UTAdvanced

Advanced Control
Simplicity
Networking
Reliability

UTAdvanced Ladder Programming （Advanced）

Ladder Programming (Advanced)

1. Register, Relay

- Computation configuration
- Input ladder computation
- Output ladder computation
- Internal device
- Power failure action
- PID register, relay
- Special relay
- Peer-to-peer communication register, relay

2. Data type

- Relay process
- Register process

3. Instruction

- Basic instruction
- Advanced instruction

4. Training

- Training 1 Annunciator circuit
- Training 2 Starting circuit using timer

Register, Relay (Computation configuration) UTAdvanced

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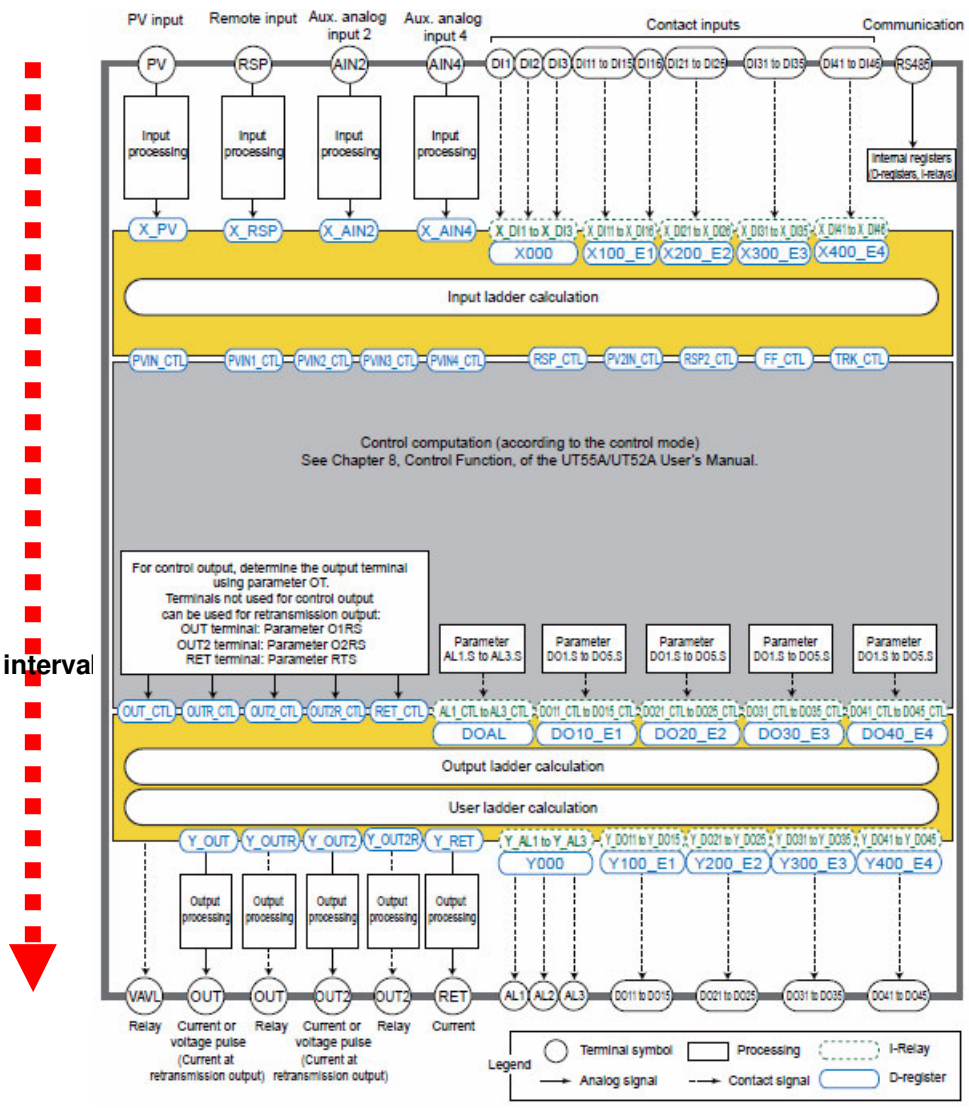

Input process
(related control setting parameters)
(AI, scaling, DI condition setting)

Input ladder calculation
Analog input etc is calculated

Control computation
P I D, alarm setting

Output ladder calculation
Additional calculation to PID OUT is programmed

User ladder calculation
Sequence control not related to PID is programmed

Output process
(related to control setting parameters)
(AO, DO setting etc)

Register, Relay (Input ladder calculation)

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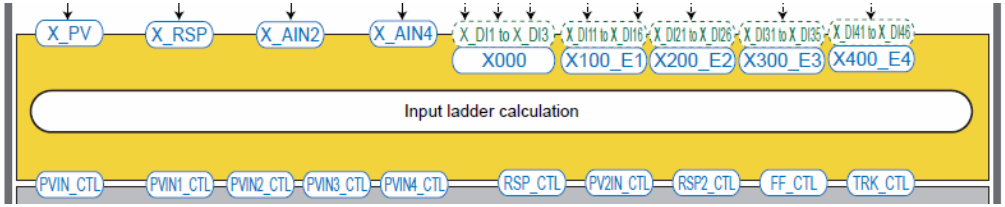
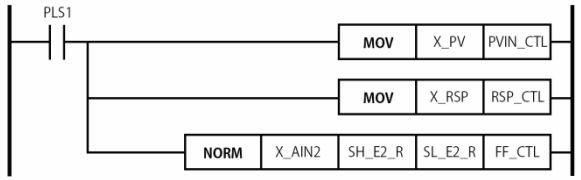


Input ladder calculation block figure



Default ladder program (Single loop control)

User ladder calculation

In input ladder calculation, user ladder calculation is programmed, which is used for transfer input process data to PID calculation.

→ You can make your own input calculation revising, adding to this.

Register

Main registers: Data after input process is transferred to PID control
(AI related of X_PV , X_RSP etc, DI related ofX_DI1 etc
DI related →status register such as X000
Registers such as X_PV: Scaring data processed in input →
can be processed in actual engineering units

Execution order

Before PID calculation process is executed: Input analog calculation process is programmed Input ladder calculation and transferred to PID control.

Register, Relay (Input ladder calculation)

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Input Ladder Calculation: Analog Input Registers

Position	Terminal Symbol	Register (16 bits)	Description
Standard terminal area	PV	X_PV	PV analog input
E1-terminal area	RSP	X_RSP	RSP analog input
E2-terminal area	AIN2	X_AIN2	AIN2 aux. analog input
E4-terminal area	AIN4	X_AIN4	AIN4 aux. analog input

Data format

Analog inputs:
signed two-byte data of
-19999 to 30000 including
decimal point position

Input Ladder Calculation: Control Input Registers

Register (16 bits)	Description
PVIN_CTL	Control PV input (in controls other than Loop control with PV switching or Loop control with PV auto-selector)
PVIN1_CTL	Control PV input 1 (in Loop control with PV switching or Loop control with PV auto-selector)
PVIN2_CTL	Control PV input 2 (in Loop control with PV auto-selector or Loop control with PV switching)
PVIN3_CTL	Control PV input 3 (in Loop control with PV auto-selector)
PVIN4_CTL	Control PV input 4 (in Loop control with PV auto-selector)
PV2IN_CTL	Control PV2 input (in Cascade control)
RSP_CTL	Control RSP input
RSP2_CTL	Control RSP2 input (in Cascade control)
TRK_CTL	Control tracking input (except for Cascade control)
FF_CTL	Control feedforward input (in Single-loop control or Loop control with PV-hold function)

Data format

Calculated results:
signed two-byte data of
-19999 to 30000 including
decimal point position

Register, Relay (Input ladder calculation)

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Input status relay

Position	Terminal Symbol	Relay (1 bit)	Status Register (16 bits)	Description
Standard terminal area	DI1	X_DI1	X000	DI1 status
	DI2	X_DI2		DI2 status
	DI3	X_DI3		DI3 status
E1-terminal area	DI11	X_DI11	X100_E1	DI11 status
	DI12	X_DI12		DI12 status
	DI13	X_DI13		DI13 status
	DI14	X_DI14		DI14 status
	DI15	X_DI15		DI15 status
	DI16	X_DI16		DI16 status
E2-terminal area	DI21	X_DI21	X200_E2	DI21 status
	DI22	X_DI22		DI22 status
	DI23	X_DI23		DI23 status
	DI24	X_DI24		DI24 status
	DI25	X_DI25		DI25 status
	DI26	X_DI26		DI26 status
E3-terminal area	DI31	X_DI31	X300_E3	DI31 status
	DI32	X_DI32		DI32 status
	DI33	X_DI33		DI33 status
	DI34	X_DI34		DI34 status
	DI35	X_DI35		DI35 status
E4-terminal area	DI41	X_DI41	X400_E4	DI41 status
	DI42	X_DI42		DI42 status
	DI43	X_DI43		DI43 status
	DI44	X_DI44		DI44 status
	DI45	X_DI45		DI45 status
	DI46	X_DI46		DI46 status

Remarks

Status registers such as X000:
relay bit (X_DI etc) automatically reflected

0/1 of X_DIxx is decided by setting parameters of input process.
Default: 1 in case of contact ON

In using input status in ladder program,
Set DI functions (A/M, R/S etc) of Off
From the fault setting, DI function is assigned

Register, Relay (Output calculation, User ladder)

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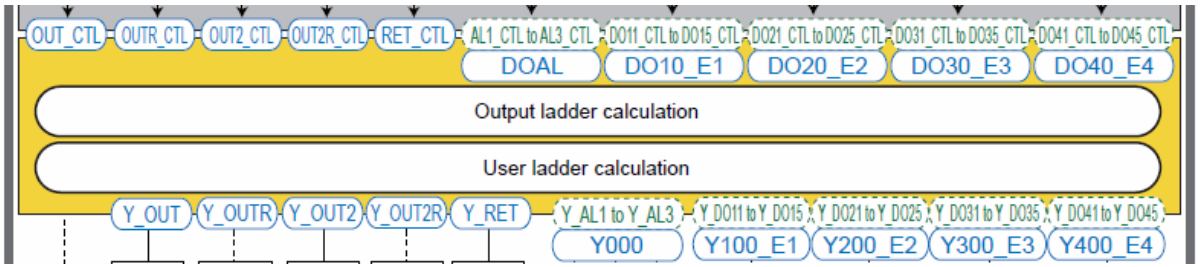
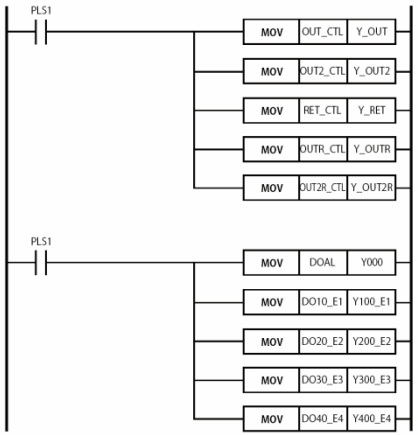


Output/User ladder calculation block figure



Default ladder program (single loop program)

Default ladder program

- Output ladder calculation is programmed in default ladder program, which transfer data after PID calculation to output process.

→User program can be program revising and adding

- In user ladder calculation, no default program

→is used for sequence control not related to PID

Register

Main registers: PID calculation result such as OUT_CTL,RET_CTL,DOAL etc
transferred to Output terminal (Y_OUT, Y000 etc)
(Status data of alarm needs to be transferred to output process)

Execution order

It is executed after PID calculation: Used for program which needs PID calculation result
Ladder calculation is executed after output ladder calculation

Register, Relay (Output calculation, User ladder)

Output Ladder Calculation: Control Computation Registers

Register (16 bits)	Description
OUT_CTL	Control OUT output (current and voltage pulses)
OUTR_CTL	Control OUT output (relays)
OUT2_CTL	Control OUT2 output (current and voltage pulses)
OUT2R_CTL	Control OUT2 output (relays)
RET_CTL	Control RET output (current)

Data format

Analog inputs:
signed two-byte data of
-19999 to 30000 including
decimal point position

Output Ladder Calculation: Output Registers

Terminal Symbol	Register (16 bits)	Description
OUT	Y_OUT	OUT control output (current and voltage pulses)
OUT	Y_OUTR	OUTR control output (relays)
OUT2	Y_OUT2	OUT2 control output (current and voltage pulses)
OUT2	Y_OUT2R	OUT2R control output (relays)
RET	Y_RET	RET retransmission output (current)

Data format

Calculated results:
signed two-byte data of
-19999 to 30000 including
decimal point position.
Output data:-5.0 - 105.0% .

Data of output process: output followed by control output parameters (4-20mA, 0-20mA etc)

Register, Relay (Output calculation, User ladder)

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Control Relays/Control Status Registers

Relay (1 bit)	Status Register (16 bits)	Description	
AL1_CTL	DOAL	Control AL1 status	Function set using parameter AL1.S
AL2_CTL		Control AL2 status	Function set using parameter AL2.S
AL3_CTL		Control AL3 status	Function set using parameter AL3.S
DO11_CTL	DO10_E1	Control DO11 status	Function set using parameter DO1.S
DO12_CTL		Control DO12 status	Function set using parameter DO2.S
DO13_CTL		Control DO13 status	Function set using parameter DO3.S
DO14_CTL		Control DO14 status	Function set using parameter DO4.S
DO15_CTL		Control DO15 status	Function set using parameter DO5.S
DO21_CTL	DO20_E2	Control DO21 status	Function set using parameter DO1.S
DO22_CTL		Control DO22 status	Function set using parameter DO2.S
DO23_CTL		Control DO23 status	Function set using parameter DO3.S
DO24_CTL		Control DO24 status	Function set using parameter DO4.S
DO25_CTL		Control DO25 status	Function set using parameter DO5.S
DO31_CTL	DO30_E3	Control DO31 status	Function set using parameter DO1.S
DO32_CTL		Control DO32 status	Function set using parameter DO2.S
DO33_CTL		Control DO33 status	Function set using parameter DO3.S
DO34_CTL		Control DO34 status	Function set using parameter DO4.S
DO35_CTL		Control DO35 status	Function set using parameter DO5.S
DO41_CTL	DO40_E4	Control DO41 status	Function set using parameter DO1.S
DO42_CTL		Control DO42 status	Function set using parameter DO2.S
DO43_CTL		Control DO43 status	Function set using parameter DO3.S
DO44_CTL		Control DO44 status	Function set using parameter DO4.S
DO45_CTL		Control DO45 status	Function set using parameter DO5.S

Output Relays/Output Status Registers

Position	Terminal Symbol	Relay (1 bit)	Status Register (16 bits)	Description
Standard terminal area	AL1	Y_AL1	Y000	AL1 status
	AL2	Y_AL2		AL2 status
	AL3	Y_AL3		AL3 status
E1-terminal area	DO11	Y_DO11	Y100_E1	DO11 status
	DO12	Y_DO12		DO12 status
	DO13	Y_DO13		DO13 status
	DO14	Y_DO14		DO14 status
	DO15	Y_DO15		DO15 status
E2-terminal area	DO21	Y_DO21	Y200_E2	DO21 status
	DO22	Y_DO22		DO22 status
	DO23	Y_DO23		DO23 status
	DO24	Y_DO24		DO24 status
	DO25	Y_DO25		DO25 status
E3-terminal area	DO31	Y_DO31	Y300_E3	DO31 status
	DO32	Y_DO32		DO32 status
	DO33	Y_DO33		DO33 status
	DO34	Y_DO34		DO34 status
	DO35	Y_DO35		DO35 status
E4-terminal area	DO41	Y_DO41	Y400_E4	DO41 status
	DO42	Y_DO42		DO42 status
	DO43	Y_DO43		DO43 status
	DO44	Y_DO44		DO44 status
	DO45	Y_DO45		DO45 status

- Status registers such as Y000 is automatically reflected to relay bit (Y_AL1 etc)
- 0/1 status of Y_AL1 and Y_DOxx are output followed by control output setting parameters (Default: 1 →contact)
- At default setting, contact output is interlocked with event display on LED (EV1-EV8) front face. Set the EV1-EV8 accordingly

Register, Relay (Internal Device)

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Device Name	Relay/Register	Data Format	Remarks
Internal (M) relays	M01 to M128	0 or 1 Internal processing handles a value of less than 0.5 as "0" and a value of 0.5 or more as "1." M1_16: status registers of M01 to M16 relays M17_32: status registers of M17 to M32 relays M33_48: status registers of M33 to M48 relays M49_64: status registers of M49 to M64 relays M65_80: status registers of M65 to M80 relays M81_96: status registers of M81 to M96 relays M97_112: status registers of M97 to M112 relays M113_128: status registers of M113 to M128 relays	Non-holding type
	M01_B to M32_B	0 or 1 Internal processing handles a value of less than 0.5 as "0" and a value of 0.5 or more as "1." M1_16_B: status registers of M01_B to M16_B relays M17_32_B: status registers of M17_B to M32_B relays	Holding type
	M33_B to M128_B	0 or 1 Internal processing handles a value of less than 0.5 as "0" and a value of 0.5 or more as "1." M33_48_B: status registers of M33_B to M48_B relays M49_64_B: status registers of M49_B to M64_B relays M65_80_B: status registers of M65_B to M80_B relays M81_96_B: status registers of M81_B to M96_B relays M97_112_B: status registers of M97_B to M112_B relays M113_128_B: status registers of M113_B to M128_B relays	Holding type However, when the control period is 50ms, the data is non-holding type.
DAT registers	DAT01 to DAT20	Handles data as 4-byte floating-point numbers (IEEE 754 single-precision floating-point format).	Non-holding type
	DAT01_B to DAT08_B		Holding type However, when the control period is 50ms, the data is non-holding type.

For power failure,
Holding type is recommended

Power Failure Action

Allowable time for instantaneous case

100-240VAC power: within 20ms
24VDC power: within 1ms
Normal operation can continue within the above condition.

Power failure actions

	Less than approx.5 sec	More than approx 5sec
Alarm action	No alarm output. In case of alarm with wait, it will be wait status	
Setting parameter	Each parameters setting can be hold	
Auto tuning	Released	
Timer, counter, relay, Registers (non-holding type)	Initialized	
Control actions	Action before power failure will be used	Followed by R.MD (restart mode) CONT: Continue action before power failure (default) MAN: output PO (preset output)* and manual operation * PO of PID group before power failure

Register, Relay (Internal Device)

K, P- Registers

Device Name	Relay/Register	Data Format	Remarks
K-registers	K01 to K30	K01 to K20: Handles 2-byte integer ranging from -32768 to 32767 and the decimal point position. K21 to K30: Handles 2-byte integer ranging from 0 to 65535 and the decimal point position.	Holding type In the ladder program, do not write to K-registers. K-register constants are set in the Parameter Setting window.
P-registers	P01 to P10	Handles 2-byte integer ranging from -19999 to 30000 and the decimal point position.	Holding type, parameter setting P-registers are the same as P-parameters displayed on the UT.

K registers: Fixed register. can be configured by LL50A

P registers: Changeable register. Can be configured by unit operation keys

Register, Relay (Internal Device)

Constant Registers, Timer, Counter

Device Name	Relay/Register	Data Format	Remarks
Constant registers	C_1	Constant -1 (unsigned 2-byte integer)	Fixed values. Write disabled.
	C0	Constant 0 (unsigned 2-byte integer)	
	C1	Constant 1 (unsigned 2-byte integer)	
	C2	Constant 2 (unsigned 2-byte integer)	
	C3	Constant 3 (unsigned 2-byte integer)	
	C4	Constant 4 (unsigned 2-byte integer)	
	C5	Constant 5 (unsigned 2-byte integer)	
	C10	Constant 10 (unsigned 2-byte integer)	
	C50	Constant 50 (unsigned 2-byte integer)	
	C60	Constant 60 (unsigned 2-byte integer)	
	C100	Constant 100 (unsigned 2-byte integer)	
	C1000	Constant 1000 (unsigned 2-byte integer)	
	C10000	Constant 10000 (unsigned 2-byte integer)	
Time-out relays	TIM1 to TIM4	"1" at time-out or "0" at reset TIM_RELAY: status registers of TIM1 to TIM4 relays	Used by a timer instruction. Write disabled.
Count-out relays	CNT1 to CNT4	"1" at count-out or "0" at reset CNT1 to CNT4: status registers of CNT_RELAY relays	Used by a counter instruction. Write disabled.

Constant registers: for multiplication/division etc

Register, Relay (PID Calculation)

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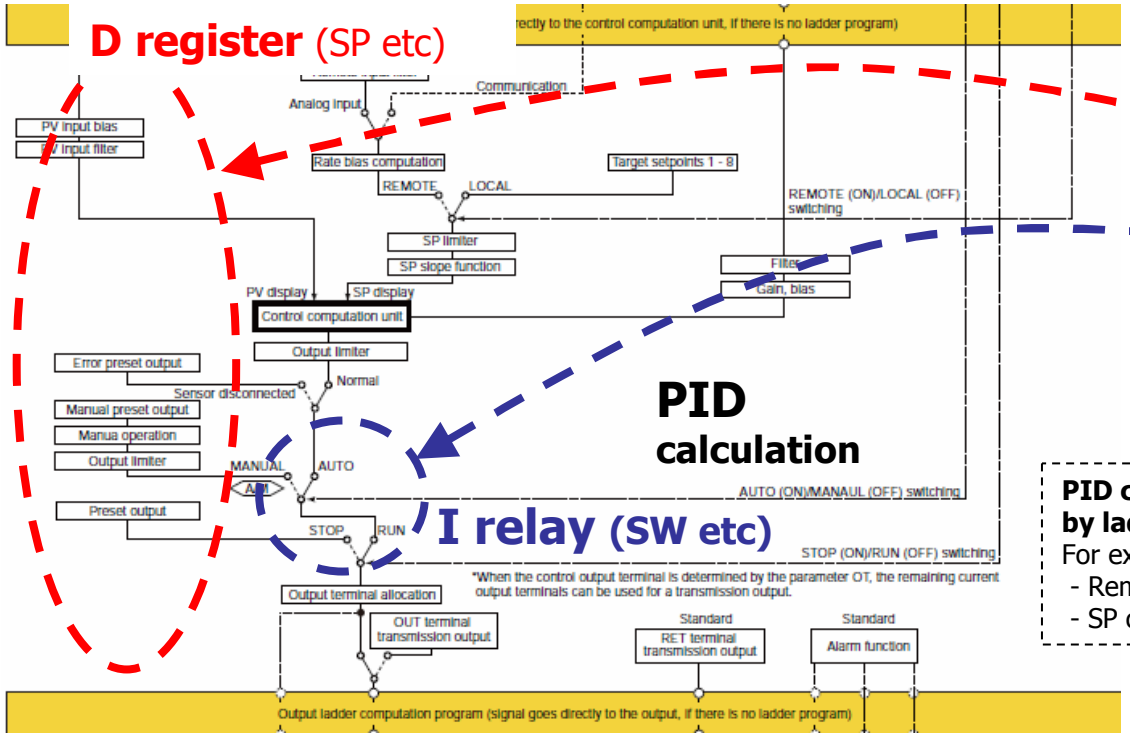
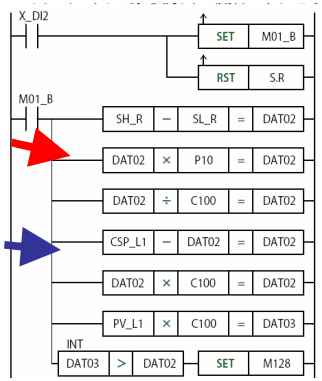
Register (D register), relay (I relay): for PID control by input/output/user ladder program
Register: 16 bit integer. Parameter registers such as process data/operation mode/TSP/Alarm
Relay: Alarm status. Operation mode, bar graph, event etc



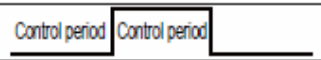
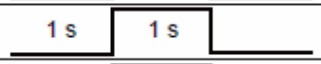
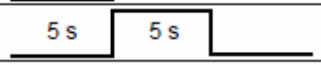
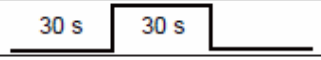
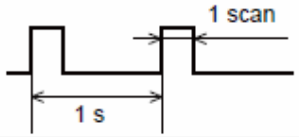
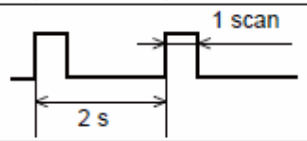
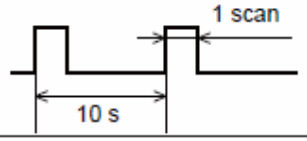
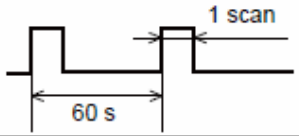


Ladder program

PID control setting and action switching use by ladder program
For example
- Remote/Local switching
- SP change

Special Relays

Read only. For timer, counter, and flicker action

Special Relay	Action	
PON	Activates a device for control period at power-on, reset start (L-RESET RUN), download the ladder program, or change of each input type and control period.	
PLS1	Always ON	
ZERO	Always OFF	
SMPCLK	Control period clock	
CLK1	1-second clock	
CLK2	2-second clock	
CLK10	10-second clock	
CLK60	60-second clock	
CLK1P	1-second clock pulse	
CLK2P	2-second clock pulse	
CLK10P	10-second clock pulse	
CLK60P	60-second clock pulse	

Register, Relay (Peer-to-peer communication)

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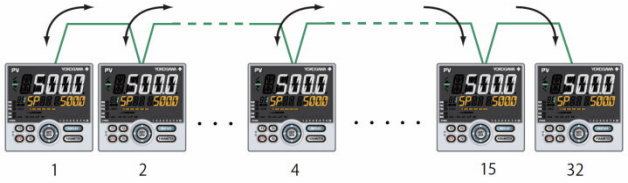
Peer-to-peer communication: Up to 32 UTs connected.

Four units: Send 4 analog data and 16 status data and receive 16 analog data, 64 status data.

Other 28 units: Receive 16 analog data and 64 status data.



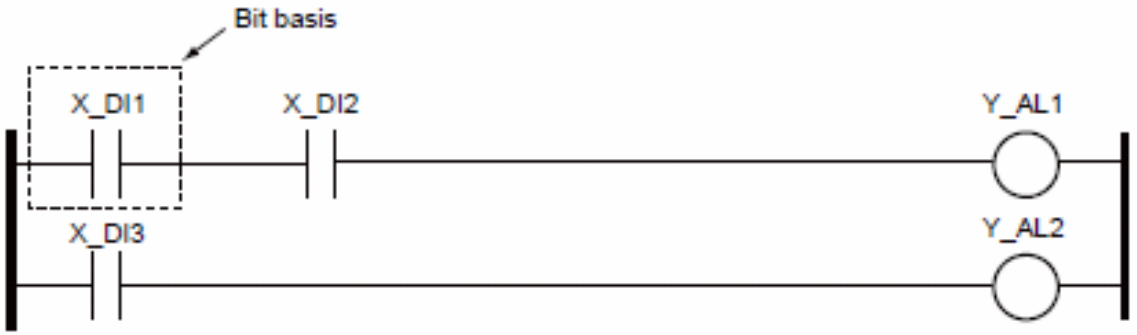
Peer-to-peer communication
by the ladder program

Register symbol	Name	Explanation	Data Type
CXn	Peer-to-peer communication analog input register	n: 01 to 04 Data received from communication address 1 n: 05 to 08 Data received from communication address 2 n: 09 to 12 Data received from communication address 3 n: 13 to 16 Data received from communication address 4	Floating point number (single-precision real number)
CYn	Peer-to-peer communication analog output register	n: 01 to 04 Data transmitted to other controllers	Floating point number (single-precision real number)
CIn	Peer-to-peer communication status input relay	n: 01 to 16 Data received from communication address 1 n: 17 to 32 Data received from communication address 2 n: 33 to 48 Data received from communication address 3 n: 49 to 64 Data received from communication address 4	Relay status data (0, 1)
COn	Peer-to-peer communication status output relay	n: 01 to 16 Data transmitted to other controllers	Relay status data (0, 1)
CFn	Reception time-out flag	n: 01 to 04 Indicates the status (normal/error) of the data received from communication address n.	Status data (0: normal, 1: error)
CEn	End of data reception flag	n: 01 to 04 Indicates the status (end of reception/during of reception) of the data received from communication address n.	Status data (0: during reception, 1: end of reception)

Data Format (Relay Processing)

Relay (Bit) Processing

Bit processing refers to processing that is performed when a bit device is specified in a basic instruction. It is executed in bits.



Type	Display Data	Internal Processing Data
Relay	0 or 1	Floating point number (Float)

Data format (Register Processing)

Data (Register) Processing

Type	Display Data	Internal Processing Data
D-register	Signed 16-bit integer	Floating point number (Float)
Status register	Unsigned 16-bit integer	Unsigned 16-bit integer
DAT register	Floating point number (Float)	Floating point number (Float)

D-registers: Contain parameter data or process data. 16-bit integers (-19999 to 31500).
Status registers: For example, M1_16 (status registers of internal relays M01 to M16),
DAT registers: Temporary registers to store data during calculations.

Monitor Ladder Program window enables data to be monitored in floating-point numbers

When DAT register (floating-point number) is moved to D register (16 bit integer), the decimal point is omitted.

1234.5 → 1235

If you need decimal point, you may use multiply and make it integer.

Instruction (Basic Instruction 1/2)

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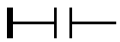
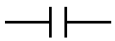
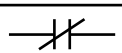
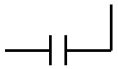
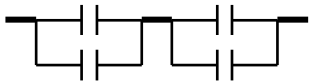
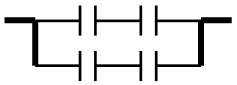
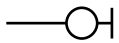
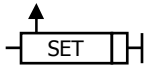
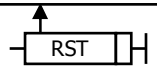
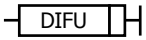
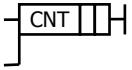
Instruction	step	Symbol	Function
Load	1		A contact
Load Not	1		B contact
And	1		And logic (a contact in parallel)
And Not	1		Not And logical (b contact in parallel)
Or	1		Performs connection in logical OR ("a" contact in parallel)
Or Not	1		Performs connection in NOR ("b" contact in parallel)
And Load	1		Executes logical AND between circuit elements
Or Load	1		Executes logical OR between circuit elements
Out	1		Outputs the previous calculation result
Set	1		Activates a specified device when input is ON
	1		Activates a specified device when an input changes from OFF to ON
Reset	1		Deactivates a specified device when input is ON
	1		Deactivates a specified device when an input changes from OFF to ON

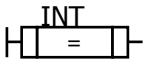
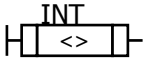
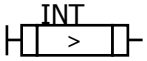
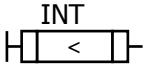
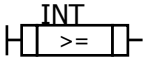
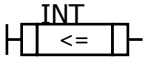
Instruction (Basic Instruction 2/2)

Instruction	step	Symbol	Function
Differential UP	1		Activates a device only for one scan when an input signal changes from OFF to ON
Differential Down	1		Activates a device only for one scan when an input signal changes from ON to OFF
Timer	4		Performs a synchronous backward timer action
Counter	3		Performs a backward counter action

Timer, Counter: up to 4 nos for each instruction

Instruction (Application Instructions 1/8)

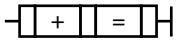
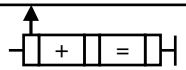
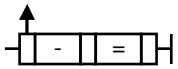
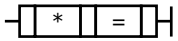
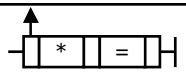
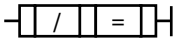
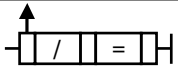
Comparison

Instruction	step	Symbol	Function
=	4		Compare 2 integer, activates if the condition is =
< >	4		Compare 2 integer, activates if the condition is <>
>	4		Compare 2 integer, activates if the condition is >
<	4		Compare 2 integer, activates if the condition is <
> =	4		Compare 2 integer, activates if the condition is >=
< =	4		Compare 2 integer, activates if the condition is <=

Number less than decimal points is omitted and the both integers are compared.
In comparison of all number including decimal point, the number must be multiplied using constant (C10, C100 etc) and execute comparison instruction.

Instruction (Application Instructions 2/8)

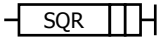
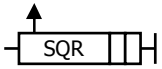
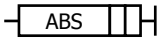
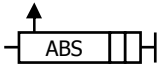
Four Fundamental Arithmetic Operations

Instruction	step	Symbol	Function
Addition	4		Performs addition when an input signal is ON
	4		Performs addition when an input signal changes from OFF to ON
Subtraction	4		Performs subtraction when an input signal is ON
	4		Performs Subtraction when an input signal changes from OFF to ON
Multiplication	4		Performs multiplication when an input signal is ON
	4		Performs multiplication when an input signal changes from OFF to ON.
Division	4		Performs Division when an input signal is ON
	4		Performs Division when an input signal changes from OFF to ON

Register: floating-decimal
When the calculation result is non-number or limited number, the ladder calculation will be over flow.

Instruction (Application Instructions 3/8)

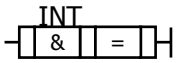
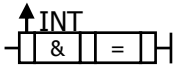
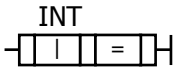
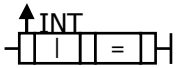
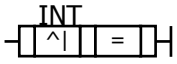
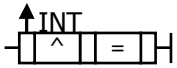
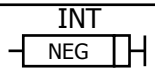
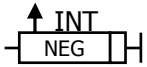
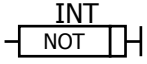
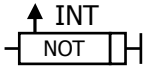
Square Root Extraction, Absolute Value

Instruction	step	Symbol	Function
Square Root Extraction	3		Performs square root extraction when an input signal is ON
	3		Performs square root extraction when an input signal changes from OFF to ON
Absolute Value	3		Performs Absolute Value when an input signal is ON
	3		Performs Absolute Value when an input signal changes from OFF to ON

Square root extraction is performed to input value (0-100%) normalized. Output (0-100%).
Negative input value is 0%.

Instruction (Application Instructions 1/8)

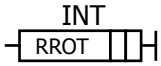
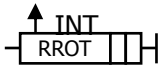
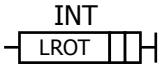
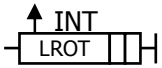
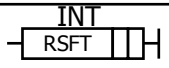
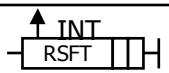
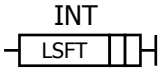
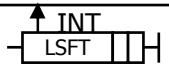
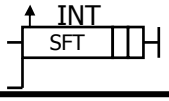
Logical computation

Instruction	step	Symbol	Function
Logical AND	4		Executes logical AND when an input signal is ON
	4		Executes logical AND when an input signal changes from OFF to ON
Logical OR	4		Executes Logical OR when an input signal is ON
	4		Executes Logical OR when an input signal changes from OFF to ON
Logical XOR	4		Executes Logical XOR when an input signal is ON
	4		Executes Logical XOR when an input signal changes from OFF to ON
Two's Complement	2		Converts data to two's complement when an input signal is ON
	2		Converts data to two's complement when an input signal changes from OFF to ON
Not	2		Executes logical NOT when an input signal is ON
	2		Executes logical NOT when an input signal changes from OFF to ON

Data format: Status register (16 bit)

Instruction (Application Instructions 5/8)

Rotate, Shift computation

Instruction	step	Symbol	Function
Right Rotate	3		Turns data to the right when an input signal is ON
	3		Turns data to the right when an input signal changes from OFF to ON
Left Rotate	3		Turns data to the left when an input signal is ON
	3		Turns data to the left when an input signal changes from OFF to ON
Right shift	3		Shifts data to the right when an input signal is ON
	3		Shifts data to the right when changes from OFF to ON
Left Shift	3		Shifts data to the left when an input signal is ON
	3		Shifts data to the left when changes from OFF to ON
Shift register	3		Shifts data to the right or left by 1 bit when an input signal changes from OFF to ON

Data format: Status register (16 bit)

Instruction (Application Instructions 6/8)

Move

Instruction	step	Symbol	Function
Move	2	MOV	Moves data to a destination when an input signal is ON
	2	MOV	Moves data to a destination when an input signal changes from OFF to ON

Data format: D register/status register/DAT register

BIN/BCD conversion

Instruction	step	Symbol	Function
BIN conversion	3	INT BIN	Converts data to binary data when an input signal is ON
	3	INT BIN	Converts data to binary data when an input signal changes from OFF to ON
BCD conversion	3	INT BCD	Converts data to BCD data when an input signal is ON
	3	INT BCD	Converts data to BCD data when an input signal changes from OFF to ON

Data format: D register/status register (16 bit)

Instruction (Application Instructions 7/8)

Analog computation (1)

Instruction	step	Symbol	Function
High selector	4	HSL	Selects a higher value when input signal is ON
	4	HSL	Selects a higher value when input signal changes from OFF to ON
Low selector	4	LSL	Selects a lower value when input signal is ON
	4	LSL	Selects a lower value when input signal changes from OFF to ON
High limiter	4	HLM	Imposes a high limit when an input signal is ON
	4	HLM	Imposes a high limit when an input signal changes from OFF to ON
Low limiter	4	LLM	Imposes a low limit when an input signal is ON
	4	LLM	Imposes a low limit when an input signal changes from OFF to ON
Ratio	5	RATIO	Calculates a ratio when an input signal is ON
	5	RATIO	Calculates a ratio when an input signal changes from OFF to ON
Temp compensation	5	TCMP1	Calculates a Temp compensation when an input signal is ON
	5	TCMP1	Calculates a Temp compensation when an input signal changes from OFF to ON
Pressure compensation	5	PCMP1	Calculates a Pressure compensation when an input signal is ON
	5	PCMP1	Calculates Pressure compensation when an input signal changes from OFF to ON

Instruction (Application Instructions 8/8)

Analog computation (2)

Instruction	step	Symbol	Function
Scaring	5	SCAL	Scale an input value when an input signal is ON
	5	SCAL	Scale an input value when an input signal changes from OFF to ON
Normalization	5	NORM	Normalizes an input value when an input signal is ON
	5	NORM	Normalizes an input value when an input signal changes from OFF to ON
Maximum value	7	MAX	Selects the maximum value when an input signal is ON
	7	MAX	Selects the maximum value when an input signal OFF to ON
Minimum value	7	MIN	Selects the minimum value when an input signal is ON
	7	MIN	Selects the minimum value when an input signal OFF to ON
Average	7	AVE	Selects the average value when an input signal is ON
	7	AVE	Selects the average value when an input signal OFF to ON

Advanced Control
Simplicity
Networking
Reliability

UT-Advanced Ladder Sequence Program (Advanced)

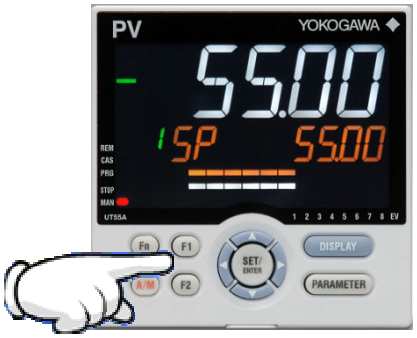
Program Training 1: Annunciator function

UTAdvanced

Full Control at Your Fingertips

UTAdvanced alarm output is used for annunciator output

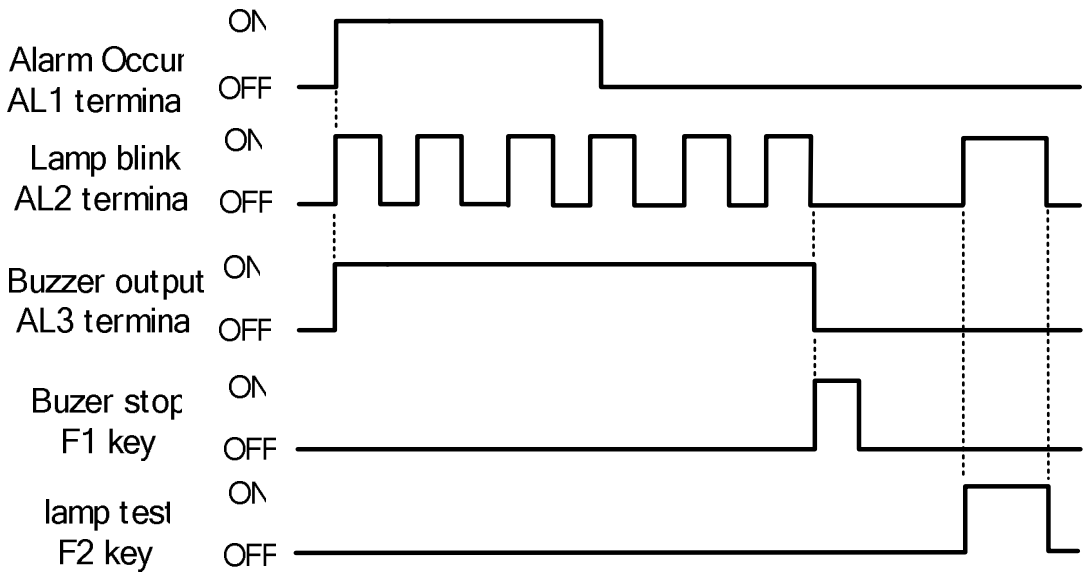
F1 Key: Buzzer stop
F2 key: lamp test



AL1 terminal (normal alarm output)

AL2 terminal (lamp blink in alarm)

AL3 terminal (buzzer output)

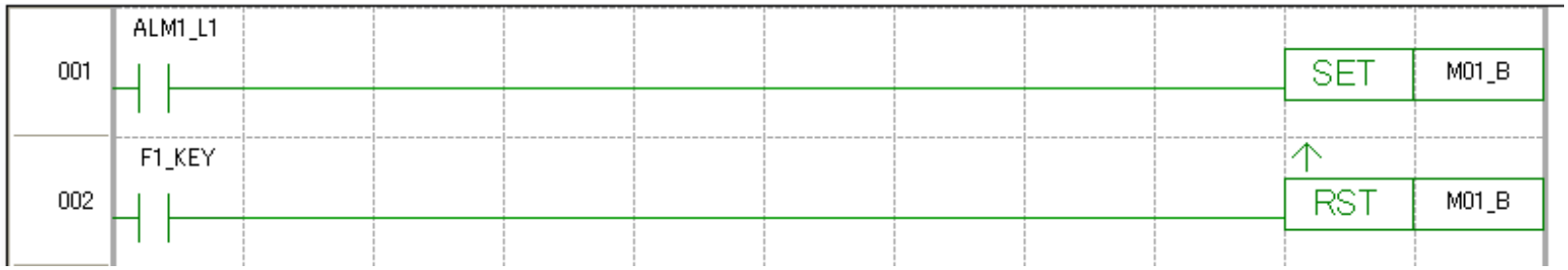


Program Training 1: Annunciator function

SET, RESET instruction (Hold alarm output)

- Make a ladder program in user ladder sheet
- Select from pallet. Locate it in 001 line and input [ALM_L1] in the name.
- Select from pallet and locate it in the right end of 001 line. Input [M01_B]
- In 002 line, write LD instruction as [F1_KEY] and RST instruction as [M01_B]
- Left click on RST instruction and you can select E_RST with right click
- If you make mistake, rewrite using Delete key and delete with right click
- In deleting, release instruction selecting from pallet.

ALM_L1: Alarm 1 status of loop1 (1 in case of alarm1 ON)
M01_B: Internal relay (holding type) lamp blink after power failure recovery
F1_KEY: F1 key in UT-Adv front face



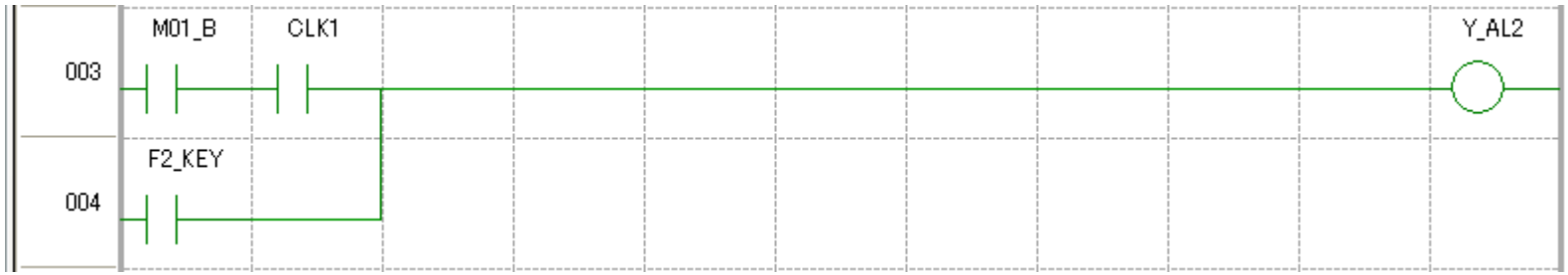
Program Training 1: Annunciator function

Or load circuit (flicker circuit, lamp test circuit)

- 003 line: LD instruction [M01_B], AND LD instruction [CLK1], Output instruction [Y_AL2]
- 004 line: OR LD instruction [F2_KEY]

Write as the below figure using  in palette

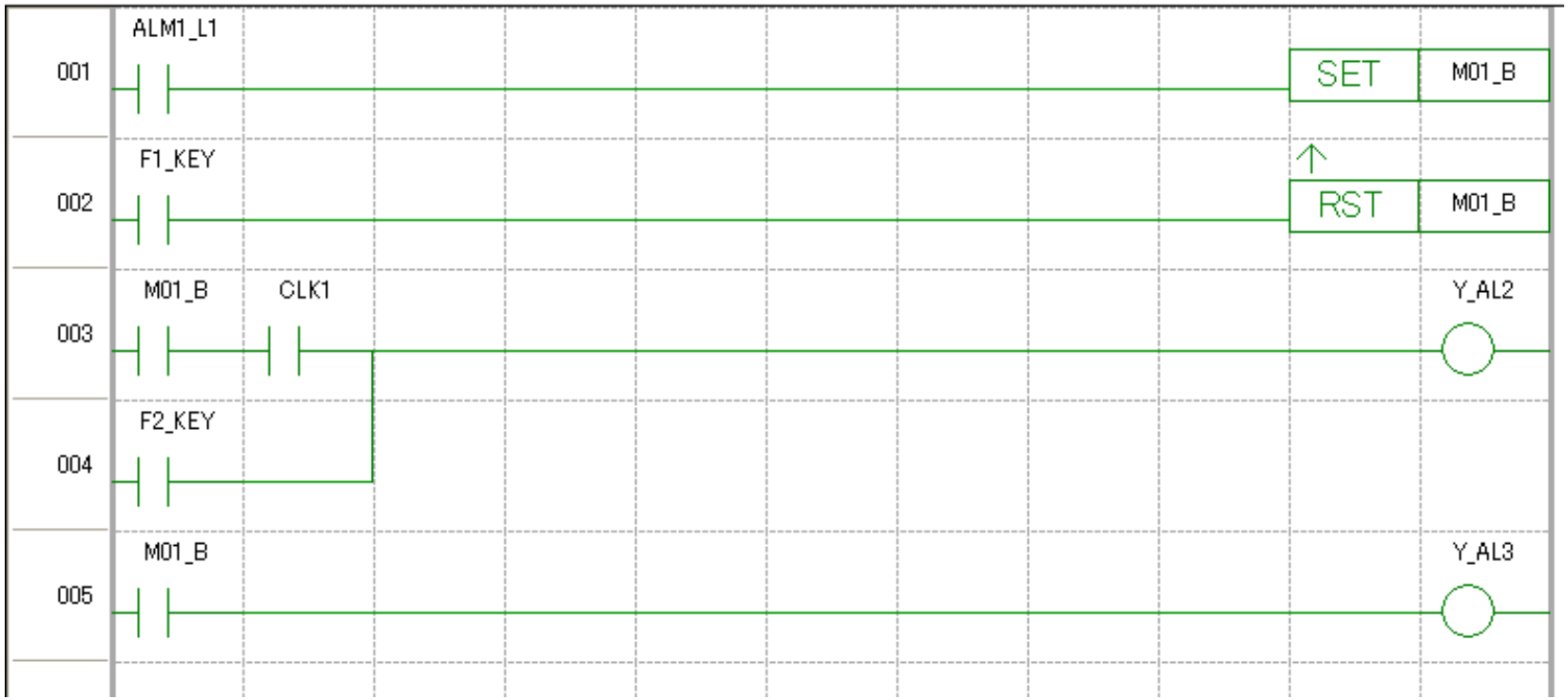
CLK1: 1 sec pulse



Program Training 1: Annunciator Function

SET output circuit (Buzzer circuit)

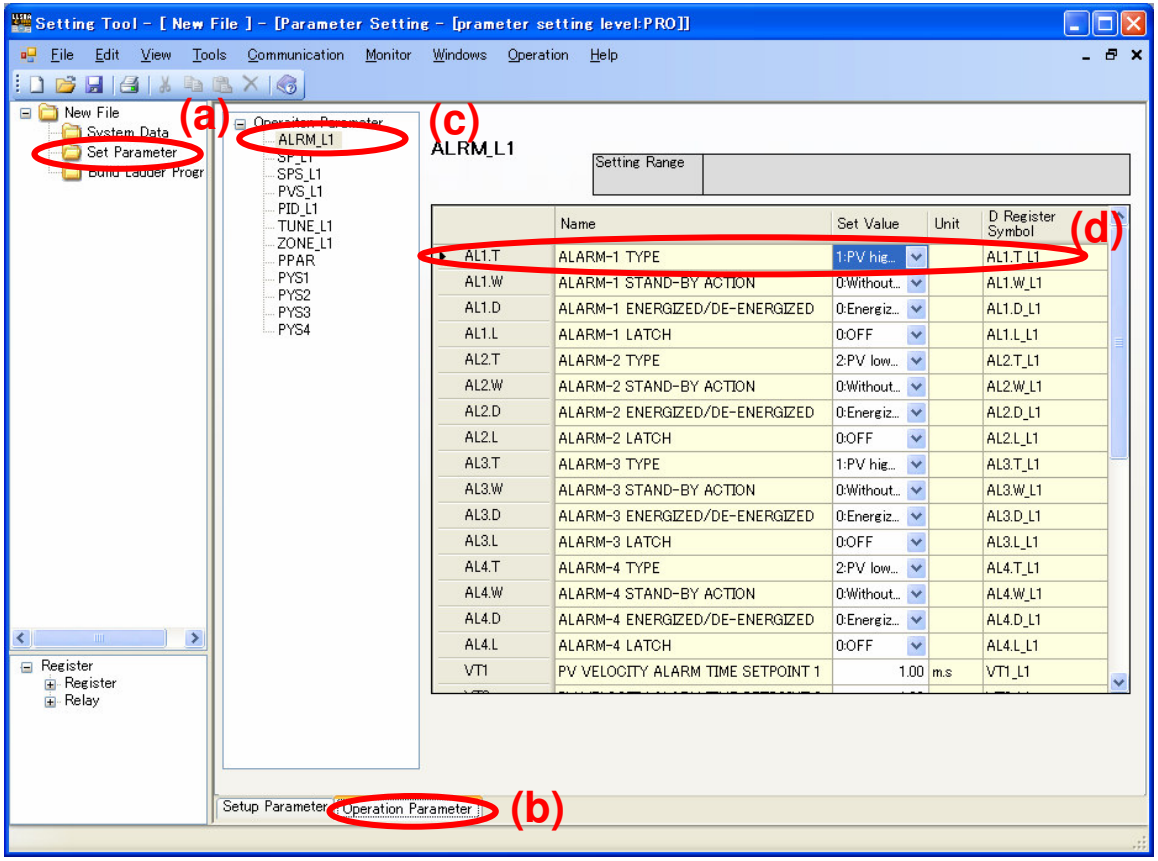
– 005 line: LD instruction [M01_B], output instruction [Y_AL3]



Program Training 1: Annunciator Function

PID parameter setting 1

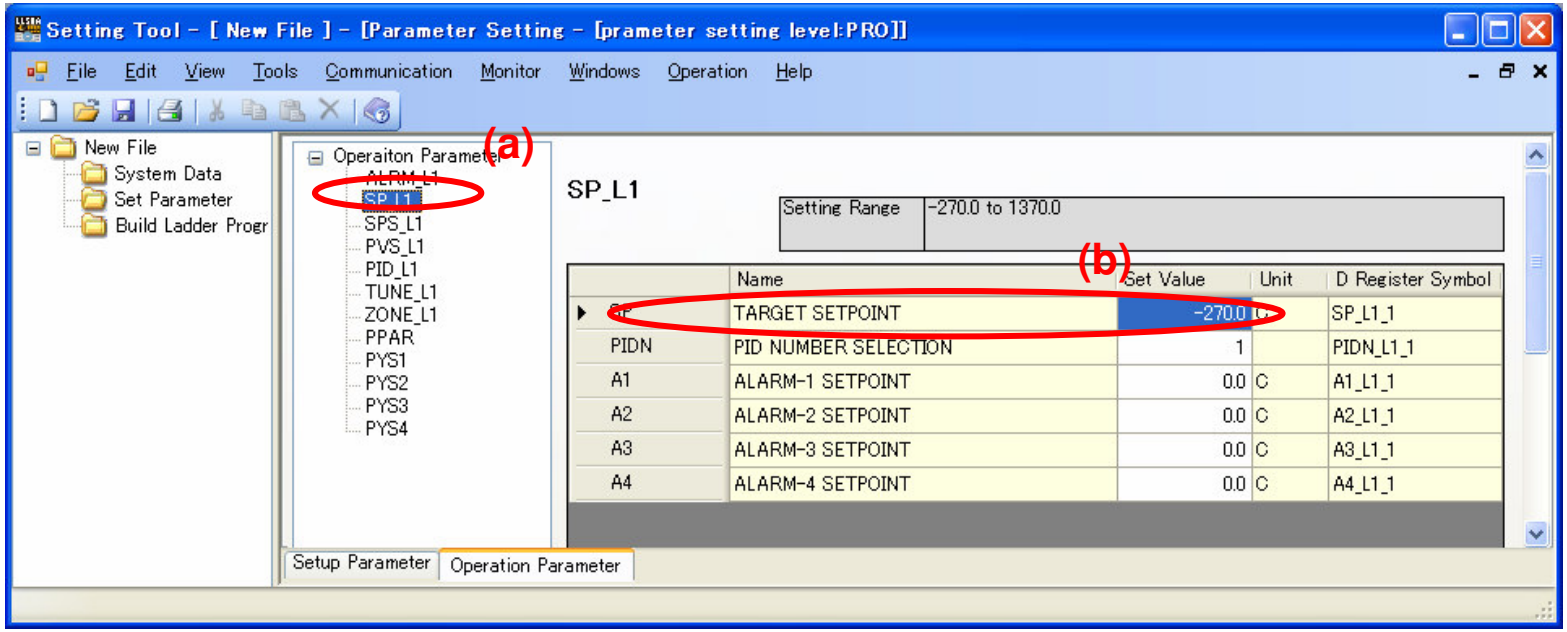
- Click "Set parameter" folder in file window (a)
- Click "Operation parameter" (b)
- Click ALRM_L1 and set alarm type as [1. PV high limit] (c)



Program Training 1: Annunciator Function

PID parameter setting 2

- Click SP_L1 (a)
- Set "600.0" in A1 (alarm1 setting) (b)



Setting is finished.

Save the setting: Select [File]>[Save as] in menu
File name: annunciator
Download setting to UTA: Select [Communication]>[all download]

Program Training 1: Annunciator Function

1. Set 650 deg C for SP of UTA

2. In operation mode, set 550 deg C for SP. In lower than PV 600 deg C, alarm annuciator status is kept;

Simulator D1: lamp off, D2: blink, D3: lamp on

3. After alarm off (D1 off), pressing F1 Key allows you to be all lamp off (alarm annuciator release)

In pressing F2 key, it will be D2 lamp on (lamp test)

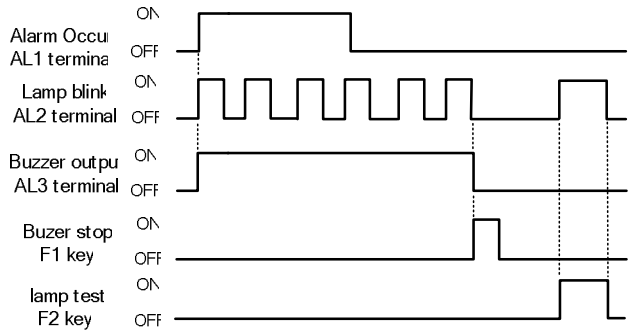
UTA A/M: Set AUTO
(MAN: No Lamp Off)

F1 key: Buzzer stop
F2 key: lamp test

AL1 terminal
(normal alarm output)

AL2 terminal
(lamp blink in alarm)

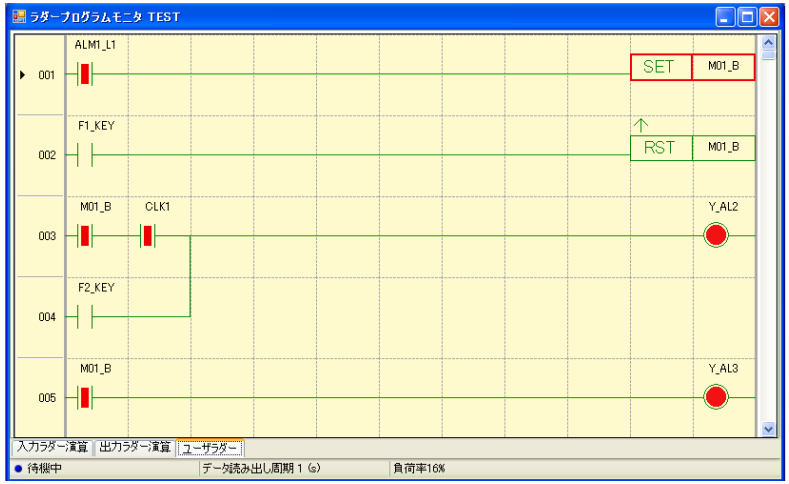
AL3 terminal
(buzzer output)



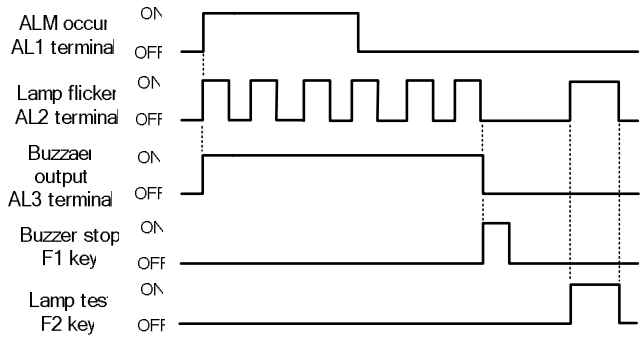
When PV is over 600 degC, D1 (light ON), D2 (blink), D3 (light on)

Program Training 1: Annunciator Function

Check ladder operation in ladder monitoring



1. Alarm 1 (ALM_L1) ON -->M01_B relay ON (SET instruction)
2. Press F1 key --> M01_B relay OFF (RST instruction)
3. AND circuit with M01_B and CLK1 allows to flicker action of Y_AL2 relay
4. Press F2 key --> Y_AL2 relay ON (lamp test)
5. Interlocking with M01_B relay, Y_AL3 relay is ON/OFF



Example **Annunciator relay unit**

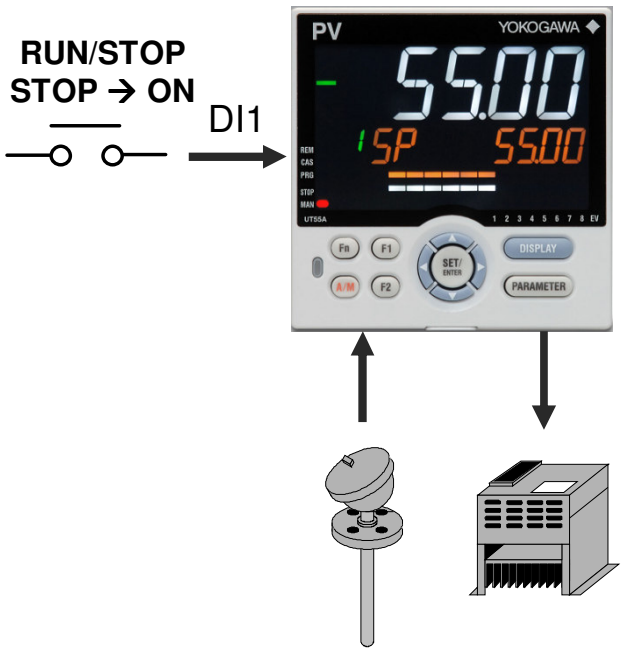
The annunciator circuit is frequently used between many users.
If the flicker action is not needed, this action can be done using UT-Adv latch alarm action without ladder program

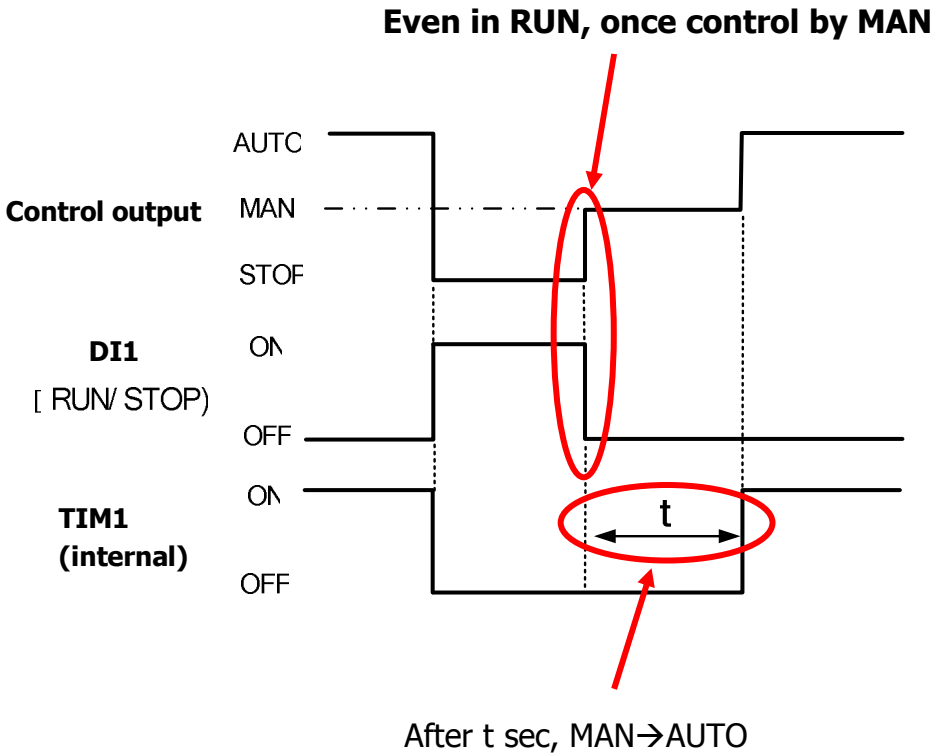
Program Training 2: Start Circuit with Timer

UTAdvanced

Full Control at Your Fingertips

- After manual operation triggered by signal from stop to run, it will switch to auto operation in some time (t sec).
- In starting of equipment, this avoids sudden output change; it protects the equipment.





Program Training 2: Start Circuit with Timer

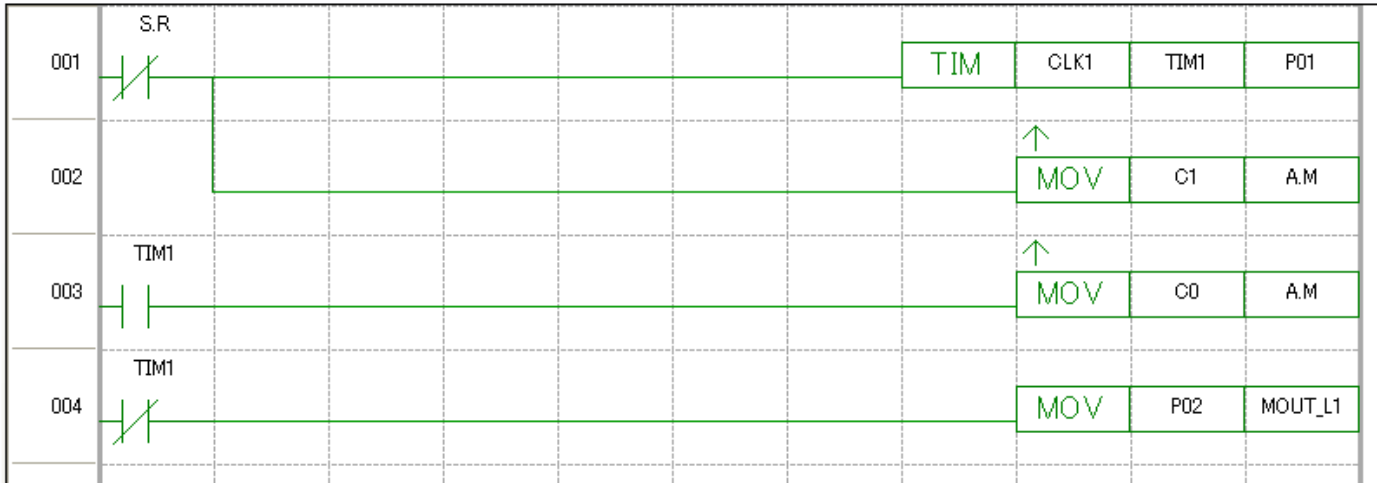
Making ladder programming

Load the "default" file made in training 1. In Menu [file]→[open]

Program

001 line: LD NOT instruction [S.R], TIM instruction [CLK1, TIM1, P01]
002 line: Stack lead (TIM1 and OR) E_MOV instruction [C1, A.M]
003 line: LD instruction [TIM1], E_MOV instruction [C0, A.M]
004 line: LD NOT instruction [TIM1], MOV instrction [MOUT_L1]

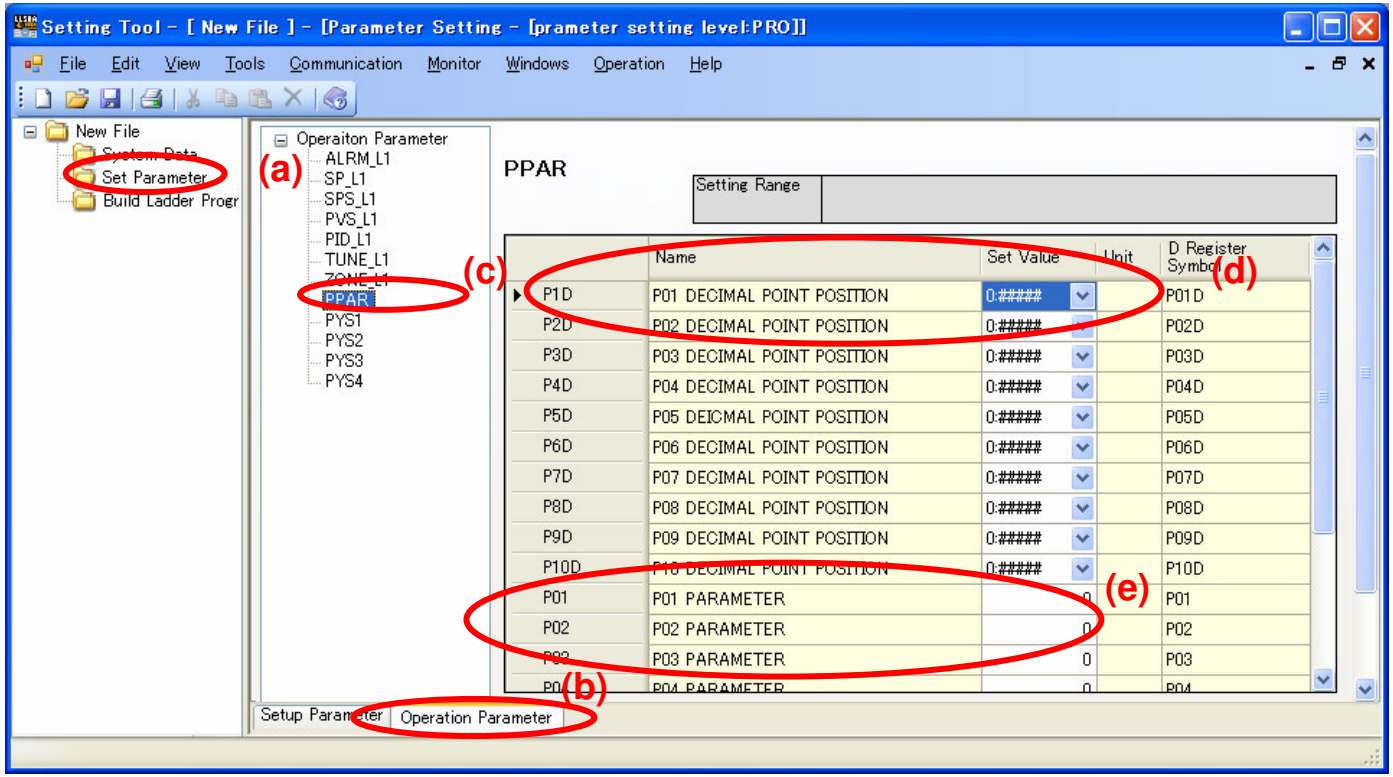
S.R: I relay, RUN/STOP status (STOP:1)
CLK1: 1 sec pulse
A.M : D register, A/M status (MAN:1)
MOUT_L1: D register control output in manual mode



Program Training 2: Start Circuit with Timer

Parameter setting (1)

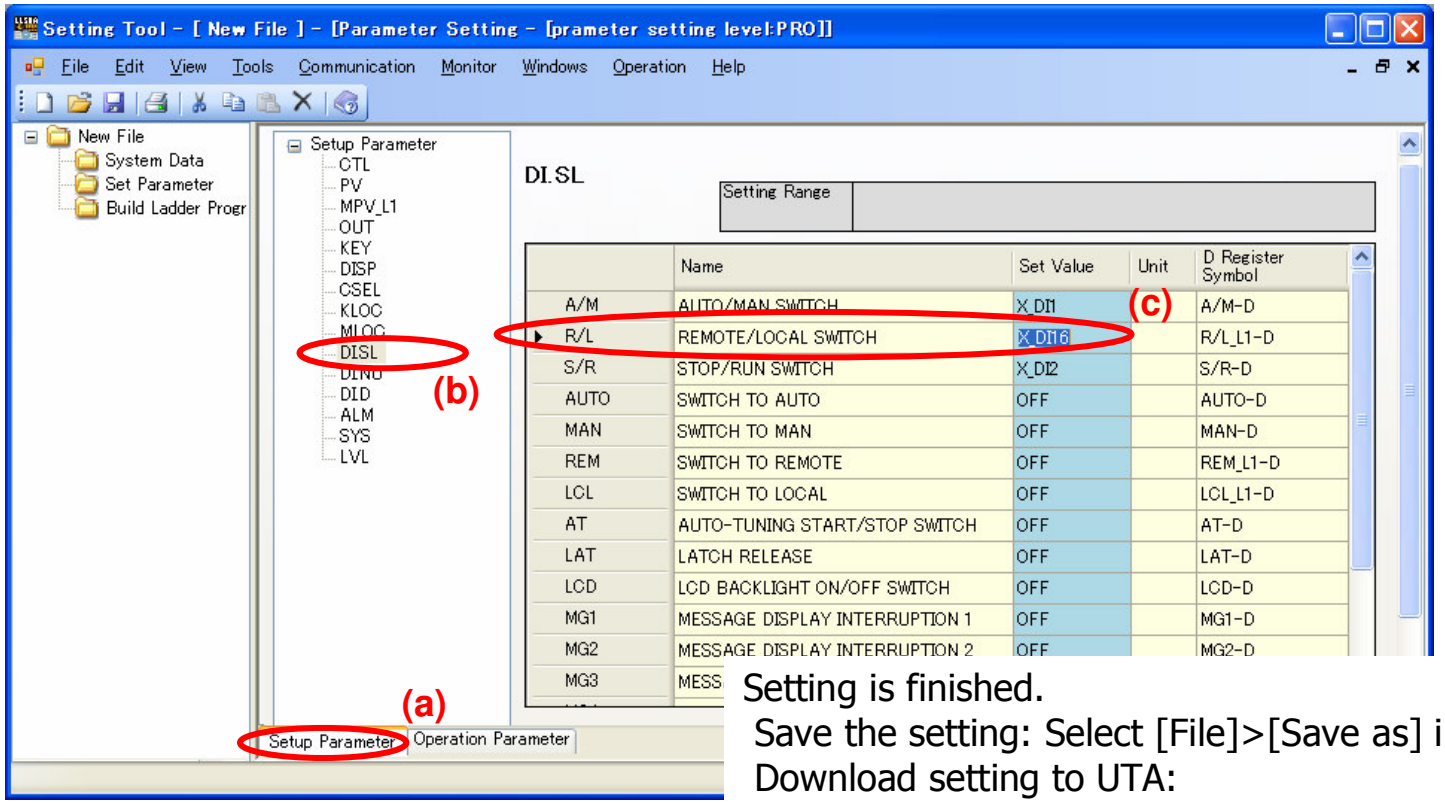
- Click "Set parameter" (a)
- Click "operation parameter" (b)
- Click "PPAR" (c)
- P1D, P01: select [0 : #####]
- P01, P02: Input [10] (e)



Program Training 2: Start Circuit with Timer

Parameter setting (2)

- Click setup parameters (a)
- Click [DISL] (b)
- S/R (RUN/STOP switching) Input [X_DI1]



Setting is finished.

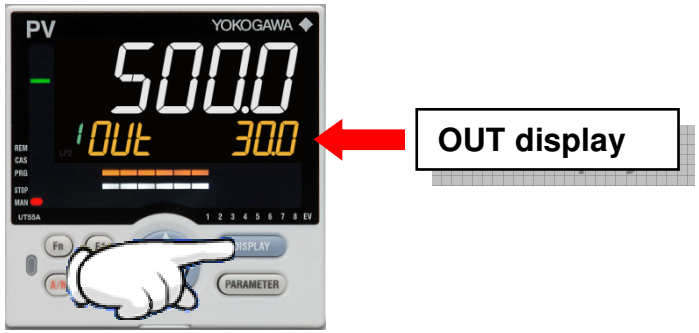
Save the setting: Select [File]>[Save as] in menu

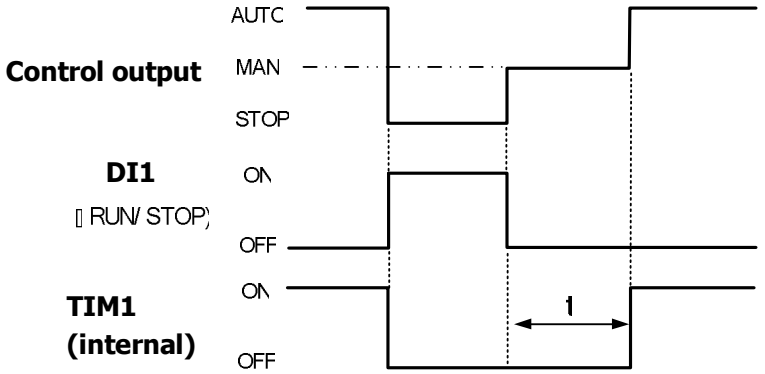
Download setting to UTA:

Select [Communication] >[all download]

Program Training 2: Start Circuit with Timer

1. **Press [DISPLAY] key and display control output on the unit**
   Use AUTO mode for A/M
2. **In SW1 (DI1) ON, it will be STOP; output will be 0 %.**
3. **In SW1 (DI1) OFF, it will switch to RUN mode and MAN mode**
   MAN mode is kept for 10 sec and then it will be AUTO mode.

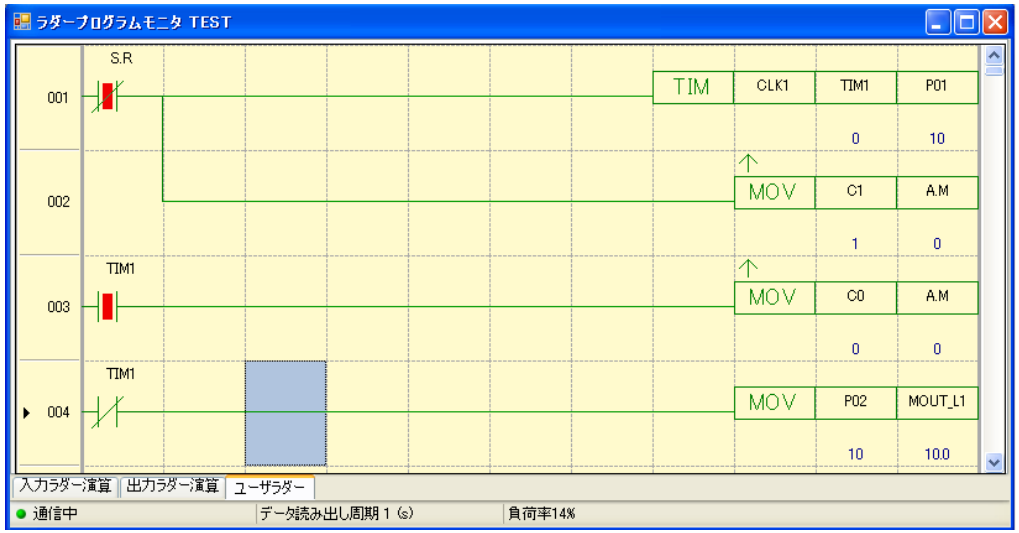




Program Training 2: Start Circuit with Timer

Ladder Program Monitoring

– In ladder program monitoring menu, you can display timer value selecting [Monitor]→[detail display] in the menu.



1. When S.R (RUN/STOP) status is RUN, TIM1 will start and 1 (MAN) will be transferred to A.M register
2. After TIM1 is finished (P01: 10sec), 0 (AUTO) will be transferred to A.M register
3. During TIM counting (MAN operation), control output P02 (10%) is transferred to MOUT_L1 register (Manual operation)

0/1 data is written to "D register", not to "I relay" for A/M stitching:
A/M key operation will be available during timer counting