Technical Features

Input Voltage	12 to 24Vdc (Fuse protection (2.5A) Polarity protection)
Input Rated Voltage	24 Vdc
Rated Power	30 W (Refer to Model Comparison table)
Maximum Current	1.5 A
Insulation Resistance	20MΩ min.at 500Vdc between the AC terminals and the protective earth terminal.
Dielectric Strength	2.300 VAC at 50/60 Hz for one minute with a leakage current of 10mA max. Between all the external AC terminals and the protective ground terminal.
Power Supply Holding Time	2 ms min.
Communications & Features	Ethernet (W5500), RS-485, RS-232, I2C, SPI, Serial TTL, USB 2.0 Type-B, RTC, µSD

ARDUINO
Original **Arduino Mega** included

Environmental Specifications

Operating Ambient Temp.	0° to 60°C
Storage Ambient Temp.	-20° to 60°C
Operating Ambient Humidity	10% to 90% (No condensation)
Ambient Environment (Oper.)	Free from corrosive gases

Controller Specifications

Arduino Board	Arduino Mega 2560
Microcontroller	ATmega2560
Flash Memory	256 KB (8 KB used by the bootloader)
SRAM	8 KB
EEPROM	4 KB
Clock Speed	16 MHz

Mechanical dimensions and weights

	Measurements			
Model	Height (mm)	Width (mm)	Depth (mm)	Max Weight (g)
19R+	119.5	70.1	101	378
21+	119.5	70.1	101	378
38AR+	119.5	94.7	101	488
38R+	119.5	94.7	101	488
42+	119.5	94.7	101	488
50RRA+	119.5	119.3	101	598
53ARR+	119.5	119.3	101	598
54ARA+	119.5	119.3	101	598
57AAR+	119.5	119.3	101	598
57R+	119.5	119.3	101	598
58+	119.5	119.3	101	598

Zones table

	Zones table			
Model	Zone A	Zone B	Zone C	Zone D
19R+	✓	Relay	-	-
21+	✓	Analog/Digital	-	-
38AR+	✓	Analog/Digital	Relay	-
38R+	✓	Relay	Relay	-
42+	✓	Analog/Digital	Analog/Digital	-
50RRA+	✓	Relay	Relay	Analog/Digital
53ARR+	✓	Analog/Digital	Relay	Relay
54ARA+	✓	Analog/Digital	Relay	Analog/Digital
57AAR+	✓	Analog/Digital	Analog/Digital	Relay
57R+	✓	Relay	Relay	Relay
58+	✓	Analog/Digital	Analog/Digital	Analog/Digital

Model Comparison Table

Model	Reference	Total Inputs	Total Outputs	Analog/Digital Inputs	Digital Isolated Inputs (Interrupts)	Analog/Digital/ PWM Outputs	Digital Isolated Outputs	Relays	*Power Consumption (W)
19R+	IS.MDUINO19R+	6	11	4	2 (2)	3	0	8	4.85
21+	IS.MDUINO.21+	13	8	6	7 (2)	3	5	0	2.88
38AR+	IS.MDUINO.38AR+	19	19	10	9 (4)	6	5	8	5.30
38R+	IS.MDUINO.38R+	12	22	8	4 (4)	6	0	16	7.51
42+	IS.MDUINO.42+	26	16	12	14 (4)	6	10	0	3.07
50RRA+	IS.MDUINO.50RRA+	22	28	12	10 (6)	8	4	16	7.73
53ARR+	IS.MDUINO.53ARR+	25	28	14	11 (6)	8	5	15	7.75
54ARA+	IS.MDUINO.54ARA+	29	25	14	15 (6)	8	9	8	5.54
57AAR+	IS.MDUINO.57AAR+	32	25	16	16 (6)	8	10	7	5.30
57R+	IS.MDUINO.57R+	18	31	12	6 (6)	8	0	23	10.20
58+	IS.MDUINO.58+	36	22	16	20 (6)	8	14	0	3.02

*Measured at 24 Vdc with all outputs active and no external load. Not the absolute maximum.

Expansion Board Resources

Certain I/O pins may be unavailable depending on the expansion board. See the table below:

WiFi & BLE	GPRS/GSM	LoRa	DALI	WiFi & BLE & GPRS/GSM
• 1 x Serial TTL • 2 x Digital Optoisolated Inputs (Interrupts)	• 1 x Serial TTL • 1 x Direct Arduino Pin • 3 x Digital Optoisolated Inputs (Interrupts)	• 1 x Direct Arduino Pin • 2 x Digital Optoisolated Inputs (Interrupts)	• 1 x Serial TTL • 2 x Digital Optoisolated Inputs (Interrupts)	• 1 x Serial TTL • 1 x RS-232 • 2 x Digital Optoisolated Inputs (Interrupts) • 1 x Analog/Digital Output

Dig. Isolated Inputs

Parameter	Value
Range	5 to 24 Vdc
Rated Voltage	24 Vdc
I min.	2 mA
Max. Freq.	20 KHz
Isolation	Optocoupled

Analog/Digital Inputs

Parameter	Value
Resolution	10 bit
Range (An)	0 to 10 Vdc
Rated Voltage (An)	10 Vdc
Range (Dig)	0 to 24 Vdc
Rated Voltage (Dig)	24 Vdc
Input Impedance	39 kΩ
I max.	2 mA
Max. Freq. (An)	15 KHz
Max. Freq. (Dig)	20 KHz
Isolation	Optocoupled

An/Dig/PWM Outputs

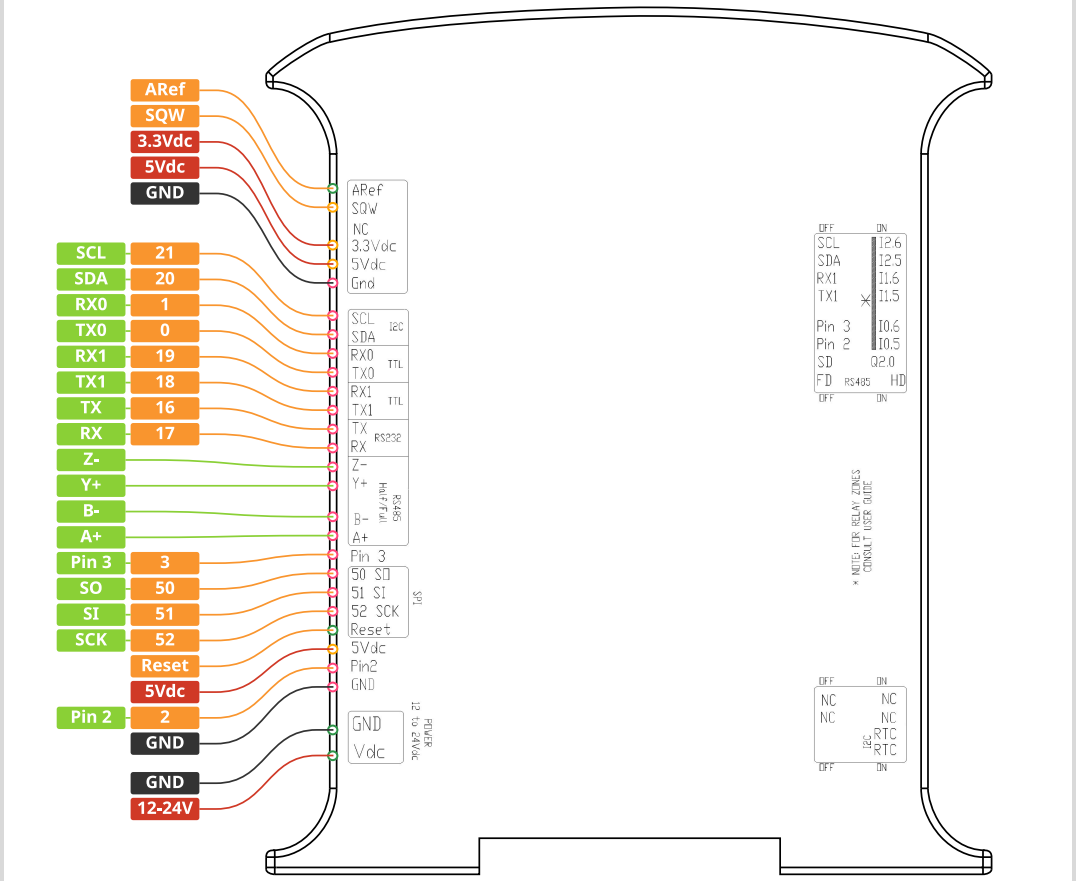
Parameter	Value
Resolution	8 bit
Range	0 to 10 Vdc
Rated Voltage (An)	10 Vdc
Range (Dig)	0 to 24 Vdc
Rated Voltage (Dig)	24 Vdc
I. max.	20 mA
Max. Freq.	2 KHz
Protection	Diode Protected for Relay
Isolation	Optocoupled

Dig. Isolated Outputs

Parameter	Value
Range	5 to 24 Vdc
Rated Voltage	24 Vdc
I max.	70 mA
Max. Freq.	4 KHz
Isolation	Optocoupled
Protection	Diode Protected for Relay

Relays

Parameter	Value
Operating Mode	*Resistive Load
Voltage Range	230 Vac (AC)
	24 Vdc (DC)
Maximum Current	4 A (AC)
	2 A (DC)
Isolation	Optocoupled



M-Duino PLC Communication Zone Pinout

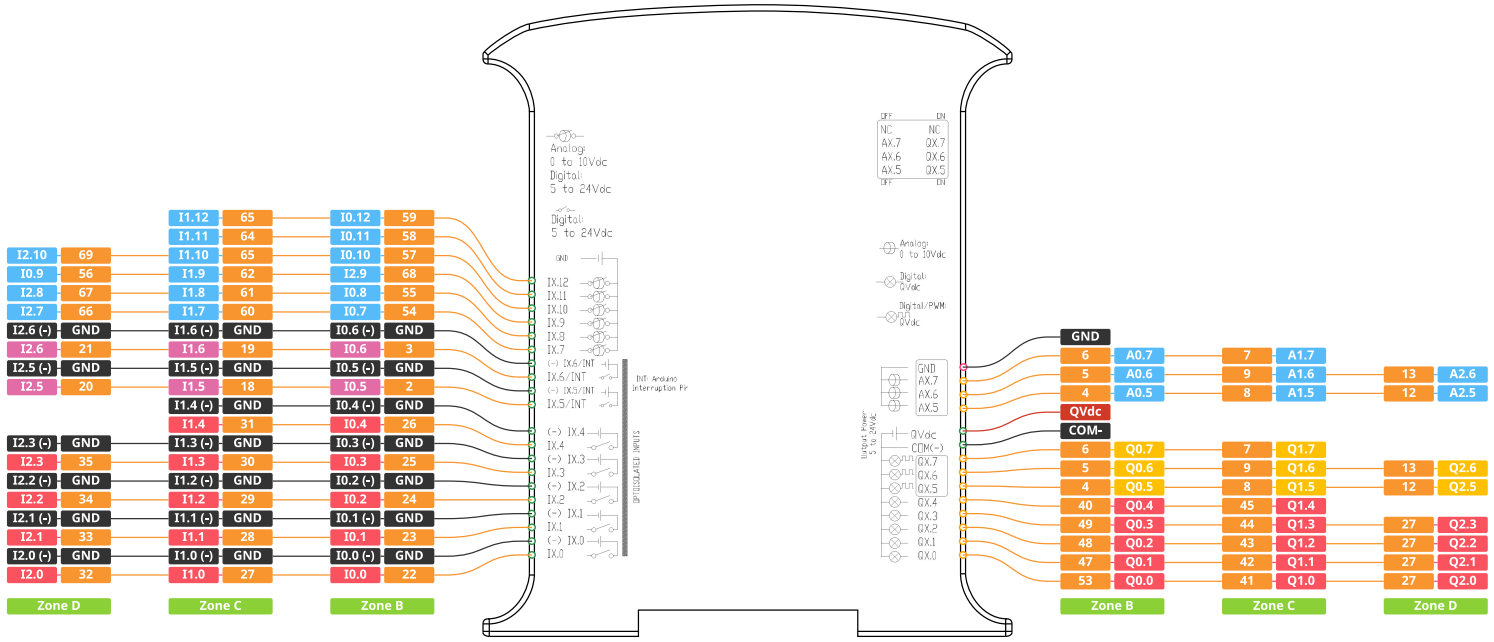
Pinout Function

Communication GPIO
Ground Power

Pinout Direction

Input Output Input/Output

*If inductive loads are used, we recommend installing an RC snubber filter. The RC values must be calculated based on the characteristics of the connected load.



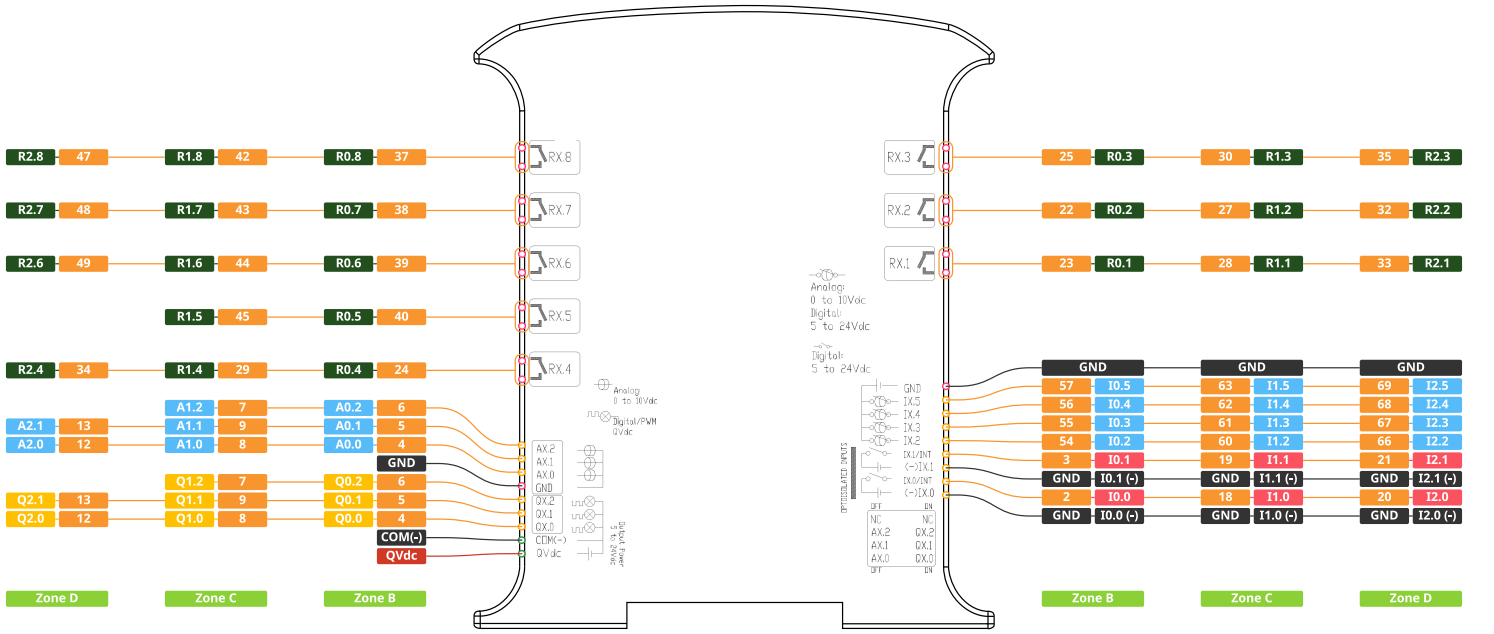
M-Duino PLC Analog/Digital Zone Pinout

Pinout Function

- Ground
- GPIO
- Power
- Analog
- Digital
- PWM
- Interrupt

Pinout Direction

- Input
- Output
- Input/Output



M-Duino Relay Zone Pinout

Pinout Function

- Ground
- GPIO
- Power
- Analog
- Digital
- PWM
- Relay

Pinout Direction

- Input
- Output
- Input/Output

Install Arduino IDE and the Industrial Shields boards

Steps to install Industrial Shields equipment in the Arduino IDE:

1. Open the Arduino IDE (version 1.8.19 or later). You can download it from: https://www.arduino.cc/en/Main/Software
2. In the Arduino IDE, go to the File menu and click Preferences.
3. In the **"Additional Board Manager URLs"** field, add this URL: http://apps.industrialshields.com/main/arduino/boards/package_industrialshields_index.json
4. Click **OK** to close the Preferences window.
5. Go to the **Tools** menu, open the **Board** submenu, and click **Boards Manager**.
6. In the Boards Manager window, type **industrialshields-avr** into the search bar. Select the result from the list and click **Install**.
7. Once the installation is complete, close the Boards Manager.

You will now be able to select the desired PLC from **Tools > Board**, such as M-Duino, Ardbox, etc.

For more information, visit:
https://www.industrialshields.com/blog/arduino-industrial-1/how-to-install-industrial-shields-boards-in-the-arduino-ide-63

References

The references are: 0EE00100MM00
E stands for the Expansion Board:

- EE = 04 → DALI
- EE = 06 → GPRS
- EE = 07 → ESP32
- EE = 15 → LoRa

M stands for Model:

- MM = 01 → 19R
- MM = 02 → 21
- MM = 03 → 38R
- MM = 04 → 42
- MM = 05 → 57R
- MM = 06 → 58
- MM = 07 → 38AR
- MM = 08 → 57AAR
- MM = 10 → 53ARR
- MM = 11 → 54ARA

Warnings

Unused pins should not be connected. Ignoring the directive may damage the controller.

Before using this product, it is the responsibility of the user to read the product's User Guide and all accompanying documentation.

Industrial Shields PLCs must be powered between 12Vdc and 24Vdc. If a higher voltage is supplied to the equipment can suffer irreversible damage.

Maintenance must be performed by qualified personnel familiarized with the construction, operation, and hazards involved with the control.

Maintenance should be performed with the control out of operation and disconnected from all sources of power.

The Industrial Shields Family PLCs are Open Type Controllers. It is required that you install the Ardbox family PLC in a housing, cabinet, or electric control room. Entry to the housing, cabinet, or electric control room should be limited to authorized personnel.

Inside the housting, cabinet or electric control room, the Industrial Shields PLC must be at a minimum distance from the rest of the components of a minimum of 25 cm, it can be severely damaged.

Failure to follow these installation requirements could result in severe personal injury and/or property damage. Always follow these requirements when installing Ardbox family PLCs.

In case of installation or maintenance of the PLC please follow the instructions marked in the Installation and Maintenance section on the User Guide.

Do not disconnect equipment when a flammable or combustible atmosphere is present.

Disconnection of equipment when a flammable or combustible atmosphere is present may cause a fire or explosion which could result in death, serious injury and/or property damage.

This equipment does not include galvanic isolation between the grounds of the different systems. This means that if an external device or sensor that shares the same ground reference (GND) with the system is connected, any potential difference between these grounds could damage the connected components. To avoid issues with interference, ground loops, or damage to external equipment, ensure that all connected devices share the same ground reference or use systems with appropriate isolation. The recommendations in this case are:

- Connection Review: Verify that all ground connections are properly made and that there are no significant potential differences between them.
- Use of Isolation: Consider using galvanic isolators or isolation transformers if it is necessary to connect equipment with different ground references.

Symbology

⎓	Indicates that the equipment is suitable for direct current only; to identify relevant terminals
~	Indicates that the equipment is suitable for alternating current only; to identify relevant terminals
⎍	To identify the control by which a pulse is started.
⏚	To identify an earth (ground) terminal in cases where neither the symbol 5018 nor 5019 is explicily required.
⊗	To identify the switch by means of which the signal lamp(s) is (are) switched on or off.
CE	CE marking indicates that a product complies with applicable European Union regulations
⚠	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury
ϟ	To indicate hazards arising from dangerous voltages

Technical Support

You can contact with us using the best channel for you:

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