



CONTROL UNIT ARDOPLC 100

MANUAL

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1. CONTROL UNIT ArdoPLC 100

1.1. INTRODUCTION

The ArdoPLC 100 control unit is a compact unit with the possibility of further expansion using the RS - 232, SPI, RS - 485 communication lines. The unit is based on the ARDUINO platform. Its programming is possible in the ARDUINO IDE programming environment. The program is being introduced through a serial line called UART.

The unit is built from several separate modules. Each of these modules can be purchased separately and used in other of your applications.

The unit is predominantly designed for simpler applications in the area of measurement and regulation. Although it's a smaller unit, it has a fair amount of peripheral equipment.

1.2. CONSTRUCTION UNIT

As mentioned in the introduction, the unit is built from several modules. We will mention them a little here.

The central module is the so-called BIN 4010 module. The module contains an ATmega 128 processor. It is an 8-bit processor with 128 KBytes Flash memory, 4KBytes EEPROM and 4KBytes RAM in a TOFP 64 case. The board also includes the DS3231 real-time circuit and EEPROM AT24C64 memory. The module is fitted with connectors for further extension and modules integration.

The other modules in the unit are the BDI5010 display module and the BKE6010 keyboard module. Both modules extend the central module BIN4010.

The BDI5010 module is populated with a TFT display 128 x 160 1.8" and an SD card case. The module communicates with the BIN4010 module on the SPI bus.

The keyboard module BKE6010 is fitted with a rotary switch with a button.

The central module is linked to the base module BBA1010 using the BRE7010 reduction. The BBA1010 module contains peripherals of inputs, outputs and communication lines.

Each of the above modules is described in separate manuals. You can find them at www.arduinoplz.cz in the "Download" section.

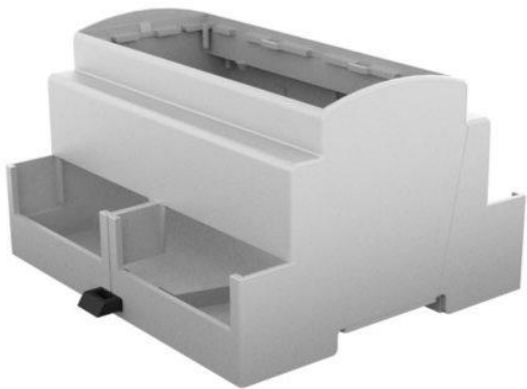
The image shows the ArdoPLC 100 modules assembly.



2. BASIC PARAMETERS UNIT ArdoPLC 100

2.1. CONSTRUCTION PARAMETERS

The ArdoPLC 100 unit is designed for installation in cabinets and stands. The unit's electronics are embedded in a plastic ABS case with a bracket for mounting on the U bar (DIN bar).



| | |
|--------------------------|--------------|
| Manufacturer: | Italtronic |
| Series: | Modulbox XTS |
| Material: | BS / PC |
| Dimension - DIN modulů : | 6M |
| Color: | gray |
| widht: | 90 mm |
| length: | 106 mm |
| height: | 62 mm |

2.2. ELECTRICAL PARAMETERS

Tab 2.1 Basic parameters

| | |
|--|--|
| Product standard Protection class of electrical object Type of equipment Coverage | ČSN EN 61131-2:2008 II Built in, fixed instalation IP20 |
| Power unit | |
| Power supply (SELV) Module power input | 24V DC Max 5W |
| Conection | |

| | |
|--|--|
| Terminals type wire | Removable screw-type connections max 1,0mm ² |
| Inputs and outputs | |
| Power supply galvanic isolation from internal circuits outputs protection Digital input and power protection | NO Resettable fuse Transil |

2. 3. PERIFERIE

As previously mentioned, the unit contains the TFT display module 128 x 160 1,8" with the case for the SD card (see the BDI5010 module manual for information), the keyboard module (see the BKE6010 module manual), and the I/O module of the BBA1010 peripherals. Again, see the manual for this module for details.

basic unit properties :

- 8x digital input (active at +24V)
- 4x analog input (range 0 – 10V)
- 10x digital output (open collector switching to GND)
- 2x PWM digital output (open collector switching to GND)
- 2x analog output (range 0 – 10V)
- 2x line to connect DALLAS thermometers
- 1x IIC line
- 1x serial line RS232 TTL
- 1x RS485 Serial Line

2. 3. 1 DIGITAL INPUTS

The module contains a total of 8 binary inputs identified as DI 1 - DI 8. Inputs are not galvanically separated from the unit's internal circuits. All inputs have one common GND terminal. Input activation is performed by bringing a positive voltage of 24V DC to a specific binary input. The maximum input voltage is 30V DC. The input stream at log 1 is typically 5mA.

Schema the binary inputs can be found at the end of the manual in the attachment chapter

2. 3. 2 ANALOG INPUTS

The unit contains a total of 4 analogue inputs designated AI 1 - AI 4. The inlets are not galvanically separated from the inner circuits. All inputs have one common GND terminal. Analogue inputs are designed to measure input voltages in the range 0 - 10 V DC. The maximum input voltage is 30V DC without damage. The digital resolution of analogue inputs is given by the processor used, i.e. 10 bits. See the end of the manual in the annex chapter for a diagram of analogue input engagement.

2. 3. 3 DIGITAL OUTPUTS

The control unit contains a total of 12 binary outputs. Outputs are realised by transistors switching to the common GND terminal. Maximum output voltage is 30V DC. Based on the current load, we distinguish two types of output. Outputs DO 1 - DO 8 are fitted with MOSFET transistors. These outputs are secured by a 1.1A return fuse. PW 1 - PW 2 and DO9 - DO10 outputs are fitted with NPN transistors. These are secured with reversible fuses of 100mA. PW 1 - PW 2 outputs can also be used in the PWM output function. See the end of the manual in the attachment chapter for a diagram of binary output engagement.

2. 3. 4 ANALOG OUTPUTS

The unit contains 2 analogue outputs of AO 1 - AO 2. Outputs are voltage in the range 0 - 10V DC. The outputs have a common GND terminal and are not galvanically separated from the internal circuits of the unit. The maximum output current load is 10 mA. The analog output signal is realised using the PWM - ANALOG converter whose wiring diagram can be found at the end of the manual in the attachment chapter

2. 3. 5 DALLAS COMMUNICATION BUS

The Dallas communication lines are primarily designed to communicate with DS 1820 temperature sensors. They can also be used for other device of this family. The Dallas communication line is represented by the DAL1 and DAL2 clamps. The 5V and GND clips provide power to the sensors on the Dallas line. As shown by the wiring diagram found at the end of the manual in the attachment chapter, two pins of processor provide communication on the line. One is designed as an output and switches a transistor that strengthens the current line. The second pin provides only reception. This solution makes it possible to achieve a sufficient line length and number of sensors on the line. It is essentially a single line that is divided into two communication circuits. The need for reliable operation of the line is to comply strictly with the wiring of the line in series.

2. 3. 6 INTERFACE RS 485

The interface is realised by the TTL serial interface converter on the RS - 485 interface. For interface engagement, see the end of the manual in the attachment chapter

2. 3. 7 INTERFACE IIC

The IIC communication interface is used to connect several participants on a single line to create a communication network. For interface engagement, see the end of the manual in the attachment chapter.

2. 3. INTERFACE USART

For interface engagement, see the end of the manual in the attachment chapter.

2. 4. TERMINALS DESCRIPTION

| Description terminal control unit ArdoPLC 100 | | |
|--|-------------|--|
| TERMINALS | | DESCRIPTION |
| DIGITAL INPUT | DI 1 - DI8 | Digital inputs 1-8 (max +24V) |
| DIGITAL OUTPUT | DO 1 - DO8 | Digital outputs 1-8 (max 30V/1A) |
| OUTPUT | AO 1 - AO2 | Analog outputs 0 - 10V |
| | PW 1 - PW 2 | Digital outputs PWM (max 30V/0,1A) |
| OUT | DO 9 - DO10 | Digital outputs (max 30V/0,1A) |
| | +5V DC | Output +5V DC (max 0,1A) |
| IIC | SCL | SCL interface IIC |
| | SDA | SDA interface IIC |
| COM0 | TX0 | TXD0 serial interface COM0 |
| | RX0 | RXD0 serial interface COM0 |
| | GND | GND serial interface COM0 |
| COM1 | A | A interface RS 485 |
| | B | B interface RS 485 |
| | GND | GND for interface RS 485 |
| DALLAS | DAL 1 | Communication link DALLAS 1 |
| | DAL 2 | Communication link DALLAS 2 |
| | GND | GND Comunikation links DALLAS |
| | + 5V | Power Comunikation links DALLAS |
| AN. INPUT | AI 1 - AI 4 | Analog inputs 1-4 (0 - 10V) |
| PWR | + 24V | Power + 24V DC |
| | GND | Power GND |
| PWR - OUT | + 24V | Output power + 24V DC (max100mA) |
| | + 10V | Output power + 10V DC (max20mA) |

3. ArdoPLC 100 PROGRAMMING

3.1. BASIC INFORMATION

As mentioned at the beginning, it is possible to program the unit in the ARDUINO IDE programming environment. The created and translated program is uploaded to the unit via a serial line, using a USB converter to UART. The recommended converter is UC - 2102 see image. The converter can be purchased in our eshop.



serial converter UC - 2102

Since manufacture, the unit contains a serial bootloader. So it's possible to start programming the unit immediately. The programmer's connection to the drive is provided by a programming connector. This is located under the front panel in the centre of the central module BIN 4010. There are two 6 pin connectors. Referred to as X6 and X7. We plug the programmer into the X6 (it's the one closer to the display) see the image.



3.2. ARDUINO IDE SETING

In order to program the unit from the ARDUINO IDE environment, it is necessary to install the kernel for the ATmega 128A processor and the controller for the programmer. We start with the simpler one and that is the installation of the UC - 2102 programmer control. From the manufacturer's website

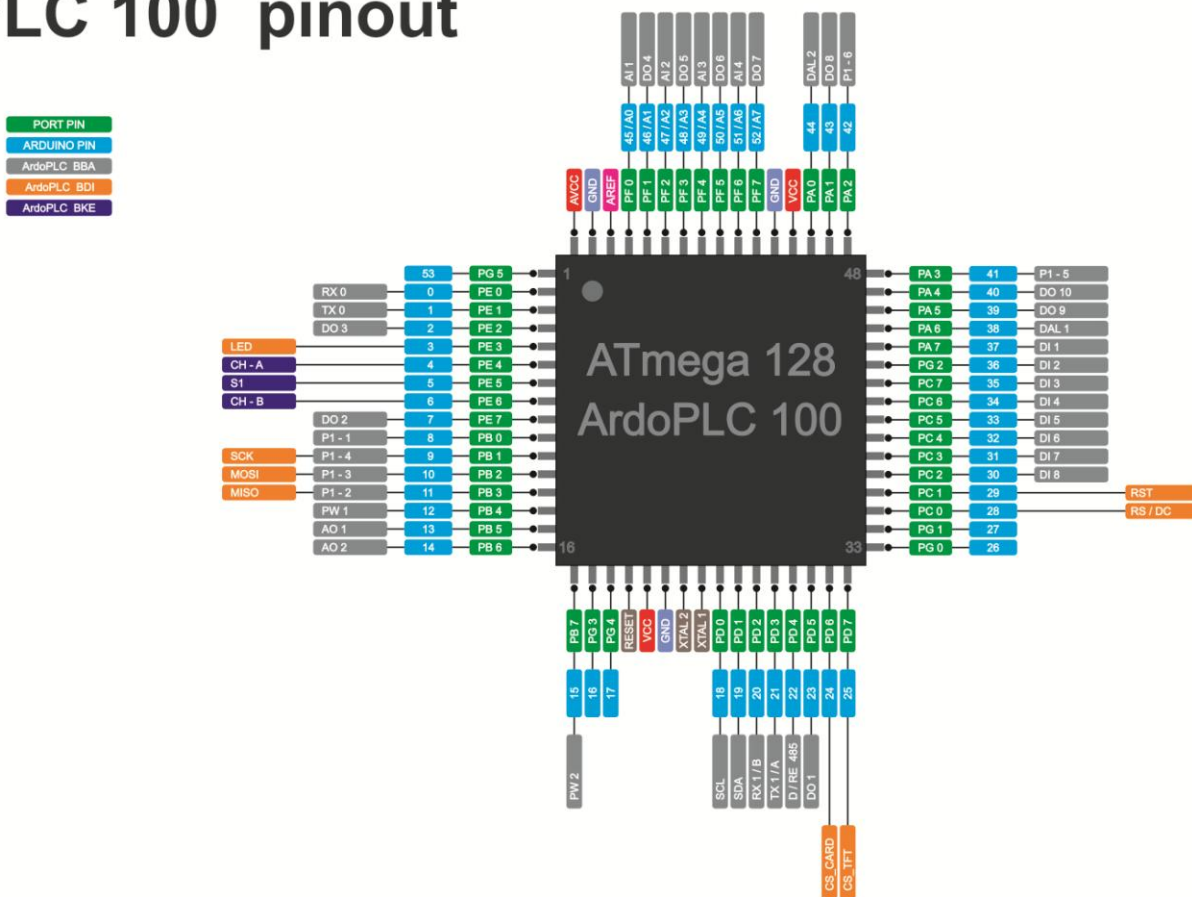
www.silabs.com/products/development-tools/software/usb-to-uart-bridge-vcv-driversuj

Download the driver file for your operating system and install everything as directed. Once installed, your programmer will appear in the device manager. You can set its COM assignments in the ARDUINO IDE tab of Tools - Port . Next, on the Tools - Programmer tab, choose the USBasp programmer. It remains to install the kernel package for the processor into the ARDUINO IDE. We'll use the "MegaCore - Master" package. This can be found at <https://github.com/MCUdude/MegaCore>.

Follow the installation instructions on the same page. If all goes well, set MegaCore to ATmega128 in the ARDUINO IDE, on the Tools - Development board tab. Set the crystal to 16 MHz and you can begin programming. The above settings and installations apply to the ARDUINO IDE 1.6 and above.

3.3. CONNECTION OF PINS MICROCONTROLLER

ArdoPLC 100 pinout

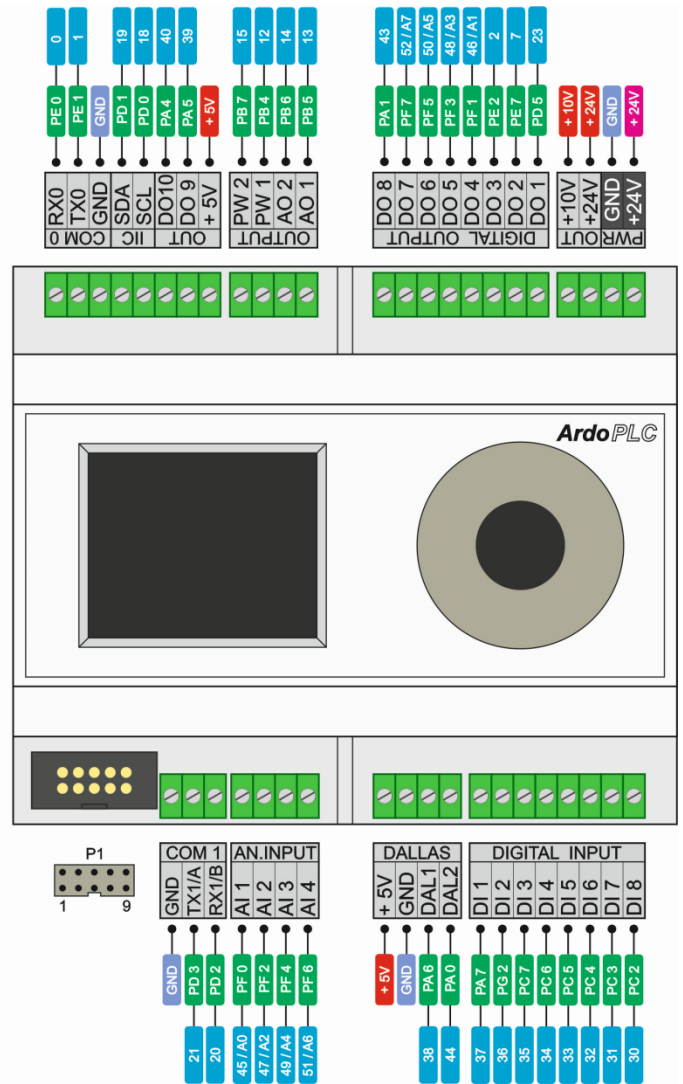
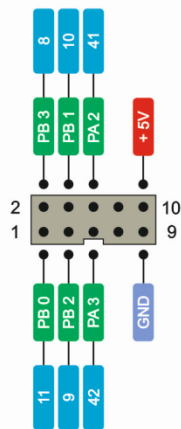


3. 4. CONNECTION OF TERMINALS ARDOPLC 100

ArdoPLC 100

connection terminals & microcontroller pins

- PORT PIN
- ARDUINO PIN
- ArdoPLC BBA

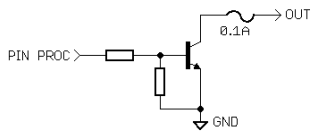


4. ATTACHMENTS

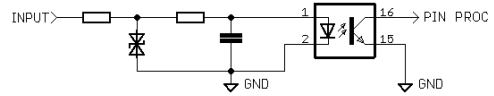
4.1. PERIPHERAL INVOLVEMENT SCHEMES

Here you will find simplified input, output and communication line engagement schemes etc.

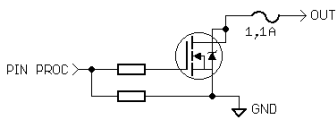
DIGITAL OUTPUTS: PW1,PW2,D09,D010



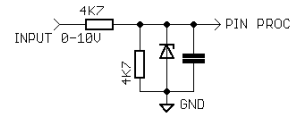
DIGITAL INPUTS: DI1 - DI8



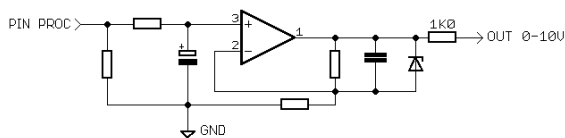
DIGITAL OUTPUTS: D01 - D08



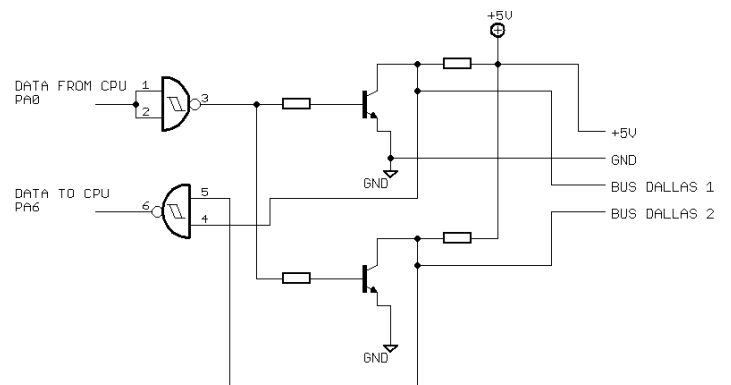
ANALOG INPUTS: AI1-AI4



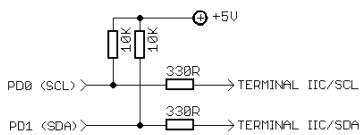
ANALOG OUTPUTS: A01 - A02



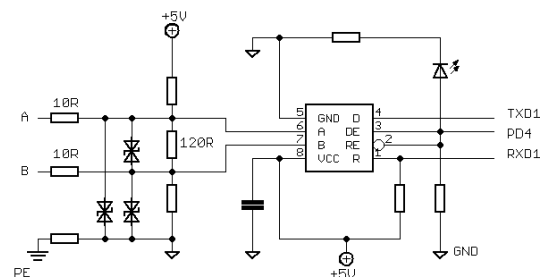
INTERFACE DALLAS



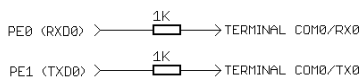
INTERFACE IIC



INTERFACE RS - 485



SERIAL INTERFACE COM0



CONECTOR P1

