MIKRODEV®

Akıllı Kontrolde Teknoloji Devi

DM500

HARDWARE MANUAL

- **DM500**

  RTU Series

04 / 2023
MIKRODEV_HM_DM500_EN
v1.1

CONTENTS

FIGURE LIST

Preface

Mikrodev DM500 Series Rack Type RTUs can read and control Smart Electrical Devices (protection relays, reclosers, energy and quality analyzers, etc.) in the electrical sector with the industry standard protocols IEC 61850, MODBUS TCP and MODBUS RTU. TCP/IP connection settings are made over the product interface. It can also communicate with SCADA or control center software with IEC 60870, DNP3 and MODBUS TCP protocols. Mikrodev RTU products are preferred in electrical energy applications with their easy, flexible and fast programming capabilities and variable I/O possibility according to the I/O module selection to be inserted into the slots on the rack panel.

In programming Mikrodev DM500 series, Function Block Diagram – FBD language defined in IEC 61131-3 standard is used. Thanks to programming with FBD language, it can develop applications easily and quickly with drag and drop logic.

Rack type feature of DM500 RTU; It offers automatic ID assignment to devices via the panel.
It saves the cable mess by feeding the devices on the panel from a single place.
For the redundant operation feature of the PSU over a single rack panel, the primary and backup PSU are automatically assigned according to the slot on the panel, without the need for an external connection.

Please follow our website www.mikrodev.com for the up to date version of the document.

About Mikrodev

Since 2006, MIKRODEV has been developing and manufacturing industrial control and communication products. MIKRODEV serves the system integrators in the public and private sector, OEM and end users.

Our products are manufactured complying with the quality standards required by the industrial automation industry and the quality of our products are proved on the field for many years

MIKRODEV is one of the few companies in the world that has its own designed IEC 61131-3 compliant library for its programmable logic control devices. In addition, the open, flexible, programmable SCADA solution developed by MIKRODEV is also available to customers.

MIKRODEV products' performance and wide range of applications make them possible for customers to achieve faster, simplified and cost-effective results.

WARNING!

✓ Please take care of the following issues when using Mikrodev Rack Type RTU devices.

✓ Since the unit operates with 48V DC voltage, you should take care of the voltage level that the unit is connected to. If a voltage above this voltage level is applied, the device may be damaged and may be out of warranty.

✓ Make sure that the energy connection of your device is connected to the ground or to a properly grounded terminal.

✓ Make sure that the environment in which your device is being used is free of moisture, electric shock, vibration and dust.

✓ Pay attention to the supply voltage and the connections of the product. Mikrodev is not responsible for any issues due to power failure since there is no auxiliary supply (UPS) on the device.

✓ The fuse to be used must be a FF super fast type and current limit value 1A.

✓ Do not use the device under conditions other than the environmental conditions specified in the "Electrical Specifications" section (humidity, dust, liquid and temperature, etc.)

✓ Removing the warranty label on the product or removing the protective case will void the warranty.

✓ Products that are damaged, boxes have been changed and other brand labels are affixed are not covered by the warranty.

✓ The appliance must not be cleaned with solvents (thinner, benzine, acid etc.) or with abrasive cleaning agents.

✓ Only dry cloth should be used when cleaning the appliance.

✓ Do not open the device by removing the case of the appliance, do not interfere with the electronic components and circuits. There is no user-replaceable part inside the device.

✓ If there is a problem or malfunction on your device, it should only be repaired by an authorized service. Installation and electrical connections must be made by technical personnel in accordance with the instructions in the operating manual.

Failure to comply with these rules may result in death, serious injury or property damage

1 PANEL INSTALLATION INFORMATION

1.1 Panel Installation

Rack Panel Mountage

The FCI connector output on the back of the device is plugged into the slots on the panel. Screws are inserted into the screw inlets located on both sides of the slots with a allen key and fixed. While installing the devices, make sure that the device is fully seated in the slots on the panel.

Rack Panel Demountage

The screws attached to the slots on the panel are removed with the help of a allen key. The FCI connector output on the back of the device is pulled out from the slots on the panel. While disassembling the device, care must be taken not to damage the slots.

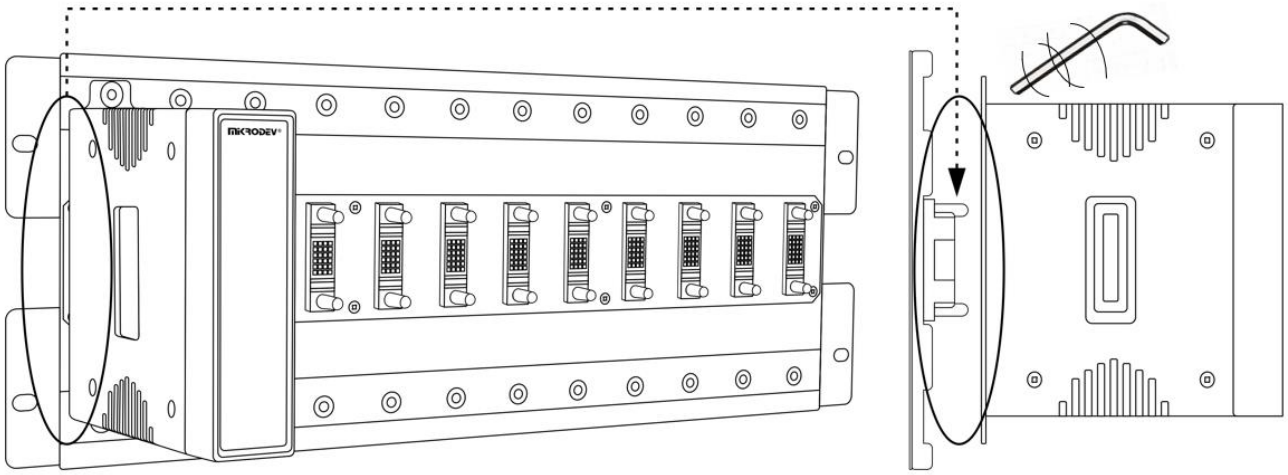


Figure 1 Mounting and Demounting

2 DM500 GENERAL INFORMATION

2.1 BP0 Rack Panel Board Type Physical Interface

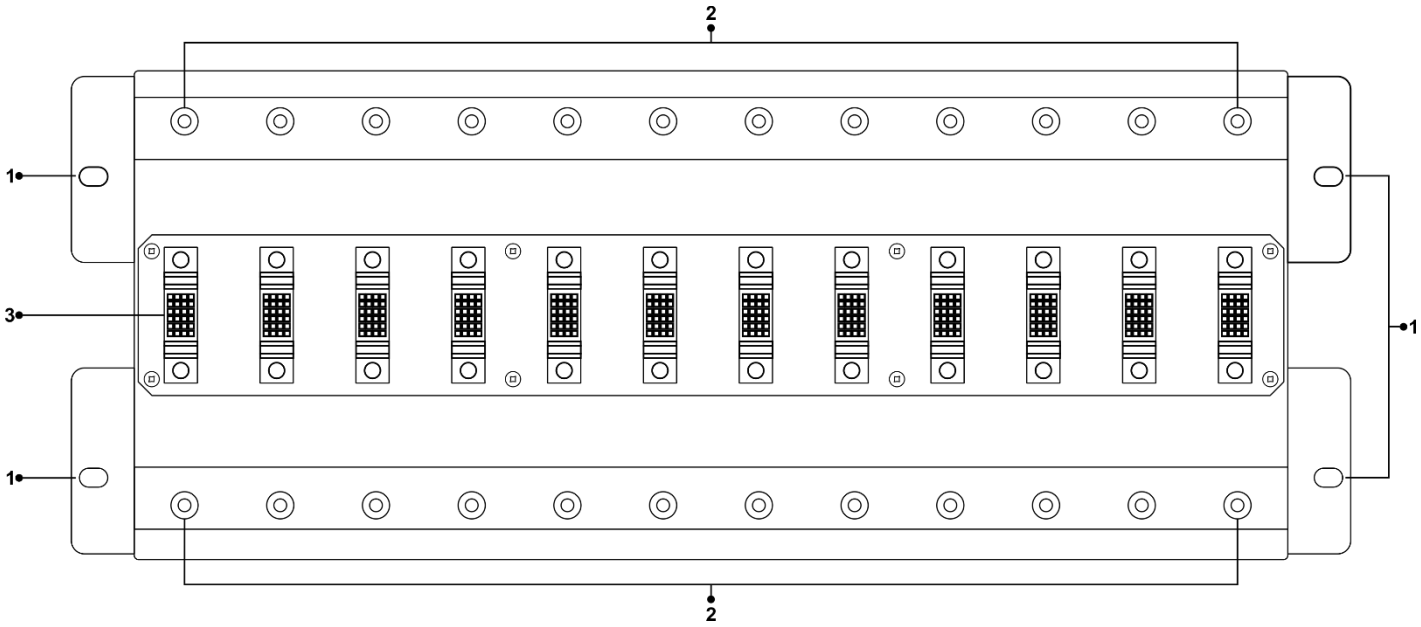


Figure 2 BP0 Board Type Physical Interface

1	Rack Mounting Slot	**3**	Module Slot Socket Inputs
2	Module Fixing Slot		

2.1.1 General Panel Specification

SPECIFICATION	ITEM	DESCRIPTION
Electrical	Panel Supply	via Rack Panel
Connection	Board Type	BP0
	Slot Count	12
	CANBUS Based	1 Mbit Speed
ID Setting	ID Address Assignments	Automatic (via Rack Panel)
Dimension	W x L	19 inch (1816 mm x 4820 mm)

2.2 CP0 CPU Board Type Physical Interface

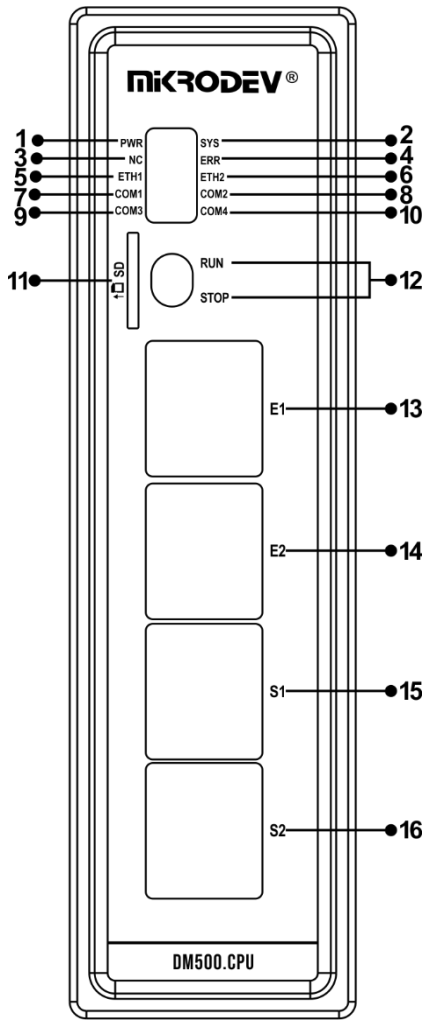


Figure 3 CP0 Board Type Physical Interface

1	System Power LED	**9**	RS232 Port 1 Connection LED
2	System Running LED	**10**	RS232 Port 2 Connection LED
3	N/A	**11**	SD Card Slot
4	System Error LED	**12**	Run/Stop Switch
5	Ethernet Port 1 Connection LED	**13**	Ethernet Port 1
6	Ethernet Port 2 Connection LED	**14**	Ethernet Port 2
7	RS485 Port 1 Connection LED	**15**	RS485 Port Connections
8	RS485 Port 2 Connection LED	**16**	RS232 Port Connections

2.2.1 General Device Specifications

SPECIFICATION	ITEM	DESCRIPTION
Processor	Processor Architecture	ARM Cortex A7
Electrical	Supply	via Rack Panel
	Power	220 mA @ 24V DC
	Real Time Clock	Integrated
	Run/Stop Mood	Available
Environmental Conditions	Operating Temperature	-25…+75 C
	Storage Temperature	-30…+80 C
	Humidity	5…95 RH
	Working Altitude	0…2000 m
Memory	SD Cart Support	Micro SD
	Retentive Memory	56 MB
	Program Memory	256 MBit
Communication Ports	Board Type	CP0
	Ethernet Port	2 Port, 10/100 Mbps
	RS485	2 Port, ESD Protection, RJ45 Socket Type
	RS232	2 Port, ESD Protection, RJ45 Socket Type
Connection	CANBUS Based	1 Mbit Speed
ID Setting	ID Address Assignments	Automatic (via Rack Panel)
Expansion Capacity	Rack Type- CANBUS Expansion Modules	Variable (Based on I/O Module Selection)
Dimension	W x L x H	360 x 1330 x 1470 mm

2.2.2 Connection Diagrams

2.2.2.1 RS485 Serial Port

Board Type	CP0
RS485 Port Count:	2 Port
Maximum Slave Count:	Limited to Hardware
Isolation:	ESD Protection, 18 kV Direct, 25 kV Air Discharge
Communication Distance:	1000 m
Data Bits:	7-8
Stop Bits:	1-2
Parity:	None-Even-Odd
Baudrate:	300 bps to 200 kbps

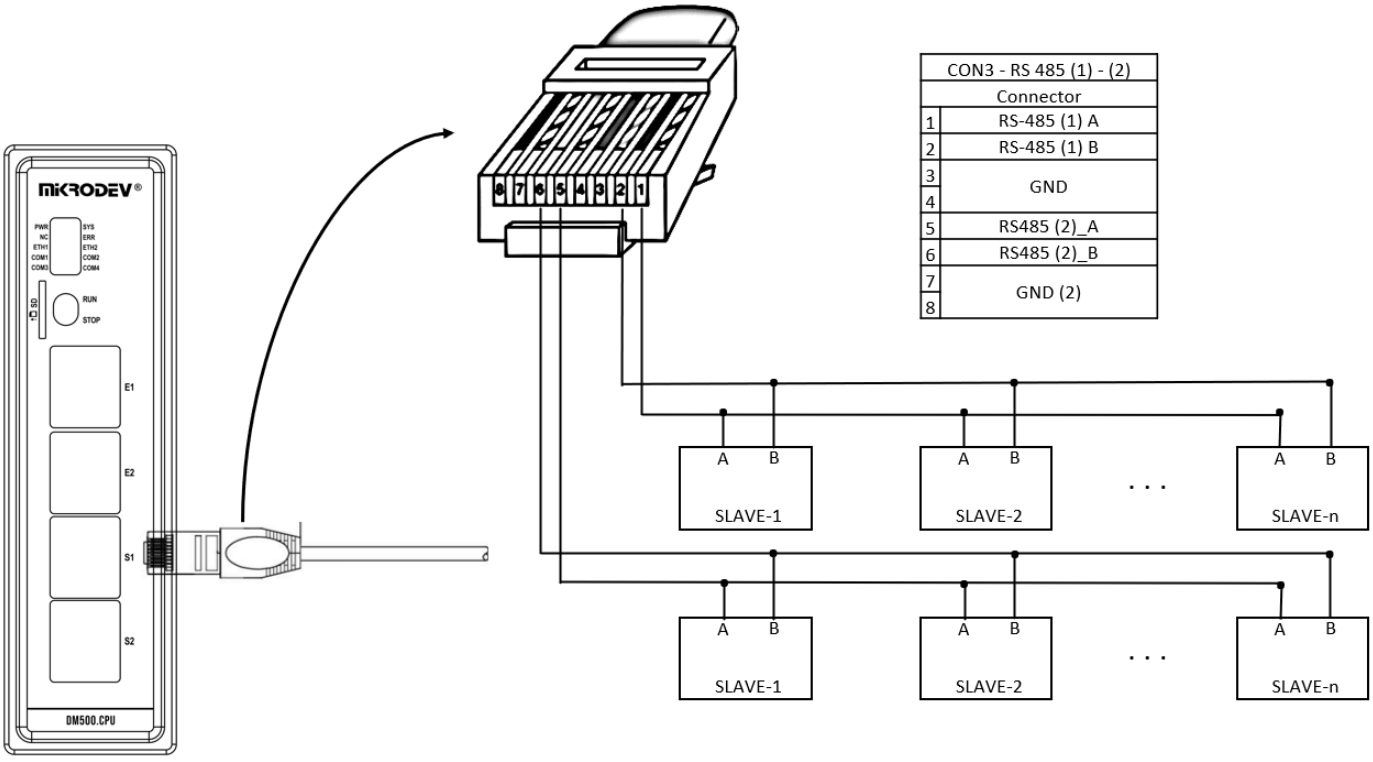


Figure 4 CP0 Board Type RS485 Serial Port Connection Diagram

2.2.2.2 RS232 Serial Port

Board Type	CP0
RS485 Port Count:	2 Port
Isolation:	ESD Protection, 8 kV Direct, 15 kV Air Discharge
Communication Distance:	10 m
Data Bits:	7-8
Stop Bits:	1-2
Parity:	None-Even-Odd
Baudrate:	300 bps to 200 kbps

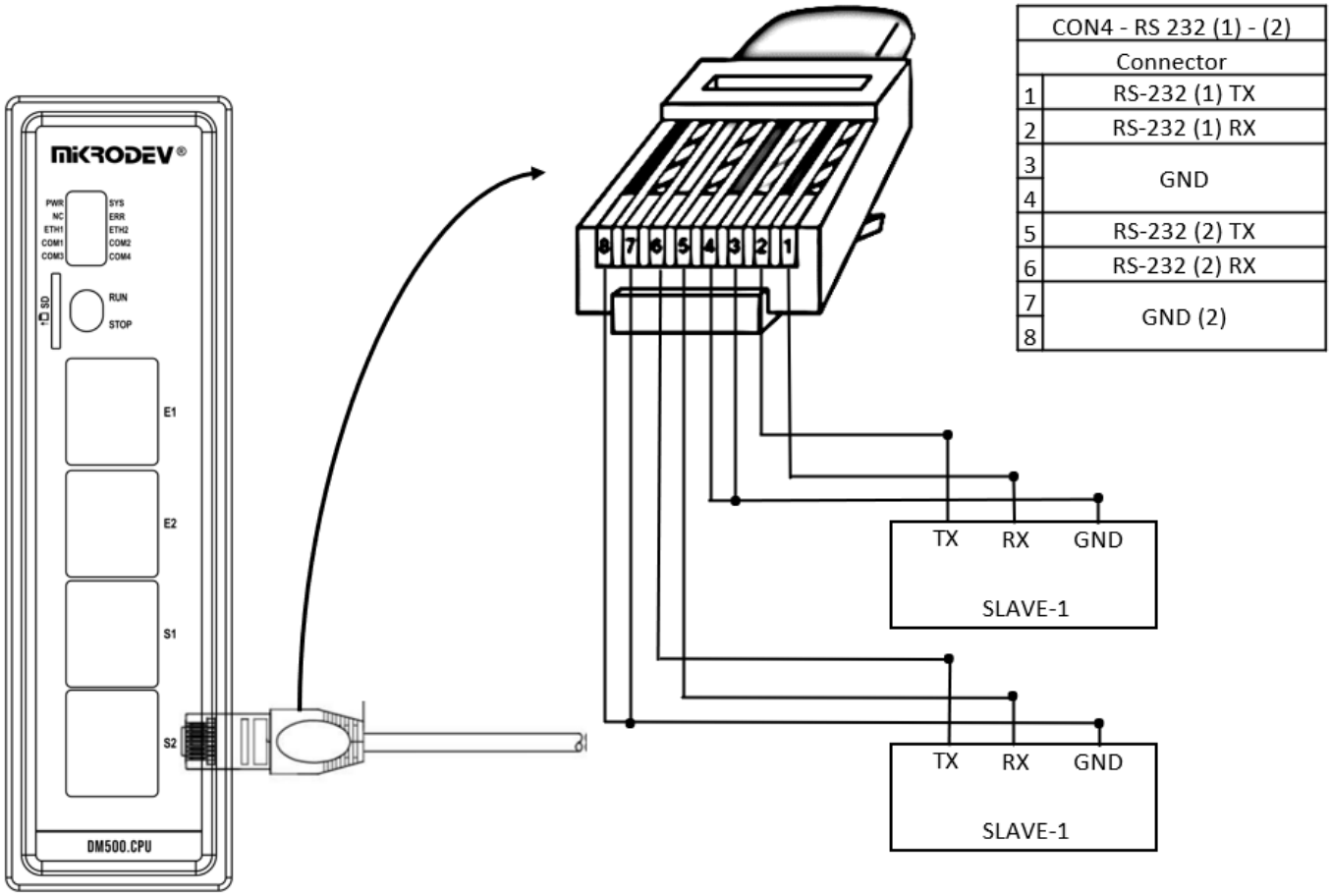


Figure 5 CP0 Board Type RS232 Serial Port Connection Diagram

2.3 CM0 Communication Board Type Physical Interface

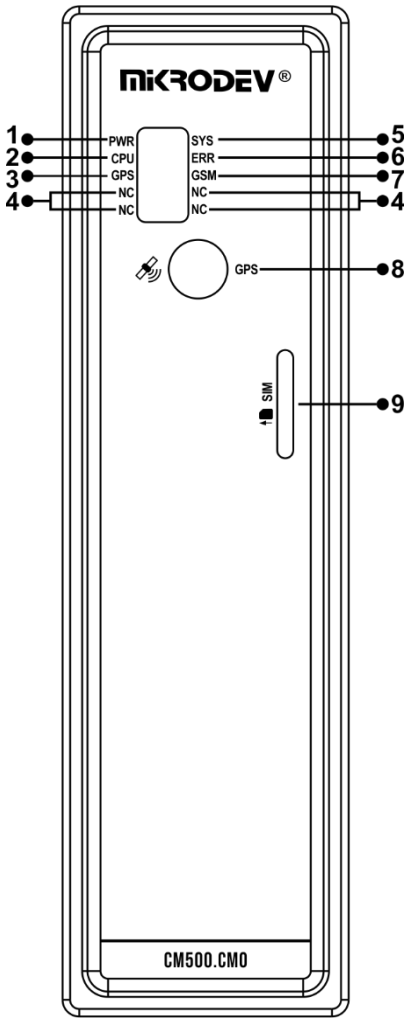


Figure 6 CM0 Board Type Physical Interface

1	System Power LED	**6**	System Error LED
2	CPU Status LED	**7**	GSM Connection Status LED
3	GPS Connection Status LED	**8**	Antenna Connection
4	N/A	**9**	SIM Card Slot
5	System Running LED		

2.3.1 General Device Specifications

SPECIFICATION	ITEM	DESCRIPTION
Electrical	Supply	via Rack Panel
	Power	90 mA @ 24V DC 140 mA @ 24V DC (at the time of pick)
Environmental Conditions	Operating Temperature	-25…+75 C
	Storage Temperature	-30…+80 C
	Humidity	5…95 RH
	Working Altitude	0…2000 m
Communication Ports	Board Type	CM0
	Integrated GSM	1 Port, 4G-LTE
	GPS Support	Available
Connection	CANBUS Based	1 Mbit Speed
ID Setting	ID Address Assignments	Automatic (via Rack Panel)
Dimension	W x L x H	360 x 1330 x 1470 mm

2.4 CM1 Communication Board Type Physical Interface

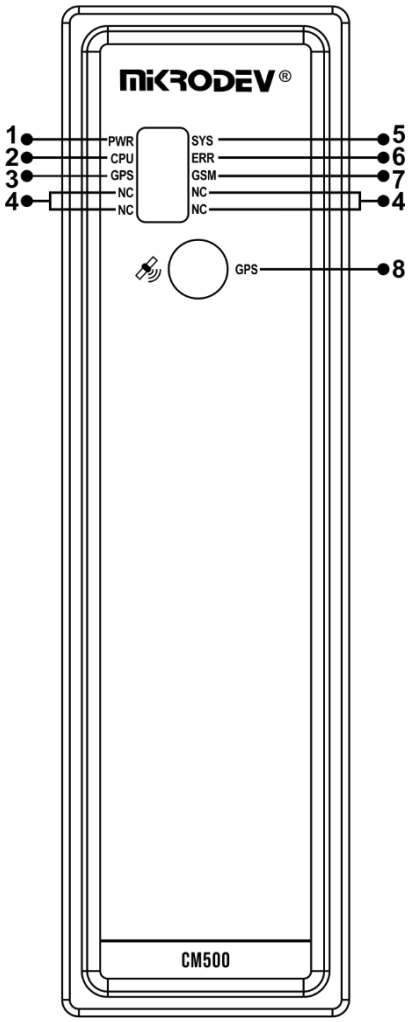


Figure 7 CM1 Board Type Physical Interface

1	System Power LED	**5**	System Running LED
2	CPU Status LED	**6**	System Error LED
3	GPS Connection Status LED	**7**	N/A
4	N/A	**8**	Antenna Connection

2.4.1 General Device Specifications

SPECIFICATION	ITEM	DESCRIPTION
Electrical	Supply	via Rack Panel
	Power	45 mA @ 24V DC
Environmental Conditions	Operating Temperature	-25…+75 C
	Storage Temperature	-30…+80 C
	Humidity	5…95 RH
	Working Altitude	0…2000 m
Communication Ports	Board Type	CM1
	GPS Support	Available
Connection	CANBUS Based	1 Mbit Speed
ID Setting	ID Address Assignments	Automatic (via Rack Panel)
Dimension	W x L x H	360 x 1330 x 1470 mm

2.5 PS0 PSU Board Type Physical Interface

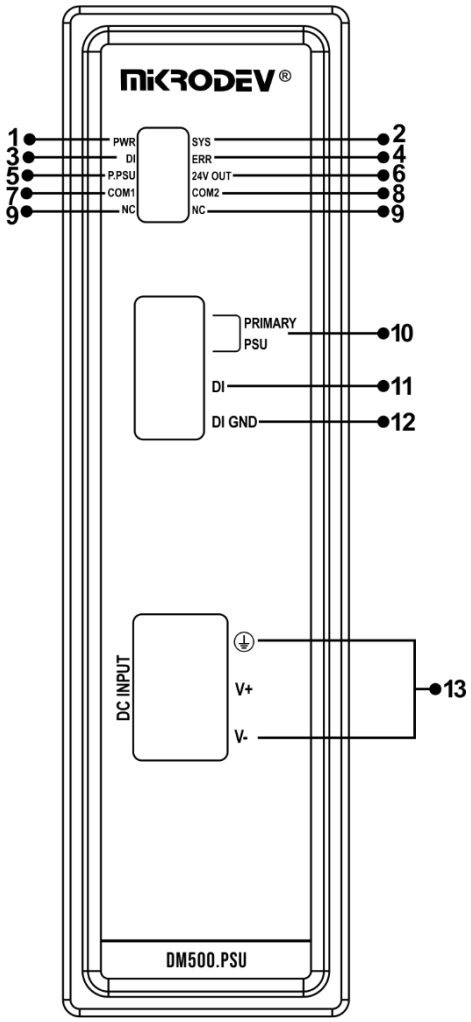


Figure 8 PS0 Board Type Physical Interface

1	System Power LED	**8**	Redundant CPU 2 Status LED
2	System Running LED	**9**	N/A
3	Digital Input Status Information LED	**10**	Primary PSU Connections
4	System Error LED	**11**	Digital Input Connections
5	Primary PSU Status LED	**12**	Digital Input GND Connections
6	24V DC Out Status Information LED	**13**	DC Input Power Connections
7	Redundant CPU 1 Status LED		

2.5.1 General Device Specifications

SPECIFICATION	ITEM	DESCRIPTION
Electrical	Supply	48V DC
	Supply Tolerance Range	-20%...+20%
	Welding Power	15 W
Input / Output	Board Type	PS0
	Digital Input	1 Channel, PNP
Environmental Conditions	Operating Temperature	-25…+75 C
	Storage Temperature	-30…+80 C
	Humidity	5…95 RH
	Working Altitude	0…2000 m
Redundant Operation	Redundant PSU Possibility	Not Available
Dimension	W x L x H	360 x 1330 x 1470 mm

2.5.2 Connection Diagrams

2.5.2.1 Supply Connection

Supply:	48V DC
Supply Tolerance Range:	-20%...+20%
Welding Power	15 W

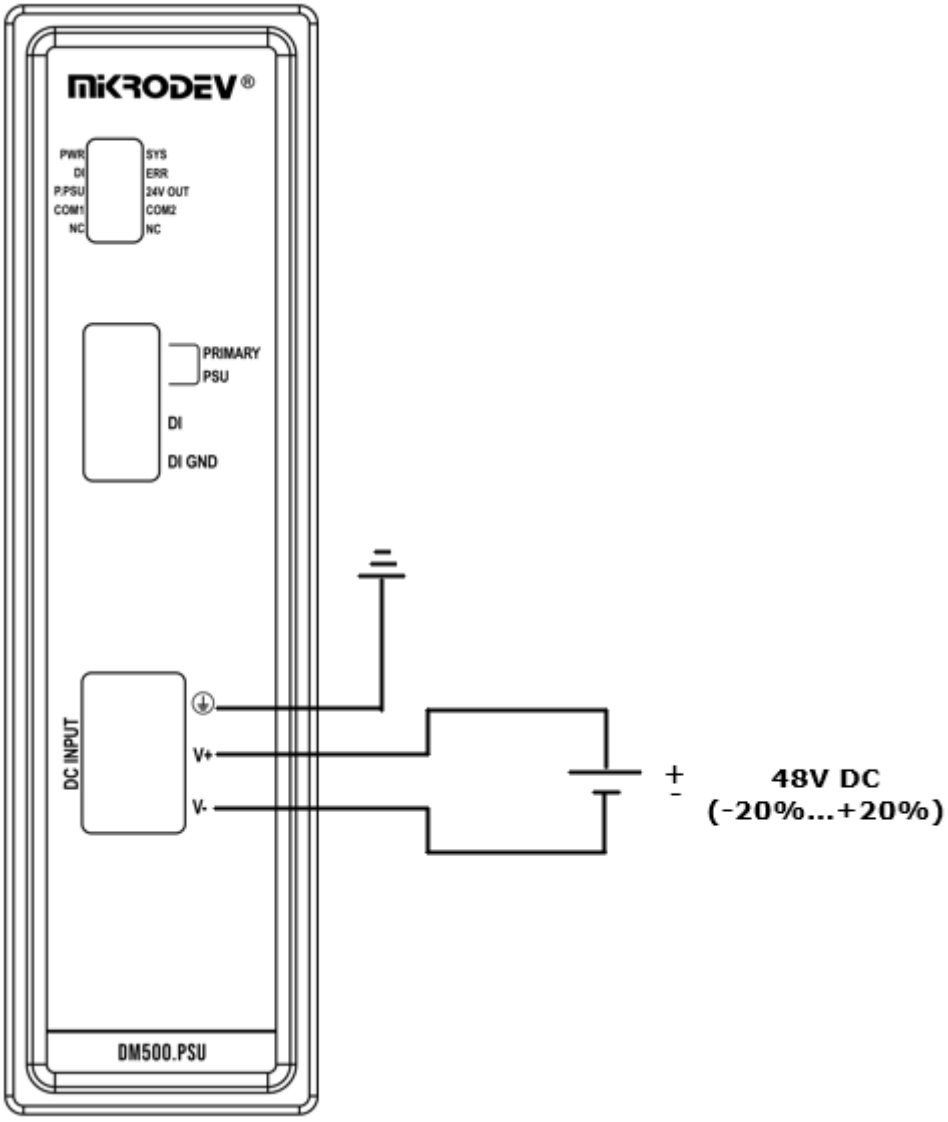


Figure 9 PS0 Board Type Power Connection Diagram

2.5.2.2 Digital Inputs

Board Type:	PS0
Module Input:	1 Channel, PNP
ON Voltage Range:	17-48V DC
OFF Voltage Level:	0-6.5V DC
Input Impedance:	>2 M
Isolation:	Optical
OFF to ON Response:	20 us
ON to OFF Response:	90 us

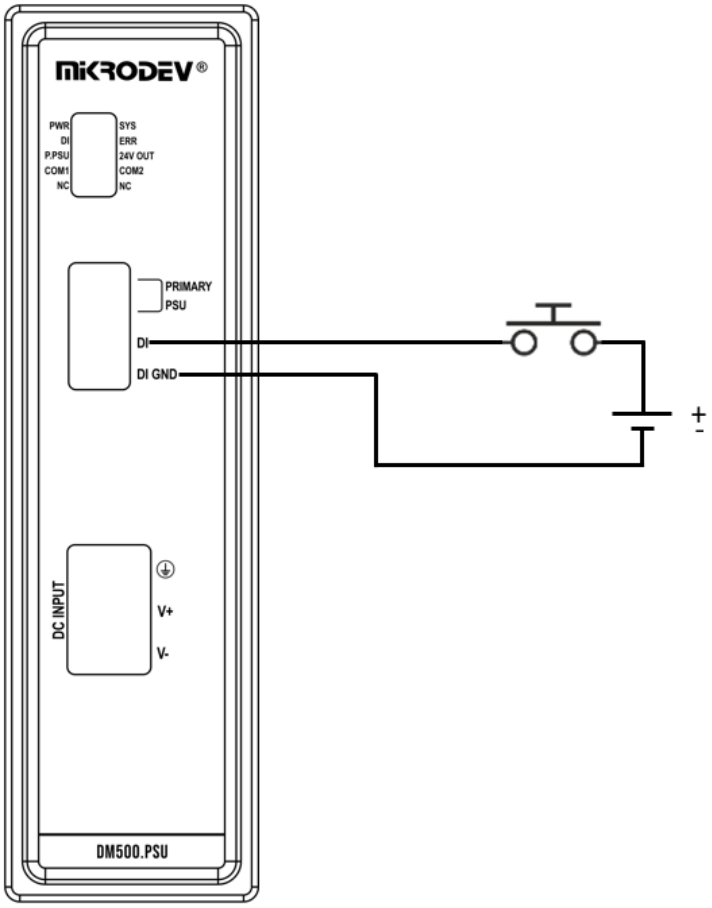


Figure 10 PS0 Board Type Digital Input Connection Diagram

2.6 PS1 PSU Board Type Physical Interface

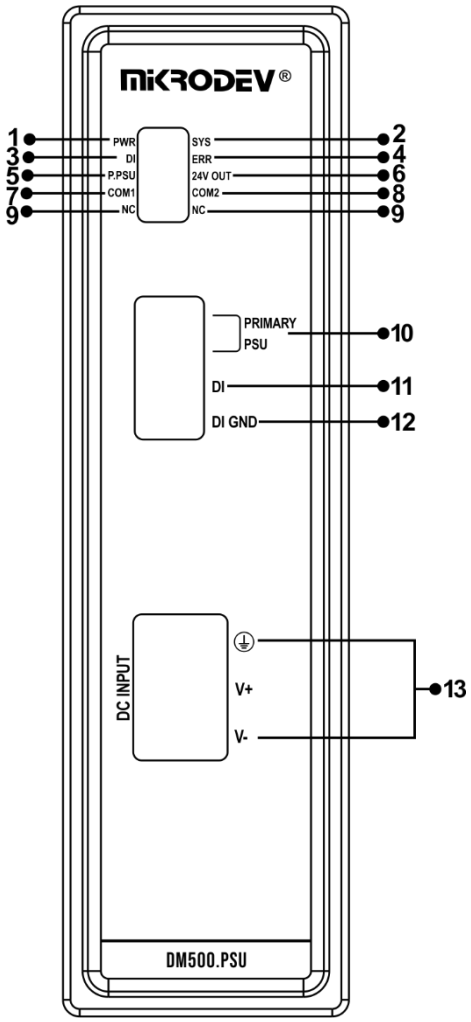


Figure 11 PS1 Board Type Physical Interface

1	System Power LED	**8**	Redundant CPU 2 Status LED
2	System Running LED	**9**	N/A
3	Digital Input Status Information LED	**10**	Primary PSU Connections*
4	System Error LED	**11**	Digital Input Connections
5	Primary PSU Status LED	**12**	Digital Input GND Connections
6	24V DC Out Status Information LED	**13**	DC Input Power Connections
7	Redundant CPU 1 Status LED		

** This connection is meaningful if the redundant operation feature of PSUs on more than one rack panel will be used. If the redundant operation feature of the PSU is to be used over a single rack panel, the primary or backup PSU is automatically detected according to the slot input used.*

2.6.1 General Device Specifications

SPECIFICATION	ITEM	DESCRIPTION
Electrical	Supply	48V DC
	Supply Tolerance Range	-20%...+20%
	Welding Power	15 W
Input / Output	Board Type	PS1
	Digital Input	1 Channel, PNP
Environmental Conditions	Operating Temperature	-25…+75 C
	Storage Temperature	-30…+80 C
	Humidity	5…95 RH
	Working Altitude	0…2000 m
Redundant Operation	Redundant PSU Possibility	Available
Dimension	W x L x H	360 x 1330 x 1470 mm

2.6.2 Connection Diagrams

2.6.2.1 Supply Connection

Supply:	48V DC
Supply Tolerance Range:	-20%...+20%
Welding Power	15 W

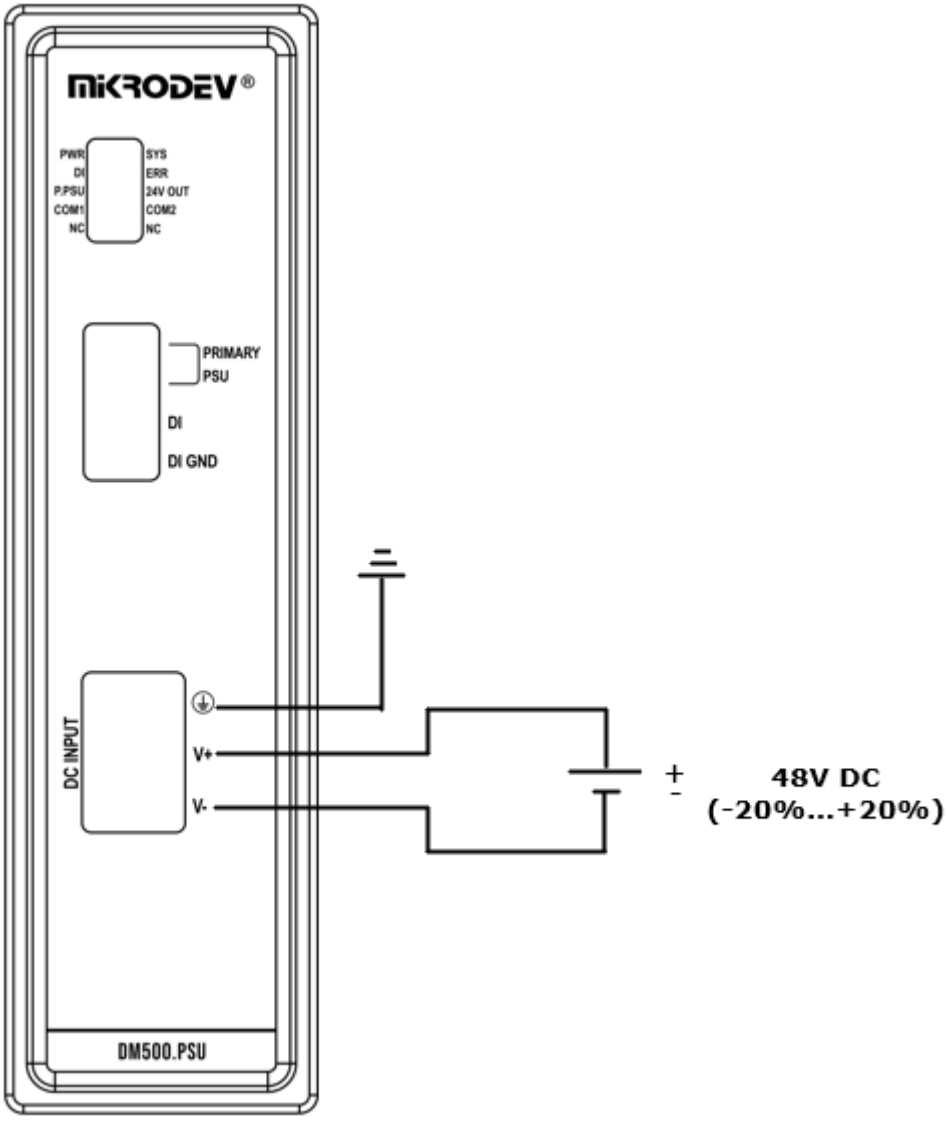


Figure 12 PS1 Board Type Power Connection Diagram

2.6.2.2 Redundant Connection

* If the redundant operation feature of PSUs on more than one Rack panel will be used, the Primary PSU connection of the PSU to be Primary must be short-circuited.

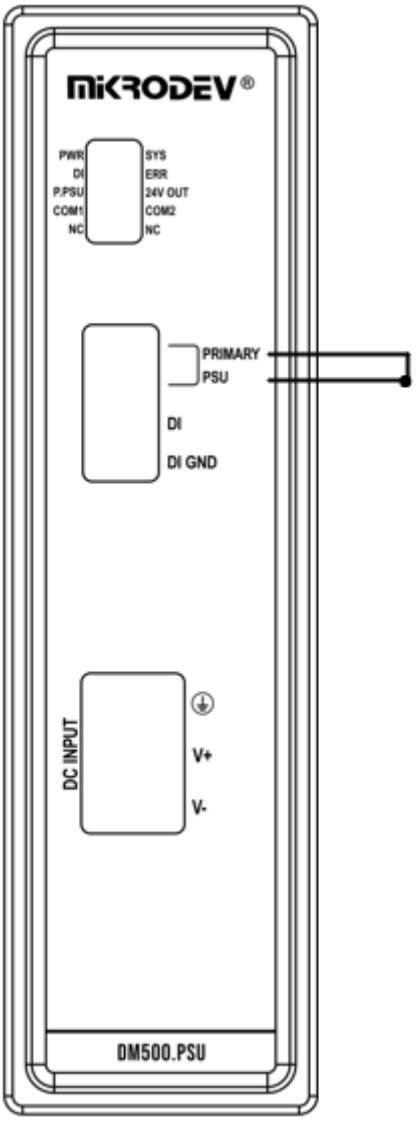


Figure 13 PS1 Board Type Redundancy Connection Diagram

2.6.2.3 Digital Inputs

Board Type:	PS01
Module Input:	1 Channel, PNP
ON Voltage Range:	17-48V DC
OFF Voltage Level:	0-6.5V DC
Input Impedance:	>2 M
Isolation:	Optical
OFF to ON Response:	20 us
ON to OFF Response:	90 us

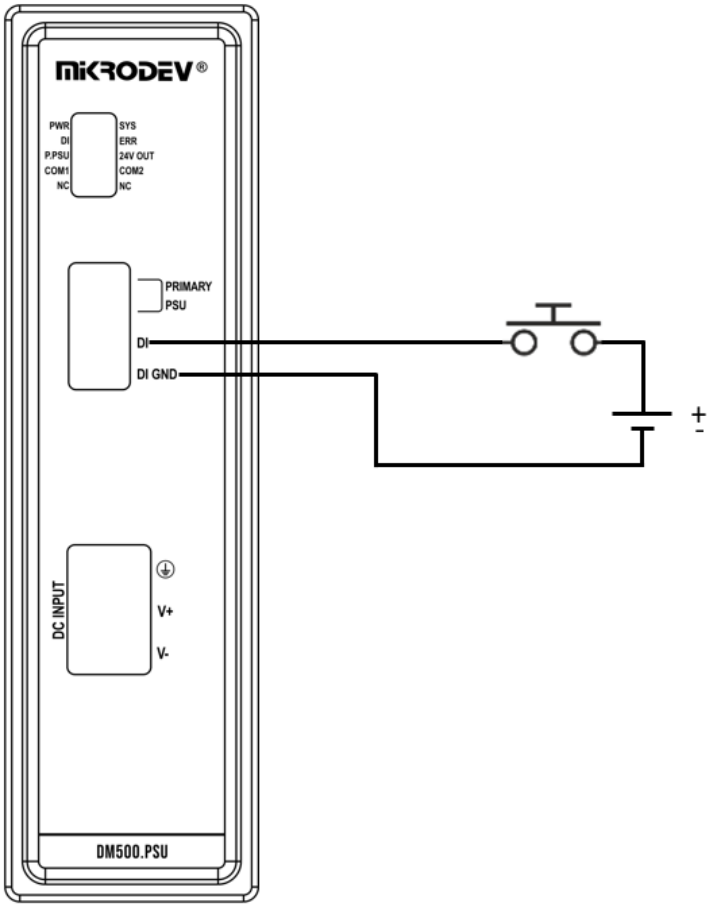


Figure 14 PS1 Board Type Digital Input Connection Diagram

2.7 IO0 Digital Input (32 Digital Inputs) Board Type Expansion Modules Physical Interfaces

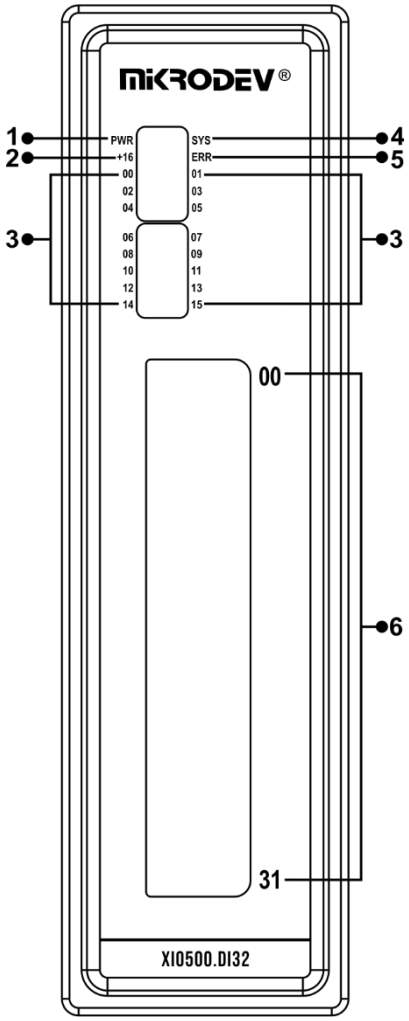


Figure 15 IO0 Board Type Physical Interface

1	System Power LED	**4**	System Running LED
2	Over 16 Digital Inputs Activity Status LED*	**5**	System Error LED
3	Digital Input Status Information LED*	**6**	Digital Input Connections

** Over 16 Digital Input Activity Status LED (LED No. 2) blink every 5 seconds to show the status of the digital input leds.*
LED No.2: When it is passive (low), LED No.3 shows the status of digital inputs 0-15.
LED No.2: When active (high), LED No.3 shows the status of digital inputs 16-31.

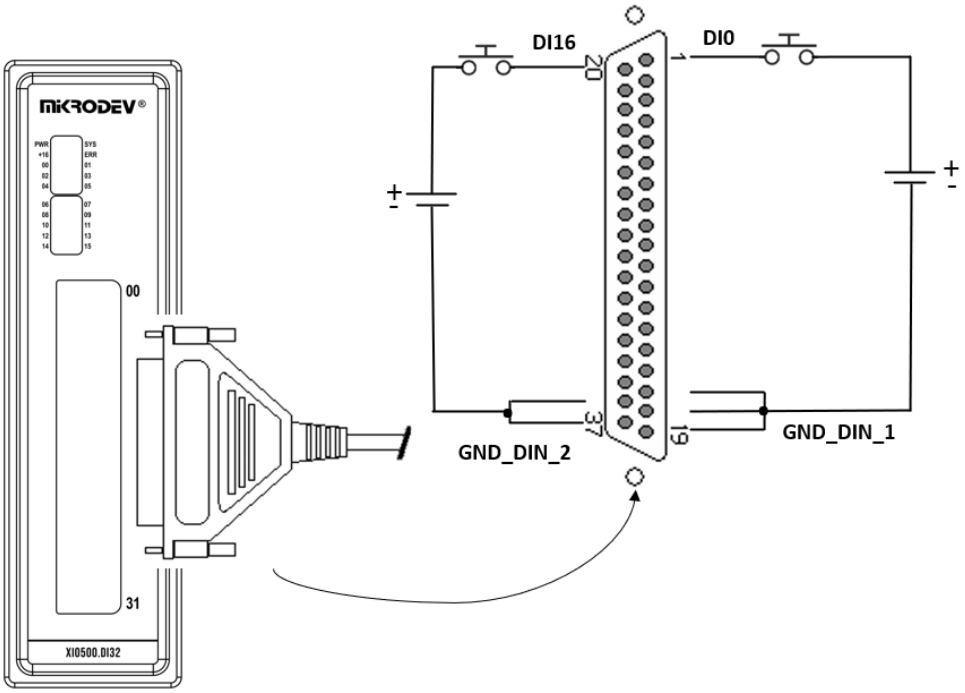
2.7.1 General Device Specifications

SPECIFICATION	ITEM	DESCRIPTION
Electrical	Supply	via Rack Panel
	Power	20 mA @ 24V DC
	Power Production	Yes
Environmental Conditions	Operating Temperature	-25…+75 C
	Storage Temperature	-30…+80 C
	Humidity	5…95 RH
	Working Altitude	0…2000 m
Connection	CANBUS Based	1 Mbit Speed
ID Setting	ID Address Assignments	Automatic (via Rack Panel)
Dimension	W x L x H	360 x 1330 x 1470 mm

2.7.2 Connection Diagrams

2.7.2.1 Digital Inputs

Order Code:	DM500-E0-IO0-B2000
Digital Input:	32 Channel, PNP
ON Voltage Range:	12-30V DC
OFF Voltage Level:	0-5V DC
Input Impedance:	<3 Kohm
Isolation:	Optical
OFF to ON Response:	20 us
ON to OFF Response:	90 us



DIN PINOUT			
1	DI0	20	DI16
2	DI1	21	DI17
3	DI2	22	DI18
4	DI3	23	DI19
5	DI4	24	DI20
6	DI5	25	DI21
7	DI6	26	DI22
8	DI7	27	DI23
9	DI8	28	DI24
10	DI9	29	DI25
11	DI10	30	DI26
12	DI11	31	DI27
13	DI12	32	DI28
14	DI13	33	DI29
15	DI14	34	DI30
16	DI15	35	DI31
17	GND_DIN(2)	36	GND_DIN(1)
18		37	
19			

Figure 16 IO0 Board Type Digital Output Expansion Module Connection Diagram

2.8 IO1 Analog Input (12 Analog Inputs) Board Type Expansion Modules Physical Interfaces

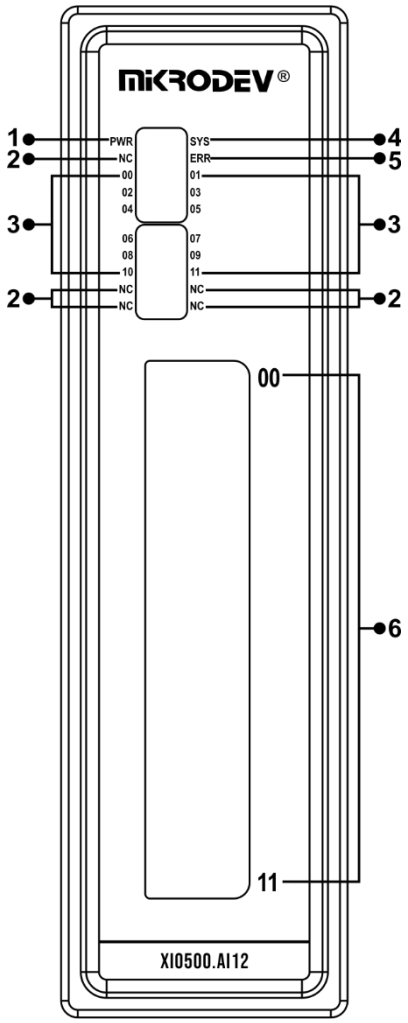


Figure 17 IO1 Board Type Physical Interface

1	System Power LED	**4**	System Running LED
2	N/A	**5**	System Error LED
3	Analog Input Status Information LED	**6**	Analog Input Connections

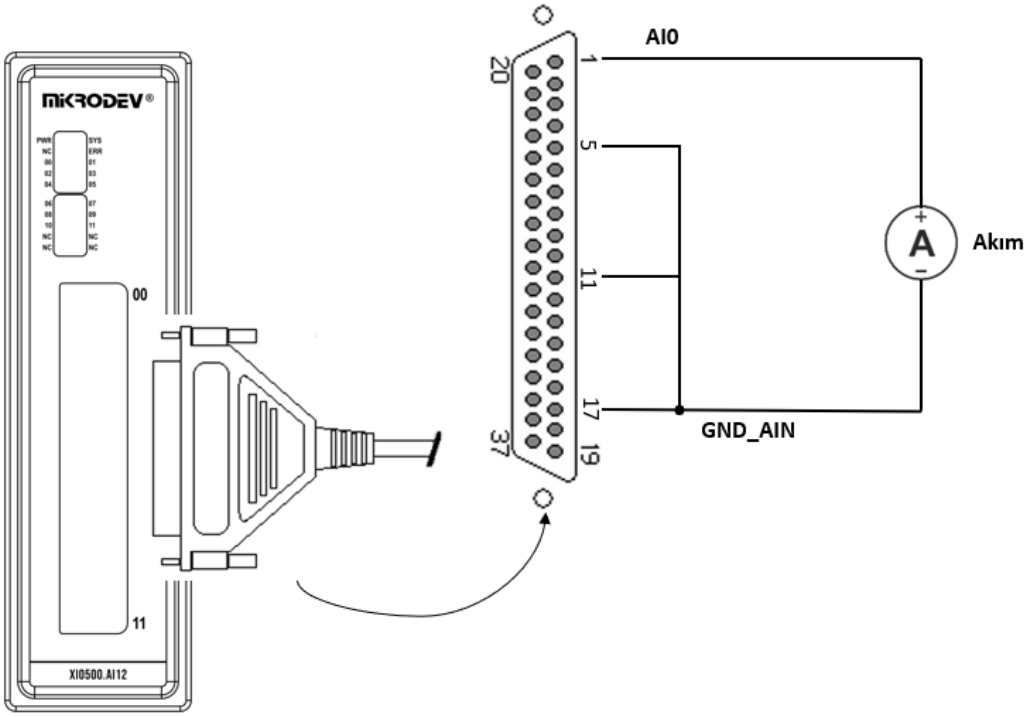
2.8.1 General Device Specifications

SPECIFICATION	ITEM	DESCRIPTION
Electrical	Supply	via Rack Panel
	Power	35 mA @ 24V DC
	Power Production	Yes
Environmental Conditions	Operating Temperature	-25…+75 C
	Storage Temperature	-30…+80 C
	Humidity	5…95 RH
	Working Altitude	0…2000 m
Connection	CANBUS Based	1 Mbit Speed
ID Setting	ID Address Assignments	Automatic (via Rack Panel)
Dimension	W x L x H	360 x 1330 x 1470 mm

2.8.2 Connection Diagrams

2.8.2.1 Analog Inputs

Order Code:	DM500-E0-IO1-B2000
Module Input Type:	Current
Analog Input:	12 Channel
Resolution:	16 Bit
Analog Input Accuracy:	%1 Accuracy
Current Input Range:	0-20 mA, 4-20 mA
Analog Input GND Connection:	1 GND (3 Point)
Isolation:	Optical



AIN PINOUT			
1	AI0	20	NC
2	AI1	21	NC
3	AI2	22	NC
4	AI3	23	NC
5	GND	24	NC
6	NC	25	NC
7	AI4	26	NC
8	AI5	27	NC
9	AI6	28	NC
10	AI7	29	NC
11	GND	30	NC
12	NC	31	NC
13	AI8	32	NC
14	AI9	33	NC
15	AI10	34	NC
16	AI11	35	NC
17	GND	36	NC
18	NC	37	NC
19	NC		

Figure 18 IO1 Board Type Analog Input Expansion Module Connection Diagram

2.9 IO2 Digital Output (32 Digital Outputs) Board Type Expansion Modules Physical Interfaces

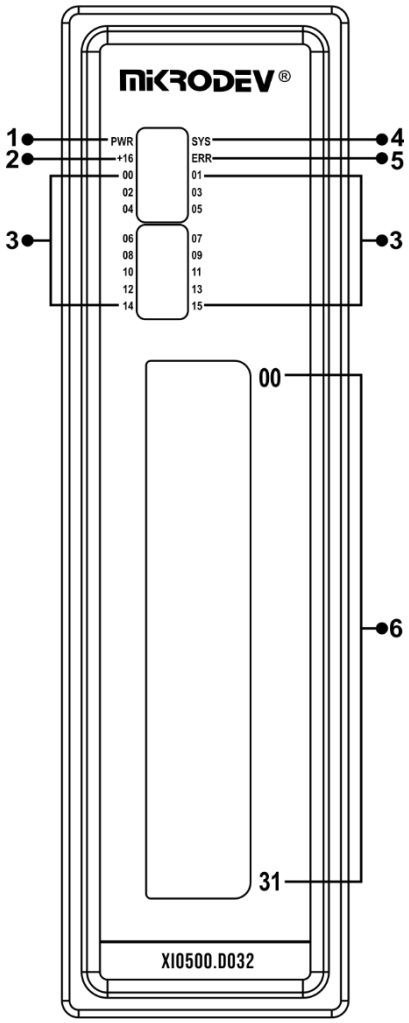


Figure 19 IO2 Board Type Physical Interfaces

1	System Power LED	**4**	System Running LED
2	Over 16 Digital Outputs Activity Status LED*	**5**	System Error LED
3	Digital Output Status Information LED*	**6**	Digital Output Connections

** Over 16 Digital Output Activity Status LED (LED No. 2) blink every 5 seconds to show the status of the digital output leds.*
LED No.2: When it is passive (low), LED No.3 shows the status of digital outputs 0-15.
LED No.2: When active (high), LED No.3 shows the status of digital outputs 16-31.

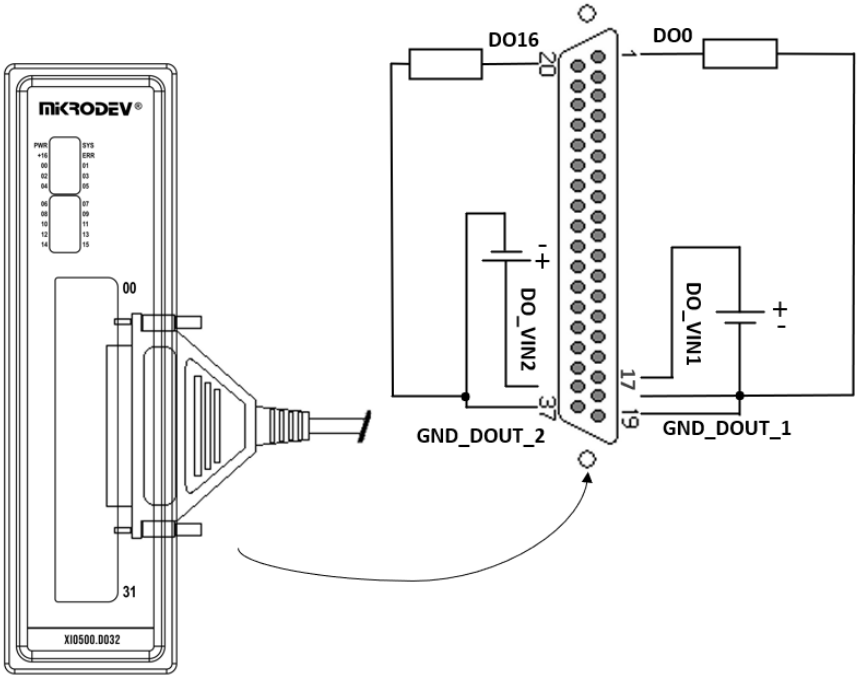
2.9.1 General Device Specifications

SPECIFICATION	ITEM	DESCRIPTION
Electrical	Supply	via Rack Panel
	Power	
	Power Production	Yes
Environmental Conditions	Operating Temperature	-25…+75 C
	Storage Temperature	-30…+80 C
	Humidity	5…95 RH
	Working Altitude	0…2000 m
Connection	CANBUS Based	1 Mbit Speed
ID Setting	ID Address Assignments	Automatic (via Rack Panel)
Dimension	W x L x H	360 x 1330 x 1470 mm

2.9.2 Connection Diagrams

2.9.2.1 Digital Outputs

Order Code:	DM500-E0-IO2-B2000
Digital Output:	32 Channel, PNP
Module Output Range:	12-36V DC
Module Output Current:	2 A @ 24V DC
Digital Output GND Connection:	2 GND (3 Point)
Isolation:	Optical



DOUT PINOUT			
1	DO0	20	DO16
2	DO1	21	DO17
3	DO2	22	DO18
4	DO3	23	DO19
5	DO4	24	DO20
6	DO5	25	DO21
7	DO6	26	DO22
8	DO7	27	DO23
9	DO8	28	DO24
10	DO9	29	DO25
11	DO10	30	DO26
12	DO11	31	DO27
13	DO12	32	DO28
14	DO13	33	DO29
15	DO14	34	DO30
16	DO15	35	DO31
17	DO_VIN(1)	36	DO_VIN(2)
18	GND_DOUT(1)	37	GND_DOUT(2)
19			

Figure 20 IO2 Board Type Digital Output Expansion Module Connection Diagram

2.10 IO3 Analog Output (12 Analog Outputs) Board Type Expansion Modules Physical Interfaces

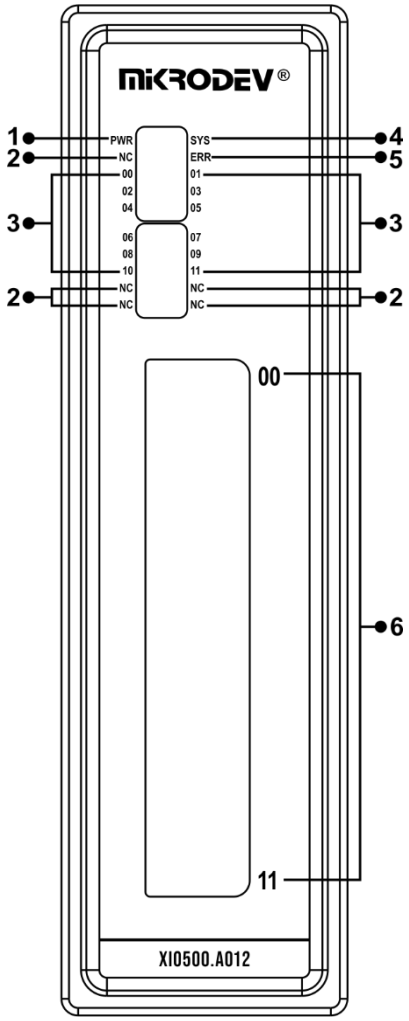


Figure 21 IO3 Board Type Physical Interfaces

1	System Power LED	**4**	System Running LED
2	N/A	**5**	System Error LED
3	Analog Output Status Information LED	**6**	Analog Output Connections

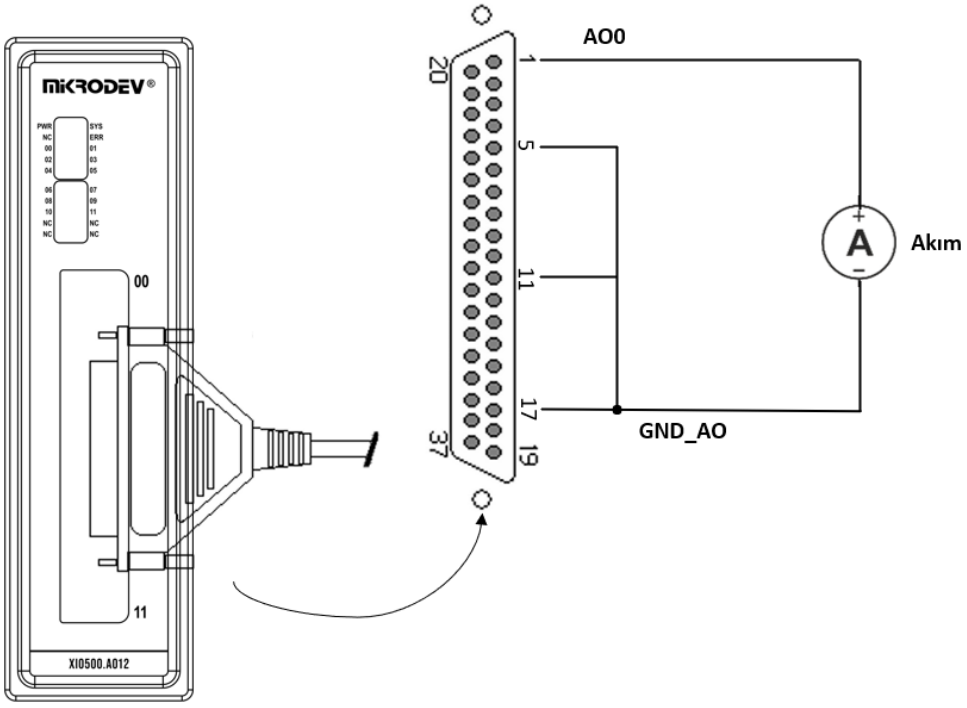
2.10.1 General Device Specifications

SPECIFICATION	ITEM	DESCRIPTION
Electrical	Supply	via Rack Panel
	Power	
	Power Production	Yes
Environmental Conditions	Operating Temperature	-25…+75 C
	Storage Temperature	-30…+80 C
	Humidity	5…95 RH
	Working Altitude	0…2000 m
Connection	CANBUS Based	1 Mbit Speed
ID Setting	ID Address Assignments	Automatic (via Rack Panel)
Dimension	W x L x H	360 x 1330 x 1470 mm

2.10.2 Connection Diagrams

2.10.2.1 Analog Outputs

Order Code:	DM500-E0-IO3-B2000
Module Input Type:	Current
Analog Output:	12 Channel
Resolution:	12 Bit
Analog Output Accuracy:	%1 Accuracy
Current Output Range	0-20 mA, 4-20 mA
Analog Output GND Connection:	3 GND (3 Point)
Isolation:	Optical



AOUT PINOUT			
1	AO0	20	NC
2	AO1	21	NC
3	AO2	22	NC
4	AO3	23	NC
5	GND	24	NC
6	NC	25	NC
7	AO4	26	NC
8	AO5	27	NC
9	AO6	28	NC
10	AO7	29	NC
11	GND	30	NC
12	NC	31	NC
13	AO8	32	NC
14	AO9	33	NC
15	AO10	34	NC
16	AO11	35	NC
17	GND	36	NC
18	NC	37	NC
19	NC		

Figure 22 IO3 Board Type Analog Output Expansion Module Connection Diagram