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Occupancy detector *GBM16X-8A*

The ***GBM16X-8A*** is a microcontroller (MC68HC711E9) controlled occupancy detector for 16 or 2 x 8 track sections for model railways. The ***GBM16X-8A*** senses locomotives or specially equipped rolling stock by measuring electric current feeding each electrically isolated track section to determine if a section is occupied, i.e. it is a current detecting device.

The ***GBM16X-8A*** consists of two modules:

- Main-board
- Interface module

The main-board of the ***GBM16X-8A*** is available as a kit or as a build and tested device. The Interface is only available as a built module. If you want to order the kid or the built version, please indicate which interface is required. It is also possible to use the ***GBM16X-8A*** without the interface. In this case, the monitored track section are indicated only the by LEDs on the main-board of the ***GBM16X-8A***, since a feedback to a bus system is impossible.

Main-board of the *GBM16X-8A*

The **GBM16X-8A** is built on an epoxy printed circuit board with dimensions 100 mm x 160 mm (standard euro-card). The board must be fixed by four screws with the provided spacers close to the monitored track sections of the layout. Due to the low voltages required by the ***GBM16X-8A***, an enclosure is not provided in order to minimize product costs.

Features of the GBM16X-8A:

- Total current per section: 8 Amps

- The occupancy of the track sections and the supply voltages are monitored by 18 LEDs on the main-board of the ***GBM16X-8A***. Connector J4 provides the opportunity to drive additional low current LEDs (2 mAmps) for remotely monitoring the same track sections. If more current is needed to drive normal (20 mAmps) LEDs or relay, an adapter (***GB16SDR***) is available.

- Either 16 track sections can be powered by one booster or 8 each with two boosters. This configuration is jumper selectable by JP5.

- All connections between the ***GBM16X-8A*** and the layout are made by detachable Phoenix Minicon® connectors. They allow easy removal of the ***GBM16X-8A*** for re-programming.

- The ***GBM16X-8A*** requires a 9 – 16 V AC power supply. To prevent interference from other devices, it is recommended that this power supply is used for this purpose only.

- The following functions of the ***GBM16X-8A*** are programmable in the PAGE- or CV-mode by LENZ Digital plus® or the Uhlenbrock Intellibox®:

1. Address

Necessary only for LENZ RS- and LocoNet-Bus. Default value RS: 65, 66; LocoNet: 33

2. Current sensitivity for each of the 16 channels of the *GBM16X-8A*

The current sensitivity, i.e. the current which must flow between the rails to detect an occupied track section, can be graduated in steps of 16. The default value is 8 (GBM16X-8A/8: default value 10). With this value the ***GBM16X-8A*** will detect a section as occupied when the resistance between the rails is less than or equal 22 k? . The sensitivity may be increased, due to the light weight of the rolling stock, for Z and N scales, or may be decreased for larger scales. Even when a high sensitivity is used, the ***GBM16X-8A*** is highly immune to interference, due to the superb hardware and software.

3. On-delay time for each of the 16 channels of the *GBM16X-8A*

The on-delay time, i.e. the time after which a previously vacant track section is set as occupied, can be graduated in 255 steps (25 ms to 6.375 s). The default value is 1 (1 x25 ms = 0.025 s).

4. Off-delay time for each of the 16 channels of the *GBM16X-8A*

The off-delay time, i.e. the time after which a previously occupied track section is cleared by the ***GBM16X-8A***, can be graduated in 255 steps (25 ms to 6.375 s). The default value is 13 (13 x 25 ms = 325 ms = 0.325 s)

5. Behaviour of the *GBM16X-8A* in case of a voltage breakdown of the digital power

In case of a voltage breakdown of the digital power the ***GBM16X-8A*** is able to react in two different modes for just 8 or all 16 track sections respectively:

5.1.1 Mode 1: Supervision by an auxiliary DC-voltage

The track sections (8 or 16) can independently be supervised by a small DC-voltage. In this case, adding or removing rolling stock will be indicated by the ***GBM16X-8A***.

5.1.2 Mode 2: “Freezing” the occupancy status of the monitored sections

The occupancy status of the track sections (8 or 16) can be “frozen”, i.e. they are stored in the microcontroller memory when digital power is down. In this mode, adding or removing rolling stock will be not indicated by the GBM16X-8A. The stored values are transmitted via the feedback bus immediately after digital power is restored.

Interface modules of the *GBM16X-8A*

The adaptation of the ***GBM16X-8A*** to the different feedback busses is achieved by various interface modules. These modules are plugged into the main-board. To prevent any interference between the feedback bus and the track voltage, the modules are separated from the main-board by optocouplers. The following interface modules are currently available:

- **RS** Module for the LENZ RS-feedback bus
- **s88** Module for the s88-feedback bus
- **LN** Module for the LocoNet bus

The plug-in module is identified automatically by the main-board and no settings need to be altered by the user. Due to the modular design of the ***GBM16X-8A*** it is both easy and cost efficient to change the feedback bus.