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Preset Protocol Specifications Manual

Remote Automation Solutions

EMERSON™

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Contents

Chapter 1 – Introduction 1-1

1.1 Manual Organization 1-1
1.2 General Protocol Message Format 1-2
1.3 Broadcast 1-3
1.4 Calculating Data Offsets 1-3

Chapter 2 – Opcodes 2-1

2.1 Opcode Overview 2-1
2.2 Opcode 6, System Configuration 2-3
2.3 Opcode 7, Read Real-time Clock 2-14
2.4 Opcode 8, Set Real-time Clock 2-14
2.5 Opcode 10, Read Configurable Opcode Point Data 2-15
2.6 Opcode 11, Write Configurable Opcode Point Data 2-15
2.7 Opcode 17, Login Request 2-16
2.8 Opcode 24, Store and Forward 2-17
2.9 Opcode 50, Request I/O Point Position 2-18
2.10 Opcode 100, Access User-defined Information 2-18
2.11 Opcode 105, Request Today's and Yesterday's Min/Max Values 2-19
2.12 Opcode 108, Request History Tag and Periodic Index 2-21
2.13 Opcode 117, Request Weights and Measures Event Data 2-22
2.14 Opcode 118, Request Alarm Data 2-25
2.15 Opcode 119, Request Event Data 2-28
2.16 Opcode 135, Request Single History Point Data 2-32
2.17 Opcode 136, Request Mutiple History Point Data 2-34
2.18 Opcode 137, Request History Index for a Day 2-36
2.19 Opcode 138, Request Daily and Periodic History for a Day 2-37
2.20 Opcode 139, History Information Data 2-38
2.21 Opcode 166, Set Single Point Parameters 2-39
2.22 Opcode 167, Request Single Point Parameters 2-39
2.23 Opcode 180, Request Parameters 2-40
2.24 Opcode 181, Write Parameters 2-41
2.25 Opcode 203, General File Transfer 2-42
2.26 Opcode 224, SRBX Signal 2-44
2.27 Opcode 225, Acknowledge SRBX 2-44
2.28 Opcode 255, Error Indicator 2-45

Chapter 3 – Parameter Lists for Point Types 3-1

3.1 Type, Location/Logical, and Parameter (TLPs) 3-1
3.2 Logical/Location Details 3-1
3.3 Binary Field (BIN) Example 3-2
3.4 Point Type Table Fields 3-3
3.4.1 Point Type 60: Print Parameters 3-4
3.4.2 Point Type 61: Transaction History Parameters 3-11
3.4.3 Point Type 63: General Preset Parameters 3-45
3.4.4 Point Type 64: General Preset Parameters #2 3-93
3.4.5 Point Type 65: Transaction History Parameters (#2) 3-105
3.4.6 Point Type 67: Additives 3-109
3.4.7 Point Type 68: Recipes 3-115
3.4.8 Point Type 69: Components 3-124

3.4.9 Point Type 70: Liquid Preference Parameters....3-138
3.4.10 Point Type 71: Liquid Station Parameters....3-141
3.4.11 Point Type 72: Product Parameters....3-151
3.4.12 Point Type 73: Liquid Meter Parameters....3-154
3.4.13 Point Type 74: Densitometer Interface Parameters....3-167
3.4.14 Point Type 75: Meters....3-173
3.4.15 Point Type 76: Valves....3-184
3.4.16 Point Type 82: Virtual Discrete Outputs....3-186
3.4.17 Point Type 84: HART Extended Point Type....3-190
3.4.18 Point Type 85: HART Parameters....3-199
3.4.19 Point Type 91: System Variables:....3-220
3.4.20 Point Type 92: Logon Parameters....3-225
3.4.21 Point Type 95: Communication Port Parameters....3-228
3.4.22 Point Type 96: FST Parameters....3-233
3.4.23 Point Type 97: FST Register Tags....3-236
3.4.24 Point Type 98: Soft Point Parameters....3-237
3.4.25 Point Type 99: Configurable Opcode Table....3-240
3.4.26 Point Type 100: Power Control Parameters....3-242
3.4.27 Point Type 101: Discrete Inputs....3-245
3.4.28 Point Type 102: Discrete Outputs....3-247
3.4.29 Point Type 103: Analog Inputs....3-250
3.4.30 Point Type 104: Analog Outputs....3-254
3.4.31 Point Type 105: Pulse Inputs....3-256
3.4.32 Point Type 106: RTD....3-259
3.4.33 Point Type 107: Thermocouple....3-263
3.4.34 Point Type 108: Multi-Variable Sensor....3-266
3.4.35 Point Type 109: System Analog Inputs....3-274
3.4.36 Point Type 110: PID Control Parameters....3-280
3.4.37 Point Type 117: Modbus Configuration Parameters....3-287
3.4.38 Point Type 118: Modbus Register to TLP Mapping Parameters....3-290
3.4.39 Point Type 119: Modbus Event, Alarm, and History Table....3-303
3.4.40 Point Type 120: Modbus Master Modem Configuration....3-312
3.4.41 Point Type 121: Modbus Master Table....3-314
3.4.42 Point Type 122: DS800 Configuration....3-325
3.4.43 Point Type 123: Security – Group Configuration....3-327
3.4.44 Point Type 124: History Segment Configuration....3-329
3.4.45 Point Type 125: History Segment 0 Point Configuration....3-331
3.4.46 Point Type 126: History Segment 1 Point Configuration....3-333
3.4.47 Point Type 127: History Segment 2 Point Configuration....3-335
3.4.48 Point Type 128: History Segment 3 Point Configuration....3-337
3.4.49 Point Type 129: History Segment 4 Point Configuration....3-339
3.4.50 Point Type 130: History Segment 5 Point Configuration....3-341
3.4.51 Point Type 131: History Segment 6 Point Configuration....3-343
3.4.52 Point Type 132: History Segment 7 Point Configuration....3-345
3.4.53 Point Type 133: History Segment 8 Point Configuration....3-347
3.4.54 Point Type 134: History Segment 9 Point Configuration....3-349
3.4.55 Point Type 135: History Segment 10 Point Configuration....3-351
3.4.56 Point Type 136: ROC Clock....3-353
3.4.57 Point Type 137: Internet Configuration Parameters....3-355
3.4.58 Point Type 138: User C++ Host Parameters....3-362
3.4.59 Point Type 139: Smart I/O Module Information....3-363
3.4.60 Point Type 140: Alternating Current Input / Output....3-367
3.4.61 Point Type 141: Advance Pulse Module....3-375
3.4.62 Point Type 142: History Segment 11 Point Configuration....3-388
3.4.63 Point Type 143: History Segment 12 Point Configuration....3-390
3.4.64 Point Type 144: Transactional History Configuration....3-392
3.4.65 Point Type 145: Transactional History Point Configuration....3-393
3.4.66 Point Type 172: RTU Network Discovery List Point Configuration....3-394

3.4.67 Point Type 173: Network Commissioned List 3-395
3.4.68 Point Type 174: Network Export Data 3-397
3.4.69 Point Type 175: Network Import Data 3-398
3.4.70 Point Type 176: IEC62591 Live List Configuration 3-399
3.4.71 Point Type 177: IEC62591 Commissioned List Configuration 3-400

Chapter 4 – CRC-16 Code **4-1**

Chapter 5 – IEEE Floating Point Format **5-1**

Chapter 6 – Spontaneous-Report-By-Exception **6-1**

Chapter 7 – Device-to-Device Communications **7-1**

Index **I-1**

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Chapter 1 – Introduction

This manual provides information required to understand the ROC Plus protocol and its implementation within the DL8000 Preset Controller ("DL8000"). It is written for personnel needing to implement a ROC Plus Protocol driver in the DL8000 or as a reference to understanding the ROC Plus communications protocols. This manual is intended for users experienced in the development of communication drivers. The protocol provides access to database configuration, real-time clock, event and alarm logs, and historically archived data.

The ROC Plus database is broken into individual parameters. Each database parameter is uniquely associated by parameter number and point type. See *Chapter 3, Parameter Lists for Point Types*, for detailed information.

1.1 Manual Organization

This manual is organized into the following chapters:

Chapter	Description
Chapter 1 Introduction	Describes this manual and provides a summary of the general protocol message format, summary of each opcode, and how to calculate data offsets.
Chapter 2 Opcodes	Lists each opcode the ROC Plus protocol uses.
Chapter 3 Parameter Lists for Point Types	Describes ROC Plus protocol point types and data types.
Chapter 4 CRC-16 Code	Provides information concerning the cyclical redundancy check the ROC Plus protocol uses.
Chapter 5 IEEE Floating Point Format	Provides information about the binary representation of floating-point numbers.
Chapter 6 Spontaneous Report-by-Exception	Provides information on the DL8000's Spontaneous Report-by-Exception (RBX or RBX) function.
Chapter 7 Device to Device Communications	Provides information detailing store and forward options in the DL8000.
Index	Provides an alphabetic listing of items and topics contained in this manual.

1.2 General Protocol Message Format

Figure 1-1 shows the various ROC and host protocol message formats.

General Message Format - Station 'A' Polling Station 'B' for Data/Action:

Destination (B)		Source (A)		Opcode	Data Length	m Data Bytes								CRC	
unit	group	unit	group		# of bytes	d1	d2	d3	–	–	–	–	dm	LSB	MSB

General Message Format - Station 'B' Responding to Station 'A':

Destination (A)		Source (B)		Opcode	Data Length	n Data Bytes								CRC	
unit	group	unit	group		# of bytes	d1	d2	d3	–	–	–	–	dn	LSB	MSB

Figure 1-1. General Message Format

A message generally contains the following fields, in order from left to right:

Field	Description	
Destination	Specifies the address for the destination device. Destination has two components:	
	Unit	One-byte unit code for the station address. The unit code for a ROC address is user-configurable. For a host, this must be a unique number. **0** represents "broadcast within group" and **240** is the "direct connect address."
	Group	Indicates the group code for the station address. This is user-configurable and usually set to **2**.
Source	Specifies the address for the source device. Source has two components:	
	Unit	One-byte unit code for the station address. The unit code for a ROC address is user-configurable. For a host, this must be a unique number. **0** represents "broadcast within group" and **240** is the "direct connect address."
	Group	Indicates the group code for the station address. This is user-configurable and usually set to **2**.
Opcode	Defines the operation code (opcode) action to perform.	
# of bytes	Indicates the number of bytes in the data byte field, consisting of the path, desired opcode, number of data bytes for the desired message, and the desired message itself.	
Data Bytes	Contains messages of varying lengths, consisting of the path, desired opcode, number of data bytes for the desired message, and the message itself.	
CRC	Confirms validity of message transmission.	

Field	Description	
	LSB	Least significant byte.
	MSB	Most significant byte.

Messages are of flexible length. The first six data bytes are used for the header information including: destination, source, opcode, and data length (number of bytes). The length of a message equals the number of data bytes transmitted plus eight overhead bytes (header information and CRC).

The minimum message length is eight bytes if the number of data bytes is zero (no data bytes transmitted). The maximum message length is 248 bytes (240 bytes of data). A "nibble" is a four-bit unit or half a byte.

Figure 1-2 provides examples of the messages exchanged if the host requests the current time and date from DL8000 13 of Group 5.

Host Request to DL8000:

ROC Address		Host Address		Opcode	Data Length	CRC	
unit	group	unit	group	–	# of bytes	LSB	MSB
13	5	1	0	7	0	1	m

DL8000 Response to Host:

Host Address		ROC Address		Opcode	Data Length	8 Data Bytes								CRC	
unit	group	unit	group	–	# of bytes	d1	d2	d3	–	–	–	–-	dn	LSB	MSB
1	0	13	5	7	8	sec	min	hr	day	mo	yr	lyr	dwk	l	m

Figure 1-2. Request/Response Example

Note: Addresses **240,240** and **0,x** are reserved and should not be used.

1.3 Broadcast

DL8000 firmware version 1.10 and higher supports message broadcasting. A broadcast message is an opcode that is sent to a unit of 0. In this case, all DL8000s with the group matching the request accept the opcode and process it (regardless of the unit designation that each DL8000 may have). The DL8000 does not respond to the request.

For example, you may need to synchronize several DL8000s to the same date and time. If the DL8000s were connected to the same radio link and configured for the same group, a host could send an opcode 8 (Set Real-Time Clock) request to Unit 0 that would then set all of the DL8000s configured in this group to the same date and time.

1.4 Calculating Data Offsets

A data byte offset is the offset (zero-based) from the beginning of a transmit or receive buffer for the data items that comprise the opcode

data. The offset of the first data item is always **6** to allow for the header information (bytes 0-5).

Certain data offset values are determined based on the DL8000's configuration, such as for Opcode 0. The data byte offset for each item may be calculated. To calculate the next data offset value, add the previous offset value to the length of the previous data item:

Offset = Previous Offset + Length of Previous Data Item