



RS232 • Ethernet • Wireless 802.11B Ethernet • USB • 4-20mA • RS485 • Fiber Optic

RS-485 Option

OVERVIEW

RS485 communications are similar to RS232 except that RS485 provides better noise immunity, it is suited to cable distances up to 4,000 feet, and it allows multiple scales to be connected to the same data line.

RS485 BACKGROUND

RS485 achieves the cable length advantage over RS232 by utilizing differential logic. The RS485 device sends two copies of its data; in positive logic and negative logic. The RS485 bus master device receives the two output signals and calculates the difference between them. If the signal difference is positive, the bit is interpreted as “1” and if the difference is negative, the bit is a “0”.

When wiring multiple scales, RS485 allows for all scales and the PC or PLC (bus master device) to share one communications cable consisting of two conductors in a daisy chain topology. The ability of RS485 to have multiple devices attached to the same line creates the advantages of reduced wiring and only utilizing one communications port on the RS485 bus master device. The daisy chain topology requires all devices to share one communication line, which requires each RS485 device to follow a set of communications rules to prevent data collision.

Each scale on the RS485 bus is assigned a unique address in order to prevent data loss that would occur if each scale communicated on the same cable at once. Also, each scale is not permitted to communicate unless the RS485 bus master device has specifically polled that scale’s address. Since a scale on the RS485 bus may not communicate unless the master device activates it, a data buffer is provided to store scale data until requested by the master device.

Weight data is stored in the data buffer until a buffer dump command is received from the master device. Once the dump command is received, the scale takes control of the serial bus and transmits the stored scale readings. When the data buffer is empty, the scale releases the RS485 bus and will not communicate until the master device again activates it.

If scale data stored in data buffer exceeds buffer size, only the latest data that will fit in buffer will be saved. If the scale is set for the Doran default data string, the data buffer will store up to 15 print strings before data loss occurs.

APPLICATION DESCRIPTION

Data Collection and Remote Configuration

A manufacturing plant wants to station three 10 lb capacity Doran Model 4300 checkweighers on the production floor and transmit all weighments to a PC, which will collect and store the scale data. Several different products will be weighed on this line for confirmation that all parts are present in the box before shipment to their customer. Each product will have different over, under and accept checkweigh tolerances. The checkweigh tolerances will be programmed by the PC via ASCII serial configuration commands.

Although RS-232 is available in each scale, only one serial port is available on the PC for communication. An RS485 to RS232 converter is used to connect the PC RS232 port to the RS485 bus. As the finished product is weighed, the weight data is stored in the scale's data buffer. The PC is programmed to poll each scale, one at a time, for the weighments stored in the data buffer.

When the product line is changed to manufacture a different product, the PC sends out an ASCII serial command to each scale to reprogram the under, over and accept checkweigh tolerances. Once programmed, each scale is polled for its current checkweigh settings to confirm the settings were received before the next product is checkweighed.

AVAILABILITY AND ORDERING INSTRUCTIONS

Doran is able to provide the following option for RS485, this option can be found in the Option Section of all Excel Series Scales:

EXOPT105: RS485 serial data output option. Includes: 10 ft long two conductor, shielded cable with pigtail ends.

RS485 OPTION SPECIFICATION

Maximum Cable length	4,000 ft.
Maximum number of scales per bus	32 nodes
Maximum Number of Print commands that can be stored in Print Buffer	256 bytes or 15 data strings with Print Output format = "FO"
Bus common mode range	± 7 volts
RS485 node load impedance	12K ohms
Termination resistors available on board	120 ohm line to line termination resistor 1K ohm pull up bias resistor 1K pull down bias resistor