
mtu NautIQ Master Essential

THE MOST ADVANCED AND COMPLETE SYSTEM DEVELOPED AND DESIGNED FOR MARINE AUTOMATION

The **mtu** NautIQ Master automation system has been specifically designed to offer the best solutions in terms of integration, reliability and cost-saving of which the marine world was badly in need of:

- **Weight and space reduction**
- **Optimization of time and easy installation**
- **Integration with onboard devices and reduction of costs**
- **System reliability and implementation of onboard safety**
- **Eye-catching graphics and design**
- **No limits to customized solutions and stylish integration**
- **Easy communication with the outside world**

these are plus values that a marine automation system should guarantee.

Although top-quality products, the electronic components currently used in most of the automation systems on the market offer no adequate answers because designed to satisfy the needs of the industrial and residential markets.

The unique feature of the **mtu** NautIQ Master automation system lies in having been able to use a completely reversed approach to the problem: instead of using the components present on the market and adapting them to the marine environment, we have created components designed to solve the problems that are specific to an onboard marine system, paying attention not to overlook those aspects linked to the production and sales of the Yacht product.

From this analysis and thanks to strong partnerships with other important electronic companies, we have developed and created hardware and software components that make our system the most advanced and complete currently present on the marine automation market

RELIABILITY

mtu NautIQ Master electronic modules are specifically designed to be used in the marine environment. Each component is accurately tested after production, thus

assuring reliability and functionality. The electronic components are of top-quality and suitable for extended temperature ranges (-20 to +85 °C).

Protection class becomes IP65 when the modules are mounted inside the specifically designed Smart Box: case in extruded anodized aluminum, ABS self-extinguishing sides with sealing gaskets in moving parts and cable glands.

CONTROL

Our touch-screen panels are selected based on our specifications and are manufactured by the most important European companies in this field. Reliability, design and robustness are the key points of these panels which -together with the functional specifications designed for the marine market - make them a unique product, very difficult to imitate

The front IP66 protection class, the screen visibility also under severe conditions and the powder-coated aluminum case make them suitable for outdoor installations also under harsh and rigorous conditions.

For PC-based applications, a wide range of choice is available among the best PC's and displays currently manufactured for the marine market by the most important players in this field.

POWER

The **OM-430** CPU is a module based on a very powerful microprocessor with enhanced calculating capacities, built-in inputs for direct data acquisition, complete independent networks and outstanding management of the different communication protocols.

CONNECTIVITY

Ethernet high-level communication network: an Ethernet network used for high-level communication allows connections to multiple types of operator's interface. In addition to the standard unit provided (that can be either operating panels or PC), it is possible to repeat the data on any onboard PC, laptop or portable device, using wired or WiFi connections.

CAN Bus low-level communication network: the use of a **CAN Bus** network to communicate with the field modules allows for unparalleled stability and reliability.

SAFETY

Redundant architecture: our monitoring and control system can be configured to support full redundancy of the CPU (with a second CPU in hot-backup mode) and the networks (both Ethernet and CANbus). This ensures unsurpassed reliability of the system and peace of mind for the ship's Owner.

Remote control: remote notification of alarms, both via SMS and PABX (for onboard crew paging) is possible, as well as remote monitoring of the system through Internet . From your home PC or from a laptop you can operate as if you were working with the onboard control panel.

Access to the system functions: access to the system functions can be protected or limited through a password of different levels or through various identification systems (electronic badges, biometric identification systems, etc.).

INTEGRATION

The remarkable aptitude for integration of **mtu** NautIQ Master automation components, a feature of ever growing importance onboard, does in no way affect the reliability of the automation system.

The unique features of the **OM-430** CPU, the Ethernet and CANbus networks, the SCADA software for onboard use of displays and PCs, together with a great number of protocols developed in collaboration with several marine manufacturers, allow communicating with, interfacing with, and managing most of the onboard systems, always keeping total control of the entire automation system:

- Air conditioning and refrigerating systems;
- Domotic and light control systems;
- Entertainment systems;
- Anti-intrusion systems;
- Fire detection and alarm systems;
- Engines;
- Generators, automatic or manual parallel and power management systems;
- and much more...

TECHNICAL SUPPORT

Technical support is granted both at national and international level thanks to our network of authorized

installers and to our in-house technicians prepared to identify the problems and find the solutions for each single project.

The technical features of the **mtu** NautIQ Master electronic modules, together with the various possible remote connections allow us to carry out software updates and functional checks without the need of our technical staff onboard, with great cost and time savings.

Furthermore, such functionalities give us the opportunity to implement any system function even after the project has been defined.

CUSTOMER CARE AND SERVICE

Thanks to the powerful **OM-430** processor, the system can carry out functional tests, detect anomalies and automatically restore the correct settings once the failure has been removed. For example, in case of module malfunctioning, the system sets off an alarm which guides the operator during the replacement of the faulty component (a simple process of disconnection and reconnection of cables). The system subsequently proceeds to recognizing the new module and to automatically reprogramming it correctly, thus restoring full functionality to the system. Remote technical support service can be supplied by our technical staff through remote access connection.

The possibility offered by **mtu** NautIQ Master automation systems to memorize in a database the functional data of the onboard technical systems connected to the automation system greatly helps maintenance management.

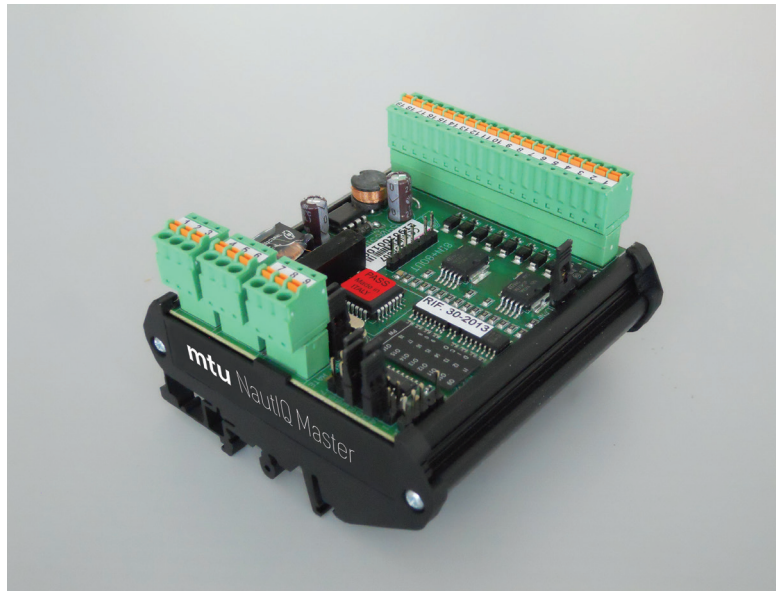
Thanks to the **plug-and-play** feature of each module and to the possibility of remotely update the software, maintenance and repair can also be carried out by non-qualified personnel that can be easily found locally or even onboard, thus drastically reducing timing and service costs.

The modularity and flexibility of the self-programmable **mtu** NautIQ Master automation modules make it very simple and cost effective to supply spare-parts kits.

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OM-110B

The **OM-110B module** features 8 PNP/NPN opto-isolated digital inputs and 8 PNP digital outputs protected against short circuit. The PNP/NPN mode can be configured by means of jumpers. This module is the ideal solution for managing remote I/O points, or for dimmer-controlled lights since it can be easily interfaced with commercial dimmers featuring switch-on feedback signal. Like all **mtu** NautIQ Master automation components, this module has been specifically designed for the marine environment, and the use of extended temperature range components (-20 to +85 °C) make it an invaluable element for a modern marine automation system.

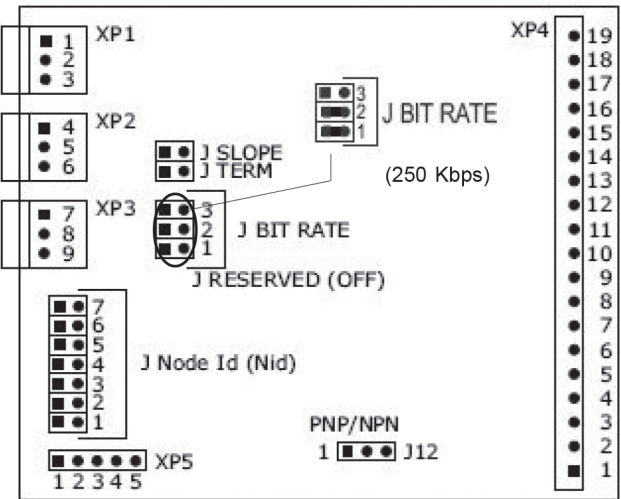


Technical Data

- T89C51CC02 40MHz CPU
- Full CAN 2.0 A and B interfaces, CANOpen protocol
- RS232 interface
- 2Kbyte EEPROM memory
- 512 byte RAM memory
- 16 + 2 Kbyte EPROM FLASH memory
- 0.2A 24VDC (18÷32VDC) power supply
- 8 NPN/PNP digital inputs + 8 24V 0.5A PNP outputs
- 100Hz standard inputs
- Fast inputs for 400Hz counters
- Operating temperature: -20...85 °C
- Size: 92×82×56 mm
- EN50022 DIN bar mounting
- Certifications: CE, UKCA

Device Layout

Layout:



Connections:

POWER SUPPLY CONNECTION

XP1.1 +24VDC
XP1.2 GND
XP1.3 GROUND (PE)

CAN BUS CONNECTION

XP2.4 CANH
XP2.5 CANL
XP2.6 REF
XP3.7 CANH
XP3.8 CANL
XP3.9 REF

Jumpers:

J Node Id (Nid) CANopen Address 1 ... 127

7	6	5	4	3	2	1	Nid
OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	1
OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	1
OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	OPEN	2
OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	CLOSED	3
OPEN	OPEN	OPEN	OPEN	CLOSED	OPEN	OPEN	4
.....							
CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	OPEN	126
CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	127

J12 1-2 PNP mode inputs

J12 2-3 NPN mode inputs

J Term CAN bus network termination

CONNECTIONS OF TERMINALS

XP4.1 COM +24VDC
XP4.2 COM +24VDC
XP4.3 REF GND
XP4.4 In1 PNP/NPN
XP4.5 In2 PNP/NPN
XP4.6 In3 PNP/NPN
XP4.7 In4 PNP/NPN
XP4.8 In5 PNP/NPN
XP4.9 In6 PNP/NPN
XP4.10 In7 PNP (**)/NPN
XP4.11 In8 PNP (**)/NPN
XP4.12 Out1 PNP
XP4.13 Out2 PNP
XP4.14 Out3 PNP
XP4.15 Out4 PNP
XP4.16 Out5 PNP
XP4.17 Out6 PNP
XP4.18 Out7 PNP
XP4.19 Out8 PNP

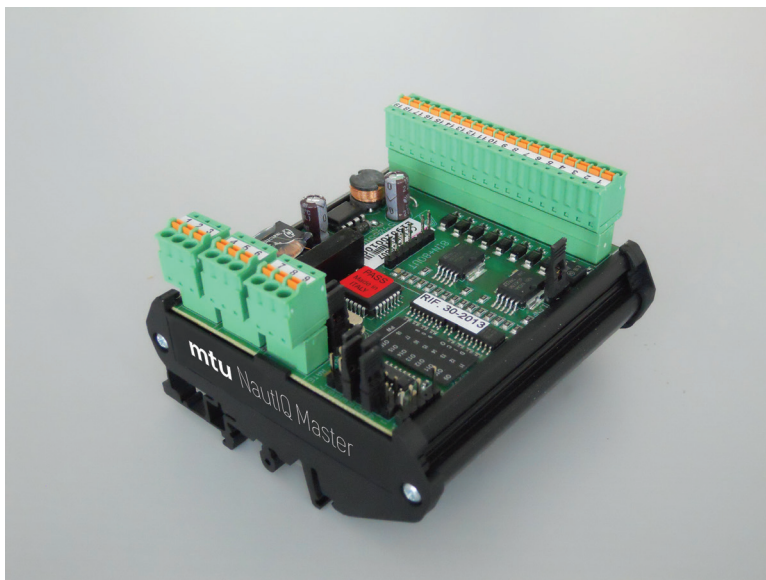
(**) Fast inputs when used as counters

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OM-115B

The **OM-115B module** features specific firmware to handle the switching of up to 8 cabin lights: simply connect one or more pushbuttons to each input and a 24VDC or 220VAC power relay to each output.

Each time an input pushbutton is pressed, the module will switch the relevant output (step-by-step relay function). This allows the supervisor to read the status or switch on/off the lights via CAN bus. The module works also in stand-alone modes, without connection to the CAN network. Like all **mtu** NautIQ Master automation components, this module has been specifically designed for the marine environment, and the use of extended temperature range components (-20 to +85 °C) make it an invaluable element for a modern marine automation system.

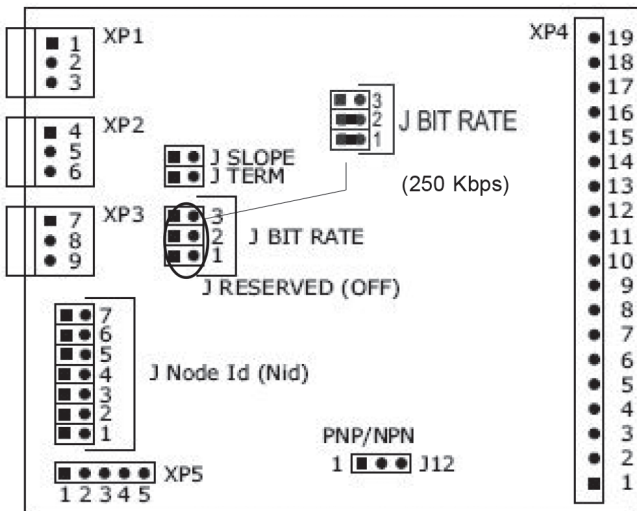


Technical Data

- T89C51CC02 40MHz CPU
- Full CAN 2.0 A and B interfaces, CANOpen protocol
- RS232 interface
- 2Kbyte EEPROM memory
- 512 byte RAM memory
- 16 + 2 Kbyte EPROM FLASH memory
- 0.2A 24VDC (18÷32VDC) power supply
- 8 NPN/PNP digital inputs + 8 24V 0.5A PNP outputs
- 100Hz standard inputs
- Fast inputs for 400Hz counters
- Operating temperature: -20...85 °C
- Size: 92×82×56 mm
- EN50022 DIN bar mounting
- Certifications: CE, UKCA

Device Layout

Layout:



Connections:

POWER SUPPLY CONNECTION

XP1.1 +24VDC
XP1.2 GND
XP1.3 GROUND (PE)

CAN BUS CONNECTION

XP2.4 CANH
XP2.5 CANL
XP2.6 REF
XP3.7 CANH
XP3.8 CANL
XP3.9 REF

Jumpers:

J Node Id (Nid) CANopen Address 1 ... 127

7	6	5	4	3	2	1	Nid
OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	1
OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	1
OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	OPEN	2
OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	CLOSED	3
OPEN	OPEN	OPEN	OPEN	CLOSED	OPEN	OPEN	4
.....							
CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	OPEN	126
CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	127

J12 1-2 PNP mode inputs

J12 2-3 NPN mode inputs

J Term CAN bus network termination

CONNECTIONS OF TERMINALS

XP4.1 COM +24VDC
XP4.2 COM +24VDC
XP4.3 REF GND
XP4.4 In1 PNP/NPN
XP4.5 In2 PNP/NPN
XP4.6 In3 PNP/NPN
XP4.7 In4 PNP/NPN
XP4.8 In5 PNP/NPN
XP4.9 In6 PNP/NPN
XP4.10 In7 PNP (**)/NPN
XP4.11 In8 PNP (**)/NPN
XP4.12 Out1 PNP
XP4.13 Out2 PNP
XP4.14 Out3 PNP
XP4.15 Out4 PNP
XP4.16 Out5 PNP
XP4.17 Out6 PNP
XP4.18 Out7 PNP
XP4.19 Out8 PNP

(**) Fast inputs when used as counters

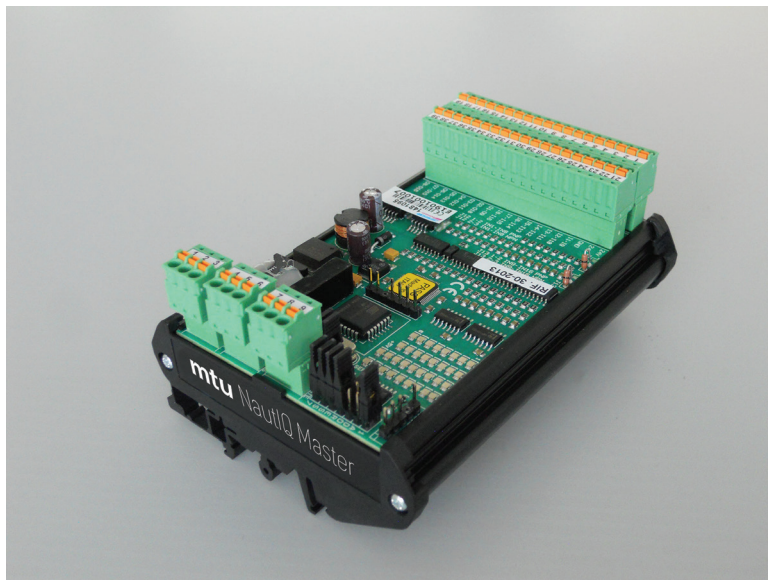
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OM-125B **OM-125B-WD01**

The **OM-125B module** features 16 NPN/PNP selectable opto-isolated digital inputs and 16 PNP digital outputs protected against short circuit, each with a maximum output current of 3A.

The **OM-125B-WD01 module** is equipped with a special version of the firmware, featuring the watchdog functionality when used in conjunction with an OM-320B-NL01 Navigation Lights Controller

Like all **mtu** NautIQ Master automation components, these modules have been specifically designed for the marine environment: the use of extended temperature range components (-20 to +85 °C) and Type Approval certification make them invaluable elements for modern marine automation systems.

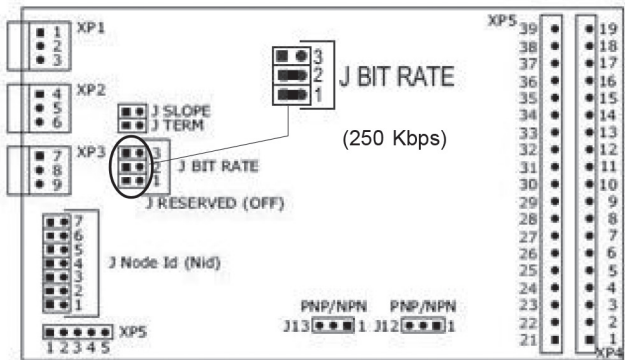


Technical Data

- T89C51CC02 40MHz CPU
 - Full CAN 2.0 A and B interfaces, CANOpen protocol
 - RS232 interface
 - 2Kbyte EEPROM memory
 - 512 byte RAM memory
 - 16 + 2 Kbyte EPROM FLASH memory
 - 0.2A 24VDC (18÷32VDC) power supply
 - 16 24V PNP/NPN selectable digital inputs
 - 16 24V 3A PNP digital outputs.
 - 100Hz standard inputs
 - Fast inputs for 400Hz counters
 - Operating temperature: -20...85 °C
 - Size: 128×82×56 mm
 - EN50022 DIN bar mounting
 - Certifications: CE, UKCA, EU RO MR Type Approval
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Device Layout

Layout:



Connections:

POWER SUPPLY CONNECTION

XP1.1 +24VDC
XP1.2 GND
XP1.3 GROUND (PE)

CAN BUS CONNECTION

XP2.4 CANH
XP2.5 CANL
XP2.6 REF
XP3.7 CANH
XP3.8 CANL
XP3.9 REF

Jumpers:

7	6	5	4	3	2	1	Nid
OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	1
OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	1
OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	OPEN	2
OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	CLOSED	3
OPEN	OPEN	OPEN	OPEN	CLOSED	OPEN	OPEN	4
CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	OPEN	126
CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	127

J12/J13 1-2 PNP mode inputs

J12/J13 2-3 NPN mode inputs

J Term CAN bus network termination

CONNECTIONS OF TERMINALS

XP4.1 COM +24VDC	XP5.21 COM +24VDC
XP4.2 COM +24VDC	XP5.22 COM +24VDC
XP4.3 REF GND	XP5.23 REF GND
XP4.4 In1 PNP/NPN	XP5.24 In9 PNP/NPN
XP4.5 In2 PNP/NPN	XP5.25 In10 PNP/NPN
XP4.6 In3 PNP/NPN	XP5.26 In11 PNP/NPN
XP4.7 In4 PNP/NPN	XP5.27 In12 PNP/NPN
XP4.8 In5 PNP/NPN	XP5.28 In13 PNP/NPN
XP4.9 In6 PNP/NPN	XP5.29 In14 PNP/NPN
XP4.10 In7 PNP/NPN	XP5.30 In15 PNP/NPN(**)
XP4.11 In8 PNP/NPN	XP5.31 In16 PNP/NPN(**)
XP4.12 Out1 PNP 3A	XP5.32 Out9 PNP 3A
XP4.13 Out2 PNP 3A	XP5.33 Out10 PNP 3A
XP4.14 Out3 PNP 3A	XP5.34 Out11 PNP 3A
XP4.15 Out4 PNP 3A	XP5.35 Out12 PNP 3A
XP4.16 Out5 PNP 3A	XP5.36 Out13 PNP 3A
XP4.17 Out6 PNP 3A	XP5.37 Out14 PNP 3A
XP4.18 Out7 PNP 3A	XP5.38 Out15 PNP 3A
XP4.19 Out8 PNP 3A	XP5.39 Out16 PNP 3A

(**) Fast inputs when used as counters

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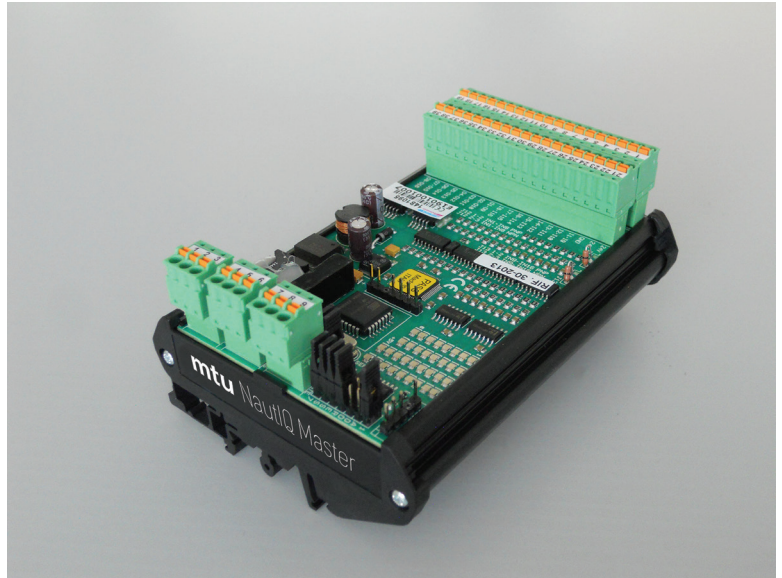
OM-135B OM-145B OM-145B-AL01

The OM-135B module features 16 PNP opto-isolated digital inputs and 16 PNP digital outputs protected against short circuit. Equipped with a series of input diodes that avoids current returns when the module is switched off, it allows the parallel connection of inputs to discrete backup circuits for alarm detection.

The OM-145B module features 16 NPN opto-isolated digital inputs and 16 PNP digital outputs protected against short circuit. Equipped with a series of input diodes that avoids current returns when the module is switched off, it allows the parallel connection of inputs to discrete backup circuits for alarm detection.

The OM-145B-AL01 module is equipped with a special version of the firmware, featuring the annunciator sequence ISA-A (options 1-14) according to the ISA 18.1-2004 standard (formerly named ISA-1 sequence). This function allows using the module as a stand-alone alarm annunciator, when disconnected from the network, or as an alarm module when connected to the automation system. Up to 13 alarm inputs are provided, as well as a power check input and a watchdog output.

Like all **mtu** NautIQ Master automation components, these modules have been specifically designed for the marine environment: the use of extended temperature range components (-20 to +85 °C) and Type Approval certification make them invaluable elements for modern marine automation systems.



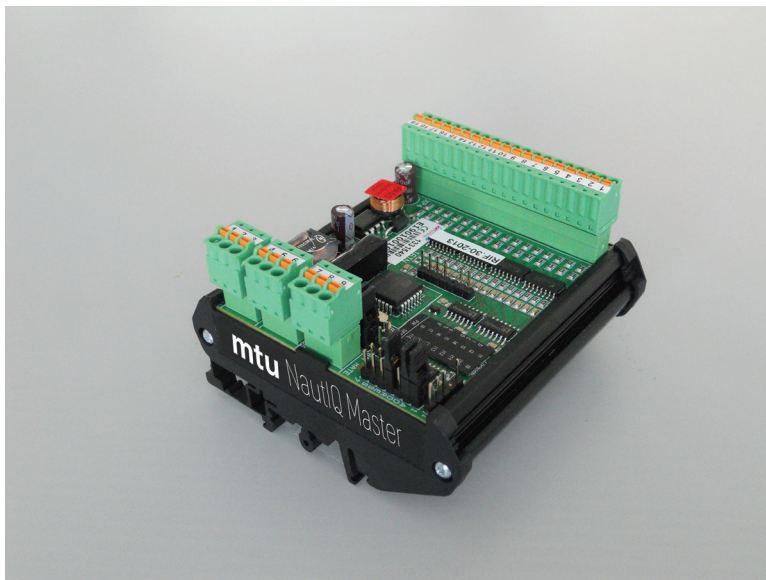
Technical Data

- T89C51CC02 40MHz CPU
 - Full CAN 2.0 A and B interfaces, CANOpen protocol
 - RS232 interface
 - 2Kbyte EEPROM memory
 - 512 byte RAM memory
 - 16 + 2 Kbyte EPROM FLASH memory
 - 0.2A 24VDC (18÷32VDC) power supply
 - 16 24V PNP digital inputs (mod. OM-135B) with diodes against reverse currents
 - 16 24V NPN digital inputs (mod. OM-145B) with diodes against reverse currents
 - 16 24V 0.5A PNP digital outputs (all models). 3A digital outputs version available, please contact us for further details
 - 100Hz standard inputs
 - Fast inputs for 400Hz counters
 - Operating temperature: -20...85 °C
 - Size: 128×82×56 mm
 - EN50022 DIN bar mounting
 - Certifications: CE, UKCA, EU RO MR Type Approval
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OM-130B **OM-140B**

The **OM-130B** and **OM-140B** modules feature 16 PNP (mod. OM-130B) or NPN (mod. OM-140B) opto-isolated digital inputs. All inputs are equipped with a series of diodes that avoids current returns when the module is switched off and allows the parallel connection of inputs to external backup circuits for alarm detection. Like all **mtu** NautIQ Master automation components, these modules have been specifically designed for the marine environment: the use of extended temperature range components (-20 to +85 °C) and Type Approval certification make them invaluable elements for modern marine automation systems.

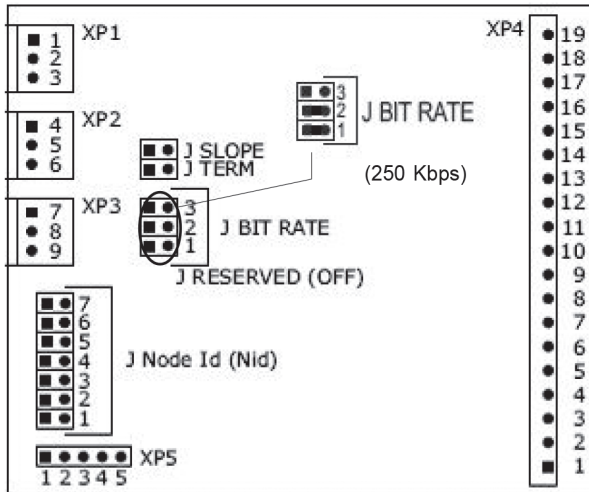


Technical Data

- T89C51CC02 40MHz CPU
 - Full CAN 2.0 A and B interfaces, CANOpen protocol
 - RS232 interface
 - 2Kbyte EEPROM memory
 - 512 byte RAM memory
 - 16 + 2 Kbyte EPROM FLASH memory
 - 0.2A 24VDC (18÷32VDC) power supply
 - 16 24V PNP digital inputs (mod. OM-130B) with diodes against reverse currents
 - 16 24V NPN digital inputs (mod. OM-140B) with diodes against reverse currents
 - 100Hz standard inputs
 - Fast inputs for 400Hz counters
 - Operating temperature: -20...85 °C
 - Size: 92×82×56 mm
 - EN50022 DIN bar mounting
 - Certifications: CE, UKCA, EU RO MR Type Approval
-

Device Layout

Layout:



Connections:

POWER SUPPLY CONNECTION

XP1.1 +24VDC
XP1.2 GND
XP1.3 GROUND (PE)

CAN BUS CONNECTION

XP2.4 CANH
XP2.5 CANL
XP2.6 REF
XP3.7 CANH
XP3.8 CANL
XP3.9 REF

Jumpers:

J Node Id (Nid) CANopen Address 1 ... 127

7	6	5	4	3	2	1	Nid
OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	1
OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	CHIUSO	1
OPEN	OPEN	OPEN	OPEN	OPEN	CHIUSO	OPEN	2
OPEN	OPEN	OPEN	OPEN	OPEN	CHIUSO	CHIUSO	3
OPEN	OPEN	OPEN	OPEN	CLOSED	OPEN	OPEN	4
CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	OPEN	126
CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	127

J Term

CAN bus network termination

CONNECTIONS OF TERMINALS

OM-130B

XP4.1 COM A +24VDC
XP4.2 COM B +24VDC
XP4.3 REF GND
XP4.4 In1 PNP
XP4.5 In2 PNP
XP4.6 In3 PNP
XP4.7 In4 PNP
XP4.8 In5 PNP
XP4.9 In6 PNP
XP4.10 In7 PNP
XP4.11 In8 PNP
XP4.12 In9 PNP
XP4.13 In10 PNP
XP4.14 In11 PNP
XP4.15 In12 PNP
XP4.16 In13 PNP
XP4.17 In14 PNP
XP4.18 In15 PNP (*)
XP4.19 In16 PNP (*)

OM-140B

XP4.1 NC
XP4.2 NC
XP4.3 REF +24VDC
XP4.4 In1 NPN
XP4.5 In2 NPN
XP4.6 In3 NPN
XP4.7 In4 NPN
XP4.8 In5 NPN
XP4.9 In6 NPN
XP4.10 In7 NPN
XP4.11 In8 NPN
XP4.12 In9 NPN
XP4.13 In10 NPN
XP4.14 In11 NPN
XP4.15 In12 NPN
XP4.16 In13 NPN
XP4.17 In14 NPN
XP4.18 In15 NPN (**)
XP4.19 In16 NPN (**)

(*) Fast inputs when used as counters

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OM-150B

The **OM-150B module** features 16 PNP digital outputs.

Each output supplies up to 500mA current and is protected against short circuit.

Like all **mtu** NautIQ Master automation components, this module has been specifically designed for the marine environment: the use of extended temperature range components (-20 to +85 °C) and Type Approval certification make it an invaluable element for a modern marine automation system.

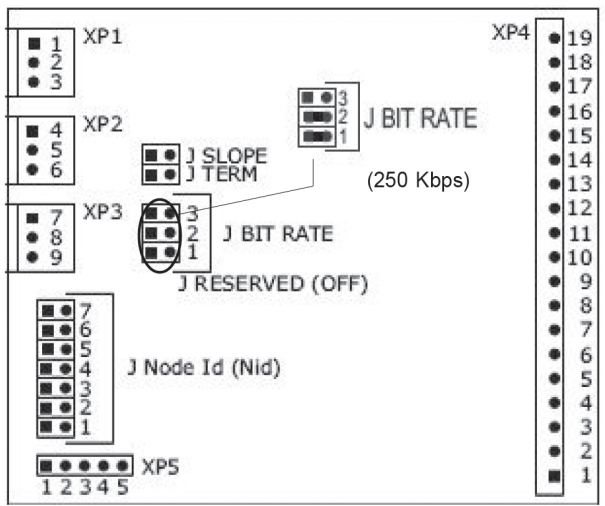


Technical Data

- T89C51CC02 40MHz CPU
- Full CAN 2.0 A and B interfaces, CANOpen protocol
- RS232 interface
- 2Kbyte EEPROM memory
- 512 byte RAM memory
- 16 + 2 Kbyte EPROM FLASH memory
- 0.2A 24VDC (18÷32VDC) power supply
- 16 24V 0.5A PNP digital outputs
- Operating temperature: -20...85 °C
- Size: 92×82×56 mm
- EN50022 DIN bar mounting
- Certifications: CE, UKCA, EU RO MR Type Approval

Device Layout

Layout:



Connections:

POWER SUPPLY CONNECTION

- XP1.1 +24VDC
- XP1.2 GND
- XP1.3 GROUND (PE)

CAN BUS CONNECTION

- XP2.4 CANH
- XP2.5 CANL
- XP2.6 REF
- XP3.7 CANH
- XP3.8 CANL
- XP3.9 REF

Jumpers:

J Node Id (Nid) CANopen Address 1 ... 127

7	6	5	4	3	2	1	Nid
OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	1
OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	1
OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	OPEN	2
OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	CLOSED	3
OPEN	OPEN	OPEN	OPEN	CLOSED	OPEN	OPEN	4
.....							
CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	OPEN	126
CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	127

J Term CAN bus network termination

CONNECTIONS OF TERMINALS

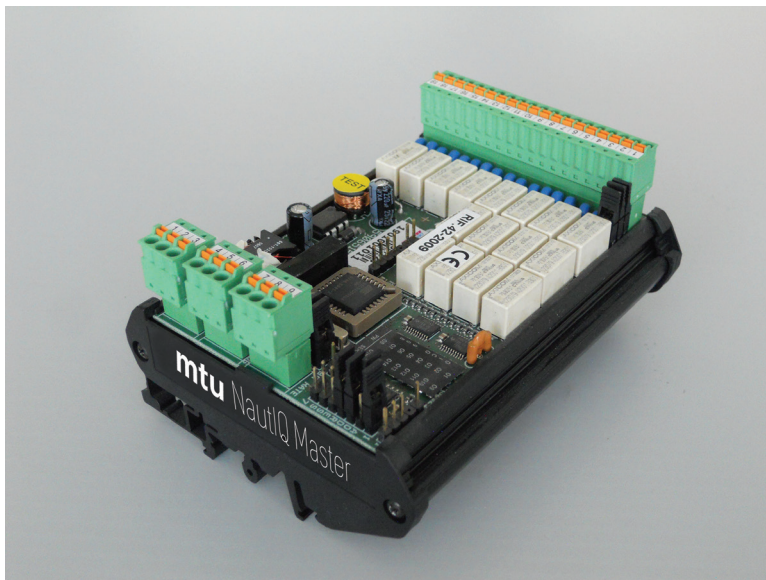
OM-150B

- XP4.1 +24VDC
- XP4.2 +24VDC
- XP4.3 GND
- XP4.4 OUT1
- XP4.5 OUT2
- XP4.6 OUT3
- XP4.7 OUT4
- XP4.8 OUT5
- XP4.9 OUT6
- XP4.10 OUT7
- XP4.11 OUT8
- XP4.12 OUT9
- XP4.13 OUT10
- XP4.14 OUT11
- XP4.15 OUT12
- XP4.16 OUT13
- XP4.17 OUT14
- XP4.18 OUT15
- XP4.19 OUT16

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OM-160B

The **OM-160B module** features 16 digital outputs with 24VDC 1A dry contacts. The main feature of this model is the use of three different common lines to form up to three groups of completely independent relays. This module can be configured by means of jumpers. Like all **mtu** NautIQ Master automation components, this module has been specifically designed for the marine environment, and the use of extended temperature range components (-20 to +85 °C) make it an invaluable element for a modern marine automation system.

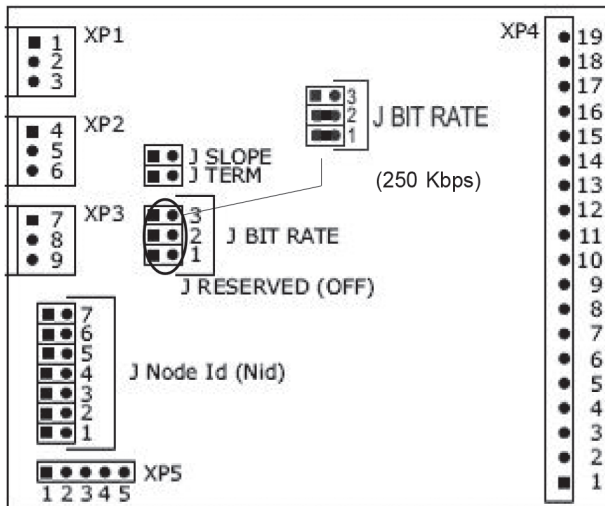


Technical Data

- T89C51CC02 40MHz CPU
- Full CAN 2.0 A and B interfaces, CANOpen protocol
- RS232 interface
- 2Kbyte EEPROM memory
- 512 byte RAM memory
- 16 + 2 Kbyte EPROM FLASH memory
- 0.2A 24VDC (18÷32VDC) power supply
- 16 digital outputs:
 - 24VDC max 1 A
 - 110VAC max 0.3A
 - 240VAC max 0.2A
 - (in case of use of a single COM: max. current = 0.2A)
- Operating temperature: -20...85 °C
- Size: 117×82×56 mm
- EN50022 DIN bar mounting
- Certifications: CE, UKCA

Device Layout

Layout:



Jumpers:

J Node Id (Nid) CANopen Address 1 ... 127

7	6	5	4	3	2	1	Nid
OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	1
OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	1
OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	OPEN	2
OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	CLOSED	3
OPEN	OPEN	OPEN	OPEN	CLOSED	OPEN	OPEN	4
.....							
CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	OPEN	126
CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	127

JC1 + JC2	Joins COM_A to COM_B
JC3	Joins COM_B to COM_C
J Term	CAN bus network termination

Connections:

POWER SUPPLY CONNECTION

XP1.1 +24VDC
XP1.2 GND
XP1.3 GROUND (PE)

CAN BUS CONNECTION

XP2.4 CANH
XP2.5 CANL
XP2.6 REF
XP3.7 CANH
XP3.8 CANL
XP3.9 REF

CONNECTIONS OF TERMINALS

OM-160B

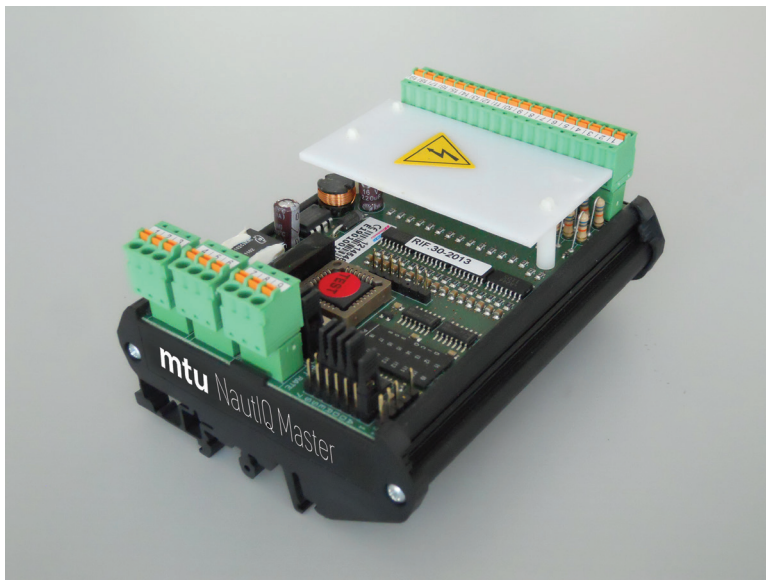
XP4.1 COM_A (*)
XP4.2 COM_B (*)
XP4.3 COM_C (*)
XP4.4 OUT1
XP4.5 OUT2
XP4.6 OUT3
XP4.7 OUT4
XP4.8 OUT5
XP4.9 OUT6
XP4.10 OUT7
XP4.11 OUT8
XP4.12 OUT9
XP4.13 OUT10
XP4.14 OUT11
XP4.15 OUT12
XP4.16 OUT13
XP4.17 OUT14
XP4.18 OUT15
XP4.19 OUT16

(*) The 16 relay outputs are referred to 3 common lines:
COM_A: for the outputs OUT1 to OUT6
COM_B: for the outputs OUT7 to OUT11
COM_C: for the outputs OUT12 to OUT16
The JC1, JC2 and JC3 jumpers allow connecting all the outputs to the same COM with max. current = 0.2A (each channel).

mtu NautIQ Master Essential

OM-170B

The **OM-170B module** features 16 opto-isolated digital 230 VAC inputs and allows the connection of mains voltage directly to the terminal board. It can be used to detect the presence of mains voltage on power supply sources, or get the feedback signals coming from 230VAC devices, taking them directly from the load. Like all **mtu NautIQ Master** automation components, this module has been specifically designed for the marine environment, and the use of extended temperature range components (-20 to +85 °C) make it an invaluable element for a modern marine automation system.

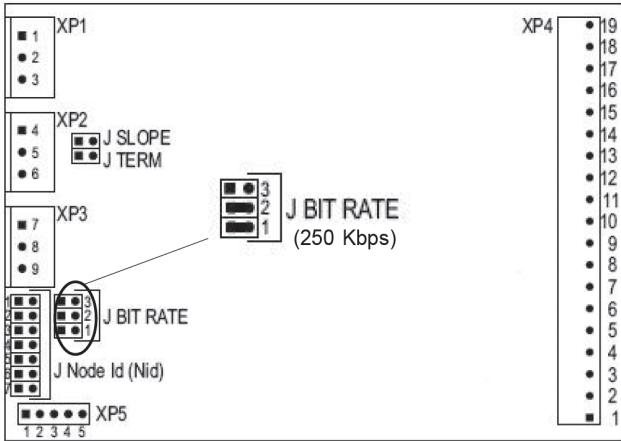


Technical Data

- T89C51CC02 40MHz CPU
- Full CAN 2.0 A and B interfaces, CANOpen protocol
- RS232 interface
- 2Kbyte EEPROM memory
- 512 byte RAM memory
- 16 + 2 Kbyte EPROM FLASH memory
- 0.2A 24VDC (18÷32VDC) power supply
- 16 digital inputs 230VAC
- Cover protecting against accidental electrical shock
- Operating temperature: -20...85 °C
- Size: 117×82×56 mm
- EN50022 DIN bar mounting
- Certifications: CE, UKCA

Device Layout

Layout:



Connections:

POWER SUPPLY CONNECTION

XP1.1 +24VDC
XP1.2 GND
XP1.3 GROUND (PE)

CAN BUS CONNECTION

XP2.4 CANH
XP2.5 CANL
XP2.6 REF
XP3.7 CANH
XP3.8 CANL
XP3.9 REF

Jumpers:

J Node Id (Nid) CANopen Address 1 ... 127

7	6	5	4	3	2	1	Nid
OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	1
OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	1
OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	OPEN	2
OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	CLOSED	3
OPEN	OPEN	OPEN	OPEN	CLOSED	OPEN	OPEN	4
.....							
CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	OPEN	126
CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	127

J Term CAN bus network termination

CONNECTIONS OF TERMINALS

XP4.1 COM Neutral
XP4.2 NC
XP4.3 NC
XP4.4 In1 Line
XP4.5 In2 Line
XP4.6 In3 Line
XP4.7 In4 Line
XP4.8 In5 Line
XP4.9 In6 Line
XP4.10 In7 Line
XP4.12 In9 Line
XP4.13 In10 Line
XP4.14 In11 Line
XP4.15 In12 Line
XP4.16 In13 Line
XP4.17 In14 Line
XP4.18 In15 Line
XP4.19 In16 Line

NOTE: The module is designed for usage in TN (earthed neutral) systems only. Do not use in IT/TT systems as unwanted voltage can return through the inputs. The maximum voltage allowed between each input and the COM line is 230VAC. Make sure there are no unwanted current returns through the COM reference terminal block.

NOTE: this module is designed for single-phase use. In three-phase systems use a separate module for each phase.

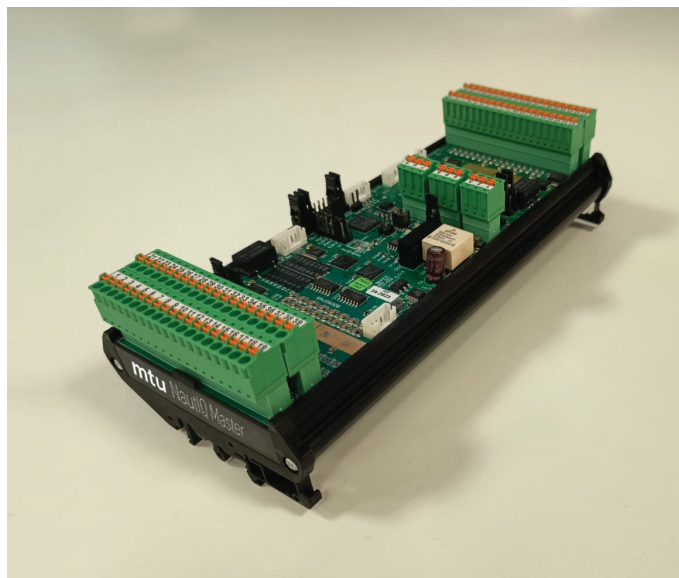
OM-180B (-SP01) **OM-185B (-SP01)** **OM-190B**

The **OM-180/190 series** is a powerful set of digital I/O modules that offer unmatched flexibility and high channel density. Each module combines several elements to create a variety of configurations.

The following configurations are currently available:

- OM-180B: 16 PNP/NPN digital inputs + 16 PNP 0.5A digital outputs
- OM-180B-SP01: 16 PNP/NPN digital inputs + 16 PNP 0.5A digital outputs + RS232/RS485/RS422 multi-standard serial port
- OM-185B: 32 PNP/NPN digital inputs + 32 PNP 0.5A digital outputs
- OM-185B-SP01: 32 PNP/NPN digital inputs + 32 PNP 0.5A digital outputs + RS232/RS485/RS422 multi-standard serial port
- OM-190B: 48 PNP/NPN digital inputs + 16 PNP 0.5A digital outputs

Additional configurations are available upon request. All digital inputs are opto-isolated, and all digital outputs are short-circuit protected. The multi-standard serial port, also opto-isolated, allows the module to be used as a stand-alone unit in simplified environments that do not require a CAN-bus network, or as a serial bridge with built-in I/O ports. Like all **mtu** NautIQ Master automation components, these modules have been specifically designed for the marine environment: the use of extended temperature range components (-20 to +85 °C) and Type Approval certification make them invaluable elements for modern marine automation systems.

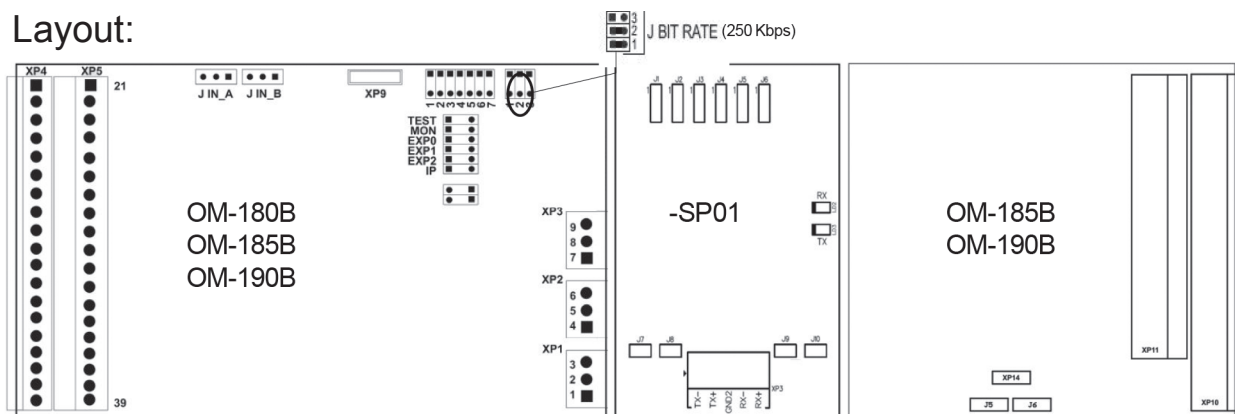


Technical Data

- ARM Cortex XMC4500 CPU @120MHz
 - Full CAN 2.0 A and B interfaces, CANOpen protocol
 - 1024 Kbyte FLASH memory
 - 160 Kbyte RAM memory
 - 1A 24VDC (18÷32VDC) power supply
 - 16 24V PNP/NPN digital inputs (mod. OM-180B)
 - 32 24V PNP/NPN digital inputs (mod. OM-185B)
 - 48 24V PNP/NPN digital inputs (mod. OM-190B)
 - 16 24V 0.5A PNP digital outputs (mod. OM-180B, OM-190B)
 - 32 24V 0.5A PNP digital outputs (mod. OM-185B)
 - RS232/RS485/RS422 multistandard, opto-isolated, serial port (mod. -SP01)
 - 100Hz standard inputs, fast inputs for 400Hz counters
 - Operating temperature: -20...85 °C
 - Size: 128×82×56 mm (mod. OM-180B), 178×82×56 mm (mod. OM-180B-SP01), 200×82×56 mm (mod. OM-185B), 250×82×56 mm (mod. OM-185B-SP01), 200×82×56 mm (mod. OM-190B)
 - EN50022 DIN bar mounting
 - Certifications: CE, UKCA, EU RO MR Type Approval
-

Device Layout

Layout:



Connections:

CONNECTIONS OF TERMINALS

OM-180B/185B/190B

XP4.1 COM +24VDC	XP5.21 COM +24VDC
XP4.2 COM +24VDC	XP5.22 COM +24VDC
XP4.3 REF GND	XP5.23 REF GND
XP4.4 In1A PNP/NPN	XP5.24 In9B PNP/NPN
XP4.5 In2A PNP/NPN	XP5.25 In10B PNP/NPN
XP4.6 In3A PNP/NPN	XP5.26 In11B PNP/NPN
XP4.7 In4A PNP/NPN	XP5.27 In12B PNP/NPN
XP4.8 In5A PNP/NPN	XP5.28 In13B PNP/NPN
XP4.9 In6A PNP/NPN	XP5.29 In14B PNP/NPN
XP4.10 In7A PNP/NPN	XP5.30 In15B PNP/NPN(**)
XP4.11 In8A PNP/NPN	XP5.31 In16B PNP/NPN(**)
XP4.12 Out1 PNP	XP5.32 Out9 PNP
XP4.13 Out2 PNP	XP5.33 Out10 PNP
XP4.14 Out3 PNP	XP5.34 Out11 PNP
XP4.15 Out4 PNP	XP5.35 Out12 PNP
XP4.16 Out5 PNP	XP5.36 Out13 PNP
XP4.17 Out6 PNP	XP5.37 Out14 PNP
XP4.18 Out7 PNP	XP5.38 Out15 PNP
XP4.19 Out8 PNP	XP5.39 Out16 PNP

POWER SUPPLY

XP1.1 +24VDC
XP1.2 GND
XP1.3 GROUND (PE)

CAN BUS

XP2.4/XP3.7 CANH
XP2.5/XP3.8 CANL
XP2.6/XP3.9 REF

SERIAL PORT (-SP01)

PIN	RS232	RS485	RS422
XP3.1	TX	DATA-	TX-
XP3.2	RTS	DATA+	TX+
XP3.3	GND	GND	GND
XP3.4	CTS	==	RX-
XP3.5	RXD	==	RX+

Jumpers:

J Node Id (NId) CANopen Address 1 ... 127, binary coded

J Term CAN bus network termination

J IN_A/B 1-2=Bank A/B inputs PNP mode

2-3=Bank A/B inputs NPN mode

CONNECTIONS OF TERMINALS

OM-185B

XP10.41 COM +24VDC	XP11.64 In9B PNP/NPN
XP10.42 COM +24VDC	XP11.65 In10B PNP/NPN
XP10.43 REF GND	XP11.66 In11B PNP/NPN
XP10.44 In1A PNP/NPN	XP11.67 In12B PNP/NPN
XP10.45 In2A PNP/NPN	XP11.68 In13B PNP/NPN
XP10.46 In3A PNP/NPN	XP11.69 In14B PNP/NPN
XP10.47 In4A PNP/NPN	XP11.70 In15B PNP/NPN
XP10.48 In5A PNP/NPN	XP11.71 In16B PNP/NPN
XP10.49 In6A PNP/NPN	XP11.72 Out9 PNP
XP10.50 In7A PNP/NPN	XP11.73 Out10 PNP
XP10.51 In8A PNP/NPN	XP11.74 Out11 PNP
XP10.52 Out1 PNP	XP11.75 Out12 PNP
XP10.53 Out2 PNP	XP11.76 Out13 PNP
XP10.54 Out3 PNP	XP11.77 Out14 PNP
XP10.55 Out4 PNP	XP11.78 Out15 PNP
XP10.56 Out5 PNP	XP11.79 Out16 PNP
XP10.57 Out6 PNP	
XP10.58 Out7 PNP	
XP10.59 Out8 PNP	

OM-190B

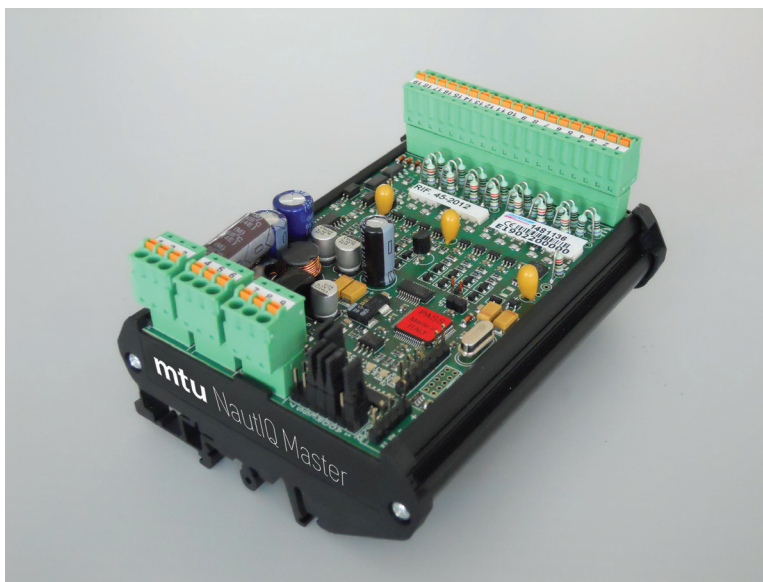
XP10.41 COM +24VDC	XP11.64 In17B PNP/NPN
XP10.42 COM +24VDC	XP11.65 In18B PNP/NPN
XP10.43 REF GND	XP11.66 In19B PNP/NPN
XP10.44 In1A PNP/NPN	XP11.67 In20B PNP/NPN
XP10.45 In2A PNP/NPN	XP11.68 In21B PNP/NPN
XP10.46 In3A PNP/NPN	XP11.69 In22B PNP/NPN
XP10.47 In4A PNP/NPN	XP11.70 In23B PNP/NPN
XP10.48 In5A PNP/NPN	XP11.71 In24B PNP/NPN
XP10.49 In6A PNP/NPN	XP11.72 In25B PNP/NPN
XP10.50 In7A PNP/NPN	XP11.73 In26B PNP/NPN
XP10.51 In8A PNP/NPN	XP11.74 In27B PNP/NPN
XP10.52 In9A PNP/NPN	XP11.75 In28B PNP/NPN
XP10.53 In10A PNP/NPN	XP11.76 In29B PNP/NPN
XP10.54 In11A PNP/NPN	XP11.77 In30B PNP/NPN
XP10.55 In12A PNP/NPN	XP11.78 In31B PNP/NPN
XP10.56 In13A PNP/NPN	XP11.79 In32B PNP/NPN
XP10.57 In14A PNP/NPN	
XP10.58 In15A PNP/NPN	
XP10.59 In16A PNP/NPN	

(**) Fast inputs when used as counters

mtu NautIQ Master Essential

OM-210B

The **OM-210B module** is the ideal solution for the acquisition of the voltage/current analog signals normally used on the onboard automation systems. Featuring 8 software-programmable input channels, it can be interfaced with 4-20mA analog sensors (level transducers, electronic TA, signal converters, etc.) and allows monitoring directly the battery voltage (0-40V), as well as measuring the current with shunt (0-200mV). The maximum common mode voltage allowed (max. 40V) ensures the connection of the shunt to the positive branch. This module also features two digital inputs that can be used as frequency meters for interfacing with analog revs counters. The completely programmable inputs allow configuring the module after installation. Like all **mtu** NautIQ Master automation components, this module has been specifically designed for the marine environment: the use of extended temperature range components (-20 to +85 °C) and Type Approval certification make it an invaluable element for a modern marine automation system.



Technical Data

- 32 bit, ARM7 60MHz CPU
- Full CAN 2.0A and 2.0B interfaces
- RS232 interface
- 128Kbyte FLASH memory
- 16Kbyte RAM memory
- 2Kbyte EEPROM memory
- 0.3A 24VDC (18÷32VDC) power supply
- Operating temperature: -20...85 °C
- Size: 117×82×56 mm
- EN50022 DIN bar mounting
- Isolation of I/O analog points from power supply voltage and isolation between points up to 60V common mode
- Software-configurable
- Certifications: CE, UKCA, EU RO MR Type Approval
- Bandwidth: 25Hz to 500Hz, according to digital filter parameters
- Accuracy: 1% FS
- Input resistance: 0-40 V: 2KOhm; 4-20 mA: 220hm; 0-200 mV: 220hm

SECTION OF FREQUENCY INPUTS

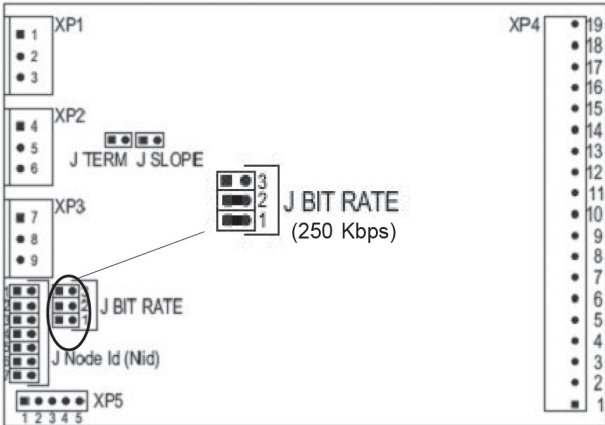
- Number of inputs: 2 digital
- Type of inputs: 0-40 V, switching threshold between 2.5V and 3.5V
- Conversion: 16-bit
- Bandwidth: 6KHz
- Resolution: 0.1Hz
- Protection of input stage: ±2000V (electrostatic discharges)

SECTION OF VOLTAGE/CURRENT INPUTS

- Number of inputs: 8 differential
 - Ranges: 4-20 mA, 0-200 mV, 0-40 V
 - Max. common mode voltage: -3..+40VDC
 - Conversion: 12 bit
 - Sampling rate: 1KHz
-

Device Layout

Layout:



Connections:

POWER SUPPLY CONNECTION

XP1.1 +24VDC
XP1.2 GND
XP1.3 GROUND (PE)

CAN BUS CONNECTION

XP2.4 CANH
XP2.5 CANL
XP2.6 REF.
XP3.7 CANH
XP3.8 CANL
XP3.9 REF.

Jumpers:

J Node Id (Nid) CANopen Address 1 ... 127

7	6	5	4	3	2	1	Nid
OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	1
OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	1
OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	OPEN	2
OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	CLOSED	3
OPEN	OPEN	OPEN	OPEN	CLOSED	OPEN	OPEN	4
.....							
CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	OPEN	126
CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	127

J Term CAN bus network termination

CONNECTIONS OF TERMINALS

XP4.1 In 1+
XP4.2 In 1 -
XP4.3 In 2+
XP4.4 In 2 -
XP4.5 In 3+
XP4.6 In 3 -
XP4.7 In 4+
XP4.8 In 4 -
XP4.9 In 5+
XP4.10 In 5 -
XP4.11 In 6+
XP4.12 In 6 -
XP4.13 In 7+
XP4.14 In 7 -
XP4.15 In 8+ (*)
XP4.16 In 8 - (*)

XP4.16 Freq. In 1- (*)
XP4.17 Freq. In 1+ (*)
XP4.18 Freq. In 2-
XP4.19 Freq. In 2+

(*) The use of the first frequency input does not allow using the XP4.15 and XP4.16 terminals and the corresponding V/I In8+/In8- input

mtu NautIQ Master Essential

OM-220B

OM-230B

OM-240B

V.2018

This new series represents the state-of-the-art of the analog modules by **mtu** NautIQ Master. Based on a powerful ARM processor, the modules feature unsurpassed performance and flexibility. **The OM-220B module** features 4 analog inputs that can be individually programmed and interfaced with temperature sensors (thermocouples, temperature resistors and PT100) as well as resistive sensors, such as level, position and pressure sensors.

The OM-230B module features 4 analog output channels, that can be used to control the devices by means of voltage modulated analog signals. The single or dual output signal, ranging from 0-5V to 0-10V, can be selected by jumpers. **The OM-240B module** offers the characteristics of both module above, featuring 4 analog inputs and 4 analog outputs, with the same performance of the OM-220B and OM-230B modules. Like all **mtu** NautIQ Master automation components, these modules have been specifically designed for the marine environment, with extended temperature range components (-20 to +85 °C) and Type Approval certification.



Technical Data

- ARM Cortex XMC4500 CPU
- Full CAN 2.0A and 2.0B interfaces
- RS232 interface
- 1024 Kbyte FLASH memory
- 160 Kbyte RAM memory
- 0.3A 24VDC (18÷32VDC) power supply
- Operating temperature: -20...85 °C
- Size: 117×82×56 mm
- EN50022 DIN bar mounting
- Certifications: CE, UKCA, EU RO MR Type Approval

- Isolation of I/O points from supply voltage
- Inputs (OM-250B, OM-270B): 4, differential
- Outputs (OM-240B, OM-270B): 4, single/dual

INPUT SECTION (OM-220B, OM-240B)

- Types of configurable inputs:
J, K, T, R and S thermocouples
2 or 3- wire Pt100-Pt1000

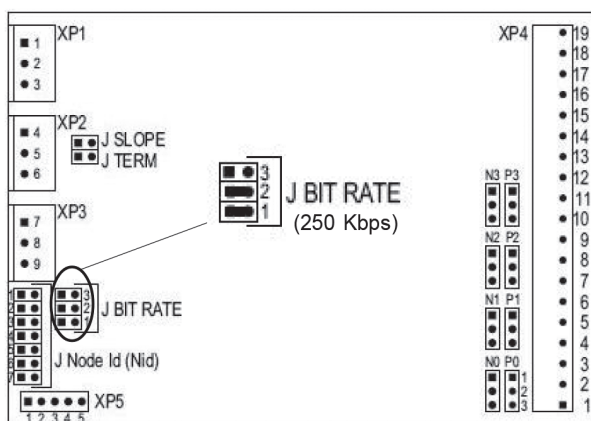
- 0÷10 KOhm resistors
- Conversion: 16 bit
- Bandwidth: 0-10 Hz
- Resolution: 0.1 °C
- Accuracy: < 0.2% FS (25 °C)
- Protection of input stage: ±2000V (ESD)

OUTPUT SECTION (OM-230B, OM-240B)

- Output impedance: 0.1 ohm
- Output range:
0..5 V, 0..10 V, -5..5 V, -10..10 V
- Max. output current: 2mA
- Conversion: 12 bit
- Max. setup time: 10usec.
- Coding: Binary Code
- Max. output update frequency: 1KHz
- Accuracy: ±1% FS
- Protection against short circuit (output)

Device Layout

Layout:



Jumpers:

J Node Id (Nid) CANopen Address 1 ... 127

7	6	5	4	3	2	1	Nid
OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	1
OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	1
OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	OPEN	2
OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	CLOSED	3
OPEN	OPEN	OPEN	OPEN	CLOSED	OPEN	OPEN	4
CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	OPEN	126
CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	127

J Term CAN bus network termination

Px - Nx To be inserted always in positions 1 - 2

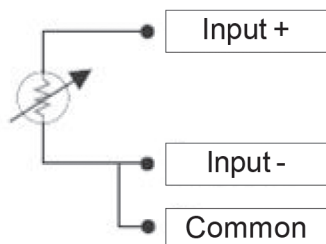
Output mode (OM-230B, OM-240B):

BIPx: ON → dual voltage output ($\pm 10V/\pm 5V$)
OFF → single voltage output (0-10V/0-5V)

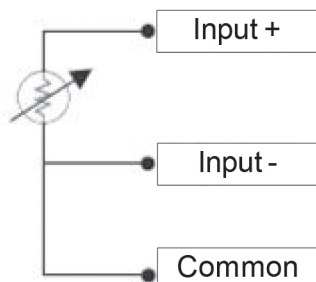
AV $\frac{1}{2}$ x: ON → output with gain $\frac{1}{2}$ (0-5V/ $\pm 5V$)
OFF → output with gain 1 (0-10V/ $\pm 10V$)

Connections of sensors (OM-220B, OM-240B):

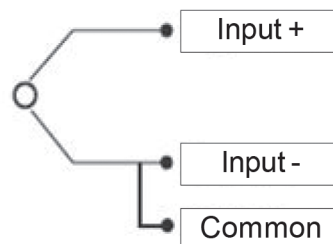
- 2-wire temperature resistor



- 3-wire temperature resistor



- Thermocouples



Connections:

POWER SUPPLY CONNECTION

XP1.1 +24VDC
XP1.2 GND
XP1.3 GROUND (PE)

CAN BUS CONNECTION

XP2.4 CANH
XP2.5 CANL
XP2.6 REF.
XP3.7 CANH
XP3.8 CANL
XP3.9 REF.

CONNECTIONS OF TERMINALS

INPUTS (OM-220B, OM-240B)

XP4.1 Input 0 +
XP4.2 Input 0 -
XP4.3 Common 0
XP4.4 Input 1 +
XP4.5 Input 1 -
XP4.6 Common 1
XP4.7 Input 2 +
XP4.8 Input 2 -
XP4.9 Common 2
XP4.10 Input 3 +
XP4.11 Input 3 -
XP4.12 Common 3

OUTPUTS (OM-230B, OM-240B)

XP4.13 Analog output 0
XP4.14 Common analog outputs
XP4.15 Analog output 1
XP4.16 Common analog outputs
XP4.17 Analog output 2
XP4.18 Common analog outputs
XP4.19 Analog output 3

mtu NautIQ Master Essential

OM-275B

The **OM-275B module** is the ideal solution for generating 0-10V or 4-20mA signals in analog-driven application.

Featuring 4 software-programmable output channels, it can be interfaced with 0-10V or 4-20mA analog devices, like inverters or engine governors.

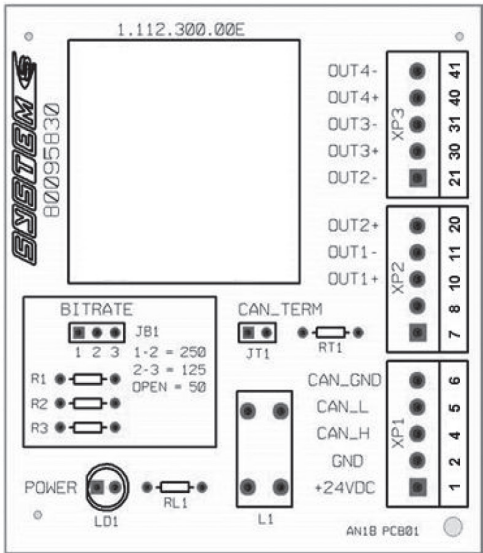
Like all **mtuNautIQ Master** automation components, this module has been specifically designed for the marine environment: the use of extended temperature range components (-20 to +85 °C) and Type Approval certification make it an invaluable element for a modern marine automation system.



Technical Data

- ARM7 Freescale S08DZ60 CPU
 - Full CAN 2.0A and 2.0B interfaces
 - 24VDC (18÷32VDC) power supply
 - Operating temperature: -40...85 °C
 - Size: 70×85×80 mm
 - EN50022 DIN bar mounting
 - Isolation of I/O analog points from power supply voltage
 - Number of outputs: 4
 - Ranges: 0...10 V, 4-20mA (software-selectable)
 - Certifications: CE, UKCA, EU RO MR
Type Approval
-

Layout:



Connections:

POWER SUPPLY CONNECTION

XP1.1 +24VDC
XP1.2 GND

CAN BUS CONNECTION

XP1.4 CANH
XP1.5 CANL
XP1.6 REF.

Jumpers:

CAN Term	CAN bus network termination
BITRATE	1-2 = 250 kbps 2-3 = 125 kbps open = 50 kbps

CONNECTIONS OF TERMINALS

XP2.10	Out 1+
XP2.11	Out 1 -
XP2.20	Out 2+
XP3.21	Out 2 -
XP3.30	Out 3+
XP3.31	Out 3 -
XP3.40	Out 4+
XP3.41	Out 4 -

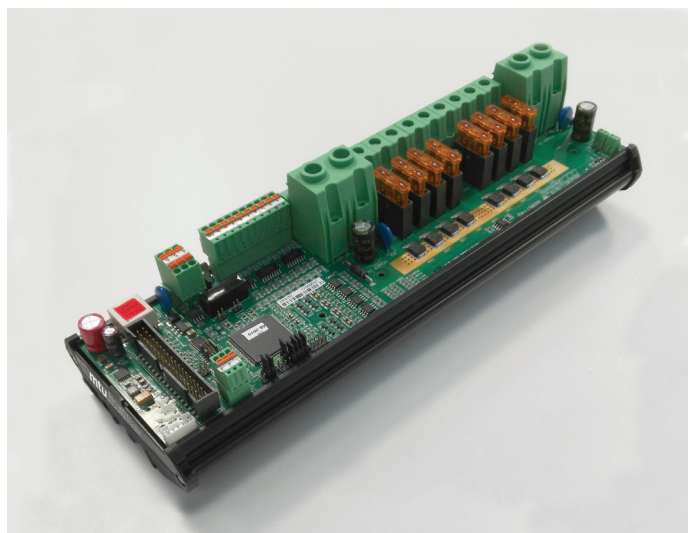
mtu NautIQ Master Essential

OM-320B

V.2018

The **OM-320B module** replaces the traditional automatic circuit breakers and control relays for 24VDC loads. It is able to measure the current drained by the load (automatically opening the circuit if the current exceeds the threshold set), control the load switch-on/off and detect possible overloads or low current consumption due to faults or failing bulbs.

The module features 8 channels. The protection thresholds (4, 8, 12, 16 and 20A), characteristic curve (B or C) and operating modes (breaker, cabin lights, bilge pump, timer-controlled tank pump and navigation lights) of each channel can be configured. The configuration can be done by the CAN network or locally, thanks to the optional programming keyboard. In case of fault of the electronic, a bypass cable (available as option), fuse protected, can be used to activate each output.



Each channel outputs up to 20A @ 24VDC current and features a redundant protection system: electronic and with traditional fuse. Several channels can be connected in parallel to feed high-consumption loads (max. 4 channels and 55A each group). Moreover, 8 digital input channels can be used to control cabin lights, to connect to bilge or level sensors, etc. The module can operate in stand-alone mode - when the automation system is not present or switched off - or integrated with the monitoring system; in this case, the module ensures, for each channel, the complete control of switch-on commands and feedback signals as well as the alarm for low current consumption and/or overload. In both operating modes the module can be controlled and monitored locally through pushbuttons and LEDs wired to the appropriate 34-pole connector.

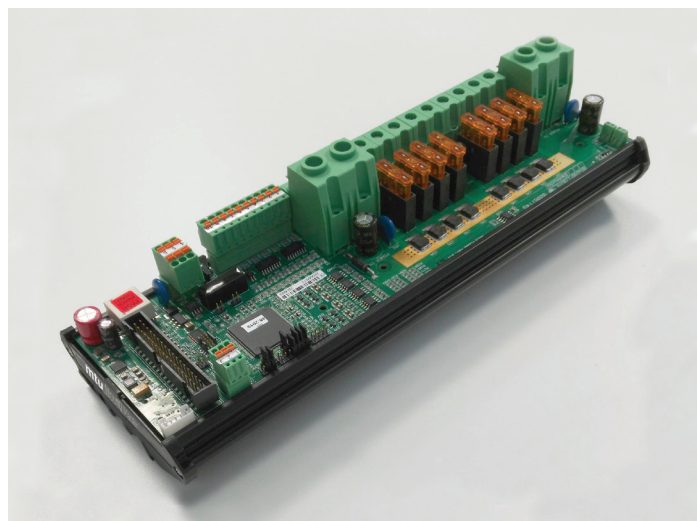
Like all **mtu** NautIQ Master automation components, this module has been specifically designed for the marine environment: the use of extended temperature range components (-20 to +85 °C) and Type Approval certification make it an invaluable element for a modern marine automation system.

Technical Data

- 144MHz ARM7 Cortex M4 CPU
 - Full CAN 2.0A and B interfaces, CANOpen protocol
 - RS232 interface
 - 2Kbyte EEPROM memory
 - 64kB FRAM memory
 - 2MB FLASH memory
 - 0.2A 24VDC (18÷32VDC) power supply
 - 8 PNP 24V 20A outputs
 - 8 NPN/PNP inputs for connecting sensors/ external controls
 - 100Hz standard inputs
 - Operating temperature: -20...+85 °C
 - Size: 270×75×80
 - EN50022 DIN bar mounting
 - IDC 34-pole connector for local control
 - RJ-39 connector for programming keyboard
 - Safety fuses, bypass fused cable (option)
 - Protection thresholds: 4, 8, 12 and 16A
 - Characteristic curves: B and C
 - Modes: breaker, cabin lights, bilge pump, timer-controlled tank pump, navigation lights
 - Certifications: CE, UKCA, EU RO MR Type Approval
-

OM-320B-NL01 ^{V.2018}

The **OM-320B-NL01 module** is designed for the management of navigation lights according to the IMO resolution MSC 253(83), and is Type Approved by the main Class Societies. 7 independent outputs are available for as many 24VDC lights (max. 60W per channel), with monitoring of the drained current to identify the fault or short circuit of the relevant lamp. The protection is electronic, redundant with an automotive-type fuse to achieve galvanic separation. There is also an additional dimmed output dedicated to powering the LEDs of the synoptic panel, and the input for monitoring the power sources.



Synoptic panel support: the module offers a connector that allows you to connect the OM-321A auxiliary terminal block for the creation of the dashboard synoptic using simple buttons and LEDs, without any additional circuit or relay. For each navigation light there is an input for turning on the light, an output for signaling that the light is on and one for signaling that the light is faulty. There are also inputs for adjusting the dimming of the LEDs, for silencing the alarm and for the lamp test, and an output for the alarm buzzer.

Redundancy: for boats with double lights, one module manages the main lights while another manages the backup lights. The two modules communicate with each other via a serial connection which constantly monitors their correct functioning: if one module fails, the companion module will generate an alarm. Furthermore, the two modules prevent the accidental switching on of both lights (main and backup) of the same light. In the case of single lights, the OM-125B-WD01 watchdog module is available which monitors the operation of the single light module and signals the alarm, generating emergency switching on of the lights in the event of module failure.

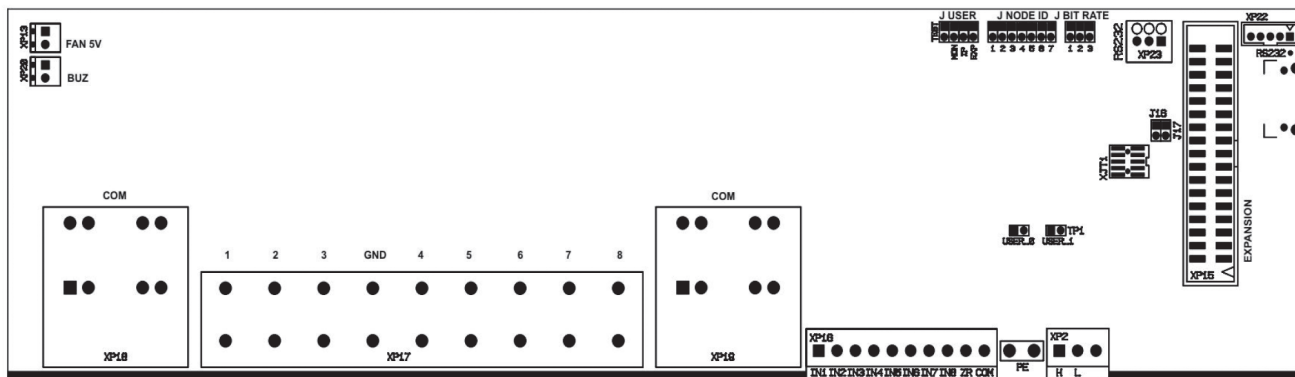
Advanced features: the module is equipped with a self-learning function of the current value drained by each channel, and generates a malfunction alarm when such current drops below 85% (adjustable value) of the recorded value. Furthermore, the lifespan alarm is managed according to IMO MSC 253(83), generating a signal when the total working hours of a light exceed the threshold value (default 50,000 hours, adjustable). Through the automation system it is possible to read the hour meter of each light, reset it (in case of light replacement) and set the lifespan of the lights.

Flexibility: the module can work either as a stand-alone unit or connected to an automation system, using the native CANOpen protocol or via Modbus/TCP protocol over Ethernet, using the OM-430B processor as a gateway. **mtu** NautIQ Master systems automatically integrate the module into the network.

Technical Data

- ARM7 Cortex M4 144MHz CPU
 - Power supply 24VDC (18÷32VDC)
 - 7 x 24V 2.5A outputs
 - Thermal and overcurrent protection
 - Safety fuse on each channel
 - Operating temperature: -20...+85 °C
 - Dimensions: 270×75×80 mm (OM-321A: 70x75x80)
 - DIN EN50022 bar mounting
 - Applicable standards: IMO MSC 253(83)
 - Certifications: CE, UKCA, EU RO MR Type Approval
-

Layout:



Jumpers:

J Node Id (NId) CANopen Address 1 ... 127

7	6	5	4	3	2	1	NId
OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	1
OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	1
OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	OPEN	2
OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	CLOSED	3
OPEN	OPEN	OPEN	OPEN	CLOSED	OPEN	OPEN	4
CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	OPEN	126
CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	127

Connections:

POWER SUPPLY

XP6.1, 6.2 +24VDC (*)

XP6.3, 6.4 +24VDC (*)

XP5.5 GND (**)

(*) The conductor size shall be suitable for the overall current drained by the sum of the 8 output channels, max. 17.5A

(**) For supplying the electronic section and allow de-energizing the inductive loads. Use at least 1.5 mm² conductor. The negative wires from the loads shall be connected in separate terminal blocks.

CAN BUS CONNECTION

XP2.4 CANH

XP2.5 CANL

XP2.6 REF

POWER OUTPUTS

XP5.1...XP5.4 Power nav light 1...4 (24VDC max.2.5A)

XP5.6...XP5.7 Power nav light 5...7 (24VDC max.2.5A)

XP5.8 LED panel dimmed power

NOTE: for a correct use of the module, make sure to comply with the Register regulations reported below. We decline any responsibility for any problem that may arise out of the improper use of the product or non-compliance with installation instructions.

- Use only in SELV/PELV-type systems, that is systems powered by battery and/or CE certified battery chargers or power supply equipped with safety transformers.
- If only one module is used, always add the watch-dog module OM-1xxB-WD01. If more than one module is used, place all the main navigation lights in one module and all the backup lights in a different module, to ensure module diversity in case of fault.

Connections:

INPUTS/OUTPUTS

XP4.1 ... XP4.7 Reserved

XP4.8 Main/Emergency power line

XP4.9 Reserved

XP4.10 GND

XP20.2 Heart-beat out

AUXILIARY PANEL OM-321A

XP15.1 LED panel lamp test

XP15.2 LED panel dim +

XP15.3 LED panel dim -

XP15.4 LED panel mute alarm

XP15.5 Learn drained current

XP15.6 Heart-beat in

XP15.7, XP15.8 Reserved

XP15.9 On/off nav light 1

...

XP15.15 On/off nav light 7

XP15.16 Reserved

XP15.17 LED panel bulb failure nav light 1

..

XP15.23 LED panel bulb failure nav light 7

XP15.24 Main/Emergency power failure

XP15.25 LED panel status nav light 1

...

XP15.31 LED panel status nav light 7

XP15.32 LED panel alarm buzzer

XP15.34 GND

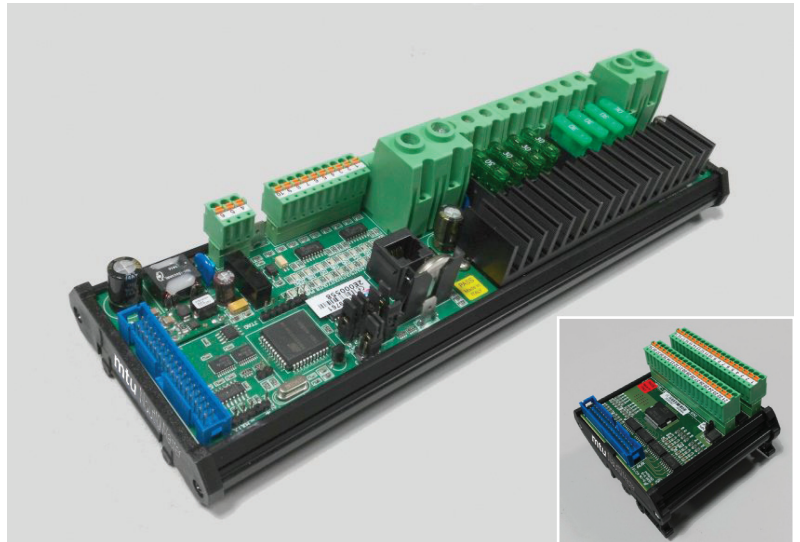
mtu NautIQ Master Essential

OM-320B-DM01

V.2018

The **OM-320B-DM01 module** is the ideal solution for monitoring, control and dimming of any 24V lighting source.

The module features 8 channels, each of them can switch on/off and dim any PWM-dimmable light, both traditional and LED type. Non-dimmable lights can be controlled in on/off mode. Each channel can output up to 16A, can be programmed either in on/off or dimmer mode, is electronically protected with current limitation and overheating protection, and features a built-in fuse for additional safety. The module can drive an external fan for ventilating the heat sink, and in case of overheating would derate the current output in order to reduce the heating, before shutting down in case of critical temperature.



The module can operate in stand-alone mode - when the monitoring system is not present or switched off - or integrated with the monitoring system; in this case, the module ensures, for each channel, the complete control of command and feedback signals as well as the measurement of the drained current. In both operating modes the module can be controlled locally through pushbuttons.

The OM-321C optional slave module offers 32 additional I/O channels: 8 digital inputs are available for programmable scenario pushbuttons, 8 digital outputs can be used as feedbacks for the wall-mounted switch plates, and further 8 digital inputs and 8 digital outputs can be used to drive up to 4 motorized blinds or curtains, with automatic interlock and selection between momentary, step-relay or time delay. Such channels can be even used to drive different devices, like the cabin extractors.

Like all **mtu** NautIQ Master automation components, this module features extended temperature range components (-20 to +85 °C) and Type Approval certification.

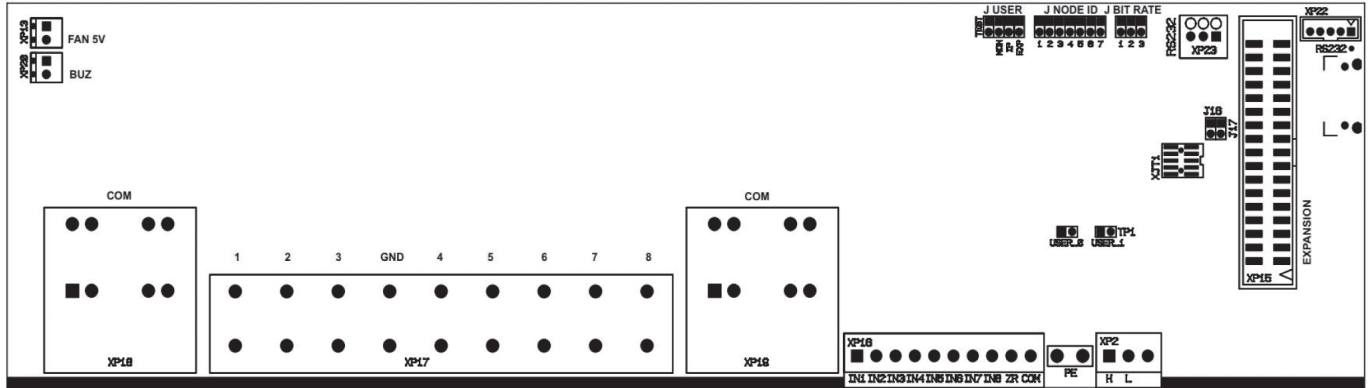
Technical Data

- 144MHz ARM7 Cortex M4 CPU
- Full CAN 2.0A and B interfaces, CANOpen protocol
- RS232 interface
- 2Kbyte EEPROM memory
- 64kB FRAM memory
- 2MB FLASH memory
- 0.2A 24VDC (18÷32VDC) power supply
- 8 PNP 24V 20A outputs
- 8 NPN/PNP optoisolated inputs for wall switches
- Operating temperature: -20...+85 °C
- Size: 270×75×80
- EN50022 DIN bar mounting
- IDC 34-pole connector for slave board
- Safety fuses

OM-321C SLAVE MODULE

- 8 NPN/PNP optoisolated inputs for wall switches
 - 8 PNP 24V 500mA outputs for feedbacks
 - 8 NPN/PNP optoisolated inputs for curtains
 - 8 PNP 24V 500mA outputs for curtains
 - Operating temperature: -20...+85 °C
 - Size: 77×75×80
 - EN50022 DIN bar mounting
 - IDC 34-pole connector for master board
 - Certifications: CE, UKCA, EU RO MR Type Approval
-

Layout:



Jumpers:

J Node Id (Nid) CANopen Address 1 ... 127

7	6	5	4	3	2	1	Nid
OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	1
OPEN	OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	1
OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	OPEN	2
OPEN	OPEN	OPEN	OPEN	OPEN	CLOSED	CLOSED	3
OPEN	OPEN	OPEN	OPEN	CLOSED	OPEN	OPEN	4
.....							
CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	OPEN	126
CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	CLOSED	127

Connections:

POWER SUPPLY

XP6.1, 6.2 +24VDC (*)

XP6.3, 6.4 +24VDC (*)

XP5.5 GND (**)

(*) The conductors size shall be suitable for the overall current drained by the sum of the 8 output channels, max. 128A

(**) For supplying the electronic section and allow de-energizing the inductive loads. Use at least 1.5 mm² conductor. The negative wires from the loads shall be connected in separate terminal blocks.

CAN BUS CONNECTION

XP2.4 CANH

XP2.5 CANL

XP2.6 REF

POWER OUTPUTS

XP5.1...XP5.4 Light circuits 1...4 (24VDC max.20A)

XP5.6...XP5.8 Light circuits 5...8 (24VDC max.20A)

INPUTS

XP4.1 ... XP4.8 Wall switches for circuits 1..8 (***)

XP4.9 Reserved

XP4.10 REF (****)

(***) 24VDC photocoupled inputs, drained current < 10mA

(****) Connect to +24VDC for NPN inputs, connect to GND for PNP inputs.

Connections:

OM-321C SLAVE MODULE

XP4.1 +24VDC

XP4.2 +24VDC

XP4.3 GND

XP4.4..XP4.11 Scenario 1..8 wall switches (°)

XP4.12..XP4.19 Light circuit 1..8 feedbacks (°°)

XP5.21 +24VDC

XP5.22 +24VDC

XP5.23 GND

XP5.24..XP5.31 Curtains 1..4 up/down wall switches (°)

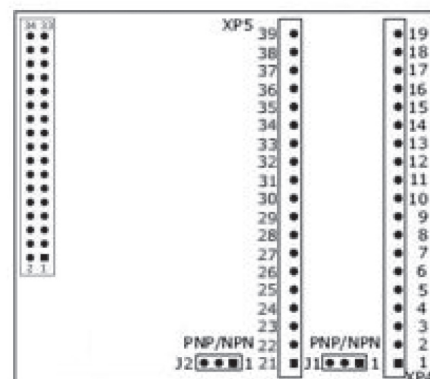
XP5.32..XP5.39 Curtains 1..4 up/down relay activation (°°)

(°) 24VDC photocoupled inputs, drained current < 10mA.

NPN/PNP selectable by means of the jumper onboard

(°°) +24VDC, 500mA max output

Curtains channels can be programmed as momentary, step-relay or time delayed. Each couple of channels is interlocked (with automatic stop) for curtains, or can be set as two independent channels for single loads driving.



mtu NautIQ Master Essential

OM-430B

The **OM-430B module** is a powerful CPU designed to grant - besides a high computing power - unparalleled efficiency in managing several different communication protocols at a time, thanks to the wide range of communications peripherals onboard.

Featuring two CAN bus ports, two Ethernet ports, twice as much the memory offered by the previous models (OM-420B and OM-410B, now obsolete) and up to four serial ports, this module can interface with a standard operator panel or a PC-based network via ModBus/TCP protocol, handling at the same time a number of remote

I/O nodes connected through one or two fieldbus: these characteristics make the design of advanced supervision and control architectures easy, without the need of PC-based systems, thus bringing significant assets in terms of reliability and system management. Like all **mtu NautIQ Master** automation components, this module has been specifically designed for the marine environment: the use of extended temperature range components (-20 to +85 °C) and Type Approval certification make it an invaluable element for a modern marine automation system.

The original **EasyMap™** software supplied with the module was developed to allow for rapid development of supervision and control applications based on the **mtu NautIQ Master** automation remote I/O modules. Just connect the I/O modules required to the CAN network, add the OM-430B CPU, and a wide range of data will be instantly available at the Ethernet port of the CPU, ready to be used. In particular, the **EasyMap™** software supports the following functions:

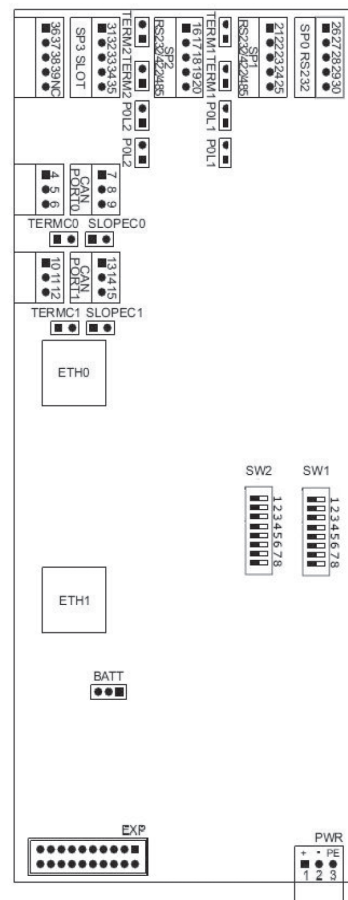
- Advanced diagnostics of the CAN bus network and all modules connected
- Straight ModBus address mapping of all I/O channels from the CAN network
- Linear functions (like $y = a/b * x + c$) applied to the values read from each channel
- Non-linear functions (like $y = f(x)$) applied to the values read from each channel, through interpolation from discrete tables
- Straight ModBus address mapping of I/O channels from serial protocols
- Wide range of serial protocols to handle audio/video devices, engines, multimeters, NMEA0183 instruments, lights, etc.
- Wide library of algorithms working on I/O channels and internal variables
- Programmable alarm handling, with SMS/GSM remote notification
- Dry contact output for network/CPU fault notification (OM-400C serial module required)
- J1939 protocol supported on the second CAN port
- Compatible with any CAN-based protocol



Technical Data

- DSTni-EX 120MHz microprocessor, x86 compatible
24-bits address space
- 2 ETHERNET 10/100 Mbps ports
- 2 full CAN 2.0A and 2.0B interfaces, CANOpen protocol
- 1 RS232 serial port
- 2 RS232/RS422/RS485 serial ports
- 1 expansion slot for an additional RS-232 or RS485 port (OM-400A/OM-400B)
- RAM volatile memory 4MB
- RAM back-up memory 2MB
- FLASH parallel memory 4MB
- EEPROM serial memory 1KB x 2
- 24VDC (18÷32VDC) 1A power supply
- Watch-Dog
- Real-time clock with calendar
- Operating temperature: -20...85 °C
- Humidity: UR 85% (non-condensing)
- Size: 195×88×56 mm
- EN50022 DIN bar mounting
- EasyMaptm software supplied
- Available protocols: please contact us for further information
- Built-in web server
- Dry contact for fault notification (OM-400C module required)
- Certifications: CE, UKCA, EU RO MR Type Approval

Layout:



Connections:

POWER SUPPLY CONNECTION

XP1.1 +24VDC
XP1.2 GND
XP1.3 GROUND (PE)

CAN BUS CONNECTION

CAN 0 (main)	CAN 1 (aux)
XPC0.4 CANH	XPC1.10 CANH
XPC0.5 CANL	XPC1.11 CANL
XPC0.6 REF	XPC1.12 REF
XPC0.7 CANH	XPC1.13 CANH
XPC0.8 CANL	XPC1.14 CANL
XPC0.9 REF	XPC1.15 REF

Jumpers and dip-switches:

TERMC0 CAN 0 network terminator
TERMC1 CAN 1 network terminator
PL1 RS422 polarization for SP1 port
PL2 RS422 polarization for SP2 port
TERM1 RS485/422 termination for SP1 port
TERM2 RS485/422 termination for SP1 port
BATT 1-2 backup battery enabled

SW1/SW2 Always set SW1.6=OFF + SW1.7=ON + SW1.8=ON for 250Kbps baud rate.

Other switches might require proper setting depending on the application. Please contact us for further details.

SERIAL PORTS CONNECTION

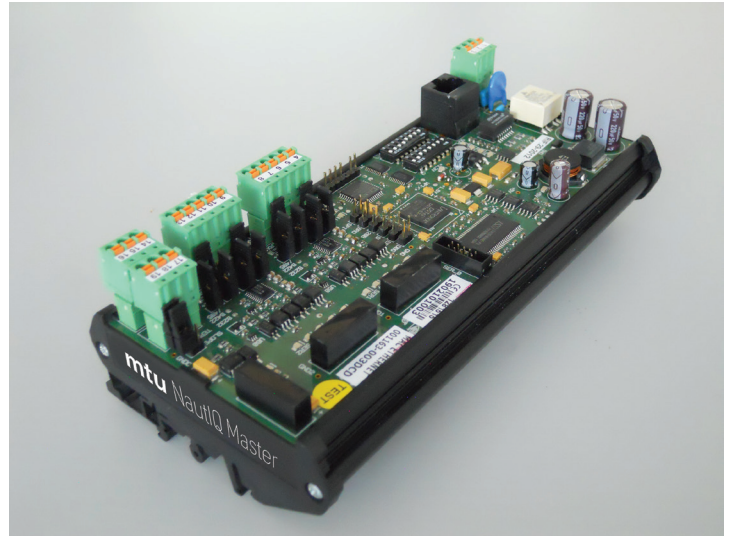
SP0	RS-232	SP3	RS-232	RS-485	RS-422
XSP0.26	TX	XSP3.31	—	—	—
XSP0.27	RTS	XSP3.32	RX	—	—
XSP0.28	GND	XSP3.33	TX	DATA +	TX+
XSP0.29	CTS	XSP3.34	DTR	—	RX+
XSP0.30	RX	XSP3.35	GND	GND	GND
		XSP3.36	—	—	—
		XSP3.37	RTS	—	—
		XSP3.38	CTS	DATA -	TX-
		XSP3.39	—	—	RX-
SP1/SP2	RS-232	RS-485	RS-422		
XSP1.21/XSP2.16	TX	DATA -	TX -		
XSP1.22/XSP2.17	RTS	DATA +	TX +		
XSP1.23/XSP2.18	GND	GND	GND		
XSP1.24/XSP2.19	CTS	—	RX -		
XSP1.25/XSP2.20	RX	—	RX+		

mtu NautIQ Master Essential

OM-405B

The OM-405B module is a serial-CANbus bridge based on a powerful CPU designed to manage different communication protocols at a time.

Featuring one CAN bus ports, one Ethernet port and two multi-standard serial ports, this module runs and processes any serial protocol locally, and then send the processed data to the main CPU unit. This way, the computing load is distributed among the different units present in the system, thus reducing the workload of the main CPU. Data can even be accessed through the Ethernet port in Modbus/TCP mode.



Like all **mtu** NautIQ Master automation components, this module has been specifically designed for the marine environment: the use of extended temperature range components (-20 to +85 °C) and Type Approval certification make it an invaluable element for a modern marine automation system.

Technical Data

- DSTni-EX 120MHz microprocessor, x86 compatible, 24-bits address space
 - 1 ETHERNET 10/100 Mbps port
 - 1 full CAN 2.0A and 2.0B interface, CANOpen protocol
 - 2 RS232/RS422/RS485 serial ports
 - RAM volatile memory 2MB
 - FLASH parallel memory 2MB
 - EEPROM serial memory 1KB x 2
 - 24VDC (18÷32VDC) 1A power supply
 - Watch-Dog
 - Operating temperature: -20...85 °C
 - Size: 195×80×50 mm
 - Available protocols: please contact us for further information
 - Certifications: CE, UKCA, EU RO MR Type Approval
-

Connections:

POWER SUPPLY CONNECTION

XP1.1 +24VDC
XP1.2 GND
XP1.3 GROUND (PE)

CAN BUS CONNECTION

XPC2.14 CANH
XPC2.15 CANL
XPC2.16 REF
XPC2.17 CANH
XPC2.18 CANL
XPC2.19 REF

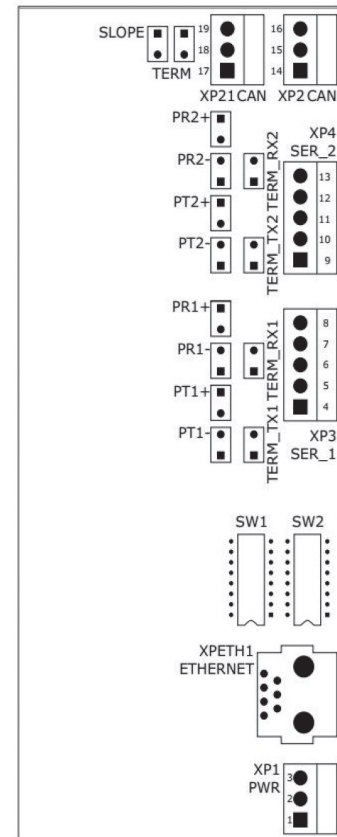
SERIAL PORTS CONNECTION

SP1/SP2	RS-232	RS-485	RS-422
XSP1.4/XSP2.9	TX	DATA -	TX -
XSP1.5/XSP2.10	RTS	DATA +	TX +
XSP1.6/XSP2.11	GND	GND	GND
XSP1.7/XSP2.12	CTS	—	RX -
XSP1.8/XSP2.13	RX	—	RX+

Jumpers and dip-switches:

TERM CAN network terminator
PR1 RS485/422 polarization for SP1 port
PR2 RS485/422 polarization for SP2 port
TERMTX1 RS485/422 termination for SP1 port
TERMRX1 RS485/422 termination for SP1 port
TERMTX2 RS485/422 termination for SP1 port
TERMRX2 RS485/422 termination for SP1 port
SW1/SW2 Always set SW1.6=OFF + SW1.7=ON + SW1.8=ON
for 250Kbps baud rate. Other switches might require proper
setting depending on the application. Please contact us for further details.

Layout:



mtu NautIQ Master Essential

OM-961M **OM-961S**

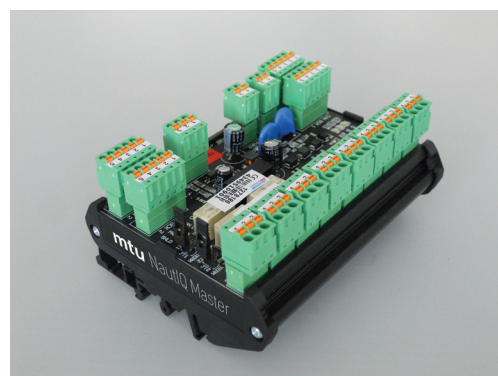
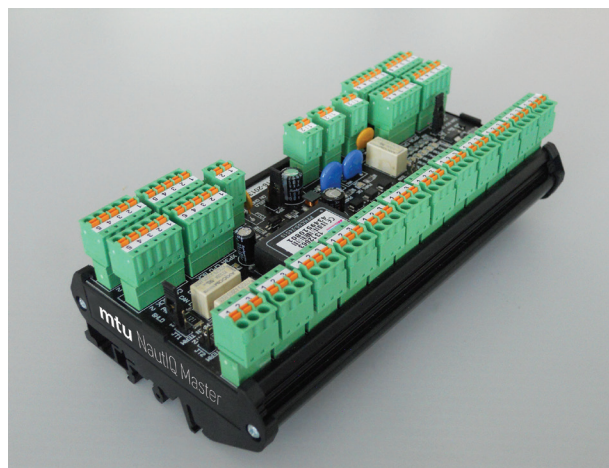
The **OM-961M/OM-961S modules** are two modules designed to offer a complete redundant solution for the **mtu** NautIQ Master automation systems.

The OM-961M module is the master unit: once connected to a couple of OM-430B controllers and to the double CANbus network, it handles the switchover between master and backup controller, as well as primary and backup CANbus paths.

The OM-961S module is a slave unit, and it is used to handle the switchover between primary and secondary CANbus paths at board or switchboard level.

Both modules feature fail-to-safe design, redundant power supply and a number of I/O lines used for diagnostic purpose.

Like all **mtu** NautIQ Master automation components, these modules have been specifically designed for the marine environment: the use of extended temperature range components (-20 to +85 °C) and Type Approval certification make them an invaluable element for a modern marine automation system.



Technical Data

- Master unit: up to 12 CANbus slots, 4 connectors for redundant CANbus network.
 - Slave unit: up to 8 CANbus slots, 4 connectors for redundant CANbus network.
 - Master unit: full interface with 2 OM-430B controllers, easy wiring (same connectors, same pinout)
 - Dual power supply
 - CANbus terminators onboard
 - Test jumpers for easy debug and test
 - LED diagnostics onboard
 - I/O diagnostics
 - Operating temperature: -20...85 °C
 - Size: 170×80×50 mm (master unit), 113×80×50 mm (slave unit)
 - Certifications: CE, UKCA, EU RO MR Type Approval
-

Connections:

POWER SUPPLY (PWR1/2, PWR CPU MAIN, PWR CPU BCK)

- 1 +24VDC (main)
- 2 GND

CAN BUS SLOTS (CAN1..CAN12)

- 1 CANH
- 2 CANL
- 3 CAN GND

CAN BUS TRUNKS (CAN MAIN 1/2, CAN BCK 1/2)

- 1 CANH
- 2 CANL
- 3 CAN GND
- 4 CAN PWR
- 5 SHIELD

CPU INTERFACE (XP3A/B CPU MAIN, XP3A/B CPU BCK) (*)

XP3A pin-to-pin wiring to XP3A on OM-430B

XP3B pin-to-pin wiring to XP3B on OM-430B

(*) OM-400C piggyback module required on both main and backup CPU

Jumpers and dip-switches:

CPU MAIN OFF: for debug only, forces switchover to backup CPU

CAN BCK ON: for debug only, forces switchover to backup network

MAIN TERM: set termination resistor on main trunk

BCK TERM: set termination resistor on backup trunk

Connections:

POWER SUPPLY (PWR1/2)

- 1 +24VDC (main)
- 2 GND

CAN BUS SLOTS (CAN1..CAN12)

- 1 CANH
- 2 CANL
- 3 CAN GND

CAN BUS TRUNKS (CAN MAIN 1/2, CAN BCK 1/2)

- 1 CANH
- 2 CANL
- 3 CAN GND
- 4 CAN PWR
- 5 SHIELD

STATUS

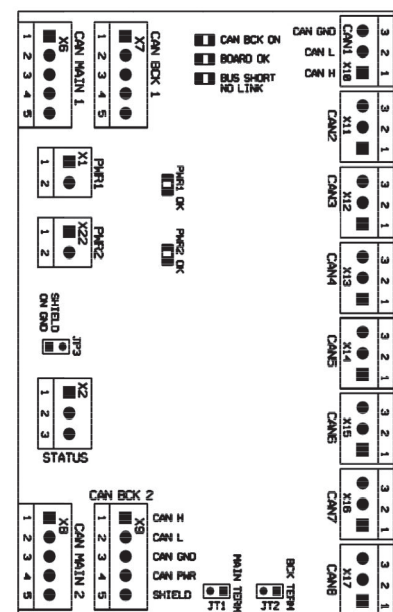
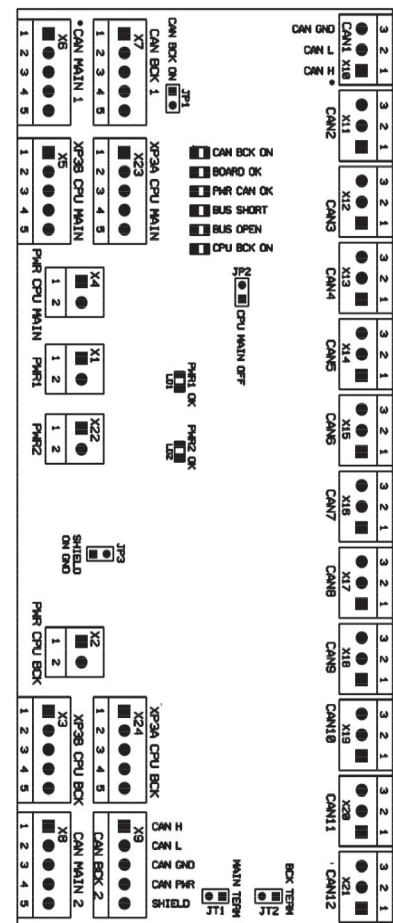
- 1 Bus short/no link error feedback (dry contact)
- 2 Board ok feedback (dry contact)
- 3 Common reference

Jumpers and dip-switches:

MAIN TERM: set termination resistor on main trunk

BCK TERM: set termination resistor on backup trunk

Layout:



Touch-screen displays

Like all **mtu** NautIQ Master automation components, our touch-screen displays, PCs and panel PCs have been specifically designed for the marine environment.

Ranging from the smaller 7" to the large 24" and 32" sizes, they are carefully selected among the products manufactured by the most important companies in this field.

Reliability, design and robustness are the key points of these products which - together with the functional specifications designed for the marine market and the marine type approvals (ABS, LRS, RINA, DNV depending on the models) - make them the ideal solution to complete our monitoring systems.
