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Revision: A

1. Description

The RS-485 isolated serial module AL-2405/485I is to be used with AL-2005/RTMP or AL-2003 processors. This interface have an RS-485 electric interface standard and is isolated from system ground.

2. Packing List

- The product packing contains the following parts:
- AL-2405/485I: RS-485 isolated serial module

3. Functional Characteristics

3.1. General Characteristics

- Module to be attached to AL-2005/RTMP or AL-2003 processors
- Network topology:
 - 4 wire bus, one pair used for data signals and other pair for bus reference
- Network physical interface: RS-485
- Communication Speed: to 256 kbits/s
- Maximum number of connected points: 32
- RS-485 Interface with 9 pin connector according to Profibus standard
- Configurable transmitted data echo through dip-switch
- Configurable bus termination through dip-switch, Profibus 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
- MTBF: 150000 hours @ 40°C according to MIL-HDBK-217E standard
- Weight:
 - net: 100 g shipped: 200 g
- 3.2. Electrical Characteristics
- Power Supply:
 - Supplied by the processor
- Maximum module dissipation 1,5 W (300 mA @ 5V)
- RS-485 interface galvanic isolation to frame and system ground:
 - 500 Vdc
- Electrostatic discharge immunity (ESD): according IEC 1131 standard, level 3
- Damped oscillatory wave conducted noise immunity: according IEC 1131, level A, and IEEE C37.90.1 (SWC) standards
- Fast transient conducted noise immunity: according IEC 1131 standard, level B according IEC 801-4 standard, level 3
- Radiated electromagnetic field immunity: 10 V/m @ 140 MHz according IEC 1131 standard
- Protection against electrical shock:



4. Physical Dimensions



5. Installation

The module may be installed on AL-2005/RTMP or AL-2003 processors.

In case of AL-2005/RTMP processor two AL-2405 modules may be installed at a time, using one or two of the available positions (see following figure). The module is attached by its connectors.



5.1. Connections

In AL-2005/RTMP processor installation, the module AL-2405 is associated with the corresponding position DB9 connector, available at AL-2005 panel. The following table shows DB9 connector pinout:

Pin	Mnemo	Description
1	PGND	Protective Ground
2	NC	Not Connected
3	D+	tx/rx+ data
4	NC	Not Connected
5	BR-	Bus Reference 0V
6	BR+	Bus Reference 5V
7	NC	Not Connected
8	D-	tx/rx- data
9	NC	Not Connected

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5.2. Network Cable Connection

A simple network made of two directly connected AL-2405/485I is made through AL-2302 cables and an AL-2600 ALNET II/Profibus connection/terminator

Network cable must be terminated at both ends, witch can be done by AL-2600 module straps or by AL-2405/485I serial modules dip-switches.

Both AL-2600 and serial modules AL-2405/485I can be used as network terminators, however just one of them must be used as the terminator, at each network end.



D: AL-2600 as derivator

T: AL-2600 as derivator and terminator

I Node: Network node (AL-2005/RTMP + AL-2405/485I)

One net node is a serial module installed in an AL-2005/RTMP processor. In case we have two serial modules installed in the same

AL-2005, each AL-2405 is a separate node for the network.





5.3. RS-485 Network Cable

The cable for using in RS-485 network must have low capacitance, inductance and electric resistance per meter to be used for high speed long distance data communications.

The AL-2301 cable is tested for this application and is

recommended for. AL-2301 have the following characteristics: – ALTUS part number: AL-2301

- Transmission velocity: 0,8 c
- Characteristic impedance: 120 Ω

- Capacitance: 39,0 pF/m
- Signal Loss: 0,5 dB/100m @ 200 kHz
- Resistance: 20 Ω/km
- Rise time(10% a 90%): 900 ns/km
- Wires: 4
- Gauge: 18 AWG

It is very important that the communication cable is installed as far apart as possible from noise sources (motors, contactors, high voltage cables).

5.4. Network Cable Connections and Distances

Network node connection is done by 4 wire, using interconnected RS-485 node bus references.

The following figure shows 4 wire node interconnection. One wire pair is used for data (D+ and D-), while the other pair is used for connecting the bus references. The network is physically formed by cable segments interconnecting the AL-2600 derivator modules. The cable segment shield also must be interconnected through Al-2600. The grounding must be made at only in one AL-2600, to the rack frame.

In special cases the network can be assembled with user made cable, dispensing the use of

AL-2600. In this case network termination can be made by serial modules AL-1405/4851, at network ends.

5.5. Maximum Distances

The following table shows the velocity/distance relation of a RS-485 network which uses

AL-2301 cable in a 4 wire type connection:

Transmission Speed	Maximum Length
0 90 kbps	2.4 km
90 kbps 200 kbps	1.2 km
200 kbps 256 kbps	0.4 km



D: AL-2600 as derivator

T: AL-2600 as derivator and terminator

I Node: Network node (AL-2005/RTMP + AL-2405/485I)

D+: Data +

D-: Data -

BR+: Bus Reference+

BR-: Bus Reference-

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5.6. Configuration

The AL-2405/485I have one dip switch to configure module termination and echoing:

- SW1-1 and SW1-2: inserts the termination when switches 1 and 2 are turned ON. Both switches 1 and 2 must be at the same state (ON or OFF).
- SW1-3: This switch configures transmitted data "echo" mode on AL-2405/485I with two possibilities: with echo (switch 3 ON) or without echo (switch 3 OFF). This choice is dependent of the application software in AL-2005/RTMP processor.

The SW1-4 switch have no function.

For configuring AL-2600 derivation and termination modules, see corresponding Technical Characteristic

6. Handbooks

For more information about AL-2005 consult AL-2005/RTMP User Manual.

For installation of AL-2405/485I in AL-2003 processor, consult AL-2003 User Manual.

7. Ordering Data

7.1. Optionals

The following items may be ordered separately:

	Description	
AL-2301	RS-485 network cable	
AL-2302	Profibus derivator cable	
AL-2600	ALNET II/Profibus derivator and terminator	

RS-485 network cable AL-2301 must be specified in meters. This cable is the physical media for the net.

The AL-2302 Profibus derivator cable connects the serial module AL-2405/485I to the derivator/terminator adapter AL-2600

The derivator/terminator adapter ALNET II/Profibus AL-2600 acts as a derivator and/or terminator for the network cable. Also permits the connection of this cable and the serial modules. Each net node uses one AL-2600.

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8. Revisions

This Technical Characteristic is valid for AL-2405/485I: RS-485 isolated serial 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 Approval: Luís Fernando Saraiva Author: Sérgio Bordini Date: 11/08/98

Remarks:

Initial revision