

SmartBob™



Different Ways of Connecting to SmartBob Remote Sensors

BINMASTER®

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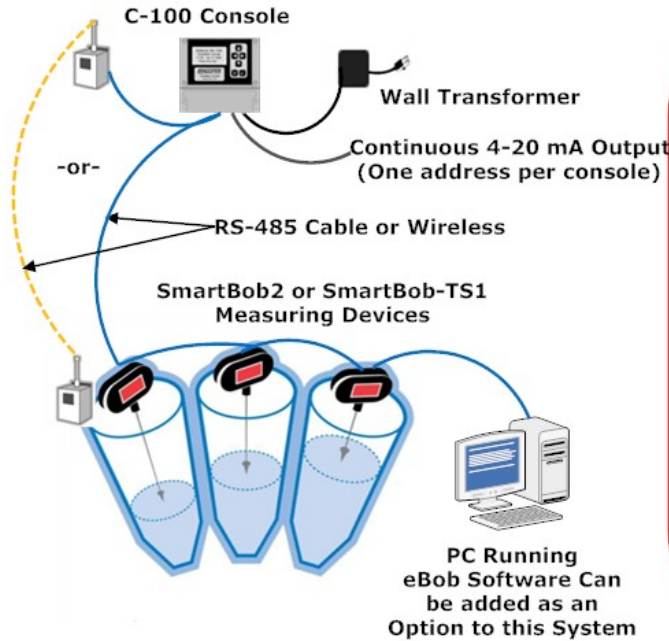
Abstract

This document describes different methods for connecting the SmartBob2 to a variety of systems.



Note: All methods of connections are for recommendations only and the user may use more or any other solutions to get connected to the SmartBob2.

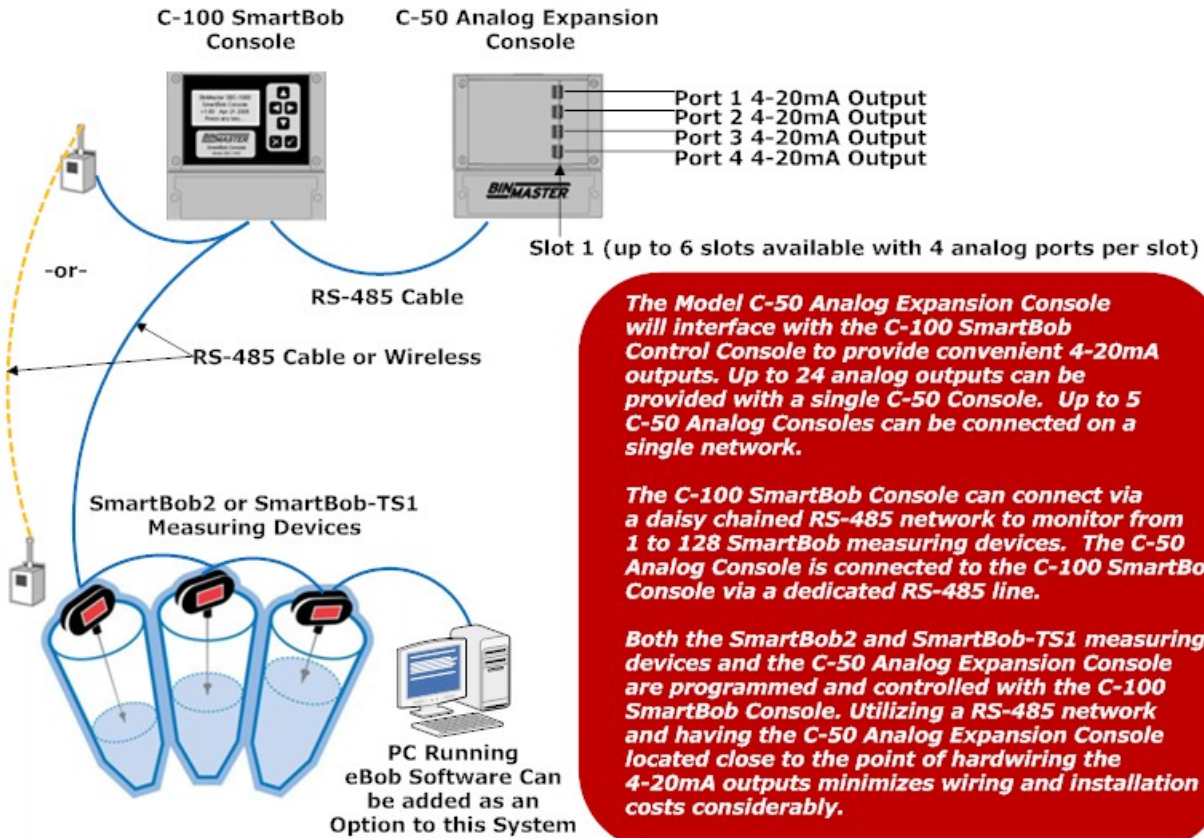
C-100 Manual Push Button Console with LCD Readout



The SmartBob2 Console is the easiest way to remotely initiate and view measurements from multiple SmartBob2 sensors. This compact, manually-operated console provides fast measurement readings from one up to 128 SmartBob remotes at a single location ... with the push of a button. The SmartBob Console can be used alone or integrated into a network using eBob software. It provides basic, local control and monitoring of a single SmartBob remote or a network of up to 128 SmartBob remotes at a networked site. Individual bin parameters are programmed into the SmartBob Console and measurements are displayed as distance to product, height of product, percent full, and weight. The weight display function is derived using a Wizard type menu to estimate weight – calculated by entering vessel shape and dimensions, plus the product density in lbs/ft³ or kg/m³.

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C-100 SmartBob Console Interfaced with C-50 Analog Expansion Console



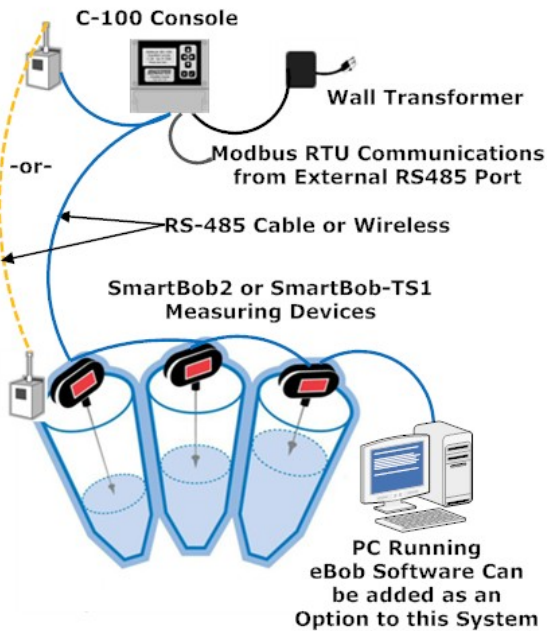
The Model C-50 Analog Expansion Console will interface with the C-100 SmartBob Control Console to provide convenient 4-20mA outputs. Up to 24 analog outputs can be provided with a single C-50 Console. Up to 5 C-50 Analog Consoles can be connected on a single network.

The C-100 SmartBob Console can connect via a daisy chained RS-485 network to monitor from 1 to 128 SmartBob measuring devices. The C-50 Analog Console is connected to the C-100 SmartBob Console via a dedicated RS-485 line.

Both the SmartBob2 and SmartBob-TS1 measuring devices and the C-50 Analog Expansion Console are programmed and controlled with the C-100 SmartBob Console. Utilizing a RS-485 network and having the C-50 Analog Expansion Console located close to the point of hardwiring the 4-20mA outputs minimizes wiring and installation costs considerably.



C-100-MB Manual Console with Modbus RTU Communications from External RS485 Port



The C-100-MB is a traditional PLC based system and it is a distributed I/O system for DCS or PC-based control architectures. For instance, you can connect to a PC based control system using the C-100-MB Console's using the external RS485 port. The PC based control system will need an OPC or I/O server for Modbus RTU. The C-100-MB has an application program that controls the SmartBob2 or SmartBob-TS1 sensors, and gathers measurement data. The C-100-MB filters the data and provides Modbus RTU data exchange between the OPC/IO clients and the C-100-MB Console.

Modbus protocol is defined as a master/slave protocol, meaning a device operating as a master (the host PC or PLC controller) will poll one or more devices (SmartBob's) operating as a slave. The master will write data to a slave device's registers, as well as read the data from the slave device's registers.

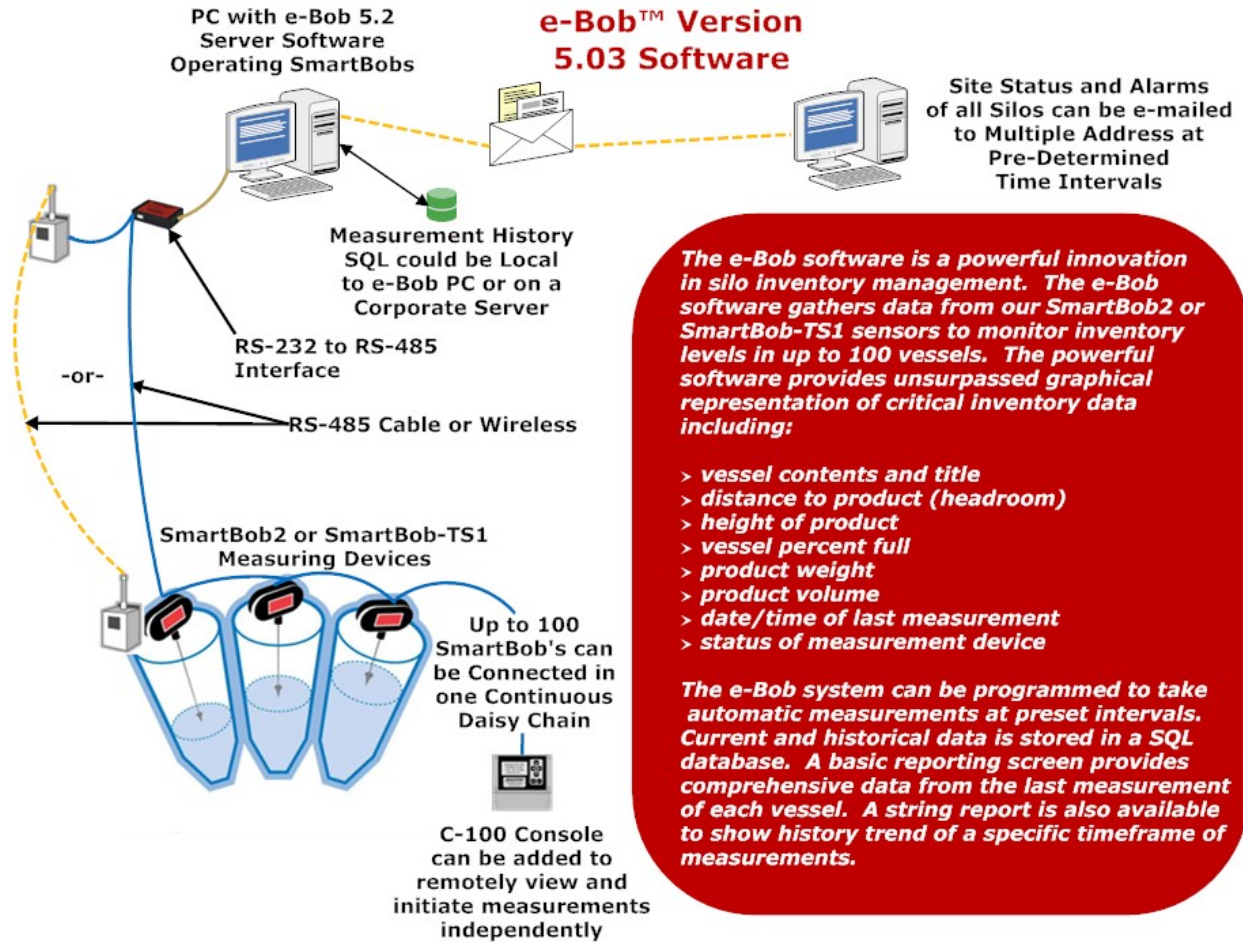
To program a PC (master) to poll network slaves requires a data logging software package (third party SCADA system). Some SCADA systems support Modbus out-of-the-box, while others may need the addition of an optional installable driver, which can be purchased separately. All PC-based options run on current hardware under 32-bit Microsoft Windows operating systems.

A Modbus master can alternatively be nearly any PLC that is Modbus compatible. Optional modules can be added if they are not compatible.

The SmartBob Modbus implementation uses an RS-485 network to send data. Theoretically, it is possible for 64 Scanners to be polled on one network, but is dependent on the SCADA software used.

The Modbus connection is the most flexible communications methods, but does require technical expertise to set up the communication system, database, and screens to display the data.

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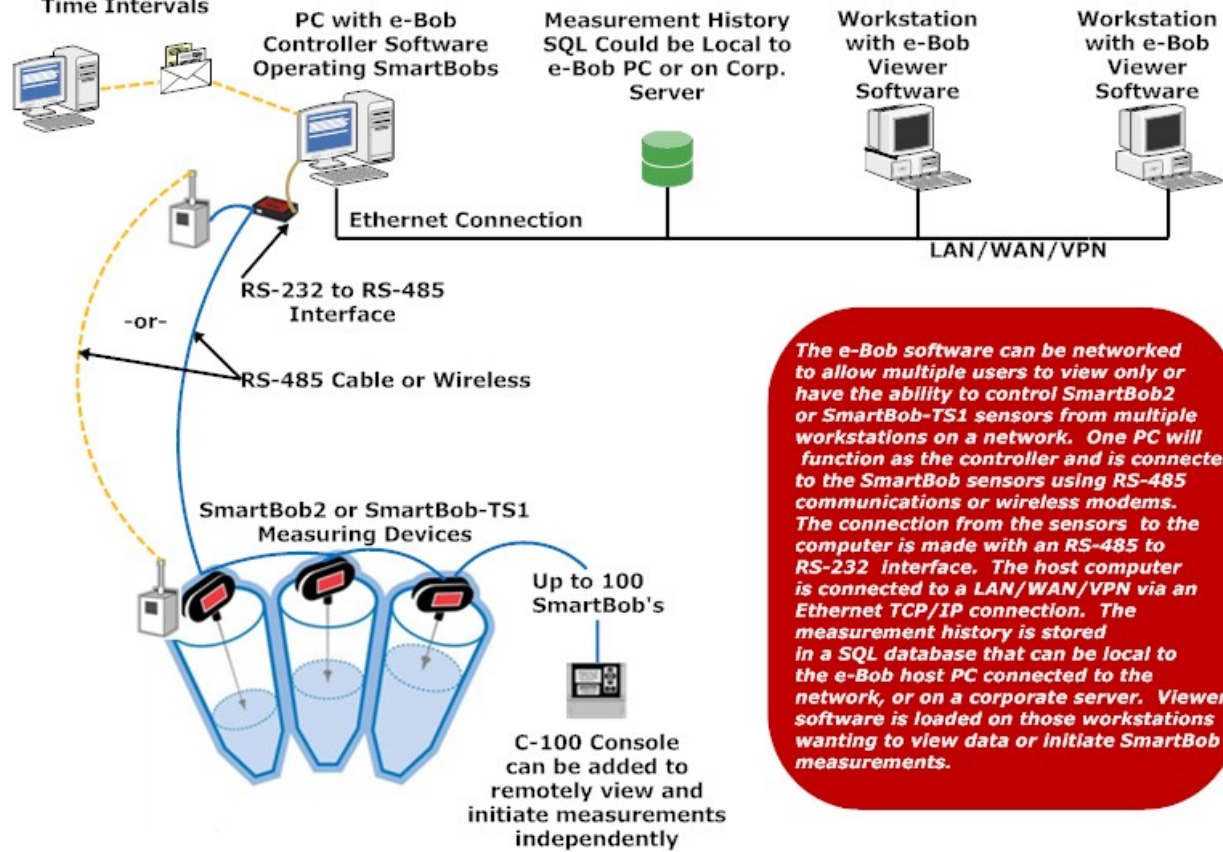
The e-Bob software is a powerful innovation in silo inventory management. The e-Bob software gathers data from our SmartBob2 or SmartBob-TS1 sensors to monitor inventory levels in up to 100 vessels. The powerful software provides unsurpassed graphical representation of critical inventory data including:

- > vessel contents and title
- > distance to product (headroom)
- > height of product
- > vessel percent full
- > product weight
- > product volume
- > date/time of last measurement
- > status of measurement device

The e-Bob system can be programmed to take automatic measurements at preset intervals. Current and historical data is stored in a SQL database. A basic reporting screen provides comprehensive data from the last measurement of each vessel. A string report is also available to show history trend of a specific timeframe of measurements.

Site Status of all Silos can be E-mailed to Multiple Address at Pre-Determined Time Intervals

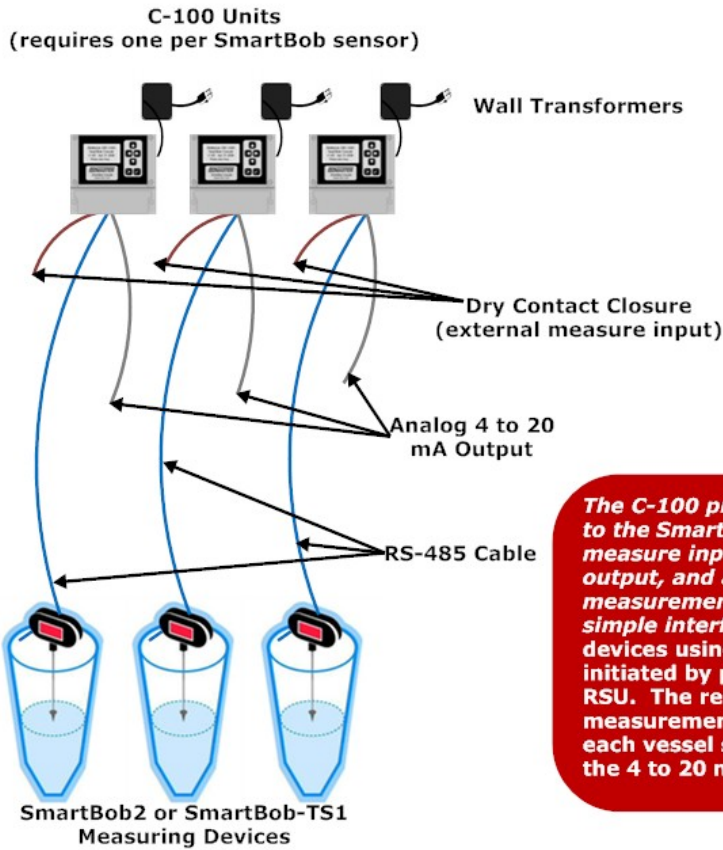
e-Bob™ Version 5.03 Controller & Viewer Software



The e-Bob software can be networked to allow multiple users to view only or have the ability to control SmartBob2 or SmartBob-TS1 sensors from multiple workstations on a network. One PC will function as the controller and is connected to the SmartBob sensors using RS-485 communications or wireless modems. The connection from the sensors to the computer is made with an RS-485 to RS-232 Interface. The host computer is connected to a LAN/WAN/VPN via an Ethernet TCP/IP connection. The measurement history is stored in a SQL database that can be local to the e-Bob host PC connected to the network, or on a corporate server. Viewer software is loaded on those workstations wanting to view data or initiate SmartBob measurements.

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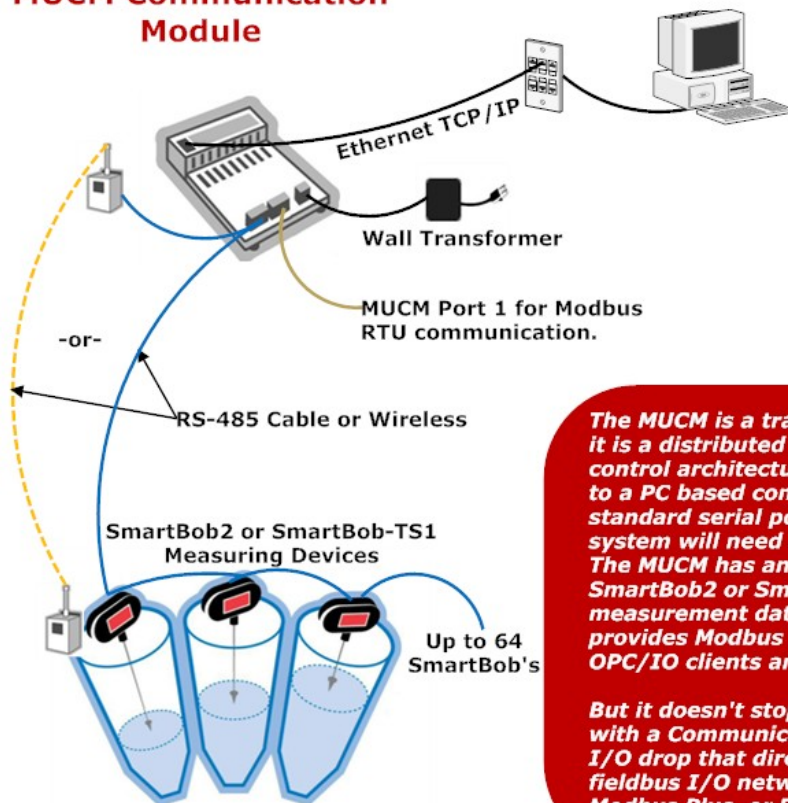
C-100 Console Used as a Single Analog Interface



Note: A Remote Start Unit (RSU) can be used to replace the C-100 Console

The C-100 provides a variety of enhancements to the SmartBob2 or SmartBob-TS1: an external measure input, a 4 to 20 mA current loop (analog) output, and a remote display or remote readout of measurement. These enhancements allow for a simple interface between the SmartBob sensor and devices using analog inputs. Measurements can be initiated by providing a dry contact closure to the RSU. The remote readout feature allows you to view measurement data and diagnostic information from each vessel separately from the device reading the 4 to 20 mA signal.

MUCM Communication Module



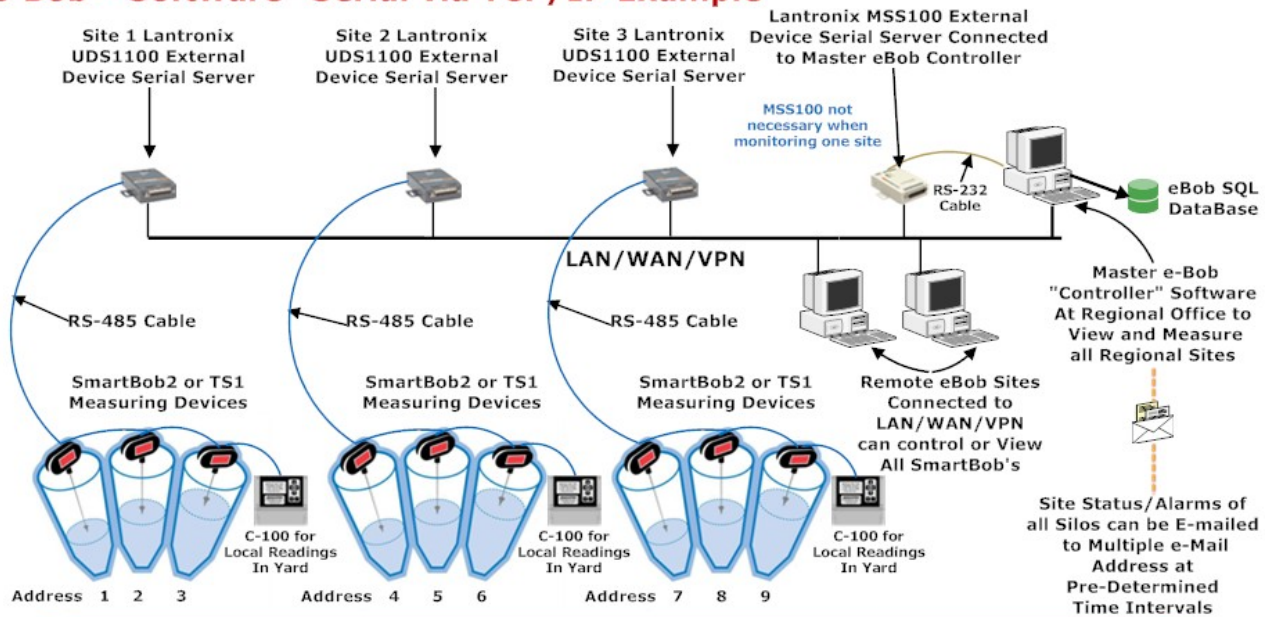
Example of the MUCM Ethernet Tophat that provides direct connection to an Ethernet network, enabling an Ethernet host to communicate with SmartBob's connected to the MUCM. A programmable controller or other host device on the network can read from the input terminals and write to the output terminals of the base MUCM. The Ethernet Tophat communicates with host devices using Modbus Application Protocol with TCP/IP packets.

The MUCM is a traditional PLC based system and it is a distributed I/O system for DCS or PC-based control architectures. For instance, you can connect to a PC based control system using the MUCM's standard serial port connection. The PC based control system will need an OPC or I/O server for Modbus RTU. The MUCM has an application program that controls the SmartBob2 or SmartBob-TS1 sensors, and gathers measurement data. The MUCM filters the data and provides Modbus RTU data exchange between the OPC/IO clients and the MUCM.

But it doesn't stop there. When the MUCM is coupled with a Communication Adapter, the two form a remote I/O drop that directly connects to virtually any standard fieldbus I/O network that include Ethernet, DeviceNet, Modbus Plus, or Profibus.

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e-Bob™ Software "Serial via TCP/IP Example



Each individual site has an Ethernet to serial converter (UDS1100) for serial tunneling via the TCP/IP network

The Master eBob Controller PC has an Ethernet to Serial device server (MSS100) which can talk to sixteen (16) LAN devices (UDS1100) for serial tunneling

The Master eBob Controller software communicates via a Serial Port to the MSS100 Device Server, which in turn routes the serial communications to all the UDS1100's

- The UDS1100 in-turn sends the received serial data out it's RS-485 port
- Each SmartBob Level Sensor tied to the network will have a unique serial address

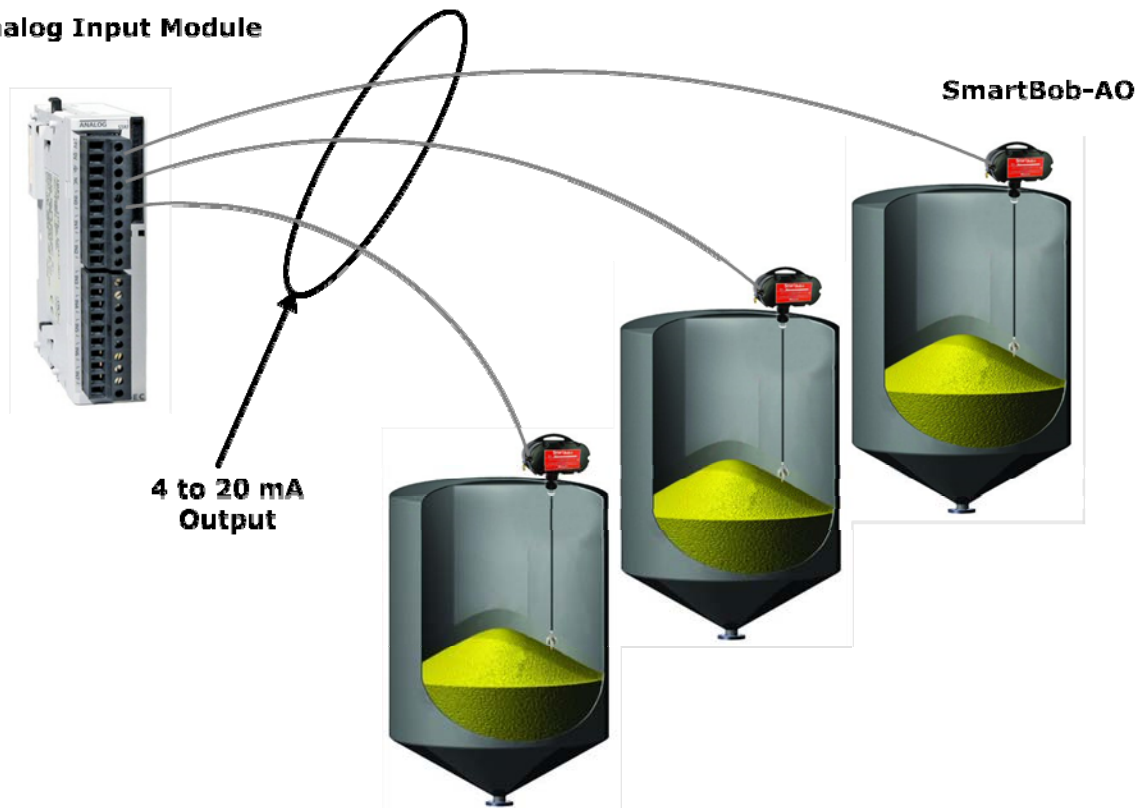
Measurement history is stored in a centralized SQL database. Remote PC(s) connected to the network can work through the Master eBob Controller PC to only view the data from all SmartBob sites, or they can also be set-up to read and control.

C-100 Console's can be installed at each site for local measurements

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SmartBob-AO with Direct 4 to 20 mA Output

Analog Input Module



The SmartBob AO with built-in 4-20 mA output can easily replace any 4-20 device by simply installing the SmartBob on the top of the bin and wiring the sensor to the existing 4-20 input. When the SmartBob AO takes a measurement, it automatically transmits an updated analog signal containing the measurement data. The SmartBob AO can be programmed to initiate a measurement utilizing an internal timer to take readings at a predetermined time interval or an external start input can be used to take a measurement immediately, should one be needed. Two configurable relay outputs can be used to alert to measurement status or high, low or error alarms.



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