



**FUJITSU**

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# CONCERTO-Kit



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# Overview



## ■ Introduction

- [About the CONCERTO-Kit](#)
- [CONCERTO-Kit content](#)
- [Test it](#)
- [The hardware](#)
- [The software](#)

## ■ Try yourself

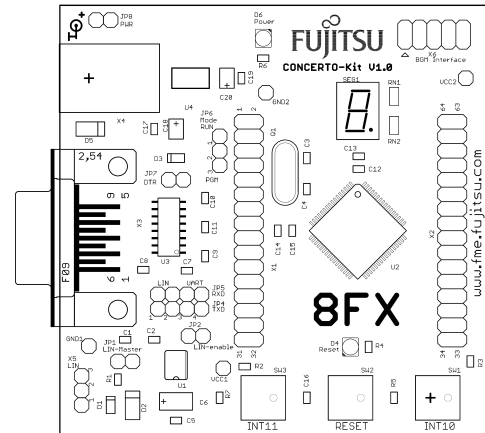
- [Software examples](#)
- [Program download](#)
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## ■ Optional tools

- [Emulator, Programmer, etc.](#)

## ■ 8FX product overview

## ■ Contacts



## ■ Additional documents

- [Schematic 'CONCERTO-Kit'](#)
- [Data sheet MB95100 series](#)
- [Hardware manual 8FX family](#)
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## About the **CONCERTO-Kit**

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- The **CONCERTO-Kit** is a low-cost evaluation board based on the Fujitsu 8FX microcontroller MB95F108AHS
  
- The **MB95F108AHS** microcontroller includes the following features:
  - 60KB Dual-Flash Memory
  - 2KB RAM
  - 1x UART/SIO
  - 1x LIN-USART
  - 1x I<sup>2</sup>C
  - Timers (Reload Timer, PPGs, others)
  - ADC
  - External interrupts
  - Others



## About the **CONCERTO-Kit**

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■ **The CONCERTO-Kit evaluation board includes the following features:**

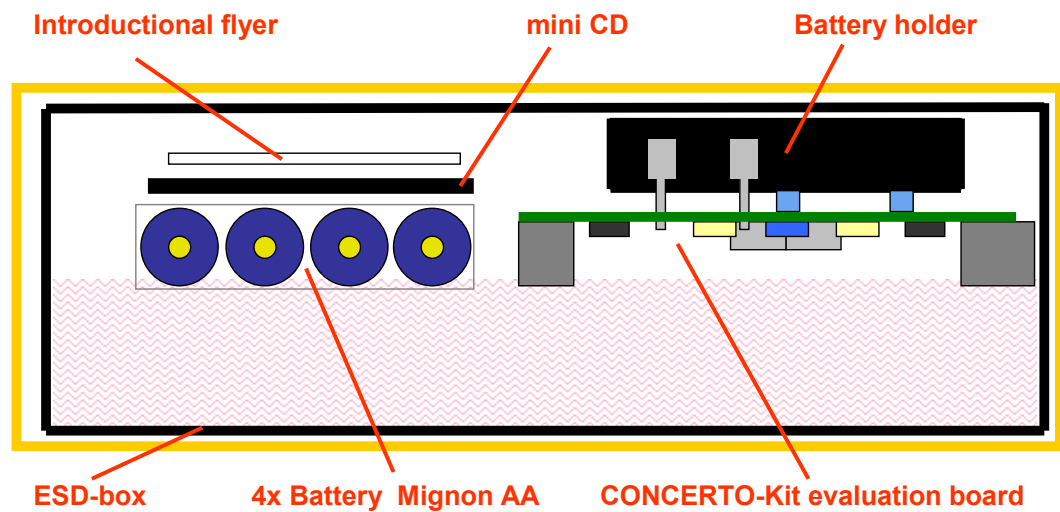
- Microcontroller MB95F108AHS
- 1x UART-transceiver (SUB-D9 connector)
- 1x LIN-transceiver (3-pin header)
- 1x 7-segment LED-Display
- 2x 'User'-button
- 1x 'Reset'-button, 'Reset'-LED
- All 64 pins routed to pin-header
- On-board 5V voltage regulator, 'Power'-LED
- Battery-supply (external power supply possible)



# CONCERTO-Kit content

## ■ The CONCERTO-Kit contains

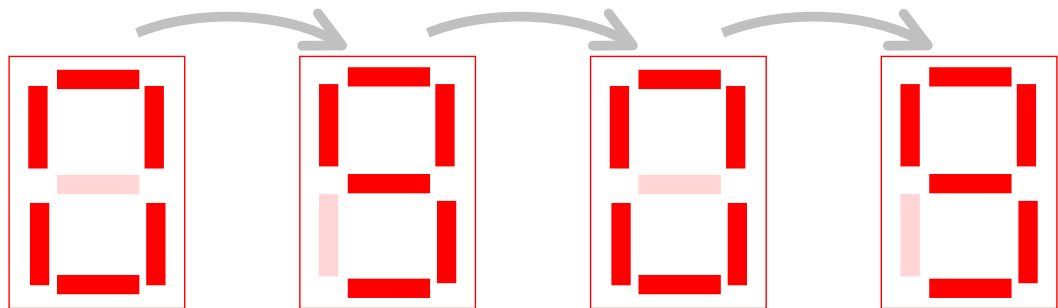
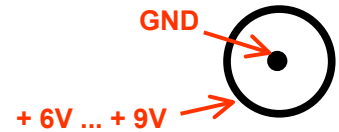
- CONCERTO-Kit evaluation board
- 4x Battery Mignon AA
- 1-page introductory flyer
- Mini CD with documentation and software examples





# Test it

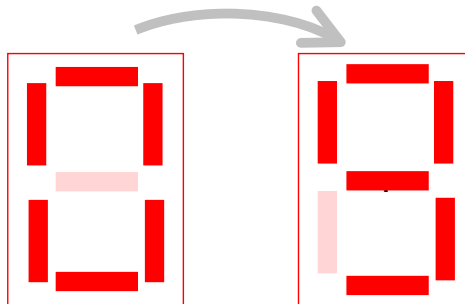
- Put the batteries into the battery holder (close JP8!)  
or
- connect an optional external power supply
- Press the ,Reset'- button
- The software starts automatically counting from 0 to 9 on the 7-segment display.



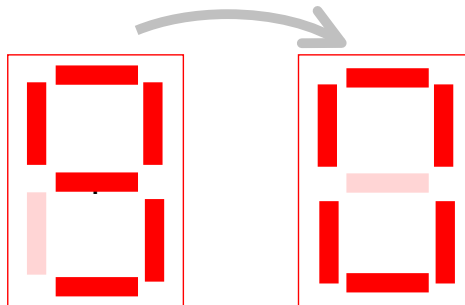


# Test it

- Press ,User'-button ,INT10' to set counter direction to up



- Press ,User'-button ,INT11' to set counter direction to down

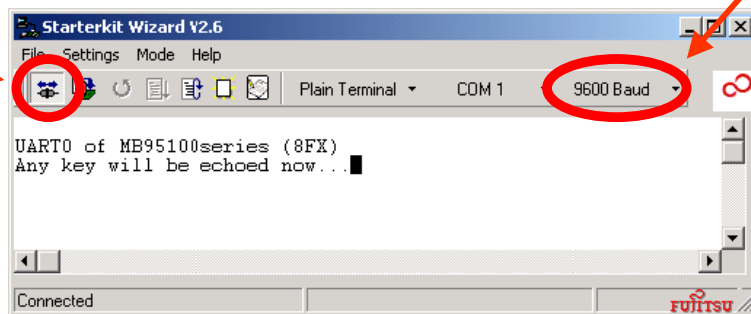




## Test it

- Connect the ,SubD9'-connector (X3) to the PC's COM port via 1:1 serial cable
- Start a terminal application on your PC and set it to 9600 baud (use for example **SKwizard** terminal on this CD)
- Press the ,Connect'-Button in SKwizard
- Press the ,Reset'-Button on CONCERTO-Kit
- A welcome string is output via UART

,Connect'-  
Button



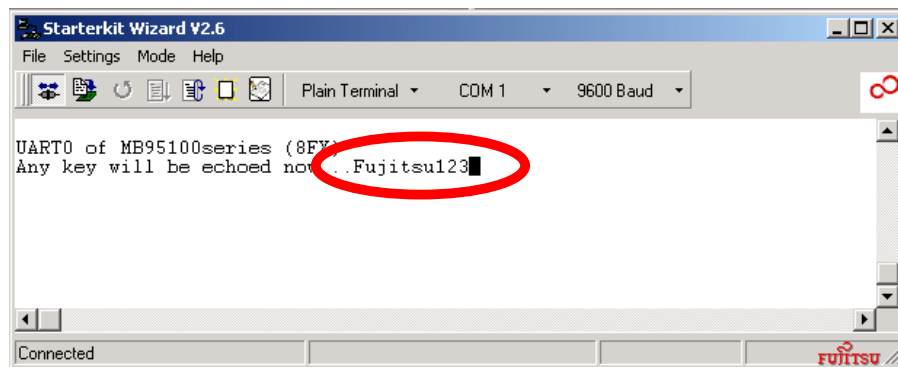
Baud rate  
setting





## Test it

- Send a character to the CONCERTO-Kit by pressing a character key on your keyboard
- The character is echoed by the microcontroller and displayed in terminal application





## Test it

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# Congratulations!

- You finished successfully the first test
  
- In the following you will get more details about the CONCERTO-Kit
  
- You will learn more about
  - The on-board features
  - How to program the flash
  - How to start your own application



# The Hardware

## ■ Main-features

### Ext. Power

+6V ... +9V



### UART

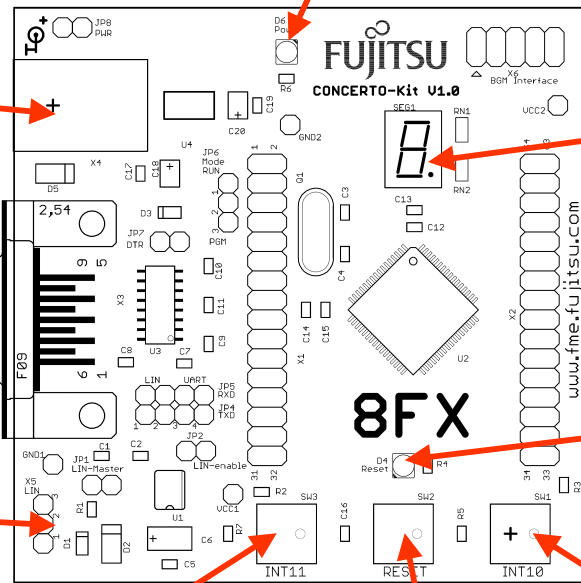
Use 1:1 cable for PC-connection

### LIN

1 Vbat  
2 GND  
3 LIN

### LED ,Power'

### 7-Segment Display



### Keybutton ,INT11'

Port PE1

### Keybutton ,RESET'

### Keybutton ,INT10'

Port PE2



# The Hardware

## ■ The jumpers

### JP8: Battery power

Close the jumper to power the module by the battery pack

### JP6: Mode selection

**RUN:** Set jumper to position 1-2 in order to select the run-mode

**PGM:** Set jumper to position 2-3 in order to select the program-mode

### JP4 & JP5: TxD/RxD connection

These jumpers are used for settings of LIN and USART connection.

Following settings are possible:

1-2: SOT/SIN (LIN-USART) are connected to LIN transceiver

2-3: SOT/SIN (LIN-USART) are connected to MAX232 for UART communication

3-4: UI0/U00 (UART) are connected to MAX232 for UART communication

### JP7: DTR-Reset

Close the jumper to connect the DTR-Signal to the microcontroller reset-pin.

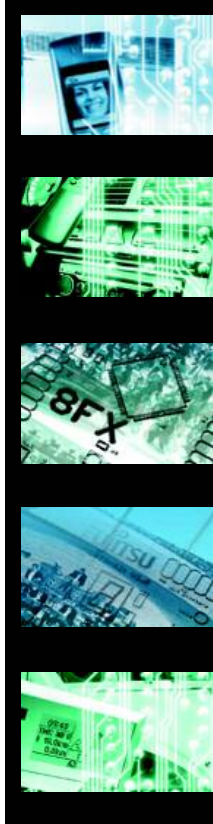
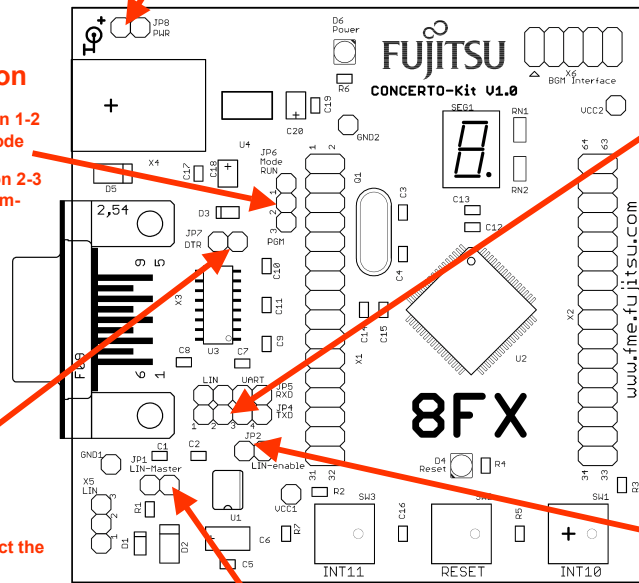
Some terminal-programs, e.g. Fujitsu SKwizard, allow to reset the evaluation board by using the DTR-Signal.

### JP1: LIN Master mode

Close the jumper to set LIN node in master mode

### JP2: LIN enable

Close the jumper to enable operation of LIN driver device





# The Hardware

## ■ The microcontroller pins

Pin	Pin-name	On CONCERTO-Kit used by
1	AVcc	+ 5V
2	AVR	+ 5V
3	PE3/INT13	
4	PE2/INT12	
5	PE1/INT11	Button 'INT10'
6	PE0/INT10	Button 'INT11'
7	P83	
8	P82	
9	P81	
10	P80	
11	P71/T10	
12	P70/T00	
13	MOD	Jumper JP6 'Mode'
14	X0	4MHz crystal
15	X1	4MHz crystal
16	Vss	GND

Pin	Pin-name	On CONCERTO-Kit used by
17	Vcc	+ 5V
18	PG0/(C pin)	100n ,C' Capacitor
19	X1A/PG2	
20	X0A/PG1	
21	/RST	Button 'Reset', BGM-I/F
22	P00/INT0	SEG-A
23	P01/INT01	SEG-B
24	P02/INT02	SEG-C
25	P03/INT03	SEG-D
26	P04/INT04	SEG-E
27	P05/INT05	SEG-F
28	P06/INT06	SEG-G
29	P07/INT07	SEG-DP
30	P10/UI0	Jumper JP5 'RxD' (UART), BGM-I/F
31	P11/UO0	Jumper JP4 'TxD' (UART), BGM-I/F
32	P12/UCK0	BGM-I/F



# The Hardware



## ■ The microcontroller pins (cont'd)

Pin	Pin-name	On CONCERTO-Kit used by
33	P13/TRG0/ADTG	4k7 Ohm resistor
34	P14/PPG0	
35	P20/PPG00	
36	P21/PPG01	
37	P22/TO00	
38	P23/TO01	
39	P24/EC0	
40	P50/SCL0	
41	P51/SDA0	
42	P52/PPG1	
43	P53/TRG1	
44	P60/PPG10	
45	P61/PPG11	
46	P62/TO10	
47	P63/TO11	
48	P64/EC1	

Pin	Pin-name	On CONCERTO-Kit used by
49	P65/SCK	
50	P66/SOT	Jumper JP5 'RxD' (LIN/USART)
51	P67/SIN	Jumper JP4 'Tx'D' (LIN/USART)
52	P43/AN11	
53	P42/AN10	
54	P41/AN09	
55	P40/AN08	
56	P37/AN07	
57	P36/AN06	
58	P35/AN05	
59	P34/AN04	
60	P33/AN03	
61	P32/AN02	
62	P31/AN01	
63	P30/AN00	
64	AVss	GND



## The Software

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### ■ The CONCERTO-Kit CD includes the following software packages

- Softune Workbench (development platform for Fujitsu microcontroller)
- MCU flash programmer tool for 8FX family
- Utilities (SKwizard terminal)
- Software examples for the CONCERTO-Kit

### ■ Additionally you can order the „Fujitsu MICROS CD V3.6“

- Includes documentation & software for all Fujitsu microcontrollers
- Please contact your local [distributor](#)

### ■ Please check our dedicated microcontroller web-site

[www.fme.gsdc.de/gsdc.htm](http://www.fme.gsdc.de/gsdc.htm)

- for updates of the flash programmer tool, utilities and examples
- for data sheets, hardware manuals, application notes, etc.



# The Software

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## ■ Softune Workbench

- Free of charge (only registration is required)
- Windows based development platform for all 8-bit FX microcontrollers
- Includes: editor, C-compiler, assembler, linker, core simulator
- Supports optional hardware emulator
  
- Please fill in the [registration-form](#) and send it to
  - [micro\\_info@fme.fujitsu.com](mailto:micro_info@fme.fujitsu.com) or FAX: ++49-(0)6103-690-122
  - Receive your password by email
  
- Requires 'administration' or 'power user' rights on the PC
  
- [Start installation](#)
  - Enter password and choose destination folder (e.g. c:\Softune8)

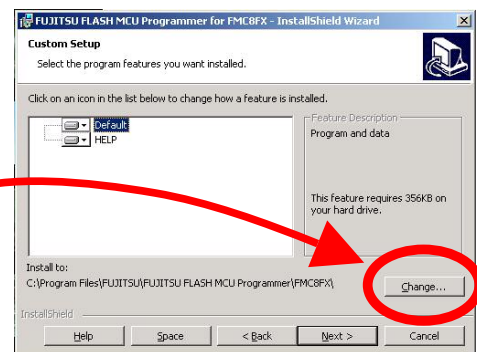
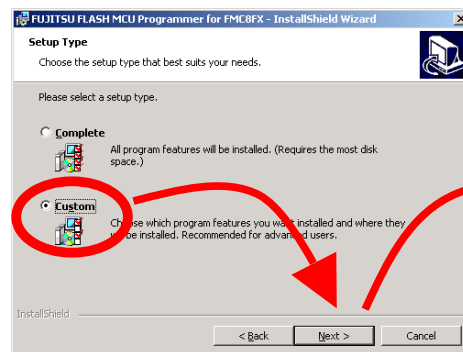




# The Software

## ■ MCU flash programmer

- Free of charge, no registration required
- Windows based programming tool for all 8-bit FX Fujitsu microcontrollers
- Uses PC serial port COMx
- Start installation
  - Select custom installation and select “change...” in order to choose the destination folder (e.g. c:\Softune\Utilities\8FXprogrammer)



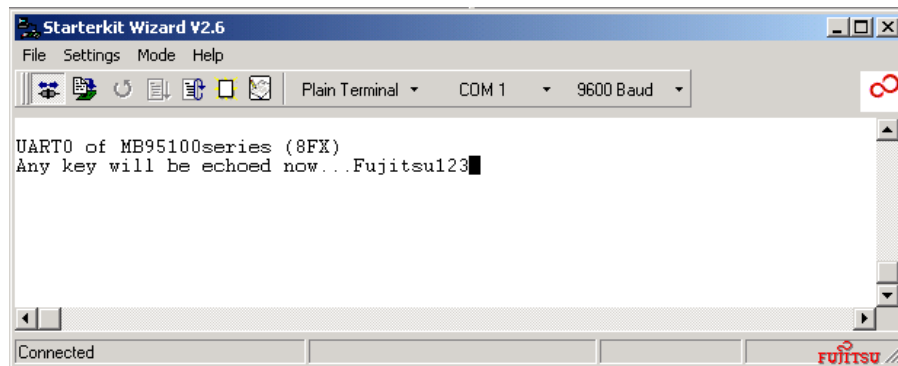
Fujitsu Microelectronics Europe - [www.fme.fujitsu.com](http://www.fme.fujitsu.com)

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# The Software

- Some more tools are available....
- SKwizard
  - Free of charge, no registration required
  - Windows based terminal program
  - [Start installation](#)
    - choose destination folder (e.g. c:\Softune\Utilities\SKwizard)





## Software Examples

### ■ The following examples are provided with the CONCERTO-Kit CD

- Template ,Empty' project as base for the 8FX family
- Template\_CONCERTOkit Template for CONCERTO-Kit applications
- ADC Example for the AD-converter
- CONCERTO-Kit Example for the CONCERTO-Kit
- 7SegCounter Example for I/O ports
- IOPort Example for I/O ports
- ExtInt Example for external interrupts
- PPGTimer Example for the PPG-Timer
- PPGxx Examples for the PPG in different modes
- UART Example for UART
- LIN\_UART Example for LIN-UART
- ReloadTimer Example for reload timer

(Detailed program descriptions can be found in each project's 'readme.txt')

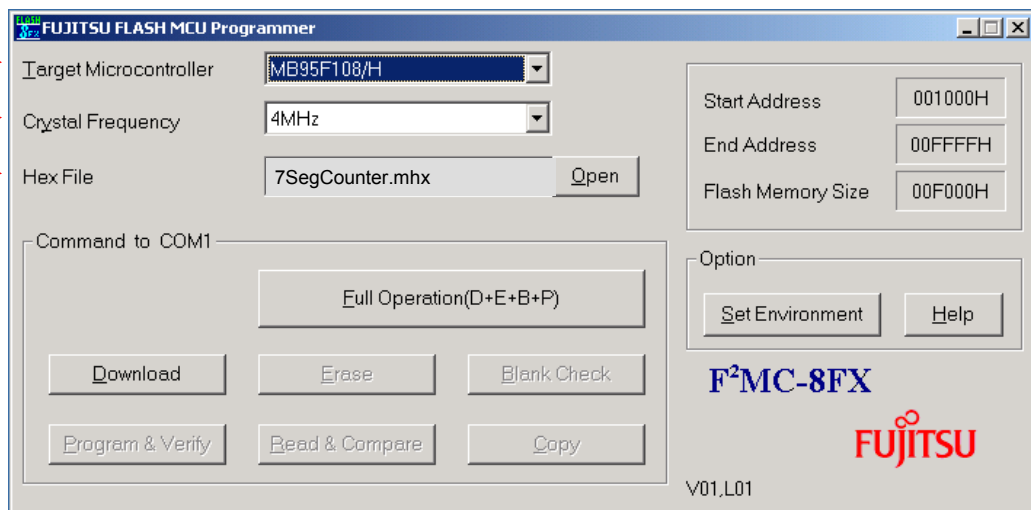
#### Start installation

- choose destination folder  
(e.g. C:\Softune\sample\Smpl8\951xx)



# Program Download

- Start the Fujitsu MCU flash programmer
- Select the target microcontroller (MB95F108/H)
- Select the crystal frequency (4MHz)
- Choose the software example from the example\‘ABS‘-folder (e.g. C:\Softune\smp18\CONCERTO-Kit\7SegCounter\abs\7SegCounter.mhx)





# Program Download

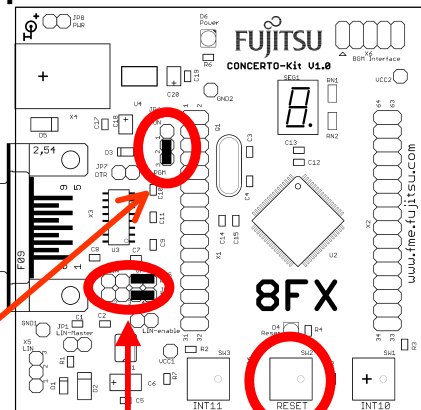
- Connect X3 (Sub D9) to the PC's COM port
- Set jumper JP6 to position ,PGM'
- Set jumper JP4 + JP5 to position 3-4
- Connect power supply
- Press ,Download' button
- Press button ,Reset'
- Press 'OK'

COM port

Use 1:1 cable for PC-connection

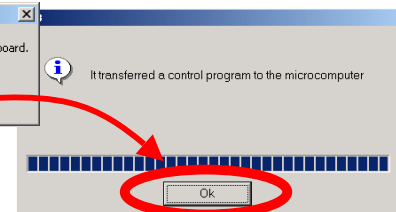
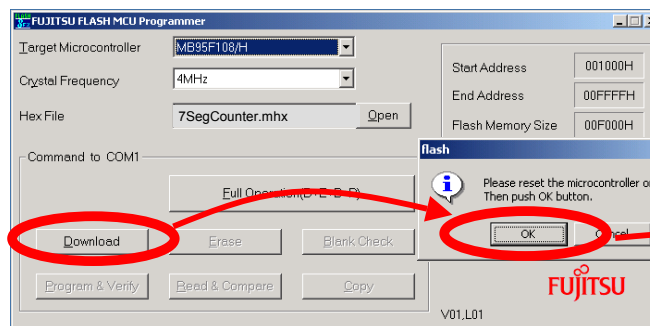
JP1: Mode selection

PGM: Set jumper to position 2-3 in order to select the program-mode



JP4 + JP5:  
Rx/D/TxD

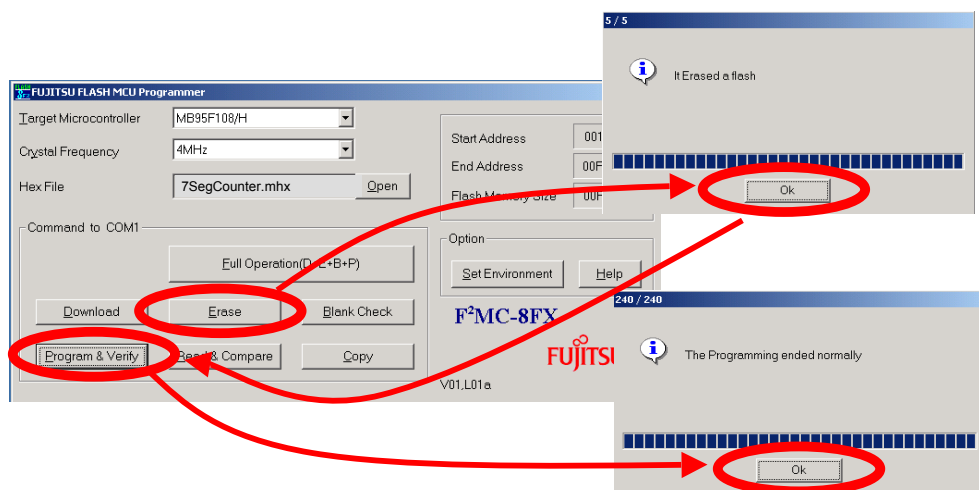
Button ,RESET'





# Program Download

- Click ,Erase' button
- After successful erase click ,OK'
- Click ,Program & Verify' button
- After successful programming click ,OK'





# Program Download

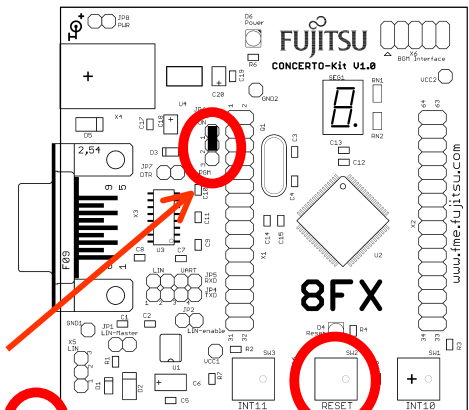
- Close the MCU flash programmer
- Power off the board
- Set jumper JP6 to position ,RUN‘
- Power on the board
- Press ,Reset‘

COM port

Use 1:1 cable for PC-connection

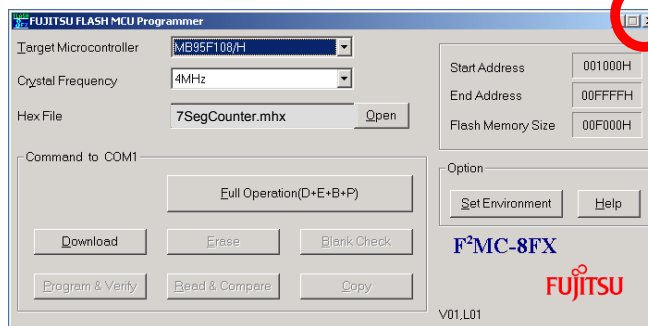
JP1: Mode selection

PGM: Set jumper to position 2-3 in order to select the program-mode



Button ,RESET‘

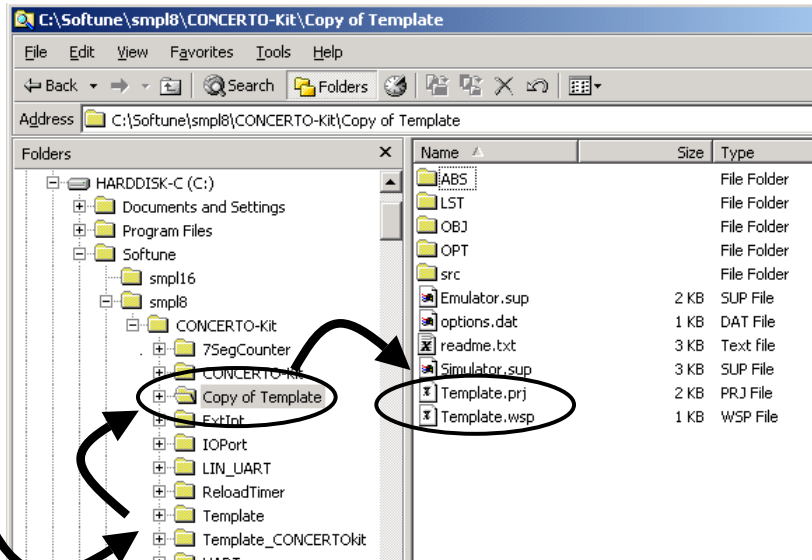
Close the flash programmer





# New Project

- To start a new project use the CONCERTO-Kit template project
  - This project includes the startup code, header files and vector table
- Copy the folder 'Template\_CONCERTOkit' within the example-folder
  - Rename 'Copy of Template' into 'my\_application'







# New Project

- Enter 'my\_application'-folder
  - Rename 'template.prj' into 'my\_application.prj'
  - Rename 'template.wsp' into 'my\_application.wsp'
- Edit 'my\_application.prj'
  - rename 'template' -> 'my\_application'
- Edit 'my\_application.wsp'
  - rename 'template' -> 'my\_application'

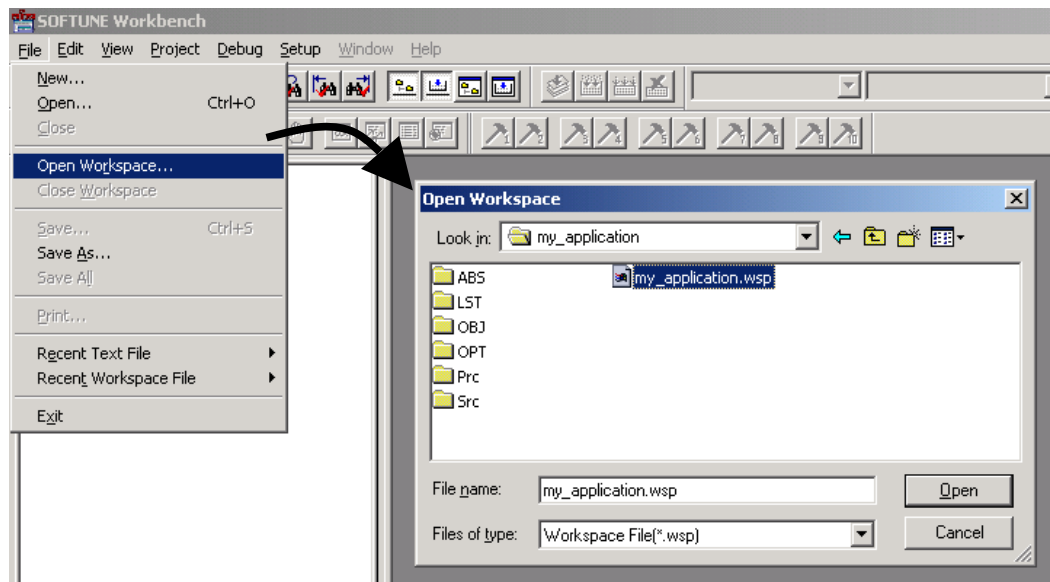
```
Template.prj - Notepad
File Edit Format Help
[DirInfo]
PRJ=C:\softune\Smp18F\template\
...
[MEMBER-Debug]
F0=5
F1=0 m 1 ABS\template.abs
F2=0 a 1 src\startup.asm
```

```
Template.wsp - Notepad
File Edit Format Help
[PrjFile]
Count=1
FILE-0=template.prj
ActivePrj=template.prj
[subPrj-template.prj]
Count=0
[DirInfo]
WSP=C:\softune\Smp18F\template\
```



# New Project

- Start Softune Workbench and open your project





# New Project

- Write your application code
  - Start.asm : Startup code
  - Vector.c : Vector table
  - Main.c : Your application

```
40 /*=====*/
41 /* Main Routine */
42 /*=====*/
43
44 unsigned long delay;
45 unsigned char counter;
46
47 void main(void)
48 {
49
50
51   InitIrqLevels(); /* Disable Interrupt */
52   _EI();           /* enable interrupt */
53   DDR6 = 0xFF;
54   PDR6 = 0x00;
55   counter = 0;
56
57   while(1)
58   {
59     PDR6 = seg_display[counter++];
60     for(delay = 0; delay < 10000; delay++)
61       asm("\tNOP");
62     if (counter == 10)
63       counter = 0;
64   }
65 }
66
67
68
```

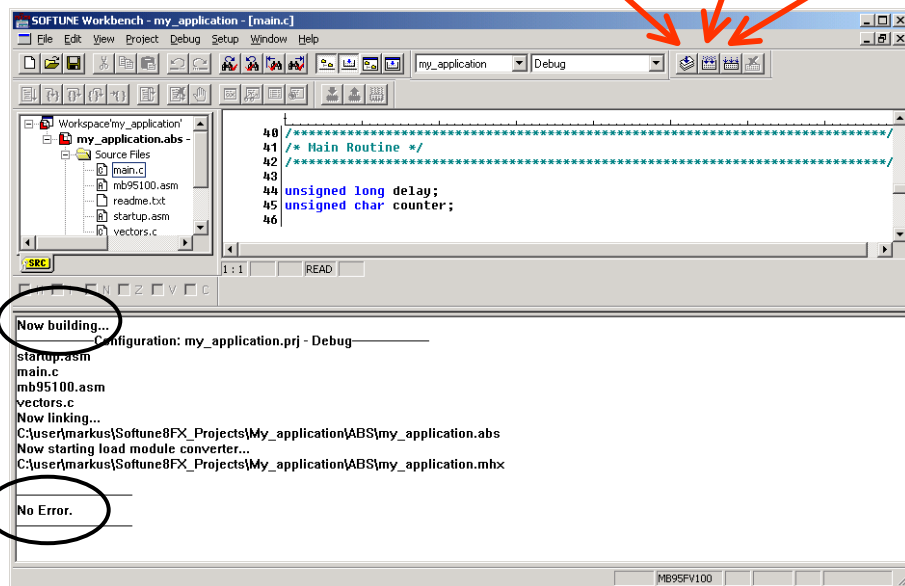


# New Project

## ■ Compile & build your project

- Generates the MHX-file, which can be programmed to the flash

Compile Make Build





# New Project

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- You have finished your first project

## Congratulations!

- Please see our application note ['Getting started'](#) for a more detailed introduction.



## Further Steps

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### ■ In order to learn more about Fujitsu microcontrollers

- See our application notes
  - [www.fme.gsdc.de/macrofam/applica0.htm](http://www.fme.gsdc.de/macrofam/applica0.htm)
- See our software examples
  - [www.fme.gsdc.de/products/samples.htm](http://www.fme.gsdc.de/products/samples.htm)

### ■ Contact your local distributor ...

- for individual support
- to order the latest “Fujitsu Micros CD” containing all information regarding Fujitsu 8-bit, 16-bit and 32-bit microcontrollers



# Optional Tools

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## ■ High-end evaluation board

- MB2146-401 F<sup>2</sup>MC-8FX evaluation board

## ■ Hardware emulator

- MB2146-09 BGM adaptor
- MB2146-301 MCU board (3V version)
  - Includes evaluation chip MB95FV100-101
- MB2146-303 MCU board (5V version)
  - Includes evaluation chip MB95FV100-103
- MB2146-210/220/221 Header Boards

## ■ 8FX Family

- Flash Devices of F<sup>2</sup>MC-8FX family



# Evaluation Board

## MB2146-401 F<sup>2</sup>MC-8FX Evaluation Board

- Emulator target board
- 3V or 5V MCU board can be used
- 16x 'User'-LEDs
- 'Reset'-button
- I/F-connector for expansion
- All pins routed to breadboard area







# Hardware Emulator

## ■ MB2146-09 In-Circuit emulator for F<sup>2</sup>MC-8FX

- USB communication interface
- Connected to target system via user interface connector (BGM)
- 256 code / 2 data event breakpoints
- Sequential breakpoints (2 levels)
- Trace function





# Hardware Emulator

## ■ MCU Board

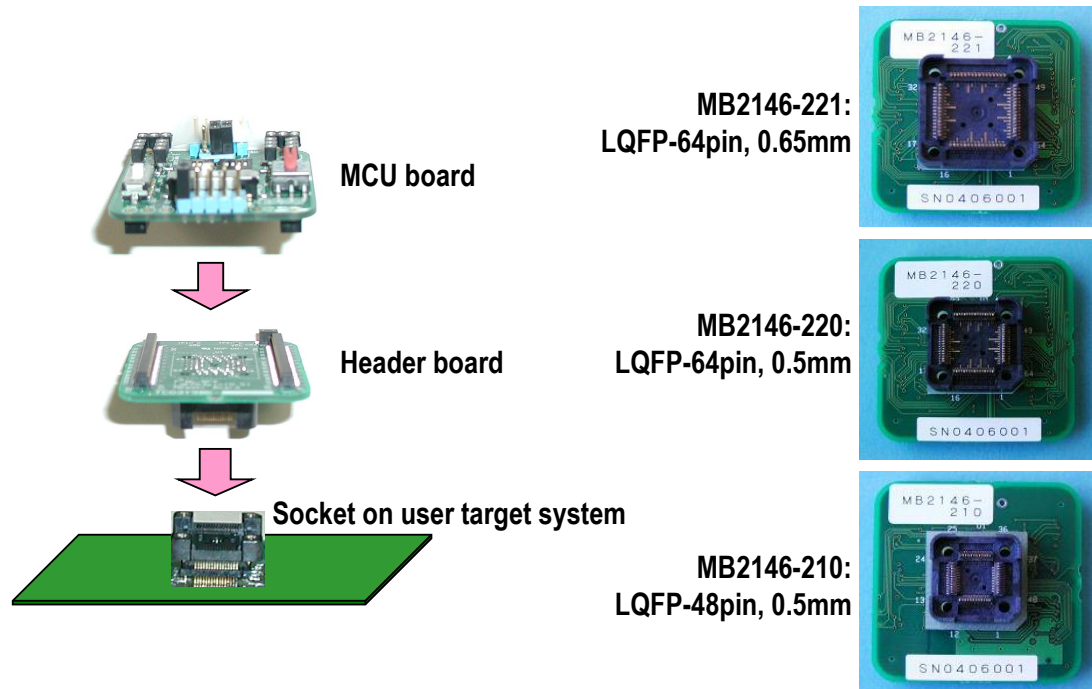
- MB2146-301 MCU board (3V version)
  - Includes evaluation chip MB95FV100-101
- MB2146-303 MCU board (5V version)
  - Includes evaluation chip MB95FV100-103





# Header Boards

- Connect MCU board with evaluation chip to your target system





# F<sup>2</sup>MC-8FX Family Overview



## ■ 64-pin devices

- [MB95F108AHSPFM](#) (5V, 60k dual-operation Flash, 2k RAM, single clock)
- [MB95F108AHWPFM](#) (5V, 60k dual-operation Flash, 2k RAM, dual clock)
- [MB95F108ASPFV](#) (3V, 60k dual-operation Flash, 2k RAM, single clock)
- [MB95F108AWPFV](#) (3V, 60k dual-operation Flash, 2k RAM, dual clock)

## ■ 48-pin devices

- [MB95F118AHSPFM](#) (5V, 60k dual-operation Flash, 2k RAM, single clock)
- [MB95F118AHWPFM](#) (5V, 60k dual-operation Flash, 2k RAM, dual clock)
- [MB95F118ASPFV](#) (3V, 60k dual-operation Flash, 2k RAM, single clock)
- [MB95F118AWPFV](#) (3V, 60k dual-operation Flash, 2k RAM, dual clock)

## ■ Further devices from 20-pin up to 100-pins are coming soon!

- Check our website for updates: [www.fme.gsdc.de/gsd.htm](http://www.fme.gsdc.de/gsd.htm)



## Contacts - Distribution

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### ■ European distributors

- ATeG-Anatec AG [www.anatec.ch](http://www.anatec.ch)
- ATeG-GD Technik Limited [www.GD-Technik.com](http://www.GD-Technik.com)
- ATeG-Ineltek GmbH [www.ineltek.de](http://www.ineltek.de)
- EBV Elektronik GmbH [www.ebv.com](http://www.ebv.com)
- Glyn GmbH & Co. KG [www.glyn.de](http://www.glyn.de)
- Glyn Ltd. [www.glyn.com](http://www.glyn.com)
- Malpassi srl [www.malpassi.it](http://www.malpassi.it)
- Melchioni Electronica SpA [www.melchioni.it](http://www.melchioni.it)
- PN Electronics [www.pne.fr](http://www.pne.fr)
- Rutronik GmbH [www.rutronik.com](http://www.rutronik.com)
- Sagitrón [www.sagitron.es/english.htm](http://www.sagitron.es/english.htm)



# Fujitsu Microelectronics Europe

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## ■ Germany (Headquarters)

- Am Siebenstein 6-10, D-63303 Dreieich-Buchschlag
- Tel: (0 61 03) 69 00, Fax: (0 61 03) 69 01 22

## ■ France

- 105 rue Jules Guesde, F-92300 Levallois Perret
- Tel: (01) 55 21 00 40, Fax: (01) 55 21 00 41

## ■ Italy

- Palazzo Pitagora – Milano 3 City, Via Ludovico il Moro 4B, I-20080 Basiglio, Milano
- Tel: (02) 90 45 02 1, Fax: (02) 90 75 00 87

## ■ United Kingdom

- Network House, Norreys Drive, Maidenhead, Berkshire SL6 4FJ
- Tel: (01628) 50 46 00, Fax: (01628) 50 46 66

## ■ World-Wide-Web (Internet)

- [www.fme.gsdc.de/gsd.htm](http://www.fme.gsdc.de/gsd.htm)
- [www.fme.fujitsu.com](http://www.fme.fujitsu.com)
- Contact: [micro\\_info@fme.fujitsu.com](mailto:micro_info@fme.fujitsu.com)





# Fujitsu Microelectronics Europe

## ■ 'CONCERTO-Kit'-CD Link-List

- Software
  - [Softune Workbench](#)
  - [MCU Flash Programmer](#)
  - [SKwizard](#)
  - [Software examples](#)
- Documents
  - [Schematic 'Concerto-Kit'](#)
  - [Data sheet MB95100A series](#)
  - [Data sheet MB95100AH series](#)
  - [Data sheet MB95110A series](#)
  - [Data sheet MB95110AH series](#)
  - [Hardware manual 8FX family](#)
  - [Programming manual 8FX family](#)
  - [Application note 'Getting Started'](#)
  - [Application note 'Emulator HW Setup'](#)
  - [Application note 'Flash Programming'](#)



# Fujitsu Microelectronics Europe

## ■ 'CONCERTO-Kit'-CD Link-List

- Additional documents for 8FX Softune Workbench
  - [Assembler manual](#)
  - [C-compiler manual](#)
  - [Command reference manual](#)
  - [Linkage kit manual](#)
  - [Operation manual](#)
  - [User's manual](#)
- Additional documents for 8FX tools
  - [MCU Flash Programming Specifications](#)
  - [Operation manual MB2146-09 BGM adapter](#)
  - [Softune first step guide MB2146-09 BGM adapter](#)
  - [Operation manual MB2146-210 Header board](#)
  - [Operation manual MB2146-220 Header board](#)
  - [Operation manual MB2146-221 Header board](#)
  - [Operation manual MB2146-301 MCU board](#)
  - [Operation manual MB2146-303 MCU board](#)
  - [Operation manual MB2146-401 Evaluation board \(3V setup\)](#)
  - [Operation manual MB2146-401 Evaluation board \(5V setup\)](#)

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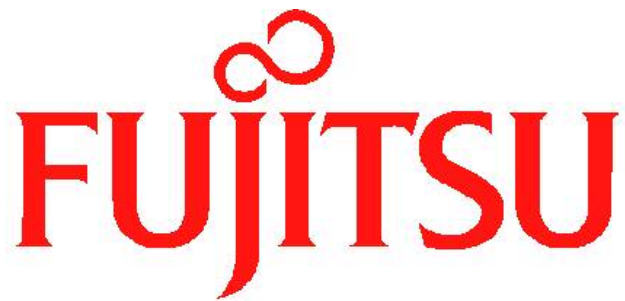


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V1.0 tools\_8bit



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