 2000 / 3500

### References

Each **BMX XBP ●●00** rack must be equipped with a power supply module. These modules are inserted in the first two slots of each rack (marked CPS). The power required to supply each rack depends on the type and number of modules installed in the rack. It is therefore necessary to draw up a power consumption table rack by rack in order to determine the **BMX CPS ●●●0** power supply module most suitable for each rack (see page 6/8).

### Power supply modules

Line supply	Available power (1)				Reference	Weight kg
	3.3 V $\text{---}$ (2)	24 V rack $\text{---}$ (2)	24 V sensor $\text{---}$ (3)	Total		
24 V $\text{---}$ isolated	8.3 W	16.8 W	–	16.8 W	<b>BMX CPS 2010</b>	0,290
24...48 V $\text{---}$ isolated	15 W	31.2 W	–	31.2 W	<b>BMX CPS 3020</b>	0,340
100...240 V $\sim$	8.3 W	16.8 W	10.8 W	20 W	<b>BMX CPS 2000</b>	0.300
	15 W	31.2 W	21.6 W	36 W	<b>BMX CPS 3500</b>	0.360

### Replacement parts

Description	Composition	Type	Reference	Weight kg
Packs of 2 removable connectors	One 5-way terminal block and one 2-way terminal block	Cage clamp	<b>BMX XTS CPS10</b>	0.020
		Spring-type	<b>BMX XTS CPS20</b>	0.015

(1) The sum of the absorbed power on each voltage (3.3 V  $\text{---}$  and 24 V  $\text{---}$ ) should not exceed the total power of the module. See the power consumption table on page 6/8.

(2) 3.3 V  $\text{---}$  and 24 V rack  $\text{---}$  voltages for powering Modicon M340 PLC modules

(3) 24 V sensor  $\text{---}$  voltage for powering the input sensors (voltage available via the 2-way removable connector on the front panel)

### Presentation

**BMX XBP ●●00** racks are the basic element of the Modicon M340 automation platform in a single-rack configuration.

These racks perform the following functions:

- **Mechanical function:** They are used to install all the modules in a PLC station (power supply, processor, discrete I/O, analog and application-specific I/O). These racks can be mounted on a panel, plate or DIN rail:
  - Inside enclosures
  - On machine frames, etc.
- **Electrical function:** The racks incorporate a Bus X. They are used to:
  - Distribute the power supplies required for each module in the same rack
  - Distribute data and service signals for the entire PLC station
  - Hot swap modules during operation

### Description

**BMX XBP ●●00** racks are available in 4, 6, 8 or 12-slot versions, and comprise:

- 1 A metal frame that performs the following functions:
  - Holds the Bus X electronic card and protects it against EMI and ESD type interference
  - Holds the modules
  - Gives the rack mechanical rigidity
- 2 A ground terminal for grounding the rack
- 3 Holes for mounting the rack on a frame. These holes are big enough for M6 screws.
- 4 Fixing points for the shielding connection bar
- 5 Tapped holes to take each module locking screw
- 6 A connector for an expansion module. This connector (marked XBE) is not used for this version.
- 7 40-way female ½ DIN connectors forming the connection between the rack and each module. When the rack is delivered, these connectors are protected by covers that should be removed before inserting the modules. Slots for anchoring the module pins

**To be ordered separately:**

**BMX XSP ●●00** cable shielding connection kit, used to protect against electrostatic discharge when connecting the shielding of cordsets for connecting:

- Analog modules
- A Magelis XBT operator interface to the processor (via **BMX XCA USBH0●●** shielded USB cable)

This kit comprises:

- 8 A metal bar that takes the clamping rings
- 9 Two sub-bases to be mounted on the rack
- 10 A set of spring clamping rings for attaching cables with their shielding to the metal bar. Packs of 10 **STB XSP 30●●0** clamping rings can be ordered in addition if required.

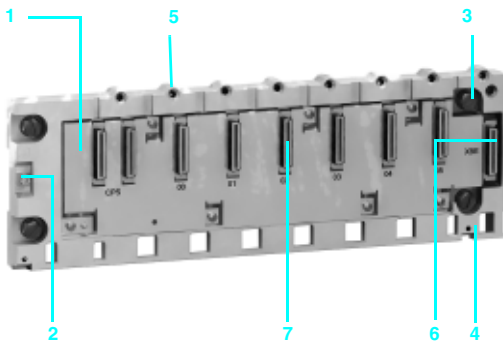
### Function

#### Addressing modules in a single-rack configuration

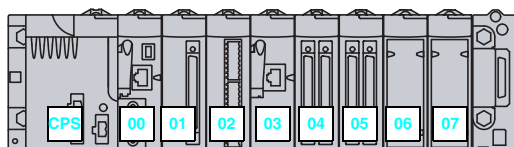
Each rack must contain a power supply module and a processor module.

**Inserting different modules in the rack:**

- The power supply module always occupies the **CPS** slot.
- The processor module must always be installed in slot **00**.
- Its I/O modules and application-specific modules are installed in slot **01** to slot ...
  - **03** with a 4-slot rack
  - **05** with a 6-slot rack
  - **07** with an 8-slot rack
  - **11** with a 12-slot rack

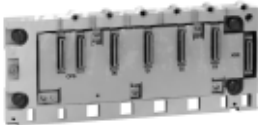


Rack 6 slots BMX XBP 0600

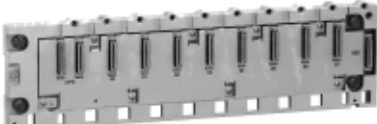


Example of installation with 8-slot rack

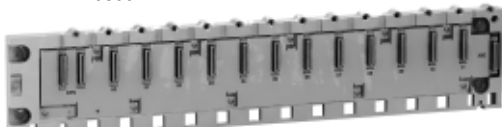




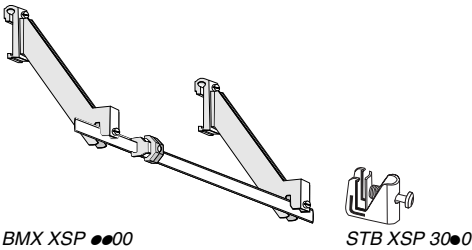
BMX XBP 0400



BMX XBP 0800



BMX XBP 1200



BMX XSP ●●00

STB XSP 30●0

### Racks

Description	Type of module to be inserted	No. of slots (1)	Reference	Weight kg
<b>Racks</b>	BMX CPS power supply,	4	<b>BMX XBP 0400</b>	1.470
	BMX P34 processor, I/O	6	<b>BMX XBP 0600</b>	1.750
	modules and	8	<b>BMX XBP 0800</b>	2.310
	application-specific	12	<b>BMX XBP 1200</b>	-
	modules (counter, communication)			

### Accessories

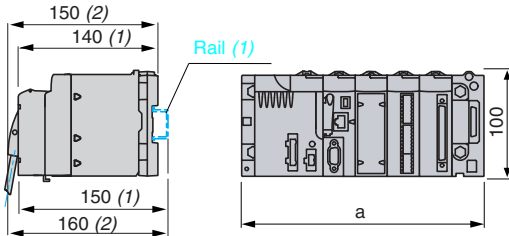
Description	For use with	Unit reference	Weight kg
<b>Shielding connection kits</b> comprising:	BMX XBP 0400 rack	<b>BMX XSP 0400</b>	0.280
	BMX XBP 0600 rack	<b>BMX XSP 0600</b>	0.310
	BMX XBP 0800 rack	<b>BMX XSP 0800</b>	0.340
	BMX XBP 1200 rack	<b>BMX XSP1200</b>	0.400
- a metal bar			
- two sub-bases			
- one set of spring clamping rings			
<b>Spring clamping rings</b> (pack of 5)	Cables with 1.5...6 mm <sup>2</sup> cross-section	<b>STB XSP 3010</b>	0.050
	Cables with 5...11 mm <sup>2</sup> cross-section	<b>STB XSP 3020</b>	0.070
<b>Protective covers</b> (pack of 5)	Unoccupied slots on BMX XBP ●●00 rack	<b>BMX XEM 010</b>	0.005

(1) Number of slots taking the processor module, I/O modules and application-specific modules (excluding power supply module).

## Dimensions, mounting

### BMX XBP

Common side view      Front view: BMX XBP example

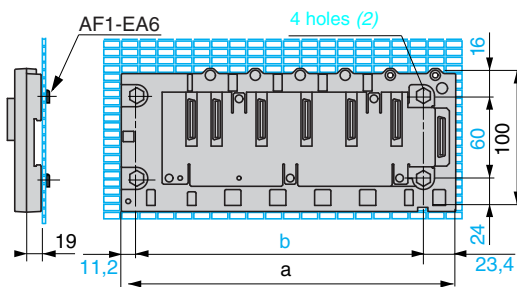


	a
<b>BMX XBP 0400</b>	242.4
<b>BMX XBP 0600</b>	307.6
<b>BMX XBP 0800</b>	372.8
<b>BMX XBP 1200</b>	503.2

(1) With removable terminal block (cage, screw or spring).  
(2) With FCN connector.

### Mounting the racks

On AM1 PA and AM3 PA pre-slotted plate

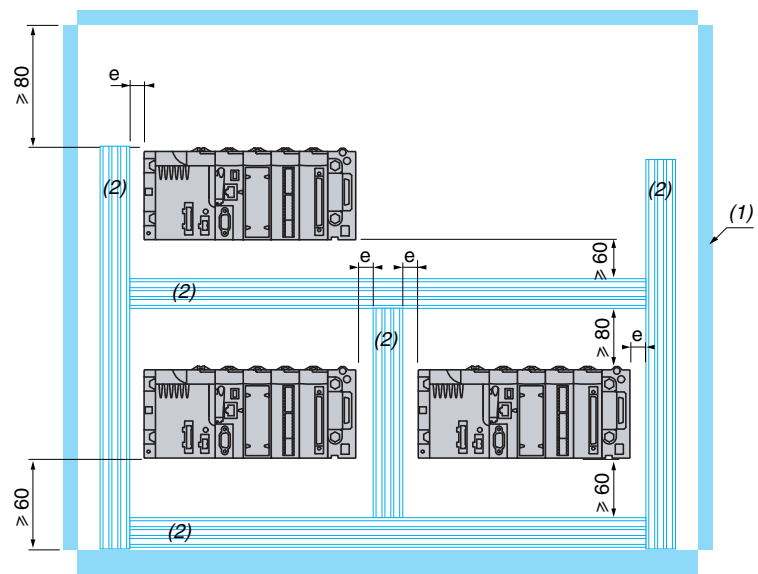


	a	b
<b>BMX XBP 0400</b>	242.4	207.8
<b>BMX XBP 0600</b>	307.6	273
<b>BMX XBP 0800</b>	372.8	338.2
<b>BMX XBP 1200</b>	503.2	468.6

(1) On AM1 ED rail: 35 mm wide, 15 mm deep Only possible with BMX XBP 0400/0600/0800 rack.

(2) For panel-mounting: The diameter of the fixing holes must be sufficient to accept M4, M5, M6 screws (4.32 to 6.35).

### Installation rules



e ≥ 3 mm

(1) Equipment or enclosure.  
(2) Cable ducting or clip.



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## 2.1 Discrete I/O modules

*Discrete input, mixed, and output modules selection guide. . . . . page 2/2*

- Discrete I/O modules
  - Presentation, description . . . . . page 2/6
  - Functions . . . . . page 2/8
  - Characteristics . . . . . page 2/10
  - References . . . . . page 2/16
  - Connections . . . . . page 2/18

## 2.2 Analog I/O modules and process control

*Analog I/O modules selection guide . . . . . page 2/22*

- Analog I/O modules
  - Presentation, description . . . . . page 2/24
  - Connections . . . . . page 2/25
  - Functions . . . . . page 2/26
  - Characteristics . . . . . page 2/28
  - References . . . . . page 2/31
- Programmable process control . . . . . page 2/32

## 2.3 Distributed I/O

*IP 67 and IP 20 distributed I/O selection guide. . . . . page 2/34*

## 2.4 Counter modules and Motion Function Blocks

- Counter modules
  - Presentation, description . . . . . page 2/36
  - Functions . . . . . page 2/37
  - Characteristics . . . . . page 2/40
  - References . . . . . page 2/41
  - Connections . . . . . page 2/42
- MFB, Motion Function Blocks . . . . . page 2/44

# Modicon M340 automation platform

## Discrete I/O modules

### Input modules and mixed I/O modules

Applications

16-channel input modules

Connection via cage clamp, screw clamp or spring-type removable terminals

2

2.1



<b>Type</b>	--- or ~				
<b>Voltage</b>	24 V	48 V	24 V	48 V	100...120V
<b>Modularity</b> (Number of channels)	16 isolated channels				
<b>Connection</b>	Via BMX FTB 2000/2010/2020 20-way cage clamp, screw clamp or spring-type removable terminals				
<b>Isolated inputs</b>	IEC 61131-2 conformity				
	Logic				
	Sensor compatibility in accordance with standard IEC 947-5-2				
	Type 3	Type 1	Type 1 (~)	Type 3	
	Positive		Pos. or neg.		-
	2-wire ---, 3-wire --- PNP any type		2-wire ---/~, 3-wire --- PNP or NPN any type		2-wire ~
<b>Isolated outputs</b>	Fallback				
	IEC 61131-2 conformity				
	Protection				
	Logic				
<b>Module</b>	BMX DDI 1602	BMX DDI 1603 ▲	BMX DAI 1602 ▲	BMX DAI 1603 ▲	BMX DAI 1604
<b>Page</b>	2/16				
<b>Compatibility with installation help system</b>	Tego Dial				
	TeSys Quickfit				
<b>Compatibility with Advantys Telefast ABE 7 pre-wired system</b>	Connection sub-bases				
	Input and output adaptor sub-bases				
<b>Passive connection sub-base</b>	Optimum "Economy"				
	Optimum "Miniature"				
	Universal				
<b>Relay adaptor sub-base</b>	Fixed relays				
	Plug-in relays				
<b>Preformed cordsets with 40-way connector</b>	-				
<b>Pages</b>	-				

▲ Available 4<sup>th</sup> quarter 2007

**32/64-channel high-density input modules**

Connection via 40-way connectors with preformed cordsets



**16/32-channel mixed I/O modules**

Connection via cage clamp, screw clamp or spring-type removable terminals



Connection via 40-way connectors with preformed cordsets



--- 24 V	
32 isolated channels	64 isolated channels
Via one 40-way connector	Via two 40-way connectors
Type 3	Non-IEC
Positive	
2-wire ---, 3-wire --- PNP any type	-

--- 24 V I/O	--- and ~ (outputs only) 24 V inputs, relay outputs	--- 24 V I/O
8 isolated inputs and 8 isolated outputs		16 isolated inputs and 16 isolated outputs
Via BMX FTB 2000/2010/2020 20-way cage clamp, screw clamp or spring-type removable terminals		Via one 40-way connector
Type 3		
Positive	-	Positive

Configurable output fallback, continuous monitoring of output control and resetting of outputs in case of internal fault

Yes		
Protected	Not protected	Protected
Positive	-	Positive

<b>BMX DDI 3202K</b>	<b>BMX DDI 6402K</b>
----------------------	----------------------

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APE 1B24M Dialbase interface with 8I/8Q

LU9 G02 splitter boxes (8 motor starters) and BMX FCC ●●1/●●3 preformed cordsets

<b>BMX DDM 16022</b>	<b>BMX DDM 16025</b>	<b>BMX DDM 3202K</b>
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2/17

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APE 1B24M Dialbase interface

LU9 G02 splitter boxes (8 motor starters) and BMX FCC ●●1/●●3 preformed cordsets

Depending on model, 8- or 16-channel passive sub-bases, with or without LED, with common or 2 terminals per channel

Depending on model, 16-channel active sub-bases with solid state or electromechanical, fixed or removable relays, 5...48 V ---, 24 V ---, 24 V...240 V ~ or volt-free, with common or 2 terminals per channel, screw or spring-type connection

<b>ABE 7H20E●00</b>
<b>ABE 7H16C●●</b>
<b>ABE 7H08R●●/7H08S21,</b> <b>ABE 7H16R1●/7H16R50,</b> <b>ABE 7H16R2●/7H16S21,</b> <b>ABE 7H16R3●/7H16R23,</b> <b>ABE 7H16S43,</b>
<b>ABE 7S16E2●●</b>
<b>ABE 7P16F31●●</b>
<b>BMX FCC ●●1/FCC ●●3</b>
5/10 to 5/15, 2/17

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<b>ABE 7H20E●00</b>
<b>ABE 7H16C●●</b>
<b>ABE 7H08R●●/7H08S21,</b> <b>ABE 7H16R1●/7H16R50,</b> <b>ABE 7H16R2●/7H16S21,</b> <b>ABE 7H16R3●/7H16R23,</b> <b>ABE 7H16S43/7H16F43</b>
<b>ABE 7S16E2●●</b> <b>ABE 7S16S●●●/7R16S</b>
<b>ABE 7P16F31●●</b> <b>ABE 7R16T●●●/7P16T●●●</b>
<b>BMX FCC ●●3</b>
5/10 to 5/15, 2/17

# Modicon M340 automation platform

Discrete I/O modules  
Output modules

Applications

32/64-channel high-density output modules  
Connection via 40-way connectors with preformed cordsets

2

2.1



Type	--- solid state	
Voltage	24 V	
Current	0.1 A per channel	
Modularity (Number of channels)	32 protected channels	64 protected channels
Connection	Via one 40-way connector	Via two 40-way connectors
Isolated outputs	Configurable output fallback, continuous monitoring of output control and resetting of outputs in case of internal fault	
Fallback	Yes	
IEC 61131-2 conformity	Current limiter with electronic tripping	
Protection	Positive	
Logic		-
Discrete output module	BMX DDO 3202K	BMX DDO 6402K
Page	2/16	
Compatibility with installation help system	Tego Dial	
	TeSys Quickfit	
Compatibility with Advantys Telefast ABE 7 pre-wired system	Connection sub-bases	
	Input adaptor sub-bases	
Passive sub-base	Optimum "Economy"	
	Optimum "Miniature"	
	Universal	
Relay adaptor sub-base	Fixed relays	
	Removable relays	
Preformed cordsets with 40-way connector	BMX FCC●●1/FCC ●●3	
Pages	5/10 to 5/15, 2/17	





### Presentation

Discrete I/O modules in the Modicon M340 offer are standard modules occupying a single slot, equipped with either of the following:

- A connector for a screw or spring-type 20-way removable terminal block
- One or two 40-way connector(s)

A wide range of discrete inputs and outputs can be used to meet whatever requirements arise in terms of:

- functions, AC or DC I/O, positive or negative logic
- modularity, 8, 16, 32 or 64 channels per module

The inputs receive signals from the sensors and perform the following functions:

- acquisition
- adaptation
- electrical isolation
- filtering
- protection against interference signals

The outputs memorize commands issued by the processor to enable control of the preactuators via the decoupling and amplification circuits.

### Description

**BMX D●I/D●O/DRA** discrete I/O modules are standard format (1 slot). They have a case, which ensures IP 20 protection of the electronics, and are locked into position by a captive screw.

#### I/O modules connected via 20-way removable terminal block

- 1 Rigid body providing support and protection for the electronic card
- 2 Module reference marking (a label is also visible on the right-hand side of the module)
- 3 Channel status display block
- 4 Connector taking the 20-way removable terminal block for connecting sensors or preactuators

#### To be ordered separately:

A **BMX FTB 20●0** 20-way removable terminal block or a preformed cordset with a 20-way removable terminal block at one end and flying leads at the other (see page 2/7).

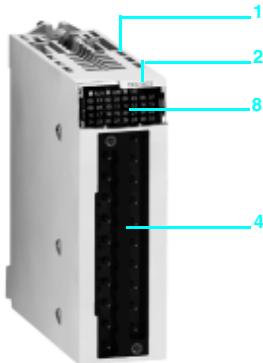
#### I/O modules connected via 40-way connector

- 1 Rigid body providing support and protection for the electronic card
- 2 Module reference marking (a label is also visible on the right-hand side of the module)
- 3 Channel status display block
- 4 One or two 40-way connectors (32 or 64 channels) (1) for connecting sensors or preactuators
- 5 With the 64-channel module, a pushbutton, which, with successive presses, displays the state of channels 0...31 or 32...63 on the block 3 (see page 2/9)

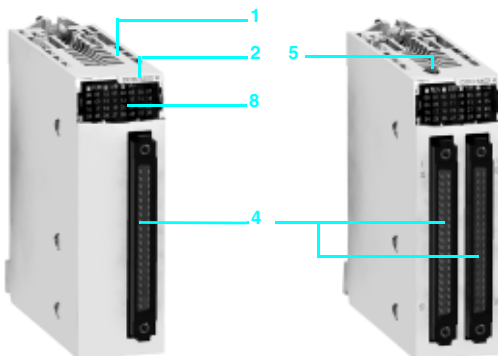
#### To be ordered separately, depending on the type of module:

One or two preformed cordset(s) with a 40-way connector (see page 2/7).

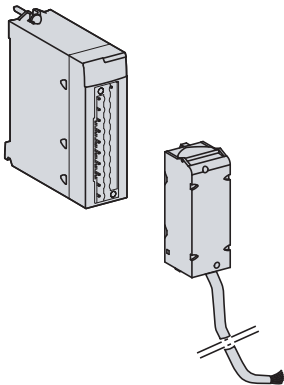
(1) Fujitsu FCN 40-way connector



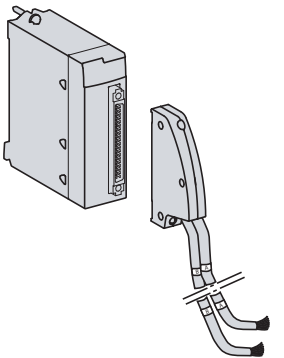
Module and 20-way removable terminal block



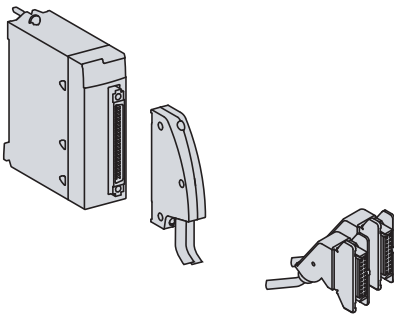
32- and 64-channel modules with for connection via 40-way connector(s)



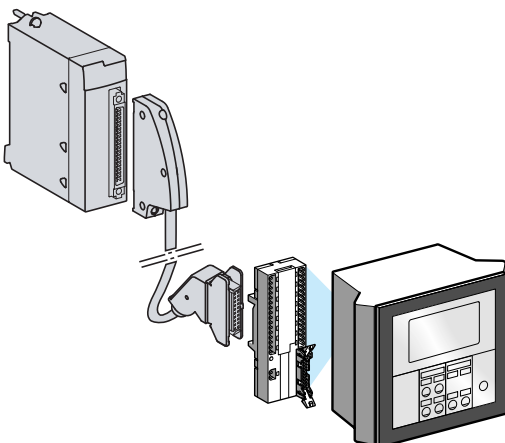
Preformed cordset with removable terminal block at one end and flying leads at the other



Preformed cordset with 40-way connector at one end and 2 flying leads at the others



Preformed cordset with 40-way connector and HE 10 connector for Advantys Telefast ABE 7 system



Example of connection to the Tego Dial installation help system

### Connecting modules with removable terminal blocks

There are three types of 20-way removable terminal block:

- Screw clamp terminal block
- Cage clamp terminal block
- Spring-type terminal block

Each removable terminal block can take:

- Bare wires
  - Wires equipped with DZ5-CE cable ends
- One version of the removable terminal block is equipped with **BMX FTW●●1** cordsets with color-coded flying leads (3, 5 or 10 m long).

### Cage clamp terminal blocks

The capacity of each terminal is:

- Minimum: One 0.34 mm<sup>2</sup> wire (AWG 22)
- Maximum: One 1.5 mm<sup>2</sup> wire (AWG 14)

**BMX FTB 2000** cage clamp connectors are equipped with captive screws (maximum tightening torque 0.5 N.m).

### Screw clamp terminal blocks

The capacity of each terminal is:

- Minimum: One or two 0.34 mm<sup>2</sup> wires (AWG 22)
- Maximum: Two 1.5 mm<sup>2</sup> wires (AWG 14)

**BMX FTB 2010** screw clamp connectors are equipped with captive screws (maximum tightening torque 0.5 N.m).

### Spring-type terminal blocks

The capacity of each terminal in the **BMX FTB 2020** spring-type terminal blocks is:

- Minimum: Two 0.34 mm<sup>2</sup> wires (AWG 22)
- Maximum: Two 1.5 mm<sup>2</sup> wires (AWG 14)

### Connecting modules with 40-way connectors

#### Preformed cordsets with 40-way connector at one end and flying leads at the other

Preformed cordsets can be used for easy direct wire-to-wire connection between the I/O of modules with connectors **1** and the sensors, preactuators or intermediate terminals.

These preformed cordsets comprise:

- At one end, a 40-way connector **2** with either of the following:
  - One sheath **3** containing 20 wires with a cross-section of 0.34 mm<sup>2</sup> (AWG 22) (**BMX FCW ●●1**)
  - Two sheaths **4**, each containing 20 wires with a cross-section of 0.34 mm<sup>2</sup> (AWG 22) (**BMX FCW ●●3**)
- At the other end **5**, color-coded flying leads conforming to standard DIN 47100 (see page 2/21)

#### Preformed cordsets with 40-way connector and HE 10 connector(s)

Two types of cordset can be used for connecting the I/O of modules with 40-way connectors **1** to rapid wiring connection and adaptation interfaces called Advantys Telefast ABE 7 **2** (see page 5/8).

These preformed cordsets comprise:

- At one end, a 40-way connector **3** with either of the following:
  - One sheath **4** containing 20 wires (**BMX FCC ●●1**)
  - Two sheaths **5** each containing 20 wires (**BMX FCC ●●3**)
- At the other end, one or two HE 10 connectors **6**

### Connection to Tego Dial and TeSys Quickfit systems

**BMX DDI 3202K/6402K** input modules and **BMX DDO 3202K/6402K** output modules **1** are designed, amongst other things, for use in conjunction with Tego Dial and TeSys Quickfit installation help systems.

The modules are easily connected using a connection cable.

## Functions

### Hot swapping

Due to their integrated devices, I/O modules (including application-specific modules) can be removed and connected while powered up.

**Note:** When the PLC is powered up and running, the I/O modules can be removed without any material risk by performing the following sequence **before** removing the module:

- Disconnect the power voltage on the outputs
- Disconnect the sensor and preactuator power supply
- Remove the terminal block or connector

### I/O module assignment

Discrete I/O modules have different parameters for each channel. The channels are grouped into blocks of 4, 8 or 16 consecutive channels depending on the type of module. Each group of channels can be assigned to a specific application task (master or fast).

### Protection of DC inputs

The 24 and 48 V  $\text{---}$  inputs are constant-current type. This characteristic makes it possible to:

- Ensure minimum current in active state in compliance with the IEC standard
- Limit the current consumption when the input voltage increases, to avoid unwanted temperature rise in the module
- Reduce the current consumption on the sensor power supply provided by the PLC power supply or by a process power supply

### Protection of DC outputs

All protected solid state outputs have a protective device which, when an output is active, can detect the occurrence of:

- An overload or short-circuit: This type of fault deactivates the output (tripping) and indicates a fault on the display on the module front panel (the faulty channel LED flashes, the I/O module fault LED lights up).
- Reverse polarity: This type of fault short-circuits the power supply without damaging the module. For this protection to work in optimum conditions, it is essential to place a fast-blow fuse on the power supply upstream of the preactuators.
- Inductive overvoltage: Each output is protected individually against inductive overvoltages and has a fast zener diode demagnetization circuit for electromagnets, which can reduce the output response time for some fast machines.

### Reactivation of DC outputs

If a fault has caused an output to trip, the output can be reactivated using this parameter if no other terminal fault is present.

Reactivation is defined for each group of 8 channels. It has no effect on an inactive channel or one that is not faulty.

The reactivation command can be:

- Programmed: Reactivation is carried out by a command from the PLC application or via the debug screen. To avoid repeated reactivations too close together, the module automatically allows a time delay of 10 s between two reactivations.
- Automatic: Reactivation takes place automatically every 10 s until the fault disappears.

### RUN/STOP command

An input can be configured to control the RUN/STOP mode for the PLC.

This is taken into account on a rising edge. A STOP command from an input has priority over a RUN command from a programming terminal or via the network.

### Functions (continued)

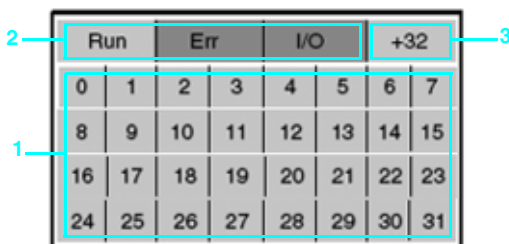
#### Output fallback

This parameter defines the fallback mode used by the DC solid state outputs when the PLC stops following a:

- Processor fault
- Rack fault
- Fault on the cable connecting the racks

The outputs must be set to a state that is not harmful to the application. This state, known as the fallback position, is defined for each module when the DC solid state outputs are configured. This configuration offers a choice between:

- Fallback: The channels are set to 0 or 1 according to the fallback value defined for the group of 8 corresponding channels.
- Maintain: The outputs maintain the state in which they were before the stop occurred.



#### I/O module diagnostics

Each discrete I/O module is equipped with a display block on the front panel centralizing all the information necessary for module control, diagnostics and maintenance. The display block comprises:

- 1 A set of 8, 16 or 32 green LEDs depending on the module modularity. Each LED is associated with one channel:
  - On: channel in state 1; Off: channel in state 0
  - Flashing: channel faulty, overloaded or short-circuited
- 2 Three LEDs indicating the module status:
  - RUN (green): On: Normal operation
  - ERR (red): On: Internal module fault; Flashing: Exchange fault between the module and the processor
  - I/O (red): On: External fault (sensor/preactuator voltage, overload, short-circuit, etc.); Flashing: Terminal block fault
- 3 A +32 LED (green) indicating, in the case of 64-channel modules, whether the set of 32 LEDs 1 displays the state of channels 0...31 (off) or the state of channels 32...63 (on). This +32 LED is activated or deactivated by a pushbutton located on top of the module.

#### Diagnostics via Unity Pro

Using the integrated diagnostics in Unity Pro, this local diagnostics on the module front panel is complemented by system diagnostics based on predefined screens at global hardware configuration level, module level and channel level (see pages 4/21 and 4/22).

#### Remote diagnostics using a web browser on a "Thin Client" PC

In addition, the diagnostics described above can be performed remotely using a simple web browser thanks to the standard web server integrated in the Modicon M340 platform (processor with integrated Ethernet port or Ethernet module), using the "ready-to-use" Rack Viewer function (see page 3/4).

#### Compatibility with 2-wire and 3-wire sensors

Input type	≡ 24 V Non CEI log. positive (sink)	≡ 48 V type 1 log. positive (sink)	≡ 24 V type 3 log. positive (sink)	~ 24 V type 1	~ 48 V type 3	~ 100...120V type 3
Any 3-wire ≡ sensor, PNP type						
Any 3-wire ≡ sensor, NPN type				(1)		
Telemecanique 2-wire ≡ sensor or other brand, with the following characteristics: - Residual voltage in closed state ≤ 7 V - Minimum switched current ≤ 2.5 mA - Residual current in open state ≤ 1.5 mA						
Telemecanique 2-wire ≡ sensor or other brand with the following characteristics: - Residual voltage in closed state ≤ 4 V - Minimum switched current ≤ 1 mA - Residual current in open state ≤ 0.5 mA						
2-wire ≡/~ sensor (1)						
2-wire ~ sensor						

Not compatible
  Compatible

(1) The ~ 24 V inputs can be used as negative logic (source) compatible with 3-wire ≡ sensor, NPN type, but are not IEC-compliant.

### Common characteristics

#### Environment

Conformity to standards	NFC 63 850, IEC 664, IEC 1131 2, UL 508, UL7 46C, CSA 22 2 no. 142
Temperature derating	The characteristics at 60°C are assured for 60% of inputs and 60% of outputs at state 1

### Characteristics of DC input modules

Module			BMX DDI 1602	BMX DDI 1603	BMX DDI 3202K	BMX DDI 6402K	BMX DAI 1602	
Number of inputs			16		32	64	16	
Connection			Spring or screw-type 20-way removable terminal block		One 40-way connector	Two 40-way connectors	Spring or screw-type 20-way removable terminal block	
Nominal input values	Voltage	<b>V</b>	24 ---	48 ---	24 ---			
	Current	<b>mA</b>	3.5	2.5	2.5	1	3	
	Logic		Positive ( <i>sink</i> )				Negative ( <i>source</i> )	
Input limit values	At state 1	Voltage	<b>V</b>	≥ 11	≥ 34	≥ 11	≥ 15	≥ 14
		Current	<b>mA</b>	> 2 (for U ≥ 11 V)	> 2 (for U ≥ 34 V)	> 2 (for U ≥ 11 V)	> 1 (for U ≥ 15 V)	> 2
	At state 0	Voltage	<b>V</b>	< 5	< 10	< 5		
		Current	<b>mA</b>	≤ 1.5	≤ 0.5	≤ 1.5	≤ 0.5	
Sensor power supply (ripple included)		<b>V</b>	19...30 (possible up to 34 V, limited to 1 hour in every 24 hours)	38...60	19...30 (possible up to 34 V, limited to 1 hour in every 24 hours)			
Input impedance at nominal voltage			<b>KΩ</b>	6.8	19.2	9.6	24	6.4
Response time (filtering)	Typical	<b>ms</b>	4				10	
	Maximum	<b>ms</b>	7				20	
Reverse polarity			Protected			No	–	
IEC 61131-2 conformity			Type 3		Type 1	Type 3	Non-IEC	
Compatibility with 2-wire/3-wire sensors			IEC 947-5-2				–	
Paralleling of inputs (1)			Yes			No		
Protection of inputs			Use an external 0.5 A fast-blow fuse per group of channels					
Insulation resistance			<b>MΩ</b>	>10 at 500 V ---				
Dielectric strength	Primary/Secondary	<b>Vrms</b>	1,500 - 50/60 Hz for 1 minute (up to 4,000 m)					
	Between groups of channels	<b>V</b>	–		500 ---		–	
Type of input			Current sink				Resistive	
Sensor voltage control threshold	OK	<b>V</b>	> 18 ---	> 36 ---	> 18 ---			
	Fault	<b>V</b>	< 14 ---	< 24 ---	< 14 ---			
Reliability	MTBF in hours	At T <sub>ambient</sub> = 30°C	798,237		696,320	362,681	1,504,958	
Consumption			Typical	<b>mA</b> See power consumption table page 6/8				
Maximum dissipated power			<b>W</b>	2.5	3.6	3.9	4.3	3
Temperature derating			None					

(1) This characteristic allows several inputs to be wired in parallel on the same module or on different modules for input redundancy.

Characteristics of AC input modules						
Module			BMX DAI 1602	BMX DAI 1603	BMX DAI 1604	
<b>Number of inputs</b>			16			
<b>Connection</b>			Spring or screw-type 20-way removable terminal block			
<b>Nominal input values</b>	Voltage	<b>V</b>	24 ~	48 ~	100...120 ~	
	Current	<b>mA</b>	3	5		
	Frequency	<b>Hz</b>	50/60			
<b>Input limit values</b>	At state 1	Voltage	<b>V</b>	≥ 15	≥ 34	≥ 74
		Current	<b>mA</b>	≥ 2		≥ 2.5
	At state 0	Voltage	<b>V</b>	≤ 5	≤ 10	≤ 20
		Current	<b>mA</b>	≤ 1		
	Frequency	<b>Hz</b>	47...63			
	Sensor power supply (ripple included)	<b>V</b>	20...26	40...52	85...132	
	Current peak on activation	At nominal voltage	<b>mA</b>	5	95	240
<b>Input impedance at nominal voltage and F = 55 Hz</b>		<b>KΩ</b>	6	9	13	
<b>Response time (filtering)</b>	Activation	<b>ms</b>	15	10		
	Deactivation	<b>ms</b>	20			
<b>IEC 61131-2 conformity</b>			Type 1	Type 3		
<b>Compatibility with 2-wire/3-wire sensors</b>			IEC 947-5-2			
<b>Protection of inputs</b>			Use a external 0.5 A fast-blow fuse per group of channels			
<b>Insulation resistance</b>		<b>MΩ</b>	>10 at 500 V ---			
<b>Dielectric strength</b>		<b>Vrms</b>	1,500 - 50/60 Hz for 1 minute (up to 4,000 m)			
<b>Type of input</b>			Resistive	Capacitive		
<b>Sensor voltage control threshold</b>	OK	<b>V</b>	> 18	> 36	> 82	
	Fault	<b>V</b>	< 14	< 24	< 40	
<b>Reliability</b>	MTBF in hours	At T <sub>ambient</sub> = 30°C	1,504,958			
<b>Consumption</b>	Typical	<b>mA</b>	See power consumption table page 6/8			
<b>Maximum dissipated power</b>		<b>W</b>	3	4	3.8	
<b>Temperature derating</b>			None			
Characteristics of triac output module						
Module			BMX DAO 1605			
<b>Number of inputs</b>		<b>W</b>	16			
<b>Connection</b>			Spring or screw-type 20-way removable terminal block			
<b>Operating voltages</b>	Nominal	<b>V</b>	100...240 ~			
	Limit	<b>V</b>	85...288 ~			
<b>Currents</b>	Maximum	<b>A</b>	0.6 per channel, 2.4 per common, 4.8 for all 4 commons			
	Minimum		25 mA at 100 V ~, 25 mA at 240 V ~			
<b>Maximum inrush current</b>		<b>A</b>	≤ 20/cycle			
<b>Leakage current</b>	At state 0	<b>mA</b>	≤ 1.5 for 120 V ~, 60 Hz, ≤ 3 for 240 V ~, 60 Hz			
<b>Residual voltage</b>	At state 1	<b>V</b>	≤ 1.5			
<b>Response time</b>	Activation	<b>ms</b>	≤ 1 +/- 0.5 Hz			
<b>Nominal resistive load</b>	Deactivation	<b>ms</b>	≤ 1 +/- 0.5 Hz			
<b>Type of command</b>			Passage through zero			
<b>Built-in protection</b>			Varistor			
<b>Protection fuses</b>			None (use an external fast-blow fuse)			
<b>Dielectric strength</b>		<b>Vrms</b>	2,830 ~/3 cycles (2,000 m altitude)			
<b>Insulation resistance</b>		<b>MΩ</b>	>10 at 500 V ---			
<b>Reliability</b>			-			
<b>Consumption</b>	Typical	<b>mA</b>	See power consumption table page 6/8			
<b>Maximum dissipated power</b>			-			

### Characteristics of DC solid state output modules

Module			BMX DDO 1602	BMX DDO 1612	BMX DDO 3202K	BMX DDO 6402K
<b>Number of inputs</b>			16		32	64
<b>Connection</b>			Spring or screw-type 20-way removable terminal block		One 40-way connector	Two 40-way connectors
<b>Output nominal values</b>	Voltage	<b>V</b>	24 ---			
	Current	<b>A</b>	0.5		0.1	
	Logic		Positive (source)	Negative (sink)	Positive (source)	
<b>Output limit values</b>	Voltage (ripple included)	<b>V</b>	19...30 (possible up to 34 V, limited to 1 hour in every 24 hours)			
	Current per channel	<b>A</b>	0.625		0.125	
	Current per module	<b>A</b>	10		3.2	6.4 if $\theta \leq 40^\circ\text{C}$ 5.1 if $\theta \leq 50^\circ\text{C}$ 3.8 if $\theta \leq 60^\circ\text{C}$
<b>Tungsten filament lamp power</b>			<b>W</b>		6 maximum	
<b>Leakage current</b>			<b>mA</b>		1.2 maximum	
<b>At state 0</b>			<b>mA</b>		< 0.5	
<b>Residual voltage</b>			<b>V</b>		< 1.2	
<b>At state 1</b>			<b>V</b>		< 1.5 (for I = 0.1 A)	
<b>Minimum load impedance</b>			$\Omega$		48	
<b>Response time (1)</b>			<b>ms</b>		1.2	
<b>Maximum overload time</b>			<b>ms</b>		-	
<b>Compatibility with IEC 61131-2 DC inputs</b>			Yes (type 3, not IEC)		Yes (not IEC)	Yes (type 3, not IEC)
<b>Paralleling of outputs</b>			Yes (2 max.)		Yes (3 max.)	
<b>Switching frequency on inductive load</b>			<b>Hz</b>		0.5/LI <sup>2</sup>	
<b>Built-in protection</b>			Yes, by Transil diode			
Against overvoltages						
Against inversions			Yes, by reverse-mounted diode. Use a 2 A fuse on the + 24 V of the preactuators.			
Against short-circuit and overloads			Yes, with current limiter and electronic circuit-breaker 1.5 In < Id < 2 In		Yes, with current limiter and electronic circuit-breaker 0.125 A < Id < 0.185 A	
<b>Preactuator voltage control threshold</b>			<b>V</b>		> 18	
At state 0			<b>V</b>		< 14	
Fault			<b>V</b>		< 14	
<b>Insulation resistance</b>			<b>M<math>\Omega</math></b>		> 10 at 500 V ---	
<b>Dielectric strength</b>			<b>Vrms</b>		1,500 ~ - 50/60 Hz for 1 minute	
Output/ground or output/internal logic			<b>V</b>		-	
Between groups of channels			<b>V</b>		500 ---	
<b>Reliability</b> MTBF in hours			At T <sub>ambient</sub> = 30°C		409,413	-
<b>Consumption</b>			Typical		360,412	173,792
<b>Maximum dissipated power</b>			<b>W</b>		See power consumption table page 6/8	
At state 0			<b>W</b>		4	
Fault			<b>W</b>		2.26	
<b>Temperature derating</b>			<b>W</b>		3.6	
At state 0			<b>W</b>		6.85	
Fault			<b>W</b>		6.85	
<b>Temperature derating</b>			None		See "Current per module" above	

(1) All outputs are equipped with a fast demagnetization circuit for the electromagnets. Discharge time for the electromagnets < L/R.

(2) Excluding load current.

Characteristics of relay output modules																
Module			BMX DRA 0805				BMX DRA 1605									
Number of inputs			8				16									
Connection			Spring or screw-type 20-way removable terminal block													
Limit operating voltages	DC	V	10...34 ---				24...125 --- (resistive load)									
	AC	V	10...264 ~				200...264 ~ (Cos φ = 1)									
Thermal current			A				3									
Switching load			Minimum			mA				1 at 5 V ---						
Electrical life			-				24 V			200 V		240 V				
AC load	Power cos φ = 0.7	VA	-				-			300 (1), 80 (2)		240 (1), 72 (2)				
		VA	-				-			200 (1), 60 (2)		120 (1), 36 (2)				
DC load	Power	W	-				24 (1), 7.2 (2)			-		-				
		W	-				-			-		-				
Voltage			24 V		48 V		110... 120 V		200... 240 V		24 V		200 V		240 V	
AC load	Resistive loads AC-12	Power	VA	50 (3)	50 (4), 110 (5)	110 (4), 220 (5)	220 (4)	-								
	Inductive loads AC-15 (cos φ = 0.3)	Power	VA	24 (5)	10 (6), 24 (7)	10 (8), 50 (9), 110 (10)	10 (8), 50 (11), 110 (4), 220 (12)	-		200 (1), 60 (2)		120 (1), 36 (2)				
	Inductive loads AC-14 (cos φ = 0.7)	Power	VA	-				-		300 (1), 80 (2)		240 (1), 72 (2)				
DC load	Resistive loads DC-12	Power	W	24 (4), 40 (13)	-											
	Inductive loads DC-13 (14)	Power	W	10 (7), 24 (4)	-		24 (1), 7.2 (2)		-							
Response time	Activation	ms	< 10													
	Deactivation	ms	< 8				< 12									
Built-in protection	Against overloads and short-circuits		None. Use a fast-blow fuse per channel or group of channels													
	Against AC inductive overvoltages		None. Use an RC circuit or ZNO surge limiter appropriate to the voltage in parallel on each output													
	Against DC inductive overvoltages		None. Use a discharge diode on each output													
Insulation resistance			MΩ	> 10 at 500 V ---												
Dielectric strength			Vrms	2,000 - 50/60 Hz for 1 minute												
Reliability	MTBF in hours	At T <sub>ambient</sub> = 30°C	1,573,341				2,463,296									
Consumption			Typical	mA							See power consumption table page 6/8					
Dissipated power			W	2.7 max.				3								
Temperature derating			None													

(1) For 1 x 10<sup>5</sup> operating cycles  
 (2) For 3 x 10<sup>5</sup> operating cycles  
 (3) For 0.7 x 10<sup>6</sup> operating cycles  
 (4) For 1 x 10<sup>6</sup> operating cycles  
 (5) For 0.5 x 10<sup>6</sup> operating cycles  
 (6) For 5 x 10<sup>6</sup> operating cycles  
 (7) For 2 x 10<sup>6</sup> operating cycles  
 (8) For 10 x 10<sup>6</sup> operating cycles  
 (9) For 1.5 x 10<sup>6</sup> operating cycles  
 (10) For 0.15 x 10<sup>6</sup> operating cycles  
 (11) For 3 x 10<sup>6</sup> operating cycles  
 (12) For 0.1 x 10<sup>6</sup> operating cycles  
 (13) For 0.3 x 10<sup>6</sup> operating cycles  
 (14) Where L/R = 60 ms for BMX DRA 0805 module, L/R = 7 ms for BMX DRA 1605 module



#### Characteristics of mixed I/O relay module

Module				BMX DDM 16025		
				24 V $\overline{\text{DC}}$ inputs	24 V $\overline{\text{DC}}$ or 24...240 V $\sim$ relay outputs	
<b>Number of inputs/outputs</b>				8	8	
<b>Connection</b>				Spring or screw-type 20-way removable terminal block		
<b>Nominal values</b>	Inputs	Voltage	<b>V</b>	24 $\overline{\text{DC}}$ (positive logic)	–	
		Current	<b>mA</b>	3.5	–	
	Outputs	DC voltage	<b>V</b>	–	24 $\overline{\text{DC}}$	
		Direct current	<b>A</b>	–	2 (resistive load)	
		AC voltage	<b>V</b>	–	220 $\sim$ , Cos $\varphi$ = 1	
		Alternating current	<b>A</b>	–	2	
<b>Input limit values</b>	At state 1	Voltage	<b>V</b>	$\geq 11$	–	
		Current	<b>mA</b>	$\geq 2$ (for $U \geq 11$ )	–	
	At state 0	Voltage	<b>V</b>	5	–	
		Current	<b>mA</b>	$\leq 1.5$	–	
Sensor power supply (ripple included)		V		19...30 (possible up to 30 V, limited to 1 hour in every 24 hours)		
<b>Relay output voltage</b>					<b>24 V</b>	<b>200 V</b>
<b>AC load</b>	Inductive loads AC-14 (cos $\varphi$ = 0.7)	Power	<b>VA</b>	–	–	300 (1), 80 (2)
		Power	<b>VA</b>	–	–	240 (1), 72 (2)
<b>DC load</b>	Inductive loads AC-15 (cos $\varphi$ = 0.35)	Power	<b>VA</b>	–	–	200 (1), 60 (2)
		Power	<b>W</b>	–	–	120 (1), 36 (2)
<b>DC load</b>	Inductive loads DC-13	Power	<b>W</b>	–	24 (1), 7.2 (2)	–
		Power	<b>W</b>	–	–	–
<b>Maximum switching frequency</b>				–	3,600 cycles/hour	
<b>Input impedance at nominal voltage</b>				<b>K<math>\Omega</math></b>	6.8	–
<b>Input response time</b>	Typical		<b>ms</b>	4	–	
	Maximum		<b>ms</b>	7	–	
<b>Reverse polarity on inputs</b>				Protected		
<b>IEC 61131-2 conformity</b>				Yes, type 3		
<b>Compatibility with 2-wire/3-wire sensors</b>				IEC 947-5-2		
<b>Paralleling of inputs</b>				No		
<b>Input type</b>				Current sink		
<b>Output response time</b>	Activation		<b>ms</b>	–	$\leq 12$	
	Deactivation		<b>ms</b>	–	$\leq 10$	
<b>Switching load</b>	Minimum		<b>V</b>	–	5 V $\overline{\text{DC}}$ /1 mA	
	Maximum		<b>V</b>	–	264 $\sim$ /125 $\overline{\text{DC}}$	
<b>Mechanical durability</b>				No. of switching operations	–	$\geq 20$ million
<b>Fuse protection</b>				Use a external 0.5 A fast-blow fuse per group of channels	No (use one fast-blow fuse per channel or group of channels)	
<b>Sensor voltage control thresholds</b>	OK		<b>V</b>	$> 18$	–	
	Fault		<b>V</b>	$< 14$	–	
<b>Insulation resistance</b>				<b>M<math>\Omega</math></b>	$> 10$ at 500 V $\overline{\text{DC}}$	
<b>Dielectric strength</b>	Primary/secondary		<b>Vrms</b>	1,500 - 50/60 Hz for 1 minute	–	
	Between groups of I/O		<b>V</b>	500 $\overline{\text{DC}}$	–	
	Max. voltage		<b>Vrms</b>	–	2,830 $\sim$ /cycle	
<b>Reliability</b>				MTBF in hours	At $T_{\text{ambient}} = 30^{\circ}\text{C}$	912,167
<b>Consumption</b>				Typical	<b>mA</b>	See power consumption table page 6/8
<b>Dissipated power</b>				<b>W</b>	3.1 maximum	
<b>Temperature derating</b>				None		

(1) For  $1 \times 10^5$  operating cycles  
 (2) For  $3 \times 10^5$  operating cycles  
 (3) Excluding load current

Characteristics of 24 V $\overline{\text{---}}$ mixed I/O modules								
Module			BMX DDM 16022		BMX DDM 3202K			
			Inputs	Solid state outputs	Inputs	Solid state outputs		
Number of inputs/outputs			8	8	16	16		
Connection			Spring or screw-type 20-way removable terminal block		One 40-way connector			
Nominal values			Voltage	V	24 $\overline{\text{---}}$			
			Current	mA	3.5	500		
			Logic		Positive (sink)	Positive (source)		
Tungsten filament lamp power			W	–	6 maximum	–		
Input limit values	At state 1	Voltage	V	$\geq 11$	–	$\geq 11$	–	
		Current	mA	$> 3$ (for $U \geq 11$ V)	–	$\geq 2$ (for $U \geq 11$ )	–	
	At state 0	Voltage	V	5	–	5	–	
		Current	mA	$\leq 1.5$	–	$\leq 1.5$	–	
	Sensor power supply (ripple included)	Possible up to 30 V, limited to 1 hour in every 24 hours	V	19...30	–	19...30	–	
Output limit values	Voltage (ripple included)	Possible up to 30 V, limited to 1 hour in every 24 hours	V	–	19...30	–	19...30	
	Currents	Per channel	mA	–	625	–	125	
Per module		A	–	5	–	3.2		
Input impedance at nominal voltage			K $\Omega$	6.8	–	9.6	–	
Input response time	Typical	ms	4	–	4	–		
	Maximum	ms	7	–	7	–		
Reverse polarity on inputs				Protected	–	Protected	–	
IEC 61131-2 conformity				Yes, type 3	–	Yes, type 3	–	
Compatibility with 2-wire/3-wire sensors				IEC 947-5-2	–	IEC 947-5-2	–	
Input type				Current sink	–	Current sink	–	
Leakage current			At state 0	mA	–	< 0.5	–	
Residual voltage			At state 1	V	–	< 1.2	–	
Minimum load impedance			$\Omega$	–	48	–	220	
Output response time (1)			ms	–	1.2	–	1.2	
Max. overload time before fault state			ms	–	15	–	15	
Compatibility with IEC 61131-2 DC inputs				–	Yes (type 3, not IEC)	–	Yes (type 3, not IEC)	
Paralleling of outputs				–	Yes (2 maximum)	–	Yes (3 maximum)	
Switching frequency on inductive load			Hz	–	0.5/LI <sup>2</sup>	–	0.5/LI <sup>2</sup>	
Built-in protection			Against overvoltages		–	Yes, by Transil diode	–	Yes, by Transil diode
			Against inversions		–	Yes, by reverse-mounted diode. Use a 2 A fuse on the preactuator + 24 V	–	Yes, by reverse-mounted diode. Use a 2 A fuse on the preactuator + 24 V
			Against short-circuits and overloads		Use a external 0.5 A fast-blow fuse per group of channels	Yes, by current limiter and electronic circuit-breaker 1.5 In< Id < 2 In	Use a external 0.5 A fast-blow fuse per group of channels	Yes, by current limiter and electronic circuit-breaker 0.125 A < Id < 0.185 A
Sensor and preactuator voltage control thresholds			OK	V	> 18			
			Fault		< 14			
Insulation resistance			M $\Omega$	> 10 at 500 V $\overline{\text{---}}$				
Dielectric strength	Primary/secondary		Vrms	1,500 - 50/60 Hz for 1 minute				
	Between groups of inputs and outputs		V	500 $\overline{\text{---}}$				
	Outputs/ground or outputs/internal logic			–	1,500 - 50/60 Hz for 1 minute	–	1,500 - 50/60 Hz for 1 minute	
Reliability			MTBF in hours	At T <sub>ambient</sub> = 30°C	447,581		432,904	
Consumption	3.3 V $\overline{\text{---}}$	Typical	mA	79		125		
		Maximum	mA	111		166		
	24 V $\overline{\text{---}}$ preactuators (2)	Typical	mA	59		69		
		Maximum	mA	67		104		
Maximum dissipated power			W	3.7		4		
Temperature derating				None				

(1) All outputs are equipped with a fast demagnetization circuit for the electromagnets. Discharge time for the electromagnets < L/R.  
(2) Excluding load current.

# Modicon M340

## automation platform

### Discrete I/O modules

2

2.1



BMX DDI 1602



BMX DDI 3202K



BMX DDI 6402K

## References

## Discrete input modules

Type of current	Input voltage	Connection by (1)	IEC 61131-2 conformity	Modularity (no. of channels)	Reference	Weight kg	
=	24 V (positive logic)	Screw or spring-type 20-way removable terminal block	Type 3	16 isolated inputs	<b>BMX DDI 1602</b>	0.115	
		One 40-way connector	Type 3	32 isolated inputs	<b>BMX DDI 3202K</b>	0.112	
		Two 40-way connectors	Non-IEC	64 isolated inputs	<b>BMX DDI 6402K</b>	0.145	
=	24 V (negative logic)	Screw or spring-type 20-way removable terminal block	Non-IEC	16 isolated inputs	<b>BMX DAI 1602 ▲</b>	0.115	
		48 V (positive logic)	Screw or spring-type 20-way removable terminal block	Type 1	16 isolated inputs	<b>BMX DDI 1603 ▲</b>	0.115
~	24 V	Screw or spring-type 20-way removable terminal block	Type 1	16 isolated inputs	<b>BMX DAI 1602 ▲</b>	0.115	
		48 V	Screw or spring-type 20-way removable terminal block	Type 3	16 isolated inputs	<b>BMX DAI 1603 ▲</b>	0.115
		100...120 V	Screw or spring-type 20-way removable terminal block	Type 3	16 isolated inputs	<b>BMX DAI 1604</b>	0.115



BMX DDO 1602



BMX DRA 0805/1605



BMX DDO 3202K



BMX DDO 6402K

## Discrete output modules

Type of current	Output voltage	Connection by (1)	IEC 61131-2 conformity	Modularity (no. of channels)	Reference	Weight kg
= solid state	24 V/0.5 A (positive logic)	Screw or spring-type 20-way removable terminal block	Yes	16 protected outputs	<b>BMX DDO 1602</b>	0.120
		Screw or spring-type 20-way removable terminal block	Non-IEC	16 protected outputs	<b>BMX DDO 1612 ▲</b>	0.120
	24 V/0.1 A (positive logic)	One 40-way connector	Yes	32 protected outputs	<b>BMX DDO 3202K</b>	0.110
		Two 40-way connectors	Yes	64 protected outputs	<b>BMX DDO 6402K</b>	0.150
~ triac	100...240	Screw or spring-type 20-way removable terminal block	-	16 outputs	<b>BMX DAO 1605 ▲</b>	0.140
= or ~ relay	12...24 V =/3 A, 24...240 V ~/3 A	Screw or spring-type 20-way removable terminal block	Yes	8 non-protected outputs	<b>BMX DRA 0805</b>	0.145
		Screw or spring-type 20-way removable terminal block	Yes	16 non-protected outputs	<b>BMX DRA 1605</b>	0.150

(1) By connector, module supplied with cover(s)

▲ Available 4<sup>th</sup> quarter 2007

# Modicon M340 automation platform

## Discrete I/O modules



BMX DDM 160 ●2      BMX DDM 320K

### References (continued)

#### Discrete mixed I/O modules

Number of I/O	Connection via (1)	No. and type of inputs	No. and type of outputs	IEC 1131 2 conformity	Reference	Weight kg
16	Screw or spring-type 20-way removable terminal block	8 (positive logic)	8, solid state 24 V $\overline{\text{---}}$ / 0,5 A	Inputs, type 3	BMX DDM 16022	0.115
			8, relay 24 V $\overline{\text{---}}$ or 24...240 V $\sim$	Inputs, type 3	BMX DDM 16025	0.135
32	One 40-way connector	16 (positive logic)	16, solid state 24 V $\overline{\text{---}}$ / 0,1 A	Inputs, type 3	BMX DDM 3202K	0.110



BMX FTB 20 ●0

#### Removable connection blocks

Description	Use	Reference	Weight kg	
20-way removable terminal blocks	Cage clamp	For module with 20-way removable terminal block	BMX FTB 2000	0.093
	Screw clamp	For module with 20-way removable terminal block	BMX FTB 2010	0.075
	Spring-type	For module with 20-way removable terminal block	BMX FTB 2020	0.060

#### Preformed cordsets for I/O modules with removable terminal block

Description	Composition	Length	Reference	Weight kg
Preformed cordsets with one end with flying leads	One 20-way terminal block	3 m	BMX FTW 301	0.850
	One end with color-coded flying leads	5 m	BMX FTW 501	1.400
		10 m	BMX FTW 1001	2.780



BMX FTW ●01

#### Preformed cordsets for I/O modules with 40-way connectors

Description	No. of sheaths	Composition	Cross-section	Length	Reference	Weight kg
Preformed cordsets with one end with flying leads	1 x 20 wires (16 channels)	One 40-way connector	0.324 mm <sup>2</sup>	3 m	BMX FCW 301	0.820
		One end with color-coded flying leads		5 m	BMX FCW 501	1.370
				10 m	BMX FCW 1001	2.770
	2 x 20 wires (32 channels)	One 40-way connector	0.324 mm <sup>2</sup>	3 m	BMX FCW 303	0.900
		Two ends with color-coded flying leads		5 m	BMX FCW 503	1.490
				10 m	BMX FCW 1003	2.960



BMX FCW ●01

#### Preformed cordsets for Telefast Advantys ABE 7 sub-bases

Description	No. of sheaths	Composition	Cross-section	Length	Reference	Weight kg
Preformed cordsets for Telefast Advantys ABE 7 sub-bases	1 x 20 wires (16 channels)	One 40-way connector	0.324 mm <sup>2</sup>	0.5 m	BMX FCC 051	0.140
		One HE 10 connector		1 m	BMX FCC 101	0.195
				2 m	BMX FCC 201	0.560
				3 m	BMX FCC 301	0.840
				5 m	BMX FCC 501	1.390
				10 m	BMX FCC 1001	2.780
	2 x 20 wires (32 channels)	One 40-way connector	0.324 mm <sup>2</sup>	0.5 m	BMX FCC 053	0.210
		Two HE 10 connectors		1 m	BMX FCC 103	0.350
				2 m	BMX FCC 203	0.630
				3 m	BMX FCC 303	0.940
				5 m	BMX FCC 503	1.530
				10 m	BMX FCC 1003	3.000



BMX FCW ●03

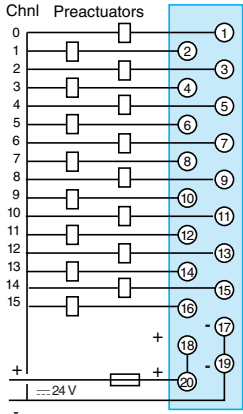


BMX FCC ●01

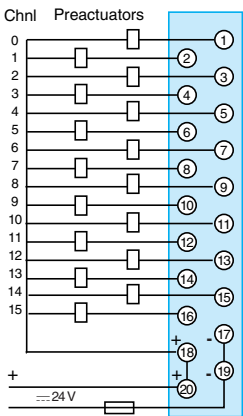


### Output modules

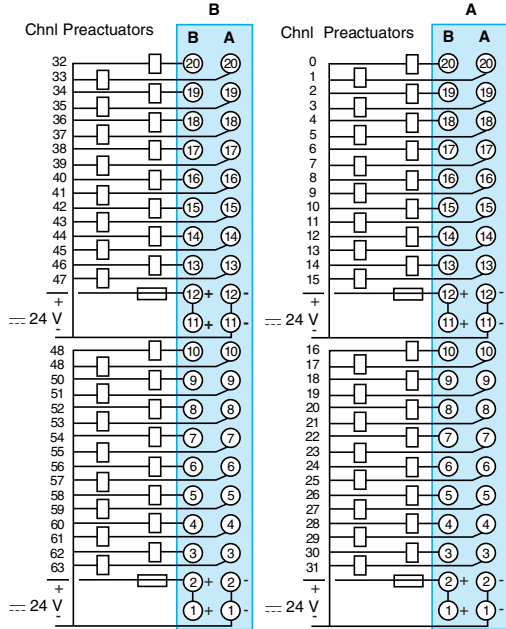
#### BMX DDO 1602



#### BMX DDO 1612



#### BMX DDO 3202K/6402K

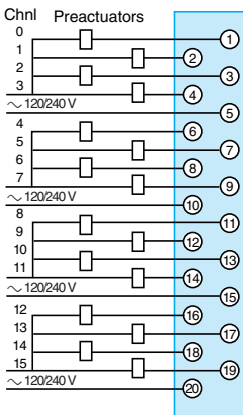


**BMX DDO 3202K:** Connector A (outputs Q0...Q32)

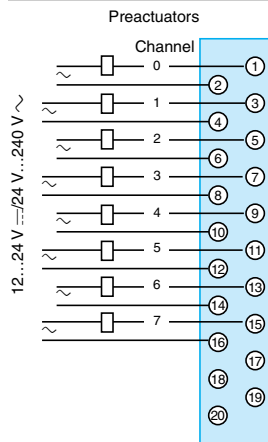
**BMX DDO 6402K:** Connector A (outputs Q0...Q32) and connector B (outputs Q33...Q63)

**Note:** For correspondence of the FCN 40-way connector pins with the wire colors of BMX FCW ●01/●03 prewired cordsets, in accordance with DIN 47100, see table on page 2/22.

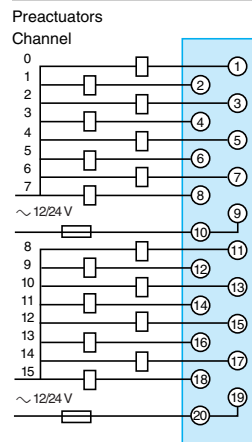
#### BMX DAO 1605



#### BMX DRA 0805

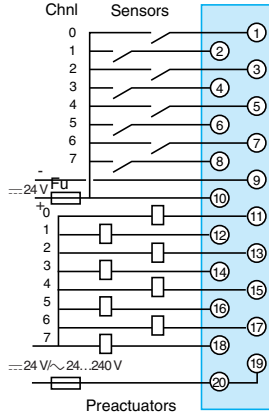


#### BMX DRA 1605

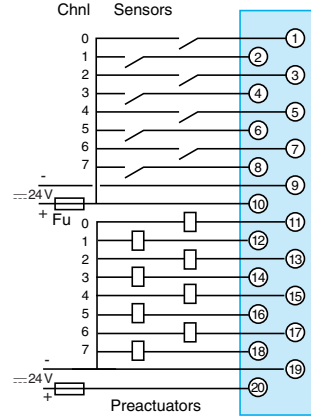


Mixed I/O modules

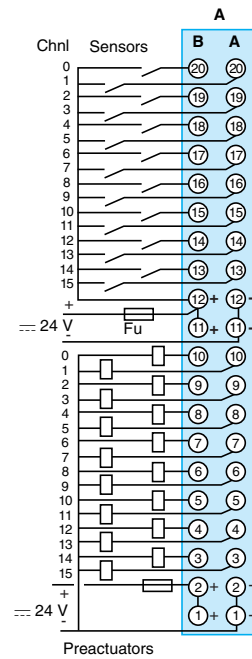
BMX DDM 16025



BMX DDM 16022



BMX DDM 3202K



Fu: 0.5 A fast-blow fuse

# Modicon M340 automation platform

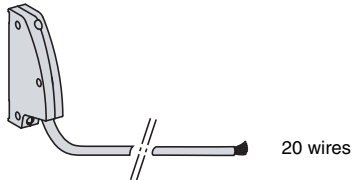
Discrete I/O modules

Cordset color codes in accordance with DIN 47100

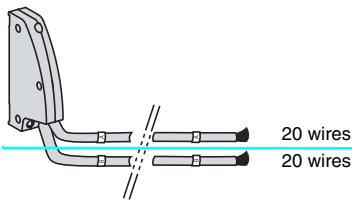
2  
2.

## Connection cables with 40-way connector and end(s) with flying leads BMX FCW ●01/●03

Correspondence of connector pins with the wire colors at the sheath end



Cordset with one sheathed end with flying leads  
BMX FCW ●01



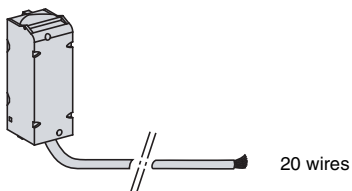
Cordset with two sheathed ends with flying leads  
BMX FCW ●03

Connector pin no.	Color at sheath end	32/64-channel inputs	32/64-channel outputs	32-channel I/O
B20	White	Input 0/32	Output 0/32	Input 0
A20	Brown	Input 1/33	Output 1/33	Input 1
B19	Green	Input 2/34	Output 2/34	Input 2
A19	Yellow	Input 3/35	Output 3/35	Input 3
B18	Gray	Input 4/36	Output 4/36	Input 4
A18	Pink	Input 5/37	Output 5/37	Input 5
B17	Blue	Input 6/38	Output 6/38	Input 6
A17	Red	Input 7/39	Output 7/39	Input 7
B16	Black	Input 8/40	Output 8/40	Input 8
A16	Purple	Input 9/41	Output 9/41	Input 9
B15	Gray/pink	Input 10/42	Output 10/42	Input 10
A15	Red/blue	Input 11/43	Output 11/43	Input 11
B14	White/green	Input 12/44	Output 12/44	Input 12
A14	Brown/green	Input 13/45	Output 13/45	Input 13
B13	White/yellow	Input 14/46	Output 14/46	Input 14
A13	Yellow/brown	Input 15/47	Output 15/47	Input 15
B12	White/gray	+ 24 V	+ 24 V	+ 24 V
A12	Gray/brown	- 24 V	- 24 V	- 24 V
B11	White/pink	+ 24 V	+ 24 V	+ 24 V
A11	Pink/brown	- 24 V	- 24 V	- 24 V
B10	White	Input 16/48	Output 16/48	Output 0
A10	Brown	Input 17/49	Output 17/49	Output 1
B9	Green	Input 18/50	Output 18/50	Output 2
A9	Yellow	Input 19/51	Output 19/51	Output 3
B8	Gray	Input 20/52	Output 20/52	Output 4
A8	Pink	Input 21/53	Output 21/53	Output 5
B7	Blue	Input 22/54	Output 22/54	Output 6
A7	Red	Input 23/55	Output 23/55	Output 7
B6	Black	Input 24/56	Output 24/56	Output 8
A6	Purple	Input 25/57	Output 25/57	Output 9
B5	Gray/pink	Input 26/58	Output 26/58	Output 10
A5	Red/blue	Input 27/59	Output 27/59	Output 11
B4	White/green	Input 28/60	Output 28/60	Output 12
A4	Brown/green	Input 29/61	Output 29/61	Output 13
B3	White/yellow	Input 30/62	Output 30/62	Output 14
A3	Yellow/brown	Input 31/63	Output 31/63	Output 15
B2	White/gray	+ 24 V	+ 24 V	+ 24 V
A2	Gray/brown	- 24 V	- 24 V	- 24 V
B1	White/pink	+ 24 V	+ 24 V	+ 24 V
A1	Pink/brown	- 24 V	- 24 V	- 24 V

## Connection cables with 20-way terminal block at one end and flying leads at the other BMX FTW ●01

Correspondence of 20-way removable terminal block pins with the wire colors (at sheath end)

Correspondence of terminal block pins with the wire colors at the sheath end



Cordset with 1 sheathed end with flying leads  
BMX FTW ●01

Terminal block pin no.	Color at sheath end	16-channel inputs	8- or 16-channel outputs	16-channel I/O
1	White	Input 0	See page 2/20	Input 0
2	Brown	Input 1	See page 2/20	Input 1
3	Green	Input 2	See page 2/20	Input 2
4	Yellow	Input 3	See page 2/20	Input 3
5	Gray	Input 4	See page 2/20	Input 4
6	Pink	Input 5	See page 2/20	Input 5
7	Blue	Input 6	See page 2/20	Input 6
8	Red	Input 7/	See page 2/20	Input 7
9	Black	Input 8	See page 2/20	Sensor + common power supply
10	Purple	Input 9	See page 2/20	Sensor pwr supply
11	Gray/pink	Input 10	See page 2/20	Output 0
12	Red/blue	Input 11	See page 2/20	Output 1
13	White/green	Input 12	See page 2/20	Output 2
14	Brown/green	Input 13	See page 2/20	Output 3
15	White/yellow	Input 14	See page 2/20	Output 4
16	Yellow/brown	Input 15	See page 2/20	Output 5
17	White/gray	Power supply	See page 2/20	Output 6
18	Gray/brown	+ common pwr sup.	See page 2/20	Output 7
19	White/pink	Power supply	See page 2/20	Preactuator pwr sup.
20	Pink/brown	Power supply	See page 2/20	Preactuator pwr sup.



# Modicon M340 automation platform

## Analog I/O modules

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**Applications**

**Analog inputs**



<b>Type of I/O</b>	
<b>Type</b>	
<b>Range</b>	<b>Voltage</b>
	<b>Current</b>
	<b>Thermocouple, Temperature probe, Resistor</b>
<b>Modularity</b>	
<b>Acquisition period</b>	
<b>Conversion time</b>	
<b>Resolution</b>	
<b>Isolation</b>	
<b>Connection</b>	<b>Directly to the module</b>
	<b>Via preformed cordsets</b>
<b>Module</b>	

Isolated low-level voltage inputs, resistors, thermocouples and temperature probes	
Multi-range	
± 40 mV, ± 80 mV, ± 160 mV, ± 320 mV, ± 640 mV and ± 1.28 V	
–	
Thermocouples type B, E, J, K, L, N, R, S, T, U Temperature probes type Pt 100, Pt 1000, Ni 100, Ni 1000 and Cu 10, 2-, 3- or 4-wire Resistors 2-, 3- or 4-wire, 400 Ω or 4,000 Ω	
4 channels	8 channels
400 ms for all 4 channels	400 ms for all 8 channels
–	
16 bits	
Between channels: 750 V $\overline{\text{---}}$ Between channels and bus: 1,400 V $\overline{\text{---}}$ Between channels and ground: 750 V $\overline{\text{---}}$	
Via 40-way connector	Via two 40-way connectors
BMX FCW ●01S cordsets with one end with color-coded flying leads (3 or 5 m long)	
<b>BMX ART 0414</b>	<b>BMX ART 0814 ▲</b>

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<b>Compatibility with Advantys Telefast ABE 7 pre-wired system</b>	
<b>Type of module</b>	<b>Connection sub-base</b>
	<b>Preformed cordsets (1.5, 3 or 5 m long)</b>

Sub-base with 4 channels for direct connection of 4 thermocouples plus connection and provision of cold-junction compensation	
<b>ABE 7CPA412</b>	
<b>BMX FCA●●2</b>	

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▲ Available 4<sup>th</sup> quarter 2007

**Analog inputs**

**Analog outputs**

**Mixed analog I/O**



Isolated high-level inputs
Voltage/current
± 10 V, 0...10 V, 0...5 V, 1...5 V, ± 5 V
0...20 mA, 4...20 mA, ± 20 mA
–
4 channels
Fast: 1 + (1 x no. of declared channels) ms By default, 5 ms for all 4 channels
–
16 bits
Between channels: 300 V $\overline{\text{---}}$ Between channels and bus: 1,400 V $\overline{\text{---}}$ Between channels and ground: 1,400 V $\overline{\text{---}}$

Isolated high-level outputs
Voltage/current
± 10 V
0...20 mA, 4...20 mA
–
2 channels
–
≤ 1 ms
16 bits
Between channels: 750 V $\overline{\text{---}}$ Between channels and bus: 1,400 V $\overline{\text{---}}$ Between channels and ground: 1,400 V $\overline{\text{---}}$

Non-isolated high-level inputs	Non-isolated high-level outputs
Voltage/current	
± 10 V, 0...10 V, 0...5 V, 1...5 V	± 10 V
0...20 mA, 4...20 mA	0...20 mA, 4...20 mA
–	–
4 channels	2 channels
Fast: 1 + (1 x no. of declared channels) ms By default, 5 ms for all 4 channels	–
–	≤ 2 ms
14 bits in 10 V range 12 bits in 20 mA range	12 bits
Between group of input channels and group of output channels: 750 V $\overline{\text{---}}$ Between channels and bus: 1,400 V $\overline{\text{---}}$ Between channels and ground: 1,400 V $\overline{\text{---}}$	

Via 20-way removable terminals (screw or spring-type)  
 BMX FTW ●01S cordsets with one end with color-coded flying leads (3 or 5 m long)

**BMX AMI 0410**

**BMX AMO 0210**

**BMX AMM 0600 ▲**

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4-channel sub-base for direct connection of 4 inputs, delivers and distributes 4 protected isolated power supplies

**ABE 7CPA410**

**BMX FCA●●0**

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–

–

2

2.2

### Presentation

The analog I/O module offer consists of:

- Three isolated analog input modules:
  - 4 analog high-speed channels (16 bits), voltage or current, **BMX AMI 0410**
  - 4 and 8 analog channels (15 bits + sign) for thermocouples, Pt, Ni or Cu temperature probes, **BMX ART 0414/0814**
- One analog output module with 2 voltage/current channels, **BMX AMO 0210**
- One mixed module (12 bits) with 4 analog input channels and 2 analog output channels, non-isolated, voltage or current, **BMX AMM 0600**

Analog I/O modules are equipped with a connector for a 20-way removable terminal block, except for **BMX ART 0414/0814** analog input modules with thermocouples/temperature probes, which are equipped with a 40-way connector.

All analog modules occupy a single slot in the **BMX XBP ●●●** racks. These modules can be installed in any slot in the rack, except the first two (PS and 00) reserved for the power supply module in the **BMX CPS ●●0** rack and the **BMX P34 ●●0** processor module respectively.

The power supply for the analog functions is supplied by the backplane bus (3.3 V and 24 V). Analog I/O modules are hot-swappable (see page 2/9).

In a Modicon M340 single-rack configuration, the maximum number of analog channels is limited by the number of slots available in the rack (11 slots maximum).

### Description

**BMX AM●/ART** analog I/O modules are standard format (1 slot). They have a case, which ensures IP 20 protection of the electronics, and are locked into position by a captive screw.

#### I/O modules connected via 20-way removable terminal block

**BMX AM●** analog I/O modules have the following on the front panel:

- 1 A rigid body providing support and protection for the electronic card
- 2 A module reference marking (a label is also visible on the right-hand side of the module).
- 3 A module and channel status display block
- 4 A connector taking the 20-way removable terminal block, for connecting sensors or preactuators on screw or spring-type terminals

**To be ordered separately:**

- 5 A **BMX FTB 20●0** 20-way removable terminal block or preformed cordsets with 20-way terminal block at one end and flying leads at the other (**BMX FTW ●01S** or, with 25-way SUB-D connector, **BMX FCA ●●0**) for direct connection to Advantys Telefast ABE 7 sub-bases (see page 2/31).

#### I/O modules connected via 40-way connector

**BMX ART 0●14** analog input modules have the following on the front panel:

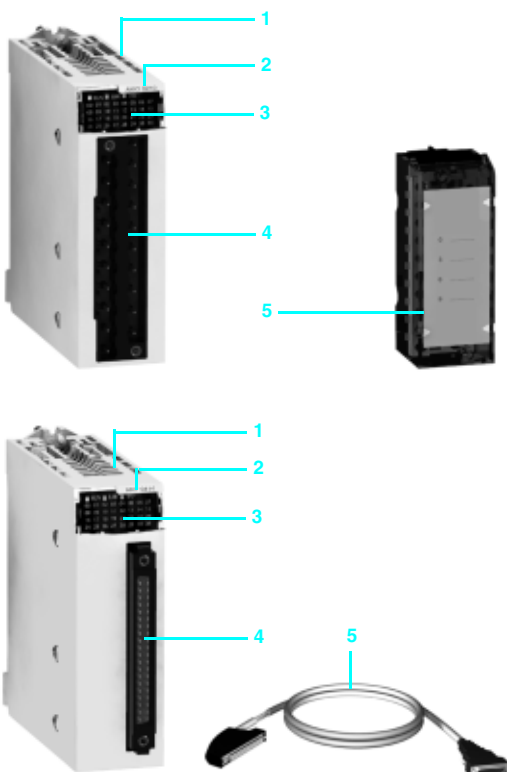
- 1 A rigid body providing support and protection for the electronic card
- 2 A module reference marking (a label is also visible on the right-hand side of the module)
- 3 A module and channel status display block
- 4 A 40-way connector for connecting the sensors

**To be ordered separately:**

- 5 Preformed cordsets with 40-way connector at one end and flying leads at the other (**BMX FCW ●01S** or, with 25-way SUB-D connector, **BMX FCA ●●2**) for direct connection to Advantys Telefast ABE 7 sub-bases (see page 2/32).

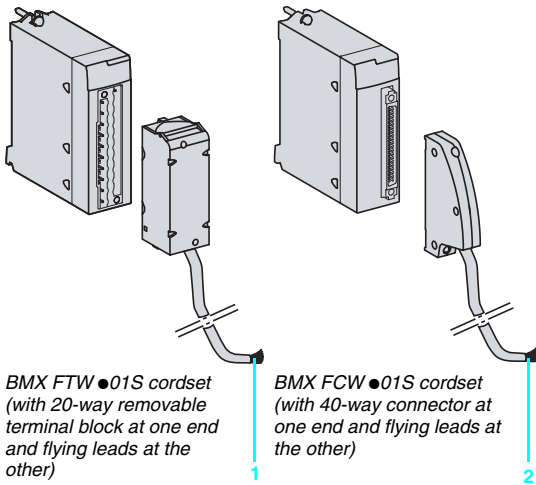
**To be ordered separately** irrespective of the type of module:

- A shielding connection kit to protect against electrostatic discharge, consisting of a metal bar and two sub-bases for mounting on the rack supporting the analog modules
- A set of **STB XSP 3020** clamping rings for the shielding braids of analog signal cables.



# Modicon M340 automation platform

## Analog I/O modules



### Connecting modules with removable terminal blocks

#### BMX AMI 0410/AMO 0210/AMM 0600 modules with 20-way terminal block

These 20-way removable terminal blocks are the same as those used for discrete I/O modules (screw clamp, cage clamp or spring-type). See page 2/8.

One version of the removable terminal block is equipped with a 3 or 5 m long cordset with color-coded flying leads (**BMX FTW●●S**). These preformed cordsets, with reinforced shielding have, at the other end **1**, color-coded flying leads conforming to standard DIN 47100.

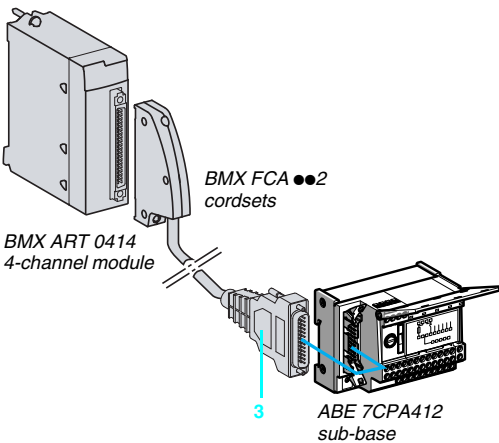
### Connecting modules with 40-way connectors

#### BMX ART 0●14 modules with 40-way connectors

Two types of cordset are available:

- Preformed cordsets with reinforced shielding (**BMX FCW ●01S**) have, at the other end **2**, color-coded flying leads conforming to standard DIN 47100. They are available in 3 or 5 m lengths, and provide easy direct wire-to-wire connection of the analog sensors via terminal blocks.

- Preformed cordsets with reinforced shielding (**BMX FCA ●02**) which have at the other end **3**, a 25-way SUB-D connector. They are available in 1.5, 3 or 5 m lengths, and provide direct connection to the Advantys Telefast **ABE 7CPA412** sub-base (see below).



### Use with Advantys Telefast ABE 7 sub-bases

Using the Advantys Telefast ABE 7 pre-wired system makes it easier to install the modules since the inputs (or outputs) can be accessed using screw terminals. Two special sub-bases are available:

#### Advantys Telefast ABE 7CPA410 sub-base

The Advantys Telefast **ABE 7CPA410** sub-base is mainly used in conjunction with the **BMX AMI 0410** voltage/current analog 4-input module. It is used to:

- Connect the four sensors directly
- Remotely locate the input terminals in voltage mode
- Power the 4...20 mA conditioners one channel at a time with a 24 V voltage, protected and limited to 25 mA, while maintaining isolation between channels
- Protect the current impedance matching resistors integrated in the sub-base against overvoltages

Connection is via the **BMX FCA ●●0** cordset (1.5, 3 or 5 m long).

#### Advantys Telefast ABE 7CPA412 sub-base

The Advantys Telefast **ABE 7CPA412** sub-base is specially designed as a wiring interface for the **BMX ART 0414** and **BMX ART 0814** thermocouple modules. It is used to:

- Connect the four thermocouple probes
- Provide external cold-junction compensation with a temperature probe integrated in the sub-base
- Ensure continuity of the shielding

The **BMX ART 0814** module requires two Advantys Telefast **ABE 7CPA412** sub-bases. The connection with each sub-base is made via a **BMX FCA ●●2** cordset (1.5, 3 or 5 m long).

# Modicon M340

## automation platform

### Analog I/O modules

#### BMX AMI 0410 analog input modules

The **BMX AMI 0410** module is a high-level analog input module with 4 isolated inputs (16 bits).

Used with sensors or transmitters, it performs monitoring, measurement and process control functions for continuous processes.

For each input, the **BMX AMI 0410** module offers the following ranges:

- Voltage  $\pm 10$  V,  $\pm 5$  V, 0...10 V, 0...5 V and 1...5 V
- Current 0...20 mA, 4...20 mA and  $\pm 20$  mA, depending on the choice made during configuration

The module operates with voltage inputs. It includes four reading resistors connected to the terminal block to form the current inputs.

#### Functions

The **BMX AMI 0410** module includes the following functions:

- Adaptation and multiplexing:
  - Physical connection to the process
  - Protection of the module against overvoltages
  - Protection of the current reading resistors
  - Adaptation of input signals by analog filtering
  - Scanning of input channels by solid state multiplexing, by optical commutator switches
- Adaptation to input signals: Gain selection, drift compensation
- Conversion: 24-bit analog/digital converter
- Conversion of input measurements to a unit that is suitable for the user:
  - Taking account of the alignment coefficients to be applied to measurements, as well as the module autocalibration coefficients
  - Measurement filtering, depending on the configuration parameters
  - Measurement scaling, depending on the configuration parameters
- Interface and communication with the application:
  - Receipt of the configuration parameters for the module and its channels
  - Transmission of measured values to the application, as well as module status
- Module power supply
- Module monitoring and indication of any faults to the application:
  - Conversion circuit test
  - Channel range overshoot test and watchdog test.

#### BMX ART 0414/0814 analog input modules

**BMX ART 0414/0814** modules are multirange input modules with 4 or 8 low-level isolated inputs (15 bits + sign) respectively.

Depending on the choice made during configuration, the modules offer, for each of the inputs, the following range:

- Temperature probe: Pt100, Pt1000, Cu10, Ni100 or Ni1000, with open-circuit detection
- Thermocouple: B, E, J, K, L, N, R, S, T or U, with broken wire detection
- Resistor: 0...400 or 0...4000  $\Omega$ , 2-, 3- or 4-wire
- Voltage:  $\pm 40$  mV,  $\pm 80$  mV,  $\pm 160$  mV,  $\pm 320$  mV,  $\pm 640$  mV,  $\pm 1.28$  V.

#### Functions

**BMX ART 0414/0814** modules offer the following functions

- Adaptation and current source per channel:
  - Accepting an overload of  $\pm 7.5$  V
  - Autocalibration of the analog module offset as close as possible to the input terminal
  - Selection of the cold-junction compensation sensor included in the Advantys Telefast **ABE 7 CPA412** sub-base or externally by the Pt 100 probe
- Adaptation to input signals: Based on a low offset amplifier internal to the A/D converter
- Conversion: 16-bit converter
- Conversion of input measurements to a unit that is suitable for the user:
  - Taking account of the alignment coefficients to be applied to measurements, as well as the module autocalibration coefficients
  - Measurement filtering, depending on the configuration parameters
  - Measurement scaling, depending on the configuration parameters
- Interface and communication with the application:
  - Receipt of the configuration parameters for the module and its channels
  - Transmission of measured values to the application, as well as module status
- Module monitoring and indication of any faults to the application:
  - Conversion circuit test
  - Channel range overshoot test and watchdog test.

#### BMX AMO 0210 analog output module

The **BMX AMO 0210** module is a module with 2 high-level isolated outputs (15 bits + sign). It offers, for each of them, the ranges:

- Voltage:  $\pm 10$  V
- Current: 0...20 mA and 4...20 mA

The range is selected during configuration.

#### Functions

The **BMX AMO 0210** module includes the following functions:

- Physical connection to the process
- Protection of the module against overvoltages
- Adaptation of the output signals:
  - Voltage or current adaptation by software configuration
  - Protection of the outputs against short-circuits and overloads
- Conversion to 15 bits with sign with redefinition of data
- Conversion of application values into data that can be used by the digital/analog converter:
  - Use of factory calibration parameters
- Interface and communication with the application:
  - Managing exchanges with the processor
  - Geographical addressing
  - Receipt of the configuration parameters for the module and its channels
  - Transmission of module status to the application
- Module monitoring and indication of any faults to the application:
  - Output power supply test
  - Channel range overshoot test
  - Output fault presence test
  - Watchdog test.

#### BMX AMM 0600 mixed analog I/O module

The **BMX AMM 0600** mixed module is a module with 4 inputs 14/12 bits and 2 outputs 12 bits, non-isolated between one another. It offers, for each of them, the ranges:

- Voltage:  $\pm 10$  V, 0...10 V, 0...5 V and 1...5 V
- Current: 0...20 mA and 4...20 mA.

#### Functions

The **BMX AMM 0600** module has the following functions:

- Protection of the module against overvoltages
- Adaptation to the different actuators: voltage or current output
- Conversion of digital signals (10 bits or 12 bits depending on the range) to analog signals
- Conversion of application data into data that can be used by the digital/analog converter
- Module monitoring and fault indication to the application: Converter test, range overshoot test, watchdog test.

### Characteristics of BMX AMI 0410 analog input modules

Input module		BMX AMI 0410							
Input type		Isolated high-level inputs							
Number of channels		4							
Nature of inputs	Voltage	$\pm 10\text{ V}$ , $0\dots 10\text{ V}$ , $0\dots 5\text{ V}$ , $1\dots 5\text{ V}$ , $\pm 5\text{ V}$							
	Current	$0\dots 20\text{ mA}$ , $4\dots 20\text{ mA}$ , $\pm 20\text{ mA}$ (via protected internal $250\ \Omega$ resistors)							
Analog/digital conversion		24 bits							
Voltage/current range		$\pm 10\text{ V}$	$\pm 5\text{ V}$	$0\dots 5\text{ V}$	$0\dots 10\text{ V}$	$1\dots 5\text{ V}$	$0\dots 20\text{ mA}$	$4\dots 20\text{ mA}$	$\pm 20\text{ mA}$
Maximum conversion value		$\pm 11.4\text{ V}$					$\pm 30\text{ mA}$		
Resolution		0.35 mV					0.92 $\mu\text{A}$		
Input impedance	Typical	$\text{M}\Omega$							
		10 (irrespective of the input level)							
Permitted overload on the inputs	Voltage range	$\text{V}$							
	Current range	$\text{mA}$							
Voltage/current internal conversion resistor		$\Omega$	-					250	
Precision of internal conversion resistor			-					0.1% - 15 ppm/ $^{\circ}\text{C}$	
Filtering		1 <sup>st</sup> order digital filtering							
Read cycle time	Fast	$\text{ms}$							
	Default	$\text{ms}$							
Measurement errors (1)	At $25^{\circ}\text{C}$	%FS					0.075%		
	Maximum at $0\dots 60^{\circ}\text{C}$	%FS					0.1%		
Temperature drift		15 ppm/ $^{\circ}\text{C}$					30 ppm/ $^{\circ}\text{C}$		
Recalibration		Internal							
Common mode between channels		$\text{dB}$							
Digital value format		$\pm 10,000$ by default, $\pm 32,000$ in user scale							
Isolation	Between channels	$\text{V}$							
	Between channels and bus	$\text{V}$							
	Between channels and ground	$\text{V}$							
Consumption	Typical	$\text{mA}$							

### Characteristics of BMX ART 0414/0814 analog input modules

Input module		BMX ART 0414		BMX ART 0814	
Input type		Isolated inputs, low-level voltage, resistors, temperature probes, thermocouples			
Number of channels		4		8	
Nature of inputs		$\pm 40\text{ mV}$ ; $\pm 80\text{ mV}$ ; $\pm 160\text{ mV}$ ; $\pm 320\text{ mV}$ ; $\pm 640\text{ mV}$ ; $\pm 1.28\text{ V}$			
Analog/digital conversion		$\Sigma \Delta$ 16 bits			
Resolution		$\text{mV}$			
Filtering		1 <sup>st</sup> order digital filtering			
Read cycle time		$\text{ms}$		$\text{ms}$	
Permitted overload on the inputs		$\text{V}$			
50/60 Hz rejection	Differential mode	Typical		$\text{dB}$	
	Common mode	Typical		$\text{dB}$	
Cold junction compensation	External compensation by Pt100 probe		<input type="checkbox"/> Using the dedicated Advantys Telefast ABE 7CPA412 sub-base including the probe <input type="checkbox"/> Using a 2-wire temperature probe wired on channel 0 and/or 4 <input type="checkbox"/> Using a 3-wire temperature probe wired on channel 3 and/or 7		
	Recalibration		Internal		
	Isolation	Between channels	$\text{V}$		750 ---
Between channels and bus		$\text{V}$		1,400 ---	
Between channels and ground		$\text{V}$		750 ---	
Consumption	Typical	$\text{mA}$			

(1) %FS: Error as a % of full scale  
 (2) Including the conversion resistor error

### Characteristics of BMX ART 0414/0814 analog input modules

#### Input ranges for BMX ART 0414/0814 modules

Voltage range			± 40 mV	± 80 mV	± 160 mV	± 320 mV	± 640 mV	± 1.28 V
Typical input impedance	MΩ		10					
Maximum conversion value			± 102.5%					
Maximum resolution	mV		40/2 <sup>14</sup>	80/2 <sup>14</sup>	160/2 <sup>14</sup>	320/2 <sup>14</sup>	640/2 <sup>14</sup>	1280/2 <sup>14</sup>
Measurement errors (1)	At 25°C	%FS	0.05					
	Maximum at 0...60°C	%FS	0.15					
Temperature drift	ppm/ °C		30					
Resistor range			400 Ω			4,000 Ω		
Type			2-, 3- or 4-wire					
Maximum conversion value			± 100%					
Maximum resolution	mV		400/2 <sup>14</sup>			4,000/2 <sup>14</sup>		
Measurement errors (1)	At 25°C	%FS	0.12					
	Maximum at 0...60°C	%FS	0.2					
Temperature drift	ppm/ °C		25					
Temperature probe ranges			Pt100	Pt1000	Cu10	Ni100	Ni1000	
Measurement range	°C		According to IEC: -200...+850 According to US/JIS: -100...+450		-100...+260	-60...+180		
Resolution	°C		0.1					
Detection type			Open circuit (detection on each channel)					
Measurement errors (1)	At 25°C (2)	°C	± 2.1		± 4	± 2.1	0.7	
	Maximum at 0...60°C	°C	± 2		± 4	± 3.0	1.3	
Max. wiring resistance	4-wire	Ω	50	500	50	500		
	2/3-wire	Ω	20	200	20	200		
Temperature drift			30 ppm/°C					
Thermocouple ranges			B	E	J	K	L	
Measurement range	°C		+130...+1820	-270...+1000	-200...+760	-270...+1370	-200...+900	
Resolution	°C		0.1					
Detection type			Open circuit (detection on each channel)					
Measurement errors (1)	At 25°C	°C	± 3.5	± 3.7	± 2.8	± 3.7	± 3.0	
	Maximum at 0...60°C	°C	± 5	± 5	± 4.5	± 5	± 4.5	
Temperature drift	ppm/ °C		25					
Thermocouple ranges (continued)			N	R	S	T	U	
Measurement range	°C		+270...+1300	-50...+1769	-50...+1769	-270...+400	-200...+600	
Resolution	°C		0.1					
Detection type			Open circuit (detection on each channel)					
Measurement errors (1)	At 25°C	°C	± 3.7	± 3.2	± 3.2	± 3.7	± 2.7	
	Maximum at 0...60°C	°C	± 5	± 4.5	± 4.5	± 5	± 4.5	
Temperature drift	ppm/ °C		25					

(1) %FS: Error as a % of full scale. ± 1 °C with Pt100 temperature probe range, - 100...+ 200 °C  
(2) Excluding error caused by the wiring



2

2.2

### Characteristics of the BMX AMO 0210 analog output module

Module		BMX AMO 0210	
<b>Output type</b>		Isolated high-level outputs	
<b>Number of channels</b>		2	
<b>Ranges</b>	Voltage	± 10 V	
	Current	0...20 mA and 4...20 mA	
<b>Resolution</b>	<b>bits</b>	15 + sign	
<b>Conversion time</b>	<b>ms</b>	≤ 1	
<b>Output power supply</b>		Internal power supply via rack	
<b>Output ranges</b>		Voltage	Current
<b>Adjustment range</b>	Nominal	<b>V</b>	± 10 V
	Maximum	<b>V</b>	± 11.25 V
<b>Load impedance</b>	<b>Ω</b>	≥ 1,000	≤ 600
<b>Detection type</b>		Short-circuit	Open circuit
<b>Measurement errors (1)</b>	At 25°C	<b>%FS</b>	0.10
	Maximum at 0...60°C	<b>%FS</b>	0.25
<b>Temperature drift</b>		40 ppm/°C	
<b>Recalibration</b>		None, factory-calibrated	
<b>Fallback mode (2)</b>		Default or configurable	
<b>Isolation</b>	Between channels	<b>V</b>	750 V ---
	Between channels and bus	<b>V</b>	1,400 V ---
	Between channels and ground	<b>V</b>	1,400 V ---
<b>Consumption</b>	Typical	<b>mA</b>	See power consumption table page 6/8

### Characteristics of BMX AMM 0600 mixed analog I/O module

Module		BMX AMM 0600								
<b>Channel type</b>		Non-isolated high-level inputs					Non-isolated high-level outputs			
<b>Number of channels</b>		4					2			
<b>Ranges</b>		± 10 V	0...5 V	0...10 V	1...5 V	0...20 mA	4...20 mA	± 10 V	0...20 mA	4...20 mA
<b>Maximum conversion value</b>	Voltage	<b>V</b>	± 11.25			-		± 11.25	-	
	Current	<b>mA</b>	-			0...30		-	0...24 mA	
<b>Resolution</b>	<b>bits</b>	14	12	13	12	12	12	11		
<b>Filtering</b>		1 <sup>st</sup> order digital filtering by firmware								
<b>Precision of internal conversion resistor</b>		250 Ω, 0.1% - 15 ppm/°C								
<b>Read cycle time</b>	Fast	<b>ms</b>	1 + 1 x no. of channels used (periodic reading of no. of declared channels)					-		
	Default	<b>ms</b>	5 for 4 channels					-		
<b>Conversion time</b>	<b>ms</b>	-								
<b>Permitted overload on the input channels</b>	Voltage	<b>V</b>	± 30			-		± 11.25	-	
	Current	<b>mA</b>	-			± 30		-	0...24	
<b>Measurement errors (1)</b>	At 25°C	<b>%FS</b>	0.25			0.35		0.25		
	Maximum at 0...60°C	<b>%FS</b>	0.35			0.50		0.60		
<b>Temperature drift</b>		30 ppm/°C			50 ppm/°C		100 ppm/°C			
<b>Recalibration</b>		Internal								
<b>Fallback mode (2)</b>		-								
<b>Isolation</b>	Between group of input channels and group of output channels	<b>V</b>	750 ---							
	Between channels and bus	<b>V</b>	1,400 ---							
	Between channels and ground	<b>V</b>	1,400 ---							
<b>Consumption</b>	Typical	<b>mA</b>	See power consumption table page 6/8							

(1) %FS: Error as a % of full scale

(2) Default: Output at 0 (V or mA). Configurable: Hold last value or set at predefined value for each channel.

# Modicon M340 automation platform

## Analog I/O modules



BMX AMI 0410



BMX ART 0414    BMX ART 0814



BMX FTB 2000



BMX FTW 01S



ABE 7CPA41



BMX FCA 01



BMX FCA 02

### References

#### Analog input modules

Input type	Input signal range	Resolution	Connection	No. of channels	Reference	Weight kg
Isolated high-level inputs	$\pm 10$ V, 0...10 V, 0...5 V, 1...5 V, $\pm 5$ V 0...20 mA, 4...20 mA, $\pm 20$ mA	16 bits	Via cage clamp, screw clamp or spring-type removable terminal block	4 fast channels	BMX AMI 0410	–
Isolated low-level inputs	Temperature probe, thermocouple $\pm 40$ mV, $\pm 80$ mV, $\pm 160$ mV, $\pm 320$ mV, $\pm 640$ mV, $\pm 1.28$ V 0...400 $\Omega$ , 0...4000 $\Omega$	15 bits + sign	40-way connector	4 channels 8 channels	BMX ART 0414 BMX ART 0814 ▲	– –

#### Analog output module

Output type	Output signal range	Resolution	Connection	No. of channels	Reference	Weight kg
Isolated high-level outputs	$\pm 10$ V, 0...20 mA, 4...20 mA	16 bits	Via cage clamp, screw clamp or spring-type removable terminal block	2 channels	BMX AMO 0210	–

#### Mixed analog I/O module

Channel type	Signal range	Resolution	Connection	No. of channels	Reference	Weight kg
Mixed I/O, non-isolated	$\pm 10$ V, 0...10 V, 0...5 V, 1...5 V, 0...20 mA, 4...20 mA	14 bits or 12 bits depending on the range	Via cage clamp, screw clamp or cage spring-type removable terminal block	I: 4 channels Q: 2 channels	BMX AMM 0600 ▲	–

#### Connection accessories for analog modules (1)

Description	For use with modules	Type, composition	Length	Reference	Weight kg
20-way removable terminal blocks	BMX AMI 0410	Cage clamp	–	BMX FTB 2000	–
	BMX AMO 0210	Screw clamp	–	BMX FTB 2010	–
	BMX AMM 0600	Spring-type	–	BMX FTB 2020	–
Preformed cordsets	BMX AMI 0410	One 20-way removable terminal block	3 m	BMX FTW 301S	–
	BMX AMO 0210		5 m	BMX FTW 501S	–
	BMX AMM 0600	One end with color-coded flying leads	–	–	–
	BMX ART 0414	One 40-way connector	3 m	BMX FCW 301S	–
BMX ART 0814 (2)	One end with color-coded flying leads	5 m	BMX FCW 501S	–	

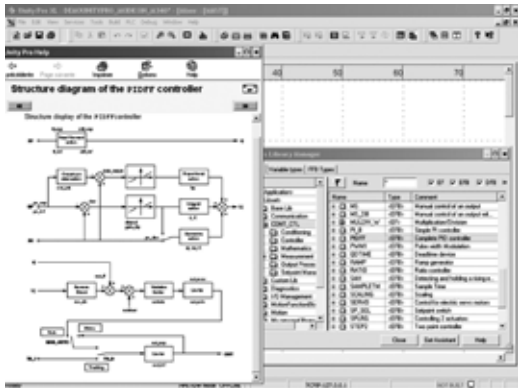
#### Advantys Telefast ABE 7 pre-wired system

Advantys Telefast ABE 7 sub-bases	BMX AMI 0410	Distribution of isolated power supplies Delivers 4 protected isolated power supplies for 4...20 mA inputs Direct connection of 4 inputs	–	ABE 7CPA410	0.180
	BMX ART 0414 BMX ART 0814	Connection and provision of cold junction compensation for thermocouples Direct connection of 4 inputs	–	ABE 7CPA412	0.180
Preformed cordsets for ABE 7CPA41 sub-bases	BMX AMI 0410	One 20-way removable terminal block and one 25-way SUB-D connector for ABE 7CPA410 sub-base	1.5 m	BMX FCA150	–
			3 m	BMX FCA300	–
			5 m	BMX FCA500	–
	BMX ART 0414 BMX ART 0814	One 40-way connector and one 25-way SUB-D connector for ABE 7CPA412 sub-base	1.5 m	BMX FCA152	–
			3 m	BMX FCA302	–
		5 m	BMX FCA502	–	

(1) The shielding on the cordsets carrying the analog signals must always be connected to the BMX XSP000 shielding connection kit mounted under the rack holding the analog modules (see page 1/15).

(2) The BMX ART 0814 8-channel module requires two ABE 7CPA412 sub-bases and two BMX FCA02 cordsets.

▲ Available 4<sup>th</sup> quarter 2007



CONT\_CTL, programmable process control integrated in Unity Pro

## Process control in machines

Unity Pro contains CONT\_CTL, a library of 36 function blocks used to create control loops for machine control.

All requirements for closed loop control functions in machines are adequately met by Modicon M340 thanks to the wealth of functions in the library and the flexibility with which function blocks can be linked together through programming. This solution therefore eliminates the need for external controllers, and simplifies the overall control architecture of the machine, as well as its design, roll-out and operation.

The function blocks, EF or EFB, can be used in all Unity Pro languages i.e. LD, ST, IL and FBD. FBD is particularly suitable for accessing control processing operations in Unity Pro through its assistant for entering and viewing parameters and function block variables.

## CONT\_CTL library functions

The library consists of five function families:

- Input data conditioning
- Controllers
- Math functions
- Measurement processing
- Output value processing

### Input data conditioning

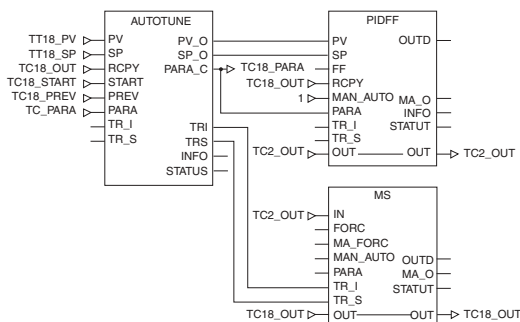
DTIME	Pure delay
INTEGRATOR	Integrator with limiting
LAG_FILTER	First order time lag device
LDLG	PD device with smoothing
LEAD	Differentiator with smoothing
MFLOW	Mass flow calculation based on the measurement of differential pressure or flow speed with pressure and temperature compensation
QDIME	Deadtime device
SCALING	Scaling
TOTALIZER	Integrator (typically of flow) until a limit (typically a volume) is reached, with automatic reset
VEL_LIM	Velocity limiter, with manipulated variable limiting

### Controllers

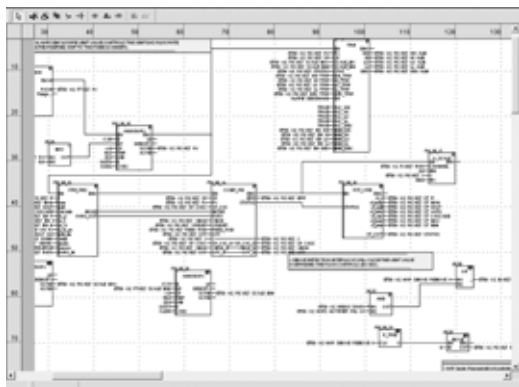
PI_B	Simple PI controller: PI algorithm with a mixed structure (series/parallel)
PIDFF	Complete PID controller: PID algorithm with a parallel or mixed structure (series/parallel)
AUTOTUNE	Automatic tuner setting for the PIDFF (complete PID) controller or the PI_B (simple PI) controller <ul style="list-style-type: none"> <li>□ Identification using Ziegler Nichols type method</li> <li>□ Modeling based on 1<sup>st</sup> order process</li> <li>□ Building of control parameters with criterion for prioritizing either the reaction time to disturbance (dynamic) or the stability of the process</li> </ul>
IMC	Model corrector. The model is a first order model with delay. This corrector is useful: <ul style="list-style-type: none"> <li>□ When there are serious delays compared with the main time constant of the process; this scenario cannot be satisfactorily resolved by standard PID process control</li> <li>□ For regulating a non-linear process</li> </ul> IMC can handle any stable and aperiodic process of any order.
SAMPLETM	Control of controller startup and sampling
STEP2	Two-point controller
STEP3	Three-point controller for temperature regulation

### Math functions

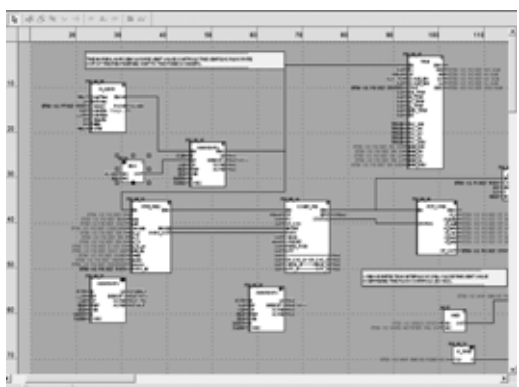
COMP_DB	Comparison of two values, with dead zone and hysteresis
K_SQRT	Square root, with weighting and threshold, useful for linearization of flow measurements
MULDIV_W	Weighted multiplication/division of 3 numerical values
SUM_W	Weighted summation of 3 numerical values



Example: PID controller with MS manual control



Programming in Unity Pro in offline mode



Programming in online mode

### Measurement processing

AVGMV	Moving average with fixed number of samples (50 max.)
AVGMV_K	Moving average with constant correction factor, 10,000 samples max.
DEAD_ZONE	Dead zone
LOOKUP_TABLE1	Linearization of characteristic curves using first-order interpolation
SAH	Detection of a rising edge
HYST_XXX	Detection of high threshold with hysteresis (1)
INDLIM_XXX	Detection of high and low thresholds with hysteresis (1)

### Output value processing

MS	Manual control of an output
MS_DB	Manual control of an output with dead zone
PWM1	Control via pulse width modulation
SERVO	Control for servo motors
SPLRG	Control of two <i>Split Range</i> actuators

### Setpoint management

RAMP	Ramp generator, with separate ascending and descending ramps
RATIO	Ratio controller
SP_SEL	Selection of setpoint value: local (operator) or <i>remote</i> (processing)

### Setting up process control function blocks

Based on the sequencing of function blocks, the FBD language integrated into Unity Pro is a programming language particularly suitable for building control loops. Designers can use FBD to easily associate blocks from the CONT\_CTL library with their own DFB blocks written in Unity Pro's ST, IL or LD language, or in C language.

### Debugging, operation

All Unity Pro's standard debugging services (see page 4/21) are available. In particular, the Modicon M340 processor simulator can be used to check correct execution of processing offline.

### Compatibility

The CONT\_CTL control function block library is available in all versions of Unity Pro. It is compatible with all processors in the Modicon M340, Premium, Quantum, and Atrium ranges.

### Resources

The technical documentation provides many examples of how to set up programmable process control function blocks in FBD, LD, IL and ST languages.

The techniques for adjusting process control loops are described in the document "Process control, Unity V3.0" available on the [www.telemecanique.com](http://www.telemecanique.com) website.

(1) XXX depending on the type of variable: DINT, INT, UINT, UDINT, REAL



**Monobloc IP 20 distributed I/O**  
**Modicon Momentum**



**Optimum IP 20 distributed I/O**  
**Advantys OTB**



**Modular IP 20 distributed I/O**  
**Advantys STB**



Ethernet TCP/IP

Ethernet TCP/IP  
CANopen  
Modbus (RS 485)

Ethernet TCP/IP  
CANopen

1 base with 1 communicator

1 interface module

1 "NIM" interface module + 32 I/O modules

Base of 16 I, 32 I, 8 O, 16 O, 32 O, 10 I/8 O,  
16 I/8 O, 16 I/12 O et 16 I/16 O  
--- 24 V, ~ 120 V et ~ 230 V  
--- 24 V, ~ 120 V and ~ 230 V and relay

12 I/8 O  
--- 24 V  
--- 24 V and relay

Module of 2 I, 4 I, 6 I, 16 I, 2 O, 4 O, 6 O or 16 O  
--- 24 V, ~ 115 V and ~ 230 V  
--- 24 V, ~ 115/230 V and relay

Bases 8 I, 16 I or 4 O voltage/current  
Base 4 I thermocouple or RTD

–

Modules 2 I and 2 O voltage/current  
Module 2 I thermocouple or RTD

Base 2 channels 10 kHz/200 kHz

Integrated in interface module:  
- 2 channels 5 kHz/20 kHz  
- 2 PWM function channels

Module 1 channel 40 kHz

Base 6 I/3 O ~ 120 V with 1 Modbus port

–

Parallel interface module for TeSys Quickfit and TeSys U motor-starters

Screw or spring terminal blocks

Removable screw terminal blocks

Screw or spring connectors

Plastic

**170 AD●**

**OTB 1●O DM9LP**

**STB D●●/A●●**

Consult our catalogue  
"Modicon Momentum automation platform"

Consult our catalogue  
"Advantys OTB distributed I/O"

Consult our catalogue  
"Advantys STB distributed I/O"

# Modicon M340 automation platform

## BMX EHC 0200/0800 counter modules

### Presentation

**BMX EHC 0200** and **BMX EHC 0800** counter modules for the Modicon M340 automation platform are used to count the pulses generated by a sensor or to process the signals from an incremental encoder.

The two modules differ in the number of counter channels, maximum input frequencies, functions and auxiliary input and output interfaces:

Counter module	No. of channels	Maximum frequency	Applications	No. of physical inputs	No. of physical outputs
<b>BMX EHC 0200</b>	2	60 kHz	Upcounting Downcounting Measurement Frequency meter Frequency generator Axis following	6 per channel	2 per channel
<b>BMX EHC 0800</b>	8	10 kHz	Upcounting Downcounting Measurement Interfacing	2 per channel	–

The sensors used on each channel can be:

- 2-wire 24 V proximity sensors
- 3-wire 24 V proximity sensors
- 10/30 V output signal incremental encoders with push-pull outputs

**BMX EHC 0200/0800** counter modules can be used to meet the demands of applications such as:

- Alarm generation on empty unwinder status using the ratio
- Sorting small parts using the period meter
- Single electronic cam using the dynamic setting thresholds
- Speed control using the period meter

These standard format modules can be installed in any available slot of a Modicon M340 PLC; they can be removed while powered up.

In a Modicon M340 PLC configuration, the number of **BMX EHC 0200/0800** counter modules should be added to the number of application-specific modules (communication).

The function parameters are set by configuring the Unity Pro software.

### Description

**BMX EHC 0200 / 0800** counter modules are standard format. They occupy a single slot in **BMX XBP ●●00** racks.

They come in a plastic case, which ensures IP 20 protection of the electronics, and locks into position with a screw.

#### BMX EHC 0200 module, 2 channels, 60 kHz

The **BMX EHC 0200** counter module has the following on the front panel:

- 1 Module and channel status LED array
- 2 16-way connector for wiring the sensors of counter 0
- 3 16-way connector for wiring the sensors of counter 1
- 4 10-way connector for wiring:
  - the auxiliary outputs
  - the sensor and actuator power supplies

#### To be ordered separately:

- A **BMX XTS HSC 20** kit containing two 16-pin connectors and one 10-pin connector
- A **BMX XSP ●●00** electromagnetic compatibility kit, see page 1/15.

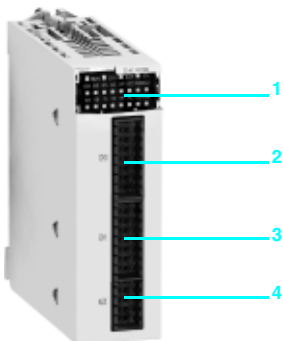
#### BMX EHC 0800 module, 8 channels, 10 kHz

The **BMX EHC 0800** counter module has the following on the front panel:

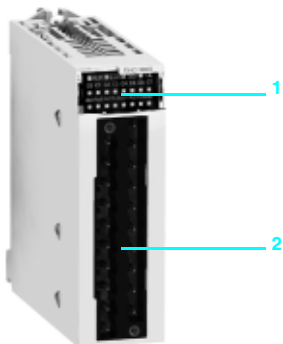
- 1 Module and channel status LED array
- 2 **BMX FTB 20●0** 20-way connector compatible with discrete I/O

#### To be ordered separately:

- A **BMX XSP ●●00** electromagnetic compatibility kit, see page 1/15 .



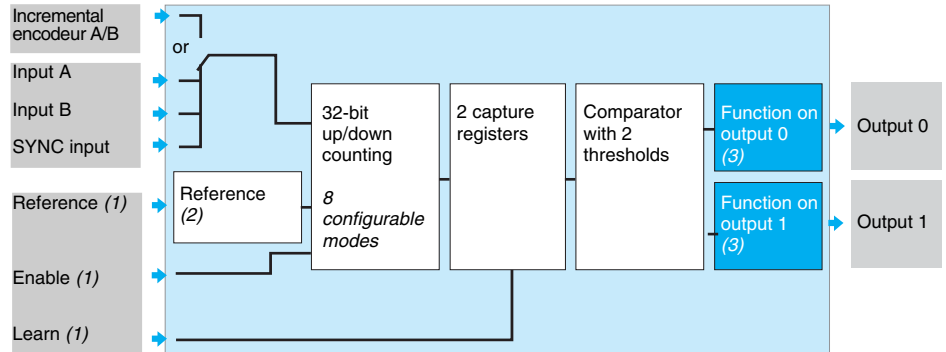
BMX EHC 0200



BMX EHC 0800

### Operation

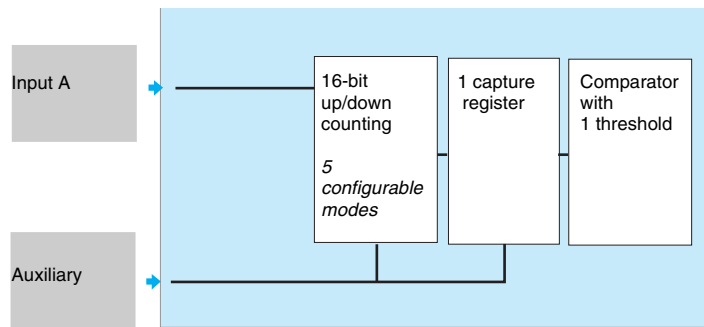
Block diagram of a BMX EHC 0200 module counter channel



2

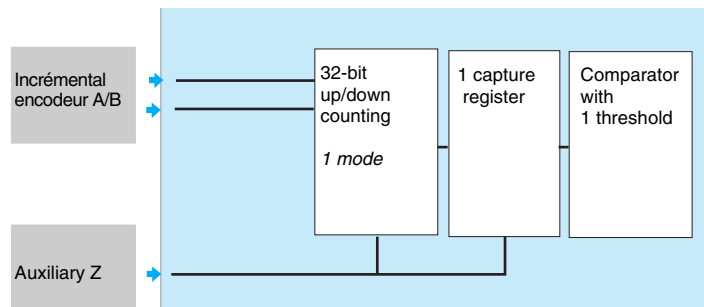
Block diagram of a BMX EHC 0800 module counter channel

Used in 16-bit (8 channels)



2.4

Used in 32-bit (4 channels)



(1) Optional inputs.

(2) Reference: 5 operating modes for SYNC "IN\_SYNC" and Reference "IN\_REF" inputs.

(3) Functions of inputs: 15 possible types of behavior.



### Functional characteristics of the BMX EHC 0200 module

8 configurable modes	Frequency meter	<p>This mode measures a frequency, speed, data rate or an event stream. As standard, this mode measures the frequency received on the IN_A input. This frequency is always expressed in Hz (number of pulses per second), with a precision of 1 Hz.</p> <p>The maximum frequency on the IN_A input is 60 kHz. The maximum cyclic ratio at 60 kHz is 60%.</p>
	Count events	<p>This mode is used to determine the number of events received intermittently. In this mode, the counter calculates the number of pulses applied to the IN_A input, at time intervals defined by the user.</p> <p>The module counts the pulses applied to the IN_A input each time the pulse for this input lasts longer than 5 µs (without anti-bounce filter).</p>
	Measure time periods	<p>This mode is used to:</p> <ul style="list-style-type: none"> <li>■ Determine how long an event lasts for</li> <li>■ Determine the time that separates 2 events</li> <li>■ Time and measure the execution time of a process</li> </ul> <p>Measures the elapsed time during an event or between two events (IN_A input) according to a selectable time base of 1 µs, 100 µs or 1 ms. The IN_SYNC input can be used to enable or stop a measurement.</p> <p>The module can carry out a maximum of 1 measurement every 5 ms. The smallest measurable pulse is 100 µs, even if the unit defined by the user is 10 µs. The maximum measurable duration is 4,294,967,295 units (unit to be defined).</p>
	Ratio count	<p>The ratio count mode only uses the IN_A and IN_B inputs. This count mode consists of 2 modes:</p> <ul style="list-style-type: none"> <li>■ Ratio 1: used to divide 2 frequencies and useful in applications such as flowmeters and mixers, for example.</li> <li>■ Ratio 2: used to subtract 2 frequencies and useful in the same applications but requiring more precise regulation (more similar frequencies).</li> </ul> <p>Ratio 1 mode presents the results in thousandths in order to have better accuracy (a display of 2000 corresponds to a value of 2) and ratio 2 mode presents the results in Hz.</p> <p>The maximum frequency that the module can measure on the IN_A and IN_B inputs is 60 kHz.</p>
	Downcounting	<p>This mode is used to list a group of operations. In this mode, activation of the synchronization function starts the counter which, starting with a preset value, decreases on each pulse applied to the IN_A input, until it reaches the value 0. This downcounting is made possible when the enable function has been activated. The counting register is thus updated at intervals of 1 ms. One basic use of this mode is to signal, using an output, the end of a group of operations (when the counter reaches 0).</p> <p>The smallest pulse applied to the IN_SYNC input is 100 µs. The frequency applied to the IN_SYNC input is at maximum 1 pulse every 5 ms. The maximum value of the preset value is 4,294,967,295. The maximum count value is 4,294,967,295 units.</p>
	Loop (modulo) counting	<p>This mode is used in packaging and labeling applications where actions are repeated on series of moving objects.</p> <ul style="list-style-type: none"> <li>■ In the counting direction, the counter increases until it reaches the preset "modulo - 1" value. On the next pulse, the counter is reset to 0 and counting restarts.</li> <li>■ In the downcounting direction, the counter decreases until it reaches the value 0. On the next pulse, the counter is reset to the preset "modulo - 1" value. Downcounting can then restart.</li> </ul> <p>The maximum frequency applied to the IN_A and IN_B inputs is 60 kHz. The frequency of the modulo event is at maximum 1 every 5 ms. The maximum modulo value is 4,294,967,296 (possible with modulo adjust value is 0) .</p>
	32-bit counter counting	<p>This mode is used mainly in axis following.</p> <p>The maximum frequency applied simultaneously to the IN_A and IN_B inputs is 60 kHz. The frequency of the referencing event is at maximum 1 every 5 ms. The counter value is between - 2,147,483,648 and + 2,147,483,647.</p>
	Width modulation	<p>In this operating mode, the module uses an internal clock generator to supply a periodic signal on the module output Q0. Only the Q0 output is affected by this mode, the Q1 output being independent of this mode.</p> <p>The maximum output frequency value is 4 kHz. As the Q0 output is source type, a load resistor is needed for the Q0 output signal to change to 0 at the correct frequency. The cyclic ratio adjustment range varies according to the frequency of the Q0 output.</p>

### Functional characteristics of the BMX EHC 0800 module

<p><b>5 configurable modes in 16-bit</b></p>	<p>Frequency meter</p>	<p>This mode measures a frequency, speed, rate or data stream control. As standard, this mode measures the frequency received on the IN_A input. This frequency is always expressed in Hz (number of pulses per second), with a precision of 1 Hz. The maximum frequency on the IN_A input is 10 kHz. The maximum cyclic ratio at 10 kHz is 60%.</p>
	<p>Count events</p>	<p>This mode is used to determine the number of events received intermittently. In this mode, the counter calculates the number of pulses applied to the IN_A input, at time intervals defined by the user. As an option, it is possible to use the IN_AUX input during a period of time, provided that the enable bit has indeed been configured. The module counts the pulses applied to the IN_A input each time the pulse for this input lasts longer than 50 µs (without anti-bounce filter). Pulses with less than 100 ms synchronization are lost.</p>
	<p>Downcounting</p>	<p>This mode is used to list a group of operations. In this mode, when counting is enabled (software validation via the valid_sync command), a rising or falling edge on the IN_AUX input causes a value, defined by the user, to be loaded in the counter. The latter decreases on each pulse applied to the IN_A input, until it reaches the value 0. Downcounting is made possible when the force_enable command is high (software positioning). The smallest pulse applied to the IN_AUX input varies according to the selected filter level. The frequency applied to the IN_AUX input is at maximum 1 pulse every 25 ms.</p>
	<p>Loop (modulo) counting</p>	<p>This mode is used in packaging and labeling applications where actions are repeated on series of moving objects. The counter increases on each pulse applied to the IN_A input, until it reaches the preset "modul - 1" value. On the next pulse in the upcounting direction, the counter is reset to 0 and upcounting restarts. The maximum frequency applied to the IN_A input is 10 kHz. The smallest pulse applied to the IN_AUX input varies according to the selected filter level. The frequency applied to the IN_AUX input is at maximum 1 pulse every 25 ms. The frequency of the modulo event is at maximum 1 every 25 ms. The maximum modulo value is 65,536 units.</p>
	<p>Up/down counter</p>	<p>This mode is used for an accumulation, upcounting or downcounting operation on a single input. Each pulse applied to the IN_A input produces:  <ul style="list-style-type: none"> <li>■ Upcounting of pulses if the IN_AUX input is high</li> <li>■ Downcounting of pulses if the IN_AUX input is low</li> </ul>                     The counter values vary between the limits - 65,536 and + 65,535. The maximum frequency applied to the IN_A input is 10 kHz. Pulses applied to the IN_A input, after a change of direction, are only upcounted or downcounted after a period corresponding to the delay for taking account of the state of the IN_AUX input due to the programmable filter level on this input.</p>
<p><b>One mode in 32-bit</b></p>	<p>32-bit counter counting</p>	<p>32-bit counter counting mode is available for channels 0, 2, 4, and 6 (channels 1, 3, 5 and 7 are now inactive). It behaves in the same way as the up/down counting mode using up to 3 physical inputs. It enables simultaneous upcounting and downcounting. The counter values vary between the limits -2,147,483,648 and +2,147,483,647 (31 bits + sign). The maximum frequency applied to the IN_A and IN_B inputs is 10 kHz. The smallest pulse applied to the IN_AUX input is defined according to the filtering applied to this input. The frequency of loading the preset value is at maximum 1 every 25 ms.</p>

2

2.4

General characteristics				
Type of module		BMX EHC 0200		BMX EHC 0800
		32-bit	16-bit	32-bit
Modularity		2 channels	8 channels	4 channels
Number of inputs		6 per channel	2 per channel	3 per channel
Number outputs		2 per channel	–	–
Applications		Upcounting, downcounting, measurement, frequency meter, frequency generator, axis following		Upcounting, downcounting, measurement, interfacing
Configurable modes		8 modes	5 modes	1 mode (Dual phase)
Frequency on counter inputs	<b>kHz</b>	Max. 60	Max. 10	
Module cycle time	<b>ms</b>	1	5	
Encoder		10...30 V incremental encoder model with push-pull outputs	–	10...30 V incremental encoder model with push-pull outputs
Distribution of power to the sensors		Yes. Short-circuit and overload protection, 300 mA typical	–	
Hot swapping		Yes, in certain conditions: the module can be removed and reinserted in its slot while the rack is powered up, but the counter may need to be re-enabled when it is reinserted in its base.		
Insulation voltage from the ground to the bus	<b>V rms</b>	1500 for 1 min		
Consumption	Typical	<b>mA</b>	See power consumption table page 6/8	

Input characteristics				
Module type		BMX EHC 0200		BMX EHC 0800
		16-bit	32-bit	32-bit
Input type	High-speed inputs per channel	IN_A, IN_B and IN_SYNC		IN_A and IN_AUX
	Auxiliary inputs per channel	IN_EN, IN_REF and IN_CAP		–
Number of inputs per channel		6	2	3
Inputs	Voltage	<b>V</b>	24 ---	
	IEC 61131-2 conformity		Type 3	
	At state 1	Voltage	<b>V</b>	11...30 ---
		Current	<b>mA</b>	5 up to 30 V ---
	At state 0	Voltage	<b>V</b>	< 5 ---
		Current	<b>mA</b>	< 1.5
	Current	At 11 V ---	<b>mA</b>	> 2

Characteristics of outputs				
Output type		BMX EHC 0200		BMX EHC 0800
Outputs	Nb per channel		2	–
Voltages	Nominal	<b>V</b>	24 ---	–
	Limits	<b>V</b>	19.2...30 ---	–
Maximum load current	Each point	<b>A</b>	0.5	–
	Per module	<b>A</b>	1	–
Leakage current	At state 0	<b>mA</b>	≤ 0.1	–
Voltage drop	At state 1	<b>V</b>	≤ 3	–
Short-circuit output current	Each point	<b>A</b>	< 1.5	–
Short-circuit and overload			Protection for each channel	–
Output logic	Default		Positive (source) on both channels	–
	User configuration		Negative (sink) on one or two channel(s)	–
Inductive load			L = 0.5/l <sup>2</sup> × F where: - L: load inductance in Henrys - I: load current in A - F: switching frequency in Hz	–

# Modicon M340 automation platform

## BMX EHC 0200/0800 counter modules



BMX EHC 0200



BMX EHC 0800



BMX FTB 2000

### References

#### Counter modules

Description	No. of channels	Characteristics	Reference (1)	Weight kg
<b>Counter modules</b> for 2 and 3-wire 24 V $\pm$ sensors and 10/30 V $\pm$ incremental encoders with push-pull outputs	2	Counting at 60 kHz	<b>BMX EHC 0200</b>	0.112
	8	Counting at 10 kHz	<b>BMX EHC 0800</b>	0.113

#### Connection accessories (1)

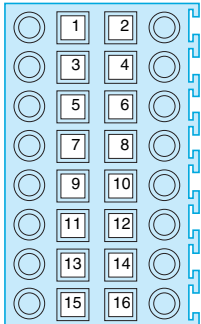
Description	Composition Use	Unit reference	Weight kg
<b>Connector kit</b> For BMX EHC 0200 module	Two 16-pin connectors and one 10-pin connectors	<b>BMX XTS HSC 20</b>	0.021
<b>20-way removable terminals blocks</b> For BMH EHC 0800 module	Cage clamp	<b>BMX FTB 2000</b>	0,093
	Screw clamp	<b>BMX FTB 2010</b>	0,075
	Spring-type	<b>BMX FTB 2020</b>	0,060

<b>Electromagnetic compatibility kits</b> For BMX EHC 0200/0800 modules	Comprising: a metal bar, two sub-bases and one set of spring clamping rings	See page 1/15	–
--	---	---------------	---

(1) The shielding on the cordsets carrying the analog signals must always be connected to the **BMX XSP000** shielding connection kit mounted under the rack holding the analog modules (see page 1/15).

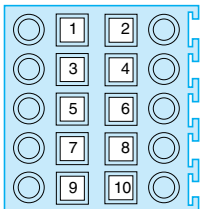
### Connections for BMX EHC 0200 module

#### 16-pin connector pinout



Pin number	Symbol	Description
1, 2, 7, 8	24V_SEN	+ 24 V $\overline{\text{---}}$ sensors
5, 6, 13, 14	GND_SEN	0 V $\overline{\text{---}}$ sensors
15, 16	FE	Functional earth
3	IN_A	Input A
4	IN_SYNC	Synchronization input
9	IN_B	Input B
10	IN_EN	Enable input
11	IN_REF	Referencing input
12	IN_CAP	Capture input

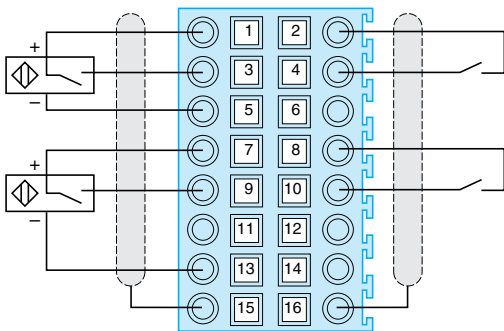
#### 10-pin connector pinout



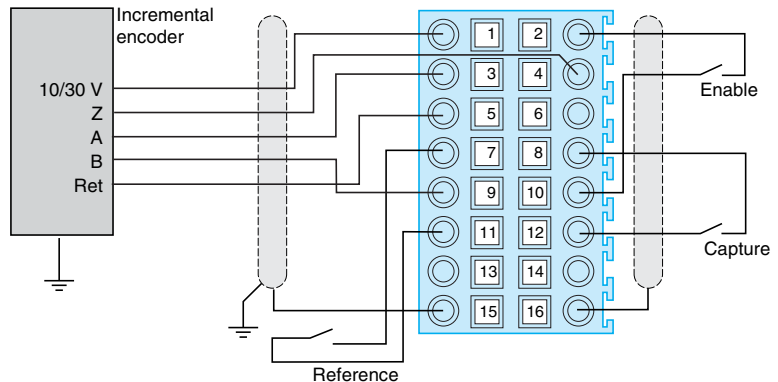
Pin number	Symbol	Description
1	24V_IN	+ 24 V $\overline{\text{---}}$ input power supply
2	GND_IN	0 V $\overline{\text{---}}$ input power supply
5	Q0-1	Q1 output of counter channel 0
6	Q0-0	Q0 output of counter channel 0
7	Q1-1	Q1 output of counter channel 1
8	Q1-0	Q0 output of counter channel 1
9	24V_OUT	+ 24 V $\overline{\text{---}}$ output power supply
10	GND_OUT	0 V $\overline{\text{---}}$ output power supply

### Examples of connection to the BMX EHC 0200 module

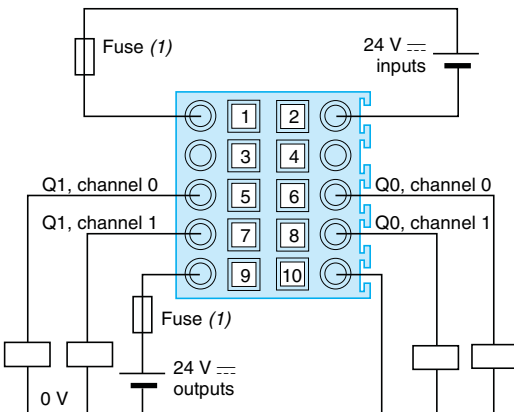
#### 2-/3-way sensor



#### Incremental encoder



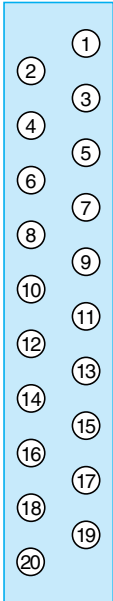
### Power supplies and actuators



(1) A fast-blow fuse should be used to protect the module electronics in the event of reversed polarity of the power supplies on the inputs and outputs.

### Connections for BMX EHC 0800 module

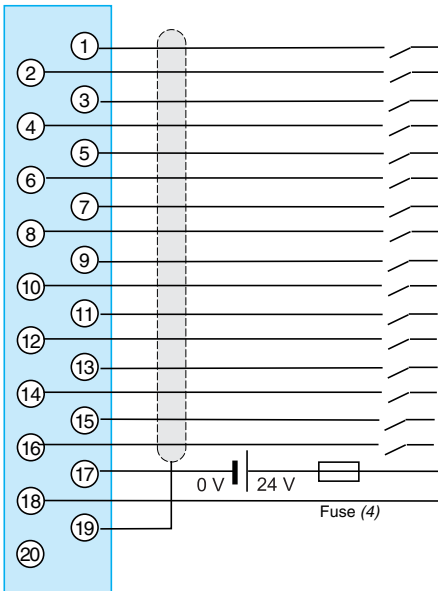
#### Connector pinout for the BMX FTX 20●0, 20-way terminal block



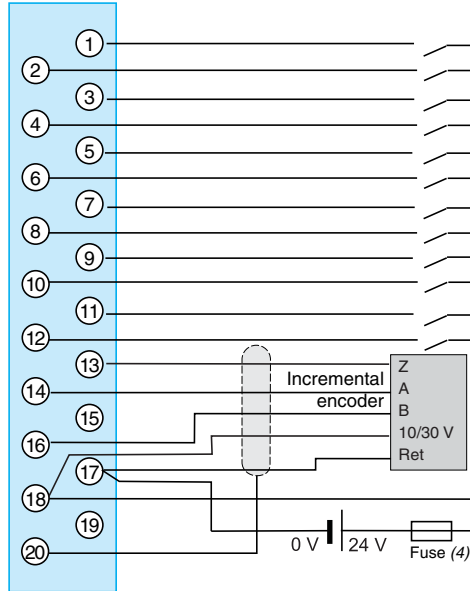
Pin number	Description
1	IN_AUX input of channel 0
2	IN_A input of channel 0
3	IN_AUX input of channel 1
4	IN_A input of channel 1 or IN_B input of channel 0
5	IN_AUX input of channel 2
6	IN_A input of channel 2
7	IN_AUX input of channel 3
8	IN_A input of channel 3 or IN_B input of channel 2
9	IN_AUX input of channel 4
10	IN_A input of channel 4
11	IN_AUX input of channel 5
12	IN_A input of channel 5 or IN_B input of channel 4
13	IN_AUX input of channel 6
14	IN_A input of channel 6
15	IN_AUX input of channel 7
16	IN_A input of channel 7 or IN_B input of channel 0
17	0 V $\text{---}$ sensors
18	+ 24 V $\text{---}$ sensors
19	Functional earth, for shielding connection
20	Functional earth, for shielding connection

#### Examples of connection to the BMX EHC 0800 module

##### Connection of sensors (1) (2) (3)



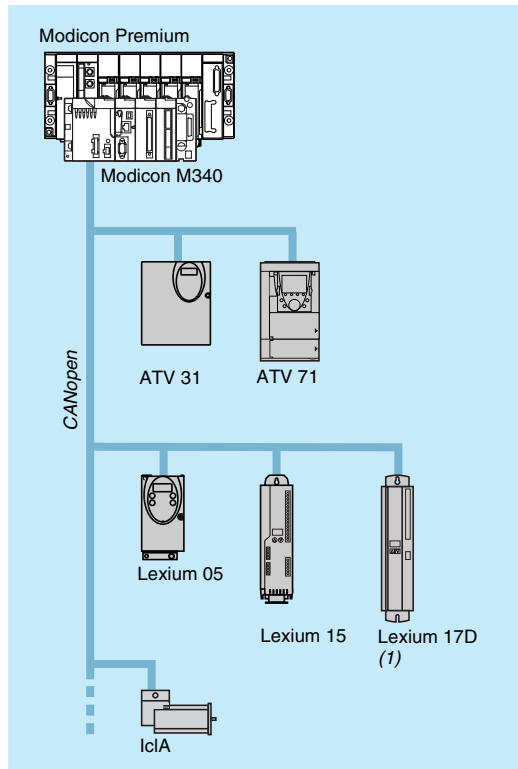
##### Connection of an incremental encoder (1) (2) (3)



- (1) It is advisable to adapt the programmable filtering to the frequency applied to the inputs since using programmable filtering avoids the need to use a shielded cable.
- (2) In the case of an encoder or a high-speed sensor without programmable filtering, it is advisable to use a shielded cable connected to pins 15 and 16 of the connector.
- (3) In the case of a very disturbed environment without programmable filtering, it is advisable to use the **BMX XSP 010** electromagnetic protection kit to connect the shielding. In this case it is also advisable to use a 24 V  $\text{---}$  power supply dedicated to the inputs as well as a shielded cable for connecting the power supply to the module.
- (4) A fast-blow fuse should be used to protect the module electronics in the event of reversed polarity of the power supplies.

2

.4



MFB: Motion control distributed over CANopen



## Presentation

MFB (Motion Function Blocks) is a library of function blocks integrated in Unity Pro used to set up motion control in the architectures of drives and servo drives on machine buses and CANopen installations:

- Altivar 31: For asynchronous motors from 0.18 to 15 kW
- Altivar 71: For asynchronous motors from 0.37 to 500 kW
- Lexium 05: For servo motors from 0.4 to 6 kW
- Lexium 15LP/MP/HP: For BSH and BDH servo motors from 0.9 to 42.5 kW
- Lexium 17D: For BPH, BPL and SER servo motors from 1.5 to 70 A rms (1)
- IclA IFA/IFE/IFS: For integrated motor drives from 0.05 to 0.25 kW

In compliance with PLCopen specifications, the MFB library allows both easy and flexible motion programming with Unity Pro, as well as axis diagnosis. In maintenance operations, drives can be replaced quickly and safely thanks to drive parameter download blocks.

Setting up drives on the CANopen network is facilitated through Motion Tree Manager organization in the Unity Pro browser, making it easy for users to access the application drives.

## Applications

The features of the Motion Function Blocks library are particularly suitable for machines with independent axes. In the case of these modular/special machines, MFB function blocks are the perfect solution for controlling single axes. The following are typical applications for this type of architecture:

- Automatic storage/removal
- Handling
- Palletizers/depalletizers
- Conveyors
- Packaging, simple label application
- Grouping/ungrouping
- Adjustment axes in flexible machines, etc.

## Functions

The table below lists the function blocks of the MFB library and the drives compatible with them. The prefix indicates the block family:

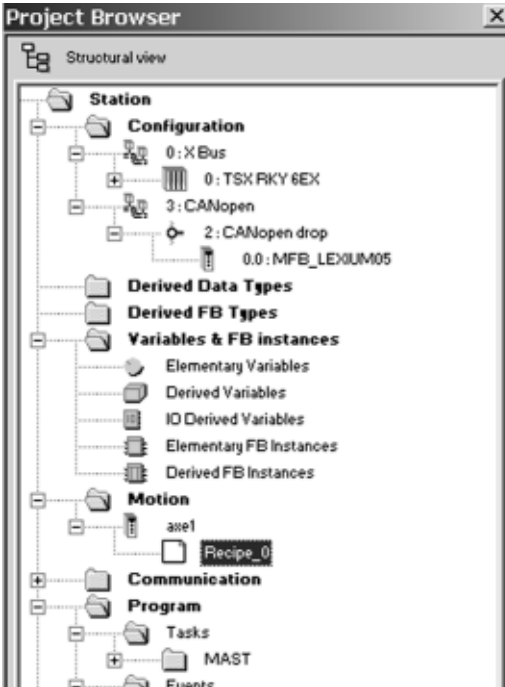
- MC: Function block defined by the Motion Function Blocks PLCopen standard
- TE: Function block specific to Telemecanique products
- Lxm: Function block specific to Lexium servo drives

Type	Function	Function block	Altivar		Lexium		IclA
			ATV 31	ATV 71	05	15/17D (1)	
Management and motion	Read an internal parameter	MC_ReadParameter					
	Write an internal parameter	MC_WriteParameter					
	Read the current position	MC_ReadActualPosition					
	Read the instantaneous speed	MC_ReadActualVelocity					
	Acknowledge error messages	MC_Reset					
	Stop all active movement	MC_Stop					
	Axis coming to standstill	MC_Power					
	Movement to absolute position	MC_MoveAbsolute					
	Relative movement	MC_MoveRelative					
	Additional movement	MC_MoveAdditive					
	Homing	MC_Home					
	Movement at given speed	MC_MoveVelocity					
	Read diagnostic data	MC_ReadAxisError					
	Read servo drive status	MC_ReadStatus					
Save and restore parameters (FDR)	Read all parameters and store in PLC memory	TE_UploadDriveParam					
	Write all parameters from the PLC memory	TE_DownloadDriveParam					
Advanced Lexium functions	Set the reduction ratio	Lxm_GearPos				(2)	
	Read a motion task	Lxm_UploadMTask					
	Write a motion task	Lxm_DownloadMTask					
	Start a motion task	Lxm_StartMTask					
System	Communication with the servo drive	TE_CAN_Handler					

Compatible

(1) Lexium 17D supported by MFB with Modicon Premium platform only

(2) Function not supported by Lexium 15 LP servodrives



Motion Tree Manager integrated in the Unity Pro browser

### Motion Tree Manager

Motion Tree Manager is associated with Unity Pro's MFB library, and integrated in its browser. It provides specific assistance for:

- Axis object management
- Axis variable definition
- Drive parameter management

Motion Tree Manager automatically creates links between the CANopen bus configuration and the MFB function block data using a limited amount of configuration data.

### General axis parameters

In this tab, the designer is prompted to define:

- The name of the axis that will identify it in the browser for the entire application
- The address of the drive on the CANopen bus

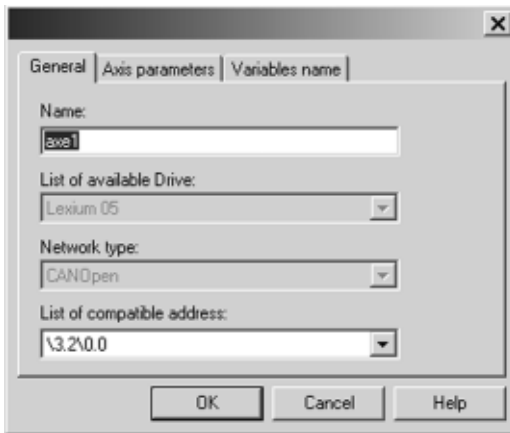
### Axis parameters

The dropdown lists in this tab are used to determine the exact type of drive: family, version.

### Variable names

This last tab is used to identify data structures:

- **Axis Reference**, used by all the instances of function blocks for the axis in question
- **CAN\_Handler**, used to manage communication with the drive via the CANopen network



General parameters: Axis name and address

### Recipe definition

The "recipes" attached to the axis are the data structures containing all the adjustment parameters of a given drive. This data is used when:

- Changing the drive with restoration of the context during "Faulty Device Replacement" maintenance
- Changing the manufacturing program of the machine, and calling up an appropriate set of parameters, such as servo control gains, limitations etc. adapted to the weight and size of the moving parts.

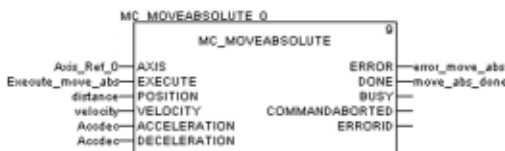
### Programming, diagnostics and maintenance

Communication between the PLC and drive is automatically set up by the system as soon as a TE\_CAN\_Handler instance is declared in the Unity Pro task with which the axis is associated.

Movements are then programmed by sequencing function blocks from the library in the Unity Pro editor as selected by the user (LD, ST, FBD).

The two function blocks, MC\_ReadStatus, and in some cases MC\_ReadAxisError, are useful for determining the overall status of the axis, and the code of active warnings or errors.

The function blocks TE\_UploadDriveParam and TE\_DownloadDriveParam allow the application to save all the parameters of a drive (recipe) and to then quickly reload them into another drive if the first one fails.



MFB: Programming a movement in absolute mode





*Communication selection guide* ..... page 3/2

## 3.1 - Ethernet TCP/IP networks - Transparent Ready

- Embedded Web services ..... page 3/4
- Ethernet TCP/IP communication services ..... page 3/8
- Performance ..... page 3/16
- Ethernet integrated port / module selection ..... page 3/21
- Ethernet processor/module product data sheet ..... page 3/22
- ConneXium cabling system ..... page 3/24

## 3.2 - CANopen machines and installations bus

- Presentation ..... page 3/36
- Description ..... page 3/38
- Characteristics ..... page 3/38
- References ..... page 3/39
- Cabling system ..... page 3/40

## 3.3 - Serial lines

- Modbus and character mode serial link ..... page 3/42
- Cabling system ..... page 3/44



# Modicon M340 automation platform

Communication, integrated ports and modules

**Applications**

**Processors with integrated Ethernet TCP/IP port**

**Ethernet TCP/IP module**



3

**Type**

**Ethernet TCP/IP**

<b>Structure</b>	Physical interface
	Connector type
	Access method
	Data rate

10BASE-T/100BASE-TX
RJ45
CSMA-CD
10/100 Mbit/s

**Medium**

Double twisted pair copper cable, category CAT 5E  
Optical fiber via ConneXium wiring system

<b>Configuration</b>	Maximum number of devices
	Maximum length
	Number of links of the same type per station
	Other integrated port

-	
100 m (copper cable), 4,000 m (multi-mode optical fiber), 32,500 m (single-mode optical fiber)	
1 (integrated port)	1 (Ethernet module) with BMX P34 1000/2010 processor 2 (integrated port et Ethernet module) with BMX P34 2020/2030 processor
Serial link	CANopen bus

**Standard services**

Modbus TCP/IP messaging

**Conformity class**

Transparent Ready class B10	Transparent Ready class B30	Transparent Ready class C30
-----------------------------	-----------------------------	-----------------------------

<b>Embedded Web server services</b>	Standard services
	Configurable services

"Rack viewer" PLC diagnostics "Data editor" access to PLC data and variables	
-	"Alarm viewer" "Graphic Data Editor"
-	Hosting and display of user Web pages (16 Mb)

<b>Transparent Ready communication services</b>	I/O Scanning service
	FDR service
	SNMP network management service
	Global Data service
	SMTP E-mail notification service
	SOAP/XML Web services
	Passband management

No	Yes
Yes (client)	Yes (server)
Yes	
No	Yes
No	Server
Yes	

**Compatibility with processor**

- Standard and Performance processors

**Processor or module**

<b>BMX P34 2020</b>	<b>BMX P34 2030</b>	<b>BMX NOE 0100</b>	<b>BMX NOE 0110</b>
---------------------	---------------------	---------------------	---------------------

**Page**

3/22	3/23
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▲ Available 4<sup>th</sup> quarter 2007. Before this date, please order the **BMX NOE 0100** Ethernet module with **BMX RWS C016M** memory card, same services except Data editor service with pocket PC or PDA terminal and SOAP/XML Web services.

**Processors with integrated machine and installation bus**

**Processors with integrated serial link**



**CANopen**

ISO 11898 (9-way SUB-D connector)  
 9-way SUB-D  
 CSMA/CA (multiple access)  
 20 Kbit/s...1 Mbit/s depending on distance

Double shielded twisted pair copper cable

63  
 20 m (1 Mbit/s)...2,500 m (20 kbit/s)  
 1

Serial link      Ethernet TCP/IP

- PDO implicit exchange (application data)  
 - SDO explicit exchange (service data)  
 Class M20

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**BMX P34 2010**

**BMX P34 2030**

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**Modbus and Character mode**

Non-isolated, 4-wire RS 232/2-wire RS 485  
 RJ45  
 Master/slave with Modbus link,  
 Half duplex (RS 485)/Full duplex (RS 232) in character mode  
 0.3...19.2 Kbit/s

Double shielded twisted pair copper cable

32 per segment, 247 max.  
 15 m (non-isolated), 1,000 m with insulating case  
 1

-      CANopen      Ethernet TCP/IP

Read/write bits and words, diagnostics with Modbus link  
 Send and receive character string in character mode

-

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-

**BMX P34 1000**

**BMX P34 2010**

**BMX P34 2020**

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# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready  
Web services

## Overview of the Web services

In conformity with Schneider Electric Ethernet products (processors and Ethernet modules on Modicon automation platforms, distributed I/O modules, variable speed drives and gateways), standard Web functions are integrated in

**BMX P34 2020/2030** processors and the **BMX NOE 0100/110** Ethernet network modules on the Modicon M340 platform.

From a simple Internet browser, the standard Web server authorizes the following "ready-to-use" functions:

- Remote diagnostics and maintenance of products
- Display and adjustment of products (read/write variables, status)

With the **BMX NOE 0110 (1)** Ethernet network module, the Web server also offers the following functions:

- Management of PLC alarms (system and application) with partial or total acknowledgement (ready-to-use Alarm Viewer function pages).
- Hosting and display of Web pages created by the user.

The embedded Web server is a realtime data server. All the data can be presented in the form of standard Web pages in HTML format and can therefore be accessed using any Web browser that supports the embedded Java code. The standard functions provided by the Web server are supplied "ready-to-use" and thus do not require any programming of either the PLC or the client PC device supporting a Web browser.

## Standard Web server on the Modicon M340 platform

### Rack Viewer PLC diagnostics function

The Rack Viewer function can be used for PLC system and I/O diagnostics. It displays the following in realtime:

- LED status on the front panel of the PLC
- The PLC type and version
- The hardware configuration of the PLC including the status of the system bits and words
- Detailed diagnostics (2) of each of the:
  - I/O module channels or application-specific channels in the configuration
  - equipment connected on the CANopen bus.

### Data Editor read/write function for PLC data and variables

The Data Editor function can be used to create tables of animated variables for realtime read/write access to PLC data in the form of lists.

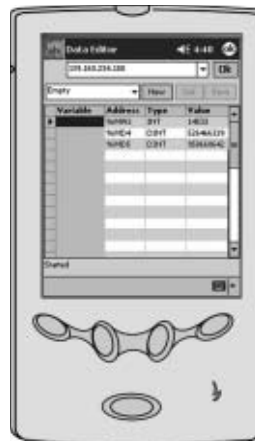
Various animation tables containing specific application variables to be monitored or modified can be created by the user and saved in the standard Web server module.



Modicon M340 hardware configuration



Data editor variables table



In addition when using FactoryCast Web server of the **BMX NOE 0110 (1)** module:

- The variables can be entered and displayed by their symbol (3) (S\_Pump 234)
- The write access option can be enable/disable for each variable using the Factorycast software. The write access is protected by a dedicated password
- Dedicated data monitoring tool can be use on pocket PC or PDA terminal (2).

(1) Module available 4<sup>th</sup> quarter 2007. Before this date, please order the **BMX NOE 0100** module with **BMX RWS C016M** memory card.

(2) Function available 4<sup>th</sup> quarter 2007.

(3) Access to symbols available 4<sup>th</sup> quarter 2007. Hence provides access to unlocated data.

# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready FactoryCast Web services



Alarm display from the diagnostic buffer

## BMX NOE 0110 module FactoryCast Web server

With the **BMX NOE 0110 (1)** Ethernet network module, the Web server offers, in addition to the standard Web services, the functions below.

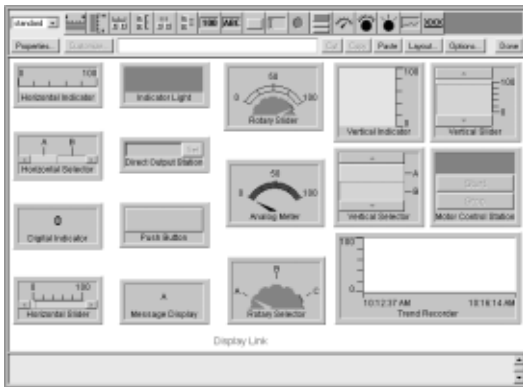
### Alarm Viewer function (2)

Alarm Viewer (2) is a ready-to-use, password-protected function. This function can be used to process alarms (display, acknowledgment and deletion) managed at PLC level by the system or using diagnostic function blocks known as DFBs (system-specific diagnostic function blocks and application-specific diagnostic function blocks created by the user).

These alarms are stored in the diagnostic buffer managed by the Modicon M340 platform (special memory space for storing all the diagnostics events).

The diagnostics viewer is a Web page comprising a list of messages, which displays the following information for each alarm:

- Dates and times of the occurrence/removal of a fault
- Alarm message
- Alarm status
- Type of associated diagnostic function block (DFB)



Library of predefined graphic objects

### Graphic Data Editor function

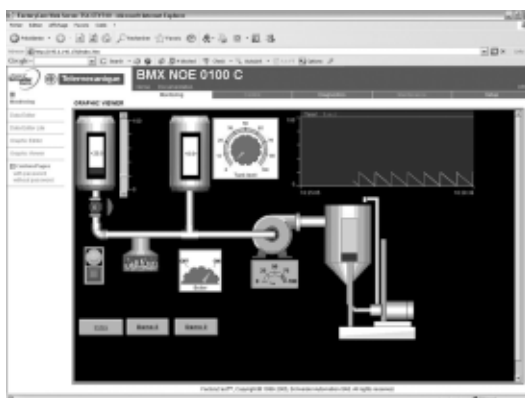
This function is used to create the graphic views animated by the PLC variables that can be accessed via their address or their symbol (3) (access to located data). The ready-to-use graphic editor is available online, connected to the **BMX NOE 0110** module (1).

These views are created from a library of predefined graphic objects by simple copy/paste operations. The objects are configured to suit the user's requirements (color, PLC variables, name, etc).

List of proposed graphic objects:

- Analog and digital indicators
- Horizontal and vertical bar charts
- Boxes for displaying messages and entering values
- Pushbutton boxes
- Functions for recording trends
- Vats, valves, motors, etc

Customized graphic objects can be added to this list. They can be reused in user Web pages that have been created using standard software for editing HTML pages. The views thus created are saved in the **BMX NOE 0110** module and displayed using any Web browser.



Realtime supervision graphic interface

### User Web page hosting and display function

The **BMX NOE 0110** Ethernet network module has a 16 Mbyte non-volatile memory (accessible as a hard disk). This allows hosting of Web pages and any user-defined Word or Acrobat Reader document (for example, maintenance manuals, wiring diagrams, etc).

The Web pages can be created using any standard tool for creation and editing in HTML format. These pages can be enhanced by inserting animated graphic objects linked to PLC variables. These animated objects are created using the Graphic Data Editor. They are then downloaded to the **BMX NOE 0110** module via configuration software of FactoryCast Web server.

The Web pages created can be used, for example, to:

- Display and modify all PLC variables in real time
  - Create hyperlinks to other external Web servers (documentation, suppliers, etc)
- This function is particularly suitable for creating graphic interfaces used for the following purposes:
- Realtime display and supervision
  - Production monitoring
  - Diagnostics and help with maintenance
  - Operator guides

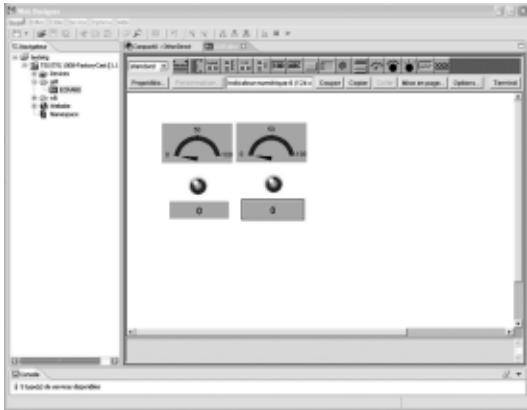
(1) Module available 4<sup>th</sup> quarter 2007. Before this date, please order the **BMX NOE 0100** module with **BMX RWS C016M** memory card.

(2) Function available 4<sup>th</sup> quarter 2007.

(3) Access to symbols available 4<sup>th</sup> quarter 2007.

# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready FactoryCast Web services and SOAP/XML Web services



## FactoryCast Web server configuration software

The FactoryCast Web server configuration software is supplied on CD-ROM with the **BMX NOE 0110** FactoryCast module.

This software is used for configuration and administration of the Web server embedded in these modules. It is compatible with Windows 2000 and Windows XP operating systems. It provides the following functions:

- Setting the parameters of the FactoryCast functions
  - Definition of access security, passwords
  - Importing of PLC symbol databases
  - Definition of access to write-enabled variables
- Management of the Web site:
  - Management of default Web site pages
  - Management of user Web site pages (2)
  - Graphic object editor for animating Web pages
  - Downloading of Web pages between the PC and the module
  - Debugging of Web pages in online mode or in simulation mode (including animations and Java beans)
- Simulation mode

The application and the Web site (including the Java animations) can be set up in online mode or in simulation mode. Simulation mode is used to test the operation of the Web application without a FactoryCast module (with no physical connection to a PLC) thereby simplifying debugging.

A graphics editor integrated in the configuration software can be used for easy customization of graphic objects (bar charts, gauges, LEDs, curves, cursors, operator input fields, alphanumeric display fields, buttons, etc).

- Creation of user Web pages (1)

User Web pages are created graphically using an external HTML editor (FrontPage or similar, not supplied).

User Web pages created in the FactoryCast environment are actual animated supervision screens and can be used to monitor your process. Based on Web technologies (HTML and Java) they provide realtime access to PLC variables using the FactoryCast graphic object library (Java beans).

## SOAP/XML Web services (2)

The **BMX NOE 0110** FactoryCast module (3) incorporates a standard SOAP/XML data server that provides direct interoperability between automation devices and computer management applications (MES, ERP, SAP, ●Net application, etc).

## SOAP/XML Web Services embedded in the PLC

Communication between platforms or applications is now a necessity in a market where **e-manufacturing** and **e-business** are an essential fact of life for companies. Web service technology currently represents the most successful strategy for ensuring interoperability of heterogeneous software applications via an Intranet or the Internet, independently of any platform, operating system and programming language.

The standardisation of Web services has come about as a result of joint development between **Microsoft** and **IBM**, amongst others, validated at the **W3C (World Wide Web Consortium)** as an open "standard".

It now provides all the tools, specifications and environments needed for each platform.

Web services are based on standards such as:

- **XML (eXtensible Markup Language)**: the universal standard for data exchange
- **SOAP (Single Object Access Protocol)** protocol carried via the **HTTP (Hyper Text Transfer Protocol)** channel.
- **WSDL (Web Services Description Language)** the Web Services description language, in **XML** format.

SOAP is currently considered to be the reference protocol, including in industry. It has since been adopted by the main players such as Microsoft (●NET, SQL Server, Office, etc), IBM (Java, Web Sphere), Lotus, ORACLE, Sub, SAP, ...

(1) FactoryCast includes a plug-in for FrontPage 2000. This plug-in makes it easier to set up animations for realtime access to the PLC variables in HTML pages created by the user. They are created in the HTML editor by simply inserting customized graphic objects.

(2) Web services available 4<sup>th</sup> quarter 2007.

(3) Module available 4<sup>th</sup> quarter 2007.

# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready SOAP/XML Web services

## SOAP/XML Web services (suite)

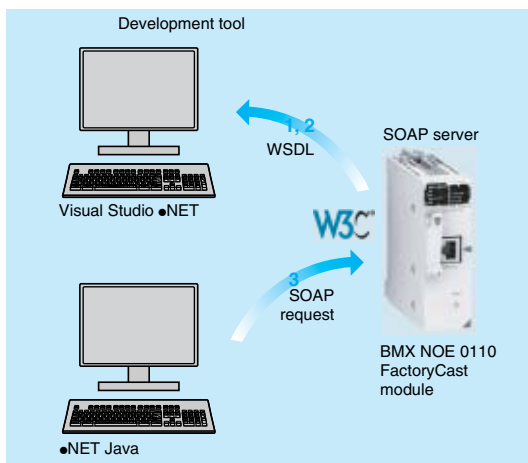
### Embedded SOAP/XML Web Services: ModbusXMLDa Web services

This new Transparent Ready service offers the previously unused (or uncommon) possibility of making an IT/e-business application interact directly with the control system levels using the same standards.

With the implementation of ModbusXMLDa (*Modbus XML Data access*) Web services in FactoryCast Web servers, the IT engineer can easily create his own application which will access the desired information directly in the PLC and in real time.

Data exchanges are made in XML standard format in response to a request using SOAP protocol.

The implementation of Web services in control system equipment makes it easy to achieve vertical integration of the control level and the creation of even more collaborative architectures which can be used to link production systems to the corporate management systems. It brings simplified access to information, a reduction in the costs of training, development and deployments costs, plus an increase in productivity.



### Implementation of the ModbusXMLDa Web services: server interface

This implementation enables a SOAP client application (management level computer application, MES, ERP, etc) to communicate directly with a FactoryCast Web server module embedded in the PLC.

Exchanges are initiated by the SOAP client application (the server responds to these requests).

- **Step 1: Creation of the client application with learning of the Web services.** The development environment (for example, Visual Studio .NET) looks in the FactoryCast server for the list of available services and their WSDL standard interfaces provided by the module.
- **Step 2: Development of the client application.** The developer integrates the Web service functions using the code retrieved at the learning stage.
- **Step 3: Execution of the client application.** The client application communicates in real time with the FactoryCast Web server module using the SOAP protocol.

Requests implemented in the **BMX NOE 0110** FactoryCast module listed provide either physical or symbolic variables data access. They are defined in the table below.

	ModbusXMLDa functions implemented in each FactoryCast module
Access to data via physical address	ReadDeviceIdentification
	ReadMultipleRegisters
	WriteMultipleRegisters
	ReadCoils
	WriteMultipleCoils
Access to data via symbol	ReadDiscretInputs
	Read, operation to read item list value
	Write, operation to write item list value
	Browse, operation to browse item list

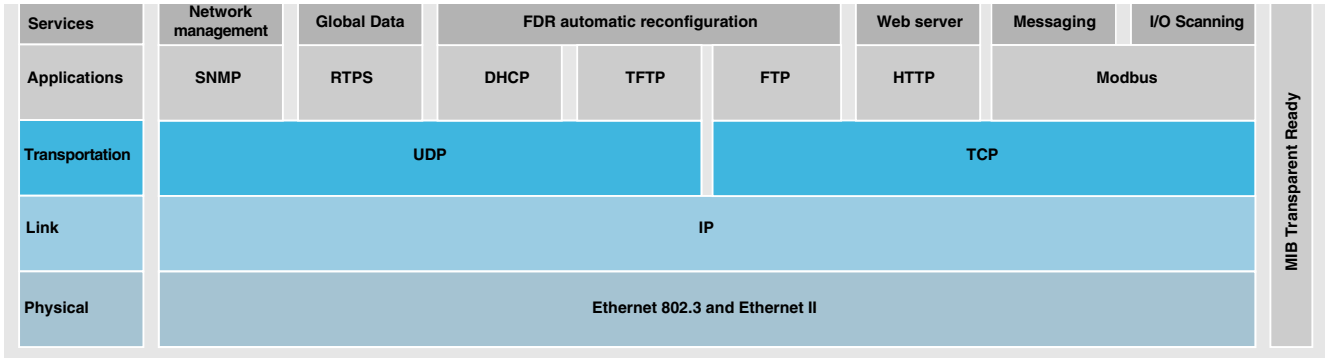


# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready  
Ethernet TCP/IP communication services

## Presentation

**BMX P34 2020 / 2030** processors, via their integrated Ethernet port (class 10) and the **BMX NOE 0100/0110** network module (class 30) provide transparent communication on a single Ethernet TCP/IP network.



3

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In addition to universal Ethernet services (HTTP, BOOTP/DHCP, FTP, etc) and with the Modicon M340 automation platform, the Transparent Ready device communication services designed for use in automation applications include:

- Modbus TCP/IP messaging for class 10 or 30 devices
- I/O Scanning service for class 30 devices
- FDR (Faulty Device Replacement) for class 10 or 30 devices
- SNMP (*Simple Network Management Protocol*) network management for class 10 or 30 devices
- Global Data, for class 30 devices
- Bandwidth management for class 10 or 30 devices

The following pages present the various options available through all of these services in order to facilitate the optimum choice of solutions when defining a system integrating Transparent Ready devices.

# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready  
Ethernet TCP/IP communication services

## Functions

### Ethernet universal services

#### HTTP "Hyper Text Transfer Protocol" (RFC1945)

The HTTP protocol (*HyperText Transfer Protocol*) is a protocol used to transmit Web pages between a server and a browser. HTTP has been used on the Web since 1990.

Web servers embedded in Transparent Ready automation products provide easy access to products located anywhere in the world from a standard Internet browser such as Internet Explorer.

#### BOOTP/DHCP (RFC1531)

BOOTP/DHCP is used to supply devices with IP parameters automatically. This avoids having to manage each device address individually by transferring this management to a dedicated IP address server.

The DHCP protocol (Dynamic Host Configuration Protocol) is used to assign configuration parameters to devices automatically. DHCP is an extension of BOOTP. The DHCP protocol consists of 2 components:

- One to supply the IP network address.
- One to supply the specific IP parameters to the device from a DHCP server.

*Telemecanique devices can be:*

- *BOOTP clients used to retrieve the IP address automatically from a server.*
- *BOOTP servers allowing the device to distribute IP addresses to the network stations.*

*Telemecanique has used BOOTP/DHCP standard protocols to offer the FDR (Faulty Device Replacement) service.*

#### FTP "File Transfer Protocol" (RFCs 959, 2228, and 2640)

File Transfer Protocol (FTP) provides the basic elements for file sharing. The FTP protocol is used by several systems to exchange files between devices.

#### TFTP "Trivial File Transfer Protocol" (updated firmware)

Trivial File Transfer Protocol (TFTP) is a network transfer protocol used to connect to a device and download code to it.

For example, it can be used to transfer a boot code to a workstation without a disk drive or to connect and download updates of network device firmware.

**Note:** *Transparent Ready devices implement FTP and TFTP to transfer certain information to or from products, in particular for downloads of firmware or user-defined Web pages.*

# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready  
Ethernet TCP/IP communication services

## Functions (continued)

### Ethernet universal services (continued)

#### SNMP "Simple Network Management Protocol" (RFCs 1155, 1156 and 1157)

The Internet community has developed the SNMP standard in order to manage the various network components via a single system. The network management system can exchange data with SNMP agent devices. This function allows the manager to display the status of the network and products, modify their configuration and feed back alarms in the event of a fault.

*Note: Transparent Ready products are compatible with SNMP and can be integrated naturally in a network administered via SNMP.*

#### COM/DCOM "Distributed Component Object Model"

COM/DCOM (Distributed Component Object Model) or OLE (Object Linking and Embedding) is the name of the technology consisting of Windows objects which enables transparent communication between Windows applications.

*Note: These technologies are used in the OFS (OLE for Process Control Factory Server) data server software.*

# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready Ethernet TCP/IP communication services

Modbus TCP/IP function codes		dec	hex
Bit access	Read n input bits	02	02
	Read n output bits	01	01
	Read exception status	07	07
	Write 1 output bit	05	05
	Write n output bits	15	0F
	Read 1 input word	04	04
	Read n input words	03	03
	Write 1 output word	06	06
	Write n output words	16	10
	Read device ID	43/14	2B/0E

Examples of Modbus TCP/IP function codes for accessing data and diagnostics.

## Functions (continued)

### Modbus standard communication protocol

Modbus, the industry communication standard since 1979 has been brought together with Ethernet TCP/IP, the medium for the Internet revolution, to form Modbus TCP/IP, a totally open protocol on Ethernet. The development of a connection to Modbus TCP/IP does not require any proprietary component, nor purchase of a license.

This protocol can easily be combined with any product supporting a standard TCP/IP communication stack. The specifications can be obtained free of charge from the following Web site: [www.modbus-ida.org](http://www.modbus-ida.org).

### Modbus TCP/IP, simple and open

The Modbus application layer is very simple and universally familiar with its 9 million installed connections. Thousands of manufacturers are already using this protocol. Many have already developed a Modbus TCP/IP connection and numerous products are presently available.

The simplicity of Modbus TCP/IP enables any field device, such as an I/O module, to communicate on Ethernet without the need for a powerful microprocessor or lots of internal memory.

### Modbus TCP/IP, high-performance

Due to the simplicity of its protocol and the fast speed of 100 Mbit/s Ethernet, the performance of Modbus TCP/IP is excellent. This allows this type of network to be used in realtime applications such as I/O scanning.

### Modbus TCP/IP, a standard

The application protocol is identical on serial link Modbus, Modbus Plus or Modbus TCP/IP. This means that messages can be routed from one network to the other without converting protocol.

Since Modbus is implemented on top of the TCP/IP layer, users can also benefit from IP routing enabling devices located anywhere in the world to communicate without worrying about the distance between them.

Schneider Electric offers a complete range of gateways for connecting a Modbus TCP/IP network to existing Modbus Plus networks, a Modbus serial link or AS-Interface bus. Please consult your Regional Sales Office.

The IANA organization (Internet Assigned Numbers Authority) has allocated the fixed port TCP 502 ("Well known" port) to the Modbus protocol. Thus Modbus has become an Internet standard.

A study by the ARC Advisory Group, the market leader in analysis of the automation and software sectors, has shown that Modbus TCP/IP is the world-leading Ethernet industrial protocol in terms of units sold in 2004.

Modbus and Modbus TCP/IP are recognized by the IEC 61158 international standard as a fieldbus. They are also compliant with the "Chinese National Standard" managed by ITEI.

### Interfacing CANopen with Modbus TCP/IP

CiA DSP 309-2 provides standardized organization of CANopen data to be carried on a Modbus TCP/IP Ethernet network. The specification reserves the Modbus 43/13 function code for this purpose. This function code is reserved exclusively for CANopen.

### Characteristics of Modbus TCP/IP

Maximum size of data:

- Read: 125 words or registers
- Write: 100 words or registers

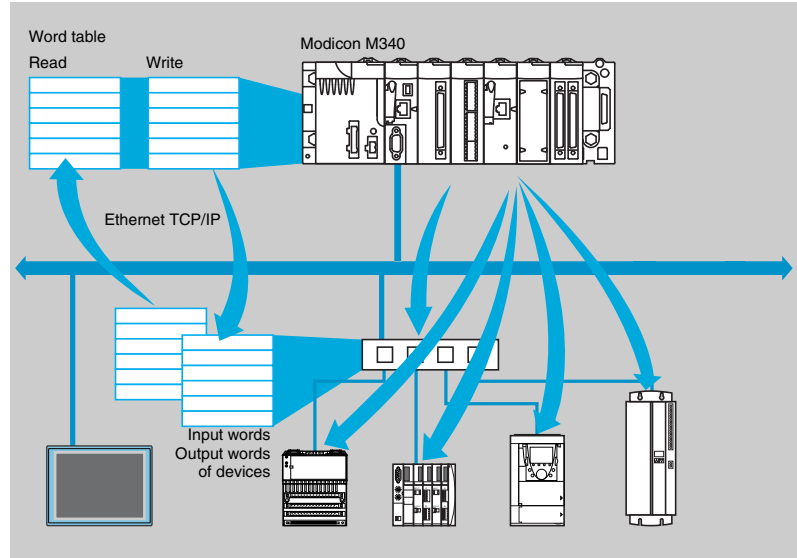
# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready Ethernet TCP/IP communication services

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## Functions (continued)

### I/O Scanning service



The I/O Scanning Service is used to manage the exchange of remote I/O states on the Ethernet network after simple configuration, without the need for any special programming.

I/O scanning is performed transparently by means of read/write requests according to the Modbus client/server protocol on the TCP/IP profile. This scanning principle via a standard protocol is used to communicate with any device supporting a Modbus server on TCP/IP.

This service allows you to define:

- A %MW word zone reserved for reading inputs.
- A %MW word zone reserved for writing outputs.
- Refresh periods independent of the PLC scan.

During operation, the module:

- Manages TCP/IP connections for each remote device.
- Scans devices and copies the I/O to the configured %MW word zone .
- Feeds back status words used to check that the service is working correctly from the PLC application.
- Applies pre-configured fallback values if a communication problem occurs

An offer of hardware and software products used to implement the I/O Scanning protocol on any type of device that can be connected to the Ethernet network is available (please consult the Modbus-IDA Web site: [www.modbus-ida.org](http://www.modbus-ida.org)).

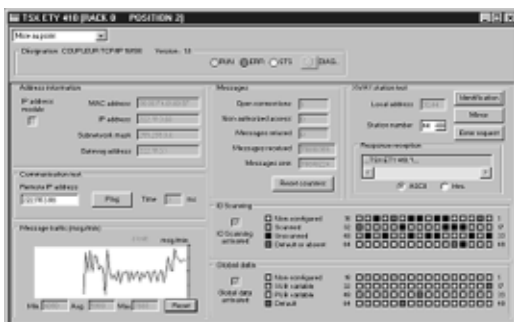
### Characteristics

- Each Modicon M340 station can exchange a maximum of:
  - 100 write words
  - 125 read words
- Maximum size in the Modicon M340 PLC that manages the service (64 stations max.):
  - with **BMX NOE 0100/0110** network module, 2 %MW Kwords as inputs and 2 %MW Kwords as outputs
  - with **BMX P34 2020/2030** processor, 512 %MW words as inputs and 512 %MW words as outputs

### Diagnostics of the I/O Scanning service

There are 5 ways to perform diagnostics on the I/O Scanning service:

- Via the application program from a specific PLC data zone.
- From the setup software debug screen.
- From the PLC system diagnostic function displayed by means of an internet browser on a PC station.
- From the ConneXium diagnostic software **TCS EAZ 01P SFE10**.
- From the standard SNMP manager software.



# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready  
Ethernet TCP/IP communication services

## Functions (continued)

### FDR (Faulty Device Replacement) service

The faulty device replacement service uses standard address management technologies (BOOTP, DHCP) and the TFTP (*Trivial File Transfer Protocol*) file management service, in the aim of simplifying maintenance of Ethernet products.

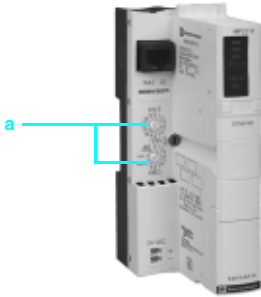
It is used to replace a faulty device with a new device with the guarantee that it will be detected, reconfigured and automatically rebooted by the system.

The main steps in replacement are:

- 1 A device using the FDR service malfunctions.
- 2 Another similar device is taken from the maintenance store, preconfigured with the Device name for the faulty device, then reinstalled on the network. Depending on the devices, addressing can be performed using spin buttons (for example, Advantys STB distributed I/O, **a** or Advantys OTB) or can be given via the keypad integrated in the device (for example Altivar variable speed drives).
- 3 The FDR server detects the new device, allocates it an IP address and transfers the configuration parameters to it.
- 4 The substituted device checks that all these parameters are indeed compatible with its own characteristics and switches to operational mode.

The FDR server can be:

- A Modicon M340 Ethernet module, **BMX NOE 0100/0110**
- A Modicon Premium Ethernet module, **TSX ETY 4103/5103**
- A Modicon Quantum PLC Ethernet module, **140 NOE 771 01/771 11**
- A Modicon Premium processor with integrated Ethernet port, **TSX P57 ●●●●M**
- A Modicon Quantum processor with integrated Ethernet port, **140 CPU 651 50/60**



"NIM" network module for Advantys STB I/O

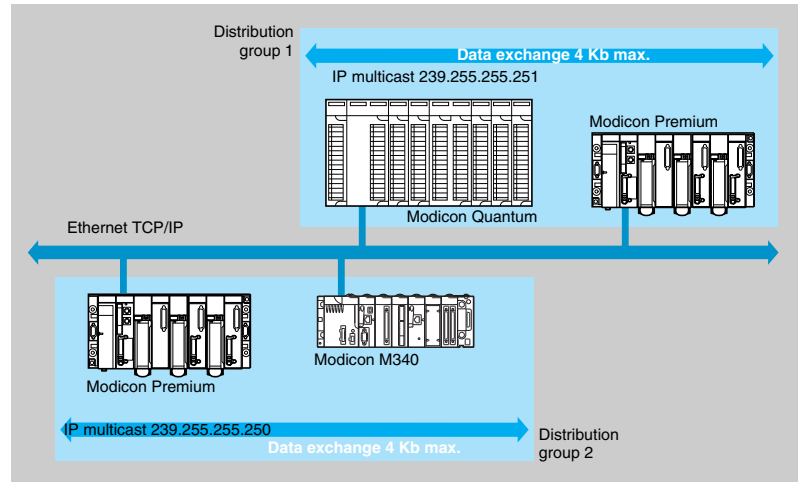
# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready Ethernet TCP/IP communication services

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## Functions (continued)

### Global Data service



The Global Data service exchanges data in real time between stations belonging to the same distribution group. It is used to synchronize remote applications, or even to share a common database between a number of distributed applications. Exchanges are based on a producer/consumer type standard protocol, guaranteeing optimum performances with a minimum load on the network. This RTPS (*Real Time Publisher Subscriber*) protocol is promoted by Modbus-IDA (*Interface for Distributed Automation*), and is already a standard adopted by several manufacturers.

### Characteristics

A maximum of 64 stations can participate in Global Data within a single distribution group.

Each station can:

- Publish 1 variable of 1024 bytes. The publication period can be configured from 1 to n processor master task (*Mast*) periods.
- Subscribe between 1 and 64 variables. The validity of each variable is controlled by status bits (*Health Status bits*) linked to a refresh timeout configurable between 50 ms and 1 s. Access to an element of the variable is not possible. The total size of subscribed variables amounts to 4 contiguous Kbytes.

To further optimize the performance of the Ethernet network, Global Data can be configured with the “multicast filtering” option which, combined with switches in the ConneXium range (see pages 3/26 to 3/33) distribute data only to Ethernet ports where there is a station subscribed to the Global Data service. If these switches are not used, Global Data is sent in “multicast” mode to all switch ports.

### Global Data service diagnostics

The diagnostic screens show the status of Global Data using a color code:

- Configured/not configured/faulty
- Published/subscribed

There are 5 ways to perform diagnostics on the Global Data service:

- Via the application program from a specific PLC data zone.
- From the setup software debug screen.
- From the PLC system diagnostic function displayed by means of an internet browser on a PC station.
- From the ConneXium diagnostic software **TCS EAZ 01P SFE10**.
- From the standard SNMP manager software.



# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready Ethernet TCP/IP communication services

## Functions (continued)

### SNMP network management service

From a network management station, the SNMP (*Simple Network Management Protocol*) protocol monitors and checks all components of the Ethernet architecture and thus ensures quick diagnostics in the event of a problem.

It is used to:

- Interrogate network components such as computer stations, routers, switches, bridges or terminal devices to display their status.
- Obtain statistics about the network on which devices are connected.

This network management software adheres to the conventional client/server model. However, to avoid confusion with other communication protocols that use this terminology, we talk instead about:

- ConneXview network diagnostics software, **TCS EAZ 01P SFE10**. For more informations, please consult our “Machines & Installations with industrial communications” catalogue
- Network manager for the client application that operates on the computer station.
- SNMP agent for the network device server application

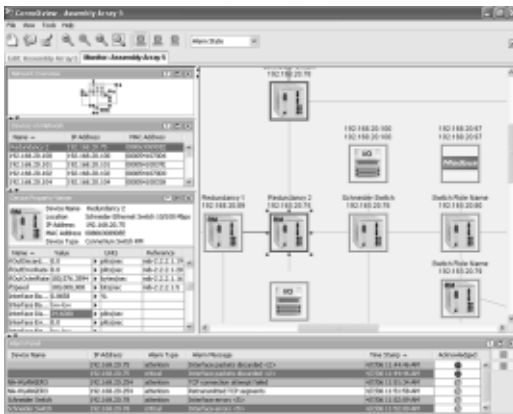
Transparent Ready devices can be managed by any SNMP network manager, including HP Openview and IBM Netview.

The SNMP (*Simple Network Management Protocol*) standard protocol is used for access to configuration and management objects that are contained in the device MIB (Management Information Base). These MIBs must comply with certain standards to be accessed by any commercially-available manager, but depending on the complexity of products, manufacturers can add certain objects to private databases.

The Transparent Ready private MIB presents management objects specific to the Telemecanique offer. These objects simplify the installation, setup and maintenance of Transparent Ready devices in an open environment using standard network management tools.

Transparent Ready devices support 2 levels of SNMP network management:

- The Standard MIB II interface: An initial level of network management is accessible via this interface. It enables the manager to identify the devices making up the architecture and retrieve general information on the configuration and operation of Ethernet TCP/IP interfaces.
- The Transparent Ready MIB interface: the management of Transparent Ready devices is improved via this interface. This MIB has a set of information enabling the network management system to supervise all the Transparent Ready services. The Transparent Ready MIB can be downloaded from the FTP server of any Transparent Ready Ethernet module in a PLC.



Automatic recognition of IP devices via the ConneXview diagnostic software for Ethernet industrial networks



# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready  
Performance

## Selecting the communication architecture

When choosing an architecture, it is advisable to take account of the required performance as early as possible. To do this, the developer must:

- 1 Know exactly what he needs:
  - quantity and type of devices to be connected to one another
  - volume and type of exchanges
  - expected response times
  - environment
- 2 Compare his needs with the characteristics of the available offers, being aware that the actual performance level between any 2 points in an architecture is dependent on the weakest link in the chain, which may:
  - depend on the hardware
  - but also depends on the applications (size, architecture, operating system, machine power rating, etc) which are often only vaguely defined at this stage of the project.
- 3 Work out from this which is the most suitable architecture.

The purpose of the next few pages is to provide the main information and instructions needed to answer the second point. Given that the performance of an Ethernet architecture is linked to several parameters, these pages do not supply all the information needed to calculate the network performance. Their aim is to focus on the following main aspects:

- **Instructions for calculating the network load** so as to design an Ethernet network that meets the demands of the applications.
- **Application response time** to be obtained depending on the configuration used, see page 3/17 to 3/19.
- **Processing capacities of Modicon M340, Modicon Premium and Modicon Quantum platforms** used to select the processor and define the number of Ethernet connections required on the PLC depending on the application, see pages 3/20 and 3/21.

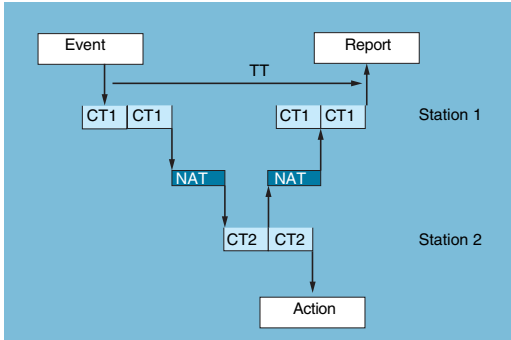
## Calculating the network load

### Introduction

When calculating the load on an Ethernet network, all the communication services of all the peripheral devices connected to the network need to be calculated. Because of the outstanding performance of the Ethernet network, the load is often less than the limits of the Ethernet network and does not greatly affect the application response time. This phenomenon is explained by the high speed of the Ethernet network: the network transaction time is 10% less than the application response time. In order to ensure a low network load and avoid large theoretical calculations, it is highly advisable to separate the collision domain so as to limit the network load, using only the switched network (tree, star or daisy-chain topology).

# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready Performance



## Application response time

### Modbus (or Uni-TE) messaging service response time

Exchanges between the PLC processor and the Ethernet module are synchronous with the PLC scan time, just like the I/O exchanges. On occurrence of the event (an input set to state 1 for example), a message can only be sent after this input has been taken into account (start of the next cycle) and execution of the PLC program (Modicon M340, Modicon Premium or Modicon Quantum), are on average around 1.5 cycle times after occurrence of the event.

The network access time (NAT) appearing in the table below in ms, adds together the module transit time and the waiting time before the message can be sent on the network.

Processing Modbus TCP/IP message requests	Modicon M340		Modicon Premium		Modicon Quantum	
		BMX NOE 0100 BMX NOE 0110	BMX P34 2020 BMX P34 2030	TSX ETY 210 TSX ETY 110WS	TSX ETY 4103/5103 TSX WMY 100 TSX P57 10...57 50	140 NOE 771 01/111 140 CPU 113/311 ●● 140 CPU 434/534 1●
Network access time NAT	< 10 ms	< 10 ms	< 25 ms	< 10 ms	< 10 ms	< 10 ms

The transaction time TT integrates the delay between sending a message from a client station 1, its reception by the server station 2, processing the request, sending the response and it being taken into account by the station 1 (updating an output for example).

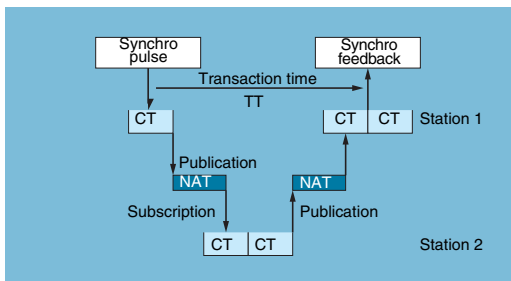
As shown in the above block diagram:

- The transaction time TT should be between:

$$2 \times CT1 + 2 \times NAT < TT < 4 \times CT1 + CT2 + 2 \times NAT$$

- The average duration  $TT_{av}$  is equivalent to:

$$TT_{av} = 3 \times CT1 + 0.5 \times CT2 + 2 \times NAT$$



## Global Data service response time

The transaction time TT integrates the delay between publication of a Global Data service by station 1, its reception and its processing by the remote station 2 and it being resent to the initial station 1:

For an exchanged variable:

- If  $CT < 5$  ms,

transaction time:

$$TT = 5 \text{ to } 6 \times CT$$

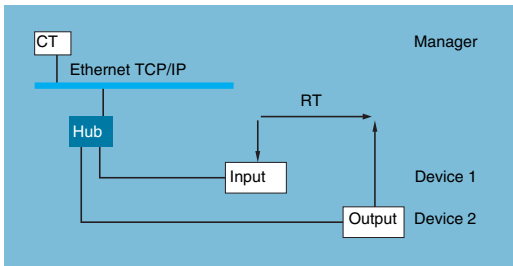
- If  $CT \geq 10$  ms,

transaction time:

$$TT = 3 \times CT$$

# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready Performance

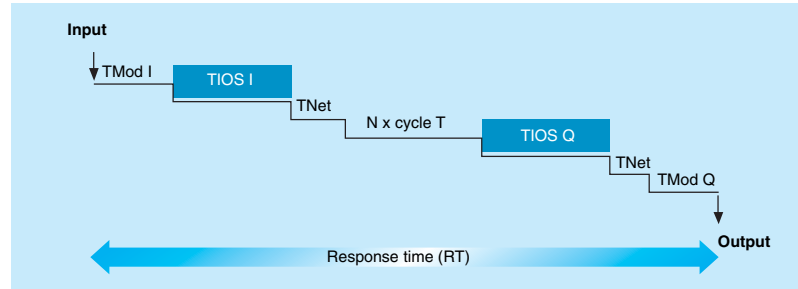


## Application response time (continued)

### I/O Scanning service response time

The response time RT includes the time between taking a remote input into account and updating the state of a remote output. It includes the processing time in the PLC.

This response time RT consists of the following parameters:



- TMod In and TMod Out: Response time of the read/written device, excluding the electrical transit time at the input/output (TMod depends on the device, usually between 1 and 8 ms)
- TIOS In and TIOS Out: Time between 2 read/write operations on the same device (0.3 ms x number of scanned devices), at least equivalent to the configured scan time
- As TIOS is executed in parallel with the PLC scan, it can be hidden with respect to the response time RT.
- Cycle T: PLC scan time.
- TNet : propagation time on the network (depends on the application, usually TNet = 0.05 ms at 10 Mbit/s and 0.005 ms at 100 Mbit/s).

The response time RT can be estimated with the following 3 formulas:

- $RT_{min}$ , minimum response time with TIOS hidden and 1 PLC scan:

$$RT_{min} = (TMod In + 0) \times TIOS In + (Tnet + N) \times cycle T + (0 \times TIOS Out) + Tnet + TMod Out$$

- $RT_{typ}$ , typical response time with 0.5 TIOS hidden:

$$RT_{typ} = TMod In + 0,5 \times TIOS In + (Tnet + N) \times Cycle T + (0,5 \times TIOS Out) + Tnet + TMod Out$$

- $RT_{max}$ , maximum response time with TIOS not hidden:

$$RT_{max} = TMod In + TIOS In + (Tnet + N) \times Cycle T + TIOS Out + Tnet + TMod Ou$$

# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready Performance

## Application response time (continued)

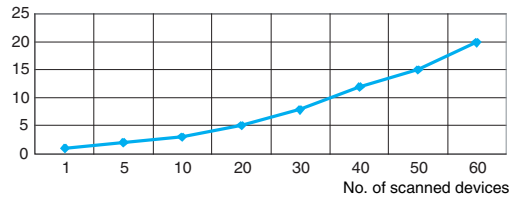
### I/O Scanning service response time (continued)

Below are the TMod In and TMod Out response times:

Type of distributed I/O	Response time	Min.	Typical	Max.
Momentum 170 ENT 110 02	TMod In	1 ms	1 ms	1 ms
	TMod Out	5 ms	5 ms	5 ms
Momentum 170 ENT 110 01	TMod In or TMod Out	4 ms	6 ms	8 ms
Advantys STB STB NIP 2212	TMod In or TMod Out	2 ms	3 ms	4 ms

Below are the TIOS In/TIOS Out times measured between 2 scan cycles (Ethernet network with switches)

Time (ms)



Below is the number of processor cycles N:

Number of processor cycles N	Min.	Typical	Max.
Modicon M340 platform with modules: <b>BMX NOE 0100 and BMX NOE 0110</b>	2	2.5	3
Modicon Premium platform with modules: <b>TSX ETY 4103 and TSX ETY 5103</b>			
Modicon Quantum platform with modules: <b>140 NOE 771 01 and 140 NOE 771 11</b>			
Modicon M340 processors: <b>BMX P34 2020 and BMX P34 2030</b>	1	1	2
Modicon Premium processors: <b>TSX P57 26/3634M, TSX P57 26/2823M and TSX P57 36/4823AM</b>			
Modicon Premium processors: <b>TSX P57 4634M and 5634M</b>			
Modicon Quantum processors: <b>140 CPU 651 50 and 140 CPU 651 60</b>			

# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready Performance

## Processing capacities of Modicon platforms

### Processing capacity

Use the table below to compare for each station, the total number of messages received on the Modbus (or Uni-TE) messaging service if used (value R1, R2 or Ri) with the station processor capacity.

Processing Modbus requests for each PLC scan

Modicon M340, Modicon Premium/Atrium platforms	Messages received
<b>Communication using EFs or EFBs (PL7 or Unity Pro)</b>	
Total messages received by the PLC from all the communication modules (1)	TSX 57 10 4 messages/cycle
	BMX P34 20/TSX 57 20 8 messages/cycle
	TSX 57 30 12 messages/cycle
	TSX 57 40 16 messages/cycle
	TSX 57 50 (2) 16/20 messages/cycle

Modicon Quantum platform	Limitations of the integrated port		Limitations of the communication modules		Ethernet modules per PLC
	All types of communication request	Additional read/write 4x registers	All types of communication request	Additional read/write 4x registers	
140 CPU 113 (3)	–	–	1 message/cycle	4 messages/cycle	max. 2
140 CPU 311	–	–	1 message/cycle	4 messages/cycle	max. 2
140 CPU 434/534	–	–	4 messages/cycle	8 messages/cycle	max. 6
140 CPU 651	16 messages/cycle	16 messages/cycle	4 messages/cycle	8 messages/cycle	max. 6

messages/cycle: number of messages received per cycle from the PLC master task (typical cycle of 50 to 100 ms)

Example:

Quantum 140 CPU 434 12● processor with 4 Ethernet 140 NOE 771 ●1 modules:  
- 20 messages/cycle for all types of communication request, and  
- 32 messages/cycle for the read/write 4x registers

### Ethernet transaction processing capacity

Compare, for each station, the total number of messages received  $\Sigma$  [values Ri, Rj] and the total number of messages sent  $\Sigma$  [values Ei, Ej] (for example, for station N) with the Ethernet transaction processing capacity indicated below. Use the elements below for the Ethernet connection per PLC, rather than the number of transactions required by the application.

Ethernet transaction processing capacity	Modicon M340 BMX		Modicon Premium TSX			Modicon Quantum140	
	NOE 0100 NOE 0110	P34 2020 P34 2030	ETY 210 ETY 110WS	ETY 4103/5103 WMY 100 (4) P57 10/20/30/40	P57 50	NOE 771 01/11 NWM 100 00 (4)	CPU 65 150/160 CPU 67 160
Modbus messaging	450 transactions/s	200 transactions/s	60 transactions/s	450 transactions/s	500 transactions/s	350 transactions/s	350 transactions/s
I/O Scanning service	2,000 transactions/s	Service not available	Service not available	2,000 transactions/s	2,000 transactions/s	2,000 transactions/s	2,000 transactions/s
Publication of Global Data	800 transactions/s			800 transactions/s	800 transactions/s	800 transactions/s	800 transactions/s

(1) A temporary overload, due for example to an adjustment terminal or the temporary connection of an Internet browser, on which a few PLC scans are permitted.

(2) Only with Unity Pro software.

(3) Only with Concept/ProWORX software.

(4) Module not featuring I/O Scanning and Global Data services (TSX WMY 100 and 140 NWM 100 00).

# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready Performance

## Processing capacities of Modicon platforms (continued)

### Maximum number of simultaneous TCP/IP connections

The maximum number of simultaneous TCP/IP connections depends on the platform as well as the type of connection to the Ethernet network:

- The 10/100BASE-TX port in network modules.
- The 10/100BASE-TX port integrated in processors.

Number of simultaneous TCP/IP connections	Modicon M340		Modicon Premium		Modicon Quantum	
	BMX NOE 0100 BMX NOE 0110	BMX P34 2020 BMX P34 2030	TSX ETY 210 TSX ETY 110WS	TSX ETY 4103/5103 TSX WMY 100 TSX P57 10...57 50	140 NOE 771 01/11 140 CPU 113/311 ●● 140 CPU 434/534 14B	140 CPU 65 150 140 CPU 65 160
Client	16	16	32	16 (1)	16 (1)	16 (1)
Server	16	16		64 (1)	64 (1)	64 (1)

(1) With 64 simultaneous TCP/IP connections maximum (clients and servers).



## Managing the passband of Ethernet TCP/IP modules

The passband management service indicates the load level of the Ethernet network module. This allows the user to monitor any drift and anticipate any problems.

The Ethernet module load is indicated in 3 ways:

- Expected load in the Unity Pro/PL7 configuration screen.
- Actual load in the Unity Pro/PL7 diagnostics/debug screen, as well as in the diagnostics pages via the Web. It is displayed in the form of a bar chart animated in real time.
- In the SNMP interface for access by the SNMP network manager.



The passband is indicated as a percentage for each of the following services:

- Modbus (and Uni-TE) messaging
- I/O Scanning
- Global Data
- Other



Ethernet port integrated in the BMX P34 2020/2030 or Ethernet module BMX NOE 0100/0110

## Ethernet solutions with the Modicon M340 platform

The M340 PLC has 2 types of connection to the Ethernet network:

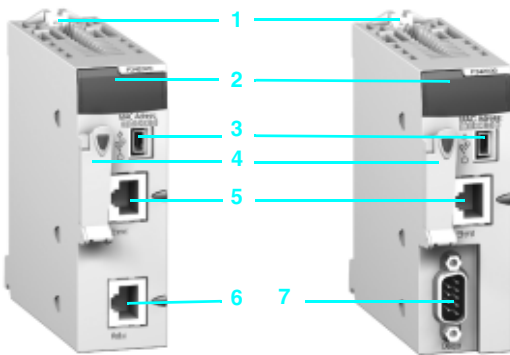
- The 10/100BASE-TX port integrated in **BMX P34 2020/2030** Performance processors, which also process the application, exchanges with other modules supported by the rack and other communication ports (CANopen bus or Modbus serial link).
- The 10/100BASE-TX port in the **BMX NOE 0100** and **BMX NOE 0110** module on which, unlike the Performance processor, all the resources are allocated to Ethernet TCP/IP communication.

These fundamentally different hardware characteristics result in equally different capacities in terms of services and performance:

- The integrated port is a low-cost way of satisfying applications that are not too demanding in terms of communication (less than 500 useful messages/s) in environments little affected by interference.
- Where there are a large number of exchanges, or networks are heavily polluted, use of a dedicated module is unavoidable.

# Modicon M340 automation platform

## Processors with integrated Ethernet TCP/IP port



### Description

**BMX P34 2020** and **BMX P34 2030** Modicon M340 processors with integrated Ethernet port have the following on the front panel:

- 1 Safety screw for locking the module in its slot (marked 0) in the rack
- 2 A display unit including at minimum 3 LEDs relating to the Ethernet port:
  - ETH ACT LED (green): Activity on the Ethernet TCP/IP network
  - ETH STS LED (green): Ethernet TCP/IP network status
  - ETH 100 LED (red): Data rate on the Ethernet TCP/IP network (10 or 100 Mbit/s)
- 3 A mini B USB connector for a programming terminal (or Magelis XBT GT operator interface)
- 4 A slot equipped with its Flash memory card for saving the application and activating the standard Web server, Transparent Ready class B10 .
- 5 An RJ45 connector for connection to the 10BASE-T/100BASE-TX Ethernet TCP/IP network

Also included, depending on the model:

- 6 **BMX P34 2020** processor: An RJ45 connector for the Modbus serial link or character mode link (RS 232C/RS 485, 2-wire, non-isolated)
- 7 **BMX P34 2030** processor: A 9-way SUB-D connector for the master CANopen machine and installation bus

On the back panel: 2 rotary switches for assigning the IP address in one of 3 modes:

- Address set by the position of the two switches
- Address set by the application parameters
- Address set by the Ethernet TCP/IP BOOTP server

### Characteristics

Module type	Unity Pro software	BMX P34 2020	BMX P34 2030	
<b>Transparent Class</b>		B10		
<b>Ready services</b>	Standard Web server	Rack Viewer access to the product description and status and to the PLC diagnostics Data Editor access to the configuration functions and PLC variables		
	Standard Ethernet TCP/IP communication service	Modbus TCP messaging (read/write data words)		
	Ethernet TCP/IP advanced communication services	I/O Scanning	-	
		Global Data	-	
		FDR Client	Automatic assignment of IP address and network parameters	
		SMTP E-mail notification	-	
		SNMP network administrator	Yes	
SOAP/XML Web services	No			
Bandwidth management	Yes			
<b>Structure</b>	Physical interface	10BASE-T/100BASE-TX (RJ45)		
	Data rate	10/100 Mbit/s with automatic recognition		
	Medium	Twisted pair		
<b>Modicon M340 processor</b>	No. of discrete I/O	1024		
	No. of analog I/O	256		
	No. of application-specific channels	36		
	Max. no. of Ethernet TCP/IP connections	2 (integrated port and BMX NOE 0100/0110 network module)		
	Other integrated communication ports	Modbus serial link or character mode	CANopen bus	
	Operating temperature	0...+ 60 °C		
	Relative humidity	10...95% non condensing during operation		
	Degree of protection	IP 20		
	Power supply	Via the power supply of the rack supporting the processor		
	Conformity to standards	IEC/EN 61131-2, UL 508, CSA 22.2 n°142, CSA 22.2 n°213 Class 1 Division 2 , CE		
LED indicators	Activity on the Ethernet TCP/IP network (ETH ACT, green) Status of the Ethernet TCP/IP network (ETH STS, green) Data rate on the 10 or 100 Mbit/s Ethernet TCP/IP network, (ETH 100, red) 4 LEDs specific to processor operation (RUN, ERR, I/O, CARD ERR) 1 or 2 LEDs specific to the other communication ports (SER COM or CAN RUN and CAN ERR) (2)			

### References



BMX P34 2020

BMX P34 2030

Description	I/O capacity Memory capacity	Other integrated communication ports	Reference	Weight kg
<b>Processors with integrated Ethernet link</b>	1024 discrete I/O 256 analog I/O 36 app-sp. channels	Modbus serial link or character mode CANopen bus	<b>BMX P34 2020</b>	0.205
			<b>BMX P34 2030</b>	0.215
Transparent Ready class B10	4096 Kb integrated			

(1) SER COM for serial link or CAN RUN and CAN ERR for CANopen bus.

# Modicon M340 automation platform

## Ethernet TCP/IP network module

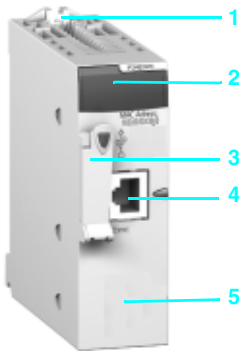
### Presentation

The **BMX NOE 0100** and **BMX NOE 0110** modules are a standard module occupying a single slot in the rack of the Modicon M340 platform equipped with a Standard processor or associated Performance processor (maximum of 1 module per configuration).

### Description

The **BMX NOE 01●0** module has the following on the front panel:

- 1 Safety screw for locking the module in its slot in the rack
  - 2 A display unit consisting of 6 LEDs, including 3 relating to the Ethernet port:
    - ETH ACT LED (green): Activity on the Ethernet TCP/IP network
    - ETH STS LED (green): Ethernet TCP/IP network status
    - ETH 100 LED (red): Data rate on the Ethernet TCP/IP network (10 or 100 Mbit/s)
  - 3 A slot equipped with its Flash memory card for application saving and activating the standard Web server, Transparent Ready class B30 or C30 depending on model
  - 4 An RJ45 connector for connection to the 10BASE-T/100BASE-TX Ethernet TCP/IP network
  - 5 A pencil-point RESET pushbutton for a cold restart of the module
- On the back panel: 2 rotary switches for assigning the IP address in one of 3 modes:
- address set by the position of the two switches
  - address set by the application parameters
  - address set by the Ethernet TCP/IP network BOOTP server



### Characteristics

Module type	Unity Pro software	BMX NOE 0100	BMX NOE 0110
<b>Transparent Ready services</b>	Class	B30	C30
	Standard Web server	Rack Viewer access to the product description and status and to the PLC diagnostics	Data Editor access to PLC variable via PC terminal
	Configurable Web server	Yes	Yes
	User Web pages (available size)	–	Yes (16 Mb)
	Standard Ethernet TCP/IP communication service	Modbus TCP messaging (read/write data words)	
	Ethernet TCP/IP advanced communication services	I/O Scanning	Yes
		Global Data	Yes
		FDR server	Automatic assignment of IP address and network parameters
		SMTP E-mail notification	–
		SNMP network administrator	Yes
		SOAP/XML Web services	–
		Bandwidth management	Yes
<b>Structure</b>	Physical interface	10BASE-T/100BASE-TX (RJ45)	
	Data rate	10/100 Mbit/s with automatic recognition	
	Medium	Twisted pair	
<b>Network module</b>	Operating temperature	0...+ 60 °C	
	Relative humidity	10...95% non condensing during operation	
	Degree of protection	IP 20	
	Power supply	Via the power supply of the rack supporting the processor	
	Conformity to standards	IEC/EN 61131-2, UL 508, CSA 22.2 n°142, CSA 22.2 n°213 Class 1 Division 2 , C€	
	LED indicators	Activity on the Ethernet TCP/IP network (ETH ACT, green) State of the Ethernet TCP/IP network (ETH STS, green) Data rate on the 10 or 100 Mbit/s Ethernet TCP/IP network, (ETH 100, red) 3 LEDs specific to module operation (RUN, ERR, CARD ERR)	

### References



BMX NOE 0100/0110

Description	Data rate	Transparent Ready class	Reference	Weight kg
<b>Ethernet TCP/IP network module</b>	10/100 Mbit/s	B30	<b>BMX NOE 0100</b>	0.200
		C30	<b>BMX NOE 0110</b>	▲ 0.200

▲ Available 4<sup>th</sup> quarter 2007

Before this date, please order the **BMX NOE 0100** Ethernet module with **BMX RWS C016M memory card**, same services except Data editor service with pocket PC or PDA terminal and SOAP/XML Web services.



# Modicon M340 automation platform

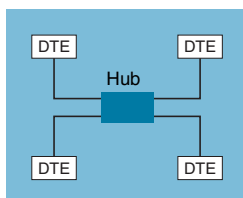
Ethernet TCP/IP network, Transparent Ready  
Cabling system: ConneXium hub

## Presentation

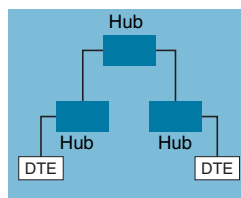
Hubs (*concentrators*) are used for transmitting signals between several media (ports). Hubs are “plug and play” devices that do not need any configuration. The use of hubs makes it possible to create the following topologies:

- Star topology using hubs
- Tree topology using hubs

Consult our catalogue “Ethernet TCP/IP and Web technologies, Transparent Ready”.



Star topology



Tree topology

## Characteristics and reference

Transparent Ready



Hubs			
<b>Interfaces</b>	Copper cable ports	Number and type	4 x 10BASE-T ports
		Shielded connectors	RJ45
		Medium	Shielded twisted pair, category CAT 5E
		Total length of pair	100 m
<b>Topology</b>	Fiber optic ports	Number and type	–
		Number of cascaded hubs	max. 4
<b>Redundancy</b>	Number of hubs in a ring		–
<b>Power supply</b>	Voltage		P1 and P2 redundant power supplies
		Power consumption	24 V (18...32) ~~, safety extra low voltage (SELV)
		Removable connector	80 mA (130 max. at 24 V ~-)
<b>Operating temperature</b>			5-way
<b>Relative humidity</b>			0...+ 60 °C
<b>Degree of protection</b>			10...95% non condensing
<b>Dimensions</b>	W x H x D		IP 30
<b>Mounting</b>			40 x 125 x 80 mm
<b>Weight</b>			On symmetrical DIN rail, 35 mm wide
<b>Conformity to standards</b>			0.530 kg
<b>LED indicators</b>			cUL 60950, UL 508 and CSA 142, UL 1604 and CSA 213 Class 1 Division 2, CE, GL
<b>Alarm relay</b>			FM 3810, FM 3611 Class 1 Division 2
<b>Reference</b>			Power supply fault, Ethernet network fault or communication port fault (1 A max. volt-free contact at 24 V ~-)
			499 NEH 104 10

# Modicon M340 automation platform

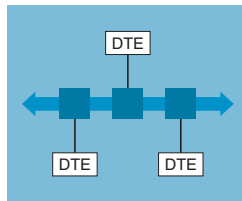
Ethernet TCP/IP network, Transparent Ready  
Cabling system: ConneXium transceivers

## Presentation

- The use of ConneXium transceivers makes it possible to perform the following:
- Creation of linear fiber optic bus topologies, for products with twisted pair cable Ethernet connection.
  - Interfacing products with twisted pair cable Ethernet connection with a fiber optic cable.

Transceivers are “plug and play” devices that do not need any configuration. Consult our catalogue “Ethernet TCP/IP and Web technologies, Transparent Ready”.

ConneXium transceivers provide fiber optic connections for transmission in areas subject to interference (high levels of electromagnetic interference) and for long distance communications.



Linear topology on optical fiber

## Characteristics and reference

Transparent Ready



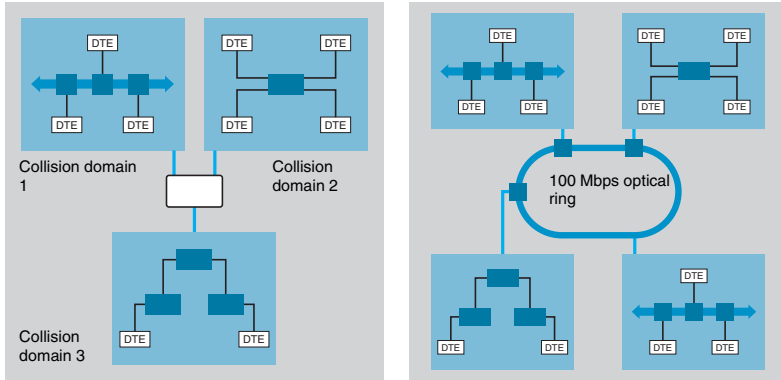
Transceivers			
Interfaces	Copper cable ports	Number and type	1 x 100BASE-TX port
		Shielded connectors	
		Medium	Shielded twisted pair, category CAT 5E
		Total length of pair	100 m
	Fiber optic ports	Number and type	1 x 100BASE-FX port
		Connectors	SC
		Medium	Multimode optical fiber
		Length of optical fiber	
		50/125 µm fiber	3000 m (1)
		62.2/125 µm fiber	3000 m (1)
Attenuation analysis	50/125 µm fiber	8 dB:	
	62.2/125 µm fiber	11 dB:	
Redundancy		P1 and P2 redundant power supplies	
Power supply	Voltage	24 V (18...32) ---, safety extra low voltage (SELV)	
	Power consumption	160 mA (190 max. at 24 V ---)	
	Removable connector	5-way	
Operating temperature		0...+ 60 °C	
Relative humidity		10...95% non condensing	
Degree of protection		IP 20	
Dimensions	W x H x D	47 x 135 x 111 mm	
Mounting		On symmetrical DIN rail, 35 mm wide	
Weight		0.230 kg	
Conformity to standards		cUL 60950, UL 508 and CSA 142, UL 1604 and CSA 213 Class 1 Division 2, C, E, GL	
LED indicators		P1 and P2 power supplies, Ethernet link/port status	
Alarm relay		Power supply fault, Ethernet network fault or communication port fault (1 A max. volt-free contact at 24 V ---)	
Reference		499 NTR 10 100	

(1) Length dependent on the attenuation analysis and attenuation of the optical fiber (typical value: 2000 m).

# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready  
Cabling system: ConneXium unmanaged switches

## Presentation



Switches are used to increase the limits of architectures based on hubs or transceivers, by separating collision domains.

Higher layer communication is provided between the ports, and collisions at link layer are not propagated (filtering). They therefore improve performance by better allocation of the pass band due to the reduction of collisions and the network load.

Certain Connexium switch models also enable redundant architectures to be created on twisted pair copper ring or fiber optic.

Switches are “plug & play” devices that do not need any configuration. They can also be managed remotely via the SNMP or HTTP protocols for monitoring and diagnostics purposes.

Consult our catalogue “Ethernet TCP/IP and Web technologies, Transparent Ready”.

## Characteristics and references: twisted pair

Transparent Ready



Switches			Optimized, copper twisted pair, unmanaged	Copper twisted pair, unmanaged
Interfaces	Copper cable ports	Number and type	5 x 10BASE-T/100BASE-TX ports	8 10BASE-T/100BASE-TX ports
		Shielded connectors	RJ45	
		Medium	Shielded twisted pair, category CAT 5E	
		Total length of pair	100 m	
	Fiber optic ports	Number and type	-	
		Connectors	-	
		Medium	-	
		Length of optical fiber	-	
		50/125 µm fiber	-	
		62.2/125 µm fiber	-	
Attenuation analysis	50/125 µm fiber	-		
	62.2/125 µm fiber	-		
	9/125 µm fiber	-		
Topology	Number of switches	Cascaded	Unlimited	
		Redundant in a ring	-	
Redundancy				P1 and P2 redundant power supplies
Power supply	Voltage		24 V $\bar{\text{---}}$ (19.2...30)	24 V $\bar{\text{---}}$ (18...32) safety extra low voltage (SELV)
	Power consumption	mA max.	120	125 (290 max.)
	Removable connector		3-way	5-way
Operating temperature			0...+ 60 °C	
Relative humidity			10...95% non condensing	
Degree of protection			IP 20	
Dimensions		W x H x D	75.2 x 143 x 43 mm	47 x 135 x 111 mm
Mounting			On symmetrical DIN rail, 35 mm wide	
Weight			0.190 kg	0.230 kg
Conformity to standards			UL 508, CSA 1010, EN 61131-2	cUL 60950, UL 508 and CSA 142, UL 1604 and CSA 213 Class 1 Division 2, C, E, GL
LED indicators			Power supply, link status, data rate	P1 and P2 power supplies, Ethernet link/port status
Alarm relay			-	Power supply fault, Ethernet network fault or communication port fault (1 A max. volt-free contact at 24 V $\bar{\text{---}}$ )
Reference			499 NES 251 00	499 NES 181 00

# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready  
Cabling system: ConneXium unmanaged switches

**Characteristics and references: 5 ports, twisted pair and fiber optic**



Switches			Copper twisted pair and fiber optic, unmanaged			
<b>Interfaces</b>	Copper cable ports	Number and type	4 x 10BASE-T/ 100BASE-TX ports	3 x 10BASE-T/ 100BASE-TX ports	4 x 10BASE-T/ 100BASE-TX ports	3 x 10BASE-T/ 100BASE-TX ports
		Shielded connectors	RJ45			
		Medium	Shielded twisted pair, category CAT 5E			
		Total length of pair	100 m			
	Fiber optic ports	Number and type	1 x 100BASE-FX port	2 x 100BASE-FX ports	1 x 100BASE-FX port	2 x 100BASE-FX ports
		Connectors	SC			
		Medium	Multimode optical fiber		Single mode optical fiber	
		Length of optical fiber				
		50/125 µm fiber	5,000 m (1)		-	
		62.2/125 µm fiber	4,000 m (1)		-	
Attenuation analysis	9/125 µm fiber	-		32,500 m (2)		
	50/125 µm fiber	8 dB		-		
	62.2/125 µm fiber	11 dB		-		
	9/125 µm fiber	-		16 dB		
<b>Topology</b>	Number of switches	Cascaded	Unlimited			
		Redundant in a ring	-			
<b>Redundancy</b>			P1 and P2 redundant power supplies			
<b>Power supply</b>	Voltage	24 V $\bar{\text{---}}$ (18...32), safety extra low voltage (SELV)				
	Power consumption	mA max.	200	240	200	240
	Removable connector	5-way				
<b>Operating temperature</b>			-40...+70 °C			
<b>Relative humidity</b>			10...95% non condensing			
<b>Degree of protection</b>			IP 20			
<b>Dimensions</b>	W x H x D		47 x 135 x 111 mm			
<b>Mounting</b>			On symmetrical DIN rail, 35 mm wide			
<b>Weight</b>			0.330 kg	0.335 kg	0.330 kg	0.335 kg
<b>Conformity to standards</b>			cUL 60950, cUL 508 and CSA 142, UL 1604 and CSA 213 Class 1 Division 2, CE, GL			
<b>LED indicators</b>			P1 and P2 power supplies, Ethernet link status, transmission activity			
<b>Alarm relay</b>			Activity, power supply fault, Ethernet network fault or communication port fault (1 A max. volt-free contact at 24 V $\bar{\text{---}}$ )			
<b>Reference</b>			499 NMS 251 01	499 NMS 251 02	499 NSS 251 01	499 NSS 251 02

(1) Length dependent on the attenuation analysis and attenuation of the fiber optic (typical value: 2,000 m).

(2) Length dependent on the attenuation analysis and attenuation of the fiber optic (typical value: 15,000 m).

# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready  
Cabling system: ConneXium managed switches

## Characteristics and references: 4 ports, twisted pair and fiber optic

Transparent Ready



Switches			Copper twisted pair and fiber optic, managed			
Interfaces	Copper cable ports	Number and type	3 x 10/100BASE-TX ports	2 x 10/100BASE-TX ports	3 x 10/100BASE-TX ports	2 x 10/100BASE-TX ports
		Shielded connectors	RJ45			
		Medium	Shielded twisted pair, category CAT 5E			
	Fiber optic ports	Total length of pair	100 m			
		Number and type	1 x 100BASE-FX port	2 x 100BASE-FX ports	1 x 100BASE-FX port	2 x 100BASE-FX ports
		Connectors	Duplex SC			
		Medium	Multimode optical fiber		Single mode optical fiber	
		Length of optical fiber				
		50/125 µm fiber	5,000 m (1)			–
		62.2/125 µm fiber	4,000 m (1)			–
9/125 µm fiber	–			32,500 m (2)		
Ethernet services	Attenuation analysis					
	50/125 µm fiber	8 dB			–	
	62.2/125 µm fiber	11 dB			–	
Topology	Number of switches	Cascaded	Unlimited			
		Redundant in a ring	max. 50			
Redundancy		Redundant power supplies, redundant single ring, ring coupling				
Power supply	Voltage	Operation	9.6...60 V $\overline{\text{---}}$ /18...30 V $\sim$ , safety extra low voltage (SELV)			
	Power consumption		6.5 W	7.3 W	6.5 W	7.3 W
	Removable connector		6-way			
Operating temperature		0...+ 60 °C				
Relative humidity		10...90% non condensing				
Degree of protection		IP 20				
Dimensions		W x H x D	47 x 131 x 111 mm			
Mounting		On symmetrical DIN rail, 35 mm wide				
Weight		0.400 kg				
Conformity to standards		IEC 61131-2, IEC 61850-3, UL 508, UL 1604 Class 1 Division 2, CSA C22.2 14 (cUL), CSA C22.2 213 Class 1 Division 2 (cUL), C€, GL				
LED indicators		Power supply status, alarm relay status, active redundancy, redundancy management, copper port status and copper port activity				
Alarm relay		Power supply fault, Ethernet network fault, communication port fault, redundancy fault (1 A max. volt-free contact at 24 V $\overline{\text{---}}$ )				
Reference		TCS ESM 043F1CU0	TCS ESM 043F2CU0	TCS ESM 043F1CS0	TCS ESM 043F2CS0	

(1) Length dependent on the attenuation analysis and attenuation of the fiber optic (typical value: 2,000 m).

(2) Length dependent on the attenuation analysis and attenuation of the fiber optic (typical value: 15,000 m).

3

3.1

# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready  
Cabling system: ConneXium managed switches

## Characteristics and references: 4 and 8 ports, twisted pair



Switches			Copper twisted pair, managed		
Interfaces	Copper cable ports	Number and type	4 x 10/100BASE-TX ports	8 x 10/100BASE-TX ports	
		Shielded connectors	RJ45		
		Medium	Shielded twisted pair, category CAT 5E		
		Total length of pair	100 m		
	Fiber optic ports	Number and type	-		
		Connectors	-		
		Medium	-		
		Length of optical fiber	-		
		50/125 µm fiber	-		
		62.2/125 µm fiber	-		
		9/125 µm fiber	-		
	Ethernet services	Attenuation analysis		-	
		50/125 µm fiber		-	
62.2/125 µm fiber		-			
9/125 µm fiber		-			
Ethernet services		FDR, SMTP V3, SNMP client, multicast filtering for optimization of the Global Data protocol, configuration via Web access VLAN, IGMP Snooping, RSTP ( <i>Rapid Scanning Tree Protocol</i> ), priority port, data stream control, secure port			
Topology	Number of switches	Cascaded	Unlimited		
		Redundant in a ring	max. 50		
Redundancy		Redundant power supplies, redundant single ring, ring coupling			
Power supply	Voltage	Operation	9.6...60 V $\overline{\text{---}}$ /18...30 V $\sim$ , safety extra low voltage (SELV)		
	Power consumption		5.3 W	5.3 W	
	Removable connector		6-way		
Operating temperature		0...+ 60 °C			
Relative humidity		10...90% non condensing			
Degree of protection		IP 20			
Dimensions		W x H x D	47 x 131 x 111 mm	74 x 131 x 111 mm	
Mounting		On symmetrical DIN rail, 35 mm wide			
Weight			0.400 kg	0.410 kg	
Conformity to standards		IEC 61131-2, IEC 61850-3, UL 508, UL 1604 Class 1 Division 2, CSA C22.2 14 (cUL), CSA C22.2 213 Class 1 Division 2 (cUL), C€, GL			
LED indicators		Power supply status, alarm relay status, active redundancy, redundancy management, copper port status and copper port activity	Power supply status, alarm relay status, active redundancy, redundancy management, fiber port status and fiber port activity		
Alarm relay		Power supply fault, Ethernet network fault or communication port fault (1 A max. volt-free contact at 24 V $\overline{\text{---}}$ )			
Reference			TCS ESM 043F23F0	TCS ESM 083F23F0	

3  
3.

# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready  
Cabling system: ConneXium managed switches

## Characteristics and references: 8 ports, twisted pair and fiber optic

Transparent Ready



Switches			Copper twisted pair and fiber optic, managed					
Interfaces	Copper cable ports	Number and type	7 x 10/100BASE-TX ports	6 x 10/100BASE-TX ports	7 x 10/100BASE-TX ports	6 x 10/100BASE-T ports		
		Shielded connectors	RJ45					
		Medium	Shielded twisted pair, category CAT 5E					
		Total length of pair	100 m					
	Fiber optic ports	Number and type	1 x 100BASE-FX port	2 x 100BASE-FX ports	1 x 100BASE-FX port	2x 100BASE-FX ports	1 + 1 x 100BASE-FX port	
		Connectors	Duplex SC					
		Medium	Multimode optical fiber		Single mode optical fiber		Single mode optical fiber and multimode optical fiber	
		Length of optical fiber	50/125 µm fiber		-		5,000 m (1)	
			62.2/125 µm fiber		-		4,000 m (1)	
			9/125 µm fiber		32,500 m (2)		32,500 m (2)	
Attenuation analysis		50/125 µm fiber		-		8 dB		
	62.2/125 µm fiber		-		11 dB			
	9/125 µm fiber		16 dB		16 dB			
	Ethernet services	FDR, SMTP V3, SNTp client, multicast filtering for optimization of the Global Data protocol, configuration via Web access VLAN, IGMP Snooping, RSTP ( <i>Rapid Scanning Tree Protocol</i> ), priority port, data stream control, secure port						
Topology	Number of switches	Cascaded	Unlimited					
		Redundant in a ring	max. 50					
Redundancy			Redundant power supplies, redundant single ring, ring coupling					
Power supply	Voltage	Operation	9.6...60 V $\overline{\text{---}}$ /18...30 V $\sim$ , safety extra low voltage (SELV)					
	Power consumption		6.5 W	7.3 W	6.5 W	7.3 W		
	Removable connector		6-way					
Operating temperature			0...+ 60 °C					
Relative humidity			10... 90% non condensing					
Degree of protection			IP 20					
Dimensions		W x H x D	74 x 131 x 111 mm					
Mounting			On symmetrical DIN rail, 35 mm wide					
Weight			0.410 kg					
Conformity to standards			IEC 61131-2, IEC 61850-3, UL 508, UL 1604 Class 1 Division 2, CSA C22.2 14 (cUL), CSA C22.2 213 Class 1 Division 2 (cUL), CE, GL					
LED indicators			Power supply status, alarm relay status, active redundancy, redundancy management, fiber port status and fiber port activity					
Alarm relay			Power supply fault, Ethernet network fault or communication port fault (1 A max. volt-free contact at 24 V $\overline{\text{---}}$ )					
Reference			TCSESM 083F1CU0	TCSESM 083F2CU0	TCSESM 083F1CS0	TCSESM 083F2CS0	TCSESM 083F2CX0	

(1) Length dependent on the attenuation analysis and attenuation of the fiber optic (typical value: 2,000 m).

(2) Length dependent on the attenuation analysis and attenuation of the fiber optic (typical value: 15,000 m).

3

3.1

# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready  
Cabling system: ConneXium managed switches

## Characteristics and references: 16 and 24 ports, twisted pair, fiber optic

Transparent  
Ready



Switches			Copper twisted pair and fiber optic, managed	Copper twisted pair, managed	Copper twisted pair and fiber optic, managed
Interfaces	Copper cable ports	Number and type	16 x 10/100BASE-TX ports	14 x 10/100BASE-TX ports	22 x 10/100BASE-TX ports
		Shielded connectors	RJ45		
		Medium	Shielded twisted pair, category CAT 5E		
		Total length of pair	100 m		
	Fiber optic ports	Number and type	–	2 x 100BASE-FX ports	
		Connectors	–	Duplex SC	
		Medium	–	Multimode optical fiber	
		Length of optical fiber	–	–	
		50/125 µm fiber	–	5,000 m (1)	
		62.2/125 µm fiber	–	4,000 m (1)	
		9/125 µm fiber	–	–	
	Ethernet services	Attenuation analysis	–	–	
		50/125 µm fiber	–	8 dB	
62.2/125 µm fiber		–	11 dB		
9/125 µm fiber		–	–		
			FDR, SMTP V3, SNMP client, multicast filtering for optimization of the Global Data protocol, configuration via Web access VLAN, IGMP Snooping, RSTP ( <i>Rapid Scanning Tree Protocol</i> ), priority port, data stream control, secure port		
Topology	Number of switches	Cascaded	Unlimited		
		Redundant in a ring	max. 50		
Redundancy			Redundant power supplies, redundant single ring, ring coupling		
Power supply	Voltage	Operation	9.6...60 V $\overline{\text{---}}$ /18...30 V $\sim$ , safety extra low voltage (SELV)		
	Power consumption		9.4 W	11.8 W	15.5 W
	Removable connector		6-way		
Operating temperature			0...+ 60 °C		
Relative humidity			10... 90% non condensing		
Degree of protection			IP 20		
Dimensions		W x H x D	111 x 131 x 111 mm		
Mounting			On symmetrical DIN rail, 35 mm wide		
Weight			0.600 kg		0.650 kg
Conformity to standards			cUL 60950, UL 508 and CSA 142, UL 1604 and CSA 213 Class 1 Division 2, C€, GL		
LED indicators			Redundant power supplies, single ring	Redundant power supplies, single ring, double ring	
Alarm relay			Power supply fault, Ethernet network fault or communication port fault (1 A max. volt-free contact at 24 V $\overline{\text{---}}$ )		
Reference			TCSESM 163F2CU0	TCSESM 163F23F0	TCSESM 243F2CU0

(1) Length dependent on the attenuation analysis and attenuation of the fiber optic (typical value: 2,000 m).



# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready  
Cabling system: ConneXium managed switches

## Characteristics and references: 8 ports and 2 Gigabit ports, twisted pair, fiber optic



Switches			Copper twisted pair and fiber optic, managed			Copper twisted pair, managed			
<b>Interfaces</b>	Copper cable ports	Number and type	8 x 10/100BASE-TX ports			8 x 10/100BASE-TX ports and 2 x 10/100/1000BASE-TX ports (Gigabit)			
		Shielded connectors	RJ45						
		Medium	Shielded twisted pair, category CAT 5E						
		Total length of pair	100 m						
	Gigabit ports fiber optic (with SFP fiber module to be mounted on SFP connector)	Number and type	2 x 1000BASE-SX ports (1)	2 x 1000BASE-LH ports (2)	2 x 1000BASE-LX ports (3)	-			
		Connectors	LC						
		Medium	Multimode optical fiber	Single mode optical fiber	Single mode and multimode optical fiber	-			
		Length of optical fiber							
		50/125 µm fiber		550 m	-	550 m	-		
		62.2/125 µm fiber		275 m	-	550 m	-		
		9/125 µm fiber		-	8 -72,000 m	20,000 m	-		
		Attenuation analysis							
		50/125 µm fiber		7.5 dB	-	11 dB	-		
		62.2/125 µm fiber		7.5 dB	-	11 dB	-		
		9/125 µm fiber		-	6 - 22 dB	11 dB	-		
Ethernet services		FDR, SMTP V3, SNMP client, multicast filtering for optimization of the Global Data protocol, configuration via Web access VLAN, IGMP Snooping, RSTP ( <i>Rapid Scanning Tree Protocol</i> ), priority port, data stream control, secure port							
<b>Topology</b>	Number of switches	Cascaded	Unlimited						
		Redundant in a ring	max. 50						
<b>Redundancy</b>			Redundant power supplies, redundant single ring, ring coupling						
<b>Power supply</b>	Voltage	Operation	9.6...60 V $\overline{\text{---}}$ /18...30 V $\sim$ , safety extra low voltage (SELV)						
	Power consumption		8.9 W + 1 W per SFP fiber module			8.3 W			
	Removable connector		6-way						
<b>Operating temperature</b>			0...+60 °C						
<b>Relative humidity</b>			10... 90% non condensing						
<b>Degree of protection</b>			IP 20						
<b>Dimensions</b>	W x H x D		111 x 131 x 111 mm						
<b>Mounting</b>			On symmetrical DIN rail, 35 mm wide						
<b>Weight</b>			0.410 kg						
<b>Conformity to standards</b>			cUL 60950, UL 508 and CSA 142, UL 1604 and CSA 213 Class 1 Division 2, C€, GL						
<b>LED indicators</b>			Power supply status, alarm relay status, active redundancy, redundancy management, fiber port status and fiber port activity						
<b>Alarm relay</b>			Power supply fault, Ethernet network fault or communication port fault (1 A max. volt-free contact at 24 V $\overline{\text{---}}$ )						
<b>Reference</b>			TCS ESM 103F2LG0			TCS ESM 103F23G0			

(1) With TCS EAA F1LFU00 fiber optic module to be ordered separately, see page 3/35.

(2) With TCS EAA F1LFH00 fiber optic module to be ordered separately, see page 3/35.

(3) With TCS EAA F1LFS00 fiber optic module to be ordered separately, see page 3/35.

# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready  
Cabling system: ConneXium IP 67 switch

## Characteristics and references: IP 67 unmanaged switch



<b>IP 67 switch</b>		<b>Twisted pair, unmanaged</b>	
<b>Interfaces</b>	Copper cable ports	Number and type	5 x 10BASE-T/100BASE-TX ports
		Shielded connectors	M12 (type D)
		Medium	Shielded twisted pair, category CAT 5E
		Total length of pair	100 m
	Fiber optic ports	Number and type	–
		Connectors	–
		Medium	–
Length of optical fiber		–	
Ethernet services	Attenuation analysis	–	
Ethernet services		Storage and re-routing of received data, auto MDI/MDX (automatic switching depending on whether cables are straight or crossed), automatic negotiation of 10/100 Mbps and duplex mode (on all ports), automatic change of polarity	
<b>Topology</b>	Number of switches	Cascaded	Unlimited
		Redundant in a ring	–
<b>Redundancy</b>		–	
<b>Power supply</b>	Voltage	24 V $\pm$ (18...32 V $\pm$ ), safety extra low voltage (SELV)	
	Power consumption	100 mA	
	Connector	5-way M12 (type A, male)	
<b>Operating temperature</b>		0...+ 60°C	
<b>Relative humidity</b>		–	
<b>Degree of protection</b>		IP 67	
<b>Dimensions W x H x D</b>		60 x 126 x 31 mm	
<b>Weight</b>		0.210 kg	
<b>Conformity to standards</b>		cUL 508 and CSA 22.2 14	
<b>LED indicators</b>		Power supply, line status, line activity	
<b>Alarm relay</b>		–	
<b>Reference</b>		TCS ESU 051 F0	

<b>IP 67 cordsets</b>			
<b>Ethernet cordsets</b>		Preformed at each end, see page 3/35	
<b>Power supply cables</b>		Preformed at each end with M12 female straight connectors	Preformed at each end with female M12 angled connectors
Length	2 m	5 m	2.5 m 5 m
<b>Reference</b>	XZC P1164L2	XZC P1164L5	XZC P1264L2 XZC P1264L5
<b>Spare power connectors</b>		Female M12 straight connector	Female M12 angled connector
<b>Reference</b>	XZC C12 FDM 50B	XZC C12 FCM 50B	

# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready  
Cabling system: Connexium connection components

3

3.1



490 NT● 000 ●●

## Shielded copper connection cables

ConneXium shielded connection cables are available in two versions to meet the various current standards and approvals:

- EIA/TIA 568 standard shielded twisted pair cables

These cables conform to:

- EIA/TIA-568 standard, category CAT 5E,
- IEC 11801/EN 50173 standard, class D.

Their fire resistance conforms to:

- NFC 32070# C2 classification
- IEC 322/1 standards
- Low Smoke Zero Halogen (LSZH).

- UL and CSA 22.1 approved shielded twisted pair cables

These cables conform to:

- UL and CSA 22.1 standards
- Their fire resistance conforms to NFPA 70.

## EIA/TIA 568 standard shielded twisted pair cables

Description	Preformed at both ends	Length	Reference	Weight kg
<b>Straight cables</b>	2 RJ45 connectors For connection to terminal devices (DTE)	2 m	<b>490 NTW 000 02</b>	—
		5 m	<b>490 NTW 000 05</b>	—
		12 m	<b>490 NTW 000 12</b>	—
		40 m	<b>490 NTW 000 40</b>	—
		80 m	<b>490 NTW 000 80</b>	—
<b>Crossed cord cables</b>	2 RJ45 connectors For connections between hubs, switches and transceivers	5 m	<b>490 NTC 000 05</b>	—
		15 m	<b>490 NTC 000 15</b>	—
		40 m	<b>490 NTC 000 40</b>	—
		80 m	<b>490 NTC 000 80</b>	—

## UL and CSA 22.1 approved shielded twisted pair cables

Description	Preformed at both ends	Length	Reference	Weight kg
<b>Straight cables</b>	2 RJ45 connectors For connection to terminal devices (DTE)	2 m	<b>490 NTW 000 02U</b>	—
		5 m	<b>490 NTW 000 05U</b>	—
		12 m	<b>490 NTW 000 12U</b>	—
		40 m	<b>490 NTW 000 40U</b>	—
		80 m	<b>490 NTW 000 80U</b>	—
<b>Shielded cables</b>	2 RJ45 connectors For connections between hubs, switches and transceivers	5 m	<b>490 NTC 000 05U</b>	—
		15 m	<b>490 NTC 000 15U</b>	—
		40 m	<b>490 NTC 000 40U</b>	—
		80 m	<b>490 NTC 000 80U</b>	—

## Glass fiber optic cables

These glass fiber optics are for making connections:

- To a terminal device (DTE)
- Between hubs, transceivers and switches

Description	Preformed at both ends	Length	Reference	Weight kg
<b>Glass fiber optic cables</b>	1 SC connector 1 MT-RJ connector	5 m	<b>490 NOC 000 05</b>	—
		5 m	<b>490 NOT 000 05</b>	—
	2 MT-RJ connectors	3 m	<b>490 NOR 000 03</b>	—
		5 m	<b>490 NOR 000 05</b>	—
		15 m	<b>490 NOR 000 15</b>	—



490 NOC 000 05



490 NOT 000 05



490 NOR 000 05

# Modicon M340 automation platform

Ethernet TCP/IP network, Transparent Ready  
Cabling system: ConneXium connection components



TCS EAA F1LF00

## Separate parts for TCS ESM switches

Description	Optical fiber	Type	Reference	Weight kg
<b>Fiber optic modules for Gigabit ports with LC connector</b> (1)	Multimode 50/125µm or 62.5/125µm	1000BASE-SX	TCS EAA F1LFU00	0.040
	Single mode 9/125µm	1000BASE-LH	TCS EAA F1LFH00	0.040
	Multimode 50/125µm or 62.5/125µm Single mode 62.5/125µm	1000BASE-LX	TCS EAA F1LFS00	0.040
<b>Configuration backup key</b>	Via the USB port on the front of the switch, used to: - save and retrieve the switch configuration - update the internal software		TCS EAM 0100	-

## Connection components for IP 67 switch

Description	Preformed at both ends	Length	Reference	Weight kg
<b>Copper cables</b>	1 IP 67 4-way M12 connector and 1 RJ45 connector	1 m	TCS ECL 1M3M 1S2	-
		1.5 m	TCS ECL 1M3M 1X5S2	-
		3 m	TCS ECL 1M3M 3S2	-
		5 m	TCS ECL 1M3M 5S2	-
		10 m	TCS ECL 1M3M 10S2	-
		25 m	TCS ECL 1M3M 25S2	-
		40 m	TCS ECL 1M3M 40S2	-
	2 IP 67 4-way M12 connectors	1 m	TCS ECL 1M1M 1S2	-
		1.5 m	TCS ECL 1M1M 1X5S2	-
		3 m	TCS ECL 1M1M 3S2	-
		5 m	TCS ECL 1M1M 5S2	-
		10 m	TCS ECL 1M1M 10S2	-
		25 m	TCS ECL 1M1M 25S2	-
		40 m	TCS ECL 1M1M 40S2	-
<b>M12/RJ45 adaptor</b>	IP 67 female 4-way M12 connector and female RJ45 connector	-	TCS EAA F11F13F00	-

(1) Dimensions W x H x D = 20 x 18 x 50 mm.

# Modicon M340 automation platform

## CANopen machine and installation bus

### Presentation

Schneider Electric has selected CANopen for its machines and installations because of its wealth of functions and its resulting benefits in the automation world. This decision was based on the general acceptance of CANopen, and the fact that CANopen products are increasingly used in control system architectures.

CANopen is an open network supported by more than 400 companies worldwide, and promoted by CAN in Automation. CANopen conforms to standards EN 50325-4 and ISO 15745-2.

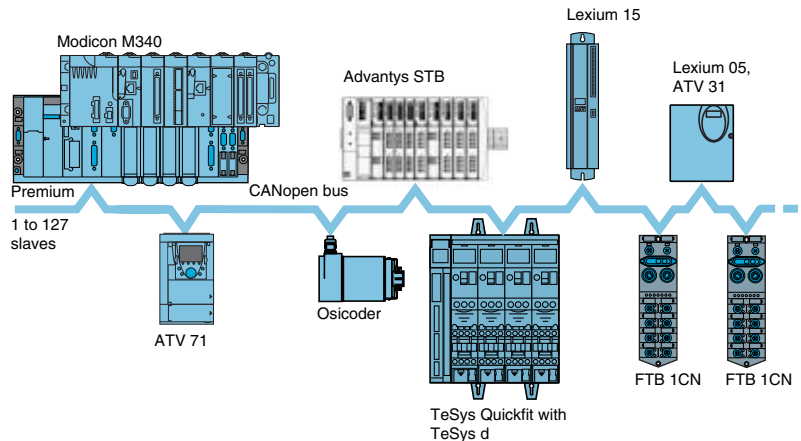
Schneider Electric is heavily involved in working groups, which are important for machine and installation architectures, systems and products.

### CANopen brings transparency to Ethernet

CAN in Automation and Modbus-IDA have worked together to create a standard that ensures total transparency between CANopen and Modbus TCP/IP. The result of this collaboration has been the CiA DSP309-2 specification, defining communication standards between a Modbus TCP/IP network and a CANopen bus.

The specification defines mapping services enabling CANopen devices to communicate with a Modbus TCP/IP network through a gateway. The data in a CANopen device can be accessed in both read and write mode.

This specification is the first standard available for developing an open standard communication between Modbus TCP/IP and CANopen. It is driving Schneider Electric network solutions toward better integration, diagnostics and configuration of distributed applications. It allows machines and installations to be connected to an Ethernet network continuously, while combining the advantages of each network in its specific area.



The CANopen bus is a multi-master bus ensuring reliable, deterministic access to real-time data in control system devices. The CSMA/CA protocol is based on broadcast exchanges, sent cyclically or on an event, to ensure optimum use of the passband. A message handling channel can also be used to define slave parameters.

The bus uses a double twisted pair on which, with the Modicon M340 platform, 63 devices maximum are connected by daisy-chaining or by tap junctions. The variable data rate between 20 Kbit/s and 1 Mbit/s depends on the length of the bus (between 20 m and 2,500 m).

Each end of the bus must be fitted with a line terminator.

The CANopen bus is a set of profiles on CAN systems, possessing the following characteristics:

- Open bus system
- Data exchanges in real time without overloading the protocol
- Modular design allowing modification of size
- Interconnection and interchangeability of devices
- Standardized configuration of networks
- Access to all device parameters
- Synchronization and circulation of data from cyclic and/or event-controlled processes (short system response time)

# Modicon M340 automation platform

## CANopen machine and installation bus



Advantys FTB



Advantys OTB



TeSys Quickfit



Altivar ATV 31

Example of devices that can be connected on CANopen

### Connectable devices

The Modicon M340 automation platform, via its **BMX P34 2010/2030** processors with integrated CANopen link, performs the role of master on the machine bus.

The following Telemecanique devices can be connected to the CANopen bus:

- Ø 58 mm Osicoder multi-turn absolute encoders:
  - **XCC 3510P/3515C S84CB**, version ≥ 1.0
- TeSys U starter-controllers:
  - with **LUL C08** communication module, version ≥ 1.2
- TeSys d motor-starters, using the TeSys Quickfit installation help system:
  - with **APP 1CC00/O2** communication module, version ≥ 1.0
- Advantys OTB IP 20 Optimum distributed I/O (I/O extension modules not permitted):
  - with **OTB 1C0 DM9LP** interface module, version ≥ 2.0
- Advantys STB IP 20 modular distributed I/O:
  - with NIM module **STB NCO 1010**, version ≥ 1.0 or **STB NCO 2212**, version ≥ 2.02
- Advantys FTB IP 67 monobloc I/O splitter boxes:
  - **FTB 1CN●●●●●**, version ≥ 1.7
- Preventa configurable safety controllers:
  - **XPS MC16ZC/32ZC**, version ≥ 1.10
- Altivar 31 variable speed drives for asynchronous motors 0.18...15 kW:
  - **ATV 31H ●●●●●**, version ≥ 1.1 (1)
- Altivar 71/61 variable speed drives for asynchronous motors 0.75...630 kW:
  - **ATV 61H /71H ●●●●●**, version ≥ 1.1 (1)
- Lexium 05 servo drives (0.4...6 kW) for BSH servo motors:
  - **LXM 05A●D●●●●**, version ≥ 1.120 (2)
- Lexium 15 servo drives (0.9...42.5 kW) for BDH or BSH servo motors:
  - **LXM 15L●**, version ≥ 1.45 (3)
  - **LXM 15MD/15HC**, version ≥ 6.64 (4)
- IclA intelligent compact motor-drives from Berger Lahr (compagny of Schneider Electric group):
  - **IFA 6●**, version ≥ 1.105 (5)
  - **IFE 71**, version ≥ 1.104 (5)
  - **IFS 6●/9●**, version ≥ 1.107 (5)

(1) Requires the PowerSuite software workshop **VW3 A8 104**, version ≥ 2.00.

(2) Requires the PowerSuite software workshop for Lexium 05 **VW3 A8 104**, version 2.2.0 patch V2.2.0B.

(3) Requires the Unilink software, version ≥ 1.5.

(4) Requires the Unilink software, version ≥ 4.0.

(5) Requires the IclA Easy software, version ≥ 1.104.

### Software setup via Unity Pro

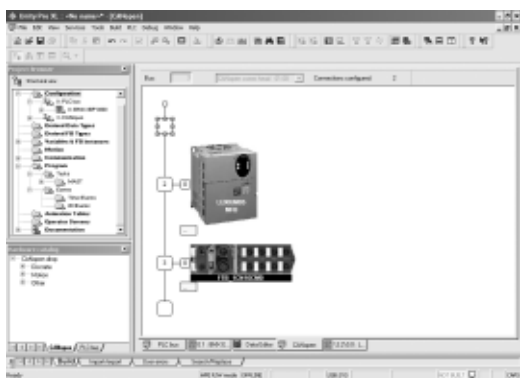
Configuration of the CANopen bus on the Modicon M340 platform is fully integrated in the Unity Pro software. From the Unity Pro graphic editor, simply select the devices available in the catalog and assign them their CANopen slave address. Exchanges between the CANopen bus and the Modicon M340 processor can be assigned by configuration to the fast or master task.

Predefined profiles or functions are used to create the user interface automatically using process variables (PDO), in such a way that any subsequent modification to the mapping of these variables will have no impact on their topological addressing. Depending on the devices, dedicated configuration screens are used to assign the initial parameters.

The dedicated screens are available for CANopen specialists who wish to optimize the performance of the CANopen bus or re-assign the Process Data Objects (PDO) differently.

Acyclical access to the Service Data Object (SDO) corresponding to any CANopen object of a particular device is easily possible from the application using the standard communication functions **READ\_VAR** and **WRITE\_VAR**, or even from the Unity Pro diagnostic screens.

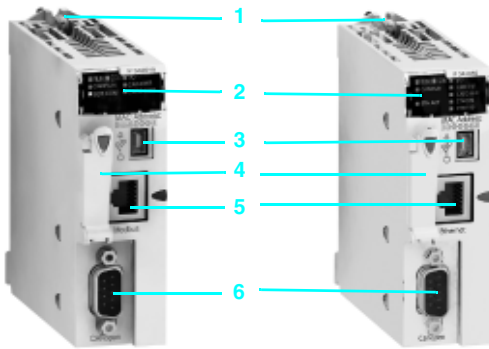
These screens can be used to display the bus status graphically, as well as to access the diagnostics sent by a faulty device with a single click of the mouse.



Example of Unity Pro configuration screen for Lexium 05 servo drive and Advantys FTB IP 67 I/O splitter box

# Modicon M340 automation platform

## CANopen machine and installation bus



BMX P34 2010

BMX P34 2030

### Description

Both of the Performance processors on the Modicon M340 platform, **BMX P34 2010** and **BMX P34 2030**, have an integrated CANopen communication port. They have the following on the front panel:

- 1 Safety screw for locking the module in its slot (marked 0) in the rack
- 2 A display block comprising at least:
  - CAN RUN LED (green): Integrated machine/installation bus operational
  - CAN ERR LED (red): Integrated machine/installation bus faulty
- 3 A mini B USB connector for a programming terminal
- 4 A slot equipped with Flash memory card for backing up the application
- 5 An RJ45 connector for serial link (with **BMX P34 2010** model) or Ethernet TCP/IP port (with **BMX P34 2030** model)
- 6 A 9-way SUB-D connector for the CANopen Master machine and installation bus

### Characteristics (1)

Type of bus		CANopen								
<b>CANopen services</b>	Conformity class	M20								
	Standard	DS 301 V 04.02, 303-2								
	Device profile	DS 405								
	Special	-								
<b>Structure</b>	Physical interface	9-way male SUB-D								
	Topology	Devices connected by daisy-chaining and/or tap junctions								
	Access method	CSMA/CA, carrier sense consumer/producer principle, collision detection and arbitration of message priorities								
	Application layer	Messages carrying objects: process data (PDO), service data (SDO), network management (NMT), special functions (SYNC, EMCY, TIME)								
<b>Transmission</b>	Data rate	20 Kbit/s...1 Mbit/s depending on bus length								
	Medium	Double shielded twisted pair								
<b>CANopen physical configuration (1)</b>	No. of slave devices	63 maximum								
	Data rate	1 Mbit/s	800 Kbit/s	500 Kbit/s	250 Kbit/s	125 Kbit/s	50 Kbit/s	20 Kbit/s		
	Maximum length of bus (2)	<b>m</b>	20	40	100	250	500	1000	2500	
	Maximum length of tap-offs on one tap junction (3)	<b>m</b>	0.6	6	10	10	10	120	300	
	Limitation per segment	No. of devices	64	32	16					
	Maximum length of segment (4)	<b>m</b>	160	185	205					
<b>Modicon M340 processor</b>			<b>BMX P34 2010</b>				<b>BMX P34 2030</b>			
	No. of racks	1 (4, 6, 8 or 12 slots)								
	Maximum no. of slots	12 for processor and modules (excluding power supply module)								
	Maximum no. in rack	Discrete I/O	1,024, 704 in single-rack configuration (64 I/O x 11)							
		Analog I/O	256, 66 in single-rack configuration (4I/2Q x 11)							
		Process control	Programmable loops (via CONT-CTL process control EFB library)							
		Counting	36 channels							
	Integrated connections	Motion	Independent axes on CANopen bus (via MFB library)							
		Ethernet TCP/IP	-				1 RJ45 port, 10/100 Mbit/s			
		CANopen bus	1 master (9-way SUB-D)							
		Serial link	1 RJ45 port, Modbus master/slave or character mode   -							
	USB port	1 port, 12 Mbit/s								
Communication module	Ethernet TCP/IP	1 RJ45 port, 10/100 Mbit/s with Transparent Ready : - class B30 standard Web server with BMX NOE 0100 module - class C30 configurable Web server with BMX NOE 0110 module								
Internal RAM capacity	<b>Kb</b>	4,096 including 3,584 for the program, constants and symbols and 256 for data								

(1) For more information, please refer to the "Machines and installations with industrial communication" catalogue.

(2) Deduct 15 m per repeater from the length of the bus.

(3) For other restrictions, please refer to the CANopen hardware setup manual available on our website ([www.telemecanique.com](http://www.telemecanique.com)).

(4) With the use of **TSX CAN C●50/100/300** CANopen cables and **TSX CAN C●DD03/1/3/5** preformed cordsets.



# Modicon M340 automation platform

## CANopen machine and installation bus

### Modicon M340 Performance processors with integrated CANopen bus link



BMX P34 2010



BMX P34 2030

Modicon M340 processor modules are supplied with the **BMX RMS 008MP** Flash memory card. This card performs the following actions transparently:

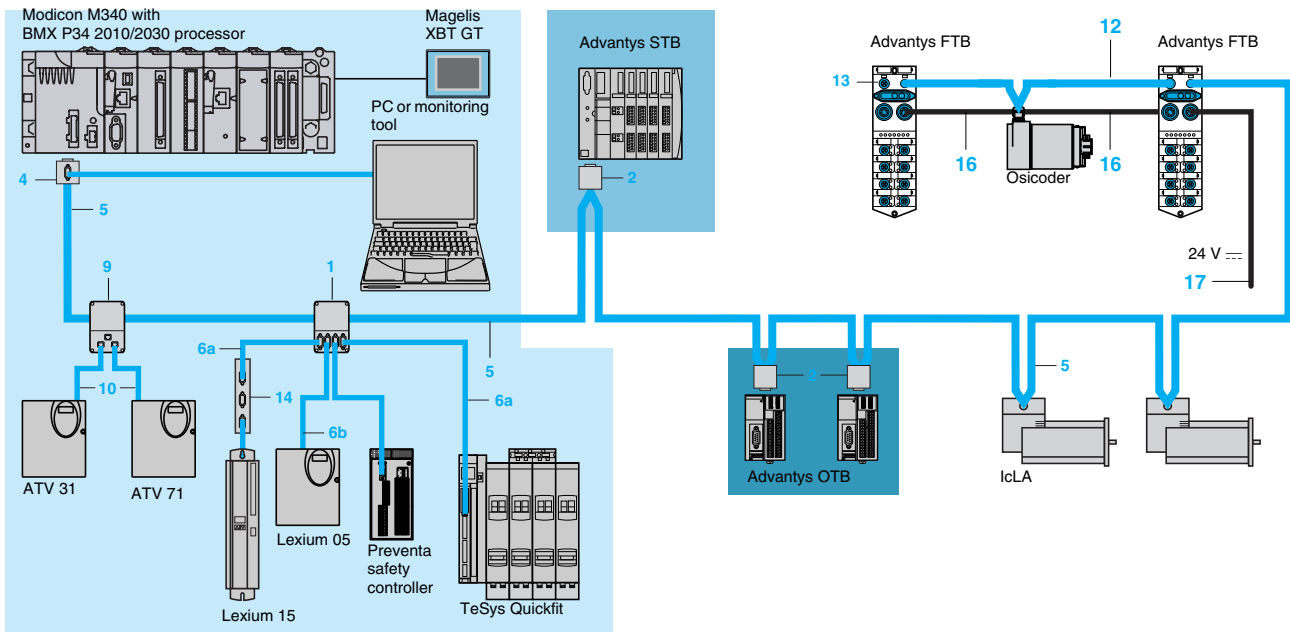
- Backing up the application (program, symbols and constants) supported in the processor internal RAM that is not backed up
- Activation of the Transparent Ready class B10 standard web server (with **BMX P34 2030** processor)

This card can be replaced by another card featuring a file storage option (see page 1/9).

I/O capacity (1)	Memory capacity	Max. no. of network modules	Integrated communication ports	Reference (3)	Weight kg
<b>Performance BMX P340 20, 1 rack</b>					
1,024 discrete I/O 256 analog I/O 36 app-sp. channels	4,096 Kb integrated	1 Ethernet TCP/IP network	CANopen bus Modbus serial link	<b>BMX P34 2010</b>	—
			CANopen bus Ethernet TCP/IP network	<b>BMX P34 2030</b>	—

(1) For I/O capacity in single-rack configuration, see characteristics, page 1/8

### CANopen bus wiring system



**Note:** For numbers and references 1, 2, ..., 17, see pages 3/40 and 3/41.

Different types of cable are available making it possible to create any type of application, including for harsh environments (for a definition of standard and harsh environments, see page 3/40).

Several connectors are available to meet any requirement: straight or 90° angled connectors, or angled connectors with the option of connecting a PC or diagnostic pocket PC.

Power can be supplied to the equipment by means of cables, cordsets and tap junctions: one AWG24 pair for the CAN signals, one AWG22 pair for the power supply and the ground.

In addition to the IP 20 wiring offer, there is also an IP 67 wiring offer.



# Modicon M340 automation platform

## CANopen machine and installation bus Wiring system



TSX CAN TDM4



VW3 CAN TAP2



TSX CAN KCD F90T



TSX CAN KCD F180T



TSX CAN KCD F90TP

### Standard tap junctions and connectors

Designation	Description	No. (1)	Length	Reference	Weight kg
<b>IP 20 CANopen tap junction</b>	4 SUB-D ports. Screw terminal block for connection of trunk cables Line termination	1	–	TSX CAN TDM4	0.196
<b>IP 20 connectors</b> CANopen female	90° angled	2	–	TSX CAN KCDF 90T	0.046
	Straight (2)	–	–	TSX CAN KCDF 180T	0.049
	90° angled with 9-way SUB-D for connecting a PC or diagnostic tool	4	–	TSX CAN KCDF 90TP	0.051
<b>IP 67 M12 connectors</b>	Male	–	–	FTX CN 12M5	0.050
	Female	–	–	FTX CN 12F5	0.050
<b>IP 20 CANopen tap junctions</b> for Altivar and Lexium 05	2 RJ45 ports	9	–	VW3 CAN TAP2	–

### IP 20 standard cables and preformed cordsets

Designation	Description	No. (1)	Length	Unit reference	Weight kg	
<b>CANopen cables</b> (AWG 24)	Standard, C€ marking: low smoke. Halogen-free. Flame-retardant (IEC 60332-1)	5	50 m	TSX CAN CA50	4.930	
			100 m	TSX CAN CA100	8.800	
			300 m	TSX CAN CA300	24.560	
	Standard, UL certification, C€ marking: flame-retardant (IEC 60332-2)	5	50 m	TSX CAN CB50	3.580	
			100 m	TSX CAN CB100	7.840	
			300 m	TSX CAN CB300	21.870	
	For harsh environments (3) or mobile installation, C€ marking: low smoke. Halogen-free. Flame-retardant (IEC 60332-1). Resistance to oils	5	50 m	TSX CAN CD50	3.510	
			100 m	TSX CAN CD100	7.770	
			300 m	TSX CAN CD300	21.700	
<b>CANopen preformed cordsets</b> One 9-way female SUB-D connector at each end (AWG 24)	Standard, C€ marking: low smoke. Halogen-free. Flame-retardant (IEC 60332-1)	6a	0.3 m	TSX CAN CADD03	0.091	
			1 m	TSX CAN CADD1	0.143	
			3 m	TSX CAN CADD3	0.295	
			5 m	TSX CAN CADD5	0.440	
			Standard, UL certification, C€ marking: flame-retardant (IEC 60332-2)	6a	0.3 m	TSX CAN CBDD03
	1 m	TSX CAN CBDD1	0.131			
	3 m	TSX CAN CBDD3	0.268			
	5 m	TSX CAN CBDD5	0.400			
	<b>CANopen preformed cordsets</b> One 9-way SUB-D connector and one RJ45 connector (AWG 24)	6b	0.5 m		TCS CCN 4F3M05T	–
			1 m	TCS CCN 4F3M1T	–	
3 m			TCS CCN 4F3M3T	–		
Two 9-way SUB-D connectors, one male and one female			–	0.5 m	TLA CD CBA 005	–
1.5 m				TLA CD CBA 015	–	
3 m	TLA CD CBA 030	–				
5 m	TLA CD CBA 050	–				

### IP 67 standard preformed cordsets

Designation	Description	No. (1)	Length	Unit reference	Weight kg
<b>CANopen preformed cordsets</b>	Preformed cordsets of two 5-way M12 A-coded angled connectors (one male connector and one female connector)	12	0.3 m	FTX CN 3203	0.40
			0.6 m	FTX CN 3206	0.70
			1 m	FTX CN 3210	0.100
			2 m	FTX CN 3220	0.160
			3 m	FTX CN 3230	0.220
			5 m	FTX CN 3250	0.430

(1) For numbers, see page 3/39.

(2) For connection to Controller Inside programmable card, the VW3 CAN KCDF 180T connector can also be used.

(3) **Standard environment:**

- Without any particular environmental constraints
- Operating temperature between +5°C and +60°C
- Fixed installation

**Harsh environment:**

- Resistance to hydrocarbons, industrial oils, detergents, solder splashes
- Relative humidity up to 100%
- Saline atmosphere
- Significant temperature variations
- Operating temperature between -10°C and +70°C
- Mobile installation

# Modicon M340 automation platform

## CANopen machine and installation bus Wiring system



VW3 CAN A71



AM0 2CA 001V000

### IP 20 connection accessories

Designation	Description	No. (1)	Length	Unit reference	Weight kg
<b>CANopen connector</b> for Altivar 71 drive (2)	9-way female SUB-D. Switch for line termination. Cables exit at 180°	–	–	VW3 CAN KCDF 180T	–
<b>Adaptor for Altivar 71 drive</b>	CANopen adaptor SUB-D to RJ45	–	–	VW3 CAN A71	–
<b>Preformed CANopen cordsets</b> for Altivar and Lexium 05 drives	One RJ45 connector at each end	10	0.3 m	VW3 CAN CARR03	–
			1 m	VW3 CAN CARR1	–
<b>CANopen bus adaptor</b> for Lexium 15 servo drive	Hardware interface for a link conforming to the CANopen standard + one connector for a PC terminal	14	–	AM0 2CA 001V000	0.110
<b>Y-connector</b>	CANopen/Modbus	–	–	TCS CTN011M11F	–

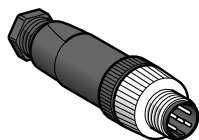
### IP 67 connection accessories

#### For Advantys FTB monobloc I/O splitter boxes

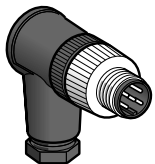
Designation	Composition	No. (1)	Length m	Reference	Weight kg
<b>IP 67 line terminator</b>	Equipped with one M12 connector (for end of bus)	13	–	FTX CNTL12	0.010
<b>24 V <math>\equiv</math> power supply connection cables</b>	Equipped with two 5-way 7/8 connectors	16	0.6	FTX DP2206	0.150
			1	FTX DP2210	0.190
			2	FTX DP2220	0.310
			5	FTX DP2250	0.750
			Equipped with one 5-way 7/8 connector at one end and flying leads at the other end	17	1.5
3	FTX DP2130	0.430			
5	FTX DP2150	0.700			
<b>T-junction box for power supply</b>	Equipped with two 5-way 7/8 connectors	–	–	FTX CNCT1	0,100



FTX DP21



XZ CC12DM50B



XZ CC12CM50B



FTX CY1208

#### Separate parts

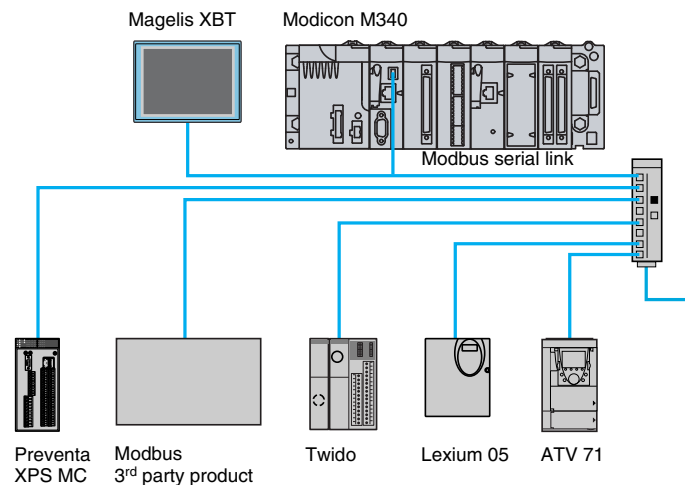
Designation	Composition	Sold in	Reference	Weight kg	
<b>Connectors</b>	7/8 type, 5-way	Male	–	FTX C78M5	0.050
		Female	–	FTX C78F5	0.050
	Straight, M12 type, 5 screw terminals	Male	–	XZ CC12MDM50B	0.020
		Female	–	XZ CC12FDM50B	0.020
		Male	–	XZ CC12MCM50B	0.020
		Female	–	XZ CC12FCM50B	0.020
<b>Sealing plugs</b>	For M8 connector (sold in packs of 10)	–	FTX CM08B	0.100	
	For M12 connector (sold in packs of 10)	–	FTX CM12B	0.100	
	For 7/8 connector	–	FTX C78B	0.020	
<b>Y-connector</b>	Connection of two M8 connectors to M12 connector on splitter box	–	FTX CY1208	0.020	
	Connection of two M12 connectors to M12 connector on splitter box	–	FTX CY1212	0.030	
<b>Diagnostics adaptor</b>	Equipped with two M12 connectors	–	FTX DG12	0.020	
<b>Marker labels</b>	For plastic splitter boxes	Packs of 10	FTX BLA10	0.010	
	For metal splitter boxes	Packs of 10	FTX MLA10	0.010	

(1) For numbers, see page 3/39.

(2) For ATV 71H...M3, ATV 71HD11M3X, HD15M3X, ATV 71H075N4... HD18N4 drives, this connector can be replaced by the TSX CAN KCDF 180T connector.

3

## Presentation



The Modbus bus is used for master/slave architectures (it is necessary, however, to check that the Modbus services used by the application are implemented on the devices concerned).

The bus comprises one master station and several slave stations. Only the master station can initiate the exchange (direct communication between slave stations is not possible). Two exchange mechanisms are possible:

- Question/answer, where the requests from the master are addressed to a given slave. The master then waits for the response from the slave which has been interrogated.
- Broadcasting, the master broadcasts a message to all the slave stations on the bus. These stations execute the order without transmitting a response.

3.3

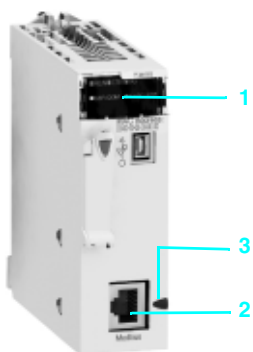
## Description

The **BMX P34 1000 / 2010 / 2020** processors in the Modicon M340 automation platform range integrate a serial link that can operate under Modbus master/slave RTU/ASCII protocol or under character mode protocol.

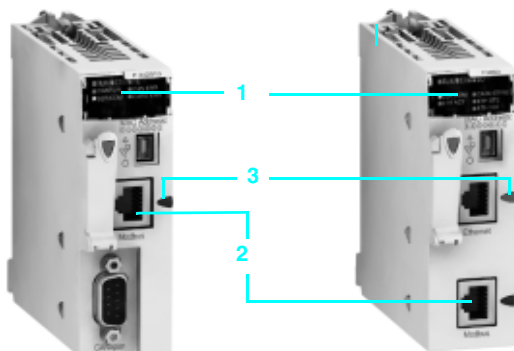
For this serial port, these processors have the following on the front panel :

- 1 A display block comprising among other LEDs:
  - SER COM LED (yellow): Activity on the Modbus serial link (lit) or failure on an equipment present on the link (flashing).
- 2 An RJ45 connector for the Modbus serial link or character mode link (RS 232C/RS 485, non-isolated) and its black indicator 3.

**Nota :** Complete processors descriptions, see page 1/5.



BMX P34 1000



BMX P34 2010

BMX P34 2000

### Characteristics

Protocol		Modbus		Character mode	
Structure	Type	Non isolated serial link (1)			
	Method of access	Master/slave type		-	
	Physical Interface	RS 232, 2 wires	RS 485, 2 wires	RS 232, 4 wires	RS 485, 2 wires
Transmission	Mode	Asynchronous in baseband		Asynchronous in baseband	
	Frame	RTU/ASCII, Half duplex		Full duplex	Half duplex
	Data rate	0.3...19.2 Kbit/s (default 19.2 Kbit/s)		0.3...19.2 Kbit/s (default 19.2 Kbit/s)	
	Medium	Shielded twisted pair		Simple or double shielded twisted pair	Shielded twisted pair
Configuration	Number of devices	2 (point-to-point)	32 max. per segment	2 (point-to-point)	32 max. per segment
	Maximum number of link addresses	248		248	
	Maximum length of bus	15 m	10 m non isolated link 1000 m isolated link	15 m	10 m non isolated link 1000 m isolated link
	Maximum length of tap links	-	15 m non isolated link 40 m isolated link	-	15 m non isolated link 40 m isolated link
Services	Requests	252 data bytes per RTU request 504 data bytes per ASCII request		1 K data bytes per request	
	Security, control parameters	One CRC on each frame (RTU) One LRC on each frame (ASCII)		One LRC on each frame (ASCII)	
	Monitoring	Diagnostic counters, event counters		-	

(1) For an isolated link, you must use the TWD XCA ISO terminal port cable connector.

### Modbus functions

Modbus functions available on serial ports  
integrated to Modicon M340 processors

Code	Modbus slave (server)	Modbus master (client)
01	Read n output bits	Read output bits
02	Read n input bits	Read input bits
03	Read n output words	Read words
04	Read n input words	Read input words
15	Write n output bits	Write n output bits
16	Write n output words	Write n output words

### References



BMX P34 1000

BMX P34 2020

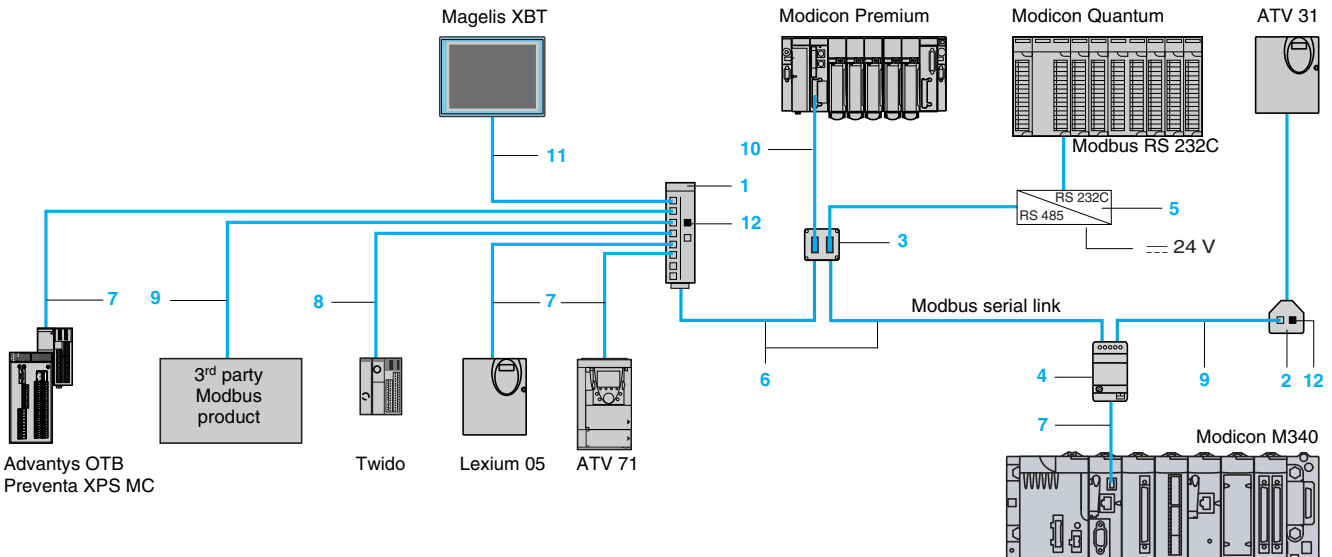
I/O capacity (1)	Memory capacity	Integrated communication ports	Reference (3)	Masse kg
<b>Standard processor with integrated serial link BMX P34 10</b>				
512 discrete I/O 128 E/S analog I/O 20 application-specific channels	2,048 Kb integrated	Modbus serial link	<b>BMX P34 1000</b>	0.200
<b>Performance processors with integrated serial link BMX P34 20</b>				
1024 discrete I/O 256 E/S analog I/O 36 application-specific channels	4,096 Kb integrated	Modbus serial link CANopen bus	<b>BMX P34 2010</b>	0.210
		Modbus serial link Ethernet TCP/IP network	<b>BMX P34 2020</b>	0.205

Serial link cabling system, see pages 3/44 and 3/45.

# Modicon M340 automation platform

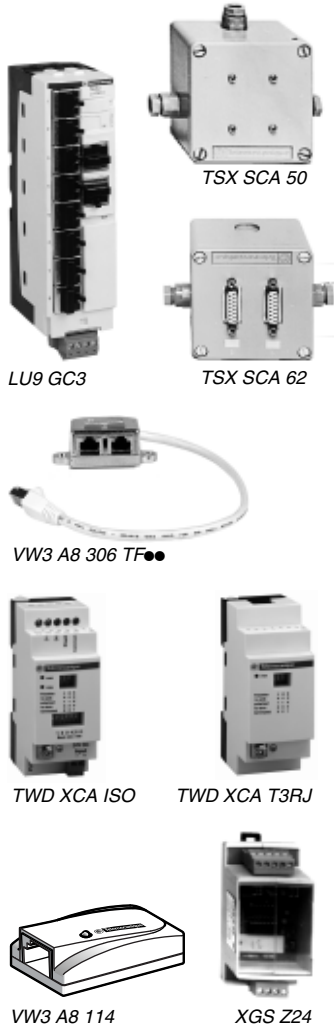
Modbus serial link and character mode  
Cabling system

## Cabling system



3

## Extension and adaptation elements for RS 485 serial link



Designation	Description	Reference	Length	Unit reference	Weight kg
<b>Modbus splitter box</b>	- 10 x RJ45 connectors - 1 x screw terminal block	1	-	LU9 GC3	0.500
<b>T-junction boxes</b>	- 2 x RJ45 connectors - 1 x integrated cable with RJ45 connector Dedicated for Altivar and Lexium	2	0.3 m 1 m	VW3 A8 306 TF03 VW3 A8 306 TF10	0.190 0.210
<b>Passive T-junction box</b>	- Tap-off point, extension of trunk cable - Line termination adapter	-	-	TSX SCA 50	0.520
<b>Passive 2-channel subscriber socket, 2 x 15-way female SUB-D connectors and 2 x screw terminals</b>	- 2-channel tap-off point and extension of trunk cable - Address coding - Line termination adapter	3	-	TSX SCA 62	0.570
<b>T-junction box</b> Screw terminals for main cable. 1 x RJ45 connector for derivation	- Insulation of the RS 485 serial line - Line termination adaptation (R = 120 Ω, C = 1 nF) - Line pre-polarized (2 x R = 620 Ω) (1) 24 V <sub>DC</sub> power (2) Mounting on 35 mm	4	-	TWD XCA ISO	0.100
<b>T-junction box</b> 3 x RJ45 connectors	- Line termination adaptation (R = 120 Ω, C = 1 nF) - Line pre-polarized (2 x R = 620 Ω) (1) Mounting on 35 mm	-	-	TWD XCA T3RJ	0.080
<b>Modbus / Bluetooth® adapter</b>	- 1 x Bluetooth® adapter (10 m range, class 2) with 1 x RJ45 connector, - 1 x 0.1 m long cordset for PowerSuite with 2 x RJ45 connectors, - 1 x 0.1 m long cordset for TwidoSuite with 1 x RJ45 connector and 1 x mini-DIN connector, - 1 x RJ45/SUB-D male 9-way adapter for ATV speed drives	-	-	VW3 A8114	0.155
<b>RS 232C/RS 485 line adapter without modem signals</b>	24 V <sub>DC</sub> /20 mA power supply, 19.2 kbit/s Mounting on 35 mm	5	-	XGS Z24	0.100
<b>Line terminator</b>	For RJ45 connector (R = 120 Ω, C = 1 nF)	12	Sold in lots of 2	VW3 A8 306 RC	0.200

(1) Polarized terminated requires to connection of Twido controller master.  
(2) 24 V<sub>DC</sub> power supply external or thru the serial port integrated to Modicon M340 processors.

# Modicon M340

## automation platform

### Modbus serial link and character mode

#### Cables and connecting cordsets for RS 485 serial link

Designation	Description	Reference	Length	Unit reference	Weight kg
<b>RS 485 double shielded twisted pair trunk cables</b>	Modbus serial link, supplied without connector	6	100 m	<b>TSX CSA 100</b>	5.680
			200 m	<b>TSX CSA 200</b>	10.920
			500 m	<b>TSX CSA 500</b>	30.000
<b>Modbus RS 485 cables</b>	2 x RJ45 connectors	7	0.3 m	<b>VW3 A8 306 R03</b>	0.030
			1 m	<b>VW3 A8 306 R10</b>	0.050
			3 m	<b>VW3 A8 306 R30</b>	0.150
	1 x RJ45 connector and 1 x 15-way SUB-D connector	–	3 m	<b>VW3 A8 306</b>	0.150
	1 x mini-DIN connector for Twido controller and 1 x RJ45 connector	8	0.3 m	<b>TWD XCA RJ003</b>	0.040
1 m			<b>TWD XCA RJ010</b>	0.090	
3 m			<b>TWD XCA RJ030</b>	0.16	
	1 x RJ45 connector and 1 end with flying leads	5	3 m	<b>VW3 A8 306 D30</b>	0.150
	1 x miniature connector and 1 x 15-way SUB-D connector	9	3 m	<b>TSX SCP CM 4530</b>	0.180
<b>Cordsets for Magelis XBT display and terminal</b>	1 x RJ45 connector and 1 x 25-way SUB-D connector for: - XBT N200/N400/NU400 - XBT R410/411 - XBT GT2...GT7 (COM1 port) (1)	11	2.5 m	<b>XBT Z938</b>	0.210
	2 x RJ45 connectors for : - XBT GT1 (COM1 port) - XBT GT2...GT7 (COM2 port)	11	3 m	<b>VW3 A8 306 R30</b>	0.150

#### Connecting cordsets for RS 232 serial link

Designation	Description	Reference	Length	Unit reference	Weight kg
<b>Cordset for Data Terminal Equipment</b> (DTE: printer...)	Serial link for Data Terminal Equipment (DTE) (2) 1 x RJ45 connector and 1 x 9-way SUB-D female connector	–	3 m	<b>TCS MCN 3M4F3C2</b>	0.150
<b>Cordset for Data Communication Equipment</b> (DCE: modem, converter...)	Serial link for point-to-point equipment (DCE) 1 x RJ45 connector and 1 x 9-way SUB-D male connector	–	3 m	<b>TCS MCN 3M4M3S2</b>	0.150

(1) Must be associated with an **XBT ZG909** adapter.

(2) If the DTE is equipped with a 25-way SUB-D connector, additionally order the 25-way female / 9-way male SUB-D **TSX CTC 07** adapter.



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## 4 - Unity software

*Unity software selection guide* ..... page 4/2

- Unity Pro programming software
  - Presentation, setup ..... page 4/4
  - Software structure ..... page 4/9
  - 5 IEC languages ..... page 4/12
  - Functions ..... page 4/18
  - References ..... page 4/29
- Unity EFB Toolkit software ..... page 4/32
- Unity SFC View software ..... page 4/34
- Unity Dif application comparison software ..... page 4/38
- Unity Loader software ..... page 4/40





# Modicon M340 automation platform

## Unity software

**Unity Pro programming software for:**

- Modicon M340 **M**
- Premium **P**, Atrium **A**
- Quantum **Q**



4

<b>IEC 61131-3 languages</b>	Instruction List (IL)	M	M - A - P	M - A - P - Q	M - A - P - Q	
	Ladder (LD)	M	M - A - P	M - A - P - Q	M - A - P - Q	
	Structured Text (ST)	M	M - A - P	M - A - P - Q	M - A - P - Q	
	Function Block Diagram (FBD)	M	M - A - P	M - A - P - Q	M - A - P - Q	
	Sequential Function Chart (SFC)/Grafcet	M	M - A - P	M - A - P - Q	M - A - P - Q	
	<b>Programming services</b>	Multitask programming (Master, fast and event-triggered)	M	M - A - P	M - A - P - Q	M - A - P - Q
		Multitask programming (Master, fast, auxiliary and event-triggered)				P (TSX P57 5●) Q (140 CPU 651/671)
		Functional view and function modules	M	M - A - P	M - A - P - Q	M - A - P - Q
		DFB editor and DFB instances	M	M - A - P	M - A - P - Q	M - A - P - Q
		DDT compound data editor	M	M - A - P	M - A - P - Q	M - A - P - Q
Data structure instances and tables		M	M - A - P	M - A - P - Q	M - A - P - Q	
EF function block libraries and EFB function blocks		M	M - A - P	M - A - P - Q	M - A - P - Q	
User-definable control loops			A (TSX PCI 2●) - P (TSX P57 2●)	A (TSX PCI 20●) - P (TSX P57 2●/3●/4●)	P (TSX P57 2●/3●/4●/5●)	
Programmable control loops (FB library)		M	M - A - P	M - A - P - Q	M - A - P - Q	
Motion Function Blocks		M	M - A - P	M - A - P	M - A - P	
<b>Debugging and display services</b>	Hot Standby PLC redundancy system		P (TSX H57 24M)	P (TSX H57 24/44M)	P (TSX H57 24/44M) - Q (140 CPU 67 160)	
	System diagnostics	M	M - A - P	M - A - P - Q	M - A - P - Q	
	Application diagnostics	M	M - A - P	M - A - P - Q	M - A - P - Q	
	Diagnostics with location of error source	M	M - A - P	M - A - P - Q	M - A - P - Q	
	PLC simulator	M	M - A - P	M - A - P - Q	M - A - P - Q	
	Hypertext link animations in graphic languages	M	M - A - P	M - A - P - Q	M - A - P - Q	
	Step by step execution, breakpoint	M	M - A - P	M - A - P - Q	M - A - P - Q	
	Watchpoint	M	M - A - P	M - A - P - Q	M - A - P - Q	
	Operator screens	M	M - A - P	M - A - P - Q	M - A - P - Q	
	Diagnostic viewer	M	M - A - P	M - A - P - Q	M - A - P - Q	
<b>Other services</b>	Creation of hyperlinks	M	M - A - P	M - A - P - Q	M - A - P - Q	
	XML import/export	M	M - A - P	M - A - P - Q	M - A - P - Q	
	Application converters (Concept, PL7)		M - A - P	M - A - P - Q	M - A - P - Q	
	Utilities for updating PLC operating systems	M	M - A - P	M - A - P - Q	M - A - P - Q	
	Communication drivers for Windows 2000/XP	M	M - A - P	M - A - P - Q	M - A - P - Q	
	Unity Pro Servers - openness -				M - A - P - Q	
	<b>UDE support</b>	Dynamic exchange with 3 <sup>rd</sup> party tools, OFS				M - A - P - Q
		Static exchange thru XML/XVM export files	M	M - A - P	M - A - P - Q	

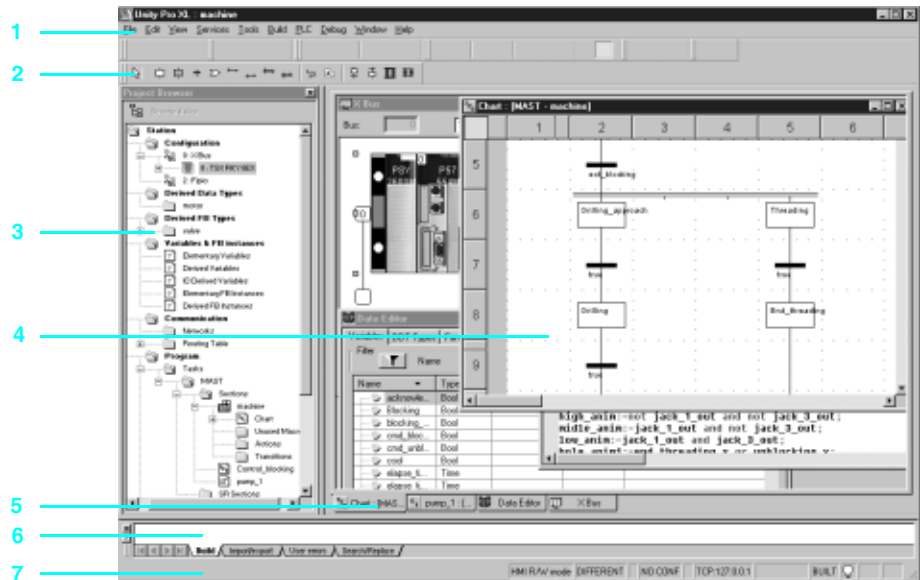
<b>Compatible Modicon platforms</b>	Modicon M340 PLCs <b>M</b>	BMX P34 1000 BMX P34 20●0	BMX P34 1000 BMX P34 20●0	BMX P34 1000 BMX P34 20●0	BMX P34 1000 BMX P34 20●0
	Atrium slot-PLCs <b>A</b>	-	TSX PCI 204M	TSX PCI 204M TSX PCI 354M	TSX PCI 204M TSX PCI 354M
	Premium CPUs <b>P</b>	-	TSX P57 C● 0244/0244M TSX P57 104/1634/154M TSX P57 204/2634/254M TSX H57 24M	TSX P57 C● 0244/0244M TSX P57 104/1634/154M TSX P57 204/2634/254M TSX P57 304/3634/354M TSX P57 4634/454M TSX H57 24/44M	TSX P57 C● 0244/0244M TSX P57 104/1634/154M TSX P57 204/2634/254M TSX P57 304/3634/354M TSX P57 4634/454M TSX P57 5634/554M TSX H57 24/44M
	Quantum CPUs <b>Q</b>	-	-	140 CPU 311 10 140 CPU 434 12U	140 CPU 311 10 140 CPU 434 12U 140 CPU 651 50/60 140 CPU 671 60

<b>Software name</b>	Unity Pro Small	Unity Pro Medium	Unity Pro Large	Unity Pro Extra Large
<b>Unity Pro software type</b>	UNY SPU SF● CD30	UNY SPU MF● CD30	UNY SPU LF● CD30	UNY SPU EF● CD30
<b>Pages</b>	4/29			

EF/EFB function development software in C language	SFC View application diagnostic and monitoring software	Comparison of Unity Pro applications	Software for firmware and application loading	Software for designing and generating batch/process applications	Pack for developing specific solutions
					
<p>Enhancement of EF and EFB function block libraries:</p> <ul style="list-style-type: none"> <li>□ Creation of families</li> <li>□ Development of functions in C language</li> <li>□ Access to all data and variable types</li> <li>□ Debugging functions (step by step, breakpoint)</li> <li>□ Use of functions created in all languages</li> </ul> <p>Supplied with:</p> <ul style="list-style-type: none"> <li>□ Microsoft Visual C++</li> <li>□ GNU source code and compiler</li> </ul>	<p>ActiveX control component for monitoring and diagnostics of chart status (SFC or Grafset) in sequential applications:</p> <ul style="list-style-type: none"> <li>□ Overview of charts and detailed views</li> <li>□ Can be integrated in human/machine interface (HMI) applications</li> <li>□ Access to PLC data via OFS (<i>OPC Factory Server</i>)</li> </ul> <p>Includes EFB function block library for Unity Pro (for Premium, Atrium and Quantum CPUs)</p>	<p>Automatic comparison of 2 Modicon M340, Premium, Atrium and Quantum applications with identification of all differences.</p>	<p>Simple and easy to use software to upgrade a Modicon M340 PLC when the user doesn't need to display/modify the program.</p> <p>Upload/download:</p> <ul style="list-style-type: none"> <li>□ CPU and Ethernet module firmware</li> <li>□ PLC project, including: <ul style="list-style-type: none"> <li>- Program</li> <li>- Located and unlocated data</li> <li>- User files and user web pages</li> </ul> </li> </ul>	<p>UAG specialist software for designing and generating batch/process applications in a "Collaborative Automation" environment.</p> <p>It provides the unique project database:</p> <ul style="list-style-type: none"> <li>□ process and control (PLCs)</li> <li>□ HMI user interface (Magelis)</li> <li>□ SCADA supervision (Monitor Pro V7.2)</li> </ul> <p>Based around re-usable objects (PID, valves, etc) and complying with standard ISA S88, UAG generates the PLC code and the elements required for the HMI system.</p> <p>Complies with the GAMP standard (<i>Good Automation Manufacturing Practice</i>)</p>	<p>Specialist software for developing made-to-order solutions (for example interfaces with an electrical CAD system, automatic application generator, etc):</p> <p>Access to Unity Pro object servers</p> <p>Reserved for IT development engineers using Visual Basic or C++</p>
Compatible with Unity Pro Small, Medium, Large and Extra Large	Compatible with Unity Pro Extra Large	Compatible with Unity Pro Extra Large	Compatible with Unity Pro Small, Medium, Large and Extra Large	Compatible with Unity Pro Extra Large	Compatible with Unity Pro Extra Large
<p>Compatible with:</p> <ul style="list-style-type: none"> <li>□ All Modicon M340 PLCs</li> <li>□ All Atrium slot-PLCs</li> <li>□ All Premium Unity CPUs</li> <li>□ All Quantum Unity CPUs</li> </ul>	<p>Compatible with:</p> <ul style="list-style-type: none"> <li>□ All Modicon M340 PLCs</li> <li>□ All Atrium slot-PLCs</li> <li>□ All Premium Unity CPUs</li> <li>□ All Quantum Unity CPUs</li> </ul>	<p>Compatible with:</p> <ul style="list-style-type: none"> <li>□ All Modicon M340 PLCs</li> <li>□ All Atrium slot-PLCs</li> <li>□ All Premium Unity CPUs</li> <li>□ All Quantum Unity CPUs</li> </ul>	<p>Compatible with:</p> <p>All Modicon M340 PLCs</p>	<p>Compatible with:</p> <ul style="list-style-type: none"> <li>□ TSX P57 4634/454M and TSX P57 5634/554M Premium Unity CPUs</li> <li>□ All Quantum Unity CPUs</li> </ul>	<p>Compatible with:</p> <ul style="list-style-type: none"> <li>□ All Modicon M340 PLCs</li> <li>□ All Atrium slot-PLCs</li> <li>□ All Premium Unity CPUs</li> <li>□ All Quantum Unity CPUs</li> </ul>
<b>Unity EFB Toolkit</b>	<b>Unity SFC View</b>	<b>Unity Dif</b>	<b>Unity Loader</b>	<b>Unity Application Generator</b>	<b>Unity Developer's Edition</b>
UNY SPU ZFU CD30E	UNY SDU MF● CD20	UNY SDU DFU CD20	UNY SMU ZU CD30	UNY SEW LF● CD23	UNY UDE VFU CD21E
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### User interface

Unity Pro's main screen provides access to all available tools in a user-friendly format that has been redesigned on the basis of feedback received from users of Concept and PL7 application design software.



This main screen consists of a general view made up of a number of windows and toolbars, which can be arranged as required on the screen:

- 1 Menu bar from which all functions can be accessed
- 2 Toolbar consisting of icons from which the most frequently used functions can be accessed
- 3 Application browser, which can be used to browse the application based on a conventional and/or a functional view
- 4 Editor windows area, which can be used to view a number of editors at the same time (configuration editor, Structured Text/Ladder etc. language editors, data editor)
- 5 Tabs for direct access to editor windows
- 6 Information window with tabs (User Errors, Import/Export, Search/Replace, etc.)
- 7 Status bar

### Accessing functions

All functions can be accessed via drop-down menus from the menu bar. The toolbar, which consists of icons, provides more rapid access to the most frequently used functions. This toolbar, which is displayed by default, can be customized to meet the requirements associated with the various uses of Unity Pro software and is divided into three groups:

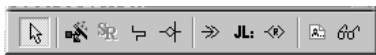
- Main toolbars, which are visible at all times
- Contextual toolbar, which is displayed when the corresponding editor is selected
- Toolbar with zoom functions (in and out), full-screen view for editor window

They are classified according to the category of functions available:

- File management (New Project, Open, Save, Print)
- Edit (Undo, Redo, Confirm, Go To)
- Application services (Analyze Project, Build Project, Browse, Find, Access Library)
- Automation platform operating mode (Upload/Download Project, Online/Offline, Run/Stop, Animate, PLC/Simulation Mode)
- Debug mode (Set/Remove Breakpoint, etc.)
- Window display (Cascade, Horizontal, Vertical)
- Online help (non-contextual or contextual)



"File/Edit" toolbar



FBD language editor contextual toolbar



"PLC" toolbar for debug mode



Toolbar with zoom (in and out)

# Modicon M340 automation platform

## Unity Pro software

### Project browser

The project browser can be used:

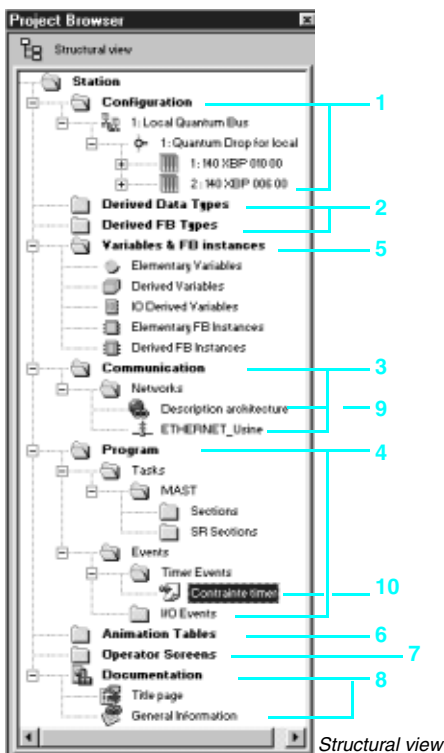
- To display the content of a Modicon M340, Atrium, Premium or Quantum PLC project
- To move between the different components of the application (configuration, program, variables, communication, DFB user function blocks, DDT derived function blocks) created by the user

The project can be displayed using two types of view:

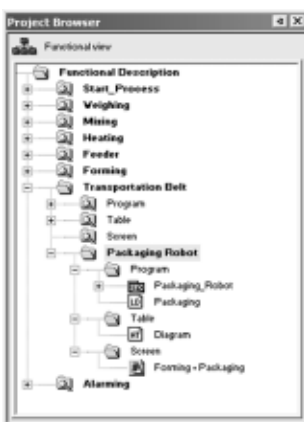
- The **structural view**, which provides an overall view of the various components of the application. This representation provides a view of the order in which the program sections are processed in the PLC.

- The **functional view**, which provides a view of the project based on specific function modules. This representation provides a breakdown according to consistent functions in relation to the process to be controlled.

These two types of view, which are available at any time, can be displayed separately or at the same time (horizontal or vertical windows) by clicking on the icons in the toolbar.



Structural view



Functional view

### Structural view

This conventional view allows you to access all the different components of the application (configuration, programming, function blocks, debugging, etc.) via the application browser.

The browser gives an overall view of the program and offers fast access to all application components.

- 1 Configuration editor
- 2 DFB (user function block) and DDT (Derived Data Type) editors
- 3 Communication networks editor
- 4 Program editor
- 5 Variables editor
- 6 Animation tables editor
- 7 Operator screens editor
- 8 Documentation editor

From any level in the tree structure, you can:

- 9 Create a hyperlink to a comment or description
  - 10 Create a directory for storing hyperlinks used to access a set of user folders
- From this level, it is also possible to zoom in and only view the detailed levels for a component on this level.

### Functional view

Unity Pro software applications support the creation of an application structure for Modicon M340, Atrium, Premium and Quantum platforms based on function modules comprising:

- Sections (program code)
- Animation tables
- Runtime screens

The designer can define a multi-level tree structure for the application, independently of the multitask structure of the PLC.

Program sections written in Ladder (LD), Structured Text (ST), Instruction List (IL), Function Block Diagram (FBD) or Sequential Function Chart (SFC) language can be associated with each level, along with animation tables and runtime screens.

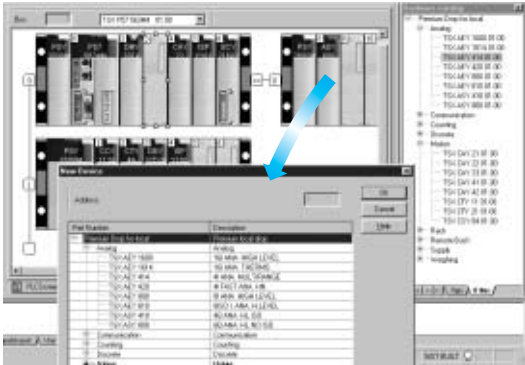
### Exporting/Importing function modules

All or part of the tree structure can be exported as function modules. In this case, all program sections on the various module levels are exported.

Utilities make it easy to reuse these modules in new applications by means of data and module name reassignment services.

# Modicon M340 automation platform

## Unity Pro software



Hardware configuration

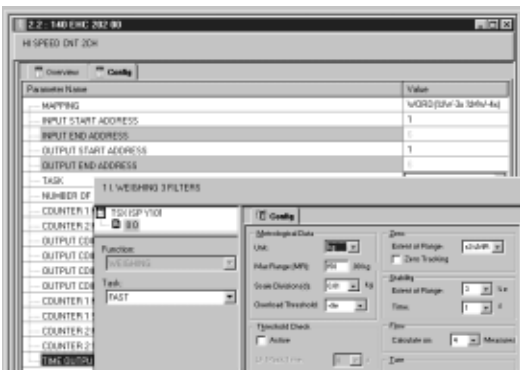
### Configuration editor

#### Hardware configuration

The first step when creating an automation project based on a Modicon M340, Atrium, Premium or Quantum platform is to select the processor for which a rack and power supply are defined by default.

The configuration editor supports the intuitive and graphics-based modification and extension of this configuration with the following elements:

- Racks, power supply
- PCMCIA memory or communication cards (Atrium/Premium) on the processor
- Discrete I/O, analog I/O or application-specific modules
- Etc

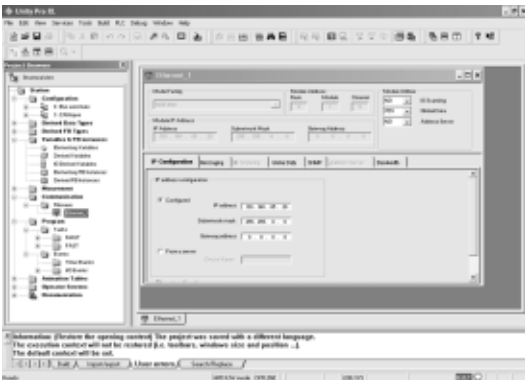


I/O modules parameter setting

#### Configuration and parameter settings for I/O and application-specific modules

From the configuration screen for Modicon M340, Atrium, Premium or Quantum racks, the parameters screen displayed for the module concerned can be used to define the operating characteristics and parameters for the selected application, e.g.:

- Filter values for discrete I/O
- Voltage or current range for analog I/O
- Threshold counter values
- Trajectory of axes for position control
- Weigher calibration for weighing
- Transmission speed for communication
- Presymbolization for variables associated with modules
- Etc



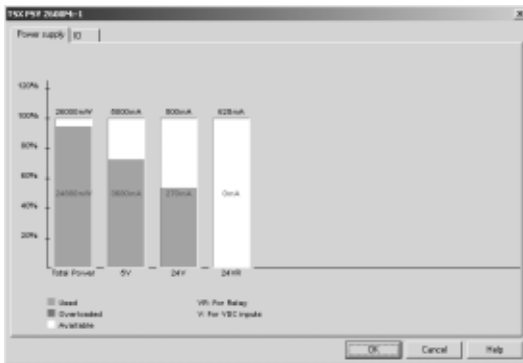
Communication folder with 2 networks declared

#### Configuration and parameter settings for communication networks

The "Communication" folder in the structural view can be used to define the list of networks connected to the PLC station. Then, the parameters for all elements required for networks to function correctly can be set by:

- Creating a logical network to which comments can be associated
  - Configuring a logical network defining the various associated network services.
- Once the network module has been created in the configuration, it must then be associated with one of the logical networks.

Ethernet TCP/IP, Modbus Plus and Fipway network modules are all configured in this way.



Power supply requirements analysis

### Configuration editor (continued)

#### Configuration check

The following information can be accessed at any time during configuration:

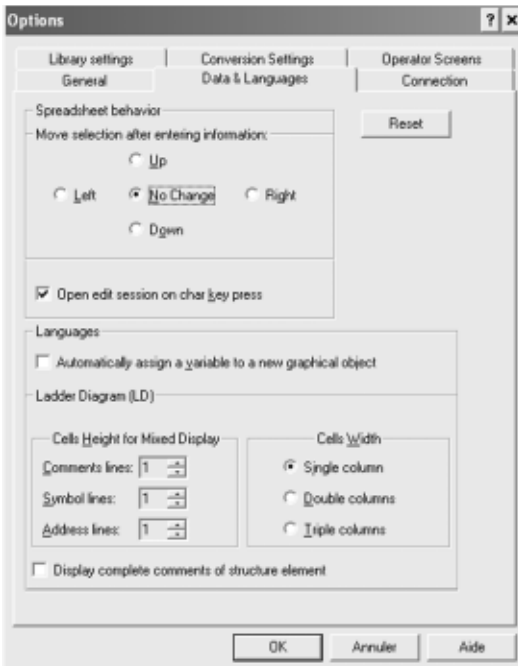
- The power consumption statistics for the power supply in each of the racks in the PLC configuration, for all the different voltages provided by each of these power supplies
- The number of inputs/outputs configured (with a Modicon M340, Atrium or Premium platform)



Graphical configuration of devices on CANopen bus

#### Configuration of devices on CANopen

In the same way as for in-rack modules, the configuration of devices on CANopen through a Modicon M340 is fully integrated in the configuration editor.



"Data & Languages" tab in the workstation options

### Workstation and project configuration

Unity Pro can be used to configure both the working environment (workstation options) and the content of the project itself.

It is also possible to configure the toolbars and to run third-party applications from Unity Pro.

In addition, users can choose the working language from the list of languages selected when the software was installed.

#### Workstation options

The workstation options cover all the characteristics specific to a given workstation. They are applied when Unity Pro is used to develop any project on that station.

The following elements can be configured:

- How the data in the project being developed is edited and presented (for example, whether or not coils are positioned in the last column of the editor, or the position of the cursor after confirmation of the data entered)
- The application conversion strategy from PL7, Concept IEC and LL984 language
- The function library path
- The opening mode for Unity Pro: either programming or run mode





"Build" tab in the workstation options

### Workstation and project configuration (continued)

#### Project options

Unlike the workstation options, the project options cover characteristics that have a direct impact on the programming and operating capabilities offered by the program in the PLC. They are saved in the application, and, consequently, are attached to the project. They can be modified during the course of the project.

Project option configuration covers the following elements:

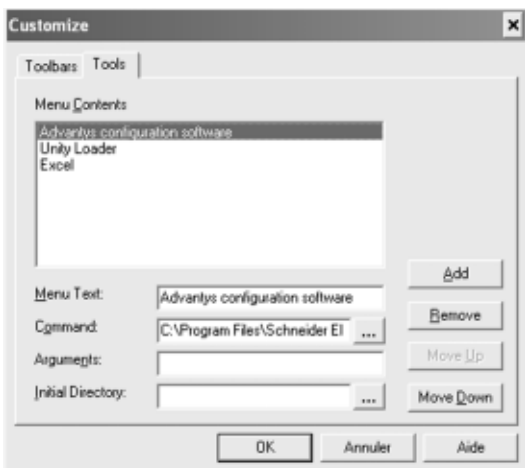
- Building the project with all or part of the data it contains so that it can be retrieved on a new terminal
- Use of diagnostic functions and language for messages
- Warnings generated during project analysis: overlapping of addresses, unused variables etc.
- Language extension: If none of the boxes are checked, the program is strictly compliant with standard IEC 61131-3. Extensions are possible in all five of Unity Pro's languages.
- Access management to runtime screens in online mode



User-created toolbar containing all the debugging tools

#### Other possible options

Users can create their own toolbars by reusing the default icons provided in the toolbars.



Menu for adding and deleting tool access from Unity Pro

It is also possible to enhance Unity Pro's main menu bar by adding direct links to other software tools.

A utility in the Unity Pro program group can be used to change the working language. This is then applied the next time the program is launched. Six languages are available: English, French, German, Italian, Spanish and Chinese.

### Software structure

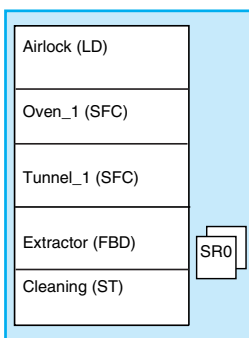
The Modicon M340, Atrium, Premium and Quantum platforms set up by Unity Pro software support two types of application structure:

- **Single-task:** This is the more simple default structure, in which only the master task is executed.
- **Multitask:** This structure, which is more suitable for high-performance real-time events, consists of a master task, a fast task, periodic tasks, and high-priority event-triggered tasks.

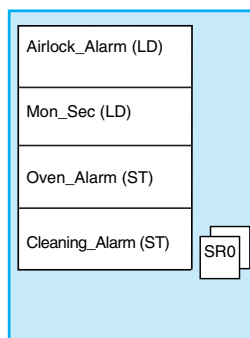
The master, fast and periodic tasks are made up of sections and subroutines. The sections and subroutines can be programmed in any of the following languages: Structured Text (ST), Instruction List (IL), Ladder (LD) or Function Block Diagram (FBD). The event-triggered tasks use the same languages. Sequential Function Chart (SFC) or Grafcet language is reserved for master task sections.

The table below lists the possible program tasks for Modicon M340, Atrium, Premium and Quantum type processors respectively.

Platform	Modicon M340		Premium			Atrium		Quantum	
	BMX P34 1000	BMX P34 2000	TSX P 57 C 244M TSX P 57 0244M TSX P 57 104M	TSX P 57 20(3)4M TSX P 57 30(3)4M TSX P 57 40(3)4M	TSX P 57 554M TSX P 57 5634M	TSX PCI 57 204 M TSX PCI 57 454 M	140 CPU 31110 140 CPU 434 12U	140 CPU 651 00 140 CPU 671 60	
Cyclic or periodic master task	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Periodic fast task	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Periodic auxiliary tasks	–	–	–	–	4	–	–	4	
<b>Event-triggered tasks</b>									
From modules	32	64	32	64	128	64	64	128	
From timers	32	64	–	–	32	–	16	32	
Total	32	64	32	64	128	64	64	128	



Master task



Fast task

### Structure, modular and portable programming

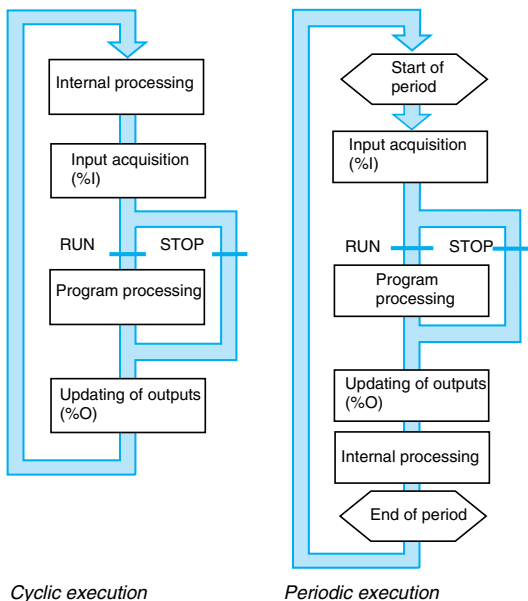
The tasks of a Unity Pro program for Modicon M340, Atrium, Premium or Quantum platforms are composed of several parts known as sections and subroutines. Each of these sections can be programmed in the most appropriate language for the process to be executed.

Such division into sections enables a structured program to be created and program modules to be generated or added with ease.

Subroutines can be called from any section of the task to which they belong or from other subroutines in the same task.

**Compatibility of languages compliant with IEC standard 61131-3:** Unity Pro software can be configured (*Tools/Project Settings/Language Extensions menu*) to ensure that applications generated are compliant with IEC standard 61131-3. Furthermore, as long as you use only the standard instruction libraries, you will be able to reuse programs created in this way on any Modicon M340, Atrium, Premium or Quantum platform.





Cyclic execution

Periodic execution

### Single-task memory structure

Two types of cyclic execution are supported:

- Normal cyclic execution. This is the default option.
- Periodic execution. This type of execution, as well as the period, are selected by the user during programming when the task parameters are set (master task).

#### Normal execution (cyclic)

At the end of each scan, the PLC system launches a new scan. The execution time of each scan is monitored by a software watchdog whose value is defined by the user (max. 1500 ms).

In the event of overrun, a fault occurs causing:

- The scan to stop immediately (STOP)
- A fault state to be displayed on the front panel of the processor
- The alarm relay for the main rack power supply to be set to 0

#### Periodic execution

A new scan is executed at the end of each period. The execution time of the scan must be less than the time of the period defined (max. 255 ms). In the event of overrun, the latter is stored in a system bit (%S19), which can be reset to 0 by the user (via the program or terminal).

A software watchdog, which can be configured by the user (max. 1500 ms), monitors the scan time. In the event of overrun, an execution fault is indicated (see normal execution). The scan execution times (the last scan, the longest scan and the shortest scan) are stored in system words %SW 30/31/32.

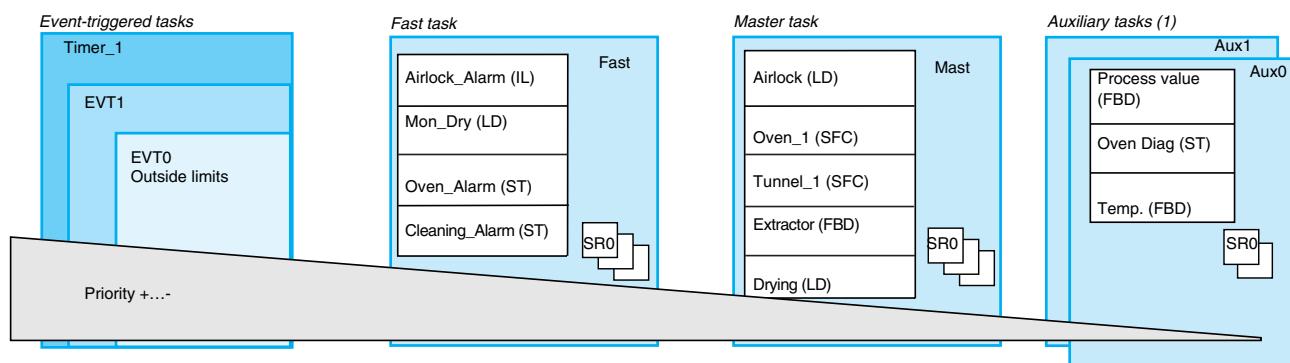
### Multitask software structure

Modicon M340, Atrium, Premium and Quantum platforms support a multitask structure comprising:

- 1 master task (divided into several sections programmed in ST, IL, LD, FBD, and SFC languages)
- 1 fast task (divided into sections)
- 0 to 4 auxiliary tasks (divided into sections) (1)
- 1 or more event-triggered tasks (only one section per task)

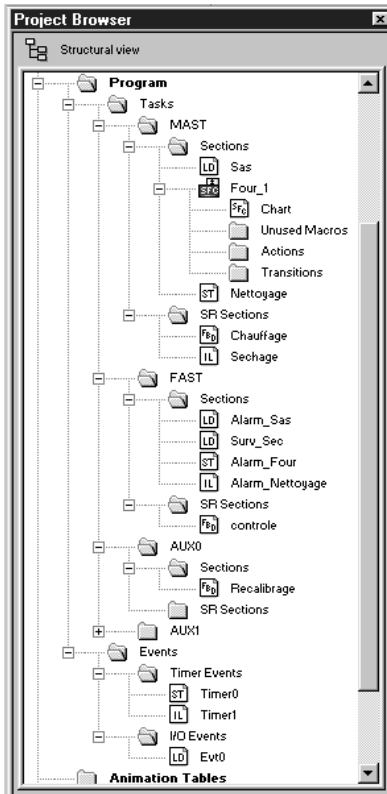
These tasks are independent and are executed in parallel, with the PLC processor managing their execution priority. When an event occurs, or at the start of the fast task scan:

- If any lower-priority tasks are currently being executed, they are suspended.
- The event-triggered task or fast task is executed.
- The interrupted task resumes once execution of the priority task has been completed.



This structure optimizes the way in which processing power is employed and can be used to structure the application and simplify design and debugging, as each task can be written and debugged independently of the others.

(1) Tasks reserved for top-of-the-range Premium TSX P57 5●4M and Quantum 140 CPU 651 ●0/67160 processors.



Application browser

## Multitask memory structure (continued)

### Master task

This task, which can be periodic or cyclic, executes the main program. It is activated systematically.

Each of its component sections and subroutines can be programmed in Ladder (LD), Function Block Diagram (FBD), Structured Text (ST) or Instruction List (IL) language. Several sections of the master task can be programmed in Sequential Function Chart (SFC) or Grafcet language.

### Fast task

This task, which has a higher priority than the master task, is periodic in order to allow time for tasks with lower priorities to be executed. It should be used when fast periodic changes in discrete inputs need to be monitored and acknowledged.

The execution of the master task (lower priority) is suspended while the fast task is being executed. Processing operations in this task must be as short as possible in order to avoid adversely affecting master task processing operations.

Each of the component sections and subroutines of the fast task can be programmed in Instruction List, Structured Text, Ladder or Function Block Diagram language (ST, IL, LD or FBD).

### Auxiliary tasks

These tasks, which are available on top-of-the-range Premium TSX P57 5•4M and Quantum 140 CPU 651 •0/67160 processors, are designed for use with slower types of processing operation such as measurement, process control, HMI, application diagnostics, etc.

Periodic type auxiliary tasks have the lowest level of priority and are executed once the higher-priority periodic tasks (master and fast) have completed their scan.

Each of the component sections and subroutines of the fast task can be programmed in Instruction List, Structured Text, Ladder or Function Block Diagram language (ST, IL, LD or FBD).

### Event-triggered tasks

Unlike the tasks described above, these tasks are not linked to one period. The execution of these tasks is triggered asynchronously by:

An event from certain application-specific modules (e.g.: overrun of a counter threshold, change of state of a discrete input)

An event from the event timers

These tasks are processed before all other tasks and are thus suitable for processing requiring very short reaction times in comparison to the arrival of the event.

Modicon M340, Atrium, Premium or Quantum platforms have 3 levels of priority (these are, in descending order, module event EVT0, module events EVTi and timer events Timeri).

These tasks, each comprised of a single section, can be programmed in Instruction List, Structured Text, Ladder or Function Block Diagram language (ST, IL, LD or FBD).

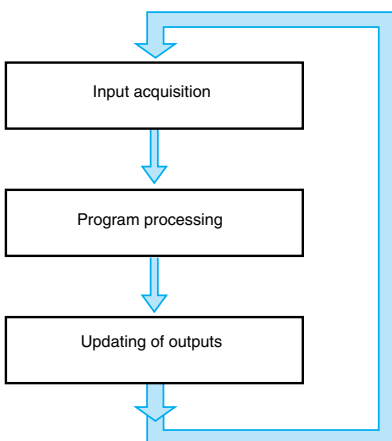
### Assignment of I/O channels to tasks

Each of the master, fast or event-triggered tasks reads (at the start of the scan) and writes (at the end of the scan) the inputs assigned to it. By default, they are assigned to the master task.

For the Quantum platform, the remote inputs/outputs (RIO) are only assigned to the master task (these assignments can be made per station or for each of the component sections of the task), while the distributed inputs/outputs (DIO) are all assigned to the master task (without assignment to its component sections).

For event-triggered tasks, it is possible to assign input/output channels (1) other than those relating to the event. Exchanges are then performed implicitly at the start of processing for inputs and at the end of processing for outputs.

(1) These channel assignments are made per I/O module for Quantum and per channel for Atrium/Premium inputs/outputs.



Program execution

#### The five IEC languages

The five graphical or textual languages available in Unity Pro are used for programming Modicon M340, Atrium, Premium and Quantum automation platforms.

The 3 graphical languages are:

- Ladder (LD)
- Function Block Diagram (FBD)
- Sequential Function Chart (SFC) or Grafcet

The 2 textual languages are:

- Structured Text (ST)
- Instruction List (IL)

For these 5 languages, you can use the standard set of instructions compliant with IEC standard 61131-3 to create applications, which can be transferred from one platform to another. Unity Pro software also provides extensions to this standard set of instructions. When they are specific to Modicon M340, Atrium/Premium and Quantum PLCs, these extensions support the development of more complex applications in order to maximize the potential of the specific features of each of these platforms.

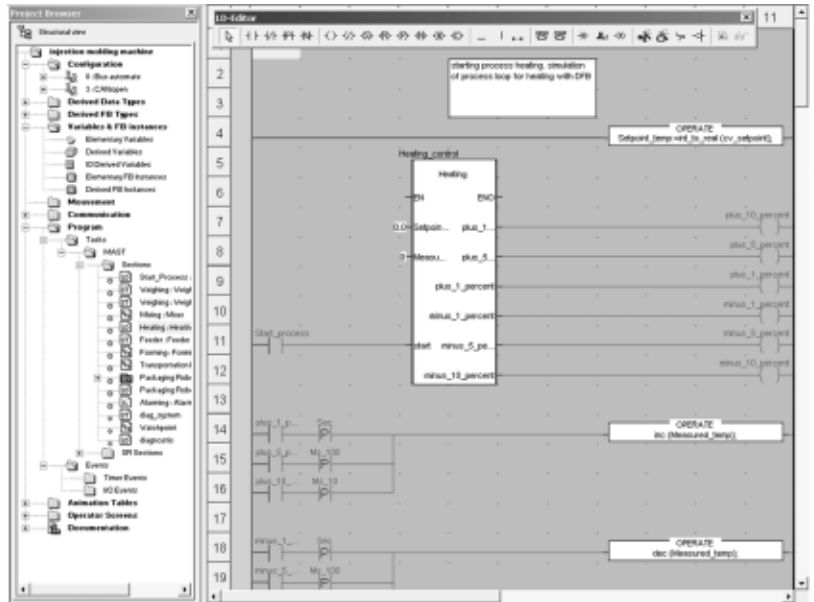
#### Functionalities common to all five language editors

The editors for each of the 5 languages provide a number of common tools used for writing, reading and analyzing programs in a user-friendly manner:

- The text editors for Instruction List (IL) and Structured Text (ST) support:
  - Text entry in insert or overwrite mode
  - The use of dialog boxes for the assisted entry of variables, functions, function blocks or assignment instructions
  - Checks on data entry to detect syntax or semantics errors. The user is informed of the result of this check by red “wavy” underlining or by a change in the color of the text concerned.
  - Access to a set of colors, which can be used to facilitate reading by distinguishing text (black) from operators (red), language key words (blue), and program comments (green)
- The graphics editors for Ladder (LD) language, Function Block Diagram (FBD) language and Sequential Function Chart (SFC) language feature:
  - A set of graphic elements for direct access to the various graphic symbols in the language via the mouse or keyboard
  - A pop-up menu, which can be accessed by right-clicking with the mouse
- Unlimited number and length of comments. These comments can be positioned as text objects in any cell (graphical languages) or at any point in expressions (textual languages).
- Assisted data entry functions for:
  - Accessing DFB function libraries, the variables editor or the text object for entering comments
  - Initializing a variable reference
  - Initializing the animation table on selected variables
  - Displaying and modifying the properties of the selected variable
  - Creating variables in real time without having to use the data editor
- “Cut”, “Copy”, “Paste”, “Delete”, “Move”, etc.
- Setting bookmarks on lines of text or in the margin so that you can:
  - Easily locate lines in important program sections
  - Browse in an editor by bookmark, label or line and column number

### Ladder (LD) language

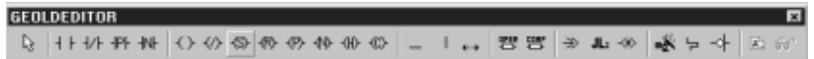
Each section or subroutine using Ladder language consists of a series of rungs, which are executed sequentially by the PLC. Each rung consists of graphic objects (placed in cells arranged in columns and lines) corresponding to contacts, links, coils, operation blocks, EF/EFB/DFB function blocks, jumps, SR calls, etc.



### Program structure (section or subroutine)

Each Ladder language section may contain:

- Between 11 and 64 columns (number set by user)
- Up to 2000 lines (for all rungs in the section)

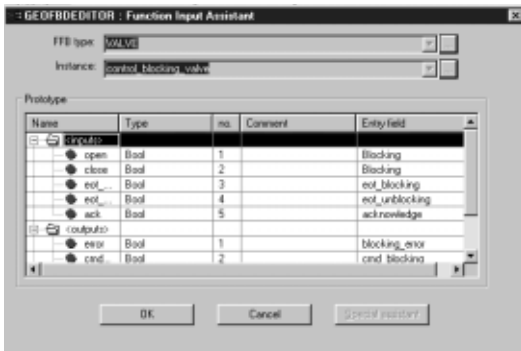
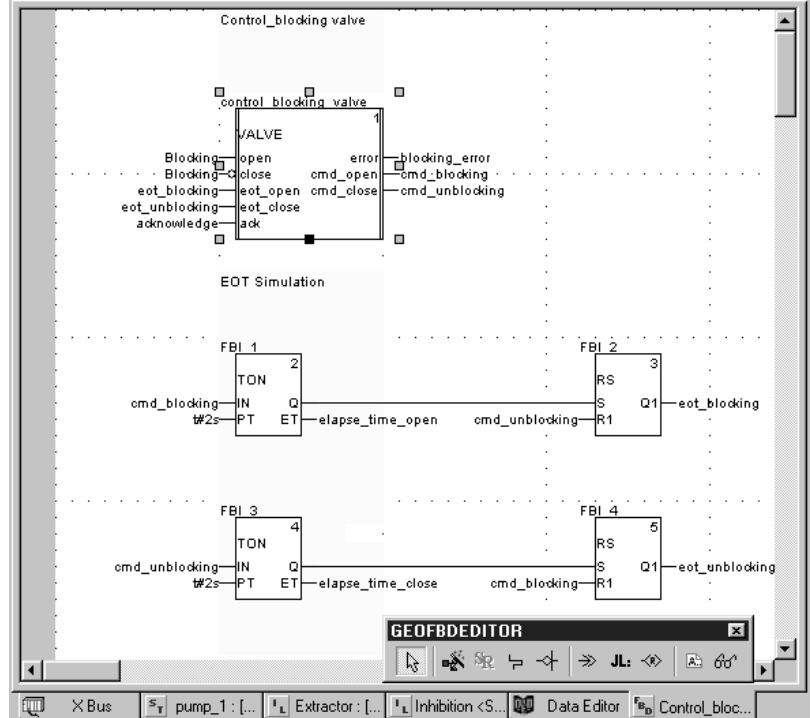


Graphics palette in the Ladder language editor

“Mixed Display” mode supports the unrestricted display of comments, addresses and symbols for the variables used for rungs.

### Function Block Diagram (FBD) language

Function Block Diagram language is a graphical language based on function blocks associated with variables or parameters, which are linked together. This language is particularly suitable for process control applications.



Function Block Assistant

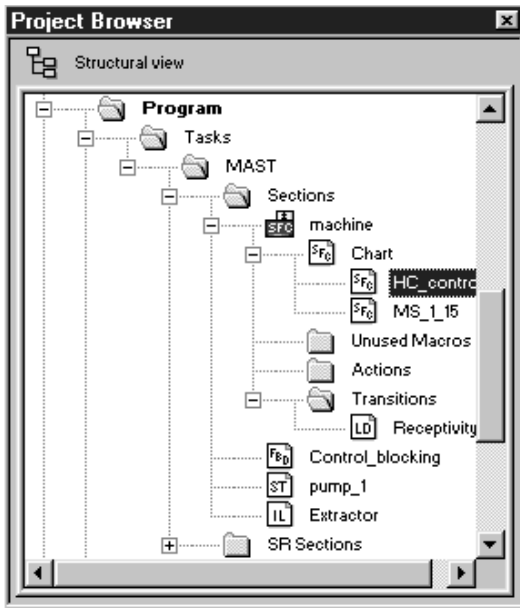
### Program structure (section or subroutine)

The graphical language FBD supports three types of function blocks:

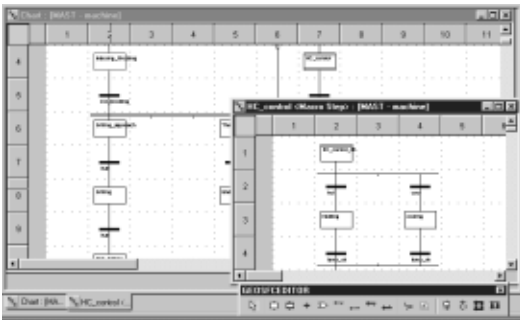
- Elementary blocks (EFs)
- Elementary Function Blocks (EFBs), sorted into different libraries depending on their type of use
- Derived Function Blocks (DFBs), which have a structure identical to that of EFBs but are created by the user with the ST, IL, LD or FBD programming languages

Within the same section, subroutines can be called using a specific block. Program jumps to a block instance can also be programmed.

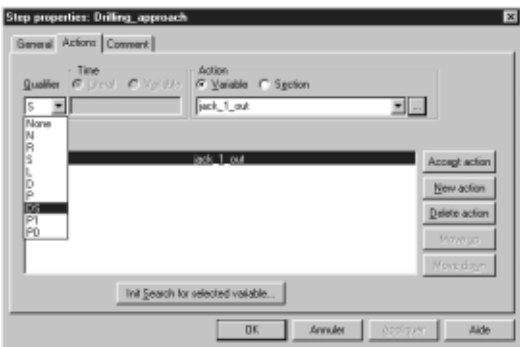
A section programmed in FBD language contains the equivalent of a default grid with 30 columns and 23 rows. This can be extended to a wider page.



SFC structure in the browser



SFC chart



Step properties

### Sequential Function Chart (SFC) and Grafcet language

Sequential Function Chart (and Grafcet) language can be used to describe the sequential part of an automation system in simple graphical format using steps and transitions.

SFC language does not process charts in the same way as Grafcet language:

- SFC only authorizes one token in one chart.
- Grafcet language authorizes several tokens in one chart.

Unity Pro software has one editor for these two languages with the option of defining behavior in the application settings (*Tools/Project Settings/Language Extensions menu*).

### Program structure (master task section)

SFC language is only used in sections belonging to the master task. Each SFC section consists of a main chart sub-section CHART and sub-sections for each of the macro-steps. The component parts of the charts are:

- Macro-steps, which are the sole representation of a set of steps and transitions (used to set up a hierarchical chart structure)
  - Steps
  - Transitions and directed links between steps and transitions
- Associated with steps and transitions respectively, the actions and transition conditions can be:

- Integrated into the CHART or macro-step charts, in which case the actions or transition conditions are defined by a single variable
- Processed in specific sections, in which case dedicated processing (to be programmed in Ladder, Function Block Diagram, Structured Text or Instruction List language) is necessary

In order to check that machine scans have been completed successfully, activity times (minimum, maximum) can be associated with each step. These times are set by the user.

### Program structure (section in master task)

For each SFC section, the graphics editor provides a maximum of:

- One grid containing 32 columns and 200 rows, or 6400 cells. Steps, transitions or jumps all need one cell respectively.
- 1024 steps (macro-steps and steps in macro-steps)
- 20 actions assigned to the same step
- 100 steps activated at the same time
- 100 actions activated at the same time

To help you to create basic charts, graphic screens can be used to create “n” steps in series and “m” steps in parallel in a single operation.

Dialog boxes can be used to assign associated properties to steps (activity time, actions), transitions (variable linked to transition condition), etc.

### Structured Text (ST) language

Structured Text language is a sophisticated algorithmic type language, which is particularly suitable for programming complex arithmetic functions, table operations, message handling, etc.

```

(* pump_1 management *)
if pump_1.start
  then pump_1.cmd:=true;
  end_if;
if not start and waiting.x
  then pump_1.cmd:=false;
  end_if;
if pump_1.cmd and pump_1.speed<100
  then pump_1.speed:=pump_1.speed+2;
  end_if;
if not pump_1.cmd and pump_1.speed>0
  then pump_1.speed:=pump_1.speed-4;
  end_if;

END_IF;

(* animation drilling & threading *)
high_anim:=not jack_1_out and not jack_3_out;
middle_anim:=jack_1_out and not jack_3_out;
low_anim:=jack_1_out and jack_3_out;
hole_anim1:=end_threading.x or unblocking.x;
hole_anim2:=end_drilling.x or unblocking.x;

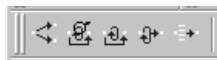
(* if no selection hot/cool *)

```

### Program structure (section or subroutine)

Structured Text language, which can be used to directly transcribe an analysis based on an organization chart, is structured into expressions composed of a series of instructions organized in lines.

There is no limit to the number of characters an instruction line may contain (the only limit is the program memory available for the Modicon M340, Premium and Quantum platforms, except on TSX P57 10...40 processors, where the limit is 64 Kb). The length of the section is only limited by the size of the application memory.



Four preformatted expression structures can be called up directly from the toolbar:

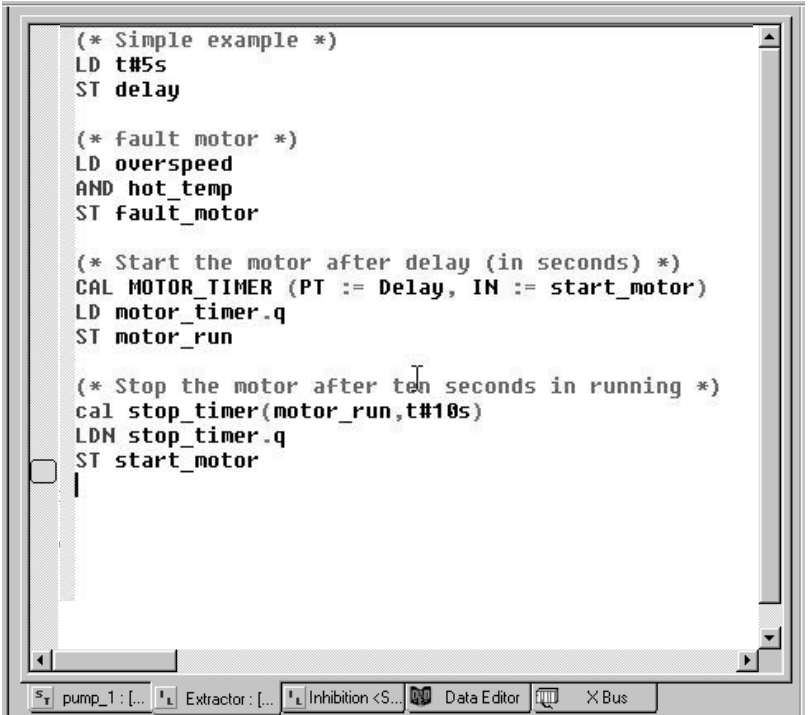
- **Conditional action** : *IF...THEN...ELSIF...THEN...ELSE...END-IF;*
- **Iterative conditional action**: *WHILE...DO...END\_WHILE;*  
*REPEAT...UNTIL...END\_REPEAT;*
- **Repetitive action**: *FOR...TO...BY...DO...END\_FOR;*
- **Selective action**: *CASE...OF...ELSE...END\_CASE;*

The operands used in the expressions are bit variables, word variables or variables linked to function blocks.

To make the expressions easier to read, different colors are used to identify objects, language key words and program comments.

#### Instruction List (IL) language

Instruction List language is a language representing the equivalent of a Ladder diagram in text form. It can be used to write Boolean and arithmetic equations using all the functions available in the Unity Pro language (calling of functions and function blocks, assignment of variables, creation of program jumps, branching to subroutines within a program section, etc.).



```

(* Simple example *)
LD t#5s
ST delay

(* fault motor *)
LD overspeed
AND hot_temp
ST fault_motor

(* Start the motor after delay (in seconds) *)
CAL MOTOR_TIMER (PT := Delay, IN := start_motor)
LD motor_timer.q
ST motor_run

(* Stop the motor after ten seconds in running *)
cal stop_timer(motor_run,t#10s)
LDN stop_timer.q
ST start_motor

```

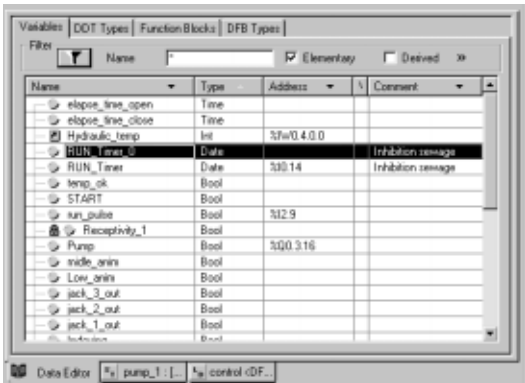
#### Program structure (section or subroutine)

A program in Instruction List language comprises a sequence of instructions classified into the following different families:

- Bit instructions, e.g. read input: *LD overspeed*
- Function block instructions, e.g. call timer: *CAL MOTOR\_TIMER*
- Numerical instructions using single, double and floating point integers, e.g.: *LD Result ADD Surplus ST Archive*
- Word table or character string instructions, e.g. make assignment: *LD Result:10:=Setpoint:10*
- Program instructions, e.g. SR call: *CALL SR10*

The operands used in the expressions are bit variables, word variables or variables linked to function blocks.





Data editor

## Data editor

The data editor, which can be accessed from the structural view of the project, provides a single tool for performing the following editing tasks:

- Declaration of data including variables and function blocks (declaration of their type, instants and attributes)
- Use and archiving of function block data types in different libraries
- Hierarchical view of data structures
- Searching, sorting and filtering of data
- Creation of a hyperlink to access a description from any variable comment

The data is displayed under four tabs:

- “Variables” tab for the creation and management of the following data instances: bits, words, double words, inputs/outputs, tables, and structures
- “DDT Types” tab for the creation of derived data types (tables and structures)
- “Function Blocks” tabs for the declaration of EFB and DFB function blocks
- “DFB Types” for the creation of DFB user function block data types

Each data instance has several attributes, of which:

- The name and type of the variable are mandatory
- The comment, physical address in the memory or initial values are optional

The data editor columns can be configured (number of columns, order). All the attributes associated with a variable can be displayed in a properties window.

This editor can be accessed at any time during programming by selecting variables for data modification or creation.



Variable attributes

4

### DFB user function blocks

The user can create his own function blocks for specific application requirements on Modicon M340, Atrium, Premium and Quantum platforms using Unity Pro software. Once created and saved in the library, these user function blocks can be reused as easily as EFBs (Elementary Function Blocks).

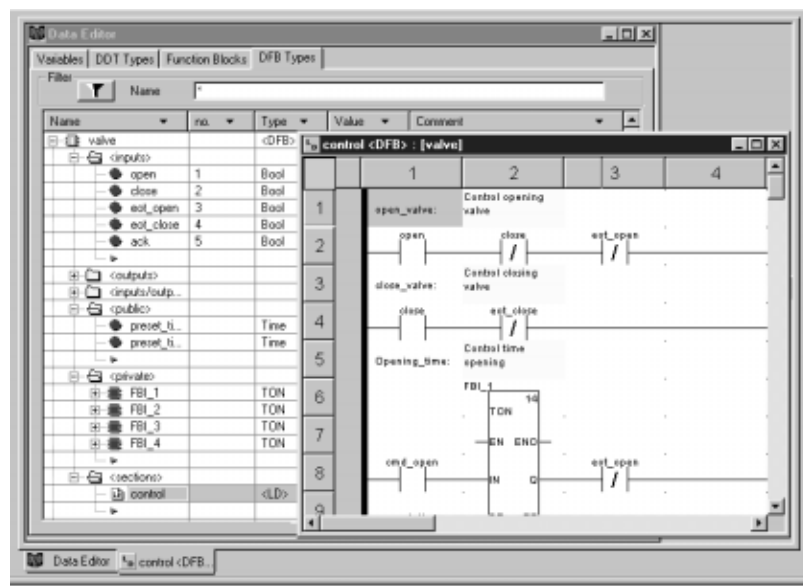
These user function blocks can be used to structure an application. They are used when a program sequence is repeated several times in the application or for fixing a standard programming routine. They can be read-only protected or read/write-protected. They can be exported to all other Unity Pro applications.

Using a DFB function block in one or more applications:

- Simplifies program design and entry
- Improves program readability and understanding
- Facilitates program debugging (all variables handled by the DFB block function are identified in the data editor)
- Enables the use of private variables specific to the DFBs, which are independent of the application

A DFB function block is set up in several phases:

- The DFB is designed by assigning a name, a set of parameters (inputs, outputs, public and private internal variables) and a comment to it via the data editor.
- The code is created in one or more sections of the program, with the following languages selected according to requirements: Structured Text, Instruction List, Ladder or Function Block Diagram (ST, IL, LD or FBD).
- The DFB may be stored in a library with an associated version number.
- A DFB instance is created in the data editor or when the function is called in the program editor.
- This instance is used in the program in the same way as an EFB (Elementary Function Block). (The instance can be created from within the program.)



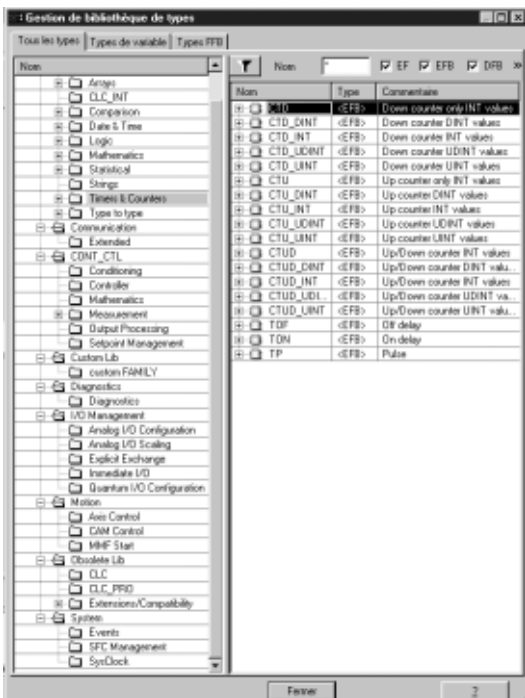
### Main characteristics

<b>Inputs</b>	32 max. (1)
<b>Outputs</b>	32 max. (2)
<b>Inputs/outputs</b>	32 max. (1) (2)
<b>Public internal variables</b>	Unlimited (3), can be accessed via the application program
<b>Private internal variables</b>	Unlimited (3), cannot be accessed via the application program
<b>Comment</b>	1024 characters max.
<b>Program sections</b>	Unlimited, each section can be programmed independently in one of the 4 languages (IL, ST, LD, and FBD).

(1) The maximum cumulative total of inputs and inputs/outputs is 32.

(2) The maximum cumulative total of outputs and inputs/outputs is 32.

(3) For Premium processors, see page 1/9: characteristics of memories, maximal sizes of objects zones, internal unlocated data, DFB & EFB function blocks.



Type library manager

## Function block libraries

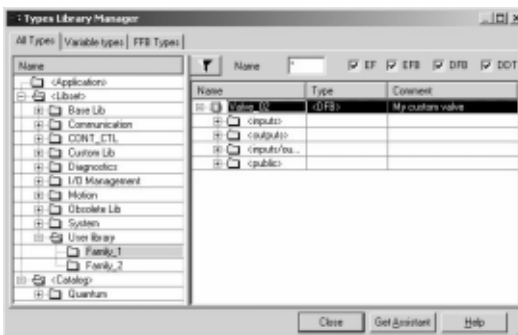
The function and function block libraries manager contains all the elements provided with Unity Pro software. The functions and function blocks are organized into libraries, which themselves consist of families. Depending on the type of PLC selected and the model of processor, the user will have a sub-set of these libraries available to write his/her applications. However, the “Base Lib” library contains a set of functions and function blocks, the majority of which are compatible with all platforms. In particular, it contains the blocks compliant with IEC 61131-3.

The “Base Lib” library is structured into families:

- Timers and counters
- Internal process control
- Array management
- Comparison
- Date and time management
- Logic processing
- Mathematical processing
- Statistical processing
- Character string processing
- Type-to-type data conversion

The “Base Lib” library, which covers standard automation functions, is supplemented by others, more application-specific libraries, and some platform-specific functions:

- **Communication library**, providing an easy means of integrating communication programs from PLCs with those used by HMIs from the PLC application program. Like other function blocks, these EFBs can be used in all languages to exchange data between PLCs or to deliver data to be displayed on an HMI.
- **Process control library**. The CONT\_CTL library can be used to set up process-specific control loops. In particular, it offers controller, derivative and integral control functions. CONT\_CTL comes with other families, providing additional algorithms, e.g.: EFBs for calculating mean values, selecting a maximum value, detecting edges or assigning a hysteresis to process variables, etc.
- **Diagnostics library**, which can be used to monitor actuators and contains EFBs for active diagnostics, reactive diagnostics, interlocking diagnostics, permanent process condition diagnostics, dynamic diagnostics, monitoring of signal groups, etc.
- **I/O management library**, providing services to handle information exchanged with hardware modules (formatting data, scaling...)
- **Motion Function Blocks library** containing a set of predefined functions and data structures to manage motion on drives and servo drives connected on CANopen.
- **Motion library** for motion control and fast counting
- **“System” library**, which provides EFBs for the execution of system functions: evaluation of scan time, availability of several different system clocks, SFC section monitoring, display of system state, etc. In addition, management of files inside the Modicon M340 memory cartridge.
- Finally, a library named “obsolete” containing all function blocks used by legacy programming software that are needed to perform application conversions



User-defined library manager

## Management of user standards

Users may create libraries and families in order to store their own DFB function blocks and DDT data structures. This enhancement allows users to take advantage of programming standards adapted to their needs, along with version management. This means that it is possible to:

- Check the version of the elements used in an application program against those stored in the library
- Perform an upgrade, if necessary

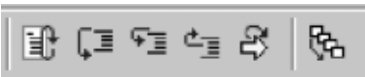
### Debugging tools

Unity Pro software offers a complete set of tools for debugging Modicon M340, Atrium, Premium or Quantum applications. A tool palette provides direct access to the main functions:

- Dynamic program animation
- Setting of watchdogs or breakpoints (not authorized in event-triggered tasks)
- Step-by-step program execution. A function in this mode enables section-by-section execution. Instruction-by-instruction execution can be launched from the previous breakpoint. Three execution commands are therefore possible when the element to be processed is a subroutine (SR) or DFB user block:
  - Detailed step-by-step or “Step Into”. This command is used to move to the first element of the SR or DFB.
  - Overall step-by-step or “Step Over”. This command is used to process the entire SR or DFB.
  - Outgoing step-by-step or “Step Out”. This command is used to move to the next instruction after the SR or DFB element.
- Independent execution of the master (MAST), fast (FAST), auxiliary (AUX), and event-triggered (EVTi) tasks.



Insertion/removal of watchpoint



Execution: step-by-step command

```
Secureite : [MAST]
IF Niveau_1 >= 600 THEN Pompe_1 := False;
END_IF;
IF Niveau_2 >= 200 Then Pompe_2 := False;
END_IF;
IF Niveau_3 >= 400 Then Vanne_1 := False;
    Vanne_2 := False;
END_IF;
IF Boite = 10 Then Vanne_3 := False;
End_IF;
IF Niveau_3 < 80 Then Chauff_on := False;
    := False;
```

Animation of ST program

### Animation of program elements

Dynamic animation is managed section by section. A button in the toolbar is used to activate or deactivate animation for each section.

When the PLC is in RUN, this mode can be used to view, simultaneously:

- The animation of a program section, regardless of the language used
- The variables window containing the application objects created automatically from the section viewed

Several windows can be displayed and animated simultaneously. The “Tool tip” function, which uses help balloons, can be used to view a variable and its content simultaneously when the object is selected with the mouse (or other pointing device). The user can add inspect windows to display variables inside the program.

Two types of animation are supported:

- Standard: The variables of the active section are refreshed at the end of the master task (MAST).
- Synchronized: The watchpoint can be used to synchronize the display of animated variables with a program element in order to determine their value at this precise point in the program.

Name	Value	Type	Comment
Initial	0	Bool	
Niveau_1	420	Int	
Niveau_2	0	Int	
Niveau_3	313	Int	
Boite	0	Int	
Quantite_a_p...	0	Int	
Quantite_pro...	0	Int	
Pompe_1	1	Bool	
Melange_2	0	Bool	

Animation table

### Animation table

Tables containing the variables of the application to be monitored or modified can be created by data entry or initialized automatically from the selected program section. In addition to data animation it is possible to:

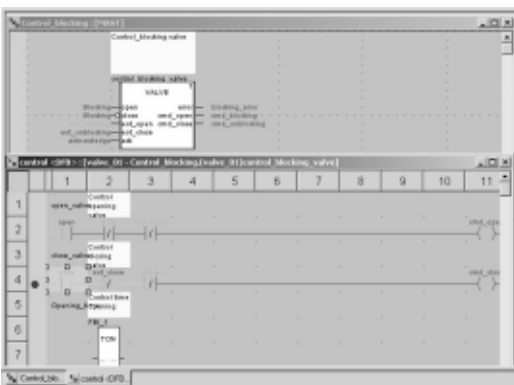
- Modify bit variables or force them to 0 or 1
- Change the display format
- Copy or move variables
- Search by cross-reference
- Display the list of forced bits

These tables can be stored in the application and retrieved from there at a later date.

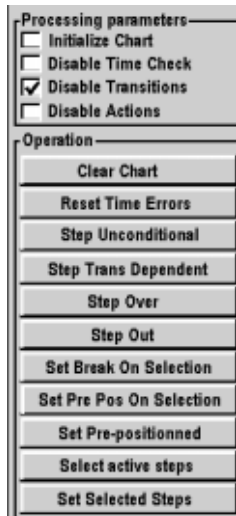
### Debugging of DFB user function blocks

The parameters and public variables of these blocks are displayed and animated in real time using animation tables, with the possibility of modifying and forcing the required objects.

In exactly the same way as with other program elements, the watchpoint, breakpoint, step-by-step execution, and program code diagnostics functions can be used to analyze the behavior of DFBs. Setting a breakpoint in a DFB user function block instance stops the execution of the task containing this block.



Animation of a DFB program



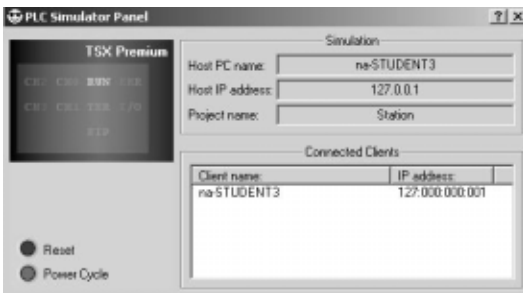
SFC control panel

### Debugging in Sequential Function Chart (SFC) language

The various debugging tools are also available in SFC language. However, unlike other sections (IL, ST, LD or FBD) an SFC section executed step by step does not stop execution of the task but instead freezes the SFC chart. Several breakpoints can be declared simultaneously within a single SFC section.

Numerous commands are available in this debugging mode via the control panel:

- Deactivate active step(s)
- Activate initial step(s)
- Disable step execution times
- Freeze chart regardless of transition conditions
- Stop processing of steps
- Move to the next step taking account of the transition conditions
- Enable transition and move to next step(s) (detailed step-by-step command, "Step Into")
- Enable transition in order to execute the end of the macro-step (outgoing step-by-step command, "Step Out")
- Preposition chart on steps for which markers have been set, etc.



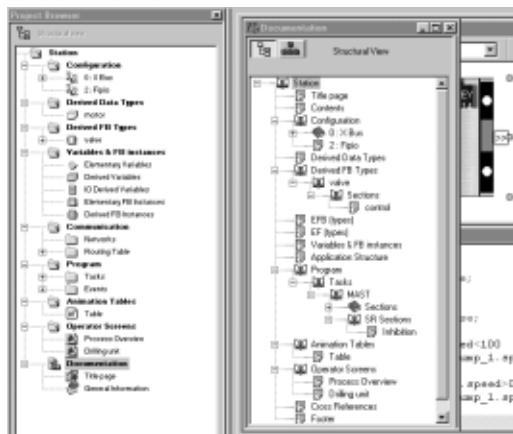
Simulator control panel

### PLC simulator

The simulator integrated in Unity Pro can be used to test the application program for Modicon M340, Atrium, Premium or Quantum PLCs from the PC terminal without having to connect to the PLC processor. The functions provided by the debugging tools are available for debugging the master, fast and auxiliary tasks.

As the simulator does not manage the PLC I/O, animation tables can be used to simulate the state of inputs by forcing them to 0 or 1.

The simulator can be connected to third-party applications via an OPC server with OFS (OPC Factory Server) software.



Access to documentation editor

### Documentation editor

The documentation editor is built around the Documentation Browser, which shows the file structure in tree form.

It allows all or part of the application file to be printed on any graphics printer accessible under Windows and using True Type technology, in A4 or US letter print format.

The documentation editor supports the creation of user-specific documentation files using the following headings:

- Title page
- Contents
- General information
- Title block
- Configuration
- EF, EFB and DFB type function blocks
- User variables
- Communication
- Project structure
- Program
- Animation tables and cross-references
- Runtime screens

The documentation editor can generate the documentation file based on two different structures:

- Structural view: All the objects in the project are associated with their corresponding headings.
- Functional view: The objects in the project are associated with the function modules to which they belong.

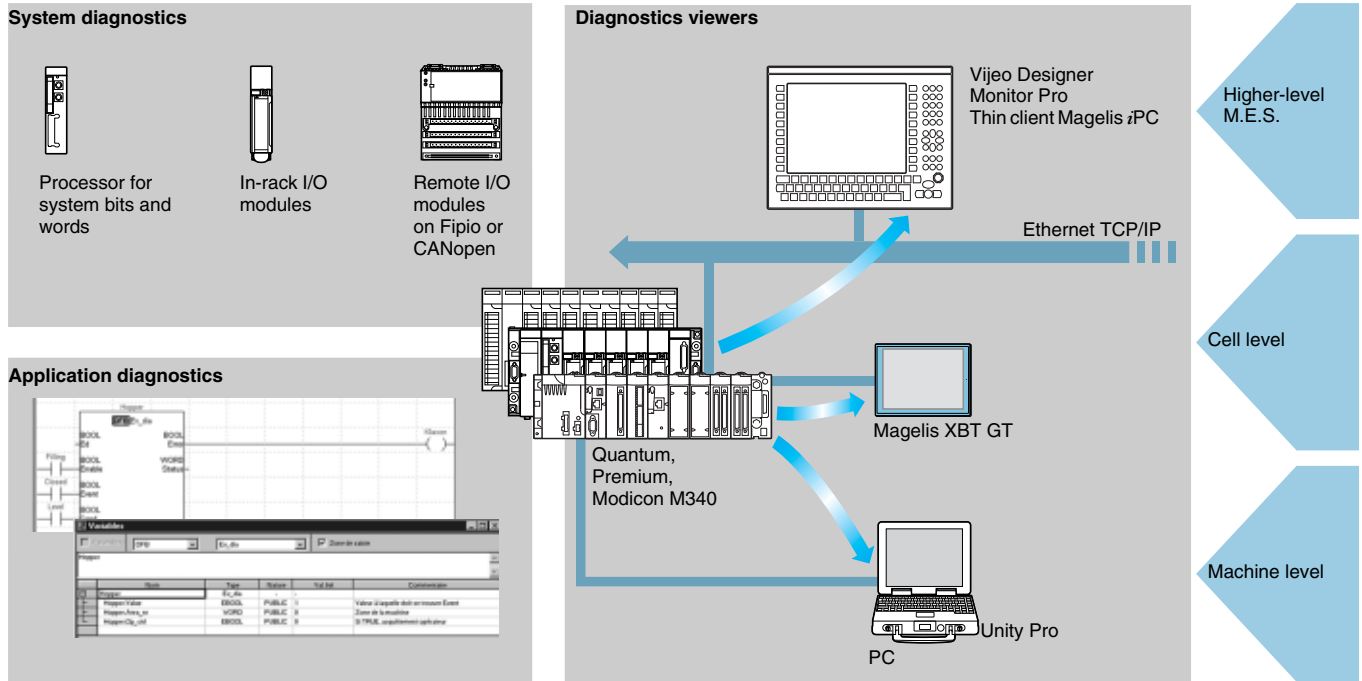
The documentation file can be created and saved as the project progresses, from one Unity Pro session to another.

# Modicon M340 automation platform

Unity Pro software  
Integrated diagnostics

## Presentation

Diagnostics integrated into Modicon M340, Atrium, Premium and Quantum automation platforms



The diagnostics offer for Modicon M340, Atrium, Premium and Quantum platforms is based on three components:

- System diagnostics
- DFB and EFB diagnostic function blocks (for system and application diagnostics)
- Error message display system or viewers supplied as standard with Magelis XBT GT and iPC terminals, Vijeo Designer/Monitor Pro supervisory software and Unity Pro setup software.

## Functions

### System diagnostics

The system diagnostics for the Modicon M340, Atrium, Premium and Quantum platforms supports the monitoring of system bits/words, I/O modules and activity times (minimum/maximum) of SFC steps. By simply choosing the relevant option in the application configuration, any event will result in time-stamped messages logged inside the diagnostic buffer in the PLC. These events are displayed on a diagnostics viewer (1) automatically without the need of any additional programming.

With the assistance of Unity Pro's integrated diagnostics, this function can be used to perform 1<sup>st</sup> level diagnostics of the elements in the configuration, up to and including each I/O module channel.



(1) Diagnostics viewers are tools used to display and acknowledge error messages relating to diagnostics. They are supplied as standard with Unity Pro, Vijeo Designer and Monitor Pro software, with Magelis terminals, and with the PLC web server which is accessible through a thin client Magelis iPC.





#### Application diagnostics

Unity Pro software also has a library of function blocks for monitoring, called diagnostic DFBs and EFBs. The library of diagnostic function blocks contains:

#### ■ Manufacturer blocks for system diagnostics

- IO\_DIA input/output fault, which is used to monitor the state of inputs/outputs.
- ASI\_DIA, which monitors whether an error has occurred on the AS-i bus (module or bus fault, no slave, slave not configured or faulty).

#### ■ Manufacturer blocks for application diagnostics, for example:

- EV\_DIA, which monitors whether an event (bit status) has the correct value at a given time (no notion of timing).
- MV\_DIA, D\_GRP, D\_REA, which monitor whether an event (change in the status of a bit) occurs in accordance with the specified time conditions.
- ALRM\_DIA, which monitors the combination of the status of 2 bits.
- NEPO\_DIA and TEPO\_DIA, which can be used to check, control and perform diagnostics for elements in the working part of the system made up of the combination of 2 actuators and 2 sensors.

#### ■ Open diagnostics blocks

These enable users to create their own diagnostic function blocks to meet the specific requirements of their applications and therefore to supplement the manufacturer DFBs and EFBs described above. They can be created from 2 model blocks, which must be written in Ladder (LD), Structured Text (ST), Function Block Diagram (FBD) or Instruction List (IL) language.

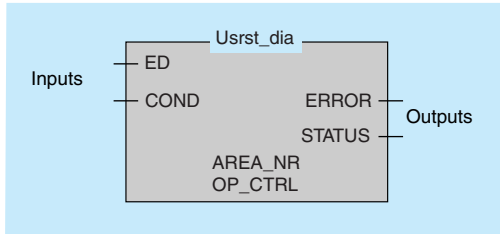
#### Diagnostics with fault cause analysis

Furthermore, when a fault occurs, Unity Pro analyzes the program sections concerned and opens a second window displaying the causes and probable sources of the fault.

The user or process operator is guided through the fault-finding process, enabling machine downtimes to be reduced.

The configuration module or instruction, which is the source of the fault, can also be accessed via the diagnostics viewer integrated into Unity Pro, directly from the alarm in the viewer output window (see page 4/23).

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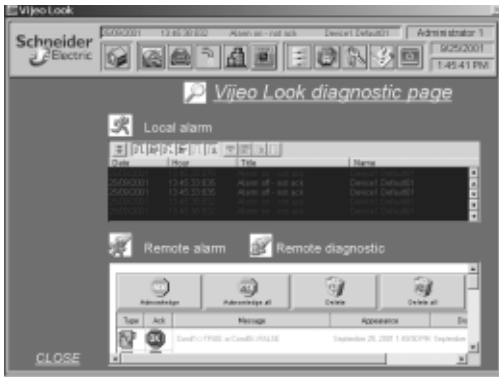


Fault cause analysis

# Modicon M340 automation platform

## Unity Pro software

### Integrated diagnostics



#### Diagnostics viewers

All the diagnostic events processed by Modicon M340, Atrium, Premium and Quantum platforms via diagnostic DFBs/EFBs are stored in a buffer (specific data memory area on the PLC). The information contained in this buffer is sent (transparently for the user) to viewers for automatic display and for management of faults and alarms. The viewer function is supplied as standard with:

- Vijeo Look and Monitor Pro V7 supervisory software
- Unity Pro programming software
- Magelis XBT GT and Magelis iPC HMI terminals

The viewer integrated in Unity Pro can also be used to access the instruction or module, which is the source of the fault. See “Diagnostics with fault cause analysis”, page 4/22.

Modicon M340, Atrium, Premium and Quantum platforms have multiviewer capability (can be used with a maximum of 15 viewers). A PC-compatible station with the viewer function can be multi-PLC (can be used with a maximum of 15 Modicon M340/ Atrium/Premium/Quantum platforms).

The buffer/viewer structure supports:

- A single point for fault management in each application
- Time-stamping of the occurrence of faults at source
- Storage of intermittent faults in memory
- Independence with regard to the viewer functions. The frame sent from the PLC buffer is identical for all viewers.
- Automatic archiving of all error messages

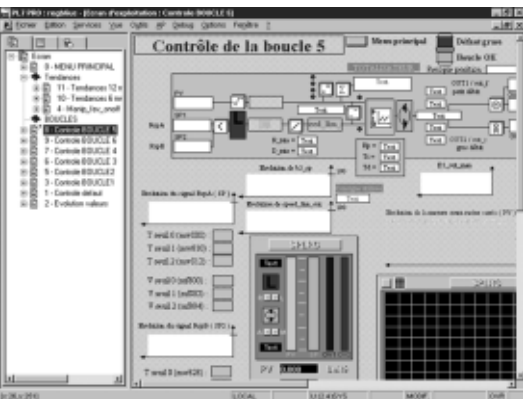


Viewer

#### Output window

The diagnostics viewer takes the form of an output window divided into 2 sections:

- A message list indicating, for each alarm: state, DFB type, geographical zone, dates and times of appearance/disappearance, associated message and status
- An area for additional information about the selected message: type, comment, date of appearance, specific data, variables in error state, etc.



#### Operator screens

The operator screen tool is integrated into Unity Pro. The operator screens are designed to facilitate the operation of automated processes during debugging, startup and maintenance. The operator screens provide a set of information (explanatory texts, display of dynamic values, push buttons, and synoptics), enabling users to act quickly and easily to modify and dynamically monitor PLC variables.

The operator screens editor provides all the HMI (Human/Machine Interface) elements needed for the animated design and viewing of processes. It enables these screens to be designed using specific tools:

- Screen: Creation of runtime screens, which can be classified according to family.
- Message: Creation of messages to be displayed.
- Objects: Creation of a graphic objects library using:
  - Geometrical elements (line, rectangle, ellipse, incorporation of images, controller front panels, etc.)
  - Control elements (buttons, data entry fields, screen browsing controls, etc.)
  - Animation elements (colors, flashing elements, bar graphs, etc.)

When the station on which Unity Pro has been installed is connected to the PLC, the user can obtain a dynamic display of the screens according to the state of the process. Screen sequencing is possible, depending on the priority attributed, either via the keyboard or a PLC request.

When online, the Unity Pro application program can be accessed directly from the operator screens by clicking on the selected object in a synoptic screen view. It is also possible to activate the animation table or cross-reference functions by selecting one or more variables on the screen. To make the display easier to read, the synoptic views can be displayed in full-screen view.

As it is possible to build or modify an operator screen while the PLC is running, this service increases the productivity during the commissioning and maintenance phases.

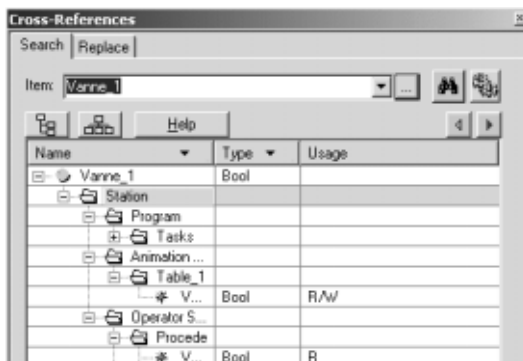


### Modifying the program with the PLC in RUN

Unity Pro enables changes to be made to the program when the PLC connected to the programming terminal is in RUN. These modifications are made by performing the following operations:

- When necessary, transferring the application from the PLC to the PC terminal running Unity Pro.
- Preparing the program changes. These program modifications can be of any type and in any language (IL, ST, LD, FBD, and SFC), for example adding/deleting SFC steps or actions. Furthermore, modifications can be made to the code of a DFB user function block (although its interface cannot be modified).
- Updating the program in the PLC (in RUN) to reflect these program changes.

This function allows program code and data in different parts of the application to be added or modified in a single modification session (thus making modification unified and consistent with regard to the controlled process). This increased flexibility comes at a cost in terms of the program memory volume required.

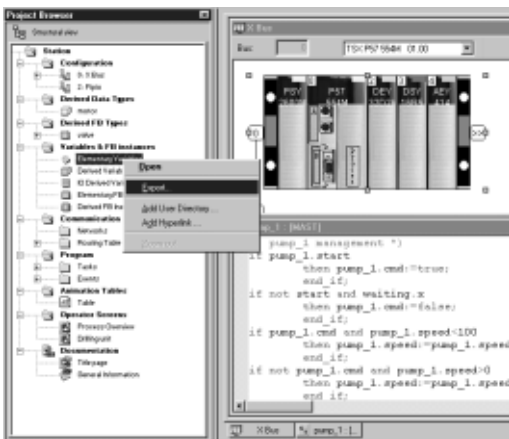


### Cross-References functions

The Unity Pro Cross-References function, which is available in standalone mode (offline) and when connected to the PLC (online), allows users to view all the elements of a PLC application by searching for variables of any type. This view indicates where the declared variable is used as well as the mode in which it is used (write, read, etc.).

This function also provides access to the Search/Replace function for variable names.

The variables search can be initialized from any editor (language, data, runtime screen, animation table, etc.).



### Import/export function

The import/export function available in Unity Pro supports the following operations from the structural and functional project views:

- Via the import function, to reuse all or part of a project created previously in the current project
- Via the export function, to copy all or part of the current project to a file for subsequent reuse

The files generated on export are generally in XML format (1). However, variables can be exported or imported in the following formats in addition to XML:

- .xvm format compatible with OFS data server software
- Source format, in a .scy file compatible with PL7 design software
- Text format with separator (TAB), in a .txt file for compatibility with any other system

On import, data can be assigned to new instances of the following elements via an assistant:

- DFB function blocks
- DDT data structures
- Simple data

Furthermore, when importing a function module, the data associated with animation tables and operator screens is also reassigned.

The XML import function also supports the transfer of a Modicon M340, Atrium, Premium or Quantum PLC configuration prepared in the SIS Pro costing and configuration tool for use in the creation of a project in Unity Pro.

This import function means that the user does not have to repeat the PLC configuration process when this has already been completed in the SIS Pro tool.

(1) XML language: Open text-based language providing structural and semantic information.

### Application converters

Unity Pro's integrated conversion tools can be used to convert PLC applications created with Concept and PL7 programming and setup software in Unity Pro applications.

#### Concept/Unity Pro converter (Quantum PLC)

The conversion can be performed from a Concept V2.5 application (possible in V2.11 or later but only once it has been updated to version V2.5). In order to perform the conversion, the application must be exported to an ASCII file in Concept. The export file is converted into Unity Pro source files automatically. This source file is then analyzed by Unity Pro. At the end of the procedure, a conversion report is generated and an output window displays any conversion errors from which the part of the program to be modified can be accessed directly. The Concept application converter converts the application into Unity Pro but does not guarantee that it will operate correctly in real time. It is therefore essential to test or debug any converted application.

#### PL7/Unity Pro converter (Premium and Atrium slot PLC)

The conversion can be performed from a PL7 application V4 or later (Premium PLC or Atrium slot PLC). In order to perform the conversion, the source file (complete application) or source file (user function block) must be exported in PL7. The conversion procedure is similar to that of the Concept conversion described above.

**Nota :** Conversion of PLC applications created with Concept, Modsoft, ProWorx in LL984 is possible. Please consult your Regional Sales Office.

### Operating system update utilities

OS-Loader software is designed for updating operating systems on Atrium, Premium and Quantum platforms and is supplied with Unity Pro software. It can be used to upgrade the processor and modules from PL7 or Concept for compatibility with Unity Pro:

- Premium **TSX P57 2●3M/2623M** and **TSX P57 3●3M/3623M** processors
- Quantum **140 CPU 434 12A** and **140 CPU 534 14A** processors (requires PV 04 or later)
- Ethernet **TSX ETY ●102** and **140 NOE 771 ●1** communication modules

These operating system updates are performed as follows for the various types of processor:

- Uni-Telway RS 485 terminal link for Premium processors
- Modbus or Modbus Plus terminal link for Quantum processors
- Ethernet TCP/IP network for integrated Ethernet port on Premium processors and Ethernet Premium and Quantum processors (1)

**Nota :** For Modicon M340 this service is supplied by Unity Loader (see page 4/38)

(1) Updating the OS on a Quantum **140 CPU 671 60** processor is done thru an Ethernet network on its MT-RJ type optical fiber connector (and thru a transceiver or a ConneXium switch for electrical/optical interfacing)

### Communication drivers

The drivers used most frequently on the Atrium, Premium and Quantum platforms are installed at the same time as the Unity Pro software.

Furthermore, Unity Pro also includes the following communication drivers, which can be installed as required (1):

Driver type	Windows XP Windows 2000	Windows NT	Windows 98 Millenium	Windows 95
Uni-Telway COM port	V1.9 IE20	V1.9 IE17	V1.7 IE18	V7.8 IE18
Uni-Telway TSX SCP 114	V1.2 IE05			
Modbus COM port	V1.6 IE29			
Fip ISA TSX FPC10 card	V1.4 IE06	V1.3 IE08	V1.4 IE06	V2.4 IE08
Fip TSX FPC20 PCMCIA card	V1.2 IE03	V1.1 IE08	V1.2 IE04	
Ethway	V1.4 IE05	V1.1 IE03	V2.6 IE06 (2)	
ISAWay PCX 57, ISA card	V1.2 IE04	V1.5 IE06	V1.2 IE04	V1.2 IE09
PCIway Atrium, PCI card	V1.1 IE09	-		
XIP X-Way on TCP/IP	V1.10 IE22			
USB for USB terminal port	V1.2 IE17	-		

4



### Unity Developer's Edition, advanced openness

Advanced openness, which is reserved for experienced IT engineers, supports the development of interfaces between Unity and expert tools as well as specific user-defined functions.

This type of development requires expert IT knowledge in the following areas:

- C++ or Visual Basic languages
- Client/server architectures
- XML and COM/DCOM technologies
- Issues relating to data synchronization

As a supplement to the Unity Pro Extra Large software (3), the UDE (Unity Developer's Edition) development tool **UNY UDE VFU CD21E** can be used to set up made-to-order solutions. In addition to a development kit, it includes the Unity servers and documentation.

Unity Developer's Edition is compatible with:

- Unity Pro Extra Large.
- All Modicon M340 processors.
- All Atrium slot-PLCs.
- All Premium Unity processors.
- All Quantum Unity processors.

(1) Also available as separate part **TLX CD DRV 20M**

(2) Windows 98 only

(3) Only Unity Pro Extra Large implements dynamic databases management for OFS data servers and 3<sup>rd</sup> party software.

# Modicon M340 automation platform

## Unity Pro software



### References

#### Unity Pro Small, Medium, Large and Extra Large software packages

The software is available in 4 versions:

- **Unity Pro Small** for programming and setting up Unity automation platforms:
  - Modicon M340 BMX P34 1000 and BMX P34 20●0
- **Unity Pro Medium** for programming and setting up Unity automation platforms:
  - Modicon M340 BMX P34 1000 and BMX P34 20●0
  - Atrium TSX PCI 57 20
  - Premium TSX 57 0●, 57 10 and 57 20
- **Unity Pro Large** for programming and setting up automation platforms:
  - Modicon M340 BMX P34 1000 and BMX P34 20●0
  - Atrium TSX PCI 57 20 and 57 30
  - Premium TSX 57 0●, 57 10, 57 20, 57 30 and 57 40
  - Quantum with 140 CPU 311 10 and 434 12U processors
- **Unity Pro Extra Large** for programming and setting up all Unity automation platforms:
  - Modicon M340 BMX P34 1000, and BMX P34 20●0
  - Atrium TSX PCI 57 20 and 57 30
  - Premium TSX 57 0●, 57 10, 57 20, 57 30, 57 40 and 57 50
  - Quantum with 140 CPU 311 10, 434 12U, 651 50, 651 60 and Hot Standby 140 CPU 671 60 processors

#### Upgrade kits for Concept, PL7 Pro and ProWORX software

Users who have already purchased these installed base software programs **and have a current subscription** may purchase Unity Pro version V3.0 software at reduced prices. These upgrades are only possible for licenses of the same type (from Concept XL group license to Unity Pro Extra Large group license).

#### OS Windows composition and compatibility

Unity Pro multilingual software is compatible with Windows 2000 Professional and Windows XP operating systems.

It comprises:

- Documentation in electronic format in 6 languages (Chinese, English, French, German, Italian and Spanish)
- Converters for converting applications created with Concept and PL7 Pro programming software
- PLC simulator

Cables for connecting the processor to the programming PC must be ordered separately.

# Modicon M340 automation platform

## Unity Pro software



### References (continued)

#### Unity Pro Small version 3.0 software packages

For PLCs	Description	Type of license	Reference	Weight kg
BMX P34 1000 BMX P34 2000	Unity Pro Small software packages	Single-station	UNY SPU SFU CD30	–
		Group (3 stations)	UNY SPU SFG CD30	–
		Team (10 stations)	UNY SPU SFT CD30	–
	Software upgrades from: - Concept S - PL7 Micro - ProWORX NxT/32 Lite	Single-station	UNY SPU SZU CD30	–
		Group (3 stations)	UNY SPU SZG CD30	–
		Team (10 stations)	UNY SPU SZT CD30	–

#### Unity Pro Medium version 3.0 software packages

For PLCs	Description	Type of license	Reference	Weight kg
BMX P34 1000 BMX P34 2000 TSX 57 0...57 20 TSX PCI 57 20	Unity Pro Medium software packages	Single-station	UNY SPU MFU CD30	–
		Group (3 stations)	UNY SPU MFG CD30	–
		Team (10 stations)	UNY SPU MFT CD30	–
	Software upgrades from: - Concept S, M - PL7 Micro, Junior - ProWORX NxT/32 Lite	Single-station	UNY SPU MZU CD30	–
		Group (3 stations)	UNY SPU MZG CD30	–
		Team (10 stations)	UNY SPU MZT CD30	–

#### Unity Pro Large version 3.0 software packages

For PLCs	Description	Type of license	Reference	Weight kg
BMX P34 1000 BMX P34 2000 TSX 57 0...57 40 TSX PCI 57 20/30 140 CPU 311 10 140 CPU 434 12U	Unity Pro Large software packages	Single-station	UNY SPU LFU CD30	–
		Group (3 stations)	UNY SPU LFG CD30	–
		Team (10 stations)	UNY SPU LFT CD30	–
		Site (> 10 stations)	UNY SPU LFF CD30	–
	Software upgrades from: - Concept S, M - PL7 Micro, Junior, Pro - ProWORX NxT/32 Lite	Single-station	UNY SPU LZU CD30	–
		Group (3 stations)	UNY SPU LZG CD30	–
		Team (10 stations)	UNY SPU LZT CD30	–
		Site (> 10 stations)	UNY SPU LZF CD30	–

#### Unity Pro Extra Large version 3.0 software packages

For PLCs	Description	Type of license	Reference	Weight kg
BMX P34 1000 BMX P34 2000 TSX 57 0...57 50 TSX PCI 57 20/30 140 CPU 311 10 140 CPU 434 12U 140 CPU 651 50/60 140 CPU 671 60	Unity Pro Extra Large software packages	Single-station	UNY SPU EFU CD30	–
		Group (3 stations)	UNY SPU EFG CD30	–
		Team (10 stations)	UNY SPU EFT CD30	–
		Site (> 10 stations)	UNY SPU EFF CD30	–
	Software upgrades from: - Concept S, M, XL - PL7 Micro, Junior, Pro - ProWORX NxT Lite, Full - ProWORX 32 Lite, Full	Single-station	UNY SPU EZU CD30	–
		Group (3 stations)	UNY SPU EZG CD30	–
		Team (10 stations)	UNY SPU EZT CD30	–
		Site (> 10 stations)	UNY SPU EZF CD30	–

#### Unity Developer's Edition

For PLCs	Description	Type of licence	Reference	Masse kg
BMX P34 1000 BMX P34 2000 TSX 57 0...57 50 TSX PCI 57 20/30 140 CPU 311 10 140 CPU 434 12U 140 CPU 651 50/60 140 CPU 671 60	UDE Unity Developer's Edition Requires Unity Pro Extra Large	Single-station	UNY UDE VFU CD21E	–



# Modicon M340 automation platform

## Unity Pro software

## References (continued)

## Documentation for Unity Pro version 3.0

For PLCs	Description	Type of license	Reference	Weight kg
Hardware and software manuals (on DVD)	Platform setup for: - Modicon M340 - Atrium/Premium - Quantum - Momentum  Electromagnetic compatibility of networks and fieldbuses  Software setup for: - Unity Pro - EF/EFB/DFB function blocks library	Multilingual: Chinese, English, French, German, Italian and Spanish	<b>UNY USE 909 CD M</b>	—

## Separate parts

Description	Use from processor	To PC port	Length	Reference	Weight kg
PC terminal connection cables	USB Mini B port Modicon M340 BMX P34 1000/20●0	USB port	1.8 m	<b>BMX XCA USB H018</b>	0.065
			4.5 m	<b>BMX XCA USB H045</b>	0.110
	Mini-DIN port for Premium TSX 57 1●/2●/3●/4● Atrium TSX PCI 57	RS 232D (15-way SUB-D connector)	2.5 m	<b>TSX PCX 1031</b>	0.170
			USB port (USB/RS 485 converter)	0,4 m	<b>TSX CUSB 485 (1)</b>
	Modbus port 15-way SUB-D Quantum 140 CPU 311 10 140 CPU 434 12A 140 CPU 534 14A	RS 232D (15-way SUB-D connector)	3.7 m	<b>990 NAA 263 20</b>	0.300
			15 m	<b>990 NAA 263 50</b>	0.180
	USB port Premium TSX 57 5● Quantum 140 CPU 6●1	USB port	3.3 m	<b>UNY XCA USB 033</b>	—
	RJ45 connector for Modbus port Quantum 140 CPU 6●1	RJ45 connector	1 m	<b>110 XCA 282 01</b>	—
			3 m	<b>110 XCA 282 02</b>	—
			6 m	<b>110 XCA 282 03</b>	—

(1) With **TSX CUSB 485** converter, use the **TSX CRJMD 25** cordset (equipped with 1 x mini-DIN and 1 x RJ45 connectors).



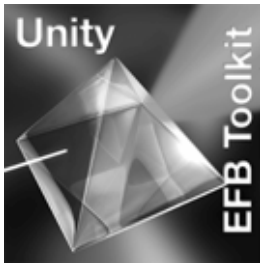
BMX XCA USB H0●●



TSX PCX 1031



TSX CUSB 485



## Presentation

Unity EFB Toolkit is the software for developing EF functions and EFB function blocks in C language and is optional software for Unity Pro. It can be used to develop new functions (whose internal code is written in C language) to extend and complete the set of functions proposed as standard in Unity Pro. This software comes with Microsoft Visual C++ @.Net which can be used to debug the functions used on the Unity Pro PLC simulator. Unity EFB Toolkit also includes a service for creating and managing families of functions, with a view to their integration in the Unity Pro function libraries.

## Setup

C language development software is a proper tool for managing the whole function while it is being performed:

- A user-friendly creation interface, integrated in Unity Pro, with automatic file organization
- Powerful tools for testing and debugging
- Management of compatibilities and software versions of created functions
- Generation of files for subsequent installation of functions on other development stations

## Managing function families

The software can be used to define different function families. These functions, also known as EFs/EFBs, are stored in families, making it possible to create an organized library of functions written in C language.

Once created, these families can be distributed and integrated in the Unity Pro libraries.

They are:

- Arranged in families/functions
- Used in all languages with the same flexibility as standard functions (data entry wizard)
- Managed by the Unity Pro library tool (version management)

## Editing functions

The various tabs in the EFB Toolkit software editor allow the user to create the function by:

- Declaring the interface, all data types are possible (elementary, structures, tables)
- Supporting public and private variables

## Writing the source code file in C language

A function written in C language can access numerous internal PLC services such as the real-time clock, PLC variables, system words, math functions. In particular, it is possible to perform numerical processing in floating point format.

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## Setup (continued)

### Debugging functions

The function created can be tested after insertion in an application and loading into the Unity Pro PLC simulator.

The Microsoft Visual C++ tool is used to debug the function.

It is used to:

- Insert breakpoints
- Perform step by step execution
- Display the code with the breakpoints visible
- Display manipulated data

**Nota :** To generate the code for a Modicon M340 platform, a specific GNU compiler is used. It is supplied with the Unity EFB Toolkit.



### Enhancing the function library

As the function has been debugged, it can be generated and distributed, and the updating tool supplied with Unity Pro can be used to enhance the libraries on a user station.

Version management means that at any time the user knows the level of functions installed on a station and can update the application with the latest existing versions.

### Compatibility

Unity EFB Toolkit is compatible with Unity Pro Small, Medium, Large, and Extra Large.

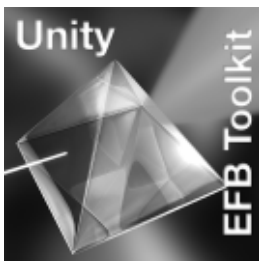
Developing EF functions and EFB functions is possible for the Modicon M340, Premium, Atrium, and Quantum platforms.

### References

The “companion” software for Unity Pro, Unity EFB Toolkit can be used to create EF elementary blocks and EFB elementary function blocks. These are developed in Visual C++ language and are integrated in Unity Pro function block libraries.

The Unity EFB Toolkit software and its documentation are supplied in electronic form on CD-ROM in English.

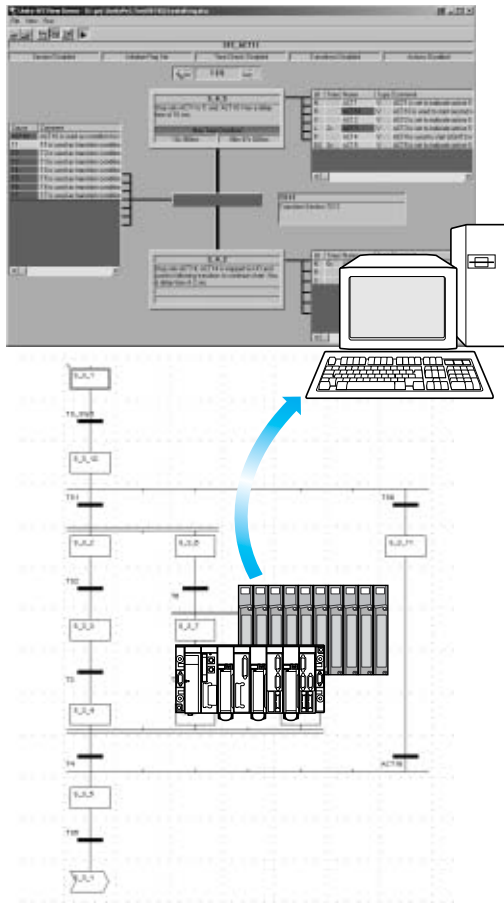
Description	Type of license	Language	Reference	Weight kg
Unity EFB Toolkit, kit for developing EF and EFB blocks	Single (1 station)	English (software and electronic documentation)	UNY SPU ZFU CD30E	—





# Modicon M340 automation platform

## Unity SFC View software



### Presentation

Unity SFC View is integrated in human/machine interface (HMI) applications for monitoring Unity Pro sequential applications written in sequential function chart language (SFC or Grafset) executed by a PLC.

Set up in the same way as an ActiveX control component, Unity SFC View is used to display status information relating to SFC charts executed by a Modicon M340, a Premium or a Quantum PLC. Installed on an HMI station, Unity SFC View monitors and controls the status of SFC charts in real time, supplying detailed diagnostic data.

Unity SFC View reads the necessary data from the Unity project database in offline mode. The PLC data is accessed online via the OFS (*OPC Factory Server*).

Without needing to recreate SFC charts in the HMI environment, Unity SFC View reads the structure of the SFC charts directly from the Unity project database. Modifications made to the SFC application are detected and updated at any time. In online mode, Unity SFC View accesses the PLC diagnostic data, thus enabling awareness and tracking of the occurrence of the first fault and subsequent faults. System downtime is much reduced since Unity SFC View enables maintenance staff to locate the source of the problem much more quickly.

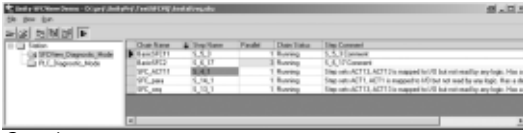
Unity SFC View is designed for end users and system designers who wish to integrate this control into their HMI system. Unity SFC View is compatible with most HMI platforms handling ActiveX Control components such as Vijeo Look control software or Monitor Pro supervisory software or in a programming environment such as Visual Basic.

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### The 3 Unity SFC View views

Unity SFC View offers 3 views:

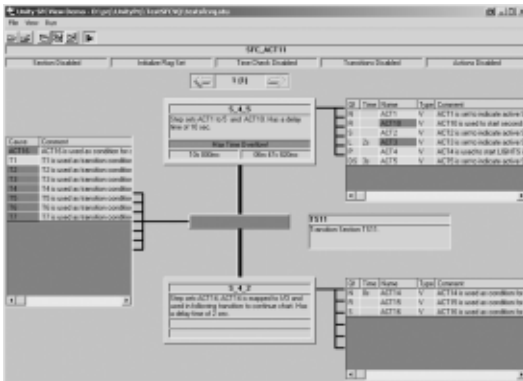
- An overview for managing selection of SFC charts
- Two detailed views presenting the status and diagnostic data of the selected SFC chart



Overview



Simple detailed view



Detailed view

**The overview** provides a general view of all the SFC charts in a Unity project. It contains real-time data such as current step, simultaneous steps, chart error with indication of the SFC chart status. The overview makes it easy to browse through SFC charts and switch quickly to the detailed view of the desired SFC chart in the Unity Pro application.

**The simple detailed view** shows the elementary data on the active step (or selected step) of the SFC chart in real time. The data displayed may include the name, comment, chart and step status, as well as the activity times (min, max, actual). You can also enable the chart navigation option.

Because of the compact size of the simple detailed view, it is possible to place several instances of it on a single HMI screen relating to a certain part of the process. From this simple detailed mode, you can navigate between HMI screens with SFC View controls and display the detailed view of SFC charts.

**The detailed view** illustrates the details of an SFC chart in real time. The display indicates the current step, the transition awaiting activation and the next step. The actions associated with the steps are displayed along with sequence selections or parallel branches. The detailed diagnostic data includes analysis of the causes of the fault at transition level. Depending on the diagnostic mode, the error grid contains the causes of errors or all the variables assigned to the transition logic. The current state of the various variables and selected errors are identified by different colors.

### Diagnostic mode

Transition logic diagnostics is a key function of Unity SFC View. It minimizes system downtimes in the event of a fault.

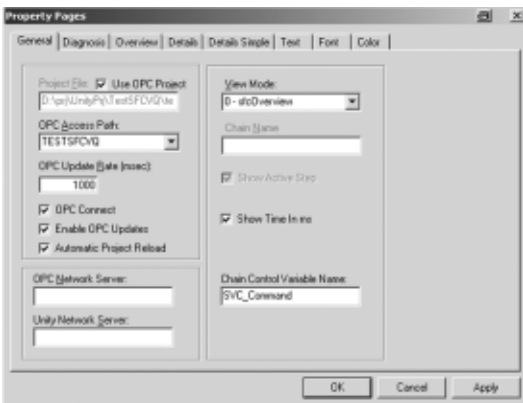
Two different diagnostic modes are available:

- Unity SFC View reads the data in the Unity PLC diagnostic buffer. It provides information about faulty or missing events that are preventing the transition from being enabled. This mode does not require any configuration or additional programming in the PLC program.
- Unity SFC View monitors the internal logic of the transition conditions “back to front”. This mode provides diagnostic data concerning all the inputs connected to the transition (not limited to faulty inputs). In this mode, for Premium, Atrium and Quantum platforms, Unity SFC View uses specific EFB function blocks linked to the transition conditions. The library for these blocks is supplied with the Unity SFC View software.

### Customization

Unity SFC View offers a programming interface which can be used to integrate the ActiveX Control component in an HMI application and customize its functions and its operator interface.

The ActiveX Control component in Unity SFC View can be customized. It accepts properties, methods and events (all the properties have a default value). The properties pages simplify configuration. Unity SFC View accepts scripts with methods such as browsing through charts, status control of charts, and also events such as error notification or chart selection. This data can be used to launch programs or operator screens.



SFC View properties page

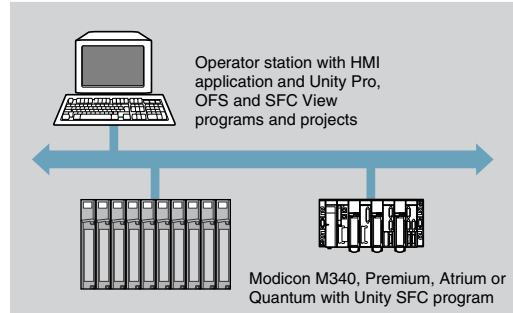
# Modicon M340 automation platform

## Unity SFC View software

### Possible architectures

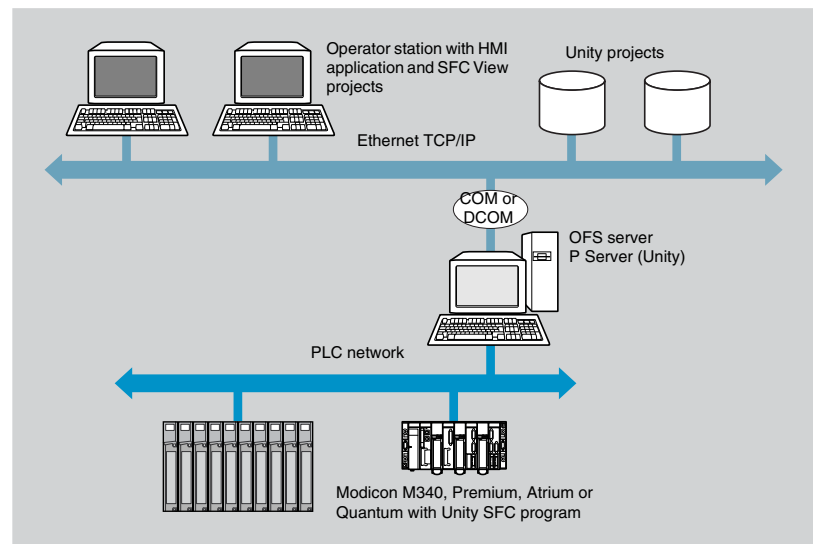
#### Basic architecture

Unity SFC View is used in a configuration where the OFS and Unity Pro software reside on the same PC platform as the HMI application.



#### Distributed architecture

In a distributed configuration, the OFS and Unity Pro software can be installed on different servers.



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# Modicon M340

## automation platform

### Unity SFC View software



#### References

When integrated in an HMI application, Unity SFC View can be used to monitor and control charts in applications developed in Sequential Function Chart (SFC) language running on Premium/Quantum Unity PLCs.

The HMI station, compatible with Windows 2000 or Windows XP Professional operating systems, must support ActiveX Control components. Unity SFC View V2.0 requires:

- Unity Pro V3.● XL, to be ordered separately
- OFS V3.3 data server software, to be ordered separately

Unity SFC View multilingual software, supplied on a CD-ROM, includes:

- The SFC View ActiveX Control component
- The EFB function block library for Unity Pro V3.●
- An example of how to integrate SFC View in Unity Pro projects
- The electronic documentation (English, French and German)

The Unity SFC View integration example illustrates the main possibilities offered by Unity SFC View. This is an executable program which does not need HMI software in order to run. It helps the user understand how to configure and use the Unity SFC View ActiveX Control component.

Description	Type of license	Reference	Weight kg
<b>Unity SFC View software packages</b> (version V2.0)	Single (1 station)	<b>UNY SDU MFU CD20</b>	–
	Team (10 stations)	<b>UNY SDU MFT CD20</b>	–
	Site (100 stations)	<b>UNY SDU MFF CD20</b>	–

# Modicon M340 automation platform

## Unity Dif application comparison software



### Presentation

Unity Dif application comparison software for Modicon M340/Premium/Atrium/Quantum platforms is an optional program which complements the Unity Pro Extra Large programming software. It is used to compare two Unity applications generated by Unity Pro and automatically provide an exhaustive list of all the differences between them.

The Unity Dif program increases productivity in the main life phases of a control system based on a M340/Premium/Atrium/Quantum platforms:

- Application development and debugging.
- Starting up installations and processes.
- Operation and maintenance of installations and processes.

Unity Dif software is an efficient tool for handling Unity applications for:

- Control system design offices.
- Operation and maintenance managers.
- Installers and systems integrators.

### Software setup

The Unity Dif software can be used in one of two modes:

- Interactive mode, when the comparison is launched by an operator command (double-click on the Unity Dif software icon).
- Automatic mode, when it is launched by a previously established call command.

These comparison commands locate all the differences between two applications in terms of:

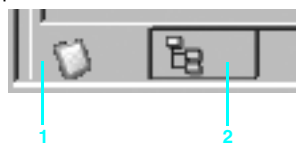
- The hardware configuration (Modicon M340/Premium/Atrium/Quantum)
- The network configuration (Ethernet TCP/IP network, CANopen bus and RIO remote I/O)
- The entire of variables and function block instances
- The application structure and its content (regardless of the language(s) used)
- The function modules.
- The code for the DFB user function blocks and DDT compound data.
- The project options.

The result of the comparison between the two applications can be:

- Displayed.
- Printed.
- Saved in .txt format in a differences list.

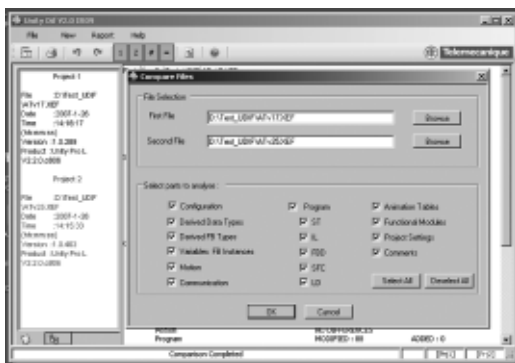
### Comparison

The end of the comparison operation is signalled by the appearance of the application browser with its two tabs.



1 Identification tab for accessing the characteristics of the two applications being compared. The differences are marked by the sign #.

2 Browser tab for accessing the application multilevel tree structure.



(1) RIO remote I/O for Modicon Quantum platform.

# Modicon M340 automation platform

## Unity Dif application comparison software

### Setup (continued)

#### Display of results

The representation of the application multilevel tree structure, which can be accessed via the browser tab after launching a comparison, is annotated by 4 symbols in which the information associated with application 1 appear in blue and those associated with application 2 appear in red:



This branch, found in this level of the tree structure, contains at least one difference



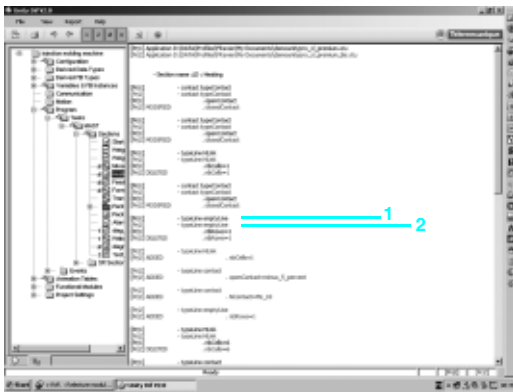
This block contains at least one difference



This section is only present in application 1



This section is only present in application 2



In the example opposite, a difference on the rung causing changeover to manual mode is detected:

1 This line displayed in blue belongs to application 1 [Prj1]

2 This line displayed in red belongs to application 2 [Prj2]

The source code extracts of both applications can be used to locate the differences precisely.

#### Differentiation report

The "Report" command allows to generate the report file (.txt):

```
Compared Files:
-----
[Prj1] D:\Test\UDIF\ATv17.XEF
[Prj2] D:\Test\UDIF\ATv25.XEF

Date/Time of Report/Generation : 26/03/2007 10:16:33
Machine Name : 50-FfoV1er
Windows User Name : FR.ACC\Frauster

First file : D:\Test\UDIF\ATv17.XEF
Name : DAK04
Size : 4183,72 KB
Date : 2007-1-26 (yyyy-mm-dd)
Time : 14:16:17 (hh:mm:ss)
Version : 1.0.289
Product : Unity Pro L V2.2.0.c806
Company : Schneider Automation
PLC Address : [2.0]SV5, XIP01

Second file : D:\Test\UDIF\ATv25.XEF
Name : DAK04
Size : 4183,58 KB
Date : 2007-1-26 (yyyy-mm-dd)
Time : 14:15:33 (hh:mm:ss)
Version : 1.0.403
Product : Unity Pro L V2.2.0.c806
Company : Schneider Automation
PLC Address : [2.0]SV5, XIP01

Compared Part(s):
Configuration                MODIFIED : 0          ADDED : 21          DELETED : 21
Derived Data Types            NO DIFFERENCES
Derived FB Types              MODIFIED : 51          ADDED : 27          DELETED : 24          MOVED : 0
Variables & FB Instances     MODIFIED : 29          ADDED : 71          DELETED : 2
Communication                 MODIFIED : 0          ADDED : 0          DELETED : 2
Motion                        NO DIFFERENCES
Program
Function Block Diagram        MODIFIED : 88          ADDED : 0          DELETED : 0          MOVED : 0
Ladder Diagram               MODIFIED : 279         ADDED : 93          DELETED : 70
Structured Text               MODIFIED : 435         ADDED : 381         DELETED : 446
Instruction List              NO DIFFERENCES
Sequential Function Chart    NO DIFFERENCES
Animation Tables             MODIFIED : 0          ADDED : 80          DELETED : 34
Functional Modules            MODIFIED : 23          ADDED : 0          DELETED : 0          MOVED : 0
Project Settings             NO DIFFERENCES

Non compared part(s) :

Filters :
Shown : 1, 2, #
Hidden : =

Report in Tree View:
-----
[ ] DAK04
  |-- (#) Configuration
  |   |-- (#)0 : XBUS
  |   |-- (#)1 : TSXREV17
  |   |-- (#)2 : TSXPS746134M
  |   |-- (#)3 : TSXETV4103
  |-- (*) Derived Data Types
  |-- (#) Derived FB Types
  |   |-- (#)RESS_RE_3F_TEST
  |   |-- (#) Regulation
```

### Reference

This software extension used to compare two PL7 applications generated by Unity Pro software version ≥ V2.1

Function	Target extension PLC target	Type of device	Reference	Weight kg
Unity Dif application comparison software extension	Unity Pro Extra Large Modicon M340/ Premium/Atrium Quantum	Single (1 station)	UNY SDU DFO CD20	-



## Presentation

Unity Loader is companion software to Unity Pro and is used to perform maintenance operations on automation applications. Its easy setup and the small size of its executable make it an essential tool for updating Modicon M340 PLC projects when it is not necessary to read or modify the program. It is also essential software for updating the embedded software on the M340 PLC. It performs the following two main functions:

- Transfer of automation project components from the PC to the PLC or from the PLC to the PC, such as the program, data, files and user Web pages stored in the memory cartridge
- Transfer of embedded software from the PC to the processor or Ethernet communication modules

## Software graphic interface

The software is designed to be used by people with limited automation expertise. The interface consists of four tabs, and buttons within each of the tabs to perform different operations.

- The first tab, "Project", is used for project transfers: program, data and user files. The three exchange operations between the PC and the processor can be sequenced together in a single command.
- The second tab, "Operating System", is used to update the embedded software in the PLC. The screen displays the detailed content of the PLC firmware versions, and, when a file is selected on the PC, the characteristics of that file are displayed.
- The third tab, "Options", is used to configure the working environment, including the location of files on the PLC, selection of one of six languages (English, French, German, Italian, Spanish, Chinese) for the interface and online help, etc. The last tab can be used to display information about the software.

**Note:** Regardless of which tab is selected, the connection status with the PLC is displayed, together with commands for connection/disconnection and changing the PLC operating mode.



Unity Loader: "Project" tab

## Modicon M340 PLC project transfer

### Exchanges between the PC and the PLC processor

The software can be used to transfer the components of a project in either direction:

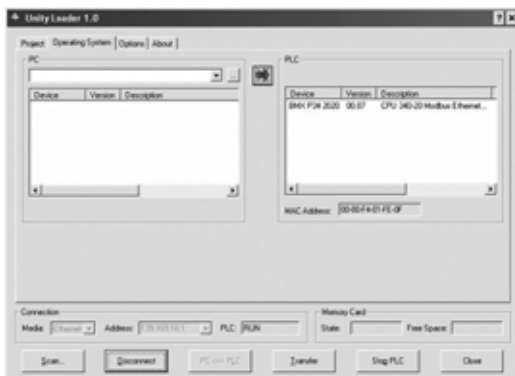
- Program: binary and source, if the application has been built using the source format
- Data file: located and unlocated data
- Data on the processor memory cartridge: user files (if the cartridge allows this)

Unity Pro can be used to transfer the application from either the application file .stu, or the archive file .sta. The program file and data formats, together with the functions performed by Unity Loader, are identical to those built and used by Unity Pro.

When the cartridge-based user files are transferred from the PLC to the PC, a private file specific to Unity Loader is created. The operation is then possible in the other direction. Unity Pro cannot be used to perform this type of transfer.

In order to simplify project management, Unity Loader defaults to store the three files read in the PLC in the same directory with an identical file name (the project name by default), but with a different file extension. The default choice suggested can be modified by the user.

Once connected to the PLC, Unity Loader displays the characteristics of the data read in the PLC. Similarly, when the files are selected on the PC, the corresponding characteristics are also displayed. All the data necessary to decide on the action required is displayed on a single screen. The three components of the project are selected by default, provided that they are valid for the chosen direction of transfer. Transfer of one or two of the components can be disabled. All of the transfers are performed in a single command.



Unity Loader: "Operating System" tab

4



## Modicon M340 PLC project transfer (continued)

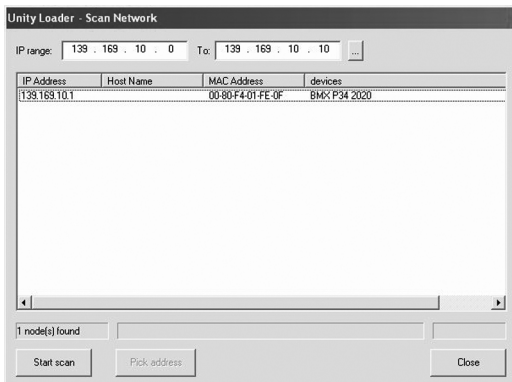
### File transfer to the Modicon M340 PLC Ethernet communication module

The BMX NOE 0100/BMX NOE 0110 communication modules contain a memory cartridge that can store user web pages, depending on the model used. When Unity Loader is connected to the communication module, web pages can be transferred from the module to the PC or vice versa. The operating mode is identical to that available for exchanges with the processor.

### Updating embedded software in the Modicon M340 processor and Ethernet communication modules

Firmware can be updated by following the same principle as that used for for transferring projects.

Once connected to the PLC, Unity Loader displays the characteristics of the firmware read in the PLC. Similarly, when a file corresponding to a valid file for the firmware is selected on the PC, the corresponding characteristics are also displayed. All the data necessary to decide on whether the update should be performed is displayed on a single screen.



Unity Loader: Network scanning

### Communication between the PC and the PLC

Unity Loader uses two communication vectors, USB and Ethernet. USB is always available for exchanges with the PLC processor. Ethernet is essential for exchanges with the Ethernet modules and can also be used for exchanges with processors which have an integrated Ethernet port.

PLC	Type	Ethernet port	USB port
BMX P34 1000	CPU		
BMX P34 2010	CPU		
BMX P34 2020	CPU		
BMX P34 2030	CPU		
BMX NOE 0100	Ethernet module		
BMX NOE 0110	Ethernet module		

Supported

When Unity Loader is connected to an Ethernet network, it is possible to define a range of addresses to be scanned and thus display all the devices recognized on the network. By selecting the Modicon M340 PLC, the transfer operations can then be performed.

All connection and transfer operations, together with any errors, are recorded in a trace file stored in the PC.

### Compatibility

Unity Loader is compatible with Modicon M340 PLCs.

Its use is totally independent from Unity Pro. Program files and PLC data are compatible between Unity Pro and Unity Loader.

### Reference

Unity Loader is available in two formats. It is automatically provided with all versions of Unity Pro Small, Medium, Large and Extra Large. It can be ordered separately under a unit reference.

The product includes a graphic interface and documentation in six languages (English, French, German, Italian, Spanish, Chinese).

Description	Type	Reference	Weight kg
Unity Loader	Single license	UNY SMU ZU CD30	—







# 5 - Connection interfaces, power supplies and HMI interfaces

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## 5 - Advantys Telefast ABE 7 pre-wired I/O system

[Advantys Telefast ABE7 selection guide](#) ..... page 5/2

- Presentation, combinations ..... page 5/8
- References
  - Passive connection sub-base for discrete inputs/outputs ..... page 5/10
  - Adaptation sub-bases with soldered relays and removable terminal blocks ..... page 5/12
  - Adaptation sub-bases for or with plug-in relays ..... page 5/13
  - Plug-in relays ..... page 5/15
  - Connection sub-bases for counter and analogue channels ..... page 5/16
  - Accessories for connection sub-bases ..... page 5/17
- Dimensions ..... page 5/18

## 5 - Phaseo power supplies

[Phaseo Modular, Optimum and Universal ranges of power supplies selection guide](#) ..... page 5/20

- Phaseo Universal range of regulated switch mode power supplies ... page 5/22

## 5 - Human/machines Interfaces

[Magelis display units and terminals selection guide](#) ..... page 5/32

[Magelis graphic terminals selection guide](#) ..... page 5/34

[Magelis iPC industrial PCs selection guide](#) ..... page 5/36

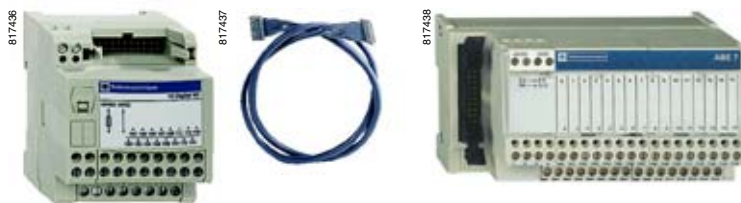
[HMI software and Web servers selection guide](#) ..... page 5/38



# Connection interfaces

Advantys Telefast ABE 7 pre-wired system  
Discrete input and/or output sub-bases

Applications	Discrete inputs or outputs		
	Optimum "Low cost"	Optimum "Miniature"	Universal



Relay amplification	-			
Equipped with relay	-			
Control voltage	= 24V			
Output voltage	= 24V			
Output current per channel	0.5 A			
Modularity	16		8 -12 -16	
No. of terminals per channel	1	1 to 3	1	2
Type of connection terminals	Signal	Signal, common (configurable = 24 V or 0 V)	Signal	Signal, common (configurable = 24 V or 0 V)
Connectors	20-way HE10 connector			
Terminal block	Removable	No		No
	Terminal type	Screw		Screw or spring
Additional or optional* function	Low cost version fitted with cable	Miniature sub-bases	Compact size *	Type 2 input * (1)
Device type	ABE 7H20E●●● ABE 7H32E●●●	ABE 7H16C●●	ABE 7H●●R1● ABE 7H●●R50	ABE 7H●●R2● ABE 7H●●S21
Pages	5/10		5/11	

(1) For TSX Micro and Premium PLCs

5

**Discrete inputs and outputs**

**Optimum "Miniature"**

**Optimum**



-		Plug-in electromechanical or solid state	
-		No	Yes
≡ 24V			
≡ 24V		≡ 24V (solid state) ≡ 5... 24V, ~ 230 V (electromechanical)	
0.5 A	0.5 A	5 A (E.M.), 2 A (solid state)	5 A (th)
16		16 8 passive inputs 8 relay outputs	
1	2	1	
Signal, 2 common connections between the inputs and the outputs.		Signal, common, 2 common connections between the inputs and the outputs.	
20-way HE10 connectors			
No			
Screw			
Miniature sub-base Synergy with Tego Power and Micro PLC		Miniature sub-base - Common per 4 channels Synergy with Tego Power and Micro PLC	
<b>ABE 7H16CM11</b>	<b>ABE 7H16CM21</b>	<b>ABE 7P16M111</b>	<b>ABE 7R16M111</b>
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# Connection interfaces

## Advantys Telefast ABE 7 pre-wired system Discrete input and output sub-bases

Applications	Discrete output			
	“Optimum”	“Universal”	“Optimum”	“Universal”



Relay amplification	Electromechanical, fixed		Electromechanical or solid state			
Equipped with relay	Yes		Yes	No	No	
Control voltage	≡ 24 V					
Output voltage	≡ 5 V... 30 V ~ 230 V		≡ 5 V... 150 V ~ 230 V	≡ 24 V (solid state) ≡ 5 V... 24 V, ~ 230 V (E.M.)		≡ 5 V... 150 V ~ 230 V
Output current per channel	2 A (th)	3 A (th)	5 A (th)	2 A (solid state), 6 A (electromechanical)		Depends on relay mounted 0.5 to 10 A
Modularity	8	8 - 16		16		8 or 16
No. of terminals per channel	2	1	2	1	2 to 3	
Type of connection terminals	1 N/O contact and common Volt-free	1 N/O contact	1 N/O contact and common	1 N/O contact	Signal, Polarities	
Connectors	20-way HE 10 connector					
Terminal block	Removable	Yes	Yes	Yes	No	No
	Terminal type	Screw or spring			Screw	
Additional or optional* function	Miniature sub-base Latching relay	Volt-free or common per 8 channels		Miniature sub-bases Common per 4 channels		Isolator and fuse
Device type	ABE 7R08S216●	ABE 7R●●S1●●	ABE 7R●●S2●●	ABE 7R16T111	ABE 7P16T111	ABE 7P16T2●●● ABE 7P08T3●●●
Pages	5/12			5/13	5/14	

5



Discrete outputs	Discrete inputs				
“Universal”	“Universal”				

817439



Electromechanical, plug-in		Solid state, fixed		–	–	Solid state, fixed	Solid state, plug-in
Yes		Yes		–	–	Yes	No
= 24 V						From = 24 V to ~ 230 V	From 5 V TTL to ~ 230 V
= 5 V... 150 V ~ 230 V		= 24 V					
5A (th)	8 A (th)	from 0.5 to 2 A	125 mA	0.5 A	125 mA	12 mA	
16							
2 to 3	2 to 6	2		3	2		
1 C/O contact or 1 N/O contact and common	1 C/O contact or 2 C/O contacts and common	Signal and 0 V		Signal = 24 V and 0 V	Signal can be isolated, Protected common	Signal	Signal and common
20-way HE 10 connector							
No		Yes	No	No	Yes		No
Screw		Screw or spring		Screw		Screw or spring	
Volt-free or common per:		Fault signal	Isolator and fuse (indicator)	3-wire proximity sensor	Isolator and fuse (indicator)	–	
8 channels	4 channels						
<b>ABE 7R16T2●●</b>	<b>ABE 7R16T3●●</b>	<b>ABE 7S●●S2B●</b>	<b>ABE 7H16F43</b>	<b>ABE 7H16R3●</b>	<b>ABE 7H16S43</b>	<b>ABE 7S16E2●●</b>	<b>ABE 7P16F31●</b>
5/13		5/12	5/11		5/12		5/15

5

Applications		Analogue signals and special functions			
					
<b>Compatibility</b>		TSX Micro	Premium	Standard	Modicon M340 BMX ART 0414 / 0814 BMX AMI 0410
<b>Type of signal</b>		Counter inputs and analogue I/O	Counter inputs Axis control Position control	Analogue inputs Current Voltage Pt 100	Analogue outputs Current Voltage
<b>Functions</b>		Passive connection, point-to-point with shield continuity			Direct connection Cold-junction compensation or distributed 4 protected isolated power supplies
<b>Modularity</b>		1 counter channel or 8 analogue inputs + 2 analogue outputs	8 channels	4 channels	4 channels
<b>Control voltage</b>		= 24 V			–
<b>Output voltage</b>		= 24 V			–
<b>Output current per channel</b>		25 mA			–
<b>No. of terminals per channel</b>		2	2 or 4	2 or 4	2 or 4
<b>Connector type</b>		15-way SUB-D + 9-way SUB-D		25-way SUB-D	25-way SUB-D
<b>Terminal block</b>	Removable	No		No	
	Terminal type	Screw		Screw	
<b>Device type</b>		<b>ABE 7CPA01</b>	<b>ABE 7CPA02</b>	<b>ABE 7CPA21</b>	<b>ABE 7CPA412/410</b>
<b>Pages</b>		5/16			

5

## Analogue signals and special functions

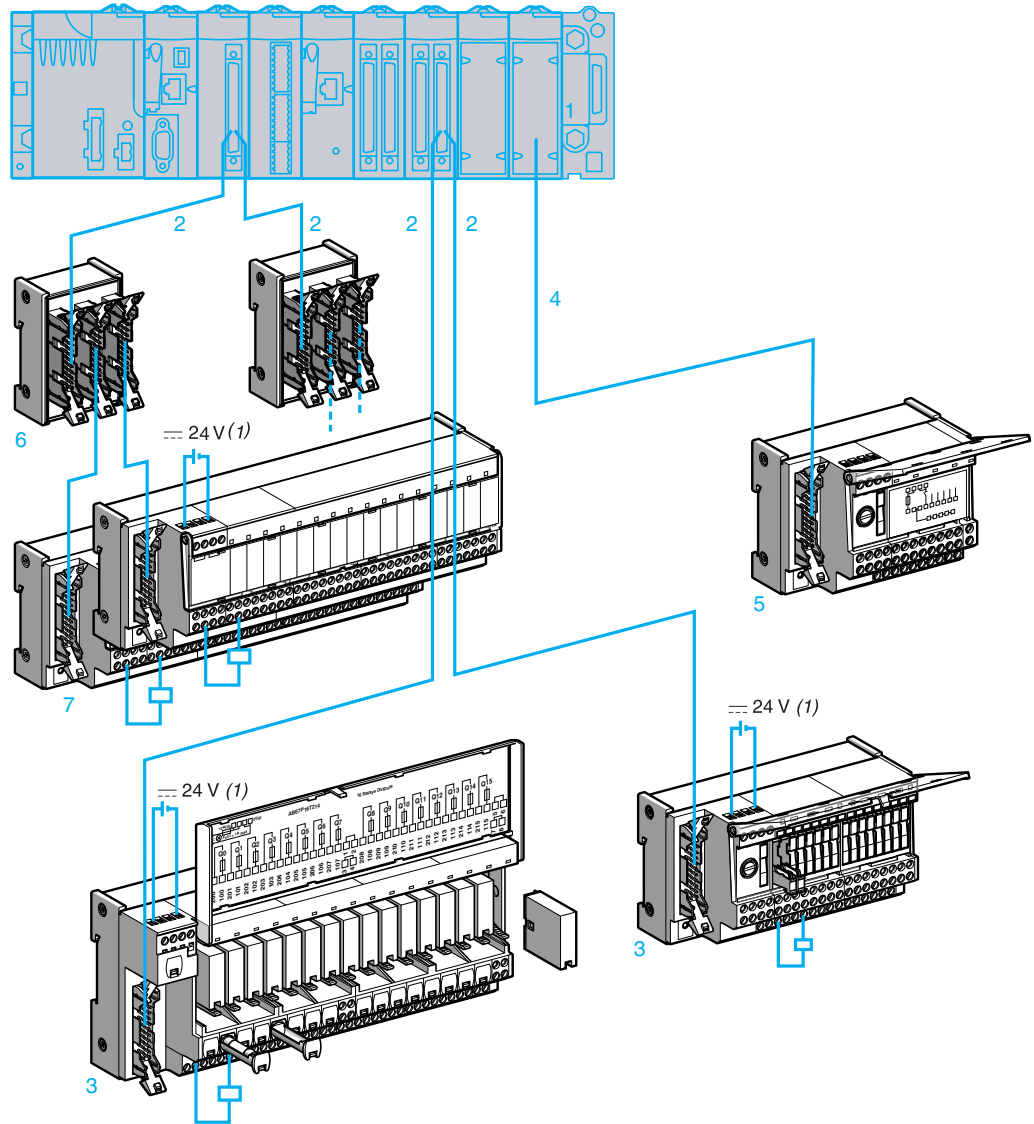


Standard	Premium TSX AEY810	Premium TSX CAY●1 TSX CTY2C	Premium TSX AEY1614	Premium TSX PAY2●2
Analogue inputs Current Voltage Pt 100	Isolated analogue inputs	Inputs Counter	Inputs for thermocouples	Inputs/outputs
Distribution of sensor power supplies per limiter (25 mA)	Distribution of isolated sensor power supplies per converter	Acquisition of value from an absolute encoder	Connection of 16 thermocouples with cold junction compensation	Safety module (BG)
8 channels	8 channels	1 channel	16 channels	12 Emergency stops
— 24 V				
— 24 V				
25 mA				—
2 or 4		—	2 or 4	1
25-way SUB-D	25-way SUB-D	15-way SUB-D	25-way SUB-D	50-way SUB-D
No	No	No	No	No
Screw	Screw or spring	Screw	Screw	Screw
<b>ABE 7CPA03</b>	<b>ABE 7CPA31●</b>	<b>ABE 7CPA11</b>	<b>ABE 7CPA12</b>	<b>ABE 7CPA13</b>
5/16				



# Connection interfaces

Advantys Telefast ABE 7 pre-wired system  
Interface with Modicon M340 I/O modules



5

- 1 Discrete **BMX DDI ●●02K** input modules, **BMX DDO ●●02K** output modules and **BMX DDM 3202K** mixed I/O modules equipped with one or two 40-way FCN connectors. The module modularity (●●) is 32 or 64 channels.
- 2 Cordset equipped with connectors (one 40-way FCN connector with one or two 20-way HE 10s). 2 models are available: cordsets with one or two 20-wire sheaths (AWG 22) equipped with an HE 10 moulded connector, **BMX FCC ●●1/●●3**.  
These cordsets are available in 0.5, 1, 2, 3, 5 or 10 m lengths.
- 3 16-channel Optimum or Universal Advantys Telefast ABE 7 passive connection sub-bases or adaptor sub-bases.
- 4 Cordset equipped with connectors (including one 25-way SUB-D type on the sub-base end). 2 models are available, depending on the type of connections on the analog module side:
  - 20-way screw terminal block, **BMX FCA●●0** cordset for **ABE 7CPA410** sub-bases
  - 40-way FCN connector, **BMX FCA●●2** cordset for **ABE 7CPA412** analog input module
 These cordsets are available in 1.5, 3 or 5 m lengths.
- 5 Sub-bases for analog input modules:
  - **ABE 7CPA410** for connection on a screw terminal block of 4 current/voltage inputs of the **BMX AMI 0410** analog module, with supply of 4 isolated protected power supplies for the current loop inputs.
  - **ABE 7CPA412** for connection on a screw terminal block of 4 thermocouple inputs for the **BMX ART 0414/0814** analog module, with supply of cold-junction compensation for these inputs.
- 6 **ABE 7ACC02** sub-base for splitting 16 into 2 x 8 channels, allows connection to an 8-channel sub-base.
- 7 8-channel Optimum or Universal Advantys Telefast ABE 7 passive connection sub-bases or adaptor sub-bases.

(1) Connection of the 24 V  $\overline{\overline{}}$  power supply is only possible using Advantys Telefast ABE 7 sub-bases. Equipotentiality of the 0 V  $\overline{\overline{}}$  supplies is compulsory.

### I/O modules on the Modicon M340 platform

		Discrete 24 V ---					Analog			
		Inputs		Outputs		Inputs/ Outputs	Inputs			Outputs
		2 x 16 I	4 x 16 I	2 x 16 Q	4 x 16 Q		1 x 16 I 1 x 16 Q	4 I	4 I	
With Modicon M340 modules	BMX	DDI 3202K	DDI 6402K	DDO 3202K	DDO 6402K	DDM 3202K	AMI 0410	ART 0414	ART 0814	AMO 0210
Preformed cordsets (at both ends)	BMX	FCC●●1/FCC●●3				FCC●●3	FCA●●0	FCA●●2	FCA●●0	
<b>Passive connection sub-bases</b>										
Optimum	ABE 7H20E●●0	"low-cost"								
16 channels	ABE 7H16C●●	"miniature"								
Universal	ABE 7H08R●●	(1)	(1)	(1)	(1)	(1)				
8 channels	ABE 7H08S21	(1)	(1)	(1)	(1)	(1)				
Universal	ABE 7H16R1●●									
16 channels	ABE 7H16R50●●									
	ABE 7H16R2●●									
	ABE 7H16S21●●									
	ABE 7H16R3●●									
	ABE 7H16R23									
	ABE 7H16S43									
	ABE 7H16F43									
<b>Input adaptor sub-bases with solid state relays</b>										
Universal	ABE 7S16E2●●●									
16 channels	Welded solid state relays, removable terminal blocks									
	ABE 7P16F31●●									
	Removable solid state relays									
<b>Output adaptor sub-bases with welded relays, removable terminal blocks</b>										
Optimum &	ABE 7S08S2B●●●			(1)	(1)	(1)				
Universal	Solid state relays									
8 channels	ABE 7R08S111●●/7R08S21●●●			(1)	(1)	(1)				
	Electromechanical relays									
Optimum &	ABE 7S16S●●B●●●									
Universal	Solid state relays									
16 channels	ABE 7R16S111●●/7R16S21●●●									
	Electromechanical relays									
<b>Output adaptor sub-bases with removable relays</b>										
Universal	ABE 7P08T330●●			(1)	(1)	(1)				
8 channels	Solid state relays									
Optimum &	ABE 7R16T●●●/7R16M111									
Universal	Electromechanical relays									
16 channels	ABE 7P16T●●●/7P16M111									
	Solid state and/or electromechanical relays									
<b>Sub-bases for analog I/O</b>										
4 channels	ABE 7CPA410									
	ABE 7CPA412									
	ABE 7CPA21									

Preformed cordsets

(1) Via the ABE 7ACC02 splitter sub-base used to separate 16 channels into 2 x 8 channels

# Connection interfaces

Advantys Telefast ABE 7 pre-wired system  
Passive connection sub-bases

816480



ABE 7H20E

## Passive connection sub-base for discrete inputs/outputs

### Optimum "Low cost" sub-bases

Function	No. of channels	No. of terminals per channel	No. of terminals on row	For PLCs	Length of PLC connection cable	Type of connection	Reference	Weight
					m			kg
Input or output	16	1	2	Modicon M340	1	Screw	ABE 7H20E100	0.330
				Modicon TSX Micro	2	Screw	ABE 7H20E200	0.410
				Modicon Premium	3	Screw	ABE 7H20E300	0.480

### Optimum "Miniature" sub-bases

Function	No. of channels	No. of terminals per channel	No. of terminals on row	LED per channel	Polarity distribution	Type of connection	Reference	Weight			
								kg			
Input or output	16	1	1	No	No	Screw	ABE 7H16C10	0.160			
				Yes	No	Screw	ABE 7H16C11	0.160			
			2	2	Yes	0 or 24 V	Screw	ABE 7H16C21	0.205		
					Yes	0 or 24 V	Screw	ABE 7H16C31	0.260		
			Input and output (1)	16	1	1	Yes	No	Screw	ABE 7H16CM11	0.160
							Yes	0 or 24 V	Screw	ABE 7H16CM21	0.200



ABE 7H16C21



ABE 7H16CM21

(1) 8 I + 8 O: these products have 2 commons connections which enable inputs and outputs to be connected to the same sub-base at the same time.

81E464  
ABE 7H16R5081E465  
ABE 7H16R31

## Passive connection sub-base for discrete signals (continued)

## Universal sub-bases

Function	No. of channels	No. of terminals per channel	No. of terminals on row per channel number	LED per channel	Polarity distribution	Isolator (I) Fuse (F) per channel	Type of connection	Reference	Weight kg	
Input or output	8	1	1	No	No	–	Screw	ABE 7H08R10	0.187	
				Yes	No	–	Screw	ABE 7H08R11	0.187	
		2	2	Yes	0 or 24 V	–	Screw	ABE 7H08R21	0.218	
				I	–	Screw	ABE 7H08S21	0.245		
		12	1	1	No	No	–	Screw	ABE 7H12R10	0.274
					Yes	No	–	Screw	ABE 7H12R11	0.274
	2		2	No	No	–	Screw	ABE 7H12R50	0.196	
				I	–	Screw	ABE 7H12S21	0.375		
	2		2	No	0 or 24 V	–	Screw	ABE 7H12R20	0.300	
				Yes	0 or 24 V	–	Screw	ABE 7H12R21	0.300	
	16	1	1	No	No	–	Screw	ABE 7H16R10	0.274	
				Yes	No	–	Screw	ABE 7H16R11	0.274	
2			2	No	No	–	Screw	ABE 7H16R50	0.196	
				I	–	Screw	ABE 7H16S21	0.375		
2			2	No	0 or 24 V	–	Screw	ABE 7H16R20	0.300	
				Yes	0 or 24 V	–	Screw	ABE 7H16R21	0.300	
2		2	2	No	0 or 24 V	–	Screw	ABE 7H16R23	0.320	
				Yes	0 or 24 V	–	Screw	ABE 7H16R21E	0.300	
		2	2	No	0 or 24 V	–	Screw	ABE 7H16R20	0.300	
				I	–	Screw	ABE 7H16S21	0.375		
		2	2	No	0 or 24 V	–	Screw	ABE 7H16R20	0.300	
				I	–	Screw	ABE 7H16S21E	0.375		
3	3	3	No	0 or 24 V	–	Screw	ABE 7H16R30	0.346		
			Yes	0 or 24 V	–	Screw	ABE 7H16R31	0.346		
Type 2 input (1)	16	2	2	Yes	0 or 24 V	–	Screw	ABE 7H16R23	0.320	
Input	16	2	1	Yes	24 V	I, F (2)	Screw	ABE 7H16S43	0.640	
Output	16	2	1	Yes	0 V	I, F (2)	Screw	ABE 7H16F43	0.640	

(1) For Modicon Premium.

(2) With LED to indicate blown fuse.

# Connection interfaces

Advantys Telefast ABE 7 pre-wired system  
Discrete input/output adaptation sub-bases  
with soldered relays and removable terminal blocks

## Adaptation sub-bases with soldered relays, removable terminal blocks

### Input Universal sub-bases with solid state relays

No. of channels	No. of terminals per channel	Isolation PLC/Operative part	Voltage	Type of connection	Reference	Weight kg
16	2	Yes	--- 24 V	Screw	ABE 7S16E2B1	0.370
				Spring	ABE 7S16E2B1E	0.370
			--- 48 V	Screw	ABE 7S16E2E1	0.370
				Spring	ABE 7S16E2E1E	0.370
			~ 48 V	Screw	ABE 7S16E2E0	0.386
				Spring	ABE 7S16E2E0E	0.386
			~ 110 V	Screw	ABE 7S16E2F0	0.397
				Spring	ABE 7S16E2F0E	0.397
			~ 230 V	Screw	ABE 7S16E2M0	0.407
				Spring	ABE 7S16E2M0E	0.407

### Output Universal sub-bases with solid state relays

No. of channels	Isolation PLC/Operative part	Output voltage	Output current	Fault detection signal (1)	Type of connection	Reference	Weight kg
8	No	--- 24 V	0.5 A	Yes (2)	Screw	ABE 7S08S2B0	0.252
					Spring	ABE 7S08S2B0E	0.252
			2 A	Yes (2)	Screw	ABE 7S08S2B1	0.448
					Spring	ABE 7S08S2B1E	0.448
16	No	--- 24 V	0.5 A	Yes (2)	Screw	ABE 7S16S2B0	0.405
					Spring	ABE 7S16S2B0E	0.405
			Non		Screw	ABE 7S16S1B2	0.400
					Spring	ABE 7S16S1B2E	0.400

### Output Optimum & Universal sub-bases with electromechanical relays

No. of channels	Relay width	Number of contacts	Output current	Polarity distribution/operative part	Type of connection	Reference	Weight kg
8	5 mm	1 N/O	2 A	Contact common per group of 4 channels	Screw	ABE 7R08S111	0.252
					Spring	ABE 7R08S111E	0.252
		Latching	2 A	Volt-free	Screw	ABE 7R08S216	0.448
	Spring				ABE 7R08S216E	0.448	
	10 mm	1 N/O	5 A	Volt-free	Screw	ABE 7R08S210	0.448
					Spring	ABE 7R08S210E	0.448
16	5 mm	1 N/O	2 A	Contact common per group of 8 channels	Screw	ABE 7R16S111	0.405
					Spring	ABE 7R16S111E	0.405
		10 mm	1 N/O	5 A	Volt-free	Screw	ABE 7R16S210
	Spring					ABE 7R16S210E	0.405
	Common per group of 8 channels on both poles				Screw	ABE 7R16S212	0.400
					Spring	ABE 7R16S212E	0.400

(1) A fault on a sub-base output Qn will set PLC output Qn to safety mode, which will be detected by the PLC.

(2) Can only be used with modules with protected outputs.



ABE 7R08S216

## Adaptation sub-bases, for plug-in relays

## Input Universal sub-bases for solid state relays (1)

No. of channels	No. of terminals per channel	For relay type	Isolation PLC/Operative part	Input connection	Type of connection	Reference	Weight kg
16	2	ABS 7E ABR 7 ABS 7S33E	Yes	Volt-free	Screw	<b>ABE 7P16F310</b>	0.850
					Spring	<b>ABE 7P16F310E</b>	0.850
					Polarity distribution	Screw	<b>ABE 7P16F312</b>

## Output Optimum &amp; Universal sub-bases with electromechanical relays (2)

No. of channels	Relay width	For relay type	No. and type of contacts	Polarity distribution/operative part	Reference	Weight kg
16	5 mm	ABR 7S11	1 N/O	Contact common per group of 4 channels	<b>ABE 7R16T111</b>	0.600
				Contact common per group of 4 output channels + 2 input common terminals	<b>ABE 7R16M111</b> (3)	0.600
				Volt-free	<b>ABE 7R16T210</b>	0.735
	10 mm	ABR 7S21	1 N/O	Common on both poles (4)	<b>ABE 7R16T210</b>	0.735
					<b>ABE 7R16T212</b>	0.730
					Volt-free	<b>ABE 7R16T230</b>
12 mm	ABR 7S33	1 C/O	Common on both poles (5)	Contact common (4)	<b>ABE 7R16T231</b>	0.730
				<b>ABE 7R16T330</b>	1.300	
				<b>ABE 7R16T332</b>	1.200	
		ABR 7S37	2 C/O	Volt-free	<b>ABE 7R16T370</b>	1.300

816471



ABE 7R16M111

52345



ABE 7R16T210

(1) Not equipped with relays.

(2) Both technologies (electromechanical and solid state) may be combined on the same sub-base.

(3) 2 connection methods are available, enabling inputs and outputs to be connected to the same sub-base at the same time.

(4) Per group of 8 channels.

(5) Per group of 4 channels.

# Connection interfaces

## Advantys Telefast ABE 7 pre-wired system

### Discrete output adaptation sub-bases for plug-in relays

#### Adaptation sub-bases for plug-in relays (1)

#### Output Optimum & Universal sub-bases for solid state and/or with electromechanical relays (2)

No. of Relay channels	Relay width	For relay type	Isolator per channel	Fuse per channel	Polarity distribution/operative part	Type of connection	Reference	Weight kg
16	5 mm	ABR 7S11 ABS 7SC1B	No	No	Contact common per group of 4 channels		ABE 7P16T111	0.550
							ABE 7P16M111 (2)	0.550
16	10 mm	ABR 7S2● ABS 7SA2● ABS 7SC2● ABE 7ACC20	No	No	Volt-free	Screw	ABE 7P16T210 (3)	0.615
							ABE 7P16T230 (3)	0.655
						Spring	ABE 7P16T230E (3)	0.655
							ABE 7P16T214	0.675
16	10 mm	ABR 7S33 ABS 7A3● ABS 7SC3●● ABE 7ACC21	No	No	Volt-free	Screw	ABE 7P16T212	0.615
							ABE 7P16T215	0.670
8	12 mm	ABR 7S33 ABS 7A3● ABS 7SC3●● ABE 7ACC21	No	No	Volt-free	Screw	ABE 7P08T330	0.450
						Spring	ABE 7P08T330E	0.450
16	12 mm	ABR 7S33 ABS 7A3● ABS 7SC3●● ABE 7ACC21	No	No	Volt-free	Screw	ABE 7P16T330	0.900
							ABE 7P16T330E	0.900
						Screw	ABE 7P16T332	0.900
							ABE 7P16T334	0.900
16	12 mm	ABR 7S33 ABS 7A3M ABS 7SC3E ABE 7ACC21	No	Yes	Volt-free	Screw	ABE 7P16T318	1.000
							ABE 7P16T318E	1.000



ABE 7P16T210

(1) Not equipped with relays.

(2) 2 connection methods are available, enabling inputs and outputs to be connected to the same sub-base at the same time.

(3) With relay ABR 7S21 for sub-base ABE 7P16T210, with relay ABR 7S23 for sub-base ABE 7P16T230.

(4) Per group of 8 channels.

(5) Per group of 4 channels.

571152



ABS 7SC1B

## Plug-in solid state relays

Relay width	Functions	Input circuit		Output circuit		Unit reference	Weight	
		Current	Nominal voltage	Current (1)	Nominal voltage			
5 mm	Output	---	24 V	2 A	--- 24 V	<b>ABS 7SC1B</b>	0.010	
10 mm	Output	---	24 V	0.5 A	--- 5...48 V	<b>ABS 7SC2E</b>	0.016	
					~ 24...240 V	<b>ABS 7SA2M</b>	0.016	
12 mm	Input	---	5 V TTL	–	--- 24 V	<b>ABS 7EC3AL</b>	0.014	
			24 V	–	--- 24 V	<b>ABS 7EC3B2</b>	0.014	
			Type 2	–	---			
			48 V	–	--- 24 V	<b>ABS 7EC3E2</b>	0.014	
			Type 2	–	---			
			~ 50 Hz	48 V	–	--- 24 V	<b>ABS 7EA3E5</b>	0.014
			~ 60 Hz	110...130 V	–	--- 24 V	<b>ABS 7EA3F5</b>	0.014
~ 50 Hz	230...240 V	–	--- 24 V	<b>ABS 7EA3M5</b>	0.014			
	Output	---	24 V	2 A	--- 24 V	<b>ABS 7SC3BA</b>	0.016	
				Self-protected	---			
				1.5 A	--- 5...48 V	<b>ABS 7SC3E</b>	0.016	
					~ 24...240 V	<b>ABS 7SA3MA</b>	0.016	

## Plug-in electromechanical relays

Relay width	Control voltage	Output current (1)	Number of contacts	Sold in lots of	Unit reference	Weight
5 mm	--- 24 V	5 A (lth)	1 N/O	4	<b>ABR 7S11</b>	0.005
10 mm	--- 24 V	5 A (lth)	1 N/O	4	<b>ABR 7S21</b>	0.008
			1 C/O	4	<b>ABR 7S23</b>	0.008
12 mm	--- 24 V	10 A (lth)	1 C/O	4	<b>ABR 7S33</b>	0.017
		8 A (lth)	2 C/O	4	<b>ABR 7S37</b>	0.017
		--- 48 V	8 A (lth)	1 C/O	4	<b>ABR 7S33E</b>

## Accessory

Description	Reference	Weight
Extractor for 5 mm miniature relays	<b>ABE 7ACC12</b>	0.010

(1) See characteristics table for specifications of relays in the sub-bases.

816476



ABR 7S2

816474



ABR 7S3



# Connection interfaces

## Advantys Telefast ABE 7 pre-wired system

### Connection sub-bases

#### for counter and analogue channels



816478  
ABE 7CPA01



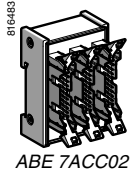
816479  
ABE 7CPA412/410/21



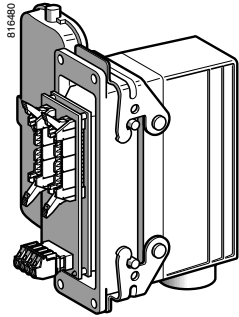
816477  
ABE 7CPA02

### Connection sub-bases for counter and analogue channels

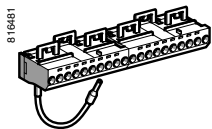
Functions	For Modicon PLCs	Compatible modules	Type of connection Telefast 2 side	Type of connection	Reference	Weight kg
Counting and analogue	TSX Micro	Integrated analogue and counter TSX 37 22 TSX CTZ●A	15-way SUB-D	Screw	<b>ABE 7CPA01</b>	0.300
Counting, Axis control, Position control	Premium	TSX CTY●A TSX CAY●1	15-way SUB-D	Screw	<b>ABE 7CPA01</b> (	0.300
Parallel output absolute encoder connection	Premium	TSX CTY●A TSX CAY●1	15-way SUB-D	Screw	<b>ABE 7CPA11</b>	0.330
Distribution of 4 thermocouples	Modicon M340	BMX ART 0414 BMX ART 0814	25-way SUB-D	Screw	<b>ABE 7CPA412</b>	0.180
Distribution of 16 thermocouples	Premium	TSX AEY1614	25-way SUB-D	Screw	<b>ABE 7CPA12</b>	0.300
Passive distribution of 8 channels on screw terminal block with shielding continuity	Premium	TSX ASY810 TSX AEY1600 TSX A●Y800	25-way SUB-D	Screw	<b>ABE 7CPA02</b>	0.290
Distribution and supply of 4 analogue channels protected isolated	Modicon M340	BMX AMI 0410	25-way SUB-D	Screw	<b>ABE 7CPA410</b>	0.180
Distribution of 4 analogue output channels	Premium	TSX ASY410 TSX AEY420	25-way SUB-D	Screw	<b>ABE 7CPA21</b>	0.180
Distribution and supply of 8 analogue channels with limitation of each current loop	Premium	TSX AEY800 TSX AEY1600	25-way SUB-D	Screw	<b>ABE 7CPA03</b>	0.330
Distribution and supply of 8 analogue input channels isolated from each other with 25 mA/ channel limiter	Premium	TSX AEY810	25-way SUB-D	Screw Spring	<b>ABE 7CPA31</b> <b>ABE 7CPA31E</b>	0.410 0.410
Safety	Premium	TSX PAY2●2	25-way SUB-D	Screw	<b>ABE 7CPA13</b>	0.290



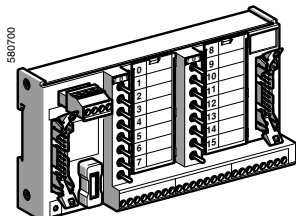
ABE 7ACC02



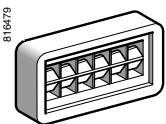
ABE 7ACC80 + ABE 7ACC81



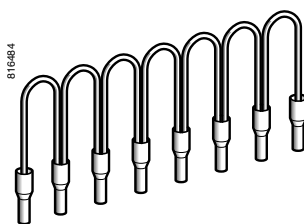
ABE 7BV20



ABE 7TES160



AR1 SB3



ABE C08R\*\*\*

## Software

Description	Operating system	Reference	Weight kg
Software for marking customer labels	Under Windows version 3.1 or 95	ABE 7LOGV10	0.350
Pack of 25 pre-cut label sheets (160 labels)	–	ABE 7LOGF25	0.200

## Accessories

Description	No. of channels	Characteristics	Sold in lots of	Unit reference	Weight kg
Kit for mounting on solid plate	–	–	10	ABE 7ACC01	0.008
Splitter sub-base	–	16 as 2 x 8 channels	1	ABE 7ACC02	0.075
Redundant output sub-base	–	16 as 2 x 16 channels	1	ABE 7ACC10	0.075
Redundant input sub-base	–	16 as 2 x 16 channels	1	ABE 7ACC11	0.075
Plug-in continuity blocks	–	Width 10 mm	4	ABE 7ACC20	0.007
		Width 12 mm	4	ABE 7ACC21	0.010
Locating device for removable terminal block	–	–	100	ABE 7ACC30	0.100
Enclosure feedthrough with industrial connector	32	40-way	1	ABE 7ACC80	0.300
Plug-in 40-way male connector	32	For mounting on ABE 7ACC80	1	ABE 7ACC81	0.370
Enclosure feedthrough with CNOMO M23 connector (1 x 20-way HE 10 connector, PLC end)	16	19-way	1	ABE 7ACC82	0.150
	8 and 12	19-way	1	ABE 7ACC83	0.150
Impedance adapter for Type 2 compatibility	–	Used with ABE 7ACC82 and ABE 7ACC83	1	ABE 7ACC85	0.012
IP 65 cable gland	–	For 3 cables	5	ABE 7ACC84	0.300
Additional snap-on terminal blocks (shunted terminals)	8	10 screw terminals	5	ABE 7BV10	0.030
		10 spring terminals	5	ABE 7BV10E	0.030
		16	20 screw terminals	5	ABE 7BV20
		20 spring terminals	5	ABE 7BV20E	0.060
I/O simulator sub-base	16	Display, forcing inhibition, continuity	1	ABE 7TES160	0.350
Self-adhesive marker tag holder	–	For 6 characters	50	AR1 SB3	0.001
Quick-blow fuses 5 x 20, 250 V, UL	–	0.125 A	10	ABE 7FU012	0.010
		0.5 A	10	ABE 7FU050	0.010
		1 A	10	ABE 7FU100	0.010
		2 A	10	ABE 7FU200	0.010
		4 A	10	ABE 7FU400	0.010
		6.3 A	10	ABE 7FU630	0.010

## Commoning link accessories

Description	For common	Colour	Distance between cable ends cm	Reference	Weight kg
Commoning links Modularity 8 x 1 mm <sup>2</sup>	Coil	White	12	ABF C08R12W	0.020
			2	ABF C08R02W	0.010
~		Red	12	ABF C08R12R	0.020
			2	ABF C08R02R	0.010
---		Blue	12	ABF C08R12B	0.020
			2	ABF C08R02B	0.010

# Connection interfaces

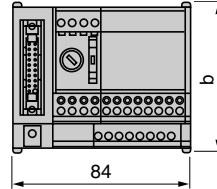
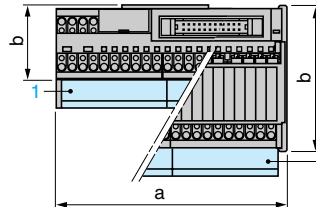
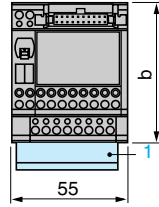
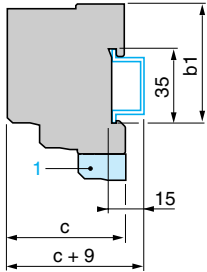
## Advantys Telefast ABE 7 pre-wired system

Common side view

ABE 7H20E●●●  
ABE 7H32E●●●

ABE 7H16C●●/ABE 7H16CM●●,  
ABE 7●16M111/ABE 7●16T111

ABE 7H16R50, ABE 7H12R50,  
ABE 7H08R1●, ABE 7H08R21,  
ABE 7R08S111/S111E,  
ABE 7H08S21, ABE 7CPA21/40/412



ABE	7H20E/7H32E●●●
b	67
b1	56
c	59

ABE	7H16C●●, 7●16M111, 7H16CM●●	7●16T111
a	106	110
b	49	89
b1	41.5	58
c	60	54

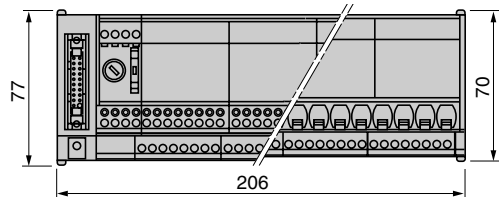
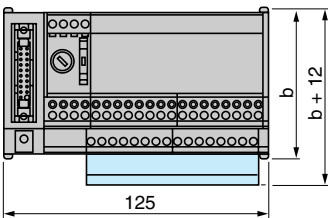
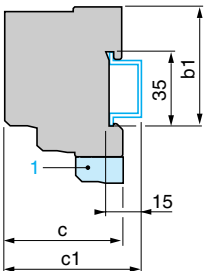
ABE	7H16/12/08●●● 7R08S111● 7CPA21/410/412
b	70
b1	58
c	58

1 Additional shunt terminal block ABE 7BV10/7BV20

Common side view

ABE 7H16R2●, ABE 7H12R2●, ABE 7H16R3●,  
ABE 7H16R1●, ABE 7H12R1●, ABE 7H12S21,  
ABE 7H16S2●, ABE 7R16S11●, ABE 7R08S210,  
ABE 7S08S2B0, ABE 7CPA02, ABE 7CPA03  
ABE 7S16S1B2, ABE 7R08S216

ABE 7R16S21●, ABE 7H16●43  
ABE 7S16S2B0/S2B02E,  
ABE 7S16E2●●/S16E2●●E,  
ABE 7S08S2B1/S08S2B1E  
ABE 7CPA31



ABE	7●●●●●	7●R08S210●, 7S16S1B2●, 7R08S216
b	70	77
b1	58	58
c	58	58

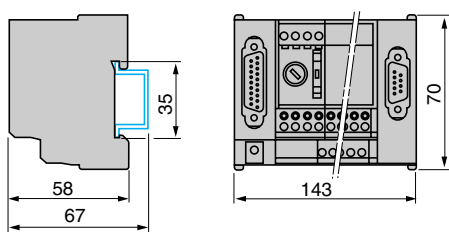
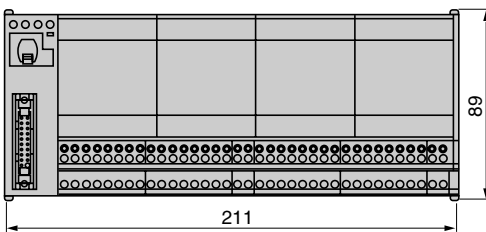
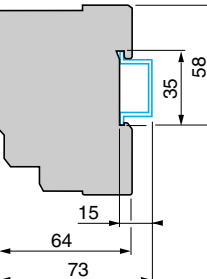
All sub-bases	
b1	
c	58

1 Additional shunt terminal block ABE 7BV10/7BV20

Common side view

ABE 7R16T2●●, ABE 7P16T2●●

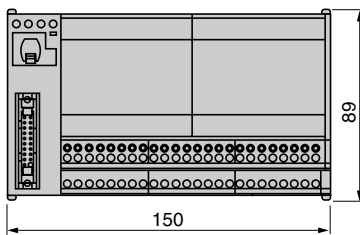
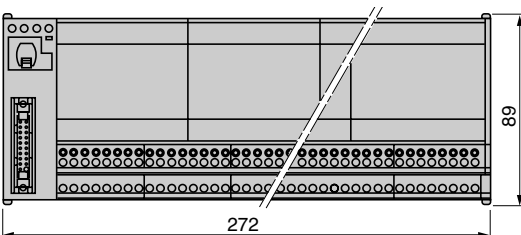
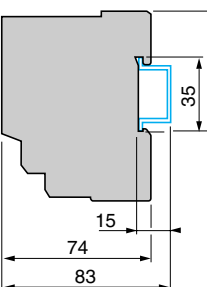
ABE 7CPA01, ABE 7CPA11/CPA12/CPA13



Common side view

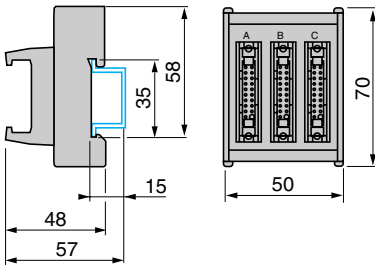
ABE 7R16T3●●, ABE 7P16T3●●, ABE 7P16F31●

ABE 7P08T330

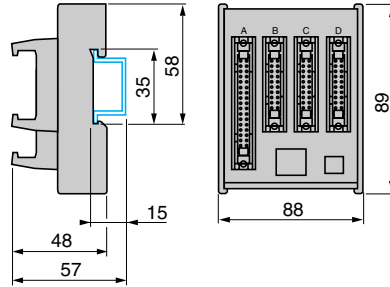


Note : details of the front view are the same as for the ABE 7CPA01.

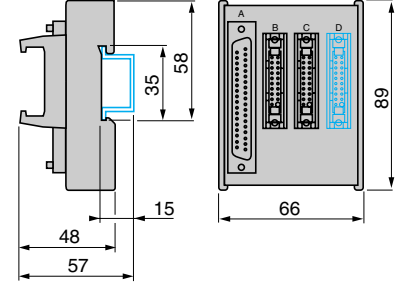
ABE 7ACC02



ABE 7ACC03

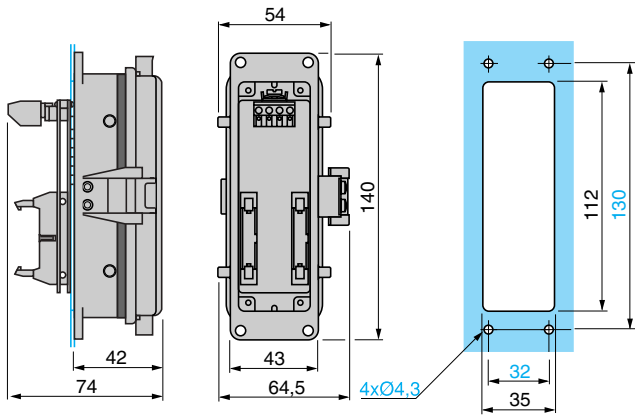


ABE 7ACC04, ABE 7ACC05  
ABE 7ACC10, ABE 7ACC11

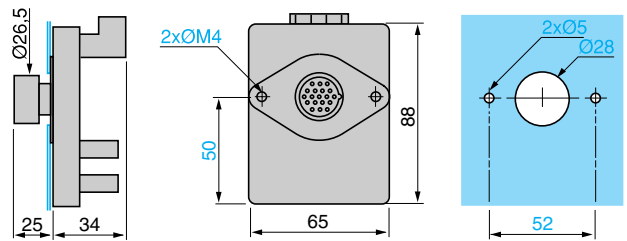


Note : Drawing representing ABE 7ACC04 and ABE 7ACC05

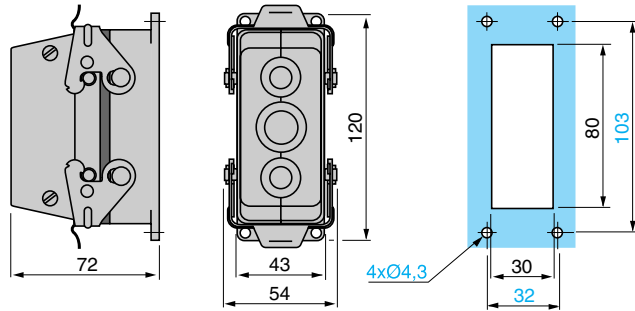
ABE 7ACC80



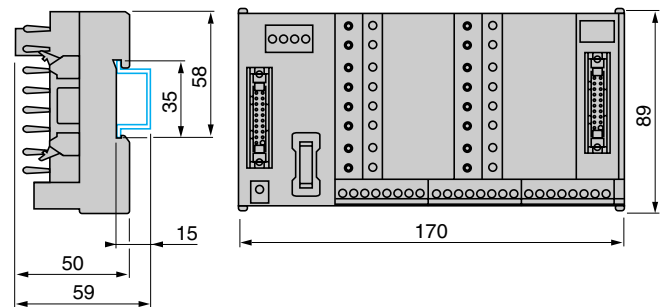
ABE 7ACC82, ABE 7ACC83



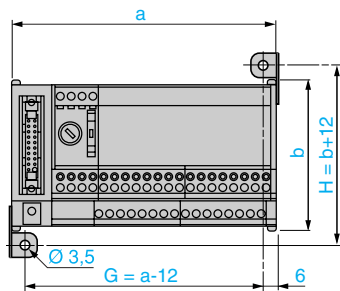
ABE 7ACC84



ABE 7TES160



Fixing centres for sub-bases using mounting kit ABE 7ACC01



ABE 7	G	H
ACC02	38	82
ACC03	53	101
ACC04	53	101
ACC05	53	101
ACC10/11	53	101
H08R●●	72	82
H08S21	72	82
H12R50	72	82
H16R50	72	82
R08S111	72	82
CPA01	131	82
CPA02	113	82
CPA1●	131	82
CPA03	113	82

ABE 7	G	H
H12R1●	113	82
H12R2●	113	82
H16R1●	113	82
H16R2●	113	82
H16R3●	113	82
H12S21	113	82
H16S21	113	82
R08S210	113	82
R16S111	113	82
R16S21●	194	82
S08S2B0	113	82
S08S2B1	194	82

ABE 7	G	H
H16F43	194	82
H16S43	194	82
S16E2●●	194	82
S16S1B2	113	82
S16S2●●	194	82
R16T2●●	199	101
P16T2●●	199	101
R16T3●●	260	101
P08T330	150	101
P16T3●●	260	101
P16F3●●	260	101

**Power supplies**

**Regulated switch mode**

Phaseo Modular range and Optimum range industrial power supplies



**Input voltage**

100...240 V ~  
120...250 V --- (see pages 13 and 14)

**Connection to world-wide line supplies**

- United States
  - 120 V (in phase-to-neutral)
  - 240 V (in phase-to-phase)
- Europe
  - 230 V (in phase-to-neutral)
  - 400 V (in phase-to-phase)
- United States
  - 277 V (in phase-to-neutral)
  - 480 V (in phase-to-phase)

Single-phase (N-L1) or 2-phase (L1-L2) connection

Single-phase (N-L1) connection

–

**IEC 61000-3-2 conformity**

Yes for ABL 7RP, not for ABL 8REM and not applicable for ABL 8MEM and ABL 7RM

**Protection against undervoltage (U > 19 V)**

Yes

**Protection against overloads and short-circuits**

Yes, voltage detection. Automatic restart on elimination on the fault

**Diagnostic relay**

–

**Compatibility with function modules**

–

**Power reserve (Boost)**

1,25 to 1,4 In during 1 minute, depending on model (with ABL 8MEM) | No

**Output voltage**

5 V ---	12 V ---	24 V ---	48 V ---
		<b>ABL 8MEM24003</b> <i>(Modular)</i>	
		<b>ABL 8MEM24006</b> <i>(Modular)</i>	
		<b>ABL 8MEM24012</b> <i>(Modular)</i>	
	<b>ABL 8MEM12020</b> <i>(Modular)</i>		
		<b>ABL 7RM24025</b> <i>(Modular)</i>	<b>ABL 7RP4803</b> <i>(Optimum)</i>
		<b>ABL 8REM24030</b> <i>(Optimum)</i>	
<b>ABL 8MEM05040</b> <i>(Modular)</i>			
	<b>ABL 7RP1205</b> <i>(Optimum)</i>	<b>ABL 8REM24050</b> <i>(Optimum)</i>	

**Output current**

- 0.3 A
- 0.6 A
- 1.2 A
- 2 A
- 2.5 A
- 3 A
- 4 A
- 5 A
- 6 A
- 10 A
- 20 A
- 40 A

**Pages**

Consult our "Phaseo Power supplies and transformers" catalog

(1) Except **ABL 8RPM24200**. ~ 100...120 V and ~ 200...240 V.

(2) --- / --- converter module, requires to be associated with the Phaseo Universal range power supply.

**Regulated switch mode**  
**Phaseo Universal range industrial power supplies**



100...120 V ~ and 200...500 V ~ (1)	380...500 V ~	24 V ---	
Single-phase (N-L1) or 2-phase (L1-L2) connection	–	–	
	3-phase (L1-L2-L3) connection	–	
	3-phase (L1-L2-L3) connection	–	
Yes	–		
Yes	–		
Yes, current limitation or undervoltage detection	Yes, current limitation		
Yes, depending on model			
Yes with buffer module, battery and battery check modules, redundancy module and discriminating downstream protection module			
1,5 In during 4 secondes		No	
24 V ---		5 V ---	7...12 V ---
			ABL 8DCC12020 (2)
ABL 8RPS24030			
ABL 8RPS24050			
		ABL 8DCC05060 (2)	
ABL 8RPS24100			
ABL 8RPM24200	ABL 8WPS24200		
	ABL 8WPS24400		
29		Consult our "Phaseo Power supplies and transformers" catalog	



ABL 8RPS24050 Modicon M340 automation platform

### Switch mode power supplies: Universal range

The **ABL 8RPS/RPM/WPS** power supply offer is designed to provide the DC voltage necessary for the control circuits of automation system equipment. Comprising six products, this range meets the needs encountered in industrial and commercial applications. These compact electronic switch mode power supplies provide a quality of output current that is suitable for the loads supplied and compatible with the **Modicon M340, Premium and Quantum** ranges. When used with additional function modules, they ensure continuity of service in the event of network power outages or application malfunctions. Clear guidelines are given on selecting the function modules and upstream protection devices which are often used with them, and thus a comprehensive solution is provided that can be used in total safety.

The Universal range of Phaseo power supplies must be connected in phase-to-neutral or phase-to-phase for **ABL 8RPS/RPM**, and in 3-phase for **ABL 8WPS**. They deliver a voltage that is precise to 3%, whatever the load and whatever the type of line supply, within the ranges:

- 85 to 132 V  $\sim$  and 170 to 550 V  $\sim$  for **ABL 8RPS**
- 85 to 132 V  $\sim$  and 170 to 264 V  $\sim$  for **ABL 8RPM**
- 340 to 550 V  $\sim$  for **ABL 8WPS**

Their very wide input voltage range allows a considerable reduction of parts held in stock and offers a distinct advantage in terms of machine design.

Conforming to IEC standards and UL and CSA certified, they are suitable for universal use.

**ABL 8RPS/RPM and ABL 8WPS** power supplies are all equipped with a harmonic filter, ensuring compliance with standard 61000-3-2 concerning harmonic pollution.

All the Universal range of Phaseo power supplies have protection devices to ensure optimum performance of the automation system. Their operating mode can be configured as required by the user:

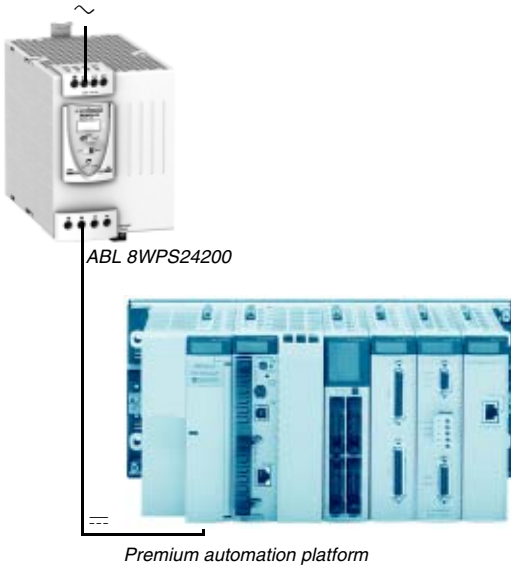
- **Manual reset protection mode:** Priority is given to the voltage so as to guarantee the PLC logic states and nominal operation of the supplied actuators.
- **Automatic reset protection mode:** Priority is given to the current to allow troubleshooting for example, or to ensure continuity of service until the arrival of the maintenance team.

The Universal range of Phaseo power supplies also has a power reserve, allowing them to deliver a current of 1.5 In at regular intervals. This avoids the need to oversize the power supply if the device has a high inrush current, while ensuring optimum performance of the automation system.

The diagnostics for the Universal range of Phaseo power supplies are available on the front of the device via LEDs (Uout and Iout) and via a volt-free relay contact (whether or not the PLC states are guaranteed).

All products are equipped with an output voltage adjustment potentiometer in order to be able to compensate for any line voltage drops in installations with long connection cable runs.

These power supplies are designed for direct mounting on a 35 mm  $\text{U}$  rail.



#### Switch mode power supplies: Universal range (continued)

There are four references available in the Universal range of Phaseo power supplies for phase-to-neutral or phase-to-phase connection:

■ <b>ABL 8RPS24030</b>	72 W	3 A	24 V $\overline{\text{---}}$
■ <b>ABL 8RPS24050</b>	120 W	5 A	24 V $\overline{\text{---}}$
■ <b>ABL 8RPS24100</b>	240 W	10 A	24 V $\overline{\text{---}}$
■ <b>ABL 8RPM24200</b>	480 W	20 A	24 V $\overline{\text{---}}$

The Universal range of Phaseo power supplies also features two references for 3-phase connection:

■ <b>ABL 8WPS24200</b>	480 W	20 A	24 V $\overline{\text{---}}$
■ <b>ABL 8WPS24400</b>	960 W	20 A	24 V $\overline{\text{---}}$

A range of function modules also allows functions to be added to the Universal range of Phaseo power supplies so as to ensure continuity of service:

- A Buffer module or Battery check modules combined with their batteries to ensure continuity of service in the event of a network power outage
- A Redundancy module to meet the most demanding requirements for continuity of service even if the power supply fails
- Downstream electronic Protection modules to ensure that the protection in the application is discriminating
- Converter modules delivering nominal voltages of 5 and 12 V  $\overline{\text{---}}$  from the 24 V  $\overline{\text{---}}$  output of the Universal range of Phaseo power supplies

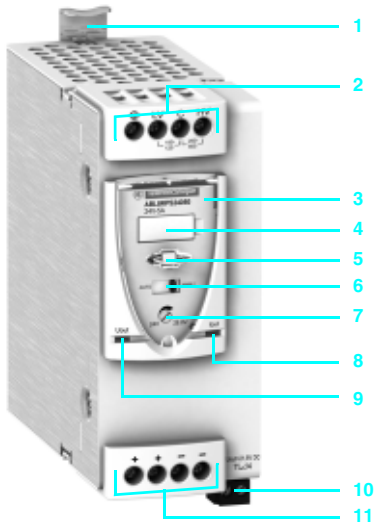
#### Description

##### Universal range of power supplies

The Universal range of Phaseo regulated switch mode power supplies,


**ABL 8RPS24●●0/RPM24200/WPS24●00**, comprise:

- 1 Spring clip for 35 mm  $\overline{\text{---}}$  rail
- 2 4 mm<sup>2</sup> enclosed screw terminals for connection of the AC voltage (single-phase, phase-to-phase or 3-phase connection)
- 3 Protective glass flap
- 4 Clip-on marker label
- 5 Locking catch for the glass flap (sealable)
- 6 Protection mode selector
- 7 Output voltage adjustment potentiometer
- 8 Output voltage status LED (green and red)
- 9 Output current status LED (green, red and orange)
- 10 Screw terminals for connection of the diagnostic relay contact, except **ABL 8RPS24030**
- 11 4 mm<sup>2</sup> (10 mm<sup>2</sup> on **ABL 8WPS24●00** and **ABL 8RPM24200**) enclosed screw terminals for connection of the DC output voltage






#### Technical characteristics

Type of power supply		ABL 8RPS24030	ABL 8RPS24050	ABL 8RPS24100	ABL 7RPM24200	
<b>Certifications</b>		CB scheme EN 60950-1, UL (pending), cCSAus				
<b>Conformity to standards</b>	Safety	IEC/EN 60950-1, EN 61204, SELV				
	EMC	EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4, EN 61204-3				
<b>Input circuit</b>						
<b>Input values</b> phase-to-neutral (N-L1) or phase-to-phase (L1-L2)	Nominal voltage	V	100...120 V ~ / 200...500 V ~		100...120 V ~ / 200...240 V ~	
	Limit voltage	V	85...132 V ~ / 170...550 V ~		85...132 V ~ / 170...264 V ~	
	Permissible frequencies	Hz	47...63			
	Maximum inrush current	A	30 for 2 ms max.			
	Power factor		0.59 at 120 V ~ / 0.51 at 240 V ~		0.69 at 120 V ~ / 0.68 at 240 V ~	
	Efficiency at nominal load		> 87 %			
	Dissipated power at nominal load	W	7.8	15.5	31	57.6
	<b>Anti-harmonic filtering</b>		Yes, via integrated PFC ( <i>Power Factor Correction</i> ) passive filter			
<b>Output circuit</b>						
<b>Compatibility with function modules</b>		Buffer, battery and battery check unit, redundancy, discriminating protection				
<b>Diagnostics</b>	LEDs on front panel	Current (green, orange and red), voltage (green, red and off)				
	Relay	-		Relay closed $U_{Out} > 21.6 V$ contact 230 V ~, 0.5 A max; 24 V ---, 5 mA min		
<b>Nominal output values</b>	Nominal output voltage ( $U_{Out}$ )	V	24 ---			
	Current	A	3	5	10	20
	Power	W	72	120	240	480
<b>Permissible temporary inrush current (boost)</b>		A	1.5 $I_n$ for 4 s maximum, see curves on page 5/27			
<b>Precision</b>	Nominal output voltage ( $U_{Out}$ )	V	Adjustable 24...28.8			
	Line and load regulation		1 %...3 %			
	Residual ripple - noise	mV	< 200 (peak-peak)			
<b>Holding time for I max.</b>	$U_{In} = 100 V \sim$	ms	$\geq 20$			
	$U_{In} = 240 V \sim$	ms	$\geq 40$			
	$U_{In} = 400 V \sim$	ms	$\geq 120$			
<b>Protection</b>	Against short-circuits		Permanent, automatic or manual restart			
	Against overloads		< 1.10 $I_n$ (after "boost" function)			
	Against overvoltages	V	30...32 ---			
	Against undervoltages	V	Tripping if $U_{Out} < 21.6$ (in manual mode)			
	Thermal		Yes			
<b>Operating and environmental characteristics</b>						
<b>Connections</b>	Input	mm <sup>2</sup>	2 x 0.5...4 screw terminals (22...12 AWG) + ground			
	Output	mm <sup>2</sup>	4 x 0.5...4 screw terminals (24...10 AWG) + ground (1)			
	Diagnostic relay	mm <sup>2</sup>	-	2 x 2.5 removable screw terminal block		
<b>Mounting</b>	On  rail		35 x 7.5 mm and 35 x 15 mm			
<b>Operating position</b>			Vertical			
<b>Connections</b>	Series		Possible, see page 5/28			
	Parallel		Possible, see page 5/28			
<b>Degree of protection</b>			IP 20 conforming to IEC 60529			
<b>Environment</b>	Operating temperature	°C	- 25...+ 60 (derating from 50°C, see page 5/26)			
	Storage temperature	°C	- 40...+ 70			
	Maximum relative humidity		90% during operation, 95% in storage			
	Vibration acc. to EN 61131-2		3...11.9 Hz amplitude 3.5 mm & 11.9 -150 Hz acceleration 2 g			
<b>Protection class</b>			According to VDE 0106 1			
<b>Dielectric strength</b> 50 Hz for 1 min	Input/output	V rms	4000 ~		3000 ~	
	Input/ground	V rms	3500 ~		2500 ~	
	Output/ground	V rms	500 ~			
<b>Input fuse incorporated</b>			No			
<b>Emissions</b> according to EN 61000-6-3	Radiation		EN 55022 Class B and GL levels			
	Conducted on the power line		EN 55022 Class B and GL levels			
	Harmonic currents		IEC/EN 61000-3-2			
<b>Immunity</b> according to EN 61000-6-2 and GL	Electrostatic discharge		IEC/EN 61000-4-2 (6 kV contact/8 kV air)			
	Radiated electromagnetic fields		IEC/EN 61000-4-3 level 3 (10 V/m)			
	Induced electromagnetic fields		IEC/EN 61000-4-6 level 3 (10 V/m)			
	Rapid transients		IEC/EN 61000-4-4 (4 kV)			
	Surges		IEC/EN 61000-4-5 (2 kV)			
	Primary outages		IEC/EN 61000-4-11 (voltage dips and interruptions)			

(1) No ground screw on ABL 8RPM 24200 power supply

### Technical characteristics

Type of power supply		ABL 8WPS24200	ABL 8WPS24400	
<b>Certifications</b>		CB scheme EN 60950-1, UL (pending), cCSAus		
<b>Conformity to standards</b>	Safety	EN 60950-1, EN 61204, SELV		
	EMC	EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4, EN 61204-3		
<b>Input circuit</b>				
<b>LED indication</b>		-		
<b>Input values</b> 3 phase (L1-L2-L3)	Nominal values	<b>V</b>	380-500 V ~	
	Permissible values	<b>V</b>	320-550 V ~	
	Permissible frequencies	<b>Hz</b>	47...63	
	Maximum inrush current	<b>A</b>	25 for 2 ms max.	
	Power factor		0.65	0.85
	Efficiency at nominal load		> 92%	
	Dissipated power at nominal load	<b>W</b>	38.4	76.8
<b>Anti-harmonic filtering</b>		Yes, via integrated PFC ( <i>Power Factor Correction</i> ) passive filter		
<b>Operating mode in the event of phase failure</b>		<b>V</b>	Operation possible for a few minutes then protection trips	
<b>Output circuit</b>				
<b>Compatibility with function modules</b>		Buffer, battery and battery check unit, redundancy, discriminating protection		
<b>Diagnostics</b>	LEDs on front panel	Current (green, orange and red), voltage (green, red and off)		
	Relay	Closed relay $U_{out} > 21.6$ V, contact 230 V ~, 0.5 A max; 24 V ---, 5 mA min		
<b>Nominal output values</b>	Output voltage ( $U_{out}$ )	<b>V</b>	24 ---	
	Current	<b>A</b>	0...20	0...40
	Power	<b>W</b>	480	960
<b>Permissible temporary inrush current (boost)</b>		<b>A</b>	1.5 $I_n$ for 4 s maximum, see curves on page 5/27	
<b>Precision</b>	Output voltage ( $U_{out}$ )	<b>V</b>	Adjustable 24...28.8	
	Line and load regulation		1 %...3 %	
	Residual ripple - noise	<b>mV</b>	< 200 (peak-peak)	
<b>Holding time</b> for $I_{max}$	$U_{in} = 400$ V ~	<b>ms</b>	$\geq 18$	$\geq 14$
<b>Protection</b>	Against short-circuits		Permanent, automatic or manual restart	
	Against overloads		< 1.10 $I_n$ (after "boost" function)	
	Against overvoltages	<b>V</b>	30...32 ---	
	Against undervoltages	<b>V</b>	Tripping if $U_{out} < 21.6$ (in manual mode)	
	Thermal		Yes	
<b>Operating and environmental characteristics</b>				
<b>Connections</b>	Input	<b>mm<sup>2</sup></b>	3 x 0.5...4 screw terminals (22...12 AWG) + ground	
	Output	<b>mm<sup>2</sup></b>	4 x 0.5...10 screw terminals (22...8 AWG)	
	Diagnostic relay	<b>mm<sup>2</sup></b>	2 x 2.5 removable screw terminal block	
<b>Mounting</b>	On  rail		35 x 7.5 mm and 35 x 15 mm	
<b>Operating position</b>			Vertical	
<b>Connections</b>	Series		Possible, see page 5/28	
	Parallel		Possible, see page 5/28	
<b>Degree of protection</b>			IP 20 conforming to IEC 60529	
<b>Environment</b>	Operating temperature	<b>°C</b>	- 25...+ 60 (derating from 50°C, see page 5/26)	
	Storage temperature	<b>°C</b>	- 40...+ 70	
	Maximum relative humidity		90% during operation, 95% in storage	
	Vibration acc. to EN 61131-2		3...11.9 Hz amplitude 3.5 mm & 11.9 -150 Hz acceleration 2 g	
<b>Protection class according to VDE 0106 1</b>			Class I	
<b>Dielectric strength</b> 50 Hz for 1 min	Input/output	<b>V rms</b>	4000 ~	
	Input/ground	<b>V rms</b>	3500 ~	
	Output/ground	<b>V rms</b>	500 ~	
<b>Input fuse incorporated</b>			No	
<b>Emissions</b> according to EN 61000-6-3	Radiation		EN 55022 Class B and GL levels	
	Conducted on the power line		EN 55022 Class B and GL levels	
	Harmonic currents		IEC/EN 61000-3-2	
<b>Immunity</b> according to EN 61000-6-2 and GL	Electrostatic discharge		IEC/EN 61000-4-2 (6 kV contact/8 kV air)	
	Radiated electromagnetic fields		IEC/EN 61000-4-3 level 3 (10 V/m)	
	Induced electromagnetic fields		IEC/EN 61000-4-6 level 3 (10 V/m)	
	Rapid transients		IEC/EN 61000-4-4 (4 kV)	
	Surges		IEC/EN 61000-4-5 (1 kV)	
	Primary outages		IEC/EN 61000-4-11 (voltage dips and interruptions)	

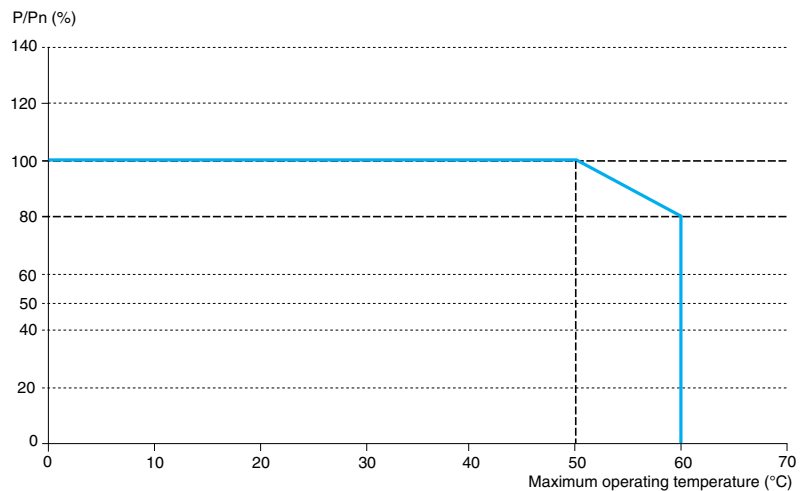
### Output characteristics

#### Derating

The ambient temperature is a determining factor that limits the power an electronic power supply can deliver continuously. If the temperature around the electronic components is too high, their life will be significantly reduced.

The nominal ambient temperature for the Universal range of Phaseo power supplies is 50°C. Above this temperature, derating is necessary up to a maximum temperature of 60°C.

The graph below shows the power (in relation to the nominal power) that the power supply can deliver continuously, depending on the ambient temperature.



ABL 8RPM, ABL 8RPS, ABL 8WPS mounted vertically

Derating should be considered in extreme operating conditions:

- Intensive operation (output current permanently close to the nominal current, combined with a high ambient temperature)
- Output voltage set above 24V (to compensate for line voltage drops, for example)
- Parallel connection to increase the total power

#### General rules to be complied with

<b>Intensive operation</b>	See derating on above graph. Example for ABL 8RPS: - Without derating, from 0°C to 50°C - Derating of nominal current by 2%, per additional °C, up to 60°C
<b>Rise in output voltage</b>	The nominal power is fixed. Increasing the output voltage means that the current delivered must be reduced.
<b>Mounting</b>	To allow heat dissipation, the power supplies must not be in contact with each other.

In all cases, there must be adequate convection around the products to assist cooling. There must be sufficient clearance around the Universal range of Phaseo power supplies:

- 50 mm above and below
- 10 mm on the sides

Output characteristics (continued)

Behavior in the event of overloads

Behavior in the event of overloads:

■ **Automatic reset protection mode (current limiting):** If the output current exceeds approximately 1.2  $I_n$ , the output current is limited to this value. The value of the output voltage can then be less than 21 V but the diagnostic relay opens, allowing the anomaly to be fed back to the automation system and thus prevent feedback of any undefined logic state. On elimination of the overload, the output voltage reverts to its preset value.

■ **Manual reset protection mode (undervoltage detection):** If the output current exceeds approximately 1.2  $I_n$ , the power supply stops completely before the output voltage drops below 21 V and no longer delivers any current. The fault is memorized as long as voltage is present at the power supply primary. The power supply will become operational again, if the fault has disappeared, after de-energizing the primary for a few seconds.

*Nota : In both these modes, any overload of less than 1.5  $I_n$  and lasting less than 4 s will be absorbed by the "boost" circuit and the voltage delivered will stay within the specified limits (adjustment voltage +/- 3%).*

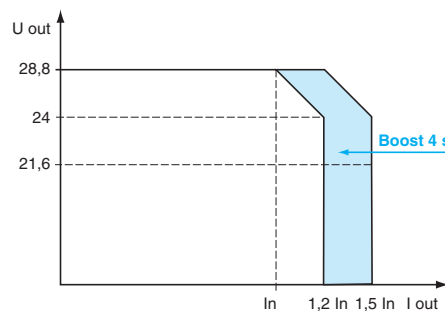
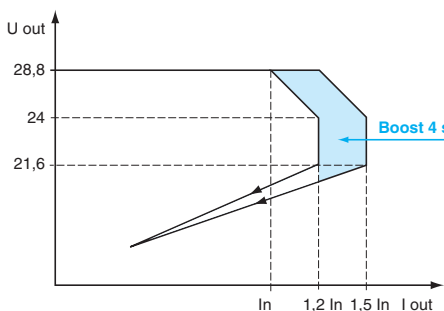
Load limit

Manual reset protection mode

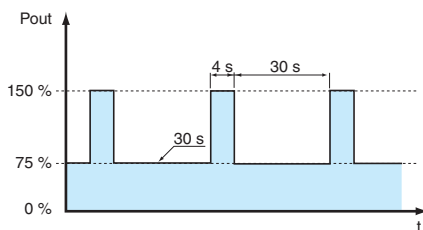
ABL 8RPM24200/ABL 8RPS24●●●/ABL 8WPS24●●●

Automatic reset protection mode

ABL 8RPM24200/ABL 8RPS24●●●/ABL 8WPS24●●●



"Boost" repeat accuracy



The **ABL 8RPS/RPM/WPS** Universal range of Phaseo power supplies has a power reserve, allowing them to supply the application with energy up to 1.5 times the nominal current at the intervals illustrated by the graph opposite.

The "boost" amplitude and repeat accuracy depend on:

- The overload duration
- The overload intensity
- The period between each consumption peak

When the power supply can no longer cope (repeated overloads, overload duration > 4 seconds, power rating > 150% of nominal power) the integrated protection trips.

This type of operation is described in detail in the user manual, which can be downloaded from our website, [www.telemecanique.com](http://www.telemecanique.com).

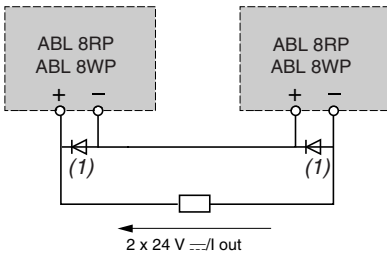
Behavior in the event of phase failure on three-phase power supplies

The **ABL 8WPS24●00** Universal range of Phaseo power supplies is capable of starting and delivering a nominal current and voltage for a few minutes in the event of failure of one phase. Their protection (thermal) then trips and they are reset automatically.

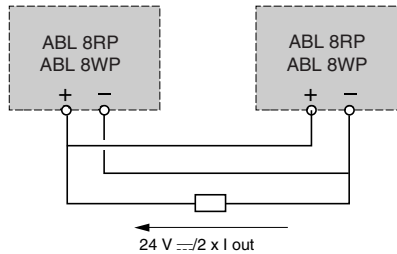
## Output characteristics (continued)

### Series or parallel connection

#### Series connection



#### Parallel connection



Family	Series	Parallel
ABL 8RPS/8RPM/8WPS	2 products max. (1)	2 products max.

**Nota :** Series or parallel connection is only recommended for products with identical references.

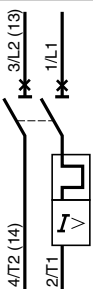
For better availability, the power supplies can also be connected in parallel using the **ABL8 RED24400** Redundancy module.

## Selection of protection on the power supply primaries

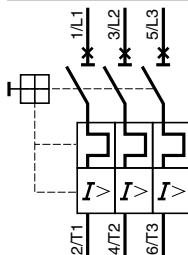
Type of line supply Type of protection	115 V ~ phase-to-neutral		230 V ~ phase-to-phase		400 V ~ phase-to-phase	
	Thermal-magnetic circuit-breaker	gG/gL fuse	Thermal-magnetic circuit-breaker	gG/gL fuse	Thermal-magnetic circuit-breaker	gG/gL fuse
	Telemecanique GB2 (IEC) (2)	Merlin Gerin C60N (IEC) C60N (UL)	Telemecanique GB2 (IEC) (2)	Merlin Gerin C60N (IEC) C60N (UL)	Telemecanique GV2 (IEC/UL)	
ABL 8RPS24030	GB2 CD07	MG24443	GB2 CD07	MG24443	GV2 RT06	2 A (14 x 51)
ABL 8RPS24050	GB2 CD08	MG24444	GB2 CD07	MG24443	GV2 RT06	2 A (14 x 51)
ABL 8RPS24100	GB2 CD12	MG24447	GB2 CD08	MG24444	GV2 RT07	4 A (14 x 51)
ABL 8RPM24200	GB2 CD16	MG24449	GB2 CD12	MG24447	-	-
ABL 8WPS24200	-	-	-	-	GV2 ME07	2 A (14 x 51)
ABL 8WPS24400	-	-	-	-	GV2 ME08	4 A (14 x 51)

## Schemes

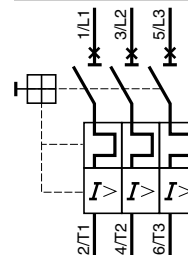
### GB2 CD●●



### GV2 RT●●



### GV2 ME●●



(1) Two Schottky diodes  $I_{min}$  = power supply  $I_n$  and  $V_{min}$  = 50 V  
(2) UL certification pending



ABL 8RPS24050



ABL 8RPM24200



ABL 8WPS24200



ABL 8BUF24400



ABL 8BBU24200



ABL 8RED24400

## Regulated switch mode power supplies: Phaseo Universal range

Input voltage	Secondary		Reset	Conforming to standard EN 61000-3-2	Reference	Weight kg	
	Output voltage	Nominal power					Nominal current
<b>Single-phase (N-L1) or phase-to-phase (L1-L2) connection</b>							
100...120 V - 200...500 V ~	24...28.8 V	72 W	3 A	Auto/man	Yes	ABL 8RPS24030	0.300
- 15%, + 10%	---	120 W	5 A	Auto/man	Yes	ABL 8RPS24050	0.700
50/60 Hz	---	240 W	10 A	Auto/man	Yes	ABL 8RPS24100	1.000
100...120 V/200..	24...28.8 V	480 W	20 A	Auto/man	Yes	ABL 8RPM24200	1.600
.240 V ~	---	---	---	---	---	---	---
- 15%, + 10%	---	---	---	---	---	---	---
50/60 Hz	---	---	---	---	---	---	---
<b>3-phase connection (L1-L2-L3)</b>							
380...500 V ~	24...28.8 V	480 W	20 A	Auto/man	Yes	ABL 8WPS24200	1.600
± 10 %	---	960 W	40 A	Auto/man	Yes	ABL 8WPS24400	2.700
50/60 Hz	---	---	---	---	---	---	---

## Function modules for continuity of service

Function	Use	Designation	Reference	Weight kg
Continuity after a power outage	Holding time 100 ms at 40 A and 2 s at 1 A	Buffer module	ABL 8BUF24400	1.200
	Holding time 9 min at 40 A...2 hrs at 1 A (depending on use with a battery check module-battery unit and load) (1)	Battery check module 20 A output current	ABL 8BBU24200	0.500
		Battery check module 40 A output current	ABL 8BBU24200	0.700
		3.2 Ah battery module (2)	ABL 8BPK24A03	3.500
		7 Ah battery module (2)	ABL 8BPK24A03	6.500
		12 Ah battery module (2)	ABL 8BPK24A12	12.000
Continuity after a malfunction	Paralleling and redundancy of the power supply to ensure uninterrupted operation of the application excluding AC line failures and application overloads	Redundancy module	ABL 8RED24400	0.700
Discriminating downstream protection	Electronic protection (1...10 A overload or short-circuit) with 4 output terminals from a Universal range Phaseo power supply	Protection module with single-pole breaking (3)	ABL 8PRE24100	0.270
		Protection module with 2-pole breaking (4) (3)	ABL 8PRP24100	0.270

## --- converters (for use with Universal range of Phaseo power supplies)

Primary (5)	Secondary		Reference	Weight kg	
	Input voltage	Universal range power supply module output current			Output voltage
24 V ---	2.2 A	5...6.5 V ---	6 A	ABL 8DCC05060	0.300
- 9%, + 24%	1.7 A	7...15 V ---	2 A	ABL 8DCC12020	0.300

## Separate and replacement parts

Designation	Description	Composition	Unit reference	Weight kg
Fuse assemblies	For ABL 8PR●24100 discriminating Protection modules	4 x 3 A, 4 x 7.5 A and 4 x 15 A	ABL 8FUS01	—
	For ABL 8BKP24A●● Battery	4 x 20 A and 6 x 30 A	ABL 8FUS02	—
Clip-on marker labels	All products except ABL 8PR●●●●●●	Order in multiples of 100	LAD 90	0.030
		Order in multiples of 22	ASI20MACC5	—
DIN rail mounting kit	For ABL 8BPK2403 Battery Module	Single unit	ABL 1A02	—
Cables	Connection cable between ABL8 BBU and PC for updating the software	RS232 3 m	SR2CBL01	0.150
		USB 3 m	SR2USB01	0.150
EEPROM memory	Backup and duplication of ABL8 BBU parameters	Single unit	SR2MEM02	0.010

(1) For table of compatibility of battery check module-battery unit with holding time depending on the load, consult our "Phaseo Power supplies and transformers" catalogue.

(2) Supplied with 20 or 30 A fuse depending on the model.

(3) Supplied with four 15 A fuses.

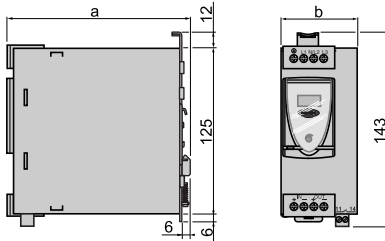
(4) Local reset via pushbutton or automatic reset on elimination of the fault and diagnostic relay.

(5) Voltage from a 24 V --- Universal range Phaseo power supply.

▲ Available 2<sup>nd</sup> quarter 2007.

## Dimensions

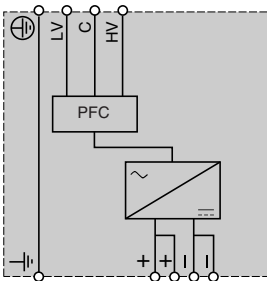
ABL 8RPS24●●●/ABL 8RPM24200/ABL 8WPS24●●●  
Common side view



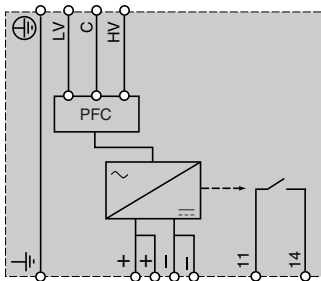
ABL 8	a	b
RPS24030	120	44
RPS24050	120	56
RPS24100	140	85
RPM24200	140	145
WPS24200	155	95
WPS24400	155	165

## Internal schemes

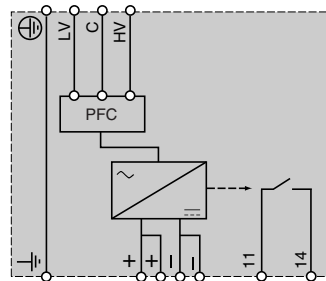
ABL 8RPS24030



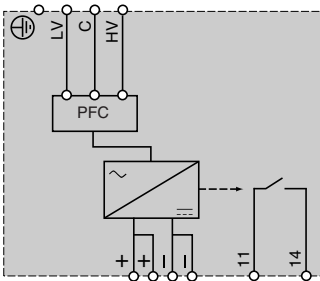
ABL 8RPS24050



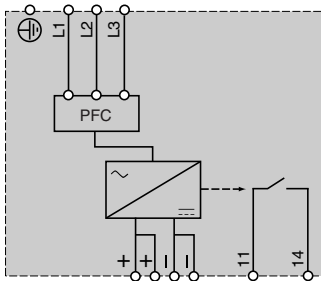
ABL 8RPS24100



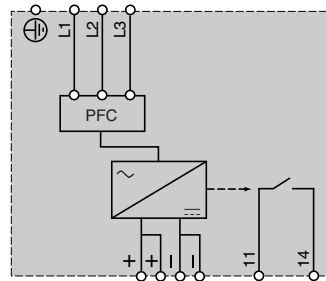
ABL 8RPM24200



ABL 8WPS24200



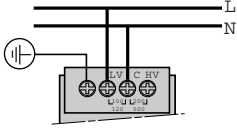
ABL 8WPS24400



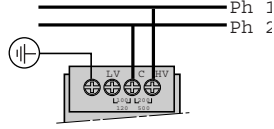
5

## Line supply connection schemes

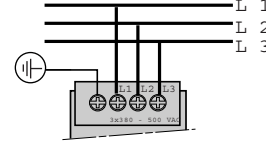
### Single-phase (L-N) 100 to 120 V



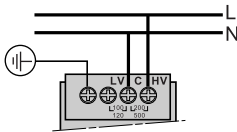
### Phase-to-phase (L1-L2) 200 to 500 V




### 3-phase (L1-L2-L3) 3 x 380 to 500 V



### Single-phase (L-N) 200 to 500 V





<b>Applications</b>		<b>Display of text messages</b>	<b>Display of text messages and/or semi-graphics</b>
<b>Type of unit</b>		<b>Compact display units</b>	
			
<b>Display</b>	Type	Back-lit green LCD, height 5.5 mm or Back-lit green, orange or red LCD, height 4.34...17.36 mm	Back-lit monochrome matrix LCD (240 x 64 pixels), height 5.3 or 10.6 mm
	Capacity	2 lines of 20 characters or 1 to 4 lines of 5 to 20 characters	4 to 8 lines of 20 to 40 characters
<b>Data entry</b>		Via keypad with 8 keys (4 with changeable legends)	Display only or via keypad with 4 function keys + 1 service key or 5 service keys
<b>Memory capacity</b>	Application	512 Kb Flash	384 Kb Flash EPROM
	Extension via type II PCMCIA	–	–
<b>Functions</b>	Maximum number of pages	128/200 application pages 256 alarm pages	600 application pages 256 alarm pages 256 print-out form pages (1)
	Variables per page	40...50	50
	Representation of variables	Alphanumeric	Alphanumeric, bargraph, gauge
	Recipes	–	–
	Curves	–	–
	Alarm logs	Depending on model	–
	Real-time clock	Access to the PLC real-time clock	–
	Alarm relay	–	No
<b>Communication</b>	Serial link	RS 232 C/RS 485	RS 232C or RS 422/485
	Downloadable protocols	Uni-TE, Modbus	Uni-TE, Modbus, AEG and for PLC brands: Allen-Bradley, GE Fanuc, Omron, Siemens
	Printer link	RS 232C serial link (1)	–
<b>Development software</b>		XBT L1001 and XBT L1003 (under Windows 98, 2000 and XP)	
<b>Operating systems</b>		Magelis	
<b>Type of terminal</b>		<b>XBT N</b>	<b>XBT HM</b>
<b>Pages</b>		Consult our "Human/Machine Interfaces" catalogue (1) Depending on model.	

Display of text messages Control and parametering of data	Display of text messages and/or semi-graphics Control and parametering of data
--	---

**Compacts terminals**



Back-lit green, orange and red LCD, height 4.34...17.36 mm	Back-lit monochrome matrix LCD (240 x 64 pixels), height 5.3 or 10.6 mm
1 to 4 lines of 5 to 20 characters	4 to 8 lines of 20 to 40 characters

Via keypad with 12 keys for function or numeric input (according to the context) + 8 service keys	Via keypad with 12 function keys 10 service keys 12 numeric keys 4 soft function keys
---	---

512 Kb Flash	512 Kb Flash EPROM
-	-

128/200 application pages 256 alarm pages	800 application pages 256 alarm pages 256 print-out form pages (1)
--	--

40...50	50
---------	----

Alphanumeric	Alphanumeric, bargraph, gauge
--------------	-------------------------------

-	-
---	---

-	-
---	---

Depending on model	
--------------------	--

Access to the PLC real-time clock	
-----------------------------------	--

No	
----	--

RS 232C/RS 485	RS 232C or RS 422/485
----------------	-----------------------

Uni-TE, Modbus	Uni-TE, Modbus, AEG and for PLC brands: Allen-Bradley, GE Fanuc, Omron, Siemens
----------------	---


RS 232C serial link (1)	
-------------------------	--

XBT L1001 and XBT L1003 (under Windows 98, 2000 and XP)	
---	--

Magelis	
---------	--

<b>XBT R</b>	<b>XBT PM</b>
--------------	---------------

Consult our "Human/Machine Interfaces" catalogue

<b>Applications</b>		Display of text messages and graphic objects Control and parametering of data		
<b>Type of unit</b>		<b>Graphic terminals</b>		
				
<b>Display</b>	Type	Colour LCD TFT with touch-sensitive screen (320 x 240 pixels) with optimum viewing angle (1)		
	Capacity	5,7" (color)	10,4" (color)	
<b>Data entry</b>		Via keypad with: - 10 static function keys - 8 soft function keys - 12 service keys - 12 alphanumeric keys	Via touch-sensitive screen	
			Via keypad with: - 12 static function keys - 10 soft function keys - 12 service keys - 12 alphanumeric keys	
<b>Memory capacity</b>	Application	16 Mb Flash EPROM (via PCMCIA type II card)		
	Extension	-		
<b>Functions</b>	Maximum number of pages	50 to 720 application, alarm, help and print-out form pages depending on the memory card used (512 alarms maximum)	30 to 480 application, alarm, help and print-out form pages depending on the memory card used (512 alarms maximum)	
	Variables per page	64		
	Representation of variables	Alphanumeric, bitmap, bargraph, gauge, potentiometer, selector		
	Recipes	125 records maximum with 5000 values maximum		
	Curves	16		
	Alarm logs	Yes		
	Real-time clock	Access to the PLC real-time clock		
	Discrete inputs/outputs	1 alarm relay		
	Multimedia inputs/outputs	-		
	<b>Communication</b>	Downloadable protocols	Uni-TE, Modbus, KS and for PLC brands: GE Fanuc, Omron, Allen-Bradley and Siemens	Uni-TE, Modbus, KS, Modbus TCP/IP, Uni-TE TCP/IP (1) and for PLC brands: GE Fanuc, Omron, Allen-Bradley and Siemens
Asynchronous serial link		RS 232C or RS 422/485		
USB Ports		-		
Bus and networks		Modbus Plus, Fipio/Fipway avec carte additive PCMCIA type III (1),		
		-	Ethernet TCP/IP (10BASE-T/100BASE-TX) (1)	
Printer link		RS 232C serial link (1)		
<b>Development software</b>		XBT L1003 (under Windows 98, Windows 2000 and Windows XP)		
<b>Operating systems</b>		Magelis		
<b>Type of terminal</b>		<b>XBT F01</b>	<b>XBT F02/F03</b>	
<b>Pages</b>		Consult our "Human/Machine Interfaces" catalogue (1) Depending on model. (2) Uni-TE version V2 for Twido/TSX Micro/Premium PLCs.		

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**Display of text messages and graphic objects  
Control and parametering of data**

**New Technology touch-sensitive graphic terminals**



Back-lit monochrome (amber or red mode) LCD STN (320 x 240 pixels)	Back-lit monochrome or colour LCD STN or back-lit colour LCD TFT (320 x 240 pixels)	Back-lit colour LCD STN or color LCD TFT (640 x 480 pixels)	Back-lit colour LCD STN or color LCD TFT (640 x 480 pixels)	Back-lit colour LCD TFT (800 x 600 pixels)	Back-lit colour LCD TFT (1024 x 768 pixels)
3,8" (monochrome)	5,7" (monochrome or colour)	7,5" (colour)	10,4" (colour)	12,1" (colour)	15" (colour)

Via touch-sensitive screen 6 dynamic function keys	Via touch-sensitive screen				
---	----------------------------	--	--	--	--

8 Mb Flash EPROM	16 Mb Flash EPROM	32 Mo Flash EPROM			
–	By Compact Flash card 128, 256, 512 Mb or 1 Gb (except XBT GT2110 model)				

Limited by the internal Flash memory capacity	Limited by the internal Flash memory capacity or Compact Flash card memory capacity				
---	---	--	--	--	--

Unrestricted (8000 variables max.)					
Alphanumeric, bitmap, bargraph, gauge, tank, curves, polygons, button, light					
32 groups of 64 recipes of 1024 ingredients max.					
Yes, with log					
Yes					
Built-in					
–		1 input (reset) et 3 outputs (alarm, buzzer, run)			
–		1 audio input (microphone), 1 composite vidéo input (numerical or analog camera), 1 audio input (loudspeaker) (1)			

Uni-TE (2), Modbus, Modbus TCP/IP (1) and for PLC brands: Mitsubishi, Omron, Allen-Bradley and Siemens

RS 232C/485 (COM1)	RS 232C/RS 422/485 (COM1) and RS 485 (COM2)				
–	1 (application download)	2 (application download and peripherals)			
–					
Ethernet TCP/IP (10BASE-T) (1)	Ethernet TCP/IP (10BASE-T/100BASE-TX) (1)				
–	RS 232C serial link (COM1), USB port for parallel printer				

Vijeo Designer VJD ●●D TGS V44M (under Windows 2000 and Windows XP)

Magelis (CPU 100 MHz RISC)	Magelis (CPU 133 MHz RISC)	Magelis (CPU 266 MHz RISC)			
----------------------------	----------------------------	----------------------------	--	--	--

<b>XBT GT11</b>	<b>XBT GT21/22/23</b>	<b>XBT GT42/43</b>	<b>XBT GT52/53</b>	<b>XBT GT63</b>	<b>XBT GT73</b>
-----------------	-----------------------	--------------------	--------------------	-----------------	-----------------

Consult our "Human/Machine Interfaces" catalogue





**Applications**

Traditional architecture, HMI executed on dedicated terminal or PC platform

Configuration software for user interface applications



**Target products** Type

---

Operating system on terminals

Magelis XBT N/R  
Magelis XBT H/P/E/HM/PM  
Magelis XBT F/FC  
(1)

---

Proprietary Magelis operating system

Magelis XBT G (1)  
Magelis XBT GT

---

**Functions**

Reading/writing of PLC variables

Display of variables

Data processing

---

Sharing of variables between HMI applications

---

Saving of variables to external database

Yes

Yes

– Yes, with Java programming

–

–

**Development of graphics applications**

Native library of graphic objects

Container Active X  
Java Beans

---

Curves and alarms

---

Scripts

Yes

–

– Yes

Yes, with XBT F/FC terminal + alarms via diagnostic buffer (2)

– Yes, with log

– Java

**Online modification of applications**

–

**Communication between PLCs and HMI application**

Via I/O drivers

**Uploading of applications**

Yes –

**Simulation of HMI applications**

Yes

**Redundancy**

–

**Recipe management**

Yes –

**Report printing**

Form, historical data and alarm pages

On the fly alarms, historical data

**Access security**

Linked to user profiles

**Software compatible with OS**

Windows 98, 2000 or Windows XP

Windows 2000 or Windows XP

**Type of software**

**XBT L1000**

**Vijeo Designer**

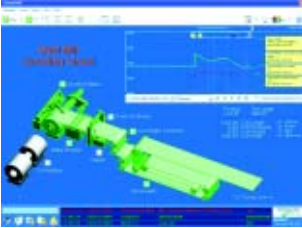


**Pages**

Consult our "Human/Machine Interfaces" catalogue  
(1) Magelis XBT terminals behave transparently on restoration of power.

5

**SCADA supervisory software**      **Web architecture, embedded HMI in PLC**  
**Ethernet TCP/IP modules with embedded Web server**



Magelis Compact iPC industrial PCs  
 Magelis Modular iPC industrial PCs  
 PC micro-computers  
 Servers  
 Microsoft Windows

TSX Micro TSX ETZ  
 Premium TSX ETY  
 Quantum 140 NOE 771  
 FactoryCast Gateway TSX ETG 1000

Premium TSX WMY 100  
 Quantum 140 NWM 100 00

Yes	-	Yes
Yes	-	
Yes	-	Yes + E-mail transmission triggered by event

Yes	-	
-	Yes	
	Alarms via diagnostic buffer (2)	
C compiler integrated	-	
Yes	-	Yes
Via OFS data server	Via internal bus on Premium/Quantum platforms	
Yes		
	-	Yes
Yes	-	
Yes	-	
All information in the real-time database	-	

Windows XP, Servers      Windows 98/2000/NT, Windows XP      Windows 2000 or Windows XP

**Vijeo Citect**

**FactoryCast**

**FactoryCast HMI**



Consult our "Human/Machine Interfaces" catalogue

(2) Specific memory area with Modicon Premium (with PL7 or Unity Pro software) and Quantum (with Unity Pro software) PLC platforms.





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## 6 - Technical information

- Standards, certifications, and environmental conditions ..... page 6/2
- Automation product certifications and community regulations ..... page 6/6
- Power consumption table ..... page 6/8

## Index

- Product reference index ..... page 6/9

# Modicon M340 automation platform

## Standards, certifications and environment conditions

### Standards and certifications

Modicon M340 PLCs have been developed to conform to the principal national and international standards concerning electronic equipment for industrial automation systems.

- Requirements specific to programmable controllers: functional characteristics, immunity, resistance, safety, etc.: IEC/EN 61131-2, CSA 22.2 N° 142, UL 508.
- Merchant navy requirements of the main international bodies (with ABS, BV, DNV, GL, LR, RINA, RMRS): IACS (*International Association of Classification Societies*)
- Compliance with European Directives:
  - Low Voltage: 73/23/EEC amendment 93/68/EEC,
  - Electromagnetic Compatibility: 89/336/EEC amendments 92/31/EEC and 93/68/EEC.
- Electrical qualities and self-extinguishing capacity of insulating materials: UL 746C, UL 94.
- Hazardous areas classification: CSA 22.2 No. 213, Class I, Division 2, Groups A, B, C and D.

### Characteristics

#### Service conditions and recommendations relating to environment

Temperature	Operation	°C	0...+ 60			
	Storage	°C	- 40...+ 85			
Relative humidity	Operation	%	93...95 without condensation according to IEC/EN 60060-2-30 Db			
	Storage	%	93...95 without condensation according to IEC/EN 60060-2-30 Db			
Altitude		m	0...4000, temperature derating from 3000 m: 1 °C / 400 m, equals to + 55 °C at 4000 m			
Supply voltage	Nominal voltage	V	BMX CPS 2010	BMX CPS 3020	BMX CPS 2000	BMX CPS 3500
			~: according to IEC/EN 61131-2	--- 24	--- 24...48	~ 100...240
---	Nominal frequencies	Hz	---	---	~ 85...264	~ 85...264
			---: according to IACS E10 battery without charge	---	---	50/60
	Limit frequencies	Hz	---	---	47/63	47/63

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### Protective treatment of Modicon M340 PLCs

Modicon M340 PLCs meet the requirements of "TC" treatment (*Treatment for all Climates*).

For installations in industrial production workshops or environments corresponding to "TH" treatment (*treatment for hot and humid environments*), Modicon M340 PLCs must be embedded in envelopes with a minimum IP 54 protection, in compliance with IEC/EN 60664 and NF C 20 040.

Modicon M340 PLCs themselves offer **protection to IP 20 level** and **protection against pins** (enclosed equipment) (1). They can therefore be installed without an envelope in reserved-access areas which do not exceed **pollution level 2** (control room with no dust-producing machine or activity). The pollution level 2 does not take account of more severe environmental conditions: air pollution by dust, smoke, corrosive or radioactive particles, vapours or salts, attack by fungi, insects, ...

(1) In the case where a position is not occupied by a module, a **BMX XEM 010** protection cover must be installed.

## Environment tests

### Immunity to LF interference (CE) (1)

Name of test	Standards	Levels
Voltage and frequency variation	IEC/EN 61000-4-11 IACS E10 / IEC 60092-504	0.9 Un/0.95 Fn for 30 minutes; 1.10 Un/1.05 Fn for 30 minutes; 0.8 Un/0.9 Fn for 1,5/5 seconds; 1.2 Un/1.1 Fn for 1,5/5 seconds
Direct voltage variation	IEC/EN 61131-2 IEC/EN 61000-4-11 IEC 60092-504 IACS E10 (battery without charge)	0.85 Un...1.2 Un for 30 minutes with 5% ripple (peak values)
Harmonic 3	IEC/EN 61131-2	10 % Un; 0° for 5 min...180° for 5 min
Inter harmonic	IACS E10 / IEC 60092-504	H2...H200 - 10 % (H15), - 10 %...1 % (H15...H100) and 1 % (H100...H200)
Short momentary interrupt	IEC/EN 61131-2 IEC/EN 61000-4-11/-6-2	10 ms with ~ supply; 1 ms with --- supply
Voltage shut-down/start-up	IEC/EN 61131-2	Un-0-Un; Un for 60 s; 3 cycles separated by 10 s Un-0-Un; Un for 5 s; 3 cycles separated by 1 to 5 s Un-0.9-Udl; Un for 60 s; 3 cycles separated by 1 to 5 s

Where:  
Un: nominal voltage  
Fn: nominal frequency  
Udl: detection level when powered

### Immunity to HF interference. (CE) (1)

Name of test	Standards	Levels
Damped oscillatory wave	IEC/EN 61000-4-12 IEC/EN 61131-2 Zone C	~ / --- main supply, ~ auxiliary supply, discrete ~ I/O (unshielded): 2.5 kV in commun mode, 1 kV in differential mode --- auxiliary supply, discrete ~ I/O (unshielded) and analogue I/O: 1 kV in commun mode, 0.5 kV in differential mode All shielded cable: 0.5 kV in commun mode
Electrical fast transient bursts	IEC/EN 61000-4-4 IEC 61131-2 / IACS E10	~ / --- main and auxiliary supplies, discrete ~ I/O (unshielded): 2 kV in wire mode, 2 kV in common mode Discrete --- I/O (unshielded), analogue I/O and all shielded cable: 1 kV in common mode
Surge	IEC/EN 61000-4-5 IEC/EN 61131-2 Zone B IACS E10	~ / --- main and auxiliary supplies, discrete ~ I/O (unshielded): 2 kV in commun mode, 1 kV in differential mode Discrete ~ I/O (unshielded) and analogue I/O: 0.5 kV in commun mode, 0.5 kV in differential mode All shielded cable: 1 kV in commun mode
Electrostatic discharges	IEC/EN 61000-4-2 IEC/EN 61131-2 Zone B IACS E10	6 kV contact, 8 kV air
Radiated electromagnetic field	IEC/EN 61000-4-3	15 V/m : 80 MHz...2 GHz Sinusoidal modulation amplitude 80 % / 1 kHz + internal clock frequency
Conducted interference induced by radiated field	IEC/EN 61000-4-6 IEC/EN 61131-2 IACS E10	10 V : 0,15 MHz...80 MHz Sinusoidal modulation amplitude 80% / 1 kHz + spot frequency

### Electromagnetic emissions (CE) (1) (2)

Name of test	Standards	Levels
Interference voltage	EN 55011, Classe A IEC/EN 61131-2 IEC/EN 61000-6-4 FCC part 15 IACS E10	150 kHz...500 kHz: quasi-peak 79 dB (µV); average 66 dB (µV) 500 kHz...30 MHz: quasi-peak 73 dB (µV); average 60 dB (µV) Values according general power distribution zone
Interference field	EN 55011, Classe A IEC/EN 61131-2 IEC/EN 61000-6-4 FCC part 15 IACS E10	30 MHz...230 MHz: quasi-peak 40 dB (measurement at 10 m), quasi-peak 50 dB (measurement at 3 m) 230 MHz...2 GHz: quasi-peak 47 dB (measurement at 10 m), quasi-peak 57 dB (measurement at 3 m) Values depending on general power distribution zone

- (1) Devices must be installed and wired in compliance with the instructions provided in the manual "Grounding and Electromagnetic Compatibility of PLC Systems", pdf format on CD-Rom support included in Unity Pro software packages or on DVD UNY USE 909 CD M reference (see page 4/31).
- (2) These tests are performed without a cabinet, with devices **fixed on a metal grid** and wired as per the recommendations in the manual "Grounding and Electromagnetic Compatibility of PLC Systems".

(CE): tests required by European directives CE and based on IEC / EN 61131-2 standards.

**Environment tests (continued)**

**Immunity to climatic variations**

Name of test	Standards	Levels
Dry heat	IEC/EN 60068-2-2 Bd IACS E10	60 °C for 16 hours
Cold	IEC/EN 60068-2-1 Ab & Ad IACS E10	0 °C for 16 hours with start at 0°C
Continuous humid heat	IEC/EN 60068-2-78 Ca	60 °C with 93 % relative humidity for 96 hours
Cyclical humid heat	IEC/EN 60068-2-30 Db	55 °C, 25 °C with 93...95 % relative humidity with 2 cycles of 12 hours/12 hours
Cyclical temperature variations	IEC/EN 60068-2-14 Na & Nb IEC/EN 61131-2	0...60 °C with 5 cycles of 3 hours/3 hours

**Withstand to climatic variations**

Name of test	Standards	Levels
Dry heat (power off)	IEC/EN 60068-2-2 Bb & Bd	85 °C for 96 hours
Cold (power off)	IEC/EN 60068-2-1 Ab & Ad IEC/EN 60068-2-48	- 40 °C for 96 hours
Humid heat (power off)	IEC/EN 60068-2-30 dB	25...60 °C with 93...95 % relative humidity with 2 cycles of 12 hours/12 hours
Heat shocks (power off)	IEC/EN 60068-2-14 Na & Nb	- 40...85 °C with 2 cycles of 3 hours/3 hours

## Environment tests (continued)

### Immunity to mechanical constraints (1) (power on)

Name of test	Standards	Levels
Sinusoidal vibrations	IEC/EN 60068-2-6 Fc IACS E10	3 Hz...100 Hz/1 mm amplitude / 0.7 g, transition frequency 13.2 Hz Endurance to resonance frequency 90 min/axis Application coefficient < 10
Sinusoidal vibrations (Class 3M7)	IEC/EN 60068-2-6 Fc IEC/EN 61131-2 Specific profil	5...150 Hz with 10 mm amplitude / 3 g, transition frequency 9 Hz Endurance: 10 cycles of 1 octave/min
Shocks	IEC/EN 60068-2-27 Ea	30 g - 11 ms; 3 shocks/direction/axis (2)
Bumps	IEC/EN 60068-2-29 Eb	25 g - 6 ms; 100 bumps/direction/axis (3)
Plugging / unplugging	IEC/EN 61131-2	For modules and connectors 50 operations for permanent connections 500 operations for non permanent connections

### Withstand to mechanical constraints (power off)

Name of test	Standards	Levels
Flat freefall	IEC/EN 60068-2-32 Ed method 1 IEC/EN 61131-2	10 cm / 2 falls
Controlled position freefall (for handheld product)	IEC/EN 60068-2-31 Ec IEC/EN 61131-2	30 ° or 10 cm / 2 falls
Random freefall (equipment in packaging)	IEC/EN 60068-2-32 method 1 IEC/EN 61131-2	1 m / 5 falls
Vibrations, transports (Class 2M3)	IEC/EN 60721-4-2 IEC/EN 60068-2-64 Fh	Stationary vibrations, random: 5 m <sup>2</sup> /s <sup>3</sup> from 10...100 Hz, 7 dB/octave from 100...200 Hz, 1 m <sup>2</sup> /s <sup>3</sup> de 200...2000 Hz, 30 min duration per axe

### Equipment and personnel safety (1) (C€)

Name of test	Standards	Levels
Dielectric strength	UL 508/CSA 22-2 No.142 / FM IEC/EN 61131-2	2 Un + 1000 V / 1 min
Insulation resistance	UL 508/CSA 22-2 No.142 / FM IEC/EN 61131-2	Un ≤ 50 V: 10 MΩ 50 V ≤ Un ≤ 250 V: 10 MΩ
Continuity of earth	UL 508/CSA 22-2 No.142 / FM IEC/EN 61131-2	30 A for 2 min, R < 0,1 Ω
Leakage current	IEC/EN 61131-2	I < 3.5 mA after disconnecting
Protection offered by enclosures	IEC/EN 61131-2	IP 20 and protection against standardize pins
Withstand to impacts	UL 508/CSA 22-2 No.142 / FM IEC/EN 61131-2	500 g sphere: fall from 1.3 m
Stored energy injury risk	IEC/EN 61131-2	After 10 s, max. 37 % Un
Overload	UL 508/CSA 22-2 No.142 / FM IEC/EN 61131-2	50 cycles 1 s / 9 s to Un and 1.5 In
Endurance	UL 508/CSA 22-2 No.142 / FM IEC/EN 61131-2	12 cycles 100 ms / 100ms, 988 cycles 1 s / 1 s and 5000 cycles 1 s / 9s to Un and In
Temperature rise	IEC/EN 61131-2/UL 508 CSA 22-2 No.142/UL 1604 CSA 22-2 No.213 / FM	Ambient temperature 60 °C

(1) Devices must be installed, wired and maintained in compliance with the instructions provided in the in the manual "Grounding and Electromagnetic Compatibility of PLC Systems".

(2) In case of using fast actuators (response time ≤ 15 ms) driven by relay outputs: 15 g - 11 ms; 3 shocks/direction/axis

(3) In case of using fast actuators (response time ≤ 15 ms) driven by relay outputs: 15 g - 6 ms; 100 bumps/direction/axis.

(C€): tests required by European directives C€. and based on IEC / EN 61131-2 standards.

# Technical information

## Automation products certifications





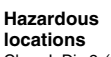

In some countries, certification of certain electrical components is enforced by law. A standard conformity certificate is then issued by the official organization. Each certified product must carry approval symbols when enforced. Use on board merchant navy vessels generally requires prior approval (= certification) of an electrical device by certain marine classification authorities.

Key	Certification body	Country
CSA	Canadian Standards Association	Canada
C-Tick	Australian Communication Authority	Australia
GOST	Gost Standard Scientific Research Institute	C.I.S., Russia
UL	Underwriters Laboratories	USA
Key	Classification authority	Country
IACS	International Association of Classification Societies	International
ABS	American Bureau of Shipping	USA
BV	Bureau Veritas	France
DNV	Det Norske Veritas	Norway
GL	Germanischer Lloyd	Germany
LR	Lloyd's Register	United Kingdom
RINA	Registro Italiano Navale	Italy
RMRS	Russian Maritime Register of Shipping	C.I.S.

The table below shows the situation as at 01.04.2007 for certifications obtained or pending from organizations for base PLCs. An overview of certificates for Telemecanique products is available on our Internet website:

[www.telemecanique.com](http://www.telemecanique.com)

### Product certifications

	Approvals					
	 UL USA	 CSA Canada	 ACA Australia	 GOST CIS, Russia	 Hazardous locations Class 1, Div 2 (1) USA, Canada	 ATEX Europe
Advantys OTB						
Advantys STB					FM	
Advantys Telefast ABE 7						
ConneXium					(2)	
Magelis iPC	(3)				UL	
Magelis XBT GT						Cat 3 G-D
Magelis XBT F/FC/HM/PM						
Magelis XBT N/R					CSA/UL	Cat 3 G-D
Modicon M340					CSA	
Modicon Momentum						
Modicon Premium				(2)	CSA	
Modicon Quantum				(2)	FM (2)	
Modicon TSX Micro						
Phaseo	(3) (4)					
Twido	(3)	(2)			UL (2)	

(1) **Hazardous locations:** UL 1604, CSA 22.2 no. 213 or FM 3611, certified products are acceptable for use in hazardous locations of Class I, division 2, groups A, B, C and D or unclassified only.

(2) Depending on product, consult our website: [www.telemecanique.com](http://www.telemecanique.com)

(3) **cULus** North American certification (Canada and USA).

(4) Except Universal power supplies and Function modules: UL certification pending.

#### Local certifications








<b>BG</b>	Germany	TSX DPZ 10D2A safety module (TSX Micro). TSX PAY 262/282 safety modules (Premium).
<b>SIMTARS</b>	Australia	Modicon TSX Micro automation platform Modicon Premium automation platform (PL7)
<b>AS-Interface</b>	Europe	TWD NOI 10M3 master module (Twido). TSX SAZ 10 master module (TSX Micro). TSX SAY 1000 master modules (Premium).

# Technical information

## Automation products certifications

### Community regulations

#### Marine classification

	Marine classification authorities						
	 ABS	 BV	 DNV	 GL	 LR	 RINA	 RMRS
	USA	France	Norway	Germany	UK	Italy	C.I.S.
Advantys OTB							
Advantys STB	(1)						
Advantys Telefast ABE 7							
ConneXium				(2)			
Magelis #PC							
Magelis XBT GT							
Magelis XBT F/FC/HM/PM							
Magelis XBT N/R							
Modicon M340	(3)						
Modicon Momentum							
Modicon Premium (4)	(2)	(2)	(2)	(2)	(2)	(2)	(2)
Modicon Quantum				(2)		(2)	
Modicon TSX Micro							
Phaseo							
Twido			(2)	(2)	(2)		

(1) Also meets US Navy requirements, ABS-NRV part 4.

(2) Depending on product, consult our website: [www.telemecanique.com](http://www.telemecanique.com).

(3) Request for Marine certifications forecast 2<sup>nd</sup> quarter 2007.

(4) Modicon Premium, also KRS (Korean register of Shipping) certified.

#### Community regulations

##### European directives

The opening of European markets implies a harmonization of regulations in the various European Union member states.

European Directives are documents used to remove obstacles to the free movement of goods and their application is compulsory in all states of the European Union. Member states are obliged to transcribe each Directive into their national legislation and, at the same time, to withdraw any conflicting regulations.

The Directives, particularly those of a technical nature with which we are concerned, only set objectives, called "general requirements".

The manufacturer must take all necessary measures to ensure that his products conform to the requirements of each Directive relating to his equipment.

As a general rule, the manufacturer affirms that his product conforms to the necessary requirements of the Directive(s) by applying the CE label to his product. The CE marking is applied to Telemecanique products where relevant.

##### The significance of CE marking

- The CE marking on a product means that the manufacturer certifies that his product conforms to the relevant European Directives; it is necessary in order that a product which is subject to a Directive(s) can be marketed and freely moved within the European Union.
- The CE marking is intended solely for the national authorities responsible for market regulation.

For electrical equipment, conformity of the product to standards indicates that it is suitable for use. Only the guarantee of a recognized manufacturer provides an assurance of high quality.

One or more Directives, as appropriate, may apply to our products, in particular:

- The Low Voltage Directive 72/23/EEC amended by Directive 93/68/EEC: The CE marking under the terms of this Directive is compulsory as of January 1, 1997.
- The Electromagnetic Compatibility Directive 89/336/EEC, amended by Directives 92/31/EEC and 93/68/EEC: The CE marking on the products covered by this Directive has been compulsory since January 1, 1996.
- Directive CE ATEX 94/9/EC.



# Modicon M340 automation platform

## Power consumption table (specimen to be photocopied)

The power required to supply each **BMX XBP ●●●0** rack depends on the type and number of modules installed. It is therefore necessary to create a power consumption table for each rack in order to define the most suitable **BMX CPS ●●●0** power supply module for each rack. The table below can be used to calculate the consumption on the 2 or 3 different voltages (depending on model) to be supplied by the **BMX CPS ●●●0** power supply module: --- 3,3 V, --- 24 V rack, --- 24 V sensors.

**Procedure:**

- Check and choose a power supply module corresponding to the power supplies available for the 2 or 3 voltages.
- Check that the total power absorbed on these three voltages does not exceed the overall power of the power supply module.
- Values to be entered according to the type of Modicon M340 configuration.

Rack n°	Module reference	Format S: standard D: double	Number	Consumption in mA							
				Voltage --- 3,3 V		Voltage --- 24 V rack		Voltage --- 24 V sensors			
				Module	Total	Module	Total	Module	Total		
<b>Processors</b>	BMX P34 1000	S	1			72					
	BMX P34 2010	S				90					
	BMX P34 2020	S				95					
	BMX P34 2030	S				135					
<b>Discrete I/O</b>	BMX DAI 1602	S		90							
	BMX DAI 1603	S		90							
	BMX DAI 1604	S		90							
	BMX DAO 1605	S		100							
	BMX DDI 1602	S		90				60			
	BMX DDI 1603	S		90							
	BMX DDI 3202K	S		140				110			
	BMX DDI 6402K	S		200				110			
	BMX DDM 16022	S		100				30			
	BMX DDM 16025	S		100		50		30			
	BMX DDM 3202K	S		150				55			
	BMX DDO 1602	S		100							
	BMX DDO 1612	S		100							
	BMX DDO 3202K	S		150							
	BMX DDO 6402K	S		240							
	BMX DRA 0805	S		100		55					
	BMX DRA 1605	S		100		95					
<b>Analogue I/O</b>	BMX AMI 0410	S		150		45					
	BMX AMM 0600	S		150		110					
	BMX AMO 0210	S		150		110					
	BMX ART 0414	S		150		40					
	BMX ART 0814	S		150		50					
<b>Counting</b>	BMX EHC 0200	S		200		40		80			
	BMX EHC 0800	S		200				80			
<b>Communication</b>	BMX NOE 0100	S				90					
	BMX NOE 0110	S				90					
<b>Consumption per voltage</b>				Total current (mA)	<input type="text"/>	<input type="text"/>	<input type="text"/>				
				Consumption voltage (mW)	<input type="text"/>	+	<input type="text"/>	+	<input type="text"/>	=	<input type="text"/>
					Power available (mW)			Power overall (mW)			
<b>Choice of power supply</b>	BMX CPS 2010	D	--- 24 V isolated	8250		16 800				17 000	
	BMX CPS 3020	D	--- 24...48 V isolated	14850		31 200				32 000	
	BMX CPS 2000	D	~ 100...240 V	8250		16 800		10 800		20 000	
	BMX CPS 3500	D		14850		31 200		21 600		36 000	

(1) Typical value given for 100 % of inputs or outputs at state 1.

<b>1</b>									
110 XCA 282 01	4/31	ABE 7FU012	5/17	ABE 7R16T111	5/13	<b>B</b>		BMX P34 1000	1/9 and 3/43
110 XCA 282 02	4/31	ABE 7FU050	5/17	ABE 7R16T210	5/13	BMX AMI 0410	2/31	BMX P34 2010	1/9, 3/39 and 3/43
110 XCA 282 03	4/31	ABE 7FU100	5/17	ABE 7R16T212	5/13	BMX AMM 0600	2/31	BMX P34 2020	1/9, 3/22 and 3/43
<b>4</b>		ABE 7FU200	5/17	ABE 7R16T230	5/13	BMX AMO 0210	2/31	BMX P34 2030	1/9, 3/22 and 3/43
490 NOC 000 05	3/34	ABE 7FU400	5/17	ABE 7R16T231	5/13	BMX ART 0414	2/31	BMX RMS 008MP	1/9
490 NOR 000 03	3/34	ABE 7FU630	5/17	ABE 7R16T330	5/13	BMX ART 0814	2/31	BMX RMS 008MPF	1/9
490 NOR 000 05	3/34	ABE 7H08R10	5/11	ABE 7R16T332	5/13	BMX CPS 2000	1/13	BMX XBP 0400	1/15
490 NOR 000 15	3/34	ABE 7H08R11	5/11	ABE 7R16T370	5/13	BMX CPS 2010	1/13	BMX XBP 0600	1/15
490 NOT 000 05	3/34	ABE 7H08R21	5/11	ABE 7S08S2B0	5/12	BMX CPS 3020	1/13	BMX XBP 0800	1/15
490 NTC 000 05	3/34	ABE 7H08S21	5/11	ABE 7S08S2B0E	5/12	BMX CPS 3500	1/13	BMX XBP 1200	1/15
490 NTC 000 05U	3/34	ABE 7H12R10	5/11	ABE 7S08S2B1	5/12	BMX DAI 1602	2/16	BMX XCA	1/9 and 4/31
490 NTC 000 05U	3/34	ABE 7H12R11	5/11	ABE 7S08S2B1E	5/12	BMX DAI 1603	2/16	BMX XCA	1/9 and 4/31
490 NTC 000 15	3/34	ABE 7H12R20	5/11	ABE 7S16E2B1	5/12	BMX DAI 1604	2/16	USB H018	4/31
490 NTC 000 15U	3/34	ABE 7H12R21	5/11	ABE 7S16E2B1E	5/12	BMX DAO 1605	2/16	BMX XCA	1/9 and 4/31
490 NTC 000 40	3/34	ABE 7H12R50	5/11	ABE 7S16E2E0	5/12	BMX DDI 1602	2/16	USB H045	4/31
490 NTC 000 40U	3/34	ABE 7H12S21	5/11	ABE 7S16E2E0E	5/12	BMX DDI 1603	2/16	BMX XEM 010	1/15
490 NTC 000 80	3/34	ABE 7H16C10	5/10	ABE 7S16E2E1	5/12	BMX DDI 3202K	2/16	BMX XSP 0400	1/15
490 NTC 000 80U	3/34	ABE 7H16C11	5/10	ABE 7S16E2E1E	5/12	BMX DDI 6402K	2/16	BMX XSP 0600	1/15
490 NTC 000 80U	3/34	ABE 7H16C21	5/10	ABE 7S16E2F0	5/12	BMX DDM 16022	2/17	BMX XSP 0800	1/15
490 NTW 000 02	3/34	ABE 7H16C31	5/10	ABE 7S16E2F0E	5/12	BMX DDM 16025	2/17	BMX XSP1200	1/15
490 NTW 000 02U	3/34	ABE 7H16CM11	5/10	ABE 7S16E2M0	5/12	BMX DDM 3202K	2/17	BMX XTS CPS10	1/13
490 NTW 000 05	3/34	ABE 7H16CM21	5/10	ABE 7S16E2M0E	5/12	BMX DDO 1612	2/16	BMX XTS CPS20	1/13
490 NTW 000 05U	3/34	ABE 7H16F43	5/11	ABE 7S16S1B2	5/12	BMX DDO 3202K	2/16	BMX XTS HSC 20	2/41
490 NTW 000 12	3/34	ABE 7H16R10	5/11	ABE 7S16S1B2E	5/12	BMX DDO 6402K	2/16		
490 NTW 000 12U	3/34	ABE 7H16R11	5/11	ABE 7S16S2B0	5/12	BMX DRA 0805	2/16		
490 NTW 000 40	3/34	ABE 7H16R11E	5/11	ABE 7S16S2B0E	5/12	BMX DRA 1605	2/16		
490 NTW 000 40U	3/34	ABE 7H16R20	5/11	ABE 7TES160	5/17	BMX EHC 0200	2/41		
490 NTW 000 80	3/34	ABE 7H16R21	5/11	ABF C08R02B	5/17	BMX EHC 0800	2/36 and 2/41		
490 NTW 000 80U	3/34	ABE 7H16R21E	5/11	ABF C08R02R	5/17				
499 NEH 104 10	3/24	ABE 7H16R23	5/11	ABF C08R02W	5/17				
499 NES 181 00	3/26	ABE 7H16R30	5/11	ABF C08R12B	5/17	BMX FCA150	2/31	<b>F</b>	
499 NES 251 00	3/26	ABE 7H16R31	5/11	ABF C08R12R	5/17	BMX FCA152	2/31	FTX BLA10	3/41
499 NMS 251 01	3/27	ABE 7H16R50	5/11	ABF C08R12W	5/17	BMX FCA152	2/31	FTX C78B	3/41
499 NMS 251 02	3/27	ABE 7H16R50E	5/11	ABL A02	5/29	BMX FCA300	2/31	FTX C78F5	3/41
499 NSS 251 01	3/27	ABE 7H16S21	5/11	ABL 8BBU24200	5/29	BMX FCA302	2/31	FTX C78M5	3/41
499 NSS 251 02	3/27	ABE 7H16S21E	5/11	ABL 8BBU24400	5/29	BMX FCA500	2/31	FTX CM08B	3/41
499 NTR 10 100	3/25	ABE 7H16S43	5/11	ABL 8BPK24A03	5/29	BMX FCA502	2/31	FTX CM12B	3/41
		ABE 7H20E100	5/10	ABL 8BPK24A07	5/29	BMX FCC 051	2/17	FTX CN 12F5	3/40
		ABE 7H20E200	5/10	ABL 8BPK24A12	5/29	BMX FCC 053	2/17	FTX CN 12M5	3/40
		ABE 7H20E300	5/10	ABL 8BPK24A12	5/29	BMX FCC 1001	2/17	FTX CN 3130	3/40
<b>9</b>		ABE 7H32E150	5/10	ABL 8BPK24A12	5/29	BMX FCC 1003	2/17	FTX CN 3150	3/40
990 NAA 263 20	4/31	ABE 7H32E300	5/10	ABL 8DCC05060	5/29	BMX FCC 101	2/17	FTX CN 3203	3/40
990 NAA 263 50	4/31	ABE 7LOGF25	5/17	ABL 8DCC12020	5/29	BMX FCC 103	2/17	FTX CN 3206	3/40
<b>A</b>		ABE 7LOGV10	5/17	ABL 8FUS01	5/29	BMX FCC 201	2/17	FTX CN 3210	3/40
ABE 7ACC01	5/17	ABE 7P08T330	5/14	ABL 8FUS02	5/29	BMX FCC 203	2/17	FTX CN 3220	3/40
ABE 7ACC02	5/17	ABE 7P08T330E	5/14	ABL 8PRE24100	5/29	BMX FCC 203	2/17	FTX CN 3230	3/40
ABE 7ACC10	5/17	ABE 7P16F310	5/13	ABL 8PRP24100	5/29	BMX FCC 301	2/17	FTX CN 3250	3/40
ABE 7ACC11	5/17	ABE 7P16F310E	5/13	ABL 8RED24400	5/29	BMX FCC 303	2/17	FTX CN 3250	3/40
ABE 7ACC12	5/15	ABE 7P16F312	5/13	ABL 8RPM24200	5/29	BMX FCC 501	2/17	FTX CNCT1	3/41
ABE 7ACC20	5/17	ABE 7P16M111	5/14	ABL 8RPM24200	5/29	BMX FCC 503	2/17	FTX CNTL12	3/41
ABE 7ACC21	5/17	ABE 7P16T111	5/14	ABL 8RPS24030	5/29	BMX FCW 1001	2/17	FTX CY1208	3/41
ABE 7ACC30	5/17	ABE 7P16T210	5/14	ABL 8RPS24050	15/29	BMX FCW 1003	2/17	FTX CY1212	3/41
ABE 7ACC80	5/17	ABE 7P16T212	5/14	ABL 8RPS24100	5/29	BMX FCW 301	2/17	FTX DG12	3/41
ABE 7ACC81	5/17	ABE 7P16T214	5/14	ABL 8RPS24100	5/29	BMX FCW 301S	2/31	FTX DP2115	3/41
ABE 7ACC82	5/17	ABE 7P16T215	5/14	ABL 8WPS24200	5/29	BMX FCW 303	2/17	FTX DP2130	3/41
ABE 7ACC83	5/17	ABE 7P16T230E	5/14	ABL 8WPS24400	5/29	BMX FCW 303	2/17	FTX DP2150	3/41
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