

ISDA/ISDA4

Protocol Driver Manual

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Document Revision History

Revision	Description	Date
2.20	Initial Release	11/30/01

Related Documents & Reference Materials

Several resources are available to assist with the configuration and support of the ProLinx Communication Gateways, Inc. modules. The following files are available off the web site:

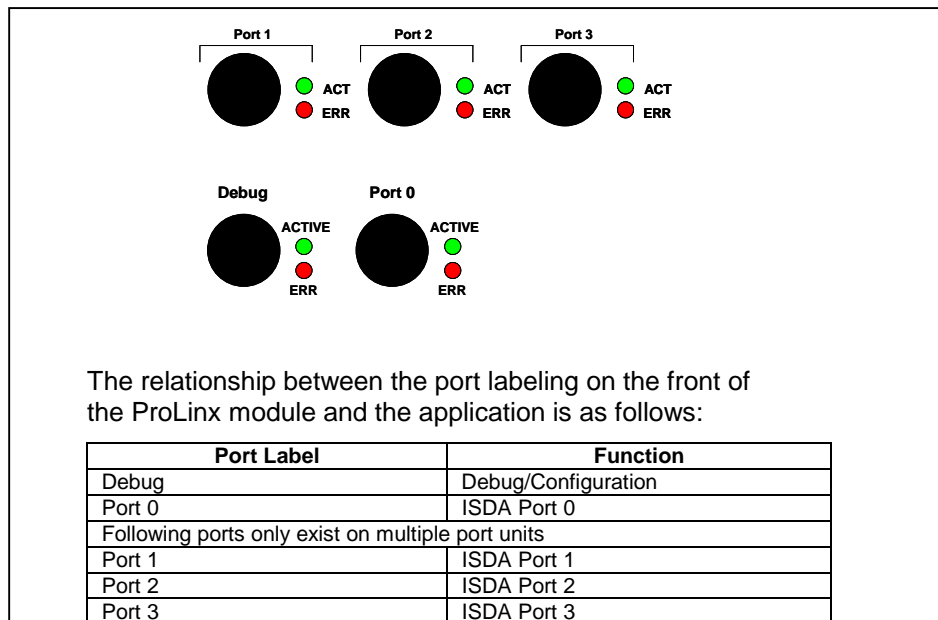
Startup Guide	www.prolinxgateways.com/downloads	
	startup_guide_2.20.pdf	ProLinx Communication Gateways, Inc. Startup Guide

1 Functional Overview

The Ishida Master Protocol driver can exist in a single port (ISDA) or a multiple port (ISDA4) implementation. In either case, the driver can be configured on an individual port basis to operate as a Ishida Master. Each port is independently configured for communication on an Ishida network and interfaces with the internal database in the module.

1.1 Master Serial Port(s)

The ProLinx module is capable of supporting the Ishida protocol as a Master on up to four ports. Each of the ports is individually configurable, providing a great deal of flexibility.



One or more Ishida protocol master ports can be configured on the module to continuously interface with Ishida slave devices over a serial communication interface (RS-232, RS-422 or RS-485). Each port is configured independently. User-defined commands determine the commands to be issued on each port. Up to 100 commands can be defined for each port. Data read from the devices are placed in the virtual database. Any write requests for the Ishida slave devices are sourced with data from the virtual database.

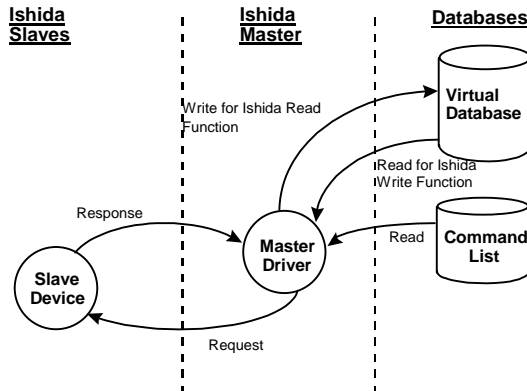
The module can be configured to place slave devices that are not responding to commands from the master ports at a lower priority. If the module recognizes that a slave device has failed to respond to a message after the user defined retry count, it will mark the slave as "in communication failure" and set the error delay counter to the user specified value. Each time the module encounters this slave in the command list, the counter will be decremented. When the value reaches zero, the slave will be placed in an active status. This facility can improve communication throughput on the network.

1.2 Module Internal Database

Central to the functionality of the module is the internal database. This database is shared between all the ports on the module and is used as a conduit to pass information from one device on one network to one or more devices on another network. This permits data from devices on one communication port to be viewed and controlled by devices on another port. In addition to data from the master ports, status and error information generated by the module can also be mapped into the internal database.

1.2.1 ISDA Serial Port Driver Access to Database

The following diagram details the flow of data between the serial port drivers and the internal database.



The Master driver uses the database in two ways:

1. A read command issued to a slave device by the master driver will return the slave data into the internal database
2. A write command issued to a slave device by the master driver uses the data in the internal database to write to the slave device

2 Protocol Functional Specifications

2.1 ISDA Master Serial Port Specifications

Type	Specifications
General Parameters (Software Configurable)	
Internal Database	4000 registers (words) available
Communication parameters	Local Station ID: 0 to 255 Port 0 Baud Rate: 110 to 115.2K baud Port 1,2,3 Baud Rate: 110 to 115K baud Stop Bits : 1 or 2 Data Size: 7 or 8 bits Parity: None, Even, Odd RTS Timing delays: 0 to 65535 ms
Error Checking	Modulo 256
ISDA Master Driver	
General	Point to Point
Configurable Parameters per Master port	Min Command Delay Number of Commands Response Timeout Retry Count
ISDA Commands supported	1 ROM number data request 2 Status data request 3 Current totals data request 4 Histogram data request 5 Efficiency data request 6 Totals data request 7 Error log data request 8 Combination calculation results data request 9 Product setting data request 10 Feeder adjustment data request 11 Timing adjustment data request 12 Weigh, spec set data request 13 Sectioning method data request 14 Infeeder control data request 15 Packer interlock set data request 16 Product set data registration 17 Feeder adjustment data registration 18 Timing adjustment data registration 19 Weigher, calc spec set data registration 20 Sectioning method data registration 21 Infeeder control data registration 22 Packer interlock spec set data registration 23 All totals clear indicator 24 Data and time setting 25 Drive system power ON indicator 26 Drive system power OFF indicator 27 Production start indicator 28 Auto zero adjustment start indicator 29 Drain start indicator 30 Drain stop indicator 31 Error clear start indicator 32 Manual calculation indicator 33 Production stop indicator

Command List	Up to 100 command per master port, each fully configurable for function, slave address, register to/from addressing and word/bit count
Status Data	Error codes available on an individual command basis. In addition, a slave status list is maintained per active master port.

Polling of command list	User configurable polling of commands, including disabled, continuous and on change of data (write only)
Physical Specifications	
	See Hardware specifications in the Installation Guide manual

2.2 Serial Port Specifications

Type	Specifications
Serial Ports	
Serial Port Cables (DB-9M Connector)	One DIN to DB-9M cable included per configurable serial port
Port 0	RS-232/422/485 – jumper selectable DB-9M connector Hardware Handshaking: RTS,CTS,DTR,DSR,DCD
Port 1,2,3 Protocol Ports 1,2,3 (Only if product includes extra serial ports)	RS-232/422/485 – Software configurable DB-9M connector Hardware Handshaking: RTS,CTS,DTR,DSR,DCD
Serial Port Isolation	2500V RMS port-to-port isolation per UL 1577. 3000V DC min. port to ground and port to logic power isolation.
Serial Port Protection	RS485/422 port interface lines TVS diode protected at +/- 27V standoff voltage. RS232 port interface lines fault protected to +/- 36V power on, +/- 40V power off.

3 ISDA Protocol Specific Configuration File

The following is excerpted from a full configuration file showing typical examples of the ISDA port configurations. In this example, one port has been setup as a master. This example should serve only to give the programmer an idea of how a CFG file is structured. Complete configuration files are shipped on each unit and are available off the web site for each of the products. These files can serve as an excellent starting point for any project.

```
# This section is used to define the configuration for the Ishida master device
# simulated on Port 0.
#

[ISDA Port 0]
Enabled           : Yes      #Y=Use port, N=Do not use port
Local Station ID  : 3        #Node address
Baud Rate         : 9600     #Baud rate for port 110-38400
Parity            : No       #N=None, O=Odd, E=Even, M=Mark, S=Space
Data Bits         : 8        #5, 6, 7 or 8
Stop Bits         : 1        #1 or 2
Min Response Delay : 0       #0-65535 mSec before sending response msg
RTS On            : 0        #0-65536 mSec before message
RTS Off           : 0        #0-65536 mSec after message
Use CTS Line      : No       #Use CTS modem control line (Y/N)
Response Timeout  : 3000    #Response message timeout (0-65535 mSec)
Retry Count       : 0        #Response failure retry count

Minimum Command Delay : 10    #Minimum number of msec's between commands
Error Delay Counter   : 0     #0-65535 Command cycle count if error
```


4 CFG File: [ISDA Port x] Section

The [ISDA PORT 0], [ISDA PORT 1], [ISDA PORT 2] and [ISDA PORT 3] sections of the **DFNTISDA.CFG** file are used to set the ISDA port type, communication parameters, define the protocol specifics and set the command list parameters. The parameters are the same for all four sections. The command list for each master port is entered in a different section in the file. The table below lists the parameters defined in this section:

[SECTION]/Item	Range	Description																																	
[ISDA PORT 0] [ISDA PORT 1] [ISDA PORT 2] [ISDA PORT 3]		Configuration Header for Port 0 Configuration Header for Port 1 Configuration Header for Port 2 Configuration Header for Port 3																																	
Enabled:	Yes or No	This flag specifies if the port on the module will be utilized. If the parameter is set to No, the port will not be used. If the parameter is set to Yes, the port will be used supporting the ISDA protocol.																																	
Local Station ID:	0 to 255	This parameter specifies the local station ID for all ISDA messages sent from this master port.																																	
Baud Rate:		This is the baud rate to be used on the port. Enter the baud rate as a value. For example, to select 19K baud, enter 19200. <table border="1" data-bbox="927 898 1365 1297"> <thead> <tr> <th>Baud Rate</th> <th>Parameter Value</th> <th>Port</th> </tr> </thead> <tbody> <tr> <td>110</td> <td>110</td> <td>0</td> </tr> <tr> <td>150</td> <td>150</td> <td rowspan="14">0, 1, 2, 3</td> </tr> <tr> <td>300</td> <td>300</td> </tr> <tr> <td>600</td> <td>600</td> </tr> <tr> <td>1200</td> <td>12 or 1200</td> </tr> <tr> <td>2400</td> <td>24 or 2400</td> </tr> <tr> <td>4800</td> <td>48 or 4800</td> </tr> <tr> <td>9600</td> <td>96 or 9600</td> </tr> <tr> <td>14,400</td> <td>14, 114 or 14400</td> </tr> <tr> <td>19,200</td> <td>19, 192 or 19200</td> </tr> <tr> <td>28,800</td> <td>28, 288 or 28800</td> </tr> <tr> <td>38,400</td> <td>38, 384 or 38400</td> </tr> <tr> <td>57,600</td> <td>57 or 576</td> </tr> <tr> <td>115,200</td> <td>115 or 1152</td> </tr> </tbody> </table>	Baud Rate	Parameter Value	Port	110	110	0	150	150	0, 1, 2, 3	300	300	600	600	1200	12 or 1200	2400	24 or 2400	4800	48 or 4800	9600	96 or 9600	14,400	14, 114 or 14400	19,200	19, 192 or 19200	28,800	28, 288 or 28800	38,400	38, 384 or 38400	57,600	57 or 576	115,200	115 or 1152
Baud Rate	Parameter Value	Port																																	
110	110	0																																	
150	150	0, 1, 2, 3																																	
300	300																																		
600	600																																		
1200	12 or 1200																																		
2400	24 or 2400																																		
4800	48 or 4800																																		
9600	96 or 9600																																		
14,400	14, 114 or 14400																																		
19,200	19, 192 or 19200																																		
28,800	28, 288 or 28800																																		
38,400	38, 384 or 38400																																		
57,600	57 or 576																																		
115,200	115 or 1152																																		
Parity:	None, Odd, or Even		This is the Parity code to be used for the port. The values are as follows: None, Odd, Even.																																
Data Bits:	7 or 8	This parameter sets the number of data bits for each word used by the protocol.																																	
Stop Bits:	1 or 2	This parameter sets the number of stop bits to be used with each data value sent.																																	
Minimum Response Delay:	0 to 65535	This parameter sets the number of milliseconds to wait to respond to a request on the port. This is required for slow reacting devices.																																	
RTS On:	0 to 65535	This parameter sets the number of milliseconds to delay after RTS is asserted before the data will be transmitted.																																	
RTS Off:	0 to 65535	This parameter sets the number of milliseconds to delay after the last byte of data is sent before the RTS modem signal will be set low.																																	
Use CTS Line:	Yes or No	This parameter specifies if the CTS modem control line is to be used. If the parameter is set to No, the CTS line will not be monitored. If the parameter is set to Yes, the CTS line will be monitored and must be high before the module will send data. Normally, this parameter is required when half-duplex modems are used for communication (2-wire).																																	

[SECTION]/Item	Range	Description
Response Timeout:	0 to 65535	This parameter represents the message response timeout period in 1-ms increments. This is the time that a port configured as a master will wait before re-transmitting a command if no response is received from the addressed slave. The value is set depending upon the communication network used and the expected response time of the slowest device on the network.
Retry Count:	0 to 10	This parameter specifies the number of times a command will be retried if it fails.
Minimum Command Delay:	0 to 65535	This parameter specifies the number of milliseconds to wait between the initial issuance of a command. This parameter can be used to delay all commands sent to slaves to avoid "flooding" commands on the network. This parameter does not affect retries of a command as they will be issued when failure is recognized.
Error Delay Counter:	0 to 65535	This parameter specifies the number of polls to be skipped on the slave before trying to re-establish communications. After the slave fails to respond, the master will skip commands to be sent to the slave the number of times entered in this parameter.

5 CFG File: [ISDA PORT x COMMANDS] Section

The [ISDA PORT 0 COMMANDS], [ISDA PORT 1 COMMANDS], [ISDA PORT 2 COMMANDS] and [ISDA PORT 3 COMMANDS] sections of the CFG file are used to set the serial master port command lists. These lists are used to poll slave devices attached to the master ports. The module supports 33 commands.

The command list is formatted differently than the other sections of the configuration file. Commands are present in a block between the labels **START** and **END**. These labels are used to inform the program where the list resides. The module's program will parse all commands after the **START** label until it reaches the **END** label.

5.1 Command List Overview

In order to interface the ProLinX module with slave devices, the user must construct a command list. The commands in the list specify the slave device to be addressed, the function to be performed (read or write), the data area in the device to interface with and the registers in the internal database to be associated with the device data. There is a separate command list for each master port, with up to 100 commands allowed per master port. The command list is processed from top (command #0) to bottom. A poll interval parameter is associated with each command to specify a minimum delay time in seconds between the issuance of a command. If the user specifies a value of 10 for the parameter, the command will be executed no more frequently than every 10 seconds.

Write commands have a special feature, as they can be set to execute only if the data in the write command changes. If the register data values in the command have not changed since the command was last issued, the command will not be executed. If the data in the command has changed since the command was last issued, the command will be executed. Use of this feature can lighten the load on the Ishida network. In order to implement this feature; set the enable code for the command to a value of 2.

The module supports 33 commands. This permits the module to interface with Ishida CCW weigh scales.

5.2 Commands Supported by the Module

The format of each command in the list is dependent on the function being executed. To simplify command construction, the module uses its own set of function codes to associate a command with a ISDA command/function type. The tables below list the functions supported by the module:

Basic Command Set Functions

Prolinx Function Code	Definition
1	ROM number data request
2	Status data request
3	Current totals data request
4	Histogram data request
5	Efficiency data request
6	Totals data request
7	Error log data request

Prolinx Function Code	Definition
8	Combination calculation results data request
9	Product setting data request
10	Feeder adjustment data request
11	Timing adjustment data request
12	Weigh, spec set data request
13	Sectioning method data request
14	Infeeder control data request
15	Packer interlock set data request
16	Product set data registration
17	Feeder adjustment data registration
18	Timing adjustment data registration
19	Weigher, calc spec set data registration
20	Sectioning method data registration
21	Infeeder control data registration
22	Packer interlock spec set data registration
23	All totals clear indicator
24	Data and time setting
25	Drive system power ON indicator
26	Drive system power OFF indicator
27	Production start indicator
28	Auto zero adjustment start indicator
29	Drain start indicator
30	Drain stop indicator
31	Error clear start indicator
32	Manual calculation indicator
33	Production stop indicator

Each command list record has the same general format. The first part of the record contains the information relating to the communication module and the second part contains information required to interface to the Ishida slave device.

5.3 Command Entry Formats

Appendix Reference

The format of each command in the list is dependent on the function being executed. Refer to the Appendix A for a complete discussion of the ISDA commands supported by the module and of the structure and content of each command.

The table below shows the structure of the configuration data necessary for each of the supported commands:

Column #	1	2	3	4	5	6	7
Function Code	Enable Code	Parameter Address	Poll Interval Time	Swap Code	Node Address	Function Code	Database Address
FC1	Code	Address	Seconds	Code	Node	1	Address
FC2	Code	Address	Seconds	Code	Node	2	Address
FC3	Code	Address	Seconds	Code	Node	3	Address

Column #	1	2	3	4	5	6	7
Function Code	Enable Code	Parameter Address	Poll Interval Time	Swap Code	Node Address	Function Code	Database Address
FC4	Code	Address	Seconds	Code	Node	4	Address
FC5	Code	Address	Seconds	Code	Node	5	Address
FC6	Code	Address	Seconds	Code	Node	6	Address
FC7	Code	Address	Seconds	Code	Node	7	Address
FC8	Code	Address	Seconds	Code	Node	8	Address
FC9	Code	Address	Seconds	Code	Node	9	Address
FC10	Code	Address	Seconds	Code	Node	10	Address
FC11	Code	Address	Seconds	Code	Node	11	Address
FC12	Code	Address	Seconds	Code	Node	12	Address
FC13	Code	Address	Seconds	Code	Node	13	Address
FC14	Code	Address	Seconds	Code	Node	14	Address
FC15	Code	Address	Seconds	Code	Node	15	Address
FC16	Code	Address	Seconds	Code	Node	16	Address
FC17	Code	Address	Seconds	Code	Node	17	Address
FC18	Code	Address	Seconds	Code	Node	18	Address
FC19	Code	Address	Seconds	Code	Node	19	Address
FC20	Code	Address	Seconds	Code	Node	20	Address
FC21	Code	Address	Seconds	Code	Node	21	Address
FC22	Code	Address	Seconds	Code	Node	22	Address
FC23	Code	Address	Seconds	Code	Node	23	Address
FC24	Code	Address	Seconds	Code	Node	24	Address
FC25	Code	Address	Seconds	Code	Node	25	Address
FC26	Code	Address	Seconds	Code	Node	26	Address
FC27	Code	Address	Seconds	Code	Node	27	Address
FC28	Code	Address	Seconds	Code	Node	28	Address
FC29	Code	Address	Seconds	Code	Node	29	Address
FC30	Code	Address	Seconds	Code	Node	30	Address
FC31	Code	Address	Seconds	Code	Node	31	Address
FC32	Code	Address	Seconds	Code	Node	32	Address
FC33	Code	Address	Seconds	Code	Node	33	Address

The first part of the record is the Module Information, which relates to the ProLinx module and the second part contains information required to interface to the slave device. Refer to the slave device documentation for a full discussion of each function.

The following shows an example of a command list section of the CFG file:

```

[ISDA Port 0 Commands]
# The file contains examples for a Ishida weigh scale.
#
# LOCATION      :
# DATE          : 09/20/01
# CONFIGURED BY : KDH
# MODIFIED      :
#
START
#      1          2          3      4          5      6          7
#      Parm      Poll      Swap      Node  Func      DB
# Enable  Address Interval Code  Address Code Address
#      1      100      2      0      3      1      0
END

```

Each parameter is discussed in the following table:

Command Parameter	Range	Description								
Enable	0 ,1,2	<p>This field is used to define whether or not the command is to be executed and under what conditions.</p> <table border="1"> <thead> <tr> <th>Value</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>The command is disabled and will not be executed in the normal polling sequence.</td> </tr> <tr> <td>1</td> <td>The command is executed each scan of the command list if the Poll Interval Time is set to zero. If the Poll Interval time is set, the command will be executed, when the interval timer expires.</td> </tr> <tr> <td>2</td> <td>The command will execute only if the internal data associated with the command changes. This value is valid only for write commands.</td> </tr> </tbody> </table>	Value	Description	0	The command is disabled and will not be executed in the normal polling sequence.	1	The command is executed each scan of the command list if the Poll Interval Time is set to zero. If the Poll Interval time is set, the command will be executed, when the interval timer expires.	2	The command will execute only if the internal data associated with the command changes. This value is valid only for write commands.
Value	Description									
0	The command is disabled and will not be executed in the normal polling sequence.									
1	The command is executed each scan of the command list if the Poll Interval Time is set to zero. If the Poll Interval time is set, the command will be executed, when the interval timer expires.									
2	The command will execute only if the internal data associated with the command changes. This value is valid only for write commands.									
Parameter Address	0 to 3999	<p>This field specifies the internal database register to be associated with the command. For read and write functions, the data written to the slave device will be sourced from the address specified.</p>								
Poll Interval	0 to 65535	<p>This parameter specifies the minimum interval to execute continuous commands (Enable code of 1). The parameter is entered in units of seconds. Therefore, if a value of 10 is entered for a command, the command will execute no more frequently than every 10 seconds.</p>								

Command Parameter	Range	Description										
Swap Code	0,1,2,3	<p>This parameter is used to define if the data received from the slave is to be ordered differently than received from the slave device. This parameter is helpful when dealing with floating-point or other multi-register values, as there is no standard method of storage of these data types in slave devices. This parameter can be set to order the register data received in an order useful by other applications. The table below defines the values and their associated operations:</p> <table border="1"> <thead> <tr> <th>Swap Code</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>None – No Change is made in the byte ordering</td> </tr> <tr> <td>1</td> <td>Words – The words are swapped</td> </tr> <tr> <td>2</td> <td>Words & Bytes – The words are swapped then the bytes in each word are swapped</td> </tr> <tr> <td>3</td> <td>Bytes – The bytes in each word are swapped</td> </tr> </tbody> </table>	Swap Code	Description	0	None – No Change is made in the byte ordering	1	Words – The words are swapped	2	Words & Bytes – The words are swapped then the bytes in each word are swapped	3	Bytes – The bytes in each word are swapped
Swap Code	Description											
0	None – No Change is made in the byte ordering											
1	Words – The words are swapped											
2	Words & Bytes – The words are swapped then the bytes in each word are swapped											
3	Bytes – The bytes in each word are swapped											
Node Address	1 to 255	<p>This parameter is used to specify the slave node address on the network to be considered. Values of 1 to 255 are permitted.</p>										

Command Parameter	Range	Description
Function Code	Reference Appendix A	<p>These parameters specify the function to be executed by the command. Appendix A in this Manual details the meaning of these values for each of the available supported commands. Following is a complete list of the command supported by the Master driver.</p> <p><u>ProLinx Function Code Listing</u> <u>Basic Command Set</u></p> <ol style="list-style-type: none"> 1 ROM number data request 2 Status data request 3 Current totals data request 4 Histogram data request 5 Efficiency data request 6 Totals data request 7 Error log data request 8 Combination calculation results data request 9 Product setting data request 10 Feeder adjustment data request 11 Timing adjustment data request 12 Weigh, spec set data request 13 Sectioning method data request 14 Infeeder control data request 15 Packer interlock set data request 16 Product set data registration 17 Feeder adjustment data registration 18 Timing adjustment data registration 19 Weigher, calc spec set data registration 20 Sectioning method data registration 21 Infeeder control data registration 22 Packer interlock spec set data registration 23 All totals clear indicator 24 Data and time setting 25 Drive system power ON indicator 26 Drive system power OFF indicator 27 Production start indicator 28 Auto zero adjustment start indicator 29 Drain start indicator 30 Drain stop indicator 31 Error clear start indicator 32 Manual calculation indicator 33 Production stop indicator
Database Address	0 to 3999	For read functions, the data read from the slave device will be placed starting at the register value entered in this field.

6 Communication Port Cables

This section contains information on the cable and pin assignments for the ProLinx Communication Gateways, Inc. module's serial ports (RS-232/422/485) and the application port.

The ProLinx Communication Gateways, Inc. module will come with one to five serial ports, depending on the configuration purchased. In all cases, the protocol serial ports will have the same pin-outs.

Example:

The 4202-DFNT-ISDA4 module contains five serial communication ports - four configurable ISDA ports and a Configuration/ Debug port.

The 4201-DFNT-ISDA module contains two serial communication ports - one configurable ISDA port and a Configuration/Debug port.

Each serial port is a Mini-DIN physical connection. A 6-inch 'Mini-DIN to DB-9M' cable is provided for each active protocol port. The DB-9M provides connections for RS-232, RS-422 and RS-485. The diagrams in the following sections detail the pin assignments for several possible physical connections.

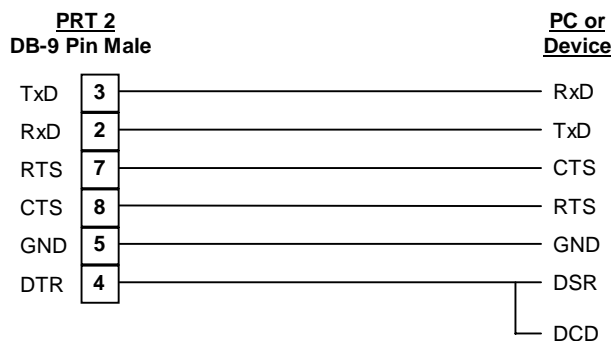
6.1 Serial Port Cable Connections

The relationship between the port labeling on the front of the ProLinx module and the application is as follows:

Port Label	Function
Debug	Debug/Configuration
Port 0	Serial Port 0
Following ports only exist on multiple port units	
Port 1	Serial Port 1
Port 2	Serial Port 2
Port 3	Serial Port 3

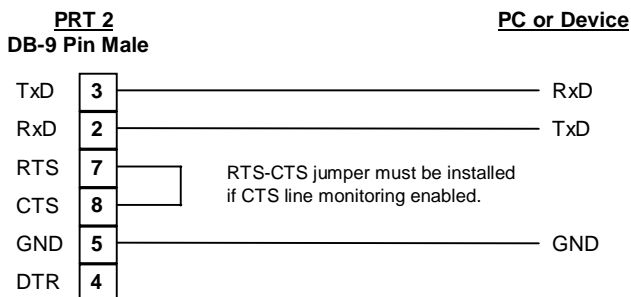
6.1.1 Port 0,1,2,3 : RS-232 - Null Modem (w/ Hardware Handshaking)

This type of connection is used when the device connected to the module requires hardware handshaking (control and monitoring of modem signal lines).



6.1.2 Port 0,1,2,3 : RS-232 - Null Modem (w/o Hardware Handshaking)

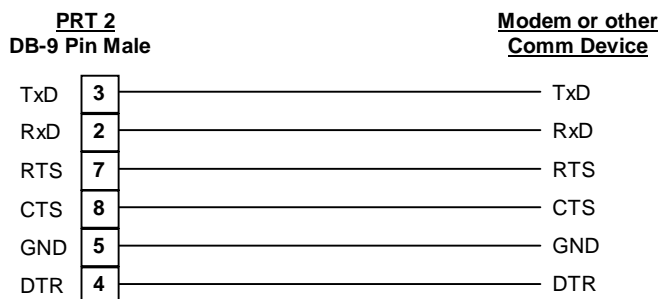
This type of connection can be used to connect the module to a computer or field device communication port.



NOTE: If the port is configured with the "Use CTS Line" set to 'Y', then a jumper is required between the RTS and the CTS line on the module connection.

6.1.3 Port 0,1,2,3 : RS-232 - Modem Connection

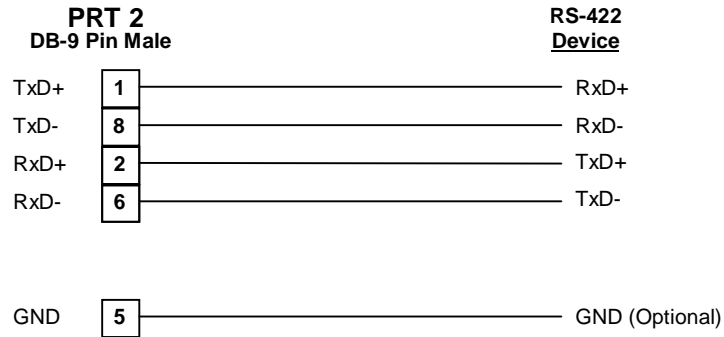
This type of connection is required between the module and a modem or other communication device.



The "Use CTS Line" parameter for the port configuration should be set to 'Y' for most modem applications.

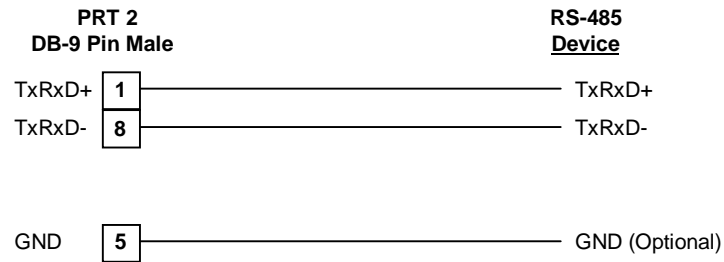
6.1.4 Port 0,1,2,3 : RS-422 Interface Connections

The diagram below applies when the RS-422 interface is selected.



6.1.5 Port 0,1,2,3 : RS-485 Interface Connections

The diagram below applies when the RS-485 interface is selected.



7 LED Indicators

LED indicators provide a means of monitoring the operation of the unit and individual ports and are extremely useful for troubleshooting. In addition to port monitoring, system configuration errors, application errors, and fault indications are all monitored with LEDs providing alerts to possible problems. The *ProLinx Communication Gateways, Inc. Startup Guide* provides more information on LEDs and troubleshooting.

7.1 LEDs for Serial ISDA Protocol Ports

Troubleshooting the operation of the serial ISDA protocol ports can be performed using several methods.

The first and quickest is to scan the LEDs on the module to determine the existence and possibly the cause of a problem. This section provides insight into the operation of the Serial Port status LEDs.

Some ProLinx Communication Gateways, Inc. modules will include three extra serial ports. Each of these serial ports has two LEDs indicating status.

LED	Color	Description
Port 0 – ACT	Off	No activity on the port.
Port 1 – ACT	Green	The port is either actively transmitting or receiving data
Port 2 – ACT	Flash	
Port 3 – ACT		
Port 0 – ERR	Off	Normal state. When off and Port Active led is indicating activity, there are no communication errors
Port 1 – ERR	Amber	Activity on this led indicates some communication error was detected, either during transmit or receive. To determine the exact error, connect the Debug terminal to the Debug port.
Port 2 – ERR	On or	
Port 3 – ERR	Flashing	

Note that the meaning of the other LEDs on the unit can be found in the Product Manual for the specific module that is being debugged.

7.2 Configuration, Application, and Fault LEDs

There are three (3) LEDs that provide information on configuration errors (**CFG**), application errors (**APP ERR**), and system faults (**FAULT**). The following table provides descriptions of LED conditions.

CFG	APP ERR	FAULT	Program	Description
1	1	1	Loader	The Loader program is running.
1	1	0	App	The module is currently in configuration mode.
1	0	0	App	There is a configuration error and the program is running with the default parameter(s). Refer to Sections 4 & 5 for valid configuration parameters.
0	0	0	App	All configuration information is correct and there are no application errors.
1	0	1	App	The module recognized a critical configuration error. Only the debugger may be active. Connect a PC running a terminal program to the debug port, then refer to Section 10 for details on troubleshooting configuration errors.
0	1	0	App	The module recognized an application error (The LEDs will only flash briefly). Refer to Section 8 for details on troubleshooting application errors.
0	1	1	App	A hardware error exists or a program is aborting on a critical error. If a hardware error is suspected, contact your technical support representative.
0	0	1	DOS	All programs exited and the module is now running in DOS mode.

Key

0 = Off

1 = On

7.2.1 Debug LEDs

Debug LED State	Condition
ON	N/A
OFF	Serial ISDA pass-through port on Debug port set to debug mode.

8 Serial Port Protocol Error/Status Data

The second and most thorough troubleshooting method for debugging the operation of the ISDA driver (and the module in general) is the powerful Debug port on the module which provides much more complete access to the internal operation and status of the module. Accessing the Debug capabilities of the module is accomplished easily by connecting a PC to the Debug port and loading a terminal program. If using a module with hardware version 1, download PSTerm (see 'Module Configuration & Debug Port Manual'). If using hardware version 2 (indicated with a 'V2' sticker on the back of the module) any terminal program can be used.

8.1 Viewing Error/Status Data

The following sections describe the register addresses that contain protocol error and status data. Viewing the contents of each register is accomplished using the Database View option. The use of this option and its associated features are described in detail in the *ProLinx Communications Gateways, Inc. Startup Guide*.

8.2 ISDA Error and Status Data Area Addresses

ISDA error and status data are stored in registers based on the ISDA port configuration. Starting register addresses are shown in the following table:

ISDA Port	Starting Address
0	6300
1	6700
2	7100
3	7500

Note: None of the addresses are available in the ISDA address range. In order to view them, the data must be moved using the Data Map section of the configuration file. Appendix B illustrates the appropriate section and provides an example of how to move data to the ISDA address range.

8.3 ISDA Ports: Error/Status Data

The serial port (ISDA Master/Slave) Error and Status Data areas are discussed in this section.

The data area is initialized with zeros whenever the module is initialized. This occurs during a cold-start (power-on), reset (reset push-button pressed) or a warm-boot operation (commanded or loading of new configuration).

Example Internal Database Address	Offset	Description
6300	0	Number of Command Requests
6301	1	Number of Command Responses
6302	2	Number of Command Errors
6303	3	Number of Requests
6304	4	Number of Responses
6305	5	Number of Errors Sent
6306	6	Number of Errors Received
6307	7	Configuration Error Word
6308	8	Current Error Code
6309	9	Last Error Code

Refer to the following Error Codes section to interpret the status/error codes present in the data area.

8.4 Master Port: Command Errors

The individual command errors for each master port are returned to the address locations specified in the following table:

ISDA Port	Address Range
0	6310 – 6409
1	6710 – 6809
2	7110 – 7209
3	7510 - 7609

The first word in the register location defined contains the status/error code for the first command in the port's command list. Each successive word in the command error list is associated with the next command in the list.

Refer to Section 9 to interpret the status/error codes present in the data area.

Example ISDA Port 0 Command List Errors

Internal Database Address (Example)	Offset	Description
6310	0	Command #0 Error Status
6311	1	Command #1 Error Status
6312	2	Command #2 Error Status
6313	3	Command #3 Error Status
6314	4	Command #4 Error Status
.	.	.
.	.	.
.	.	.
6407	97	Command #97 Error Status
6408	98	Command #98 Error Status
6409	99	Command #99 Error Status

Note that the values in the Command List Error Status tables are initialized to zero (0) at power-up, cold boot and during warm boot.

8.5 Master Port: ISDA Slave List Status

Each slave polled in the command list on the ISDA master ports has a reserved word value for a status code. This status data list can be read using the Configuration/Debug Port and can be placed in the module's internal database. The first word in the register location defined contains the status code for the ISDA slave node address 0. Each successive word in the list is associated with the next node up to slave node 255.

Slaves attached to the master port can have one of the following states:

0	The slave is inactive and not defined in the command list for the master port.
1	The slave is actively being polled or controlled by the master port and communication is successful.
2	The master port has failed to communicate with the slave device. Communication with the slave is suspended for a user defined period based on the scanning of the command list.

Slaves are defined to the system when the module initializes the master command list. Each slave defined will be set to a state value of 1 in this initial step. If the master port fails to communicate with a slave device (retry count expired on a command), the master will set the state of the slave to a value of 2 in the status table. This suspends communication with the slave device for a user specified scan count (**Error Delay Counter** value in the configuration). Each time a command in the list is scanned that has the address of a suspended slave, the delay counter value will be decremented. When the value reaches zero, the slave state will be set to 1. This will enable polling of the slave.

The individual Slave List Status errors for each ISDA port are returned to the address locations specified in the following table:

ISDA Port	Address Range
0	6410 – 6665

1	6810 – 7065
2	7210 – 7465
3	7610 - 7865

Example ISDA Port 0 Slave List Status Example

Internal Database Address (Example)	Offset	Description
6410	0	Slave #0 Status
6411	1	Slave #1 Status
6412	2	Slave #2 Status
6413	3	Slave #3 Status
6414	4	Slave #4 Status
.	.	.
.	.	.
.	.	.
6663	253	Slave #253 Status
6664	254	Slave #254 Status
6665	255	Slave #255 Status

The example addresses shown above assumes ISDA Port 0. Note that each master port will have one of these status data blocks available in the internal database, each individually located with a separate address.

Note that the values in the Slave List Status tables are initialized to zero (0) at power-up, cold boot and during warm boot.

9 Error Codes

The module error codes are listed in this section. Error codes returned from the command list process are stored in the command list error memory region. A word is allocated for each command in the memory area. The error codes are formatted in the word as follows: The least-significant byte of the word contains the extended status code and the most-significant byte contains the status code.

Use the error codes returned for each command in the list to determine the success or failure of the command. If the command fails, use the error code to determine the cause of failure. Note: the Module Specific error codes (not ISDA compliant) are returned from within the module and never returned from an attached ISDA slave device.

These are error codes that are extended codes unique to this module. The most common errors are shown in the following tables:

MODULE SPECIFIC ERROR (NOT ISDA COMPLIANT)	
0xFFFF	CTS Modem control line not set before transmit
0xFFFFE	Timeout while transmitting message
0xFFFF5	Timeout waiting for response after request
0xFF2D	Bad Checksum

9.1 ISDA Configuration Error Word

ISDA Configuration Error Word errors are stored in protocol-specific registers. The following table lists the Port/Register Address configuration.

ISDA Port	Configuration Error Word Register
0	6307
1	6707
2	7107
3	7507

A register containing a code indicates a problem with the configuration. The following table lists the codes, a description of the problem, and parameters to correct the error condition within the configuration file.

Bit	Code	Description
0	0x0001	Invalid Enabled parameter (Yes or No)
1	0x0002	Invalid RS-Interface parameter (0 to 2)
2	0x0004	Invalid Local Station ID
3	0x0008	Reserved
4	0x0010	Reserved
5	0x0020	Invalid Baud Rate
6	0x0040	Invalid Parity (None, Odd, Even)
7	0x0080	Invalid Data Bits (7 or 8 bits)
8	0x0100	Invalid Stop Bits (1 or 2)
9	0x0200	Reserved
10	0x0400	Invalid Use CTS Line (Yes or No)
11	0x0800	Reserved
12	0x1000	Retry Count Invalid (0 to 10)
13	0x2000	Reserved
14	0x4000	Reserved
15	0x8000	Reserved

Appendix A: ISDA Command Support

Function Code # 1

ROM Number Data Request

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 1	ROM number data request.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 2

Status Data Request

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 2	Status data request.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 3

Current Totals Data Request

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 3	Current totals data request.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 4

Histogram Data Request

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 4	Histogram data request.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 5

Efficiency Data Request

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 5	Efficiency data request.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 6

Totals Data Request

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 6	Totals data request.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 7

Error Log Data Request

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 7	Error log data request.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 8

Combination Calculation Results Data Request

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 8	Combination calculation results data request.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 9

Product Setting Data Request

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 9	Product setting data request
7	Device Address	Address within the ISDA slave to write to.

Function Code # 10

Feeder Adjustment Data Request

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 10	Feeder adjustment data request.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 11

Timing Adjustment Data Request

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 11	Timing adjustment data request.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 12

Weigh, Spec Set Data Request

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 12	Weigh, Spec Set Data Request.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 13

Sectioning Method Data Request

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 13	Sectioning method data request.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 14

Infeeder Control Data Request

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 14	Infeeder control data request.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 15

Packer Interlock Set Data Request

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 15	Packer interlock set data request.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 16

Product Set Data Registration

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 16	Product set data registration.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 17

Feeder Adjustment Data Registration

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 17	Feeder adjustment data registration.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 18

Timing Adjustment Data Registration

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 18	Timing adjustment data registration.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 19

Weigher, Calc Spec Set Data Registration

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 19	Weigher, Calc Spec Set Data Registration
7	Device Address	Address within the ISDA slave to write to.

Function Code # 20

Sectioning Method Data Registration

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 20	Section method data registration.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 21

Infeeder Control Data Registration

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 21	Infeeder control data registration.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 22

Packer Interlock Spec Set Data Registration

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 22	Packer interlock spec set data registration.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 23

All Totals Clear Indicator

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 23	All totals clear indicator.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 24

Date and Time Setting

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 24	Date and time setting
7	Device Address	Address within the ISDA slave to write to.

Function Code # 25

Drive System Power ON Indicator

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 25	Drive system power ON indicator.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 26

Drive System Power OFF Indicator

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 26	Drive system power OFF indicator.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 27

Production Start Indicator

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 27	Production start indicator.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 28

Auto Zero Adjustment Start Indicator

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 28	Auto zero adjustment start indicator.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 29

Drain Start Indicator

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 29	Drain start indicator.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 30

Drain Stop Indicator

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 30	Drain stop indicator.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 31

Error Clear Start Indicator

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 31	Error clear start indicator.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 32

Manual Calculation Indicator

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 32	Manual calculation indicator.
7	Device Address	Address within the ISDA slave to write to.

Function Code # 33

Production Stop Indicator

Column	Command Parameter	Description
1	Enable/Type Word	0=Disabled, 1=Continuous, and 2=Conditional
2	Parameter Address	This parameter defines the database address of the first data point to be associated with the command.
3	Poll Interval	Minimum number of seconds to wait before polling with this command.
4	Swap Type Code	Swap Type Code for command: 0=None, 1=Swap words, 2=Swap words & bytes, and 3=Swap bytes in each word.
5	Node Address	Address of unit to reach on the network.
6	Function Code = 33	Production stop indicator.
7	Device Address	Address within the ISDA slave to write to.

Appendix B: Moving Data

The following is an example of the Data Map section of the configuration file. This section allows a user to move data to different addresses within the database in order to create simpler data requests and control.

```
# This section is used to move data within the database to concentrate
# information for simpler data requests and control. The Form Address
# specifies the start
# database location to copy the number of registers set by Register Count
# to the specified To Address (destination of data). When the data is
# copied, the order # of the bytes can be altered using the Swap Code
# field as follows:

#
# SWAP CODE   DEFINITION
# 0           Bytes left in original order      (1234 -> 1234)
# 1           Words are swapped                 (1234 -> 3412)
# 2           Words and bytes are swapped       (1234 -> 4321)
# 3           Bytes in each word are swapped   (1234 -> 2143)

[DATA MAP]
#   From      To      Register   Swap   Delay
#   Address   Address  Count      Code   Preset
START
      4000      1000         9        0      1000
      4170      1010         2        0      1001
      4370      1020        30        0      1002
      6300      1100        20        0      1003

END
```

----- **END OF MANUAL** -----