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Digitized Automation for a Changing World

TP70P Quick Start



TP70P Quick Start

Revision History

Version	Revision	Date
1 st	The first version is published.	2014/10/31
2 nd	 The information about TP70P-RM1 and TP70P-RM2 is added to Chapter 1~Chapter 3. The wiring diagrams in section 1.8.4 are updated, and the descriptions of the communication ports on TP70P series text panels are added to section 1.9. The TPEditor version number in section 2.1.2 is corrected. Chapter 3 changes from describing the setting of COM2 and COM3 to describing the setting of text panel communication and PLC communication. Besides, the description of the setting of analog channels in TP70P-22XA1R and TP70P-21EX1R is added to section 3.9. 	2015/07/01
3rd	 Updated the program image in Step 1 of the Example "COM2 on TP70P-16TP1R is used to set Y0 on a DVP series PLC to ON" in section 3.4. Updated description and picture image in Step 2 of the Example" COM2 on TP70P-16TP1R is used to set Y0 on a DVP series PLC to ON" in section 3.4. Added a preparation description before Step 1 of the Example" A PLC modifies data in TP70P through an RTU mode" in section 3.7. Updated the picture image in Step 2 of the Example" A PLC modifies data in TP70P through an RTU mode" in section 3.7. Updated description in Step 6 of the Example" A PLC modifies data in TP70P through an RTU mode" in section 3.7. 	2020/01/10
4 th	 1.Add information of panel waterproof rating, altitude ranges and weights to section 1.6.1 as well as updating installation instruction in section 1.7. 2.Update the official website address in chapter 3. 	2022/10/06

TP70P Quick Start

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Chapter 1 Introduction

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1.1 Introduction of TP70P

TP70P is highly flexible in that it can be connected to various devices. The devices which can be connected to TP70P are shown in the block diagram below.



The functions of TP70P are described below.

- The LCD on TP70P can display 65535 colors, and is a touchscreen.
- TP70P provides various kinds of objects, including X-Y curves, circular meters, bars, sliders, and alarms.
- TP70P supports PLC Links.
- The driver in TP70P supports Delta controllers. It can be connected to Delta servos, inverters, and temperature controllers.
- There are two serial communication ports. One supports PLC communication, and the other supports TP70P communication.
- The USB port on TP70P can communicate with a computer. It supports the use of WPLsoft/ISPsoft/TPEditor to upload/download a program and to monitor devices.
- There are four models which have different I/O configurations. They can be connected to various types of output devices.

1.2 Related Manuals

The manuals related to TP70P are described below.

- TP70P Instruction Sheet: TP70P Instruction Sheet provides information related to TP70P for users who use TP70P for the first time. (TP70P Instruction Sheet is attached to a TP70P series text panel.)
- DVP-ES2/EX2/SS2/SA2/SX2/SE&TP Operation Manual: DVP-ES2/EX2/SS2/SA2/SX2/SE&TP Operation Manual introduces the PLC instructions supported by TP70P. Users can find the manual on the Delta website.
- TPEditor User Manual: TPEditor User Manual introduces the usage of TPEditor, including the interface of TPEditor, and the objects which can be displayed on a text panel. Users can find the manual on the Delta website or in TPEditor.
- WPLSoft User Manual: WPLSoft User Manual introduces the usage of WPLSoft, including the interface of WPLSoft, and the objects which can be used. Users can find the manual in WPLSoft.
- ISPSoft User Manual: ISPSoft User Manual introduces the usage of ISPSoft, including variables, connections, programs, and function blocks. Users can find the manual on the Delta website or in ISPSoft.
- TP70P Quick Start: TP70P Quick Start introduces the functions of TP70P, the wiring of TP70P, the installation of TP70P, the system of TP70P, and the usage of TP70P.

1.3 Profile and Dimensions

1.3.1 Profile







1.3.2 Dimensions of TP70P



1.3.3 Dimensions of an Opening

If protection against water is required (NEMA 4X), a hole should be made to a tolerance of ±0.1 mm.



1.4 Definitions of External Connectors



TP70P-16TP1R					
1	2				
S/S	C0				
X0	Y0				
X1	Y1				
X2	Y2				
X3	Y3				
X4	Y4				
X5	Y5				
X6	Y6				
X7	Y7				

Т	TP70P-32TP1R								
1	2	3	4						
S/S0	C0	S/S0	C1						
X0	Y0	X10	Y10						
X1	Y1	X11	Y11						
X2	Y2	X12	Y12						
X3	Y3	X13	Y13						
X4	Y4	X14	Y14						
X5	Y5	X15	Y15						
X6	Y6	X16	Y16						
X7	Y7	X17	Y17						

TP70P-22XA1R								
1	2	3	4					
S/S0	C0	V0+	V3+					
X0	Y0	VI0-	VI3-					
X1	Y1	10+	13+					
X2	Y2	V1+	FE					
X3	Y3	VI1-	VO4					
X4	Y4	11+	104					
X5	Y5	V2+	AG					
X6	Y6	VI2-	VO5					
X7	Y7	l2+	105					
		FE	AG					

TP70P-21EX1R						
1	2	3	4			
S/S0	C0	10+	L3+			
X0	Y0	10-	L3-			
X1	Y1	FE	13-			
X2	Y2	l1+	FE			
X3	Y3	11-				
X4	Y4	FE	L4+			
X5	Y5		L4-			
X6	Y6	102	14-			
X7	Y7	AG	FE			
		FE				

1.5 Functional Specifications

Specifications	Model	TP70P	TP70P	TP70P	TP70P	TP70P	TP70P	TP70P		
opeenioutione	Screen/Color	7" TET I CD (65535 colors)								
	Resolution	800×480 p	ixels	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,						
Display	Backlight	LED backlight (It has a lifespan of twenty thousand hours at a temperature of								
	type	25℃)	5 (···· ·					
	Display area	Width × Height = 154 × 85 (Unit: mm); 7 inches (diagonal)								
Driver		Delta product								
		Transmissi	on: Virtual o	communica	tion port					
		Data length	n: 7 bits or 8	3 bits						
USB port		Stop bit: 1	bit or 2 bits							
cc_pon		Parity chec	k: None/Oc	ld/Even						
		Transmissi	on rate: 9,6	00 bps~115	5,200 bps					
		USB port:	Type B USE	s connector		DO 000				
		RS-485				RS-232				
		PLC mode) =:+=		Text panel	mode			
		Data lengtr	1: / DIIS OF (5 DITS						
	COM2	Stop bit: 1 bit of 2 bits Parity sheek: Nana/Odd/Even								
		rancy check. NUTH/UUU/EVEN Transmission rate: 0.600 bbs~115.200 bbs								
		Connector: Male DB-9 connector (Please refer to section 1.9 for more								
		information	.)		(
		RS-485	,			RS-485	RS-485/ RS-422	RS-485		
		Text panel mode								
		Data length: 7 bits or 8 bits								
_ , .	COM3	Stop bit: 1 bit or 2 bits								
Extension		Parity check: None/Odd/Even								
communication		Transmission rate: 9,600 bps~115,200 bps								
ports		Connector:	Male DB-9	connector	(Please ref	er to section	n 1.9 for mo	ore		
		Information	.)							
		Not applica	ble			Not applicable	Not applicable	RS-485		
		-				·	·	Text panel		
								mode		
	COM4	Data length	n: 7 bits or 8	3 bits						
		Stop bit: 1	bit or 2 bits							
		Parity chec	k: None/Oo	ld/Even						
		Transmissi	on rate: 9,6	00 bps~115	5,200 bps					
		Connector: Male DB-9 connector (Please refer to section 1.9 for more								
		Information	.)							
Monitoring devi	ces	After a program is downloaded to TP70P by means of the virtual communication port on TP70P, the devices in the PLC can be monitored								

1.5.1 Arrangement of I/O Terminals

Model	TP70P	TP70P	TP70P	TP70P	TP70P
Specifications	-32TP1R	-16TP1R	-22XA1R	-21EX1R	-RM0/1/2
Digital input terminal	X0~X7, X10~X17 (16 terminals)	X0~X7 (8 terminals)	X0~X7 (8 terminals)	X0~X7 (8 terminals)	

Model	TP70P	TP70P	TP70P	TP70P	TP70P
Specifications	-32TP1R	-16TP1R	-22XA1R	-21EX1R	-RM0/1/2
Digital output terminal	Y0~Y7, Y10~Y17 (16 terminals)	Y0~Y7 (8 terminals)	Y0~Y7 (8 terminals)	Y0~Y7 (8 terminals)	
Analog input terminal			Voltage/Current 4 channels (12-bit)	Current 2 channels (12-bit)	
Analog output terminal			Voltage/Current 2 channels (12-bit)	Current 1 channel (12-bit)	
Temperature input terminal (Pt100)				2 channels (16-bit)	

1.5.2 Devices in a PLC

	Item		ltem	Range		
	X	External input relay		X0~X7; X10~X17	(*1)	
	Y	Exter	nal output relay	Y0~Y7; Y10~Y17	(4)	
		_		M0~M511: 512 auxiliary relays (*1)		
		Au	General	M768~M999: 232 auxiliary relays (*1)	4006	
	Relay Bit			M2000~M2047: 48 auxiliary relays (*1)	4090 auvilian/	
			Latching	M512~M767: 256 auxiliary relays (*2)		
Re				M2048~M4095: 2048 auxiliary relays (*2)	total	
lay			Special	M1000~M1999: 1000 auxiliary relays	lotai	
				Some of them are latching auxiliary relays		
d	it de		100 mc /if M1028 is On	T0~T126: 127 timers (*1)		
evi	Time		$T64 \sim T126$ will be 10	T128~T183: 56 timers (*1)	_	
Ce			millisecond timers	T184~T199 (for subroutines): 16 timers (*1)		
				T250~T255 (accumulation): 6 timers (*1)	256	
			10 ms (If M1038 is On,	T200~T239: 40 timers (*1)	timers in	
		Ť	T200~T245 will be 1		total	
			millisecond timers.)	1240~1245 (accumulation), 6 timers (*1)	-	
			1 ms	T127: 1 timer (*1)		
	1 ms		1 1113	T246~T249 (accumulation): 4 timers (*1)		
				C0~C111: 112 counters (*1)		
			16-bit up counter	C128~C199: 72 counters (*1)		
	C Counter 32			C112~C127: 16 counters (*2)	140	
				C200~C223: 24 counters (*1)	counters	
				C224~C232: 9 counters (*2)	in total	
ת			32-bit up/down counter	C233~C234: 2 counters (*2)	in total	
ela				C237~C250: 14 counters (*2)		
N N				C252~C255: 3 counters (*2)		
Sit			32-bit high-speed	C235, C236: 2 one-phase one-input counters (*2)	3	
dev			up/down counter		counters	
ice			- P	C251. T two-phase two-input counter (2)	in total	
		st	Initialization	S0~S9: 10 stepping relays (*2)	-	
		abk	Returning to zero	S10~S19: 10 stepping relays (S10~S19 and the	1024	
	s pin			instruction IST are used together.) (*2)	stepping	
	S Ing r		Latching	S20~S127: 108 stepping relays (*2)	relays in	
		elay	General	S128~S911: 784 stepping relays (*1)	total	
	Alarm		Alarm	S912~S1023: 112 stepping relays (*2)		



-	

				_		
			Item	Range		
	Т	Pres	ent value in a timer	10~1255: 256 timers		
	C Present v		ent value in a counter	C0~C199: 200 16-bit counters		
Re	<u> </u>	1103		C200~C254: 55 32-bit counters		
gis				D0~D407: 408 data registers (*1)		
ster			General	D600~D999: 400 data registers (*1)		
r Word device	D		D3920~D3999: 80 data registers (*1)			
	lta	Detentive	D408~D599: 192 data registers (*2)	5000 data		
	D	reç	Retentive	D2000~D3919: 1920 data registers (*2)	registers	
		jist	Special	D1000~D1999: 1000 data registers (Some of them	in total	
		ter		are retentive data registers.)		
				D4000~D4999: 1000 data registers (*2)		
	Index			E0~E7, F0~F7: 16 data registers (*1)		
	Ν	Mast	er control loop	N0~N7: 8 N devices		
	Ρ	Point	er	P0~P255: 256 pointers		
-			Extornal interrunt	I000/I001(X0), I100/I101(X1)		
°i i		=		(01: Rising edge-triggered; 00: Falling edge-triggered)		
nte		ter	Timer interrupt	1602~1699, 1702~1799: 2 interrupts (Time base=1 m	s)	
_	•	rup	High-speed interrupt	I010: 1 interrupt		
		¥	Communication	1150(00M2)(1) interrupt (*2)		
			interrupt			
ဂ	K	Decir	nal avotom	K-32,768~K32,767 (16-bit operation)		
ons	n	Decir	nai system	K-2,147,483,648~K2,147,483,647 (32-bit operation)		
stai	u	Hove	decimal avetem	H0000~HFFFF (16-bit operation)		
1ŧ	H Hexadecimal system		uecimal system	H00000000~HFFFFFFF (32-bit operation)		

Note:

*1: They are not latching/retentive devices. They can not be changed.

*2: They are latching/retentive devices. They can not be changed.

*3: Please refer to section 1.9 for more information.

*4: Please refer to section 1.5.1 for more information.

1.6 Electrical Specifications

1.6.1 Specifications for PLCs

Model Item	TP70P -16TP1R	TP70P -32TP1R	TP70P -22XA1R	TP70P -21EX1R	TP70P -RM0/1/2	
CPU	32-bit ARM Cortex	-M4 MCU				
Program	Flash ROM: 128 M	ЛB				
memory	(OS: 30 MB/Back	up: 16 MB/User AF	P: 82 MB)			
Internal memory	64 Mbytes					
Retentive	32 Kbytes					
memory	· · ·					
Supply voltage	24 V DC (-15%~2	0%) (DC input pov	ver polarity reversa	al protection)		
Electric energy consumption	5 W	5 W	5 W	5 W	3 W	
Power protection	DC input power po	plarity reversal pro	tection			
Insulation impedance	$>5~\text{M}\Omega$ (The voltage between all I/O terminals and the ground is 500 V DC.)					
Noise immunity	ESD (IEC 61131-2, IEC 61000-4-2): 8 kV air discharge EFT (IEC 61131-2, IEC 61000-4-4): Power line: 2 kV, Digital I/O: 1 kV, Analog & Communication I/O: 1 kV Damped-Oscillatory Wave: Power Line: 1 kV, Digital I/O: 1 kV RS (IEC 61131-2, IEC 61000-4-3): 26 MHz~1 GHz, 10 V/m					

Model Item	TP70P -16TP1R	TP70P -32TP1R	TP70P -22XA1R	TP70P -21EX1R	TP70P -RM0/1/2
Ground	The diameter of th connected to the p (If several PLCs a	ne ground used sho power terminals of re used simultane	ould not be less that the PLC used. ously, please use s	an the diameters o ingle-point ground	f the wires .)
Battery	3 V CR2032 batte	ry			
Battery lifespan	3 years at a tempe	erature of 25°C			
Operating temperature	0°C~50°C Relative humidity: 20%~90% RH【0~40°C】,10%~55% RH【41~50°C】 Pollution degree 2 (No condensation)				
Storage temperature	-20°C~60°C				
Vibration/Shock resistance	International standards IEC61131-2, IEC 68-2-6 (TEST Fc)/IEC61131-2 & IEC 68-2-27 (TEST Ea)				
Dimensions	175.8 × 108.6 × 5	9.2 mm (Width × ⊦	leight × Depth)		
Cooling	Transfer of therma	al energy via conve	ection		
Front Panel Waterproof Ratings	IP66 / NEMA4X / UL Type4X (Indoor use only)				
Altitude Ranges	0 to 2000 meters a	above sea level			
Weights (g)	650	700	700	700	600

1.6.2 Electrical Specifications for Digital Input Terminals

	Model	Electrical specifications for digital inp	ut terminals	
Item		24 V DC (-15% ~ 20%) single common terminal		
Input termina	I	X0, X1	X2~X7, X10~X17	
Input form		Sinking current: Current flows into the terminal S/S.		
input ioni		Sourcing current: Current flows from the terminal S/S.		
Input voltage (±10%)		24 V DC, 5 mA		
Input impeda	nce	4.7 κΩ		
Maximum input frequency		10 kHz 60 Hz		
Action loval	Off→On	> 16.5 V DC		
Action level On→Off		< 8 V DC		
Response	Off→On	<20 us	10 mg	
time	On→Off	<50 us	10 ms	

1.6.3 Electrical Specifications for Digital Output Terminals

Model		Electrical specifications for digital output terminals
Output typ	e	Relay
Voltage		250 V AC, < 30 V DC
	Resistance	1.5 A/point (5 A/COM)
Current	Inductance	#1
	Bulb	20 W DC/100 W AC
Response	Off→On	Approximately 10 mg
time	On→Off	
Maximum output		50 Hz
frequency		





1.6.4 Electrical Specifications for Analog I/O Terminals

Electrical	specifications	for the ana	log I/O ter	rminals on [*]	TP70P-22XA1R
	specifications	ior the aria			1 F / VF - 22 AA IIN

Model	Electrical specifications for the analog I/O terminals on TP70P-22XA1R				
Item	Voltage input	Current input	Voltage output	Current output	
Analog input range	±10 V	±20 mA			
Analog output range			±10 V	0~20 mA	
Digital conversion range	±2000	±1000	±2000	0~4000	
Resolution	12 bits (1 LSB=5 mV)	11 bits (1 LSB=20 uA)	12 bits (1 LSB=2.5 mV)	12 bits (1 LSB=5 uA)	
Input impedance	Above 200 kΩ	250 Ω			
Output impedance	100 Ω				
Overall accuracy	 If a signal reaches full scale at a temperature of 25°C (77°F), there will be an error the range of ±0.5% If a signal reaches full scale at a temperature in the range of 0~55°C (32[~]131°F), there will be an error in the range of ±1%. 				
Response time	3 ms/channel				
Isolation	No isolation				
Absolute input range	±15 V	±32 mA			
Digital data type	16-bit two's complem There are 11 significa	nent ant bits.			
Maximum output current (Allowable load)	-	-	10 mA (1 kΩ~2 MΩ)	0~500 Ω	
Protection	The voltage output terminals equipped with short circuit pr (Please do not short-circuit th output terminals for a long tir they may be burned.) The cu				

Electrical specifications for the analog I/O terminals on TP70P-21EX1R

Model	Electrical specifications for the analog I/O terminals on TP70P-21EX1R				
ltem	Current input	Temperature measurement			
Sensor type			2-wire/3-wire Pt100		
Driving current			1.6 mA		
Analog input range	0~20 mA		-20°C~160°C		
Analog output range		0~20 mA			

Model	Electrical specifications for the analog I/O terminals on TP70P-21EX1R			
Item	Current input	Current output	Temperature measurement	
Digital conversion range	0~4000	0~4000	-200~1600	
Resolution	11 bits (1 LSB=10 uA)	12 bits (1 LSB=10 uA)	12 bits (0.1°C)	
Input impedance	250 Ω			
Output impedance		100 Ω		
Overall accuracy	If a signal reaches full scale at a temperature of $25^{\circ}C$ (77°F), there will be an error in the range of $\pm 0.5\%$. If a signal reaches full scale at a temperature in the range of $0^{-}55^{\circ}C$ ($32^{\sim}131^{\circ}F$), there will be an error in the range of $\pm 1\%$		If a signal reaches full scale at a temperature in the range of 0~55°C (32 [~] 131°F), there will be an error in the range of ±1%.	
Response time	3 ms/channel		300 ms × Quantity of channels	
Isolation	No isolation			
Absolute input range	0~32 mA			
Digital data type	16-bit two's complement There are 11 significant bit	S		
Maximum output current (Allowable load)	0~500 Ω			
Protection		The current output terminals can have open circuits.		

1.7 Installation

Please put (embed) TP70P into a control panel. Use the fasteners and the screws in the container in which TP70P is packaged. Insert the fasteners into the slots on TP710P, and then tighten the screws. (The torque applied to the screws should be 4.75 kg-cm. It can not exceed 4.75 kg-cm, otherwise the panel will be destroyed. If the fasteners are not used correctly, Delta does not guarantee a degree of resistance to water. Please see the figures below.

Notes: Only the front panel is guaranteed by ingress protection rating. The control panel itself must comply with the testing conditions required by the applied ingress protection rating.

(EN) CAUTION: FOR USE IN A CONTROLLED ENVIRONMENT. (FR) ATTENTION: À N'UTILISER QU'EN ENVIRONNEMENT CONTRÔLÉ

Please do not install TP70P in the following environments.

- Environments in which there are dust, oily smoke, metal powder, and corrosive or flammable gas
- High-temperature and humid environments
- Environments in which TP70P may be shocked and vibrated directly





Wiring terminals

1. Please connect 22 to 16 AWG (1.5 mm) single-core or twin-core cables to the input/output terminals on TP70P.



The torque applied to the screws on TP70P should be 1.90 kg-cm (1.65 in-lbs). Only copper leads which can resist the heat above $60^{\circ}C/75^{\circ}C$ can be used.

- Please connect 22 to 12 AWG single-core or twin-core cables to the power input connector on TP70P. (Only copper leads which can resist the heat above 60°C/75°C can be used.) The torque applied to the screws on the PLC in TP70P should be in the range of 5~8 kg-cm (4.3~6.9lb-in).
- 3. Please do not wire the terminal •. Input cables and output cables should not be put in the same cable tray.
- 4. When users tighten screws and wire terminals, they should prevent tiny metallic conductors from dropping into TP70P. After the wiring of TP70P is complete, the users have to ensure that TP70P can radiate heat normally.

1.8 Wiring

1.8.1 Wiring a Power Input Connector

The power supplied to TP70P is DC power. When users use TP70P, they have to note the following points.

- Please connect wires to the terminals +24V and 0V. The power supplied to TP70P should be in the range of 20.4 V DC to 28.8 V DC. If the voltage of the power supplied to TP70P is less than 20.4 V DC, TP70P will stop running, and output devices will be off.
- If a power cut is shorter than 10 milliseconds, TP70P will not stop running. If a power cut is long, or the voltage of the power supplied to TP70P decreases, TP70P will stop running, and output devices will be off. If power is restored after a power cut, TP70P will automatically resume running. (There are latching auxiliary relays and retentive registers in TP70P. Users should use them carefully when they design a program.)



 The power supplied to TP70P is DC power. A Delta power supply module (DVPPS02/DVPPS05) can be used to supply power to TP70P. In order to protect DVPPS02/DVPPS05, users need to have the protection circuit shown below.



1	AC power supply: 100~240 V AC, 50/60 Hz
2	Circuit breaker
3	Emergency stop: An emergency stop button can be used to cut off power when an emergency occurs.
4	Power indicator
5	AC load
6	2 A fuse
\bigcirc	Ground (Impedance: Less than 100 Ω)
8	DC power supply: 24 V DC



1.8.2 Wiring Input Terminals

An input signal is direct-current input. There are two types of current. They are sinking current and sourcing current.

• Sinking current



• Sourcing current



1.8.3 Wiring Relay Output Terminals



1.8.4 Wiring Analog Input Channels

• TP70P-22XA1R



• TP70P-21EX1R



*1: Please isolate analog input cables from other power cables.

*2: If current is connected, the connection between V3+ and I3+ need to be a short circuit.

*3: If ripple voltage results in interference with the wiring, please connect a 0.1~0.47 μF and 25 V capacitor.
 *4: If there is much noise, please connect the terminal FE to the ground terminal.

*5: Please connect the ground terminal on a power supply module and the analog input terminal FE to the system ground, and then ground the system ground or connect the system ground to a distribution box.

1.8.5 Wiring Analog Output Channels



TP70P-22XA1R



• TP70P-21EX1R



- *1: Please isolate analog output cables from other power cables.
- *2: If the ripple voltage of the input terminal of the load connected is large, and results in interference with the wiring, please connect a 0.1~0.47 μF and 25 V capacitor.
- *3: If there is much noise, please connect the terminal FE to the ground terminal.
- *4: Please connect the ground terminal on a power supply module and the analog output terminal FE to the system ground, and then ground the system ground or connect the system ground to a distribution box.



1.8.6 Wiring Temperature Measurement Input Terminals

TP70P-21EX1R

- *1: The cables connected to the input terminals should be cables or shielded twisted pair cables which can be connected to temperature sensors, and should be kept separate from other power cables and cables which may generate noise.
- *2: If there is much noise, please connect the terminal FE to the ground terminal.
- *3: Please connect FE on a power supply module and the temperature measurement input terminal FE to the system ground, and then ground the system ground or connect the system ground to a distribution box.
- *4: Please do not wire the terminal •.

Definitions of Communication Ports 1.9

• TP70P-16TP1R, TP70P-21EX1R, TP70P-22XA1R, TP70P-32TP1R					
Pin	RS-485 (COM2)	RS-485 (COM3)			
5	GND	GND			
6	D+	N/C			
7 D-		N/C			
8	N/C	D+			
9	N/C	D-			





Communication port		Communication		
	Туре	RS-485		
	Mode	PLC mode		
COM2		Data length: 7 bits or 8 bits		
COIVIZ	Farment	Stop bit: 1 bit or 2 bits		
	Format	Parity check: None/Odd/Even		
		Transmission rate: 9,600 bps~115,200 bps		
	Туре	RS-485		
	Mode	Text panel mode		
COM3		Data length: 7 bits or 8 bits		
CONIS	Format	Stop bit: 1 bit or 2 bits		
	Format	Parity check: None/Odd/Even		
		Transmission rate: 9,600 bps~115,200 bps		

• TP70P-RM0

Pin	RS-232 (COM2)	RS-485 (COM3)	
1	N/C	N/C	
2	RX	N/C	
3	ТХ	N/C	
4	N/C	N/C	
5	GND	GND	
6	N/C	D+	9876
7	N/C	D-	
8	N/C	N/C	
9	N/C	N/C	

Communication port	Communication		
	Туре	RS-232	
	Mode	Text panel mode	
COM2		Data length: 7 bits or 8 bits	
COWZ	Format	Stop bit: 1 bit or 2 bits	
	Format	Parity check: None/Odd/Even	
		Transmission rate: 9,600 bps~115,200 bps	
	Туре	RS-485	
	Mode	Text panel mode	
COM3		Data length: 7 bits or 8 bits	
CONIS	Format	Stop bit: 1 bit or 2 bits	
	Format	Parity check: None/Odd/Even	
		Transmission rate: 9,600 bps~115,200 bps	

• TP70P-RM1

Pin	RS-232 (COM2)	RS-485 (COM3)	RS-422 (COM3)
1	N/C	N/C	N/C
2	RX	N/C	N/C
3	ТХ	N/C	N/C
4	N/C	N/C	N/C
5	GND	GND	GND
6	N/C	D+	RX+
7	N/C	D-	RX-
8	N/C	N/C	TX+
9	N/C	N/C	TX-

 30^{2}

Communication port	Communication		
	Туре	RS-232	
	Mode	Text panel mode	
COM2		Data length: 7 bits or 8 bits	
COWZ	Format	Stop bit: 1 bit or 2 bits	
	Format	Parity check: None/Odd/Even	
		Transmission rate: 9,600 bps~115,200 bps	
	Туре	RS-485/RS-422 (switched by software)	
	Mode	Text panel mode	
COM3		Data length: 7 bits or 8 bits	
COINIS	Format	Stop bit: 1 bit or 2 bits	
	Format	Parity check: None/Odd/Even	
		Transmission rate: 9,600 bps~115,200 bps	

• TP70P-RM2

Pin	RS-232 (COM2)	RS-485 (COM3)	RS-485(COM4)
1	N/C	N/C	N/C
2	RX	N/C	N/C
3	TX	N/C	N/C
4	N/C	N/C	N/C
5	GND	GND	GND
6	N/C	D+	N/C
7	N/C	D-	N/C
8	N/C	N/C	D+
9	N/C	N/C	D-

Communication port	Communication		
	Туре	RS-232	
	Mode	Text panel mode	
COM2		Data length: 7 bits or 8 bits	
COWIZ	Format	Stop bit: 1 bit or 2 bits	
	Format	Parity check: None/Odd/Even	
		Transmission rate: 9,600 bps~115,200 bps	
	Туре	RS-485	
	Mode	Text panel mode	
COM2	Format	Data length: 7 bits or 8 bits	
CONIS		Stop bit: 1 bit or 2 bits	
		Parity check: None/Odd/Even	
		Transmission rate: 9,600 bps~115,200 bps	
	Туре	RS-485	
	Mode	Text panel mode	
COMA	Format	Data length: 7 bits or 8 bits	
COWI4		Stop bit: 1 bit or 2 bits	
		Parity check: None/Odd/Even	
		Transmission rate: 9,600 bps~115,200 bps	

1

1.10 Controllers Supporting TP70P

Controllers supporting TP70P Delta servos, Delta AC motor drives, Delta temperature controllers, and Delta PLCs

<u>Wiring:</u> ● Delta servo

TP70P COM3 (RS-485)	Controller Male CN3 connector (RS-485)	Controller Pins in a male CN3 connector
RS-485+ (8)	(3)485+ (5)485+	
RS-485- (9)	(4)485- (6)485-	
GND (5) ——	GND(1)	

• Delta AC motor drive

TP70P COM3 (RS-485)	Controller RJ11 connector (RS-485)	Controller Pins in an RJ11 connector
RS-485+ (8)	SG+(4)	
RS-485- (9)	SG-(3)	
GND (5)	GND(1)	1~6

• Delta temperature controller

TP70P COM3 (RS-485)	Controller RS-485
RS-485+ (8)	D+(10)
RS-485- (9)	D-(9)

• Delta PLC

TP70P COM3 (RS-485)	Controller RS-485
RS-485+ (8)	D+
RS-485- (9)	D- 1



Chapter 2 Writing Programs

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2.1 Preparations

2.1.1 Hardware

The hardware required is listed below.



2.1.2 Software

The software required is listed below.

- WPLSoft version 2.36 or above
- TPEditor version 1.85 or above

2.1.3 Tools and Materials

The tools and the materials which are required are listed below.

- One personal computer (The software mentioned above has been installed.)
- One 100~240 V AC and 50/60 Hz power supply
- One coil of wire
- One screwdriver
- One USB cable (Please refer to section 3.1 for more information about installing a USB driver.)

2.2 Wiring

After users install a text panel, they can wire the text panel. In order to ensure that the users can write programs smoothly, the users need to at least connect power cables. Please connect power cables to a text panel when the text panel is disconnected. The structure required is like the one shown below.





2.2.1 Wiring Diagram for a Delta VFD-M Series AC Motor Drive

※ Please refer to VFD-M User Manual for more information.

2.2.2 Wiring Diagram for External Terminals

TP70P series text panel External I/O connector	VFD-M series AC motor drive
C0	GND
Y0	M0
Y1	M1

2.2.3 Wiring Diagram for Communication



Parameter	Setting	Description
P00	03	A master frequency is determined by an RS-485 port.
P01	01	Operation is controlled by external terminals. STOP on a keypad is effective.
P03	60	Maximum operating frequency (50.00~400.0 Hz)
P08	1.50	Minimum output frequency (0.10~20.00 Hz)
P88	01	The communication address of the VFD-M series AC motor drive is 1.
P89	01	Baud rate: 9600 bps
P92	01	MODBUS ASCII mode Data format: <7, E, 1>

2.2.4 Setting Parameters in a Delta VFD-M Series AC Motor Drive

% If an AC motor drive can not operate normally due to the fact that parameters are not set correctly, users can set P76 to 10 (restore all parameters to the default value 60 Hz), and then set other parameters according to the table above.

2.3 Example

After users install, wire and power up hardware, they can prepare to write programs. In order to make the users have a specific target and a specific direction before they begin to write programs, the manual provides a common example for the users. The complete procedure which starts with the creation of a new project and ends with the downloading of the project to a PLC is described step by step.

• Structure of a system



Control

The communication between a PLC and a Delta VFD-M series AC motor drive is described here. Y devices on TP70P are used to control the forward/backward rotation of the AC motor drive. RS-485 communication (COM3) is used to read/set the frequency of signals output by the VFD-M series AC motor drive. If the AC motor drive breaks down, an alarm signal in the AC motor drive will be sent to TP70P.

Actions:

- 1. If the AC motor drive rotates forwards, its forward rotation indicator will be on, and the input which makes the AC motor drive rotate backwards will be ineffective.
- 2. If the AC motor drive rotates backwards, its backward rotation indicator will be on, and the input which makes the AC motor drive rotate forwards will be ineffective.
- 3. If stop control is input, the operation of the AC motor drive will stop, and its stop indicator will be on.
- 4. The users can input a frequency range. The frequency range that the users set should be between the maximum operating frequency of the AC motor drive and the minimum operating frequency of the AC motor drive.
- 5. If the AC motor drive sends an error code, the operation of the AC motor drive will stop.

I/O devices in the PLC:

- 1. Forward rotation control (M0)
- 2. Backward rotation control (M1)
- 3. Stop control (M2)
- 4. Forward rotation switch (Y0)

- 5. Backward rotation switch (Y1)
- 6. Stop indicator (M3)

Objects displayed on TP70P:

- 1. Forward rotation control
- 2. Backward rotation control
- 3. Stop control
- 4. Rotational speed input
- 5. Forward rotation indicator
- 6. Backward rotation indicator
- 7. Stop indicator
- 8. Current rotational speed
- 9. Warning message

2.4 Writing a Program for a Text Panel

The writing of a program for a text panel is described in this section. Please refer to TPEditor User Manual for more information about the functions of TPEditor.

Step 1: Start TPEditor. (Start→Programs→Delta Industrial Automation→PLC→TPEditor x.xx→TPEditor x.xx)

Welcom screen



Main screen

Delta TPEditor			(C) 🔿
Be Edit View Compile Object Local Page Setting	Global Letting Communication Tool 1	Indox Belp	
	9 Q Q 4 # P		

Step 2: After in the standard toolbar is clicked, a new project will be added. In the **New Project** window, select **DELTA VFD Inverter** in the **HMI<=>PLC** section, select **TP70P** in the **TP Type** drop-down list box, and type "TP70-VFD CTRL" in the **File Name** box.

HMI <=> PLC Set Device Type	
DELTA VFD Inverter	•
ТР Туре	
TP70P	•
File Name	
TP70-VFD CTRL	
OK Cancel	

After OK in the New Project window is clicked, a project environment will be displayed.

	ET TP70-VFD CTRL - Delta TPEditor	
	File Edit View Compile Object Local Page Setting Global Setting Communication Iool Window Help	
	🕂 🐵 🖪 A A A 🗍 🛱 Å Å State - Font Size - Text Input 🖉 0 🗘	Т
	\ □ O ſ O G Ώ A N □ ⊑ 🥺 🗭 % □ ● 🚣 🗏 ≚ + Q = 	
		I IP Page
		0:
		Boot Page
	4	3
-	Device Type: DELTA VFD Inverter TP Type	e: TP70P

The interface of TPEditor is described below. Please refer to TPEditor User Manual for more information.

- Menu bar, standard toolbar, and object arrangement toolbar: The main functions of TPEditor are included. The functions which are used more frequently are on the standard toolbar, and the functions which are used less frequently are on the menu bar.
- Geometric object toolbar and object toolbar: They provide buttons used for drawing figures and creating buttons. There are some other objects on the **Object** menu.
- B Page management area: Users can view/add/delete pages.
- Working area: Users can edit pages in this area.
- Status bar: The information about the current project and communication is displayed here.

2.4.1 Planning Objects

After users make sure of system requirements, they can plan messages which need to be displayed. The objects and the pages which need to be planned for the example in this chapter are described below.

Planning objects

- Forward rotation control→A button is used. After users press the button, the AC motor drive connected will rotate forwards.
- Backward rotation control→A button is used. After users press the button, the AC motor drive connected will rotate backwards.
- Forward rotation indicator → A multi-state image is used. If the AC motor drive connected rotates forwards, a green indicator will be on, and a message saying that the AC motor drive rotates forwards will appear.
- Backward rotation indicator → A multi-state image is used. If the AC motor drive connected rotates backwards, a yellow indicator will be on, and a message saying that the AC motor drive rotates backwards will appear.
- Stop indicator → A multi-state image is used. If the AC motor drive connected stops running, a red indicator will be on, and a message saying that the AC motor drive stops running will appear.
- Current rotational speed → A numeric display is used. The current rotational speed of the AC motor drive connected can be read by means of RS-485 communication.
- Error message → A message display is used. The state of the AC motor drive connected can be monitored by means of RS-485communication. If an error code in the AC motor drive connected is read, the error message corresponding to the error code will be displayed on the text panel used.
- Rotational speed input→A numeric input is used. A frequency can be written to the AC motor drive connected by means of RS-485 communication. If a minimum value and a maximum value are typed in the Limit Setting section, users can be prevented from setting a frequency which is not in the range of the minimum operating frequency of the AC motor drive connected to the maximum operating frequency of the AC motor drive connected.

Planning pages

- Plan a boot page on which the connection between TP70P and a VFD-M series AC motor drive is displayed.
- The state of the AC motor drive used is displayed on page 0, that is, the current rotational speed of the AC motor drive, a warning message, forward rotation control, backward rotation control, and stop control are displayed on page 0.

2.4.2 Managing Pages

Adding a page

Users have to add to two pages first. After the users right-click **TP Page** in the page management area, and click **Add** on the context menu which appears, a page will be added.



2

Editing the title of a page

The users have to give names to the two pages. After the users right-click a page number in the page management area, and click **Edit** on the context menu which appears, they can type a page title.



2.4.3 Creating Objects

After users click an object on the object toolbar, they can click where they want to begin the selection of an area in the working area, hold down the left mouse button, and drag the cross over the area that they want to select. After the users double-click the object in the working area, the window used for setting the object will be opened.

The objects on the object toolbar are described below. Please refer to TPEditor User Manual for more information.

- **Static Bitmap** (]): The files that TP70P supports are .gif files. The resolution of TP70P is 480×800 pixels. If the size of an image exceeds the resolution, the part which is left will not be displayed.
- Static Text (A): Text is displayed.
- Numeric/ASCII Display (N): The value in a related device is read, and displayed on the screen of TP70P.
- **Bar Graph** (): The value in a related device is read, and represented by a bar according to the target value, the maximum value, and the minimum value which are set.
- Circle Meter (): The value in a related device can be represented by the number to which the pointer on the dial of a meter points. The upper limit set can be differentiated from the lower limit set by means of the region colors set.
- **Message Display** (<u>p</u>): The state of a related device or the value in a related device can be represented by a message displayed on the screen of TP70P.
- Button (
 Button ():After users press a button, the state of the device related to the button will be changed, or a function can be set, e.g. the page selected will be displayed or passwords can be set.
- **RTC Display** (1): The time on the real-time clock in TP70P is displayed on the screen of TP70P, or the time in related devices will be read and dispalyed on the screen of TP70P.

- Multi-State Bitmap/Label (): The function of a multi-state image is the same as that of a dynaic image. The difference between a multi-state image and a dynamic image is that text can be inserted in a multi-state image.
- Numeric Input (): A numeric input displayed on the screen of TP70P is used to write a value to a related device.
- X-Y Curve (): The values in related devices can be represented by an X-Y curve displayed on the screen of TP70P.
- Alarm (<u>></u>): An alarm and a system alarm are used together. If a condition set is met, an alarm will appear.

The users have to plan pages and add object. They have to add an image representing the connection between TP70P and an AC motor drive to the boot page. They need to click in the object toolbar, click where they want to begin the selection of an area in the working area, hold down the left mouse button, and drag the cross over the area that they want to select. After the users double-click the object in the working area, an **Open** window will appear. After the users select a .gif file, an image will appear in the working area.



The state of the AC motor drive used is displayed on page 0, that is, the current rotational speed of the AC motor drive, a warning message, forward rotation control, backward rotation control, and stop control are displayed on page 0.



If the users want to add an object to a page, they have to click an object type on the object toolbar, click where they want to begin the selection of an area in the working area, hold down the left mouse button, and drag the cross over the area that they want to select.



After the users add an object, they have to set the parameters related to be object. After users double-click a button in the working area, the **Button Setting** window will appear. In the example in this chapter, Y0 in TP70P is used to control the forward rotation of an AC motor drive. If a button is pressed, M0 will be ON. If M0 is ON, Y0 will be ON. If the button is pressed again, M0 will be OFF. Consequently, the button type selected in the **Button Type** drop-down list box is **Push On/Off**, and the **Internal PLC Setting** option button and M0 in the **Refer Device** window are selected.

Preview	Property Display	1
	Refer Device Write-in Interlock Setting Read	
Total States 2	State OFF Value Type Unsigned Value Length 16 Bits User Level 0 Call Setting Call Setting	
	OK Cancel	J

© PLC	Refer Device	
Internal PLC Setting External PLC Setting	Device Number 0 0 1 2 3 4 5	OK
Connect Com COM3 -	6 7 8 9 A B C D E F . /	Clear


After the users click the **Property** tab in the window used to set the parameters of an object, they can set the appearance of the object. After the users click the **Property** tab in the **Button Setting** window, they can select a value in the a **Border Width** box, select colors in the **Button Event Color Setting** section, and type text or select an image in the **States** section. The text displayed on a button varies with the current state of the button. In the example in this chapter, "FORWARD" need to be displayed on the forward rotation control button created if the forward rotation control button is not pressed yet, and "Running..." need to be displayed on the rotation control button created if the forward rotation control button control button is pressed. Consequently, the users have to type "FORWARD" in the **Button Text** when **0** in the **Current State** drop-down list box is selected, and they have to type "Running" in the **Button Setting** window, the setting of the parameters and the appearance of the button created will be complete.

fest Akgument Middle Middle Font Setting Font Font Font Color Middle Midd
OK Cancel
Text Alignment Middle Middle Forst Setting Forst Setting Forst Color Bitmap Alignment Middle Middle Middle States Button Text Faunting
I I F F

OK

Cancel



If the users want to make a copy of an object in the working area, they have to click the object, right-click the object, click Copy on the context menu which appears, right-click the object, and click Paste on the context menu which appears. If the users want to make several copies of an object in the working area, they have to click the object, right-click the object, click Multi-Copy... on the context menu which appears, select checkboxes, values or an option button in the Multi-Copy window, and click OK.



Multiple copies:

			Multi-Copy	×
band 1:			Copies	
			Set Copies Horizontally	1 .
- FORWA	Undo	Ctrl+Z	Set Copies Vertically	3 •
	Redo Soloct All	Ctrl+Alt+Z	Interval	
	Copy Page		Distance Point Horizontally	2
	Paste Page	Del	Distance Point Vertically	2
	Cut	Ctrl+X		
	Copy Paste	Ctrl+C Ctrl+V	✓ Shift Address	
	Multi-Copy Move Up	N		
	Move Down		Orient Horizontally	
	Move to Bottom		C Orient Vertically	
	Page Jump Condition Setting Write Page No. Setting			
	Page Color Setting		OK Car	ncel
1:		•	- • -	
	FORWARD			
		1		
	FURVARD			
	FORWARD	1		
	FORWARD	G.		
	FORWARD	la		
	FORWARD	Ģ		
	FORWARD	Ŀ,		



The users can complete the page shown below in the way described above.



Setting the parameters of objects:

	Ohiaat	Button/Object	Related de	evice	
Item	description	tvpe	Communication	Device	Other settings
			method	address	
1	Forward	Push On/Off	Internal PLC	MO	_
	rotation control	1 don on/on			
2	Backward	Push On/Off	Internal PLC	M1	_
2	rotation control	Fusit Off/Off			-
3	Stop control	Momentary	Internal PLC	M2	-
	Forward	Multi-Stato			Background color (1/0):
4	rotation	Ritman/Labol	Internal PLC	Y0	Green/White
	indicator	Ditiliap/Laber			Green/Writte
	Backward	Multi-State			Background color (1/0):
5	rotation	Ritman/Label	Internal PLC	Y1	
	indicator	Ditiliap/Laber			
6	Ston indicator	Multi-State	Internal PLC	МЗ	Background color (1/0):
		Bitmap/Label	Internal i EO		Red/White
					In the Value Setting section:
					Integer Number: 3
7	Rotational	Numeric Input	COM3, station	\$2001	Decimal Number: 2
1	speed input	Numeric input	address 1	Ψ2001	In the Limit Setting section:
					Max Value: 600
					Min Value: 15
	Current	Numeric/ASCII	COM3 station		
8	rotational	Display	address 1	\$2102	-
	speed				

2

2.4.4 Basic Configuration

After users click **Basic Configuration** on the **Tool** menu, they can click **PC <=> TP Communication Setting**, **TP <=> PLC Protocol**, or **TP Other Setting** in the **Basic Configuration** window.

PC <=> TP Communication Setting

Before users download the program in TPEditor to a text panel, or upload the program in a text panel to their personal computer, they have to click PC <=> TP Communication Setting in the Basic Configuration window. The users have to use a USB cable to connect the text panel to the personal computer. The communication ports on the personal computer are displayed in TPEditor. After the users select the communication port which is connected to the text panel, they can download the program in TPEditor to the text panel, or upload the program in the text panel to the personal computer.

Basic Configuration				0
FC <=> TP Communication Set	PC Communication Setting (TP Station Address PC COM Port Baud Rate	PC <=> TP) I COM3 9600	Communications Port (Communications Port) TPD4G-BL-CU USB Por	Boot Pa COM1) COM2) E (COM3)
				Property
< <u> </u>		OK	Cancel	

TP <=> PLC Protocol

After users click **TP <=> PLC Protocol** in the **Basic Configuration** window, they can set a communication protocol between a text panel and an external device. The text panel can be connected to the external device only if the communication protocol of the text panel and the communication of the external device are the same. In the example in this chapter, the communication protocol between the VFD-M series AC motor drive used and TP70P is "9600, 7, E, 1".

Basic Configuration	
 PC ↔ TP Communication Set TP <>> PLC Protocol TP Other Setting 	Protocol Setting(TP ≪> PLC) Object Communication Setting □ Default COM Port □ Default PLC Address Set TP Port □ Set PLC Address □ Set TP Cont □ 1 □ Set PLC Address □ Set PLC Address
	Apply COM3 R5485 Baud Rate 9600 Pata Length 7 Parity Even Stop Bit 1 V
<→	OK Cancel



TP Other Setting

After users click **TP Other Setting** in the **Basic Configuration** window, they can select a station address, set the brightness of the backlight that illuminates the screen of TP70P, enable the buzzer of TP70P, set a password, select a boot page, etc. In the example in this chapter, a user-defined boot page is designed, and therefore the **User Define** option button in the **Start-Up Menu Display** section is selected.

PC <=> TP Communication Set	Menu Setting		
TP <=> PLC Protocol TP Other Setting	Set Default TP Address	1 🔹	
	Backlight Brightness		10
	Backlight Time	0	Minutes
	Function Setting		
	Enable Buzzer Setting		
	LIONDOGO PL LIMA		
	Download PC Time		
	Upload/Download Protect	Password Setting	
	Upload/Download Protect I	Password Setting	
	Upload/Download PC Inne Upload/Download Protect I Enable Start-Up Menu Display	Password Setting	
	C TP Default	Password Setting	
	C Download PC ime Upload Download Protect i Fanble Start-Up Menu Display T PD efault Start-Up Menu Delay Time	Password Setting	Seconds
< <u> </u>	Lovenda PC inte Upload Download Protect) Faable Start-Up Menu Display TP Default Start-Up Menu Delay Time	Password Setting	Seconds

2.4.5 Compile and Downloading a Program

After users write a program, and adjust related settings, they can download the program to a text panel. The users have to compile the program first. After the users click **Build All** on the **Compile** menu, or in the standard toolbar, the program will be compiled. If the program is compiled successfully, the percentage of memory used will be shown.

0.			TP Page 0. Boot Page
	FOWARD	Status FORWARD REVERSE	STOP
		Freq. Setting ######	
	REVERSE	Current Freq. Comple successful Memory is used:1%	Property
	STOP	Err MSG 0	

After the program is compiled, the users can download the program. After the users click **Write to TP** on the **Communication** menu, or on the standard toolbar, the **Download Setting** window will appear.



After the users make sure of the pages which need to be downloaded, and click **Download** in the **Download Setting** window, the **Confirm** window will appear.

Confirm			
?	Are you su	ure to transfe	r to TP?
	Yes	No	

After the transmission of the program is complete, a message saying the downloading of the program is complete will appear.



2

2.5 Writing a Program for a PLC

TP70P can be used to integrate control, and execute and display functions. The conditions which control actions can be created in a PLC program. The writing of a program for the PLC used in the example in this chapter is described below. The Delta software which supports TP70P is WPLSoft and ISPSoft. Please refer to WPLSoft User Manual and ISPSoft User Manual for more information about the usage of WPLSof and ISPSoft. In the example in this chapter, WPLSoft version 2.36 is used to write a program for the PLC used. Step 1: Start WPLSoft. (Start \rightarrow Programs \rightarrow Delta Industrial Automation \rightarrow PLC \rightarrow WPLSoft 2.36 \rightarrow WPLSoft 2.36)



Welcome screen



Main screen



Step 2: After is clicked, a new project will be added. In the **Select a PLC Model** window, type "TP70-VFD CTRL" in the **Program Title** box, select **TP70P/TP70G** in the **Select** drop-down list box, and type "TP70 example" in the **File Name** box.

Select a PLC Model	
Program Title TP70-VFD CTRL	
Select TP70P/TP	•70G ▼
Communication Setting	
RS232 (COM9)	Setting
File Name	
TP70 example	
OK	Cancel

Step 3: After **Setting** in the **Communication Setting** section is clicked, the **Communication Setting** window will appear. Select **RS232** in the **Type** drop-down list box, and select the communication port which is connected to TP70P. The communication protocol set in the **Communication Setting** window need to be the communication protocol of TP70P. The default communication protocol set in the **Communication Setting** window is "9600, 7, E, 1". Select **1** in the **Station Address** box. Click **OK** after the adjustment of settings in the **Communication Setting** window is complete.

onnection Setup		
Type	RS232	
onumunication Setti	14	Communications Port (C
COM Port	COMI	TP04G-BL-CU USB Port (
Data Length	7	▼ C RTU (8 bits)
Parity	Even	•
Stop Bits	1	· Auto-detect
Baud Rate	9600	•
Station Address	1	- Default
Ethernet Setting	1	
🗖 Aniga (P		
Port	502	_
Baud Rate Decides	iby	
Setup Responding	Time	
Times of Auto-ret	ry	3 1
Time Interval of A	uto-retry (sec	3 +

After **OK** in the **Communication Setting** window is clicked, a project environment will be displayed (the program title set will appear in the upper left corner of the **Delta WPLSoft** window).



2.5.1 Planning a Program

In order to meet the requirements of the system used in the example in this chapter, the following conditions need to be planned.

Planning devices

- M0→Forward rotation control
- M1→Backward rotation control
- M2→Stop control
- M3→Stop flag
- Y0→Forward rotation output
- Y1→Backward rotation output

Planning actions

- If M0 is ON, Y0 will be ON.
- If M1 is ON, Y1 will be ON.
- If M2 is ON, Y0 and Y1 will be OFF.
- If Y0 is ON, M1 will be ineffective.
- If Y1 is ON, M0 will be ineffective.
- If Y0 and Y1 are OFF, the AC motor drive used will stop running, and M3 will be ON.



2.5.2 Control Program

The control program shown below is created according to the conditions planned in section 2.5.1. Please refer to WPLSoft User Manual for more information about the usage of WPLSoft.



2.5.3 Compiling and Downloading a Program

After users write the program shown in section 2.5.2, they can download the program to TP70P. The users have to compile the program first. After the users click **Ladder => Instruction** on the **Compiler** menu, or on the standard editing toolbar, the program will be compiled. The result of the comipiling of the program is shown in the message area in WPLSoft.

💱 WPL Editor - [Ladder Diagram Mode]	
Eile Edit Compiler Comments Search View Communication Options Wizard Window	low Help
' 🐹 😕 🗗 😋 🙆 📰 💭 🖓 🔍 🖓 💷 🖽 🖉 🔛 🖽	🥦 🖫 🖹 🔁 🖬 🚳 🔍 🚖 🐥 🐺
🗋 🕞 📰 🖾 💿 💿 🐰 🗈 🗈 🍠 🗥 🔍 🔍 🔍 🚱 Relay Type 🕂	🗳 👗 🎁 👌 🗃 🛱 🍘 🎁 🎁
□ Image: Second state s	
USB M2 STOP	 ▼
Overwrite Row:0 20/7920 Steps	
Compiling is complete!	

After the program is compiled, the users can download the program. After the users click **Setup**, the **Transfer Setup** window will appear. The users can select checkboxes in the **Transfer Setup** window. Owing to the fact that there are comments on the devices in the program, the **Device Comment** checkbox in the **Transfer Setup** window is selected.

Transfer Setup
Communication Mode
PC => PLC V
✓ Program
✓ Device Comment Cancel
Initialize Device Comment
Synchronize Project and PLC Password
TRetentive Range
🗖 Default Value
T RIC
☐ Backup to Flash (EH2/EH2L/SV)
·



After the users select the **Device Comment** checkbox, the **System Block** window will appear. The users can select devices and set device ranges.

	Device	Min.	Max.	Start	End	
	X	0	377	0	377	
	Y	0	377	0	377	
	М	0	999	0	999	
	М	2000	4095	2000	4095	
	S	0	1023	0	1023	
	Т	0	255	0	255	
	С	0	255	0	255	
	D	0	999	0	999	
	D	2000	4999	2000	4999	
Mem	ory Rema	in: 7	843 Steps			

2

After the users click **OK** in the **Transfer Setup** window, the program will be downloaded to TP70P.

2.6 Monitoring and Debugging a Program

2.6.1 Monitoring a Program

When a program is executed by a system, users can understand the current logic state of the system by monitoring the program, or test the system by changing the values in devices.

Monitoring a program

Users have to open the program which has been compiled in section 2.5.3.

After the users click 💋, the program will be monitored. The program is composed of a logic program,

and the information related to devices. (The states of Boolean devices are indicated by green backgrounds or white backgrounds, and the information about other devices is indicated by values or text.)

			(V0)
FORWARD	R_OUTPUT		F_OUTPUT
м1	Y0		
\vdash	<mark>/</mark>		— (Y1)
REVERSE	F_OUTPUT		R_OUTPUT
M2			
\vdash		RST	м0
STOP			FORWARD
		Dat	
		RS1	BEVERSE
			HEVENSE
		RST	М2
			STOP
YO	Y1		
	<mark>//</mark>		— (МЗ)
F_OUTPUT	R_OUTPUT		STOP_S
			END
1			

If the users want to change the state of a device, they can right-click the device, and click an item on the context menu which appears. In the figure below, M0 is set to ON.

MO	Y1		
FORWARD			(Y0 F_OUTPU1
M1 	Set On Set Off Change Present Value ASCII Input Forced Devices List		(Y1 R_OUTPU
M2 	Rising-edge Trigger Falling-edge Trigger	RST	M0 FORWARI
		RST	M1 REVERSE
		RST	M2 STOP

Note: **Set On** and **Set Off** can not be used to change the state of a device corresponding to an actual I/O device because the state of the actual I/O device immediately overwrites the value which is set. **Force ON** and **Force OFF** can be used instead.





Monitoring devices

It is sometimes inconvenient for users to search for devices in a logic program that the users test, and change the values in the devices because the devices are in different sections of the logic program. Besides, sometimes the purpose of modifying the values in devices in a program is not to debug the program, but to test an external device. If the users want to change the values in devices in a program by monitoring the program, they may not easily find the devices, and they need to have the program. To solve these problems, the users can use a device monitoring table. If the users change the values in devices in a program by means of a device monitoring table, they do not even need the program.

The users have to click (, and then double-click the device monitoring table which appears.

After the users type a device name and the number of devices, and click **Input** in the **Device monitor input** window, devices will be brought into the device monitoring table.





😂 Example(ENG) - Delt	ta WPLSoft - [Mon	itor Devices]				, o x
📴 Eile Edit Compiler	r Co <u>m</u> ments <u>S</u> earc	th <u>V</u> iew <u>C</u> ommunication O	otions W <u>i</u> zard <u>W</u> i	ndow <u>H</u> elp		_ <i>6</i> ×
🖩 🔛 🎏 🚔 🔮 💋	😫 🗉 📒 🍠 🦷) 🗊 🔋 👔 🖉 🕥	🗢 💀 🖳 💺 J		2 5 2 9 9	⊧ .*
	© X 🗅 🛍	/ G Q Q Q 🖉				
<u>–––––––––––––––––––––––––––––––––––––</u>	Device Name	Comment	Status	T/C Set Value	Present Value (16 bits	Present Value (
Communication	M0	FORWARD				
Ethemet	M1	REVERSE	0			
DVPEN01	M2	STOP	Õ			
IFD9506	M3	STOP_S	•			
PLC						
DVPFEN0	L					
⊡ ⊡ DirectLink						
Different						
	٠ 🗌					+
< <u> </u>						
Overw	vrite	Scan Time: 1.4 m	s 20/7920 Steps		PLC COM: 1 (9600), 7, E, 1)
						<u> </u>
<u> </u>						

The states of the devices broght into the device monitoring table will be shown only if *(e)* is pressed. If the users want to change the state of a device, they can right-click the device, and click an item on the context menu which appears. M0 is set to ON here. When M0 is ON, Y0 is ON, the AC motor drive used rotates forwards, and the users can see that the forward rotation indicator on the screen of TP70P is green.

😽 WPL Editor - [Monito	or Devices]				
Eile Edit Compiler	Co <u>m</u> ments <u>S</u> ea	rch <u>V</u> iew <u>C</u> ommunication	<u>)</u> ptions Wizard <u>N</u>	/indow <u>H</u> elp	_ _ 8 ×
🖩 🔛 湿 陲 🔮 💋	12 💷 🔄 🍠	• • • • • • • •	e 💀 💀 😒	高文 累 宮 邑 司 西	Q 🗠 🐥 🐺 🐺
	O X D D	0 3 0 4 4 0			
	Device Name	Comment	Status	T/C Set Value Present Value (16 bits Present Value (
Communication S	M0	FORWARD			
Ethernet	M1	REVERSE	0	Set On	6
DVPEN01	M2	STOP	0	Rising-edge Trigger	
IFD9506	M3	STOP_S	•	Falling-edge Trigger	
PLC	YO	F_OUTPUT	0	Force	+
DVPFEN0	Y1	R_OUTPUT	0	Forced Device Table	
USB				Delete	Del
Ethernet				Cut	Ctrl+X
				Сору	Ctrl+C
				Paste	Ctrl+V
<	•			Clear All	•
Overw	rite Row: 0	Scan Time: 1.4 r	ns 20/7920 Steps	Device Comment	
				Display Item	· <u></u> – – ×
				Export to CSV File	



ie for complet	B III tua 🕞	arch <u>View</u> Communicat	ion Options wizard	window <u>H</u> eip	22000	- E
		00 0 0 0 0 0				• 1 10
크고	Device Name	Comment	Status	T/C Set Value	Present Value (16 bits P	resent Valu
Communication S	M0	FORWARD	•	-	1	
Ethemet	M1	REVERSE	Ő			
DVPEN01	M2	STOP	ŏ			
IFD9506	M3	STOP_S	Ő			
	YO	F_OUTPUT				
DVPFEN0	Y1	R_OUTPUT	0			
DirectLink						
Ethernet						
	•					
4 III					ČHČ	
Overw	rite Row: 6	Scan Tin	ne: 1.4 ms 20/7920 Steps	RUN	PLC COM: 1 (9600, 7	7, E, 1)
						<u> </u>

2.6.2 Removing System Errors

When a system runs, errors may occur. If users follow the procedure introduced in this chapter, there will be no error. After a program is written to a PLC, M1004 will be ON if an error occurs. The reason for the error may be that operands (devices) are invalid, or syntax is incorrect. It is indicated by the error code (hexadecimal value) in D1004. D1004 can be monitored by means of WPLSoft.

1. Click Edit Monitored Devices on the View menu in WPLSoft.

an pripe i	petta wPLSoft · [Moni	tor Ladder Diagram]						u
Eile Ed	it Compiler Comments	Search View Communication Options Wizard	∰indow <u>H</u> elp					_ @ ×
060		Toobars .	- C • C 4					
P 2 1) 🖉 🖄 🟗 🛄	7 Workspace	1. 突突突 28 座市	BQQR	숖			
0		Monitoring Data Format						^
	i.	Eloating Format Setting	-			Security	EI	
1	M1002	Zoom			and Comparents	КО	KO	
		Instruction List Mode			ZRST	C235	C254	
		🚟 Ladder Diagram Mode			That	1.10		
10		i∰ ≦FC Diagram Mode			2851	YU	TI	1.2
12	M1000	Edit Monitored Devices		la cur	NU			
		Device Comment List		DUNT	L251	KTUUU		
		Show Comment	K20000	C251		Y0		
		Action/Transition Editor Shift+Alt+L		KQ				100
		Syndol Table	K.40000	C251		YO		
		System Block		КО		8000	90	
		DHSC	S K60000	C251		1010		
58	YO	1	1997 December 201			25	KO	
						INCP	D10	
62								
	·						FEND	
63	M1000							
1010						SET	Y0	
66	0							~
	Overwrite Row: 2, 0	Col. 4 Scan Time: 1.4 ms 68/7920 Steps	RUN PLC	COM: 1 (9600, 7, E,	1) TP1	OP/TP70G (PL	C Station Address: 1)	
								뽀×



Proceeding Row 1 Some Time: 15 me 107/7920 Steps TO Set Value Proceeding Row 1 TO Set Value Proceeding Row 1 Construct Some Time: 15 me 107/7920 Steps TO Set Value Proceeding Row 1 TO Set Value Proceeding Row 1 Construct Some Time: 15 me 107/7920 Steps TO Set Value Proceeding Row 1 TO Set Value Proceeding Row 1 Construct Some Time: 15 me 107/7920 Steps TO Set Value Proceeding Row 1 TO Set Value Proceeding Row 1 Construct Some Time: 15 me 107/7920 Steps TO Set Value Proceeding Row 1 TO Set Value Proceeding Row 1 Construct Some Time: 15 me 107/7920 Steps TO Set Value Proceeding Row 1 TO Set Value Proceeding Row 1 Construct Some Time: 15 me 107/7920 Steps TO Set Value Proceeding Row 1 TO Row Proceeding Row 1 <t< th=""><th>Dvp0 - De</th><th>Ita WPLSoft - [Mo</th><th>nitor Devices]</th><th></th><th></th><th></th><th></th><th></th><th></th><th>_ 7</th></t<>	Dvp0 - De	Ita WPLSoft - [Mo	nitor Devices]							_ 7
Coversatile Row 1 Scan Time: 1.5 as 107/9520 Steps PLC COM: 1 (6600, 7, E, 1) TPR0P/TP700 (PLC Station Addrese: 1) X21 misure-openand (Cover code: 00003) taxes 20 applicable PLC COM: 1 (6600, 7, E, 1) TPR0P/TP700 (PLC Station Addrese: 1)	🖀 Eile Edit	Compiler Commen	ts Search View	Communication 0	otions Wgzard W	indow <u>H</u> elp				_ 6
Coverwrite Row 1 Status: 15 ms 107/7920 Steps Extra 107/7920 Steps Extra 107/7920 Steps Extra 107/7920 Steps Extra 107/7920 Steps C20 minuse operand (Exter code: 0000) taxees Step Musher, 52 Status: 15 ms 107/7920 Steps Extra 107/7920 Steps Extra 107/7920 Steps Extra 107/7920 Steps		2 0 0 X	0000	0 9 9 9	1730	000	3			
Courant Status T/C Set Value Present Value (16 kg Present Value (22 kg Ploating Point) Format T/C Set Value Refer 004 RC03 R24220D03 F0.000 Honderinal Refer 005 RC04 Refer Refer Refer Refer 006 Refer Refer Refer Refer Refer 007 Refer Refer Refer Refer Refer 008 Refer Refer Refer Refer Refer 009	風渡區	@ @ B 🖂 🖢	8000		• 0 0 k :	王父王宫日	TOOO	黑白		
D4 HD03 HD03 P0.000 Hendecinal Coerwrite Row 1 Seat Time: 1.5 me 107/7920 Steps FLC COM: 1 (9400, 7, E, 1) TP70P/TP700 (PLC Station Address: 1) S25 minuses operand (Entry code: 0007) tames Step Number: 30 Scat Time: 1.5 me 107/7920 Steps FLC COM: 1 (9400, 7, E, 1) TP70P/TP700 (PLC Station Address: 1)	evice Name	Comment	Status	TJC Set Value	Present Value (16)	ni Present Value (32)	oi Floating Point	Format	TJC Set Value Refere	
Overwrite Row: 1 Scan Time: 1.5 ms 107/7920 Steps E10/008 PLC OOM: 1 (9600, 7, E, 1) TP70P/TP700 (PLC Station Address: 1) 525 misues operaal (Encr code (0003) tance Step Number: 93 525 misues operaal (Encr code (0003) 525 misues operaal (Encr code (0003)	1004		-		HD03	H24220D03	F0.000	Hexadecimal		
Overwrite Row 1 Scan Time: 1.5 ms 107/7920 Steps PLC COM: 1 (9600, 7, R, 1) TP70P/TP700 (PLC Station Address: 1) CC minuse openad (Ener code: 0003) ienee Step Number; 93										
Oversnite Row: 1 Scan Time: 1.5 ms 107/7920 Steps PLC COM: 1 (9600, 7, E, 1) TP70P/TP703 (PLC Station Address: 1) 2C3 missues operant (Error code: 0003) tenee Step Nander: 93									L	
Overwrite Row: 1 Scan Time: 1.5 ms 107/0920 Steps PLC COM: 1 (9600, 7, E, 1) TP70P/TP70G (PLC Station Address: 1) 2C3 misues operand (Encr code: 0000) users Step Number: 33										
Overwrite Row: 1 Scan Time: 1.5 ms 107/7920 Steps PLC COM: 1 (9600, 7, E, 1) TP70P/TP700 (PLC Station Address: 1) 203 minues operand (Enor code: 0003) tenes Step Number: 93										
Overwrite Row 1 Scan Time: 1.5 me 107/7920 Stege PLC COM: 1 (9600, 7, E, 1) TP70P/TP700 (PLC Station Address: 1) 2C3 misues operand (Enor code: 0003) issues Steg Nanha:: 93										
Overwrite Row: 1 Scan Time: 1.5 ms 107/7920 Steps ERVOR PLC COM: 1 (9600, 7, E, 1) TF70F/TP700 (FLC Station Address: 1) PC3 misuses operand (Enor code: 0003) transe Step Number: 23 Termine: 12 Termine: 12										
Overwrite Row: 1 Scan Time: 1.5 ms 107/7920 Steps PLC COM: 1 (9600, 7, E, 1) TP70P/TP70G (PLC Station Address: 1) CC misuses operand (Encr code: 0003) isense Step Number: 93 Station Address: 10 Station Address: 10										
Overwrite Row: 1 Scan Time: 1.5 ms 107/7920 Steps PLC COM: 1 (9600, 7, E, 1) TP70P/TP70G (PLC Station Address: 1) SC5 misues operand (Ence code: 0003) tences Step Number: 93										
Overwrite Row: 1 Soan Time: 1.5 ms 107/7920 Steps PLC COM: 1 (9600, 7, E, 1) TP70P/TP703 (PLC Station Address: 1) SC misues operand (Enor code: 0003) tennes Step Number: 93										
Overwrite Row: 1 Scan Time: 1.5 ms 107/7920 Steps PLC COM: 1 (9600, 7, E, 1) TP70P/TP700 (PLC Station Address: 1) CC5 misues operand (Enor code: 0003) izense Step Number: 93										
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SCS misues operand (Error code: 0D03) benne Stey Number: 93										
SC5 misues operand (Enor code: 0003) tranco Step Number: 93		Overwrite Row		Scan Time: 1.5 m	s 107/7920 Steps		PLC COM: 1 (9600,	7, E, 1)	TP70P/TP70G (PLC Station Address: 1)	
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isence Step Number 93		Overwrite Row J		Scan Time: 1.5 m	s 107/7920 Steps	ERCR	PLC COM 1 (960),	7, E, 1)	TP70P/TP70G (PLC Station Address: 1)	
	HSCS misues o	Overwrite Row J	33)	Scan Time: 1.5 m	s 107/7920 Steps	ERCR	PLC COM 1 (9600,	7, E, 1)	TP70P/TP70G (PLC Station Address: 1)	
	15C5 misuses o Forence Step N	Overwzite Row: J operand (Enor code: 0D unaber; 93	33)	Scan Time: 1.5 m	s 107/7920 Steps	ERCR	PLC COM: 1 (9600,	7, E, 1)	TP70P/TP70G (PLC Station Address: 1)	
	ISCS misuses o	Overwrite Row I Iperand (Enor code: 0D Jumber; 93	33)	Scan Time: 1.5 m	s 107/7920 Steps	ERCR	PLC COM 1 (9600,	7, E, 1)	TP70P/TP70G (PLC Station Address: 1)	
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	SCS misuses o Reence Step N	Overwrite Row 1 perant (Error code: 0D Yumber; 93	33)	Scan Time: 1.5 m	s 10777920 Steps	ERC R	PLC COM 1 (9600,	7, E, 1)	TP70P/TP70G (PLC Station Address: 1)	
	ISCS misures o Resence Step N	Overwrite Row 1 iperant (Error code: 0D humber: 93	333)	Seaa Time: 1.5 m	s 107/7920 Steps	ERROR	PLC COM 1 (9600,	7, E, 1)	TP70P/TP70G (PLC Station Address: 1)	

3. The error code shown in the figure above is HD03. It indicates that the operands of the instruction DHSCS are invalid. After DHSCS is checked, and the operands are modified, the error will be eliminated.

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Chapter 3 Frequently Asked Questions and Answers

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3.1 Installing a USB Driver

[Question] How to install a USB driver?

- [Answer] If users use TP70P for the first time, they have to follow the steps below, and install a USB driver.
- 1. Download the latest version of TPEditor from the official website of Delta, and install the software. (Official website of Delta:<u>http://www.deltaww.com</u>)
- After a USB cable is connected to a USB port on the computer, the Found New Hardware Wizard window will appear. Please select the Install from a list or specific location (Advanced) option button, and click Next.





 Select the Include this location in the search checkbox, select the USB folder contained inside the directory where TPEditor is installed, and click Next. (Default path: C:\Program Files\Delta Industrial Automation\TPEditor X.X\USB)

dware update wizard		
Please choose your search and installation options.		
Search for the best driver in these locations. Use the check boxes below to limit or expand the default search, which includes local	Browse For Folder Select the folder that contains drivers for your hardw	?
paths and removable media. The best driver found will be installed. Search removable media (floppy, CD-ROM) To Include this location in the search:	□ □ TFEditor 1.90 □ □ BIN □ □ BIN □ □ BIN □ □ DocFles	
C.\Program Files\Delta Industrial Automation\TPEdit Browse Don's search. I will choose the driver to install.	GfData GfData HMI Canguage Cog	
Choose this option to select the device driver from a list. Windows does not guarantee that the driver you choose will be the best match for your hardware.	Recipe	-
	To view any subfolders, click a plus sign above.	
< Back Next > Cancel	OK Car	cel

 After the installation of the USB driver selected is complete, the communication port connected to TP70P will be displayed in the Ports (COM & LPT) section in the Device Manager window.



 The communication port which is connected to TP70P is also shown in the PC COM Port box in the PC Communication Setting (PC <=> TP) section in TPEditor.

-PC Communication Setting (PC <=>	• TP)	
TP Station Address	1	-
PC COM Port	COM5	
Baud Rate	115200	•

 TP70P can communicate with the computer by means of the communication port. TPEditor is used to upload/download a text panel program, and WPLSoft is used to upload/download/monitor a PLC program.

3.2 Descriptions of the Communication Ports on TP70P

[Question] What are the differences among the communication ports on TP70P, and methods of setting the communication ports, and how to set them?

[Answer] The number of communication ports varies from model to model. The modes that the communication ports on TP70P series text panels support are different, and the methods of setting the communication ports are also different. Please refer to the tables below for more information. TP70P-32TP1R/16TP1R/22XA1R/21EX1R:

Communication port	Interface	Mode supported	Method of setting a communication port
		COM1 supports connection to	Users have to install a USB
COM1	USB	software, and the	driver if COM1 is used for the
		uploading/download of a program.	first time.
	RS-485	S-485 PLC mode	COM2 is set by means of
COM2			special D devices and special
			M devices in the PLC.
COM3	DC 495	Taxt papel mode	COM3 is set by means of
	1.3-405		objects in the text panel.

TP70P-RM0

Communication port	Interface	Mode supported	Method of setting a communication port
		COM1 supports connection to	Users have to install a USB
COM1	USB	software, and the	driver if COM1 is used for the
		uploading/download of a program.	first time.
COM2	I2 RS-232 Text panel mode	Toxt papel mode	COM2 is set by means of
COIVIZ		objects in the text panel.	
COM2	PS 495 Taxt papel made		COM3 is set by means of
COMS RS-405 Text panel mode		objects in the text panel.	

TP70P-RM1

Communication port	Interface	Mode supported	Method of setting a communication port
		COM1 supports connection to	Users have to install a USB
COM1	USB	software, and the	driver if COM1 is used for the
		uploading/download of a program.	first time.
COM2	RS-232	Toxt papel made	COM2 is set by means of
COIVIZ		lext parlet mode	objects in the text panel.
COM2	RS-485/	Taxt papel made	COM3 is set by means of
COMS	RS-422	lext panel mode	objects in the text panel.

TP70P-RM2

Communication port	Interface	Mode supported	Method of setting a communication port
		COM1 supports connection to	Users have to install a USB
COM1	USB	software, and the	driver if COM1 is used for the
		uploading/download of a program.	first time.
COM2	RS-232	Text panel mode	COM2 is set by means of
COMZ			objects in the text panel.
COM2	RS-485	Taxt papel made	COM3 is set by means of
COMS		Text parter mode	objects in the text panel.
COM4	DO 405	Taxt namel mode	COM3 is set by means of
001/14	K3-400	lext parlet mode	objects in the text panel.

3-4

COM1

COM1 can not function as a master station. It only supports the uploading/downloading of a program. If users use COM1 for the first time, they need to install a USB driver so that the computer can identify the virtual communication port which is connected to COM1. Please refer to section 3.1 for more information about installing a USB driver.

COM2

The mode that COM2 supports is a PLC mode or a text panel mode. COM2 supports ASCII/RTU communication. Users can set a serial transmission rate. The maximum transmission rate which can be set is 115 kbps. The users can set the number of data bits, a parity bit, and the number of stop bits. If RTU communication is used, the number of data bits must be eight. When the mode that COM2 on a TP70P series text panel supports is a PLC mode, D1120 in the PLC is used to set a communication protocol. If a communication error occurs in COM2, the users can check special M devices. When the mode that COM2 on a TP70P series text panel supports is a text panel mode, COM2 is set by means of objects in the text panel. If a communication error occurs in COM2, a message saying that a communication error occurs in COM2 will appear on the screen of the text panel.

COM3

COM3 supports the text panel. After a driver is selected, COM3 can function as a master/slave station, and support ASCII/RTU communication. Users can set a serial transmission rate. The maximum transmission rate which can be set is 115 kbps. The users can set the number of data bits, a parity bit, and the number of stop bits. If a communication error occurs in COM3, a message saying that a communication error occurs in COM3 will appear on the screen of the text panel.

COM4

COM4 supports the text panel. After a driver is selected, COM4 can function as a master/slave station, and support ASCII/RTU communication. Users can set a serial transmission rate. The maximum transmission rate which can be set is 115 kbps. The users can set the number of data bits, a parity bit, and the number of stop bits. If a communication error occurs in COM4, a message saying that a communication error occurs in COM4 will appear on the screen of the text panel.



3.3 Setting PLC Communication

[Question] How to set the PLC communication of TP70P?

[Answer] The PLC communication of TP70P is set in the same way as the communication of a DVP series PLC is. It is set by means of special D devices and special M devices. Please refer to the table below for more information.

Register
D1120
M1120
M1143
D1121
D1129
M1129



Users can set a communication protocol according to the table below.

		Contents		
b0	Data length	0: 7 1: 8 (If RTU communication is used, the number of data bits set must be 8.)		
b1 b2	Parity bit	00: None 01: Odd 11: Even	00: None 01: Odd 11: Even	
b3	Number of stop bits	0: 1 bit 1: 2 bits		
b4 b5 b6 b7	Serial transmission rate	0001 (H1): 110 0010 (H2): 150 0011 (H3): 300 1011 (H3): 300 1011 (H5): 1200 0110 (H5): 1200 0110 (H6): 2400 0111 (H7): 4800 1000 (H8): 9600 1001 (H9): 19200 1010 (H2): 38400 1011 (HB): 57600 1100 (HC): 115200 1101 (HD): 500000 1110 (HE): 32150		
b8	Start-of-text character	None	D1124	
b9	First end-of-text character	None	D1125	
b10	Second end-of-text character	None	D1126	
b11~b15	undefined			

Example: PLC communication uses an ASCII mode.

If the communication format that PLC communication uses is the ASCII communication protocol (9600, 7, E, 1), the program code below must be added to the top of the program in the PLC. When the PLC runs during the first program scan, it checks whether M1120 is ON. If M1120 is ON, the setting of COM2 will be changed according to the value in D1120.



Example: PLC communication uses an RTU mode.

If the communication format that COM2 uses is the RTU communication protocol (9600, 8, E, 1), the program below will be required.

Notes:

- 1. After the modification of the communication format that COM2 uses is complete, the communication format that COM2 uses will not change if the PLC stops running.
- After the modification of the communication format that COM2 uses is complete, the communication
 protocol that COM2 uses will be the default communication protocol (9600, 7, E, 1) if the PLC is turned off
 and then powered when it stops running.
- If COM2 functions as a slave station, users only need to set a communication format. If COM2 functions as a master station, a Modbus command will need to be sent by means of a communication instruction (MODRD/MODWR/MODRW)

Using the Communication Port Supporting PLC 3.4 **Communication as a Master Station**

[Question] How to use the communication port supporting PLC communication as a master station? [Answer] If the communication port supporting PLC communication is used as a master station connected to another device, commands will need to be sent by means of the Modbus instructions in a PLC program. Please refer to Chapter 4 in DVP-ES2/EX2/SS2/SA2/SX2/SE&TP Operation Manual for more information about the communication ports on a PLC. (Users can download DVP-ES2/EX2/SS2/SA2/SX2/SE&TP Operation Manual from the official website of Delta (http://www.deltaww.com).

Using COM2 to read the data in a DVP series PLC and write data to a DVP series PLC is described below.

Example: COM2 on TP70P-16TP1R is used to set Y0 on a DVP series PLC to Step 1: Please download the program below to TP70P.	ON.		
M1002			
	_MOV	H86	D1120
		SET	M1120
M10			
î		SET	M1122
M10			
MODWR	К1	H500	K1

Step 2: Connect COM2 on TP70P-16TP1R to the two RS-485 wires connected to a DVP series PLC. When M10 is ON, Y0 on the DVP series PLC is ON.

Step 3: If communication error judgement is required, the program below can be added. If communication data is transmitted normally, M0 will be ON. If a communication timeout occurs, M1 will be ON. If the data received is incorrect, M2 will be ON. If parameters of an instruction are set incorrectly, M3 will be ON. Users can judge the state of communication by means of these flags.

3.5 Setting Text Panel Communication

[Question] How to set the text panel communication of TP70P?

[Answer] After a driver is selected, the communication port supporting text panel communication can function as a master/slave station. Users can set a communication format for the communication port supporting text panel communication in the **Basic Configuration** window in TPEditor. The drivers supported by TP70P are shown in the table below. The setting of COM3 is described below.

Master/Slave	Driver
	Delta PLC
	Delta Inverter VFD
	Delta ASD AC Servo
Master	Delta VFD ASCII Mode
	Delta VFD RTU Mode
	Delta Modbus ASCII
	Delta Modbus RTU
	Modicon Modbus RTU Mode
Slave	Modbus Slave ASCII Mode
	Modbus Slave RTU Mode

Example: COM3 is used to read the value in D0 in a DVP series PLC.

Step 1: Select DELTA PLC in the HMI <=> PLC section in the New Project window.

New Project
-HMI <=> PLC Set Device Type
DELTA PLC
ТР Туре
TP70P
File Name
TpeO
OK

Step 2: Create a numeric display in the working area. Select the **External PLC Setting** option button, and set a PLC address in the **Refer Device** window. (In the example, the PLC address set is 1.)

Refer Device		Font Setting Font Alignment Align Left
Value Type	Unsigned 💌	□ Leading Zeros
Value Length	Refer Device	
Integer Numbe Decimal Numbe	© PLC C TP	Refer Device
	Internal PLC Setting External PLC Setting	Device Number 0 0 1 2 3 4 5 OK
	Connect Com COM3 PLC Address 1 (0~255)	

Step 3: In the **Basic Configuration** window, click **TP <=> PLC Protocol**, and then set a communication format for COM3. (In the example, the communication format set is (9600, 7, E, 1).)

Basic Configuration	
PC <=> TP Communication Set	Protocol Setting(TP <=> PLC)
TP <=> PLC Protocol	Object Communication Setting
N IF Other Setting	✓ Default COM Port ☐ Default PLC Address
	Set TP Port Set PLC Address
	Internal ComPort
	C External ComPort
	Apply
	R3485
	Baud Rate 9600
	Data Length 7 💌
	Parity Even 💌
	Stop Bit 1
< · · · · · · · · · · · · · · · · · · ·	
	OK Cancel

Step 4: Compile the program created, and download the program to TP70P. Connect COM3 on TP70P to an RS-485 communication port on a PLC.

3.6 Setting an RTU Mode for Text Panel Communication

[Question] How to set an RTU mode for text panel communication?

[Answer] When COM3 functions as a master station, it supports three RTU drivers. One is a Delta VFD RTU mode. It supports the RTU modes of Delta AC motor drives. Another is a Delta Modbus RTU mode. It can be used to connect a product which supports Delta Modbus. The other is a Modicon Modbus RTU mode. It can be used to connect a product which supports Modicon Modbus RTU communication. The example below describes how a TP70P series text panel which uses Delta Modbus RTU communication is connected to a PLC.

Example: An RTU mode is used to read the value in D0 in a DVP series PLC. Step 1: Select DELTA Modbus RTU in the HMI <=> PLC section in the New Project window.

New Project
HMI <=> PLC Set Device Type
DELTA Modbus RTU
ТР Туре
TP70P
File Name
Tpe0
OK

Step 2: Create a numeric display in the working area. Select the **External PLC Setting** option button, and set a PLC address in the **Refer Device** window. (In the example, the PLC address set is 1.) Type a standard Modbus communication address in the **Device Number** box.

Refer Device		Font Setting Alignment	Font Align Left 💌	
Value Type	Unsigned 💌	🔲 Leading Zeros		
Value Length	Refer Device			
Integer Number Decimal Number	© PLC C TP	Refer I	Device vice Name	
	Internal PLC Setting External PLC Setting Connect Com COM PLC Address (0 ~ 255)	Devi	re Number 404097 1 2 3 4 5 7 8 9 A B D E F . /	OK Clear Close

Step 3: In the **Basic Configuration** window, click **TP <=> PLC Protocol**, and then set a communication format for COM3. (In the example, the communication format set is (9600, 7, E, 1).)

Basic Configuration		
PC <=> TP Communication Set	Protocol Setting(TP <=> PLC)	
TP <=> PLC Protocol	Object Communication Setting	
IF Other Setting	Default COM Port Default PLC Address	
	Set TP Port Set PLC Address	
	Internal ComPort	
	C External ComPort	
	Apply	
	СОМЗ	
	RS485	1
	Baud Rate 9600	
	Data Length 7 💌	
	Parity Even 💌	
	Stop Bit 1	
< · · · · · · · · · · · · · · · · · · ·		
	OK Cancel	

Step 4: Compile the program created, and download the program to TP70P. Connect COM3 on TP70P to an RS-485 communication port on a PLC.

3.7 Using the Communication Port Supporting Text Panel Communication as a Slave Station

[Question] How does a device read data in TP70P through COM3 on TP70P?

[Answer] COM3 supports Modbus slave ASCII/RTU modes. The example below describes how a device read data in TP70P through COM3 on TP70P.

Example: A PLC modifies data in TP70P through an RTU mode.

Preparation: You need to restore TP70P to its default values before switching to Modbus Slave RTU Mode. Turn the TP70P on and then press RESET button for more than 3 seconds. Go to system setting page and select FA Rest. After that TP70P will restart and you can follow the steps below to modify data in TP70P through the RTU mode

Step 1: Select Modbus Slave RTU Mode in the HMI <=> PLC section in the New Project window.

New Project	
HMI <=> PLC Set Device Type	
Modbus Slave RTU Mode	
ТР Туре	
TP70P	•
Eile Name	
Tpe0	
OK	Cancel

Step 2: Create a numeric display in the working area. Type a Modbus communication address in the **Device Number** box.

Refer Device		Font Setting Alignment Leading Z	Font Align Left 💌	
Value Length	Refer Device			
Integer Number Decimal Number	© PLC © TP		Refer Device	•
	☞ 一體機PLC設定		Device Numb	
	C 外接PLC設定	_	0 1 2 3 4 5	OK
	PLC Address [1 (0~255)	×	CDEF./	Clear

Step 3: In the **Basic Configuration** window, click **TP <=> PLC Protocol**, and then set a communication format for COM3. (In the example, the communication format set is (9600, 7, E, 1).)

Basic Configuration	
PC <=> TP Communication Set	Protocol Setting(TP <=> PLC)
TP <=> PLC Protocol	Object Communication Setting
Ny IF Other Setting	Default COM Port Default PLC Address
	Set TP Port Set PLC Address
	 Internal ComPort
	C External ComPort
	A subs
	Abbiy
	COM3
	RS485
	Baud Rate 9600 💌
	Data Length 7 💌
	Parity Even
	L'uny L'un -
	Stop Bit 1
< >>	
	OK Cancel

Step 4: Compile the program created, and download the program to TP70P. Connect COM3 on TP70P to an RS-485 communication port on a PLC.

Step 5: Download the program below to the PLC.

Step 6: When M10 is ON, users can see that the value displayed on the screen of TP70P is changed to 1.

3.8 Data Exchange

[Question] How does TP70P exchange data with a device by means of COM3 instead of objects in TP70P? [Answer] TP70P can exchange data with a device by means of COM3. Users have to select the **Read Block Setting** checkbox and the **Write Block Setting** checkbox, and specify devices in the **Read/Write Block Setting** section in the **System Parameter Setting** window. The devices specified are groups of consecutive devices. Thirty-two values at most can be read/written at a time. The example below describes how TP70P communicates with a DVP series PLC by means of COM3. The communication is composed of two parts.

- Read Block Setting: The values in D0~D7 in the DVP series PLC are read, and then put in D0~D7 in TP70P.
- 2. Write Block Setting: The values in D10~D17 in TP70P are written to D10~D17 in the DVP series PLC.
- Read Block Setting: The values in D0~D7 in the DVP series PLC are read, and then put in D0~D7 in TP70P.

Step 1: Click System Parameter Setting on the Global Setting menu.
Step 2: Select the Read Block Setting checkbox in the Read/Write Block Setting section.
Read Start Addr.: The values in D0~D7 in the DVP series PLC are read.
Write Start Addr.: The values which are read are put in D0~D7 in TP70P.

System Parameter Setting	
Page Auto-Jump/Backlight Control	
Page Auto-Jump Refer Device	Backlight Control Refer Device
Read/Write Block Setting	
Read Start Addr. D0	Length 8
Write Start Addr. D0	
🔲 Write Block Setting	
Write Start Addr.	Length 2
Read Start Addr.	
	OK Close

Step 3: Click ... at the right side of the Read Start Addr. box. Select the External PLC Setting option button and D0 in the Refer Device window.

System Parameter Setting	\mathbf{X}	
Page Auto-Jump/Backlight Control Enable Page Auto-Jump Refer Device Back	ght Control Refer Device	
	Refer Device	
Read/Write Block Setting	© PLC C TP	Refer Device
Write Start Addr. D0	C Internal PLC Setting	Device Number 0
Write Start Addr.	© External PLC Setting Connect Com COM3	0 1 2 3 4 5 6 7 8 9 A B Clear
Read Start Addr.	PLC Address 1	C D E F . /
	OK Close	

Write Block Setting: The values in D10~D17 in TP70P are written to D10~D17 in the DVP series PLC.

Step 1: Select the Write Block Setting checkbox in the Read/Write Block Setting section. Write Start Addr.: Values are written to D10~D17 in the DVP series PLC. Read Start Addr.: Values in D10~D17 in TP70P

Page Auto-Jump/Bac 🦳 Enable	klight Contro	1		
Page Auto-Jump Ref	er Device	Backlig	nt Control Refer	Device
Read/Write Block Set Read Block Settin	tting g			
Read Start Addr.			Length 2	-
Write Start Addr.				
🔽 Write Block Settir	ng			
Write Start Addr.	D10		Length 8	
Read Start Addr	D10			

Step 2: Click ... at the right side of the Write Start Addr. box. Select the External PLC Setting option button and D10 in the Refer Device window.

System Parameter Setting		
Page Auto-Jump/Backlight Control Enable Page Auto-Jump Refer Device Backligh	it Control Refer Device	
Read/Write Block Setting	Refer Device	
Read Block Setting		Refer Device
Read Start Addr.	C PLC	🔽 Device Name 🛛 💌
Write Start Addr.	C TP	
₩ Write Block Setting	C. Internal BLC Satting	Device Number 10
Write Start Addr. D10	External PLC Setting	0 1 2 3 4 5 OK
Read Start Addr. D10	Connect Com COM3 PLC Address 1	6 7 8 9 A B C D E F . /
	(0~255)	Close

Step 3: After the steps above are complete, and the program in TPEditor is downloaded to TP70P, TP70P can exchange data with the DVP PLC series by means of COM3.

3.9 Setting the Analog Channels in TP70P

[Q] How to control the analog channels in TP70P?

[A] The analog channels in TP70P can be set by means of special D devices. This function is only applicable to TP70P-22XA1R and TP70P-21EX1R.

The correspondence between analog input values and digital values is shown below.

	Model	TD70D 22YA4D		
Mode		IF/0F-22AAIR	IF/0F-2IEAIR	
Voltage	-10 V~+10 V	-2000~+2000	Not supported	
	-20 mA~+20 mA	-1000~+1000	Not supported	
Current	+4 mA~+20 mA	+0~+1000	+0~+4000	
	+0 mA~20 mA	Not supported	+0~+4000	
Temperature	Pt100	Net even ented	-200~+1600	
	-20° C ~+160° C	Not supported		

The correspondence between the analog output values and digital values is shown below.

Model		TP70P-22XA1R	TP70P-21EX1R	
Voltage	-10 V~+10 V	-2000~+2000	Not supported	
Current	+0 mA~+20 mA	+0~+4000	+0~+4000	
Current	+4 mA~+20 mA	+0~+4000	+0~+4000	

 The special D devices used to set the analog channels in TP70P-22XA1R and TP70P-21EX1R are described below.

Device number	TP70P-22XA1R	TP70P-21EX1R
D1110	Present value of analog input channel 0 (AD0)	Present value of analog input channel 0 (AD0)
D1111	Present value of analog input channel 0 (AD1)	Present value of analog input channel 0 (AD1)
D1112	Present value of analog input channel 2 (AD2)	Present value of temperature input channel 3 (PT3)
D1113	Present value of analog input channel 3 (AD3)	Present value of temperature input channel 4 (PT4)
D1115	Modes used by analog channels	
D1116	Output value of analog output channel 4 (DA4)	Output value of analog output channel 2 (DA2)
D1117	Output value of analog output channel 5 (DA5)	Not supported

D1115 in TP70P-22XA1R D1115 is described below.

	D1115								
	Bit 15~12	Bit 11~10	В	it 9~8	Bit 7~6	Bit 5∼	4	Bit 3~2	Bit 1~0
	Х	DA5		DA4 AD3 AD2			AD1	AD0	
Value				AD mode			DA mode		
00					-10 V~10 V		-10 V~10 V		
01			-20 mA~+20 mA			0 mA~20 mA		mA	
10			4 mA~20 mA			4 mA~20 mA			

Note: X means "Not supported".

Example: Setting D1115 in TP70P-22XA1R D1115

If the mode used by AD0 is -20 mA \sim +20 mA current, the mode used by AD1 is +4 mA \sim +20 mA current, the mode used by AD2 is -10 V \sim 10 V voltage, the mode used by AD3 is -10 V \sim 10 V voltage, the mode used by DA4 is +4 mA \sim +20 mA current, and the mode used by DA5 is -10 V \sim 10 V voltage, the value in D1115 will be D'209.

D1115								
Bit 15~12 Bit 11~10 Bit 9~8 Bit 7~6 Bit 5~4 Bit 3~2 Bit 1~0								
Х	DA5	DA4	AD3	AD2	AD1	AD0		
Х	00	10	00	00	10	01		

D1115 in TP70P-21EX1R is described below.

D1115								
Bit 15~10	Bit 9~8	Bit 7~6	Bit 5~4	Bit 3~2	Bit 1~0			
Х	X DA2 X X AD1				AD0			
Value		AD mode		DA mode				
00		0 mA~20 mA		0 mA~20 mA				
01		4 mA~	20 mA	4 mA~20 mA				

Note 1: X means "Not supported".

Note 2: The temperature input channels only support Pt100 sensors.

Example: Setting D1115 in TP70P-21EX1R

If the mode used by AD0 is 0 mA~20 mA current, the mode used by AD1 is +4 mA~+20 mA current, and the mode used by DA2 is 4 mA~20 mA current, the value in D1115 will be D'104.

D1115								
Bit 15~10 Bit 9~8 Bit 7~6 Bit 5~4 Bit 3~2 Bit 1~0								
Х	DA2	Х	Х	AD1	AD0			
00	01	00	00	01	00			

