

WE503D Fieldbus

*Dynamic Integrator for Belt Scales, Screw Weighers,
Bulkside Flowmeters and Impact Flowmeters*

Program Version: From v3.06

Communication Protocol Manual



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1.0 Introduction

This manual provides Fieldbus communication protocol information for the WE503D Dynamic Integrator.

Ensure the WE503D Dynamic Integrator is fully installed by following the instructions of the WE503D Dynamic Integrator Installation Manual (PN 200479).



Manuals and additional resources are available from the Rice Lake Weighing Systems website at www.ricelake.com

Warranty information can be found on the website at www.ricelake.com/warranties

1.1 Additional Resources

For additional resources, see the following information:

WE503D Dynamic Integrator Installation Manual

The WE503D Dynamic Integrator Installation Manual (PN 200479) provides an overview of the installation instructions for the WE503D Dynamic Integrator.

WE503D Modbus RTU Communication Protocol Manual

The WE503D Modbus RTU Communication Protocol Manual (PN 203226) provides an overview of the Fieldbus communication protocol.

1.2 Safety

Safety Signal Definitions:



Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. Includes hazards that are exposed when guards are removed.



Indicates a potentially hazardous situation that, if not avoided, could result in serious injury or death. Includes hazards that are exposed when guards are removed.



Indicates a potentially hazardous situation that, if not avoided, could result in minor or moderate injury.



Indicates information about procedures that, if not observed, could result in damage to equipment or corruption to and loss of data.

General Safety



Do not operate or work on this equipment unless this manual has been read and all instructions are understood. Failure to follow the instructions or heed the warnings could result in injury or death. Contact any Rice Lake Weighing Systems dealer for replacement manuals.



Failure to heed could result in serious injury or death.

1.3 General

The Fieldbus communication protocol defines the structure of the messages and the communication mode between one or multiple master devices which manage the system and one or multiple slave devices which respond to the interrogations of the master (master-slave technique, of multi-master type).

The masters, called also active devices, define the traffic of the data on the bus and periodically scan the slaves; when the master has the access permission (token), it can transmit data without external requests. The slaves, defined also as passive devices, do not have the permission to access the bus, but can only confirm the received messages or transmit messages when requested by a master.

- A master can either address single slaves or transmit to all a broadcast message (in the multi-master case each slave is linked to a master)

2.0 Selection of the Fieldbus Serial Communication Mode

Enter the technical setup environment to select the Fieldbus communication protocol.

To enter the setup environment, turn off the instrument by pressing the **CLR** key for 3-seconds, the instrument will startup again, when the firmware version is displayed press the **TARE** key once and again when **USER – PRESS KEY** is displayed. Password: 41042

- Select **Serial Printouts, ETC** by using the **F6** and **F7** key, press **Enter**
- Select **Serial Ports Configuration** and press **Enter**
- Select a selection with COM3: PC and press **Enter**
- Select **PC Serial Configuration** and press **Enter**
- Select **Address 485** and press **Enter**
- Enter slave address 01 and press **Enter**
- Select **Selection Protocol** and press **Enter**
- Select **Fieldbus** and press **Enter**
- Select the fieldbus type and set the desired parameters
- Press **CLR** until the display show **Exiting Setup: Save?** and press **Enter** to save the settings

3.0 Fieldbus Parameters

Available Fieldbus types are:

Profibus

Ethernet/IP

ProfNet

Ethercat

Canopen

DeviceNet

If **Fieldbus Time Out Display** = Yes, the connection timeout and connection closed errors (000141 and 000142) will be displayed every 5-seconds.

If **Automatic Configuration** = Yes, the IP address is set from the PLC. If **Automatic Configuration** = NO, the IP address is set from the WE503 indicator.

- The device name will have a fixed format: dini-xxx, xxx = the last byte of the IP address which is set in the WE503 indicator; It is not possible to overwrite the device name from the PLC because the WE503 indicator will overwrite the device name after a restart

4.0 Messages and Errors

Message	Meaning
Profibus	
PB.INI	Initialization displayed on startup
PB.OK	Initialization successful
PB.ERR	No connection received from Profibus module after 30-seconds since system startup or after 3-seconds since last received frame from module
PB.CONN	Connection from Profibus master
PB.DISC	Disconnection from Profibus master
Other Fieldbus	
FBUS.ER	No connection received from Fieldbus module after 30-seconds since system startup or after 3-seconds since last received frame from module
FRxx.yy	Firmware version of the Fieldbus module
FB.CONN	Start communication between Fieldbus module an indicator
FB.OK	Fieldbus master connected
FB.DISC.	Fieldbus master disconnected and timeout error
FB.ERRxxxx	xxxx = Error state, see error table (Table 4-2)

Table 4-1. Profibus and Other Fieldbus Messages

Error Code	Meaning
1000	Fatal error in Fieldbus modules
1001	Inconsistency between protocol type selected and the one managed by the Fieldbus module, e.g. module type DeviceNet module with Profinet protocol selected on the indicator
1 ... 18	Other fatal errors in the Fieldbus module
000001 ... 000139	Unrecoverable error Fieldbus module
000140	General network error
000141	Connection closed
000142	Timeout connection
000143	Isolated network
000144	Duplicated node
000145	Network cable disconnected
600078	Modbus TCP: client has not sent any data for more than 30-seconds and the server has closed the connection

Table 4-2. Error Codes

5.0 Notes

There are two data areas, input data and output data area. The input area is read by the master and the output area is written by the master. Both areas are organized in registers. Each register consists of 16-words (32-bytes). See [Section 6.0 on page 6](#) for input data information. The input register consists of multiple pages. It's possible to change the displayed page by writing a command in the output data area.

All data are expressed in big endian order (first byte is most significant).

Wx: Word rank in a multi-word data.

Example: (W2), (W1), (W0): W2 is the most significant word and W0 is the least significant word.

6.0 Input Register

Word Addr.	Byte Nr.	Word Contents	Word Type	Bit Addr.	Contents
IW0	0	Number of processed commands	Integer number	0.0 ... 0.3	Number of processed commands
				0.4 ... 0.7	Result of last command: 0= Ok 1= Not allowed command 2= Wrong command data 3= Unknown command
	1	Displayed page	Integer number		
IW1	1	Belt status	Integer number	0.0 ... 0.3	Operation mode: 0= Reader (PID disabled) 1= Regulator (PID enabled)
				0.4 ... 0.7	Belt status: 0= Error (Alarm) 1= Manual functioning 2= Wait for start 3= Pause 5= Running (Dosage) 6= Start phase 7= Stop (Dosage end) 8= Locked 9= Zero calibration active
	2	Error code	Integer number		0= No error 1= Off track 2= Underflow (alarm) 3= Overflow (alarm) 4= Zero flow rate 5= Weight (alarm) 7= Underflow (locked) 8= Overflow (locked) 9= Total dosed weight (locked) 10= Dosage disabled by input 11= Weight (locked) 12= External alarm 13= External alarm lock 14= Flow rate (locked)
IW2		Belt load (W1)	Integer number		Kg/m or lb/ft with three decimals
IW3		Belt load (W0)	Integer number		Kg/m or lb/ft with three decimals
IW4		Flow rate	Integer number		
IW5		PID value %	Integer number		With two decimals
IW6		Analog output %	Integer number		With two decimals
IW7		Partial total (W2)	Integer number		
IW8		Partial total (W1)	Integer number		
IW9		Partial total (W0)	Integer number		
IW10		General total (W2)	Integer number		
IW11		General total (W1)	Integer number		
IW12		General total (W0)	Integer number		
IW13		Input status	Discr. Bits	13.0	Load polarity: 0= +, 1=--
				13.1	Weight stability: 0= Unstable, 1= Stable
				13.2	Underload: 0= No, 1= Yes
				13.3	Overload: 0= No, 1= Yes
				13.4	Gross zero zone: 0= Out, 1= In zone
				13.5 ... 13.6	Total units of measure: 1=kg, 2= t, 3= lb
				13.7	Flow rate polarity: 0= +, 1=--
				13.8 ... 13.9	Flow rate units of measure: 1= kg/h, 2= t/h, 3= lb/h
				13.10	Status if input 1: 0= Disabled, 1= Enabled
				13.11	Status if input 2: 0= Belt speed = 0, 1= Belt speed > 0
				13.12	Status if input 3: 0= Disabled, 1= Enabled
				13.13	Status if input 4: 0= Disabled, 1= Enabled
				13.14	Status if input 5: 0= Disabled, 1= Enabled
				13.15	Status if input 6: 0= Disabled, 1= Enabled
IW14		Output status	Discr. Bits	14.0 ... 14.15	Status of output: 0= Disabled, 1= Enabled
IW15		Other data	Integer number	15.0 ... 15.3	Weight decimals
			Integer number	15.4 ... 15.5	Flow rate decimals
			Discr. Bits	15.6	Status if input 7: 0= Disabled, 1= Enabled
			Discr. Bits	15.7	Status if input 8: 0= Disabled, 1= Enabled
			Integer number	15.8 ... 15.15	Number of dosages (batch)

Table 6-1. Page 0

Word Addr.	Byte Nr.	Word Contents	Word Type	Bit Addr.	Contents
IW0	0	Number of processed commands	Integer number	0.0 ... 0.3	Number of processed commands
				0.4 ... 0.7	Result of last command: 0= Ok 1= Not allowed command 2= Wrong command data 3= Unknown command
	1	Displayed page	Integer number		
IW1		Target flow rate	Integer number		
IW2		Scale capacity (W1)	Integer number		
IW3		Scale capacity (W0)	Integer number		
IW4		Max flow rate	Integer number		
IW5		Min flow rate	Integer number		
IW6		Dosage time (W1)	Integer number		1/100 sec
IW7		Dosage time (W0)	Integer number		1/100 sec
IW8		Target batch weight (W2)	Integer number		
IW9		Target batch weight (W1)	Integer number		
IW10		Target batch weight (W0)	Integer number		
IW11		Digital output function	Integer number	11.0 ... 11.7	Digital output function: 0= None 1= Run / batch active 2= Batch finished 3= Pause 4= Off track 5= > Upper flow 6= < Lower flow 7= Alarm 8= Lock 9= Totalizer pulse 10= Material enable 11= Slow flow 12= Belt speed > 0 13= Zero calibration active 14= Flow in dead band 15= Test weight 16= Air purge
				11.8 ... 11.15	Digital output index
IW12		Digital output ON value (W1)	Integer number		Used only with digital output function 9, ON and OFF values are set with the same value
IW13		Digital output ON value (W0)	Integer number		Used only with digital output function 9, ON and OFF values are set with the same value
IW14		Digital output OFF value (W1)	Integer number		Used only with digital output function 9, ON and OFF values are set with the same value
IW15		Digital output OFF value (W0)	Integer number		Used only with digital output function 9, ON and OFF values are set with the same value

Table 6-2. Page 1

Word Addr.	Byte Nr.	Word Contents	Word Type	Bit Addr.	Contents
IW0	0	Number of processed commands	Integer number	0.0 ... 0.3	Number of processed commands
				0.4 ... 0.7	Result of last command: 0= Ok 1= Not allowed command 2= Wrong command data 3= Unknown command
	1	Displayed page	Integer number		
IW1		PID P value	Integer number		With two decimals
IW2		PID I value	Integer number		With two decimals
IW3		PID D value	Integer number		With two decimals
IW4		PID interval time	Integer number		In seconds with one decimal

Table 6-3. Page 2

Word Addr.	Byte Nr.	Word Contents	Word Type	Bit Addr.	Contents
IW0	0	Number of processed commands	Integer number	0.0 ... 0.3	Number of processed commands
				0.4 ... 0.7	Result of last command: 0= Ok 1= Not allowed command 2= Wrong command data 3= Unknown command
	1	Displayed page	Integer number		
IW1	1	Belt status	Integer number	0.0 ... 0.3	Operation mode: 0= Reader (PID disabled) 1= Regulator (PID enabled)
				0.4 ... 0.7	Belt status: 0= Error (Alarm) 1= Manual functioning 2= Wait for start 3= Pause 5= Running (Dosage) 6= Start phase 7= Stop (Dosage end) 8= Locked 9= Zero calibration active
	2	Error code	Integer number		0= No error 1= Off track 2= Underflow (alarm) 3= Overflow (alarm) 4= Zero flow rate 5= Weight (alarm) 7= Underflow (locked) 8= Overflow (locked) 9= Total dosed weight (locked) 10= Dosage disabled by input 11= Weight (locked) 12= External alarm 13= External alarm lock 14= Flow rate (locked)
IW2		Belt load (W1)	Integer number		Kg/m or lb/ft with three decimals
IW3		Belt load (W0)	Integer number		Kg/m or lb/ft with three decimals
IW4		Flow rate	Integer number		
IW5		PID value %	Integer number		With two decimals
IW6		Analog output %	Integer number		With two decimals
IW7		Partial total (W1)	Integer number		
IW8		Partial total (W0)	Integer number		
IW9		General total (W1)	Integer number		
IW10		General total (W0)	Integer number		
IW11		Speed	Integer number		In m/s or ft/min with two decimals
IW12		Inclination	Integer number		In ° with one decimal
IW13		Input status	Discr. Bits	13.0	Load polarity: 0= +, 1=--
				13.1	Weight stability: 0= Unstable, 1= Stable
				13.2	Underload: 0= No, 1= Yes
				13.3	Overload: 0= No, 1= Yes
				13.4	Gross zero zone: 0= Out, 1= In zone
				13.5 ... 13.6	Total units of measure: 1=kg, 2= t, 3= lb
				13.7	Flow rate polarity: 0= +, 1=--
				13.8 ... 13.9	Flow rate units of measure: 1= kg/h, 2= t/h, 3= lb/h
				13.10	Status of input 1: 0= Disabled, 1= Enabled
				13.11	Status of input 2: 0= Belt speed = 0, 1= Belt speed > 0
				13.12	Status of input 3: 0= Disabled, 1= Enabled
				13.13	Status of input 4: 0= Disabled, 1= Enabled
				13.14	Status of input 5: 0= Disabled, 1= Enabled
13.15	Status of input 6: 0= Disabled, 1= Enabled				
IW14		Output status	Discr. Bits	14.0 ... 14.15	Status of output: 0= Disabled, 1= Enabled
IW15		Other data	Integer number	15.0 ... 15.3	Weight decimals
			Integer number	15.4 ... 15.5	Flow rate decimals
			Discr. Bits	15.6	Status of input 7: 0= Disabled, 1= Enabled
			Discr. Bits	15.7	Status of input 8: 0= Disabled, 1= Enabled
			Integer number	15.8 ... 15.15	Number of dosages (batch)

Table 6-4. Page 3

Word Addr.	Byte Nr.	Word Contents	Word Type	Bit Addr.	Contents
IW0	0	Number of processed commands	Integer number	0.0 ... 0.3	Number of processed commands
				0.4 ... 0.7	Result of last command: 0= Ok 1= Not allowed command 2= Wrong command data 3= Unknown command
	1	Displayed page	Integer number		
IW1		Selected article	Integer number		(65535 or FFFF hex if no article is selected)
IW2		PID start value %	Integer number		With two decimals
IW3		Target Flow rate	Integer number		
IW4		Target batch weight (W1)	Integer number		
IW5		Target batch weight (W0)	Integer number		
IW6		Correction factor (W1)	Integer number		
IW7		Correction factor (W0)	Integer number		With six decimals
IW8		Total batch weight (W1)	Integer number		
IW9		Total batch weight (W0)	Integer number		
IW10		Total number of batches (W1)	Integer number		
IW11		Total number of batches (W0)	Integer number		

Table 6-5. Page 4

7.0 Output Register

Word Addr.	Byte Nr.	Word Contents	Word Type	Bit Addr.	Contents
OW0	0	Command	Integer number		Command value: 0= None 1= Not used 2= Start 3= Pause 4= Stop 5= Set flow rate / % remote flow-rate Set value in OW1 6= Set batch target weight Set value in OW1 (W2), OW2 (W1), OW3 (W0) 7= Set batch dosage time Set value in OW1 (W1), OW2 (W0) 8= Print format Set value in OW1 9= Reset general total 10= Set digital output Set value in OW1 (bitmap of the outputs) 11= Store setup 12= Change digital output index (page 1) Set value in OW1 13= Set digital output value Set index in OW1, ON value in OW2 (W1) and OW3 (W0), OFF value in OW4 (W1) and OW5 (W0) 14= Change page Set value in OW1 15= Zero calibration 16= Set PID P parameter Set value in OW1 17= Set PID I parameter Set value in OW1 18= Set PID D parameter Set value in OW1 19= Set PID interval time Set value in OW1 20= Set digital input Set value in OW1 (bitmap of the inputs) 21= Select article Set value in OW1 (value 9999 is unselect)
	1	0 or 1	Integer number		Write 0 with Profibus, 1 with another fieldbus
OW1		Parameter	Integer number		
OW2		Parameter	Integer number		
OW3		Parameter	Integer number		
OW4		Parameter	Integer number		
OW5		Parameter	Integer number		

Table 7-1. Output Register



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