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Flasher 5 PRO

Tool for serial in circuit programming of microcontrollers with on-chip flash memory

User & Reference Guide

Document: UM05009

Software version: 2.10

Revision: 0

Date: October 8, 2014

A product of SEGGER Microcontroller GmbH & Co. KG

www.segger.com

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Manual versions

This manual describes the current software version. If any error occurs, inform us and we will try to assist you as soon as possible.
Contact us for further information on topics or routines not yet specified.

Print date: October 8, 2014

Software	Revision	Date	By	Description
2.10	0	141006	MD	Initial version.

4

About this document

Assumptions

This document assumes that you already have a solid knowledge of the following:

- The software tools used for building your application (assembler, linker, C compiler)
- The C programming language
- The target processor
- DOS command line

If you feel that your knowledge of C is not sufficient, we recommend The C Programming Language by Kernighan and Richie (ISBN 0-13-1103628), which describes the standard in C-programming and, in newer editions, also covers the ANSI C standard.

How to use this manual

This manual explains all the functions and macros that the product offers. It assumes you have a working knowledge of the C language. Knowledge of assembly programming is not required.

Typographic conventions for syntax

This manual uses the following typographic conventions:

Style	Used for
Body	Body text.
Keyword	Text that you enter at the command-prompt or that appears on the display (that is system functions, file- or pathnames).
Parameter	Parameters in API functions.
Sample	Sample code in program examples.
Sample comment	Comments in program examples.
Reference	Reference to chapters, sections, tables and figures or other documents.
GUIElement	Buttons, dialog boxes, menu names, menu commands.
Emphasis	Very important sections.

Table 1.1: Typographic conventions

SEGGER Microcontroller GmbH & Co. KG develops and distributes software development tools and ANSI C software components (middleware) for embedded systems in several industries such as telecom, medical technology, consumer electronics, automotive industry and industrial automation.

SEGGER's intention is to cut software development time for embedded applications by offering compact flexible and easy to use middleware, allowing developers to concentrate on their application.

Our most popular products are emWin, a universal graphic software package for embedded applications, and embOS, a small yet efficient real-time kernel. emWin, written entirely in ANSI C, can easily be used on any CPU and most any display. It is complemented by the available PC tools: Bitmap Converter, Font Converter, Simulator and Viewer. embOS supports most 8/16/32-bit CPUs. Its small memory footprint makes it suitable for single-chip applications.

Apart from its main focus on software tools, SEGGER develops and produces programming tools for flash micro controllers, as well as J-Link, a JTAG emulator to assist in development, debugging and production, which has rapidly become the industry standard for debug access to ARM cores.

Corporate Office:
http://www.segger.com

United States Office:
http://www.segger-us.com

EMBEDDED SOFTWARE (Middleware)

emWin
Graphics software and GUI
emWin is designed to provide an efficient, processor- and display controller-independent graphical user interface (GUI) for any application that operates with a graphical display.

embOS
Real Time Operating System
embOS is an RTOS designed to offer the benefits of a complete multitasking system for hard real time applications with minimal resources.

embOS/IP
TCP/IP stack
embOS/IP a high-performance TCP/IP stack that has been optimized for speed, versatility and a small memory footprint.

emFile
File system
emFile is an embedded file system with FAT12, FAT16 and FAT32 support. Various Device drivers, e.g. for NAND and NOR flashes, SD/MMC and Compact-Flash cards, are available.

USB-Stack
USB device/host stack
A USB stack designed to work on any embedded system with a USB controller. Bulk communication and most standard device classes are supported.

SEGGER TOOLS

Flasher
Flash programmer
Flash Programming tool primarily for micro controllers.

J-Link
JTAG emulator for ARM cores
USB driven JTAG interface for ARM cores.

J-Trace
JTAG emulator with trace
USB driven JTAG interface for ARM cores with Trace memory. supporting the ARM ETM (Embedded Trace Macrocell).

J-Link / J-Trace Related Software
Add-on software to be used with SEGGER's industry standard JTAG emulator, this includes flash programming software and flash breakpoints.

Table of Contents

8

Chapter 1

Introduction

This chapter gives a short overview about the features of the Flasher.

1.1   Flasher overview

Flasher is a programming tool for microcontrollers with on-chip flash memory. It is designed for programming flash targets with the Flasher software or in stand-alone mode. Flasher connects to a PC using the USB/Ethernet/RS-232 interface, running Microsoft Windows 2000, Windows XP, Windows 2003, Windows Vista, Windows 7 or Windows 8. In stand-alone mode, Flasher can be driven by the start/stop button, or via the RS-232 interface (handshake control or ASCII interface). Flasher interfaces to target via a 10-pin connector.

1.1.1   Supported microcontrollers

- M16C/1N series
- M16C/26 series
- M16C/24 series
- M16C/26; M16C26A series
- M16C/28; M16C28B series
- M16C/29 series
- M16C/56 series
- M16C/57 series
- M16C/57 series
- M16C/62 series
- M16C/62P series
- M16C/64 series
- M16C/65 series
- M16C/6N series
- M16C/6S series
- M16C/6V series
- M16C/80 series
- M32C/83; M32C/84; M32C/85; M32C/86; M32C/88; M32C/95 series
- R8C/14; R8C/15; R8C/18; R8C/19; R8C/22; R8C/23; R8C/24; R8C/25; R8C/26; R8C/27; R8C/28;
- R8C/29; R8C/2C; R8C/2D, R8C/3x series
- R32C series
- M79 series

For detailed information on supported flash chips please check www.segger.com/flashmcus.htm

1.1.2   Features

- Easy to use Windows software
- Serial in target programming supported
- Programming / Clearing / Verifying / Read back supported; High speed programming
- User or boot area selectable (read only in serial mode)
- 128 MByte flash memory to store target program
- Can be used in a production environment
- PC software for batch mode processing, allowing usage in automated test systems.
- Remote control functions for automated testers
- Flasher 5 PRO can be controlled an accessed via RS-232 or Ethernet.

1.1.3   Working environment

Host System

IBM PC/AT or compatible. CPU: 486 (or better) with at least 8Mb of RAM, running Windows 95 / 98 / 2000 / Vista / Windows 7 or Windows 8. It needs to have an RS-232 or Ethernet interface available for communication with Flasher.

Power supply

Flasher requires a 5V power supply over its USB connector, minimum current consumption is about 80mA. You may use the power supply which comes with the tool or may power it from a USB port from your PC. Flasher is NOT protected against polarity reversion on the supply input. Please avoid excess voltage over 6.0V.

Flasher can be supplied from the target, if the target is operated from 4.5 to 5V.

Installing the Flasher PC-software

The latest PC software FLASHER.EXE is available from the download pages on our website: http://www.segger.com.

In order to use the software, simply copy it onto your hard drive and start the executable which will guide you through the installation process.

Chapter 2

Working with Flasher

This chapter describes functionality of Flasher and how to use it.

2.1 Connecting Flasher to the PC

2.1.1 Using the RS-232 interface with a serial COM port

Flasher comes with a standard serial 1 by 1 interface cable with one male and one female 9 pin SUB-D9 connector which can be used to connect the Flasher to the PC. The pin assignment of the 9 pin SUB-D female RS-232 interface connector is as follows:

Pin no.	Signal	Function	Host signal
2	TxD	Serial async. data input	Serial data output (TxD)
3	RxD	Serial async. data output	Serial data input (RxD)
5	GND	Signal ground	Signal ground

Table 2.1: RS-232 signals

Getting started

1. Connect the Flasher to the power supply.
2. Connect the Flasher to a PC using the 1 by 1 RS-232 serial interface cable and run the Flasher PC software FLASHER.EXE
3. Select the chosen COM port of your PC in the communication settings dialog in the Flasher PC software by menu: "Options | Communication".
4. Set up the device via menu "Options | Device" in the PC software.
5. For in-circuit programming: Connect the Flasher to the target system via the standard 10 pin or customized interface cable.

2.1.2 Using the RJ45 Ethernet interface

Flasher comes with an RJ54 Ethernet cable which can be used to communicate via Ethernet. The cable can be plugged in directly into an RJ45 socket on the PC or elsewhere in the LAN using hubs or switches.

Getting started

1. Connect the FLASHER to the power supply.
2. Connect the FLASHER to a PC or LAN using the RJ45 Ethernet cable and run the Flasher PC software FLASHER.EXE
3. Select the Flasher in the communication settings dialog in the Flasher PC software by menu: "Options | Communication". Details how to select the Flasher with Ethernet connection are described later on in the manual.
4. Set up the device via menu "Options | Device" in the PC software.
5. For in-circuit programming: Connect the Flasher to the target system via the standard 10pin or customized interface cable.

2.2   Using the Flasher PC software

General

Flasher comes with an easy to use Windows software. It allows reading of program files in motorola, intel hex or binary format. The following is a screenshot of FLASHER.EXE with loaded target program.
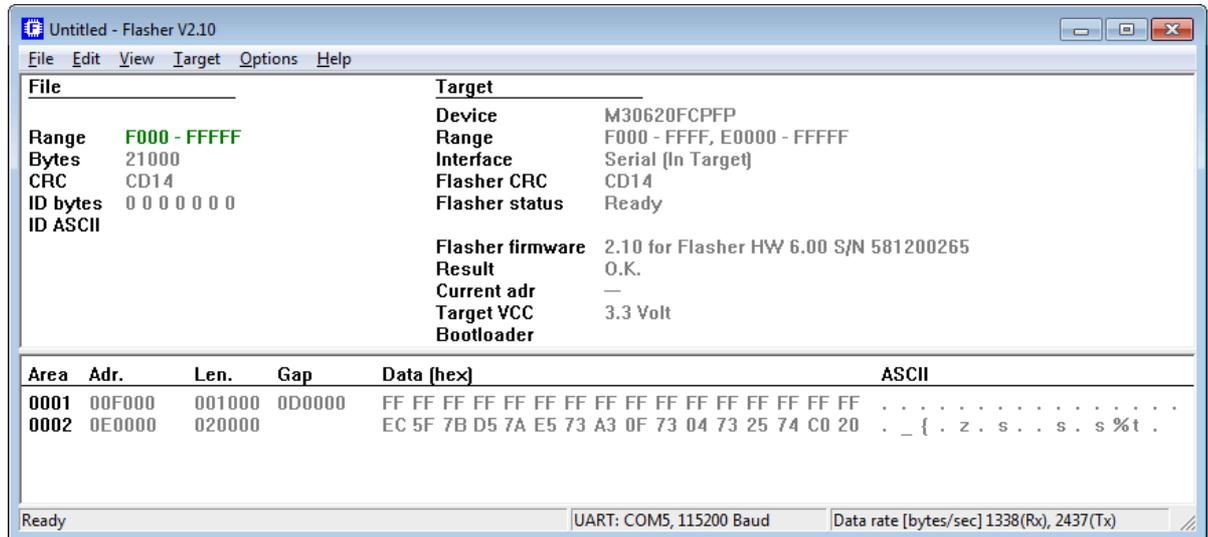
Setup the communication between PC and Flasher

Make sure that the power supply is connected (one of Flasher LEDs should be illuminated) and that the Flasher is connected to your PC with either the 9pin 1 by 1 RS-232 serial interface cable, or the Ethernet cable. Both interfaces can be connected at the same time. It depends on the configuration, which interface is used to communicate. The Ethernet interface is much faster than the serial RS-232 interface, but may require additional configuration of the Flasher.

2.2.1   Setup the serial UART connection for communication

The RS-232 port of the Flasher can be used for communication to PC. You have to select a COM port on your PC and set up the Flasher PC software to use this COM port.

1. Connect the Flasher to a COM port of your PC via the provided serial cable.
2. Chose menu "Options | Communication" to open the setup dialog for the communication parameters.
3. Select the "UART Port" radio button.
4. In the corresponding listbox select the COM port which is connected to your Flasher. You may chose COM1 to COM20. If this does not match any of your COM ports, you may try to assign a port number in the range from 1 to 20 in your Sys-

tem settings to the COM port you want to use.
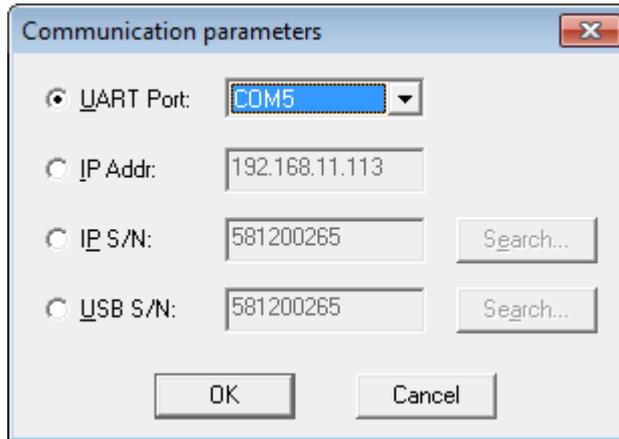
After the COM port selection, press OK. The Flasher PC software and Flasher should now communicate. The Flasher status and serial number should be visible in the Flasher PC software.

2.2.2   Setup the Ethernet connection for communication

Using the Ethernet for communication has the advantage that download and upload of data between the Flasher and PC is much faster. Since Flasher software version 2.10, communication between Flasher PC software and Flasher via Ethernet is supported.

A Flasher with firmware older than version 2.10 requires a firmware update which can be done via the RS-232 port.

Initially, the Flasher retrieves its IP address from a DHPC server. Therefore, the connection between the Flasher and the PC requires a LAN with an active DHCP server to communicate unless a fixed IP address has been assigned to the Flasher.

When the Flasher and the PC are connected to a hub or switch in the same LAN with DHCP server, the Flasher can be accessed by your PC without further configuration.

1. Connect the Flasher to a hub or switch in your LAN using the RJ45 cable. It may take a few seconds until the Flasher gets its IP address from your DHCP server.
2. In the Flasher PC software chose menu "Options | Communication" to open the setup dialog for communication parameters.
3. Depending on the desired connection mode select "IP Addr" or "IP S/N" radio button. If "IP Addr" radio button is selected the Flasher PC software connects to Flasher using the IP address of Flasher. The IP address can be specified on the edit field on the right in the "dotted" format. If the "IP S/N" radio button is selected the Flasher PC software uses the serial number of the Flasher to connect to it. The serial number can be found on the label at the bottom of the Flasher. The edit field on the right can be used to specify the serial number of the Flasher to connect to.
4. Click "OK" button to confirm your settings.
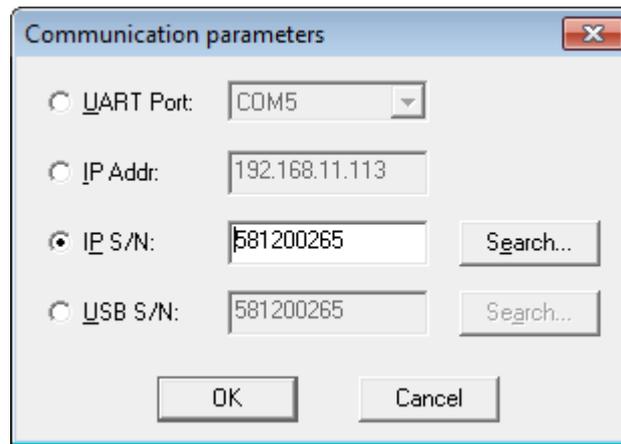
You may click the "Search..." button to scan the network for your connected Flasher. A list with Flasher which are found in your network is shown:
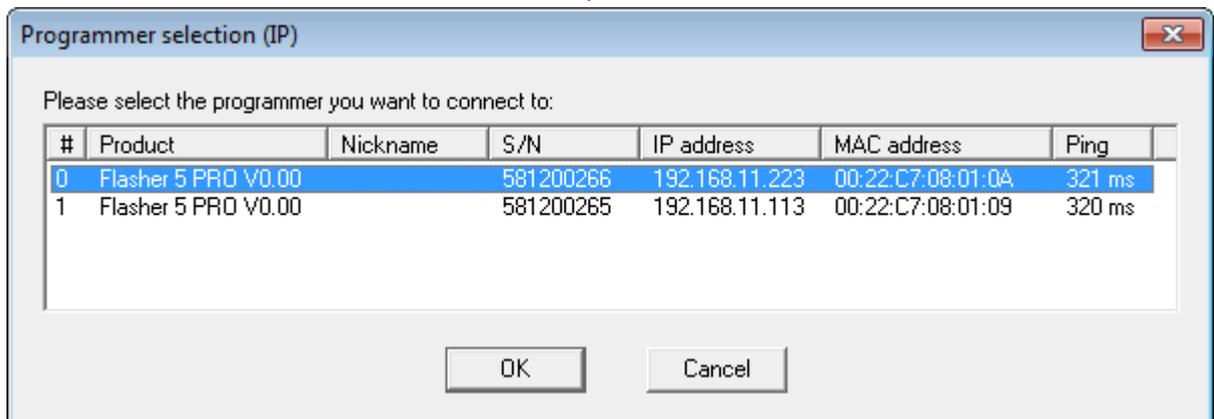
Select one Flasher in the list and click OK (or double-click on one Flasher in the list). All available data of the selected Flasher is automatically read into the communication parameters dialog. At least the serial number and the IP address are available. When used in a LAN with DHCP server, it is a good choice to address and identify the Flasher by its serial number.

2.2.3   Setup the Network configuration for Flasher

It may be useful to assign a fixed IP address and a nickname to the Flasher, which can be done by the network configuration for the Flasher.

Fixed IP addresses have to be used when the Flasher should be driven in a network without DHCP server, for example, if it shall be directly connected to a PC or Laptop without DHCP server. Note that with version 2.10 of the Flasher PC software, this configuration settings can not be set from the Flasher PC software. Network configuration for the Flasher from the Flasher PC software will be implemented in later versions of the Flasher PC software.

To configure the network settings of Flasher version 2.10, you have to use the built in web-server of Flasher 5 PRO. For first time setup, connect the Flasher to a LAN with DHCP server. To start the web server, you have to examine the IP address of the connected Flasher. To get the IP address, you may use the Flasher PC software and

retrieve the IP address from the programmer selection list as described above, or you may start the 5PRO_UDPDiscover.exe tool which is located in the program folder of the Flasher PC software.
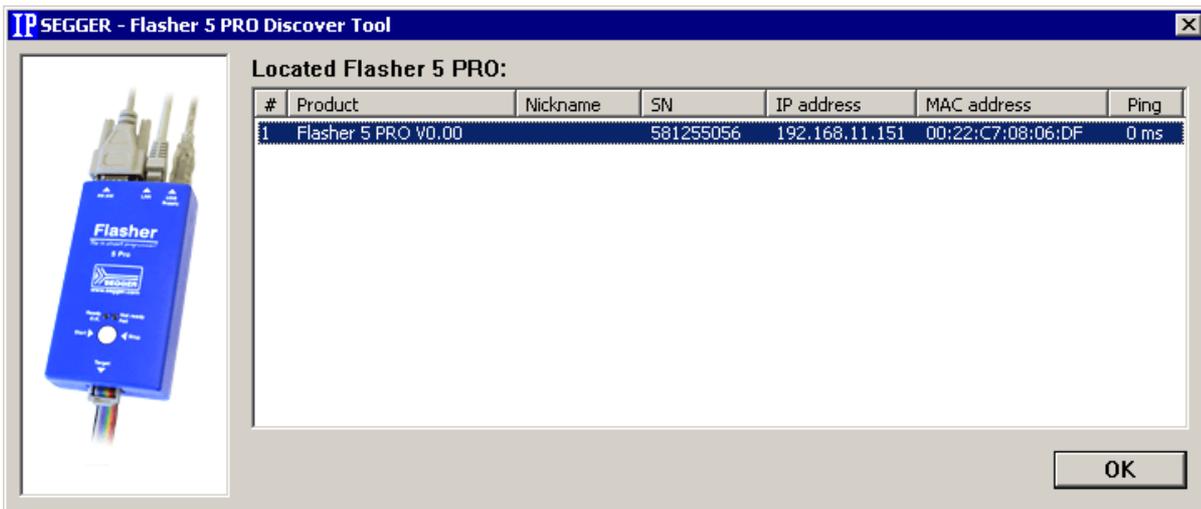
After examining the IP address of the Flasher to configure, start a web browser and enter the IP address in the address bar of your browser. Using the example above, you have to type 192.168.11.151 in the address bar of your browser.

The browser will connect to the Flasher and show the main web-page. In the web server window, chose the function "Network configuration" by a click of the link shown on the left side.

When you want to assign a nickname and a fixed IP address, first enter the nickname and press the "Save" button assigned to the nickname. Then enter the IP address and the subnet mask and press the "Save" button assigned to the IP address settings. There is no need to enter an IP address for a gateway.

When you modify the IP address and save the settings, you will lose the connection. It is a good idea to write down the address you assigned. Be careful to assign an address which you can reach with your PC or laptop.

The screenshot below shows a sample configuration to assign a fixed IP address and a nickname to the Flasher:
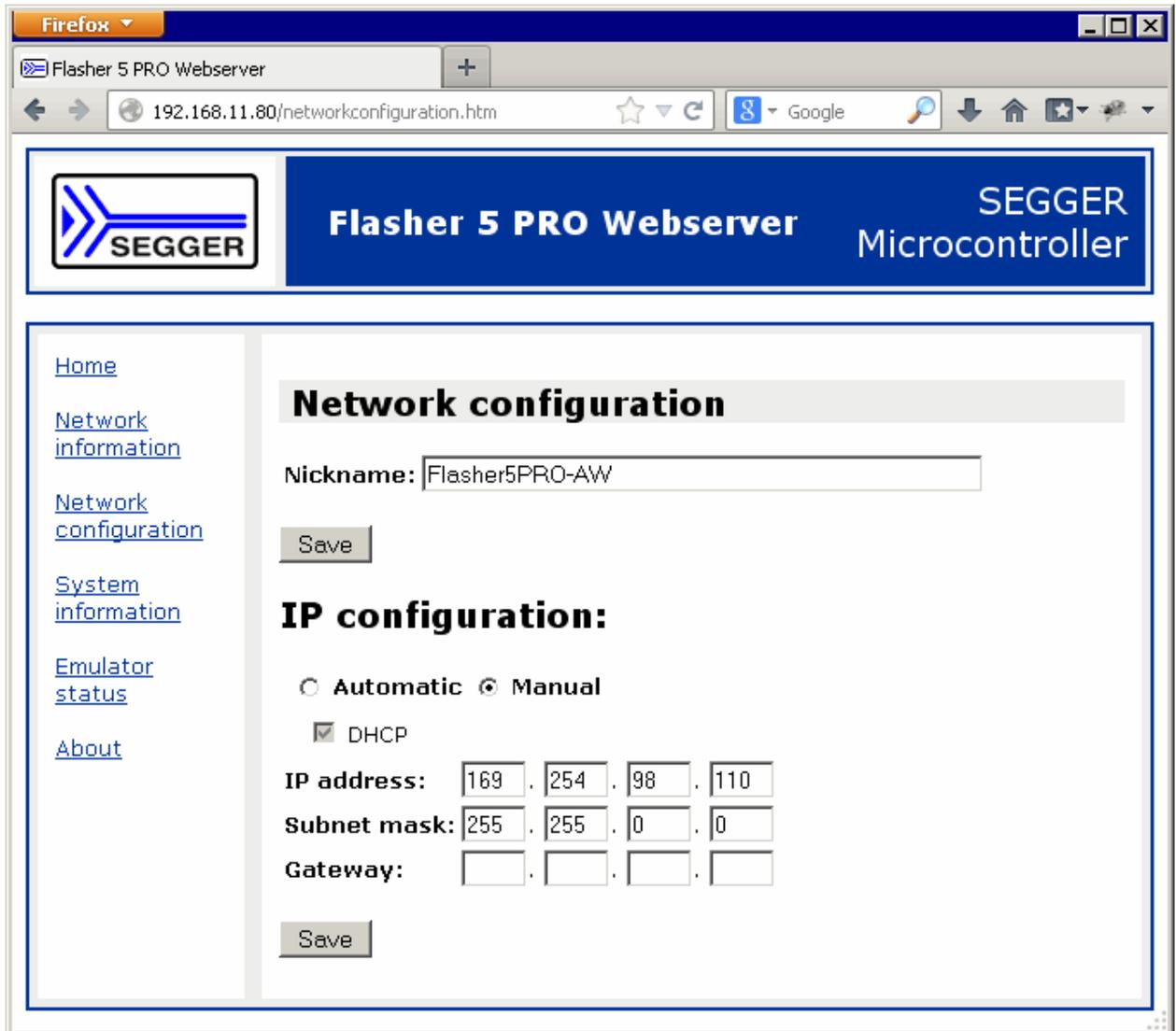
The sample above shows a configuration which was used to setup Flasher for a direct connection between a laptop and Flasher. The laptop had the IP address 169.254.98.109, the IP address for Flasher has to differ from the IP address of the PC it should be used with, but has to be in the same subnet.

2.2.4   Setup the USB connection for communication

Since the software version 2.10 Flasher supports communication via USB. Communication via USB has the advantage of being faster than communication via UART.

A Flasher with firmware older than version 2.10 requires a firmware update which can be done via the RS-232 port.

The following steps must be followed in order to connect the Flasher to PC via USB:

1. Connect the Flasher to an USB port of your PC or to a USB hub connected to your PC using the provided USB cable.
2. Chose menu "Options | Communication" to open the setup dialog for the communication parameters.
3. Select the "USB S/N" radio button.
4. In the corresponding edit field specify the serial number of the Flasher you want to connect to.

5.   Click "OK" button to confirm your settings.
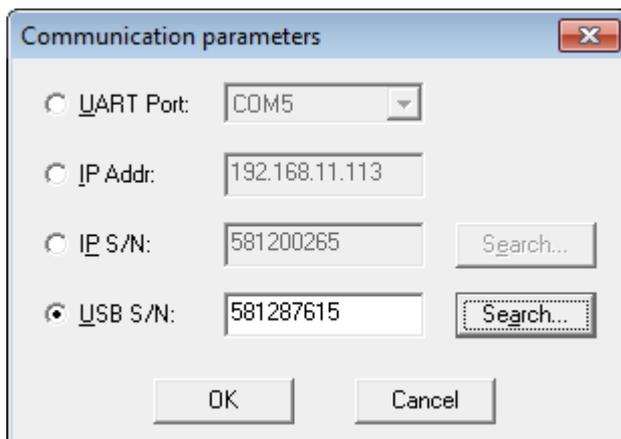
You may click the "Search..." button to scan the USB ports for your connected Flasher. A list with Flasher devices which are found is shown:
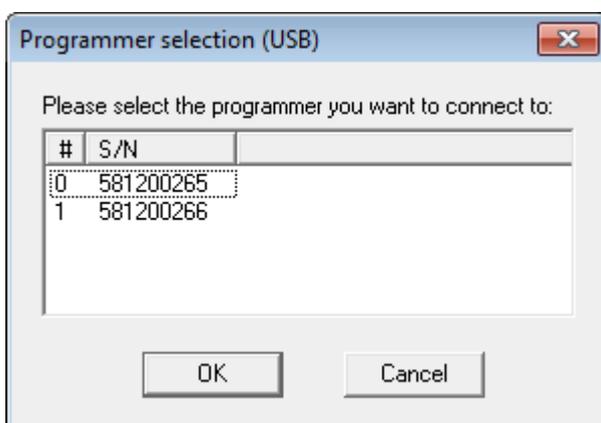
Select one Flasher in the list and click OK (or double-click on one Flasher in the list). The serial number of the selected Flasher is automatically read into the communication parameters dialog.

2.2.5   First time setup of Flasher

When using Flasher for the first time, please select the menu point "Options | Device". You will see the following dialog box:

The device properties dialog allows selection of the chip area you would like to access, the sectors of the on chip-flash and the interface you would like to use. The serial interface requires a cable to connect Flasher to your target. For targets running at low frequencies, it may be necessary to set the "Speed" option to "Slow".

To select an other device, press the "Select Device" button. The device selection dialog will open. You can select the group in a dropdown list and the specific device from the list below.

Now you should be able to blank check, clear, program, verify or read the target chip in serial mode (if your target is properly connected to Flasher). The first time you program or verify, the PC downloads your target program to Flasher, where it is stored in the on board RAM chip for programming or verification. The PC Software stores all setup information in an FLASHER.INI; when you start the program the next time, it will start with the same settings.

2.2.6   Program, clear, verify and blank check

Select one of the commands in the "Target" menu to start the operation. Note that some of the menu points may be grayed if you have no connection to the target or no file loaded.
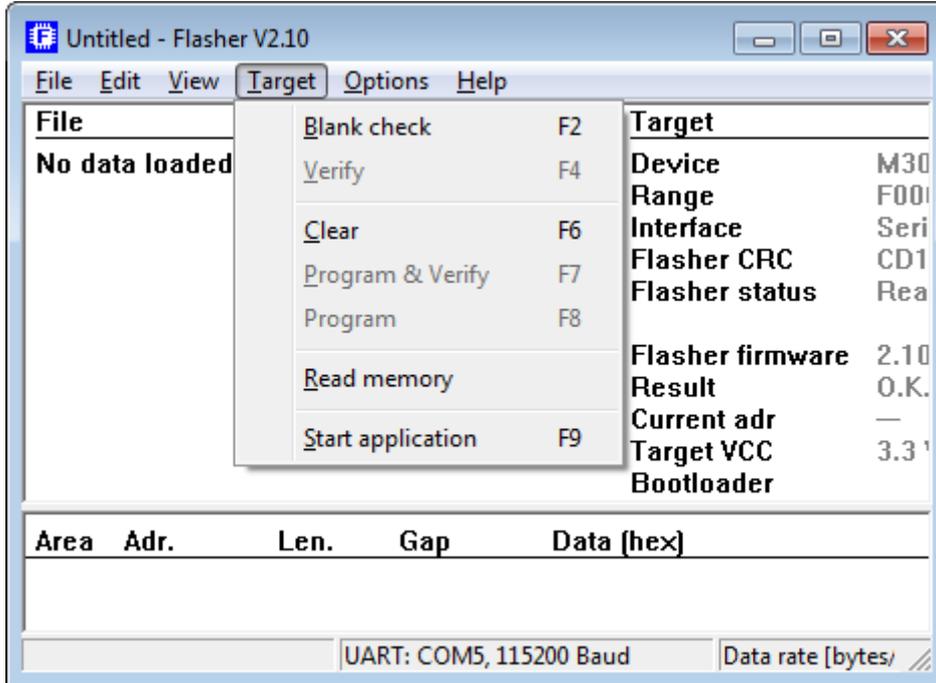
A modal dialog box will indicate the status and progress of the operation; the operation can be stopped any time by hitting the "Cancel" button.
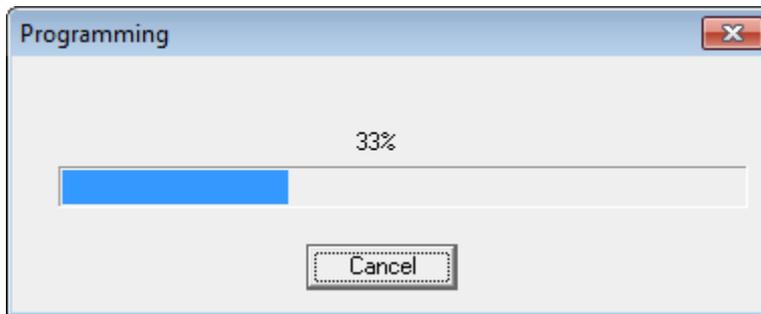
2.2.7   Setup

The operating mode of Flasher may be changed using the "Setup" dialog from the "Options" menu. Power up mode, Power down mode and Reset mode should not be changed for normal operation. You may change the reset active and reset inactive

time, if required by your target hardware. You may select reset output mode as Push-Pull output or Open Drain. All setup settings are stored permanently in Flasher after pressing "Save setup" button.
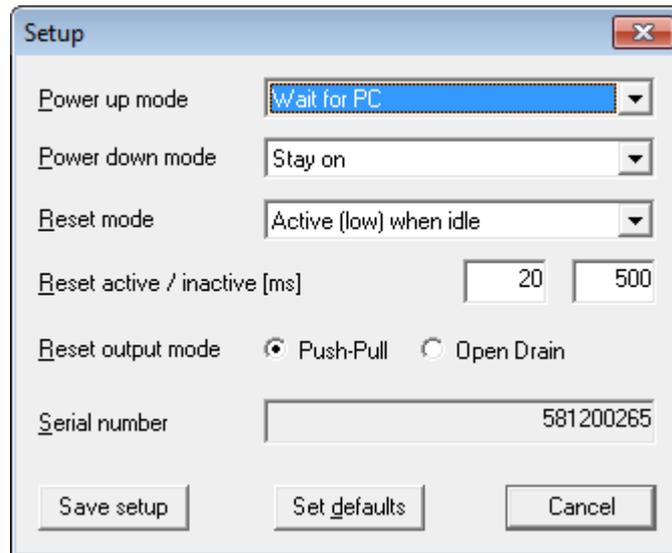
2.2.8 Additional options

The "Filling & Misc." settings from the "Options" menu may be altered if required. Normally there is no need to change any of these settings. Improper setting of fill byte may lock your target CPU! When programming blank (virgin) CPUs the option "Automatic clear before program" is not required, so this feature can be disabled to speed up programming procedure.

"Detailed errorlevel on return" option may be used to return a detailed error code to the calling program when Flasher is used in batch mode.
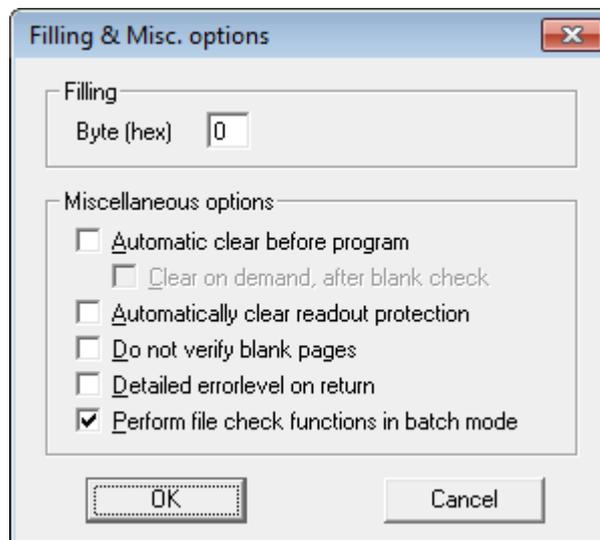
2.2.9 ID check

When programming Renesas CPUs in serial mode (in target), an identification of up to 15 bytes has to be supplied. If the target MCUs user program area is blank, this ID-value does not matter. However, after programming, these values need to be set correctly, because otherwise Flasher will be unable to communicate with the target CPU. These ID-values can be set using the menu point "Options | Passcode". With a standard program, these values should be 0, as the high bytes of the interrupt vectors which are used to store the values are usually 0.

For more detailed information, please consult the Renesas users manual. The menu point "Edit | Copy passcode into loaded file" can be used to copy these ID bytes into your application program.
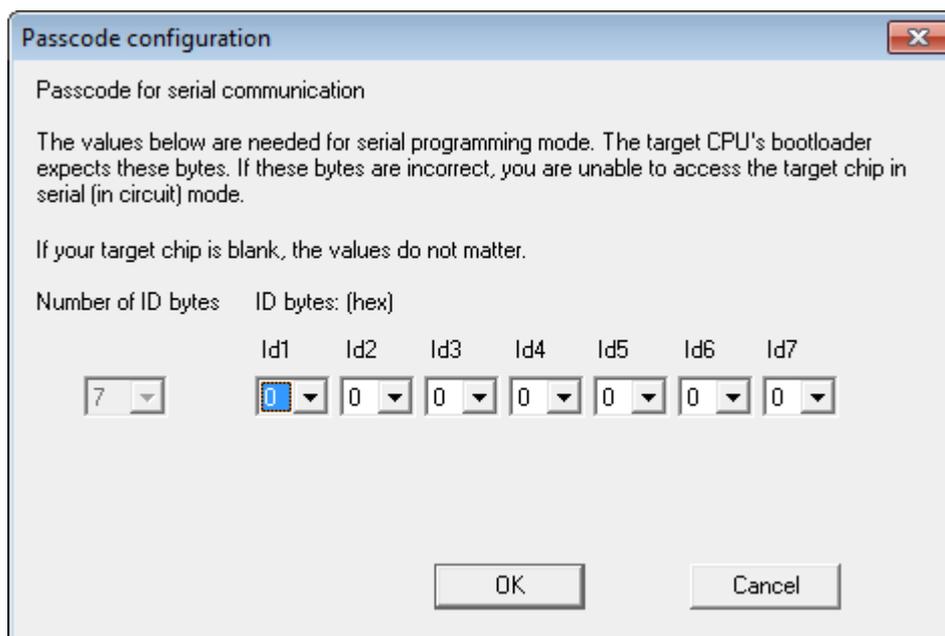
Problems with ID check

You should act carefully when programming ID bytes. If you do not know the ID-value programmed into a target chip, there is no way to erase, read or reprogram the chip in-circuit later. We recommend not to use this feature during the development process.

2.3   Using the serial link to program in circuit

Flasher can be used for in circuit programming of supported CPUs, which incorporate built in firmware for serial update of user flash. The target system has to be designed to support this mode of operation. Refer to target specific connection diagrams or Users manuals of your target CPU.