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Machine Configuration & Product Tracking – Data Management Improved by Barcodes

July 16, 2020

In the past year, improving operator efficiency as well as production throughput and product tracking have become common requests from customers. I have assisted on these applications and both were able to be solved by implementing a barcode reader into a PLC automation system. There are two major application solutions we've identified.

First, machines have become ever more configurable. A machine operator needs to manage the many settings for each product coming down the line. These settings typically are managed and updated via the HMI page and could take minutes to update on a product change over. Imagine a system that requires an operator to get the work order paperwork, grab a barcode reader and scan, and then one second later the machine is configured for that product. I see two methods of this system working–either the barcode itself is holding the configuration parameters within its value, or the PLC controller supports recipe management where the barcode selects the specific product via the CSV parameter file.

Second, product tracking and validation of production and quality values are becoming the norm. Companies or regulatory organizations want to have each product's production specs available. Determining what product was being run at a specific time requires an operator to accurately enter the product value into the PLC. If this is done wrong, the data log files will have incorrect data, thus making tracking impossible. With a barcode data entry that can be automated, the code can be generated by the ERP system and the PLC logged data can close the loop on what was produced.

At Power/mation, we can assist in guiding your vital digital systems production value decisions. From implementing a barcode system, improving production throughput, and gaining system awareness to report generation. These are necessary for an efficient process automation application. Find our basic application guide in the following pages and reach out to your Power/mation Sales Representative for further questions.

Andrew Jagger
Associate Business Development Manager
Process & Logic Control Products
Power/mation
andrew.jagger@powermation.com
651.605.3301

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Horner OCS Working with Datalogic Handheld Barcode Reader

HORNER AUTOMATION GROUP

DATALOGIC

This guide provides step-by-step instuction for connecting a DATALOGIC Handheld Barcode to a Horner OCS via RS232 Serial ASCII protocol.

Contents:

Hardware Requirements

- Horner Automation OCS product can be selected here.
  - https://hornerautomation.com/product-category/all-in-one-controllers/
  - Sample Projects for the XL7 or XLTe.

XL OCS Series (10)

Micro OCS Series (5)

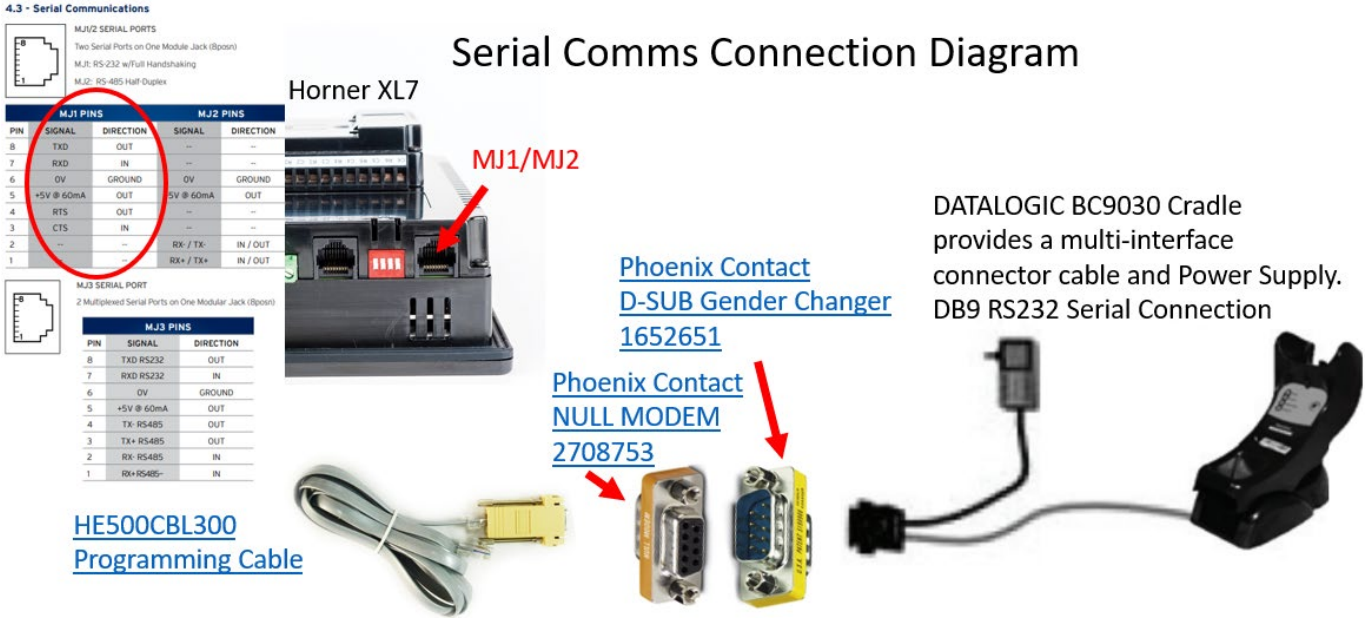
- DATALOGIC Handheld Barcode Reader will need to be a RS232 version. The Industrial, drop on the floor, model is know as the PowerScan.
  - https://www.datalogic.com/eng/retail-transportation-logistics/hand-held-scanners/powerscan-9100-pd-868.html
  - Sample project uses PowerScan 9100 Handheld Scanner with BC9030 Wireless Base Station.

PowerScan™ 9100 Family

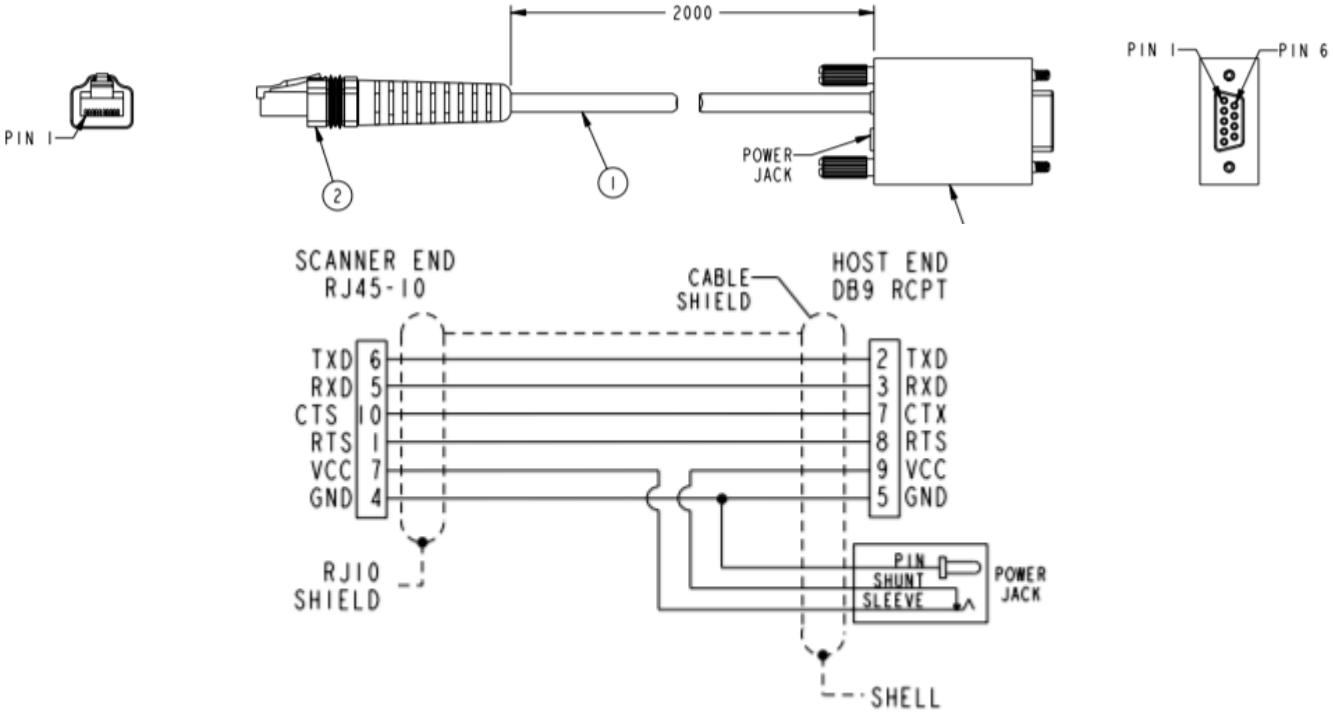
Linear Imager Bar Code Reader

PowerScan PD9130/PBT9100/PM9100

Connection Diagram

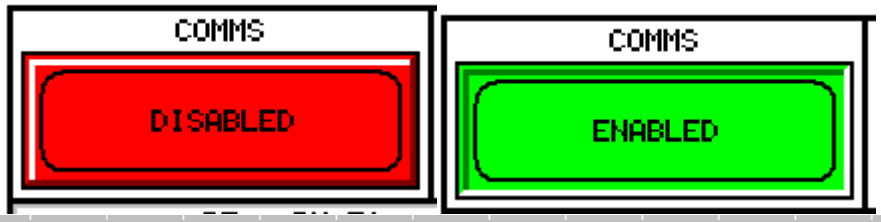


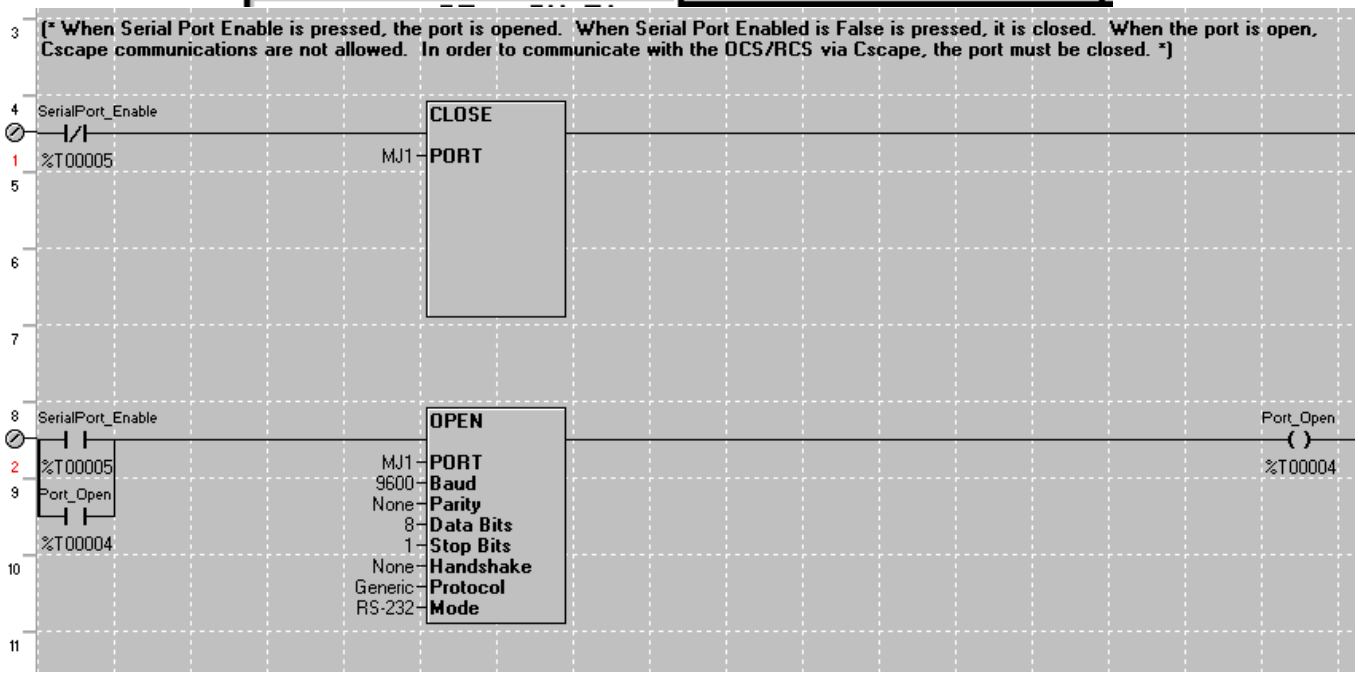
- The Horner OCS has multiple serial ports. The MJ1 port will be used in this application. Note: any RS232 serial port will function.
- For ease of connection to Horner OCS, use the HE500CBL300 programming cable
  - https://hornerautomation.com/product/optoisolator-12/
  - Optional to create custom communication cable. A good accessory is the HE200MJ2TRM
- To swap the Transmit and Receive, a Phoenix Contact Null Modem is used 2708753
- To swap the connector gender, a Phoenix contact Gender Changer is used 1652651
- The DATALOGIC Barcode Cradle comes with a Multi-Interface cable.
  - PM9501-HP910RBK20 or PM9100-910RBK20 Cable



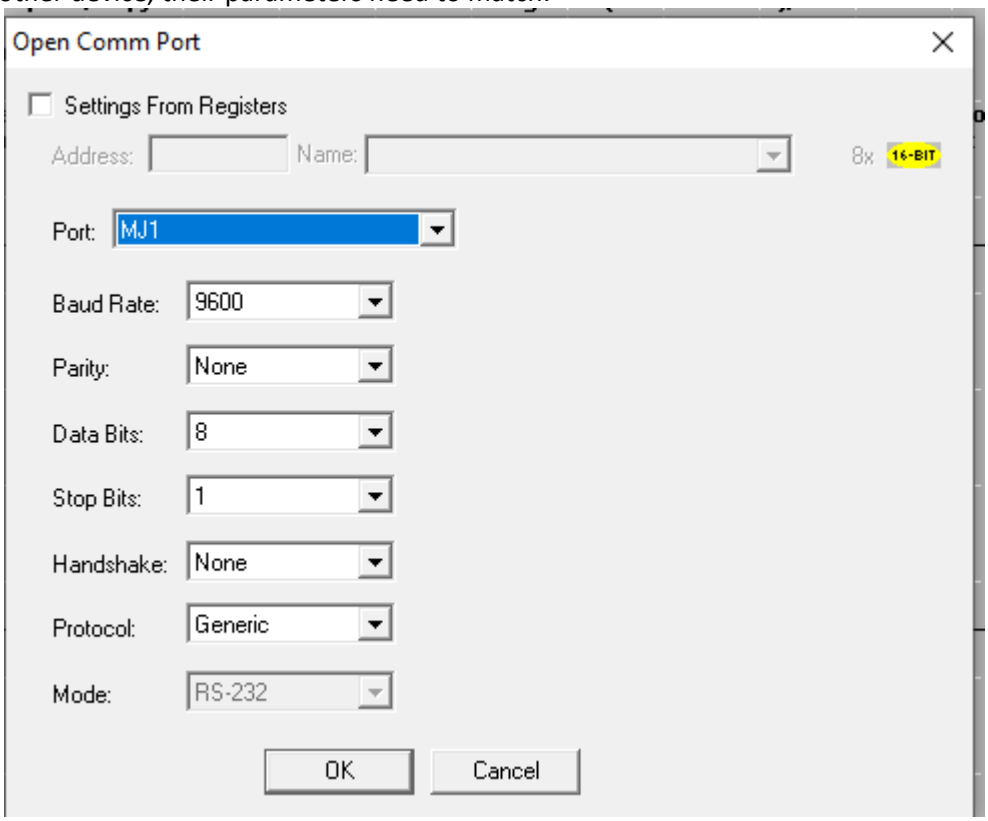
CSCAPE Serial Port Configuration & Sample Code

- The serial port communication needs to be enabled within the logic of the controller. In the past, the serial port was the only method of programming a Horner OCS, therefore, if one wanted to use the port for an application, it would disable the port for programming. Thus, programming a method to turn off the port in logic, or taking the controller out of RUN mode was necessary. With USB and Ethernet as options for programming, this is less of a concern now, but the Logic still exists where a port needs to be opened.

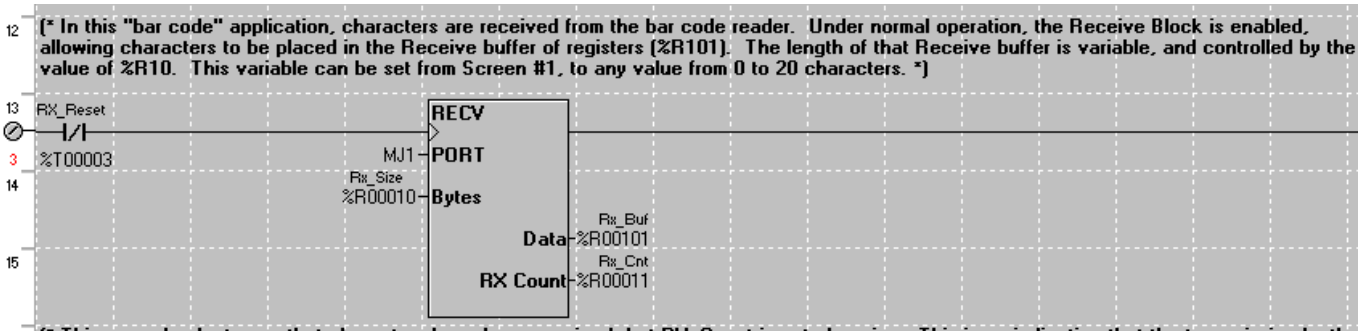




- Serial communication requires verification and management of the speed and format of the data across the wire. These parameters are found in the OPEN command block. For the Horner OCS to communicate with another device, their parameters need to match.

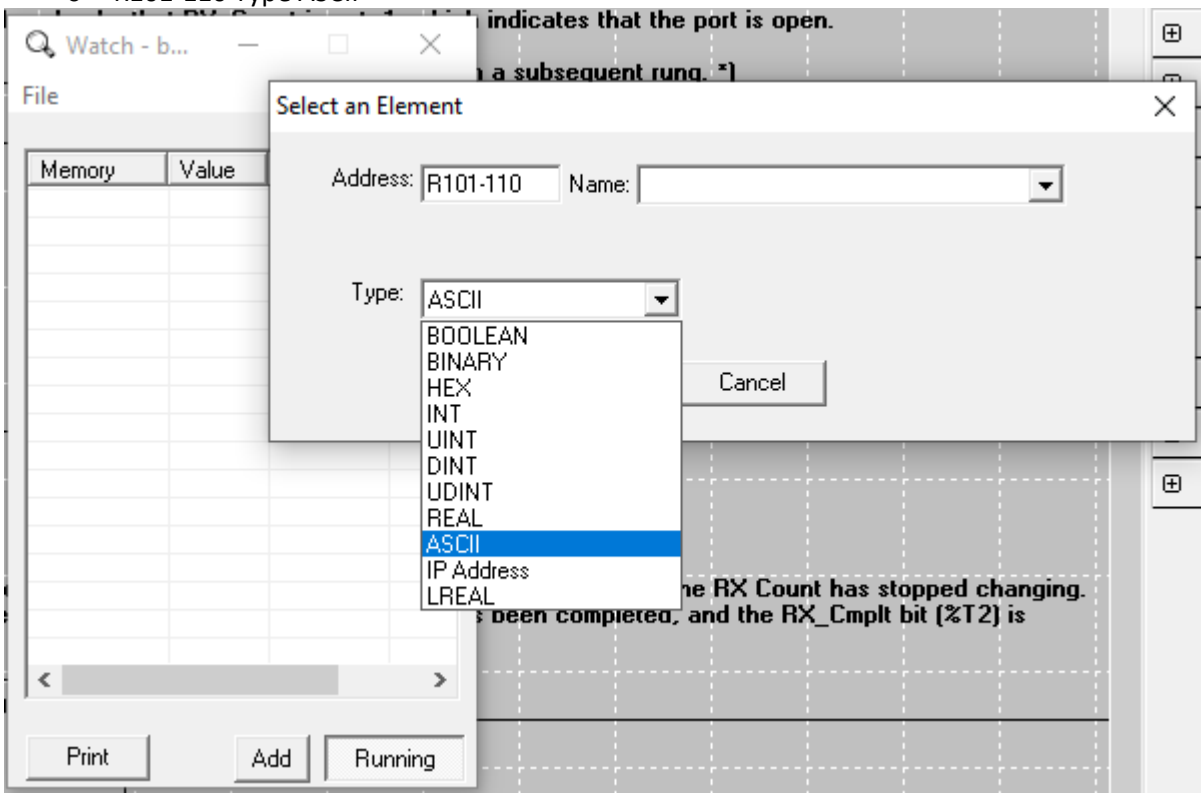


- Once the Port is Open, the controller is ready to either send or receive data. A barcode reader is the sender of the data and the Horner is the receiver.

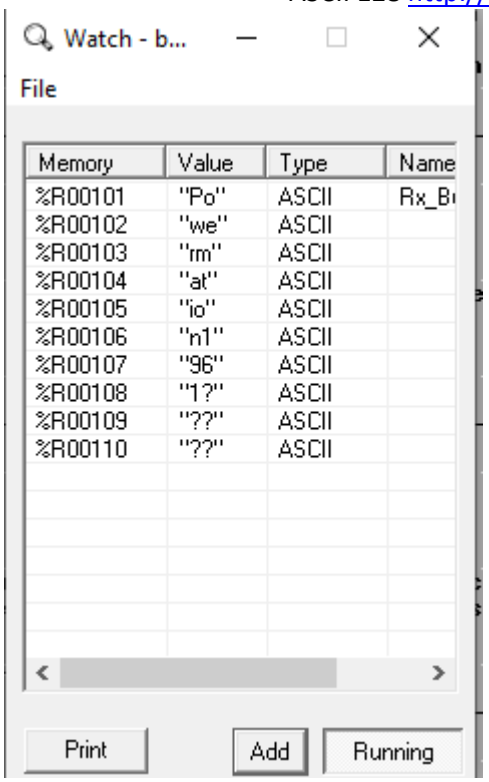


- The Horner OCS can display 20 Bytes of data at a time. ASCII code uses bytes, thus 20 characters of text and RX_Size %R10 in the sample the value needs to be set between 1 to 20, typically it is always set to 20.

- The Data is stored in a Buffer at memory location, %R101, length 20 bytes, to %R110. Within the Horner, this data can be read in real time using the Watch tool.
    - R101-110 Type ASCII



    - The values will be displayed as 2 characters per register ie. Powermation1961
    - ASCII code uses a decimal value in each byte to refer to a specific character.
        - ASCII 128 http://www.asciitable.com/



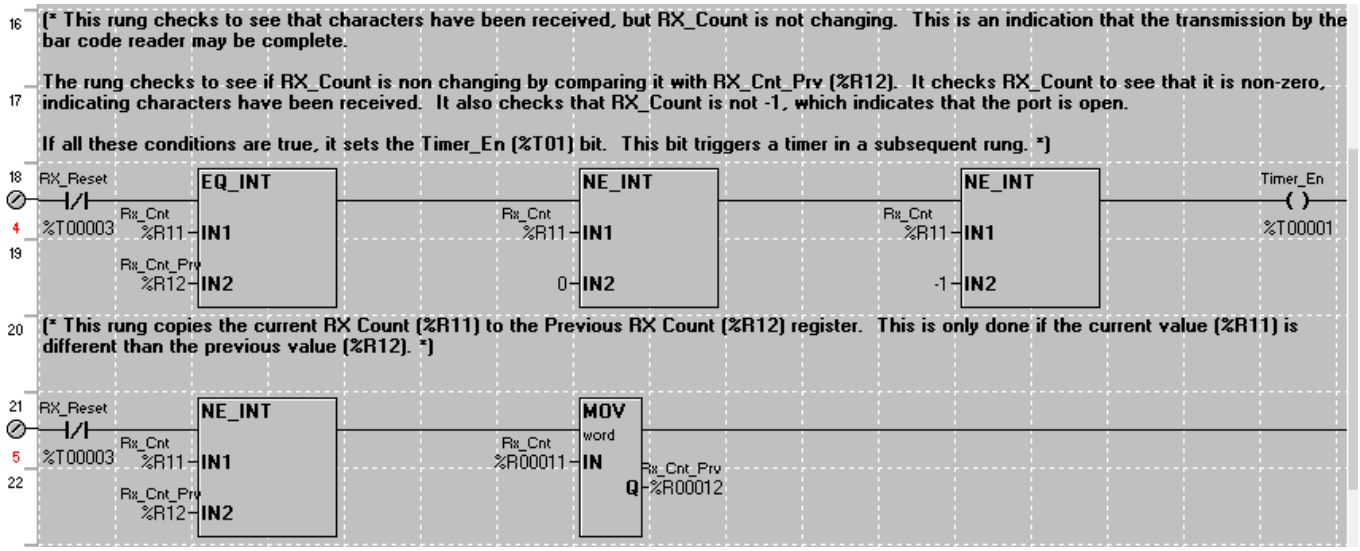
- The Sample project Rungs 4 & 5 are written to check the RX Count variable to determine when the read is completed. If the Receive value is the same as it was before and not a 0, meaning clear buffer or -1 meaning closed port.

RX COUNT contains the number of bytes to be copied from the port's internal buffer to the registers at **DATA** (or -1 when the function is not active).

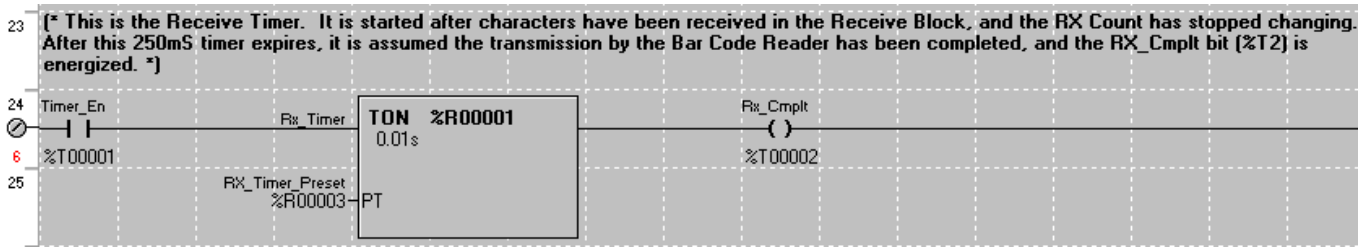
If the port is not opened the Receive Element does nothing, and power flow through the element is FALSE.

Power flow through the element is FALSE until the requested number of characters has been received from the comm port buffer (at which time the power flow will be TRUE). It is possible that the element can not transfer all data in one program **scan time**, especially at slower baud rates.

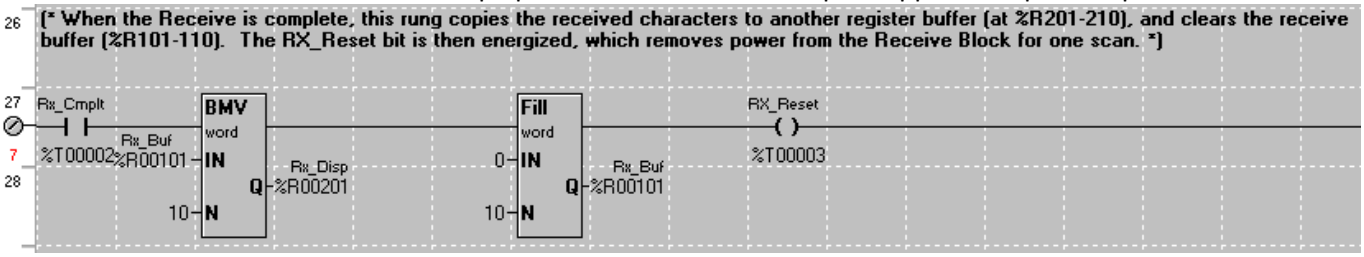
The **BYTES** can be a Register Type and Offset references. The maximum acceptable value is 255 bytes. When using a Register Type and Offset address, if the register contains a value less than 0 (zero) or greater than 255, the element does nothing, and power flow through the element is FALSE.



- The sample project uses time as the trigger for the end of a read buffers. During testing the suggestion of 500 hundredths of a second as the timer preset. During runtime of the application, the suggestion is 25 hundredths of a second.



- Once the timer completes, the data from the buffer is moved to a static memory location %R201-210, which can be used to be the recipe pointer or be used to decipher application process parameters.



Barcode Configuration

- The sample project utilizes a DATALOGIC barcode reader with wireless remote base.
  - For 1D only Kit Part Number: PM9100-910RBK20
  - For 2D/1D Kit Part Number: PM9501-HP910RBK20
- The barcode reader itself is configured by scanning specifically coded barcodes. Below will be the codes required to get a scanner configured to communicate with the Horner's sample code.
  - This information is found on DATALOGIC's website in the product manual.
    - PowerScan 9100
      - Powerscan_9100_family_prg_eng
      - Quick Reference PowerScan PD9130
  - Link the cradle and the reader. If this was done before, skip this step.
    - Scan Unlink

    - Place reader in cradle for 5 seconds.
      - This links the wireless reader to the wireless cradle base.

  - Select Standard RS232 as Interface Type.

- Set Factory Default Settings for the RS232 parameters.

NOTE

Factory defaults are based on the interface type. Be sure your reader is configured for the correct interface before scanning this label. See "Selecting the Interface Type" on page 5 for more information.

Reset Default Settings

- The Horner Controller is setup for a Baud Rate of 9600. Adjust this setting from defaults.
  - Enter Programming Mode

Enter/Exit Programming Mode

  - Baud Rate = 9600

Baud Rate = 9600

  - Exit Programming Mode

Enter/Exit Programming Mode

  - The Horner OCS should now be receiving data from the barcode reader.

Sample Barcodes

- The Default Code in the DATALOGIC Barcode Reader is ASCII 128.
  - Generate Some Sample Codes Here
    - https://barcode.tec-it.com/en/Code128?data=Power%2Fmation%201961

    - Horner Automation

    - DATALOGIC

    - THANKS Andrew Jagger 651-605-3300

Bill Of Materials

LN#	Item Code	Item Description	Quantity
1	**HE-XW1E2**	**HORNER APG LLC** XL7 Series OCS w/ DC/Relay I/O. 12 Digital Inputs compatible w/ 12V/24VDC - four (4) inputs can be used for two 500kHz High Speed Counters. Six (6) Relay Outputs - up to 5A continuous current. Four (4) 12-bit Analog Inputs selectable between 0-10V and 4-2	1.00
2	**PM9100-910RBK20**	**DATALOGIC USA, INC.** Datalogic PowerScan PM9100 - RS-232 Serial Kit, Barcode scanner, Datalogic PowerScan PM9100, 910 MHz, Cordless, Kit Includes Scanner (PM9100-910RB), Communication Base (BC9030-910), RS-232 Interface Cable (CAB-433), and Power supply (6003-0941 & 8-0935).	1.00
3	**HE500CBL300**	**HORNER APG LLC** PROGRAMMING CABLE FOR COLOR-TOUCH OCS	1.00
4	**2708753**	**PHOENIX CONTACT INC** PSM-AD-D9-NULLMODEM V.24 (RS-232) zero modem connector	1.00
5	**1652651**	**PHOENIX CONTACT INC** VS-09-GC-ST/ST D-SUB contact insert shell size 1 with nine signal contacts contact type pin gender changer fixing with 4-40 UNC thread	1.00