

The DMC-164 from Renu Electronics is a low cost addition to their Operator Interface line. Featuring 4 lines of 16 characters backlit LCD, it allows monitoring machine status as messages AND change data in the PLC. Cost is saved since the unit uses PLC memory.

- Compact 1/4 DIN size case
- ASCII messages from PLC data memory
- Access PLC registers, timers and counters
- Embed register values and bit sensitive text
- Display data in a BAR GRAPH format
- No setup software required
- Data Entry possible

### Function Keys and LEDs

The DMC-164 has 8 keys which hold a bit On in the register RW51 while the key is pressed. They can be used to replace push buttons.

The same keys can also be used to monitor and edit PLC data registers, timers, counters etc. when the unit is in the register display mode.

The DMC-164 has 4 LEDs controlled by 4 bits in RW50 in the PLC. These bits are R500, R501, R502 and R503. The LEDs are ON when the status of these bits is "1" and OFF when the status of these bits is "0".

### Modes of Operation

Two words are defined for each PLC to control the display and unit operation: CONTROL WORD and OFFSET. In the Toshiba T1, these words are RW50 and D1000 respectively.

The unit operates in 2 modes. RW50 controls the operating mode.

In the message mode, 32 words ( MESSG to MESSG+31 ) are scanned by the DMC-164 and displayed on the LCD where MESSG is the register number stored in D1000. Each word has 2 bytes of ASCII characters. The user simply has to put the correct data in these registers to display a message. Data can be embedded in a message by special formats. This mode is used to display alarm or status.

In the Operator mode, a key press initiates the register mode and times out after the specified time period to the 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 gets access to ALL the PLC registers and bits. Hence, it is advisable to use a password protection created using the PLC data registers before this mode is activated in the ladder logic.

If the PLC needs to control the register being viewed and/or edited, the message mode itself can be used effectively using the data embedding feature. When the data is to be edited, the UP and DOWN arrow keys can be used in the PLC to increment or decrement the data. This way, the operator gets access only to those registers as allowed by the PLC ladder logic. Refer to the examples for detailed information on this.

### Control Word

The DMC-164 reads RW50 ( CONTROL WORD ) in the PLC which controls the operating mode. The meaning of the individual bits in RW50 is as follows:

R500	1: LED0 On 0: LED0 Off	R510	Key F1
R501	1: LED1 On 0: LED1 Off	R511	Key F2
R502	1: LED2 On 0: LED2 Off	R512	Key F3
R503	1: LED3 On 0: LED3 Off	R513	Key F4
R508-9	00: Message 01: Register	R514	Key F5
	10: Operator 11: Invalid	R515	Key F6
R50A-B	Timeout to message mode	R516	Key F7
	00: 10 sec 01: 20 sec	R517	Key F8
	10: 30 sec 11: 40 sec		
R50C-E	Reserved for future use		
R50F	Disable Data Entry in Message mode (ON : Disable)		

### Messages

In the Message mode, the unit displays 64 bytes ( 32 words ) from the location given by the Offset register. For example, if the Offset register has number 120 in it, the unit will display 64 bytes ( 32 words ) from D120 to D151.

Thus, there are two ways to control the display messages. One way is to store messages in the data memory and the ladder logic simply changes the number in the Offset register. Another way is, the program memory puts different message data in the MESSG registers by using the ASC instruction. Note that the former method uses data memory whereas the later method uses program memory. A combination of the two can also be used.

### Embedded Registers and Variables

It is possible to embed D1000 to D1015 in messages by using a special format in the message mode. When the message words ( MESSG to MESSG+31 ) contain ASCII bytes which are between 20H to 7FH, the corresponding ASCII characters are displayed. The range 00H to 0BH is used to embed variables in the messages. The range 0CH to 0FH is used to show data in bar graph format. It is possible to embed one data entry field in a message. It is similar to embedding a register, only instead of 0 to F, use 10 to 1Fhex bytes to address D1000 to D1015. The registers D1000 to D1015 can be edited with this feature one at a time in a message. A decimal point can be inserted in the variable. Refer to the example to understand how this can be done. The PLC ladder can control bit sensitive text messages by simply manipulating the ASCII characters based on a bit status.

# Specifications

Power : From T1/T2 programming port; 1.5W max  
 Display : 4 lines of 16 characters backlit LCD  
 Bezel : IP65 rated membrane keypad  
 Temperature : Operating: 0 to 50 degrees C  
 Storage: -25 to 80 degrees C  
 Humidity : 10% to 90% (Non condensing)  
 Size : Bezel: 96 mm X 96 mm; Depth:32 mm  
 Panel cutout : 92 mm X 92 mm  
 ( 1/4 DIN size cutout )

Communication : Using the programming port of the T1/T2 PLC  
 Immunity to ESD : Level 3 as per IEC1000-4-2  
 Immunity to Transients : Level 3 as per IEC1000-4-4  
 Immunity to Radiated RF : Level 3 as per IEC1000-4-3  
 Immunity to Conducted RF: Level 3 as per IEC1000-4-6  
 Emissions : EN55011 CISPR A

# Example

To display a message such as do the following:

Caution !!  
 Emergency Stop  
 Air pres.: 5 psi  
 Overload trip

Assume that the data for the air pressure is in register T17. The DMC-162 uses the range D1000 to D1015 for embedding. So, move T17 into one of the embedded register ranges, say D1005. Now move number say 124 ( decimal ) in the Offset register. Then, move the string "Caution !!" into D124 using the ASC instruction. This will fill up registers D124 to D128 as shown in the table below. Then move string "Emergency Stop " in register D129. Similarly move strings "Air pres.: psi" and "Overload trip" into registers D136 and D144 respectively. Now move Hex 0520H into word D141. This will display the desired message. Refer to the table below:

Word	ASCII	HEX	Word	ASCII	HEX
D124	"aC"	6143H	D129	"mE"	6D45H
D136	"iA"	6941H	D144	"vO"	764FH
D125	"tu"	7475H	D130	"re"	7265H
D137	" r"	2072H	D145	"re"	7265H
D126	"oi"	6F69H	D131	"eg"	6567H
D138	"rp"	7270H	D146	"ol"	6F6CH
D127	" n"	206EH	D132	"cn"	636EH
D139	"se"	7365H	D147	"da"	6461H
D128	"!!"	2121H	D133	" y"	2079H
D140	".:"	3A2EH	D148	"t "	7420H
D134	"tS"	7453H	D141		0520H
D149	"ir"	6972H	D135	"po"	706FH
D142	"p "	7020H	D150	" p"	2070H
D143	"is"	6973H			

In the same example, if the Bake Time is expected to be changed, then embed D1006 as data entry field (16162E16) and use UP and DOWN keys to change the Bake Time. When the ENT key is pressed, the data entered is accepted in the PLC register . The CLR key can be used to clear the data field. Since all the keys are sent to the PLC in the pre-defined bit locations, the PLC will know when a key is pressed and will take the necessary action.

In the Register mode, by pressing the REG key, the register types will be accessed in the following order: D, T, C, W, F, LW, XW, YW, RW, and SW. The UP and DOWN arrow keys allow changing register or device numbers. To edit the data, press the DATA key. The data field will blink to indicate that the unit is ready to accept new data. The new data can be entered by pressing the UP or DOWN arrow keys followed by the ENT key. This mode is very useful for supervisors who need to access all registers/devices in the PLC.

**Remember to password protect the mode in the PLC ladder!**

## PLC REGISTERS USED IN T1

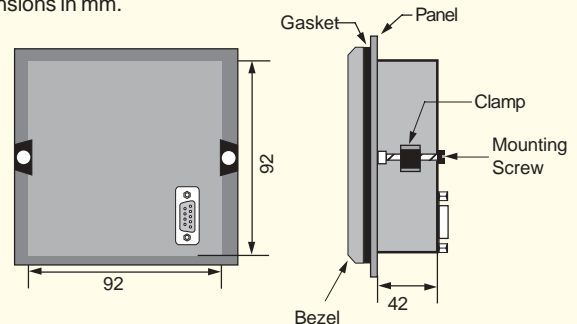
Offset Word	D1020
Control Word	RW50
Embedded Words	D1000-D1015

## WRITING TO DATA WORDS

In the T1/T2 PLC, use the ASC instruction to write an ASCII text message to the PLC data memory. Upto 16 characters ( 8 words ) can be written to the data words in one instruction. The Data Monitor screen can also be used to enter data in the data words. However, note that the low byte of the word is displayed first so the data must be entered backwards in every word.

# Dimensions

Dimensions in mm.



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