

Manual

MPA 41xx PF V2.0

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Target group

The target group for this manual is specialised **gas safety and control technology personnel, qualified persons or the persons instructed by them.**

They can assess the work assigned to them as well as potential hazards on the basis of their technical training, knowledge and experiences, as well as knowledge of the relevant regulations. Only they are permitted to install, start up, adjust and service the equipment in compliance with the accepted rules of industrial safety.



Place this user manual in an easily viewable location in the installation room! Perform work only after reading the safety instructions in this user manual.

Warnings

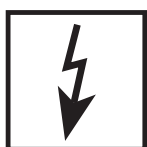
General warnings



The accepted rules of industrial safety and the accident prevention regulations must be followed, taking safety measures to ensure the protection of persons if necessary.



Set all settings and setting values only in accordance with the user manual for the connected machine.



Never perform work when gas pressure or voltage is present. Avoid open fire. Comply with government regulations.



The device must be examined for transport damage prior to installation.



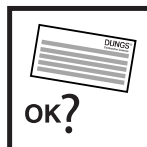
The device must not be exposed to an open flame. Protection against lightning must be provided.



Pipelines connected must be free of dirt and fouling.



Protection must be ensured against environmental and climatic influences (corrosion, snow, icing, moisture (e.g. due to condensation), mould, UV radiation, harmful insects and toxic, corrosive solutions / liquids (e.g. cutting / cooling fluids)). Appropriate safety measures must be taken depending on the installation location.



The device may only be operated in accordance with the operating conditions specified on the rating plate.



The device must be protected against vibrations and mechanical impacts.



The device must not be used in areas with heightened risk of earthquakes.

Explanation of the characters

- 1, 2, 3, ... = Perform actions in sequence
- = Instruction

Intended use

The device is considered to be used as intended if the following instructions are followed:

- Use only in accordance with the operating conditions specified on the rating plate.
- Use only in good order and condition.
- Malfunctions and faults must be corrected immediately.
- Use only when following the instructions in this user manual and the national regulations.

Risks in case of misuse

- The equipment is reliable in its operation when used normally.
- Personal or consequential material damage, financial damage or environmental damage is possible in the event of non-observance of the instructions.
- Misuse or misapplication pose a risk to the life and limb of the operator, the device and other material assets.
- The mains switch of the MPA 4122 is not a disconnect within the meaning of DIN EN 60730. Even in the OFF switch position, mains voltage is still present within the housing.
Risk of fatal electric shocks!
As a result, the power supply must be interrupted before opening the housing.

Approval overview

Approval overview	Article number	CE	FM	UL recognised	UL listed	CSA C22.2	EAC	AGA	UA
									
MPA 4112 PF V2.0 / AC 230 V	297421	x					x		x
MPA 4112 PF V2.0 / AC 115 V	297424	x					x		x
MPA 4114 PF V2.0 / AC 230 V	297427	x					x		x
MPA 4114 PF V2.0 / AC 115 V	297430	x					x		x
MPA 4122 PF V2.0 / AC 230 V	297433	x					x		x
MPA 4122 PF V2.0 / AC 115 V	297436	x					x		x
Display AM41	297004						x		x
Extension module									
EM 2/4 MPA 411x	298655	x					x		x
EM 2/4 MPA 412x	300821	x					x		x
EM 2/6 MPA 412x	298667	x					x		x
EM 2/6 MPA 411x	298663	x					x		x
Flame detector device									
UV 41	256692	x					x		x
UV 41 HE	260575	x					x		x
UV 42	258385	x					x		x
UV 4x EM 1/1 (shutter)	259361	x					x		x
FLW 10 IR V2.1	255216	x					x		x
FLW 41 I	258396	x					x		x
KLC 20/230	TBA	x					x		x
FLW 20 UV	250733	x					x		x
FLW 20 UV/F V1.0	266054	x					x		x

Safety integrity level (SIL)

MPA 41xx PF from V2.0	UV 4x	UV 4x-EM 1/1 (shutter)	Components	SIL	SFF	PFH
X			Ionisation input	3	99.46 %	1.84E-09
X			Input FLW 2 NO, HT, LDW and remote unlock	3	99.37 %	1.80E-09
X	X		UV 41 + ionisation input	2	96.90 %	1.50E-07
X	X		UV 42 + input FLW 2 NO	2	96.87 %	1.51E-07

MPA 41xx PF system description

The MPA 41xx PF is suitable for use on high-speed burners with rapid pulse firing.

The system parameters may be set on the integrated display and / or using the DUNGS VisionBox.

The flame is monitored either using:

- Ionisation
- Flame detector device FLW xx
- Flame detector device UV 41

connected to the ionisation electrode input or over a second flame detector input for a flame detector device with potential-free two-way contact or by means of the DUNGS UV 42 flame detector device. The two flame detector device inputs may be used individually or in combination.

High-temperature operation can be activated by means of an external switching signal (NO and NC contact).

Field bus communication is possible via the local extension modules for operation in networked burner systems.

System variants

Designation	Article no.	Voltage	Display
MPA 4112 PF V2.0	297421	230 VAC	3-digit 7-segment internal display
MPA 4112 PF V2.0	297424	115 VAC	3-digit 7-segment internal display
MPA 4114 PF V2.0	297427	230 VAC	Minimal LED display 3-digit 7-segment external display optional
MPA 4114 PF V2.0	297430	115 VAC	Minimal LED display 3-digit 7-segment external display optional
MPA 4122 PF V2.0	297433	230 VAC	3-digit 7-segment internal display
MPA 4122 PF V2.0	297436	115 VAC	3-digit 7-segment internal display

Accessories

Ignition transformers:

- DEZ xxx, DIZ xxx
- Mains connection line
- Ignition line

Flame detector devices:

- IR: FLW 10 IR, FLW 10 IR V2.1, KLC 20 / 230 VAC
- UV: FLW 20, FLW 20 UV/F/(HE), UV 41, UV 41 HE, UV 42
- Ionisation: FLW 41 I

Extension module EM

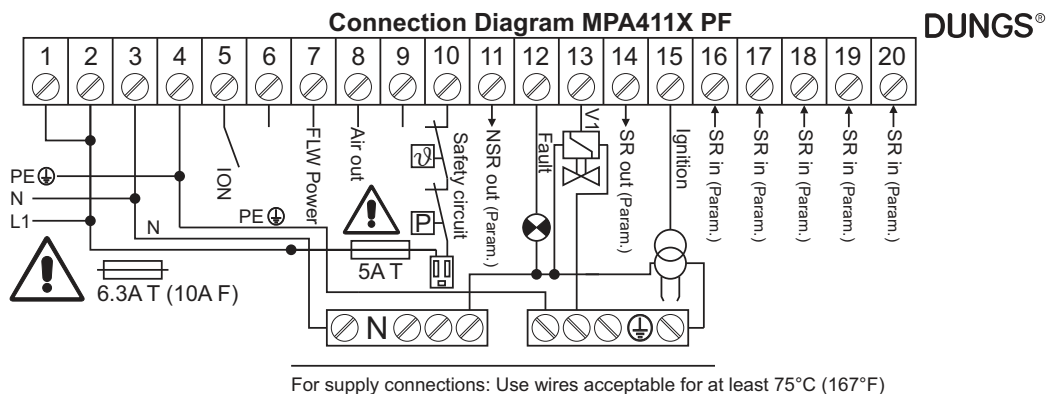
Only partial functions of the extension modules can be used

- EM 2/4: Profibus DP, Modbus
- EM 2/6: Profibus DP, Modbus
- EM 2/8: Profinet
- EM 2/9: Profinet

Technical data

General MPA 41xx PF V2.0	
Protection class of the plastic housing	
MPA 4114 PF	IP 54
Display AM 41	IP 20, after installation: front side IP 54, rear side IP 20
MPA 4112 PF	IP 54
Protection class of the metal housing	
MPA 4122 PF	IP 65 (attention: use suitable cable screw connections only)
Ambient temperature MPA 41xx PF	-40 °C to +70 °C
Storage and transport	-40 °C to +80 °C
Humidity	DIN 60730-1, no dewing admissible
Operating altitude	Suitable for use up to 2 000 metres above mean sea level
Service life	2.5 million switches depending on contact load
Switching outputs	
Installation position	Any
Dimensions (L x H x D):	
MPA 411x PF in mm	MPA 4114 152.5 x 165 x 77 mm MPA 4112 approx. 152.5 x 151.5 x 77 mm
Dimensions (L x H x D):	
MPA 4122 PF in mm	approx. 160 x 240 x 80 mm (excluding cable screw connections)
Weight MPA 411x PF	0.82 kg
Weight MPA 4122 PF	2.2 kg

Electrical data	
Rated voltage	230 VAC -15 % to +10 % or 115 VAC -15 % to +10 %, depending on the version
Frequency	50 Hz / 60 Hz
Fuse	6.3 A slow-blow or 10 A fast-blow, integrated, 5 A slow-blow in fuse holder, replaceable
Isolation	No galvanic isolation between grid and 24 VDC or 5 VDC
Electrical connection	In-phase (!) connection and protective earth connection according to connection diagram The touch protection for the UV sensor must be ensured through installation in the operating equipment
Power consumption (own consumption)	Maximum 10 W Typical 115 V 230 V Standby 1.5 W ... 1.8 W Operation 3.4 W ... 4.8 W With extension card EM 2/4: Standby 3.3 W ... 3.5 W Operation 5.4 W ... 6.3 W With extension card EM 2/6: Standby 6 W ... 6.3 W Operation 6.2 W ... 9.0 W
Short-circuit current ION against N	280 µA



* The connection lines used must be suitable for an ambient temperature of at least 75 °C (167 °F).

** Different functions can be configured for the inputs X16 to X20, see the chapter for the parameters P18, P24-P26, P84. For the output X11, see chapter P19; for output X14, see P80.

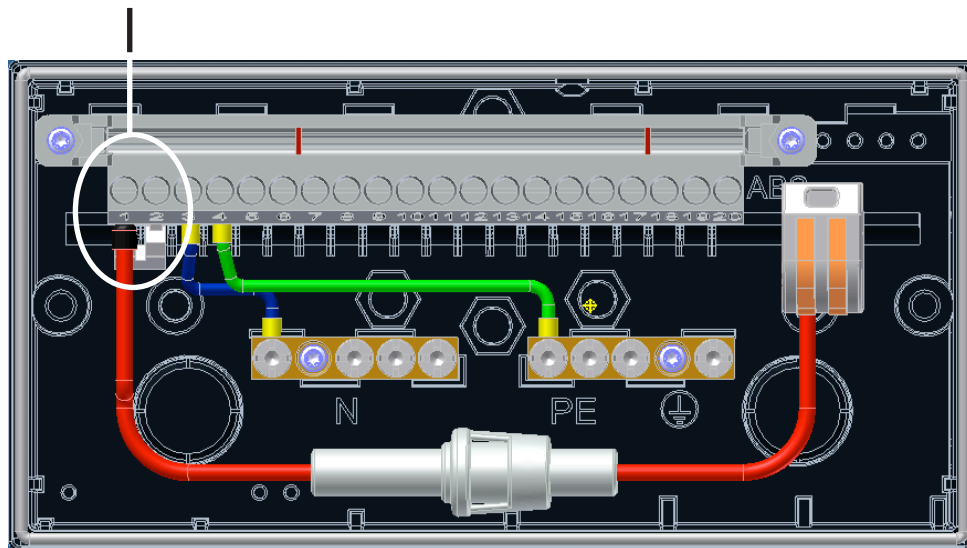
Attention:

After removing the hood, it is possible to touch electrical connections in the terminal socket – risk of fatal electric shocks!

The power supply must therefore be interrupted before opening the hood.

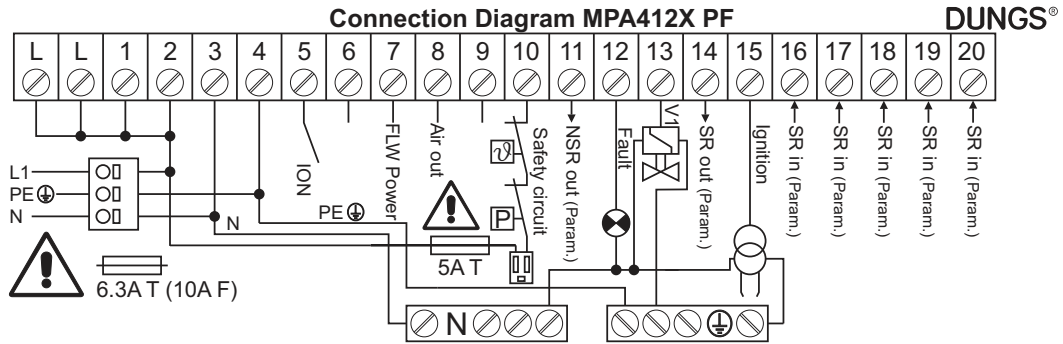
Do not remove the jumper between terminals 1 and 2 that was installed at the factory. It is required for the intended use of the automatic gas burner control system.

The bridge from pin 1 to pin 2 may be removed if it can be ensured that the maximum current for the entire application is less than 5 A. This must take into account all devices in use, such as valves, ignition transformers, relays for fault and operating displays, fans and the power consumption of the MPA itself.



Connection diagram

MPA 4122 PF V2.0



For supply connections: Use wires acceptable for at least 75°C (167°F)

* The connection lines used must be suitable for an ambient temperature of at least 75 °C (167 °F).

** Different functions can be configured for the inputs X16 to X20, see the chapter for the parameters P18, P24-P26, P84. For the output X11, see chapter P19; for output X14, see P80.

The mains switch of the MPA 4122 is not a disconnecter within the meaning of DIN EN 60730. Even in the OFF switch position, mains voltage is still present within the housing – risk of fatal electric shocks! As a result, the power supply must be interrupted before opening the housing.

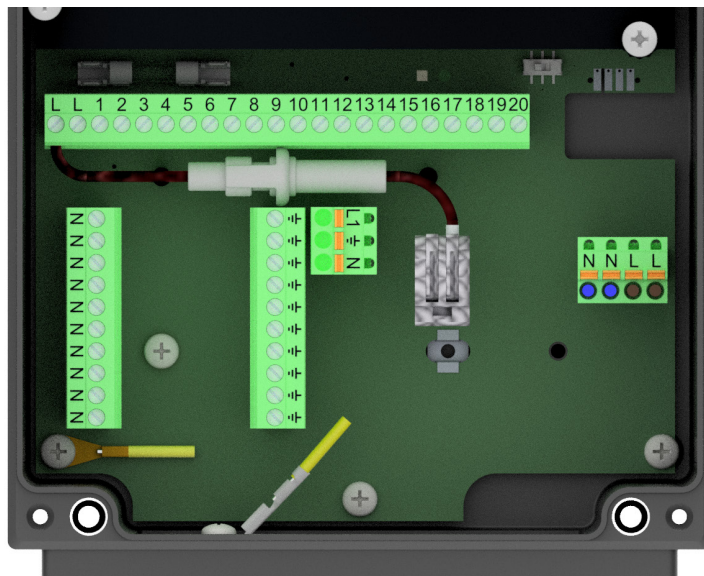
The MPA 4122 must be protected using a 10 A back-up fuse.

Attention:

After removing the hood, it is possible to touch electrical connections in the terminal socket danger – risk of fatal electric shocks! Interrupt the power supply before removing the hood.

Attention:

The switch in the MPA 4122 housing is not a disconnecter within the meaning of DIN EN 60730. That is, even if the switch is deactivated, mains voltage is still present within the housing – risk of fatal electric shocks! As a result, the power supply must be interrupted before opening the housing.



Outputs					
Designation	Connection X	Safety-relevant	Output type	Line length	Electrical data
V1 Safety valve	13	●	Relay contact	Max. 100 m	At 250 000 switching cycles: 115 / 230 VAC / 2 A $\cos \varphi = 1$ At 2.5 million switching cycles: 115 / 230 VAC / 1 A $\cos \varphi = 1$ Minimum load 0.5 W
V2 configurable	14	●	Relay contact	Max. 100 m	At 250 000 switching cycles: 115 / 230 VAC / 2 A $\cos \varphi = 1$ At 2.5 million switching cycles: 115 / 230 VAC / 1 A $\cos \varphi = 1$ Minimum load 0.5 W
Ignition	15	●	Semiconductor contact	Max. 100 m	115 / 230 VAC / 2 A ^{*2} Minimum load 0.5 W
Ventilation	8	-	Relay contact	Max. 100 m	At 250 000 switching cycles: 115 / 230 VAC / 1 A $\cos \varphi = 0.4$ corr. 115 / 230 VAC / 2.5 A $\cos \varphi = 1$ At 2.5 million switching cycles: 115 / 230 VAC / 1 A $\cos \varphi = 1$
HT function or AUX out Multifunction output configurable	11	-	Relay contact	Max. 100 m	115 / 230 VAC / 1 A $\cos \varphi = 1$
Fault Alarm	12	-	Relay contact	Max. 100 m	115 / 230 VAC / 1 A $\cos \varphi = 1$
FLW power	7	-	For UV 41 (HE), UV 42 FLW 10 x, FLW 20 x, KLC 20/230	Max. 100 m	230 VAC / 10 mA ^{*1}

^{*1}: The flame detector device is also supplied with 230 VAC in the 115 VAC version via "Supply Flame Detector", connection 7.

^{*2}: With a pre-ignition time > 100 s or a duty cycle (DC) > 80% of the ignition output, the maximum permissible output current is reduced to 1.5 A.

The total currents of all safety-related consumers must not exceed 5 A (note the safety value).
The total currents of all consumers must not exceed 6.3 A (10 A).

Inputs					
Designation	Connection X	Safety-relevant	Output type	Line length	Electrical data
L1	1		Contact		
N	3		Contact		
PE / earth	4		Contact		
Safety chain input (from L1, fused via fuse in fuse holder) ^{*5}	10	●	Contact	Max. 100 m	115 / 230 VAC / max. 5 A
Flame detector device Ionisation ^{*1}	5	●	Ionisation for one or two-probe operation	Max. 10 m ^{*2}	Threshold value: approx. 1.2 µA
X16*** Configurable input, see chapter P26	16	●	Switching contact	Max. 100 m	115 / 230 VAC
X17*** Configurable input, see chapter P18	17	●	Switching contact	Max. 100 m	115 / 230 VAC
X18*** Configurable input, see chapter P27	18	●	Switching contact	Max. 100 m	115 / 230 VAC
X19*** Configurable input, see chapter P28	19	●	Switching contact	Max. 100 m	115 / 230 VAC
X20*** Configurable input, see chapter P29	20	●	Switching contact	Max. 100 m	115 / 230 VAC

^{*1} Safety-relevant in flame mode, not safety-relevant in HT mode (flame detection off).

^{*2} For special applications, ionisation line lengths of up to 50 m are possible on request.

^{*3} Devices that are looped into the safety chain, such as pressure or temperature monitors, must be connected between the pre-installed fuse and X10.

Technical data

General				
Designation	Input type	Electrical data	MPA 4114 PF	MPA 41x2 PF
Connection L1 via replaceable back-up fuse *1		L1 fused via integrated fuse, 6.3 A slow-blow or 10 A fast-blow, breaking capacity H = 1500 A	●	●
TWI interface	TWI	Connection only for VisionBox NOT galvanically isolated!	●	●
Switch for parameter mode	Bistable switch	ON / OFF switch in MPA	●	●
Display unit "Multi-function switch"	Within the housing	1 button with 2 LEDs	●	
Display unit	Within the housing for the integrated display	3 x 7 segments + 4 buttons		●
Display unit AM 41 (external display)		3 x 7 segments + 4 buttons Max. connection line length 10 m	●	

*1 A fuse with a breaking capacity of H = 1500 A must be used.

Ignition transformer connection

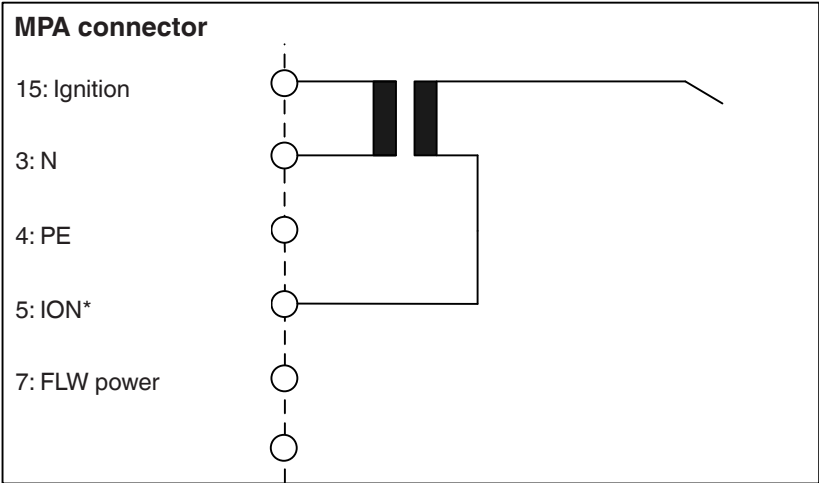
The MPA 41xx PF does not have an integrated ignition transformer.

For details of suitable ignition transformers, see the accessories list.

Attention: Depending on the electrode arrangement, a special ignition transformer may be required (e.g. single-electrode operation)

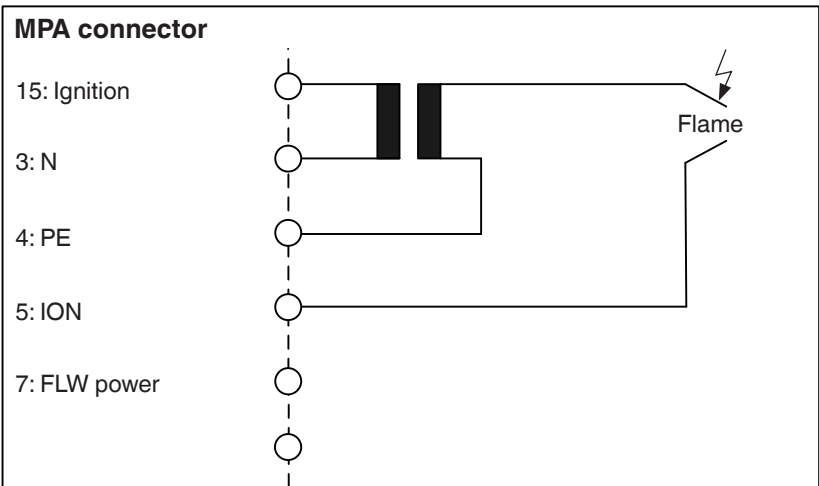
Flame monitoring and ignition
Connection of flame detector device 1

Single electrode operation, ionisation



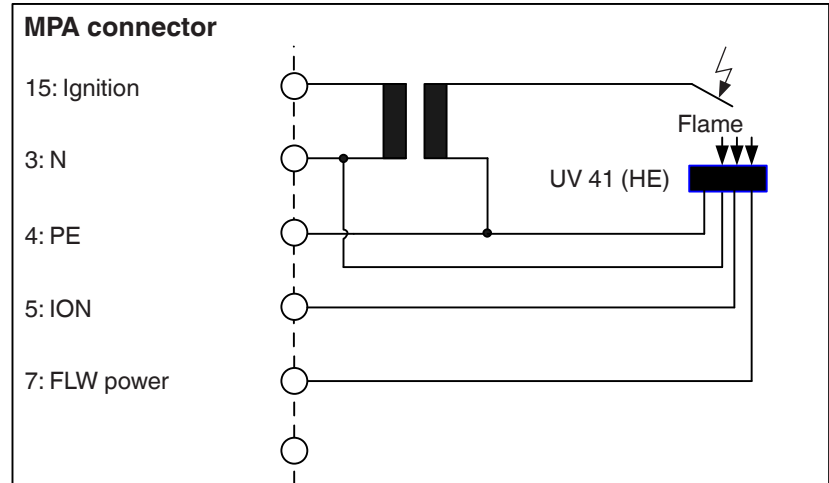
* When using a DUNGS DEZ 1xx SEO ignition transformer for single electrode operation, the green / yellow line must be connected to terminal 5.

Two electrode operation, ionisation



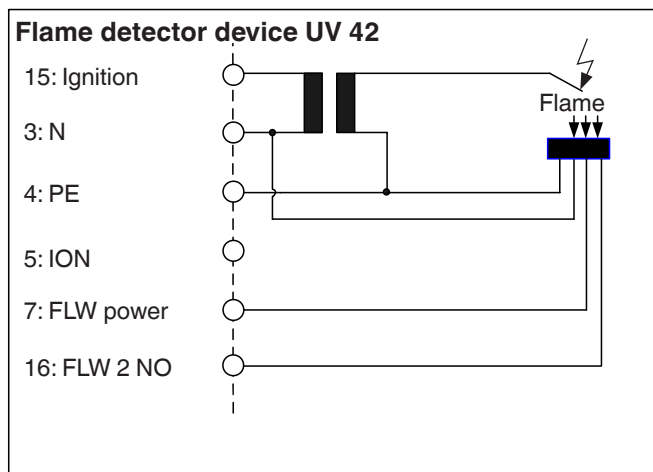
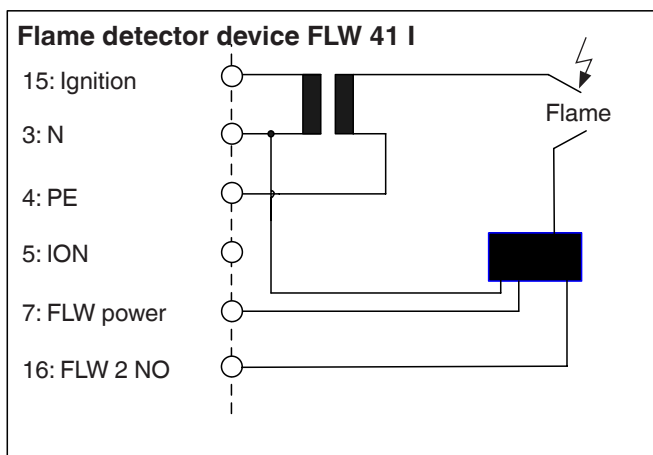
Flame detector device UV 41 (HE) / FLW 10 x / FLW 20 UV x / KLC 20/230

Note: The flame detector devices FLW 10 x and FLW 20 x do not have a protective earth connection



Connection of flame detector device 2

Note: The FLW 2 NO function can also be configured for another input X16 to X20, see parameters P18, P24, P25, P26, P84



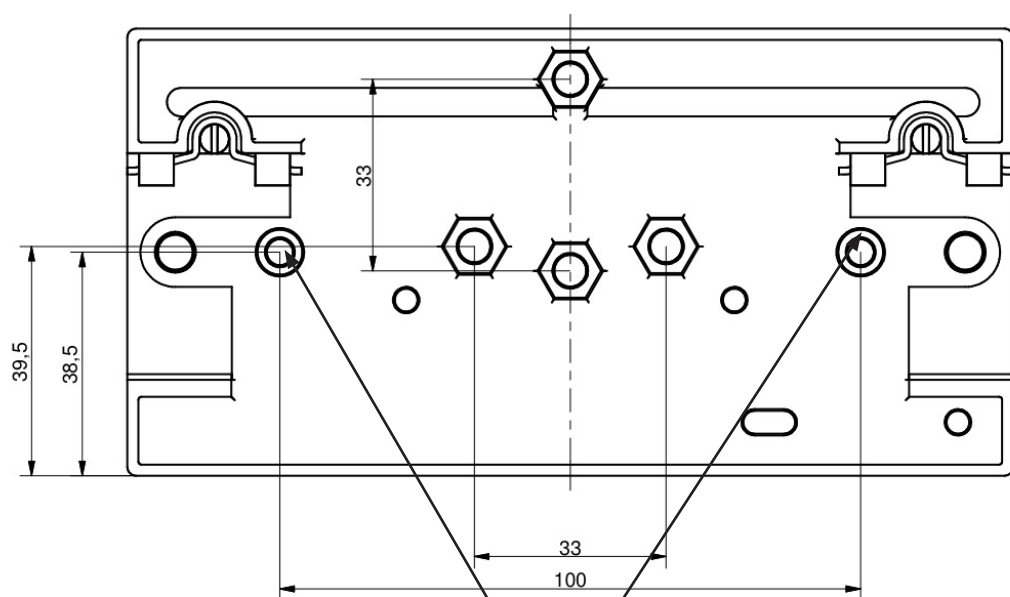
Use ignition lines with internal resistance (e.g. carbon fibre) or, in the case of ignition lines with a copper core, use ignition plugs with integrated interference suppression of at least 1 k Ω .

MPA 41xx PF installation

MPA 411x PF V 2.0

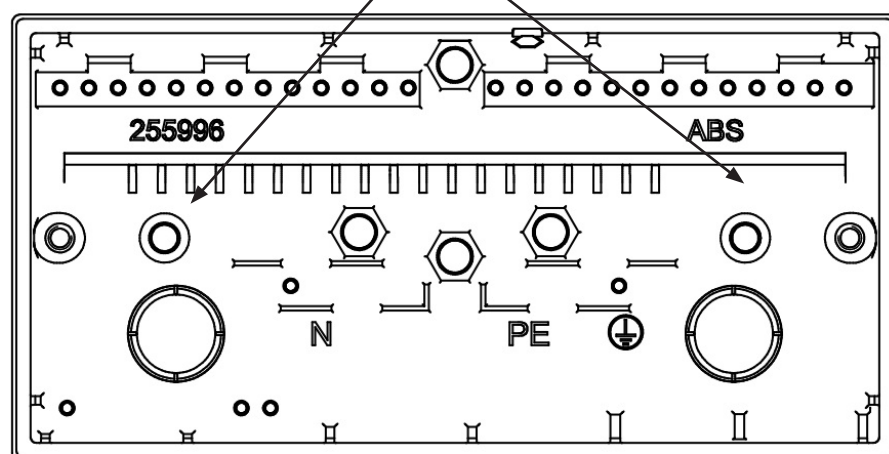
Installation options:

- Direct screw connection of the base on the mounting surface
Break out mounting holes, e.g. using a suitable screwdriver or with a 4.2 mm (M4) drill. During installation, use O-rings with 4.2 mm internal diameter to guarantee the IP protection.
- Hat rail mounting (locking the base into place on a hat rail)

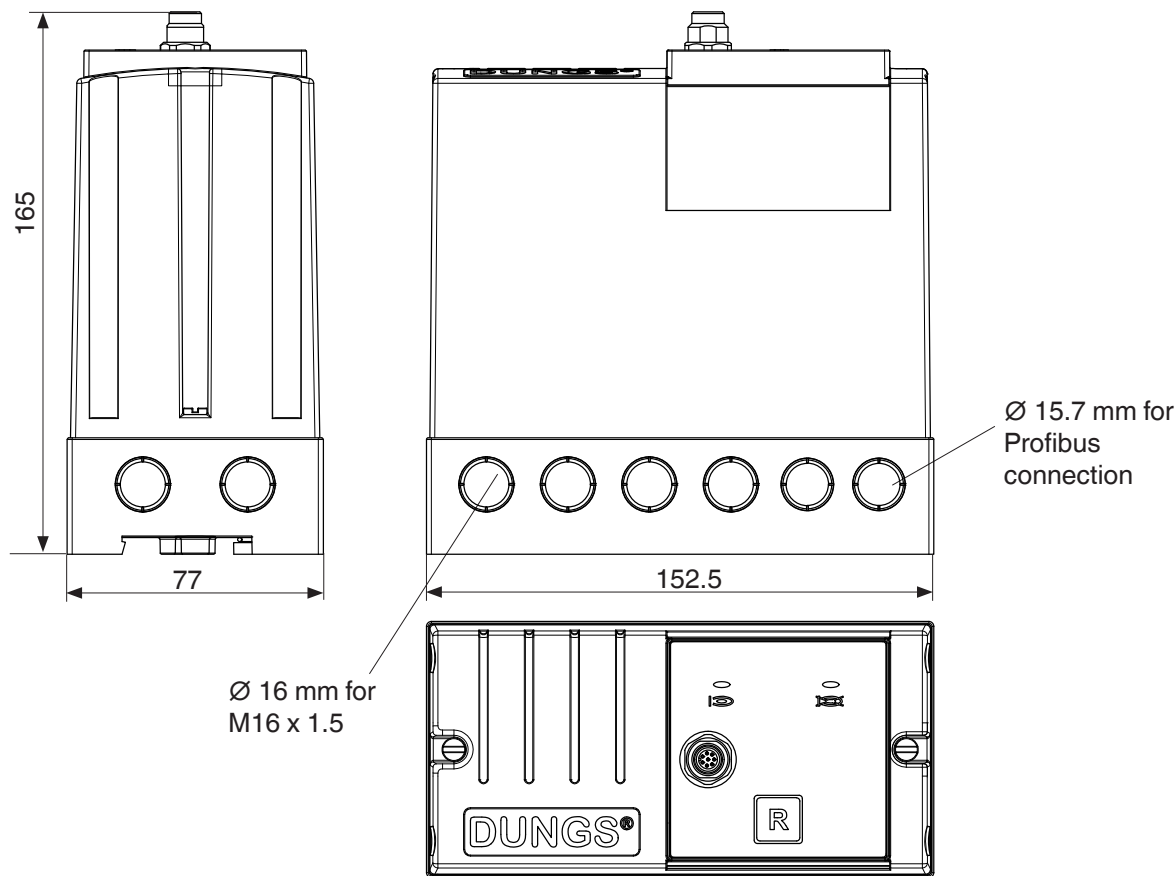


Mounting holes

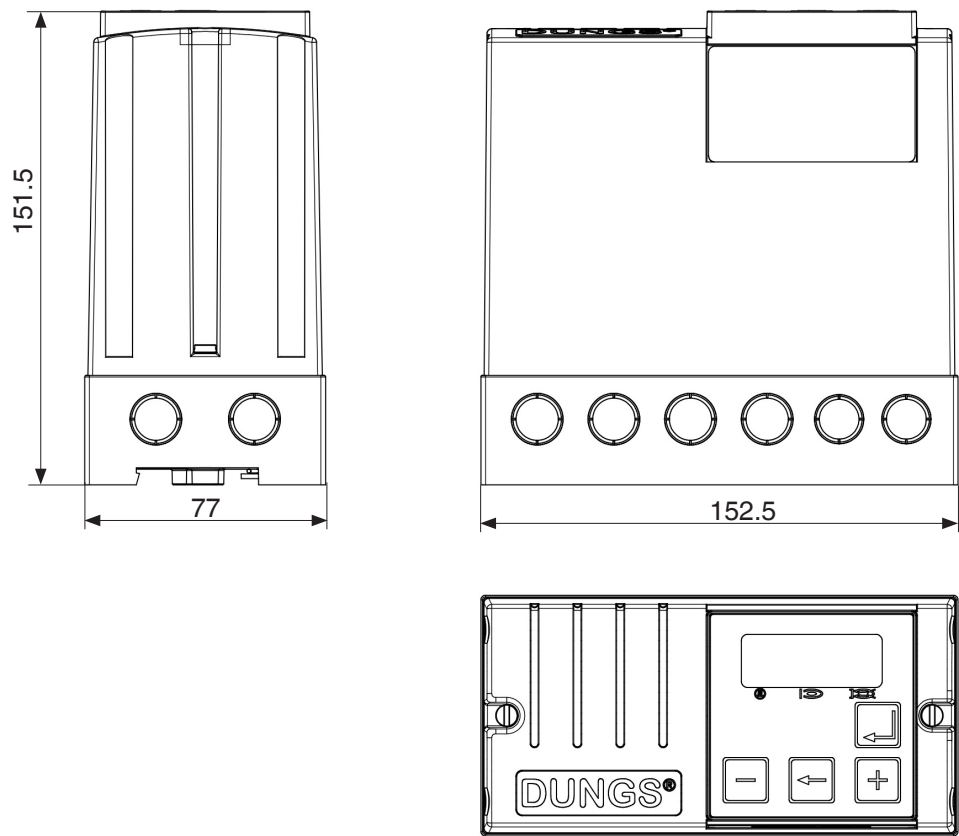
Screw M4



MPA 4114 PF dimensions



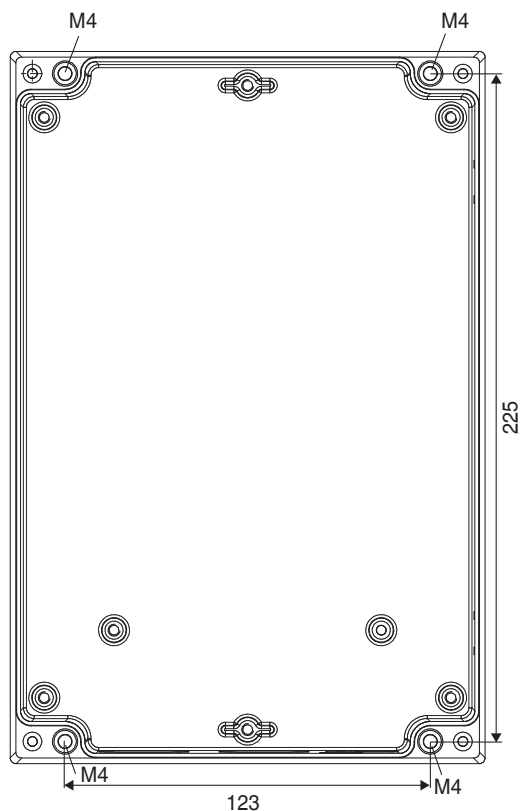
MPA 4112 PF dimensions



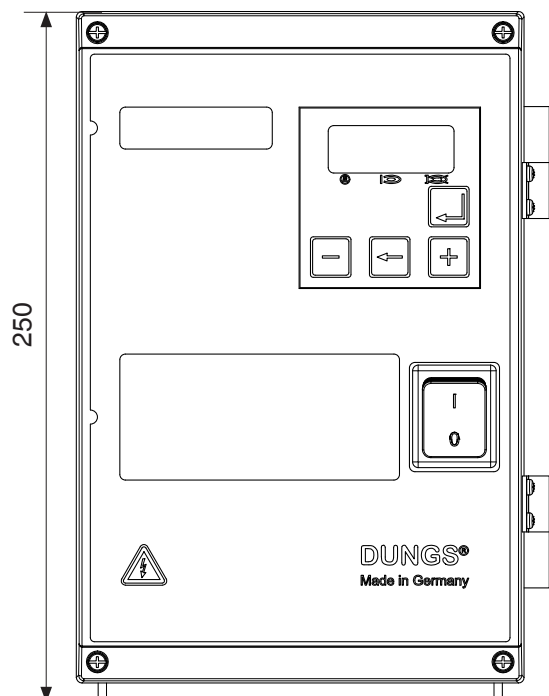
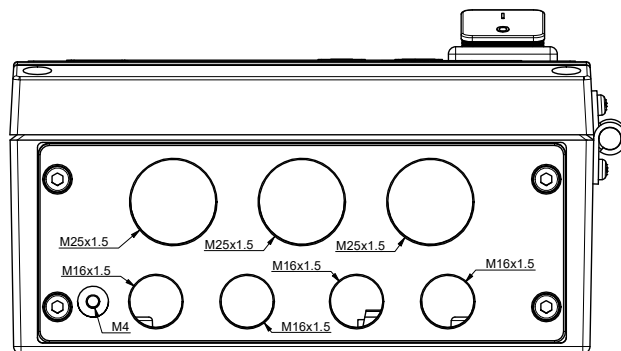
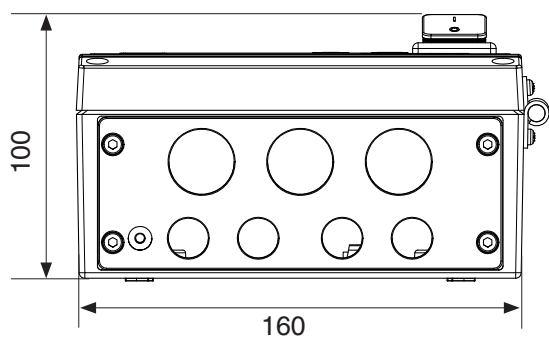
MPA 41xx PF installation

MPA 412x installation options:

Direct screw connection of the housing to the mounting surface using M4 screws, min. length 20 mm



MPA 412x PF dimensions



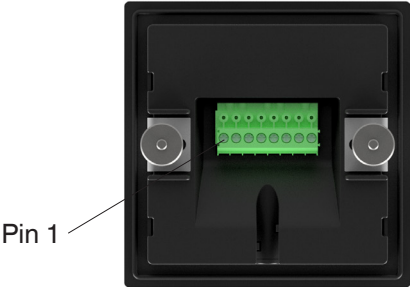
Display AM 41

A cut-out of 68 x 68 mm is required for installation. Maximum material thickness 5 bmm.
Display function identical to MPA 41x2



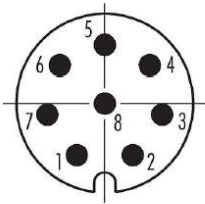
AM 41 plug assignment

PIN	1	2	3	4	5	6	7	8
Colour	White	Brown	Green	Yellow	Grey	Pink	Blue	Red



To connect the display, use connection line AM 41 #298790 (max. 10 m).

**MPA 4114 PF Connector
Display**



Description of functions

Unlock function

If the MPA is locked (state 0), it can be unlocked by pressing the unlock button. To distinguish this action from potential EMC interference pulses, the button must remain pressed for at least 0.5 s (max. 5 s).

The same applies for 230 V unlocking and unlocking via fieldbus modules.

In accordance with DIN EN 14459 (Annex J), the number of possible unlock actions is limited to 5 in 15 minutes, i.e. the automatic system denies any further unlocks if the MPA has already been unlocked 5 times within a short time period. Only after a waiting time has elapsed, during which the MPA is provided with power, is it possible to unlock the MPA again.

The waiting time is 15 minutes or 3 minutes for each unlock action

Enhanced unlock

The limitation to 5 unlock actions within 15 minutes described above can be reset by means of "enhanced unlocking". To do this, the unlock button must be pressed for at least 5 s (max. 10 s) (the display begins to flash after 5 s).

"Enhanced unlocking" is active in all operational states of the MPA. This means that "enhanced unlocking" can also be used to perform a safety shut-down with restart of the MPA during operation if a flame is present.

Enhanced unlocking is not possible via the 230 V unlocking input and via fieldbus modules.

Access level

In the MPA, write access is defined using access levels.

Each parameter has a corresponding access level. In order to change a parameter, the MPA must be at the assigned level or a higher level.

If the access level is insufficient to change a parameter, this is indicated on the VisionBox or a request to enter the valid password is shown on the MPA display. When working at higher access levels, users must press a button to confirm that they are on site.

For this, the display flashes for 30 s until a button is pressed. If no button is pressed, the MPA remains at the previous level.

To change the access level, the correct password must be entered either via the display or via the VisionBox → Settings Automatic gas burner control system → Access level. The access level resets automatically after 5 hours or in the case of power failure. Exception: If the automatic gas burner control system restarts during this 5-hour period (e.g. due to an error), a new period of 5 hours starts for the user in the current access level.

NOTE

We recommend resetting the access level after the automatic gas burner control system has been configured successfully.

Level	Designation	Button press required
1	Dungs	yes
2	OEM expert	yes
3	OEM	yes
4	Service	yes
5	Operator	no

Gas valves V1 X13, V2 X14

The valve connection can be configured, see the section "Parameter description" – P80.

Depending on the value of the parameter, another line in the flow diagram will apply.

Multifunction inputs

The inputs X16-X20 can be freely assigned functions by setting the parameters P18, 26, 27, 28 and 29. Each input can be assigned any function.

Each function can be assigned once.

Configurable functions

Flame detector device NO

Air pressure detector

HT signal

Gas pressure detector

Closed position signal contact (POC)

Parameter mode (manual operation)

A switch in the connection chamber is used to switch between parameter and automatic mode.

The MPA will not register a change to the switch position until it is restarted.

After the mains power is connected, the display in parameter mode shows a prompt to enter a code. You must enter the password for the service or OEM level.

Once the level has been changed successfully, selected parameters are run through in sequence. An overview of the parameters and their sequence can be found in the parameter display section. The parameter values can be changed using the + and - buttons. The unlock button is used to save the displayed value. The ← button can be used to return to the previous position or parameter. Since the display shows only two positions, some values are displayed at an optimised resolution. If the desired value cannot be displayed in this resolution, the display shows "– –". The value can be converted to a resolution that can be displayed.

Once all the parameters have been set, all the values must be confirmed again. At that point, the parameter configuration is completed (H5 is displayed) and the parameter switch can be set back to the "Auto" position.

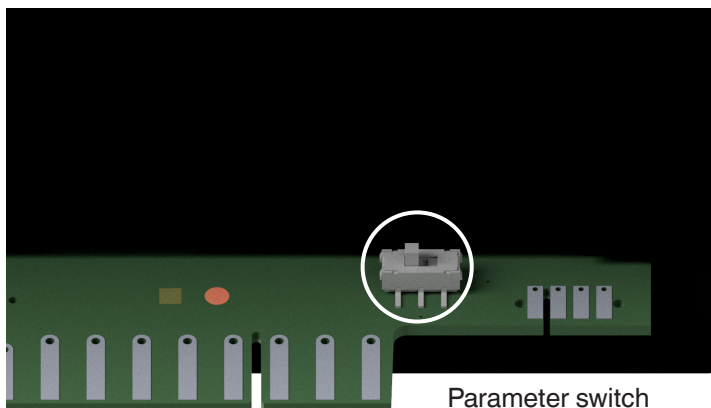
If no button is pressed for 30 min while in parameter mode, the program attempts to restart.

Switch to "Auto"

When this switch position is selected, the MPA operates in normal mode.

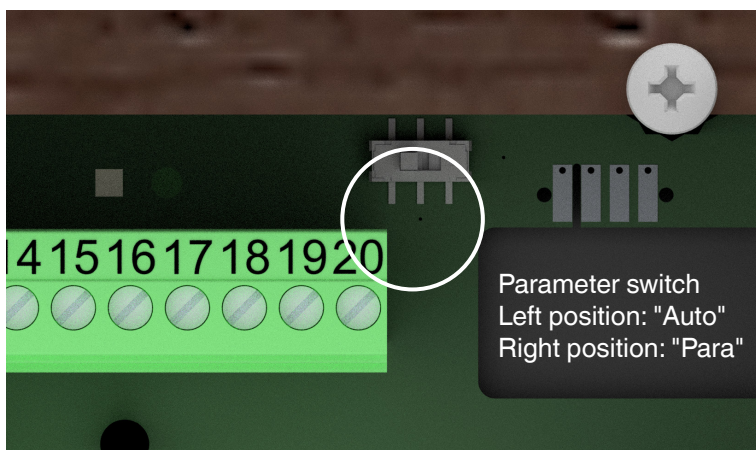
If monitored parameters have been changed and not released, the MPA enters fault mode with error F 60.

MPA 411x PF



Parameter switch
Left position: "Auto"
Right position: "Para"

MPA 412x PF



Parameter switch
Left position: "Auto"
Right position: "Para"

Flow diagram:

The program sequence may be modified by changing the parameters.

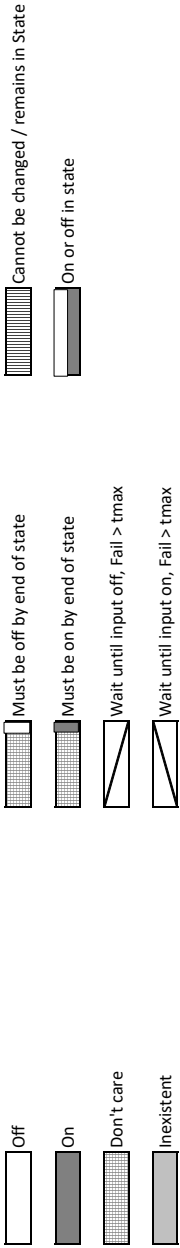
Attention

All settings must be made in accordance with the requirements of the applicable standards and the national requirements in place at the installation site.

DUNGS accepts no liability or guarantees for material or personal damage caused by improper use or by parameter settings made for the automatic burner control system.

	Note	Parameter	Terminal X	Safety relevant	Error	Manual operation - Pause 1 (H5)	Main switch-on delay	Active standard position	Internal state	Watchdog loading phase	Idle state control air pressure sw.	Wait for heat request	External light monitoring	Waiting for air pressure	Pre-eration	Pre-ignition	First safety time, TFI	Flame sense	Flame stabilisation A	Operate pilot	Second safety time	Flame sense	Flame stabilisation B	Operation (main burner)	Restart pilot	Post-eration	Extraneous light	Restart protection	Lack of gas pressure switch min.	Safety chain open						
State Number: State Display Info:					0	Menu	00	00	01	5	A4	A0	A1	A1	A1	A1	A1	A2	A2	A3	A3	A3	A1	A4	A4	A4	A4	D2	D1	44	45					
Mode:					*A		Initialization												Flame Operation																	
Notes:																			*2, *15, *22	*2, *15, *22				*23												
Parameter:																																				
Maximum time:																																				
Safety Chain																																				
Heat Request	*30	P15, P20	10	SR																																
		P17, P45, P18, P24, P26, P84	16-20																																	
Flame 1 (ionisation) and/or Flame 2 (dfl. mains voltage in.)	*5, *11, *20	P41, P33, P36	5 / 16-20	*11																																
HT Mode	*1, *2, *3, *19	P86, P18, P24, P26, P84	16-20	SR																																
Proof-of-closure (V1)	*16, *24	P23, P18, P24, P26, P84	16-20	SR																																
Proof-of-closure (V2)	*16, *24	P23, P18, P24, P26, P84	16-20	SR																																
Gas pressure min.	*16, *17	P 22, P18, P24, P26, P84	16-20	SR																																
Gas pressure max.	*16	P 22, P18, P24, P26, P84	16-20	SR																																
Air pressure 1	*4, *16, *28	P16/P93/P18/P24/P26/P84	16-20	SR																																
Air pressure 2	*16, *28	P16/P100/P18/P24/P26/P84	16-20	SR																																
V2 staged operation on	*26	P18, P24, P26, P84	16-20	SR																																
Burgling / Flexible Output function (for X14) on	*28, *27	P28, P18, P24, P26, P84	16-20	SR																																
Cooling (for X8) on	*28, *21	P28, P18, P24, P26, P84	16-20	SR																																
Main burner on	*22, *23	P46, P18, P24, P26, P84	16-20	SR																																
V1 Out - Interrupted start gas																																				
V1 Out - Permanent start gas / direct ignition			13	SR																																
V2 Out - Boost	*18, *25																																			
V2 Out - Main burner (V1 pilot)																																				
V2 Out - Direct Ignition		P80	14	SR																																
V2 Out - 2 stage	*25, *26																																			
V2 Out - Purging / flexible output function	*25, *27, *29																																			
Energy interrupt																																				
Wait for heat request																																				
Pre-eration																																				
Flame on																																				
Flame stable																																				
HT operation		P19	11																																	
Operation (both modes)																																				
Air boost																																				
Reaction on field bus (A80, Bt 3)	*21																																			
Flame stable pilot burner operation																																				
Flame stable main burner operation																																				
Ignition out			15	SR																																
Air out (ind cooling)	*21, *29		8																																	
Alarm out			12																																	
Ionisation input active	*31		int.																																	

See page 23 for legend



*A) Failure / Lock-out mode

*B) Jump from flame to HT mode

*1) Operation mode High-temp. is detected by both configured terminals as an EXOR signal and mode transition is after a tolerance time of 1 s. High-temperature (HT) mode is selected or disabled by parameter P86. If the system changes to HT mode (>1 s) while operating in flame mode, the sequence jumps to the 4 states marked with "Ab", then jumps directly to state "HT stabilize A or B".

*2) If the system changes to flame mode (>1 s) while operating in High-temp mode, the sequence jumps to state "Standard position" and the burner starts in flame mode.

*4) Parameters P18, P24, P25, P26, P84 determine the functions of the inputs.

*5) If flame signal appears during state "HT operate", the sequence jumps, if air boost or V2 boost is active to the four states marked with "Ab" and then jumps directly to state "HT stabilize".

The number of HT recycle attempts per start/stop sequence for air boost, or V2 boost due to flame appearance is limited by parameter P81.

After the last possible recycle attempt (P81) the burner stays in operation and a warning message via bus and display is generated.

Flame appearance at type energy interrupt will generate also a warning message via bus and display. The burner stays in operation.

The warning message and display information will disappear while HT startup sequence (end of state "b1"), and after a switch to flame operation.

A tolerance time of P42 is accepted. If the flame appears and disappears for a period shorter than the time specified in P42 no action will follow.

*10) The flame signal must be constantly off for a minimum time of 5 s before advancing to the next state and if not achieved within 1 minute during state, then Fail.

*11) The flameinput is safety relevant for flame operation mode, non safety relevant in high temperature (HT) operation mode.

*12) The states marked with "0b" are necessary after a system restart (i.e. after power on, 24-hour self-check, ...).

After the initialization states and with the system still in HT operation mode, the sequence jumps to the 2 states marked with "0b"

When the heat request comes back ON after a normal shut down, the sequence skips the 2 states marked with "0b" and goes to "HT external light check".

*13) If the time since the last self check exceeds the time in parameter P82, the sequence will jump to do all self checks when the "heat request" is off.

This action resets the automatic 24 hour self check operation time (see note *15). For self checks, the sequence jumps to the state "Activate standard position".

*14) The "Power on start delay" state is executed for the duration specified in parameter P83 only after power on.

When the start sequence is initiated from a safety shut down, the duration of this state is <0.5 s.

*15) If the elapsed time exceeds 24 hours since the last self check, the sequence forces a normal shutdown, performs the self checks, and then starts again if the heat request is still active.

*16) These input functions tolerate incorrect signals up to 1 s. If the POC function is used, the tolerance can be set via P23.

*17) If the gas pressure min. check fails, no error is entered in the error log.

*18) Terminal X14 for V2 boost can be independent of Air boost on terminal X11.

*19) If the High-temp mode is ON during the marked flame state, the sequence jumps to the HT mode states marked with "0b".

*20) If P95 is set to 0 the flame input is ignored completely while HT operation (no check for improper flame and no check of flame appearance).

*21) The air output depends on a flag in the bus signal or a configured input in the wait states, during start-up and operation the output is always on.

*22) An external signal via fieldbus or via an appropriately configured input, changes (if on) to main burner operation after remaining in pilot operation for the second safety time.

*23) Flame operation: If the signal disappears during main burner operation, the state "restart pilot" is executed and then switched to flame detection or ignition (depending on P46).

HT operation: If the signal is lost in main burner operation, the state HT restart pilot is executed and then switched to HT stabilization time A.

*24) POC signal monitoring depending on the control V1 or V2.

*25) For operating modes without a pilot burner, the second safety time is skipped and the MPA goes directly into the operating state.

*26) An external signal via fieldbus or via a configured input switches V2 on/off during operation.

*27) An external signal via fieldbus or via an configured input switches output X14 for air valve control or as flexible output control.

This is only possible in the marked states, in the other states there is no output.

*28) Outside of start-up and operation, the air pressure switch can be monitored with a tolerance of 1.5s depending on the cooling / air purge, see for air pressure sw. 1=P16/P99, and air pressure sw. 2: P65/P100. The reaction of

the MPA to LDW errors in these cases can be configured via P27 and P29.

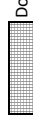
*29) During idle control of air pressure (if enabled) the output is automatically turned off.

*30) If a minimum duration for operation is configured in parameter P45, a cessation of the heat request in the marked states is ignored.

*31) Switching from ionization input to PE during ignition.

Flow diagram

[illegible]

	Off		Must be off by end of state		Cannot be changed / remains in State
	On		Must be on by end of state		On or off in state
	Don't care		Wait until input off, Fail > tmax		
	Inexistent		Wait until input on, Fail > tmax		

*A) Failure / Lock-out mode

*B) Jump from flame to HT mode

*1) Operation mode High-temp. is detected by both configured terminals as an EXOR signal and mode transition is after a tolerance time of 1 s. High-temperature (HT) mode is selected or disabled by parameter P86. If the system changes to HT mode (>1 s) while operating in flame mode, the sequence jumps to the 4 states marked with "Ab", then jumps directly to state "HT stabilize A or B".

*2) If the system changes to flame mode (>1 s) while operating in High-temp mode, the sequence jumps to state "Standard position" and the burner starts in flame mode.

*4) Parameters P18, P24, P25, P26, P84 determine the functions of the inputs.

*5) If flame signal appears during state "HT operate", the sequence jumps, if air boost or V2 boost is active to the four states marked with "Ab" and then jumps directly to state "HT stabilize".

The number of HT recycle attempts per start/stop sequence for air boost, or V2 boost due to flame appearance is limited by parameter P81.

After the last possible recycle attempt (P81) the burner stays in operation and a warning message via bus and display is generated.

Flame appearance at type energy interrupt will generate also a warning message via bus and display. The burner stays in operation.

The warning message and display information will disappear while HT startup sequence (end of state "b1"), and after a switch to flame operation.

A tolerance time of P42 is accepted. If the flame appears and disappears for a period shorter than the time specified in P42 no action will follow.

*10) The flame signal must be constantly off for a minimum time of 5 s before advancing to the next state and if not achieved within 1 minute during state, then Fail.

*11) The flameinput is safety relevant for flame operation mode, non safety relevant in high temperature (HT) operation mode.

*12) The states marked with "0b" are necessary after a system restart (i.e. after power on, 24-hour self-check, ...).

After the initialization states and with the system still in HT operation mode, the sequence jumps to the 2 states marked with "0b"

When the heat request comes back ON after a normal shut down, the sequence skips the 2 states marked with "0b" and goes to "HT external light check".

*13) If the time since the last self check exceeds the time in parameter P82, the sequence will jump to do all self checks when the "heat request" is off.

This action resets the automatic 24 hour self check operation time (see note *15). For self checks, the sequence jumps to the state "Activate standard position".

*14) The "Power on start delay" state is executed for the duration specified in parameter P83 only after power on.

When the start sequence is initiated from a safety shut down, the duration of this state is <0.5 s.

*15) If the elapsed time exceeds 24 hours since the last self check, the sequence forces a normal shutdown, performs the self checks, and then starts again if the heat request is still active.

*16) These input functions tolerate incorrect signals up to 1 s. If the POC function is used, the tolerance can be set via P23.

*17) If the gas pressure min. check fails, no error is entered in the error log.

*18) Terminal X14 for V2 boost can be independent of Air boost on terminal X11.

*19) If the High-temp mode is ON during the marked flame state, the sequence jumps to the HT mode states marked with "0b".

*20) If P95 is set to 0 the flame input is ignored completely while HT operation (no check for improper flame and no check of flame appearance).

*21) The air output depends on a flag in the bus signal or a configured input in the wait states, during start-up and operation the output is always on.

*22) An external signal via fieldbus or via an appropriately configured input, changes (if on) to main burner operation after remaining in pilot operation for the second safety time.

*23) Flame operation: If the signal disappears during main burner operation, the state "restart pilot" is executed and then switched to flame detection or ignition (depending on P46).

HT operation: If the signal is lost in main burner operation, the state HT restart pilot is executed and then switched to HT stabilization time A.

*24) POC signal monitoring depending on the control V1 or V2.

*25) For operating modes without a pilot burner, the second safety time is skipped and the MPA goes directly into the operating state.

*26) An external signal via fieldbus or via a configured input switches V2 on/off during operation.

*27) An external signal via fieldbus or via an configured input switches output X14 for air valve control or as flexible output control.

This is only possible in the marked states, in the other states there is no output.

*28) Outside of start-up and operation, the air pressure switch can be monitored with a tolerance of 1.5s depending on the cooling / air purge, see for air pressure sw. 1=P16/P99, and air pressure sw. 2: P65/P100. The reaction of

the MPA to LDW errors in these cases can be configured via P27 and P29.

*29) During idle control of air pressure (if enabled) the output is automatically turned off.

*30) If a minimum duration for operation is configured in parameter P45, a cessation of the heat request in the marked states is ignored.

*31) Switching from ionization input to PE during ignition.

Configuration of multifunction inputs X16 to X20

The inputs on terminals 16 to 20 are not assigned fixed functions and can instead be defined using corresponding parameter settings.

Each function can be used only once. The functions can influence or exclude each other.

The parameters relevant for parameter setting are P18 and P24-P26, P84.

Note: If the five available hardware inputs are insufficient, check whether certain functions can be controlled by a fieldbus signal.

Function: Air pressure detectors LDW1 and LDW2

The functions of air pressure detector 1 (LDW1) are configured using parameters P18, P24-P26 and P84. Monitoring of air pressure can be configured in the programming steps (states) start-up, operation, post-aeration and in idle state control using P16.

If the air supply to the burner is maintained during non-burner operation (outside of burner start-up and operation) – for example, to cool the system – this can also be monitored.

A multifunction input can be used to configure a second LDW2 that is independent of LDW1.

The actively monitored program states are defined using parameters P16, P65, P99 and P100.

Function: Gas pressure detector with minimum operating pressure (GDWmin)

The function GDWmin monitors the minimum fuel pressure required for safe operation. If the required value is not met during start-up or in standby mode, the program state "Waiting for gas pressure" is activated.

If the gas pressure is lost during start-up, an error message is also entered in the error memory.

If pressure is lost during operation, a normal shutdown occurs.

The system exits the state "Waiting for gas pressure" only once gas pressure has been detected again.

Function: Check closed valve state (POC)

The system monitors the limit switch contact signal for a fuel valve.

The tolerance from activation of the valve output to receipt of the signal can be configured using P23. If no signal is detected within the configurable time, the system performs a safety shutdown.

Attention: The total closing time required for the application must be taken into account.

The POC function can be set separately for V1 and V2.

Function: Safety valve V2 stepwise on

The safety valve is activated via a multifunction input or fieldbus signal (P64).

Activation can be performed only in the operating state.

P80 is set to "Stepwise operation, V1 on V2 on / off".

Function: Main burner on

The main burner is activated via a multifunction input or fieldbus signal (P64). Activation is possible only in pilot mode (V1 open, flame detected).

P80 is set to pilot mode (with interrupted or permanent start gas).

Flame monitoring for pilot mode (= phase 1) and main mode (= phase 2) can be set using parameters P33 and P36. To switch back from main mode to pilot mode, the main burner is switched off using a signal.

P46 specifies whether the ignition is switched on to start the pilot burner.

Function: Air purge on (acts on output X14)

The air purge is activated via a multifunction input or fieldbus signal (P64).

Activation is only possible when starting from the "Idle state control LDW" state until the end of the re-start delay, and is otherwise ignored.

P80 is configured for "Direct ignition, V1 on, V2 = X14 for air purge".

Function: Flame monitoring

Two flame signals can be connected to the MPA.

Flame detector device 1: Ionisation input X5

Flame detector device 2: Single-pole digital input (NO) or two double-pole digital inputs (NC / NO) X16 to X20

The ionisation signal has a fixed assignment to connection X5.

This input is suitable for connecting an ionisation electrode or for flame detector devices that simulate an ionisation current, such as UV 41, FLW 20, KLC 20/230 etc.

A digitally switching flame detector device (flame detector device 2 – FLW 2) can either switch only the operating mode contact NO or additionally switch the idle state contact (NC).

The flame detector device must be suitable for switching mains voltage. See also the "Flame detector device" annex.

The flame monitoring performed by the automatic gas burner control system is divided into two phases. Phase 1 is the pilot burner mode; phase 2 is the main burner mode. The corresponding flame detector device can be assigned using the parameters P33 (= phase 1) and P36 (= phase 2). This can also be done using AND / OR operations.

Function: Heat request

The heat request is activated (P17) via a multifunction input or fieldbus signal (P64).

A combination of bus and hardware signal is possible.

Preferential cooling can be set using P65.

In this case, the automatic gas burner control system does not start up when a heat request is received.

If the heat request is not present at the beginning of start-up, the system switches back to the start-up standby position.

If the heat request cuts out shortly before ignition, the restart protection causes the system to switch back to the start-up standby position.

If the request cuts out after the valves have already been opened, a normal shutdown is performed via the post-aeration.

If a repeat heat request is issued during the post-aeration, the system responds by cancelling the post-aeration time only if the restart protection time P52 is configured as 0

Function: Remote unlock

The remote unlock is activated via a multifunction input or fieldbus signal.

Function: Gas pressure detector with maximum operating pressure (GDWmax)

The function GDWmin monitors the minimum fuel pressure required for safe operation.

The signal is monitored actively during operation.

Input for safety chain X10

Connection for limiters or breakers such as pressure controllers, temperature limiters, pressure limiters.

The switches must be suitable and tested for the required function. The switching capacity must be > 5 A.

If no switch / limiter is provided, X10 must be directly powered via the fuse.

Configuration of multifunction outputs X8 to X13 and X14

Function: Cooling (with X8) on

The burner or furnace can be cooled by opening the combustion air supply. In the states start-up standby, restart protection, waiting for gas pressure and fault, the fan / air valve (X8) output can be opened to provide cooling. The cooling function is activated via a multifunction input or bus signal (P64).

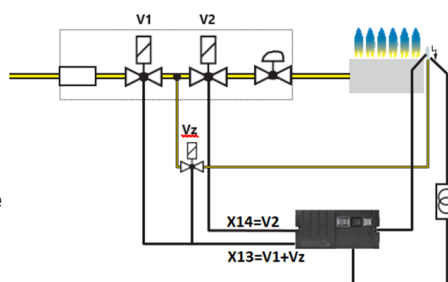
The response to LDW errors during cooling is defined using P29.

Parameter P28 specifies the prioritisation between cooling function and heat request.

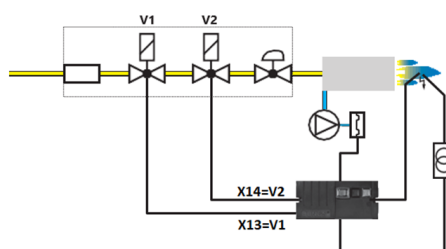
Function: Outputs X13 and X14

Parameter P80 can be used to configure the function of the valve outputs.

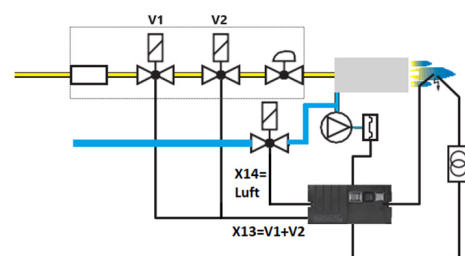
1. When using the setting with pilot gas valve (interrupted or permanent start gas), the second safety time, including a second stabilisation time, is observed during the state flow. This time is skipped when using other operating modes. If the "Main burner on" input function is also configured, the state flow pauses in pilot mode and waits for the signal to proceed in main burner mode.



2. For the "Direct ignition" option, V1 can be connected to X13 and V2 to X14.



3. For the option "Direct ignition, V1 on, V2 = X14 for air purging", both valves V1 and V2 must be connected to output X13. In this case, the power consumption of the valves must be taken into account in particular. Output X14 is controlled by a signal, see the above description of the function "Air purge (with X14) on".



Ignition output X15

The ignition output is activated depending on the program state. Ignition can be activated by P31 prior to the opening of the valves (pre-ignition).

If the main burner needs to be switched off during operation and the ignition burner started again, this behaviour is activated using P45.

Output for air fan / air valve X8

The fan or air valve output is activated depending on the program state. The output can be used as a cooling function (with X8) in a fault state or in standby mode (waiting for heat request).

Output for operation X11

The operation output can be configured individually (P19). Attention: Not approved for the switching of safety-related functions.

Output for alarm / fault X12

The output is activated in a fault state / when the automatic gas burner control system is locked. Attention: Not approved for the switching of safety-related functions.

State description		
MPA 41xx PF		
State xx	Designation	Description
00 (Fxx)	Errors	If the automatic gas burner control system is in this state, an error is present. The display automatically switches to the error screen and shows the current error (e.g. "F 11") instead of the state number. The air valve (X8) can be switched on and off using a signal (bus or HW).
01 (H5)	Manual operation pause 1	If the switch for parameter mode is on "Para", the MPA stops in this state. The user must use the "Next" button (unlock button) to confirm the listed parameters. If no button is pressed for 30 minutes, the automatic gas burner control system restarts or enters fault mode. If the parameter switch is reset prior to reaching the H5 display and parameters have been changed, they are not yet released and the automatic gas burner control system enters fault mode (see error F 60).
02 (00)	Switch-on delay when powering on	When powering on, the MPA must wait for a configurable value before it switches to the next state, see chapter P83: Duration of switch-on delay after powering on.
03 (00)	Running in default position	From this state, the gas pressure is checked (if a gas pressure detector has been configured at least for inputs X16 to X20). If there is no pressure, the MPA will switch to the lack of gas state without an error message (i.e. FM locking does not take place).
04	Internal state	
05 (01)	Watchdog loading phase	A check is made to determine whether the safety chain is still open; if this is the case, open branching to state 45 safety chain will take place. If the safety chain is OK, the safety-relevant watchdog switch is activated. If the safety chain is opened after the WD relay is pulled in up to and including the HT restart protection, a safety shutdown will be performed. The restart attempt depends on P15: locks if the safety chain is open.
06 (A4)	Idle state control LDW	Depending on the operating mode of the LDW (P16 / P65), a check is performed for whether the LDW is reporting "no air pressure". The maximum state time is 60 s; if the air pressure detector does not achieve any idle time during this time, the automatic gas burner control system will perform a safety shutdown with a restart attempt or a fault if FM mode is active (see P22: Configuration of FM mode). If HT mode is permitted (see P86 and if the HT signal function has been configured to two inputs for NO and NC from X16 to X20), the system will respond to an HT signal here and switch to HT mode via the "0b" states (states 28 and 29).

* In () on the display

State description		
MPA 41xx PF		
State xx	Designation	Description
07 (A0)	Waiting for heat request	The automatic gas burner control system is ready for operation, but no heat request is present. The MPA can start a voluntary self-test from this state (see P82: Self-test). The air valve (X8) can be switched on and off using a bus command. Up to this state, if there is no gas pressure, the MPA will switch to the lack of gas state with no error message. If HT mode is permitted (see P86 and the HT signal function has been configured to two inputs for NO and NC from X16 to X20), the system will respond to an HT signal here and switch to HT mode via the "0b" states (states 28 and 29).
08 (A1)	External light monitoring	Within the maximum state time of 1 min., the flame must no longer be detected. If it is detected, the automatic gas burner control system will attempt a restart. From this state, the air valve is activated and can no longer be deactivated via bus or HW input.
09 (A1)	Waiting for air pressure	If the MPA is configured to connect an LDW, the air pressure must be on within a maximum state time of 60 s. Otherwise, the automatic gas burner control system will perform a safety shutdown with a restart attempt depending on P22 (see P22: FM mode configuration). An external light control will take place for the entire duration of this state.
10 (A1)	Pre-aeration	This state provides sufficient pre-aeration. For the set duration of the pre-aeration parameter see P30 and P47: Pre-aeration duration. An external light control will take place for the entire duration of this state. Up to and including this state, if the heat request cuts out, the system will jump to flame restart protection. If HT mode is permitted (P86 configured correctly), the system will respond to an HT signal here and switch to HT mode via the "0b" states (states 28 and 29).
11 (A1)	Pre-ignition	Ignition is already activated here (terminal 15) for the duration of parameter P31 without valve V1 being open. From this state, if the heat request cuts out again, flame post-aeration will be performed.
12 (A1)	First safety time – flame detection	In this state, gas valve V1 is opened. Gas flows and a flame is able to form. The state duration is P32 – 0.5 s.
13 (A1)	Flame A stabilisation	The process for flame detection starts after the ignition is deactivated. If an ionisation current is flowing or a switch input detects a signal, depending on the configuration, the MPA will report a flame. The state duration is 0.5 s.
14 (A2)	Stabilisation	The flame can stabilise in this state. The duration of this stabilisation phase is configured via P34 (stabilisation time). If HT mode is permitted (see P86 and the HT signal function has been configured to two inputs for NO and NC from X16 to X20), the system will respond to an HT signal here and switch to HT mode via the "Ab" states (states 24 to 27).

State description

MPA 41xx PF

State xx	Designation	Description
15 (A2)	Pilot burner mode	If a pilot burner is configured with P80 (value 4 or 5) and an input or bus control (with P64) is configured to the "Main burner on" function, the automatic gas burner control system will stay in this operating state for the pilot flame and wait for the signal to switch to the second safety time to start the main burner. In this state, flame monitoring continues with phase 1 (P33). After 24 hours of operation, a forced normal shutdown will be performed automatically, as the MPA works in intermittent operation. If HT mode is permitted (see P86 and if the HT signal function has been configured to two inputs for NO and NC from X16 to X20), the system will respond to an HT signal here and switch to HT mode via the "Ab" states (states 24 to 27).
16 (A2)	Second safety time	In this state, gas valve V2 is opened. The state duration is P35 – 0.5 s. Note: The states for the second safety time including stabilisation B are executed only if the pilot or main burner (value 4 or 5) is configured using P80.
17 (A2)	Second safety time Flame detection	The process for flame detection of the second flame will start. If an ionisation current is flowing or a switch input detects a signal, depending on the configuration, the MPA will report a flame for phase 2. The state duration is 0.5 s.
18 (A3)	Flame B stabilisation	Flame 2 can stabilise in this state. The duration of this stabilisation phase can be configured via P37.
19 (A3)	Operation	The automatic gas burner control system is now in operation. After 24 hours of operation, a forced normal shutdown will be performed automatically, as the MPA works in intermittent operation. If HT mode is permitted (see P86 and if the HT signal function has been configured to two inputs for NO and NC from X16 to X20), the system will respond to an HT signal here and switch to HT mode via the "Ab" states (states 24 to 27). If the heat request cuts out, the MPA will switch to the post-aeration state.
20 (A1)	Restart pilot burner	The automatic gas burner control system is now in operation. After 24 hours in this state, a forced normal shutdown will be performed automatically, as the MPA works in intermittent operation. If HT mode is permitted (P18 and P86 configured correctly), the system will respond to an HT signal here and switch to HT mode via the "Ab" states (states 19 to 22). If the heat request cuts out, the MPA will switch to the post-aeration state.
21 (A4)	Post-aeration	In this state, the system performs post-aeration of the combustion chamber (see P51: Post-aeration time). The gas valves are closed as of this state. The air valve will remain open in this state and will not be switched off until the next one.

State description		
MPA 41xx PF		
State xx	Designation	Description
22 (A4)	Follow-up time	During this time (P50-P51 if > 0), a flame signal may still be present from the previous mode due to existing residual gas in the combustion chamber, for example. External light monitoring will not start until the following state. The follow-up time starts in the post-aeration state. If the post-aeration is equal to or greater than the follow-up time, then the follow-up time state is skipped.
23 (A4)	Restart protection	In this state, the system waits until parameter P52 has finished. This prevents an immediate restart of the automatic gas burner control system if a heat request is active again. The flame must no longer be detected in this state; otherwise, the MPA reports an external light error.
24 (Ab)	Running operation test	Starting from this state, if the HT signal cuts out, the MPA will switch to HT post-aeration as the gas valves are open. States 24-27 will be performed in sequence. This will be followed by a switch to state 30 HT stabilisation.
25 (Ab)	Running HT mode	The state time is configured with P87. If the V2 boost function is active (see P80: mode X14), output X14 will be activated for this state duration.
26	Internal state	
27 (Ab)	Running HT mode	This state is followed by a switch to stabilisation for HT mode.
28 (0b)	Running startup test	The system will jump to this state after a power-up or restart or if the burner is not yet burning in flame mode and it receives an HT signal. Starting from this state, if the HT signal cuts out, the MPA will switch to state 3 (running in default position).
29 (0b)	Running HT startup	The system waits for the time in parameter P87, then switch to the idle state control LDW state for HT mode.
30 (b4)	HT idle state control LDW	Depending on the LDW mode (see P99 and P100: Air pressure detector mode), the air pressure is monitored in different states. Whether or not an idle state control is performed in this state depends on this parameter setting. The maximum state time is 60 s. If the air pressure detector does not achieve any idle time during this time, the automatic gas burner control system will perform a safety shutdown with a restart attempt or a fault if FM mode is active (see P22: Configuration of FM mode).
31 (b0)	HT waiting for heat request	The automatic gas burner control system is ready for operation in HT mode, but no heat request is present. The MPA can start a voluntary self-test from this state (see P82: Self-test). The air valve (X8) can be switched on and off using a bus command.
32 (b1)	HT external light control	Within the maximum state time of 60 s, the flame must no longer be detected if activated for HT mode (see P95: HT: External light monitoring). If the flame is still detected after this time, the automatic gas burner control system will perform a safety shutdown followed by a malfunction lockout. From this state, the air valve is activated and can no longer be deactivated via bus / HW.

State description

MPA 41xx PF

State xx	Designation	Description
33 (b1)	HT waiting for air pressure	If the MPA is configured to connect an LDW, the air pressure must be on within a maximum state time of 60 s. Otherwise, the automatic gas burner control system will perform a safety shutdown with a restart attempt depending on P22: FM mode configuration. An external light control will take place for the entire duration of this state if activated for HT mode (see P95: HT: External light monitoring).
34 (b1)	HT pre-aeration	This state provides sufficient pre-aeration. For the set duration of the pre-aeration parameter see P85 and P101: HT pre-aeration. An external light control will take place for the entire duration of this state if activated (P95). Up to and including this state, if the heat request cuts out, the system will jump to flame restart protection.
35	Internal state	
36 (b2)	HT stabilisation	HT mode can stabilise in this state. The duration of this stabilisation phase is configured via P89. From this state, if the heat request cuts out again, HT post-aeration will be performed. Starting from this state, if the HT signal cuts out, the MPA will switch to HT post-aeration.
37 (b2)	HT pilot burner mode	If a pilot burner is configured with P80 (value 4 or 5) and an input or bus control (with P64) is configured to the "Main burner on" function, the automatic gas burner control system will stay in this operating state for the pilot flame and wait for the signal to switch to the second safety time to start the main burner. In this state, flame monitoring continues with phase 1 (P33). After 24 hours of operation, a forced normal shutdown will be performed automatically, as the MPA works in intermittent operation. If HT mode is permitted (see P86 and if the HT signal function has been configured to two inputs for NO and NC from X16 to X20), the system will respond to an HT signal here and switch to HT mode via the "Ab" states (states 24 to 27).
38 (b2)	HT start of main burner	In this state, gas valve V2 is opened. The duration of this state is configured in P97. Note: The states for the second safety time including stabilisation B are executed only if the pilot or main burner (value 4 or 5) is configured using P80.
39 (b3)	Flame B stabilisation	Flame 2 can stabilise in this state. The duration of this stabilisation phase can be configured via P96.
40 (b3)	HT mode	The automatic gas burner control system is now in HT mode. After 24 hours in this state, a forced normal shutdown will be performed automatically, as the MPA works in intermittent operation. An external light control will take place for the entire duration of this state if activated (see P95: HT: External light monitoring). If a flame is detected, "blow-out attempts" may be started depending on the burner type (see chapter P81: Anti-oscillation counter in case of flame detection during HT). If the heat request cuts out, the MPA will switch to the HT post-aeration state.

State description		
MPA 41xx PF		
State xx	Designation	Description
41 (b1)	HT restart pilot burner	If the "Main burner on" signal in the main burner mode state cuts out, the pilot burner should be restarted; to do this, pilot valve V1 should be reopened. The state time is defined via P98.
42 (b4)	HT post-aeration	In this state, the system performs post-aeration of the combustion chamber (see chapter P90: HT post-aeration time). The gas valves are closed as of this state. The air valve will remain open in this state and will not be switched off until the next one.
43 (b4)	HT restart protection	In this state, the system waits until parameter P91 has finished. This prevents an immediate restart of the automatic gas burner control system if a heat request is active again.
44 (d2)	Lack of gas GDWmin	If the automatic gas burner control system is configured to use a GDW (see parameters for configuration of inputs X16 to X20), it will switch to this state when a lack of gas is detected from all states. It does not return to state 3 until gas pressure has built up. From the states after waiting for heat request, the MPA will generate an error message when making the jump.
45 (d1)	Safety chain open	The automatic gas burner control system remains in this state for the time set in parameter P20 if it does not detect a closed safety chain. Once the time has expired, the system uses P15 to decide whether immediate locking should take place or a restart. If the safety chain closes before the time set for P20 has expired, the MPA changes to state 3 and then checks the safety chain again in state 5.

Parameters

Parameter change

Parameter types

1-bit parameter (U1) – setting 0 and 1 (indicated as ON / OFF on the display), no limits

8-bit parameter (U8) – value setting within variable limits

16-bit parameter (U16) – value setting within variable limits.

A parameter can be changed using the display on the MPA 4112 PF / MPA 4122 PF, the AM 41 display on the MPA 4114 PF or the VisionBox software on a PC.

The access level assigned to a parameter must be present in order to change the parameter.

The value must be within the variable limits; a value outside these limits is not possible.

At access level 2 (OEM expert), it is possible to change the variable upper and lower limits. The variable limits may be changed only by using the VisionBox, not on the MPA display. The outer bounds for variable limits are restricted by fixed limits which cannot be changed.

To change a parameter that cannot be modified during normal operation, it is necessary to change to the state "Waiting for heat request".

Most parameters are monitored in automatic mode (switch on the PCB is set to "Auto"). The MPA detects changes to the values and immediately changes to malfunction lockout (error F 60). Value changes must be released in parameter mode (refer also to the parameter table).

As of the "OEM" access level, it is possible to release parameter changes directly using P10 "Release parameter settings".

Parameters			
Parameter description			
Parameters	Designation	Description	Setting / Examples
P10	Release parameter settings	Direct release of the parameter set without using parameter mode (parameter switch set to "Para"). Use of the OEM level is required to release parameters directly.	Setting / Examples Value range: 0: No, do not release 1: Yes, release parameter Note: If the parameter is set to cause a release, it will then to reset to 0 by the automatic gas burner control system.
P11	Fieldbus address configuration	Setting of the bus slave address of the MPA If an invalid address is set for the connected bus module and the MPA is in automatic mode, a restart attempt is initiated (error F 18). If an invalid value is set for the connected bus module and the MPA is in parameter mode, an error message is generated. When viewing the operating and error display, the current bus address can be seen by pressing the ← button.	Value range: OFF (no fieldbus present) 1 to 254 (e.g. Profibus setting range from 1 to 126) Note: Changes to the values for this parameter are not applied until a restart takes place.
P12	Number of restart attempts or anti-oscillation counter	Number of MPA restart attempts. If the most recent restart was unsuccessful, the MPA locks and changes to a non-volatile lock-out (state 0 "Error"). The anti-oscillation counter is reset when returning to the operating state after 15 min., in a normal shut-down or when the MPA is unlocked.	Value range: 0-5 restart attempts
P13	Number of restart attempts when flame is missing after the safety time for start-up	A restriction can be placed on the number of restart attempts after flame creation (P12) for cases in which the flame is still missing after the first safety time for start-up. The restart counter and the anti-oscillation counter are reset when changing to the operating state or after unlocking.	Value range: 0-5 restart attempts Example: P12 = 5, P13 = 1 No flame is generated during the first start phase → 1st restart attempt → error idle state control LDW → 2nd restart attempt → error idle state control LDW → 3rd restart attempt → After the third restart attempt LDW OK, there is still no flame present → The automatic gas burner control system locks even though the number of restart attempts (P12) has not yet been reached. This is because the number of restart attempts when flame is missing has been reached.

Parameters			
Parameter description			
Parameters	Designation	Description	Setting / Examples
P14	Number of restart attempts after flame lift-off or missing flame after the second safety time for start-up	A restriction can be placed on the number of restart attempts (P12) for cases where a flame lift-off occurs or the flame is still missing after the safety time for start-up. The restart counter and the anti-oscillation counter are reset when changing to the operating state or after unlocking.	Value range: 0-5 restart attempts Example: P12 = 5, P14 = 1 Flame lift-off during operation → 1st restart attempt → error idle state control LDW → 2nd restart attempt → error idle state control LDW → 3rd restart attempt → After the third restart attempt LDW OK, there is still no flame present → The automatic gas burner control system locks.
P15	Locking with open safety chain	If the safety chain is not closed, the MPA waits in state 35 (Safety chain open). If the safety chain is still open after the configurable time (P20) has elapsed, the system either switches to a malfunction lockout or restarts (depending on the anti-oscillation counter).	This setting also applies if the safety chain is opened after state 4. Setting: 0: Restart attempt, depending on the anti-oscillation counter 1: Immediate malfunction lockout
P16	LDW1: Mode	The monitoring of air pressure 1 in flame mode can be activated separately in start-up in pilot mode, in main burner mode, in post-aeration, if cooling is being performed in standby mode via X8 and if cooling is being performed in standby mode via X14. This also applies for LDW idle state control. Note: For input function LDW2, there is a separate parameter for flame mode (see P65) The functions LDW1 and LDW2 offer the same setting options.	Value range: LDW1 monitoring in flame mode during: Bit0: Idle state control Bit1: Pilot burner mode Bit2: Main burner mode Bit3: Startup Bit4: Post-aeration Bit5: Standby during cooling with X8 Bit6: Reserved Bit7: Standby during air purging with X14

Parameters			
Parameter description			
Parameters	Designation	Description	Setting / Examples
P17	Temperature controller mode	This parameter can be used to configure the behaviour of the MPA as it accepts the heat request via bus or via the HW input heat request / temperature controller (X19).	Setting 0: Only the heat request hardware input is active, the bus signal for the heat request is ignored. Note: This setting cannot be used to prioritise air purging (bus signal) ahead of the heat request (P241 Bit0 = 1); configuration errors will occur (see errors from the base system in the case of error 0x18) Setting 1: The bus signal for the heat request is active. However, the burner can start only if the HW signal is also present. If the bus connection cuts out, the MPA will perform a normal shutdown after a tolerance time of 10 s. Setting 2: The bus signal for the heat request is active. If the bus connection cuts out, the MPA will switch to the HW signal after a tolerance time of 10 s. Setting 3: Only the bus signal for the heat request is relevant. If the bus connection cuts out, the MPA will perform a normal shutdown after a tolerance time of 10 s. Setting 4: Only the bus signal for the heat request is relevant. If the bus connection cuts out, the MPA will perform a safety shutdown with a malfunction lockout after a tolerance time of 10 s. ATTENTION: Unlike Profibus, Modbus does not have cyclical communication, but the MPA expects a Modbus request each minute and an interrupted connection cannot be detected immediately. If no request is received, the bus module will forward a bus interruption to the system and F9 will flash on the display. Only then will the parameter P17 take effect with its behaviour.

Parameters			
Parameter description			
Parameters	Designation	Description	Setting / Examples
P18	X17 mode	This parameter decides the function according to which the input should behave.	Setting 0: No function assigned for this input. Setting 1: Function: HT-NO for high-temperature signal. The signals NO and NC must be inverted. When using this setting, an HT NO function must also be set, otherwise a configuration error occurs. Setting 2: Function: Flame NC for the HT signal. Setting 3: Function: Min. gas pressure monitoring. Setting 4: Function: POC V1 closed position indicator switch signal for valve 1 Setting 5: Function: POC V2 closed position indicator switch signal for valve 2 Setting 6: Function: V2 stepwise on, for switching on output X14 in operation. Note: Also available as a bus signal Setting 7: Function: Main burner on, for switching the automatic gas burner control system to main burner mode. Note: Also available as a bus signal. Setting 8: Function: Air purge (control on / off possible for output X14 in start-up and operation) Note: Also available as a bus signal. Setting 9: Function: LDW1, for monitoring an air pressure detector. Note: Also take setting P16 / P99 into account. Setting 10: Function: Heat request / temperature controller Setting 11: Function: Remote unlock Note: Also available as a bus signal. Setting 12: Function: Flame NO for flame input 2. Setting 13: Function: Switch on fan / air valve (X8) to provide cooling Note: Also available as a bus signal. Setting 14: Function: LDW2, for monitoring an air pressure detector 2. Note: Also take setting P65 / P100 into account. Setting 15: Function: GDW max., for monitoring a gas pressure detector max.

Parameters			
Parameter description			
Parameters	Designation	Description	Setting / Examples
P19	Configuration of output for operation	The output can be switched to specific states using the following parameter settings. On means 115 VAC or 230 VAC; all other states are off (i.e. 0 V).	Setting 0: "Waiting for heat request": Output is on in state 7 (Waiting for heat request) and in state 31 (HT waiting for heat request). Setting 1: "Flame stable" output is on in state 15 (Pilot mode) and state 19 Operation. Setting 2: "HT stable" output is on in state 37 (HT pilot mode) and 40 (HT mode). Setting 3: "Flame on": Output is on from state 14 (Stabilisation) to state 20 (Restart pilot). Setting 4: "Operation": Output is on in state 15 (Pilot mode), state 19 (Operation), state 37 (HT pilot mode) and state 40 (HT mode). Setting 5: "Pre-aeration": Output is on in state 10 (Pre-aeration) and in state 34 (HT pre-aeration). Settings 6-9: Reserved Setting 10: "Air boost": Output is on in state 25 (Running HT mode). Setting 11: "Bus-dependent": The output is bus-dependent, i.e. if bit 3 is set to AB0, the output is switched on regardless of the state of the MPA, even if there is a fault. Setting 12: Reserved Setting 13: "Pilot burner stable": Output is on in state 15 (Pilot mode) and state 37 (HT pilot mode). Setting 14: "Main burner stable": Output is on in state 19 (Operation) and state 40 (HT mode).

Parameters			
Parameter description			
Parameters	Designation	Description	Setting / Examples
P20	Safety chain open duration	This parameter can be used to determine the duration of state 25 (Safety chain open). This is the time after which the automatic gas burner control system makes a restart attempt or switches immediately to a lock state, depending on the anti-oscillation counter and P15 (Locking with open safety chain).	Value range: 0 to 65 534 (resolution in 1/16 s). 65 535: State duration infinite
P22	FM mode	Immediate non-volatile lock-out in the event of: lack of gas, main gas limit switch error, error in idle state control for air pressure detector and no air pressure error	Setting 0: Not active Setting 1: Active
P23	POC tolerance time	Configurable tolerance time to safety shutdown is triggered with a limit switch error. The prescribed maximum total closing time must be taken into account.	Value range: 16 to 48 (resolution in 1/16 s)
P24	Input X16	This parameter specifies the function according to which the input should behave.	Same setting options as P18 input X17
P25	Input X19	This parameter specifies the function according to which the input should behave.	Same setting options as P18 input X17
P26	Input X20	This parameter specifies the function according to which the input should behave.	Same setting options as P18 input X17
P27	Behaviour for air pressure error, external air purging	Response to LDW error during air purging (for X14) LDW monitoring during air purging, see P16 / P65 / P99 / P100	Setting 0: No response (only information on bus) Setting 1: Error memory entry only Setting 2: Safety shutdown with restart attempt

Parameters			
Parameter description			
Parameters	Designation	Description	Setting / Examples
P28	Behaviour when waiting for air purge / cooling	Setting the priority for a ventilation (for X14) or cooling request (for X8) compared to the heat request	Bit 0: OFF = heat request overwrites cooling request (for X8), MPA goes into operation even in the event of a cooling request Bit 0: ON = cooling request (for X8) overwrites heat request When the cooling request is set (can be done via bus / HW) in operation, the MPA performs a normal shutdown and remains in waiting for heat request with cooling. Bit 1: OFF = heat request overwrites ventilation request (for X14), MPA goes into operation even in the event of a ventilation request Bit 0: ON = ventilation request (for X14) overwrites heat request When the ventilation request is set (can be done via bus / HW) in operation, the MPA performs a normal shutdown and remains in waiting for heat request with cooling.
P29	Behaviour for air pressure error, external cooling	Response to LDW error during cooling (for X8). LDW monitoring during cooling, see P16 / P65 / P99 / P100	Setting 0: No response (only information on bus) Setting 1: Error memory entry only Setting 2: Safety shutdown with restart attempt
P30	Pre-aeration duration	This parameter can be used to determine the duration of state 10 (Pre-aeration). Attention: The time in P47 Pre-aeration B is added	Value range: 0 to 65 534 (resolution in 1/16 s)
P31	Duration of pre-ignition time	This parameter can be used to determine the duration of state 11 (Pre-ignition). During this time, ignition is already active and the gas valve is closed.	Value range: 2 to 65 534 (resolution in 1/16 s)
P32	Safety time for start-up / first safety time	Defines the duration of the safety time for start-up. Maximum time from opening the gas valves to flame detection. NOTE: This duration is divided between the two states 12 and 13. State 13 always lasts 0.5 seconds.	Value range: 16 to 240 (resolution in 1/16 s) Attention: In FM applications, the following times must not be exceeded. Burner with direct ignition: < 2 500 000 Btu/h ≤ 15 s (Setting value max. 240) > 2 500 000 Btu/h ≤ 10 s (Setting value max. 160)

Parameters			
Parameter description			
Parameters	Designation	Description	Setting / Examples
P33	Active flame detector device(s) for safety time for start-up	This parameter controls which flame detector device(s) (state 13 to state 16) is / are active for flame detection. NOTE: If flame signal 2 is used, take into account the input settings P18, P24, P25, P26, P84 (function: flame detector devices NO for FLW 2).	Setting 1: Only flame signal 1 is relevant Setting 2: Only flame signal 2 is relevant Setting 3: Flame 1 AND flame 2 Setting 4: Flame 1 OR flame 2
P34	Stabilisation time A	Duration of states 14 "Stabilisation of flame A"	Value range: 0 to 65 534 (resolution in 1/16 s)
P35	Second safety time during start-up	Duration of the second safety time. This setting is for the maximum time from the opening of gas valve V2 until flame detection in phase 2.	NOTE: This duration is divided between the two states 16 and 17. State 17 always lasts 0.5 seconds. Value range: 16 to 480 (resolution in 1/16 s) Attention: In FM applications, the following times must not be exceeded. Burner with pilot flame: 10 s (setting value max. 160) Burner with direct ignition: < 2 500 000 Btu/h ≤ 15 s (Setting value max. 240) > 2 500 000 Btu/h ≤ 10 s (Setting value max. 160)
P36	Active flame monitor(s) for phase 2	The parameter controls which flame monitor(s) is / are active in phase 2 (state 17 "Second safety flame detection" to state 20 "Restart pilot") for flame detection. NOTE: If flame signal 2 is used, take into account the input settings P18, P24, P25, P26, P84 (function: flame detector devices NO for FLW 2).	Setting 1: Only flame signal 1 is relevant Setting 2: Only flame signal 2 is relevant Setting 3: Flame 1 AND flame 2 Setting 4: Flame 1 OR flame 2
P37	Stabilisation time B	Defines the duration of state 18 "Stabilisation of flame B" after the second safety time.	Value range: 0 to 9 600 (resolution in 1/16 s)
P39	Ionisation threshold	An ionisation current above 1.2 µA is registered as a flame. The threshold for ionisation flame detection (FLW 1) can be increased with this parameter. The threshold applies to start-up during external light detection and also to operation. In order to ensure a sufficient safety clearance, it must be ensured that the measurement tolerance is ± 0.5 µA.	Value range: 12 to 60 (resolution in 0.1 µA)

Parameters			
Parameter description			
Parameters	Designation	Description	Setting / Examples
P41	Safety time operation FLW 1	Defines the duration of the MPA safety time during operation for flame 1. Time until the gas valves close in the case of flame failure.	Value range: 12 to 56 (resolution in 1/16 s) ATTENTION: The total response time to flame failure during operation consists of P41 plus any possible response times of external flame detector devices, see the "Flame detector device" annex.
P42	HT tolerance time for flame signal	If a flame is detected in HT mode for longer than this tolerance time, the MPA will switch to state 19 and attempt to "blow out" the flame. Modes in which the flame is blown out (with the remaining modes, the MPA does not change state): - Air boost to X11, see P19 - V2 boost to X14, see P80 If this is not successful, this procedure will be repeated (see P81: Anti-oscillation counter in case of flame detection during HT). Flame detection during HT can be deactivated (see P95: HT: External light monitoring).	Setting 12 to 80 (resolution in 1/16 s) NOTE: The parameter value is the minimum response time. Depending on the boundary conditions, the actual response time may be extended.
P43	Duration for new start of pilot burner	If the "Main burner on" signal cuts out and triggers a switch back to pilot mode, this parameter is used to determine the period in which V1 opens again before the state process switches back to flame detection / ignition (note P46).	Value range: 8 to 960 (resolution in 1/16 s)
P44	Safety time operation FLW 2	Defines the duration of the MPA's safety time during operation for flame 2. Time until the gas valves close in the case of flame failure.	Value range: 7 to 56 (resolution in 1/16 s) ATTENTION: The total response time to flame failure during operation consists of P44 plus any possible response times of external flame detector devices, see the "Flame detector device" annex.
P45	Minimum duration of normal operation	For both operating states, the heat request signal is maintained until the time set via this parameter has expired. If a time is configured, the stabilisation triggered by a loss of the heat request can no longer be interrupted.	Value range: 0 to 960 (resolution in 1/16 s)
P46	Ignition on for pilot restart	After the "Restart pilot burner" state, this parameter determines whether the system switches to ignition (state 12) or directly to flame detection.	Value range: 0: Directly to flame detection 1: To ignition

Parameters			
Parameter description			
Parameters	Designation	Description	Setting / Examples
P47	Duration of pre-aeration B	This parameter can be used to determine the duration of state 10 (Pre-aeration). Attention: The parameter "Pre-aeration" (P30) is also added to the state time	Value range: 0 to 32 767 (resolution in 1/16 s)
P50	Follow-up time	Defines the follow-up time (state 22), although the time measurement already starts during post-aeration (state 21). That is, if the follow-up time is less than or equal to the post-aeration time, the "Follow-up time" state is skipped.	Value range: 16 to 160 (resolution in 1/16 s)
P51	Post-aeration time	Defines the duration of the post-aeration time (state 21).	Value range: 0 to 65 534 (resolution in 1/16 s)
P52	Restart protection	Defines the duration of the restart protection (state 18).	Value range: 8 to 65 534 (resolution in 1/16 s)
P60	Network address 2	Setting of Profinet address	Value range: 0 to 255
P61	Network address 1	Setting of Profinet address	Value range: 0 to 255
P62	Network address 0	Setting of Profinet address Note: The last part of the address is located in P11 (Fieldbus address)	Value range: 0 to 255
P64	Selection of HW or bus inputs	This parameter is used to select whether input signals should be accepted via an HW input or via a field bus signal.	Setting using 4 bits: Bit0: Main burner on Bit1: V2 stepwise on Bit2: Air purge / flexible output function (for X14) on Bit3: Cooling (for X8) on The following applies for the functions: 0 = HW input or input function not configured, 1 = input function via Fieldbus.
P65	LDW2: Mode	This parameter is used to select whether input signals should be accepted via an HW input or via a field bus signal.	Value range: LDW2 monitoring in flame mode during: Bit0: Idle state control Bit1: Pilot burner mode Bit2: Main burner mode Bit3: Startup Bit4: Post-aeration Bit5: Standby during cooling with X8 Bit6: Reserved Bit7: Standby during air purging with X14

Parameters			
Parameter description			
Parameters	Designation	Description	Setting / Examples
P80	X14 mode	This parameter is used to define the function of output X14 and therefore to set the burner type.	Setting 0: Reserved Setting 1: High temperature active Setting 2: V2 boost Setting 3: Energy interrupt Setting 4: Interrupted start gas. V1 off, V2 on (pilot gas valve V1 off in second safety time) Setting 5: Permanent start gas. V1 and V2 on (pilot gas valve V1 also remains on for main mode) Setting 6: Two-stage operation. V1 on, V2 on / off in operation (state 19 and 40), determined by input function or bus setpoint, see P64. Setting 7: Direct ignition. V1 and V2 both open for the first safety time; the second safety time is skipped in the state sequence Setting 8: Direct ignition with signal V1. Output X14 is used for air purge / flexible output function, see input functions. The second safety time is skipped in the state sequence.

Parameters			
Parameter description			
Parameters	Designation	Description	Setting / Examples
P81	Anti-oscillation counter in case of flame detection during HT (8-bit parameter)	If flame detection is active during HT (P95: HT: External light monitoring), an attempt will be made to "blow out" the flame in compliance with the tolerance time for flame detection (HT: Tolerance time for flame signal). The number of attempts started is configured using parameter P81. If all the attempts have been exhausted, the MPA will remain in HT mode but a warning message will be output on the display (see error from processor 2) and via the field bus (see master input data from MPA). The error message is reset at the state end of the HT pre-aeration, i.e. after a normal shutdown and a subsequent restart in HT mode. It is also reset after switching to flame mode in the watchdog loading phase state. The attempts are not carried out for energy interrupt; the MPA remains in operation and the warning message is output immediately. The parameter has no effect on these burner types (P80: Mode X14).	Settings 0 to 5
P82	Self-test	As the MPA 41xxPF is an intermittent automatic system, a self-test must be carried out every 24 hours (jump to state 3 and internal self-test). This parameter can be used to define a time from which the MPA will perform an early voluntary self-test if it is in waiting for heat request (flame or HT) to prevent a subsequent interruption of the heat request. If the MPA remains in operation for longer than the parameter value, a forced normal shutdown will be carried out, followed by a self-test.	Settings 1 to 1 439 (resolution in min).
P83	Duration of switch-on delay after power on (16-bit parameter)	After powering on, the system will wait for the time set in P83, i.e. switching on will be delayed. In the event of a safety shutdown with restart or after unlocking from a fault, the system will not wait and the parameter will have no effect.	Setting 0 to 9 600 (resolution in 1/16 s).
P84	Input X18	This parameter specifies the function according to which the input should behave.	Same setting options as P18 input X17

Parameters			
Parameter description			
Parameters	Designation	Description	Setting / Examples
P85	Pre-aeration time HT	This parameter can be used to determine the duration of state 34 (HT pre-aeration). Attention: The time in P101 HT: Pre-aeration B is added	Same setting options as P18 input X17
P86	HT operating mode permitted	This parameter be used in order not to permit HT mode.	Setting 0: HT operation not permitted. The HT mode states are not accessible, even if the HT signal on the inputs is correctly present. Setting 1: HT operation permitted.
P87	Duration of jump from flame or power on after HT	Defines the duration for state 25. That is, this sets the length of the boost function (if used) via output X14 or X11.	Setting 16 to 4 800 (resolution in 1/16 s).
P89	HT: Stabilisation time	Defines the duration of the HT stabilisation time state (state 36, HT stabilization).	Setting 8 to 4 800 (resolution in 1/16 s).
P90	HT: Post-aeration time	Defines the duration of HT post-aeration time (state 32, HT post-aeration).	Setting 0 to 65 534 (resolution in 1/16 s).
P91	HT: Duration of restart protection	Defines the duration of the HT restart protection (state 33, HT restart protection).	Setting 8 to 65 534 (resolution in 1/16 s).
P92	Service interval WD	One counter counts the application of the watchdog relay in state 5 (Watchdog loading phase). If the counter value reaches the value in parameter $P92 \cdot 1\,000$, a notification will be output via fieldbus (see chapter Master input data from MPA) and via the display (see chapter Errors without error ID). However, the MPA will continue to operate. The notification can be reset after servicing via the display (see reset display).	Setting 1 to 65 534 (resolution 1 000).
P93	Service interval V1	One counter counts the application of relay V1. If the counter value reaches the value in parameter $P93 \cdot 1\,000$, a notification will be output via fieldbus (see chapter Master input data from MPA) and via the display (see chapter Errors without error ID). However, the MPA will continue to operate. The notification can be reset after servicing via the display (see reset display)	Setting 1 to 65 534 (resolution 1 000).

Parameters			
Parameter description			
Parameters	Designation	Description	Setting / Examples
P94	Air output service interval	A counter counts the application of the relay for air output. If the counter value reaches the value in parameter P94*1 000, a notification will be output via fieldbus (see chapter Master input data from MPA) and via the display (see chapter Errors without error ID). However, the MPA will continue to operate. The notification can be reset after servicing via the display (see reset display).	Setting 1 to 65 534 (resolution 1 000).
P95	External light monitoring	This parameter can be used to completely deactivate external light monitoring in HT mode, i.e. no "blow-out attempts" will be started because no flame is detected. Parameter P81 anti-oscillation counter in case of flame detection during HT and P42 HT: Tolerance time for flame signal have no effect.	Settings 0 to 1
P96	HT: Stabilisation time B	Defines the duration of state 39 "HT stabilisation B" after the second safety time.	Value range: 8 to 4 800 (resolution in 1/16 s)
P97	HT: Duration of start of main burner	Defines the duration of state 38 "HT start main burner" until V1 is closed again in pilot interrupted mode.	Value range: 8 to 4 800 (resolution in 1/16 s)
P98	HT: Duration of start of pilot burner	If the "Main burner on" signal cuts out and triggers a switch back to HT pilot mode, this parameter is used to determine the period in which V1 opens again before the state process switches back to the HT stabilisation state.	Value range: 8 to 960 (resolution in 1/16 s)
P99	HT: LDW1 mode	The monitoring of air pressure 1 in HT mode can be activated separately in start-up in HT pilot mode, in HT main burner mode, in HT post-aeration, if cooling is being performed in standby mode via X8 and if cooling is being performed in standby mode via X14. The same applies to LDW HT idle state control. Note: For input function LDW2, there is a separate parameter for HT mode (see P100) The functions LDW1 and LDW2 offer the same setting options.	Value range: 8 to 960 (resolution in 1/16 s)

Parameters			
Parameter description			
Parameters	Designation	Description	Setting / Examples
P100	HT: LDW2 mode	The monitoring of air pressure 2 in HT mode can be activated separately in start-up in HT pilot mode, in HT main burner mode, in HT post-aeration, if cooling is being performed in standby mode via X8 and if cooling is being performed in standby mode via X14. The same applies to LDW HT idle state control. Note: For input function LDW1, there is a separate parameter for HT mode (see P99) The functions LDW1 and LDW2 offer the same setting options.	Value range: LDW2 monitoring in HT mode during: Bit0: HT idle state control Bit1: HT pilot burner mode Bit2: HT main burner mode Bit3: HT startup Bit4: HT post-aeration Bit5: HT standby during cooling with X8 Bit6: Reserved Bit7: HT standby during air purging with X14
P101	HT: Duration of pre-aeration B	This parameter can be used to determine the duration of state 34 (HT pre-aeration). Attention: The parameter "Pre-aeration" (P85) is also added to the state time.	Value range: 0 to 32 767 (resolution in 1/16 s)
P239	Extension module	If an extension module is integrated, this parameter must be configured to > 0, otherwise the MPA will perform a safety shutdown with a restart attempt with error F 98.	Setting 0: Engine not needed Setting > = 1: module integrated
P240-P249		Reserved parameters	P244 value must be "0"
P260ff	Internal parameters	Do not change!	

Parameters							
Factory settings							
Para- meters	Designation	Factory setting	Unit	Access level	Convenience parameter settings	Min. value	Max. value
P10	Release param- eter settings	0		OEM			
P11	Fieldbus address configuration	255 = OFF		OPERATOR	x	1	255
P12	Number of restart attempts or anti-oscillation counter	0		OEM	x	0	5
P13	Number of restart attempts when flame is missing after the safety time for start-up	0		OEM	x	0	2
P14	Number of restart attempts after flame lift-off.	0		OEM	x	0	1
P15	Locking with open safety chain	ON		OEM	x		
P16	Operating mode for air pressure detector	31		OEM	x	0	255
P17	Temperature con- troller mode	0		SERVICE	x	0	4
P18	Input X17	0		OEM	x	0	16
P19	Configuration of output for operating mode	3		SERVICE	x	0	255
P20	Safety chain open duration						
P22	FM mode	960	1/16 s	OEM		0	65 534
P23	POC tolerance time	OFF		OEM			
P24	Input X16	16	1/16 s	OEM		16	48
P25	Input X19	0		OEM		0	16
P26	Input X20						
P27	Behaviour for air pressure error, external air purg- ing	10		OEM		0	16
P28	Behaviour when waiting for air purge / cooling						
P29	Behaviour for air pressure error, external cooling	11		OEM		0	16
P30	Pre-aeration du- ration	0	1/16 s	SERVICE	x	0	32 767
P31	Duration of pre-ignition time	0	1/16 s	OEM	x	0	1 920
P32	safety time for start-up	48	1/16 s	OEM	x	16	160

Parameters							
Factory settings							
Para- meters	Designation	Factory setting	Unit	Access level	Convenience parameter settings	Min. value	Max. value
P34	Stabilisation time A	1	1/16 s	OEM		1	4
P35	Second safety time during start- up	16	1/16 s	SERVICE	x	0	9 600
P36	Active flame monitor(s) for phase 2	16	1/16 s	OEM		16	480
P37	Stabilisation time B	1		OEM		1	4
P39	Ionisation threshold	16	1/16 s	SERVICE		0	9 600
P41	Safety time operation	16	1/16 s	OEM	6	12	56
P42	HT Tolerance time Flame signal	16	1/16 s	OEM		12	80
P43	Duration for new start of pilot burner	16	1/16 s	OEM		8	960
P44	Safety time operation FLW 2	16	1/16 s	OEM		7	56
P45	Minimum dura- tion of normal operation	0	1/16 s	OEM		0	960
P46	Ignition on for pilot restart	OFF		OEM			
P47	Duration of pre-aeration B	0	1/16 s	OEM		0	32 767
P50	Follow-up time	80	1/16 s	SERVICE		16	160
P51	Post-aeration time	0	1/16 s	SERVICE	8	0	65 534
P52	Restart protection	8	1/16 s	SERVICE	0	8	65 534
P60	Network address 2	192		OPERATOR		0	255
P61	Network address 1	168		OPERATOR		0	255
P62	Network address 0	0		OPERATOR		0	255
P64	Selection of HW or bus inputs	0		OEM		0	15
P65	LDW2: Mode	0		OEM		0	255
P80	Output X14 mode	2		SERVICE		0	8
P81	Anti-oscillation counter in case of flame detection during HT mode	0		SERVICE		0	5
P82	Self-test	1 380	min.	SERVICE		1	1 439

Parameters							
Factory settings							
Para- meters	Designation	Factory setting	Unit	Access level	Convenience parameter settings	Min. value	Max. value
P83	Duration of switch-on delay voltage on	0	1/16 s	SERVICE	5	0	9 600
P84	Output x18 mode	9		OEM		0	16
P85	Pre-aeration time HT mode	0	1/16 s	SERVICE	7	0	4 800
P86	HT on / off operating mode	OFF		OEM			
P87	Duration of voltage on or flame operation in HT mode	16	1/16 s	SERVICE	E	16	4 800
P89	HT mode stabilisation time	16	1/16 s	SERVICE		8	4 800
P90	HT mode post-aeration time	0	1/16 s	SERVICE		0	65 534
P91	HT duration of restart protection	8	1/16 s	SERVICE		8	65 534
P92	Watchdog (WD) service interval	250		SERVICE		1	65 534
P93	Service interval V1	1 000		SERVICE		1	65 534
P94	Ait output service interval	1 000		SERVICE		1	65 534
P95	HT mode external light monitoring	OFF		OEM			
P96	HT: Stabilisation time B	16	1/16 s	SERVICE		8	4 800
P97	HT: Duration of start of main burner	16	1/16 s	SERVICE		8	960
P98	HT: Duration of start of pilot burner	16	1/16 s	SERVICE		8	960
P99	HT: LDW1 mode	31		OEM		0	255
P100	HT: LDW2 mode	0		OEM		0	255
P101	HT: Duration of pre-aeration B	0	1/16 s	OEM		0	32 767
P239	Extension module yes / no	OFF		OEM			

Status information			
MPA 41xx PF			
Designation	Description	Displayed using VisionBox	Displayed using display
General information			
Non-volatile lock-out	Automatic gas burner control system is locked	●	LED
State number	Current state of the automatic gas burner control system, button combination + and -	●	7Seg
Current access level		●	
Flame	Flame detected	●	LED
Manual operation	Automatic gas burner control system in manual mode	●	7Seg
Flame quality	Value in µA good flame (for ionisation)	●	Info
HW input for temperature controller	Signal for temperature controller input	●	
Bus connection available	Connection OK	●	7Seg
Fieldbus available debounced	10 s debounced signal	●	
Temperature controller (HW + parameter / bus)	Signal combination from bus setpoint and HW input	●	LED
Flame in HT warning message		●	Fx
Error information for air pressure for cooling		●	
Error information for air pressure for air purge		●	
Temperature of automatic gas burner control system	Internal temperature of MPA	●	Info
Warning of high internal temperature	High internal temperature MPA > 82°C	●	
Inputs			
Air pressure detector 1	Signal from HW input for LDW1	●	
Air pressure detector 2	Signal from HW input for LDW2	●	
Flame 1	Signal from input for flame X5	●	
Flame 2 NO	Signal from HW input for Flame 2 NO	●	
HT-NO signal	Signal from HW input for HT-NO	●	
HT-NC signal	Signal from HW input for HT-NC	●	
Remote unlocking	Signal from HW input for remote unlocking	●	
GDW	Signal from HW input for GDW min	●	
Main burner on	Signal from HW input for main burner on	●	
Cooling (for X8) on	Signal from HW input for cooling (for X8) on	●	
Air purge (for X14) on	Signal from HW input for air purge (for X14) on	●	
POC V1	Signal from HW input POC V1	●	
POC V2	Signal from HW input for POC V2	●	
V2 stepwise on	Signal from HW input for V2 stepwise on	●	
Outputs			
Valve 1	Output X13	●	
Output X14	Output X14	●	
Ignition	Output X15	●	
Fan	Output X8 (air valve)	●	
Output X11	Output X11 (Operation)	●	

Status information			
MPA 41xx PF			
Designation	Description	Displayed using VisionBox	Displayed using display
Counter			
Lifetime counter	Time since the automatic gas burner control system was switched on	●	
Runtime meter	Flame mode runtime, not resettable	●	Info
Runtime meter resettable	Flame and HT, resettable via VisionBox and display	●	Info
Resettable start counter	Start counter for flame mode, resettable via VB and display	●	Info
Start counter	Flame mode start counter, not resettable	●	
HT runtime meter	HT flame mode runtime, not resettable	●	
HT start counter	HT start counter, not resettable	●	
Switching cycles counter WD	Switching cycles for watchdog relay, resettable via display	●	
Switching cycles counter V1	Switching cycles for V1 relay, resettable via display	●	
Switching cycles counter for air valve	Switching cycles, resettable via display	●	
Internal information			
State timer in minutes	Displayed state timer runs in minutes, otherwise in 1/16 sec.	●	
Initialisation phase	Automatic gas burner control system is being initialised	●	
Multi-function switch	Is "ON" when the unlock button is pressed	●	
Procedure for access level change	CCC or value flashes on the display, ↵ button expected	●	7Seg
Safety shutdown flag	Automatic gas burner control system is locked	●	
Error index	Internal error counter	●	
Remaining state time	Set to 65 535 if the remaining time is unlimited	●	
Cycl. state frame counter	Counts in a 1/128 s cycle	●	
Processor load		●	
Nominal modulation degree	No function	●	
Actual modulation degree	No function	●	

LED: Indicated by one of the 3 LEDs on the display

7Seg: Indicated by one or more characters on the 7-segment display

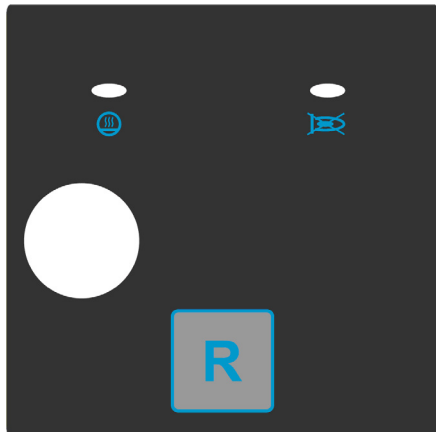
Info: Shown in information display mode

MPA 4114 PF

Version without display

The MPA 4114 version has an integrated RESET button and two LEDs that indicate the device status. The M8 socket in the display area can be used to connect an external AM 41 display that provides the same functions as the display on the versions MPA 4112 and 4122.

Display unit



Yellow LED

- Display of operating state

Red LED

- Display of a fault
- Flashing signal for error code
- Display of pause status during configuration

RESET button

- Unlocking
- Enhanced unlock
- Confirmation of access level change

Yellow LED information

LED off:

Fault (state 0)

LED permanently on:

Waiting for heat request (state 2) until second safety time for flame detection (state 17), and from the states post-aeration (20) to pause 5 (23).

Flashing LED (0.5 Hz):

Operating display (state 18 and state 19).

LED flashing rapidly (2 Hz):

Waiting for gas pressure if there is a lack of gas (state 24) and safety chain open (state 25).

Red LED information

Fault

The most important error codes are displayed using different flashing patterns.

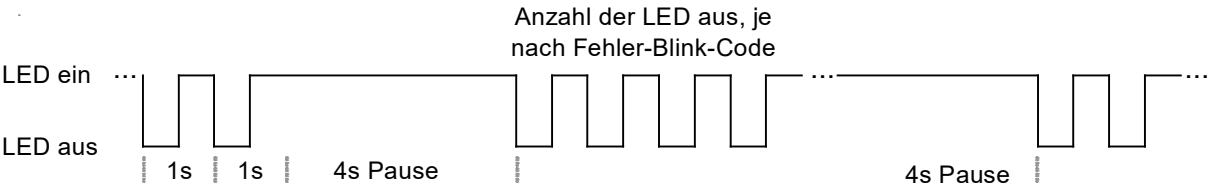
The remaining error codes are displayed using a permanently on LED.

Information conveyed by both LEDs:

Password entry expected.
Both LEDs flash alternately.

MPA 4114 in parameter mode.
After a password has been entered, both LEDs flash simultaneously.
Parameters can be changed.

Flashing patterns for error codes
MPA 4114 PF



Flashing code MinDisp	Error ID	Error designation
		Refer to the above tables for more information about individual errors
1	F A2	ERROR_SAFETY_CHAIN_OPEN
2	F 60	ERROR_PARAMETER_CHANGE_NOT_RELEASED
3	F A7	ERROR_NO_FLAME_DURING_FIRST_SAFETY_TIME
3	F BC	ERROR_NO_FLAME_DURING_SECOND_SAFETY_TIME
3	F A9	ERROR_FLAME_GONE_OUT_DURING_STABILISATION
4	F A8	ERROR_FLAME_GONE_OUT_DURING_OPERATION
5	F AA	ERROR_IDLE_STATE_CONTROL_LDW
5	F AB	ERROR_NO_AIR_PRESSURE
6	F A6	ERROR_EXTERNAL_LIGHT
7	F 18	ERROR_EXTERNAL_APPLICATION
8	F 16	ERROR_TWI_COMMUNICATION_AND_LOW_VOLTAGE

Parameter settings

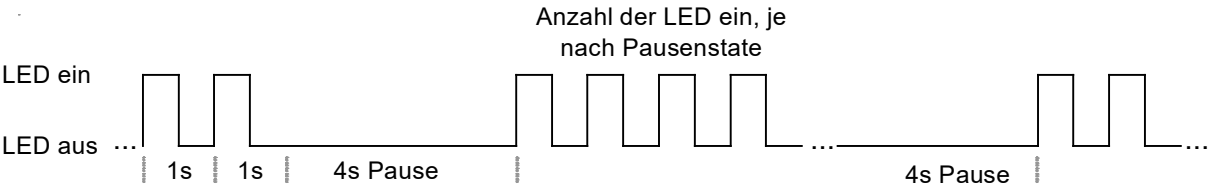
To change parameters, set the switch in the connection chamber to "Para" and supply the automatic gas burner control system with power; both LEDs flash alternately.
Enter the password and confirm it by pressing the RESET button. Both LEDs flash simultaneously.
The parameters can now be changed. In parameter mode, the MPA stops in pause states. Press the RESET button to continue to the next state (see state description).

Attention

The changed parameters are applied after pause 5 (state 23).
The flashing frequency of the LED indicates the pause state and shows that the RESET button must be pressed.

Example

The system has reached the state "Pause 4". The red LED flashes 4 times and then switches off for 4 seconds.



Information conveyed by both LEDs

When the power is turned on, both LEDs illuminate twice to check that they are functioning correctly.

Both LED flash (1 Hz) if a button press is required to change a level or if the automatic gas burner control system is ready for enhanced unlocking (pressing a button for between 5 and 10 s).

Both LEDs flash alternately if the automatic gas burner control system is started in parameter mode and the password for changing the parameters has not yet been entered (using VisionBox on the PC). The RESET button (and therefore manual mode) is locked.

**MPA 4112 PF, MPA 4122 PF,
display AM 41**

Display function

The integrated display or an external display can be used to set all parameters of the MPA.

Passwords are used to regulate access rights.

The display can show different information depending on the operating status of the automatic burner control system.

The device parameters can also be set using the VisionBox.



Display 3 x 7 segment

LED:

Blue: Heat request

Yellow: Flame quality
(flashes if the flame quality is poor)

Red: Fault



Release button

RESET function and confirmation of input



Back



Plus

Increase the indicated value



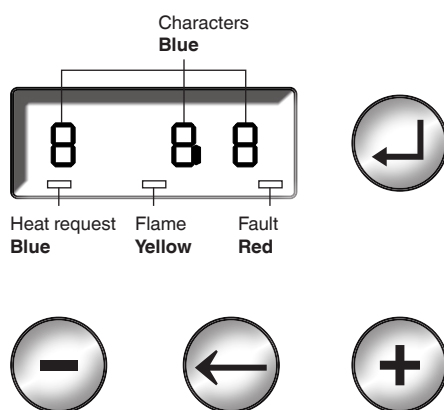
Minus

Reduce the indicated value

Overview of display modes
MPA 4112 PF / MPA 4122 PF /
AM 41
Mode

Active

Operating display	in normal operating conditions, if there is no fault.
Error display	if the unit is subject to a malfunction lockout.
Information display	From the operating display or error display by pressing the button combination  and 
Error memory display	From the operating display or error display by pressing the button combination  and 
Parameter display	From the operating display or error display by pressing the button combination  and 
Reset display	From the operating display or error display by pressing the button combination  and 
Flashing display	Depending on display mode: 1. Prompt to confirm the switch of access level 2. To intentionally reboot the MPA, press and hold the unlock button for more than 5 seconds ("Enhanced unlock") 3. Processor 2 error, see error list 4. New password after password change 5. Unit restart, all segments and LEDs flash



Attention

Note the appearance on a 7-segment display

1. Digits

6 = 6

8 = 8

0 = 0

2. Letters

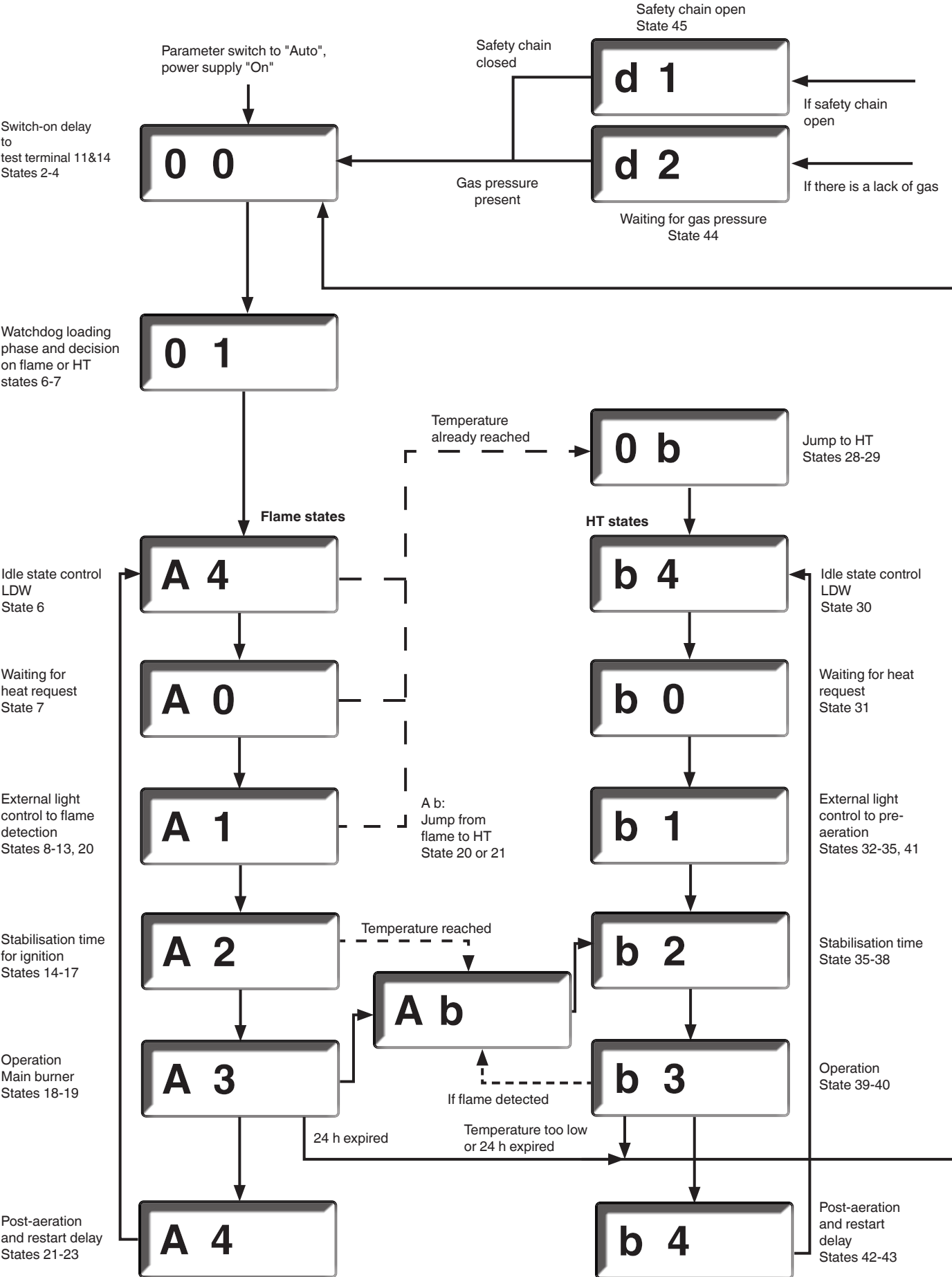
B or b = b

D or d = d

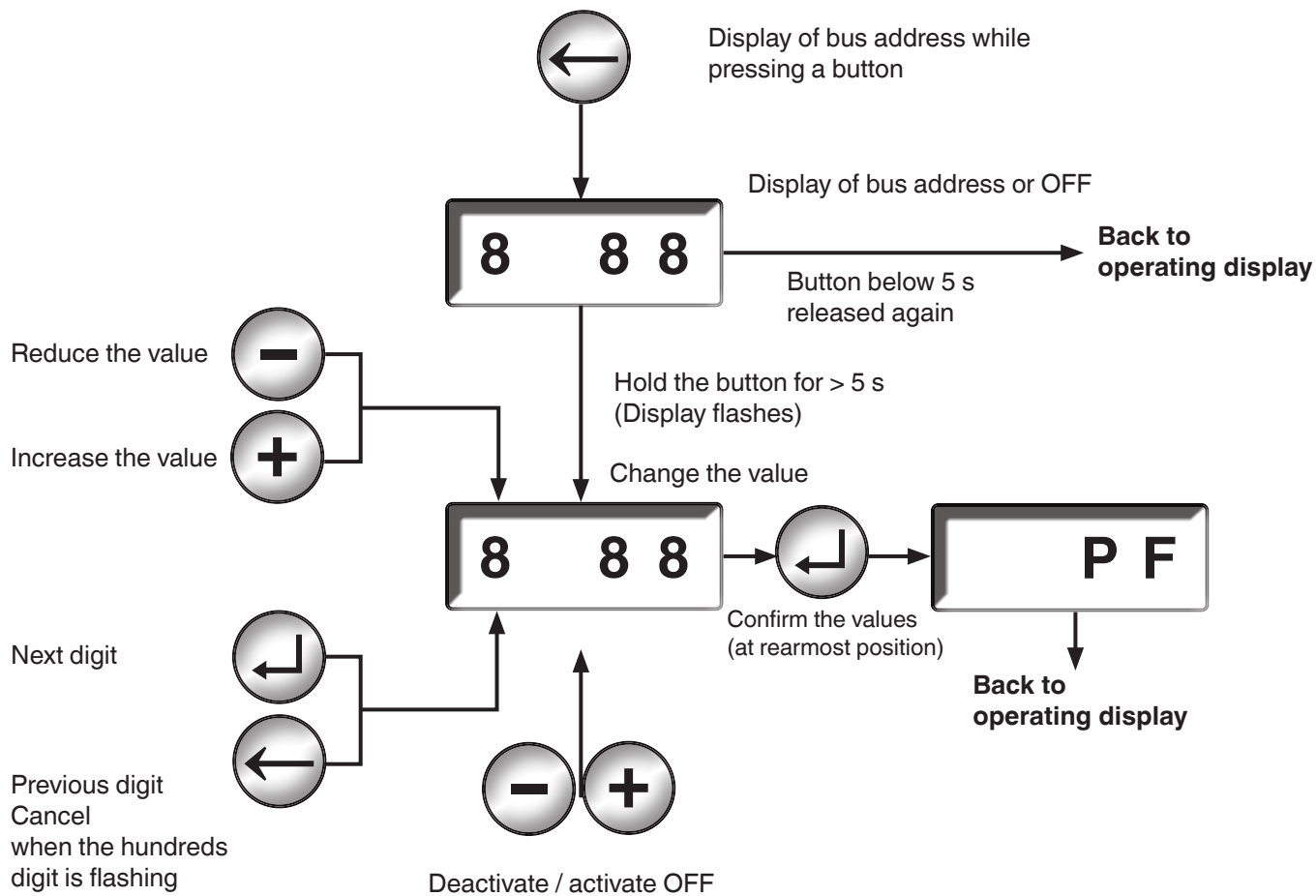
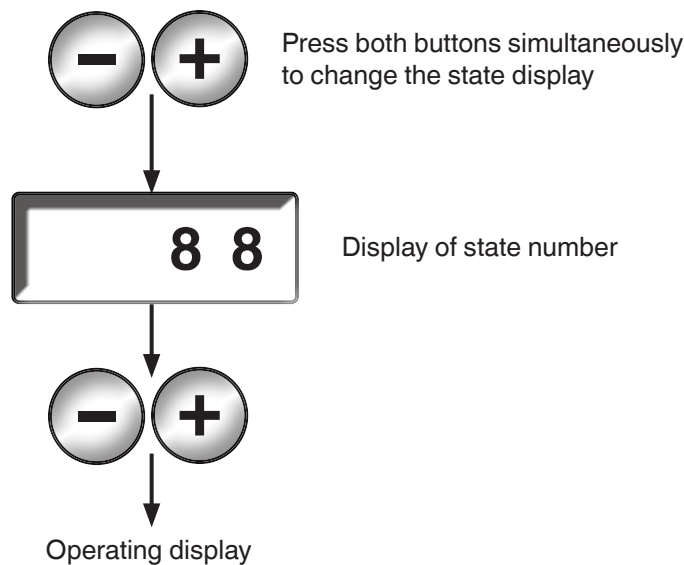
O or o = o

Operating display MPA 41xx PF

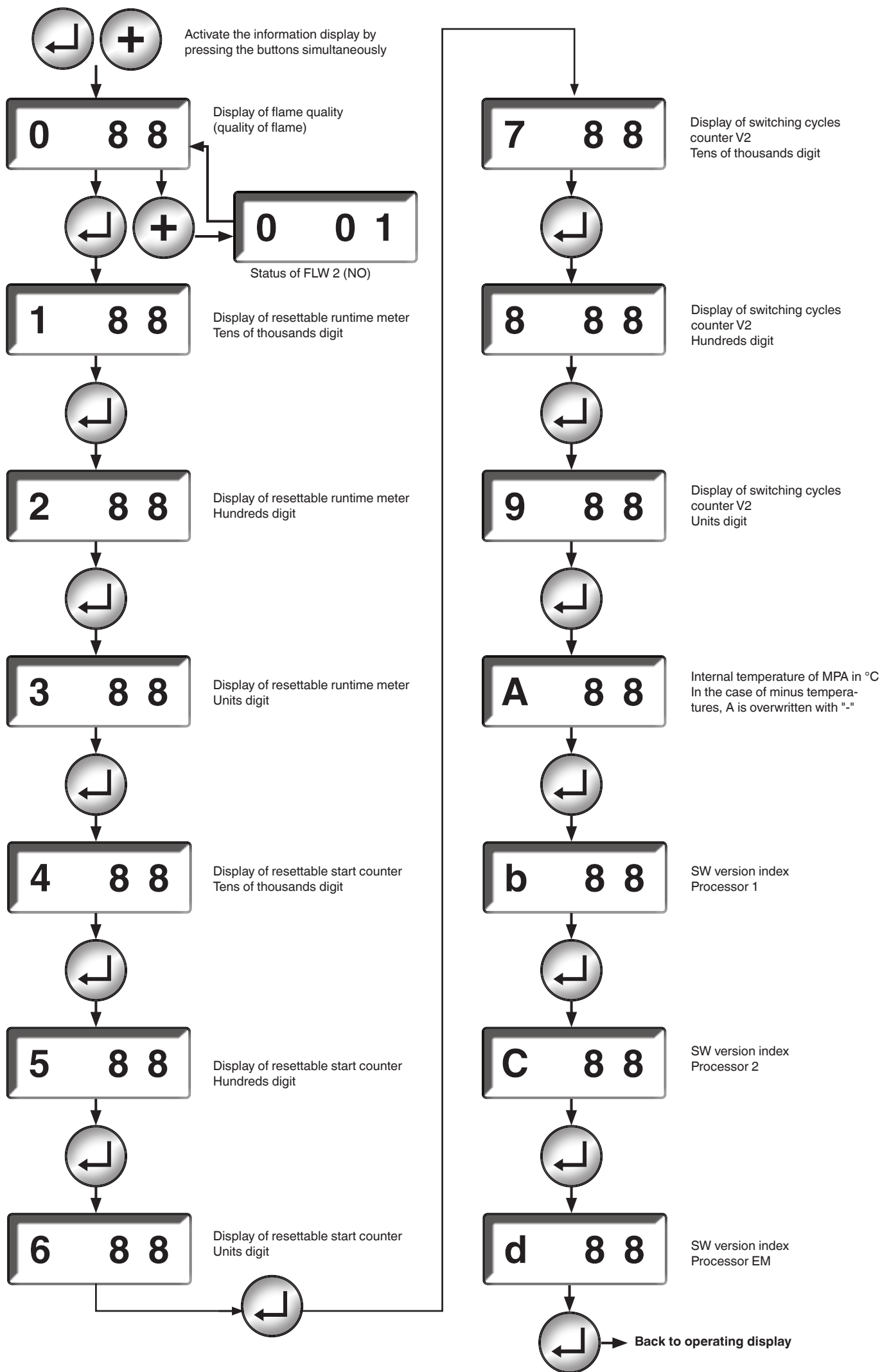
► Indicates the operating state of the automatic gas burner control system



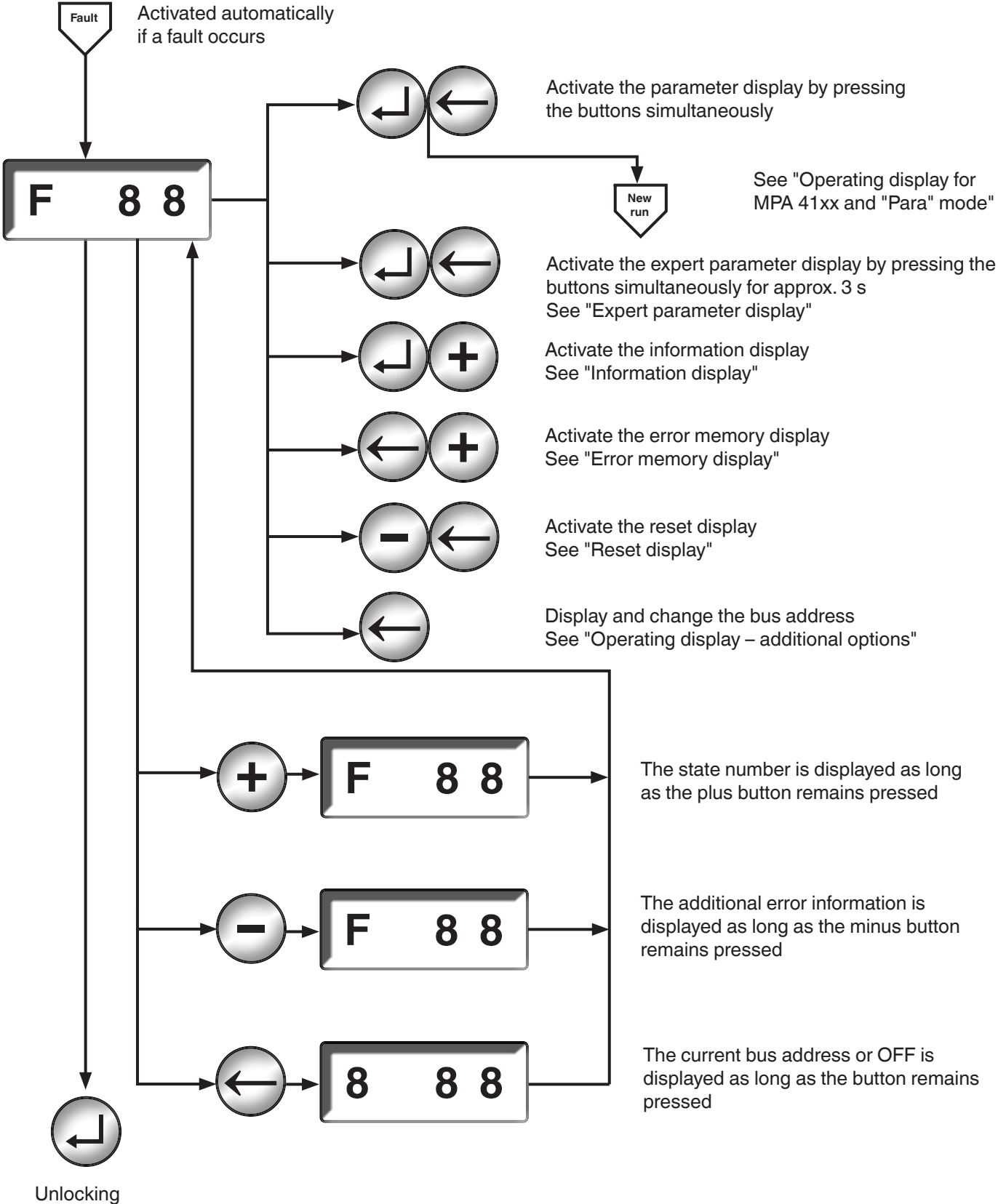
Operating display – additional information	
►	Display of state number
►	Display and setting of the bus address



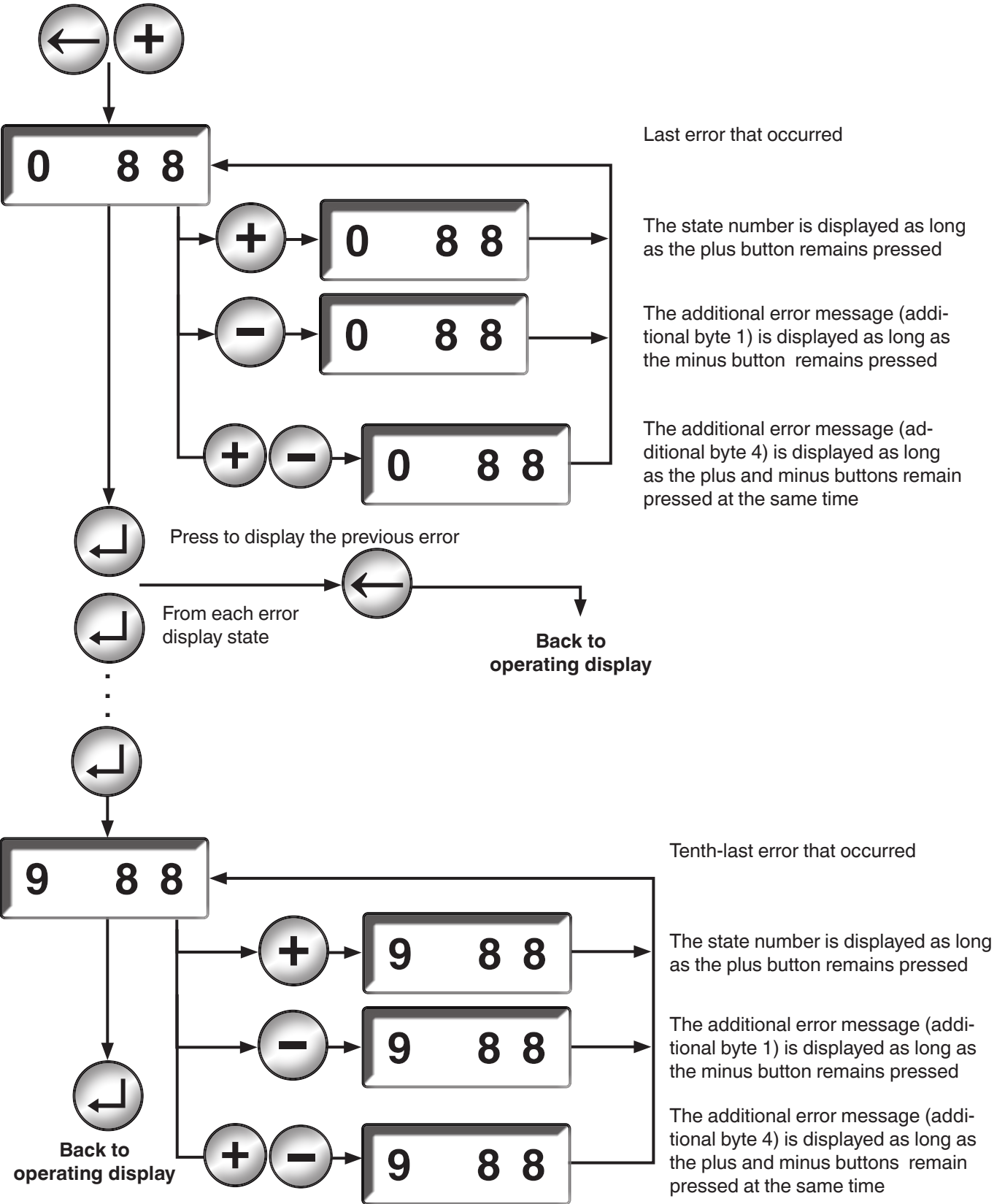
Information display	
▶	The information display is activated from the operating display or error display (not during automatic parameter setting).
▶	The information display can be used to call up information about the flame quality, the resettable runtime meter, the resettable start counter, the switching cycles counter V2, the MPA internal temperature and the software indexes.
▶	This mode is exited again after 60 seconds if no further buttons are pressed during this time.



Error display	
▶	The error display is activated automatically if the automatic gas burner control system enters a fault state.
▶	The most recent error is displayed.
▶	F1 to F9 are also displayed in standby and operation. F5 to F9 can be acknowledged by pressing   simultaneously.



Error memory display	
▶	The error memory display is used to call up the last 10 errors.
▶	The first error displayed is the one that occurred most recently.
▶	The error display is activated from the operating display (not during the display of parameters).
▶	The error is shown on the two-digit seven-segment display.
▶	The error memory display is exited again after 60 seconds if no further keys are pressed during this time.
▶	If no error is yet saved in the error position, the display shows "--".



Parameter display	
▶	Once automatic parameter setting has been activated, the following parameter values must be set; see the parameter list.
▶	The parameter setting display is not exited after a timeout period. If no buttons are pressed for 30 minutes, the system switches off and a malfunction lockout occurs.
▶	A password is required to change the parameters.
▶	Attention: Some parameter values are displayed here using a different resolution to the parameter mode when using the VisionBox. If it is not possible to display the parameter value at this resolution, "--" is shown on the display. The value can, however, still be changed using the resolution shown.
▶	Service or OEM parameters can be changed only by entering the corresponding password or a higher-level password (e.g. the OEM password can also be used to change all service parameters).

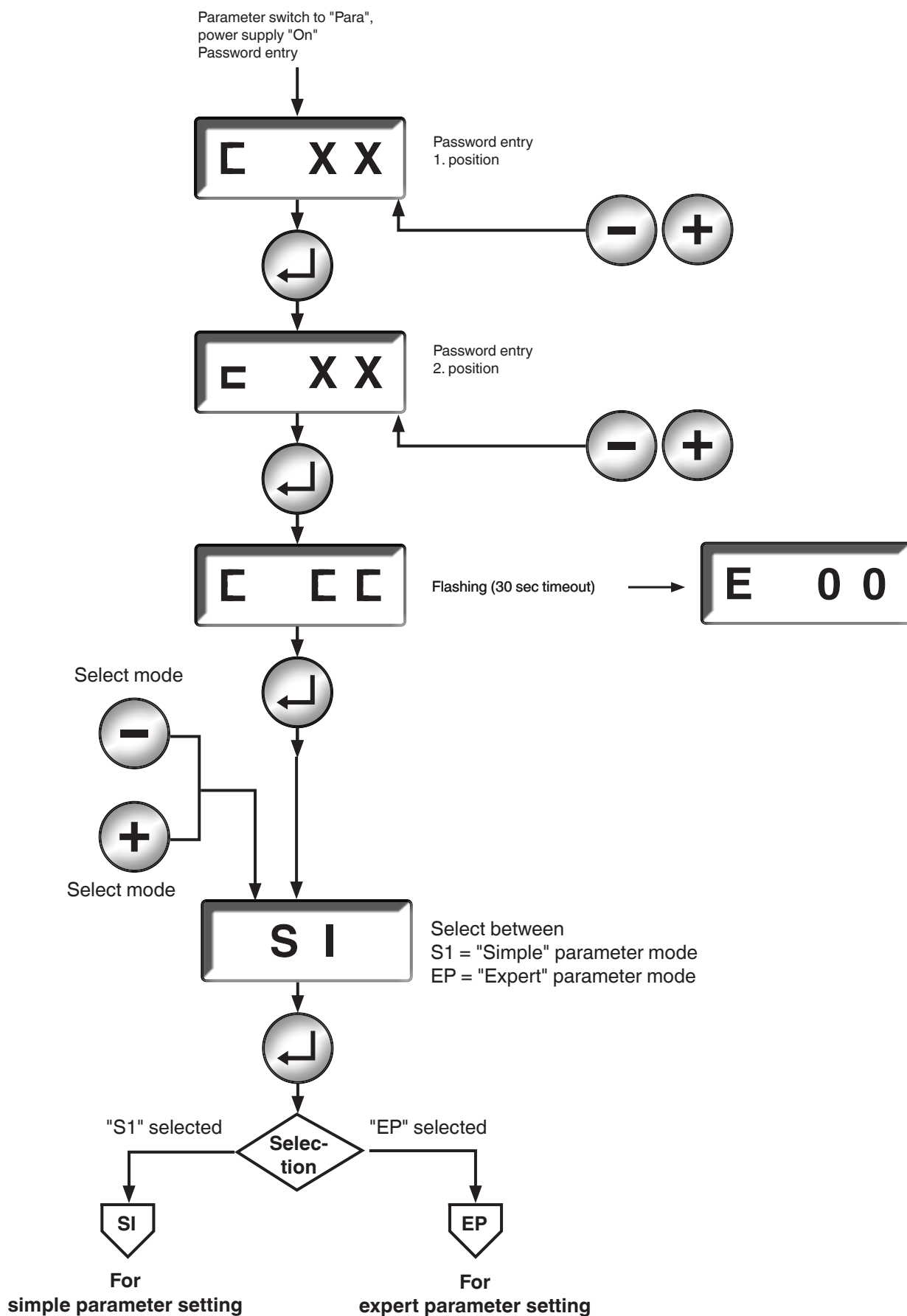
Display Number	Parameters	Value range	Unit
0	P30 – Pre-aeration duration	0-99	1 s
1	P31 – Pre-ignition time	0-99	1 s
2	P32 – First safety time	1-15	1 s
3	P12 – Restart attempts	1-5	
4	P34 – Stabilisation time A	0-99	1 s
5	P83 – Duration of switch-on delay after power on	0-99	1 s
6	P41 – Safety time operation FLW1	08-35 (= 0.75-3.5 s)	0.1 s ^{*1}
7	P85 – Pre-aeration time for HT	0-99	1 s
8	P51 – Post-aeration time for flame	0-99	1 s
9	P14 – Restart attempts after flame lift-off	0-5	
A	P13 – Restart attempts when flame is missing	0-5	
b	P15 - Non-volatile lock-out when opening safety chain	0 = off / 1 = on	
C	P16 – LDW: Mode	0-99	
d	P18 – X17 mode	0-3	
h	P17 – Temperature controller: Mode	0-4	
L	P19 – Operation output mode	0-99	
o	P52 – Restart protection time for flame	1-99	1 s
n ^{*2}	P11 – Fieldbus address	0-99 ^{*2}	
c	P239 – Extension module	0-1	

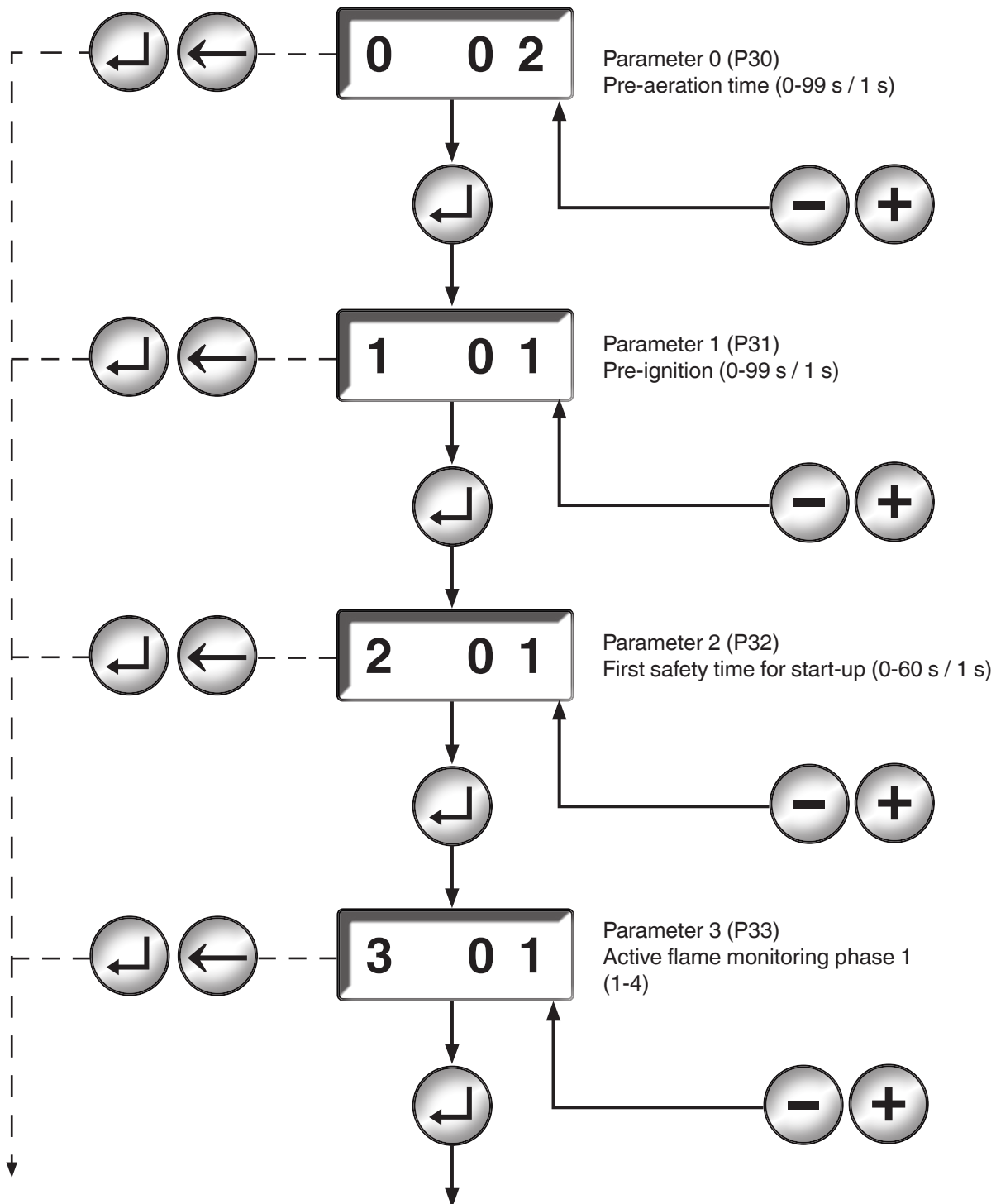
^{*1} Adjustable in steps:

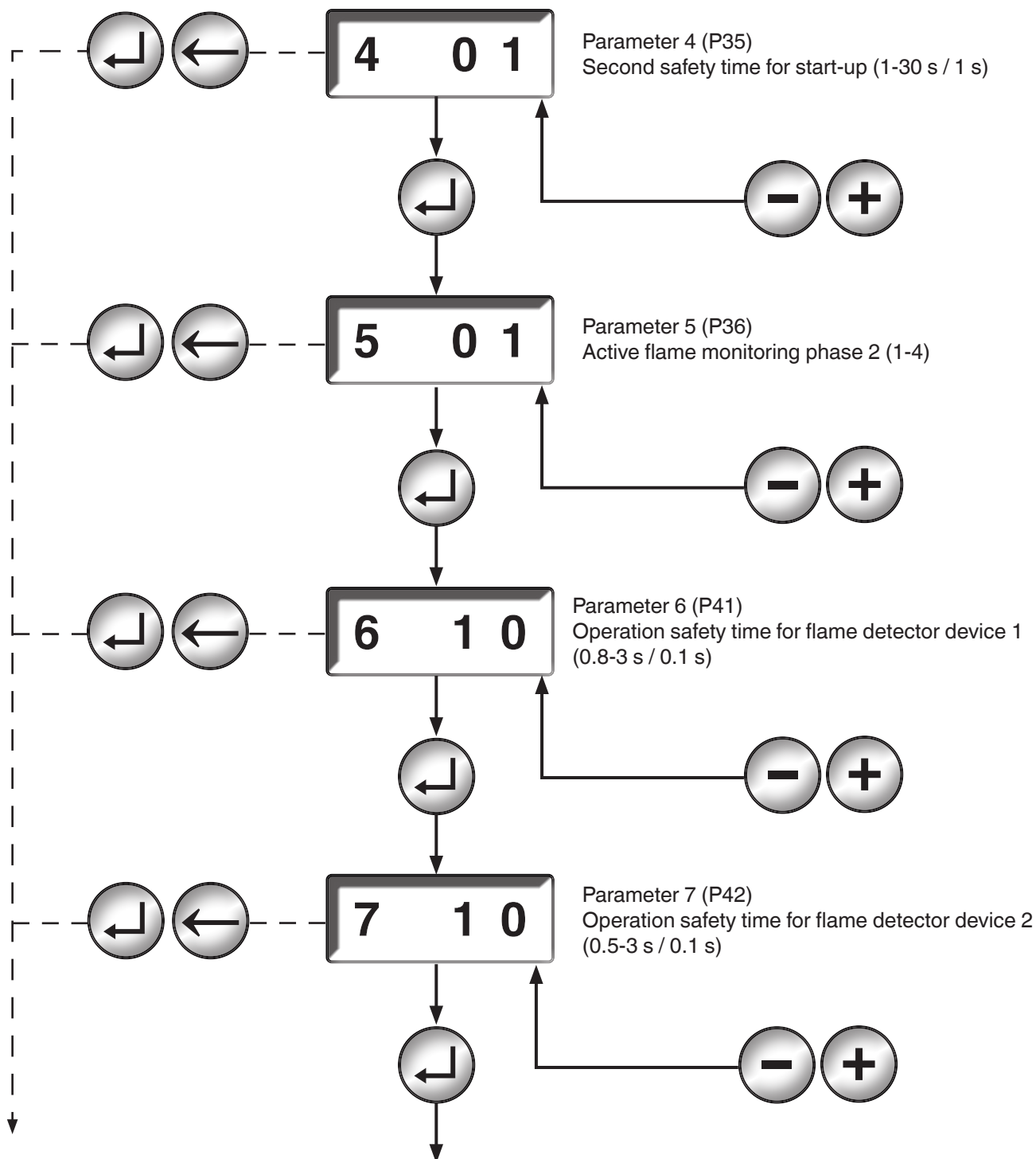
08 = 0.75 s	12/16	(only possible for FLW 1, smallest possible adjustment)
09 = 0.8125 s	13/16	
09 = 0.875 s	14/16	(for UV 41 with 0.125 s response time)
10 = 1 s	16/16	
15 = 1.5 s	24/16	
18 = 1.8125 s	29/16	
19 = 1.875 s	30/16	(for UV 41 with 0.125 s response time)
20 = 2 s	32/16	
25 = 2.5 s	40/16	
28 = 2.8125 s	45/16	
29 = 2.875 s	46/16	(for UV 41 with 0.125 s response time)
30 = 3 s	48/16	
35 = 3.5 s	56/16	

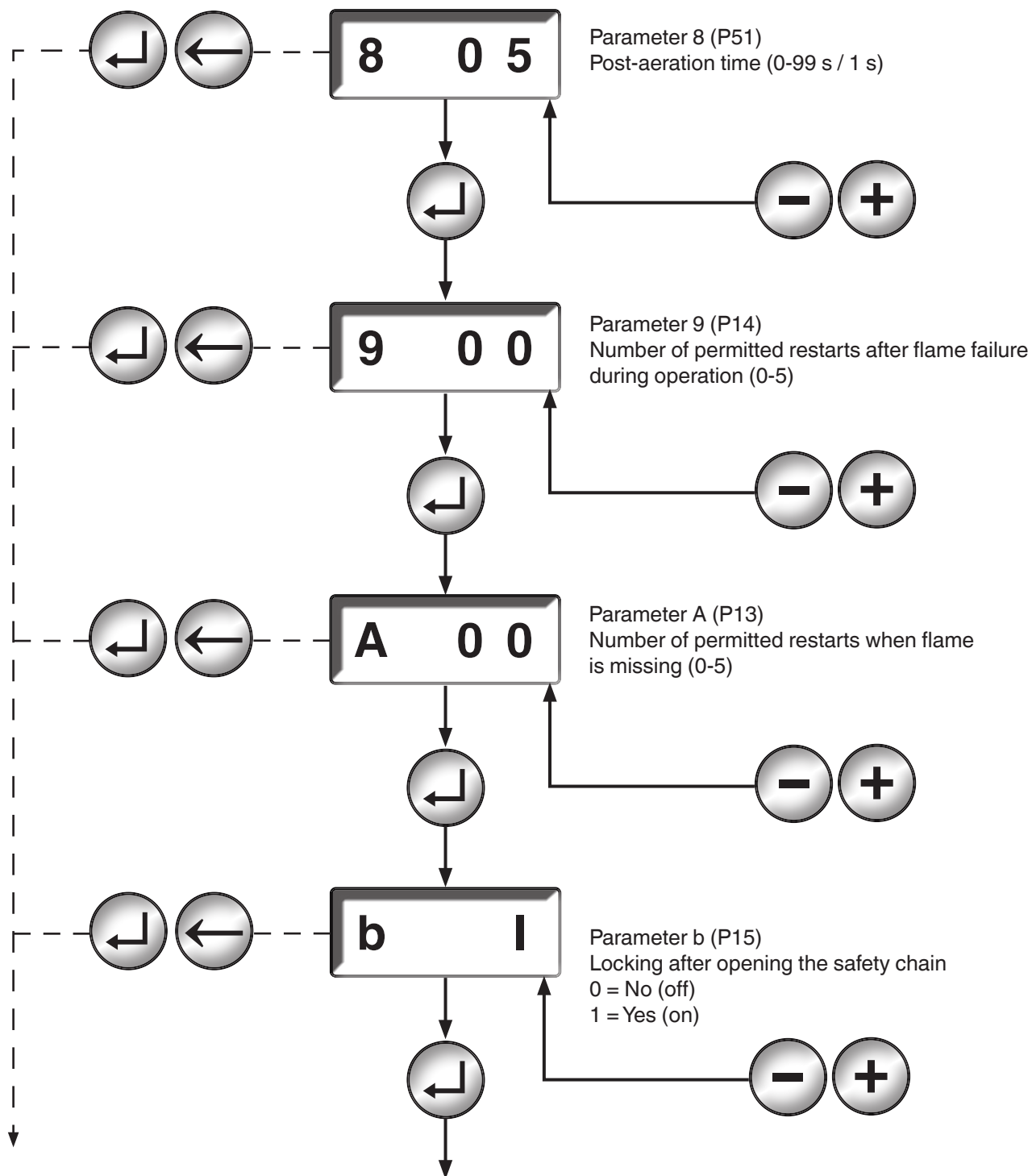
^{*2} The button combination - and + can be used to switch between OFF (display = oF) and the address. Addresses over 99 must be set using the VisionBox. Do not use the address "0".

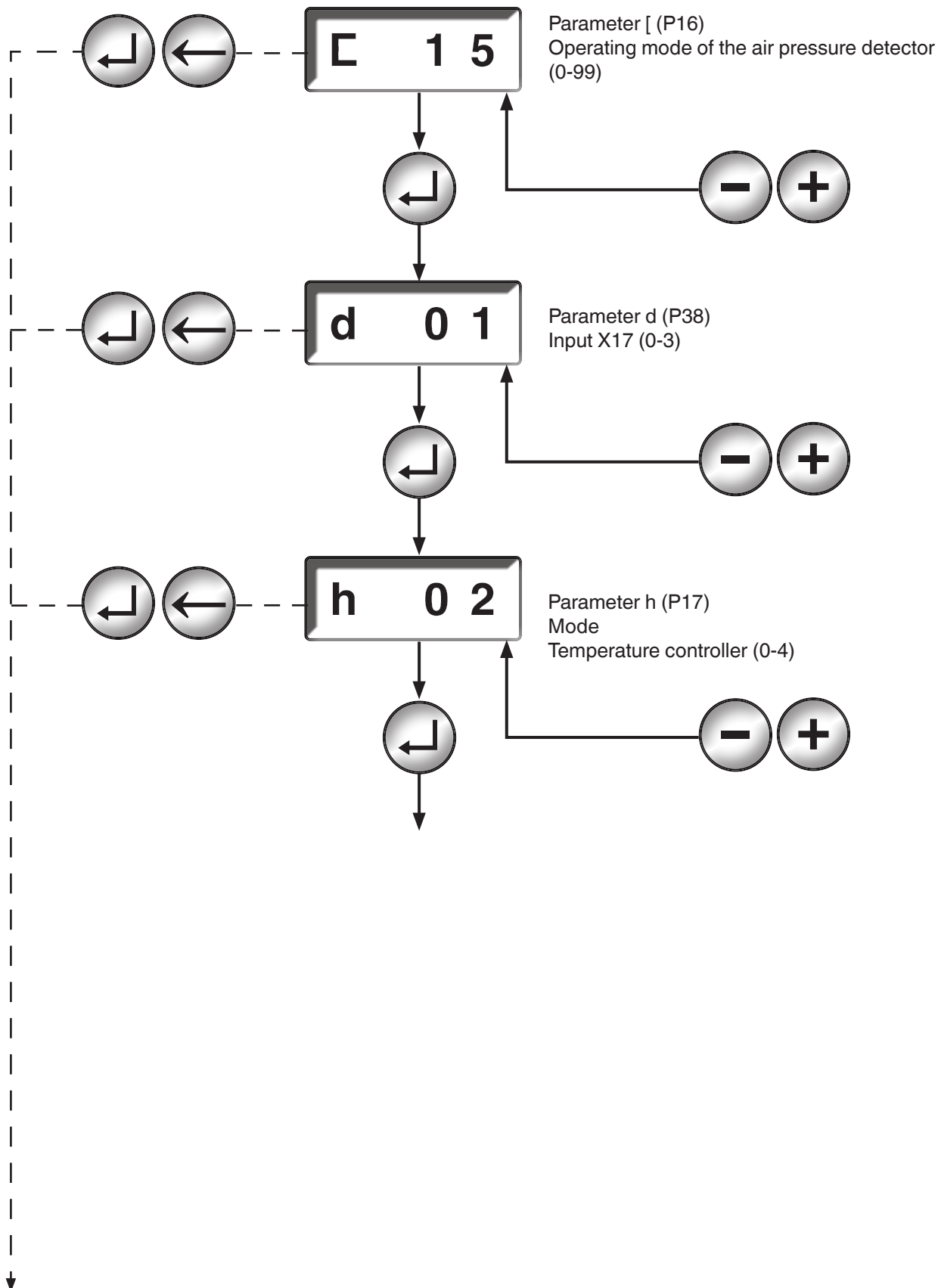
- **Attention:** The "Back"  button can be used to return to previous steps in the program flow when working in parameter mode.
Once the first input field is reached, the next press of the  button returns to parameter mode.



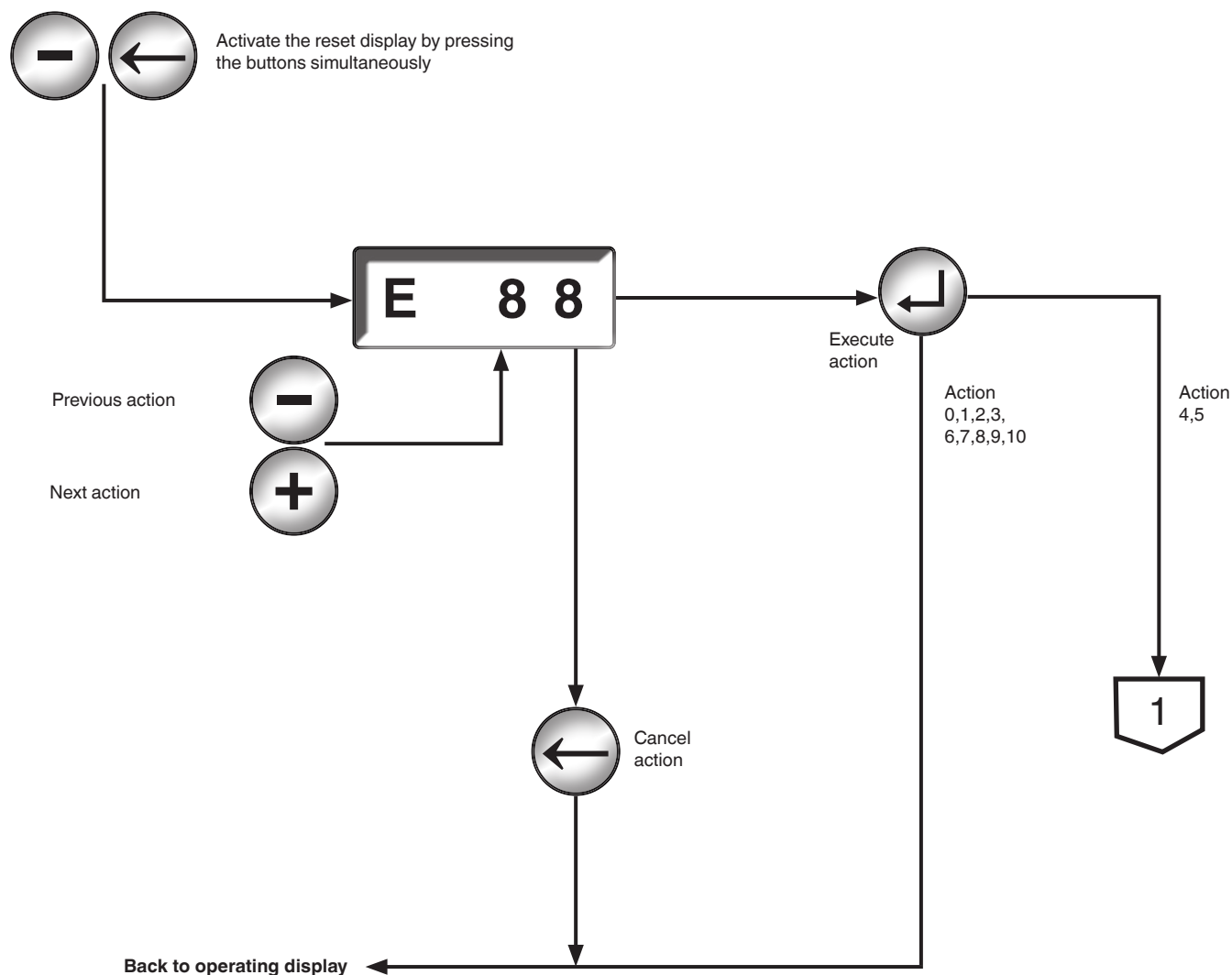






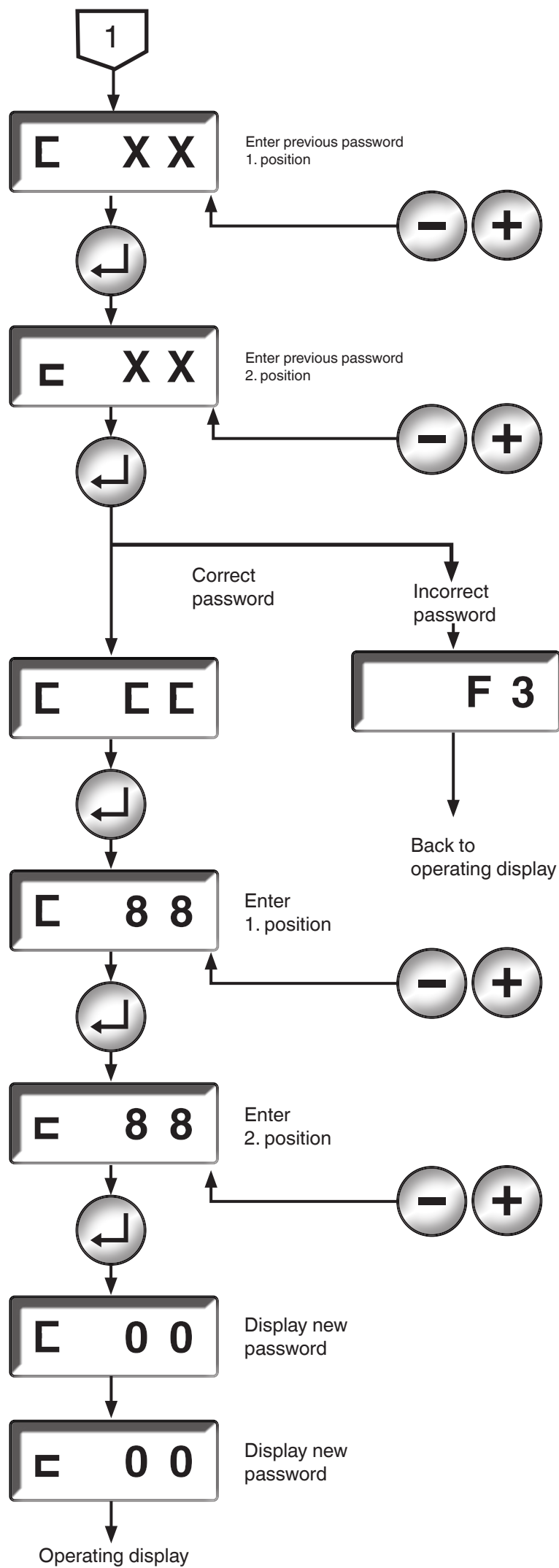


Reset display	
▶	The reset display is activated from the operating display (not during automatic parameter setting).
▶	The reset display can be used to delete the error memory, access level and resettable runtime meter, start-up counter or switching cycles counter, as well as to change the passwords for the service and OEM level.
▶	This mode is exited again after 60 seconds if no further buttons are pressed during this time.
▶	If the test mode for the parameter and service case is active, the reset display is locked.



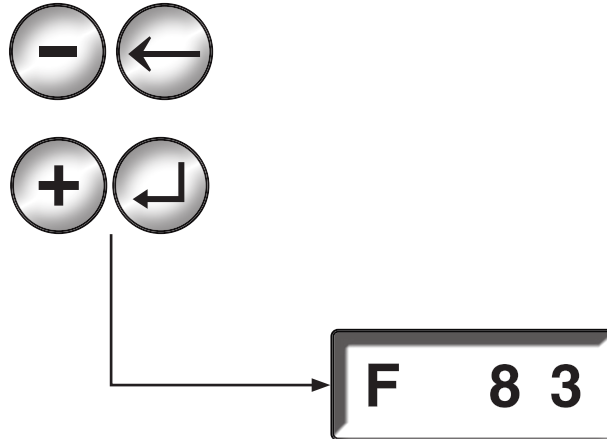
Execute action:

- 0 Delete error memory
- 1 Reset access level
- 2 Delete resettable runtime meter for flame and HT
- 3 Delete resettable start counter
- 4 Change password for service level
- 5 Change password for OEM level
- 6 Delete switching cycles counter for watchdog
Reset error F 6
- 7 Delete switching cycles counter for V1
Reset error F 7
- 8 Delete switching cycles counter for air output
Reset error F 8



MPA shutdown function

- ▶ Press all buttons simultaneously
MPA switches to malfunction lockout and displays error F83
Possible from all operating states
Note: This function is not an emergency stop.



Error overview**MPA 41xx PF error without error ID**

Errors ID	Internal Errors	Error description Refer to the above tables for more information about individual errors
F 1 flashing	x	Low voltage Internal error
F 2 flashing		High MPA internal temperature
F 3 flashing		The password was entered incorrectly when attempting to change it or was not confirmed using the unlock key
F 4 flashing		The signal for remote unlocking via bus has been active for too long
F 5 flashing		Warning message for flame detected in HT mode and number of deletion tests expired. The error message flashes three times every 5 s, alternately with the state number (and other error messages, if any)
F 6 flashing		Warning message for service interval for watchdog relay expired. The error message flashes three times every 5 s, alternately with the state number (and other error messages, if any)
F 7 flashing		Warning message for service interval for V1 expired. The error message flashes three times every 5 s, alternately with the state number (and other error messages, if any)
F 8 flashing		Warning message for service interval for air valve expired. The error message flashes three times every 5 s, alternately with the state number (and other error messages, if any)
F 9 flashing		Connection to fieldbus missing. P11 has been set to ON.

Error overview			
MPA 41xx PF V2.0			
Errors from the basic system (F 01 to F 3F)			
Errors ID	Flashing code MinDisp	Internal error	Error description
F 01	0	x	
F 02	0	x	
F 03	0		ERROR_WD_HARDWARE Possible cause of the error: Ambient temperature is too high Overvoltage
F 04	0		ERROR_UNLOCKING_DENIED Possible cause of the error: More than five unlocks in the last 15 minutes; wait or use enhanced unlock
F 05	0	x	
F 06	0	x	
F 07	0	x	
F 08	0	x	
F 09	0	x	
F 0A	0	x	
F 0b	0	x	
F 0C	0	x	ERROR_CONFIGURATION Detailed errors: Additional byte 1: 0xC3: LDW1 monitoring has been configured in P16 / P99 but no HW input has been configured for LDW1. 0xC4: An LDW1 input has been configured but no monitoring has been switched on in P16 / P99. 0xC5: The HW behaviour for the temperature controller input has been configured in P17 but no heat request input has been configured. 0xC6: The HT-NC function has been configured without HT-NO. 0xC7: The HT-NO function has been configured without HT-NC. 0xC8: LDW2 monitoring has been configured in P65 / P100 but no HW input has been configured for LDW2. 0xC9: An LDW2 input has been configured but no monitoring has been switched on in P65 / P100.
F 0d	0	x	
F 0E	0	x	
F 0F	0	x	
F 10	0	x	
F 11	0		ERROR_UNDERVOLTAGE Possible cause of the error: The permitted lower voltage limit was not met for at least a brief period
F 12	0		ERROR_POWERFAILURE Possible cause of the error: The supply voltage was interrupted during start-up, operation or a normal shutdown
F 13	0		ERROR_WD_STATUS Safety chain is not free of potential. Possible cause of the error: The fan continues running for too long. Remedy: Increase the time for the restart protection
F 14	0	x	
F 15	0	x	

Error overview**MPA 41xx PF V2.0****Errors from the basic system (F 01 to F 3F)**

Errors ID	Flashing code MinDisp	Internal error	Error description
F 16	8		ERROR_TWI_COMMUNICATION Possible cause of the error: VisionBox has been connected to the TWI bus or disconnected from the bus while MPA was not de-energised. The TWI line is subject to EMC interference.
F 17	0	x	
F 18	7		Additional byte 1: 0xB4 (VisionBox error) A shutdown was initiated externally by selecting the "Switch off" function in the VisionBox PC software Additional byte 1: 0x90 (internal MPA error P2) Additional byte 4: 0x01 internal error: State frame Additional byte 4: 0x08 internal error: Stack overflow Additional byte 4: 0x09 internal error: Programming Additional byte 4: 0x16 internal error: TWI communication Additional byte 4: 0x1D internal error: Processor crash Additional byte 4: 0x1E internal error: Work group control Additional byte 1 0xC2 (error in extension module) Additional byte 4: 0x08 internal error: Stack overflow Additional byte 4: 0x09 internal error: Programming Additional byte 4: 0x0A internal error for DI variable Additional byte 4: 0x17 internal error: Work group control Additional byte 4: 0xE1 / 0xE2 calibration value not set in EEPROM or not OK
F 19	0		Reserved
F 1A	0	x	
F 1b	0		Reserved
F 1C	0	x	
F 1d	0		ERROR_PROCESSOR Possible cause of the error: MPA is subject to strong EMC interference
F 1E	0	x	

Error overview			
MPA 41xx PF			
Error from the extension functions (0x40 to 0x9F)			
Errors ID	Flashing code MinDisp	Internal error	Error description
F 40-F 42	0		Reserved
F 43	0	x	
F 44-F 55	0		Reserved
F 56	0	x	
F 57-F 58	0		Reserved
F 59	0		Error in interface P2 Possible causes of the error: The bus connection was interrupted and parameter P17 was configured such that a bus interruption triggers a safety shutdown with malfunction lockout, see P17: Temperature controller mode The bus connection was interrupted, but the MPA receives the specification for switching from output 14 via the bus
F 5A-F 5F	0		Reserved
F 60	2		ERROR_PARAMETER_CHANGE_NOT_RELEASED A monitored parameter has been changed
Error from the application (starting from 0xA0)			
F 6F	0		ERROR_INPUT_FUNCTION_DUPLICATED Input function on X16–X20 was assigned multiple times
F 70	0	x	
F 80	0		ERROR_TIME_OUT_PARAMETER_MODE
F 81	0		ERROR_INVALID_BUS_ADDRESS Configuration P11 does not correspond to the address range of the fieldbus used Note: This error may occur when using an OFF setting for the value. In this case, it can be ignored.
F 82	0		Reserved
F 83	0		ERROR_SHUTDOWN Shutdown was triggered using a button combination
F 84	0		Reserved
F 85	0		ERROR_EM_RESET_OVERLOAD The extension module is not responding / communication has been interrupted
F 86-F 97	0		Reserved
F 98	0		ERROR_REGISTRATION P239 = 0, but an EM 2/x is connected
F 99-F 9d	0		Reserved
F 9E	0		ERROR_P2_NOT_UNDERSTOOD Communication from extension module to MPA interrupted
F 9F	0		ERROR_EM_NOT_COMPATIBLE Expansion module not compatible with MPA version
Error from the application (starting from F A0)			
F A0	0	x	
F A1	0		Reserved
F A2	1		ERROR_SAFETY_CHAIN_OPEN Possible cause of the error: The safety chain has been opened or is not closed The wires of the safety chain are disconnected
F A3	0		Reserved
F A4	0	x	ERROR_FEEDBACK_V1_INCORRECT
F A5		x	ERROR_FEEDBACK_V2_INCORRECT

Error overview			
MPA 41xx PF			
Error from the application (starting from 0xA0)			
Errors ID	Flashing code MinDisp	Internal error	Error description
F A6	6		ERROR_EXTERNAL_LIGHT Possible cause of the error: Earth connection to ionisation electrode Gas is escaping and being burned, e.g. by neighbouring burners Defective UV tube Connected flame detector device (UV, ...) is detecting light or is defective
F A7	3		ERROR_NO_FLAME_DURING_SAFETY_TIME Additional information byte 0: Bit0 = Flame at FLW 1 Additional information byte 1: Flame quality at FLW 1 Possible cause of the error: Ionisation electrode set incorrectly Ignition electrodes set incorrectly Defective insulation lines for ignition electrodes or ionisation electrode Gas vales do not open the gas flow Connected flame detector device (UV, ...) is not detecting light or is defective Mains connection lines to MPA switched over ("N" and "L1")
F A8	4		ERROR_FLAME_GONE_OUT_DURING_OPERATION Additional information byte 0: Bit0 = Flame at FLW 1 Additional information byte 1: Flame quality at FLW 1 Possible cause of the error: Flame body defective Connected flame detector device (UV, ...) is not detecting light or is defective
F A9	3		ERROR_FLAME_GONE_OUT_DURING_STABILISATION Additional information byte 0: Bit0 = Flame at FLW 1 Additional information byte 1: Flame quality at FLW 1
F AA	5		ERROR_IDLE_STATE_CONTROL_LDW Possible cause of the error: The air pressure detector is defective Air pressure is present during the idle state control, for example due to wind influence from the exhaust line, ... The threshold value of the air pressure detector device is set incorrectly
F Ab	5		ERROR_NO_AIR_PRESSURE No air pressure during start-up
F AC	0	x	ERROR_FEEDBACK_IGNITION_INCORRECT
F Ad	0		ERROR_LACKOFGAS_GDWMIN
F AE-F AF	0		Reserved
F b0	0	x	ERROR TEST CIRCUIT EXTENSION
F b1-F b2	0		Reserved
F b3	0		ERROR_GASVALVEFEEDBACK_FALSE Feedback from output V1 (X13) incorrect
F b4	0		ERROR_NO_AIR_PRESSURE_LDW1 Air pressure failure for LDW1
F b5	0		ERROR_NO_AIR_PRESSURE_LDW2 Air pressure failure for LDW2
F b6	0		ERROR_LIMIT_SWITCH_MAIN_GAS (POC) The limit switch POC of the monitored gas valve V1 shows a different status than expected.
F b7-F b9	0		Reserved
F bA	0		ERROR_EXTERNAL_LIGHT_STARTUP External light > 1 min after heat request
F bb	0		Reserved

Error overview			
MPA 41xx PF			
Error from the application (starting from 0xA0)			
Errors ID	Flashing code MinDisp	Internal error	Error description
F bC	3		ERROR_NO_FLAME_DURING_SECOND_SAFETY_TIME Additional information byte 0: Bit0 = Flame at FLW 1, Bit1 = Flame at FLW 2 Additional information byte 1: Flame quality at FLW 1
F bd-F Cd	0		Reserved
F CE	0		ERROR_GDW_MAX
F CF-F d1	0		Reserved
F d2	0		Remote unlocking not permitted The MPA must be unlocked using the display unlock button
F d3	0		HT signal not DI
F d4	0		ERROR_CONFIRMATION_SR_OUPUT_FALSE Feedback from output V2 (X14) incorrect
F d5-F dd	0		Reserved
F dE	0		ERROR_AIR_PRESSURE_AIR_PURGING The air pressure signal for air purging does not match the X14 control
F dF	0		Reserved
F E0	0		ERROR_AIR_PRESSURE_COOLING The air pressure signal for cooling does not match the X8 control
F E1	0		ERROR_NETWORK_CONFIRMATION_INGITION_FALSE Feedback from ignition output (X15) incorrect.
F E2	0		ERROR_EXTERNAL_LIGHT_PILOT Flame detection signals flame at the pilot burner even though only the main burner is active
F E3	0		ERROR_EXTERNAL_LIGHT_MAIN Flame detection signals flame at the main burner even though only the pilot burner is active.
F E4	0		ERROR_LIMIT_SWITCH_V2 The limit switch POC of the monitored gas valve V2 shows a different status than expected.

EMC-compliant version

The ignition line must be laid separately to the other current-carrying lines.

EMC-compliant version for bus lines:

A line with a twisted pair of wires including shielding must be used.

The shielding on both cables must be connected flush to the shielding terminal for looping through the PE. The shielding must be connected to the PE rail at only one point (control cabinet / PLC / master).

The bus line must be laid separately to the other current-carrying lines.

The bus line must be terminated at the first device (usually the master) and last device in the chain using suitable termination. On the automatic gas burner control system side, the DIP switch or an external termination as an M12 plug on the MPA 4112 can be mounted on the connection of the second lead (bus out).

Setting the fieldbus address

If the automatic gas burner control system is to be connected to the bus, a valid address must be entered in parameter P11. If no address is entered, the display shows OFF during parameter setting. Press the button combination + and - to switch to change mode. You can now set the desired address.

If the address needs to be changed later, this can be done during operation.

- Profibus 1 to 126

- Modbus 1 to 247

Attention: Error F 18 (F 81) may occur when changing the field address.

Important: Changes are only applied after a restart or an enhanced unlock of the automatic gas burner control system.

A bus connection is not required for operating the MPA. If no bus is connected, the MPA can receive a heat request only via the "Temperature controller" hardware input.

If a bus connection exists (indicated by a flashing character on the display), the heat request is given by means of bit 0 in AB0. If the automatic gas burner control system is disconnected from the bus again, the behaviour set in P17:

Temperature controller mode applies. When viewing the operating and error display, the current bus address can be seen by pressing the ← button.

If an invalid address is set for the connected bus module and the MPA is in automatic mode, a restart attempt is initiated (error F 81).

If an invalid value is set for the connected bus module and the MPA is in parameter mode, an error message is generated.

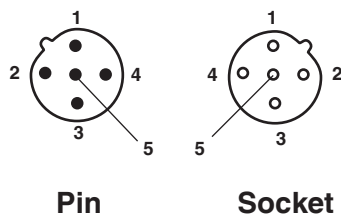


Bus termination

The bus must be terminated with a terminating resistor at the first and last device on the bus.

The shielding of the bus cable should be connected to PE to avoid electromagnetic radiation.

Plug assignment of MPA 4112 PF (M12-5 B-coded) EM 2/4



Pin

Socket

EM 2/4 for MPA 41x PF M12

Pin no. MPA 4112 PF	Signal
1	+5 V supply for bus termination
2	Data line minus (A conductor)
3	⏚ Earth
4	Data line plus (B conductor)
5	Not assigned
Thread	Shielding (earth connection) recommended

Pin assignment of MPA 4122 PF EM2/6



Extension module MPA 41xx EM 2/4
Profibus DP interface,
Modbus RTU / ASCII

Universal extension module for integrating the MPA 41xx PF within fieldbus systems with up to 31 slaves (without a repeater).

Integrated functions:
- Profibus DP interface
- Modbus RTU / ASCII

The bus protocol can be selected using a DIP switch.
The bus can be used to transmit commands to the MPA and query status information.

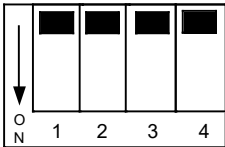
BUS protocol presets

The 4-pin DIP switch is used to select the bus protocol and activate the respective bus termination.
The bus protocol may only be selected in a de-energised state. It is not possible to make changes during operation.

Bus protocol selection

DIP switch no. 4:

OFF position = Profibus
ON position = Modbus



Bus termination

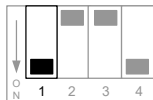
If termination is made via the DIP switch, no external terminating resistor is permitted to be plugged into the output socket.

If a termination is activated, the termination of the alternative bus protocol must always be deactivated.

Modbus termination

DIP switch no. 1:

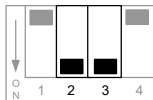
ON position = Modbus termination
120 ohm



Profibus termination

DIP switches no. 2 and 3:

ON position = Profibus termination
220 ohm. Important: Switch both



Setting the bus address

The bus address is entered in the parameter P11 (display indication "n"). The display shows OFF if an address has not yet been entered.
In parameter mode, a value between 1 and 99 (up to 126 via VisionBox) can be entered for the address. The change does not take effect until a restart occurs.

When viewing the operating and error display, the current bus address can be seen by pressing the ← button.

Bus interruption

Modbus

The bus module requires at least one request per minute. If this does not occur, the behaviour set in P17 takes place

Profibus

If the cyclical data stream is interrupted, the behaviour set in P17: Temperature controller mode takes place after a Profibus Watchdog period defined via the master (e.g. 2.5 s).

Profibus bus data

The volume of input and output data is defined by the "modules" in the supplied GSD file for Profibus.

Profibus output data from master to MPA

The output data has 8 bits, see the table below

Bit	Output byte AB0
0	Heat request
1	Cooling (for X8) on
2	Remote unlocking
3	Output X11 (P19 = 11)
4	V2 stepwise / air purge Flexible output function (for X14) on
5	Main burner on
6	Not used
7	Not used

Command content of the assigned bits:

Bit 0 (heat request) set to 1 by the master = heat request. (Consider P17)

Bit 1 (cooling) switches the air valve on output X8 if the automatic gas burner control system is not starting up or in operation. (Consider P64)

Bit 2 (remote unlocking) set to 1 by the master (min. 0.5 s, max. 5 s) = MPA is unlocked.

Bit 3 – as long as bit 3 is set to 1 by the master, the output X11 is switched on (P19 = 11).

Bit 4 switches output X14 (depending on configuration of P80 and P64).

Bit 5 switches from pilot to main burner mode (consider P64).

There are ten modules integrated in the supplied GSD file. Five of them – modules for Basic, Standard, Extended and Special Extended and Exceptional Extended – do not contain any output bytes but only input bytes (information about the MPA, see below). However, they cannot issue any commands to the MPA.

Profibus input data from MPA to master EM 2/4

Input data provides information about the state of the MPA. The input data contains a different number of bytes depending on the data transfer module used. The lower bytes are always the same. That is, the Basic transfer is included in the Standard transfer and the Standard transfer is likewise included in the Extended transfer.

Basic transfer 2 bytes
EB0 and EB1

Standard transfer 4 bytes
EB0 to EB3

Extended transfer 12 bytes
EB0 to EB11

Special Extended transfer 20 bytes
EB0 to EB19

Exceptional Extended transfer
31 bytes
EB0 to EB30

Bytes EB0, EB1, EB23 and EB24 contain bit information.
The description of the bits shows the condition when the bit is set to 1.
Some bits are active during a fault (indicated with "X"), others are set to 0.

Basic transfer area			
MPA 41xx PF			
Bit	Input byte EB0	Description	During fault
0	Input for flame for ionisation	X5	0
1	Input for HT	HT NO input function from HW input	X
2	Input for HT NC / GDW / POC	HT NC input function from HW input	X
3	Flame warning for HT	Flame detected in HT mode	X
4	Input for LDW1	LDW1 input function from HW input	X
5	Input for temperature controller	Heat request input function from HW input	X
6	Output for valve 1	X13	X
7	V2 / V2 boost / energy int. / HT active	X14	X
Bit	Input byte EB1	Description	During fault
0	Ignition transformer (Ignition active)	X15	X
1	Warning message for switching cycles V1	Parameter value reached	0
2	Output for air valve (air out)	X8	X
3	Output options	X11	X
4	Evaluation of temp. controller (HW+bus)	Evaluation between HW input for temperature controller and bus specification	X
5	Warning message for switching cycles for air valve	Parameter value reached	0
6	Warning message for switching cycles for watchdog relay	Parameter value reached	0
7	Fault	X12	X

Standard transfer area			
MPA 41xx PF			
Bit	Input byte EB2	Description	During fault
0-7	State number or error code	Current state number or error code in the case of a fault	X
Bit	Input byte EB3	Description	During fault
0-7	Flame quality	Quality of the flame over the ionisation input in 0.1 µA	0

Extended transfer area			
MPA 41xx PF			
Bit	Input byte EB4	Description	During fault
0-7	Resettable runtime meter for flame and HT	Low byte (byte 0) of the 32-bit runtime meter (Unit: s)	X
Bit	Input byte EB5	Description	During fault
0-7	Resettable runtime meter for flame and HT	Byte 1 of the 32-bit runtime meter (Unit: s)	X
Bit	Input byte EB6	Description	During fault
0-7	Resettable runtime meter for flame and HT	Byte 2 of the 32-bit runtime meter (Unit: s)	X
Bit	Input byte EB7	Description	During fault
0-7	Resettable runtime meter for flame and HT	High byte (byte 3) of the 32-bit runtime meter (Unit: s)	X
Bit	Input byte EB8	Description	During fault
0-7	Resettable start counter for flame mode	Low byte (byte 0) of the 32-bit start counter	X
Bit	Input byte EB9	Description	During fault
0-7	Resettable start counter for flame mode	Byte 1 of the 32-bit start counter	X
Bit	Input byte EB10	Description	During fault
0-7	Resettable start counter for flame mode	Byte 2 of the 32-bit start counter	X
Bit	Input byte EB11	Description	During fault
0-7	Resettable start counter for flame mode	High byte (byte 3) of the 32-bit start counter	X

Special Extended transfer area			
MPA 41xx PF			
Bit	Input byte EB12	Description	During fault
0-7	Service counter V1	Low byte (byte 0) of the 16-bit service counter, resolution 1 000 switching cycles	X
Bit	Input byte EB13	Description	During fault
0-7	Service counter V1	High byte (byte 1) of the 16-bit service counter, resolution 1 000 switching cycles	X
Bit	Input byte EB14	Description	During fault
0-7	Service counter Air valve	Low byte (byte 0) of the 16-bit service counter, resolution 1 000 switching cycles	X
Bit	Input byte EB15	Description	During fault
0-7	Service counter Air valve	High byte (byte 1) of the 16-bit service counter, resolution 1 000 switching cycles	X
Bit	Input byte EB16	Description	During fault
0-7	Service counter Watchdog relay	Low byte (byte 0) of the 16-bit service counter, resolution 1 000 switching cycles	X
Bit	Input byte EB17	Description	During fault
0-7	Service counter Watchdog relay	High byte (byte 1) of the 16-bit service counter, resolution 1 000 switching cycles	X
Bit	Input byte EB18	Description	During fault
0-7	Not used		0
Bit	Input byte EB19	Description	During fault
0-7	Not used		0

Exceptional Extended transfer area			
MPA 41xx PF			
Input byte EB20		Description	During fault
Additional information error 1		Detail byte error memory 1	X
Input byte EB21		Description	During fault
Additional information error 4		Detail byte error memory 4	X
Input byte EB22		Description	During fault
Error state number		State number in which the error occurred	X
Bit	Input byte EB23	Description	During fault
0	Gas pressure detector (GDW) min.	Low byte (byte 0) of the 16-bit service counter, resolution 1 000 switching cycles	X
1	POC V1	POC V1 input function from HW input	X
2	POC V2	POC V2 input function from HW input	X
3	FLW2 NO	Flame 2 NO input function from HW input	X
4	V2 stepwise on	V2 stepwise input function from HW input	X
5	Main burner on	Heat request input function from HW input	X
6	Air purging / flexible output function for X14 on	Air purging / flexible output function (for X14) from HW input	
7	Cooling for X8 on	Cooling input function (for X8) from HW input	X
Bit	Input byte EB24	Description	During fault
0	Error information for LDW cooling	Information: Incorrect LDW position during cooling with X8	X
1	Reserved		0
2	Warning of high internal temperature	Warning: High temperature in MPA housing (> 82 °C)	X
3	Input for LDW2	LDW2 input function from HW input	X
4	Error information for LDW air purge	Information: Incorrect LDW position during air purge with X14	X
5	Not used	Not used	0
6	Flame detection	General flame detection, merging of FLW1 and FLW 2	0
7	Not used	Not used	0
Input byte EB25		Description	During fault
Internal temperature of MPA		Internal temperature of MPA housing in °C; an offset of 50 K must be deducted.	X
Input byte EB26-EB30		Description	During fault
Not used		Not used	X

Declaration of the Profibus interface	
MPA 41xx PF	
Manufacturer identification	ID number 0xOCF1 (Karl Dungs GmbH & Co. KG)
ASCIC type	VPC3+C
Sync and freeze mode	Supported (Sync command: Freeze all outputs of the addressed slaves Freeze command: Freeze all inputs of the addressed slaves)
Cycle time	Maximum time until a response is received to a request telegram, depending on the bus transfer rate: 9.6 kBit/s to 500 kBit/s → 15 bit times 1 500 kBit/s → 20 bit times 3 000 kBit/s → 35 bit times 6 000 kBit/s → 50 bit times 12 000 kBit/s → 95 bit times
Diagnostics	The Profibus module creates external diagnostics if it detects an internal error. The diagnostic information for the DP slave consists of standard diagnostic information (6 bytes). Octet 1: Bit 0 = Diag.station does not exist (sets master) Bit 1 = Diag.station not_ready: Slave is not ready for data exchange Bit 2 = Diag.cfg_Fault: Configuration data does not match Bit 3 = Diag.ext_diag: Slave has external diagnostics data Bit 4 = Diag.not supported: Requested function is not supported in the slave Bit 5 = Diag.invalid_slave_response (sets slave to the fixed value 0) Bit 6 = Diag.prm_fault: Incorrect parameter setting (ID number etc.) Bit 7 = Diag.master_lock (sets master): Parameters of slave are set by another master Octet 2: Bit 0 = Diag.Prm_req: Slave requires new parameters Bit 1 = Diag.Stat_diag: Static diagnostics (byte diag bits) Bit 2 = Fixed at 1 Bit 3 = Diag.WD_ON: Response monitoring active Bit 4 = Diag.freeze_mode: Freeze command received Bit 5 = Sync_mode: Sync command received Bit 6 = Reserved Bit 7 = Diag.deactivated (sets master) Octet 3: Bit 0 – bit 6 = Reserved Bit 7 = Diag.ext_overflow Octet 4: Diag master_add: Master address after parameter setting (FF without parameter setting) Octet 5: High byte ID number Octet 6: Low byte ID number
Parameters	Only cyclical communication supported
Automatic baud rate detection	Supported

Bus data for Modbus EM 2/4 Modbus RTU or ASCII mode

The Modbus protocol can be switched over to ASCII mode using the function code 0x41.

The setting is permanently saved in the slave.

The default value (upon delivery) is Modbus RTU, 19 200 baud and even parity.

Modbus output data from master to MPA

The output data constitutes commands to the MPA. These specifications can be written using the following function codes.

05 (0x05) write single coil

06 (0x06) write single register

The output data has 16 bits, see table

Bit	Register address 0
0	Heat request
1	Cooling (for X8) on
2	Remote unlocking
3	Output X11 (P19 = 11)
4	V2 stepwise / air purge Flexible output function (for X14) on
5	Main burner on
6	Not used
7	Not used
8	Not used
9	Not used
10	Not used
11	Not used
12	Not used
13	Not used
14	Not used
15	Not used

Command content of the assigned bits:

Bit 0 (heat request) set by master to 1 = heat request. (Consider P17)

Bit 1 (cooling) switches the air valve on output X8 if the automatic gas burner control system is not starting up or in operation. (Consider P64)

Bit 2 (remote unlocking) set to 1 by the master (min. 0.5 s, max. 5 s) = MPA is unlocked.

Bit 3

As long as bit 3 is set to 1 by the master, the output X11 is switched on (P19 = 11).

Bit 4 switches output X14 (depending on configuration of P80 and P64)

Bit 5 switches from pilot to main burner mode (consider P64)

Bit 6-15 is reserved.

There are ten modules integrated in the supplied GSD file. Five of them – modules for Basic, Standard, Extended, Special Extended and Exceptional Extended – do not contain any output bytes but only input bytes (information about the MPA, see below). However, they cannot issue any commands to the MPA.

Modbus input data from MPA to master

Input data provides information about the state of the MPA.

An EBx contains 16 bits.

This information can be read using the following function codes.

03 (0x03) Read Holding Registers

01 (0x01) Read Coils.

Bit	Register address 0	Description	During fault
0	Input for flame for ionisation	X5	0
1	Input for HT	HT NO input function from HW input	X
2	Input for HT NC	HT NC input function from HW input	X
3	Warning of flame in HT	Flame detected in HT mode	X
4	Input for LDW	X18	X
5	Input for temperature controller (HW)	LDW1 input function from HW input	X
6	Output for valve 1	Heat request input function from HW input	X
7	V2 boost / energy int. / HT active	X14	X
8-15	Not used		

Bit	Register address 1	Description	During fault
0	Ignition transformer	X15 (ignition active)	X
1	Warning message for switching cycles V1	Parameter value reached	0
2	Output for air valve (air out)	X8	X
3	Output options 0–11	X11	X
4	Evaluation of temp. controller (HW+bus)	Evaluation between HW input for temperature controller and bus specification	X
5	Warning message for switching cycles for air valve	Parameter value reached	0
6	Warning message for switching cycles for watchdog relay	Parameter value reached	0
7	Fault	X12	X
8-15	Not used		

Bit	Register address 2	Description	During fault
0-7	State number or error code	Current state number OR error code in the case of a fault	X
8-15	Not used	Not used	

Bit	Register address 3	Description	During fault
0-7	Flame quality	Quality of the flame signal / ionisation input in 0.1 µA	0
8-15	Not used	Not used	

Bit	Register address 4	Description	During fault
0-7	Resettable runtime meter for flame and HT	Low byte (byte 0) of the 32-bit runtime meter (in s)	X
8-15	Not used	Not used	

Bit	Register address 5	Description	During fault
0-7	Resettable runtime meter for flame and HT	Byte 1 of the 32-bit runtime meter (in s)	X
8-15	Not used	Not used	

Bit	Register address 6	Description	During fault
0-7	Resettable runtime meter for flame and HT	Byte 2 of the 32-bit runtime meter (in s)	X
8-15	Not used	Not used	

Bit	Register address 7	Description	During fault
0-7	Resettable runtime meter for flame and HT	High byte (byte 3) of the 32-bit runtime meter (in s)	X
8-15	Not used	Not used	

Bit	Register address 8	Description	During fault
0-7	Resettable start counter for flame mode	Low byte (byte 0) of the 32-bit start counter	X
8-15	Not used	Not used	

Bit	Register address 9	Description	During fault
0-7	Resettable start counter for flame mode	Byte 1 of the 32-bit start counter	X
8-15	Not used	Not used	

Bit	Register address 10	Description	During fault
0-7	Resettable start counter for flame mode	Byte 2 of the 32-bit start counter	X
8-15	Not used	Not used	

Bit	Register address 11	Description	During fault
0-7	Resettable start counter for flame mode	High byte (byte 3) of the 32-bit start counter	X
8-15	Not used	Not used	

Bit	Register address 12	Description	During fault
0-7	Service counter V1	Low byte (byte 0) of the 16-bit service counter, resolution 1 000 switching cycles	X
8-15	Not used	Not used	

Bit	Register address 13	Description	During fault
0-7	Service counter V1	High byte (byte 1) of the 16-bit service counter, resolution 1 000 switching cycles	X
8-15	Not used	Not used	

Bit	Register address 14	Description	During fault
0-7	Service counter for air valve	Low byte (byte 0) of the 16-bit service counter, resolution 1 000 switching cycles	X
8-15	Not used	Not used	

Bit	Register address 15	Description	During fault
0-7	Service counter for air valve	High byte (byte 1) of the 16-bit service counter, resolution 1 000 switching cycles	X
8-15	Not used	Not used	

Bit	Register address 16	Description	During fault
0-7	Service counter Watchdog relay	Low byte (byte 0) of the 16-bit service counter, resolution 1 000 switching cycles	X
8-15	Not used	Not used	

Bit	Register address 17	Description	During fault
0-7	Service counter Watchdog relay	High byte (byte 1) of the 16-bit service counter, resolution 1 000 switching cycles	X
8-15	Not used		

Bit	Register address 18	Description	During fault
0-7	Not used	Not used	
8-15	Not used	Not used	

Bit	Register address 19	Description	During fault
0-7	Not used	Not used	
8-15	Not used	Not used	

Bit	Register address 20	Description	During fault
0-7	Additional error information	First additional error information byte	X
8-15	Not used	Not used	

The following section summarises the information required for complete use of the 16-bit registers. This query can be used if the bus load needs to be minimised.

Bit	Register address 21	Description	During fault
0	Input for flame	X5	0
1	Input for HT	HT NO input function from HW input	X
2	Input for HT NC	HT NC input function from HW input	X
3	Warning of flame in HT	Flame detected in HT mode	X
4	Input for LDW	LDW1 input function from HW input	X
5	Input for temperature controller	Heat request input function from HW input	X
6	Output for valve 1	X13	X
7	V2 / V2 boost / energy int. / HT active	X14	X
8	Ignition transformer	X15 (ignition active)	X
9	Warning message for switching cycles V1	Parameter value reached	0
10	Output for air valve (air out)	X8	X
11	Output options 0–11	X11	X
12	Evaluation of temperature controller (HW + bus)	Evaluation between HW input for temperature controller and bus specification	X
13	Warning message for switching cycles for air valve	Parameter value reached	0
14	Warning message for switching cycles for watchdog relay	Parameter value reached	0
15	Fault	X12	X

Bit	Register address 22	Description	During fault
0-7	State number or error code	Current state number OR error code in the case of a fault	X
8-15	Flame quality	Quality of the flame over the ionisation input in 0.1 µA	0

Bit	Register address 23	Description	During fault
0-7	Resettable runtime meter for flame and HT	Low byte (byte 0) of the 32-bit runtime meter (in s)	X
8-15	Resettable runtime meter for flame and HT	Byte 1 of the 32-bit runtime meter (in s)	X

Bit	Register address 24	Description	During fault
0-7	Resettable runtime meter for flame and HT	Byte 2 of the 32-bit runtime meter (in s)	X
8-15	Resettable runtime meter for flame and HT	High byte (byte 3) of the 32-bit runtime meter (in s)	X

Bit	Register address 25	Description	During fault
0-7	Resettable start counter for flame mode	Low byte (byte 0) of the 32-bit start counter	X
8-15	Resettable start counter for flame mode	Byte 1 of the 32-bit start counter	X

Bit	Register address 26	Description	During fault
0-7	Resettable start counter for flame mode	Byte 2 of the 32-bit start counter	X
8-15	Resettable start counter for flame mode	High byte (byte 3) of the 32-bit start counter	X

Bit	Register address 27	Description	During fault
0-15	Service counter V1	16-bit service counter, resolution 1 000 switching cycles	X

Bit	Register address 28	Description	During fault
0-15	Service counter for air valve	16-bit service counter, resolution 1 000 switching cycles	X

Bit	Register address 29	Description	During fault
0-15	Service counter Watchdog relay	16-bit service counter, resolution 1 000 switching cycles	X

Bit	Register address 30	Description	During fault
0-15	Not used		

Bit	Register address 31	Description	During fault
0-7	Additional error information	1. Detailed info on the error message	X
8-15	Not used	Not used	

Bit	Register address 32	Description	During fault
0-7	Article number for SW P1	Byte 0 (low byte) of the 24-bit article number	X
8-15	Article number for SW P1	Byte 1 of the 24-bit article number	X

Bit	Register address 33	Description	During fault
0-7	Article number for SW P1	Byte 0 (high byte) of the 24-bit article number	X
8-15	Index of article number for SW P1	e.g. 0x5F = "_"; 0x41 = "A", 0x42 = "B" ...	X

Bit	Register address 34	Description	During fault
0-7	Day of production	of the MPA 41xx PF	X
8-15	Month of production	of the MPA 41xx PF	X

Bit	Register address 35	Description	During fault
0-7	Year of production	of the MPA 41xx PF	X
8-15	Not used		

Bit	Register address 36	Description	During fault
0-7	Device number	Byte 0 (low byte) of the 32-bit device number	X
8-15	Device number	Byte 1 of the 32-bit device number	X

Bit	Register address 37	Description	During fault
0-7	Device number	Byte 2 of the 32-bit device number	X
8-15	Device number	Byte 3 (high byte) of the 32-bit device number	X

Bit	Register address 38	Description	During fault
0-7	Article number for HW	Byte 0 (low byte) of the 24-bit article number	X
8-15	Article number for HW	Byte 1 of the 24-bit article number	X

Bit	Register address 39	Description	During fault
0-7	Article number for HW	Byte 2 (high byte) of the 24-bit article number	X
8-15	Index of article number for HW	e.g. 0x5F = "_"; 0x41 = "A", 0x42 = "B" ...	X

Bit	Register address 40	Description	During fault
0-7	Article number for device	Byte 0 (low byte) of the 24-bit article number	X
8-15	Article number for device	Byte 1 of the 24-bit article number	X

Bit	Register address 41	Description	During fault
0-7	Article number for device	Byte 2 (high byte) of the 24-bit article number	X
8-15	Index of article number for device	e.g. 0x5F = "_"; 0x41 = "A", 0x42 = "B" ...	X

Bit	Register address 42	Description	During fault
0-7	Article number for SW EM	Byte 0 (low byte) of the 24-bit article number	X
8-15	Article number for SW EM	Byte 1 of the 24-bit article number	X

Bit	Register address 43	Description	During fault
0-7	Article number for SW EM	Byte 2 (high byte) of the 24-bit article number	X
8-15	Article number for SW EM	e.g. 0x5F = "_"; 0x41 = "A", 0x42 = "B" ...	X

Bit	Register address 44	Description	During fault
0-7	Day of production	of the EM 2/4	X
8-15	Month of production	of the EM 2/4	X

Bit	Register address 45	Description	During fault
0-7	Year of production of EM	of the EM 2/4	X
8-15	Not used		

Bit	Register address 46	Description	During fault
0-7	Device number for EM	Byte 0 (low byte) of the 32-bit device number	X
8-15	Device number for EM	Byte 1 of the 32-bit device number	X

Bit	Register address 47	Description	During fault
0-7	Device number for EM	Byte 2 of the 32-bit device number	X
8-15	Device number for EM	Byte 3 (high byte) of the 32-bit device number	X

Bit	Register address 48	Description	During fault
0-7	Article number for HW-EM	Byte 0 (low byte) of the 24-bit article number	X
8-15	Article number for HW-EM	Byte 1 of the 24-bit article number	X

Bit	Register address 49	Description	During fault
0-7	Article number for HW-EM	Byte 2 (high byte) of the 24-bit article number	X
8-15	Index of article number for HW-EM	e.g. 0x5F = "_"; 0x41 = "A", 0x42 = "B" ...	X

Bit	Register address 50	Description	During fault
0-7	Article number for device EM	Byte 0 (low byte) of the 24-bit article number	X
8-15	Article number for device EM	Byte 1 of the 24-bit article number	X

Bit	Register address 51	Description	During fault
0-7	Article number for device EM	Byte 2 (high byte) of the 24-bit article number	X
8-15	Index of article number for device EM	e.g. 0x5F = "_"; 0x41 = "A", 0x42 = "B" ...	X

Bit	Register address 52	Description	During fault
0-7	Additional error information	4. Detailed info on the error message	X
8-15	Not used		

Bit	Register address 53	Description	During fault
0-7	Error state number	State in which the error occurred	X
8-15	Not used		

Bit	Register address 54	Description	During fault
0	GDWmin	GDWmin input function from HW input	X
1	POC V1	POC V1 input function from HW input	
2	POC V2	POC V2 input function from HW input	
3	FLW 2 NO	Flame 2 NO input function from HW input	
4	V2 stepwise on	V2 stepwise input function from HW input	
5	Main burner on	Heat request input function from HW input	
6	Air purging / flexible output function for X14 on	Air purging / flexible output function (for X14) from HW input	X
7	Cooling for X8 on	Cooling input function (for X8) from HW input	X
8	Error information for LDW cooling	Information: Incorrect LDW position during cooling with X8	X
9	Reserved		0
10	Warning of high internal temperature	Warning: High temperature in MPA housing (> 82 °C)	X
11	Input for LDW2	LDW2 input function from HW input	X
12	Error information for LDW air purge	Information: Incorrect LDW position during air purge with X14	X
13	Not used	Not used	0
14	Flame detection	General flame detection, merging of FLW 1 and FLW 2	0
15	Not used	Not used	

Bit	Register address 55	Description	During fault
0-7	Internal temperature of MPA	Internal temperature of MPA housing in °C; an offset of 50 K must be deducted.	X
8-15	Not used		

Bit	Register addresses 56–61	Description	During fault
0-7	Not used		X
8-15	Not used		

Line lengths

Designation	Line length	Electrical data
Profibus DP	Max. 1 200 m	Galvanically isolated 4 kV
Modbus	Max. 1 000 m	Galvanically isolated 4 kV

Supported baud rates

Profibus

The following table is valid only for line type A according to EN50170

Transfer speed in kBit/s	9.6	19.2	45.45	93.75	187.5	500	1 500	3 000	6 000	12 000
Max. line length in m	1 200	1 200	1 200	1 200	1 000	400	200	100	100	100

Modbus

9 600 baud, 19 200 baud,
19 200 baud and 57 600 baud

The baud rate can be changed during operation using the function code 0x41. This setting is saved permanently to the slave.

The associated parity bit can also be specified. The settings "none", "even" and "odd" are supported. The default values (upon delivery) are 19 200 baud and even parity.

Bus termination

The bus must be terminated with a terminating resistor at the first and last device in the bus structure.

As an alternative to internal termination (see above), an external bus terminating resistor can be connected instead of a continuing bus cable.

The shielding of the bus cable should be connected to PE to avoid electromagnetic radiation.

Extension module MPA 41xx EM 2/6

Profibus DP interface,
Modbus RTU / ASCII

The EM 2/6 expansion module is used in the MPA 4122 PF for bus functionality. The only difference from the EM 2/4 is the arrangement of the input data on the bus (shift backwards by EB4, EB5, and EB6).

DIP switch settings, see chapter EM 2/4

For output data for Profibus, see chapter EM 2/4
For output data for Modbus, see chapter EM 2/4

For line lengths, supported baud rates for Modbus / Profibus, see chapter EM 2/4

For declaration of the Profibus interface, see chapter EM 2/4

Plug assignment of MPA 4122 PF



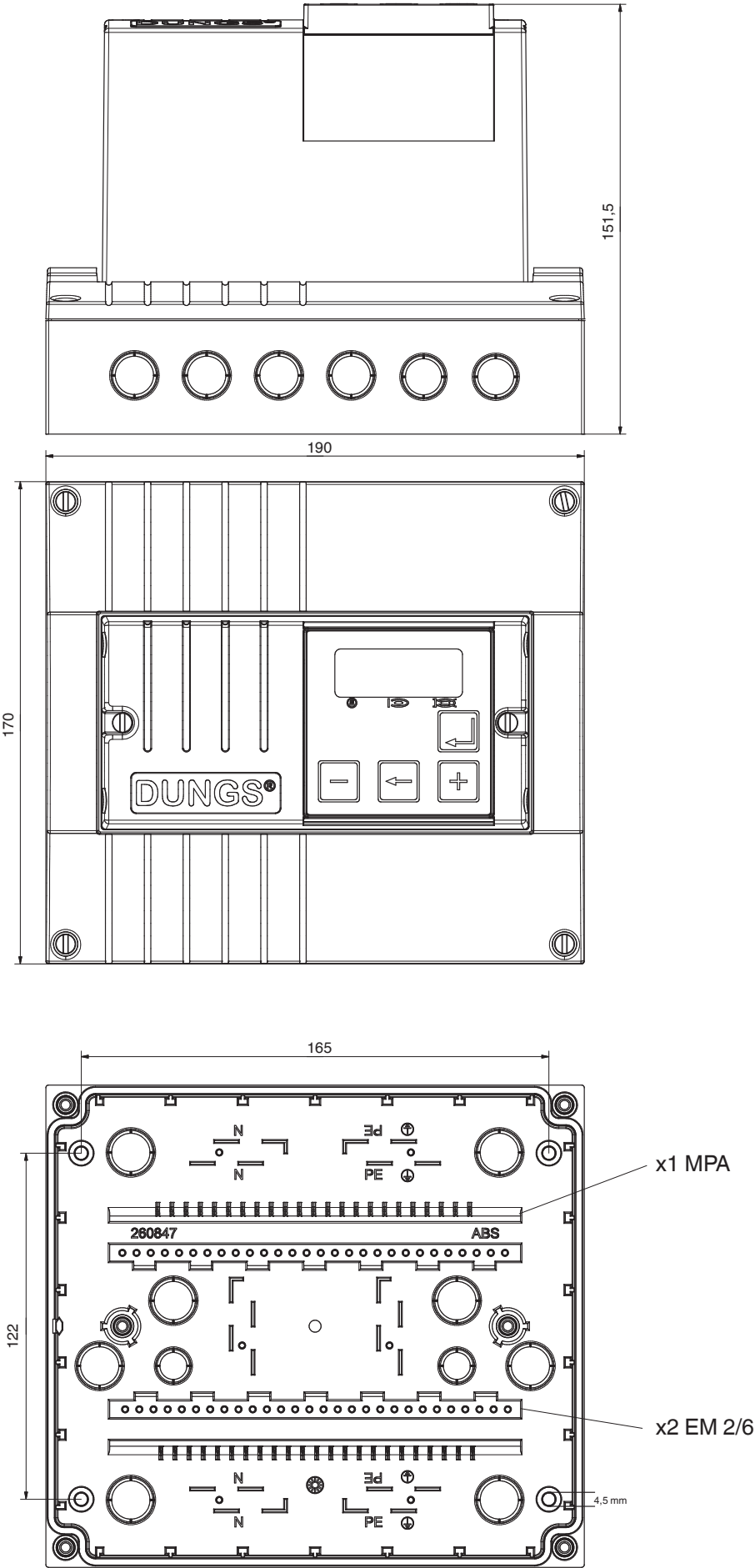
Input data provides information about the state of the MPA. The input data contains a different number of bytes depending on the data transfer module used.
The lower bytes are always the same. That is, the Basic transfer is included in the Standard transfer and the Standard transfer is likewise included in the Extended transfer.

- Basic transfer 2 bytes
EB0 and EB1
- Standard transfer 7 bytes
EB0 to EB6
- Extended transfer 15 bytes
EB0 to EB15
- Special Extended transfer 25 bytes
EB0 to EB24
- Exceptional Extended transfer 34 bytes
EB0 to EB33
- Bytes EB0, EB1, EB26 and EB27 contain bit information.
The description of the bits shows the condition when the bit is set to 1.
Some bits are active during a fault (indicated with "X"), others are set to 0.

Attention

Mounting of the EM 2/6 modules must be performed only by DUNGS or by third parties authorised by DUNGS.

Dimensions of plug-in socket
MPA 411x with EM 2 / 6



Technical data

Functions*			
Designation	Input type	Line length	Electrical data
Modbus interface	Modbus based on RS485	Max. 1 000 m	RS485 galvanically isolated 4 kV
DIP switch for terminating resistors, Modbus	DIP switch		For activating or deactivating the RS485 terminating resistors (Modbus)
Profibus DP		Max. 1 200 m	Galvanically isolated 4 kV

* The connection lines used must be suitable for an ambient temperature of at least 75 °C (167 °F)

Plug assignment of EM 2/6 for
MPA 4122 version

Connector 1 (analogue on / off
115 VAC / 230 VAC)

Function not supported

Connector 2 (115 VAC / 230 VAC
inputs)

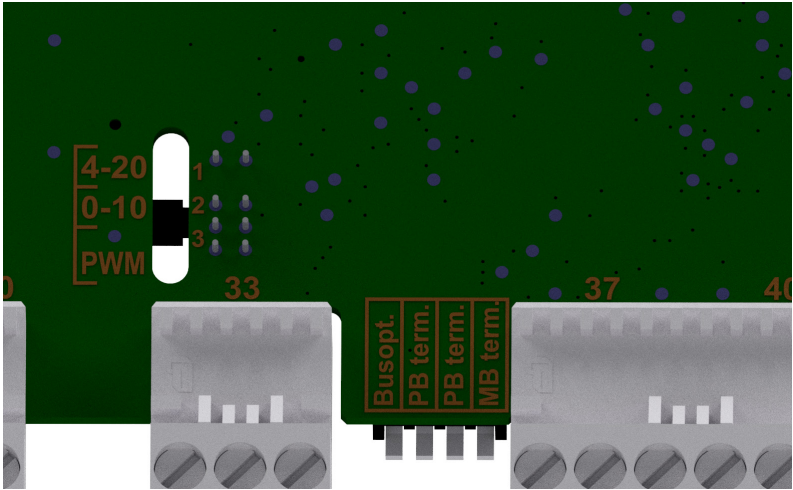
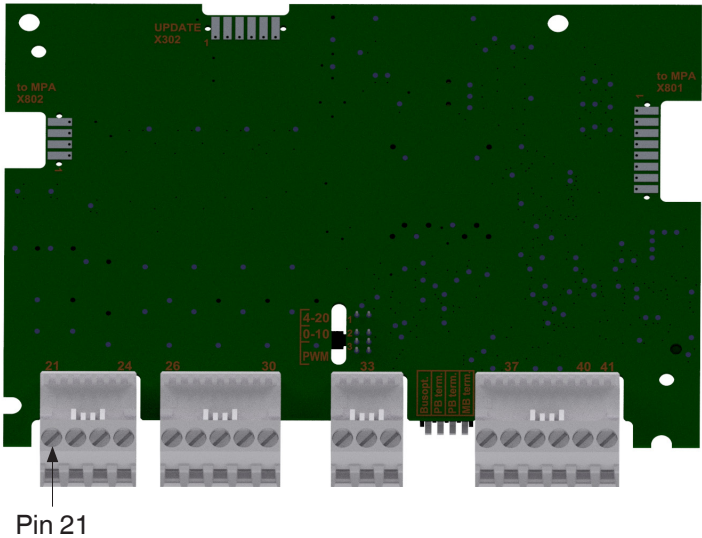
Function not supported

Connector 3 (analogue out)

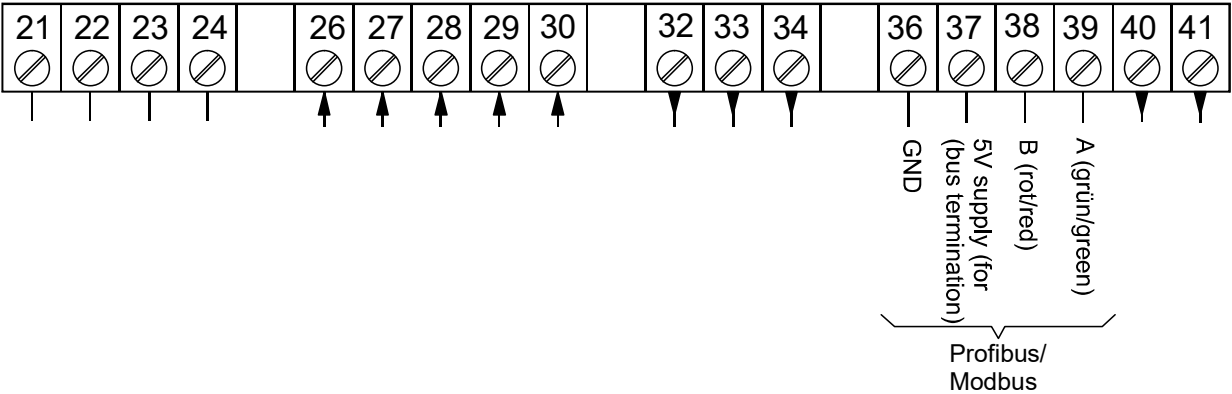
Function not supported

Plug 4 (bus):

- 36: GND
- 37: VCC 5 V (for bus termination)
- 38: B (red)
- 39: A (green)



Connection diagram for MPA 4122
EM 2/6 V2.0



Plug assignment of EM 2/6 for MPA 411x version
Connector 1 (analogue on / off 115 VAC / 230 VAC)

Function not supported

Connector 2 (115 VAC / 230 VAC inputs)

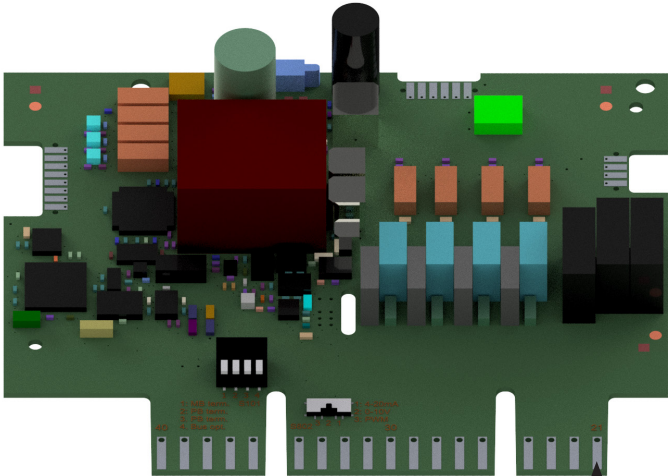
Function not supported

Connector 3 (analogue out)

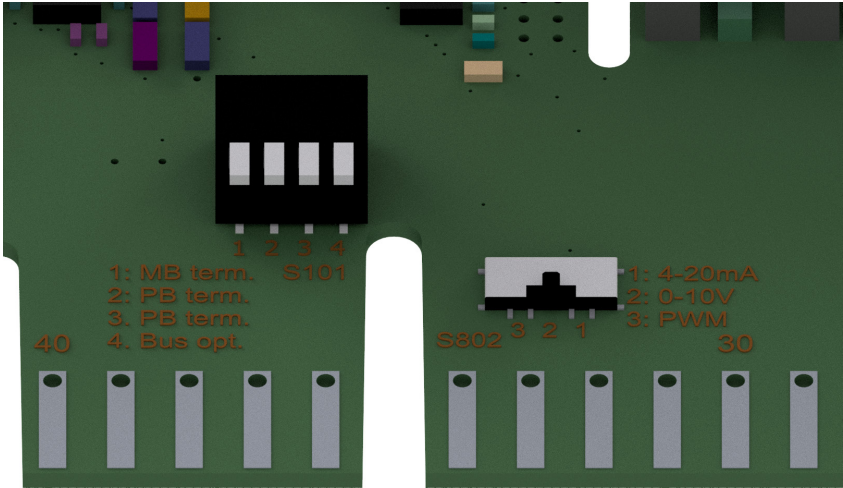
Function not supported

Connector 4 (bus):

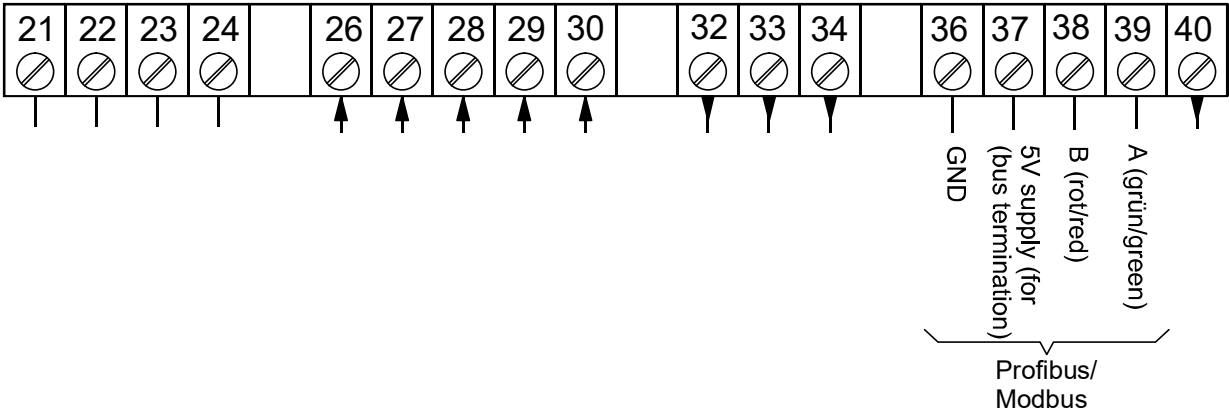
- 36: GND
- 37: VCC 5 V (for bus termination)
- 38: B (red)
- 39: A (green)



Pin 21



Connection diagram for MPA 411x EM 2/6 V2.0



Parameters			
Parameter description			
Parameters	Designation	Description	Setting / Examples
P239	Extension module	Configuration of whether an extension module is installed	Value range: 0: No EM installed 1: EM installed

Fieldbus communication EM 2/6 Profibus DP

Profibus setting, termination, technical data for EM 2/4 and EM 2/6 module

Profibus input data from MPA to master

Input data provides information about the state of the MPA. The input data contains a different number of bytes depending on the data transfer module used. The lower bytes are always the same. That is, the Basic transfer is included in the Standard transfer and the Standard transfer is likewise included in the Extended transfer.

Basic transfer 2 bytes
EB0 and EB1

Standard transfer 7 bytes
EB0 to EB6

Extended transfer 15 bytes
EB0 to EB14

Special Extended transfer 25 bytes
EB0 to EB24

Exceptional Extended transfer
34 bytes
EB0 to EB33

Bytes EB0, EB1, EB26 and EM27 contain bit information.
The description of the bits shows the condition when the bit is set to 1.
Some bits are active during a fault (indicated with "X"), others are set to 0.

Basic transfer area			
MPA 41xx PF			
Bit	Input byte EB0	Description	During fault
0	Input for flame for ionisation	Input for X5	0
1	Input for HT	HT NO input function from HW input	X
2	Input for HT NC	HT NC input function from HW input	X
3	Warning of flame in HT	Flame detected in HT mode	X
4	Input for LDW1	LDW1 input function from HW input	X
5	Input for temperature controller	Heat request input function from HW input	X
6	Output for valve 1	Output X13	X
7	V2 / V2 boost / energy int. / HT active	Output X14	X

Bit	Input byte EB1	Description	During fault
0	Ignition transformer	Ignition for active output X15	X
1	Warning message Switching cycles for V1	Parameter value reached	X
2	Output for air valve (air out)	Output for X8	X
3	Output options	Output X11	0
4	Evaluation of temp. controller (HW+bus)	Evaluation between HW input for temperature controller and bus specification	X
5	Warning message Switching cycles for air valve	Parameter value reached	0
6	Warning message for switching cycles for watchdog relay	Parameter value reached	0
7	Fault	Output for X12	X

Standard transfer area			
Bit	Input byte EB2	Description	During fault
0-7	State number or error code	Current state number or error code in the case of a fault	X

Bit	Input byte EB3	Description	During fault
0-7	Flame quality	Quality of the flame over the ionisation input in 0.1 µA	0

Bit	Input byte EB4	Description	During fault
0-7	Not used		0

Bit	Input byte EB5	Description	During fault
0-7	Not used		0

Bit	Input byte EB6	Description	During fault
0-7	Not used		0

Extended transfer area			
MPA 41xx PF			
Bit	Input byte EB7	Description	During fault
0-7	Resettable runtime meter for flame and HT	Low byte (byte 0) of the 32-bit runtime meter (Unit: s)	X
Bit	Input byte EB8	Description	During fault
0-7	Resettable runtime meter for flame and HT	Byte 1 of the 32-bit runtime meter (Unit: s)	X
Bit	Input byte EB9	Description	During fault
0-7	Resettable runtime meter for flame and HT	Byte 2 of the 32-bit runtime meter (Unit: s)	X
Bit	Input byte EB10	Description	During fault
0-7	Resettable runtime meter for flame and HT	High byte (byte 3) of the 32-bit runtime meter (Unit: s)	X
Bit	Input byte EB11	Description	During fault
0-7	Resettable start counter for flame mode	Low byte (byte 0) of the 32-bit start counter	X
Bit	Input byte EB12	Description	During fault
0-7	Resettable start counter for flame mode	Byte 1 of the 32-bit start counter	X
Bit	Input byte EB13	Description	During fault
0-7	Resettable start counter for flame mode	Byte 2 of the 32-bit start counter	X
Bit	Input byte EB14	Description	During fault
0-7	Resettable start counter for flame mode	High byte (byte 3) of the 32-bit start counter	X

Special Extended transfer area			
MPA 41xx PF			
Bit	Input byte EB15	Description	During fault
0-7	Service counter V1	Low byte (byte 0) of the 16-bit service counter, resolution 1 000 switching cycles	X
Bit	Input byte EB16	Description	During fault
0-7	Service counter V1	High byte (byte 1) of the 16-bit service counter, resolution 1 000 switching cycles	X
Bit	Input byte EB17	Description	During fault
0-7	Service counter for air valve	Low byte (byte 0) of the 16-bit service counter, resolution 1 000 switching cycles	X
Bit	Input byte EB18	Description	During fault
0-7	Service counter for air valve	High byte (byte 1) of the 16-bit service counter, resolution 1 000 switching cycles	X
Bit	Input byte EB19	Description	During fault
0-7	Service counter for watchdog relay	Low byte (byte 0) of the 16-bit service counter, resolution 1 000 switching cycles	X
Bit	Input byte EB20	Description	During fault
0-7	Service counter for watchdog relay	High byte (byte 1) of the 16-bit service counter, resolution 1 000 switching cycles	X
Bit	Input byte EB21	Description	During fault
0-7	Not used		0
Bit	Input byte EB22	Description	During fault
0-7	Not used		0

Exceptional Extended transfer area			
MPA 41xx			
Bit	Input byte EB23	Description	During fault
0-7	Additional error information 1	Detail byte error memory 1	X
Bit	Input byte EB24	Description	During fault
0-7	Additional error information 4	Detail byte error memory 4	X
Bit	Input byte EB25	Description	During fault
0-7	Error state number	State number in which the error occurred	X
Bit	Input byte EB26	Description	During fault
0	GDW min. / gas pressure min.	GDW min. input function from HW input	X
1	POC V1	POC V1 input function from HW input	X
2	POC V2	POC V2 input function from HW input	X
3	FLW 2 NO	Flame 2 NO input function from HW input	X
4	V2 stepwise on	V2 stepwise input function from HW input	X
5	Main burner on	Heat request input function from HW input	X
6	Function X14	Air purge / flexible output function from HW input	X
7	X8 cooling on	Cooling input function from HW input	X
Bit	Input byte EB27	Description	During fault
0	Error information for LDW cooling	Incorrect LDW position during cooling with X8	X
1	Reserved		0
2	Warning of high internal temperature	Warning: High internal temperature in MPA housing (> 82 °C)	X
3	Input for LDW2	LDW2 input function from HW input	X
4	Error information for air purge	Information: Incorrect LDW position during air purge with X14	X
5	Not used	Not used	0
6	Flame detection	General flame detection, merging of FLW1 and FLW 2	0
7	Not used	Not used	0
Bit	Input byte EB28	Description	During fault
0-7	Internal temperature of MPA	Internal temperature of MPA housing in °C; an offset of 50 must be deducted	X
Bit	Input byte EB29-33	Description	During fault
0-7	Not used	Not used	0

Fieldbus communication EM 2/6 modbus

Bit	Register address 0	Description	During fault
0	Input for flame for ionisation	Signal X5 present	0
1	Input for HT	HT NO input function from HW input	X
2	Input for HT NC	HT NC input function from HW input	X
3	Warning of flame in HT	Flame detected in HT mode	X
4	Input for LDW	Signal X18 present	X
5	Input for temperature controller HW	Input function from HW input	X
6	Output for valve 1		X
7	V2 / V2 boost / energy interrupt / HT active	Signal X14	X
8-15	Not used	Not used	0

Bit	Register address 1	Description	During fault
0	Ignition transformer	X15 ignition active	X
1	Warning message for switching cycles V1	Parameter value reached	0
2	Air valve output	Output X8 active	X
3	Output options 0-11	Output X11 active	X
4	Evaluation of temperature controller (HW++)	Evaluation between HW input for temperature controller and bus specification	X
5	Warning message for switching cycles for air valve	Parameter value reached	0
6	Warning message for switching cycles for watchdog relay	Parameter value reached	0
7	Fault	Output X12 active	X
8-15	Not used	Not used	0

Bit	Register address 2	Description	During fault
0-7	State number or error code	Current state number OR error code in the case of a fault	X
8-15	Not used	Not used	0

Bit	Register address 3	Description	During fault
0-7	Flame quality	Quality of the flame over the ionisation input in 0.1 µA	0
8-15	Not used	Not used	0

Bit	Register address 4	Description	During fault
0-7	Reserved		0
8-15	Not used		0

Bit	Register address 5	Description	During fault
0-	Reserved		0
8-15	Not used		0

Bit	Register address 6	Description	During fault
0-7	Reserved		0
8-15	Not used		0

Bit	Register address 7	Description	During fault
0-7	Resettable runtime meter for flame and HT	Low byte (byte 0) of the 32-bit runtime meter (in s)	X
8-15	Not used	Not used	0

Bit	Register address 8	Description	During fault
0-7	Resettable runtime meter for flame and HT	Byte 1 of the 32-bit runtime meter (in s)	X
8-15	Not used	Not used	0

Bit	Register address 9	Description	During fault
0-7	Resettable runtime meter for flame and HT	Byte 2 of the 32-bit runtime meter (in s)	X
8-15	Not used	Not used	0

Bit	Register address 10	Description	During fault
0-7	Resettable runtime meter for flame and HT	High byte (byte 3) of the 32-bit runtime meter (in s)	X
8-15	Not used	Not used	0

Bit	Register address 11	Description	During fault
0-7	Resettable start counter for flame mode	Low byte (byte 0) of the 32-bit start counter	X
8-15	Not used	Not used	0
Bit	Register address 12	Description	During fault
0-7	Resettable start counter for flame mode	Byte 1 of the 32-bit start counter	X
8-15	Not used	Not used	0
Bit	Register address 13	Description	During fault
0-7	Resettable start counter for flame mode	Byte 2 of the 32-bit start counter	X
8-15	Not used	Not used	0
Bit	Register address 14	Description	During fault
0-7	Resettable start counter for flame mode	High byte (byte 3) of the 32-bit start counter	X
8-15	Not used	Not used	0
Bit	Register address 15	Description	During fault
0-7	Service counter V1	High byte (byte 1) of the 16-bit service counter, resolution 1 000 switching cycles	X
8-15	Not used	Not used	0
Bit	Register address 16	Description	During fault
0-7	Service counter V1	Low byte (byte 0) of the 16-bit service counter, resolution 1 000 switching cycles	X
8-15	Not used	Not used	0
Bit	Register address 17	Description	During fault
0-7	Service counter for air valve	Low byte (byte 0) of the 16-bit service counter, resolution 1 000 switching cycles	X
8-15	Not used	Not used	0
Bit	Register address 18	Description	During fault
0-7	Service counter for air valve	High byte (byte 1) of the 16-bit service counter, resolution 1 000 switching cycles	X
8-15	Not used	Not used	0
Bit	Register address 19	Description	During fault
0-7	Service counter for watchdog relay	Low byte (byte 0) of the 16-bit service counter, resolution 1 000 switching cycles	X
8-15	Not used	Not used	0
Bit	Register address 20	Description	During fault
0-7	Service counter for watchdog relay	High byte (byte 1) of the 16-bit service counter, resolution 1 000 switching cycles	X
8-15	Not used	Not used	0
Bit	Register addresses 21-22	Description	During fault
0-7	Not used	Not used	0
8-15	Not used	Not used	0

Bit	Register address 23	Description	During fault
0-7	Additional error information 1	First additional error information byte	X
8-15	Not used	Not used	0
Bit	Register address 24	Description	During fault
0-7	Additional error information 4	Fourth additional error information byte	X
8-15	Not used	Not used	0

The following section summarises the information required for complete use of the 16-bit registers. This query can be used if the bus load needs to be minimised

Bit	Register address 25	Description	During fault
0	Input for flame for ionisation	Signal X5 present	0
1	Input for HT	HT NO input function from HW input	X
2	Input for HT NC	HT NC input function from HW input	X
3	Warning of flame in HT	Flame detected in HT mode	X
4	Input for LDW	Signal X18 present	X
5	Input for temperature controller HW	Input function from HW input	X
6	Output for valve 1		X
7	V2 / V2 boost / energy interrupt / HT active	Signal X14	X
8	Ignition transformer	X15 ignition active	X
9	Warning message for switching cycles V1	Parameter value reached	0
10	Air valve output	Output X8 active	X
11	Output options 0-11	Output X11 active	X
12	Evaluation of temperature controller (HW++)	Evaluation between HW input for temperature controller and bus specification	X
13	Warning message for switching cycles for air valve	Parameter value reached	0
14	Warning message for switching cycles for watchdog relay	Parameter value reached	0
15	Fault	Output X12 active	X
Bit	Register address 26	Description	During fault
0-7	State number or error code	Current state number or error code in the case of a fault	X
8-15	Flame quality	Quality of the flame over the ionisation input in 0.1 µA	0
Bit	Register address 27	Description	During fault
0-7	Reserved		0
8-15	Reserved		0
Bit	Register address 28	Description	During fault
0-7	Reserved		0
8-15	Reserved		0

Bit	Register address 29	Description	During fault
0-7	Resettable runtime meter for flame and HT	Low byte (byte 0) of the 32-bit runtime meter (in s)	X
8-15	Resettable runtime meter for flame and HT	Byte 1 of the 32-bit runtime meter (in s)	X
Bit	Register address 30	Description	During fault
0-7	Resettable runtime meter for flame and HT	Byte 2 of the 32-bit runtime meter (in s)	X
8-15	Resettable runtime meter for flame and HT	High byte (byte 3) of the 32-bit runtime meter (in s)	X
Bit	Register address 31	Description	During fault
0-7	Resettable start counter for flame mode	Low byte (byte 0) of the 32-bit start counter	X
8-15	Resettable start counter for flame mode	Byte 1 of the 32-bit start counter	X
Bit	Register address 32	Description	During fault
0-7	Resettable start counter for flame mode	Byte 2 of the 32-bit start counter	X
8-15	Resettable start counter for flame mode	High byte (byte 3) of the 32-bit start counter	X
Bit	Register address 33	Description	During fault
0-7	Service counter V1	16-bit service counter, resolution 1 000 switching cycles	X
Bit	Register address 34	Description	During fault
0-7	Service counter for air valve	16-bit service counter, resolution 1 000 switching cycles	X
Bit	Register address 35	Description	During fault
0-7	Service counter for watchdog relay	16-bit service counter, resolution 1 000 switching cycles	X
Bit	Register address 36	Description	During fault
0-15	Not used		0
Bit	Register address 37	Description	During fault
0-7	Additional error information 1	First additional error information byte	X
8-15	Additional error information 4	Fourth additional error information byte	X
Bit	Register address 38	Description	During fault
0-7	Article number for SW P1	Byte 0 (low byte) of the 24-bit article number	X
8-15	Article number for SW P1	Byte 1 of the 24-bit article number	X
Bit	Register address 39	Description	During fault
0-7	Article number for SW P1	Byte 0 (high byte) of the 24-bit article number	X
8-15	Index of article number for SW P1	e.g. 0x5F = " "; 0x41 = "A"; 0x42 = "B"...	X
Bit	Register address 40	Description	During fault
0-7	Day of production		X
8-15	Month of production		X

Bit	Register address 41	Description	During fault
0-7	Year of production		X
8-15	Not used		0
Bit	Register address 42	Description	During fault
0-7	Device number	Byte 0 (low byte) of the 32-bit device number	X
8-15	Device number	Byte 1 of the 32-bit device number	X
Bit	Register address 43	Description	During fault
0-7	Device number	Byte 2 of the 32-bit device number	X
8-15	Device number	Byte 3 (high byte) of the 32-bit device number	X
Bit	Register address 44	Description	During fault
0-7	Article number for HW	Byte 0 (low byte) of the 24-bit article number	X
8-15	Article number for HW	Byte 1 of the 24-bit article number	X
Bit	Register address 45	Description	During fault
0-7	Article number for HW	Byte 0 (high byte) of the 24-bit article number	X
8-15	Index of article number for HW	e.g. 0x5F = " "; 0x41 = "A"; 0x42 = "B"...	X
Bit	Register address 46	Description	During fault
0-7	Article number for device	Byte 0 (low byte) of the 24-bit article number	X
8-15	Article number for device	Byte 1 of the 24-bit article number	X
Bit	Register address 47	Description	During fault
0-7	Article number for device	Byte 0 (high byte) of the 24-bit article number	X
8-15	Index of article number for device	e.g. 0x5F = " "; 0x41 = "A"; 0x42 = "B"...	X
Bit	Register address 48	Description	During fault
0-7	Article number for SW EM	Byte 0 (low byte) of the 24-bit article number	X
8-15	Article number for SW EM	Byte 1 of the 24-bit article number	X
Bit	Register address 49	Description	During fault
0-7	Article number for SW EM	Byte 0 (high byte) of the 24-bit article number	X
8-15	Index of article number for SW EM	e.g. 0x5F = " "; 0x41 = "A"; 0x42 = "B"...	X
Bit	Register address 50	Description	During fault
0-7	Day of production	of the EM 2/4	X
8-15	Month of production	of the EM 2/4	X
Bit	Register address 51	Description	During fault
0-7	Year of production	of the EM 2/4	X
8-15	Not used	of the EM 2/4	0
Bit	Register address 52	Description	During fault
0-7	Device number for EM	Byte 0 (low byte) of the 32-bit device number	X
8-15	Device number for EM	Byte 1 of the 32-bit device number	X
Bit	Register address 53	Description	During fault
0-7	Device number for EM	Byte 2 of the 32-bit device number	X
8-15	Device number for EM	Byte 3 (high byte) of the 32-bit device number	X

Bit	Register address 54	Description	During fault
0-7	Article number for HW EM	Byte 0 (low byte) of the 24-bit article number	X
8-15	Article number for HW EM	Byte 1 of the 24-bit article number	X
Bit	Register address 55	Description	During fault
0-7	Article number for HW EM	Byte 0 (high byte) of the 24-bit article number	X
8-15	Index of article number for HW EM	e.g. 0x5F = " "; 0x41 = "A"; 0x42 = "B"...	X
Bit	Register address 56	Description	During fault
0-7	Article number for device EM	Byte 0 (low byte) of the 24-bit article number	X
8-15	Article number for device EM	Byte 1 of the 24-bit article number	X
Bit	Register address 57	Description	During fault
0-7	Article number for device EM	Byte 0 (high byte) of the 24-bit article number	X
8-15	Index of article number for device EM	e.g. 0x5F = " "; 0x41 = "A"; 0x42 = "B"...	X
Bit	Register address 58	Description	During fault
0-7	Error state	State in which the error was triggered	X
8-15	Not used		0
Bit	Register address 59	Description	During fault
0	Gas pressure detector (GDW) min.	GDW min. input function from HW input	X
1	POC V1	POC V1 input function from HW input	X
2	POC V2	POC V2 input function from HW input	X
3	FLW2 NO	FLW 2 NO input function from HW input	X
4	V2 stepwise on	V2 stepwise input function from HW input	X
5	Main burner ON	Heat request input function from HW input	X
6	Air purge / flexible output function for X14	Air purge / flexible output function for X14 from HW input	X
7	Cooling X8 on	Cooling input function (for X8) from HW input	X
8	Error information for LDW cooling	Information: Incorrect LDW position during cooling with X8	X
9	Reserved		0
10	Warning of high internal temperature	Explanation of high temperature in MPA housing (> 82 °C)	X
11	Input for LDW2	LDW2 input function from HW input	X
12	Error information for LDW air purge	Information: Incorrect LDW position during air purge with X14	X
13	Not used		0
14	Flame detection	General flame detection, merging of FLW 1 and FLW 2	0
15	Not used		0
Bit	Register address 60	Description	During fault
0-7	Internal temperature of MPA	Internal temperature of MPA housing in °C; an offset of 50 K must be deducted	X
8-15	Not used		0
Bit	Register addresses 61–63	Description	During fault
0-7	Not used		0
8-15	Not used		0

Flame detector device

Requirements for the operation of separate flame detector devices on the MPA 41xx:

The flame detector devices must have been tested and approved for the monitoring of gas burners.

The response times must be observed.

Total response time = MPA response time + flame detector device response time.

Proof of compliance with the requirements of EN 298 must be provided.

The response time to a flame failure by an external flame detector device must not be longer than the first or second safety time during start-up. When connected to FLW1, the ionisation behaviour of the flame must be simulated (rectifier effect). The following values are present at the ionisation input / output of the MPA: 230 VAC +10 % to 15 %.

The internal resistance of the MPA is approx. 1 MΩ. For safety reasons, the flame sensor must also function properly with an internal resistance of 360 kΩ. Under these conditions, the simulation circuit in the flame detector device must reach at least a direct current of 3 μA.

If an alternating current with a DC component is simulated, a DC component must not fall below 25 %.

The current can be diverted to N, PE, or returned to N on the MPA.

When connected to FLW 2, the switching output of a suitable flame detector device must be connected to FLW 2_NO (115 VAC or 230 VAC).

The EMC regulations must be observed (EN 298). The overall system must not produce inadmissible emissions.

The MPA 41xx is not galvanically isolated.

The MPA 41xx and flame monitor must be connected in the correct phase

For flame detector device 1, the quality of the flame signal is displayed as a number between 0 and 15 μA.

Evaluation of the flame signal is possible only when using ionisation flame monitoring or monitoring via UV 41 (HE).

When using the UV 42, FLW 10 IR or FLW 20 UV, the system always displays the maximum value.

Attention

DUNGS cannot be held liable if the flame detector device and automatic burner control system do not function correctly together. This applies in particular to electromagnetic behaviour that does not conform to standards and to incorrect timing.

Flame detector devices approved by DUNGS:

Manufacturer	Designation	Type	Output signal	Safety time Flame detector device	Total response time to flame failure	Intermittent	Continuous operation
–	Ionisation electrode	Ionisation	Ionisation	0 s	P41	Yes	No
DUNGS	UV 41 (HE)	UV tube	Ionisation	0.125 s (= 2/16 s)	P41 + 0.125 s	Yes	No
DUNGS	UV 42	UV tube	Switching output 230 VAC	0.125 s (= 2/16 s)	P44 + 0.125 s	Yes	No
DUNGS	FLW 20 (KLC 1000) KLC 10/230 KLC 1000/230* FLW 20UV** KLC 10/230 RA KLC 1000/230 RA* FLW 20UV/F V1.0**	UV tube	Ionisation	0.5 s	P41 + 0.5 s	Yes	No
DUNGS	KLC 2002 FLW 10 IR** KLC 2002 FLW 10IR V2.1** KLC 20/230	Flicker detector with frequency analysis	Ionisation	0.5 s	P41 + 0.5 s	Yes	No
DUNGS	FLW 41 I	Ionisation	Switching output 230 VAC	0.19 s (= 3/16 s)	P44 + 0.19 s	Yes	No

* Alternative designation by BST Solutions

** Alternative designation by DUNGS

Flame detectors that are not included in this list must be approved by DUNGS prior to use.

UV 41 (HE)

The UV 41 (HE) is a flame detector device with UV tube. It is made of metal to withstand high mechanical stresses.

The flame detector is connected to the ionisation input of the MPA 41xx and is suitable for intermittent operation.

A UV 4x-EM 1/x adapter must be used to mount the UV 41 (HE).

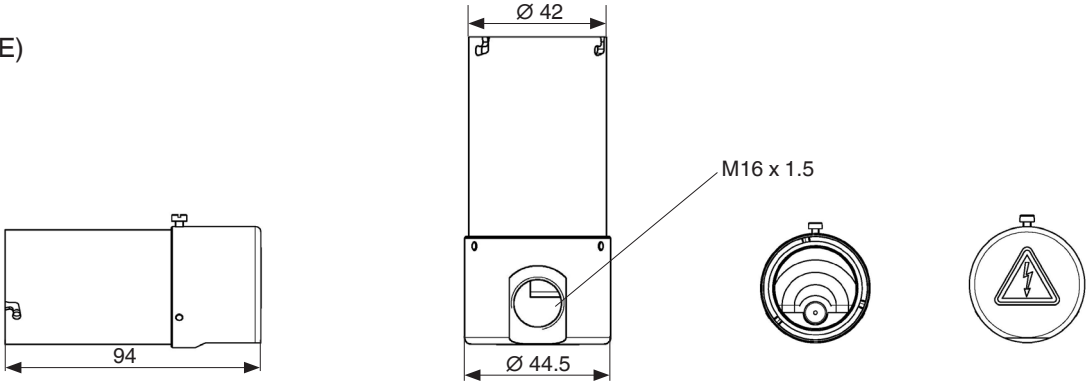


Technical data

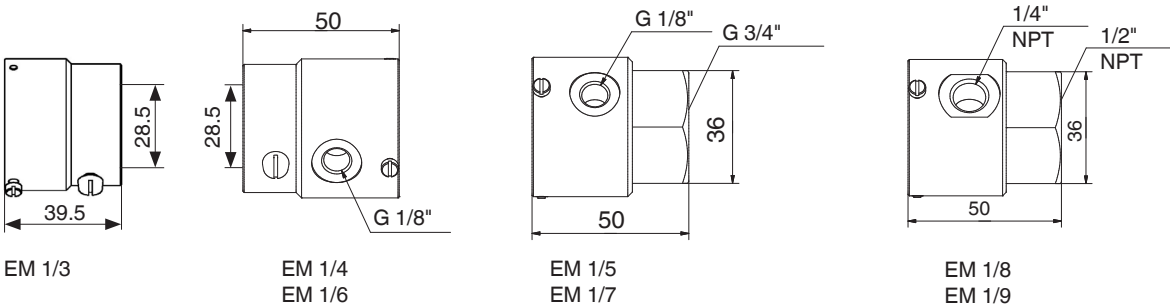
General information for UV 41	
Rated voltage	230 VAC -15 % to +10 %
Frequency	50-60 Hz
Power consumption	< 1 W
Protection class	IP 54
Ambient temperature	-40 °C to +60 °C -40 °C to +80 °C with reduced lifetime of the UV tube
Storage and transport	-40 °C to +80 °C
Humidity	DIN 60730-1, no dewing admissible
Service life	10 000 operating hours (version (HE) has reduced service life)
Installation position	Any
Dimensions in mm	Diameter: 44.5 mm Length: 94 mm Length with UV 4x-EM 1: Approx. 128-143 mm
Max. line length	10 m

Dimensions

UV 41 (HE)



UV 4x EM 1/x adapter



Installation

The UV 41 (HE) must be installed as close as possible to the flame to be monitored.

The UV 41 (HE) EM 1/3 adapter fits a 1" inspection tube. During installation, make sure that the rubber sealing ring supplied with the UV 41 (HE) is inserted between the UV 41 (HE) and the mounting adapter.

The UV 41 (HE) sensor also reports external light as a flame.

The UV 41 (HE) must therefore be mounted such that, for example, no daylight, ignition sparks or other UV sources can be detected.

Since the UV 41 (HE) tube is sensitive to impacts, vibrations, etc., it must be installed in a way that minimises vibration.

After the installation work is complete, all screws must be checked for tight fit.

If temperatures in excess of 60 °C are reached at the UV 41 (HE), an adapter fitted with a quartz cover glass and, if necessary, an additional purging air connection must be used (available upon request).

Attention

The maximum permitted line lengths must not be exceeded. Supply and signal lines must be laid separately, to the extent possible.

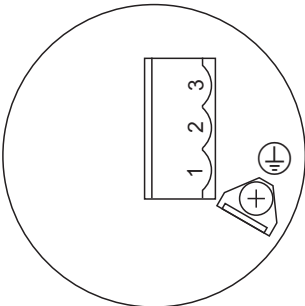
Attention

The flame detector device UV 41 (HE) is delivered without a cable screw connection.

To guarantee the required strain relief and IP protection class IP 54, a cable screw connection M16 x 1.5 for cable diameters 5-9 mm is required (3 x 0.75 mm², corresponding to AWG 20, up to 3 x 1.5 mm², corresponding to AWG 16).

The protective earth conductor must be connected using an insulated female connector according to DIN 46245.

Electrical connection



Connection	UV 41 (HE)	MPA 41xx
Pin 1	Out	Ionisation (5)
Pin 2	N	N
Pin 3	L	Vers. FLW (7)
PE		

UV 42

The UV 42 is a flame detector device with UV tube. It is made of metal to withstand high mechanical stresses. The flame detector is connected to the switch input of the MPA 41xx (flame detector device 2) and is suitable for intermittent operation.

A UV 4x-EM 1/x adapter must be used to mount the UV 42.

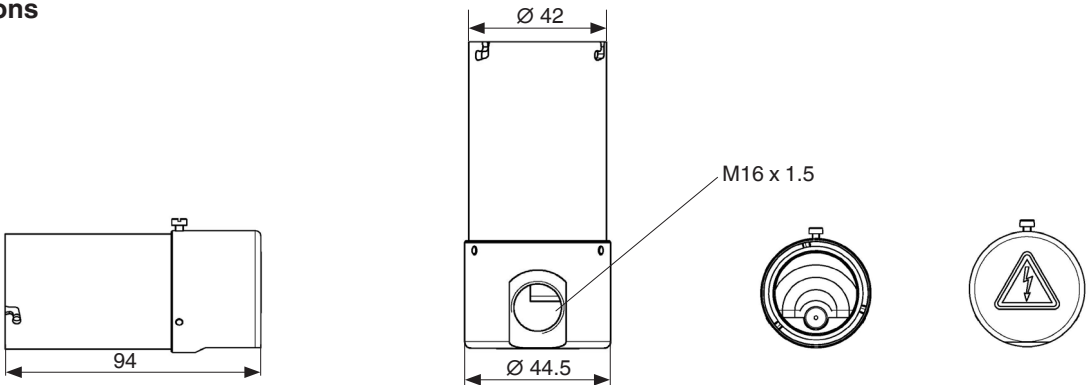


Technical data

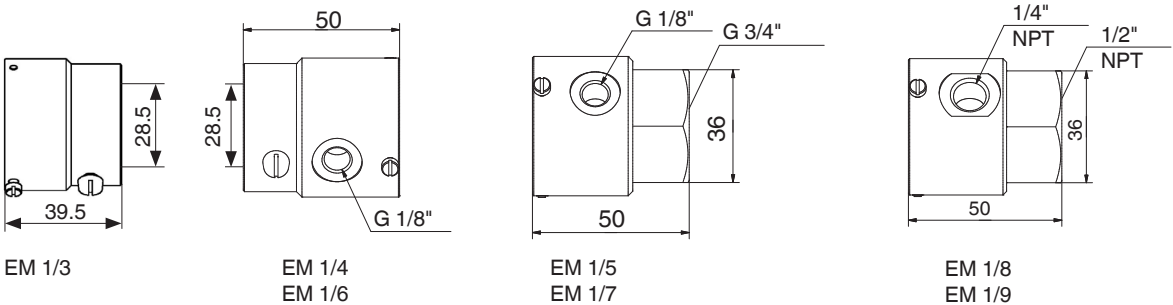
General information for UV 42	
Rated voltage	230 VAC -15 % to +10 %
Frequency	50-60 Hz
Power consumption	< 1 W
Protection class	IP 54
Ambient temperature	-20 °C to +60 °C -40 °C to +80 °C with reduced lifetime of the UV tube
Storage and transport	-40 °C to +80 °C
Humidity	DIN 60730-1, no dewing admissible
Service life	10 000 operating hours
Installation position	Any
Dimensions in mm	Diameter: 44.5 mm Length: 94 mm Length with UV 4x-EM 1 ix: Approx. 128-143 mm
Max. line length	100 m

Dimensions

UV 42



UV 4x EM 1/x adapter



Installation

The UV 42 must be installed as close as possible to the flame to be monitored.

The UV 42 EM 1/3 adapter fits a 1" inspection tube. During installation, make sure that the rubber sealing ring supplied with the UV 42 is inserted between the UV 42 and the mounting adapter.

The UV sensor also reports external light as a flame. The UV 42 must therefore be mounted such that, for example, no daylight, ignition sparks or other UV sources can be detected. Since the UV tube is sensitive to impacts, vibrations, etc., it must be installed in a way that minimises vibration.

After the installation work is complete, all screws must be checked for tight fit.

If temperatures in excess of 60 °C are reached at the UV 42, an adapter fitted with a quartz cover glass and, if necessary, an additional purging air connection must be used (available upon request).

Attention

The maximum permitted line lengths must not be exceeded. Supply and signal lines must be laid separately, to the extent possible.

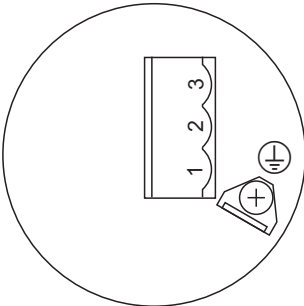
Attention

The flame detector device UV 42 is delivered without a cable screw connection.

To guarantee the required strain relief and IP protection class IP 54, a cable screw connection M16 x 1.5 for cable diameters 5-9 mm is required (3 x 0.75 mm², corresponding to AWG 20, up to 3 x 1.5 mm², corresponding to AWG 16).

The protective earth conductor must be connected using an insulated female connector according to DIN 46245.

Electrical connection



Connection	UV 42	MPA 41xx
Pin 1	Out	FLW 2 NO (16)
Pin 2	N	N
Pin 3	L	Vers. FLW (7)
PE		

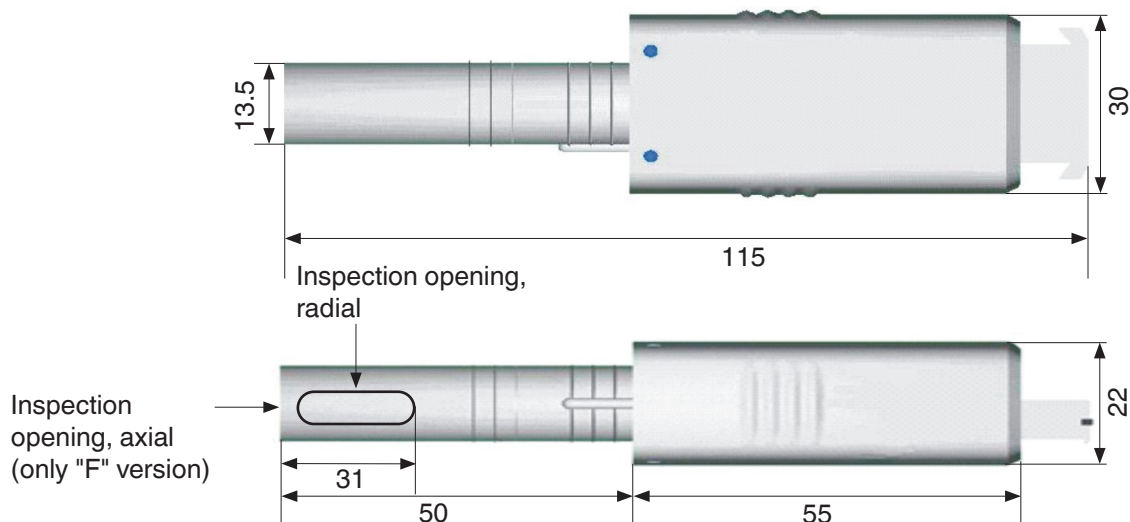
FLW 20 / FLW 20 UV / FLW 20 UV/F V1.0

The FLW 20 UV is a flame detector with UV tube in a plastic design. The use of a UV tube guarantees that background radiation (for example from hot refractory linings or parts of the mixing device) is not detected. The flame signal intensity can be viewed directly using the optical LED display of the flame detector device. The FLW 20 UV is connected to the ionisation input of the MPA 41xx and is suitable only for intermittent operation. The FLW flanges are suitable for mounting.

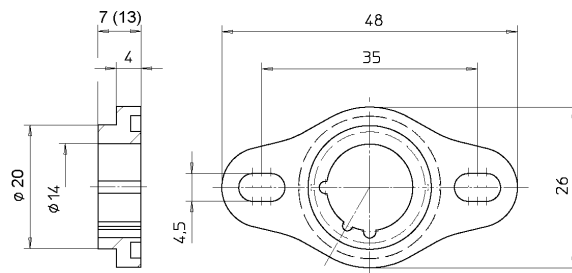


Technical data	
Rated voltage	230 VAC -15 % to +10 %
Frequency	50-60 Hz
Current consumption	5.5 mA
Output data	Typical response time with flame on: 0.5 sec. Response time to flame failure < 0.5 sec.
Switching output	Max. switching current 15 mA, Max. switching power 0.3 W Max. switching voltage 280 VAC / 400 VDC
Optical evaluation	Spectral range 185-260 nm Tolerated flame signal drops: Approx. 200 ms
Alignment to flame	Radial, left
Protection class	IP 41
Ambient temperature	-20 °C to +50 °C -20 °C to + 60 °C with reduced lifetime
Storage and transport	-20 °C to +60 °C
Humidity	Max 95 % RH, no dewing permitted
Service life	10 000 operating hours
Installation position	Any
Max. line length	10 m

Dimensions [mm] FLW 20 UV



FLW flange



Installation

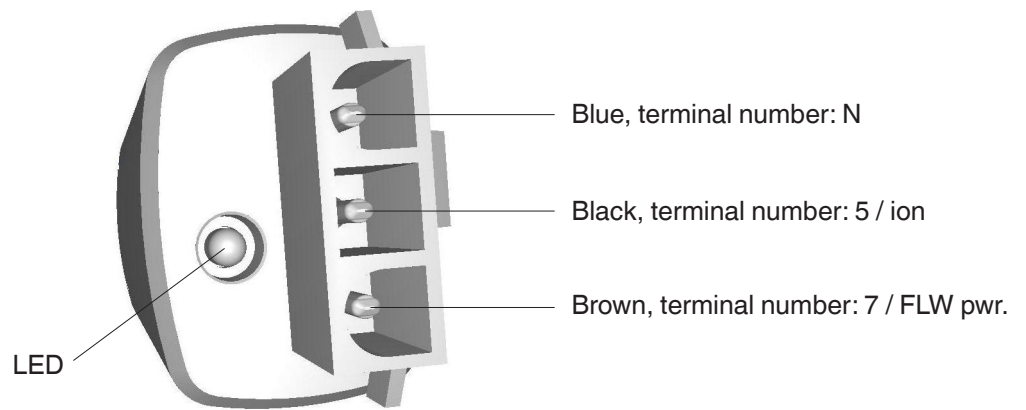
The FLW 20 UV must be installed as close as possible to the flame to be monitored.

It is installed using an FLW flange (height 7 or 13 mm) or a mount with a 14 mm installation aperture.

The flame detector device must be firmly inserted into the mount. No external light is permitted to fall on the sensor, and a direct line of sight to the ignition spark must also be avoided.

Attention: The maximum permitted line lengths must not be exceeded. Supply and signal lines must be laid separately, to the extent possible.

Electrical connection



Operating display LED

The flame signal intensity recorded by the FLW 20 UV flame detector device is shown using the built-in LED.

LED off

FLW is de-energised or no flame is detected

LED flashes

Flame detected; the number of flashing pulses of the LED indicates the flame signal intensity: increasing flashing pulses = higher intensity

LED permanently on

Flame detected at the highest flame intensity

Commissioning and maintenance

Since the UV tubes are subject to ageing, a technical safety check of the flame detector device must be carried out during commissioning and during each maintenance activity. The following functions must be checked:

Start-up without flame signalling

Darken the flame detector during start-up. At the end of the safety time, the automatic burner control system must either output a fault or perform a restart.

Start-up with flame signalling

Perform a start-up attempt of the automatic gas burner control system with the flame detector device exposed to external UV radiation, such as a cigarette lighter or gas flame (available room light is not sufficient). The automatic burner control system reports external light.

Burner mode

Darken the flame detector device while the burner is running. Depending on the parameter settings for the automatic gas burner control system, this will trigger a non-volatile lock-out or safety shutdown followed by a restart attempt.

If malfunctions occur, the flame detector device must be replaced. After a runtime of 10 000 hours, the flame detector should be replaced as a preventive measure. It is not possible to replace the UV tubes.

**FLW 10 IR / FLW 10 IR V2.1 /
KLC 20/230**

The FLW 10 IR is a flame detector device equipped with an IR sensor for monitoring burners with blue-burning flames.

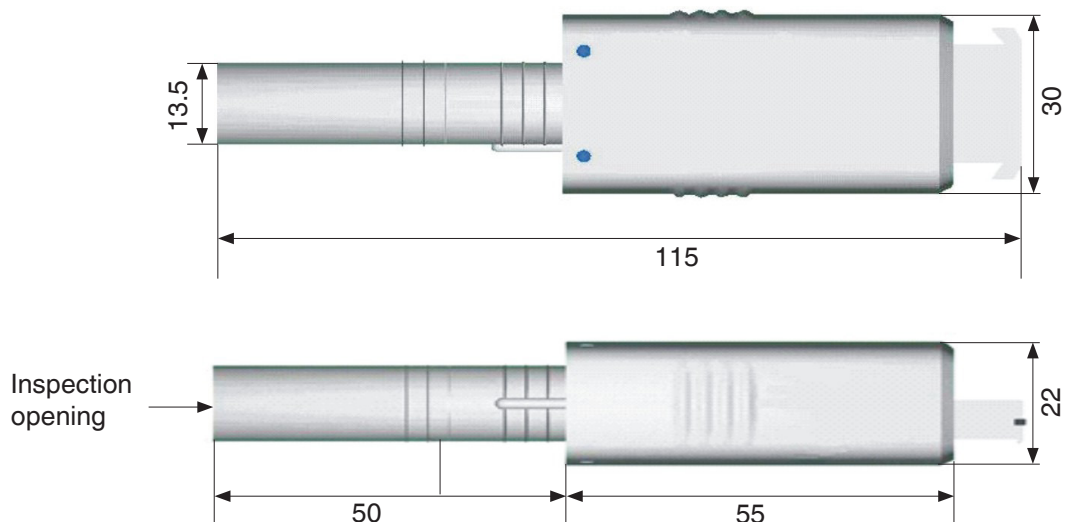
The flame detector detects the flicker frequency of the flame. Light rays that emit a uniform frequency are filtered out. External light (e.g. light caused by glowing components or fluorescent tubes) is not detected as flame. The flame signal intensity can be viewed directly using the optical LED display of the flame detector device. The FLW 10 IR is connected to the ionisation input of the MPA 41xx and is suitable only for intermittent operation.

The FLW flanges are suitable for mounting.

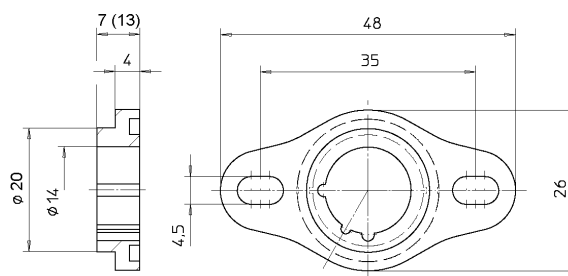


Technical data	
Rated voltage	230 VAC -15 % to +10 %
Frequency	50-60 Hz
Current consumption	3 to 4 mA
Output data	Typical response time with flame on: 0.5 sec. Response time to flame failure < 0.5 sec.
Switching output	Max. switching current 15 mA, Max. switching power 0.3 W Max. switching voltage 280 VAC / 400 VDC
Optical evaluation	Spectral range 380-1 150 nm, max. sensitivity at 920 nm Tolerated flame signal drops: Approx. 280 ms
Alignment to flame	Frontal
Protection class	IP 41
Ambient temperature	-20 °C to +60 °C
Storage and transport	-20 °C to +60 °C
Humidity	Max 95 % RH, no dewing permitted
Installation position	Any
Max. line length	10 m

Dimensions [mm] FLW 10 IR



FLW flange



Installation

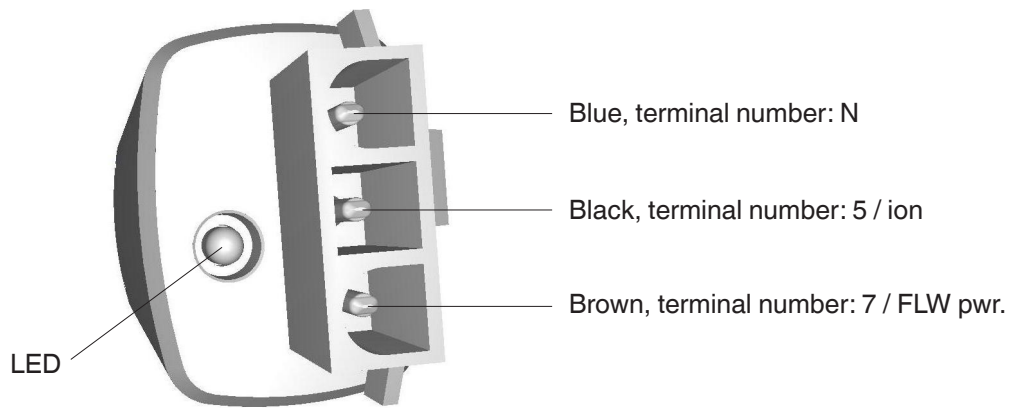
The FLW 10 IR must be installed as close as possible to the flame to be monitored.

It is installed using an FLW flange (height 7 or 13 mm) or a mount with a 14 mm installation aperture.

The flame detector device must be firmly inserted into the mount. No external light is permitted to fall on the sensor, and a direct line of sight to the ignition spark must also be avoided.

Attention: The maximum permitted line lengths must not be exceeded. Supply and signal lines must be laid separately, to the extent possible.

Electrical connection



Operating display LED

The flame signal intensity recorded by the FLW 10 IR flame detector device is shown using the built-in LED.

LED off

FLW is de-energised or no flame is detected

LED flashes

Flame detected; the number of flashing pulses of the LED indicates the flame signal intensity: increasing flashing pulses = higher intensity

LED permanently on

Flame detected at the highest flame intensity

Commissioning and maintenance

The FLW 10 IR is service-free.

FLW 41 I

The flame detector device module FLW 41 I is connected to the second detector device input of the MPA 41xx.

The flame is monitored using an ionisation electrode.

This allows burners to be monitored using two measuring points.

Suitable for intermittent operation.

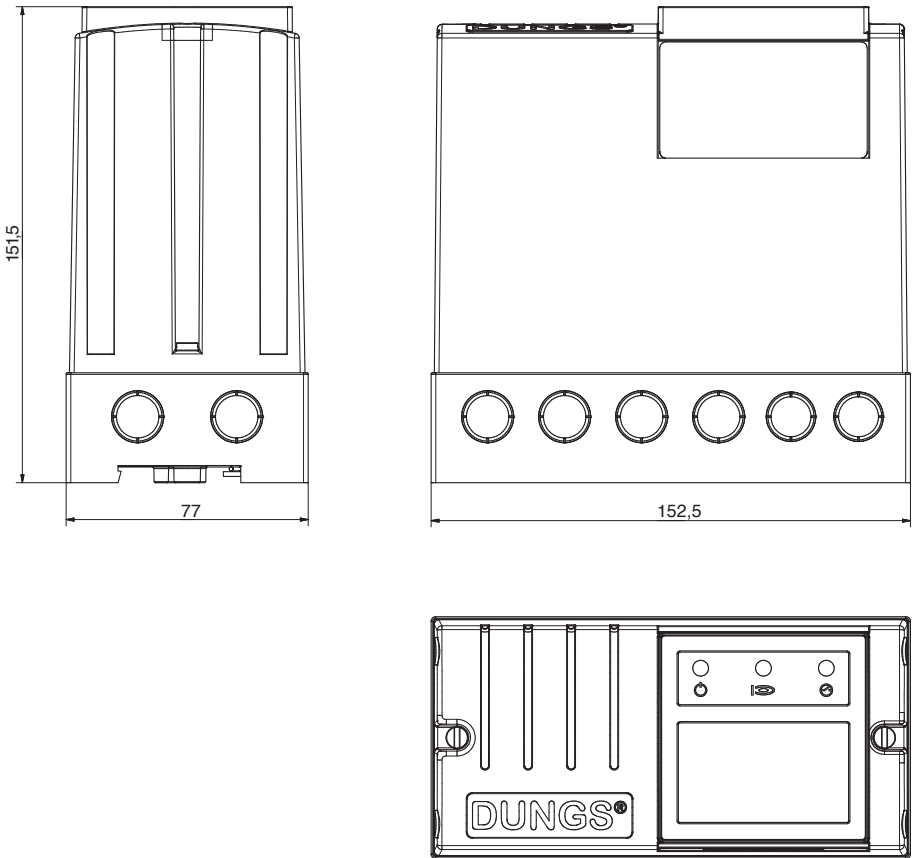


Technical data

General information for FLW 41	
Rated voltage	230 VAC -15 % to +10 %, supplied via MPA 41xx FLW pwr.
Frequency	50-60 Hz
Power consumption	< 3 W
Protection class	IP 54
Ambient temperature	-40 °C to +70 °C
Storage and transport	-40 °C to +80 °C
Humidity	DIN 60730-1, no dewing admissible
Installation position	Any
Dimensions in mm (LxHxD)	Approx. 152.5 x 151.5 x 77 mm
Weight	0.6 kg
Max. line length to MPA	100 m
Max. line length for ionisation	10 m

Dimensions

FLW 41 I



Installation

The FLW 41 I can be mounted either on a hat rail or using a direct screw connection (all dimensions are the same as for the MPA 411)

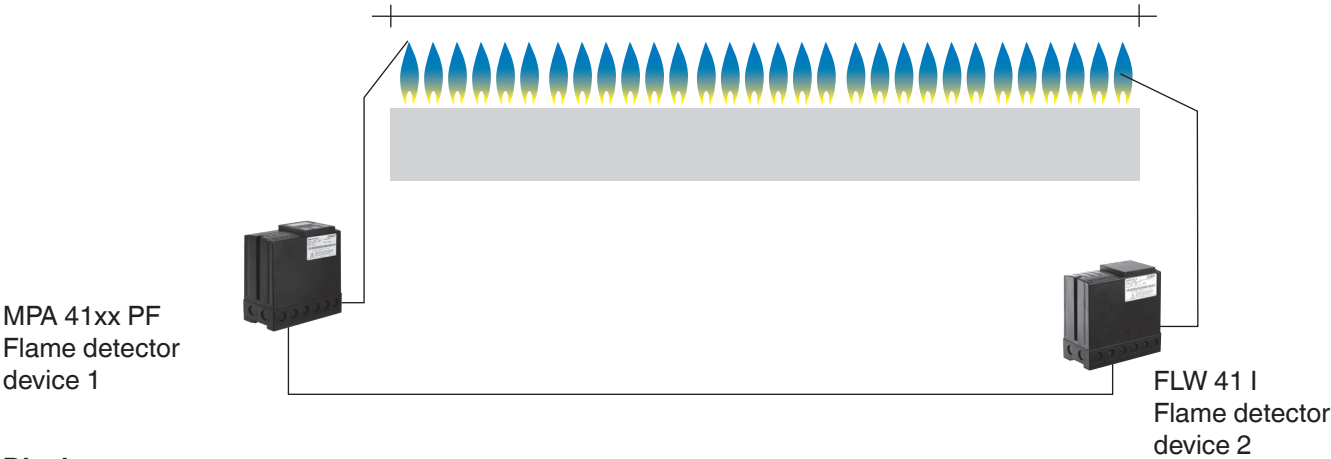
Attention

The maximum permitted line lengths must not be exceeded.
Supply and signal lines must be laid separately.

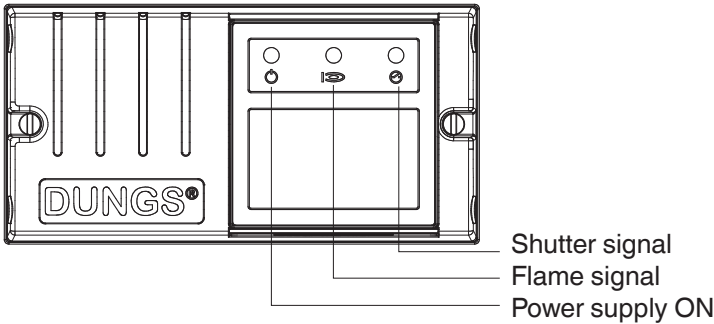
Role

The FLW 41 I enables a flame to be monitored at two measuring points or two flames to be monitored independently of each other.

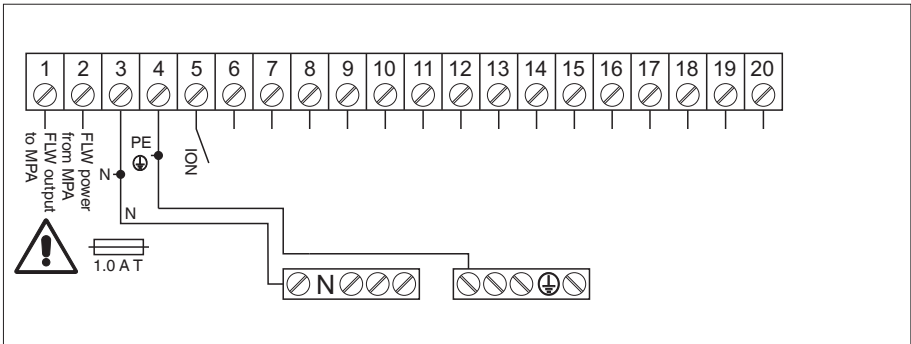
Example:



Display



Electrical connection



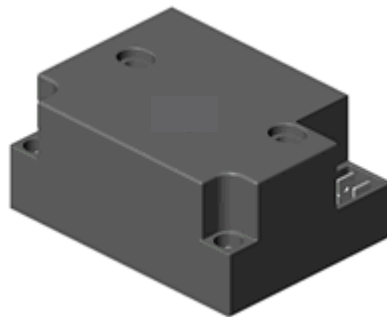
DEZ ignition transformers

Technology

The DUNGS DEZ units are electronic, high-performance ignition transformers with high-frequency oscillation technology.

The DEZ units are much smaller and lighter than conventional inductive ignition transformers.

Versions for one or two ignition electrodes are available in different voltage variants.



Application

For oil and gas burners, ignition takes place with one ignition electrode against the burner mass or with two ignition electrodes between the electrodes, depending on the version.

Certification

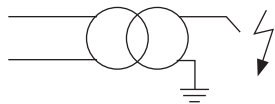
73/23/EEC Low Voltage Directive
89/336/EEC EMC Directive

DEZ function

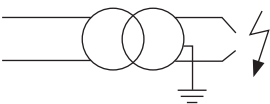
DEZ ignition transformers are available in two versions: either with one high-voltage output (DEZ 1xx) for ignition against the burner mass or with two high-voltage outputs (DEZ 2xx) for ignition between the electrodes.

Both versions are available with different performance data. The "SEO" versions must be used in burner systems in which ignition and ionisation flame monitoring are performed using a common electrode.

DEZ 1xx



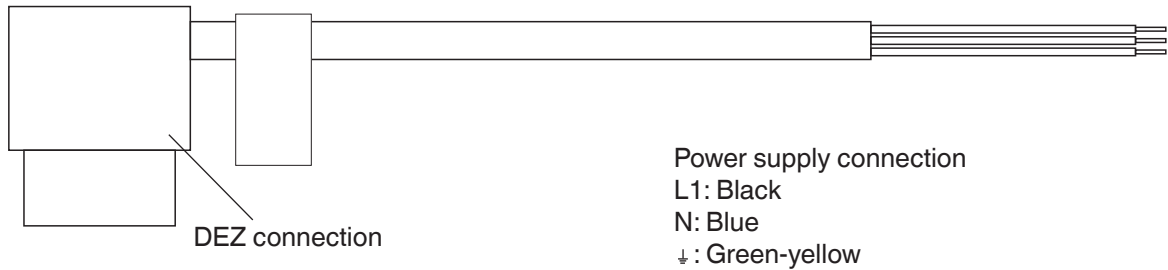
DEZ 2xx



DEZ Versions	DEZ 100	DEZ 101	DEZ 100 SEO	DEZ 101 SEO	DEZ 200
High-voltage outputs	1	1	1	1	2
Mains voltage [VAC]	230 / 240	120	230	120	230 / 240
Frequency [Hz]	50 / 60	50 / 60	50 / 60	50 / 60	50 / 60
Current consumption [A]	0.3	0.5	0.3	0.5	0.14
Power consumption [VA]	69	55	69	60	32
Secondary voltage [kV] ±10 %	1 x 15	1 x 15	1 x 15	1 x 15	2 x 10
Secondary frequency [kHz]	10	13	10	16	10
Short-circuit current [mA]	30	30	30	30	20
Duty cycle 3 min	33 %	33 %	33 %	33 %	100 %
Protection class	IP 54	IP 54	IP 54	IP 54	IP 54
Ambient temperature ta [°C]	-20 to 60 °C	-20 to 60 °C	-20 to 60 °C	-20 to 60 °C	-20 to 60 °C
Weight [kg]	0.32	0.32	0.32	0.32	0.32
Article no.	252113	255018	257126	257127	252114

Electrical connection

The connection to mains power is made using the pre-fabricated connection lines DEZ 1xx / 2xx, which are available in different lengths.

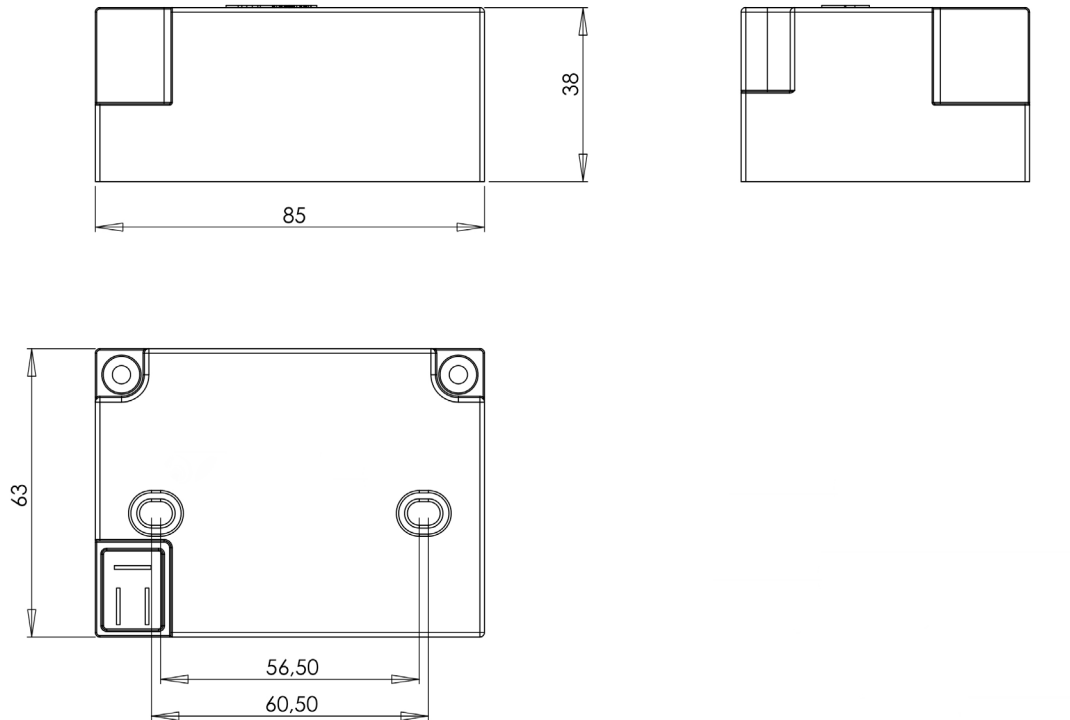


The ignition electrodes are connected using pre-fabricated carbon fibre ignition lines. The high line resistance of 10 kOhm/m effectively suppresses EMC faults.

The ignition lines are fitted with an insulated 6.5 mm angle plug on the electrode side.



Dimensions



Attention

The operation of the DEZ ignition transformers produces very high voltages. The ignition transformers may be put into operation only if the ignition electrodes are built into the burner / burner chamber in a way that prevents touch contact and all live connections are made using the lines provided for this purpose in a way that prevents touch contact.

The length of the ignition line(s) must not exceed 1 m.

The protective earth must always be connected.

In the "SEO" version for single-electrode operation, the protective earth is connected to terminal 5 of the MPA 41xx.

VisionBox

The VisionBox provides access to the MPA using a PC.

See VisionBox documentation and download from www.dungs.com

www.dungs.com