

Mitsubishi Ethernet Q系列PLC連結操作範例

本章節將實際操作一次KEPServerEX如何與前端PLC做連結,選用的PLC為Mitsubishi Q系列Built-in Ethernet, Driver為Mitsubishi Ethernet。

●首先,需在PLC配置相關設定值,本範例使用Mitsubishi GX Works2軟體,新建或開啟已建立的Q Series 專案,設定PLC Parameter。

| 🇱 MELSOFT Series GX Works2 (Unsel |
|---|
|] Project Edit Eind/Replace Compile |
|] 🗅 😂 🖬 🗸 📲 🕹 🔛 🛣 |
| Project 🕂 🕈 🗙 |
| (Unset Project) Connection Destination Parameter PLC Parameter PLC Parameter PLC Parameter Program_Pool Program_Pool Device Comment Device Memory Device Initial Value Intelligent Function Module |

●點選Built-in Ethernet Port Setting頁籤,在IP Address Setting區塊,填入您的IP設定,在Communication Data Code區塊,點選Binary Code。

| 研杰科技 YOUNGTEC | |
|-------------------------|--|
|-------------------------|--|

| IP Address Setting | | | | | | |
|---------------------------|---------------------------|------------------|----------------------|--------------|---------|--|
| | Input Format DEC. | | Open Setting | | | |
| IP Address | 192 168 | 0 10 | FTP Setting | | | |
| Subnet Mask Pattern | 255 255 2 | 55 0 | Time Setting | | | |
| Default Router IP Address | 192 168 | 0 1 | Set if it is needed(| Default / Ch | anged) | |
| Communication Data Code | | | | | | |
| Binary Code | | | | | | |
| C ASCII Code | | | | | | |
| Enable online change (F | TP, MC Protocol) | | | | | |
| Disable direct connection | n to MELSOFT | | | | | |
| Do not respond to search | h for CPU (Built-in Ether | net port) on nei | twork | | | |

●點擊Open Setting按鈕,在Protocol欄位,選擇UDP或TCP,在Open System欄位,選擇MC Protocol, 在Host Station設定Port號。本範例使用的port號為4998 (1386H)及4999 (1387H)。 設定完畢後單擊End按鈕。

重要!

KEPServer的Mitsubishi Ethernet Driver中,預設的port號5000 UDP及5001 TCP,並不適用於built-in Ethernet port號,KEPServer使用的是10進位,GX Works2使用的是16進位,需將port號轉換為同樣進位,有效的 port號範圍是 0401H (1025) 到 1387H (4999),以及 1392H (5010) 到 FFFEH (65534)。



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Built-in Ethernet Port Open Setting

| | Proto | col | Open System | | TCP Connection | Host Station Port No. | Destination IP Address | Destination Port No. |
|-----------------|--------------------------|--------|--|---------------|----------------|--------------------------|---------------------------|-------------------------|
| 1 | UDP | - | MELSOFT Connection | - | • | | | |
| 2 | TCP | + | MELSOFT Connection | + | - | | | |
| 3 | UDP | + | MC Protocol | - | - | 1386 | | |
| 4 | TCP | - | MC Protocol | • | - | 1387 | | |
| 5 | TCP | - | MELSOFT Connection | - | - | 8 | | |
| 6 | TCP | - | MELSOFT Connection | - | • | 2 | | |
| 7 | TCP | - | MELSOFT Connection | - | • | 1 | | |
| 8 | TCP | - | MELSOFT Connection | - | • | | | 1 |
| 9 | TCP | - | MELSOFT Connection | - | • | 1 | | |
| 10 | TCP | - | MELSOFT Connection | - | - | | | |
| 11 | TCP | - | MELSOFT Connection | - | • | Ŭ. | | |
| 12 | TCP | - | MELSOFT Connection | - | • | D. | | |
| 13 | TCP | - | MELSOFT Connection | - | • | | | |
| 14 | TCP | - | MELSOFT Connection | + | • | | | |
| 15 | TCP | + | MELSOFT Connection | - | • | | | |
| 16 | TCP | - | MELSOFT Connection | - | - | Q. | | |
| 15 16 Ho: | TCP TCP st station | ▼ ▼ | MELSOFT Connection MELSOFT Connection Io, destination port No: Ple | ▼ ▼ ase | input in HEX. | | | |

●設定完畢後,必須確定已將設定值寫入PLC,並將PLC關閉,將電源切換至關閉狀態,再將電源切換 至開啟狀態,再將PLC開機。



●開啟KEPServerEX選擇一個新的專案:

建立一個新的Channel,Channel名稱可自訂,決定名稱後來到下圖選擇Mitsubishi Ethernet之後進行下一步

| New Channel - Device Drive | er X |
|----------------------------|--|
| | Select the device driver you want to assign to the channel. The drop-down list below contains the names of all the drivers that are installed on your system. |
| | Device driver: Mitsubishi Ethemet |
| | Enable diagnostics |
| | <上→步(B) 下→步(N)> 取消 說明 |

●接著請你選擇本機中與PLC設備連結的網路卡位址,然後我們就建立好一個Channel,馬上跟著建立一個New Device,Device名稱可自取,來到下圖,請選擇Device型號這邊以Q Series為範例

| New Device - Model | x |
|--------------------|--|
| | The device you are defining uses a device driver that supports more than one model. The list below shows all supported models. Select a model that best describes the device you are defining. |
| | Device <u>m</u> odel: Q Series |
| | <mark>→步(B) 下→步(N)> 取消 說明</mark> |



●請輸入欲連結之PLC的IP位址及PC Number,如範例:192.168.0.205:255,PC Number建議設定為255,如此0~255範圍的PC Number皆可抓到。

| The device you are defining may be multidropped as part of a network of devices. In order to communicate with the device, it must be assigned a unique ID. Your documentation for the device may refer to this as a "Network ID" or "Network Address." |
|--|
| Device ID: 192.168.0.205:255 |
| └─步(B) \ 下一步(N) > \ 取消 〕 說明 |

●必須確認PLC上面的UDP的設定Port號是多少?!範例是用:UDP 的4998,若對於port號設定不清楚, 可點擊說明按鈕查看詳細說明。

| | Select the Ethernet protocol used by the device. Set the port number the device is configured to use. The default port is 5001 for TCP/IP and 5000 for UDP. | |
|---|--|--|
| | IP Protocol: UDP Port Number: 4998 | |
| < | | |



●再來就是建立Tag, Tag Name可自訂

| General | Scaling | | | |
|---------|----------------------------|-----------------------------|---|-------|
| Identi | fication | | | |
| | Name: | D00001 | 5 | |
| | Address: | D000000 | 1 🕘 🗸 | 8 |
| De | escription: | | | × |
| Data | properties | | | 1. AP |
| | D |)ata type: | Short - | |
| | Clien | t access: | Read/Write - | |
| | S | ican rate: | 100 🚔 milliseconds | |
| Note | : The scan ifv a rate w | rate is only hen referer | vused for client applications that do not noing this tag (e.g., non-OPC clients) | |

●如果不知道Address跟Data type的定義可至Help中查詢

| 弓(M) 搜尋©) 我 → M | litsubishi Q Series Ac he default data types for c | Idress Descriptions lynamically defined tags are sho | wn in bold. | |
|---|--|---|--|------------|
| etting Started | Device Type | Range | Data Type | Access |
| Help Contents j Overview | inputs* | X0000-X3FFF (Hex) X0000-X3FF0 (Hex) X0000-X3FE0 (Hex) | Boolean Short, Word, BCD Long, DWord, LBCD | Read/Write |
| C Setup | Direct Inputs* | DX0000-DX3FFF (Hex) DX0000-DX3FF0 (Hex) DX0000-DX3FE0 (Hex) | Boolean Short, Word, BCD Long, DWord, LBCD | Read/Write |
| ata Types Description dress Descriptions Address Descriptions | Outputs* | Y0000-Y3FFF (Hex) Y0000-Y3FF0 (Hex) Y0000-Y3FE0 (Hex) | Boolean Short, Word, BCD Long, DWord, LBCD | Read/Write |
| Mitsubishi A Series Addre Mitsubishi Q Series Addre | Direct Outputs* | DY0000-DY3FFF (Hex) DY0000-DY3FF0 (Hex) DY0000-DY3FE0 (Hex) | Boolean Short, Word, BCD Long, DWord, LBCD | Read/Write |
| Mitsubishi FX3U Series A ror Descriptions r Help | .ink Relays* | B0000-BEA60 (Hex) B0000-BEA50 (Hex) B0000-BEA40 (Hex) | Boolean Short, Word, BCD Long, DWord, LBCD | Read/Write |
| | Special Link Relays* | SB0000-SB7D00(Hex) SB0000-SB7CF0(Hex) SB0000-SB7CE0(Hex) | Boolean Short, Word, BCD Long, DWord, LBCD | Read/Write |
| Internal Relays* | Internal Relays* | M0000-M60000 M0000-M59984 M0000-M59968 | Boolean Short, Word, BCD Long, DWord, LBCD | Read/Write |
| 5 | Special Int. Relays* | SM0000-SM2047 SM0000-SM2032 SM0000-SM2016 | Boolean Short, Word, BCD Long, DWord, LBCD | Read/Write |
| | atch Relays* | L0000-L32000 L0000-L31984 L0000-L31968 | Boolean Short, Word, BCD Long, DWord, LBCD | Read/Write |
| | Annunciator Relays* | F0000-F32000 F0000-F31984 F0000-F31968 | Boolean Short, Word, BCD Long, DWord, LBCD | Read/Write |
| | Edge Relays* | V0000-V32000 | Boolean | Read/Write |



●最後要確認PLC與Server是否有連接上,這時我們以Quick Client程式來做確認,請點選下圖(紅線圈起) 位置

| лл. К | EPServ | erEx - | [untitled | .opf *] (| (Demo E | quires | 01:42 | :48) | | | | |
|-------|------------|--------|-----------|-----------|---------|--------|-------|------|---|---|---|---|
| File | Edit | ∐iew | Users | Tools | Help | | | | | | | |
| | é [| 1 2 | 1 |) Ö | | * | 6 | R × | 2 | 2 | - | 8 |

●開啟Quick Client主畫面後,系統會自動將目前Server中所連結的PLC狀態直接載入,此時我們只需察看 Quality(紅線圈起)若為Good代表目前Server與PLC通信正常

| ——OPC Quick Client - 未命名標題 * | | | | | | - 🗆 × |
|----------------------------------|---------------------------|-----------|---------|--------------|---------|-------|
| <u>File Edit View Tools Help</u> | | | | | | |
| D 🖻 🖬 🛫 💣 📽 👗 🖻 🖻 🗙 | | | | | | |
| 🖃 📹 KEPware KEPServerEx.V4 | Item ID | Data Type | Value | Timestamp | Quality | |
| System Channell _System | Channell.Device1.Input_1 | Boolean | Unknown | 17:23:33:562 | Good | |
| | Channel1.Device1.Input_2 | Boolean | Unknown | 17:23:33:562 | Good | |
| Channell Devicel | Channel1.Device1.Input_3 | Boolean | Unknown | 17:23:33:562 | Good | |
| Channell DevicelSystem | Channel1.Device1.Output_1 | Boolean | Unknown | 17:23:42:562 | Good | |
| | Channel1.Device1.Output_2 | Boolean | Unknown | 17:23:42:562 | Good | |
| | Channel1.Device1.Output_3 | Boolean | Unknown | 17:23:42:562 | Good | |
| | 4 | | | | | Þ |
| Date Time Event | | | | | | |

注意事項:

- 在進入KEPServerEX與PLC連線之前最好先做一次網路連結的確認,確定要與設備連結的網路裝置IP
 位址與PLC設備處於同一網路區段之中,並可先以PING指令測試通信狀況。
- 在建立Channel與Device的時候除了PLC的型號與連結方式、IP位置等重要設定之外,其他的設定可以先以系統預設值帶過,若有需要可於建立好之後在Channel與Device的位置上按右鍵,進入Properties項目中,再依需要進行相關細部的屬性設定。



KEPServerEX 內建之 OPC Client 程式-Quick Client 操作範例

本章節將實際操作一次Quick Client程式如何建立並取得OPC Server的值,首先從程式集中開啟OPC Quick Client程式:

開啟之後點選如下圖指示建立一個新的 Server 位置



這邊系統會帶出目前本機中所有的OPC Server如果是遠端的Server則從網路上去點選,這邊我們選擇 KEPServerEX,確定之後就會開啟Server

| erver Properties | | | _ |
|------------------------------|-----------------|-------------|----------|
| General | | | |
| E- B Local Machine | | | * |
| Kepware.K | EPServerEX.V5.R | ed | |
| ; Kepware.Lir | nkMaster.V3 | | = |
| Intellution.iF | ixOPCClient | | |
| : CV.OPC.1 | | | |
| Kepware.K | EPServerEX.V5 | | |
| : Matrikon.OF | C.Simulation.1 | | |
| ; Advosol.DA | 3SimpleCS.1 | | |
| Advosol Sim | DAServer 1 | | * |
| Prog ID: | Kepware.KEP | ServerEX.V5 | |
| Remote <u>M</u> achine Name: | | | |
| Connection Type: | C InProc | C Local | |
| | 確定 | 取消 | |



接下來需要先建立一個Group直接在指定的Server上面按右鍵選擇New Group...

| Section Client - 未命名 * | | | | | | | | |
|---------------------------|--------------|----------|---|-----------|-------|-----------|---------|----------|
| File Edit View Tools Help | | | | | | | | |
| D 🖻 🖬 🗯 💣 💣 🕷 👗 | B R × | | | | | | | |
| Kepware.KEPServerEX.V5 | | tem ID | 1 | Data Type | Value | Timestamp | Quality | Updat |
| | New Grou | p | | | | | | |
| | Connect | | | | | | | |
| | Disconneo | t | | | | | | |
| | Reconnec | t | L | | | | | |
| | Get Error | String | | | | | | |
| | Enumerat | e Groups | | | | | | |
| | Get Group | By Name | | | | | | |
| | Auto Crea | te Tags | | | | | | |
| | Cut | Ctrl+X | | | | | | |
| | Сору | Ctrl+C | | | | | | |
| | Paste | Ctrl+V | | | | | | |
| | Delete | Del | | | | | | |
| | Properties | | | | | | | |
| | | | - | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | F. |
| Create a new group | | | | | | | Item (| Count: 0 |

輸入Group的名稱直接按確定

| Group Properties | | | | x |
|----------------------------|-------------|----|--------------|----------|
| General | | | | |
| <u>N</u> ame: | Group 1 | | | |
| Update <u>R</u> ate (ms.): | 1000 | | | |
| Time <u>B</u> ias (min.): | 0 | | | |
| Percent Deadband: | 0 | | | |
| Language ID: | 1033 | | | |
| Update Notification: | OPC 2.0/3.0 | • | Active State | |
| Keep Alive Rate (ms): | 0 | | | |
| | | | | |
| | | 確定 | 取消 | |



建立完Group後便可以我們就可以來建立Item,直接在Group上面按右鍵選New Item…

| E | ServerEX.V5 | D |
|---|----------------------------|--------|
| | New Item | |
| | Set Group Inactive | |
| | Clone Group | |
| | Asynchronous 2.0 Cache Ref | resh |
| | Asynchronous 2.0 Device Re | fresh |
| | Export CSV | |
| | Import CSV | |
| | Cut | Ctrl+X |
| | Сору | Ctrl+C |
| | Paste | Ctrl+V |
| | Delete | Del |
| | Properties | |

首先如下圖中選擇好OPC Server的路徑與Tag決定之後點選Add Leaves(紅色圈起部分)會自動加到Item ID 之中,按OK便完成了

| Add Items | | | | | —X — |
|-------------------------------|---|--|----------------------------|-----------------|--------------------------|
| - Item Properties | | | | | ОК |
| Access <u>P</u> ath: | | | | | Cancel |
| Item <u>I</u> D: | Channel1.Device1.Tag1 | | - | 8 6 | Help |
| Data <u>T</u> ype: | Native | | | | |
| Acti <u>v</u> e | $\overline{\mathbf{v}}$ | | | | |
| Branch Filter: | NMP Agent System hannel1 Statistics System Device1 | Leaf Filter: * Tag10 Tag101 Tag101 Tag102 Tag103 Tag103 Tag103 | Typ Native 這裡 Tag | e: Ar 建選擇要加入 | A <u>c</u> cess: ny ・ |
| 本視窗中 □ Browse <u>f</u> lat | 可以選擇OPC Server中 address space on selected branch | 對應的Tag |)路徑 | | Add Leaves |
| □ Vali <u>d</u> ate item I | before adding it to the list | | | | Item Count: 1 |



| 🕵 OPC Quick Client - 未命名 * | | | | | | |
|-----------------------------------|-------------------------|-----------|-------|--------------|---------|----|
| <u>File Edit View Tools H</u> elp | | | | | | |
| 🗅 🖨 📕 🧾 💣 💣 😭 👗 🖻 🖻 | × | | | | | |
| ⊡:: | Item ID | Data Type | Value | Timestamp | Quality | Up |
| Group1 | Channel1.Device1.Tag1 | Word | 5479 | 09:28:46.157 | Good | 12 |
| | Channel1.Device1.Tag1 | Word | 5479 | 09:28:46.157 | Good | 12 |
| | Channel1.Device1.Tag10 | Word | 2728 | 09:28:46.247 | Good | 12 |
| | Channel1.Device1.Tag100 | Word | 2728 | 09:28:46.247 | Good | 12 |
| | Channel1.Device1.Tag101 | Word | 2728 | 09:28:46.247 | Good | 12 |

接著我們可以來測試利用Quick Client來改變Item中的值,如下圖在要更改數值的Item上面按右鍵選擇 Synchronous Write…

| Item ID | Data Type | Value | Timestamp | Quality | Updat |
|-------------------------|-----------|--------------|--------------|---------|-------|
| Channel1.Device1.Tag1 | 141 | n | 00.01.E1 000 | Good | 1 |
| Channel1.Device1.Tag10 | New Ite | •m | | Good | 10 |
| Channel1.Device1.Tag100 | Set Acti | ve | | Good | 10 |
| Channel1.Device1.Tag101 | Set Inac | tive | | Good | 10 |
| | Synchro | onous Cache | e Read | | |
| | Synchro | onous Devic | e Read | | |
| | Synchro | onous Write | | | |
| | Asynchi | onous 2.0 F | Read | | |
| | Asynchi | ronous 2.0 V | Vrite | | |
| | Cut | | Ctrl+X | | |
| | Сору | | Ctrl+C | | |
| | Paste | | Ctrl+V | | |
| | Delete | | Del | | |
| | Propert | ies | | | |

在下圖視窗中於Write Value欄位可更改你想要的值,之後按Apply,OK之後回到主畫面便可看到數值已被 變更

| Item ID | Current Value | Write Value | | UN |
|-----------------------|---------------|-------------|---|-----------------|
| Channel1.Device1.Tag1 | 23 | 23 | l | Apply Cancel |
| | | | | |
| | | | | |
| | | | | |