

DFC M / E SERIES DFC M / E PR SERIES



DFC M / E __ C/S SERIES DFC M / E PRC/S SERIES

**AUTOMATIC DIGITAL CONTROL UNITS FOR
ATMOSPHERIC GAS BURNERS WITH OR
WITHOUT FAN AND WITH REMOTE IGNITER
(TR2) OR OUTPUT SUPPLY FOR REMOTE
IGNITION TRANSFORMER (ELECTRICAL OR
MANUAL RESET)**

APPLICATION

These control units have been specifically designed for atmospheric gas burners for non-permanent operation (i.e. the operating cycle should be interrupted at least one time every 24 hours to enable the system to check its own efficiency), with or without fan in the combustion circuit.

The control units can be provided with volatile or non-volatile lockout: in case of volatile lockout the system can only be restarted from the safety shutdown condition by cutting off and then restoring the power supply; in non-volatile lockout versions the restart from the safety shutdown condition is only possible by manually acting on the reset push-button. The control units are suitable to be connected to electronic control boards with insulation between the automatic remote ignition system and the low-voltage control part. As the units perform correct burner ignition cycle and flame monitoring operations, they are suitable to transmit the flame signal by using a relay with 4kV insulation and clearance and creepage distances of the printed circuit board $\geq 4\text{mm}$.

The units are suitable for installation in:

- boilers;
- hot air generators;
- radiant tube heaters;
- water heaters.

FEATURES

Followings are the main features of this series:

- use of an SRM safety module certified to EN298. For more details please see our data sheet nr. 27694;
- inbuilt SRM safety module equipped with a microcontroller ensuring accurate and repeatable setting times, with possibility to perfectly adapt the operating cycle to the final application;
- high-efficiency remote ignition device type TR2 (for technical characteristics, see our data sheets "REMOTE IGNITION TRANSFORMERS TYPE TR2" nr.4473);
- output for power supply an external ignition transformer (e.g. TSM) in single electrode configuration (DFC...PR versions) or in double electrode configuration (DFC...BPR versions);
- flame monitoring by the rectification property of the flame (ionization).

PART REFERENCES AND MAIN FEATURES

TYPE	RESET	IGN.	DET.	FAN	EV2
DFC M11	M				
DFC M12	M				*
DFC M31	M			*	
DFC M32	M			*	*
DFC E11	E				
DFC E12	E				*
DCF E31	E			*	
DFC E32	E			*	*
DFC M11PR	M	R	M		
DFC M12PR	M	R	M		*
DFC M31PR	M	R	M	*	
DFC M32PR	M	R	M	*	*
DFC M11BPR	M	R	B		
DFC M12BPR	M	R	B		*
DFC M31BPR	M	R	B	*	
DFC M32BPR	M	R	B	*	*
DFC E11PR	E	R	M		
DFC E12PR	E	R	M		*
DFC E31PR	E	R	M	*	
DFC E32PR	E	R	M	*	*
DFC E11BPR	E	R	B		
DFC E12BPR	E	R	B		*
DFC E31BPR	E	R	B	*	
DFC E32BPR	E	R	B	*	*

NOTE

Lockout: M = Non volatile; E = Volatile

Igniter: R = Output for supply external ignition transformer

Detection: M = single electrode; B = double electrode

TECHNICAL DATA

Supply Voltage: 220-240V~ 50-60Hz

On request: 100-120V~ 50-60Hz

Operating temperature range: -20°C + 60°C

Ambient humidity: 95% max. at 40°C

Protection rating: IP 00

Times:

- waiting or pre-purge time (**TW or TP**): 1,5...60 s
- safety time (**TS**): 3...60 s
- drop-out time on running flame failure: < 1 s
- post-purge time: 0...30 min
- inter-waiting or inter-purge time (opt. Inn): 1,5...240 s
- air flow failure lockout delay (opt. Qnn): 3 120 s
- extraneous light lockout delay (opt. Knn): 0...60 s
- pre-ignition time (opt. Jnn): 0...60 s
- recycling attempts (opt. Ynn and YnnRmm): 1...10

The times appearing on the control unit label correspond to guaranteed values. Actual values may differ slightly from declared ones, as the waiting or pre-purge time may be longer and the safety time shorter than their rated values.

Operating power consumption¹: 7 VA

Contact rating:

- Live (terminal 13): 2 A $\cos \varphi \geq 0.4$
- EV1: 0.25 A $\cos \varphi \geq 0.4$
- EV2: 0.25 A $\cos \varphi \geq 0.4$
- Lockout signal: 0.5 A $\cos \varphi = 1$
- Fan: 0.5 A $\cos \varphi \geq 0.4$
- External ignition transformer: 0.25 A $\cos \varphi \geq 0.6$

Max. length of the cables of external components: 1 m

External fuse rating²: 1.6 A quick acting

Remote ignition device:

The electronic circuit of the unit is equipped with a part controlling the remote ignition transformer type TR2. For further information about the characteristics of the transformer please refer to the related data sheets.

Primary peak voltage: 200 V

Spark frequency: 1.. 25 Hz

Output for external ignition transformer:

In DFC...PR versions there is a relay for supply an external ignition transformer (e.g. TSM). Please see technical notes of the ignition transformer for further features.

Flame monitoring:

For flame detection, the unit exploits the rectification property of the flame itself.

- Min. ionization current: 0.5 μ A
- on request: 1.2 μ A
- Max. ionization current (to be measured):
 - polarized version (@197 Vac) 8,1 μ A
 - non-polarized version, opt. N (@97 Vac) 3,8 μ A
- Recommended ionization current: 3÷5 times the minimum one
- Max. cable length⁴: 1 m
- Min. insulation resistance of the flame detection cable and electrode to earth: ≥ 50 M Ω
- Max. stray capacitance of the flame detection electrode: ≤ 1 nF
- Max. short circuit current: < 200 μ A AC

Weight:

95 g approx.

NOTES:

- Power consumption of the control unit only (power consumption of the loads excluded) in full running status.
- External fuses should be rated according to the max. rating of the loads connected to the control unit but should not exceed the indicated values. Failure to use external fuses may cause irreparable damage to the unit in case of overload of the solenoid valve due, for example, to a short-circuit in the coil windings.
- The remote ignition transformer type TR2 cannot work alone. At the same time, it is not possible to connect an ignition transformer different from type TR2 to terminals 1 and 2 (and also to terminal 3 in case of single-electrode operation).
- Longer cables may generate a resistance and a stray capacitance that might reduce the flame signal.

CONSTRUCTION

The varnishing of the printed circuit board protects the control unit from possible damages resulting from crashes, dust, moisture and contacts with the external environment.

The use of surface-mount technology (SMT) has allowed to develop a very small printed circuit board, thus reducing the overall dimensions of the control unit itself.

A varistor protects the unit from possible voltage transients in the mains supply, caused for example by thunderbolts. Internal integrated fuses protect the relays of the control unit in case of short circuits on the outputs (valves). In any case the unit should be protected by means of two external fast-blow fuses (each one in series to one pole of the mains supply) suitable to the loads connected and not exceeding 1.6 A.

OVERALL DIMENSIONS OF UNITS TYPE DFC M/E..C

The following figures show the main overall dimensions of DFC M/E and DFC M/E PR units in version C, i.e. equipped with 90° Molex female connectors for direct mounting on the printed circuit board.

Figure 1 shows frontal view of DFC M/E and figure 2 shows the frontal view of DFC M/EPR version.

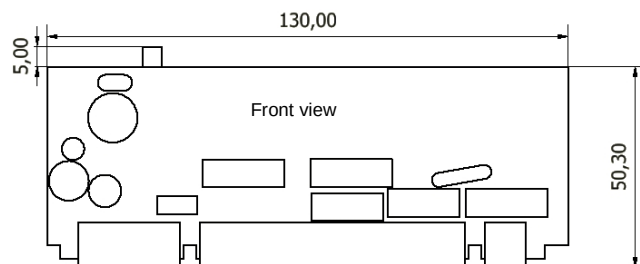


Fig.1

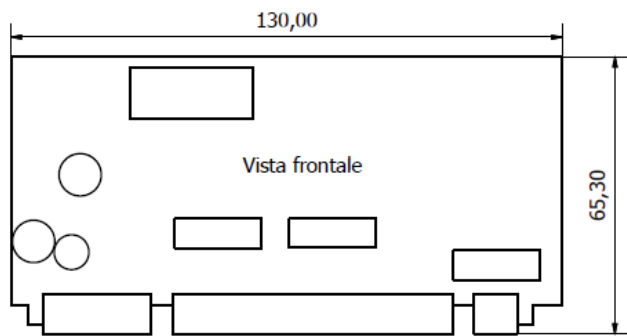


Fig. 2

Figures 3 and 4 show lateral right and left view for versions DFC..M/E while figure 5 shows the lateral right view for DFC..M/EPR version.

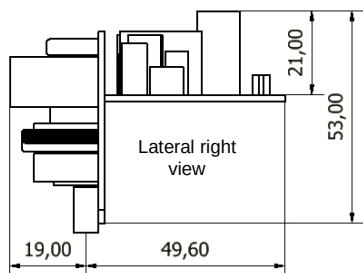


Fig. 3

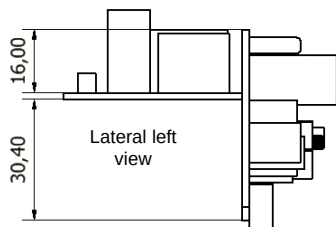


Fig. 4

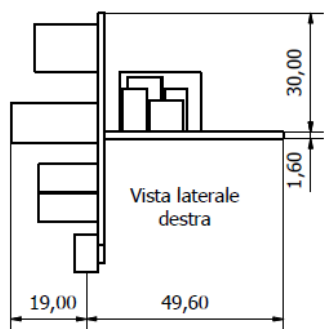


Fig. 5

Figure 6 shows top view of both of versions.

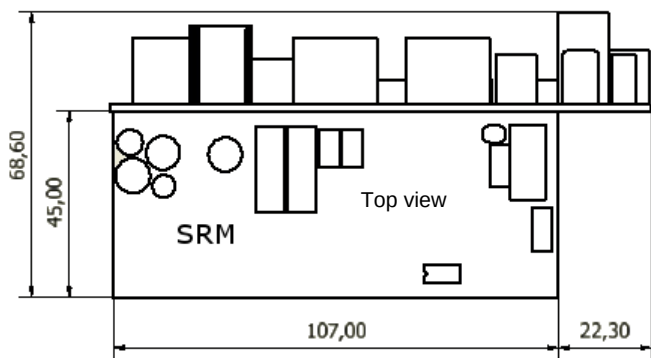


Fig. 6

OVERALL DIMENSIONS OF UNITS TYPE DFC M/E AND DFC M/E..PR STANDARD VERSIONS AND FOR SOLDERING

Following figures shows the main overall dimensions of DFC M/E (Fig. 7) and DFC M/E PR (Fig. 8) units (version with fast-on and male Molex connectors); Figure 9 (DFC M/E) and 10 (DFC M/E PR) shows the overall dimensions of version that can be soldered directly on the printed circuit board (S version).

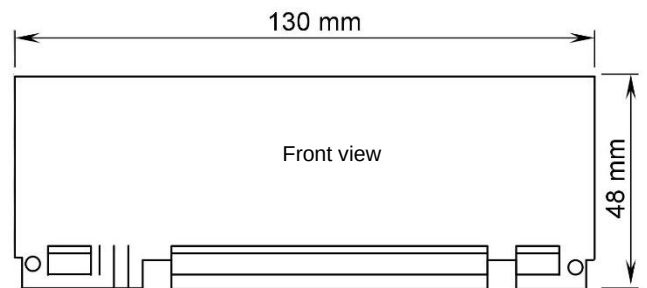


Fig. 7

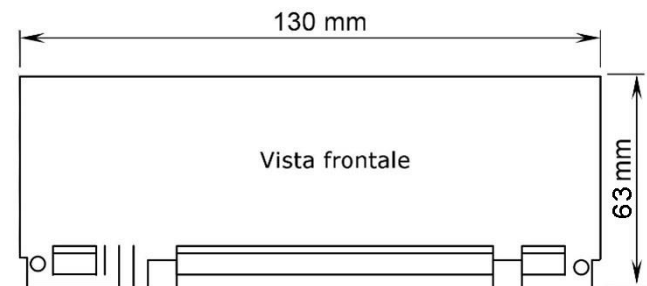


Fig. 8

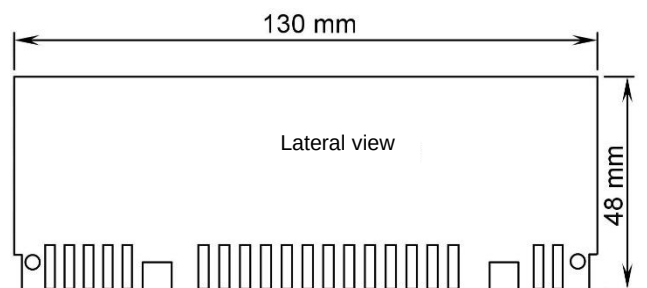


Fig. 9

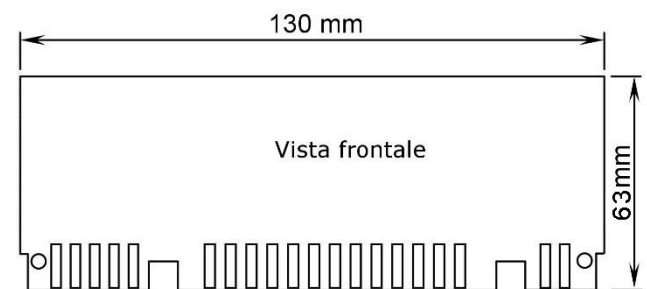


Fig. 10

ACCESSORIES FOR DFC M/E SERIES

The control unit is usually supplied with a kit of female connectors consisting of one 13-pin connector and two 2-pin connectors (see Fig.11).

FEMALE CONNECTOR
TYPE MOLEX 3001

TERMINAL
TYPE MOLEX 2478

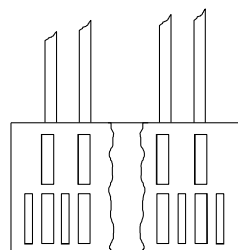


Fig. 11

On request, can be supplied a reset pushbutton (Fig. 12).

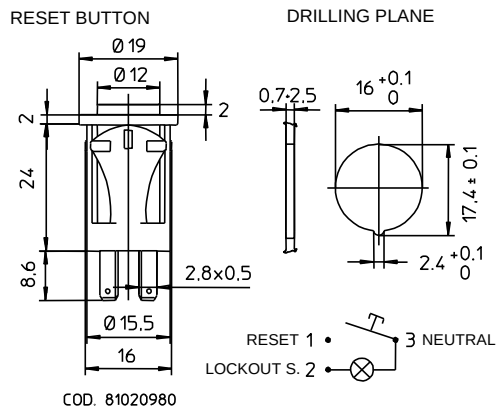


Fig. 12

CONNECTION

Provisions such as cable holders and a suitable number of earth and neutral terminals should be available in the appliance or in external connection boxes.

DIRECTIONS FOR DESIGNING THE PCB OF THE TEMPERATURE ADJUSTMENT BOARD – UNITS TYPE DFC M/E _C/S

Please refer to the following directions when designing the PCB of the temperature adjustment board to be used in connection with these control units (Fig.6):

- The distance between the PCB tracks should be in accordance with IEC 730 – 1 (depending on voltage rating).
- The correct mounting position of the PCB of DFC units is perpendicular to the temperature adjustment board. In order to ensure the electrical safety and perfect operating conditions of DFC units and to avoid any mechanical interference, all components should be kept at a distance of at least 5 mm from the highest component profile on the through-hole components side and 10 mm on the SMD components side.
- For the connection of DFC _ _ _C_ units (with Molex female connectors) to the PCB, use connectors type Molex series 3001.

For the connection of DFC _ _ _S_ units (which can be soldered directly on the PCB), refer to the indications related to the PCB footprint layout illustrated in Fig.13.

Recommended PCB footprint layout

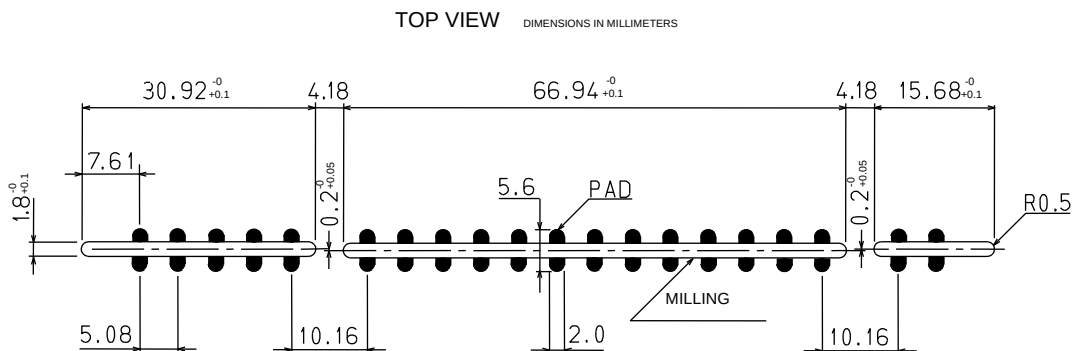


Fig. 13

DIRECTIONS FOR USE

- **This automatic control unit is a safety device and shall NOT be modified. The manufacturer's responsibility and guarantee are invalidated if the unit is unduly opened or tampered with by the user.**
- **This device is designed to stay in running position for less than 24 hrs (system for non-permanent operation). Reaching this limit causes a regulation shutdown in order to allow the controller to check its efficiency;**
- The control unit can be mounted in any position;
- The unit can be connected and disconnected only after switching off the power supply.
- Avoid exposing the control unit to dripping water;
- All operations (installation, maintenance, etc.) must be carried out by a qualified technician;
- During and after any operation (installation, maintenance, etc.), make sure that the type, timing and code are the ones provided, that the wiring is in good condition and perform the safety check in the "COMMISSIONING NOTES";
- In the event of a fall or impact, the devices must not be started, as safety functions may be compromised even if no damage is visible to the outside;
- Faulty devices or damaged must be unplugged from power supply and cannot be used;
- Condensation, ice formation and liquids intake are not permitted;
- A ventilated installation ambient and a quite low temperature ensure the longest life of the controller;
- The appliance in which the controllers are installed must provide adequate protection against the risk of electric shock (at least IP20);
- EMC emission requirements, according to the directive EN55014-1, shall be tested after the incorporation of the device into the equipment;
- burner controls has a designed lifetime* of 250,000 burner startup cycles which, under normal operating conditions in heating mode, correspond to approx. 10 years of usage (starting from the production date given on the type field). This lifetime is based on the endurance tests in the standard EN 298. A summary of the conditions has been published by the European Control Manufacturers Association (Afecon) (www.afecor.org). The designed lifetime is based on use of the burner control according to the manufacturer's technical notes. After reaching the designed lifetime in terms of the number of burner startup cycles, or the respective time of usage, the burner control has to be replaced by authorized personnel.;

* The designed lifetime is not the warranty time specified in the Terms of Delivery;



NOTES FOR PRODUCT DISPOSAL

The device contains electronic components and cannot therefore be disposed of as normal household waste. For the disposal procedure, please refer to the local rules in force for special waste.

COMMISSIONING NOTES

When commissioning the plant or when doing maintenance work, make the following safety checks:

Safety check to be carried out	Anticipated response
Burner startup without fuel supply	Lockout at the end of safety time (TS)
Burner operation with simulated loss of flame. For that purpose, close the fuel supply during operation and leave it in this state.	Recycle (or immediate lockout with V option).
Burner startup with response from air pressure switch interruption.	Continuous prepurge (or immediate lockout with Q option, delayed lockout with Qnn option).
Burner operation with air pressure failure simulation.	Recycle (or immediate lockout with S option).

ELECTRICAL INSTALLATION

- The applicable national regulation and European standards (Ex. EN 60335-1 and EN 60335-2-102) related to the electrical safety must be observed. Not respecting the phase-neutral polarity causes at start-up a non-volatile lockout at the end of the safety time. This doesn't occur in the non-polarized versions (see option (4) N);
- Avoid putting the detection cable close to power or ignition cables;
- This unit is equipped with non-restorable internal fuses and should therefore be protected by a fuse at least on the live connection (see "TECHNICAL DATA");
- In case of a "partial" short circuit or dispersion between phase and earth, the detection electrode voltage can be reduced till causing lockout of the controller due to impossibility of detecting the flame signal:
Refer to paragraph ELECTRICAL INSTALLATION of data sheet 27964.

CHECKING AT START-UP

Always check the unit before the first start-up and also after any replacement or a long period of non-operation of the system. Before any ignition attempt make sure that the combustion chamber is free from gas.

Then make sure that:

- if the starting attempt occurs without gas supply the control should perform a lockout after the safety time (TS);
- when stopping the gas flow while the control unit is running, the supply to the gas valve/s is interrupted within 1 second, and after one or more recycling attempts the unit should go to lockout;
- operating times and sequence should correspond to those declared for the model used;
- the level of the flame signal should be high enough;
- In versions equipped with remote ignition device (TR2), the ignition probe should be adjusted in the most stable way for a spark gap between 2-4 mm;
- In versions equipped with relay for supply an external ignition transformer, refer to the referenced technical note;
- the intervention of adjusters, limiters or safety devices should cause a safety shutdown according to the type of application and the related operating procedure.

RESETTING THE UNITS

In general, the reset push-button should be positioned in sight and close to the appliance. The reset of the unit should occur through a deliberate manual action.

Units with manual reset

The reset of the unit from lockout occurs by pressing the reset push-button until the lockout signal is shutting off or in any case for a time not exceeding 3 seconds. The unit cannot be reset by cutting off the power supply or by switching on the room thermostat. The unit can be reset immediately.

Units with electrical reset

The reset of the unit from lockout is only possible by cutting off the power supply. The power cut-off should last at least 2 seconds.

OPERATION

The sequence described hereunder refers to the standard operating cycle of a control unit without fan and with 2 valves. At every start-up the unit carries out a self-check of its own components. When the low temperature thermostat closes (between terminal 13 and Live), the waiting time (TP) starts and the correct working status of the flame signal amplifier is verified. A failure in the flame signal amplifier leading to flame simulation prevents the ignition cycle from starting.

At the end of the waiting or pre-purge time (TP) the EV1 gas valve and the ignition device (or the external ignition transformer) are energized. This determines the beginning of the safety time (TS) and the ignition time (TSP). The ignition device is switched off 1 second (2 seconds for PR versions with single electrode) before the end of TS (end of TSP). The flame signal output is energized when flame is detected. In DFCXX2 versions this output is used to energize the second gas valve (EV2).

Else, if no flame signal is detected by the end of the safety time (TS), the unit will go to lockout, the EV1 gas valve output will be inhibited and the lockout signal will be energized.

The operating cycle diagrams illustrated in the following pages enable to better understand the operation of each control unit.

Operating cycle variations

The available (optional) operating cycle variations are described hereunder:

- Option (7), ignition mode: The control unit can keep the ignition device operating for the whole safety time TS (**A**), the igniter is switched off nn seconds before the end of TS (**Ann**) or can switch it off as soon as the flame signal is detected (**B**);
- Option (8), EV2 opening mode: The output can be activated at the end of the safety time TS (**W**) or with a delay starting from the end of the safety time TS (**Wnn**);

- Option (10), lockout for extraneous light: In case of flame signal detection during the waiting/pre-purge time (TP), the device can go to lockout immediately (**K**) or with a delay of nn seconds (**Knn**);
- Option (11), no or insufficient air flow at start-up: In case of no or insufficient air flow at start-up, the control unit can go to lockout with a delay of nn seconds (**Qnn**);
- Option (12), no or insufficient air flow in running status: In case of no or insufficient air flow in running status, the unit can go to lockout immediately (**R**) or by counting how many times this failure occurs (**Rnn**). After reaching the pre-set max. number of failures, any new failure will cause the lockout of the unit.
- Option (13), no flame signal in running status: If no flame is detected in running status, the unit can go to lockout immediately (**V**) or by counting how many times this failure occurs (**Vnn**). After reaching the pre-set max. number of failures, any new failure will cause the lockout of the unit.
- Option (14), ignition cycle repetitions: With option **Ynn**, without flame at the end of the TS of the first ignition cycle the whole operating sequence is repeated. The total number of ignition attempts is therefore nn. On request, with option **YnnRmm**, multiple ignition attempts Ynn with restore Rmm at running. For example, with option Y3R0, there are 3 ignition attempts at starting but, if the device detect flame at the first cycle, it restore 0, so with flame failure the device has only an ignition attempt;
- Option (15), pre-ignition time: With this option, at the end of the waiting/pre-purge time (TW/TP) the ignition device is activated for nn seconds before the safety time TS begins (**Jnn**);
- Option (16), post-purge: With this option, when the low temperature thermostat opens the combustion fan is kept operating for nn seconds. If required, the post-purge can be interrupted in case of restoring temperature thermostat (**PTnn**) or the operating cycle can start again at the end of the post-purge time only (**Pnn**);
- Option (17), inter-purge time: If this option is chosen together with option Ynn, starting from the second operating cycle, a delay of nn seconds is added to the waiting/pre-purge time (**Inn**);
- Option (18), Air Pressure Switch check: In the versions with combustion fan, in the standard mode, with check for presence of Air Pressure Check. In special versions where the check of Air Pressure Switch is not required by the referenced standard, with option **G**, without check.

PART REFERENCES AND OPTIONS

Type

Options

DFC (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20)

Model description

(1) Type of lockout:

M: Lockout with manual reset
E: Lockout with reset by cutting off the power supply

(2) Combustion fan:

1: not available
3: available

(3) Fuel valve/s:

1: direct ignition (1 valve)
2: low-power ignition (2 valves)

(4) Trasformatore d'accensione – Versione controllo fiamma

No letter: Single and double electrode flame detection with remote ignition device (TR2). Standard mode
PR: Single and double electrode flame detection with external ignition transformer
BPR: Only double electrode detection flame with external ignition transformer

(5) Connection and wiring type:

No letter: Molex and fast-on male connectors supplied as a separate connection kit upon request. Standard mode
C: Molex female connectors for direct mounting on the board
S: Without connectors for direct soldering on the printed circuit board (see layout in Fig. 15).

Options description:

(6) Ignition mode:

No letter: The ignition device operates for the TSP time (TS time minus 1 second). Standard mode
A: The ignition device operates for the whole safety time TS
Ann: The ignition device is switched OFF nn seconds before the end of TS
B: The ignition device is switched off as soon as the flame signal is detected

NOTE: In the versions DFC...PR, in the standard mode, the TSP is TS minus 2 seconds. For this versions options A and B are not available

(7) Second valve opening/flame signal mode:

No letter: The output is activated as soon as the flame signal is detected. Standard mode
W: The output is activated at the end of the safety time TS
Wnn: The output is activated with a delay of nn seconds starting from the end of the safety time TS

(8) Spark frequency (only versions with remote ignition device TR2):

No letter: 25 sparks per second (25 Hz). Standard mode
nn: Frequency value. See TECHNICAL DATA for details

(9) Behaviour in case of flame signal detection during the waiting/pre-purge time (extraneous light):

No letter: The unit remains in permanent waiting/pre-purge status. Standard mode
K: Immediate lockout
Knn: Lockout with a delay of nn seconds. See TECHNICAL DATA for details

(10) No or insufficient air flow at start-up (for DFCX3X versions only):

No letter: The unit remains in permanent pre-purge status. Standard mode
Qnn: Lockout with a delay of nn seconds

(11) No or insufficient air flow in running status (for DFCX3X versions only):

No letter: Safety shutdown followed by permanent pre-purge status. Standard mode
R: Immediate lockout
Rnn: Lockout after nn events of no or insufficient air flow in running status (see TECHNICAL DATA paragraph for details)

(12) No flame signal in operation:

No letter: Complete ignition cycle repetition. Standard mode
V: Immediate lockout

(13) Recycling attempts:

No letter: One attempt. Standard mode
Ynn: nn number of recycling attempts
YnnRmm: nn number of recycling attempts with restoring of mm attempts in operation

(14) Pre-ignition time:

No letter: The ignition device is switched on at the beginning of TS. Standard mode
J: only the igniter is ON during waiting/pre-purge time
Jnn: The ignition device alone is switched on nn seconds before the beginning of TS

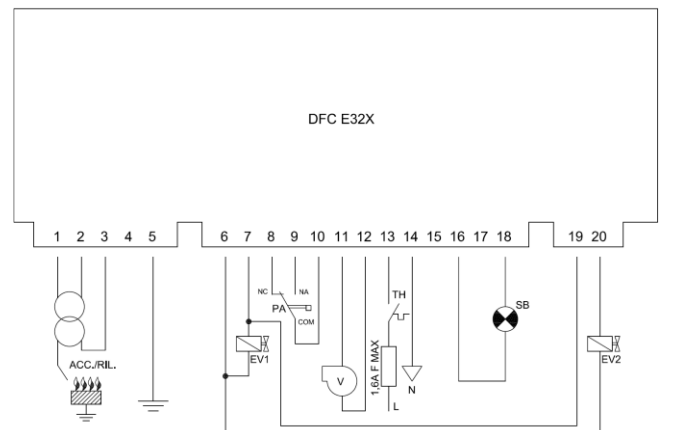
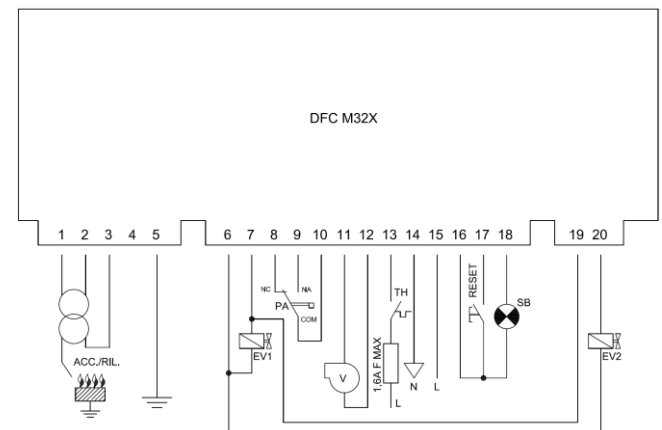
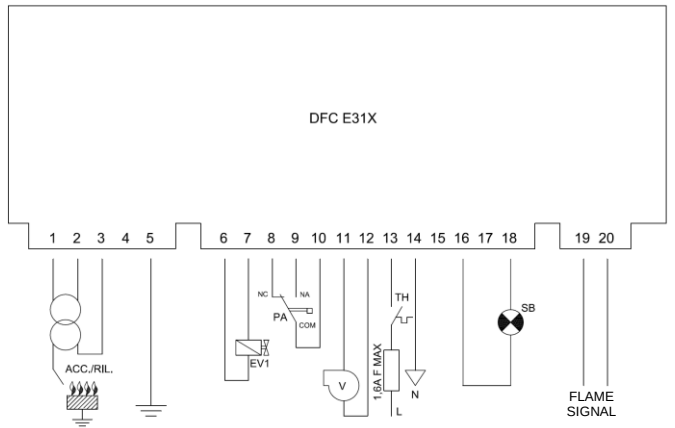
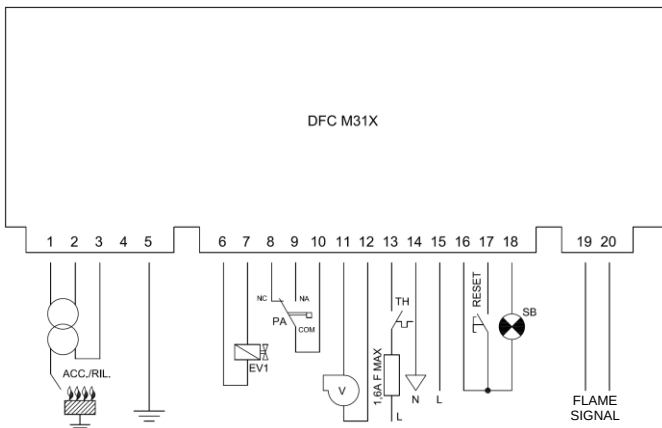
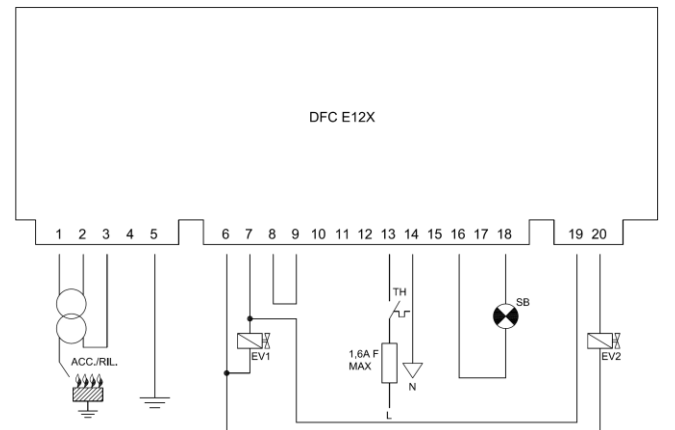
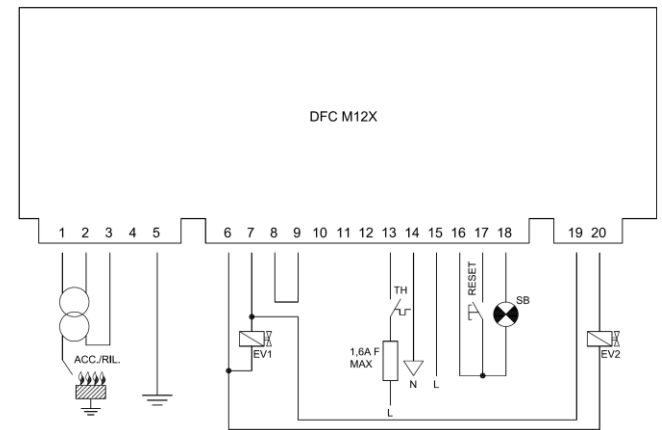
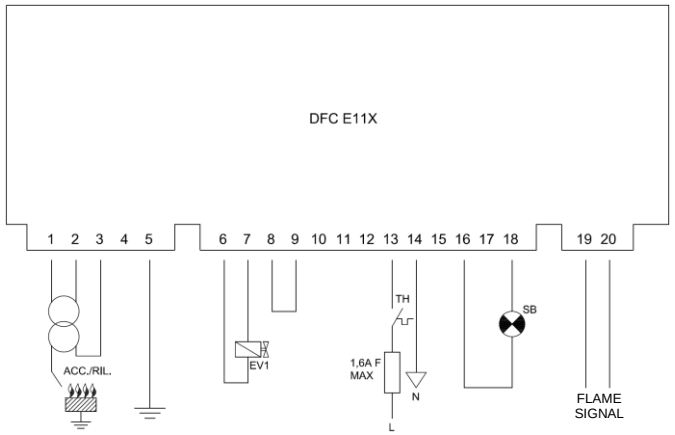
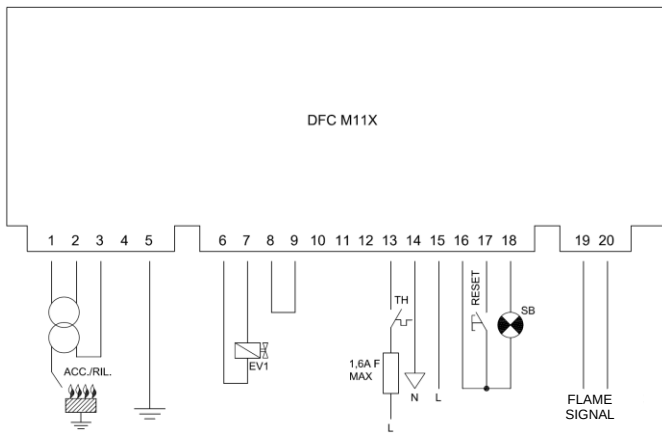
(15) Post-purge time and modalities (for DFC M3X versions only):

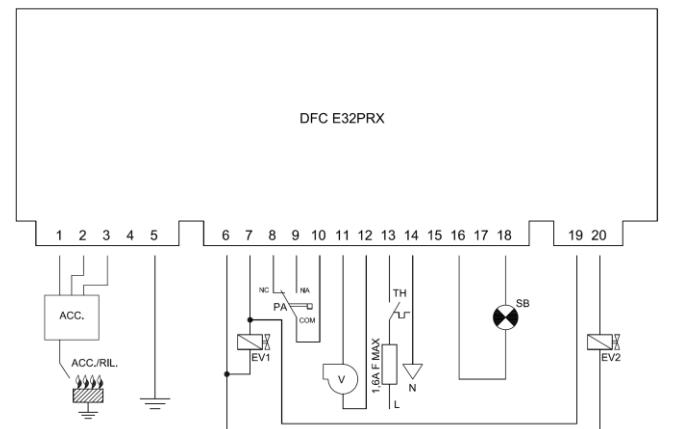
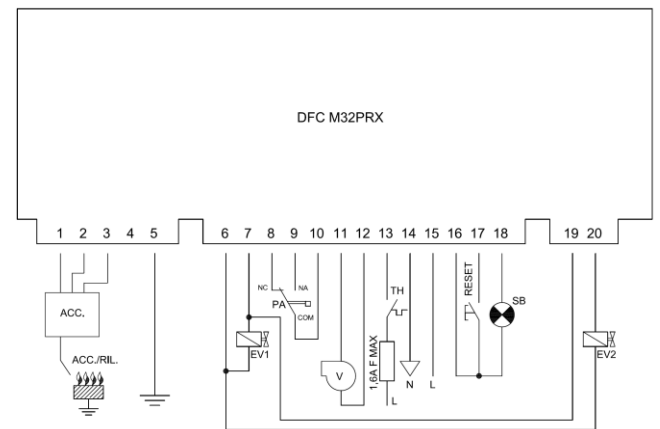
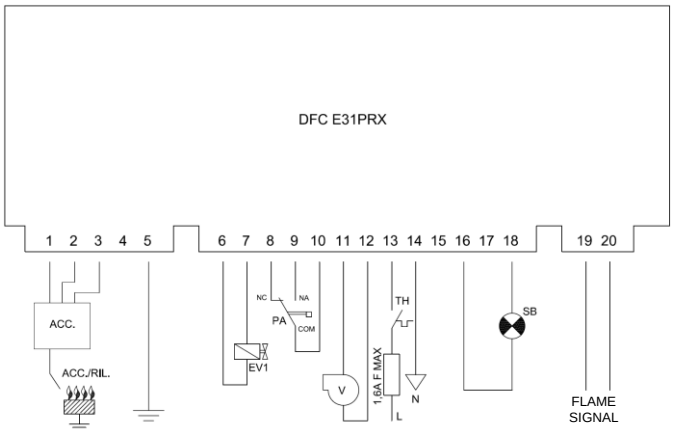
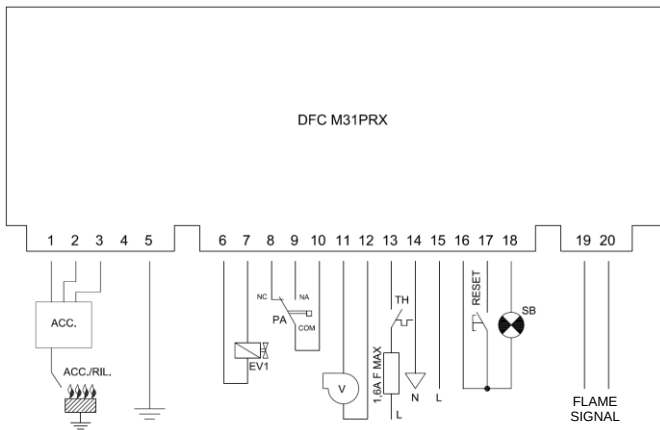
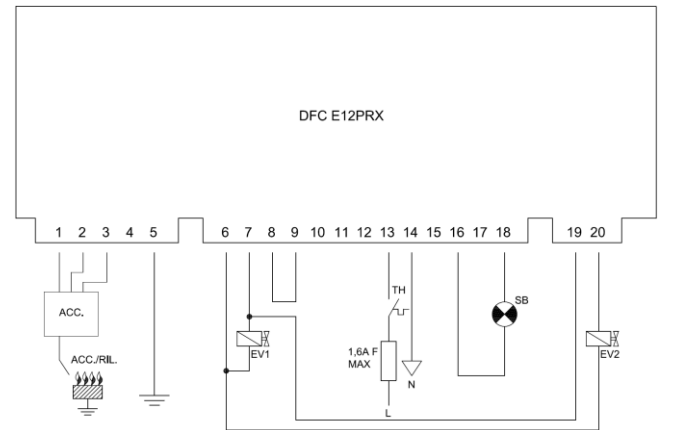
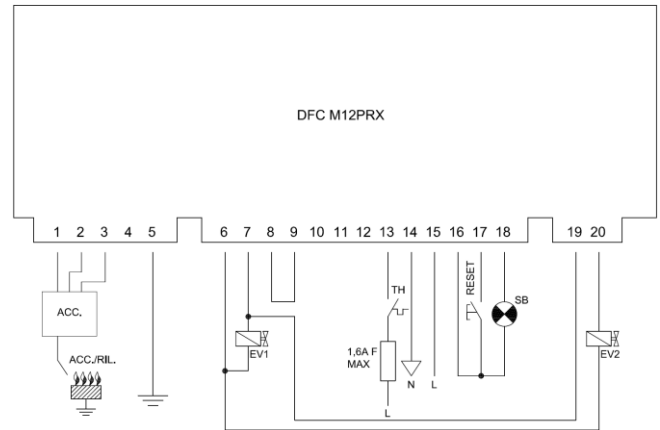
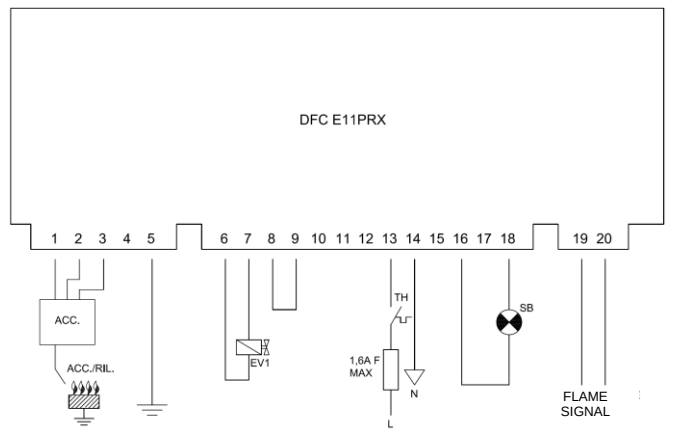
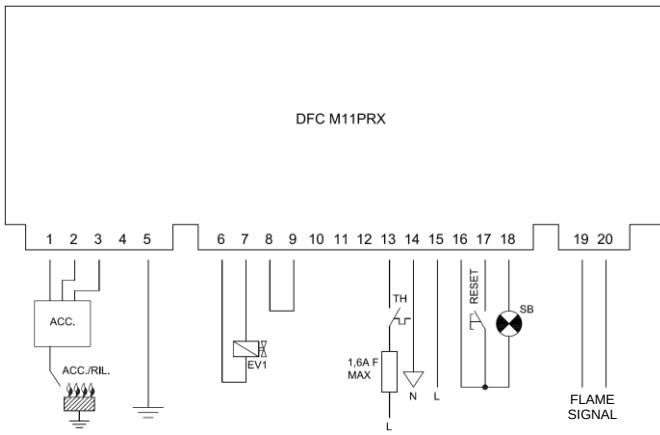
No letter: The fan is switched off on heat demand thermostat opening. Standard mode
Pnn: nn-second post-purge that cannot be interrupted by a new heat demand (TH closing)
PTnn: : nn-second post-purge that can be interrupted by a new heat demand (TH closing)

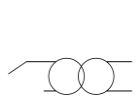
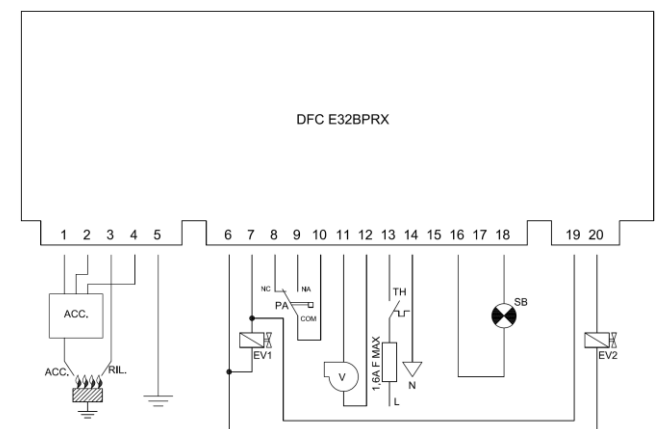
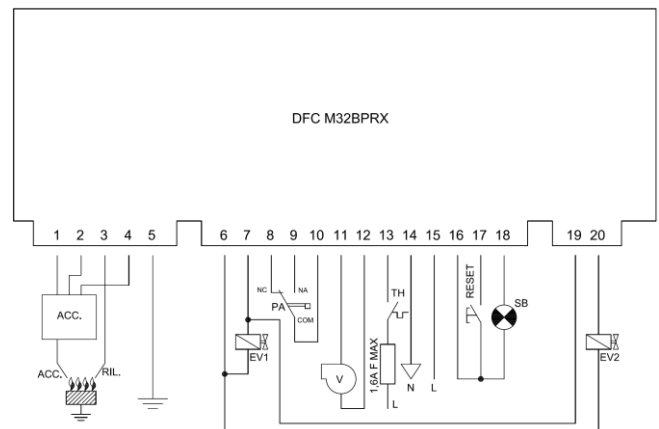
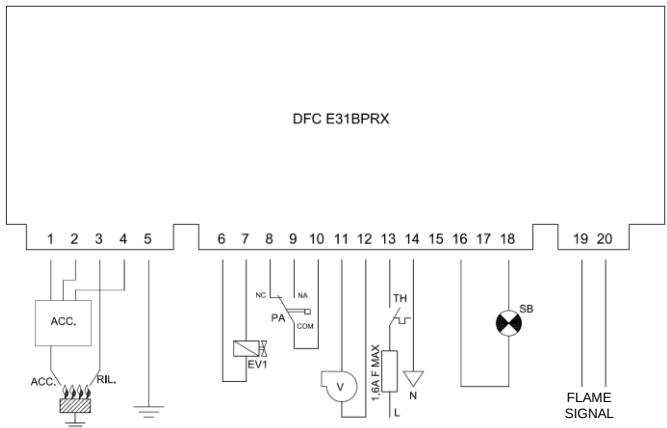
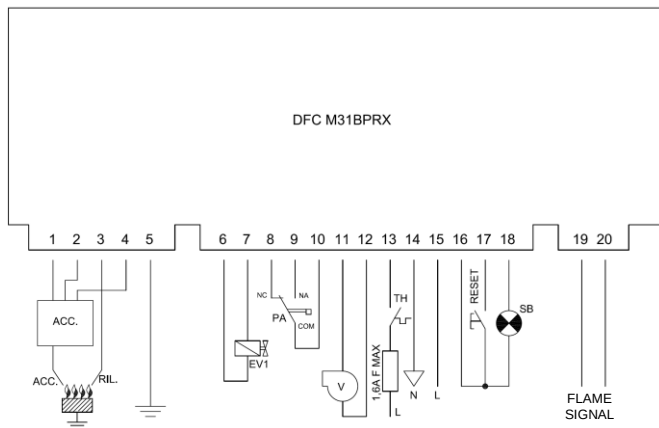
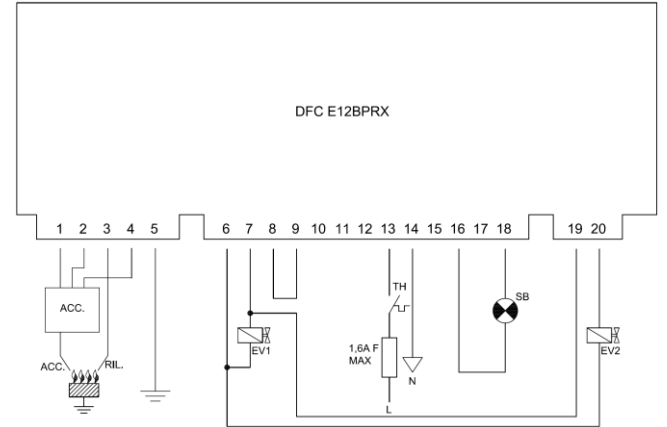
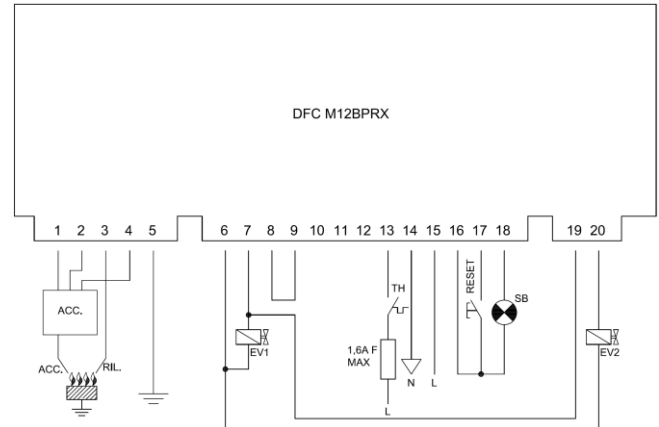
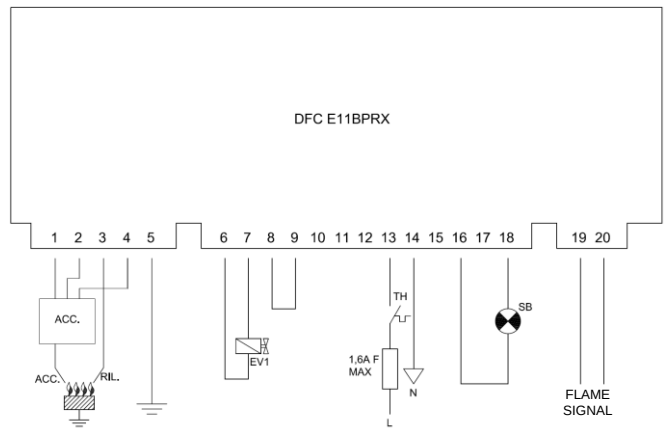
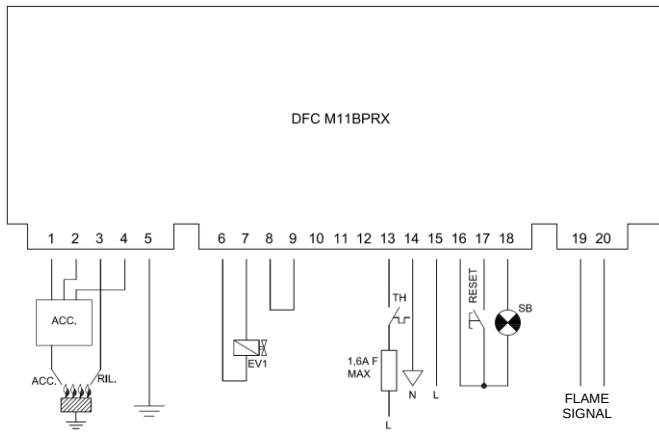
NOTE: Options available only with non-volatile and with combustion fan versions

- (16) **Inter-purge time (available together with option Ynn and YnnRmm only)**
No letter: No inter-purge time. Standard mode
Inn: At every recycling (depending on Ynn) an nn-second delay is added to TW/TP
- (17) **Air Pressure Switch check:**
No letter: With Air Pressure Switch check. Standard mode
G: Without Ait Pressure Switch check
- (18) **Reset line protection (protection mounted on the lockout signal output for DFCMXX versions only):**
No letter: With protection resistor. Standard mode
U: Without protection
- (19) **Power supply connection:**
No letter: Polarized live-neutral (phase-sensitive device). Standard mode
N: Device not polarized for Live To Neutral supply networks. Option not available for supply networks with 110-120 Vac
- (20) **Lockout signal output:**
No letter: Standard operation
RL1: Lockout signal OFF during waiting/prepurge time (only for volatile lockout versions)

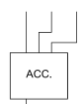
WIRING DIAGRAMS







IGNITION DEVICE



IGNITION TRANSFORMER



SOLENOID VALVES



AIR PRESSURE SWITCH



COMBUSTION FAN



EXTERNAL FUSE



HEAT THERMOSTAT



RESET



LOCKOUT SIGNAL

NOTES:

The wiring diagrams above refer to control unit DFC M/E with remote ignition device TR2 versions with single-electrode connection (one electrode only for both fuel ignition and flame signal detection). For versions with separate ignition and flame detection electrodes please refer Fig. 15

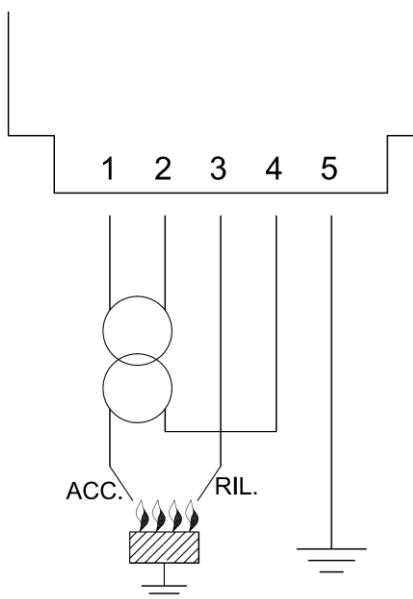


Fig. 15

Wiring diagrams for versions DFC M/EPR are with single electrode detection flame (one electrode for ignition and detection) for external ignition transformer. Please refer to Fig. 16 for colors. If you are using TSM ignition transformer please refer to the wiring diagram in Fig. 17.

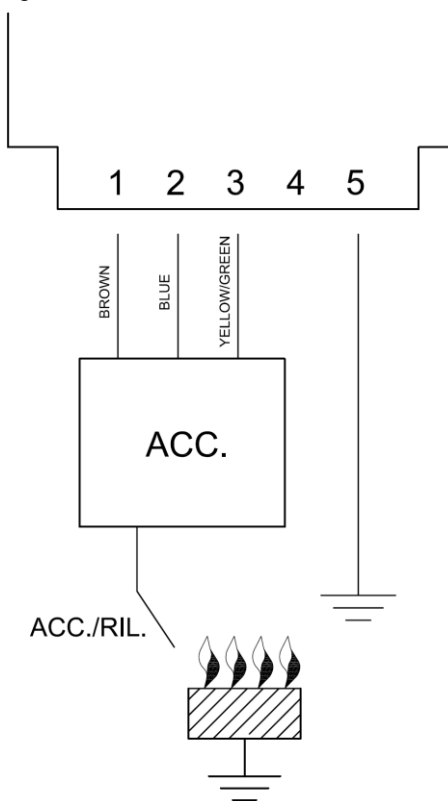


Fig. 16

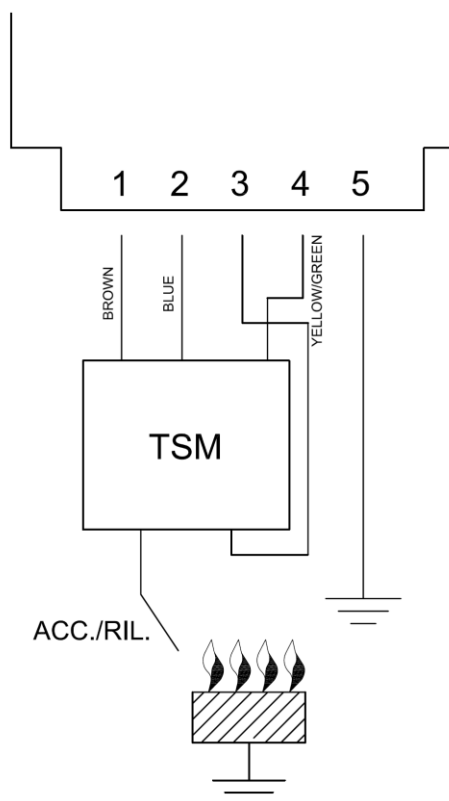
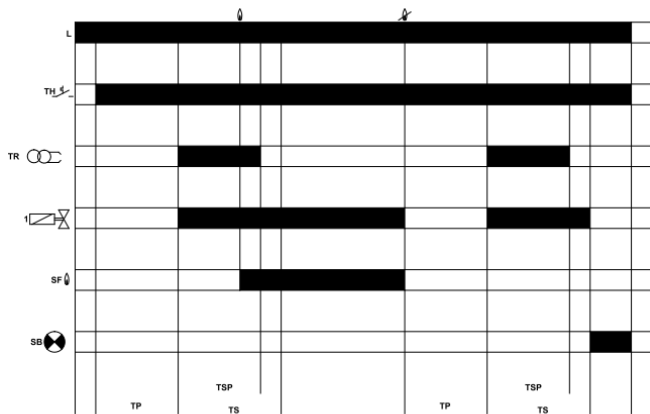
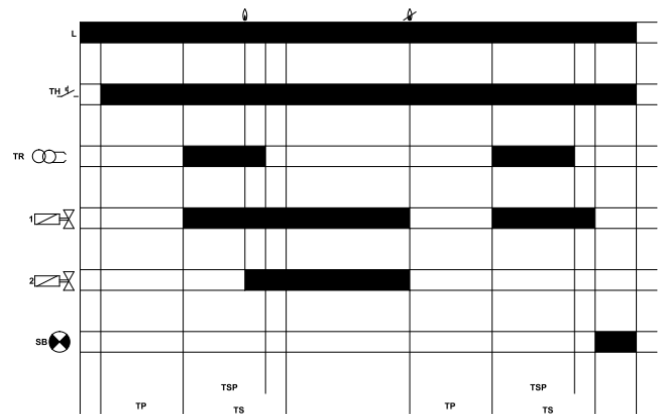


Fig. 17

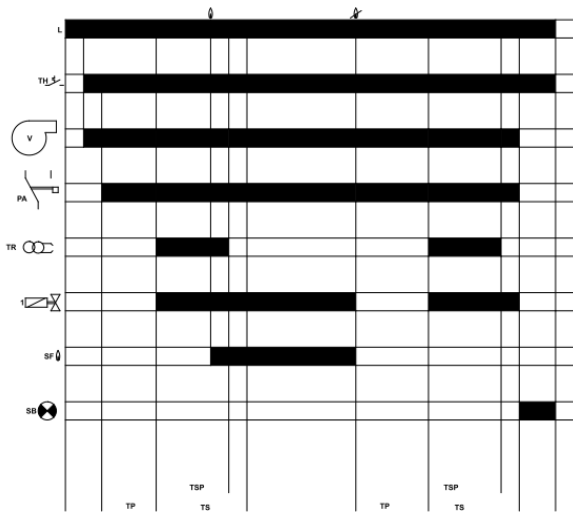
OPERATING CYCLES



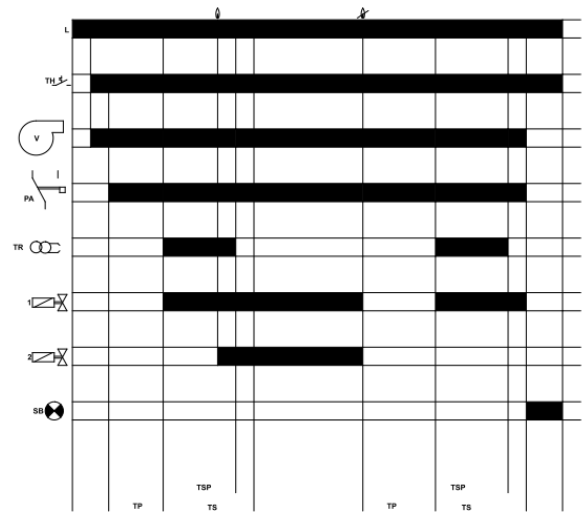
DFC_11



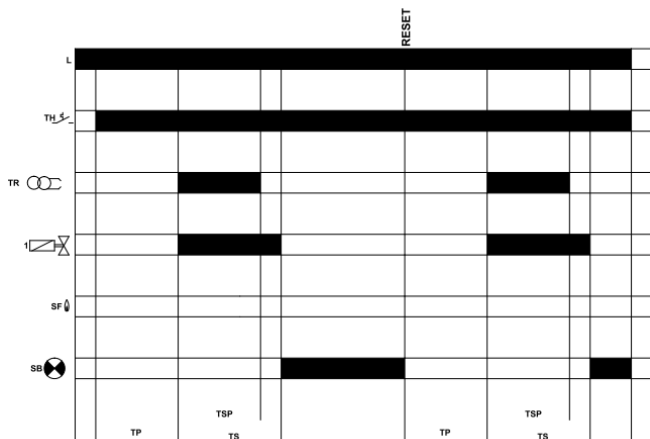
DFC_12



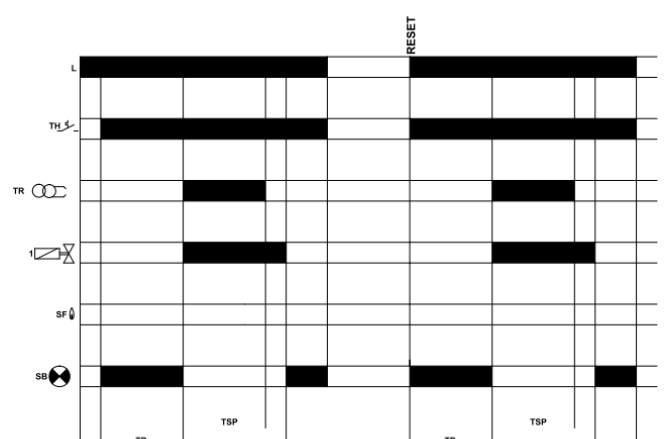
DFC_31



DFC_32

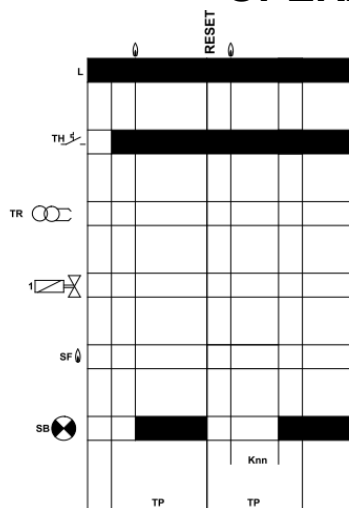


Manual reset versions (DFCM___)

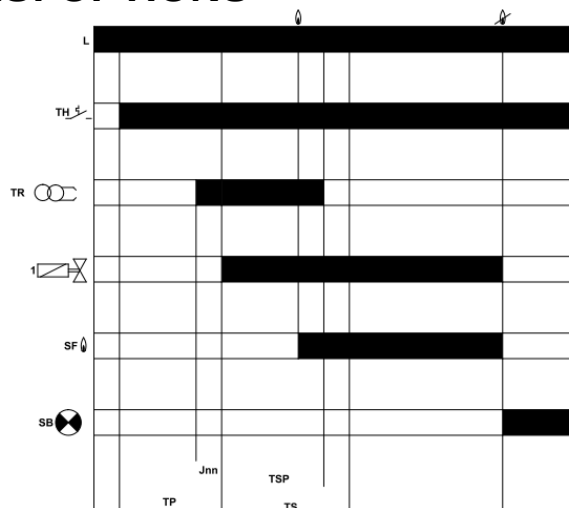


Electrical reset versions (DFCE___)

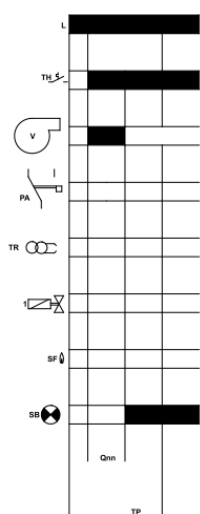
OPERATING CYCLES: OPTIONS



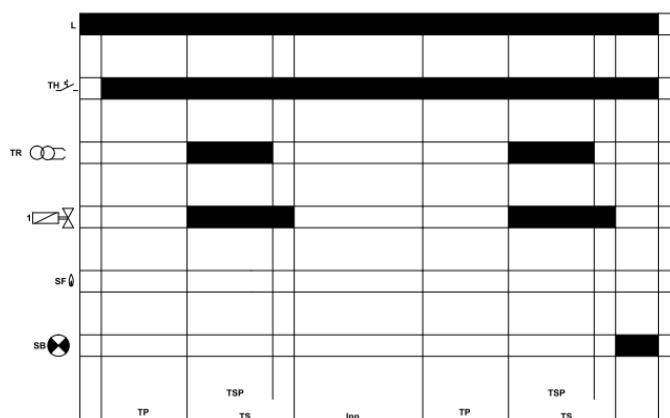
Options K and Knn



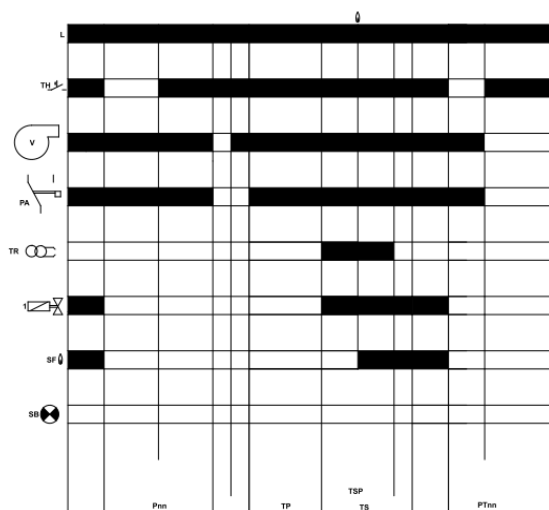
Options Jnn and V



Option Qnn



Options Ynn (e.g. Y1) and Inn



Options Pnn and PTnn

ATTENTION → Company Brahma S.p.A. takes no responsibility for any damage resulting from Customer tampering with the product.

BRAHMA S.p.A.

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28 April 2023 subject to amendments without notice