

1. Product Description

NX-ERA Series programmable controllers are the ultimate solution for industrial automation and system control. With high technology embedded, the products of the family are able to control, in a distributed and redundant way, complex industrial systems, machines, high performance production lines and the most advanced processes of Industry 4.0. Modern and high-speed, the NX-ERA series uses cutting-edge technology to provide reliability and connectivity, helping to increase the productivity of different businesses.

Compact, robust and with high availability, the series products have excellent processing performance and rack expansion possibilities. Its architecture allows easy integration with supervision, control and field networks, in addition to PLC redundancy. The series equipment also offers advanced diagnostics and hot swapping, minimizing or eliminating maintenance downtime and ensuring a continuous production process.



Its main features are:

- Up to 32 Kbytes of %I points and 32 Kbytes of %Q points
- Large memory capacity for user application and user data
- Up to 7,5 Kbytes of retain or persistent memory
- High-speed 32-bit processing
- Floating point unit
- 1 serial ports
- 1 Ethernet interfaces at front panel
- Enhanced diagnostics services
- System messages log
- OPC DA/UA, IEC 60870-5-104, PROFINET, SNMP and EtherNet/IP protocols
- Support clock synchronization via SNTP or via IEC 60870-5-104
- Web server features
- Integrated power supply
- One Touch Diag
- IEC 61131-3 compliant
- Real-time clock (RTC)
- Compact and modern design
- Free of moving parts (fans, active cooling, etc.)

2. Ordering Information

2.1. Included Items

The product package contains the following items:

- NX3005 module
- 6-terminal connector with fixing

2.2. Product Code

The following code should be used to purchase the product:

Code	Description
NX3005	CPU, 1 Ethernet port, 1 serial channel, remote rack expansion support, power supply integrated and user web pages support

Table 1: Product Code

3. Related Products

The following products must be purchased separately when necessary:

Code	Description
MT8500	MasterTool IEC XE
AL-2600	RS-485 network branch and terminator
AL-2306	RS-485 cable for MODBUS or CAN network
AL-1763	CMDB9-Terminal Block Cable
NX9202	RJ45-RJ45 2 m Cable
NX9205	RJ45-RJ45 5 m Cable
NX9210	RJ45-RJ45 10 m Cable
NX9404	6-terminal connector with fixing
NX9020	2-Slot base for panel assembly
NX9000	8-Slot Backplane Rack
NX9001	12-Slot Backplane Rack
NX9002	16-Slot Backplane Rack
NX9003	24-Slot Backplane Rack
NX9010	8-Slot Backplane Rack (No Hot Swap)

Table 2: Related Products

Notes:

MT8500: MasterTool IEC XE is available in four different versions: LITE, BASIC, PROFESSIONAL and ADVANCED. For more details, please check MasterTool IEC XE User Manual - MU299609.

AL-2600: This module is used for branch and termination of RS-422/485 networks. For each network node, an AL-2600 is required. The AL-2600 that is at the ends of network must be configured with termination, except when there is a device with active internal termination, the rest must be configured without termination.

AL-2306: Two shielded twisted pairs cable without connectors, used for networks based on RS-485 or CAN.

AL-1763: Cable with one DB9 male connector and terminal block for communication between CPUs of the NX-ERA Series and products with RS-485/RS-422 standard terminal block.

NX9202/NX9205/NX9210: Cables used for Ethernet communication and to interconnect the bus expansion modules.

NX9404: 6 terminal connector.

NX9020: 2 slot base for panel assembly.

4. Innovative Features

NX-ERA Series brings to the user many innovations regarding utilization, supervision and system maintenance. These features were developed focusing a new concept in industrial automation.



Battery Free Operation: NX-ERA Series does not require any kind of battery for memory maintenance and real time clock operation. This feature is extremely important because it reduces the system maintenance needs and allows the use in remote locations where maintenance can be difficult to be performed. Besides, this feature is environmentally friendly.



Easy Plug System: NX-ERA Series has an exclusive method to plug and unplug I/O terminal blocks. The terminal blocks can be easily removed with a single movement and with no special tools. In order to plug the terminal block back to the module, the frontal cover assists the installation procedure, fitting the terminal block to the module.



Multiple Block Storage: Several kinds of memories are available to the user in NX-ERA Series CPUs, offering the best option for any user needs. These memories are divided in volatile memories and non-volatile memories. For volatile memories, NX-ERA Series CPUs offer addressable input (%I), addressable output (%Q), addressable memory (%M), data memory and redundant data memory. For applications that require non-volatile functionality, NX-ERA Series CPUs bring retain addressable memory (%Q), retain data memory, persistent addressable memory (%Q), persistent data memory, program memory, source code memory, CPU file system (doc, PDF, data) and memory card interface.



One Touch Diag: One Touch Diag is an exclusive feature that NX-ERA Series brings to PLCs. With this new concept, the user can check diagnostic information of any module present in the system directly on CPU's graphic display with one single press in the diagnostic switch of the respective module. OTD is a powerful diagnostic tool that can be used offline (without supervisor or programmer), reducing maintenance and commissioning times.

OFD – On Board Full Documentation: NX-ERA Series CPUs are capable of storing the complete project documentation in its own memory. This feature can be very convenient for backup purposes and maintenance, since the complete information is stored in a single and reliable place.

ETD – Electronic Tag on Display: Another exclusive feature that NX-ERA Series brings to PLCs is the Electronic Tag on Display. This new functionality brings the process of checking the tag names of any I/O pin or module used in the system directly to the CPU's graphic display. Along with this information, the user can check the description, as well. This feature is extremely useful during maintenance and troubleshooting procedures.

DHW – Double Hardware Width: NX-ERA Series modules were designed to save space in user cabinets or machines. For this reason, NX-ERA Series delivers two different module widths: Double Width (two backplane rack slots are required) and Single Width (only one backplane rack slot is required). This concept allows the use of compact I/O modules with a high-density of I/O points along with complex modules, like CPUs, fieldbus masters and power supply modules.

High-speed CPU: All NX-ERA Series CPUs were designed to provide an outstanding performance to the user, allowing the coverage of a large range of applications requirements.



iF Product Design Award 2012: NX-ERA Series was the winner of iF Product Design Award 2012 in industry + skilled trades group. This award is recognized internationally as a seal of quality and excellence, considered the Oscars of the design in Europe..

5. Product Features

5.1. Common General Features

	NX3005
Backplane rack occupation	2 sequential slots
Power supply integrated	Yes
Ethernet TCP/IP local interface	1
Serial Interface	1
CAN Interface	No
USB Port Host	No
Memory Card Interface	No
Real time clock (RTC)	Yes Resolution of 1 ms and maximum variance of 2 s per day.
Watchdog	Yes
Status and diagnostic Indication	Graphic display LEDs System Web Page CPU internal memory
Programming languages	Structured Text (ST) Ladder Diagram (LD) Sequential Function Chart (SFC) Function Block Diagram (FBD) Continuous Function Chart (CFC)
Tasks	Cyclic (periodic) Event (software interruption) External (hardware interruption) Freewheeling (continuous) Status (software interruption)
Online changes	Yes
Maximum number of tasks	16
Maximum number of expansion bus	4
Bus expansion redundancy support	Yes
Maximum number of I/O modules on the bus	64
Maximum number of additional Ethernet TCP/IP interface modules	1
Ethernet TCP/IP interface redundancy support	No
Maximum number of PROFIBUS-DP network (using master modules PROFIBUS-DP)	1
PROFIBUS-DP network redundancy support	No
Redundancy support (half-clusters)	No
Hot Swap support	Yes
Event oriented data reporting (SOE) Protocol	No -
Maximum Event Queue Size	-
Web pages development (available through the HTTP protocol)	Yes

	NX3005
One Touch Diag (OTD)	Yes
Electronic Tag on Display (ETD)	Yes

Table 3: Common Features

Notes:

Real Time Clock (RTC): The retention time, time that the real time clock will continue to update the date and time after a CPU power down, is 15 days for operation at 25 °C. At the maximum product temperature, the retention time is reduced to 10 days.

Maximum number of I/O modules on bus: The maximum number of I/O modules refers to the sum of all modules on the local bus and expansions.

5.2. Standards and Certifications



Standards and Certifications	
IEC	61131-2: Industrial-process measurement and control - Programmable controllers - Part 2: Equipment requirements and tests 61131-3: Programmable controllers - Part 3: Programming languages
	DNV Type Approval – DNV-CG-0339 (TAA000013D)
CE	2014/30/EU (EMC) 2014/35/EU (LVD) 2011/65/EU and 2015/863/EU (ROHS)
UK CA	S.I. 2016 No. 1091 (EMC) S.I. 2016 No. 1101 (Safety) S.I. 2012 No. 3032 (ROHS)
	UL/cUL Listed – UL 61010-1 UL 61010-2-201 (file E473496)
EAC	TR 004/2011 (LVD) CU TR 020/2011 (EMC)

Table 4: Standards and Certifications

5.3. Memory

	NX3005
Addressable input variables memory (%I)	32 Kbytes
Addressable output variables memory (%Q)	32 Kbytes
Direct representation variable memory (%M)	16 Kbytes
Symbolic variable memory	3 Mbytes
Persistent or Retain symbolic variables memory	7.5 Kbytes
Full Redundant Data Memory	-
Direct representation input variable memory (%I)	-
Direct representation output variable memory (%Q)	-
Direct representation variable memory (%M)	-
Symbolic variable memory	-
Program memory	8 Mbytes
Source code memory (backup)	40 Mbytes
Webvisu files memory	32 Mbytes
User files memory	16 Mbytes

Table 5: Memory

Note:

Program memory: From version 3.40 of MasterTool IEC XE on, the memory has been increased from 6 MBytes to 8 MBytes.

5.4. Protocols

	NX3005	Interface
Open Protocol	Yes	COM1
MODBUS RTU Master	Yes	COM1
MODBUS RTU Slave	Yes	COM1
MODBUS TCP Client	Yes	NET1
MODBUS TCP Server	Yes	NET1
MODBUS RTU over TCP Client	Yes	NET1
MODBUS RTU over TCP Server	Yes	NET1
CANopen Master	No	-
CANopen Slave	No	-
CAN low level	No	-
SAE J-1939	No	-
OPC DA Server	Yes	NET1
OPC UA Server	Yes	NET1
EtherCAT Master	No	-
SNMP Agent	Yes	NET1
SOE (Event-oriented data)	No	-
IEC 60870-5-104 Server	Yes	NET1
EtherNet/IP Scanner	Yes	NET1

	NX3005	Interface
EtherNet/IP Adapter	Yes	NET1
MQTT Client	Yes	NET1
SNTP Client (for clock synchronism)	Yes	NET1
PROFINET Controller	Yes	NET1
PROFINET Device	No	-

Table 6: Protocols

Note:

PROFINET Controller: Enabled for use on a simple (not ring) network with up to 8 devices. For larger applications, consult technical support.

5.5. Serial Interface

5.5.1. COM 1


	COM 1
Connector	Shielded female DB9
Physical interface	RS-422 or RS-485 (depending on the selected cable)
Communication direction	RS-422: full duplex RS-485: half duplex
RS-422 maximum transceivers	11 (1 transmitter and 10 receivers)
RS-485 maximum transceivers	32
Termination	Yes (optional via cable selection)
Baud rate	200, 300, 600, 1200, 1800, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps
Isolation Logic to Serial Port Serial Port to protection earth 	1000 Vac / 1 minute 1000 Vac / 1 minute

Table 7: COM 1 Serial Interface Features

Notes:

Physical Interface: Depending on configuration of the used cable, it is possible to choose the kind of physical interface: **RS-422 or RS-485**. The list of cables can be found at [Related Products](#) section.

RS-422 Maximum Transceivers: It is the maximum number of RS-422 transceivers that can be used on a same bus.

RS-485 Maximum Transceivers: It is the maximum number of RS-485 transceivers that can be used on a same bus.

5.6. Ethernet interface

5.6.1. NET 1

	NET 1
Connector	Shielded female RJ45
Auto crossover	Yes
Maximum cable length	100 m
Cable type	UTP or ScTP, category 5
Baud rate	10/100 Mbps
Physical layer	10/100 BASE-TX (Full Duplex)
Data link layer	LLC (Logical Link Control)
Network layer	IP (Internet Protocol)
Transport layer	TCP (Transmission Control Protocol) UDP (User Datagram Protocol)
Diagnostic	LEDs - green (speed), yellow (link/activity)
Isolation Ethernet interface to Serial Port	1500 Vac / 1 minute

Table 8: Ethernet NET 1 Interface Features

5.7. Environmental Characteristics

	NX3005
Current consumption on the power supply rail	-
Dissipation	4 W
Operating temperature	0 to 60 °C @ 15W 0 to 50 °C @ 20W
Storage temperature	-25 to 75 °C
Relative humidity	5% to 96%, non-condensing
Conformal coating	Yes
IP Level	IP 20
Module dimensions (W x H x D)	36,00 x 114,63 x 115,30 mm
Package dimensions (W x H x D)	44,00 x 122,00 x 147,00 mm
Weight	350 g
Weight with package	400 g

Table 9: Environmental Characteristics

Notes:

Conformal coating of electronic circuits: The covering of electronic circuits protects internal parts of the product against moisture, dust and other harsh elements to electronic circuits.

5.8. Power Supply



	Power Supply
Nominal input voltage	24 Vdc
Maximum output power	15W @ 60 °C 20W @ 50 °C
Maximum output current	3 A
Input voltage	19.2 to 30 Vdc
Maximum input current (in-rush)	30 A
Maximum input current	1.4 A
Maximum input voltage interrupt time	10 ms @ 24 Vdc
Isolation	
Input to logic	1000 Vac / 1 minute
Input to protective earth 	1500 Vac / 1 minute
Input to functional earth 	1000 Vac / 1 minute
Cross section	0.5 mm ²
Polarity inversion protection	Yes
Internal auto recovery fuse	Yes
Output short-circuit protection	Yes
Overcurrent protection	Yes

Table 10: Power Supply Features

Note:

Maximum output power: To use the extended maximum output power, some conditions must be respected: use of NX-ERA Jet I/O modules only; reduction of maximum operating temperature; do not perform a hot swap of I/O modules, at the risk of affecting the system operation; modules NJ6000, NJ6010 and NJ6100 need to have revision AB or greater.

5.9. Performance

Instruction	Language	Variables	Instruction Times (µs)
1000 Contacts	LD	BOOL	6
1000 Divisions	ST	INT	43
		REAL	81
	LD	INT	43
		REAL	81
1000 Multiplications	ST	INT	15
		REAL	23
	LD	INT	15
		REAL	23
1000 Sums	ST	INT	15
		REAL	23
	LD	INT	15
		REAL	23
1000 PID	ST	REAL	< 5000

Table 11: Instruction Times

6. Compatibility with Other Products

To develop an application for NX-ERA Series CPUs, it is necessary to check the version of MasterTool IEC XE. The following table shows the minimum version required (where the controllers were introduced) and the respective firmware version at that time:

NX-ERA Series	MasterTool IEC XE	Firmware version
NX3005	2.07 to 2.09	1.6.0.0 to 1.7.17.0
NX3005	3.00 or above	1.8.11.0 or above

Table 12: Compatibility with other products

Additionally, along the development roadmap of MasterTool IEC XE some features may be included (like special Function Blocks, etc...), which can introduce a requirement of minimum firmware version. During the download of the application, MasterTool IEC XE checks the firmware version installed on the controller and, if it does not meet the minimum requirement, will show a message requesting to update. The latest firmware version can be downloaded from Messung website, and it is fully compatible with previous applications.

7. Physical Dimensions

Dimensions in mm.

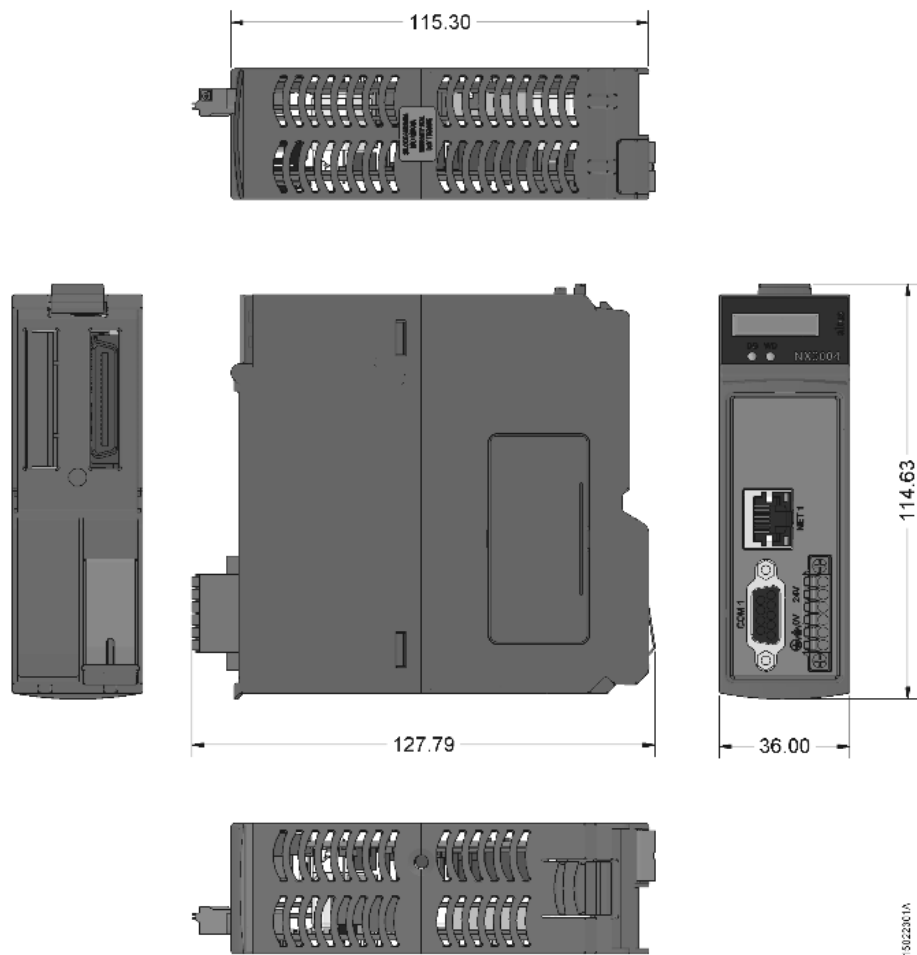


Figure 1: NX3004 and NX3005 CPU Physical Dimensions

8. Installation

For the correct installation of this product, it is necessary to use a rack (backplane rack) and it must be carried out according to the mechanical and electrical installation instructions that follow.

8.1. Product Identification

This product has some parts that must be observed before installation and use. The following figure identifies each of these parts.

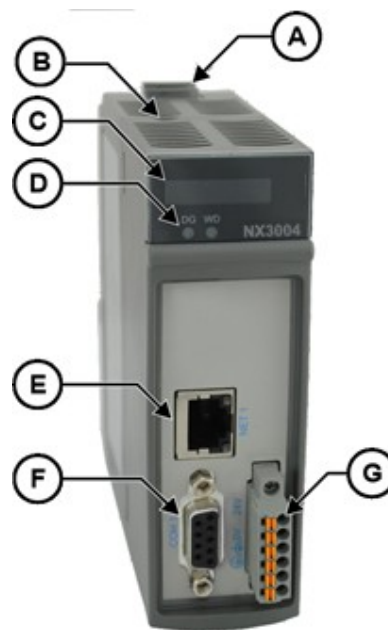


Figure 2: NX3005

- Ⓐ Fixing lock.
- Ⓑ Diagnostic switch.
- Ⓒ Status and diagnostic display.
- Ⓓ Diagnostic and watchdog LEDs.
- Ⓔ RJ45 connector for Ethernet communication.
- Ⓕ Female DB9 connector for RS-485/RS-422.
- Ⓖ Connector for power supply.

The product has in its mechanics a label that identifies it and in it are presented some symbols whose meaning is described below:



Attention! Before using the equipment and installing, read the documentation.



Direct Current.

8.2. Electrical Installation

The figure below illustrates the electrical diagram of the product installed in a NX-ERA Series rack. The arrangement of connectors and terminals in the figure is merely illustrative.

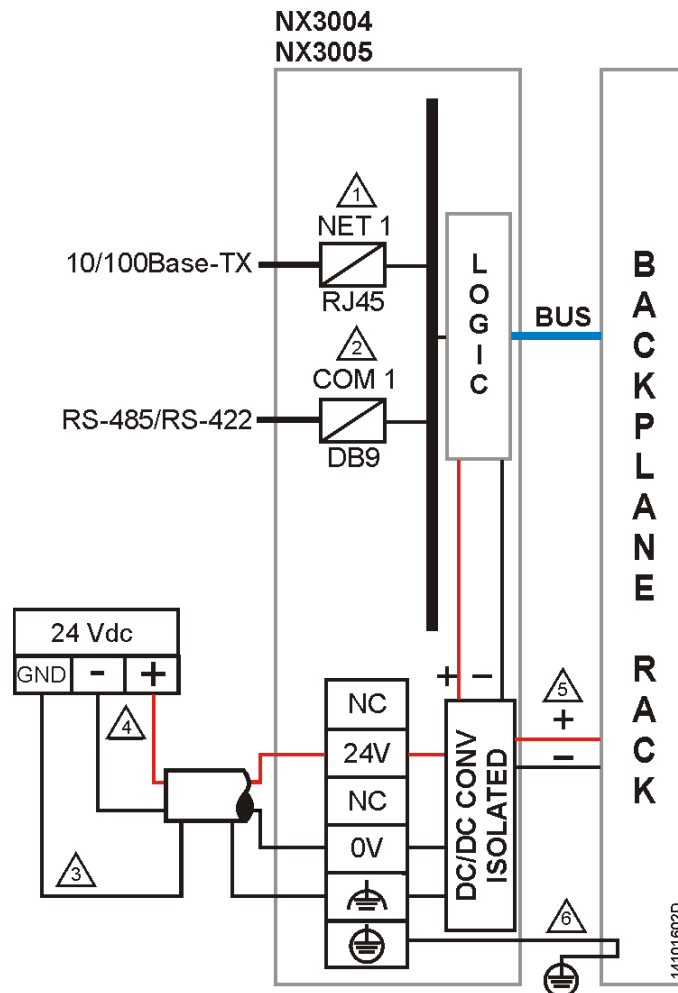









Figure 3: NX3004 and NX3005 CPU Electric Diagram

Diagram Notes:

-  Ethernet interface 10/100Base-TX standard for programming, debugging and MODBUS TCP network connection or other protocols.
 -  Serial interface RS-485/RS-422 standard for MODBUS RTU network connection or other protocols. The physical interface choice depends on the cable used.
 -  The grounding from the external power source is connected to the terminal . Use 0.5 mm² cables.
 -  The power supply is connected to the terminals 24 V and 0 V. Use 0.5 mm² cables.
 -  The module feeds the other modules of the NX-ERA Series through rack connection.
-  Functional earth terminal.

8.3. Mechanical Assembly

This product must be inserted in the backplane rack position 0. It requires two sequential positions, this means that it uses positions 0 and 1 of the rack.

The mechanical assembly of this module is described in the NX3005 CPU User Manual – MU214617.

ATTENTION

Products with broken warranty seal are not covered in warranty.

CAUTION

The device is sensitive to static electricity (ESD). Always touch in a metallic grounded object before handling it.

DANGER

NX-ERA Series can operate with voltage up to 250 Vac. Special care must be taken during the installation, which should only be done by qualified technical personnel. Do not touch on the wiring field when in operation.

9. Manuals

For the correct application and use, the CPU NX-ERA NX3005 Series User Manual – MU214105 must be consulted.

For more technical details, configuration, installation and programming of NX-ERA Series, see the table below. This table is just a guide to some relevant documents that can be useful during the use, maintenance and programming of NX-ERA Series controllers. The complete and updated table containing all NX-ERA Series documents can be found at NX-ERA Series User Manual – MU214600.

Code	Description	Language
CE114000	NX-ERA Series – Technical Characteristics	English
CE114104	NX3005 Technical Characteristics	English
CE114700	NX-ERA Series Backplane Racks Technical Characteristic	English
CE114810	NX-ERA Series Accessories for Backplane Rack Technical Characteristics	English
CE114902	NX-ERA Series PROFIBUS-DP Master Technical Characteristics	English
CE114903	NX-ERA Series Ethernet Module Technical Characteristics	English
CE114908	NX5110 and NX5210 PROFIBUS-DP Heads Technical Characteristics	English
MU214600	NX-ERA Series User Manual	English
MU214617	NX3005 CPU User Manual	English
MU299609	MasterTool IEC XE User Manual	English
MP399609	MasterTool IEC XE Programming Manual	English
MU214601	NX5001 PROFIBUS DP Master User Manual	English
MU214608	NX-ERA PROFIBUS-DP Head Utilization Manual	English
MU214603	NX-ERA Series HART Manual	English
MU214606	MQTT User Manual	English
MU214609	OPC UA Server for Messung Controllers User Manual	English
MU214610	Advanced Control Functions User Manual	English
MU223603	IEC 60870-5-104 Server Device Profile Document	English
MU214621	NX-ERA Series PROFINET Manual	English

Table 13: Related documents