Instruction Manual 830-1
2/25/2011

Eclipse Trilogy Flame Safeguard

No-Purge & Purge Sequences

Series T410

Version 1

SIMPLE. SECURE. EFFICIENT.
TRILOGY
SERIES

ECLIPSE®
Innovative Thermal Solutions

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Document Conventions

There are several special symbols in this document. You must know their meaning and importance.

The explanation of these symbols follows below. Please read it thoroughly.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE Is used to address practices not related to personal injury.

NOTE Indicates an important part of text. Read thoroughly.

Table of Contents

Introduction 1

Product Description

Figure 1.1. T410 Flame Safeguard

The T410 Flame Safeguard is a microprocessor-based burner control with matching system components for the control and supervision of burners in intermittent operation. The flame supervision is by flamerod or with UV flame detectors. All safety related digital inputs and outputs of they system are monitored by a contact feedback network.

An integral display with keypad and multi-color indicator light shows the status of burner operation program sequence and faults. A remote display or PC software can be connected to the flame safeguard basic unit. The remote display features menu driven operation, offering straight forward operation and targeted diagnostics.

Audience

This manual has been written for people who are already familiar with all aspects of a combustion system and its add-on components, also referred to as “the burner system”.

The audience is expected to have had experience with the ratio regulator component of a burner system.

Purpose

The purpose of this manual is to make sure that the flame safeguard component of a burner system is used in a safe, effective and trouble free manner.

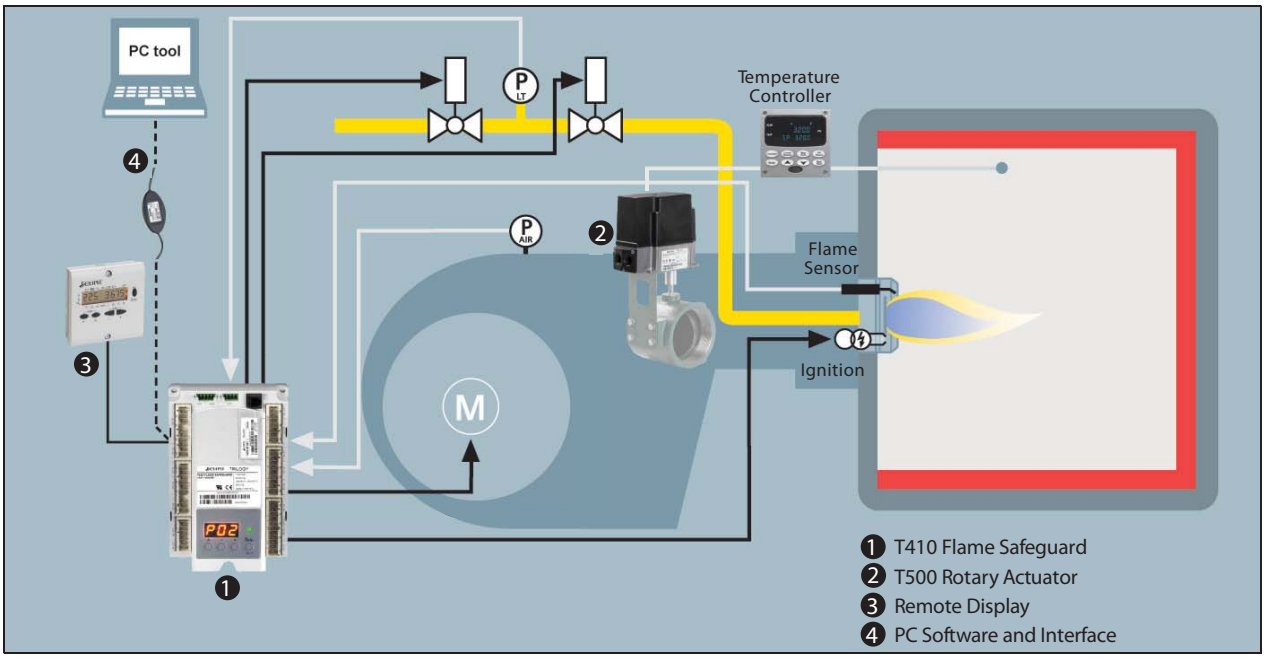


Figure 1.2. Typical Modulating Gas Burner Control System with a T500 Series Rotary Actuator

Features & Benefits

Feature	Benefit
3-color signal light	Gives quick status and diagnostics by blink codes
4 button control panel	Provides local reset, stop, and display selection
Air pressure supervision with shared air switch detection	Meets global requirements and provides extra safety and diagnosis
Both UV and flame rod sensor inputs	Adapts quickly to application changes, reduce parts inventory
Cycle counter	Simplifies scheduling of safety maintenance
Delayed main valve	Prevents undesired gas flow from spark induced flame signals
Extended temperature range, -40 to +60 °C	Adapts quickly to application changes, reduce parts inventory
Fault history	Eases troubleshooting with detail of the error, phase step and cycle count
Integral 3-digit display	Shows extensive service fault and state information
Microprocessor control	Gives accurate timing and sequence, avoids unnecessary waiting
Multiple country approvals	Adapts quickly to application changes, reduce parts inventory
Optional PC software and interface	Shows extensive service fault and state information
	Information in greater detail outside the control panel
	Simplifies multiple unit setup
Optional remote display	Shows extensive service fault and state information
	Information in greater detail outside the control panel
Pilot and direct spark control	Adapts quickly to application changes, reduce parts inventory
Plug-in program modules	Adapts quickly to application changes, reduce parts inventory
Plug-in screw terminals	Eases assembly, aids troubleshooting
Programmable timing and sequence option selection	Adapts quickly to application changes, reduce parts inventory
	Energy savings
Proof of valve closure input	Meets NFPA 86 standard without additional components in the control panel
Remote reset input	Allows simple door mounted push button
Selectable forced 24 hour intermittent operation	Enhanced safety by performing a momentary shut-down and start-up self test
Supervised safety inputs and outputs	Enhanced safety for external wiring errors and internal faults

Type Summary

Assembly Part Number*	Base Unit Part Number	Program Module Part Number	Actuation			Voltage		Purge		Type		Approvals		Features	
			Non Actuator	Modulation	Dry-Contact	120V	230V	No	Yes	UV	FR	UL	CE, FM	VPS	Programmable
10042540	10042554	10042559	•			•		•		•	•	•	•		•
10042542	10042554	10042561	•			•			•	•	•	•	•		•
10042544	10042555	10042560	•				•	•		•	•		•		•
10042546	10042555	10042562	•				•		•	•	•		•		•

* Includes base unit, program module and connector set.

Safety

2

Important notices for safe operation of the flame safeguard will be found in this section. To avoid personal injury, damage to property or the facility, the following warnings must be observed. Read this entire manual before attempting to start the system. If any part of the information in this manual is not understood, contact Eclipse before continuing.

Safety Warnings

DANGER

- **The Flame Safeguard is a safety device. Do not open, interfere with or modify the unit.**

WARNING

- **All activities (mounting, installation, and service) must be performed by qualified staff.**
- **Protect against electrical shock before making any wiring changes in the connection area by turning off the main power supply. Ensure that the power cannot be inadvertently switched on again and that it is indeed off.**
- **Ensure protection against electrical shock by providing adequate protection for the burner control's connection terminals.**
- **The space where the program module is located is defined as plugging space. Keep hands away when the program module is not fitted and the unit is powered.**
- **Each time work is carried out such as mounting, installation, or service, check that wiring and parameterization is correct and perform safety checks.**
- **If the housing or area near the operating panel is damaged, the unit must be immediately put out of operation or there may be a risk of electrical shock.**
- **Do not use any tools or pointed objects when pressing the buttons on the display. If the film on the operating panel is damaged, there is a risk of electrical shock.**

WARNING

- **Fall or shock can adversely affect the safety functions. Such burner controls must not be put into operation, even if they do not appear to be damaged.**
- **If applicable, the dataline for the remote display or PC interface must be connected or disconnected only when the main supply voltage is off to guard against electrical shock in case of an internal fault. If the connector jack is not in use, it must be covered to avoid electrical shock in case of an internal fault.**

CAUTION

- **Use of this product in the European community shall only be deployed in a manner that meets the applicable EC directives and laws.**

Capabilities

Adjustment, maintenance and troubleshooting of the mechanical parts of this system should be done by qualified personnel with good mechanical aptitude and experience with combustion equipment.

Operator Training

The best safety precaution is an alert and competent operator. Thoroughly instruct operators so they demonstrate an understanding of the equipment and its operation.

Replacement Parts

Order replacement parts from Eclipse only.

Disposal

The unit contains electrical and electronic components and must not be disposed of together with domestic waste. Local and currently valid legislation must be observed.

Installation 3

In this section you will find the information and instructions that you need to install the Flame Safeguard.

CAUTION

- **Installation and maintenance must conform with the National Electrical Code and all other national and local codes and authorities having jurisdiction. The Flame Safeguard must be installed by a qualified technician.**

Handling & Storage

Handling

1. Make sure that the area is clean.
2. Protect the flame safeguard from the weather, damage, dirt and moisture.
3. Protect the flame safeguard from excessive temperatures and humidity.
4. Take care not to hit or drop the flame safeguard.

Storage

1. Make sure that the flame safeguard is clean and in good condition.
2. After you have made sure that everything is present and in good condition, keep the flame safeguard in the original package as long as possible.
3. Store the flame safeguard in a cool, clean, dry room.

Approval of Components Electrical Wiring

All of the electrical wiring must comply with one of the following standards:

- NFPA Standards 70
- EN60204-1
- the electrical wiring must be acceptable to the local authority having jurisdiction

Where to get the standards:

The NFPA Standards are available from:

National Fire Protection Agency
Batterymarch Park
Quincy, MA 02269

Information on the EN standards, and where to get the standards is available from:

CENELEC
Avenue Marnix 17
B-1000 Brussels, Belgium

Checklist Before Installation

Access

Make sure that you install the flame safeguard in such a way that you have easy access to it for inspection and maintenance.

Environment

Make sure that the local environment matches the original operating specifications. Check the following items:

- voltage, frequency and stability of the electrical power
- humidity and temperature of air
- presence of damaging corrosive gases in the air

Flame Safeguard Mounting

Ensure that the relevant national safety regulations are complied with when installing the Flame Safeguard.

Mount the unit properly by supporting the shaded areas on an even surface using 3 screws through the holes shown in Figure 3.1. The maximum diameter of the screws is M5 or #10. The thickness of the plastic housing is 6 mm.

CAUTION

- **The unit must be mounted in an enclosure that provides adequate protection against shock hazard and enviromental damage.**

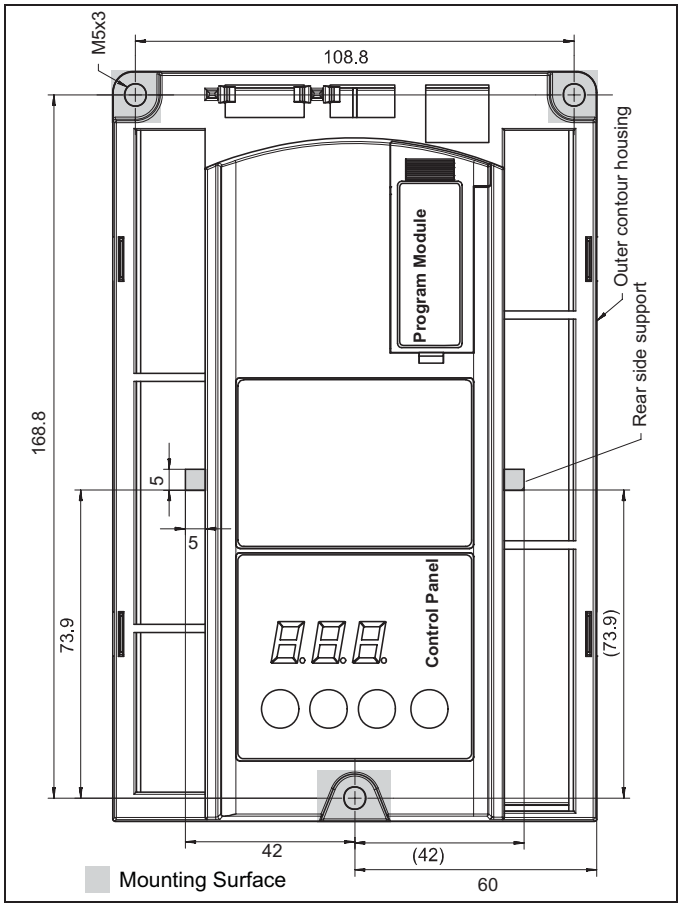


Figure 3.1. Mounting Diagram

Installation Notes

- Always run the high-voltage ignition cable separately from the unit and other cables and keep it the greatest possible distance away.
- Do not cross connect line (hot) and neutral conductors.
- Do not route the signal cable from the Flame Safeguard to the remote display together with other cables, keep separate.
- Install switches, fuses, grounds, etc. in compliance with local regulations.
- Make certain that the maximum permissible current rating of the connection terminals is not exceeded.
- Do not feed external mains voltage to the control outputs of the unit. Isolate the output wiring when testing the devices controlled by the Flame Safeguard.
- Service operation with a longer signal cable from the Flame Safeguard to the remote display is permitted for temporary use, however, extra protection must be provided to guard the cable insulation against mechanical stress. Provide heat shrink tubing or other sheathing.
- Both the signal cable and remote display must be stored so that no damage due to dust and water can occur.
- The remote display must be used in a dry, clean environment.

Electrical Connection of Flame Detectors

It is important to achieve practically disturbance-free and loss-free signal transmission:

- Never run the detection cable together with other cables because line capacitance reduces the magnitude of the flame signal. Use a separate cable or conduit.
- Observe the permissible detection cable lengths. With long lengths near the maximum, the wire line capacitance increases and causes the detector voltage and current to drop. The use of low capacitance cable can improve signal strength.
- The power to the flamerod is not protected against electrical shock. Protect against accidental contact.
- Locate the ignition electrode and the flamerod such that the ignition spark cannot arc over to the flamerod (risk of electrical overloads) and that it cannot adversely affect the supervision of ionization.
- Ignition interference from the spark plug may increase or decrease the flame signal strength. Reversing the ignition transformer primary leads may reduce this effect. Changing the spark gap or adding grounding area between the flamerod and spark plug may eliminate the interference.
- Insulation resistance must be a minimum of 50MΩ between flamerod and the ground. Soiled detector holders reduce the insulation resistance, thus lowering the flame signal.
- Ground the burner in compliance with the relevant regulations; grounding by structure alone does not suffice.
- When using a flamerod in ground free power mains, connect terminal X10-05/1 to burner ground.

Additional Equipment

Connector Sets

10042577

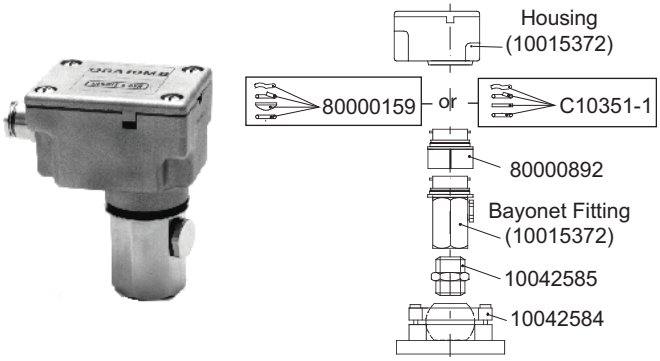
Connector Set Complete for Flame Safeguard RAST5 and RAST3.5, Single packs

Flame Detection

10005156

The standard flame detector for use with Eclipse T400 burner controls, for the supervision of gas flames, yellow-burning / blue-burning oil flames and for ignition spark proving. Aluminum housing with a 3/4" mounting coupling and 3m (10ft) of wire. Rated for -20° to +60°C and IP54.

10015372



An alternative flame detector for use with Eclipse T400 burner controls, for supervision of gas flames, yellow-burning / blue-burning oil flames and for ignition spark proving. Die-cast aluminium housing with a 1" mounting coupling and connection facility for cooling air. Rated for -20° to + 60°C and IP54.

Part Number	Description
80000159	Magnifying Lens Kit
C10351-1	Heat Insulating Glass Kit
80000892	Glass Holder
10042585	Nipple Coupling, 1-in
10042584	Ball Joint, 1-in

10016523

An alternate flame detector for use with Eclipse T400 burner controls, for the supervision of gas flames, yellow-burning / blue-burning oil flames and for ignition spark proving. Plastic insulated housing, metallized to prevent static charging caused by the air flow from the fan. For direct mounting on the burner. Supplied complete with flange and clamp. Rated for -20° to +60°C and IP54.

21741

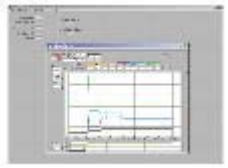
Low capacitance flame rod cable to improve signal strength on long line lengths. Coax, 22awg Solid, 0.26 O.D., -40°C To +80°C, 750V.

Service Tools

10046770

Interface between burner control and PC Facilitates viewing, handling and recording setting parameters on site in connection with the software.

PC Software Tool



PC software for setting the parameters and for visualizing the burner controls.

Display and Operating Units

10042578

Display and operating unit, detached, 8-digit LCD, 5 buttons. Rated for -20° to + 60°C and IP54.

10046773

Signal cable for portable display, with jack RJ11, cable length 1 m, single unit.

10047457

Blank plug for RJ11 jack.

Connecting Diagrams Fuel Train Applications (Examples)

Gas Direct Ignition (G), 1-Stage

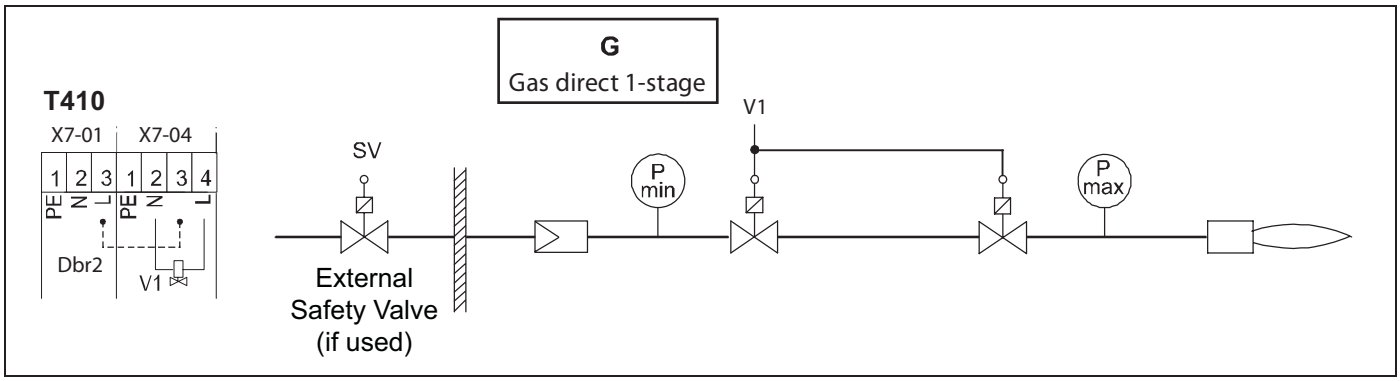


Figure 3.2.

Gas Pilot Ignition 1 (Gp1/1), 1-Stage

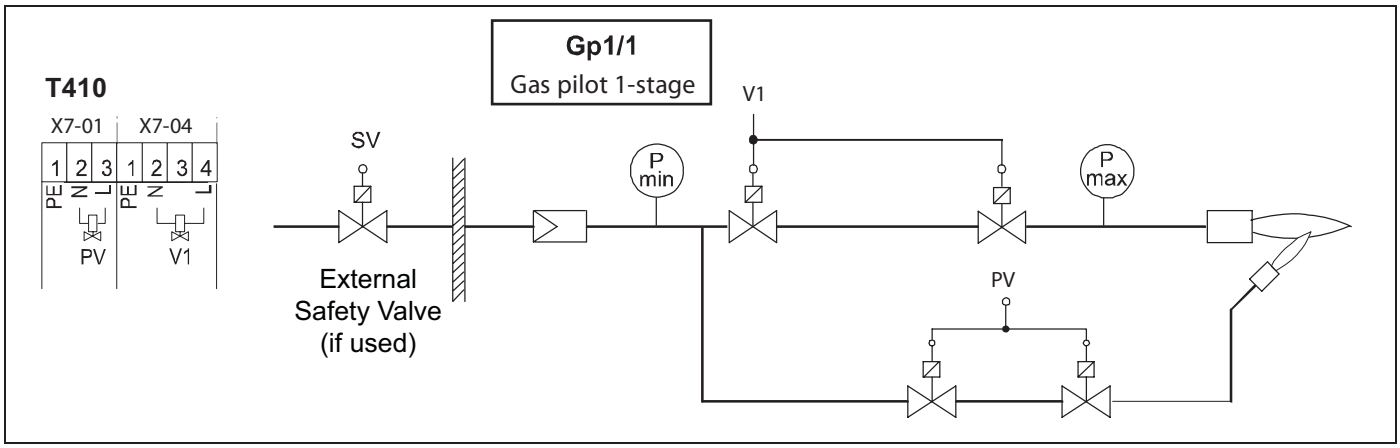
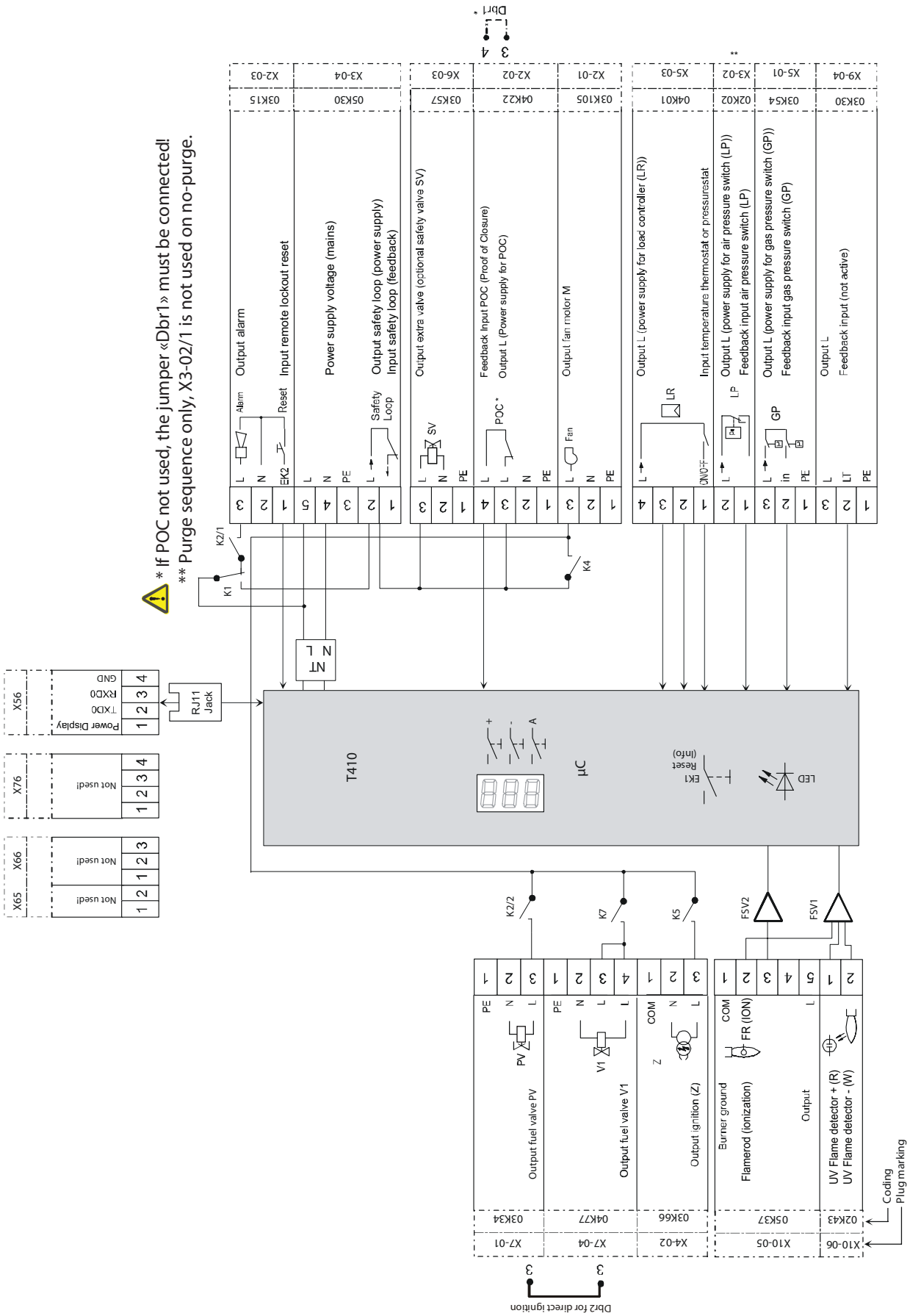
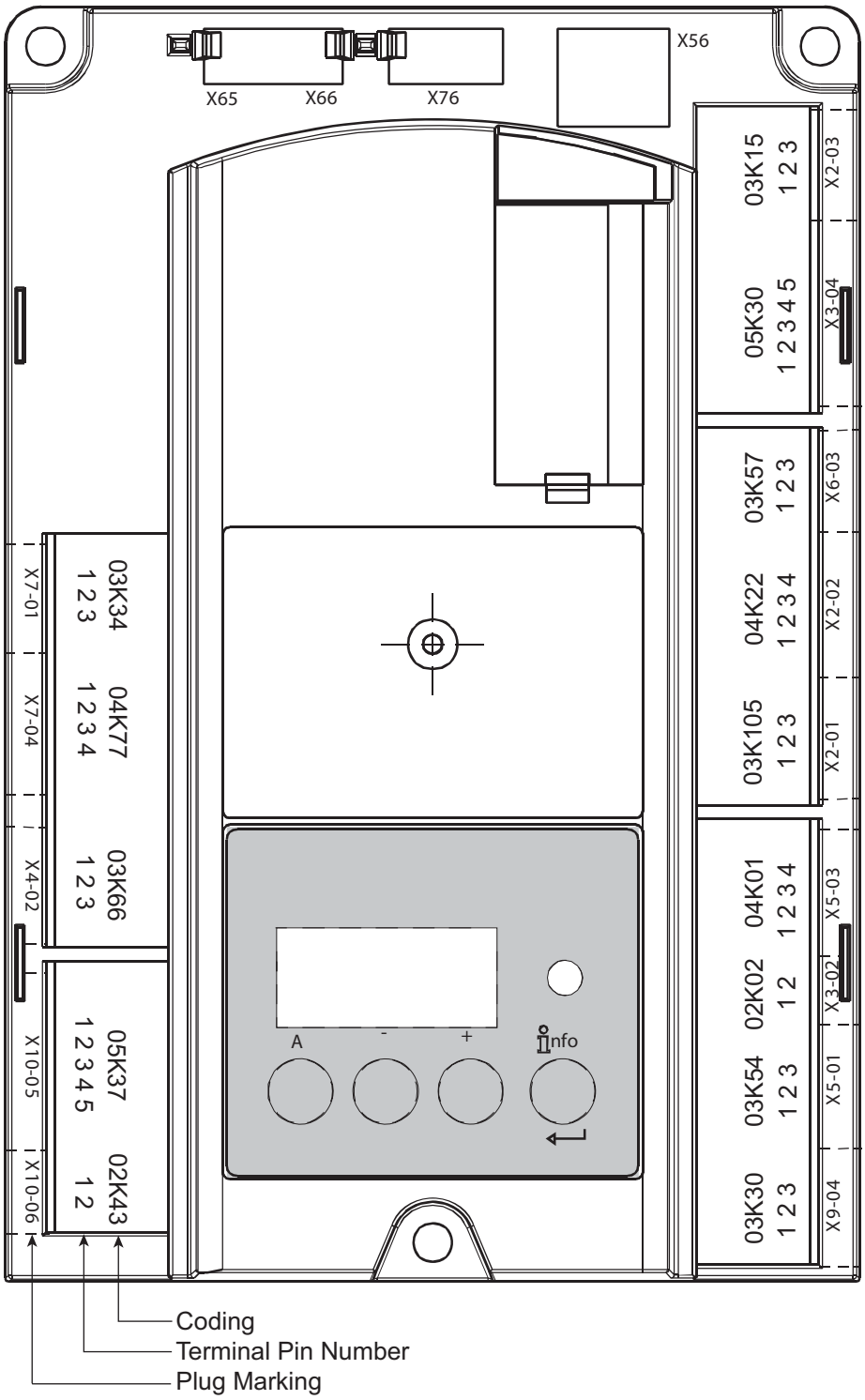


Figure 3.3.

Inputs and Outputs / Internal Connection Diagram



Connector Identification



Specifications 4

General Technical Data

Supply voltage (mains)	AC 120 V, +10%, -15%	AC 230 V, +10%, -15%
Supply frequency	50 / 60 Hz ± 6%	50 / 60 Hz ± 6%
External primary fuse	Max. 6,3 A (slow)	Max. 6,3 A (slow)
Power consumption	<10 W, typical	
Safety class	Class I with parts according to II and III to DIN EN 60730-1	
Degree of protection	IP00 **NOTE**: The installer must ensure electrical shock protection, such as IP40 as per DIN EN 60529, or NEMA/UL type 1.	
Mounting position	Any	
Weight	Approximately 490 g	

Terminal Rating (Inputs)

Input current depends on the operating state of the unit		
The contact feedback network (CFN) inputs such as temperature controller, temperature switch, load controller, pressure switch, and air pressure switch are used for system supervision and require mains-related input voltage		
Maximum voltage	Supply (Mains) +10% (132 VAC)	Supply (Mains) +10% (252 VAC)
Minimum voltage	Supply (Mains) -15% (102 VAC)	Supply (Mains) -15% (196 VAC)
Maximum current	1,5 mA (peak value)	1 mA (peak value)
Minimum current	0,8 mA (peak value)	0,5 mA (peak value)
ON - State detection	> AC 60 V	> AC 120 V
OFF - State detection	< AC 40 V	< AC 80 V
Reaction time for change of state	0.3s min to 0.45s max	
External switch contact material recommendation	Gold-plated silver contacts	
Transition bounce time of contacts	Max. 50 ms (after the bounce time, the contact must stay closed or open)	

Terminal Rating (Outputs)

	Nominal Voltage	
	AC 120 V 50 / 60 Hz	**AC 230 V 50 / 60 Hz**
Unit input current X3-04 (safety loop) from: - Fan motor conductor - Ignition transformer - Fuel valves	Max. 5 A	Max. 5 A
Individual Contact Loading		
Fan motor contactor X2-01/3 - Rated current - Power factor	 2A (15A for max. 0.5s) Cosφ >0.4	 2A (15A for max. 0.5s) Cosφ >0.4
Alarm output X2-03/3 - Rated current - Power factor	 1A Cosφ >0.6	 1A Cosφ >0.6
Ignition transformer X4-02/3 - Rated current - Power factor	 2A Cosφ >0.4	 2A Cosφ >0.4
Fuel valves / pilot valve (PV) X7-01/3 - Rated current - Power factor	 1A Cosφ >0.4	 1A Cosφ >0.4
Fuel valve (V1) X7-04/4 - Rated current - Power factor	 2A Cosφ >0.4	 2A Cosφ >0.4
Safety loop (SL) X3-04/2, safety valve (SV) X6-03/3, POC X2-02/3 - Rated voltage - Total current - Power factor	 AC 120V 50 / 60 Hz 2 A Cosφ >0.4	 AC 230V 50 / 60 Hz 2 A Cosφ >0.4

Cable Lengths

Cable Function	Length (Capacitance)
Mains supply line	Max. 100 m (100 pF/m)
Remote display (laid separately)	For use in a control panel or protected by an enclosure Max. 1m (100 pF/m)
Load controller (LR)	Max. 30 m (100 pF/m)
Other lines	Max. 30 m (100 pF/m)
Reset (laid separately)	Max. 30 m (100 pF/m)
Fuel valve	Max. 30 m (100 pF/m)
Specification as per EN 60730-1	
Type of shutdown or interruption of each circuit	
Shutdown with micro switch	1 pole
Operating mode	Type 2 B

Cross-Sectional Areas

The wire gauge or cross-sectional areas of the mains power lines (L, N, and PE) and, if required, the safety loop (safety limit thermostat, etc.) must be sized for nominal currents according to the selected external primary fuse. The cross-sectional areas of the other cables must be sized in accordance with the internal unit fuse (max. 6.3 AT).

Min. Cross-Sectional Area	0.75 mm^2 (16 gauge) (single or multi-core to VDE 0100)

Cable insulation must be suited for the respective temperature and environmental conditions.

Standards and Certificates

Conformity of EEC directives:
Electomagnetic compatibility EMC (immunity) 2004/108/EEC

Directives for gas fired applications

Low voltage directive 2006/95/RC

Identification codes, EN298 chapter 4
•T410-111...F B C L B N
•T410-112...A B C L B N

FM APPROVED

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UL:
File MH47376

Environmental Conditions

Storage	DIN EN 60721-3-1
Climatic conditions	Class 1K3
Mechanical conditions	Class 1M2
Temperature range	-40 to 70 °C
Humidity	<95% r.h.
Transport	DIN EN 60721-3-2
Climatic conditions	Class 2K3
Mechanical conditions	Class 2M2
Temperature range	-40 to 70 °C
Humidity	<95% r.h.
Operation	DIN EN 60721-3-3
Climatic conditions	Class 3K3
Mechanical conditions	Class 3M2
Temperature range	-40 to 60 °C
Humidity	<95% r.h.

CAUTION

- **Condensation, formation of ice and ingress of water are not permitted. Protect the flame safeguard from the weather, damage, dirt and moisture, excessive temperatures and humidity.**

Flame Signal Display

The following conditions apply for display of the flame signal:

- Display is subject to various component tolerances so that deviations of ±10% can occur.
- Note that for physical reasons there is no linear relationship between the flame display and detector signal values.

Flame Supervision with Flamerod

No-load voltage at terminal (X10–05, terminal 2)	300 VAC

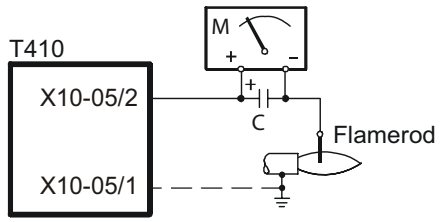
CAUTION

- **The flamerod must be protected against electric shock hazard.**
- **If the supply does not have a grounded neutral, connect terminal X10-05/1 to burner ground.**

Short circuit current	Max AC 1 mA
Required flame detector current	Min. DC 1 µA, display approx. 20%
Possible flame detector current	Min. DC 40 µA, display approx. 100%
Permissible length of flame detector cable (laid separately)	30 m (core-earth 100 pF/m)

Flamerods should be used only on gas burners. They accumulate soot from oil burners, causing nuisance shutdowns and unsafe operating conditions.

Measuring Circuit for Detector Current Measurement



C Electrolytic capacitor 100...470 µF; DC 10...25 V
M Microammeter Ri max. 5,000 Ω

CAUTION

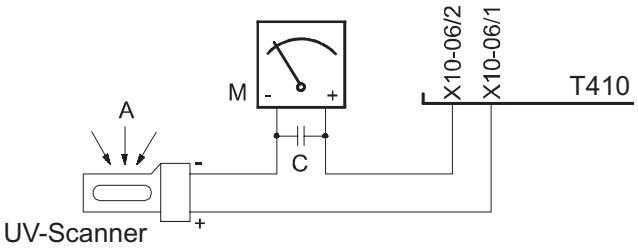
- **Simultaneous operation of UV Scanner and flamerod is not permitted.**

Flame Supervision with UV Flame Detector

Operating voltage	AC 280 V ± 15%
Mains frequency	50 to 60 Hz ± 6%
Required detector current	Min 70 µA
Perm. length of detector cable Normal cable, laid separately.[2]	Max 100m

[2] Multicore cable not permitted

Measuring Circuit for Detector Current Measurement



A Exposure to light
C Electrolytic condenser 100...470 µF; DC 10...25V
M Microammeter Ri max. 5000 Ω

CAUTION

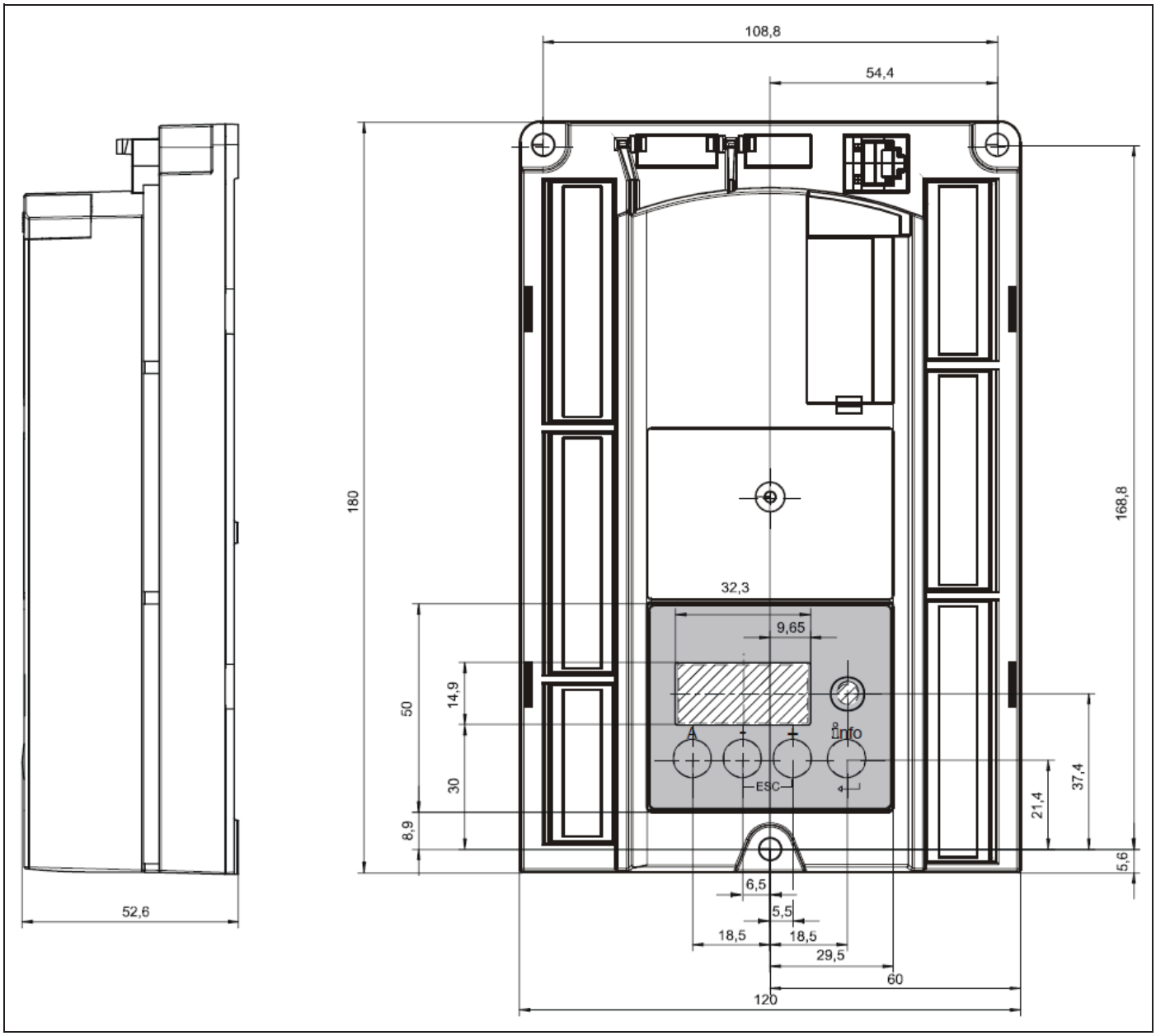
- **Input UV scanner is not short circuit proof. Short circuits X10-06/2 against the ground can disrupt the UV scanner signal.**
- **Simultaneous operation of flame detection with UV scanner and flamerod is not permitted.**

Life Cycle

The Flame Safeguard has a designed lifetime of 250,000 burner start-up cycles which, under normal operating conditions in heating mode, corresponds to approximately 10 years of usage (starting from the production date given on the label). The designed lifetime is not the warranty time specified in the terms of delivery. This lifetime is based on the endurance tests specified in standard EN 298 and the table containing the relevant test documentation as published by the European Association of Component Manufacturers (Afecor) (www.afecor.org).

The designed lifetime is based on use of the burner controls according to the manufacturer's basic documentation. After reaching the designed lifetime in terms of the number of burner startup cycles, or the respective time of usage, the burner control is to be replaced by authorized personnel.

Dimensions



Start-Up 5

Setting Parameters

The safety and sequence parameters must be set before placing the system into operation. Only the system designer or heating engineer responsible for the plant should make these adjustments. Refer to the parameter list in this section and the remote display in Section 9.

⚠ WARNING

- **After entering the password, it is possible to adjust parameters to valves that do not conform to your specific application standard. Make certain that the application will run safely in accordance with legal requirements.**

Documentation

After installation and commissioning, the parameterized values and settings must be documented by the person / heating engineer responsible for the plant. The data can be printed out with the help of the PC software, for example, or must be written down. The documentation must be checked by the expert and then kept in a safe place.

Back-Up of Parameters

After the parameters are adjusted, perform a back-up procedure as explained in Section 8 or 9.

PreConditions for Burner Start-Up

The following available or required input state signals must be checked:

- Burner control must be reset
- All contacts in the line are closed, request for heat
- No undervoltage
- Air pressure switch and Proof-of-Closure must be in its no-load position, or Dbr1 is connected to X2-02 (depending on program sequence)
- Flame detector is darkened and there is no extraneous light
- All contacts in the safety loop are closed

Required Safety Tests

When making the approval tests the following actions must be taken:

Action	Response
Burner start-up with disconnected flame detector	Lockout at the end of 1st safety time
Burner startup with flame detector exposed to extraneous light, e.g. to incandescent light with detectors for visible radiation, quartz-halogen bulb or cigarette lighter flame with detectors for UV radiation	Lockout at prepurge time
Simulation of loss of flame during operation. For that, disconnect the flame detector in the operating position and maintain that state	Lockout or restart, depending on the burner control's configuration
Check the plant's response time with loss of flame during operation. For that purpose, manually disconnect the fuel valves from power and check the time from this moment until the burner control turns off power to the valve	Turning off power to the valves by the burner control within the period of time permitted by local regulations

Further checks may be required, depending on the field of use and the relevant standards.

Functions

Under Voltage

- A safety shutdown during the operation phase takes place if the mains voltage drops below about 75 VAC for 120 VAC units or 165 VAC for 230 VAC units.
- Restart is initiated when mains voltage exceeds about 100 VAC for 120 VAC Units or 195 VAC for 230 VAC units.

Controlled Intermittent Operation

After no more than 24 hours of continuous operation, the burner control initiates automatic controlled shut down followed by a restart, according to parameter 239.

Control Sequence in the Event of Fault

If lockout occurs, the outputs for the fuel valves, the burner motor and the ignition equipment are immediately deactivated (less than1 second).

In the event of lockout, the flame safeguard remains locked and the red fault signal light (LED) lights up. The burner control can immediately be reset. This state is also maintained in the event of re-powering after a mains failure.

Resetting the Burner Control

When lockout occurs, the burner control can immediately be reset. To do this, press the lockout reset button (InFo or i/reset button) for about 1 second (less than 3 seconds). The flame safeguard can only be reset when it is powered and when there is no undervoltage.

Limitation of Repetitions

If the flame is lost after 30 seconds of operation, a maximum of 1 repetition per controlled startup can be performed if enabled by parameter 240, or else lockout will be initiated.

Parameter List

Parameter Number	Parameter	Edit	Value Range		Resolution	Factory Settings	Display Level (Reading)	Password Level (Writing)
			Minimum	Maximum				
000	**Administration**							
60	Backup / Restore	Edit	Restore	Backup	-	-	-	VSD
100	**General**							
102	Date Identification	Read Only	-	-	-	-	InFo	-
103	Number Identification	Read Only	0	9999	1	0	InFo	-
113	Burner Identification	Read Only	x	xxxxxxxx	1	--------	InFo	-
140	Display Mode 1 = Program phase 2 = Flame 1 (Flamerod/UV) 3 = Flame 2 (Special) 4 = Do not use	Edit	1	4	1	2	-	VSD
164	Numbers of Startups, Resettable	Resettable	0	999999	1	0	InFo	InFo
166	Total Number of Startups	Read Only	0	999999	1	0	InFo	-
170	Relay Switching Cycles: .00 = Relay K12, not used for T410 .01 = Relay K11, not used for T410 .02 = Relay K2/2, Pilot Valve .03 = Relay K1, Safety Main Supply	Read Only	0	999999	1	0	InFo	-
171	Max. Relay Switching Cycles	Read Only	0	999999	1	1000000	InFo	-
200	**Burner Control**							
225	Prepurge Time (t1-2.1 seconds)	Edit	0	1237	4.851	29.106	VSD	VSD
230	Pilot Stabilize Time (t4)	Edit	3.234	74.97	0.294	3.234	VSD	VSD
231	Pilot Interrupt Time (t9)	Edit	0	74.97	0.294	9.996	VSD	VSD
234	Postpurge Time (t8)	Edit	0	1237	4.851	19.404	VSD	VSD
239	Forced Intermittent Operation After 24 hours of Operation 0 = OFF 1 = ON	Edit	0	1	1	0	VSD	VSD
240	Repetition in the Event of Loss of Flame in Operation 0 = None 1 = None 2 = 1 x repetition	Edit	0	2	1	0	VSD	VSD
247	Pilot Stays On (during operation) 0 = Off 1 = On	Edit	0	1	1	0	VSD	VSD
254	Reaction Time Flame Fault 0 = 1 s 1 = 3 s	Edit	0	1	1	0	VSD	VSD
257	Ignition Interval (t3n - 0.3s)	Edit	0	13.23	0.147	4.116	VSD	VSD
700	**Error History**							
701	Current Error: 00: Error code 01: Startup counter 02: Program phase 03: Not used	Read Only	 2 0 - 0%	 255 999999 --- 100%	 1 1 --- 1	-	SEr	-
702 - 711	Error History Previous 1-10 00: Error code 01: Startup counter 02: Program phase 03: Not used	Read Only	 2 0 ---	 255 999999 ---	 1 1 ---	-	SEr	-
900	**Process Data**							
936	Not Used	Read Only					SEr	
951	Mains Voltage	Read Only	0 V	175 or 350 V	1 V	-	SEr	-
954	Flame Intensity	Read Only	0%	100%	1%	-	SEr	-

T410 - 111 Parameters Only

Operation 6

Integral Control Panel

The InFo (i/reset) button performs multiple functions:

- resets the burner control
- access the fault blink code
- access the interface diagnostics

The multi-color signal light (LED) provides a redundant indicating element to the 3-digit display and shows either operational state or fault diagnostics information.

Operational State Indication

During startup, state indication takes place on both the signal light and the display according to the “Color Code for Multi-Color LED”, Table 6.1, and the “Phase Code List”, Table 6.2.

Fault Diagnostics Indication

After lockout, the red fault signal light (LED) will remain on. In that condition, visual diagnostics of the cause of fault according to the fault blink code, Table 6.3 can be activated by pressing the InFo (i/reset) button for more than 3 seconds. Pressing the InFo (i/reset) button again for at least 3 seconds, interface diagnostics will be activated. In this mode, the signal light will flicker a dimly lit red color. If, by accident, interface diagnostics has been activated, it can be deactivated by again pressing InFo (i/reset) button greater than 3 seconds. The instant of change is indicated by a yellow light pulse. Refer to the sequence in Figure 6.1.

Also, the 3-digit display shows the lockout code per Table 6.4.

During the time the cause of fault is diagnosed, the control outputs are deactivated:

- Burner remains shut down
- External fault indication «AL» at terminal X2-03 pin 3 is on

The diagnostics mode is cancelled and the burner can be switched on again by resetting the burner control. To reset, press the InFo (i/reset) button for about 1 second but less than 3 seconds.

Table 6.1 Color Code for Multi-Color LED

State	Color Code	Colors
Waiting time, other waiting states	❍.....	Off
Ignition phase, ignition controlled	● ❍ ● ❍ ● ❍ ● ❍ ● ❍ ●	Flashing Yellow
Operation, flame good	□.....	Green
Operation flame not good	□ ❍ □ ❍ □ ❍ □ ❍ □ ❍	Flashing Green
Extraneous light on burner startup	□ ▲ □ ▲ □ ▲ □ ▲ □ ▲	Flashing Between Green-Red
Undervoltage	● ▲ ● ▲ ● ▲ ● ▲ ● ▲	Yellow-Red
Alarm fault	▲.....	Red
Error code ouput (Refer to Error Code Table)	▲❍ ▲❍ ▲❍ ▲❍	Flashing Red
Interface diagnostics	▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲	Red Flickering Light
Heating request	●.....	Yellow
New program card	● ● ▲ ● ● ▲ ● ● ▲ ● ●	Yellow-Yellow-Red

Legend

..... Steady on
❍ Off
▲ Red
● Yellow
□ Green

Table 6.2 Phase Code List		
Phase Code	**LED**	**Function**
Standby		
OFF	Off	Standby, waiting for heat demand
P08	Off	Mains voltage ON, test phase
Startup		
P21	Yellow	Safety valve ON, air pressure switch test / POC test (timeout / locking after 5 seconds)
P22	Yellow	Fan motor ON or air pressure switch test / stabilization time
P30	Yellow	Prepurging (T410 - 111)
P40	Yellow blinking	Ignition ON, pilot valve ON / 1st Safety time (TSA 1)
P42	Green	Flame detection
P44	Green	Interval: End of safety time and fuel valve 1 ON
P50	Green	2nd safety time (Main proving, TSA 2)
Operation		
oP1	Green	Operation
FL.1	Green	Flame strength
Shutdown		
P10	Yellow	Shutdown
P74	Yellow	Postpurging
Waiting Phases (Prevention of Startup)		
P01	Red / Yellow blinking	Undervoltage
P02	Yellow	Safety loop open, followed by lockout
P04	Red / Green blinking	Flame signal at startup (followed by lockout after 30 seconds)
P90	Yellow	Gas pressure switch open, followed by lockout
Lockout		
LOC	Red	Lockout

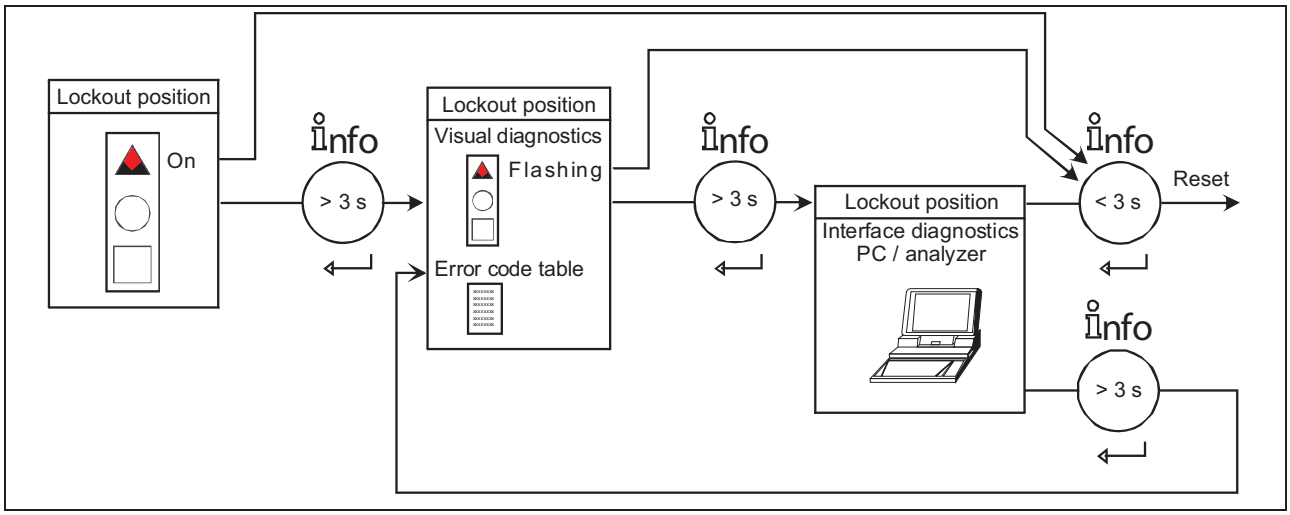


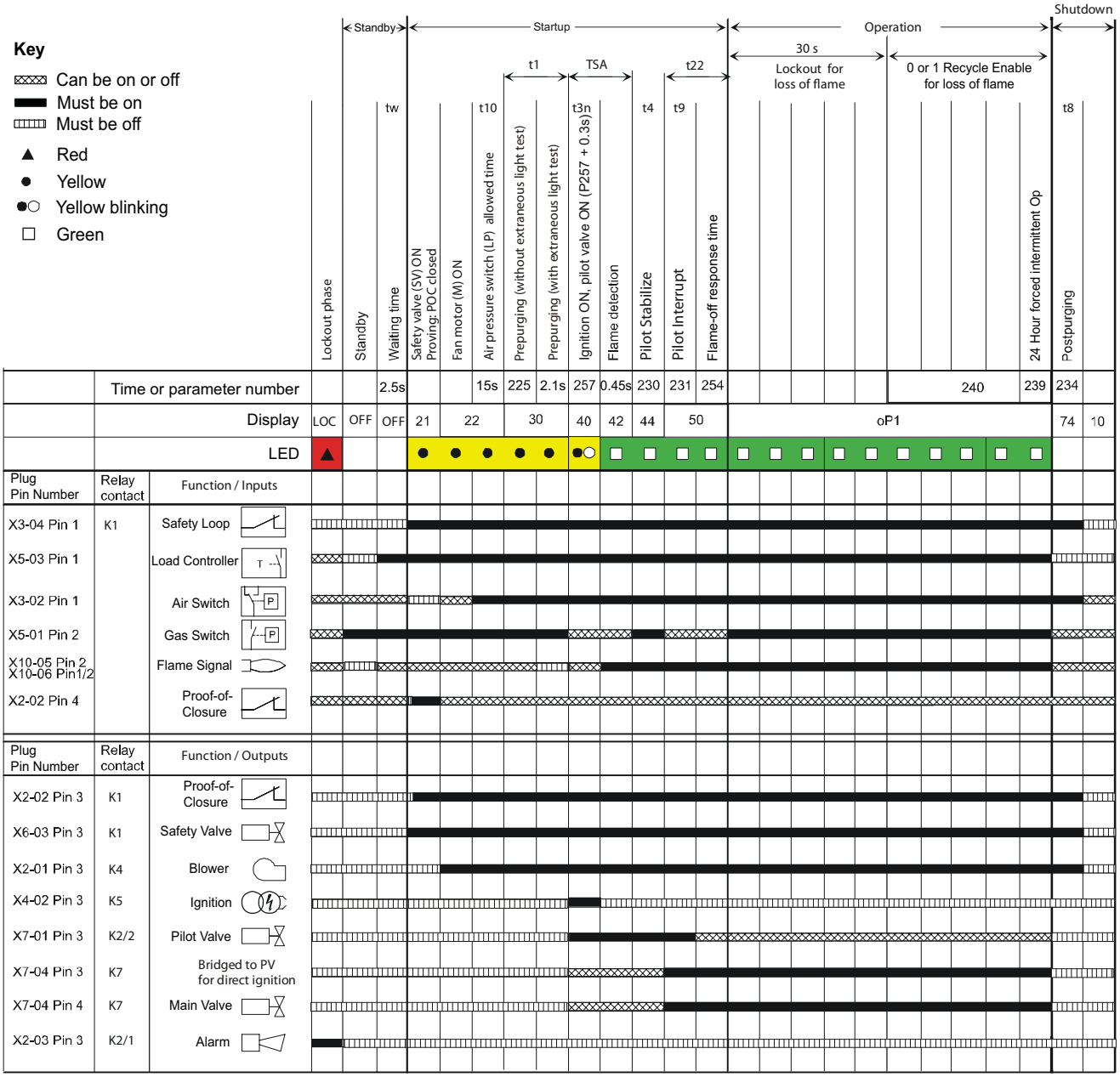
Figure 6.1. InFo Button Operation

Table 6.3 Blink Code of Fault Signal Light (LED)	
Fault Blink Code	**Possible Cause**
2 x blinks	No establishment of flame at the end of safety time «TSA»
3 x blinks	Air pressure switch contacts not closed
4 x blinks	Extraneous light on burner startup
5 x blinks	Air pressure switch short
7 x blinks	Loss of flame during operation
10 x blinks	Wiring error or internal error, output contacts, other faults
14 x blinks	Proof of Closure (POC) failed
15 x blinks	Error code ≥15, e.g. (depending on the program module) Error code 20: Gas pressure failure Error code 22: Safety loop (SL) open circuit

Table 6.4 Error Code List	
Error Code	**Description**
bAC Er3	Back-Up Error
Err PrC	Program Module Data Error
Loc2	No Flame at Start Up
Loc3	Open Air Switch
Loc4	Improper Flame Signal
Loc5	Shorted Air Switch
Loc7	Loss of Flame Signal
Loc10	Wiring or Internal Error
Loc14	POC Switch Failure
Loc20	Gas Switch Open
Loc22	Safety Loop Open
Loc138	Restore OK (no fault)
Loc139	Program Module Reinserted
Loc167	Manual Lockout
rSt Er1	Wrong Program Module
rSt Er2	Wrong Basic Unit
rSt Er3	Module Read Error

T410 - 111A(X) Purge Program Sequence

Programmable for Blower Application 1 stage, direct ignition, or intermittent / interrupt pilot.

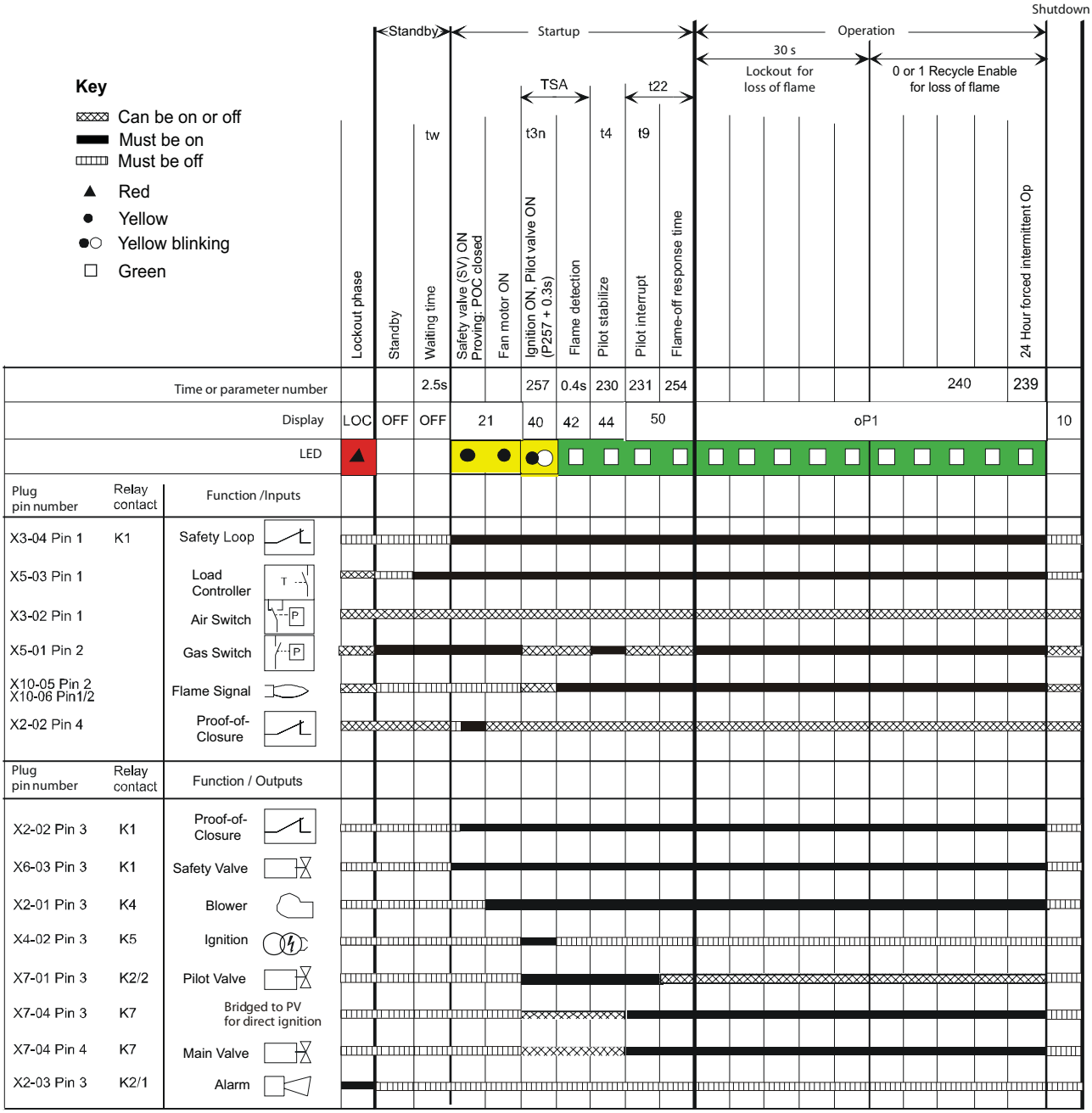


LEGEND

tw	Waiting Time	t8	Post-Purge Time
TSA	Safety Time (first)	t9	Pilot Interrupt Time
t1	Pre-purge Time	t10	Air Pressure Switch Start-Up Time
t3n	Ignition Interval (TFI)	t22	Second Safety Time (Main Proving, TSA2)
t4	Pilot Stabilize Time		

T410 - 112A(X) No-Purge Program Sequence

Programmable for Blower Application 1 stage, direct ignition, or intermittent / interrupt pilot.



LEGEND

tw	Waiting Time	t9	Pilot Interrupt Time
TSA	Safety Time (first)	t22	Second Safety Time (Main Proving, TSA2)
t3n	Ignition Interval (TFI)		
t4	Pilot Stabilize Time		

Maintenance & Troubleshooting

7

This section is divided into two parts:

- The first part describes maintenace procedures.
- The second part describes troubleshooting procedures.

Maintenance

Preventative maintenance is the key to a reliable, safe and efficient actuator. The core of any preventative maintenance program is a list of periodic tasks.

NOTE: Monthly and yearly lists are for average intervals. If your environment is dirty, then the intervals may be shorter.

Monthly Checklist

1. Inspect the actuator for physical damage to the housing or display.

2. Inspect flame-sensing devices for good condition and cleanliness. Keep scanner lenses clean with a soft, damp cloth, since small amounts of dust will measurably reduce the flame signal strength. Wash the flamerod electrode and insulator with soap and water, then rinse and dry thoroughly.

3. Test all the alarm systems for proper signals.

4. Check ignition spark electrodes and check proper gap.

5. Test interlock sequence of all safety equipment. Manually make each interlock fail, noting what related equipment closes or stops as specified by the manufacturer.

6. Test flame safeguard by manually shutting off gas to the burner.

Yearly Checklist

1. Test (leak test) safety shut-off valves for tightness of closure.

2. Test pressure switch settings by checking switch movements against pressure setting and comparing with actual impulse pressure.

3. Visually check ignition cable and connectors.

4. Make sure that the following components are not damaged or distorted:
   - The burner nozzle
   - The spark plugs
   - The flame sensors
   - The flame tube or combustion block of the burner
   - The actuator housing or display

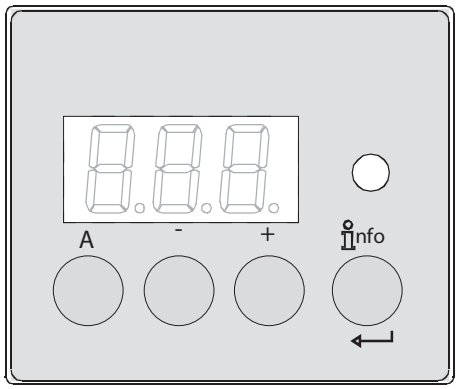
5. Inspect the coupling for loose connections.

6. Confirm the parameters settings are identical to those originally selected.

Troubleshooting

Problem	Possible Cause	Solution
Dead, no lights	Internal overload	Replace unit.
	Mains voltage failure	Check power supply wiring.
Won't start	In Lockout, refer to lockout code table	Check devices related to the lockout code; Reset.
	Loc10 - Internal error	Check for overload on output that damaged internal relay contacts; Replace unit.
	Loc10 - Wiring error	Check design; Test for external voltage onto output terminal; Check for electrical interference.
No ignition	Loc2 - Faulty ignition components	Check output voltage; Check ignition transformer; Check spark plug and cable.
	Loc2 - No establishment of flame	Check faulty or dirty flame detector; Check faulty or dirty fuel valves; Check poor adjustment of burner; Check fuel supply.
	Loc2 - Insufficient Flame Signal	Check sensor wire type and length for excessive capacitance to ground; Replace with low capacitance wire; Check for ignition interference, swap line, and neutral primary connections to the ignition transformer.
	Loc3 - No air pressure signal	Check blower components; Check pressure connections; Check wiring; Replace air switch.
	Loc4 - Inappropriate flame signal before ignition safety time	Check for leaky fuel valves; Check for residual flame; Check sighting of flame from other burner in chamber; Check for electrical interference.
	Loc5 - Air pressure switch contacts shorted	Check switch operation; Check wiring; Check design timing between blower and air switch; Replace air switch.
	Loc14 - Proof-Of-Closure (POC) contact is shorted during self-test or open during startup	Check fuel valves; Check wiring; Check adjustment; Replace valves or Proof-Of-Closure (POC) switch.
Shutdown and restart	Loss of flame after 30 seconds	Check faulty or dirty flame detector; Check faulty or dirty fuel valves; Check poor adjustment of burner; Check fuel supply.
	Voltage below under voltage threshold	Check for loose power supply wiring; Check control transformer size vs load; Use constant voltage source.
Shutdown and lockout	Loc7 - Loss of flame	Check faulty or dirty flame detector; Check faulty or dirty fuel valves; Check poor adjustment of burner; Check fuel supply.
	Loc20 - Gas pressure fault	Check fuel supply; Check gas regulator and vent; Check wiring; Check pressure connection; Replace gas switches.
	Loc22 - Safety loop open	Check all interlocks and limit switches; Reset high temperature limit.
	Loc167 - Manual locking	Operator pressed key sequence to initiate a lockout; reset.

LED Display 8

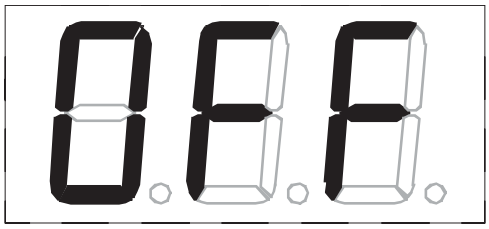


Button	Function
A	**Button A** Not used with T410
Info	**Info and Enter Button** Reset in the event of fault, change visual diagnostic mode (refer to Figure 6.1)
-	**- Button** Display flame signal current 2 or phase code In lockout: Phase code at the time of fault
+	**+ Button** Display flame signal current 1 or phase code In lockout: Phase code at the time of fault
	3 Color Signal Light Refer to Section 6
- and +	**+ and - Button; Escape Function** Press both buttons simultaneously Cancel selection One menu level up

Normal Display

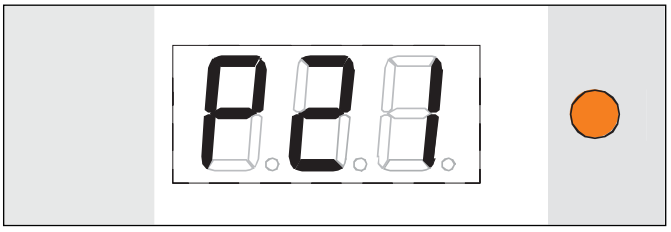
Normal display shows program phase codes during startup and shutdown; during operation phase, parameter 140 determines what is displayed.

Display in Standby Mode



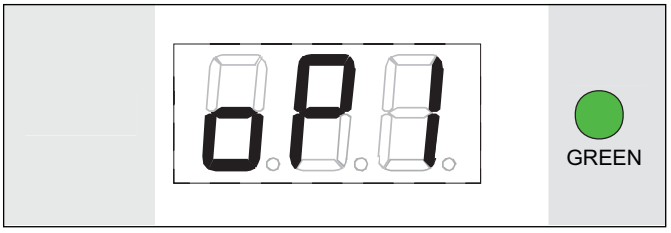
Unit is in standby mode.

Display During Startup / Shutdown, Program Phases



The unit is in Phase 21. The individual program phases are displayed in accordance with the program sequence. For color display of signal light, refer to the program sequences and phase code list.

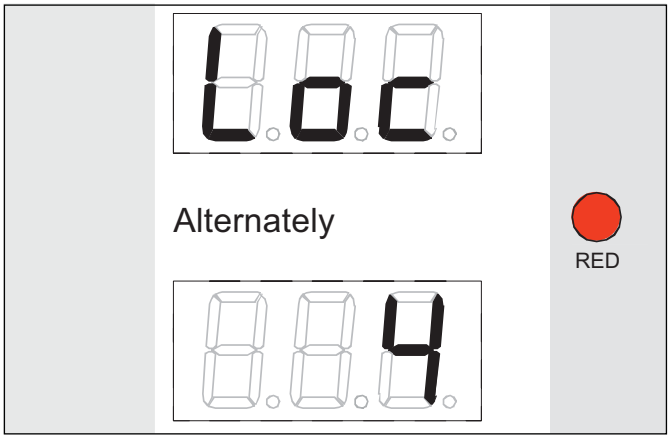
Display of Operating Phase



Display **oP1** stands for Stage 1. The display following **oP** is unit-specific. The signal light is green. After this, the display shows the selection according to parameter 140.

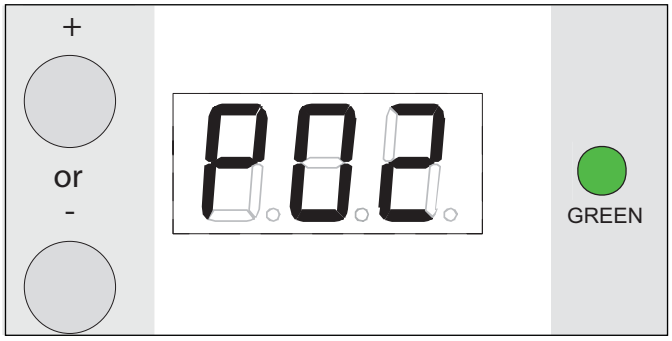
Fault State Messages, Display of Errors

Display of Errors with Lockout



The display shows **Loc** and **4** alternately. The unit is in the lockout position. The current error code is displayed and the signal light is flashing red.

Example: Error code **4**



Press + or - buttons for display of phase at the time of fault. The signal light flashes green.

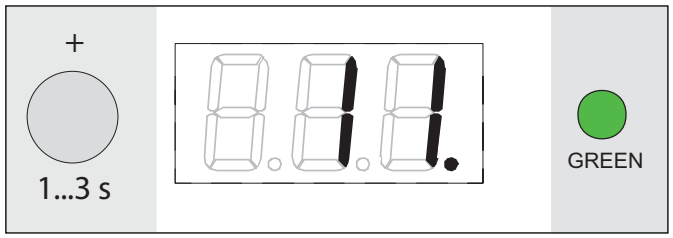
Example: Phase **P02**

Display of Flame Current 1, Flamerod (ION) or UV

This display is only possible in operating mode or standby.

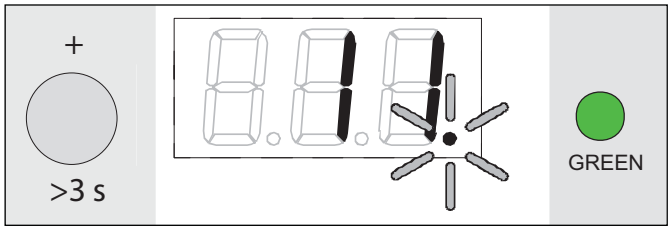
Press + button for display of flame signal amplifier. The signal light flashes green.

The display shows **FL.1**.



When pressing + button for 1 to 3 seconds, the flame signal current will be displayed. The signal light flashes green.

Example: **11**.



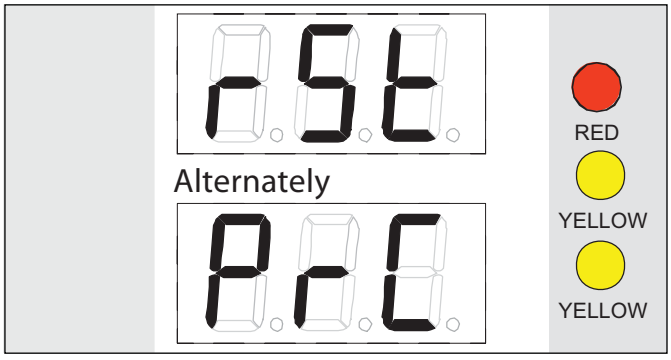
When pressing the + button for >3 seconds, the point after the number begins flashing. When the button is released, the value will be displayed for 2 minutes. The signal light flashes green. After this time the normal display will be displayed.

Display: Point **.** flashes, value **11** does not flash.

Display of Flame Current 2

This display is not used in these models. Pressing the - button will not display a value.

First Startup with a New Program Module or in Case of Replacement of Program Module



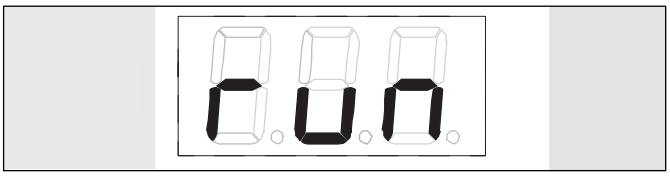
rSt and **PrC** appears alternately in the display.

The display shows the replacement of the program module.

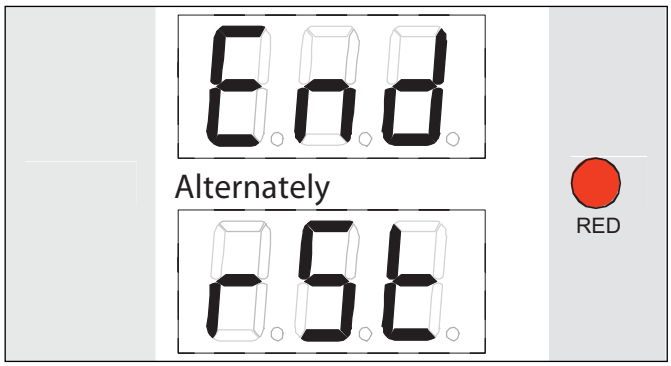
The signal light flashes red for one time and yellow for two times alternately.

Press the info button for >3 seconds for starting the download of data from the program module. The signal light flashes yellow. The process of 3 seconds is confirmed by a short flash of the yellow signal light.

NOTE: If you press the info button <3 seconds, the downloading of data does not start and is locked. To start the restore process again, the Flame Safeguard must be powered off and on.

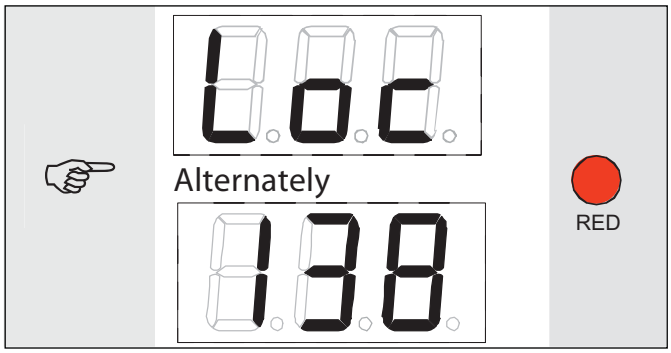


Display shows **run** during download (restore process) of program sequence.

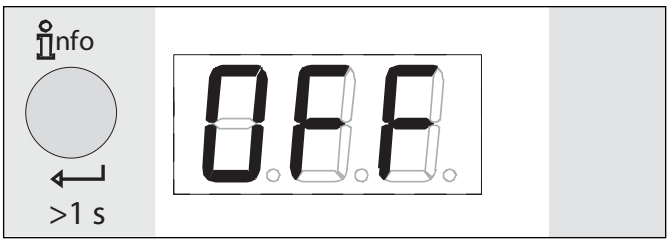


End and **rSt** appears alternately in the display. The display shows the end of exchange of data. The signal light flashes red.

After 2 minutes the unit displays in **Loc 138**



After restore process, the unit is in lockout position (**LOC 138**) automatically and must be reset for operation.

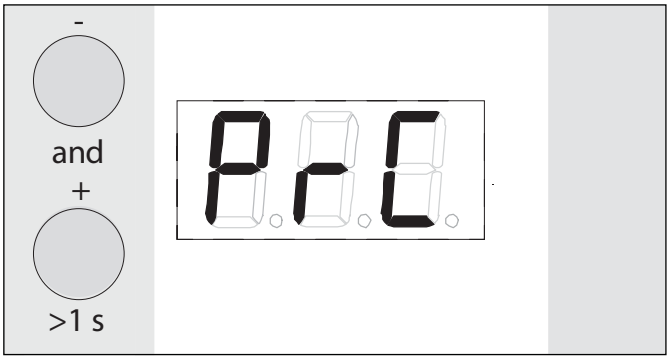


Press the Info button for >1 second to reset the unit. Display **OFF**.

CAUTION

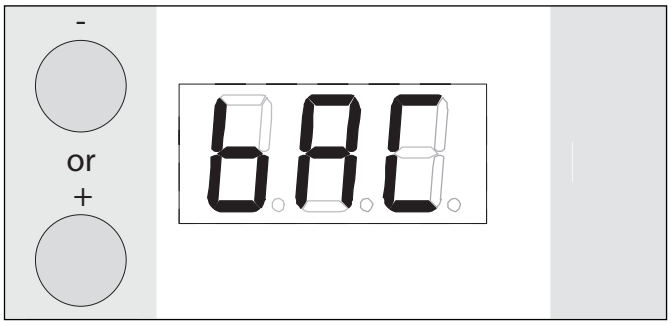
- **On first startup or after exchange of the program module, the sequence of functions and parameter settings must be checked upon completion of the restore process.**

Manual Backup



Press - and + buttons for >1 seconds (Escape) together to start the manual backup process. Parameter **PrC** is displayed. and followed by rSt.

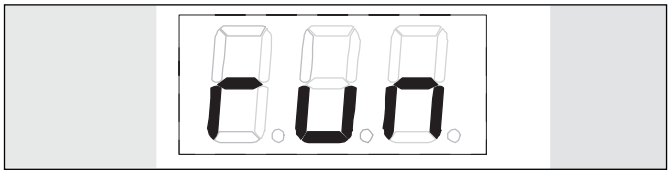
Display: **PrC / rSt**



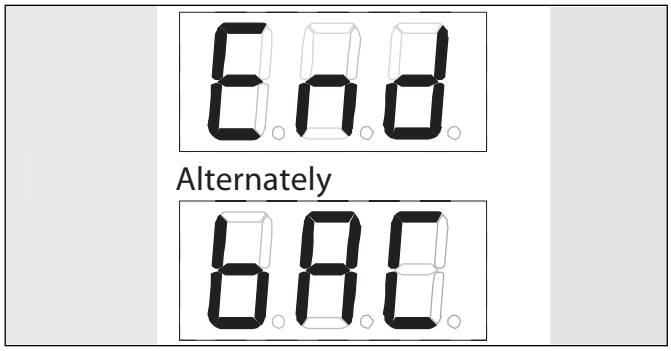
Press - or + button to display parameter **bAC**.

Display: **bAC**

Press the info button for 1 to 3 seconds.

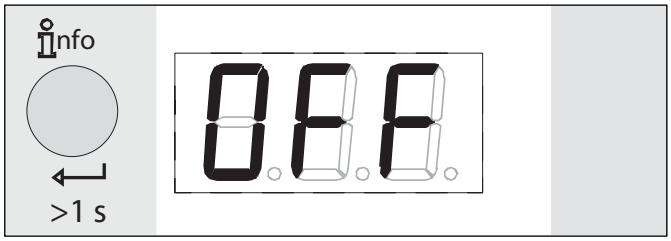


run is displayed during downloading (backup process) of the program sequence.



End and **bAC** appear alternately on the display. Display shows the end of exchange of data.

Display is maintained for 2 minutes or can be ended by pressing the InFo button.



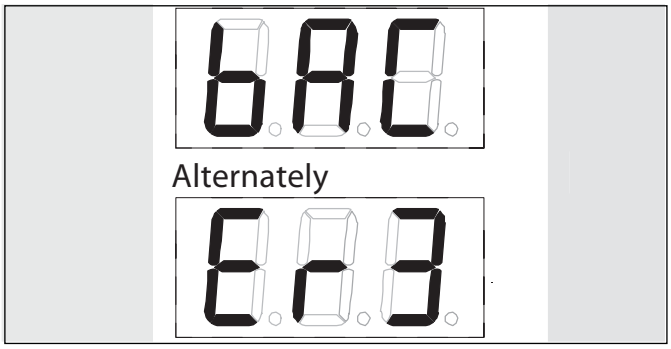
If backup process is completed, display shows **OFF**. Press the InFo button for > 1 second to reset the unit.

Display: **OFF**

⚠ CAUTION

- **If any parameters are changed, a backup must be made.**

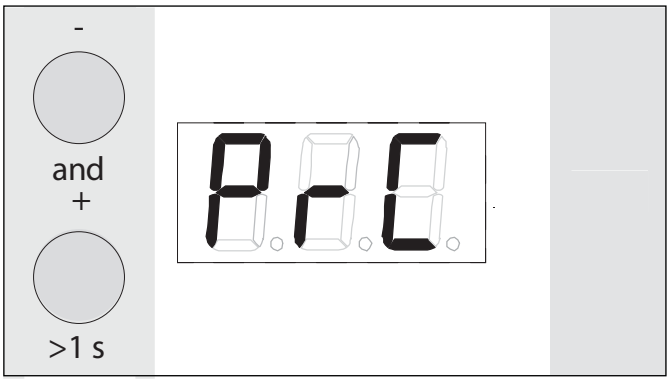
Error During Backup Process



bAC and **Er3** appears alternately in the display. See the Error Code List for its meaning.

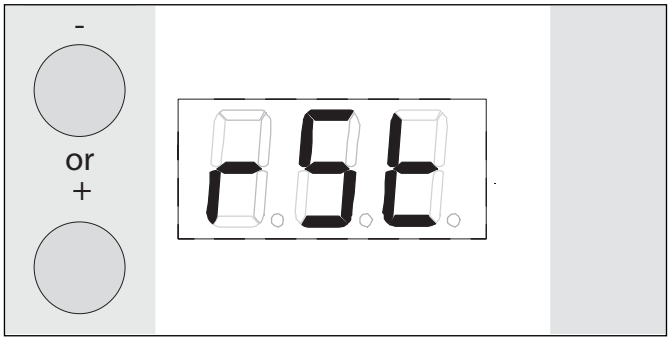
During backup, all settings and parameters are transferred from the Flame Safeguard unit's memory device to the memory device of the program module.

Manual Restore



Press - and + buttons for >1 seconds (Escape) together, for starting the manual restore process. You get in the parameter **PrC**.

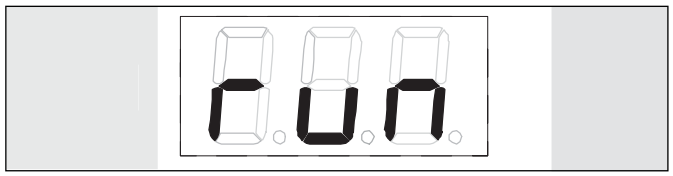
Display: **PrC**



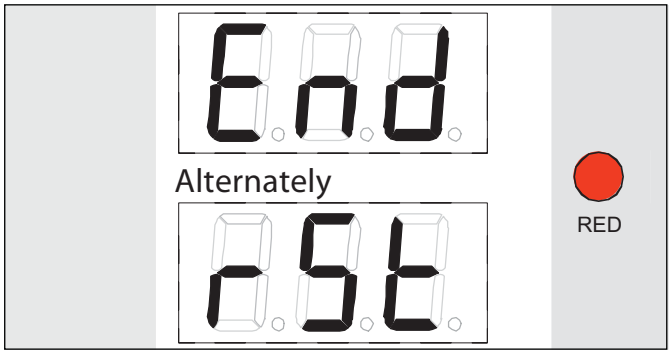
Press - or + button to get in parameter **rSt**.

Display: **rSt**

Press the InFo button for 1 to 3 seconds.

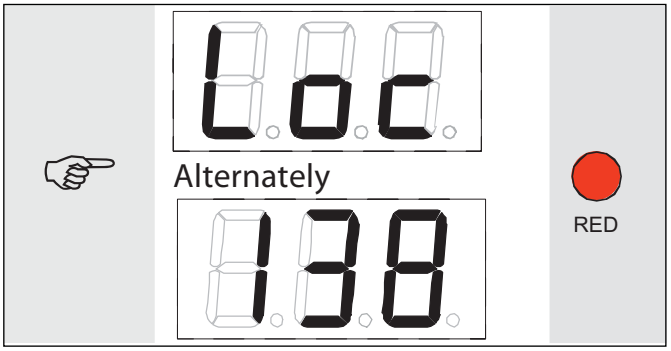


run displayed during downloading (restore process) of program sequence.

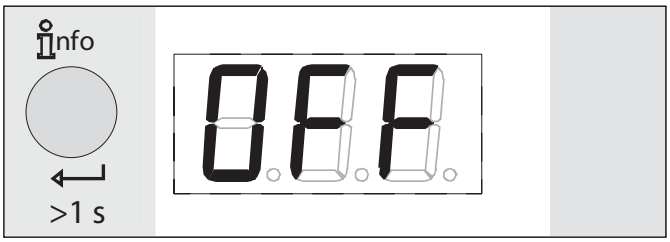


End and **rSt** appears alternately in the display. The display shows the end of exchange of data. The signal light flashes red.

After 2 minutes the unit displays in **Loc 138**.



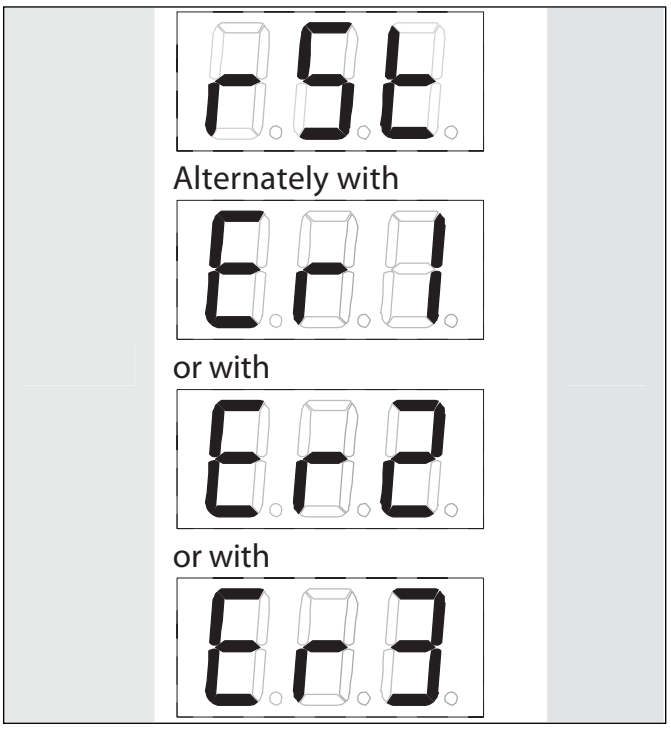
After restore process, the unit is in lockout position (**Loc 138**) automatically and must be reset for operation.



Press the InFo button for >1 second to reset the unit.

Display **OFF**

Error During Restore Process

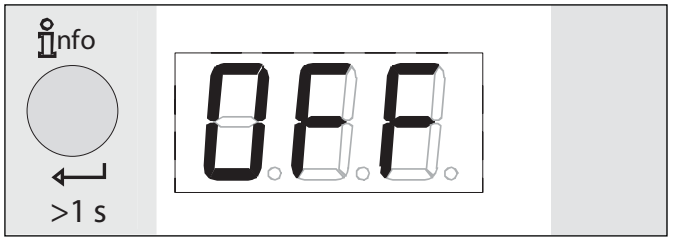


rSt and **Er1**, **Er2** or **Er3** appears alternately on the display.

For meaning of possible cause, refer to the *Error code list*.

During the restore process, all settings and parameters are written from the program module to the internal memory device of the basic unit. In the process, it is possible that previous program sequences, parameters and settings in the internal memory device of the basic unit will be overwritten.

Reset

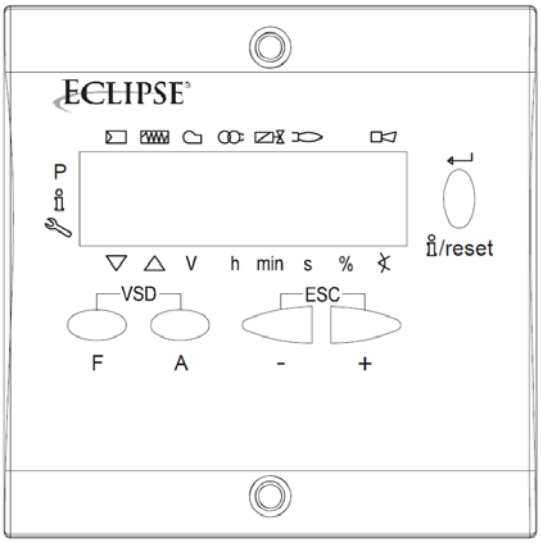


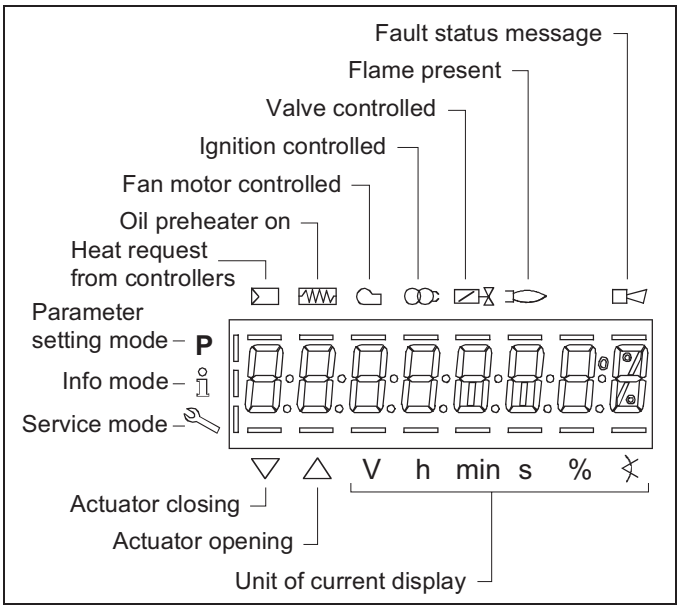
When pressing the InFo button 1 to 3 seconds, **OFF** is displayed. When the button is released, the basic unit is unlocked.

NOTE: For meaning of the error and diagnostic codes, refer to the error code list.

Remote Display 9

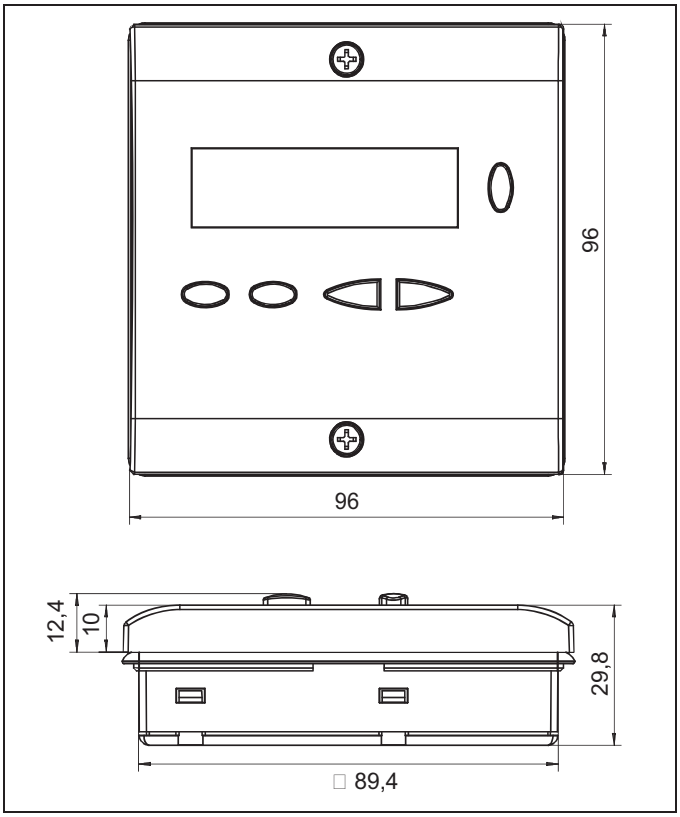
Display Buttons & Functions





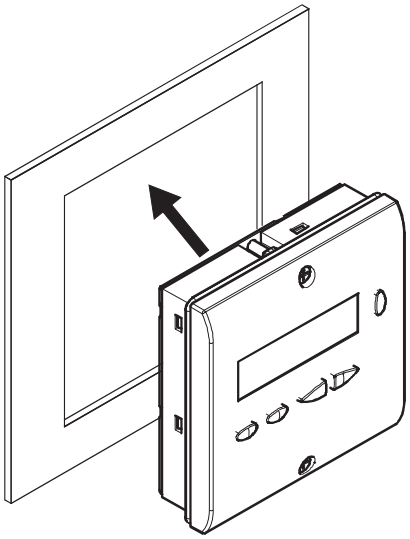
Button	Function
VSD F A	Buttons A & F; VSD Function is for switching to parameter setting mode P by pressing F and A simultaneously.
i/reset	Info and Enter Button is for navigation in info mode. • For selecting (symbol flashing) (press button for <1 second) • For changing the lower level menu level (press button for 1 to 8 seconds) • For changing to a higher menu level (press button for 3 to 8 seconds) • For changing to the normal display (press button for >8 seconds) • **Enter** in parameter setting mode • **Reset** in the event of fault • One menu level down
-	Decrease Button
+	Increase Button
ESC - +	ESC Function; Press - & + simultaneously • No adoption of value • One menu level up

Dimensions

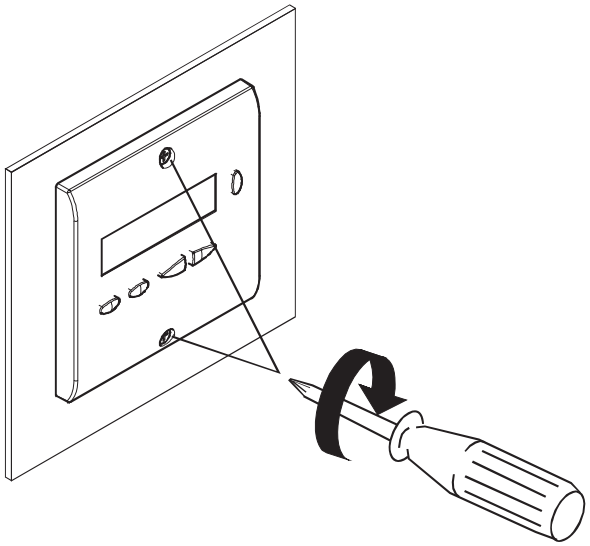


Mounting

1. Ensure that the mounting surface is completely flat and the thickness is from 1 to 3 mm.
2. Prepare a cut out 92 x 92 mm, with tolerance of +0.8/-0.
3. Place the remote display into the cut out as shown (without applying any force). If the remote display does not fit in the cutout, check the dimensions of the cutout and housing.



4. Secure the remote display with the two Phillips-head screws provided (without applying any force). Use a tightening torque of 0.4 Nm for the screws to ensure sealing but prevent damage.

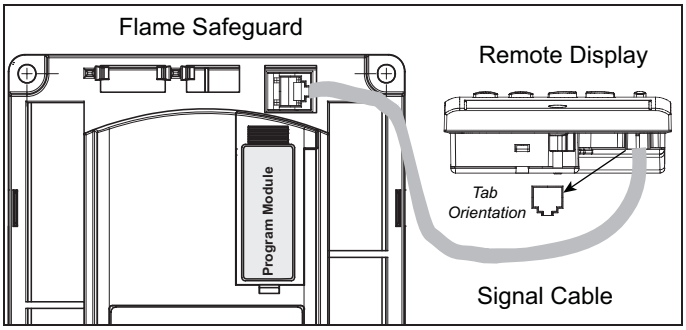


Cable Installation & Removal

CAUTION

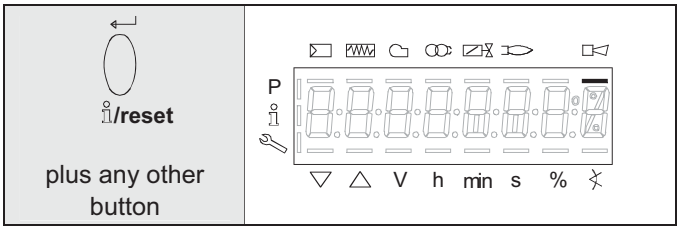
- **Make sure the power supply is off before inserting or removing cable.**

Observe the orientation of the tab on the plug and insert into the jack. The tab should engage and prevent the cable from falling out. To remove, press the tab in while pulling the plug. On the remote display, use a small screwdriver blade in the slot above the jack to push the tab.



Special Functions

Manual Lockout



Press i/reset button together with any other button. The basic unit switches instantly to the lockout position, no matter what the operating position. The display shows the fault state message, Loc 167.

Operation

CAUTION

- **All modifications to parameters and settings are set and saved in the internal unit memory of the Flame Safeguard basic unit. To save the modified settings to the program module, the backup must be triggered manually.**
- **On the first startup or after exchange of the program module, the sequence of functions and parameter settings must be checked upon completion of the restore process.**

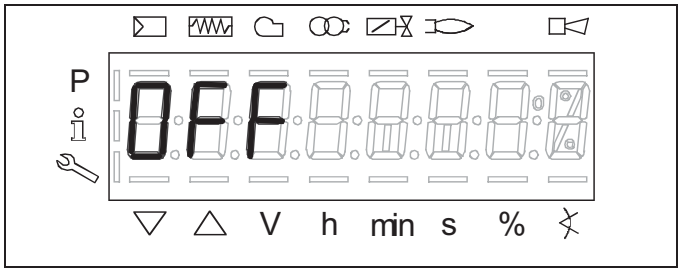
CAUTION

- **If any parameters are changed, a backup must be made.**

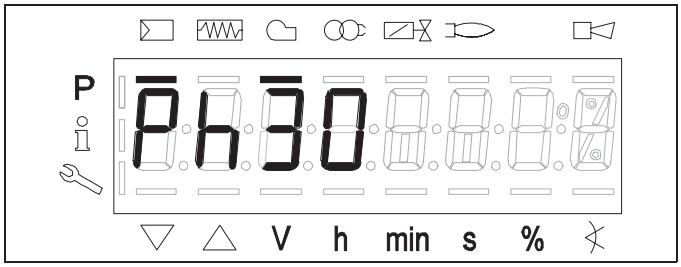
Normal Display

Normal display is the standard display in normal operation, representing the highest menu level. From the normal display, you can change to the info, service or parameter level.

Standby Mode

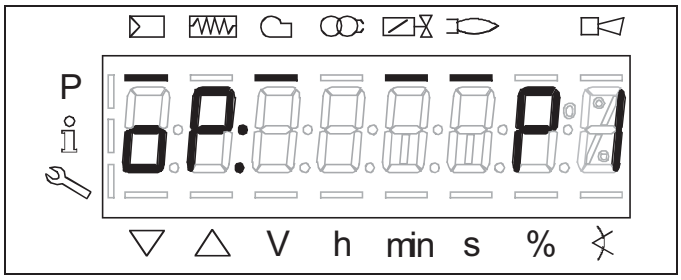


Program Phase



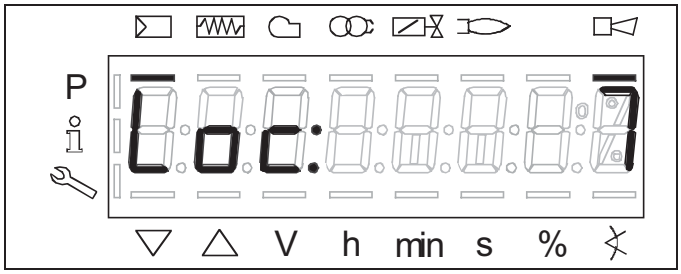
The unit is in Phase 30. The controller calls for heat. In the bar above the “heat request from controllers” and “fan motor controlled” symbols appear. The individual program phases and controlled components are displayed in accordance with the program sequence.

Operating Phase



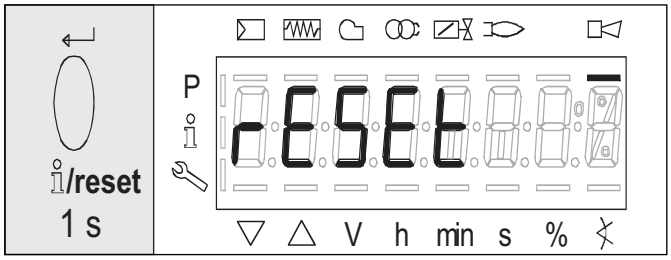
Display oP: P1 stands for «Stage 1» and P2 is for «Stage 2». The display following oP is unit-specific.

Errors with Lockout

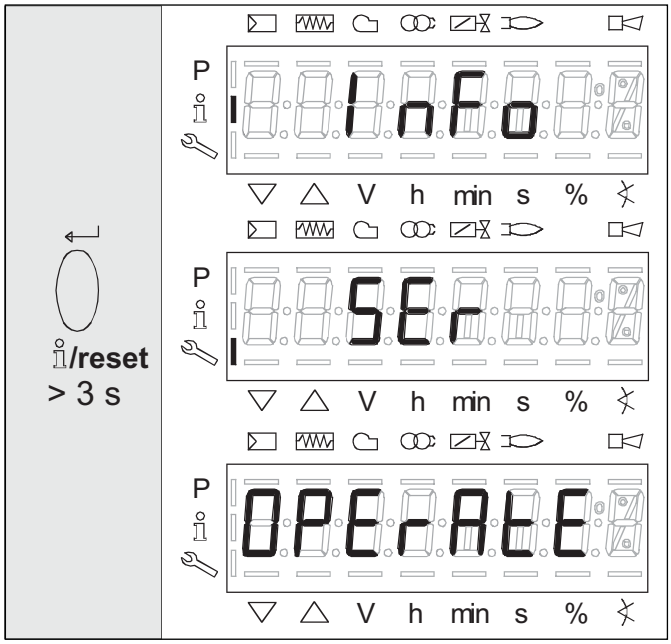


The display shows Loc: The bar under the fault state message appears. The unit is in the lockout position. The current error code is displayed (refer to «Blink code table»). Example: Error code 7.

Reset



When pressing the i/reset button for 1 second, rESEt appears on the display. When the button is released the basic unit will be reset.



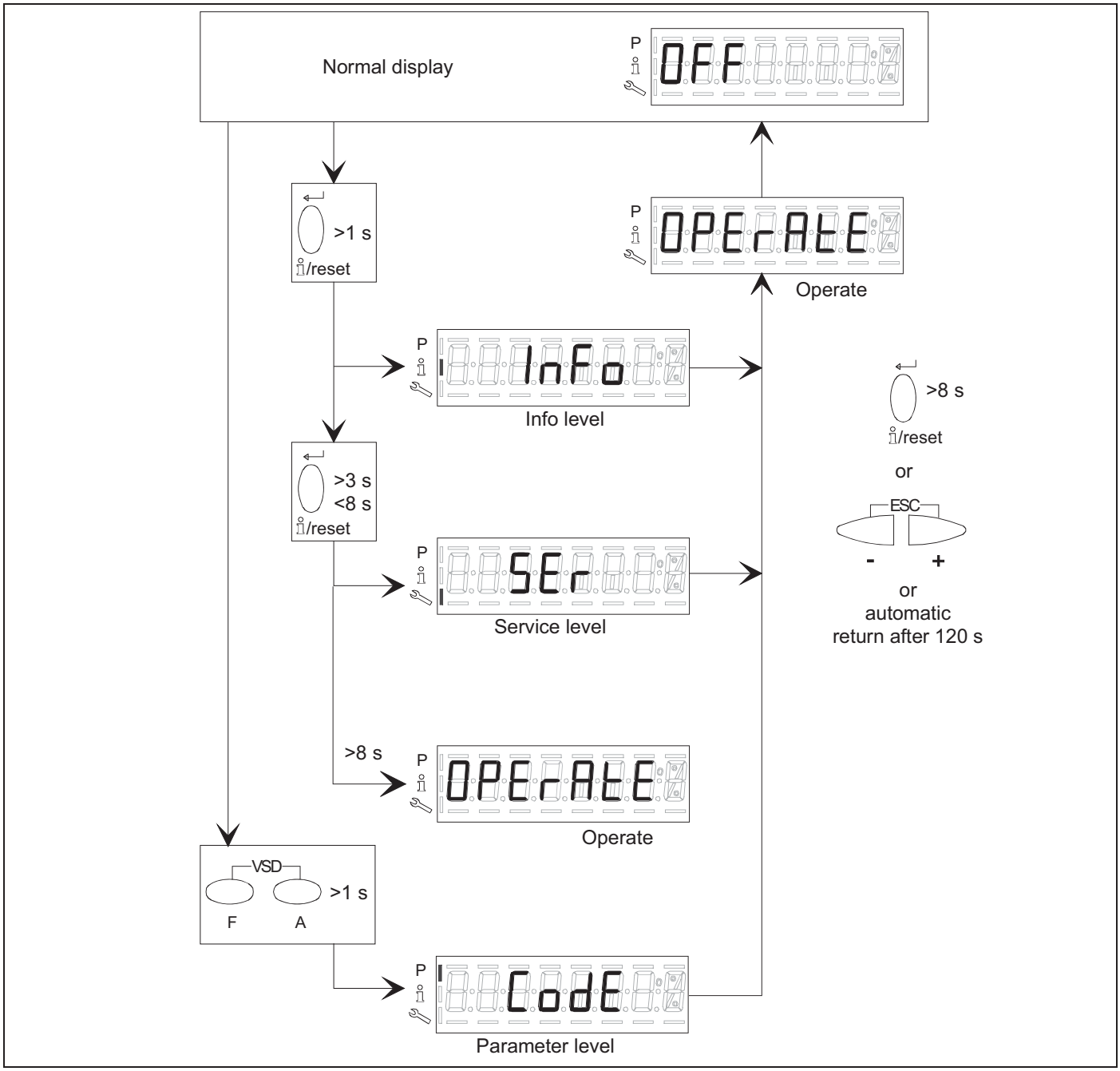
When pressing the i/reset button for >3 seconds, the display shows InFo, SEr and then OPErAtE. When the button is released, the basic unit will be reset.

NOTE: For error and diagnostic code definitions, refer to the error code list. When an error has been acknowledged, it can still be read from the error history.

Menu Level-Drive Operation

Assignment of Levels

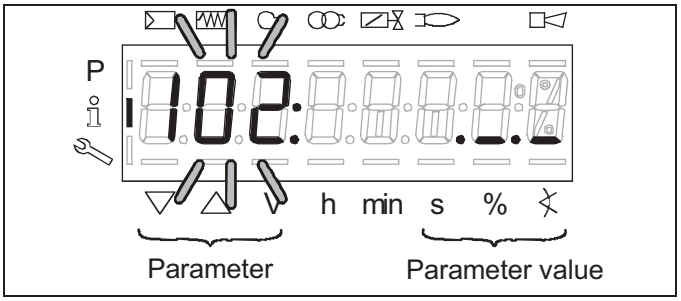
The various levels can be accessed via different button combinations. The parameter level can only be accessed by entering a password.



Info Level

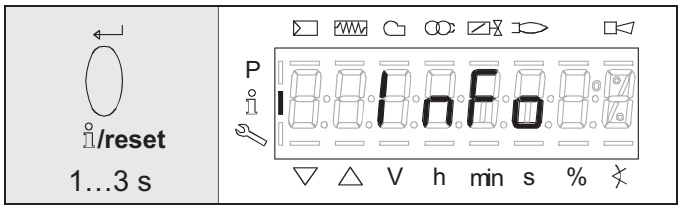
The info level displays information about the basic unit and operation in general.

On the info level you can press the + or - buttons to display the next or the previous parameter. In place of the + button, you can also press the i/reset button for < 1 second. By pressing the + and - or the i/reset button for > 8 seconds the display returns to normal.



There is no change of value on the info level. If the display shows ._._ together with the parameter, the value may consist of more than 5 digits. When pressing the i/reset button for > 1 second and < 3 seconds, the value will be displayed. By pressing the i/reset button for > 3 seconds or the - and + buttons, you return to the selection of the parameter number. The parameter number flashes.

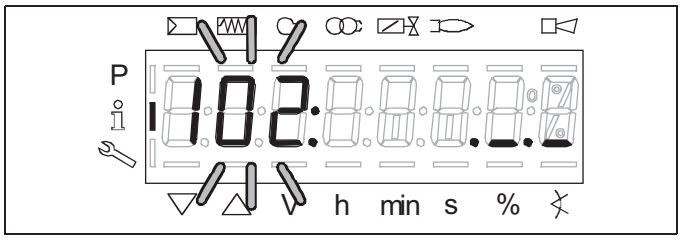
Display of Info Level



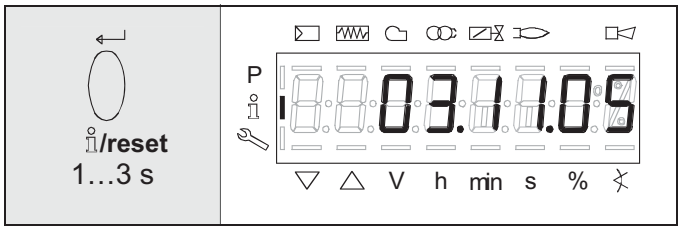
Press the i/reset button until InFo appears. When releasing the i/reset button, you are on the info level.

Display of Info Values

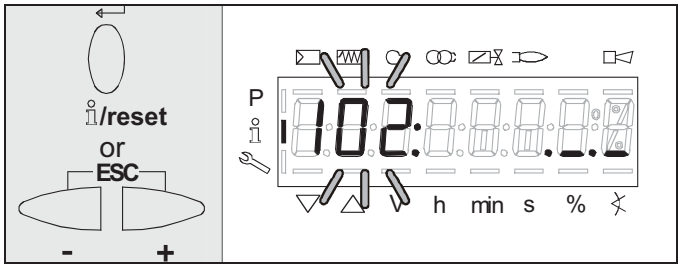
Identification Date



On the left, parameter **102:** is displayed flashing. On the right, ._._ is displayed. Example: **102:** ._._

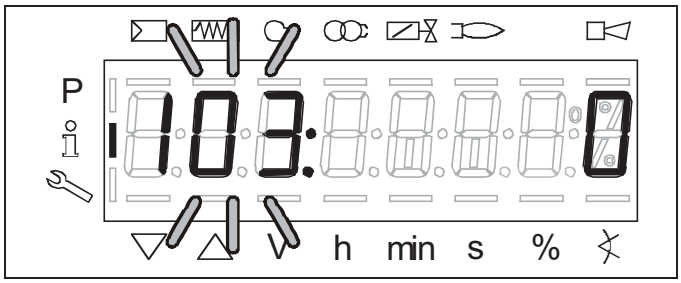


Press the i/reset button for 1…3 seconds to display the identification date **DD.MM.YY**. Example: Identification date **03.11.05**



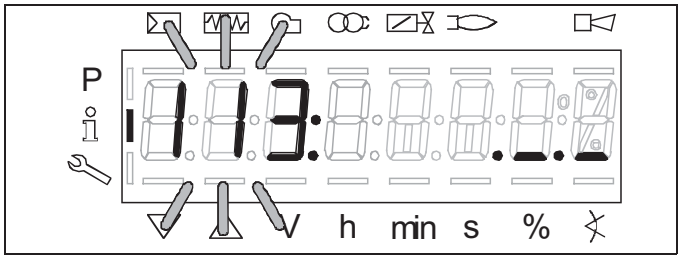
Press the i/reset button or - and + to return to the display of parameters. Press the + button to go to the next parameter.

Identification Number

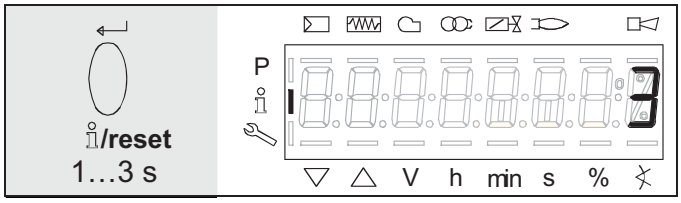


On the left, parameter **103:** is displayed flashing. On the right, identification number **0** appears. Example: **103: 0**. To go to the next parameter select the + button or the i/reset button for < 1 second. To return to the previous parameter select the - button.

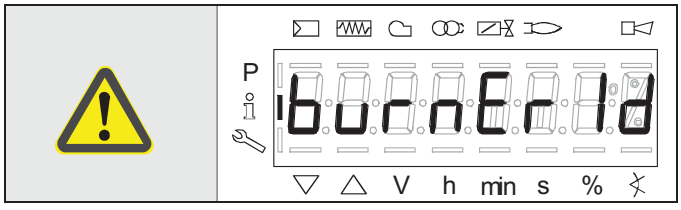
Burner Identification



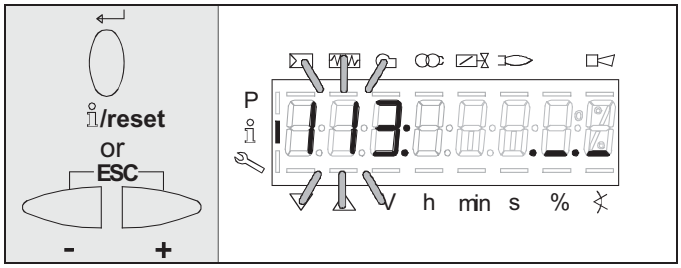
On the left, parameter **113:** is displayed flashing. On the right, ._._ appears. Example **113:** ._._.



Press the i/reset button for 1...3 seconds to display the burner's identification. Factory setting: - - - - - - - -. Example: **3**.

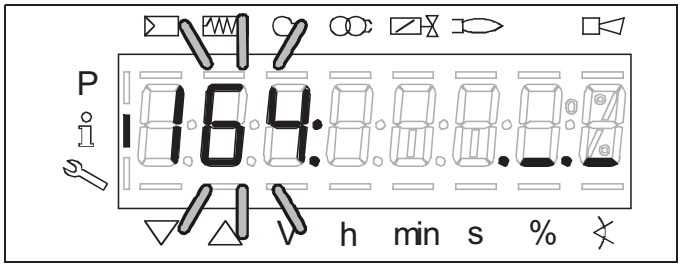


burnEr Id can only be changed with the help of the ACS410 PC software diagnostic tool.



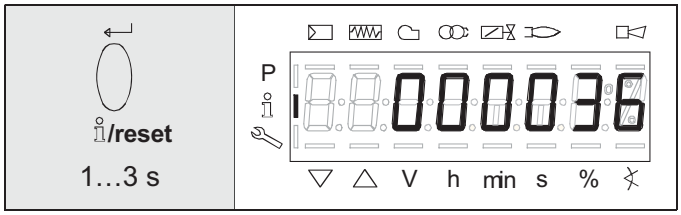
Press the i/reset button or the - and + buttons to return to the display of parameters. Select the + button to go to the next parameter or the - button to go back to the previous parameter.

Number of Start-Ups Resettable

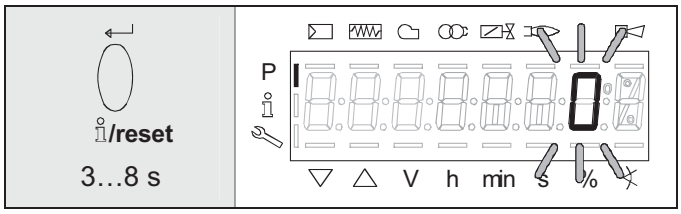


On the left, parameter **164:** is displayed flashing. On the right, characters ._._ appear.

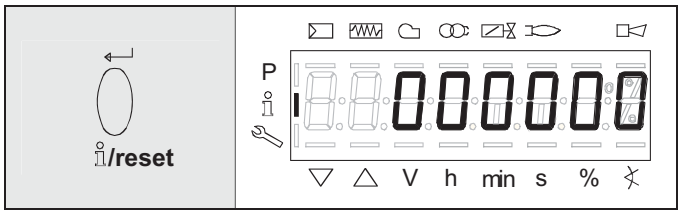
Example: Parameter **164:** ._._



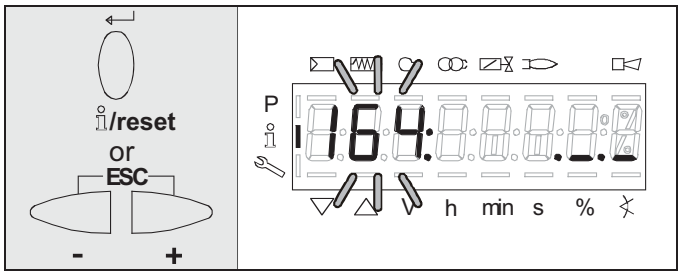
Press the i/reset button for 1 to 3 seconds to display the number of startups (resettable). Example: **000036**.



Press the i/reset button for 3 to 8 seconds to go to the range that can be changed. Digit **0** flashes.

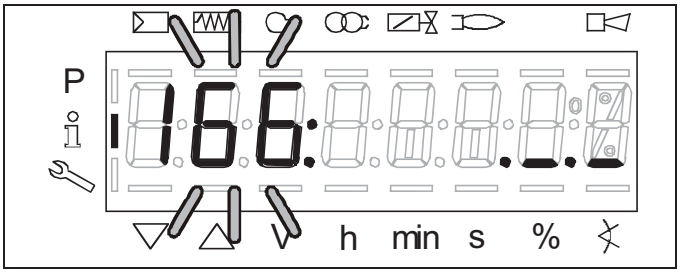


By pressing the i/reset button, the number of startups is reset to 0. Display: **000000**.

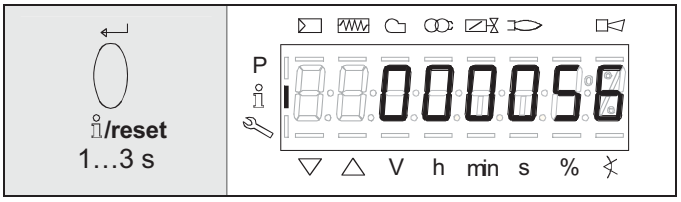


Press the i/reset button or the - and + buttons to show parameter **164** flashing again. Select the + button to go to the next parameter or the - button to go back to the previous parameter.

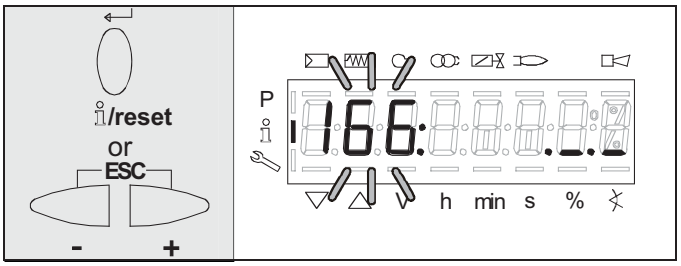
Total Number of Start-Ups



On the left, parameter **166:** is displayed flashing. On the right, characters ._._ appears.
Example: Parameter **166:** ._._.

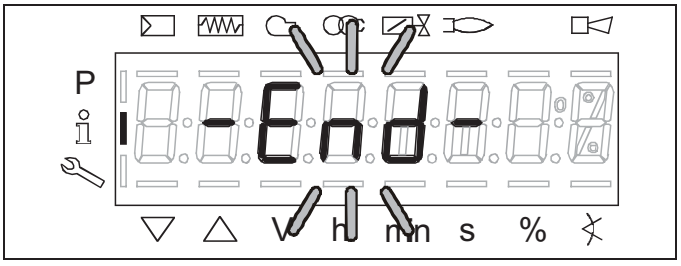


Press the i/reset button for 1 to 3 seconds to display the total number of startups. Example: **000056**.

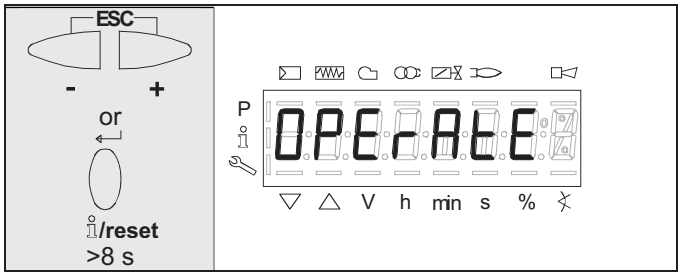


Press the i/reset button or - and + buttons to go back to the display of parameters. Select the + button to go to the next parameter or the - button to go back to the previous parameter.

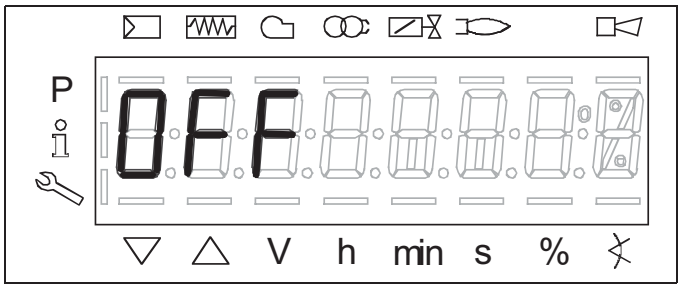
End of Info Level



When the display appears, you have reached the end of the info level. The display shows **-End-** flashing.



Press the - and + buttons or the i/reset button for > 8 seconds to return to the standby mode. The display shows **OPErAtE**.



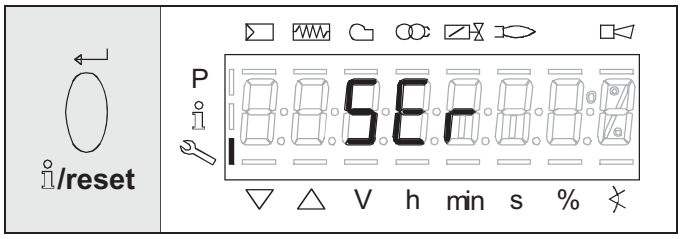
When this display appears, you are back on the normal display and you can change to the next level mode. Press the i/reset button to switch between the service and the parameter level.

Service Level

The service level is used to display information about errors including the error history. When on the service level you can press - or + buttons to display the next or the previous parameter. Instead of pressing the + button, you can also press the i/reset button for < 1 second.

Press the - and + button or the i/reset button for > 8 seconds to return to the normal display.

Display of the Service Level



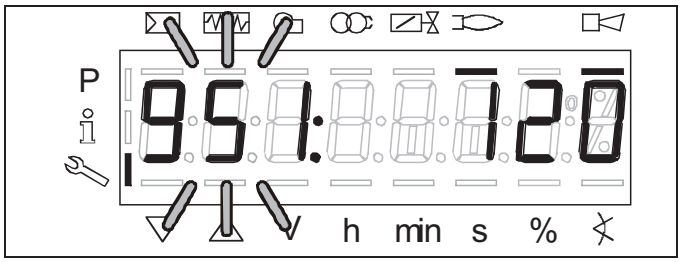
Press the i/reset button for > 3 seconds until SEr appears. When releasing the i/reset button you are on the service level.

Error History

See “Parameters with Index, with or without Direct Display” on page 45.

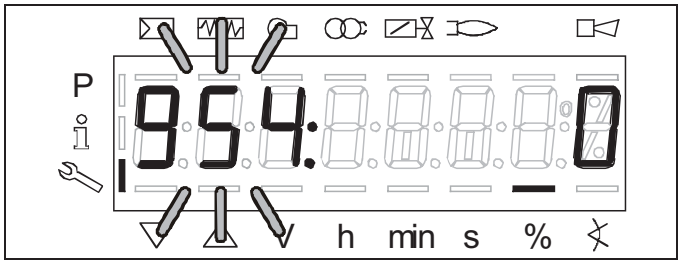
See parameter list page 20.

Mains Voltage



Parameter **951:** appears flashing. Mains voltage is displayed on the right. Example **951: 120**

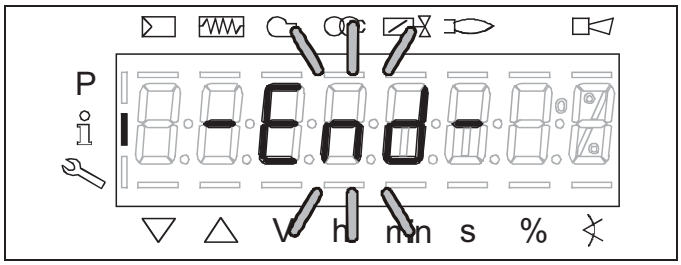
Intensity of Flame



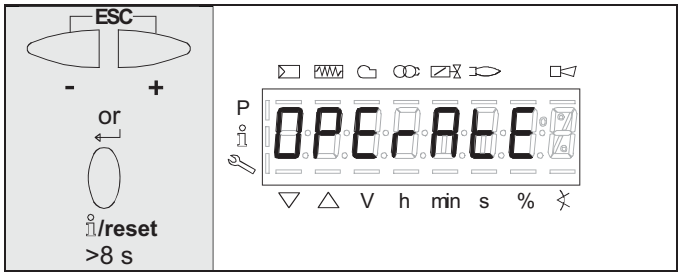
The display shows parameter **954**: flashing. On the right, the intensity of the flame is displayed in 0 to 100%. Example: **954: 0**.

Pressing the + button will end the service level. Pressing the - button will display the previous parameter.

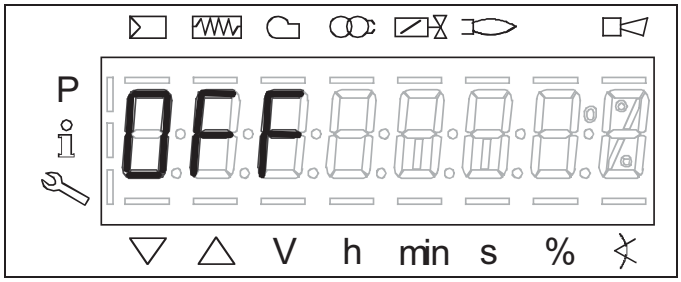
End of Service Level



When the display appears, you have reached the end of the info level. The display shows **-End-** flashing.



Press the - and + buttons or the i/reset button for > 8 seconds to return to the standby mode. The display shows **OPErAtE**.



When this display appears, you are back on the normal display and you can change to the next level mode.

Parameter Level

The parameters stored in the basic unit can be displayed or changed on the parameter level. The change to the parameter level requires entry of a password.

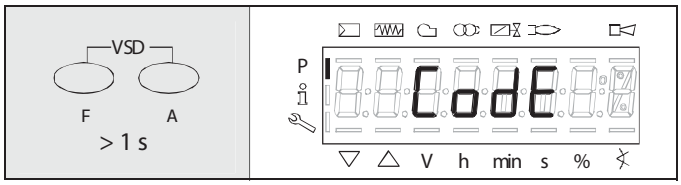
CAUTION

- **Parameters and setting may only be changed by qualified staff.**
- **If parameters are changed, responsibility for the new parameter settings is assumed by the person who - in accordance with the access rights - has made parameter changes on the respective access level.**

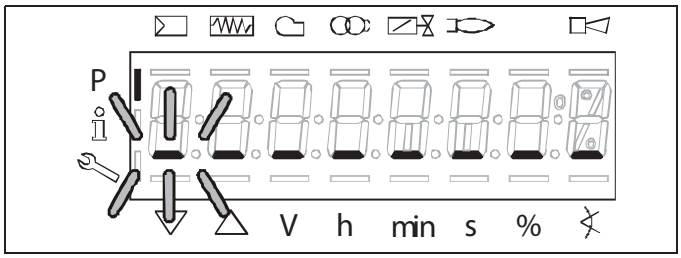
WARNING

- **If the factory settings are changed, all changes made must be documented and checked by the engineer responsible for the system.**

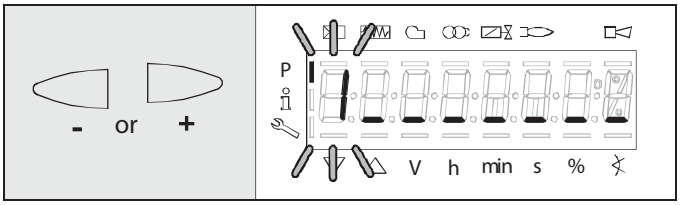
Entering the Password



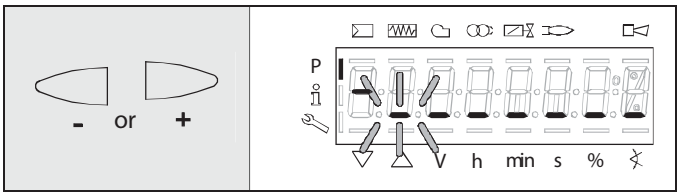
Press the VSD buttons F and A to display CodE.



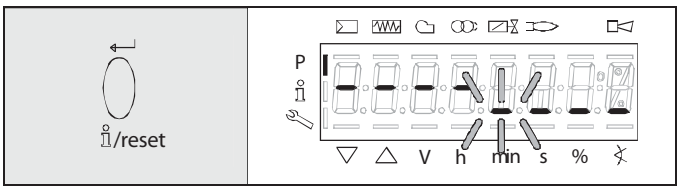
When releasing the buttons, 6 bars appear the first of which flashes.



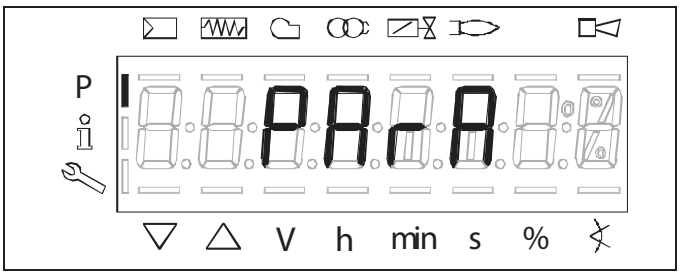
Press the - or + buttons to select a number or letter.



Press the i/reset button to confirm the entry. The value entered changes to a minus sign (**-**). The next bar will then start flashing. Repeat process until password has been entered.

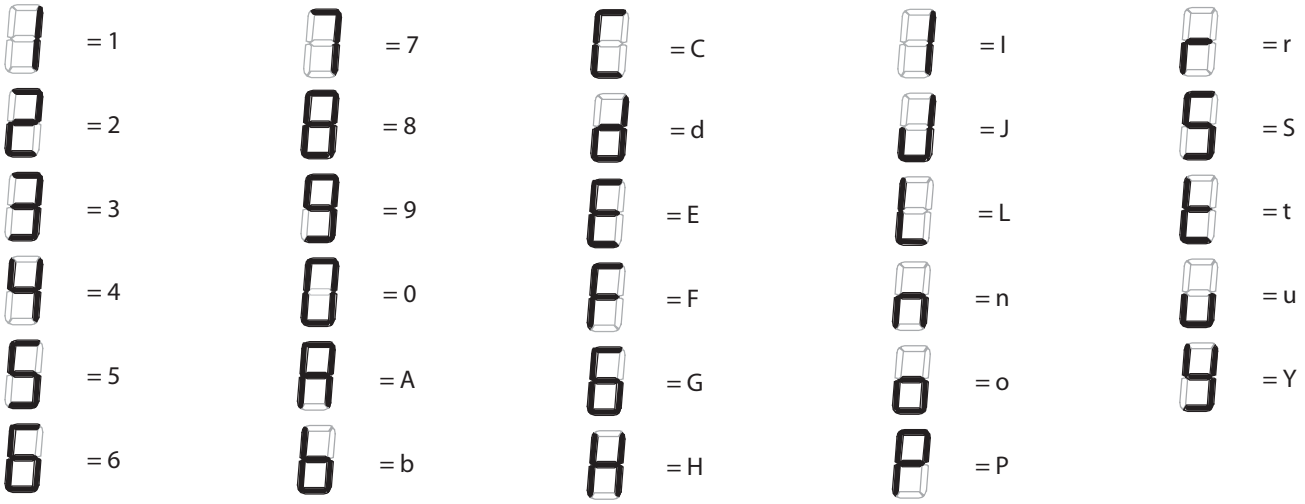


After entry of the last character, the password must be confirmed by pressing the i/reset button. Press the i/reset button again to finish entering the password.

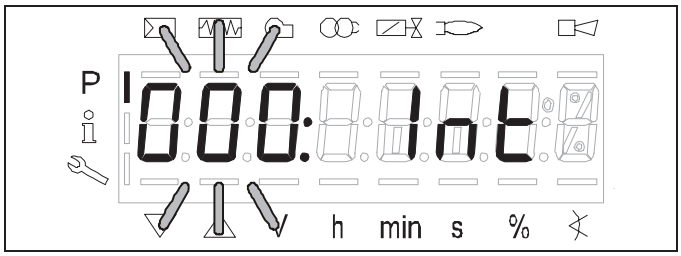


As a confirmation of correct entry, **PArA** appears for a maximum of 2 seconds.

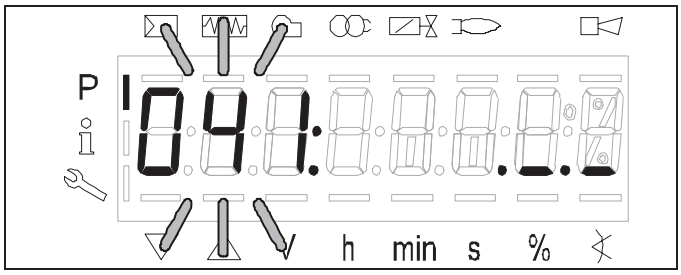
NOTE: For the entry of passwords or burner IDs, the following numerals and letters can be used:



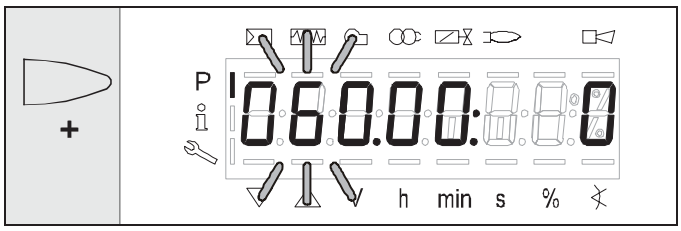
Backup



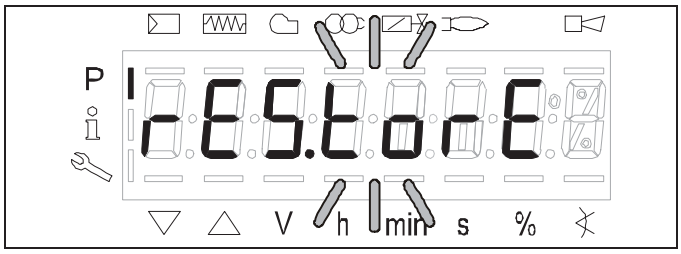
Parameter **000:** blinks. Display Parameter **000:** blinks display **Int** does not blink.



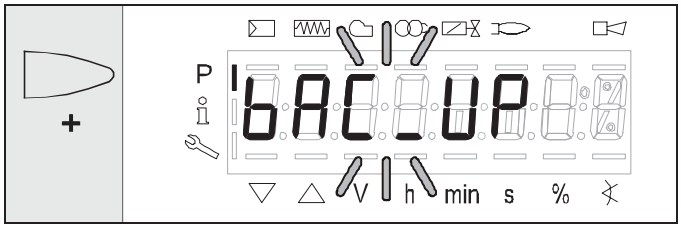
Press the i/reset button to get in parameter group **041**. Display: **041:** blinks, display **._._** does not blink.



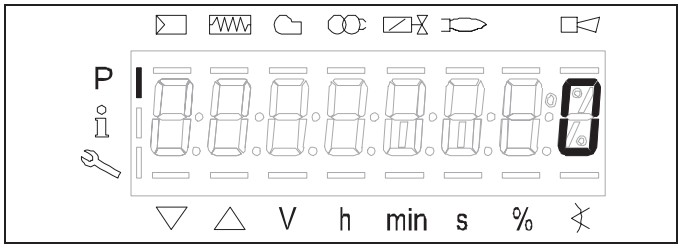
Press the + button to get in the parameter **060**. Display: Parameter **060**, blinks, index **00:** and value **0** does not blink.



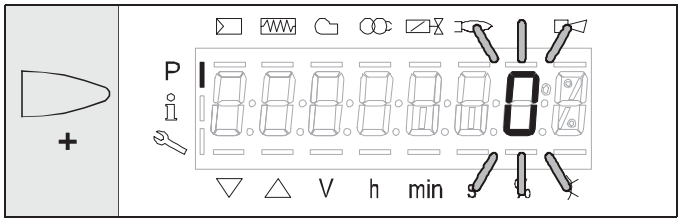
Press the i/reset button to get in parameter **rEStorE**. Display: Parameter **rEStorE** blinks.



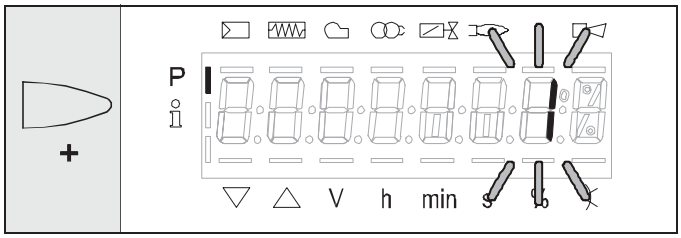
Press the + button to get in parameter **bAC_UP**. Display: Parameter **bAC_UP** blinks.



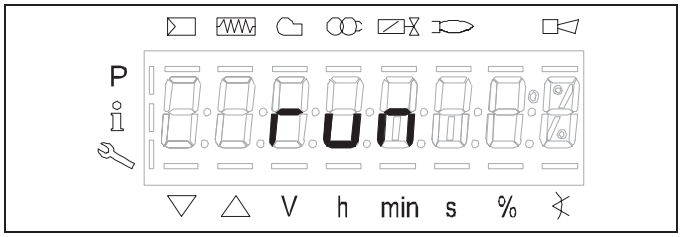
Press the i/reset button to get in the backup process. Display: Value **0**.



Press the + button to shift the value to change mode one place to the left. Display: Value **0** blinks. Note: The value shifts one place to the left to detect a faulty display.

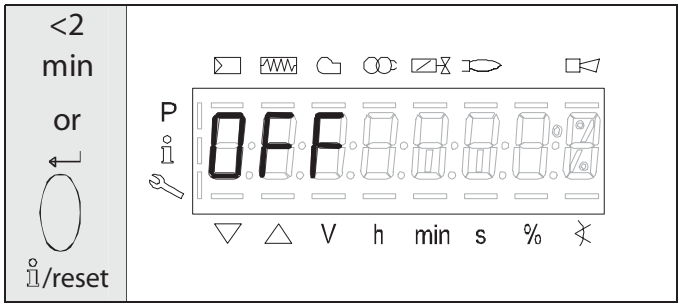


Press the + button to display value 1. Display: Value **1** blinks.



Press the i/reset button to activate the backup process. Display shows **run**.

After approximately 3 seconds (depending on the duration of the program sequence), the display shows **bAC End** and signals the end of the backup process. Display **bAC End**. The display is maintained for 2 minutes or can be ended by pressing the i/reset button.

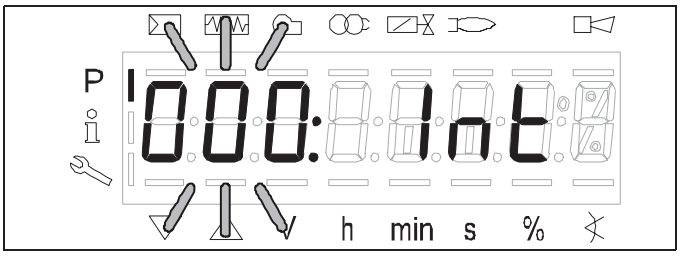


The display shows **OFF** when the backup process is finished.

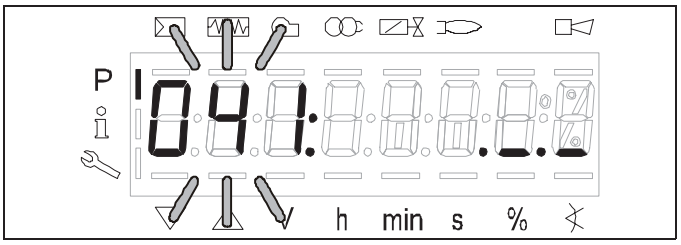
During backup, all settings and parameters are transferred from the basic unit's memory device to the memory device of the program module.

If any parameters are changed, a backup must be made.

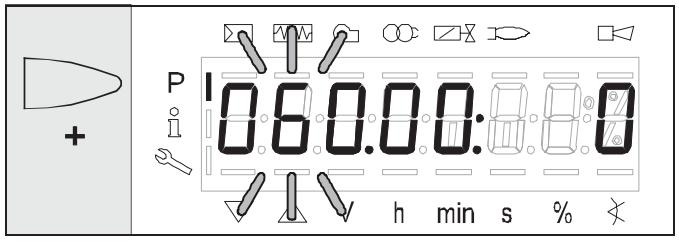
Restore



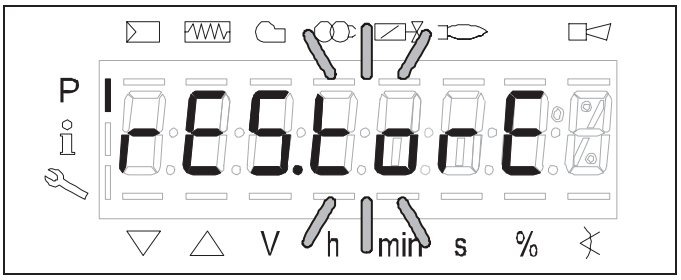
Parameter **000:** blinks. Display Parameter **000:** blinks, display **Int** does not blink.



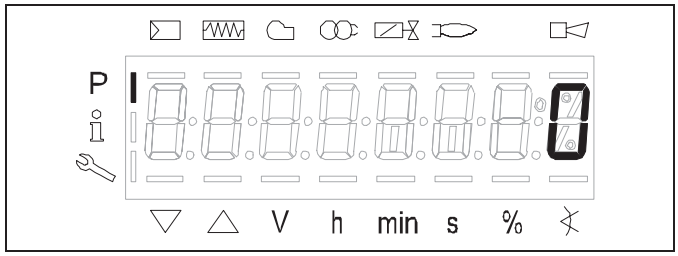
Press the i/reset button to get in the parameter group **041**. Display: Parameter **041:** blinks, display **_._** does not blink.



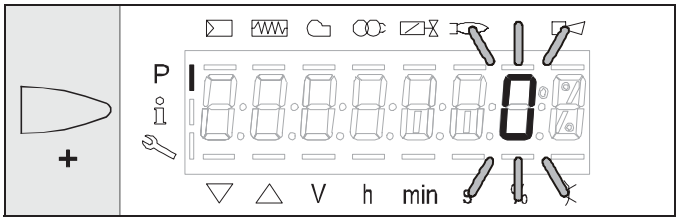
Press the + button to select the parameter **060**. Display: Parameter **060.** blinks, index **00:** and value **0** does not blink.



Press the i/reset button to get in parameter **rEStorE**. Display: Parameter **rEStorE** blinks.

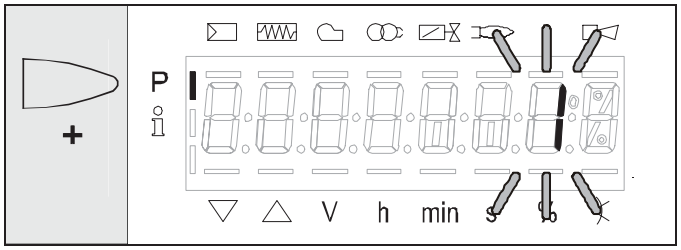


Press the i/reset button to select the restore process. Display: value **0**.

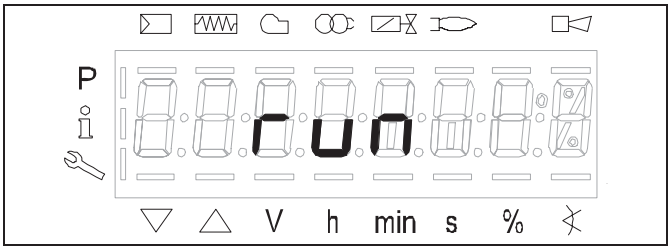


Press the + button to shift the value to change mode one place to the left. Display: Value **0** blinks.

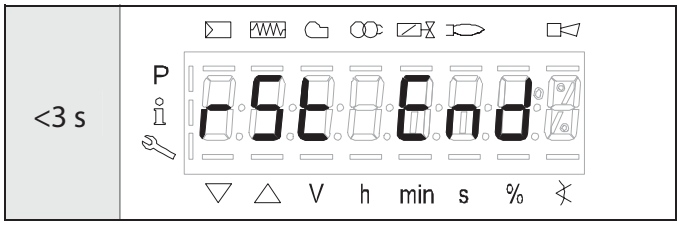
NOTE: For realizing display faults, the value change one place to the left.



Press the + button to select the value **1**. Display: Value **1** blinks.

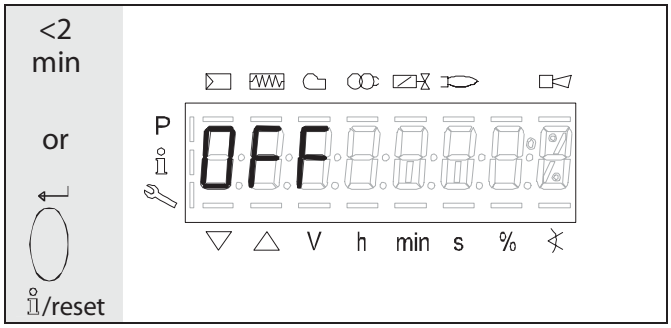


Press the i/reset button to activate the restore process. Display shows **run**.



After approximately 3 seconds (depending on the duration of the program sequence), the display shows **rSt End** and signals the end of the restore process. Display: **rSt End**.

Display is maintained for 2 minutes or can be ended by pressing the i/reset button.



The display shows **OFF** when the restore process is finished.

During the restore process, all settings and parameters are written from the program module to the internal memory device of the basic unit. In the process, it is possible that previous program sequences, parameters and settings in the internal memory device of the basic unit will be overwritten.

CAUTION

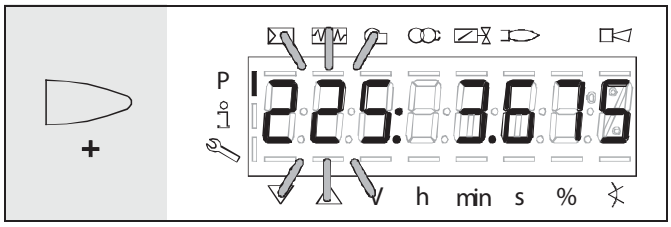
- **On first startup or after exchange of the program module, the sequence of functions and parameter settings must be checked upon completion of the restore process.**

Operating Variants of the Parameters

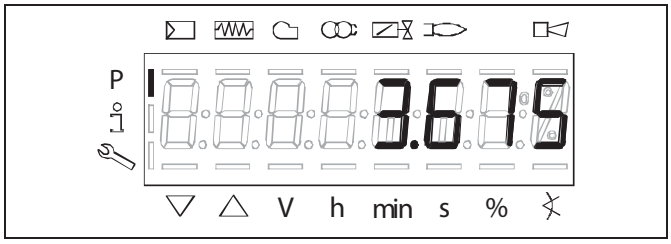
The parameters stored in the flame safeguard gas burner control can be displayed and changed on the parameter level.

Parameters without Index, with Direct Display

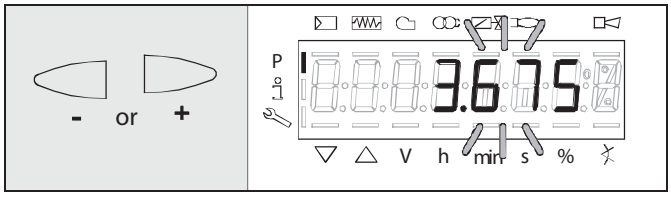
Example: Parameter 225: Gas Prepurge time on the Parameter Level



Press the + button to select the Gas Prepurge Times. Display: Parameter **225:** flashes, value **3.675** does not flash.

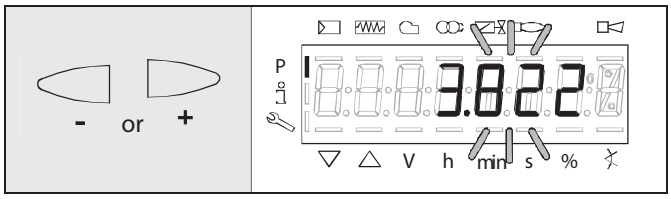


Press the i/reset button to go to editing mode. Display: **3.675**.



Press the - or + button to shift the former gas prepurge time to change mode one place to the left. Display: Gas prepurge time **3.675** flashes.

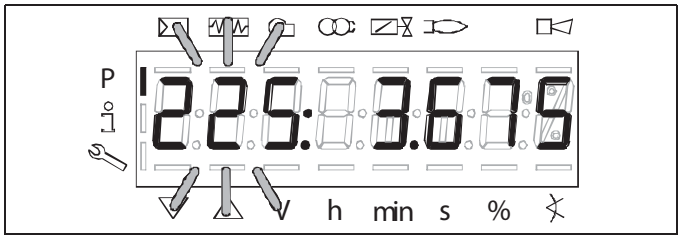
NOTE: To detect display errors, the value appears one place shifted to the left.



Press the - or + buttons to select the required gas prepurge time. Display: Prepurge time **3.822** flashes.

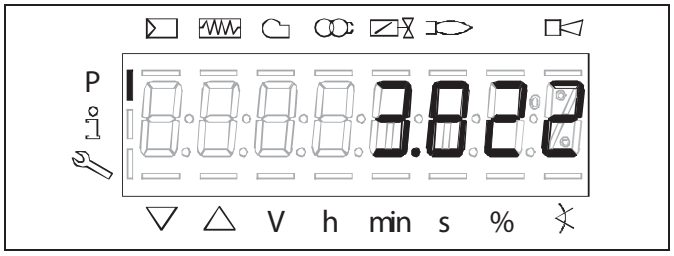
Alternative 1:

Discard the changes by pressing the - and + buttons.



Alternative 2:

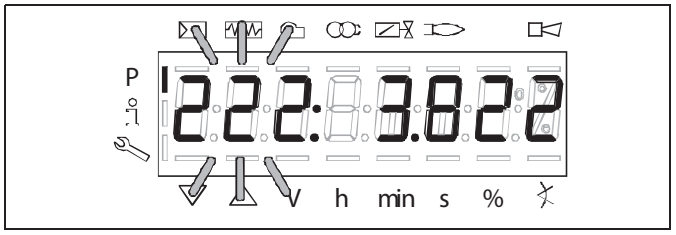
Adopt the value by pressing the i/reset button.



Press the i/reset button to return to editing mode. The value set will be adopted.

NOTE: To detect display errors, the value appears one place shifted to the right.

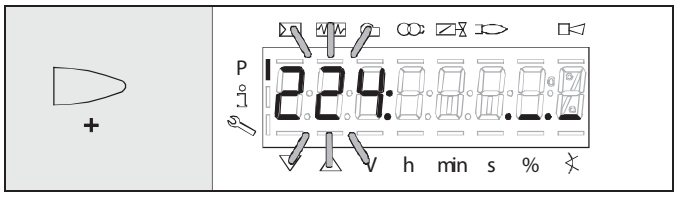
Display: Value **3.822**



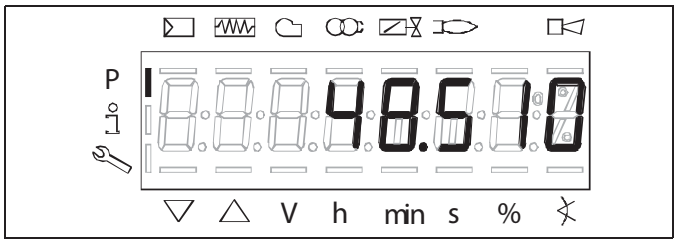
Press the + button to proceed to the next parameter. Press the - button to return to the previous parameter.

Parameters without Index, with No Direct Display

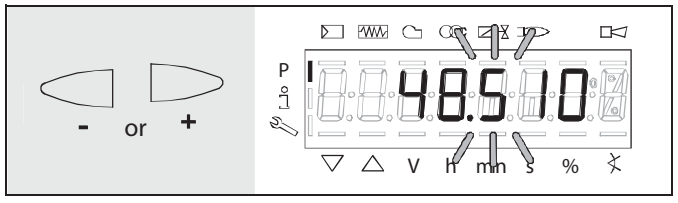
Example: Parameter 224: Specified Time for Air Pressure Signal on the Parameter Level



Press the + button to select the specified time for air pressure signals. Display: Parameter **224:** flashes, characters **._._** do not.

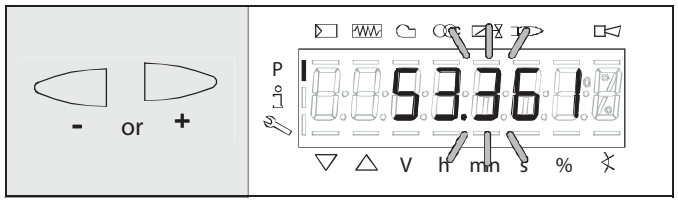


Press the i/reset button to go to editing mode.
Display: **48.510**



Press the - or + buttons to shift the former gas specified time into change mode one place to the left.
Display: Specified time **48.510** flashes.

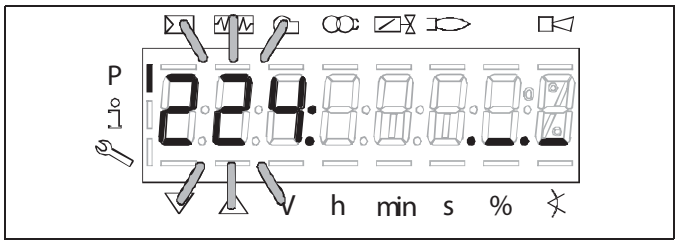
NOTE: To detect display errors, the value appears one place shifted to the left.



Press the - or + buttons to set the gas specified time. Display: Specified time **53.361** flashes.

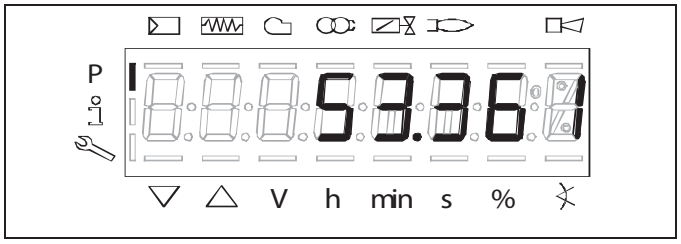
Alternative 1:

Discard the changes by pressing the - and + buttons.



Alternative 2:

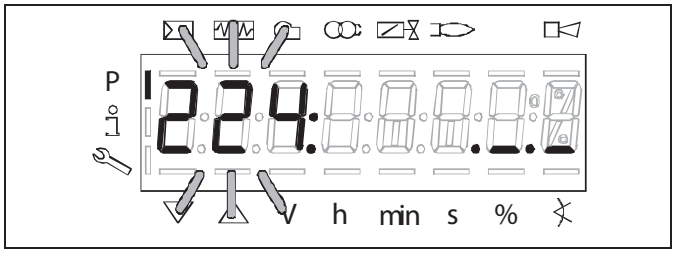
Adopt the changes by pressing the i/reset button.



Press the i/reset button to return to editing mode. The value set will be adopted.

NOTE: To detect display errors, the value is shown again, but shifted one place to the right.

Display: Value **53.361**.

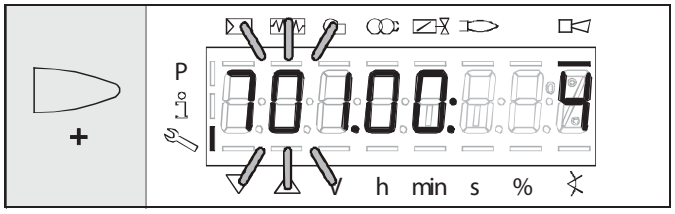


Press the - and + buttons to return to the parameter level. Display Parameter **224**: flashes, characters **._._** do not flash.

Press the + button to proceed to the next parameter. Press the - button to return to the previous parameter.

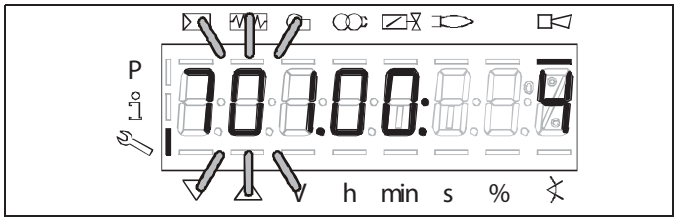
Parameters with Index, with or without Direct Display

Example: Parameter 701: Error History on the Service Level

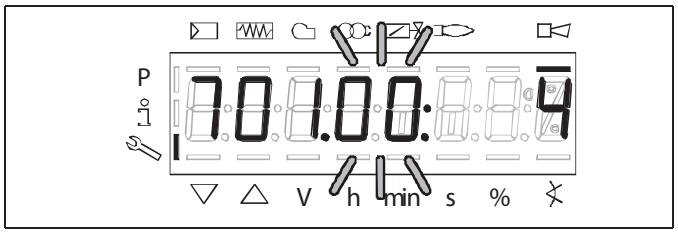


Press the + button to select parameter **701**.

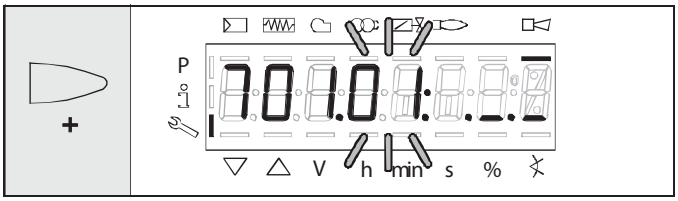
Display: Parameter **701.** flashes, index **00:** and error **4** do not flash.



On the left, the current error **701.** appears flashing, index 00: does not flash. On the right, error code **4** is displayed. **Example: 701.**, index **00:**, error code **4**.



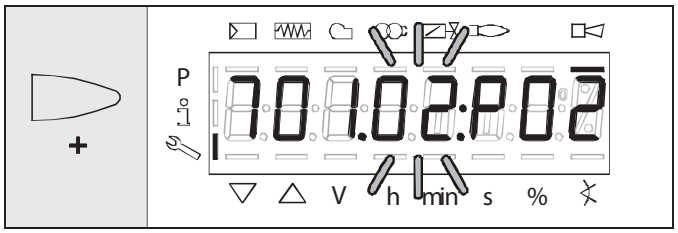
Press the i/reset button for 1 to 3 seconds to show index **00:** for the error code flashing. Display: Parameter **701.** does not flash, index **00:** flashes, error code **4** does not flash.



Press the + button to select the index.

.00 = error code
.01 = Startup meter reading
.02 = program phase at the time of fault
.03 = Not used on T410

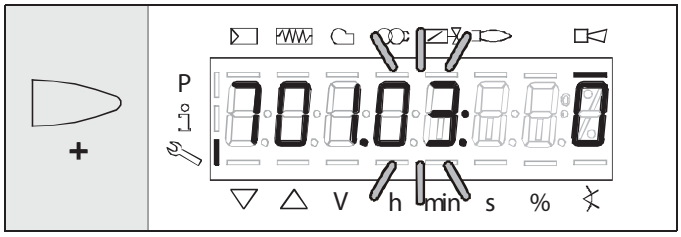
Example: Parameter **701.**, index **01:**, startup meter reading **._._**



Press the + button to select the index.

.02 phase code at the time of fault

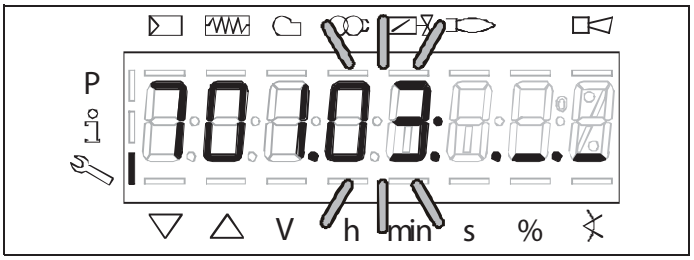
Example: Parameter **701.**, index **02:**, Phase **02** = safety shutdown



Press the + button to select the index.

.03 = Not used on T410

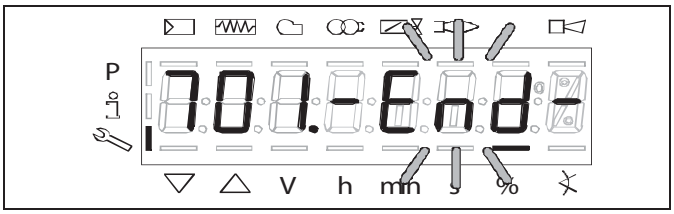
Example: Parameter **701.**, index **03:**, value **0**%



Press the - and + buttons to return to the index.

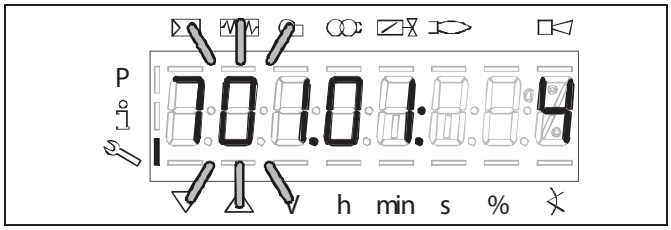
Display: Parameter **701.** does not flash, index **03:** flashes, characters **._._** does not flash.

Press the + button to proceed to the next parameter. Press the - button to return to the previous parameter.



When this display appears, you have reached the end of the index level within parameter **701.**

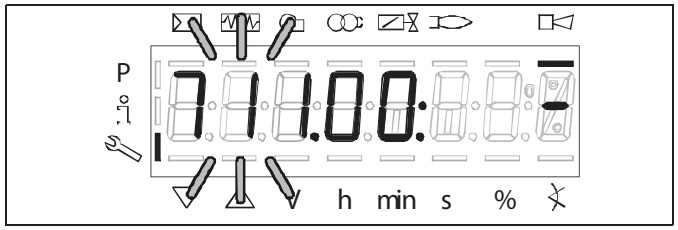
Display **-End-** appears flashing.



Press the - and + buttons to return to the parameter level.

Display: Parameter **701**. flashes, index **01:** and diagnostic code **4** does not flash.

To proceed to the previous error press the + button



Parameters cover the period back to the last error since deletion of the history. (maximum to parameter **711.**)

Example: Parameter **711.**, index **00: -**

Press the + button to proceed to the next parameter. Press the - button to return to the previous parameter.

NOTES

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