



THEMA4 CONTROL SYSTEM

TH4LOG

Installation and User Manual

Document Rev.4

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INTRODUCTION

This document contains information about the Thema4 Dynamic Link Library (“TH4LOG.DLL”) version 1, a group of API's provided in the DLL form to enable Windows applications written in most languages including C, VB, C++, *Scada script* to obtain process log files from a Thema4 controller.

TH4LOG is not able to browse process reports stored in the controller and to retrieve the desired process report the filename must be supplied to the get procedure.

NOTATIONS

In this manual, these notations are used:



NOTICE

for additional notices



REFERENCE

for references to other sections



IMPORTANT NOTICE

for important notices



WARNING!!

for very important notices

DOCUMENT SECTIONS

1	HW REQUIREMENTS & SW PACKAGE
2	INSTALLATION AND USAGE
3	API SPECIFICATION
4	EXAMPLES
5	TROUBLESHOOTING & ERRORS
6	COMPATIBILITY TABLE

INDEX

1	HW REQUIREMENTS & SW PACKAGE	7
1.1	HW REQUIREMENTS	8
1.2	SW REQUIREMENTS	8
1.3	TH4LOG PACKAGE	10
2	INSTALLATION AND USAGE	11
2.1	TH4LOG INSTALLATION	12
2.2	TH4LOG USAGE	13
3	API SPECIFICATION	15
3.1	DLL'S VERSION : TH4_VERSION	16
3.2	INITIALISATION OF THE SESSION : TH4_INITSESSION	16
3.3	CONNECTION TO THEMA4 : TH4_CONNECT	17
3.4	OBTAINING A FILE : TH4_READFILE	17
3.5	CLOSING THE SESSION : TH4_CLOSE	18
3.6	DEBUGGING THE SESSION : TH4_DEBUG	18
3.7	LAST ERROR : TH4_LASTERROR	19
3.8	SETUP OF CONNECTION : TH4_SETUP	19
3.9	ERROR MESSAGES: TH4_MESSAGE	20
4	EXAMPLES	21
4.1	EXCEL EXAMPLE	22
4.2	VISUAL STUDIO EXAMPLE	23
5	TROUBLESHOOTING & ERRORS	25
5.1	CONNECTION	26
5.2	ERROR CODES	26
6	COMPATIBILITY TABLE	27
6.1	COMPATIBILITY BETWEEN TH4 SW VERSIONS AND TH4LOG VERSIONS	28

FIGURES

Figure 1	– Remote station enabled for TH4LOG	8
Figure 2	– Remote stations enabled for TH4LOG and Remote GUI	8
Figure 3	– Option TH4Log enabled for sw version W29.2 and next	9
Figure 4	– SCADA communication by FECF protocol enablement	9
Figure 5	– TH4LOG folder structure in host PC	12
Figure 6	– Copy the file th4log.dll inside the WINDOWS directory	12
Figure 7	– Connect to THEMA4	13
Figure 8	– Excel example	22
Figure 9	– Visual Studio example	23

TABLES

Table 1	– Compatibility table	28
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Section 1

THEMA4 CONTROL SYSTEM

1 HW REQUIREMENTS & SW PACKAGE

1.1 - HW REQUIREMENTS

1.2 - SW REQUIREMENTS

1.3 - TH4LOG PACKAGE

1.1 HW REQUIREMENTS

In order to run TH4LOG following requirements apply:

- an host PC with ethernet card for TCP/IP connection with the Thema4
- Operative System Windows NT, 98, 2000, XP

1.2 SW REQUIREMENTS



IMPORTANT NOTICE

It is important that the account used in the host PC has an ADMINISTRATOR account

To enable the connection between Thema4 and host PC is necessary to enable the remote access in the authorization file:

For sw version previous to W29.2

The TH4LOG program requires a remote station enabled on the Thema4 controller

Station Configuration	
Primary:	60.0.0.24
Subnet mask:	255.255.255.0
Remote 1:	60.0.0.4

Figure 1 – Remote station enabled for TH4LOG

if it is necessary to use at the same time the Remote GUI and TH4LOG, the controller needs to be configured with two remote station and the applications must be installed on two different host PCs.

Station Configuration	
Primary:	60.0.0.24
Subnet mask:	255.255.255.0
Remote 1:	60.0.0.4
Remote 2:	60.0.0.11

Figure 2 – Remote stations enabled for TH4LOG and Remote GUI

For sw version W29.2 and next

The TH4Log option must be enable the Option list displayed in the Autohrization Parameters.

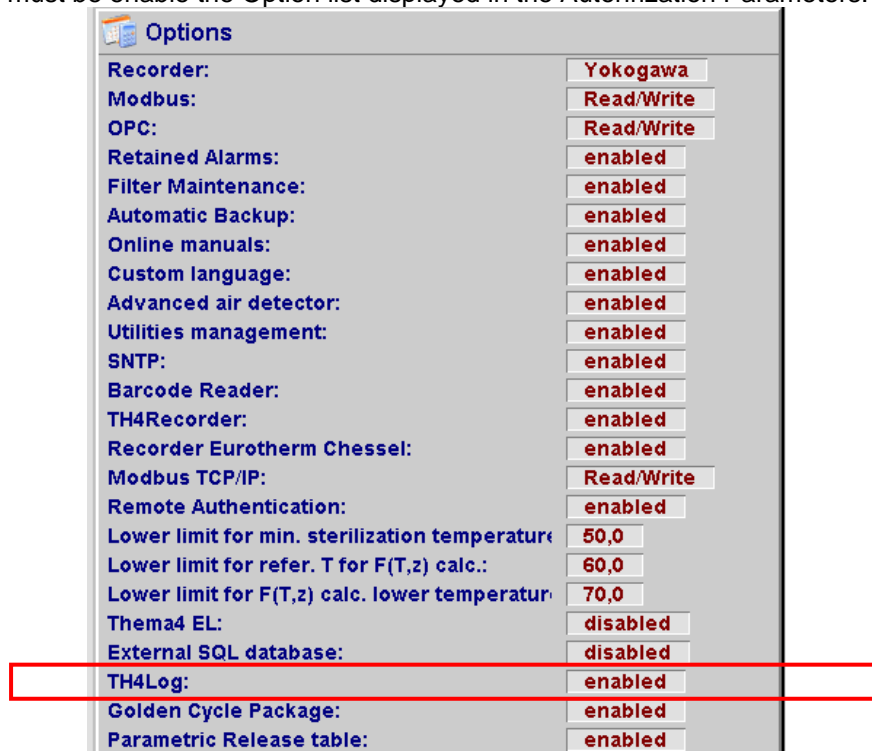


Figure 3 – Option TH4Log enabled for sw version W29.2 and next

If the TH4LOG option is enabled, to enable the connection is necessary also to enable the SCADA communication by FECP protocol in the System parameters.

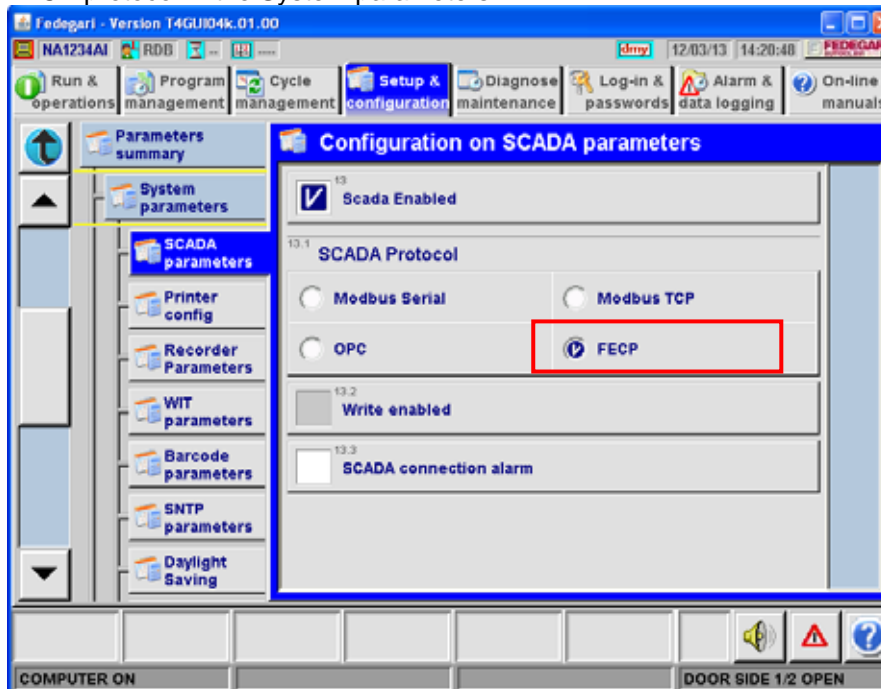


Figure 4 – SCADA communication by FECP protocol enablement

1.3 TH4LOG PACKAGE

The TH4LOG software package includes:

- **CD-ROM labeled TH4LOG vx.yy** (where x.yy is the version of the program) that includes:
 - **SOFTWARE**
 - API's packaged as a DLL
 - a LIB to link the DLL in a C program
 - **EXAMPLES**
 - an Excel™ spreadsheet to test the DLL
 - a C source code with an header file to test the LIB
 - **DOCUMENTATION**
 - TH4LOG Installation and User Manual (document #125190) in PDF format
- **Hard copy of TH4LOG Installation and User Manual (document #125190) in paper format**

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Section 2

THEMA4 CONTROL SYSTEM

2 INSTALLATION AND USAGE

2.1 - TH4LOG INSTALLATION

2.2 - TH4LOG USAGE

2.1 TH4LOG INSTALLATION

To install TH4LOG operate as follows:

1. Create on C:\ disk of host PC a folder named "TH4LOG"
2. Copy inside the TH4LOG folder the content of sw CD-ROM., The result should be the same displayed below:



Figure 5 – TH4LOG folder structure in host PC

3. Copy the file **th4log.dll** (in C:\TH4LOG\bin\) inside the WINDOWS directory to install the DLL

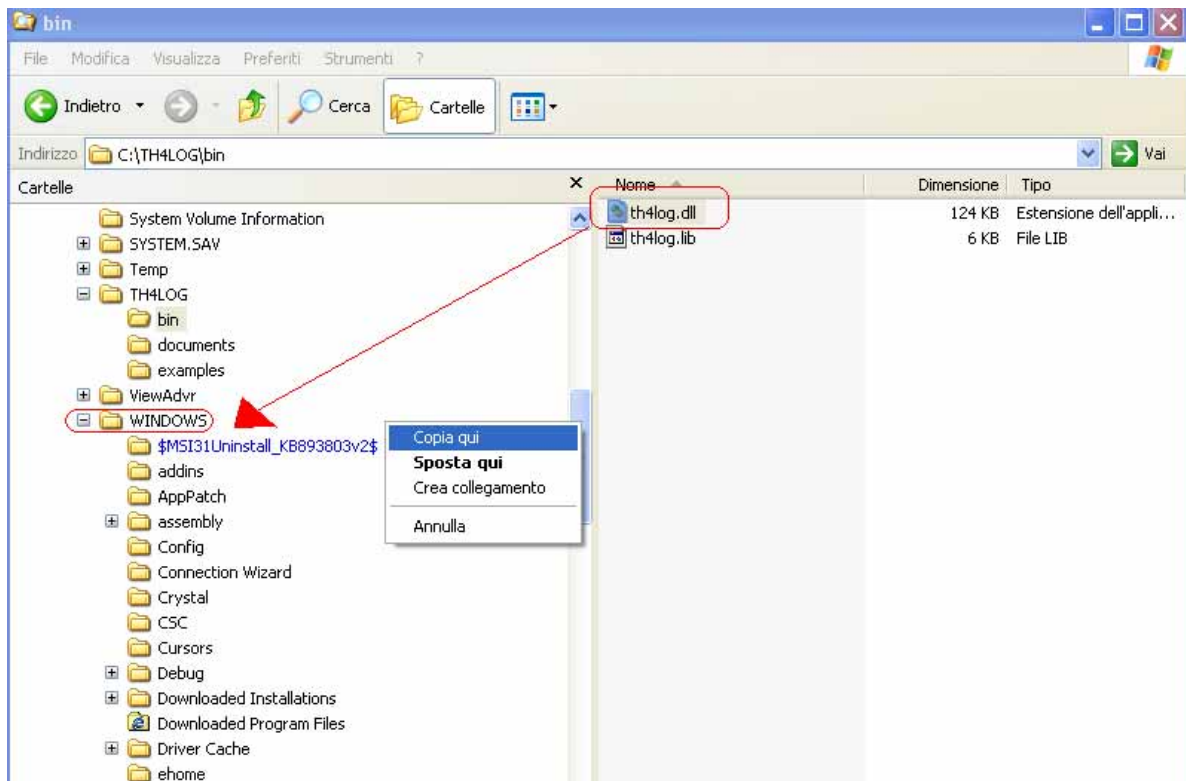


Figure 6 – Copy the file th4log.dll inside the WINDOWS directory

4. LIB installation: no specific installation is required; th4log.lib need just to be copied into a directory where it can be seen from the Visual Studio

2.2 TH4LOG USAGE

The DLL contains API's that allows to read process report files from the Thema4 controller. To obtain files from the controller it is necessary to perform the following steps:

1. Initialise the session for the connection

This initialises internal data structures and attempts to establish a link over the TCP/IP to the Thema4. The result of this call is a handle which should be used to all subsequent calls.

2. Connect to the Thema4

This performs a connection request with the Thema4. This involves verifying that the PC has access rights to the Thema4 and that it is configured for the correct version.

When the TH4LOG program is connected to THEMA4, a SCADA session is displayed in the list of logged sessions

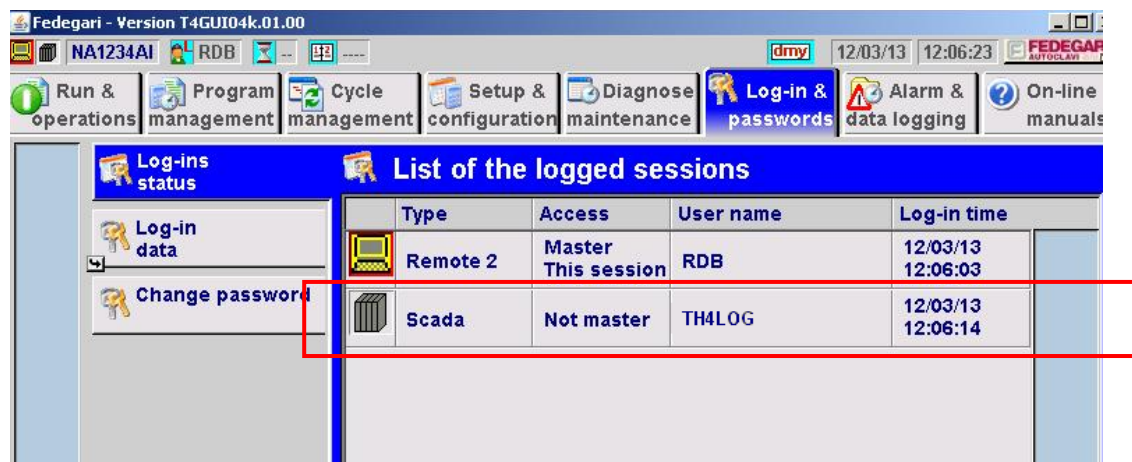


Figure 7 – Connect to THEMA4

3. Read any number of files

Specifying the remote file name and optional local filename this command is used for obtaining the file from the Thema4. This command can be called as many times as needs be before closing the session.

The file name can be obtained merging the sterilizer ID, the process report number (5 digit) and the ".log" extension. Here is some examples:

a) If there is no sterilizer ID, for process report number 82 the file name is:
"00082.log"

If there is sterilizer ID "NA1147AL", for process report number 82 the file name is:
"NA1147AL00082.log"

4. Close the connection

When finished with the connection it should be closed. This makes it available for other users.

There are additional commands for

- 5 Configuring the connection
- 6 Obtaining English error messages
- 7 Obtaining version number of DLL
- 8 Logging actions that are being performed.

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Section 3

THEMA4 CONTROL SYSTEM

3 API SPECIFICATION

3.1 - DLL'S VERSION : TH4_VERSION

3.2 - INITIALISATION OF THE SESSION :
TH4_INITSESSION

3.3 - CONNECTION TO THEMA4 : TH4_CONNECT

3.4 - OBTAINING A FILE : TH4_READFILE

3.5 - CLOSING THE SESSION : TH4_CLOSE

3.6 - DEBUGGING THE SESSION : TH4_DEBUG

3.7 - LAST ERROR : TH4_LASTERROR

3.8 - SETUP OF CONNECTION : TH4_SETUP

3.9 - ERROR MESSAGES: TH4_MESSAGE

This is a list of API's contained in the TH4LOG package. All API's return a 32 bit long error code.

3.1 DLL'S VERSION : TH4_VERSION

This function returns the version of the DLL as a float/single. This can be used for verifying that the correct version.

Arguments: None

Result : Version number

C definition:

```
float th4_version(void)
```

VB definition:

```
Private Declare Function th4_version Lib "th4log" () As Single
```

3.2 INITIALISATION OF THE SESSION : TH4_INITSESSION

This function must be used to initialise the connection session and must be the first API called if a file is to be obtained

Arguments:

Thema4 Version number : eg. 15 for W15 (or 2901 for W29.1)
IP Address or name of Thema4 eg. 192.0.0.1

Result : Handle of the session or 0 if failed. To obtain the error call th4_lasterror

C definition:

```
long th4_initSession(int asl_version, /* Version number eg. 15*/  
                    char *apc_address /* IP address or name */)
```

VB definition:

```
Private Declare Function th4_initSession Lib "th4log" (ByVal version As Long, ByVal  
ipaddress As String) As Long
```


3.3 CONNECTION TO THEMA4 : TH4_CONNECT

This function connects the PC to the Thema4 and verifies the version and authentication of the connection

Arguments: Handle returned from the th4_initSession

Result : Status with 0 meaning Ok otherwise an error number

C definition:

```
unsigned long th4_connect(long asl_handle)
```

VB definition:

```
Private Declare Function th4_connect Lib "th4log" (ByVal handle As Long) As Long
```

3.4 OBTAINING A FILE : TH4_READFILE

This function can be used for obtaining a log file. Note that it is not necessary and in fact recommended not to initialise and connect for every file. Connect once and read the files many times

Arguments:

Handle : The handle returned from the th4_initSession

Remote File : The remote file name

Local file : The local file name or NULL if the same as remote

Result : Status with 0 ok otherwise error code

C definition:

```
unsigned long th4_readFile(long asl_handle,          /* Session handle */
                           char *apc_remote_file, /* Remote */
                           char *apc_local_file    /* Local */)

```

VB definition:

```
Private Declare Function th4_readFile Lib "th4log" (ByVal handle As Long, ByVal
remotefile As String, ByVal localfile As String) As Long

```

3.5 CLOSING THE SESSION : TH4_CLOSE

This function should be called to close the session.

Arguments:

Handle : Address of handle

Result :

Status : 0 or error code

C definition:

```
unsigned long th4_close(long *apl_handle)
```

VB definition:

```
Private Declare Function th4_close Lib "th4log" (handle As Long) As Long
```

3.6 DEBUGGING THE SESSION : TH4_DEBUG

This function can be used for enabling debugging and logging which can be useful. When enabled a file c:\th4log.txt is created containing information on APIs called and their status

Arguments:

Debug on (1) or off (0)

Result :

0

C definition:

```
unsigned long th4_debug(long asl_debug)
```

VB definition:

```
Private Declare Function th4_debug Lib "th4log" (debug As Long) As Long
```

3.7 LAST ERROR : TH4_LASTERROR

This function can be used for obtaining the last error code

Arguments:

None

Result :

The last error code

C definition:

```
unsigned long th4_lasterror(void)
```

VB definition:

```
Private Declare Function th4_lasterror Lib "th4log" () As Long
```

3.8 SETUP OF CONNECTION : TH4_SETUP

This function can be used for setting up the connection and making some fine adjustments to the way the connection works

Arguments:

Connection timeout in milliseconds
Receive message timeout in milliseconds
Send message timeout in milliseconds
Hour difference between PC and Thema4
Interval between keep alive message
Retries for keep alive message

Result :

0 or error code

C definition:

```
unsigned long th4_setup(long asl_conn_timeout,  
                        /* Connection timeout -1 (default) */  
                        long asl_rcv_timeout,  
                        /* Receive timeout -1 (default) */  
                        long asl_send_timeout,  
                        /* Send timeout -1 (default) */  
                        long asl_hour_delta,  
                        /* Hour difference */  
                        int asi_keepalive_interval,  
                        /* Keep alive interval */  
                        int asi_keepalive_retries  
                        /* Keep alive retries */  
                        )
```

VB definition:

```
Private Declare Function th4_setup Lib "th4log" (ByVal conn_timeout as Long, ByVal  
rcv_timeout as Long, ByVal send_timeout as Long, ByVal hour_delta as Long, ByVal  
keepalive_interval as Integer, ByVal keepalive_retries as Integer) As Long
```

3.9 ERROR MESSAGES: TH4_MESSAGE

This function can be used to retrieve a brief message explaining the error.

Arguments:

Error number
String buffer where to put message

Result : 0 or error code if the message is not available

C definition:

```
unsigned long th4_message(long asl_code, /* error number */  
                          char *apc_message, /* message buffer */)
```

VB definition:

```
Private Declare Function th4_message Lib "th4log" (ByVal code as Long, ByRef  
message as String) As Long
```

Section 4

THEMA4 CONTROL SYSTEM

4 EXAMPLES

4.1 - EXCEL EXAMPLE

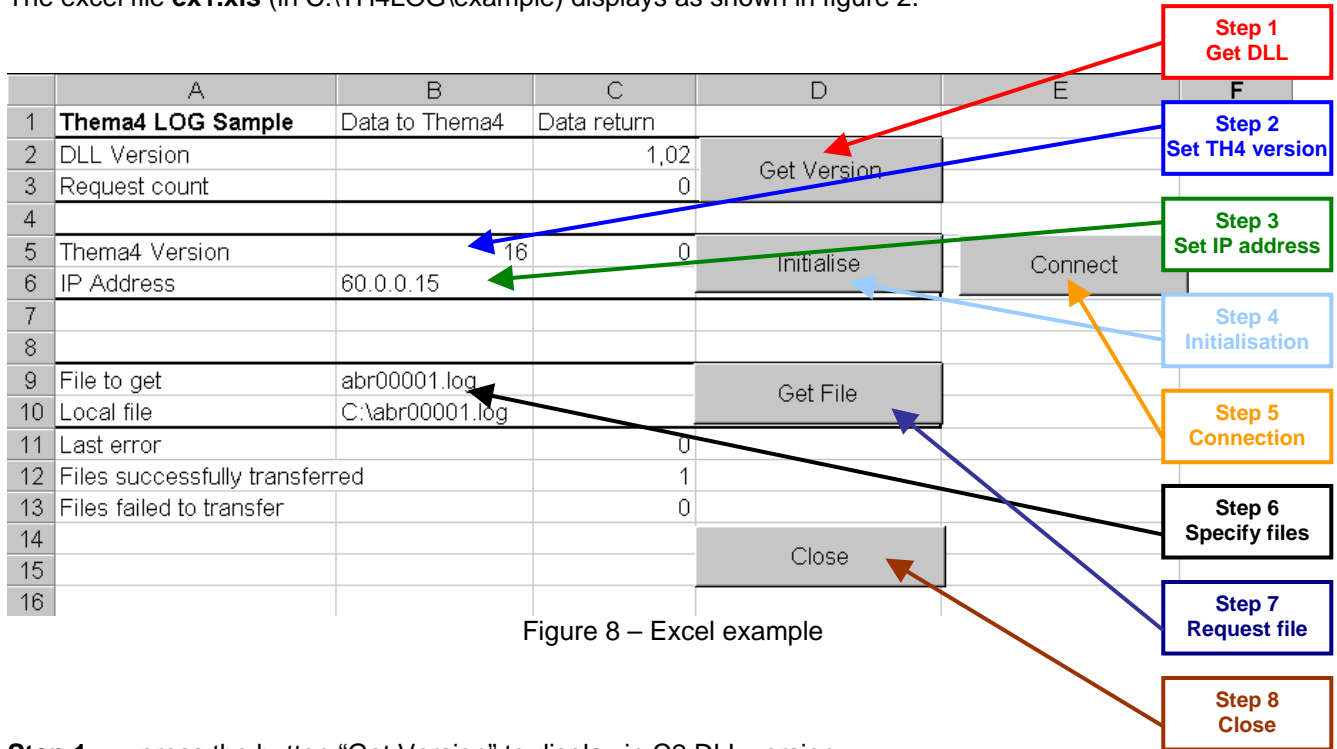
4.2 - VISUAL STUDIO EXAMPLE

The TH4LOG package contains two examples

- ex1.xls is a simple Visual Basic example using Excel VBA to show DLL usage
- th4test.c is a simple C program to show LIB usage

4.1 EXCEL EXAMPLE

The excel file **ex1.xls** (in C:\TH4LOG\example) displays as shown in figure 2.



Step 1: press the button “Get Version” to display in C2 DLL version

Step 2: insert into B5 the number of the Thema4 controller software version to talk to (e.g. type 13 if a W13, 15 if a W15)

Step 3: insert the “IP address” of the Thema4 controller

Step 4: Press the button “Initialise”. If no error occurs, the “Request count” is increased but the “Last error” is still 0.

Step 5: Press the button “Connect”. If no error occurs the “Request count” is increased but the “Last error is still 0”.

Step 6: Set filenames of the “File to get” and the “Local file”. The “File to get” must be an existing process report.

Step 7: Press the button “Request file” to get the file. If successful the “Files successfully transferred” increases.

Step 8: Press the button “Close” to drop connection.

4.2 VISUAL STUDIO EXAMPLE

Be sure to put the th4log.lib file in a folder where Visual Studio can see it and add it to the linker list of lib files. Insert the file th4test.c in a Console Project and then build. The program displays as in figure below.



```
C:\WINNT\system32\cmd.exe - th4test
C:\TH4log\examples>th4test
TH4 Test Version 2.0
Copyright(c) 2005. Fedegari SpA, Italy
TH4Log DLL version: 2.32

Select from the list below:
 1=Initialise                2=Connect
 3=Getfile                   4=Sendfile
 5=Close connection          6=Setup <defaults>
 7=Debug                     8=Software Version
 9=Change directory          10=Generate file list
11=Delete file               12=Copy file
13=Rename file               14=File exists
15=Recursive file list       16=Login
17=Loop test on last command 18=Connect test
 0=Exit
Select ?
```

Figure 9 – Visual Studio example

To perform the test follow the same steps as in the previous example

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Section 5

THEMA4 CONTROL SYSTEM

5 TROUBLESHOOTING & ERRORS

5.1 - CONNECTION

5.2 - ERROR CODES

Some common explanation of common errors. To assist in troubleshooting enable logging using the th4_debug(1) API.

5.1 CONNECTION

First check that the PC can communicate with the Thema4.

1. Try the DOS command ping <ipaddress> to determine if connected – If not make sure that the two are physically connected and on the same subnet mask
2. If connected check that the Remote PC is licensed for this Thema4.
3. If licensed verify what error is being reported

5.2 ERROR CODES

Some common error codes:

Number : 32899128

Explanation : Already connected

Cause & Remedy : Only one connection can be supported at a time. Make sure that this is already not a connection

Number : 32899137

Explanation : Illegal state for command

Cause & Remedy : A specific API was called and probably in the wrong order eg. not yet connected or initialised. Make sure the APIs are called in the correct order

Number : 32899138

Explanation : Unknown remote device

Cause & Remedy : The IP address or name is invalid. Check the validity of the name

Number : 32899139

Explanation : Invalid handle passed into API

Cause & Remedy : The API called was passed an invalid handle. Check that the handle is the value returned to th4_initSession

Number : 3670019

Explanation : File not found

Cause & Remedy : The requested file on the thema4 could not be found. Check that the name is correct and that the file exists.

Number : 21

Explanation : The device is not ready.

Cause & Remedy : The local file could not be created due to device not ready

Number : 5

Explanation : Access is denied

Cause & Remedy : The local file could not be created probably due to file being read only

Section 6

THEMA4 CONTROL SYSTEM

6 COMPATIBILITY TABLE

6.1 - COMPATIBILITY BETWEEN TH4 SW VERSIONS AND TH4LOG VERSIONS

6.1 COMPATIBILITY BETWEEN TH4 SW VERSIONS AND TH4LOG VERSIONS

The TH4DLL communicates with Thema4 by means of FECF protocol. For this reason Thema4 controller software version and DLL version are linked together and this information is needed at initialisation time. The following table shows relationship between Wx and DLL versions:

Thema4 controller software version	DLL version							
	1.03	2.31	2.32	2.33				
W12	x	x	x	(1)				
W13	x	x	x					
W14	x	x	x					
W15	x	x	x					
W16	x	x	x					
W17	x	x	x					
W18		x	x					
W18.1		x	x					
W19		x	x					
W20		x	x					
W21		x	x					
W22		x	x					
W22.1		x	x					
W23		x	x					
W23.1		x	x					
W23.2		x	x					
W23.3		x	x					
W23.4		x	x					
W23.5		x	x					
W24		x	x					
W24.1		x	x					
W24.2		x	x					
W25		x	x					
W26		x	x					
W27		x	x					
W27.1		x	x					
W28		x	x					
W29		x	x					
W29.1		x	x					
W29.2				(2)				
W29.3								
W30								
W31.								
W32								
W33								
W34								
W35								
W35.1								
W36								
W36.1								
W36.2								
W36.2								
W36.3								
W36.4								
W36.5								
W37				(1)				
W37.1				x				

Table 1 – Compatibility table

**IMPORTANT NOTICE**

- (1) *Sw version compatible with DLL version but not tested***
- (2) *Sw version not compatible with DLL***