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Preset Protocol Specifications Manual

Remote Automation Solutions

EMERSON™

Revision Tracking Sheet

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This manual may be revised periodically to incorporate new or updated information. The revision date of each page appears at the bottom of the page opposite the page number. A change in revision date to any page also changes the date of the manual that appears on the front cover. Listed below is the revision date of each page (if applicable):

Page	Revision
All Pages	June-2016
All Pages	June-2015
Chapters 2 and 3	October-2013
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Contents

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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	l	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