

## 1. Product Description

The PL140 is an analog I/O module belonging to Piccolo series of Programmable Controllers, offering configurable 4 voltage, current, thermocouple or PT100 analog inputs and 2 voltage or current analog outputs. The outputs supply voltage and current simultaneously. The module connects directly to Piccolo series CPUs PL103, PL104 and PL105 by its I/O bus. Up to 3 modules can be connected to a CPU.

## 2. Packing List

The product package contains the following parts:

- 01 PL140: 4 Inputs, 2 Outputs Analog I/O Module
- Diskette with software and manual

## 3. Functional Characteristics

### 3.1. General Characteristics

- Activity LED indicating the software access to the module
- Optocoupling: not available
- Data format: decimal
- Connection system: removable terminal blocks
- Maximum and minimum cable gauging connection in mm<sup>2</sup>: 0.5 to 1.0 mm<sup>2</sup>
- MTBF: 32,000 hours @ 40 °C  
according MIL-HDBK-217E standard
- Operation temperature: 0 to 60 °C  
exceeding IEC 1131 standard
- Storage temperature: -25 to 75 °C  
according IEC 1131 standard
- Operation relative humidity: 5 to 95 % (no condensing)  
according IEC 1131 standard
- Ambient Protection: coating
- Weight:
  - net: 280 g
  - shipped: 330 g
- Degree of protection: IP 30, against contact with live moving parts inside and no protection against water  
according to IEC 529 standard

#### 3.1.1. Analog Inputs

- Number of points: 4
- Input types: configurable to RDT (Pt-100), thermocouple, current or voltage
- Connection between points: all points have a common GND
- Conversion method: successive approximation
- Open wire indication: yes for Thermocouple or PT100

#### 3.1.2. Analog Outputs

- Number of points: 2
- Individually selectable
- Connection between points: all points have a common GND
- Allowed load types: resistive and capacitive
- Protection: against short circuit and voltage application below 30 Vdc

### 3.2. Electrical Characteristics

- Maximum error @25 °C: ± 0.3 % full scale
- Maximum error in temperature range:
  - voltage and current scale : ± 50 ppm/°C
  - thermocouple scale: ± 100 ppm/°C
  - RDT scale: ± 500 ppm/°C
- Monotonicity without missing codes:

yes

- External power supply:
  - voltage: 19.2 to 30 Vdc (ripple included)
- Current consumption for module:
  - 350 mA @ 24V
- Maximum power dissipation: 8.4 W
- Temperature stabilization time: 10 min
- Stability in the time: 175 ppm/year
- Electrical noise immunity (oscillating wave):
  - according to IEC 1131 and IEEE C37.90.1 (SWC)
- Fast transient conducted noise immunity:
  - according IEC 801-4 standard, level 3
- Electrostatic discharge immunity (ESD):
  - according IEC 801-2 standard, level 4
- Radiated electromagnetic field immunity:
  - 10 V/m @ 140 MHz
  - according IEC 1131 and IEC 255-22-3 standards
- Protection against electrical discharge:
  - according IEC 1131 and IEC-536-1976 class I standards

#### 3.2.1. Analog Inputs

- Resolution: 12 bits
- Input range:

Voltage / Current	
Range	Resolution
4 to 20 mA	3.9 µA
-10 to +10 V	4.9 mV

Thermocouple		
Model	Temperature	Resolution
J	0 to 870 °C	0.24 °C
K	0 to 1230 °C	0.33 °C

Pt100	
Range	Resolution
-50 to +810 °C	0.21 °C

- Input Impedance: 10 MΩ  
voltage, thermocouple and RDT mode: 10MΩ  
current mode: 119 Ω
- Filter attenuation:
  - Thermocouple: -40 dB @ 60 Hz
  - RDT: -7 dB @ 60 Hz
  - Voltage / Current: -6 dB @ 1 KHz
- Allowed overvoltage: ± 30 V
- Maximum allowed voltage without irreversible damage: ± 12 V
- Thermocouple cold junction compensation: maximum error ± 3 °C
- Maximum compensated wire resistance in PT100 three wire operation: 5 Ω (total wire resistance: 10 Ω)
- Sample rate:
  - 400 ms for channel (RTD)
  - 400 ms for channel (Thermocouple)
  - 400 ms for channel (Voltage/Current)
- Sample duration: 2 µs
- Common Noise Rejection (thermocouple)
  - 54 dB minimum @ 60Hz

#### 3.2.2. Analog Outputs

- Resolution: 12 bits
- Output signal variation:
  - Voltage mode: -10 to +10 V
  - Current mode: 4 to 20 mA
- Operation load impedance:
  - Voltage mode: 1 K $\Omega$  minimum
  - Current mode: 600  $\Omega$  maximum
- LSB value:
  - Voltage mode: 5 mV
  - Current mode: 4  $\mu$ A
- Maximum capacitive load: 90 nF
- Overshoot: no
- Short-circuit current:  $\pm$  30 mA (voltages outputs)
- Maximum external voltage applied in the point, between the output and its return:
  - voltage outputs:  $\pm$  30 Vdc
  - current outputs: + 30 Vdc to -0.6 Vdc
- Protection: against short circuit among outputs and common, against short circuit among outputs

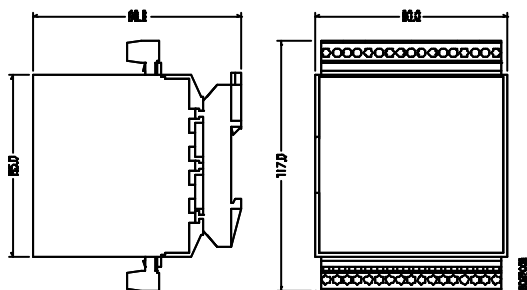
### 3.3. Software Characteristics

- Communication with CPU: through the modules F-PT100.002, F-TERMO.003, F-A\_D.027 and F-A\_D.028
- Reading and writing program application operand: %MXXXX
- Format of data: word of 16 bits, values from 0 to 4095
- Update time of the inputs:
  - 400 ms for channel (RTD)
  - 400 ms for channel (Thermocouple)
  - 100 ms for channel (Voltage/Current)

In case the scan time is larger than the previous values, the inputs are updated once by scan.

- Update time of the outputs: updated once each scan
- The executives CPUs versions:
  - PL103: version 1.42 or later
  - PL104: version 1.00 or later
  - PL105: version 1.00 or later
- Programmer versions:
  - MASTERTOOL MT4000: version 1.04 or later
  - MASTERTOOL PL: version 1.27 or later

## 4. Physical Dimensions



## 5. Handbooks

For more information about Piccolo series installation, programming and user security consult one or more of the following handbooks:

- Piccolo User's Manual
- PL140 and PL141 User's Manual
- MasterTool User's Manual

## 6. Ordering Data

### 6.1. Products

	Description
PL140	4 Inputs, 2 Outputs Analog I/O Module

### 6.2. Related Items

The following items must be ordered separately:

	Description
AL-1517	110/220 Vac, 24 Vdc 1A power supply, TS32/35 rail mounting
QK1500	TS32/35 rail for CPU and I/O modules mounting

## 7. Revisions

This Technical Characteristic is valid for PL140: configurable 4 analog input and 2 analog outputs module, revision A and above.

The revision of this document is shown on top of the page, indicating content changing or format improvements.

Altus reserve the right to change this TC without previous warning.

The following account shows the observations corresponding to each revision:

Revision: A	Date: 09/21/2000
Approval: Luiz Gerbase	
Author: Alexandre Hessler	

Remarks:

■ Initial revision