

## **FMeter\_G431: Function / description of the source files**

The FMeter-G431 project was created with the "IAR EWARM"-IDE. The free demo version allows max. 32 kB code size, whereby approx. 26 kB are generated here. There should therefore be enough space for your own changes.

The following program parts are required:

### **main.c:**

Start program generated by CubeMX, which lists the variables and initializes the controller. Various IRQ handlers, SysTickTimer and NVIC, whereby no subpriorities are used.  
HSI clock and FLASH waiting cycles are set to max. speed.

### **Fmeter\_G431.c :**

Is called immediately after the initialization of main.c and is not exited again. First the HSE clock is set, whereby local (VC) TCXO or ext. reference be used. Then the measuring channels with F1\_message (1) and F2\_message (1) initialized and a loop is executed waiting for manual operation. In the function lese\_taste(), both measuring channels are queried for new results, the automatic output on LCD and data output to serial interface.

The loop is left when the ext. reference frequency switched on or is switched off. Then it is first switched to HSI clock (if ext. ref. connected) and then HSE remeasured and initialized. If ext. reference is turned off or fails the controller switches internally to the HSI cycle and triggers an NMI. Any ongoing manual operation is aborted and the controller is initialized with the new HSE clock.

### **G431\_lcd.c :**

Used to display measured values and manual settings using the control button.

### **G431\_usart2.c:**

For serial communication to output measured values, set and query from internal parameters.

### **G431\_ee\_iic.c:**

Read and write routines for EEPROM or FRAM via IIC bus.

### **G431\_ee\_save\_recall:**

Retrieval and storage of device settings that have been made manually or via ser. interface to be changed.

### **G431\_gpio\_timer.c:**

Basic function for setting / deleting a port bit. Function delay\_us() and Timer ISR for key query / decoding and flashing frequency of ready and GPS LED. The use of the timer and IO pins is described in **G431\_gpio\_timer.h**.

### **G431\_Bedienung.c:**

Key decoding and manual setting of internal parameters, general or specifically for the associated measuring channel.

**G431\_serio\_input.c:**

Command scanner for serial inputs and queries of internal parameters.

**G431\_F1\_message\_reg .c:**

Routines for both measuring channels (F1 and F2), formatting of the output values and Display / ser. Output of the measured values depending on the setting. Channel F2 also allows Correction of the internal clock frequency via GPS signal, provided the 1 pps signal is plausible and the correction was selected by setting.

After initialization with Fx\_message (1), the frequency measurements run permanently via ISR. Channel F1 carries out a maximum of F\_SAMPLES measurements / s (typ. 200 kHz), to obtain the highest possible resolution at higher input frequencies. After the minimum measuring time has elapsed, the output is shown on line 1 and line 2 of the LC-display and, if selected, by serial interface.

With channel F2, a final evaluation only takes place after the expiry the minimum measuring time. The measured values from F2 are only shown on a 4-line LCD displayed in lines 3 and 4. Alternatively, the measured value F2 frequency can be sent via RS232.

If manual operation is active, lines 1 and 2 of the displays are used. The F1 display remains blocked during this time. The serial output of the results continues, however.

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