DYNASERVO

*Profi*RT3

User's Manual

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1. Overview

The *Profi*RT3 is a handheld control terminal with ProfiBus-DP communication capability. The terminal is specifically designed for control of robotic systems and automated machines. The *Profi*RT3 integrates LCD display, keypad and operator safety devices into one compact and convenient unit. Almost all features of the *Profi*RT3 can be customer defined to produce a truly dedicated control terminal for any motion control applications.

2. Technical Specifications

2.1 Standard Specifications

Item	Description
Keypad	(5×8+4) mechanical key switches
Display	15 row×20 character LCD display
Emergency Stop Switch	Mushroom style, push-lock type switch, 2 dry contact outputs
3-Position Liveman Switch (option)	2 dry contact outputs
Communication Interface	ProfiBus DP-V0
Power Supply	DC24V, 60mA
Working Temperature	0 ~ 40 Degree
Dimension Weight	235×120×30 (mm) 310 (g)
Cable Length	2m standard

2.2 Customer Defined Features

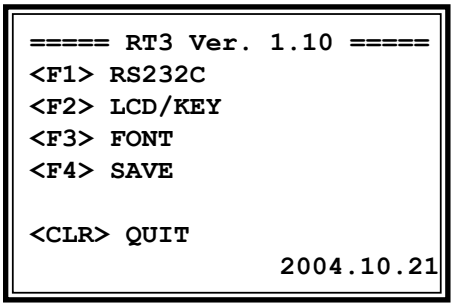
Customers can specify the following when ordering their original terminal:

- Keypad layout and definition
- Cable (length, connector, and wiring)
- Emergency switch
- 3-Position liveman switch
- Others (please contact our sales office for further details)

3. Unit Setting

3.1 Procedures to Access Setting Menu

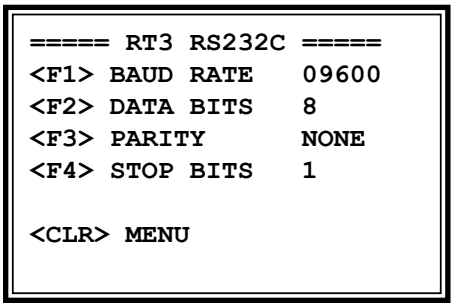
Pressing<SHIFT>, <CLR> and <MODE> keys simultaneously leads to the following unit setting screen:



Communication stops at this time.

3.2 Procedures to Set or Change Unit Parameter

1. Press <F1> from the RT3 main menu (refer to 3.1) to access the RS232C menu for unit parameter changes:



2. Press <F1>-<F4> key to select the parameters and set corresponding values.

No.	Parameter Name & Set Value	Available Choices
1	BAUD RATE = 9600	300 / 600 / 1200 / 2400 / 4800 / **9600** / 19200 / 56000
2	DATA BITS = 8	**08/07**
3	PARITY = NONE	**NONE**/EVEN/ODD
4	STOP BITS = 1	**1**/2
5	KEY BREAK = CODE	NONE/ZERO/**CODE**

Note: Bold Face Indicates Default Values

For ProfiBus communication, the baud rate has to be set as 19200. This is the unit internal communication speed, NOT the ProfiBus communication speed between nodes, which can be as high as 12Mbps.

After parameters are changed, press <CLR> to return to the RT3 main menu. Press <F4> to **save** the parameters.

If communication parameters are changed, please turn the power off and then on in order for the new parameters to take effect.

3.3 Procedures to Set or Change LCD Backlight Setting or Key Break Code

1. Press <F2> from the RT3 main menu (refer to 3.1)to access LCD/KEY setting menu to set LCD Backlight setting or key break code.

```
===== RT3   LCD/KEY =====
<F1> BACKLIGHT   ON
<F2> KEYBREAK    CODE



<CLR> MENU
```

2. Press <F1> to select from ON/60min/10min for screen backlight. “ON” indicates the backlight will be turned on all the time. “10min/60min” indicates the backlight will be turned off if none of the keys are touched for a time period of 10/60 minutes.

3. Press <F2> to set the key break code among “CODE/NONE/ZERO”.

4. Communication Specifications

4.1 Cable Pin Definition

Signal Name	Color	Signal Level	I/O	Signal Name	Color	Signal Level	I/O
POW (+24VDC)	Yellow(Red)	24V	IN	POW GND	Yellow(Black)		-
EMG1	Pink(red)	DRY	OUT	ENG1 COM	Pink(Black)	DRY	OUT
EMG2	Grey(Red)	DRY	OUT	EMG 2 COM	Grey(Black)	DRY	OUT
DeadMan1	Orange(Red2)	DRY	OUT	DeadMan1 COM	Orange(Black2)	DRY	OUT
DeadMan2	Grey(Red2)	DRY	OUT	DeadMan2 COM	Grey(Black2)	DRY	OUT
BD+	Orange(Red)		IN/OUT	NOT USED	White(Red)		
BD-	Orange(Black)		IN/OUT	VGND	White(Black)		-
NOT USED				FG	Shield		-

4.2 GSD File

DNX_0001.GSD
GSD Version: Revision 2
ProfiBus DP Version: DP-V0

4.3 ProfiBus Communication Speed

*Profi*RT3 supports up to 12Mbps communication speed (refer to DNX_0001. GSD).

4.4 Node (Station) Number Setting

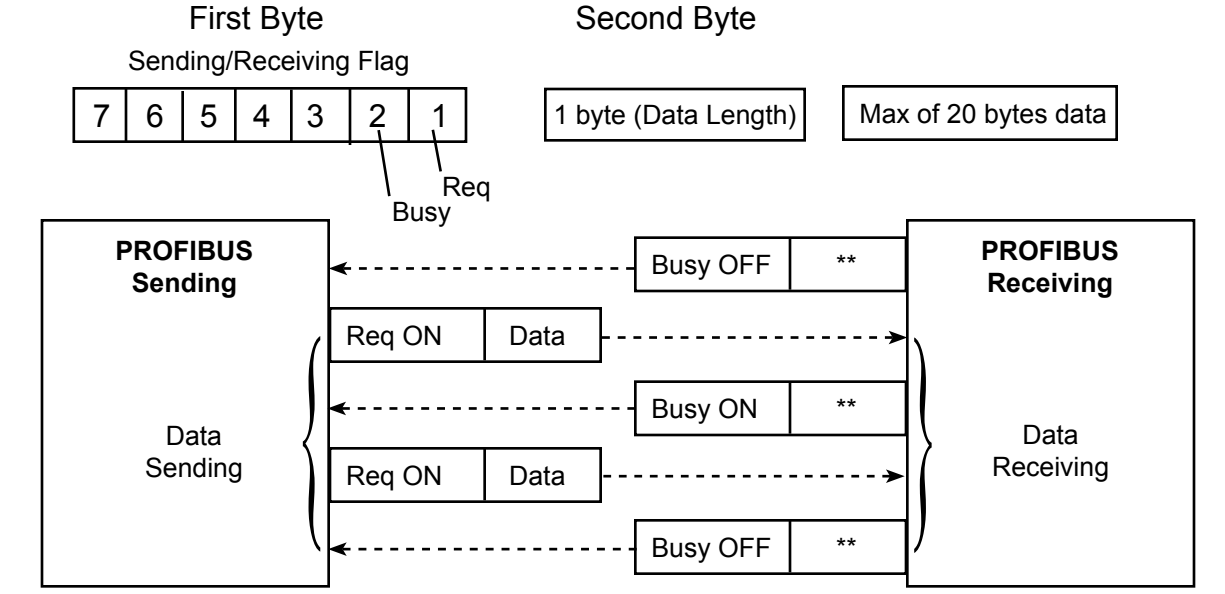
The node (station) number is fixed at 16 for the time being. It is possible to change the station number offline using a rotary switch in future.

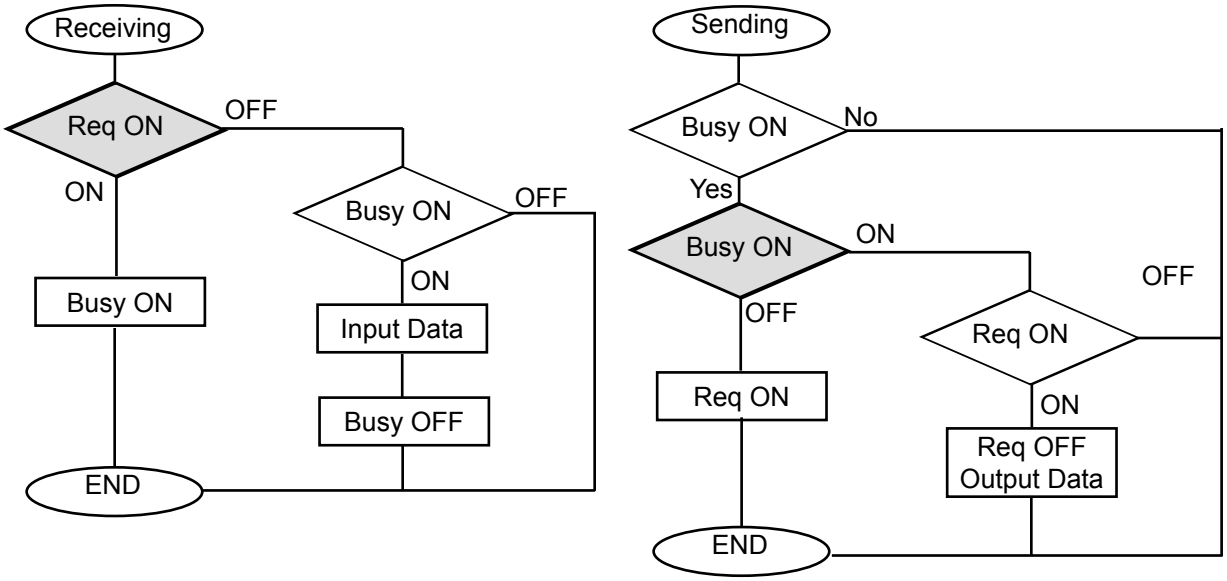
4.5 ProfiBus Terminator Switch

There is a jumper switch inside the unit to enable/disable the ProfiBus terminator resistor. The switch name is S3.

Configuration	Function
[S3-1, S3-2]=[ON,ON]	Terminator ON
[S3-1, S3-2]=[ON,OFF]	Not Allowed
[S3-1, S3-2]=[OFF,ON]	Not Allowed
[S3-1, S3-2]=[OFF,OFF]	Terminator OFF

4.6 Communication Protocol





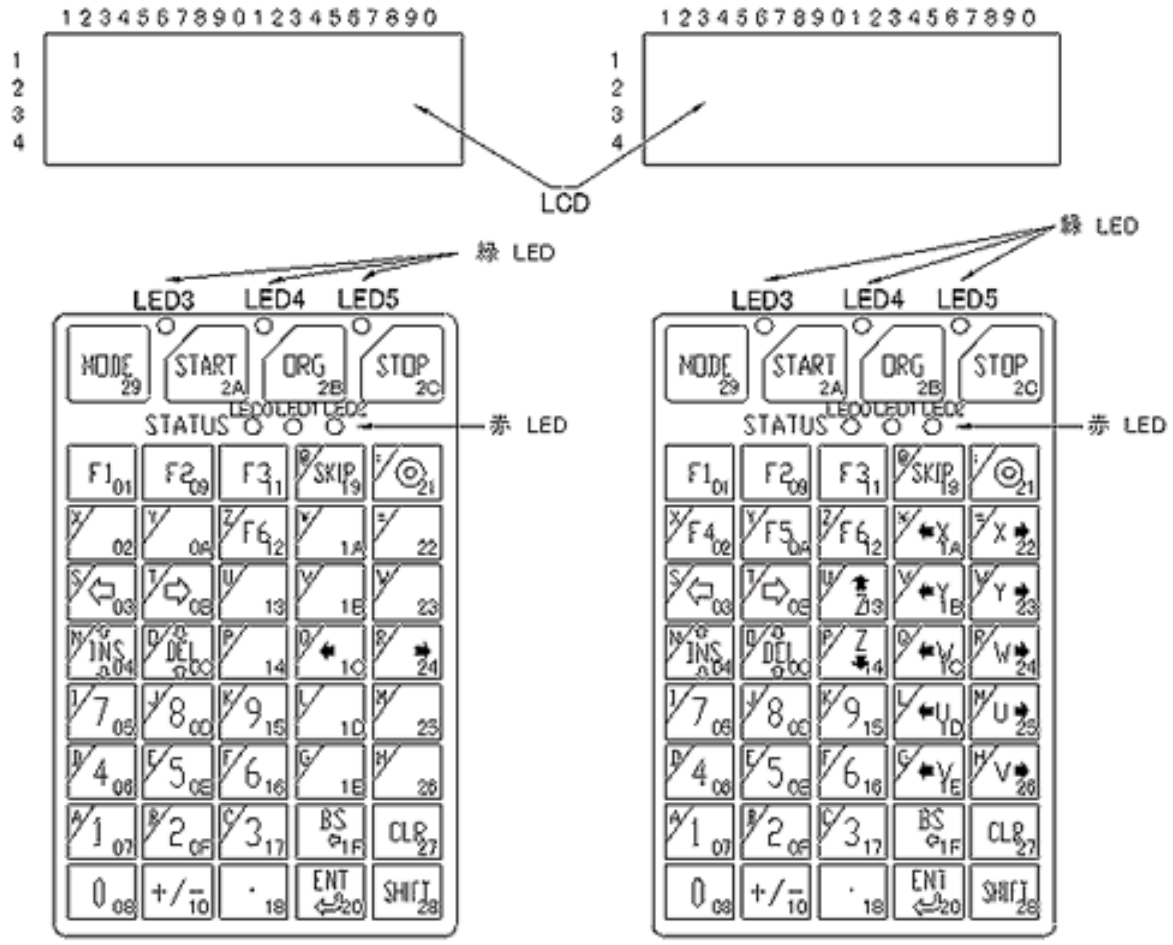
4.7 VC++ Sample Program for ProfiBus Master to Receive Data from Slave

```
#define MASTER_REQUEST_BIT      0x01
#define MASTER_BUSY_BIT         0x02
#define SLAVE_REQUEST_BIT       0x01
#define SLAVE_BUSY_BIT          0x02
#define RESPONSE_TIMEOUT        3000    // msec

DWORD WINAPI WorkerThread( PVOID pContext )
{
        UINT8   bTemp[3];
        UINT8   bData;
        DWORD  dwStart;
        CProfibusMaster1Dlg* pstrStatus = (CProfibusMaster1Dlg *)pContext;
        CString strTemp;

        while( fWorking )
        {
                if ( (pstrStatus->m_bOpenFlag == TRUE) && (bOnWrite == FALSE) )
                {
                        bOnRead = TRUE;
                        ABS_ReadOutArea( pstrStatus->m_pPath, 0, bTemp, 3, 100 );

                        if ( bTemp[0] & SLAVE_REQUEST_BIT )
                        {
                                // Slave-Req ON
                                bData = bTemp[2];                       // Slave-Data
                                bTemp[0] = MASTER_BUSY_BIT;             // Master-Busy ON
                                bTemp[1] = 0;
                                bTemp[2] = 0;

                                ABS_WriteInArea( pstrStatus->m_pPath, 0, bTemp, 3, 100 );
                                dwStart = GetTickCount();

                                while(TRUE)
                                {
                                        if ( ABS_ReadOutArea( pstrStatus->m_pPath, 0, bTemp, 3, 100 )
                                        != TP_ERR_NONE)
                                                break;

                                        if ( !(bTemp[0] & SLAVE_REQUEST_BIT) )
                                                break;                  // Slave-Req

                                        if ( GetTickCount() - dwStart >= RESPONSE_TIMEOUT )
                                                break;
                                }

                                bTemp[0] = 0x00;                        // Master-Busy OFF
                                bTemp[1] = 0x00;
                                bTemp[2] = 0x00;

                                ABS_WriteInArea( pstrStatus->m_pPath, 0, bTemp, 3, 100 );
                                pstrStatus->UpdateButtonStatus( bData );
                        }
                        bOnRead = FALSE;

                }
                Sleep(50);
        }
        return 0;
}
```

For details, please refer to the enclosed VC++ project file CD-ROM.

5. Keys, LED Locations & Key Code

The Keys and LED location of *Profi*RT3 are shown below for 1-axis type and multi-axis type. The key code of *Profi*RT3 is shown at the bottom right of each key. LCD can display ASCII characters for 15 x 20 resolution.



The hexadecimal values shown in bold face at the bottom right corner of each key represent the code to be sent out when the key is pressed. For example, if <F1> is pressed, *Profi*RT3 will send out “01” (hexadecimal). When <F1> is released, *Profi*RT3 sends out “80 + 01” (hexadecimal) by default.

The code that each key represented are NOT the standard ASCII codes.

6. Terminal Display

6.1 General Information

*Profi*RT3 displays, on its LCD, the received ASCII character at the current cursor position. Every time it receives a character, the cursor moves from left to right.

When the cursor reaches the furthest right-hand point, the cursor moves to the left-hand side of next row.

When the cursor reaches the right-hand side of the last row, it moves to the left-hand side of the first row.

For the corresponding characters and their ASCII codes, please refer to the Appendix.

6.2 Error Message

Error Code	Displayed Error
00h(RT1)[1]	Connection Hand-Shake Code (*Profi*RT3 sends 00h out)
08h(BS)	Back Space Code
0Ah(LF)	Line Feed Code (Cursor moves to next row. When it reaches the last row, cursor will not move)
0Dh(CR)	Cartridge Return Code (Cursor moves to the beginning in the same row)
1Bh(ESC)	Escape Code

[1]Connection Test: send 00h to *Profi*RT3. If 00h is received, then *Profi*RT3 is connected.

6.3 Escape Sequence

The escape sequence, represented by the Escape Code (1Bh) + one character, has the following special meaning.

Escape Sequence	Function	Specification
ESC A	Cursor UP	Cursor moves 1 row up
ESC B	Cursor Down	Cursor moves 1 row down
ESC C	Cursor Right	Cursor moves 1 character right
ESC D	Cursor Left	Cursor moves 1 character left
ESC E	Clear Display & Home Cursor	Clear display and cursor moves to the home position
ESC F	Cursor On	
ESC G	Cursor Off	
ESC H	Cursor Home	
ESC J	Erase To End Of Screen	Erase from cursor position to the end of screen
ESC K	Erase To End Of Line	Erase from cursor position to the end of line
ESC L	Long Bell	
ESC M	Erase Line	
ESC N	Key Brake Code	When key is pressed generate the key code. When key is released generate ‘key code’+’80h’
ESC O	Key Brake None	When key is pressed generate the key code. When key is released do nothing
ESC P	Key Brake Zero	When key is pressed generate the key code. When key is released generate `00h` code
ESC R	Enable Cursor Blink	
ESC S	Disable Cursor Blink	
ESC T	Short Tone	Active buzzer with short tone
ESC U	Enable Key Click	Beep when key is clicked
ESC V	Disable Key Click	Disable beep when key is clicked
ESC Y Pr Pc	Position Cursor At Pr, Pc	Cursor moves to row Pr and column Pc
		Row1, Col1=(20h+row position), (20h+column position)
ESC Z	Report Device ID	Send *Profi*RT3 identification code(‘RT3 V1.10’)
ESC [0a	LED0 ON	
ESC [1a	LED1 ON	
ESC [2a	LED2 ON	
ESC [3a	LED3 ON	
ESC [4a	LED4 ON	
ESC [5a	LED5 ON	
ESC [0b	LED0 OFF	
ESC [1b	LED1 OFF	
ESC [2b	LED2 OFF	
ESC [3b	LED3 OFF	
ESC [4b	LED4 OFF	
ESC [5b	LED5 OFF	

Appendix: LCD Character Code

The correspondence between characters and their ASCII codes is given below.

upper 4bits / lower 4bits	0	1	10	11	100	101	110	111
xxxx0000	RT1			0	@	P	`	p
xxxx0001			!	1	A	Q	a	q
xxxx0010			“	2	B	R	b	r
xxxx0011			#	3	C	S	c	s
xxxx0100			$	4	D	T	d	t
xxxx0101			%	5	E	U	e	u
xxxx0110			&	6	F	V	f	v
xxxx0111			‘	7	G	W	g	w
xxxx1000	BS		(	8	H	X	h	x
xxxx1001			)	9	I	Y	i	y
xxxx1010	LF		*	:	J	Z	j	z
xxxx1011		ESC	+	;	K	[	k	{
xxxx1100			,	<	L	\	l	|
xxxx1101	CR		-	=	M	]	m	}
xxxx1110			.	>	N	^	n	
xxxx1111			/	?	O	_	o	