Induction Heater Documentation

Pulse Width Modulation:

The program uses two timers, that is, timer1 and timer3

Timer 1 clock at 8MHz

Timer 1 used for PWM generation in Fast PWM mode.

ICR1 🡪 Input Capture Register for timer 1.

OCR1A 🡪 Output Compare Register A for timer 1.

TOP value from 16 bit ICR1 register and compare value from 16 bit OCR1A register.

Duty Cycle value = (OCR1A/ICR1)\*100

Timer 3 used for reading adc values to set Frequency and Duty cycle, Timer 3 clock set at 1 MHz.

Timer 3 Overflow interrupt initialized at rate = OCR3A/Timer clock.

Variables:

|  |  |
| --- | --- |
| **FC** | Used for **reading frequency** potentiometer values and to **set value of ICR1 register** |
| **DCC** | Used for **reading duty cycle** potentiometer values and to **set value of OCR1A register** |
| **perc** | Finding on time: **DCC/FC \* 100**.  Used to limit the duty cycle from 90% to 10%. |
| **UL** | Upper Limit set value for frequency. Corresponds to **minimum frequency**. |
| **LL** | Lower Limit set value for frequency. Corresponding to **maximum frequency**. |
| **mode** | flag used for selection of frequency control mode or duty cycle control mode. |
| **pwm\_flag** | Set to 1 when on button is pressed. Reset to 0 if any error occurs |
| **Error** | Flag set to 0 while no errors have occurred.  Value 1 corresponds to **Heat sensor offline**.  Value 2 corresponds to **Crucible unplugged**.  Value 3 corresponds to **Water pressure sensor offline**. |

SoftStart: Sweeps PWM from highest frequency to the current value of potentiometer.

SoftStop: Sweeps PWM from current read value of frequency to the highest frequency and switches off PWM.