



HYDRONIC Hardware Modules' Specifications

Contents' Table

1. Overview.....	2
2. Hardware Parts.....	2
2.1 Power Supply.....	2
2.2 RS485 Communication.....	2
2.3 RS485 connector.....	3
2.4 RS485 Interface Topology.....	3
2.5 DOUT8A.....	4
2.6 DIN8A.....	5
2.7 DDIN5A.....	6
2.8 AOUT8A.....	7
2.9 AIN5A.....	8
2.10 ROUT5A.....	10
2.11 CIO5A.....	11
2.12 TRMA.....	12
2.13 IOBridge.....	13
2.14 CON64A.....	14



1. Overview

The purpose of this document is to present the main Hardware features of the HYDRONIC project Modules and list them per device.

2. Hardware Parts

2.1 Power Supply

The power supply in the HYDRONIC installation shall be from 9 till 14VDC with recommended supply of 12VDC. When a module is correctly connected to the power supply and flashed with a firmware, a power LED indicator is used to indicate if it is powered correctly.

2.2 RS485 Communication

The HYDRONIC project is designed to support RS485 bus communication through an exposed interface on each module.

The maximum number of IO peripherals supported to the communication bus is 64.

The maximum bus length from the first node to the last can be up to 1000m, for interior installations. For exterior ones please use shorter bus lengths and ideally lightning protection at your installation.

The connection to the RS485 interface is performed as follows:

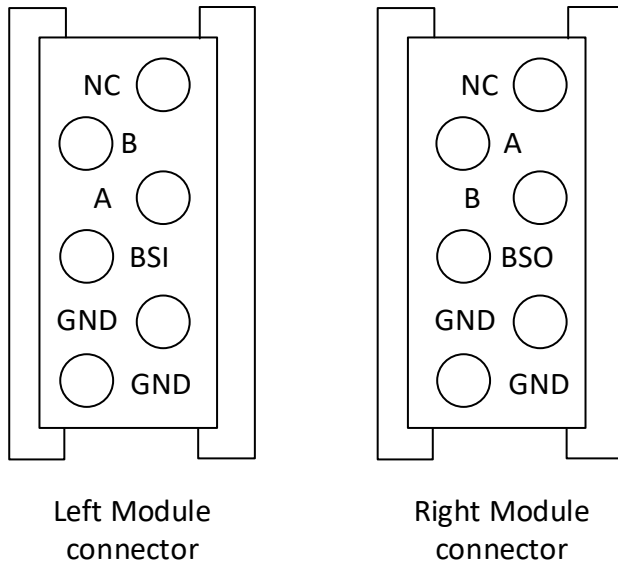
The master controller unit, CON64A, has one terminal connection where the first slave node shall be connected. Each additional node has two terminal connections. The left one is used for the incoming connection and the right one for the outgoing.

If a node in the bus is the terminal node, then a standard termination of 120Ω shall be used.

For long distance installations, a typical connection among the slave nodes may be achieved with a UTP cable. The minimum number of cables required is five (4), three (2) for the RS485 signals P and N and two (1) for GND signal. It is recommended that additional power supplies are used in the various distant sections of the installation. The common GND signal shall be maintained.

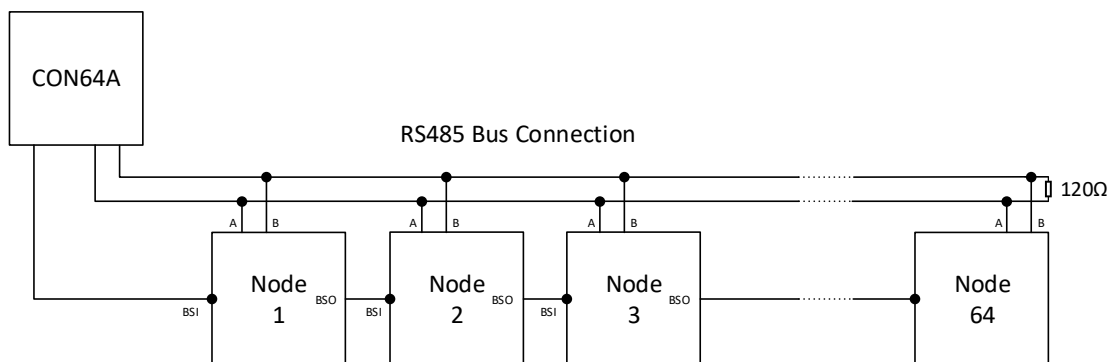
For diagnostics regarding the RS485 connection a communication indicator LED is used on all modules. When a slave node is exchanging messages with the Master node the LED blinks.

2.3 RS485 connector



The RS485 pinout incorporates a pin for the RS485 A signal, a pin for the RS485 B signal, a pin which brings the BSI signal from the previous node or transmits the BSO signal to the next node depending on the Interface position (Left vs Right) on the module and two (2) GND connected pins. The connection between two modules is performed using specific mini boards with ESD protection.

2.4 RS485 Interface Topology



In this figure the various nodes that may be connected to an RS485 Bus are presented. Each node is connected to the RS485 and additionally to the next node through the BSI and BSO signals coming from the microcontroller.

In that way each node may identify the next node independently of the RS485 communication, allowing auto addressing during initial setup.

2.5 DOUT8A

Technical Specifications:

8 onboard integrated Digital Outputs

2 Common Inputs

Interface: RS485

Supply Voltage: 9-14VDC

typ: 20mA @ 12V

max: 30mA @ 12V

COM1 refers to DO.8-5

COM2 refers to DO.1-4

COM Voltage: 0-60VDC +/- 15%

max: 10mA @ 48Volt per D.Output

Additional specs:

PWM Output supported

Frequency range: 0 – 80Hz

Duty Cycle range: 0 – 100%

CPU: STM32F100 Arm Cortex-M3 core

Diagnostics:

2 orange LEDs (Power, Comm.)

4 green LEDs (Diagnostics per 2 outputs)

Housing:

Dimensions (WxHxD): 36mm x 90 mm x 58mm

Material: Plastic

Mounting: on Standard mounting DIN rail EN 60715 TH35

Protection Class: < IP40

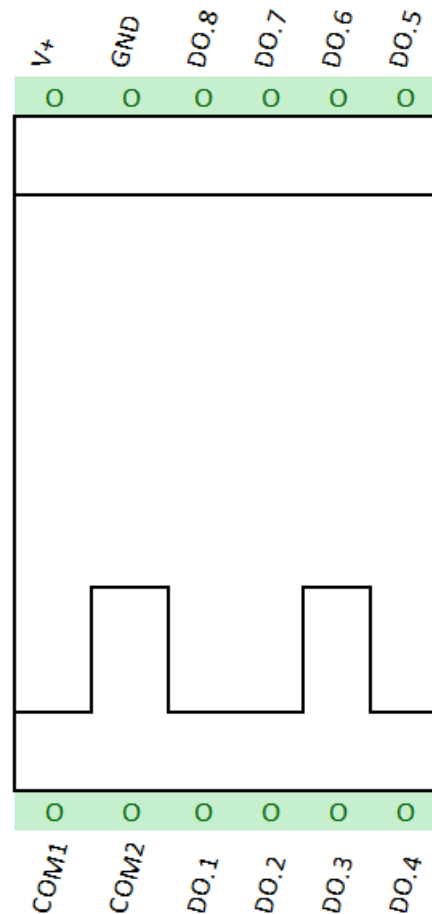
Connection: removable spring terminals

Mounting position: Optional

Description:

DOUT8A is a fast Digital Output switching module with 8 integrated Outputs. It brings two COM isolated connection Inputs that can be powered from external power supply up to 60VDC.

The same input voltage applied to each COM is driven to the corresponding output where the COM refers to. When no additional power supply is used a connection has to be made with the V+ connection but for optimal PWM performance it is recommended to use a separate power supply to the COM input.



2.6 DIN8A

Technical Specifications:

8 onboard integrated Digital Inputs
2 Common 12V powered outputs

Interface: RS485

Supply Voltage: 9-14V

typ: 20mA @ 12V

max: 30mA @ 12V

Additional specs:

Configurable Pulse input support

CPU: STM32F100 Arm Cortex-M3 core

Diagnostics:

2 orange LEDs (Power, Comm.)

4 green LEDs (Diagnostics per 2 Inputs)

Housing:

Dimensions (WxHxD): 36mm x 90 mm x 58mm

Material: Plastic

Mounting: on Standard mounting DIN rail EN 60715
TH35

Protection Class: < IP40

Connection: removable spring terminals

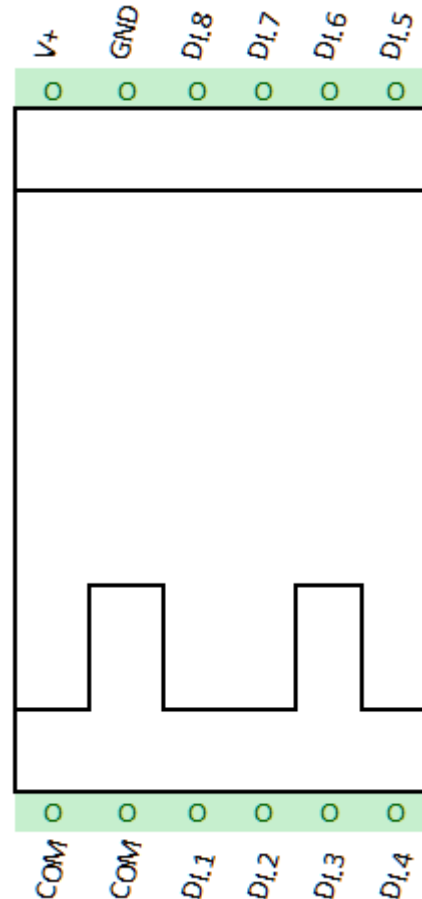
Mounting position: Optional

Description:

DIN8A module brings 8 integrated Inputs and 2 Common 12V powered Outputs.

The Outputs are used to power a desired contact and then return back to the Voltage to the Digital Input.

The typical usage refers to Relay type contacts.



2.7 DDIN5A

Technical Specifications:

5 onboard integrated Digital Differential Inputs

Interface: RS485

Supply Voltage: 9-14V

typ: 20mA @ 12V

max: 30mA @ 12V

Input Specifications:

Voltage: 12 – 240 VAC/DC +/- 15%

max line cable 200meter (tested)

CPU: STM32F100 Arm Cortex-M3 core

Diagnostics:

2 orange LEDs (Power, Comm.)

3 green LEDs (Diagnostic IN.1 – IN.3)

1 green LED (Diagnostic IN.4 – IN.5)

DDIN5A module brings 5 integrated Differential Inputs and is ideal for installations where the Input contact to be controlled needs to be isolated from the module's power supply.

In that way multiple different power sources may be connected to the Digital Inputs.

The Input power source supported may be either DC or AC.

It is designed to eliminate capacitive cable effects in AC Input voltages offering a robust solution for high demanding installations.

Housing:

Dimensions (WxHxD): 36mm x 90 mm x 58mm

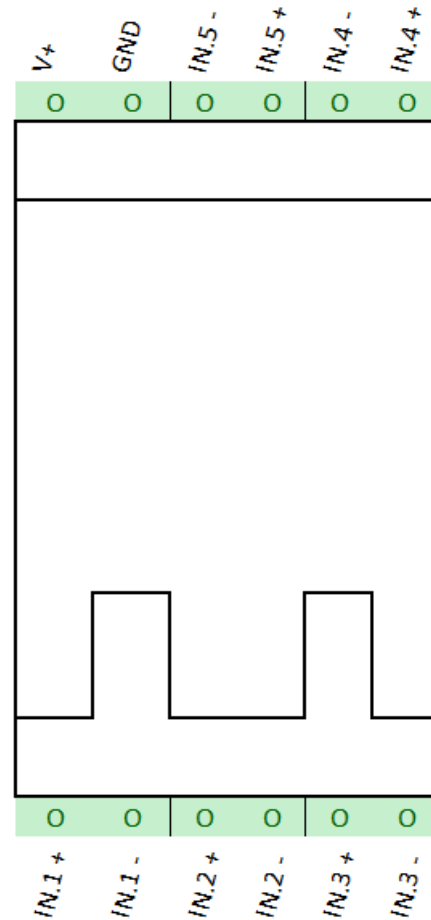
Material: Plastic

Mounting: on Standard mounting DIN rail EN 60715 TH35

Protection Class: < IP40

Connection: removable spring terminals

Mounting position: Optional



2.8 AOUT8A

Technical Specifications:

8 onboard integrated Analog Outputs

Interface: RS485

Supply Voltage: 10-14V

typ: 20mA @ 12V

max: 100mA @ 12V

Output Specifications:

Voltage: 0-10V

max: 10mA @ 10V per output

CPU: STM32F100 Arm Cortex-M3 core

Diagnostics:

2 orange LEDs (Power, Comm.)

4 green LEDs (Diagnostics per 2 Outputs)

Housing:

Dimensions (WxHxD): 36mm x 90 mm x 58mm

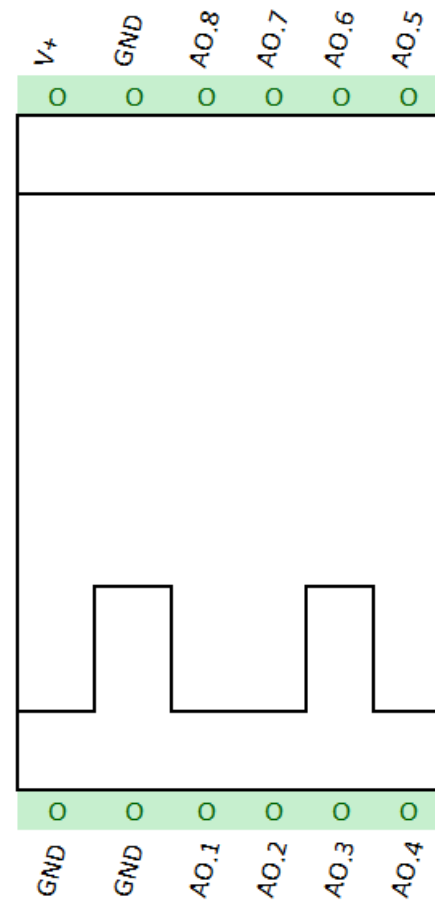
Material: Plastic

Mounting: on Standard mounting DIN rail EN 60715 TH35

Protection Class: < IP40

Connection: removable spring terminals

Mounting position: Optional



2.9 AIN5A

Technical Specifications:

5 onboard integrated Analog Inputs

Interface: RS485

Supply Voltage: 9-14V

typ: 20mA @ 12V

max: 30mA @ 12V

Input Specifications:

Voltage: 0 – [(V+) + 0.6V]

CPU: STM32F100 Arm Cortex-M3 core

Diagnostics:

2 orange LEDs (Power, Comm.)

3 green LEDs (Diagnostic AI.1 – AI.3)

1 green LED (Diagnostic AI.4 – AI.5)

AIN5A is 5 Inputs module designed to support the majority of the commonly used sensors of the market. Either for Active or Passive sensors it can measure resistance up to 800kΩ offering solutions for High demanding installations.

The connection to the Input is done with a GND signal, common for all inputs and the Voltage signal. It is important to connect always the GND signal as sensors from different power sources may be used and a common reference is necessary for all of them.

Currently the following sensors are supported:

Active

0 - 5 V

0 - 10 V

2 - 10 V

1.5 – 5.5 V

Passive

PT100_DIN_43760_DIN_EN_60751_Temp(C):[-50,600]

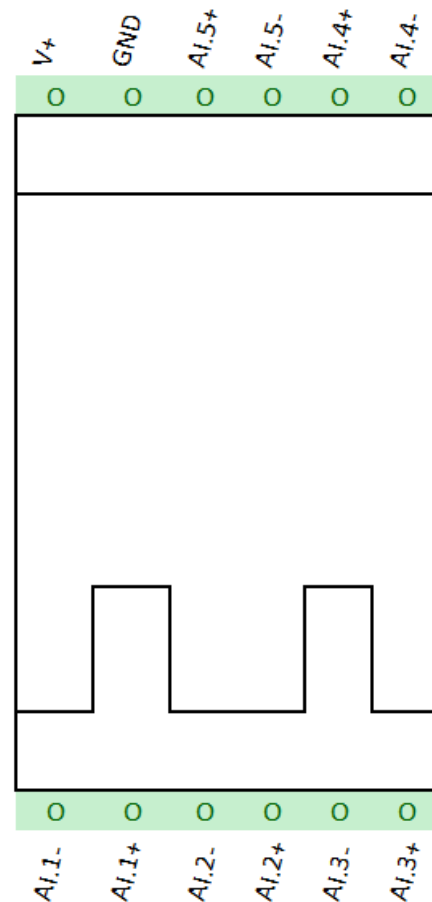
PT500_DIN_43760_DIN_EN_60751_Temp(C):[-50,600]

PT1000_DIN_43760_DIN_EN_60751_Temp(C):[-50,600]

Ni100_TCR5000_Temp(C):[-50,650]

Ni1000_TCR5000_Temp(C):[-50,650]

Ni100_TCR6180_Temp(C):[-50,650]





Ni1000_TCR6180_Temp(C):[-50,650]
NTC_10k_3435_Temp(C):[-40,125]
NTC_10k_3977_Temp(C):[-40,125]
NTC_12k_3740_Temp(C):[-40,125]
NTC_20k_4284_Temp(C):[-50,150]
KTY_81-121_Temp(C):[-55,150]
KTY_81-122_Temp(C):[-55,150]
KTY_81-210_Temp(C):[-55,150]
KTY_81-221_Temp(C):[-55,150]
KTY_81-250_Temp(C):[-55,150]

Custom

PT defined from equation $R = Type(1 + At + Bt^2 + C(t-100)t^3)$

NTC defined from equation $R_t = R_{25} \cdot \exp[B \cdot (1/T - 1/T_{25})]$

Linear Sensor defined from three interpolated pair values

Warning NOTICE: It is suggested that no longer cables than 10m long will be used for any Analog Sensor Input in order to not lose accuracy.

Housing:

Dimensions (WxHxD): 36mm x 90 mm x 58mm

Material: Plastic

Mounting: on Standard mounting DIN rail EN 60715 TH35

Protection Class: < IP40

Connection: removable spring terminals

Mounting position: Optional

2.10 ROUT5A

Technical Specifications:

5 onboard integrated Relay Contact Outputs

Interface: RS485

Supply Voltage: 9-14V

typ: 20mA @ 12V

max: 70mA @ 12V

Output Specifications:

NO contact Type

Supported Contact Types:

AC1: 5A @ 250VAC

DC12: 5A @ 24VDC

AC15: 2A @ 250VAC

DC13: 2A @ 24VDC

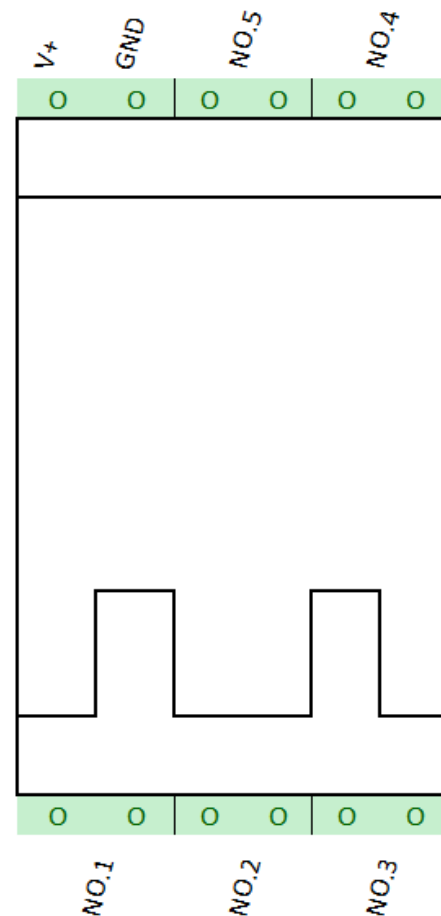
CPU: STM32F100 Arm Cortex-M3 core

Diagnostics:

2 orange LEDs (Power, Comm.)

3 green LEDs (Diagnostic NO.1 – NO.3)

1 green LED (Diagnostic NO.4 – NO.5)



ROUT5A is a relay Output module offering 5 Integrated Normal Open Contact Outputs.

The type of electrical load of the relays supported is

AC1: These types of contactors are used for Non-inductive or slightly inductive loads they are used for Heaters which are resistive loads.

DC12: Control of resistive loads and solid-state loads with opto-coupler isolation

AC15: Control of AC electromagnetic loads - power factor = 0.5 (inductive)

DC13: Control of DC electromagnetics - power factor = 0.5 (inductive)

For more information on the electric loads please refer to

https://en.wikipedia.org/wiki/Utilization_categories

When a contact is used mainly for DC Output the ON – OFF switch number is limited to around 10.000 due to arching effects.

Housing:

Dimensions (WxHxD): 36mm x 90 mm x 58mm

Material: Plastic

Mounting: on Standard mounting DIN rail EN 60715 TH35

Protection Class: < IP40

Connection: removable spring terminals
Mounting position: Optional

2.11 CIO5A

Technical Specifications:

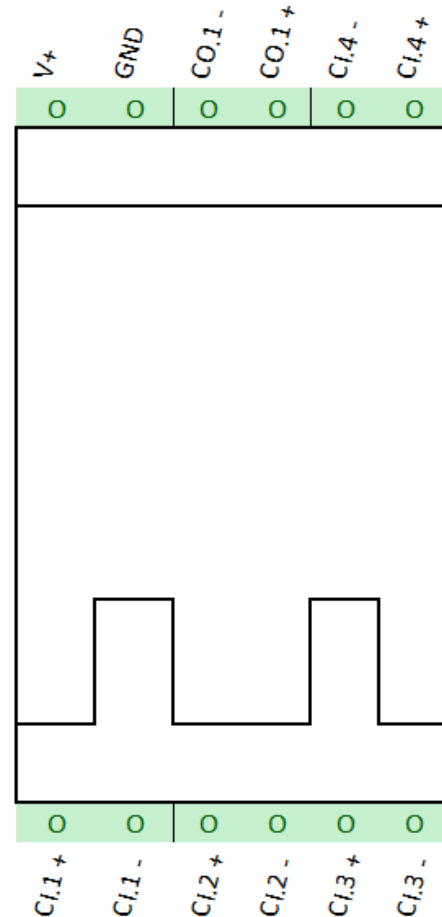
1 onboard integrated Current Output
4 onboard integrated Current Inputs

Interface: RS485

Supply Voltage: 9-14V
typ: 20mA @ 12V
max: 60mA @ 12V

Input Specifications:
I_{max}: -28 - +28 mA
Voltage 0-24VDC +/- 10%

Output Specifications:
Current: 0-20mA
3KV isolation
I_{max}: 30mA + 2%
V_{out}: 12Volt +/- 5%
Current to device + → -



CIO5A module offers 4 current Inputs and 1 current Output.

The current output does not require external power source as it is internal powered offering a simple and flexible solution in installations.

The current to the device flows from + to – contact.

Warning: This device is not designed to measure itself, meaning that the CO_{UT} is not meant to be connected to the CIN.

CPU: STM32F100 Arm Cortex-M3 core

Diagnostics:

2 orange LEDs (Power, Comm.)
2 green LEDs (Diagnostic CI.1 – CI.4)
1 green LED (Diagnostic CO.1)

Housing:
 Dimensions (WxHxD): 36mm x 90 mm x 58mm
 Material: Plastic
 Mounting: on Standard mounting DIN rail EN 60715 TH35
 Protection Class: < IP40
 Connection: removable spring terminals
 Mounting position: Optional

2.12 TRMA

Technical Specifications:

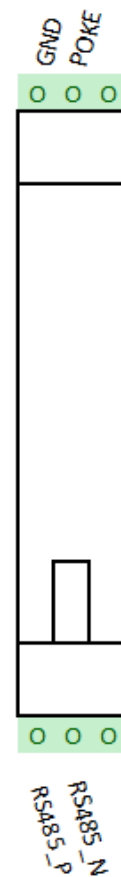
Terminal Module to expose RS485 cables to Connector Terminal Blocks.

Interface: RS485

Supply V+: No Supply

Input:
 RS485 Connector

Output: 0-20mA
 RS485_P: Corresponds to (B)+
 RS485_N: Corresponds to (A)-
 POKE : Corresponds to BSO
 GND



2.13 IOBridge

Technical Specifications:

Offers hard connectivity between the
Various Slaves.

When the optional 120Ω is soldered the
connector is considered as terminal
connector and must be installed to the last
slave in the row.



2.14 CON64A

Technical Specifications:

Microcontroller Unit

Supply V+: 12V

Clock: 168MHz

CPU:

STM32F437 Arm Cortex-M4 core

Interfaces:

Ethernet:

100 MHz, RMII, half-duplex

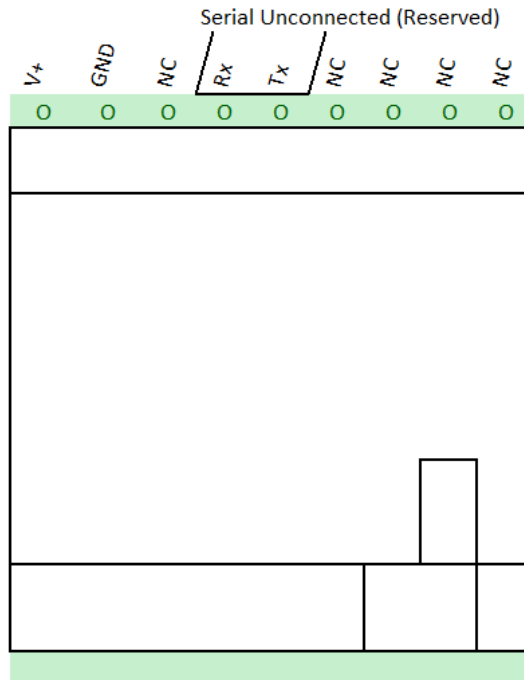
RS485

RAM Memory: 256KB

Flash Memory:

Internal: 1 MB

External: 64 MB



Housing:

Dimensions (WxHxD): 53mm x 90 mm x 58mm

Material: Plastic

Mounting: on Standard mounting DIN rail EN 60715 TH35

Protection Class: < IP40

Connection: removable spring terminals

Mounting position: Optional

Diagnostics:

2 orange LEDs (Power, Comm.)

1 green LEDs (FS Operations)

1 green LED (Error State)

Extras: The Ethernet communication provides an easy way to the user to interact with the microcontroller's Web Interface.

The device is designed for usage in private LAN networks without accessibility to the Internet, it is easy though through the Ethernet to provide remote access to the Interface. Remote access may be achieved by connecting the device to an Access Point using the Ethernet Interface.



The seller is not responsible for any loss or damage arising from the usage of this device in networks accessible from the internet.