



# iLOG

## Internet enabled RTU/Data loggers

### iLog-GSM/EDM: Tutorial

Vers. 1.2-3.4/2.0 – August 2006

## 1. Introduction

iLOG™ is a new generation digital RTU/data logger incorporating full Internet capabilities. This step by step tutorial intends to make you familiar with the advanced system capabilities, quickly and easily.

### What you need:

- An iLOG-GSM unit or iLOG-EDM unit with external GSM/GPRS modem. Recommended modems are Wavcom FASTRACK & Multitech MTCBA modems and Siemens TC35.
- A valid GSM SIM card with data/fax services enabled, so that the device will be capable of establishing data calls to an ISP provider.
- A valid internet account with dial up connectivity service.
- A valid email account for data transfer.
- A mobile phone
- A PT100 temperature sensor

### What you learn:

- Preparing the unit for a temperature measurement and recording. Setting the alarm limits and other alarm parameters.
- Get an alarm SMS.
- Get an alarm email.
- Receive the recorded data in an email attachment.
- Remote control the unit with your mobile phone.

## 2. Setting up a temperature measurement & recording

The most common type of RTD is the platinum resistance thermometer (PRT), with a practical operating range of -250 to 850°C. The most frequently used PRT is the Pt100 - so called because it has a resistance of 100  $\Omega$  at 0°C. Figure 1 contains the resistance-temperature curve for a PT100 sensor.

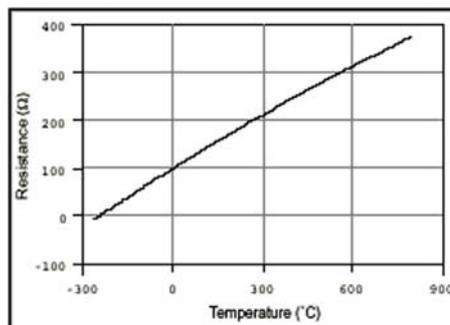
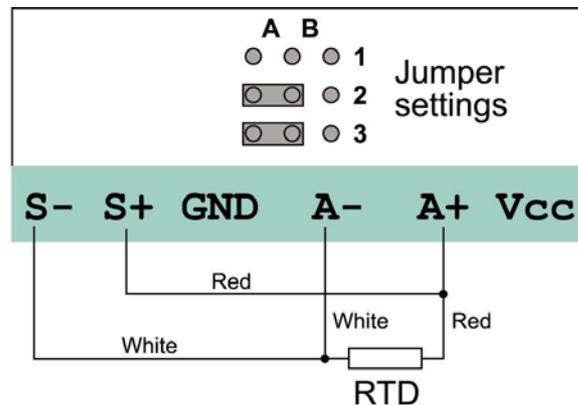


Figure 1. Resistance-Temperature Curve for a 100  $\Omega$  Platinum RTD

## 2. 1 Wiring

Connect the SCT-04 adaptor to the iLOG unit.

- Do not plug in or unplug the 25 pin D-connector during operation.
- iLOG-EDM: See section 2.3.2 of the iLOG User Guide V2.2 for wiring an external modem.
- Do not install the SIM card yet.
- Wire the PT100 sensor according to Figure 2 and put the jumpers to the 0-1V range position.



**Figure 2.** Wiring the PT100 sensor on the SCT-04 terminals.

Measurement is accomplished by driving a current through the sensor and measuring the voltage drop across it. The internal current source is used for the excitation of the RTD sensor by driving a current of 1.24 mA. The input voltage drop is in the 0-1V range.

- Complete the wiring by connecting the power supply to the SCT-04 adaptor.
- Power up the unit and set the Real time clock to the current date and time:  
(Menu) > Commissioning > Set RTC
- Power up the unit and execute the **Factory settings procedure**, so that all device parameters are reset.  
(Menu) > Commissioning > Factory Settings

Press <OK> and wait until the Factory settings procedure is completed.

## 2. 2 Setting the measurement parameters

### 2.2.1 Calculations

The measurement range to set is  $-50 \dots 595^{\circ}\text{C}$ . The PT100 resistance is  $100\Omega$  at  $0^{\circ}\text{C}$  and  $138.5\Omega$  at  $100^{\circ}\text{C}$ . The resistance change in this almost linear section is  $0.385\Omega/^{\circ}\text{C}$ . Using this scaling factor and assuming an overall linear characteristic:

The input voltage drop at  $-50^{\circ}\text{C}$  (**Scale low parameter**) is calculated to:

$$V_{in} = (100 - 0.385 \cdot 50)\Omega \cdot 0.00124\text{ A} = 0.1001\text{ V}$$

The input voltage of the internal A/D converter is:

$$V_{adc} = 0.1001\text{ V} \cdot \text{Gain} = 0.1001\text{ mV} \cdot 10 = 1001\text{ mV}$$

The converted value is **1001**. This is the raw reading at scale low (**Sensor low parameter**).

The voltage drop at 595 °C (Scale high parameter) is:

$$V_{in} = (100 + 0.385 \cdot 595) \Omega \cdot 0.00124 \text{ A} = 0.408053 \text{ V}$$

$$V_{adc} = 0.408053 \text{ V} \cdot \text{Gain} = 0.408053 \text{ V} \cdot 10 = 4081 \text{ mV}$$

The converted value is **4081**. This is the raw reading at scale high (**Sensor high parameter**).

### 2.2.2 Settings

Power up the unit and enter the menu by pressing **<MAIN>** and entering the default password **<2466>**.

**(Menu) > Setup > Measurement > Analog IN > Select channel > 1**

- Select the submenu '**Description**' and enter a naming for channel 1, e.g. → **Room temperature**. Press **<OK>** to save the entry.
- Select the submenu '**Unit**' and use the arrow keys to select the measurement unit → **°C**.
- Select the submenu '**Scale low**' and enter the value → **-50**.
- Select the submenu '**Scale high**' and enter the value → **595**.
- Select the submenu '**Sensor low**' and enter the value → **1001**.
- Select the submenu '**Sensor high**' and enter the value → **4081**.
- Select the submenu '**Linearization**' and press the **arrow keys** to select → **PT100**. This option is selected to enable PT100 sensor nonlinearity correction at lower and higher temperatures.
- Select the submenu '**Gain**' and press the **arrow keys** to select → **High**. This option sets the channel gain to 10.
- Select the submenu '**RTD supply**' and press the **arrow keys** to select → **ON**. This option is selected to declare the use of the internal current source for sensor excitation.

## 2.3 Setting the logging parameters

**(Menu) > Setup > Log > Log channels**

Press the **up arrow key** to select channel 2 and **<F1>** to deselect channel 2 for logging. Proceed in the same way to disable logging for channels 3 and 4. The 'Log channels' screen, after disabling not used channels, should be:

```

      Ch1 Ch2 Ch3 Ch4
Log : *

F1-Change   OK-Next
  
```

Press **<OK>** to save the settings. Wait until the FIFO is formatted according to the new setting. Enable alarm logging by selecting the option:

**(Menu) > Setup > Log > Logging mode**

Press **<OK>** to leave the field 'Channels' unchanged. Press **<F1>** to enable alarm logging by setting the respective option to 'YES'. Press **<OK>** to save the settings and leave the menu. A new FIFO formatting is initiated.

```

Channels: All
Alarms  : Yes
DI      : No
F1-Change   OK-Next
  
```

Now set the logging rate to **300** sec (one record every 5 minutes):

(Menu) > Setup > Log > Log rate → 300

Press <OK> to save the setting.

## 2.4 Viewing the main screen

Press 'ESC' to leave the menus and enter the main screen.

```
Room temperature
C1=25.3 °C
L=0          H=4095
02/05/06    13:12:30
```

The unit logs one record every 5 minutes according to the logging rate setting. We can see these logs by selecting the menu option:

(Menu) > View FIFO > Select channel > 1

```
Channel 1
Record:00001/00003
02/05/06 13:13:06
C1=25.2 °C
```

## 2.5 Setting the alarm limits

(Menu) > Setup > Measurements > Analog IN > Select channel > 1

- Select the submenu 'Alarm low' and enter the value → **15** (°C).
- Select the submenu 'Alarm high' and enter the value → **35.8** (°C).

(Menu) > Setup > Alarm > Prealarm → 0.9 (%)

The prealarm limit is entered in % of the total scale (645°C). The setting above means that a prealarm will be announced if the temperature exceeds the limit of 30°C (0.9%\*645°C ~ 5.8°C).

(Menu) > Setup > Alarm > Alarm deadband → 0.3 (%)

The alarm deadband is entered in % of the total scale (645°C). The setting above means that a +/-1.3°C hysteresis will be adapted near the alarm limits to prevent bouncing.

Press 'ESC' to leave the menus and enter the main screen.

Now warm the RTD sensor until the sensor temperature rises above the high alarm limit. When the temperature reaches 30°C, the prealarm is announced by turning **Output 1** on SCT-04 to 'ON'. High alarm is announced by turning the **Output 2** to 'ON' if the temperature exceeds the high alarm limit of 35.8°C. The temperature reading on the main screen starts blinking, displaying the alarm condition.

The alarm event is logged in a special alarm log:

(Menu) > View alarm log

```
02/05/06      13:16
Channel 1
High alarm
ESC-Back Anykey-Next
```

### 3. Getting an alarm SMS

#### 3.1 Installing the SIM card

With the device not powered, install the SIM card. If the SIM card has a pin number set then power up the device without SIM, and set the pin number.

**(Menu) > Setup > Communication > GSM > GSM PIN**

Type in the PIN number and press **<OK>**.

Alternatively, disable the PIN number using a mobile phone.

#### 3.2 Setting the GSM parameters

**(Menu) > Setup > Communication > GSM > GSM port → COM1**

This selection activates the SMS transmission capability on port COM1.

**(Menu) > Setup > Communication > GSM > SMS center → e.g. +306976240001**

The SMS center parameter must be set to the SMS center number of your GSM provider.

Type in your mobile phone number in the 'SMS receiver 1' parameter field.

**(Menu) > Setup > Communication > GSM > SMS receivers → SMS receiver 1 → e.g. 6944466454**

Now enable alarm announcing via SMS:

**(Menu) > Setup > Communication > Alarm send mode**

Press the **up arrow key** to select the SMS field and **<F1>** to enable alarm announcement via SMS.

```
Alarm Send Mode
EMAIL      SMS
           *
Arr-Select F1-Change
```

Press **<OK>** to save the setting.

Set the **Power save** parameter to **'OFF'** to enable modem stand by operation.

**(Menu) > Setup > Communication > Power save → OFF**

Press **'ESC'** to leave the menus and enter the main screen. The modem state LED starts blinking after establishing a connection to the GSM provider wireless network.

#### 3.2 Getting an alarm SMS

Put the RTD sensor in a glass with cold water. Wait until the sensor temperature goes under the low alarm limit (15°C). The iLOG unit initiates a SMS transmission containing the alarm announcement. You get the SMS alarm on your mobile phone.

```
iLog01 Room temperature (AI1) Low Alarm
```

## 4. Getting an alarm email

### 4. 1 Setting the TCP/IP & email parameters

(Menu) > Setup> Communication> TCP/IP Parameters> Modem type

Set the modem type:

- ILOG-GSM: Factory set to GSM P2
- iLOG EDM: Set GSM P2 for a Wavcom or Multitech GSM modem, GSM P1 for a Siemens GSM modem.

Set the appropriate ISP phone number to dial:

**ISP Phone No** → **eg. 8962555555**

Enter the internet account username required for user login:

**ISP Username** → **eg. infinite**

Enter the internet account password required for connection authentication.

**ISP Password** → **eg. Indinf2005**

Set up all email account related parameters:

(Menu) > Setup > Communication > e-mail

**e-mail SMTP** → **eg. mail.corpmail.gr**

**e-mail POP3** → not needed

**e-mail Username** → **eg. thomas@indinf.gr**

**e-mail Password** → **eg. 4554**

**e-mail Recievers** → **eg. george@indinf.gr** (your email address)

Now enable alarm annunciation via email:

(Menu)> Setup> Communication> Alarm send mode

Select the EMAIL field and press <F1> to enable alarm annunciation via email.

```

Alarm Send Mode
EMAIL      SMS
*          *
Arr-Select F1-Change

```

Now warm the RTD sensor again. Keep warming until the sensor temperature reaches the high alarm limit (35.8°C). The iLOG unit initiates an email transmission and then a SMS transmission containing the alarm annunciation. You get an SMS alarm on your mobile phone.

iLog01 Room temperature (AI1) High Alarm

Open your email client application (Outlook express, Eudora, etc.) to view the alarm email with the same text content as the SMS.

## 5. Receiving logged data in an email attachment

Set the data send rate to 30 minutes:

(Menu)> Setup> Communication> Send rate → 30

The unit will send every 30 minutes the data logged during this period.

Now enable data transmission via email:

(Menu)> Setup> Communication> Data send mode

Select the Email field and press <F1> to enable data transmission via Email.

```

Data Send Mode
EMAIL      FTP
*
Arr-Select F1-Change
  
```

Press 'ESC' to leave the menus and enter the main screen. Wait until you receive a data email.

Open the attachment file (.xls) with Excel. The file contents are similar to the following:

```

Station      iLog01

AI1          Room temperature

DATE         TIME           AI1           ALARM1
02-05-06    13:35:20      27.2
02-05-06    13:40:00      26.1
02-05-06    13:45:00      25.4
02-05-06    13:50:00      24.9
02-05-06    13:58:56      24.2
02-05-06    14:00:00      24
02-05-06    14:05:00      24.2
02-05-06    14:10:00      24.5
02-05-06    14:15:00      24.2
02-05-06    14:20:00      24.5
02-05-06    14:25:00      24

ALARM LIST
DATE         TIME           CHANNEL      TYPE
02-05-06    13:16:36      AI1          H
02-05-06    13:23:54      AI1          L
02-05-06    13:29:02      AI1          H
  
```

**Figure 3.** Data file contents

## 5. Remote control with SMS

With the unit on main screen, send a SMS at the iLOG phone number, with the following content:

**0510**

Be carefull to type in only the 4 digits, without any spaces.

You get an SMS respond with the actual measurements, similar to the following:

6944466454

```

AI1 = 24.5
DI1=0
DI2= 0
DI3= 0
DI4= 0
DO1= 0
DO2= 0
    
```

Switch the digital output control to 'User' (remote control):

**(Menu)> Digital outputs> DO mode>**

Press the **arrows** to select user controlled mode for the digital outputs and **<OK>** to save the setting.

```

Digital Outputs Mode
User
Use arrows to select
OK-Save    ESC-Back
    
```

Press **<ESC>** to leave the menus. With the unit on main screen, send a SMS with the following content:

```
0511,1,1
```

Be carefull to type in only the 4 digits without any spaces. This command will set digital output 1. You receive a SMS respond with the following contents:

```
6944466454
```

```
OK
```

Now send another SMS to reset the digital output 1:

```
0511,1,0
```

Section 8.5 of the iLOG User Guide contains a table with the available SMS and TCP commands.