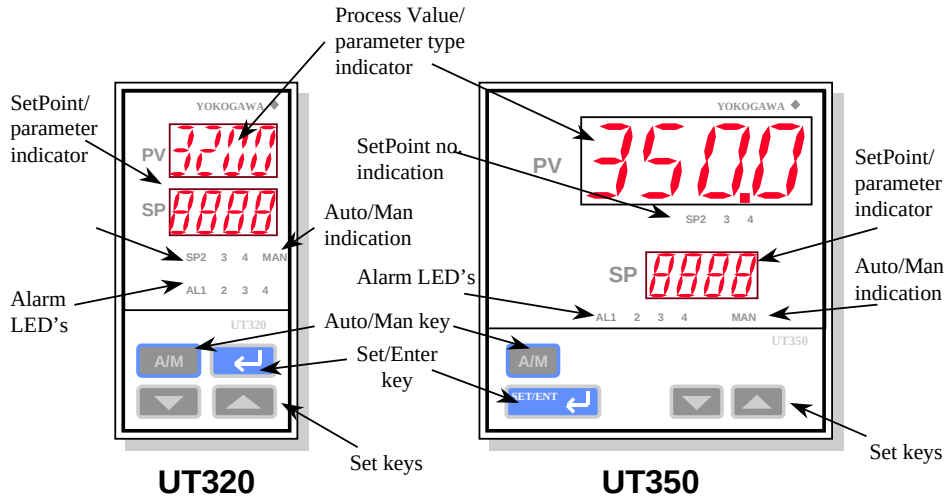
UT320E/UT350E SHORT FORM INSTRUCTION MANUAL

ENHANCED GREEN SERIES

Congratulations on your purchase of the finest program controller available. This short form guide is designed to speed up your configuration and operation. For additional information, please refer to the Instruction Manual on CD-ROM provided with the controller.

Front Panel



Key Function

Set/Enter ↵	Used to select a parameter or set a parameter. Hold down for 3 seconds to enter the configuration mode.
A/M	Used to select automatic or manual mode. The setting toggles between auto and manual with each keystroke.
▲ ▼	Used to change values. Pressing and holding causes the speed of charging to increase.

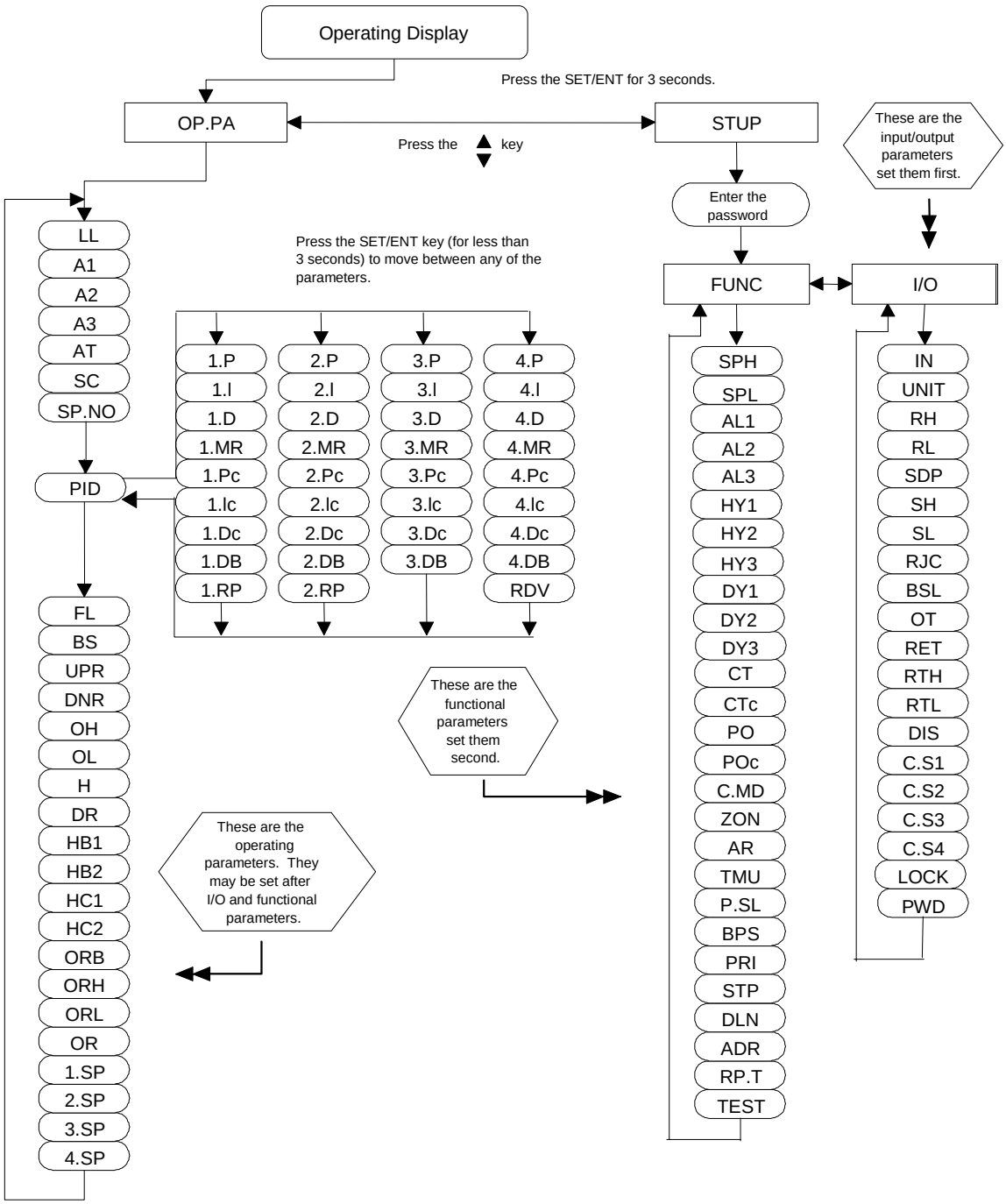
Configuration

It is important that the controller be set up in the following manner. Failure to do so could result in incorrect operation, as changing some parameters will change other related functions.

1. Apply power (See ***Wiring Diagram***, pg. 16)
2. Set I/O parameters
3. Set functional parameters
4. Set operation parameters
5. Operate process
6. Set a reasonable medium setpoint
7. Turn AUTOTUNE parameter (AT) on.

Parameter Flow Charts

The UT320/UT350 have a number of software parameters which may or may not be required depending on your particular application.



INPUT/OUTPUT (I/O) MENU

Symbol	Description	Range	Default Setting	Explanation	CS #
IN	Input type	Select from table 1	1	Sets the type of input such as type K T/C, PT100 RTD, 1-5VDC, etc.	1201
UNIT	Input unit selection	°F, °C	°C	Select from °F or °C look-up tables for T/C or RTD. Not Used for linear inputs.	1202
RH	Range high	See table 1	Max. of input range	Max/Min of selected range selected in table 1. May be set to any number in that range	1204
RL	Range low	See table 1	Min. of input range	See explanation above	1205
SDP	Scale decimal point selection	Only available for DC voltage inputs, 0 to 3	1	Selects the number of digits displayed to the right of the decimal. Limits – 0: -1999 to 9999, 1: -199.9 to 999.9, 3: -19.99 to 99.99	1206
SH	Scale high (only for voltage inputs)	DC voltage –1999 to 9999	100.0 when DC voltage is selected	Allows setting of properly scaled units for flow, level, pH, etc. If 1 to 5VDC represents 0 to 250, then set SH to 250 and SL to 0.	1207
SL	Scale low (only for voltage inputs)	DC voltage –1999 to 9999	0.0 when DC voltage is selected	See explanation above	1208
RJC	Reference junction compensation	OFF, ON	ON	RJC must be on for TC inputs to read properly. It is not used for RTD or DCV.	1210
BSL	Burnout selection	0 (OFF), 1(upscale), 2(downscale)	1	Determines which way the PV will drive when the input circuit is opened. 1 will cause the PV to drive to max and display burnout. 2 will cause the PV to drive to min and display burnout. When the input is in B.OUT, the controller goes to a preset output. (PO/POc)	1209
OT	Output type	0: Relay 1: Voltage pulse 2: Current 3: ON/OFF control 4 to 12: Heating / Cooling control	0	Sets the control output type as determined table 2. For UT320/350-0X, only types 0-3 are available. For UT320/350-2X units, all of the output types are available.	1238
RET	Retransmission type	1: PV, 2: SP, 3: OUT 4: LPS (power supply for sensor)	1	Selects what is retransmitted to a recorder or other analog device. Also, selects whether loop power supply is used.	1013

INPUT/OUTPUT (I/O) MENU Cont.

Symbol	Description	Range	Default Setting	Explanation	CS #
RTH	Retransmission high	EU (0.0 to 100%) RTL<RTH	RH value	Max value for the retransmitted output.	1014
RTL	Retransmission low	EU (0.0 to 100%) RTL<RTH	RL value	Min value for the retransmitted output	1015
DIS	Digital input selection	0: Disables the contact inputs 1: DI1–2.SP(on)/ 1.SP(off), DI2– AUTO(on)/MAN (off) 2: DI1 – Hides (on) / shows (off) LOCK parameter 3: See note 1 4: DI1 – 2.SP(on)/ 1.SP(off), DI2- STOP(on)/RUN(off)	1	All UT320/350 controllers have 2 digital inputs. They can be used to perform the described functions.	932
C.S1	Custom SELECT display 1 selection	Custom SELECT display definition Allows access to any selected parameter.	OFF	Up to (4) parameters may be set for operator access. They may then be viewed by pressing the SET/ENT key during normal operations	N/A
C.S2	Custom SELECT display 1 selection	See above	OFF	See above	N/A
C.S3	Custom SELECT display 1 selection	See above	OFF	See above	N/A
C.S4	Custom SELECT display 1 selection	See above	OFF	See above	N/A
LOCK	Key lock	OFF, 1: All parameter changes prohibited, 2: Changes to operating parameters prohibited 3: A/M key disabled	OFF	Restricts access to various functions by locking out certain keys.	1036
PWD	Password	0: OFF 1-9999	0	Password prohibits access to setup menus (FUNC and I/O) for those that don't know the password.	N/A

Note 1: SP selection when DIS = 3 set

	DI1	DI2
1.SP	OFF	OFF
2.SP	ON	OFF
3.SP	OFF	ON
4.SP	ON	ON

FUNCTION (Func) MENU

Symbol	Description	Range	Default Setting	Explanation	CS #
SPH	Target setpoint limiter upper limit	0.0 to 100.0% of PV input range where SPL<SPH	100% of PV input range	Places a limit on how high the setpoint can be set.	933
SPL	Target setpoint limiter lower limit	0.0 to 100.0% of PV input range where SPL<SPH	0% of PV input range	Places a limit on how low the setpoint can be set.	934
AL1	Alarm 1 type	OFF, 1 to 25, 28 to 31 See Table 3	1	Sets the type of alarm action as described in table 3.	915
AL2	Alarm 2 type	See above	2	See above	916
AL3	Alarm 3 type (see Note 1)	See above	1	See above	917
HY1	Alarm 1 hysteresis	EUS (0.0 to 100.0%)	EUS (0.5%)	Sets the dead band of the alarm to avoid relay chattering or frequent ON/OFF activation. Set in engineering units.	919
HY2	Alarm 1 hysteresis	See above	See above	See above	920
HY3	Alarm 1 hysteresis (see Note 1)	See above	See above	See above	921
DY1	Alarm 1 delay timer	0.00 to 99.59 (min, sec) (enabled when AL1 is 1 to 20 or 28 to 30)	0.00	An alarm is output when the delay timer expires after the alarm setpoint is reached.	935
DY2	Alarm 2 delay timer	See above	0.00	See above	936
DY3	Alarm 3 delay timer	See above	0.00	See above	937
CT	Control output cycle time (see Note 1)	1 to 1000 seconds	30 seconds	For time proportional outputs only. Selects the total on and off time.	1240
CTc	Control output cycle time for cooling side (see note 2)	1 to 1000 seconds	30 seconds	For time proportional outputs only. Selects the total on and off time.	1241

Note 1: When control output (setup parameter OT) is set from 4 to 6 for heating/cooling type, the functions for alarm 3 will be invalid. ALM3 is used for cooling.

Note 2: These parameters will be displayed when heating/cooling control is selected.

FUNCTION (Func) MENU Cont.

Symbol	Description	Range	Default Setting	Explanation	CS #
PO	Preset output	-5.0 to 105.0%; 0.0 to 105.0% in heating/cooling control	0.0%	The output used when the input sensor is in a burn-out condition. (open sensor)	924
POc	Preset output for cooling side (see Note 1)	0.0 to 105.0%	0.0%	See above	925
C.MD	PID control mode *	0: Batch 1: Fixed value	0	Selects between derivative of deviation (0) or PV derivative (1) PID which reduces the disturbances caused by setpoint changes. If setpoint changes are made during operation, set to 1, otherwise set to 0.	927
ZON	Zone PID selection *	OFF: SP number selection ON: Zone PID	OFF	Selects between SP or zone selected PID. For SP PID, SP1 uses PID1, SP2 uses PID2, etc. For Zone PID, PID is selected automatically depending on the PV and reference points in each PID set.	929
AR	Anti-reset wind-up	AUTO, 50.0 to 200.0%	AUTO	Eliminates the I term effect from leaving controller operating while system is turned off. In most cases Auto is the correct choice.	928
TMU	Time unit for ramp (*)	0: Hour 1: Minute	0	Sets the time units used by the UPR and DNR prompts in the operating parameter display.	904
P.SL	Protocol selection (see Note 2)	0: PC link 1: PC link check sum 2: Ladder comm. 3: Master unit 4: Slave unit 7: Modbus (ASCII) 8: Modbus (RTU)	0	0: Connection to PC, basic module or touch screen 1: Same as 0 but adds check sum capability. 2: Direct connection to devices supporting BCD. 3&4: SP from master unit is sent to slave units.	1247

Note 1: These parameters will be displayed when heating/cooling control is selected.
Note 2: These parameters will be displayed on models with the optional RS485 interface (UT3 0- 1)

*** See additional information in the appendix.**

FUNCTION (Func) MENU Cont.

Symbol	Description	Range	Default Setting	Explanation	CS #
BPS	Communication speed (see Note 1)	0: 600, 1: 1200; 2: 2400, 3: 4800, 4: 9600	4	In most cases, these comm. Parameters do not need to be adjusted other than the address. Check the driver or the software package for exact requirements.	1248
PRI	Parity (see Note 1)	0: None, 1: Even, 2: Odd	1	See above	1249
STP	Stop bit (see Note 1)	1, 2	1	See above	1250
DLN	Data length (see Note 1)	7 or 8	8	See above	1251
ADR	Address (see Note 1)	1 to 99; limited to a max. of 31 units connected together	1	See above	1252
RP.T	Min. response time (see Note 1)	0 to 10 x 10ms	0	See above	1253

Note 1: These parameters will be displayed on models with the optional RS485 interface (UT3 0- 1)

Operating Parameters

Symbol	Description	Range	Default Setting	Explanation	CS #
LL	LL communication interface selection	OFF (0): RS485 terminals ON (1): Light loader adapter	OFF (0)	Used to choose comm. method for using LL100 configuration software.	N/A
A1	Setpoint value for alarm 1	Process variable and setpoint value EU (-100.0 to 100.0 %) Deviation: EUS (100.0 to 100.0%) Output value: -5.0% to 105.0%	Process variable and setpoint value EU: 100% Other PV and setpoint values EU: 0% Deviation 0%	This is the setpoint for the alarms and is set in engineering units used (like °F).	231
A2	Setpoint value for alarm 2	See above	See above	See above	232
A3	Setpoint value for alarm 3 (see Note 1)	See above	See above	See above	233
AT	Auto tuning (*)	OFF, 1 to 4(by group for PID 1 to 4), AUTO (only for zone PID)	OFF	Auto tuning will disturb your process 3 times to learn it's performance characteristics and then set the optimal PID values for control. 1 sets PID1, 2 sets PID2, ETC. AUTO sets all 4 PID sets.	241
SC	Super control (*)	OFF, ON	OFF	Uses fuzzy logic to eliminate overshoot and improve control performance. It should be ON in most cases.	242
SP.NO	Selection of setpoint number	1 to 4	1	Up to (4) preset setpoints that can be switched by external DI, RS485, or front face.	207
PID	PID parameter number	0: Transition to parameter screen; 1 to 4: All PID sets are displayed	0	Provides access to the (4) PID sets in each controller. 1=PID set 1, 2=PID set 2, etc.	N/A
FL	PV input filter (*)	OFF, 1 to 120 sec	OFF	Helps settle down an erratic PV display (input). Use the smallest filter to get a smooth result. Excessive filter can be dangerous.	244
BS	PV input bias	EUS (-100.0 to 100.0%)	EUS (0.0%))	Corrects the PV reading for poor sensor placement or sensor errors.	243

Note 1: When control output (setup parameter OT) is set from 4 to 6 for heating/cooling type, the functions for alarm 3 will be invalid. ALM3 is used for cooling.

* See additional information in appendix.

Operating Parameters cont.

Symbol	Description	Range	Default Setting	Explanation	CS #
UPR	Setpoint value increasing ramp rate (*)	OFF, EUS (0 to 100%) / Hours or minutes	OFF	In effect any time the setpoint is changed or after a power failure. When the power comes on, the SP will be the same as the PV. It will then ramp to the correct SP based on these settings.	245
DNR	Setpoint value decreasing ramp rate (*)	See above	OFF	See above	246
OH	Output high limit	OL + 1 digit to 105.0% / 0.0 to 105% (During heating/cooling control)	100.0%	Limits the output when the process system cannot tolerate max. or min. ouput levels.	254
OL	Output low limit	-5.0% to OH –1 digit/0.0 to 105% (During heating /cooling control)	0.0% / 100.0% (during heating / cooling control)	See above	255
H	Hysteresis of ON/OFF control	EUS (0.0 to 100.0 %), 0.1 to 0.5% (During heating / cooling control)	EUS (0.5%) 0.1% (during heating / cooling control)	Dead band of the control output. Only in effect when on/off control (OT=3) is selected.	256
DR	Direct / reverse action selection (see Note 1)	0: Reverse 1: Direct	0	Sets the control response. Reverse – as PV exceeds SP, output decreases. Direct – as PV exceeds SP, output increases.	257
HB1	Heater break alarm 1 current setpoint (see note 2)	OFF, 1 to 50A	OFF	Setpoint at which the HB alarm is a activated. Set this value in amps.	258
HB2	Heater break alarm 2 current setpoint (see note 2)	OFF, 1 to 50A	OFF	See above	259
HC1	Heater disconnection alarm 1 measured current (see Note 2)	Read only 1 to 50 mA		Allows reading the current flowing through a CT.	
HC2	Heater disconnection alarm 2 measured current (see Note 2)	Read only 1 to 50 mA			

Note 1: During heating/cooling control, the heating output is fixed as reverse action and the cooling output is fixed as direct action.

Note 2: The symbols HB1, HB2, HC1 and HC2 will be displayed on the models with optional specifications (UT3 0- 1or UT3 0- 2).

* See additional information in appendix.

Operating Parameters cont.

Symbol	Description	Range	Default Setting	Explanation	CS #
ORB	ON/OFF rate detection band	EUS (0.0 to 100.0%)	EUS (1.0%)	Predicts sensor or output device failure	250
ORH	ON/OFF rate upper limit	ORL + 1 digit to 105.0%	100.0%	See above	251
ORL	ON/OFF rate lower limit	-5.0% to ORH + 1 digit		See above	252
OR	ON/OFF rate	Read only –5.0 to 105.0%		See above	
1.SP	Target setpoint 1	EU (0.0 – 100.0%)	EU (0.0%)	Internal setpoints allow presetting up to 4 setpoints.	301
2.SP	Target setpoint 2	EU (0.0 – 100.0%)	EU (0.0%)	See above	326
3.SP	Target setpoint 3	EU (0.0 – 100.0%)	EU (0.0%)	See above	351
4.SP	Target setpoint 4	EU (0.0 – 100.0%)	EU (0.0%)	See above	376

Operating Parameters cont.

Symbol	Description	Range	Default Setting	Explanation	CS #
n.P	Proportional band (P); For heating/cooling control, the proportional band for the heating side.	0.1% to 999.0% During heating/cooling control, 0.0 to 999.9%	5.0%	These control parameters determine how well your system will perform. Incorrect PID parameters are the most common reason for poor results. Use the AUTOTUNE function to set the optimal control parameters.	1P 306 2P 331 3P 356 4P 381
n.I	Integral time (I); For heating/cooling control, the integral time for the heating side.	OFF, 1 to 6,000 sec	240	See above	1I 307 2I 332 3I 357 4I 382
n.D	Derivative time (D); For heating/cooling control, the derivative time for heating side.	OFF, 1 to 6,000 sec	60	See above	1D 308 2D 333 3D 358 4D 383
n.MR	Manual reset (see Note 2)	-5.0 to 105.0%	5.0%	See above	1MR 311 2MR 336 3MR 361 4MR 386
n.Pc	Proportional band for the cooling side (Pc) (see Note 3)	0.0 to 999.9% however, cooling side ON/OFF control applies when 0.0	5.0%	See above	1PC 314 2PC 339 3PC 364 4PC 389
n.Ic	Integral time for the cooling side (Ic) (see Note 3)	OFF, 1 to 6,000 sec	240	See above	1IC 315 2IC 340 3IC 365 4IC 390
n.Dc	Derivative time for the cooling side (Dc) (see Note 3)	OFF, 1 to 6,000 sec	60	See above	1DC 316 2DC 341 3DC 366 4DC 391
n.DB	Dead band (heating / cooling control) (see Note 3)	-100 to 50.0%	3.0%	Dead band or overlap of heating and cooling outputs.	1DB 318 2DB 343 3DB 368 4DB 393
1.RP	Reference point 1 (*) (see Note 4)	EU (0.0%) </= 1.RP </= 2.RP </= EUS (100.0%)	EU (100.0%)	Reference point where control transfers from PID set 1 to PID set 2.	319
2.RP	Reference point 2 (*) (see Note 4)	EU (0.0%) </= 1.RP </= 2.RP </= EUS (100.0%)	EU (100.0%)	Reference point where control transfers from PID set 2 to PID set 3.	344
RDV	Reference deviation (see Note 4)	OFF, EUS (0.1 to 100.0%) S	EUS (0.5%)	Selects the deviation from setpoint where PID set 4 is used.	494

Note 2: The parameter will be displayed when the integral time (nIn = 1 to 4) is set to 0.
Note 3: These parameters will be displayed when heating/cooling control is set.
Note 4: These parameters will be displayed when zone PID is selected.
***** See additional information in appendix

Table 1 – Input Selection

Input	Type	Range (ºC)	Range(ºF)	Accuracy	Code
Thermocouple	K	-200 to 1370º	-300 to 2500º	At or above 0º, +/-0.1% +/-1 digit full scale	1
	K	-199.9 to 999.9º	0 to 2300º	See above	2
	K	-199.9 to 500.0º	-199.9 to 999.9º	See above	3
Thermocouple	J	-199.9 to 999.9º	-300 to 2300º	See above	4
Thermocouple	T	-199.9 to 400.0º	-300 to 750º	See above	5
	T	0.0 to 400.0º	-199.9 to 750.0º	See above	6
Thermocouple	B	0 to 1800º	32 to 3300º	At or above 400ºC, +/-0.15% +/-1 digit of full scale. <400ºC, 5% of full scale +/-1 digit.	7
Thermocouple	S	0 to 1700º	32 to 3100º	+/-0.15% +/- 1 digit of F.S	8
Thermocouple	R	0 to 1700º	32 to 3100º	See above	9
Thermocouple	N	-200 to 1300º	-300 to 2400º	+/-0.2% +/-1 digit of F.S.	10
Thermocouple	E	-199.9 to 999.9º	-300 to 1800º	=/> 0ºC, +/-0.1% +/-1 digit of F.S. < 0ºC, +/-0.2% +/-1 digit F.S.	11
Thermocouple	L (DIN)	-199.9 to 900.9º	-300 to 1300º	See above	12
Thermocouple	U (DIN)	-199.9 to 400.0º	-300 to 750º	See above	13
	U (DIN)	0.0 to 400.0º	-19.9 to 750.0º	See above	14
Thermocouple	W (DIN)	0 to 2300º	32 to 3400º	+/-0.1% +/-1 digit F.S.	15
Thermocouple	Platinel 2	0 to 1390º	32 to 2500º	See above	16
Thermocouple	PR20-40	0 to 1900º	32 to 3400º	=/> 800ºC, +/-0.5% +/-1 digit of F.S. <800ºC no guaranteed	17
Thermocouple	W97Re3-W75Re25	0 to 2000º	32 to 3600º	+/-0.2% +/-1 digit of F.S.	18
RTD	JPt100	-199.9 to 500.0º	-300 to 1180º	+/-0.1% +/-1 digit of F.S.	30
RTD	JPt100	-150.0 to 150.0º	-199.9 to 300.0º	+/-0.2% +/-1 digit of F.S.	31
RTD	PT100	-199.9 to 640.0º	-300 to 1180º	+/-0.1% +/-1 digit of F.S.	35
RTD	PT100	-199.9 to 500.0º	-199.9 to 999.9º	+/-0.2% +/-1 digit of F.S.	36
RTD	PT100	-150.0 to 150.0º	199.9 to 300.0º	See above	37
DC Voltage	0.000 to 2.000V	Display range -1999 to 9999	Display range -1999 to 9999	+/-0.1% +/-1 digit of F.S.	50
DC Voltage	0.0 to 10.0V	Display range -1999 to 9999	Display range -1999 to 9999	See above	51
DC Voltage	0.400 to 2.000V	Display range -1999 to 9999	Display range -1999 to 9999	See above	40
DC Voltage	1.000 to 5.000	Display range -1999 to 9999	Display range -1999 to 9999	See above	41
DC Voltage	-10.00 to 20.00 mV	Display range -1999 to 9999	Display range -1999 to 9999	See above	55
DC Voltage	0.0 to 100.0 mV	Display range -1999 to 9999	Display range -1999 to 9999	See above	56

Table 2 – Output Selection

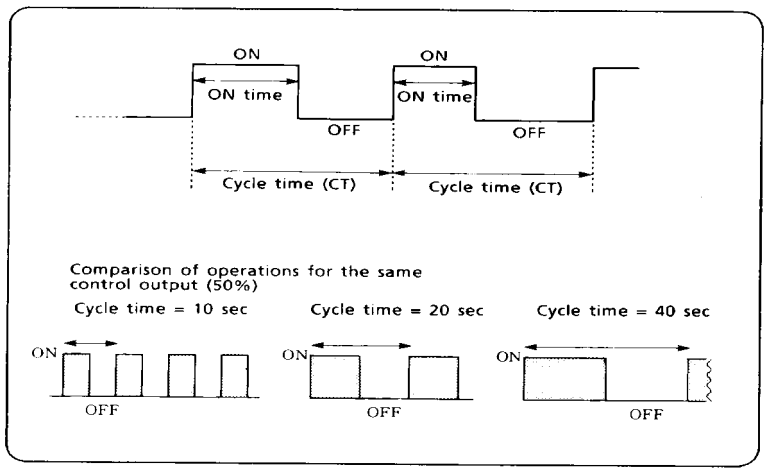
OT	Control Type	Output Current/Pulse	RET Current/Pulse	Output Relay Contact	ALM3 Relay Contact
0	Time proportional PID	Not used	Retransmission output	Control output	Alarm output
1	↑	Pulse control output	↑	Not used	↑
2	Continuous PID	Current control output	↑	↑	↑
3	ON/OFF control	Not used	↑	Control output	↑
4	Heating/Cooling control	↑	↑	Heating output	Cooling output
5	↑	Heating pulse control output	↑	Not used	Cooling output
6	↑	Heating current control output	↑	↑	Cooling output
7	↑	Not used	Cooling pulse control output	Heating output	Alarm output
8	↑	Heating pulse control output	Cooling pulse control output	Not used	↑
9	↑	Heating current control output	Cooling pulse control output	↑	↑
10	↑	Not used	Cooling current control output	Heating output	↑
11	↑	Heating pulse control output	Cooling current control output	Not used	↑
12	↑	Heating current control output	Cooling current control output	Not used	↑

Table 3 - Alarms

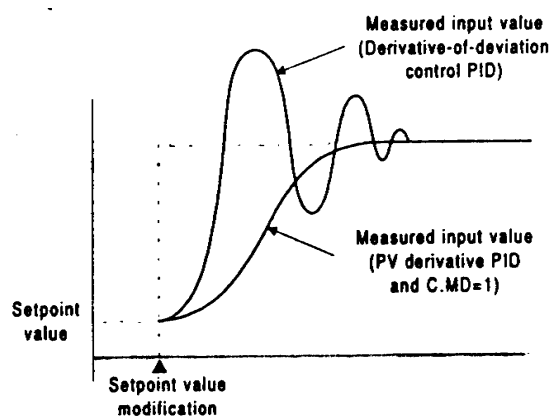
Type of Alarm	Action of Relay	Code	Code
Process Variable Alarms		**Alarm always active**	**Standby on startup**
High level alarm	Normally open – closes on alarm	1	11
Low level alarm	Normally open – closes on alarm	2	12
Positive (high) deviation	Normally open – closes on alarm	3	13
Negative (low) deviation	Normally open – closes on alarm	4	14
Positive (high) deviation	Normally closed – opens on alarm	5	15
Negative (low) deviation	Normally closed – opens on alarm	6	16
Deviation band (high & low)	Normally open – closes on alarm	7	17
Within deviation band	Closed within deviation band	8	18
High level alarm	Normally closed – opens on alarm	9	19
Low level alarm	Normally closed – opens on alarm	10	20
Setpoint Alarms			
High setpoint alarm	Normally open – closes on alarm	28	
Low setpoint alarm	Normally open – closes on alarm	29	
Output Alarms			
High output alarm	Normally open – closes on alarm	30	
Low output alarm	Normally open – closes on alarm	31	
Heater Break Alarms			
High current HBA1	Normally open – closes on alarm	24	
High current HBA2	Normally open – closes on alarm	25	
Diagnosis Alarms			
Sensor grounding	Normally open – closes on alarm	23	
Self diagnosis	Normally open – closes on alarm	21	
Fail	Normally open – closes on alarm	22	

CT – Cycle Time: Applies to time proportional relay or pulse outputs only. Cycle time is the the total on and off time of the output. Small cycle times will provide the most precise control, but will shorten the life of the replaceable relay. Normal recommended cycle times: 10-30 seconds

Control output pulse width = control output (%) x cycle time.

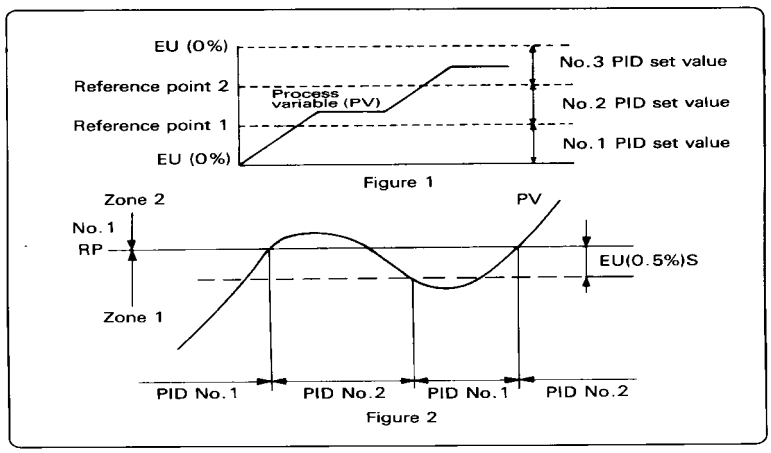


C.MD – PID Control Mode: The new strategy uses PV-Derivative PID to eliminate the negative effect sometimes caused by setpoint changes. When setpoint changes are to be made, and the process being controlled has lots of inertia, try setting the control mode to 1 otherwise leave it set to 0.

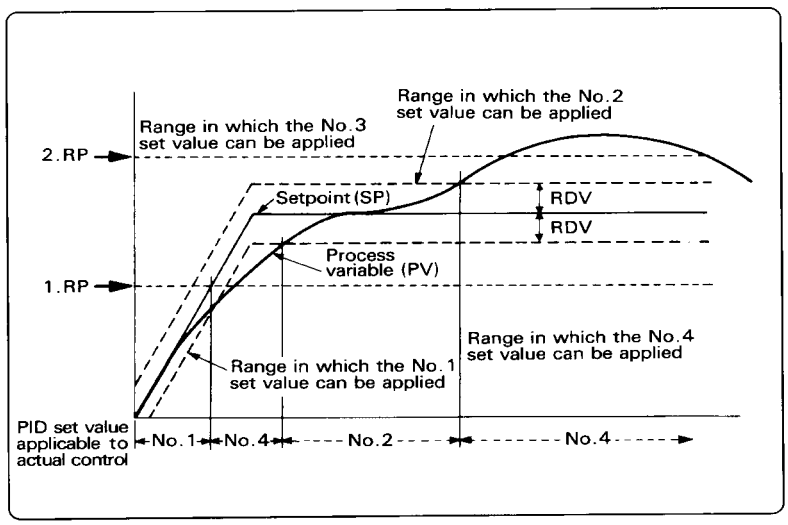


ZON – Zone PID Selection: PID sets may be selected by setpoints or by zone.

If ZON is OFF:	**If ZON is ON:**
SP # 1 uses PID # 1	PID set will be automatically selected based on the process value.
SP # 2 uses PID # 2	This is determined by setting RP1 and RP2 for the PID sets PID1,
SP # 3 uses PID # 3	PID2, and PID3.
SP # 4 uses PID # 4	

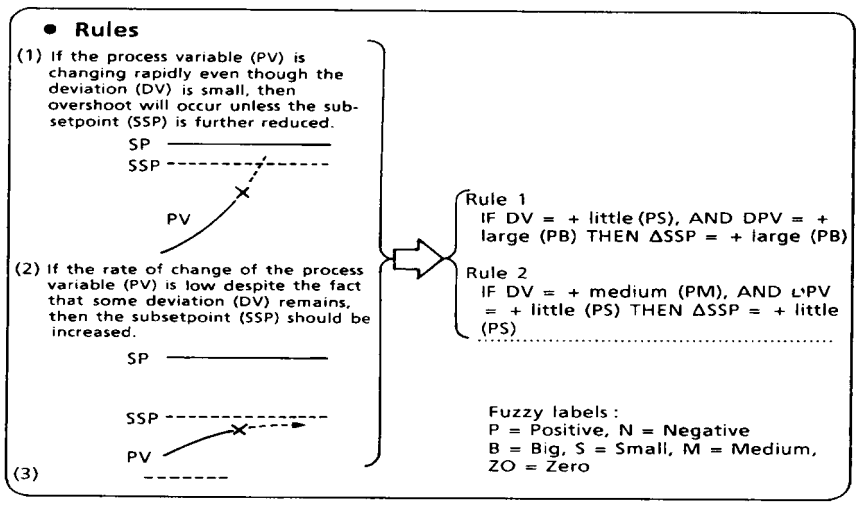


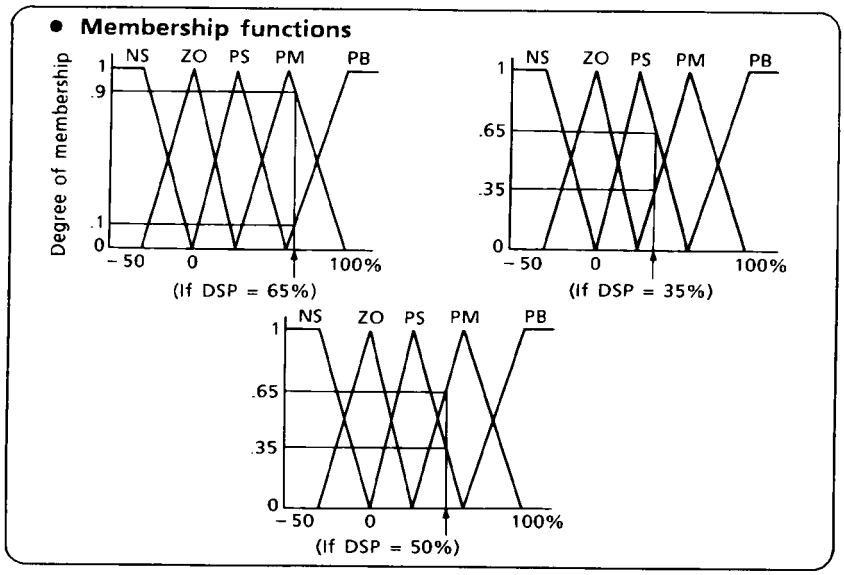
The 4th PID set is selected when the deviation from setpoint exceeds the value R.DV entered with PID4. This is shown below.



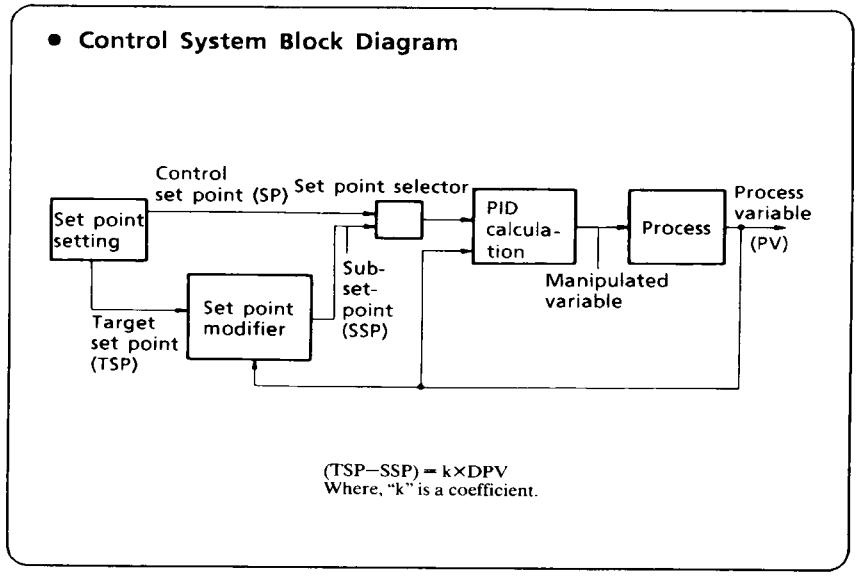
Important Note: During auto tune, when ZON is on, the auto tune will occur at the midpoint of the zone no matter what setpoint is selected.

SC – Super Control: Super control uses fuzzy logic to emulate the manipulations of an expert operator. The fuzzy logic learns how your process operates and then uses sub-setpoints to eliminate overshoot and improve control performance.

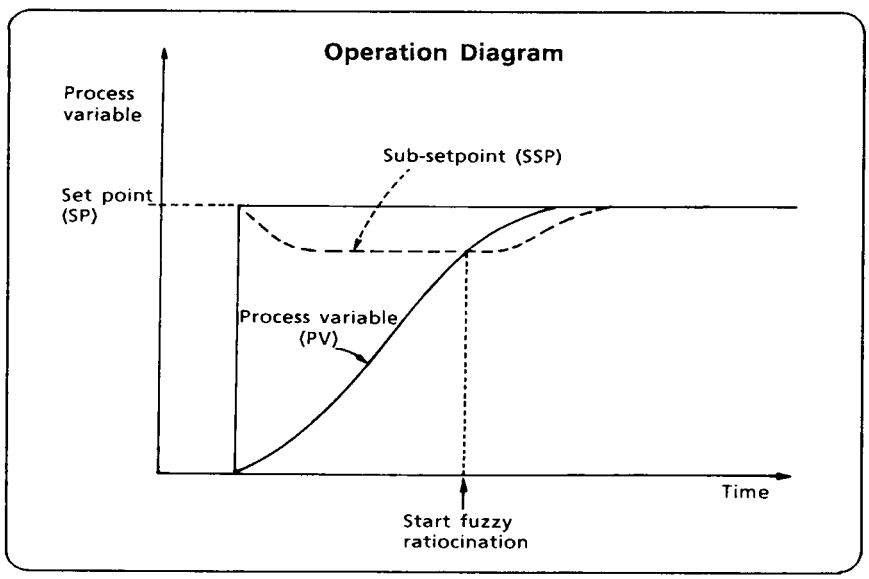




Block Diagram:

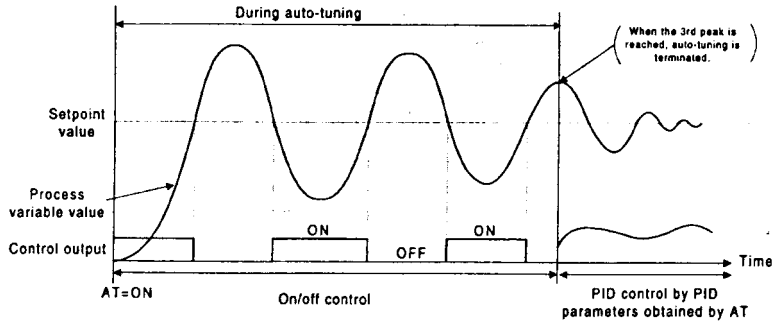


Principles:



The result is outstanding control performance with totally automatic operation.

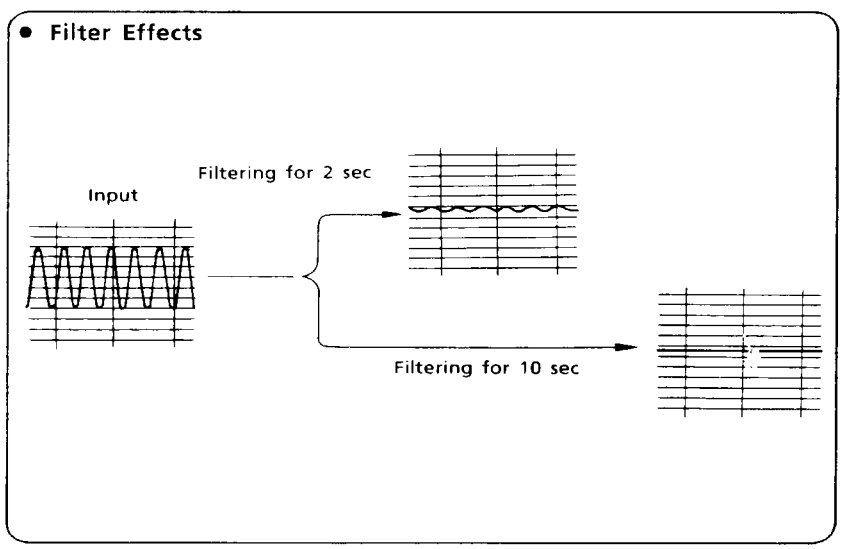
AT – Autotune: Yokogawa's autotune uses the limit cycle method, which does ON/OFF control to learn the control loops characteristics and then derive the best PID settings. Great care should be taken when trying to use autotune on a loop that has a fast response rate like flow or pressure loop.



Autotune offers several choices:

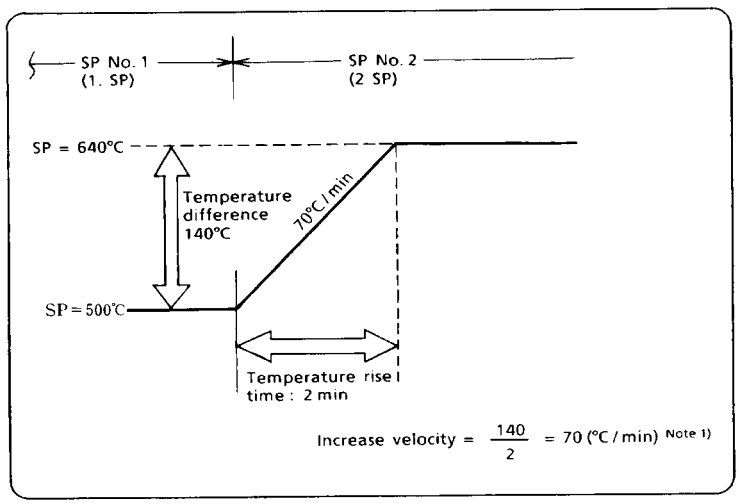
If ZON = OFF:	If ZON = ON:
AT1 – Sets PID1 at SP1	AT1 – Sets PID1 at midpoint of Zone 1
AT2 – Sets PID2 at SP2	AT2 – Sets PID1 at midpoint of Zone 2
AT3 – Sets PID3 at SP3	AT3 – Sets PID1 at midpoint of Zone 3
AT4 – Sets PID4 at SP4	AT4 – Sets PID4 at midpoint of instrument range (see diagram in Zone area of appendix)

FL – Filter: The input filter will reduce the oscillation or fluctuation of the process value. Use the smallest filter that accomplishes the desired result.



UPR/DNR – Setpoint Ramping: Setpoints can be ramped gradually to avoid abrupt setpoint change and smooth the control. UPR – Defines the rate in an upper direction. DNR – Defines the rate in a downward direction.

TMU in the functional parameter menu defines whether this is in units per hour (0) or units per minute (1). The ramp will be in effect anytime the setpoint is changed, SP NO is changed, or the power is turned on. When power is turned on, the setpoint will begin at the process value and ramp to the previous setpoint.



Wiring Diagram: