

# Understanding the Features

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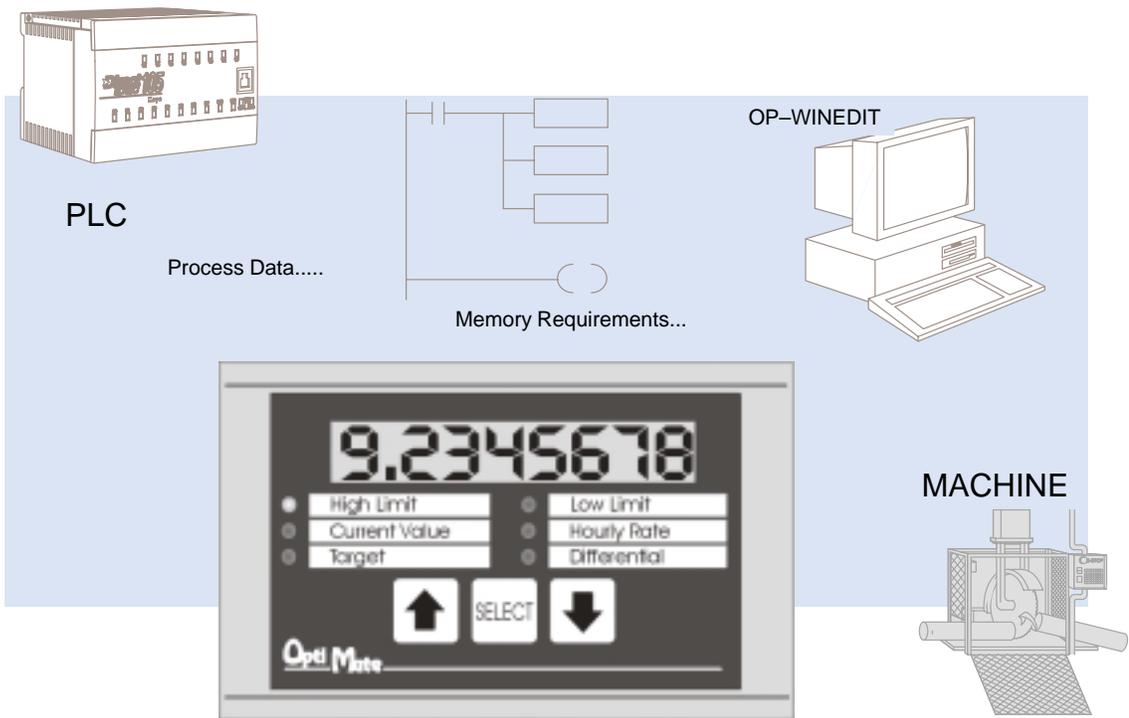
## In This Chapter. . . .

- Learning the Features
  - Display and Setpoint Operations
  - Numerical Data Types
  - Decimal Point
  - PLC Registers
  - *Direct*LOGIC User Memory Overview
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## Learning the Features

In this section, the subject of how to use the OP-414 features is described. We recommend that you study this chapter before attempting to configure and use the OP-panel. As you proceed through this chapter, relate the topics discussed with how your operator panel may be implemented. The concepts discussed in this chapter are applicable to all PLCs.

- Display and Setpoint Operations
- Numeric Data Types
- Decimal Point
- PLC Registers
- User Memory Overview

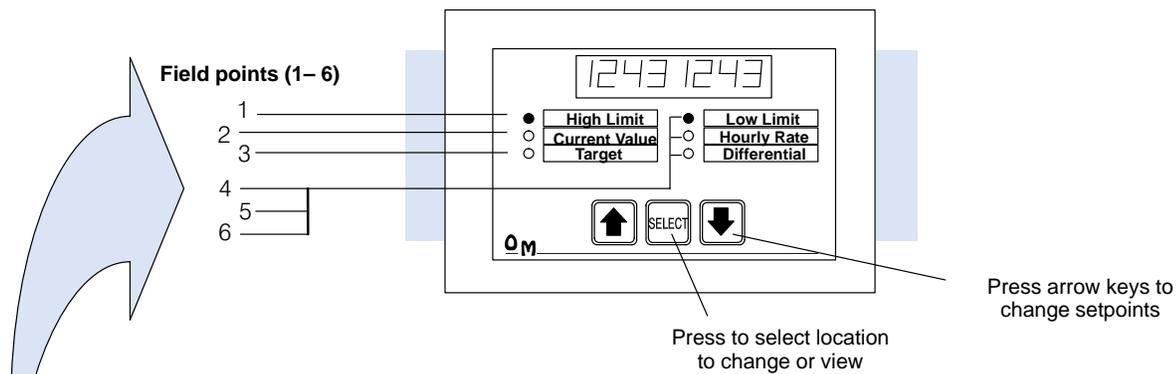


# Display and Setpoint Operations

## Display and Setpoint Data

The OP-414 has six LEDs with a label for each one. Each LED (with its label) refers to a user-defined field point. These field points are actually memory locations in the PLC where data is stored. You can make a field point a read only location—in which case, we refer to it as **display data**. Or you can designate a field point to store **setpoint data**—in which case, the field point is a read/write location. The panel allows you to either read the display data or read and write the setpoint data. When an LED is on, the corresponding field point (in the PLC) is displayed on the panel. Look at the illustrated example below.

Pressing the <SELECT> key scrolls through the field points, turning the LED on and displaying the data from the PLC. If you move to a label whose field point has been configured as **setpoint data**, then you can use the UP or DOWN ARROWS to change the value shown in the window. However, the UP or DOWN ARROWS have no effect on field points that have been configured as **display data**.



PLC Registers are mapped to Field points (1- 6)

OP-414 Panel PLC Register Map

PLC Register	Register Function
M+0	Field point 1 data cell
M+1	Field point 1 data cell 2 (long BCD)
M+2	Field point 2 data cell
M+3	Field point 2 data cell 2 (long BCD)
M+4	Field point 3 data cell
M+5	Field point 3 data cell 2 (long BCD)
M+6	Field point 4 data cell
M+7	Field point 4 data cell 2 (long BCD)
M+8	Field point 5 data cell
M+9	Field point 5 data cell 2 (long BCD)
M+10	Field point 6 data cell
M+11	Field point 6 data cell 2 (long BCD)
M+12	Field point force data cell
M+13	Field point force data cell 2 (long BCD)
M+14	Force control

**Reading or Writing a Setpoint**

Setpoint data is continually and transparently written to the associated PLC register(s). To access and use the setpoint data, reference the relevant PLC register(s) (M+0 through M+11) in your PLC program.

**Reading a Display Point**

When a value is written to a PLC register (M+0 through M+11) designated as display data, the OP-414 automatically retrieves and displays the data.



**NOTE:** The OP-414 can read and write setpoint data, but can only read display data.

**Forcing a Setpoint**

There are times when it is necessary for the PLC program to initialize or override a setpoint. The capability to do so is provided as the Force Setpoint function.

To force a setpoint to a given value, place the value in register M+12 (and M+13 for BCD long numbers). Next, set the bit(s) FP1-FP6 found in register M+14 corresponding to the setpoint(s) to be forced and set the FSP bit. Once the OP-414 has forced the setpoint(s) to the required value, it will clear registers M+12, M+13 and M+14.



**NOTE:** If the Force Setpoint option is not selected in the OP-WINEDIT configuration software, then setpoints cannot be forced and registers M+12, M+13 and M+14 cannot be used.

## Numeric Data Types

There are two types of data that the OP-414 can display: BCD long (also known as BCD double) and Binary.

**BCD Long Data**

BCD long (or BCD double) data has a value range of 0-99999999.

To display a BCD long number, place the least significant four digits of the number into the field point data cell. Next, place the most significant four digits into the field point data cell 2.

To read a setpoint BCD long value, the OP-414 continuously places the least significant four digits into the corresponding field point data cell and the most significant four digits into the corresponding field point data cell 2. Simply reference both registers in your PLC program to display the value.

For example, if the displayed value or the setpoint value is 92345678, then the PLC register will display the following (shown in BCD/Hex format):

BCD Long Data	PLC Register
Field point data cell	5678
Field point data cell 2	9234

## Binary Data

Binary data has a range of 0 – 65535 (0 – FFFF in Hex format).

To display a Binary number in a display point, simply place the Binary value in the appropriate data cell.

To read a Binary setpoint value, reference the PLC register in your PLC program. If the displayed value or the setpoint value is 40500, the PLC register will display the following (shown in BCD/Hex format):

Binary Data	PLC Register
Field point data cell	9E34
Field point data cell 2	XXXX (Don't care)

## Decimal Point

The number of digits displayed after the decimal point is configured in the OP-WINEDIT Configuration Software. The decimal point location is configured separately for each field point.

The decimal point is for displaying purposes only and cannot be changed by or written to a PLC register for use in the PLC program. Once configured, it is fixed and can only be changed by reconfiguring the OP-414.

For BCD long numbers, the number of digits that can be displayed after the decimal varies from 0 to 7.

For Binary numbers, the number of digits that can be displayed after the decimal varies from 0 to 7 but the highest number that can be displayed is 65535 (that is, 0.0065535).

# PLC Registers

## PLC Register Overview

The OP400 panels communicate to the PLC through user defined PLC data registers. The starting or “Base” register is assigned during panel configuration and automatically occupies fifteen consecutive 16-bit data registers. In this manual the registers are identified as M+0, M+1, M+2, thru M+14. Force control register M+14 contains bit-of-word information to force a setpoint to a specified value. The term PLC register is used for the area of memory within the PLC used for data exchange with the OP-414. PLC registers (addresses) are sometimes known as data registers, internal registers or 16-bit (word) addresses.

## PLC Register Map

The OP-414 uses a bank of 15 contiguous PLC registers. The register set is shown in the table below.

**OP-414 Panel PLC Register Map**

PLC Register	Register Function
M+0	Field point 1 data cell
M+1	Field point 1 data cell 2 (long BCD)
M+2	Field point 2 data cell
M+3	Field point 2 data cell 2 (long BCD)
M+4	Field point 3 data cell
M+5	Field point 3 data cell 2 (long BCD)
M+6	Field point 4 data cell
M+7	Field point 4 data cell 2 (long BCD)
M+8	Field point 5 data cell
M+9	Field point 5 data cell 2 (long BCD)
M+10	Field point 6 data cell
M+11	Field point 6 data cell 2 (long BCD)
M+12	Field point force data cell
M+13	Field point force data cell 2 (long BCD)
M+14	Force control

## Force Control Registers

**Force Control Registers**

	MSB															LSB																
	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
M+12																	Field point force data cell															
M+13																	Field point force data cell 2 (long BCD)															
M+14																	FSP FP6 FP5 FP4 FP3 FP2 FP1															

Understanding the Features

**Register Definition** The following describes the function of each of the registers shown in the table.

- **Register M+0** – Field point 1 data. Either setpoint or display, as configured. Numeric data is either a Binary value or the four least significant digits of the BCD long number in field point 1.
- **Register M+1** – Field point 1 data cell 2 (for long BCD numbers only). Either setpoint or display, as configured. Numeric data is the four most significant digits of data for field point 1.
- **Register M+2** – Field point 2 data.
- **Register M+3** – Field point 2 data cell 2 (for long BCD numbers only).
- **Register M+4** – Field point 3 data.
- **Register M+5** – Field point 3 data cell 2 (for long BCD numbers only).
- **Register M+6** – Field point 4 data.
- **Register M+7** – Field point 4 data cell 2 (for long BCD numbers only).
- **Register M+8** – Field point 5 data.
- **Register M+9** – Field point 5 data cell 2 (for long BCD numbers only).
- **Register M+10** – Field point 6 data.
- **Register M+11** – Field point 6 data cell 2 (for long BCD numbers only).
- **Register M+12** – Field point force data. Value to force setpoint equal to when force operation is initiated by the PLC program.
- **Register M+13** – Field point force data cell 2 (for long BCD numbers only). Four most significant digits of BCD long value to force setpoint equal to when force operation is initiated by the PLC program.
- **Register M+14** – Force control. Controls the forcing of setpoints.
  - > **FSP** bit: When set, the field point force data (M+12 and/or M+13) will be forced into the field points that are set to be forced selected by FP1–FP6. Once the force is finished, the OP–414 will clear M+12, M+13 and M+14.
  - > **FP1–FP6** bits: Identifies the setpoints to be forced.

### PLC Register Assignment Examples

Examine the address conventions for **Automationdirect (DirectLOGIC)** and Allen-Bradley. For example, the **DirectLOGIC** address references are **octal**, and the Allen-Bradley's are **decimal**. The **DirectLOGIC** DL05/DL105/DL205/D3-350/DL405 OP-panel address uses V-memory registers which are 16-bit registers. The DL305 family uses reference assignments with 8-bit registers. This means that the DL305 will require thirty 8 bit registers for data handling. The Allen-Bradley memory is defined with a reference (**Nx**) which represents the memory area, and (**:n**) which defines the word within the memory area. Please refer to the appropriate CPU User manual for the PLC product you are using.

#### **DirectLOGIC** DL05/DL105/DL205/D3-350/DL405

Example Address		Function
V2000	M+0	Field point 1 data cell
V2001	M+1	Field point 1 data cell 2 (long BCD)
V2002	M+2	Field point 2 data cell
V2003	M+3	Field point 2 data cell 2 (long BCD)
V2004	M+4	Field point 3 data cell
V2005	M+5	Field point 3 data cell 2 (long BCD)
V2006	M+6	Field point 4 data cell
V2007	M+7	Field point 4 data cell 2 (long BCD)
V2010	M+8	Field point 5 data cell
V2011	M+9	Field point 5 data cell 2 (long BCD)
V2012	M+10	Field point 6 data cell
V2013	M+11	Field point 6 data cell 2 (long BCD)
V2014	M+12	Field point force data cell
V2015	M+13	Field point force data cell 2 (long BCD)
V2016	M+14	Force control

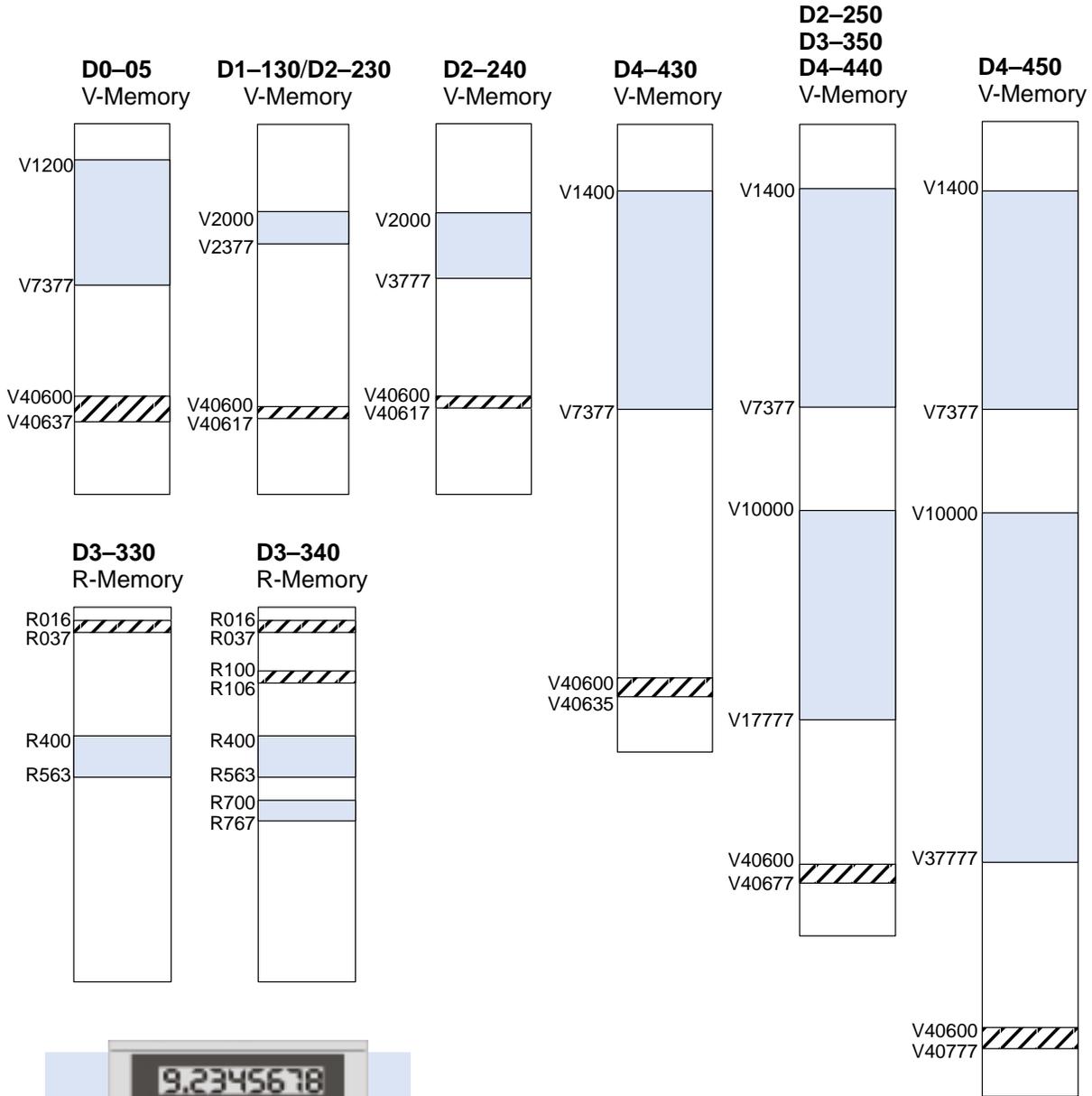
#### **DirectLOGIC** DL305 (D3-330 & D3-340)

Example Address		Function
R400/R401	M+0	Field point 1 data cell
R402/R403	M+1	Field point 1 data cell 2 (long BCD)
R404/R405	M+2	Field point 2 data cell
R406/R407	M+3	Field point 2 data cell 2 (long BCD)
R410/R411	M+4	Field point 3 data cell
R412/R413	M+5	Field point 3 data cell 2 (long BCD)
R414/R415	M+6	Field point 4 data cell
R416/R417	M+7	Field point 4 data cell 2 (long BCD)
R420/R421	M+8	Field point 5 data cell
R422/R423	M+9	Field point 5 data cell 2 (long BCD)
R424/R425	M+10	Field point 6 data cell
R426/R427	M+11	Field point 6 data cell 2 (long BCD)
R430/R431	M+12	Field point force data cell
R432/R433	M+13	Field point force data cell 2 (long BCD)
R434/R435	M+14	Force control

## Allen-Bradley SLC 5/03, 5/04, and Micrologix

Example Address		Function
<b>N7:0</b>	<b>M+0</b>	Field point 1 data cell
<b>N7:1</b>	<b>M+1</b>	Field point 1 data cell 2 (long BCD)
<b>N7:2</b>	<b>M+2</b>	Field point 2 data cell
<b>N7:3</b>	<b>M+3</b>	Field point 2 data cell 2 (long BCD)
<b>N7:4</b>	<b>M+4</b>	Field point 3 data cell
<b>N7:5</b>	<b>M+5</b>	Field point 3 data cell 2 (long BCD)
<b>N7:6</b>	<b>M+6</b>	Field point 4 data cell
<b>N7:7</b>	<b>M+7</b>	Field point 4 data cell 2 (long BCD)
<b>N7:8</b>	<b>M+8</b>	Field point 5 data cell
<b>N7:9</b>	<b>M+9</b>	Field point 5 data cell 2 (long BCD)
<b>N7:10</b>	<b>M+10</b>	Field point 6 data cell
<b>N7:11</b>	<b>M+11</b>	Field point 6 data cell 2 (long BCD)
<b>N7:12</b>	<b>M+12</b>	Field point force data cell
<b>N7:13</b>	<b>M+13</b>	Field point force data cell 2 (long BCD)
<b>N7:14</b>	<b>M+14</b>	Force control

## DirectLOGIC User Memory Overview



- User Data Space available for OP-panels
- Internal Relay Memory

DirectLOGIC PLCs use octal addressing, as indicated by the shaded areas.

Understanding the Features