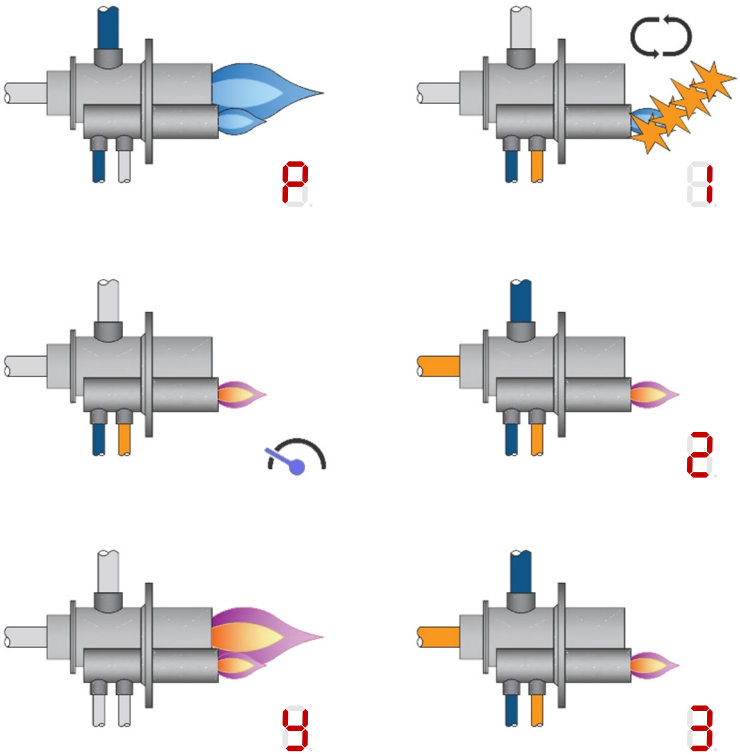
PICO AUTOMATIC BURNER CONTROL
MODEL PCF202512

MADE IN EU



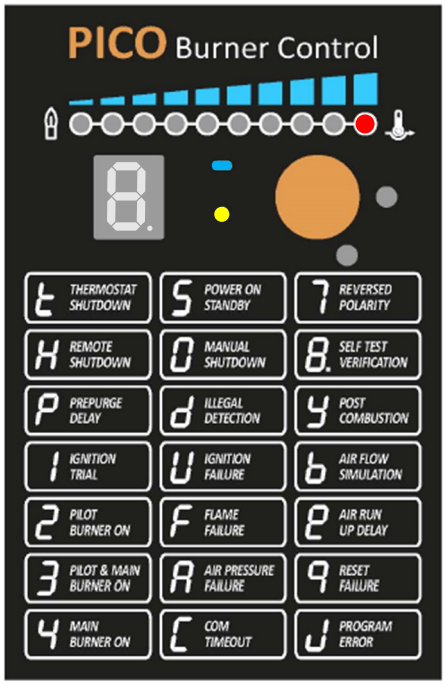
READ OPERATION MANUAL BEFORE OPERATING THIS EQUIPMENT.

- VERIFY THE CORRECT POWER SUPPLY AND INPUT VOLTAGE
- ONLY A TRAINED AND FULLY QUALIFIED TO INSTALL OR SERVICE THIS UNIT
- ANY TIME MUST REPLACE, USE THE SAME TYPE AND MODEL
- BEFORE REMOVING OR WIRING, BE SURE TO TURN OFF THE POWER
- FAILURE TO UNDERSTAND COULD RESULT IN SERIOUS PERSONAL INJURY
- BE SURE TO KEEP THIS MANUAL NEARBY FOR HANDY REFERENCE
- DO NOT INSTALL WHERE EXPOSED HIGH TEMPERATURE CONDITION
- FOLLOW THE USER MANUAL FOR COMBUSTION EQUIPMENT
- IF YOU SHOULD FIND AN ERROR OR UNIT DAMAGE, PLEASE CONTACT PICO

PRODUCT USED AS COMBUSTION COMPONENTS AND FOLLOWS :

- GAS EQUIPMENT DIRECTIVE (2009/142/EC)
- LOW VOLTAGE EQUIPMENT DIRECTIVE (2014/35/EC)
- EMC DIRECTIVE (2014/30/EC)
- IN CONJUNCTION WITH EN298 - EN746-2 - EN60730-1 - EN13611
- READ ALL PARAMETERS VIA ANDROID SMARTPHONE OR TABLETS USB CABLE

BURNER CONTROL UNIT



Burner control unit PCF202512 is suitable for the control of gas/oil burners for intermittent or continuous operation.

Flame burner control by means of UV scanner or ionization rod (even shared with ignition) and high temperature option for flame surveillance bypass.

Setting times and cycle are configurable the same device can be used to control different types of gas/oil burners, meeting all relevant requirements.

A red led bar graph flame signal indicators and an advanced self diagnostic system provides the display of either the cycle status, lockouts and failures.

Remote control and supervision of the burner system can be implemented traditional electrical wirings or through built-in communication line.

SAFETY INFORMATIONS

- Read and understand this manual before installing, operating or servicing this unit.
- This unit must be installed according to this manual and local regulations.
- Disconnect power supply and follow all usual safety precautions before carrying out any operation on the device. Be sure to re-install plastic covers or shields before operating any devices. The device is not user serviceable, a faulty device must be put out of order and sent back for servicing. PICO manufactures products used as components in a wide variety of industrial systems and equipment.
- PICO accepts no responsibility for the way its products are incorporated into the final system and safety design. All systems or equipment's designed to incorporate a product manufactured by PICO must be supplied to the end user with appropriate warnings and instructions as to the safe use and operations of that part. Any warnings provided by PICO must be promptly provided to the end user.
- PICO guarantees one years from the date of manufacture of its product to replace or at its option, to repairs any product or part thereof (except fuses and some limitations for UV tubes and photocells) which is found defective in material or workmanship or which otherwise fails to conform to the description of its sales order.
- PICO makes no warranty of merchantability or any other warranty express or implied. and assumes no liability for any personal injury, property damage, losses, or any claims arising from mis-application of its products.

WIRING TERMINAL DESCRIPTIONS

A1	LOW AIR PRESSURE SWITCH
A2	AIR VALVE OUTPUT - PHASE
A3	AIR VALVE OUTPUT - NEUTRAL
C1	COM INTERFACE - POSITIVE
C2	COM INTERFACE - NEGATIVE
01	POWER SUPPLY - NEUTRAL
02	POWER SUPPLY - PHASE
03	2ND FUEL VALE (MAIN) - NEUTRAL
04	2ND FUEL VALVE (MAIN) - PHASE
05	1ST FUEL VALVE (PILOT) - NEUTRAL
06	1ST FUEL VALVE (PILOT) - PHASE
07	IGNITION TRANSFORMER - NEUTRAL
08	IGNITION TRANSFORMER - PHASE
09	GROUND

10	FLAME DETECTOR INPUT ROD | UV
11	OUT BURNER ON
12	OUT BURNER LOCKOUT
13	OUT COMMON RETURN
14	IN REMOTE RESET
15	IN AIR CONTROL
16	IN THERMOSTAT 1
17	IN THERMOSTAT 2 | HI BYPASS | FLAME 2
18	IN COMMON RETURN
A	AIR PRESSURE SWITCH
L	EXTERNAL LIMITS
VA	AIR VALVE (FAN)
V1	1ST STAGE FUEL VALVE (PILOT)
V2	2ND STAGE FUEL VALVE (MAIN)

MAKE JUMPER A1-A2 WHEN THE AIR PRESSURE SWITCH IS NOT INSTALLED AND AIR OUTPUT VA PARAMETER IS ENABLE.

WIRING DIAGRAM

Use power, signals and control cables suitable for type of operations and complying with all regulations.
Do not route all cable connections together with frequency converter cables or cables emitting strong fields.
Provide reliable cable connection to PE (Protection Earth) and burner frame, recommended wire gauge > 4 mm².
All electronic equipment's must be supplied by a dedicated transformer in a TN-S earthing system.
Use unscreened high-voltage cables for ignition spark plug and ionization rod lines, laying all cables individually and avoiding metal conduits.
Keep high voltage ignition cables as short as possible with burner and avoiding loops, keep all other cables especially UV scanner or ionization rod, as far apart as possible.

Air valve, fuel valves and ignition transformer outputs are protected by internal fuse, this fuse must be replaced only with same type and value component.
Power supply fuse: Ultimate protection against dangerous conditions by means of internal, non replaceable 5A safety use.

Please inspect the burner control unit for any damage, verify correct power supply and inputs voltage by checking the label and stamp.

TECHNICAL DATA BURNER CONTROL UNIT

POWER SUPPLY

Voltage Power Supply	:	230 Vac +10-15%
Frequency	:	50/60 Hz
Line Fuse	:	3 A quick acting 5x20mm
Power Consumption	:	6 VA MAX
Power Dissipation	:	4 W MAX

OVERVOLTAGE CATEGORY II PURSUANT TO EN 60730

ENVIRONMENT

Operating Temperature	:	-20 to 60°C
Storage Temperature	:	-40 to 85°C
Relative Humidity	:	NO condensation allowed
Protection Class	:	IP67 NEMA6 PLASTIC
Body Weight	:	850 grams
Mounting Position	:	ANY

THIS UNIT IS NOT INTENDED FOR EXPLOSIVE OR CORROSIVE ENVIRONMENTS

OUTPUTS

Maximum Rated Voltage	:	250 Vac
Maximum Switching Voltage	:	440 Vac
Maximum Load (per-output)	:	2 A cos φ = 0,7

AIR PRESSURE SWITCH INPUT

Maximum Rated Current	:	3 A MAX

PROCESS INPUTS

Rated Voltage	:	230 Vac, 115 Vac, 48 Vac, 24 Vac
Current Maximum	:	3 mA MAX

FLAME DETECTION

Minimum Ionization Current	:	> 1 mA
Current Limitation	:	< 1 mA
Signal Display	:	0 to 100 % (0.. 30 µA)
Detector Line Length	:	< 30 m
Single Rod Line	:	< 2 m
Detector Voltage	:	250 Vac
Detector insulation	:	> 50 MΩ
UV Sensor	:	Non permanent operation (UV1PC)

COMMUNICATION INTERFACE

Baud Rate	:	4800, 9600, 19200, 38400, 57600, 115200

STATUS DISPLAYS

The STATUS DISPLAY gives at any time a complete, clear indication about the working status conditions of both the burner and the equipment and displays specific number information, making it easier to detect any failure occurring in process system or the device.

CYCLE

MANUAL SHUTDOWN
UNIT HAS BEEN PUT OUT OF SERVICE FROM PUSH BUTTON, PUSH BUTTON AGAIN.

THERMOSTAT SHUTDOWN
BURNER HAS BEEN TURNED OFF BY LOCAL THERMOSTAT 1 INPUT.

REMOTE SHUTDOWN
REMOTE HAS BEEN TURNED OFF BY REMOTE CONTROL THROUGH FIELDBUS.

AIR RUN UP DELAY
OPTIONAL WAITING TIME FOR AIR REACHING RATED FLOW. SIR SIMULATION TEST.

AIR PRESSURE WAITING
WAITING FOR RATED AIR PRESSURE BEFORE TO CONTINUE WITH PREPURGE.

PREPURGE
PURGE OF COMBUSTION CHAMBER OR MINIMUM TIME FOR ILLEGAL FLAME PROVING.

IGNITION
1ST SAFETY TIME, BURNER IGNITION TRIAL WITH PILOT FUEL VALVE OPEN.

PILOT BURNER ON
PILOT FUEL VALVE IS ON, OPERATING POSITION FOR SINGLE STAGE BURNERS.

PILOT & MAIN BURNER ON
INTERMITTENT PILOT OR 2ND SAFETY TIME FOR INTERRUPTED PILOT BURNER.

MAIN BURNER ON
ONLY MAIN FUEL VALVE IS ON (DUAL STAGE WITH INTERRUPTED PILOT).

POSTCOMBUSTION
WAITING FOR FLAME QUENCHING AFTER LOCKOUT OR SHUTDOWN REQUEST.

PREPURGE
PURGE OF COMBUSTION CHAMBER SHOWN TOGETHER WITH ASSOCIATED CODE.

LOCKOUTS

STANDBY
WAITING FOR RESET WHEN PROGRAMMED FOR STANDBY MODE AT POWER ON.

FLAME SIMULATION
FLAME DETECTION DURING PREPURGE OR POSTPURGE (AFTER POSTCOMBUSTION).

AIR FLOW SIMULATION
AIR PRESSURE DETECTED WHEN AIR OUTPUT IS OFF.

RESET / COMMAND ERROR
ILLEGAL RESET COMMAND OR TOO MANY RESETS (MORE THAN 5 WITHIN 15 MIN).

IGNITION FAILURE
NO FLAME DETECTED AT THE END OF 1ST SAFETY TIME (IGNITION TRIAL).

FLAME FAILURE
FLAME QUENCHING DURING NORMAL BURNER OPERATION.

AIR FAILURE
AIR PRESSURE FAILURE DURING PURGE OR DURING NORMAL OPERATION.

COMMUNICATION TIMEOUT
MISSING COMMAND FROM SUPERVISOR OR EXPANSION BOARD.

WARNINGS

SELF-TEST
VERIFICATION AND INTIALIZATION OF SYSTEM COMPONENTS AT POWER ON.

CONFIGURATION
UNIT IN CONFIGURATION MODE THROUGH COMMUNICATION LINK.

FAILURES

IGNITION OUTPUT FAILURE
IGNITION DEVICE OUTPUT REMAIN INACTIVE.

FUEL VALVE OUTPUT FAILURE
1ST STAGE (PILOT) FUEL VALVE OUTPUT REMAIN INACTIVE.

FUEL VALVE OUTPUT FAILURE
2ND STAGE (MAIN) FUEL VALVE OUTPUT REMAIN INACTIVE.

PROCESS INPUTS FAILURE
UNRELIABLE OPERATION OF PROCESS INPUTS

OUTPUT RELAY FAILURE
SHORT CIRCUIT ON OUTPUT RELAY CONTACT LOADS DISCONNECTED BY SAFETY RELAY.

UNDERVOLTAGE
POWER SUPPLY VOLTAGE TOO LOW SYSTEM REMAINS ACTIVE.

OVERVOLTAGE
POWER SUPPLY VOLTAGE TOO HIGH SYSTEM REMAINS ACTIVE.

PROGRAM ERROR
WRONG PROGRAM SEQUENCE.
UNSAFE OPERATION STOPPED.

MEMORY ERROR
DATA CORRUPTION.
CONFIGURATION ERROR.

TIMEBASE ERROR
MISMATCH BETWEEN 1ST AND 2ND INTERNAL TIMEBASE GENERATORS.

SYSTEM ERROR
MICROPROCESSOR IS NOT OPERATING PROPERLY.

FLAME INPUT FAILURE
FLAME SENSOR REVERSED POLARITY OR UNRELIABLE FLAME AMPLIFIER.

RESET FAILURE
PUSH BUTTON OR REMOTE RESET ACTIVE FOR LONG TIME (MORE THAN 10 SECONDS).

MASTER SAFETY RELAY FAILURE
SHORT CIRCUIT ON SAFETY RELAY CONTACT.

A permanent failure to the relay contact point may cause the main fuse to blown, as a safety measure to prevent dangerous conditions. In such case the burner unit fail, must be returned to factory for servicing.

FLAME SIGNAL BAR GRAPH

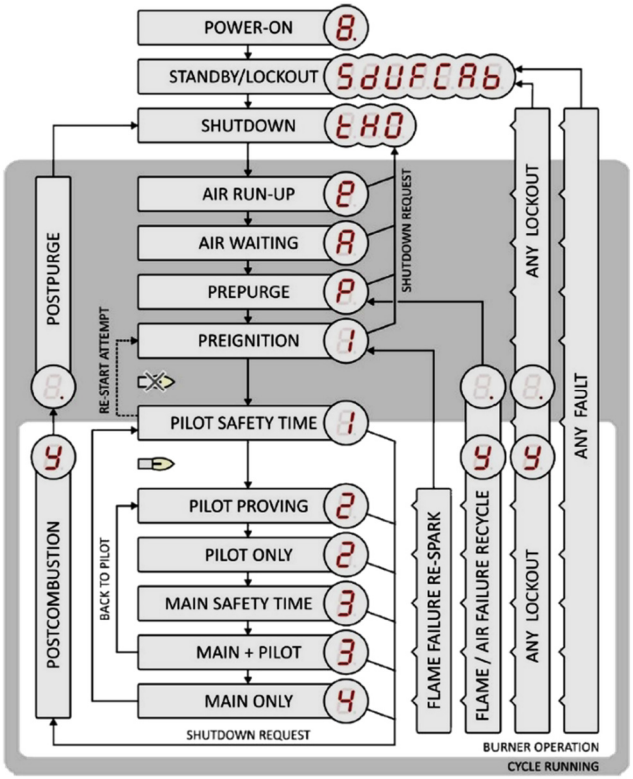
The flame signal strength detected by the sensor connected at terminal 10 is reported by means of 10 red led status bar graphs. Full scale ranges 100% is corresponding to a flame signal of 30 µA approx. To improve readability, the amplifier provides similar signals for both electrodes and UV scanners. One of the first four led indicators blinks when flame is detected but the flame burner signal is below the sensitivity threshold setting by configuration setpoint parameters (1 to 9 µA). The last indicator (full scale) is turned on instead, when the flame is detected by the independent main burner surveillance at INPUT 17.

RESET

A reset action is supposed to be a clearly defined manual action. An automatic reset is not allowed by EN 13611:2015. When manual action is initiated from remote by means of RESET INPUT at terminal 14 or through the FIELDBUS CONTROL, without being within the visible sight of the appliances:

- Actual status and relevant information of the process shall be visible to the user.
- Limits the maximum number of resets to 5 actions within a span of 15 minutes. Lockout (resettable only from local button) exceeding this limit.

PROGRAM SEQUENCE



A self-test is performed at power supply-on. Once successfully completed burner is ready to start and use.

If the unit has been turned off while in lockout or parameters has been set to standby, it will be necessary to push the reset button or issue a fieldbus command parameter to exit from non-volatile lockout.

Burner remains in shutdown until thermostat 1 is closed or remote run command is received from fieldbus. Flame simulation will be verified while in waiting or pre-purge process.

After preset waiting time or pre-purge time has elapsed, ignition device activated verified and the pilot valve is open.

The pilot proving starts if the flame is detected within the safety time.

If no any flame is detected within the safety times, a lockout occurs. Depending on setting parameter, the unit could carry out up to three further start-up attempts. After the pilot proving the main valve opens, at the end of 2nd safety time, the pilot fuel valve is turned off (interrupted mode) or remains open (intermittent mode). Main fuel gas/oil valves controlled by means of thermostat 2 input parameter or fieldbus remote control.

Flame failure during operation leads to lockout, ignition restoration or recycles. Air failures during process operation leads to immediate lockout or recycle depending on parameters.

Shutdown request (thermostat 1 or fieldbus command) will turn off the burner, will waiting for allowed post combustion or optional postpurge. An optional adjustable minimum combustion time ensures that the burner will burning for a defined setpoint period. Even if thermostat 1 is switched off or an halt command is received through fieldbus beforehand.

Firing systems operating temperature above 750°C are considered to be high temperature equipment (see EN 746-2): flame burner presence must be verified until temperature furnace is below 750°C. Bypass configuration request can be issued through a contact at terminal 17 (handled by safety temperature monitor, DIN 3440).

Receiving a valid bypass request, the internal flame control system is bypassed and the fuel valves are opened without flame supervision and the system works as usual but without flame monitoring. The burner is turned on directly (no safety time and no ignition transformer) when temperature is above 750°C. When operating temperature in the furnace drops below 750°C, the remote control must be released.

SINGLE STAGE BURNER

A flame simulation test is carried out during pre-purge. Turn ON/OFF the burner by means of thermostat input at terminal 16 or through remote fieldbus command.
Air simulation test is carried out before to activate the air output [VA] if enabled.

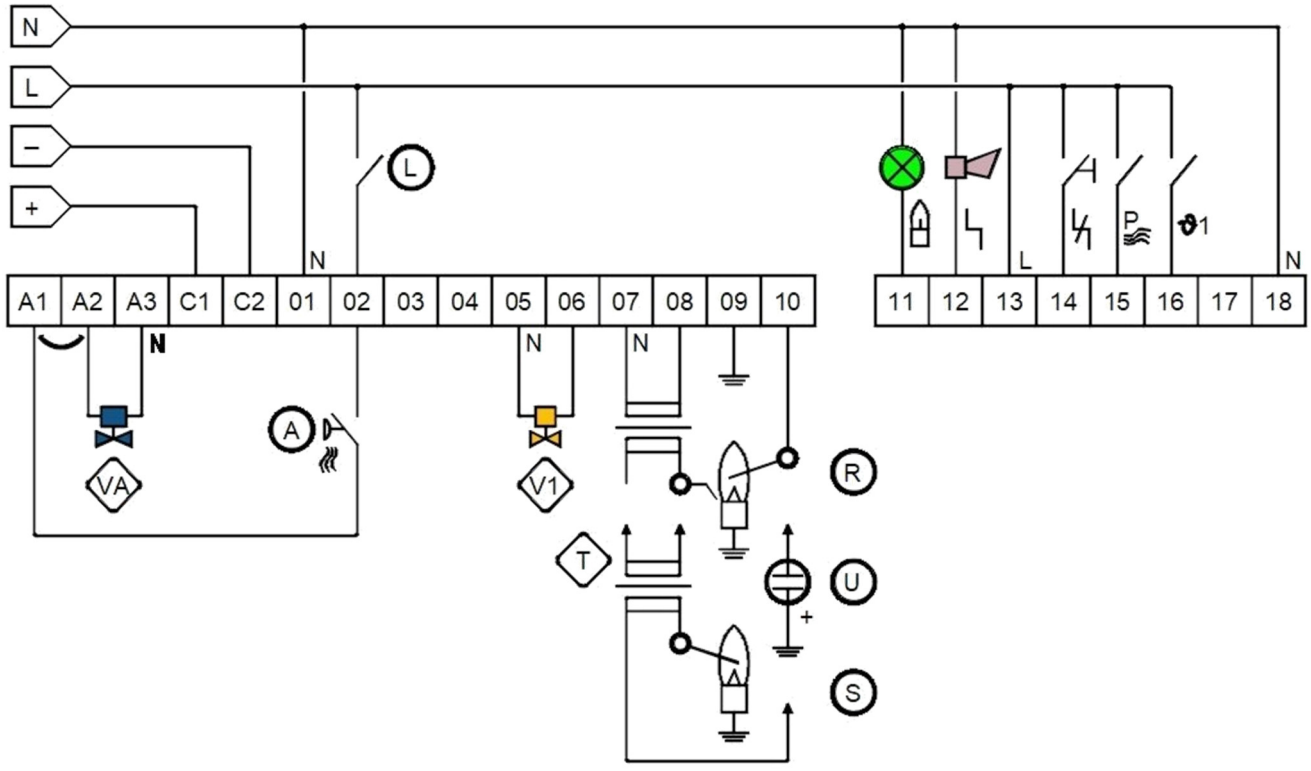
The fuel valve [V1] will be activated only if the ignition device is detected during pre-ignition times. The fuel valves remains open during the programmed 1st safety time, if a valid flame signal is detected within the safety time the valve is kept open, the burner is on and after pilot proving time the contact at terminals 11 will be closed (burner on).

If no any flame is detected the system will lockout and contact at terminals 12 will be closed (lockout). In accordance with EN746-2 and EN676 regulations, up to 4 times ignition attempts are allowed if the safety condition is not impaired. Push the front panel button by manual or activate the input signal at terminal input 14 to reset from lockout condition (will take place at release). Flame quenching during burner operation will force the system to lockout, recycles or ignition restoration.

To put the burner out of service (manual shut-down) condition, push the front panel reset button during the operating cycles. A post-combustion time setpoint (maximum 20 seconds) is allowed after a lockout or shutdown request, followed by post-purge.

The air output [VA] behavior is configurable for each cycle step, providing also cooling and purging processes, this output is monitored through the low air pressure switch [A].

UV sensor or ionization rod can be used for flame detections. It's possible to share a single rod for ignition and flame detection using special ignition transformers.



DUAL STAGE BURNER

Turn ON/OFF the burner control unit by means of thermostat input at terminal 16 or through remote fieldbus command.
Depending on configuration, the pilot burner could be :

- INTERRUPTED - extinguished at the end of the second safety time.
- INTERMITTENT - shut off simultaneously with the main flame.

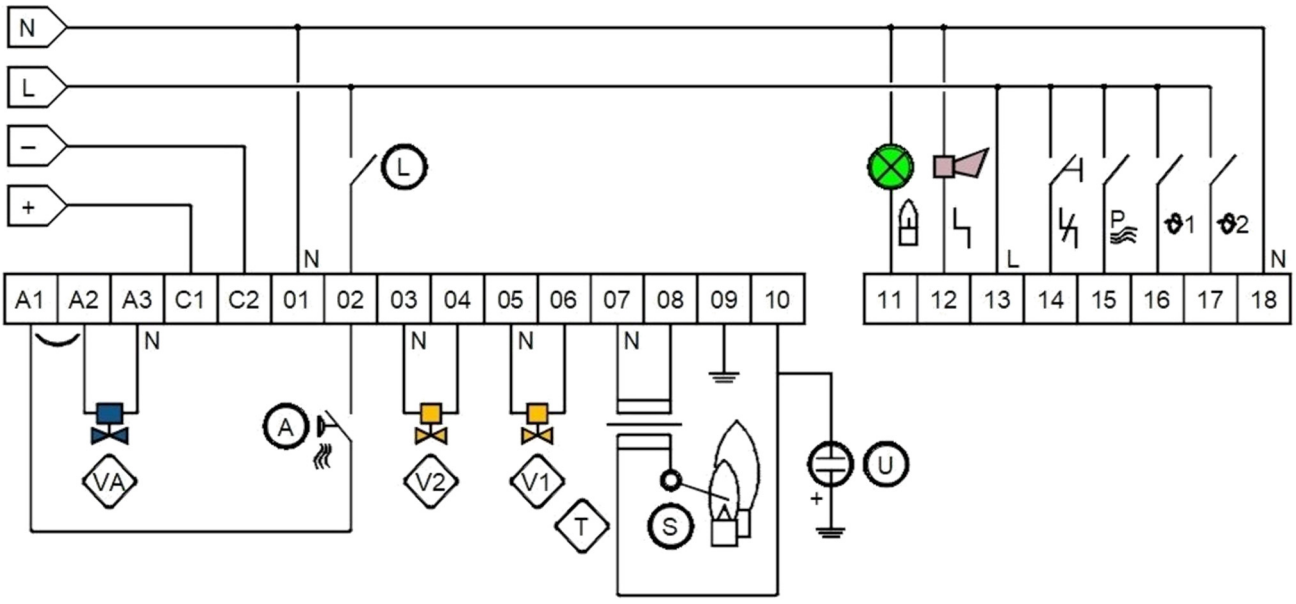
FLAME DETECTION OPTIONS :

A single flame detector monitors both the pilot and main burner.
Pursuant to EN 746-2 regulation: A single common flame safeguard is allowed for the burners that guarantee stable flame combustion throughout of regulation and are on the same air/gas ratio control system, arranged adjacent in such way that if one of them is extinguished, it's re-ignited quickly and smoothly by the flame form the next burner.

Pilot and main flame detected by two independent sensors wired at same input.
Pursuant to EN 746-2 regulation: When two independent sensors shares the same flame, amplifier input the main flame sensor shall be positioned that it cannot in any circumstances detect the pilot flame. Both UV detector & ionization rod can be used for pilot and main burner.

Once the pilot burner has started up, the main burner on/off can be controlled by means of thermostat input at terminal 17 or through fieldbus command.
Turning off the main burner when the pilot burner is operating in INTERRUPTED mode will lead to a new burner ignition trial (1st safety time) including spark generation.

The air output operation is configurable setpoint during the whole cycle, providing also cooling and purging processes. For modulating burner system, the butterfly valve must be managed by external logic. See SINGLE STAGE BURNER description for process input description.



DUAL STAGE BURNER WITH INDEPENDENT FLAME SENSOR

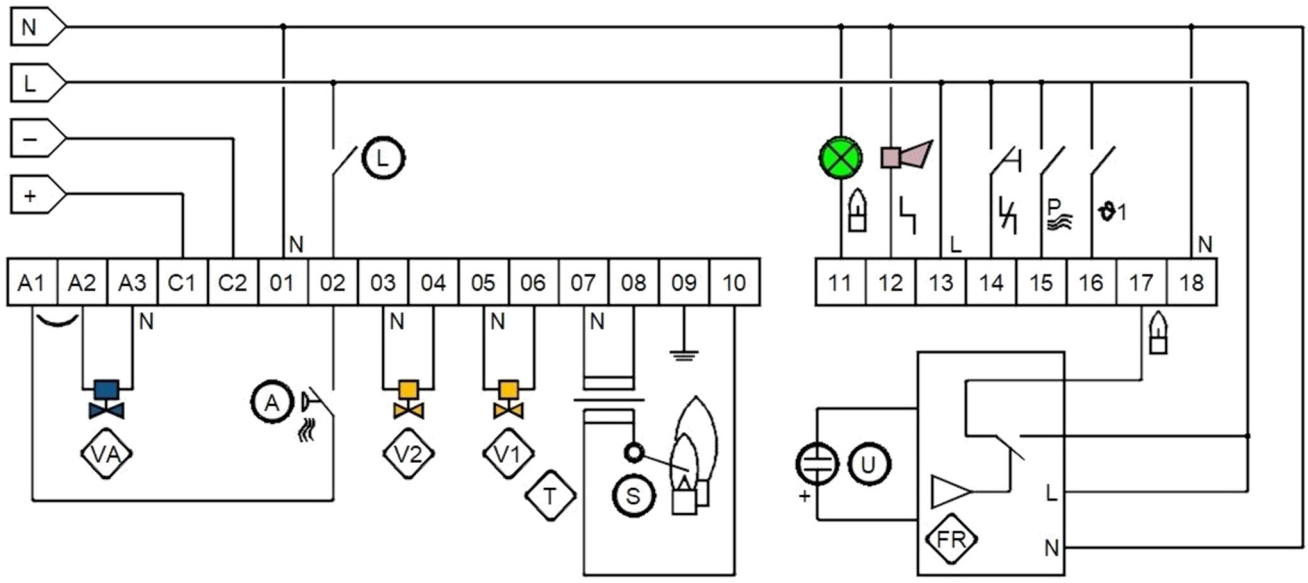
When two independent sensors are required for dual stage burners, the input at terminal 17 can be configured to receive a contact from an external flame relay unit used for the 2nd stage burner. When external contact from independent flame surveillance is closed the last indicator of flame signal bar graph is permanently on (full scale).

A flame simulation lockout occurs when a flame is detected by UV or flame rod sensor while related fuel valve is closed.
Pilot burner flame signal strength reported when only the pilot flame is detected.

WARNING !

The flame sensor wired at terminal 17 must be certified for permanent operation if the main burner remains operative longer than 24 hours.

Using a standard flame relay product, the main burner must be turned off within 24 hours of continuous operation (non permanent operation of main burner).



FIELDBUS REMOTE CONTROL - COM INDICATOR

Complete remote control and supervision is possible through built-in serial communication interface using proprietary fieldbus remote controls, designed for reliable operation in harsh industrial environments with simplified wiring.
Communication protocol could be easily implemented into any programmable controller for great efficiency and low cost.

Once a valid command is received through the communication line yellow led will blink once at power on during self-diagnosis. A failure to internal supervision logics occurred when this indicator remains permanently on. Remove power supply and restart.

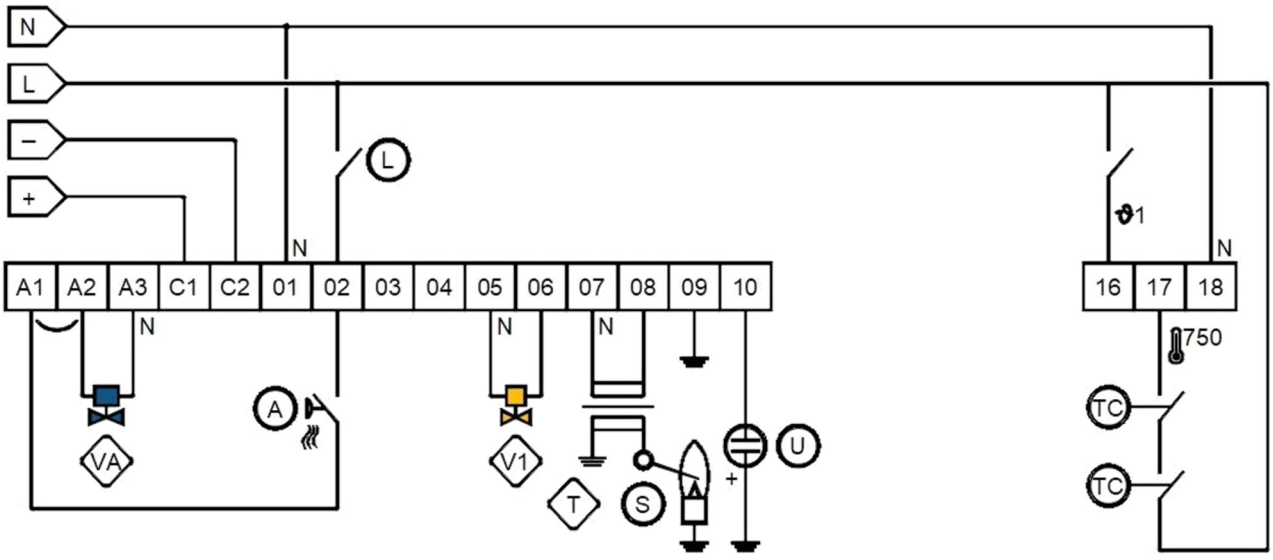
HI-TEMP FLAME SURVEILLANCE BYPASS

When the burner is operating in combustion chamber having walls above 750°C, it's possible to bypass the flame surveillance by means of specific contact at input terminal 17 (redundant safety control as per DIN 3440).

Flame surveillance must be active when the temperature in the combustion chamber is below 750°C. Please operate under professional engineers/operators.
Operating in high temperature mode the fuel valves are opened without flame surveillance. Indirect control of flame provided by external (dual channel, fail-safe) temperature monitor (DIN3440). Any failure to temperature monitor or sensor must release the bypass contact. The burner is turned on without 1st safety time when the high temperature mode is active.

Flame simulation is not verified during pre-purge, the ignition transformer is not energized and no ignition spark generated, in order to provide reliable operation for flameless burners. The only reason to activate high temperature mode is to improve system availability, ignoring false flame detection that may occur at high temperatures.

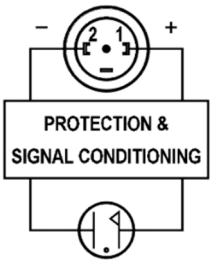
UV sensor or ionization rod can be used for flame detections. The air valve output operation is configurable during the whole cycle.
See SINGLE STAGE BURNER description for process input description.



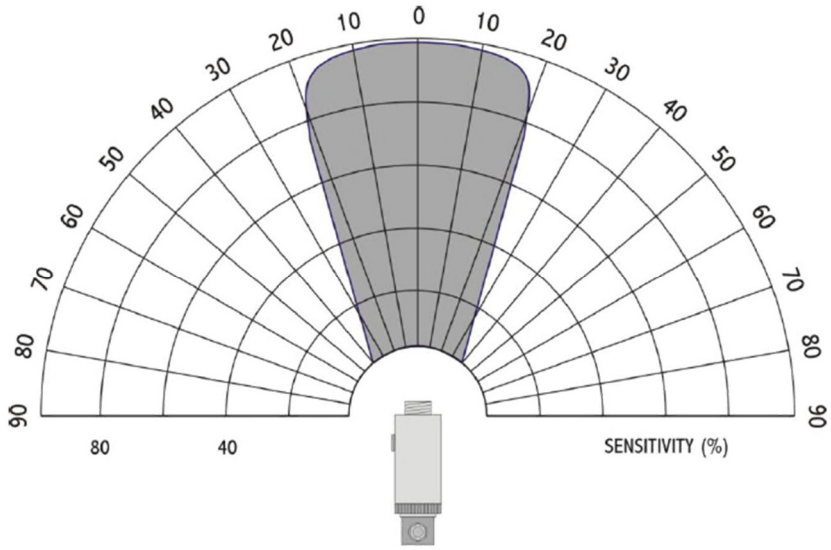
TECHNICAL DATA UV SCANNER UV1PC

Spectral Response	:	185 to 260 nm
Operating Voltage	:	200 to 280 Vac
Discharge Current	:	1 mA
Peak Discharge Current	:	30 mA
Recovery Time	:	20 µs @ 10% DUTY CYCLE
Operating Temperature	:	-20 to +90°C
Storage Temperature	:	-40 to +85°C
UV Tube Temperature	:	125°C MAX
Operating Life	:	> 10.000 hours @ 50°C / 1mA
Relative Humidity	:	Non Condensing 10 to 90%
Protection Class	:	IP65
Body Weight	:	50 grams
Mounting Position	:	ANY
Front Side of Sensor	:	Sealed with epoxy resin

MADE IN EU



UV ANGULAR SENSITIVITY



This sensor features a high temperature and high sensitivity ultraviolet (UV) tube, checks a short-circuited or runaway for monitoring gas or oil flames which cycle on and off frequently.

The UV tube is made of quartz glass and is filled with gas that surrounds two electrodes and energized continuously by a high voltage. The gas acts as an insulator in the absence of UV radiation. Combustion will produce UV radiation to ionize the gas and cause current pulses to follow between the electrodes.
These current pulses result in a flame signal which is transmitted to amplifier in the control, where it is processes to energize and hold in the flame control relay.

When the operating temperature at peepsight exceed 70°C, it's advisable to add a ¼" pipe space (up to 40 cm) between the burner and the sensor.