Gas leak detection system

for heating rooms and similar environments

LYC11

Electronic control unit for gas leak detection with single sensor aimed to drive a gas flow cut-off 12VDC normally closed (NC) or normally open (NO) solenoid valve. Single threshold sensor with tin dioxide sensing element. Possible control of auxiliary devices (hooters, flashing lights, fans...) or 230VAC solenoid valves through built-in relay. 24VAC power supply. Built-in battery charger for optional external 12V buffer battery charge with automatic intervention in case of power failure.

Use

LYC11 control unit is used, connected to a QA..13/A sensor, for optical/acoustic signaling or to drive a gas flow cut-off valve in presence of dangerous concentrations of:
- methane (CH4)
- LPG
- carbon monoxide (CO)

note: Only one sensor QA..13/A can be connected to the control unit

Available models

<table>
<thead>
<tr>
<th>Description</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control unit</td>
<td>LYC11</td>
</tr>
<tr>
<td>Sensor for methane gas IP44</td>
<td>QAG13/A</td>
</tr>
<tr>
<td>Sensor for LPG gas IP44</td>
<td>QAG13.P/A</td>
</tr>
<tr>
<td>Sensor for carbon monoxide (CO) IP44</td>
<td>QAO13/A</td>
</tr>
<tr>
<td>Gas solenoid valves 12V DC</td>
<td>E..D (NC) or E..E (NO)</td>
</tr>
<tr>
<td>Gas solenoid valves 230V AC</td>
<td>E..D-AC (NC) or E..E-AC (NO)</td>
</tr>
</tbody>
</table>
Mounting

LYC11

The LYC11 can be installed as follows:

A Onto a DIN bar minimum length 120 mm
B Onto a wall using 2 screws
C On panel front end using a DIN bar minimum length 150 mm
  and 2 hex spacers 50 mm, screws and washers.

Sensor QA..13

In a position exposed to natural air circulation. Never close to suction grids, openings
  towards building outside or in place subject to water jets and anyhow near possible gas
  leak places. Besides:

QAG13/A: High, at about 30cm (1 ft) from the ceiling, for light gas detection like
  methane (CH4) or town gas.

QAG13.P/A: Low, at about 30cm (1 ft) from the floor, for heavy gas detection like LPG
  (Propane, Butane, etc.).

QAO13/A: At about 1.5m (5 ft) from the floor, for detection of carbon monoxide (CO)
  with density similar to air.

Respect the correct mount orientation in order to
  ensure the normal convection air flow inside the
  sensor.

Check that environmental specifications of the installation place are compatible with the
  values listed on technical data.

Wiring

It is possible to use common electric cables. However, when installing in places exposed
  to high electromagnetic fields, use of shielded cables is recommended.

The LYC11 must be powered at 24VAC.

There is no protection against accidental connection with 230V on the 24V side.
Use double-insulation safety transformers; they should be sized for continuous operation
  at rated power (please refer to technical data).

As a general rule:

Comply with local regulation about wiring. The device should be directly connected to
  mains and be permanently powered up. Check that sensor QA..13/A is compatible with
  the gas type to be detected and make certain that connected solenoid valve is compatible
  with the control unit.
Case

The control unit is included in a case suitable for mounting on a DIN bar and a processing and control PCB.

1. Terminal for 12V battery
2. Battery protection fuse T3.15A
3. LEDs for control unit, valve and sensor status
   For complete functionality please refer to functional table
4. Terminal for sensor QA..13/A
5. Terminal for 24VAC power supply
6. VALVE MODE Jumper for operating mode selection of EV output
   (active only with VALVE TYPE jumper = NO)
   - CONT = continuous
   - PULSE = impulse (1 impulse every 10s)
7. VALVE TYPE Jumper for solenoid valve type selection
   - NC = Normally Closed
   - NO = Normally Open
8. LED test button
9. OUTPUT test button
10. RESET button
11. Terminal for 12VDC 13W max solenoid valve
12. Terminal for SPDT relay output

Commissioning

Please carefully read and follow enclosed instructions and retain them with the equipment for any future need.

The control unit and sensor are monitoring equipment, so they must not be tempered:
never touch the sensor or electronics.

LED TEST button = temporarily turns all LEDs ON in order to check their integrity.

OUTPUT TEST button = if pressed for at least 5s, starting from normal operating condition, temporarily activates all outputs (valve + relay) in order to check regular operation of intervention and signal devices.

Jumper Setup

Set JP2 jumper VALVE TYPE to NC for normally closed valve type E..D (delivery condition) or to NO for normally open valve type E..E.

Set JP3 jumper VALVE MODE only in case of normally open valve use.
CONT position allows to set EV output constantly powered in case of gas alarm, while PULSE position allows to set it powered by impulses at 10s intervals.
Every change of jumper setup should be made under power off. Alternatively, if change is made under power on conditions, the control unit must be powered off for at least 5s.

If no Intelligas valve should be connected to EV output, insert a valve termination Rv 1.8Kohm 1/2W (supplied with the equipment) in the EV terminal. This will avoid any wrong valve fault signal.

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**Operation**

After powering up (24V AC) the control unit LYC11 carries out these phases in sequence:

1. **Sensor preheating phase.** During this phase, about 1min, the detection system is not operational. Moreover, it is not possible to open the solenoid valve if normally closed, while it is possible to if normally open.

2. **TEST phase.** During this phase, about 3min, all internal timers are zeroed in order to facilitate sensor test (alarm simulation).

3. **Normal operation phase.** This is the normal operating phase of the control unit while both gas alarm monitoring and self test for plant faults (sensor and valve) and system faults (control unit) are active.

In presence of dangerous gas or carbon monoxide concentrations control unit LYC11 enters gas alarm phase and carries out these operations:

- Closes the gas cut-off solenoid valve and avoids it can be open again until alarm condition is true. Closing is made as follows:
  - NC Valve type = voltage cut-off from EV terminals
  - NO Valve type = voltage feed to EV terminals, by impulses or continuously (please refer to VALVE MODE jumper),
- Activates flashing of red alarm LED
- Activates auxiliary devices (if connected to the relay)

Once gas alarm condition is passed the control unit must be reset to normal operation. Press RESET button on front side: the control unit carries out the following operations:

- makes possible manual opening of cut-off valve
- deactivates flashing of red alarm LED that turns steady on
- deactivates auxiliary devices (if connected to the relay)

At any moment, starting from normal operating condition, it is possible to activate again TEST phase by pressing RESET button for at least 5s.

**Note:**
Return to normal operating condition by pressing RESET button is possible only if there are no active alarms.

**WARNING:**
The sensor must be replaced within the 5th year from installation date
## LYC11 Functional table

<table>
<thead>
<tr>
<th>FUNCTIONS</th>
<th>GREEN LED</th>
<th>YELLOW LED</th>
<th>RED LED</th>
<th>EV output (NC valve)</th>
<th>RELAY output</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor preheat phase</td>
<td>Flash (1Hz)</td>
<td>ON</td>
<td>ON</td>
<td>Voltage absence</td>
<td>De-energized</td>
</tr>
<tr>
<td>TEST phase</td>
<td>Flash (2Hz)</td>
<td>ON</td>
<td>ON</td>
<td>Voltage presence</td>
<td>Energized</td>
</tr>
<tr>
<td>Normal operation</td>
<td>ON</td>
<td>ON</td>
<td>ON</td>
<td>Voltage presence</td>
<td>Energized</td>
</tr>
<tr>
<td>Gas alarm</td>
<td>ON</td>
<td>ON</td>
<td>Flash (1Hz)</td>
<td>Voltage absence</td>
<td>De-energized</td>
</tr>
<tr>
<td>Valve fault (*)</td>
<td>ON</td>
<td>Flash (1Hz)</td>
<td>OFF</td>
<td>Voltage absence</td>
<td>De-energized</td>
</tr>
<tr>
<td>Sensor fault</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>Voltage absence</td>
<td>De-energized</td>
</tr>
<tr>
<td>General fault</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
<td>Voltage absence</td>
<td>De-energized</td>
</tr>
</tbody>
</table>

(*) Valve fault is detected by short circuit (normally closed valve), and by open circuit (normally open valve).

The simultaneousness of two or more events causes a combined management of LEDs and outputs according to a given priority.

An alarm or fault condition during test phase (3 min) causes flashing of the relevant red or yellow LED at 2Hz frequency instead of 1 Hz as indicated in function table. This latter will be valid for events starting from normal operating condition.

### Environmental compatibility and disposal

This product was developed and manufactured using materials and processes which take full account of environmental issues and which comply with our environmental standards. Please note the following for disposal at the end of the product life, or in the event of its replacement:

- For disposal, this product is defined as waste from electrical and electronic equipment ("electronic waste"); do not dispose of it as household waste. This applies particularly to the PCB assembly.
- Always use the most environmentally compatible method of disposal, in line with the state-of-the-art technology in environmental protection, recycling, and waste management.

**Observe all current local laws and regulations.**

- Always aim for maximum re-use of the basic materials at minimum environmental stress. Observe any notes on materials and disposal that may be attached to individual components.
- Use local depots and waste management companies, or refer to your supplier or manufacturer to return used products or to obtain further information on environmental compatibility and waste disposal.

### Shipping case

The LYC11 shipping case can be recycled. Retain it for future use or in case of product return to the manufacturer.
## Hints for design

Respect current regulations for wiring. The devices should be directly connected to mains (that is with no switches, etc.) and be permanently powered up.

The positive logic operation of internal relay means an always energized contact (C-NC open) in no alarm and/or fault condition.

**EV control output is solid state type and is sized for an INTELLIGAS® solenoid valve with 13W maximum absorbed power. It is not to be used to drive solenoid valves with higher power consumption.**

## Ordering

Indicate control unit number and sensor corresponding to the gas type to be detected

<table>
<thead>
<tr>
<th>Control Unit</th>
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<tr>
<td>LYC11</td>
<td>Gas detection control unit for 1 sensor</td>
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<tr>
<td>QAG13/A</td>
<td>Sensor IP44 for Methane detection (CH4)</td>
</tr>
<tr>
<td>QAG13.P/A</td>
<td>Sensor IP44 LPG detection</td>
</tr>
<tr>
<td>QAO13/A</td>
<td>Sensor IP44 for carbon monoxide (CO) detection</td>
</tr>
</tbody>
</table>

## Technical data

**Control unit LYC11**

- **Power supply voltage**: 24VAC +/-10%
- **Frequency**: 50 Hz
- **Power consumption**: 21VA max (with battery under charge)
- **Control Outputs**
  - electronic 12V DC (13W max)
  - SPDT Relay 250V 5(3)A
- **Operation Logic**: Positive (normally energized relay, de-energizes in case of alarm and/or fault)
- **Type of controlled solenoid valve**:
  - normally closed type E..D / E...DFL
  - normally open type E...E
- **Connections length**
  - 80m max (sensor and NO solenoid valve)
  - 40m max (NC solenoid valve)
- **Cable cross section**: 1.5mm² min (sensor and solenoid valve)
- **Connectable sensor**: 1 (type QA..13/A)
- **Optical indications**
  - Green LED (power presence / TEST)
  - Yellow LED (control unit / solenoid valve / sensor fault)
  - Red LED (gas alarm)
- **Timers**: 3s between alarm acknowledgement from sensor and solenoid valve, relay output and relevant LED activation.
- **Allowed room temperature**
  - 0…+50°C (operation)
  - -20…+70°C (transport and storage)
- **Allowed room humidity**: 20…90% R.H. non condensing
- **Case**: PC polycarbonate
- **Protection**: IP20 – EN60529
- **Dimensions**: 130 x 106 x 56.5 mm
- **Compliance**:
  - Low voltage 73/23 CEE
  - Electromagnetic Compatibility 89/336 CEE
  - EN60335-1
  - EN50270
Sensor QA..13/A
Sensing element        Tin dioxide semiconductor
Case                  Self-extinguishing ABS
Protection degree     IP44 if correctly installed
Allowed room temperature
  0…50°C (operation)
  -20…+70°C (transport and storage)
Allowed room humidity  30…90% R.H. non condensing
Alarm threshold       QAG13/A= 10000ppm methane (20% LEL)
                       QAG13.P/A= 3700ppm LPG (20% LEL)
                       QAO13/A= 200ppm CO
Sensors Average Lifetime 5 years from installation date
Sensor covered surface About 40m² (indicative)

Built-in relay
Operation             Positive Logic (normally energized).
                      De-energizes in case of alarm / fault
Contact               Changeover, voltage free 250VAC 5(3)A

Built-in battery charger
Charge voltage        13.8VDC
Charge current        0.5A max
Battery protection fuse T3.15A 250V 5x20
Connectable Battery   12V 4-6 Ah (not supplied by Siemens)
Buffer charge with automatic intervention current limit

Wiring diagrams
Diagram 1: Control unit LYC11 with sensor QA..13/A and 12V DC solenoid valve type E..D. 12V buffer battery. Optional control of signal lamps and air extractors.

Symbols:
N1 = Control unit LYC11
B1 = Sensor QA..13/A
Y1 = Intelligas solenoid valve NC 12VDC type E..D / E…DFL
V1 = 12V 4-6Ah Battery

Options:
M1 = air extractor
L1 = signal lamp
Diagram 2: Control unit LYC11 with sensor QA..13/A and 230V AC solenoid valve type E..D-AC. Optional control for signal lamp

Symbols:
- N1 = Control unit LYC11
- B1 = Sensor QA..13/A
- Y1 = Intelligas solenoid valve NC 230VAC type E..D-AC / E..DFL-AC
- Rv = EV termination resistor

Options
- L1 = 230VAC signal lamp

Note:
The termination resistor (Rv = 1.8Kohm 1/2W) is to be inserted between EV terminals only if that output is not used

Dimensions

Dimensions in mm

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Subject to modifications