

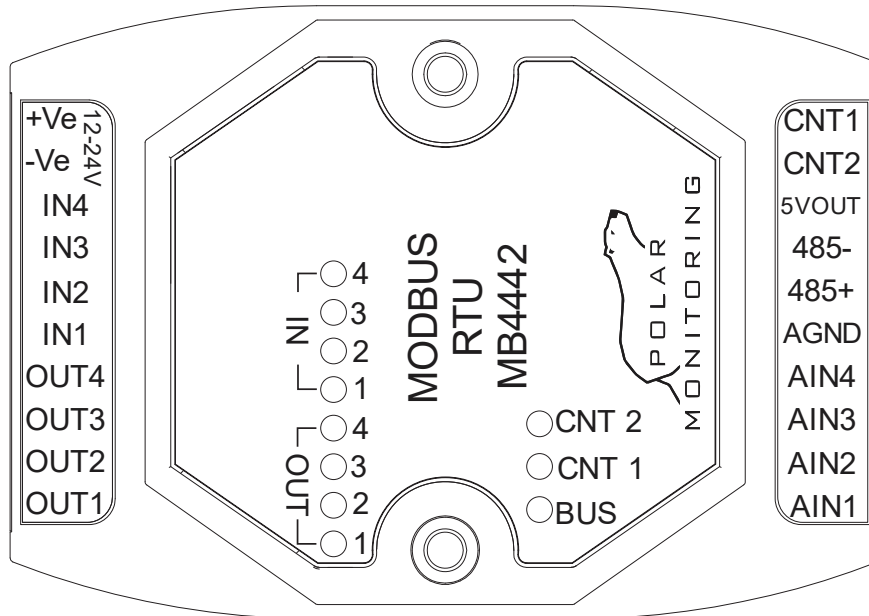


Polar Monitoring  
MB4442 Module

**USER MANUAL**

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# Introduction

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This document will provide the technical data and specifications around the Polar Monitoring MB4442 module (MB4442) and how it can be incorporated to monitor and control other devices in the field.

## Overview

The MB4442 Module is an analogue input and digital input/output device that is controlled and read via RS-485. It is fully integrated with the Polar Monitoring Cloud Portal and when used alongside the Polar Monitoring Gateway to get data from non RS-485 devices and sensors to the Polar Portal.

It can read any 4-20ma sensor output for remote monitoring and display, provide remote control via digital outputs, read and graph pulse data from water and electricity meters and monitor run times.

## Features

The MB4442 can take several inputs in and control up to 4 digital outputs. The input and output configuration of the device is as follows:

- 4x Digital Outputs
- 4x Digital Inputs
- 4x Analogue Inputs (4-20ma)
- 1x Analogue Ground
- 1x 5v DC Output
- 2x Pulse Counters

# Installation Procedures

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The installation will be two parts, the first being the mechanical installation of the physical device and the second is the wiring configurations of the various terminals.

## Mechanical Installation

The MB4442 is din rail mount and has its clips on the back of the device. The unit has a water and dust ingress rating (IP Rating) of IP40. This means that it will require additional protection from the elements and should be mounted inside of an electrical panel or housing.

The MB4442 should be placed at least 100mm away from any high-power devices and must not be placed above any device that produces heat in the panel.

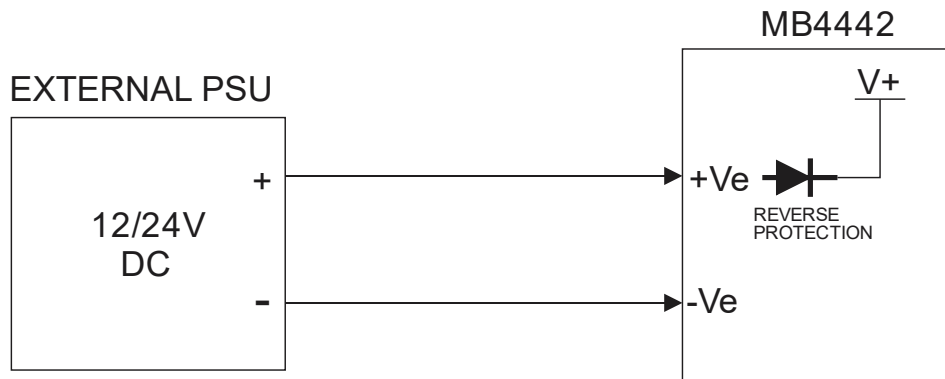
Care must be taken when mounting to allow for the communication cables and power cables to fit into the unit without obstructing or being obstructed by any other devices in the enclosure.

## Electrical installation

### Power Supply

The MB4442 is powered with 9 to 30V DC only, this needs to be provided by a DC power supply. The power supply has an internal reverse polarity protection diode.

# Installation Procedures



## Electrical Connections / Terminals

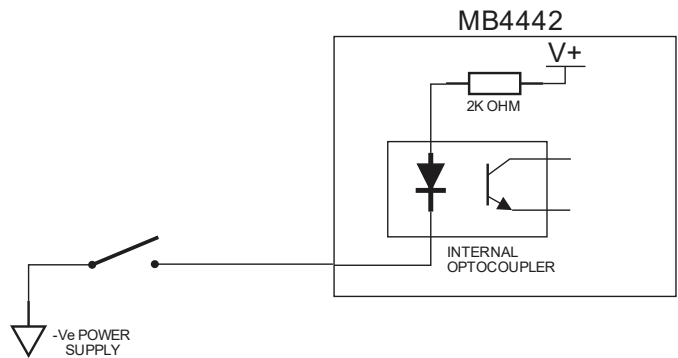
Refer to the Electrical connectors below as to which terminal needs to be used for the various inputs and outputs. A breakdown of each pin out and how they function internally is also included below. Care must be taken when connecting various sensors so that they function as intended.

Symbol	Name	Description:
+Ve	Positive Supply Voltage	12 to 24V DC
-Ve	Negative Supply Voltage	Ground / 0V DC
IN1	Digital Input 1	NPN Type (Pull to GND)
IN2	Digital Input 2	NPN Type (Pull to GND)
IN3	Digital Input 3	NPN Type (Pull to GND)
IN4	Digital Input 4	NPN Type (Pull to GND)
OUT1	Digital Output 1	NPN Type (Pull to GND)
OUT2	Digital Output 2	NPN Type (Pull to GND)
OUT3	Digital Output 3	NPN Type (Pull to GND)
OUT4	Digital Output 4 -	NPN Type (Pull to GND)
AIN1	Analogue Input 1	(4-20mA)
AIN2	Analogue Input 2	(4-20mA)
AIN3	Analogue Input 3	(4-20mA)
AIN4	Analogue Input 4	(4-20mA)
AGND	Analogue Ground for Analog Inputs	Pin bridged to GND Internally
485 (A+)	RS485 (A+)	Modbus Tx
485 (B-)	RS485 (B-)	Modbus Rx
5VOUT	+5V DC Output	5V DC Output
CNT1	Pulse Counter 1 Input	Count saves locally
CNT2	Pulse Counter 2 Input	Count saves locally

# Installation Procedures

## Digital Inputs

Digital inputs are used to monitor on/off states of devices in the field. The Digital inputs are **NPN Type** inputs as shown on the right.



## Digital Outputs

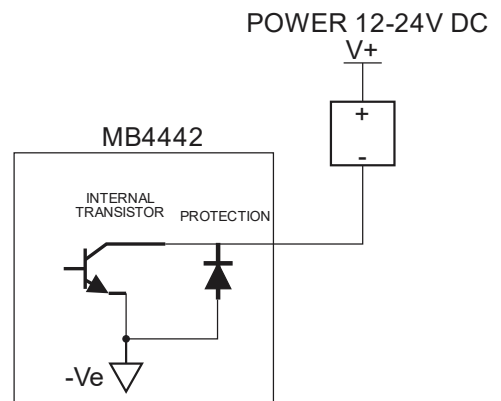
Digital outputs are used to provide on off control to devices in the field. The Digital Outputs are **NPN Type**.

The internal transistor is connected to the negative power supply

The load can be supplied from the same power supply or a separate power supply which has the negative supply connected to the negative supply of the MB4442 (common ground).

The output current is short-circuit protected for 2 seconds.

Maximum output current is 500mA continuous.

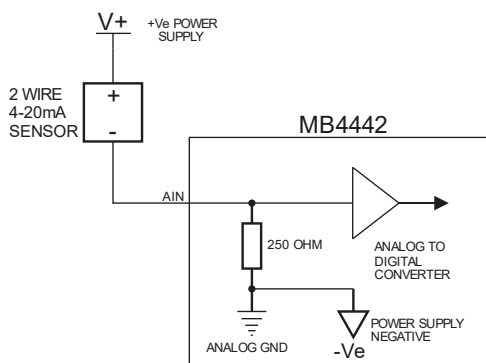


## Analogue Inputs

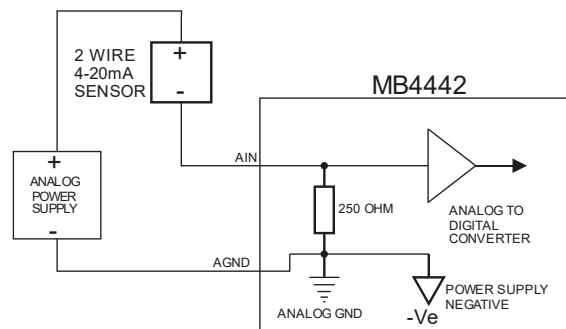
Analogue inputs are used in applications where a varying signal or output is required. The input functions as a 4-20mA input sensor only.

The analogue inputs are referenced to the internal analogue ground (AGND) for added accuracy.

If a second power supply is used for the analogue inputs, it's negative terminal must be connected to the AGND terminal of the MB4442.



CONNECTIONS USING THE SAME POWER SUPPLY AS THE MB4442



CONNECTIONS USING A SECOND ANALOG SUPPLY

# Installation Procedures

## Pulse Counter Inputs

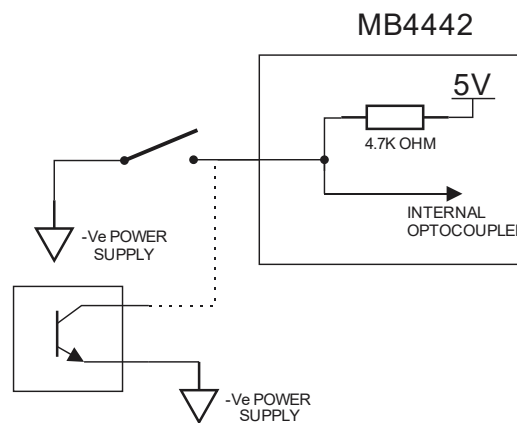
Pulse counters are used to incrementally count the number of on/off signals given by devices in the field. These come in the form of pulse output devices such as water and electricity meters.

Both counters have the same input circuitry

The counter counts once every time their input is connected to the -Ve power supply (GND).

The switch must be de-bounced.

The switch can be any device which connects the input to GND, such as a reed switch, optocoupler or transistor output.



# Indicators

The indicators are found on the front face of the MB4442 and represent the following information

LED	COLOUR	MEANING
IN 1 - 4	Green	Solid Green - Digital Input Is ON. No light - Digital input is OFF
OUT 1 - 4	Red	Solid Red - Output is ON No Light - Output is OFF
CNT 1	Blue	Flashes when the counter 1 is counting, 1 flash per count received
CNT 2	Blue	Flashes when the counter 2 is counting, 1 flash per count received
BUS	Green	ON Permanently to show that power is ON Flashes OFF when unit receives its own ID on the Modbus network

# RS-485 Communication

The unit's communication works using a RS-485 serial network. It then uses the Modbus protocol on top of the RS-485 to extract the data from the units.

## Connection:

The connection of the RS-485 network must be connected using a twisted pair cable, where wires (A) & (B) are twisted around each other.

The -Ve (GND) of the unit must be common with the RS-485 master device.

## Network Address:

The MB442 is a Modbus slave device. By default, the units slave address is set to 1. This can be changed via Modbus commands.

# Specifications

Below is a table describing connectivity and specifications of the MB4442 Fieldbus

	Parameters	Description
Basic Parameters	Power	9-36V DC
	Operating Current (12V)	Average: 100mA Max: 160mA
	Serial Interface	RS-485
Environmental	Dimensions	123.5 x 71.5 x 44.2 CAD File: <a href="http://polarmonitoring.com/support/">polarmonitoring.com/support/</a>
	Weight	98g
	Operating Temperature	-20°C to +50°C
	Storage Temperature	-30°C to +50°C
	Operating Humidity	5% to 90% (non-condensating)
	Water and Dust Protection (IP rating)	IP40
Serial Parameters	Slave ID	1
	Baud Rate	9600 kps (not configurable)
	Stop/parity	8, no, 1

**Drawing:**

