I²C Communication Protocol

For PFLOW products with the I²C interface User Reference

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1 APPENDIX: I2C Commands Temperature

1.1 Read ambient and gas temperature

Ambient temperature command code: 0x003F
Gas temperature command code: 0x0040

This command is used to read the current instant temperature. The temperature consists of 2-Bytes value, which are combined with 1-byte CRC to give a 3 Byte data package:

MSB		LSB
Byte-1	Byte-2	Byte-3
Temp1	Temp2	CRC

1.1.1 Procedure

This command is a “pure” command (which has no command values). The procedure is as follows:

1. The master sends a start bit;
2. The master sends “slave address + write bit”, and the slave acknowledges it;
3. The master sends the command code “0x003F / 0x0040” (2 Bytes), and the slave acknowledges it;
4. The master sends a re-start bit (master keeps bus active). There is no stop-bit!
5. The master sends “slave address + read bit”, and the slave acknowledges it;
6. The slave returns the most significant Byte of the flow rate index (Byte1), and the master acknowledges it;
7. The slave returns the 2nd Byte of the flow rate index, and the master acknowledges it;
8. The slave returns the 3rd Byte of data, which is CRC8 of Byte1 and Byte2, and the master acknowledges it;
9. The master sends a stop bit.

1.1.2 Note

The actual temperature is then calculated by:
Measured temperature = Data (2-Byte, DEC) / 100

E.g.:
Received flow data from the sensor: 09 2C
The flow rate: 092C (HEX) = 2348 (DEC) / 100 = 23.48 °C

1.1.3 Sample code

```
#include <Wire.h>
uint8_t address_PFLOW = 0x50;
uint8_t Readflow [6];

/// setting up the interface:
void setup()
{
Wire.begin();
Wire.setClock(100000);      // i2c clock set to 100kHz
Serial.begin(9600);   // initialize Serial Protocol. Change baudrate if
necessary
while (!Serial);
}

// Read Ambient temperature
uint8_t Readtempamb[3];
 Wire.beginTransmission(address_PFLOW);
  Wire.write(0x00);
  Wire.write(0x3F);
  Wire.endTransmission(false);
  Wire.requestFrom(address_PFLOW,3);
    for (int i=0; i<3; i++) {
     Readtempamb[i] = Wire.read();
     }
  delay(10);

// Read medium temperature
uint8_t Readtempmed[3];
 Wire.beginTransmission(address_PFLOW);
  Wire.write(0x00);
  Wire.write(0x40);
  Wire.endTransmission(false);
  Wire.requestFrom(address_PFLOW,3);
    for (int i=0; i<3; i++) {
        Readtempmed[i] = Wire.read();
      }
// calculation to grad C
long TempAmb = ((long)Readtempamb[0] << 8) + (long)Readtempamb[1];
float TempAmbC = (float)TempAmb/100;

long TempGas = ((long)Readtempmed[0] << 8) + (long)Readtempmed[1];
float TempGasC = (float) TempGas/100;

//Display values in the Serial monitor:
Serial.print(" Tamb [C]: ");
Serial.print(TempAmbC);

Serial.print(" Tgas[C]: ");
Serial.print(TempGasC);

Serial.print("\n");
delay(1000);
}
```

2 References:

[1] I²C-Bus Specification and User Manual, Philips Semiconductors (now NXP Semiconductors). Rev. 03, 19 June 2

[2] PFLOW I2C communication protocol V2_1_2, Angst + Pfister Sensors and Power 2023

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