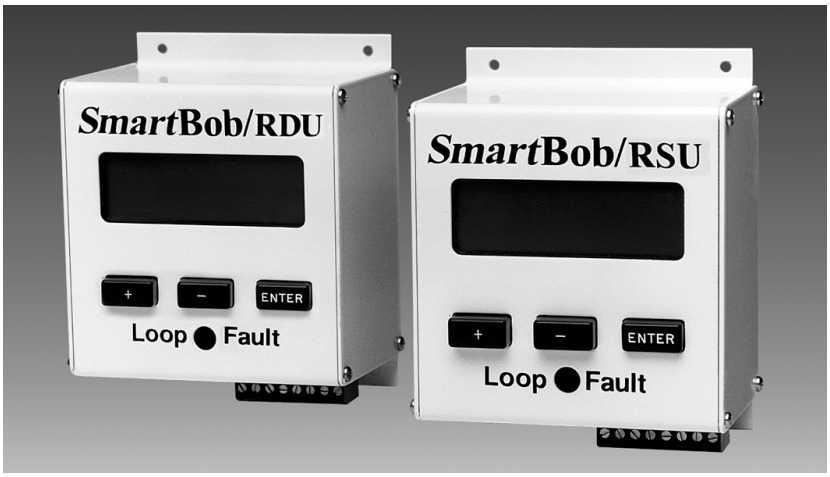
BINMASTER®

Taking Control…To A Higher Level

*SMART*BOB
REMOTE START UNIT



INSTALLATION and OPERATING INSTRUCTIONS
PLEASE READ CAREFULLY

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925-0119
Rev.2

Distribué par :

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REMOTE START UNIT

INTRODUCTION

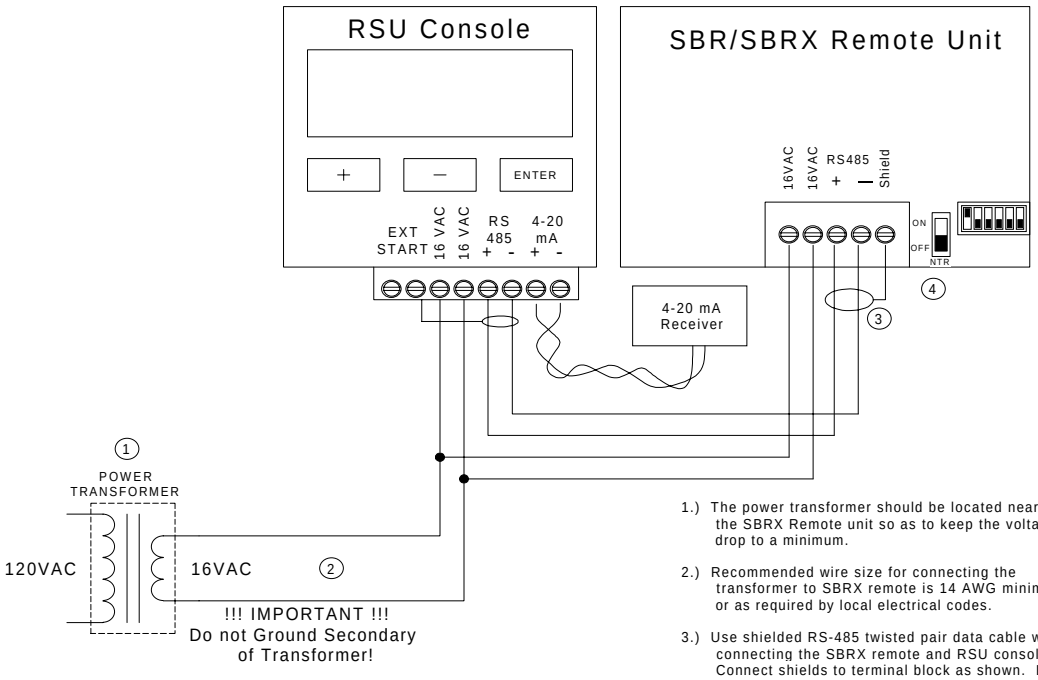
The *Smart*Bob Remote Start Unit (RSU) is an optional accessory to the BinMaster *Smart*Bob System. The RSU provides the following enhancements to the *Smart*Bob System: an external start input, a 4-20mA current loop (analog) output, and a remote display or remote readout of the measurements. These enhancements allow for a simple interface between the *Smart*Bob System and Programmable Logic Controllers (PLC) or Distributed Control Systems (DCS). The PLC \ DCS can initiate a measurement by providing a dry contact closure to the RSU. The PLC can then retrieve the measurement from the analog 4-20mA current loop output on the RSU. The remote readout feature allows you to view the current measurement information at each vessel or in a control room away from the controlling PLC or DCS. The display provides distance to product, height of product, percentage of product in the storage vessel, and status of the bob. All measurements and user information is stored in nonvolatile memory; therefore, the information will not be lost if power is removed.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

INSTALLATION AND WIRING

The RSU requires a 16VAC-power connection, such as wall transformer P/N 388-0039, an RS-485 data connection, and an external start input. A 4-20mA current loop is also an available output to use. The wiring diagram is located directly below the pluggable terminal block on the RSU. Refer to Figure 1 on the last page on this manual for the interconnect wiring connections. The 16VAC 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 18 gauge wire. The RSU communicates with the *Smart*Bob remote via the RS-485 cable. This cable must be a good quality twisted pair with a shield. The shield must be connected to the (-) negative terminal of the 4-20mA loop. The maximum length for the RS-485 cable is 4000 feet. Please verify the polarity of the RS-485 wires during installation. The system will not work if RS-485 wires are reversed. The RSU will only communicate with one *Smart*Bob remote; therefore, the *Smart*Bob's address must be set to one (1). This is the factory default for the *Smart*Bob. Refer to the *Smart*Bob's manual on changing the bin address. The external start input is a dry contact closure e.g. a push button switch or PLC contacts. A good quality twisted pair wire is recommended. The 4-20mA output from the RSU provides a method to interface to a PLC or DCS. The maximum 4-20mA-loop resistance 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. Figure 1 on the following page illustrates how an RSU is connected to an SBR or SBRX remote unit. Figure 2 illustrated how an RSU is connected to an SBRII remote unit.

RSU Interconnect Wiring Diagram



1.) The power transformer should be located near the SBRX Remote unit so as to keep the voltage drop to a minimum.

2.) Recommended wire size for connecting the transformer to SBRX remote is 14 AWG minimum or as required by local electrical codes.

3.) Use shielded RS-485 twisted pair data cable when connecting the SBRX remote and RSU console. Connect shields to terminal block as shown. Do not connect shields to earth ground.

4.) NTR (Network Termination) is in the "ON" position.

FIGURE 1

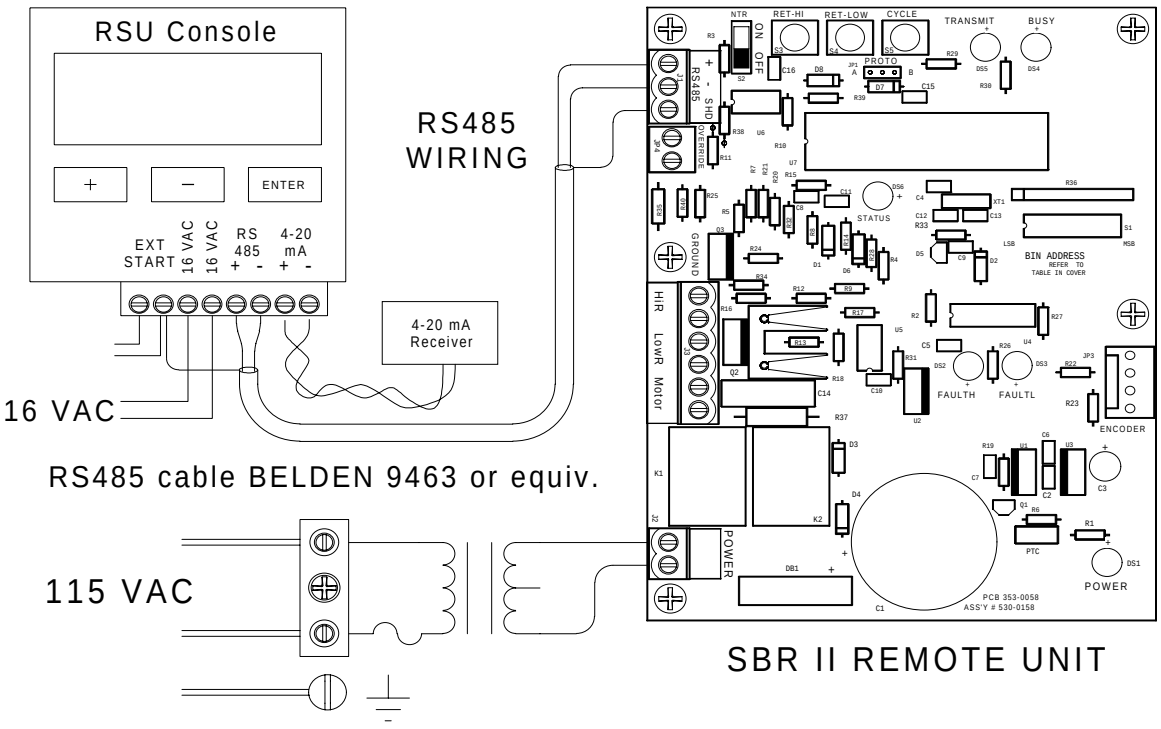


FIGURE 2

PROGRAMMING

The RSU has four programmable options, Bin Height (required), External Start Input, Internal Timer, and Units selection. A bin height must be programmed into the Remote Start Unit. This allows the RSU to correctly convert the *Smart*Bob's measurement into the 4-20mA output. The External Start Input menu has two options: momentary input and maintained input. The momentary input is edge triggered and will only take one measurement each time the PLC closes the dry contact. The maintained input is level triggered and will continue to take measurements as long as the contacts are closed. The factory default for the External Start Input is momentary. The RSU has a 24 hour Interval Timer that when enabled can be programmed to take repetitive measurements at timed intervals up to 24 hours apart. The RSU can display the measurements in either metric or English units. The default setting for measurements is feet. Also included in the RSU is test menu that can be used to calibrate the 4-20mA-loop receiver. The user can select a 4mA output or a 20mA output. **Once all programmable options have been set, the user must then select Display Mode from the Main Menu.** The RSU will then be ready to receive External Start Inputs, or start timed measurements and instruct the *Smart*Bob to execute measurements.

MENU SCREENS

Programming Menu Screens Flowchart is located in the back of this Manual and can be used as a guide through the Programming Screens. The following Menu Screen will appear at power up only if the Bin Height is set to 000.0

BINMASTER Smart Bob
Remote Start Unit
With 4-20mA Output
Press any Key

Upon pressing any key the screen will advance to the Main Menu. If a Bin Height had already been setup, the RSU would go to the DISPLAY MENU when powered up, ready to take a measurement.

Main Menu (+) Key = Setup Menu

Setup Menu (+) Key = Set Bin Height
Setup Menu (-) Key = Configuration Menu
Setup Menu (Enter) Key = Return to Main Menu

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 hundreds' 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 again.

Configuration Menu

Configuration Menu (+) Key = External Start Setup
Configuration Menu (-) Key = Units Menu
Configuration Menu (Enter) Key = Interval Timer Menu

Selecting External Start Input:

Pressing the "-" key at the SETUP MENU will display the EXTERNAL START MENU. Pressing the "+" key will select the **momentary** (edge triggered) input. Pressing the "-" will select **maintained** (level triggered) input. The momentary input will only execute one measurement for each time the input is closed. The maintained input will continue to execute repeated measurements until the input contacts are opened. Once an external start input is selected, pressing the "ENTER" key will return the SETUP MENU.

Units Menu

Pressing the "+" key at the Units Menu selects English units displayed in Feet. Pressing the "-" key at the Units Menu selects Metric units displayed in Meters. Pressing the "ENTER" key at the UNITS MENU will return to the SETUP MENU.

Interval Timer Menu

Interval Timer Menu (+) Key = Set Interval Timer
Interval Timer (-) Key = Enable Timer
Interval Timer(Enter) Key = Return to Setup Menu

Setting Interval Timer

Pressing the "+"' key at the INTERVAL TIMER MENU allows you to set the repetitive time interval that the RSU will take a measurement. The interval can be set in increments of 1 minute up to a maximum of 24 hours. The time format is *hh: mm.* Use the +/- keys to increment / decrement the digits and the ENTER key to select the digit displayed and move to the next digit. After setting the hours and minutes, if the interval displayed is correct press the "+" key to accept and return to the Interval Timer Menu. The time interval set is the time from the one end of one measurement to the start of the next measurement.

ENABLE / DISABLE TIMER

Pressing the "-" key at the INTERVAL TIMER MENU is used to enable or disable the interval timer, depending on its current status. If the choice to select is ENABLE TIMER, then the timer is currently disabled and by pressing the enter key the timer well be enabled. This selection toggles to the other mode each time it is selected.

Main Menu (-) Key = Test Menu

Test Menu (+) Key = 20mA output
Test Menu (-) Key = 4mA output
Test Menu (Enter) Key = Return to Main Menu

Pressing the "-" key at the MAIN 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 RSU 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.

Main Menu (Enter) Key = Display Mode

Display Mode:

Pressing the "ENTER" key from the MAIN MENU enters the Display Mode. When the Display Mode is selected, the RSU is ready to receive an External Start or if the INTERVAL TIMER is enabled, will take a measurement and then start timing down the interval to the next measurement. The Display Mode is the operational mode and the RSU will only accept External Start Inputs 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.

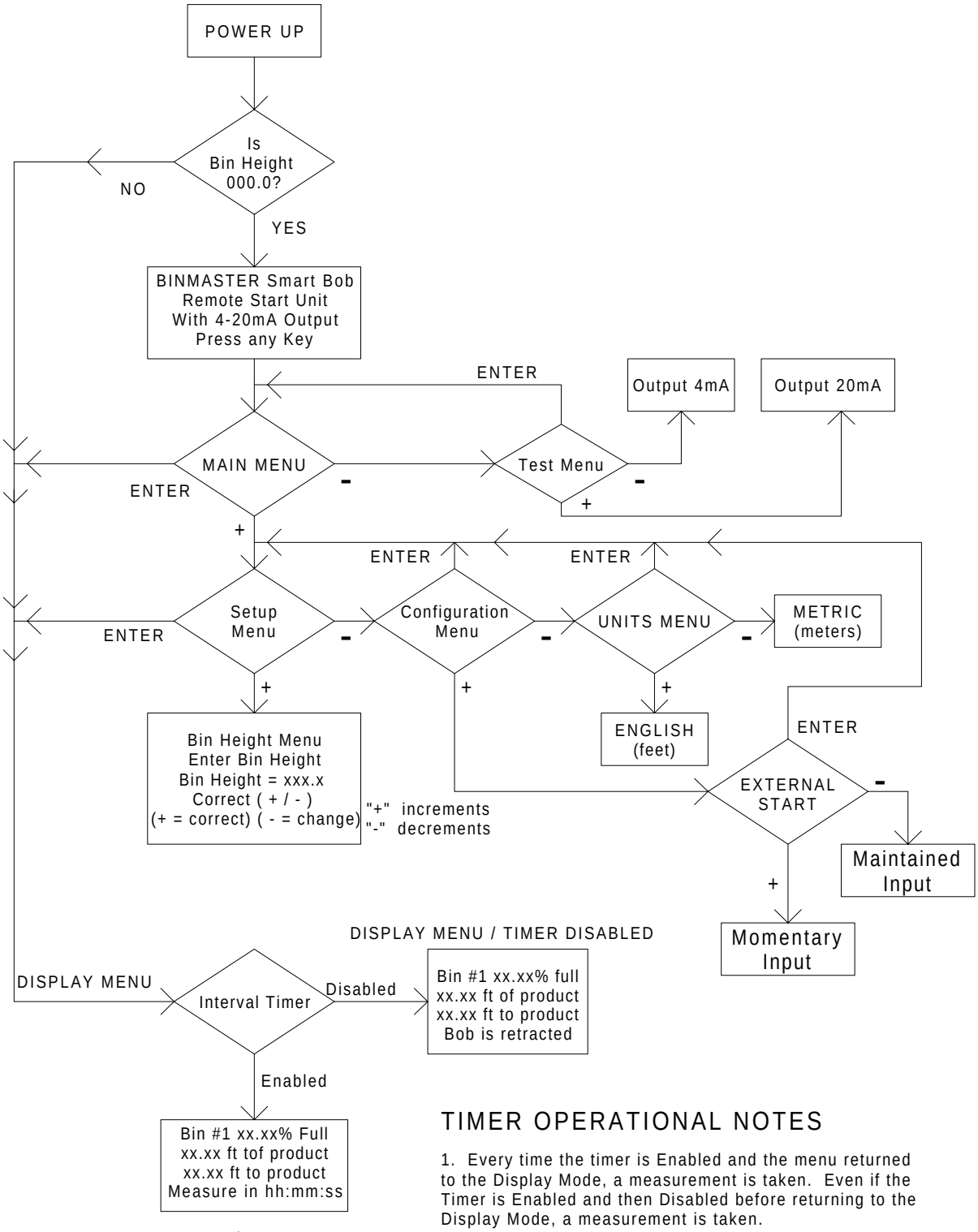
LOOP FAULT INDICATOR

On the RSU'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 RSU 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 use this as a fault indication.

RSU MENU SCREENS FLOWCHART



TIMER OPERATIONAL NOTES

1. Every time the timer is Enabled and the menu returned to the Display Mode, a measurement is taken. Even if the Timer is Enabled and then Disabled before returning to the Display Mode, a measurement is taken.

2. When the Timer is Disabled, the time remaining is retained in memory and when the timer is again Enabled, it begins counting down from this retained time.

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