

Customer Manual
Digital C-Level
Model Mini 11-100
Communication Option

REC 3867 Rev D, Part No. 047140

Revision History

Revision Number	Date Released	ECO Number	Release Specifics
Revision 4	October 1994		
Revision B	April 1996		
Revision C	March 2004	ECO 0225	
Revision D	January 2006	ECO 0930	Update

©2004 Thermo Fisher Scientific. All rights reserved.

This document is confidential and is the property of Thermo Fisher Scientific (Thermo Scientific). It may not be copied or reproduced in any way without the express written consent of Thermo Scientific. This document also is an unpublished work of Thermo Scientific. Thermo Scientific intends to, and is maintaining the work as confidential information. Thermo Scientific also may seek to protect this work as an unpublished copyright. In the event of either inadvertent or deliberate publication, Thermo Scientific intends to enforce its rights to this work under the copyright laws as a published work. Those having access to this work may not copy, use, or disclose the information in this work unless expressly authorized by Thermo Scientific.

“*Microsoft*” and “*Windows*” are either registered trademarks or trademarks of Microsoft Corporation in the United States and/or other countries.

All other trademarks are the property of Thermo Fisher Scientific and its subsidiaries.

Software Program Licence Terms

The Software Program is licensed, not sold. Thermo Fisher Scientific, grants you a license for the Software Program only in the country where you acquired the Equipment, as defined below. You obtain no rights other than those granted you under this license.

The term “Equipment” means the equipment with which the Software Program is used. The term “Software Program” means the original and all whole or partial copies of the Software Program used in connection with Equipment sold by Thermo Fisher Scientific to the user, including modified copies or portions of the Software Program. Thermo Scientific retains title to the Software Program, as well as all improvements, modifications and enhancements to the Software Program, whether made by Thermo Scientific or any other party. Thermo Scientific owns, or has licensed from the owner, copyrights in the Software Program.

You are responsible for the selection of the Equipment.

Following the commissioning of the Equipment, any change made by the user to the Software Program will terminate all warranties with respect to the Equipment and Software Program.

All other trademarks are the property of Thermo Fisher Scientific and its subsidiaries.

License

Under this license, you may:

Use the Software Program on only one piece of equipment at any one time, unless the license information specifies otherwise;

Copy the Software Program for backup or in order to modify it;

Modify the Software Program and/or merge it into another Software Program; and

Subject to the following limitations, transfer the possession of the Software Program to another party, but only in connection with a transfer of the Equipment. If you transfer the Software Program, you must transfer a copy of these License Terms, all other documentation and at least one complete, unaltered copy of the Software Program to the other party. Unless you have other copies of the Software Program to be used in connection with other Equipment purchased from Thermo Scientific, or one of its divisions, you must, at the same time, either transfer all your other copies of the Software Program to the transferee of the Equipment or destroy them. Your license is then terminated. The other party agrees to these terms and conditions by its first use of the Software Program.

You must reproduce the copyright notices(s) on each copy of the Software Program.

You may not:

1. Use, copy, modify, merge, or transfer copies of the Software Program except as provided in this license; Reverse engineer, decompile, or disassemble the Software Program; or Sub-license, rent, lease, or assign the Software Program.

Limitation of Remedies

Thermo Scientific's entire liability under this license is the following:

Thermo Scientific will: (a) replace defective media, or (b) make a warranted Software Program operate or (c) replace the Software Program with a functionally equivalent Software Program, as warranted.

For any claim (including breach), in any form, related in any way to this license, Thermo Scientific's liability will be for the actual value of the Software Program.

Thermo Scientific will not be liable for any lost profits, lost savings, any incidental damages, or other economic consequential damages, even if Thermo Scientific, or its authorized supplier, has been advised of the possibility of such damages. Thermo Scientific will not be liable for any damages claimed by you based on any third party claim.

General

Thermo Scientific may terminate your license if you fail to comply with the terms and conditions of this license. In such event, you must destroy all your copies of the Software Program. You are responsible for payment of any taxes, including personal property taxes, resulting from this license.

Occupational Safety and Health Act (OSHA)

The Occupational Safety and Health Act clearly places the burden of compliance on the user of the equipment and the act is generalized to the extent that determination of compliance is a judgment decision on the part of the local inspection. Hence, Thermo Scientific will not be responsible for meeting the full requirements of OSHA in respect to the equipment supplied or for any penalty assessed for failure to meet the requirements, in respect to the equipment supplied, of the Occupational Safety and Health Act, as interpreted by an authorized inspector. Thermo Scientific will use their best efforts to remedy such violation at a reasonable cost to the buyer.

Thermo Scientific Warranty

The seller agrees, represents, and warrants that the equipment delivered hereunder shall be free from defects in material and workmanship. Such warranty shall not apply to accessories, parts, or material purchased by the seller unless they are manufactured pursuant to seller's design, but shall apply to the workmanship incorporated in the installation of such items in the complete equipment. To the extent purchased parts or accessories are covered by the manufacturer's warranty, seller shall extend such warranty to buyer.

Seller's obligation under said warranty is conditioned upon the return of the defective equipment, transportation charges prepaid, to the seller's factory in Minneapolis, Minnesota, and the submission of reasonable proof to seller prior to return of the equipment that the defect is due to a matter embraced within seller's warranty hereunder. Any such defect in material and workmanship shall be presented to seller as soon as such alleged errors or defects are discovered by purchaser and seller is given opportunity to investigate and correct alleged errors or defects and in all cases, buyer must have notified seller thereof within one (1) year after delivery, or one (1) year after installation if the installation was accomplished by the seller.

Said warranty shall not apply if the equipment shall not have been operated and maintained in accordance with seller's written instructions applicable to such equipment, or if such equipment shall have been repaired or altered or modified without seller's approval; provided, however, that the foregoing limitation of warranty insofar as it relates to repairs, alterations, or modifications, shall not be applicable to routine preventive and corrective maintenance which normally occur in the operation of the equipment.

“EXCEPT FOR THOSE WARRANTIES SPECIFICALLY CONTAINED HEREIN, SELLER DISCLAIMS ANY AND ALL WARRANTIES WITH RESPECT TO THE EQUIPMENT DELIVERED HEREUNDER, INCLUDING THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR USE. THE SOLE LIABILITY OF SELLER ARISING OUT OF THE WARRANTY CONTAINED HEREIN SHALL BE EXCLUSIVELY LIMITED TO BREACH OF THOSE WARRANTIES. THE SOLE AND EXCLUSIVE REMEDY FOR BREACH OF THE WARRANTIES SET OUT ABOVE SHALL BE LIMITED TO THE REPAIR OR REPLACEMENT OF ANY DEFECTIVE ACCESSORY, PART OR MATERIAL WITH A SIMILAR ITEM FREE FROM DEFECT, AND THE CORRECTION OF ANY DEFECT IN WORKMANSHIP. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES.”

Purchaser agrees to underwrite the cost of any labor required for replacement; including time, travel, and living expenses of a Thermo Scientific Field Service Engineer at the closest factory base.

Thermo Fisher Scientific
501 90th Ave. NW
Minneapolis, MN 55433
Phone: (800) 227-8891
Fax: (763) 783-2525

Disclaimer

Though the information provided herein is believed to be accurate, be advised that the information contained herein is not a guarantee for satisfactory results. Specifically, this information is neither a warranty nor guarantee, expressed or implied, regarding performance, merchantability, fitness, or any other matter with respect to the products, and recommendation for use of the product/process information in conflict with any patent. Please note that Thermo Scientific reserves the right to change and/or improve the product design and specifications without notice.

Contents

Contents	i
Introduction.....	1-1
General	1-1
Installation Preparation	1-1
Serial Communications Setup.....	1-1
Analog Output Setup	1-1
Serial/Analog Module Installation	1-2
Chassis Cover Re-Installation.....	1-2
Installation.....	2-1
Serial Communications Wiring.....	2-1
Analog Current Output Wiring	2-1
General	3-1
Setup/Calibration	3-1
Serial Communications Selection	3-1
Protocol Selection	3-1
Replacement Parts	4-1
General	4-1
Parts Ordering Information.....	4-2
Phone/Fax for Thermo Scientific Offices	4-5
Modbus Communication Protocol	A-1
General	A-1
Description of Commands Register (27)	A-4
Communication Protocol Siemens 3964	B-1
General	B-1
Description of Command Word (27).....	B-4
Communication Protocol Allen Bradley DF1.....	C-1
General	C-1
Communication Protocol With PC Master	D-1
General	D-1
Package Format.....	D-2
PC-Master Functions	D-4

This page intentionally left blank

Chapter 1

Introduction

General

The Thermo Scientific Digital C-Level Model Mini 11-100, Communication Option is normally installed at the factory. When a field upgrade is necessary, follow the instructions outlined below..

Installation Preparation

To prepare for the installation, perform the following steps.

1. Unplug all of the device's wiring and remove it from the panel.
2. Place the instrument facedown on a workbench and remove the four screws from the sides.
3. Lift the outer cover from the chassis.

Serial Communications Setup.



After the cover has been removed from the chassis, follow these steps.

1. Carefully remove the circuit board from the protective wrap.

CAUTION. The circuit board can be damaged by static discharges and mishandling. Insure the device and all personnel handling it are grounded!. ▲

2. Normally the module is shipped from the factory set up for RS422/485. To verify the current setup, check the jumper plugs on the circuit board. Jumpers J2, J3, J6, J8, J9, J10 and J11 must be in position A as indicated by drawing C07259H-Y002. Note that J4 is always in the B position, and J5 is always in the A position. Operation in the RS423/RS232 is possible, but not recommended because only one device can be addressed and the operating distance of the instrument is shorter.
3. Wiring drawing C07259H-Y005 shows two 180 ohm resistors used as terminations for the line. This only applies to the RS422 mode of operations. Omit these resistors for RS485 operation.

Analog Output Setup

To set up the analog output, follow these steps:

1. The module normally is shipped from the factory set up in the current mode. The ranges and polarity are front panel selectable. Please refer to your Mini 11-100 Operator's Manual for more information.
2. Referring to drawing C07259H-Y002, position jumper J1 to the desired location.

Serial/Analog Module Installation

Place the instrument on the table with the components facing up and follow these steps:

1. Remove the mounting screw from the center post.
2. With the component side of the module facing down, gently insert the board into the connector, being careful to clear the heat sinks on either side of the main board.
3. Carefully align the mounting hole in the circuit board with the mounting post. Insert the mounting screw.

Chassis Cover Re-Installation

After the serial/analog module has been installed, follow these steps to re-install the chassis cover.

1. Place the instrument facedown on the bench. Remove the two wiring connectors from the circuit board.
2. Carefully slide the chassis cover over the circuit boards. It is imperative that the board edges fit into the slots on the inside of the device. Also use caution when sliding the chassis cover past the heat sinks so no pressure is put on them.
3. Install the two heat sink screws on the side slots. Note the heat sink is not mechanically bolted to anything at this time; therefore **VERY GENTLE** pressure must be used when starting and tightening these screws.
4. The instrument may now be re-installed in the panel. The output plug that will be used should be wired before re-installation, unless wiring will not be done at this time. The unused connector should be re-installed in case needed in the future.

Chapter 2

Installation

Serial Communications Wiring

Wire connector M-7 according to drawing C07259H-Y005. In the unlikely case that RS422 will be used, be certain to include the two 180 ohm resistors as shown. Because they are termination resistors, their position on the line must match that shown in the drawing. When using RS485, the resistors will not be required. In fact, the instrument will not operate if the resistors are installed.

Wiring for a single unit using RS423 (RS232) is shown in drawing C07259H-Y004. This configuration is not recommended by Thermo Scientific because of its limitations.



-
- **Note:** The recommended cable for serial communications is Belden 9829; it is low capacitance, double twisted pairs. The maximum operating distance is 4,000 feet. ▲

Analog Current Output Wiring

Wire connector M-6 according to drawing C07259H-Y003.

This page intentionally left blank

Chapter 3

Setup/Calibration

General

There is no operator interface with this device except setup.

Serial Communications Selection

Follow the instructions given below to select serial communications

1. .To enable the board, press the SETUP key. Press the UP ARROW key twice to reach the Option menu.
2. Press the ENTER key. Press the UP ARROW key to select Serial Communications.
3. Press the ENTER key to display the setting. Pressing the ENTER key again allows the selections of YES or NO when pressing the UP ARROW key.
4. Press the ENTER key to complete the selection.

Protocol Selection

Follow the instructions given below to select protocol.

1. Press the SETUP key. Press the UP ARROW key six times or until you reach the Serial Communications menu.
4. Press the ENTER key twice to display the current protocol. If the desired protocol is not displayed, press the ENTER key twice.
5. Press the UP ARROW key followed by the ENTER key to select the desired protocol. The protocol is determined by the CUSTOMER SYSTEM and must be known by the setup person before beginning. The instrument is shipped from the factory set up for PC-Master protocol.
6. After selecting the protocol, press the UP ARROW key to access the Baud Rate menu. Press the ENTER key to display the current baud rate setting. Press the ENTER key again to cause the baud rate number to flash. Then, using the UP ARROW key, select the desired baud rate and press the ENTER key. The instrument is shipped from the factory set at 4,800 baud.

Note: The Digital C-Level is operated at 4,800 baud or less.



7. After setting the baud rate, press the UP ARROW key to access the Stop Bit menu. Press the ENTER key to display the current setting. Press the ENTER key again to cause the display to flash. Then, using the UP ARROW key, select either 1 or 2 stop. Bits. Press the ENTER key to complete the selection. The instrument is shipped from the factory set at 1 stop bit.
8. After setting the stop bit, press the UP ARROW key to access the Parity menu. Press the ENTER key to display the current setting. Press the ENTER key again to cause the display to flash. Then, using the UP ARROW key, select odd, even, or not used (no parity). Press the ENTER key to complete the selection. The instrument is shipped from the factory set to no parity (not used).
9. After setting the stop bit(s), press the UP ARROW key to access the Word Length menu. Press the ENTER key to display the current setting. Press the UP ARROW key again to cause the display to flash. Then, using the UP ARROW key, select either 7 or 8-bit word length. Press the ENTER key to complete the selection. The instrument is shipped from the factory set to an 8-bit word length.
10. After setting the word length, press the UP ARROW key again to access the CTS (Clear to Send) menu. Press the UP ARROW key to display the current setting. Press the UP ARROW key again to cause the display to flash. Then, using the UP ARROW key, select either Yes or No. Press the ENTER key to complete the selection. The instrument is shipped from the factory with the CTS set to No.

11. After setting the CTS status, press the Up ARROW key again to access the Address menu. Press the UP ARROW key to display the current setting. Press the ENTER key again to cause the display to show three digits with the left most digit flashing. The flashing indicates the digit can be set by pressing the UP ARROW key. Digits are selected by pressing the RIGHT ARROW key. The UP ARROW key is used to increase the value of the selected digit. If a lower value is desired, continue pressing the UP ARROW key until the digit reaches zero and then increment it to the desired level.



- - **Note:** No two instruments may share a single address. Multiple devices trying to communicate at the same time will overload and disable the system. ▲
12. All of the foregoing settings are detailed in your system documentation. The PC-Master protocol is Thermo Scientific's standard. The instrument is shipped from the factory set up to this standard.

This page intentionally left blank

Chapter 4

Replacement Parts

General

This chapter provides information about service, repair, and replacement parts for your Thermo Scientific product. It includes the telephone numbers for various departments at Thermo Scientific, the procedure for ordering replacement parts, a Return Material Authorization Form, and the parts list for the product are also included in this chapter.

The maintenance information in this manual is designed to meet your service needs. If you should encounter a problem that requires technical assistance, you may call Thermo Scientific Product Service at (800) 227-8891.

Thermo Scientific also provides on-site service technicians to assist customers with installation, setup, initial calibration, customer training, maintenance, and repair. Contact the Thermo Scientific Field Service department at the number given below for current rates and scheduling.

Thermo Scientific has repair centers located at the plant in Minneapolis, Minnesota. Products that need system checkout or repair can be returned to the plant with the Return Material Authorization (RMA) Form. Contact our Repair and Return department (800) 227-8891 to get an RMA number to use on the form.



Note: Have your machine model number and serial number available when you call.

Main Switchboard	(800) 227-8891
FAX	(763) 783-2525
Service	(800) 227-8891
Return Material Authorization & Repair	(800) 227-8891

Or any local Thermo Scientific office.

Parts Ordering Information

For the fastest service when ordering parts, telephone or FAX the Thermo Scientific Parts Department at the numbers given below. Your regional field service representative can also assist you with parts orders.

The recommended procedure for ordering parts is:

1. Determine the broken or faulty part.
13. Locate the part in the Parts List.
14. Find the part number(s) for the item(s) you need.
15. Before you contact Thermo Scientific for your parts, make sure you have the following information:
 - 1 Machine model and serial number
 - 1 Purchase Order number
 - 1 Date Required
 - 1 Preferred shipping method
 - 1 Part number(s), description, and quantity needed.
 - 1 Telephone or FAX:

Thermo Fisher Scientific

Customer Service Department

501 90th Ave. NW

Minneapolis, MN 55433

FAX: (763) 783-2525

Phone: (800) 227-8891

Return Material Authorization and Repair: (800) 227-8891

ThermoFisher SCIENTIFIC

501 90th Avenue N.W.
Minneapolis MN 800-227-8891

Return Material Authorization
RMA _____

(This RMA Number Must Be Marked On All Paperwork And On Outside Of Package)

Req'd. By: _____

Date: _____

Customer _____

Contact: _____

Phone: _____ () _____

Area Code

Return, Freight Prepaid To:

Thermo Scientific

501 90th Avenue N.W.

Minneapolis, MN 55433

Bill To Customer #: _____

Ship To _____

Returned From: _____

Return To: _____

Description Of Material Being Returned:

Describe Equipment Malfunction Or Defect, If Any; Symptoms:

Minimum Charge

Informed Customer of

Inspection Charge Per Item

Service Requested:

Repair & Return

Estimate P.O. Required No.: _____

Return for Credit

Original P.O. or Thermo Scientific Order No.: _____

Warranty Repair or Replacement

Serial No: _____

Return Warranty/Exchange Unit

Shipped on Thermo Scientific Order No.: _____

Other: _____

Disposition/Comments: (Thermo Scientific Internal Use Only)



501 90th Avenue NW Minneapolis, MN 55433
(763) 783-2500 Fax (763) 780-1537

Foreign Customer Repair Authorization

Please complete the following regarding equipment that will be returned for repair

Contact Name: _____ Telephone 011- _____
(country code) (telephone number)

Company Name: _____

Fax 011- _____ - _____ E-mail: _____
(country code) (fax number)

Billing Address: _____

Purchase Order No. (required): _____

Equipment Type: _____ Serial No. _____

Description of problem: _____

Shipping Method (Please check one option):

Thermo Scientific sends good direct to customer. Thermo Scientific determines shipping method and carrier. Charges will be prepaid by Thermo Scientific and customer will be invoiced for charges. Truck and/or air freight will always be utilized unless customer arranges shipment

Thermo Scientific sends goods to customer's designated freight forwarder. Charges for inland freight to U.S. port will be prepaid by Thermo Scientific and customer will be invoiced for charges.

Shipping Address: _____ Freight forwarder? Yes No

Attn: _____ Telephone _____

Copies of shipping documents should be sent to the following individual via e-mail or fax. Originals will be sent to the billing address above via regular mail

Contact Name: _____

Fax 011- _____ - _____ E-mail: _____
(country code) (telephone number)

Important Notice:

Shipment requests will be processed according to this document, which must be fully completed prior to issuance of a Return Material Authorization (RMA) number. Shipping documents will be sent as requested to the individual above upon shipment of goods from Thermo Fisher Scientific plant in Minneapolis, MN. Thereafter, Thermo Scientific bears no responsibility for charges associated with customs clearance or warehouse charges due to customer failure to liberate goods from customs.

This completed form should be faxed to: Attn: Customer Service fax (763) 780-1537

**Phone/Fax for
Thermo
Scientific
Offices**

Argentina

+54 (0) 11 4 334 3827
+54 (0) 11 4 334 9159 fax

Australia

+61 (0) 8 8150-5300
+61 (0) 8 8234-5882 fax

Canada

+1 (905) 888-8808
+1 (905) 888-8828 fax

Chile

+56 (0) 2 335 3388
+56 (0) 2 335 1590 fax

China

+86 (0) 21 5465 7588
+86 (0) 21 6445 7830 fax

France

+33 (0) 1 60 92 48 00
+33 (0) 1 60 92 49 00 fax

Germany

+49 (0) 208-824930
+49 (0) 208-852310 fax

India

+91 (0) 20-4011245
+91 (0) 20-26125739 fax

Italy

+39 02-959514-1
+39 02-953200-15 fax

Malaysia

+60 (0) 3 2300 1626
+60 (0) 3 2300 1636 fax

Mexico

+52 (01) 55 5638 0237
+52 (01) 55 5639 2227 fax

Netherlands

+31 (0) 33-454-9000
+31 (0) 33-454-9009 fax

Poland

+48 (0) 22848 3708 phone and
fax

South Africa

+27 (0) 11-609-3101
+27 (0) 11-609-3110 fax

Spain

+34 91-484-5949
+34 91-661-5572 fax

United Kingdom

+44 (0) 1788-820300
+44 (0) 1788-820301 fax

United States

+1 (877) 290-7422
+1 (763) 783-2525 fax

This Page Left Blank Intentionally

Appendix A

Modbus Communication Protocol

General

This appendix details the modbus protocol used by the Mini 11-100. The Mini 11-100 is always “slave” when this protocol is used.

The instrument responds only if a valid message is received. When a complete message is received, the instrument examines the address byte contained in the message. If the address byte matches that of the instrument, it then responds with an acknowledgement of the message/data sent.

Following is a table which shows what registers the Mini 11-100 data are stored in.

Table A–1. Storage of 11-100 Registers for Communication Using Modbus Protocol

word			
0			gross weight
1			
2			net weight
3			
4			tare
5			
6			total
7			
8			
9			progressive
10			
11			threshold 1
12			
13			threshold 2
14			
15			threshold 3
16			
17			threshold 4
18			
19			zero
20			
21			span
22			
23			scale capacity

word			
24			
25			sample weight
26			
27			commands register
28			free
29			free
30			free
31			free
32			free
33			free
34			free
35			free
36			free
37			free
38			free
39			free
40			free
41			free
42			free
43			free
44			free
45			free
46			free
47			free
48			free
49			free
50			free
51			free

The instrument can handle two different groups of messages. They are Data Query and Data Send. Each of these groups are discussed in the following examples.

1. Data Query (Code 03H)

The general format is as follows:

Query:

address	function	data start reg HO	data start reg LO	date # of regs HO	data # of regs LO	CRC LO	CRC HO

Response:

address	function	byte CNT	data (multiple of 2)	LO CRC	HO CRC

EXAMPLE 1

In the following example, the slave address is 01H. The actual address could be from 01H to 0FH.

PC Asks the Mini 11-100 for Gross Weight, which is stored as follows:

0	00	00	gross weight (100.0)
1	03	E8	

The query message is:

address	function	data start reg HO	data start reg LO	date # of regs HO	data # of regs LO	CRC LO	CRC HO
01H	03H	00H	00H	00H	02H	C4H	0BH

The 11-100 response is:

address	function	byte CNT	data (multiple of 2)				LO CRC	HO CRC
01H	03H	04H	00H	00H	03H	E8H	FAH	BDH

EXAMPLE 2

Host asks for the gross weight and the net weight, which are stored as follows:

0	00	00	gross weight (100.0)
1	03	E8	
2	00	00	net weight (50.0)
3	01	F4	

Query

address	function	data start reg HO	data start reg LO	date # of regs HO	data # of regs LO	CRC LO	CRC HO
01H	03H	00H	00H	00H	04H	44H	09H

Response

address	function	byte CNT	data (multiple of 2)								LO CRC	HO CRC
01H	03H	08H	00H	00H	03H	E8H	00H	00H	01H	F4H	F5H	E4H

EXAMPLE 3

Host asks for the net weight, which is stored as follows:

2	00	00	net weight (50.0)
3	01	F4	

Query

address	function	data start reg HO	data start reg LO	date # of regs HO	data # of regs LO	CRC LO	CRC HO
01H	03H	00H	02H	00H	02H	65H	CBH

Response

address	function	byte CNT	data (multiple of 2)				LO CRC	HO CRC
01H	03H	08H	00H	00H	01H	F4H	FAH	24H

2. Data Send (Code 10H)

Query

address	function	address HO	address LO	quantity HO	quantity LO	bytes CNT	data (multiple of 2)	CRC LO	CRC HO

Response

address	function	address HO	address LO	quantity HO	quantity LO	LO CRC	HO CRC

Please see the next two examples for specific Data Send usage.

EXAMPLE 1

Host sends to Slave the value 1750 for threshold 1, which is stored as follows:

11	00	00	threshold 1 (1750)
12	06	D6	

Query

address	function	offset		quantity		bytes CNT	data (multiple of 2)				CRC	
		HO	LO	HO	LO						LO	HO
01H	10H	00H	0BH	00H	02H	04H	00H	00H	06H	D6H	30H	22H

Response

address	function	offset		quantity		CRC LO	CRC HO
		HO	LO	HO	LO		
01H	10H	00H	0BH	00H	02H	30H	0AH

EXAMPLE 2

Host sends to Slave the values 1000, 1001 and 1002 on thresholds 1, 2 and 3, which are stored as follows:

The following is the planned message (see Table A-1).

11	00	00	threshold 1 (1750)
12	03	E8	
13	00	00	threshold 2 (1001)
14	03	E9	
15	00	00	threshold 3 (1002)
16	03	EA	

Query

address	function	offset		quantity		bytes CNT	data (multiple of 2)			
		HO	LO	HO	LO					
01H	10H	00H	0BH	00H	06H	0CH	00H	00H	03H	ESH

data (multiple of 2)								CRC LO	CRC HO
00H	00H	03H	E9H	00H	00H	03H	EAH	CFH	70H

Response

address	function	offset		quantity		CRC	CRC
		HO	LO	HO	LO	LO	HO
01H	10H	00H	0BH	00H	06H	31H	C9H

This page intentionally left blank

Appendix B

Communication Protocol Siemens 3964

General

The Siemens S3964 Communications Protocol can be used to read and write the registers as listed in the following page. The instrument 11-100 is always slave. The instrument only responds upon receiving an integer message. No error messages or alarms are created in case of an incorrect message.

Two communication modes are provided:

- | | |
|-------|--|
| FETCH | The HOST asks the slave unit for registers |
| SEND | The HOST sends registers to the slave |

The choice between requesting or sending data is made using a specific code inside the message.

Data is mapped in the 11-100 registers as indicated in Table 1.

Table B–1. Map of the Registers of the 11-100 for Communication with 3964R

nr. word		
0		
1		gross weight
2		net weight
3		
4		tare weight
5		
6		
7		total
8		
9		batch count
10		
11		threshold 1
12		
13		threshold 2
14		
15		threshold 3
16		
17		threshold 4
18		
19		zero
20		
21		span
22		
23		scale capacity
24		

nr. word			
25			test weight
26			
27			commands register
28			free
29			free
30			free
31			free
32			free
33			free
34			free
35			free
36			free
37			free
38			free
39			free
40			free
41			free
42			free
43			free
44			free
45			free
46			free
47			free
48			free
49			free
50			free
51			free
52			free

Appendix C

Communication Protocol Allen Bradley DF1

General

The Allen Bradley DF1 Communication Protocol is currently not available with the Mini 11-100.

This page intentionally left blank

Appendix D

Communication Protocol With PC Master

General

The PC Master Communication Protocol is a multi-drop type which has been designed by Thermo Scientific to maximize communications speeds. The protocol accepts only one Master, defined before the beginning of communication operations (usually a PC), and a maximum number of slaves of 255. The number of slaves is limited by the real capacity of the line, which reaches a maximum number of 16.

The Masters sends a data package to the Slave, whose address is contained in the package. It is possible to send packages to all the Slaves at the same time (broadcasting) by specifying the address zero.

There are two types of packages: question-answer and comm. and packages (without answer). Each Slave receiving the package controls the integrity and answers (when needed) only if the package is complete. In case of error, the Slave does not answer.

The Slave is not allowed to generate any communication error. The check of communication is performed by the Master.

The Slave must read the message and decide if the message is addressed to him or not. The package must be sent without interruptions, simulating a synchronous mode. In case of communication interruption for more than 0.1 seconds, the Slave has to eliminate the package and to assume the next byte received as the start of a new package.

The programming of horizontal protocol can be of any type, but it must be defined before the beginning of communication on line. The default values are:

- Baud Rate 4800
- Stop Bits 1
- Parity Even
- Data Bits 8 (must be set to 8)

Package Format

The communication package is in the following format:

BEGIN OF FRAME	ADDRESS	FUNCTION	STAMP	DATA	ERROR CHECK	END OF FRAME
STX, DLE 2 bytes	1 CHAR 1 byte	1 CHAR 1 byte	1 CHAR 1 byte	n x 8 bits n bytes	CKS 1 byte	EXT 1 byte

1. Begin of Frame

The Begin of Frame is the header of the package formed by the pair of characters STX (Ascii 02H) and DLE (Ascii 10H). To make the reception of the message easier on lines using RS422 or 485, an additional three NUL characters (Ascii 00H) are sent before STX.

2. Address

This is the address of the Slave. It is sent from Master to Slave and re-sent from Slave to Master to verify the proper unit responded. In some packages, it has accepted the address zero which indicates a message sent to all Slaves (broadcasting). In some messages, the address can be zero, which causes all units to listen (broadcasted message).

3. Stamp

This is a number used to identify the message. This number is sent by the Master and then sent back by the Slave. It must always be a different number. If the Slave receives the same message twice, this means the second message is the repetition of the previous one and it is not a new message. This kind of operation is used to send dynamic data which can be sent only once.

4. Data

The data format is 8 bit binary type. The quantity and the meaning depend on the function code as described later.

5. Error Check

A check sum used by the receiver to verify the integrity of the received package. It is defined as a sum on a byte of sent or received data, starting from "Address", which is included. See the following example.

Begin of Frame	STX	02
	DLE	10
Address	2	02 <...+
Function	3	03 <...+
Stamp	4	04 <...+
Data (first byte)	1	01 <...+
...	120.0	00 <...+
		04 <...+
		b0 <...+
		01 <...+
...	195	c3 <...+
...	2.5	00 <...+
		00 <...+
		19 <...+
		01 <...+
...	0	00 <...+
		00 <...+
...	0	00 <...+
Data (last byte)	3	03 <...+
Error check		9f (19F)
End of frame	ETX	03

6. End of Frame

The EXT character (Ascii 03H) defines the end of message. To make the message reception easier on RS422 or RS4485 lines, an additional three NUL characters, (Ascii 00H) are sent after ETX.

PC-Master Functions

The following is a list of the functions available with the PC-Master protocol:

CODE	INSTR	FUNCTION
65	11-100	WRITE A KEY
66	11-100	READ DISPLAY
67	11-100	READ STATUS
68	11-100	READ/SET TO ZERO TOTAL AND PROGRESSIVE VALUE
69	11-100	SET OF A VARIABLE
70	11-100	READ A VARIABLE
71-96	11-100	reserved

The following pages give specific examples of each function.

1. 65 Write a Key to 11-100

This operation allows the Master to send to Slave codes which simulate pressing the keys on the front of the instrument. Broadcasting is allowed.

QUERY MESSAGE (length = 15)

Begin frame	STX	02
	DLE	10H
Address	xxx	xx
Code	65	41H
Stamp	xxx	xx
Data	KEYS	8 bytes
Error check	xxx	xx
End of frame	ETX	03

The maximum number of keys for a package is 8. The keys which are not used are set to zero.

KEYS CODIFICATION: (the same as the one inside the instrument)

CODE VALUE	FUNCTION
0AH	SIMULATES THE SETUP/RUN KEY
0FH	SIMULATES THE CALIBRATION KEY
14H	RESETS THE ALARMS
05H	SIMULATES THE SETUP/RUN KEY
04H	SIMULATES THE SET/RESET TARE KEY
09H	NOT USED
0EH	SIMULATES THE VERTICAL ARROW KEY
13H	SIMULATES THE HORIZONTAL ARROW
10H	KEY
0BH	SIMULATES THE ENTER KEY
01H	NOT USED
06H	NOT USED
02H	NOT USED
07H	NOT USED
0CH	NOT USED
11H	NOT USED
03H	NOT USED
08H	NOT USED
0DH	NOT USED
12H	NOT USED

RESPONSE MESSAGE

There is no response to this message.

2. 66 Read Display from 11-100

The Master asks the Slave to send the tex and LED's which appear on the instrument front.

QUERY MESSAGE (length = 7)

Begin frame STX 02

	DLE	10H
Address	xxx	xx
Code	66	42H
Stamp	xxx	xx
Data	-	0 byte
Error check	xxx	xx
End of frame	ETX	03

RESPONSE MESSAGE (length = 24)

Begin frame	STX	02
	DLE	10H
Address	xxx	xx
Code	66	42H
Stamp	xxx	xx
Data	DISPLAY	16 bytes
	LEDS	1 byte
Error check	xxx	xx
End of frame	ETX	03

DISPLAY contains the string actually shown on the instrument display. The code is a Ascii-type and corresponds to the content present inside the display buffer of the instrument.

The decimal point is not sent out. It is indicated by setting the most significant bit of the digit preceding it to 1. For example the buffer "123.43" is sent with the following sequence.

20h 20h 20h 20h 20h 31h 32h 33h+80h 34h 33h 20h 20h

Led is a byte that contains the LED's status:

bit	7	free
	6	free
	5	free
	4	WEIGHT STABLE
	3	LED4

2	LED3
1	LED2
0	LED1

The LED on corresponds to status 1; the LED off to status 0.

3. 67 Read Status from 11-100

The Master asks the Slave to send flags of internal status and flags of most important variables.

QUERY MESSAGE (length = 7)

Begin frame	STX	02
	DLE	10H
Address	xxx	xx
Code	67	43H
Stamp	xxx	xx
Data	-	0 byte
Error check	xxx	xx
End of frame	ETX	03

RESPONSE MESSAGE (length = 34)

Begin frame	STX	02
	DLE	10H
Address	xxx	xx
Code	67	43H

Stamp	xxx	xx
Data	GROSS	3 + 1 bytes
	WEIGHT	3 + 1 bytes
	NET WEIGHT	3 + 1 bytes
	TARE	2 bytes
	STATUS	5 bytes
	INPUTS	5 bytes
	OUTPUTS	3 bytes
	ALARMS	

Error check	xxx	xx
End of frame	ETX	03

STATUS:

byte	0, bit	7	CUM. ALARMS	(0)
		6	CALIBRATION	(0)
		5	WEIGHT HOLD	(0)
		4	WEIGHT STABLE	(0)
		3	THRESHOLD 1	(0)
		2	THRESHOLD 2	(0)
		1	THRESHOLD 3	(0)
		0	THRESHOLD 4	(0)

INPUTS

1 = INPUT IS CLOSED

0 = INPUT IS OPEN

mother board

byte	0	7-3	free
	2	Inp 3	
	1	Inp 2	
	0	Inp 1	

OUTPUTS

1 = OUTPUT IS OFF

0 = OUTPUT IS ON

motherboard

byte	0	7-4	free
	4	Out 4	
	3	Out 3	

1	Out 2
0	Out 1

ALARMS

When the alarm is present, the relevant bit is set to 1.

byte	0, bit	7	free
		6	CALIBRATION
		5	FAIL
		4	DATA LOST
		3	THRESHOLD 1
		2	THRESHOLD 2
		1	THRESHOLD 3
		0	THRESHOLD 4
byte	1, bit	7	free
		6	free
		5	free
		4	free
		3	free
		2	free
		1	free
		0	free
byte	2m bit	7	free
		6	free
		5	free
		4	free
		3	free
		2	free
		1	free
		0	free

4. 68 Read/Set to Zero Total and Progressive Value from 11-100

The Master asks the Slave to send the content of the total and progressive registers and, optionally, to set them to zero. In case of zeroing, the slave sends back the zeroed registers.

QUERY MESSAGE (length = 8)

Begin frame	STX	02
	DLE	10H
Address	xxx	xx
Code	68	44H
Stamp	xxx	xx
Data	Set to zero TOT and PROGR	1 byte (1 – zeroed)
Error check	xxx	xx
End of frame	ETX	03

RESPONSE MESSAGE (length = 34)

Begin frame	STX	02
	DLE	10H
Address	xxx	xx
Code	68	44H
Stamp	xxx	xx
Data	TOTALIZED PROGRESSIVE	6 + 1 bytes 3 bytes
Error check	xxx	xx
End of frame	ETX	03

5. 69 Set of a Variable to 11-100

The Master sends the instrument a threshold value.

QUERY MESSAGE (length = 12)

Begin frame	STX	02
	DLE	10H
Address	xxx	xx

Code	69	45H
Stamp	xxx	xx
Data	variable number	1 byte
	threshold value	3 + 1 bytes
Error check	xxx	xx
End of frame	ETX	03

RESPONSE MESSAGE (length = 8)

Begin frame	STX	02
	DLE	10H
Address	xxx	xx
Code	69	45H
Stamp	xxx	xx
Data	ACK or NACK	ACK = executed command NACK = not executed command
Error check	xxx	xx
End of frame	ETX	03

6. 70 Read a Variable From 11-100

The Master asks the instrument a variable value.

QUERY MESSAGE (length = 8)

Begin frame	STX	02
	DLE	10H
Address	xxx	xx
Code	70	46H
Stamp	xxx	xx

Data	variable nr	1 byte
Error check	xxx	xx
End of frame	ETX	03

RESPONSE MESSAGE (length = 12)

Begin frame	STX	02
	DLE	10H
Address	xxx	xx
Code	70	46H
Stamp	xxx	xx
Data	required variable nr	1 byte
	variable value	3 + 1 bytes
Error check	xxx	xx
End of frame	ETX	03

VARIABLE NUMBERING

THRESHOLD 1	= 1
THRESHOLD 2	= 2
THRESHOLD 3	= 3
THRESHOLD 4	= 4
FULL SCALE	= 5
SAMPLE WEIGHT	= 6
ZERO	= 7
SPAN	= 8

This page intentionally left blank