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Investigación de componentes.

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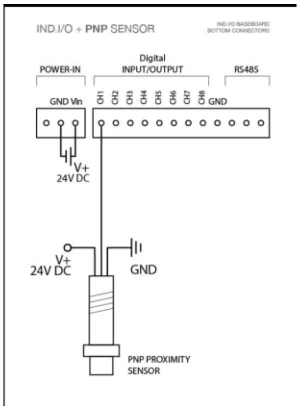
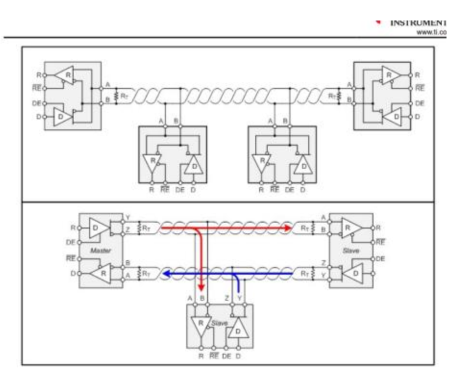
RS-485

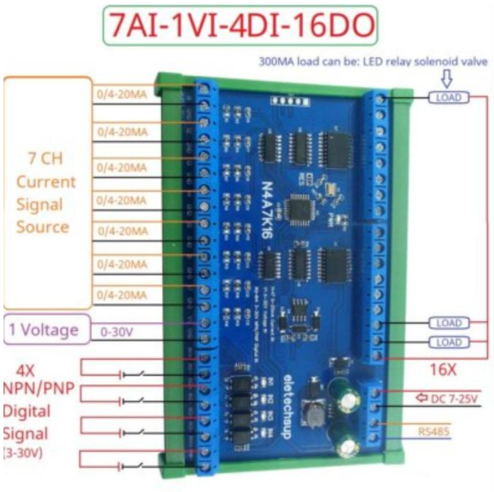


Trademarks All trademarks are the property of their respective owners. 1 Introduction In 1983, the Electronics Industries Association (EIA) approved a new balanced transmission standard called RS-485. Finding widespread acceptance and usage in industrial, medical, and consumer applications, RS-485 has become the industry's interface workhorse. This application report presents design guidelines for engineers new to the RS-485 standard that can help them accomplish a robust and reliable data transmission design in the shortest time possible. This application report presents design guidelines for engineers new to the RS-485 standard that can help them accomplish a robust and reliable data transmission design in the shortest time possible. 2 Standard and Features RS-485 is an electrical-only standard. In contrast to complete interface standards, which define the functional, mechanical, and electrical specifications, RS-485 only defines the electrical characteristics of drivers and receivers that could be used to implement a balanced multipoint transmission line. This standard, however, is intended to be referenced by higher level standards, such as DL/T645, for example, which defines the communication protocol for electronic energy-meters in China, specifying RS-485 as the physical layer standard. Key features of RS-485 are: • Balanced interface • Multipoint operation from a single 5-V supply • –7-V to +12-V bus common-mode range • Up to 32 unit loads • 10-Mbps maximum data rate (at 40 feet) • 4000-foot maximum cable length (at 100 kbps) 3 Network Topology The RS-485 standards suggests that its nodes be networked in a daisy-chain, also known as party line or bus topology (see Figure 3-1. In this topology, the participating drivers, receivers, and transceivers connect to a main cable trunk via short network stubs. The interface bus can be designed for full-duplex or half-duplex transmission (see Figure 3-2).



1. RS-485: Interface Diferencial y Failsafe

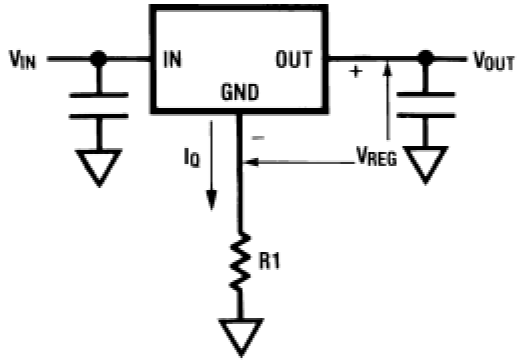
Los esquemas típicos para RS-485 muestran un **driver diferencial** y un **receptor**, con resistencias de terminación y resistencias failsafe que garantizan estados definidos cuando el bus está libre.
Un ejemplo detallado se encuentra en el manual de NI para sbRIO, mostrando cómo conectar DE/RE, terminaciones y resistencias.

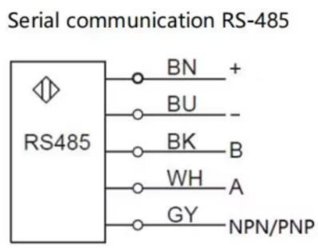


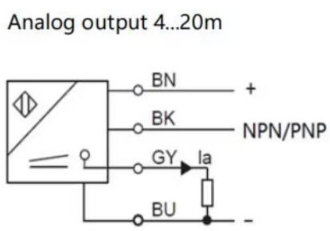
2. Entradas digitales NPN / PNP

- **NPN (sink)**: el sensor conecta la carga al **negativo** del circuito.
- **PNP (source)**: el sensor conecta al **positivo** del circuito.
  Los diagramas típicos demuestran el cableado para sensores de 2 y 3 hilos, con códigos de color para conectar sensores a entradas de PLC o tarjetas de control.
- Introduction What happens when the need arises for a regulator voltage that isn't matched by your stock of fixed voltage I/C regulators? For the standard NPN pass transistor regulators (LM340 for example) the answer may be as simple as adding a resistor (R1) in the ground pin (Figure 1). The new output voltage (VO) will then be: VO = VREG + IQ × R1 (1) where: VREG is the original regulator output voltage, IQ is the regulator's quiescent current. But if the need is also for a low drop across the regulator, then a PNP pass regulator is required. Simply adding a resistor in the ground pin doesn't work, since the regulator internal current varies too much because of increased base drive to compensate for lower PNP beta. However, if a zener is used instead of a resistor, the higher voltages can be accommodated (Figure 2). The new output voltage (VO) is: VO = VREG + VZ (2) where VZ is the zener voltage. As VREG is constant, the output voltage regulation will depend largely on the zener voltage (VZ) and its dynamic impedance. The zener voltage will vary slightly with the current flowing through. Let's take the popular LM2931Z PNP regulator as an example of variation of the quiescent current. When the regulator load changes from 50 mA to 150 mA, the zener current will increase by 12.5 mA. The zener voltage variation due to this current change will only be a few hundred mV. That is, the output voltage will vary slightly, but not as much (as high as a

few volts) as with a resistor to ground. Thus, a much better regulated output voltage is maintained.

- 





4. Entradas / Salidas de corriente 4-20 mA

- **Transmitidor 4-20 mA**: los esquemas incluyen un DAC, opamp y regulador, generando corriente proporcional desde 4 mA (0%) hasta 20 mA (100%).
- **Receptor**: un diseño con resistencia de shunt y amplificador precisa el valor de corriente y lo convierte en tensión medible.
  El clásico lazo de corriente es robusto frente a interferencia, ideal en ambientes industriales.

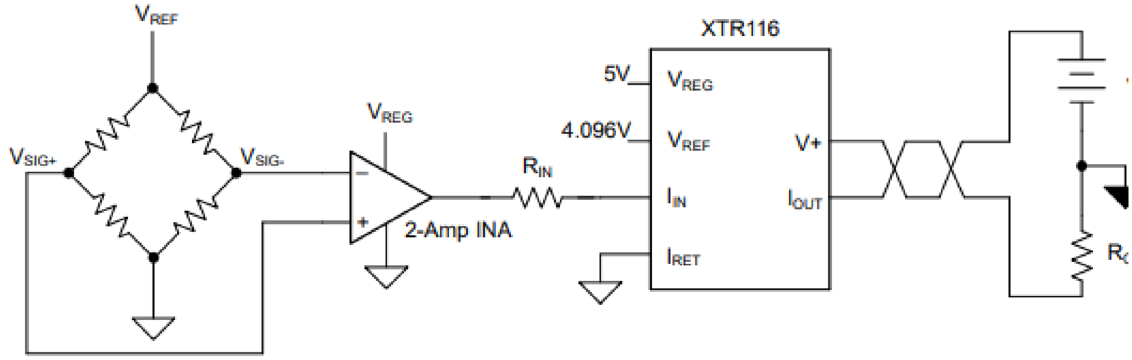


Figure 2-1. Simplified Bridge Amplification to 4-20-mA Circuit

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