
PIC KEYFOB PROGRAMMER QUICK START GUIDE

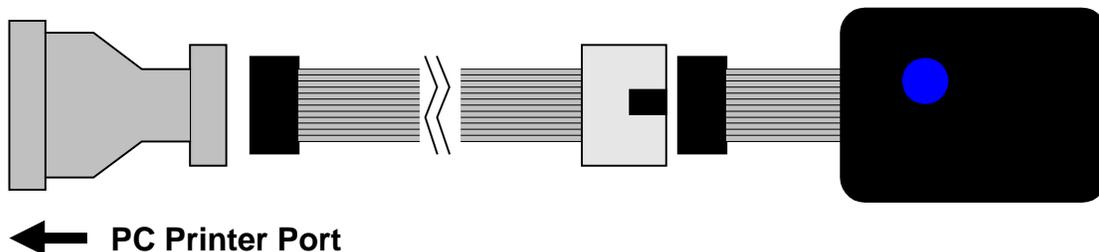
IMPORTANT INFORMATION

1) Do not leave the programmer connected to the PC adapter or a target system, as this will drain the battery. The keyfob programmer is NOT recommended for target circuits with VDD less than 4.5V – see Handheld programmer for alternative for low voltage circuits.

LOADING FROM THE PC

1) Connect the PC adapter (dongle) to the PC parallel port.

2a) Connect the extension cable, using the end black socket, to the PC adapter. Then connect the programmer to the end grey plug of the extension cable. This method is useful where access to the PC adapter is poor.



2b) Or, simply connect the PC adapter directly to the programmer

3) To load code, follow the instructions in the software.

Install and Run the Handheld Programmer software

- Select the file to use in the filename box.

Notes:

The programmer expects a Microchip type hex file (as produced by MPLAB). The file should contain

- Program Code
- EEPROM data – if PIC device has EEPROM and data is required
- Configuration Bytes including Security information
- User ID if required

See section on Hex File formats for more details

- Now select the device family required (16F or 18F) and the device type

- Choose the Programming Mode, Low voltage (LVP) or High Voltage (HVP). If you choose LVP, you must connect LVP pin – see section on ***Low Voltage Programming***.
Note: Not all PIC devices have LVP mode – check device datasheet
- There are also three check boxes.
 1. **Match Device ID**. Checking this box means the programmer will read the device ID and compare it with the ID of the selected device to ensure they match. Some newer device where there is incomplete information could fail this test. ***See section on Error Codes***.
 2. **Verify Configuration Bytes**. Allows configuration byte programming to be verified. ***See section on Error Codes***.
 3. **Program User ID**. User ID bytes are programmed – PIC18F only. The User ID bytes must be included in the Hex file or all locations will be programmed with 0xFF. ***See section on Hex File formats for more detail***
- The **Port button** allows you to change the LPT port if you have more than one printer port
- **Bulk Erase:** This should normally be checked. If your target circuit has VDD less than 4.5V, then bulk erase will not work. This means that locked devices cannot be programmed as Bulk Erase command is needed for this. This is a feature of PIC microcontrollers rather than a limitation of the programmer.
- The final step is to click the **Upload** button to load the keyfob programmer.

You Programmer is now loaded and ready for use.

If you get errors with connecting to the programmer, see the troubleshooting section at the end of this guide.

CONNECTING TO A TARGET

The programmer is designed to be powered from the target system. If target VDD is less than 4.5V, bulk erase function will not work. The on-board battery is only used for loading the keyfob from the PC.

10-way connector

Connect the programmer to the target system using Keyfob plug. The programmer has a 10-way connector with the following properties.

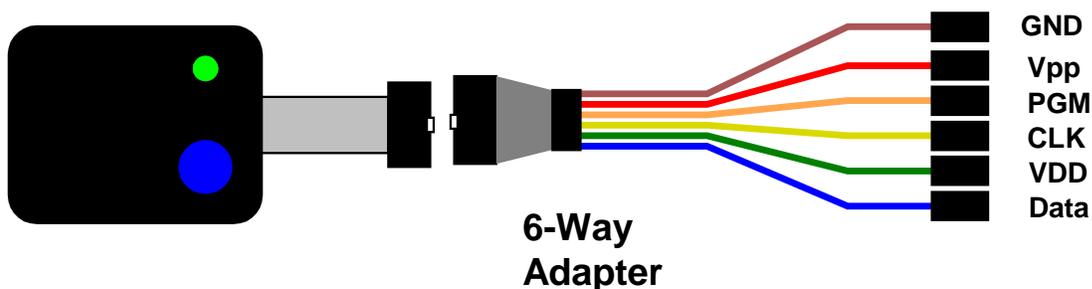
- Target Layout – not end of lead view
- Header is 0.1" (2.54mm) box header in 5 x 2 format, with polarising notch
- GND* These pins must be connected to target ground
- GND One or both must be connected to Target ground
- VDD must be connected to target circuit Vdd
- PGM pin is only connected for LVP programming

N/C	9	10	VDD
PGM	7	8	GND
MCLR/Vpp	5	6	GND *
Clock - PGC	3	4	GND *
Data - PGD	1	2	GND

6-way connector

The programmer is supplied with a 10-way to 6-way flying lead adapter. Only 5 off these connections need to be made for HVP programming, as PGM pin is only used for LVP programming. Connect the adapter to the programmer as shown in the diagrams below.

LVP Programming



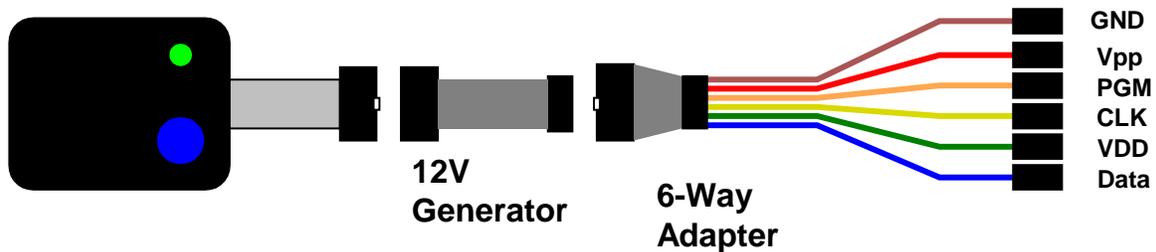
Only some PIC devices have 5V programming – LVP – option. Consult the device data sheet if you are unsure.

Assuming the PIC device has LVP mode, then you need to connect the PGM pin on the PIC to the header and connect the orange programmer line to this header pin. The pull-down resistor on the PGM line must be fitted for LVP to function correctly – see note 4 on diagram in **ICSP circuit requirements** section.

Notes:

- 1) The LVP enable fuse must be set – in CONFIG4L register. Factory default is LVP enabled. If you program this fuse off, then only HVP mode can set it again.
 - 2) The programmer software must be set to Low Voltage mode - LVP
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HVP Programming



Note: This adapter connects all the GND pins shown in the 10-way connector. If you make your own 10- to 6-way adapter, it should also connect all the GND pins on the programmer lead.

- **HVP Modes:** The keyfob programmer uses Vdd first method of HVP – Vdd is applied before Vpp. It cannot do Vpp first method where Vpp is applied before Vdd.

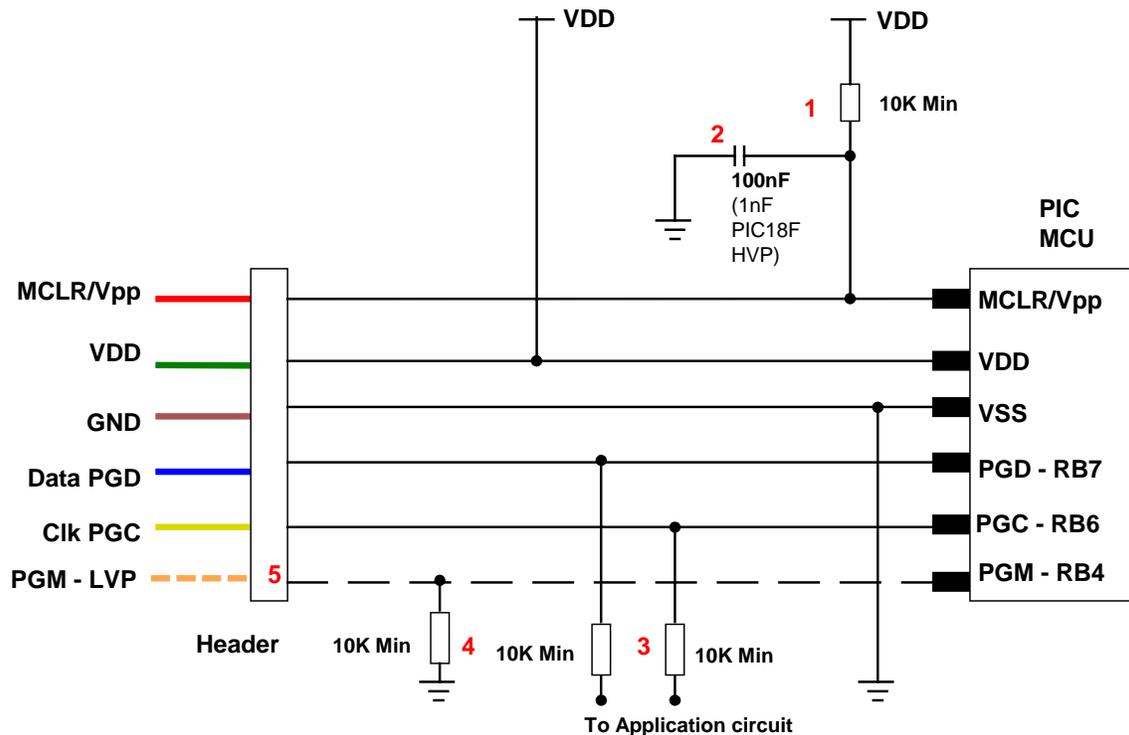
This can give problems with some user code, as the code starts to run before the device enters ICSP mode. If you have problems entering ICSP mode with HVP, then make sure your code does not affect MCLR or programming lines or go to sleep at the start of code.

ICSP CIRCUIT REQUIREMENTS

Microchip do not recommend any particular circuit for ICSP programming. There are diagrams for different tools, such as Pro Mate and PICKit2 with similar circuitry but slight variations.

Kanda have produced a recommended circuit that will work effectively with our programmer. This circuit is shown in the diagram below. Please read the notes that explain the circuit.

The values given are suggested values. The programmer may work with some of these suggestions omitted or with different values but there may be problems with different circuits.



1) MCLR/VPP pin needs the resistor to VDD. A minimum of 10K should be fitted but bigger resistors will work. Supervisory circuits or push buttons on MCLR should be isolated from the VPP voltage, by placing them on the VDD side of the resistor or by fitting a Schottky diode on this line.

2) The 100nF capacitor shown on this pin is optional but we do recommend that it is fitted if possible to avoid glitches on MCLR. This is the **maximum** value. Larger capacitors may prevent the PIC from entering HVP mode.

Note:

Do NOT fit this capacitor for PIC18F High Voltage Programming (HVP mode), or at most fit 1nF.

3) If possible, the Clock and Data lines should be dedicated to ICSP but where this is undesirable, the application circuit should be isolated from the data and clock lines with series resistors, above 10K. This is especially important if either of these lines forces the pin as an input or output. In exceptional cases, series resistors may not be sufficient and a 4053 multiplexer or similar circuit should be used.

Capacitors on these lines should be avoided if at all possible. If they are needed, for noise immunity for example, then the maximum capacitance the programmer can handle is 1nF for PIC18F and PIC16F.

- 4) If LVP mode is used, this resistor must be fitted.
 - 5) This line is only needed for Low Voltage Programming – LVP mode.
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Press the button to start programming.

Once programming is finished, the button can be pressed again to do another programming cycle without unplugging the programmer.

LED Codes

Normal operation:

A single green flash, when first connected. Then, after pressing the button, the LED turns green for the duration of programming. At the end of programming the green LED flashes for 5 seconds and switches off, and the target system is powered down.

If there was an error, the LED will flash RED. The code repeats several times, but with an interval between groups.

Error codes – LED turns red:

2 flashes - Verify error – **PIC16F has this error only**

Extra error Codes for PIC18F only

3 flashes - Data memory did not verify
4 flashes - Code memory did not verify
5 flashes - User ID words did not verify *
6 flashes - Configuration Bytes did not verify *
7 flashes - Device ID did not match *

* Only if selected in check box – ***see Loading the Programmer section***

HEX FILE FORMAT FOR PIC18F DEVICES

The programmer loads a Microchip format Hex file. This is an extended Intel Hex file with code, data, configuration bytes and user ID included. All PIC tools should follow this format.

Each line in the file has this format:

:BBAAAATT[DDDDDDDD]CC

where

: is start of line marker

BB is number of data bytes on line

AAAA is address in bytes

TT is type. 01 means EOF and 04 means extended address

DD is data bytes, number depends on BB value

CC is checksum (2s-complement of number of bytes+address+data)

- **Code:** This is at the top of the file and may be preceded by an extended address line - :020000040000FA, where 04 is the type for extended address
Some compilers include empty code lines (all FF) but others omit these lines to save space
- **EEPROM Data:** It is preceded by the extended address line - :0200000400F00A. The EEPROM section is optional
- **Configuration bytes:** These are stored at 300000h and are preceded by the extended address line - :020000040030CA
The correct format is 8 Fuse bytes and 6 Lock bytes all on the same line but different compilers and assemblers have different methods of displaying these bytes. Sometimes lock bytes are omitted if they are not set, sometimes the data is spread over multiple lines.
The standard format displays unused bits as 1 (e.g. FF for an unused byte) but on the PIC device they read as 0. The programmer masks unused bits to 0 so that the Configuration Byte verify will be correct.
- **User ID:** These are bytes for the user to store data, such as code version numbers. They are stored at 200000h. Again they are preceded by the extended address line :020000040020DA
The standard format requires 8 bytes but again some compilers omit unused bytes.
- **End of File:** The End Of File marker for all Intel Hex files is :00000001FF

HEX FILE FORMAT FOR PIC16F DEVICES

The programmer loads a Microchip format Hex file. This has a similar format to the PIC18F file but does not use extended addressing as the PIC16F devices are smaller.

- **Code:** Code is always at the top of the .hex file. The layout varies with different compilers and assemblers e.g. amount of data per line, whether blank lines are included etc. Note that the PIC16F devices use 14-bit instructions, so code is stored as Words with low byte first. Therefore, an unused location appears as FF3F. Addressing is in bytes though.
- **EEPROM Data:** If the device has EEPROM, the data is stored at address 0x4200 upwards in the HEX file. It is stored in word format but only the lower byte contains data – the high byte is always 0 and is discarded.

- **Configuration Word:** There is only one 14-bit configuration word, stored at address 0x400E. It is stored high byte first.
 - **End of File:** The End Of File marker for all Intel Hex files is :00000001FF
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BATTERY

The Keyfob Programmer uses a standard 12V battery as used in car keyfobs. These are commonly available from electronics suppliers and motor factors.

SIZE: 23A - 26mm x 10mm Diameter (1 inch x 0.4 inches)

TYPE: ALKALINE

VOLTAGE: 12V

CAPACITY: 38mAH (current drawn not specified).

TROUBLESHOOTING

Error message: “Dongle was not detected – check connections and parallel port settings”

- 1) Ensure dongle (PC adapter) is connected to printer port
- 2) Check port setting – LPT1, LPT2 etc.
- 3) In BIOS, make sure port is set to EPP v1.9 or ECP
- 4) Some early versions of XP poll printer port – if you have early XP version, load service packs

Error Message: “Programmer is not responding – check connections and battery power”

- 1) Check that programmer is connected to PC as shown on Page 1
- 2) Check battery in the programmer

Programming Errors – RED Flashes on LED when programming

- 1) Ensure your target circuit is wired correctly as discussed on page 3 and 4, especially where capacitors are fitted on programming lines (PGD and PGC – RB6 and RB7).
- 2) Check you have correct device selected, especially if ID match is turned off
- 3) Ensure you have selected LVP or HVP in software as appropriate.
- 4) If **LVP** is selected, make sure PGM is connected (orange connector), pull-down resistor is fitted to the PGM pin and LVP Enable fuse is set.
- 5) If **HVP** is selected, make sure 12V generator is attached – see page 3. For PIC18F only, ensure capacitor on MCLR is no larger than 1nF.

- 6) Check programmer is connected to Vdd with more than 3.3V on VDD pin on header.
- 7) Check that there is 12V on VPP pin for HVP, or 5V on PGM pin for LVP, during programming

FURTHER INFORMATION

Please contact support@kanda.com for technical support or go to our website support pages for latest software.

See www.kanda.com/support

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