FX50 Datasheet

Electrical Specifications

Input voltage	6 – 26V
Outputs	1 Solid State Relay, 40V (max), 2A
Hall Sensor	Linear Hall Sensor, AH8500
Processor	NXP/Freescale ARM Cortex M0+

Magnetic Specifications

Gauss Sensitivity	+/- 430 Gauss	
Sample Magnet A, .125"x.125", N42	20G from .5" from surface.	K&J D22
Sample Magnet B, .25"x.25", N42	107G from .5" from surface.	K&J D44
Sample Magnet C, . 375"x.50", N42	62G from 1.0" from surface. 307G from .5" from surface.	K&J D68
Sample Magnet D, .5"x.5", N52	69G from 1.75" from surface. 236G from 1.25" from surface.	K&J D88-N52
When using the same magnet in two positions, the goal is to stay within the sensitivity range but provide enough 'margin on each side for accurate detection and discretion (difference between the two). When combined with utilizing both poles, 4 or more combinations can be accurately detected.		
Magnetic field calculator and magnets available at https://www.kjmagnetics.com/		

User Configuration

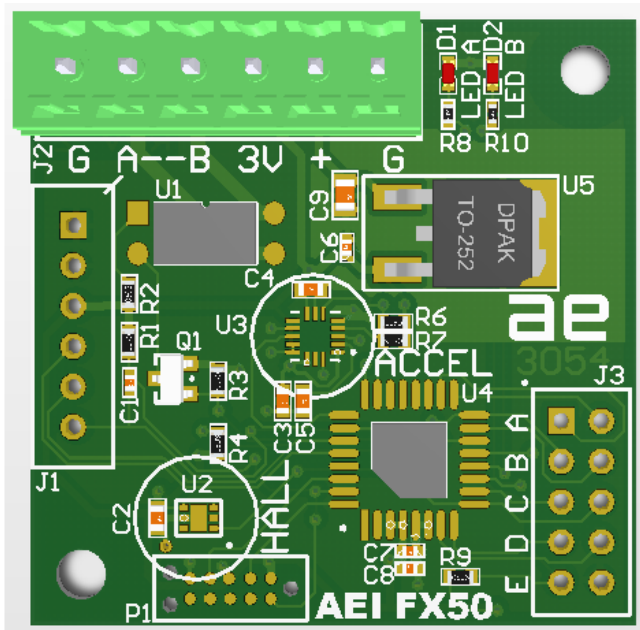
For most users, configuration and setup is made with a set of tweezers.

Locate Header J3, where each set of holes is designated by a letter. By placing the tweezers between the holes in each row, the user will short the pins and send the command to the processor. The jumper definitions are defined below.

LEDS

LED A reflects the state of the solid-state contacts.

LED B is a power LED and will flicker off to acknowledge the successful receipt of a command. Jumpering pins A will calibrate the device and set two general sensitivities, low and high. Jumpering pins B – C will respond with a single off flash if the command is accepted, double flash if setting is out of range. D will respond with a flash count corresponding to the setting (below).



Terminal Block J2

The main connector for the FX50 is J2. It is a 6 pin terminal block for power and switching.

Pin # from Right	Use	Notes
1	Ground - Negative	
2	Power – 6 – 26VDC	<23mA
3	3.3V	Do not use without consulting Anidea
4	B - Switch	These two pins are the contact for the solid-state switch. **NOTE: Do not attempt to switch AC line (110V/220V AC with this contact. Use a relay or other appropriate level switch.)**
5	A - Switch	
6	Ground - Negative	Same as #1

Jumpers J3

Jumper A – Calibrate and Reset. Set the zero magnet force point of the sensor. Reset threshold to detect a weak magnet of either polarity. Reset output mode to Active High. Simple setup mode. Note: Do this in the ABSENSE of any magnetic field. This mode will trigger at about 20 gauss of either polarity.

*Updated 12/13/2017. Shorting Jumper A the first time will flash the LEDB once and set a low sensitivity, polarity independent. Jumpering A again will re-calibrate and set a high sensitivity. When using Sample magnet D, low will trigger at about 1.25” and high will trigger at about 3.25”. The high sensitivity was developed to use much smaller magnets under chess pieces and allow for much more lateral (sideways) sensitivity.

Jumper B – Set magnet threshold by current field and trigger +/- 10%, polarity dependent.

Jumper C – Set magnet threshold by current field and trigger +/- 20%, polarity dependent.

Jumper D – Set output mode

Flash Count	Mode
1	Active High – Output closed when magnet is present.
2	Active Low – Output is open when magnet is present.
3	High Pulse – Output is closed for 500ms when magnet is detected.
4	Low Pulse – Output is opened for 500ms when magnet is detected.
5	Set – Output is closed when magnet is detected. Cycle power to reset.
6	Clear - Output is opened when magnet is detected. Cycle power to reset. Note, output will be open when power is off.

Jumper E – Future use.

All configuration information is stored in non-volatile flash.

Serial Configurable – Future capability

Standard configuration for most users. Supports professional style headers with sufficient inputs and outputs for standard escape game props and project.

Installation

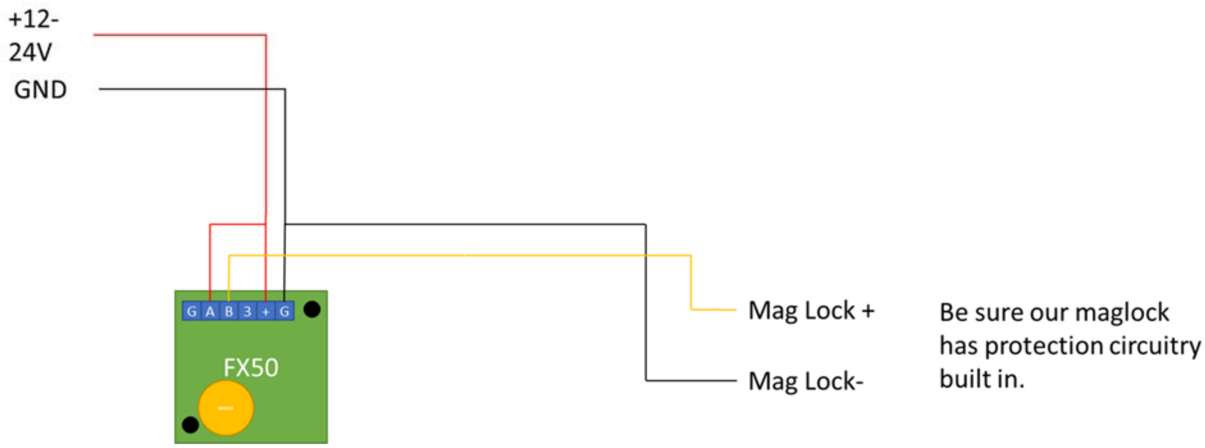
Installation is accomplished most easily with double backed tape. For rough surfaces or for extra durability, place small, #4 screws through the mounting holes.

Examples

Simple Mag Lock Controller

To use the FX50 as a simple magnetic lock controller to detect a magnet, reset and calibrate the FX50 in the absence of any magnets by shorting the 'A' pins for a moment. LED B will flicker once. Then set the output mode. Here you want power to the maglock to start then either cut it off for a pulse (to let a spring door open) or forever (for something you want to stay unlocked). Short jumper 'D' pins repeatedly to either Active Low, Low Pulse, or Clear depending on your requirements.

When using a 12V or 24V maglock drawing less than 2A, the FX50's solid-state relay can drive it directly. Apply power to + and G. Jumper + to A. Run your maglock to B and G (ground). Done!

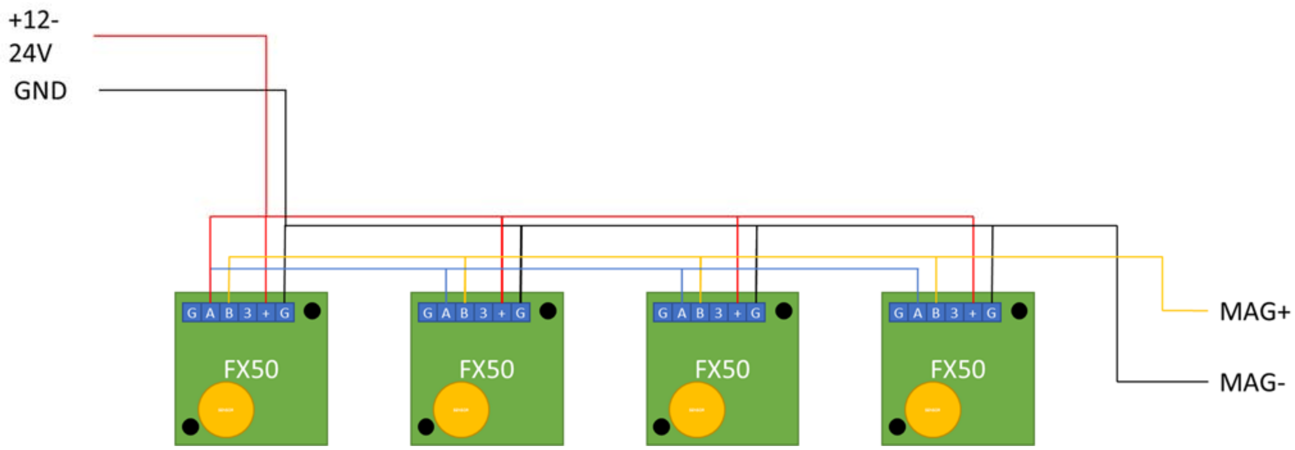


4 Position Puzzle

Typically, if you want to detect the proper placement of 4 puzzle pieces, RFID would be the go to solution. With the FX50, 4 devices can be configured to detect both poles and two magnet strengths providing the detection of 4 unique magnetic fields. To start out, each puzzle piece should have close registration to the puzzle board. This can be accomplished with small recesses to show the players where each puzzle piece should be placed. By placing the magnets in two orientations (to set polarity) and two different depths (to vary strength), you can create different fields the FX50 can detect. Next, reset each FX50 by shorting the 'A' pins. This resets each device to a known state. Then, place each puzzle piece in the solved position and short the 'B' or 'C' pins. 'B' and 'C' set different ranges. You may need to experiment with different range settings and magnet positions (within each polarity). Swap around your puzzle pieces to be sure the ranges don't overlap.

Finally wire the outputs in parallel to create the logic you need to operate the lock. This configuration is appropriate if you want the lock to be powered until the puzzle is solved. If you have a maglock you want to open when all the props are in place, then short the 'D' pins to invert the logic (as shown below). If running in series and operating a PLC input, or relay, then you do not need to change the output mode. The pulse outputs are generally not useful here unless you know the order the players will place the puzzle pieces.

Sample magnets are listed towards the top.



References

Solid State Relay: Omron G3VM-41DY1(TR05)

https://www.digikey.com/product-detail/en/omron-electronics-inc-emc-div/G3VM-41DY1(TR05)/Z5418TR-ND/5799757

Terminal Blocks: Onshore Tech

Header - OSTOQ063250 https://www.digikey.com/products/en?keywords=OSTOQ063250

Terminals - OSTTS06315B https://www.digikey.com/products/en?keywords=OSTTS06315B

Regulator: LP2950CDT-3.3RKG

https://www.digikey.com/product-detail/en/on-semiconductor/LP2950CDT-3.3RKG/LP2950CDT-3.3RKGOSCT-ND/2120668

Hall Sensor: Diodes Inc AH8500-FDC-7 http://www.diodes.com/_files/datasheets/AH8500.pdf

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