Honeywell

UDC 2300
UDC 3000
UDC 3300
UDC 5000
UDC 6000
UDC 6300

Universal Digital Controllers

RS422/485 ASCII Communications Option

Product Manual

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TotalPlant

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About This Publication

The UDC manual for RS422/485 ASCII communications option contains the following sections:

Section 1	–	Overview
Section 2	–	Installation
Section 3	–	Establishing Communications
Section 4	–	Read and Write Operations
Section 5	–	Reading, Writing, and Overriding Parameters on UDC 3000 Versa-Pro Controllers
Section 6	–	Reading, Writing and Overriding Parameters on UDC 5000 Ultra-Pro Controllers
Section 7	–	Reading, Writing, and Overriding Parameters on UDC 6000 Process Controllers
Section 8	–	Reading, Writing, and Overriding Parameters on UDC 6300 Process Controllers
Section 9	–	Reading, Writing, and Overriding Parameters on UDC 3300 Process Controllers
Section 10	–	Reading, Writing, and Overriding Parameters on UDC 2300 Process Controllers
Section 11	–	Operating the Controller with Communications Option
Section 12	–	ASCII Conversion Table
Section 13	–	Cable Specifications

Communication between your computer and the UDC Controller is accomplished for one piece of information (parameter) at a time. Each parameter has an associated identifying code.

The Identifying Code and Format Code will be listed along with information pertaining to that parameter.

The identifying codes are grouped in the same order as they appear in the controller configuration prompts.

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Parameters

ADDRESS 2 .... Communication Address (Loop 2)
ADDRESS .... Communication Address (Loop 1)
BAUD RATE .... Baud Rate (bits/second)
COM STATE.. Communication State
CSP BIAS .... Commun. SP Bias (Loop 1)
CSP RATIO .... Commun. SP Ratio (Loop 1)
CSP2 BIAS .... Commun. SP Bias (Loop 2)
CSP2 RATIO .... Commun. SP Ratio (Loop 2)
DUPLEX .... Duplex Operation
PARITY.. Parity
SHED MODE... Controller Shed Mode and Output Level
SHED SP .... Shed Setpoint Recall
SHED TIME .... Shed Time
TX DELAY .... Transmission Delay
UNITS.. Communication Units

References

Publication Title	Publication Number
UDC 3000 Controller Product Manual	51-52-25-07
UDC 3000 Limit Controller Product Manual	51-52-25-09
UDC 5000 Controller Product Manual	51-51-25-17
UDC 6000 Controller Product Manual	51-52-25-32
UDC 6300 Controller Product Manual	51-52-25-45
UDC 6300 Indicator Product Manual	51-52-25-46
UDC 3300 Controller Product Manual	51-52-25-55
UDC 3300 Limit Controller Product Manual	51-52-25-56
UDC 2300 Controller Product Manual	51-52-25-73

Section 1 – Overview

1.1 Introduction

The communications option

The RS422/485 Communications Option on the UDC Controller provides a serial multi-drop link whereby up to fifteen UDC controllers connect directly to a host computer.

Monitor or slave mode

The UDC controller can be placed in monitor or slave by the host computer. When monitored, the controller will send Configuration, Tuning, and Operating parameters to the host computer. When in slave, the controller will be switched through the communications interface board to "Slave" operation. This means that the computer can write configuration or tuning information into any controller on the link including overriding of PV, the setpoint, and output.

Message exchanges

The computer and the controllers talk to each other through a series of message exchanges. There are two RS422/485 message exchange protocols: Configuration or Loopback.

1.2 Message Exchange Protocols

Configuration protocol

Table 1-1 lists the rules and regulations of configuration protocol.

Table 1-1 Rules and Regulations for Configuration Protocol

Protocol	Rule
Data Type Transactions	The configuration protocol permits reading or writing of data type transactions such as PV, SP, or Output, as well as configuration type transactions such as Tuning, Algorithm selections, etc.
Read	Read transactions can be performed in either UDC state: Monitor or Slave.
Write	Write transactions can only be performed in the Slave mode.
Busy	Following any Write message, a Busy indication is returned.
Ready	A Ready transaction is required as the next message request to determine if the information received was correct.
Transaction Limits	In a Write transaction, only single items are permitted to be written, however, for Read transactions, single or multi-item parameters may be requested.

Loopback

Loopback protocol is also provided for link tests. With this message exchange you can test the Communications link between your computer and the controllers on the link. The host computer sends a series of ASCII characters to the desired device, and the device returns the characters it received to the host computer.

Checksum

There is an optional transaction called "Checksum" which is used to increase security on the RS422/485 link. Used with any message exchange, it enables both your computer and controller to detect messages that have been interrupted by line noise.

Controller Address

Each controller will have its own specific address. If you have a 2 loop controller, there will be a specific address for each loop.

Keyboard Configuration

Address, Baud Rate, and Parity are keyboard selectable as well as Shed Time, Shed Mode, and Output Level.

1.3 Field Upgrade

Adding the communications option

RS422/485 Communications Option can be added in the field by installing the proper RS422/485 Printed Wiring Board Assembly.

Table 1-2 lists the part numbers required to add the RS422/485 Communication option Printed Wiring Board to the UDC controllers.

Table 1-2 Upgrade PWB Part Numbers

Model	Upgrade PWB Part Numbers
UDC 2300	Part Number 51309831-501
UDC 3000	Part Number 30756693-501
UDC 3300	Part Number 30756693-501 or Part Number 30756687-502 (Aux Out/RS-485)
UDC 5000	Part Number 30755865-502
UDC 6000	Part Number 30755865-501
UDC 6300	Part Number 30755865-504

ATTENTION

Early version UDC 5000 with 28-pin PROM cannot be upgraded to RS422/485 unless the PROM socket has 32-pin receptacles.

Section 2 – Installation

2.1 Introduction

General

The Installation section (Section 2) of the UDC Product Manual contains information and drawings required to mount and wire the controller. Refer to the Controller Product Manual for appropriate information regarding the basic installation requirements.

Electrical noise protection

When installing and wiring the controller, follow the practices that conform to all local codes and ordinances. In addition, be aware of the precautions you should take to avoid electrical noise.

Electrical noise is unwanted electrical signals that provide undesirable effects. Digital equipment is especially sensitive to the effects of electrical noise. The controller has built-in circuits to reduce the effects of this noise.

For information concerning further reduction of electrical noise, refer to "How to Apply Digital Instrumentation in Severe Electrical Noise Environments" – in the UDC Controller Product Manual or Honeywell Document 51-52-05-01.

What's in this section

This section contains the following information:

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2.2 RS232 to RS485 Converters

Overview

Up to 16 devices on an RS485 link can be connected to your computer by installing a Black Box or Westermo RS232 to RS485 converter between the RS232 port on your computer and the devices on the RS485 link. These devices include:

- UDC2300, UDC3000, UDC 5000, UDC3300, UDC6000, or UDC6300 Controllers with an RS485 Communications Option

Converters

Table 2-1 lists the specific information needed to procure either of these converters.

Table 2-1 Converters

Arrangement	Description
Black Box Converter	Using the RS232 port and a Black Box RS232 to RS485 converter installed between the RS232 port and the first device on the link. This converter is available from . . . Black Box Corp Pittsburgh PA.. *Model* IC109A - Stand alone RS232 to RS485/422 converter with opto-isolation
Westermo Converter (Europe)	Using the RS232 port and a Westermo RS232 to RS485 converter installed between the RS232 port and the first device on the link. The Westermo converter can be ordered from a Honeywell sales office, Part Number 46210088-001. A 2 meter shielded cable with Female/Male DB9/DB25 connectors for use between the PC communication port and the Westermo box is also available, Part Number 46210061-002

2.3 Using a Black Box Converter

Wiring the Black Box converter and the link

Figure 2-1 shows the wiring diagram and terminal connections for wiring the RS232 to RS485 Black Box converter.

Follow the procedure in Table 2-2 to wire the Black Box converter.

Table 2-3 shows the terminal designation for the devices on the link.

Table 2-2 Black Box Converter Wiring Connections Procedure

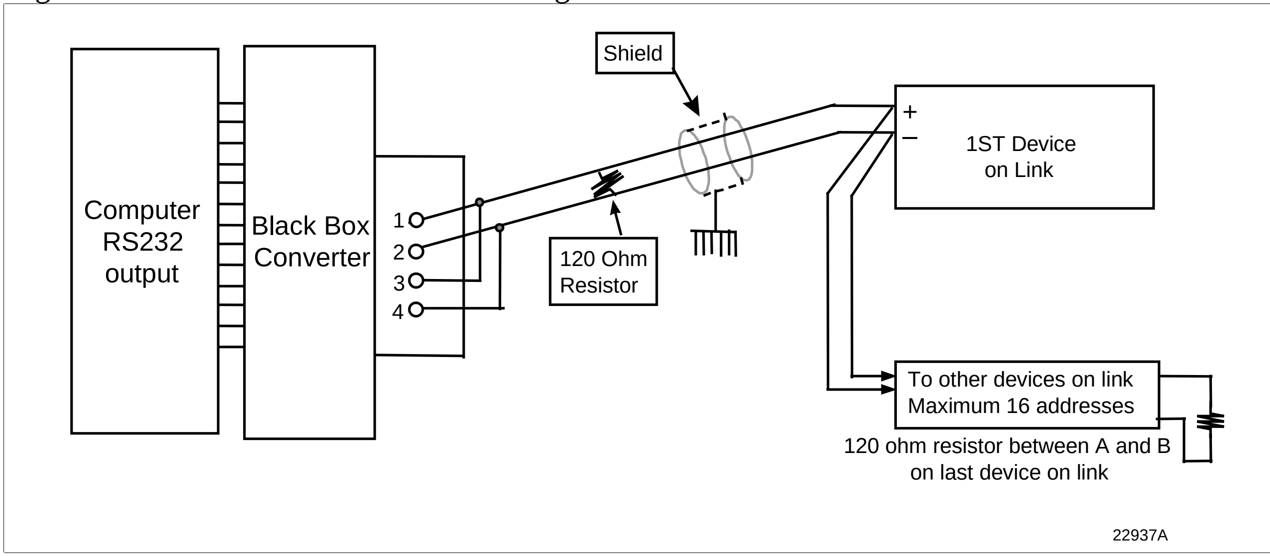
Step	Action
1	Install an appropriate Serial Communication Connector between the Computer serial port and the RS232 input connector of the Black Box converter. ***See the Black Box data sheet for the required interfacing signals.***
2	Connect one wire to terminal 2 (–).
3	Connect other wire to terminal 1 (+).
4	Connect a 120 ohm resistor across 1 and 2.
5	Set the jumpers on the Black Box converter Printed Circuit Board as follows: **JUMPER** — **SETTING** XW1A — DCE W8 — B-C (2-wire) W15 — B-C (Data Enabled) W5 — A-B (RTS/CTS delay - normal) W9 — C (0 msec) W17 — C (2 msec) W16 — B (0.1 msec) S1 — OUT (Normal) S2 — ON (RS485 Receiver Terminated) S3 — ON (Line Bias On)
6	Create a chain of up to 16 devices by connecting them with shielded twisted pair wiring (Belden 9271 Twinax or equivalent) to a maximum total length of 4000 feet(1250 meters). *(See Section 12—Cable Specifications.)* **REFER TO TABLE 2-3 FOR TERMINAL DESIGNATIONS OF THE DEVICES ON THE LINK**

2.3 Using a Black Box Converter, Continued

Black Box wiring connections

Figure 2-1 shows the wiring for the Black Box converter and the devices on the link.

Figure 2-1 Black Box Converter Wiring Connections



Link devices terminal connections

Table 2-3 lists the terminal connections between the Black Box converter and the devices on the communication link.

Table 2-3 Terminal Connections for Black Box Converters

BLACK BOX	UDC3000 UDC3300	UDC6000 UDC6300	UDC5000	UDC2300
2	15	23	11	14
1	14	22	12	13

2.4 Using a Westermo Converter

Wiring the Westermo converter and the link

Figure 2-2 shows the recommended switch setting for the WESTERMO converter.

Figure 2-3 shows the wiring diagram and terminal connections for wiring the RS485 Westermo converter.

Follow the procedure in Table 2-4 to configure and wire the Westermo converter.

Table 2-5 shows the terminal designation for the devices on the link.

Table 2-4 Westermo Converter Configuration and Wiring Procedure

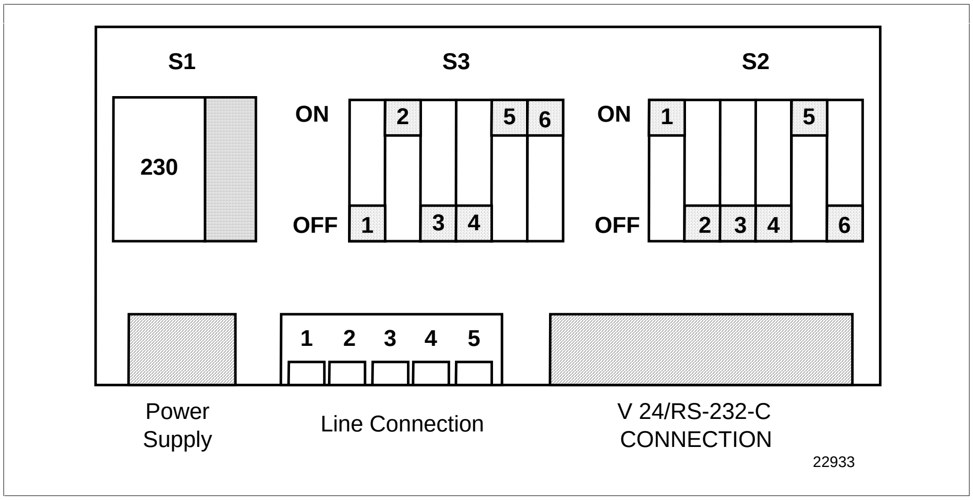
Step	Action
1	Install an appropriate Serial Communication Connector between the Computer serial port and the RS232 input connector of the Westermo converter. See the Westermo data sheet for the required interfacing signals.
2	Configure the switch settings on the Westermo converter as shown in Figure 2-6.
3	Connect the shield to terminal 5. See Figure 2-3.
4	Connect one wire to terminal 3 (–).
5	Connect other wire to terminal 4 (+).
6	Connect a 120 ohm resistor across terminals 3 and 4.
7	Create a chain of up to 16 Devices by connecting them with shielded twisted pair wiring (Belden 9271 Twinax or equivalent) to a maximum total length of 4000 feet(1250 meters). (See Section 13—Cable Specifications.) **REFER TO TABLE 2-5 FOR TERMINAL DESIGNATIONS OF THE DEVICES ON THE LINK**

2.4 Using a Westermo Converter, Continued

Configuring the WESTERMO Converter

Figure 2-2 shows the recommended switch settings for the WESTERMO converter.

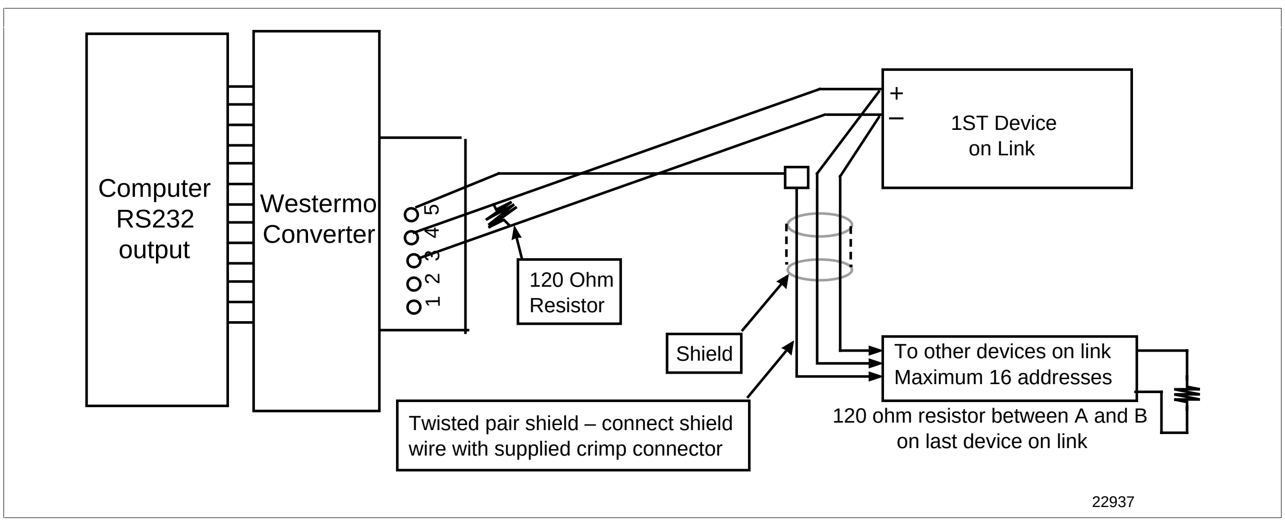
Figure 2-2 Recommended Switch Settings for Westermo Converter



Westermo wiring connections

Figure 2-3 shows the wiring for the Westermo converter and the devices on the link.

Figure 2-3 Westermo Converter Wiring Connections



Link devices terminal connections

Table 2-5 shows the terminal connections between the Westermo converter and the devices on the communication link.

Table 2-5 Terminal Connections for Westermo Converters;

Westermo Line Connections	UDC 3000 UDC 3300	UDC 5000	UDC 6000 UDC 6300	UDC 2300
3	15	11	23	14
4	14	12	22	13

2.5 Wiring Diagrams

Communications option connections

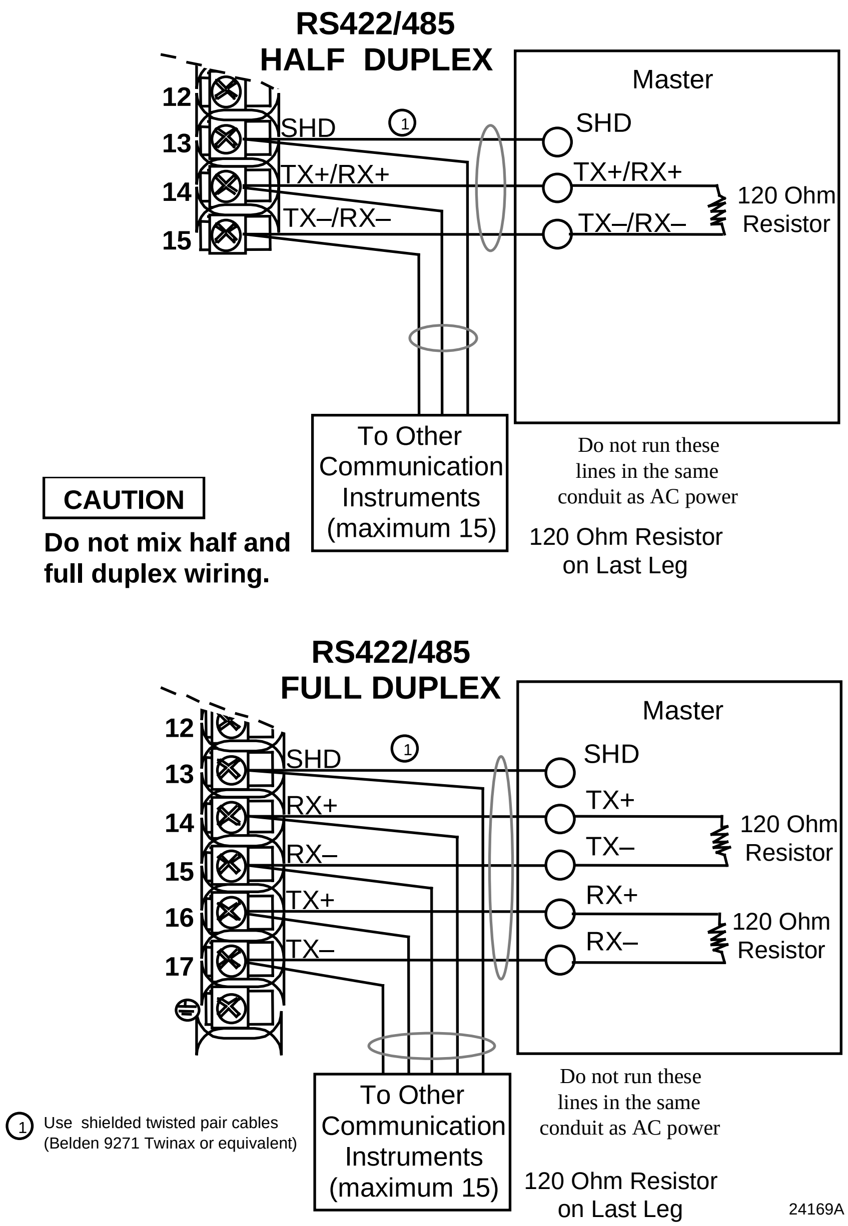
Figure 2-4: UDC3000 and UDC3300

Figure 2-5: UDC6000 and UDC6300

Figure 2-6: UDC5000

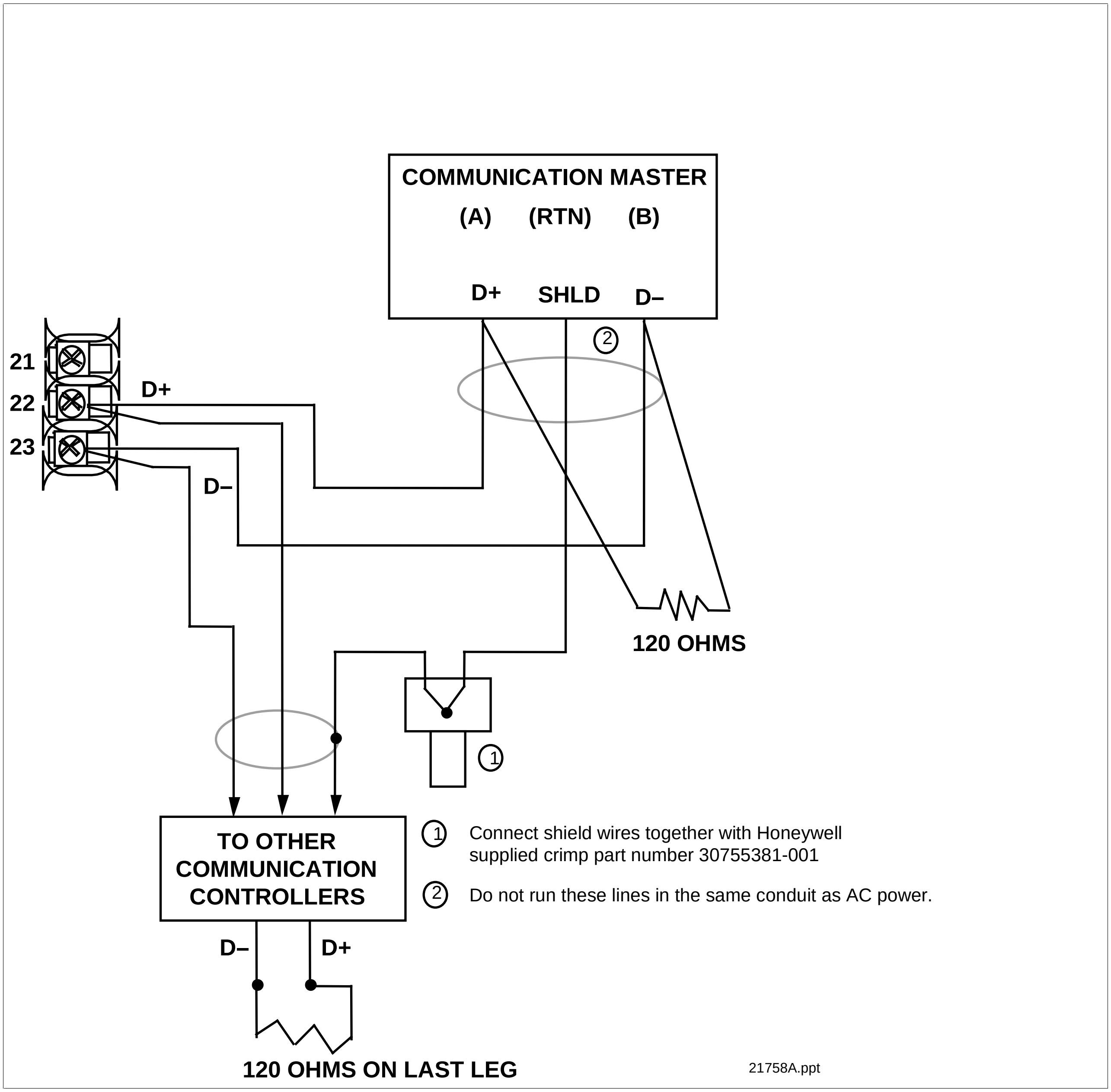
Figure 2-7: UDC 2300

Figure 2-4 UDC3000/3300 Connections



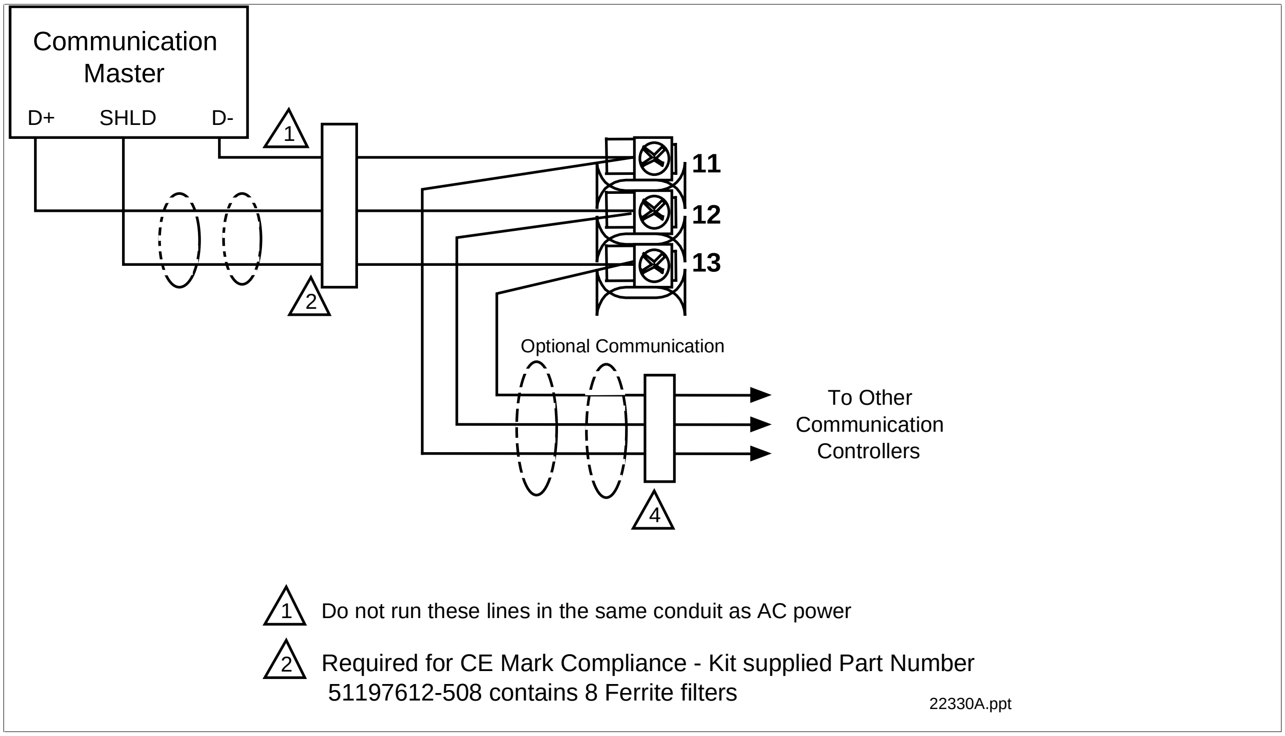
2.5 Wiring Diagrams, Continued

Figure 2-5 UDC6000/6300 Connections



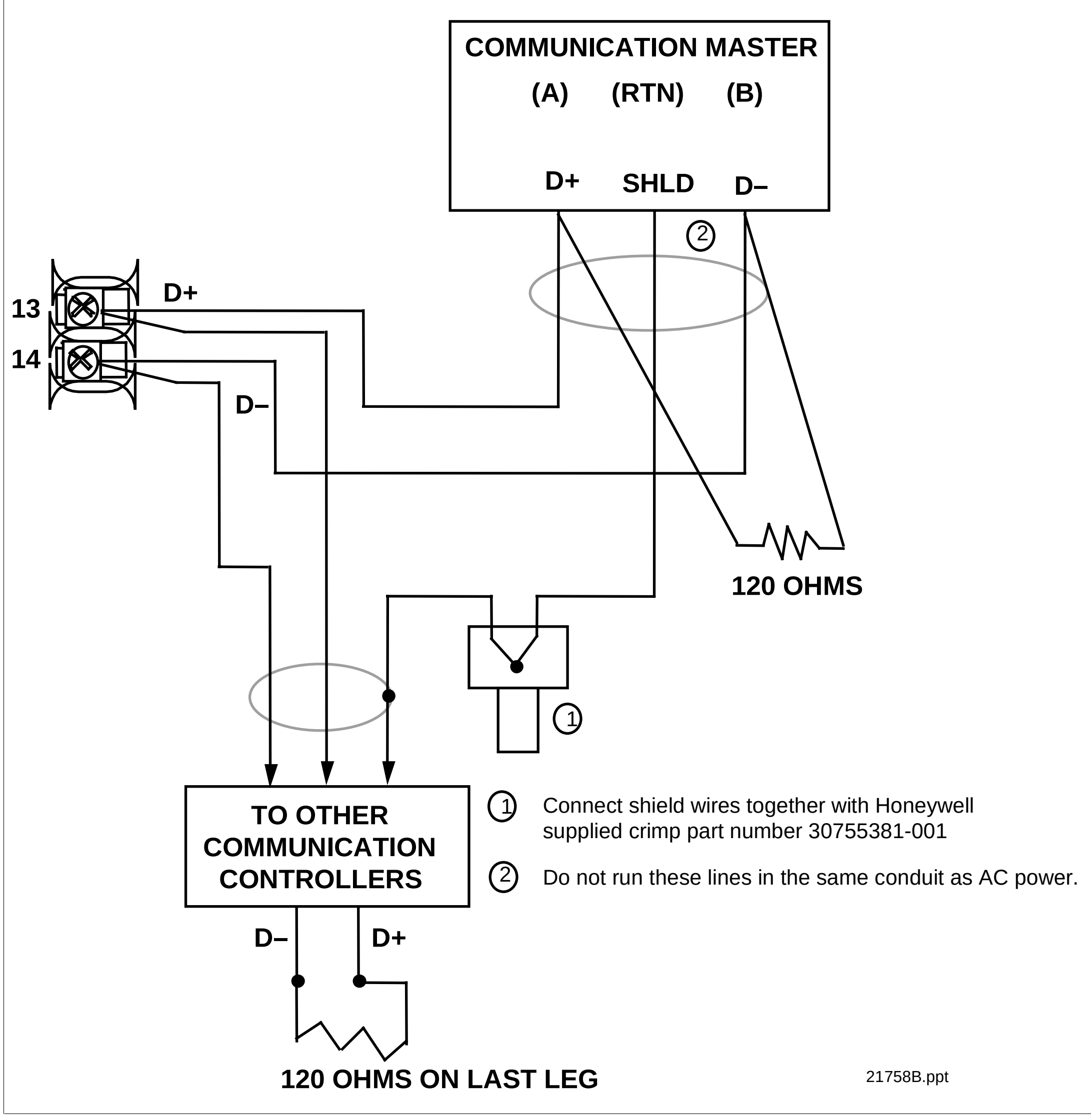
2.5 Wiring Diagrams, Continued

Figure 2-6 UDC5000 Connections (without Digital Input Option)



2.5 Wiring Diagrams, Continued

Figure 2-7 UDC2300 Connections



1 Connect shield wires together with Honeywell supplied crimp part number 30755381-001

2 Do not run these lines in the same conduit as AC power.

Section 3 – Establishing Communications and Testing

3.1 Preparing the Controller for Communications

Introduction

Each controller on the RS422/485 Communications link must be configured at the controller level for certain parameters before communications between the Host and the Controller can be accomplished.

Synchronization

Before you attempt to exchange messages between your computer and the controllers on the RS422/485 link, you must set up the controller for the same form of data transmission that the host computer's RS422/485 interface uses. This is called Synchronization.

You must match the controller Baud Rate and Parity with that of your computer.

Configurable parameters

Table 3-1 is a list of parameters that should be configured, their definitions, range of settings or selections, the procedure for entering the information into the controller is found in Table 3-2.

Table 3-1 Communications Parameters

Parameter	Definition
Communications State	Enables or disables the Communication function in the controller.
Communications Address	This is a number that is assigned to a controller (limited to 15 controllers) that will be used during communications. This number will be its address on the link (address 0-99). If your controller has two loops, each loop must have its own individual address (i.e. Loop 1, #6; Loop 2, #7).
Shed	Term used to describe a point in time when the controller, which had been working as a slave, reverts to an independent, stand alone controller using its own inputs, configuration data and control mode. Shed will happen when a controller is in slave, the shed is not zero, and the communication stops.
Shed Time	The number selected will represent how many sample periods will elapse before the controller sheds from computer control. Each period equals 1/3 second. 0 = No shed.
Duplex	Selection made for transmission type. Two-wire transmission is half duplex. Four-wire transmission is full duplex.
TX Delay	Configurable response delay timer allows you to force the UDC to delay its response for a time period of from 1 to 500 milliseconds. Compatible with the host system hardware/software.

Parameters, continued

Table 3-1 Communications Parameters, Continued

Parameter	Definition
Shed Controller Mode and Output Level	This selection determines the mode of local control whenever the controller is SHED from the slave mode. • Last Mode and Output – The controller will return to the same mode (Manual or Automatic) and Output level that it was in before shed. • Manual Mode, Last Output – The controller will return to manual mode and the last output level it was in before shed. • Manual Mode, Failsafe Output – The controller will return to manual mode at the output level selected at ID code 40 – Failsafe Output Value. • Shed to Automatic Mode – The controller will return to automatic mode.
Shed Setpoint Recall	This selection determines what setpoint will be used if the controller is shed from the communications link. • TO LSP – The controller will use the last local setpoint stored. • TO CSP – The controller will store the last computer setpoint and use it at the Local Setpoint (LSP1, LSP2, or LSP3, whichever is in use).
Parity	Transmitting each ASCII character requires 8 bits: • 7 bits for the character code • 1 bit (the eighth) for Parity, which may represent either ODD or EVEN parity. Thus, the controller can accommodate your computer's choice of parity (odd or even) and perform parity checks on your computer's data transmission. The controller will return STATUS CODE 04 if it detects incorrect parity.
Baud Rate	This is the transmission speed in bits per second. In order to communicate properly, the controller must be set to the same Baud Rate as your computer. The Baud Rate selections are: 300, 600, 1200, 2400, 4800, 9600, or 19,200.
Communication Units	This selection determines how the controller values are expressed during communications: Percent of span or Engineering units.
Communications Setpoint Ratio	Ratio value for computer setpoint. The range is from -20.00 to +20.00.
Communications Setpoint Bias	Bias value for computer setpoint. The range is from -999 to 9999.

Procedure

The procedure in Table 3-2 tells you what keys to press on the controller keyboard, the upper and lower display indications, and the range of settings available to you.

Not all prompts may be available for your particular controller.

Use ▲▼ to make adjustments to the range of setting or selection.

Table 3-2 Controller Procedure for Communication Parameters

Step	Press	Lower Display	Upper Display Range of Setting or Selection	Parameter Description
1	SET UP	COMMUN		
2	FUNC	successive presses of the [FUNCTION] key will sequentially display all the functions and their values or selections.		
		COM STATE	DISABLE DMCS RS422	Communication State
		ADDRESS	01 to 99* * Address 00 disconnects it from the link	Communication Address (Loop 1)
		ADDRESS 2	01 to 99* (must be different from Loop 1) * Address 00 disconnects it from the link	Communication Address (Loop 2)
		SHED TIME	0 to 255 Sample periods 0 = No Shed will occur	Shed Time
		PARITY	ODD EVEN	Parity
		BAUD RATE	300 4800 600 9600 1200 19200 2400	Baud Rate (bits/second)
		SHED MODE	LAST FAILSAFE TO MAN TO AUTO	Controller Shed Mode and Output Level
		SHED SP	TO LSP TO CSP	Shed Setpoint Recall
		DUPLEX	HALF FULL	Duplex Transmission Type
		TX DELAY	1 to 500 milliseconds	Transmission Delay Timer

Procedure, continued

Table 3-2 Controller Procedure for Communication Parameters, Continued

Step	Press	Lower Display	Upper Display Range of Setting or Selection	Parameter Description
		UNITS	PERCENT ENG UNITS	Communication Units
		CSP RATIO	–20.00 to +20.00	Commun. SP Ratio (Loop 1)
		CSP BIAS	–999 to +9999	Commun. SP Bias (Loop 1)
		CSP2 RATIO	–20.00 to +20.00	Commun. SP Ratio (Loop 2)
		CSP2 BIAS	–20.00 to +20.00	Commun. SP Bias (Loop 2)
3	**LOWR DISP**	TO RETURN TO NORMAL CONTROL		

3.2 Programming Your Computer

Introduction

To program your computer for communication with the various controllers on the link, you write input and output statements to send and receive ASCII character strings to and from the controller. (See ASCII and Hexadecimal conversion table in Section 12.) You treat the controller like any I/O device.

Request

To send a request, you program your computer to output the appropriate character string to the controller.

Response

To get a response, you program your computer to input the expected character string from the controller.

Example

The following programming statements show how you would output a request message and read the resulting response. This example is written in Fortran and uses the following assignments:

- I/O Channel 5 for your computer's RS422/485 Transmit Data Line.
- I/O Channel 6 for your computer's RS422/485 Receive Data Line.
- I/O Channel 7 for your computer's printer or terminal.

Table 3-3 lists the programming statements for this example.

Table 3-3 Programming Statements

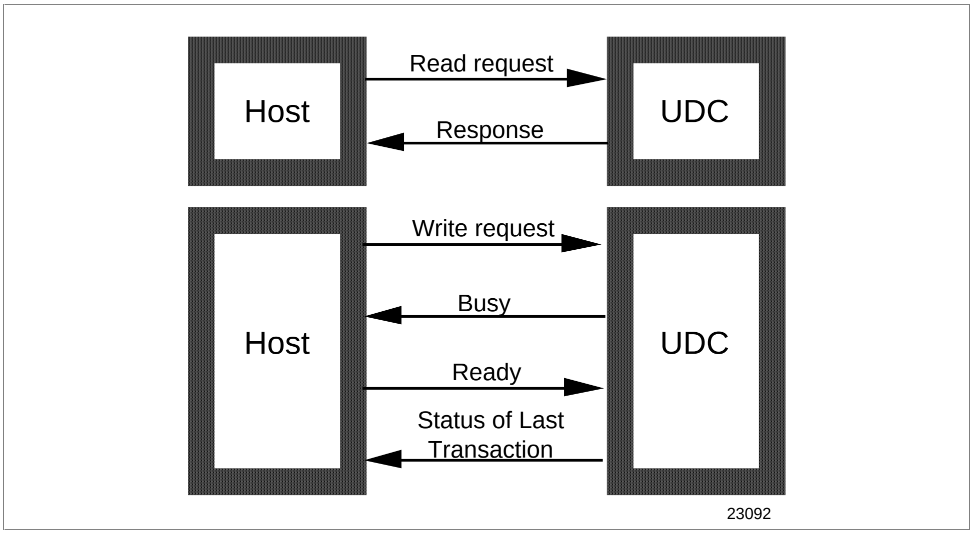
Step	Statement	Action
Sending the Request	10 Write (5,20) 20 Format (“XXXXXXX”)	Writing the character string the character string XXXXXXX to I/O channel 5 which transmits the character string XXXXXXX to the controller.
Getting the Response	30 Read (6,40) Reply 40 Format (12)	Reading the character string at I/O Channel 6 which receives data from the controller into reply.
Displaying the Response	50 Write (7,60) Reply 60 Format (12)	Writing the contents of Reply to I/O Channel 7, a printer or terminal.

3.3 Message Exchange

What is a message exchange?

Your computer communicates with the UDC controllers using the RS422/485 link. Each communication takes place as a message exchange: Your computer sends a request message (ASCII characters), and then waits for the resulting response from the controller involved (ASCII characters). Figure 3-1 shows how this occurs.

Figure 3-1 Message Exchanges



Sending requests

Your computer is the host, it initiates a message exchange. The UDC controllers are respond-only devices.

When you send a Read request, the UDC responds with the data requested. If you write configuration or override data into a UDC, the UDC responds with a Busy message (0082xx). The host should send a Ready message at which time the UDC will respond with a status of the write transaction. Communication with a single UDC should not be faster than 1/3 second.

Until the UDC completes processing of the data, any subsequent valid message received is answered with a busy response.

3.4 Request Messages

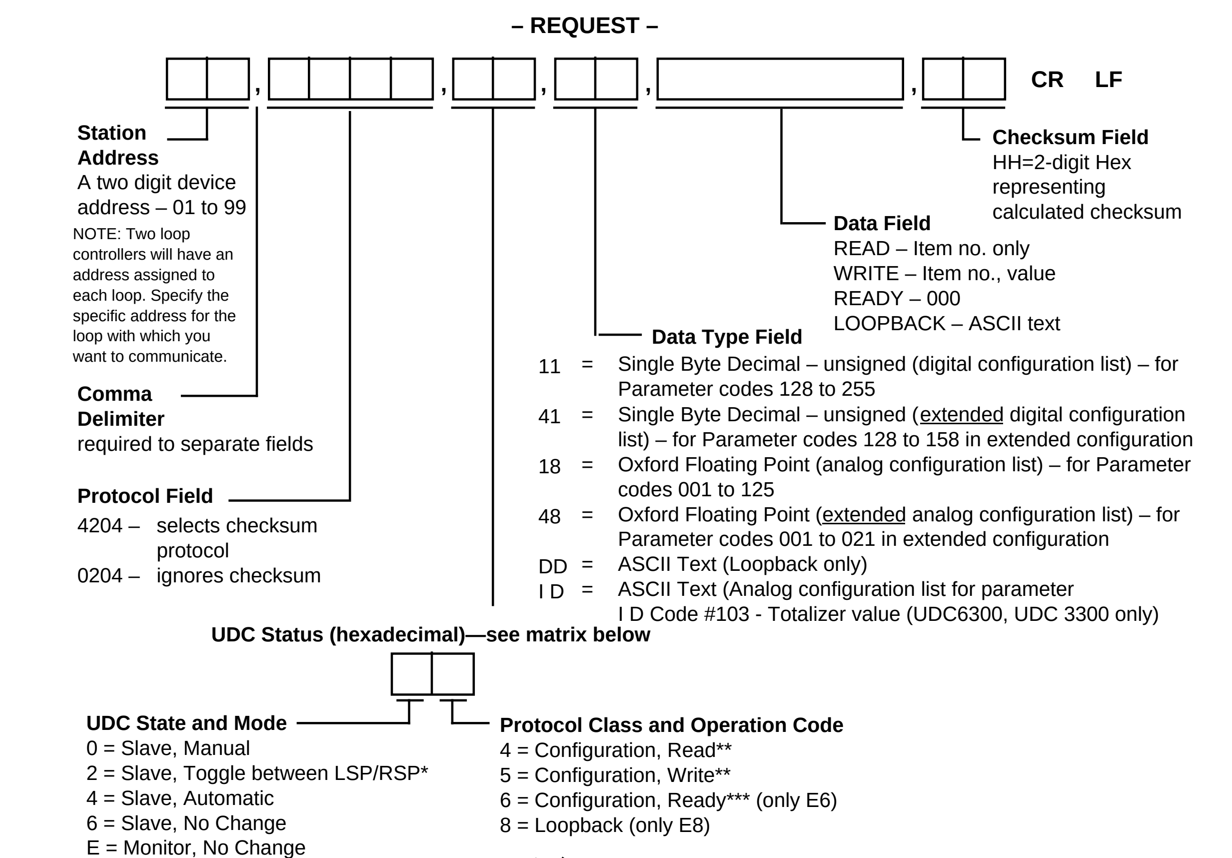
What is a request message?

Your computer queries a controller and indicates the communication function, or operation, that the controller should perform by sending a request message. Request messages are composed of standard fields, separated by commas. Each field contains a certain kind of information, which you must enter in order to have a valid request message.

Request message fields

Figure 3-2 shows the request message fields and the selections that may be entered into each field. Table 3-4 lists these selections and their definitions.

Figure 3-2 Request Message Fields



Mode \ Protocol	CONF READ	CONF WRITE	CONF READY	LOOP BACK
SLAVE MAN	00000100 04	00000101 05	00000110 06	X
SLAVE TOGGLE	00100100 24	00100101 25	00100110 26	X
SLAVE AUTO	01000100 44	01000101 45	01000110 46	X
SLAVE NO CHNG	01100100 64	01100101 65	01100110 66	68
MON NO CHNG	11100100 E4	X	11100110 E6	E8

* Change from RSP to LSP or LSP to RSP
** READ only in Monitor Mode
READ and WRITE in Control Mode
*** Used after WRITE to verify data transaction

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Request message field selections

Table 3-4 is a list of selections for the request message fields and their definitions.

Table 3-4 Request Message Fields Definitions

Selection	Definition
Station Address	A two digit device address – from 01 to 99 – that identifies the specific controller you are addressing. You must assign a unique station address to each controller on the link. For a 2 Loop controller, two distinct addresses must be configured. One address is used to designate Loop 1; and one is used to designate Loop 2. Either address may be used for transactions which are loop independent. See "Preparing the Controller for Communications" in this manual. A UDC will not respond to address 0 since the address results in a disconnect.
Protocol Field	A four digit number that selects whether or not you are going to use a Checksum Protocol (for increased data security) with your message exchange. • 4204 selects Checksum Protocol – see “Checksum Protocol” • 0204 ignores Checksum Protocol Any sequence utilizing other than 4 or 0 in the first digit results in an error with an error message returned.
UDC State and Mode	A hexadecimal number that determines what state you want the UDC to be in (monitor or slave) and the mode of operation desired (manual or automatic). You can also change the controller setpoint from Local setpoint to Remote setpoint or vice-versa. **ATTENTION** Any change made in UDC State or Control mode will not be indicated in the response until the next transaction.
Protocol Class and Operation Code	A hexadecimal number that allows you to do a Loopback or do a READ, WRITE, or READY transaction.

Request message field selections, continued

Table 3-4 Request Message Fields Definitions, Continued

Selection	Definition
Data Type Field	A two digit number that specifies the format, or data type, of each of the parameters that can be accessed in the UDC controller. 11 = Single Byte Decimal (unsigned) – used with configuration protocol for <u>digital</u> parameter code numbers 128 through 255. 41 = Single Byte Decimal (unsigned) – used with configuration protocol of <u>extended digital</u> parameter code numbers. 18 = Floating Point Format – used with configuration protocol for <u>analog</u> parameters code numbers 001 through 125. 48 = Floating Point Format – used with configuration protocol for <u>extended analog</u> parameter code numbers. DD = ASCII Text – Used with loopback protocol only. I D = ASCII Text – Used with configuration protocol for Analog Parameters ID Code #103 | (UDC 6300, UDC 3300 only)
Data Field	The data in this field is determined by the type of request: • READ – three digit parameter code which identifies a particular parameter for which you want to know the value or selection. • WRITE – three digit parameter code, which identifies a particular parameter you want to change, a comma (,), and the value or selection you want to enter. • READY – three zero's (000) – used in conjunction with a write request. Sent after a write request to verify that the information transmitted was received. • LOOPBACK – ASCII Text
Checksum Field (**Optional)**	This field is a one byte hexadecimal value (two ASCII characters) representing the binary sum, ignoring carries, generated by adding the ASCII code for each character in the message exchange, up to but not including the checksum and the CR and LF characters. • No Characters = No Checksum • HH = two digit hexadecimal number representing the calculated checksum
Carriage Return/Line Feed	Terminates a message. The message will not be exchanged unless used in this order (CR LF).

3.5 Response Messages

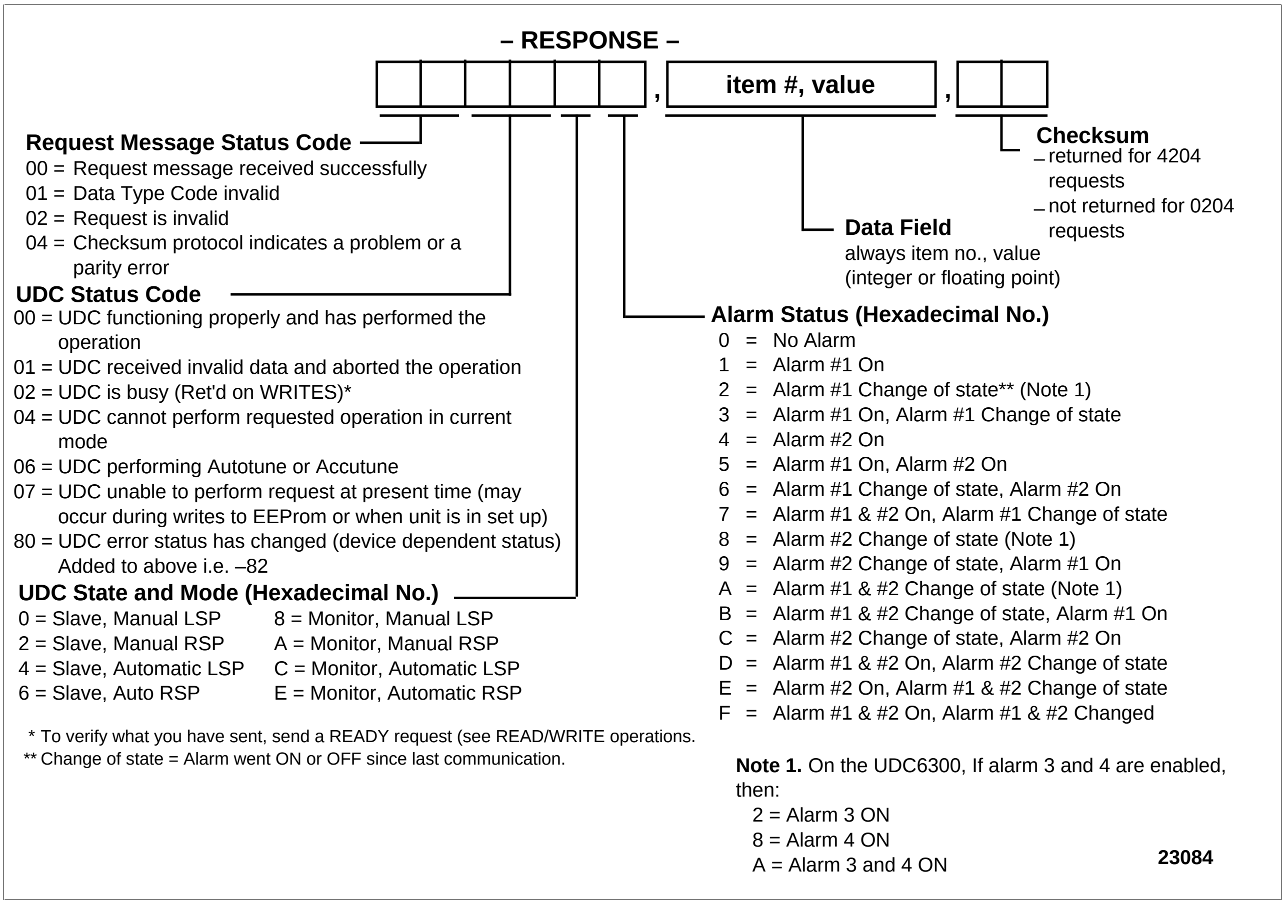
What is a response message?

The response message tells your computer the present status of the operation initiated by the request message. Response messages are composed of standard fields, separated by commas.

Response message fields

Each field contains a certain kind of information. Figure 3-3 indicates the response message fields and lists the information that could be returned in each field.

Figure 3-3 Response Message Fields Information



Response message field Information

Table 3-5 is a list of the information contained in the response message and their definitions.

Table 3-5 Response Message Fields Definitions

Type of Information	Definition
Request Message Status Code	A two digit code that indicates whether or not the present request message was successfully processed. For detailed explanations and recovery procedures for these codes, refer to ‘Request Message Status Codes” in this section.
UDC Status Code	A two digit code that indicates whether or not the UDC controller addressed is working correctly and has performed the requested operation. For detailed explanations and recovery procedures for these codes, refer to “UDC Status Codes” in this sections.
UDC State and Mode	A hexadecimal number that indicates whether the UDC controller's present state is "Slave" or "Monitor" and whether it is in Manual or Automatic mode using the Local setpoint or Remote setpoint. **ATTENTION** Any change made in UDC State or Control mode will not be indicated in the response until the next transaction.
Alarm Status	A hexadecimal number that indicates the status of Alarm #1 and #2 or both. It indicates when the Alarm is on or has changed state since last communication. The change of state indicator is a backup to the on/off state indicator. If an alarm goes from off to on then off in between consecutive communications, the on/off would not show it. The change of state flag would show that it had happened.
Data Field	This field always returns the identifying number for the parameter in the request message and the value for that parameter (either an integer or field floating decimal point).
Optional Checksum Field	This field is a one byte hexadecimal value (two ASCII characters) representing the binary sum, ignoring carries, generated by adding the ASCII code for each character of the response message, ignoring parity, up to but not including the checksum. It is returned for 4204 requests only. See “Checksum Protocol” in this section.

3.6 Status Codes

Request message status codes

The codes, listed in Table 3-6, indicate whether or not the request message was successfully processed. A suggested recovery procedure is listed for those that indicate an error.

Table 3-6 Request Message Status Codes

Request Message Status Code	Explanation	Suggested Recovery
00	The request message was successfully processed.	Not applicable.
01	Request message format invalid.	Check format of request message. Re-send message.
02	Request is invalid. The controller addressed does not support the requested operation.	Check parameter identifying code and value.
04	Checksum indicated in the request message differs from the checksum the UDC calculated. Or UDC has detected incorrect parity for character transmitted in request.	Check checksum calculations. Re-send message.

UDC status codes

All the controllers on the link return the UDC Status Codes listed in Table 3-7. A suggested recovery procedure is listed for those that indicate an error.

Table 3-7 UDC Status Codes

UDC Status Code	Explanation	Example	Suggested Recovery
00	UDC functioning properly and has received the message correctly.		Not applicable.
01	UDC has received invalid data from the computer and did not perform the requested operation.	Data error: Configuration item number incorrect, data out-of-range or incorrect.	Check the UDC's configuration and limits.
02	UDC is busy until the data received is processed.	Returned after each write when a controller is processing a change to configuration database.	1. Do ready request to see if information received. 2. Wait, then re-send request.
04	UDC cannot perform the requested operation in its current mode.	1. Request error, request illegal, request incorrect in present state (Calib). 2. Requested illegal mode change. 3. Data received in wrong format.	Check configuration with last request. Check data field and data type field.
06	The UDC is performing Autotune or Adaptive Tune.	Returned when the controller is performing the Autotune or Adaptive Tune function.	Wait or stop Autotune/ Adaptive Tune, then re-send message.
07	UDC unable to perform request at present time.	May occur during writes to EEPROM or when unit is in set up and data changing via the keyboard.	Wait, re-send request.
+80	UDC status change	Indicates one or more of the following have changed.*	Read 255 code. Clear by writing to 255 code.

*Emergency manual, Failsafe, Working calibration checksum error, Configuration checksum error, Factory calibration error, Hardware failure, Restart after shed, Configuration/calibration memory changed.

3.7 Checksum Protocol (for Data Security)

Introduction

The optional Checksum Protocol is used to increase security on the RS422/485 link. This protocol enables both your computer and your UDC to detect messages that the RS422/485 link has transmitted inaccurately. Thus, this protocol makes the RS422/485 communications link more reliable.

CAUTION

Failure to use checksum protocol could make the undetected error rate for the RS422/485 link unacceptable for your process control application.

Using checksum protocol

You can use the checksum protocol with any message exchange. The UDC uses the protocol to check the transmission of request messages. Your computer uses the protocol to check the transmission of response messages.

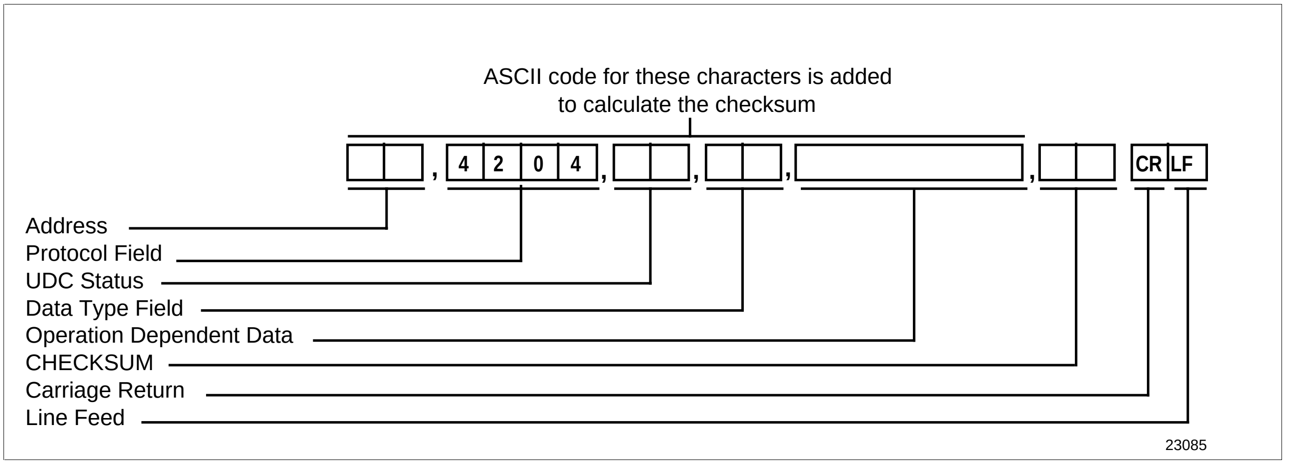
When a message exchange includes checksum protocol:

- Your UDC can tell, with high probability, if the ASCII code in the request message has changed during transmission from your computer.
- Your computer can tell, with high probability, if the ASCII code in the response message has changed during transmission from the UDC.

To use Checksum Protocol, you change the format of the request message as shown in Figure 3-4 as follows:

- You use a 4204 in the request format.
- You insert a 2-digit Hexadecimal number that represents the checksum that you have calculated from the ASCII codes in the request message as explained in “Calculating the Checksum”. See Section 12 for an ASCII Conversion table and a Hexadecimal Binary table.

Figure 3-4 Request Format for Checksum Protocol



3.7 Checksum Protocol (for Data Security), Continued

Calculating the Checksum

Table 3-8 lists the procedure for calculating the checksum. See Figure 3-5 for an example.

Table 3-8 Calculating the Checksum Procedure

Step	Action
1	Take the binary sum, ignoring carries generated by the most significant bits, of the ASCII code for each of the message's characters, ignoring parity, up to but not including the CHECKSUM field and the CR and LF characters. The final sum should be an 8-bit binary number. See Section 12 for ASCII Conversion table and Hexadecimal to Binary table.
2	Convert the four least significant bits of this sum to the equivalent hexadecimal digit. This becomes the least significant digit in the CHECKSUM field.
3	Convert the four most significant bits of this sum to the equivalent hexadecimal digit. This becomes the most significant digit in the checksum field.

3.7 Checksum Protocol (for Data Security), Continued

Checksum calculation example

Figure 3-5 shows an example of the result of a checksum calculation according to instructions in Table 3-8.

Figure 3-5 Example of Checksum Calculation

Example

03,4204,E4,18,001,7C CR LF

0	0011	0000
3	0011	0011
	0110	0011
,	0010	1100
	1000	1111
4	0011	0100
	1100	0011
2	0011	0010
	1111	0101
0	0011	0000
	0010	0101
4	0011	0100
	0101	1001
,	0010	1100
	1000	0101
E	0100	0101
	1100	1010
4	0011	0100
	1111	1110
,	0010	1100
	0010	1010
1	0011	0001
	0101	1011
8	0010	1000
	1001	0011
,	0010	1100
	1011	1111
0	0011	0000
	1110	1111
0	0011	0000
	0001	1111
1	0011	0001
	0101	0000
,	0010	1100
	0111	1100
Hex →	7	C (Checksum)

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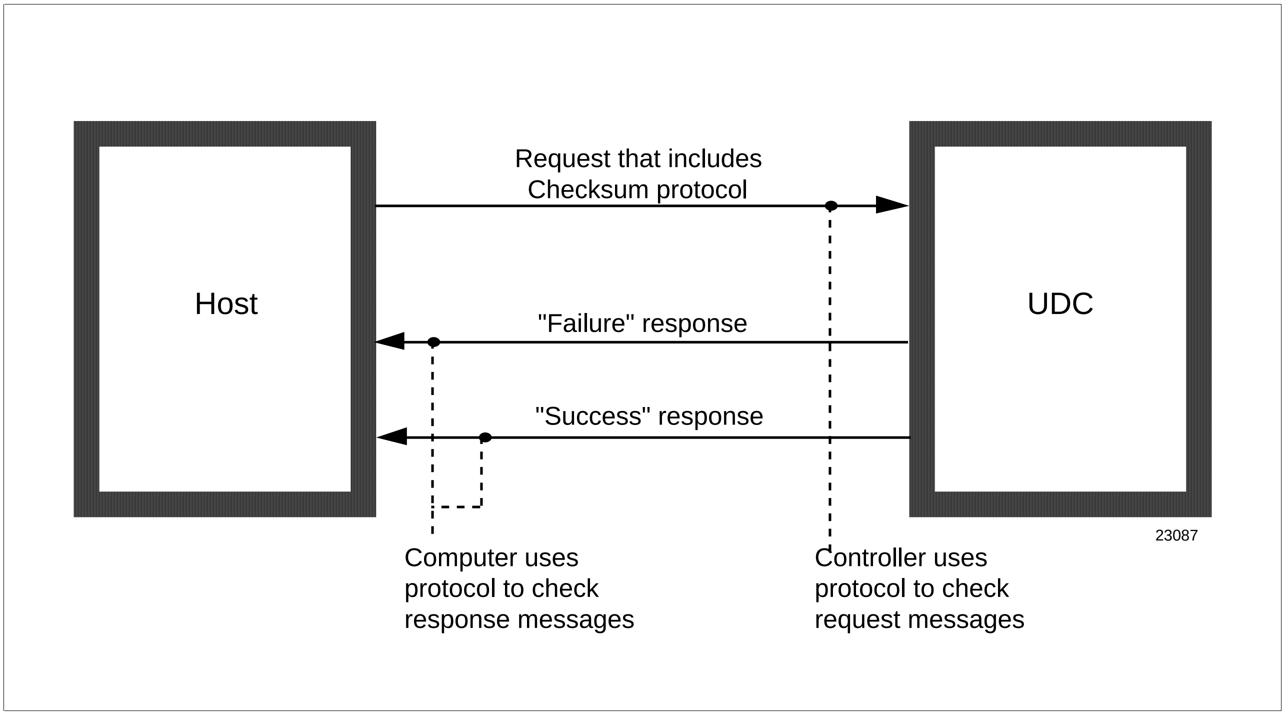
Success or failure

After receiving a request that uses checksum protocol, the UDC calculates the checksum of the characters received and compares this to the hexadecimal number stated in the checksum field. Depending on whether the checksums agree, the UDC returns either the “success” or “failure” response. Figure 3-6 indicates what happens when checksum protocol is used.

Figure 3-6 Using Checksum Protocol

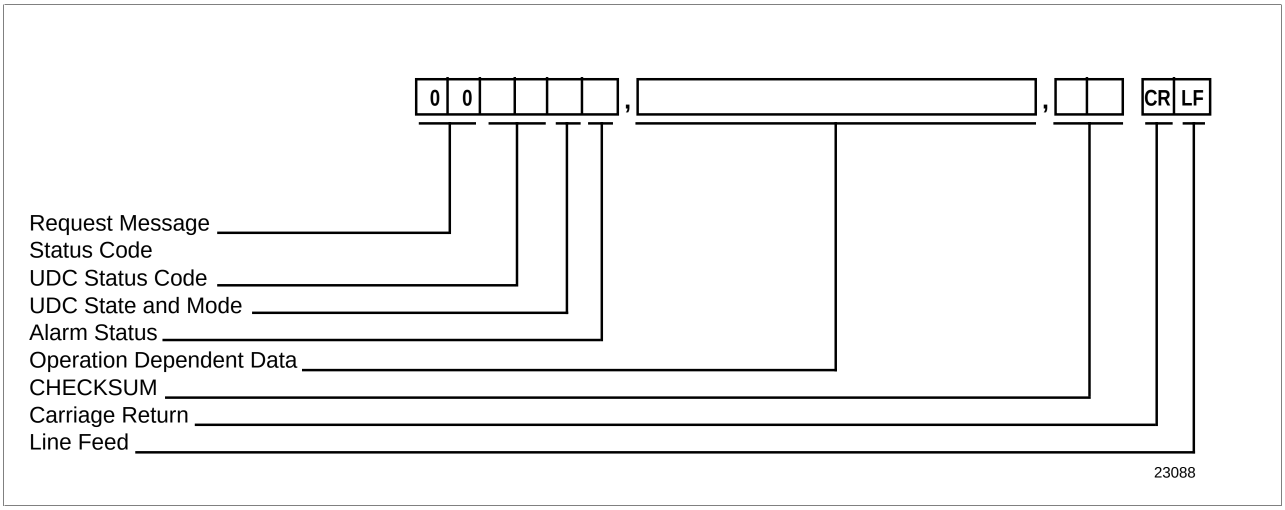


3.7 Checksum Protocol (for Data Security), Continued

Success response

If the checksums agree – and no other problems are encountered – the UDC returns the success response beginning with Request Message Status Code 00. Figure 3-7 indicates this response.

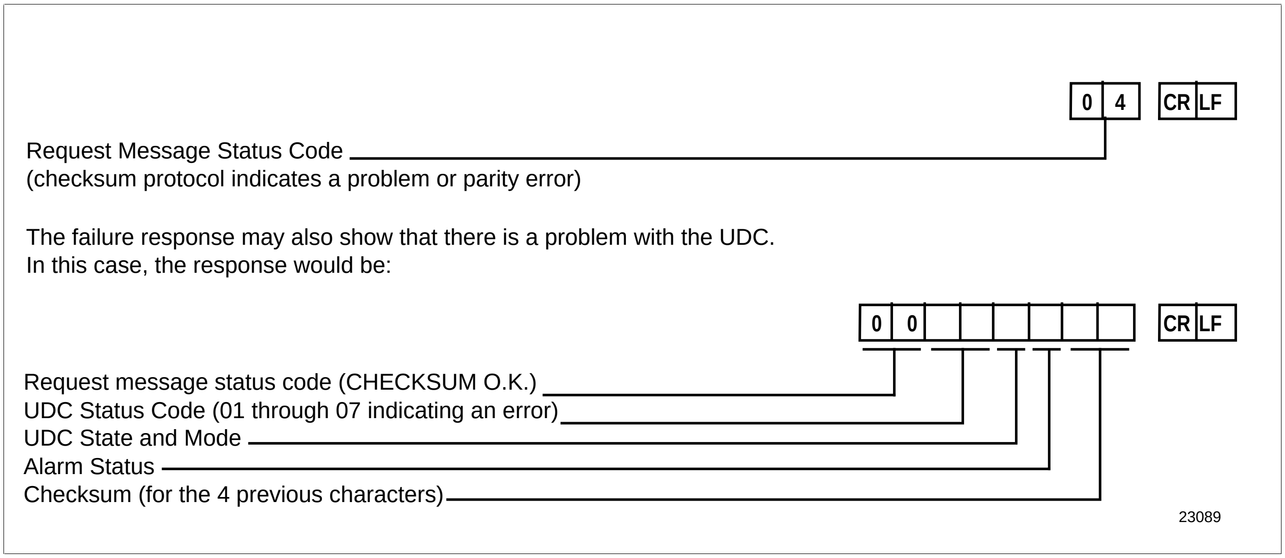
Figure 3-7 "Success Response" Message Fields



Failure response

If the checksums disagree, UDC ignores the request and returns the failure response Request Message Status Code 04. To recover, your computer repeats the operation. Figure 3-8 indicates this response.

Figure 3-8 “Failure Response” Message Fields



Checksum Calculation

After receiving a response that has checksum protocol, your computer should perform the checksum calculations on the characters received, and compare the results to the checksum in the response message. If the checksums disagree, your computer should repeat the operation.

ATTENTION

If there is a problem with the UDC itself, a UDC Status Code indicating an error will be returned.

3.8 Shed

What is Shed?

Shed happens when the controller, which has been working in "Slave," reverts to "Stand Alone" mode. Upon receiving a "Slave" message, the controller resets the "SHED TIMER." If this timer expires before the next valid message, the controller goes to stand alone operation. When the host reconnects with a valid message, the response will indicate as 8 at the third digit to indicate a restart after shed.

Thus SHED acts as a safeguard in case the computer or communications link fail. If something prevents the computer from communicating with the controller the device returns to the local control mode. The local operator is then able to regain control over the controller and operate it by the keyboard.

Shed time

Shed Time works like a timer. The number selected will represent how many sample periods there will be before the controller sheds from computer control. You can configure the shed time to be one that is between 1/3 second and approximately 83 seconds. 0 = No Shed.

Shed controller mode and output level

This determines the mode of local control whenever the controller is shed from the communication link.

Shed setpoint recall

This determines what setpoint will be used if the controller is shed from the communications link.

How to enter this information

Refer to “Preparing the Controller for Communications” in this section for these selections and procedure for entering the information into the controller.

3.9 Loopback (UDC 2300, UDC 3000, UDC 3300 Only)

Making sure all the UDC 2300/3000/3300 controllers are on-line

Once you have established communications between the UDC 2300/3000/3300 controller and your computer and understand the message exchange, it is a good idea to test communications to all the controllers on the RS422/485 link. The LOOPBACK operation is an easy way to do this. By including the appropriate address in the loopback operation, you can send a series of characters from your computer to any device on the link.

After receiving these characters, the device addressed "echoes" back the same characters. By comparing the characters sent to those returned, you can tell whether communications are working correctly.

Loopback message exchange

With this message exchange, you can test the communication link between your computer and any controller.

- In the request message, your computer sends a series of characters to the desired device.
- In the response message, the device returns the characters it received to your computer.

Request message

Table 3-9 is an example of the Loopback Request Message with or without the checksum.

Table 3-9 Example of Loopback Request Message

Protocol	Message Format
With Checksum	AA,4204,E8,DD,123456789ABC,CS CR LF (12 characters max.)
Without Checksum	AA,0204,E8,DD,123456789ABCDE, CR LF (14 characters max.) *Where:* AA = Status Address

Response message

Table 3-10 is an example of the Loopback Response Message with or without the checksum.

Table 3-10 Example of Loopback Response Message

Protocol	Message Format
With Checksum	OOSSMA,123456789ABC,CS CR LF
Without Checksum	OOSSMA,123456789ABCDE, CR LF *Where:* OO = UDC Type Error SS = UDC Status M = Mode (Hex – see "Message Exchange") A = Alarm Data (Hex – see "Message Exchange")

Programming example

The programming statements in Table 3-11 show how you could perform the LOOPBACK operation with the UDC controller that has station address 09– not using checksum.

If the LOOPBACK operation is successful, these statements would print OOOOMA,HELLO#09.

Where: M = Mode
A = Alarm Data

Table 3-11 Programming Example

	Programming Statement	Result
Request	10 Write (5,20) 20 Format ("09,0204,E8,DD,HELLO#09")	Sending the LOOPBACK request message that contains the eight characters HELLO#09 to the controller with station address 09.
Response	30 Read (6,40) Reply 40 Format (A15) 50 Write (7,60) Reply 60 Format (A15)	Receiving and printing the response message that contains the characters returned.

3.10 Recovering from Communications Failures

What is a lost message?

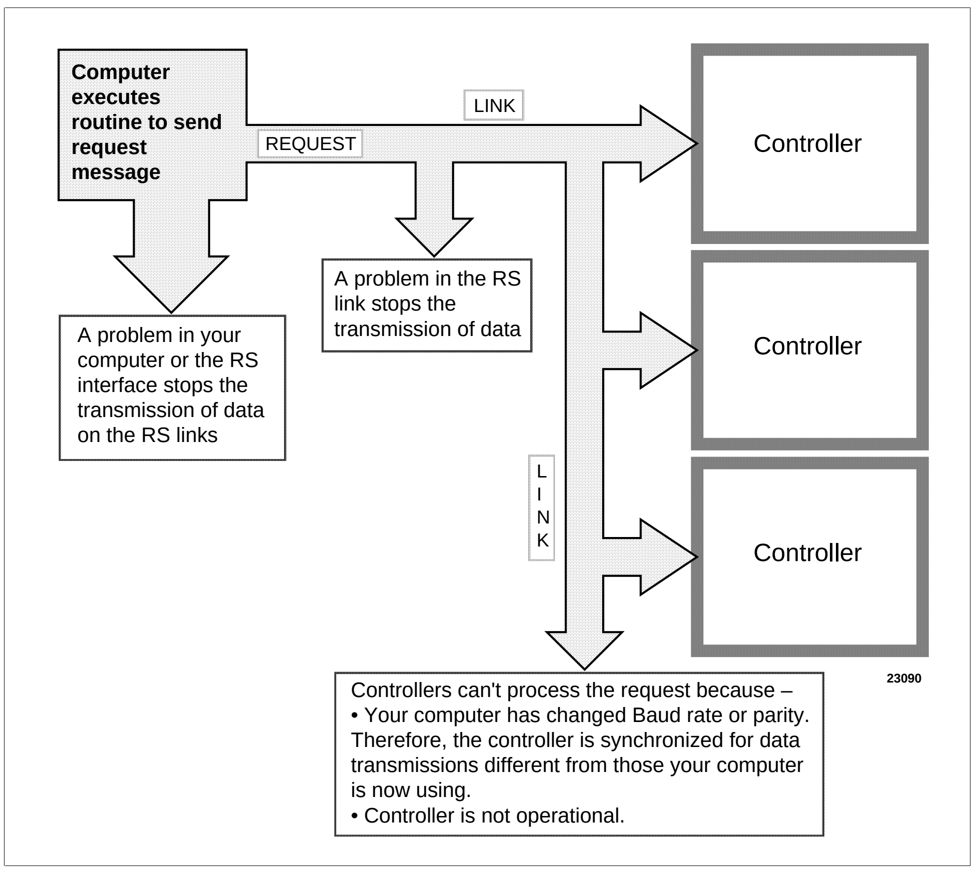
When your computer sends a request message but doesn't receive a response, a message (either the request or the response) has been lost on the link. As shown in Figure 3-9, problems in your computer, the link, or the controller could cause a message to get lost.

What happens to a lost message

Depending on how your programming handles messages, a lost message could hang up your programming forever. Suppose your programming uses a high-level language input command (in Fortran, READ) to retrieve response messages from the input device or buffer fed by the link. Upon executing this input command, your computer goes to the input device to retrieve the response message and waits there until the data arrives. If a message is lost, the message exchange is never completed. Thus, the input command is left waiting for a response message that will never arrive.

As you can see, you must design your programming to handle the possibility that the messages will get lost on the link. Make sure that your programming includes a timing routine that detects the lost message and aborts the pending input command.

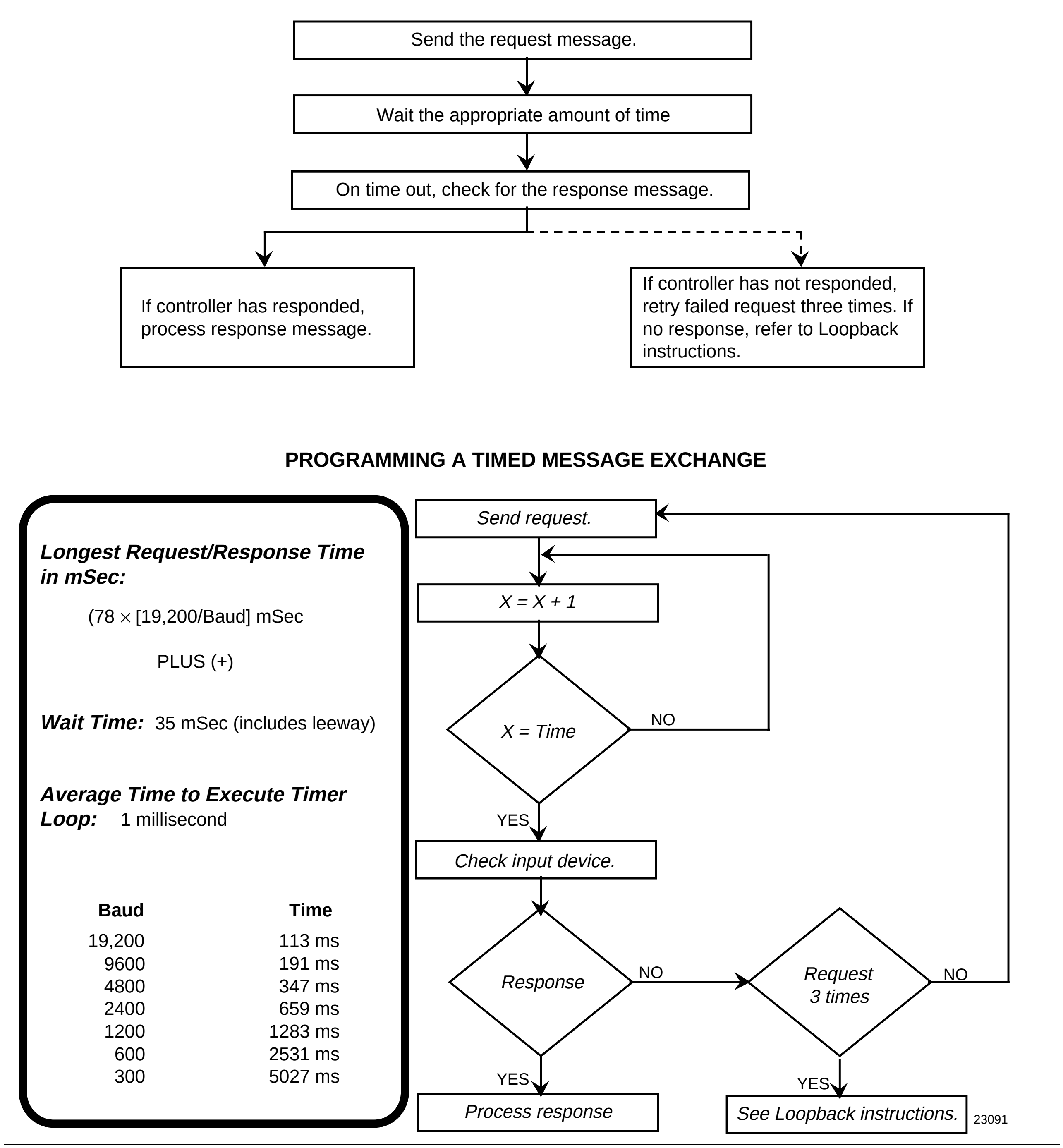
Figure 3-9 Lost Messages



Timing message exchanges to detect lost messages

The flowchart in Figure 3-10 shows how to time a message exchange so that you can tell if a message has been lost. (This is only an example, not the suggested method.) Like all timing routines, this one includes a wait and a read interrupt (in Basic, a PEEK) rather than a standard input command.

Figure 3-10 Timing a Message Exchange and Checking for a Response



Wait

The WAIT is the amount of time that your computer will wait for a response before assuming that a message has been lost. If the response doesn't appear in the allotted time, your computer should retry the request – up to three times. If your computer still hasn't gotten a response, your programming assumes that communications on the link have failed and calls the recovery or alarm routine.

Read Interrupt

The READ interrupt merely checks that input device or buffer for data, instead of waiting indefinitely until data arrives.

How long to wait

Before you can program a timing routine, you must determine how long to wait for a response. This wait must be at least as long as the response time for the longest message exchange when executed at your computer's baud rate. Also note that after the UDC has completed sending a response to your computer, it will require up to 1/3 second of additional processing time before it is ready to accept any new request message. If your computer sends a request to the UDC while it is still busy processing the previous request, it will respond with a BUSY status. Your computer can handle this situation by re-trying the request.

Timing routine

Once you have established the appropriate wait time, you can program the timing routine. To do so, you loop an instruction until the desired wait time has elapsed, as shown in the figure on the previous page.

This timing routine is the simplest one you could program. But, it is not efficient – your program waits the same amount of time for the shortest message as the longest. You devise a more efficient routine, such as a loop that checks for the response message each time "X" increments.

Section 4 – Read and Write Operations

4.1 Read Operations

Introduction

The Read operations (Data Retrieval) allow your computer to read data from any controller on the RS422/485 link. Data retrieval for each operation is accomplished through a message exchange between your computer and the device you are addressing.

You can request the data for only one identifying code at a time, but, the response may be a single variable or a three variable type depending on the code used.

Transaction states

Read transactions can be performed in either UDC state: Monitor or Slave.

ATTENTION Any change made in UDC state or control mode will not be indicated in the response until the next transaction.

Analog or digital

The parameters being read will be either Analog (codes 1 through 125) or Digital (Codes 128 through 255) value or selections so that all Read message formats must adhere to the standardization rules shown in the tables that follow.

4.2 Read Analog Parameters

Introduction

The Analog identifying Codes are codes 001 through 125. Each of these codes are read using the Request and Response formats shown in tables 4-1 and 4-2.

Request format

Table 4-1 lists the request format with or without checksum, for Analog I.D. Codes 001 through 125.

Where:

AA	=	Station Address (Each loop of a 2-loop controller has a unique address – see "Message Exchange")
X	=	UDC State and Mode (Hex – see "Message Exchange")
NNN	=	Identifying Code for Analog Parameter (001 to 125)
CS	=	Checksum Value (2 digit hex – see "Checksum")
CR	=	Carriage Return
LF	=	Line Feed

Table 4-1 Analog Parameter Request Format

Format Type	Format
With Checksum	AA, 4204, X4, 18*, NNN, 0, CS CR LF
Without Checksum	AA, 0204, X4, 18*, NNN, 0, CR LF

*Use 48 for extended analog configuration I.D. codes (001 to 043), UDC 3300, UDC 6000, UDC 6300 only.

Response format

Table 4-2 lists the response format, single or three variable with or without checksum, for Analog I.D. Codes 1 through 125.

Where:

OO	=	UDC Type Error (00 = No Error)
SS	=	UDC Status
M	=	Mode (Hex – see "Message Exchange")
A	=	Alarm Data (Hex – see "Message Exchange")
NNN	=	Identifying Code for Analog Parameter
DDD.D	=	Floating Point Value
CS	=	Checksum (two digit hex – see "Checksum")
CR	=	Carriage Return
LF	=	Line Feed

Table 4-2 Analog Parameter Response Format

Variable	Format Type	Format
Single	with checksum	OOSSMA, NNN, DDD.D, CS, CR LF (see note 1)
	without checksum	OOSSMA, NNN, DDD.D, CR LF (see note 1)
Three	with checksum	OOSSMA, NNN, DDD.D, DDDD, DDD.D, CS, CR LF (see note 1)
	without checksum	OOSSMA, NNN, DDD.D, DDD.D, DDDD.,CR LF (see note 1)

Note 1. Floating point values may look like this:

DDDD.	DDD.D	DD.DD	D.DDD
-DDD.D	-DDD.	-DD.DD	-D.DDD

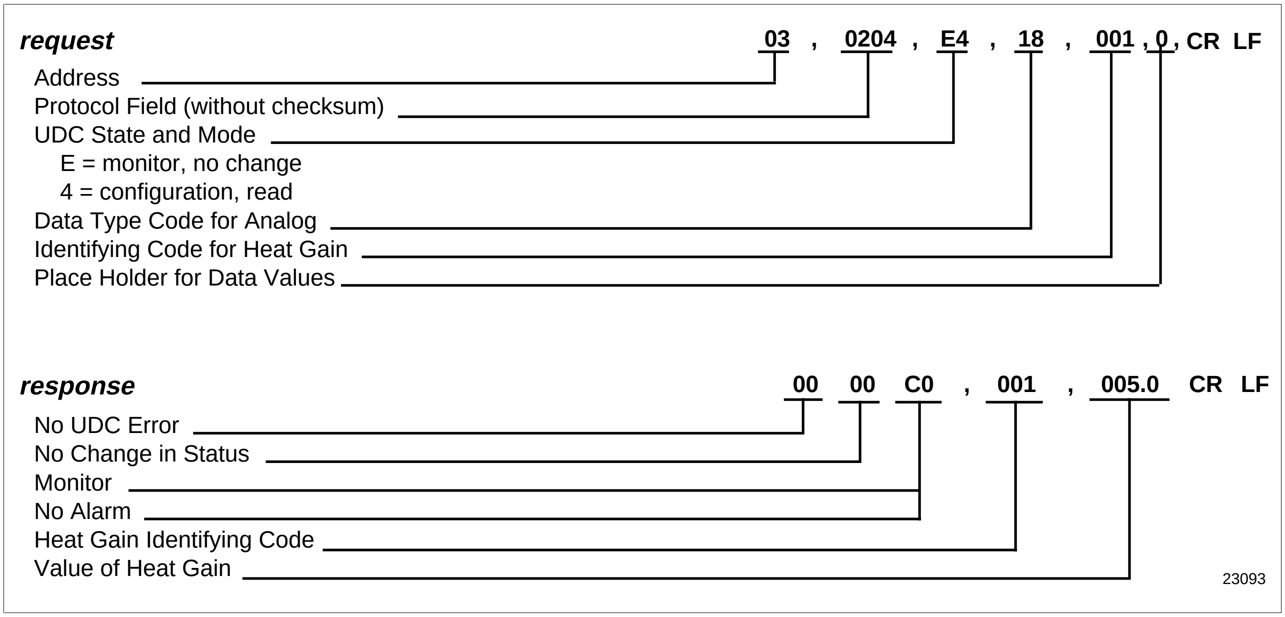
They must have four characters and one decimal point as shown, negative sign as an extra character.

4.2 Read Analog Parameters, Continued

Example

Figure 4-1 is an example of a Read Analog Parameter message exchange; specifically, Read the value of heat gain; Analog I.D. Code 001.

Figure 4-1 Read Analog Parameter Message Exchange



4.3 Read Digital Parameters

Introduction

The Digital identifying codes are Codes 128 through 255. Each of these codes are read using the Request and Response formats shown in Tables 4-3 and 4-4.

Request format

Table 4-3 lists the request format, with or without checksum, for digital I.D. Codes 128 through 255.

Where:

AA	=	Station Address (Each loop of a 2 loop controller has a unique address – see "Message Exchange")
X	=	UDC State and Mode (Hex – see "Message Exchange")
MMM	=	Identifying Code for Digital Parameter (128 to 255)
CS	=	Checksum Value (two digit hex – see "Checksum")
CR	=	Carriage Return
LF	=	Line Feed

Table 4-3 Digital Parameter Request Format

Format Type	Format
With Checksum	AA, 4204, X4, 11*, MMM, 0, CS, CR LF
Without Checksum	AA, 0204, X4, 11*, MMM, 0, CR LF

*Use 41 for extended digital configuration I.D. codes (128 to 158), UDC 3300, UDC 6000, UDC 6300 only.

4.3 Read Digital Parameters, Continued

Response format

Table 4-4 lists the response format, with or without checksum, for digital I.D. codes 128 through 255.

Where:

OO	=	UDC Type Error (00 = No Error)
SS	=	UDC Status
M	=	Mode (Hex – see "Message Exchange")
A	=	Alarm Data (Hex – see "Message Exchange")
MMM	=	Identifying Code for Digital Parameter
DDD	=	Digital Value (always 3 characters)
CS	=	Checksum (2 digit hex – see "Checksum")
CR	=	Carriage Return
LF	=	Line Feed

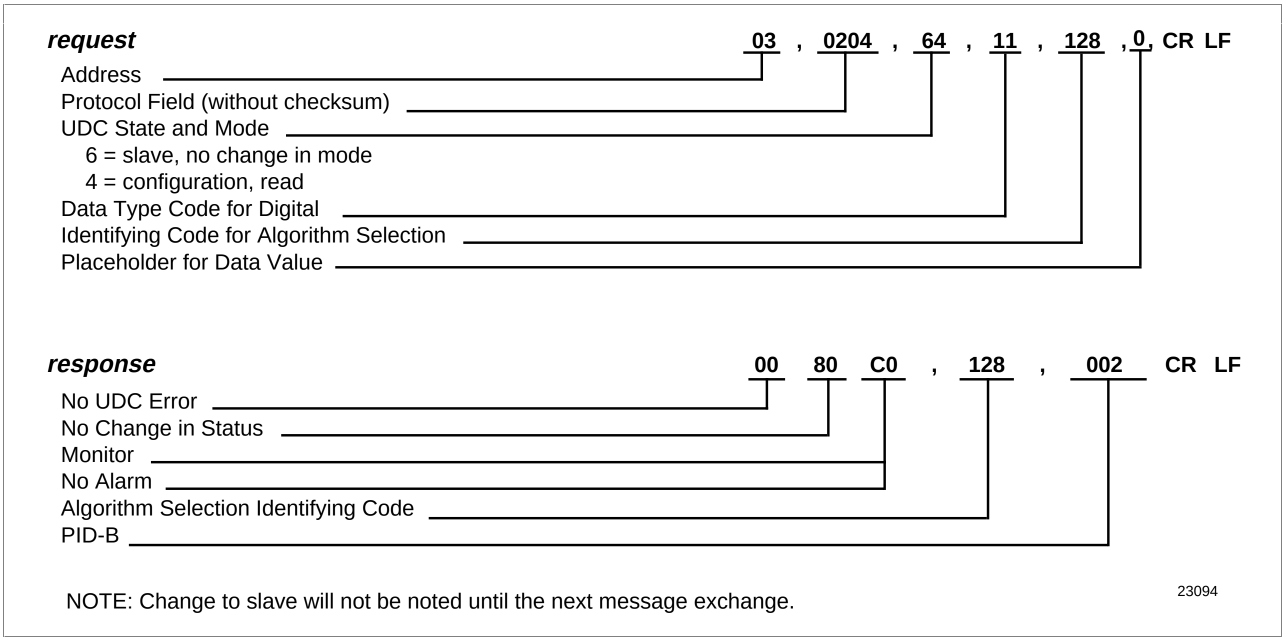
Table 4-4 Digital Parameter Response Format

Format Type	Format
With Checksum	OOSSMA, MMM, DDD, CS CR LF
Without Checksum	OOSSMA, MMM, DDD, CR LF

Example

Figure 4-2 is an example of a Read Digital Parameter message exchange; specifically, read the algorithm selection: digital I.D. Code 128 and maintain or change the UDC state to slave.

Figure 4-2 Read Digital Parameter Message Exchange



4.4 Write Operations

Introduction

The Write operations allow your computer to write data type transactions such as Overriding the PV, Setpoint, inputs as well as writing configuration data such as Tuning Parameters, Algorithm Selection, Setpoint Ramp Information, etc. to the controller.

Transaction state

Write transactions can only be performed in the Slave Mode.

Write message exchange

In a Write transaction, only single items are permitted to be written.

A Ready transaction is required to determine if the information was received.

Following any Write, a Busy indication is returned.

Table 4-5 lists the steps for the Write message exchange.

Table 4-5 Write Message Exchange Steps

Step	Action
1	Do a Write request to change a parameter (see Table 4- 6).
2	Receive a Busy response (see Table 4-7).
3	Send Ready request to see if the information has been processed (see Table 4-8).
4	Receive an “Is Ready” response (see Table 4-9).
5	Do a Read request to check the value (OPTIONAL).

CAUTION

The data stored in non-volatile memory is expected to be retained for 10 years. However, additional writes will degrade the retentivity of the non-volatile memory.

ATTENTION

Any change made in UDC State or Control Mode will not be indicated in the response until the next transaction.

4.5 Write Analog Parameters

Introduction

The analog identifying codes are codes 001 through 125. The Write request and response formats are shown in Tables 4-6, 4-7, 4-8, and 4-9.

Request format

Table 4-6 lists the write request format with or without checksum for Analog I.D. Codes 1 through 125.

Where:

AA	=	Station Address (Each loop of a 2 loop controller has a unique address – see "Message Exchange")
X	=	UDC State and Mode (Hex – see "Message Exchange")
NNN	=	Identifying Code for Analog Parameter (001 to 125)
DDD.D	=	Floating Point Value (see note 1)
CS	=	Checksum Value (two digit hex – see "Checksum")
CR	=	Carriage Return
LF	=	Line Feed

Table 4-6 Write Request Format for Analog I.D. Codes

Format Type	Format
With Checksum	AA, 4204, X5, 18*, NNN, DDD.D, CS CR LF (see note 1)
Without Checksum	AA 0204, X5, 18*, NNN, DDD.D, CR LF (see note 1)

*Use 48 for extended analog I.D. codes 001 through 043, UDC 3300, UDC 6000, or UDC 6300 only.

Note 1 Floating point values may look like this:

DDDD.	DDD.D	DD.DD	D.DDD
-DDD.D	-DDD.	-DD.DD	-D.DDD

They must have four characters and one decimal point as shown, negative sign as an extra characters.

"Busy" response

If the controller did not process the information, the controller will return a four digit status code indicating an error in the third and fourth digit. See "Status Codes."

Table 4-7 lists the busy response that can be received, with or without checksum, after a Write request that indicates a good write:

Where:

M	=	Mode (Hex - see "Message Exchange")
A	=	Alarm Data (Hex – see "Message Exchange")
CS	=	Checksum (two digit hex – see "Checksum")
CR	=	Carriage Return
LF	=	Line Feed

Table 4-7 "Busy" Response

Format Type	Format
With Checksum	0002MA, CS, CR LF
Without Checksum	0002MA, CR LF

"Ready" request

After receiving a "Busy" response, enter a "Ready" request. Table 4-8 lists the "Ready" request format, with or without checksum.

Table 4-8 Ready Requests

Format Type	Format
With Checksum	03, 4204, 66, 11, 0, CS CR LF
Without Checksum	03, 0204, 66, 11, 0, CR LF

"Is Ready" response

This is the response to a Ready request. Table 4-9 lists the "Is Ready" response formats, with or without checksum.

Where:

SS	=	UDC Status
M	=	Mode (Hex - see "Message Exchange")
A	=	Alarm Data (Hex – see "Message Exchange")
CS	=	Checksum (two digit hex – see "Checksum")
CR	=	Carriage Return
LF	=	Line Feed

Table 4-9 "Is Ready" Response

Format Type	Format
With Checksum	00SSMA, CS, CR LF
Without Checksum	00SSMA, CR LF

Check write transaction

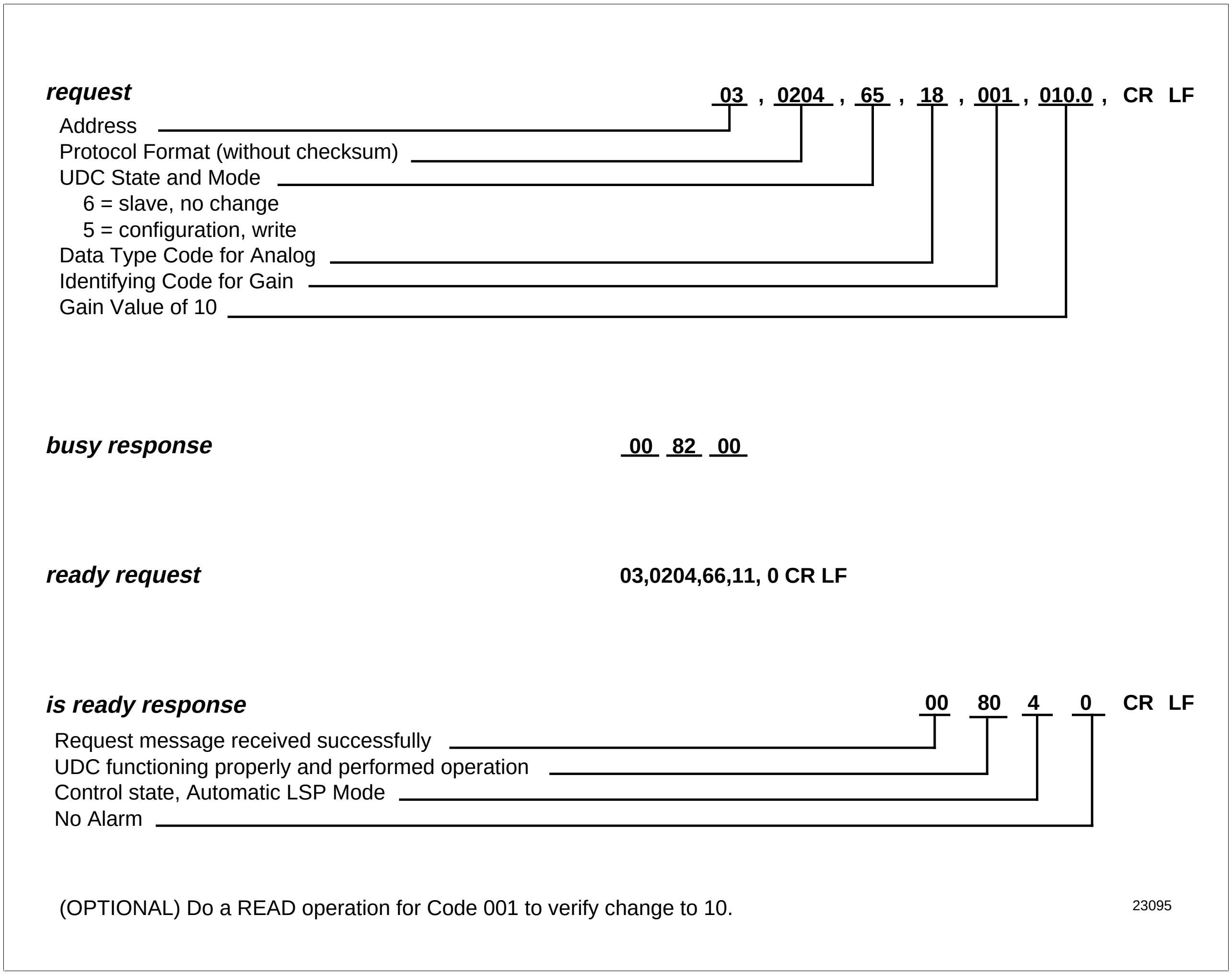
To check the value a change do a "Read" for the particular parameter (I.D. Code) you have changed.

4.5 Write Analog Parameters, Continued

Example

Figure 4-3 is an example of a Write of an analog parameters message exchange; specifically to change the gain value from 5 to 10; analog I.D. Code 001.

Figure 4-3 Write Analog Parameter Message Exchange Example



4.6 Write Digital Parameters

Introduction

The digital identifying codes are Codes 128 through 225. The Write request and response formats are shown in Tables 4-10, 4-11, 4-12, and 4-13.

Request format

Table 4-10 lists the Write request format, with or without checksum, for digital I.D. Codes 128 through 255.

Where:

AA	=	Station Address (Each loop of a 2 loop controller has a unique address – see "Message Exchange")
X	=	UDC State and Mode (Hex – see "Message Exchange")
MMM	=	Identifying Code for Digital Parameter (128 to 255)
DDD	=	Digital Value (always three characters)
CS	=	Checksum Value (two digit hex – see "Checksum")
CR	=	Carriage Return
LF	=	Line Feed

Table 4-10 Write Request Format for Digital I.D. Codes

Format Type	Format
With Checksum	AA, 4204, X5, 11*, MMM, DDD, CS CR LF
Without Checksum	AA, 0204, X5, 11*, MMM, DDD, CR LF

*Use 41 for extended digital I.D. codes 128 through 159, UDC 3300, UDC 6000, or UDC 6300 only.

"Busy" response

If the controller did not process the information, the controller will return a four digit status code, indicating an error in the third and fourth digit. See "Status Codes."

Table 4-11 lists the busy responses that can be received with or without checksum, after a write request that indicates a good write:

Where:

M	=	Mode (Hex - see "Message Exchange")
A	=	Alarm Data (Hex – see "Message Exchange")
CS	=	Checksum Value (2 digit hex – see "Checksum")
CR	=	Carriage Return
LF	=	Line Feed

4.6 Write Digital Parameters, Continued

"Busy" response, continued

Table 4-11 Busy Response

Format Type	Format
With Checksum	OOO2MA, CS, CR LF
Without Checksum	OOO2MA, CR LF

"Ready" request

After receiving a "Busy" response, enter a "Ready" request. Table 4-12 lists the "Ready" request format, with or without checksum.

Table 4-12 Ready Request

Format Type	Format
With Checksum	03, 4204, 66, 11, 0 CS CR LF
Without Checksum	03, 0204, 66, 11, 0 CR LF

"Is Ready" response

This is the response to the Ready request. Table 4-13 lists the "Is Ready" response formats, with or without checksum.

Where:

SS = UDC Status
M = Mode (Hex - see "Message Exchange")
A = Alarm Data (Hex – see "Message Exchange")
CS = Checksum Value (two digit hex – see "Checksum")
CR = Carriage Return
LF = Line Feed

Table 4-13 "Is Ready" Response

Format Type	Format
With Checksum	00SSMA, CS, CR LF
Without Checksum	00SSMA, CR LF

Check write transaction

To check the value of a change, do a "Read" for the particular (I.D. Code) you have changed.

Example

Figure 4-4 is an example of a Write of a digital parameter message exchange; specifically, to change the setpoint ramp time to 60 minutes (Code 174).

Figure 4-4 Write Digital Parameter Message Exchange Example

request **03 , 0204 , 65 , 11 , 174 , 060 , CR LF**

Address
Protocol Format (without checksum)
UDC State and Mode
6 = slave, no change
5 = configuration, write
Data Type Code for Digital
Identifying Code for SP Ramp Time
SP Ramp Time in Minutes

busy response **00 82 00**

ready request **03,0204,66,11,000,0 CR LF**

is ready response **00 00 4 0 CR LF**

Request message received successfully
UDC functioning properly and performed operation
Control state, Automatic LSP Mode
No Alarm

(OPTIONAL) Do a READ operation for Code 174 to verify change.

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Section 5 – Read, Write and Override Parameters on UDC 3000 Versa-Pro Controllers

5.1 Overview

Introduction

This section contains information concerning reading, writing, and overriding parameters on the UDC 3000 Controllers. There are two types of parameters:

- Data Transfer—these parameters include reading control data, option status, and reading or changing setpoints or outputs.
- Configuration Data—all the configuration data is listed in the order in which it appears in the controller.

Each type of parameter has the identifying codes listed with it. Follow the message exchange rules listed in “Read and Write Operations.”

What’s in this section

This section contains the following topics:

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What's in this section, continued

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General information

Analog Parameters

- Whenever analog parameters 001 through 107 (those that can be changed via Communications) are changed, a write cycle occurs immediately after receipt of the message.

Override Parameters

- Override analog parameters 123, 124, and 125 (computer setpoint, output, and input) are not stored in non-volatile memory and can be changed as frequently as desired with no effect on non-volatile memory retentivity, but the controller must remain in slave mode.

Digital Parameters

- Whenever digital configuration parameters 128 through 250 are updated via communications, the non-volatile memory is updated as soon as the message is received.

5.2 Reading Control Data - UDC 3000

Overview

You can Read the following control data from the UDC 3000 controller.

- Input 1
- Input 2
- PV
- Internal RV
- PV, Setpoint, Output

I.D. codes

Use the identifying codes listed in Table 5-1 to read the specific items. A Write request for these codes will result in an Error message.

Table 5-1 Control Data Parameters

Parameter Description	Identifying Code	Format Code	Range or Selection
Input #1	118	18	In Engineering Units or Percentage
Input #2	119	18	In Engineering Units or Percentage
PV	120	18	In Engineering Units or Percentage
Internal RV	121	18	In Engineering Units or Percentage
PV, Setpoint, and Output*	122	18	In Engineering Units or Percentage

*This READ request will give a three variable response (see READ/WRITE operation).

5.3 Read Option Status - UDC 3000

Read

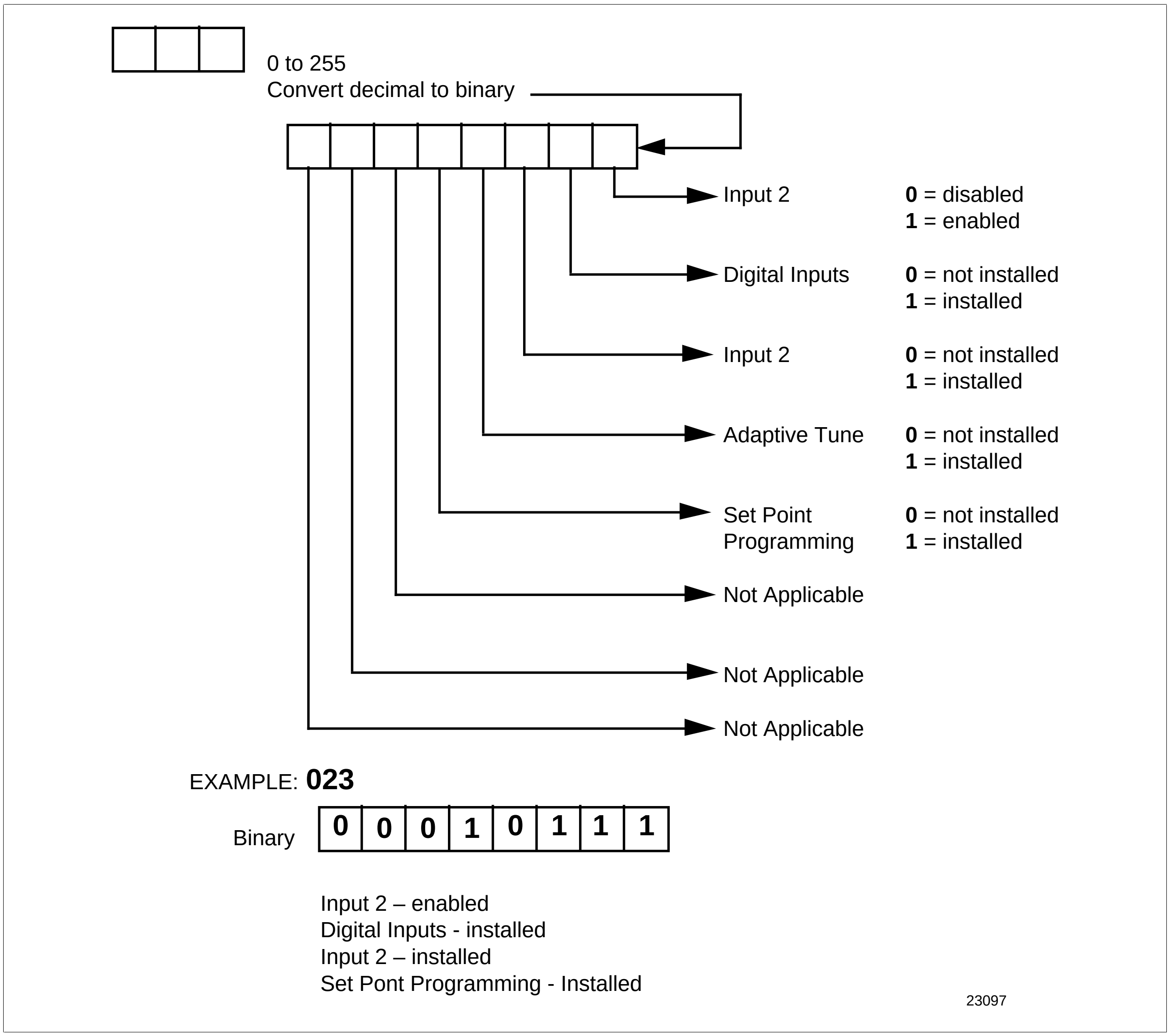
Doing a Read of I.D. Code 185 listed in Table 5-2 will tell you which of the available options are enabled/installed or disabled/not installed.

Table 5-2 Option Status

Parameter Description	Identifying Code	Format Code	Range or Selection
Option Status (read only)	185	11	See Figure 5-1

The data field in the response message will be a decimal number from 0 to 255. Convert the decimal number to binary as shown in Figure 5-1 to determine which options are or are not active.

Figure 5-1 Option Status Information



5.4 Miscellaneous Read Only's - UDC 3000

I.D. codes for read only's

The identifying codes listed in Table 5-3 represent some parameters that are Read only. No Writes allowed.

Table 5-3 Miscellaneous Read Only's

Parameter Description	Identifying Code	Format Code	Range or Selection
Output Current Calibration 0%	33	18	READ only
Output Current Calibration 100%	34	18	READ only
Software Type	157	11	READ only 31 = Basic UDC 3000 32 = Field upgrade for Adaptive Tune 33 = Field upgrade for Adaptive Tune + Setpoint Programming 37 = Limit Controller
Software Version	167	11	0 to 225
UDC Error Status	255	11	See below READ/WRITE* 001 = Emergency Manual 002 = Failsafe 004 = Working Calibration Checksum Error 008 = Configuration Checksum Error 016 = Parameter Limit Indicator 032 = Hardware Failure 064 = Restart after Shed 128 = Configuration/Calibration Memory Changed

*Write to clear.

FOR EXAMPLE: If Read returns 192 (restart after shed-064 plus configuration change -128)

Write 192 to 255
Read returns 000 (clear)

Error status definitions

Table 5-4 lists the UDC error status codes and their definitions.

Table 5-4 Error Status Definitions

Status Code	Error	Definitions
001	Emergency Manual	Indicates that the output of the unit which has been in slave operation, is under manual control, locally. Error remains until local control is relinquished at the controller.
002	Failsafe	Error occurs whenever the control reverts to failsafe operation and remains as long as the condition exists.
004	Working Calibration Checksum Error	Indicates that an error exists in the working calibration data. Re-select the inputs to load factory calibration data or field calibrate the inputs.
008	Configuration Checksum Error	Error exists in the configuration data. Verify configuration data at the keyboard. Checksum will be recomputed by stepping the controller through the status tests.
016	Parameter Limit Indicator	A limit condition exists on one of the following: PV, RV, Input 1, Input 2, Input 3, Computer Setpoint. User must determine EXACT limit condition and correct.
032	Hardware Failure	Indicates either a RAM test failure or Input 1, Input 2, Input 3 failure on two consecutive conversions.
064	Restart After Shed	Error occurs whenever a shed of slave override is performed. Error is reset following a WRITE command to I.D. Code 255 (064).
128	Configuration /Calibration Memory Changed	Error occurs whenever shed, configuration, or calibration changed. Also occurs whenever there is a change of state in 001, 002, 004, 008, or 016. Error is reset following a WRITE command to I.D. Code 255.

5.5 Setpoints - UDC 3000

Overview

You can use two separate setpoints in the UDC 3000 Controller. The identifying codes listed in Table 5-5 allow you to select which setpoint you want to use and to enter a value in Engineering Units or Percent (whichever is selected at Code 161) for that setpoint via communications.

I.D. codes

Make your selection using I.D. Code 173 and enter the value for the setpoint chosen using I.D. Code 39 (SP 1) or 53 (SP 2).

Table 5-5 Setpoint Code Selections

Parameter Description	Identifying Code	Format Code	Range or Selection
Local Setpoint #1	39	18	Value within the setpoint range limits
Local Setpoint #2	53	18	Value within the setpoint range limits
Local Setpoint Select	173	11	000 = Local Set Point #1 only 001 = 2nd Local Setpoint via keyboard or communications*

*I.D. Code 131—second input function must be set to 0 (LSP).

Associated parameters

Refer to Table 5-6 for the codes required to display or change any of the parameters associated with setpoints.

Table 5-6 Setpoint Associated Parameters

Parameter	Code
Setpoint Limits	007, 008
Computer Setpoint	125
Setpoint Program/Ramp	178

5.6 Using a Computer Setpoint (Overriding Controller Setpoint) - UDC 3000

Overview

You can use a setpoint generated from the computer to override the setpoint being used by the controller.

The value generated by the computer will have ratio and bias applied by the controller.

I.D. codes

Use the identifying code in Table 5-7 to enter the computer setpoint.

Shed

The computer setpoint override will continue until "SHED" from communications occurs or the controller is placed into monitor mode through communications. Doing periodic "SLAVE READS" within the shed time will allow the override to continue until communication is stopped and shed time elapses.

ATTENTION 0 Shed (code 154) allows the Override to continue indefinitely or until the Override is canceled. (See Override selection I.D. Code 183.)

Override display

When SP is overridden, the left most digit in the upper display becomes a "C."

Table 5-7 Computer Setpoint Selection

Parameter Description	Identifying Code	Format Code	Range or Selection
Computer Setpoint	125	18	Within the Setpoint Range Limits in Engineering Units or Percent.

Associated parameters

Refer to Table 5-8 for the codes required to display or change any of the parameters associated with the computer setpoint.

Table 5-8 Computer Setpoint Associated Parameters

Parameter	Code
Setpoint Limits	007, 008
Local Setpoint #1	039
Local Setpoint #2	053
Local Setpoint Selection	173

5.7 Overriding Input 1 - UDC 3000

Overview

You can override the Input 1 value in the controller using I.D. Code 124 as shown in Table 5-9.

Override display

When you override the PV, the first digit in the upper display becomes a “C.”

Table 5-9 Input 1 Override Code

Parameter Description	Identifying Code	Format Code	Range or Selection
Override Input 1	124	18	Within the input 1 limits in Engineering Units or Percent (whichever is selected at I.D. Code 161).

Shed

The Override to Input 1 will continue until “SHED” from communications occurs or the controller is placed into monitor via communications. Doing Reads within the shed time will allow the override to continue until Reads are stopped and shed time elapses (I.D. Code 154).

ATTENTION 0 Shed allows override to continue indefinitely or until override is canceled. (See Override Selection, I.D. Code 183.)

Associated parameters

Refer to Table 5-10 for the codes required to display or change any of the parameters associated with Input 1.

Table 5-10 Input Override Associated Parameters

Parameter	Code
High/Low Range Values (Read Only)	029,030
Temperature Units (Read Only)	129
Input 1 Type (Read Only)	168
Transmitter Characterization (Read Only)	169
Input 1 Bias	107
Input 1 Filter Time Contrast	042
Burnout	164
Emissivity	023

5.8 Canceling the Override - UDC 3000

Overview

Doing a Read of I.D. Code 183 will tell you which Override is active—Input 1 (PV) or Setpoint.

Doing a Write lets you cancel either the Input 1 override set at Code 124 or setpoint override set at Code 125 or both.

I.D. codes

Using the identifying code in Table 5-11 to Read or Write your selection.

Table 5-11 PV or Setpoint Override Cancellation

Parameter Description	Identifying Code	Format Code	Range or Selection
Override Selection	183	11	001 = Cancels Input 1 (PV) Override 008 = Cancels Setpoint Override 009 = Cancels Both Overrides

The example below cancels both Input 1 and setpoint overrides:

XX,0204,65,11,183,<u>009</u>,0 CR LF

5.9 Reading or Changing the Output - UDC 3000

Overview

You can read the output of a particular UDC 3000 controller (Read Transaction) or you can change it to suit your needs. (Do a Write Transaction.)

I.D. codes

Use the identifying code in Table 5-12 to monitor (Read) or change (Write) the output (in manual only).

ATTENTION To Write (change) the output, the controller must first be in manual mode.

Table 5-12 Reading or Changing the Output

Parameter Description	Identifying Code	Format Code	Range or Selection
Output	123	18	-5 to +105% of full span (current output) 0 to 100% (relay type output)

Associated parameters

Refer to Table 5-13 for the codes required to display or change any of the parameters associated with the output.

Table 5-13 Associated Output Codes

Parameter	Code
Output Direction	135
Output Limits	14, 15
Output Dropoff Limits	20
Failsafe Output Values	40
Output Hysteresis	19
Output Type (Read only)	160

5.10 Local Setpoint/PID Set Selection/Setpoint Ramp Status - UDC 3000

Overview

Identifying Code 250 lets you monitor or make selections for:

- Tuning Parameter Set #1 or #2
  If Tuning Sets selection is "two keyboard" code 171 = 001
- Local Setpoint #1 or #2
  If "2 Local Setpoints" is selected 131 = 0, 173 = 1
- Run or Hold Setpoint Ramp or a Setpoint Program Data
  If SP Ramp or SP Program is enabled 178 = 1 Program, 178 = 2 Ramp

Read

Table 5-14 is a table of numbers that could be returned by the UDC 3000 controller. When a Read is requested for this I.D. Code (250) you can determine which parameters are active from this table.

Write

To Write information to the controller, select what parameters you want from Table 5-14 and enter the associated number in the data field of the Write request.

For example:

- Maintain TUNING SET #2
- Maintain LOCAL SET POINT #1
- CHANGE A SET POINT PROGRAM TO RUN

READ 250 response is 020 or 022

WRITE 250 (023), Response Busy

READ 250 Response is 023

Note: some of the numbers are Read only.

Table 5-14 LSP/PID Set Selection and Setpoint Ramp Status

Parameter Description	Identifying Code	Format Code	Range or Selection
Enhanced Function	250	11	See Figure 5-2

5.10 Local Setpoint/PID Set Selection /Setpoint Ramp Status - UDC 3000, Continued

Write, continued

Figure 5-2 I.D. Code 250 Indications

Set Point Ramp or Program Data Selections	Tuning Set #1 Selection Local Set Point #1 Selection	Tuning Set #1 Selection Local Set Point #2 Selection	Tuning Set #2 Selection Local Set Point #1 Selection	Tuning Set #2 Selection Local Set Point #2 Selection
None or SP Ramp, Enabled Not in Progress, (READ)	000	008	016	024
SP Ramp in Progress, Hold (READ/WRITE)	002	010	018	026
SP Ramp in Progress, Run (READ/WRITE)	003	011	019	027
SP Program, Enabled Not in Progress, (READ)	004	012	020	028
SP Program in Progress, Hold (READ/WRITE)	006	014	022	030
SP Program in Progress, Run (READ/WRITE)	007	015	023	031

23098

5.11 Configuration Parameters - UDC 3000

Overview

Listed on the following pages are the identifying codes for the parameters in the various setup groups in the UDC 3000 controller. The table below lists the setup groups and the table number in which they are listed. Most of the parameters are configurable through the Host. Some are READ ONLY and are indicated as such and cannot be changed.

Setup Group	Table Number
TUNING	5-15
SP RAMP/PROG	5-16
ADAPTIVE	5-17
ALGORITHMS	5-18
INPUT 1	5-19
INPUT 2	5-20
CONTROL	5-21
OPTIONS	5-22
COMMUNICATIONS	5-23
ALARMS	5-24

Reading or Writing

Do a Read or Write (see "Read/Write Operations") depending on your requirements using the identifying code and format code listed in the tables. The range or selection available for each range is listed in the tables.

5.11 Configuration Parameters - UDC 3000, Continued

Tuning

Table 5-15 lists all the I.D. Codes and ranges or selection for the function parameters in the setup group “TUNING.”

Table 5-15 Setup Group-Tuning

Parameter Description	Identifying Code	Format Code	Range or Selection
Heat Gain or PB	001	18	PB=0.1 to 9999% Gain=0.1 to 9999
Heat Rate	002	18	0.08 to 10.00 Minutes
Heat Reset or RPM	003	18	Reset=0.00 to 50.0 min/rpt RPM = 0.00 to 50.0 rpt/min
Manual Reset	013	18	-100 to +100% Output
Cool Gain/Gain #2 or PB	004	18	PB=0.1 to 9999% Gain=0.1 to 9999
Cool Rate/Rate #2	005	18	0.08 to 10.00 Minutes
Cool Rate/Reset #2 or RPM	006	18	Reset=0.00 to 50.0 min/rpt RPM = 0.00 to 50.0 rpt/min
Heat Cycle Time	158	11	1 to 120 Seconds
Cool Cycle Time	159	11	1 to 120 Seconds
Lockout Changes to data always possible via communication regardless of this configuration.	132	11	0 = None 1 = Calibration 2 = +Configuration 3 = +View *(N/A for Limit)* 4 = Maximum

Tuning, continued

Table 5-15 Setup Group-Tuning, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Keyboard Lockout	191	11	0 = All keys enabled 1 = Manual Auto Key Locked 2 = Setpoint Select Key Locked 3 = Manual/Auto and Setpoint Select Keys Locked 4 = Run Hold Key Locked 5 = Run Hold Key and Manual/Auto Keys Locked 6 = Run Hold Key and Setpoint Select Keys Locked 7 = Run Hold, Setpoint Select, and Manual/Auto Keys Locked.

5.11 Configuration Parameters - UDC 3000, Continued

Setpoint Ramp/Rate/Program

Table 5-16 lists all the I.D. Codes and ranges or selections for the function parameters in the setup group "SP RAMP/RATE/PROGRAM."

Table 5-16 Setup Group-SP Ramp, Rate, or SP Program

Parameter Description	Identifying Code	Format Code	Range or Selection
Setpoint Program Ramp Selection	178	11	0 = SP Program, Rate, and Ramp Disabled 1 = SP Program Enabled 2 = SP Ramp Enabled 3 = SP Rate Enabled
SP Ramp			
Single SP Ramp Time	174	11	0 to 255 (Minutes)
Final Ramp SP Value	026	18	PV Range in Engineering Units
SP Rate			
Rate Up	108	18	0 to 9999
Rate Down	109	18	0 to 9999
SP Program			
Start Segment Number	175	11	1 to 11
End Segment Number (Soak)	176	11	2, 4, 6, 8, 10, or 12
Program Recycles	177	11	0 to 99
Guaranteed Soak Deviation	087	18	0 to 99.9 (0 = no soak)
Segment #1 Ramp Time	057	18	99.59 (0-99 Hrs : 0-59 Min) or 999 (0-999 Deg/Min)
Segment #2 Soak Setpoint Value	058	18	Within Setpoint Limits
Segment #2 Soak Time	059	18	99.59 (0-99 Hrs : 0-59 Min)
Segment #3 Ramp Time	060	18	99.59 (0-99 Hrs : 0-59 Min) or 999 (0-999 Deg/Min)

Setpoint Ramp/Rate/Program, continued

Table 5-16 Setup Group-SP Ramp, Rate, or SP Program, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Segment #4 Soak Setpoint Value	061	18	Within Setpoint Limits
Segment #4 Soak Time	062	18	99.59 (0-99 Hrs : 0-59 Min)
Segment #5 Ramp Time	063	18	99.59 (0-99 Hrs : 0-59 Min) or 999 (0-999 Deg/Min)
Segment #6 Soak Setpoint Value	064	18	Within Setpoint Limits
Segment #6 Soak Time	065	18	99.59 (0-99 Hrs : 0-59 Min)
Segment #7 Ramp Time	066	18	99.59 (0-99 Hrs : 0-59 Min) or 999 (0-999 Deg/Min)
Segment #8 Soak Setpoint Value	067	18	Within Setpoint Limits
Segment #8 Soak Time	068	18	99.59 (0-99 Hrs : 0-59 Min)
Segment #9 Ramp Time	069	18	99.59 (0-99 Hrs : 0-59 Min) or 999 (0-999 Deg/Min)
Segment #10 Soak Setpoint Value	070	18	Within Setpoint Limits
Segment #10 Soak Time	071	18	99.59 (0-99 Hrs : 0-59 Min)
Segment #11 Ramp Time	072	18	99.59 (0-99 Hrs : 0-59 Min) or 999 (0-999 Deg/Min)
Segment #12 Soak Setpoint Value	073	18	Within Setpoint Limits
Segment #12 Soak Time	074	18	99.59 (0-99 Hrs : 0-59 Min)
Program End State	181	11	0 = Disable SP Program 1 = Hold at Program End
Controller Status at Program End	180	11	0 = Last Setpoint 1 = Manual, Failsafe

Setpoint Ramp/Rate/Program, continued

Table 5-16 Setup Group-SP Ramp, Rate, or SP Program, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Engineering Units or Ramp Segments	182	11	0 = HRS:MIN 1 = Degrees/Minute
Present Segment Number	251	11	(READ ONLY)
Time Remaining — Minutes	252	11	(READ ONLY)
Time Remaining — Hours	253	11	(READ ONLY)
Cycles Remaining	254	11	(READ ONLY) Recycles—Elapsed Cycles

5.11 Configuration Parameters - UDC 3000, Continued

Adaptive tune

Table 5-17 lists all the I.D. Codes and ranges or selections for the function parameters in the setup group “ADAPTIVE TUNE.”

Table 5-17 Setup Group-Adaptive Tune

Parameter Description	Identifying Code	Format Code	Range or Selection
Adaptive Tune Selection	152	11	Read only 0 = Disabled 3 = SP Tune 4 = Fast SP Tune
Setpoint Change	153	11	Read Only 5 to 15
Process Gain (KPG)	114	18	0.01 to 50.0
Adaptive Tune Error Codes	151	11	Read Only 0 = None 1 + Output > or < Output Limits or Manual Step = 0 2 = Output > or < Heat/ Cool Limits 4 PV Changes Insufficient 5 = Process Identification failed 6 = Calculated Reset Outside Reset Limits 7 = Calculated Gain Outside Gain Limits 8 = Adaptive Tune Aborted on Command 9 = Input #1 Error Detected 10 = Adaptive Tune Illegal during Ramp/SP Program 11 = Adaptive Tune Aborted when External Switch Detected 12 = Adaptive Tune Running

Algorithm

Table 5-18 lists all the I.D. codes and ranges or selections for the function parameters in the setup group "ALGORITHM."

Table 5-18 Setup Group-Algorithm

Parameter Description	Identifying Code	Format Code	Range or Selection
Algorithm Selection	128	11	0 = ON/OFF 1 - PID-A 2 = PID-B 3 = PD-A with Manual Reset 4 = Three Position Step
Output Type	160	11	READ ONLY 0 = Not Allowed 1 = Position Proportional 2 = Relay Simplex 3 = Relay Duplex 4 = Current 5 = Current Duplex - Full Range* 6 = Relay/Current Duplex (relay on heat) 7 = Relay/Current duplex (relay on cool) *Current Duplex with split range not available with communications installed.

5.11 Configuration Parameters - UDC 3000, Continued

Input 1

Table 5-19 lists all the I.D. Codes and ranges or selections for the function parameters in the setup group “INPUT 1.”

Table 5-19 Setup Group-Input 1

Parameter Description	Identifying Code	Format Code	Range or Selection
Decimal Point Location	155	11	0 = XXXX Fixed 1 = XXX.X Floating DP with none 2 = XX.XX Fixed
Temperature Units	129	11	0 = °F 1 = °C 2 = No Units
Input Type 1	168	11	READ ONLY 0 =B T/C 1 = E T/C H 2 = E T/C L 3 = J T/C H 4 = J T/C L 5 = K T/C H 6 = K T/C L 7 = N T/C H 8 = N T/C L 9 = R T/C 10 = S T/C 11 = T T/C H 12 = T T/C L 13 = W T/C H 14 = W T/C L 15 = 100 PLAT. 16 = 500 PLAT 17 = 100-LO 18 = 4-20 mA* 19 = 0-10 mV* 20 = 10-50 mA* 21 = 1-5 Volts* 22 = 0-10 Volts* 23 = NIC T/C 24 = Radiamatic (RH) * Limit Control: Non FM Only

5.11 Configuration Parameters - UDC 3000, Continued

Input 1, continued

Table 5-19 Setup Group-Input 1, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Transmitter Characterization	169	11	READ ONLY 0 =B T/C 1 = E T/C H 2 = E T/C L 3 = J T/C H 4 = J T/C L 5 = K T/C H 6 = K T/C L 7 = N T/C H 8 = N T/C L 9 = R T/C 10 = S T/C 11 = T T/C H 12 = T T/C L 13 = W T/C H 14 = W T/C L 15 = 100 PLAT. 16 = 500 PLAT 17 = 100-LO 18 = LINEAR 19 = SQ ROOT 20 = NIC T/C 21 = Radiamatic (RH)
High Range Value	029	18	READ ONLY - For TC/RTD Types (In Engineering Units, T/C-RTD)
Low Range Value	030	18	READ ONLY-For TC/RTD Types (In Engineering Units, T/C-RTD)
Bias	107	18	-999.9 to 9999
Filter Time Constant	042	18	0 to 120 Seconds (No Filter = 0)
Burnout (Open Circuit Detection)	164	11	0 = None and Failsafe 1 = Upscale 2 = Downscale Limit: 0=Downscale 1=Upscale *Writes Illegal*
Power Line Frequency	166	11	0 = 60 Hz 1 = 50 Hz
Emissivity	023	18	0.01 to 1.00

Input 2

Table 5-20 lists all the I.D. Codes and ranges or selections for the function parameters in the setup group "INPUT 2."

Table 5-20 Setup Group-Input 2

Parameter Description	Identifying Code	Format Code	Range or Selection
Input Type	170	11	READ ONLY (18 = LINEAR)
Transmitter Characterization	171	11	READ ONLY 0 = B T/C 1 = E T/C H 2 = E T/C L 3 = J T/C H 4 = J T/C L 5 = K T/C H 6 = K T/C L 7 = N T/C H 8 = N T/C L 9 = R T/C 10 = S T/C 11 = T T/C H 12 = T T/C L 13 = W T/C H 14 = W T/C L 15 = 100 PLAT. 16 = 500 PLAT 17 = 100-LO 18 = LINEAR 19 = SQ ROOT 20 = NIC T/C 21 = Radiamatic (RH)
High Range Value	035	18	READ ONLY (In Engineering Units)
Low Range Value	036	18	READ ONLY (In Engineering Units)
Filter Time Constant	043	18	0 to 120 Seconds (No Filter = 0)

5.11 Configuration Parameters - UDC 3000, Continued

Control

Table 5-21 lists all the I.D. Codes and ranges or selections for the function parameters in the setup group “CONTROL.”

Table 5-21 Setup Group-Control

Parameter Description	Identifying Code	Format Code	Range or Selection
Number of Tuning Sets	172	11	0 = One Set Only 1 = Two Sets (keyboard or communications 2 = Two Sets (Auto Switch PV) 3 = Two Sets (Auto Switch PV)
PV Switchover Value	056	18	Within the PV Range
Remote Setpoint Source	131	11	0 = None 1 = Input 2
Local Setpoint Select	173	11	000 = Local Setpoint #1 Only 001 = 2nd Local Setpoint via keyboard or communications*
Ratio	021	18	-20.00 to +20.00
Bias	022	18	-999 to +9999 in Engineering Units
LSP Tracking	138	11	0 = None 1 = Rsp 2 = PV
Power Up Recall	130	11	0 = Manual—LSP 1 = Automatic—LSP 2 = Automatic—RSP 3 = Last Mode, Last Setpoint 4 = Last Mode, Last Local Setpoint
High Setpoint Limit	007	18	Within the PV Range (Engineering Units)
Low Setpoint Limit	008	18	Within the PV Range (Engineering Units)

Control, continued

Table 5-21 Setup Group-Control, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Control Output Direction	135	11	0 = Direct 1 = Direct 2 = Reverse 3 = Reverse
Output Change Rate Limiting	189	11	0 = Disable 1 = Enable
Output Change Rate Up	110	18	1 to 9999 %/MIN
Output Change Rate Down	111	18	1 to 9999 %/MIN
High Output Limit	014	18	-5 to +105% of output
Low Output Limit	015	18	-5 to +105% of output
Output Dropoff Limit	020	18	-5 to +105% of output
Deadband	018	18	-5 to +25.0%
Output Hysteresis	019	18	0 to 5.0% of PV span
Failsafe Output Value	040	18	Within the Range of Output Limits
Proportional Band Units	148	11	0 = Gain 1 = Proportional Band
Reset Units	149	11	0 = Minutes 1 = Repeats per Minute

*I.D. Code 131—Second Input Function must be set to 0 (LSP).

Options

Table 5-22 lists all the I.D. Codes and ranges or selections for the function parameters in the setup group "OPTIONS."

Table 5-22 Setup Group-Options

Parameter Description	Identifying Code	Format Code	Range or Selection
Digital Input #1	186	11	0 = None 1 = To Manual 2 = To Local Setpoint #1 3 = To Local Setpoint #2 4 = To Direct Action 5 = To Hold 6 = To PID 2 7 = PV = Input 2 8 = To Run 9 = Reset SP Program 10 = Inhibit PID Integral (I) Action 11 = To Manual Failsafe 12 = Disable Keyboard 13 = To Automatic 14 = To Timer 15 = To Auto/Manual Station *For Digital Input combinations, see Figure 5-3*
Digital Input #2	187	11	Same as Digital Input #1 (Code 186)
Digital Input Status	188	11	0 = Digital Input 1 Open Digital Input 2 Open 1 = Digital Input 1 Closed Digital Input 2 Open 2 = Digital Input 1 Open Digital Input 2 Closed 3 = Digital Input 1 Closed Digital Input 2 Closed

5.11 Configuration Parameters - UDC 3000, Continued

COMRS422

Table 5-23 lists all the I.D. Codes and ranges or selections for the function parameters in the setup group "COMRS422."

Table 5-23 Setup Group-COMRS422

Parameter Description	Identifying Code	Format Code	Range or Selection
Shed Time	154	11	0 to 255 Sample Periods 0 = No Shed
Shed Controller Mode and Output Level	162	11	0 = Last Mode and Last Output 1 = Manual Mode, Last Output 2 = Manual Mode, Failsafe Output 3 = Automatic Mode
Shed Setpoint Recall	163	11	0 = Use UDC Setpoint as determined by Remote/Local mode, LSP unchanged 1 = Use UDC Setpoint as determined by Remote/Local mode, LPS = Last setpoint prior to shed
Communication Units	161	11	0 = Percent (%) 1 = Engineering Units

Alarms

Table 5-24 lists all the I.D. Codes and ranges or selections for the function parameter in the setup group “ALARMS.”

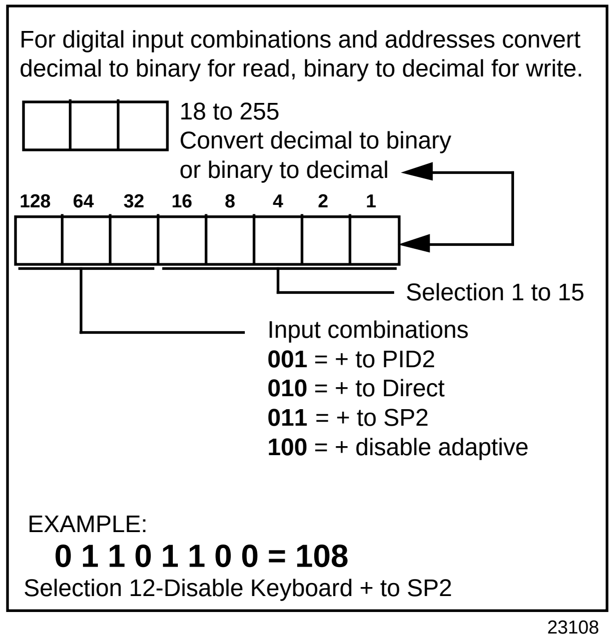
Table 5-24 Setup Group-Alarms

Parameter Description	Identifying Code	Format Code	Range or Selection
Alarm #1 SP #1 Value	009	18	Value in Engineering Units
Alarm #1 SP #2 Value	010	18	Value in Engineering Units
Alarm #2 SP #1 Value	011	18	Value in Engineering Units
Alarm #2 SP #2 Value	012	18	Value in Engineering Units
Alarm #1 SP #1 Type	140	11	0 = None 1 = Input 1 2 = Input 2 3 = PV 4 = Deviation 5 = Output 6 = Alarm on Shed 7 = SP Event ON 8 = SP Event OFF 9 = Alarm on Manual
Alarm #1 SP #2 Type	142	11	Same as Code 140
Alarm #2 SP #1 Type	144	11	Same as Code 140
Alarm #2 SP #2 Type	146	11	Same as Code 140
Alarm #1 SP #1 State	141	11	0 = Low Alarm 1 = High Alarm
Alarm #1 SP #2 State	143	11	0 = Low Alarm 1 = High Alarm
Alarm #2 SP #1 State	145	11	0 = Low Alarm 1 = High Alarm
Alarm #2 SP #2 State	147	11	0 = Low Alarm 1 = High Alarm
Alarm Hysteresis	041	18	0 to 100.0% of full span or full output

5.11 Configuration Parameters - UDC 3000, Continued

Digital input combinations

Figure 5-3 Digital Input Combinations



Section 6 – Read, Write and Override Parameters on UDC 5000 Ultra-Pro Controllers

6.1 Overview

Introduction

This section contains information concerning reading, writing, and overriding parameters on the UDC 5000 Ultra-Pro Controller. There are two types of parameters:

- Data Transfer—these parameters include reading control data, option status, and reading or changing setpoints or outputs.
- Configuration Data—all the configuration data is list in the order in which it appears in the controller.

Each type of parameter has the identifying codes listed with it. Follow the message exchange rules listed in “Read and Write Operations.”

6.1 Overview - UDC 5000, Continued

What's in this section

This section contains the following topics:

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6.1 Overview - UDC 5000, Continued

General information

Analog Parameters

- Whenever Analog Parameters 001 through 114 (those that can be changed via Communications) are changed, a write cycle occurs immediately after receipt of the message.

Override Parameters

- Override Analog Parameters 120, 123 and 125 (PV, output, computer setpoint) are not stored in non-volatile memory and can be changed as frequently as desired with no effect on non-volatile memory retentivity, but controller must remain in slave mode.

Digital Parameters

- Whenever digital configuration parameters 128 through 250 are updated via communications, the non-volatile memory is updated as soon as the message is received.

6.2 Reading Control Data - UDC 5000

Overview

You can Read the following control data from the UDC controller.

- Input 1
- Input 2
- Input 3
- PV
- Internal RV
- PV, Setpoint, Output

I.D. codes

Use the identifying codes listed in Table 6-1 to read the specific items.

A Write request for these Codes will result in an Error message.

Table 6-1 Control Data Parameters

Parameter Description	Identifying Code	Format Code	Range or Selection
Input #1	118	18	In Engineering Units or Percentage
Input #2	119	18	In Engineering Units or Percentage
Input #3	117	18	In Engineering Units or Percentage
PV	120	18	In Engineering Units or Percentage
Internal RV	121	18	In Engineering Units or Percentage
PV, Setpoint, and Output*	122	18	In Engineering Units or Percentage

*This Read request will give a three variable response (see Read/Write operation).

6.3 Option Status - UDC 5000

Read

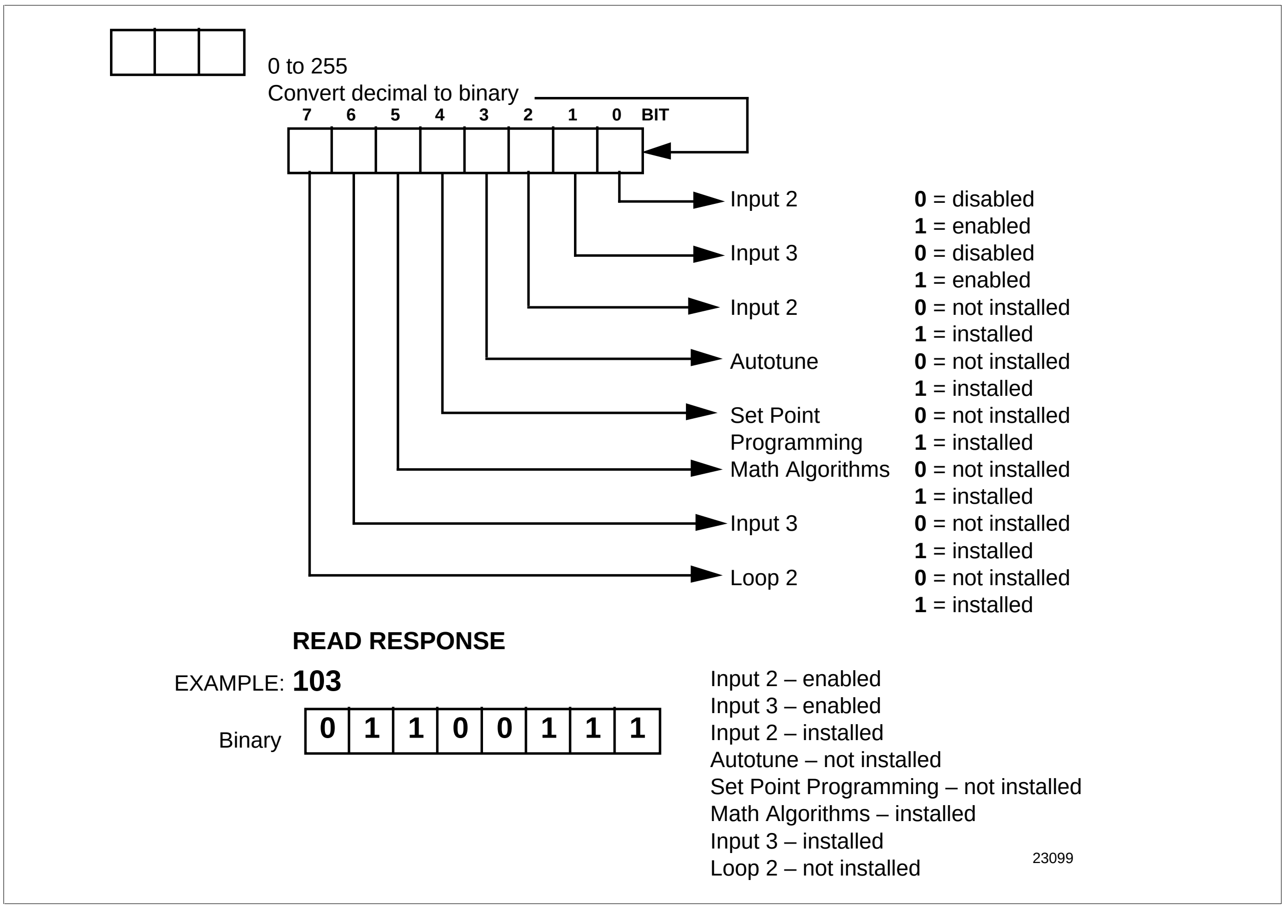
Doing a Read of I.D. Code 185 listed in Table 6-2 will tell you which of the available options are enabled/installed or disabled/not installed.

Table 6-2 Option Status

Parameter Description	Identifying Code	Format Code	Range or Selection
Option Status (read only)	185	11	See Figure 6-1

The data field in the response message will be a decimal number from 0 to 255. Convert the decimal number to binary as shown in Figure 6-1 to determine which options are or are not active.

Figure 6-1 Option Status Information



Write

A limited Write is available with which you can enable/disable Input 3. Change bit 0 or 1 as shown in Figure 6-1 and write the decimal designation to Code 185.

EXAMPLE: Disable Input 3—Write 101

6.4 Miscellaneous Read Only's - UDC 5000

I.D. codes for read only's

The identifying codes listed in Table 6-3 represent some parameters that are Read only. No Writes allowed.

Table 6-3 Miscellaneous Read Only's

Parameter Description	Identifying Code	Format Code	Range or Selection
Software Type	157	11	Read only (UDC 5000) 61 = Basic software 62 = Field upgrade for Autotune + Input 3 63 = Field upgrade for Autotune + Math + SPP + Input 3 64 = Field upgrade for Autotune + Input 3 + 2 Loop 65 = Field Upgrade has all options
Software Version (Read only)	167	11	0 to 99
Digital Input Switch Status (Read only)	190	11	0 = Switch #1 open Switch #2 open 1 = Switch #1 closed Switch #2 open 2 = Switch #1 open Switch #2 closed 3 = Switch #1 closed Switch #2 closed
UDC Error Status (Definitions are listed in Table 6-4)	255	11	See below Read/Write* 001 = Emergency Manual 002 = Failsafe 004 = Working Calibration Checksum Error 008 = Configuration Checksum Error 016 = Parameter Limit Indicator 032 = Hardware Failure 064 = Restart after Shed 128 = Configuration/Calibration Memory Changed * Write to clear.

6.4 Miscellaneous Read Only's - UDC 5000, Continued

I.D. codes for read only's, continued

ATTENTION Any checksum error reported can only be cleared via keyboard/display viewing of the Status group (recalculates all checksums at least parameter.)

FOR EXAMPLE: If read returns 192 (restart after shed-064 plus configuration change -128)

Write anything to I.D. Code 255
Read returns 000 (clear)

Error status definitions

Table 6-4 lists the UDC error status codes and their definitions.

Table 6-4 Error Status Definitions

Status Code	Error	Definitions
001	Emergency Manual	Indicates that the output of the unit which has been in slave operation, is under manual control, locally. Error remains until local control is relinquished at the controller.
002	Failsafe	Error occurs whenever the control reverts to failsafe operation and remains as long as the condition exists.
004	Working Calibration Checksum Error	Indicates that an error exists in the working calibration data. Re-select the inputs to load factory calibration data or field calibrate the inputs.
008	Configuration Checksum Error	Error exists in the configuration data. Verify configuration data at the keyboard. Checksum will be recomputed by stepping the controller through the status tests.
016	Parameter Limit Indicator	A limit condition exists on one of the following: PV, RV, Input 1, Input 2, Input 3, Computer Setpoint. User must determine EXACT limit condition and correct.
032	Hardware Failure	Indicates either a RAM test failure or Input 1, Input 2, Input 3 failure on two consecutive conversions.
064	Restart After Shed	Error occurs whenever a shed of slave override is performed. Error is reset following a Write command to I.D. Code 255 (064).
128	Configuration /Calibration Memory Changed	Error occurs whenever shed, configuration, or calibration changed. Also occurs whenever there is a change of state in 001, 002, 004, 008, or 016. Error is reset following a Write command to I.D. Code 255.

6.5 Setpoints - UDC 5000

Overview

You can use three separate setpoints in the UDC Controller. The identifying codes listed in Table 6-5 allow you to select which setpoint you want to use and to enter a value in Engineering Units or Percent (whichever is selected at Code 161) for that setpoint via communications.

I.D. codes

Make your selection using I.D. Code 173 and enter the value for the setpoint chosen using I.D. Code 39 (SP1) or 53 (SP2) or 113 (SP3).

Table 6-5 Setpoint Code Selections

Parameter Description	Identifying Code	Format Code	Range or Selection
Local Setpoint #1	039	18	Value within the setpoint range limits
Local Setpoint #2	053	18	Value within the setpoint range limits
Local Setpoint #3	113	18	Value within the setpoint range limits
Local Setpoint Select	173	11	000 = Local Setpoint #1 only 001 = 2nd Local Setpoint via keyboard or communications 003 = 3rd Local Setpoint via keyboard or communications

Associated parameters

Refer to Table 6-6 for the codes required to display or change any of the parameters associated with the setpoint.

Table 6-6 Setpoint Associated Parameters

Parameter	Code
Setpoint Limits	007, 008
Computer Setpoint	125

6.6 Using a Computer Setpoint (Overriding Controller Setpoint) - UDC 5000

Overview

You can use a setpoint generated from the computer to override the setpoint being used by the controller.

The value generated by the computer will have Ratio and Bias applied by the controller.

I.D. codes

Use the identifying code in Table 6-7 to enter the computer setpoint.

Table 6-7 Computer Setpoint Selections

Parameter Description	Identifying Code	Format Code	Range or Selection
Computer Setpoint	125	18	Within the Setpoint Range Limits in Engineering Units or Percent.

Shed

The Computer Setpoint Override will continue until "SHED" from Communications occurs or the controller is placed into monitor mode through communications. Doing periodic "SLAVE READS" within the shed time will allow the override to continue until communication is stopped and Shed Time elapses.

ATTENTION 0 Shed (code 154) allows the Override to continue indefinitely or until the Override is canceled. (See Override selection I.D. Code 183.)

When SP is overridden, the left most digit in the upper display becomes a "C."

6.6 Using a Computer Setpoint (Overriding Controller Setpoint) - UDC 5000, Continued

Associated parameters

Refer to Table 6-8 for the codes required to display or change any of the parameters associated with the computer setpoint.

Table 6-8 Computer Setpoint Associated Parameters

Parameter	Code
Setpoint Limits	007, 008
Local Setpoint #1	039
Local Setpoint #2	053
Local Setpoint #3	113
Local Setpoint Selection	173

6.7 Overriding the Inputs - UDC 5000

Overview

You can override any of the three input values in the controller using the codes listed in Table 6-9.

Table 6-9 Input Override Codes

Parameter Description	Identifying Code	Format Code	Range or Selection
Override Input 1	124	18	Within the input limits in engineering units or percent (whichever is selected at I.D. Code161).
Override Input 2	115	18	Within the input limits in engineering units or percent (whichever is selected at I.D. Code 161).
Override Input 3	116	18	Within the input limits in engineering units or percent (whichever is selected at I.D. Code 161).

Shed

The override to the input will continue until “SHED” from Communications occurs or the controller is placed into monitor via communications. Doing Reads within the shed time will let the override continue until Reads are stopped and SHED time elapses (I.D. Code 154).

ATTENTION 0 shed time (Code 154) lets the override continue indefinitely or until override is canceled. (See I.D. Code 183.)

Associated parameters

Refer to Table 6-10 for the codes required to display or change any of the parameters associated with the inputs.

Table 6-10 Input Override Associated Parameters

Parameter	Code
High/Low Range Values	
Input 1	029/030
Input 2	035/036
Input 3	108/109
Temperature Units	129
Input Type	
Input 1	168
Input 2	170
Input 3	186
Transmitter Characterization	
Input 1	169
Input 2	171
Input 3	187
Bias	
Input 1	107
Input 2	137
Input 3	111
Filter Time Constant	
Input 1	042
Input 2	043
Input 3	112
Burnout	
Input 1	164
Input 2	165

6.8 PV, Setpoint, or Input Override Status or Cancellation - UDC 5000

Overview

You can Read the present override status of the inputs, PV, or setpoint or you can do a Write transaction to cancel an existing override.

I.D. codes

Use the Identifying Code in Table 6-11 to Read or Write your selection.

Table 6-11 PV, Setpoint , or Input Override Cancellation

Parameter Description	Identifying Code	Format Code	Range or Selection
PV or Setpoint Override Selection	183	11	01 = Input 1 02 = Input 2 04 = PV 08 = Setpoint 16 = Input 3

6.9 Reading or Changing the Output - UDC 5000

Overview

You can read the output of a particular UDC controller (Read transaction) or you can change it to suit your needs. (Do a Write transaction.)

I.D. codes

Use the identifying code in Table 6-12 to monitor (Read) or change (Write) the output (in manual only).

ATTENTION To Write (change) the output, the controller must first be in manual mode.

Table 6-12 Reading or Changing the Output

Parameter Description	Identifying Code	Format Code	Range or Selection
Output	123	18	-5 to +105% of full span (current output) 0 to 100% (relay type output)

Associated parameters

Refer to Table 6-13 for the codes required to display or change any of the parameters associated with the output.

Table 6-13 Associated Output Codes

Parameter	Code
Output Limits	014, 015
Output Dropoff Limits	020
Failsafe Output Values	040
Output Deadband	018
Output Hysteresis	019
Output Type	160

6.10 Local Setpoint/PID Selection/Setpoint Ramp Status - UDC 5000

Overview

Identifying Code 250 lets you

- Monitor your Setpoint Ramp Status
  - In Progress, Not in Progress
  - In Run, On Hold (see Note 1)

  and determine which tuning set and local setpoint is being used.
- Abort, Run, Hold, or Start and SP Ramp.
- Select Local Setpoint #1, #2, or #3.
- Select Tuning Parameter Set #1 or #2.

Read

When you do a Read, the code in Table 6-14 determines which parameters are active:

- Local Setpoint Selection
- Tuning Parameter Set Selection
- Setpoint Ramp Status

Table 6-14 I.D. Code 250 Reads

Parameter Description	Identifying Code	Format Code	Range or Selection
Read Local Set Point/PID Set Selection and SP Ramp Status	250	11	See Figure 6-2

6.10 Local Setpoint/PID Selection /Setpoint Ramp Status - UDC 5000, Continued

Read, continued

Figure 6-2 I.D. Code 250 Indications

SET POINT RAMP INFORMATION	Tuning Set #1 Selection Local Set Point #1 Selection	Tuning Set #1 Selection Local Set Point #2 Selection	Tuning Set #2 Selection Local Set Point #1 Selection	Tuning Set #2 Selection Local Set Point #2 Selection	Tuning Set #1 Selection Local Set Point #3 Selection	Tuning Set #2 Selection Local Set Point #3 Selection
SP Ramp, Enabled not in progress (Read only)	**000**	**008**	**016**	**024**	**032**	**048**
SP Ramp in progress, Hold (Read/Write)	**002**	**010**	**018**	**026**	**034**	**050**
SP Ramp in progress, Run (Read/Write)	**003**	**011**	**019**	**027**	**035**	**051**
SP Program, Enabled no in progress (Read only)	**004**	**012**	**020**	**028**	**036**	**052**
SP Program in progress, Hold (Read/Write)	**006**	**014**	**022**	**030**	**038**	**054**
SP Program in Progress, Run (Read/Write)	**007**	**015**	**023**	**031**	**039**	**055**

23100

Write

A Write of code 250 lets you change the SP ramp status as well as the local setpoint or tuning set selection. Refer to Table 6-15.

Table 6-15 I.D. Code 250 Writes

Parameter Description	Identifying Code	Format Code	Range or Selection
Write Local Setpoint/PID Set Selection and SP Ramp Status	250	11	000 = Abort SP Ramp 001 = Run SP Ramp 002 = Hold SP Ramp 003 = Start SP Ramp 004 = Change to Local Setpoint #1 005 = Change to Local Setpoint #2 006 = Change to PID Tuning Set #1 007 = Change to PID Tuning Set #2 008 = Change to Local Setpoint #3

ATTENTION

To enable or disable the setpoint ramp, refer to identifying Code 150.

6.11 Configuration Parameters - UDC 5000

Overview

Listed on the next pages are the Identifying codes for the parameters in the various Setup groups in the UDC 5000 Ultra-Pro controller. The table below lists the Setup Groups and their table numbers in which they are listed. Most of the parameters are configurable through the host. Some are Read Only and are indicated as such and cannot be changed.

Setup Group	Table Number
TUNING	6-16
TUNING L2	6-17
SP RAMP/PROGRAM	6-18
AUTOTUNE/ADAPTIVE TUNE	6-20
ALGORITHM	6-21
OUTPUT ALGORITHM	6-22
INPUT 1	6-23
INPUT 2	6-24
INPUT 3	6-25
CONTROL AND CONTROL 2	6-26
OPTIONS	6-27
COMMUNICATIONS	6-28
ALARMS	6-29
DISPLAY	6-30

Reading or writing

Do a Read or Write (see “Read/Write Operations”), depending on your requirements using the identifying code and format code listed in the tables. The range or selection available for each range is listed in the tables.

Tuning

Table 6-16 lists all the I.D. codes and ranges or selections for the function parameters in the Setup Group “TUNING” (Loop 1).

Table 6-16 Setup Group-Tuning (Loop 1)*

Parameter Description	Identifying Code	Format Code	Range or Selection
Gain #1 or PB	001	18	0.1 to 1000
Rate #1	002	18	0.00 to 10.00
Reset #1	003	18	0.02 to 50.00
Manual Reset	013	18	-100 to +100
Gain #2 or PB	004	18	0.1 to 1000
Rate #2	005	18	0.00 to 10.00
Reset #2	006	18	0.02 to 50.00
Cycle Time #1	158	11	1 to 120 seconds
Cycle Time #2	159	11	1 to 120 seconds
Lockout (keyboard only) Changes to data always possible via communications regardless of this configuration.	132	11	**0** = None **1** = Calibration + Configuration **2** = Max Lockout **3** = Calibration only **4** = Calibration + Configuration + View

* Loop selected by address in request message.

Tuning 2

Table 6-17 lists all the I.D. codes and ranges or selections for the function parameters in the Setup Group “TUNING 2” (Loop 2).

Table 6-17 Setup Group-Tuning 2* (Loop 2)

Parameter Description	Identifying Code	Format Code	Range or Selection
Gain #3 or PB	001	18	0.1 to 1000
Rate #3	002	18	0.00 to 10.00
Reset #3	003	18	0.02 to 50.00
Man 3 Reset	013	18	–100 to +100
Gain #4 or PB	004	18	0.1 to 1000
Rate #4	005	18	0.00 to 10.00
Reset #4	006	18	0.02 to 50.00
Cycle Time #3	158	11	1 to 120 seconds
Cycle Time #4	159	11	1 to 120 seconds

* Loop selected by address in request message.

SP ramp/program

Table 6-18 lists all the I.D. codes and ranges or selections for the function parameters in setup group "SP RAMP."

Table 6-18 Setup Group-Setpoint Ramp/Program

Parameter Description	Identifying Code	Format Code	Range or Selection
Setpoint Program/Ramp Selection	178	11	**0** = SP Program and Ramp disabled **1** = SP Program enabled **2** = SP Ramp enabled **3** = SP Program enabled–Loop 2 **4** = SP Program enabled–both loops **5** = SP Ramp enabled–Loop 2 **6** = SP Ramp enabled–both loops
SP RAMP Setpoint Ramp Loop Enable	150	11	**0** = OFF **2** = SP Ramp – enabled Loop 1 **3** = SP Ramp – enabled Loop 2 **4** = SP Ramp – enabled both loops
Single SP Ramp Time	174	11	0 to 255 (minutes) applies to whichever loop has SP Ramp configured
Final Ramp SP Value	026	18	PV Range in Engineering Units
SP PROGRAM Start Segment No.*	175	11	1 to 19
End Segment No. (Soak)*	176	11	2, 4, 6, 8, 10, 12, 14, 16, 18, 20
No. of Recycles*	177	11	0 to 99

SP ramp/program, continued

Table 6-18 Setup Group-Setpoint Ramp/Program, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Program Status at Power Up from Power Outage*	179	11	**0** = *Abort* program on reset **1** = *Resume* program at last segment and last segment time **2** = *Restart*
Controller Status at Program End*	180	11	**0** = Hold at last setpoint in program **1** = Manual mode/ failsafe output
Controller State at Program End*	181	11	**0** = Disables SP program **1** = Hold–Run key restarts SP program
Engineering Units for Ramp Segments*	182	11	**0** = HRS:MIN **1** = Degrees/minute
Guaranteed Soak Enable*	184	11	**0** = Enable **1** = Disable
Present Segment No.*	251	11	(Read only) 1 to 20
Time Remaining Minutes*	252	11	(Read only) 0 to 59
Time Remaining Hours*	253	11	(Read only) 0 to 99
Cycles Remaining*	254	11	(Read only) 0 to 99 recycles–elapsed cycles
Segment Ramp Time	See Table 6-17	18	99.59 (0-99 hrs; 0-59 min) 999 (0-999 deg/min)
Segment Soak Setpoint Value	See Table 6-17	18	Within setpoint limits
Segment Soak Time	See Table 6-17	18	99.59 (0-99 hrs; 0-59 min)
Segment Guaranteed Soak Deviation + (Plus)	See Table 6-17	18	0 to 99.99
Segment Guaranteed Soak Deviation – (Minus)	See Table 6-17	18	0 to 99.99

*Applies to whichever loop has Setpoint Program applied to it.

6.11 Configuration Parameters - UDC 5000, Continued

Ramp and soak I.D. codes for each segment

Table 6-19 lists each segment and the I.D. code associated with ramp and soak information for each particular segment.

Table 6-19 Setpoint Program Ramp and Soak Identifying Codes for Each Segment

Segment Number	Identifying Codes				
	Ramp Time	**Soak Setpoint Value**	**Soak Time**	**Guaranteed Soak Deviation (Plus)**	**Guaranteed Soak Deviation (Minus)**
1	057	—	—	—	—
2	—	058	059	087	088
3	060	—	—	—	—
4	—	061	062	089	090
5	063	—	—	—	—
6	—	064	065	091	092
7	066	—	—	—	—
8	—	067	068	093	094
9	069	—	—	—	—
10	—	070	071	095	096
11	072	—	—	—	—
12	—	073	074	097	098
13	075	—	—	—	—
14	—	076	077	099	100
15	078	—	—	—	—
16	—	079	080	101	102
17	081	—	—	—	—
18	—	082	083	103	104
19	084	—	—	—	—
20	—	085	086	105	106

6.11 Configuration Parameters - UDC 5000, Continued

Autotune/adaptive tune

Table 6-20 lists all the I.D. codes and ranges or selections for the function parameters in setup group "AUTOTUNE/ADAPTIVE TUNE." Loop 1 or 2 is selected in the request message.

Table 6-20 Setup Group-Autotune/Adaptive Tune

Parameter Description	Identifying Code	Format Code	Range or Selection
Autotune/ Adaptive Tune Selection	152	11	**0** = Autotune and adaptive tune disabled – Loop 1 **1** = Exponential response – Loop 1** **2** = Critically damped – moderate – Loop 1** **3** = Critically damped – fast – Loop 1 **4** = Auto step – Loop 1 **5** = Manual step – Loop 2 **6** = Auto step – Loop 2 **7** = Adaptive SP – Loop 1 **8** = Adaptive SP + PV – Loop 1
Adaptive Tune Selection (Loop 2 only) NOTE: Loop 1 I.D. Code 152 must not be configured for any Autotune; i.e. Autotune and Adaptive are mutually exclusive.	152	11	**0** = Disabled **1** = Adaptive setpoint **2** = Adaptive SP + PV
Autotune Step Size/Adaptive SP Change Size (Loop 1 only)	153	11	Step size/5 to 15% span SP change/–100 to +100
Process Gain (Loop 1 only)	114	18	0.01 to 50.0

6.11 Configuration Parameters - UDC 5000, Continued

Autotune/adaptive tune, continued

Table 6-20 Setup Group-Autotune/Adaptive Tune, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Adaptive Tune Error (Read only)	151	11	**0** = None **1** = Output less than or greater than Output Limits or Man Step = 0 **2** = Output greater or less than Heat/Cool Limits **3** = Alarm 1 error **4** = PV change not sufficient **5** = Process Identification failed **6** = Calculated Reset outside Reset Limits **7** = Calculated Gain outside Gain Limits **8** = Adaptive tune/ Autotune aborted on command **9** = Input 1 error detected **10** = Adaptive Tune/ Autotune illegal during Ramp/Program **11** = Adaptive Tune/ Autotune aborted when external switch detected

**Selections 1 and 2 will internally default to the #3 selection.

Algorithm

Table 6-21 lists all the I.D. codes and ranges or selections the function parameters in setup group "ALGORITHM." Loop 1 or 2 selected in the request message.

Table 6-21 Setup Group-Algorithm

Parameter Description	Identifying Code	Format Code	Range or Selection
Control Algorithm Selection *not available for Loop 2	128	11	**0** = ON/OFF* **1** = PID-A **2** = PID-B **3** = PD-A with manual reset **4** = Three position step*
Loop 2 Selection (Loop 2 address only)	168	11	**0** = Loop 1 only **1** = Loop 2 enabled **2** = Loop 1 and 2 are cascaded. Loop 2 primary – Loop 1 secondary.
Output Override Hi or Lo Select (on Loop 2 address only – Loop 1 Output in Auto)	136	11	**0** = Disabled **1** = Hi Select **2** = Lo Select

Algorithm, continued

Table 6-21 Setup Group-Algorithm, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Second Input Function NOTE: Any selection except 0 may affect the Third Input Function (ID Code #188) All selections available for Loop 1. Selections 0, 1, and 2 only selections available for Loop 2. All others result in error message.	131	11	**0** = Local setpoint **1** = Remote setpoint with ratio **2** = Remote setpoint with ratio and bias (auto bias) **3** = Weighted average (LSP) **4** = Relative humidity (LSP) **5** = Carbon potential A (LSP) **6** = Carbon potential B (LSP) **7** = Carbon potential C (LSP) **8** = Feed forward (Loop 1) **9** = Add inputs 1 and 2 – without ratio and bias **10** = Subtract input 2 from input 1 – without ratio and bias **11** = Input high select (without ratio and bias) **12** = Input low select (without ratio and bias) **13** = General math A (sq. rt. mult. div.) **14** = General math B (sq. rt. mult.) **15** = General math C (mult. div.) **16** = General math D (mult.) **17** = Summer (with ratio and bias) **18** = Input hi select (with ratio and bias)

6.11 Configuration Parameters - UDC 5000, Continued

Algorithm, continued

Table 6-21 Setup Group-Algorithm, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Second Input Function (continued)	131	11	**19** = Input low select (with ratio and bias) **20** = Feedforward – Loop 2 **21** = Carbon potential D **22** = Carbon potential FCC **23** = Oxygen **24** = Dewpoint
Atmospheric Pressure	024	18	590.0 to 760.0
Percent Co	046	18	0.02 to 0.350
Constant K	045	18	0 to 20.00
Input 3 Function NOTES: When 2nd input function (ID 131) is 1 or 2, Input 3 function cannot be selection 1 or 2. When 2nd input function (ID 131) is 3 or greater, input 3 function cannot be selection 3 through 7.	188	11	**0** = None **1** = Remote setpoint (with ratio) **2** = Remote setpoint (with ratio and bias) auto bias **3** = Feed forward (with ratio and bias) **4** = Sums input 143* (with ratio and bias) **5** = Input high select* (with ratio and bias) **6** = Input low select* (with ratio and bias)
PV High	054	18	–999 to +9999 in engineering units (Read only on loop 2)
PV Low	055	18	–999 to +9999 in engineering units (Read only on loop 2)

*Not available on Loop 2.

Output algorithm

Table 6-22 lists all the I.D. codes and ranges or selections the function parameters in setup group “OUTPUT ALGORITHM.”Loop 1 or 2 selected by address in the request message.

Table 6-22 Setup Group-Output Algorithm

Parameter Description	Identifying Code	Format Code	Range or Selection
Output Algorithm	160	11	**0** = None (loop 1) – disabled (loop 2) **1** = Position proportional (loop 1 only) **2** = Relay simplex **3** = Relay duplex (loop 1 only) **4** = Current **5** = Current duplex **6** = Relay/current (relay–heat, current–full) **7** = Relay/current (relay–cool, current–full) **8** = Current duplex (current out–cool, aux. out–heat) **9** = Relay/current (relay heat, current split) loop 1 only **10** = Relay/current (relay–cool, current–split) loop 1 only
Duplex Relay State at 0% Output (on Loop 1 address only)	136	11	**0** = Relay 1–de-energized Relay 2–de-energized **1** = Relay 1–energized Relay 2–de-energized **2** = Relay 1–de-energized Relay 2–energized **3** = Relay 1–energized Relay 2–energized

6.11 Configuration Parameters - UDC 5000, Continued

Input 1

Table 6-23 lists all the I.D. codes and ranges or selections for the function parameters in setup group "INPUT 1."

Table 6-23 Setup Group-Input 1 (Loop 1 Address only)

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 1 Type	168	11	**0** = B T/C** **1** = E T/C high **2** = J T/C high **3** = K T/C high **4** = Ni-Ni-Moly T/C high **5** = R T/C **6** = S T/C **7** = T T/C high **8** = W T/C high **11** = Nicrosil Nisil T/C **12** = 100 ohm plt RTD **13** = 100 ohm plt RTD RH 21-212°F range **14** = 200 ohm plt RTD **15** = 500 ohm plt RTD **19** = Radiamatic **22** = 0-20/4-20 mA **23** = 0-10 mV **24** = 10-50 mV **25** = 1-5 volts **26** = 0-10 volts **30** = E T/C low **31** = J T/C low **32** = K T/C low **33** = Ni-Ni-Moly T/C low

Input 1, continued

Table 6-23 Setup Group-Input 1 (Loop 1 Address only), Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 1 Type, continued	168	11	**34** = T T/C low **35** = W T/C low **36** = 100 ohm plt RTD low
Input 1 Transmitter Characterization NOTE: Applicable when ID Code 168 equals 22, 23, 24, 25, or 26.	169	11	**0** = B T/C **1** = E T/C high **2** = J T/C high **3** = K T/C high **4** = Ni-Ni-Moly T/C high **5** = R T/C **6** = S T/C **7** = T T/C high **8** = W T/C high **11** = Nicrosil-Nisil T/C **12** = 100 plt RTD **13** = Plt RTD RH 21-212°F range **19** = Linear **20** = Square root **21** = E T/C low **22** = J T/C low **23** = K T/C low **24** = Ni-Ni-Moly T/C low **25** = T T/C low **26** = W T/C low **27** = 100 ohm plt RTD low **28** = 200 ohm plt RTD **29** = 500 ohm plt RTD
Input 1 High Range Value	029	18	–999. to 9999. engineering units
Input 1 Low Range Value	030	18	–999 to 9999. engineering units

Input 1, continued

Table 6-23 Setup Group-Input 1 (Loop 1 Address only), Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 1 Bias	107	18	–999 to 9999. engineering units
Input 1 Filter	042	18	0 to 120 seconds
Input 1 Burnout	164	11	**0** = None and failsafe **1** = Upscale **2** = Downscale
Input 1 Emissivity	023	18	0.01 to 1.00

*T/C = thermocouple

Input 2

Table 6-24 lists all the I.D. codes and ranges or selections for the function parameters in setup group “INPUT 2.”

Table 6-24 Setup Group-Input 2 (Loop 1 Address only)

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 2 Type	170	11	**0** = B T/C** **1** = E T/C high **2** = J T/C high **3** = K T/C high **4** = Ni-Ni-Moly T/C high **5** = R T/C **6** = S T/C **7** = T T/C high **8** = W T/C high **11** = Nicrosil Nisil T/C **12** = 100 ohm plt RTD **13** = 100 ohm plt RTD RH 21-212°F range **14** = 200 ohm plt RTD

Input 2, continued

Table 6-24 Setup Group-Input 2 (Loop 1 Address only), Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 2 Type, continued	170	11	**15** = 500 ohm plt RTD **19** = Radiamatic **22** = 0-20/4-20 mA **23** = 0-10 mV **24** = 10-50 mV **25** = 1-5 volts **26** = 0-10 volts **28** = Carbon sensor **29** = Oxygen **30** = E T/C low **31** = J T/C low **32** = K T/C low **33** = Ni-Ni-Moly T/C low **34** = T T/C low **35** = W T/C low **36** = 100 ohm plt RTD low
Input 2 Transmitter Characterization NOTE: Applicable when ID Code 170 equals 22, 23, 24, 25, or 26.	171	11	**0** = B T/C** **1** = E T/C high **2** = J T/C high **3** = K T/C high **4** = Ni-Ni-Moly T/C high **5** = R T/C **6** = S T/C **7** = T T/C high **8** = W T/C high **11** = Nicrosil-Nisil T/C **12** = 100 plt RTD **13** = Plt RTD RH 21-212°F range

Input 2, continued

Table 6-24 Setup Group-Input 2 (Loop 1 Address only), Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 2 Transmitter Characterization, continued NOTE: Applicable when ID Code 170 equals 22, 23, 24, 25, or 26.	171	11	**19** = Linear **20** = Square root **21** = E T/C low **22** = J T/C low **23** = K T/C low **24** = Ni-Ni-Moly T/C low **25** = T T/C low **26** = W T/C low **27** = 100 ohm plt RTD low **28** = 200 ohm plt RTD **29** = 500 ohm plt RTD
Input 2 High Range Value	035	18	–999. to 9999. Engineering Units
Input 2 Low Range Value	036	18	–999 to 9999. Engineering Units
Input 2 Bias	037	18	–999 to 9999. Engineering Units
Input 2 Filter	043	18	0 to 120 seconds
Input 2 Burnout	165	11	**0** = None and failsafe **1** = Upscale **2** = Downscale
Input 2 Emissivity	044	18	0.01 to 1.00

*T/C = thermocouple

Input 3

Table 6-25 lists all the I.D. codes and ranges or selections for the function parameters in setup group "INPUT 3."

Table 6-25 Setup Group-Input 3 (Loop 1 Address only)

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 3 Type	186	11	0 = OFF 19 = Linear NOTE: If 0 is received as a write, the input is disabled and the transmitter selection is lost. Whenever 19 is received as a write, if the input was previous disabled, the transmitter selection is set to linear with a range indeterminate; however, if the input was previously enabled, the transmitter type is unchanged.
Input 3 Transmitter Characterization	187	11	**0** = B T/C **1** = E T/C high **2** = J T/C high **3** = K T/C high **4** = Ni-Ni-Moly T/C high **5** = R T/C **6** = S T/C **7** = T T/C high **8** = W T/C high **11** = Nicrosil Nisil T/C **12** = 100 ohm plt RTD **19** = Linear **20** = Square root **21** = E T/C low **22** = J T/C low **23** = K T/C low **24** = Ni-Ni-Moly T/C low **25** = T T/C low **26** = W T/C low **27** = 100 ohm plt RTD low **28** = 200 ohm plt RTD **29** = 500 ohm plt RTD
Input 3 High Range Value	108	18	–999. to 9999. Engineering Units

Input 3, continued

Table 6-25 Setup Group-Input 3 (Loop 1 Address only), Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 3 Low Range Value	109	18	–999 to 9999. Engineering Units
Input 3 Ratio	110	18	–20.00 to 20.00
Input 3 Bias	111	18	–999 to 9999. Engineering Units
Input 3 Filter	112	18	0 to 120 seconds

6.11 Configuration Parameters - UDC 5000, Continued

Control and Control 2

Table 6-26 lists all the I.D. codes and ranges or selections for the function parameters in setup group "CONTROL OR CONTROL 2."Loop 1 or 2 is selected by address in the request message.

Table 6-26 Setup Groups-Control and Control 2

Parameter Description	Identifying Code	Format Code	Range or Selection
Tuning Parameter Selection	172	11	**0** = One set only **1** = 2 sets keyboard selected **2** = 2 sets with PV automatic switchover **3** = 2 sets with Setpoint automatic switchover
Automatic Switchover Value (used with 172 selection 2 or 3)	056	18	Within the PV Range in engineering units
Local Setpoint Source	173	11	**0** = One Local Setpoint **1** = Two Local Setpoints **3** = Three Local Setpoints
Local Setpoint Tracking/Power-up Output	138	11	Setpoint Tracking / Power-up Output **0** = No Recall **1** = Yes Recall **2** = No Failsafe **3** = Yes Failsafe
PV Tracking, Control Mode and Setpoint Recall	130	11	See table below

PV Tracking	Control Model	Setpoint Mode
0 = No	Manual	Local SP
1 = Yes	Manual	Local SP
2 = No	Last*	Last*
3 = Yes	Last*	Last*
4 = No	Last*	Last*
5 = Yes	Last*	Last*

*Last before power outage

6.11 Configuration Parameters - UDC 5000, Continued

Control and Control 2, continued

Table 6-26 Setup Groups-Control and Control 2, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Control Setpoint High Limit	007	18	0 to 100% of PV (Engineering Units)
Control Setpoint Low Limit	008	18	0 to 100% of PV (Engineering Units)
Control Output Direction/Alarm Outputs	135	11	**0** = Direct Action Alarm Output energized **1** = Direct Action Alarm Output de-energized **2** = Reverse Action Alarm Output energized **3** = Reverse Action Alarm Output energized
High Output Limit	014	18	–5 to 105% of output
Low Output Limit	015	18	–5 to 105% of output
High Reset Limit	016	18	–5 to 105% of output
Low Reset Limit	017	18	–5 to 105% of output
Controller Output Dropoff	139	11	**0** = No dropout **1** = Dropout using ID Code 20 value
Controller Dropoff Value	020	18	–5 to 105% of output
Output Deadband	018	18	–5 to +25.0%
Output Hysteresis (Loop 1 address only)	019	18	0 to 5.0%
Failsafe Output Level	040	18	0 to 100%
Proportional Band Units Loop 1 address only) applies to Loop 1 and 2	148	11	**0** = Gain **1** = Proportional band
Reset Units (Loop 1 address only) applies to Loop 1 and 2	149	11	**0** = Minutes **1** = RPM

6.11 Configuration Parameters - UDC 5000, Continued

Options

Table 6-27 lists all the I.D. codes and ranges or selections for the function parameters in setup group "OPTIONS." Loop 1 or 2 is selected by address in the request message.

Table 6-27 Setup Group-Options

Parameter Description	Identifying Code	Format Code	Range or Selection
2nd Current Output	134	11	**0** = None **1** = Input 1 **2** = Input 2 **3** = PV – Loop 1 **4** = Deviation – Loop 1 **5** = Output – Loop 1 **6** = Setpoint – Loop 1 **7** = Input 3 **8** = PV – Loop 2 **9** = Deviation – Loop 2 **10** = Output – Loop 2 **11** = Setpoint – Loop 2
Low Scaling Factor*	049	18	Within the range of the selected variable in I.D. 134
High Scaling Factory*	050	18	Within the range of the selected variable in I.D. 134
Digital Input #1*	155	11	**0** = None **1** = To Manual **2** = To Local Setpoint #1 **3** = To Local Setpoint #2 **4** = To Direct Action **5** = To Hold Ramp/SPP **6** = To PID Set #2 **7** = PV = Input 2 **8** = PV = Input 3 **9** = To Run Ramp/SPP **10** = To Starting Segment (SPP)
Digital Input #2*	156	11	**0** = None **1** = To Manual **2** = To Local Setpoint #1 **3** = To Local Setpoint #2 **4** = To Direct Action **5** = To Hold Ramp/SPP **6** = To PID Set #2 **7** = PV = Input 2 **8** = PV = Input 3 **9** = To Run Ramp/SPP **10** = To Starting Segment (SPP)

*Loop 1 address only

Communications

Table 6-28 lists all the I.D. codes and ranges or selections for the function parameters in setup group "COMMUNICATIONS." Loop 1 or 2 is selected in the request message.

Table 6-28 Setup Group-Communications

Parameter Description	Identifying Code	Format Code	Range or Selection
Shed Time (Loop 1 address only)	154	11	**0** = No Shed **1** = 255 sample periods
Shed Mode and Output (Loop 1 address only) Selections apply to either loop	162	11	**0** = Last Mode and Last Output **1** = Manual Mode, Last Output **2** = Manual Mode, Failsafe Output **3** = Automatic Mode
Shed Setpoint Recall (Loop 1 address only) Selections apply to either loop	163	11	**0** = To Last Local Setpoint used **1** = Last Setpoint prior to Shed
Communication Override Units (Loop 1 address only) applies to Loop 1 and 2	161	11	**0** = Percent **1** = Engineering Units
Computer Setpoint Ratio	021	18	–20.00 to 20.00
Computer Setpoint Bias	022	18	–999 to 9999.

Alarms

Table 6-29 lists all the I.D. codes and ranges or selections for the function parameters in setup group "ALARMS."

Table 6-29 Setup Group-Alarms

Parameter Description	Identifying Code	Format Code	Range or Selection
Alarm 1 Setpoint 1 Value	009	18	Within the range of selected parameter or PV span for deviation alarm
Alarm 1 Setpoint 2 Value	010	18	Within the range of selected parameter or PV span for deviation alarm
Alarm 2 Setpoint 1 Value	011	18	Within the range of selected parameter or PV span for deviation alarm
Alarm 2 Setpoint 2 Value	012	18	Within the range of selected parameter or PV span for deviation alarm
Alarm 1 Setpoint 1 Type	140	11	**0** = None **1** = Input 1 **2** = Input 2 **3** = PV – Loop 1 **4** = Deviation – Loop 1 **5** = Output – Loop 1 **6** = Alarm on Shed **7** = SP Event ON **8** = SP Event OFF **9** = Input 3 **10** = PV – Loop 2 **11** = Deviation – Loop 2 **12** = Output – Loop 2
Alarm 1 Setpoint 2 Type	142	11	Same as 140
Alarm 2 Setpoint 1 Type	144	11	Same as 140
Alarm 2 Setpoint 2 Type	146	11	Same as 140
Alarm 1 Setpoint 1 Event	141	11	**0** = Low Alarm or begin segment **1** = High Alarm or end segment

6.11 Configuration Parameters - UDC 5000, Continued

Alarms, continued

Table 6-29 Setup Groups-Alarms, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Alarm 1 Setpoint 2 Event	143	11	**0** = Low Alarm or begin segment **1** = High Alarm or end segment
Alarm 2 Setpoint 1 Event	145	11	**0** = Low Alarm or begin segment **1** = High Alarm or end segment
Alarm 2 Setpoint 2 Event	147	11	**0** = Low Alarm or begin segment **1** = High Alarm or end segment
Alarm Hysteresis	041	18	0.0 to 5.0% of output or span

6.11 Configuration Parameters - UDC 5000, Continued

Display

Table 6-30 lists all the I.D. codes and ranges or selections for function parameters in setup group "DISPLAY." Loop 1 or 2 is selected by address in the request message.

Table 6-30 Setup Groups-Display

Parameter Description	Identifying Code	Format Code	Range or Selection
Temperature Units and Decimal Point Place	129	11	**Units** / **Decimal Places** **0** = °F 0 **1** = °C 0 **2** = °F 1 **3** = °C 1 **4** = °F 2 **5** = °C 2 **6** = °F 3 **7** = °C 3 **8** = None 0 **9** = None 1 **10** = None 2 **11** = None 3
Power Frequency (Loop 1 address only)	166	11	**0** = 60 Hertz **1** = 50 Hertz
Bar graph Configuration	191	11	**0** = Output **1** = Deviation **2** = Dev/Out

Section 7 – Read, Write and Override Parameters on UDC 6000 Process Controllers

7.1 Overview

Introduction

This section contains information concerning Reading, Writing, and Overriding parameters on the UDC 6000 Process Controller. There are two types of parameters:

- Data Transfer—these parameters include reading control data, option status, and reading or changing setpoints or output.
- Configuration Data—all the configuration data is list in the order in which it appears in the controller.

Each type of parameter has the identifying codes listed with it. Follow the message exchange rules listed in “Read and Write Operations.”

7.1 Overview - UDC 6000, Continued

What's in this section This section contains the following topics:

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7.1 Overview - UDC 6000, Continued

General information

Analog Parameters

- Whenever analog parameters 001 through 114 (those that can be changed via communications) are changed, a Write cycle occurs immediately after receipt of the message.

Override Parameters

- Override analog parameters 120, 123 and 125 (PV, output, computer setpoint) are not stored in non-volatile memory and can be changed as frequently as desired with no effect on non-volatile memory retentivity, but controller must remain in slave mode.

Digital Parameters

- Whenever digital configuration parameters 128 through 250 are updated via communications, the non-volatile memory is updated as soon as the message is received.

7.2 Reading Control Data - UDC 6000

Overview

You can Read the following control data from the UDC controller.

- Input 1
- Input 2
- Input 3
- Input 4
- Input 5
- PV
- Internal RV
- PV, Setpoint, Output

ATTENTION Loop 1 or Loop 2 is selected by address in request message.

I.D. codes

Use the identifying codes listed in Table 7-1 to read the specific items.

A Write request for these codes will result in an Error message.

Table 7-1 Control Data Parameters

Parameter Description	Identifying Code	Format Code	Range or Selection
Input #1	118	18	In Engineering Units or Percentage
Input #2	119	18	In Engineering Units or Percentage
Input #3	117	18	In Engineering Units or Percentage
Input #4	104	18	In Engineering Units or Percentage
Input #5	105	18	In Engineering Units or Percentage
PV	120	18	In Engineering Units or Percentage
Internal RV	121	18	In Engineering Units or Percentage
PV, Setpoint, and Output*	122	18	In Engineering Units or Percentage

*This Read request will give a three variable response (see Read/Write operation).

7.3 Read Options Status - UDC 6000

Read

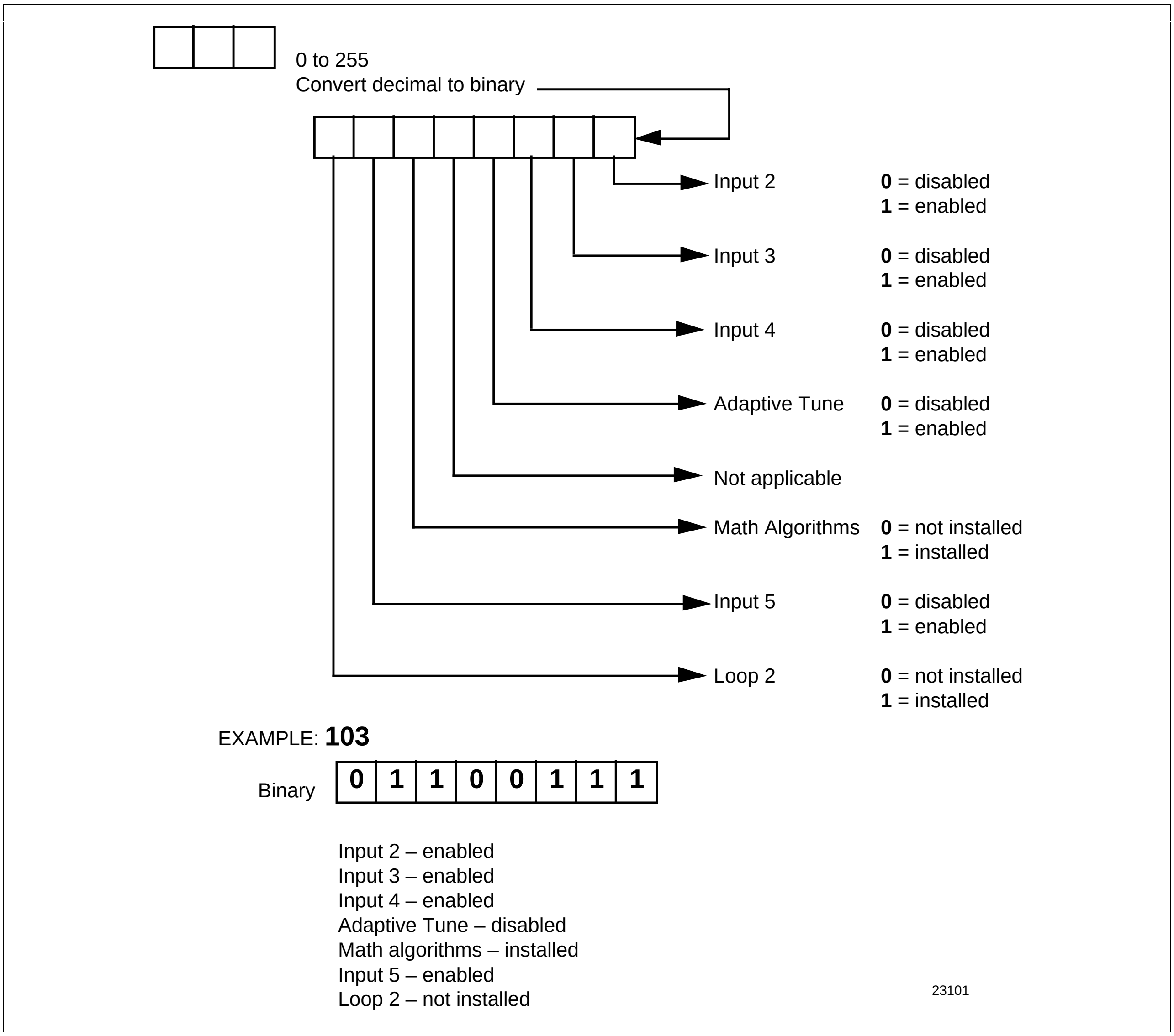
Doing a read of I.D. Code 185 listed in Table 7-2 will tell you which of the available options are enabled/installed or disabled/not installed.

Table 7-2 Option Status

Parameter Description	Identifying Code	Format Code	Range or Selection
Option Status (Read only)	185	11	See Figure 7-1

The data field in the response message will be a decimal number from 0 to 255. Convert the decimal number to binary as shown in Figure 7-1 to determine which options are or are not active.

Figure 7-1 Option Status Information



7.4 Miscellaneous Read Only's - UDC 6000

I.D. codes for Read Only's

The identifying codes listed in Table 7-3 represent some information that are Read only. No Writes allowed.

Table 7-3 Miscellaneous Read Only's

Parameter Description	Identifying Code	Format Code	Range or Selection
Software Type	157	11	READ only (UDC 6000) 71 = Basic UDC 6000 software 72 = Field upgrade for Adaptive Tune 73 = Field upgrade for Adaptive Tune + Math 74 = Field upgrade for Adaptive Tune + 2 Loop 75 = Field Upgrade for all options
Software Version	167	11	READ only 0 to 99
Digital Input Switch Status (Read only)	190	11	0 = Switch #1 open Switch #2 open 1 = Switch #1 closed Switch #2 open 2 = Switch #1 open Switch #2 closed 3 = Switch #1 closed Switch #2 closed
UDC Error Status (Definitions are listed in Table 7-4)	255	11	See below READ/WRITE* 001 = Emergency Manual 002 = Failsafe 004 = Working Calibration Checksum Error 008 = Configuration Checksum Error 016 = Factory Calibration Error 032 = Hardware Failure 064 = Restart after Shed 128 = Configuration/Calibration Memory Changed

*Write to clear.

For example:

If Read returns 192 (restart after shed-64 plus configuration change-128)

Write anything to I.D. Code 255

Read returns 000 (clear).

Error status definitions

Table 7-4 list the UDC error status codes and their definitions.

Table 7-4 Error Status Definitions

Status Code	Error	Definitions
001	Emergency Manual	Indicates that the output of the unit which has been in slave operations, is under manual control, locally. Error remains until local control is relinquished at the controller.
002	Failsafe	Error occurs whenever the control reverts to failsafe operation and remains as long as the condition exists.
004	Working Calibration Checksum Error	Indicates that an error exists in the working calibration data. Re-select the inputs to load factory calibration data or field calibrate the inputs.
008	Configuration Checksum Error	Error exists in the configuration data. Verify configuration data at the keyboard. Checksum will be recomputed by stepping the controller through the status tests.
016	Factory Calibration Error	Error exists in the factory calibration data and remains as long as the conditions exists.
032	Hardware Failure	Indicates either a RAM tests failure or Input 1, Input 2, Input 3 failure on two consecutive conversions.
064	Restart After Shed	Error occurs whenever a shed of slave override is performed. Error is reset following a WRITE command to I.D. Code 255 (064).
128	Configuration /Calibration Memory Changed	Error occurs whenever shed, configuration, or calibration changed. Also occurs whenever there is a change of state in 001, 002, 004, 008, or 016. Error is reset following a Write command to I.D. Code 255.

7.5 Setpoints - UDC 6000

Overview

You can use three separate local setpoints in the UDC Controller. The identifying codes listed Table 7-5 allow you to select which setpoint you want to use and to enter a value in Engineering Units or Percent (whichever is selected at Code 161) for that setpoint via communications.

ATTENTION Loop 1 or Loop 2 is selected by address in request message.

I.D. codes

Make your selection using I.D. Code 173 and enter the value for the setpoint chosen using ID Code 39 (SP1) or 53 (SP2) or 113 (SP3).

Table 7-5 Setpoint Code Selections

Parameter Description	Identifying Code	Format Code	Range or Selection
Local Setpoint #1	039	18	Value within the setpoint range limits
Local Setpoint #2	053	18	Value within the setpoint range limits
Local Setpoint #3	113	18	Value within the setpoint range limits
Local Setpoint Select	173	11	000 = Local Setpoint #1 only 001 = 2nd Local Setpoint via keyboard or communications 003 = 3rd Local Setpoint via keyboard or communications

Associated parameters

Refer to Table 7-6 to display or change any of the parameters associated with the setpoint.

Table 7-6 Setpoint Associated Parameters

Parameter	Code
Setpoint Limits	007, 008
Computer Setpoint	125

7.6 Using a Computer Setpoint (Overriding Controller Setpoint) - UDC 6000

Overview

You can use a setpoint generated from the computer to override the setpoint being used by the controller.

The value generated by the computer will have ratio and bias applied by the controller.

I.D. codes

Use the Identifying Code in Table 7-7 to enter the computer setpoint.

ATTENTION Loop 1 or Loop 2 is selected by address in request message.

Table 7-7 Computer Setpoint Selection

Parameter Description	Identifying Code	Format Code	Range or Selection
Computer Setpoint	125	18	Value from computer with Ratio/Bias applied by the controller. Within the Setpoint Range Limits in Engineering Units or Percent.

Shed

The computer setpoint override will continue until "SHED" from communications occurs or the controller is placed into monitor mode through communications. Doing periodic "SLAVE READS" within the shed time will allow the override to continue until communication is stopped and shed time elapses.

ATTENTION 0 Shed (code 154) allows the override to continue indefinitely or until the override is canceled. (See override selection ID Code 183.)

When SP is overridden, the left most digit in the upper display becomes a "C."

7.6 Using a Computer Setpoint (Overriding Controller Setpoint) - UDC 6000, Continued

Associated parameters

Refer to Table 7-8 for the codes to display or change any of the parameters associated with the computer setpoint.

Table 7-8 Computer Setpoint Associated Parameters

Parameter	Code
Setpoint Limits	007, 008
Local Setpoint #1	039
Local Setpoint #2	053
Local Setpoint #3	113
Local Setpoint Selection	173
Loop #1 Computer Setpoint Ratio	021
Loop #1 Computer Setpoint Bias	022

7.7 PV or Setpoint Override Selections - UDC 6000

Overview

You can Read the present override status or the PV or setpoint or you can do a write transaction to cancel the override.

I.D. codes

Use the Identifying Code in Table 7-9 to Read or Write your selection.

ATTENTION Loop 1 or Loop 2 is selected by address in request message.

Table 7-9 PV or Setpoint Override Selections

Parameter Description	Identifying Code	Format Code	Range or Selection
PV or Setpoint Override Selection	183	11	04 = PV 08 = Setpoint

7.8 Reading or Changing the Output - UDC 6000

Overview

You can read the output of a particular UDC controller (Read transaction) or you can change it to suit your needs. (Do a Write transaction.)

I.D. codes

Use the identifying code in Table 7-10 to monitor (Read) or change (Write the output (in manual only).

ATTENTION To Write (change) the output, the controller must first be in manual mode.

Table 7-10 Reading or Changing the Output

Parameter Description	Identifying Code	Format Code	Range or Selection
Output	123	18	-5 to +105% of full span (current output) 0 to 100% (relay type output)

Associated parameters

Refer to Table 7-11 for the codes required to display or change any of the parameters associated with the output.

Table 7-11 Associated Output Codes

Parameter	Code
Output Limits	014, 015
Output Dropoff Limits	020
Failsafe Output Values	040
Output Deadband	018
Output Hysteresis	019
Output Type	160

7.9 Local Setpoint/PID Selection/Setpoint Ramp Status - UDC 6000

Overview

Identifying Code 250 lets you

- Monitor your Setpoint Ramp Status
  - In Progress, Not in Progress
  - In Run, On Hold

  and determine which tuning set and local setpoint is being used.
- Abort, Run, Hold, or Start and SP Ramp.
- Select Local Setpoint #1, #2, or #3.
- Select Tuning Parameter Set #1 or #2.

ATTENTION Loop 1 or Loop 2 is selected by address in request message.

Read

When you do a Read, the code in Table 7-12 determines which parameters are active:

- Local Setpoint Selection
- Tuning Parameter Set Selection
- Setpoint Ramp Status

Table 7-12 I.D. Code 250 Reads

Parameter Description	Identifying Code	Format Code	Range or Selection
Read Local Set Point PID Set Selection and SP Ramp Status	250	11	See Figure 7-2

7.9 Local Setpoint/PID Selection/Setpoint Ramp Status - UDC 6000, Continued

Read, continued

Figure 7-2 I.D. Code 250 Indications

Tuning Set #2 Selection
Local Set Point #3 Selection

Tuning Set #1 Selection
Local Set Point #3 Selection

Tuning Set #2 Selection
Local Set Point #2 Selection

Tuning Set #2 Selection
Local Set Point #1 Selection

Tuning Set #1 Selection
Local Set Point #2 Selection

Tuning Set #1 Selection
Local Set Point #1 Selection

SET POINT RAMP INFORMATION (Note 1)						
SP Ramp, Enabled not in progress	**000**	**008**	**016**	**024**	**032**	**048**
SP Ramp in progress, Hold	**002**	**010**	**018**	**026**	**034**	**050**
SP Ramp in progress, Run	**003**	**011**	**019**	**027**	**035**	**051**

NOTE 1: This data is ignored in a Write command. Run/Hold set by Communications or by the Run/Hold key.

23102

7.9 Local Setpoint/PID Selection /Setpoint Ramp Status - UDC 6000, Continued

Write

A write of code 250 lets you change the SP ramp status as well as the local setpoint or tuning set selection. Refer to Table 7-13.

Table 7-13 I.D. Code 250 Writes

Parameter Description	Identifying Code	Format Code	Range or Selection
Write Local Setpoint/PID Set Selection and SP Ramp Status	250	11	000 = Abort SP Ramp 001 = Run SP Ramp 002 = Hold SP Ramp 003 = Start SP Ramp 004 = Change to Local Setpoint #1 005 = Change to Local Setpoint #2 006 = Change to PID Tuning Set #1 007 = Change to PID Tuning Set #2 008 = Change to Local Setpoint #3

ATTENTION

To enable or disable the setpoint ramp, refer to Identifying Code 150.

7.10 Configuration Parameters - UDC 6000

Overview

Listed on the next pages are the identifying codes for the parameters in the various Setup Groups in the UDC 6000 Process Controller. The table below lists the Setup Groups and their table numbers in which they are listed. Most of the parameters are configurable through the hosts. Some are Read Only and are indicated as such and cannot be changed.

Setup Group	Table Number
TUNING	7-14
TUNING L2	7-15
SP RAMP	7-16
ADAPTIVE	7-17
ALGORITHM	7-18
ADVANCED MATH	7-19
OUTPUT ALGORITHM	7-20
INPUT 1	7-21
INPUT 2	7-22
INPUT 3	7-23
INPUT 4	7-24
INPUT 5	7-25
CONTROL AND CONTROL 2	7-26
OPTIONS	7-27
COMMUNICATIONS	7-28
ALARMS	7-29
DISPLAY	7-30

Reading or writing

Do a Read or Write (see “Read/Write Operations”), depending on your requirements using the identifying code and format code listed in the tables. The range or selection available for each range is listed in the tables.

7.10 Configuration Parameters - UDC 6000, Continued

Tuning

Table 7-14 lists all the I.D. codes and ranges or selections for the function parameters in the setup Group "TUNING" (Loop 1).

Table 7-14 Setup Group-Tuning (Loop 1)*

Parameter Description	Identifying Code	Format Code	Range or Selection
Gain #1 or PB	001	18	0.01 to 1000
Rate #1	002	18	0.00 to 10.00
Reset #1	003	18	0.02 to 50.00
Manual Reset	013	18	-100 to +100
Gain #2 or PB	004	18	0.01 to 1000
Rate #2	005	18	0.00 to 10.00
Reset #2	006	18	0.02 to 50.00
Cycle Time #1	158	11	1 to 120 seconds
Cycle Time #2	159	11	1 to 120 seconds
Lockout (keyboard only) Changes to data always possible via communications regardless of this configuration.	132	11	**0** = None **1** = Calibration + Configuration **2** = Max Lockout **3** = Calibration only **4** = Calibration + Configuration + View
PV1 Value gain scheduling	001**	48	–9999 to 9999
PV2 Value gain scheduling	002**	48	–9999 to 9999
PV3 Value gain scheduling	003**	48	–9999 to 9999
PV4 Value gain scheduling	004**	48	–9999 to 9999
PV5 Value gain scheduling	005**	48	–9999 to 9999
PV6 Value gain scheduling	006**	48	–9999 to 9999
PV7 Value gain scheduling	007**	48	–9999 to 9999

Tuning, continued

Table 7-14 Setup Group-Tuning (Loop 1)*, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
PV8 Value gain scheduling	008**	48	–9999 to 9999
Gain 1 value gain scheduling	009**	48	0.1 to 999.9
Gain 2 value gain scheduling	010**	48	0.1 to 999.9
Gain 3 value gain scheduling	011**	48	0.1 to 999.9
Gain 4 value gain scheduling	012**	48	0.1 to 999.9
Gain 5 value gain scheduling	013**	48	0.1 to 999.9
Gain 6 value gain scheduling	014**	48	0.1 to 999.9
Gain 7 value gain scheduling	015**	48	0.1 to 999.9
Gain 8 value gain scheduling	016**	48	0.1 to 999.9

*Loop selected by address in request message.

**Extended Codes—Use Format Code 48.

Tuning 2

Table 7-15 lists all the I.D. codes and ranges or selections for the function parameters in the setup Group “TUNING 2.”

Table 7-15 Setup Group-Tuning 2* (Loop 2)

Parameter Description	Identifying Code	Format Code	Range or Selection
Gain #3 or PB	001	18	0.1 to 1000
Rate #3	002	18	0.00 to 10.00
Reset #3	003	18	0.02 to 50.00
Man 3 Reset	013	18	–100 to +100
Gain #4 or PB	004	18	0.1 to 1000
Rate #4	005	18	0.00 to 10.00
Reset #4	006	18	0.02 to 50.00
Cycle Time #3	158	11	1 to 120 seconds
Cycle Time #4	159	11	1 to 120 seconds
PV1 Value gain scheduling	001**	48	–9999 to 9999
PV2 Value gain scheduling	002**	48	–9999 to 9999
PV3 Value gain scheduling	003**	48	–9999 to 9999
PV4 Value gain scheduling	004**	48	–9999 to 9999
PV5 Value gain scheduling	005**	48	–9999 to 9999
PV6 Value gain scheduling	006**	48	–9999 to 9999
PV7 Value gain scheduling	007**	48	–9999 to 9999
PV8 Value gain scheduling	008**	48	–9999 to 9999
Gain 1 value gain scheduling	009**	48	0.1 to 999.9

**Extended Codes—Use Format Code 48.

7.10 Configuration Parameters - UDC 6000, Continued

Tuning 2, continued

Table 7-15 Setup Group-Tuning 2* (Loop 2), Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Gain 2 value gain scheduling	010**	48	0.1 to 999.9
Gain 3 value gain scheduling	011**	48	0.1 to 999.9
Gain 4 value gain scheduling	012**	48	0.1 to 999.9
Gain 5 value gain scheduling	013**	48	0.1 to 999.9
Gain 6 value gain scheduling	014**	48	0.1 to 999.9
Gain 7 value gain scheduling	015**	48	0.1 to 999.9
Gain 8 value gain scheduling	016**	48	0.1 to 999.9

* Loop selected by address in request message.

**Extended Codes—Use Format Code 48.

SP ramp/rate

Table 7-16 lists all the I.D. codes and ranges or selections for the function parameters in setup group “SP RAMP/RATE.” Loop 1 or 2 selected by address in request message.

Table 7-16 Setup Group-Setpoint Ramp/Rate

Parameter Description	Identifying Code	Format Code	Range or Selection
Setpoint Ramp Enable NOTE: Cannot be enabled if **Setpoint Rate** is enabled.	150	11	**0** = OFF **2** = SP Ramp enabled – Loop 1 **3** = SP Ramp enabled – Loop 2 **4** = SP Ramp enabled – both loops
Single SP Ramp Time	174	11	0 to 255 (minutes) applies to whichever loop has SP Ramp configured
Final Ramp SP Value	026	18	PV Range in engineering units
Setpoint Rate Enable NOTE: Cannot be enabled if **Setpoint Ramp** is enabled.	180	11	**0** = OFF **1** = SP Rate enabled – Loop 1 **2** = SP Rate enabled – Loop 2 **3** = SP Rate enabled – both loops
SP Rate Up Value	057	18	0 to 9999
SP Rate Down Value	058	18	0 to 9999

Adaptive Tune

Table 7-17 lists all the I.D. codes and ranges or selections for the function parameters setup group “ADAPTIVE TUNE.” Loop 1 or 2 is selected by address in request message.

Table 7-17 Setup Group-Adaptive Tune

Parameter Description	Identifying Code	Format Code	Range or Selection
Adaptive Tune Enable – Loop 1	152	11	**0** = Disabled **7** = SP Tune **8** = SP + PV Tune
Setpoint Change	153	11	5 to 15% span
Process Gain	114	18	0.01 to 50.0
Adaptive Tune Error (Read only)	151	11	**0** = None **1** = Output less than or greater than Output Limits **2** = Output greater or less than Heat/Cool Limits **3** = Not applicable **4** = PV change not sufficient **5** = Process Identification failed **6** = Calculated Reset outside Reset Limits **7** = Calculated Gain outside Gain Limits **8** = Adaptive tune aborted on command **9** = Input 1 error detected **10** = Adaptive Tune illegal during Ramp **11** = Adaptive Tune aborted when external switch detected. **12** = Running

7.10 Configuration Parameters - UDC 6000, Continued

Algorithm

Table 7-18 lists all the I.D. codes and ranges or selections for the Function Parameters in setup group "ALGORITHM." Loop 1 or 2 is selected is the request message.

Table 7-18 Setup Group-Algorithm

Parameter Description	Identifying Code	Format Code	Range or Selection
Loop Rate (conversion/ second) (**on Loop 1 address only**)	192	11	**Loop 1** **Loop 2** **0** = 12x disabled **1** = 9x disabled **2** = 6x 3x **3** = 3x 3x
Control Algorithm Selection †Not available for Loop 2	128	11	**0** = ON/OFF† **1** = PID-A **2** = PID-B **3** = PD-A with Manual Reset **4** = Three Position Step†
Loop 2 Selection (**Loop 2 address only**)	168	11	**0** = Loop 1 only **1** = Loop 2 enabled **2** = Loop 1 and 2 are cascaded. Loop 2 primary – Loop 1 secondary.
Output Override Hi or Lo Select (**on Loop 2 address only – Loop 1 Output in Auto**)	136	11	**0** = Disabled **1** = Hi Select **2** = Lo Select

Algorithm, continued

Table 7-18 Setup Group-Algorithm, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Input Algorithm 1 †Input source selected via ID 193, 194, 195.	131	11	**0** = None **3** = Weighted Average† **8** = Feed forward - Summer† **13** = √Multiplier Divider† **14** = √Multiplier† **15** = Multiplier Divider† **16** = Multiplier† **17** = Summer (with Ratio and Bias)† **18** = Input Hi Select (with Ratio and Bias)† **19** = Input Lo Select (with Ratio and Bias)† **25** =Feedforward/ Multiplier
Input Algorithm 2 †Input source selected via ID 164, 165, 188.	137	11	**0** = None **3** = Weighted Average† **8** = Feed forward - Summer† **13** = √Multiplier Divider† **14** = √Multiplier† **15** = Multiplier Divider† **16** = Multiplier† **17** = Summer (with Ratio and Bias)† **18** = Input Hi Select (with Ratio and Bias)† **19** = Input Lo Select (with Ratio and Bias)† **25** =Feedforward/ Multiplier
Constant K for Math Algorithms	045	18	0.001 to 1000
Calc High	054 (Loop 1) 051 (Loop 2)	18	–999 to +9999 in Engineering Units
Calc Low	055 (Loop 1) 052 (Loop 2)	18	–999 to +9999 in Engineering Units
Constant K for Math Algorithm 2	047	18	0.001 to 1000

7.10 Configuration Parameters - UDC 6000, Continued

Algorithm, continued

Table 7-18 Setup Group-Algorithm, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Input Algorithm 1 Input A Selection (used with ID 131 math calculations)	193	11	**0** = Input 1 **1** = Input 2 **2** = Input 3 **3** = Input 4 **4** = Input 5
Input Algorithm 1 Input B Selection (used with ID 131 math calculations)	194	11	**0** = Input 1 **1** = Input 2 **2** = Input 3 **3** = Input 4 **4** = Input 5
Input Algorithm 1 Input C Selection (used with ID 131 math calculations)	195	11	**0** = None **1** = Input 1 **2** = Input 2 **3** = Input 3 **4** = Input 4 **5** = Input 5
Input Algorithm 2 Input A Selection (used with ID 137 math calculations)	164	11	**0** = Input 1 **1** = Input 2 **2** = Input 3 **3** = Input 4 **4** = Input 5
Input Algorithm 2 Input B Selection (used with ID 137 math calculations)	165	11	**0** = Input 1 **1** = Input 2 **2** = Input 3 **3** = Input 4 **4** = Input 5
Input Algorithm 2 Input C Selection (used with 137 math calculations)	188	11	**0** = None **1** = Input 1 **2** = Input 2 **3** = Input 3 **4** = Input 4 **5** = Input 5
8-segment Characterizer	179	11	**0** = Disable **1** = Input 2 **2** = Loop 1 – Output **3** = Loop 2 – Output

Algorithm, continued

Table 7-18 Setup Group-Algorithm, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
X0 Input to 8-segment characterizer	059	18	0 to 99.99
X1 Input	060	18	0 to 99.99
X2 Input	061	18	0 to 99.99
X3 Input	062	18	0 to 99.99
X4 Input	063	18	0 to 99.99
X5 Input	064	18	0 to 99.99
X6 Input	065	18	0 to 99.99
X7 Input	066	18	0 to 99.99
X8 Input	067	18	0 to 99.99
Y0 Output from 8-segment Characterizer	068	18	0 to 99.99
Y1 Output	069	18	0 to 99.99
Y2 Output	070	18	0 to 99.99
Y3 Output	071	18	0 to 99.99
Y4 Output	072	18	0 to 99.99
Y5 Output	073	18	0 to 99.99
Y6 Output	074	18	0 to 99.99
Y7 Output	075	18	0 to 99.99
Y8 Output	076	18	0 to 99.99
Polynomial	181	11	**0** = Disable **1** = Input 1 **2** = Input 2 **3** = Input 3 **4** = Input 4 **5** = Input 5

7.10 Configuration Parameters - UDC 6000, Continued

Algorithm, continued

Table 7-18 Setup Group-Algorithm, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
C0 – Polynomial Coefficient	081	18	–99.99 to 99.99
C1 – Coefficient	082	18	–9.999 to 9.999
C2 – Coefficient	083	18	–9.999 to 9.999
C3 – Coefficient	084	18	–9.999 to 9.999
C4 – Coefficient	085	18	–9.999 to 9.999
C5 – Coefficient	086	18	–9.999 to 9.999
Totalizer	184	11	**0** = Disable **1** = Input 1 **2** = Input Algorithm 1 **3** = Input Algorithm 2
Totalizer Scale Factor (display only)	175	11	**0** = 10^0 = 1 **1** = 10^1 = 10 **2** = 10^2 = 100 **3** = 10^3 = 1,000 **4** = 10^4 = 10,000 **5** = 10^5 = 100,000 **6** = 10^6 = 1,000,000
Totalizer Reset Lock (when locked, totalizer cannot be reset from keyboard)	176	11	**0** = Unlock **1** = Lock
Current Totalizer Value	103	11	0 to 10^{14}–1 NOTE: A value of “0” may be written to reset the totalizer. A write of any other value is not accepted.
Totalizer Integration Rate	177	11	**0** = Second **1** = Minute **2** = Hour **3** = Day **4** = Million/Day

Advanced math

Table 7-19 lists all the I.D. codes and ranges and selections for the function parameters in setup group "ADVANCED MATH." Loop 1 or 2 is selected request message.

Table 7-19 Setup Group-Advanced Math

Parameter Description	Identifying Code	Format Code	Range or Selection
Logic Gates	128**	41	**0** = Disable **1** = Enable
Gate 1 Type	129**	41	**0** = Not Used **1** = OR **2** = NOR **3** = AND **4** = NAND **5** = XOR **6** = XNOR **7** = BLTA **8** = BGTA
Gate 1 Input A (for gate types 1 through 6)	130**	41	**0** = Digital Input 1 **1** = Digital Input 2 **2** = Digital Output 1 **3** = Digital Output 2 **4** = Digital Output 3 **5** = Digital Output 4 **6** = Output from gate 1 **7** = Output from gate 2 **8** = Output from gate 3 **9** = Output from gate 4 **10** = Output from gate 5 **11** = Fixed on – always "1" **12** = Fixed off – always "0" **13** = Manual/Auto mode **14** = Local/Remote SP **15** = Disable/Enable Adaptive Tune **16** = Manual/Auto Mode (Loop 2 only)

**Extended Code—Use Format Code 41.

Advanced math, continued

Table 7-19 Setup Group-Advanced Math, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Gate 1 Input A (for gate types 1 through 6), Continued	130**	41	**17** = Local/Remote SP (Loop 2 only) **18** = Disable/Enable Adaptive Tune (Loop 2 only)
Gate 1 Input A (for gate type 7 or 8)	131**	41	**0** = Input 1 **1** = Input 2 **2** = Input 3 **3** = Input 4 **4** = Input 5 **5** = Loop 1 PV **6** = Loop 1 SP **7** = Constant K **8** = Loop 2 PV (Loop 2 address only) **9** = Loop 2 SP (Loop 2 address only)
Gate 1 Input A “K” Value (appears only if selection 7 – Constant K is made at ID Code 131)	017***	48	–999.0 to 9999
Gate 1 Input B (for gate types 1 through 6)	132**	41	Same as 130
Gate 1 Input B (for gate type 7 or 8	133**	41	**0** = Input 1 **1** = Input 2 **2** = Input 3 **3** = Input 4 **4** = Input 5 **5** = Loop 1 PV **6** = Loop 1 SP **7** = Totalizer **8** = Loop 2 PV (Loop 2 address only) **9** = Loop 2 SP (Loop 2 address only)

**Extended Code—Use Format Code 41.

***Extended Codes—Use Format Code 48.

Advanced math, continued

Table 7-19 Setup Group-Advanced Math, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Gate 1 Output	134**	41	**0** = Digital Output 1 **1** = Digital Output 2 **2** = Digital Output 3 **3** = Digital Output 4 **4** = Any Gate **5** = Manual/Auto Mode **6** = Local/Remote SP **7** = Disable/Enable Adaptive **8** = Reset Totalizer **9** = Manual/Auto Mode (Loop 2 address only) **10** = Local/Remote SP (Loop 2 address only) **11** = Disable/Enable Adaptive Tune (Loop 2 address only)
Gate 2 Type	135**	41	Same as 129
Gate 2 Input A (for gate types 1 through 6)	136**	41	Same as 130
Gate 2 Input A (for gate type 7 or 8)	137**	41	Same as 131
Gate 2 Input A “K” Value (appears only if selection 7 – Constant K is made at ID code 137)	018***	48	–999.0 to 9999
Gate 2 Input B (for gate types 1 through 6)	138**	41	Same as 130
Gate 2 Input B (for gate type 7 or 8)	139**	41	Same as 133
Gate 2 Output	140**	41	Same as 134
Gate 3 Type	141**	41	Same as 129

**Extended Code—Use Format Code 41.

***Extended Codes—Use Format Code 48.

Advanced math, continued

Table 7-19 Setup Group-Advanced Math, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Gate 3 Input A (for gate types 1 through 6)	142**	41	Same as 130
Gate 3 Input A (for gate type 7 or 8)	143**	41	Same as 131
Gate 3 Input A “K” Value (appears only if selection 7 – Constant K is made at ID code 143)	019***	48	–999.0 to 9999
Gate 3 Input B (for gate types 1 through 6)	144**	41	Same as 130
Gate 3 Input B (for gate type 7 or 8)	145**	41	Same as 133
Gate 3 Output	146**	41	Same as 134
Gate 4 Type	147**	41	Same as 129
Gate 4 Type A (for gate types 1 through 6)	148**	41	Same as 130
Gate 4 Input A (for gate type 7 or 8)	149**	41	Same as 131
Gate 4 Input A “K” Value (appears only if selection 7 – Constant K is made at ID code 149)	020***	48	–999.0 to 9999
Gate 4 Input B (for gate types 1 through 6)	150**	41	Same as 130
Gate 4 Input B (for gate type 7 or 8)	151**	41	Same as 133
Gate 4 Output	152**	41	Same as 134
Gate 5 Type	153**	41	Same as 129

**Extended Code—Use Format Code 41.

***Extended Codes—Use Format Code 48.

Advanced math, continued

Table 7-19 Setup Group-Advanced Math, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Gate 5 Input A (for gate types 1 through 6)	154**	41	Same as 130
Gate 5 Input A (for gate type 7 or 8)	155**	41	Same as 131
Gate 5 Input A "K" Value (appears only if selection 7 – Constant K is made at ID code 151)	021***	48	–999.0 to 9999
Gate 5 Input B (for gate types 1 through 6)	156**	41	Same as 130
Gate 5 Input B (for gate type 7 or 8)	157**	41	Same as 133
Gate 5 Output	158**	41	Same as 134

**Extended Code—Use Format Code 41.

***Extended Codes—Use Format Code 48.

Output Algorithm

Table 7-20 lists all the I.D. codes and ranges or selections for the function parameters in setup group "OUTPUT ALGORITHM." Loop 1 or 2 is selected in the request message.

Table 7-20 Setup Group-Output Algorithm

Parameter Description	Identifying Code	Format Code	Range or Selection
Output Algorithm	160	11	**0** = None (Loop 1) – Disabled (Loop 2) **2** = Time Simplex **3** = Time Duplex (Loop 1 only) **4** = Current **5** = Current Duplex **6** = Relay/Current - Relay on Heat, Current full **7** = Current/Relay - Relay on Cool, Current full **8** = Current Duplex **9** = Relay/Current - Relay on Heat, Current Split **10** = Relay/Current - Relay on Cool, Current Split
Digital Output State at 0% Output (on Loop 1 address only)	136	11	**0** = Out 3 de-energized Out 4 de-energized **1** = Out 3 energized Out 4 de-energized **2** = Out 3 de-energized Out 4 energized **3** = Out 3 energized Out 4 energized

Input 1

Table 7-21 lists all the I.D. codes and ranges or selections for the function parameters in setup group "INPUT 1."

Table 7-21 Setup Group-Input 1 (Loop 1 Address only)

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 1 Type	168	11	0 = OFF 27 = Linear NOTE: If 0 is received as a write, the input is disabled and the transmitter selection is lost. Whenever 27 is received as a write, if the input was previous disabled, the transmitter selection is set to linear with a range indeterminate; however, if the input was previously enabled, the transmitter type is unchanged.
Input 1 Transmitter Characterization	169	11	**0** = B T/C **1** = E T/C **2** = J T/C **3** = K T/C **4** = NiNiMo T/C **5** = R T/C **6** = S T/C **7** = T T/C **8** = W T/C **11** = Nicrosil-Nisil T/C **12** = 100 Pt RTD **19** = Linear **20** = Sq. Root **27** = 100 Pt RTD Low **28** = 200 Pt RTD **29** = 500 Pt RTD
Input 1 High Range Value	029	18	–999. to 9999. Engineering Units
Input 1 Low Range Value	030	18	–999 to 9999. Engineering Units
Input 1 Ratio	106	18	–20.00 to 20.00
Input 1 Bias	107	18	–999 to 9999. Engineering Units
Input 1 Filter	042	18	0 to 120 seconds

7.10 Configuration Parameters - UDC 6000, Continued

Input 2

Table 7-22 lists all the I.D. codes and ranges or selections for the function parameters in setup group "INPUT 2."

Table 7-22 Setup Group-Input 2 (Loop 1 Address only)

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 2 Type	170	11	0 = OFF 27 = Linear NOTE: If 0 is received as a write, the input is disabled and the transmitter selection is lost. Whenever 27 is received as a write, if the input was previous disabled, the transmitter selection is set to linear with a range indeterminate; however, if the input was previously enabled, the transmitter type is unchanged.
Input 2 Transmitter Characterization	171	11	**0** = B T/C **1** = E T/C **2** = J T/C **3** = K T/C **4** = NiNiMo T/C **5** = R T/C **6** = S T/C **7** = T T/C **8** = W T/C **11** = Nicrosil-Nisil T/C **12** = 100 Pt RTD **19** = Linear **20** = Sq. Root **27** = 100 Pt RTD Low **28** = 200 Pt RTD **29** = 500 Pt RTD
Input 2 High Range Value	035	18	–999. to 9999. Engineering Units
Input 2 Low Range Value	036	18	–999 to 9999. Engineering Units
Input 2 Ratio	037	18	–20.00 to 20.00
Input 2 Bias	038	18	–999 to 9999. Engineering Units
Input 2 Filter	043	18	0 to 120 seconds

Input 3

Table 7-23 lists all the I.D. codes and ranges or selections for the function parameters in setup group “INPUT 3.”

Table 7-23 Setup Group-Input 3 (Loop 1 Address only)

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 3 Type	186	11	0 = OFF 27 = Linear NOTE: If 0 is received as a write, the input is disabled and the transmitter selection is lost. Whenever 27 is received as a write, if the input was previous disabled, the transmitter selection is set to linear with a range indeterminate; however, if the input was previously enabled, the transmitter type is unchanged.
Input 3 Transmitter Characterization	187	11	**0** = B T/C **1** = E T/C **2** = J T/C **3** = K T/C **4** = NiNiMo T/C **5** = R T/C **6** = S T/C **7** = T T/C **8** = W T/C **11** = Nicrosil-Nisil T/C **12** = 100 Pt RTD **19** = Linear **20** = Sq. Root **27** = 100 Pt RTD Low **28** = 200 Pt RTD **29** = 500 Pt RTD **30** = IN2 no Ratio/Bias
Input 3 High Range Value	108	18	–999. to 9999. engineering units
Input 3 Low Range Value	109	18	–999 to 9999. engineering units
Input 3 Ratio	110	18	–20.00 to 20.00
Input 3 Bias	111	18	–999 to 9999. engineering units
Input 3 Filter	112	18	0 to 120 seconds
Input 3 Deadtime	98	18	0 to 60 minutes

Input 4

Table 7-24 lists all the I.D. codes and ranges or selections for the function parameters in setup group “INPUT 4.”

Table 7-24 Setup Group-Input 4 (Loop 1 Address only)

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 4 Type	202	11	0 = OFF 27 = Linear NOTE: If 0 is received as a write, the input is disabled and the transmitter selection is lost. Whenever 27 is received as a write, if the input was previous disabled, the transmitter selection is set to linear with a range indeterminate; however, if the input was previously enabled, the transmitter type is unchanged.
Input 4 Transmitter Characterization	203	11	**0** = B T/C **1** = E T/C **2** = J T/C **3** = K T/C **4** = NiNiMo T/C **5** = R T/C **6** = S T/C **7** = T T/C **8** = W T/C **11** = Nicrosil-Nisil T/C **12** = 100 Pt RTD **19** = Linear **20** = Sq. Root **27** = 100 Pt RTD Low **28** = 200 Pt RTD **29** = 500 Pt RTD
Input 4 High Range Value	087	18	–999. to 9999. engineering units
Input 4 Low Range Value	088	18	–999 to 9999. engineering units
Input 4 Ratio	089	18	–20.00 to 20.00
Input 4 Bias	090	18	–999 to 9999. engineering units
Input 4 Filter	091	18	0 to 120 seconds

Input 5

Table 7-25 lists all the I.D. codes and ranges or selections for the function parameters in setup group “INPUT 5.”

Table 7-25 Setup Group-Input 5 (Loop 1 Address only)

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 5 Type	204	11	**0** = OFF **1** = E T/C **2** = J T/C **3** = K T/C **4** = NiNiMo T/C **5** = R T/C **6** = S T/C **7** = T T/C **8** = W T/C **9** = B T/C **11** = Nicrosil Nisil T/C **12** = 100 Pt RTD **14** = 200 Pt RTD **15** = 500 Pt RTD **19** = Radiamatic **22** = 4-20 mA **23** = 0-10 mV **24** = 10-50 mV **25** = 1 to 5 volts **26** = 0 to 10 volts **36** = 100 Pt RTD Low **37** = Pulse (only when pulse input board is installed)
Input 5 Type (when pulse input is installed – i.e. 37 above)	207	11	**0** = Disabled **1** = Frequency Input **2** = Pulse Input

Input 5, continued

Table 7-25 Setup Group-Input 5 (Loop 1 Address only), Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 5 Transmitter Characterization	205	11	**0** = B T/C **1** = E T/C **2** = J T/C **3** = K T/C **4** = NiNiMo T/C **5** = R T/C **6** = S T/C **7** = T T/C **8** = W T/C **11** = Nicrosil-Nisil T/C **12** = 100 Pt RTD **19** = Linear **20** = Sq. Root **27** = 100 Pt RTD Low **28** = 200 Pt RTD **29** = 500 Pt RTD
Input 5 High Range Value	092	18	–999. to 9999. engineering units
Input 5 Low Range Value	093	18	–999 to 9999. engineering units
Input 5 Ratio	094	18	–20.00 to 20.00
Input 5 Bias	095	18	–999 to 9999. engineering units
Input 5 Filter	096	18	0 to 120 seconds
Input 5 Burnout	206	11	**0** = None **1** = Upscale **2** = Downscale
Input 5 Emissivity	097	18	0.01 to 1.00

Control and Control 2

Table 7-26 lists all the I.D. codes and ranges or selections for the function prompts in setup group “CONTROL OR CONTROL 2.” Loop 1 or 2 address selected in request message.

Table 7-26 Setup Group-Control and Control 2

Parameter Description	Identifying Code	Format Code	Range or Selection
PV Source	196	11	**0** = Input 1 **1** = Input 2 **2** = Input 3 **3** = Input 4 **4** = Input 5 **5** = Input Algorithm 1
Tuning Parameter Selection	172	11	**0** = One set only **1** = 2 sets keyboard selected **2** = 2 sets with PV automatic switchover **3** = 2 sets with setpoint automatic switchover
Automatic Switchover Value (used with 172 selection 2 or 3)	056	18	Within the PV Range in engineering units
Local Setpoint Source	173	11	**0** = One Local Setpoint **1** = Two Local Setpoints **3** = Three Local Setpoints

Control and Control 2, continued

Table 7-26 Setup Group-Control and Control 2, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Setpoint Source	197	11	**0** = Local Setpoint only **1** = Remote Setpoint via Input 2 **2** = Remote Setpoint via Input 3 **3** = Remote Setpoint via Input 4 **4** = Remote Setpoint via Input 5 **5** = Loop 1 Input Algorithm **6** = Loop 2 Input Algorithm
Auto-Bias (LSP to RSP)	198	11	**0** = Disabled (bump) **1** = Enabled (bumpless)
Setpoint Tracking	138	11	**0** = NO **1** = PV **2** = RSP
Control Setpoint High Limit	007	18	0 to 100% of PV (engineering units)
Control Setpoint Low Limit	008	18	0 to 100% of PV (engineering units)
Control Output Direction/Alarm Outputs	135	11	**0** = Direct Action Alarm Output energized **1** = Direct Action Alarm Output de-energized **2** = Reverse Action Alarm Output energized **3** = Reverse Action Alarm Output de-energized
High Output Limit	014	18	–5 to 105% of output
Low Output Limit	015	18	–5 to 105% of output
High Reset Limit	016	18	–5 to 105% of output

Control and Control 2, continued

Table 7-26 Setup Group-Control and Control 2, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Low Reset Limit	017	18	–5 to 105% of output
Output Rate	182	11	**0** = Disable **1** = Enable
Output Rate Value Up	044	18	0 to 9999%/minute
Output Rate Value Down	046	18	0 to 9999%/minute
Controller Dropoff Value	020	18	–5 to 105% of output
Output Deadband	018	18	–5 to +25.0%
Output Hysteresis (Loop 1 address only)	019	18	0 to 5.0%
Failsafe Mode	199	11	**0** = Latching **1** = Non latching
Failsafe Output Level	040	18	0 to 100%
Proportional Band Units (Loop 1 address only) applies to Loop 1 and 2	148	11	**0** = Gain **1** = Proportional band
Reset Units (Loop 1 address only) applies to Loop 1 and 2	149	11	**0** = Minutes **1** = RPM

Options

Table 7-27 lists all the I.D. codes and ranges or selections for the function parameters in setup group "OPTIONS." Loop 1 or 2 is selected in the request message.

Table 7-27 Setup Groups-Options

Parameter Description	Identifying Code	Format Code	Range or Selection
2nd Current Output	134	11	**0** = None **1** = Input 1 **2** = Input 2 **3** = PV – Loop 1 **4** = Deviation – Loop 1 **5** = Output – Loop 1 **6** = Setpoint – Loop 1 **7** = Input 3 **8** = PV – Loop 2 **9** = Deviation – Loop 2 **10** = Output – Loop 2 **11** = Setpoint – Loop 2 **12** = Input 4 **13** = Input 5
Low Scaling Factor (Loop 1 address only)	049	18	Within the range of the selected variable in I.D. 134
High Scaling Factory (Loop 1 address only)	050	18	Within the range of the selected variable in I.D. 134

7.10 Configuration Parameters - UDC 6000, Continued

Options, continued

Table 7-27 Setup Groups-Options, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Digital Input #1 (Loop 1 address only)	155	11	**0** = None **1** = To Manual **2** = To Local Setpoint #1 **3** = To Local Setpoint #2 **4** = To Direct Action **5** = To Hold Ramp **6** = To PID Set #2 **7** = PV = Input 2 **8** = PV = Input 3 **9** = To Run Ramp **10** = To Local Setpoint #3 **11** = PV = Input 4 **12** = PV = Input 5 **13** = To Manual/ Failsafe Output **14** = Output 1 tracks Input 4 **15** = Output 2 tracks Input 4 **16** = Output 2 overrides Output 1 **17** = Pulse Down **18** = Out 3 On **19** = Out 4 On **20** = Inhibit Reset **21** = To RSP **22** = Display – Loop 2 **23** = External Reset Feedback For 0 through 255 loop selected by address in request message. For digital input combinations see Figure 7-3.

7.10 Configuration Parameters - UDC 6000, Continued

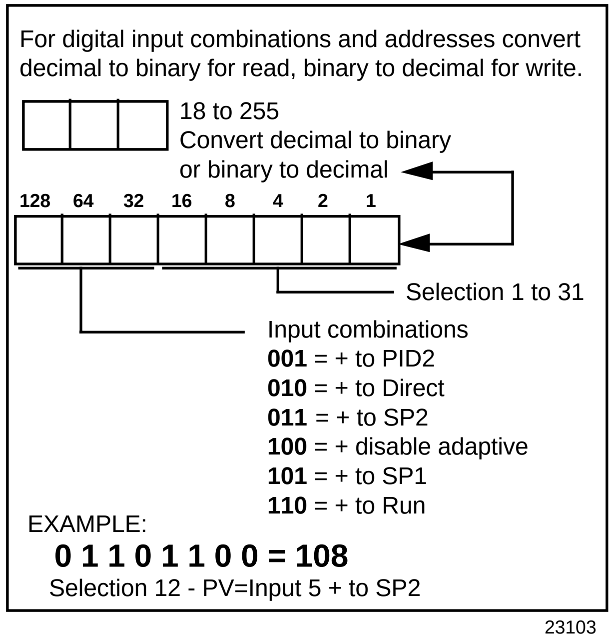
Options, continued

Table 7-27 Setup Groups-Options, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Digital Input #2 (Loop 1 address only)	156	11	**0** = None **1** = To Manual **2** = To Local Setpoint #1 **3** = To Local Setpoint #2 **4** = To Direct Action **5** = To Hold Ramp **6** = To PID Set #2 **7** = PV = Input 2 **8** = PV = Input 3 **9** = To Run Ramp **10** = To Local Setpoint #3 **11** = PV = Input 4 **12** = PV = Input 5 **13** = To Manual/ Failsafe Output **14** = Output 1 tracks Input 4 **15** = Output 2 tracks Input 4 **16** = Output 2 overrides Output 1 **17** = Pulse Down **18** = Out 3 On **19** = Out 4 On **20** = Inhibit Reset **21** = To RSP **22** = Display – Loop 2 **23** = External Reset Feedback Digital Input 2 combinations are the same as Digital Input 1, Figure 7-3.

Options, continued

Figure 7-3 Digital Input Combinations



Communications

Table 7-28 lists all the I.D. codes and ranges or selections for the function parameters in setup group "COM." Loop 1 or 2 is selected in the request message.

Table 7-28 Setup Group-Communications

Parameter Description	Identifying Code	Format Code	Range or Selection
Shed Time (Loop 1 address only)	154	11	**0** = No Shed **1** = 255 sample periods
Shed Mode and Output (Loop 1 address only) Selections apply to either loop	162	11	**0** = Last Mode and Last Output **1** = Manual Mode, Last Output **2** = Manual Mode, Failsafe Output **3** = Automatic Mode
Shed Setpoint Recall (Loop 1 address only) Selections apply to either loop	163	11	**0** = To Last Local Setpoint used **1** = Last Setpoint prior to Shed
Communication Override Units (Loop 1 address only) applies to Loop 1 and 2	161	11	**0** = Percent **1** = Engineering Units
Computer Setpoint Ratio	021	18	–20.00 to 20.00
Computer Setpoint Bias	022	18	–999 to 9999.

7.10 Configuration Parameters - UDC 6000, Continued

Alarms

Tables 7-29 lists all the I.D. codes and ranges or selections for the function parameters in setup group “ALARMS.”

Table 7-29 Setup Group-Alarms (Loop 1 Address only)

Parameter Description	Identifying Code	Format Code	Range or Selection
Alarm 1 Setpoint 1 Value	009	18	Within the range of selected parameter or PV span for deviation alarm
Alarm 1 Setpoint 2 Value	010	18	Within the range of selected parameter or PV span for deviation alarm
Alarm 2 Setpoint 1 Value	011	18	Within the range of selected parameter or PV span for deviation alarm
Alarm 2 Setpoint 2 Value	012	18	Within the range of selected parameter or PV span for deviation alarm
Alarm 1 Setpoint 1 Type	140	11	**0** = None **1** = Input 1 **2** = Input 2 **3** = PV – Loop 1 **4** = Deviation – Loop 1 **5** = Output – Loop 1 **6** = Alarm on Shed **9** = Input 3 **10** = PV – Loop 2 **11** = Deviation – Loop 2 **12** = Output – Loop 2 **13** = Input 4 **14** = Input 5 **15** = Manual-Loop 1 **16** = Manual-Loop 2 **17** = RSP-Loop 1 **18** = RSP-Loop 2 **19** = Failsafe-Loop 1 **20** = Failsafe-Loop 2
Alarm 1 Setpoint 2 Type	142	11	Same as 140
Alarm 2 Setpoint 1 Type	144	11	Same as 140
Alarm 2 Setpoint 2 Type	146	11	Same as 140
Alarm 1 Setpoint 1 Event	141	11	**0** = Low Alarm **1** = High Alarm
Alarm 1 Setpoint 2 Event	143	11	**0** = Low Alarm **1** = High Alarm
Alarm 2 Setpoint 1 Event	145	11	**0** = Low Alarm **1** = High Alarm

Alarms, continued

Table 7-29 Setup Group-Alarms (Loop 1 Address only), Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Alarm 2 Setpoint 2 Event	147	11	**0** = Low Alarm **1** = High Alarm
Alarm Hysteresis	041	18	0.0 to 5.0% of output or span
Alarm Latching for Loop 1	200	11	**0** = Non Latching **1** = Latching
Alarm Latching for Loop 2	201	11	**0** = Non Latching **1** = Latching

Display

Table 7-30 lists all the I.D. codes and ranges or selections for the function parameters in setup group "DISPLAY." Loop 1 or 2 is selected by address in the request message.

Table 7-30 Setup Group-Display

Parameter Description	Identifying Code	Format Code	Range or Selection
Temperature Units and Decimal Point Place	129	11	**Units** **Decimal Places** **0** = °F 0 **1** = °C 0 **2** = °F 1 **3** = °C 1 **4** = °F 2 **5** = °C 2 **6** = °F 3 **7** = °C 3 **8** = None 0 **9** = None 1 **10** = None 2 **11** = None 3
Power Frequency (Loop 1 address only)	166	11	**0** = 60 Hertz **1** = 50 Hertz

Section 8 – Read, Write and Override Parameters on UDC 6300 Process Controllers

8.1 Overview

Introduction

This section contains information concerning Reading, Writing, and Overriding parameters on the UDC 6300 Process Controller. There are two types of parameters:

- Data Transfer—these parameters include reading control data, option status, and reading or changing setpoints or output.
- Configuration Data—all the configuration data is listed in the order in which it appears in the controller.

Each type of parameter has the identifying codes listed with it. Follow the message exchange rules listed in “Read and Write Operations.”

8.1 Overview - UDC 6300, Continued

What's in this section This section contains the following topics:

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General information

Analog Parameters

- Whenever analog parameters 001 through 114 (those that can be changed via communications) are changed, a Write cycle occurs immediately after receipt of the message.

Override Parameters

- Override analog parameters 120, 123 and 125 (PV, output, computer setpoint) are not stored in non-volatile memory and can be changed as frequently as desired with no effect on non-volatile memory retentivity, but controller must remain in slave mode.

Digital Parameters

- Whenever digital configuration parameters 128 through 250 are updated via communications, the non-volatile memory is updated as soon as the message is received.

8.2 Reading Control Data - UDC 6300

Overview

You can Read the following control data from the UDC controller.

- Input 1
- Input 2
- Input 3
- Input 4
- Input 5
- PV
- Internal RV
- PV, Setpoint, Output

ATTENTION Loop 1 or Loop 2 is selected by address in request message.

I.D. codes

Use the identifying codes listed in Table 8-1 to read the specific items.

A Write request for these codes will result in an Error message.

Table 8-1 Control Data Parameters

Parameter Description	Identifying Code	Format Code	Range or Selection
Input #1	118	18	In Engineering Units or Percentage
Input #2	119	18	In Engineering Units or Percentage
Input #3	117	18	In Engineering Units or Percentage
Input #4	104	18	In Engineering Units or Percentage
Input #5	105	18	In Engineering Units or Percentage
PV	120	18	In Engineering Units or Percentage
Internal RV	121	18	In Engineering Units or Percentage
PV, Setpoint, and Output*	122	18	In Engineering Units or Percentage

*This Read request will give a three variable response (see Read/Write operation).

8.3 Read Options Status - UDC 6300

Read

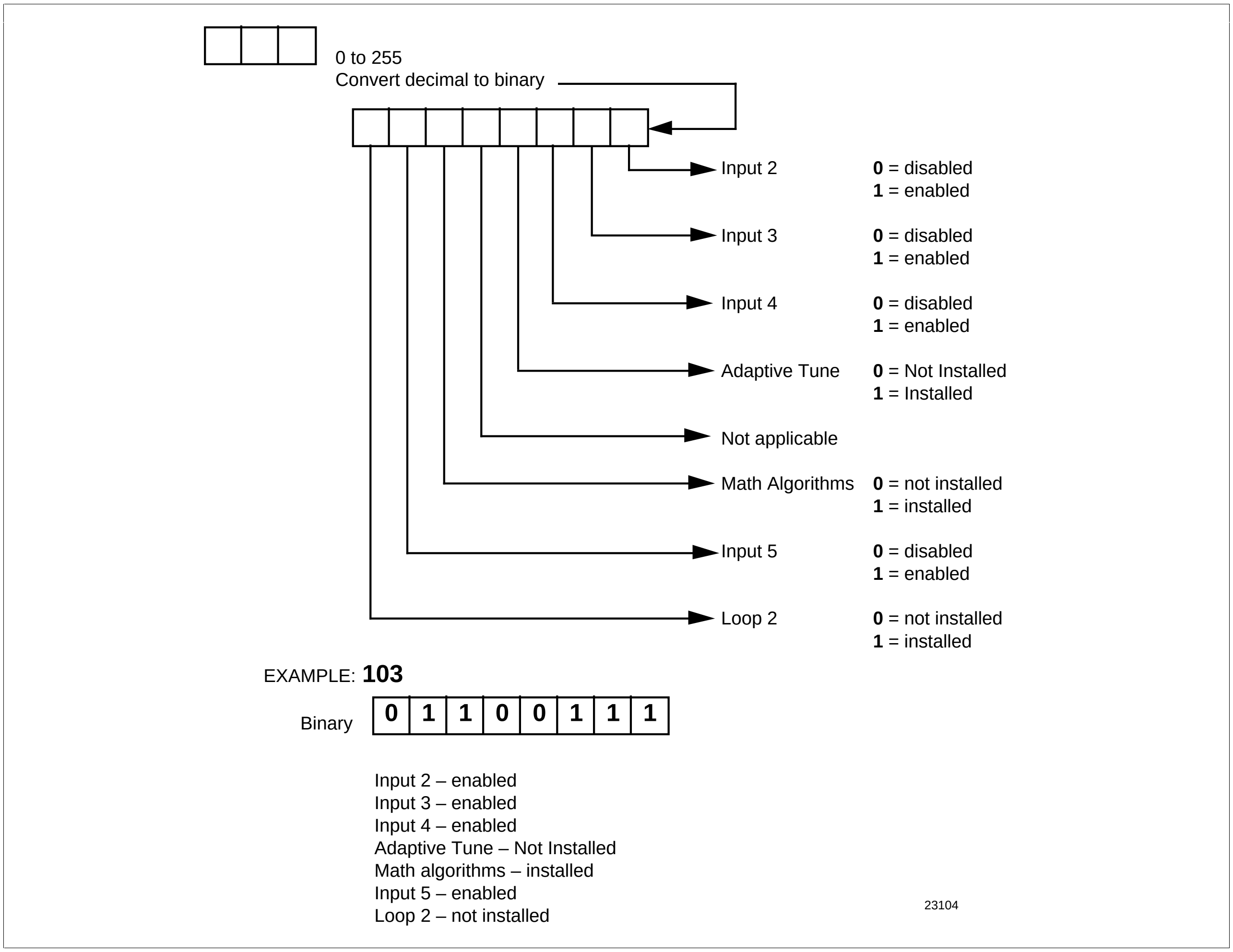
Doing a read of I.D. Code 185 listed in Table 8-2 will tell you which of the available options are enabled/installed or disabled/not installed.

Table 8-2 Option Status

Parameter Description	Identifying Code	Format Code	Range or Selection
Option Status (Read only)	185	11	See Figure 8-1

The data field in the response message will be a decimal number from 0 to 255. Convert the decimal number to binary as shown in Figure 8-1 to determine which options are or are not active.

Figure 8-1 Option Status Information



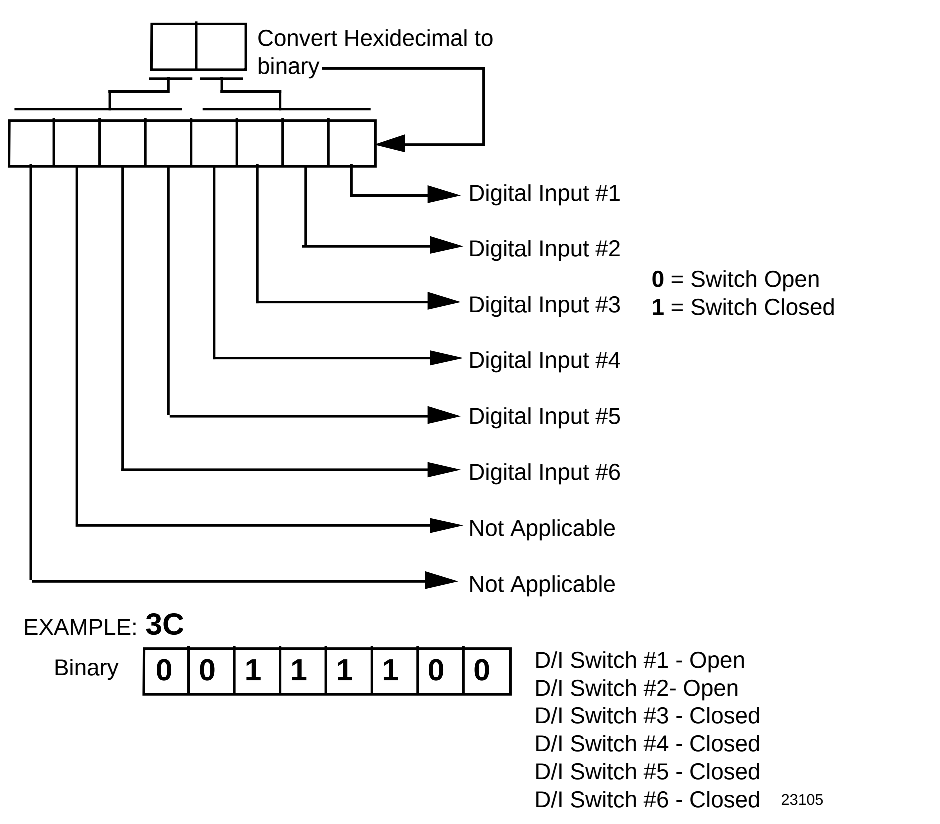
8.4 Miscellaneous Read Only's - UDC 6300

I.D. codes for Read Only's

The identifying codes listed in Table 8-3 represent some information that are Read only. No Writes allowed.

Table 8-3 Miscellaneous Read Only's

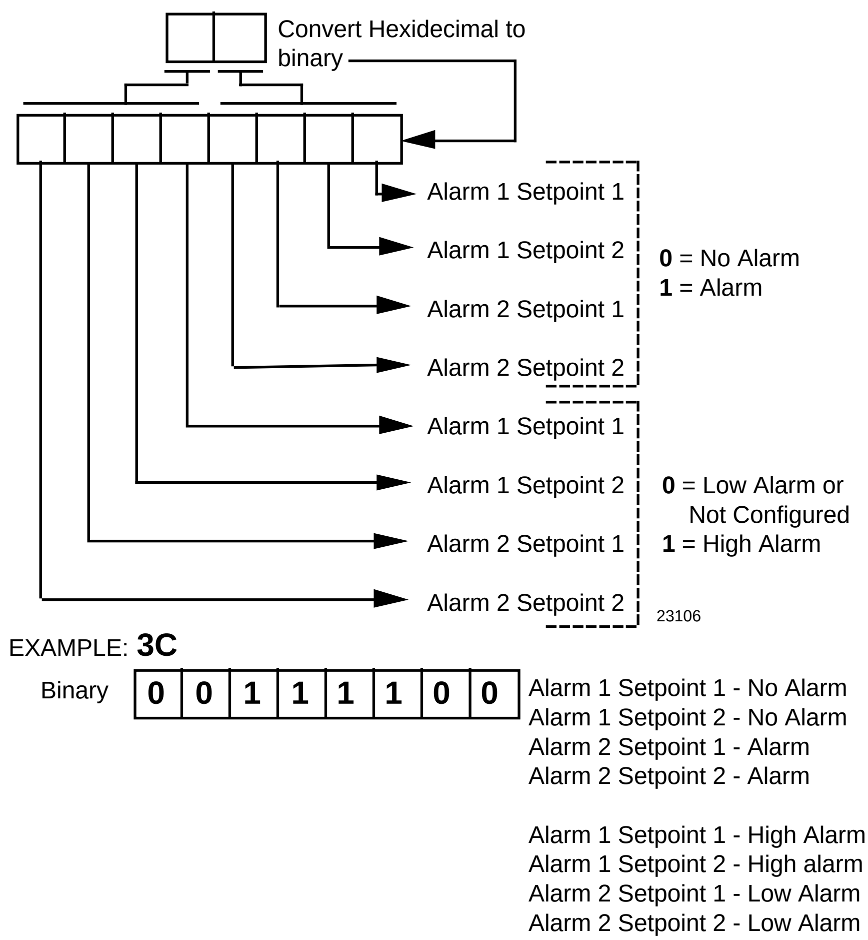
Parameter Description	Identifying Code	Format Code	Range or Selection
Software Type	157	11	READ only (UDC 6300) 81 = Basic UDC 6300 software 82 = Field upgrade for Adaptive Tune 83 = Field upgrade for Adaptive Tune + Math 84 = Field upgrade for Adaptive Tune + 2 Loop 85 = Field Upgrade for all options 86 = Indicator Version
Software Version	167	11	READ only 0 to 99
Second Current Output Value	48	18	Engineering Units for selected type
Digital Input Switch Status (Read only)	190	11	The data field in the response message will be a hexadecimal number. Convert the HEX to binary as shown below to determine which Digital Input switches are closed.



8.4 Miscellaneous Read Only's - UDC 6300, Continued

.ID. codes for Read Only's, continued

Table 8-3 Miscellaneous Read Only's, Continued

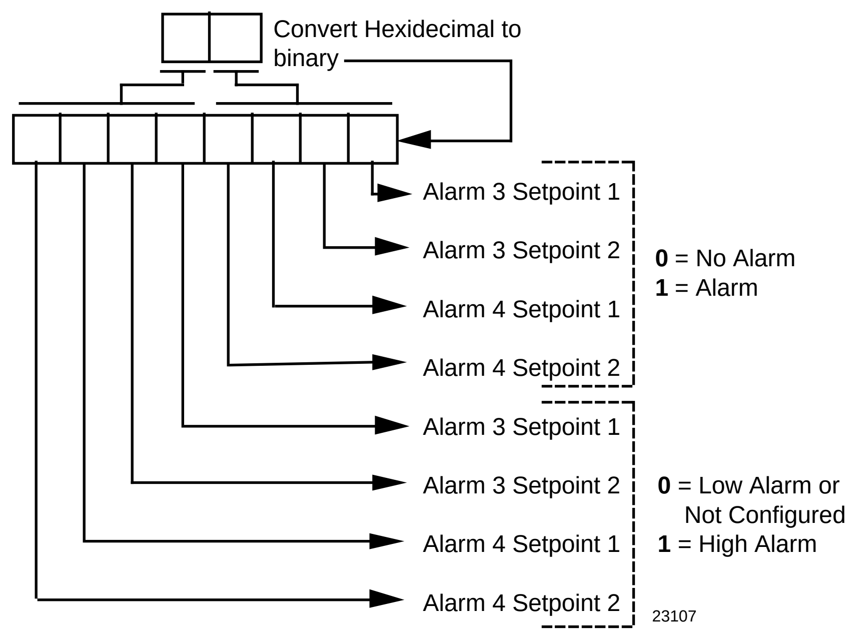
Parameter Description	Identifying Code	Format Code	Range or Selection
Alarm 1 and 2 Status	189	11	The data field in the response message will be a hexadecimal number. Convert the HEX to binary as shown below to determine the state of Alarm #1 and Alarm #2. 

8.4 Miscellaneous Read Only's - UDC 6300, Continued

.ID. codes for Read Only's, continued

Table 8-3 Miscellaneous Read Only's, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Alarm 3 and 4 Status	191	11	The data field in the response message will be a hexadecimal number. Convert the HEX to binary as shown below to determine the state of Alarm #3 and Alarm #4.



EXAMPLE: **3C**

Binary

0	0	1	1	1	1	0	0

Alarm 3 Setpoint 1 - No Alarm
Alarm 3 Setpoint 2 - No Alarm
Alarm 4 Setpoint 1 - Alarm
Alarm 4 Setpoint 2 - Alarm

Alarm 3 Setpoint 1 - High Alarm
Alarm 3 Setpoint 2 - High alarm
Alarm 4 Setpoint 1 - Not Configured
Alarm 4 Setpoint 2 - Not Configured

8.4 Miscellaneous Read Only's - UDC 6300, Continued

I.D. codes for Read Only's

Table 8-3 Miscellaneous Read Only's

Parameter Description	Identifying Code	Format Code	Range or Selection
UDC Error Status (Definitions are listed in Table 8-4) Loop 1 or 2 designated in the request message	255	11	See below READ/WRITE* 001 = Emergency Manual 002 = Failsafe 004 = Working Calibration Checksum Error 008 = Configuration Checksum Error 016 = Factory Calibration Error 032 = Hardware Failure 064 = Restart after Shed 128 = Configuration/Calibration Memory Changed

* Write to clear.

For example:

If Read returns 192 (restart after shed-64 plus configuration change-128)
Write anything to I.D. Code 255
Read returns 000 (clear).

Error status definitions

Table 8-4 list the UDC error status codes and their definitions.

Table 8-4 Error Status Definitions

Code	Error	Definitions
001	Emergency Manual	Indicates that the output of the unit, which has been in slave operations, is under manual control, locally. Error remains until local control is relinquished at the controller.
002	Failsafe	Error occurs whenever the control reverts to failsafe operation and remains as long as the condition exists.
004	Working Calibration Checksum Error	Indicates that an error exists in the working calibration data. Re-select the inputs to load factory calibration data or field calibrate the inputs.
008	Configuration Checksum Error	Error exists in the configuration data. Verify configuration data at the keyboard. Checksum will be recomputed by stepping the controller through the status tests.
016	Factory Calibration Error	Error exists in the factory calibration data and remains as long as the condition exists.
032	Hardware Failure	Indicates either a RAM tests failure or Input 1, Input 2, Input 3 failure on two consecutive conversions.
064	Restart After Shed	Error occurs whenever a shed of slave override is performed. Error is reset following a WRITE command to I.D. Code 255 (064).
128	Configuration /Calibration Memory Changed	Error occurs whenever shed, configuration, or calibration changed. Also occurs whenever there is a change of state in 001, 002, 004, 008, or 016. Error is reset following a Write command to I.D. Code 255.

8.5 Setpoints - UDC 6300

Overview

You can use three separate local setpoints in the UDC Controller. The identifying codes listed Table 8-5 allow you to select which setpoint you want to use and to enter a value in Engineering Units or Percent (whichever is selected at Code 161) for that setpoint via communications.

I.D. codes

Make your selection using I.D. Code 173 and enter the value for the setpoint chosen using ID Code 39 (SP1) or 53 (SP2) or 113 (SP3).

ATTENTION Loop 1 or Loop 2 is selected by address in request message.

Table 8-5 Setpoint Code Selections

Parameter Description	Identifying Code	Format Code	Range or Selection
Local Setpoint #1	039	18	Value within the setpoint range limits
Local Setpoint #2	053	18	Value within the setpoint range limits
Local Setpoint #3	113	18	Value within the setpoint range limits
Local Setpoint Select	173	11	000 = Local Setpoint #1 only 001 = 2nd Local Setpoint via keyboard or communications 003 = 3rd Local Setpoint via keyboard or communications

Associated parameters

Refer to Table 8-6 to display or change any of the parameters associated with the setpoint.

Table 8-6 Setpoint Associated Parameters

Parameter	Code
Setpoint Limits	007, 008
Computer Setpoint	125

8.6 Using a Computer Setpoint(Overriding Controller Setpoint) - UDC 6300

Overview

You can use a setpoint generated from the computer to override the setpoint being used by the controller.

The value generated by the computer will have ratio and bias applied by the controller.

I.D. codes

Use the Identifying Code in Table 8-7 to enter the computer setpoint.

ATTENTION Loop 1 or Loop 2 is selected by address in request message.

Table 8-7 Computer Setpoint Selection

Parameter Description	Identifying Code	Format Code	Range or Selection
Computer Setpoint	125	18	Value from computer with Ratio/Bias applied by the controller. Within the Setpoint Range Limits in Engineering Units or Percent.

Shed

The computer setpoint override will continue until "SHED" from communications occurs or the controller is placed into monitor mode through communications. Doing periodic "SLAVE READS" within the shed time will allow the override to continue until communication is stopped and shed time elapses.

ATTENTION 0 Shed (code 154) allows the override to continue indefinitely or until the override is canceled. (See override selection ID Code 183.)

When SP is overridden, the left most digit in the upper display becomes a "C."

8.6 Using a Computer Setpoint (Overriding Controller Setpoint), - UDC 6300, Continued

Associated parameters

Refer to Table 8-8 for the codes to display or change any of the parameters associated with the computer setpoint.

Table 8-8 Computer Setpoint Associated Parameters

Parameter	Code
Setpoint Limits	007, 008
Local Setpoint #1	039
Local Setpoint #2	053
Local Setpoint #3	113
Local Setpoint Selection	173
Loop #1 Computer Setpoint Ratio	021
Loop #1 Computer Setpoint Bias	022

8.7 PV or Setpoint Override Selections - UDC 6300

Overview

You can Read the present override status or the PV or setpoint or you can do a write transaction to cancel the override.

I.D. codes

Use the Identifying Code in Table 8-9 to Read or Write your selection.

ATTENTION Loop 1 or Loop 2 is selected by address in request message.

Table 8-9 PV or Setpoint Override Selections

Parameter Description	Identifying Code	Format Code	Range or Selection
PV or Setpoint Override Selection	183	11	04 = PV 08 = Setpoint

8.8 Reading or Changing the Output - UDC 6300

Overview

You can read the output of a particular UDC controller (Read transaction) or you can change it to suit your needs. (Do a Write transaction.)

I.D. codes

Use the identifying code in Table 8-10 to monitor (Read) or change (Write the output (in manual only).

ATTENTION To Write (change) the output, the controller must first be in manual mode.

ATTENTION Loop 1 or Loop 2 is selected by address in request message.

Table 8-10 Reading or Changing the Output

Parameter Description	Identifying Code	Format Code	Range or Selection
Output	123	18	-5 to +105% of full span (current output) 0 to 100% (relay type output)

Associated parameters

Refer to Table 8-11 for the codes required to display or change any of the parameters associated with the output.

Table 8-11 Associated Output Codes

Parameter	Code
Output Limits	014, 015
Output Dropoff Limits	020
Failsafe Output Values	040
Output Deadband	018
Output Hysteresis	019
Output Type	160

8.9 Local Setpoint/PID Selection/Setpoint Ramp Status UDC 6300

Overview

Identifying Code 250 lets you

- Monitor your Setpoint Ramp Status
  - In Progress, Not in Progress
  - In Run, On Hold

  and determine which tuning set and local setpoint is being used.
- Abort, Run, Hold, or Start and SP Ramp.
- Select Local Setpoint #1, #2, or #3.
- Select Tuning Parameter Set #1 or #2.

ATTENTION Loop 1 or Loop 2 is selected by address in request message.

Read

When you do a Read, the code in Table 8-12 determines which parameters are active:

- Local Setpoint Selection
- Tuning Parameter Set Selection
- Setpoint Ramp Status

Table 8-12 I.D. Code 250 Reads

Parameter Description	Identifying Code	Format Code	Range or Selection
Read Local Set Point PID Set Selection and SP Ramp Status	250	11	See Figure 8-2

8.9 Local Setpoint/PID Selection/Setpoint Ramp Status - UDC 6300, Continued

Read, continued

Figure 8-2 I.D. Code 250 Indications

SET POINT RAMP INFORMATION (Note 1)	**Tuning Set #1 Selection Local Set Point #1 Selection**	**Tuning Set #1 Selection Local Set Point #2 Selection**	**Tuning Set #2 Selection Local Set Point #1 Selection**	**Tuning Set #2 Selection Local Set Point #2 Selection**	**Tuning Set #1 Selection Local Set Point #3 Selection**	**Tuning Set #2 Selection Local Set Point #3 Selection**
SP Ramp, Enabled not in progress	**000**	**008**	**016**	**024**	**032**	**048**
SP Ramp in progress, Hold	**002**	**010**	**018**	**026**	**034**	**050**
SP Ramp in progress, Run	**003**	**011**	**019**	**027**	**035**	**051**

NOTE 1: This data is ignored in a Write command. Run/Hold set by Communications or by the Run/Hold key.

8.9 Local Setpoint/PID Selection /Setpoint Ramp Status - UDC 6300, Continued

Write

A write of code 250 lets you change the SP ramp status as well as the local setpoint or tuning set selection. Refer to Table 8-13.

ATTENTION Loop 1 or Loop 2 is selected by address in request message.

Table 8-13 I.D. Code 250 Writes

Parameter Description	Identifying Code	Format Code	Range or Selection
Write Local Setpoint/PID Set Selection and SP Ramp Status	250	11	000 = Abort SP Ramp 001 = Run SP Ramp 002 = Hold SP Ramp 003 = Start SP Ramp 004 = Change to Local Setpoint #1 005 = Change to Local Setpoint #2 006 = Change to PID Tuning Set #1 007 = Change to PID Tuning Set #2 008 = Change to Local Setpoint #3

ATTENTION To enable or disable the setpoint ramp, refer to Identifying Code 150.

8.10 Configuration Parameters - UDC 6300

Overview

Listed on the next pages are the identifying codes for the parameters in the various Setup Groups in the UDC 6300 Process Controller. The table below lists the Setup Groups and their table numbers in which they are listed. Most of the parameters are configurable through the hosts. Some are Read Only and are indicated as such and cannot be changed.

Setup Group	Table Number
TUNING	8-14
TUNING L2	8-15
SP RAMP	8-16
ADAPTIVE	8-17
ALGORITHM	8-18
ADVANCED MATH	8-19
OUTPUT ALGORITHM	8-20
INPUT 1	8-21
INPUT 2	8-22
INPUT 3	8-23
INPUT 4	8-24
INPUT 5	8-25
CONTROL AND CONTROL 2	8-26
OPTIONS	8-27
COMMUNICATIONS	8-28
ALARMS	8-29
DISPLAY	8-30

Reading or writing

Do a Read or Write (see “Read/Write Operations”), depending on your requirements using the identifying code and format code listed in the tables. The range or selection available for each range is listed in the tables.

Tuning

Table 8-14 lists all the I.D. codes and ranges or selections for the function parameters in the Setup Group “TUNING” (Loop 1).

Table 8-14 Setup Group-Tuning (Loop 1)*

Parameter Description	Identifying Code	Format Code	Range or Selection
Gain #1 or PB	001	18	0.01 to 1000 Gain 0.1 to 9999 PB
Rate #1	002	18	0.00 to 10.00
Reset #1	003	18	0.02 to 50.00
Manual Reset	013	18	-100 to +100
Gain #2 or PB	004	18	0.01 to 1000
Rate #2	005	18	0.00 to 10.00
Reset #2	006	18	0.02 to 50.00
Cycle Time #1	158	11	1 to 120 seconds
Cycle Time #2	159	11	1 to 120 seconds
Lockout (keyboard only) Changes to data always possible via communications regardless of this configuration.	132	11	**0** = None **1** = Calibration + Configuration **2** = Max Lockout **3** = Calibration only **4** = Calibration + Configuration + View
PV1 Value gain scheduling	001**	48	–9999 to 9999
PV2 Value gain scheduling	002**	48	–9999 to 9999
PV3 Value gain scheduling	003**	48	–9999 to 9999
PV4 Value gain scheduling	004**	48	–9999 to 9999
PV5 Value gain scheduling	005**	48	–9999 to 9999
PV6 Value gain scheduling	006**	48	–9999 to 9999
PV7 Value gain scheduling	007**	48	–9999 to 9999

8.10 Configuration Parameters - UDC 6300, Continued

Tuning, continued

Table 8-14 Setup Group-Tuning (Loop 1)*, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
PV8 Value gain scheduling	008**	48	–9999 to 9999
Gain 1 value gain scheduling	009**	48	0.001 to 1000
Gain 2 value gain scheduling	010**	48	0.001 to 1000
Gain 3 value gain scheduling	011**	48	0.001 to 1000
Gain 4 value gain scheduling	012**	48	0.001 to 1000
Gain 5 value gain scheduling	013**	48	0.001 to 1000
Gain 6 value gain scheduling	014**	48	0.001 to 1000
Gain 7 value gain scheduling	015**	48	0.001 to 1000
Gain 8 value gain scheduling	016**	48	0.001 to 1000

*Loop selected by address in request message.

**Extended Codes—Use Format Code 48.

8.10 Configuration Parameters - UDC 6300, Continued

Tuning 2

Table 8-15 lists all the I.D. codes and ranges or selections for the function parameters in the Setup Group “TUNING 2.”

Table 8-15 Setup Group-Tuning 2* (Loop 2)

Parameter Description	Identifying Code	Format Code	Range or Selection
Gain #3 or PB	001	18	0.1 to 1000 Gain 0.1 to 9999 PB
Rate #3	002	18	0.00 to 10.00
Reset #3	003	18	0.02 to 50.00
Man Reset3	013	18	–100 to +100
Gain #4 or PB	004	18	0.1 to 1000
Rate #4	005	18	0.00 to 10.00
Reset #4	006	18	0.02 to 50.00
Cycle Time #3	158	11	1 to 120 seconds
Cycle Time #4	159	11	1 to 120 seconds
PV1 Value gain scheduling	001**	48	–9999 to 9999
PV2 Value gain scheduling	002**	48	–9999 to 9999
PV3 Value gain scheduling	003**	48	–9999 to 9999
PV4 Value gain scheduling	004**	48	–9999 to 9999
PV5 Value gain scheduling	005**	48	–9999 to 9999
PV6 Value gain scheduling	006**	48	–9999 to 9999
PV7 Value gain scheduling	007**	48	–9999 to 9999
PV8 Value gain scheduling	008**	48	–9999 to 9999
Gain 1 value gain scheduling	009**	48	0.001 to 1000

**Extended Codes—Use Format Code 48.

8.10 Configuration Parameters - UDC 6300, Continued

Tuning 2, continued

Table 8-15 Setup Group-Tuning 2* (Loop 2), Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Gain 2 value gain scheduling	010**	48	0.001 to 1000
Gain 3 value gain scheduling	011**	48	0.001 to 1000
Gain 4 value gain scheduling	012**	48	0.001 to 1000
Gain 5 value gain scheduling	013**	48	0.001 to 1000
Gain 6 value gain scheduling	014**	48	0.001 to 1000
Gain 7 value gain scheduling	015**	48	0.001 to 1000
Gain 8 value gain scheduling	016**	48	0.001 to 1000

*Loop selected by address in request message.

**Extended Codes—Use Format Code 48.

8.10 Configuration Parameters - UDC 6300, Continued

SP ramp/rate

Table 8-16 lists all the I.D. codes and ranges or selections for the function parameters in setup group "SP RAMP/RATE." Loop 1 or 2 selected by address in request message.

Table 8-16 Setup Group-Setpoint Ramp/Rate

Parameter Description	Identifying Code	Format Code	Range or Selection
Setpoint Ramp Enable NOTE: Cannot be enabled if **Setpoint Rate** is enabled.	150	11	**0** = OFF **2** = SP Ramp enabled – Loop 1 **3** = SP Ramp enabled – Loop 2 **4** = SP Ramp enabled – both loops
Single SP Ramp Time	174	11	0 to 255 (minutes) applies to whichever loop has SP Ramp configured
Final Ramp SP Value	026	18	PV Range in engineering units
Setpoint Rate Enable NOTE: Cannot be enabled if **Setpoint Ramp** is enabled.	180	11	**0** = OFF **1** = SP Rate enabled – Loop 1 **2** = SP Rate enabled – Loop 2 **3** = SP Rate enabled – both loops
SP Rate Up Value (EU/HR)	088	18	0 to 9999
SP Rate Down Value (EU/HR)	089	18	0 to 9999

8.10 Configuration Parameters - UDC 6300, Continued

Accutune

Table 8-17 lists all the I.D. codes and ranges or selections for the function parameters in setup group “ACCUTUNE.” Loop 1 or 2 is selected by address in request message.

Table 8-17 Setup Group-Adaptive Tune

Parameter Description	Identifying Code	Format Code	Range or Selection
Fuzzy Overshoot Suppression	225	11	**0** = Disabled **1** = Enable Loop 1 **2** = Enable Loop 2 **3** = Enable Loops 1 and 2
Accutune Enable – Loop 1	152	11	**0** = Disabled **7** = SP Tune **8** = SP + PV Tune **9** = SP Tune FAST **10** = SP+PV Tune FAST **11** = Tune **12** = Tune + PV
Accutune Enable – Loop 2	152	11	**0** = Disabled **1** = SP Tune **2** = SP + PV Tune **3** = SP Tune FAST **4** = SP+PV Tune FAST **5** = Tune **6** = Tune + PV
Setpoint Change	153	11	5 to 15% span
Process Gain (KPG)	114	18	0.01 to 50.0
Accutune Error (Read only)	151	11	**0** = None **1** = Output less than or greater than Output Limits **2** = Output greater or less than Heat/Cool Limits **3** = Not applicable **4** = PV change not sufficient **5** = Process Identification failed **6** = Calculated Reset outside Reset Limits **7** = Calculated Gain outside Gain Limits **8** = Accutune aborted on command **9** = Input 1 error detected **10** = Accutune illegal during Ramp **11** = Accutune aborted when external switch detected.

8.10 Configuration Parameters - UDC 6300, Continued

Algorithm

Table 8-18 lists all the I.D. codes and ranges or selections for the Function Parameters in setup group “ALGORITHM.” Loop 1 or 2 is selected is the request message.

Table 8-18 Setup Group-Algorithm

Parameter Description	Identifying Code	Format Code	Range or Selection
Loop Rate (conversion/ second) (on Loop 1 address only)	192	11	**Loop 1** **Loop 2** **0** = 12x disabled **1** = 9x disabled **2** = 6x 3x **3** = 3x 3x
Control Algorithm Selection †Not available for Loop 2	128	11	**0** = ON/OFF† **1** = PID-A **2** = PID-B **3** = PD-A with Manual Reset **4** = Three Position Step†
3 Position Step Motor Time	25	18	5.0 to 255.0 seconds
Loop 2 Selection (Loop 2 address only)	168	11	**0** = Loop 1 only **1** = Loop 2 enabled **2** = Loop 1 and 2 are cascaded. Loop 2 primary – Loop 1 secondary.
Output Override Hi or Lo Select (on Loop 2 address only – Loop 1 Output in Auto)	136	11	**0** = Disabled **1** = Hi Select **2** = Lo Select

8.10 Configuration Parameters - UDC 6300, Continued

Algorithm, continued

Table 8-18 Setup Group-Algorithm, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Input Algorithm 1 †Input source selected via ID 193, 194, 195.	131 (Loop 1 or 2)	11	**0** = None **3** = Weighted Average† **8** = Feed forward† **13** = ∣Multiplier Divider† **14** = ∣Multiplier† **15** = Multiplier Divider† **16** = Multiplier† **17** = Summer (with Ratio and Bias)† **18** = Input Hi Select (with Ratio and Bias)† **19** = Input Lo Select (with Ratio and Bias)† **25** = Feedforward/ Multiplier
Input Algorithm 2 †Input source selected via ID 164, 165, 188.	137 (Loop 1) 131 (Loop 2)	11	**0** = None **3** = Weighted Average† **8** = Feed forward Summer† **13** = ∣Multiplier Divider† **14** = ∣Multiplier† **15** = Multiplier Divider† **16** = Multiplier† **17** = Summer (with Ratio and Bias)† **18** = Input Hi Select (with Ratio and Bias)† **19** = Input Lo Select (with Ratio and Bias)† **25** = Feedforward/ Multiplier
Constant K for Math Algorithm 1	045	18	0.001 to 1000
Calc High (for Input Algorithm 1)	054	18	–999.0 to +9999 in Engineering Units
Calc Low (for Input Algorithm 1)	055	18	–999.0 to +9999 in Engineering Units
Constant K for Math Algorithm 2	047	18	0.001 to 1000
Calc High (for Input Algorithm 2)	051	18	–999.0 to +9999 in Engineering Units
Calc Low (for Input Algorithm 2)	052	18	–999.0 to +9999 in Engineering Units

8.10 Configuration Parameters - UDC 6300, Continued

Algorithm, continued

Table 8-18 Setup Group-Algorithm, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Input Algorithm 1 Input A Selection (used with ID 131 math calculations)	193	11	**0** = Input 1 **1** = Input 2 **2** = Input 3 **3** = Input 4 **4** = Input 5 **5** = Other Algorithm **6** = Output 1 **7** = Output 2
Input Algorithm 1 Input B Selection (used with ID 131 math calculations)	194	11	**0** = Input 1 **1** = Input 2 **2** = Input 3 **3** = Input 4 **4** = Input 5 **5** = Other Algorithm **6** = Output 1 **7** = Output 2
Input Algorithm 1 Input C Selection (used with ID 131 math calculations)	195	11	**0** = None **1** = Input 1 **2** = Input 2 **3** = Input 3 **4** = Input 4 **5** = Input 5 **6** = Other Algorithm
Input Algorithm 2 Input A Selection (used with ID 137 math calculations)	164	11	**0** = Input 1 **1** = Input 2 **2** = Input 3 **3** = Input 4 **4** = Input 5 **5** = Other Algorithm **6** = Output 1 **7** = Output 2
Input Algorithm 2 Input B Selection (used with ID 137 math calculations)	165	11	**0** = Input 1 **1** = Input 2 **2** = Input 3 **3** = Input 4 **4** = Input 5 **5** = Other Algorithm **6** = Output 1 **7** = Output 2
Input Algorithm 2 Input C Selection (used with 137 math calculations)	188	11	**0** = None **1** = Input 1 **2** = Input 2 **3** = Input 3 **4** = Input 4 **5** = Input 5 **6** = Other Algorithm

Algorithm, continued

Table 8-18 Setup Group-Algorithm, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
8-segment Characterizer	179	11	**0** = Disable **1** = Input 2 **2** = Loop 1 – Output **3** = Loop 2 – Output **4** = Input 4
X0 Input to 8-segment characterizer	059	18	0 to 99.99
X1 Input	060	18	0 to 99.99
X2 Input	061	18	0 to 99.99
X3 Input	062	18	0 to 99.99
X4 Input	063	18	0 to 99.99
X5 Input	064	18	0 to 99.99
X6 Input	065	18	0 to 99.99
X7 Input	066	18	0 to 99.99
X8 Input	067	18	0 to 99.99
Y0 Output from 8-segment Characterizer	068	18	0 to 99.99
Y1 Output	069	18	0 to 99.99
Y2 Output	070	18	0 to 99.99
Y3 Output	071	18	0 to 99.99
Y4 Output	072	18	0 to 99.99
Y5 Output	073	18	0 to 99.99
Y6 Output	074	18	0 to 99.99
Y7 Output	075	18	0 to 99.99
Y8 Output	076	18	0 to 99.99

Algorithm, continued

Table 8-18 Setup Group-Algorithm, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
8-segment Characterizer 2	159**	41	**0** = Disable **1** = Input 2 **2** = Loop 1 – Output **3** = Loop 2 – Output **4** = Input 4
X0 Input to 8-segment Characterizer 2	026***	48	0 to 99.99
X1 Input (Char.2)	027***	48	0 to 99.99
X2 Input (Char.2)	028***	48	0 to 99.99
X3 Input (Char.2)	029***	48	0 to 99.99
X4 Input (Char.2)	030***	48	0 to 99.99
X5 Input (Char.2)	031***	48	0 to 99.99
X6 Input (Char.2)	032***	48	0 to 99.99
X7 Input (Char.2)	033***	48	0 to 99.99
X8 Input (Char.2)	034***	48	0 to 99.99
Y0 Output from 8-segment Characterizer2	035***	48	0 to 99.99
Y1 Output (Char.2)	036***	48	0 to 99.99
Y2 Output (Char.2)	037***	48	0 to 99.99
Y3 Output (Char.2)	038***	48	0 to 99.99
Y4 Output (Char.2)	039***	48	0 to 99.99
Y5 Output (Char.2)	040***	48	0 to 99.99
Y6 Output (Char.2)	041***	48	0 to 99.99
Y7 Output (Char.2)	042***	48	0 to 99.99
Y8 Output (Char.2)	043***	48	0 to 99.99

**Extended Codes - Use Format Code 41

***Extended Codes - Use Format Code 48

Algorithm, continued

Table 8-18 Setup Group-Algorithm, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Polynomial	181	11	**0** = Disable **1** = Input 1 **2** = Input 2 **3** = Input 3 **4** = Input 4 **5** = Input 5
C0 – Polynomial Coefficient	081	18	–99.99 to 99.99
C1 – Coefficient	082	18	–9.999 to 9.999
C2 – Coefficient	083	18	–9.999 to 9.999
C3 – Coefficient	084	18	–9.999 to 9.999
C4 – Coefficient	085	18	–9.999 to 9.999
C5 – Coefficient	086	18	–9.999 to 9.999
Totalizer	184	11	**0** = Disable **1** = Input 1 **2** = Input Algorithm 1 **3** = Input Algorithm 2
Totalizer Scale Factor (display only)	175	11	**0** = 10^0 = 1 **1** = 10^1 = 10 **2** = 10^2 = 100 **3** = 10^3 = 1,000 **4** = 10^4 = 10,000 **5** = 10^5 = 100,000 **6** = 10^6 = 1,000,000
Totalizer Reset Lock (when locked, totalizer cannot be reset from keyboard)	176	11	**0** = Unlock **1** = Lock
Current Totalizer Value	103	11	0 to 10^{14}–1 NOTE: A value of “0” may be written to reset the totalizer. A write of any other value is not accepted.
Totalizer Integration Rate	177	11	**0** = Second **1** = Minute **2** = Hour **3** = Day **4** = Million/Day

Advanced math

Table 8-19 lists all the I.D. codes and ranges and selections for the function parameters in setup group "ADVANCED MATH." Loop 1 or 2 is selected request message.

Table 8-19 Setup Group-Advanced Math

Parameter Description	Identifying Code	Format Code	Range or Selection
Logic Gates	128**	41	**0** = Disable **1** = Enable
Gate 1 Type	129**	41	**0** = Not Used **1** = OR **2** = NOR **3** = AND **4** = NAND **5** = XOR **6** = XNOR **7** = BLTA **8** = BGTA
Gate 1 Input A (for gate types 1 through 6)	130**	41	**0** = Digital Input 1 **1** = Digital Input 2 **2** = Digital Output 1 **3** = Digital Output 2 **4** = Digital Output 3 **5** = Digital Output 4 **6** = Output from gate 1 **7** = Output from gate 2 **8** = Output from gate 3 **9** = Output from gate 4 **10** = Output from gate 5 **11** = Fixed on – always "1" **12** = Fixed off – always "0" **13** = Manual/Auto mode (Loop 1) **14** = Local/Remote SP (Loop 1) **15** = Disable/Enable Adaptive Tune (Loop 1) **16** = Manual/Auto Mode (Loop 2 only) **17** = Local/Remote SP (Loop 2 only) **18** = Disable/Enable Adaptive Tune (Loop 2 only)

**Extended Code—Use Format Code 41.

Advanced math, continued

Table 8-19 Setup Group-Advanced Math, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Gate 1 Input A (for gate type 7 or 8)	131**	41	**0** = Input 1 **1** = Input 2 **2** = Input 3 **3** = Input 4 **4** = Input 5 **5** = Loop 1 PV **6** = Loop 1 SP **7** = Constant K **8** = Loop 2 PV (Loop 2 address only) **9** = Loop 2 SP (Loop 2 address only)
Gate 1 Input A "K" Value (appears only if selection 7 – Constant K is made at ID Code 131)	017***	48	–999.0 to 9999
Gate 1 Input B (for gate types 1 through 6)	132**	41	Same as 130
Gate 1 Input B (for gate type 7 or 8	133**	41	**0** = Input 1 **1** = Input 2 **2** = Input 3 **3** = Input 4 **4** = Input 5 **5** = Loop 1 PV **6** = Loop 1 SP **7** = Totalizer **8** = Loop 2 PV (Loop 2 address only) **9** = Loop 2 SP (Loop 2 address only)

**Extended Code—Use Format Code 41.

***Extended Codes—Use Format Code 48.

Advanced math, continued

Table 8-19 Setup Group-Advanced Math, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Gate 1 Output	134**	41	**0** = Digital Output 1 **1** = Digital Output 2 **2** = Digital Output 3 **3** = Digital Output 4 **4** = Any Gate **5** = Manual/Auto Mode **6** = Local/Remote SP **7** = Disable/Enable Adaptive **8** = Reset Totalizer **9** = Manual/Auto Mode (Loop 2 address only) **10** = Local/Remote SP (Loop 2 address only) **11** = Disable/Enable Adaptive Tune (Loop 2 address only)
Gate 2 Type	135**	41	Same as 129
Gate 2 Input A (for gate types 1 through 6)	136**	41	Same as 130
Gate 2 Input A (for gate type 7 or 8)	137**	41	Same as 131
Gate 2 Input A “K” Value (appears only if selection 7 – Constant K is made at ID code 137)	018***	48	–999.0 to 9999
Gate 2 Input B (for gate types 1 through 6)	138**	41	Same as 130
Gate 2 Input B (for gate type 7 or 8)	139**	41	Same as 133
Gate 2 Output	140**	41	Same as 134
Gate 3 Type	141**	41	Same as 129

**Extended Code—Use Format Code 41.

***Extended Codes—Use Format Code 48.

Advanced math, continued

Table 8-19 Setup Group-Advanced Math, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Gate 3 Input A (for gate types 1 through 6)	142**	41	Same as 130
Gate 3 Input A (for gate type 7 or 8)	143**	41	Same as 131
Gate 3 Input A “K” Value (appears only if selection 7 – Constant K is made at ID code 143)	019***	48	–999.0 to 9999
Gate 3 Input B (for gate types 1 through 6)	144**	41	Same as 130
Gate 3 Input B (for gate type 7 or 8)	145**	41	Same as 133
Gate 3 Output	146**	41	Same as 134
Gate 4 Type	147**	41	Same as 129
Gate 4 Type A (for gate types 1 through 6)	148**	41	Same as 130
Gate 4 Input A (for gate type 7 or 8)	149**	41	Same as 131
Gate 4 Input A “K” Value (appears only if selection 7 – Constant K is made at ID code 149)	020***	48	–999.0 to 9999
Gate 4 Input B (for gate types 1 through 6)	150**	41	Same as 130
Gate 4 Input B (for gate type 7 or 8)	151**	41	Same as 133
Gate 4 Output	152**	41	Same as 134
Gate 5 Type	153**	41	Same as 129

**Extended Code—Use Format Code 41.

***Extended Codes—Use Format Code 48.

Advanced math, continued

Table 8-19 Setup Group-Advanced Math, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Gate 5 Input A (for gate types 1 through 6)	154**	41	Same as 130
Gate 5 Input A (for gate type 7 or 8)	155**	41	Same as 131
Gate 5 Input A “K” Value (appears only if selection 7 – Constant K is made at ID code 151)	021***	48	–999.0 to 9999
Gate 5 Input B (for gate types 1 through 6)	156**	41	Same as 130
Gate 5 Input B (for gate type 7 or 8)	157**	41	Same as 133
Gate 5 Output	158**	41	Same as 134

**Extended Code—Use Format Code 41.

***Extended Codes—Use Format Code 48.

8.10 Configuration Parameters - UDC 6300, Continued

Output algorithm

Table 8-20 lists all the I.D. codes and ranges or selections for the function parameters in setup group "OUTPUT ALGORITHM." Loop 1 or 2 is selected in the request message.

Table 8-20 Setup Group-Output Algorithm

Parameter Description	Identifying Code	Format Code	Range or Selection
Output Algorithm	160	11	**0** = None (Loop 1) – Disabled (Loop 2) **1** = 3 Position Step **2** = Relay Simplex **3** = Relay Duplex (Loop 1 only) **4** = Current Simplex **5** = Current Duplex **6** = Relay/Current Duplex (Relay on Heat/Current Full) **7** = Current/Relay Duplex (Relay on Cool/Current Full) **8** = Current Duplex - Loop 1 only (Current Output - Cool, 2nd Current Output - Heat) **9** = Relay/Current Duplex - Loop 1 only (Relay on Heat/Current Split) **10** - Relay/Current Duplex - Loop 1 only (Relay on Cool/Current Split)
Digital Output State at 0% Output (on Loop 1 address only)	136	11	**0** = Out 3 de-energized Out 4 de-energized **1** = Out 3 energized Out 4 de-energized **2** = Out 3 de-energized Out 4 energized **3** = Out 3 energized Out 4 energized

Input 1

Table 8-21 lists all the I.D. codes and ranges or selections for the function parameters in setup group "INPUT 1."

Table 8-21 Setup Group-Input 1 (Loop 1 Address only)

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 1 Type	168	11	0 = OFF 27 = Linear NOTE: If 0 is received as a write, the input is disabled and the transmitter selection is lost. Whenever 27 is received as a write, if the input was previous disabled, the transmitter selection is set to linear with a range indeterminate; however, if the input was previously enabled, the transmitter type is unchanged.
Input 1 Transmitter Characterization	169	11	**0** = B T/C **1** = E T/C **2** = J T/C **3** = K T/C **4** = NiNiMo T/C **5** = R T/C **6** = S T/C **7** = T T/C **8** = W T/C **11** = Nicrosil-Nisil T/C **12** = 100 Pt RTD **19** = Linear **20** = Sq. Root **27** = 100 Pt RTD Low **28** = 200 Pt RTD **29** = 500 Pt RTD
Input 1 High Range Value	029	18	–999. to 9999. Engineering Units
Input 1 Low Range Value	030	18	–999 to 9999. Engineering Units
Input 1 Ratio	106	18	–20.00 to 20.00
Input 1 Bias	107	18	–999 to 9999. Engineering Units
Input 1 Filter	042	18	0 to 120 seconds
Input Filtering	133	11	**0** = None(set IN1 and IN2 filter to 0) **1** = Input 1 (set IN2 filter to)) **2** = Input 2 (set IN1 filter to)) **3** = Filter both IN 1 and IN 2

Input 2

Table 8-22 lists all the I.D. codes and ranges or selections for the function parameters in setup group "INPUT 2."

Table 8-22 Setup Group-Input 2 (Loop 1 Address only)

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 2 Type	170	11	0 = OFF 27 = Linear NOTE: If 0 is received as a write, the input is disabled and the transmitter selection is lost. Whenever 27 is received as a write, if the input was previous disabled, the transmitter selection is set to linear with a range indeterminate; however, if the input was previously enabled, the transmitter type is unchanged.
Input 2 Transmitter Characterization	171	11	**0** = B T/C **1** = E T/C **2** = J T/C **3** = K T/C **4** = NiNiMo T/C **5** = R T/C **6** = S T/C **7** = T T/C **8** = W T/C **11** = Nicrosil-Nisil T/C **12** = 100 Pt RTD **19** = Linear **20** = Sq. Root **27** = 100 Pt RTD Low **28** = 200 Pt RTD **29** = 500 Pt RTD
Input 2 High Range Value	035	18	–999. to 9999. Engineering Units
Input 2 Low Range Value	036	18	–999 to 9999. Engineering Units
Input 2 Ratio	037	18	–20.00 to 20.00
Input 2 Bias	038	18	–999 to 9999. Engineering Units
Input 2 Filter	043	18	0 to 120 seconds

8.10 Configuration Parameters - UDC 6300, Continued

Input 3

Table 8-23 lists all the I.D. codes and ranges or selections for the function parameters in setup group “INPUT 3.”

Table 8-23 Setup Group-Input 3 (Loop 1 Address only)

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 3 Type	186	11	0 = OFF 27 = Linear NOTE: If 0 is received as a write, the input is disabled and the transmitter selection is lost. Whenever 27 is received as a write, if the input was previous disabled, the transmitter selection is set to linear with a range indeterminate; however, if the input was previously enabled, the transmitter type is unchanged.
Input 3 Transmitter Characterization	187	11	**0** = B T/C **1** = E T/C **2** = J T/C **3** = K T/C **4** = NiNiMo T/C **5** = R T/C **6** = S T/C **7** = T T/C **8** = W T/C **11** = Nicrosil-Nisil T/C **12** = 100 Pt RTD **19** = Linear **20** = Sq. Root **27** = 100 Pt RTD Low **28** = 200 Pt RTD **29** = 500 Pt RTD
Input 3 High Range Value	108	18	–999. to 9999. engineering units
Input 3 Low Range Value	109	18	–999 to 9999. engineering units
Input 3 Ratio	110	18	–20.00 to 20.00
Input 3 Bias	111	18	–999 to 9999. engineering units
Input 3 Filter	112	18	0 to 120 seconds
Input 3 Deadtime	98	18	0.0 to 60.0 minutes

Input 4

Table 8-24 lists all the I.D. codes and ranges or selections for the function parameters in setup group "INPUT 4."

Table 8-24 Setup Group-Input 4 (Loop 1 Address only)

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 4 Type	202	11	0 = OFF 27 = Linear NOTE: If 0 is received as a write, the input is disabled and the transmitter selection is lost. Whenever 27 is received as a write, if the input was previous disabled, the transmitter selection is set to linear with a range indeterminate; however, if the input was previously enabled, the transmitter type is unchanged.
Input 4 Transmitter Characterization	203	11	**0** = B T/C **1** = E T/C **2** = J T/C **3** = K T/C **4** = NiNiMo T/C **5** = R T/C **6** = S T/C **7** = T T/C **8** = W T/C **11** = Nicrosil-Nisil T/C **12** = 100 Pt RTD **19** = Linear **20** = Sq. Root **27** = 100 Pt RTD Low **28** = 200 Pt RTD **29** = 500 Pt RTD
Input 4 High Range Value	087	18	–999. to 9999. engineering units
Input 4 Low Range Value	088	18	–999 to 9999. engineering units
Input 4 Ratio	089	18	–20.00 to 20.00
Input 4 Bias	090	18	–999 to 9999. engineering units
Input 4 Filter	091	18	0 to 120 seconds

Input 5

Table 8-25 lists all the I.D. codes and ranges or selections for the function parameters in setup group “INPUT 5.”

Table 8-25 Setup Group-Input 5 (Loop 1 Address only)

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 5 Type	204	11	**0** = OFF **1** = E T/C **2** = J T/C **3** = K T/C **4** = NiNiMo T/C **5** = R T/C **6** = S T/C **7** = T T/C **8** = W T/C **9** = B T/C **11** = Nicrosil Nisil T/C **12** = 100 Pt RTD **14** = 200 Pt RTD **15** = 500 Pt RTD **19** = Radiamatic **22** = 4-20 mA **23** = 0-10 mV **24** = 10-50 mV **25** = 1 to 5 volts **26** = 0 to 10 volts **36** = 100 Pt RTD Low **37** = Pulse (only when pulse input board is installed)
Input 5 Type (when pulse input is installed – i.e. 37 above)	207	11	**0** = Disabled **1** = Frequency Input **2** = Pulse Input

Input 5, continued

Table 8-25 Setup Group-Input 5 (Loop 1 Address only), Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 5 Transmitter Characterization	205	11	**0** = B T/C **1** = E T/C **2** = J T/C **3** = K T/C **4** = NiNiMo T/C **5** = R T/C **6** = S T/C **7** = T T/C **8** = W T/C **11** = Nicrosil-Nisil T/C **12** = 100 Pt RTD **19** = Linear **20** = Sq. Root **27** = 100 Pt RTD Low **28** = 200 Pt RTD **29** = 500 Pt RTD
Input 5 High Range Value	092	18	–999. to 9999. engineering units
Input 5 Low Range Value	093	18	–999 to 9999. engineering units
Input 5 Ratio	094	18	–20.00 to 20.00
Input 5 Bias	095	18	–999 to 9999. engineering units
Input 5 Filter	096	18	0 to 120 seconds
Input 5 Burnout	206	11	**0** = None **1** = Upscale **2** = Downscale
Input 5 Emissivity	097	18	0.01 to 1.00

Control and Control 2

Table 8-26 lists all the I.D. codes and ranges or selections for the function prompts in setup group "CONTROL OR CONTROL 2." Loop 1 or 2 address selected in request message.

Table 8-26 Setup Group-Control and Control 2

Parameter Description	Identifying Code	Format Code	Range or Selection
PV Source	196	11	**0** = Input 1 **1** = Input 2 **2** = Input 3 **3** = Input 4 **4** = Input 5 **5** = Input Algorithm 1 **6** = Input Algorithm 2
Tuning Parameter Selection	172	11	**0** = One set only **1** = 2 sets keyboard selected **2** = 2 sets with PV automatic switchover **3** = 2 sets with setpoint automatic switchover **4** = Gain scheduling
Automatic Switchover Value (used with 172 selection 2 or 3)	056	18	Within the PV Range in engineering units
Local Setpoint Source	173	11	**0** = One Local Setpoint **1** = Two Local Setpoints **3** = Three Local Setpoints
PV Tracking	130	11	**0** = No **1** = Yes

Control and Control 2, continued

Table 8-26 Setup Group-Control and Control 2, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Setpoint Source	197	11	**0** = Local Setpoint only **1** = Remote Setpoint via Input 2 **2** = Remote Setpoint via Input 3 **3** = Remote Setpoint via Input 4 **4** = Remote Setpoint via Input 5 **5** = RSP using Input Algorithm 1 **6** = RSP using Input Algorithm 2
Auto-Bias (LSP to RSP)	198	11	**0** = Disabled (bump) **1** = Enabled (bumpless)
Setpoint Tracking	138	11	**SP Tracking Power UP Output** **0** = NO Recall **1** = YES Recall **2** = NO Failsafe **3** = YES Failsafe
Control Setpoint High Limit	007	18	0 to 100% of PV (engineering units)
Control Setpoint Low Limit	008	18	0 to 100% of PV (engineering units)
Control Output Direction/Alarm Outputs	135	11	**0** = Direct Action Alarm Output energized **1** = Direct Action Alarm Output de-energized **2** = Reverse Action Alarm Output energized **3** = Reverse Action Alarm Output de-energized
High Output Limit	014	18	–5 to 105% of output
Low Output Limit	015	18	–5 to 105% of output
High Reset Limit	016	18	–5 to 105% of output

Control and Control 2, continued

Table 8-26 Setup Group-Control and Control 2, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Low Reset Limit	017	18	–5 to 105% of output
Output Rate	182	11	**0** = Disable **1** = Enable
Output Rate Value Up	044	18	0 to 9999%/minute
Output Rate Value Down	046	18	0 to 9999%/minute
Output Dropout	139	11	**0** = None **1** = Dropout using value selected at ID Code #20
Controller Dropoff Value	020	18	–5 to 105% of output
Output Deadband	018	18	–5 to +25.0%
Output Hysteresis (Loop 1 address only)	019	18	0 to 5.0%
Failsafe Mode	199	11	**0** = Latching **1** = Non latching
Failsafe Output Level	040	18	0 to 100%
Proportional Band Units (Loop 1 address only) applies to Loop 1 and 2	148	11	**0** = Gain **1** = Proportional band
Reset Units (Loop 1 address only) applies to Loop 1 and 2	149	11	**0** = Minutes **1** = RPM

Options

Table 8-27 lists all the I.D. codes and ranges or selections for the function parameters in setup group "OPTIONS." Loop 1 or 2 is selected in the request message.

Table 8-27 Setup Groups-Options

Parameter Description	Identifying Code	Format Code	Range or Selection
2nd Current Output	134	11	**0** = None **1** = Input 1 **2** = Input 2 **3** = PV – Loop 1 **4** = Deviation – Loop 1 **5** = Output – Loop 1 **6** = Setpoint – Loop 1 **7** = Input 3 **8** = PV – Loop 2 **9** = Deviation – Loop 2 **10** = Output – Loop 2 **11** = Setpoint – Loop 2 **12** = Input 4 **13** = Input 5 **14** = Input Algorithm 1 **15** = Input Algorithm 2 **16** = LSP1, Loop1 **17** = LSP1, Loop2
Low Scaling Factor (Loop 1 address only)	049	18	Within the range of the selected variable in I.D. 134
High Scaling Factory (Loop 1 address only)	050	18	Within the range of the selected variable in I.D. 134

Options, continued

Table 8-27 Setup Groups-Options, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Digital Input #1 (Loop 1 address only)	155	11	**0** = None **1** = To Manual **2** = To Local Setpoint #1 **3** = To Local Setpoint #2 **4** = To Direct Action **5** = To Hold Ramp **6** = To PID Set #2 **7** = PV = Input 2 **8** = PV = Input 3 **9** = To Run Ramp **10** = To Local Setpoint #3 **11** = PV = Input 4 **12** = PV = Input 5 **13** = To Manual/ Failsafe Output **14** = Output 1 tracks Input 4 **15** = Output 2 tracks Input 4 **16** = Output 2 overrides Output 1 **17** = Pulse Down **18** = Out 3 On **19** = Out 4 On **20** = Inhibit Reset **21** = To RSP **22** = Display – Loop 2 **23** = Reset FB **24** = To Auto/Man Station **25** = To Purge **26** = To Low Fire **27** = To Tune For 0 through 255 loop selected by address in request message. For digital input combinations see Figure 8-3.

8.10 Configuration Parameters - UDC 6300, Continued

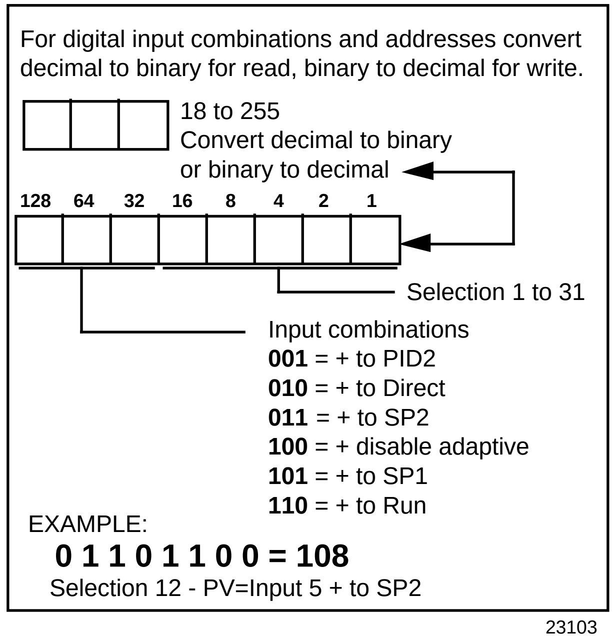
Options, continued

Table 8-27 Setup Groups-Options, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Digital Input #2 (Loop 1 address only)	156	11	**0** = None **1** = To Manual **2** = To Local Setpoint #1 **3** = To Local Setpoint #2 **4** = To Direct Action **5** = To Hold Ramp **6** = To PID Set #2 **7** = PV = Input 2 **8** = PV = Input 3 **9** = To Run Ramp **10** = To Local Setpoint #3 **11** = PV = Input 4 **12** = PV = Input 5 **13** = To Manual/ Failsafe Output **14** = Output 1 tracks Input 4 **15** = Output 2 tracks Input 4 **16** = Output 2 overrides Output 1 **17** = Pulse Down **18** = Out 3 On **19** = Out 4 On **20** = Inhibit Reset **21** = To RSP **22** = Display – Loop 2 **24** = To Auto/Man Station **25** = To Purge **26** = To Low Fire **27** = To Tune Digital Input 2 combinations are the same as Digital Input 1, Figure 8-3.

Options, continued

Figure 8-3 Digital Input Combinations, Inputs 1 and 2



8.10 Configuration Parameters - UDC 6300, Continued

Options, continued

Table 8-27 Setup Groups-Options, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Digital Input #3 (Loop 1 address only)	210	11	**0** = None **1** = To Manual **2** = To Local Setpoint #1 **3** = To Local Setpoint #2 **4** = To Local Setpoint #3 **5** = To Run Ramp **6** = To Hold Ramp **7** = To PID Set #2 **8** = PV = Input 1 **9** = PV = Input 2 **10** = PV = Input 3 **11** = PV = Input 4 **12** = PV = Input 5 **13** = RSP = Input 1 **14** = RSP = Input 2 **15** = RSP = Input 3 **16** = RSP = Input 4 **17** = RSP = Input 5 **18** = To Direct Action **19** = To Manual/Failsafe Output **20** = To Auto/Man Station **21** = To Purge **22** = To Low Fire
Digital Input #4 (Loop 1 address only)	211	11	Same as I D #210 Digital Input 3
Digital Input #5 (Loop 1 address only)	212	11	Same as I D #210 Digital Input 3
Digital Input #6 (Loop 1 address only)	213	11	Same as I D #210 Digital Input 3
Digital Input #3 to 6 (Loop 1 Assignment)	214	11	**0** = None **1** = D/I 3, 4, & 5 only **2** = D/I 3, & 4 only **3** = D/I 3 only

Communications

Table 8-28 lists all the I.D. codes and ranges or selections for the function parameters in setup group “COM.” Loop 1 or 2 is selected in the request message.

Table 8-28 Setup Group-Communications

Parameter Description	Identifying Code	Format Code	Range or Selection
Shed Time (Loop 1 address only)	154	11	**0** = No Shed **1** = 255 sample periods
Shed Mode and Output (Loop 1 address only) Selections apply to either loop	162	11	**0** = Last Mode and Last Output **1** = Manual Mode, Last Output **2** = Manual Mode, Failsafe Output **3** = Automatic Mode
Shed Setpoint Recall (Loop 1 address only) Selections apply to either loop	163	11	**0** = To Last Local Setpoint used **1** = Last Setpoint prior to Shed
Communication Override Units (Loop 1 address only) applies to Loop 1 and 2	161	11	**0** = Percent **1** = Engineering Units
Computer Setpoint Ratio	021	18	–20.00 to 20.00
Computer Setpoint Bias	022	18	–999 to 9999.

Alarms

Tables 8-29 lists all the I.D. codes and ranges or selections for the function parameters in setup group "ALARMS."

Table 8-29 Setup Group-Alarms (Loop 1 Address only)

Parameter Description	Identifying Code	Format Code	Range or Selection
Alarm 1 Setpoint 1 Value	009	18	Within the range of selected parameter or PV span for deviation alarm
Alarm 1 Setpoint 2 Value	010	18	Within the range of selected parameter or PV span for deviation alarm
Alarm 2 Setpoint 1 Value	011	18	Within the range of selected parameter or PV span for deviation alarm
Alarm 2 Setpoint 2 Value	012	18	Within the range of selected parameter or PV span for deviation alarm
Alarm 3 Setpoint 1 Value	022***	48	Within the range of selected parameter or PV span for deviation alarm
Alarm 3 Setpoint 2 Value	023***	48	Within the range of selected parameter or PV span for deviation alarm
Alarm 4 Setpoint 1 Value	024***	48	Within the range of selected parameter or PV span for deviation alarm
Alarm 4 Setpoint 2 Value	025***	48	Within the range of selected parameter or PV span for deviation alarm
Alarm 1 Setpoint 1 Type	140	11	**0** = None **1** = Input 1 **2** = Input 2 **3** = PV – Loop 1 **4** = Deviation – Loop 1 **5** = Output – Loop 1 **6** = Alarm on Shed **9** = Input 3 **10** = PV – Loop 2 **11** = Deviation – Loop 2 **12** = Output – Loop 2 **13** = Input 4 **14** = Input 5 **15** = Manual Loop 1 **16** = Manual Loop 2 **17** = RSP Loop 1 **18** = RSP Loop 2 **19** = Failsafe Loop 1 **20** = Failsafe Loop 2

***Extended Code - Use Format Code 48

Alarms, continued

Table 8-29 Setup Group-Alarms (Loop 1 Address only), Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Alarm 1 Setpoint 2 Type	142	11	Same as 140
Alarm 2 Setpoint 1 Type	144	11	Same as 140
Alarm 2 Setpoint 2 Type	146	11	Same as 140
Alarm 3 Setpoint 1 Type	215	11	Same as 140
Alarm 3 Setpoint 2 Type	217	11	Same as 140
Alarm 4 Setpoint 1 Type	219	11	Same as 140
Alarm 4 Setpoint 2 Type	221	11	Same as 140
Alarm 1 Setpoint 1 Event	141	11	**0** = Low Alarm **1** = High Alarm
Alarm 1 Setpoint 2 Event	143	11	**0** = Low Alarm **1** = High Alarm
Alarm 2 Setpoint 1 Event	145	11	**0** = Low Alarm **1** = High Alarm
Alarm 2 Setpoint 2 Event	147	11	**0** = Low Alarm **1** = High Alarm
Alarm 3 Setpoint 1 Event	216	11	**0** = Low Alarm **1** = High Alarm
Alarm 3 Setpoint 2 Event	218	11	**0** = Low Alarm **1** = High Alarm
Alarm 4 Setpoint 1 Event	220	11	**0** = Low Alarm **1** = High Alarm
Alarm 4 Setpoint 2 Event	222	11	**0** = Low Alarm **1** = High Alarm
Alarm Hysteresis	041	18	0.0 to 5.0% of output or span
Alarm Latching for Output 1	200	11	**0** = Non Latching **1** = Latching
Alarm Latching for Output2	201	11	**0** = Non Latching **1** = Latching
Alarm Latching for Output 3	223	11	**0** = Non Latching **1** = Latching
Alarm Latching for Output 4	224	11	**0** = Non Latching **1** = Latching

Display

Table 8-30 lists all the I.D. codes and ranges or selections for the function parameters in setup group “DISPLAY.” Loop 1 or 2 is selected by address in the request message.

Table 8-30 Setup Group-Display

Parameter Description	Identifying Code	Format Code	Range or Selection
Temperature Units and Decimal Point Place	129	11	**Units** / **Decimal Places** **0** = °F 0 **1** = °C 0 **2** = °F 1 **3** = °C 1 **4** = °F 2 **5** = °C 2 **6** = °F 3 **7** = °C 3 **8** = None 0 **9** = None 1 **10** = None 2 **11** = None 3
Language (Displays)	209	11	**0** = English **1** = French **2** = German
Front Pane Ratio 4 Enabled	208	11	**0** = Disabled **1** = Enabled on Lower Display
Power Frequency (Loop 1 address only)	166	11	**0** = 60 Hertz **1** = 50 Hertz

Section 9 – Read, Write and Override Parameters on UDC 3300 Process Controllers

9.1 Overview

Introduction

This section contains information concerning Reading, Writing, and Overriding parameters on the UDC 3300 Process Controller. There are two types of parameters:

- Data Transfer—these parameters include reading control data, option status, and reading or changing setpoints or output.
- Configuration Data—all the configuration data is listed in the order in which it appears in the controller.

Each type of parameter has the identifying codes listed with it. Follow the message exchange rules listed in “Read and Write Operations.”

9.1 Overview - UDC 3300, Continued

What's in this section

This section contains the following topics:

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General information

Analog Parameters

- Whenever analog parameters 001 through 114 (those that can be changed via communications) are changed, a Write cycle occurs immediately after receipt of the message.

Override Parameters

- Override analog parameters 120, 123 and 125 (PV, output, computer setpoint) are not stored in non-volatile memory and can be changed as frequently as desired with no effect on non-volatile memory retentivity, but controller must remain in slave mode.

Digital Parameters

- Whenever digital configuration parameters 128 through 250 are updated via communications, the non-volatile memory is updated as soon as the message is received.

9.2 Reading Control Data - UDC 3300

Overview

You can Read the following control data from the UDC controller.

- Input 1
- Input 2
- Input 3
- PV
- Internal RV
- PV, Setpoint, Output

ATTENTION Loop 1 or Loop 2 is selected by address in request message.

I.D. codes

Use the identifying codes listed in Table 9-1 to read the specific items.

A Write request for these codes will result in an Error message.

Table 9-1 Control Data Parameters

Parameter Description	Identifying Code	Format Code	Range or Selection
Input #1	118	18	In Engineering Units or Percentage
Input #2	119	18	In Engineering Units or Percentage
Input #3	117	18	In Engineering Units or Percentage
PV	120	18	In Engineering Units or Percentage
Internal RV	121	18	In Engineering Units or Percentage
PV, Setpoint, and Output*	122	18	In Engineering Units or Percentage

*This Read request will give a three variable response (see Read/Write operation).

9.3 Read Options Status - UDC 3300

Read

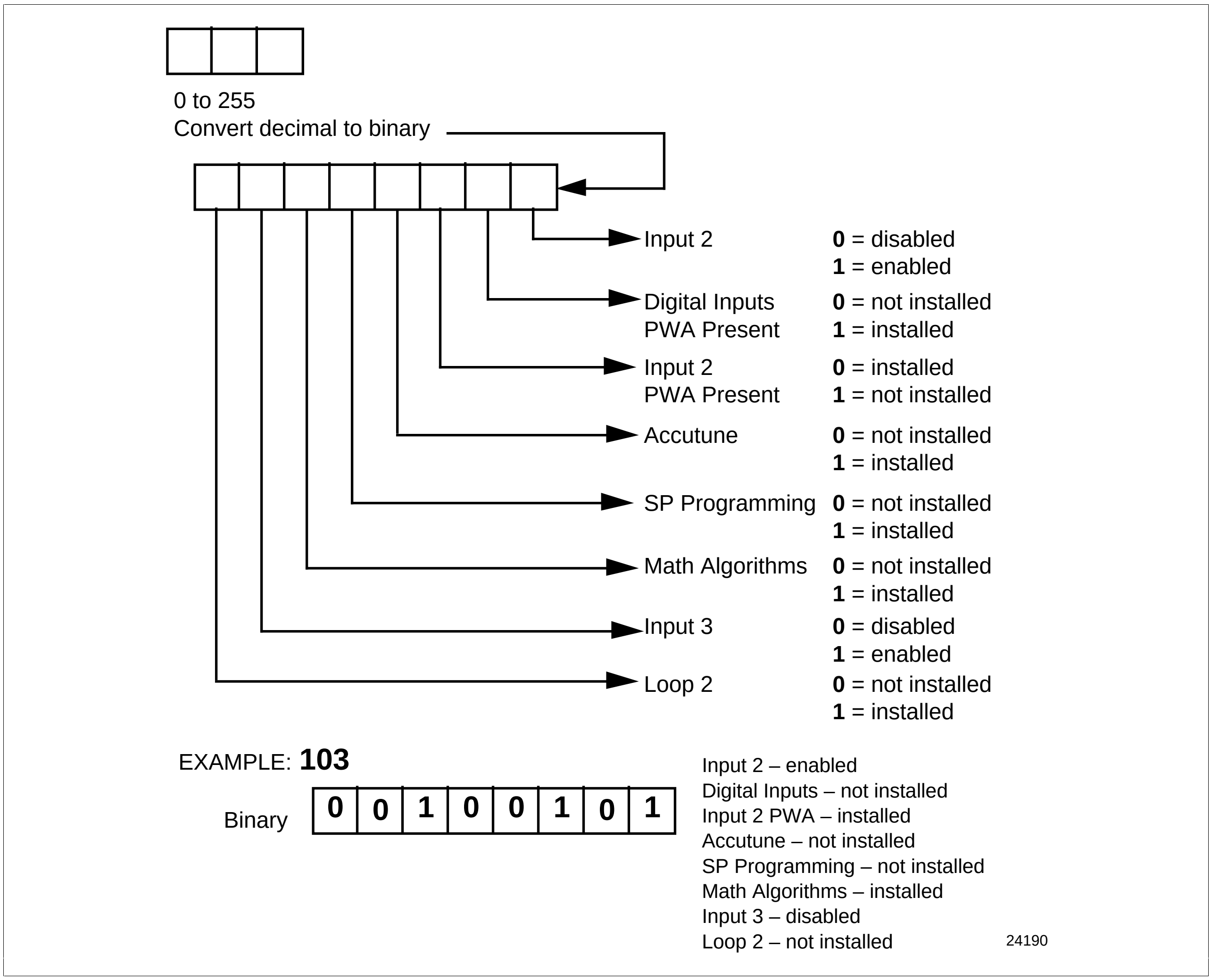
Doing a read of I.D. Code 185 listed in Table 9-2 will tell you which of the available options are enabled/installed or disabled/not installed.

Table 9-2 Option Status

Parameter Description	Identifying Code	Format Code	Range or Selection
Option Status (Read only)	185	11	See Figure 9-1

The data field in the response message will be a decimal number from 0 to 255. Convert the decimal number to binary as shown in Figure 9-1 to determine which options are or are not active.

Figure 9-1 Option Status Information



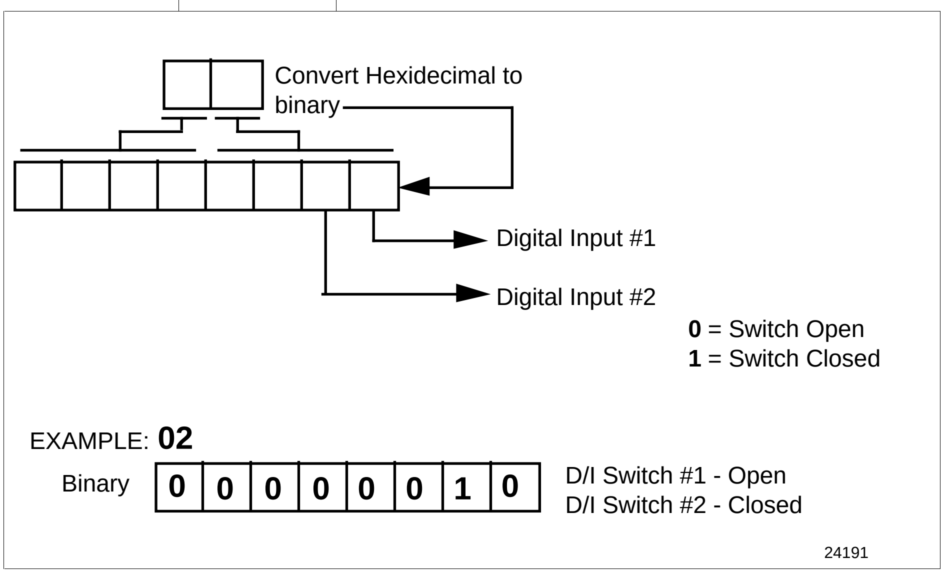
9.4 Miscellaneous Read Only's - UDC 3300

I.D. codes for Read Only's

The identifying codes listed in Table 9-3 represent some information that are Read only. No Writes allowed.

Table 9-3 Miscellaneous Read Only's

Parameter Description	Identifying Code	Format Code	Range or Selection
Software Type	157	11	READ only (UDC 3300) 41 = Basic UDC 3300 software 42 = Field upgrade for SPP 43 = Expanded Controller Version 44 = Field Upgrade for SPP + Math 45 = Field Upgrade for 2 Loops + SPP 46 = Field Upgrade for SPP + 2 Loops + Math 47 = DMCS (UDC 3000 software) 48 = DMCS + Accutune + SPP 49 = Limit Controller
Software Version	167	11	READ only 0 to 255
Auxiliary Output Value	48	18	READ only Engineering Units for selected type (Write results in error message)
Digital Input Switch Status (Read only)	188	11	The data field in the response message will be a hexadecimal number. Convert the HEX to binary as shown below to determine which Digital Input switches are closed.



I.D. codes for Read Only's

Table 9-3 Miscellaneous Read Only's

Parameter Description	Identifying Code	Format Code	Range or Selection
UDC Error Status (Definitions are listed in Table 9-4) Loop 1 or 2 designated in the request message	255	11	See below READ/WRITE* 001 = Emergency Manual 002 = Failsafe 004 = Working Calibration Checksum Error 008 = Configuration Checksum Error 016 = Factory Calibration Error 032 = Hardware Failure 064 = Restart after Shed 128 = Configuration/Calibration Memory Changed

* Write to clear.

For example:

If Read returns 192 (restart after shed-64 plus configuration change-128)
Write anything to I.D. Code 255
Read returns 000 (clear).

Error status definitions

Table 9-4 list the UDC error status codes and their definitions.

Table 9-4 Error Status Definitions

Code	Error	Definitions
001	Emergency Manual	Indicates that the output of the unit which has been in slave operations, is under manual control, locally. Error remains until local control is relinquished at the controller.
002	Failsafe	Error occurs whenever the control reverts to failsafe operation and remains as long as the condition exists.
004	Working Calibration Checksum Error	Indicates that an error exists in the working calibration data. Re-select the inputs to load factory calibration data or field calibrate the inputs.
008	Configuration Checksum Error	Error exists in the configuration data. Verify configuration data at the keyboard. Checksum will be recomputed by stepping the controller through the status tests.
016	Factory Calibration Error	Error exists in the factory calibration data and remains as long as the condition exists.
032	Hardware Failure	Indicates either a RAM tests failure or Input 1, Input 2, Input 3 failure on two consecutive conversions.
064	Restart After Shed	Error occurs whenever a shed of slave override is performed. Error is reset following a WRITE command to I.D. Code 255 (064).
128	Configuration /Calibration Memory Changed	Error occurs whenever shed, configuration, or calibration changed. Also occurs whenever there is a change of state in 001, 002, 004, 008, or 016. Error is reset following a Write command to I.D. Code 255.

9.5 Setpoints - UDC 3300

Overview

You can use three separate local setpoints in the UDC Controller. The identifying codes listed Table 9-5 allow you to select which setpoint you want to use and to enter a value in Engineering Units or Percent (whichever is selected at Code 161) for that setpoint via communications.

I.D. codes

Make your selection using I.D. Code 173 and enter the value for the setpoint chosen using ID Code 39 (SP1) or 53 (SP2) or 113 (SP3).

ATTENTION Loop 1 or Loop 2 is selected by address in request message.

Table 9-5 Setpoint Code Selections

Parameter Description	Identifying Code	Format Code	Range or Selection
Local Setpoint #1	039	18	Value within the setpoint range limits
Local Setpoint #2	053	18	Value within the setpoint range limits
Local Setpoint #3	116	18	Value within the setpoint range limits
Number of Local Setpoints	173	11	000 = Local Setpoint #1 only 001 = 2nd Local Setpoint via keyboard or communications 003 = 3rd Local Setpoint via keyboard or communications (This disables RSP.)

Associated parameters

Refer to Table 9-6 to display or change any of the parameters associated with the setpoint.

Table 9-6 Setpoint Associated Parameters

Parameter	Code
Setpoint Limits	007, 008
Computer Setpoint	125

9.6 Using a Computer Setpoint(Overriding Controller Setpoint) - UDC 3300

Overview

You can use a setpoint generated from the computer to override the setpoint being used by the controller.

The value generated by the computer will have ratio and bias applied by the controller.

I.D. codes

Use the Identifying Code in Table 9-7 to enter the computer setpoint.

ATTENTION Loop 1 or Loop 2 is selected by address in request message.

Table 9-7 Computer Setpoint Selection

Parameter Description	Identifying Code	Format Code	Range or Selection
Computer Setpoint	125	18	Value from computer with Ratio/Bias applied by the controller. Within the Setpoint Range Limits in Engineering Units or Percent.

Shed

The computer setpoint override will continue until "SHED" from communications occurs or the controller is placed into monitor mode through communications. Doing periodic "SLAVE READS" within the shed time will allow the override to continue until communication is stopped and shed time elapses.

ATTENTION 0 Shed (code 154) allows the override to continue indefinitely or until the override is canceled. (See override selection ID Code 183.)

When SP is overridden, the left most digit in the upper display becomes a "C."

9.6 Using a Computer Setpoint (Overriding Controller Setpoint) - UDC 3300, Continued

Associated parameters

Refer to Table 9-8 for the codes to display or change any of the parameters associated with the computer setpoint.

Table 9-8 Computer Setpoint Associated Parameters

Parameter	Code
Setpoint Limits	007, 008
Local Setpoint #1	039
Local Setpoint #2	053
Local Setpoint #3	116
Local Setpoint Selection	173
Loop #1 Computer Setpoint Ratio	021
Loop #1 Computer Setpoint Bias	022

9.7 PV or Setpoint Override Selections - UDC 3300

Overview

You can **Read** the present override status or the PV or setpoint or you can do a **Write** transaction to cancel the override.

I.D. codes

Use the Identifying Code in Table 9-9 to Read or Write your selection.

ATTENTION Loop 1 or Loop 2 is selected by address in request message.

Table 9-9 PV or Setpoint Override Selections

Parameter Description	Identifying Code	Format Code	Range or Selection
PV or Setpoint Override Selection	183	11	01 = Input 1 02 = Input 2 04 = PV 08 = Setpoint ***Limit Controller*** *FM Units (Read Only):* 0 = Unlatched 1 = Latched Relay *Non-FM Units (Read/Write):* Write 0 to Reset relay

9.8 Reading or Changing the Output - UDC 3300

Overview

You can read the output of a particular UDC controller (Read transaction) or you can change it to suit your needs. (Do a Write transaction.)

I.D. codes

Use the identifying code in Table 9-10 to monitor (Read) or change (Write the output (in manual only).

ATTENTION To Write (change) the output, the controller must first be in manual mode.

ATTENTION Loop 1 or Loop 2 is selected by address in request message.

Table 9-10 Reading or Changing the Output

Parameter Description	Identifying Code	Format Code	Range or Selection
Output	123	18	-5 to +105% of full span (current output) 0 to 100% (relay type output)

Associated parameters

Refer to Table 9-11 for the codes required to display or change any of the parameters associated with the output.

Table 9-11 Associated Output Codes

Parameter	Code
Output Limits	014, 015
Output Dropoff Limits	020
Failsafe Output Values	040
Output Deadband	018
Output Hysteresis	019
Output Type	160

9.9 Local Setpoint/PID Selection/Setpoint Ramp Status – UDC 3300

Overview

Identifying Code 250 lets you monitor or make selections for:

- Tuning Parameter Set #1 or #2
  If Tuning Sets selection is “two keyboard” code 172 = 001
- Local Setpoint #1, #2, or #3
  If “2 Local Setpoints” is selected 131 = 0, 173 = 1
- Run or Hold Setpoint Ramp or a Setpoint Program Data
  If SP Ramp or SP Program is enabled 178 = 1 Program, 178 = 2 Ramp

ATTENTION Loop 1 or Loop 2 is selected by address in request message.

Read

Table 9-12 is a table of numbers that could be returned by the UDC 3300 controller. When a Read is requirested for this I.D. Code (250) you can determine which parameters are active from this table.

Write

To Write information to the controller, select what parameters you want from Table 9-12 and enter the associated number in the data field of the Write request.

For example:

Suppose you want to change from TUNING SET #1 to TUNING SET #2 while maintaining LOCAL SETPOINT #1 and SP RAMP STATUS = HOLD.

READ 250 response is 00 or 02

WRITE 250 (07)

READ 250 response is 018

Note: Some of the numbers are Read only.

Table 9-12 LSP/PID Set Selection and Setpoint Ramp Status

Parameter Description	Identifying Code	Format Code	Range or Selection
Enhanced Function	250	11	See Figure 9-2

9.9 Local Setpoint/PID Selection/Setpoint Ramp Status - UDC 3300, Continued

Read, continued

Figure 9-2 I.D. Code 250 Indications

Setpoint Ramp or Program Data Selections	Tuning Set #1 Selection Local Setpoint #1 Selection	Tuning Set #1 Selection Local Setpoint #2 Selection	Tuning Set #2 Selection Local Setpoint #1 Selection	Tuning Set #2 Selection Local Setpoint #2 Selection	Tuning Set #1 Selection Local Setpoint #3 Selection	Tuning Set #2 Selection Local Setpoint #3 Selection
SP Ramp, Enabled Not in Progress	**000**	**008**	**016**	**024**	**032**	**048**
SP Ramp in Progress, Hold	**002**	**010**	**018**	**026**	**034**	**050**
SP Ramp in Progress, Run	**003**	**011**	**019**	**027**	**035**	**051**
SP Program, Enabled Not in Progress, (READ)	**004**	**012**	**020**	**028**	**036**	**052**
SP Program in Progress, Hold (READ/WRITE)	**006**	**014**	**022**	**030**	**038**	**054**
SP Program in Progress, Run (READ/WRITE)	**007**	**015**	**023**	**031**	**039**	**055**

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9.9 Local Setpoint/PID Selection /Setpoint Ramp Status - UDC 3300, Continued

Write

A write of code 250 lets you change the SP ramp status as well as the local setpoint or tuning set selection. Refer to Table 9-13.

ATTENTION Loop 1 or Loop 2 is selected by address in request message.

Table 9-13 I.D. Code 250 Writes

Parameter Description	Identifying Code	Format Code	Range or Selection
Write Local Setpoint/PID Set Selection and SP Ramp Status	250	11	000 = Abort SP Ramp 001 = Run SP Ramp 002 = Hold SP Ramp 003 = Start SP Ramp 004 = Change to Local Setpoint #1 005 = Change to Local Setpoint #2 006 = Change to PID Tuning Set #1 007 = Change to PID Tuning Set #2 008 = Change to Local Setpoint #3

ATTENTION

To enable or disable the setpoint ramp, refer to Identifying Code 150.

9.10 Configuration Parameters - UDC 3300

Overview

Listed on the next pages are the identifying codes for the parameters in the various Setup Groups in the UDC 3300 Process Controller. The table below lists the Setup Groups and their table numbers in which they are listed. Most of the parameters are configurable through the hosts. Some are Read Only and are indicated as such and cannot be changed.

Setup Group	Table Number
TUNING	9-14
TUNING L2	9-15
SP RAMP / RATE / PROGRAM	9-16
ADAPTIVE	9-17
ALGORITHM	9-18
OUTPUT ALGORITHM	9-19
INPUT 1	9-20
INPUT 2	9-21
INPUT 3	9-22
CONTROL AND CONTROL 2	9-23
OPTIONS	9-24
COMMUNICATIONS	9-25
ALARMS	9-26
DISPLAY	9-27

Reading or writing

Do a Read or Write (see “Read/Write Operations”), depending on your requirements using the identifying code and format code listed in the tables. The range or selection available for each range is listed in the tables.

9.10 Configuration Parameters - UDC 3300, Continued

Tuning

Table 9-14 lists all the I.D. codes and ranges or selections for the function parameters in the Setup Group “TUNING” (Loop 1).

Table 9-14 Setup Group-Tuning (Loop 1)*

Parameter Description	Identifying Code	Format Code	Range or Selection
Gain #1 or PB Note 1	001	18	0.01 to 1000 Gain 0.1 to 9999 PB
Rate #1 Note 1	002	18	0.00 to 10.00
Reset #1 Note 1	003	18	0.02 to 50.00
Manual Reset	013	18	-100 to +100
Gain #2 or PB Note 1	004	18	0.01 to 1000
Rate #2 Note 1	005	18	0.00 to 10.00
Reset #2 Note 1	006	18	0.02 to 50.00
Cycle Time #1	158	11	1 to 120 seconds
Cycle Time #2	159	11	1 to 120 seconds
Lockout (keyboard only) Changes to data always possible via communications regardless of this configuration.	132	11	**0** = No Lockout **1** = Calibration only **2** = Calibration + Configuration **3** = Calibration + Configuration + View **4** = Maximum Lockout
Keyboard Lockout	191	11	**0** = All keys enabled **1** = Manual Auto Key Locked **2** = Setpoint Select Key Locked **3** = Manual/Auto and Setpoint Select Keys Locked **4** = Run Hold Key Locked **5** = Run Hold Key and Manual/Auto Keys Locked **6** = Run Hold Key and Setpoint Select Keys Locked **7** = Run Hold, Setpoint Select, and Manual/Auto Keys Locked

NOTE 1: Writes to these locations not available when Accutune is enabled.

Tuning, continued

Table 9-14 Setup Group-Tuning (Loop 1)*, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
PV1 Value gain scheduling	001**	48	–9999 to 9999
PV2 Value gain scheduling	002**	48	–9999 to 9999
PV3 Value gain scheduling	003**	48	–9999 to 9999
PV4 Value gain scheduling	004**	48	–9999 to 9999
PV5 Value gain scheduling	005**	48	–9999 to 9999
PV6 Value gain scheduling	006**	48	–9999 to 9999
PV7 Value gain scheduling	007**	48	–9999 to 9999
PV8 Value gain scheduling	008**	48	–9999 to 9999
Gain 1 value gain scheduling	009**	48	0.001 to 1000
Gain 2 value gain scheduling	010**	48	0.001 to 1000
Gain 3 value gain scheduling	011**	48	0.001 to 1000
Gain 4 value gain scheduling	012**	48	0.001 to 1000
Gain 5 value gain scheduling	013**	48	0.001 to 1000
Gain 6 value gain scheduling	014**	48	0.001 to 1000
Gain 7 value gain scheduling	015**	48	0.001 to 1000
Gain 8 value gain scheduling	016**	48	0.001 to 1000

*Loop selected by address in request message.

**Extended Codes—Use Format Code 48.

Tuning 2

Table 9-15 lists all the I.D. codes and ranges or selections for the function parameters in the Setup Group “TUNING 2.”

ATTENTION Not applicable to Limit Controller.

Table 9-15 Setup Group-Tuning 2* (Loop 2)

Parameter Description	Identifying Code	Format Code	Range or Selection
Gain #3 or PB	001	18	0.1 to 1000 Gain 0.1 to 9999 PB
Rate #3	002	18	0.00 to 10.00
Reset #3	003	18	0.02 to 50.00
Man Reset3	013	18	–100 to +100
Gain #4 or PB	004	18	0.1 to 1000
Rate #4	005	18	0.00 to 10.00
Reset #4	006	18	0.02 to 50.00
Cycle Time #3	158	11	1 to 120 seconds
Cycle Time #4	159	11	1 to 120 seconds
PV1 Value gain scheduling	001**	48	–9999 to 9999
PV2 Value gain scheduling	002**	48	–9999 to 9999
PV3 Value gain scheduling	003**	48	–9999 to 9999
PV4 Value gain scheduling	004**	48	–9999 to 9999
PV5 Value gain scheduling	005**	48	–9999 to 9999
PV6 Value gain scheduling	006**	48	–9999 to 9999
PV7 Value gain scheduling	007**	48	–9999 to 9999
PV8 Value gain scheduling	008**	48	–9999 to 9999
Gain 1 value gain scheduling	009**	48	0.001 to 1000

**Extended Codes—Use Format Code 48.

Tuning 2, continued

Table 9-15 Setup Group-Tuning 2* (Loop 2), Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Gain 2 value gain scheduling	010**	48	0.001 to 1000
Gain 3 value gain scheduling	011**	48	0.001 to 1000
Gain 4 value gain scheduling	012**	48	0.001 to 1000
Gain 5 value gain scheduling	013**	48	0.001 to 1000
Gain 6 value gain scheduling	014**	48	0.001 to 1000
Gain 7 value gain scheduling	015**	48	0.001 to 1000
Gain 8 value gain scheduling	016**	48	0.001 to 1000

*Loop selected by address in request message.

**Extended Codes—Use Format Code 48.

SP ramp/rate/program

Table 9-16 lists all the I.D. codes and ranges or selections for the function parameters in setup group “SP RAMP/RATE/PROGRAM.”

ATTENTION Loop 1 or Loop 2 selected by address in request message.

Table 9-16 Setup Group-Setpoint Ramp/Rate

Parameter Description	Identifying Code	Format Code	Range or Selection
Setpoint Program Ramp Selection	178	11	**0** = SP Program, Rate, and Ramp Disabled **1** = SP Program Enabled **2** = SP Ramp Enabled **3** = SP Rate Enabled
SP Ramp	150	11	**0** = OFF **2** = Loop 1 **3** = Loop 2 **4** = Both Loops
Single SP Ramp Time	174	11	0 to 255 (minutes)
SP Rate			
Rate Up (EU/HR)	108	18	0 to 9999
Rate Down (EU/HR)	109	18	0 to 9999
SP Program			
Start Segment Number	175	11	1 to 11
End Segment Number (Soak)	176	11	2, 4, 6, 8, 10, or 12
Program Recycles	177	11	0 to 99
Guaranteed Soak Deviation	087	18	0 to 99.9 (0 = no soak)
Segment #1 Ramp Time	057	18	99.59 (0-99 Hrs:0-59 Min) or 0 to 999 (Degrees/Minute)

Setpoint ramp/rate/program, continued

Table 9-16 Setup Group-SP Ramp, Rate, or SP Program, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Segment #2 Soak Setpoint Value	058	18	Within Setpoint Limits
Segment #2 Soak Time	059	18	99.59 (0-99 Hrs:0-59 Min)
Segment #3 Ramp Time	060	18	99.59 (0-99 Hrs:0-59 Min) or 0 to 999 (Degrees/Minute)
Segment #4 Soak Setpoint Value	061	18	Within Setpoint Limits
Segment #4 Soak Time	062	18	99.59 (0-99 Hrs:0-59 Min)
Segment #5 Ramp Time	063	18	99.59 (0-99 Hrs:0-59 Min) or 0 to 999 (Degrees/Minute)
Segment #6 Soak Setpoint Value	064	18	Within Setpoint Limits
Segment #6 Soak Time	065	18	99.59 (0-99 Hrs:0-59 Min)
Segment #7 Ramp Time	066	18	99.59 (0-99 Hrs:0-59 Min) or 0 to 999 (Degrees/Minute)
Segment #8 Soak Setpoint Value	067	18	Within Setpoint Limits
Segment #8 Soak Time	068	18	99.59 (0-99 Hrs:0-59 Min)
Segment #9 Ramp Time	069	18	99.59 (0-99 Hrs:0-59 Min) or 0 to 999 (Degrees/Minute)
Segment #10 Soak Setpoint Value	070	18	Within Setpoint Limits
Segment #10 Soak Time	071	18	99.59 (0-99 Hrs:0-59 Min)
Segment #11 Ramp Time	072	18	99.59 (0-99 Hrs:0-59 Min) or 0 to 999 (Degrees/Minute)

9.10 Configuration Parameters - UDC 3300, Continued

Setpoint Ramp/Rate/Program, continued

Table 9-16 Setup Group-SP Ramp, Rate, or SP Program, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Segment #12 Soak Setpoint Value	073	18	Within Setpoint Limits
Segment #12 Soak Time	074	18	99.59 (0-99 Hrs:0-59 Min)
Program End State	181	11	**0** = Disable SP Program **1** = Hold at Program End
Controller Status at Program End	180	11	**0** = Last Setpoint and Mode **1** = Manual, Failsafe Output
Engineering Units or Ramp Segments	182	11	**0** = HRS:MIN **1** = Degrees/Minute
Present Segment Number	251	11	(READ ONLY) 1 to 12
Time Remaining — Minutes	252	11	(READ ONLY) 0-59 minutes (SP Program) 0-255 minutes (SP Ramp)
Time Remaining — Hours	253	11	(READ ONLY) 0 to 99
Cycles Remaining	254	11	(READ ONLY) 0 to 99

Accutune

Table 9-17 lists all the I.D. codes and ranges or selections for the function parameters in setup group "ACCUTUNE." Loop 1 or 2 is selected by address in request message.

Table 9-17 Setup Group-Adaptive Tune

Parameter Description	Identifying Code	Format Code	Range or Selection
Fuzzy Overshoot Suppression	193	11	**0** = Disabled **1** = Loop 1 enabled **2** = Loop 2 enabled **3** = Both loops enabled
Accutune Enable – Loops 1 and 2	152	11	**0** = Accutune disabled **1** = Limit tune **2** = Limit tune + PV **3** = SP tune – Normal **4** = SP tune – Fast **5** = SP tune + PV – Normal **6** = SP Tune + PV – Fast
Setpoint Change	153	11	5 to 15% span
Process Gain (KPG)	114	18	0.10 to 10.00
Accutune Error (Read only)	151	11	**0** = None **1** = Output less than or greater than Output Limits or Man Step = 0 **2** = Output greater or less than Heat/Cool Limits **3** = Not applicable **4** = PV change not sufficient **5** = Process Identification failed **6** = Calculated Reset outside Reset Limits **7** = Calculated Gain outside Gain Limits **8** = Accutune aborted on command **9** = Input 1 error detected **10** = Accutune illegal during Ramp **11** = Accutune aborted when external switch detected **12** = Running

Algorithm

Table 9-18 lists all the I.D. codes and ranges or selections for the Function Parameters in setup group “ALGORITHM.” Loop 1 or 2 is selected in the request message.

Table 9-18 Setup Group-Algorithm

Parameter Description	Identifying Code	Format Code	Range or Selection
Control Algorithm Selection (Selection here will affect I.D. code 160 in “Output Algorithms.”) †Not available for Loop 2	128	11	**0** = ON/OFF† **1** = PID-A **2** = PID-B **3** = PD-A with Manual Reset **4** = Three Position Step†
Loop 2 Selection (Loop 2 address only)	168	11	**0** = Loop 1 only **1** = Loop 2 enabled **2** = Loop 1 and 2 are cascaded. Loop 2 primary (no output)– Loop 1 secondary.
Input Algorithm 1 †Input source selected via ID 205, 206, 207.	204	11	**0** = None **1** = Weighted Average (LSP)† **2** = Feedforward – Summer† **3** = Feedforward – Multiplier† **4** = Relative Humidity **5** = Summer (with ratio and bias)† **6** = Input High Select (with ratio and bias)† **7** = Input Low Select (with ratio and bias)† **8** = General Math A (sq. rt., mult., div.)† **9** = General Math B (sq. rt., mult.)† **10** = General Math C (mult., div.)† **11** = General Math D (mult.)† **12** = Carbon A **13** = Carbon B **14** = Carbon C **15** = Carbon D **16** = Carbon FCC **17** = Oxygen **18** = Dewpoint

Algorithm, continued

Table 9-18 Setup Group-Algorithm, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Input Algorithm 2 †Input source selected via ID 210, 211, 212.	209	11	**0** = None **1** = Weighted Average† **2** = Feedforward – Summer† **3** = Feedforward – Multiplier† **4** = Relative Humidity **5** = Summer (with ratio and bias)† **6** = Input High Select (with ratio and bias)† **7** = Input Low Select (with ratio and bias)† **8** = General Math A (sq. rt., mult., div.)† **9** = General Math B (sq. rt., mult.)† **10** = General Math C (mult., div.)† **11** = General Math D (mult.)†
Timeout Period	099	18	00.00 to 99.59
Timer	216	11	0 = Disable 1 = Enable
Start	217	11	0 = Key 1 = Alarm2
LDisp	218	11	0 = Ti Rem 1 = E_time
Constant K for Math Algorithm 1	045	18	0.001 to 1000
Calc High (for Input Algorithm 1)	031	18	–999.0 to +9999 in Engineering Units
Calc Low (for Input Algorithm 1)	032	18	–999.0 to +9999 in Engineering Units
Constant K for Math Algorithm 2	047	18	0.001 to 1000
Calc High (for Input Algorithm 2)	051	18	–999.0 to +9999 in Engineering Units
Calc Low (for Input Algorithm 2)	052	18	–999.0 to +9999 in Engineering Units
Input Algorithm 1 Input A Selection (used with ID 204 math calculations)	205	11	**0** = Input 1 **1** = Input 2 **2** = Loop 1 Output **3** = Loop 2 Output **4** = Input Algorithm 1 **5** = Input Algorithm 2 **6** = Input 3

Algorithm, continued

Table 9-18 Setup Group-Algorithm, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Input Algorithm 1 Input B Selection (used with ID 204 math calculations)	206	11	**0** = Input 1 **1** = Input 2 **2** = Loop 1 Output **3** = Loop 2 Output **4** = Input Algorithm 1 **5** = Input Algorithm 2 **6** = Input 3
Input Algorithm 1 Input C Selection (used with ID 204 math calculations)	207	11	**0** = None **1** = Input 1 **2** = Input 2 **3** = Loop 1 Output **4** = Loop 2 Output **5** = Input Algorithm 1 **6** = Input Algorithm 2 **7** = Input 3
Atmospheric Pressure	024	18	590.0 to 760.0
Percent Carbon	046	18	0.02 to 0.350
Percent Hydrogen		18	1 to 99 (% H_2)
Input Algorithm 2 Input A Selection (used with ID 209 math calculations)	210	11	**0** = Input 1 **1** = Input 2 **2** = Loop 1 Output **3** = Loop 2 Output **4** = Input Algorithm 1 **5** = Input Algorithm 2 **6** = Input 3
Input Algorithm 2 Input B Selection (used with ID 209 math calculations)	211	11	**0** = Input 1 **1** = Input 2 **2** = Loop 1 Output **3** = Loop 2 Output **4** = Input Algorithm 1 **5** = Input Algorithm 2 **6** = Input 3
Input Algorithm 2 Input C Selection (used with 209 math calculations)	212	11	**0** = None **1** = Input 1 **2** = Input 2 **3** = Loop 1 Output **4** = Loop 2 Output **5** = Input Algorithm 1 **6** = Input Algorithm 2 **7** = Input 3
8-segment Characterizer 1	198	11	**0** = Disable **1** = Input 1 **2** = Input 2 **3** = Loop 1 – Output **4** = Loop 2 – Output **5** = Input 3

Algorithm, continued

Table 9-18 Setup Group-Algorithm, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
X0 Input to 8-segment characterizer	026***	48	0 to 99.99
X1 Input	027***	48	0 to 99.99
X2 Input	028***	48	0 to 99.99
X3 Input	029***	48	0 to 99.99
X4 Input	030***	48	0 to 99.99
X5 Input	031***	48	0 to 99.99
X6 Input	032***	48	0 to 99.99
X7 Input	033***	48	0 to 99.99
X8 Input	034***	48	0 to 99.99
Y0 Output from 8-segment Characterizer	035***	48	0 to 99.99
Y1 Output	036***	48	0 to 99.99
Y2 Output	037***	48	0 to 99.99
Y3 Output	038***	48	0 to 99.99
Y4 Output	039***	48	0 to 99.99
Y5 Output	040***	48	0 to 99.99
Y6 Output	041***	48	0 to 99.99
Y7 Output	042***	48	0 to 99.99
Y8 Output	043***	48	0 to 99.99
8-segment Characterizer 2	199	11	**0** = Disable **1** = Input 1 **2** = Input 2 **3** = Loop 1 – Output **4** = Loop 2 – Output **5** = Input 3
X0 Input to 8-segment Characterizer 2	045***	48	0 to 99.99
X1 Input (Char.2)	046***	48	0 to 99.99
X2 Input (Char.2)	047***	48	0 to 99.99
X3 Input (Char.2)	048***	48	0 to 99.99
X4 Input (Char.2)	049***	48	0 to 99.99
X5 Input (Char.2)	050***	48	0 to 99.99

***Extended codes—use format code 48.

Algorithm, continued

Table 9-18 Setup Group-Algorithm, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
X6 Input (Char.2)	051***	48	0 to 99.99
X7 Input (Char.2)	052***	48	0 to 99.99
X8 Input (Char.2)	053***	48	0 to 99.99
Y0 Output from 8-segment Characterizer2	054***	48	0 to 99.99
Y1 Output (Char.2)	055***	48	0 to 99.99
Y2 Output (Char.2)	056***	48	0 to 99.99
Y3 Output (Char.2)	057***	48	0 to 99.99
Y4 Output (Char.2)	058***	48	0 to 99.99
Y5 Output (Char.2)	059***	48	0 to 99.99
Y6 Output (Char.2)	060***	48	0 to 99.99
Y7 Output (Char.2)	061***	48	0 to 99.99
Y8 Output (Char.2)	062***	48	0 to 99.99
Totalizer	194	11	**0** = Disable **1** = Input 1 **2** = Input Algorithm 1 **3** = Input Algorithm 2
Totalizer Scale Factor (display only)	195	11	**0** = 10^0 = 1 **1** = 10^1 = 10 **2** = 10^2 = 100 **3** = 10^3 = 1,000 **4** = 10^4 = 10,000 **5** = 10^5 = 100,000 **6** = 10^6 = 1,000,000
Totalizer Reset Lock (When locked, totalizer cannot be reset from keyboard.)	196	11	**0** = Unlock **1** = Lock
Current Totalizer Value	103	11	0 to 10^{14}–1 NOTE: A value of “0” may be written to reset the totalizer. A write of any other value is not accepted.
Totalizer Integration Rate	197	11	**0** = Second **1** = Minute **2** = Hour **3** = Day **4** = Million/Day

***Extended codes—use format code 48.

Output algorithm

Table 9-19 lists all the I.D. codes and ranges or selections for the function parameters in setup group “OUTPUT ALGORITHM.” Loop 1 or 2 is selected in the request message.

Table 9-19 Setup Group-Output Algorithm

Parameter Description	Identifying Code	Format Code	Range or Selection
Output Algorithm	160	11	**0** = None (Loop 1) – (Loop 2 disabled) **1** = 3 Position Step or Position Proportioning **2** = Relay Simplex **3** = Relay Duplex (Loop 1 only) **4** = Current Simplex **5** = Current Duplex **6** = Relay/Current Duplex (Relay on Heat/Current Full) **7** = Current/Relay Duplex (Relay on Cool/Current Full) **8** = Current Duplex - Loop 1 only (Current Output - Cool, 2nd Current Output - Heat) **9** = Relay/Current Duplex - Loop 1 only (Relay on Heat/Current Split) **10** = Relay/Current Duplex - Loop 1 only (Relay on Cool/Current Split)
Relay Cycle Time Increments	190	11	**0** = 1 second increments **1** = 1/3 second increments

Input 1

Table 9-20 lists all the I.D. codes and ranges or selections for the function parameters in setup group "INPUT 1."

Table 9-20 Setup Group-Input 1 (Loop 1 Address only)

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 1 Type	168	11	**0** = Disable **1** = B TC **2** = E TC H **3** = E TC L **4** = J TC H **5** = J TC L **6** = K TC H **7** = K TC L **8** = NNM H **9** = NNM L **10** = NM90 H **11** = NM90 L **12** = Nicrosil TC **13** = R TC **14** = S TC **15** = T TC H **16** = T TC L **17** = W TC H **18** = W TC L **19** = 100 PT RTD **20** = 100 PT LO RTD **21** = 200 PT RTD **22** = 500 PT RTD **23** = Radiamatic RH **24** = Radiamatic RI **25** = 0-20 mA* **26** = 4-20 mA* **27** = 0-10 mV* **28** = 0-50 mV* **29** = 0-5 Vdc **30** = 1-5 Vdc* **31** = 0-10 Vdc* **32** = Dewpoint **33** = Carbon **34** = Oxygen *Limit: Non-FM only **ATTENTION** Changing the Input Type will result in the loss of Field Calibration values and will restore the Factory Calibration values.

Input 1, continued

Table 9-20 Setup Group-Input 1 (Loop 1 Address only), Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 1 Transmitter Characterization	169	11	**0** = B TC **1** = E TC H **2** = E TC L **3** = J TC H **4** = J TC L **5** = K TC H **6** = K TC L **7** = NNM TC H **8** = NNM TC L **9** = R TC **10** = S TC **11** = T TC H **12** = T TC L **13** = W TC H **14** = W TC L **15** = 100 PT RTD **16** = 500 PT RTD **17** = 100 PT LO RTD **18** = Linear **19** = Square Root **20** = Nicrosil TC **21** = Radiamatic RH **22** = Radiamatic RI **23** = 200 PT RTD **24** = NM90 H **25** = NM90 L
Input 1 High Range Value	029	18	–999. to 9999. Engineering Units (Linear types only)
Input 1 Low Range Value	030	18	–999 to 9999. Engineering Units (Linear types only)
Input 1 Ratio	106	18	–20.00 to 20.00
Input 1 Bias	107	18	–999 to 9999. Engineering Units
Input 1 Filter	042	18	0 to 120 seconds
Burnout (Open Circuit Detection)	164	11	**0** = None and Failsafe **1** = Upscale **2** = Downscale ***Limit:*** **0** = Downscale **1** = Upscale *Read only, Writes illegal*
Emissivity	023	18	0.01 to 1.00

Input 2

Table 9-21 lists all the I.D. codes and ranges or selections for the function parameters in setup group "INPUT 2."

Table 9-21 Setup Group-Input 2 (Loop 1 Address only)

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 2 Type	170	11	**0** = Disable **1** = B TC **2** = E TC H **3** = E TC L **4** = J TC H **5** = J TC L **6** = K TC H **7** = K TC L **8** = NNM H **9** = NNM L **10** = NM90 H **11** = NM90 L **12** = Nicrosil TC **13** = R TC **14** = S TC **15** = T TC H **16** = T TC L **17** = W TC H **18** = W TC L **19** = 100 PT RTD **20** = 100 PT LO RTD **21** = 200 PT RTD **22** = 500 PT RTD **23** = Radiamatic RH **24** = Radiamatic RI **25** = 0-20 mA **26** = 4-20 mA **27** = 0-10 mV **28** = 0-50 mV **29** = 0-5 Vdc **30** = 1-5 Vdc **31** = 0-10 Vdc **32** = Slidewire **ATTENTION** Changing the Input Type will result in the loss of Field Calibration values and will restore the Factory Calibration values.

Input 2, continued

Table 9-21 Setup Group-Input 2 (Loop 1 Address only), Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 2 Transmitter Characterization	171	11	**0** = B TC **1** = E TC H **2** = E TC L **3** = J TC H **4** = J TC L **5** = K TC H **6** = K TC L **7** = NNM TC H **8** = NNM TC L **9** = R TC **10** = S TC **11** = T TC H **12** = T TC L **13** = W TC H **14** = W TC L **15** = 100 PT RTD **16** = 500 PT RTD **17** = 100 PT LO RTD **18** = Linear **19** = Square Root **20** = Nicrosil TC **21** = Radiamatic RH **22** = Radiamatic RI **23** = 200 PT RTD **24** = NM90 H **25** = NM90 L
Input 2 High Range Value	035	18	–999. to 9999. Engineering Units
Input 2 Low Range Value	036	18	–999 to 9999. Engineering Units
Input 2 Ratio	037	18	–20.00 to 20.00
Input 2 Bias	038	18	–999 to 9999. Engineering Units
Input 2 Filter	043	18	0 to 120 seconds
Burnout 2	165	11	**0** = None and Failsafe **1** = Upscale **2** = Downscale ***Limit:*** **0** = Downscale **1** = Upscale *Writes illegal*
Emissivity 2	044	18	0.01 to 1.00

9.10 Configuration Parameters - UDC 3300, Continued

Input 3

Table 9-22 lists all the I.D. codes and ranges or selections for the function parameters in setup group “INPUT 3.”

Table 9-22 Setup Group-Input 3 (Loop 1 Address only)

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 3 Type	214	11	**0** = Disable **18** = 4-20 mA **21** = 1-5 Vdc **27** = 0-20 mA **28** = 0-5 Vdc **ATTENTION** Changing the Input Type will result in the loss of Field Calibration values and will restore the Factory Calibration values.
Input 3 Transmitter Characterization	215	11	**0** = B TC **1** = E TC H **2** = E TC L **3** = J TC H **4** = J TC L **5** = K TC H **6** = K TC L **7** = NNM TC H **8** = NNM TC L **9** = R TC **10** = S TC **11** = T TC H **12** = T TC L **13** = W TC H **14** = W TC L **15** = 100 PT RTD **16** = 500 PT RTD **17** = 100 PT LO RTD **18** = Linear **19** = Square Root **20** = Nicrosil TC **21** = Radiamatic RH **22** = Radiamatic RI **23** = 200 PT RTD
Input 3 High Range Value	027	18	–999. to 9999. Engineering Units
Input 3 Low Range Value	028	18	–999 to 9999. Engineering Units
Input 3 Ratio	104	18	–20.00 to 20.00
Input 3 Bias	105	18	–999. to 9999. Engineering Units
Input 3 Filter	033	18	0 to 120 seconds

Control and Control 2

Table 9-23 lists all the I.D. codes and ranges or selections for the function prompts in setup group "CONTROL or CONTROL 2." Loop 1 or 2 address selected in request message.

Table 9-23 Setup Group-Control and Control 2

Parameter Description	Identifying Code	Format Code	Range or Selection
PV Source	133	11	**0** = Input 1 **1** = Input 2 **2** = Input Algorithm 1 **3** = Input Algorithm 2 **4** = Input 3
Tuning Parameter Selection	172	11	**0** = One set only **1** = 2 sets keyboard selected **2** = 2 sets with PV automatic switchover **3** = 2 sets with setpoint (SP) automatic switchover **4** = Gain scheduling
Automatic Switchover Value (used with 172 selection 2 or 3)	056	18	Within the PV Range in engineering units
Local Setpoint Source (Number of LSP's)	173	11	**0** = One Local Setpoint **1** = Two Local Setpoints **3** = Three Local Setpoints (disables RSP)
Power Up Mode Recall	130	11	**Control Mode** / **Setpoint Mode** **0** = MAN LSP1 **1** = AUTO LSP1 **2** = AUTO Last SP **3** = LAST Last SP **4** = LAST Last local SP

9.10 Configuration Parameters - UDC 3300, Continued

Control and Control 2, continued

Table 9-23 Setup Group-Control and Control 2, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Setpoint Source	131	11	**0** = Local Setpoint only **1** = Remote Setpoint via Input 1 **2** = Remote Setpoint via Input 2 **3** = Remote Setpoint using Input Algorithm 1 **4** = Remote Setpoint using Input Algorithm 2 **5** = Remote Setpoint via Input 3
Auto-Bias (LSP to RSP)	137	11	**0** = Disabled (bump) **1** = Enabled (bumpless)
Setpoint Tracking	138	11	**0** = None **1** = LSP = PV (when in Manual) **2** = LSP = RSP
Control Setpoint High Limit	007	18	0 to 100% of PV (engineering units)
Control Setpoint Low Limit	008	18	0 to 100% of PV (engineering units)
Control Output Direction/Alarm Outputs	135	11	**0** = Direct Action Alarm Output energized **1** = Direct Action Alarm Output de-energized **2** = Reverse Action Alarm Output energized **3** = Reverse Action Alarm Output de-energized
High Output Limit	014	18	–5 to 105% of output
Low Output Limit	015	18	–5 to 105% of output
High Reset Limit	016	18	–5 to 105% of output

Control and Control 2, continued

Table 9-23 Setup Group-Control and Control 2, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Low Reset Limit	017	18	–5 to 105% of output
Output Change Rate Limiting	189	11	**0** = Disable **1** = Enable
Output Change Rate Up	110	18	0 to 9999%/minute
Output Change Rate Down	111	18	0 to 9999%/minute
Output Dropout	139	11	**0** = None **1** = Dropout using value selected at ID Code #20
Controller Dropoff Value	020	18	–5 to 105% of output
Output Deadband	018	18	–5 to +25.0%
Output Hysteresis (Loop 1 address only)	019	18	0 to 5.0%
Failsafe Mode	213	11	**0** = Latching **1** = Non latching
Failsafe Output Level	040	18	0 to 100%
Manual Power Up Output	112	18	0 to 100
Auto Power Up Output	113	18	0 to 100
Proportional Band Units (Loop 1 address only) applies to Loop 1 and 2	148	11	**0** = Gain **1** = Proportional band
Reset Units (Loop 1 address only) applies to Loop 1 and 2	149	11	**0** = Minutes **1** = RPM

9.10 Configuration Parameters - UDC 3300, Continued

Options

Table 9-24 lists all the I.D. codes and ranges or selections for the function parameters in setup group “OPTIONS.” Loop 1 or 2 is selected in the request message.

Table 9-24 Setup Groups-Options

Parameter Description	Identifying Code	Format Code	Range or Selection
Auxiliary Output	134	11	**0** = None **1** = Input 1 **2** = Input 2 **3** = PV – Loop 1 **4** = Deviation – Loop 1 **5** = Output – Loop 1 **6** = Setpoint – Loop 1 **7** = LSP1 – Loop 1 **8** = Input Algorithm 1 **9** = Input Algorithm 2 **10** = Input 3 **12** = PV – Loop 2 **13** = Deviation – Loop 2 **14** = Output – Loop 2 **15** = Setpoint – Loop 2 **16** = LSP1 – Loop 2
Low Scaling Factor (Loop 1 address only)	049	18	Within the range of the selected variable in I.D. 134
High Scaling Factory (Loop 1 address only)	050	18	Within the range of the selected variable in I.D. 134

Options, continued

Table 9-24 Setup Groups-Options, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Digital Input #1 (Loop 1 address only)	186	11	**0** = None **1** = To Manual **2** = To Local Setpoint #1 **3** = To Local Setpoint #2 **4** = To Direct Action **5** = To Hold Ramp **6** = To PID Set #2 **7** = PV = Input 2 **8** = To Run Ramp **9** = Reset SP Program **10** = Inhibit Reset **11** = To Manual/Failsafe Output **12** = Disable Keyboard **13** = To Automatic Output **14** = To Timer **15** = To Auto/Man Station **16** = To Local Setpoint #3 **17** = Initiate Limit Cycle Tuning **18** = Setpoint Initialization **19** = Output 1 Tracks Input 2 **20** = Output 2 Overrides Output 1 **21** = To RSP **22** = Display Other Loop on Closure **23** = External Reset Feedback **24** = To Purge **25** = To Low Fire **26** = Track 2 **27** = Manual Latching **28** = PV = Input 3 **29** = Rerun For 0 through 255 loop selected by address in request message. For digital input combinations see Figure 9-3.

Options, continued

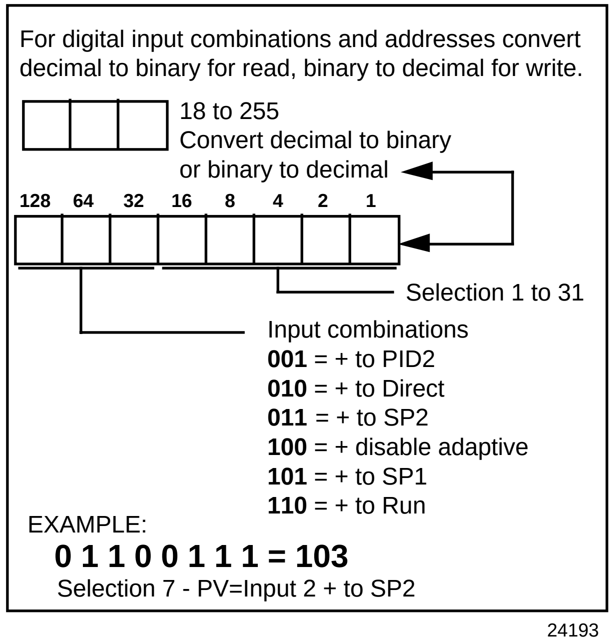
Table 9-24 Setup Groups-Options, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Digital Input #2 (Loop 1 address only)	187	11	**0** = None **1** = To Manual **2** = To Local Setpoint #1 **3** = To Local Setpoint #2 **4** = To Direct Action **5** = To Hold Ramp **6** = To PID Set #2 **7** = PV = Input 2 **8** = To Run Ramp **9** = Reset SP Program **10** = Inhibit Reset **11** = To Manual/Failsafe Output **12** = Disable Keyboard **13** = To Automatic Output **14** = To Timer **15** = To Auto/Man Station **16** = To Local Setpoint #3 **17** = Initiate Limit Cycle Tuning **18** = Setpoint Initialization **19** = Output 1 Tracks Input 2 **20** = Output 2 Overrides Output 1 **21** = To RSP **22** = Display Other Loop on Closure **23** = External Reset Feedback **24** = To Purge **25** = To Low Fire **26** = Track 2 **27** = Manual Latching **28** = Input 3 **29** = Rerun For 0 through 255 loop selected by address in request message. For digital input combinations see Figure 9-3.

9.10 Configuration Parameters - UDC 3300, Continued

Options, continued

Figure 9-3 Digital Input Combinations, Inputs 1 and 2



Communications

Table 9-25 lists all the I.D. codes and ranges or selections for the function parameters in setup group "COM." Loop 1 or 2 is selected in the request message.

Table 9-25 Setup Group-Communications

Parameter Description	Identifying Code	Format Code	Range or Selection
Shed Time (Loop 1 address only)	154	11	**0** = No Shed **1** = 255 sample periods
Shed Mode and Output (Loop 1 address only) Selections apply to either loop	162	11	**0** = Last Mode and Last Output **1** = Manual Mode, Last Output **2** = Manual Mode, Failsafe Output **3** = Automatic Mode
Shed Setpoint Recall (Loop 1 address only) Selections apply to either loop	163	11	**0** = To Last Local Setpoint used **1** = Last Setpoint prior to Shed
Communication Override Units (Loop 1 address only) applies to Loop 1 and 2	161	11	**0** = Percent **1** = Engineering Units
Computer Setpoint Ratio	021	18	–20.00 to 20.00
Computer Setpoint Bias	022	18	–999 to 9999.

9.10 Configuration Parameters - UDC 3300, Continued

Alarms

Tables 9-26 lists all the I.D. codes and ranges or selections for the function parameters in setup group “ALARMS.”

Table 9-26 Setup Group-Alarms (Loop 1 Address only)

Parameter Description	Identifying Code	Format Code	Range or Selection
Alarm 1 Setpoint 1 Value	009	18	Within the range of selected parameter or PV span for deviation alarm
Alarm 1 Setpoint 2 Value	010	18	Within the range of selected parameter or PV span for deviation alarm
Alarm 2 Setpoint 1 Value	011	18	Within the range of selected parameter or PV span for deviation alarm
Alarm 2 Setpoint 2 Value	012	18	Within the range of selected parameter or PV span for deviation alarm
Alarm 1 Setpoint 1 Type	140	11	**0** = None **1** = Input 1 **2** = Input 2 **3** = PV – Loop 1 **4** = Deviation – Loop 1 **5** = Output – Loop 1 **6** = Alarm on Shed **7** = SP Event On **8** = SP Event Off **9** = Manual – Loop 1 **10** = Setpoint – Loop 1 **11** = Failsafe – Loop 1 **12** = PV Rate of Change – Loop 1 **13** = Input 3 **15** = PV – Loop 2 **16** = Deviation – Loop 2 **17** = Output – Loop 2 **18** = Manual – Loop 2 **19** = Setpoint – Loop 2 **20** = Failsafe – Loop 2 **21** = PV Rage of Change – Loop 2 ***Limit Controller:*** **0** = None **1** = PV **2** = Deviation **3** = Shed

Alarms, continued

Table 9-26 Setup Group-Alarms (Loop 1 Address only), Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Alarm 1 Setpoint 2 Type	142	11	Same as 140
Alarm 2 Setpoint 1 Type	144	11	Same as 140
Alarm 2 Setpoint 2 Type	146	11	Same as 140
Alarm 1 Setpoint 1 Event	141	11	**0** = Low Alarm **1** = High Alarm
Alarm 1 Setpoint 2 Event	143	11	**0** = Low Alarm **1** = High Alarm
Alarm 2 Setpoint 1 Event	145	11	**0** = Low Alarm **1** = High Alarm
Alarm 2 Setpoint 2 Event	147	11	**0** = Low Alarm **1** = High Alarm
Alarm Hysteresis	041	18	0.0 to 5.0% of output or span
Alarm Latching for Output 1	200	11	**0** = Non Latching **1** = Latching
Alarm Latching for Output2	201	11	**0** = Non Latching **1** = Latching

Display

Table 9-27 lists all the I.D. codes and ranges or selections for the function parameters in setup group “DISPLAY.” Loop 1 or 2 is selected by address in the request message.

Table 9-27 Setup Group-Display

Parameter Description	Identifying Code	Format Code	Range or Selection
Temperature Units	129	11	**0** = °F **1** = °C **2** = None
Language (Displays)	192	11	**0** = English **1** = French **2** = German **3** = Spanish **4** = Italian
Front Panel Ratio 2 Enabled	208	11	**0** = Disabled **1** = Enabled on Lower Display
Power Frequency (Loop 1 address only)	166	11	**0** = 60 Hertz **1** = 50 Hertz
Decimal Point Location	155	11	**0** = XXXX – Fixed **1** = XXX.X – Floating decimal point to one **2** = XX.XX – Floating decimal point to two **3** = X.XXX – Floating decimal point to three

Section 10 – Read, Write and Override Parameters on UDC 2300 Process Controllers

10.1 Overview

Introduction

This section contains information concerning Reading, Writing, and Overriding parameters on the UDC 2300 Process Controller. There are two types of parameters:

- Data Transfer—these parameters include reading control data, option status, and reading or changing setpoints or output.
- Configuration Data—all the configuration data is listed in the order in which it appears in the controller.

Each type of parameter has the identifying codes listed with it. Follow the message exchange rules listed in “Read and Write Operations.”

10.1 Overview - UDC 2300, Continued

What's in this section

This section contains the following topics:

Topic		See Page
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10.3	Read Option Status	281
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General information

Analog Parameters

- Whenever analog parameters 001 through 114 (those that can be changed via communications) are changed, a Write cycle occurs immediately after receipt of the message.

Override Parameters

- Override analog parameters 120, 123 and 125 (PV, output, computer setpoint) are not stored in non-volatile memory and can be changed as frequently as desired with no effect on non-volatile memory retentivity, but controller must remain in slave mode.

Digital Parameters

- Whenever digital configuration parameters 128 through 250 are updated via communications, the non-volatile memory is updated as soon as the message is received.

10.2 Reading Control Data - UDC 2300

Overview

You can Read the following control data from the UDC controller.

- Input 1
- Input 2
- PV
- Internal RV
- PV, Setpoint, Output

I.D. codes

Use the identifying codes listed in Table 10-1 to read the specific items.

A Write request for these codes will result in an Error message.

Table 10-1 Control Data Parameters

Parameter Description	Identifying Code	Format Code	Range or Selection
Input #1	118	18	In Engineering Units or Percentage
Input #2	119	18	In Engineering Units or Percentage
PV	120	18	In Engineering Units or Percentage
Internal RV	121	18	In Engineering Units or Percentage
PV, Setpoint, and Output*	122	18	In Engineering Units or Percentage

*This Read request will give a three variable response (see Read/Write operation).

10.3 Read Options Status - UDC 2300

Read

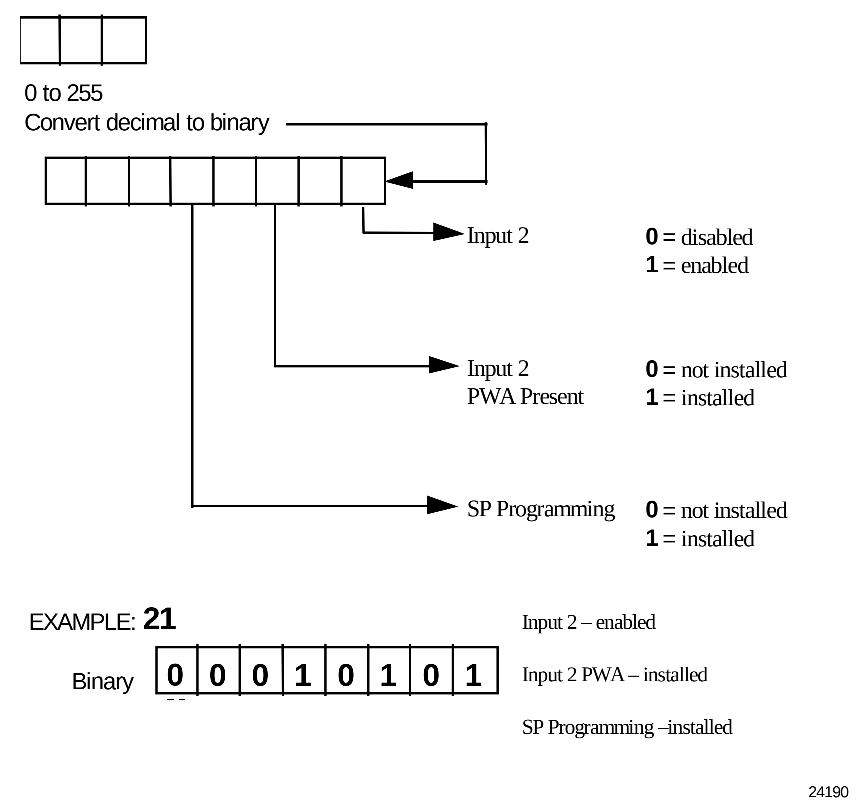
Doing a read of I.D. Code 185 listed in Table 10-2 will tell you which of the available options are enabled/installed or disabled/not installed.

Table 10-2 Option Status

Parameter Description	Identifying Code	Format Code	Range or Selection
Option Status (Read only)	185	11	See Figure 10-1

The data field in the response message will be a decimal number from 0 to 255. Convert the decimal number to binary as shown in Figure 10-1 to determine which options are or are not active.

Figure 10-1 Option Status Information



10.4 Miscellaneous Read Only's - UDC 2300

I.D. codes for Read Only's

The identifying codes listed in Table 10-3 represent some information that are Read only. No Writes allowed.

Table 10-3 Miscellaneous Read Only's

Parameter Description	Identifying Code	Format Code	Range or Selection
Software Type	157	11	READ only (UDC 2300) A1 = Basic UDC 2300 software A2 = Limit Controller
Software Version	167	11	READ only 0 to 255
UDC Error Status (Definitions are listed in Table 10-4	255	11	See below READ/WRITE* 001 = Emergency Manual 002 = Failsafe 004 = Working Calibration Checksum Error 008 = Configuration Checksum Error 016 = Factory Calibration Error 032 = Hardware Failure 064 = Restart after Shed 128 = Configuration/Calibration Memory Changed

* Write to clear.

For example:

If Read returns 192 (restart after shed-64 plus configuration change-128)

Write anything to I.D. Code 255

Read returns 000 (clear).

10.4 Miscellaneous Read Only's - UDC 2300, Continued

Error status definitions

Table 10-4 list the UDC error status codes and their definitions.

Table 10-4 Error Status Definitions

Code	Error	Definitions
001	Emergency Manual	Indicates that the output of the unit which has been in slave operations, is under manual control, locally. Error remains until local control is relinquished at the controller.
002	Failsafe	Error occurs whenever the control reverts to failsafe operation and remains as long as the condition exists.
004	Working Calibration Checksum Error	Indicates that an error exists in the working calibration data. Re-select the inputs to load factory calibration data or field calibrate the inputs.
008	Configuration Checksum Error	Error exists in the configuration data. Verify configuration data at the keyboard. Checksum will be recomputed by stepping the controller through the status tests.
016	Factory Calibration Error	Error exists in the factory calibration data and remains as long as the condition exists.
032	Hardware Failure	Indicates either a RAM tests failure or Input 1, Input 2, Input 3 failure on two consecutive conversions.
064	Restart After Shed	Error occurs whenever a shed of slave override is performed. Error is reset following a WRITE command to I.D. Code 255 (064).
128	Configuration /Calibration Memory Changed	Error occurs whenever shed, configuration, or calibration changed. Also occurs whenever there is a change of state in 001, 002, 004, 008, or 016. Error is reset following a Write command to I.D. Code 255.

10.5 Setpoints - UDC 2300

Overview

You can use two separate local setpoints in the UDC Controller. The identifying codes listed Table 10-5 allow you to select which setpoint you want to use and to enter a value in Engineering Units or Percent (whichever is selected at Code 161) for that setpoint via communications.

I.D. codes

Make your selection using I.D. Code 173 and enter the value for the setpoint chosen using ID Code 39 (SP1) or 53 (SP2) or 113 (SP3).

Table 10-5 Setpoint Code Selections

Parameter Description	Identifying Code	Format Code	Range or Selection
Local Setpoint #1	039	18	Value within the setpoint range limits
Local Setpoint #2	053	18	Value within the setpoint range limits
Number of Local Setpoints	173	11	000 = Local Setpoint #1 only 001 = 2nd Local Setpoint via keyboard or communications

Associated parameters

Refer to Table 10-6 to display or change any of the parameters associated with the setpoint.

Table 10-6 Setpoint Associated Parameters

Parameter	Code
Setpoint Limits	007, 008
Computer Setpoint	125

10.6 Using a Computer Setpoint(Overriding Controller Setpoint) - UDC 2300

Overview

You can use a setpoint generated from the computer to override the setpoint being used by the controller.

The value generated by the computer will have ratio and bias applied by the controller.

I.D. codes

Use the Identifying Code in Table 10-7 to enter the computer setpoint.

Table 10-7 Computer Setpoint Selection

Parameter Description	Identifying Code	Format Code	Range or Selection
Computer Setpoint	125	18	Value from computer with Ratio/Bias applied by the controller. Within the Setpoint Range Limits in Engineering Units or Percent.

Shed

The computer setpoint override will continue until "SHED" from communications occurs or the controller is placed into monitor mode through communications. Doing periodic "SLAVE READS" within the shed time will allow the override to continue until communication is stopped and shed time elapses.

ATTENTION 0 Shed (code 154) allows the override to continue indefinitely or until the override is canceled. (See override selection ID Code 183.)

When SP is overridden, the upper display will flash “CSP” (provided the SP Programmer is not enabled) and the lower display will show “CSXXXX.”

10.6 Using a Computer Setpoint (Overriding Controller Setpoint) - UDC 2300, Continued

Associated parameters

Refer to Table 10-8 for the codes to display or change any of the parameters associated with the computer setpoint.

Table 10-8 Computer Setpoint Associated Parameters

Parameter	Code
Setpoint Limits	007, 008
Local Setpoint #1	039
Local Setpoint #2	053
Local Setpoint Selection	173
Computer Setpoint Ratio	021
Computer Setpoint Bias	022

10.7 PV or Setpoint Override Selections - UDC 2300

Overview

You can **Read** the present override status of the PV or setpoint or you can do a **Write** transaction to cancel the override.

I.D. codes

Use the Identifying Code in Table 10-9 to Read or Write your selection.

Table 10-9 PV or Setpoint Override Selections

Parameter Description	Identifying Code	Format Code	Range or Selection
PV or Setpoint Override Selection	183	11	01 = Input 1 02 = Input 2 04 = PV 08 = Setpoint ***Limit Controller*** *(Read Only):* 0 = Unlatched 1 = Latched Relay

10.8 Reading or Changing the Output - UDC 2300

Overview

You can read the output of a particular UDC controller (Read transaction) or you can change it to suit your needs. (Do a Write transaction.)

I.D. codes

Use the identifying code in Table 10-10 to monitor (Read) or change (Write the output (in manual only).

ATTENTION To Write (change) the output, the controller must first be in manual mode.

Table 10-10 Reading or Changing the Output

Parameter Description	Identifying Code	Format Code	Range or Selection
Output	123	18	-5 to +105% of full span (current output) 0 to 100% (relay type output)

Associated parameters

Refer to Table 10-11 for the codes required to display or change any of the parameters associated with the output.

Table 10-11 Associated Output Codes

Parameter	Code
Output Limits	014, 015
Failsafe Output Values	040
Output Deadband	018
Output Hysteresis	019
Output Type	160

10.9 Local Setpoint/PID Selection/Setpoint Ramp Status – UDC 2300

Overview

Identifying Code 250 lets you monitor or make selections for:

- Tuning Parameter Set #1 or #2

  If Tuning Sets selection is “two keyboard” code 172 = 001
- Local Setpoint #1 or #2

  If “2 Local Setpoints” is selected 131 = 0, 173 = 1
- Run or Hold Setpoint Ramp or a Setpoint Program Data

  If SP Ramp or SP Program is enabled 178 = 1 Program, 178 = 2 Ramp

Read

Table 10-12 is a table of numbers that could be returned by the UDC 2300 controller. When a Read is requirested for this I.D. Code (250) you can determine which parameters are active from this table.

Write

To Write information to the controller, select what parameters you want from Table 10-12 and enter the associated number in the data field of the Write request.

For example:

Suppose you want to change from TUNING SET #1 to TUNING SET #2 while maintaining LOCAL SETPOINT #1 and SP RAMP STATUS = HOLD.

READ 250 response is 00 or 02

WRITE 250 (07)

READ 250 response is 018

Note: Some of the numbers are Read only.

Table 10-12 LSP/PID Set Selection and Setpoint Ramp Status

Parameter Description	Identifying Code	Format Code	Range or Selection
Enhanced Function	250	11	See Figure 10-2

10.9 Local Setpoint/PID Selection/Setpoint Ramp Status - UDC 2300, Continued

Read, continued

Figure 10-2 I.D. Code 250 Indications

Setpoint Ramp or Program Data Selections	Tuning Set #1 Selection Local Setpoint #1 Selection	Tuning Set #1 Selection Local Setpoint #2 Selection	Tuning Set #2 Selection Local Setpoint #1 Selection	Tuning Set #2 Selection Local Setpoint #2 Selection
SP Ramp, Enabled Not in Progress	00	08	16	24
SP Ramp in Progress, Hold	02	10	18	26
SP Ramp in Progress, Run	03	11	19	27
SP Program, Enabled Not in Progress, (READ)	04	12	20	28
SP Program in Progress, Hold (READ/WRITE)	06	14	22	30
SP Program in Progress, Run (READ/WRITE)	07	15	23	31

24192A

10.9 Local Setpoint/PID Selection /Setpoint Ramp Status - UDC 2300, Continued

Write

A write of code 250 lets you change the SP ramp status as well as the local setpoint or tuning set selection. Refer to Table 10-13.

Table 10-13 I.D. Code 250 Writes

Parameter Description	Identifying Code	Format Code	Range or Selection
Write Local Setpoint/PID Set Selection and SP Ramp Status	250	11	000 = Abort SP Ramp 001 = Run SP Ramp 002 = Hold SP Ramp 003 = Start SP Ramp 004 = Change to Local Setpoint #1 005 = Change to Local Setpoint #2 006 = Change to PID Tuning Set #1 007 = Change to PID Tuning Set #2

ATTENTION

To enable or disable the setpoint ramp, refer to Identifying Code 150.

10.10 Configuration Parameters - UDC 2300

Overview

Listed on the next pages are the identifying codes for the parameters in the various Setup Groups in the UDC 2300 Process Controller. The table below lists the Setup Groups and their table numbers in which they are listed. Most of the parameters are configurable through the hosts. Some are Read Only and are indicated as such and cannot be changed.

Setup Group	Table Number
TIMER	10-14
TUNING	10-15
SP RAMP / RATE / PROGRAM	10-16
ADAPTIVE	10-17
ALGORITHM	10-18
INPUT 1	10-19
INPUT 2	10-20
CONTROL	10-21
COMMUNICATIONS	10-22
ALARMS	10-23

Reading or writing

Do a Read or Write (see “Read/Write Operations”), depending on your requirements using the identifying code and format code listed in the tables. The range or selection available for each range is listed in the tables.

Timer

Table 10-14 lists all the I.D. codes and ranges or selections for the function parameters in the Setup Group "TUNING".

Table 10-14 Setup Group-Timer

Parameter Description	Identifying Code	Format Code	Range or Selection
Timer	216	11	0 = Disable 1 = Enable
Period	099	18	0.00 to 99.59
Start (Initiation)	217	11	0 = Key (Run/Hold Key) 1 = Alarm 2
LDISP (Selection)	218	11	0 = TI REM 1 = Elapsed Time
Timer Reset	214	11	0 = Key (Run/Hold Key) 1 = ALI (Alarm 1 or Key)
Timer Increment	215	11	0 = min (Counts hr/min) 1 = sec (counts min/sec)

Tuning

Table 10-15 lists all the I.D. codes and ranges or selections for the function parameters in the Setup Group "TUNING".

Table 10-15 Setup Group-Tuning

Parameter Description	Identifying Code	Format Code	Range or Selection
Gain #1 or PB Note 1	001	18	0.01 to 1000 Gain 0.1 to 9999 PB
Rate #1 Note 1	002	18	0.00 to 10.00
Reset #1 Note 1	003	18	0.02 to 50.00
Manual Reset	013	18	-100 to +100
Gain #2 or PB Note 1	004	18	0.01 to 1000
Rate #2 Note 1	005	18	0.00 to 10.00
Reset #2 Note 1	006	18	0.02 to 50.00
Cycle Time #1	158	11	1 to 120 seconds
Cycle Time #2	159	11	1 to 120 seconds

Table continued next page

Parameter Description	Identifying Code	Format Code	Range or Selection
Lockout (keyboard only) Changes to data always possible via communications regardless of this configuration.	132	11	**0** = No Lockout **1** = Calibration Locked Out **2** = Timer, Tuning, SP Ramp, Accutune or Read/Write **3** = Tuning and SP Ramp are read/write, no other parameters are available **4** = Maximum Lockout
Keyboard Lockout	191	11	**0** = All keys enabled **1** = Manual Auto Key Locked **2** = Setpoint Select Key Locked **3** = Manual/Auto and Setpoint Select Keys Locked **4** = Run Hold Key Locked **5** = Run Hold Key and Manual/Auto Keys Locked **6** = Run Hold Key and Setpoint Select Keys Locked **7** = Run Hold, Setpoint Select, and Manual/Auto Keys Locked **8** = Autotune Key Locked **9** = Autotune and Man/Auto Keys Locked **10**= Autotune and Setpoint Select Keys Locked **11**= Autotune , Setpoint Select, and Man/Auto Keys Locked **12**= Autotune and Run/Hold Keys Locked **13**= Autotune, Run/Hold, and Man/Auto Keys Locked **14**= Autotune, Run/Hold, and Setpoint Select Keys Locked **15**= Autotune, Run/Hold, Setpoint Select, and Man/Auto Keys Locked

NOTE 1: Writes to these locations not available when Accutune is enabled.

SP ramp/rate/program

Table 10-16 lists all the I.D. codes and ranges or selections for the function parameters in setup group "SP RAMP/RATE/PROGRAM."

Table 10-16 Setup Group-Setpoint Ramp/Rate Program

Parameter Description	Identifying Code	Format Code	Range or Selection
Setpoint Ramp/Rate Program Selection	178	11	**0** = SP Program, Rate, and Ramp Disabled **1** = SP Program Enabled **2** = SP Ramp Enabled **3** = SP Rate Enabled
SP Ramp	150	11	**0** = OFF **2** = Ramp
Single SP Ramp Time	174	11	0 to 255 (minutes)
Ramp Final Setpoint	026	18	0 to 9999
SP Rate			
Rate Up (EU/HR)	108	18	0 to 9999
Rate Down (EU/HR)	109	18	0 to 9999
SP Program			
Start Segment Number	175	11	1 to 11
End Segment Number (Soak)	176	11	2, 4, 6, 8, 10, or 12
Engineering Units or Ramp Segments	182	11	**0** = HRS:MIN **1** = Degrees/Minute
Program Recycles	177	11	0 to 99
Guaranteed Soak Deviation	087	18	0 to 99.9 (0 = no soak)
Program End State	181	11	**0** = Disable SP Program **1** = Hold at Program End
Controller Status at Program End	180	11	**0** = Last Setpoint and Mode **1** = Manual, Failsafe Output
Reset SP Program (to begin)	179	11	**0** = Disable **1** = Via Keyboard **2** = Rerun
Segment #1 Ramp Time	057	18	99.59 (0-99 Hrs:0-59 Min) or 0 to 999 (Degrees/Minute)

Setpoint ramp/rate/program, continued

Table 10-16 Setup Group-SP Ramp, Rate, or SP Program, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Segment #2 Soak Setpoint Value	058	18	Within Setpoint Limits
Segment #2 Soak Time	059	18	99.59 (0-99 Hrs:0-59 Min)
Segment #3 Ramp Time	060	18	99.59 (0-99 Hrs:0-59 Min) or 0 to 999 (Degrees/Minute)
Segment #4 Soak Setpoint Value	061	18	Within Setpoint Limits
Segment #4 Soak Time	062	18	99.59 (0-99 Hrs:0-59 Min)
Segment #5 Ramp Time	063	18	99.59 (0-99 Hrs:0-59 Min) or 0 to 999 (Degrees/Minute)
Segment #6 Soak Setpoint Value	064	18	Within Setpoint Limits
Segment #6 Soak Time	065	18	99.59 (0-99 Hrs:0-59 Min)
Segment #7 Ramp Time	066	18	99.59 (0-99 Hrs:0-59 Min) or 0 to 999 (Degrees/Minute)
Segment #8 Soak Setpoint Value	067	18	Within Setpoint Limits
Segment #8 Soak Time	068	18	99.59 (0-99 Hrs:0-59 Min)
Segment #9 Ramp Time	069	18	99.59 (0-99 Hrs:0-59 Min) or 0 to 999 (Degrees/Minute)
Segment #10 Soak Setpoint Value	070	18	Within Setpoint Limits
Segment #10 Soak Time	071	18	99.59 (0-99 Hrs:0-59 Min)
Segment #11 Ramp Time	072	18	99.59 (0-99 Hrs:0-59 Min) or 0 to 999 (Degrees/Minute)

Setpoint Ramp/Rate/Program, continued

Table 10-16 Setup Group-SP Ramp, Rate, or SP Program, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Segment #12 Soak Setpoint Value	073	18	Within Setpoint Limits
Segment #12 Soak Time	074	18	99.59 (0-99 Hrs:0-59 Min)

Accutune

Table 10-17 lists all the I.D. codes and ranges or selections for the function parameters in setup group "ACCUTUNE."

Table 10-17 Setup Group-Adaptive Tune

Parameter Description	Identifying Code	Format Code	Range or Selection
Fuzzy Overshoot Suppression	193	11	**0** = Disabled **1** = Enabled
Accutune Enable	152	11	**0** = Accutune disabled **1** = Tune
Accutune Error (Read only)	151	11	**0** = None **3** = Process Identification failed **4** = Accutune aborted on command **5** = Running

Algorithm

Table 10-18 lists all the I.D. codes and ranges or selections for the Function Parameters in setup group "ALGORITHM."

Table 10-18 Setup Group-Algorithm

Parameter Description	Identifying Code	Format Code	Range or Selection
Control Algorithm Selection (Selection here will affect I.D. code 160 in "Output Algorithms.")	128	11	**0** = ON/OFF† **1** = PID-A **2** = PID-B **3** = PD-A with Manual Reset **4** = Three Position Step
Output Algorithm	160	11	**0** = Time Simplex Relay 1 **1** = Time Simplex Relay 2 **2** = Current Simplex **3** = TPSC **4** = Time Duplex **5** = Current Duplex **6** = Current Time Duplex **7** = Time Current Duplex
Relay Cycle Time Increments	190	11	**0** = 1 second increments **1** = 1/3 second increments

Input 1

Table 10-19 lists all the I.D. codes and ranges or selections for the function parameters in setup group "INPUT 1."

Table 10-19 Setup Group-Input 1

Parameter Description	Identifying Code	Format Code	Range or Selection
Decimal Point Location	155	11	**0** = XXXX – Fixed **1** = XXX.X – Floating decimal point to one **2** = XX.XX – Floating decimal point to two
Temperature Units	129	11	**0** = °F **1** = °C **2** = None

10.10 Configuration Parameters - UDC 2300, Continued

Input 1, continued

Table 10-19 Setup Group-Input 1, Continued

Input 1 Type	168	11	**1** = B TC **2** = E TC H **3** = E TC L **4** = J TC H **5** = J TC L **6** = K TC H **7** = K TC L **8** = NNM H **9** = NNM L **10** = NM90 H **11** = NM90 L **12** = Nicrosil TC **13** = R TC **14** = S TC **15** = T TC H **16** = T TC L **17** = W TC H **18** = W TC L **19** = 100 PT RTD **20** = 100 PT LO RTD **21** = 200 PT RTD **22** = 500 PT RTD **23** = Radiamatic RH **24** = Radiamatic RI **25** = 0-20 mA* **26** = 4-20 mA* **27** = 0-10 mV* **28** = 0-50 mV* **29** = 0-5 Vdc **30** = 1-5 Vdc* **31** = 0-10 Vdc* **32** = Unused **33** = 100 M *Limit: Non-FM only **ATTENTION** Changing the Input Type will result in the loss of Field Calibration values and will restore the Factory Calibration values.

Input 1, continued

Table 10-19 Setup Group-Input 1, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 1 Transmitter Characterization	169	11	0 = B TC 1 = E TC H 2 = E TC L 3 = J TC H 4 = J TC L 5 = K TC H 6 = K TC L 7 = NNM TC H 8 = NNM TC L 9 = NM90 H 10 = NM90 L 11 = Nicrosil TC 12 = R TC 13 = S TC 14 = T TC H 15 = T TC L 16 = W TC H 17 = W TC L 18 = 100 PT RTD 19 = 100 PT LO RTD 20 = 200 PT RTD 21 = 500 PT RTD 22 = Radiamatic RH 23 = Radiamatic RI 24 = Linear 25 = Square Root
Input 1 High Range Value	029	18	–999. to 9999. Engineering Units (Linear types only)
Input 1 Low Range Value	030	18	–999 to 9999. Engineering Units (Linear types only)
Input 1 Ratio	106	18	–20.00 to 20.00
Input 1 Bias	107	18	–999 to 9999. Engineering Units
Input 1 Filter	042	18	0 to 120 seconds
Burnout (Open Circuit Detection)	164	11	**0** = None **1** = Upscale **2** = Downscale **3** = NOFS (No Failsafe) ***Limit:*** **0** = Downscale **1** = Upscale *Read only, Writes illegal*

Input 1, continued

Table 10-19 Setup Group-Input 1, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Display	186	11	**0** = SP (setpoint) **1** = PRY (PV with label) **2** = PRN (PV without label)
Language (Displays)	192	11	**0** = English **1** = French **2** = German **3** = Spanish **4** = Italian
Power Frequency	166	11	**0** = 60 Hertz **1** = 50 Hertz

Input 2

Table 10-20 lists all the I.D. codes and ranges or selections for the function parameters in setup group "INPUT 2."

Table 10-20 Setup Group-Input 2

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 2 Type	170	11	**1 to 24** = Unused **0** = Disable **25** = 0-20 mA **26** = 4-20 mA **29** = 0-5 Vdc **30** = 1-5 Vdc **31** = Unused **32** = Slidewire **ATTENTION** Changing the Input Type will result in the loss of Field Calibration values and will restore the Factory Calibration values.
Input 2 Transmitter Characterization	171	11	0 = B TC 1 = E TC H 2 = E TC L 3 = J TC H 4 = J TC L 5 = K TC H 6 = K TC L 7 = NNM TC H 8 = NNM TC L 9 = NM90 H 10 = NM90 L 11 = Nicrosil TC 12 = R TC 13 = S TC 14 = T TC H 15 = T TC L 16 = W TC H 17 = W TC L 18 = 100 PT RTD 19 = 100 PT LO RTD 20 = 200 PT RTD 21 = 500 PT RTD 22 = Radiamatic RH 23 = Radiamatic RI 24 = Linear 25 = Square Root
Input 2 High Range Value	035	18	–999. to 9999. Engineering Units

10.10 Configuration Parameters - UDC 2300, Continued

Input 2, continued

Table 10-20 Setup Group-Input 2, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Input 2 Low Range Value	036	18	–999 to 9999. Engineering Units
Input 2 Ratio	037	18	–20.00 to 20.00
Input 2 Bias	038	18	–999 to 9999. Engineering Units
Input 2 Filter	043	18	0 to 120 seconds

Control

Table 10-21 lists all the I.D. codes and ranges or selections for the function prompts in setup group "CONTROL."

Table 10-21 Setup Group-Control

Parameter Description	Identifying Code	Format Code	Range or Selection
Tuning Parameter Selection	172	11	**0** = One set only **1** = 2 sets keyboard selected **2** = 2 sets with PV automatic switchover **3** = 2 sets with setpoint (SP) automatic switchover
Automatic Switchover Value (used with 172 selection 2 or 3)	056	18	Within the PV Range in engineering units
Local Setpoint Source (Number of LSP's)	173	11	**0** = One Local Setpoint **1** = Two Local Setpoints (disables RSP)
Power Up Mode Recall	130	11	**Control Mode** / **Setpoint Mode** **0** = MAN LSP1 **1** = AUTO LSP1 **2** = AUTO Last RSP **3** = LAST Last SP **4** = LAST Last local SP
RSP Source	131	11	**0** = None **1** = Remote Setpoint via Input 2
Setpoint Tracking	138	11	**0** = None **1** = LSP = PV (when in Manual) **2** = LSP = RSP (when switched)
Control Setpoint High Limit	007	18	0 to 100% of PV (engineering units)
Control Setpoint Low Limit	008	18	0 to 100% of PV (engineering units)

Control, continued

Table 10-21 Setup Group-Control, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Control Output Direction/Alarm Outputs	135	11	**0** = Direct Action Alarm Output energized **1** = Direct Action Alarm Output de-energized **2** = Reverse Action Alarm Output energized **3** = Reverse Action Alarm Output de-energized
High Output Limit	014	18	–5 to 105% of output
Low Output Limit	015	18	–5 to 105% of output
Output Deadband	018	18	–5 to +25.0% Time Duplex 0.5 to 5.0% 3 position step
Output Hysteresis	019	18	0.0 to 100.0% of PV
Failsafe Mode	213	11	**0** = Latching **1** = Non latching
Failsafe Output Level	040	18	0 to 100%
Proportional Band Units	148	11	**0** = Gain **1** = Proportional Band
Reset Units	149	11	**0** = Minutes **1** = RPM

Communications

Table 10-22 lists all the I.D. codes and ranges or selections for the function parameters in setup group “COM.”

Table 10-22 Setup Group-Communications

Parameter Description	Identifying Code	Format Code	Range or Selection
Shed Time	154	11	**0** = No Shed **1** = 255 sample periods
Shed Mode and Output	162	11	**0** = Last Mode and Last Output **1** = Manual Mode, Last Output **2** = Manual Mode, Failsafe Output **3** = Automatic Mode
Shed Setpoint Recall	163	11	**0** = To Last Local Setpoint used **1** = Last Setpoint prior to Shed
Communication Override Units	161	11	**0** = Percent **1** = Engineering Units
Computer Setpoint Ratio	021	18	–20.00 to 20.00
Computer Setpoint Bias	022	18	–999 to 9999.

Alarms

Tables 10-23 lists all the I.D. codes and ranges or selections for the function parameters in setup group "ALARMS."

Table 10-23 Setup Group-Alarms

Parameter Description	Identifying Code	Format Code	Range or Selection
Alarm 1 Setpoint 1 Value	009	18	Within the range of selected parameter or PV span for deviation alarm
Alarm 1 Setpoint 2 Value	010	18	Within the range of selected parameter or PV span for deviation alarm
Alarm 2 Setpoint 1 Value	011	18	Within the range of selected parameter or PV span for deviation alarm
Alarm 2 Setpoint 2 Value	012	18	Within the range of selected parameter or PV span for deviation alarm
Alarm 1 Setpoint 1 Type	140	11	**0** = None **1** = Input 1 **2** = Input 2 **3** = PV **4** = Deviation **5** = Output **6** = Alarm on Shed **7** = SP Event On **8** = SP Event Off **9** = Manual **10** = Remote Setpoint **11** = Failsafe **12** = PV Rate of Change **13** = Alarm on Digital Input **14** = Alarm based on SP2 **15** = Loop Break Alarm ***Limit Controller:*** **0** = None **1** = PV **2** = Deviation **3** = Shed
Alarm 1 Setpoint 2 Type	142	11	Same as 140
Alarm 2 Setpoint 1 Type	144	11	Same as 140

10.10 Configuration Parameters - UDC 2300, Continued

Alarms, continued

Table 10-23 Setup Group-Alarms, Continued

Parameter Description	Identifying Code	Format Code	Range or Selection
Alarm 2 Setpoint 2 Type	146	11	Same as 140
Alarm 1 Setpoint 1 Event	141	11	**0** = Low Alarm **1** = High Alarm
Alarm 1 Setpoint 2 Event	143	11	**0** = Low Alarm **1** = High Alarm
Alarm 2 Setpoint 1 Event	145	11	**0** = Low Alarm **1** = High Alarm
Alarm 2 Setpoint 2 Event	147	11	**0** = Low Alarm **1** = High Alarm
Alarm Hysteresis	041	18	0.0 to 100.0% of output or span
Alarm Latching for Output 1	200	11	**0** = Non Latching **1** = Latching
Alarm Blocking	201	11	**0** = Disabled **1** = Block Alarm 1 **2** = Block Alarm 2 **3** = Block Both Alarms

Section 11 – Operating the Controller with Communications Option

11.1 Operation

Introduction

During communications the controller can operate in various modes and the operator can assume manual control of the output. There are various indications of these actions.

Monitor mode

During "Monitor Mode" the UDC will control normally with operator access allowed at the keyboard. See the individual Product Manual.

Slave mode

During "Slave" operation:

- Configuration data may not be changed via the front keyboard.
- MAN annunciator is OFF.
- The controller will use override data provided at the computer.

Emergency manual

During "Slave" operation the operator can assume manual control of the output (Emergency Manual). The procedure in Table 11-1 tells you how to start and stop emergency manual.

Table 11-1 Emergency Manual Procedure

Operation	Action
Start Emergency Manual	• Press [MAN/AUTO]. • MAN annunciator comes ON. • Press [▲] or [▼] to position the output manually.
End Emergency Manual	• Press [MAN/AUTO] key - this second press ends the Emergency Manual operation. The controller reverts to "Slave" mode, Manual output. • MAN annunciator goes OFF.

Overriding setpoint or PV indication

When setpoint or PV are overriden, a blinking "CSP" appears in the upper display.

Section 12 – ASCII Conversion Table

12.1 Overview

Overview

Table 12-1 lists all the Hex and Decimal designations for all the ASCII Character Codes.

Table 12-2 is a Hex, Decimal, and Binary conversion table.

Table 12-1 ASCII Character Codes

Control			Figures			Uppercase			Lowercase		
ASCII	HEX	DEC	ASCII	HEX	DEC	ASCII	HEX	DEC	ASCII	HEX	DEC
NUL (CTL @)	00	0	space	20	32	@	40	64	\	60	96
SOH (CRL A)	01	1	!	21	33	A	41	65	a	61	97
STX (CTL B)	02	2	"	22	34	B	42	66	b	62	98
ETX (CTL C)	03	3	#	23	35	C	43	67	c	63	99
EOT (CTL D)	04	4	$	24	36	D	44	68	d	64	100
ENQ (CTL E)	05	5	%	25	37	E	45	69	e	65	101
ACK (CTL F)	06	6	&	26	38	F	46	70	f	66	102
BEL (CTL G)	07	7	’	27	39	G	47	71	g	67	103
BS (CTL H)	08	8	(	28	40	H	48	72	h	68	104
HT (CTL I)	09	9	)	29	41	I	49	73	i	69	105
LF (CTL J)	0A	10	*	2A	42	J	4A	74	j	6A	106
VT (CTL K)	0B	11	+	2B	43	K	4B	75	k	6B	107
FF (CTL L)	0C	12	,	2C	44	L	4C	76	l	6C	108
CR (CTL M)	0D	13	–	2D	45	M	4D	77	m	6D	109
SO (CTL N)	0E	14	.	2E	46	N	4E	78	n	6E	110
SI (CTL O)	0F	15	/	2F	47	O	4F	79	o	6F	111
DLE (CTL P)	10	16	0	30	48	P	50	80	p	70	112
DC1 (CTL Q)	11	17	1	31	49	Q	51	81	q	71	113
DC2 (CTL R)	12	18	2	32	50	R	52	82	r	72	114
DC3 (CTL S)	13	19	3	33	51	S	53	83	s	73	115
DC4 (CTL T)	14	20	4	34	52	T	54	84	t	74	116
NAK (CTL U)	15	21	5	35	53	U	55	85	u	75	117
SYN (CTL V)	16	22	6	36	54	V	56	86	v	76	118
ETB (CTL W)	17	23	7	37	55	W	57	87	w	77	119
CAN (CTL X)	18	24	8	38	56	X	58	88	x	78	120
EM (CTL Y)	19	25	9	39	57	Y	59	89	y	79	121
SUB (CTL Z)	1A	26	:	3A	58	Z	5A	90	z	7A	122
ESC (CTL [)	1B	27	;	3B	59	[	5B	91	{	7B	123
FS (CTL \)	1C	28	<	3C	60	\	5C	92	¦	7C	124
GS (CTL])	1D	29	=	3D	61	]	5D	93	}	7D	125
RS (CTL ^)	1E	30	>	3E	62	^	5E	94	~	7E	126
US (CTL _)	1F	31	?	3F	63	_	5F	95	DEL	7F	127

12.1 Overview, Continued

Overview, continued

Table 12-2 Hexadecimal to Binary

HEX	DEC	BINARY	HEX	DEC	BINARY	HEX	DEC	BINARY	HEX	DEC	BINARY
0	0	0000	4	4	0100	8	8	1000	C	12	1100
1	1	0001	5	5	0101	9	9	1001	D	13	1101
2	2	0010	6	6	0110	A	10	1010	E	14	1110
3	3	0011	7	7	0111	B	11	1011	F	15	1111

Section 13 – Cable Specifications

13.1 Introduction

Introduction

Table 13-1 lists the cable specifications for 2000 feet or 5000 feet cabled used for wiring the communications link.

Table 13-1 Cable Specifications

	2000 Foot Cable	**5000 Foot Cable**
Cable Type	Two-conductor stranded (twin axial), 100% shield, 120 ohms, #25 AWG, polyethylene insulated, with aluminum-mylar shield, drain wire, and vinyl jacket.	Two-conductor stranded (twin axial), 100% shield, 150 ohms, #25 AWG, datalene insulated, with aluminum-mylar shield, drain wire, and vinyl or teflon jacket.
Commercial Equivalent	Belden Corporation type 9271 Twinax	Belden Corporation type 9182 Twinax OR Belden Corporation type 89128 Twinax
Electrical Characteristics		
Characteristic Impedance	124 ohms	150 ohms
Resistance: Center Conductors Shield	 104.3 ohms per kilometer 39.4 ohms per kilometer	 49.2 ohms per kilometer 15 ohms per kilometer
Capacitance	40 picofarads per meter	28.9 picofarads per meter
Attenuation	at 1 MHz – 2 db per 100 meters at 10 MHz – 5.6 db per 100 meters	at 1 MHz – .98 db per 100 meters at 10 MHz – 4.3 db per 100 meters
Mechanical Characteristics		
Center Conductor Insulation	Polyethylene	Datalene®
Jack Composition	Vinyl (PVC)	Vinyl (PVC) (Belden 9182) or Teflon (Belden 89182)
Jacket Outer Diameter	6.1 millimeters	8.9 millimeters
Environmental Limits		
Temperature	–20 to 80°C (–4 to 176°F)	–20 to 80°C (–4 to 176°F)
Relative Humidity	5 to 95%	5 to 95%
Distance Limits	625 meters (2000 feet) Cable must be terminated at each end with a 124 ohm ±10% 1/4 watt resistor.	1524 meters (5000 feet) Cable must be terminated at each end with a 150 ohm ±10% 1/4 watt resistor.
Maximum Number of Devices	15	15
Baud Rate	19.2K	19.2K

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