V120-22-T2C Graphic Operator Panel & Programmable Logic Controller
12/24VDC, 12 pnp/npn digital inputs, 2 analog inputs, 3 high-speed counter/Shaft encoder inputs, 12 transistor outputs, I/O expansion port, RS232/RS485 plus CANbus

Power supply
- 12VDC or 24VDC
- Permissible range: 10.2VDC to 28.8VDC with less than 10% ripple
- Maximum current consumption:
  - 130mA@24VDC (pnp inputs)
  - 230mA@24VDC (nnp inputs)
  - 250mA@12VDC (pnp inputs)
  - 290mA@12VDC (nnp inputs)

Digital inputs
- 12 pnp (source) or nnp (sink) inputs. See Notes 1 and 2.
- Nominal input voltage: 12VDC or 24VDC. See Notes 3 and 4.
- Input voltages for pnp (source):
  - For 12VDC: 0-3VDC for Logic ‘0’
  - 8-15.6VDC for Logic ‘1’
  - For 24VDC: 0-5VDC for Logic ‘0’
  - 17-28.4VDC for Logic ‘1’
- Input voltages for nnp (sink):
  - For 12VDC: 8-15.6VDC<1.2mA for Logic ‘0’
  - 0-3VDC><3mA for Logic ‘1’
  - For 24VDC: 0-5VDC><6mA for Logic ‘1’
- Input current: 4mA@12VDC
- 8mA@24VDC
- Input impedance: 3kΩ
- Response time (except high-speed inputs): 10ms typical
- Galvanic isolation: None
- Input cable length: Up to 100 meters, unshielded

High-speed counter
Specifications below apply when inputs are wired for use as a high-speed counter input/Shaft encoder. See Notes 5 and 6.
- Resolution: 32-bit
- Input freq.: 10kHZ max.
- Minimum pulse: 40μs

Notes:
1. All 12 inputs can be set to pnp (source) or nnp (sink) via a single jumper and appropriate wiring.
2. Inputs #10 and #11 can function as either digital inputs or as analog inputs, via a single jumper and appropriate wiring.
3. All 12 inputs can function in 12 VDC or 24 VDC; set via a single jumper and appropriate wiring.
4. nnp (sink) inputs use voltage supplied from the controller’s power supply.
5. Inputs #0, #2, and #4 can each function as either high-speed counter or as part of a shaft encoder. In each case, high-speed input specifications apply. When used as a normal digital input, normal input specifications apply.
6. Inputs #1, #3, and #5 can each function as either counter reset, or as a normal digital input; in either case, specifications are those of a normal digital input.
   These inputs may also be used as part of a shaft encoder. In this case, high-speed input specifications apply.

Shaft encoder

![Shaft encoder diagram]

Warnings:
- Unused pins should not be connected. Ignoring this directive may damage the controller.
- Improper use of this product may severely damage the controller.
- Refer to the controller’s User Guide regarding wiring considerations.
- Before using this product, it is the responsibility of the user to read the product’s User Guide and all accompanying documentation.
Analog Inputs
Two 10-bit, multi-range inputs: 0-10V, 0-20mA, 4-20mA
See Note 2.
Conversion method
Successive approximation
Input impedance
>1MΩ for voltage
243Ω for current
Galvanic isolation
None
Resolution (except 4-20mA)
10-bit (1024 units)
Resolution at 4-20mA
204 to 1023 (820 units)
Conversion time
Synchronized to scan time
Absolute max. rating
±15V
Full scale error
± 2 LSB
Linearity error
± 2 LSB
Status indication
Yes, see Note 8

Note 8:
The analog value can also indicate when the input is functioning out of range. If an analog input deviates above the permissible range, its value will be 1024.

Voltage / Current connection

Digital outputs
12 pnp (source) outputs
12VDC or 24VDC
Output type
P-MOSFET (open drain)
Isolation
None
Output current
0.5A max.
Total current: 3A max.
Max. frequency for normal outputs
50Hz (resistive load)
0.5Hz (inductive load)
High speed output maximum frequency
2kHz (resistive load)
See Note 10.
Short circuit protection
Yes
Short indication
by software
On voltage drop
0.5VDC maximum

Power supply for outputs
Operating voltage
10.2 to 28.8VDC
Nominal operating voltage
12VDC or 24VDC

Note 10:
Output #0 and Output #1 may be used as high-speed outputs.

Graphic Display
STN, LCD display
Illumination backlight
LED, yellow-green, software-controlled
Display resolution
128x64 pixels

Keypad
Sealed membrane
Number of keys
16

Program
Application Memory
448K
Memory Bits (coils)
2048
Memory Integers (registers)
1600
Long Integers (32 bit)
256
Double Word (32 bit unsigned)
64
Floats
24
Timers
192
Counters
24
Data Tables
120K (RAM) / 64K (FLASH)
HMI displays
Up to 255
Execution time
0.6µs for bit operations

RS232/RS485 serial port
Used for:
- Application Download/Upload
- Application Testing (Debug)
- Connect to GSM or standard telephone modem:
  - Send/receive SMS messages
  - Remote access programming
- RS485 Networking
RS232 (See Note 11)
2 ports
Galvanic isolation
None
Voltage limits
±20V
RS485 (See Note 11)
1 port
Input voltage
±7 to ±12V differential max.
Cable type
Shielded twisted pair
in compliance with EIA RS485
Galvanic isolation
None
Baud rate
110 – 57600 bps
Nodes
Up to 32

Note 11:
RS232/RS485 is determined by jumper settings and wiring. Refer to the controller's User Guide regarding communications.

I/O expansion port
Up to 128 additional I/Os, including digital & analog I/Os, RTD and more.

CANbus port
Up to 63 nodes
Baud rate range
20Kbps - 1Mbps
Cable length
Up to 150m for 12VDC network
Up to 1000m for 24VDC network

CANbus connection

Miscellaneous
Clock (RTC)
Real-time clock functions.
(Date and Time)
Battery back-up
7 years typical battery back-up for
RTC and system data.
Weight
240g (8.46 oz.)
Operational temperature
0 to 50°C (32 to 122°F)
Storage temperature
-20 to 60°C (-4 to 140°F)
Relative Humidity (RH)
5% to 95% (non-condensing)
Mounting method
DIN-rail mounted (IP20/NEMA1)
Panel mounted (IP65/NEMA4X)
The tables below show how to set a specific jumper to change the functionality of the controller. To open the controller and access the jumpers, refer to the directions at the end of these specifications.

**Important:**
Incompatible jumper settings and wiring connections may severely damage the controller.

### JP1
**Digital Inputs type**

<table>
<thead>
<tr>
<th>To use as</th>
<th>JP1</th>
</tr>
</thead>
<tbody>
<tr>
<td>npn (sink)</td>
<td>A</td>
</tr>
<tr>
<td>pnp (source)*</td>
<td>B</td>
</tr>
</tbody>
</table>

*Default factory setting*

### JP2
**Inputs voltage**

<table>
<thead>
<tr>
<th>To use as</th>
<th>JP2</th>
</tr>
</thead>
<tbody>
<tr>
<td>12VDC</td>
<td>A</td>
</tr>
<tr>
<td>24VDC*</td>
<td>B</td>
</tr>
</tbody>
</table>

### JP3, JP4
**Analog inputs type**

<table>
<thead>
<tr>
<th>To use as</th>
<th>JP3 for analog input #1</th>
<th>JP4 for analog input #0</th>
</tr>
</thead>
<tbody>
<tr>
<td>Voltage input*</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Current input</td>
<td>B</td>
<td>B</td>
</tr>
</tbody>
</table>

### JP5, JP6
**Digital/Analog inputs**

<table>
<thead>
<tr>
<th>Range</th>
<th>JP5 for AN1 / In#10</th>
<th>JP6 for AN0 / In#11</th>
</tr>
</thead>
<tbody>
<tr>
<td>Digital inputs*</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>Analog inputs</td>
<td>B</td>
<td>B</td>
</tr>
</tbody>
</table>

In this figure, the jumper settings will cause the controller to function as follows:
- Digital inputs: nnp, 24VDC inputs
- Analog input #0: Voltage input
- Analog input #1: Current input

Opening the controller enclosure

1. Locate the 4 slots on the sides of the enclosure
2. Using the blade of a flat-bladed screwdriver, gently pry off the back of the controller as shown in the figure below, exposing the controller’s board.