# 1 Q-meter

## 1.1 Goal

Create an application, which simulate the Q-meter. The application should allow to measure capacity or inductance of chosen element. The user can choose one of four unknown capacitors and one, unknown coil. When user measure capacity, he/she can choose one of four reference coils.

## 1.2 General requirements

- The application should be hierarchical and scalable. Remember to use subVIs.

- Use the Queued Message Handler (QMH).

- **Do not use state machine or flat sequence inside the QMH.**

- **Do not use local, global or shared variables.**

- Close all opened references and handlers.

- Application shouldn't crash. Inform the user about the errors using the error cluster or a dialog box.

- Remember to prepare well documented code. Especially remember about: labels on long wires, descriptions showing in context help, tip strips of controls and labels of constant values.

- **All subVIs should have intuitive icon and description, which should be shown in context help.**

- **Remember that Event Message Loop should only send the orders to Message Handler Loop.**

## 1.3 Description

- Front panel contains three sections: the Q-meter (center of front panel), the reference coil (the right part of front panel) and unknown elements (bottom part of front panel).

- User can choose the element, which would like to study (4 capacitors are represented by 4 buttons with number: 1, 2, 3 and 4 and coil is represented by button with letter "C").

- The Q-meter will start work, when *ON/OFF* control is turned on.

- The user can change the range of frequency (*Zakres f* control):

- The actual range of frequency is shown in *Wybrany zakres f* indicator in the same way as in the following table.

| Zakres f value | Range of frequency |
|---|---|
| 0 | 30-95 kHz |
| 1 | 95-300 kHz |
| 2 | 300-950 kHz |
| 3 | 950-3000 kHz |
| 4 | 3-9,5 MHz |
| 5 | 9,5-30 MHz |
| 6 | 30-75 MHz |

- The range of frequency affects the range of *Częstotliwość* control, e.g. if user choose range 30-95 kHz, the minimum value of control should be 30 and the maximum value of control should be 95.

- The user can choose the capacity of built-in capacitor by changing the value of *c_reg* and *c_reg2* controls. The *c_reg2* control is used to precise selection of the capacity. The *c_reg2* value affects *c_reg* control, e.g. if user choose the *c_reg* value as 100 and than *c_reg2* value as +5, the *c_reg* control should show 105 pF.

- The *Zakres Q* control is used to change the range of quality factor value. If the control has value 6 or smaller, the range of Q is 500. When the control has value 7, the range of Q is 250. When the control has value 8 or higher, the range of Q is 50.

- The *Dobroć* indicator is used to show the Q factor value.

## 1.4   Realization

- Use the Queued Message Handler Design Pattern, in which Event Handling Loop (EHL) will add a task and data to queue. The Message Handling Loop should realize all tasks.

- The *Calculate Q* frame inside the *Message Handling Loop* is ready to calculate the Q factor.

- Remember that user can use only one coil and one capacitor in the same time.

- The reference coil values are shown on buttons.

- The unknown elements should have values:

| Button | C or L | Q |
|---|---|---|
| 1 | 9.99 nF | 310 |
| 2 | 103 pF | 277 |
| 3 | 2.19 nF | 73 |
| 4 | 120 pF | 239 |
| C | 64,7 $\mu$H | 42 |

Please use the front panel from public folder.

Rysunek 1: The *front panel* of Q-meter.