

Integrating a Network Enabled Temperature Guard Device

Disclaimer:

The information and code provided in this document is provided "as is" without warranty of any kind. Microtechnologies, Inc. disclaims all warranties, either express or implied, including the warranties of merchantability and fitness for a particular purpose. In no event shall Microtechnologies, Inc. or its suppliers be liable for any damages whatsoever including direct, indirect, incidental, consequential, loss of business profits or special damages, even if Microtechnologies, Inc. or its suppliers have been advised of the possibility of such damages. Some states do not allow the exclusion or limitation of liability for consequential or incidental damages so the foregoing limitation may not apply.

There are two methods for integrating a network enabled Temperature Guard device into an existing monitoring application or custom software application.

- **TGInterface DLL Usage** - Using the TGInterface ActiveX DLL to interface with a network enabled Temperature Guard device by calling DLL methods.
- **Temperature Guard Protocol Integration** – Using the Temperature Guard Protocol in any programming language to interface on a byte-by-byte level with a network enabled Temperature Guard device.

TGInterface DLL Usage

The TGInterface DLL and reference material can be downloaded from <http://www.TemperatureGuard.com/DCP/TGInterface.zip>.

The TGInterface DLL is an ActiveX DLL that can be used to communicate with network enabled Temperature Guard devices MOLLY303, MOLL304, VM500-5E-DCP-E, VM500-8-DCP-E, VM500-10E-DCP-E, VM520-DCP-E, VM540-DCP-E, and VM508E

Once the DLL has been installed and registered it can be used in Visual Basic, VBScript applications.

Documentation on using the ActiveX DLL is installed on the computer or can be viewed online at <http://www.temperatureguard.com/Manuals/TGInterfaceDLLReference.htm>.

Temperature Guard Protocol Integration

Open a TCP/IP socket connection to the unit at port 10001.

Send a 60 byte string with the first four bytes set to 0x3f 0xcd 0xdc 0x00, this is the command. Set the remaining 56 bytes to 0x00.

The Temperature Guard will immediately respond with a 60 byte string. The first four bytes of the string will be the command. The remaining bytes are defined below.

Data is returned as a signed integer made up of two bytes, a low byte and a high byte. Extract the two bytes from the string and convert it to a signed decimal value. An example written in Visual Basic is included at the end of the document.

VM500-5-DCP-E and VM500-10-DCP-E

<u>Byte #</u>	<u>Return String</u>
1	0x3F (command byte 1)
2	0xCD (command byte 2)
3	0xDC (command byte 3)
4	0x00 (command byte 4)
5	Temperature Sensor 1 Reading high byte (degrees, 1000 if sensor not connected)
6	Temperature Sensor 1 Reading low byte (degrees)
7	Temperature Sensor 1 Time out of limits high byte (minutes)
8	Temperature Sensor 1 Time out of limits low byte (minutes)
9	Temperature Sensor 1 Out of limits state (1 = out of limits)
10	Temperature Sensor 2 Reading high byte (degrees, 1000 if sensor not connected)
11	Temperature Sensor 2 Reading low byte (degrees)
12	Temperature Sensor 2 Time out of limits high byte (minutes)
13	Temperature Sensor 2 Time out of limits low byte (minutes)
14	Temperature Sensor 2 Out of limits state (1 = out of limits)
15	Temperature Sensor 3 Reading high byte (degrees, 1000 if sensor not connected)
16	Temperature Sensor 3 Reading low byte (degrees)
17	Temperature Sensor 3 Time out of limits high byte (minutes)
18	Temperature Sensor 3 Time out of limits low byte (minutes)
19	Temperature Sensor 3 Out of limits state (1 = out of limits)
20	Temperature Sensor 4 Reading high byte (degrees, 1000 if sensor not connected)
21	Temperature Sensor 4 Reading low byte (degrees)
22	Temperature Sensor 4 Time out of limits high byte (minutes)
23	Temperature Sensor 4 Time out of limits low byte (minutes)
24	Temperature Sensor 4 Out of limits state (1 = out of limits)
25	Temperature Sensor 5 Reading high byte (degrees, 1000 if sensor not connected)
26	Temperature Sensor 5 Reading low byte (degrees)
27	Temperature Sensor 5 Time out of limits high byte (minutes)
28	Temperature Sensor 5 Time out of limits low byte (minutes)
29	Temperature Sensor 5 Out of limits state (1 = out of limits)
30	Temperature Sensor 6 Reading high byte (degrees, 1000 if sensor not connected)
31	Temperature Sensor 6 Reading low byte (degrees)
32	Temperature Sensor 6 Time out of limits high byte (minutes)
33	Temperature Sensor 6 Time out of limits low byte (minutes)
34	Temperature Sensor 6 Out of limits state (1 = out of limits)
35	Temperature Sensor 7 Reading high byte (degrees, 1000 if sensor not connected)
36	Temperature Sensor 7 Reading low byte (degrees)
37	Temperature Sensor 7 Time out of limits high byte (minutes)
38	Temperature Sensor 7 Time out of limits low byte (minutes)
39	Temperature Sensor 7 Out of limits state (1 = out of limits)
40	Temperature Sensor 8 Reading high byte (degrees, 1000 if sensor not connected)
41	Temperature Sensor 8 Reading low byte (degrees)
42	Temperature Sensor 8 Time out of limits high byte (minutes)
43	Temperature Sensor 8 Time out of limits low byte (minutes)
44	Temperature Sensor 8 Out of limits state (1 = out of limits)
45	Door 1 State high byte (1 = closed, 0 = open, 1000 = loss of power)
46	Door 1 State low byte
47	Door 1 Time out of limits high byte (minutes)
48	Door 1 Time out of limits high byte (minutes)
49	Door 1 Out of limits state (1 = out of limits)
50	Door 2 State high byte (1 = closed, 0 = open, 1000 = loss of power)
51	Door 2 State low byte
52	Door 2 Time out of limits high byte (minutes)
53	Door 2 Time out of limits high byte (minutes)

54 Door 2 Out of limits state (1 = out of limits)
55 X
56 X
57 X
58 X
Specifies temperature measurement resolution (10 = .1°, any other number 1° resolution) If set to 10,
divide the temperature reading by 10 and display .1 degree. Else ignore. IE: Temperature returned
59 value is 354. If byte 59 is 10 the temperature is 35.4
60 Degrees °C or °F (0x43 = C, 0x46 = F)

VM500-8-DCP-E and VM508E

<u>Byte #</u>	<u>Return String</u>
1	0x3F
2	0xCD
3	0xDC
4	0x00
5	Temperature Sensor 1 Reading high byte (degrees, 1000 if sensor not connected)
6	Temperature Sensor 1 Reading low byte (degrees)
7	Temperature Sensor 1 Time out of limits high byte (minutes)
8	Temperature Sensor 1 Time out of limits low byte (minutes)
9	Temperature Sensor 1 Out of limits state (1 = out of limits)
10	Humidity Sensor 1 Reading high byte (relative humidity, 1000 if sensor not connected)
11	Humidity Sensor 1 Reading low byte (relative humidity)
12	Humidity Sensor 1 Time out of limits high byte (minutes)
13	Humidity Sensor 1 Time out of limits low byte (minutes)
14	Humidity Sensor 1 Out of limits state (1 = out of limits)
15	Temperature Sensor 2 Reading high byte (degrees, 1000 if sensor not connected)
16	Temperature Sensor 2 Reading low byte (degrees)
17	Temperature Sensor 2 Time out of limits high byte (minutes)
18	Temperature Sensor 2 Time out of limits low byte (minutes)
19	Temperature Sensor 2 Out of limits state (1 = out of limits)
20	Humidity Sensor 2 Reading high byte (relative humidity, 1000 if sensor not connected)
21	Humidity Sensor 2 Reading low byte (relative humidity)
22	Humidity Sensor 2 Time out of limits high byte (minutes)
23	Humidity Sensor 2 Time out of limits low byte (minutes)
24	Humidity Sensor 2 Out of limits state (1 = out of limits)
25	Temperature Sensor 3 Reading high byte (degrees, 1000 if sensor not connected)
26	Temperature Sensor 3 Reading low byte (degrees)
27	Temperature Sensor 3 Time out of limits high byte (minutes)
28	Temperature Sensor 3 Time out of limits low byte (minutes)
29	Temperature Sensor 3 Out of limits state (1 = out of limits)
30	Humidity Sensor 3 Reading high byte (relative humidity, 1000 if sensor not connected)
31	Humidity Sensor 3 Reading low byte (relative humidity)
32	Humidity Sensor 3 Time out of limits high byte (minutes)
33	Humidity Sensor 3 Time out of limits low byte (minutes)
34	Humidity Sensor 3 Out of limits state (1 = out of limits)
35	Temperature Sensor 4 Reading high byte (degrees, 1000 if sensor not connected)
36	Temperature Sensor 4 Reading low byte (degrees)
37	Temperature Sensor 4 Time out of limits high byte (minutes)
38	Temperature Sensor 4 Time out of limits low byte (minutes)
39	Temperature Sensor 4 Out of limits state (1 = out of limits)
40	Humidity Sensor 4 Reading high byte (relative humidity, 1000 if sensor not connected)
41	Humidity Sensor 4 Reading low byte (relative humidity)
42	Humidity Sensor 4 Time out of limits high byte (minutes)
43	Humidity Sensor 4 Time out of limits low byte (minutes)
44	Humidity Sensor 4 Out of limits state (1 = out of limits)
45	Water Input State high byte (1 = water present, 0 = water not present, 1000 = loss of power)
46	Water Input State low byte
47	Water Input Time out of limits high byte (minutes)
48	Water Input Time out of limits high byte (minutes)
49	Water Input Out of limits state (1 = out of limits)
50	X
51	X
52	X
53	X

54	X
55	X
56	X
57	X
58	X
59	X
60	Degrees °C or °F (0x43 = C, 0x46 = F)

VM540-LV-DCP-E

<u>Byte #</u>	<u>Return String</u>
1	0x3F (command byte 1)
2	0xCD (command byte 2)
3	0xDC (command byte 3)
4	0x00 (command byte 4)
5	Temperature Sensor 1 Reading high byte (degrees, 1000 if sensor not connected)
6	Temperature Sensor 1 Reading low byte (degrees)
7	Temperature Sensor 1 Time out of limits high byte (minutes)
8	Temperature Sensor 1 Time out of limits low byte (minutes)
9	Temperature Sensor 1 Out of limits state (1 = out of limits)
10	Temperature Sensor 2 Reading high byte (degrees, 1000 if sensor not connected)
11	Temperature Sensor 2 Reading low byte (degrees)
12	Temperature Sensor 2 Time out of limits high byte (minutes)
13	Temperature Sensor 2 Time out of limits low byte (minutes)
14	Temperature Sensor 2 Out of limits state (1 = out of limits)
15	Temperature Sensor 3 Reading high byte (degrees, 1000 if sensor not connected)
16	Temperature Sensor 3 Reading low byte (degrees)
17	Temperature Sensor 3 Time out of limits high byte (minutes)
18	Temperature Sensor 3 Time out of limits low byte (minutes)
19	Temperature Sensor 3 Out of limits state (1 = out of limits)
20	Temperature Sensor 4 Reading high byte (degrees, 1000 if sensor not connected)
21	Temperature Sensor 4 Reading low byte (degrees)
22	Temperature Sensor 4 Time out of limits high byte (minutes)
23	Temperature Sensor 4 Time out of limits low byte (minutes)
24	Temperature Sensor 4 Out of limits state (1 = out of limits)
25	Power Input 1 Status high byte
26	Power Input 1 Status low byte (1 = power is on, 0 = power is off)
27	Power Input 1 Time out of limits high byte
28	Power Input 1 Time out of limits low byte
29	Power Input 1 Out of limits state (1 = out of limits)
30	Power Input 2 Status high byte
31	Power Input 2 Status low byte (1 = power is on, 0 = power is off)
32	Power Input 2 Time out of limits high byte
33	Power Input 2 Time out of limits low byte
34	Power Input 2 Out of limits state (1 = out of limits)
35	Power Input 3 Status high byte
36	Power Input 3 Status low byte (1 = power is on, 0 = power is off)
37	Power Input 3 Time out of limits high byte
38	Power Input 3 Time out of limits low byte
39	Power Input 3 Out of limits state (1 = out of limits)
40	Power Input 4 Status high byte (1 = power is on, 0 = power is off)
41	Power Input 4 Status low byte
42	Power Input 4 Time out of limits high byte
43	Power Input 4 Time out of limits low byte
44	Power Input 4 Out of limits state (1 = out of limits)
45	Aux Alarm Input Status high byte

46	Aux Alarm Input Status low byte	(1 = power is on, 0 = power is off)
47	Aux Alarm Input Time out of limits high byte	
48	Aux Alarm Input Time out of limits low byte	
49	Aux Alarm Input Out of limits state (1 = out of limits)	
50	X	
51	X	
52	X	
53	X	
54	X	
55	X	
56	X	
57	X	
58	X	
59	X	
60	Degrees °C or °F (0x43 = C, 0x46 = F)	

VM520-DCP-E

<u>Byte #</u>	<u>Return String</u>	
1	0x3F	(command byte 1)
2	0xCD	(command byte 2)
3	0xDC	(command byte 3)
4	0x00	(command byte 4)
5	Temperature Sensor 1 Reading high byte (degrees, 1000 if sensor not connected)	
6	Temperature Sensor 1 Reading low byte (degrees)	
7	Temperature Sensor 1 Time out of limits high byte (minutes)	
8	Temperature Sensor 1 Time out of limits low byte (minutes)	
9	Temperature Sensor 1 Out of limits state (1 = out of limits)	
10	Temperature Sensor 2 Reading high byte (degrees, 1000 if sensor not connected)	
11	Temperature Sensor 2 Reading low byte (degrees)	
12	Temperature Sensor 2 Time out of limits high byte (minutes)	
13	Temperature Sensor 2 Time out of limits low byte (minutes)	
14	Temperature Sensor 2 Out of limits state (1 = out of limits)	
15	Temperature Sensor 3 Reading high byte (degrees, 1000 if sensor not connected)	
16	Temperature Sensor 3 Reading low byte (degrees)	
17	Temperature Sensor 3 Time out of limits high byte (minutes)	
18	Temperature Sensor 3 Time out of limits low byte (minutes)	
19	Temperature Sensor 3 Out of limits state (1 = out of limits)	
20	Temperature Sensor 4 Reading high byte (degrees, 1000 if sensor not connected)	
21	Temperature Sensor 4 Reading low byte (degrees)	
22	Temperature Sensor 4 Time out of limits high byte (minutes)	
23	Temperature Sensor 4 Time out of limits low byte (minutes)	
24	Aux Alarm Input Status high byte	
25	Aux Alarm Input Status low byte	(1 = power is on, 0 = power is off)
26	Aux Alarm Input Time out of limits high byte	
27	Aux Alarm Input Time out of limits low byte	
28	Aux Alarm Input Out of limits state (1 = out of limits)	
29	X	
30	X	
31	X	
32	X	
33	X	
34	X	
35	X	

36	X
37	X
38	X
39	X
40	X
41	X
42	X
43	X
44	X
45	X
46	X
47	X
48	X
49	X
50	X
51	X
52	X
53	X
54	X
55	X
56	X
57	X
58	X
59	X
60	X

MOLLY303/MOLLY304

<u>Byte #</u>	<u>Return String</u>
1	0x3F (command byte 1)
2	0xCD (command byte 2)
3	0xDC (command byte 3)
4	0x00 (command byte 4)
5	Temperature Sensor 1 Reading MSB
6	Temperature Sensor 1 Reading LSB
7	Temperature Sensor 1 Time out of limits MSB (minutes)
8	Temperature Sensor 1 Time out of limits LSB
9	Temperature Sensor 1 Out of limits state (1 = out of limit, 0 = out of limits)
10	Temperature Sensor 2 Reading MSB
11	Temperature Sensor 2 Reading LSB
12	Temperature Sensor 2 Time out of limits MSB (minutes)
13	Temperature Sensor 2 Time out of limits LSB (minutes)
14	Temperature Sensor 2 Out of limits state (1 = out of limit, 0 = out of limits)
15	Door 1 State MSB (not used)
16	Door 1 State LSB (1 = closed, 0 = open)
17	Door 1 Time out of limits MSB (minutes)
18	Door 1 Time out of limits LSB (minutes)
19	Door 1 Out of limits state (0 = not out of limit, 1 = alarm)
20	Door 2 State MSB (not used)
21	Door 2 State LSB (1 = closed, 0 = open) (not used)
22	Door 2 Time out of limits MSB (minutes)
23	Door 2 Time out of limits LSB (minutes)
24	Door 2 Out of limits state (0 = not out of limit, 1 = alarm)
25-59	No Data

- 59 Specifies temperature measurement resolution (10 = .1°, any other number 1° resolution)
- 60 Degrees °C or °F (0x43 = C, 0x46 = F)

Below is a routine written in Visual Basic which is used to convert the two byte data into a signed decimal value.

Pass in: The string containing data from DCP-E and the high byte number of the data of interest.
 For example pass in 5 for Temperature Sensor 1 on a VM500-5-DCP-E

Return: Signed decimal value

```

Function ConvertBytesToDecimal(ByRef ReceiveString$, ByRef ByteNum%, ByRef ReturnValue!) As Boolean
  Dim sData!, HighByte&, LowByte&

  On Error GoTo ConvertError

  HighByte = Asc(Mid(ReceiveString, ByteNum, 1))      `Extract the data's highbyte
  HighByte = HighByte * &H100                        `Shift left
  LowByte = Asc(Mid(ReceiveString, ByteNum + 1, 1))  `Extract the data's low byte
  sData = CSng(HighByte + LowByte)                   `Add the two bytes and convert to a single data type

  `Check for negative value
  If (sData >= &H10000) Then                          `If data is negative, multiply by -1
    sData = &H10000 - sData
    sData = sData * -1
  End If

  ReturnValue = sData                                `Set return value
  ConvertBytesToDecimal = True                       `Return true

  Exit Function                                     `Exit function

ConvertError:

  ConvertBytesToDecimal = False                      `Routine failed

End Function

```