

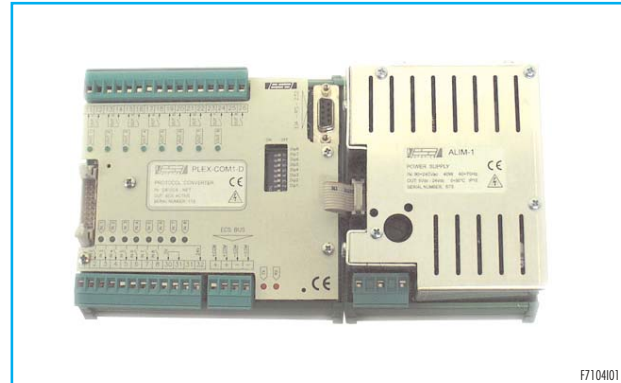
SERIAL CONVERTER FOR ESA ESTRO AND ESA REFLAM ESA PLEX-COM1 SERIES

FEATURES

- Supply voltage: 90÷240 Vac
- Supply frequency: 40÷70 Hz
- Max. absorption: 40 VA
- Operating temperature: 0÷50 °C
- Storage temperature: -10÷70 °C
- Fixing: on 35mm DIN guide (EN50022)
- Mounting position: any
- Protection degree: IP10
- Atmospheres: not suitable for use in explosive or corrosive atmospheres
- Dimensions PLEX-COM1-M232: 220X125 H80mm
- Dimensions PLEX-COM1-M485: 270X125 H80mm
- Dimensions PLEX-COM1-P/D/C/E: 250X160 H80mm
- Weight PLEX-COM1-M232: 900g
- Weight PLEX-COM1-M485: 1000g
- Weight PLEX-COM1-P/D/C/E: 1050g
- Digital input voltage: 24Vdc
- Digital input length line: max 5 m
- Maximum output capacity: 2A @ 230V $\cos\varphi=1$; 1A @ 230V $\cos\varphi=0.5$
- Length of RS-232 serial line: max 15 m
- Length of RS-485 serial line: max 1000 m
- Units connectable to RS-232 serial line: only 1
- Units connectable to RS-485 serial line: max 32
- Data receiving speed for PLEX-COM1-M232/M485: 9600 baud
- Data receiving speed for PLEX-COM1-P/D/C/E: see paragraphs below
- Number of controllable burners: max 100
- ECS fieldbus voltage: max 25Vdc
- ECS fieldbus data transmission speed: max 9600 baud
- Length ECS line: max 200m with ECS cable or busway
- Units connectable to ECS active output: max 70 4800 baud, max 60 9600 baud

APPLICATIONS

- Intelligent serial protocol converter for management ESA ESTRO flame controls and ESA REFLAM flame presence indicators
- Remote serial communication controller for ESA ESTRO flame controls



F710401

- Serial protocol converter with EIA-RS-232 or EIA-RS-485 interface from Modbus-RTU to ECS for ESA ESTRO or ESA REFLAM
- Serial protocol converter from Profibus® to ECS for ESA ESTRO or ESA REFLAM
- Serial protocol converter from Device-net® to ECS for ESA ESTRO or ESA REFLAM
- Serial protocol converter from Control-net® to ECS for ESA ESTRO or ESA REFLAM
- Serial protocol converter from EtherNet® to ECS for ESA ESTRO or ESA REFLAM

DESCRIPTION

PLEX-COM1 is a serial protocol converter that manages the ESA ESTRO flame controls or the ESA REFLAM flame presence indicators, letting all control and supervision devices (PLC, PC, DCS etc.) command and receive the burner status data via Modbus-RTU serial protocol, quickly and in a versatile manner.

PLEX COM1 communicates with the supervisor via a EIA-RS-232 or EIA-RS-485 bus and, by taking advantage of field converters, it manages the flame controls directly using other communication protocols, such as Profibus-DP, Device-Net, Ethernet, CANopen, Control-net, etc. The speed of communication with the supervisor is configurable at will and may also differ from the ECS bus communication speed to the flame controls.

PLEX-COM1's main function is to convert flag-bit controls into serial controls for the devices and, vice-versa, to facilitate interpretation of the status of the flame controls.

PLEX-COM1 continuously communicates with the flame control devices sending the commands received from the supervisor and recei-



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ving the status of the burners.

The device can control up to one hundred burners, while the number of flame controls that can be connected to the ECS bus output depends on the set speed of communication. If this exceeds the specific limit, an ECS signal repeater will be needed (ECS DRIVER).

For every burner PLEX-COM1 has two bytes or two words (depending on the set-up): one for reading and one for writing. Flag-bit management lets you perform all flame control operations, such as ignition, stop, switching to manual mode or lockout. Flag-bit also lets you detect the status of the flame controls, such as ignited burner, burner off, burner in alarm mode, etc.

PLEX-COM1 also manages the following functions:

- automatic burner lockout;
- filtering of any interference in the ECS communication bus;
- control of the locally controlled burners for maintenance, with the option of switching these off after a configurable time-limit (timeout);
- management of the sequential switching-off of the burners for cyclical flame control efficiency tests, with the possibility of setting

the switching-off repeat times and the warning time for the test start supervisor.

The PLEX-COM1 device is fitted with a set-up software so you can adapt it to suit all burner and system types equipped with the ESA ESTRO flame controls or ESA REFLAM flame indicators. This software lets you personalise all the PLEX-COM1 functions, including the flame control interface address set-up, ECS bus communication speed selection and the device/supervisor interface address set-up.

The power section, consisting of a universal ESA ALIM1 (switching) power supply, accepts a wide range of voltages to ensure that the device works in hostile environments. PLEX-COM1 is supplied with a DIN rail connector for its installation in electric panels and the connections are made with quick extraction connectors for easier maintenance and wiring operations.

The device has a pair of LEDs for each input and output, indicating the status, and two LEDs to indicate the data flow direction on the ECS line: one lights up when the interface is transmitting and the other when it is receiving.

SYSTEM SET-UP

PLEX-COM1 comes in various versions to be chosen to suit the needs of your specific system. These versions differ in terms of supervisor communication type:

- PLEX-COM1-M232: with Modbus-RTU communication via EIA-RS-232 interface
- PLEX-COM1-M485: with Modbus-RTU communication via EIA-RS-485 interface
- PLEX-COM1-P: with communication via Profibus®
- PLEX-COM1-D: with communication via Device-net®
- PLEX-COM1-C: with communication via Control-net®
- PLEX-COM1-E: with communication via EtherNet®

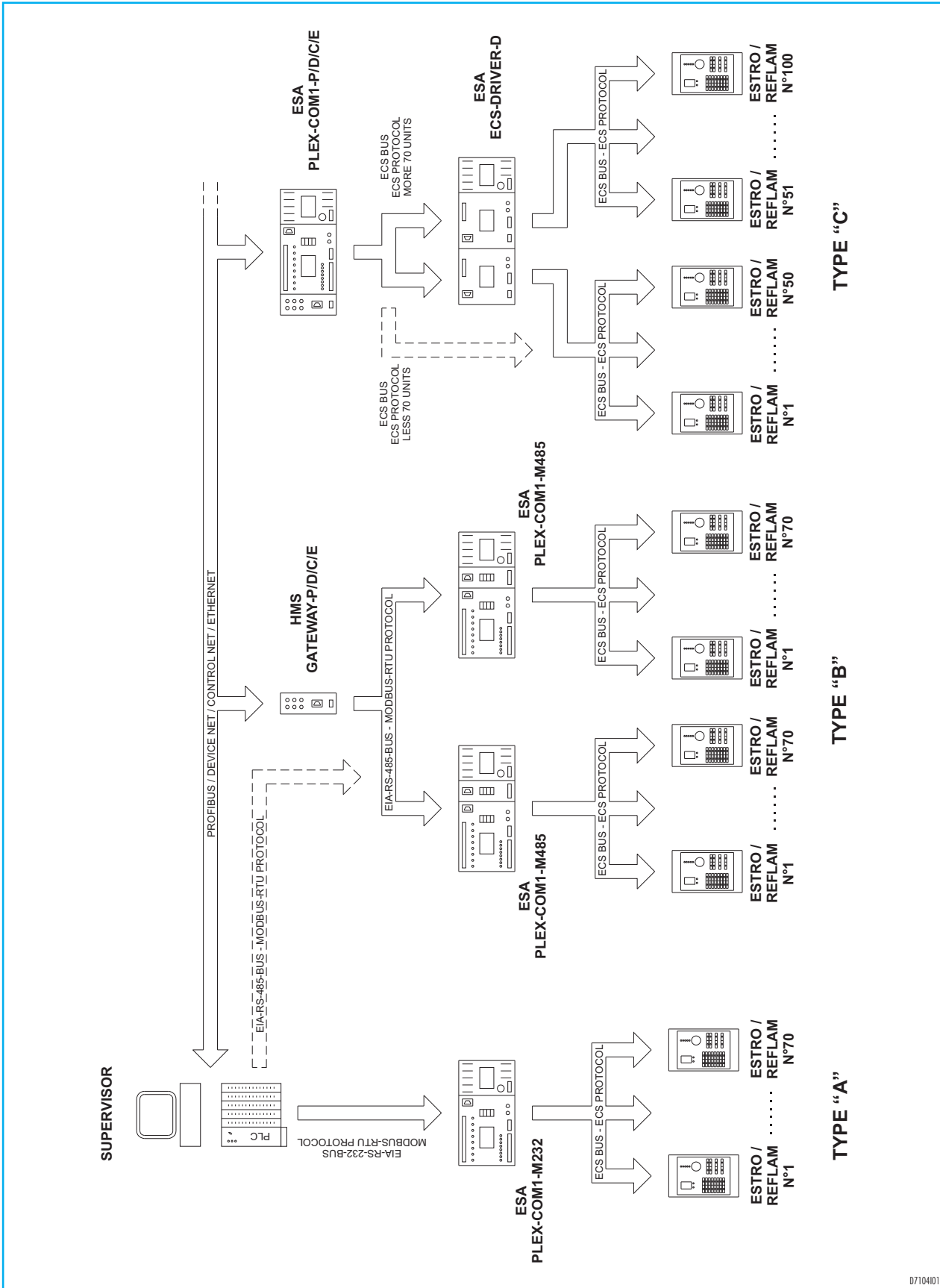
The different PLEX-COM1 versions all share the same control logic and the same flame control management capacity.

PLEX-COM1 allows for various burner control system set-ups, depending on the number of burners to be controlled and the type of supervisor communication. Here are just some of the possible system set-up options:

- **Type A:** with a PLEX-COM1-M232 you can manage up to 70 burners via the EIA-RS-232 bus. In this case, just one device is needed, fitted close to the supervisor due to the limits of the EIA RS-232 bus. If you want to manage up to 100 burners or the ECS bus

is longer than the set limit, you will need to install an ECS signal repeater, as with type C below.

- **Type B:** you can manage up to 140 burners fitted with the EIA-RS-485 bus by using one or more PLEX-COM1-M485 devices. In this case you can use just one device or several and these can be placed near the furnace. The serial control line can run directly from the supervisor or from a field bus Gateway converter (Profibus®, Device-net®, etc.) to the Modbus-RTU on the RS-485 line. If you want to manage up to 100 burners for every PLEX-COM1 device or the ECS bus is longer than the set limit, you will need to install an ECS signal repeater, as with type C below.
- **Type C:** using a PLEX-COM1-P/D/C/E device you can manage up to 100 burners from a field bus (Profibus®, Device-net®, etc.). In this case you can use just one device or several and these can be placed near the furnace. The serial control line is connected to a Gateway, which is in turn connected to the PLEX-COM1 device via an incorporated connection in the EIA RS-232. An ECS signal repeater (ECS-DRIVER-D) is fitted to let you manage up to 100 burners.



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OPERATION

PLEX-COM1 is a Modbus-RTU protocol converter using the ECS protocol with additional functions for flame control management. The

main functions of the device are described in the paragraphs below.

Serial communication

Communication towards the supervisor or gateway is via the Modbus-RTU protocol, where PLEX-COM1 acts as a slave device that only answers after having received an enquiry from the master. The data are sent as 8 bits, no parity, 1 or 2 stop bits, with baud-rate 9600

baud. The communication is Half Duplex type, and the minimum scan-rate is 100ms. Note that all the devices connected to the same network must have different addresses. PLEX-COM1 accepts the following enquiries from the supervisor:

MODBUS-RTU FUNCTION CODE		ENQUIRY TYPE	MAX NO. WORDS FOR COMMUNICATION	MAX NO. BYTES FOR COMMUNICATION
03 (dec)	03 (hex)	reading of n words	25	50
06 (dec)	06 (hex)	writing of 1 word	1	2
16 (dec)	10 (hex)	writing of n words	25	50

PLEX-COM1 has two memory tracks per burner: one for writing the command and one for reading the status, plus two further general memory tracks for device management. Depending on the data format selected, these memory tracks can be either word or byte tracks, as explained in the paragraphs below.

Communication to the flame controls connected to the ECS output is cyclical: PLEX-COM1 continuously updates the command and enquiries the status of each instrument. This type of operation is only

interrupted if there are specific general commands or active alarms, such as the time-out for communication to the supervisor or problems with the ECS bus. The ECS bus communication speed needs to be set up and must respect the selected baud-rate in the flame controls. In the memory of the device are stored all the serial addresses for the instruments on the plant, corresponding to the physical position of each burner (from 1 to 100).

Steady burner management

As soon as it's powered, PLEX-COM1 goes to steady burner management mode, that is indicated by the fixed digital output OUT8 and continuous sending of the commands on the ECS bus (TX LED flashes). In this mode, the device continuously communicates with the flame controls, sending the data commands it receives from the supervisor and receiving the burner status signals. All the addresses of the flame controls set-up in device are interrogated in turn (from the first to the last); this means that during the set-up stage, you must insert the correct number of burners actually installed on or foreseen for the furnace.

The commands for each burner are managed in bits: the combination of these by the supervisor, therefore, makes all process requests easier. These commands are first converted by the PLEX-COM1 into ECS protocol and then sent to the flame controls. The status signal for each burner received by the device is also converted into 8 bits for easy identification by the supervisor. See the relevant paragraph below for further details.

During steady operation, if there are no command bits or an installed burner is not detected, this is forced to stop by the PLEX-COM1. As soon as the 1st or 2nd gas stage ignition bit is activated, the burner is ignited and goes to the requested condition: both gas stages are maintained when both bits are present, while if only the 1st gas stage is required, the 2nd gas stage is stopped. In this condition you can activate/deactivate the bit for the 2nd gas stage to control the pulsed heat boosting in two-stage burners, taking advantage of the 2nd gas stage. Simply deactivate both bits to switch the burner off. When the burner needs to be ignited, PLEX-COM1 sends the command and checks that the burner ignites; if the burner goes into lockout or is stopped by the local button, the device will automatically try to unlock the burner a few times. Moreover, the PLEX-COM1 offers the option of manual control for each burner, i.e., local control of the burner, which is passively monitored by the supervisor. As well as managing the single burner controls, PLEX-COM1 lets you activate certain generic functions for all connected burners, such as a

general stop and the cyclical flame control efficiency test.

The device also continually checks the communication with the supervisor and to the flame controls: if there's no communication with the supervisor, PLEX-COM1 activates the Com-timeout alarm and forces all the burners to switch off; if, on the other hand, there are problems on ECS communication line (e.g. a short circuit or an inverted connection on one or more flame controls), the device commands the

Automatic unlock management

PLEX-COM1 automatically makes attempts to re-ignite the burners in lockout mode. You can set the maximum number of attempts for each burner. Note that European norm EN746-2 only allows maximum 3 automatic unlock attempts, provided that the system is safe. The necessary condition for a burner to be automatically re-ignited is that the supervisor requests ignition, vice-versa every other command inhibits this function. If all the admitted attempts to re-ignite the burner have been made unsuccessfully, you will need to check the burner to identify the cause for the lockout. Only once you have eliminated the problem you can clear the unlock counter.

The burner automatic unlock counter can be reset activating the reset bit or the manual mode bit. Moreover, if all the burners are stopped

Local or manual control of the burner

PLEX-COM1 lets you control each burner in manual mode, i.e. local ignition and switching-off of the burner via the flame control, thus making life easier during maintenance or adjustment of the burner.

When you enable this function, the device does not send any commands to the flame control, but merely checks the current status and sends the relevant signal to the supervisor.

PLEX-COM1 can stop a burner in manual mode after a configurable time limit, thus avoiding the risk of ignited burners not directly managed by the control system. The burner is stopped when you set manual mode or after the time limit, independent of the actual sta-

No response from the flame controls management

PLEX-COM1 waits for a response (indicating the status of the burner) to each command sent to the flame controls connected to the ECS bus. If a flame control fails to respond immediately to the command, the device waits for a set period, after which it then checks the next flame controls. The fact that a burner fails to respond to the enquiry may be temporary or persistent: in the first case there may be some form of interference affecting the communication bus and thus cancelling some signals, while in the second case the flame control sim-

switching-off of all the burners, activates digital output OUT1 to send the relevant warning signal to remote control device and sends to supervisor a "non communicating" status signal for all flame controls.

after using the specific bit in the general command, the unlock counters for all the burners are reset.

If the automatic unlock function is disabled, PLEX-COM1 allows for the direct unlock of the burner by the supervisor, via the activation of the reset bit together with the burner ignition command bits.

During the unlock attempts, PLEX-COM1 sends the supervisor the relevant burner status signals.

tus of the burner. In order to re-ignite the burner, simply use the flame control local button and the relevant counter is automatically reset.

In PLEX-COM1 applications that only provide for supervision and not control of the burners, the manual function must be always active and the automatic time limit stop function must be disabled.

ply stops responding to the commands.

To avoid the risk that the temporary non-response of a burner generates a false alarm signal for the supervisor, PLEX-COM1 can make up for the missing signals, by sending the supervisor the previous status of the burner. In case the problem persists, the device tells to supervisor the burners are non-communicating until communication is restored.

During the set-up stage, you can decide the maximum number of

acceptable consecutive non-responses before the device signal the flame control as "non-communicating". During steady operation, PLEX-COM1 memorizes and compensates the consecutive non-

General stop

PLEX-COM1 allows a general stop for immediate stopping of all the burners installed or to ensure that they remain off during the starting and the stopping of the furnace.

When you use the general stop command, all the currently ignited burners are forced to switch off and those in lockout mode are switched off remotely. At the same time at the supervisor is communicated the status of burners in remote stop (virtual status). Moreover,

Cyclical flame control efficiency test

PLEX-COM1 independently manages the switching-off and the sequential ignition of all the burners in order to check the efficiency of the flame controls and their detection system. On using this function, the device tests one burner at a time, checking all the ignited burners in order. Ignited burners in manual mode are not tested.

The burner test consists of two stages: first, PLEX-COM1 sends the stop command and waits for the burner to switch off; then, the device sends the start command and as soon as the burner is ignited again it moves on to test the next burner.

The cyclical flame controls efficiency test may be request by the supervisor, which activates the specific bit in the general PLEX-COM1 device command, or automatically may be activated by PLEX-COM1 after a waiting time since the last cyclical test. During the set-up stage, you can decide whether or not the device starts the cyclical test automatically and the relevant waiting time. Moreover, in the

Safety and controls

PLEX-COM1 has various communication safety controls, such as the supervision system watch-dog, a communication Com-timeout, and the ECS bus test:

- Supervision system Watch-dog: to allow the supervisor to check continually all communication with the device, PLEX-COM1 has a specific bit in the general command and a bit in the general status: when the supervisor activates the bit in the command, PLEX-COM1 activates the one in the status, and vice-versa. This function may also not be used by the supervisor, as PLEX-COM1 does not use it as an alarm.
- Communication Com-timeout: if there is no communication by the supervisor for more than 10 seconds, PLEX-COM1 activates the Com-timeout alarm. When active, the device forces all the burners to switch off and ensures that they remain off until the communi-

responses for every flame control, making sure that these do not exceed the set limit.

the device changes the commands for all the burners and resets the automatic unlock and no-response counters.

To activate the general stop control, simply activate the specific bit in the general PLEX-COM1 device command: the commands for each burner are automatically ignored for as long as the general command remains active.

case of automatic starting, PLEX-COM1 sends a warning to the supervisor that signals the general status in advance. If the cyclical test is set for automatically starting, but the supervisor gives the command before the waiting time, the test is immediately performed and the next automatic start will be delayed until the end of the next waiting time.

In applications with several PLEX-COM1 devices, only the supervisor must activate the cyclical test and the automatic start function must be disabled.

During the cyclical test PLEX-COM1 will not accept any commands for the burner currently being tested and communicates its current status besides its being tested; it also activates the specific indication in the general status.

ation is restored. The burners need to be switched off, as the application is out of control; once communication with the supervisor has been restored, PLEX-COM1 re-ignites the burners according to previous commands. This alarm can be disabled by setting 0 minutes as the maximum time for manual burner control.

- ECS bus test: PLEX-COM1 continuously checks the status of the ECS bus and stops all the burners and activates digital output if it detects an anomaly. Possible anomalies include inverted polarity of the ECS bus on one or more connected controls flame or a line short circuit that, if prolonged, could compromise the transmission stage of the PLEX-COM1 device.

CONFIGURATION PARAMETERS

The configuration determines how PLEX-COM1 works, adapting it to the system requirements. The parameters are changed in configuration mode via the ESA ELBP-110 dedicated software, communicating via the EIA RS-232 port.

The device does not manage any ECS bus communications in configuration mode (activate Dip1 on the Dip-Switch panel, indicated by the

intermittent signal at digital output OUT8). For this reason, therefore, before activating configuration mode, you must make sure that there will be no problems or risk of damage for the application once you remove PLEX-COM1 control of the burners.

PARAMETER	DESCRIPTION
Number of burners controlled	Number of burners controlled directly by the device (max. 100). You should also consider the burners that could be installed at a later date when setting this parameter, bearing in mind that the set but not installed burners will slow down the ECS bus communication cycle.
Control flame serial address	Serial addresses of the installed burners, corresponding to those set for the relevant flame controls on the system. All alphanumeric characters may be used (0-9 and capitals A-Z). You must bear in mind that all the connected flame controls must have different addresses and that burners with an 00 address are not controlled.
Baud-rate ECS bus	ECS bus transmission speed, which must be equal to that set for the flame controls (baud rate 4800 or 9600).
Automatic unlock number	Number of automatic unlock attempts (accepted range: 0 - 5) made by the device for each burner in lockout status. Set this parameter as 0 to disable the automatic unlock function and so allow the supervisor to unlock the burner directly. This parameter must be set in accordance with the relative norms for the application.
Manual control time-out	Time limit (accepted range: 0 - 120 minutes) after which PLEX-COM1 forces the manually controlled burner to switch off. Set this parameter as 0 to disable the automatic switching-off at the time-out and disable the supervisor communication Com-timeout alarm.
Number of filtered no-response	The max. number of consecutive filtered no-responses from the flame control compensated for by PLEX-COM1 (accepted range: 1 - 5).
Start cyclical test waiting time	Waiting time (accepted range: 0 - 168 hours) between the end of one cyclical burner test and the automatic start of the next one. Set this parameter as 0 to disable the automatic starting of the cyclical test .
Start cyclical test warning	Warning time (accepted range: 0 - 168 hours) between the end of one cyclical burner test and the warning that the next is about to begin. Set this parameter as 0 to disable the warning. The time between the warning and the start of the cyclical burner test should equal the difference between the waiting time and this parameter.
Device serial address	Modbus-RTU address for the device (accepted range: 1 - 254).
Data format	Selection of the format for transmissions via the Modbus-RTU line of the writing and reading data: byte (type 1), word (type2) or byte for Gateway devices (type3).

CONTROL AND STATUS FLAGS

PLEX-COM1 has two memory tracks for each burner - write and read management.
- for max. 100 burners, plus two general memory tracks for device

General PLEX-COM1 device function control Flag

The general control for the PLEX-COM1 device is a Flag-bit byte that controls all the generic functions of the device, such as the start of the cyclical flame control test, the watch-dog control and the general stop.

GENERAL COMMAND	FLAG - BIT								DESCRIPTION
	7	6	5	4	3	2	1	0	
Cyclical test start	0	X	0	0	0	0	X	1	Forcing of the cyclical test of all ignited burners.
Watch-dog	0	X	0	0	X	0	1	X	Writing Bit used to check for redundancy between the supervisor and PLEX-COM1.
General stop	0	X	0	0	1	0	X	X	General stop command for all controlled burners.
Enable ESA REFLAM control	0	1	0	0	X	0	X	X	Enabling of the ESA REFLAM indicator management and exclusion of the "ignition only 1st gas stage" command.

General PLEX-COM1 device function status Flag

The general status of the PLEX-COM1 device consists of a Flag-bit byte where the status of the general device functions are indicated, including cyclical test active, watch-dog status or a warning of the start of the cyclical test:

GENERAL STATUS	FLAG - BIT								DESCRIPTION
	7	6	5	4	3	2	1	0	
Cyclical test active	0	X	0	0	0	X	X	1	The device is currently carrying out the cyclical test of all ignited burners.
Watch-dog	0	X	0	0	X	X	1	X	Copy of the Writing Bit received from the supervisor to check for redundancy between the supervisor and PLEX-COM1.
Cyclical test start warning	0	X	0	0	X	1	X	0	The device will automatically perform the cyclical test of all ignited burners at the end of this set time.
General stop active	0	X	0	0	1	X	X	0	General stop command active and the device ensures all burners remain off.
High Temperature	0	X	X	1	X	0	X	X	High temperature function, ESA ESTRO flame control active. (At least one flame control with function ON).
ESA REFLAM control enabled	0	1	0	0	X	X	X	X	ESA REFLAM flame indicator control active and exclusion of the "ignition only 1st gas stage" command.

Single burner control

The control for each burner consists of a Flag-bit byte managed to suit the demands of the specific process. Each bit corresponds to a command, such as ignition of the 1st gas stage, ignition of the 2nd

gas stage, unlock attempt reset and burner in manual mode, plus a bit that indicates whether the burner is actually installed or only foreseen.

BURNER COMMAND	FLAG - BIT								DESCRIPTION
	7	6	5	4	3	2	1	0	
Burner not installed	0	X	X	X	X	X	X	X	Burner that is not actually installed and always controlled in remote stop (whatever the status of the other bits). Set the flame control address as 00 to skip the relevant signal for this burner.
Switch off burner	1	0	0	0	0	X	0	0	The remote stop burner command (only accepted if the burner is actively working).
Ignition 1st gas stage only	1	0	0	0	0	X	0	1	The command to ignite the 1st gas stage, accepted if the burner is switched off or in lockout mode (see automatic unlock) or if both the 1st and 2nd gas stages are ignited. This command is excluded when the ESA REFLAM indicator control is enabled.
Ignition 1st and 2nd gas stages	1	0	0	0	0	X	1	1	The command to ignite both the 1st and the 2nd gas stages; accepted if the burner is switched off or in lockout mode (see automatic unlock) or when just the 1st gas stage is ignited. Also valid for the command to ignite a single gas stage burner and for the ESA REFLAM indicators.
Purge	1	0	0	1	0	X	0	0	The ESA ESTRO flame control purges for the entire duration in which the bit is set.
Unlock attempt reset	1	0	0	0	0	1	X	X	Resetting of the automatic unlock counter, letting the device repeat the accepted number of unlock attempts. This command is only valid when the automatic unlock function is active.
Direct burner reset	1	0	0	0	0	1	X	1	Direct unlocking of the burner, only valid when the automatic unlock function is disabled.
Manual or local control	1	0	0	0	1	X	X	X	Manual mode command for local control of the burner.

Status of the single burner

The status of each burner received from PLEX-COM1 consists of a flag-bit byte indicating the status of the flame control, including the 1st gas stage ignited, the 2nd gas stage ignited, remote burner off, burner in manual mode, burner in lockout mode, etc.

BURNER STATUS	FLAG - BIT								DESCRIPTION
	7	6	5	4	3	2	1	0	
No response	0	0	0	0	0	0	0	0	The flame control does not respond or is not installed.
Burner stopped	0	0	0	X	X	0	0	1	The burner is off following a remote stop command from the supervisor or from the PLEX-COM1 device.
1st gas stage ignited	0	0	0	X	X	0	1	0	Only the 1st gas stage of the burner is ignited.
2nd gas stage ignited	0	0	0	X	X	1	0	0	Only the 2nd gas stage of the burner is ignited. This only happens with burners with the 1st gas stage interrupted (ESA ESTRO-B)
1st and 2nd gas stages ignited	0	0	0	X	X	1	1	0	Both gas stages of the burner are ignited. Applications with ESA REFLAM indicators: flame presence detected.
Cyclical test active	X	X	X	0	1	X	X	X	Cyclical burner test in progress on the burner in question. Bits 0, 1, 2, 5, 6 and 7 let you see the current status of the burner.
Manual function active	X	X	X	1	0	X	X	X	Burner in manual mode for local control. Bits 0, 1, 2, 5, 6 and 7 let you see the current status of the burner being controlled locally.
Burner in starting phase	0	0	1	X	X	0	0	0	Burner in the prepurge or ignition phase.
Burner in stopping phase	0	1	0	X	X	0	0	0	Burner in switched off phase, waiting for the flame to extinguish. This status is excluded when the ESA REFLAM indicator control is enabled.
Burner in lockout	1	0	0	X	X	0	0	0	Burner in lockout mode. Valid for all flame control lockout status.

DATA FORMAT

PLEX-COM1 lets you manage the data for each burner in two different formats - Byte or Word - and so manage the data in the best

format for the application in question. The paragraphs below describe the various transmission types.

Data management type 1 (Modbus-RTU)

This type of data management uses one byte for every command and one for every transmitted status signal. More specifically, the first word indicates the general status of the device, followed by the

status of two burners for the next words. The same goes for the commands: the general command is given on a word, followed by the commands for two burners in each word.

WORD N°	BYTE N°	DESCRIPTION	BYTE N°	DESCRIPTION
0	0	not used	1	Device general status
1	2	Burner 1 status	3	Burner 2 status
2	4	Burner 3 status	5	Burner 4 status
....
50	100	Burner 99 status	101	Burner 100 status
51÷61	102÷123	at disposition		
62	124	not used	125	Device general command
63	126	Burner 1 command	127	Burner 2 command
64	128	Burner 3 command	129	Burner 4 command
....
112	224	Burner 99 command	225	Burner 100 command
113÷122	226÷245	at disposition		

Data management type 2 (Modbus-RTU)

This data management has a word for every command and one for every transmitted status signal. More specifically, the bits in the

least meaningful byte are written and read in each word.

WORD N°	BYTE N°	DESCRIPTION
0	0÷1	Device general status
1	2÷3	Burner 1 status
2	4÷5	Burner 2 status
....
100	200÷201	Burner 100 status
101÷119	202÷239	at disposition
120	240÷241	Device general command
121	242÷243	Burner 1 command
122	244÷245	Burner 2 command
....
220	440÷441	Burner 100 command
221÷239	442÷479	at disposition

Data management type 3 (Modbus-RTU)

This data management has a byte for every command and one for every transmitted status signal. It is used when the device is connected to a field bus conversion Gateway (Profibus®, Device-net®, etc). More specifically, the general status of the device and the first burner status is read in the first word, followed by the status of two

burners in each word. The same goes for the commands: the general command for the device and the first burner command is in a word, followed by the commands for two burners in each word.

WORD N°	BYTE N°	DESCRIPTION	BYTE N°	DESCRIPTION
0	0	Device general status	1	Burner 1 status
1	2	Burner 2 status	3	Burner 3 status
2	4	Burner 4 status	5	Burner 5 status
....
50	100	Burner 100 status	101	at disposition
51÷60	102÷121	at disposition		
61	122	Device general command	123	Burner 1 command
62	124	Burner 2 command	125	Burner 3 command
63	126	Burner 4 command	127	Burner 5 command
....
111	222	Burner 100 command	223	at disposition
112÷121	224÷243	at disposition		

PLEX-COM1 WITH MODBUS-RTU COMMUNICATION ON EIA-RS-232

PLEX-COM1-M232 is the basic version of the device and uses the EIA-RS-232 gate to communicate with the supervisor. Owing to the EIA

Rs-232 bus, the device must be placed close to the supervisor and the only one connected to the network.

DESCRIPTION	EIA-RS-232 INTERFACE
Slave units connected to supervisor	1
Maximum bus length	15 mt
Device connection type	Sub Din 9 pin (Female) connector
Baud-rate to supervisor	9600 baud

PLEX-COM1-M232 lets you manage the data using the three types described in the paragraphs above.

PLEX-COM1 WITH MODBUS-RTU COMMUNICATION ON EIA-RS-485

PLEX-COM1-M485 is the version of the device that uses an EIA-RS-232/EIA RS-485 converter module to communicate with the supervisor. The EIA RS-485 bus lets you connect several devices to the same

network and lets you place the PLEX-COM1-M485 close to the furnace, thus reducing the length of the ECS bus.

DESCRIPTION	EIA-RS-485 INTERFACE
Slave units connected to supervisor	32, up to 254 with repeater
Maximum bus length	1000 m without repeater
Device connection type	3 pole quick extraction connector
Baud-rate to supervisor	9600 baud

PLEX-COM1-M485 lets you manage the data using the three types described in the paragraphs above.

PLEX-COM1 WITH PROFIBUS-DP® COMMUNICATION

PLEX-COM1-P is the version of the device that uses a Profibus-Dp® Gateway in order to communicate with the supervisor. The Gateway comes already connected to the device and set-up to communicate

with this. The Profibus-Dp® bus lets you connect several devices to the same network and lets you place the PLEX-COM1-P close to the furnace, thus reducing the length of the ECS bus.

DESCRIPTION	PROFIBUS-DP INTERFACE
Slave units connected to supervisor	254
Maximum bus length	1000 m without repeater
Device connection type	Sub Din 9 pin (Female) connector
Baud-rate to supervisor	up to 1.5 Mbit/S

PLEX-COM1-P is supplied with GSD files for fast Gateway / supervisor interfacing.

The Profibus-Dp address is selected using the two rotary selector at the front of the Gateway, while the address of the PLEX-COM1 device set using the ESA ELBP-110 software must not be changed.

PLEX-COM1-P performs all the functions described above and has

one byte for every command and every status signal.

The Gateway has 103 bytes for writing the commands and 103 bytes for reading for the status signals. Furthermore, the first command byte from supervisor must have a value of 60 (Hex) to activate the communication between the Gateway and PLEX-COM1.

WORD N°	BYTE N°	READING BYTE	WRITING BYTE
0	0	Gateway only	Gateway only - 60 Hex
	1	Gateway only	Gateway only
1	2	PLEX-COM1 general status	PLEX-COM1 general command
	3	Burner 1 status	Burner 1 command
2	4	Burner 2 status	Burner 2 command
	5	Burner 3 status	Burner 3 command
.....
.....
51	102	Burner 100 status	Burner 100 command
	103	not used	not used

PLEX-COM1 WITH DEVICE-NET® COMMUNICATION

PLEX-COM1-D is the version of the device that uses a Device-net® Gateway in order to communicate with the supervisor. The Gateway comes already connected to the device and set-up to communicate

with this. The Device-net® bus lets you connect several devices to the same network and lets you place the PLEX-COM1-D close to the furnace, thus reducing the length of the ECS bus.

DESCRIPTION	DEVICE-NET INTERFACE
Slave units connected to supervisor	63
Maximum bus length	500 m without repeater
Device connection type	5 pole quick extraction connector
Baud-rate to supervisor	Up to 500 Kbit/S

PLEX-COM1-D is supplied with EDS files for fast Gateway / supervisor interfacing.

The Device-net address and the baud-rate are selected using the Dip-switch bank at the front of the Gateway, while the address of the PLEX-COM1 device set using the ESA ELBP-110 software must not be changed.

PLEX-COM1-D performs all the functions described above and has one byte for every command and every status signal.

The Gateway has 104 bytes for writing the commands and 104 bytes for reading for the status signals. Furthermore, the first command byte from supervisor must have a value of 60 (Hex) to activate the communication between the Gateway and PLEX-COM1.

WORD N°	BYTE N°	READING BYTE	WRITING BYTE
0	0	Gateway only	Gateway only - 60 Hex
	1	Gateway only	Gateway only
1	2	not used	not used
	3	PLEX-COM1 general status	PLEX-COM1 general command
2	4	Burner 1 status	Burner 1 command
	5	Burner 2 status	Burner 2 command
3	6	Burner 3 status	Burner 3 command
	7	Burner 4 status	Burner 4 command
....
....
51	102	Burner 99 status	Burner 99 command
	103	Burner 100 status	Burner 100 command

PLEX-COM1 WITH CONTROL-NET COMMUNICATION

PLEX-COM1-C is the version of the device that uses a Control-net® Gateway in order to communicate with the supervisor. The Gateway comes already connected to the device and set-up to communicate

with this. The Control-net® bus lets you connect several devices to the same network and lets you place the PLEX-COM1-C close to the furnace, thus reducing the length of the ECS bus.

DESCRIPTION	CONTROL-NET INTERFACE
Slave units connected to supervisor	99
Maximum bus length	100 m without repeater
Device connection type	RJ45 quick extraction connector or Coax
Baud-rate to supervisor	up to 5 Mbit/S

PLEX-COM1-C is supplied with EDS files for fast Gateway / supervisor interfacing.

The Device-net address is selected using the two rotary selector at the front of the Gateway, while the address of the PLEX-COM1 device set using the ESA ELBP-110 software must not be changed.

PLEX-COM1-C performs all the functions described above and has

one byte for every command and every status signal.

The Gateway has 106 bytes for writing the commands and 106 bytes for reading for the status signals. Furthermore, the first command byte from supervisor must have a value of 60 (Hex) to activate the communication between the Gateway and PLEX-COM1.

WORD N°	BYTE N°	READING BYTE	WRITING BYTE
0	0	Gateway only	Gateway only - 60 Hex
	1	Gateway only	Gateway only
1	2	not used	not used
	3	PLEX-COM1 general status	PLEX-COM1 general command
2	4	Burner 1 status	Burner 1 command
	5	Burner 2 status	Burner 2 command
3	6	Burner 3 status	Burner 3 command
	7	Burner 4 status	Burner 4 command
....
....
51	102	Burner 99 status	Burner 99 command
	103	Burner 100 status	Burner 100 command

PLEX-COM1 WITH ETHERNET COMMUNICATION

PLEX-COM1-E is the version of the device that uses a Ethernet® Gateway in order to communicate with the supervisor. The Gateway comes already connected to the device and set-up to communicate

with this. The Ethernet® bus lets you connect several devices to the same network and lets you place the PLEX-COM1-E close to the furnace, thus reducing the length of the ECS bus.

DESCRIPTION	ETHERNET INTERFACE
Slave units connected to supervisor	64
Maximum bus length	100 m without repeater
Device connection type	RJ45 quick extraction connector
Baud-rate to supervisor	10-100 Mbit/S

PLEX-COM1-E is supplied with EDS files for fast Gateway / supervisor interfacing.

Use the Gateway set-up software to select the Ethernet serial address, while the address of the PLEX-COM1 device set using the ESA Elbp-110 software must not be changed.

PLEX-COM1-C performs all the functions described above and has

one byte for every command and every status signal.

The Gateway has 104 bytes for writing the commands and 104 bytes for reading for the status signals. Furthermore, the first command byte from supervisor must have a value of 60 (Hex) to activate the communication between the Gateway and PLEX-COM1.

WORD N°	BYTE N°	READING BYTE	WRITING BYTE
0	0	Gateway only	Gateway only - 60 Hex
	1	Gateway only	Gateway only
1	2	not used	not used
	3	PLEX-COM1 general status	PLEX-COM1 general command
2	4	Burner 1 status	Burner 1 command
	5	Burner 2 status	Burner 2 command
3	6	Burner 3 status	Burner 3 command
	7	Burner 4 status	Burner 4 command
....
....
51	102	Burner 99 status	Burner 99 command
	103	Burner 100 status	Burner 100 command

STATUS INDICATION

PLEX-COM1 is fitted with diagnostic LEDS that are activated to indicate the current status of the device and any malfunctions. Below are all the possible status with their corresponding meanings:

DEVICE	LED NAME	COLOR	DESCRIPTION
PLEX-COM1	OUT-1	GREEN	Indication of alarm on ECS bus: off - ECS bus operating normally (output deactivated) on steady - anomaly on ECS bus due to short-circuits or polarity reversal (output active)
PLEX-COM1	OUT-8	GREEN	Indication of PLEX-COM1 device status: on steady - device fully operational (output active) intermittent - device in configuration mode (output intermittent) off - device not operating or not powered (output deactivated)
PLEX-COM1	TX	RED	Indication of data transmission on ECS bus: flashing rapidly - transmission of commands to the flame controls; each flash corresponds to a communication flashing slowly - transmission of cumulative commands to the flame controls, or no answer from ECS bus off - device is not transmitting any command (not powered or in configuration) on steady - device has a damaged transmission stage
PLEX-COM1	RX	RED	Indication of data reception from ECS bus: flashing - reception of status from flame controls; each flash corresponds to a communication off - device is not receiving any status on steady - anomaly on ECS bus due to short-circuits or polarity reversal
ALIM-1		GREEN	Indication of 24 V DC output presence: on steady - output present off - output absent
ALIM-1		RED	Indication of 5 V DC output presence: on steady - output present off - output absent
Converter RS-232/485	RS-232		Indication of communication on RS-232 port: flashing green - reception of communications from RS-232 line; each flash corresponds to a communication flashing red - transmission of communications on RS-232 line; each flash corresponds to a communication on steady red - polarity reversal of RS485 connection on steady green - slave unit not connected. off - no communication or not powered

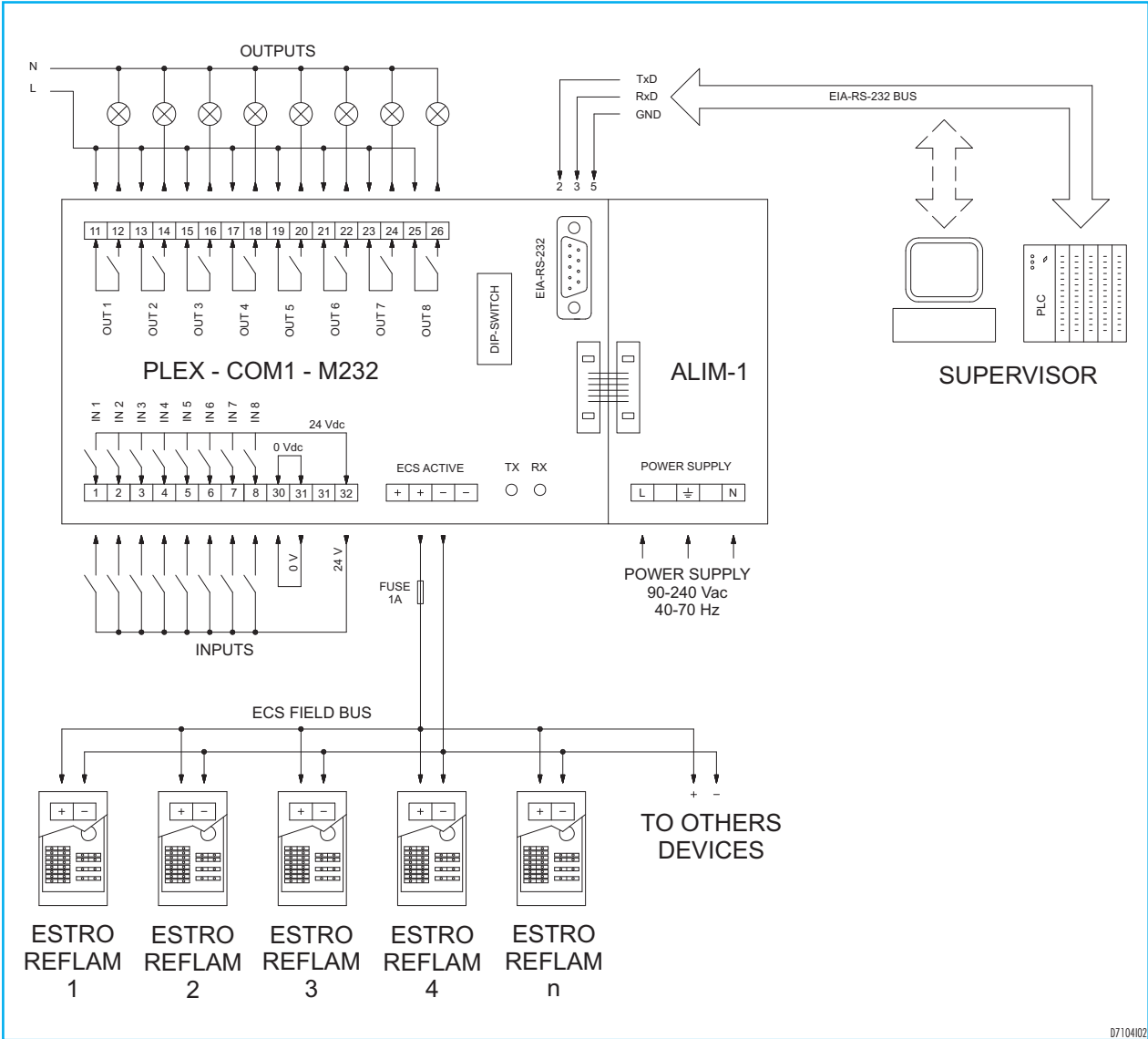
Converter RS-232/485	RS-485		Indication of communication on RS-485 port: flashing green - transmission of communications from RS-485 line; each flash corresponds to a communication flashing red - reception of communications on RS-485 line; each flash corresponds to a communication on steady green - polarity reversal of RS485 connection on steady red - slave unit not connected. off - no communication or not powered
HMS- CommunicatorGateway	1		Indication of line status to supervisor refer to Gateway documenta- tion
HMS- CommunicatorGateway	2		Indication of line status to supervisor refer to Gateway documenta- tion
HMS- CommunicatorGateway	3		Indication of line status to supervisor refer to Gateway documenta- tion
HMS- CommunicatorGateway	4		Indication of line status to supervisor refer to Gateway documenta- tion
HMS- CommunicatorGateway	5		Indication of Modbus-RTU line status to PLEX-COM1refer to Gateway documentation
HMS- CommunicatorGateway	6		Indication of Gateway configuration status refer to Gateway docu- mentation

During steady functioning, the PLEX-COM1 continuously sends commands to the flame controls and receives their status from them. This means that each flash of the TX LED must be matched by a flash of the RX LED. If the device sends cumulative commands to the burners or if there are anomalies, PLEX-COM1 will receive no response and so only the TX LED will flash slowly. This happens in the following situations:

-the general stop command for all burners has been sent;

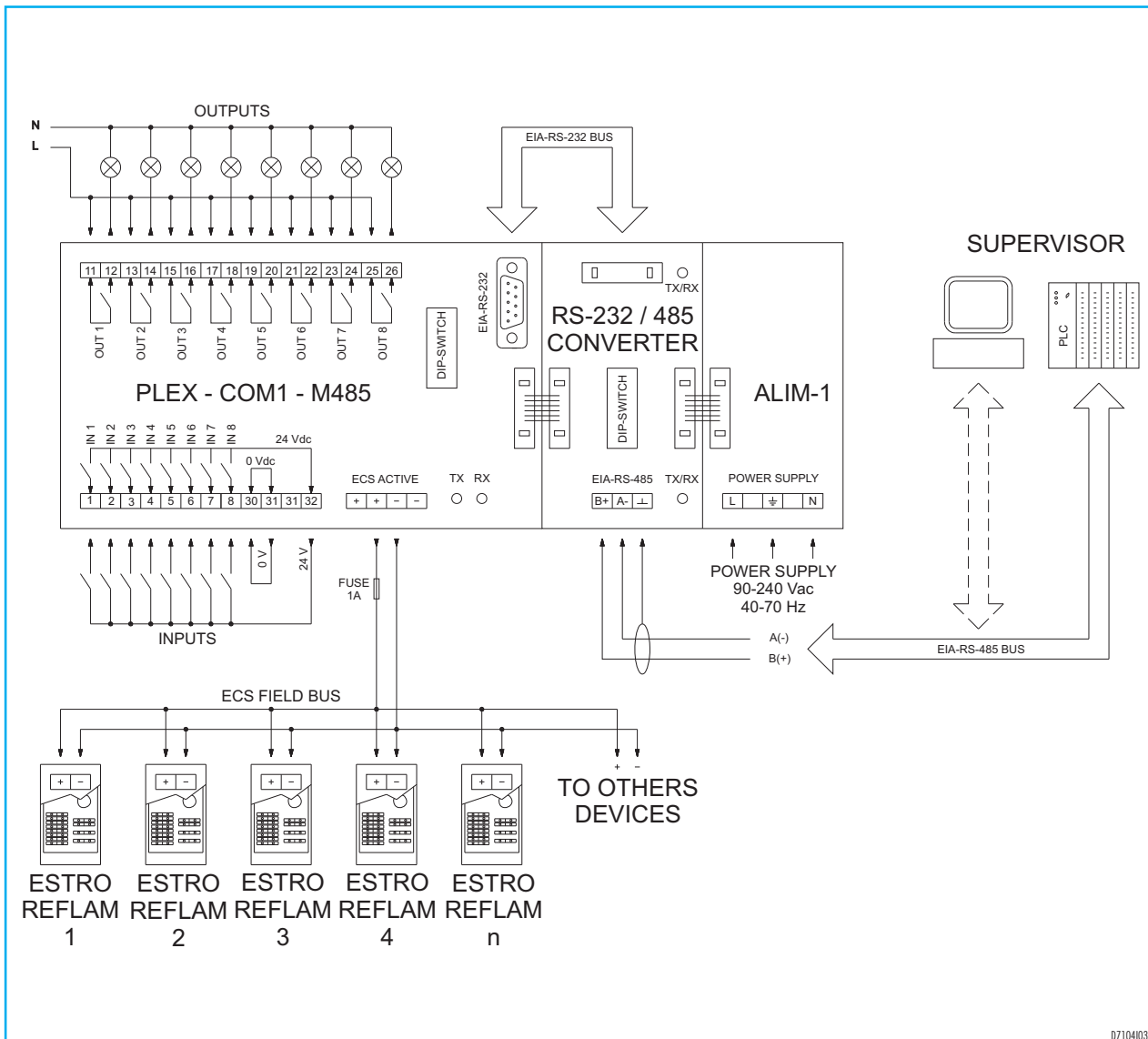
-supervisor Com-timeout alarm, as there are no request to device or the connection has been interrupted;
-ECS bus connection interruption;
-the addresses and baud-rate settings for the device and the flame controls do not correspond;
-the flame control in question is foreseen but not actually installed.

ELECTRICAL CONNECTION PLEX-COM1-M232



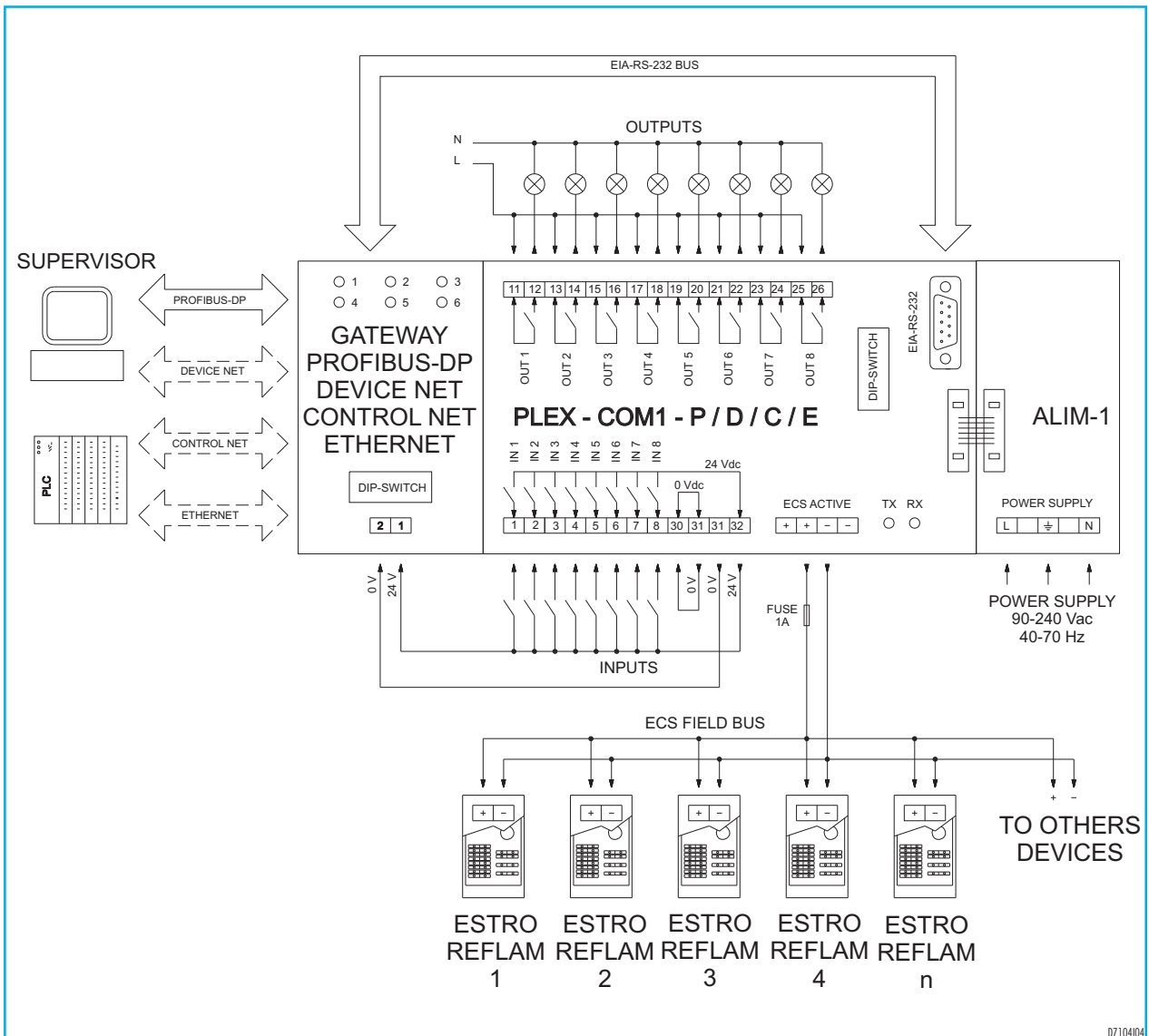
0710402

ELECTRICAL CONNECTION PLEX-COM1-M485



0710403

ELECTRICAL CONNECTION PLEX-COM1-P/D/C/E



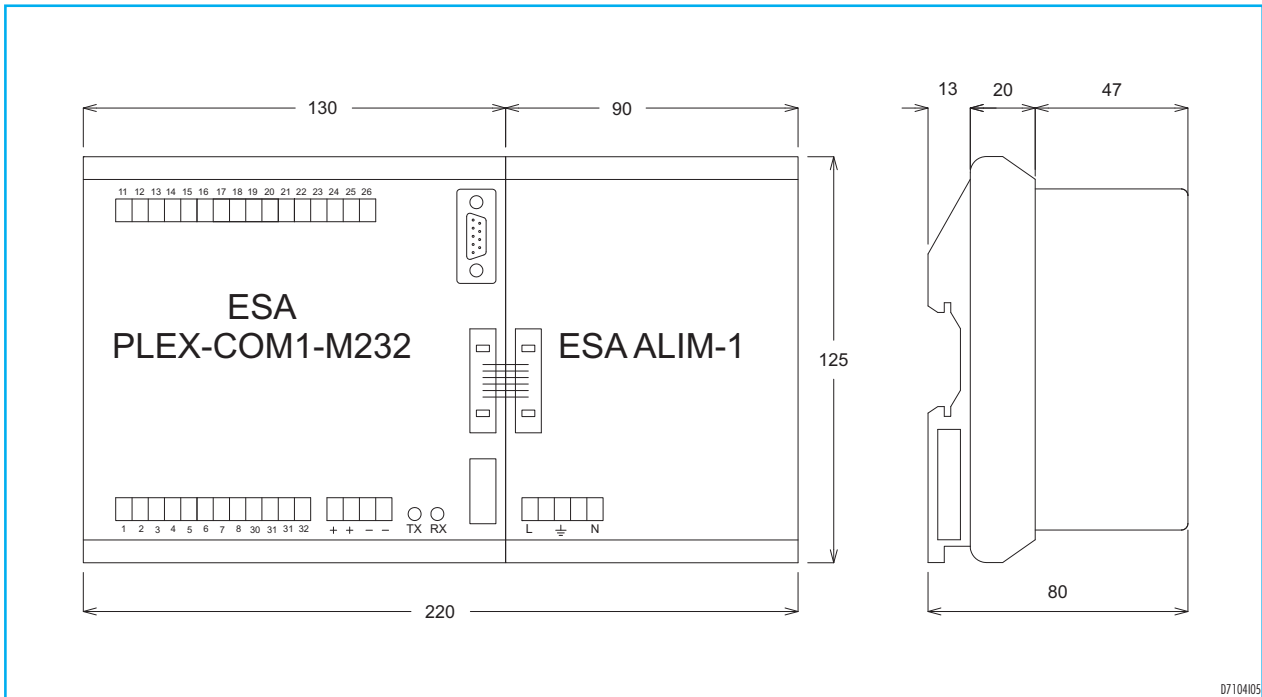
0710404

INSTALLATION

Follow these instructions to install the device correctly:

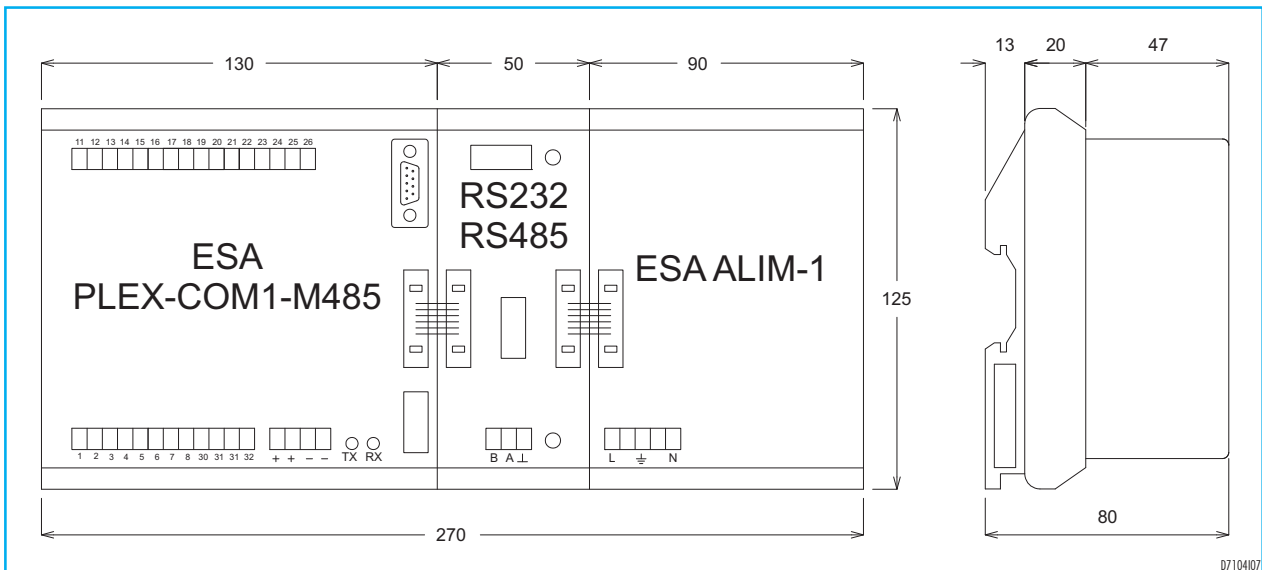
- Avoid placing the PLEX-COM1 near intense magnetic or electric fields and in conditions where it may be exposed to direct sources of heat or products from combustion, corrosive liquids, solvents or gases.
- Installation must be performed by qualified staff in compliance with regulations in force at the time and in the place of installation.
- The device must be placed inside electric panels and mounted on a DIN rail. The position must be accessible and have suitable ventilation.
- Carefully follow the technical documentation when carrying out the electrical wiring, observing the polarity of the conductors. The terminals used for electrical connection are screw type terminals and can accept conductors with cross sections from 0.5 to 2.5mm².
- Check that loads connected to the digital outputs of the device do not have an absorption greater than the maximum capacity of the output contacts.
- The laying of the communication line must always be carried out separately from the power supply lines, motor control (inverter) and the mains voltage and in particular, neither MULTIPOLAR or SHIELDED cables must be used.
- Use the ECS CABLE or unipolar cables with a cross section greater than 0.5mm² for communication lines; as an alternative, we recommend using the busway system, bearing in mind that a maximum length of cable of 1 m must be used between the busway and the instrument for both communication and power supply lines.
- The length of the communication lines must not exceed the specified limit. If the controller is a long way from the system, we recommend positioning the PLEX-COM1 near the furnace or using an ECS signal repeater.
- We recommend placing a protection fuse on the active ECS line to prevent prolonged short-circuits from damaging the board; use 1 A quick blow fuses.
- The active output of only one PLEX-COM1 device can be connected to each trunk of the ECS bus. If the number of flame control devices installed exceeds the permitted for the ECS output, an ECS signal repeater should be used; while, if the number of control flame to be controlled exceeds the amount that can be controlled by one PLEX-COM1 device, several should be used, each one connected to its ECS bus trunk.
- If the polarities on one or more flame control devices are reversed, the entire ECS bus will fail to function. This will be signalled by the RX-LED lighting up and the activation of the digital output OUT1 of the PLEX-COM1 device. The same situation occurs with a short circuit on the communication line. If it persists, the malfunction will cause the device to break.
- Before supplying power to the device, check that the voltage, frequency and capacity are correct and ensure that the protection earth is connected to the appropriate terminal. As soon as the PLEX-COM1 is powered, we recommend checking that the RX LED is not fixed on. If it is, disconnect the active output and look for the cause of the anomaly on the ECS bus.
- Connecting equipment to the ECS bus when in operation could cause a brief interruption in communication.
- If the PLEX-COM1 fails to work properly, it must be sent back to the manufacturer for repair. Modifications or repairs carried out by third parties are not permitted.

OVERALL DIMENSIONS PLEX-COM1-M232



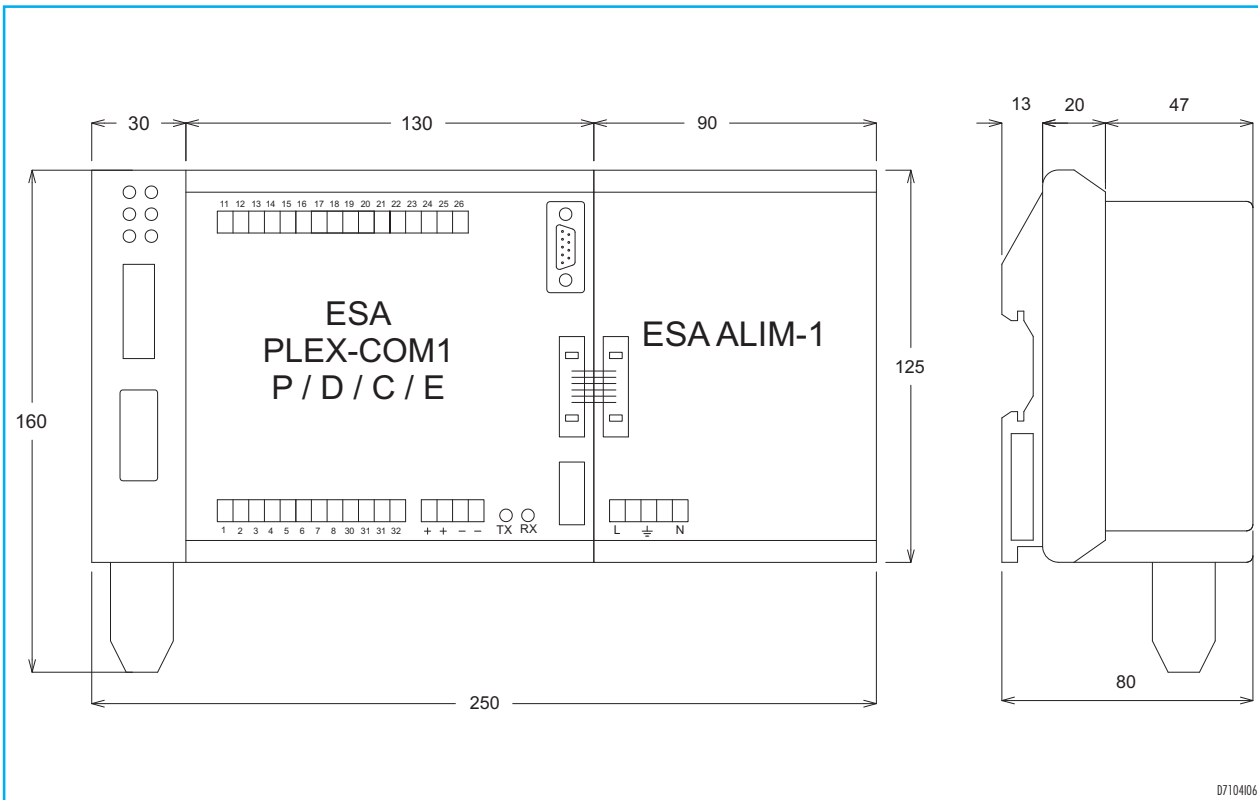
0710405

OVERALL DIMENSIONS PLEX-COM1-M485



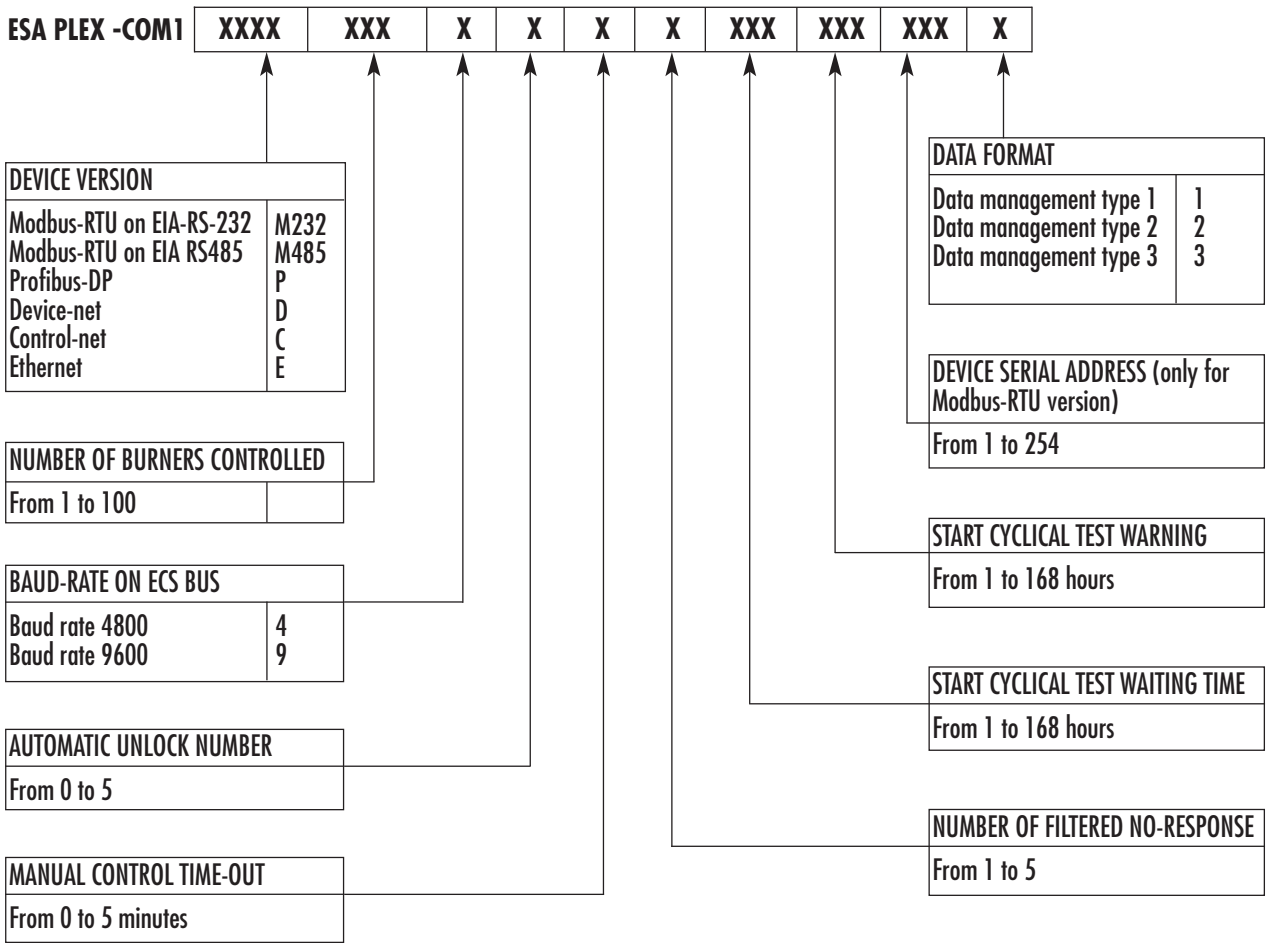
0710407

OVERALL DIMENSIONS PLEX-COM1-P/D/C/E



0710406

ORDERING CODE



The serial addresses for the flame controls for each of the burners installed must be listed in a table. Each address consists of a segment

and a node: all alphanumeric characters are valid (0-9 and capitals A-Z).

BURNER NUMBER	CONTROL FLAME SERIAL ADDRESS
1	segment e node
2	segment e node
.....
Number of burners controlled	segment e node