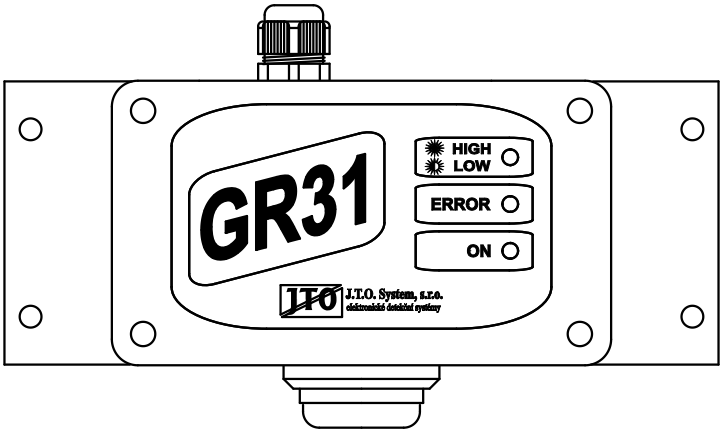
Stationary detector GR31

Technical terms and instructions

- Stationary electronic apparatus for the detection of flammable gases or vapours
- Part of industrial and commercial gas detection applications
- Applications ranging from control stations to various warehouses and process plants
- Designed for explosion hazardous areas ZONE 2
- Protection Ⓔx II 3G Ex db ec ic IIC T5 Gc
- Two detection stages with separate outputs
- Possibility to connect to a current loop
- Certification according to EN 60079–29–1
- Safety integrity SIL 1



GR31 detectors are designed to detect explosive gases and vapors of flammable substances in indoor spaces such as boilers, process plants and facilities for converting cars to LPG, where ZONA2 environment is specified. Detectors use sensor operating on the absorption principle of infrared radiation to measure the gas concentration. The signal from the sensor is evaluated in the detector electronics, which controls the state of the detector outputs and signal lights.

GR31 detectors are working without central unit. Adjusting elements are on the electronic board of the detector. Supervision of setting limits is implemented in electronics. The result is the two-state signal of excess (or overrun) set concentration. When connected to a control system user can use the output current loop, which sends a signal proportional to the sensed concentration. Exceeding preset limits of concentration is indicated visually by light on the lid of the box.¡br¿ GR31 detectors

can be used either separately (for smaller spaces security) or in the group connection of multiple units in larger buildings. Detectors can be connected to the so-called parallel bus (see below) in group connection. Electronic identification which detector triggered the actual response is not possible in this scheme. Another option is to connect detectors to the control system individual directly through either of two-state inputs or via the current loop.

Technical parameters

Parametry zařízení

Detectable gas	flammable hydrocarbon gases and vapors of explosive substances - only one calibration gas (standard calibration - methane)
Signaling	two-stage (two outputs) + current loop
Type of outputs	transistor with open collector (60 V / 0,3 A) passive 4–20 mA current loop
Warm-up Time	1 minute
Alarm signal (other settings can be agreed with the customer)	20% LEL for level II (0,88% methane according to EN 60079–20–1) and 10% LEL for level I (0,44% methane according to EN 60079–20–1)
Max. measuring range	to about 50% LEL (depending on the substance type)
Response Time	30 sec
Supply Voltage	12 V to 33 V =
Power Consumption	0,8 W max *
Protection	Ex II 3G Ex db ec ic IIC T5 Gc
Cover	IP42 sensor / electronics IP65
Weight	approximately 250 g
Working environment	0 to 50°C, 0 to 95 % RH the ambient pressure 90 to 110 kPa, BE3N2 – ZONA2 (IIC T6)
Storage temperature	-25 to 60°C / without condensing humidity
Dimensions without bracket	115x104x50 mm
Detector connection	multi-core (4) cable min. diameter 5mm, for distance > 5m use shielded type, 0.5 - 1.5 mm^2 core diameter, maximum length 30 m
Designed according to	IEC 60079-29-1, IEC 60079-15

The IP level of protection does not mean that the device will detect gas when and after exposure to these conditions, if the device is exposed to conditions representing the IP level of protection it is necessary to dry the device and perform a calibration test.

Detector placement

When placing detectors in objects, we recommend to follow EN 60079–29–2, which describes *Selection, installation, use and maintenance of flammable gas and oxygen detectors.*

Omezení použitelnosti

The GR31 detector is designed to detect the presence of flammable gas in a standard atmosphere. At high or very low pressures and in the presence of other chemicals in the air, the correct detection is not guaranteed. For example, the presence of hydrogen sulfide will affect the lifetime of the sensor. Possible applications in environment must be consulted with the manufacturer. Particularly in environments where the monitored heavy hydrocarbon substances (such as oil vapours) may evaporate into the monitored atmosphere. deposition of these vapours in the sensor and thus significantly shorten the lifetime of the sensor.

The product is designed for installation in environments with pollution level 2 or better according to EN 60664–1.

The GR31 detector must be protected from direct ultraviolet (UV) radiation during operation and storage. UV radiation sources (e.g. natural sources such as the sun or artificial sources such as some fluorescent lamps and lamps) a shielding baffle preferably of metallic material must be inserted so that the radiation on the detector the detector.

In dusty environments, it is necessary to take into account the prolongation of the reaction time in the presence of dust on the the detector sensor surface.

Function description

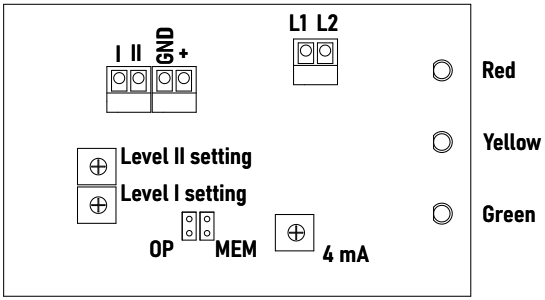
The GR31 detector uses a sensor to detect the attenuation of infrared radiation in hydrocarbon gas. These sensors are non-selective, reacting in the presence of any hydrocarbon flammable substance in the air. In general, a larger and more complex molecule will elicit a higher response. At the factory, the detector is set to the desired concentration of a particular gas.

When the supply voltage is applied, indicated by a green light, the sensor is not yet stabilized and the stabilization phase begins. During the stabilisation phase (for 1 minute) the detector does not react to the presence of gas. This condition is indicated by a flashing yellow light.

After the sensor has stabilized, the yellow light goes out and the detector is ready for operation. When the set gas concentration is present, the corresponding output changes its state (according to the setting of the corresponding switches - see below). Correct operation of the internal electronics is signalled by a short extinction of the green light within 15 sec.

Connecting the detector

The detector is connected to the detection system via wires connected to the terminal block on the electronics board. The detector always requires a power supply connection for proper operation. In case of the possibility of surges, a means for limiting the voltage to a maximum of 36 V must be included in the detector leads. The outputs can be connected as required.



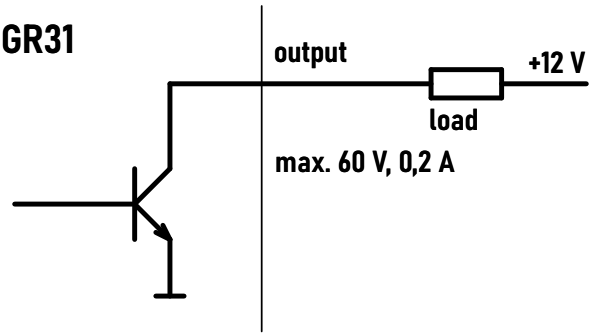
Marking	Signal – use and meaning
+	Positive pole of the detector supply voltage. To power the detector the output voltage from the supervisory control system can be used to power the detector or from the NZ425, NZ425–DIN or NZ34, NZ34–DIN power supply. It is recommended to use protection surge protectors on the power supply to the system.
GND	Common wire (ground). Wire with reference potential for power and output signals.
II	Second level output. Switches when concentration exceeds set by Trimmer II or when a fault occurs at the sensor. Quiescent state (on/off) can be set with the **OP** jumper.
I	First level output. Switches on when the concentration exceeds set by trimmer I.
L1, L2	4–20 mA current loop output terminals. The terminals are mutually interchangeable.

Connecting outputs

Outputs II and I

Outputs II and I are used to signal exceeding the concentration II and I set levels respectively. Both outputs II, I are connected as an open-collector transistor, i.e. they switch the load connected against + the supply voltage. The terminals are connected directly to the output transistor, there are no other additional transistor protection circuits on the board. When switching e.g. inductive loads, it is necessary to use an external protection elements.

Example of a resistive load with 12 V power supply:



For output II, a jumper is available on the electronics board to select the quiescent state of the output transistor.

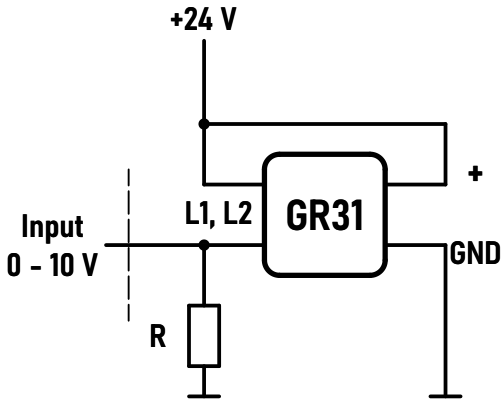
Jumper **OP** is not installed	Output transistor is disconnected in the clip - it does not conduct current (detector is without no failure and the set concentration level is not exceeded).
The **OP** jumper is on	the output transistor is quietly connected - conducting current (power supply is OK, detector without fault and the set concentration level is not exceeded).

During the stabilization period after the detector is switched on, both outputs are not active, i.e. they do not signal for this period presence of gas in the air for this period.

Outputs L1 and L2

The signal from the sensor can be processed in a superordinate system such as the NZ425 (NZ425–DIN) and the concentration exceeded can be decided at another location. The analog output is represented by a passive 4–20 mA current loop at L1 and L2 terminals. Both terminals are interchangeable, the positive terminal can be connected to either of them. In the quiescent state, 4 mA passes through the terminals, with increasing gas concentration the current increases. Terminals L1 and L2 are galvanically isolated from the remaining detector terminals to form a passive current sensor. However, power must be applied to the + and GND terminals.

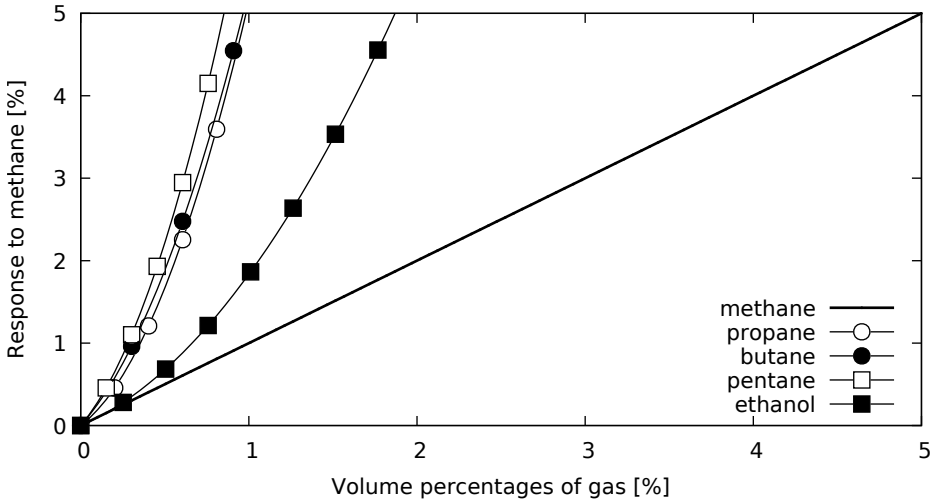
The sensor is wired into the system as a conventional 4- to 20 mA two-wire converter. To control systems with inputs prepared for current transducers can usually be connected directly. Where the control system has only voltage inputs available, a current detector loop after completing the circuit with a suitable resistor.



The resistance value of the resistor must be determined using Ohm's law. For example, for voltage inputs 0 to 10 V, a resistor of 500 Ω is suitable (can be assembled in parallel from 2 pieces of 1 kΩ). When using an additional When using an additional resistor, the voltage drop across the resistor must be taken into account.

The output values of the loop current must always be calibrated in the memory of the control system. At The following figure shows a typical dependence of the sensor output signal on concentration for some gases.

If the output current is less than 3.5 mA, a device error is indicated. The response time is determined by the response time of all parts of the system.



Controls and signalling elements

For controlling the detector functions and signalling its status there are a few control elements.

Trimmer for setting the monitored gas concentration I and II

Trimmer is used to adjust the monitored gas concentration level for each stage. Each stage has a separate trimmer. Turning the trimmer towards the terminal block sets the higher gas concentration.

Trimmer setting the resting level of the 4 mA current loop

The trimmer marked 4 mA can be used to set the resting level of the L1-L2 current loop. When fully clean ambient air, a 4.00 mA reference mA meter is used to set the value of 4.00 mA flowing loop.

Output Function Selection Connections II

The function of the output II switching transistor can be affected by two shorting jumpers. Jumper **OP** determines the quiescent state of the switching transistor and its function has been described above.

The second jumper **MEM** allows to set the memory function on output II. When the jumper is deployed the output will indicate the presence of gas even after the gas concentration falls below the set level. This condition can only be cancelled by switching off the supply voltage or removing the jumper **MEM**. If the jumper is not fitted, the output monitors the current exceedance or non-exceedance status concentration. The memory state is indicated by the flashing of the red light in a 1:7 ratio.

Signaling Lights

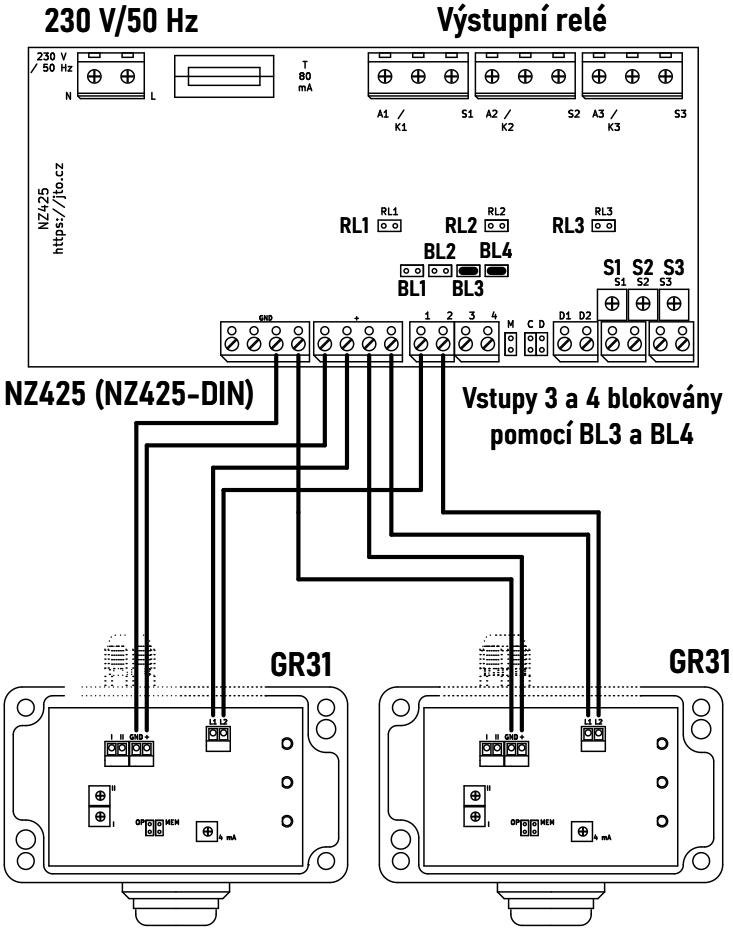
The detector status is visually indicated by 3 LEDs.

Green	Detector on, power supply present.
Yellow	Sensor stabilization after power-up or sensor fault
Red - flashing 1:1	Exceeding set concentration for stage I.
Red - lit	Exceeding the set concentration for stage II or sensor fault
Red - flashing 1:7	Stage II has been exceeded but concentration has already dropped (memory condition)

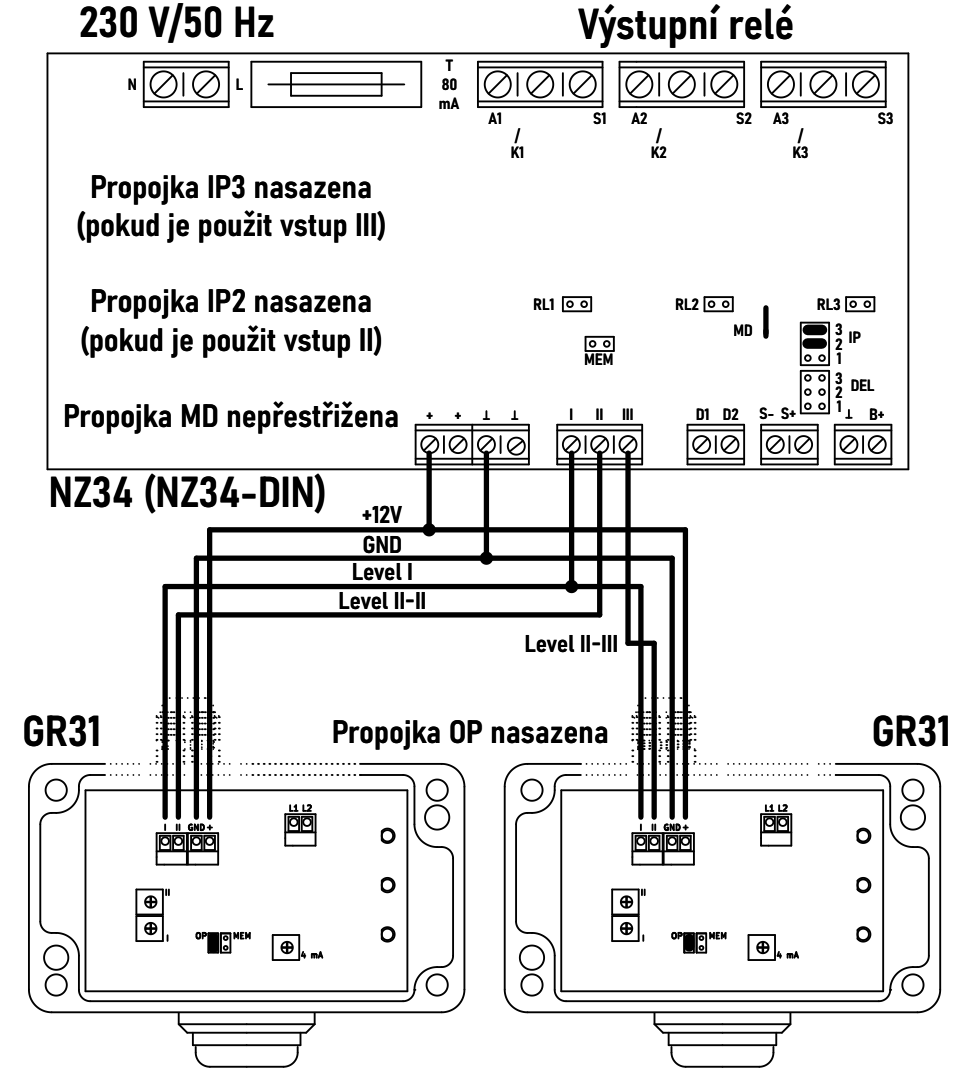
Příklad zapojení

Wiring example

The following figure shows an example of a simple setup for monitoring two different locations. They are Two detectors are used together with an NZ425 power supply (NZ425–DIN). The detectors are connected by a current loop. When the concentration set by the trimmers of the NZ425 is exceeded, the corresponding relay is switched. The relay outputs are can be used to control actuators according to the needs of the application.



The second example to connect two detectors to the NZ34 source (NZ34–DIN) using outputs I and II. Three signal wires (+12V, GND, I) are connected in parallel. The II outputs of the detectors are routed to separate inputs of the power supply. Each of the detectors thus has a separate indicator in the power supply to signal an overshoot the second concentration level. In this configuration, it is recommended to set both the source and detectors to the opposite polarity of the stage II output signal (in the ON position). The relay outputs are can be used to control actuators according to the needs of the application.



Installation and inspection of GR31 detectors

Mounting procedure

1. Screw the detector into the designated place using the screws through the holes in the metal bracket. The recommended position (due to dust) is sensor down. However, the detector can be operated in any position. The place where the detector is located must not be damp and contamination of the sensor must be avoided. of the detector by any substances (e.g. oil, petrol, paint, solvent vapours, etc.).

2. Unscrew the top cover of the detector.

3. Before connecting, check the size of the supply voltage and the load connected to the detector. For example. by measuring the magnitude of the connected voltage with a voltmeter against the GND wire with the load activated and with an ammeter connected against GND, the amount of current flowing through the load.

4. Pass the cable with the connecting wires through the loose grommet. Connect the individual signals terminals as shown (without voltage) and tighten the grommet tightly.

5. Screw on the detector cover.

6. Turn on the power supply. The green light will come on when the detector is working properly. The yellow LED flashes for 1 minute after switching on. When the detector is ready for operation, the yellow LED goes off. Then perform a functional check.

Detector GR31 control
When checking the detector, it is necessary to ensure stable conditions under which the check is carried out. For the detector must be switched on for at least 15 minutes before the check is carried out. For checking, it is advisable to switch off the memory with the MEM jumper. The detector can be checked as follows in the following way:
Functional check
This check determines whether the detector reacts to the presence of a flammable substance in the air. To check the test vial supplied for checking detectors by J.T.O. System, s.r.o. Approach the detector sensor with an open test vial containing the test substance (ensure that the liquid does not leak into the sensor!). Within approx. 1 minute, both detector stages must activate and the following response of the entire system.

A functional test preparation can also be easily created. Place a suitable container into the foam or cotton wool, which is moistened with pure or technical alcohol. The pairs coming out of the charges will then trigger a detector response when

approached.

Calibration gas check

To control the monitored levels, it is necessary to provide a calibration gas mixture with the required concentration or to create (mix) the required concentration in the enclosed space around the sensor. The calibration gas must have the required concentration mixed in synthetic air. Concentration of the calibration gas must be in the range of 10% to 50% LFL (depending on the substance used).

Calibration progress:

1. In the detector, disable the memory setup jumper – MEM.
2. Apply the required concentration to the gas sensor for the first stage level and leave it for at least one minute. If gas in a pressure cylinder with a pressure-reducing valve, it is necessary to ensure that the sensor is not affected by the strong gas flow. The recommended flow rate of the gas mixture is 0.5 l/min (this corresponds to a very gentle breeze). It is advisable to use an extension to ensure that the gas mixture is dispersed around the the sensor and does not cause the sensor to be affected by draughts. The extension must have holes for drainage excess gas.
3. Allow the gas to act on the sensor for at least 1 minute and adjust the trimmer for the first level the state where the detector output is switching.
4. Similarly set the output of the second level for a higher gas concentration.
5. When checking (calibrating) the current loop, the desired concentration is applied to the detector sensor. of calibration gas and checks the settling time of the output. After settling, this level is set in the downstream system.
6. After checking, the detector must be allowed to air out in clean air for at least 5 minutes.

If a current loop is used for gas sensing, the calibration gas must be supplied after the corresponding current values are stored in the control system memory.

Unless otherwise specified in the standard, it is recommended to check the detector with a calibration gas at least once a year. For more demanding environments and higher detector loads (more frequent leaks gas, higher humidity, temperature, etc.) it is advisable to check the detector twice a year. The frequency of functional checks can be determined according to the specific use and operation of the detector, e.g. once every 1 to 2 months.

What to do if...

The device was exposed to a high concentration of gas

If the sensor has been exposed to a high concentration of gas for an extended period

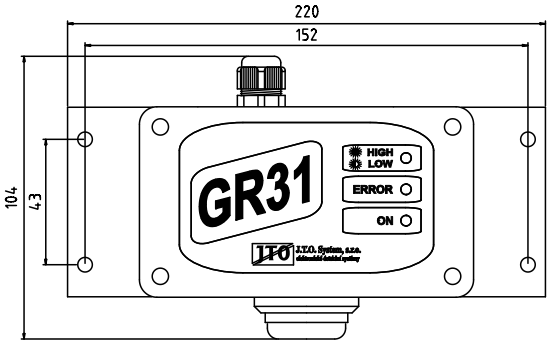
of time, perform a new calibration check.

Unknown malfunction occurred

If a fault occurs for which you do not know the solution, contact the technical manufacturer's technical support.

Detector accessories and mechanical dimensions

The detector is supplied with a test tube and a metal mounting bracket.



Storage and service

Detectors should be stored for the necessary period of time under the above conditions conditions. If the detectors are not exposed to any chemicals during storage, they will not be damaged. However, during storage period of time for the recommended periodic calibration checks. In the case of storage for more than 6 months, it is recommended that the detector be inspected prior to deployment. recalibration. The year of manufacture can be determined from the last 2 digits of the serial number.

If the device is taken out of service, it must be disposed of in an environmentally friendly manner – i.e., to a company authorized to dispose of electrical waste.

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