



ibaMS32xDO-24V

Output module for digital signals

Manual

Issue 2.0

Measurement Systems for Industry and Energy

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Certification

The product is certified according to the European standards and directives. This product meets the general safety and health requirements.

Further international customary standards and directives have been observed.



Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Issue	Date	Revision	Chapter	Author	Version HW / FW
2.0	08-2023	Scope of delivery, ibaPDA GUI			

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1 About this manual

In this manual, you learn a lot about the design of the ibaMS32xDO-24V module and how to use and operate it. You can find a general description of the iba-modular system and further information about the design of the central units and how to use and operate them in separate manuals.



Note

The documentation for the iba-modular system is part of the data medium “iba Software & Manuals”. The documentation is also available at www.iba-ag.com in the download area.

The documentation of the iba-modular system comprises the following manuals:

❑ Central units

The manuals of the ibaPADU-S-IT-2x16 central units and ibaPADU-S-CM contain the following information:

- Scope of delivery
- System requirements
- Description of the device
- Mounting/Demounting
- Start-up
- Configuration
- Technical data
- Accessories

❑ Modules

The manuals for the single modules contain specific information about the module. There are the following information classes:

- Short description
- Scope of delivery
- Product characteristics
- Configuration
- Description of the functions
- Technical data
- Connection diagram

1.1 Target group

This manual addresses in particular the qualified professionals who are familiar with handling electrical and electronic modules as well as communication and measurement technology. A person is regarded to as professional if he/she is capable of assessing safety and recognizing possible consequences and risks on the basis of his/her specialist training, knowledge and experience and knowledge of the standard regulations.

1.2 Notations

In this manual, the following notations are used:

Action	Notations
Menu command	Menu <i>Logic diagram</i>
Call of menu command	<i>Step 1 – Step 2 – Step 3 – Step x</i> Example: Select menu <i>Logic diagram – Add – New logic diagram</i>
Keys	<Key name> Example: <Alt>; <F1>
Press keys simultaneously	<Key name> + <Key name> Example: <Alt> + <Ctrl>
Buttons	<Button name> Example: <OK>; <Cancel>
File names, Paths	„File name“, „Path“ Example: „Test.doc“

1.3 Used symbols

If safety instructions or other notes are used in this manual, they mean:



⚠ DANGER

The non-observance of this safety information may result in an imminent risk of death or severe injury:

- By an electric shock!
- Due to the improper handling of software products which are coupled to input and output procedures with control function!

If you do not observe the safety instructions regarding the process and the system or machine to be controlled, there is a risk of death or severe injury!



⚠ WARNING

The non-observance of this safety information may result in a potential risk of death or severe injury!



⚠ CAUTION

The non-observance of this safety information may result in a potential risk of injury or material damage!



Note

A note specifies special requirements or actions to be observed.



Tip

Tip or example as a helpful note or insider tip to make the work a little bit easier.



Other documentation

Reference to additional documentation or further reading.

2 Introduction

The ibaMS32xDO-24V module is part of the iba-modular system. The modular concept is based on a backplane with a backplane bus. On this backplane bus, you can plug a central unit and up to 4 input/output modules. The power supply of the module is provided by the backplane bus. The ibaMS32xDO-24V module offers 32 digital outputs.

In brief

- ☐ Additional module for the iba-modular system
- ☐ 32 digital outputs
- ☐ Galvanically isolated groups of 4 signals each
- ☐ Switching frequency up to 40 kHz, freely adjustable
- ☐ Short-circuit limitation
- ☐ Rugged design, easy mounting
- ☐ CE approval

Application fields

- ☐ Power generation and distribution
- ☐ Test benches
- ☐ Compensation systems
- ☐ Condition Monitoring

3 Scope of delivery

After unpacking, check the delivery for completeness and possible damages.

The scope of delivery comprises:

- ☐ ibaMS32xDO-24V device
- ☐ 4 x 12-pin multi-pin connector
- ☐ Data medium "iba Software & Manuals" (only for single delivery)

4 Safety instructions

4.1 Proper use

The device is an electrical apparatus. It is only allowed to use the device for the following applications:

- ☐ Measurement data acquisition
- ☐ Automation of industrial plants
- ☐ Applications with iba products (ibaPDA, ibaLogic etc.)

The device is only to be applied as shown in the Technical Data.

4.2 Special safety instructions

DANGER

Strictly observe the operating voltage range (see Technical Data)!

Never use damaged measuring cables!

Measuring cables must NOT be attached or detached to/from the device under voltage!

WARNING

Modules must NOT be attached or detached to/from the rack under voltage!

Switch off the central unit or disconnect power supply before attaching/detaching the modules.

WARNING

This is a Class A device. This equipment may cause radio interference in residential areas. In this case, the operator will be required to take appropriate measures.



Important note

Do not open the device! Opening the device leads to a loss of warranty!



Note

Clean the device only on the outside with a dry or slightly damp and statically discharged cloth.

5 System Requirements

5.1 Hardware

- ☐ Central unit: ibaPADU-S-IT-2x16 or ibaPADU-S-CM (version 02.10.001 or later)
- ☐ Backplane unit, e. g. ibaPADU-B4S

5.2 Software

- ☐ ibaPDA version 6.34.0 or later
- ☐ ibaLogic-V5 version 5.0.2 or later



Note

The use of ibaLogic-V5 requires the central unit ibaPADU-S-IT-2x16. If the module is used with the predecessor ibaPADU-S-IT-16, only ibaLogic-V4 can be used.

6 Mounting, Connecting, Dismounting

CAUTION

Works on the device must NOT be done when it is under voltage! Always disconnect the central unit from the power supply!



Note

Mount one or more modules on the right next to the central unit (slot X2 to X5 can be freely selected).

6.1 Mounting

1. Disconnect the central unit from the power supply.
2. Remove the cover from the backplane bus, to which the module should be attached.
3. Attach the device to the backplane bus and press it firmly against the backplane.
4. Secure the device with the fixing screws.



Important note

Always screw tight the device and the modules. Otherwise, plugging or unplugging the connectors for the inputs/outputs can cause damage.

6.2 Connecting



Note

The backplane unit and the device must be connected to a protective conductor.

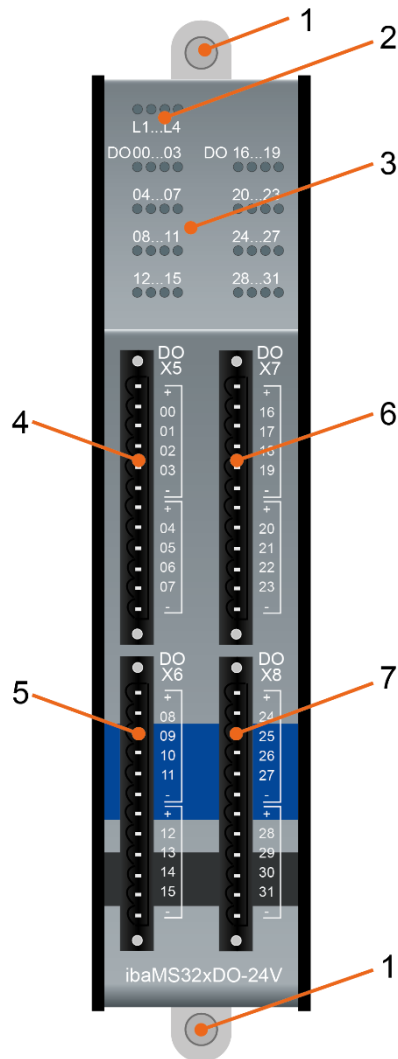
1. Connect all cables.
2. If all required cables are connected, connect the central unit to the power supply.
3. Switch on the central unit.

6.3 Dismounting

1. Disconnect the central unit from the power supply.
2. Remove all cables.
3. Remove the both fixing screws on the upper and the lower side of the device.
4. Pull the device straight from the backplane.
5. Put the cover on the backplane bus.

7 Device description

7.1 View



- 1 Fixing screws
- 2 Operating status indicators L1 to L4
- 3 Status LED of digital outputs 00 to 31
- 4 Connector X5 for digital outputs 00 to 07
- 5 Connector X6 for digital outputs 08 to 15
- 6 Connector X7 for digital outputs 16 to 23
- 7 Connector X8 for digital outputs 24 to 31

7.2 Indicating elements

The operating status of the device and the status of the digital outputs are shown by colored status LEDs.

7.2.1 Operating status L1 ... L4

LED	Status	Description
L1: green	Flashing / on	Device is working
	Off	Device is not working (switched off)
L2: yellow	On	Access to the backplane bus
L3: white	-	-
L4: red	Off	Normal status, no faults
	Flashing	Device failure

**Important note**

When the LED L4 indicates a failure, please contact the iba support.

7.2.2 Status of digital outputs

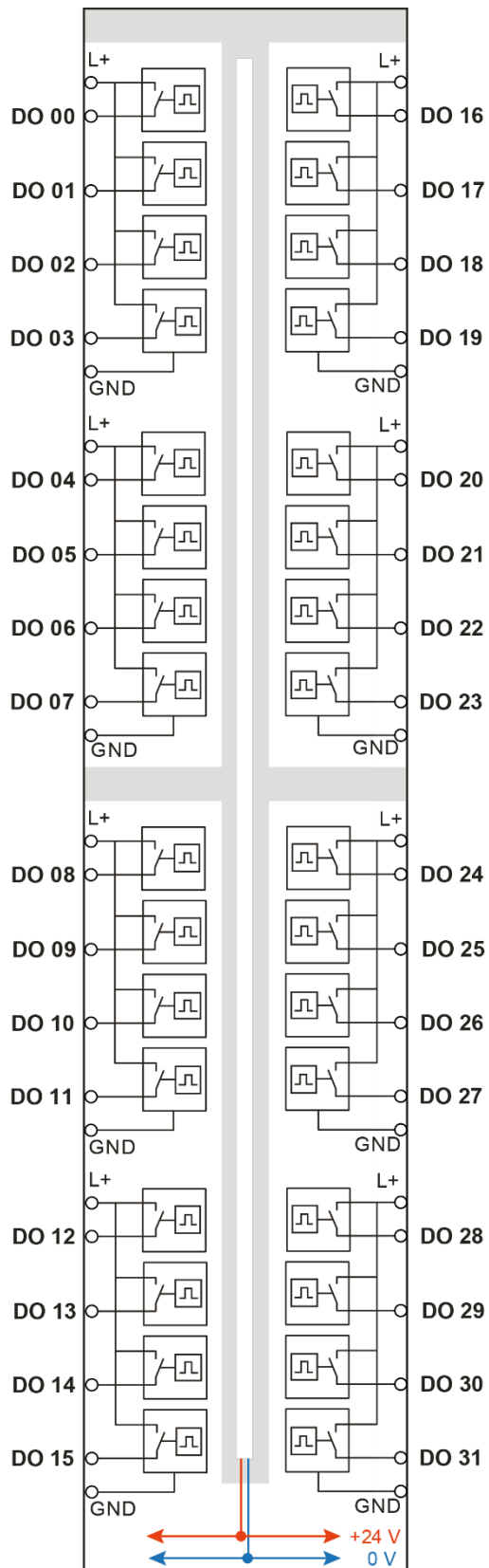
LED per channel	Status	Description
00...31	Off	No signal, logical 0
	Green	Signal ok, logical 1
	Yellow	Load voltage not present (per root)
	Red	Overcurrent (Channel root switches off)

*If an output is deactivated with ibaPDA, the corresponding LED remains off.

7.3 Digital outputs X5 to X8

7.3.1 Connection diagram / Pin assignment

32 output signals (0...31) can be connected.



Pin assignment X5...X8

X5: Pin	Connection
1	Load voltage (1) L+
2	Digital output 00
3	Digital output 01
4	Digital output 02
5	Digital output 03
6	Load voltage (1) GND
7	Load voltage (2) L+
8	Digital output 04
9	Digital output 05
10	Digital output 06
11	Digital output 07
12	Load voltage (2) GND

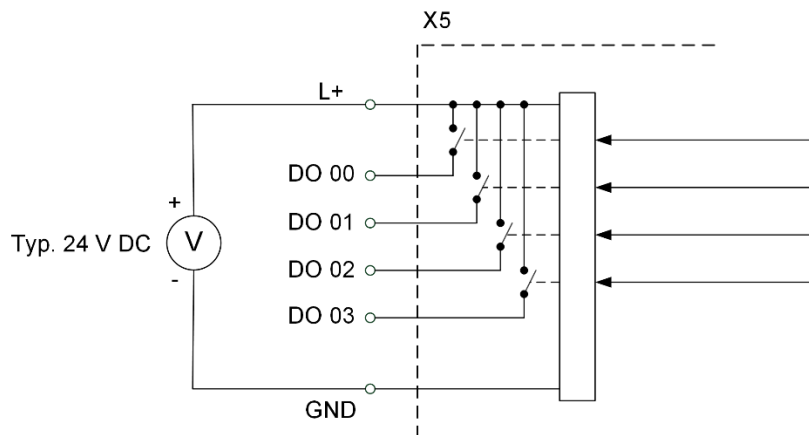
X7: Pin	Connection
1	Load voltage (5) L+
2	Digital output 16
3	Digital output 17
4	Digital output 18
5	Digital output 19
6	Load voltage (5) GND
7	Load voltage (6) L+
8	Digital output 20
9	Digital output 21
10	Digital output 22
11	Digital output 23
12	Load voltage (6) GND

X6: Pin	Connection
1	Load voltage (3) L+
2	Digital output 08
3	Digital output 09
4	Digital output 10
5	Digital output 11
6	Load voltage (3) GND
7	Load voltage (4) L+
8	Digital output 12
9	Digital output 13
10	Digital output 14
11	Digital output 15
12	Load voltage (4) GND

X8: Pin	Connection
1	Load voltage (7) L+
2	Digital output 24
3	Digital output 25
4	Digital output 26
5	Digital output 27
6	Load voltage (7) GND
7	Load voltage (8) L+
8	Digital output 28
9	Digital output 29
10	Digital output 30
11	Digital output 31
12	Load voltage (8) GND

7.3.2 Circuit design

The digital outputs of the module are pure high or P switches between the applied load voltage L+ and the 4 digital outputs of a root.



Schematic diagram, upper root X5 as an example

7.3.3 Channel protective function

The output channels provide a self-protection function in order to avoid damages to the device under fault conditions in the load circuit as far as possible. Each load current of all 4 channels per channel root is monitored. The protected range begins when the value is higher than approx. 0.6 A per channel. It may happen, that the channel is switched-off at this value, i. e. all output signals of this root are set to logical 0.

In this case, status signals report the fault status to the iba applications. The faults can be reset by the application, but only when the fault does not physically exist any longer.

8 Start-up / Update



Important note

Installing an update can take some minutes. Please do not switch off the device when an update is running. This might damage the device.

8.1 Auto-Update

After having mounted the module and applied the voltage to the central unit, the central unit detects the modules and checks the software version.

The central unit has a so called “overall release version”. This version contains the current software version of the central unit as well as the software versions of the modules. You can find the “overall release version” on the website of the central unit on the „firmware“ tab.

When the software version of a module does not match the “overall release version” of the central unit, the central unit does an automatic up- or downgrade of the module. Thereafter, the module is ready to be used.



Important note

The “overall release version” contains all modules developed up to the date of release of this firmware and the corresponding software versions. If a module cannot be detected, yet (i.e. it is more recent than the firmware version of the CPU), this module is ignored and outlined in red on the web interface.

In this case, a new update file has to be installed for the “overall release version”. If you want to get the current update file, please contact the iba support.

8.2 Overall Release Version

The „overall release version“ provides information about the software version of the entire iba-modular system. You can find it on the website of the central unit or in the I/O Manager of ibaPDA.



Important note

If you require support, please specify the „Overall Release Version“.

8.3 Update

An update can be installed in two different ways.

- ☐ Web interface (only with ibaPADU-S-IT-2x16)
- ☐ ibaPDA

No matter which of the both ways you choose to install an update: the progress of the update is shown by the LEDs L5 ... L8. Beginning with L5, the LEDs are flashing one after another, at first in orange and then in green and at a slower rate. When the update is finished, the device will be rebooted.



Important note

When updating the iba-modular system, a possible autostart of the ibaLogic PMAC is deactivated and the existing ibaLogic-V5 application deleted. Furthermore, an update of the ibaLogic-V5 software (ibaLogic Clients) might be necessary.

8.3.1 Update via web interface



Important note

The web interface is available only with the central unit ibaPADU-S-IT-2x16.

- ☐ Start the website of the iba-modular system in your browser and select the central unit.
- ☐ On the “update” tab, click on the <Browse...> button and choose the <padusit2x16_v[xx.yy.zzz].iba> update file.
- ☐ By clicking on <Start Update>, you start the update.

Module 0 : ibaPADU-S-IT-2x16

Note: any ibaLogic application will be aborted on updating firmware.
ibaLogic might not be compatible to the new firmware release after update
and therefore might not run properly.
An update of ibaLogic might be required.

Install software:

Restart device:

8.3.2 Update via ibaPDA

- ☐ Open the ibaPDA I/O Manager and choose your iba-modular system in the tree structure.
- ☐ On the “Diagnostics” tab, click on the <Write firmware> button and choose the „padusit2x16_v[xx.yy.zzz].iba“ or „paduscm_v[xx.yy.zzz].iba“ update file.
- ☐ You start the update by clicking on <OK>.

Slot	Type	Hardware version	Firmware version	FPGA version	Serial number
X1	ibaPADU-S-IT-2x16	A0	E2	v00.38.9523	29
X2	ibaMS16xAI-10V	B0	E0	v02.05.0039	999010
X3	ibaMS8xICP	A5	E0	v01.05.0009	60
X4	ibaMS4xUCO	A0	E0	v01.02.0025	5
X5	ibaMS3xAI-1A/100A	B0	E0	v02.04.0015	1000

8.4 Module Information / Diagnostics

8.4.1 Diagnostics

Important information about the iba-modular system, like hardware version, firmware version, FPGA version and serial number is displayed in the “Diagnostics” tab. Open the ibaPDA I/O Manager and choose your iba-modular system in the tree structure (see also the figure above).

8.4.2 Web interface

On the module website, general information about the module is only displayed. You cannot change the values.



Important note

The web interface is available only with the central unit ibaPADU-S-IT-2x16.

8.4.2.1 „info“ tab

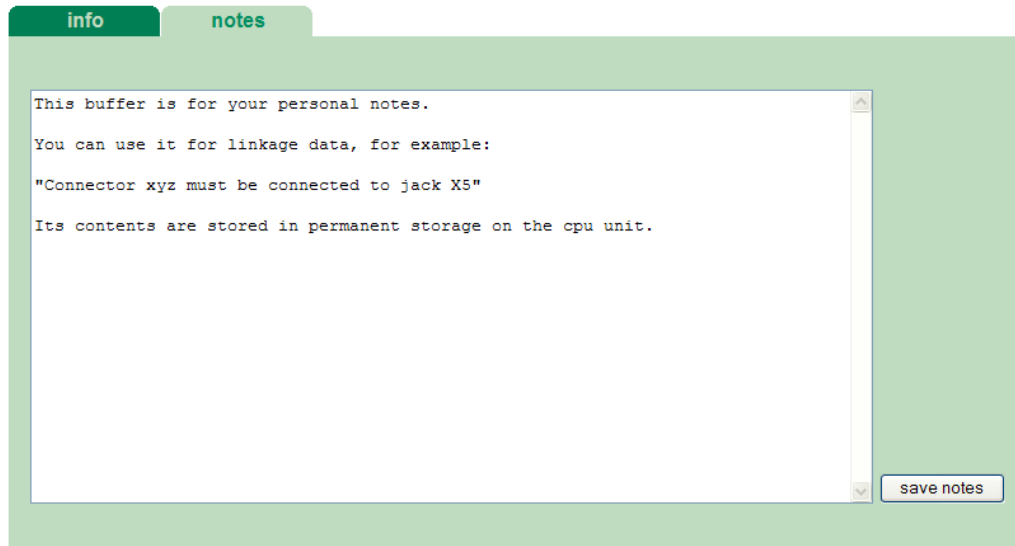
The „info“ tab shows general information about the module.

info	notes	
Serial number	000003	
Hardware version	A0	
Firmware version	E1	
Process-IO		
digital output channels	32	
design	isolated groups of 4 channels, P switch	
nominal load voltage	24 (external per root)	V DC
load voltage	+10 ... +30	V DC
switching voltage	= load voltage	
nominal output current	250	mA DC (per channel)
output current	10 ... 500	mA (per channel)
inductive load	max. 200	mJ
switching frequency	0 ... 40	kHz
protective functions	safe state, current limitation	

8.4.2.2 „notes“ tab

On the “notes” tab, you can enter notes, e.g. for notes on wiring or on recording of changes.

By clicking on <save notes>, the notes are permanently stored on the device.



9 iba Applications

9.1 Configuration in ibaPDA

You can configure the signals with the I/O Manager of ibaPDA. If the iba-modular system is already installed and you want to add a new module, click on „Read configuration from device“. The module will be detected automatically.

[Read configuration from device](#)



Note

The automatic detection requires a bidirectional FO connection from the ibaPDA computer to the central unit.

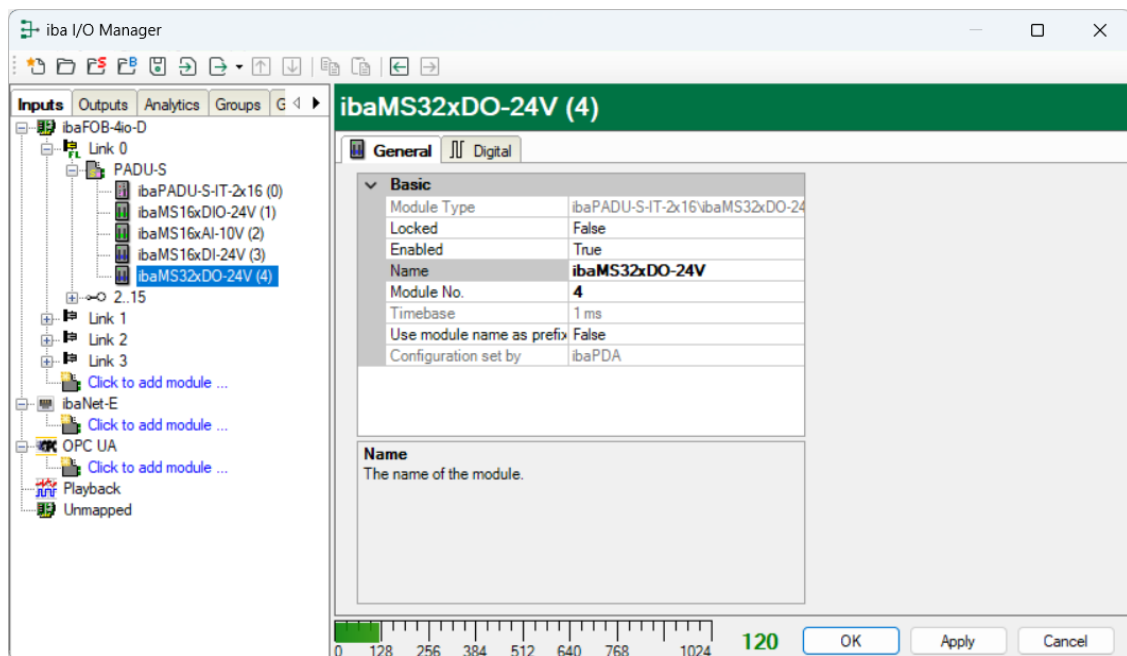


Other documentation

If you want to install the iba-modular system at first, refer to the manual of the central unit, chapter “Configuration with ibaPDA.”

9.1.1 General settings

If the module is detected, click on the module in the signal tree and the “General” tab appears.



Basic settings

☐ Module Type

Display of module type (read only)

☐ Locked

True: the module can only be changed by an authorized user.

False: the module can be changed by any user.

☐ Enabled

Data capturing for this module is enabled.

☐ Name

You can enter a name for the module.

☐ Modul No.

Consecutive module number assigned by ibaPDA for clearly referencing the signals, e.g. in expressions and for ibaAnalyzer. The number can be changed by the user.

☐ Timebase

Timebase, specified in the PADU-S module.

☐ Use name as prefix

Prefix the signal names of this module with the module name.

☐ Configuration set by

This item is only visible when ibaPADU-S-IT-2x16 is used as central unit. When an embedded application has been started on ibaPADU-S-IT-2x16 (e. g. ibaLogic), then ibaPDA cannot modify the configuration of the modules and signals. In this case the configuration is set by the embedded application. The following entries can be displayed:

- ibaPDA

Configuration set by	ibaPDA
----------------------	--------

When ibaPDA is displayed, an embedded application has not been started and the configuration can be set by ibaPDA.

- Embedded application

Configuration set by	Embedded application
Import signal names	False

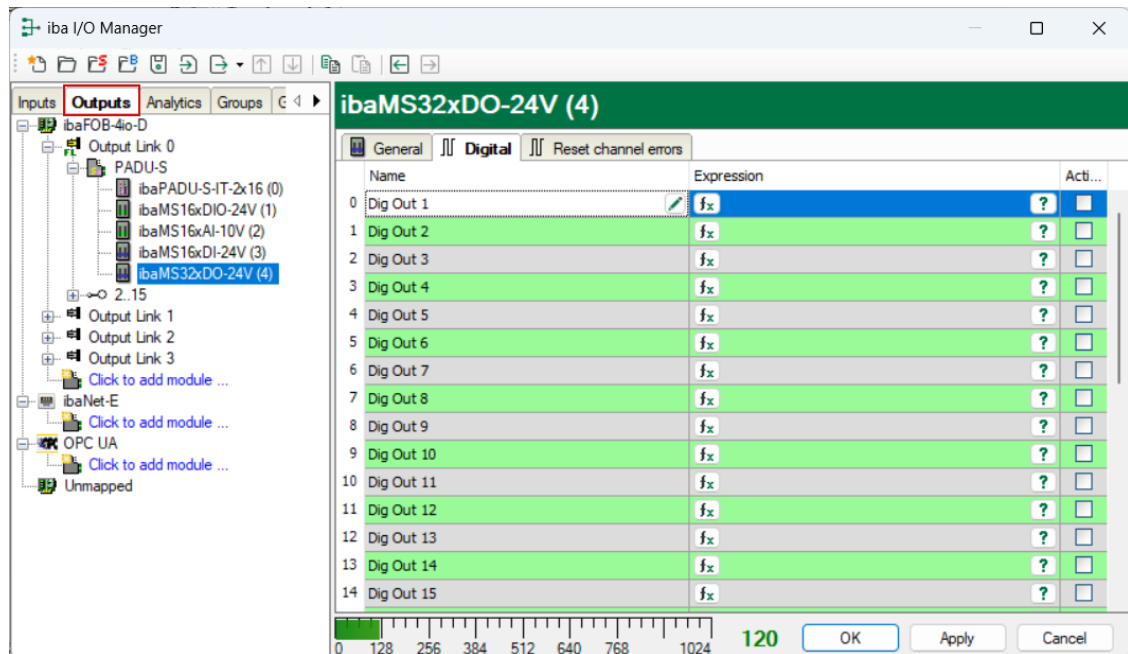
When embedded application is displayed, the configuration of the modules and signals is set by the embedded application on the device. In this case it is possible to import user-defined signal names, which are configured in the embedded application, provided that the embedded application supports this function (Import signal names: True).

The modules and signals configured by the embedded application cannot be configured in ibaPDA, they are displayed in gray in the respective fields.


The configuration is read by ibaPDA and used for the acquisition. Modules and signals which are not displayed in gray can be used in ibaPDA.

9.1.2 Output configuration


Select the „Outputs“ tab in order to configure settings and signals at the output side. The following settings apply to the “Digital” tab:



☐ Name

You can enter a name for the signal and two additional comments (click on the  icon in the Name field).

☐ Expression

For each output you can specify a signal using the expression builder . Signals can be linked mathematically or physically.

☐ Active

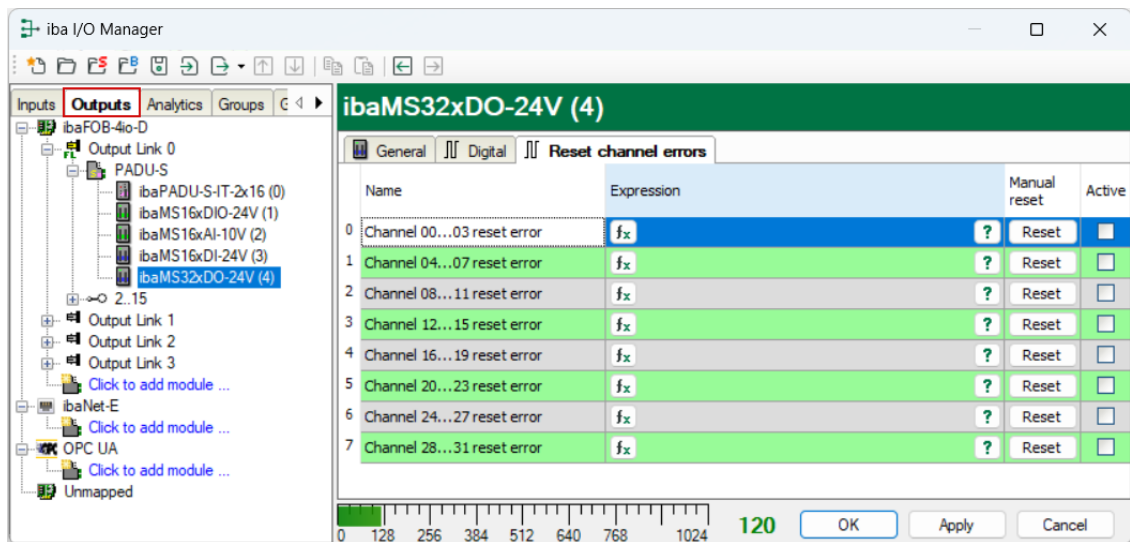
Enabling/disabling the signal.

9.1.3 Reset channel errors


Hardware errors of the quad root can be reset in two ways:

- Manually using the <Reset> button
- Automatically by an output signal


The following settings apply to the “Reset channel errors” tab in the “Outputs” menu:



☐ Name

The quad roots have default names, but you can change the names and enter two additional comments (click on the  icon in the Name field).

☐ Expression

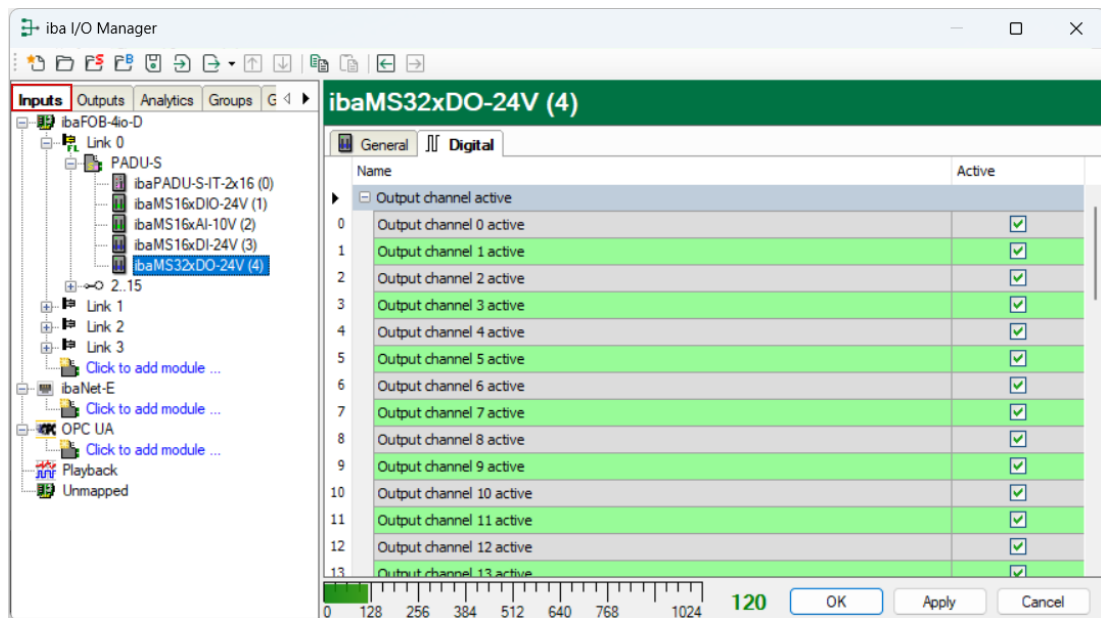
Using the expression builder  you can specify an output signal in order to reset a hardware error.

☐ Active


Enabling/disabling the signal.

9.1.4 Diagnostics channels

In the „Inputs“ tab, in the “Digital” tab, status and error signals can be activated:



☐ Name

The status signals have default names, but you can change the signal names and enter two additional comments (click on the  icon in the Name field).

- Output channel [0...31] active
Output signal is ready
- Output channel [...] supply voltage error
Error in the supply voltage of a quad root.
- Output channel [...] overcurrent error
Quad root is in error state due to overcurrent

Output channel supply voltage error		
32	Output channel 0...3 supply voltage error	<input type="checkbox"/>
33	Output channel 4...7 supply voltage error	<input type="checkbox"/>
34	Output channel 8...11 supply voltage error	<input type="checkbox"/>
35	Output channel 12...15 supply voltage error	<input type="checkbox"/>
36	Output channel 16...19 supply voltage error	<input type="checkbox"/>
37	Output channel 20...23 supply voltage error	<input type="checkbox"/>
38	Output channel 24...27 supply voltage error	<input type="checkbox"/>
39	Output channel 28...31 supply voltage error	<input type="checkbox"/>
Output channel overcurrent error		
40	Output channel 0...3 overcurrent error	<input type="checkbox"/>
41	Output channel 4...7 overcurrent error	<input type="checkbox"/>
42	Output channel 8...11 overcurrent error	<input type="checkbox"/>
43	Output channel 12...15 overcurrent error	<input type="checkbox"/>
44	Output channel 16...19 overcurrent error	<input type="checkbox"/>
45	Output channel 20...23 overcurrent error	<input type="checkbox"/>
46	Output channel 24...27 overcurrent error	<input type="checkbox"/>
47	Output channel 28...31 overcurrent error	<input type="checkbox"/>

☐ Active

Enabling/disabling the signal.

9.2 Configuration in ibaLogic-V5



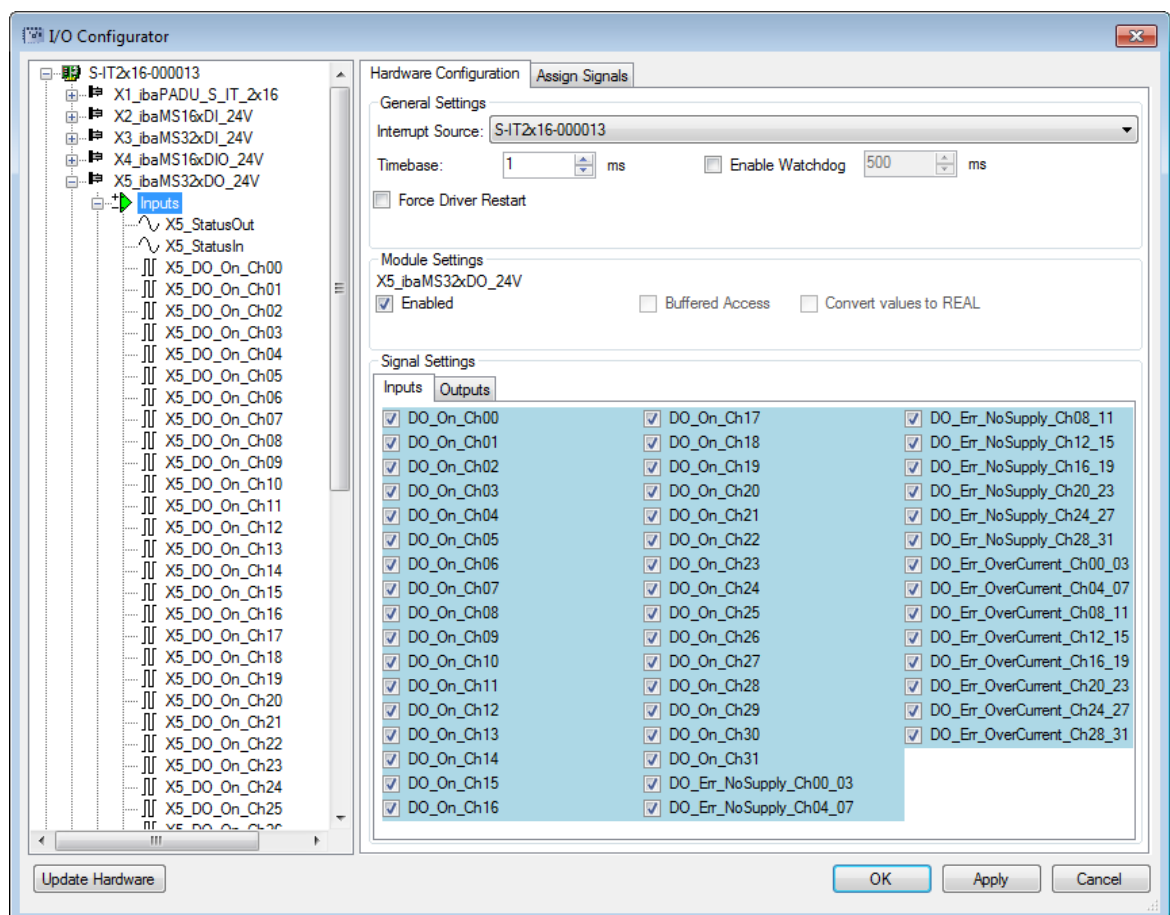
Other documentation

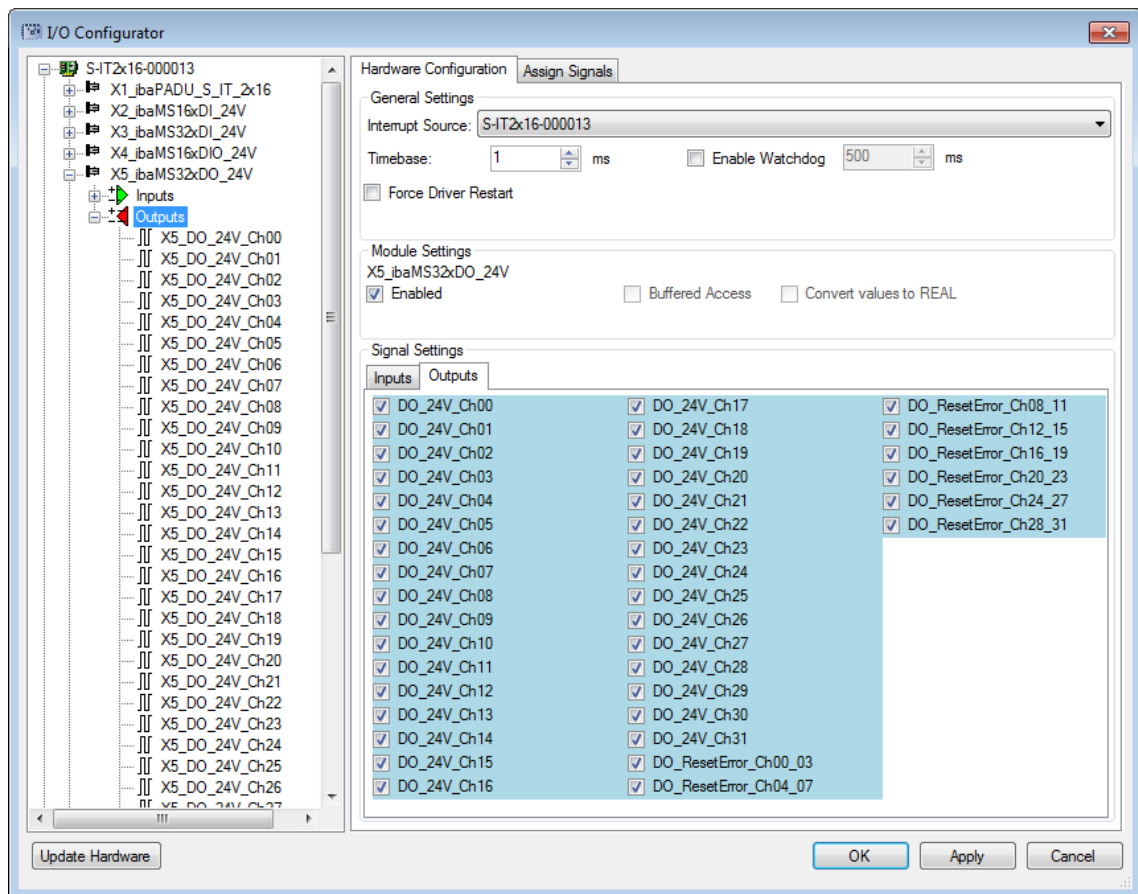
Combined with ibaLogic-V5, an ibaPADU-S-IT-2x16 device can be used to realize individual signal pre-processing or stand-alone applications. You find the basic way of proceeding description in the separate ibaPADU-S-IT-2x16 manual. This manual describes only the signals belonging to this module.

9.3 Configuring signals

The signals can be configured in the I/O configurator of ibaLogic-V5. Open the I/O Configurator in the “Tools – I/O Configurator” menu. When clicking on the <Update Hardware> button, ibaLogic-V5 identifies the module group.

The “Inputs” tab contains diagnostic signals in order to activate status and error information.





Signal	Description
Inputs	
DO_On_Ch[00...31]	Digital outputs active
DO_Err_NoSupply_Ch[00_03...28_31]	Error in the supply voltage of a quad root
DO_Err_OverCurrent_Ch[00_03...28_31]	Quad root is in error state due to overcurrent
StatusIn	Status information about the plugged input module (for output module without function): 0 = Module not initialized 1 = Module running >1 = Mistake (e.g. module cannot be initialized)
StatusOut	Status information about the plugged module (for input module without function): 0 = Module not initialized 1 = Module running >1 = Mistake (e.g. module cannot be initialized)
Outputs	
DO_24V_Ch[00...31]	Digital output signals
DO_ResetError_Ch[00_03...28_31]	Output signal in order to reset a hardware error

10 Technical Data

10.1 Main data

Short description	
Name	ibaMS32xDO-24V
Description	Output module with 32 digital outputs
Order number	10.124260
Power supply	
Power supply	24 V DC, internal via backplane bus
Power consumption max.	7 W
Interfaces, operating and indicating elements	
Indicators (LEDs)	4 LEDs for device status 32 LEDs for status of the digital outputs
Operating and environmental conditions	
Temperature ranges	
Operation	32 °F ... 122 °F (0 °C ... 50 °C)
Storage/transport	-13 °F ... 158 °F (-25 °C ... 70 °C)
Mounting	Vertical, plugged into backplane bus
Cooling	Passive
Humidity class (DIN 40040)	F, no condensation
Protection class	IP20
Certification/Standards	EMC: IEC 61326-1 FCC part 15 class A
MTBF ¹	2.005.894 hours / 228 years
Dimensions and weight	
Dimensions (Width x height x depth)	1.69 in x 8.43 in x 5.83 in (43 mm x 214 mm x 148 mm)
Weight / incl. box and documentation	1.54 lbs (0.7 kg) / 2.42 lbs (1.1 kg)

¹ MTBF (Mean time between failure) according to Telcordia 3 SR232 (Reliability Prediction Procedure of Electronic Equipment; Issue 3 Jan. 2011)

**Supplier's Declaration of Conformity
47 CFR § 2.1077 Compliance Information**

Unique Identifier: 10.124260 ibaMS32x-DO-24V

Responsible Party - U.S. Contact Information

iba America, LLC
370 Winkler Drive, Suite C
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FCC Compliance Statement

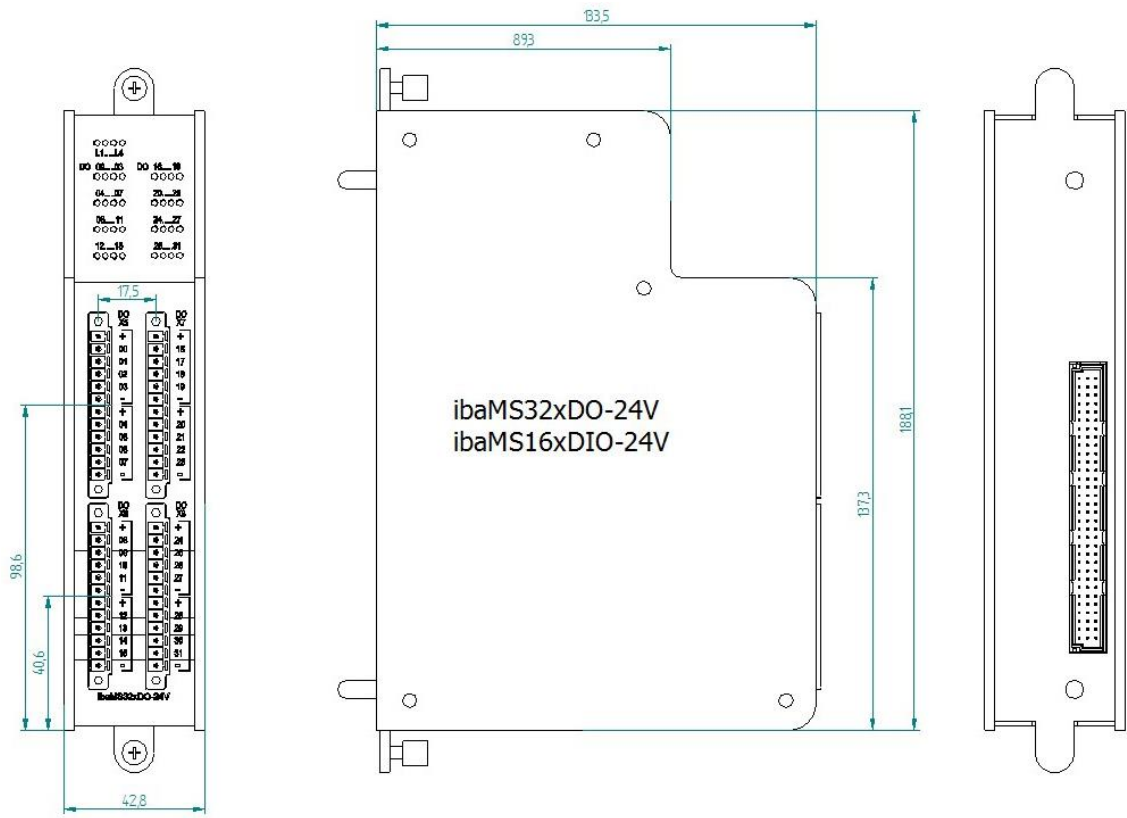
This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

10.2 Digital outputs

Digital outputs	
Number	32
Design	8 galvanically isolated roots of 4 outputs each, P switch
Load voltage	24 V, external per root, protected against reverse polarity
Load voltage range	+ 10 V ... + 30 V
Switching voltage per channel	= load voltage
Switching current per channel	250 mA
Switching current range per channel	10 mA ... 500 mA
Inductive load	Up to 200 mJ
Switching frequency	Up to 40 kHz ² , freely adjustable
Switching delay	
Switch-on delay (90% to 10%)	< 10 µs
Switch-off delay (10% to 90%)	< 10 µs at 24V switching voltage with 100 Ω load
Electrical isolation	
Root-root	AC 1.5 kV
Root-housing/power supply	AC 1.5 kV
Connector type	4 x 12-pin multi-pin connector, screw-type terminal (0.14 mm ² to 1.5 mm ²), included in delivery
Protective functions	
Safe state	Channel root switched off
Current limitation	From approx. 0.6 A per channel (all channels of a root are switched-off)

² deviating switching frequency with ibaLogic (up to 1 kHz) and ibaPDA (up to 20 Hz)

10.3 Dimension sheet



(dimensions in mm)

11 Support and contact

Support

Phone: +49 911 97282-14

Fax: +49 911 97282-33

E-Mail: support@iba-ag.com



Note

If you require support, specify the serial number (iba-S/N) of the product.

Contact

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