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# HydraFW Binary SPI mode guide

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## HydraFW binary SPI mode guide

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This guide is updated towards firmware [release HydraFW v0.9 Beta](#)

### Commands

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Once the SPI mode has been selected, the following commands are available :

- `0b00000000` Return to main mode. Returns `BBI01`
- `0b00000001` Mode identification. Returns `SPI1`
- `0b00000010` Puts the CS pin low. Returns `0x01`
- `0b00000011` Puts the CS pin high. Returns `0x01`
- `0b00000100` Write-then-read (see below)
- `0b00000101` Write-then-read with no chip select (see below)
- `0b00001101` Sniff all SPI traffic (see below)
- `0b00001110` Sniff SPI data when CS is low
- `0b00001111` Sniff SPI data when CS is high
- `0b0001xxxx` Bulk SPI transfer
- `0b01000000` configure peripherals
- `0b01100xxx` Set SPI speed
- `0b10000xyz` Configure SPI port
- `0b00000110` AVR commands
- `0b0100000x` Configure SPI peripheral

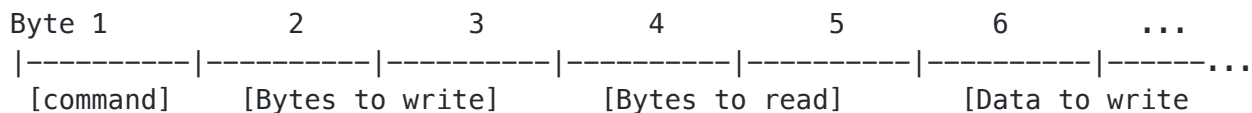
### Command details

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#### Write-then-read operation ( `0b00000100` - `0b00000101` )

This command is used to send at most 4096 bytes and will read at most 4096 bytes of data.

Format :



The bytes to read/write are in big-endian format. All data will be buffered before being sent to the SPI bus. Read data will also be buffered on the Hydrabus before being sent back to the user. In normal mode ( `0b00000100` ), CS is pulled low before sending the data. In no CS mode ( `0b00000101` ), the CS pin is not driven at all.

More information can be found here :

[http://dangerousprototypes.com/docs/SPI\\_\(binary\)#00000100\\_-\\_Write\\_then\\_read](http://dangerousprototypes.com/docs/SPI_(binary)#00000100_-_Write_then_read)

## SPI sniffer ( `0b00001101` - `0b00001110` - `0b00001111` )

To be done

## Bulk SPI transfer ( `0b0001xxxx` )

In this mode, the last 4 bits of the command define the number of bytes to write (from 1 to 16) (Command `0b00010000` will send 1 byte). The same number of bytes will be read and sent back to the user. Hydrabus will wait for the defined number of bytes, send a `0x01` (acknowledge) then the read bytes.

Since [9c9bd6d1f6923133470917bde1e2337d5cbaf45b](#), the ACK byte will be sent before accepting data.

## Set SPI speed ( `0b01100xxx` )

This command sets the SPI device bitrate. The three last bits will select the speed (int bits/sec) within the following list :

- `0b000` => 320kHz SPI1 / 160kHz SPI2
- `0b001` => 650kHz SPI1 / 320kHz SPI2
- `0b010` => 1.31MHz SPI1 / 650kHz SPI2
- `0b011` => 2.62MHz SPI1 / 1.31MHz SPI2
- `0b100` => 5.25MHz SPI1 / 2.62MHz SPI2
- `0b101` => 10.5MHz SPI1 / 5.25MHz SPI2
- `0b110` => 21MHz SPI1 / 10.5MHz SPI2
- `0b111` => 42MHz SPI1 / 21MHz SPI2

This commands returns `0x01` if successful, `0x00` in case of error.

## Configure SPI port ( **0b10000xyz** )

This allows to set the following parameters :

- x sets the polarity value
- y sets the clock phase
- z sets the SPI device (0=SPI2 or 1=SPI1)

Since [2f3aecbca7e619e4b20d13694c992d8c5f2dc64f](#), the order has changed. It is now (0=SPI2 or 1=SPI1)

See <https://github.com/hydrabus/hydrafw/wiki/HydraFW-SPI-guide> for explanation.

This command returns `0x01` if successful, `0x00` in case of error.

## Configure SPI peripheral ( **0b0100000x** )

This commands allows to select or unselect the SPI slave. (0=unselect, 1=select)

## AVR commands ( **0b00000110** )

Hydrabus can be used as an AVR ISP programmer with the help of AVRDUDE. Once this command has been issued, Hydrabus will send a `0x01` then wait for a subcommand.

The following subcommands are available :

### NULL operation ( **0b00000000** )

Returns `0x01`

### SPI AVR protocol version ( **0b00000001** )

Returns `0x01 0x00 0x01` (Protocol version 1)

### AVR read from flash

This command is a wrapper around the ISP "Read from flash" commands. After sending this command, Hydrabus will wait for :

- 2 bytes representing the address to read
- 2 bytes for the number of bytes to read from this address.

Once these additional bytes were sent, Hydrabus will respond with the read bytes.

## Example scripts

1. Example [AVRDUDE](#) ISP programming for Arduino/AVR MCU