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Modbus™ to Yo-Yo™
Protocol Guide

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I. INTRODUCTION

Modbus™ RTU is a binary serial data string that is used to connect communications between devices. All of the values listed below and examples from a Bindicator Yo-Yo™ using Modbus settings: 115.2K, N, 8, 1.
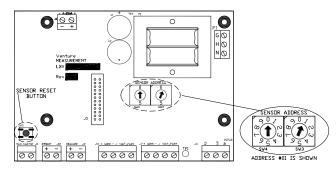
Based on the set up of the user's equipment, the send string is input; and return string is the output from Modbus.

Note: All data written and received is in HEX format. A programming calculator can be used to convert to decimal, using the HEX/Decimal function.

Invalid commands sent for data will generate unknown responses. This manual reflects version 1.05 firmware.

I. INSTRUCTIONS

1. Determine command that is requested.

2. Go to Yo-Yo unit to determine the setting of the rotary switch address.

3. Convert the position value (from decimal) to HEX, using a scientific calculator (ie position set at 89 will equal 59)

4. Determine if you are going to read or write the command

5. Verify the command - command value is specific to the command in question; the command determines the number of registers

6. Calculate Check Sum. This verifies the other parts of the string and is required as part of the whole send value

    A Check Sum Calculator can be downloaded from the Bindicator website on the Yo-Yo product page. (www.bindicator.com)

7. Receive address that comes back will be the same as the address that was in the send string

   a. Receive Function that comes back will be the same as the Function that was in the send string

   b. No. of Bytes is directly related to the No. of Registers in the Send string, which in turn is related to the Command being requested

10. Data Hex is the value that the Command was asked to retrieve; this value is in HEX and needs to be converted to decimal using a scientific calculator.

11. Check Sum value will vary depending on the other data supplied/requested

III. EXAMPLE

Assumptions:

User wants to know the Tank Height.

Bindicator Yo-Yo rotary switches set at 10

User wants to read the information

Send string to input into the Modbus would be the following: 0A030103748D (no spaces)

SEND	CHARACTERS	TYPE	VALUES	DESCRIPTION
Address	2	HEX	0A	Rotary switch postions on Yo-Yo (converted from decimal to HEX)
Function	2	HEX	03	Read/Write
Command	2	HEX	01 03	Tank Height
No. of Registers	4	HEX	00 01	Set by Command
Check Sum	4	HEX	748D	Calculated
The user would get the following Receive String as the output: 0A0302XXXXXX				
Convert the value of the Data Hex from HEX to decimal using a Programmer Caluator (available on most computers as a type of calculator). The value that is returned will the the Tank Height in centimeters and can then be converted as needed.				

RECEIVE	CHARACTERS	TYPE	VALUES	DESCRIPTION
Address	2	HEX	0A	Equals 'Send' Address
Function	2	HEX	03	Equals 'Send' Function
No. of Bytes	2	HEX	02	Associated to the No. of Registers
Data Hex	4	HEX	02 8F	HEX value; converted equals a value in cm from 100 to 6093 cm
Check Sum	4	HEX	5D41	Calculated

IV. COMMANDS

Command 1: Tank Full

Send	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Rotary switch postions on Yo-Yo (converted from decimal to HEX)
Function	2	HEX	03/10	Read/Write
Command	4	HEX	01 01	Tank Full
No. of Registers	4	HEX	00 01	Set by Command
Check Sum	4	HEX		Calculated
Receive	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Equals 'Send' Address
Function	2	HEX	03/10	Equals 'Send' Function
No. of Bytes	2	HEX	02	Associated to the No. of Registers
Data Hex	4	HEX	64 to 17CD	HEX value; converted equals a value in cm from 100 to 6093 cm
Check Sum	4	HEX		Calculated

Command 2. Tank Empty

Send	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Rotary switch postions on Yo-Yo (converted from decimal to HEX)
Function	2	HEX	03/10	Read/Write
Command	4	HEX	01 02	Tank Empty
No. of Registers	4	HEX	00 01	Set by Command
Check Sum	4	HEX		Calculated
Receive	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Equals 'Send' Address
Function	2	HEX	03/10	Equals 'Send' Function
No. of Bytes	2	HEX	02	Associated to the No. of Registers
Data Hex	4	HEX	64 to 17CD	HEX value; converted equals a value in cm from 100 to 6093 cm
Check Sum	4	HEX		Calculated

Command 3. Tank Height

Send	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Rotary switch postions on Yo-Yo (converted from decimal to HEX)
Function	2	HEX	03/10	Read/Write
Command	4	HEX	01 03	Tank Height
No. of Registers	4	HEX	00 01	Set by Command
Check Sum	4	HEX		Calculated
Receive	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Equals 'Send' Address
Function	2	HEX	03/10	Equals 'Send' Function
No. of Bytes	2	HEX	02	Associated to the No. of Registers
Data Hex	4	HEX	64 to 17CD	HEX value; converted equals a value in cm from 100 to 6093 cm
Check Sum	4	HEX		Calcualted

Command 4. Maximum Move Distance

Send	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Rotary switch postions on Yo-Yo (converted from decimal to HEX)
Function	2	HEX	03/10	Read/Write
Command	4	HEX	01 04	Max Move Distance
No. of Registers	4	HEX	00 01	Set by Command
Check Sum	4	HEX		Calculated
Receive	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Equals 'Send' Address
Function	2	HEX	03/10	Equals 'Send' Function
No. of Bytes	2	HEX	04	Associated to the No. of Registers
Data Hex	4	HEX	64 to 17CD	HEX value; converted equals a value in cm from 100 to 6093 cm
Check Sum	4	HEX		Calculated

Command 5. Cone Height

Send	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Rotary switch postions on Yo-Yo (converted from decimal to HEX)
Function	2	HEX	03/10	Read/Write
Command	4	HEX	01 05	Cone Height
No. of Registers	4	HEX	00 02	Set by Command
Check Sum	4	HEX		Calculated
Receive	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Equals 'Send' Address
Function	2	HEX	03/10	Equals 'Send' Function
No. of Bytes	2	HEX	02	Associated to the No. of Registers
Data Hex	4	HEX	64 to 17CD	HEX value; converted equals a value in cm from 100 to 6093 cm
Check Sum	4	HEX		Calculated

Command 6. Full Scale Value

Send	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Rotary switch postions on Yo-Yo (converted from decimal to HEX)
Function	2	HEX	03/10	Read/Write
Command	4	HEX	01 06	Full Scale Value
No. of Registers	4	HEX	00 02	Set by Command
Check Sum	4	HEX		Calculated
Receive	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Equals 'Send' Address
Function	2	HEX	03/10	Equals 'Send' Function
No. of Bytes	4	HEX	04	Associated to the No. of Registers
Data Hex	8	HEX	Up to 98967F	HEX conversion = a value up to 9,999,999
Check Sum	4	HEX		Calculated

Command 7. Mode

Send	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Rotary switch postions on Yo-Yo (converted from decimal to HEX)
Function	2	HEX	03/10	Read/Write
Command	4	HEX	01 08	Mode
No. of Registers	4	HEX	00 01	Set by Command
Check Sum	4	HEX		Calculated
Receive	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Equals 'Send' Address
Function	2	HEX	03/10	Equals 'Send' Function
No. of Bytes	2	HEX	02	Associated to the No. of Registers
Data Hex	4	HEX		Material 00 = Air 01 = Material
Check Sum	4	HEX		Calculated

Command 8. Units

Send	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Rotary switch postions on Yo-Yo (converted from decimal to HEX)
Function	2	HEX	03/10	Read/Write
Command	4	HEX	01 09	Units
No. of Registers	4	HEX	00 01	Set by Command
Check Sum	4	HEX		Calculated
Receive	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Equals 'Send' Address
Function	2	HEX	03/10	Equals 'Send' Function
No. of Bytes	2	HEX	02	Associated to the No. of Registers
Data Hex	4	HEX	64 to 17CD	Unit of Measure: 00 = Feet 01 = Meters 02 = Cubic Feet 03 = Cubic Meters 04 = Pounds 05 = Kilograms 06 = Gallons 07 = Liters
Check Sum	4	HEX		Calculated

Command 9. Automatic Timer

Send	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Rotary switch postions on Yo-Yo (converted from decimal to HEX)
Function	2	HEX	03/10	Read/Write
Command	4	HEX	01 0A	Auto Timer
No. of Registers	4	HEX	00 01	Set by Command
Check Sum	4	HEX		Calculated
Receive	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Equals 'Send' Address
Function	2	HEX	03/10	Equals 'Send' Function
No. of Bytes	2	HEX	02	Associated to the No. of Registers
Data Hex	4	HEX	64 to 17CD	HEX value; converted equals a value in cm from 100 to 6093 cm
Check Sum	4	HEX		Calculated

Command 10. Enable Automatic Timer

Send	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Rotary switch postions on Yo-Yo (converted from decimal to HEX)
Function	2	HEX	03/10	Read/Write
Command	4	HEX	01 0B	Enable Auto Timer
No. of Registers	4	HEX	00 01	Set by Command
Check Sum	4	HEX		Calculated
Receive	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Equals 'Send' Address
Function	2	HEX	03/10	Equals 'Send' Function
No. of Bytes	2	HEX	02	Associated to the No. of Registers
Data Hex	4	HEX	00 or 01	On/Off: 00 = Off 01 = On
Check Sum	4	HEX		Calculated

Command 11. Default 4-20 mA Mode

Send	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Rotary switch postions on Yo-Yo (converted from decimal to HEX)
Function	2	HEX	03/10	Read/Write
Command	4	HEX	01 0E	Default 4-20 mA Mode
No. of Registers	4	HEX	00 01	Set by Command
Check Sum	4	HEX		Calculated
Receive	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Equals 'Send' Address
Function	2	HEX	03/10	Equals 'Send' Function
No. of Bytes	2	HEX	02	Associated to the No. of Registers
Data Hex	4	HEX	00 or 01	Full/Empty: 00 = Empty 01 = Full
Check Sum	4	HEX		Calculated

Command 12. Sensor Name

Send	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Rotary switch postions on Yo-Yo (converted from decimal to HEX)
Function	2	HEX	03/10	Read/Write
Command	4	HEX	01 0F	Sensor Name
No. of Registers	4	HEX	00 05	Set by Command
Check Sum	4	HEX		Calculated
Receive	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Equals 'Send' Address
Function	2	HEX	03/10	Equals 'Send' Function
No. of Bytes	2	HEX	0A	Associated to the No. of Registers
Data Hex	20	HEX		
Check Sum	4	HEX		Calculated

Command 14. Level

Send	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Rotary switch postions on Yo-Yo (converted from decimal to HEX)
Function	2	HEX	03/10	Read/Write
Command	4	HEX	01 0A	Level
No. of Registers	4	HEX	00 02	Set by Command
Check Sum	4	HEX		Calculated
Receive	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Equals 'Send' Address
Function	2	HEX	03/10	Equals 'Send' Function
No. of Bytes	2	HEX	04	Associated to the No. of Registers
Data Hex	8	HEX	Up to 3B9AC9FF	HEX conversion = Value up to 9,999,999.99, 2 Fixed Decimal Places
Check Sum	4	HEX		Calculated

Command 15. Percent

Send	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Rotary switch postions on Yo-Yo (converted from decimal to HEX)
Function	2	HEX	03/10	Read/Write
Command	4	HEX	05 03	Percent
No. of Registers	4	HEX	00 01	Set by Command
Check Sum	4	HEX		Calculated
Receive	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Equals 'Send' Address
Function	2	HEX	03/10	Equals 'Send' Function
No. of Bytes	2	HEX	02	Associated to the No. of Registers
Data Hex	4	HEX	Up to 64	HEX conversion = Value from 0 to 100.0, 1 Fixed Decimal Place
Check Sum	4	HEX		Calculated

Command 16. Device Status

Send	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Rotary switch postions on Yo-Yo (converted from decimal to HEX)
Function	2	HEX	03/10	Read/Write
Command	4	HEX	05 04	Device Status
No. of Registers	4	HEX	00 01	Set by Command
Check Sum	4	HEX		Calculated
Receive	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Equals 'Send' Address
Function	2	HEX	03/10	Equals 'Send' Function
No. of Bytes	2	HEX	02	Associated to the No. of Registers
Data Hex	4	HEX	0 to 1F	HEX Value 0 = No Error 1 = Ensuring Home 2 = Measuring 3 = Testing A = Inhibit On B = Max Move C = Up/Down D = Weight Lost E = Weight Stuck F = Intermittant Fault 14 = Invalid Reply 15 = Multiple Reply 1F = Param 4-20
Check Sum	4	HEX		Calculated

Command 17. Serial Number

Send	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Rotary switch postions on Yo-Yo (converted from decimal to HEX)
Function	2	HEX	03	Read (Only)
Command	4	HEX	05 07	Serial Number
No. of Registers	4	HEX	00 02	Set by Command
Check Sum	4	HEX		Calculated
Receive	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Equals 'Send' Address
Function	2	HEX	03	Equals 'Send' Function
No. of Bytes	2	HEX	04	Associated to the No. of Registers
Data Hex	8	HEX	Varies	HEX conversion = Number
Check Sum	4	HEX		Calculated

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Command 18. Calculated Radius

Send	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Rotary switch postions on Yo-Yo (converted from decimal to HEX)
Function	2	HEX	03	Read
Command	4	HEX	05 07	Calculated Radius
No. of Registers	4	HEX	00 02	Set by Command
Check Sum	4	HEX		Calculated
Receive	Characters	Type	Values	Description
Address	2	HEX	03	YoYo
Function	2	HEX	03	Equals 'Send' Function
No. of Bytes	2	HEX	04	Associated to the No. of Registers
Data Hex	8	HEX		HEX conversion = Value
Check Sum	4	HEX		Calculated

Command 19. Measure (Physically)

Send	Characters	Type	Values	Description
Address	2	HEX	00 to 63	Rotary switch postions on Yo-Yo (converted from decimal to HEX)
Function	2	HEX	03	Read
Command	2	HEX	11 00	Measure (Physically)
No. of Registers	4	HEX	00 08	Set by Command
Check Sum	4	HEX		Calculated
Receive	Characters	Type	Values	Description
Address				
Function				
No. of Bytes				
Data Hex				
Check Sum				

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