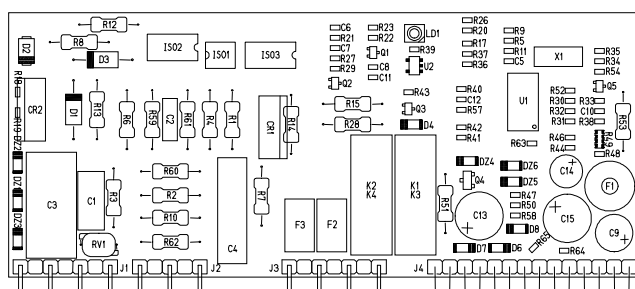


SRM M/E SERIES

SAFETY MODULE FOR CONTROLLING ATMOSPHERIC GAS BURNERS AND GAS APPLICATIONS WITH OR WITHOUT FAN, ABLE TO BE MOUNTED IN A GENERIC THERMOREGULATION DEVICE



APPLICATION

The modules of the SRM series (Safety and flame Detection for Modulation board), when fitted to a generic thermoregulation system, are designed specifically to control atmospheric gas burners for non-permanent operation, with or without fan in the combustion circuit. The module is able to perform a volatile or a non-volatile lockout, therefore restarting the module from a volatile lockout condition can be done by interrupting and then restoring the power supply, while in case of a non-volatile lockout it can be restarted only by a manual reset. Since the module is not provided with power supply circuits or connectors, it is only employable with thermoregulation boards created with galvanic isolation between the high voltage part and the safety low voltage part (SELV). Besides, there must be a communication line with I2C protocol through which the module exchanges information with the thermoregulation part. SRM is able to carry out the burner ignition cycle, to detect flame, to monitor the safety devices (flue gas thermostat/ air pressure switch, safety thermostat) and to command the fan whether it's a traditional type (on/off) or a variable speed type (cut phase driver or brushless fan).

The modules of the SRM series, fitted to generic thermoregulation devices, can be mounted in:

- Boilers, hot air generators;
- radiant tube heaters, water heaters.

FEATURES:

The main features of this series are:

- **EC-certification type (CE PIN 0476CQ0672)**, in accordance with **Gas Appliances Regulation (EU) 2016/426**;
- **CB TEST CERTIFICATE No. 3045768** according to IEC 60730-2-5:2000+A1:2004+A2:2008 in conjunction with IEC 60730-1:2010. Plus, **UL- certification (File No. MH46742)** USA (ANSI/UL 60730-2-5 ed. 3 in conjunction with UL 60730-1, ed. 4) & Canada (CSA-C22.2 No. 60730-2-5-14 ed. 1 in conjunction with CAN/CSA-E60730-1:13 A ed. 4).
- conformity to EC directives, Electromagnetic compatibility* EMC (immunity) 2014/30/EU and Low-voltage directive 2014/35/EU;
- in accordance with EN298:2012 (European Standard for automatic gas and oil burner control systems and flame detection) and with EN60730-2-5 (European Standard for automatic controls with C class software);
- possibility to drive a capacitive discharge ignition device by a step-up transformer located on a thermoregulation board, or possibility to control a relay located on the thermoregulation part in order to activate an integrated remote ignitor (Brahma TC-TD-TSM series);
- flame detection based on the rectification property of the flame (ionisation), and usage in single or dual electrode applications;
- possible non-simultaneous control of a traditional (on-off) fan or of a variable speed fan managed by a PID controller (cut phase driver or brushless fan);
- control of the application safety components such as air pressure switch or flue gas thermostat and safety thermostat;
- automatic identification of the application type where the module is employed (natural or forced draft);
- fuel solenoid valve driven by two independent elements with contacts protected by fuses against eventual bonding
- acquisition of the reset control coming from a mechanical device;
- I2C serial communication with a thermoregulation board for data exchange (demand, set-point, reset control coming from an electronic device (ex. Brahma Open Therm chronothermostat type OT1));

*) The compliance with EMC emission requirements must be checked after the burner control is installed in equipment.

TECHNICAL DATA

Power supply voltage:

120V~(cURus) 60Hz / 230V~(EC) 50-60Hz
5 VDC – 24 VDC – 24 Vac

Operating temperature range:

-20°C +70°C
Upon request -20°C +85°C

Humidity:

max. 95% at 40°C

Protection degree:

IP 00

Power consumption:

<5 VA (230Vac)
<1W (24V_{AC})
<0,5W (24V_{DC})
<0,5W (5V_{DC})

Weight:

max 50 g

Varnish coating:

Upon request

Times:

- Waiting time (TW): 1,5 ... 60s
- Pre-purge time (TP): 1,5 ... 60s
- Safety time (TS): 3 ... 60s
- Response time in case of flame failure: < 1s
- Post-purge time: 0 ... 30min.
- Inter-waiting or Inter-purge time: 1,5... 240s
- Waiting time due to lockout caused by air flow failure at start up 3 ... 120s
- Waiting time due to lockout caused by flame simulation 0... 60s
- Pre-ignition or post-Ignition time: 0 ... 60s
- Number of ignition attempts: 1 ... 10

Maximum contacts rating:

- Gas valve: 0,25A cos $\varphi \geq 0.4$
Brahma VCM01 type max. 0,4A_{DC}
- Fan: 0,5A cos $\varphi \geq 0.4$ ^(A)
- Digital output: 5Vdc – 0.5 mAdc ^(B)

(A) commanded by triac without heat sink

Repetitive peak off-state voltage: 600V

(B) Pre-driver through 0-5Vdc digital output

Maximum suppliable current: 0.5mAdc

In order to drive a remote igniter driver for example

Maximum length of the external components cables:

≤1m

External fuses: To be provided in a thermoregulation system with a value suitable to the application

Flame control:

The flame detection device makes use of the rectification property of the flame..

- Minimum ionisation current: 0,5μA_{DC}
Upon request 1,2μA_{DC}
- Maximum ionisation current:
 - Polarized: electrode voltage = 193V_{RMS} 8.1μA_{DC}
 - non polarized (opz.4 "N"):electrode voltage = 97V_{RMS} 3,8μA_{DC}
- Recommended ionisation current: 3 ÷ 5 times the minimum one
- Maximum cable length: 1 m
- Minimum insulation resistance of detection electrode and cable to earth ≥ 50MΩ
- Max parasitic capacity of the electrode: ≤1nF
- Max short circuit current: < 200μA_{AC}

Capacitive discharge igniter:

The only circuitry able to drive the igniter is located on the SRM module. The step-up transformer is located on the generic device where the module is mounted, therefore the technical sheets related to the thermoregulation system must be consulted in order to know the output features.

- Primary peak voltage: max 200V
- Spark repetition frequency: ≤ 25Hz

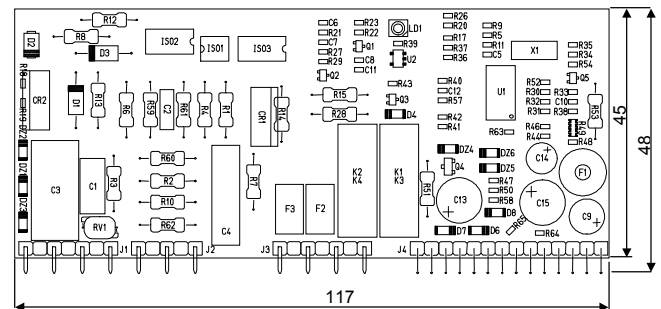
CONSTRUCTION

The SRM module is provided with 90° pin strips which allows the module to be vertically mounted on the thermoregulation device where it should be employed.

The eventual varnish coating of the PCB protects the device against possible damage caused by bump, dust and contact with the external surroundings. Using the Surface mounting technology (SMT) has allowed to reduce the dimensions of the PCB

OVERALL DIMENSIONS

The following figure (Fig.1) shows the overall dimensions of the SRM module. These dimensions are always the same regardless of the used version.



- The fan is power supplied through pole 3 of strip J2. the neutral connection of this load must be outside the thermoregulation board, in relation to phase, in order to avoid the magnetic core saturation of an eventual filter choke of the thermoregulation board ;
- Strip J3 detects and power supplies the valve (phase/neutral or 24Vdc/GND). In particular poles 3 are 4 are the inputs while 1 and 2 are the outputs;
- In case a brushless fan is used pole 1 of connector J4 must be connected directly to the command input of the fan (PWM signal at 4kHz variable duty cycle);
- Power supply must be connected to pole 2 of J4 at 24Vdc;
- The integrated remote ignition device is commanded by pole 3 of strip J4. It's a matter of a signal supplied by the microcontroller able to command a BJT;
- Pole 4 of strip J4 is employed to measure the fan rotation speed: the fan output must be connected directly to this pole;
- The low voltage reference (GND) must be connected to pole 5;
- Pole 6 of strip J4 is provided to acquire through TTL conversion a signal coming from a remote controller. This function is not implemented in any of the SRM series devices and it can be activated upon request;
- The manual reset device located on the final application where the module is employed must be connected to pole 7 of strip J4 ;
- Poles 8 and 9 of strip J4 are respectively the clock and the data line of the I2C bus which performs communication functions with the thermoregulation device;
- Pole 10 of strip J4 is the input of the air pressure switch or the flue smoke thermostat (it depends on the final application);
- Pole 11 of J4 is the output to which the other terminal of the flue smoke thermostat must be connected(if available in the final application);
- Pole 12 of strip J4 is the input of the safety thermostat: the power of the air pressure switch / flue smoke thermostat input (J4-10) is supplied by the other pole of the thermostat ;
- Poles 13 and 14 of strip J4 are respectively the 5Vdc and 24Vdc power supply

INSTRUCTIONS REGARDING THE PROJECT OF THERMOREGULATION BOARD PCB

The following instructions must be followed in the project of the PCB of the thermoregulation board where the SRM module is employed :

- The distance between the PCB tracks must be in compliance with EN60730-1 standard (depending on the voltage value);
- A galvanic isolation must be provided, according to EN 60730-1 standard, between the following strip couples: J2-J3 and J3-J4
- The connection pole of the detection electrode (J1-4) is safe-to-touch according to EN 60730-1 standard;
- The low voltage reference potential (GND) must be connected to the earth potential to allow the microcontroller to acquire the analogue signal provided by the flame amplifier. This connection must not be made directly on the thermoregulation board, but through two separate connectors coming from the thermoregulation board and connected to the earth node of the final application where the SRM module and the related thermoregulation device are employed. This is necessary to ensure the correct surface isolation distance between the different signals.

INSTALLATION INSTRUCTIONS

- The device is designed to stay in the running position for less than 24h (system for non-permanent operation). Reaching this limit causes a regulation shutdown in order to allow the device to check its efficiency.
- The SRM modules are safety devices; Guarantee and responsibility of the manufacturer will be debarred if the device is tempered with by the user.
- Connect and disconnect the SRM module to the device where it is employed without power supply.
- All operations (installation, maintenance, etc.) must be carried out by a qualified technician.
- Before any connection operation, completely isolate the system from power supply (multi-pole disconnection). Place the system safely to avoid accidental switch-on and make sure there is no voltage. If the system is not switched off, there is a risk of electric shock.
- 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.
- The device must be enclosed with box to provide adequate protection against the risk of hot surfaces.
- A moderate temperature is recommended in order to optimize the life duration of the device .
- The appliance where the devices (SRM module mounted on the related generic thermoregulation device) are installed must provide an adequate protection against risk of electric shock (at least IP20) .
- EMC emission requirements, according to the directive EN55014-1, shall be tested after the incorporation of the burner control system 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 (Afecor) (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

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 (or smoke thermostat) switch interruption.	Continuous prepurge (or immediate lockout with Q option, delayed lockout with Qnn option).
Burner operation with air pressure (or smoke thermostat) failure simulation.	Recycle (or Immediate lockout with R option).
Burner startup with response from safety thermostat switch interruption.	Continuous prepurge.
Burner operation with safety thermostat failure simulation.	Immediate lockout.

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).
- Before starting the system check the wiring carefully. Wrong connections can damage the controller and compromise safety;
- Avoid putting the detection cable close to power or ignition cables.
- Use a heat resistant cable and detection electrode well insulated to ground and protected from possible moisture (or water in general).
- Use an ignition cable as short and straight as possible and keep it far from other conductors to reduce the EMC emission (max. length < 2m and insulation voltage > 25 kV).
- The SRM module is provided with internal fuses (not replaceable by the final user) which protect only the contacts of the valve command relay. The thermoregulation device where the module is employed must provide further protection (see technical data).
- For a correct operation this module must be fitted to a suitable auxiliary thermoregulation device. Stand-alone usage is not possible.
- Use a connection between the SRM device reference (NEUTRAL-pole 1 strip J2) and earth in case the controller is power supplied by an isolation transformer
- 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..

For further details see wiring diagram at page 6

CHECKING AT START-UP

Check the controller before the first start-up, after every overhaul and after a long period of non-operation. Before any ignition attempt make sure that the combustion chamber is empty, then make sure that:

- If the start-up attempt occurs without fuel supply lockout occurs at the end of safety time of the last ignition attempt (from 1 to max. 10 attempts);
- When gas flow is interrupted (while the controller is in running state) the gas valves are de-energized within 1 second and the controller proceeds to lockout after a recycle (or more than one recycle up to max. 10 according to the settings), and the module proceeds to lockout
- Operating times and cycle are in compliance with those declared for the used controller type
- The flame signal level is high enough (see Fig. 2 and Fig. 3 measurement method);
- The intervention of limiters or safety devices causes a safety lockout or shut down of the controller according to the application type

FLAME LEVEL MEASUREMENT IN DUAL ELECTRODE APPLICATIONS

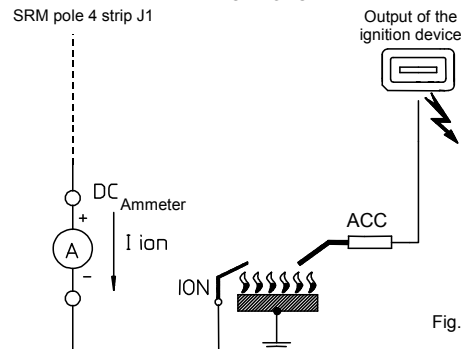


Fig. 2

FLAME SIGNAL MEASUREMENT IN SINGLE ELECTRODE APPLICATIONS

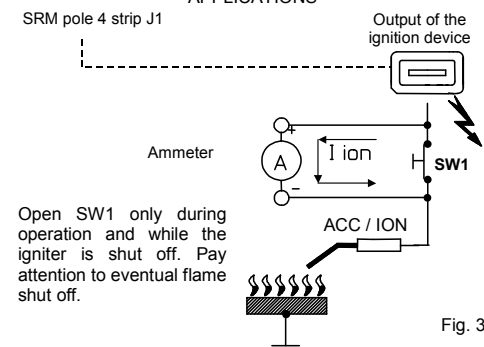


Fig. 3

OPERATION

The following description is related to the SRM modules provided with a standard operation cycle:

At every heating demand sent through I2C bus from the thermoregulation board, the SRM module carries out an identification operation of the type air/gas controller in order to identify if it is fitted to a natural draft application provided with a flue smoke thermostat or if it is a system provided with a fan and its related air pressure switch. At start-up the device checks its own efficiency. During waiting time (TW) or pre-purge time (TP) the module monitors the correct operation of the flame signal amplifier. A spurious flame signal or a fault in the amplifier related to the existing flame condition prevents the controller from starting.

In case an air pressure switch has been identified, before the beginning of the pre-purge time (TP) the air pressure switch contact is checked to ensure a 'no air-flow' condition. Only if the result of this test is positive the air pressure switch commutation makes the pre-purge stage begins.

Air pressure switch checking is carried out at every cycle start.

At the end of waiting time (TW) or pre-purge time (TP), the safety time (TS) begins. During safety time the ignition device and the gas valve are energized.

If flame is detected during safety time, at the end of this stage the system starts operating, conversely the system proceeds to lockout and the valve closes.
See cycle diagrams to better understand the operation of the single controllers

Operation cycle variations

The possible cycle variations are as follows:

Option 12: Lockout due to flame simulation

If spurious flame is detected at start-up or during waiting/pre-purge time the module goes to immediate lockout or after nn second delay (time is settable upon request)

Option 13: Air flow failure or insufficiency at start-up/ flue smoke thermostat is open at start-up

If the module detects an air flow failure or insufficiency at start-up or during waiting/pre-purge time, it goes to lockout within nn second (time is settable upon request).

Option 14: Air flow failure during operation/ flue smoke thermostat opens during operation.

In case of air flow failure during operation, the SRM module performs an immediate lockout or after nn second delay

Option 15: flame failure in running state

The module proceeds to lockout in case of flame failure during operation.

Option 16: Ignition recycle attempts

After a safety lockout the module performs multiple ignition and recycle attempts (attempts number is settable upon request)

Option 17: Pre-ignition time

The module activates the transformer at the end of safety/pre-purge time and before the beginning of safety time (time is settable upon request).

Option 18: Post-purge time

Fan is energized after a safety lockout or at the end of heating demand for nn seconds (time is settable upon request). The fan will be shut off after a new heating demand in case the post-purge stage is terminable after the up-mentioned event.

Option 19: Inter-waiting or inter-purge time

The device performs a waiting or purge time after an unsuccessful ignition attempt and before the next recycle attempt.

MODULE USAGE WITHOUT AIR PRESSURE SWITCH

In case the SRM module is to be used in an application provided with fan where the air pressure switch is not available, Pole 10 and 11 of strip J4 must be jumpered. In this way an unreal presence of the flue gas thermostat is identified.

CONTROLLER RESET

Non-volatile lockout (manual reset)

When the SRM module goes to a non-volatile lockout, in order to reset the system use the remote or local reset device (located on the final application). Only for remote reset, SRM module limits to 5 the unlock requests on a span time of 15 min; all remote reset requests after the fifth are ignored (in accordance with EN 15502-1). In the case in which, in all operating states of the SRM module, they require 6 or more unlock requests within 15 minutes, to unlock the device you will be necessary to act on the local reset.

Volatile lockout (electrical reset)

In case of a volatile lockout the module can be reset by interrupting and then restoring the power supply.



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.

SRM MODULE DENOMINATION

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

Model description

- (1) lockout state typology (option with only software modification)
 - M** Non-volatile lockout (stored in EEPROM – standard mode)
 - E** Volatile lockout (no stored in EEPROM)
- (2) Driven fan typology (options with hardware and software modifications)
 - 1** Module for controlling an ON/OFF fan
 - 2** Module for controlling a cut phase control fan
 - 3** Module for controlling a brushless fan
- (3) Typology of the driven ignition device (option with hardware and software modifications)
 - No letter** Driving a capacitive discharge ignition device
 - PR** Driving an integrated remote ignition device
- (4) Connection to power supply (option with hardware and software modifications)
 - No letter** Phase-sensitive module (polarized – standard mode)
 - N** Phase-insensitive module (non-polarized)
- (5) Optical interface with Led (option with hardware and software modifications)
 - No letter** Module not provided with led for signalling functional status/different anomalies (standard mode)
 - L** Module provided with led for signalling functional status/different anomalies
- (6) Inter waiting/pre-purge time (option with only software modification)
 - TW/TP nn** Duration of the above—mentioned time expressed in seconds
- (7) Safety time (option with only software modification)
 - TS nn** Duration of the above—mentioned time expressed in seconds
- (8) sensitivity (option with only software modification)
 - No number** 0,5µAdc (standard sensitivity)
 - 1,2** 1,2µAdc
- (9) Supply voltage
 - G** 120V~(cURus) / 230V~(CE) /50-60Hz

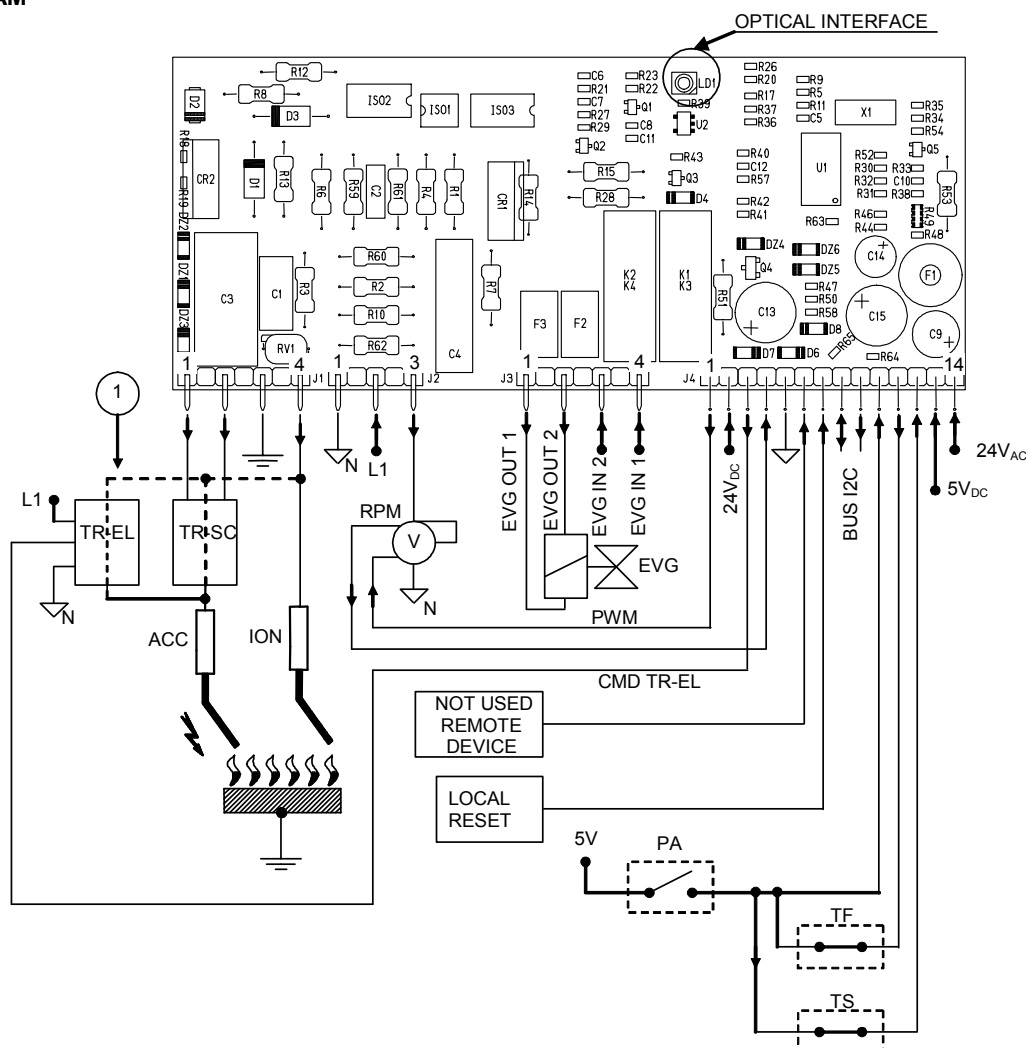
Options description

- (10) Ignition mode (option with only software modification)
 - No letter** The ignition device is active only during TSP time (TS-1 second – standard mode). In case the module is employed in an application provided with only one ignition and detection electrode then this mode must be used.
 - A** The ignition device is active during all TS time
 - B** The ignition device is turned off when flame is detected
- (11) Spark repetition frequency
 - option valid only with a capacitive discharge ignition device - See point (2) (option with only software modification)
 - No number** 25Hz (standard value)
 - nn** Another value lower than 25Hz
- (12) Behaviour in presence of flame simulation signal (option with only software modification)
 - No letter** The module remains in continuous waiting/pre-purge stage (standard mode)
 - K** Immediate lockout
 - Knn** nn second delay lockout
- (13) Failure or insufficiency of air flow/ flue gas thermostat is open at start-up (option with only software modification)
 - No letter** The module remains in continuous waiting/pre-purge stage (standard mode)
 - Qnn** nn second delay lockout
- (14) Failure or insufficiency of air flow during operation/flue smoke thermostat opens during operation (option with only software modification)
 - No letter** Safety lockout followed by a continuous waiting/pre-purge stage (standard mode)
 - R** Immediate lockout
 - Rnn** Lockout at the end of the multiple attempts (nn= number of attempts, the same as those of option Ynn)
- (15) Flame failure during operation (option with only software modification)
 - No letter** Ignition recycle/s(standard mode)
 - V** Number of carried out attempts in compliance with point (17)
 - V** Immediate lockout
- (16) Ignition recycle attempts (option with only software modification)
 - No letter** Single attempt (standard mode)
 - Ynn** Multiple attempts (nn = number of attempts)
 - YnnRmm*** nn multiple recycle attempts, with restoring of mm recycle attempts in operation
 - * Remark:** Y3R0 3 recycles according to EN676 and EN746-2, single attempt to recycle upon flame failure during operation.
- (17) Pre-ignition time (option with only software modification)
 - No letter** Not available (standard mode– ignition device is activated at the beginning of TS time)
 - Jnn*** Pre-ignition time is available and keeps on for nn seconds before the beginning of TS time
 - * Remark:** option J without nn seconds is pre-ignition during all TW/TP time
- (18) Post-purge time at the end of heating demand (option with only software modification)
 - No letter** Not available (standard mode)
 - Pnn** Post-purge time of nn seconds which doesn't end when a new heating demand occurs
 - PTnn** Post-purge time of nn seconds which ends when a new heating demand occurs
- (19) Inter-purge time (the option can be activated only in case of multiple ignition recycle attempts – the option entails only software modifications)
 - No letter** Not available (standard mode)
 - Inn** Inter-purge time of nn seconds
- (20) Air pressure switch check.
 - No letter:** Air pressure switch is checked (standard mode).
 - G:** without air pressure switch check.
 - Remark:** The "G" option in the GAS versions are intended for special applications where checking the air flow is not required by the standard appliance.

Example: **SRM M2NL 5 10 GK15Y3J2I5**

SRM module, provided with non-volatile lockout (M), able to command a variable speed fan with cut phase driver (2), phase-insensitive (N), provided with led for optical signalling (L), timing: TW 5s TS 10s, sensitivity 0,5 μ A, 230V 50/60Hz, lockout due to flame simulation during TW after 15 seconds, 3 ignition attempts, pre-ignition time = 2 seconds and inter-purge time = 5 seconds. It's also implicit (standard) that the capacitive ignition discharge lasts during TSP time = (TS-1s), with 25Hz spark repetition frequency, that the module remains in waiting stage due to air flow failure at start-up and that it repeats all the ignition attempts in case of flame failure during operation. The up-mentioned module performs no post-ignition or post-purge time .

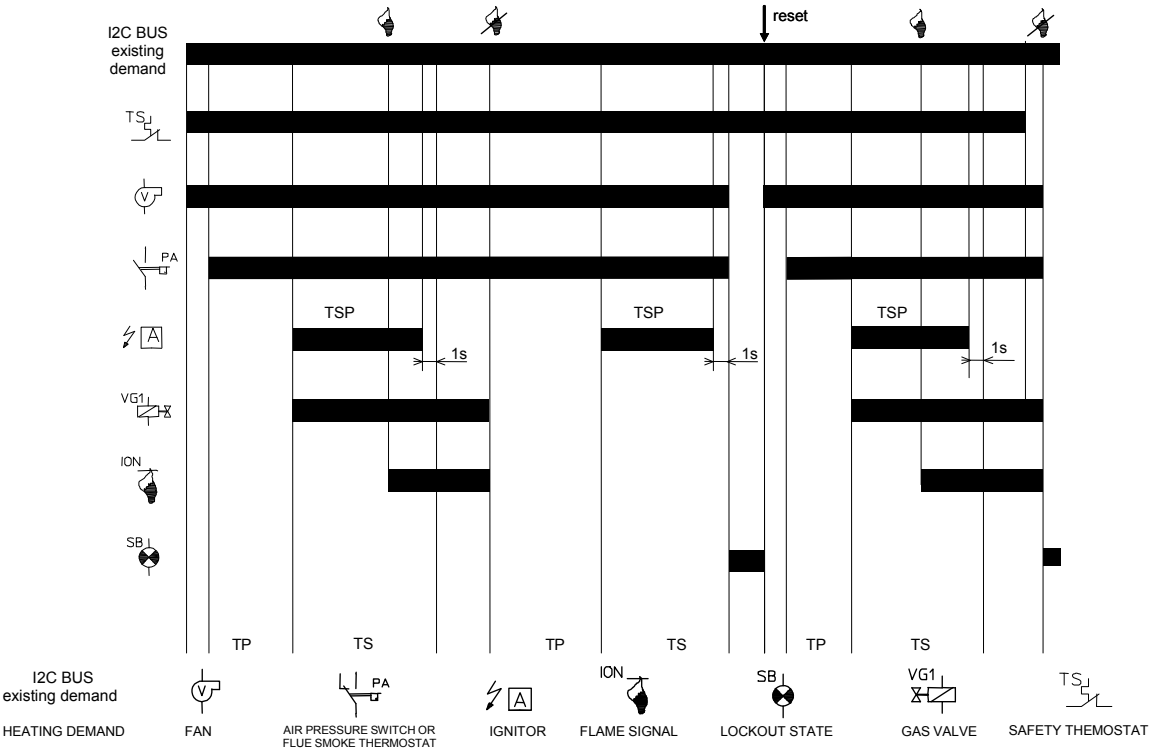
WIRING DIAGRAM



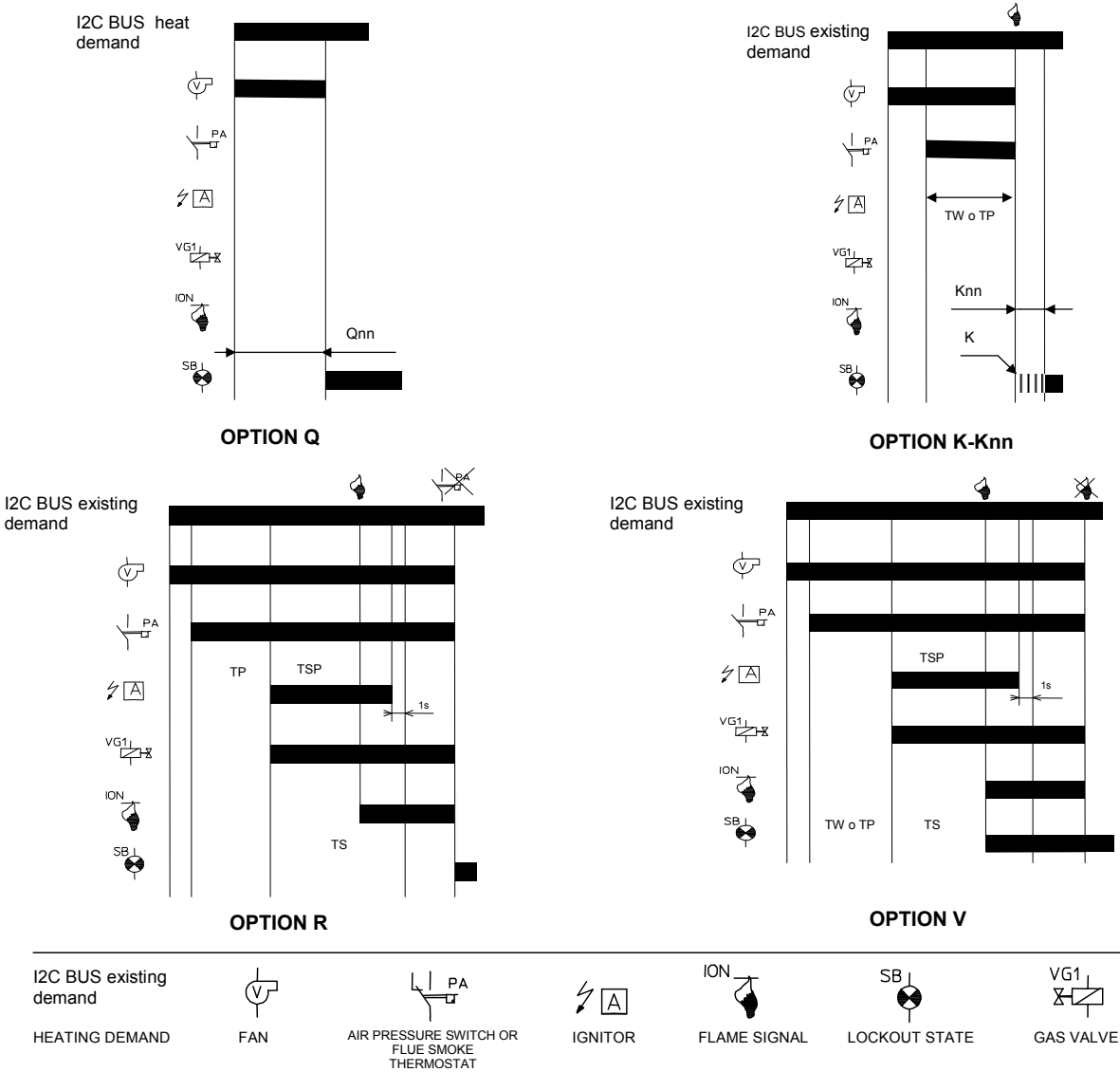
Key to symbols:

L1	120V~(cURus) 60Hz / 230V~(EC) 50/60Hz supply voltage (phase)	EVGOUT1	Power supply output pole of the gas valve (neutral or 24V _{DC} reference)
	120V~(cURus) 60Hz / 230V~(EC) 50/60Hz supply voltage (neutral)	EVGOUT2	Power supply output pole of the gas valve (phase or 24V _{DC})
	Functional earth	24V _{DC}	24 V _{DC} supply voltage
TR-EL	Integrated remote ignition device	CMD	Command line of the integrated remote ignition device
TR-SC	Step-up transformer for capacitive discharge igniter	TR_EL	Low voltage reference (SELV)
ACC	Ignition electrode		REMOTE RESET
ION	Detection electrode	LOCAL RESET	Reset signal coming from a remote control device
①	Connection for single-electrode system	RESET	Reset signal coming from a device located in the application (push button or trimmer)
V	fan	PA	Air pressure switch
RPM	Fan speed reading (brushless or cut phase driver fan)	TF	Flue smoke thermostat
PWM	Brushless fan command line	TS	Safety thermostat
EVG	Gas valve	BUS I2C	Communication line with the thermoregulation device
EVGIN1	Power supply input pole of the gas valve (neutral or 24V _{DC} reference)	5V _{DC}	5 V _{DC} supply voltage
EVGIN2	Power supply input pole of the gas valve (phase or 24V _{DC})	24V _{AC}	24 V _{AC} supply voltage
		24V _{DC}	24 V _{DC} supply voltage

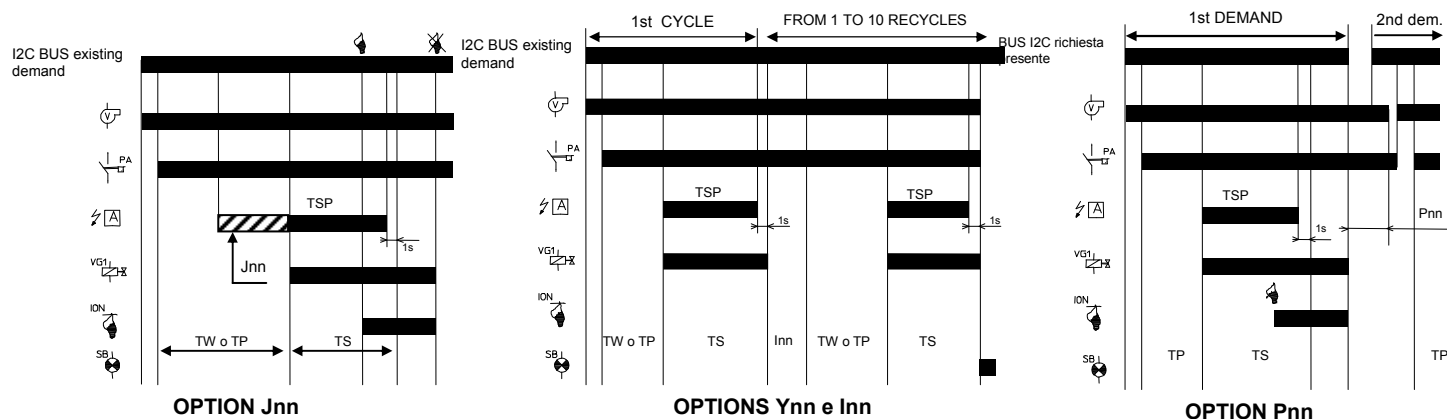
CYCLE DIAGRAM OF THE STANDARD VERSION



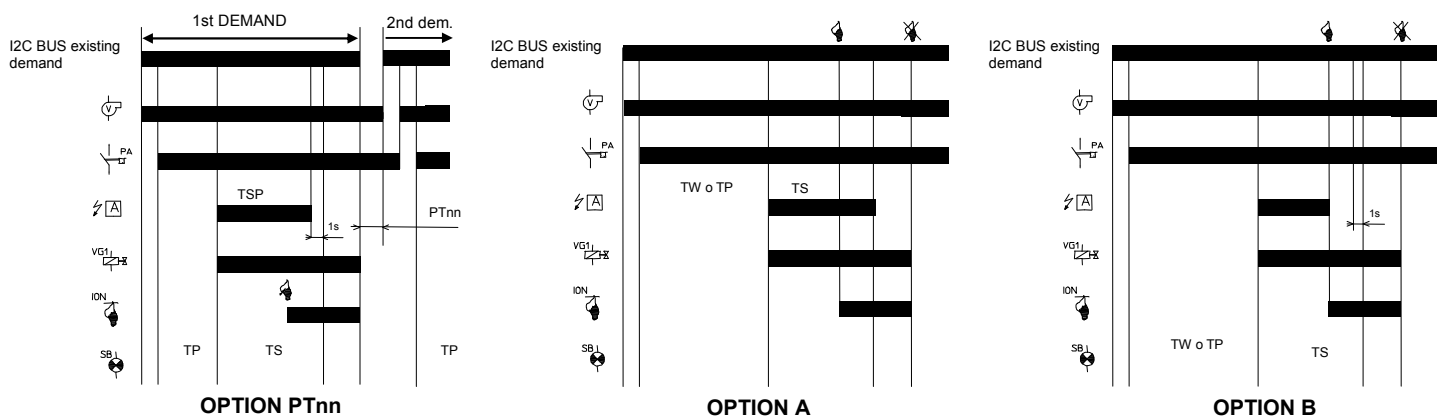
CYCLE DIAGRAM OF OPTIONS Q – K – Knn – R – V



CYCLE DIAGRAM OF OPTIONS Jnn – Ynn – Inn - Pnn



CYCLE DIAGRAM OF OPTIONS PTnn – A - B



ATTENTION -> Brahma S.p.A. accepts no responsibility of any damage resulting from customer's tampering with the product.

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11 March 2020 Subject to amendments without notice