TOSHIBA

PROGRAMMABLE CONTROLLER

PROSEC T3/T3H

SYSTEM OVERVIEW

High speed, powerful programmable controller PROSEC T3/T3H

Features

High speed processing

T3/T3H CPU is configured by two processors – a standard 16-bit micro-processor and a special designed language processor. By this advanced architecture, T3/T3H provides high speed processing.

	T3	T3H
Contact instruction	0.15 μs	0.09 μs
16-bit transfer	0.9 μs	0.54 μs
16-bit addition	1.5 μs	0.9 μs
Floating-point multiplication	22.59 μs	12.08 μs

Multitasking

T3/T3/T3H supports the multitask processing. This function can provide multiple program execution, such as high-speed scan task, slow scan task, event driven task, etc. By using this function, ideal control response can be obtained.

1 internal timer interrupt (setting: 1 to 1000 ms (T3H), 2 to 1000 ms (T3), 1 ms units)
8 I/O interrupts (activated by external events)
1 main program (core of the user program)
4 sub-programs (activated by other tasks and executed as back-ground job)

Large control capacity

T3/T3H has large control capacity in both hardware and software. T3/T3H will meet various application requirements flexibly.

	T3	T3H
Number of I/O modules	43 (2752 points max.)	76 (4864 points max.)
User program capacity	32 k steps	32 k or 64 k steps

Multiple programming languages

T3/T3H supports two types of programming languages – Ladder diagram and SFC (Sequential Function Chart). The Ladder diagram is suited for logic control and the SFC is suited for sequential control. These languages can be used in mixture. By selecting the appropriate language for the application, your program-development time will be reduced.

User friendly programming tool

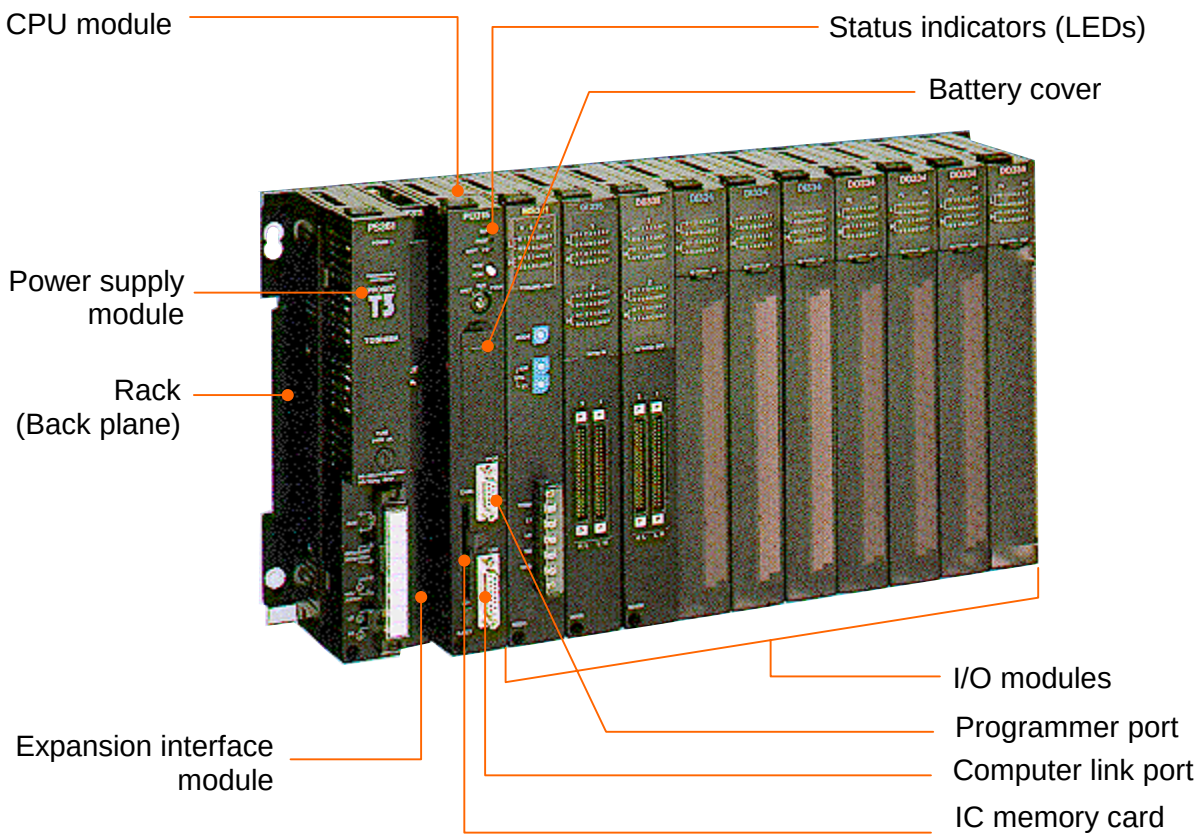
T-PDS (T-series Program Development System) is a software package that runs on any IBM-compatible personal computer. The T-PDS fully supports in programming, debugging and maintenance for T3/T3H.

Networking

T3H can be connected to the Ethernet that is a standard computer level network. For control level real-time network, T3/T3H supports Toshiba's high-speed industrial LAN TOSLINE-S20/F10. T3/T3H also supports an open field network DeviceNet. User can configure effective data link network suitable for the system requirements.

System Configuration

Basic Configuration



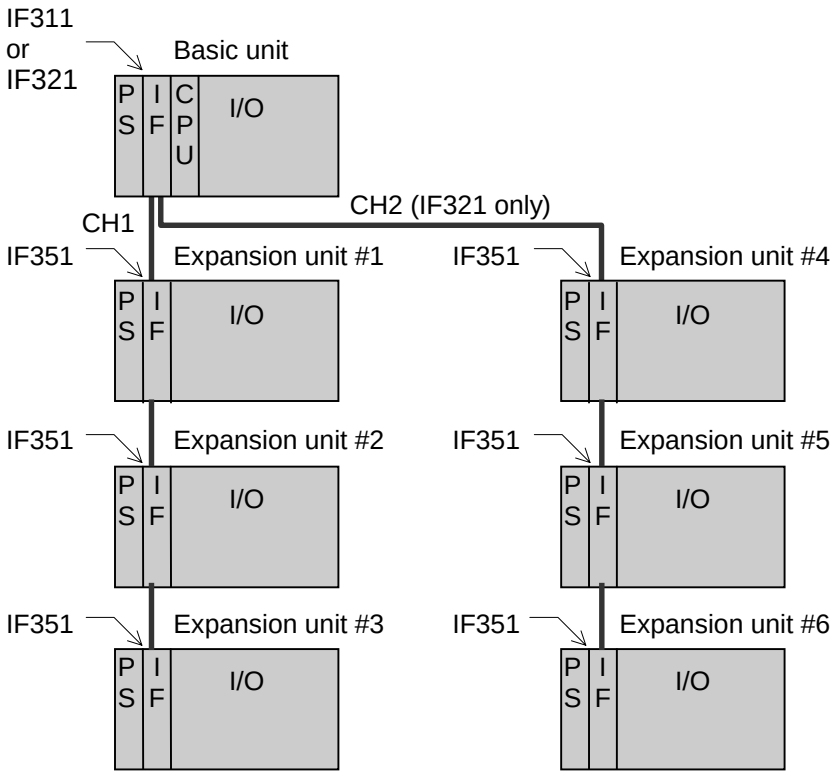
Basic Components

Item	Type	Description
CPU module (T3)	PU315	User program capacity 32 k steps (RAM only)
	PU325	User program capacity 32 k steps (RAM + EEPRM)
CPU module (T3H)	PU325H	User program capacity 32 k steps (RAM + EEPROM)
	PU326H	User program capacity 64 k steps (RAM + EEPROM)
Power supply module	PS361	Power voltage 100 - 120 / 200 - 240 Vac
	PS332	Power voltage 24 Vdc
Rack	BU31A	10 I/O slots, for basic unit
	BU315	5 I/O slots, for basic unit
	BU35B	11 I/O slots, for expansion unit
	BU356	6 I/O slots, for expansion unit
Expansion interface module	IF311	Standard type, 1 channel, for basic unit
	IF321	Standard type, 2 channels, for basic unit (T3H only)
	IF351	Standard type, for expansion unit
	IF312	Long distance type, for basic unit
	IF352	Long distance type, for expansion unit (middle)
	IF353	Long distance type, for expansion unit (terminal)

I/O Expansion Configuration

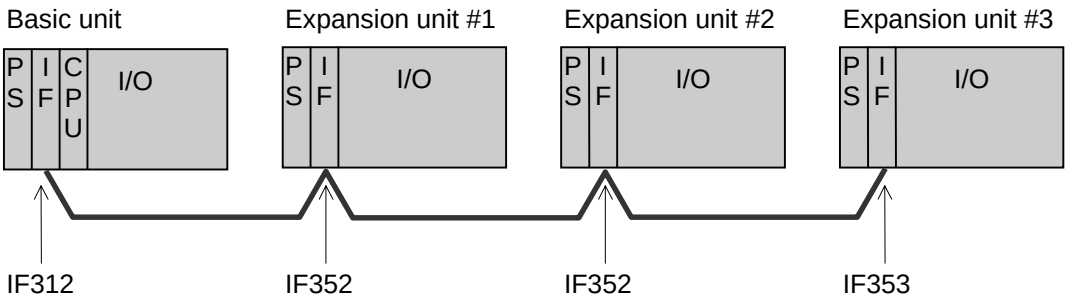
Standard Expansion

In the standard expansion configuration, the standard type Expansion interface modules (IF311, IF321 and IF351) are used. The IF311 is for basic unit. It has 1 channel (CH1) of expansion I/O bus. The IF321 is also for basic unit usable with T3H. It has 2 channels (CH1 and CH2) of expansion I/O bus. For expansion unit, the IF351 is used.
Cable length: total in each channel = 6 m max., between units = 2 m max.



Long Distance Expansion

By using the long distance type Expansion interface modules (IF312, IF352 and IF353), the long distance expansion configuration is available. In this configuration, up to 3 expansion units can be connected. The total cable length is 40 m max.

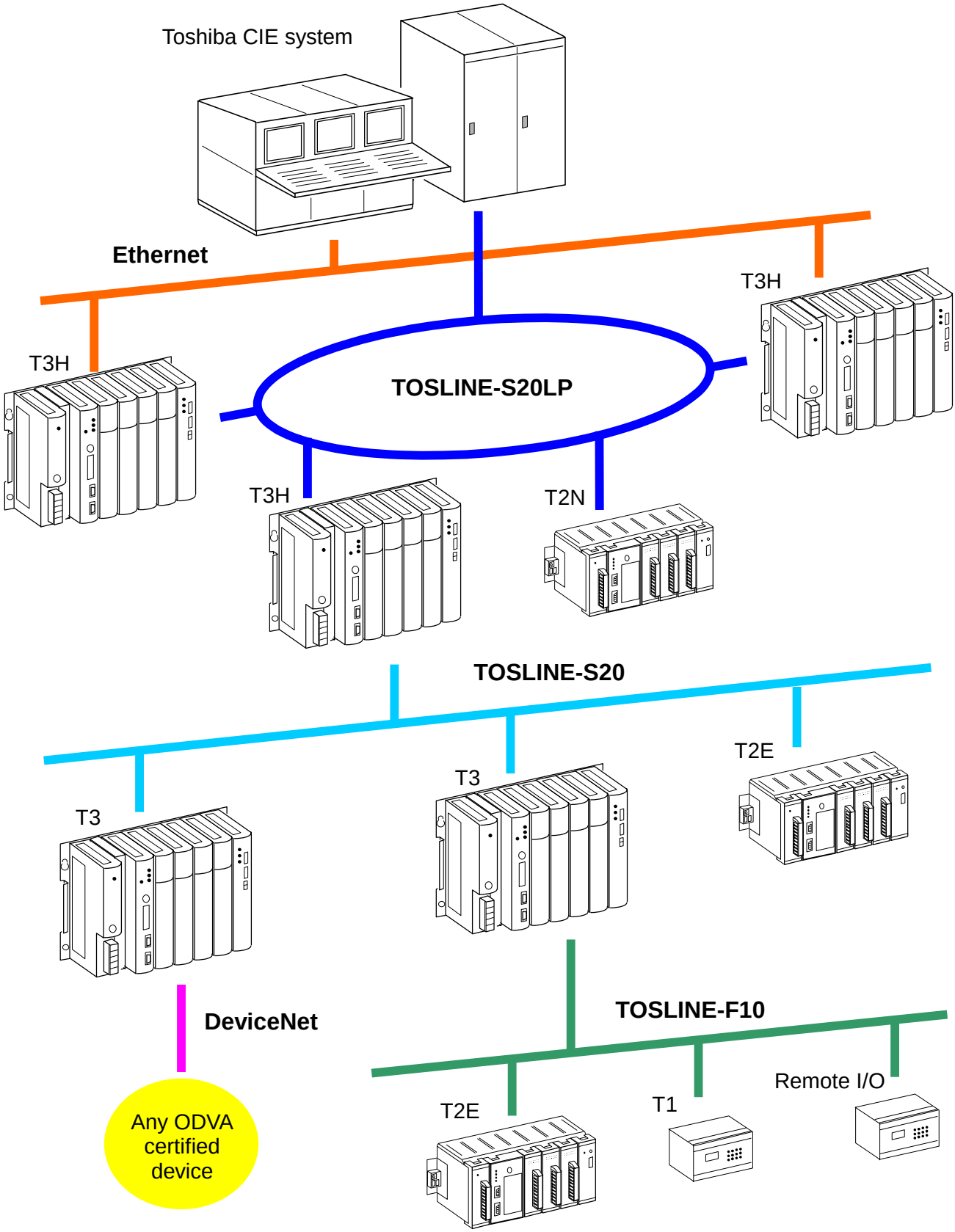


Available I/O Modules

The following I/O modules are available for T3/T3H.

Item	Type	Description
DC input	DI334	32 points, 12 - 24 Vdc input, 10 mA/point
	DI334H	32 points, 12 - 24 Vdc input, 10 mA/point (High-speed input)
	DI335	64 points, 24 Vdc input, 5 mA/point
	DI335H	64 points, 24 Vdc input, 5 mA/point (High-speed input)
AC input	IN354	32 points, 100 - 120 Vac input, 10 mA/point
	IN364	32 points, 200 - 240 Vac input, 10 mA/point
DC output	DO333	16 points, 12 - 24 Vdc output, 2 A/point, 5 A/common
	DO334	32 points, 12 - 24 Vdc output, 0.5 A/point, 5 A/common
	DO335	64 points, 5 - 24 Vdc output, 0.1 A/point
AC output	AC363	16 points, 100 - 240 Vac output, 2 A/point, 5 A/common
	AC364	32 points, 100 - 240 Vac output, 0.5 A/point, 3.2 A/common
Relay output	RO364	32 points, 240 Vac/24 Vdc (max.) output, 2 A/point, 5 A/common
	RO363S	16 points (isolated), 240 Vac/24 Vdc (max.) output, 2 A/point
Analog input	AD368	8 channels, 0-20/4-20/±20 mA, 0-5/0-10/1-5/±5/±10 V input, 12-bit
	AD318	8 channels (isolated), 0-5 V input, 12-bit, high-speed conversion
	AD328	8 channels (isolated), 0-20 mA input, 12-bit, high-speed conversion
	AD338	8 channels (isolated), ±10 V input, 12-bit, high-speed conversion
Analog output	DA364	4 channels, 0-5/0-10/1-5/±5/±10 V output, 12-bit
	DA374	4 channels, 0-20/4-20 mA output, 12-bit
Special I/O	PI312	2 channels pulse input, 5/12 V, up to 50 kpps, 24-biit counter
	AS311	2 channels ASCII communication module, RS-232C/RS-422
	CD332	8 points, change detect 24 Vdc input (Interrupt generation)
Network	EN311	Ethernet module, 10BASE5/10BASE2, 10 Mbps (T3H only)
	SN325	TOSLINE-S20LP station, 2 Mbps, fiber optic double loop (T3H only)
	SN321	TOSLINE-S20 station, 2 Mbps, coaxial cable
	SN322A	TOSLINE-S20 station, 2 Mbps, fiber optic
	SN323	TOSLINE-S20 station, 2 Mbps, co-axial/fiber optic
	MS311	TOSLINE-F10 master station, 250/750 kbps, shielded twisted-pair
	RS311	TOSLINE-F10 remote station, 250/750 kbps, shielded twisted-pair
	DN311	DeviceNet scanner module, 125/250/500 kbps

Network Configuration



Ethernet

T3H can be connected to a host system through an Ethernet network by using the Ethernet interface module EN311. Peer-to-peer communication between T3Hs is also available through the Ethernet. (The Ethernet module EN311 cannot be used with T3)

Module type	EN311	
Standard (selectable)	10BASE5 (Ethernet)	10BASE2 (Cheapernet)
Network configuration	Bus	
Transmission speed	10 Mbps	
Access method	CSMA/CD	
Modulation method	Base band	
Max. distance between nodes	2500 m	925 m
Max. segment length	500 m	185 m
Max. number of nodes	100 / segment	30 / segment
Connector	D-Sub 15-pin	BNC
Communication service	• T-series Computer Link protocol (slave) • T-series PLC Link function • Socket service	
Internal current consumption	Max. 700 mA (5 Vdc)	
External power required	12 Vdc, max. 0.5 A	
Number of modules on a T3H	Max. 4 modules	

TOSLINE-S20LP

TOSLINE-S20LP is a high-speed industrial LAN (Local Area Network), suitable for real-time control data linkage. The double-loop configuration and the floating master function allow the TOSLINE-S20LP to continue data link operation even if a transmission cable is cut or a station drops out of the network. (The TOSLINE-S20LP cannot be used with T3)

Module type	SN325
Transmission cable	Fiber optic cable (H-PCF 200/230 μm)
Cable connection	F07 connector
Network configuration	Double loop
Transmission speed	2 Mbps
Access method	Implicit token passing
Modulation method	Base band
Transmission distance	Between stations: Max. 1 km System total: Max. 30 km
Number of stations	Max. 64 stations
Communication service	• Scan transmission (cyclic broadcast) • T-series PLC Link protocol (master/slave) • T-PDS (T-series Program Development System) • S-LS (S20 Configuration Software)
Scan transmission capacity	4096 words
Internal current consumption	Max. 800 mA (5 Vdc)
Number of modules on a T3H	Max. 2 modules (S20/S20LP total)

TOSLINE-S20

TOSLINE-S20 is a high speed industrial LAN (Local Area Network), suitable for real-time control data linkage. Toshiba's various types of control products can be connected on the TOSLINE-S20 network. Two types of transmission media (cable) are available – coaxial cable and optical fiber. User can select either one depending on the environmental condition.

Module type	SN321	SN322	SN323
Transmission cable	Coaxial cable (5C-2V)	Fiber optic (GI 50/125)	Coaxial cable and fiber optic (works as bridge)
Cable connection	BNC connector	FC connector	BNC and FC
Network configuration	Bus		
Transmission speed	2 Mbps		
Access method	Implicit token passing		
Modulation method	Base band		
Transmission distance	Coaxial cable: Max. 1 km (cable total) Optical fiber: Max. 1 km (between stations) System total: Max. 10 km		
Number of stations	Max. 64 stations		
Communication service	• Scan transmission (cyclic broadcast) • T-series Computer Link protocol (slave) • T-PDS (T-series Program Development System) • S-LS (S20 Configuration Software)		
Scan transmission capacity	1024 words		
Internal current consumption	Max. 800 mA (5 Vdc)		
Number of modules on a T3/T3H	Max. 2 modules (S20/S20LP total)		

TOSLINE-F10

TOSLINE-F10 is a field network system suitable for small I/O distribution systems. High-speed data linkage between PLCs is also available.

Module type	MS311 (master station) and RS311 (remote station)	
Transmission mode (selectable)	High-speed mode	Long distance mode
Network configuration	Bus	
Transmission speed	750 kbps	250 kbps
Transmission distance	Max. 0.5 km	Max. 1 km
Number of stations	Max. 32 stations	
Communication service	Scan transmission (cyclic broadcast)	
Scan transmission capacity	32 words	
Scan data update	7 ms / 32 words	12 ms / 32 words
Internal current consumption	Max. 600 mA (5 Vdc)	
Number of modules on a T3/T3H	Max. 8 modules (TOSLINE-F10 total)	

DeviceNet

DeviceNet is an open standard field network. Many DeviceNet compatible products (ODVA certified) are available from other manufactures. The DN311 is a DeviceNet scanner module for the T3/T3H.

Module type		DN311		
Network configuration		Bus		
Transmission speed		125 k, 250 k, or 500 kbps		
Access method		CSMA/NBA		
Modulation method		Base band		
Max. transmission distance		125 k	250 k	500 k
(Trunk line)	Thick cable	500 m	250 m	100 m
	Thin cable	100 m	100 m	100 m
Max. drop length		6 m	6 m	6 m
Max. total drop length		156 m	78 m	39 m
Number of stations		Max. 64 stations (Max. 63 slaves)		
Scan I/O capacity		Input: 378 words/6048 points Output: 378 words/6048 points		
Function		• Polling • Bit strobe		
Internal current consumption		Max. 600 mA (5 Vdc)		
External power required		24 Vdc, max. 90 mA		
Number of modules on a T3/T3H		Limited by power capacity		

Computer Link

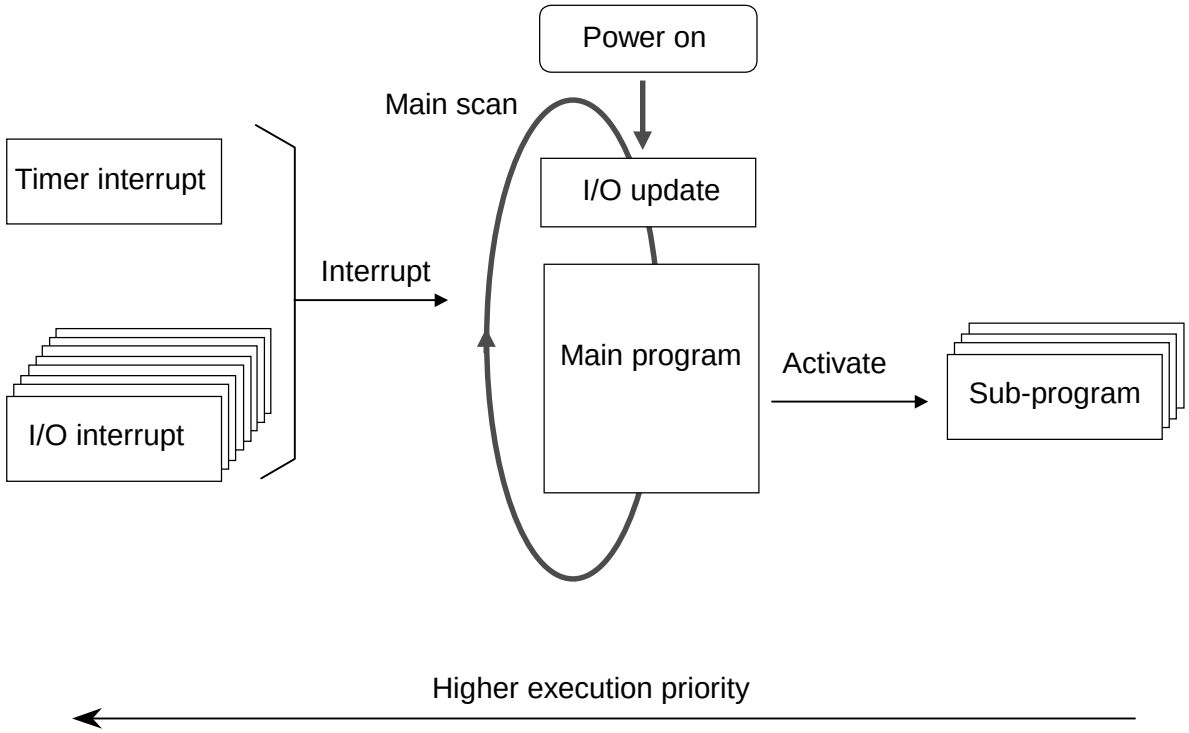
T3/T3H CPU module is equipped with the Computer Link function that enables up to 32 T3/T3Hs to be networked on a single RS-485 serial link to a host computer. The computer can run Toshiba's T-PDS software, various graphics display and data acquisition software, or user-designed custom software.

Interface	RS-485, 4-wire system
Network configuration	Bus
Transmission speed	300, 1200, 2400, 4800, 9600 or 19200 bps
Transmission code	ASCII
Frame format	Start bit: 1 bit Data length: 7 or 8 bits Parity: none, odd or even Stop bit: 1 or 2 bits
Distance	Max. 1 km (total)
Number of stations	Max. 32
Protocol	T-series Computer Link protocol
Functions	• Reading/writing PLC data • Monitoring PLC status • Controlling PLC operation • Uploading/downloading PLC program

T3/T3H Functions

Multitask Processing

T3/T3H supports the multitask processing. Depending on the control requirements, user can make grouping of the program as tasks (program types). These tasks are executed in parallel. The execution priority of each task is shown below.

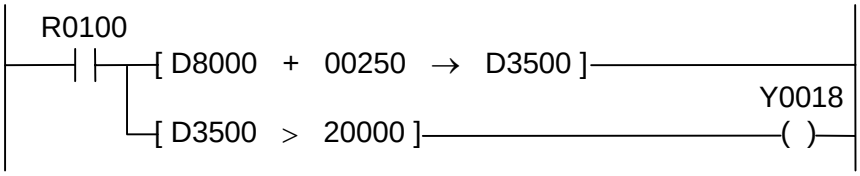


Program type (task)	Number	Priority	Description
Timer interrupt	1	1	Executed once every specified interval. Interval setting is 1 to 1000 ms.
I/O interrupt	8	2	Activated by interrupt signals generated by I/O modules (PI312 and CD332).
Main program	1	3	Executed once every main scan. It is the core of the user program. Main scan interval can be selected from floating or fixed. The fixed scan interval setting is 10 to 200 ms (10 ms units).
Sub-program	4	4	Activated by other tasks, and executed by time-sliced.

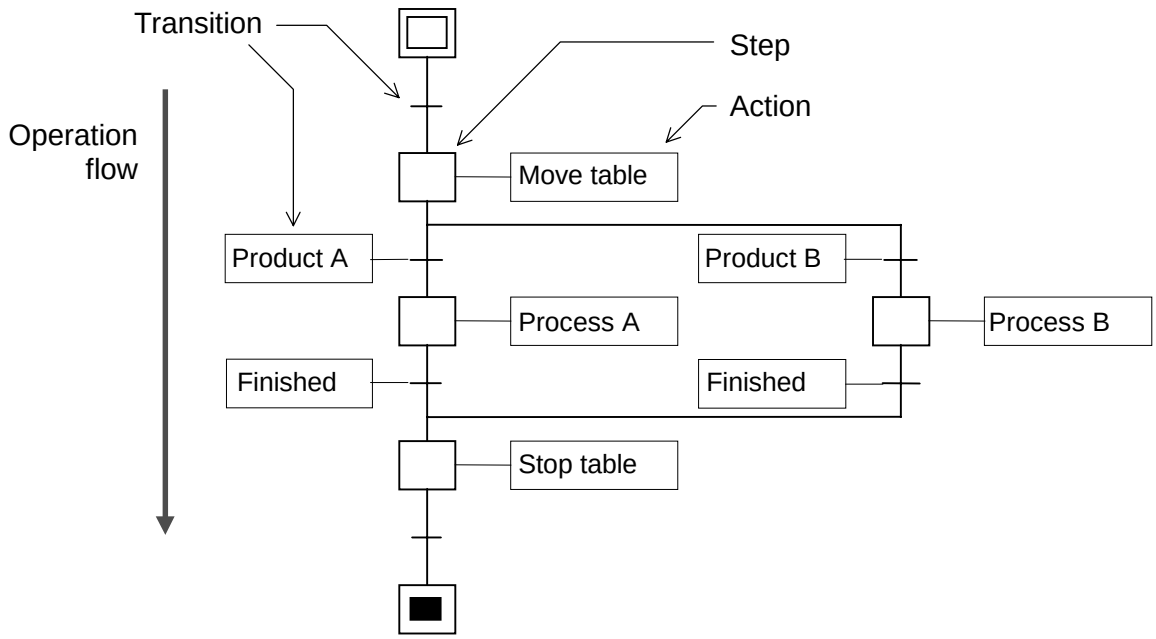
Multiple Programming Languages

T3/T3H supports two types of programming languages – Ladder diagram and SFC (Sequential Function chart). These languages can be programmed mixture in one program.
User can select the languages and create the program suitable for the control object. Therefore program-development time can be reduced.

Ladder diagram is the most popular programming language for PLC. It is similar to the hard-wired relay logic. Ladder diagram is suitable for logic control application.
In T3/T3H, for easy handling of data processing, Ladder network with Function blocks is used.



SFC is a program execution control factor, rather than a language. SFC well matches with the controlled process/machine operation flow. Therefore the program written by SFC is easy to understand. By using SFC, program development, maintenance and re-usage become easy.

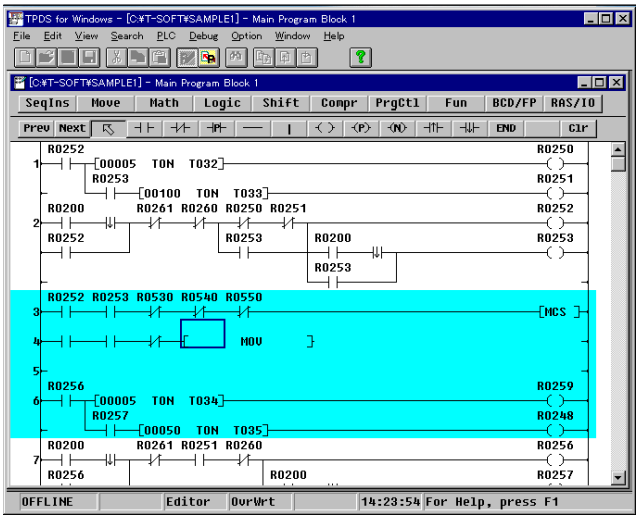


Programming Tool

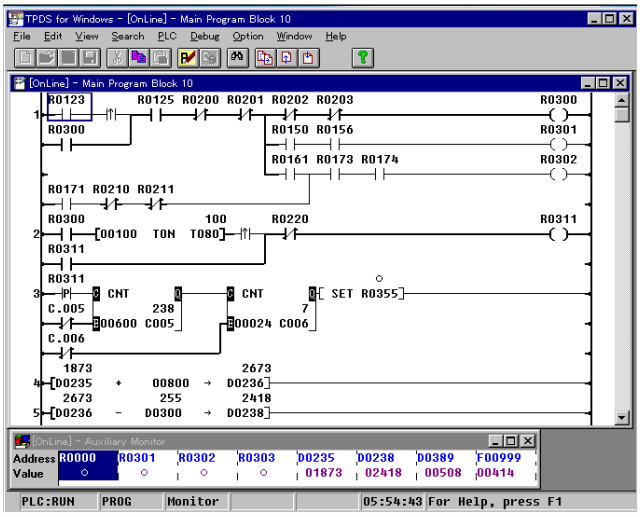
T-PDS (T-series Program Development System)

T-PDS is a software package which runs on any IBM-compatible personal computer.
The T-PDS fully supports in programming, debugging and maintenance for T3/T3H.
Also, by using the T-PDS, group programming – merging some programs created by some designers and constructing entire program – is available. It will lead to higher software productivity.

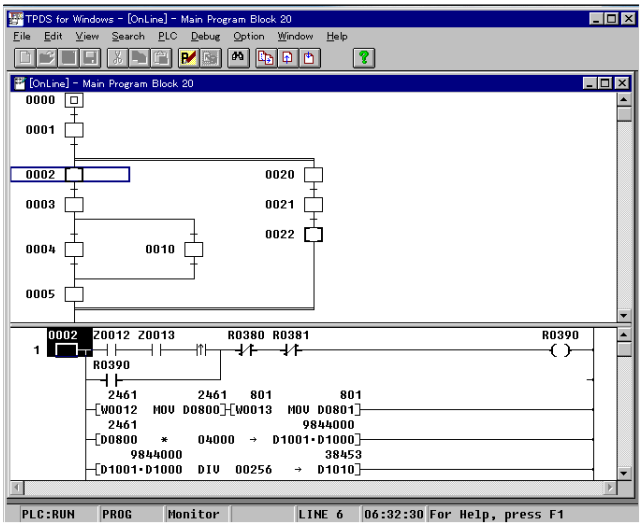
Program edit screen



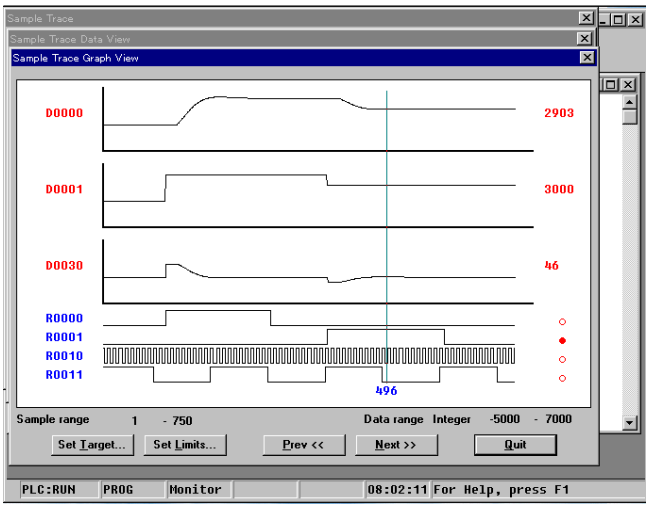
Program execution monitor (Ladder)



Program execution monitor (SFC)



Sampling trace screen



T3/T3H Instruction Set

Basic Instructions

FUN No.	Symbol	Name
	-| |-	NO contact
	-| / |-	NC contact
	-|↑|-	Transitional contact (rising edge)
	-|↓|-	Transitional contact (falling edge)
	-( )-|	Coil
	∗( )-|	Forced coil (debugging purpose only)
	-| I |-	Inverter
	-(I)-|	Invert coil
	-| P |-	Positive pulse contact
	-| N |-	Negative pulse contact
	-(P)-|	Positive pulse coil
	-(N)-|	Negative pulse coil
	JCS	Jump control set
	JCR	Jump control reset
	TON	ON delay timer
	TOF	OFF delay timer
	SS	Single-shot timer
	CNT	Counter
	MCS	Master control set
	MCR	Master control reset
134	MCSn	Master control set (nesting)
135	MCRn	Master control reset (nesting)
148	TRG	Timer trigger
	END	End

Data transfer Instructions

FUN No.	Symbol	Name
18	MOV	Data transfer
19	DMOV	Double-word data transfer
20	NOT	Invert transfer
21	DNOT	Double-word invert transfer
22	XCHG	Exchange
23	DXCH	Double-word exchange
24	TINZ	Table initialize
25	TMOV	Table block transfer
26	TNOT	Table invert transfer
90	MPX	Multiplexer
91	DPX	Demultiplexer
92	TBM	Table → bit transfer
93	BTM	Bit → table transfer

Arithmetic Operations

FUN No.	Symbol	Name
27	+	Addition
28	–	Subtraction
29	∗	Multiplication
30	/	Division

Arithmetic Operations

FUN No.	Symbol	Name
31	D+	Double-word addition
32	D–	Double-word subtraction
33	D∗	Double-word multiplication
34	D/	Double-word division
35	+C	Addition with carry
36	–C	Subtraction with carry
37	D+C	Double-word addition with carry
38	D–C	Double-word subtraction with carry
39	U∗	Unsigned multiplication
40	U/	Unsigned division
41	DIV	Unsigned double/single division
42	D∗/	Double-word multiplication and division (T3H only)
43	+1	Increment
44	D+1	Double-word increment
45	–1	Decrement
46	D–1	Double-word decrement

Logical Operations

FUN No.	Symbol	Name
48	AND	AND
49	DAND	Double-word AND
50	OR	OR
51	DOR	Double-word OR
52	EOR	Exclusive OR
53	DEOR	Double-word exclusive OR
54	ENR	NOT exclusive OR
55	DENR	Double-word NOT exclusive OR
57	TAND	Table AND
58	TOR	Table OR
59	TEOR	Table exclusive OR
60	TENR	Table NOT exclusive OR
64	TEST	Bit test
65	DTST	Double-word bit test
66	TTST	Bit file bit test

Shift Instructions

FUN No.	Symbol	Name
68	SHR1	1 bit shift right
69	SHL1	1 bit shift left
70	SHRn	n bits shift right
71	SHLn	n bits shift left
72	TSHR	Bit file n bits shift right
73	TSHL	Bit file n bits shift left
74	SR	Shift register
75	DSR	Bi-directional shift register
76	SFT	Device shift

Rotate Instructions

FUN No.	Symbol	Name
78	RTR1	1 bit rotate right
79	RTL1	1 bit rotate left
80	RTRn	n bits rotate right
81	RTLn	n bits rotate left
82	TRTR	Bit file n bits rotate right
83	TRTL	Bit file n bits rotate left
84	RRC1	1 bit rotate right with carry
85	RLC1	1 bit rotate left with carry
86	RRCn	n bits rotate right with carry
87	RLCn	n bits rotate left with carry
88	TRRC	Bit file n bits rotate right with carry
89	TRLC	Bit file n bits rotate left with carry

Comparison Instructions

FUN No.	Symbol	Name
95	TCMP	Bit file comparison
96	>	Greater than
97	>=	Greater than or equal
98	=	Equal
99	<>	Not equal
100	<	Less than
101	<=	Less than or equal
102	D>	Double-word greater than
103	D>=	Double-word greater than or equal
104	D=	Double-word equal
105	D<>	Double-word not equal
106	D<	Double-word less than
107	D<=	Double-word less than or equal
108	U>	Unsigned greater than
109	U>=	Unsigned greater than or equal
110	U=	Unsigned equal
111	U<>	Unsigned not equal
112	U<	Unsigned less than
113	U<=	Unsigned less than or equal

Special Data Operations

FUN No.	Symbol	Name
114	SET	Device / register set
115	RST	Device / register reset
116	TSET	Table bit set
117	TRST	Table bit reset
118	SETC	Set carry
119	RSTC	Reset carry
120	ENC	Encode
121	DEC	Decode
122	BC	Bit count
123	DBC	Double-word bit count
124	SCH	Data search
125	PUSH	Push
126	POPL	Pop last
127	POPF	Pop first
147	F/F	Flip flop
149	U/D	Up / down counter

Program Control Instructions

FUN No.	Symbol	Name
128	CALL	Subroutine call
137	SUBR	Subroutine entry
129	RET	Subroutine return
130	JUMP	Conditional jump
136	LBL	Jump label
132	FOR	FOR-NEXT loop (FOR)
133	NEXT	FOR-NEXT loop (NEXT)
138	STOP	Program execution stop
140	EI	Enable interrupt
141	DI	Disable interrupt
142	IRET	Interrupt return
143	WDT	Watchdog timer reset
144	STIZ	Step sequence initialization
145	STIN	Step sequence input
146	STOT	Step sequence output
158	DRUM	Drum sequencer
159	CAM	Cam sequencer
241	SFIZ	SFC initialization

RAS Functions

FUN No.	Symbol	Name
150	DIAG	Diagnostic display
151	DIAR	Diagnostic display reset
152	STLS	Status latch set
153	STLR	Status latch reset
154	CLND	Calendar set
155	CLDS	Calendar operation

Functions

FUN No.	Symbol	Name
160	UL	Upper limit
161	LL	Lower limit
162	MAX	Maximum value
163	MIN	Minimum value
164	AVE	Average value
165	FG	Function generator
166	DB	Dead band
167	RT	Square root
168	INTG	Integral
169	RAMP	Ramp function
170	PID	PID (proportional integral derivative)
171	PID2	Deviation square PID
156	PID3	Pre-derivative real PID (T3H only)
172	SIN	Sine function
173	COS	Cosine function
174	TAN	Tangent function
175	ASIN	Arc-sine function
176	ACOS	Arc-cosine function
177	ATAN	Arc-tangent function
178	EXP	Exponential function
179	LOG	Logarithm

Data Conversion Instructions

FUN No.	Symbol	Name
180	ABS	Absolute value
181	DABS	Double-word absolute value
182	NEG	Two's complement
183	DNEG	Double-word two's complement
184	DW	Double-word conversion
185	7SEG	7-segment decode
186	ASC	ASCII conversion
188	BIN	BCD to binary conversion
189	DBIN	Double-word BCD to binary conversion
190	BCD	Binary to BCD conversion
191	DBCD	Double-word binary to BCD conversion

BCD Operations

FUN No.	Symbol	Name
192	B+	BCD addition
193	B–	BCD subtraction
194	B*	BCD multiplication
195	B/	BCD division
196	DB+	Double-word BCD addition
197	DB–	Double-word BCD subtraction
198	DB*	Double-word BCD multiplication
199	DB/	Double-word BCD division
200	B+C	BCD addition with carry
201	B–C	BCD subtraction with carry
202	DB+C	Double-word BCD addition with carry
203	DB–C	Double-word BCD subtraction with carry

Floating-Point Instructions

FUN No.	Symbol	Name
204	FLT	Fixed-point to floating-point conversion
205	FIX	Floating-point to fixed-point conversion
206	FABS	Floating-point absolute value
207	FNEG	Floating-point sign inversion
208	F+	Floating-point addition
209	F–	Floating-point subtraction
210	F*	Floating-point multiplication
211	F/	Floating-point division
212	F>	Floating-point greater than
213	F>=	Floating-point greater than or equal
214	F=	Floating-point equal
215	F<>	Floating-point not equal
216	F<	Floating-point less than
217	F<=	Floating-point less than or equal

Floating-Point Instructions

FUN No.	Symbol	Name
218	FUL	Fixed-point upper limit
219	FLL	Floating-point lower limit
220	FDB	Floating-point dead band
221	FRT	Floating-point square root
222	FPID	Floating-point PID
223	FPID2	Floating-point deviation square PID
232	FPID3	Floating-point pre-derivative real PID (T3H only)
224	FSIN	Floating-point sine function
225	FCOS	Floating-point cosine function
226	FTAN	Floating-point tangent function
227	FASIN	Floating-point arc-sine function
228	FACOS	Floating-point arc-cosine function
229	FATAN	Floating-point arc-tangent function
230	FEXP	Floating-point exponential function
231	FLOG	Floating-point logarithm

Special I/O Instructions

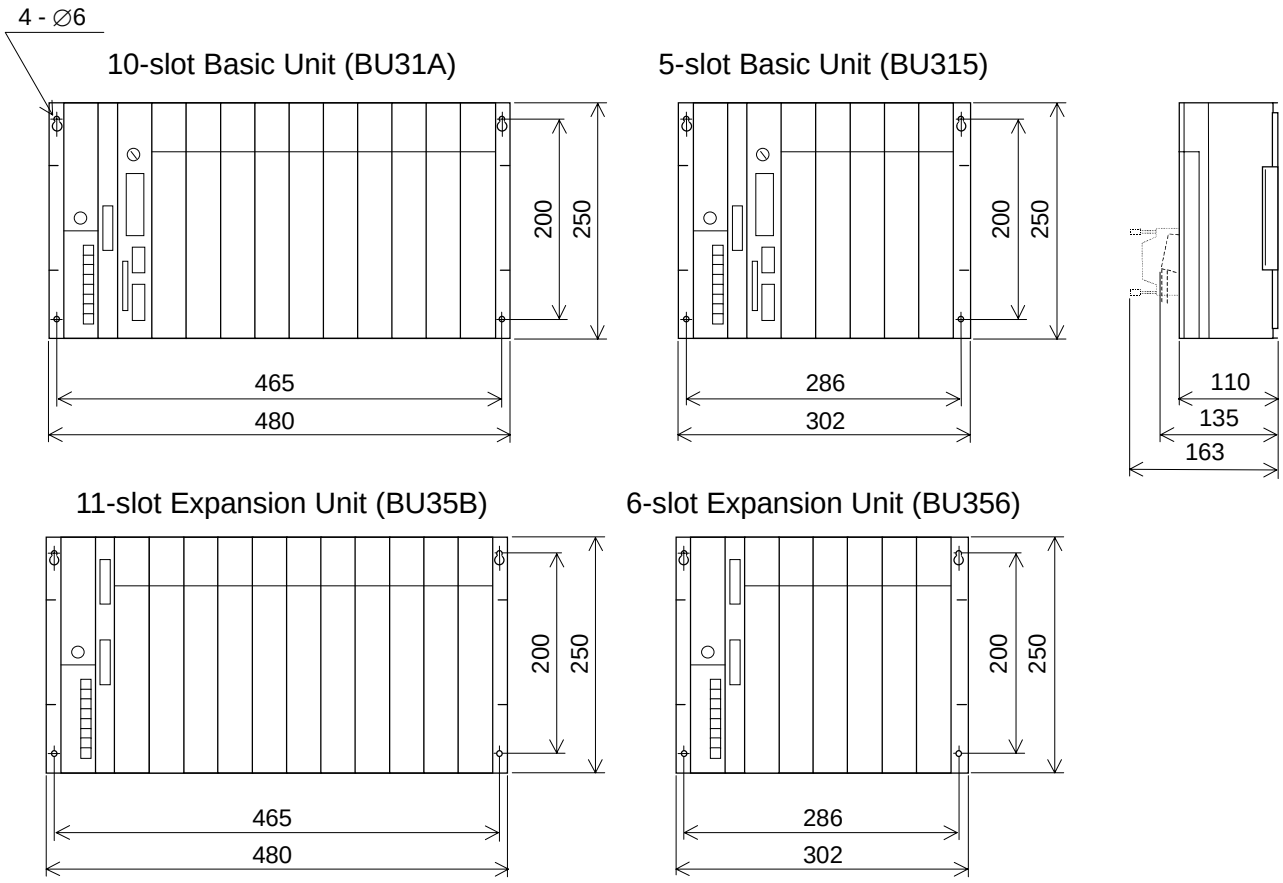
FUN No.	Symbol	Name
235	I/O	Direct input / output
236	XFER	Expanded data transfer
237	READ	Special module data read
238	WRITE	Special module data write
239	SEND	Network data send (T3H only)
240	RECV	Network data receive (T3H only)

T3/T3H Specifications

General Specifications

Item	Specifications
Power voltage	100 - 120 / 200 - 240 Vac, +10/-15% (PS361) 24 Vdc, +20/-15% (PS332)
Current consumption	80 VA or less (PS361) 50 W or less (PS332)
Continuous power interruption	10 ms or less
Operating temperature	0 - 55 °C
Storage temperature	-20 to 75 °C
Ambient humidity	20 to 90 % RH
Vibration	16.7 Hz, 3 mm p-p
Shock	98 m/s^2, X,Y,Z direction, 3 times
Noise immunity	1500 V p-p, 1μs (impulse method)
Withstand voltage	1500 Vac for 1 minute
Weight	Approx. 8 kg (10-slot basic unit)

External Dimensions



Functional Specifications

Item		T3	T3H
Control method		Stored program cyclic scan system	
Processor		Overall control: 16-bit micro processor Program execution: Custom language processor (LP)	
I/O processing		Batch I/O update (refresh) and Direct I/O access	
I/O points		1376 points (32 points I/O used) 2752 points (64 points I/O used) I/O space: 4096 points/256 words	2432 points (32 points I/O used) 4864 points (64 points I/O used) I/O space: 8192 points/512 words
Programming language		Ladder diagram (relay symbol + function block) SFC (Sequential Function Chart)	
Program capacity		32 k steps (PU315, PU325)	32 k steps (PU325H) 64 k steps (PU326H)
Memory		SRAM (battery back-up, 5 years / 25 °C) EEPROM (PU325, PU325H, PU326H) IC memory card (option)	
Program instructions		Basic: 24 types Function: 201 types	Basic: 24 types Function: 206 types
Execution speed		0.15 μs/contact 0.3 μs/coil 0.9 μs/16-bit transfer 2.25 μs 16-bit addition	0.09 μs/contact 0.18 μs/coil 0.54 μs/16-bit transfer 0.90 μs 16-bit addition
Main scan system		Floating or fixed interval Fixed interval setting: 10 to 200 ms (10 ms units)	
Multitasking		1 main program 1 timer interrupt program (2 to 1000 ms (T3) / 1 to 1000 ms (T3H), 1 ms units) 8 I/O interrupt programs 4 sub-programs	
User data	External I/O	4096 points / 256 words (X/XW, Y/YW: batch I/O) (I/IW,O/OW: direct I/O)	8192 points / 512 words (X/XW, Y/YW: batch I/O) (I/IW,O/OW: direct I/O)
	Auxiliary relay/register	8192 points / 512 words (R/RW)	16000 points / 1000 words (R/RW)
	Special relay/register	4096 points / 256 words (S/SW)	4096 points / 256 words (S/SW)
	Timer	512 points (T./T) (64 pts at 0.1s timer, 448 pts at 0.01s timer)	1000 points (T./T) (configuration of 0.1s and 0.01s timers are user definable)
	Counter	512 points (C./C)	512 points (C./C)
	Link register (for TOSLINE-S20)	8192 points / 1024 words (Z/W) (W000 to W511: bit accessible)	16000 points / 2048 words (Z/W) (W000 to W999: bit accessible)
	Link register (for TOSLINE-F10)	4096 points / 256 words (L/LW)	4096 points / 256 words (L/LW)
	Data register	8192 words (D)	8192 words (D)
	File register	8192 words (F)	32768 words (F)
	Index register	3 words (I, J, K)	3 words (I, J, K)
	Retentive data	User definable for RW, T, C and D, plus whole range of F	
Clock-calendar		Year, month, day, hour, minute, second, day of the week	
Computer link		RS-485 (standard built-in)	
Self diagnostics		Power interruption, basic/expansion power voltage, battery voltage, I/O bus, I/O response, I/O parity, WD timer, etc.	

I/O Module Specifications

Digital Input

Module type	Input type	Input points	Input voltage	Input current	ON voltage	OFF voltage	ON delay	OFF delay	Internal 5 Vdc
DI334	DC input	32 points (8 pts/cmn)	12 - 24 Vdc	10 mA	9.6 V	3.5 V	10 ms or less	15 ms or less	100 mA or less
DI334H							1 ms or less	1.5 ms or less	
DI335		64 points (8 pts/cmn)	24 Vdc	5 mA	16 V	5 V	10 ms or less	15 ms or less	170 mA or less
DI335H							1 ms or less	1.5 ms or less	
IN354	AC input	32 points (8 pts/cmn)	100 -120 Vac	10 mA	70 Vac	25 Vac	15 ms or less	15 ms or less	120 mA or less
IN364			200 - 240 Vac		140 Vac	50 Vac			

Digital Output

Module type	Output type	Output points	Output voltage	Load current	ON delay	OFF delay	Leak current	Internal 5 Vdc
DO333	Transistor output (Current sinking)	16 points (8 pts/cmn)	12 - 24 Vdc	2 A/point 5 A/cmn	1 ms or less	1 ms or less	0.1 mA or less	320 mA or less
DO334		32 points (16 pts/cmn)		0.5 A/pnt 5 A/cmn				210 mA or less
DO335		64 points (8 pts/cmn)	5 - 24 Vdc	0.1 A/pnt				400 mA or less
AC363	Triac output	16 points (8 pts/cmn)	100 - 240 Vac	2 A/point 5 A/cmn	1 ms or less	1 ms + 1/2 cycle or less	1.0 mA or less at 100 Vac	530 mA or less
AC364		32 points (16 pts/cmn)		0.5 A/pnt 3.2 A/cmn				800 mA or less
RO364	Relay output	32 points (8 pts/cmn)	240 Vac 24 Vdc	2 A/point 5 A/cmn	10 ms or less	10 ms or less	None	170 mA or less
RO363S		16 points (isolated)		2 A/point				100 mA or less

I/O Module Specifications

Analog Input

Module type	Input range	Input channels	Resolution	Input impedance	Accuracy	Conversion speed	Internal 5 Vdc
AD368	±5 V, ±10 V, 0 - 5 V, 0 - 10 V, 1 - 5 V	8 ch	12-bit 0.025 %	1 MΩ or more	± 0.2 % at 25 °C	20 ms / 8 ch	450 mA or less
	±20 mA, 0 - 20 mA, 4 - 20 mA			250 Ω			
AD318	0 - 5 V	8 ch	12- bit 0.025 %	500 kΩ or more	± 0.2 % at 25 °C	2.45 ms / 8 ch	600 mA or less
AD328	0 - 20 mA	8 ch	12- bit 0.025 %	250 Ω	± 0.2 % at 25 °C	2.45 ms / 8 ch	600 mA or less
AD338	±10 V	8 ch	12- bit 0.025 %	500 kΩ or more	± 0.2 % at 25 °C	2.45 ms / 8 ch	600 mA or less

Analog Output

Module type	Output range	Output channels	Resolution	Load impedance	Accuracy	Conversion speed	Internal 5 Vdc
DA364	± 10 V, 0 - 10 V	4 ch	12-bit 0.025 %	500 Ω or more	± 0.2 % at 25 °C	10 ms / 4 ch	180 mA or less
	±5 V, 0 - 5 V, 1 - 5 V			250 Ω or more			
DA374	0 - 20 mA, 4 - 20 mA	4 ch	12-bit 0.025 %	550 Ω or less	± 0.2 % at 25 °C	10 ms / 4 ch	180 mA or less

Special Modules

Type	PI312 Pulse input
Input channels	2 channels
Counting speed	Max. 50 kpps
Input voltage	5 / 12 Vdc (16 mA)
Counts	24-bit binary
Function	Quadrature, up/down, speed counter
Interrupt	Count match
5 Vdc	800 mA or less

Type	CD332 Change detect
Input points	8 points
Input voltage	12 - 24 Vdc
Input current	10 mA (24 Vdc)
Operation voltage	ON: 9.6 V OFF: 3.5 V
Delay	ON: 30/3.0 ms OFF: 30/3.5 ms
Interrupt	Status change
5 Vdc	300 mA or less

Type	AS311 ASCII interface
Interface	RS-232C, RS-422
No. of ports	2 ports
Baudrate (bps)	300, 600, 1200, 2400, 4800, 9600, 19200
Frame	Start: 1 bit
	Data: 7/8 bits
	Stop: 1/2 bits
	Parity: yes/no
Code	ASCII
5 Vdc	1.0 A or less

Safety Precaution

This product is intended to be used for the control of industrial machines and processes.
Misuse of this product can result in property damage or human injury.
Read related manuals carefully before using this product.

The data given in this brochure are subject to change without notice.

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June-98