

## **Technical Document**

Version 1.0 January, 2017

# **PM Designer Function Guide**

## TN027S

## 如何使用 MQTT 功能

How to using the MQTT function.



**O**Revision Record

Revision	Date	Content	Owner

## 前言(Preface)

此技術文件是說明如何設定 MQTT, 令用戶端可經由 Mosquitto Server 訂閱訊

息.

This tech note explicated how to make the MQTT setting , publish and subscribe by Cermate HMI .

### 本文使用 PT2070 與 PM Designer Ver. 4.0.2.02 測試說明

This tech note do test by using **PM Designer Ver. 4.0.2.02** and **PT2070**.



## 步驟1:點開 MQTT Client,這邊有許多區塊,別擔心,我們會依序設定.

Step 1 : Click *MQTT Client*, there are many blocks, do not worry, we will make the setting step by step.

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步驟 2 :先將 Enable 打勾 ,然後設定 MQTT Broker 的資訊 ,你也可以在自己

的電腦架設 MQTT Broker, 這次我們使用免費的 CloudMQTT 進行測試.

Step 2 : Check the *Enable* first, then make the *MQTT Broker* setting, you also can established the *MQTT Broker* on your own PC, we do the test base on *CloudMQTT* for free.

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Application and MQTT Broker	Publish Topics	Subscription Topics
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		Format #2 (HMI_Subscribe_Topic)
	2	2
Broker: m14.cloudmqtt.com	3	3
IP Address		
Broker IP Port: 14887	5	5
SSL/TLS Encryption	6	6
User Name: cytfises	Format #1 (HMI_Publish_Topic)	
< >		8
Password: 3Trv0yEKgmbN	9	9
Client ID:		
Keep-Alive Interval: 30 V seconds		
MQTT Message Receiving Macro		
	13	13
	15	15
	16	16
		OK Canad Hala

	■ <sup>()</sup> CloudMQTT Sam -		闪 tangerinekey381@gmail.com 👻
DETAILS	Details		
SETTINGS			
CERTIFICATES	Instance info		
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LOG		14007	_
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	Websockets Port (TLS only)	34887	Upgrade Instance
	Connection limit	10	
	Reset DB		
	This will erase all stored messages and sessions. The instance wi	ll be restarted.	fill Reset DB
	API		
	API Key 13574a65-6222-4718-a7dc-a071	a31c50a1	· · · · · · · · · · · · · · · · · · ·

#### 步驟 3 : 為了建立 Publish Topic 與 Subscription Topic, 我們必須先到 Text

Format Table 先設定好選項.

Step 3 : For established *Publish Topic* and *Subscription Topic*, we have to make some setting on *Text Format Table* first.

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MQTT Message Receiving Mac	0				
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plication and MQTT Broker		Publish		Subscription	lopics
General	~	Use	ID Text Format to Compose the Topic	Use ID	Text Format to Compose the Topic
			1	☑ 1	Format #2 (HMI_Subscribe_Topic)
			2	2	
oker: m14.cloudmqtt.com			3	3	
IP Address			4	4	
oker IP Port: 14887			5	5	
SSL/TLS Encryption			6	6	
er Name: cytfises			7 Format #1 (HMI_Publish_Topic) ~	7	
<		>	8	8	
ssword: 3Trv0yEKgmbN			9	9	
ent ID:			10	10	
ep-Alive Interval: 30 $\checkmark$ secon	nds		11	11	
MQTT Message Receiving Macro			12	12	
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步驟4:選擇 HMI\_Publish\_Topic, 再點選 Property, 可以看到我們勾選

Composing MQTT Publish Topic,代表 ID:00001 這個選項我們只拿來當作 MQTT

Publish 的主題,當然你也可以合併使用,將 Subscribe 與 Publish 都勾選.

Step 4 : Choose the *HMI\_Publish\_Topic*, then click *Property*, you can see we only check the *Composing MQTT Publish Topic*, that's meaning we use the *ID:00001* for *MQTT Publish* only, of course you can check *Subscribe* and *Publish* both in the same *ID*.

	the sales and a		
ID	Name	Language 1	
00001	HMI_Publish_Topic	HMI_P	
00002	HMI_Subscribe_Topic	HMI_S	
00003	CP1250-1 Status	Temperature: %1, Pressure: %2, String: "%3"	
00004	Revelving from external	Temperature. /st, Pressure. /sz, String. /s3	
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ext Format S	Settings Settings  Settings S	languages	ок
ext Format S	Settings           Image: Image and the set of the first language for all other           ariables:	languages	OK Cancel
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ext Format S	Settings Control of the first language for all other ariables: Address	languages Data Category: Data Type: Display Type: Address: Total Digits: 4 \$ Fractional Digits: 0 \$	Cancel
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ext Format 2	Settings Address	Ianguages     Data Category:   Data Type:   Display Type:   Address:   Total Digits:   4   • <td>CK Cancel</td>	CK Cancel

步驟 5:回到 MQTT Client, 現在你已經可以依照你的設定去選擇 Publish 或

是 Subscribe 的 Topic, 如果你在上個步驟裡,將某個主題的 Publish 與

Subscribe 都勾選, 那在 MQTT Client 你在 Publish 與 Subscribe 都可以選擇.

Step 5 : Back to the *MQTT Client*, you can choose the *Publish* or *Subscription Topic* that you set in last step now .

If you check *Publish* and *Subscribe* both in the same ID , now you can choose this special topic both on the *Publish* and *Subscription Topic*.

eral MQTT Message Receiving Macro	Publish Topics Topic Use ID Text Format to Compose the Topic 1	Subscription Topics Topic Use ID Text Format to Compose the Topic
]Enable Application and MQTT Broker Application Type: General ~	Publish Topics Topic Use ID Text Format to Compose the Topic	Subscription Topics Use Topic Use ID Text Format to Compose the Topic
Application and MQTT Broker Application Type: General ✓	Publish Topics Use ID Text Format to Compose the Topic	Subscription Topics Use ID Text Format to Compose the Topic
Application Type: General V	Use ID Text Format to Compose the Topic	Topic Use ID Text Format to Compose the Topic
		✓ 1 Format #2 (HMI_Subscribe_Topic) ✓
	2	2
Broker: m14.cloudmqtt.com	3	3
IP Address	4	4
Broker IP Port: 14887	5	5
SSL/TLS Encryption	6	6
User Name: cytfises	Format #1 (HMI_Publish_Topic)	
< >	8	8
Password: 3Trv0yEKgmbN	9	9
Client ID:	10	
Keep-Alive Interval: 30 🗸 seconds		
MQTT Message Receiving Macro	12	
	13	13
	14	
	☐ 15	15
	16	☐ 16

步驟 6 :現在要講解 MQTT Message Receiving Marco 的部分 , 這個 Marco 主

要是 HMI 在 Subscribe 時候用的,如果你的 HMI 單純只使用 Publish,可以跳

#### 過此步驟.

Step 6 : Now we're going to explain how the *MQTT Message Receiving Marco* working, this Marco would be used when HMI Subscribe the other . If you only want to use the Publish function, you can skip this step.

MQTT Client	×
General MQTT Message Receiving Macro	
Macro name: NQTT_Marco V	Pi
0 0\MSG_Len= MqttGet(0\Topic[0], 0\MSG[0], 0\Topic_Len) //Get the Subcribe information	^ 0
<pre>2 0\Topic_ID = MqttChkTopic(0\Topic[0], 0\Topic_Len, 0d) //check and get the topic information 3</pre>	
4 5	-
6 0\Trigger = 0d (B) 7	
8 IF 0\Topic_ID == 1d // Subcribe Topic ID 9 0\Trigger = 1d (B)	-   1
10 ENDIF	
12 IF 0\Trigger(B)	-
13 ONResult = MqttProcMsg(4d, ONMSG[0], ONMSG_Len ) //Analyze the MSG and transfer the	- I F
15 INTemperature = ONTemperature Local (F)	-
16 1\Pressure = 0\Pressure_Local (SD)	
17 1\String[0] = MOV(0\String_Local[0], 80d)(U)	-
18 UNINGER = U(B)	-
20 ENDIF	-
	- v   -
<	<
	_

步驟7: MQTT Message Receiving Marco 第0行的功能:

當有任何訊息被 Publish 時, HMI 會用這個命令去獲取 Topic 與 Message 的長

度跟內容,然後將資料儲存到你所設定的變數內,在 AP 內,我們分別使用

**0\MSG\_Len, 0\Topic[0], 0\MSG[0], 0\Topic\_Len**, 來儲存 Message 長度, Topic

內容, Message 內容, Topic 長度.

Step 7 : The line 0 in the *MQTT Message Receiving Marco*:
HMI will use this command to capture the *Length* and *Content* of Topic and
Message when some information being Published , then save them to the variable you set in the command .

In this AP, we use the **0\MSG\_Len**, **0\Topic[0]**, **0\MSG[0]**, **0\Topic\_Len** to saving Length of Message, Content of Topic, Content of Message, Length of Topic.

MQIT Client		×
General MQTT Message Receiving Macro		
Macro name: 🗮 MQTT_Marco 🗸 New		Pi
0 MSG_Len= MqttGet(0 Topic[0], 0 MSG[0], 0 Topic_Len) //Get the Subcribe information		^
<pre>1 2 ONTopic_ID = MgttChkTopic(0\Topic[0], 0\Topic_Len, 0d) //check and get the topic information 3</pre>		
4 5 0 0 0 0		
6 UNINGGER = Ud (B)		
8 IF 0\Topic_ID == 1d // Subcribe Topic ID 9 0\Trigger = 1d (B)		! !
10 ENDIF		
12       IF       0\Trigger(B)         13       0\Result = MqttProcMsg(4d, 0\MSG[0], 0\MSG_Len )       //Analyze the MSG and transfer the		
14     IF     0\Result == 0d     //data to Text Format Table #4       15     1\Temperature = 0\Temperature Local(F)		
16 1\Pressure = 0\Pressure_Local(SD) 12 1\String[0] = MOV(0\String_Local[0] = 80d)(U)		
1 = 0 = 0(B)		
20 ENDIF		
		L
<		> <
	OK Cancel	Help

步驟 8: MQTT Message Receiving Marco 第2行的功能:

將上一步驟所取得的 Topic 長度與內容與 HMI 內所設定的 Subscription Topic 比

對 ,如果有相同的 Topic,則獲得 **0\Topic\_ID**.

Step 8 : The line 2 in the *MQTT Message Receiving Marco* :

This command will compare the Length and Content of Topic with Subscription Topic we set before in the HMI, if both of them the same, get the **0\Topic\_ID**.

MQTT Client	×
General MQTT Message Receiving Macro	
Macro name: 📓 MQTT_Marco 🗸 New	Pi
0 MSG_Len= MqttGet(0\Topic[0], 0\MSG[0], 0\Topic_Len) //Get the Subcribe information	^ [0]
2 0\Topic_ID = MqttChkTopic(0\Topic[0], 0\Topic_Len, 0d) //check and get the topic informtion	
3 4	
5 6 ONTrigger = Od (B)	
8 If UNIOPIC_ID == Id // Subcribe Topic ID 9 UNTrigger = Id (B)	
10 ENDIF	
11 12 IF 0\Trigger(B)	
13 ONResult = MqttProcMsg(4d, ONMSG[0], ONMSG_Len ) //Analyze the MSG and transfer the	—————————————————————————————————————
15     1 </td <td></td>	
16 1\Pressure = 0\Pressure_Local(SD) 17 1\String[0] = MOV(0\String_Local[0] - 80d)(II)	
18 $0$ \Trigger = $0(B)$	
19 ENDIF 20 ENDIF	
<	→ V <b>I C</b>
	OK Careed Hala

步驟 9: MQTT Message Receiving Marco 第 8-10 行的功能:

若是 0\Topic\_ID 為1則觸發 0\Trigger 這個 bit,讓他可以觸發下面的 Marco.

Step 9 : The line 8-10 in the **MQTT Message Receiving Marco** :

If the value of *O***\Topic\_ID** equal to 1, the *O***\Trigger** will be ON to triggered the Marco line 12-20 below .

MQTT Client		×
General MQTT Message Receiving Macro		
Macro name: MQTT_Marco ~ New		P
0 0\MSG_Len= MqttGet(0\Topic[0], 0\MSG[0],	ONTopic_Len) //Get the Subcribe informat	tion
2 0\Topic_ID = MqttChkTopic(0\Topic[0], 0\ 3	Topic_Len, Od) //check and get the topic	informtion
4 5		
6 O\Trigger = Od (B) 7		
8 IF 0\Topic_ID == 1d // Subcribe Topic I 9 0\Trigger = 1d (B)	D	
10 ENDIF		
12     IF     0\Trigger(B)       13     0\Result = MqttProcMsg(4d, 0\MSG[0],	0\MSG_Len ) //Analyze the MSG and tra	ansfer the
14         IF         0\Result         =         0d           15         1\Temperature         0\Temperature_Lo	<pre>//data to Text Format Tak cal(F)</pre>	ble #4
16         1\Pressure = 0\Pressure_Local (SD           17         1\String[0] = MOV(0\String_Local	) [0] , 80d)(U)	
18 0\Trigger = 0(B) 19 ENDIF		
20 ENDIF		
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<u>,</u>		
		OK Cancel Help
MQTT Client		×
General MQTT Message Receiving Macro		
	D. Atab. Tantas	Subsection Testing
Application and MQTT Broker	Publish Topic	Subscription Topics Topic
· · · · · · · · · · · · · · · · · · ·	Use ID Text Format to Compose the Topic	Use ID Text Format to Compose the Topic
		Format #2 (HMI_Subscribe_Topic)
Broker: m14.cloudmqtt.com		
IP Address		
Broker IP Port: 14887		
SSL/TLS Encryption	6	6
User Name: cytfises	Format #1 (HMI_Publish_Topic)	
Password: 3Trv0yEKgmbN		
Client ID:		
Keep-Alive Interval: 30 $\checkmark$ seconds		
MQTT Message Receiving Macro		

OK Cancel Help

步驟 10: MQTT Message Receiving Marco 第 12-20 行的功能:

MqttProcMsg 這個指令是將收到的 Message 內容對照 HMI 內所設定格式,

然後將數據解析出來,因為 MQTT Message 的內容是 String,如果要取得數

據,必須使用這個指令來進行轉換.

Step 10 : The line 12-20 in the MQTT Message Receiving Marco :

This command *MqttProcMsg* will compare the Message Content which receiving from MQTT Broker with the HMI, then analyze the data and save it to the internal memory.

Because the data type of MQTT Message is String , if you want to get the data like : Word , DWord , ASCII , etc. , you must to use this command .

0	<pre>O\MSG_Len= MqttGet(O\Topic[0], 0\MSG[0], 0\Topic_Len) //Get the Subcribe information</pre>
1	
2	ONTopic_ID = MqttChkTopic(ONTopic[0], ONTopic_Len, Od) //check and get the topic information
3	
4	
5	
6	0\Trigger = Od (B)
7	
8	IF 0\Topic_ID == 1d // Subcribe Topic ID
9	ONTrigger = 1d (B)
10	ENDIF
11	
12	IF UNITIGGET(B)
12	
13	0.Result = MqttProcMsg(4d, 0.MSG[0], 0.MSG_Len ) //Analyze the MSG and transfer the
13 14	0\Result = MqttProcMsg(4d, 0\MSG[0], 0\MSG_Len )       //Analyze the MSG and transfer the         IF 0\Result == 0d       //data to Text Format Table #4
13 14 15	0\Result = MqttProcMsg(4d, 0\MSG[0], 0\MSG_Len )       //Analyze the MSG and transfer the         IF 0\Result == 0d       //data to Text Format Table #4         1\Temperature = 0\Temperature_Local(F)
13 14 15 16	0\Result = MqttProcMsg(4d, 0\MSG[0], 0\MSG_Len )       //Analyze the MSG and transfer the         IF 0\Result == 0d       //data to Text Format Table #4         1\Temperature = 0\Temperature_Local(F)       1\Pressure = 0\Pressure_Local(SD)
13 14 15 16 17	0\Result = MqttProcMsg(4d, 0\MSG[0], 0\MSG_Len )       //Analyze the MSG and transfer the         IF 0\Result == 0d       //data to Text Format Table #4         1\Temperature = 0\Temperature_Local(F)
13 14 15 16 17 18	0\Result = MqttProcMsg(4d, 0\MSG[0], 0\MSG_Len )       //Analyze the MSG and transfer the         IF 0\Result == 0d       //data to Text Format Table #4         1\Temperature = 0\Temperature_Local(F)
13 14 15 16 17 18 19	<pre>0\Result = MqttProcMsg(4d, 0\MSG[0], 0\MSG_Len ) //Analyze the MSG and transfer the IF 0\Result == 0d //data to Text Format Table #4 1\Temperature = 0\Temperature_Local(F) 1\Pressure = 0\Pressure_Local(SD) 1\String[0] = MOV(0\String_Local[0], 80d)(U) 0\Trigger = 0(B) ENDIF</pre>
13 14 15 16 17 18 19 20	<pre>0\Result = MqttProcMsg(4d, 0\MSG[0], 0\MSG_Len ) //Analyze the MSG and transfer the IF 0\Result == 0d //data to Text Format Table #4 1\Temperature = 0\Temperature_Local(F) 1\Pressure = 0\Pressure_Local(SD) 1\String[0] = MOV(0\String_Local[0], 80d)(U) 0\Trigger = 0(B) ENDIF ENDIF</pre>
13 14 15 16 17 18 19 20	<pre>0\Result = MqttProcMsg(4d, 0\MSG[0], 0\MSG_Len ) //Analyze the MSG and transfer the IF 0\Result == 0d //data to Text Format Table #4 1\Temperature = 0\Temperature_Local(F) 1\Pressure = 0\Pressure_Local(SD) 1\String[0] = MOV(0\String_Local[0], 80d)(U) 0\Trigger = 0(B) ENDIF</pre>
13 14 15 16 17 18 19 20	<pre>0\Result = MqttProcMsg(4d, 0\MSG[0], 0\MSG_Len ) //Analyze the MSG and transfer the IF 0\Result == 0d //data to Text Format Table #4 1\Temperature = 0\Temperature_Local(F) 1\Pressure = 0\Pressure_Local(SD) 1\String[0] = MOV(0\String_Local[0], 80d)(U) 0\Trigger = 0(B) ENDIF ENDIF</pre>

Text Format Table

, 🗈 🗶			
ID	Name	Language 1	
00001	HMI_Publish_Topic	HMI_P	
00002	HMI_Subscribe_Topic	HMI_S	
00003	CP1250-1 Status	Temperature:%1,Pressure:%2,String:"%3"	
00004	Reveiving from external	Temperature:%1,Pressure:%2,String:"%3"	

舉例來說,如果你從 MQTT Broker 收到了一個 Message, 內容

是:Temperature:234.56,Pressure:-6789,String:"ASCII", MqttProcMsg 這個指令

會將收到的訊息,與 Text Format Table 的 ID0004 比對,如果長度與內容都

都完全相同,0\Result 將會等於0,並且將234.56 存 0\Temperature\_Local,

-6789 存到 0\Pressure\_Local, ASCII 存到 0\String\_Local[0]

For example, if you receive a Message from MQTT Broker, the content is : Temperature:234.56,Pressure:-6789,String:"ASCII", this command *MqttProcMsg* will compare the Message with the Content of ID0004 in the *Text Format Table*. If the length and content is Totally the same, 0\Result will be 0, and save 234.56 to *0\Temperature\_Local*, -6789 to *0\Pressure\_Local*, ASCII to *0\String\_Local[0]* 

### 步驟 11: Publish 功能說明:

## 打開 Text Format Table, 設定要發送的 Message 內容與數據.

#### Step 11: Publish Function Description:

Open Text Format Table, set the detail of Message.

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	~ 1	ID ID	Name	Language 1					
P	T2070	00001	HMI_Publish_Topic	HMI_P					
Public	ch Dage (	00002	HMI_Subscribe_Topic	HMLS					
- uon.		00003	CP1250-1 Status	Temperature: %1, Pressure: %2, String	g:"%3" 	-			
U	Text For	nat Settings	Revelving from external	Temperature: /o1, Pressure: /o2, String	y: /65	Y			
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	Use	the text of the	first language for all other language	ages		ОК			
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	%2	1'Pressure		Data Type: 32-Bit Floating Point	Data Type: 32-Bit Floating Point 🗸				
	%3	1\String[0]		Display Type: 32-bit Floating Point	t v	Composing MQTT Subscription Topic			
				Address: 1\Temperature		Composing MOTT Publish Message			
				Address, Trenperdure	lustification	Sending/Receiving Data Values			
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步驟 12: 開啟 Publish Page, 看到 ON Marco 的部分.

MqttP\_IF, 這個指令是將 Topic ID 為7的 Topic 與 Message ID 為 3的 Message

Publish, 若指令成功執行, 則 **0\Result** 為 0.

Step 12: Open the *Publish Page*, we can see the *ON Marco*.

This command *MqttP\_IF* will Publish the Topic and Message which *Topic ID* is 7 and *Message ID* is 3.

If this command execute successfully, **0** (Result will be 0.



0	O\Result = MqttP_IF(7d, 3d, 0d) //P2: Topic ID , P3: MSG ID	^
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#### MQTT Client × General MQTT Message Receiving Macro 🗹 Enable Application and MQTT Broker Publish Topics Subscription Topics Topic Use ID Text Format to Compose the Topic Application Type: General Topic Use ID Text Format to Compose the Topic $\sim$ 1 Format #2 (HMI\_Subscribe\_Topic) $\sim$ 2 2 Broker: m14.cloudmqtt.com 3 3 4 4 IP Address 5 Broker IP Port: 14887 5 6 6 SSL/TLS Encryption User Name: cytfises 7 Format #1 (HMI\_Publish\_Topic) 7 ~ 8 8 Password: 3Trv0yEKgmbN 9 9 10 10 Client ID: Keep-Alive Interval: 30 $\checkmark$ seconds 11 11 12 12 MQTT Message Receiving Macro 13 13 14 15 14 15 16 16 OK Cancel Help

#### Text Format Table

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ID	Name	Language 1						
00001	HMI_Publish_Topic	HMI_P						
00002	HMI_Subscribe_Topic	HMI_S						
00003	CP1250-1 Status	Temperature: %1, Pressure: %2, String: "%3"						
00004	Reveiving from external	Temperature:%1,Pressure:%2,String:"%3"						

步驟 13: 最後,你可以使用 Android 的 Application 來收發這些訊息與監控數

據.

Step 13: Finally, you can use the Android Application to Publish / Subscribe these Message.

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# **Technical Support Information**

Cermate (Shanghai) 屏通科技(上海)有限公司

Phone: +86-21-51758590~2 FAX : +86-21-51758589 E-mail: <u>sales@panelmaster.com.cn</u>

Cermate (Shenzhen) 屏通科技(深圳)有限公司

Phone: +86-755-83572781, 755-83562179, FAX : +86-755-83562294 E-mail: <u>sales@cermate.com</u>

<u>Cermate Technologies Inc.</u> 屏通科技股份有限公司(臺灣) 7F-1, No. 168, Lien-Cheng Road, Chung-Ho City, Taipei, Taiwan 235 R.O.C. Phone: 886-2-22437000 FAX : 886-2-22499933 E-mail: service@cermate.com

#### Brand Label Contact Windows:

China:	86-13823788405	sunny@cermate.com
Taiwan:	886-910011915	Kevin@cermate.com
Worldwide:	886-910011914	Linda@cermate.com

