Automation & Control

Ethernet TCP/IP and Web technologies

Navigate freely across a universal network

Catalogue
July
04

Transparent Ready™

a brand of Schneider Electric

Telemecanique

Transparent Ready

6 – Human/Machine Interface products

7 – Cabling system

8 – Modbus-IDA organisation and Collaborative Automation Partner Program

9 – Services

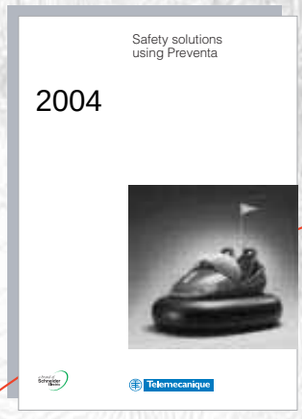
"International documentary structure"

Automation and control
Human/machine interfaces
Catalogue June 2004

Art. 802731 - MKTED204073EN

Human/Machine dialogue
Communication

Art. 67341 - MKTED203111EN



Control and Protection,
Detection,
Automation,
Human/Machine dialogue

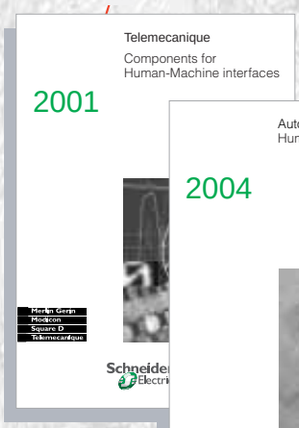
Art. 55053 - MKTED203041EN

Control and Protection,
Detection,
Automation,
Human/Machine dialogue,
Communication

An overview of the product range

Control and protection,
Detection,
Automation,
Human/Machine dialogue,
Communication,
Supervision,
Panel-building and cabling accessories

Control and signalling units
Art. 28697 - MKTED299014EN

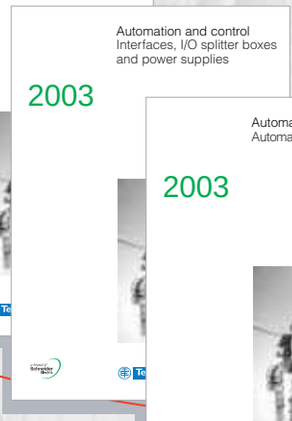


Terminals and display units
Art. 96949 - MKTED2040401EN

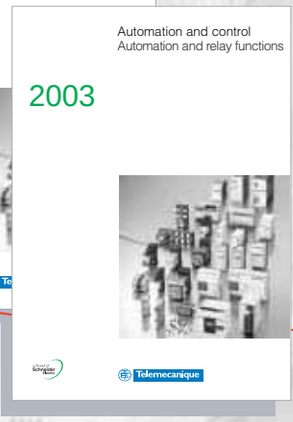
Human/Machine dialogue
Supervision

To be issued

Art. 70263 - MKTED203113EN

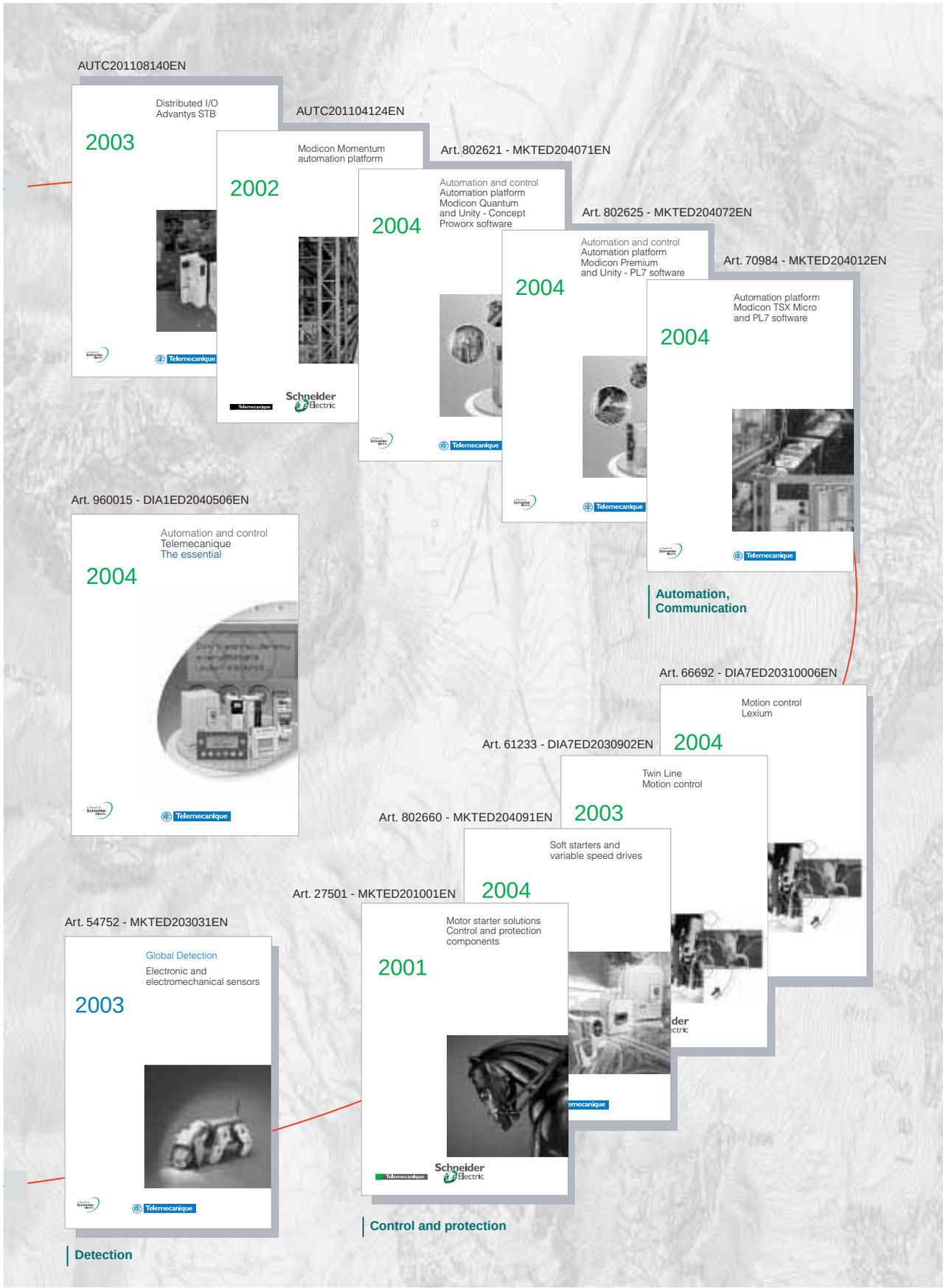


Art. 70455 - MKTED204011EN



Panel-building and cabling accessories
Automation

Automation and control
Human/machine interfaces
Catalogue June 2004



1

Contents

1 - Presentation

1 - Presentation

Transparent Ready

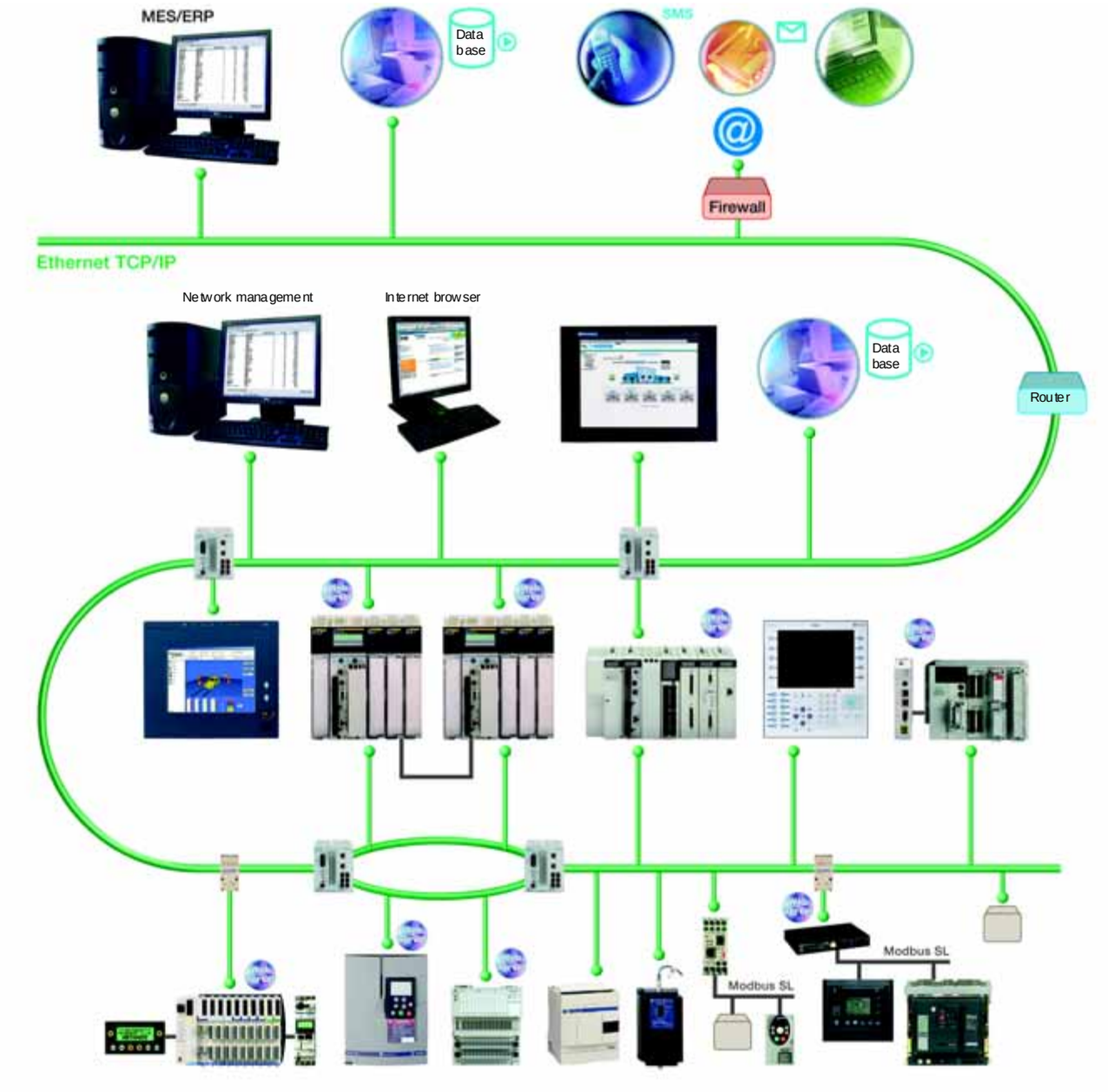
Universal technologies for a world without restrictions

Presentation

Transparent Ready making collaborative architectures a reality

Company environments are constantly changing due to the pressure of competition and the need for profitability. It is vital to take opportunities quickly. The challenge of today's world is therefore agility, which means adopting a **collaborative approach** to share data in real-time.

Schneider Electric's Transparent Ready products, based on universal Ethernet TCP/IP and Web technologies, meet this requirement. These industrial automation products (Trademark Telemecanique) and Electrical Distribution products (Trademark Merlin-Gerin) can be integrated into real-time data-sharing systems, with no need for interfaces.



Transparent Ready

Universal technologies for a world without restrictions

Presentation (continued)

The universal communication standard: Ethernet TCP/IP

The recognition of Ethernet TCP/IP, both in organizations and on the Internet, has made it the **communication standard** of today. Its wide use is leading to a reduction in connection costs, increased performance and the addition of new functions, which all combine to ensure its durability.

Ethernet TCP/IP meets the connection requirements of every application:
- Twisted pair copper cables for simplicity and low cost.
- Optical fiber for immunity to interference and for long distances.
- Communication redundancy, inherent in the IP protocol.
- Radio or satellite to overcome wiring restrictions.
- Remote point-to-point access via the telephone network or the Internet for the cost of a local call.

Ethernet TCP/IP, a truly open technology, supports all types of communication:
- Web pages
- File transfer
- Industrial messaging, etc

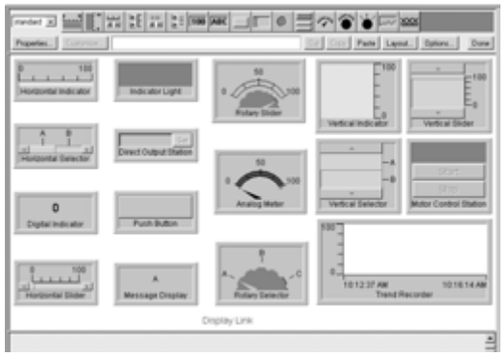
With its high speed, the network no longer limts the performance of the application. The architecture can evolve without any difficulty. The products remain compatible, ensuring the long-term durability of the system.

Modbus messaging: a standard technology adapted for the world of automation

Modbus has been the de facto standard for serial link protocols in industry since 1979. It is used for the communication of millions of automation devices. As a result of this success, the Internet community has reserved the TCP 502 port for Modbus. Modbus can thus be used for exchanging automation data on both Ethernet TCP/IP and the Internet, as well as for all other applications (file exchange, Web pages, e-mail, etc).
The simple structure of Modbus is bringing it ever-increasing success. Users can download the specifications and source code for numerous products that use the Modbus/TCP protocol, free of charge from the Modbus-IDA website www.modbus-ida.org.
Building on its industrial expertise, Telemecanique now has a complete offer of highly user-friendly services on Ethernet TCP/IP that are dedicated to the world of automation: Modbus TCP messaging, optimized I/O Scanning, publication and subscription of variables between Controllers and PLCs (Global Data), automatic product reconfiguration (Faulty Device Replacement), pass band monitoring, system diagnostics (Web), etc.
The single network, requiring no interfaces between the worlds of information technology and automation, is now a reality.

Transparent Ready

Universal technologies for a world without restrictions



Presentation (continued)

Free navigation on the Web Automation

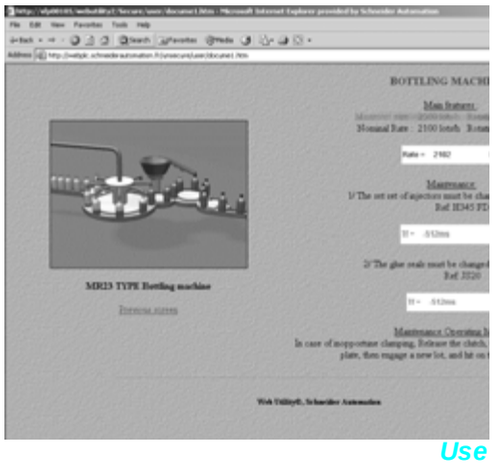
Schneider Electric broke new ground in 1998 with the first Web servers embedded in automation products. These servers provide remote access, using a simple Internet browser, to process information and equipment diagnostics.

With FactoryCast HMI, Telemecanique was once again the first, making the Web servers in Controllers and PLCs “active”. Not only does the Web server provide pages containing the system and process variables, but it also executes tasks totally autonomously, without making use of the PLC processor: management of a real-time HMI database, e-mail transmission, calculations, connectivity with databases, etc.

With its functions embedded in a PLC, the FactoryCast HMI active Web server:

- Simplifies or removes the need for conventional HMI/SCADA (Supervision Control And Data Acquisition) solutions, reducing communication via polling to update HMI/SCADA databases.
- Provides remote multistation “nomadic” control, without any special software on the client stations.
- Provides a direct link to a company’s information systems, without the need for an interface.

Transparent Ready for a world without restrictions



Telemecanique has a wide range of Transparent Ready products: Controllers and PLCs, industrial PCs, HMI devices, variable speed drives, I/O modules, gateways, servers, switches, SCADA software, inductive identification systems, etc.

These products provide different levels of Web services and communication services on Ethernet TCP/IP, according to users’ requirements. In order to simplify choice and ensure their interoperability within a system, each Transparent Ready product is now identified by the class of services it provides.

Are you Transparent Ready?

With Transparent Ready you can:

Use ➡ a common Ethernet TCP/IP infrastructure, covering all levels, from automation to company management.

Benefit ➡ from the competitive advantages of proven high performance levels.

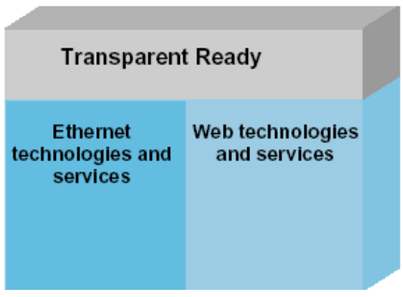
Reduce ➡ downtime thanks to remote diagnostics via the Web.

Create ➡ secure connections throughout the world.

Minimize ➡ training costs by using tools everyone is familiar with (Internet browser, etc).

Control ➡ costs by using open universal standards that do not require any special interfaces.

Transparent Ready
Service classes offered



Presentation

The Transparent Ready service classes make it possible to identify the services provided by each product:
- Diagnostic, display and control services via Web technologies
- Ethernet communication services

The Transparent Ready service classes thus simplify the choice of products and ensure their interoperability within an architecture.

Web service classes

The service level of a Web server is defined by 4 service classes identified by a letter:
- Class **A**: No Web service
- Class **B**: Standard Web services
- Class **C**: Configurable Web services
- Class **D**: Active Web services

Transparent Ready products with an embedded Web server can provide 4 types of Web service:
- Maintenance Web services
- Control Web services
- Diagnostic Web services
- Optional Web services such as documentation or configuration

The following table specifies the services provided by each Web service class (A, B, C or D).

Web server class		Web services			
		Maintenance	Control	Diagnostics	Optional
D	Active Web server	- User website update	- Autonomous execution of specific services (for example, e-mail transmission, data transmission, calculations, etc)	- User-defined states	- User documentation
C	Configurable Web server		- PLC variables editor - Remote commands - User Web pages	- Communication service diagnostics - State of internal product resources	
B	Standard Web server	- Remote product software update - Remote auto-tests	- Product description	- Product status	- Configuration of network parameters and Ethernet communication services - Product documentation
A	No Web server	- No Web service			

Transparent Ready
Service classes offered

Ethernet communication service classes

The Ethernet communication services provided by a product are defined by 3 classes, identified by a number:
- Class **10**: standard Ethernet communication services
- Class **20**: Ethernet communication management services (network level and product level)
- Class **30**: advanced Ethernet communication services

Transparent Ready products can provide eight types of Ethernet communication service:
- Modbus TCP messaging service
- I/O Scanning service
- FDR (*Faulty Device Replacement*) service
- Network management service SNMP
- Global Data service
- Pass band management service
- Time synchronization service NTP
- (E-mail) event notification service, SMTP

These Ethernet communication services are described in chapter 2, “System approach”, see pages 48290/2 to 43654/3.

The following table specifies the services provided for each Ethernet communication service class.

Ethernet communication service classes		Ethernet communication services							
		Modbus messaging	I/O Scanning	FDR	Network management SNMP	Global Data	E-mail SMTP	Bandwidth management	Time synchronization NTP
30	Advanced services	- Direct reading/writing of I/O	- Periodic reading/writing of I/O - Configuration of the list of products scanned	- Automatic control and updating of the product parameters configuration	- Use of the MIB library by an SNMP manager	- Publication and subscription of network variables	- Notification of events by e-mail	- Monitoring of load level	-Synchronization of product clocks
20	Communication management services			- Automatic assignment of the IP address and network parameters - Control and updating of the configuration and product parameters by the user	- Detection of products by an SNMP manager				
10	Standard services	- Reading/ writing of data words		- Local assignment of the IP address Verification of duplicate IP addresses					

Transparent Ready
Service classes offered

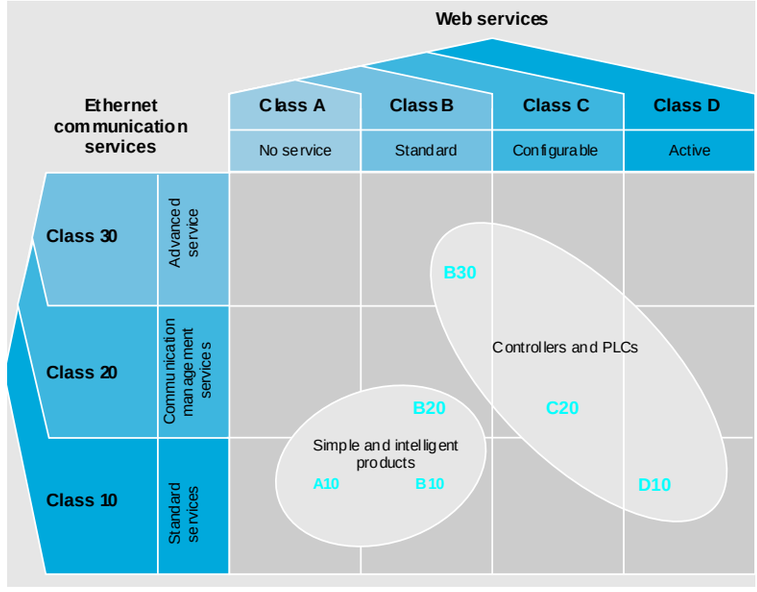
Choice of Transparent Ready products

The services provided by a Transparent Ready product are identified by a letter defining the level of Web service, followed by a number defining the level of Ethernet communication service. For example:
- A class **A10** product is a product with no Web service and standard Ethernet services.
- A class **C30** product is a product with a configurable Web server and advanced Ethernet communication services.

The services provided by a higher class include all the services supported by a lower class.

Transparent Ready products are chosen from 4 main families:
- Sensor and preactuator type field products (simple or intelligent)
- Controllers and PLCs
- Human Machine Interface (HMI) applications
- Dedicated gateways and servers

The selection table on the following pages can be used for choosing Transparent Ready products according to the required service classes.



Transparent Ready
Product selection

Ethernet TCP/IP communication services		Web services	No Web server Class A No Web service
Advanced services Class 30	◻ FDR (product replacement), automatic checking of network parameters ◻ SNMP (network administration), use of the MIB library by an SNMP tool ◻ Global Data ◻ Pass band management ◻ NTP (clock synchronization) ◻ SMTP (e-mail notification)	 TSX ETY  TSX P57   140 NOE 140 CPU	
Communication management services Class 20	◻ Modbus TCP messaging (read/write I/O) ◻ I/O Scanning ◻ FDR (product replacement), automatic assignment of network parameters ◻ SNMP (network administration), product detection	 TSX ETZ  170 ENT  STB NIP	
Standard communication services Class 10	◻ Modbus TCP messaging ◻ FDR (product replacement), verification of duplicate IP address	 TWD LCAE  170 ENT  XGKS  OTB 1E0  TSX PCI  EGX	Premium module TSX ETY 110 Twido compact base TWD LCAE 40DRF Momentum adapter 170 ENT 110 02 Advantys OTB interface OTB 1E0 DM9LP Ositrack station XGK S1715503 Atrium coprocessor TSX PCI 57 204/454M
Human-Machine Interface products and software	**Graphic terminals** See page 48297/2	 XBT G  MPC ST5	Magelis XBT G2●30/4330/5●30/6330 Magelis XBT F024610/034610
	***i*PC industrial PCs** See pages 48297/3 and 48297/4		Magelis Smart *i*PC MPC ST5 2NDJ 00T Magelis Compact *i*PC MPC KT5 ●NAA 00● Magelis Modular *i*PC MPC ●N0 ●ND● 00N
	FactoryCast HMI development software See page 48296/7		FactoryCast HMI TLX CD FCHMI V1M
	Control and supervisory software See pages 48297/5 to 48297/7	 	Vijeo Look control VJL SMD BT●/RT● V25M Monitor Pro supervisory MP72 ●●●● OFS data server TLX CD ●●OFS 30M

	Standard Web server Class B □ View product description and status □ Remote software update	Configurable Web server Class C □ Variables editor □ Remote commands □ User Web pages □ Communication service diagnostics	Active Web server Class D □ Autonomous execution of services □ Diagnostics of user-defined states	See page
	Premium module TSX ETY 4103	Premium module TSX ETY 5103		5/7
	Premium processor TSX P57 1634M Premium processor TSX P57 2623/34M Premium processor TSX P57 2823 Premium processor TSX P57 3623/34M Premium processor TSX P57 4823 Premium processor TSX P57 4634/5634M			5/5
	Quantum module 140 NOE 171 01	Quantum module 140 NOE 171 11		5/9
	Quantum processor 140 CPU 65150 Quantum processor 140 CPU 65160			5/8
	TSX Micro module TSX ETZ 410	TSX Micro module TSX ETZ 510		5/4
	Momentum adapter 170 ENT 110 01			3/2
	Advantys STB module STB NIP 2212			3/3
		Premium module TSX ETY 110 WS		5/7
				5/3
				3/2
				3/4
				3/6
				5/6
	Momentum M1E 171 CCC 980 ●0			5/2
	Momentum M1E 171 CCC 960 ●0			
	Altivar 58 TRX VW3 A58 310			3/5
	Modbus gateway EGX 200MG *(1)*	Modbus server EGX 400MG *(1)*		4/2
		Circuit Monitor card ECC 21		4/3
			Premium module TSX WMY 100	5/7
			Quantum module 140 NWM 100 00	5/9
ConneXium cabling system	**Hubs**		Twisted pair 499 NEH 1●● Fiber optic 499 NOH 1●●	7/2
	Transceivers	499 NOH	499 NTR 10● ●0	7/3
	Switches	 499 NMS	Low cost 499 NES 251 00 Twisted pair 499 NES 181/271 00 Fiber optic 499 NOS 171 00 Fiber optic 499 NMS/NSS 251 01/02	7/4 7/5
	Gateways	 174 CEV 300 20	 174 CEV 200 40 Modbus SL 174 CEV 300 20 Modbus Plus 174 CEV 200 30/40	7/6
	Cables		Twisted pair 490 NTW/NTC 000 ●● Fiber optic 490 NO●05	7/7

(1) Dedicated to Sepam protection relays, to Micrologic protection units for Masterpact circuits-breakers, to Power Logic PM et CM power meters.

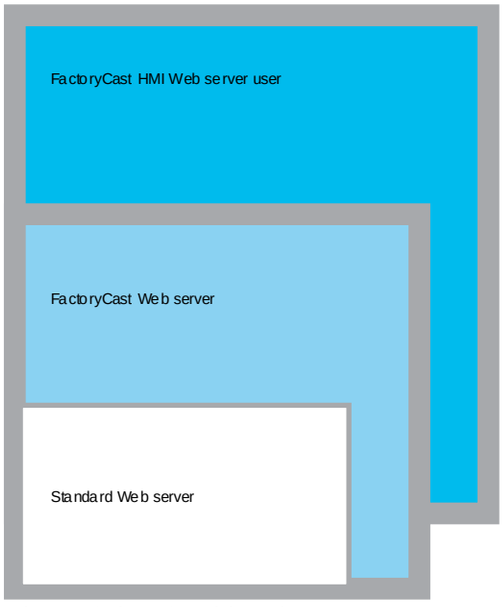
2

Contents

2 - System approach

2

Transparent Ready
System approach
Embedded Web servers



Ethernet TCP/IP PLC module services

Presentation

In line with the Transparent Ready approach, TSX Micro, Premium, Quantum, Momentum, Advantys STB distributed I/O and ATV drive automation platforms provide transparent access to data in realtime using Web-based technologies via their Ethernet TCP/IP or FactoryCast communication module.

The Transparent Ready communication modules in automation platforms integrate Ethernet TCP/IP services (Modbus TCP/IP messaging, SNMP network management functions, etc.) and provide the following Web functions:
- Standard Web server
- FactoryCast Web server
- FactoryCast HMI Web service

Standard Web server

Standard Web services can be used to execute diagnostic and maintenance functions on automation system installations locally or remotely using a simple Internet browser:
- PLC system and I/O module diagnostics, PLC error display (“Rack Viewer” pages ready to use)
- Display and adjustment of PLC variables (“Data Editor” pages ready to use)

The embedded Web server is a realtime PLC 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 Internet browser that supports the integrated Java code. The standard functions provided by the Web server are supplied “ready to use” and therefore do not require any programming at either PLC level or at the level of the PC device supporting the Internet browser.

FactoryCast Web server

In addition to providing standard Web services, the FactoryCast Web server can be used to control and monitor automation system installations both locally and remotely. The following functions are available:
- Management of system alarms and PLC application with partial or global acknowledgment (“ready to use” pages for the “Alarm Viewer” function)
- Application graphics diagnostics (customized graphical views created by the user using the “Graphic Data Editor” function)
- Graphics control via animated Web pages created by the user and stored in the FactoryCast module

FactoryCast Web servers can also be used to customize control, diagnostics and maintenance interfaces via user-defined Web pages and Web pages transferred to the module using FactoryCast configuration software (maximum available memory required is 8 Mb).

FactoryCast HMI Web server

In addition to the FactoryCast Web functions, the FactoryCast HMI Web server provides HMI Web functions, which are executed in the module itself:
- Realtime HMI database management, independent of the PLC processor
- Arithmetic and logical calculations based on HMI data
- Connectivity with relational databases
- Transmission of electronic messages (e-mail)

FactoryCast HMI is an active Web server, which can be used to execute HMI functions integrated in a PLC module. This eliminates the need for communication via polling to update the HMI/SCADA database.
In FactoryCast HMI modules, the HMI functions are executed without affecting the PLC application program and therefore the cycle time.

Transparent Ready
System approach
Embedded Web servers

Selection of Telemecanique Transparent Ready modules *(1)*

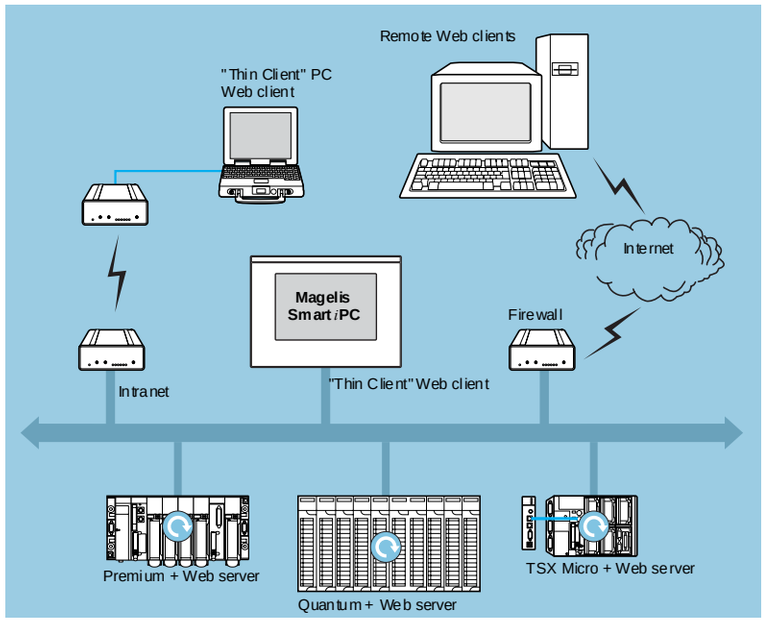
Products		Reference	Web server integrated		
			Standard Class B20	FactoryCast Class C20/C30	FactoryCast HMI Class D10
Quantum automation platform	Processors	140 CPU 651 50	■		
		140 CPU 651 60	■		
	Modules	140 NOE 771 01	■		
		140 NOE 771 11	■	■	
		140 NWM 100 00	■	■	■
Premium automation platform	Processors	TSX P57 2623 M	■		
		TSX P57 2823 M	■		
		TSX P57 3623 M	■		
		TSX P57 4823 M	■		
		TSX P57 1634 M	■		
		TSX P57 2634 M	■		
		TSX P57 3634 M	■		
		TSX P57 4634 M	■		
		TSX P57 5634 M	■		
	Modules	TSX ETY 4103	■		
		TSX ETY 110WS	■	■	
		TSX ETY 5103	■	■	
		TSX WMY 100	■	■	■
TSX Micro automation platform	Modules	TSX ETZ 410	■		
		TSX ETZ 510	■	■	
Momentum automation platform	M1E processors	171 CCC 960 20	■		
		171 CCC 960 30	■		
		171 CCC 980 20	■		
		171 CCC 980 30	■		
	Modules	170 ENT 110 01	■		
		170 ENT 110 02	■		
Advantys STB distributed I/O	Network interface module	STB NIP 2212	■		
Altivar ATV 58 TRX variable speed drive	Card	VW3 A58310U	■		

FactoryCast is a range of PLC modules associated with their configuration software and combines the following features:
- Realtime communication functions based on Ethernet TCP/IP
- Predefined Web pages, which enable advanced installation diagnostics
- The capacity to store dynamic user-defined Web pages

(1) Electrical Distribution products of Merlin Gerin, see pages 4/2 to 4/5.

Softwares and Web servers
Transparent Ready
Embedded Web servers, standard Web services

Standard Web services



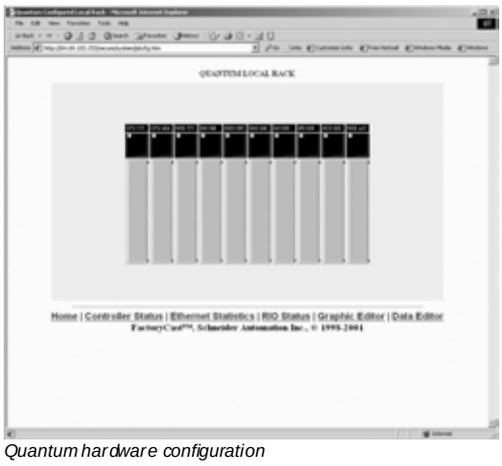
"Rack Viewer" and "Data Editor" functions are supported by the Ethernet TCP/IP modules of the following:
- TSX Micro platform,
- Premium platform ,
- Quantum platform,
- Momentum platform,
- Advantys STB distributed I/Os,
- FactoryCast modules .

See module reference on page 43617/3.

These functions can be accessed using a standard Internet browser connected to the network. They are "ready-to-use" and secure (password-protected).

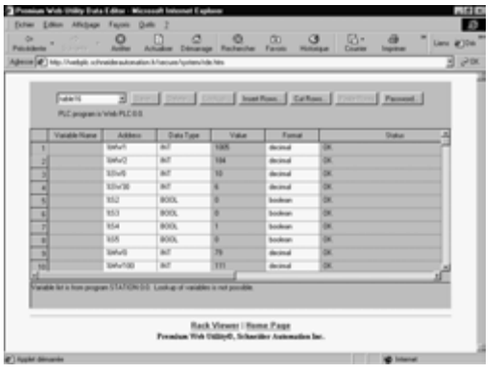
They can be used locally or remotely via:
- Intranet,
- A modem and RAS server,
- Internet.

Softwares and Web servers
Transparent Ready
Embedded Web servers, standard Web services



Quantum hardware configuration

Premium main rack hardware configuration



Variables table

"Rack Viewer" PLC diagnostics function

The "Rack Viewer" function (PLC rack display) 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 version
- The hardware configuration of the PLC including the status of the system bits and words
- Detailed diagnostics of all I/O module channels or application-specific channels in the configuration

"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 lists of PLC data.

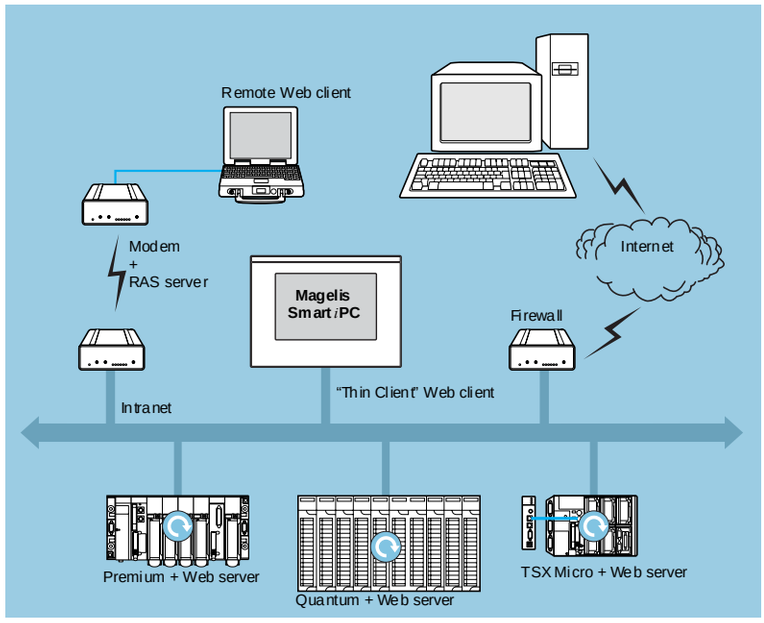
The variables to be displayed can be entered and displayed either symbolically (S_Pump 234) or by their address (%MW99).

These variables only support write access if this option has been enabled using the FactoryCast configuration software. A second password must be entered and verified when writing a value to a variable.

Various animation tables containing specific application variables to be monitored or modified can be created by the user and saved in the Ethernet TCP/IP module.

Softwares and Web servers
Transparent Ready
Embedded Web servers, FactoryCast Web server

FactoryCast Web server



In addition to standard Web services, FactoryCast modules (see selection table on page 43617/3) support the following functions:
- Alarm Viewer
- Creation and display of graphical views via an online graphics editor (Graphic Data Editor supplied)
- Hosting and display of Web pages created by the user

FactoryCast configuration software (supplied with FactoryCast modules) is required for the last 2 functions.

Alarm Viewer function

"Alarm Viewer" is a ready-to-use password-protected function. Based on the diagnostics buffer managed in the PLCs (specific memory area used to store all diagnostic events), this function is available with the Premium/Atrium platforms (with PL7 or Unity software) and the Quantum platform (with Unity software).

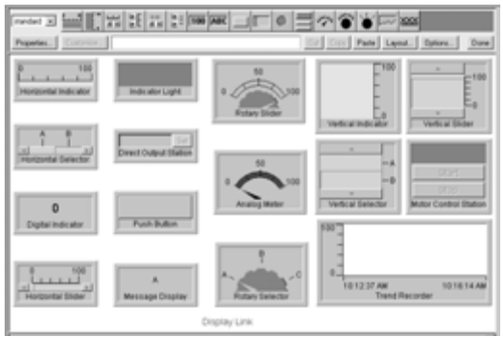
This function can be used to process alarms (display, acknowledgment and deletion) managed at PLC level by the system or using diagnostic function blocks known as DFBs (system-specific diagnostic function blocks and application-specific diagnostic function blocks created by the user).

Alarm Viewer page

The diagnostics viewer is a Web page comprising a list of messages, which displays the following information for each alarm:
- Its state
- The type of associated diagnostic function block (DFB)
- Its geographical area
- The dates and times of the occurrence/removal of a fault

FactoryCast Web server (continued)

Graphic Data Editor function



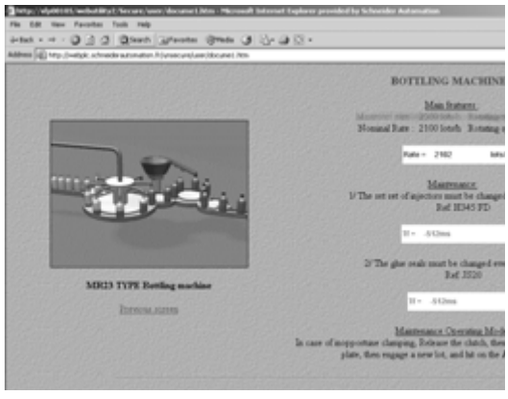
This function can be used to create graphical views online, animated by PLC variables.

These views are created using a library of graphic objects, which are predefined by simple copy/paste operations. The object parameters are set according to user requirements (color, PLC variables, labels, etc.). The graphic objects provided, which are the basic elements of the view, are as follows:
- Analog and digital indicators
- Horizontal and vertical bar charts
- Boxes for displaying messages and entering values
- Pushbutton boxes
- Functions for recording trends
- etc.

The views created can be saved in the FactoryCast modules.

These customized graphic objects can be reused in user Web pages that have been created using standard software for editing HTML pages.

Function for hosting and displaying user Web pages



In addition, FactoryCast Web modules have 8 Mbytes of memory *(1)*, which is accessed in the same way as a hard drive and can be used to host user-defined Web pages.
These Web pages can be created using any standard tool *(2)* that enables creation and editing in HTML format. These pages can be enhanced by inserting animated graphic objects linked to PLC variables. These animated objects are provided in the Graphic Data Editor supplied with FactoryCast.

The Web pages created can be used, for example, to:
- Display and modify all PLC variables in realtime
- Create hyperlinks to other external Web servers (documentation, suppliers, etc).

This function is particularly suitable for creating graphic screens used for the following purposes:
- Display, monitoring, diagnostics
- Generation of realtime production reports
- Maintenance help
- Operator guides

Configuration software for FactoryCast Web servers

The configuration software for FactoryCast Web servers is supplied on CD-ROM with every FactoryCast module (TSX Micro, Premium or Quantum).

The software is used for the configuration and administration of the Web server embedded in these modules. The software is compatible with Windows 95/98, Windows 2000, Windows NT 4.0 and Windows XP operating systems. It offers the following functions:
- Access security management
- Definition of user names and associated passwords for accessing Web pages
- Definition of access to variables authorized for modification
- Saving/restoration of an entire website
- Transfer of Web pages created locally by the user on their PC workstation to the FactoryCast module and vice versa

(1) Memory is not affected in the event of power outages or if the PLC is reinitialized.
(2) For example, Microsoft FrontPage.

Transparent Ready
System approach
Embedded Web servers, FactoryCast HMI Web server

FactoryCast HMI Web services

The FactoryCast HMI range comprises two Web server modules embedded in the PLC (one for the Premium platform and one for the Quantum platform) and FactoryCast HMI application development software (to be ordered separately).

These modules have the same Web functions as FactoryCast modules, namely:

- Ethernet TCP/IP communication functions:
  - TCP/IP messaging service with Modbus TCP and Uni-TE TCP protocols
  - SNMP agent for standardized network management, which supports standard MIB II and private Transparent Ready MIB.

- Standard Web and FactoryCast services:
  - "Rack Viewer" PLC diagnostics functions, see page 2/5
  - "Data Editor" read/write functions for PLC variables, see page 2/5
  - "Alarm Viewer" alarm display functions, see page 2/6
  - "Graphic Data Editor" online graphical editor functions, see page 2/7
  - Function for hosting and displaying user Web pages, see page 2/7

FactoryCast HMI modules also provide the following specialized HMI Web services:

- Realtime database management specific to the module, combining PLC data acquisition and the management of local internal variables.

- Arithmetic and logical calculations for pre-processing data.

- E-mail with automatic transmission triggered by a specific process event.

- Connection to the SQL Server, MySQL and Oracle relational databases for archiving data for tracking or logging.

By simply setting parameters, the FactoryCast HMI application development software can be used to set up these functions in an intuitive and user-friendly way. A simulation mode, which is integrated in the software, can be used to test the operation of the FactoryCast HMI application without a module and without the need for a physical connection to a PLC, thereby simplifying debugging.

Transparent Ready

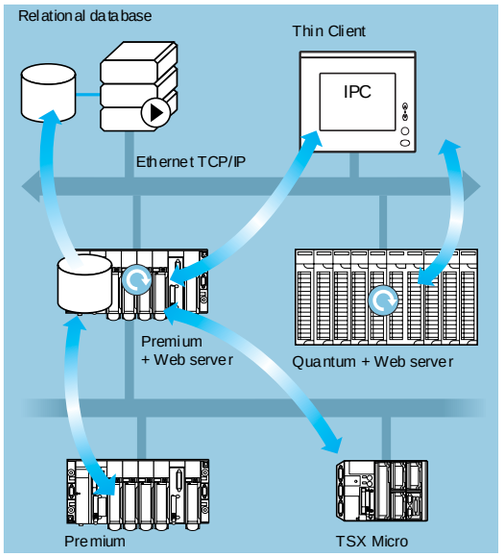
System approach

Embedded Web servers, FactoryCast HMI Web server

Architectures

FactoryCast HMI Web servers can be integrated in various architectures:

- Installations that require a flexible and cost-effective HMI solution
- "Hybrid" architectures supplementing conventional SCADA systems
- Architectures where a direct link is required between automation systems and information management levels (IT link).



Flexible Web HMI solution

The use of Web-based technologies means that FactoryCast HMI can replace conventional HMI or SCADA solutions in applications where architectures require a flexible multistation HMI, thus providing a temporary "nomadic" remote control function.

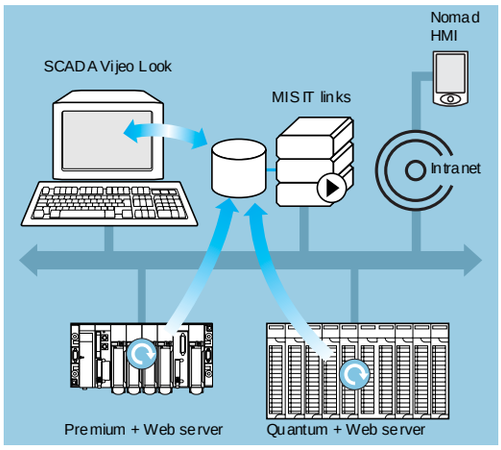
These architectures consist of:

- Several PLCs networked on Ethernet, which have FactoryCast HMI Web server modules.
- One or more PC terminals with "Thin Client" interface equipped with a simple Web browser.
- If necessary, a relational database in which FactoryCast HMI can archive data directly from the automation system.

FactoryCast HMI modules read PLC data and execute HMI services (E-mail, interpreted calculations, connection to relational databases, updating Web pages) at source in the PLC, without affecting the PLC program or the scan time.

This solution provides:

- A reliable HMI application, which is executed at source in a robust PLC device.
- An integrated multistation interface and remote access that is easy and cost-effective to set up ("Thin Client" terminal).
- An HMI application that is easy to maintain (the application is housed in a single location on the server side).
- Preventive maintenance via E-mail.
- Greater availability of data archiving done from source.



Hybrid architectures

In this type of architecture, FactoryCast HMI supplements conventional SCADA systems. SCADA Vijeo Look or Monitor Pro software meets the requirement for centralizing information for global supervision from a central site.

Combining a FactoryCast HMI solution and a conventional SCADA solution enables:

- Simplification of the SCADA application by locating some of the SCADA processing at source, at PLC level.
- Increased availability of the traceability function due to the direct connection between FactoryCast HMI modules and relational databases.
- Powerful "ready to use" remote diagnostics capacities.
- "Nomadic" stations to be connected to the Intranet or Internet via "Thin Client" PC or PDA devices.

Functions:
Pages 2/10 to 2/12

Description:
Page 2/13

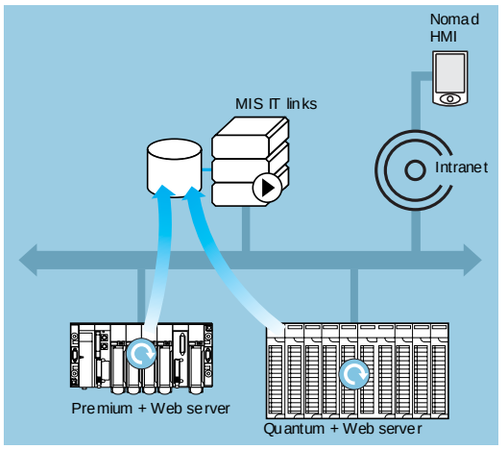
Characteristics:
Page 2/13

References:
Page 2/13

Transparent Ready

System approach

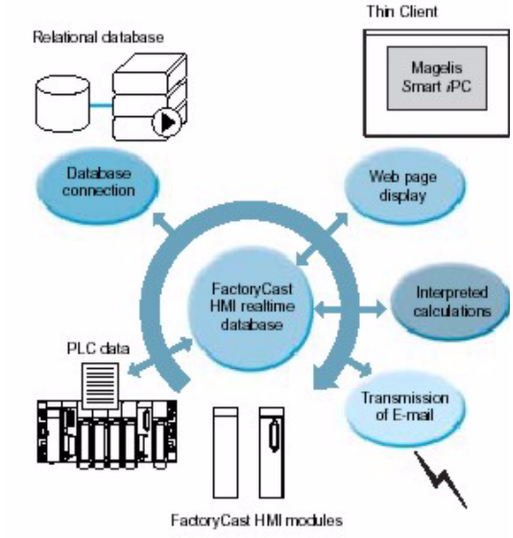
Embedded Web servers, FactoryCast HMI Web server



Direct links with the information management levels

In this type of architecture FactoryCast HMI eliminates the need for intermediate devices (gateways), which are expensive to install and maintain, by establishing a direct link between the automation levels and the global information management levels (MES, ERP, etc).
The PLC directly archives information from the automation system in relational databases, which allows a "collaborative" automation system to be set up, making it easier to share data in real time.

This solution results in:
- Simplified architectures
- Lower installation, development and maintenance costs
- Increased reliability of information (the data is collected at source)
- Greater availability of data archiving



Specialized HMI services

PLC acquisition and realtime database

With an internal architecture similar to that of an HMI/SCADA system, FactoryCast HMI modules manage their own variable database in realtime, independently of the PLC program. It is this variable database that is used to execute various functions, including internal processing, archiving, alarm, E-mail, etc.
Variables in this realtime database are updated using the automation system data acquisition service.
This service becomes operational once the following parameters have been set in the FactoryCast HMI software:
- Direct import of PLC variable/symbol databases (no double entry).
- Definition of the frequency of acquisition (period at which this variable is updated).

Note: *A FactoryCast HMI application running in a Premium configured FactoryCast HMI module can access also the remote PLC variables in the architecture via a transparent network (X-Way/ Uni-TE transparent protocols).*

Characteristics:
- Maximum number of I/O variables per application: 1000 variables from PLCs
- Maximum number of internal variables per application: 100
- Acquisition frequency: 500 ms, minimum

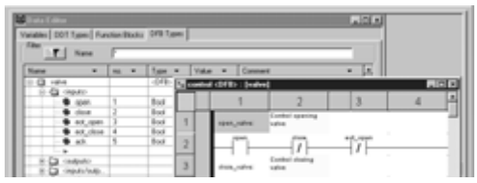
Transparent Ready
System approach
Embedded Web servers, FactoryCast HMI Web server

Specialized HMI services (continued)

E-mail transmission

The FactoryCast HMI module can, on a specific event, send E-mail completely autonomously to a predefined list of E-mail addresses. This function is executed independently of the PLC program.

The event that triggers the E-mail may be associated with the following:
- A PLC variable (I/O, internal variable)
- An alarm, a threshold overshoot
- A machine or process state
- An operator action, etc.



When an E-mail is sent to a destination E-mail address, it must pass through an SMTP *(Simple Mail Transfer Protocol)* server. This server receives the E-mail and waits for the recipient to acknowledge it. The E-mail service is compatible with all SMTP servers. A return address can be defined should delivery to the destination address fail.

Characteristics:
- Configuration of the SMTP server: Compatible with all SMTP servers
- Maximum number of E-mail: 100
- Contents of E-mail messages: Free text with embedded dynamic variable values (from the PLC) and hypertext links (unlimited)

Connection to relational databases

The FactoryCast HMI module can be connected directly and completely autonomously to the following remote relational databases:
- SQL Server
- MySQL
- Oracle

This connection enables all internal or process data to be archived so that it can be logged and traced.

The data can be archived (written) periodically and/or on a specific event. These variables can either be from PLCs (I/O bits, internal bits, internal words and registers) or local to the module. The FactoryCast HMI "Roll Over" function checks the size of tables by managing the maximum number of records. This circular data archiving function automatically deletes the oldest data and can be accessed by simply setting parameters in the FactoryCast HMI software.

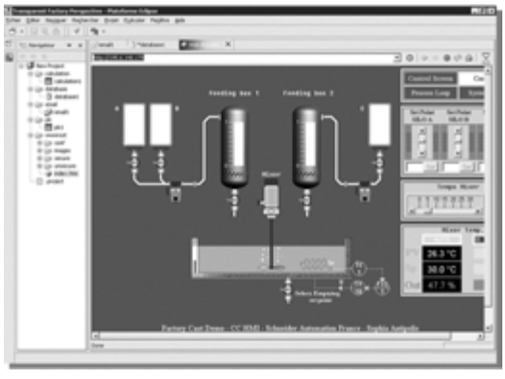
Characteristics:
- Number of databases that can be connected: 3
- Number of tables that can be written per database: 10, maximum
- Number of columns per table: 50, maximum
- Type of database supported: Oracle, SQL Server and MySQL
- Automatic table creation: The FactoryCast HMI server automatically creates a table in the database if one does not already exist

Calculation functions

The FactoryCast HMI server can carry out various arithmetic and logical operations on a combination of variables from the HMI database and does this independently of the PLC processor. These calculations include, for example, scaling, formatting, logic processing for event triggering, etc.

This calculation function is provided in the form of spreadsheets where the formulae are defined in cells. The spreadsheets are interpreted and processed by the server. The result of each formula is associated with a new internal variable. The processing of each spreadsheet is initiated by a trigger.

Functions: Pages 2/10 to 2/12 | Description: Page 2/13 | Characteristics: Page 2/13 | References: Page 2/13



FactoryCast HMI application development software

FactoryCast HMI application development software, referenced TLX CD FCHMI V1M, provides multiproject management and complete control of FactoryCast HMI applications, during both the development and the debugging phases, thanks to the online mode and simulation mode (operational when the system is offline) options.

This software enables the intuitive and user-friendly setup of HMI functions by simply setting parameters using a tree structure of the application and can be used for complete management of the Web site:

- Setting parameters for HMI functions:
  - Configuration of PLC interfaces: Import symbol databases and set parameters for the acquisition period
  - Configuration of spreadsheets
  - Configuration of E-mail
  - Configuration of connections to databases

- Management of the Web site:
  - Management of the Web site tree structure (creation/deletion of HTML folders and files)
  - Management of default Web site pages
  - Management of user Web site pages *(1)*
  - Graphic object editor for animating Web pages
  - Launch of the system editor for HTML pages (FrontPage or similar)
  - Up/downloading/comparison of Web pages in online mode
  - Debugging of Web pages in online mode or in simulation mode (including animations and Java beans)

- Simulation mode

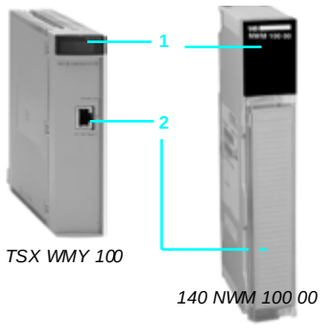
The application and the Web site (including animations and Java beans) can be debugged in either online or simulation mode, which enables operation to be tested without a FactoryCast HMI module and without a physical connection to a PLC, thus simplifying debugging.

An integrated graphics editor in the FactoryCast HMI software can be used to easily customize the following graphic objects: bar charts, gauges, LEDs, curves, cursors, operator input fields, alphanumeric display fields, buttons, etc.
User Web pages are created graphically using an external HTML editor (FrontPage or similar, not supplied).
FactoryCast HMI includes a plug-in for FrontPage 2000. This plug-in makes it easier to set up animations, which enable PLC variables to be accessed in realtime in the HTML pages created by the user. They are created in the HTML editor by simply inserting customized graphic objects (FactoryCast Java beans).

(1) Creation of user Web pages: User Web pages created in the FactoryCast HMI environment are actual animated supervision screens and can be used to monitor your process. Based on HMI Web technology, they enable realtime access to PLC variables thanks to the FactoryCast graphic objects library (FactoryCast Java beans).

Transparent Ready
System approach
Embedded Web servers, FactoryCast HMI Web server

Description



TSX WMY 100

140 NWM 100 00

The TSX WMY 100 (for Premium platform) and 140 NWM 100 00 (for Quantum platform) modules are equipped with the following on the front panel:

1 A display block, which indicates the module status and the transmission status of the Ethernet TCP/IP network.
2 An RJ45 connector (with Premium/Quantum) and an MTRJ connector for a 100BASE-FX interface (with Quantum).

To be ordered separately: Accessories and connecting cables, see Ethernet ConneXium wiring system (see page 8/5).

Characteristics

FactoryCast HMI module type		TSX WMY 100	140 NWM 100 00
Modicon automation platform		Premium	Quantum
Communication services			
Interface		10BASE-T/100BASE-TX	100BASE-TX and 100BASE-FX
Connection type		Point-to-point connection (via a standard RJ45 connector), which enables the formation of a (10BASE-T/100BASE-TX) star network (the stations are linked to ConneXium hubs or switches).	
Number of stations		64 stations maximum per network	
Transmission speed		10/100 Mbit/s with automatic speed recognition	
Ethernet communication services			
Network management		SNMP agent, supports standard MIB II and private Transparent Ready MIB	
TCP/IP services	Uni-TE	□ Client/server mode □ Client/server requests of 256 bytes (synchronous mode) □ Client/server requests of 1 K byte (asynchronous mode)	–
	Modbus	□ Client/server mode □ Asynchronous requests of 256 bytes	
X-Way services		□ X-Way inter-network routing □ X-Way/Uni-Telway routing □ Module diagnostics	–
Web server services			
Embedded Web server	Standard services	□ "Rack Viewer" PLC diagnostics □ "Data Editor" access to PLC data and variables	
	FactoryCast services	□ "Alarm Viewer" alarm display □ "Graphic Data Editor" graphic object editor □ Display of user Web pages (8 Mb available)	
	FactoryCast HMI services	□ HMI database (1000 variables, maximum) □ E-mail transmission (100, maximum) □ Connection to SQL Server, MySQL and Oracle databases: connection to 3 databases max., 10 tables maximum in write mode per database; □ Interpreted arithmetic and logical calculations □ Simulator for debugging the HMI application offline	

References

TSX WMY 100

140 NWM 100 00

Ethernet TCP/IP Transparent Ready modules

Embedded Web server	Name and description	Speed	Reference	Weight kg
FactoryCast HMI	FactoryCast HMI Premium module	10/100 Mbit/s	**TSX WMY 100**	0.340
	FactoryCast HMI Quantum module	100 Mbit/s	**140 NWM 100 00**	-

FactoryCast HMI installation software (to be ordered separately)

Name and description	Use	Operating system	Reference	Weight kg
Multilingual FactoryCast HMI *(1)*	Development and debugging of the HMI application	Windows 2000, Windows XP	**TLX CD FCHMI V1M**	0.340

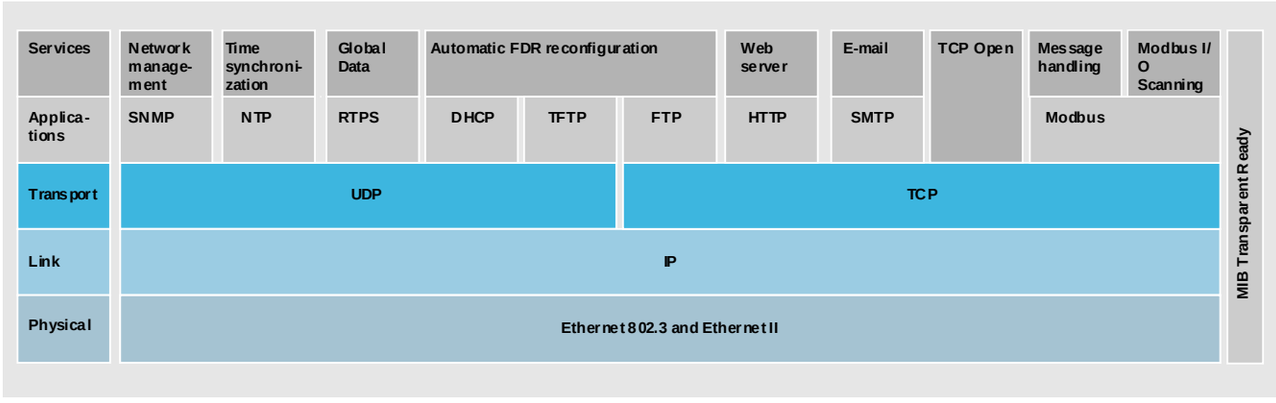
(1) Includes documentation in electronic format.

Functions: Pages 2/10 to 2/12 | Description: Page 2/13 | Characteristics: Page 2/13 | References: Page 2/13

Transparent Ready
System approach
Ethernet TCP/IP communication service

Presentation

Transparent Ready products allow transparent communication on a single Ethernet TCP/IP network.



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

- Modbus TCP messaging for class 10, 20 or 30 devices.
- I/O Scanning service for class 30 devices.
- FDR (Faulty Device Replacement) for class 10, 20 or 30 devices.
- SNMP (Simple Network Management Protocol) network administration for class 20 or 30 devices.
- Global Data, for class 30 devices.
- Pass band management for class 30 devices (see performance levels on pages 43655/2 to 43655/5).
- NTP (Network Time Protocol) time synchronization for class 30 devices.
- Notification of SMTP events via E-mail for class 30 devices.
- TCP Open, optional, for class 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.

Transparent Ready
System approach
Ethernet TCP/IP communication service

Functions

Standard Ethernet services

HTTP "Hypertext Transfer Protocol" (RFC1945)

The HTTP protocol (Hypertext Transfer Protocol) is used for transmitting Web pages between a server and a browser. HTTP has been used on the Web since 1990.

Web servers embedded into Ethernet TF devices are at the heart of the Transparent Ready concept, and are used to provide easy access to devices anywhere in the world from a standard browser such as Internet Explorer or Netscape Navigator.

BOOTP/DHCP (RFC1531)

BOOTP/DHCP is used to automatically provide the devices with the IP parameters. This avoids having to manage the addresses of each device individually.
Management is instead performed in a dedicated IP address server.
DHCP protocol (Dynamic Host Configuration Protocol) is used to automatically assign the devices their configuration parameters. DHCP is an extension of BOOTP.
DHCP protocol is made up of 2 components:
- One for providing the IP network address,
- One for providing the IP parameters specific to the device from a DHCP server.

Telemecanique devices can be:
- *BOOTP clients allowing automatic recovery of an IP address from a server,*
- *BOOTP servers enabling a device to distribute IP addresses to the network stations.*

Telemecanique uses standard BOOTP/DHCP protocols for its Faulty Device Replacement service (FDR).

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

File Transfer Protocol (FTP) provides basic file sharing elements. Many systems use FTP protocol to exchange files between devices.

Transparent Ready devices implement FTP for transferring certain data to or from devices, in particular when downloading firmware or user Web pages.

Functions (continued)

Standard Ethernet services (continued)

NTP "Network Time Protocol" (RFC 1305)

NTP (Network Time Protocol) is used to synchronize the time of a client or server device from a time server. Depending on the network used, it provides the following time precisions based on the UTC:
- Several milliseconds on a local area network (LAN).
- Several tens of milliseconds on a wide area network (WAN).

SMTP "Simple Mail Transfer Protocol" (RFC 0821)

SMTP (Simple Mail Transfer Protocol) is an E-mail transmission service. It is used to send E-mail between a sender and a recipient via an SMTP E-mail server.

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

The Internet community developed standard SNMP for managing the different components of a network through a single system. The network management system can exchange data with SNMP agent devices. This function enables the manager to view the status of the network and devices, modify their configuration and feed back alarms in the event of failure.

Transparent Ready devices are SNMP-compatible and can be integrated naturally in a network managed 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 used in Windows components. This enables Windows applications to communicate transparently.

These technologies are used in the OFS Data server software.

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

Example of Modbus TCP/IP function codes supported for accessing data and diagnostics

Functions (continued)

Modbus communication standard

Modbus, the industrial communication standard since 1979, has been combined with Ethernet TCP/IP, which supports the Internet revolution, to make Modbus TCP/IP, a completely open Ethernet protocol. The development of a connection to Modbus TCP/IP requires no proprietary component or license purchase.
This protocol may be easily combined with any device supporting a standard TCP/IP communication stack. Specifications can be obtained free of charge from the website: www.modbus-ida.org.

Modbus TCP, simple and open

The Modbus application layer is very simple and universally recognized. Thousands of manufacturers are already implementing this protocol. Many have already developed a Modbus TCP/IP connection and many products are currently available. The simplicity of Modbus TCP/IP enables any small field team, such as an I/O module, to communicate over Ethernet without the need for a powerful micro-processor or a lot of internal memory.

Modbus TCP, high-performance

Because of the simplicity of its protocol and the high speed of 100 M bits/s Ethernet, Modbus TCP/IP delivers excellent performance. This means it is possible to use this type of network in real-time applications such as I/O Scanning.

Modbus TCP/IP, one standard

An identical application protocol is used for Modbus serial link, Modbus Plus or Modbus TCP. This therefore makes it possible to route messages from a network to another without changing protocol.
As Modbus is implemented above the TCP/IP layer, users can also benefit from the IP routing which enables devices located anywhere in the world to communicate without having to worry about the distance between them.
Schneider offers an entire range of gateways for interconnecting a Modbus TCP/IP network to already existing Modbus Plus or Modbus serial link networks. For further details, consult our regional sales office.
The IANA institute (Internet Assigned Numbers Authority) has assigned Schneider port TCP 502 (Well known port), which is reserved for the Modbus protocol. This protocol will shortly be also subject to an RFC (Request For Comments), documents which form standard references within the Internet community.

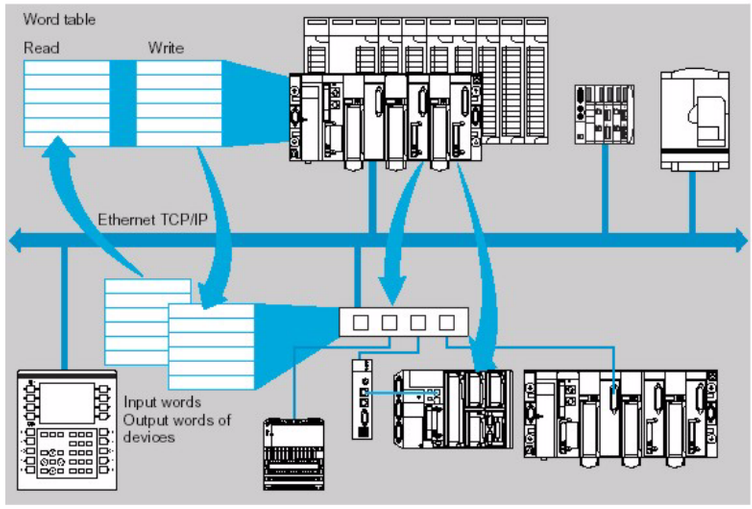
Modbus TCP/IP characteristics

Maximum size of data:
- Read: 125 words or registers.
- Write: 100 words or registers.

Transparent Ready
System approach
Ethernet TCP/IP communication service

Functions (continued)

I/O Scanning service

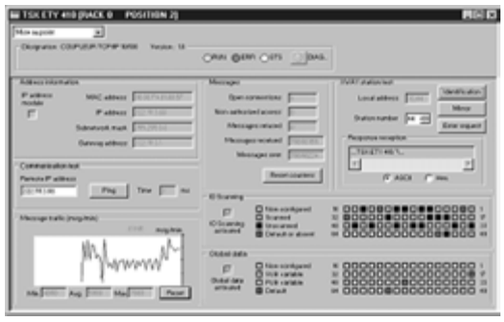


The I/O Scanning service can be used to manage the exchange of distributed I/Os on the Ethernet network after a simple configuration operation, with no need for special programming.
The I/Os are scanned transparently by means of read/write requests according to the Modbus Master/Slave protocol on the TCP/IP profile. This principle of scanning via a standard protocol enables communication with any device which supports a Modbus server on TCP/IP.
This service can be used to define:
- An %MW word zone reserved for reading inputs.
- An %MW word zone reserved for writing outputs.
- Refresh periods independent of the PLC scan.

During operation, the module:
- Manages the TCP/IP connections with each of the distributed devices.
- Scans the devices and copies the I/Os into the configured %MW word zone.
- Feeds back status words so that correct operation of the service can be monitored from the PLC application.
- Applies the preconfigured fallback values in the event of a communication problem.

An offer of hardware and software products which enable the I/O Scanning protocol to be implemented on any type of product which can be connected to the Ethernet network (please consult: www.modbus-ida.org).

Characteristics:
- Each station can exchange a maximum of 120 words.
- Maximum size in the PLC managing the service:
  - 2 K words %MW in inputs and 2 K words %MW in outputs with manager PLC (64 stations max.),
  - 4 K words %MW in inputs and 4 K words %MW in outputs with manager PLC (128 stations max.).



I/O Scanning service diagnostics

I/O Scanning service diagnostics can be performed in 3 ways:
- By the application program from a data field specific to the PLC.
- From the debugging screen in the installation software.
- From the PLC system diagnostics function viewed with the Internet browser on a PC station.

Functions (continued)

Replacement service for faulty devices *(Faulty Device Replacement)*

The Faulty Device Replacement service uses the standard BOOTP, DHCP, file management and TFTP technologies with the objective of simplifying Ethernet device maintenance.

It enables a faulty device to be replaced by a new product while guaranteeing its detection, reconfiguration, and automatic restart by the system, without difficult manual intervention.

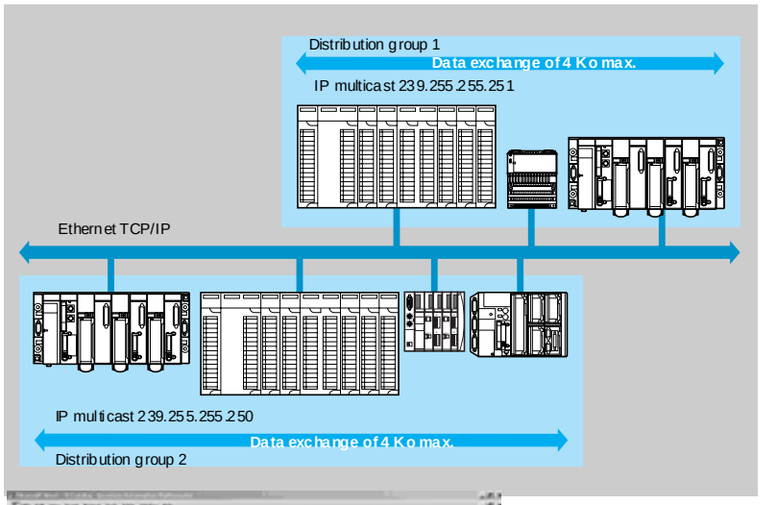
The principal steps are:
- A device using the FDR service is faulty.
- Another similar device is taken from the maintenance pool, preconfigured with the “role_name” (or identifier) of the device that is out of service, then reinstalled on the network.
- The FDR server can be:
  - Premium processor with embedded Ethernet,
  - Quantum processor with embedded Ethernet,
  - Premium Ethernet module: TSX ETY,
  - Quantum Ethernet module: 140 NOE 771,

detects the new addition, configures its IP address and transfers all configuration parameters to it.

The substituted device verifies if all the parameters are indeed compatible with its own characteristics, then switches to operating mode.

Functions (continued)

Global Data service



The Global Data service ensures data exchanges in real time between stations belonging to the same distribution group. It is used to synchronize remote applications, or share a common database among several distributed applications.
The exchanges are based on a standard producer/consumer protocol, guaranteeing optimal performance while maintaining a minimum network load. This RTPS (Real Time Publisher Subscriber) protocol is promoted by the IDA (Interface For Distributed Automation) organization, and has already been adopted as a standard by several manufacturers.

Characteristics: A maximum of 64 stations can participate in Global Data within the same distribution group.
Each station can:

- Publish one 1024-byte variable. The publication period can be configured from 1 to n periods of the MAST task of the processor.
- Subscribe to between 1 and 64 variables. Validity for each variable is controlled by Health Status Bits, linked to a refresh timeout configurable between 50 ms and 1 s. Access to a variable element is not possible. The total size of the subscribed variables reaches 4 K contiguous bytes.

In order to optimize Ethernet network performance further still, Global Data can be configured with the "multicast filtering" option, which together with switches in the ConneXium range, perform data broadcasting only on Ethernet ports, where there is a Global Data service subscriber station. If these switches are not used, Global Data is transmitted in "multicast" on all switch ports

Global Data service diagnostics

The diagnostics screens use a color code to show Global Data status:

- Configured/not configured/faulty.
- Published/subscribed.

Editeur de Global Data

Unity Studio software suite: single Global Data entry point

The Unity Studio software suite is the key component required on design office workstations used for designing and structuring distributed industrial automation projects.

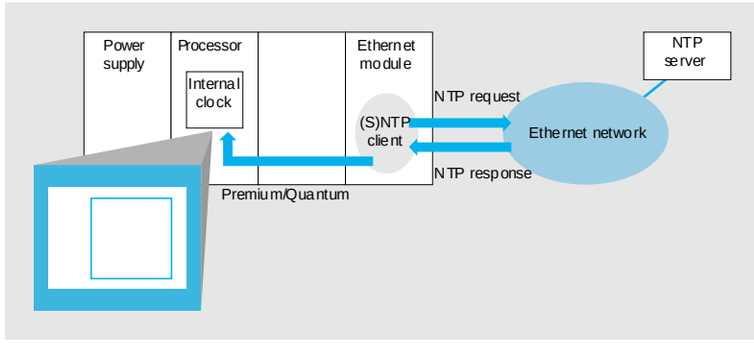
The Unity Studio Global Data view enables the definition of Global Data distribution groups and the configuration of settings for published and subscribed station variables. During generation at each station level, this setting configuration is saved automatically to station files, thereby ensuring:

- Guaranteed consistency of communication between the distributed applications in question.
- Maximum productivity with respect to station configuration tasks.
- Minimized risk of errors.

Functions (continued)

NTP time synchronization service

Presentation



The time synchronization service is based on the NTP *(Network Time Protocol)* which is used to synchronize the time of a client or a server on Ethernet TCP/IP from a server or another reference time source (radio, satellite, etc).

Operation

The Ethernet TCP/IP communication modules in the Modicon Quantum Unity V2 and Premium Unity V2 automation platforms have an NTP client component. These modules can connect to an NTP server using a client request (unicast), in order to update their local time. The module clock is updated periodically (1 to 120 seconds) with an error of less than 10 ms for standard processors and less than 5 ms for high performance processors. If the NTP server cannot be reached, the Ethernet TCP/IP module switches to a standby NTP server.

Unity module and processor used		Predicted typical time service precision		
Ethernet modules	**Ethernet modules with Unity processor**	**Clock synchronisation** *(1)*	**Event synchronisation**	**Time stamping** *(2)*
TSX ETY 4103 **TSX ETY 5103**	**TSX P57 0244M** **TSX P57 1●4M** **TSX P57 2●4M** **TSX P57 3●4M**	± 1 ms typical ± 10 ms max.	= Clock synchronisation precision	= Clock synchronisation precision
	TSX P57 4●4M **TSX P57 5●4M**	± 1 ms typical ± 5 ms max.	+ Fast task time	+ I/O time
140 NOE 771 01 **140 NOE 771 11**	**140 CPU 311 10** **140 CPU 434 12U** **140 CPU 534 14U**	± 1 ms typical ± 10 ms max.	+ I/O time	
	140 CPU 651 50 **140 CPU 651 60** **140 CPU 671 60**	± 1 ms typical ± 5 ms max.		

(1) Time difference between field input and central NTP server.
(2) Assuming input connected to the interrupt module.

The PLC processor clock is therefore itself updated with a precision of 5 ms for standard processors and 1 ms for high performance processors. A function block is available for reading this clock. In each PLC application, events or variables can be time-stamped.

The Ethernet module is configured via a Web page. The time zone can be configured. A time synchronization service (NTP) diagnostic Web page is also available.

Information on the time synchronization service (NTP) is also available in the Transparent Ready private MIB, which can be accessed via the SNMP network management service (see above).

Functions (continued)

Electronic mail notification SMTP service

Introduction

This simple mail notification service is a programmed service that allows PLC applications to report by exception conditions monitored by the PLC. The automation controller can automatically and dynamically create electronic mail to alert specified users with data, alarms and events - whether the recipients are local or remote.

Note: This service is available on the latest Premium and Quantum Ethernet modules & CPUs, when operating with Unity Pro software. A more comprehensive mail service, independent of the PLC application, is available on the FactoryCast HMI active web server modules (see page 2/11)

Usage

A simple yet powerful mechanism is used. Predefined email headers are linked together with the body of the mail which is created dynamically from the latest information in the automation application.

The user logic program can trigger the message based on a predefined event or condition. Using a function block, one of 3 predefined headers is selected and an email message with variable information and text (up to a maximum of 240 bytes) is created and sent directly from the PLC.

Each of the three mail headers contains these common predefined items –email recipient list, sender name and subject. This information can be defined and updated by an authorized administrator using the configuration web pages.

Message creation and delivery

The PLC application selects the appropriate header. The system architect may define the mail headers to indicate differing importance levels. For example :

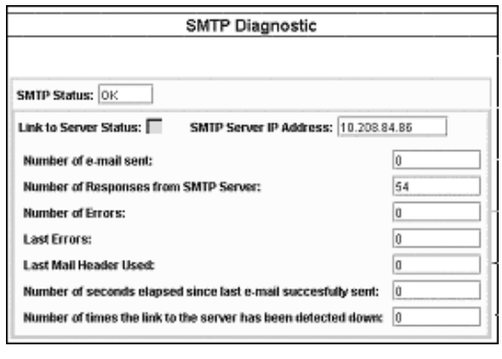
- Header 1 could be “URGENT problem reported by PLC 10”,
- Header 2 might be “WARNING at substation 10”,
- Header 3 could be “INFO message from water system”.

Differing lists of recipients between the three headers help to ensure that the right information quickly flows to the right recipients. The application can then add pertinent information to the body of the mail message such as the specific device, process or location.

Completed mail is then sent to an electronic mail server for expeditious distribution to the interested parties. These recipients could be engineers, managers, process owners etc.

Security

Each mail message can be protected by an optional login and password that is authenticated by the SMTP mail server. If, for additional security, the site’s mail installation has changed the TCP port number from the default of 25, the port number can be changed in the PLC email configuration (via secured web page access).



Configuration

An authorized administrator can use a web page to easily configure the mail service. For each of the three mail headers, the sender, recipient list and subject message can be defined. The electronic mail server connection information such as IP address and security information can also be set from the web page.

Diagnostics

As all other Ethernet services in Premium and Quantum systems, the Mail Service has a Diagnostic Web page showing the complete, up to the second, status.

Remote Monitoring

These products provide diagnostic information for remote management applications following the SNMP network management standard. Information for the mail service is included in the Schneider Electric private MIB which is publicly available.

Functions (continued)

SNMP service protocol

The SNMP (Simple Network Management Protocol) protocol is used, from a network management station, to monitor and control all Ethernet architecture components and thus ensure rapid diagnostics if a problem occurs.
It is used to:

- Query devices such as computer stations, routers, switches, bridges or terminal devices (DTE) in order to view their status.
- Obtain statistics for the network on which the devices are connected.

This management software respects the traditional Client/Server model. However, in order to avoid confusion with other communication protocols using this terminology, we prefer to use the expression:

- Network manager for the Client application running on the computer station.
- SNMP agent for the server application that runs on the device.

Transparent Factory can be managed by any SNMP network manager, including HP Openview or IBM Netview.

Standard SNMP (Simple Network Management Protocol) is used to access configuration and management objects included in the MIB (Management Information Base) for the devices. These MIBs must comply with certain standards in order to be accessed by all managers on the market. However, depending on the device complexity, manufacturers can add certain objects to the private databases.

The Transparent Factory private MIB includes management objects specific to the Telemecanique offer. These objects simplify installation, implementation, and maintenance for Transparent Factory products in an open environment using standard network management tools.
The Transparent Factory products support 2 SNMP network management levels:

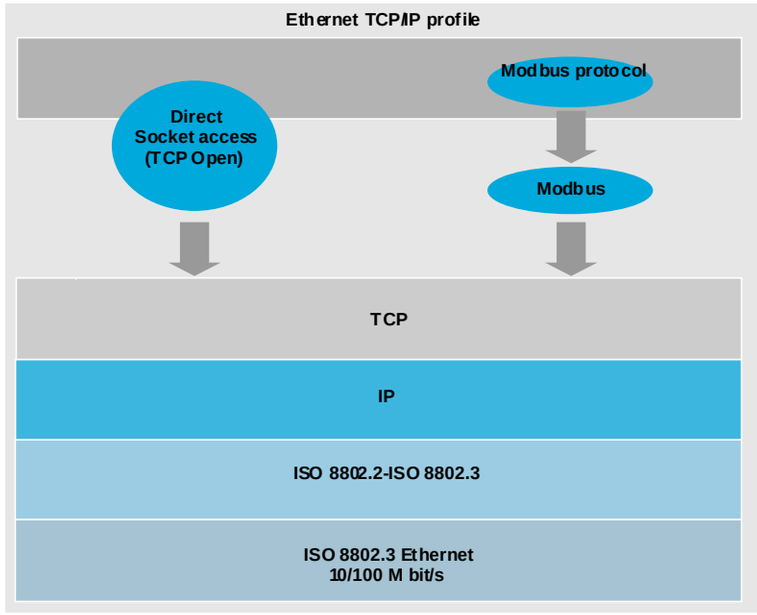
- Standard MIB II, a first level of network management, can be accessed via this interface. It lets the manager identify the devices forming the architecture and retrieve general information on the configuration and operation of the Ethernet TCP/IP interfaces.
- MIB Transparent Factory interface; management of the Transparent Factory devices is improved via this interface. This MIB includes a set of data that enables the network management system to supervise all the Transparent Factory services.

The Transparent Factory private MIB can be downloaded from the Web server from any Ethernet Transparent Factory module in a PLC.

TCP Open optional service

Presentation

TSX ETY 110 WS/5103 Premium platform Ethernet modules support a number of communication protocols based on the TCP/IP standard.
Among these, the Modbus protocol has public specifications and its simplicity recommends it for the needs of communication with third-party devices.



However, for certain applications, it may prove necessary to use other protocols. This is the case when, for example, users wish to integrate Premium platforms into existing architectures which use a particular communication protocol, possibly a proprietary one.
To meet these needs for open access, 2 interface levels are included in the Telemecanique offer:

- A library of basic functions, which can be used in C language, enables direct access to the socket interface on TCP. The user can thus create his own communication functions using SDKC development software and take advantage of the ease of use which this program offers in terms of development and debugging. Once generated, these function blocks are used in the application like any standard PL7 programming software function block.
- A library of basic function blocks known as EFs, which can be used directly in the application programs with PL7 language. These are the same as functions developed in C language seen earlier, but are designed for use by non-computer specialists. These EF function blocks are not modifiable.

Functions

Operating in TCP connection client/server mode, the basic functions on the Berkeley socket interface enable:

- Management of 16 connections on the Open profile out of a maximum of 32
- Creation of sockets and their attachment to any TCP port.
- Switching of these sockets to "listen for a connection request from a remote client" mode.
- Opening of a connection.
- Transmission and reception of data on these connections (8 bytes max.).
- Closing this connection.

TCP Open optional service (continued)

Description

The TCP Open offer consists of a CD-ROM containing the TCP/IP function libraries. Open access on TCP is only possible via TSX ETY 110WS *(1)* and TSX ETY 5103 *Ethernet modules.* With open access on TCP, all the basic functions of these modules can be used.

The TCP/IP **TLX CD TCP 50M** function library comprises:
- The SDKC program enhancement library that provides access to the module TCP/IP socket functions
- The user's manual in English (no printed version)
- EF elementary communication function blocks (Socket/Bind/Listen/Accept/Shutdown/Close/Send/Receive/Select/Set_Socket Option/Connect) for installation using PL7 software (version ≥ V3.3)
- Higher level EF function blocks, provided by way of example, which can perform more advanced functions such as the complete sequence for establishing or closing a connection, or sending or receiving data. The source files for all these EF blocks are also supplied
- An example of a PL7 application communicating with a TELNET application on a PC

If customised function blocks are needed both the SDKC program for C language **TLX L SDKC PL741M** (with PL7) or **UNY SPU ZU CD 20E** (with Unity Pro) and the library of function blocks TCP Open **TLX CD TCPA33E** should be installed on the development station.

Setup precautions

The development of C language functions requires compliance with certain setup precautions:
- To set up these services, the user should be familiar with the TCP/IP profile
- In addition, since the SDKC program enables access to all the PLC internal resources, all the necessary precautions should be taken when developing EF communication blocks to avoid endangering the PL7 application, especially on the commonly fragile operating modes such as cold/warm restarts, response to a fault, etc
- The user should also take care to maintain the requests from the different communication profiles at a level compatible with the performance required by the application
- Finally, it is the responsibility of the client application software (PL7 or C program) to manage the operating modes for communication which may be specific to the application, for example the behavior if a remote device fails to respond or in the event of a break in connection

For these different reasons, we recommend that you consult your Regional Sales Office to ensure that your TCP protocol open access project is feasible.

(1) Open access on TCP requires TSX ETY 110 WS modules, version ≥ PV 03 and SV 2.9. In addition, it should be integrated on a configuration with a TSX P57 ●●3 processor (or TSX P57 ●●2 version > V3.3).

Transparent Ready

System approach

Premium/Quantum platform performance Ethernet TCP/IP network

Selecting the communication architecture

When selecting an architecture, it is advisable to take performance into account at the earliest possible stage.
For this, the designer must:

1 Have a clear idea of his needs as regards:
- quantity and type of devices to be interconnected,
- volume and type of exchanges,
- expected response times,
- environment.

2 Compare his needs with the characteristics of the offers available and be aware that the precise performance level between any 2 points on an architecture is dependent on the weakest link in the chain, which can be:
- a function of the hardware,
- but also a function of the applications (size, architecture, OS, machine power, etc.) which are often poorly defined at this stage of project.

3 Select the most suitable architecture.

The objective of the following pages is to answer the second point by explaining the performance of the different components which constitute an Ethernet architecture, concentrating on the following 2 aspects:
- Processing capacity in terms of volume of exchanges (see pages 2/25 and 2/26).
- Application response time (see page 2/27).

Introduction

As in any communication system, the performance of an Ethernet architecture is linked to numerous parameters which depend on the:
- Hardware used:
  - network bandwidth,
  - resources of module or CPU with Ethernet embedded,
  - processor resources (PLC, PC or other CPUs).
- Application services used:
  - Modbus (or Uni-TE) industrial messaging handling service,
  - Global Data service, data scanning between PLC,
  - I/O Scanning service, data scanning of distributed I/O,
  - Others (Web access, TCP Open communication).

The difficulty in determining the correct size of an architecture is due to the fact that the majority of these parameters are linked.

Nota : *For purposes of simplification, the values shown in the tables which follow have been reduced. If these are adhered to, correct operation of the architecture is ensured. If the performance levels obtained are not sufficient, please consult our Regional Sales Office for a more detailed study.*

Nota : *The performance levels indicated depend relatively little on the size of messages. Limiting factors have much more to do with the number of messages. It is therefore necessary to group as much useful information as possible within the same message using the most suitable Modbus request.*

Processing capacity in terms of volume of exchanges

The methodology presented below in 4 steps can be used to determine the message processing capacity on Ethernet TCP/IP.

Step 1: calculation of exchanges necessary for the application

Using the tables below, calculate the exchanges necessary for the application, i.e. for each station on the architecture and for each service used, the number of messages to be transmitted and received per second.

Messages transmitted per second from		Station A	Station B	Station N	Total number of messages received per station
Messages per second sent to	Station A				R1
	Station B				R2
	Station N				Ri
Total number of messages transmitted per station		E1	E2	Ei	Network load Cru = Σ [R1…Ri, E1…Ei]

Not applicable

Transparent Ready

System approach

Premium/Quantum platform performance Ethernet TCP/IP network

Step 2: station processor processing capacity, system requests

Using the table below, compare the total number of messages received via the Modbus and Uni-TE service for each station (value R1, R2 or Ri) with the station processor processing capacity.
If the result of this initial calculation is positive, go to step **3**.

Premium or Atrium platform		**Messages being received**	**Messages being transmitted**
Communication by EFs or EFBs (PL7 or Unity Pro)			
Modbus requests *(1)*	**TSX 57 10**	4 mes/cyc	Does not constitute a limiting factor
	TSX 57 20	8 mes/cyc	
	TSX 57 30	12 mes/cyc	
	TSX 57 40	16 mes/cyc	
	TSX 57 50 *(2)*	16/20 mes/cyc	
Quantum platform		**Messages being received**	**Messages being transmitted**
Communication by EFs or EFBs (Concept, ProWORX or Unity Pro)			
Modbus requests *(1)*	**CPU 113 02/03** *(3)*	1 mes/cyc	4 mes/cyc
	CPU 311 10 *(2)*	1 mes/cyc	4 mes/cyc
	CPU 434 12●	1 mes/cyc	4 mes/cyc
	CPU 534 14●	1 mes/cyc	4 mes/cyc
	CPU 651 ●0 *(2)*	16 mes/cyc *(4)*	4 mes/cyc
	CPU 671 60 *(2)*	16 mes/cyc *(4)*	4 mes/cyc

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

Step 3: bus or network module processing capacity

For each station, compare the total number of messages received (Σ [values Ri, Rj] and the total number of messages transmitted (Σ [values Ei, Ej] for station N, for example) with the bus or network processing capacity shown below. If the result of this second calculation is positive, go to step **4**.

Processing capacity of Ethernet connections	**Premium Ethernet TCP/IP**			**Quantum Ethernet TCP/IP**	
	TSX ETY 110/210 **TSX ETY 110WS**	**TSX ETY 4103/5103** **TSX WMY 100** *(5)* **TSX P57 10/20/30/40**	**TSX P57 50**	**140 NOE 771 ●●** **140 NWM 100 00** *(5)*	**140 CPU 65 150/160** **140 CPU 67 160**
Message transactions	60	450 transactions	500 transactions	350 transactions/s	350 transactions/s
Scanning I/O polling	Service not available	2000 *(2)* transactions	2000 transactions	2000 transactions/s	2000 transactions/s
Global Data subscriptions		800 *(2)* transactions	800 transactions	800 transactions/s	800 transactions/s

Characteristics summary

- Modbus requests:
  - 125 words or registers in read access,
  - 100 words or registers in write access.
- Global Data: 1024-word published variable, subscription to a maximum of 64 variables, with a maximum size of 2 K %MW.
- I/O Scanning with maximum size in the PLC managing the service:
  - 2 K %MW in inputs and 2 K %MW in outputs with manager PLC limited to 64 stations,
  - 2 K %MW in inputs and 4 K %MW in outputs with manager PLC limited to 128 stations (TSX P57 50, 140 CPU 65 150/160 et 140 CPU 67 160).

(1) A temporary overload on several PLC cycles, due, for example, to an adjustment terminal or the temporary connection of an Internet browser, is acceptable.
(2) Only with Unity Pro.
(3) Only with Concept/ProWORX.
(4) With Unity Pro version V2.0, 1 message/cycle with version V1.0.
(5) I/O Scanning and Global Data services are not available for TSX WMY 100 and 140 NWM 100 00 modules.

Transparent Ready

System approach

Premium/Quantum platform performance Ethernet TCP/IP network

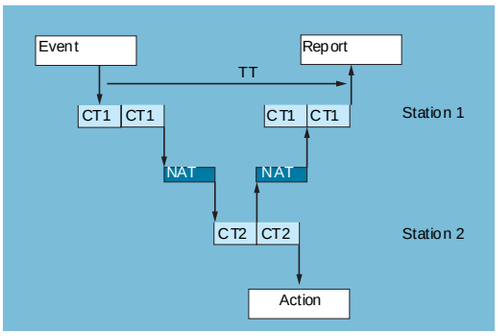
Step 3: bus or network module processing capacity (continued)
Network bandwidth management in the Ethernet TCP/IP modules

The bandwidth management service shows load level for the Ethernet module. This enables the user to monitor any drift and anticipate possible problems.
Ethernet module load is indicated in 3 ways:
- Anticipated load in the PL7 configuration screen.
- Actual load in the PL7 diagnostics/debugging screen, as well as in Web diagnostics pages. The load is displayed as a bar graph, animated in real time.
- In the SNMP interface for access to the SNMP network manager.

The bandwidth is shown as a percentage for each of the following services:
- Modbus (and Uni-TE) message handling.
- I/O Scanning.
- Global Data.
- Other.

Step 4: network load

In spite of the large bandwidth of an Ethernet Network (100 Mbit/s), the user must ensure that the actual application load does not exceed 25 to 30 % of the hypothetical network capacity. If this should occur, this load must be reduced via a switched architecture (use of switches). See page 43656/6.



Application response time

For the Modbus (or Uni-TE) messaging handling service

PLC-module processor exchanges are synchronous with the PLC cycle, in the same manner as the input/output exchanges. When an event appears, (input switching to 1 for example), a message can only be transmitted after this input has been taken into consideration (start of the following cycle) and the PLC program has been executed, i.e. approximately 1.5 cycles after the event has appeared.

Network access time (NAT) shown in the table below as ms, totals the module transit time and the delay before the message can be transmitted across the network.

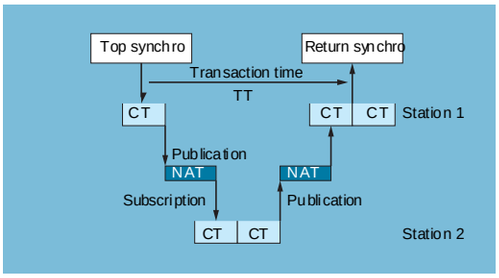
Processing Modbus message requests	Premium Ethernet TCP/IP		Quantum Ethernet TCP/IP	
	TSX ETY 110/210 TSX ETY 110WS	TSX ETY 4103/5103 TSX WMY 100 TSX P57 10...57 50	140 NOE 771 ●● 140 CPU 113/311 ●● 140 CPU 434/5341 ●	140 CPU 65 150/160 140 CPU 67 160
Network access time NAT	< 25 ms	< 10 ms	< 10 ms	< 10 ms

Transaction time TT includes the delay between the transmission of a message from a client station **1**, its reception by a server station **2**, processing the request, sending back the response and its acceptance by station 1 (update of an output for example).
As the block diagram above shows:
- The duration of the transaction will be between:

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

- Average duration is:

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



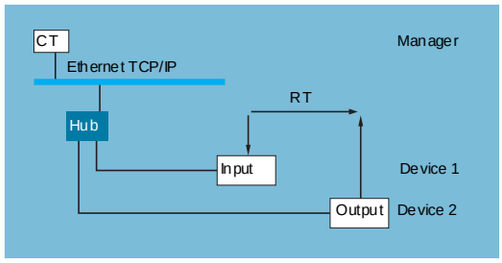
For the Global Data service

The transaction time (TT) includes the delay between publication of a Global Data by station **1**, its reception and processing by remote station 2 and its retransmission to the initial station **1**:
For an exchanged variable:
- If CT < 5 ms, transaction time: TT = 5 to 6 x CT
- If CT ≥ 10 ms, transaction time: TT = 3 x CT

Transparent Ready

System approach

Premium/Quantum platform performance Ethernet TCP/IP network

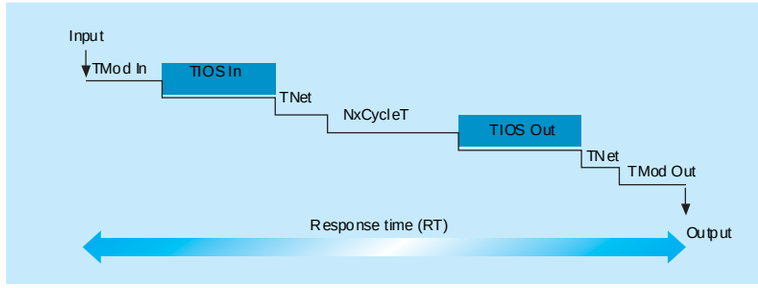


Application response time (continued)

I/O Scanning service

The RT application response time include the delay between getting data from a remote input and up dating remote output. It includes PLC application treatment time.

This RT response time is composed of following parameters:



- TMod In and TMod Out: response time of the read/written device excluding the input circuit transition (TMod depends of the device, but commonly between 1 to 8 ms).
- TIOS In and TIOS Out: time between two scanning of the same read device (0.3 ms x number of device scanned and atleast the pooling rate configured. TIOS is executed in parallel of the CPU cycle time, so could be hidden for the RT response time).
- N: number of PLC CPU cycles.
- CycleT: CPU cycle time.
- Tnet: propagation time on the network (depending of the application, but commonly Tnet is 0.05 ms at 10 Mbit/s and 0.005ms at 100 Mbit/s).

The RT response time could be estimated using the following formulas:

- TRmin, minimal response time with TIOS hidden and 1 CycleT:
  TRmin = Tmod In + 0 x TIOS In + Tnet + 1 x CycleT + 0 x TIOS Out + Tnet + TMod Out

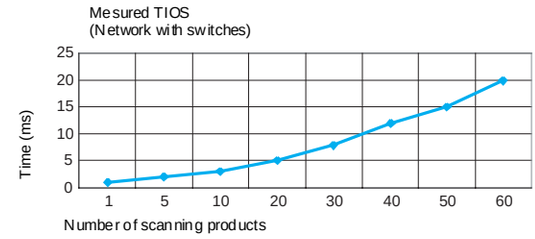
- TRtypic, typical response time (with 0,5 TIOS hidden and 2 CycleT:
  TRtypic = TMod In + 0.5 x TIOS In + Tnet + 2 x CycleT + 0.5 x TIOS Out + Tnet + TMod Out

- TRmax, maximal response time with TIOS not hidden and 3 CycleT:
  TRmax = TMod In + TIOS In + Tnet + 3 x CycleT + TIOS Out + Tnet + TMod Out

The TMod In and TMod out response time are shown below:

Type of distributed I/O	Response time	Mini	Typical	Maxi
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 NIP 2212	TMod In or TMod Out	2 ms	3 ms	4 ms

The TIOS In and TIOS Out times mesured between two scanning are shown below:



Transparent Ready
System approach
Ethernet infrastructure ConneXium wiring system

Presentation

Industrial Ethernet networks can use various standards. In each case, a set of rules must be respected when determining what topology will be produced and with what performance level.

The ConneXium offer comprises a complete family of industrial products used to build a network architecture: hubs, switches, transceivers and cables. Wiring rules pertaining to the ConneXium offer are described on pages 2/28 to 2/33.

Characteristics

General characteristics for industrial Ethernet standards

Standard	Date rate (Mbit/s)	Medium	Type of connector	Useable bandwidth (on automation network)	Advantages
10BASE5	10	Thick coaxial cable (yellow)	15-way SUB-D (AUI)	8 %, i.e. 800 Kbit/s	Cost, Ethway compatibility
10BASE-T	10	Twisted shielded pair (SFTP) *(1)*	RJ45	8 %, i.e. 800 Kbit/s	Cost
10BASE-FL	10	Fiber optic (generally 62.5/125 multimode 1300 µm *(2)*	ST or MT-RJ	8 %, i.e. 800 Kbit/s	Immunity, confidentiality
100BASE-TX	100	Shielded twisted pair (SFTP)	RJ45	40 %, i.e. 40 Mbit/s	Data rate (x 50)
100BASE-FX	100	Fiber optics	SC or MT-RJ	40 %, i.e. 40 Mbit/s	Immunity

(1) SFTP cables (Shielded and Foiled Twisted Pair) are available in 2 versions:
- *UL 1581 vertical tray, NFC 32070 level C1, IEC 332-1.*
- *Reaction to fire compliant with NFC 32 070 # class C2 and IEC 332-1, Low Smoke Zero Halogen (LSZH) and UL 1581 VW1.*

(2) The mutimode fiber is Low Smoke Zero Halogen as per HD.624-7, with reaction to fire complying with NFC 32 070 # class C2 and IEC 332-1.

Installation principles

The Ethernet 802.3 Link Layer is based on a collision detection mechanism (CSMA CD). Each station (DTE, Data Terminal Equipment) sends its data when necessary and verifies if the frame has been correctly propagated. If a collision with a frame sent by another station is detected, the station repeats the message after a timeout, which increases the network load and thus the probability that another collision will occur.

The transceivers or hubs (repeaters) are used to regenerate the signal once the physical limits of the medium have been reached. They also propagate collisions, if there are any.

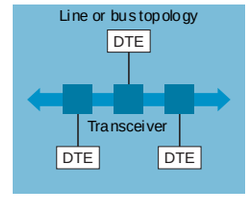
Because of the transmission time needed to send data from one end of the network to the other, a maximum network length exists, beyond which collisions might not be detected by the sender. For this reason, and for each technology, a network size limit has been set. This is described as the “maximum network diameter” within a same collision domain.

Architectures in a same collision domain

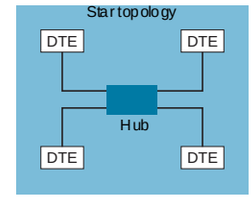
Various architectures may exist, depending on each standard:

- Line or bus topology, using transceivers.
- Star network topology, using hubs.
- Tree network topology, using hubs.

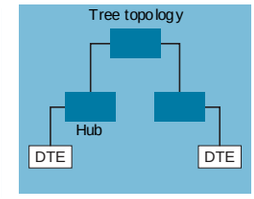
Transceivers are also used for transmitting signals between 2 dissimilar media such as fiber optic and twisted pair cables.
In addition, the hubs (or concentrators) are also used to transmit signals among several media (ports).
The transceivers and hubs are “plug and play” devices.



10BASE5



10BASE-T, 10BASE-F, 100BASE-TX, 100BASE-FX



10BASE-T, 10BASE-F, 100BASE-TX, 100BASE-FX

Note: in the information that follows, the terms “hubs” and “repeaters” are used interchangeably.

Rule 1: to respect the “maximum network diameter” within a same collision domain

Depending on the Ethernet standard employed, the network size can vary. To define the correct architecture, the 2 constraints of maximum segment length and maximum network diameter must be respected. The Schneider Electric ConneXium performances make it possible, in some situations, to surpass the limits of the 802.3 standard.

Ethernet standard	**Maximum segment length (physical limit)**		**Maximum network diameter (limited by collisions)**	
Type	**According to standard 802.3**	**With ConneXium products**	**According to standard 802.3**	**With ConneXium products**
10BASE5	500 m (50 m for a drop cable)		1.800 m (2.800 m with fiber optic segment)	
10BASE-T	100 m		500 m	1.000 m
10BASE-FL or mixed (FL and T)	2.000 m	3.100 m *(1)*	2.500 m	3.100 m *(1)*
100BASE-TX	100 m		200 m	
100BASE-FX in Half Duplex	412 m		228 m or 412 m between 2 DTE devices	
100BASE-FX in Full Duplex	2.000 m	3,000 m with multimode 15.000 m with monomode *(1)*	228 m or 412 m between 2 DTE devices	

(1) Depends on the optical budget and fiber attenuation.

Installation rules (continued)

Rule 2: for each technology, respect the following rules within the same collision domain

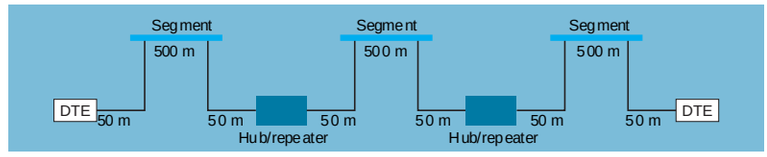
10BASE5

Between 2 DTE (Data Terminal Equipment) devices, a maximum of 2 repeaters or 1 repeater with 2 half-repeaters (half-repeaters ensure transmission between a copper and a fiber optic medium):

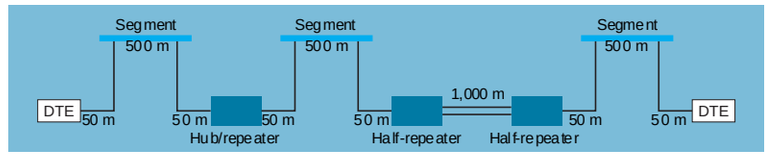
- Drop cable, 50 m length max.,
- One segment, 500 m length max.,
- Between 2 fiber optic half-repeaters, 1000 m length max.

Examples:

- All copper, 1,800 m length max.



- Mixed copper/fiber optic, 2,800 m length max.



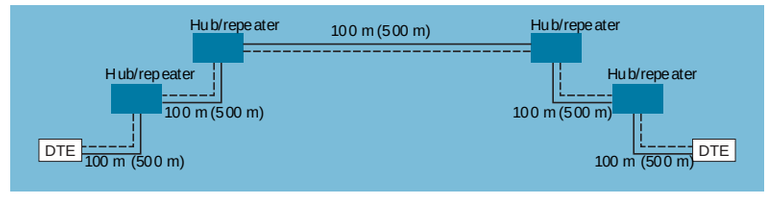
10BASE-T/10BASE-F

Between 2 DTE devices, a maximum of 5 segments and 4 hubs (or repeaters).

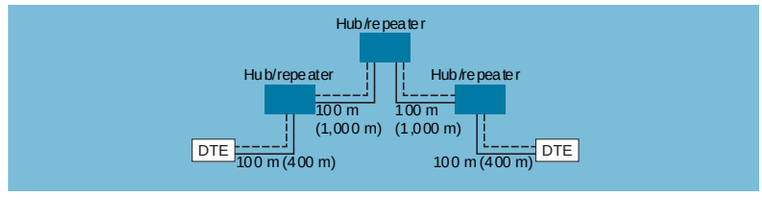
- Topology of 5 segments and 4 hubs (or repeaters): each 10BASE-FL segment must have a length of < 500 m.
- Topology of 4 segments and 3 hubs (or repeaters): the 10BASE-FL inter-repeater segments must have a length of < 1,000 m, and the 10BASE-FL segments between hub and DTE devices must have a length of < 400 m.

Examples:

In the following 2 topologies, distances are usually given for the 10BASE-T standard, with distances for the 10BASE-F standard within parentheses.



Maximum 500 m in 10BASE-T, 2,500 m in 10BASE-F.



Maximum 400 m in 100BASE-TX, 2,800 m in 100BASE-FX

Installation rules (continued)

Rule 2: for each technology, respect the following rules within the same collision domain (continued)

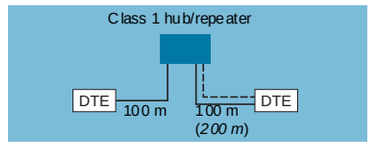
100BASE-TX/100BASE-FX

This Ethernet standard defines 2 classes of hubs (or repeaters):

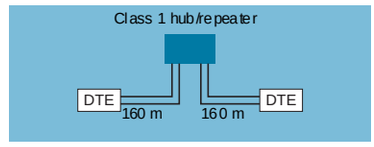
- Class 1 hubs: Maximum of 1 hub in a same collision domain.
- Class 2 hubs (for ConneXium repeaters): Maximum of 2 hubs in a same collision domain.

Examples:

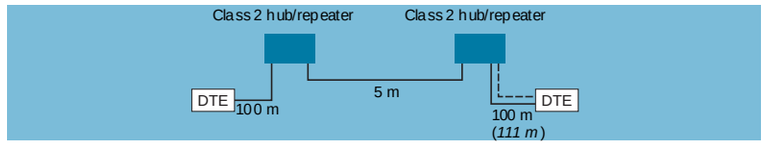
In the following 4 topologies, distances are usually given for the 100BASE-TX standard, with distances for the 100BASE-FX standard within parentheses.



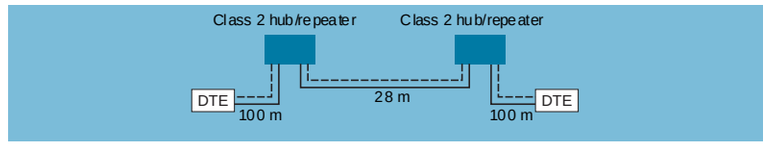
200 m max. in 100BASE-TX, 300 m in mixed



320 m max. in 100BASE-FX



205 m max. in 100BASE-TX, 216 m in mixed



228 m max. in 100BASE-FX

Architectures with several collision domains

Switched devices enable the limits of the above-described architectures to be increased. Switches are used for communicating between 2 or more collision domains. Communication for the upper layers is guaranteed among the different ports and collisions at the link layer level are not propagated (filtering).

Switches are “plug and play” devices that can be remotely administered via SNMP or HTTP. They essentially contribute 2 functions:

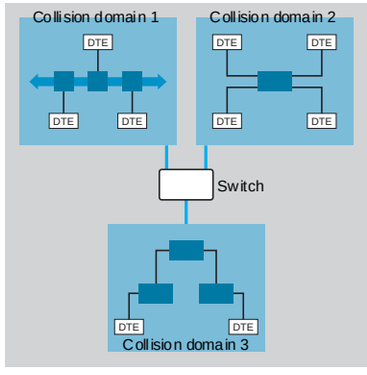
- Extension of the architecture to surpass the “maximum network diameter”.
- Improvement of performance by a better allocation of bandwidth due to reduction in collisions and network load. In addition, switches in the ConneXium range support multicast filtering via the standard GARP/GMRP protocol, which optimizes performances of the Global Data service. With these products, multicast frames are transmitted only on switch ports where stations subscribing to the Global Data service are connected. ConneXium switches also support the Faulty Device Replacement (FDR) service, as well as the Transparent Ready private MIB for managing devices via the SNMP network management protocol.

Rule 3: to be respected when switches are used

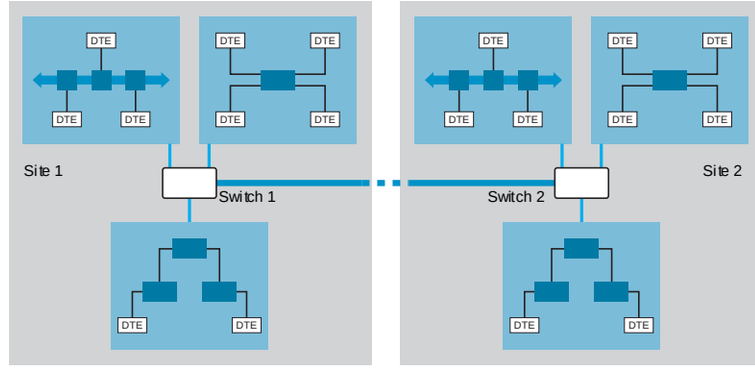
- Switches are DTE devices that can be connected to hubs or directly connected to devices. Rules 1 and 2, mentioned previously, thus apply.
- When 2 switches are connected, the line can be in Full Duplex, which removes the risk of collisions and allows the effective data rate to be doubled. The rules related to the collision domain thus do not apply, and only those imposed by the physical limits should be observed.

For example, 2 switches may be connected on their 100BASE-FX ports via a fiber optic cable 3,000 m in length.

Examples:



Switch used to isolate several collision domains (reduction of the network load in order to improve performance).



Switches used to extend the architecture to provide a link between 2 buildings, for example.

Maximum distances:

- 100BASE-TX: 100 m between 2 switches.
- 100BASE-FX: 2,000 m between 2 switches, 3,000 m with ConneXium switches and up to 40 km using monomode optical fiber (outside supply).

Routers

In general, routers are used at the Enterprise's network level, in order to link different units or sites. They are sometimes associated with security functions such as firewalls for filtering remote access.

A router must be configured to enable it to recognize where messages must be routed. Routing mechanisms are based on the IP address. Stations are grouped on the same subnet according to their IP addresses and their subnet mask.

Every message addressed to a remote network will be transmitted to the router, which ensures routing to the correct destination.

All of our Ethernet modules can be configured with a default gateway address and a subnet mask, complying with the IP standard.

On the factory floor level, a switch is less expensive than a router, performs better, and is easier to install ("plug and play").

Redundancy

The architectures previously described can be created to have greater availability by using hubs or specific switches, linked to redundant copper or fiber optic rings. If the ring is broken, communication is seamlessly restored in less than 500 ms.
These products are available with the possibility to create a redundant power supply.

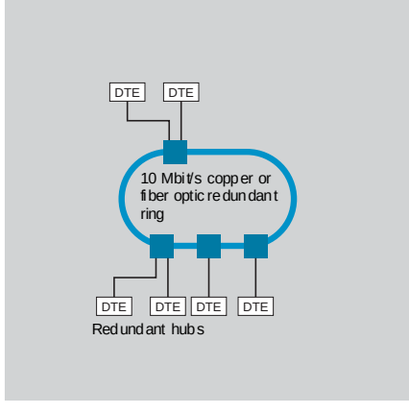
Associated with the Warm or Hot Standby offers, they guarantee maximum availability of the automation installations.

The various possible redundant topologies are:

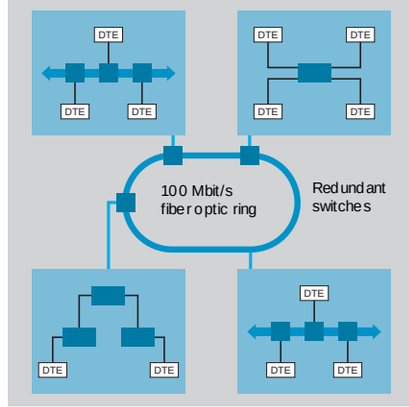
1 10 Mbit/s copper or fiber optic redundant ring topology, with redundant hubs.

2 100 Mbit/s fiber optic ring redundant topology with redundant switches: maximum commutation time from the "normal" line to the "emergency" line of 500 ms for a redundant ring with 50 switches.

3 100 Mbit/s redundant fiber optic multiple ring topology with redundant switches: maximum commutation time from the "normal" line to the "emergency" line of 500 ms.



1



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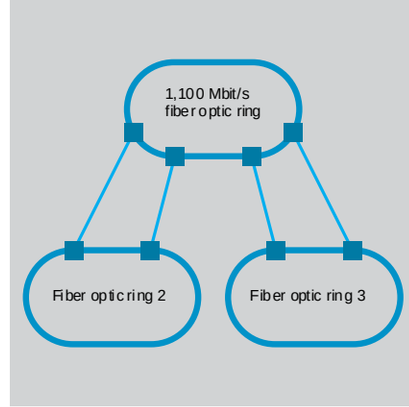
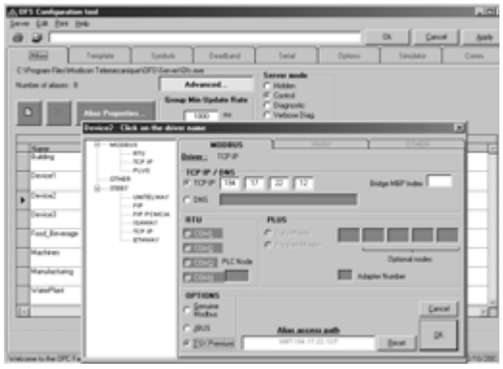


3

Transparent Ready
System approach
Application to electrical distribution



Transparent Ready Power Equipment

The application of Transparent Ready to electrical distribution power equipment is based on the concept of the Transparent Ready Power Equipment offer.

This is an optimized architecture in which the Transparent Ready services are mutualized within the EGX gateway, while providing communicating products built into the electrical equipment (switchboard) with transparent connectivity for any Modbus client on TCP/IP.

Once the parameters of the EGX gateway have been set, the user therefore has the benefit of very simple (see below) ready-to-use functions such as:
- The display of summary pages on instantaneous measurements and the status of the electrical equipment.
- The display of detailed electrical data on all circuits (rms current (A), actual power (kW), power factor, active and reactive powers, etc).
- The logging of standard data, power, trends, etc.
- The display of logs.
- Exporting data tables in standard Windows format.

The Web server embedded in the electrical equipment does not interfere with the Modbus communication flows from the Modbus clients on the Ethernet network.

Web Page Generator

The Web Page Generator is a software tool for creating Web pages, designed for the installer of the Transparent Ready Power Equipment. Its purpose is the automatic creation of Web pages, according to the actual configuration of the electrical switchboard.

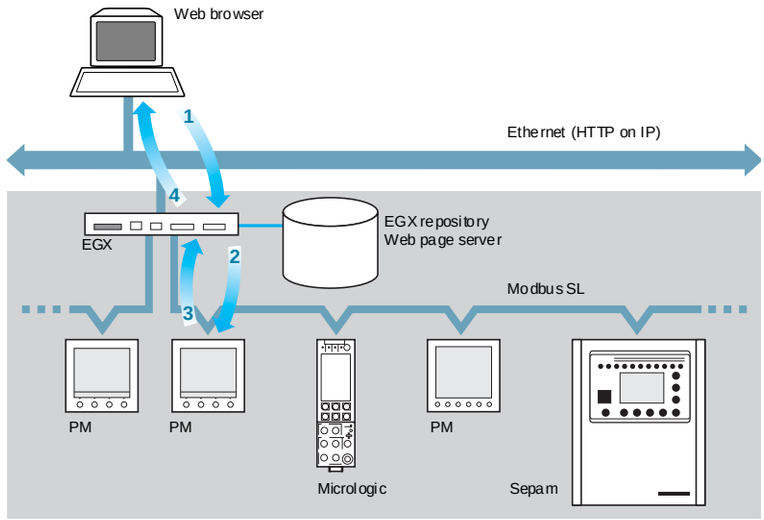
It includes a library of electrical distribution and motor control products such as:
- PM 800/500 power meters.
- Micrologic digital protection relays (Masterpact).
- Sepam 2000 and Sepam 20/40/80 digital protection relays.
- CM 3000/4000 circuit monitors for measuring and analyzing power quality.

It automatically creates the corresponding Web pages for each of the products connected on the Modbus (SL) serial link built into the electrical equipment and declared by the installer. It also automatically produces summary pages, providing the operator with an overall view of the status of his equipment. It also integrates an FTP client in the EGX gateway, which authorizes the immediate downloading of the HTML pages that have been created.
The level of knowledge required to carry out these operations has been set at a deliberately low level.

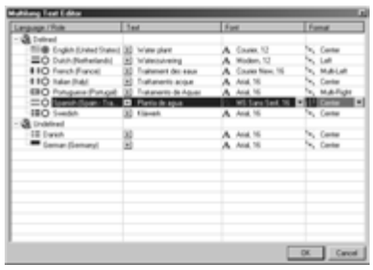
The operating mechanisms of the Web pages created in this way are described on page 48289/4. The HTML pages produced are standard format which can be edited further if necessary, using standard word processing or HTML tools.

Transparent Ready
System approach
Application to electrical distribution

Mechanism for dynamic reading via the Web

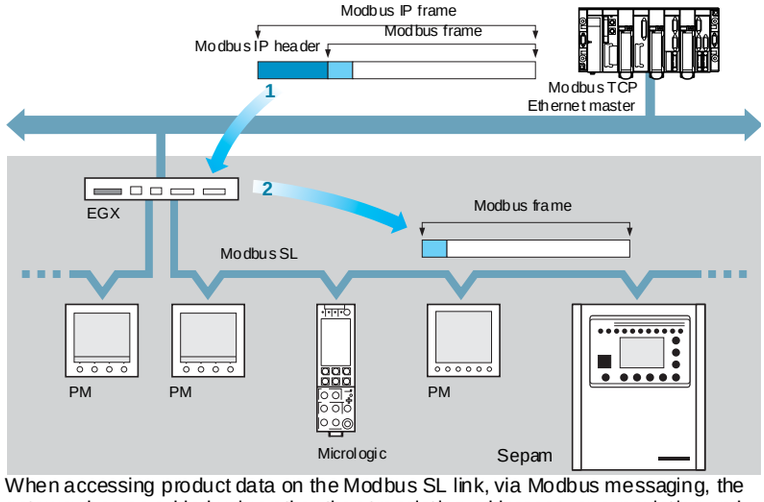


The EGX gateway uses HTML language for serving the Web pages containing dynamic values associated with the products on the Modbus SL link, and is thus compatible with all Web browsers. This mechanism is totally transparent for the user.



When HTML pages are created, each dynamic data location in the page causes a "<PL>tag" to be inserted which specifies the characteristics of the Modbus service required for finding the value of this variable, as well as presentation data for this variable (Modbus function code, Modbus address, register no., LSB order, unit).
When the Web page is viewed (action 1, reception of an HTTP request from the Web client), the EGX gateway analyzes the contents of the requested Web page, detects any "<PL> tags", then executes the Modbus services required for reading the dynamic variables (actions 2 and 3), fills in the HTML page accordingly and sends it all back as if it were a static page (action 4). The HTML page is displayed on the browser screen.
The page is automatically updated by the browser every 5 seconds.

Transparent access mechanism via Modbus messaging



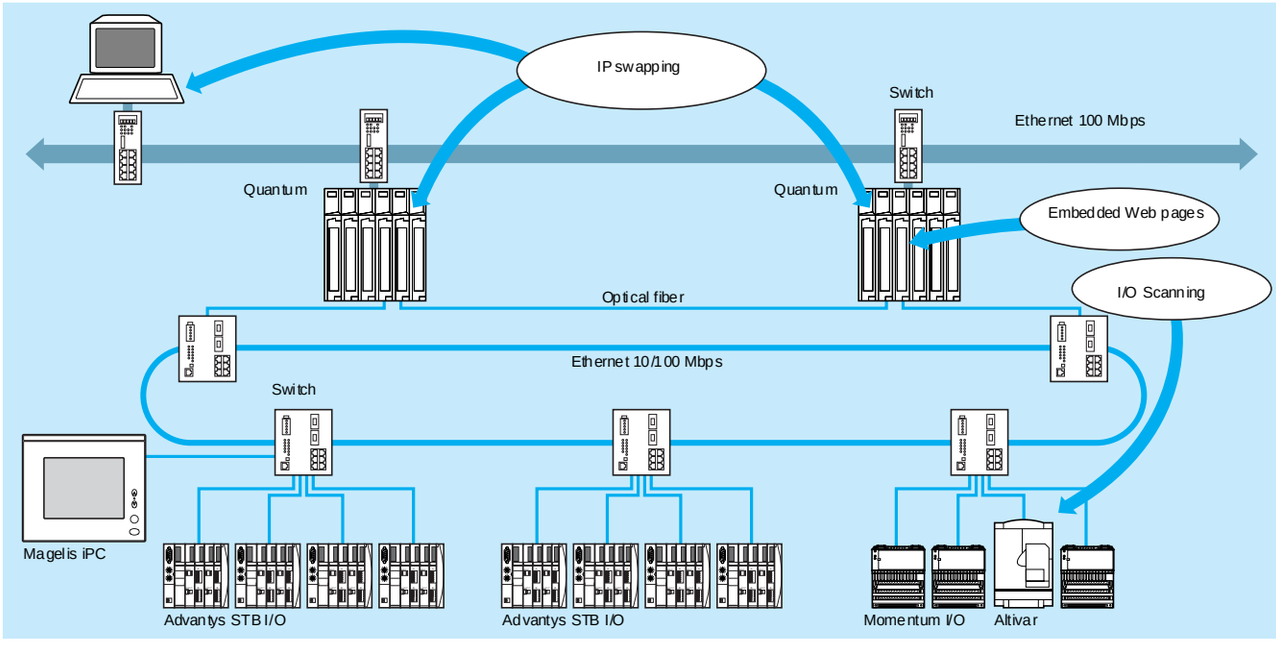
When accessing product data on the Modbus SL link, via Modbus messaging, the gateway has no added value other than translating addresses, encapsulating and unencapsulating Modbus frames, whatever function code is used.
The gateway thus provides products on the Modbus SL serial link with the Ethernet pass band and a multi-master operating capability. The latter function is also effective when the Modbus master is connected directly to one of the two Modbus SL ports on the EGX gateway (configured this way).

Transparent Ready

System approach

Modicon Quantum Hot Standby on Ethernet TCP/IP

Modicon Quantum Hot Standby on Ethernet TCP/IP



Presentation

The Hot Standby option enables the Modicon Quantum automation platform to meet the needs of the most critical applications in terms of operating safety and availability.
The main element of the system is a second PLC referred to as the "Standby", configured to be identical to the "Primary" PLC and in standby mode. The Standby PLC uses a special high speed fiber optic link to constantly monitor the status of the Primary PLC.
If there is a fault on the Primary PLC, the system automatically controls the changeover to the Standby PLC. As both PLCs (Primary and Standby) simultaneously scan the same devices distributed on Ethernet TCP/IP using the I/O Scanning service, the critical process controlled by these devices is not affected by the fault in the control system. Likewise, the "IP swapping" function for automatically transferring the IP address from the Primary to the Standby makes the changeover from one PLC to the other transparent from the supervision PCs and HMIs.

Two types of Ethernet module can be used in Quantum Hot Standby configurations: 140 NOE 771 01 and 140 NOE 771 11.
The Ethernet TCP/IP Web and communication services on these modules (Modbus messaging, Global data, FTP/TFTP, SNMP, HTTP, etc) are available in Hot Standby configuration, apart from the DHCP server providing the FDR (Faulty Device Replacement) service.

Operation on changeover

If there is a changeover from the Primary to the Standby PLC, the "IP swapping" function automatically assigns the IP address of the Ethernet 140 NOE module of the Primary PLC to the Ethernet 140 NOE module of the Standby PLC making the changeover transparent from the supervision PCs and HMIs.
After having closed the current client and server connections on Ethernet, each 140 NOE module sends a UDP changeover message to the 140 NOE module in the other PLC. The 140 NOE module that sent the message then waits for the response from the other 140 NOE module for a "Timeout" of 500 ms. As soon as the message is received or after this “Timeout”, the 140 NOE module changes its IP address.
Likewise, the changeover is transparent when seen from the process. The most recent versions of distributed I/O on Ethernet TCP/IP have a function for maintaining the status of the outputs if there is a break in communication, thus when there is a changeover from one PLC to the other.
To avoid any communication problems, it is recommended that Ethernet 140 NOE modules in Hot Standby configurations are connected on switches rather than on hubs (for further information on these products see the “Cabling system” section, page 48332/2).

Transparent Ready
System approach
Unity Studio software suite

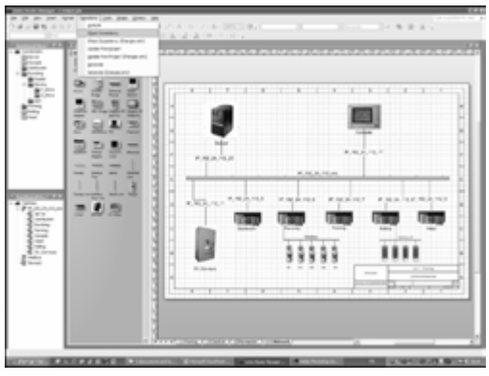
Unity Studio for the development of a distributed project

The Unity Studio software suite is the key component required on design office workstations used for designing and structuring distributed industrial automation projects.

Distributed automation projects require the involvement of experts from many different domains (electrical, mechanical and hydraulic engineering, instrumentation, P&ID, communication, HVAC/climate control, etc.) in turn requiring various specialist software applications.

The Unity Studio software suite offers designers of industrial distributed automation projects the possibility of using all these tools in conjunction.

The objective of the Unity Studio software suite is to:
- Provide a unique structural representation of the project shared by experts in all specific domains.
- Increase the productivity of each expert.

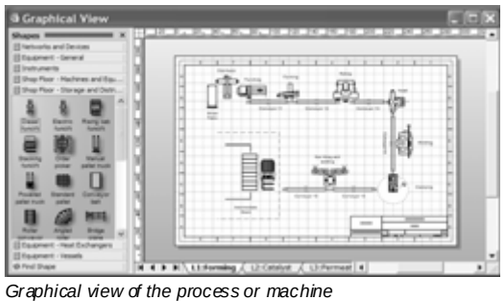


"All-in-one" software suite

Unity Studio is an all-in-one software suite based on Microsoft's graphic design tool Visio 2002 Professional. It is supplied with the following software as standard:
- MS Visio 2002.
- Unity Studio manager for the management of distributed applications.
- Unity Pro XL for the programming of Atrium, Premium and Quantum platforms.
- OPC Factory Server (OFS) for accessing and exchanging data in the architecture.
- PowerSuite for the setup of Altivar speed drives.
- XBT-L1000 for creating Magelis HMI applications.
- Microsoft Visual Basic for Applications (VBA) for the development of customized functions.

Unity Studio Manager tools allow you to create direct links with other Schneider Electric applications, or with third-party software applications.

In addition to this, the Unity Developer's Edition (UDE) software package provides an advanced open development solution for the programming of user functions and the development of interactive interfaces with other software applications (programming in C++, VBA, VBA macros, etc.).



Graphical view of the process or machine

Project views

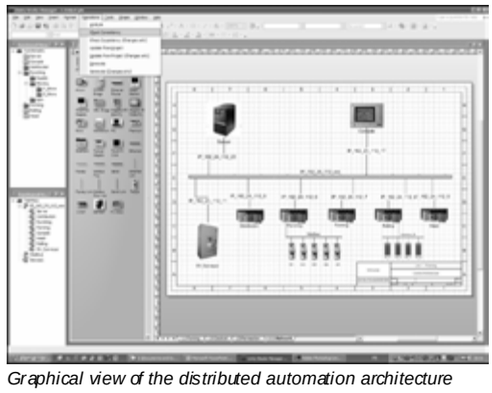
Graphical project views

The Unity Studio software suite, using the Visio 2002 Professional graphical engine, enables you to create project views in specific pages:

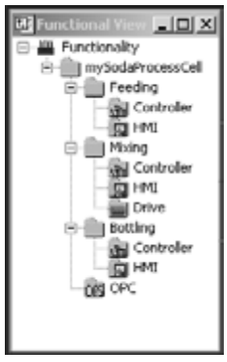
- **Process or machine view**, a unique representation shared by all specialist experts/consultants working on the project (mechanical, hydraulic and electrical engineering, etc.).
- **View of the distributed automation architecture**, graphical representation of the project's automation devices and communication networks.

These views are composed using components classified by specific application (construction, mechanical, hydraulic, electrical engineering, etc.). Visio libraries are enhanced with Schneider components. The creation of graphical views is achieved by dragging and dropping shapes from the libraries to the tabbed pages.

Components, their links and related properties composing the project views are entered once into the graphical views and shared with:
- other views,
- other Unity Studio suite software, and external software applications.



Graphical view of the distributed automation architecture



Functional view

Topological view

Process library

Schneider Electric automation product library

Project views (continued)

Functional view

The functional view is a structured tree diagram of the entire set of machine or process functions. It is taken from the graphical view of the process or machine.

Topological view

The topological view is composed using the control architecture graphical view. This topological view displays the communication networks and connected devices in a folder structure.

Object libraries

The Unity Studio software suite supplies open libraries of objects that can be re-used in graphical views:
- Visio 2002 Professional libraries.
- Telecanique automation product library.

Each object can be given its own parameters (type of valve, etc.) by using predefined properties, or be enhanced by applying customized properties.

Adding new objects

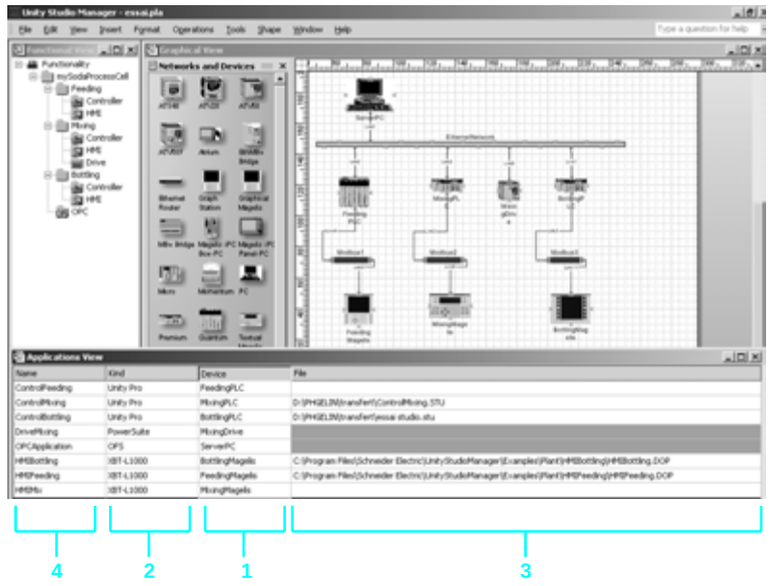
The numerous libraries supplied can be expanded as needed by:
- Downloading Visio objects available online, covering all industrial fields (Microsoft Visio site, product reseller sites or sites specialized in Visio objects).
- Creation of objects by the user.

Direct-access hyperlinks

From the Unity Studio project views, it is possible, at any time, to create hyperlinks to:
- All document types in .xls, .doc, .pdf formats, etc.
- Web pages via a URL.
- Software tools for configuration, network diagnostics, production management, etc.

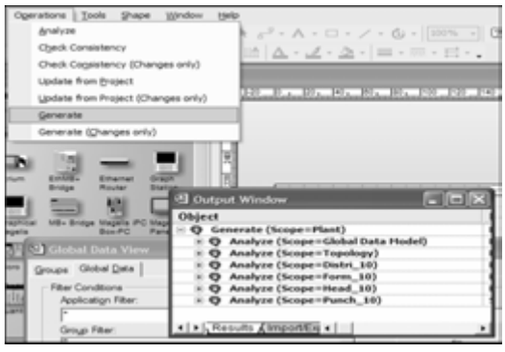
Graphical view of the distributed automation architecture

The application view of the Unity Studio software suite is used for centralized management of information related to the distributed applications.



1 Assignment of an automation application to each station in the architecture.
2 Assignment of the settings or programming tool for each station.
3 Creation and location of files for each station.
4 Assignment of functional entities of the process or the machine to station applications.

Transparent Ready
System approach
Unity Studio software suite



Project analysis operations

In order to detect any errors as early as possible, Unity Studio analyzes applications automatically. A report signals any possible errors in the form of alerts.

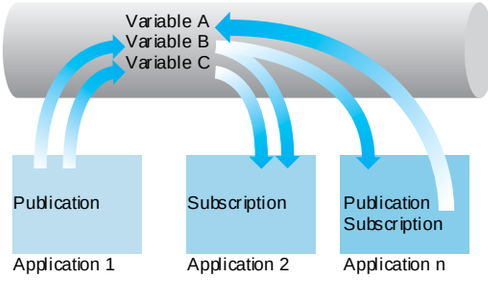
Generation for each individual station

Following the analysis (and after any corrections are made to render the application compliant), performing generation using Unity Studio enables you to create settings specific to each station in each corresponding station file.

Consistency check and update operation

This check verifies the consistency of project settings with the files of each station.
The update operation raises station file settings to the level of the Unity Studio project. Any modifications made on the stations are checked and reapplied at all other project levels. Existing settings of a station added to the project are updated in Unity Studio (in the event of re-use of an existing station).

Ethernet TCP/IP



Global Data view

The "Global Data" service of Ethernet TCP/IP communication networks ensures real-time data exchanges between connected stations. See page 48290/8.
The Unity Studio Global Data view enables the definition of Global Data distribution groups and the configuration of settings for published and subscribed station variables. During generation at each station level (see page 48290/8), this setting configuration is saved automatically to station files, thereby ensuring:
- Guaranteed consistency of communication between the distributed applications in question.
- Maximum productivity with respect to station configuration tasks.
- Minimized risk of errors.

Overall project documentation

The Unity Studio software suite is a single publishing resource for the creation of overall project documentation including information about the various levels.

Unity Studio software suite open development

Integrated open development

The Unity Studio software suite offers a great degree of open development:
- Use of diagrams or drawings from CAD tools.
- Enhancement of the object catalog (integration of Visio objects, creation of objects using XML, etc.).
- Establishment of hypertext links to documents and third-party software applications (MES, ERP, Web, configuration tools, maintenance guides, etc.).
- Launching of VBA macros.
- Import/export at all levels, in standard XML format.

Advanced open development, reserved for experienced IT specialists

In conjunction with the Unity Studio software suite, Unity Developer's Edition (UDE) enables the development of these custom solutions. It includes, in addition to the development kit, Unity servers, training, documentation and technical support.
This is supplied only after a special contract has been signed with Schneider Electric. Consult your Regional Sales Office.

References

Description	Type of license	Language (1)	Reference number	Weight kg
Unity Studio development software suite	Single station	French	**UNY SEW XFU CD10F**	–
		English	**UNY SEW XFU CD10E**	–
		German	**UNY SEW XFU CD10D**	–
		Spanish	**UNY SEW XFU CD10S**	–

(1) Defines the Visio 2002 Professional language and the electronical documentation language.

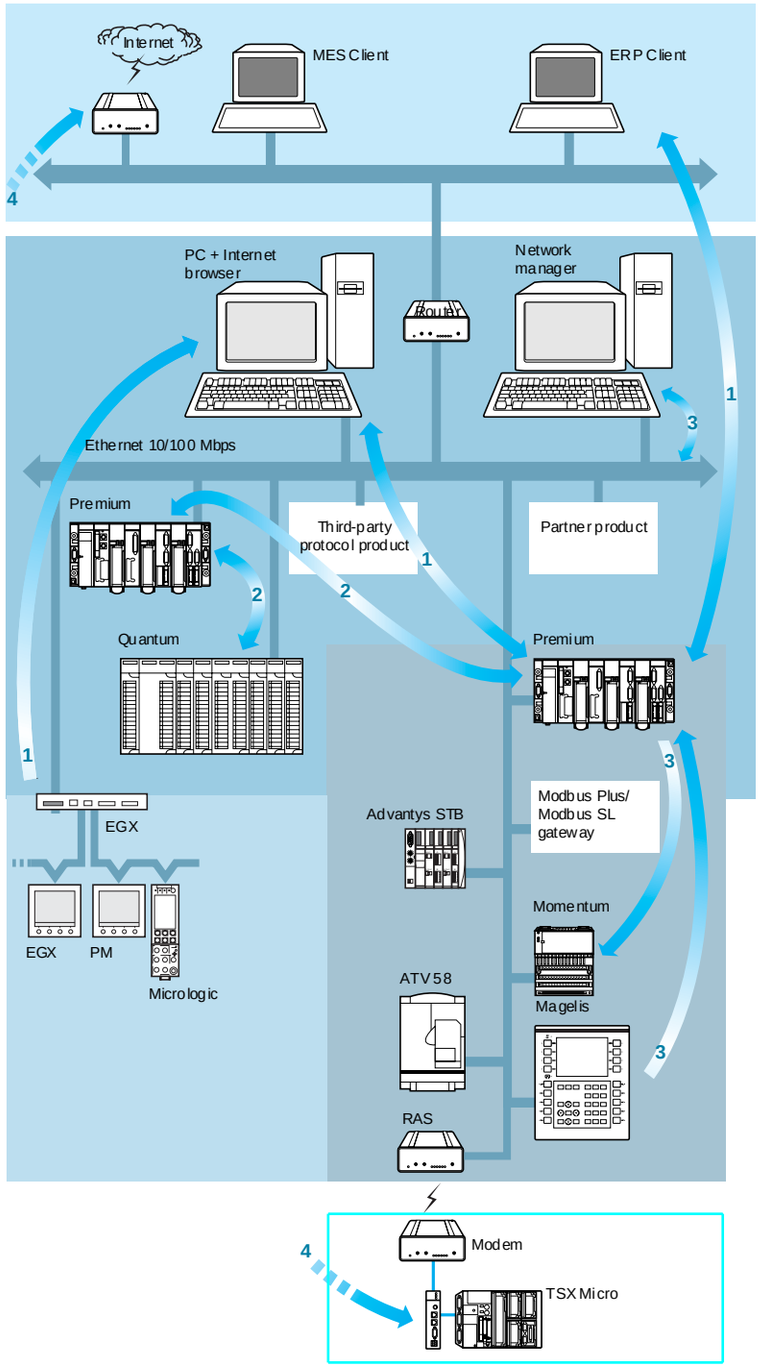
Transparent Ready

System approach

Integration of Transparent Ready products

Presentation of integration into architectures

Transparent Ready industrial products can be integrated into architectures based on the universal Ethernet TCP/IP network, with no need for any interface. The basic architecture below shows the various communication levels and functions required by industrial applications to meet data exchange requirements:



1 Company level: Communication between the control system products and the MES (Manufacturing Execution System) or ERP (Enterprise Resource Planning) supervision or information systems.

2 Inter-PLC level: Communication to PLCs for programming, diagnostics and data transfer, as well as communication between PLCs for synchronizing applications.

3 Field level: Communication between PLCs, PC and field devices.

4 Transparent remote communication: Remote communication via the Internet, or via telephone or radio link.

For a complete approach, the following requirements must also be taken into account:

- System diagnostic services
- Interoperability with third-party products or protocols
- Ethernet TCP/IP network security

The various communication requirements of the architecture are summarized below in order to:

- Present the data exchanges required by each level
- Choose the Transparent Ready services and standard solutions on Ethernet TCP/IP that are most appropriate for each type of communication

Transparent Ready
System approach
Integration of Transparent Ready products

1 Company level

Communication between MES/ERP system and PLCs

The requirements at this level are for communication using standard infrastructure and protocols for exchanging high volumes of data with production management systems. In some cases, the PLC must be able to adapt to the protocol specific to the connected system. Response times are not critical.

The Transparent Ready services used are mainly:
- HTTP communication, displaying data and sending commands via Web pages
- Data exchange using the OPC (OLE for Process Control) standard via an OFS data server
- Modbus TCP/IP messaging
- TCP Open
- E-mail transmission
- Direct publication in relational databases (via the FactoryCast HMI active Web server)

Communication between supervision systems and PLCs

For this type of communication, it is also necessary to transfer high volumes of data to a group of PLCs.
The required response times are in the region of 0.5 to 2 s.

The following Transparent Ready services are used:
- Mainly data exchanges using the OPC standard via an OFS data server
- Modbus TCP/IP messaging
- TCP Open
- HTTP communication integrated in the supervision system, for displaying Web pages from the field devices in supervision pages

Communication between HMI application and PLCs/field devices

A basic HMI (Human/Machine Interface) application must allow maintenance personnel to be notified of an event and to view the status of a field device.

The Transparent Ready services used are:
- Notification of events by e-mail
- Display of data and sending commands via Web pages

2 Inter-PLC level

Communication for data transfer

When data is sent in point-to-point mode according to PLC programming algorithms and the required response times are in the region of 200 ms to 1 s, the main Transparent Ready service to be used is Modbus TCP/IP messaging.

Inter-PLC communication for synchronizing applications

Broadcast communication must enable several applications to be synchronized via real-time exchanges. In this case a low volume of data is exchanged.
The required response times are in the region of 10 to 500 ms.
The Transparent Ready Global Data service is particularly suitable for this type of data exchange.

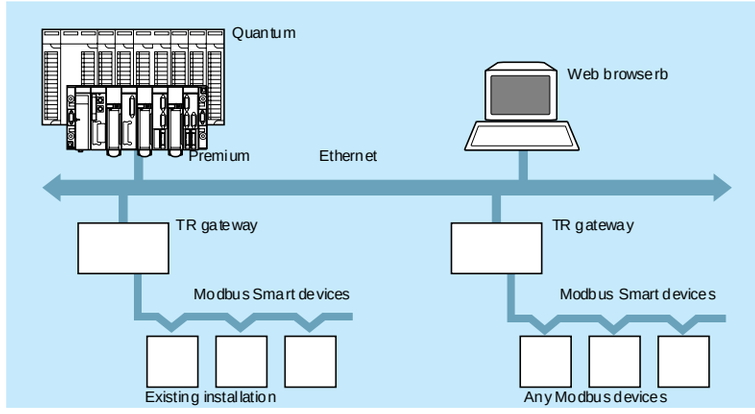
Transparent Ready
System approach
Integration of Transparent Ready products

3 Field level

Communication between PLCs and field devices for controlling the automation process

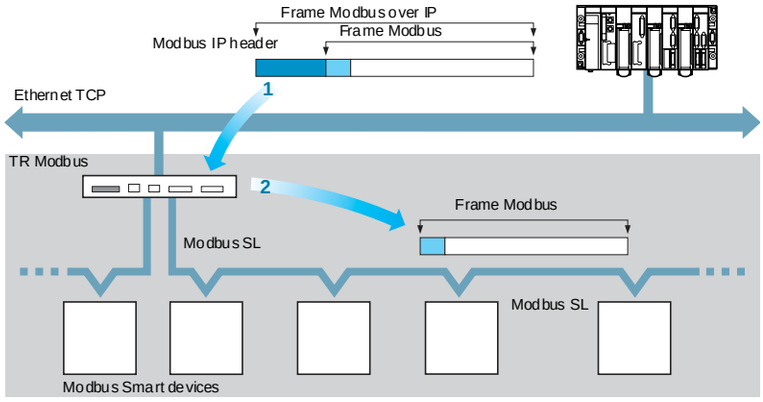
PLC applications are essentially responsible for controlling the I/O of peripheral devices. Data must be transferred to all devices quickly, deterministically and repetitively.
The required response times are in the region of 10 to 100 ms.
The Transparent Ready I/O Scanner service meets these requirements.

Communication with field products Modbus SL



Modbus serial line (Modbus SL) protocol is a world-wide de facto standard. Is simplicity, reliability and low cost enabled it to have today, probably the most impotant installed base of communicating industrial products.
It is still the best technical/cost compromise for products without needs of high end communication performances.

Modbus SL products connection into Transparent Ready architectures with174 CEV 300 20 or EGX 200/400MG gateways, is deliberately easy to manage and provides:
- Large openness capabilities at low cost, to all Modbus compliant devices of the market place
- Connection capabilities to existing applications
- A point of entry into Transparent Ready at an optimised cost
- Same application layer over a serial line than Ethernet TCP/IP, enabling transparent message routing.



Mechanism of transparent data access with Modbus messaging
In case of data access to Modbus SL devices with Modbus messaging, the gateway as no more added value than the adress translation, encapsulated and desencapsulated Modbus frames, whatever Modbus function code used.
This feature is totally transparent for the system, that makes no real difference from an Modbus SL device connected via a gateway and a device directly connected to Ethernet TCP/IP. The only difference should be performance.
Modbus SL devices connected via a gateway benefit both of Ethernet bandwidth & multi-master feature.

Transparent Ready
System approach
Integration of Transparent Ready products

Communication between field PCs or operator terminals, PLCs and field devices

This type of communication is used to configure, monitor and maintain field level devices.
It must be simple so that less qualified personnel can access first level diagnostics from a standard PC. The most suitable Transparent Ready service for this is the display of diagnostic and customized Web pages. See pages 43622/2 to 43623/3.
All the functions of Magelis XBT F and XBT G graphic display terminals are also available on Ethernet TCP/IP.
The SNMP standard network management protocol can also be used from a network management station to monitor, control and perform diagnostics on all the components of the Ethernet architecture.

Choice of Transparent Ready services

The following table can be used to select the Transparent Ready service according to the required type of communication.

Communication	Company level 1			Inter-PLC level 2		Field level 3		See page
Transparent Ready services	Communication with MES/ERP	Supervision	Basic HMI application	Inter-PLC communication	Inter-PLC synchronization	Communication with peripherals (I/O)	Diagnostics	
Modbus TCP/IP	■	■		■		■		2/15
Web/FactoryCast servers	■		■				■	2/6
I/O Scanning						■		2/16
Global Data					■			2/18
SNMP network management							■	2/21
TCP Open	■	■						2/22
OFS server	■	■						6/8

4 Transparent remote communication

Using remote communication

Transparent remote communication is possible, with no need for any special interface, for programming, diagnostics, data exchanges, viewing and adjustment, in a similar way to connecting to a local area network.

This type of connection is used for remote access to automation products via the PLC programming tool, or by viewing Web pages with a simple Internet browser. Transparent remote access can also be used for the other Transparent Ready services.

Remote communication on the Internet

Transparent remote communication on the Internet is possible without the need for any special interfaces. For this, an Internet connection must be available. If not, contact a local Internet service provider.

This type of connection is used for remotely accessing automation products at a lower communication cost and over very long distances, using:
- The PLC programming tool
- A simple Internet browser for viewing the Web pages of the automation products that have an embedded Web server

As use of the Internet involves security risks for the system, this type of access must be made secure by a Firewall. The use of a VPN (Virtual Private Network) is also possible. This type of function must be provided by the Firewall or by an additional device.
For further information on remote management services, see “Partnership Program” page 8/3.

4 Transparent remote communication (continued)

Remote communication via telephone networks

Transparent point-to-point communication on the telephone network is possible using a remote access router or RAS (Remote Access Server). Since TSX ETZ410/510 Ethernet Web server modules for Modicon TSX Micro PLCs incorporate this function themselves, there is no need to use an external server/router.
A modem for wired telephone link or GSM is also necessary for telephone communication.

As with any connection via a telephone network, access must be made secure by identification functions, or filtering by a Firewall, automatic callback by the access server or VPN server.

For further information on remote telephone connections, please consult your Regional Sales Office.

Remote communication by radio

Transparent remote communication by radio is also possible on Ethernet TCP/IP, both for communication between products and for links with HMI terminals which can thus be mobile.

Various types of radio technology are compatible with Ethernet TCP/IP:
- Bluetooth
- Wi-Fi
- Special wireless industrial systems, based on the 2.4 GHz frequency

Further information on this field, and details of partners supplying these types of technology for use with Transparent Ready products, are given on pages 8/2 to 8/9.

Other requirements of Ethernet TCP/IP architectures

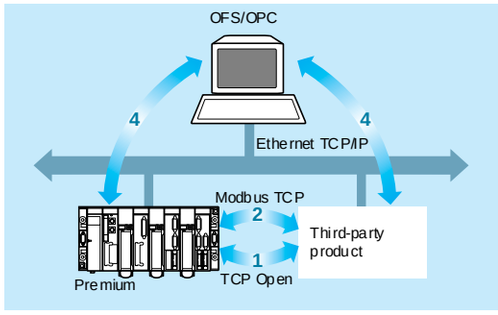
Diagnostic services

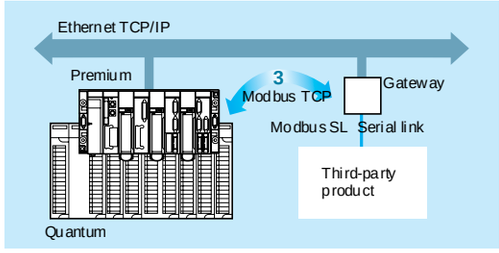
Diagnostic services are available from the PLC programming tools, which provide in particular:
- Display of the PLC system status
- Diagnostics of the communication services on Ethernet TCP/IP (Modbus TCP/IP messaging, I/O Scanning and Global Data services)
- Display of the pass band in Ethernet TCP/IP modules (module load level)

Similar or additional services are also available using a simple Internet browser by viewing the PLC Web pages:
- “Ready to use” pages for displaying the PLC status, "Rack Viewer" function
- Communication and Ethernet TCP/IP services diagnostics pages (communication statistics, I/O Scanning service and Global Data service)
- Access to the PLC variables and data via the "Data Editor" function
- "Alarm viewer" function for displaying alarms on Modicon Premium and Quantum PLCs
- User Web pages created with the "Graphic Data Editor" function or created using a standard tool, such as Microsoft Frontpage

In addition to these diagnostics functions there are also the services provided by the standard SNMP protocol (Simple Network Management Protocol). A network management station can also monitor, control and perform diagnostics on all the components of the Ethernet architecture and can in particular access the objects specific to the Transparent Ready offer contained in the private MIB (Management Information Base) of the PLC communication module.

Transparent Ready
System approach
Integration of Transparent Ready products





Interoperability with third-party products or protocols

Some applications require comunication on Ethernet TCP/IP with products from other suppliers. If these products do not have the Modbus TCP protocol, it is possible to use one of the following 4 solutions:

1 Use TCP Open for managing communication with the third-party product directly on the TCP layer in accordance with a specific protocol.

2 Develop the Modbus TCP protocol on the third-party product, if it provides open acces to the TCP layer. This development is made easy by the simplicity of the Modbus TCP protocol. The specifications are available on the Internet from Modbus-IDA (see page 8/3).

3 If the third-party product has a Modbus serial link, use the 174 CEV 30020 gateway to the Modbus protocol on TCP/IP.

4 If the product is compatible with an OPC server, it is possible to create an interface on Ethernet TCP/IP between this product and Telemecanique brand PLCs via an OPC client/server PC (equipped with Telemecanique OFS data server software).

Other requirements of Ethernet TCP/IP architectures (continued)

Ethernet TCP/IP network security

Security risks on Ethernet TCP/IP are higher than when using proprietary networks, for the following reasons:
- Ethernet TCP/IP is a universal communication network that is familiar and accessible to a huge number of users.
- The use of Ethernet TCP/IP for automation products enables external connection without the need for any interfaces.

There are three main risks:
- Multiple “PING” requests with the ICMP protocol to create a denial of service to the module.
- Reading/modification of Web server pages with the FTP protocol
- Modification of PLC variables with TCP modems

Virus risks are extremely limited at control system product level, as they are based on special operating systems.

The risks must be dealt with at each level:
- Company level 1: Possibility of using a router as access manager to the lower levels, by filtering the IP addresses and permitted communication protocols. (Please consult your Regional Sales Office for any additional information).
- Inter-PLC level 2 and field level 3: Set up an internal security policy, ensuring that only authorized people can connect to the network locally. Use the authentication, password and IP address filtering functions available at control system product level.
- Transparent remote communication 4: See page 2/43.

3

Contents

3 - Field devices

3 - Product data sheets

Product data sheet

Transparent Ready

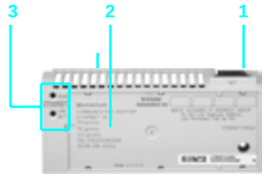
Field devices
Modicon Momentum distributed I/O
Ethernet network communication adapters

Presentation

Momentum I/O bases equipped with 170 ENT 110 0● Ethernet communication adapters create a distributed I/O system on an Ethernet TCP/IP network.
Each I/O base and communicator assembly constitutes a device on the network.
Types of base available:

- Discrete: inputs or outputs (32 channels max.), mixed I/O (20 channels max.).
- Analog: current or voltage inputs or outputs, Pt/Ni thermocouple or temperature probe inputs.
- Mixed, up to 10 discrete I/O and 10 analog I/O.
- Application-specific: 200 kHz 2-channel counter, Modbus port with 9 discrete I/O

Sensors and preactuators are connected on removable screw or spring terminals.



Description

Ethernet TCP/IP 170 ENT 110 02/01 communication adapters comprise:

1 Standard connector for 10BASE-T or 10BASE-T/100BASE-TX interface depending on model (RJ45).
2 Area for identification label (supplied with each I/O base).
3 LED status indicators.

All the communication adapters can be fitted on any type of I/O base (discrete, analog or application-specific).

Characteristics

Type of communicator			170 ENT 110 02	170 ENT 110 01
Transparent Ready services	Class		A10	B20
	Standard Web server		–	"Rack Viewer" access to the product description and status and to base unit diagnostics "Data editor" access to the configuration functions and variables
	Standard Ethernet TCP/IP communication services		Modbus Messaging (read/write data words)	
			–	FDR client for automatic assignment of the IP address and network parameters SNMP agent, detection of the product by an SNMP manager
Structure	Physical interface		RJ45 standard 10BASE-T connector	RJ45 standard 10BASE-T/100BASE-TX connector
	Data rate		10 Mbps	10/100 Mbps with automatic recognition
	Medium		Twisted pair	
Ethernet communication adapter	Operating temperature		0…+ 60°C	
	Relative humidity		5..95% non condensing	
	Degree of protection		IP 20	
	Power supply		Via I/O base	
	I/O bases	Discrete inputs	⎓ 24 V (16 or 32 channels), ∿ 120 V and 230 V (16 channels)	
		Discrete solid state outputs	⎓ 24 V/0.5 A (16 or 32 channels), ∿ 120 and 230 V/0.5 or 2A (8 or 16 channels)	
		Discrete solid state mixed I/O	Inputs ⎓ 24 V (16 channels) and Outputs ⎓ 24 V/0.5 or 2 A (8, 12 or 16 channels) Inputs ∿ 120 V (10 channels) and Outputs ∿ 120 V/0.5 A (8 channels)	
		Relay mixed I/O	Inputs ⎓ 24 V (10 channels) and Relay outputs ⎓ 20…115 V or Outputs ∿ 24…230 V/2 A (8 N/O channels)	
		Analog inputs	Voltage/current (8 or 16 channels), thermocouple/temperature probe (4 channels)	
		Analog outputs	- 10 V…+ 10 V, 0…20 mA or - 10 V…+ 10 V, 4…20 mA (4 channels)	
		Mixed discrete and analog I/O	4I/2Q analog voltage/current and 4I/2Q ⎓ 24V 6I/4Q analog 0…10 V and 8I/8Q ⎓ 24 V, 6I/4Q analog. - 10…+ 10 V and 8I/8Q ⎓ 24 V	
		Application-specific	200 kHz 2 channel counter, module 6I/3Q ∿ 120 V with 1 RS 485 Modbus port	
	Conformity to standards		UL, CSA, CE, FM Class 1 Division 2	UL, CSA, CE
	LED indicators		Ethernet network status (LAN Active) Module status (RUN)	Ethernet network status (ST), data rate (10T, 100T) Module status (RUN)

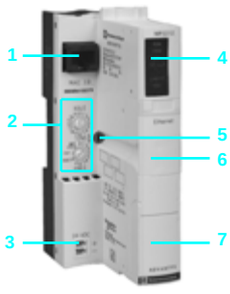
References

Description	Transparent Ready class	Data rate	Reference	Weight kg
Ethernet communication adapters	A10	10 Mbps	**170 ENT 110 02**	0.070
	B20	10/100 Mbps	**170 ENT 110 01**	0.070

170 ENT 110 02/01

(1) I/O bases and separate parts: Please consult our "Modicon Momentum automation platform" catalog.

Transparent Ready
Field devices
Advantys STB distributed I/O
Ethernet network interface modules



Presentation

The Advantys STB distributed I/O solution is an open, modular I/O system. It can be used to design industrial automation islands managed by a master controller connected to various buses and networks, including Ethernet TCP/IP. Each island comprises a set of modules mounted on a DIN rail to make up one or more segments in which the power supplies (logic ⎓ 5 V, sensors and preactuators ⎓ 24 V or ∿ 115/230 V) are distributed automatically.
Sensors and preactuators are connected on removable screw or spring terminals.
The Advantys STB configuration software is used to set the parameters of the numerous I/O module functions (logic of each channel, behavior in the event of a short-circuit or overload, fallback position, reflex functions, etc)

Description

The STB NIP 2212 Ethernet TCP/IP network interface module has the following on the front panel:

1 A standard connector for 10BASE-T interface (RJ45)
2 Two rotary selector switches for addressing nodes on the bus or the network
3 A ⎓ 24 V external power supply connector for the removable screw-type (STB XTS 1120) or spring-type (STB XTS 2120) terminals
4 An LED display block
5 A screw for unlocking the module from the DIN rail
6 A slot for an STB XMP 4440 removable memory card
7 Cover for access to: a port for connecting the island setup and configuration PC or an HMI terminal (read/write data), and the Reset button

On the right-hand side panel:
A bus connector for connecting (via base units) to the power distribution module and to the I/O modules (max. 32 modules on 7 segments).

Characteristics

Transparent Ready services	Class		B20
	Standard Web server		"Rack Viewer" access to the product description and status and to the island diagnostics "Data editor" access to the configuration functions and variables
	Ethernet TCP/IP communication management service		Modbus messaging (read/write data words) FDR client for automatic assignment of the IP address and network parameters SNMP agent, detection of the product by an SNMP manager
Structure	Physical interface		RJ45 standard 10BASE-T connector
	Data rate		10 Mbps
	Medium		Twisted pair
Ethernet communication adapter	Operating temperature		0…+ 60°C
	Relative humidity		95% non condensing at 60°C
	Degree of protection		IP 20
	Power supply		⎓ 24 V (limits ⎓ 19.2…30 V), 400 mA
	Max. number of I/O modules		32 per island (16 per segment)
	Number of segments		1 primary and 6 extensions
	I/O modules	Discrete inputs	⎓ 24 V (2, 4 or 6 channels), ∿ 115 V and 230 V (2 channels)
		Discrete solid state outputs	⎓ 24 V/0.5 A (2, 4 or 6 channels), ⎓ 24 V/2 A (2 channels), ∿ 115…230 V/2 A (2 channels)
		Relay outputs	⎓ 24 V or ∿ 115…230 V 2 "C/O"/2 A, 2 "N/C" + "N/O"/7A
		Analog inputs	- 10 V…+ 10 V, 0…20 mA, multi-range (2 channels)
		Analog outputs	- 10 V…+ 10 V, 0…20 mA (2 channels)
		Application-specific	16 Tego Power motor starter inputs, 12 TeSys model U controller-starter inputs
			40 kHz 1 channel counter
	Conformity to standards		IEC/EN 61131-2, UL 508, CSA 1010-1, FM Class 1 Division 2, CE
	LED indicators		Ethernet network status (10T ACT, LAN ST) Module and island status (POWER, RUN, ERROR and TEST)

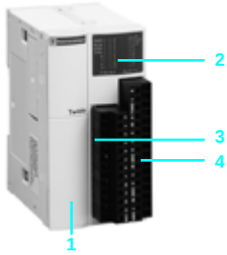
References

STB NIP 2212

Description	Use	Reference	Weight kg
Ethernet "NIM" network interface modules Class B20	⎓ 24 V power supply	**STB NIP 2212**	0.130
Removable power supply terminals (pack of 10)	Screw	**STB XTS 1120**	0.003
	Spring	**STB XTS 2120**	0.003
32 Kb removable memory card	Application memory backup	**STX XMP 4440**	–

(1) Power distribution modules, I/O modules, bases, configuration software and separate parts: Please consult our "Advantys STB I/O, the open solution" catalog.

Transparent Ready
Field devices
Advantys OTB distributed I/O
Ethernet network interface with discrete I/O



Presentation

The Advantys OTB distributed I/O solution, which complements the Advantys STB offer, consists of a compact system (network interface and integrated I/O) with the addition of Twido I/O expansion modules. Each island has, on a DIN rail:

- A network intface module (including Ethernet TCP/IP) with 12 ⎓ 24 V inputs, 6 relay outputs and 2 solid state outputs ⎓ 24 V 0.3 A.
- As an extension, up to 7 discrete or analog I/O expansion modules.

This structure, created using IP 20 modules, can thus be used to manage 20 to 244 I/O per island over a maximum length of 328.7 mm (height 94.5 mm).

Description

The OTB 1E0 DM9LP Ethernet TCP/IP network interface module with integrated I/O has the following on the front panel:

1 A pivoting door for accessing a standard connector for 10BASE-T/100BASE-TX physical interface (RJ45).
2 An LED display block.
3 Screw terminals for the ⎓ 24 V sensor power supply and for connecting the input sensors (with 1 common).
4 Screw terminals for connecting the output preactuators (with 4 commons).

On the right-hand side panel:
A connector for TWD D●●/A●● I/O expansion modules (7 modules max.).

Characteristics

Transparent Ready services	Class	A10
	Standard Web server	None
	Standard Ethernet TCP/IP communication service	Modbus messaging (read/write data words)
Structure	Physical interface	RJ45 standard 10BASE-T/10BASE-TX connector
	Data rate	10/100 Mbps with automatic recognition
	Medium	Twisted pair
Ethernet communication adapter	Operating temperature	0…+ 55°C
	Relative humidity	30…95% non condensing
	Degree of protection	IP 20
	Power supply	⎓ 24 V (limits ⎓ 20.4…26.4 V)
	Inputs	12 inputs ⎓ 24 V, 5 and 7.7 mA, 1 common point (positive or negative logic) Connection via removable screw terminals
	Outputs	6 ∿ 230 V or ⎓ 30 V, 2 A relay outputs, 3 common points (1 x 3, 1 x 2 and 1 x 1) 2 ⎓ 24 V, 0.3 A transistor outputs, 1 common point (positive logic) Connection via removable screw terminals
	Conformity to standards	IEC 61131-2, UL 508 CSA C22.2 No. 213 (Class 1 Division 2 Groups A, B, C, D), CE
	LED indicators	Controller status (PWR and STAT), I/O (I●/Q●) Ethernet network status/10 or 100 Mbps data rate (10 T and 100T)

References

OTB 1E0 DM9LP

Description	No. of discrete I/O	Reference	Weight kg
Ethernet network interface module ⎓ 24 V power supply Class A10	12 ∿ 24 V inputs 6 relay outputs 2 ⎓ 24 V solid state outputs	**OTB 1E0 DM9LP** ▲	0.205

▲ *Available soon. Please consult your Regional Sales Office.*

Discrete I/O expansion modules

Number of channels		8	16	4 I/4 Q	16 I/8 Q
	∿ 120 V inputs	**TWD DAI 8DT**	–	–	–
	⎓ 24 V inputs	**TWD DDI 8DT**	**TWD DDI 16DT**	**TWD DMM 8DRT**	**TWD DMM 24DRF**
	2 A relay outputs	**TWD DRA 8RT**	**TWD DRA 16RT**		
	⎓ 24 V 0.3 A transistor outputs	**TWD DDO 8TT**	–	–	–

Analog I/O expansion module

Number of channels		1	2	4	8	2 I/1Q
	0…10 V, 0…20 mA inputs	–	–	**TWD AMI 4LT**	**TWD AMI 8HT**	–
	Thermocouple/Pt temp. probe inputs	–	–	–	**TWD ARI 8HT**	**TWD ALM 3LT**
	0…10 V, 4…20 mA outputs	**TWD AMO 1HT**	–	–	–	**TWD AMM 3HT**
	0…10 V, 4…20 mA inputs	–	**TWD AMI 2HT**	–	–	
	+/- 0…10 V outputs	–	**TWD AVO 2HT**		–	–

For further information, please consult our "Automation and control, automation and relay functions" catalog.

Transparent Ready
Field equipment
ATV 58 TRX variable speed drives

ATV 58HU18M2

Presentation

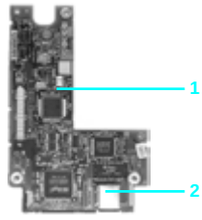
Altivar 58 variable speed drives are frequency inverters for asynchronous motors, with the following features, depending on the model:

- ATV 58 drive with the following power supplies:
  - single phase 200…240 V for 1/2 HP - 30 HP ratings
  - three phase 200…230 V for 2 HP- 50 HP ratings
  - three phase 380 V…460 V for 1 HP- 500 HP ratings

  This is designed for industrial materials handling, packing and packaging applications, pumps, fans, compressors and special machines.

Description

Altivar 58 TRX drives connect to the Ethernet TCP/IP network via the VW3 A58310 communication card.



1 The Ethernet TCP/IP communication card installs into the ATV drive.
2 The card has a standard connector for 10BASE-T/100BASE-TX interface (RJ45)

Characteristics

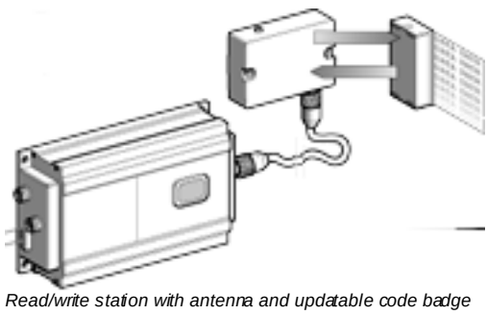
Transparent Ready services	Class	B20
	Standard Web services	"Altivar Viewer" drive diagnostics "Data editor" access to the configuration, adjustment and signaling functions "Statistics" product status and communication statistics
	Ethernet communication management services	Modbus messaging FDR client for automatic assignment of the IP address and network parameters SNMP agent, detection of the product by an SNMP manager
Structure	Physical interface	RJ45 standard 10BASE-T/100BASE-TX connector
	Data rate	10/100 Mbps with automatic recognition
	Medium	Twisted pair
Drive	Operating temperature	- 10…+ 40°C or - 10…+ 50°C depending on model, please consult our "Variable speed drives and soft starters" catalog
	Relative humidity	93% non condensing, no dripping water, conforming to IEC 60068-2-3
	Degree of protection	That of the drive: IP 21 and IP 41 on upper part
	Conformity to standards	ISO/IEC 8802.3, ANSI/IEE Std 802.3, UL 508C, CSA C22.2 N 14 M95, CE Drive standards NF-EN 50178, IEC 61800 class A
	LED indicators	Collision detection, transmission and reception activity, data rate (10 or 100 Mbps)

References

VW3 A58310U

Description	For drive	Reference	Weight kg
Communication card Ethernet Modbus TCP/IP 10/ 100 Mbps Class B20	ATV58 TRX All ratings	**VW3 A58310U**	0.300

Transparent Ready
Inductel identification system
Ethernet read/write station

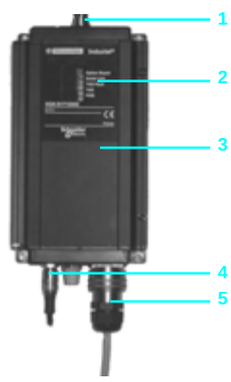


Read/write station with antenna and updatable code badge

Presentation

Inductive technology is based on the use of a medium frequency electromagnetic signal (carrier), for contactless transmission between two electronic devices. It is used for identifying products during manufacture and improving the management of product-related data flows.

The system consists of:
- Updatable code badges, with decentralized memory (ferroelectric memory or EEPROM), accessible in read and write mode for use with the product to be identified.
- The read/write station with remote antenna, a bidirectional communication device that manages the data transmitted between the badge and the processor via the Ethernet TCP/IP network.



Description

The XGKS1715503 read/write station is in the form of a dust and damp proof metal box comprising:
1. A 5-way female M12 connector for connection to the antenna (XGLA... or XGPA...).
2. A display block consisting of 5 LEDs indicating the station status.
3. A removable cover for accessing the station configuration switches.
4. A 20UNF 3 1/2" 3-pin male connector for connecting the ⎓ 24 V station power supply (female connector to be ordered separately).
5. An IP 65 shielded base for connection to the Ethernet network.

The special connector supplied with the station is used to form a dust and damp proof connection using any standard RJ45 cable.

This station (210 x 60 x 235), is fixed onto a frame or panel using 4 screws (4 x ý 8 holes).

Characteristics

Transparent Ready services	Class		A10
	Standard Web server		No Web server
	Standard Ethernet TCP/IP communication service		Modbus messaging (read/write I/O words)
Structure	Physical interface		10BASE-T/100BASE-TX, standard RJ45 connector with IP 65 shielded base
	Data rate		10/100 Mbps with automatic recognition
	Medium		Double twisted pair
Network interface module controller	Operating temperature		0...+ 50°C
	Relative humidity		30...95% non condensing
	Degree of protection		IP 65
	Power supply		⎓ 24 V (limits ⎓ 21...29 V)
	External antenna		5-way female M12 connector (antenna/station link 2 m max.)
	Communication	Requests	Modbus TCP/IP 124 words max.
		Data rate	500 words/s max. depending on antenna used
	Conformity to standards		UL, CE
			Electromagnetic interference, level 3 according to IEC 61000-4-2/4-3/4-3
	LED indicators		On (green), badge present (yellow), badge and communication port faults (red)
			Ethernet network activity (RUN, green), collision detection (COL, red), diagnostics (STS, yellow) and fault (ERR, red)

References

XGKS1715503

Description	Integrated Ethernet port	Reference	Weight kg
Read/write station ⎓ 24 V power supply Class A10	10/100 Mbps	**XGKS1715503**	1.120

Antennae, updatable code badges, connection accessories: please consult our "Inductive identification system" catalog.

4

Contents

4 - Electrical Distribution products

4 - Product data sheets

4

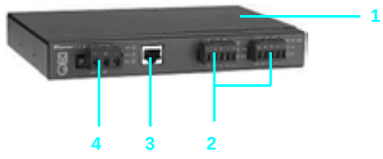
Transparent Ready
Electrical distribution products
MV and LV protection and metering products

Sepam/Masterpact/CM●000/PM●00

Presentation

Merlin Gerin communicating electrical distribution protection and measurement products are ideal for integration in Transparent Ready architectures.
This range includes in particular:
- Sepam series 20, 40 and 80 Medium Voltage (MV) protection relays.
- Masterpact Low Voltage (LV) circuit-breakers used with their Micrologic A, P or H protection units.
- Power Logic power meters (PM), such as the PM500, PM700 and PM800, that can be used for both MV and LV.
- The advanced Power Logic Circuit Monitors (CM), such as the CM2000, CM3000 and CM4000.

Description



These products are connected to Ethernet via an EGX gateway or server that is generally mutualized for a number of electrical distribution products:

1 An EGX gateway/server with, depending on the model:
- EGX 200 gateway if the only requirement is to have transparent connectivity on Ethernet (and thus multi-master openness).
- EGX 400 server to also have the Web services associated with the above products, for easy monitoring of the electrical network.

2 2 Modbus serial ports for connection to the above product(s).
3 A standard connector for 10BASE-T/100BASE-TX (RJ45) interface with, for the EGX 400 server, a standard connector for 100BASE FX interface.
4 A ⎓ 24 V power supply.

The EGX also provides Modbus serial link (SL)/Modbus TCP gateway services for all Modbus SL products.
The EGX can also take a Modbus master product on one of its ports (configured for this purpose) that will then have access to the Modbus products on the other port.
EGX are specifically designed to withstand harsh thermal or electrical environments.

Characteristics

Type of communicator		EGX 200	EGX 400
Transparent Ready services	Class	B10	C10
	Standard Web server	Configuration of the gateway communication functions	
		Monitoring/diagnostics pages associated with the products connected downstream	
	Configurable Web server	–	Summary Web pages, and ability to record variables. Web pages are created using the WPG tool
	Ethernet TCP/IP communication management service	Modbus messaging	
		SNMP agent, SNTP time synchronization, HTTP protocol, FTP file sharing	
Ethernet connection	Physical interface	10BASE-T/100BASE-TX (RJ45)	
		–	100BASE-FX
	Medium	Twisted pair	Twisted pair or optical fiber
Modbus SL connections	Number of ports	2	
	Types of port	Port 1, RS 485 (2 or 4-wire)	
		Port 2, RS 232 or RS 485 (2 or 4-wire)	
	Protocol	Modbus	
	Transmission speed	38.4 Kbps	
	Recommended max. number of devices	32 per port, ie. 64 in total	
Other characteristics	Operating temperature	- 30°C to + 80°C	
	Relative humidity	5...95% non condensing at 40°C	
	Power supply	⎓ 24 V (∿ 100-240 V socket adapter supplied), 8 W	
	Conformity to standards	cUL (conforming to CSA C22-2 no. 14-M91), UL508, CE	
	Environmental resistance	EN 61000-6-2, EN 61000-4-2/3/4/5/8/11, EN 55022/FCC class A	
	Mounting	On symmetrical or asymmetrical DIN rail	

References

EGX 200/EGX 400

For	Description	Transparent Ready class	References	Weight Kg
Sepam, Masterpact/ Micrologic, PM, CM or other Modbus SL products	**Modbus Ethernet gateway**	Class B10	**EGX 200MG**	0.700
	Modbus Ethernet server	Class C10	**EGX 400MG**	0.700

Transparent Ready
Electrical distribution products
Advanced electrical circuit monitors
CM 3000/CM 4000

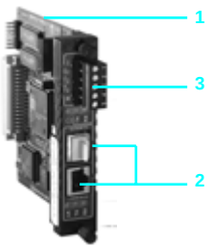
CM 3000/CM 4000

Presentation

CM 3000 and 4000 Circuit Monitors are high-performance monitoring units that provide a large number of possibilities.
Installed on the incoming feeder, on the Medium Voltage (MV) or Low Voltage (LV) switchboard incoming supply or on sensitive outgoing feeder, the Circuit Monitors record the electrical parameters of the installation. They provide relevant information for controlling costs, improving power quality and minimizing production downtime. They offer the possibility of detailed recording of the conditions of any detected interference.
Depending on the model and the options, they also perform the following:

- Detection and recording of voltage dips and jumps which cause production stoppages on some sensitive processes.
- Precise (1 ms) time synchronization by GPS.

They provide current and voltage measurement precisions from 0.04% to 0.1%.



Description

These products are connected to Ethernet via their ECC21 option card.
This card also provides an integrated Web gateway/server function to Modbus on Ethernet TCP/IP for Modbus Serial Link (SL) communicating products connected downstream:

1 ECC 21 Ethernet option card for Circuit Monitor.
2 A standard connector for 10BASE-T/100BASE-TX interface (RJ45) with, for the EGX 400, a 100BASE-FX connector.
3 Modbus (SL) serial port for gateway/server function for connecting Modbus products downstream.

The gateway/server function provided by the ECC 21 card is similar to that of the EGX server, but with a lower capacity.

Characteristics

Type of communicator		ECC 21
Transparent Ready services	Class	C10
	Configurable Web server	Configuration of the CM communication functions and the Modbus TCP gateway function
		6 monitoring pages, 5 of which are customizable One page displays details of the electrical values of the host CM The other 5 Web pages (created using the WPG tool) can provide displays of the main electrical values of the Modbus SL products connected downstream
	Ethernet TCP/IP standard communication management service	Modbus messaging
		SNMP agent, SNTP time synchronization, SMTP e-mail notification (transmission according to alarms), HTTP protocol, FTP file sharing
Ethernet connection	Physical interface	10BASE-T/100BASE-TX (RJ45)
		100BASE-FX
	Medium	Twisted pair or optical fiber
Modbus SL connections	Number of ports	1
	Type of ports	RS 485 (2 or 4-wire)
	Protocol	Modbus
	Transmission speed	38.4 Kbps
	Recommended max. number of devices	32
Other characteristics	Operating temperature	- 25°C to + 70°C
	Relative humidity	5…95% non condensing at 40°C
	Conformity to standards	CE, UL508
	Environmental resistance	EN 61000-6-2, EN 61000-4-2/3/4/5/8/11, EN 55022/FCC class A

References

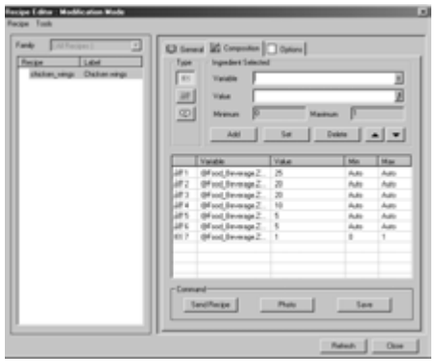
ECC 21

Description	For Circuit Monitor metering unit	Reference	Weight kg
Ethernet option card Class C10	CM3000 CM4000	**ECC21**	–

Transparent Ready

Electrical distribution products

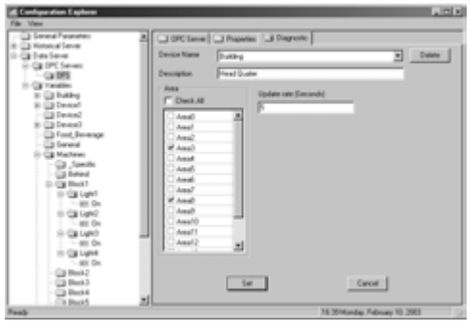
PowerLogic SMS electrical power management software



Presentation

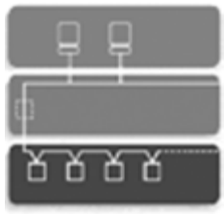
PowerLogic SMS software is a set of software tools specially designed to help the user of an electrical network to control this network and reduce the costs connected with electrical power.

The tools are deliberately simple to configure, and incorporate the library of electrical distribution communicating components, such as Power Meter, Circuit Monitor, Masterpact or Sepam, as standard. They are also open, so that they can handle any type of Transparent Ready product (using Modbus TCP messaging).



The software offers a large number of pre-defined screens, enabling users to quickly access the electrical data they require. These screens can also be customized.

Using such a tool the user can:
- Ascertain the status of his network
- View the load curves.
- Optimize his contract with his energy supplier.
- Use submetering and thus accurately re-allocate energy costs.
- Optimize his investment.
- Monitor electricity quality for optimum operation of the network and the process being supplied.



Description

The SMS software range covers various needs according to functional requirements and type of electrical installation.

Characteristics

Type		**PowerLogic SMS, “electrical engineer” supervisory software**	
Compatibility		All Merlin Gerin and SquareD electrical distribution products and other Transparent Ready products	
Operating system		Windows 98, Windows 2000 and Windows XP	
Type of software license		**Single product**	**Multi-product**
Reference	Electrical Measurement oriented	–	**PMX 1500**
	ED Network management oriented	**SMS 121**	**SMS 1500**

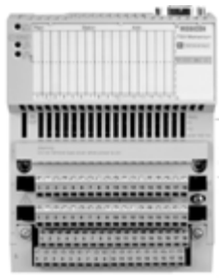
5

Contents

5 - Controller and PLCs

5 - Product data sheets

Transparent Ready
Controllers and PLCs
Modicon Momentum
M1E processor adapter



M1E processor adapter on Momentum I/O base

Presentation

M1 processor adapters are based on the Modicon Momentum distributed I/O family of products.
They are designed to be stand alone for mounting on any discrete, analog or application-specific I/O base. Depending on the type, they take one of the following:
- Remote I/O via the I/O bus port.
- Connection of a Modbus master/slave bus.

An optional module inserted between the M1 processor and the I/O base enables these units for network connection. The Flash memory can also be used to back up the applications, creating a local copy of the program to be loaded in the RAM.

Either ProWORX 32 software (LL984 programming) or Concept software (5 IEC languages) is required for programming M1 processor adapters, depending on the model.

Description

M1E 171 CCC 960 20/30 and 171 CCC 980 20/30 processor adapters have the following on the front panel:

1 A standard connector for 10BASE-T interface (RJ45).
2 A 9-way female SUB-D connector for Modbus or I/O bus connection (depending on the model).
3 Three LED indicators.

Characteristics

Type of adapter		171 CCC 980 20	171 CCC 980 30	171 CCC 960 20	171 CCC 960 30
Transparent Ready services	Class	B10			
	Web server	"Rack Viewer" access to the product description and status, and to the island diagnostics "Data editor" access to the configuration functions and variables "Web page loader" software tool			
	Ethernet TCP/IP communication management services	Modbus Messaging (read/write data words) I/O Scanning			
Structure	Physical interface	10BASE-T			
	Data rate	10 Mbps			
	Medium	Twisted pair			
Network module	Operating temperature	0…+ 60°C			
	Relative humidity	10...95% non condensing during operation			
	Degree of protection	IP 20			
	Power supply	Supplied by the 170 A●● I/O base on which the processor is mounted			
	Processor scan time	0.3 ms per Kinstruction			
	RAM/Flash memory	512 K/512 K	544 K/1 M	512 K/512 K	544 K/1 M
	User memory/data memory	18 K/24 K			
	Programming software	ProWORX 32	Concept, ProWORX 32	ProWORX 32	Concept, ProWORX 32
	Other communication ports	1 RS 485 Modbus port		1 I/O bus (derived from INTERBUS)	
	Communication extension ports	Via optional modules (1 Modbus Plus port, 1 redundant Modbus Plus port, 1 serial link)			
	Conformity to standards	UL, cUL, FM Class 1 Division 2, NEMA type 250, CE			
	LED indicators	Adapter operating (RUN) Ethernet network status (LAN Act), Ethernet network activity (LAN STS)			

References

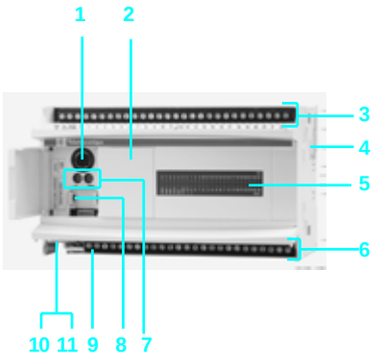
171 CCC 980/960 ●0

Description	Communication ports	Programming	Reference	Weight kg
M1E processors Class B10	1 Ethernet, 1 Modbus	ProWORX 32	**171 CCC 980 20**	0.042
		Concept, ProWORX 32	**171 CCC 980 30**	0.042
	1 Ethernet, 1 I/O bus	ProWORX 32	**171 CCC 960 20**	0.042
		Concept, ProWORX 32	**171 CCC 960 30**	0.042

Accessories and separate parts: Please consult the "Modicon Momentum automation platform" catalog.

Transparent Ready
Controllers and PLCs
Twido compact base

Compact base Twido with digital display



Presentation

The Twido range of PLCs provides a compact base with integrated Ethernet port. The TWD LCAE 40DRF base is a compact-sized (95 x 90 x 70 mm), "all-in-one" solution. It uses a ∿ 100...240 V power supply and has the following discrete I/O:

- 24 ⎓ 24 V inputs
- 14 relay outputs
- 2 ⎓ 24 V transistor outputs

This base can take:

- Up to 7 I/O expansion modules, thus increasing the I/O capacity to 152 (with screw terminal version) or 264 (with HE 10 connector version).
- All Twido range separate parts (memory cartridge or real-time clock, serial link adaptors, digital display).

Description

The TWD LCAE 40DRF Twido compact PLC base with integrated Ethernet port consists of:

1 An RS 485 serial link port mini-DIN connector (for connecting the programming terminal).
2 A slot for diagnostics/maintenance digital display unit.
3 Screw terminals for ⎓ 24 V sensor power supply and for connecting the input sensors (protected by hinged terminal covers).
4 A connector for expansion modules (7 modules max. discrete I/O, analog I/O, AS-Interface bus).
5 An LED display block.
6 Screw terminals for connecting the output preactuators (protected by hinged terminal covers).
7 Two analog adjustment points.
8 A connector for the extension of the RS 232C/RS 485 2nd serial link port.
9 Screw terminals for connecting the ∿ 100...240 V power supply.

Accessible from beneath the controller:

10 A connector for memory cartridge or real-time clock
11 A standard connector for 10BASE-T/100BASE-TX interface (RJ45)

Characteristics

Transparent Ready services	Class	A10
	Web server	None
	Standard Ethernet TCP/IP communication services	Modbus messaging (read/write data words)
Structure	Physical interface	RJ45 standard 10BASE-T/100BASE-TX connector
	Data rate	10/100 Mbps with automatic recognition
	Medium	Twisted pair
Drive	Operating temperature	- 0...+ 55°C
	Relative humidity	30...90% non condensing
	Degree of protection	IP 20
	Power supply	∿ 100...240 V, 50/60 Hz (limits ∿ 85...264 V, 47...63 Hz)
	⎓ 24 V sensor power supply	250 mA
	Inputs	24 ⎓ 24 V, 11 and 7 mA, type 1 inputs (positive or negative logic)
	Outputs	14 ∿ 230 V or ⎓ 30 V, 2 A relay outputs
		2 ⎓ 24 V, 1 A (positive logic) transistor outputs
	Counting	2 ⎓ 24 V 5 kHz channels, 2 ⎓ 24 V 20 kHz channels
	Programming	TwidoSoft (Ladder language, Instruction List), 3000 instructions (6000 with memory cartridge)
	Application memory	3000 instructions (6000 with memory extension cartridge)
	Conformity to standards	IEC 61131-2, UL 508, UL 1604/CSA C22.2 No. 213 (Class 1 Division 2 Groups A, B, C, D), CE and TuV
	LED indicators	Controller status (PWR, RUN, ERR and STAT), I/O (IN P/OUT ●) Ethernet network status (LAN ST), 10 or 100 Mbps data rate (L ACT)

References

Description	No. of discrete I/O	Reference	Weight kg
Compact base with integrated Ethernet port ∿ 100...240 V power supply Class A10	24 ∿ 24 V inputs 14 relay outputs 2 solid state outputs ⎓ 24 V	**TWD LCAE 40DRF**	–

TWD LCAE 40DRF

Separate parts, I/O expansion modules, extension modules, prewired system and TwidoSoft programming software: Please consult our "Automation and relay functions" catalog.

Transparent Ready
Controllers and PLCs
Modicon TSX Micro
Ethernet network modules

TSX 37 20 TSX Micro platform

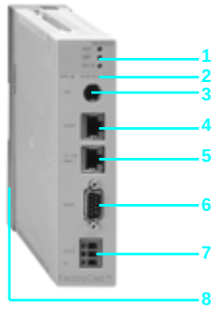
Presentation

Modicon TSX Micro is the automation platform designed for small machines and mobile systems. It is flexible and modular, offering connections using removable screw terminals or HE10 connectors, and is suitable for applications with up to 248 discrete I/O.

TSX Micro supports the following:

- 4 application-specific functions: counting, position control, analog/process control and safety.
- AS-Interface, CANopen, Fipio, Modbus and Uni-Telway buses, and Ethernet, Fipway and Modbus Plus networks.

TSX Micro offers a choice of supply voltages: ⎓ 24 V or ∿ 230 V.



Description

TSX ETZ 410/510 Ethernet modules are autonomous. They are mounted outside the TSX Micro PLC rack, on DIN rails or on AM1-PA pre-slotted plates.

TSX ETZ 410/510 modules have the following on the front panel:

1 Three LEDs indicating the module status (RUN, ERR, RX/TX).
2 The module MAC address (default factory-set address).
3 A mini-DIN connector for connection to the terminal port (marked TER).
4 An RJ45 connector for Uni-Telway auxiliary connector RS 485 serial link (marked RS 485).
5 A standard RJ45 connector for connection to the Ethernet network (marked 10BASE-T/100BASE-TX).
6 A 9-pin male SUB-D connector for RS232 serial link (Modem).
7 Screw terminals for connecting the ⎓ 24 V external power supply.
8 A support plate for fixing the module.

Characteristics

Type of module		TSX ETZ 410	TSX ETZ 510
Transparent Ready services	Class	B20	C20
	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 variables	
	FactoryCast configurable Web server	–	Editor for creating Web page mimics User Web page hosting (8 Mb available)
	Ethernet TCP/IP communication management services	Modbus messaging (read/write data words) FDR client for automatic assignment of the IP address and network parameters SNMP agent, detection of the device by an SNMP manager	
Structure	Physical interface	RJ45 standard 10BASE-T/100BASE-TX connector	
	Data rate	10/100 Mbps with automatic recognition	
	Medium	Twisted pair	
Network module	Operating temperature	0…+ 60°C	
	Relative humidity	10...95% non condensing during operation	
	Degree of protection	IP 20	
	Power supply	⎓ 24 V (limits ⎓ 19.2…30 V), 100 mA	
	Other TCP/IP communication service	Uni-TE messaging (client/server requests: 128 bytes in synchronous mode and 1 Kb in asynchronous mode)	
	Modem connection	RS 232C link, PPP protocol, Half or Full-Duplex, 56 Kbps	
	Conformity to standards	IEC/EN 61131-2, UL 508, CSA 1010-1, FM Class 1 Division 2, CE	
	LED indicators	Ethernet network status (RUN), transmission/reception activity (TX/RX) Ethernet port fault (ERR)	

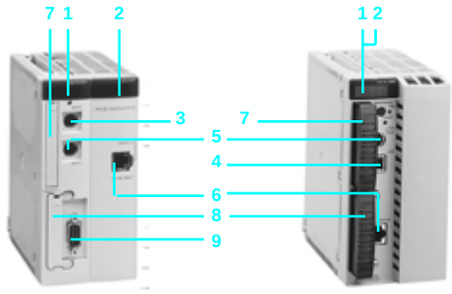
References

TSX ETZ 410/510

Description	Transparent Ready class	Reference	Weight kg
Autonomous Ethernet modules for TSX Micro PLC TSX 37 10/20/30	B20	**TSX ETZ 410**	0.280
	C20	**TSX ETZ 510**	0.280

For further information: Please consult our "Modicon TSX Micro and PL7 software automation platform" catalog.

Transparent Ready
Controllers and PLCs
Modicon Premium
Processors with integrated Ethernet port



Presentation

Modicon Premium is the optimized automation platform for complex machines, manufacturing and discrete automation. These processors are open to the latest technologies, with built-in universal Ethernet TCP/IP connections. Premium also has numerous advanced automation functions (counting, electronic cam, position control, weighing, control data storage and machine safety).

Description

TSX P57 1634M, TSX P 26●●/2823/36●●/4634/4823/5634M double format processors *(1)* with built-in Ethernet port include the following on the front panel:

1 A display block with 5 LEDs relating to the processor.
2 A display block relating to the built-in Ethernet port.
3 An 8-way female mini-DIN connector marked TER for connecting a programming or adjustment terminal.
4 A USB connector marked TER for connecting a programming or adjustment terminal.
5 An 8-way female mini-DIN connector marked AUX for connecting an RS 485 peripheral device.
6 A standard (RJ45) connector for 10BASE-T/100BASE-TX interface.
7 A slot for a PCMCIA memory extension card.
8 A slot for a PCMCIA communication or data storage memory extension card.
9 A 9-way SUB-D connector (on TSX P57 2823/4823M models) for Fipio bus manager link.

Characteristics

Type of module		Unity Pro software PL7 Pro software	TSX P57 1634M –	TSX P57 2634M TSX P57 2●23M	TSX P57 3634M TSX P57 3624M	TSX P57 4634M TSX P57 4823M	TSX P57 5634M –
Transparent Ready services	Class		B30				
	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	Yes (between 64 stations)				Yes (128 stations)
		Global Data	Yes				
		FDR server	Automatic assignment of IP address and network parameters				
		SMTP E-mail notification	Yes				
		SNMP network administrator	Yes				
		Pass band management	Yes				
Structure	Physical interface		10BASE-T/100BASE-TX (RJ45)				
	Data rate		10/100 Mbps with automatic recognition				
	Medium		Twisted pair				
Premium processor	No. of discrete I/O		512	1024		2048	
	No. of analog I/O		24	80	128	256	512
	No. of application-specific channels		8	24	32	64	
	Max. no. of network connections (including integrated link)		1		3	4	5
	Other TCP/IP communication service	Uni-TE TCP	Client/server requests: 128 bytes in synchronous mode and 1 Kb in asynchronous mode				
		X-Way	Yes				
	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 1010-1, FM Class 1 Division 2 Group A/B/C/D, CE				
	LED indicators		Ethernet network status (RUN), transmission/reception activity (TX/RX) Collision detection (COL), Ethernet link diagnostics (STS), Ethernet port fault (ERR) 5 LEDs specific to the operation of the processor (RUN, ERR, I/O, TER and FIP)				

References

Description	Discrete I/O Analog I/O App-sp. chann.	Reference Unity software	 PL7 software		Weight kg
Processors with integrated Ethernet link	512 / 24 / 8	**TSX P57 1634M**	–		0.042
	1024 / 80 / 24	**TSX P57 2634M**	**TSX P57 2623M**		0.042
		–	**TSX P57 2823M**	*(2)*	
Class B30	1024 / 128 / 32	**TSX P57 3634M**	**TSX P57 3623M**		0.042
	2048 / 256 / 64	**TSX P57 4634M**	**TSX P57 4823M**	*(2)*	0.042
	2048 / 512 / 64	**TSX P57 5634M**	–		

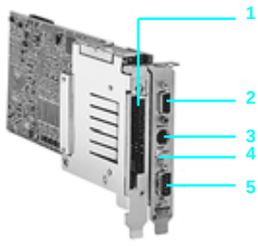
(1) Except TSX P57 1634M processor, single format.
(2) Also has an integrated Fipio bus manager link.

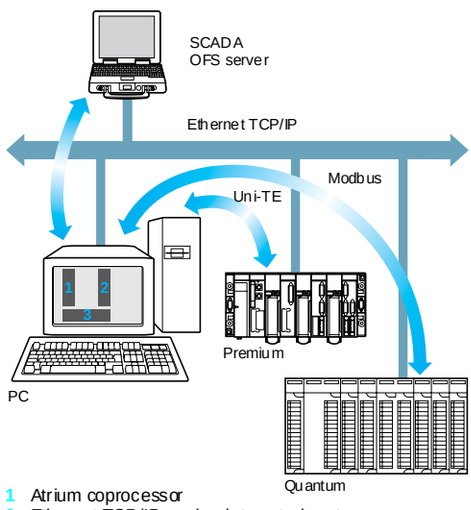
TSX P57 4634/5634M

TSX P57 26/28/36/48●●M

For further information: Please consult our "Modicon Premium and PL7 software automation platform" or "Modicon Premium and Unity software automation platform" catalogs.

Transparent Ready
Controllers and PLCs
Modicon Atrium
Coprocessors and TCP/IP gateway





1 Atrium coprocessor
2 Ethernet TCP/IP card or integrated port
3 TCP/X-Way software gateway

Presentation

The Atrium coprocessor (PCI bus card), combined with a Magelis *i*PC industrial PC, provides a PC with a built-in PLC and supervisory software. This type of configuration is designed for installations that require a high level of interaction between the automation functions and the HMI applications.
The software gateway enables Atrium PLCs to communicate using Modbus (or Uni-TE) Ethernet TCP/IP via the integrated Ethernet port in the industrial PC.

Description of the Atrium coprocessor

TSX PCI 57 204/354M coprocessors occupy two consecutive slots on the PC PCI bus but only use one electrically. They comprise:

- On the faceplate:

1 A slot for a PCMCIA communication or data storage memory extension card.
2 A 9-way female SUB-D connector for connecting Bus X to the first Premium rack supporting the I/O modules and application-specific modules.
3 An 8-way female mini-DIN connector marked TER for connecting a programming terminal.
4 An ERR LED (coprocessor or embedded equipment fault).
5 A 9-pin male SUB-D connector (on TSX PCI 57 354M model) for Fipio bus manager communication.

- On the card, component side:
  - 4 or 5 LEDs indicating the operating status.
  - A slot for the coprocessor internal RAM backup battery.
  - A slot for a PCMCIA memory extension card.

Description of the TCP/IP gateway

The TCP/X-Way software gateway performs 2 main functions for Atrium coprocessors:

- Communication using the Modbus (or Uni-TE) TCP/IP protocol via the Ethernet TCP/IP card integrated in the PC.
- Data exchange in both directions with remote stations via the telephone modem in the PC.

This software interfaces with the Atrium coprocessor PCIway driver and automatically routes messages. The most common configurations are:

- Via Ethernet network (diagram opposite). Access is made secure by checking incoming IP addresses, in a similar way to the Premium PLC Ethernet TSX ETY 4103 module. The Global Data and I/O Scanning services are not supported.
- Via modem link. Incoming calls are checked via the standard Windows password checking mechanisms. In addition to remote access with Unity Pro, the TCP/IP gateway enables communication with other stations that can be connected to a local Ethernet network (RAS (*Remote Access Server*) function).

Characteristics

Type of module	Unity Pro software	TSX PCI 57 204M	TSX PCI 57 454M
Transparent Ready services	Class	A10	
	Standard Web server	None	
	Standard Ethernet TCP/IP communication service	Modbus TCP messaging (read/write data words)	
Structure		That of the Ethernet link integrated in the host PC	
Atrium coprocessor	See characteristics of the Premium processor	TSX P57 2●●●M, page 48296/5	TSX P57 3●●●M, page 48296/5

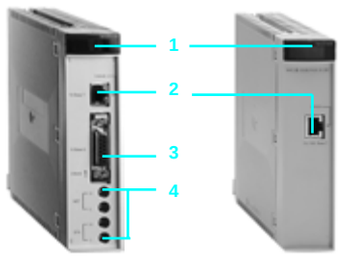
References

TSX PCI 57 204M

TSX PCI 57 454M

Description	Discrete I/O Analog I/O App-sp. chann.	Type of license	Reference	Weight kg
Coprocessors Class A10	1024 / 80 / 24	–	**TSX PCI 57 204M**	0.310
	2048 / 256 / 64	–	**TSX PCI 57 454M**	0.340
TCP/IP gateway software	–	Single station	**TLX CD GTW 10M**	–
		10 stations	**TLX CD10 GTW 10M**	–
		200 stations	**TLX CDUNT GTW 10M**	–

Transparent Ready
Controllers and PLCs
Modicon Premium
Ethernet network module



Presentation

TSX ETY ●●● modules are single format modules which are installed in a rack slot on Modicon Premium PLC stations or Modicon Atrium coprocessors. A configuration can take from 1 to 4 network modules, depending on the type of processor.
TSX ETY 110/110 WS/4103/5103 Ethernet modules route X-Way and Uni-TE messages transparently from a TCP/IP network to an X-Way network and vice versa.

Description

The front panel of TSX ETY ●●● modules comprises:
1 A display block indicating the state of the module.
2 A standard connector for 100BASE-TX and/or /100BASE-T interface (RJ45) depending on the model.
3 A standard connector for 10BASE5 interface (AUI).
4 Four thumbwheels for defining the station number and network number.

Characteristics

Type of module			TSX ETY 110	TSX ETY 110 WS	TSX ETY 4103	TSX ETY 5103	TSX WMY 100M
Transparent Ready services	Class		A10	C10	B30	C30	D10
	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 variables			
	FactoryCast configurable Web server		–	Yes	–	Yes	
	User Web pages (available size)		–	Yes (1.4 Mb)	–	Yes (8 Mb)	
	FactoryCast HMI active Web server		–				Yes *(1)*
	Standard Ethernet TCP/IP communication services		Modbus TCP messaging (read/write data words)				
	Ethernet TCP/IP advanced communication services	I/O Scanning	–		Yes (between 64 stations)		–
		Global Data	–		Yes		–
		FDR server	–		Automatic assignment of IP address and network parameters		–
		NTP time synchronization	–		Yes		–
		SMTP e-mail notification	–		Yes		–
		SNMP network administrator	SNMP agent				
		TCP Open	–	Option	–	Option	–
		Pass band management	–		Yes		–
Structure	Physical interface		10BASE-T (RJ45)/10BASE5 (AUI)		10BASE-T/100BASE-TX (RJ45)		
	Data rate		10 Mbps		10/100 Mbps with automatic recognition		
	Medium		Twisted pair/AUI cable		Twisted pair		
Network module	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				
	Other TCP/IP communication service	Uni-TE TCP	Client/server requests: 128 bytes in synchronous mode and 1 Kb in asynchronous mode				–
		Ethway/X-Way	Uni-TE, common words		–		
	Conformity to standards		IEC/EN 61131-2, UL 508, CSA 1010-1, FM Class 1 Division 2 Group A/B/C/D, CE				
	LED indicators		Ethernet network status (RUN), transmission/reception activity (TX/RX) Collision detection (COL), Ethernet port fault (ERR)				

References

TSX ETY 110/110 WS

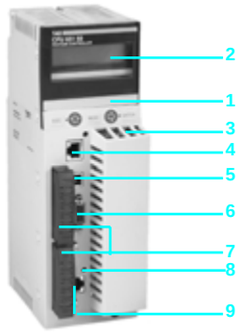
TSX ETY ●103/WMY 100

Description	Data rate	Transparent Ready class	Reference	Weight kg
Ethernet TCP/IP modules	10 Mbps	A10	**TSX ETY 110**	0.370
		C10	**TSX ETY 110 WS**	0.370
	10/100 Mbps	B30	**TSX ETY 4103**	0.340
		C30	**TSX ETY 5103**	0.340
		D10	**TSX WMY 100**	0.340
FactoryCast HMI software	HMI application development and debugging in TSX WMY 100		**TLX CD FCHMI V1M**	–
TCP Open *software (2)*	SDKC, C language development		**TLX LSDKC PL741M**	–
	TCP Open function block library		**TLX CD TCPA33E**	–

(1) Database management, arithmetic and logic calculations, automatic e-mail transmission on process event, connection to relational databases.
(2) With TSX ETY 110 WS and TSX ETY 5103 modules.

For further information: Please consult our "Modicon Premium and PL7 software automation platform" or "Modicon Premium and Unity software automation platform" catalogs.

Transparent Ready
Controllers and PLCs
Modicon Quantum
Processors with integrated Ethernet port



Presentation

Equipped with a high performance processor, Modicon Quantum is optimized for process control and high-availability needs.
The Quantum platform meets the requirements of the agribusiness, pharmaceutical, metallurgy, chemical-petrochemical and energy-infrastructure sectors.

The new Quantum processors are open to the latest technologies with built-In Ethernet TCP/IP connections, data storage, and a LCD keypad for local monitoring.

Description

The 140 CPU 651 50 and 140 CPU 651 60 processors have the following on the front panel:

1 An LCD display cover, providing access to:
- A key switch for locking system operations that may be requested and all the permitted parameters that may be modified via the LCD display (2) and 5-button keypad (3).
- A slot for the backup battery.
- A “Restart” pushbutton.

2 An LCD display (2 lines of 16 characters) with brightness and contrast controls.
3 A 5-button keypad with LEDs (ESC, ENTER, MOD, ÎI, =>).
4 An RJ45 connector for connection to the Modbus bus.
5 A type B female USB connector for connecting the programming PC.
6 A 9-way female SUB-D connector for connection to the Modbus Plus network.
7 Two slots for PCMCIA memory extension cards.
8 Two LEDS marked COM and ERR.
9 An RJ45 connector for connection to the Ethernet network.

Characteristics

Type of module		Unity Pro software	140 CPU 651 50	140 CPU 651 60
Transparent Ready services	Class		B30	
	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	Yes (between 128 stations)	
		Global Data	Yes	
		FDR client	Automatic assignment of IP address and network parameters	
		SMTP e-mail notification	Yes	
		SNMP network administrator	Yes	
		Pass band management	Yes	
Structure	Physical interface		10BASE-T/100BASE-TX (RJ45)	
	Data rate		10/100 Mbps with automatic recognition	
	Medium		Twisted pair	
Quantum processor	No. of discrete I/O		Local: 26 slots, decentralized: 31744 I/31744 Q, distributed: 8000 I/8000 Q/network	
	No. of analog I/O		Local: 26 slots, decentralized: 1984 I/31984 Q, distributed: 500 I/500 Q/network	
	Max. no. of communication modules		6 in local rack	
	Max. memory capacities	Program	7168 Kb	
		Localized/non-localized data	512 Kb	1024 Kb (768 Kb with no PCMCIA card)
		Data storage	8192 Kb	
	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		UL 508, cUL, CSA 22.2-142, FM Class 1 Division 2, CE	
	LED indicators		Activity on the Ethernet port (COM), collision detection (ERR)	

References

140 CPU 651 50/60

Description	Processor clock frequency	Program/data capacity *(1)*	Reference	Weight kg
Processors with integrated Ethernet link Class B30	166 MHz	7168 Kb/512 Kb	**140 CPU 651 50**	–
	266 MHz	7168 Kb/1024 Kb	**140 CPU 651 60**	–

(1) With PCMCIA card.
For further information: Please consult our “Modicon Quantum and Unity software automation platform” catalog.

Transparent Ready
Modicon Quantum
Ethernet network modules

Presentation

Ethernet 140 NOE 771 ●1/NWM 100 00 Ethernet network modules are single format modules for installing in the local rack slots of a Modicon Quantum PLC configuration.
A configuration can take from 2 to 6 application-specific modules, including network modules, depending on the type of processor.

Description

The front panel of TCP/IP 140 NOE 771 01/771 11 and 140 NWM10000 Ethernet modules comprises:

1 A display block, which indicates the module status and the transmission status on the network.
2 A hinged cover for access to:
- A standard (RJ45) connector for 10BASE-T/100BASE-TX interface.
- A connector for 100BASE-FX optical interface (MT-RJ).

Characteristics

Type of module			140 NOE 771 01	140 NOE 771 11	140 NWM 100 00
Transparent Ready services	Class		B30	C30	D10
	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 variables		
	FactoryCast configurable Web server	Editor for creating Web page mimics	–	Yes	
		User Web page hosting (available size)	–	Yes (8 Mb)	
	FactoryCast HMI active Web server		–		Yes *(1)*
	Standard Ethernet TCP/IP communication services		Modbus TCP messaging (read/write data words)		
	Ethernet TCP/IP advanced communication services	I/O Scanning	Yes (between 128 stations)		–
		Global Data	Yes		
		FDR server	Automatic assignment of IP address and network parameters		–
		NTP time synchronization	Yes		–
		SMTP e-mail notification	Yes		–
		SNMP network administrator	Yes		SNMP agent
		Pass band management	Yes		–
Redundancy service			Compatible with Hot Standby redundant architecture		–
Structure	Physical interface		10BASE-T/100BASE-TX (RJ45) or 100BASE-FX (MT/RJ)		
	Data rate		10/100 Mbps		
	Medium		Twisted pair/optical fiber		
Network module	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		UL 508, cUL, CSA 22.2-142, FM Class 1 Division 2, CE		
	LED indicators		Rack operational (Active), module ready (Ready), network active (Link) Ethernet network status (Run), download mode (Kernel), Full-duplex mode (Fduplex) Transmission/reception activity (TxAct/RxAct), 10 Mbps or 100 Mbps data rate (10MB/100MB) Collision detection (Coll), Ethernet module fault (Fault)		

(1) Database management, arithmetic and logic calculations, automatic e-mail transmission on process event, connection to relational databases.

References

140 NOE 771 ●1/NWM 100 00

Description	Data rate	Transparent Ready class	Reference	Weight kg
Ethernet TCP/IP modules	10/100 Mbps	B30	**140 NOE 771 01**	0.345
		C30	**140 NOE 771 11**	0.345
		D10	**140 NWM 100 00**	0.345

For further information: Please consult our "Modicon Quantum automation platform" or "Modicon Quantum and Unity software automation platform" catalogs.

6

Contents

6 - Human/Machine Interface products

6 - Product data sheets

Transparent Ready
Human-Machine Interface products
Magelis XBT graphic terminals

Presentation

Magelis XBT G (with 5.7" to 12.1" LCD touch screen) and Magelis XBT F (with keypad or 10.4" touch screen) graphic terminals provide simple access to communication solutions via their direct connection to the Ethernet TCP/IP network.

Characteristics and references

Magelis XBT G touch screen graphic terminals					
Display	LCD screen size	5.7"	7.4"	10.4"	12.1"
Functions	Representation of variables	Alphanumeric, bitmap, bargraph, gauge, button, light, clock, flashing light, keypad			
	Curves	Yes, with log			
	Alarm log	Yes, incorporated			
Communication	Integrated Ethernet	10BASE-T (RJ45)			
	Downloadable protocols	Uni-Telway, Modbus, Modbus TCP/IP			
Compatibility with PLCs		Twido, Nano, Modicon TSX Micro, Modicon Premium, Modicon Quantum			
Configuration software		Vijeo Designer **VJD SPU LFUCD V10M** (on Windows 2000 and XP)			
Compact Flash card slot		–	Yes		
Dimensions		171 x 60 x 138 mm *(1)* 132 x 74 x 78 mm *(2)*	215 x 60 x 170 mm	317 x 58 x 243 mm	
Supply voltage		⎓ 24 V			
References	Back-lit black and white monochrome STN screen	**XBT G2130** *(1)*	–	–	–
	64-color STN screen	–	–	**XBT G5230**	–
	256-color TFT screen	**XBT G2330** *(2)*	**XBT G4330**	**XBT G5530**	**XBT G6330**

Magelis XBT F graphic terminals			
Display	LCD screen size	10.4"	
	Format	256-color TFT	
Data entry keypad	Soft function keys with LED	10	–
	Static function keys with LED	12 + legends	–
	Service keys	12	–
	Alphanumeric keys	12 + 3 alphanumeric access	–
Touchscreen data entry		–	Yes
Functions	Representation of variables	Alphanumeric, bitmap, bargraph, gauge, potentiometer, selector	
	Recipes	125 records maximum with 5000 values	
	Curves	16	
	Alarm log	Yes	
Communication	Integrated Ethernet	10BASE-T/100BASE-TX (RJ45)	
	Buses and networks	Fipway, Modbus Plus, and third-party protocols	
	Downloadable protocols	Uni-Telway, Modbus, Modbus TCP/IP	
Compatibility with PLCs		Twido, Nano, Modicon TSX Micro, Modicon Premium, Modicon Quantum	
Configuration software		**XBT L1003M** (on Windows 98, 2000 and XP)	
Dimensions		296 x 91 x 322 mm	296 x 91 x 222 mm
Supply voltage		⎓ 24 V	
References	256-color TFT screen	**XBT F024610**	**XBT F034610**

Separate parts			
Magelis XBT G graphic terminals	16 Mb Compact Flash memory	32 Mb Compact Flash memory	
References	**XBTZGM16**	**XBTZGM32**	
Magelis XBT F graphic terminals	16 Mb PCMCIA memory card	Modbus Plus network PCMCIA card	Fipway network PCMCIA card
References	**XBT MEM16**	**TSX MBP 100**	**TSX FPP 20**

For further information, please consult our "Human-Machine Interfaces, The essential guide" brochure or our "Human-Machine Interface" catalog.

Transparent Ready

Human-Machine Interface products

Magelis Smart *i*PC/Compact *i*PC industrial PCs

Presentation

Magelis Smart *i*PC and Compact *i*PC industrial PCs are characterized by their compact size, their simplicity and their speed of setup. They use the latest Ethernet TCP/IP and Web client connection technologies.

Smart *i*PC and Compact *i*PC industrial PCs have a 15" TFT active matrix back-lit color LCD touchscreen. They include:

- An Ethernet 10BASE-T/100BASE-TX port (RJ45 connector)
- Web browser software tools (Internet/Intranet)

Also included, depending on the model:

- Smart *i*PC, a hardened PC with no vulnerable components (hard disk, CD-ROM drive, etc.), includes:
  - Windows XPe operating system
  - A client for Windows Terminal Services client/server architectures
  - Software (Readers) for reading Word (.doc), Excel (.xls), PowerPoint (.ppt) and Acrobat (.pdf) files.
- Compact *i*PC, an industrial PC with a hard disk (> 20 MB) and CD-ROM and floppy disk drives.

Characteristics and references

Compact industrials PCs		Smart *i*PC	Compact *i*PC	
Display	Size	15" active matrix XGA (1024 x 768)		
	Format	TFT active matrix back-lit color LCD (262,144 colors)		
Data entry		Via touchscreen		
Processor	Format	VIA		Intel Pentium 4 Mobile
	Frequency	667 MHz		1.7 GHz
Internal hard disk		–	≥ 20 Gb IDE, 2½"	
RAM		256 Mb expandable up to 512 Mb	250 Mb expandable to 512 Mb (1 memory slot max.)	
CD-ROM drive		–	Yes, 24x	
Expansion slots		2 PCMCIA slots –	1 PCI bus slot, 2 PCMCIA slots 1 Compact Flash slot	
Ethernet TCP/IP network		1 x 10BASE-T/100BASE-TX (RJ45)		
Operating system		Windows Xpe integrated	Windows 2000 preinstalled	
I/O ports		2 x USB, 1 x COM1, 1 x COM2, 1 x LPT1 (parallel), 1 x PS/2 keyboard	2 x USB, 1 x COM1, 1 x COM2, 1 x LPT1 (parallel), 1 x PS/2 keyboard and 1 x PS/2 mouse	
	On front panel	–	1 x USB	
Fixing		Fixings included with each product for mounting on panel or enclosure door		
Dimensions W x D x H		395 x 62 x 294 mm	395 x 100 x 294 mm	
Power supply		24 VDC	115...230 VAC	
References		**MPC ST5 2NDJ 00T**	**MPC KT5 2NAA 00N**	**MPC KT5 5NAA 00N**

Compact *i*PC and Vijeo Look software combined offer			
Type of processor	VIA 667 MHz	Pentium 4 Mobile 1.7 GHz	
Vijeo Look supervisory software *(1)*	Run Time (RT)		Build Time/Run Time (BT/RT)
References	**MPC KT5 2NAA 00A**	**MPC KT5 5NAA 00A**	**MPC KT5 5NAA 00B**

Separate parts			
Description	512 Mb Compact Flash memory	512 Mb memory extension for VIA 667 MHz	512 Mb memory extension for Pentium 4 Mobile 1.7 GHz
References	**MPC YN0 0CFE 00N**	**MPC YN0 2RAM 512**	**MPC YN0 5RAM 512**

(1) See page 6/5.

For further information, please consult our "Human-Machine Interface, The essential guide" brochure or our "Human-Machine Interface" catalog.

Transparent Ready

Human-Machine Interface products

Magelis Modular *i*PC industrial PCs

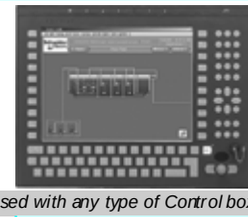
Presentation

The modularity and flexibility of the Magelis Modular *i*PC range enables you to choose the ideal solution for your HMI requirements on a PC base, with easy upgrading and fast maintenance:

- IP 65 front panels: 12" or 15" color TFT LCD screen, with or without touchscreen capability, and with or without QWERTY keyboard.
- Control boxes, with varying power and expansion capabilities.

As standard, the Control boxes include an Ethernet 10/100 Mbps port, two USB ports, the various standard serial and parallel ports, and up to 6 PCI/ISA bus slots.

Characteristics and references



Screens for Modular *i*PC *industrial PCs (any screen can be used with any type of Control box)*				
Display	LCD screen size	TFT active matrix back-lit (262,144 colors)		
Data entry	By	Keypad	Keypad and touchscreen	Touchscreen
	Alphanumeric keys	70 standard IBM keys		–
	User function keys	2 x 10 keys		–
Input/output ports and device on front panel		1 IrDA infrared port, 1 PS/2 port for keyboard/mouse and pointing device		
Combination		With any of the Control boxes listed below		
Dimensions	Screen size 12"	410 x 52.7 x 330 mm		380 x 52.7 x 330 mm
	Screen size 15"	480 x 52.7 x 370 mm		460 x 52.7 x 340 mm
References	Screen size 12"	**MPC NA2 0NNN 00N**	**MPC NB2 0NNN 00N**	**MPC NT2 0NNN 00N**
	Screen size 15"	**MPC NA5 0NNN 00N**	**MPC NB5 0NNN 00N**	**MPC NT5 0NNN 00N**



Control boxes		**Small**	**Medium**		**Large**	
Processor		Intel Celeron 566 MHz		Intel Pentium III 850 MHz	Intel Celeron 566 MHz	Intel Pentium III 850 MHz
Internal hard disk		> 20 Gb	> 20 Gb, removable			
RAM		SDRAM 256 Mb, expandable to 512 Mb (2 memory slots maximum)				
CD-ROM drive		Optional	Removable, 24x			
Floppy disk drive		3½", 1.44 Mb	3½", 1.44 Mb, removable			
Expansion slots		–	3 slots (1 ISA bus, 1 PCI bus and 1 PCI/ISA bus)		6 slots (2 ISA bus, 3 PCI bus and 1 PCI/ISA bus)	
Integrated Ethernet TCP/IP port		1 x 10BASE-T/100BASE-TX (RJ45)				
I/O ports		2 x USB, 2 x COM, 1 x parallel, 1 x external VGA screen, 1 x PS/2 keyboard, 1 x PS/2 pointing device				
Combination		With any of the above types of screen or for use on its own *(in this case, use the MPC NP0 0NNN 00N mounting panel)*				
Operating system		Windows 2000 or Windows XPe pre-installed				
Dimensions		310 x 94.2 x 310 mm	310 x 184.5 x 310 mm		310 x 258 x 310 mm	
References	∼ 115…230 V power supply	**MPC AN0 2NA● 00N**	**MPC BN0 2NA● 00N**	**MPC BN0 5NA● 00N**	**MPC CN0 2NA● 00N**	**MPC CN0 5NA● 00N**
	⎓ 24 V power supply	**MPC AN0 2ND● 00N**	**MPC BN0 2ND● 00N**	**MPC BN0 5ND● 00N**	**MPC CN0 2ND● 00N**	**MPC CN0 5ND● 00N**

Replace ● with **A** for Windows 2000, and with **J** for Windows XPe

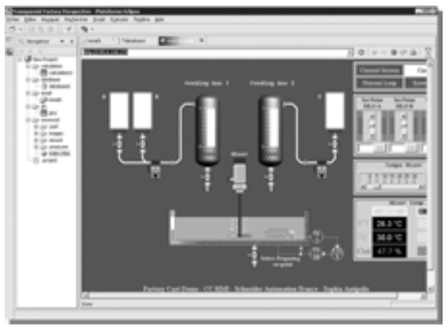
Modular Magelis *i*PC-Vijeo Look software combined offers		**Small**	**Medium**	**Large**
Processor		Intel Celeron, 566 MHz		
Vijeo Look supervisory software (see page **48297/5**)		Run Time (RT)		Build Time/Run Time (BT/RT)
References	∼ 115…230 V power supply	**MPC AN0 2NAA 00A**	**MPC BN0 2NAA 00B**	**MPC BN0 2NAA 00C**

Separate parts					
Description		RAM memory extension			Front panel remote connection kit (with 10 m cable)
		64 MB	128 MB	256 MB	
References	∼ 115…230 V power supply	**MPC YN0 0RAM 064**	**MPC YN0 0RAM 128**	**MPC YN0 0RAM 256**	**MPC YN0 0RFP KIT**

Transparent Ready

Human-Machine Interface products

Software for FactoryCast HMI applications



FactoryCast HMI application development software

FactoryCast HMI application development software, referenced TLX CD FCHMI V1M, provides multiproject management and complete control of FactoryCast HMI applications, during both the development and the debugging phases, thanks to the online mode and simulation mode (operational when the system is offline) options.

This software enables the intuitive and user-friendly setup of HMI functions by simply setting parameters using a tree structure of the application and can be used for complete management of the Web site:

- Setting parameters for HMI functions:
  - Configuration of PLC interfaces: Import symbol databases and set parameters for the acquisition period
  - Configuration of spreadsheets
  - Configuration of E-mail
  - Configuration of connections to databases

- Management of the Web site:
  - Management of the Web site tree structure (creation/deletion of HTML folders and files)
  - Management of default Web site pages
  - Management of user Web site pages *(1)*
  - Graphic object editor for animating Web pages
  - Launch of the system editor for HTML pages (FrontPage or similar)
  - Up/downloading/comparison of Web pages in online mode
  - 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 animations and Java beans) can be debugged in either online or simulation mode, which enables operation to be tested without a FactoryCast HMI module and without a physical connection to a PLC, thus simplifying debugging.

An integrated graphics editor in the FactoryCast HMI software can be used to easily customize the following graphic objects: bar charts, gauges, LEDs, curves, cursors, operator input fields, alphanumeric display fields, buttons, etc.
User Web pages are created graphically using an external HTML editor (FrontPage or similar, not supplied).
FactoryCast HMI includes a plug-in for FrontPage 2000. This plug-in makes it easier to set up animations, which enable PLC variables to be accessed in realtime in the HTML pages created by the user. They are created in the HTML editor by simply inserting customized graphic objects (FactoryCast Java beans).

(1) Creation of user Web pages: User Web pages created in the FactoryCast HMI environment are actual animated supervision screens and can be used to monitor your process. Based on HMI Web technology, they enable realtime access to PLC variables thanks to the FactoryCast graphic objects library (FactoryCast Java beans).

TSX WMY 100

140 NWM 100 00

References

Ethernet TCP/IP Transparent Ready modules

Embedded Web server	Name and description	Speed	Reference	Weight kg
FactoryCast HMI	FactoryCast HMI Premium module	10/100 Mbit/s	**TSX WMY 100**	0.340
	FactoryCast HMI Quantum module	100 Mbit/s	**140 NWM 100 00**	-

FactoryCast HMI installation software (to be ordered separately)

Name and description	Use	Operating system	Reference	Weight kg
Multilingual FactoryCast HMI *(1)*	Development and debugging of the HMI application	Windows 2000, Windows XP	**TLX CD FCHMI V1M**	0.340

(1) Includes documentation in electronic format.

Transparent Ready

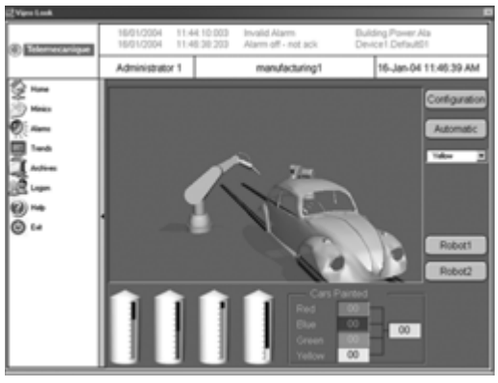
Human-Machine Interface products

Vijeo Look control software

Presentation

Vijeo Look version 2.5 is a SCADA (Supervisory Control And Data Acquisition) software package designed for standalone stations. It is based on open, standardized technologies, similar to Transparent Ready products. For example, it provides the ability to display pages in Modicon PLC embedded Web servers.

It is easy to implement and offers all the standard functions of a graphic supervision tool. Vijeo Look is supplied with a pre-configured OFS *(OPC Factory Server,* see page 48297/7*)* data server. It is compatible with PCs running Windows 2000 Professional or Windows XP Professional, and is used for creating applications based on Telemecanique Twido, Modicon TSX Micro, Modicon Premium/Atrium/ Momentum/Quantum PLCs.



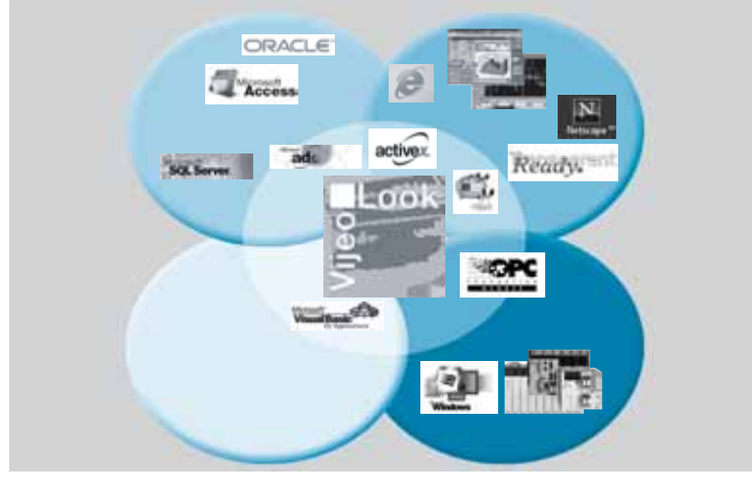
Monitor Pro
Build Time/Run Time client stations

Monitor Pro
Build Time server stations

Data/information

The functions of Vijeo Look supervisory software can be used for:
- Acquisition of PLC tags
- Visualization of these tags
- Process supervision and control
- Recording the values of PLC tags or internal process tags in a database
- Embedded software processing

PLC tags are acquired exclusively by connecting to the PLCs via the OPC server, supplied with the OFS data server software included with Vijeo Look.
In the case of discrete and analog I/O tags from TSX Micro/Premium/Quantum PLCs (and Advantys STB/Momentum/TBX remote I/O), the acquisition process in the Vijeo Look database takes place in an implicit, transparent manner.
As an OPC server, Vijeo Look enables you to create and enhance tags, as well as make them available.



Structure of the offer

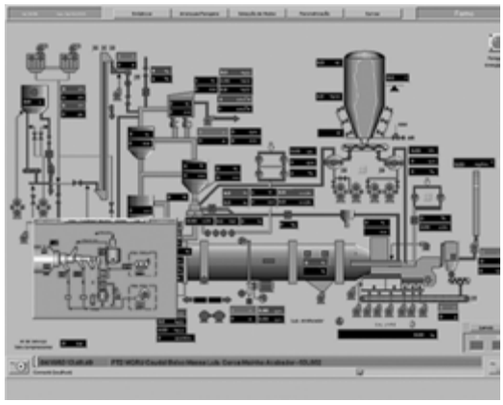
The Vijeo Look offer includes 2 types of software license:
- Build Time/Run Time license *(BT/RT)* allowing the application to be built and run
- Run Time license *(RT)* allowing the application built with the RT/BT license to run

There are three I/O sizes offered for each license type: Small (128 I/O), Medium (512 I/O) and Large (1024 I/O).

References

Vijeo Look software				
Compatibility		Twido, Modicon TSX Micro/Momentum/Premium/Atrium/Quantum PLCs		
Operating system		Windows 2000 Professional or Windows XP Professional		
Type of license		Small, 128 I/O	Medium, 512 I/O	Large, 1024 I/O
References	Build Time/Run Time (BT/RT)	**VJL SMD BTS V25M**	**VJL SMD BTM V25M**	**VJL SMD BTL V25M**
	Run Time (RT)	**VJL SMD RTS V25M**	**VJL SMD RTM V25M**	**VJL SMD RTL V25M**

Transparent Ready
Human-Machine Interface products
Monitor Pro SCADA software



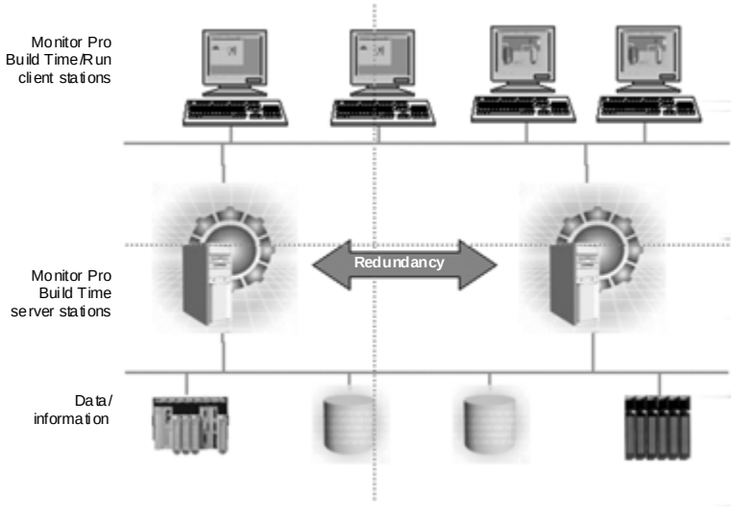
Description

Monitor Pro V7.2 is a SCADA (Supervisory Control and Data Acquisition) software solution. Its high-performance real-time server offers excellent processing capability, mainly due to the application objects. In addition, its client-server architecture on Ethernet TCP/IP enables it to be easily integrated in architectures based on Transparent Ready products: multi-server for sharing processing, multi-user for wide distribution of information, or in redundancy mode for your “high availability” applications.

- **The graphic interface** offers a library of graphic objects. Based on Windows technology, the interface is easy to customize.
- **Configuration Explorer**: an intuitive environment for configuring the real-time data server and for object-oriented configuration.
- **The relational database access interface,** supplied with SQL Server 2000. Monitor Pro V7.2 makes it easy to record production data or access stored information. Monitor Pro V7.2 also operates with Oracle, Sybase, Dbase IV and all other databases that support the ODBC standard.
- **Improved availability**: Monitor Pro incorporates redundancy services ensuring a high level of architecture availability.
- **Integrated traceability functions,** for real-time monitoring of the quality of your production as well as logging all the actions of the operators.

Monitor Pro V7.2 is the supervisory software package that adapts to your needs. It offers you real-time production monitoring and enables you to optimize the use of your equipment.

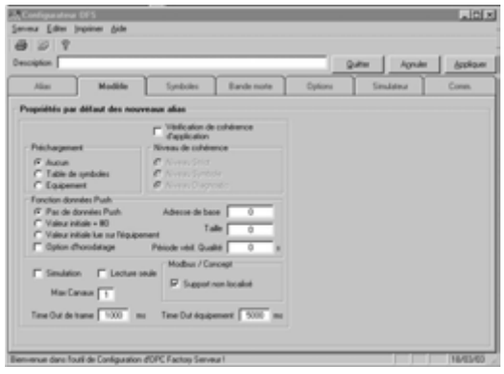
Multi-level architecture



Characteristics

Format	Control software
Compatibility	All Telemecanique PLCs and all automation systems on the market via communication drivers or using the OPC standard
Operating system	Windows 2000 service Pack 3 or Windows XP
Input/Output size	11 sizes, from 300 I/O to an unlimited number of I/O (from 4800 tags to an unlimited number)
Version	Build Time/Run Time (BT/RT) or Run Time (RT)
PC CD-ROM references	**Please contact your Regional Sales Office**

Transparent Ready
Human-Machine Interface products
OFS data server software



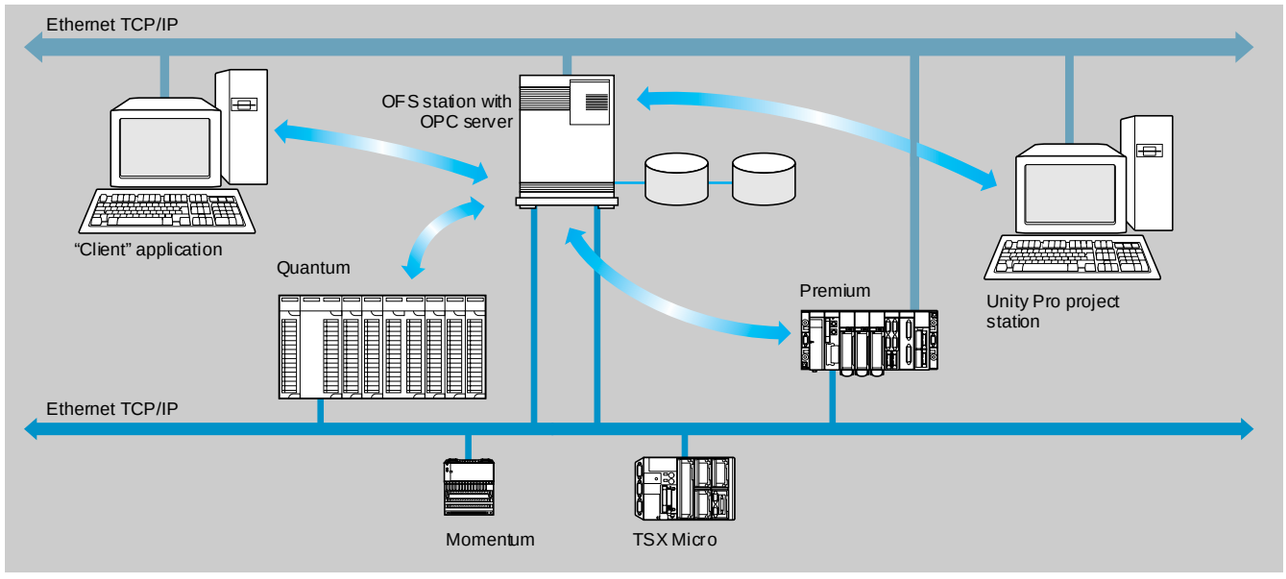
Description

OFS (OPC Factory Server) version 3.0 software uses the OPC *(OLE for Process Control)* standard that allows "Client" applications (supervisors, databases, spreadsheets) to access control system data:
- Modicon Premium/Quantum PLC internal variables (words, bits) and I/O.
- Internal variables (words, bits) only on Modicon TSX Micro, Modicon Momentum/ Quantum (with Concept/ProWORX software), TSX Series 7 and April PLCs.

OFS software is a multi-PLC data server, that enables several communication protocols to be used, by providing client applications with a set of services for accessing automation system variables.

This software is aimed at two types of user in particular:
- "End" users who want to develop applications on PCs and require access to PLC data. In this context it is possible, for example, to create client applications (supervisory control screens, Excel spreadsheets, etc) with access to a number of PLCs connected via Ethernet to the PC supporting these applications.
- Developers of industrial automation or IT products (supervision, human-machine interfaces, etc) who wish to develop client applications in their products to access the data contained in Telemecanique PLCs via the OPC server.

OFS software can be integrated in control system architectures as shown below:



Structure of the offer

The OFS offer comprises:
- An OPC server configuration tool.
- OPC server software that receives requests from an OPC client and re-transmits them using Ethernet TCP/IP to the PLCs.
- Drivers for communication with Modicon PLCs.
- An OPC client for verifying the client/server communication between the various connected elements.
- A simulator for verifying the operation of the client(s) without a connected PLC.
- Setup documentation in electronic format.

References

OFS data server software				
Compatibility		All Modicon TSX Micro/Momentum/Premium/Quantum and TSX Series 7/April PLCs		
Operating system		Windows 2000 Professional or Windows XP		
Type of license		Single station	10 stations	200 stations
References	Development of client applications accessing data on Telemecanique PLCs via OPC	**TLX CD OFS 30M**	**TLX CD 10OFS 30M**	**TLX CD UNOFS 30M**

7

Contents

7 - Cabling system

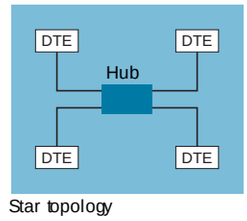
7 - ConneXium product data sheets

Transparent Ready
Cabling systems
ConneXium hubs

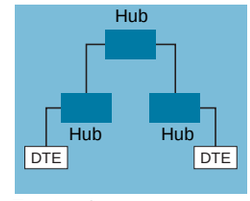
Presentation

Hubs (or 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 (or concentrators) makes it possible to create the following topologies:
- Star topology using hubs.
- Tree topology using hubs.

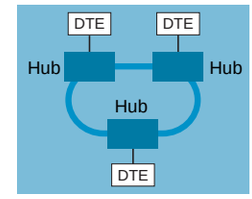
See “Cabling system” page 2/29.



Star topology



Tree topology



Ring topology
(with 499 NOH 105 10)

Characteristics and references

Hubs					
Interfaces	Copper cable ports	Number and type	4 x 10BASE-T ports	4 x 100BASE-TX ports	3 x 10BASE-T ports
		Shielded connectors	RJ45		
		Medium	Shielded twisted pair		
		Line length	100 m		
	Optical fiber ports	Number and type	–		2 x 10BASE-FL ports
		Connectors	–		ST (BFOC)
		Medium	–		Multimode optical fiber
		Line length	–		3100 m (10 170 ft) *(1)*
		Optical budget	–		With 50/125 or 62.2/125 µm fiber: 11.5 dB:
Topology	Number of cascaded hubs		4 max.	2 max.	4 max.
	Number of hubs in a ring		–		11 max.
Redundancy			P1 and P2 redundant power supplies		P1 and P2 redundant power supplies, redundant optical ring
Power supply	Voltage		⎓ 24 V (18…32 V), safety extra low voltage (SELV)		
	Power consumption		80 mA (130 max. at ⎓ 24 V)	210 mA (270 max. at ⎓ 24 V)	160 mA (350 max. at ⎓ 24 V)
	Removable terminal		5-pin		
Operating temperature			0…+ 60 °C (32…140 °F)		
Relative humidity			10…95% non condensing		
Degree of protection			IP 30	IP 20	IP 30
Dimensions W x H x D		mm (in)	40 x 125 x 80 (1.57 x 4.92 x 3.14)	47 x 135 x 111 (3.15 x 5.51 x 3.35)	80 x 140 x 85 (1.85 x 5.31 x 4.37)
Weight		kg (lbs)	0.530 (1.17)	0.240 (0.53)	0.900 (1.98)
Conformity to standards			cUL 60950, UL 508 and CSA 142, UL 1604 and CSA 213 Class 1 Division 2, CE, GL		
			FM 3810, FM 3611 Class 1 Division 2	–	FM 3810, FM 3611 Class 1 Division 2
LED indicators			Power, activity, link	Power, activity, link, error	Power, activity, link, collision
Alarm contact			Power supply failure, permanent fault in hub, faulty link status of TP port (volt-free contact 1 A max. under ⎓ 24 V)		
Reference			**499 NEH 104 10**	**499 NEH 141 00**	**499 NOH 105 10**

(1) Depends on the optical budget and fiber attenuation.

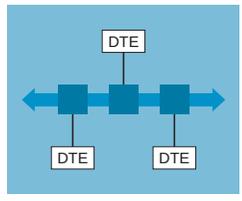
Transparent Ready
Cabling systems
ConneXium transceivers

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 fiber optic cable.

Transceivers are “plug and play” devices that do not need any configuration. See “Cabling system” page 2/29.

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

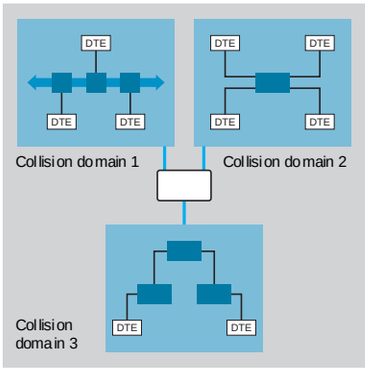
Characteristics and references

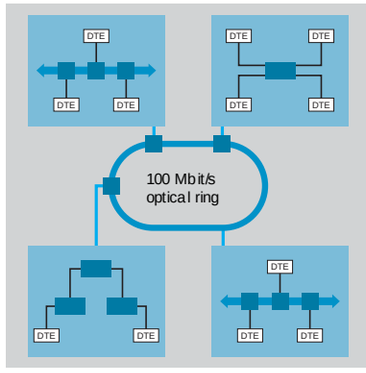

Transceivers				
Interfaces	Copper cable port	Number and type	1 x 10BASE-T port	1 x 100BASE-TX port
		Shielded connectors	RJ45	
		Medium	Shielded twisted pair	
		Line length	100 m (328 ft)	
	Optical fiber ports	Number and type	1 x 10BASE-FL port	1 x 100BASE-FX port
		Connectors	ST (BFOC)	SC
		Medium	Multimode optical fiber	
		Line length	3100 m (10 170 ft) *(1)*	
		Signal attenuation	11.5 dB with 50/125 µm fiber 11.5 dB with 62.5/125 µm fiber	8 dB with 50/125 µm fiber 11 dB with 62.5/125 µm fiber
Redundancy			P1 and P2 redundant power supplies	
Power supply	Voltage		⎓ 24 V (18...32), safety extra low voltage (SELV)	
	Power consumption		80 mA (100 max. at ⎓ 24 V)	160 mA (190 max. at ⎓ 24 V)
	Removable terminal		5-pin	
Operating temperature			0...+ 60 °C (32...140 °F)	
Relative humidity			10...95% non condensing	
Degree of protection			IP 30	IP 20
Dimensions W x H x D		mm (in)	40 x 134 x 80 (1.57 x 5.47 x 3.14)	47 x 135 x 111 (3.15 x 5.51 x 3.35)
Weight		kg (lbs)	0.520 (1.15)	0.230 (0.50)
Conformity to standards			cUL 60950, UL 508 and CSA 142, UL 1604 and CSA 213 Class 1 Division 2, CE, GL	
			FM 3810, FM 3611 Class 1 Division 2	–
LED indicators			P1 and P2 power supplies, Ethernet link/port status	
Alarm contact			Power supply failure, permanent fault in hub, faulty link status of TP port (volt-free contact 1 A max. under ⎓ 24 V)	
Reference			**499 NTR 100 10**	**499 NTR 101 00**

(1) Depends on the optical budget and fiber attenuation.

Transparent Ready
Cabling systems
ConneXium switches

Presentation





Switches (see "Cabling system" page 2/32) 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 switches also enable redundant architectures to be created on twister pair copper or fiber optic ring.
Switches are "plug & play" devices that do not need any configuration. They can also be administered remotely via the SNMP or HTTP protocols for monitoring and diagnostics purposes.

Characteristics and references

Switches			Unmanaged basic	Shielded twisted pair and optical fiber, unmanaged			
Interfaces	Copper cable ports	Number and type	5 x 10BASE-T/ 100BASE-TX ports	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				
		Max. distances	100 m (328 ft)				
	Optical fiber 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 fiber		Monomode fiber	
		Fiber length	–	3100 m (10 170 ft) *(1)*		15 000 m (49 210 ft) *(1)*	
		Optical budget	–	8 dB with 50/125 µm fiber 11 dB with 62.5/125 µm fiber		16 dB with 50/125 µm fiber	
Topology	Number of switches	Cascaded	Any				
		Redundant in a ring	–				
Power supply redundancy			–	P1 and P2 redundant power supplies			
Power supply	Voltage		⎓ 24 V (19.2…30 V)	⎓ 24 V (18…32 V), safety extra low voltage (SELV)			
	Power consumption		100 mA (120 max.)	5.4 W	5.9 W	5.4 W	5.9 W
	Removable terminals		3-pin	5-pin			
Operating temperature			0…+ 60°C (32…140 °F)				
Relative humidity			10…95% non condensing	Max. 95% non condensing			
Degree of protection			IP 20				
Dimensions W x H x D		mm (in)	75.2 x 143 x 43 (2.96 x 5.63 x 1.69)	47 x 135 x 111 (3.15 x 5.51 x 3.35)			
Weight		kg (lbs)	0.190 (0.42)	0.330 (0.72)	0.335 (0.74)	0.330 (0.72)	0.335 (0.74)
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, CE, GL			
LED indicators			Power supply, ETH link status, 10/100 Mbps	P1 and P2 power supplies, Ethernet link status, transmission activity			
Alarm contact			–	Activity, power supply failure, permanent fault in hub, faulty link status of TP port (volt-free contact 1 A max. under ⎓ 24 V)			
Reference			**499 NES 251 00**	**499 NMS 251 01** ▲	**499 NMS 251 02** ▲	**499 NSS 251 01** ▲	**499 NSS 251 02** ▲

▲ Available later

(1) Depends on the optical budget and fiber attenuation.

Characteristics and references *(continued)*

Switches			Unmanaged, copper	Managed, copper	Managed, copper + fiber
Interfaces	Copper cable ports	Number and type	8 x 10BASE-T/ 100BASE-TX ports	5 x 10BASE-T/ 100BASE-TX ports 2 x 100BASE-TX ports	5 x 10BASE-T/100BASE-TX ports
		Shielded connectors	RJ45		
		Medium	Shielded twisted pair		
		Max. distances	100 m (328 ft)		
	Optical fiber ports	Number and type	–		2 x 100BASE-FX ports
		Connectors	–		SC
		Medium	–		Multi mode optical fiber
		Fiber length	–		3100 m (10 170 ft) *(1)*
		Optical budget	–		8 dB with 50/125 µm fiber 11 dB with 62.5/125 µm fiber
	Ethernet services		–	FDR client, SNMP, multicast filtering for optimization of the Global Data protocol, Web based configuration	
Topology	Number of switches	Cascaded	Any		
		Redundant in a ring	–	50 max.	
Redundancy			P1 and P2 redundant power supplies		
Power supply	Voltage		⎓ 18…32 V, safety extra low voltage (SELV)		
	Power consumption		125 mA (290 max.)	7.5 W	9 W
	Removable terminals		5-pin		
Operating temperature			0…+ 60°C	0…+ 55°C	
Relative humidity			10…95% non condensing		
Degree of protection			IP20		
Dimensions W x H x D		mm (in)	47 x 135 x 111 (3.15 x 5.51 x 3.35)	110 x 131 x 111 mm (4.33 x 5.16 x 4.37)	
Weight		kg (lbs)	0.230 (0.72)	0.460 (1.00)	
Conformity to standards			cUL 60950, UL 508 and CSA 14, UL 1604 and CSA 213 Class 1 Division 2, CE, GL		
LED indicators			P1 and P2 power supplies, Ethernet link status,	P1 and P2 power supplies, Ethernet link status, redundancy management	
Alarm contact			Power supply failure, permanent fault in hub, faulty link status of TP port (volt-free contact 1 A max. under ⎓ 24 V)		
				redundancy health	
Reference			**499 NES 181 00**	**499 NES 171 00**	**499 NOS 171 00**

(1) Depends on the optical fiber budgt and fiber attenuation.

Transparent Ready
Cabling systems
ConneXium gateways

Presentation

ConneXium communication gateways are used for interconnecting the following:
- Modbus/Ethernet TCP/IP
- Modbus Plus/Ethernet TCP/IP

by providing multiple ports to adapt to the different architectures.

Characteristics and references

Gateways					
Functions	Communication gateway		Ethernet/Modbus serial link	Ethernet/Modbus Plus	
	Interface for programming		Ethernet/Modbus	Ethernet	Ethernet/Modbus Plus
	Standard Ethernet TCP/IP communication services		Modbus TCP messaging SNMP Agent	Modbus TCP messaging	Modbus TCP messaging SNMP Agent
	Modbus SL (RS 232/RS 485 serial link)		RTU/ASCII frame Data rate 0.3 K…115.2 Kbps	–	
	Modbus Plus (RS 485 network)		–	Token bus, HDLC synchronous mode Data rate 1 Mbps	
	Configuration		Local or remote by Telnet in hyper terminal mode	Local using DOS	Local or remote *(1)*
Interfaces	Ethernet TCP/IP port	Type	1 x 10BASE-T/100BASE-TX	1 x 10BASE-T 1 x 10BASE2 1 x 10BASE5	1 x 10BASE-T/100BASE-TX
		Shielded connectors	RJ45	RJ45, BNC and AUI	RJ45
		Medium	Shielded twisted pair		
		Max. distances	100 m (327 ft)		
	Serial port	Type	1 x Modbus SL	1 x Modbus Plus	
		Shielded connectors	RJ45	9-way SUB-D connector	
		Medium	Shielded twisted pair	Shielded twisted pair (single or double)	
Power supply	Voltage		⎓ 9…30 V, ∿ 9 …24 V	∿ 110/220 V (∿ 93.5 V…242 V), 47…63 Hz	
	Power consumption		3 W	1 A	
Operating temperature			0…+ 60°C	0…+ 50°C	
Relative humidity			20…90% non condensing	10…95% non condensing	
Degree of protection			IP20		
Dimensions W x H x D		mm (in)	35 x 95 x 60 (1.38 x 3.74 x 2.36)	122 x 229 x 248 (4.80 x 9.0 x 9.80)	
Weight		kg (lbs)	0.500 (1.10)	4.260 (9.40)	
Conformity to standards			UL, CSA, FM 3611 Class 1 Division 2	UL 508, CSA 142, CE	
LED indicators			Activity, status, diagnostics	Power	
Reference			**174 CEV 300 20**	**174 CEV 200 30**	**174 CEV 200 40▲**

▲ Available later

(1) Local with additional keyboard and monitor, via a dedicated screen for basic diagnostic and configuration. Remote, via intuitive Web pages for full configuration and diagnostic.

Transparent Ready
Cabling system
ConneXium connection cables

Presentation

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

- Standard EIA/TIA 568 shielded twisted pair cables:
  These cables conform to the EIA/TIA-568 standard, category 5, IEC 11801/EN 50173 class D. Their fire behavior conforms to NFC 32070# class C2 and IEC 322/1, Low Smoke Zero Halogen (LSZH).

- UL and CSA 22.1 approved shielded twisted pair cables:
  These cables are UL and CSA 22.1 approved. Their fire resistance conforms to NFPA 70.

490 NT● 000 ●●

References

Standard EIA/TIA 568 shielded twisted pair cables

Description	Pre-equipped at both ends	Length m (ft)	Reference	Weight kg
Straight-through shielded twisted pair cables	2 RJ45 connectors For connection to terminal devices (DTE)	2 (6.56)	**490 NTW 000 02**	–
		5 (16.4)	**490 NTW 000 05**	–
		12 (39.4)	**490 NTW 000 12**	–
		40 (131.2)	**490 NTW 000 40**	–
		80 (262.5)	**490 NTW 000 80**	–

Description	Pre-equipped at both ends	Length	Reference	Weight kg
Crossed cord shielded twisted pair cables	2 RJ45 connectors For connections between hubs, switches and transceivers	5 (16.4)	**490 NTC 000 05**	–
		15 (49.2)	**490 NTC 000 05**	–
		40 (131.2)	**490 NTC 000 40**	–
		80 (262.5)	**490 NTC 000 80**	–

490 NOC 000 05

UL and CSA 22.1 approved shielded twisted pair cables

Description	Pre-equipped at both ends	Length	Reference	Weight kg
Straight-through shielded twisted pair cables	2 RJ45 connectors For connection to terminal devices (DTE)	2 (6.56)	**490 NTW 000 02U**	–
		5 (16.4)	**490 NTW 000 05U**	–
		12 (39.4)	**490 NTW 000 12U**	–
		40 (131.2)	**490 NTW 000 40U**	–
		80 (262.5)	**490 NTW 000 80U**	–

490 NOT 000 05

Description	Pre-equipped at both ends	Length	Reference	Weight kg
Crossed cord shielded twisted pair cables	2 RJ45 connectors For connections between hubs, switches and transceivers	5 (16.4)	**490 NTC 000 05U**	–
		15 (49.2)	**490 NTC 000 05U**	–
		40 (131.2)	**490 NTC 000 40U**	–
		80 (262.5)	**490 NTC 000 80U**	–

490 NOR 000 05

Fiber optic cables

Description	Pre-equipped at both ends	Length m (ft)	Reference	Weight kg
Glass fiber optic cables for terminal devices (DTE) to hubs, switches and transceivers	1 SC connector and 1 MT-RJ connector	5 (16.4)	**490 NOC 000 05**	–
	1 ST (BFOC) connector and 1 MT-RJ connector	5 (16.4)	**490 NOT 000 05**	–
	2 MT-RJ connectors	5 (16.4)	**490 NOR 000 05**	–

8

Contents

8 - Modbus-IDA organisation and Collaborative Automation Partner Program

8 - Presentations and partner data sheets

Transparent Ready
Modbus-IDA organisation

Modbus-IDA presentation

Modbus-IDA organisation mission statement

Modbus-IDA is a group of independent users and suppliers of automation devices that seeks to drive the adoption of the Modbus communication protocol suite and the evolution to address architectures for distributed automation systems across multiple market segments. Modbus-IDA will also provide the infrastructure to obtain and share information about the protocols, their application and certification to simplify implementation by users resulting in reduced costs (e.g. the specifications of the Modbus suite of protocols are availableon line, free of charge).

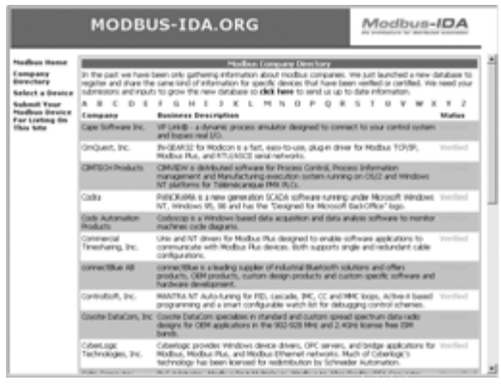
Modbus-IDA Provides Visibility to Modbus and Modbus related Products

Modbus products are the solutions to Modbus users worldwide. Modbus-IDA helps users find suppliers through a visibility program that includes:
- Member listing on the Modbus-IDA.org web site.
- Product highlights in the Modbus newsletter and on the web.

Join the discussion as Modbus-IDA embraces new technologies, and help guide the future of Modbus-IDA as part of the technical working groups. You can join on-line at www.Modbus-IDA.org

Benefits for component suppliers, Integrators and Users

Your Membership in Modbus-IDA helps provide a myriad of open technology benefits to you and your employees. An extract of the benefits includes:
- Access to a rich library of shared users and implementers experiences.
- Participation in a dynamic resourceful User Forum.
- Access to a consultant referral directory that brings together users and experts.
- Newsletters and technical training programs.



Modbus protocol Conformance Testing Program

The true benefit of any open standard is the assurance it provides to users that the products they buy will interoperate seamlessly. Unfortunately, any specification, no matter how carefully written, is subject to interpretation and occasional misunderstanding. That's where conformance testing becomes valuable.

The Modbus Conformance Testing Program provides independent verification that a broad array of qualifications has been met in compliance with Modbus specifications. It provides end users with the comfort that their design and configuration process will proceed smoothly and assures suppliers that their products were developed in accordance with key Modbus criteria.

This program is administered by Modbus-IDA.org and is performed at an independent service provider, the Modbus/TCP Conformance Test Laboratory at the University of Michigan.

TCP/IP Modbus toolkit available through Modbus-IDA.org

The first edition of the **TCP/IP MODBUS CD TOOLKIT v1.0** is a great collection of resources, selected to assist users and developers in implementing Ethernet TCP/IP Modbus servers or clients. This toolkit targets essential messaging services. Additional toolkits will be made available in the future to facilitate the deployment of other Transparent Ready services such as Global Data, etc.

This resources toolkit provides **Specifications, Implementation Guides, diagnostics, test tools** and **examples source code**. Also included the certification test suite as developed and used by the Modbus Certification Laboratory at the University of Michigan.

Become involved with the Modbus-IDA.org

Take advantages of the Modbus-IDA.org web site: www.modbus-ida.org

Transparent Ready

Collaborative Automation Partner Program

Transparent Ready Partners

Presentation of the partner program

Overview

The Collaborative Automation approach is a way of sharing data, interconnecting software tools, accessing information in real time at any point within an architecture... all with the aim of maximizing productivity.
The "Collaborative Automation Partner Program" is a program for sharing technology. Its aim is to follow a collaborative approach to promote partner products and solutions that complement the Telemecanique offer within the world of industrial control systems. The products promoted in this program use technologies developed either by our partner organizations, or by Telemecanique (Modbus Plus or Fip networks, Modicon Quantum or Modicon Premium PLCs, Unity interfaces to name but a few examples), or they use standard technologies (Ethernet Modbus TCP, OPC, etc).

The program partners

There are currently more than 100 member organizations in the "Collaborative Automation Partner Program" offering more than 700 products in total. There are 3 categories of partner:
- Technology partners
- Unity partners
- Transparent Ready partners

The Transparent Ready partner offers are principally in the areas of wireless communication TCP/IP based, gateways, servers, modems, bridges and remote management solutions.

Examples of Transparent Ready partners

This chapter details several examples of Transparent Ready partner offers to help you build a complete system:
- ConnectBlue (Bluetooth wireless communication)
- ProSoft Technology (frequency hopping or Wi-Fi type wireless communication)
- ACKSYS (Wi-Fi IEEE 802.11b wireless communication)
- Data-Linc Group (Ethernet wireless communication based on standard IEEE 802.11b, Wi-Fi compatible)
- Senside (remote management services).

Complete list of Transparent Ready Partners available on the Web site of the programm (see below).

Contacts

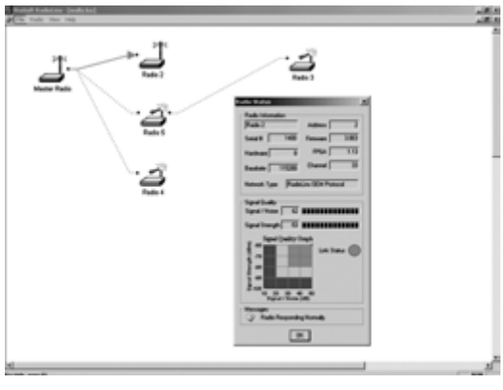
Find out more about the "Collaborative Automation Partner Program" at:
www.collaborativeautomation-schneider-electric.com
For any additional information, contact:
Mail: Collaborative Automation Partner Program - One High Street North Andover, MA 01845 USA
E-mail: info.capp6us.schneider-electric.com
Fax: +1 978 975 9321

More information on how to join the partner program can be found on the Collaborative Automation website (address above).

Transparent Ready

Collaborative Automation Partner Program

ProSoft Technology



Wireless industrial Ethernet

Popularity of wireless Ethernet

The opening up of the 2.4 GHz band (2.4×10^9 Hz) makes it simple to set up wireless solutions in industry (no license or declaration for private use). The wide pass band provides high speeds. Standards such as WiFi IEEE 802.11b and Bluetooth are emerging.
The press and television are playing an important part in promoting these new technologies for "general public" and office applications. Industrial solutions are also available, and currently offer secure transmission and availability of wireless networks.

Main points of the theory

The "2.4 GHz band" ranges between 2,400 and 2,483.5 MHz (with some variations according to the country). The waves emitted by this band are reflected by obstacles (metal, etc) and are significantly attenuated by water and vegetable matter. Radio waves are propagated in straight lines and are polarized. An absorbent object "screens" points located behind it.

An antenna is characterized by:

- The shape of the transmission/reception field (the "pattern" which defines the direction(s) in which the transmitted/received power is the strongest).
- Its gain (its capacity to amplify the transmitted/received power when the signal passes between copper and air or air and copper).
- Its azimuth (which specifies the focusing of the field in relation to the vertical plane).

The units of measurement used for the transmitted/received power are:

- **mW:** Unit of measurement of power. The maximum transmission power (at 2.4 GHz) is regulated: North America, Pacific: 250 mW. Europe, Asia, Latin America: generally 100 mW.
- **dB:** Conventional unit for the ratio of two values of the same type. In this case, radio-frequency powers. By convention the $10 \times \log_{10}(P_{variable}/P_{ref})$ relationship is used. As a matter of interest, adding/subtracting 3 dB corresponds to multiplying/dividing the signal amplitude by 2.
- **dBm:** Unit for the ratio between a power measured in mW and 1 mW.
- **dBi:** Unit for the ratio between [power measured at antenna output in a given direction] and [measurement that would be taken at the same point if the power were dispersed over the whole sphere of the isotropic antenna (theoretical)]. This ratio is used to qualify the gain of an antenna in its principal direction.

An isotropic antenna is in theory totally omindirectional. The greater the radius of the sphere centered on the antenna, the lower the power measured at one point on this sphere. In practice, the sphere is "squashed" for "omnidirectional" antennae used at 2.4 GHz, and forms a very flat toroid in the plane perpendicular to the axis of the antenna.
For long distances, "directive" antennae concentrate the power in one direction rather than diffusing it over 360°. Antennae are placed at high points so that they are free from absorbent objects close to the ground.

The waves emitted by one source may be reflected on items in the environment (machine frame, girders in buildings, metal doors, vehicles, etc). The composite wave resulting from the mixture of reflected waves may return to the initial transmitter with a higher amplitude and cause interference on this transmitter.
In the band we are interested in here, the wavelengths ($\lambda = c/f$) are between approximately 12.08 cm and 12.5 cm.
With radio transmission, data is transported in the modulation (phase, frequency, etc) of the "carrier" wave. Using all the carrier waves in a frequency band (or spectrum) considerably increases the transmission speed. This is the "**S**pread **S**pectrum":

- **DSSS** technologies operate using "direct transmission" in the frequency band ("**D**irect **S**ignal"). Each data packet occupies the whole spectrum.
- **FHSS** technologies operate in "frequency hops" within the spectrum ("**F**requency **H**opping"). Data is transmitted in smaller packets, sent one after the other in narrow sub-bands within the overall band.

DSSS and **FHSS** were developed one after the other from military applications in the Second World War. FHSS is a little slower, but offers greater reliability and security for data transfers.

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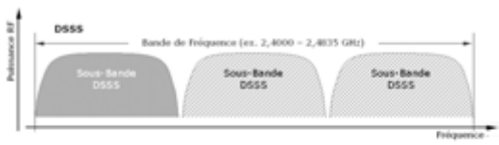
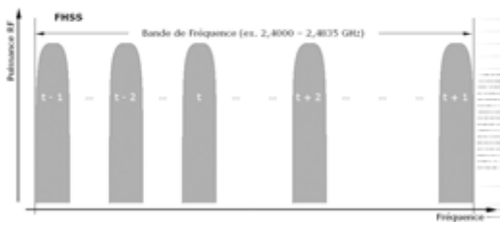
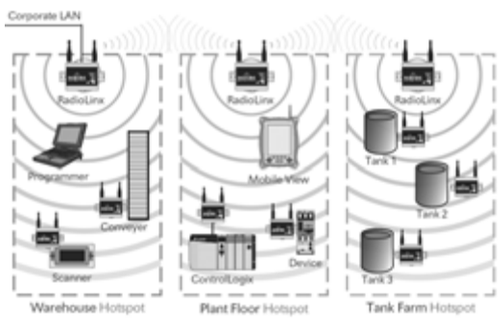
Collaborative Automation Partner Program
ProSoft Technology







Presentation (continued)

The 802.11b standard uses DSSS technology. Each transmission band is spread over 22 MHz. This means there are 3 channels (from a choice of 11 or 13) in the 83.5 MHz band that do not overlap one another.
This 22 MHz pass band offers high speeds (1 to 11 Mbps). But it is relatively sensitive to interference (reflected waves, other networks, miscellaneous equipment transmitting in the free band). This means precautions should be taken, in particular in industrial environments.
A single-frequency interfering signal can block the use of the entire 22 MHz band. Its effect is similar to that of a collision signal on Ethernet (several subscribers talking on the network simultaneously): the “line” is temporarily blocked. The site must be “audited” to anticipate this type of problem.
The RLX-FH uses FHSS technology. Each of the transmission sub-bands is reduced to around 300 kHz. Up to 32 networks can simultaneously share the entire 83.5 MHz spectrum (they use each sub-band one after the other). The individual speed of each of the 32 channels is 250 Kbps.
Amongst other advantages, narrowband transmission makes it easier to “reject” interference outside the band being used. This significantly improves the signal/noise level and limits reductions (even stopping) in transmission speed. In addition, a data packet that cannot be transmitted correctly in one sub-band is automatically re-transmitted in the next channel sub-band. Observed from the outside of the wireless network, the sequence of sub-bands seems to be random.

RadioLinx wireless industrial offer

RadioLinx RLX-FH (frequency hopping) Ethernet

The RLX-FH radio modem is compatible with Modbus TCP messaging and program loading.
- Operating temperature: - 40…+75°C.
- Shock and vibration: IEC 60068-2-6 and IEC 60068-2-27.
- Power supply: ⎓ 6…28 V.
- Industrial unit: hardened, for mounting on DIN rail.
- 32 channels (wireless networks) simultaneously on one site.
- Each radio can be configured as Master/Keeper, Remote or Repeater station.
- Repeaters can also take field devices.
- Useful data rate of each channel: 250 Kbps.
- Serial link or Ethernet TCP/IP version.
- Network security (protection against intrusion) and communication reliability (no data loss, no network power outage).
- Double antenna and special signal processing algorithms (in order to avoid problems connected with multiple reflections and attenuation).
- Applications possible in hazardous areas (ATEX for Europe under development).
- Low cost and 3 year warranty as standard.

RadioLinx RLX-IH (Industrial Hotspot™) IEEE 802.11b

The RLX-IH radio modem is compatible with Modbus TCP messaging, program loading and FactoryCast Web page viewing.
- Operating temperature: - 30…+60°C, humidity: 90%.
- Power supply: ⎓ 10…24 V.
- Compact extruded aluminum unit, for mounting on DIN rail.
- “Industrial Hotspot” function for mobile equipment.
- “Inter-Hotspot” wireless links.
- Transfers at 11, 5.5, 2 and 1 Mbps (11 or 13 channels depending on the region).
- Redundant Master/Keeper radio and automatic network overlap function for better network reliability.
- Encoding, authentication and checking of MAC ID address for better network security (TKIP, WEP, 802.11X, MAC White list).
- Embedded configuration and diagnostic software (html pages).

Contact

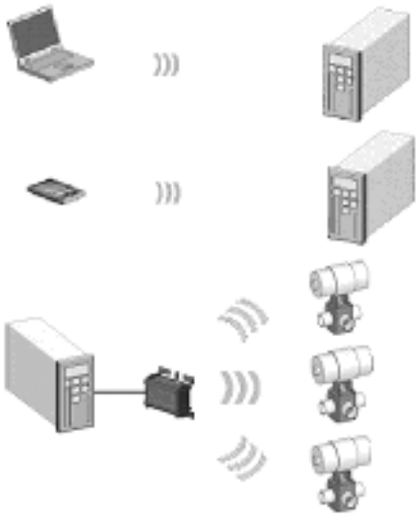
Installing radio solutions requires specialist expertise. Please contact our partner:

ProSoft Technology, Inc.
Tel: +1 (661) 716 5100
Fax: +1 (661) 716 5101
E-mail: prosoft@prosoft-technology.com
Website: www.prosoft-technology.com and www.radiolinx.com
Worldwide distributors: http://www.radiolinx.com/distributors

Transparent Ready
Collaborative Automation Partner Program
ConnectBlue

IP 22 version

IP 65 version



Presentation connectBlue Wireless offer

Bluetooth Serial Port Adapter (RS232, RS422 or RS485)

The Bluetooth Serial Port Adapter enables replacement of serial cables with Bluetooth wireless technology. Bluetooth is robust, proven and well suited for industrial applications and is license free to use.

The Serial Port Adapter connected to the RS232/RS422/RS485 port of the industrial device acts like a wireless connection point to the device. A PC, laptop, PDA or any other serial device may connect wirelessly to the industrial device for ranges up to > 100m. It supports both point-to-point and point-to-multipoint configurations.

The Serial Port Adapter is configured using a PC Configuration Wizard or by use of AT commands. The Serial Port Adapter is available in wall/DIN-rail mounted IP22 or wall mounted IP 65.

Use Cases - Serial Port Adapter (RS 232, RS 422 or RS 485)

1. Operators, programmers etc. are provided wireless access to an industrial device for configuration, programming, diagnostics using a standard computer, laptop or PDA.
2. The Serial Port Adapter supports Wireless Multidrop. It is used to replace an RS 422/RS 485 multidrop network (running e.g. Modbus protocol) with Bluetooth.

Contact

Installing radio solutions requires specialist expertise. Please contact our partner:

connectBlue

Martin Engdahl – Product Manager
ConnectBlue AB, Isbergs gata 3, Malmö, SE-21119, Sweden
Tel: +46 (0)40 6307100
Fax: +46 (0)40-237137
E-mail: sales@connectblue.se
Site Web: www.connectblue.se

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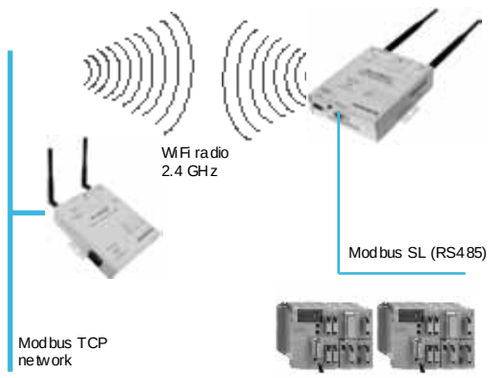
ACKSYS

WL-COMETH

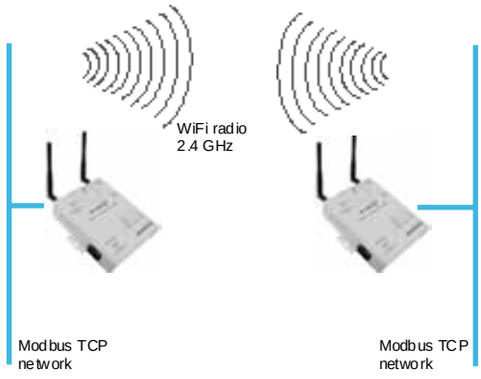
WL-COMETH, IP 65



Serial Modbus to Modbus TCP connection

WL-BRIDGE

WL-ACCESS



Modbus TCP network interconnection

ACKSYS wireless solutions

ACKSYS

ACKSYS is a French company specializing in telecommunication solutions for all industrial sectors where high performance, reliability and longevity are major requirements (industrial control systems, telecommunications, aviation, military, transport and healthcare).

Wireless solutions for industry (WiFi IEEE 802.11b)

ACKSYS also offers a range of wireless equipment based on the WiFi standard IEEE 802.11b. This range comprises an Ethernet/WiFi access point, an Ethernet/WiFi bridge and an RS 232, RS 422/RS 485 serial link server on Ethernet WiFi that also operates as a gateway between serial Modbus devices and the Modbus TCP network.

These devices can be used to:

- Build a wireless Ethernet network infrastructure (WL-ACCESS devices and WL-BRIDGE devices.
- Connect two separate Ethernet networks without using any additional wiring (WL-BRIDGE).
- Connect serial link devices to the wireless Ethernet network.
- Connect an RTU serial Modbus device to a wireless Modbus TCP Ethernet network (WL-COMETH device in gateway mode).
- Create a wireless connection between two serial link devices (WL-COMETH device in full duplex radio modem mode).

Unlike conventional, non-WiFi radio modems, which require same brand devices at both ends of the connection, WL-COMETH offers total interoperability of all devices conforming to standard IEEE 802.11b within the network, meaning that a single access point can communicate with more than 100 WL-COMETH devices. It is also possible to replace a wired full duplex serial link using two WL-COMETH radio devices.

IP65 weatherproof versions are also available for outdoor applications or applications in damp or dusty environments.

WL-COMETH is available in versions with 1, 2 and 4 RS232, RS422/RS485 serial channels. All WL range devices have a built-in 85/264VAC & 100/370VDC or low voltage 9/36VDC power supply.

They have universal mounting options (in enclosure, or wall or din rail mounting). Antennas are mounted on RSMA screw connectors allowing the use of high gain antennae for long distance applications.

Contact

Installing radio solutions requires specialist expertise. Please contact our partner:

Eric CARIOU
3-5 rue du Stade PO BOX 4580
POISSY CEDEX 78302 France
Tel: 33 1 39 11 62 81
Fax: 33 1 39 11 47 96
E-mail: eric.cariou@acksys.fr
Website: www.acksys.fr

Transparent Ready
Collaborative Automation Partner Program
DATA-LINC GROUP

SRM Long Range Radio Modems

Wireless solutions DATA-LINC

DATA-LINC

Founded in 1988, Data-Linc Group is the leading provider of industrial data communication solutions. Data-Linc Group designs and manufactures high performance, superior quality modems for a broad range of industrial applications. Their complete line of industrial grade modems and networking products consistently provide reliable, robust data communications even in the harshest environments.

SRM6210E & SRM6310E Wireless Ethernet Modems

Wireless Ethernet Modems offer superior range (SRM6210E up to 40 kilometres & SRM6310E up to 16 kilometres without repeaters and multiples of this distance with repeaters), features and benefits. The modems utilize advanced frequency hopping spread spectrum technology to insure the ultimate in data reliability and integrity in challenging industrial environments. The modems are factory pre-configured for easy, hassle-free installation. see www.data-linc.com/products.htm

FastLinc wireless Ethernet 802.11b modem (Wi-Fi compliant)

FastLinc Industrial Ethernet Wireless Modems are a high-speed, secure wireless solution using 2.4 GHz direct sequence technology. FastLinc modems have a rated range of 5 miles with unobstructed line-of-sight, farther using repeaters and/or higher gain antennas. With an output power much higher than commercial IEEE 802.11b products, they provide longer outdoor range and broader indoor coverage.

Contact

Installing radio solutions requires specialist expertise. Please contact our partner:

Jim Steffey
3535 Factoria Blvd. SE Bellevue, WA 98006 USA
Tel: 425 882 2206
Fax: 425 867 0865
E-mail: Jsteffey@data-linc.com
DATA-LINC web site: www.data-linc.com

Direct access to the DATA-LINC offer in partnership with Schneider Electric, including applications examples: www.data-linc.com/saally.htm

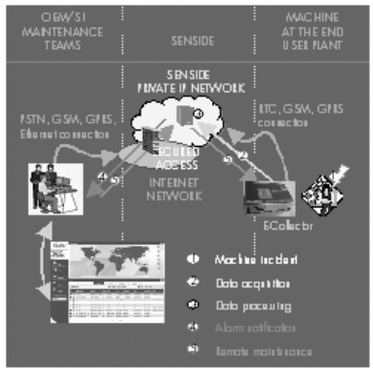
Transparent Ready

Collaborative Automation Partner Program

Senside

Senside Presentation

Senside offers solutions that are innovative and complete for remote access and management of machines' installed base, to machines builders and system integrators.
Senside solution enables optimisation of after-sales service for machine builders or integrators and the development of value added services for machines and systems users.
Senside is a subsidiary of **Schneider Electric** (80%), in partnership with **France Telecom**: this alliance brings together, within Senside, a unique expertise in industrial automation and telecommunications.



Senside Pack, the principles

A turnkey solution:

- Simple to set up and easy to use, reliable and secured.
- Available worldwide through the Equant (France Telecom) private IP network (140 countries).

A multi-protocol solution:

- Available on the whole Telemecanique PLC (Twido, Micro, Premium, Momentum, Quantum) and drives (Altivar) product families.
- Compatible as well with MPI, DF-1, Ethernet protocols.

A complete solution, provided on the basis of a yearly subscription including:

- e-Collecto (server connected to the machine control system, shipped with cabling and installation guide).
- Machines access portal, operated by Senside and accessible via Internet .
- Private IP network ensuring a reliable and secure connection to the machines (via a standard local telephone line).
- Training, maintenance and support.

The installed base Global view

Senside pack, detailed features

Remote access to machines or Installations:

- Remote viewing and/or modification of machine control device programmes.
- Remote control of SCADA PCs.
- Remote access to local Web servers.

Web Portal:

- Global view of the machine installed base and its status.
- Automatic set up of the remote connection to a given machine .

Access rights management:

- Users authentication via Personal Login/password.
- Users profiles management: machine perimeter (geographic criteria, machine user name, machine model...) and applications features (consultation, programmation...).

Remote access security:

- No access to the Machine telephone line from outside Senside network.
- Physical key provided to the machine local operator for locking/unlocking access to the control programmable devices.

Monitoring of status and variables:

- Definition by the customer of the status or variables to be monitored.
- Alarm notification sent by SMS, FAX or E-mail in case of drift (modification on the portal of alarm threshold and notification list).

Connection continuity checking:

- To the Senside e-Collector.
- To the machine control devices (PLC, PC).

Options:

- Data logging and history storing.
- Online documentation sharing.
- Brand labelling (portal personalisation with customer logo and brand).

The Alarm view

Benefits

- A yearly subscription, no initial investment.
- A turnkey platform "ready to use".
- A better control over installation and process tuning.
- A common diagnostic tool, to be shared between machine builder/system integrator and user.
- A continuous feedback on the performances of the installed base.

Contact

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Tel: + 33 1 41 29 84 08
E-mail: laurent.perrin@senside.com
Web: www.senside.com

9

Contents

9 - Services

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
UL	Underwriters Laboratories	USA

Key	Classification authority	Country
ABS	American Bureau of Shipping	USA
BV	Bureau Veritas	France
DNV	Det Norske Veritas	Norway
GL	Germanischer Lloyd	Germany
GOST	Institut de recherche Scientifique Gost Standardt	C.I.S., Russia
LR	Lloyd's Register	United-Kingdom
RINA	Registro Italiano Navale	Italiy
RMRS	Register of Shipping	C.I.S.

The table below shows the situation as of the 01.05.2002 for certifications obtained or pending from organizations for base PLCs. An overview of certificates for Telemecanique products is available on our Internet web site :
www.telemecanique.com

Product certifications

	Certifications					
Certified / *Pending certification*	**UL**	**CSA**	**ACA** (C-Tick)	**SIMTARS**	**GOST**	**Hazardous locations** Class 1 Div 2 *(1)*
	USA	Canada	Australia	Australia	CEI, Russia	US
Advantys STB	■	□	□			■
CCX 17	■					
Lexium MHD/BPH	■	■				
Magelis iPC	■					■
Magelis XBT-F/FC	■	■	■			
Magelis XBT-G/H/P/E/HM/PM	■	■				
Momentum	■	■	■			
Nano	■	■	■		■	
Premium	■	■	■	■	■	■
Quantum	■	■	■		■	■
TBX	■	■	■			
Telefast 2	■	■				
TSX Micro	■	■	■	■	■	■
TSX/PMX 47 à 107	■	■			■	■
Twido	■ *(2)*					
Twin Line	■					

(1) ***Hazardous locations****: CSA 22.2 no. 213, certified products are suitable for use in Class I, division 2, groups A, B, C and D or non-hazardous locations only.*
(2) cULus north-american certification (Canada and US).

Local certifications		
BG	Germany	TSX DPZ 10D2A safety module (TSX Micro) TSX PAY 262/282 safety modules (Premium)
AS-Interface	Europe	TSX SAZ 10 master module (TSX Micro) TSX SAY 100/1000 master modules (Premium) TBX SAP 10 Fipio bus/AS-Interface bus gateway

Marine classification

Marine classification authorities

	ABS (USA)	BV (France)	DNV (Norway)	GL (Germany)	LR (Unit-Kingdom)	RINA (Italiy)	RMRS (C.I.S.)
Advantys STB							
CCX 17							
Lexium MHD/BPH							
Magelis iPC							
Magelis XBT-F/FC							
Magelis XBT-H/P/E/HM/PM							
Momentum							
Nano							
Premium							*(1)*
Quantum							
TBX							
Telefast 2							
TSX Micro							
TSX/PMX 47 à 107							
Twido							
Twin Line							

Certified
Pending certification

(1) Unity processors, pending certification.

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 **e** label to his product.
e marking is applied to Telemecanique products where relevant.

The significance of e marking

- **e** 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.
- **e** marking is intended solely for the national authorities responsible for market regulation.

For electrical equipment, only conformity of the product to standards indicates that it is suitable for use, and only a guarantee by a recognised manufacturer can ensure a high level of 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 : **e** marking under the terms of this Directive is compulsory as of 1 January 1997.
- The Electromagnetic Compatibility Directive 89/336/EEC, amended by Directives 92/31/EEC and 93/68/EEC : **e** marking on the products covered by this Directive has been compulsory since 1 January 1996.

d

The system designer must use devices external to the SCADA to protect against active faults, which are not indicated and are judjed to be dangerous to the application.
This may require solutions from various different technologies such as mechanical, electromechanical, pneumatic or hydraulic devices (for example, directly wiring a limit switch and emergency stop switches to the coil of a movement control contactor).

Schneider Electric worldwide

Up-dated: 30-07-2003

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Anguilla	Contacts are assured by	**Schneider Electric Dominican Rep.**		
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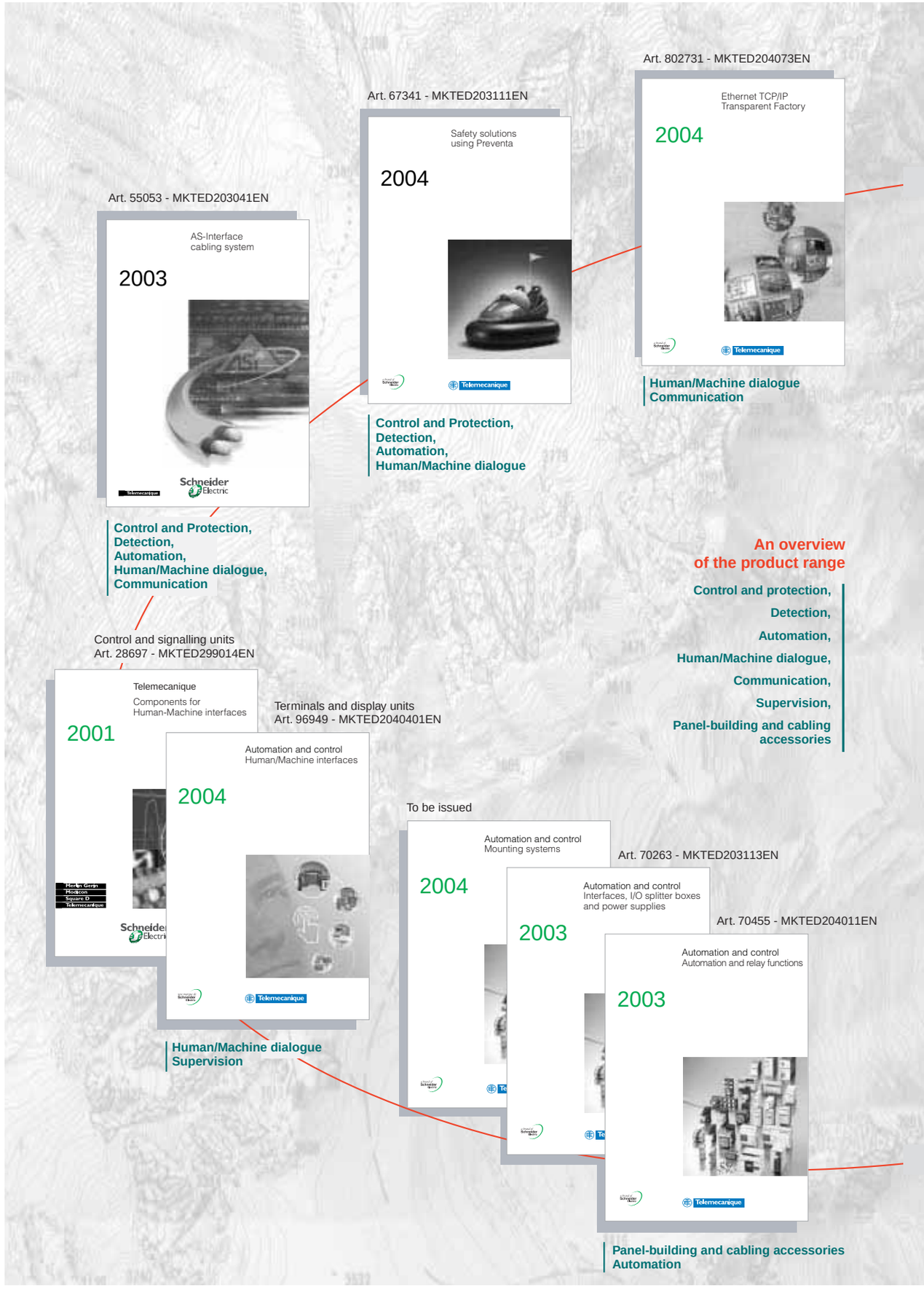
Catalogue June 2004



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Catalogue June 2004

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Modicon Premium
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The essential

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Lexium

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Production: Schneider Electric Industries
Photos: Schneider Electric Industries
Printed by: Pozzo Gros Monti - Italy

MKTED204073EN

July 2004