OPERATING MANUAL
FIBARO MOTION SENSOR
FGMS-001 V2.4

The Fibaro Motion Sensor is a universal Z-Wave multi-sensor. Along with detecting motion the device measures the temperature and light intensity. The sensor has a built-in accelerometer to detect any tampering of the device. The Fibaro Motion Sensor is battery powe-red device and designed to be installed quickly and easily on any surface. The LED indicator signals motion, temperature level, opera-ting mode and can be used to see if device is within the Z-Wave network. The motion sensor can be used for lighting scenes and security monitoring systems.

SPECIFICATIONS

Power Supply:	CR123A battery, 3.6 VDC
EU directive compliance:	LVD 2006/95/WE EMC 2004/108/WE R&TTE 1999/5/WE RoHS II
Recommended installation height:	2,4m
Operational Temperature:	0-40°C
Measured Temperature Range:	-20 to 100°C
Temperature Measuring Accuracy:	0,5°C (within 0°C-40°C range)
Light Intensity Measuring Range:	0-32000 LUX
Radio Protocol:	Z-Wave
Radio Frequency:	869 MHz EU; 908 MHz US; 921 MHz ANZ; 869 MHz RU;
Range:	up to 50 m outdoors up to 30 m indoors (depending on terrain and building structure)

TECHNICAL INFORMATION

- Compatible with any Z-Wave controller.
- Detects motion using a passive IR sensor.
- Measures the temperature.
- Measures the light intensity.
- Easy installation on a wall or any surface.
- Protected against tampering and theft - once vibrations are detected, the notification is sent to the main controller.
- Alarms of movement and temperature are signaled by LED diode blinking.
- Simple earthquake detector mode.

NOTE
Read this manual before attempting to install the device. Failure to observe recommendations included in this manual may be dangerous or cause a violation of the law. The manufacturer, Fibar Group Sp. z o.o., will not be held responsible for any loss or damage resulting from not following the instructions of operating manual.

NOTE
Work within local code height requirements for installation of the Fibaro Smoke Sensor. Take special precautions during installation and use tools and equipment in perfect working order. It's recommended to observe ladders, lifts and other obstacles.

NOTE
When handled carelessly or used in non-specified environment conditions, the device may not function properly. It's highly recommended to take all safety precautions to ensure safety and property protection.

I. GLOSSARY OF TERMS

• **INCLUSION** (adding a device, learning mode) - a device sends the Z-Wave Node Info command frame allowing to add the device to the Fibaro System (Home Center)
• **EXCLUSION** (removing / deleting a device) - removing a device from the Fibaro System.
• **ASSOCIATION** - controling other devices within the Fibaro System
• **MultiChannelAssociation** - controling other multi-channel devices within the Fibaro System.

II. Z-WAVE NETWORK INCLUSION

The Fibaro Motion Sensor can be included into the Z-Wave network by using the B-button.

1) Insert the battery into the Fibaro Motion Sensor. Enclosure lock is marked with a dot. Make sure the device is located within the direct range of the main controller.
2) Set the main controller into the learning mode (see main controller's operating manual).
3) Quickly, triple click the B-button - LED diode will glow blue.
4) Fibaro Motion Sensor will be detected and included in the Z-Wave network.
5) Wait for the main controller to configure the sensor.
6) If necessary, wake up the Motion Sensor by triple clicking the B-button.
7) LED diode will glow blue to confirm the sensor wake up, and then wait for the main controller to configure the sensor.
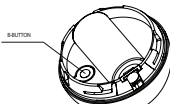

Diagram 1 - B-button.

III. EXCLUDING SENSOR FROM THE Z-WAVE NETWORK

1) Make sure the sensor is connected to power source.
2) Set the main controller into the learn mode (see main controller's operating manual)
3) Quickly, triple click the B-button, located on Fibaro Motion Senso-r's enclosure.
4) LED diode will glow blue confirming the device has been excluded from the network.

IV. SENSOR INSTALLATION

1) Include the device into the Z-Wave network (see p.II). Note that the inclusion process may be performed ONLY in direct range of the main controller.
2) Install the sensor's holder in desired location.
3) If the sensor is already included in the Z-Wave network, wake it up by triple clicking the B-button.
4) Insert the Motion Sensor in its holder.
5) Test the sensor's operation - check whether the LED diode indicates motion detection.
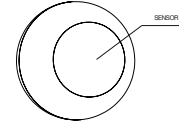6) Test the Z-Wave network assuring the device is within range.
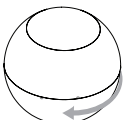

Diagram 2 - Motion detector, light sensor, LED diode.

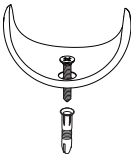Diagram 3 - preparing Fibaro Motion Sensor for operation.
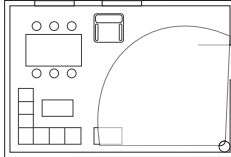

Diagram 4 - Fibaro Motion Sensor installation.

Diagram 5 - Fibaro Motion Sensor's proximity area.

V. DETECTION AREA AND WORKING CONDITIONS

Fibaro Motion Sensor's detection area is shown in diagram #6.
Fibaro Motion Sensor has to be installed in a corner of the room or perpendicularly to the doors.
Actual range of the sensor can be influenced by environment conditions. Should false motion alarms be reported, check for any moving objects within the sensor's detection area, such as trees blowing in the wind, cars passing by, windmills. False motion alarms may be caused by moving masses of air and heat as well. If the device keeps on reporting false alarms, despite eliminating all of the above-mentioned factors, install the device in another place.
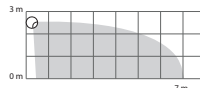

Diagram 6 - Fibaro Motion Sensor's motion detection area.

VI. INSTALLATION NOTES

Fibaro Motion Sensor cannot be pointed at any source of heat (e.g. radiators, fireplaces, cookers, etc.) or at any source of light (direct sunlight, lamps).
It's not recommended to install the motion sensor in places prone to drafts. Sensor can be mounted using screw or the sticker.

VII. RESETTING THE FIBARO MOTION SENSOR

The Fibaro Motion Sensor reset erases the EPROM memory, including all information on the Z-Wave network and the main controller.

Fibaro Motion Sensor reset procedure:
1) Make sure the B-button is held in place.
2) Press and hold the B-button for 4-6 seconds until the LED glows signaling the 2nd menu level.
3) Release the B-button.
4) Again, press the B-button briefly.
Successful reset will be confirmed with the LED changing colour to red and fading.

NOTE
Device reset will not remove it from the Z-Wave network main controller's memory. Before resetting the device, it must be excluded from the Z-Wave network.

VIII. OPERATING WITHIN THE Z-WAVE NETWORK

Fibaro Motion Sensor has a built in motion detector, temperature sensor and light intensity sensor, which make it a multi-channel device. In the Home Center 2 menu it will be presented as three devices, depending on the main controller software version.

NOTE
Fibaro Motion Sensor capabilities will vary depending on the Z-Wave network controller. Certain functionalities of the Fibaro Motion Sensor may not be supported by some controllers. To make sure your Z-Wave network controller supports the Fibaro Motion Sensor, get in touch with its manufacturer.

Motion, temperature and light intensity values are presented in Home Center 2 menu with the following icons:

IX. ASSOCIATIONS

By using association with Fibaro's devices the Fibaro Motion Sensor may control another Z-Wave network device, e.g. a Dimmer, Relay Switch, Roller Shutter, RGBW Controller, Wall Plug, or a scene (scene only through the Home Center 2 main controller).

NOTE
Association allows for direct communication between Z-Wave network devices. Main controller does not take part in such communication. Using this mechanism, Fibaro Motion Sensor may communicate with other devices even when the main controller is damaged, e.g. in case of a fire.

Fibaro Motion Sensor allows for the association of three groups.
1st Association Group is assigned to the device status - sending the BASIC SET control frame to the associated devices having detected motion.
2nd Association Group is assigned to the tamper alarm. Alarm frame will be sent to the associated devices once tampering is detected.
3rd Association Group reports the device status and allows for assigning a single device only (the main controller by default - the device reports its status to the main controller). It's not recommen-ded to modify this association group.

The Fibaro Motion Sensor allows for controling 5 regular and 5 multichannel devices per an association group, out of which 1 field is reserved for the Z-Wave network main controller.

X. EARTHQUAKE DETECTOR MODE

Fibaro Motion Sensor can be configured to work as a simple earthquake detector, by setting the Parameter 24 value to 4. Reports with scale of the vibrations (dimensionless) will be sent at the time intervals specified in Parameter 22. First report will be sent immediately after vibrations have been detected. The minimum value of the vibrations, resulting in report being sent, can be defined in Parameter 20. Once the vibrations cease, reports will stop being sent. The Home Center 2 menu presents the earthquake detector measurements in the following way:

XI. SENSOR'S ORIENTATION IN SPACE

The Fibaro Motion Sensor has a built-in accelerometer. When the value of parameter 24 is set to 2 or 3, Z-Wave networc controller will be informed on the Sensor's orientation in space.

XII. LED VISUAL INDICATORS AND SETTINGS

The Fibaro Motion Sensor is equipped with a LED diode for indicating sensor's operating modes and alarms. In addition the LED indicator may inform of the Z-Wave network range and the current temperature.

LED indicator modes:
1) Motion Alarm's colour will vary depending on the temperature. The colour and the signaling mode can be set in parameter 80.
2) Tamper alarm is signaled with an alternating blinking in red - blue - white.
3) The Z-Wave Node Info command frame is signaled with glowing in blue. Node Info command frame is sent each time the device wakes up.

To enter MENU press and hold the B-button for 3 seconds. MENU levels will be signaled with the LED colours:
- VIOLET - Z-Wave network range tester
- YELLOW - sensor reset.

XIII. Z-WAVE RANGE TEST

The Fibaro Motion Sensor has a built in Z-Wave network main controller's range tester. Follow the below instructions to test the main controller's range:

1) Press and hold the B-button for 2 to 4 seconds until the LED glows violet.
2) Release the B-button.
3) Press the B-button again, briefly.
4) LED will indicate the Z-Wave network's range (range signaling modes described below).
5) To exit Z-Wave range test, press the B-button briefly.

Z-Wave range tester signaling modes:
LED indicator pulsing green - Fibaro Motion Sensor attempts to extablish a direct communication with the main controller. If a direct communication attempt fails, sensor will try to establish a routed communication, through other modules, which will be signaled by LED indicator pulsing yellow.
LED indicator glowing green - Fibaro Motion Sensor communica-tes with the main controller directly.
LED indicator pulsing yellow - Fibaro Motion Sensor tries to establish a routed communication with the main controller through other modules (repeaters).
LED indicator glowing yellow - Fibaro Motion Sensor communica-tes with the main controller through the other modules. After 2 seconds the sensor will retry to establish a direct communication with the main controller, which will be signaled with LED blinking in green.
LED indicator pulsing violet - Fibaro Motion Sensor does communicate at the maximum distance of the Z-Wave network. It's not recommended to use the sensor at the range limit.
LED indicator glowing red - Fibaro Motion Sensor is not able to connect to the main controller directly or through another Z-Wave network device (repeater).

XIV. BATTERY USAGE TIPS

The Fibaro Motion Sensor's battery life is approximately 2 years at factory default settings. The current battery level is displayed in a Home Center 2 interface. Red battery icon means the battery needs replacement. In order to avoid tamper detection while replacing the battery, remove association of the 2-nd association group and reduce tamper sensitivity (parameter 20 value set to 0). If battery discharges quickly, please check for the following conditions which may result in reducing the battery life:
- Wake up interval is too short - it's recommended to lengthen the interval.
- Temperature and light intensity reports are sent too frequently - modify the advanced configuration settings to decrease the frequency.
- If associated devices or the Z-Wave network main controller are disconnected from the power source it will cause the sensor to frequently attempt to reconnect to those devices which will result in shortening the battery life.

NOTE
The Fibaro Motion Sensor is a battery-powered device. Using batteries other than specified may result in explosion. Dispose of properly, observing environmental protection rules.

NOTE
The Fibaro Motion Sensor features remote software updates. The functionality is supported by the Fibaro Home Center 2 and may not be supported by other controllers. During the software update process, the sensor does NOT support alarm functions.

WAKE UP INTERVAL

At each wake up the Fibaro Motion Sensor communicates with the main controller, updates parameter settings and the software if necessary. The Motion Sensor will wake up at a defined time interval and will ALWAYS try to communicate with the main controller

Wake Up Interval set to 0 cancels the WAKE UP command frame, i.e. the device will have to be woke up manually, through the B button, sending NODE INFO command frame.

Available settings: 0-65535 (0-65535 seconds).
Default setting: 7200 (7200 seconds).
Parameter size: 2 [bytes]

> **NOTE**
> It's not recommended to set the value of Wake Up interval below 10 seconds. Short wake up interval may shorten the battery life and delay the reports or even make them impossible.

1. MOTION SENSOR'S SENSITIVITY
The lower the value, the more sensitive the PIR sensor.
Available settings: 8 - 255
Default setting: 10
Parameter size: 1 [byte]

2. MOTION SENSOR'S BLIND TIME (INSENSITIVITY)
Period of time through which the PIR sensor is "blind" (insensitive) to motion. After this time period the PIR sensor will be again able to detect motion. The longer the insensitivity period, the longer the battery life. If the sensor is required to detect motion quickly, the time period may be shortened. The time of insensitivity should be shorter that the time period set in parameter 6.
Available settings: 0 - 15
Formula to calculate the time: time [s] = 0.5 x (value + 1)
Default setting: 15 (8 seconds)
Parameter size: 1 [byte]

3. PIR sensor's "PULSE COUNTER"
Sets the number of moves required for the PIR sensor to report motion. The lower the value, the less sensitive the PIR sensor. It's not recommended to modify this parameter settings.
Available settings: 0 - 3
Formula to calculate the number of pulses: pulses = (value + 1)
Default setting: 1 (2 pulses)
Parameter size: 1 [byte]

4. PIR sensor's "WINDOW TIME"
Period of time during which the number of moves set in parameter 3 must be detected in order for the PIR sensor to report motion. The higher the value, the more sensitive the PIR sensor. It's not recommended to modify this parameter setting.
Available settings: 0 - 3
Formula to calculate the time: time [s] = 4 x (value + 1)
Default setting: 2 (12 seconds)
Parameter size: 1 [byte]

6. MOTION ALARM CANCELLATION DELAY
Motion alarm will be cancelled in the main controller and the associated devices after the period of time set in this parameter. Any motion detected during the cancellation delay time countdown will result in the countdown being restarted. In case of small values, below 10 seconds, the value of parameter 2 must be modified (PIR sensor's "Blind Time").
Available settings: 1 - 65535
Default setting: 30 (30 seconds)
Parameter size: 2 [bytes]

8. PIR SENSOR OPERATING MODE
The parameter determines the part of day in which the PIR sensor will be active. This parameter influences only the motion reports and associations. Tamper, light intensity and temperature measurements will be still active, regardless of this parameter settings.
0 - PIR sensor always active
1 - PIR sensor active during the day only
2 - PIR sensor active during the night only.
Default setting: 0
Parameter size: 1 [byte]

9. NIGHT / DAY
The parameter defines the difference between night and day, in terms of light intensity, used in parameter 8.
Available settings: 1 - 65535
Default setting: 200 (200 lux)
Parameter size: 2 [bytes]

12. BASIC COMMAND CLASS FRAMES CONFIGURATION
The parameter determines the command frames sent in 1-st association group, assigned to PIR sensor.
0 - BASIC ON and BASIC OFF command frames sent in Basic Command Class.
1 - only the BASIC ON command frame sent in Basic Command Class.

2 - only the BASIC OFF command frame sent in Basic CommandClass.
Values of BASIC ON and BASIC OFF command frames may be modified by dedicated parameters.
Default setting: 0
Parameter size: 1 [byte]

14. BASIC ON command frame value
The value of 255 allows to turn ON a device. In case of the Dimmer, the value of 255 means turning ON at the last memorized state, e.g. the Dimmer turned ON at 30% and turned OFF using the value of 255, and then turned OFF, will be turned ON at 30%, i.e. the last memorized state.
Available settings: 0 - 255
Default setting: 255
Parameter size: 1 [byte]

16. BASIC OFF command frame value
The command frame sent at the moment of motion alarm cancellation, after the cancellation delay time, specified in parameter 6, has passed.
The value of 0 allows to turn a device OFF while the value of 255 allows to turn ON a device. In case of the Dimmer, the value of 255 means turning ON at the last memorized state, e.g. the Dimmer turned ON at 30% and turned OFF using the value of 255, and then turned OFF, will be turned ON at 30%, i.e. the last memorized state.
Available settings: 0 - 255
Default setting: 0
Parameter size: 1 [byte]

20. TAMPER SENSITIVITY
The parameter determines the chages in forces acting on the Fibaro Motion Sensor resulting in tamper alarm beig reported – g-force acceleration.
Available settings: 0 - 122 (0.08 - 2g; multiply by 0.016g; 0 = tamper inactive)
Default setting: 15 (0.224g)
Parameter size: 1 [byte]

22. TAMPER ALARM CANCELLATION DELAY
Time period after which a tamper alarm will be cancelled. Another tampering detected durig the countdown to cancellation will not extend the delay.
Available settings: 1 - 65535
Default setting: 30 (seconds)
Parameter size: 2 [bytes]

24. TAMPER OPERATING MODES
The parameter determines the behaviour of tamper and how it reports.
0 – Tamper alarm is reported in Sensor Alarm command class / Cancellation is not reported.
1 – Tamper alarm is reported in Sensor Alarm command class / Cancellation is reported in Sensor Alarm commad class after the time period set in parameter 22 (Tamper Alarm Cancellation Delay)
2 – Tamper alarm is reported in Sensor Alarm command class / Cancellation is not reported.
Sensor's orientation in space is reported in Fibar Commad Class after the time period set in paramer 22.
3 – Tamper alarm is reported in Sensor Alarm command class / Cancellation is reported in Sensor Alarm commad class after the time period set in parameter 22. Sensor's orientation in space is reported in Fibar Commad Class after the time period set in paramer 22.
4 - The maximum level of vibrations recorded in the time period set in parameter 22 is reported. Reports stop being sent when the vibrations cease. The reports are sent in Sensor Alarm command class. Value displayed in the "value" field (0 - 100) depends on the vibrations force. Reports to the association groups are sent using Sensor Alarm command class
Available settings: 0 or 255
Default setting: 0
Parameter size: 1 [byte]

26. TAMPER ALARM BROADCAST MODE
The parameter determines whether the tamper alarm frame will or will not be sent in broadcast mode. Alarm frames sent in broadcast mode may be received by all of the devices within communication range (if they accept such frames).
0 - Tamper alarm is not sent in broadcast mode.
1 - Tamper alarm is sent in broadcast mode.
Default setting: 0
Parameter size: 1 [byte]

40. ILLUMINATION REPORT THRESHOLD
The parameter determines the change in light intensity level resulting in illumination report being sent to the main controller.
Available settings: 0 - 65535 (1 - 65535 lux; 0 = reports are not sent)
Default setting: 200 (200 lux)
Parameter size: 2 [bytes]

42. ILLUMINATION REPORTS INTERVAL
Time interval between consecutive illumination reports. The reports are sent even if there are no changes in the light intensity.
Available settings: 0 - 65535 (1 - 65535 seconds; 0 = reports are not sent)

Default setting: 0 (no reports)
Parameter size: 2 [bytes]

> **NOTE**
> Frequent reports will shorten the battery life. Parameter value under 5 may result in blocking the temperature reports.

60. TEMPERATURE REPORT THRESHOLD
The parameter determines the change in level of temperature resulting in temperature report being sent to the main controller.
Available settings: 0 - 255 (0.1 - 25.5oC; 0 = reports are not sent)
Default setting: 10 (1oC)
Parameter size: 1 [byte]

62. INTERVAL OF TEMPERATURE MEASURING
The parameter determines how often the temperature will be measured. The shorter the time, the more frequently the temperature will be measured, but the battery life will shorten.
Available settings: 0 - 65535 (1 - 65535 seconds; 0 = temperature will not be measured)
Default setting: 900 (900 seconds)
Parameter size: 2 [bytes]

> **NOTE**
> Frequent reports will shorten the battery life. Parameter value under 5 may result in blocking the ilumination reports.

64. TEMPERATURE REPORTS INTERVAL
The parameter determines how often the temperature reports will be sent to the main controller.
Available settings: 0 - 65535 (1 - 65535 sekund; 0 = reports are not sent)
Default setting: 0
Parameter size: 2 [bytes]

66. TEMPERATURE OFFSET
The value to be added to the actual temperature, measured by the sensor (temperature compensation).
Available settings: 0 - 100 (0 to 100oC) or 64536 - 65535 (-100 to -0.10oC)
Default setting: 0
Parameter size: 2 [bytes]

80. LED SIGNALING MODE
The parameter determines the way in which LED diode behaves after motion has been detected.
Values from 1 to 9 = single blink at the moment of reporting motion. No other motion will be indicated until alarm is cancelled.

Values from 10 to 18 = single long blink at the moment of reporting motion and one short blink each time the motion is detected again.

Values from 19 to 26 = single long blink at the moment of reporting motion and two short blinks each time the motion is detected again.

0. LED inactive.
1. LED colour depends on the temperature. Set by parameters 86 and 87.
2. Flashlight mode - LED glows in white for 10 seconds.
3. White.
4. Red.
5. Green.
6. Blue.
7. Yellow.
8. Cyan.
9. Magenta.
10. LED color depends on the temperature. Set by parameters 86 and 87.
11. Flashlight mode - LED glows in white through 10 seconds. Each next detected motion extends the glowing by next 10 seconds.
12. White.
13. Red.
14. Green.
15. Blue.
16. Yellow.
17. Cyan
18. Magenta
19. LED colour depends on the temperature. Set by parameters 86 and 87.
20. White.
21. Red
22. Green
23. Blue
24. Yellow
25. Cyan
26. Magenta

Default setting: 10
Parameter size: 1 [byte]

81. LED BRIGHTNESS
The parameter determines the brightness of LED when indicating motion.
Available settings: 0 - 100 (1 - 100%; 0 = brightness determined by the ambient lighting - see parameters 82 and 83)
Default setting: 50
Parameter size: 1 [byte]

82. AMBIENT ILLUMINATION LEVEL BELOW WHICH LED BRIGHTNESS IS SET TO 1%
The parameter is relevant only when the parameter 81 is set to 0.
Available settings: 0 to parameter 83 value
Default setting: 100 (100 lux)
Parameter size: 2 [bytes]

83. AMBIENT ILLUMINATION LEVEL ABOVE WHICH LED BRIGHTNESS IS SET TO 100%
The parameter is relevant only when the parameter 81 is set to 0.
Available settings: parameter 82 value to 65535
Default setting: 1 000 (1 000 lux)
Parameter size: 2 [bytes]

> **NOTE**
> The value of the parameter 83 must be higher than the value of the parameter 82.

86. MINIMUM TEMPERATURE RESULTING IN BLUE LED ILLUMINATION
This parameter is relevant only when parameter 80 has been properly configured.
Available settings: 0 to parameter 87 value (degrees celsius)
Default setting: 18 (18oC)
Parameter size: 1 [byte]

87. MAXIMUM TEMPERATURE RESULTING IN RED LED ILLUMINATION
This parameter is relevant only when parameter 80 has been properly configured.
Available settings: parameter 86 value to 255 (degrees celsius)
Default setting: 28 (28oC)
Parameter size: 1 [byte]

89. LED INDICATING TAMPER ALARM
Indicating mode resembles a police car (white, red and blue).
0 - LED does not indicate tamper alarm.
1 - LED indicates tamper alarm.
Default setting: 1
Parameter size: 1 [byte]