

# MICROPROCESSOR BURNER CONTROL ESTRO SERIES

MODEL: 7500

Revision: 2

BULLETIN  
7500

## DESCRIPTION

The **ESTRO** is a microprocessor-operated flame controlling device equipped with inputs and outputs for the ignition and control of commercial and industrial burners. There are three different versions of the ESTRO:

- **ESTRO B:** Designed for two-stage or pilot ignited burners (pilot and main gas valves). May be remote controlled via electrical and serial signals with powered output when the burner is operating.
- **ESTRO C:** Designed for single-stage or direct spark ignited burners (only one gas valve). May be remote controlled via electrical and serial signals with normally open output when the burner is operating.
- **ESTRO Q:** Designed for single-stage or direct spark ignited burners (only one gas valve). May be remote controlled via serial signals.

An EXP-1 expansion card may be added to any of the three ESTRO versions to control a burner equipped with air damper, blower, and pressure switch (packaged burner).

On the front panel there is a lock/reset button, a cycle display, and flame signal indicator. The ESTRO is supplied in a strong thermosetting casing equipped with holes for the cable outputs which may be cabled in advance if required.



## FEATURES

- Supply voltage ..... 115/230 V
- Frequency ..... 50/60 Hz
- Power consumption (without outputs) ..... 4 VA max.
- Operating temperature ..... 30 - 140 °F.
- Storage temperature ..... 5 - 175 °F.
- Protection class (when wiring, use adequate connectors) ..... NEMA 3, 3S, 13
- Mounting position ..... Any
- Load protection fuse ..... 3.15 A
- Device protection fuse ..... 1 A
- Detector voltage ..... 300 VAC
- Minimum ionization current ..... 3 µA
- Flame current limitation ..... 3.2 mA
- Flame signal display ..... 0-90 µA
- Prepurge time (see Note 1 below) ..... 0-255 sec.
- First safety time ..... 1-25 sec.
- Main burner stabilization time ..... 1-25 sec.
- Reaction time ..... 1-20 sec.
- Post-purge time (see Note 1 below) ..... 0-255 sec.
- Auto shutoff (optional) ..... within 24 hours
- Optional input voltages ..... 24, 48, 115, 230 V AC/DC
- Dimensions ..... 7-7/8" x 4-3/4" x 3-5/8"
- Weight ..... 2.6 Lbs.
- Flame detecting device ..... Flame Rod or UV
- Rod or UV detector lead length ..... < 100 ft.

NOTE 1: WHEN THE EXP-1 EXPANSION CARD IS NOT PROVIDED, THESE VALUES MUST BE CONSIDERED AS IDLE TIMES.

## APPLICATIONS

- Flame control for single or two-stage piloted or direct spark ignited, continuous or discontinuous gas or oil burners
- Flame control for packaged burners managing the complete ignition cycle (blower, air damper, air pressure switch)
- Flame control suitable for flame detection by means of flame rod, unirod or UV tube (also in combination with each other)
- Flame control with serial interface for remote control in multi-burner systems

## APPROVALS



Evaluated to the applicable CSA and ANSI/UL standards

CAUTION: Operation of combustion equipment can be hazardous resulting in bodily injury or equipment damage. Each burner should be supervised by a combustion safeguard and only qualified personnel should install, make system adjustments and perform any required service.



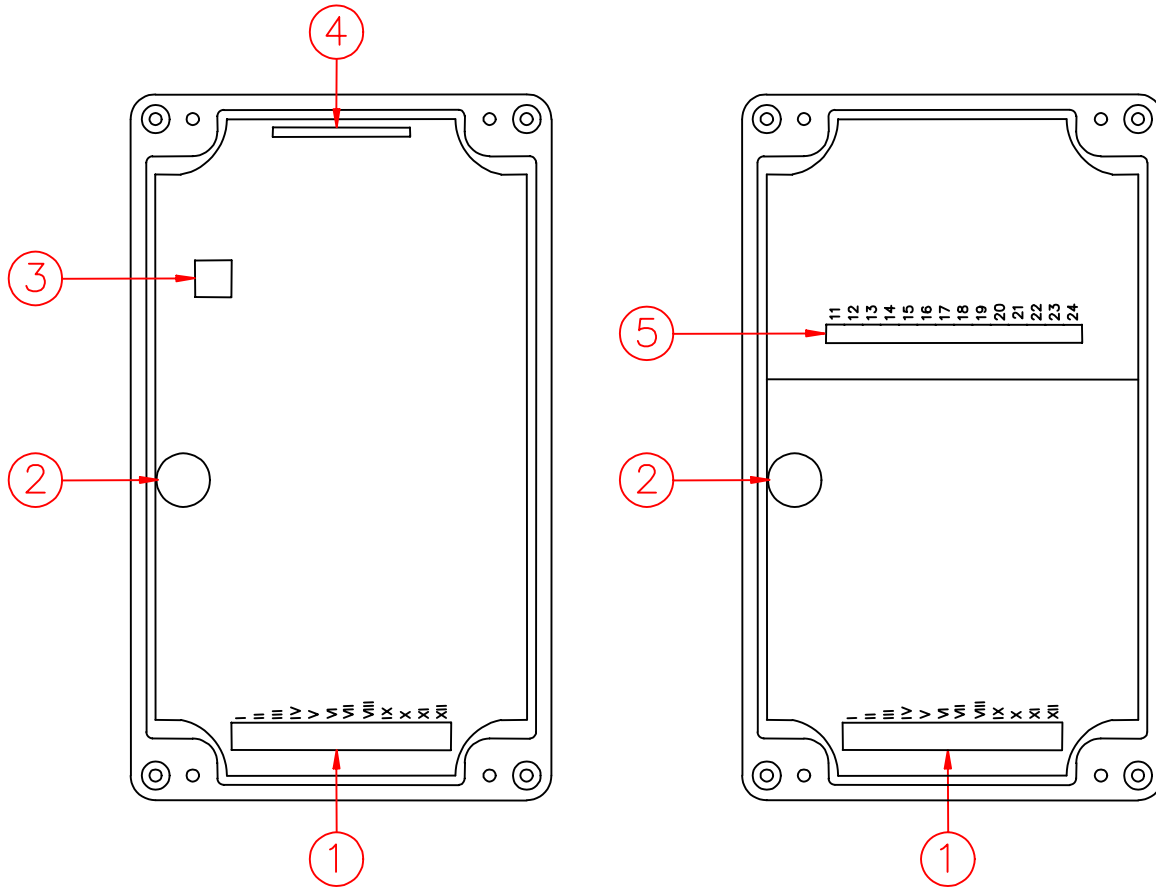
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## REAR PANEL



ESTRO - STANDARD

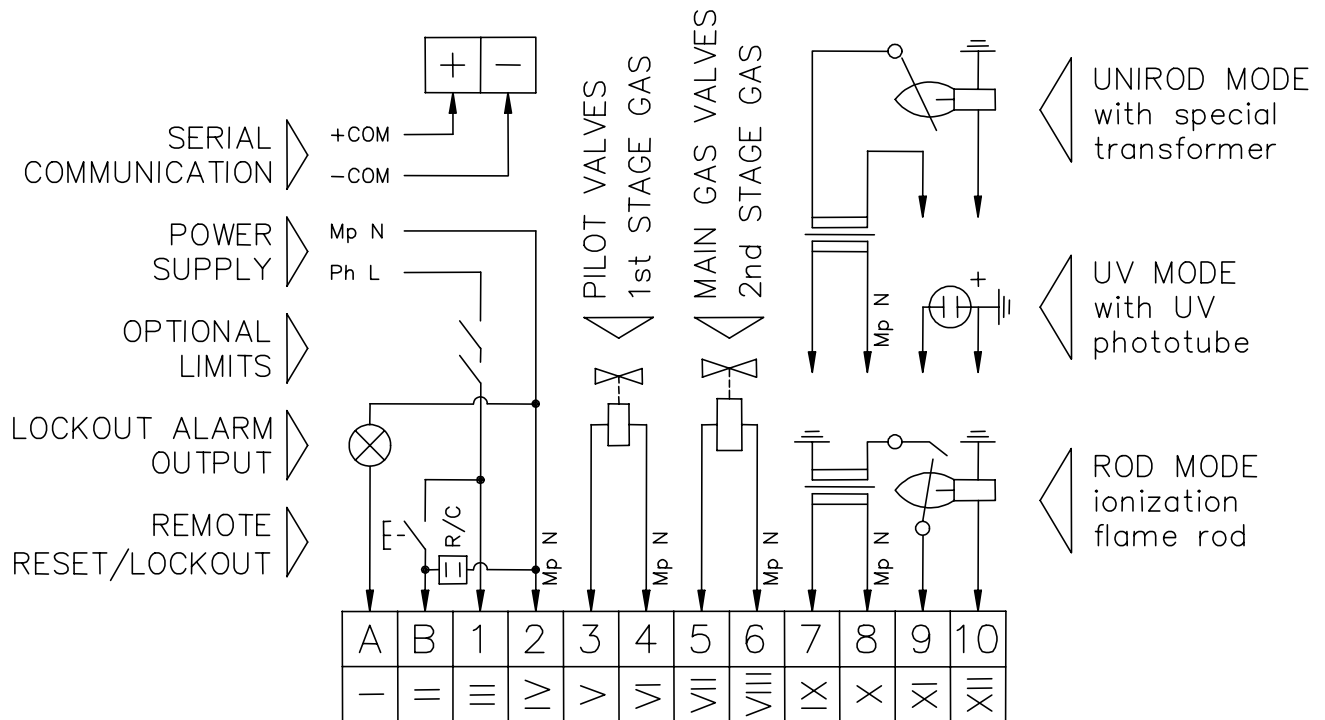
ESTRO - WITH EXP-1 CARD

Item	Description
1	Main terminal block for connections
2	Load protection fuse
3	Terminal block for serial communication
4	Expansion board EXP-1 inlet
5	Terminal block for EXP-1 expansion card

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## ESTRO-B CONNECTIONS



Terminal	Description	Terminal	Description
A	Lockout signal output	6	Main gas valve neutral
B	Remote reset / lockout input	7	Ignition transformer line
1	Power supply line	8	Ignition transformer neutral
2	Power supply neutral	9	Rod or phototube negative end
3	Pilot gas valve line	10	Ground, UV phototube positive end or burner frame
4	Pilot gas valve neutral	+	Communication input positive end
5	Main gas valve line	-	Communication input negative end

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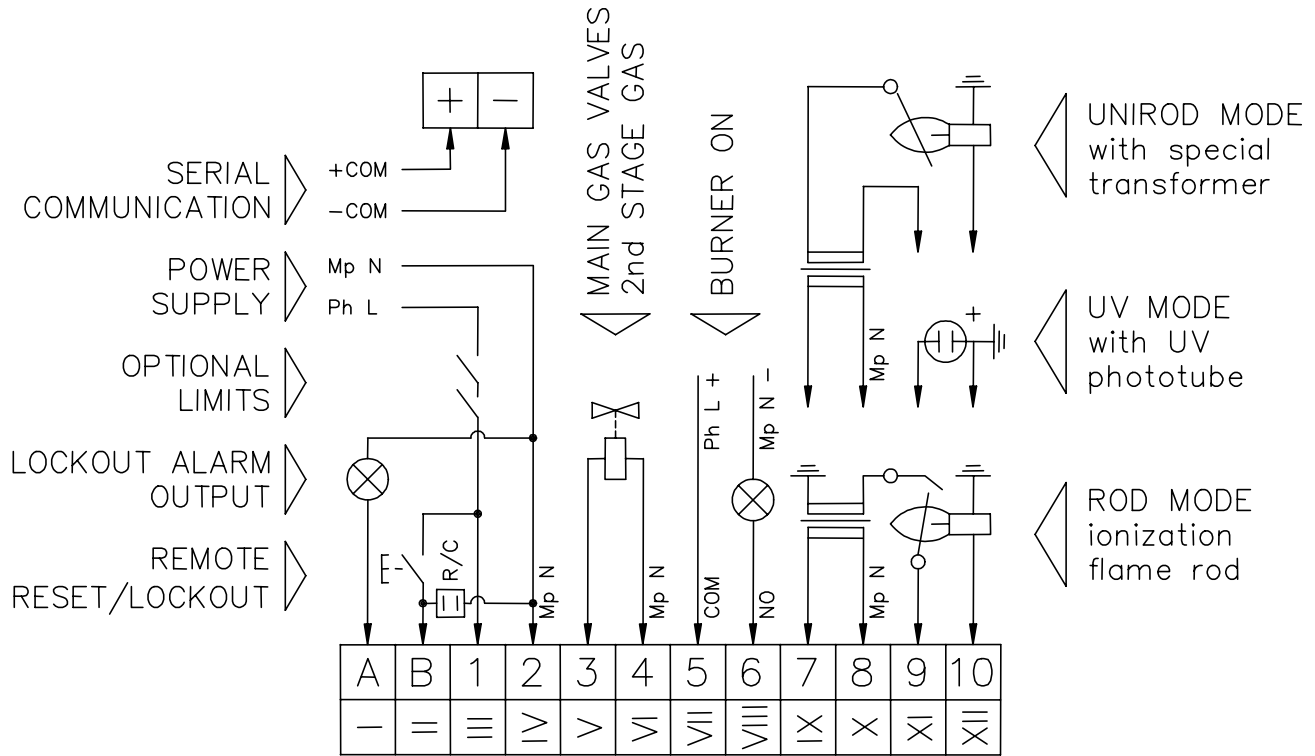
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## ESTRO-C CONNECTIONS

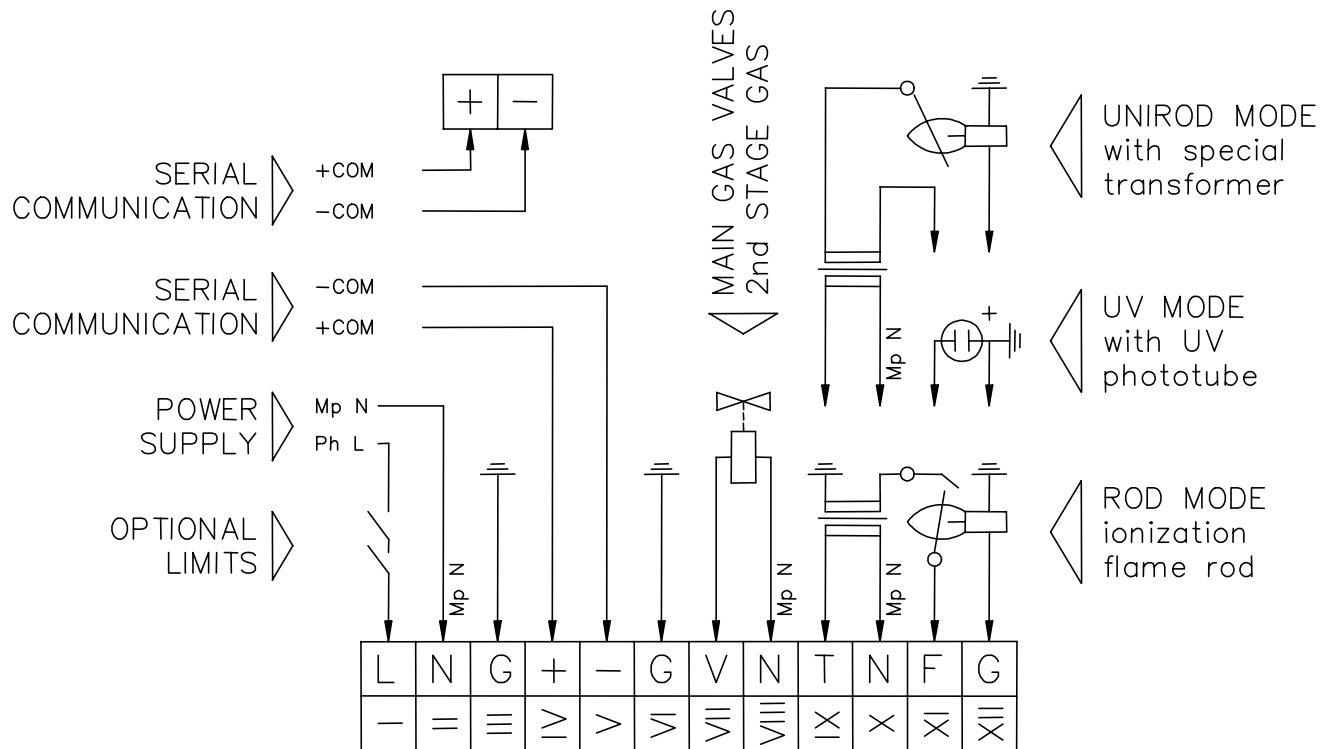


Terminal	Description	Terminal	Description
A	Lockout signal output	6	Burner On output (NO)
B	Remote reset / lockout input	7	Ignition transformer line
1	Power supply line	8	Ignition transformer neutral
2	Power supply neutral	9	Rod or phototube negative end
3	Gas valve line	10	Ground, UV phototube positive end or burner frame
4	Gas valve neutral	+	Communication input positive end
5	Burner On output (Com)	-	Communication input negative end

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## ESTRO-Q CONNECTIONS



Terminal	Description	Terminal	Description
L	Power supply line	N	Gas valve neutral
N	Power supply neutral	T	Ignition transformer line
G	Ground	N	Ignition transformer neutral
+	Communication input positive end	F	Rod or phototube negative end
-	Communication input negative end	G	Ground, UV phototube positive end or burner frame
G	Ground	+	Communication input positive end
V	Gas valve line	-	Communication input negative end

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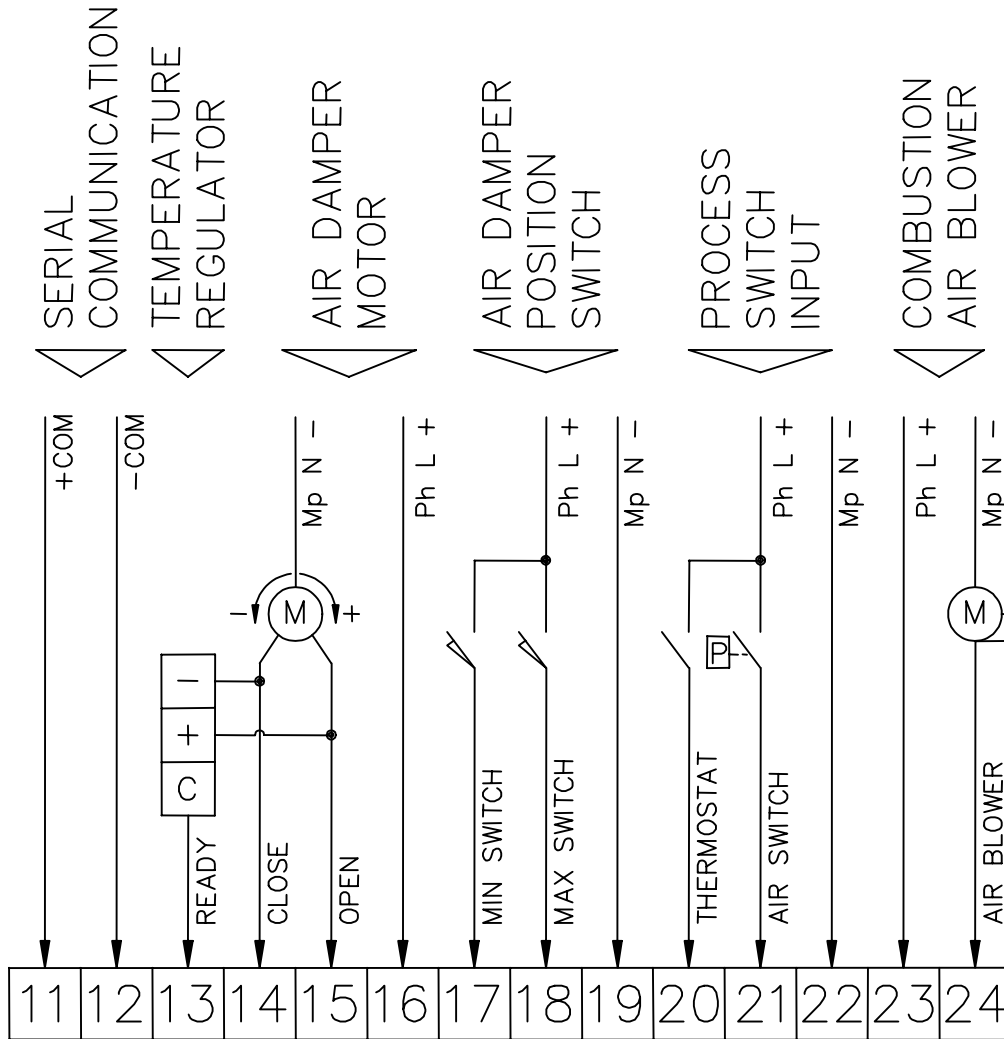
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## EXPANSION CARD EXP-1 CONNECTIONS



Terminal	Description	Terminal	Description
11	Communication input positive end	18	Damper high fire switch input
12	Communication input negative end	19	Damper limit switch neutral
13	Thermostat start / stop output	20	Thermostat start / stop input
14	Air damper closing output	21	Air pressure switch input
15	Air damper opening output	22	Process limit input neutral
16	Air damper motor power supply	23	Air blower motor power supply
17	Damper low fire switch input	24	Air blower motor output

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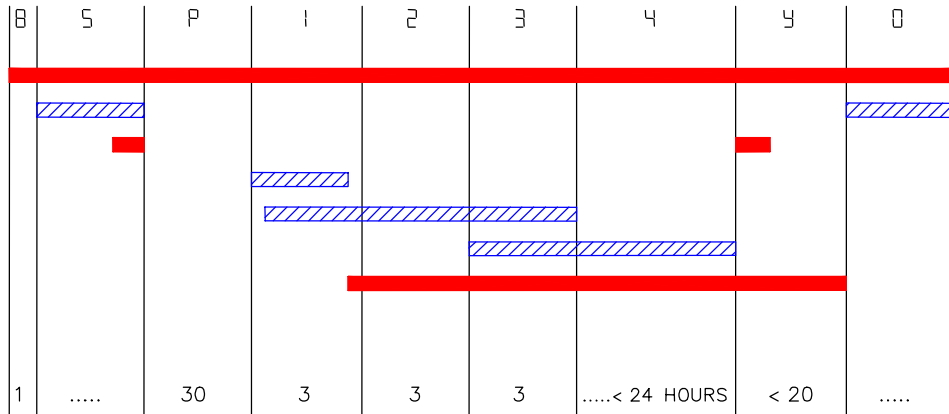
## DIAGRAM OF TIMES

The operational sequence of the ESTRO-B may differ depending on the programmed parameters. Below is the description of two types of typical timing sequences, one for the

basic ESTRO-B and one for the ESTRO-B with the EXP-1 expansion card.

### ESTRO-B BASIC VERSION

ESTRO-B S0300303DN230000D/

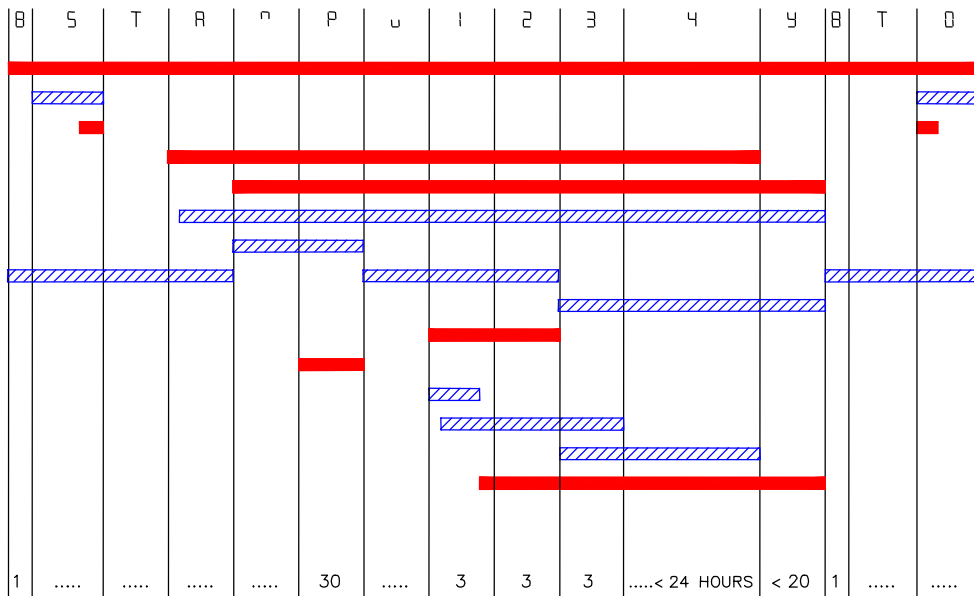


DISPLAY INDICATION (SEE PAGES 9-10)  
POWER SUPPLY  
LOCKOUT OUTPUT  
RESET SIGNAL  
IGNITION TRANSFORMER  
1st STAGE GAS or PILOT  
2nd STAGE GAS or MAIN  
FLAME SIGNAL  
■ INPUT SIGNAL  
▨ OUTPUT SIGNAL  
TIME IN SECONDS

..... = VARIABLE TIME BY PROCESS

### ESTRO-B WITH EXP EXPANSION CARD

ESTRO-B S0300303DN230000DS230230LTL



DISPLAY INDICATION (SEE PAGES 9-11)  
POWER SUPPLY  
LOCKOUT OUTPUT  
RESET SIGNAL  
THERMOSTAT SIGNAL  
AIR SWITCH SIGNAL  
START BLOWER  
OPEN AIR DAMPER  
CLOSE AIR DAMPER  
ENABLE AIR DAMPER REG.  
MIN SWITCH AIR DAMPER  
MAX SWITCH AIR DAMPER  
IGNITION TRANSFORMER  
1st STAGE GAS or PILOT  
2nd STAGE GAS or MAIN  
FLAME SIGNAL  
■ INPUT SIGNAL  
▨ OUTPUT SIGNAL  
TIME IN SECONDS

..... = VARIABLE TIME BY PROCESS

In the case of the ESTRO-B, ESTRO-C, and ESTRO-Q with intermittent pilot (1st stage) the operating condition is represented by phase number "3".

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Description	Maximum Safety Time	Maximum Flame Failure Response Time	Notes
Gas Burner	According to application and applicable standard	1 sec.	Resparking
		According to application and applicable standard	Without resparking
#2 Oil Burner with Gas Fired Pilot Burner	5 sec.	5 sec.	All applications - two oil valves in series must be utilized.
#2 Oil Burner Fuel Throughput <75 #/Hour	10 sec.	1 sec.	Resparking
	10 sec.	10 sec.	Without resparking - Prepurge > 5 sec.
	20 sec.	20 sec.	Without resparking - Prepurge < 5 sec.
#2 Oil Burner Fuel Throughput >75 #/Hour	5 sec.	1 sec.	Without resparking (Resparking may not be applied).

## INSTALLATION

- Avoid placing the ESTRO near intense magnetic or electric fields or other locations that would expose the unit to direct heat or products of combustion.
- The ESTRO must be installed in compliance with the applicable codes and regulations.
- A minimum electrical classification of NEMA 12 is required when installing the ESTRO on or near a furnace casing, etc..
- The ESTRO is intended for permanent connection to the electrical power supply and should never be fitted with a reversible main power plug. After installation, check that the connections are correct prior to delivering power to unit. Reversal of the live/neutral connections may result in damage to the unit.
- Check that the supply voltage and frequency are correct. Verify that the connected outputs do not exceed the maximum contacts capacity.
- Review all technical information, in particular the phase-neutral polarity when making electrical connections. The type of conductors and their locations must be suitable for the application(s).
- The flame signal cables must be isolated from the other conductors. Multi-conductor cables may not be used. In addition, no shielded cables are allowed.
- Detection probes and connectors (if any) must be isolated.
- Always connect the grounding wire(s).
- When using the remote reset connect the RC filter.
- For multi-burner systems, the parallel output connection of several ESTROs is not allowed. If the system is equipped with serial interface connection follow the special instructions below provided for using the remote-controlled functions.
- For multiple-burner systems with burners installed in the same combustion chamber, where a shutoff every 24 hours cannot be facilitated, the control system may be programmed to institute a shutoff.
- The communication line(s) must be isolated from the electrical supply line(s), motor controls, and inverters.
- For communication lines, single strand, 18 gauge or larger electrical cable must be used. Multi-conductor and shielded cables are not acceptable.
- When using an ECS, a one-ampere (1 amp) fast acting fuse should be incorporated in the electrical supply line to prevent possible damage to the unit due to power surges or short-circuits.
- Before any work is begun on the ESTRO system ensure that the electrical power supply and any other connections are disconnected.
- The thermostat input to the expansion card is an "adjustment" control and a safety control.
- The cables to the EXP-1 expansion card must be placed through the round opening in the ferrite supplied in the kit. Cables from terminals 11 and 12 are not to be run through the ferrite.



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## STATUS DISPLAY

The ESTRO display gives, at any time, a clear indication of the working condition of the burner. A fixed-luminous code corresponds to normal operating conditions whereas a blinking code means there

is some lockout condition or failure requiring the attention of the operator.

### ESTRO-B -- STANDARD VERSION

Below is a standard sequence for an ESTRO without an expansion card. In this case, the burner is ignited after all the limits and safety devices of the system are satisfied, and after prepurge has taken place.

Display	Indication	Description
8	Fixed	Self-diagnosis phase. The ESTRO performs this function automatically. The display is initiated each time the ESTRO is powered or when the burner is re-ignited (1 second).
0	Blinking	Manual lockout. The ESTRO is waiting for the operator to reset it via the local, remote or serial button.
5	Blinking	Waiting phase. A standby mode has been programmed. The ESTRO waits for the operator to reset it via the local, remote or serial button.
8	Fixed	Self-diagnosis phase. The ESTRO performs this function automatically. The display is initiated each time the ESTRO is powered or when the burner is re-ignited (1 second).
P	Fixed	Waiting phase or prepurge time (0 to 255 seconds).
d	Blinking	Lockout due to flame detection during the prepurge cycle. This type of lockout may also occur when switching the burner off.
1	Fixed	Ignition phase. The pilot (1st stage) burner (or 1st safety time). The ESTRO starts the ignition transformer, opens the gas safety valve of the pilot and verifies the flame (0 to 25 seconds).
E	Blinking	Lockout due to flame failure during the 1st safety time. It may be caused by the gas safety valve, ignition system or the detection system.
2	Fixed	Phase when the flame stability of the pilot burner is verified. The device verifies the efficiency of the flame probe (3 seconds).
3	Fixed	Ignition phase of the main burner (or 2nd safety time). The ESTRO allows the output of the main burner gas safety valve (1 to 25 seconds).
4	Fixed	Burner on and running phase for the 2nd stage of the burner. In addition, the ESTRO-B closes the pilot (1st stage) gas safety valve.

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Display	Indication	Description
F	Blinking	Lockout due to flame loss during standard working conditions. It may be due to the air or gas flow regulation or detection system.
4	Fixed	Phase when the detection system is verified. The ESTRO verifies that the flame is extinguished for 20 seconds since the burner has been switched off, otherwise a lockout (d) follows.
0.	Fixed	Postpurge phase after the burner has been switched off. During this phase no operation can be performed (0 to 255 seconds). This is a dim signal.
H	Fixed	Waiting phase occurring if the ESTRO has received a serial halt command. The ESTRO interrupts all the outputs while the burner is off.
C	Blinking	Lockout due to the prolonged omission of serial commands from the remote supervisor. The ESTRO interrupts all the outputs while the burner is off and when the omission exceeds the "com time out" (0 to 2040 seconds).

## ESTRO-B WITH EXP-1 EXPANSION CARD

When the ESTRO-B is equipped with an expansion card for supervision of a packaged burner, the following phases will take place:

Display	Indication	Description
8	Fixed	Self-diagnosis phase. The ESTRO performs this function automatically. The display is initiated each time the ESTRO is powered or when the burner is re-ignited (1 second).
0	Blinking	Manual lockout. The ESTRO is waiting for the operator to reset it via the local, remote or serial button.
T	Fixed	Waiting phase for the remote thermostat signal for regulation shutoff. The ESTRO forces the air damper to shut.
P	Blinking	Lockout caused by the air pressure switch signal before starting the combustion blower. This is due to incorrect cabling or failure of the pressure switch.
P	Fixed	Waiting phase for the air pressure switch signal after the starting of the combustion blower.
8	Fixed	Self-diagnosis phase. The ESTRO performs this function automatically. The display is initiated each time the ESTRO is powered or when the burner is re-ignited (1 second).
7	Fixed	Phase when the air damper is opening and waiting for the damper to reach the high fire position.
P	Fixed	Waiting phase or prepurge time (0 to 255 seconds).

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Display	Indication	Description
U	Fixed	Phase when the air damper is closing and waiting for the damper to reach the low fire position.
I	Fixed	Ignition phase. The pilot (1st stage) burner (or 1st safety time). The ESTRO starts the ignition transformer, opens the gas safety valve of the pilot and verifies the flame (0 to 25 seconds).
2	Fixed	Phase when the flame stability of the pilot burner is verified. The device verifies the efficiency of the flame probe (3 seconds).
3	Fixed	Ignition phase of the main burner (or 2nd safety time). The ESTRO allows the output of the main burner gas safety valve (1 to 25 seconds).
4	Fixed	Burner on and running phase for the 2nd stage of the burner. In addition, the ESTRO-B closes the pilot (1st stage) gas safety valve.
A	Blinking	Lockout due to the lack of air pressure switch signal during standard working conditions. This type of lockout is associated with air flow (clogged filters, etc.).

## FAILURE MESSAGES

During operating conditions, indications concerning failures within or outside the ESTRO may be displayed:

Display	Indication	Description
L	Blinking	Lockout due to a power loss at the outputs of the equipment. The causes may relate to the connected electric devices (gas safety valves, ignition transformer or safety fuse).
7	Blinking	Lockout due to a failure in the internal flame amplifier. If after one resetting attempt the problem continues, the ESTRO must be returned to Pyronics Inc..
0	Blinking	Lockout due to the internal detection circuit. If after one resetting attempt the problem continues, the ESTRO must be returned to Pyronics Inc..
b	Blinking	Lockout due to a malfunction from the input of the thermostat. If after one reset attempt the problem continues, the ESTRO must be returned to Pyronics Inc..
E	Blinking	Lockout due to a mistake while reading the memory. If after one resetting attempt the problem continues, the ESTRO must be returned to Pyronics Inc..
~	Blinking	Lockout due to the fact that the air damper cannot reach the low fire position within 150 seconds after the end of the purge time. The causes may be related to the connection or positioning of the air damper limit switch.

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Display	Indication	Description
- 0	<b>Blinking</b>	Lockout due to a short circuit in the outputs. If after one resetting attempt the problem continues, the ESTRO must be returned to Pyronics Inc..
n	<b>Blinking</b>	Lockout due to the presence of the high fire signal even though the air damper is in a low fire position. The causes may be related to the connection or positioning of the air damper limit switch.
u	<b>Blinking</b>	Lockout due to the presence of the low fire signal even though the air damper is in a high fire position. The causes may be related to the connection or positioning of the air damper limit switch.
9	<b>Fixed</b>	Malfunctioning of either the local or remote reset button in the pressed-button position. It is connected to the remote connection (no filter) or front button. In order to detect the alarm causing the lockout, disconnect the electric supply for a few seconds and then reset the ESTRO. If after one resetting attempt the problem continues, the ESTRO must be returned to Pyronics Inc..
- - -	<b>Fixed</b>	Malfunctioning due to memory corruption. In order to detect the alarm causing the lockout, disconnect the electric supply for a few seconds and then reset the ESTRO. If after one resetting attempt the problem continues, the ESTRO must be returned to Pyronics Inc..
0 -	<b>Fixed</b>	Malfunctioning due to short circuited safety relay. In order to detect the alarm causing the lockout, disconnect the electric supply for a few seconds and then reset the ESTRO. If after one resetting attempt the problem continues, the ESTRO must be returned to Pyronics Inc..
0	<b>Fixed</b>	Malfunctioning due to the short circuited microprocessor outputs. In order to detect the alarm causing the lockout, disconnect the electric supply for a few seconds and then reset the ESTRO. If after one resetting attempt the problem continues, the ESTRO must be returned to Pyronics Inc..
J	<b>Fixed</b>	Malfunctioning due to a gap in the program performance. In order to detect the alarm causing the lockout, disconnect the electric supply for a few seconds and then reset the ESTRO. If after one resetting attempt the problem continues, the ESTRO must be returned to Pyronics Inc..

## CONFIGURATION

During the configuration, the following indications will be displayed:

Display	Indication	Description
-	<b>Fixed</b>	The ESTRO is being programmed from the serial input; during this phase no operation can be performed.
	<b>Fixed</b>	The ESTRO is being programmed from the infrared input; during this phase no operation can be performed.

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The configuration defines the operating modes. The ESTRO is programmed according to the application. Some parameters are factory-set and then “locked” to comply with the applicable standards, whereas other parameters may be modified by the user via special programming devices. Any setting that is modified by the user and then locked can no longer be modified except by Pyronics Inc.. Programming is only possible if the ESTRO is in the manual

lockout mode ( **0** ). The serial address must be programmed by means of the portable programming device (PROG-1), whereas special software is required to set all parameters. You should remember that while programming an ESTRO via the serial line, IT **MUST BE DISCONNECTED** from the field network and be connected directly to the interface card. Special software allows the following parameters to be modified.

Parameter	Access	Description
Segment	Yes	It identifies the area or group the ESTRO belongs to, for the purpose of the serial communication. All alphanumeric characters are considered as valid identifiers (0-9 and A-Z, capital letters).
Node	Yes	It identifies the ESTRO as a unit within a given group or area, for the purpose of the serial communication. All alphanumeric characters are considered as valid identifiers (0-9 and A-Z, capital letters).
Prepurge	Yes	Combustion chamber prepurge time, that can be set 0 to 255 seconds. If it is set to 0 seconds, lockout <b>0</b> is not displayed.
1st Safety Time	No	1st safety time to be set: range 1 to 25 seconds.
2nd Stage Gas Time	No	Main burner flame stabilization time to be set: range 1 to 25 seconds.
Reaction Time	No	Time elapsing from the extinction of flame to gas interception. It must be programmed in compliance with the regulations concerning the specific application. It can be set from 1 to 20 seconds.
Com Timeout	Yes	Time of serial communication alarm, can be set by steps of 8 seconds up to 2040 seconds. It must be set to 0 if no serial communication is used.
Postpurge	Yes	Combustion chamber postpurge time, which can be set from 0 to 255 seconds.
Power On	Yes	Behavior on supplying power. If in Autostart mode, it starts the ignition cycle unless a previous lockout has taken place; if in standby mode it waits for the operator to reset the ESTRO.
Pilot Burner	Yes	First-stage gas output operating mode: INTERMITTENT (the output is left enabled until flame extinction occurs), INTERRUPTED (the output is inhibited at the end of the 2nd safety time).
Flame Loss	Yes	Behavior at flame extinction: LOCKOUT, RE-SPARK from the 1st safety time, RE-CYCLE (only once if the fuel does not ignite).
Air Switch	Yes	Selects the air pressure switch controlling mode: INHIBITED (does not consider the input), LOCKOUT (turns the burner off and waits for the resetting signal), STOP (stop the burner until pressure is restored).
Thermostat	Yes	It enables or inhibits the thermostat input.
Daily Shutoff	Yes	It allows the burner to automatically shutoff for adjustment purposes within 24 hours of continuous operation, to ensure that all operating tests on the burner are carried out.
Air Damper	Yes	It allows the air damper to be controlled in LOCAL (considers the inputs on the expansion card), REMOTE (controls the air damper via serial drives) or INHIBITED mode (does not consider the inputs on the expansion card).

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## COMMUNICATION PROTOCOL

The communication between the ESTRO, ECS and the controlling system (PC/PLC) takes place via an interface card designed to transform a standard signal (RS232-RS422) into an ECS signal. The

communication protocol entails the use of strings made up of ASCII characters, sent at 4800 bauds, 8 bits, no parity, 1 or 2 stop bits. The strings are to be sent as follows:

Remote Drive	<	S	N	C	KK		Cr
Description	Transmission preamble from PC/PLC to ESTRO	Segment that identifies the addressee from 0-9 to A-Z (capital letters) of ESTRO	Node that identifies the addressee from 0-9 to A-Z (capital letters) of ESTRO	Drive to be performed by the ESTRO flame control	Checksum value		Carriage Return
Ex.: a RUN drive is sent to equipment A0 (ASC II)	<	A	0	R	0	C	Cr
Hexadecimal characters used for the checksum calculation	3C	41	30	52			0D

Checksum Value      1 0C      It is the string checksum, calculated as the hex sum of all the characters, including the carriage return. If the result were made up of 3 or more characters, the two less significant ones would be used; they come inserted like ASCII code in the string.

Reaction From Device	>	S	N	T	KK		Cr
Description	Reception preamble from ESTRO to PC/PLC	Segment that identifies the addressee from 0-9 to A-Z (capital letters) of ESTRO	Node that identifies the addressee from 0-9 to A-Z (capital letters) of ESTRO	Status of the ESTRO flame controlling device	Checksum value		Carriage Return
Ex.: a HALT status is received from equipment A0 (ASC II)	>	A	0	H	0	4	Cr
Hexadecimal characters used for the checksum calculation	3E	41	30	48			0D

Checksum Value      1 04      It is the string checksum, calculated as the hex sum of all the characters, including the carriage return. If the result were made up of 3 or more characters, the two less significant ones would be used; they come inserted like ASCII code in the string.

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The ESTRO answers each drive by sending its' status. Collective drives to several devices can also be sent.

Segment	Node	Answer from ESTRO	Description
A	B	Yes	The communication takes place only with the ESTRO referred to as Segment A and Node B
*	B	No	The communication takes place with all the ESTROs referred to as Node B
A	*	No	The communication takes place with all the ESTROs referred to as Segment A
*	*	No	The communication takes place with all the connected ESTROs

## DRIVES FROM CONTROL SYSTEM TO ESTRO

Drive	ASC II Value	HEX Value	Description
Run	R	52	It corresponds to the starting drive. The drive is recognized by the ESTRO only if it is in the <b>H</b> (Halt) status
Halt	H	48	It is the halting drive for the burner. It is recognized when the ESTRO is on
Unlock	B	42	It corresponds to the reset drive of the ESTRO. It is recognized when it is in the <b>S</b> (Stop) status
Status	S	53	It corresponds to the drive for request of information on the current status
Main On	M	4D	It allows the main burner (2nd stage) to be turned on, when it is off (from stage 2 to stage 3)
Main Off	m	6D	It allows the main burner (2nd stage) to be turned off, when it is on (from stage 3 to stage 2)
Respark	K	4B	It turns off the main burner (2nd stage), and turns on the first one (from stage 4 to stage 2)
Something RUNNING	?	3F	It corresponds to the request for burner on. It can be used for collective requests, and the positive answer is a "NUL" (hex 00) character
Something LOCKED	!	21	It corresponds to the request for locked out burner. It can be used for collective requests, and the positive answer is a "NUL" (hex 00) character

CAUTION: Operation of combustion equipment can be hazardous resulting in bodily injury or equipment damage. Each burner should be supervised by a combustion safeguard and only qualified personnel should install, make system adjustments and perform any required service.



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## ANSWERS FROM ESTRO TO CONTROL SYSTEM

Answer	ASC II Value	HEX Value	Description
Stop	S	53	The burner is locked out. Only one code is used to make the analysis of the answer easier. The burner could be in an <b>0</b> , <b>U</b> , <b>5</b> , <b>d</b> or <b>F</b> lockout
Remote Halt	H	48	The burner is not working due to a previous request for Halt
Purge	P	50	Combustion chamber prepurge in progress or awaiting phase before ignition
Ignition Trial	1	31	Ignition of the pilot burner (1st stage)
Pilot (1st Stage On)	2	32	Control of the flame stability of the 1st stage burner
Pilot and Main (1st and 2nd) Stage On	3	33	Pilot and main (1st and 2nd stage) burners on. This phase may be temporary [discontinuous pilot (1st stage) burner mode] or definitive
Only 2nd Stage On	4	34	Pilot (1st stage) burner off and main (2nd stage) burner on
Postpurge Waiting	W	57	Burner off during post purge phase
Probe Test	Y	59	Detection probe test after burner is turned off

## DRIVES FROM CONTROL SYSTEM TO ESTRO EQUIPPED WITH EXP-1 EXPANSION CARD

Drive	ASC II Value	HEX Value	Description
Go To Purge	G	47	It starts the prepurge phase ( <b>P</b> )
Go To Ignition	g	67	It starts the ignition phase ( <b>I</b> )

## ANSWERS FROM ESTRO TO CONTROL SYSTEM EQUIPPED WITH EXP-1 EXPANSION CARD

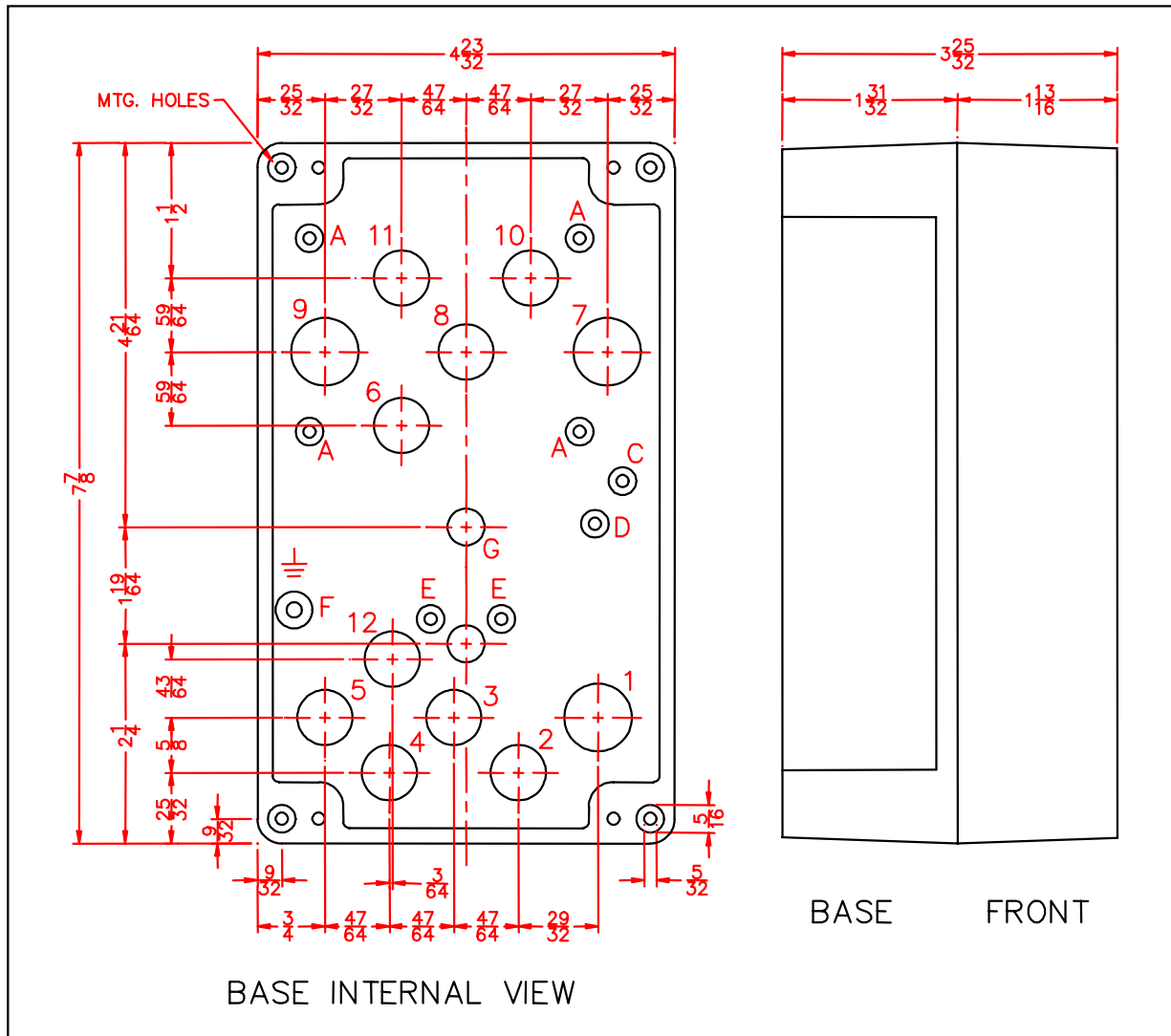
Answer	ASC II Value	HEX Value	Description
Thermostat	T	54	Lockout request from thermostat
Air Switch Fail	@	40	Lockout due to air pressure switch failure
Air Press Waiting	A	41	Waiting for consent from air pressure switch
Open Air Damper	0	30	Request for opening from the ESTRO to the controller in order to force the air damper into the high fire position for the prepurge phase
Close Air Damper	C	43	Request for closing from the ESTRO to the controller in order to force the air damper into the low fire position for burner ignition



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## DIMENSIONS



Preformed Holes	Diameter (in.)	Connector
1	3/4	PG 11
2 - 3 - 4 - 5 - 12	5/8	PG 9
6 - 8 - 10 - 11 *	5/8	PG 9
7 - 9 *	3/4	PG 11

\* When a transformer is present, it is not possible to use the preformed holes number 6 to 11.

Item	Description
A	Lugs for transformer *
C	Available
D	Available
E-E	Available
F	Terminal for grounding
G-G	Fixing holes for collar (1/2" dia. pipe, M6 screw)

When an EXP-1 expansion card is present, it is not possible to include an ignition transformer inside the ESTRO housing.

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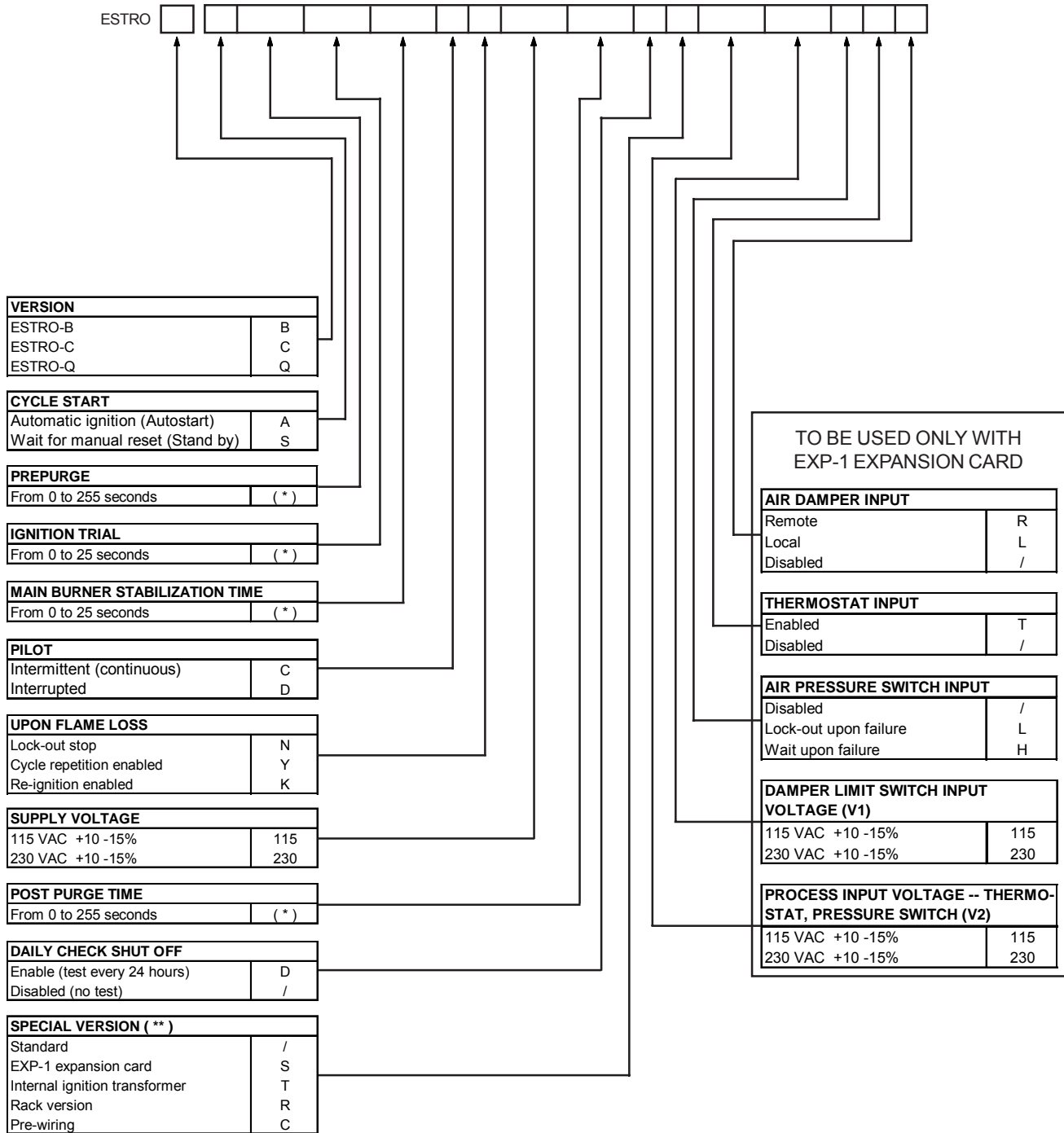
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## ORDERING CODE



(\*) Write the time value in seconds.

(\*\*) More than one code can be used, but 'S' and 'T' are incompatible (see "Dimensions").

NOTE: All boxes in the "ORDERING CODE" must be filled in. Any box that is not appropriate for your specific device should be filled with "N/A".