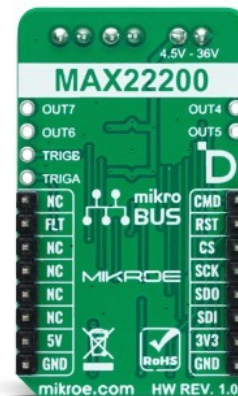
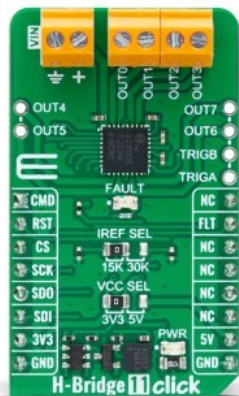


# H-Bridge 11 Click



PID: MIKROE-5636

**H-Bridge 11 Click** is a compact add-on board that allows a voltage to be applied across a load in either direction. This board features the [MAX22200](#), an octal serial-controlled solenoid and motor driver from [Analog Devices](#). The MAX22200 is SPI-configurable and rated for an operating voltage range from 4.5V to 36V. Each channel features a low impedance push-pull output stage with sink-and-source driving capability up to 1A RMS driving current. Its internal half-bridges can be configured as low-side or high-side drivers, supports two control methods (voltage and current drive regulation), and features a full set of protections and diagnostic functions. This Click board™ is well-suited for solenoid driver applications (valve control, relays control) in which low power consumption and a high level of integration are required.

## How does it work?

H-Bridge 11 Click is based on the MAX22200, an octal serial-controlled solenoid and motor driver from Analog Devices. The MAX22200 is rated for an operating voltage range from 4.5V to 36V, which can be brought externally through a VIN screw terminal. Each channel, marked with OUTx, can be configured as a low-side or high-side driver and features a low-impedance with 200mΩ typical ON-resistance push-pull output stage with sink-and-source driving capability and up to 1A RMS driving current. Also, pairs of half-bridges can be paralleled to double the driving current or can be configured as full-bridges to drive up to four latched valves (bistable valves) or four brushed DC motors.

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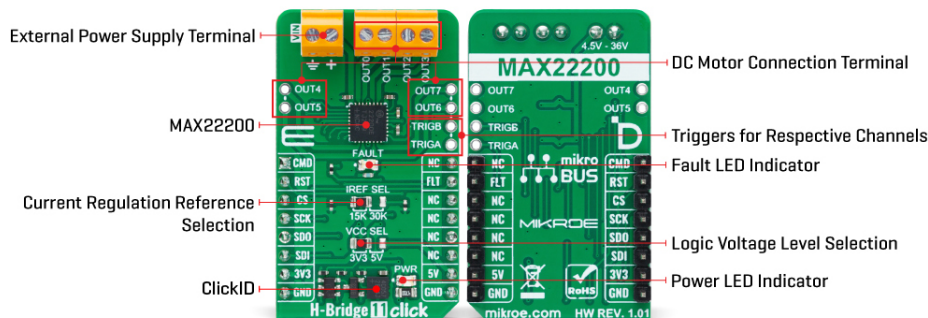
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The MAX22200 features a two-level drive sequence for optimal control of solenoid valves such as voltage-drive (VDR) and current-drive regulation (CDR) (low-side driver only). In VDR mode, the MAX22200 outputs a PWM voltage with a programmable duty cycle through the SPI interface. The output current is proportional to the programmed duty cycle for a given supply voltage and solenoid resistor. In CDR mode, an internal integrated lossless current sensing (ICS) circuit senses the output current and compares it with a programmable reference current. The CDR loop modifies the PWM duty cycle so that the output current peak matches the programmed reference current. Reference current can be set using the IREF SEL jumper, providing the possibility of setting a current of 1A, 0.5A, or 0.25A depending on the position of the jumper and the set HFS bit (jumper at position 15k with HFS\_bit=0 provides 1A, jumper at position 30k with HFS\_bit=1 provides 0.25A).

This Click board™ communicates with MCU through a standard SPI interface, supporting clock speed up to 5MHz and the most common SPI mode, SPI Mode 0. It also can be enabled or disabled through the RST pin of the mikroBUS™ socket, hence, offering a switch operation to turn ON/OFF power delivery to the MAX22200. Depending on the content of the TRGnSPI bit in the configuration register of that specific channel, the driver channels can be activated/deactivated either using the SPI interface or through a logic input signal on unpopulated header pins TRIGA and TRIGB (0, 2, 4, 6 can be triggered by the logic input TRIGA, while 1, 3, 5, 7 can be triggered by using the logic input TRIGB). For a successful register write/read function, it is first necessary to set the CMD pin of the mikroBUS™ socket to an appropriate logic level: high for the write and low for the read command.

It also provides a fault status indication signal, routed to the FLT pin of the mikroBUS™ socket, alongside its red LED indicator marked as FAULT to indicate different fault conditions such as overcurrent protection, thermal shutdown, undervoltage lockout, open-load detection, and detection of plunger movement.

This Click board™ can operate with either 3.3V or 5V logic voltage levels selected via the VCC SEL jumper. This way, both 3.3V and 5V capable MCUs can use the communication lines properly. However, the Click board™ comes equipped with a library containing easy-to-use functions and an example code that can be used, as a reference, for further development.

## Specifications

Type	Brushed
Applications	Can be used for solenoid driver applications

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	(valve control, relays control) in which low power consumption and a high level of integration are required
On-board modules	MAX22200 - serial-controlled solenoid and motor driver from Analog Devices
Key Features	Eight half-bridges up to +36V, high performance, programmable output current, two control methods, high flexibility, high-speed SPI interface, full set of protection and diagnostic features, and more
Interface	SPI
Feature	ClickID
Compatibility	mikroBUS™
Click board size	M (42.9 x 25.4 mm)
Input Voltage	3.3V or 5V

## Pinout diagram

This table shows how the pinout on H-Bridge 11 Click corresponds to the pinout on the mikroBUS™ socket (the latter shown in the two middle columns).

Notes	Pin					Pin	Notes
W/R Command Selection	<b>CMD</b>	1	AN	PWM	16	NC	
Enable / ID SEL	<b>RST</b>	2	RST	INT	15	<b>FLT</b>	Fault
SPI Select / ID COMM	<b>CS</b>	3	CS	RX	14	NC	
SPI Clock	<b>SCK</b>	4	SCK	TX	13	NC	
SPI Data OUT	<b>SDO</b>	5	MISO	SCL	12	NC	
SPI Data IN	<b>SDI</b>	6	MOSI	SDA	11	NC	
Power Supply	<b>3.3V</b>	7	3.3V	5V	10	<b>5V</b>	Power Supply
Ground	<b>GND</b>	8	GND	GND	9	<b>GND</b>	Ground

## Onboard settings and indicators

Label	Name	Default	Description
LD1	PWR	-	Power LED Indicator
LD2	FAULT	-	Fault LED Indicator
JP1	VCC SEL	Left	Logic Level Voltage Selection 3V3/5V: Left position 3V3, Right position 5V
JP2	IREF SEL	Left	Current Regulation Reference Selection 15K/30K: Left position 15K, Right position 30K

## H-Bridge 11 Click electrical specifications

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Description	Min	Typ	Max	Unit
Supply Voltage	3.3	-	5	V
External Power Supply	4.5	-	36	V
Output Current	0.25	-	1	A

## Software Support

We provide a library for the H-Bridge 11 Click as well as a demo application (example), developed using MikroElektronika [compilers](#). The demo can run on all the main MikroElektronika [development boards](#).

Package can be downloaded/installed directly from NECTO Studio Package Manager(recommended way), downloaded from our [LibStock™](#) or found on [Mikroe github account](#).

## Library Description

This library contains API for H-Bridge 11 Click driver.

Key functions

- `hbridge11_get_fault_pin` This function returns the fault pin logic state.
- `hbridge11_read_flags` This function reads and clears the fault flags from the status register.
- `hbridge11_set_motor_state` This function sets the operating state for the selected motor from the half-bridge pairs 0-1, 2-3, 4-5, or 6-7.

## Example Description

This example demonstrates the use of the H-Bridge 11 Click board™ by driving the DC motors connected between OUT0-OUT1 and OUT2-OUT3 in both directions.

The full application code, and ready to use projects can be installed directly from NECTO Studio Package Manager(recommended way), downloaded from our [LibStock™](#) or found on [Mikroe github account](#).

Other Mikroe Libraries used in the example:

- MikroSDK.Board
- MikroSDK.Log
- Click.HBridge11

## Additional notes and informations

Depending on the development board you are using, you may need [USB UART click](#), [USB UART 2 Click](#) or [RS232 Click](#) to connect to your PC, for development systems with no UART to USB interface available on the board. UART terminal is available in all MikroElektronika [compilers](#).

## mikroSDK

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This Click board™ is supported with [mikroSDK](#) - Mikroe Software Development Kit, that needs to be downloaded from the [LibStock](#) and installed for the compiler you are using to ensure proper operation of mikroSDK compliant Click board™ demo applications.

For more information about mikroSDK, visit the [official page](#).

## Resources

[mikroBUS™](#)

[mikroSDK](#)

[Click board™ Catalog](#)

[Click Boards™](#)

[ClickID](#)

## Downloads

[H-Bridge 11 click example on Libstock](#)

[MAX22200 datasheet](#)

[H-Bridge 11 click 2D and 3D files v101](#)

[H-Bridge 11 click schematic v101](#)

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