ETL25, ETC25, and ETC25A Controllers

For detailed instructions see Controller Product Manual 51-52-25-135 or Limit Product Manual 51-52-25-136.

Step 1. Record Instrument Model & Serial

Note: Check inside label on chassis (remove from case)

Model number: _____

Serial number: _____

ETL25: Limit Control, listed for safety interlock, single relay output

ETC25: Universal Control with outputs for 4-20mA current or relay or 3-position step (floating), 2 alarms, and digital input

ETC25A: Advanced Program with 4-20mA current and 2 alarms, or relay output and 1 alarm; auxiliary output and 1 digital input or no aux-out and 2 digital inputs; second input; set-point programming; and IR configuration port.

Step 2. Dimensions and mounting

Note: For NEMA 4 water protection, install the 4 screws and washers into the indentations at the corners of the front bezel.
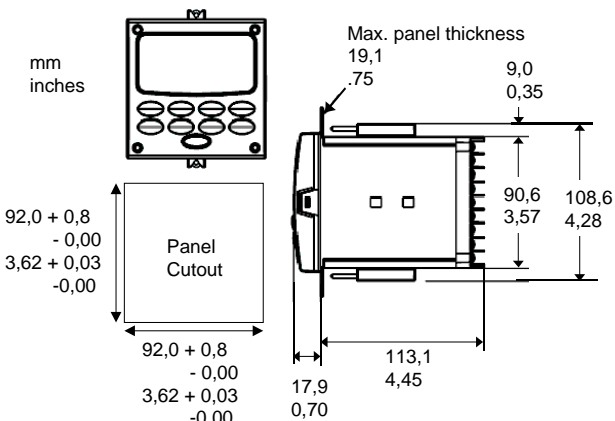
Step 3. Wiring
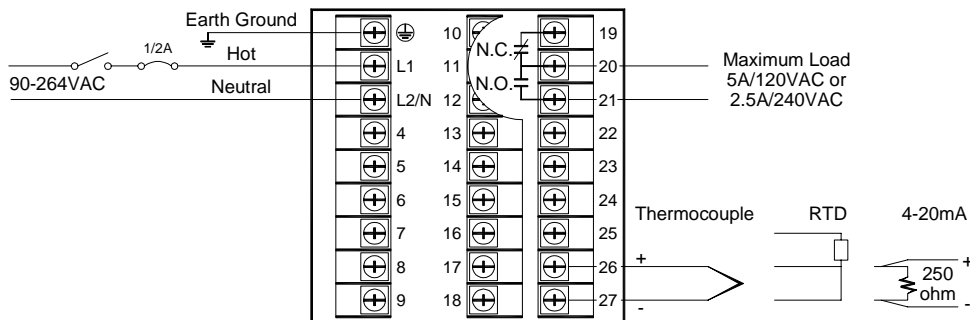
Fig. 3-1: ETL25 Limit Control

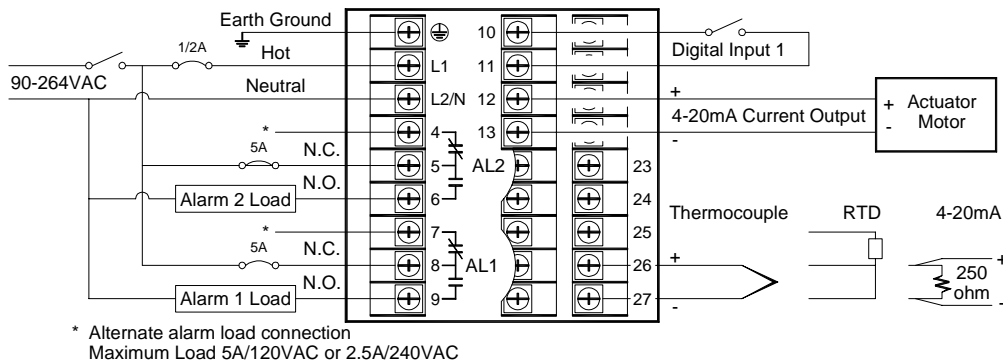**Fig. 3-2: ETC25** for 4-20mA current driven actuators

* Alternate alarm load connection
Maximum Load 5A/120VAC or 2.5A/240VAC

Fig. 3-3: ETC25 for High-Low or On-Off Control

* Alternate alarm load connection
Maximum Load 5A/120VAC or 2.5A/240VAC

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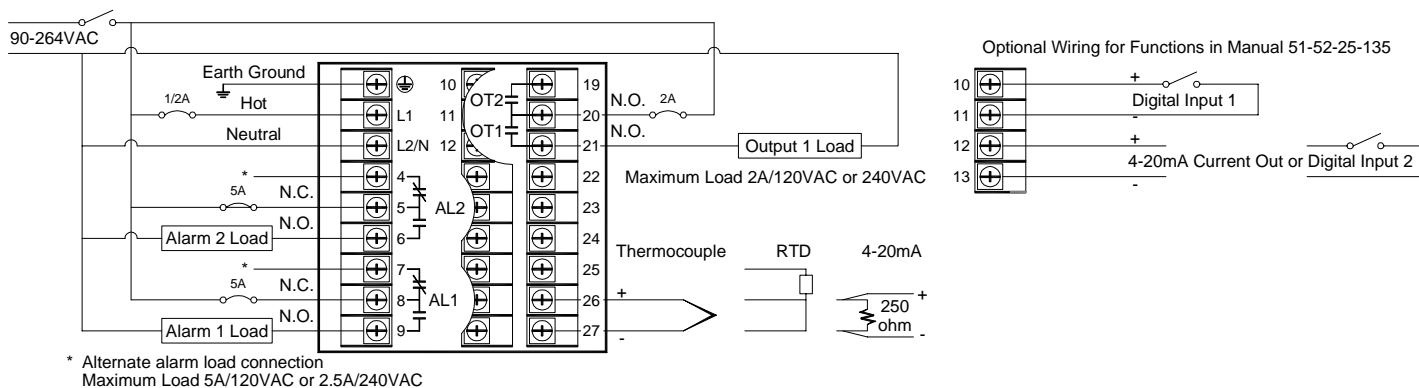
Fig. 3-4: ETC25 for Three Position Step Control of power-driven actuators

Actuator Motor

Close

Open

Maximum Load 2A/120VAC or 240VAC

Optional Wiring for Functions in Manual 51-52-25-135

10
11 Digital Input 1
12
13 4-20mA Current Out or Digital Input 2

Thermocouple   RTD   4-20mA   250 ohm

* Alternate alarm load connection
  Maximum Load 5A/120VAC or 2.5A/240VAC
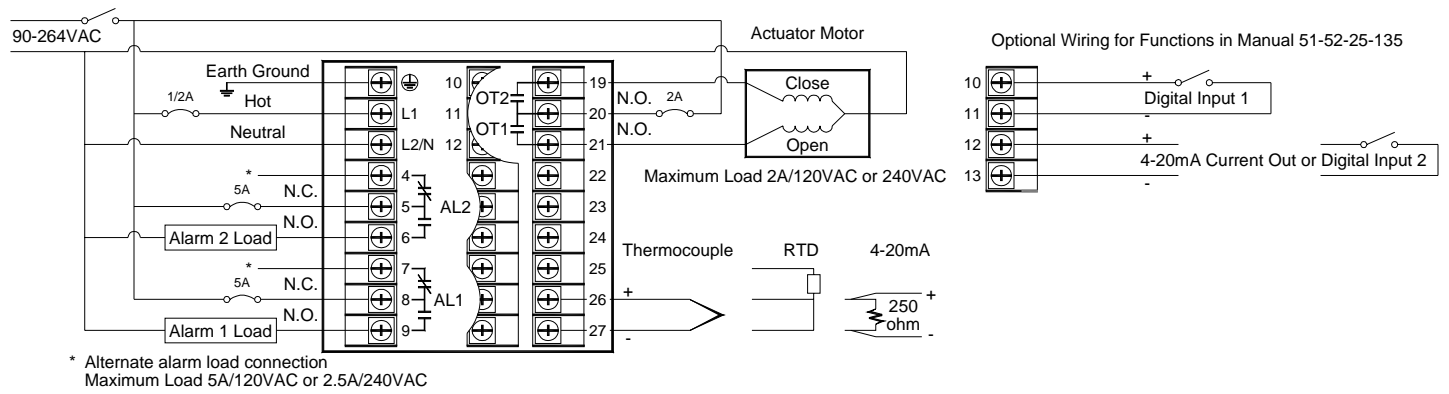
Fig. 3-5: ETC25 for Three Position Step Control of contact-driven actuators

Protector

Actuator Motor

Close

Open

Maximum Load 2A/120VAC or 240VAC

Optional Wiring for Functions in Manual 51-52-25-135

10
11 Digital Input 1
12
13 4-20mA Current Out or Digital Input 2

Thermocouple   RTD   4-20mA   250 ohm

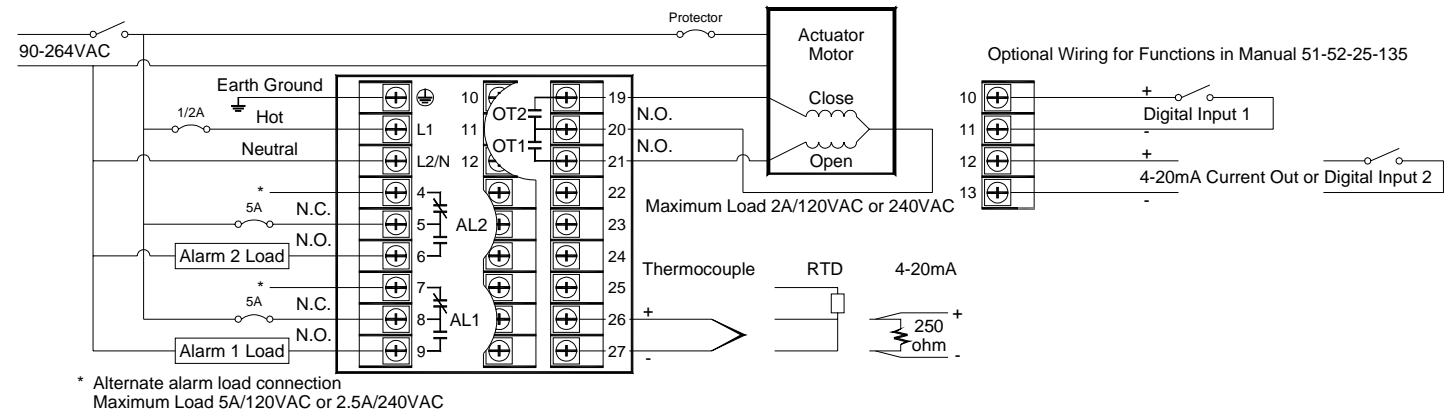* Alternate alarm load connection
  Maximum Load 5A/120VAC or 2.5A/240VAC

Fig. 3-6: ETC25A for 4-20mA current driven actuators includes Set-Point Programming, Remote Set-Point, and Heat-Cool capabilities.
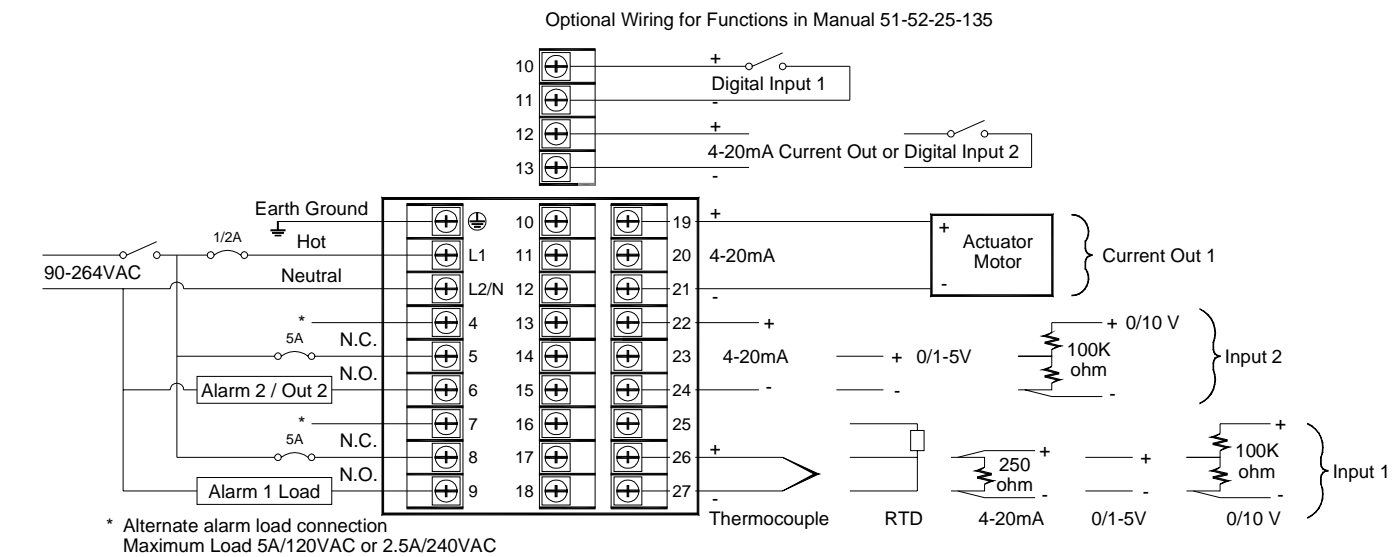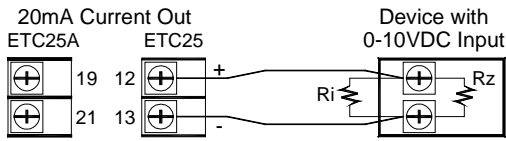

Optional Wiring for Functions in Manual 51-52-25-135

10
11 Digital Input 1
12
13 4-20mA Current Out or Digital Input 2

Actuator Motor   Current Out 1

4-20mA   0/1-5V   0/10 V   100K ohm   Input 2

Thermocouple   RTD   4-20mA   0/1-5V   0/10 V   250 ohm   100K ohm   Input 1

* Alternate alarm load connection
  Maximum Load 5A/120VAC or 2.5A/240VAC

Fig. 3-7: ETC25 and ETC25A for 0-10VDC output.


20mA Current Out — Device with 0-10VDC Input

Ri is a resistor to be added to the input terminals of the device.
Rz is the input impedance of the device. It must be greater than 500 ohms.

a) Set OUTALG – CRANGE to 0-20mA to get 0V at 0%
b) Measure or look up the input impedance of the driven device
c) Calculate Ri resistor value from the formula: $Ri = (500 \times Rz) / (Rz - 500)$
d) Choose a 1% resistor equal to or the next greater standard value for the calculated resistance and power rating of at least 1/4W.

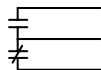**Fig. 3-8: ETC25** wiring to VeriFlame and a 4-20mA actuator

This circuit provides:
- a burner start position that is increased above the minimum firing rate,
- an alarm 1 setpoint to force the actuator to the minimum firing rate, and
- an alarm 2 setpoint to shut off the burner.
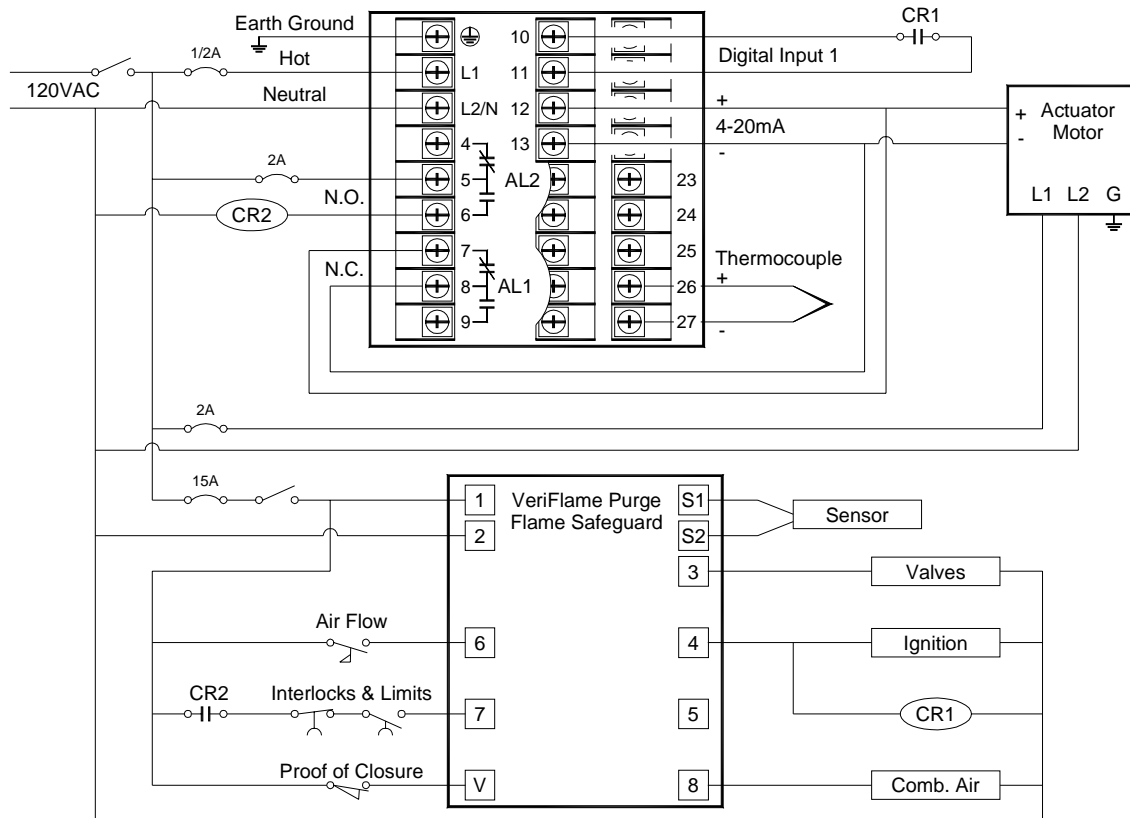
1. In this example Alarm 1 is set for high deviation, A1S1TY = DE, A1S1HL = HIGH. When the temperature exceeds the setpoint by the value entered for A1S1VA, then the contact closes across the current output causing the actuator to move to the low fire position. It will be held at low fire until the difference between the temperature and setpoint drops below the A1S1VA setting.

2. In this example Alarm 2 is also set for high deviation, A2S1TY = DE, A2S1HL = HIGH, except the value entered for A2S1VA is set greater than for alarm 1. If the application temperature keeps rising with the actuator at low fire, then the alarm 2 contact will open. This causes the CR2 contact to remove power from the interlock input of the flame safeguard and shut down the burner. When the difference between the temperature and setpoint falls within the A2S1VA setting, then power is restored to the flame safeguard interlock input and the burner is lit.

3. Digital input 1 is used to force the output to a specific value for a burner starting position. It is useful for burners that require a higher firing rate to light reliably but can be turned down lower after lit. In the OPTION group, DIGIN1 is set to manual failsafe MNFS. The value for the starting position is entered in the CONTRL group under FAILSF as a percentage of output.

Fig 3-9 Alarm Relay Contact States	**Alarm Relay Wiring**	**Variable NOT in Alarm State**		**Variable in Alarm State**	
		Relay Contact	**Indicators**	**Relay Contact**	**Indicators**
	N.O. - 5-6 or 8-9	Closed	Off	Open	On
	N.C. - 4-5 or 7-8	Open		Closed	

Step 4. General Configuration Procedure

Step	Operation	Press	Result
1	Enter Set Up Mode	Setup	*Upper Display* = **SET** *Lower Display* = **TUNING** (This is the first Set Up Group title)
2	Select any Set Up Group	Setup	Sequentially displays each Set Up Group Prompt, as listed below in the **Configuration Record Sheet**. You can also use the ▲ or ▼ keys to scan the Set Up groups in both directions. Stop at the group title that describes the group of parameters you want to configure. Then proceed to the next step.
3	Select a Function Parameter	Function	*Upper Display* = the current value or selection for the first function prompt of the selected Set Up group. *Lower Display* = the first Function prompt within that Set Up group. Sequentially displays the other function prompts of the Set Up group you have selected. Stop at the function prompt that you want to change and then proceed to the next step.
4	Change the Value or Selection	▲ or ▼	Increments or decrements the value or selection that appears for the selected function prompt. If you change the value or selection of a parameter while in Set Up mode then decide not to enter it, press [M-A Reset] once—the original value or selection is recalled.
5	Enter the Value or Selection	Function	Enters value or selection made into memory after another key is pressed.
6	Exit Configuration	Lower Display	Exits configuration mode and returns controller to the same state it was in immediately preceding entry into the Set Up mode. It stores any changes you have made. If you do not press any keys for 30 seconds, the controller times out and reverts to the mode and display used prior to entry into Set Up mode.

Table 4-1: ETC25 Steps to configure a 4-20mA Output Control [Do not use for ETC25A]

Step	Operation	Press	Result
1	Select **ALGOR** Group	Setup	*Upper Display* = **SET** ; press sequentially until *Lower Display* = **ALGOR**
2	Select **CTRALG** Function Parameter	Function	*Upper Display* = displays present value to be changed *Lower Display* = **CTRALG**
3	Set to Proportional Control Mode	▲ or ▼	*Upper Display* = **PIDA** (also PIDB or PDMR) *Lower Display* = **CTRALG**
4	Select **OUTALG** Group	Setup	*Upper Display* = **SET** *Lower Display* = **OUTALG**
5	Select **OUTALG** Function	Function	*Upper Display* = displays present value to be changed *Lower Display* = **OUTALG**
6	Set to Relay type	▲ or ▼	*Upper Display* = **RLY** *Lower Display* = **OUTALG**
7	Select **OPTION** Group	Setup	*Upper Display* = **SET** *Lower Display* = **OPTION**
8	Select **AUXOUT** Function Parameter	Function	*Upper Display* = displays present value to be changed *Lower Display* = **AUXOUT**
9	Set to **OUT**	▲ or ▼	*Upper Display* = **OUT** *Lower Display* = **AUXOUT**
10	Verify 0 percent	Function	*Upper Display* = **0.0** *Lower Display* = **0 PCT**
11	Verify 100 percent	Function	*Upper Display* = **100.0** *Lower Display* = **100PCT**
12	Verify current starts at 4mA	Function	*Upper Display* = **4-20** *Lower Display* = **CRANGE**
13	Exit Configuration	Lower Display	Exits configuration mode and returns controller to the same state it was in immediately preceding entry into the Set Up mode.

NOTE: Although the ETC25 controller is used for current output, the OUTALG is set to RLY to match the physical hardware installed for output 1 and output 2 terminals. Therefore the RLYTYP must also remain set at MECH. The RLYTYP parameter is only viewed when LOCK is set to NONE.

Table 4-2: ETC25 Steps to configure ON-OFF or HIGH-LOW Output Control [for ETC25A use OUT2 per Fig.3-6]

Step	Operation	Press	Result
1	Select **ALGOR** Group	Setup	*Upper Display* = **SET** ; press sequentially until *Lower Display* = **ALGOR**
2	Select **CTRALG** Function Parameter	Function	*Upper Display* = displays present value to be changed *Lower Display* = **CTRALG**
3	Set to On-Off Control Mode	▲ or ▼	*Upper Display* = **ONOF** *Lower Display* = **CTRALG**
4	Select **OUTALG** Group	Setup	*Upper Display* = **SET** *Lower Display* = **OUTALG**
5	Select **OUTALG** Function	Function	*Upper Display* = displays present value to be changed *Lower Display* = **OUTALG**
6	Set to Relay type	▲ or ▼	*Upper Display* = **RLY** *Lower Display* = **OUTALG**
7	Exit Configuration	Lower Display	Exits configuration mode and returns controller to the same state it was in immediately preceding entry into the Set Up mode.

Note: The RLYTYP must remain set at MECH. The RLYTYP parameter is only viewed when LOCK is set to NONE.

Table 4-3: ETC25 Steps to configure Three-Position-Step Output Control

Step	Operation	Press	Result
1	Select **ALGOR** Group	Setup	*Upper Display* = **SET** ; press sequentially until *Lower Display* = **ALGOR**
2	Select **CTRALG** Function Parameter	Function	*Upper Display* = displays present value to be changed *Lower Display* = **CTRALG**
3	Set to 3-Position Step Mode	▲ or ▼	*Upper Display* = **TPSC** *Lower Display* = **CTRALG**
4	Select **OUTALG** Group	Setup	*Upper Display* = **SET** *Lower Display* = **OUTALG**
5	Verify **OUTALG** Function	Function	*Upper Display* = **TPSC** *Lower Display* = **OUTALG**
6	Select Motor Stroke Time Function Parameter	Function	*Upper Display* = displays present value to be changed *Lower Display* = **MTR TI**
7	Set Actuator Motor Travel Time Value in Seconds	▲ or ▼	*Upper Display* = **XX** (enter time in seconds for 0 to 100% of stroke) *Lower Display* = **MTR TI**
8	Exit Configuration	Lower Display	Exits configuration mode and returns controller to the same state it was in immediately preceding entry into the Set Up mode.

NOTE: TPSC on the ETC25A uses the Alarm 1 (Output 3 terminals) and Alarm 2 (Output 4 terminals). The RLYTYP must remain set at MECH. The RLYTYP parameter is only viewed when LOCK is set to NONE.

Step 5. Configuration Record Sheet

Table 5-1: ETL25 Limit Control - Enter the value or selection for each prompt on this sheet so you will have a record of your controller settings.

Group Prompt	Function Prompt	Value or Selection	Factory Setting	Group Prompt	Function Prompt	Value or Selection	Factory Setting
LOCK	SECUR LOCK	_____ _____	DIS CAL	**COM** *Not Installed*	ComADR ComSTA IRENAB SDENAB SHDTIM BAUD TX DLY WS FLT UNITS LOOPBK	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____	3 DIS ENAB ENAB 0 19200 1 FP_B PCT DIS
LIMIT	LOW-HIGH POWRUP SP MAX SP MIN DISPLY	_____ _____ _____ _____ _____	HIGH NORM 2400 0 PROC				
INPUT1	IN1TYP XMITR1 IN1 HI IN1 LO BIAS 1 FILTR1 BRNOUT EMIS	_____ _____ _____ _____ _____ _____ _____ _____	KH LIN 2400 0 0.0 1.0 UP 1.0	**ALARMS** *Relays Not Installed, Use for Visual Alarm Indication Only*	A1S1TY A1S1VA A1S1HL A1S2TY A1S2VA A1S2HL A2S1TY A2S1VA A2S1HL A2S2TY A2S2VA A2S2HL ALHYST ALARM1 BLOCK DIAGAL	_____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____ _____	NONE 90 HIGH NONE 10 HIGH NONE 95 HIGH NONE 5 HIGH 0.1 NOL DIS DIS
OPTIONS *Not Installed*	AUXOUT 0 PCT 100 PCT CRANGE DIGIN1	_____ _____ _____ _____ _____	DIS 0 100 4-20 DIS				
				DISPLY	DECML UNITS FREQ	_____ _____ _____	NONE F 60

Note: To prevent accidental changes to the set point, adjust SP MAX and SP MIN in the LIMIT group to the desired set point value.

Table 5-2: ETC25 & ETC25A Control - Enter the value or selection for each prompt on this sheet so you will have a record of your controller settings. Some prompts may not appear due to other prompt settings. Settings marked * are for the ETC25A.

Group Prompt	Function Prompt	Value or Selection	Factory Setting	Group Prompt	Function Prompt	Value or Selection	Factory Setting
TUNING	PB or GAIN	_____	10.00 (PB)	CONTRL	PIDSET	_____	ONE
	RATE T	_____	0.00		SW VAL	_____	0.00
	I MIN or I RPM	_____	1.20 (I RPM)		LSP'S	_____	ONE
	MANRST	_____	0.0		RSPSRC*	_____	NONE*
	PB2 or GAIN 2	_____	5.00		SP TRK	_____	NONE
	RATE2T	_____	0.20		PWR UP	_____	AMLS
	I2 MIN or I2 RPM	_____	1.30		PWROUT	_____	LAST
	CYCT1 or CT1X3	_____	10		SP Hi	_____	2400
	CYC2T2 or CT2X3	_____	10		SP Lo	_____	0
	SECUR	_____	0		ACTION	_____	REV
	LOCK	_____	CAL		OUT Hi	_____	100
	AUTOMA	_____	ENAB		OUT Lo	_____	0
	RN HLD	_____	ENAB		D BAND	_____	2.0
	SP SEL	_____	ENAB		HYST	_____	0.5
					FAILSF	_____	0.0
					FSMODE	_____	NOL
SPRAMP	SPRAMP	_____	DIS		PBorGN	_____	PB
	TI MIN	_____	3		MINRPM	_____	RPM
	FINLSP	_____	1000	OPTION	AUXOUT	_____	OUT
	SPRATE	_____	DIS		0 PCT	_____	0
	EUHRUP	_____	0		100 PCT	_____	100
	EUHRDN	_____	0		CRANGE	_____	4-20
	SPPROG	_____	DIS		DIG IN 1	_____	NONE
	PVSTRT*	_____	ENAB*		DI1 CMB	_____	DIS
ATUNE	FUZZY	_____	DIS		DIG IN 2	_____	NONE
	TUNE	_____	TUNE		DI2 CMB	_____	DIS
	DUPLEX	_____	MAN	COM	ComADR	_____	3
	AT ERR	_____	---	*Not Installed*	ComSTA	_____	DIS
ALGOR	CTRALG	_____	PIDA		IRENAB*	_____	ENAB*
	TIMER	_____	DIS	*Infrared Interface on ETC25A*	BAUD	_____	19.2K
	PERIOD	_____	0:01		TX_DLY	_____	1
	START	_____	KEY		WS_FLT	_____	FP_B
	L DISP	_____	TREM		SDENAB	_____	Enable
	RESET	_____	KEY		SHDTIM	_____	0
	INCRMT	_____	MIN		SDMODE	_____	Last
OUTALG	OUTALG	_____	RLY / CUR*		SHD_SP	_____	LSP
	CRANGE*	_____	4-20*		UNITS	_____	PCT
	RLY TYP	_____	MECH		CSRATO	_____	1.0
	MTRTI	_____	15		CSP_BI	_____	0
INPUT1	IN1TYP	_____	KH		LOOPBK	_____	DIS
	XMITR1	_____	LIN	ALARMS	A1S1TY	_____	NONE
	IN1 HI	_____	2400		A1S1VA	_____	90
	IN1 LO	_____	0		A1S1HL	_____	HIGH
	RATIO1	_____	1.00		A1S1EV	_____	BEGN
	BIAS 1	_____	0.0		A1S2TY	_____	NONE
	FILTR1	_____	1.0		A1S2VA	_____	10
	BRNOUT	_____	UP		A1S2HL	_____	HIGH
	EMIS	_____	1.0		A1S2EV	_____	BEGN
INPUT2	IN2TYP	_____	1-5V*		A2S1TY	_____	NONE
ETC25A only	LIN	_____	LIN*		A2S1VA	_____	95
	IN2 HI	_____	2400*		A2S1HL	_____	HIGH
	IN2 LO	_____	0*		A2S1EV	_____	BEGN
	RATIO2	_____	1.00*		A2S2TY	_____	NONE
	BIAS 2	_____	0.0*		A2S2VA	_____	5
	FILTR2	_____	1.0*		A2S2HL	_____	HIGH
					A2S2EV	_____	BEGN
					ALHYST	_____	0.1
					ALARM1	_____	NOL
					BLOCK	_____	DIS
					DIA AL	_____	DIS
				DISPLY	DECMAL	_____	NONE
					UNITS	_____	F
					FREQ	_____	60
					NOLDSP	_____	DIS
					DISPLY	_____	SP
					LNGUAG	_____	ENGL

(*Ethernet Addresses accessible via the PIE tool)

Step 6. Start Up Procedure for Operation

Table 6-1: ETL25 Limit

Step	Operation	Press	Result
1	Display Setpoint	Lower Display	Press the "Lower Display" key till SP appears.
2	Enter the Limit Setpoint	▲ or ▼	Set the SP, using the Up & Down arrow keys, to the desired Limit Setpoint
3	Store the Limit Setpoint	Lower Display	Press the "Lower Display" to store the value.
4	If the display flashes "Limit"	M-A Reset	Press the Auto-Man/ Reset key. For high limit, the temperature must be under the setpoint before it will reset.

Table 6-2: ETC25 & ETC25A

Step	Operation	Press	Result
1	Select Manual Mode	M-A Reset	Until "**M**" indicator is ON. The controller is in manual mode.
2	Adjust the Output	▲ or ▼	To adjust the output value and test proper operation of the final control element. *Upper Display* = **Pv Value** *Lower Display* = **OT and the output value in %**
3	Enter the Local Setpoint	Lower Display	*Upper Display* = **Pv Value** *Lower Display* = **SP and the Local Setpoint Value**
		▲ or ▼	To adjust the local setpoint to the value at which you want the process variable maintained. The local setpoint cannot be changed if the Setpoint Ramp function is running.
4	Select Automatic Mode	M-A Reset	Until "**A**" indicator is ON. The controller is in Automatic mode. The controller will automatically adjust the output to maintain the process variable at setpoint.
5	Tune the Controller	Setup	Use Accutune to tune the controller; see product manual for detailed procedure or refer to Tuning Set Up group to manually adjust PB or GAIN, RATE T, and I MIN or I RPM.

Supplemental Instructions for PV Hot Start for Setpoint Ramp and Setpoint Program (ETC25A)

When power is lost and resumed, the Setpoint Ramp or Setpoint Program will be placed in "HOLD". Using the RUN/HOLD key or a switch on the digital input, you can then remotely restart the ramp or program either at the current PV (PV Hot Start Enabled) or at the original starting setpoint of the SP Ramp or SP Program.

PV STRT can be configured to ENAB or DIS under the SP RAMP or SP PROGRAM Set Up groups. The rules for PV Hot Start (initializing the setpoint at the current PV on power up) are:

- Occurs only if PV Start is ENABLED in either SP RAMP or SP PROGRAM groups
- Occurs only following a power up
- Occurs only for Local Setpoint #1, and does not apply for Local Setpoint #2 or Remote Setpoint
- Applies in either Auto or Manual mode
- Following PV Hot Start, Local Setpoint #1 and Local Setpoint #2 can be changed via the increment/decrement keys

The Digital Input can be configured to RUN or STRT.

RUN – the program starts the setpoint at the current value of setpoint #1; reopening the contact returns to the HOLD state. If PV STRT is enabled, the value of setpoint #1 will be the value of the process variable PV following a power up.

STRT – the program starts the setpoint at the original value that was selected when the SP RAMP or SP PROGRAM was first started; reopening the contact has no effect.

- This action occurs either after a power cycling or after the SP PROGRAM has completed and the STATE at program end is configured for HOLD.
- The Digital Input must be selected for STRT before the SP RAMP or SP PROGRAM is put into RUN via the RUN/HOLD key in order to capture and save the original starting setpoint value.
- If the SP RAMP or SP PROGRAM is in the RUN state and then put in the HOLD state, contact closure will re-start the program at the setpoint value existing at the time when it was put into the HOLD state.
- Once in the RUN state, then this contact closure will have no effect.
- If this contact is held closed through the time that power cycles off and on, the action will occur in accordance with the rules above.

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