

FIREYE[®] FOCUS[™] CES1000 CONTROLLER

IMPORTANT NOTICE: THE SUCCESSFUL OPERATION OF THIS PRODUCT DEPENDS ON PROPER INSTALLATION. OPTIMAL PERFORMANCE REQUIRES UNDERSTANDING THE PROCEDURES IN THIS DOCUMENT. IT IS HIGHLY RECOMMENDED THAT YOU READ THIS MANUAL COMPLETELY BEFORE ANY CONFIGURATION OF THE CONTROLLER IS ATTEMPTED!

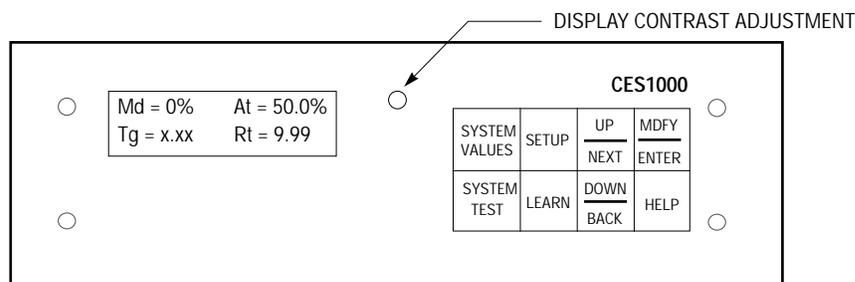
DESCRIPTION

A part of the Fireye[®] FOCUS[™] Combustion Efficiency System,¹ the CES1000 controller is a micro-controller based device whose function is to close the loop between the CS200 scanner and the CA202 trim actuator. It easily mounts into the 60-2555 mounting rack. The CES1000 controller receives the signal from the CS200 scanner and positions the CA202 trim actuator via pulsed output. This operation will maintain the programmed burner efficiency. The controller contains circuitry that generates an optically isolated pulsed output for use as a flame signal when connected to the Flame-Monitor[™] safeguard control. This allows the replacement of the installed scanner with a CS200 scanner. The need to supply a second sight port into the combustion chamber is not required when used in conjunction with a FIREYE Flame-Monitor with to an E1R1 amplifier.

The front panel consists of a keypad interface to facilitate the operation of the control as well as programming the operational characteristics. Feedback and operational parameters are conveyed to the user by means of a 2 line X 16 character alphanumeric LED backlit LCD display.

All user configured data is stored in a battery backed-up, non-volatile memory. (The battery has a minimum ten year shelf life. The battery is not field replaceable.)

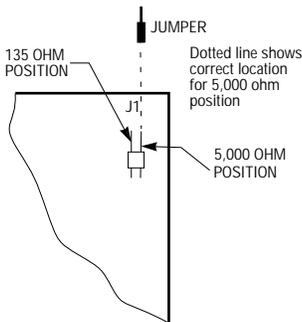
For complete installation instructions for the FOCUS system see bulletin CES-5001.



¹. Patent Pending

SPECIFICATIONS

Shipping Weight:	CES1000 Module: 2 lbs. 3 ozs.
Power Consumption:	7.5 watts
Storage temperature:	Minimum - 4 ° F (-20° C) Maximum 176° F (+80° C)
Operating temperature:	Minimum - 4° F (-20° C) Maximum 140° F (+60° C)
Humidity:	Maximum 85% RH Non-condensing



JUMPER ON CORNER OF LOWER BOARD OF CES1000 CONTROLLER (SHIPPED IN 5,000 OHM POSITION)

SELECTION OF THE FIRING RATE FEEDBACK JUMPER

The FOCUS system must use one of two styles of firing rate feedback potentiometers to provide a signal to the CES1000 controller indicating the firing rate position of the burner. The CES1000 controller can take an input from a feedback potentiometer having a total resistance range of either 0 to 135 ohms or 0 to 5,000 ohms. Depending on which potentiometer is used, a range selector jumper on the CES1000 must be properly positioned. If a change to the jumper setting is required, first remove all power to the unit. Then remove the CES1000 module from the mounting rack, by removing the screws located on the front panel and pull it out by the two handles. See the drawing for jumper location. Reverse procedure to reinstall module.

OVERVIEW OF CONTROLLER OPERATION

There are four primary programming groups which can be accessed using the keypad and viewed on the display. These groups coincide with the four keys on the left side of the keypad. These keys are marked:

SYSTEM VALUES
SYSTEM TEST
SETUP
LEARN

At any time, when you push one of these keys, you will leave the primary group you are currently viewing and enter the group corresponding to the key pushed. These groups are separate and distinct. To view, or change a parameter in that group, requires the pressing of that respective key.

SYSTEM VALUES

Pressing the **SYSTEM VALUES** key will allow you to step through the parameters listed in this group. You will move in sequence through the various parameters by using the **UP/NEXT** or **DOWN/BACK** keys. One will take you through the listing forward, the other in the reverse order. When in this group, you will not be able to change any setting of the parameters.

(Note that these parameters are not modifiable and information can only be reviewed on the display) (If there are no key entries within 10 minutes, the display on the Controller will move back into this group automatically) = Factory Default.*



Md=xxx% At=yyy.a%, (.a=0 or 5)
Tg=z.zz Rt=r.rr

“Md” is the Mod Motor position in %.“At” is the firing rate Actuator Position in % . “Tg” is the “OH/CH” Target Ratio that the control will attempt to maintain. “Rt” is the “OH/CH” Actual Ratio Value that the CS200 scanner is monitoring.

Bn Md At Ratio
xx% yyy% z.zz

Learn values, max of 10 bins. Unlearned bins are not displayed if number of learned bins is less than 2. A minimum of 4 bins must be learned before the control will become functional. Two of the bins must fall below 50% and two of the bins must fall above 50% of the firing rate feedback potentiometer value.
Bn =Bin # 0 to 9, An “*” after the # denotes calculated learn values.
Md =Firing Rate Feedback Potentiometer position in %.
At = Trimming Actuator position in %.
Ratio =“OH/CH” Actual Ratio Value that the CS200 scanner is monitoring.

Scanner Ambient
xxx°F

Displays the Ambient Temperature as read in the CS200. Proper Units, as selected under “Temp. Units” in Setup Group.

Detector Temp
xx°F

Displays the temperature of the detector as read in the CS200. Proper Units, as selected under “Temp. Units” in Setup Group.

Scanner Gain
xx

Value displayed will be within 0-100.

Scanner F/W Ver
x.x

Displays the version of firmware that is in the CS200 Scanner.

DelayStartIntlk
xxxxx

Where “xxxx” is as noted below. **Unused**, Feature is Inactive. **Time**, Number of minutes before the system will begin to trim on initial startup.**Stack Temp**, Measured temperature must equal or exceed the value entered in the **SETUP** group before the system will begin to trim on initial startup.(“Enabled” must be selected in the **SETUP** group to use this function).

Stack Temp
xxx° F

Proper Units, as selected under “Temp. Units” in Setup Group.

Digital Input
xxxxx xxxx

Where “xxxx” is as noted below. **Unused**, Feature is Inactive. **Trim Enabled**, Trim disabled (as selected under “Digital Input” in Setup Group).

xxxxxxx AuxAO
yyy% zz ma

Where xxxxxxx is the selection made in the **SETUP GROUP**. “AuxAO,” Analog Output. “yyy%,” numeric value of selected variable in % . “zz ma,” milliampere output that equates to the numeric value of selected variable.

xxxxxxx AuxAI
yyy% zz ma

Where xxxxxxx is the selection made in the **SETUP GROUP**. “AuxAI,” Analog Input. “yyy%,” numeric value of selected variable in % . “zz ma,” milliampere input that equates to the numeric value of selected variable.



FLAME OFF (or ON)
OH=xxxx CH=yyy

FLAME ON or **FLAME OFF** displays the present flame status. **OH=xxxx**, OH Averaged Raw Counts. **CH=yyy**, CH Averaged Raw Counts.

3-20-97
12:42 pm

Actual Date and Time.

FIREYE
* CES VER X:Y *

Displays the version of firmware that is in the CES1000. Where X denotes major version and Y denotes minor version.

SYSTEM TEST

SYSTEM TEST GROUP

Before entering this group the password **MUST** be enabled. (See **SETTING AND USING PASSWORDS**).

Pressing the **SYSTEM TEST** key will allow you to access a number of system parameters found in the group. Some of these parameters allow you to alter the setting and some are for viewing only. Select the parameter you want to view by pressing the **UP/NEXT** or **DOWN/BACK** key to choose the number of the **SYSTEM TEST** you want. A listing is shown later in this bulletin. Holding the key down will allow you to scroll through the numbers faster. You can chose a number from 0 to 254.

When you wish to change a variable within a parameter, you must go to the **MDFY/ENTER** key and when you see the "*"symbol select the value using the **UP/NEXT** or **DOWN/BACK** keys. Then press **MDFY/ENTER** and the "*" symbol will disappear and the setting is saved.

SET DATE AND TIME

For example, if you want to view and change the date and time of the controller, you would go through the following steps:

Press the **SYSTEM TEST** key and the following will appear:

SYS TEST #0

The Set Date and Time parameter is System Test #7 from the chart shown on the following pages. Therefore, you press the **UP/NEXT** key seven times until the number 7 appears on the screen. Then press **MDFY/ENTER** and the following appears on the display:

SYS TEST #7 *
MONTH = 07

Because the "*" symbol is on the upper line of the display, the lower line can be adjusted using the **UP/NEXT** or **DOWN/BACK** keys. Once the proper month is selected, press the **MDFY/ENTER** key. If you press the **MDFY/ENTER** key again will move you to the next step in selecting the date and time. In this case, it is the "day" and it appears on the display with the "*" symbol which again allows you to change the value using the **UP/NEXT** or **DOWN/BACK** keys.

Pressing the **UP/NEXT** or **DOWN/BACK** key when the "*" is not present will advance you to the **SYSTEM TEST # X** display position and allow you to chose another System Test parameter number.



All tests except #8 are password protected. See SETTING PASSWORD.

2	Forced Time Out of Password	
3	OH and CH Instantaneous Values	OH=YYYY CH=ZZZZ
7	Set the Date and Time	Month = XX, Day = XX, Year = XX, Hrs = XX PM or AM, Min = XX
8	Restore All Factory Settings	Clears all data
9	Forced Actuator	Takes control of actuator, allows manual movement when in trim mode with time out.
12	Clear Comm Errors	Clear scanner's comm errors.
17	View Lockout History	View last 10 Lockouts, Type, Date/Time, Detected, and Date/Time Resolved
27	Clear All Lockouts	
70	Bin Learn Parameters Edit	
75	Delete all Learned Bin Data	
161	Set Count Averaging Filter in %	NewAvg=(OldAvg * (100-Filter) + (CurReading * Filter)) /100, default is 4%
248	Set Ratio Control Integral Multiplier	Setpoint range from 1 to 1000, higher numbers result in larger corrections, 0=Disabled, default = 80
249	Additional Ratio Control Integral	If Firing Rate <=30% AND this Flag Divider Flag Multiplier of Test248 is halved. default is "Disabled"
252	Feed Forward Hold Timer	Setpoint range 0 to 300 sec, default = 0
255	View Communication Errors	View scanner's communications errors. To clear use Test #12.

SETUP

SETUP GROUP

When the **SETUP** key is pushed, the display will read:

Trim Control Disabled

This is the factory default value and message on the display when first received and powered.

You may proceed to review all the parameters in this group by pressing either the **UP/NEXT** key or the **DOWN/BACK** key. The parameters will be displayed in the order shown later in this bulletin. These keys will take you forward or backward through that list.

You cannot modify any of the parameters in this group until you enter the password parameters shown as **Password LV 1** and **Password LV 2** in this group.

(Note that these parameters are all modifiable)* = Factory Default

MESSAGE

DESCRIPTION

Trim Control xxxxx

Disabled*, Enabled (This selection determines if FOCUS will act as a trimming system).

Actuator Type xxxxx

Fireye*, configures the controller to work with the Fireye CA202 trim actuator. **Other**, This selection has no function in FIRMWARE VERSION 1.2 or 1.3

Null Position xxxxxx

Retracted, sets the CA202 actuator in (0%) position. **Center***, sets the CA202 actuator in (50%) position. **Extended**, sets the CA202 actuator in (100%) position.

Control Action xxxxxx

Direct*, the actuator moves toward the Extended (100%) position to reduce excess air. **Inverse**, the actuator moves toward the Extended (100%) position to add excess air.



Detector Temp xx° C	-20° C - + 10° C (or proper units), default = -10° C.
Deadband Type xxxxxxx	Symmetrical* , The value selected for “Deadband” is applied to both sides of the “Target Ratio.” Single Sided , The value selected for “Deadband” is applied to the upper side of the “Target Ratio.”
Deadband x.x	0.1-3.0, The value is in “OH/CH” ratio units. default = 0.1.
Sample Size xxx	Scanner Sample Size 62*, 125, 250.
Password LV1 x	If password not enabled, default = 2.
Password LV2 x	If password not enabled, default = 5.
Set LV1	If password enabled user can set a new value.
Set LV2	If password enabled user can set a new value.

LEARN

LEARN GROUP

This group will allow you to program the needed values of OH/CH ratio at various firing rates. It also allows the controller to learn the firing rate potentiometer values at low and high fire positions, to learn the trim actuator retract and extend positions.

Before you proceed to make changes to the parameters in this group, you must move to the **SETUP** group and enter the password LV 1 and LV 2 commands. After successfully entering these passwords, you can press the **LEARN** key and by pressing the **MDFY/ENTER** key in any of these parameters, you will be able to modify the data. Remember that the “*” symbol must be on the upper line of the display before you will be allowed to change the information in the parameter.

Ln Bin Params	Learn Bin Parameters: 10 bins available based on Mod Motor Positions. Bin 0: 0% to 9%, Bin 1: 10% to 19%, Bin 3: 20% to 29%, . . . , Bin 9:90% to 100%. Parameters saved are OH, CH, Mod Motor Position and Actuator Position. At least four bins must be learned (two below 50% and two above 50%).
Ln ModLow Pos xx%	User sets mod motor to low position, hit modify, then hit enter to capture current value. Display ModMotor Low Learned .



Lrn ModHigh Pos
xx%

User sets mod motor to high position, hit modify, then hit enter to capture current value. Display **Mod Motor High Learned**.

Lrn Act. Retract
xx.x%

Hit modify, then hit enter. Actuator travels toward fully retracted position until no further movement detected. Display **Actuator Ret Learned**.

Lrn Act. Extend
xx.x%

Hit modify, then hit enter. Actuator travels toward fully extended position until no further movement detected. Display **Actuator Ext Learned**.

MESSAGES

MESSAGE RULES

- Timed messages are for the specified time.
- If a timed message occurs while another timed message is currently being displayed, the second message will be ignored.
- Message priority is Normal (lowest), Solid, Lockout (highest).
If a new message has a higher priority than the current one, then the new message will overwrite the current message. If a new message has a lower priority than the current message, then the new message will be ignored.
- Lockout messages are date/time stamped and saved within battery backed-up RAM in the Lockout log. Should the lockout condition be resolved, the lockout log can be reviewed within System Test #17.
- Pressing any key when the displayed message is Solid or Lockout message will inhibit that display message for 2 minutes.

TYPICAL NORMAL MESSAGE

Pressing ENTER Will Erase Bin
Data

Mod Motor learn selected with Bin data present. If ENTER pressed, Mod Motor learn will be initiated. This invalidates the learned bin data. Bin data automatically erased.

TIMED MESSAGES

FIREYE
CES VER X.Y

At Power Up. Where X denotes major version and Y denotes minor version.

Control Error
Out of Adjust

While in “Trim” mode, the actuator has been adjusted to the actuator trim limits. After this occurs, the actuator will be repositioned to the “Feed Forward” position and “Trim” will restart.

Mod Motor Low
Learned

After a successful Mod Motor Low Learn.

Mod Motor High
Learned

After a successful Mod Motor High Learn.

Actuator Ret
Learned

After a successful Actuator Retract Learn.



Actuator Ext Learned	After a successful Actuator Extend Learn.
Flame is OFF Learn Denied	Bin learn denied as no flame present.
Mod Range Error ReLearn Mod	The difference between the Mod Motor High and Low learn values is less than 120 counts. Tested after a Mod Motor learn. Mod Motor learn defaults are reloaded.
Mod Align Error ReLearn Mod	The Mod Motor High learn value is NOT greater than the Mod Motor low learn value. Tested after a Mod Motor learn. Mod Motor learn defaults are reloaded.
Act Range Error ReLearn Mod	The difference between the Actuator High and Low learn values is less than 700 counts. Tested after an Actuator learn. Actuator learn defaults are reloaded.
Mod Out of Range Act Learn Denied	Actuator learn denied, as the Mod Motor is NOT between the Mod Trim Start and End settings.
Mod Out of Range Test 9 Denied	System Test 9 (manual actuator control) denied, as the Mod Motor is NOT between the Mod Trim Start and End settings.
Flame is ON Act Learn Denied	Actuator Learn denied, as the Flame is ON. Flame must be OFF for actuator learn.
Mod Out of Range Test 9 Aborted	System Test 9 (manual actuator control) aborted, as the Mod Motor is NOT between the Mod Trim Start and End settings.
Mod Out of Range Learn Denied	Bin learn denied, as the Mod Motor is NOT between the Mod Trim start and end settings.
Mod Motor Active Learn Aborted	During the final stages of a Bin Learn the Bin # being learned has changed causing an abort of the bin learn.
Flame is OFF Learned Aborted	Flame OFF detected during a Bin learn causing an abort of the Bin learn.
Mod Out of Range Learn Aborted	Bin learn aborted, as the Mod Motor is NOT between the Mod Trim Start and End settings.
Flame is ON Act Learn Aborted	Actuator Learn aborted, as the Flame is ON. Flame must be OFF for Actuator learn.



Actuator Unsafe
Mod Learn Denied

Mod Motor learn denied as the actuator is "Unsafe." Unsafe is defined as greater than 2.5% of Full Scale from Null.

Actuator Unsafe
Mod Learn Aborted

Mod Motor learn denied as the actuator is "Unsafe." Unsafe is defined as greater than 2.5% of Full Scale from Null.

No Bin Data
to Edit

Attempting to edit nonexistent Bin data within System Test 70.

Refer to Bltn:
CES-5001

Help message that is displayed whenever the HELP key is pressed.

Mod Not Learned
Relearn Mod

Bin learn denied, as the actuator has NOT been learned. Relearn the Mod Motor.

Mod Not Learned
Relearn Act

Bin learn denied, as the actuator has NOT been learned. Relearn the actuator.

Cannot Change Null
Relearn Act

Changing Actuator Null position denied, as the Actuator has NOT been learned. Relearn the Actuator.

SOLID MESSAGES

Cannot Trim
LearnProperBins

Attempted to start Trim (Trim Control set to Enabled) but the proper bins have NOT been learned. Need minimum of four bins, two below 50% and two above 50% firing rate.

Cannot Trim
ReLearn Act

Attempted to start Trim (Trim Control set to Enabled) but the Actuator has NOT been learned. Relearn the Actuator.

Cannot Trim
ReLearn Mod

Attempted to start Trim Control. (Trim Control set to Enabled) but the Mod Motor has NOT been learned. Relearn the Mod Motor.

LOCKOUT MESSAGES

Actuator Error
Stalled

Five consecutive attempts to move the actuator have all failed.

Scanner Error
Communications

Continual consecutive scanner communication errors have persisted for 10 sec.



Actuator Error Open	Actuator feedback is less than 50% of Actuator Low learn value. Causes all actuator signals to be disabled.
Programmer Error	External RAM test failed.
Interlock	Internal software handshake failure.

SETTING AND USING PASSWORDS

OVERVIEW

This system is equipped with password security. It has been added to insure that once the FOCUS system is set up properly, no one can alter its operation without entering the password combination.

Before proceeding, make sure all electrical connections have been properly performed.

When the **SETUP** key is pushed, the display will read:

TRIM CONTROL
DISABLED

This is the factory default value and message on the display when first received and powered.

You may proceed to review all the parameters in this group by pressing either the **UP/NEXT** key or the **DOWN/BACK** key. The parameters will be displayed in the order shown later in this bulletin. These keys will take you forward or backward through that list.

You cannot modify any of the parameters in this group until you enter the password parameters shown as **Password LV 1** and **Password LV 2** in this group.

SETTING PASSWORD

Go to the display position within the **SETUP** group which says, **Password LV 1**. When you have this on the display, push the **MDFY/ENTER** key and an "*" will appear on the upper line of the display. This indicates that you can change the value on line 2 to the proper password. **THIS IS DONE ONLY WHILE THE "*" IS ON THE DISPLAY**. By pressing the **UP/NEXT** or **DOWN/BACK** keys, the second line on the display will change to allow you to find the proper password numerical value. The default value for **Password LV 1** as received from the factory is the number **2**. When it is present on the display, by pressing the **MDFY/ENTER** key, you will have selected this number and the "*" on the upper line will disappear.

Press the **UP** key. **Password LV2** will appear.

With the **Password LV 2** display message, again, press the **MDFY/ENTER** key and the "*" will appear on the upper line. By pressing the **UP/NEXT** or **DOWN/BACK** key, you will be able to find the proper password numerical value. The default value for **Password LV2** as received from the factory is the number **5**. When it is present on the display, by pressing the **MDFY/ENTER** key, you will have selected this number and the "*" on the upper line will disappear.



You do have the option to program the CES1000 with personalized password codes as described in the following paragraph. Once you have entered the proper password, you can enter, store and edit data in the Controller.

After selecting the proper passwords for these two levels, the next display will show, **Set LV 1** and **Set LV 2**. This will allow you to select new passwords for either, or both of these levels, if you choose. Follow the procedure described above in order to modify, select and enter the new passwords. Remember to record your new passwords and store them in a secure location.

Please note, when the passwords are enabled, it will automatically disable if no key is pressed within 10 minutes. You will have to re-enter the password if left longer than that period.

LEARNING THE FIRING RATE FEEDBACK POTENTIOMETER POSITION

After the firing rate feedback potentiometer has been mechanically and electrically installed, continue as noted below.

Enter the **SETUP** group and enter the passwords for LV1 and LV 2

Then press the **LEARN** key

Lrn Bin Params appears on the display.

Press the **UP** key. - **Lrn ModLow Pos** appears on the display. Verify that the firing rate modulator motor and the feedback potentiometer are in the low fire position before proceeding.

Press **MDFY** key and the “*” appears on the display in the far right of the upper line.

Press **MDFY** key again - **Mod Motor Low Learned** appears on the display for a few seconds and then, **Lrn ModLow Pos 0%** appears on the display.

Press the **UP** key - **Lrn ModHigh Pos 0%** appears on the display. Verify that the firing rate modulator motor and the feedback potentiometer are in the high fire position before proceeding.

Press the **MDFY** key and the “*” appears on the display in the far right of the upper line.

Press the **MDFY** key again - **Mod Motor High Learned** appears on the display for a few seconds and then, **Lrn ModHigh Pos 100%** appears on the display.

The firing rate feedback potentiometer position **LEARN** is now complete.

***NOTE:** Learning the firing rate feedback potentiometer will erase all previously learned bin data.*

TO LEARN THE CA202 ACTUATOR

Enter the **SETUP** group and enter the passwords for LV1 and LV 2

Press the **LEARN** key — **Lrn Bin Params** appears on the display.

Press the **UP** key three times until **Lrn Act Retrac** appears.

Press the **MDFY** key and the “*” will appear on the display in the far right of the upper line.

Press **MDFY** - **Lrn Act Retract** appears on the display and then **Actuator Ret Learned** appears on the display for a few seconds. You will observe during this procedure that the actuator is moving to its **RETRACT** position. If it does not reach this point, an error message will be displayed. Refer to the section entitled **MESSAGES** for further instructions if this occurs. Once completed, the display will read, **Lrn Act Retract 0.0%**.

Press the **UP** key and **Lrn Act Extend** will appear on the display.

Press the **MDFY** key twice and **Lrn Act Extend 100%** will appear on the display. **Actuator Ext Learned** appears for a few seconds. You will observe during this procedure that the actuator is moving to its **EXTEND** position. If it does not reach this point, an error message will be displayed. Refer to the section entitled **MESSAGES** for further instructions if this occurs. Once completed, the display will read **Lrn Act Extend 100%**.

Press the **SYSTEM VALUES** key once. The CA202 actuator will drive to the **NULL** position.



SELECTING ACTUATOR NULL POSITION

The factory default value for the **NULL Position** may be changed as follows.

Note; If the null position is changed, the mechanical installation of the CA202 actuator must be done again.

Enter the **SETUP** group and enter the passwords for LV1 and LV2.

After the proper passwords have been entered Press the **SETUP** key once.

Trim Control is displayed,

xxxxx

Depending in what mode the control is, the “xxx” may display as **Disabled** or **Enabled**.

Press the **UP** key twice.

NULL POSITION
CENTER

Press the **MDFY** key once and the “*” will appear on the display in the far right of the upper line.

Press the **UP** key until the desired selection is displayed.

Press the **MDFY** key once and the “*” will disappear on the display in the far right of the upper line while the actuator drives to the selected position.

SELECTING ACTUATOR CONTROL ACTION

The factory default value for the **CONTROL ACTION** may be changed as follows.

Enter the **SETUP** group and enter the passwords for LV1 and LV2.

After the proper passwords have been entered press the **SETUP** key once. - **TRIM CONTROL** is displayed,

xxxxx

Depending on what mode the control is in the “xxx” may display as **Disabled** or **Enabled**

Press the **UP** key three times.

CONTROL ACTION
DIRECT

Press the **MDFY** key once and the “*” will appear on the display in the far right of the upper line.

Press the **UP** key until the desired selection is displayed.

Press the **MDFY** key once and the “*” will disappear on the display in the far right of the upper line, the **CONTROL ACTION** has been selected.

CAUTION: When the actuator is at its NULL position and the mod motor is traveling through its firing range, the actuator must not be forced against any mechanical stops.

TRIM ACTUATOR ADJUSTMENT

When learning bin data, (described later in **LEARNING THE BIN LOCATIONS AND BIN DATA**) the CA202 trimming actuator may be used as a fine tuning adjustment. This happens in the setup menu under the **LEARN BIN** mode. The screen will display the OH/CH ratio and the actuator trim position in percentages. The **UP/NEXT**, **DOWN/BACK** keys can be used to extend or retract the trimming actuator. This change in position is represented by an increase or decrease in the actuator position percentage on the display. This feature is **NOT** intended to be used to tune the burner. Variances greater than 5 percent result in excessive trim actuator movement as the burner modulates between bins and may result in unsatisfactory control.



LEARNING THE BIN LOCATIONS AND BIN DATA

The CES controller allows up to 10 firing rate locations to be learned and the data saved within the associated bins. For bins not learned, the controller will determine and display the theoretical values at the mid-point of each bin. This is noted by an asterisk (*) following the bin number. *You must **LEARN** a minimum of four bins with at least two bins above and two bins below the 50% firing rate point.* It is recommended to **LEARN** all bins as the control will be more accurate with more bins learned.

Using a combustion flue gas analyzer (such as the Fireeye Firetron[®] Analyzer), the boiler technician should first tune the burner (with the CA202 trim actuator in the **NULL** position) to its optimum performance.

Refer to bulletin CES-5001 for complete installation instructions for the entire FOCUS system.

The CES1000 controller provides up to 10 bin locations to maintain optimum burner performance data between low and high fire. After analyzing the data log from the burner tune-up:

Enter the **SETUP** group and enter the passwords for **LV1** and **LV2**.

Press the **LEARN** key and continue.

The controller display reads **LRN BIN PARAMS**,

Press the **MDFY** key once, again. The display will show the present bin number and modulator position in percentages.

Press **MDFY** key again. **Act Pos** and **Ratio** will appear on the display.

Manually, set the burner to a desired firing rate position at some point above the **LOW TRIM START** point. Typically this should be in the 15% - 18% region.

Pressing the **UP** or **DOWN** key will force the CA202 actuator to move **UP** toward the extended end and **DOWN** toward the retracted end; as such, the CA202 is being used as a fine tuning adjustment for the burner.

When used with an analyzer (such as the **Firetron Analyzer**), and when an actuator position is found yielding the lowest value O₂ with no generation of CO and the burner has stabilized, press the **MDFY/enter** key once and the displayed information will be entered into controller memory.

Repeat this process to learn additional bins.

Bins may be learned in any order, at any time. Should it be determined that a previously learned bin is not correct, the technician can proceed to that bin and relearn it. If the next position is within the same bin range of any previously learned bin, that data will then be overwritten with the new data.

A minimum of four learned bins are required in order to place the control in **ENABLED** mode; however, it is recommended the maximum number of bins be learned. The more bins learned, the better the control over the entire firing range. Any bins that are not learned by the technician, will be calculated by the controller.

After the controller is placed in a **ENABLED** mode, the processor references the learned bins and calculates a set point for OH/CH ratio along a line connecting the learned bins.

***Note:** A change in the orientation of the CS200 scanner after the system has been enabled will require recalibrating the system. If not recalibrated, the system will no longer function optimally.*



SELECTING TRIM CONTROL

When sufficient bin data has been accumulated, modifying the **TRIM CONTROL** to **ENABLED** will now allow the FOCUS system to control the burner/boiler environment. The system will not allow you to enable unless at least four (4) bins must be learned (two below 50% and two above 50%).

Enter the **SETUP** group and enter the passwords for **LV1** and **LV2**.

Press the **SETUP** key again. **TRIM CONTROL, disabled** will appear on the screen.

Press the **MDFY** key once and the "*" will appear on the display in the far right of the upper line.

Press the **UP** key until the **ENABLED** is displayed.



NOTICE

When Fireeye products are combined with equipment manufactured by others and/or integrated into systems designed or manufactured by others, the Fireeye warranty, as stated in its General Terms and Conditions of Sale, pertains only to the Fireeye products and not to any other equipment or to the combined system or its overall performance.

WARRANTIES

FIREYE guarantees for one year from the date of manufacture of its products to replace, or, at its option, to repair any product or part thereof (except lamps, electronic tubes and photocells) which is found defective in material or workmanship or which otherwise fails to conform to the description of the product on the face of its sales order. **THE FOREGOING IS IN LIEU OF ALL OTHER WARRANTIES AND FIREYE MAKES NO WARRANTY OF MERCHANTABILITY OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED.** Except as specifically stated in these general terms and conditions of sale, remedies with respect to any product or part number manufactured or sold by Fireeye shall be limited exclusively to the right to replacement or repair as above provided. In no event shall Fireeye be liable for consequential or special damages of any nature which may arise in connection with such product or part.



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