



Motor Control and Protection Unit M10x AO Module User Guide

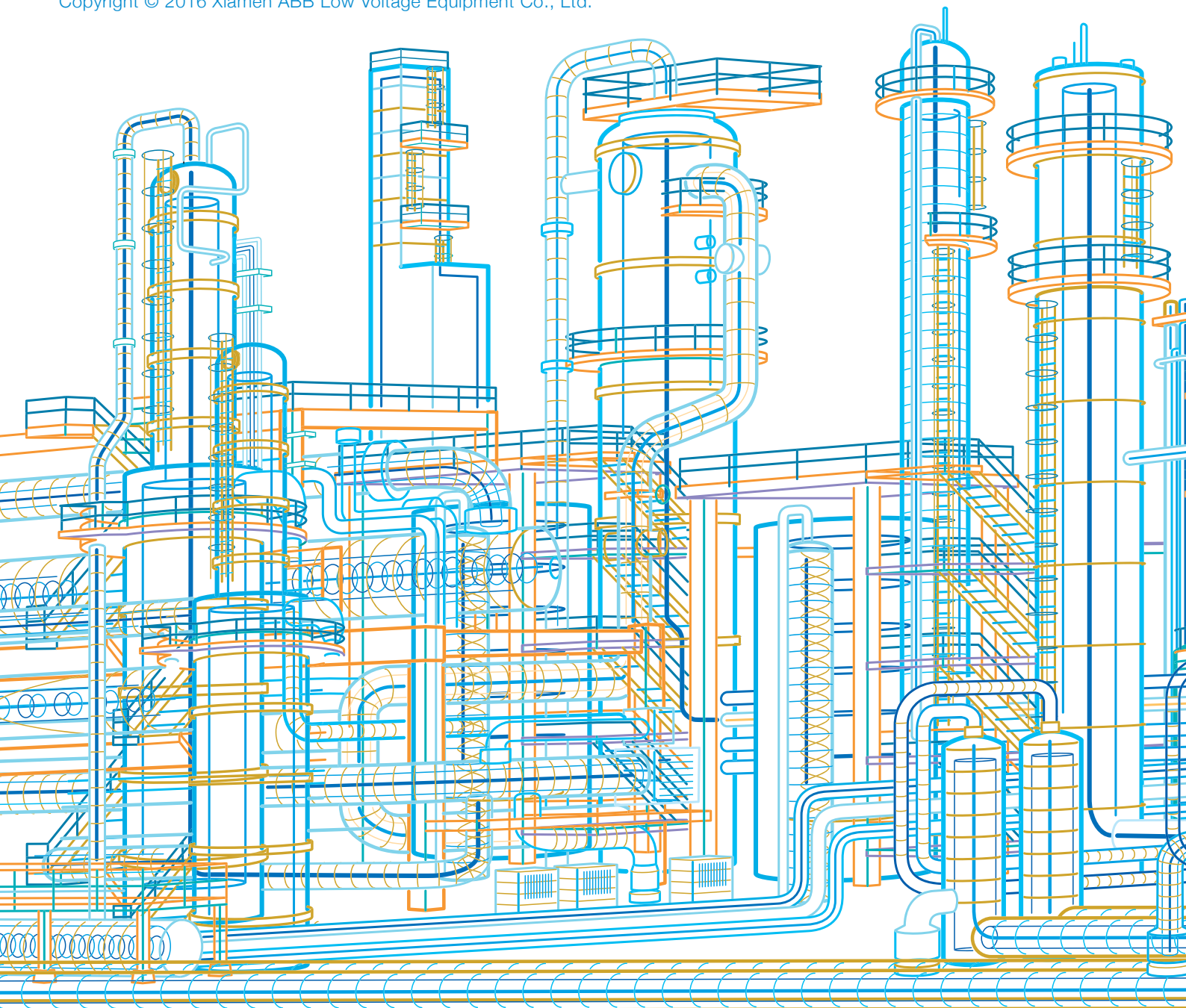
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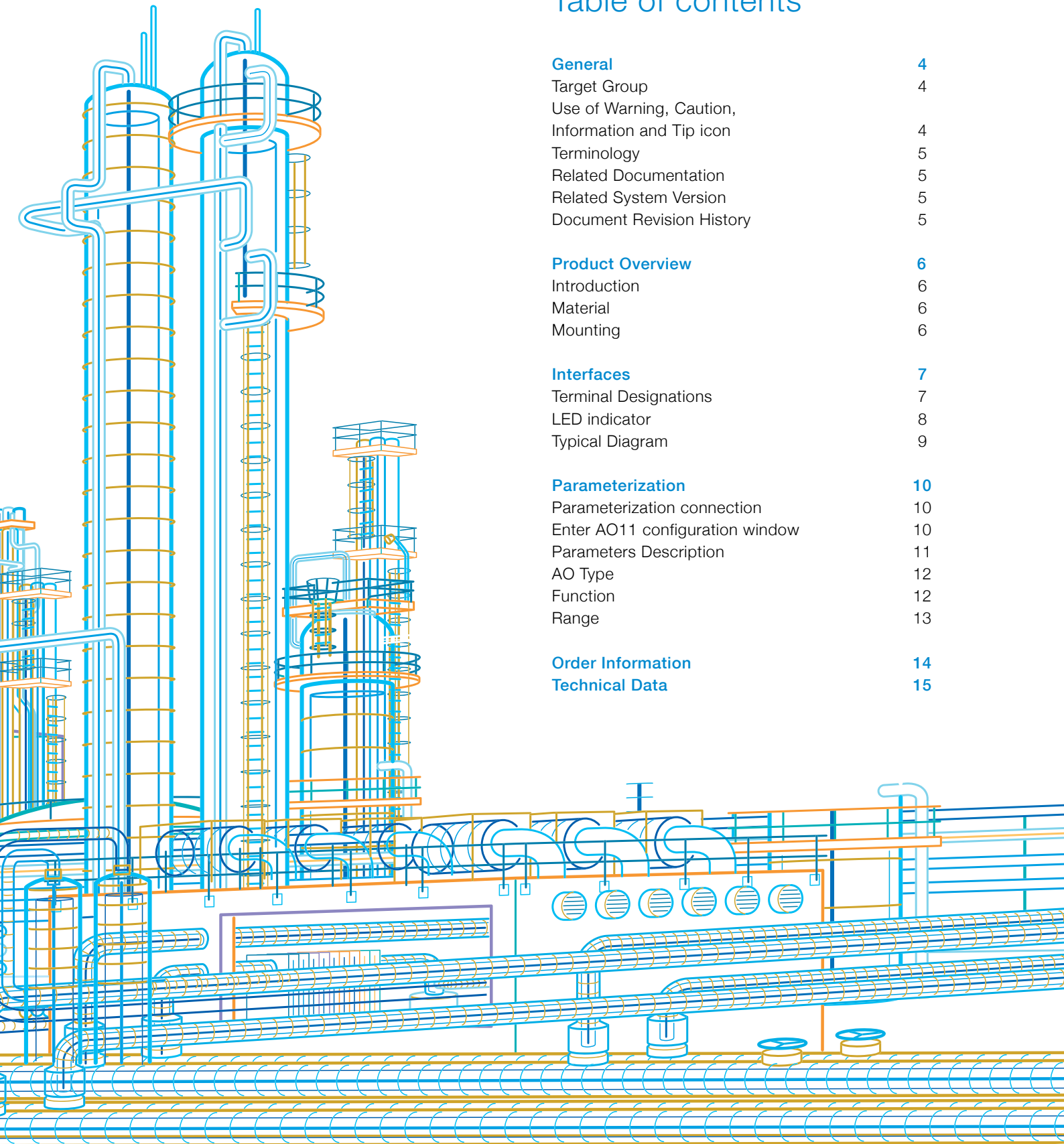


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General

Target Group






The manual is primarily intended for those requiring information on the applications of AO11, analog output module, for the purpose of understanding, engineering, wiring & operating the product.

The objective of this manual is to provide the technical functions description of AO11. This manual should be studied carefully before installing, parameterizing or operating the motor control unit. It is assumed that the user has a basic knowledge of physical and electrical fundamentals, electrical wiring practices and electrical components.

This document should be used along with M10x User Guide, which provides detailed information about parameters and their applications.

Use of Warning, Caution, Information and Tip icon

This publication includes Warning, Caution, and Information icons where appropriate to point out safety related or other important information. It also includes Tip icons to point out useful hints to the reader. The corresponding symbols should be interpreted as follows:

	The electrical warning icon indicates the presence of a hazard that could result in electrical shock.
	The warning icon indicates the presence of a hazard that could result in personal injury.
	The caution icon indicates important information or warnings related to the concept discussed in the text. It might indicate the presence of hazard that could result on corruption of software or damage to equipment/property.
	The information icon alerts the reader to pertinent facts and conditions.
	The tip icon indicates advice on, for example, how to design your project or how to use a certain function

Although Warning notices are related to personal injury, and Caution notices are associated with equipment or property damage, it should be understood that the operation of damaged equipment could, under certain operational conditions, result in impaired process performance leading to personal injury or death. It is, therefore, imperative that you comply fully with all Warning and Caution notices.

Terminology

List of the terms, acronyms, abbreviations and definitions that are used in this document.

Abbreviation	Term	Description
PTC	Positive Temperature Coefficient	PTC thermistors are semiconductor elements with a very high positive temperature coefficient.
AO module	Analogue Output module	It is the device that provide analogue signal output, for example 4-20mA signal output.

Related Documentation

- 1TNC 911112 M10x User's Guide
- 1TNC 911105 M10x Parameter Description
- 1TNC 911104 MCU Setup User's Guide
- 1TNC 920205 AO11 Installation Instructions

Related System Version

The content of this document is related to M10x products with the following hardware and firmware version releases:

	HW	FW
M10x-M 24VDC	2.0	3.2
M10x-M 110VAC	1.0	3.2
M10x-M 240VAC	1.0	3.2
M10x-P 24VDC	3.2	5.1
M10x-P 110VAC	1.0	5.1
M10x-P 240VAC	5.2	5.1
MD21	1.0	1.2
MD31	1.0	1.2
AO11 24VDC	1.0	1.0
AO11 110~240VAC	1.0	1.0

Until further notice, this document is also applicable for future firmware versions other than those listed above.

The described functions are designed but may not be fully implemented in all details. Please refer to the release notes regarding possible restrictions.

Document Revision History

Revision	Page(s)	Description of change	Date
D0201		Initial Edition	07/2015
D0202	5, 14	Corrections on revision & ordering code	09/2016

Product Overview

Introduction

M10x device provides analogue output (AO) function through add-on module AO11. AO11 module is to be used along with M10x main unit and can not be used alone. The configuration of AO11 is supported by software MCUSetup 5.3 and further versions.

AO11 provides one channel current loop output, 0-20mA or 4-20mA selectable. The signals which can be configured through AO module are listed in parameters description section in this document.

AO11 requires external power supply. Differentiated from the power supply, there are two types of AO11 module available, i.e. 24VDC type and 110-240VAC type.

Material

The enclosure of the AO11 is made of polycarbonate. Flammability rating of the material is UL 94 V-0 and material is halogen free.

Color of the enclosure is RAL 7012.

Mounting

Basic dimension of AO11

W X H X D=27mm X 86mm X 80mm

Typical Installation of AO11

Vertical DIN rail mounting on horizontal plate.



Figure 1: View of AO11

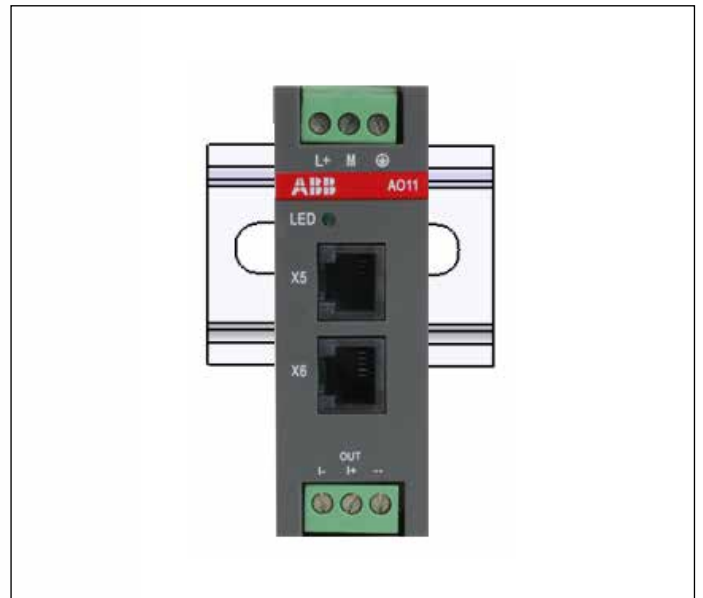


Figure 2: AO11 DIN rail mounting

Interfaces

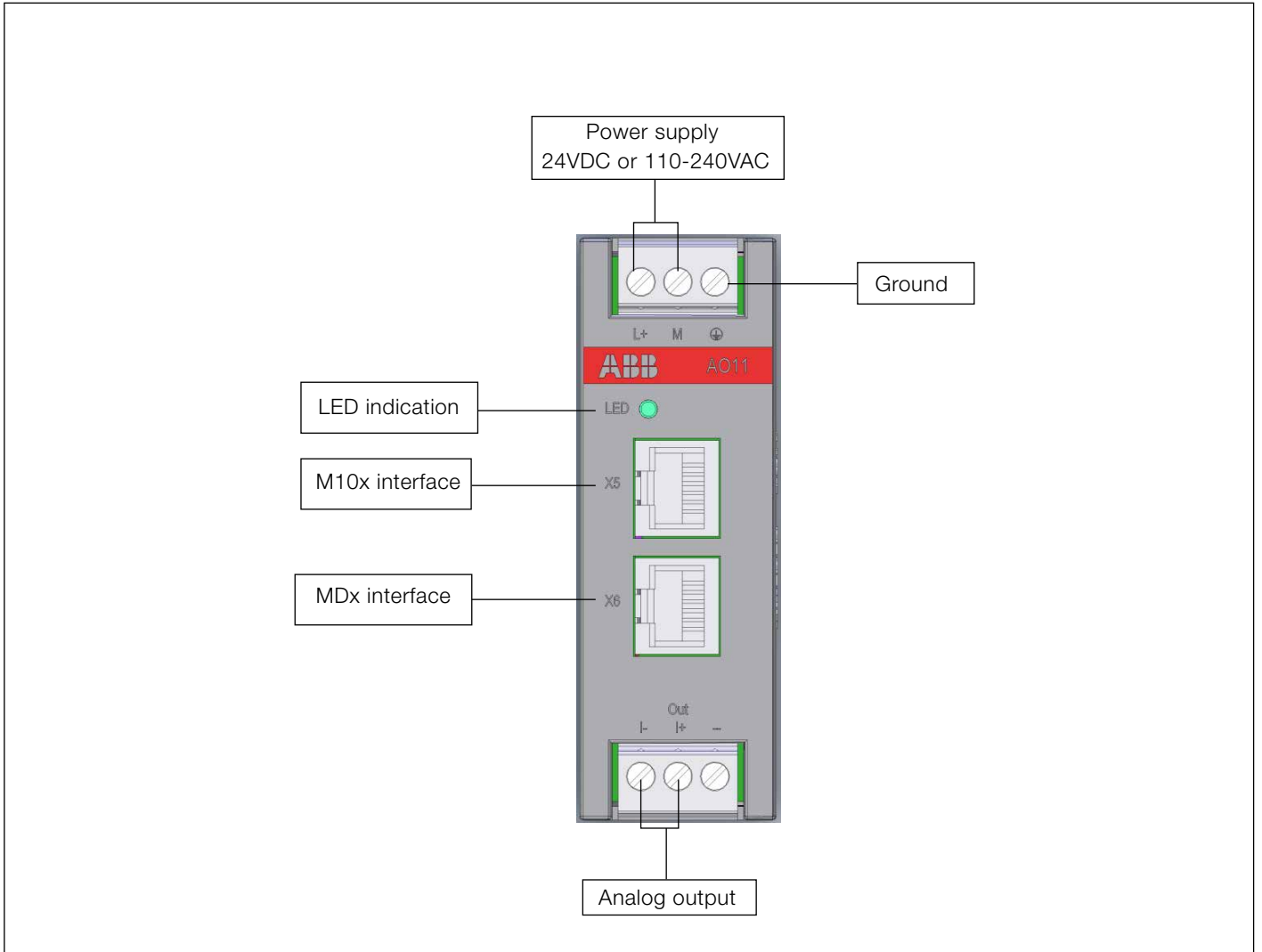


Figure 3: Top View Terminal Layout

As shown in fig 4, AO11 connects to the main M10x unit and MDx via two RJ11 interfaces (RS485 ports).

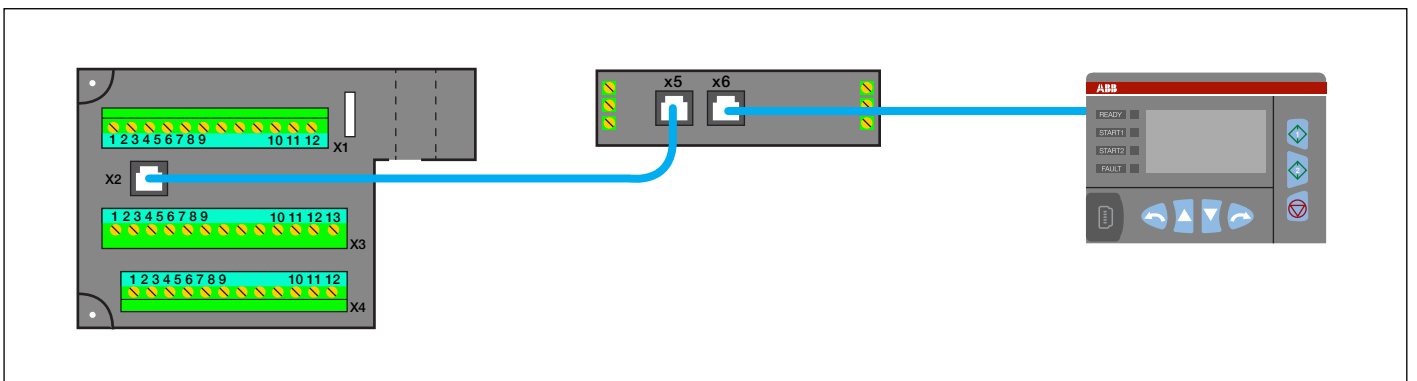



Figure 4: AO11 connect to M10x and MDx

Terminal Designations

Terminal Number		Designation	Description	Remark	
110~240VAC Type	L	L	110~240VAC	Cross section 2.5mm2*	
	N	N	Neutral		
24VDC Type	L+	24VDC	24VDC+		
	M	GND	0VDC		
		Ground	Ground safety and surge		
I-		AO-	AO negative phase		
I+		AO+	AO positive phase		
--		NC	Reserved		
X5		X5:1-6	Interface for M10x		Cable with RJ11 connector provided
X6		X6:1-6	Interface for MDx		

* Shielded cable is recommended for AO output connections.

LED indicator

There is one set of LED indicator in AO11. It is used to indicate the communication state of AO11, the following table is the LED message definition.

LED status	Explanation
Flashing	AO11 is not receiving valid data from M10x
On	Running state
Off	Abnormal state



The power supply for LED is from X5.
MDx must be connected while AO11 is working

Typical Diagram

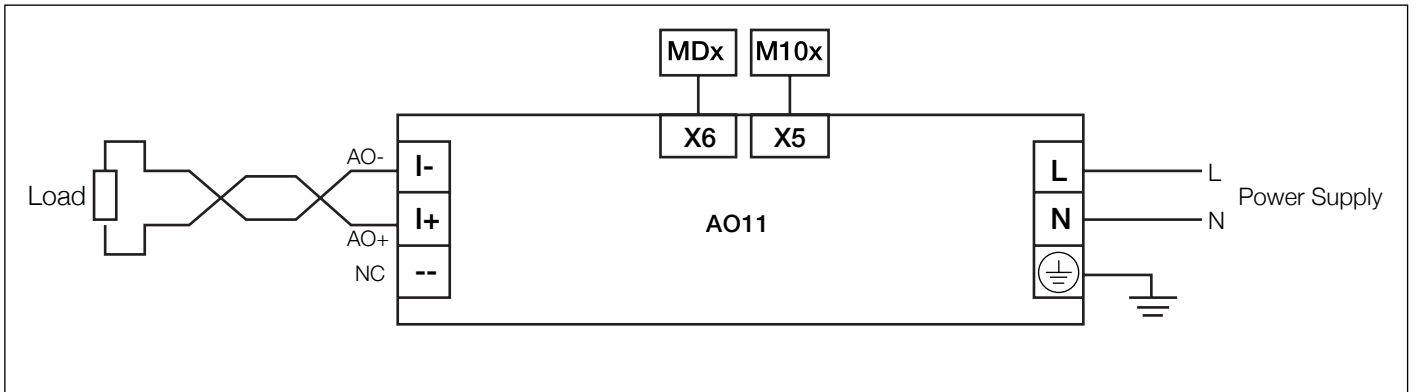


Figure 5 Typical wiring diagram (110~240VAC)

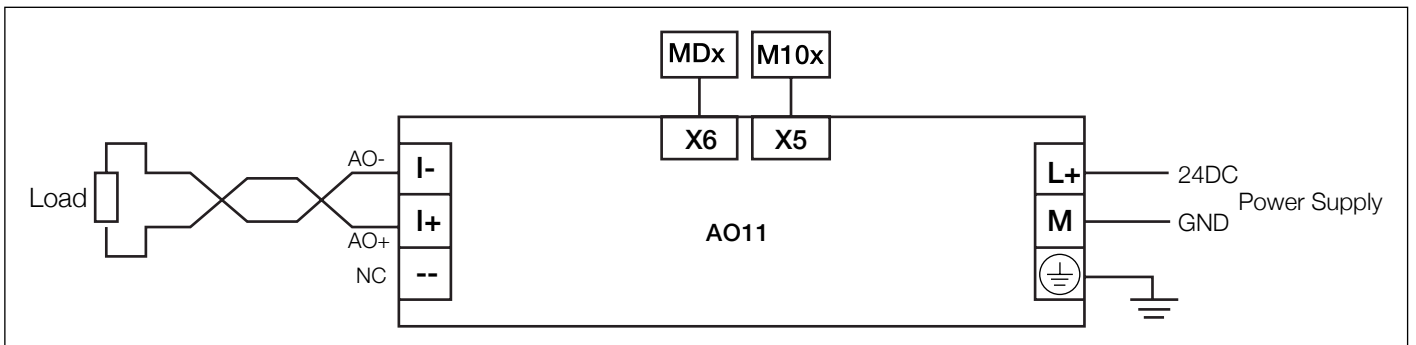


Figure 6: Typical wiring diagram (24VDC)

! Pay attention to the type of power supply of AO11 or the module may be damaged.

Parameterization

Parameterization connection

The parameters of AO11 can be configured by MCU Setup. Via mini USB-Pin physical interface on MDx, users can connect AO11 to a computer with MCU Setup software and run it to complete the parameters setting.

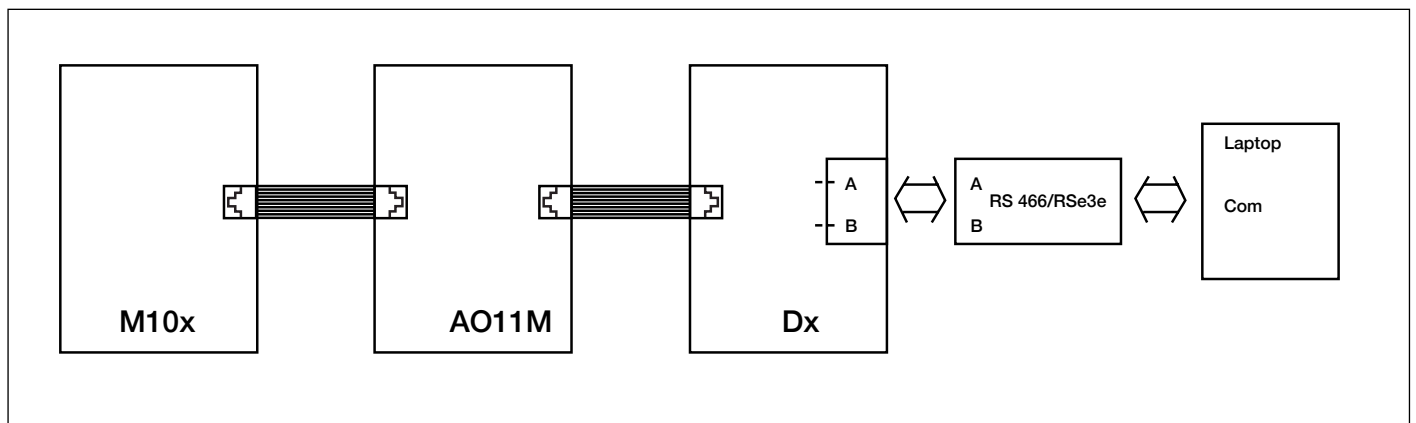
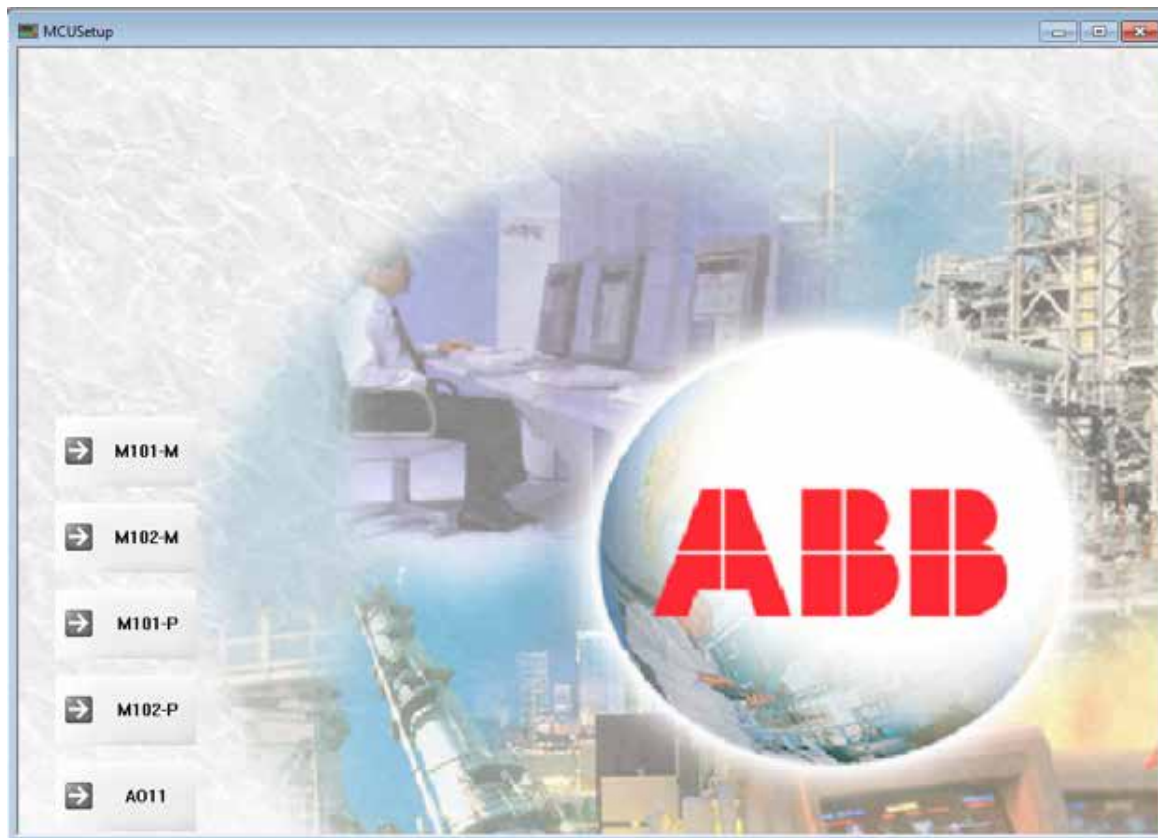


Figure 7: Parameterization connection

Enter AO11 configuration window

After login, MCUSetup's main screen is displayed:



Select AO11 to enter AO11 module configuration window:

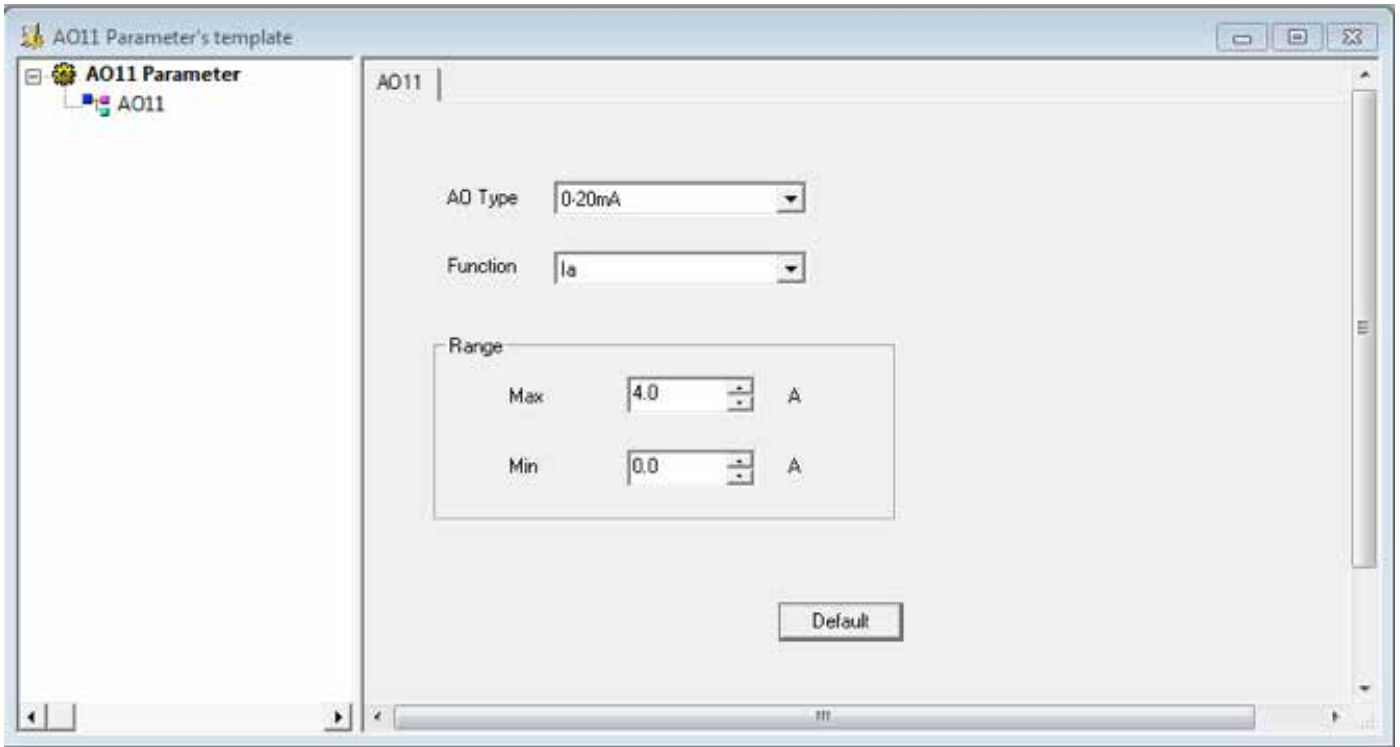


Figure 9: AO module configuration window



For more information on how to enter and use MCUSetup, please refer to separate document “MCUSetup User Guide”.

Parameters Description

AO11 has only one analog output. This analog output could be configured with functions, range and AO type.

Parameters involved in AO11 are as below:

- AO Type
- Function
- Range

AO Type

Function : AO11 Module
 Range : 0-20mA; 4-20mA
 Default setting : 0-20mA
 Related parameter : AO11 Module / Function
 Description : The parameter defines the type of analog output signal.

Function

Function : AO11 Module
 Range : Ia, Ib, Ic, Thermal, Ua, Ub, Uc, Uab, Ubc, Uca, Frequency, I0, PF%, P, PTC value, Current Phase Unbalance
 Default setting : Ia
 Related parameter : AO11 Type
 Description :

Users are free to configure any parameter as shown in the table below to be converted into analog output.

Parameter	M101	M102
Phase L1 Current (Ia)	▪	▪
Phase L2 Current (Ib)	▪	▪
Phase L3 Current (Ic)	▪	▪
Thermal Capacity	▪	▪
Phase L1-N Voltage (Ua)		▪
Phase L2-N Voltage (Ub)		▪
Phase L3-N Voltage (Uc)		▪
Phase L1-L2 Voltage (Uab)		▪
Phase L2-L3 Voltage (Ubc)		▪
Phase L1-L3 Voltage (Uca)		▪
Frequency		▪
Earth Fault Current (I0)	▪	▪
Power Factor (PF%)		▪
Power (P)		▪
PTC value		▪
Current Phase Unbalance	▪	▪

Table 1 Function

Range

Function : AO11 Module

Range : MIN, MAX

Default setting : -

Related parameter : Function

Description :

The parameter defines the MIN and MAX value of selected parameter. The MIN and MAX value should be in the scope of setting range and step as shown in Table 2

Parameter	Setting Range	Setting Step
Ia	0.00-1.0A	0.01A
	1.0-6300.0A	0.1A
Ib	0.00-1.0A	0.01A
	1.0-6300.0A	0.1A
Ic	0.00-1.0A	0.01A
	1.0-6300.0A	0.1A
Thermal Capacity	0%-255%	1%
Ua	0-400V	1V
Ub	0-400V	1V
Uc	0-400V	1V
Uab	0-690V	1V
Ubc	0-690V	1V
Uca	0-690V	1V
Frequency	47-53Hz, 57-63Hz	0.01Hz
I ₀	0-15000mA	100mA
PF%	0%-100%	1%
P	0.00-1.0KW	0.01 KW
	1.0-1000.00KW	0.1KW
PTC Value	10-10000Ω	1Ω
Current Phase Unbalance	0%-100%	1%

Table 2 Parameter setting range

The parameterization software can run on all of the following PC operation system:
Windows 2000, Windows XP, Win 7 and Win 8.

Order Information

Designation	Description	Identity Number
AO11 24VDC	AO module, 24VDC power supply type; TA204 cable included	1TNA920511R4001
AO11 110~240VAC	AO module, 110~240VAC type: TA204 cable included	1TNA920521R4001
TA204	Connection cable between AO module and M10x	1TNA920005R2106



Technical Data

Power supply	
Rated operational voltage (Ue)	24VDC or 110-240VAC
Voltage operation range	85%-110% Ue
Power consumption	1W max
Rated impulse withstand voltage (Uimp)	4KV (AC type 110~240VAC)
Over voltage category	III

Analogue Output	
Output range	One channel only, 0-20mA or 4-20mA
Accuracy*	±0.5% of full range (20mA)
Max load resistance	500Ω
* This accuracy is NOT include in the measurement error of M10x.	

Degree of protection	
IP20	

Environmental conditions	
Storage	-40~+85°C
Normal operation	-10~+60°C
Humidity	15% up to 95% without dew
Degree of pollution	3
Derating accepted operating altitude	4500m
Without derating operating altitude	2000m
EMC Environment	1) Equipments in the system comply with EMC requirement of CE / CCC certificate. 2) Power supply system complies with IEC61000-2-1, IEC61000-2-2, especially the system in which VSD / Frequency Converters are used.

Standards	
Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements	IEC61326-1

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Publication No. 1TNC920204D0202

