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Datapanel 20

Datapanel

Operator Interface Products

Datapanel 20

User's Manual

GFK-1812A

Nov. 2001

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Warning notices are used in this publication to emphasize that hazardous voltages, currents, temperatures, or other conditions that could cause personal injury exist in this equipment or may be associated with its use.

In situations where inattention could cause either personal injury or damage to equipment, a Warning notice is used.

Caution

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Note

Notes merely call attention to information that is especially significant to understanding and operating the equipment.

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The supplied unit is intended to be an operator interface. It is expected to work with a controller which actually takes any control actions. It is the responsibility of the user to ensure safety of the personnel and property while configuring the system. Proper care must be taken in the controller to validate data as entered from this unit and any action should be taken only if the newly entered data is found to be within the safe limits of the system operations.

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Preface

This manual describes features, installation, and operation of the Datapanel 20 OI product. It is assumed that you are familiar with the PLC(s) used in your application and with Windows-based configuration.

Content of This Manual

Chapter 1. Introduction: Provides an overview of Datapanel features and capabilities.

Chapter 2. Installing the Hardware: Describes how to install the Datapanels.

Chapter 3. Operation Guide: Describes operating modes, powerup conditions, controls and indicators, and typical operation scenarios.

Chapter 4. Specifications: Lists hardware, technical, electrical, and environmental specifications for the Datapanel.

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Contents

Chapter 1

Introduction

Datapanel operator interface (OI) modules are self-contained, solid state industrial display systems that include their own display screens and keypads. The Datapanel 20 (DP20) OI connects to a Programmable Logic Controller or other intelligent control device through the device's programming or standard communications port. The controller must support SNP communications.

The DP20 displays the contents of PLC memory locations and allows modification of these locations. The DP20 can display ASCII text messages that are defined by PLC programming. These text messages may contain embedded numerical values from PLC memory locations.

The DP20 offers the following features:

- **Controller Communications.** Read and write data to the control equipment via an RS232 serial port.
- **Integrated Keypad.** Includes six function keys; Cancel, Return, Up Arrow, Down Arrow, Increment and Decrement.
- **Display of Real-Time Data.** Provide information on the current state of the plant process.
- **Continuous updates**: Register values updated continuously.
- **CSA, IP65 Rated.** Ruggedized for harsh industrial environments.
- **UL 508 and UL 1604 Class I, Div 2. Groups ABCD**

System Components

A Datapanel system includes one each of the following:

- Datapanel unit, incorporating an LCD display screen and membrane keypad
- Installation kit — gasket, two mounting tabs, two M4 (4mm) screws, and two hex nuts
- Operator's Manual (this book)

Features

The following table provides a summary of features and capabilities for the DP20. Chapter 2 provides installation information, Chapter 3 provides operational information, and Chapter 4 provides detailed specifications.

Table 1-1. DP20 Features

Display capability	16 characters wide, 2 lines
ASCII messages	32 characters
Backlight	LED
Serial Port	One RS232 port
Communications	SNP
Indicators (LED)	2
Power Supply	5VDC (from PLC)
Controller memory types supported	System Registers (%R), Analog Inputs (%AI), Analog Outputs (%AQ), Discrete Inputs (%I), Discrete Outputs (%Q), Discrete Globals (%G), Internal Coils (%M) and Temporary Coils (%T).

Chapter 2

Installing the Hardware

Mounting Datapanels

The Datapanel can be mounted in a panel from 1.5 to 7mm (0.06 to 0.28 inches) thick using the mounting kit provided. The mounting kit contains a gasket, two mounting tabs, two M4 screws, and four hex nuts.

1. Cut an opening in the panel where the Datapanel is to be mounted. Table 2-1 provides cutout dimensions.

Table 2-1. Physical Dimensions and Panel Cutouts

Datapanel (Bezel Width x Height x Chassis Depth*)	
mm	108 x 60 x 27
inches	4.25 x 2.36 x 1.06
Panel Cutout (Width x Height)	
mm (±0.3)	92 x 45
inches (±0.12)	3.62 x 1.77
Panel thickness	
mm	1.5 to 7mm
inches	0.06 to 0.28

*Depth of chassis, not including bezel.

2. Place the gasket, which is provided in the mounting kit, on the Datapanel.

3. Thread a hex nut onto each screw. Insert a screw through each mounting tab. Thread a second hex nut onto each screw as shown in Figure 2-1.

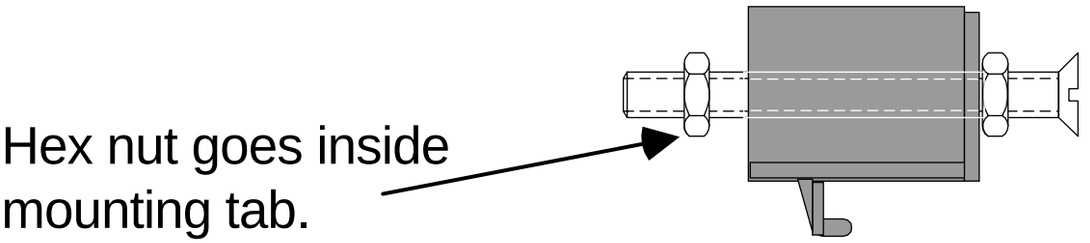


Figure 2-1. Mounting Tab Assembly

4. Insert the Datapanel from the front of the panel into the cutout, as shown in Figure 2-2.

5. Install a mounting tab on each side of the Datapanel.

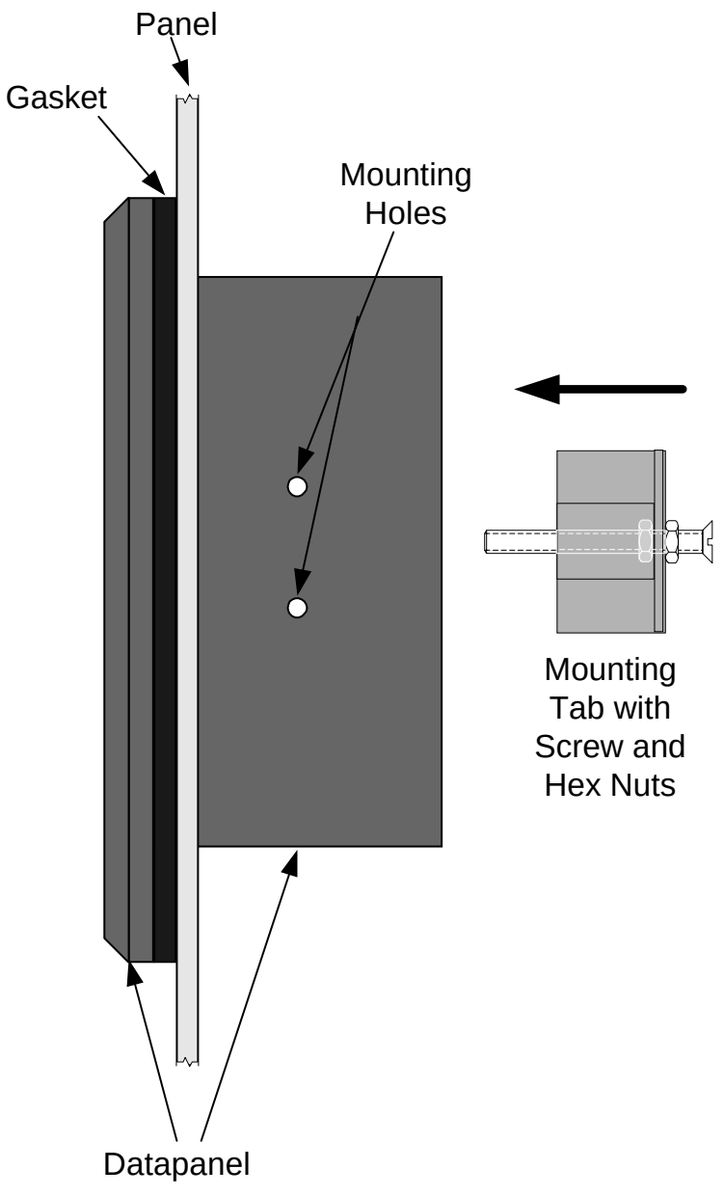


Figure 2-2. Datapanel Mounting, Side View

6. On each side of the Datapanel, use a screwdriver to tighten the screw. The nut will snug up inside the mounting tab, pushing the tab away from the panel, and holding it in place.

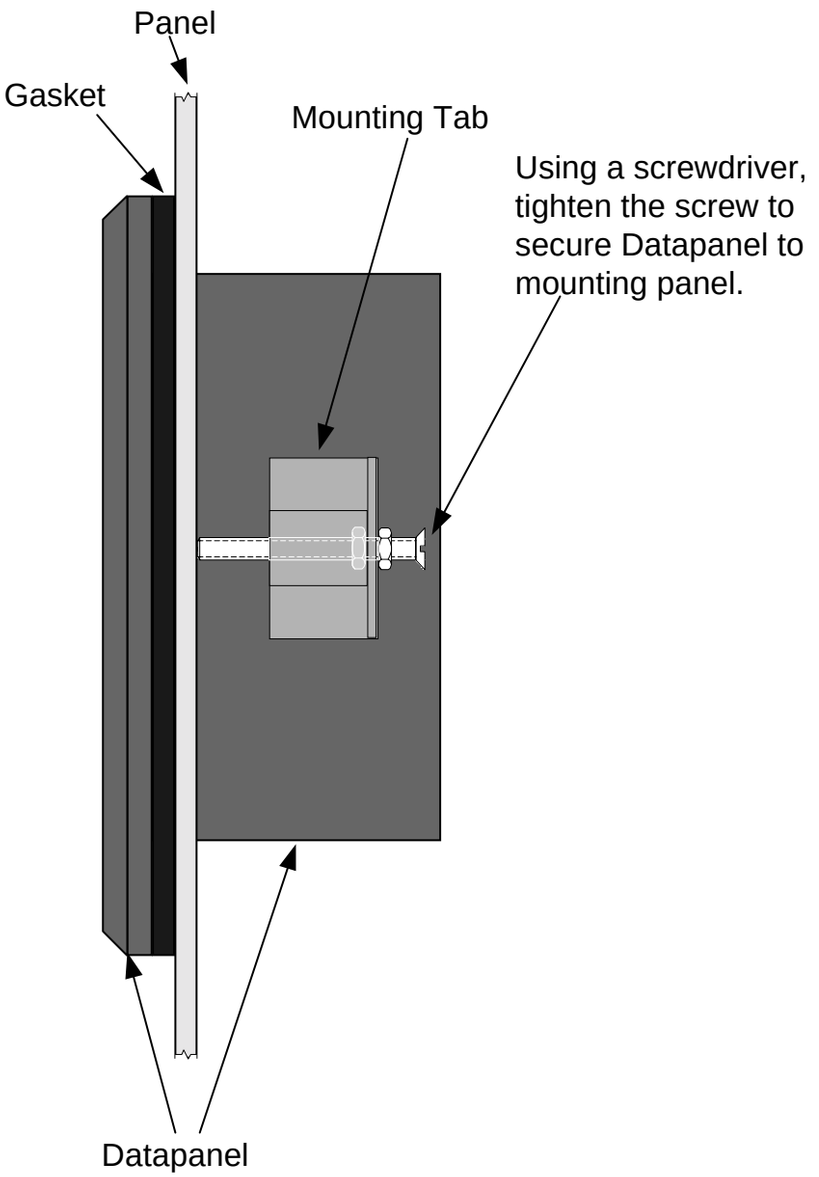


Figure 2-3. Securing Datapanel, Side View

Connectors

The PLC connector is located on the back of the unit.

Power Supply Connections

Th DP20 use the 5VDC external power supply provided by the PLC. For PLC power supply specifications, refer to the installation manual for your PLC.

Caution

Do NOT connect the chassis ground of the power supply or the OI to the power return (negative terminal) of the power supply. In some cases, power supplies have shunts to do this, if your power supply has the shunt installed, you MUST remove it.

Serial Port Connection

The Datapanel supports RS232 operation. The RS232 port is used to communicate to the PLC and to supply power to the unit.

Cable

A controller cable is required to connect DP20 to the controller. You will need one of the following cables, which are purchased separately:

Cable	PLC	Connector
IC200CBL550	Micro/Nano	RJ45
IC200CBL520	S90	15-pin D-type

Chapter 3

Operation Guide

This chapter provides the following information:

- Operating Modes
- Powerup Conditions
- Controls and Indicators
- Typical Operation Scenarios

Operating Modes

The DP20 has three operating modes that are determined by the control word in register R00022 of the PLC. A fourth operating mode, PLC Status, is available while in Register mode. An additional mode, Edit, may be used in either Register or Message mode.

- Message — The DP20 displays 32 bytes (16 words) from the location given by the Offset register. For example, if the Offset register contains a value of 50, the unit will display 32 bytes from R00050 to R00065. Register values may be embedded in a message by means of special display codes.

  In Message mode, the unit will not display any registers (except those embedded as part of a message) and the function keys will only act as pushbuttons mapped to the corresponding bits in register R00023.

  Bit 15 of the control word determines whether data entry is allowed in this mode. (See "Control Word" on page 3-5.) If so allowed, and a register value is embedded in the current message, then the Return, Increment, Decrement and Cancel keys are used to edit the value. Register R00023 continues to be updated with the bits corresponding to the function keys used for editing.

- Register — While in this mode, the DP20 allows the viewing, selection and modification of PLC memory areas. The Up and Down arrow keys are used to scroll through a list of PLC memory types and locations (R0010, AQ0050 etc.). Once the memory type has been selected via the

Return key, the arrow keys are used to display the range of locations of the selected type. Once the location has been selected, the value at that location may be edited using the Increment and Decrement keys.

The limits of range for the various types of memory is PLC model-specific (Series 90 and VersaMax).

The PLC status feature is the final selection in the list and is selected using the Return key.

- Operator – In this mode, the DP20 alternates between Message and Register Mode by pressing the Cancel key.

  If no key is pressed during the timeout period specified in the Control word (see page 3-5), the DP20 will return to Message mode.

- PLC Status — Provides access to a System menu, which can be used to view PLC operating information, such as program name, PLC ID, Run/Stop mode, battery status, etc. The operator can clear PLC faults and change PLC time.

PLC Registers Used by DP20

The DP20 uses three registers in PLC memory for its functions: Offset (R00021), Control word (R00022), and Keypad Status (R00023). It also uses registers R00001 to R00016 for embedding data in a message. (R00013 through R00016 are reserved for bar graph display.)

Offset (R00021)

The DP20 scans 16 words (MESG0 to MESG15), where MESG0 is the register number stored in R00021, and displays them. Each word contains two bytes of ASCII characters (20H to 7FH).

Note

The order of the ASCII bytes within the register may differ from the convention used by the string operations of the PLC being used.

Control Word (R00022)

Bit	Function	Value
0	Controls LED 0	0 = LED0 off 1 = LED0 on
1	Controls LED 1	0 = LED1 off 1 = LED1 on
7—2	Reserved	N/A
9—8	Operating Mode	00 = Message 01 = Register 10 = Operator 11 = Invalid
11—10	Timeout to Run Mode	00 = 10 seconds 01 = 20 seconds 10 = 30 seconds 11 = 40 seconds
14—12	Reserved	N/A
15	Enables/Disables data entry in Message mode	0 = Enabled 1 = Disabled

Keypad Status Word (R00023)

When a function key is pressed in Run mode, the corresponding bit in the Keypad Status word is held on.

Bit	Key
0	+
1	-
2	
3	
4	
5	
6—15	Reserved

Embedded Data (R00001 to R00016)

A message can contain one embedded register. If a register in the range R00001 to R00012 is embedded, the DP20 will display the contents of the register as a numerical value. If a register in the range R00013 through R00016 is embedded, the data will be displayed in bar graph form.

Powerup Conditions

The DP20 must be connected to the PLC for power. On powerup, the DP20 immediately begins operation based on the contents of the control word.

Controls and Indicators

Key Functions

Datapanels incorporate built-in membrane keypads with tactile feedback. The key functions are listed in Table 3-1.

LEDs

DP20 units have two LEDs that are controlled by the first two bits in the Control word (see page 3-5).

Table 3-1. Key Functions

Key	Mode	Function
+	Message Mode*	During editing, increments the displayed value of the variable. The longer the key is held, the faster the increment.
	Operator Mode	—
	Register/PLC Status Mode	During editing, increments the displayed value of the variable. The longer the key is held, the faster the increment.
-	Message Mode*	During editing, decrements the displayed value of the variable. The longer the key is held, the faster the decrement.
	Operator Mode	—
	Register/PLC Status Mode	During editing, decrements the displayed value of the variable. The longer the key is held, the faster the decrement.
	Message Mode*	—
	Operator Mode	—
	Register/PLC Status Mode	Displays next PLC memory type, location or status screen
	Message Mode*	—
	Operator Mode	—
	Register/PLC Status Mode	Displays previous PLC memory type, location or status screen

Key	Mode	Function
⊘	Message Mode*	Terminates editing of the embedded variable.
	Operator Mode	Alternates between Register and Message modes. Return to Message mode from Register mode occurs only from the top of the Register mode menu.
	Register/PLC Status Mode	Cancel data editing or return from PLC status screens
↵	Message Mode*	Begins the edit of an embedded variable if bit 15 is set to 0.
	Operator Mode	—
	Register/PLC Status Mode	Several operations: accepts the selected memory type; accepts the selected memory location; accepts new data and sends to the PLC or enters PLC Status

* In Message mode, pressing a function key holds the corresponding bit in R00023 in the ON state.

Typical Operation Scenarios

Message Mode

There are two ways for the PLC logic to control the display messages. One is to store messages in the data memory and have the logic change the number in the Offset register. The other way is to have the program write different message data to the MESG registers. Note that the former method uses data memory, while the latter uses program memory.

It is possible to embed register data in a message (one register per message). The DP20 reads 16 registers from R00001 to R00016 (in which R00013 to R00016 are used for Bar Graph) in every scan. To embed data from a register, place the hexadecimal value 0 to F corresponding to register R00001 to R00016 in the message. A decimal point can also be embedded in the values.

The format of the hexadecimal values placed in a message to embed register data changes slightly when the embedded data is to be edited. In this case, hexadecimal values 10 to 1F are used in the message to

edit register R00001 to R00016, respectively. This format, along with bit 15 in the Control Word (R0022), allows embedded register data to be edited.

Examples:

This example shows how to display three digits of the value in R00004. The first two digits are displayed by the 0303. The last digit and its trailing decimal point is displayed by 2E03.

- 0303 (hex) embeds two digits of R00004
- 2E03 (hex) embeds a decimal point and the third digit of R004

Edit Mode

An operator can modify the ongoing process in the controller by using the Datapanel's edit function to directly change a value in a register. Editing may occur in either Register or Message Mode. In Register mode, the memory type and location must have been selected. In Message mode, a register value must be embedded in the current message. Additionally, bit 15 in Control Word R0022 must be set to 0. To edit a value in the PLC:

1. Press the Enter key to enter edit mode. The selected values blinks.
2. Press the + key to increment the selected value. Press the – key to decrement the value.
3. To accept the modified value and send the value to the PLC press the Enter key. To terminate editing without modifying the value press the Cancel key. The value stops blinking.

Register Mode

Register mode provides access to PLC memory areas for display and possible modification. Selection of the different memory areas is organized into three steps or levels. The levels differ in which items on the screen may be selected or modified and follow each other in sequence.

The first level or step displays the PLC memory types along with the value of the first location of that type. At this level only the memory type may be selected. The second level becomes available upon selection of the memory type and only allows the memory location to be selected. The third level becomes available upon selection of the

memory location. At this final level, the value of the memory location may be modified.

1. Select the memory type by using the Up and Down keys to scroll though the available types. When the desired type is displayed (%R, %T etc.), press Enter. Pressing the Cancel key returns to Message mode (if so enabled in the Control Word).
2. Select the location by using the Up and Down keys to scroll the range of locations for the type. The numbers representing the locations will blink while being scrolled. When the desired location is displayed (%AQ0045 etc), press Enter. Blinking stops. Pressing the Cancel key returns to the memory type selection step.
3. The value of the displayed location may be selected for modification by pressing Enter. While being edited, the value blinks. Use the Increment and Decrement keys to change the value. Pressing Enter accepts the new value and sends it to the PLC. Pressing the Cancel key terminates the edit and returns to the previous level.

   The PLC status screens are also available from Register mode. PLC status may accessed during the memory type selection step described above. Also see “PLC Status” in a following section.

After a specified time period without a key press, the DP20 returns to Message mode. This is useful when normally the machine status is monitored, but the operator may change presets, etc. once in a while. Note that in this mode, the operator has access to ALL the PLC registers and bits. Hence, it is advisable to use password protection created using the PLC data registers and ladder logic before this mode is activated.

If the PLC needs to control the register being viewed or edited, message mode itself can be used effectively by embedding a register in the message and selectively enabling or disabling bit 15 in Control Word R0022. In this way, the operator gets access only to those registers as allowed by the PLC logic. Please see the sections on Message Mode and Editing for more information.

Examples

Example 1: Displaying a Static Message

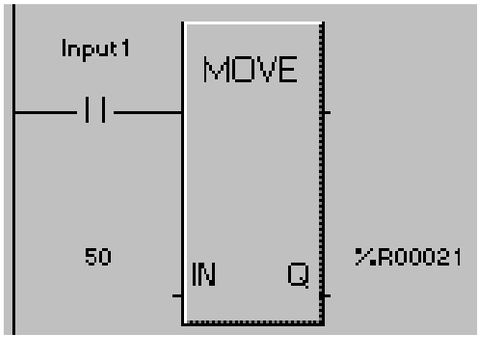
This example summarizes the logic needed to display the following message on the DP20:

Last Rinse Cycle
Water pump is on

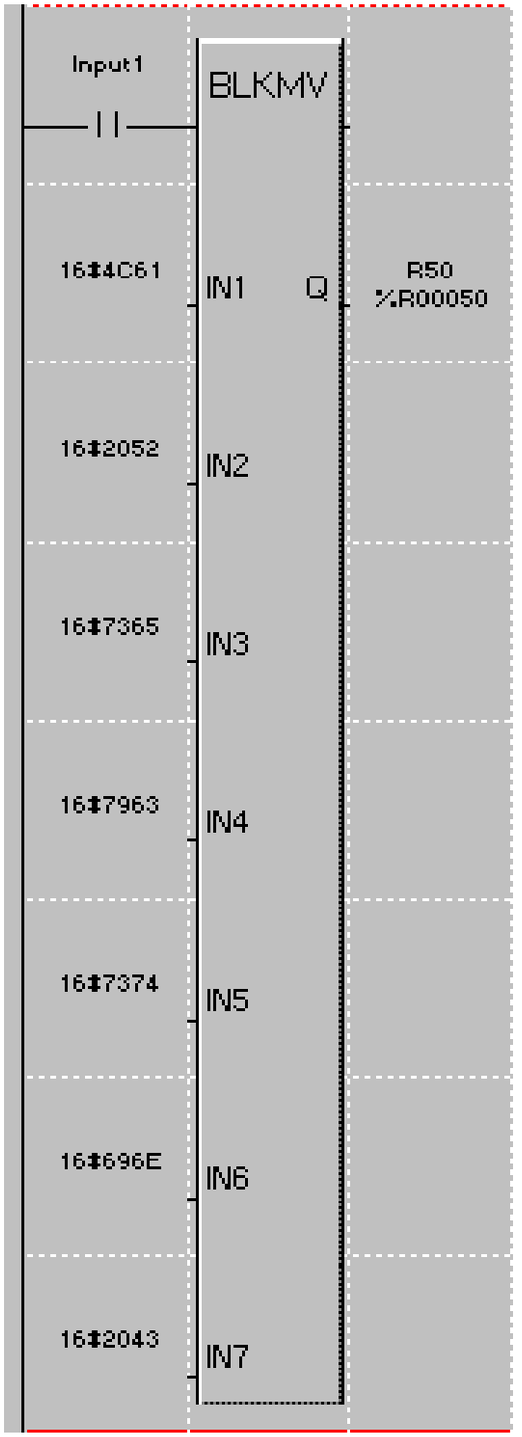
MOVE and BLKMV (Block Move) instructions are used to place data in words %R00050 through %R00065 as follows:

Word	ASCII	Hex	Word	ASCII	Hex
R50	"La"	4C61	R58	"Wa"	5761
R51	"st"	7374	R59	"te"	7465
R52	" R"	2052	R60	"r "	7220
R53	"in"	696E	R61	"pu"	7075
R54	"se"	7365	R62	"mp"	6D70
R55	" C"	2043	R63	" i"	2069
R56	"yc"	7963	R64	"s "	7320
R57	"le"	6C65	R65	"on"	6F6E

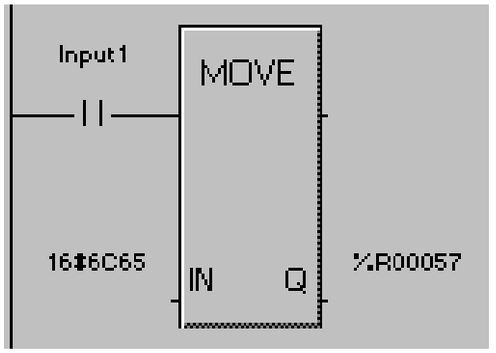
1. Move the value 50 to %R00021. The message will be stored in %R00050 onwards.



2. Move the first seven words of the message "Last Rinse Cycle" into %R00050 through %R00056.



3. Move the final word of the message into %R00057.



4. In a similar manner, move the message "Water pump is on" into the eight words from %R00058 to %R00065.

Note

The order of the ASCII bytes within the register may differ from the convention used by the string operations of the PLC being used.

Example 2: Embedding a Variable in a Message

This example summarizes the logic needed to display the following message on the DP20, where the door status is stored in DoorStat and the bake time is stored in %R00100. The register %R00004 will be used to embed the bake time data in the message.

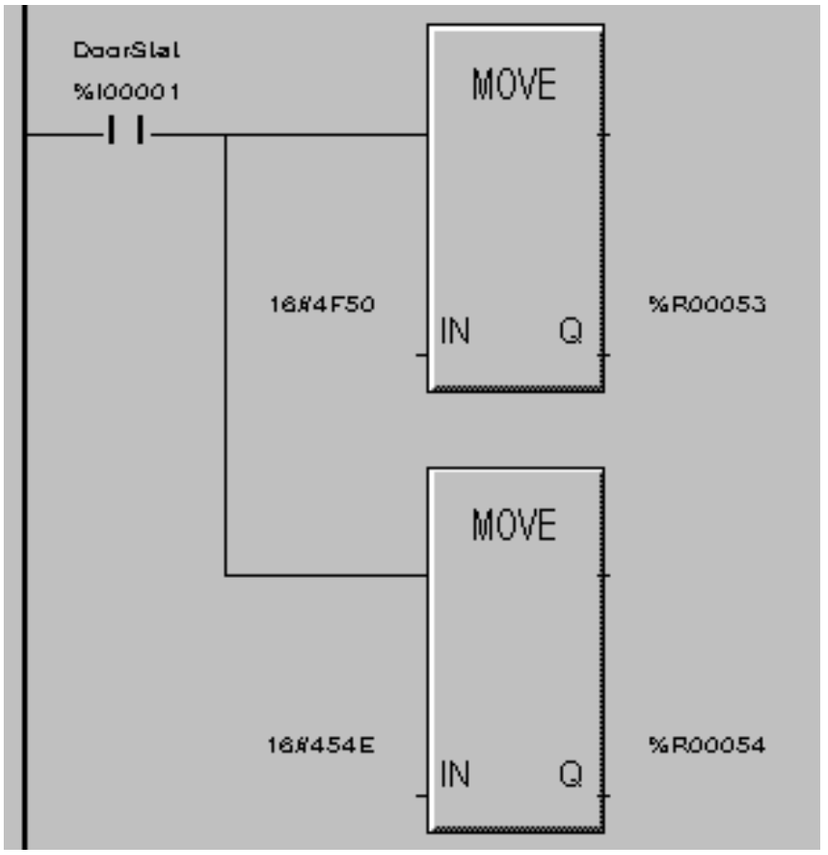
Door: CLOSED
BAKETIME: 13.6s

MOVE and BLKMV (Block Move) instructions are used to place data in words %R00050 through %R00065 as follows:

Word	ASCII	Hex	Word	ASCII	Hex
R50	"Do"	446F	R58	"BA"	4241
R51	"or"	6F72	R59	"KE"	4B45
R52	": "	3A20	R60	"TI"	5449
R53	"CL"	434C	R61	"ME"	4D45
R54	"OS"	4F53	R62	": "	3A20
R55	"ED"	4544	R63		0303
R56	" "	2020	R64	". "	2E03
R57	" "	2020	R65	"s "	7320

1. Move the value 50 to the offset register, %R00021. The message will be stored in %R00050 onwards.
2. Move the characters "Door:" into the three words, %R00050 through %R00052:

   Move 446F (hex) to %R00050.
   Move 6F72 (hex) to %R00051.
   Move 3A20 (hex) to %R00052.
3. If DoorStat is ON, move the characters "OPEN" into %R00053 and %R00054.



4. Similarly, if DoorStat is OFF, move the characters "CLOSED" into %R00053 and %R00054.

Note

To flash the characters "OPEN" or "CLOSED," use a Timer instruction to gate the enable input for the MOVE instruction.

5. To fill the remainder of the top line with spaces, move 2020 (hex) into %R00056 and %R00057.

6. In a similar manner, move the characters "BAKETIME:" into words %R00058 to %R00062.
7. Move the data in the BakeTime register, %R00100, into %R00003.
8. To embed the value in %R00003 in the message, move 0303 (hex) into %R00063 and 2E03 (hex) into %R00064. The DP20 will put data in %R00003 on display in xx.x format.
9. To complete the message, move the character "s" into %R00065.

Viewing and Editing PLC Status

In PLC Status mode, a system menu is displayed. You can use the arrow keys to view the screens in sequence. Some screens are informational only. Others provide instructions for performing actions, such as clearing PLC faults.

1. While in Register mode, use the Down or Up keys to scroll through the list of PLC memory types. When the words “PLC Status” appear, press the Enter key to begin PLC Status mode. The System menu will appear.
2. To view the next screen, press the Down  key.
3. To view the previous screen, press the Up  key.
4. For desired actions, follow instructions presented on the screens.

The system menu presents the following screens:

- Technical Support contact information
- Program name
- PLC ID
- CPU Switch (Run/Stop status)
- I/O Overrides status
- Battery status
- PLC Faults status
- Clear Faults
- Display Time (time as read from PLC)
- Change Time

Chapter 4

Specifications

Physical Specifications

Table 4-1. Dimensions and Weight

Datapanel (Bezel Width x Height x Chassis Depth*)	
mm inches	108 x 60 x 27 4.25 x 2.36 x 1.06
Panel Cutout (Width x Height)	
mm (±0.3) inches (±0.12)	92 x 45 3.62 x 1.77
Weight	
Kg lb.	0.68 1.5

*Depth of chassis, not including bezel.

Table 4-2. Technical Specifications

Processor	80c32
Memory, Flash	128KB Flash
Memory, SRAM or DRAM	2K SRAM
Database Size	32K
Serial Ports	One RS232 port
Power requirements	5.0V at 85mA typical

Pinouts

Pinouts for the Connect PLC port, located on the back of the DP20, are listed in Table 4-3.

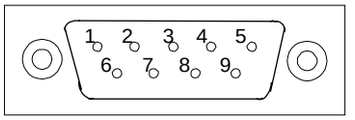


Figure 4-1. DB9 Connector

Table 4-3. Connect PLC Port Pinouts

Pin	Function
1	-
2	-
3	TX (out)
4	-
5	GND
6	VCC (in). See Table 4.2
7	-
8	RX (in)
9	-

Environmental Conformity

IP 6X & IP X5 as per IEC 529 Category I, when properly installed in an enclosure.

CAN/CSA-C22.2 No 14-M91

UL Std. No. 508 for Industrial Control Equipment.

UL-1604 Class I, Div. 2. Groups ABCD

Test Specifications

Datapanels are designed to satisfy the requirements and conditions of the following specifications. All Datapanels remain operational when tested for resistance to temperature and humidity.

Table 4-4. Test Specifications

Operating Temperature	0 to +50°C
Storage Temperature	-25 to +80°C
Humidity	10 to 90% non-condensing
Immunity to ESD	Level 3 as per IEC1000-4-2
Immunity to transients	Level 3 as per IEC1000-4-4
Radiated susceptibility	Level 3 as per IEC1000-4-3
Emissions	EN55011 CISPR A

%

B

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D

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