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TRS system

TRS-485

Documentation

Description of the document

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Typology	Documentation
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Notes	

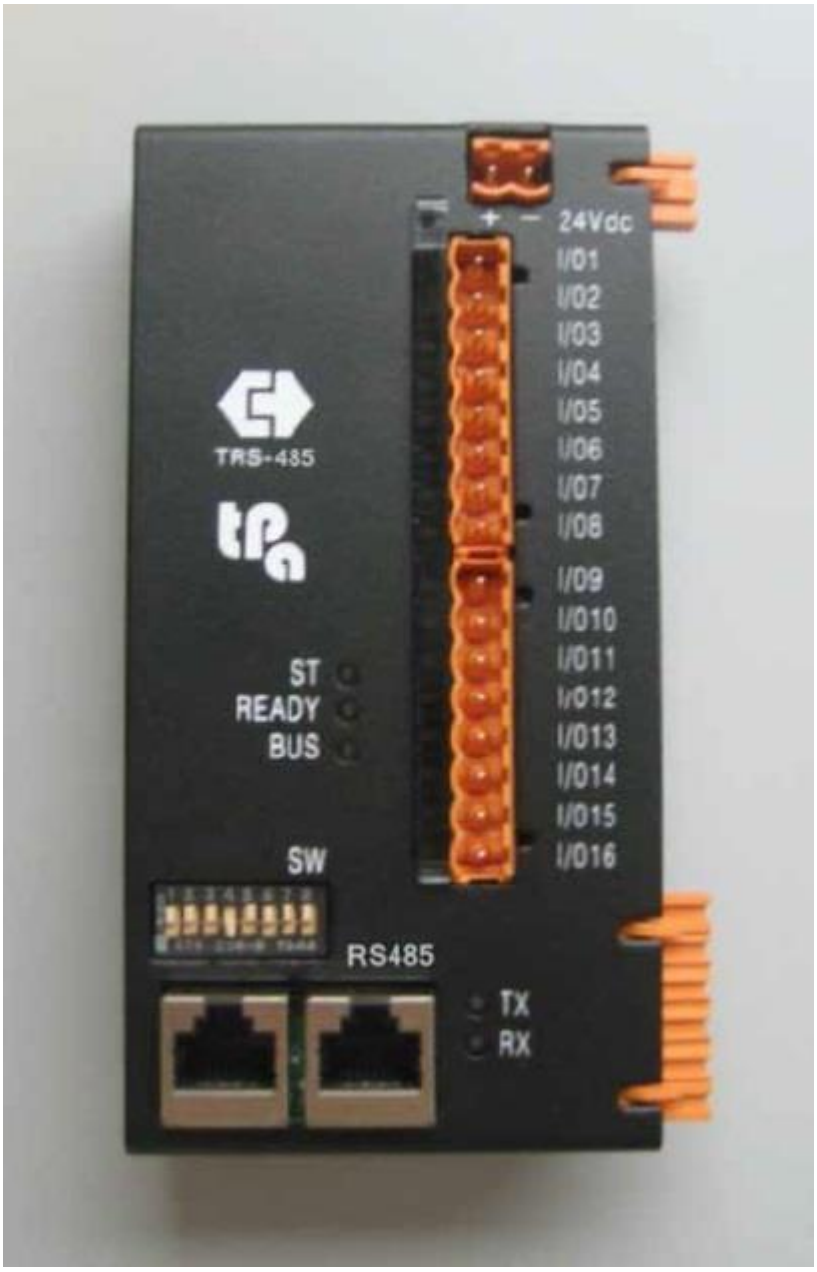
TABLE OF CONTENT

REVISIONS

Revision number	Date	Protocol	List of changes and/or modified paragraphs
Rev. 0	17/12/2013		First preliminary release
Rev. 1	18/06/2014		Official release

1 CONTENTS

This document describes the requirements and implementation specifications concerning TRS-485 remote module.



2 DESCRIPTION

- 16 bidirectional INPUT/OUTPUT lines (PNP logic consisting of High Side Driver) with yellow led status indication
- INPUT/OUTPUT Optoelectronic decoupling
- PurpleBus connection through RJ45 connector, communication speed can be selected at 19.2/38.4/57.6/115.2 kbit/s
- Requires nominal field power supply rated at +24 Vdc for output activation
- 16 OUTPUT group power supply, software control, and power signal, management of power failure error
- Hardware protection against connection errors
- Mounting on DIN rails type EN50022 and EN50035
- DIP switch for module addressing and Baudrate choice
- Debounce digital filter: input is considered stable when it remains in the status at least for 2 ms
- Continuous reading of the active outputs, deactivation procedure of short-circuited outputs (after 4 ms), automatic reset of a short-circuited output (after short-circuit removal and diagnostics – within 1 sec)
- Possibility to expand with TRS expansion modules, up to a maximum of 5 units
- Total compatibility with TRS expansion modules
- Size: 138 x 70 x 23.5 mm

3 TECHNICAL SPECIFICATIONS

- Input threshold levels:
  - 0 = 0V to 10V
  - 1 = 14V to 24V
- Max output current: 0.5 A
- Output protection against:
  - short-circuit
  - overload
  - overvoltage (40V)
- 1 terminal for each input/output referred to the 0 V of the +24 Vdc field power supply
- Connections with AWG 24 ÷ 12
- Field power supply galvanically separated from logic circuitry power supply
- Powered by PurpleBus
- Field reverse polarity protection
- Logic reverse polarity protection
- Software control and LED signals of the presence of field power
- LED signalling module activity, communication, and input/output status

4 EXPANDABILITY

TRS-485 module can be expanded by connecting the TRS-nn-E series expansions to its TRS bus in any order. Its maximum expandability is indicated in the following table.

internal expansion	max no. standard expansions	max no. smart expansions
1	5	-
1	3	1
1	1	2

5 ELECTRICAL FEATURES

5.1 Maximum values allowed

Parameters	Conditions	Min	Typ	Max	Unit
Vdc, Power Supply	by PurpleBus	10.8		13.2	V
On Output Current max	VO = 24 Volt DC			1	A
VO Output Power Supply	by external power supply	16		36	V
Icc, Power Supply current max	by external power supply			8	A
Temperature		0		65	°C

5.2 Operating parameters

Parameters	Conditions	Min	Typ	Max	Unit
Vdc, Power Supply	by PurpleBus		12		V
Iq, Quiescent Current	all off, Vdc = 12 V		40		mA
Ip, Operating Current	all active outputs, Vdc = 12 V			100	mA
On Output Current	V On = 24 Volt DC	0	--	0.5	A
VO Output Power Supply		18	24	30	V
Voh, output high status voltage	VO = 24 V, Rl = 10 KOhm, Cl = 50pF	18			V
Vol, output low status voltage	VO = 24 V, Rl = 10 KOhm, Cl = 50pF			6	V
Vih, input high status voltage	VO = 24 V	18			V
Vil, input low status voltage	VO = 24 V			10	V
Operating Temperature		5		60	°C

5.3 Other parameters

Parameter	Conditions	Min	Typ	Max	Unit
Logic to output isolation	1 minute duration		500		Vac
	100 ms duration		1100		Vac
Input to logic isolation	1 minute duration		2500		Vac

6 PROVISIONS

Generally speaking, power, temperature, and humidity values must not be exceeded as indicated in chapter 5.

TRS-485 must be interfaced through terminals/cables etc. as indicated in the following chapters.

The terminal blocks are to be considered inserted even when not wired.

TRS-485 must be mounted on DIN rail type EN50022 or EN50035 with the rear spring coupling. To attach and detach it, use a flat-blade screwdriver to pull back on the coupling tab, in order to retract it and allow it to be attached to or detached from the rail.

Warning! The metal coupling to the DIN rail is electrically connected to the ground of the TRS-485 electrical circuit: the ground connection **MUST** be supplied through this coupling (i.e., the DIN rail must be grounded).

Warning! In order to prevent the result of any electromagnetic interference, we recommend using Cat 5 S/UTP cables or higher for connection with PurpleBus.

Warning! In presence of logic and/or field power, connecting/disconnecting TRS-nn-E expansions is not allowed.

TRS-485 is an electronic device for general use in light industrial environments.

It is a class A product and, if installed in a domestic environment, it may cause electromagnetic interference; the user must therefore take all necessary precautions.

7 SIGNALLING LED

7.1 Red Led (ST)

It indicates the system status (ST). It shows different behaviours, not all of which can be attributed to error conditions.

- It blinks when waiting for communication and relative initialization of TRS-485.
- If TRS-485 is correctly initialized, it will turn off permanently. From this moment on, should it turn on, it is only to signal an on-board error.
- It turns on in the event of serious hardware fault, and it stays on until the problem is removed, followed by other signals given by other LEDs (power supply loss, etc.).

7.2 PurpleBus yellow (TX) and green (RX) Leds

- If they are off there is no communication on PurpleBus
- They blink if the module is initialized and there is communication.

7.3 Green Led BUS

- It starts off and turns on at the end of the remote auto-initialization.
- It turns off when there is a problem on the TRS bus, or the TRS bus is not active.
- It is normally on.

7.4 Green Led READY

- It starts off.
- It is permanently on since TRS-485 is auto-initialized and ready to communicate via PurpleBus.
- It can turn off if there is any hardware problem.

7.5 Yellow Led I/O

It indicates the status of the corresponding I/O.

- It is on when the logic status is 1.
- It is off when the logic status is 0.

7.6 Green Led +24 Vdc

It indicates the presence of +24 Vdc power.

- It is on when there is power.
- It is off when there is no power or it is out of the allowed range.

8 WIRING DIAGRAMS

DIP SWITCH

SW	1	2	3	4
Receiver N. 1	ON	ON	ON	ON
Receiver N. 2	OFF	ON	ON	ON
Receiver N. 3	ON	OFF	ON	ON
Receiver N. 4	OFF	OFF	ON	ON
Receiver N. 5	ON	ON	OFF	ON
Receiver N. 6	OFF	ON	OFF	ON
Receiver N. 7	ON	OFF	OFF	ON
Receiver N. 8	OFF	OFF	OFF	ON
Receiver N. 9	ON	ON	ON	OFF
Receiver N. 10	OFF	ON	ON	OFF
Receiver N. 11	ON	OFF	ON	OFF
Receiver N. 12	OFF	OFF	ON	OFF
Receiver N. 13	ON	ON	OFF	OFF
Receiver N. 14	OFF	ON	OFF	OFF
Receiver N. 15	ON	OFF	OFF	OFF

SW 5	ON	OFF	ON	OFF
SW 6	ON	ON	OFF	OFF
Baudrate	19200 bit/s	38400 bit/s	57600 bit/s	115200 bit/s

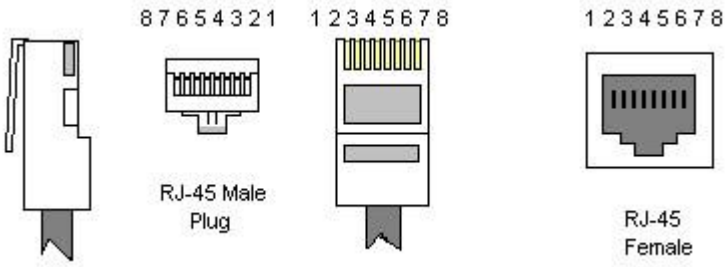
SW 7	ON	OFF
SW 8	ON	OFF
GBUS termination	Last Receiver	Last Receiver No

1	**+24 Vdc**		
2	**GND24**		

1	**I/O 1**		
2	**I/O 2**		
3	**I/O 3**		
4	**I/O 4**		
5	**I/O 5**		
6	**I/O 6**		
7	**I/O 7**		
8	**I/O 8**		

1	**I/O 9**		
2	**I/O 10**		
3	**I/O 11**		
4	**I/O 12**		
5	**I/O 13**		
6	**I/O 14**		
7	**I/O 15**		
8	**I/O 16**		

8.1 PurpleBus



Pin	Name	Function	Notes
1	0 V	PurpleBus power supply negative	
2	+12 V	PurpleBus power supply (+12 Volt ±5%)	Max 1.5 A
3	0 V	PurpleBus power supply negative	
4	TX+	PurpleBus TX (positive signal)	100 Ohm termination
5	TX-	PurpleBus TX (negative signal)	
6	+12 V	PurpleBus power supply (+12 Volt ±5%)	Max 1.5°
7	RX+	PurpleBus RX (positive signal)	100 Ohm termination
8	RX-	PurpleBus RX (negative signal)	
Shield	Ground		

This channel, designed by T.P.A. S.p.A., can connect field remote devices. Its transmission frequency can be selected among 19.2/38.4/57.6/115.2 kbit/s. The communication mode is half-duplex.

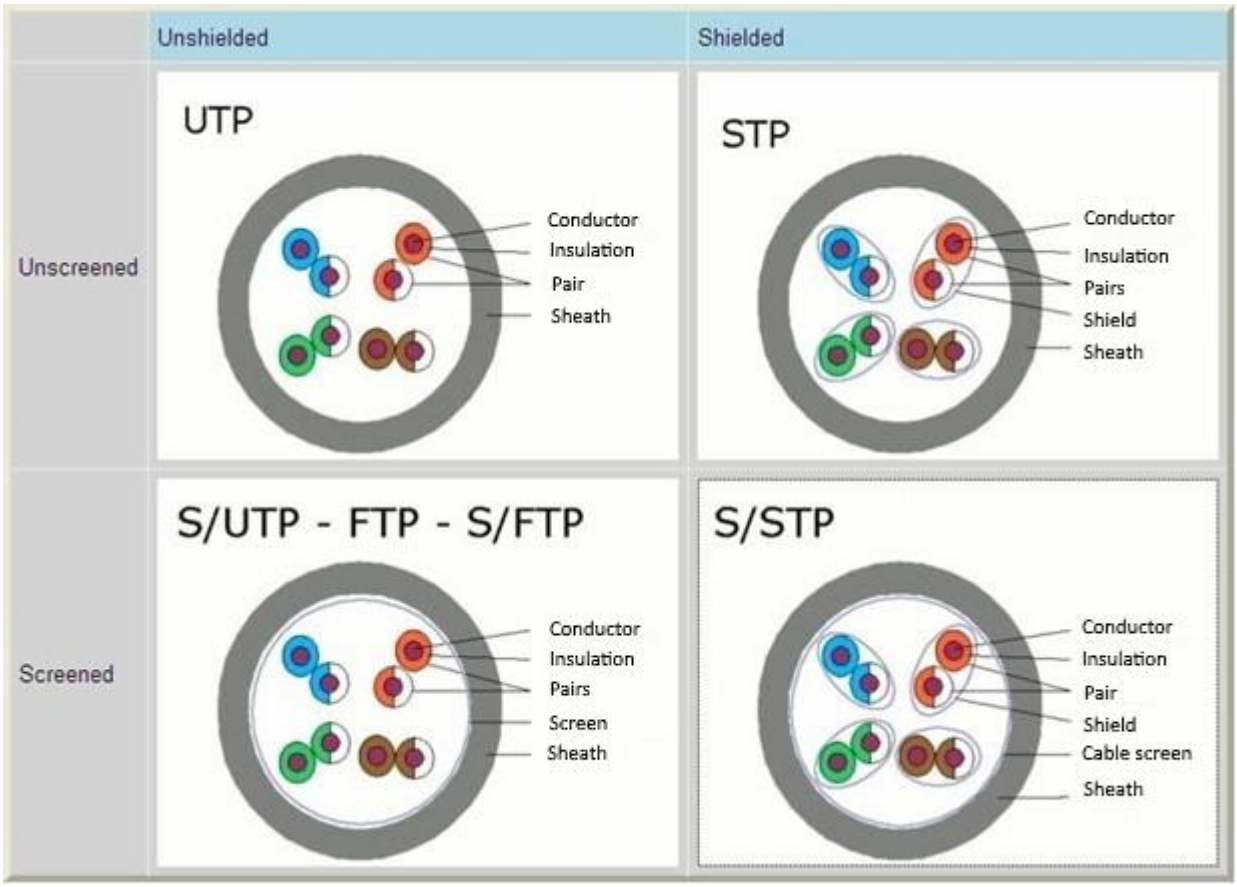
Warning! TX and RX are always referred to the transmitter.

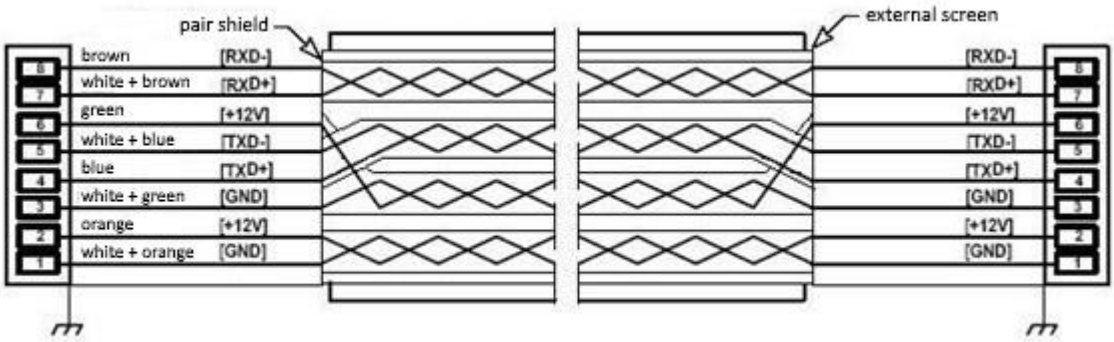
8.2 Baudrate selection

SW 5	ON	OFF	ON	OFF
SW 6	ON	ON	OFF	OFF
Baudrate	19200 bit/s	38400 bit/s	57600 bit/s	115200 bit/s

8.3 Wiring

The **PurpleBus** serial channel needs a device-to-device wiring, consisting of Ethernet cable segments terminating in a RJ45 connector. Considering the data transmission frequency, in order to prevent the result of eventual electromagnetic interference, we recommend using at least **Cat 5 STP** cables. All STP cables have shielded twisted pairs and an overall screen.





Warning! Do not use Ethernet crossover cables (a.k.a. “patch cables”).

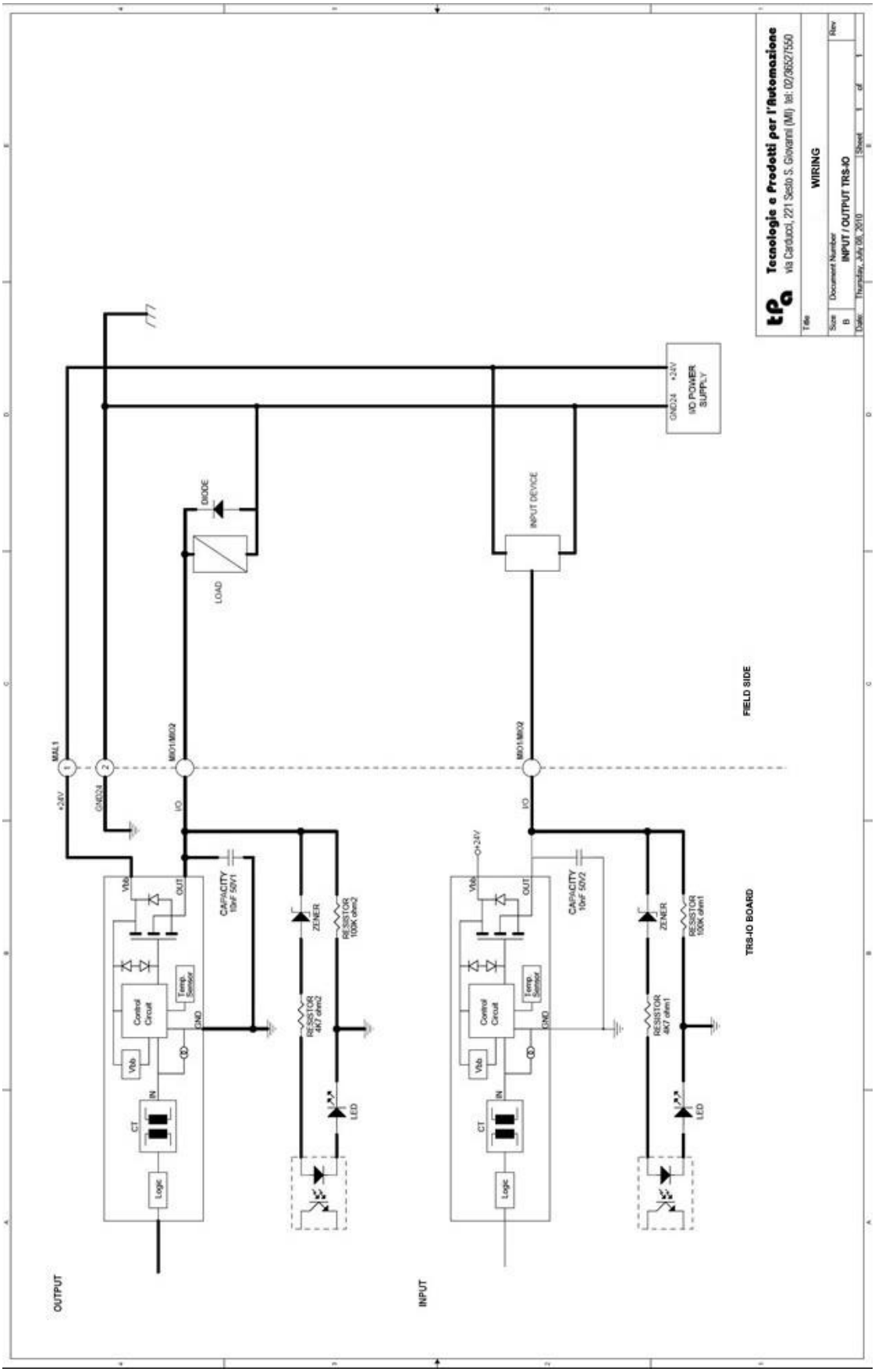
8.4 Power supply +24 Vdc

The power supply +24 Vdc is used for the output driver and is normally supplied towards the TRS bus in order to power possible expansions connected to TRS-485.

It should be noted that the maximum current limit for the +24Vdc supply along the TRS bus of a remote device (receiver plus any expansions) is 8A. I.e., the total loads driven by a remote device whose +24 Vdc power supply is collected only by this terminal block must be sized for a maximum absorption of 8A, subject to the limits indicated in chapter 3.

In any case, the terminal block must still be inserted.

8.5 INPUT/OUTPUT Wiring



9 DIMENSIONS