

BINMASTER

Taking Control . . . To A Higher Level

SMARTBOB REMOTE DISPLAY UNIT



BINMASTER

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Distribué par :

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INTRODUCTION

The *SmartBob* Remote Display Unit (RDU) is an optional accessory to the BinMaster *SmartBob* System. The RDU provides two major features to the *SmartBob* System, a 4-20mA current loop output and a remote display or readout of measurements. The current loop output can be used as an interface to Programmable Logic Controllers (PLC) or Distributed Control Systems (DCS). The remote readout feature allows you to view the current measurement information at each vessel or in a control room up to 4000 feet away from the controlling PC. The display provides distance to product, height of product, and percent of product in the storage vessel.

INSTALLATION

The RDU communicates with the *SmartBob* remotes and the master PC via the RS-485 network. The unit can be attached at any position along the network. This allows for easy expansion to an existing *SmartBob* System. Figure 1 on page 4, is a diagram of a typical *SmartBob* installation including Remote Display Units.

WIRING

The RDU requires a 16 VAC power connection, an RS-485 data connection, and provides a 4-20mA-loop output. The 16 VAC power wires should be installed according to all local and/or national electrical codes. The recommended wire size for the power connection is 14 or 16 gauge wire. The RDU communicates with the *SmartBob* remote via the RS-485 cable. The RS-485 data connection can be made anywhere along the RS-485 network. The maximum length for the RS-485 network is 4000 feet. The polarity of the RS-485 wires is important, please verify their positions during installation. The system will not work if RS485 wires are reversed. This cable must be a good quality twisted pair with a shield. The shield should be connected to the terminal labeled shield in each *SmartBob* housing. The 4-20mA output is provided for a simple interface to a PLC or DCS. A good quality twisted pair cable should also be used when utilizing this feature. The maximum resistance that should be applied to 4-20mA output is **750 Ω (Ohms)**. If this maximum resistance is exceeding the loop fault indicator will light. The 4-20mA output is not valid when loop fault is lit.

PROGRAMMING

The RDU requires two important pieces of information to operate: a bin address and a bin height. The bin address **must** correspond to the address set in the *SmartBob* remote on the bin and can range from 1 to 30. The bin height should be set to the same as in the IMS software package. This will insure that both the IMS software and the RDU display the correct distance of product measurement.

Setting Bin Height:

Pressing the "+" key at the MAIN MENU will display the SETUP MENU. Pressing the "+" at the SETUP MENU will display the BIN HEIGHT MENU. The range for the bin height is from 0.1 feet to 199.9 feet. Pressing the "+" key will increment the hundreds decimal. Pressing the "-" key will decrement the hun-

dreds decimal. Pressing the “ENTER” key will accept the value for that decimal place and move the cursor to the next decimal place. Repeat the process of incrementing and/or decrementing until the correct bin height is entered. Once the tenth decimal place has been entered, a prompt will be displayed asking if the bin height is correct. Pressing the “+” key will accept the bin height and return to the SETUP MENU, pressing the “-” key will start the process of entering a bin height over.

Setting Bin Address:

Pressing the “-” key at the SETUP MENU will display the BIN ADDRESS MENU. The range for the bin address is 1-31. Programming the bin address uses the same process as setting the bin height. First increment or decrement the tens decimal place of the address, then accept the value and increment or decrement the ones decimal place and then accept the value.

NOTE: Setting the bin address to 31 will cause the RDU to display measurements taken on ***all*** bins. Therefore the 4-20mA output will correspond to the last measurement of any bin.

Test Menu:

Pressing the “-” key at the SETUP MENU will display the 4-20mA Test Menu. Pressing the “+” key will output 4mA on the current loop. The current loop can be forced to 20mA by pressing the “-” key. This test option can be used to calibrate the current loop receiver. This is an optional setup step. The RDU does not require any calibration to provide an extremely accurate (16 bit) 4-20mA output. However, this software feature can help in troubleshooting and in system setup.

Display Mode:

The Display Mode is entered by pressing the “ENTER” key from the MAIN MENU. When the Display Mode is selected the RDU is ready for measurements to taken. The Display Mode is the operational mode and the RDU will only measurement when in this mode. A DISPLAY ERROR will occur if the user attempts to enter the Display Mode before setting the Bin Height or if the user selects a Bin Height of zero. The user can, at any time, leave the Display Mode and return to the MAIN MENU by pressing any key.

LOOP FAULT INDICATOR

On the RDU's front panel just below the keys, is an LED Loop Fault indicator. The LED will light if either of the following two conditions exist: (1) the 4-20mA loop is opened or (2) the loop resistance is greater than 750Ω. In either condition a loop fault exists and the 4-20mA-output signal is invalid.

ERROR OUTPUT

The SmartBob remote measures both the distances to the product and the distance the Bob is retracted. If the difference between these distances is greater than six (6) inches, the RDU will display an error message indicating that the Bob is stuck. This error will also be reflected on the current loop output by supplying 20mA. Two error conditions can cause an output of 20mA: 1) the Bob did not fall at all, or 2) the Bob did not retract completely and the Bob is stuck. Both conditions are considered to require attention, therefore, the PLC can be used as a fault indication.

SmartBob System with RDU RS485 Wiring

