



Rexchip

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Rexchip Electronics Corp.

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一般

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Title: FAB R1 廠務監控系統(FMCS)整合作業規範

FAB R1 廠擴建工程

廠務監控系統(FMCS)

整合作業規範



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1.0 廠務管理控制系統整合說明

廠務監控系統(Facility Monitor Control System, FMCS)係整合水、電、氣、化、空調、防災等廠務供應子系統，形成一個共同操作維護的監控系統平台，由於有多家廠商共同參與發展，所以有必要制定此一作業規範，調諧各子系統監控負責單位進行監控規劃及整合相關作業，此整合作業規範著眼於清楚釐清系統介面並提供各子系統廠家在 FMCS 架構下發展圖控軟體人機介面設計的一個遵循基準。ABB 公司經評選為 R1 FMCS 整合廠家，各子系統監控負責單位必須配合 ABB 公司發展並建置 R1 監控系統，FMCS 系統與各子系統互相依存、密不可分，系統整合的成功與否仰賴 FMCS 系統廠家與各子系統建置廠家的通力合作與密切配合，一個良好的整合作業規範有助於整合工作及系統維護工作的進行，務必請各子系統監控負責單位確實遵守整合作業規範，並於建廠期間隨時配合 REXCHIP 及 ABB 公司技術人員進行相關整合作業並參加整合會議，共同建置完善的 FMCS 系統。

1.1 FMCS 系統架構

本廠REXCHIP-R1的FMCS系統，已經由REXCHIP選定為ABB 800xA 系統，此系統主架構為客戶/伺服架構(Client/Server)。伺服器以Windows2003 Server Standard Edition為系統工作平台，採用ABB 800xA圖控軟體和資訊管理系統(Information Management System, IMS)趨勢圖歷史資料庫收集管理軟體，並以ORACLE SERVER為資料庫平台來發展歷史警報記錄收集及查詢軟體，並整合包括：CR、CRWT、VOC、HVAC、MEP、UPW、WWT、PCW、DWS、SRW、GASD、GASS、LDS、CDS、LMS等各子系統的圖控功能，配合設備保養系統建構成一套完整之廠務中央監控系統。REXCHIP-R1的FMCS主架構圖請參考附圖1。

如附圖1之系統架構大致可以區分為：

- 供值班人員操作的圖控工作站(800xA Operator Workplace, OS)
- 專司曲線資料收集及歷史警報記錄收集及查詢的伺服器(IM SERVER, IM)



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- 專司重要儀錶設備之管理的伺服器(AO SERVER, AO)
- 專司防毒、網管工作的伺服器(ANTI-Virus SERVER, AVS)
- 專司遠距及時監視、即時報表、統計分析、SPC/MSPC等工作的伺服器(APS SERVER/SPC SERVER, APS/SPC)
- 專司圖控資料庫建置的伺服器(800xA Aspect Server, AS)
- 專司收集處理各子系統控制器的即時值(Real Time Data)的連接伺服器(800xA Connectivity Server, CS)
- 雙層ETHERNET高速網路系統(控制網路Control Network及伺服器網路Client Server Network)
- 用於建立、修改控制邏輯及圖面的工程師工作站, ES。

上層網路稱之為伺服器網路(Client/Server Network)，此網路主要包含各種伺服器、工作站及網路設備等皆由FMCS廠商負責。其下與控制器連接之網路稱之為控制網路(Control Network)，此網路包含六大系統Clearn Room、HVAC、WTS、GAS、Chemical、ERC，此六大系統及其所包含的子系統內之軟硬體由各系統廠商負責。

Aspect Server(AS):

架構於FMCS網路之上，負責中央管理所有的圖控資料、規劃、設定等。例如操作圖面(Graphics)，控制元件圖型資料庫(Object Type Libraries)，使用者權限管理，操作站介面規劃，操作面板(faceplate)規劃等。

Connectivity Server(CS):

架構於FMCS網路及控制網路之間，負責與現場之控制器連線，收集設備運轉的即時資料，並將此資料提供給Aspect Server連結整合，並將遠方控制指令傳送給控制器。另將選取之重要即時資料連接至趨勢圖歷史資料庫IMS。



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Operator Station(OS):

架構於FMCS網路之上，顯示Aspect Server規劃後之資料於畫面上，並由此對控制器下達遠方操作指令。

Engineering Workstation(ES):

架構於FMCS網路之上，配備有Office、VB、AC800M編輯軟體，用以維護管理FMCS網路各項工作，供系統工程師，進行系統設定，畫面等修改維護使用。

Information Management SERVER(IM):

負責將Connectivity Server處理之資料(歷史趨勢圖歷史資料)透過網路將資料儲存於Information Management Server資料庫中。

ANTI-Virus SERVER(AVS):

負責針對FMCS網路中各個工作站及伺服器網管及自動防毒掃毒，並且透過自動或手動更新病毒引擎及病毒碼。

APS & SPC SERVER(APS/SPC):

負責遠距即時監視、即時報表、統計分析、SPC/MSPC等工作。

雙層高速網路(Client Server Network/Control Network)：

FMCS網路採用較易擴充及維護的ETHERNET網路，並區分為控制網路Control Network及伺服器網路Client Server Network，使各子系統更獨立性，並改善ETHERNET網路較易塞車的狀況，提升系統整合通信效能。

1.2 整合架構及說明

整廠控制室計有FMCS Room、Gas & Chemical Room、WTS Room、C/R CTL Room、HVAV Room及ERC Room。

FMCS整合系統於各主系統控制室中提供一Redundant Connectivity Server，連接至各系統控



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制室之系統控制網路(Control Network)中，作為各子系統控制器與圖形介面操作站間之資料伺服器。

除Redundant Connectivity Server外，另依各系統對Thirty Party PLC之需求，亦可安裝PLC OPC Driver於Redundant Connectivity Server(PLC的OPC Driver由各子系統監控負責單位自行提供)，將Third Party PLC之即時資料及控制指令，透過此Redundant PLC Connectivity Server顯示於圖形介面操作站上，操作人員可於同一操作站上同時監控Third Party PLC 狀態。

1.3 介面定義

責成各子系統監控負責單位配合REXCHIP及ABB的要求參加FMCS整合會議，並遵循本規範之規定及會議之結論，進行各子系統軟硬體及FMCS整合之工作。

各子系統監控負責人必須為專人專職不得任意更換，若因故需更換負責人，則所更換之人員必須提出申請並經過業主同意後，方可更換。

連接於Control Network上的控制器可分為安全儀控系統(Safety Instrument System, SIS)用途及基本程序控制系統(Basic Process Control System, BPCS)用途，BPCS中又可分為一般(General)控制及緊要(Critical)控制。SIS及BPCS硬體之選用請參考11.0 ABB 800XA硬體設計作業規定。SIS之規定請參考14.0 安全儀控系統相關作業規定。另外非ABB控制器的連線，請參考12.0與Third Party控制器之連線。各子系統監控負責單位必須將控制器透過網路連線至FMCS並配合進行線路標示作業，以利擴充及維護工作之進行，並配合進行網路連線測試。

各子系統建廠初期可使用單機進行規劃，於階段規劃完成後將資料匯出(Export)後交由FMCS廠商負責匯入(Import)於本廠之FMCS系統，並進行整合測試及查驗工作。各子系統及FMCS廠商必須配合業主進行各單點之全迴路測試及功能測試。各子系統匯入(Import)上線後則必須在線上(on line)增修程式或I/O 點及測試等作業。(注意：每一子系統只允許一次Import)。



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為方便各子系統商上線後之程式增修及測試，各子系統商須自行準備一台Notebook PC，FMCS廠商可幫各子系統商安裝O.S.工作站於Notebook PC上，以便各子系統商作業。唯 Notebook PC之廠牌、型號、規格須為FMCS廠商指定。

1.3.1 系統介面位置說明

各子系統與FMCS連結的網路線，需由子系統廠家施工配接至FMCS所提供之交換器(SWITCH)上，線號編碼為控制器名稱。各子系統連結之介面位置如下表：

表 1.3.1 各系統介面位置

主系統別	CR				HVAC	
子系統別	CR	CRWT	VOC		HVAC	MEP
介面位置	SUPPORT-5F & FAB-4F				CUP-4F & FAB-4F	

主系統別	WTS					
子系統別	UPW	WWT	PCW	DWS	SRW	
介面位置	CUP-B1F					

主系統別	CDS	LMS	GAS		
子系統別	CDS	LMS	GASD	GASS	LDS
介面位置	HPM-1F	OFFICE-2F	HPM-1F		

1.3.2 子系統與 FMCS 之連線介面

各子系統內部連線網路不得與 FMCS 網路共用，需加以區分獨立。若子系統使用之控制器為 ABB AC800M 控制器，則此網路部份廠商不須額外提供必要之介面軟體。若廠商使用之控制器為非 ABB AC800M 控制器，則各子系統必須提供 OPC Server (OPC Server 之規格要求請參考 12.1.1) 以便將 PLC 之資料透過 OPC Server 上傳給 FMCS。若此 OPC Server 與 PLC 連結之網域可設定在 ABB Connectivity Server 要求之網域內，則可經過 REXCHIP 和



FMCS 廠家同意後，將此 PLC 之 OPC Driver 安裝在 ABB Connectivity Server 內，否則未經 REXCHIP 和 FMCS 同意及無法配合設定網域之廠家，則必須提供一台 PC 將 OPC Driver 安裝進去後，透過 FireWall 連接 FMCS 系統(詳細安裝之軟硬體請參考 12.1.1 OPC 章節)。

1.3.3 其它規定

- 各系統需以 ABB 800xA System 4.1 為開發平台，不得呼叫，外掛額外軟體。
- 若有新增工作站或有需增加 TCP/IP 設備時，請向 REXCHIP 主辦工程師提出申請，由 REXCHIP 統一規定 TCP/IP。
- 遵循瑞晶 R1/R2 設備編碼原則及本規範 4.1 章：系統相關名稱與定義，配合訂定統一的名稱，例如 Tag Name、Graphic Name、電腦名稱等。



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2.0 伺服器及工作站軟/硬體規範

本工程範圍內之伺服器及工作站由 FMCS 廠商提供，相關之軟/硬體安裝設定亦由 FMCS 廠商負責，各子系統廠商不得隨意變更或修改，如有特殊需求，可提出經 REXCHIP 及 FMCS 廠商同意後方可進行。

2.1 單機作業工作站軟/硬體規範

各子系廠監控負責單位須自行準備單機作業之工作站及其所需之軟、硬體。

廠牌、型號由FMCS廠商指定。



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3.0 系統連線作業規範

FMCS 系統規劃中，控制器負責主要邏輯控制的執行，Aspect Server 負責中央管理所有的圖控資料、規劃、設定等，Connectivity Server 負責與現場之控制器連線，收集設備運轉的即時資料，並將此資料提供給 Aspect Server 連結整合，並將遠方控制指令傳送給控制器。訊號的傳遞及人機操作介面之處理，為了使各子系統能夠更獨立模組化，維持較高之網路通訊品質，避免網路通訊塞車，所以將 FMCS 系統通訊網路建構為二層架構(圖 3.0.1FMCS 網路階層架構圖)，其中上層連接 Aspect Server, Connectivity Server, Operator Station 等之網路稱為 Client/Server Network，並定義為 Network Area 1，下層連接 Controller, Connectivity Server 等之網路稱為 Control Network，依各子系統不同，區分為 Network Area 5、Network Area 6 等依此類推。其 IP address 及 Subnet Mask 定義如表 3.0.1，通訊協定皆採用 TCP/IP。

表 3.0.1 FMCS 網路階層架構圖

Network IDs and Network Area Number

Network type	Network Ids	Network Area	IP Subnet mask
Plant Network	10.20.0.XXX	0	255.255.252.0
	10.21.0.XXX		
Client/Server Network	10.20.4.XXX	1	255.255.252.0
	10.21.4.XXX		
Control Network CR System	10.20.20.XXX	5	255.255.252.0
	10.21.20.XXX		
Control Network HVAC System	10.20.24.XXX	6	255.255.252.0
	10.21.24.XXX		
Control Network WTS System	10.20.28.XXX	7	255.255.252.0
	10.21.28.XXX		
Control Network Chemical System	10.20.32.XXX	8	255.255.252.0
	10.21.32.XXX		
Control Network GAS System	10.20.36.XXX	9	255.255.252.0
	10.21.36.XXX		
Control Network LMS System	10.20.40.XXX	10	255.255.252.0
	10.21.40.XXX		



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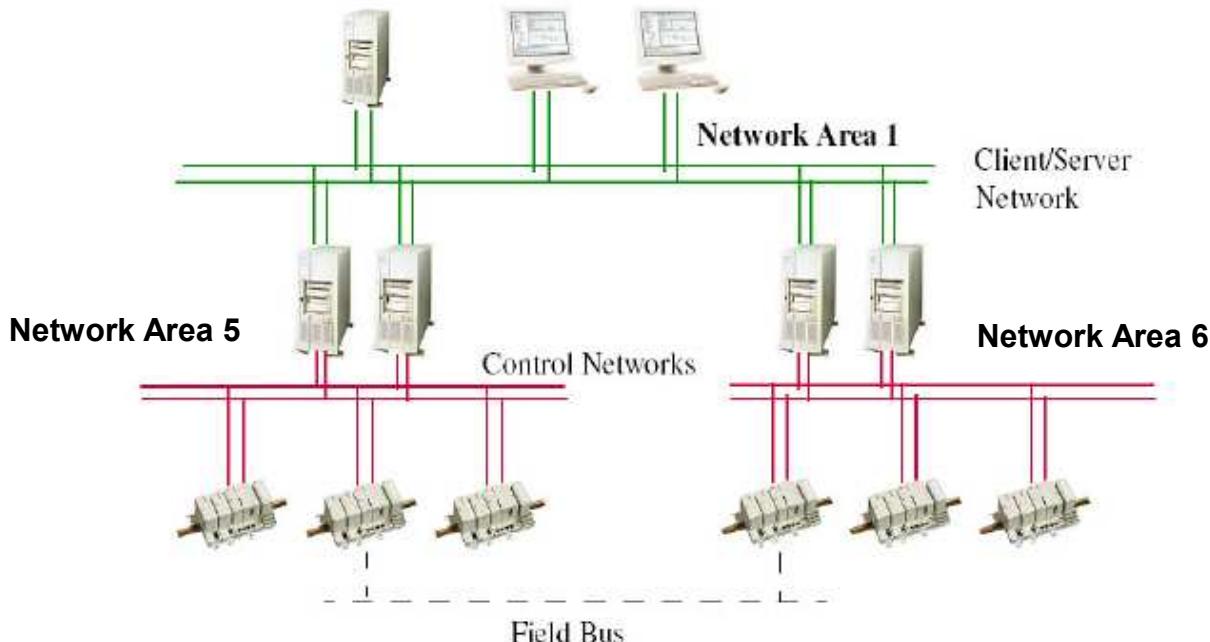
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圖 3.0.1 FMCS 網路階層架構圖



3.1 網路卡

Aspect Server：至少配備有兩片ETHERNET 10/100M/1G 網路卡，連接Client/Server Network。

Connectivity Server：至少配備有四片ETHERNET 10/100M/1G 網路卡，連接Client/Server Network。

PLC OPC Server：至少配備有ETHERNET 10/100M/1G 網路卡，連接Client/Server Network。

Engineer Station：至少配備有ETHERNET 10/100/1000M/1G 網路卡，連接Client/Server Network。

Operator Station：至少配備有兩片ETHERNET 10/100/1000M/1G 網路卡，連接Client/Server Network。

註一： 各子系統控制器的網路線需由子系統廠家施工配接到FMCS所提供之交換器(SWITCH)上，線號編碼為控制器名稱。各子系統連結之介面位置請參考本規範1.3.1章之表格。



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註二： 各子系統應在完成自己所屬的區域網路後，提供該區域網路相關設備資料給業主。

(例如：網路架構、IP位址、網路上所有設備電源位置及分電箱名稱)

3.2 TCP/IP 位置規劃與設定

3.2.1 FMCS 及各子系統網路 IP 位址分配表

請參閱表 3.2.1

表 3.2.1 FMCS 及各子系統 IP 位址分配定義一覽表

800xA system IP address setting criteria								
Type Name	Computer Name	Primary IP addr.	Secondary IP addr.	Subnet mask	Primary Prefered DNS	Primary Alternet DNS	Secondary Prefered DNS	Secondary Alternet DNS
Client / Server Network AREA 1								
Domain Controller	FMCS-R1-DC1	10.20.4.1	10.21.4.1	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
Redundant DC	FMCS-R1-DC2	10.20.4.2	10.21.4.2	255.255.252.0	10.20.4.2	10.20.4.1	10.20.4.2	10.20.4.1
Aspect Server 1	FMCS-R1-AS1	10.20.4.11	10.21.4.11	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
Aspect Server 2	FMCS-R1-AS2	10.20.4.12	10.21.4.12	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
Aspect Server 3	FMCS-R1-AS3	10.20.4.13	10.21.4.13	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
Connectivity Server CR-1	CR-R1-CS1	10.20.4.21	10.21.4.21	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
Connectivity Server CR-2	CR-R1-CS2	10.20.4.22	10.21.4.22	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
Connectivity Server HVAC-1	HVAC-R1-CS1	10.20.4.23	10.21.4.23	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
Connectivity Server HVAC-2	HVAC-R1-CS2	10.20.4.24	10.21.4.24	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
Connectivity Server WTS-1	WTS-R1-CS1	10.20.4.25	10.21.4.25	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
Connectivity Server WTS-2	WTS-R1-CS2	10.20.4.26	10.21.4.26	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
Connectivity Server GAS-1	GAS-R1-CS1	10.20.4.27	10.21.4.27	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
Connectivity Server GAS-2	GAS-R1-CS2	10.20.4.28	10.21.4.28	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
Connectivity Server CHM-1	CHM-R1-CS1	10.20.4.29	10.21.4.29	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
Connectivity Server CHM-2	CHM-R1-CS2	10.20.4.30	10.21.4.30	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
Connectivity Server ERC-1	ERC-R1-CS1	10.20.4.31	10.21.4.31	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
Connectivity Server ERC-2	ERC-R1-CS2	10.20.4.32	10.21.4.32	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
IM Server-1	FMCS-R1-IM1	10.20.4.51	10.21.4.51	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
IM Server-2	FMCS-R1-IM2	10.20.4.52	10.21.4.52	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
AO Server	FMCS-R1-AOS	10.20.4.53	10.21.4.53	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
Anti-Virus Server	FMCS-R1-AVS	10.20.4.54	10.21.4.54	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
LED Ticker	FMCS-R1-LED	10.20.4.55	10.21.4.55	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
File backup Server-1	FMCS-R1-FBS1	10.20.4.56	10.21.4.56	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
File backup Server-2	FMCS-R1-FBS2	10.20.4.57	10.21.4.57	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
Info Center Server	FMCS-R1-ICS	10.20.4.58	10.21.4.58	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2



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Type Name	Computer Name	Primary IP addr.	Secondary IP addr.	Subnet mask	Primary Prefered DNS	Primary Alternet DNS	Secondary Prefered DNS	Secondary Alternet DNS
SPC Server	FMCS-R1-SPC	10.20.4.59	10.21.4.59	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
EDMS Server-1	FMCS-R1-EDMS1	10.20.4.60	10.21.4.60	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
EDMS Server-2	FMCS-R1-EDMS2	10.20.4.61	10.21.4.61	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
FMCS-ES	FMCS-R1-ES	10.20.4.71	10.21.4.71	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
FMCS-OS1	FMCS-R1-OS1	10.20.4.72	10.21.4.72	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
FMCS-OS2	FMCS-R1-OS2	10.20.4.73	10.21.4.73	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
FMCS-OS3	FMCS-R1-OS3	10.20.4.74	10.21.4.74	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
FMCS-OS4	FMCS-R1-OS4	10.20.4.75	10.21.4.75	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
Clean Room-OS1	CR-R1-OS1	10.20.4.81	10.21.4.81	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
Clean Room-OS2	CR-R1-OS2	10.20.4.82	10.21.4.82	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
Clean Room-OS3	CR-R1-OS3	10.20.4.83	10.21.4.83	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
HVAC-OS1	HVAC-R1-OS1	10.20.4.91	10.21.4.91	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
WTS-OS1	WTS-R1-OS1	10.20.4.101	10.21.4.101	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
WTS-OS2	WTS-R1-OS2	10.20.4.102	10.21.4.102	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
WTS-TOS1	WTS-R1-TOS1	10.20.4.103	10.21.4.103	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
GAS-OS1	GAS-R1-OS1	10.20.4.111	10.21.4.111	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
GAS-Leak-OS2	GAS-R1-OS2	10.20.4.112	10.21.4.112	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
Chemical-OS1	CHM-R1-OS1	10.20.4.121	10.21.4.121	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
Chemical-OS2	CHM-R1-OS2	10.20.4.122	10.21.4.122	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
ERC-OS1	ERC-R1-OS1	10.20.4.131	10.21.4.131	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
ERC-OS2	ERC-R1-OS2	10.20.4.132	10.21.4.132	255.255.252.0	10.20.4.1	10.20.4.2	10.20.4.1	10.20.4.2
Printer Server-1		10.20.5.221	10.20.4.221	255.255.252.0	10.20.4.1	10.20.4.2	X	X
Printer Server-2		10.20.5.222	10.20.4.222	255.255.252.0	10.20.4.1	10.20.4.2	X	X
FMCS-FireWall		10.30.5.230	X	255.255.252.0	X	X	X	X
FMCS-SWITCH-1		10.20.5.231	X	255.255.252.0	X	X	X	X
FMCS-SWITCH-2		X	10.21.5.231	255.255.252.0	X	X	X	X
Control Network AREA 5	FOR CR SYSTEM							
Connectivity Server CR-1	CR-R1-CS1	10.20.20.21	10.21.20.21	255.255.252.0	X	X	X	X
Connectivity Server CR-2	CR-R1-CS2	10.20.20.22	10.21.20.22	255.255.252.0	X	X	X	X
CR-Controller-1~10	CR_Controller_1~20	10.20.20.151~170	10.21.20.151~170	255.255.252.0	X	X	X	X
CR-SWITCH-1		10.20.5.232	X	255.255.252.0	X	X	X	X
CR-SWITCH-2		X	10.21.5.235	255.255.252.0	X	X	X	X
Control Network AREA 6	FOR HVAC System							
Connectivity Server HVAC-1	HVAC-R1-CS1	10.20.24.23	10.21.24.23	255.255.252.0	X	X	X	X
Connectivity Server HVAC-2	HVAC-R1-CS2	10.20.24.24	10.21.24.24	255.255.252.0	X	X	X	X
HVAC-Controller-1~10	HVAC_Controller_1~20	10.20.24.171~190	10.21.24.171~190	255.255.252.0	X	X	X	X
HVAC-SWITCH-1		10.20.5.236	X	255.255.252.0	X	X	X	X



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Type Name	Computer Name	Primary IP addr.	Secondary IP addr.	Subnet mask	Primary Prefered DNS	Primary Alternet DNS	Secondary Prefered DNS	Secondary Alternet DNS
HVAC-SWITCH-2		X	10.21.5.237	255.255.252.0	X	X	X	X
Control Network AREA 7	FOR WTS System							
Connectivity Server WTS-1	WTS-R1-CS1	10.20.28.25	10.21.28.25	255.255.252.0	X	X	X	X
Connectivity Server WTS-2	WTS-R1-CS2	10.20.28.26	10.21.28.26	255.255.252.0	X	X	X	X
WTS-Controller-1~10	WTS_Controller_1~20	10.20.28.191~210	10.21.28.191~210	255.255.252.0	X	X	X	X
WTS-SWITCH-1		10.20.5.235	X	255.255.252.0	X	X	X	X
WTS-SWITCH-2		X	10.21.5.235	255.255.252.0	X	X	X	X
Control Network AREA 8	FOR Chemical System							
Connectivity Server Chemical	CHM-R1-CS1	10.20.32.27	10.21.32.27	255.255.252.0	X	X	X	X
Connectivity Server Chemical	CHM-R1-CS2	10.20.32.28	10.21.32.28	255.255.252.0	X	X	X	X
CHM-Controller-1~10	CHM_Controller_1~10	10.20.32.211~220	10.21.32.211~220	255.255.252.0	X	X	X	X
CHM-SWITCH-1		10.20.5.236	X	255.255.252.0	X	X	X	X
CHM-SWITCH-2		X	10.21.5.236	255.255.252.0	X	X	X	X
Control Network AREA 9	FOR GAS System							
Connectivity Server Gas-1	GAS-R1-CS1	10.20.36.29	10.21.36.29	255.255.252.0	X	X	X	X
Connectivity Server Gas-2	GAS-R1-CS2	10.20.36.30	10.21.36.30	255.255.252.0	X	X	X	X
GAS-Controller-1~10	GAS_Controller_1~20	10.20.36.221~240	10.21.36.221~240	255.255.252.0	X	X	X	X
GAS-SWITCH-1		10.20.5.237	X	255.255.252.0	X	X	X	X
GAS-SWITCH-1		X	10.21.5.237	255.255.252.0	X	X	X	X
Control Network AREA 10	FOR ERC System							
Connectivity Server ERC-1	ERC-R1-CS1	10.20.40.30	10.21.40.30	255.255.252.0	X	X	X	X
Connectivity Server ERC-2	ERC-R1-CS2	10.20.40.31	10.21.40.31	255.255.252.0	X	X	X	X
ERC-Controller-1~10	ERC_Controller_1~10	10.20.40.241~250	10.21.40.241~250	255.255.252.0	X	X	X	X
ERC-SWITCH-1		10.20.5.238	X	255.255.252.0	X	X	X	X
ERC-SWITCH-2		X	10.21.5.238	255.255.252.0	X	X	X	X

Third Network Card Connect to Firewall								
IM Server-1	FMCS-R1-IM1	10.20.255.2	X	255.255.255.0	10.20.255.1	X	X	X
IM Server-2	FMCS-R1-IM2	10.20.255.3	X	255.255.255.0	10.20.255.1	X	X	X
Anti-Virus Server	FMCS-R1-AVS	10.20.255.4	X	255.255.255.0	10.20.255.1	X	X	X
Info Center Server	FMCS-R1-ICS	10.20.255.5	X	255.255.255.0	10.20.255.1	X	X	X
SPC Server	FMCS-R1-SPC	10.20.255.6	X	255.255.255.0	10.20.255.1	X	X	X
EDMS Server-1	FMCS-R1-EDMS1	10.20.255.7	X	255.255.255.0	10.20.255.1	X	X	X
EDMS Server-2	FMCS-R1-EDMS2	10.20.255.8	X	255.255.255.0	10.20.255.1	X	X	X



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3.2.2 各子系統網域名稱及電腦名稱

請參閱表 3.2.2

表 3.2.2 各子系統網域名稱及電腦名稱

Type Name	Domain Name	Computer Name
Client / Server Network AREA 1		
Domain Controller	Fmcdomain.R1.local	FMCS-R1-DC1
Redundant DC	Fmcdomain.R1.local	FMCS-R1-DC2
Aspect Server 1	Fmcdomain.R1.local	FMCS-R1-AS1
Aspect Server 2	Fmcdomain.R1.local	FMCS-R1-AS2
Aspect Server 3	Fmcdomain.R1.local	FMCS-R1-AS3
Connectivity Server CR-1	Fmcdomain.R1.local	CR-R1-CS1
Connectivity Server CR-2	Fmcdomain.R1.local	CR-R1-CS2
Connectivity Server HVAC-1	Fmcdomain.R1.local	HVAC-R1-CS1
Connectivity Server HVAC-2	Fmcdomain.R1.local	HVAC-R1-CS2
Connectivity Server WTS-1	Fmcdomain.R1.local	WTS-R1-CS1
Connectivity Server WTS-2	Fmcdomain.R1.local	WTS-R1-CS2
Connectivity Server GAS-1	Fmcdomain.R1.local	GAS-R1-CS1
Connectivity Server GAS-2	Fmcdomain.R1.local	GAS-R1-CS2
Connectivity Server CHM-1	Fmcdomain.R1.local	CHM-R1-CS1
Connectivity Server CHM-2	Fmcdomain.R1.local	CHM-R1-CS2
Connectivity Server ERC-1	Fmcdomain.R1.local	ERC-R1-CS1
Connectivity Server ERC-2	Fmcdomain.R1.local	ERC-R1-CS2
PLC OPC Server-1~X	Fmcdomain.R1.local	XXX-R1-OPC1~X
IM Server-1	Fmcdomain.R1.local	FMCS-R1-IMS1
IM Server-2	Fmcdomain.R1.local	FMCS-R1-IMS2
AO Server	Fmcdomain.R1.local	FMCS-R1-AOS
Anti-Virus Server	Fmcdomain.R1.local	FMCS-R1-AVS
LED Ticker	Fmcdomain.R1.local	FMCS-R1-LED
File backup server-1	Fmcdomain.R1.local	FMCS-R1-FBS1
File backup server-2	Fmcdomain.R1.local	FMCS-R1-FBS2
Info center server	Fmcdomain.R1.local	FMCS-R1-ICS
FMCS-ES	Fmcdomain.R1.local	FMCS-R1-ES1
FMCS-OS1	Fmcdomain.R1.local	FMCS-R1-OS1
FMCS-OS2	Fmcdomain.R1.local	FMCS-R1-OS2
FMCS-OS3	Fmcdomain.R1.local	FMCS-R1-OS3



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Type Name	Domain Name	Computer Name
FMCS-OS4	Fmcstable.R1.local	FMCS-R1-OS4
Clean Room-OS1	Fmcstable.R1.local	CR-R1-OS1
Clean Room-OS2	Fmcstable.R1.local	CR-R1-OS2
Clean Room-OS3	Fmcstable.R1.local	CR-R1-OS3
HVAC-OS1	Fmcstable.R1.local	HVAC-R1-OS1
WTS-OS1	Fmcstable.R1.local	WTS-R1-OS1
WTS-OS2	Fmcstable.R1.local	WTS-R1-OS2
GAS-OS1	Fmcstable.R1.local	GAS-R1-OS1
Chemical-OS1	Fmcstable.R1.local	CHM-R1-OS1
Chemical-OS2	Fmcstable.R1.local	CHM-R1-OS2
ERC-OS1	Fmcstable.R1.local	ERC-R1-OS1
ERC-OS2	Fmcstable.R1.local	ERC-R1-OS2
Printer Server-1	Fmcstable.R1.local	X
Printer Server-2	Fmcstable.R1.local	X
FMCS-Switching HUB	Fmcstable.R1.local	X
CR-Switching HUB	Fmcstable.R1.local	X
HVAC-Switching HUB	Fmcstable.R1.local	X
WTC-Switching HUB	Fmcstable.R1.local	X
GAS-Switching HUB	Fmcstable.R1.local	X
Chemical-Switching HUB	Fmcstable.R1.local	X
ERC-Switching HUB	Fmcstable.R1.local	X
Control Network AREA 20	FOR CR System	
Connectivity Server CR-1	Fmcstable.R1.local	CR-R1-CS1
Connectivity Server CR-2	Fmcstable.R1.local	CR-R1-CS2
CR-Controller-1~10	Fmcstable.R1.local	CR_ControllerType_1~10
CR-Switching HUB	Fmcstable.R1.local	X
Control Network AREA 21	FOR HVAC System	
Connectivity Server HVAC-1	Fmcstable.R1.local	HVAC-R1-CS1
Connectivity Server HVAC-2	Fmcstable.R1.local	HVAC-R1-CS2
HVAC-Controller-1~10	Fmcstable.R1.local	HVAC_ControllerType_1~10
HVAC-Switching HUB	Fmcstable.R1.local	X



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Type Name	Domain Name	Computer Name
Control Network AREA 22	FOR WTS System	
Connectivity Server WTS-1	Fmcsdomain.R1.local	WTS-R1-CS1
Connectivity Server WTS-2	Fmcsdomain.R1.local	WTS-R1-CS2
WTS-Controller-1~10	Fmcsdomain.R1.local	WTS_ControllerType_1~10
WTS-Switching HUB	Fmcsdomain.R1.local	X
Control Network AREA 23	FOR GAS System	
Connectivity Server GAS-1	Fmcsdomain.R1.local	GAS-R1-CS1
Connectivity Server GAS-2	Fmcsdomain.R1.local	GAS-R1-CS2
GAS-Controller-1~10	Fmcsdomain.R1.local	GAS_ControllerType_1~10
GAS-Switching HUB	Fmcsdomain.R1.local	X
Control Network AREA 24	FOR Chemical System	
Connectivity Server Chemical-1	Fmcsdomain.R1.local	CHM-R1-CS1
Connectivity Server Chemical-2	Fmcsdomain.R1.local	CHM-R1-CS2
Chemical-Controller-1~10	Fmcsdomain.R1.local	CHM_ControllerType_1~10
Chemical-Switching HUB	Fmcsdomain.R1.local	X
Control Network AREA 25	FOR ERC System	
Connectivity Server ERC-1	Fmcsdomain.R1.local	ERC-R1-CS1
Connectivity Server ERC-2	Fmcsdomain.R1.local	ERC-R1-CS2
ERC-Controller-1~10	Fmcsdomain.R1.local	ERC_ControllerType_1~10
ERC-Switching HUB	Fmcsdomain.R1.local	X



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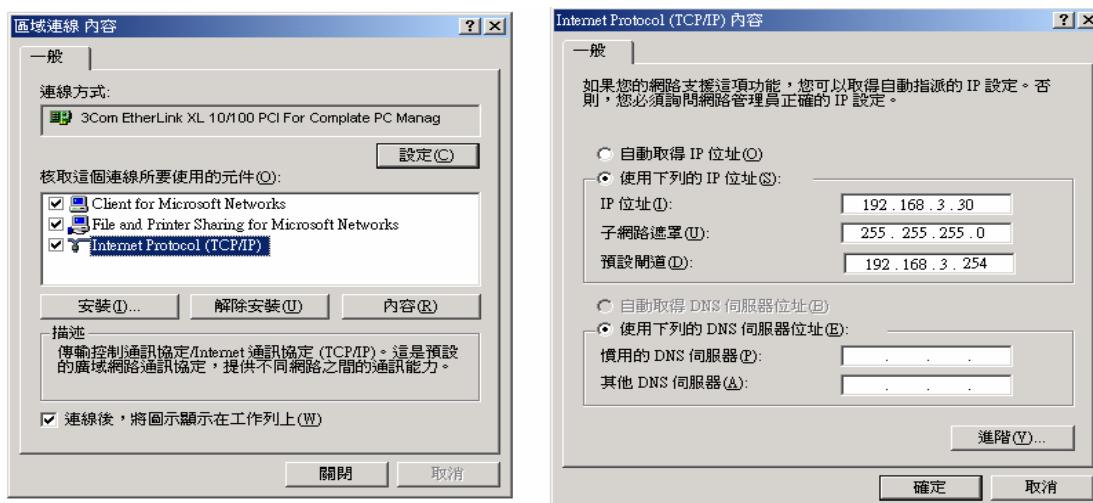
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3.2.3 Computer IP 位址設定視窗

IP 之設定如下圖 3.2.1 所示。各伺服器及工作站的 IP 統一由 FMCS 廠商設定。

圖 3.2.1



※ 若有新增工作站或需增加 IP 之設備時，請向業主主辦工程師提出申請，由業主統一分配 IP。

3.2.4 AC 800M Controller IP 位址設定視窗

如何設定 AC800M 控制器的 IP 請參考下圖 3.2.2。



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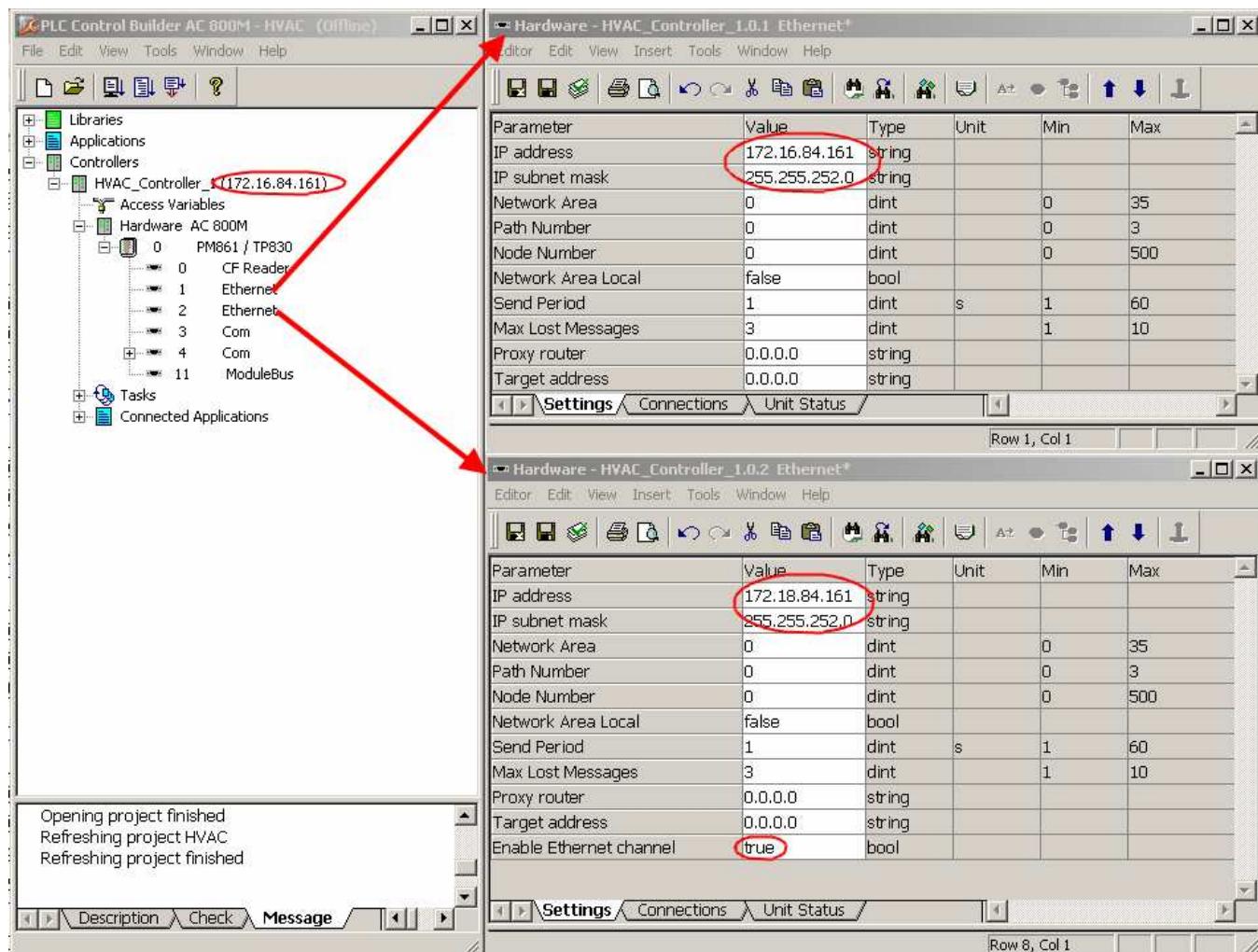
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圖 3.2.2 AC800M Controller IP 位址設定視窗



(內容依實際需求設定本圖僅供參考)



4.0 ABB 800xA系統設定及資料庫建置作業規範

4.1 系統相關名稱設定與定義

各系統代號及CBM Project Name、AE Class編號如下表4.1.1所示。各子系統廠商在撰寫控制邏輯時，請依照下表建立正確的Project名稱，以及各Tag的Alarm Class Number。

表 4.1.1 各子系統相關名稱設定與定義一覽表

項次	主系統名稱	子系統名稱	系統代號	Control Builder M	AE Class
				Project Name	
1	CR	CR	R1R	CR	101~200
2	CR	CRWT	R1R_WT	CRWT	201~300
3	CR	SPARE	SPARE	SPARE	301~400
4	CR	VOC	R1R_VOC	VOC	401~500
5	HVAC	HVAC	R1H	HVAC	501~600
6	HVAC	MEP	R1H_MEPE	MEP	601~700
7	WTS	UPW	R1W_UPW	UPW	701~800
8	WTS	WWT	R1W_WWT	WWT	801~900
9	WTS	PCW	R1W_PCW	PCW	901~1000
10	WTS	DWS	R1W_DWS	DWS	1001~1050
11	WTS	SRW	R1W_SRW	SRW	1051~1100
12	CDS	SPARE	SPARE	SPARE	1101~1150
13	GAS	GASS	R1G_S	GASS	1151~1200
14	GAS	GASD	R1G_D	GASD	1201~1300
15	GAS	LDS	R1G_LDS	LDS	1301~1400
16	CDS	CDS	R1C	CDS	1401~1500
17	LMS	LMS	R1L	LMS	1501~1600



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4.1.1 系統物件代號

總字元數不得超過 30 字元

Graphics Name

XXXXX_XXXXX

Function Block Name

Control Module Name

Variable Name

物件名稱

參考瑞晶 R1/R2 設備編碼原則，如有不足部分可與業主討論。

系統代號，參考表 4.1.1

各子系統 Graphics / Function Block Name / Control Module Name / Variable Name

名稱命名原則：底線前加上各系統代號，避免相關名稱在 FMCS 重複，造成整合作業困擾；底線後自行定義部分，不可以使用中文字，Tag Name 及 Variable 不可以數字開頭及含有特殊字元(~ ! @ # \$ % ^ & * -)。(如 CR_ MAU1 …)，且總字元數不得超過 30 字元。另外須注意 Function Block Name，Control Module Name，Variable Name 不得重覆。

4.2 物件管理與分類

ABB 800xA 系統會自動同步位於控制邏輯編輯軟體(Control Builder M, CBM)中所建立的控制模組(Control Module)或功能方塊(Function Block)到圖控編輯軟體(Plant Explore Workplace)中的控制結構(Control Structure)中。每一個Control Module 或 Function Block 皆會對應成一個物件，此物件可依其功能面及位置面有不同之分類。各子系統需依業主之需求將各物件置入(Insert)相對的位置。

4.2.1 功能結構(Functional Structure)

- Functional Structure 是 ABB 800xA system 中一個對物件分類的階層式架構，



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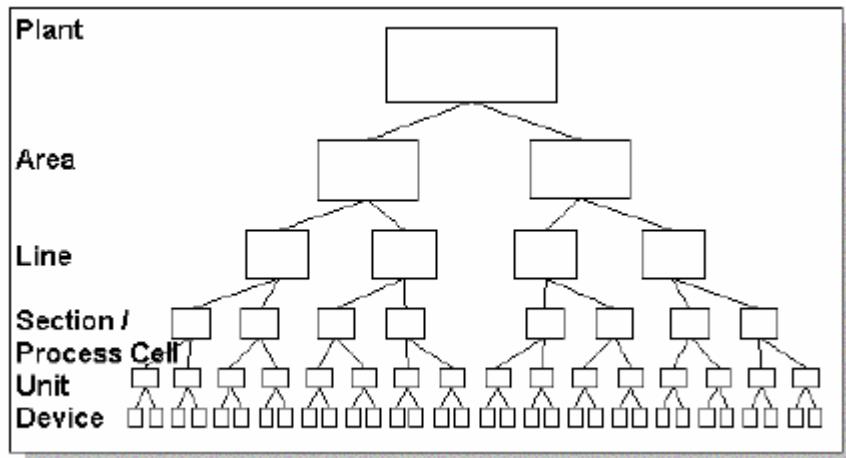
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其分類的方式是由各物件的功能面去定義此物件應該要放(insert)在 Functional Structure 的那一層中的那一個位置。各子系廠商必須配合 REXCHIP 之要求，製作出屬於該子系統的 Functional Structure。各系統在上線(Import)以前，必需完成此部份之軟體規劃工作。

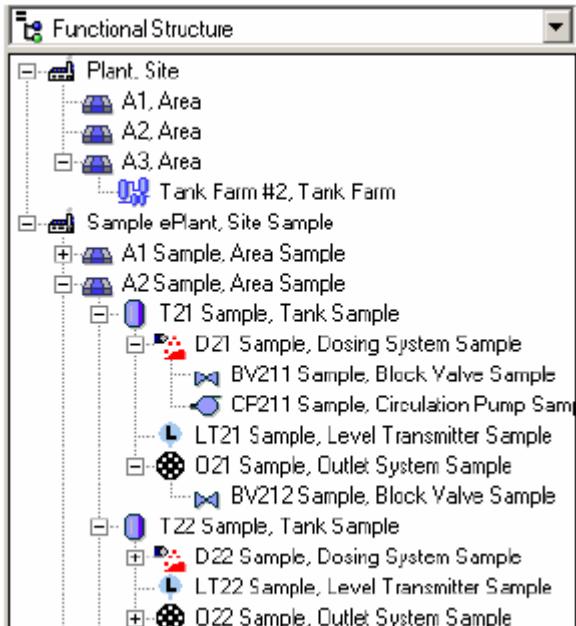
- 各子系統在製作 Functional Structure 之前，必須先提出如圖 4.1.1 之架構，經 REXCHIP 核可後方可施行。

圖 4.1.1 Functional Structure 之階層示意圖



- 由圖 4.1.1 之示意圖可產生如下圖 4.1.2 所示之 Functional Structure

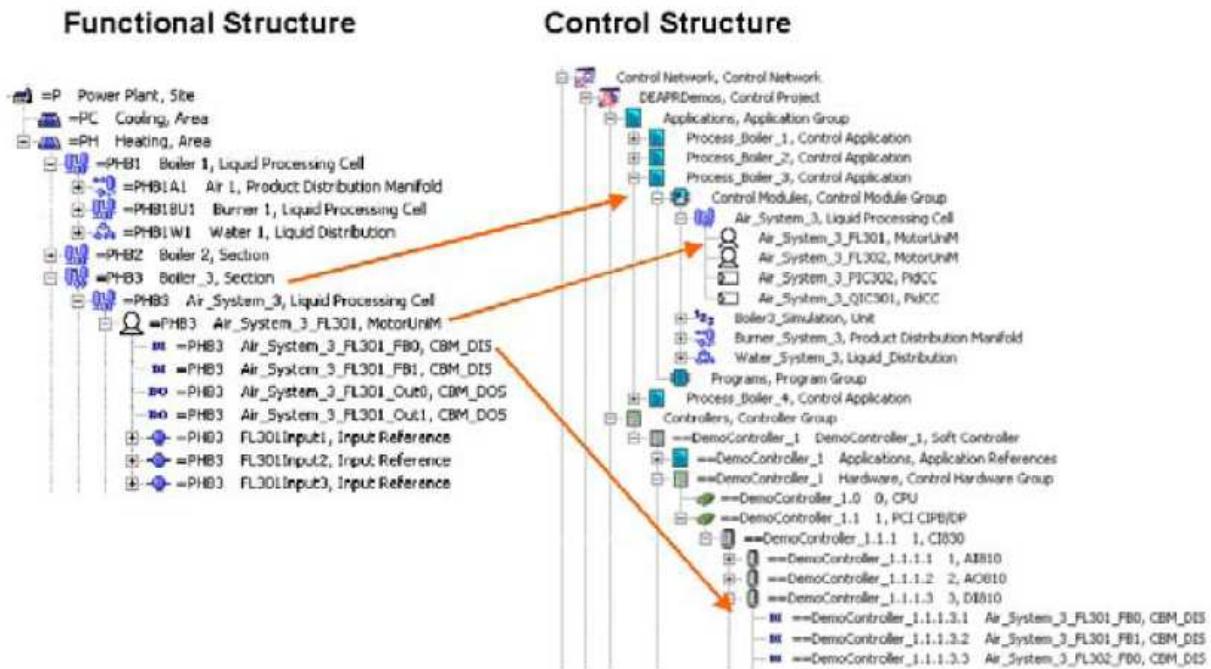
圖 4.1.2 Functional Structure



- Functional Structure 之製作之方式

Functional Structure 製作之方式如下圖 4.1.3 所示，將 Control Structure 中之物件，依據不同之功能將之由 Control Structure 放置(Insert)至 Functional Structure 相對應之位置。

圖 4.1.3 Functional Structure 之製作之方式



4.2.2 位置結構(Location Structure)

Location Structure 是 ABB 800xA system 中一個對物件分類的階層式架構，其分類的方式是由各物件的位置面去定義此物件應該要放(insert)在 Location Structure 的那一層中的那一個位置。各子系廠必須配合 REXCHIP 之要求，製作出屬於該子系統的 Location Structure。

各子系統在製作 Location Structure 之前，必須先提出如圖 4.1.4 之架構，經 REXCHIP 核可後方可施行。



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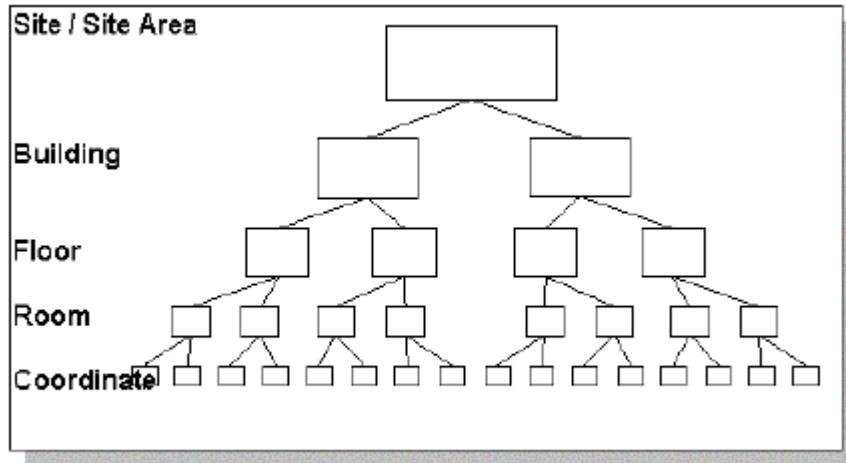
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圖 4.1.4 Location Structure 之階層示意圖



- Location Structure 之階層與圖 4.1.2 所示相似，只是改為 Location Structure 之階層。
- Location Structure 之製作方式與圖 4.1.3 所示相似，只是將 Control Structure 中之物件，改為依據不同之位置將之由 Control Structure 放置(Insert)到 Location Structure 相對應之位置。



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5.0 警報管理

因廠務管理控制系統所含概之監視控制點數量龐大，若無適當的管理及分類將會使得警報處理的速度減慢，進而可能造成設備的損害及人員的損傷。故需對警報加以區分等級及區域及處理權限。

5.1 警報等級

警報合理等級區分：

警報合理等級分區依附件1，REXCHIP之警報優先等級風險評估表，定義各個Tags警報合理等級，共分為A1，A2，A3，A4，A5，B1，B2，B3，B4，B5，C1，C2，C3，C4，C5，D1，D2，D3，D4，D5等20等級。此20等級可對應至ABB 800xA System 之20個Variables。此20個Variables需於每一個CBM Project中由各子系統監控負責單位建立於各自的Project Constants中。如A1對應AESev. A1(dint:951)，A2對應AESev. A2(dint:901)，B3對應AESev. A3(dint:851)等，以此類推如圖5.1.1所示。

各子系統監控負責單位必須提供警報規劃資料，其內容欄位請依照13840-C附錄一送審，經REXCHIP核可後，將警報依規劃資料建置於系統中(如圖5.1.2所示)。

圖 5.1.1 警報等級設定



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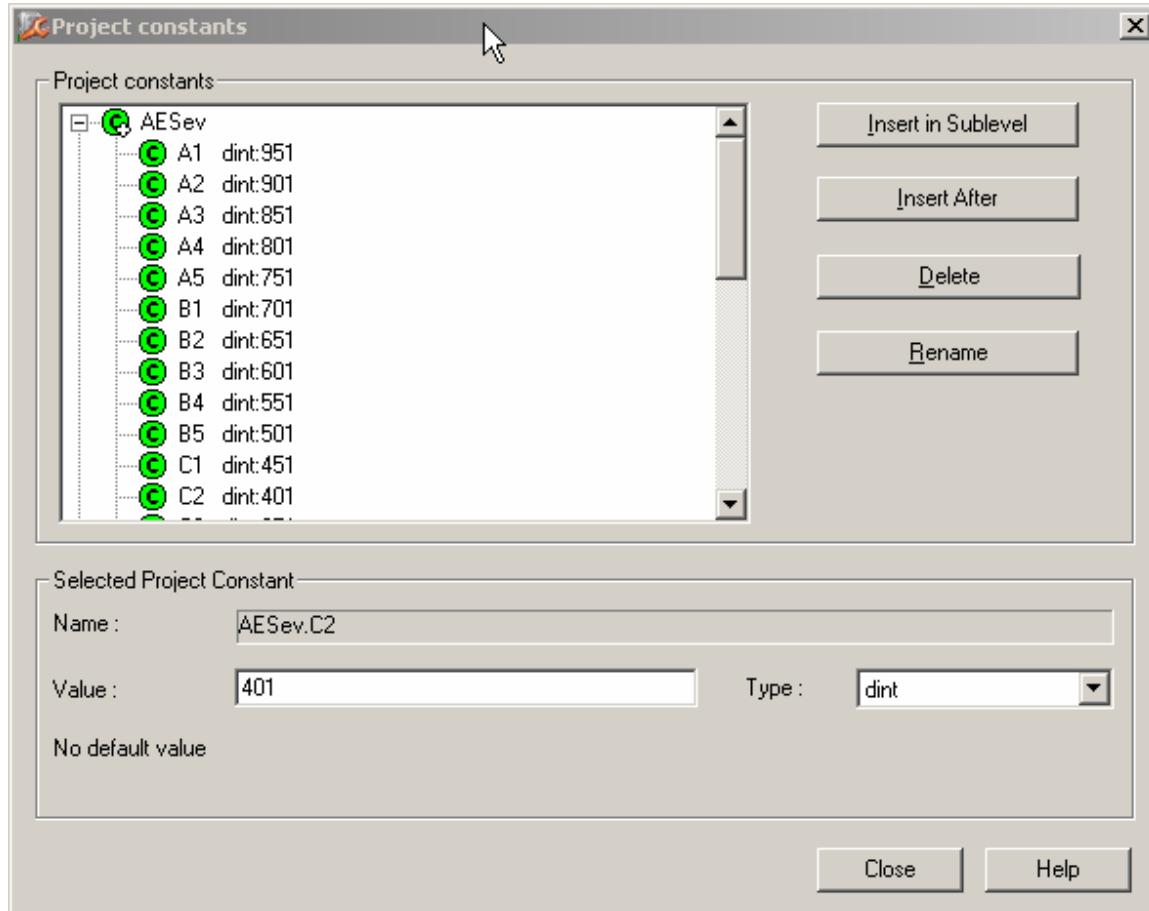


圖 5.1.2 控制邏輯的警報設定

Connections - H3_MAU01_TT_101 PCDeviceLib.Transmitter*					
Name	Data Type	Initial Value	Parameter	Direction	Description
33 AELevelHH	real	90	24.0	in_out	IN INIT HighHigh limit for Value that causes Alarm/Event RangeMin<=AELevelH<=RangeMax
34 AELevelHHH	real	95		in_out	IN INIT HighHighHigh limit for Value that causes Alarm/Event RangeMin<=AELeve
35 AELevelInc	real	99		in_out	IN INIT (units/sec) Max Increase Rate of the Input 0<=AELevelInc<=(RangeMax-Ran
36 AELevelL	real	5	21.0	in_out	IN INIT Low limit for Value that causes Alarm/Event RangeMin<=AELevelL<=Ran
37 AELevelLL	real	3	20.0	in_out	IN INIT LowLow limit for Value that causes Alarm/Event RangeMin<=AELevelLL<
38 AELevelLLL	real	1		in_out	IN INIT LowLowLow limit for Value that causes Alarm/Event RangeMin<=AELev
39 AESevH	dint	cPI.AlarmEvent.HAISev	AESev.B3	in_out	IN Severity High. Range 1-1000, Else ParError+(Alarms:Prev valid value used
40 AESevHH	dint	cPI.AlarmEvent.HHAISev	AESev.C4	in_out	IN Severity HighHigh. Range 1-1000, Else ParError+(Alarms:Prev valid value used
41 AESevHHH	dint	cPI.AlarmEvent.HHHAISev		in_out	IN Severity HighHighHigh. Range 1-1000, Else ParError+(Alarms:Prev valid value
42 AESevInc	dint	cPI.AlarmEvent.IncSev	AESev.B3	in_out	IN Severity Dec/In ROC. Range 1-1000, Else ParError+(Alarms:Prev valid value
43 AESevL	dint	cPI.AlarmEvent.LAISev	AESev.C4	in_out	IN Severity Low. Range 1-1000, Else ParError+(Alarms:Prev valid value used else
44 AESevLL	dint	cPI.AlarmEvent.LLAISev		in_out	IN Severity LowLow. Range 1-1000, Else ParError+(Alarms:Prev valid value used
45 AESevLLL	dint	cPI.AlarmEvent.LLLAISev		in_out	IN Severity LowLowLow. Range 1-1000, Else ParError+(Alarms:Prev valid value used
46 AESevOE	dint	cPI.AlarmEvent.OESev		in_out	IN Severity for OE. Range 1-1000, Else ParError+(Alarms:Prev valid value used e
47 RedIncDecLim	real	10		in_out	IN Rate of change during the linear phase of switchover > 0.0 else considered as



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5.2 抑制的警報

抑制的警報(Hidden Alarm)是一種伴隨發生的警報。例如壓力低的警報是因為馬達停止運轉的緣故，那壓力低即可定義為 Hidden Alarm。因各系統 Process 之不同，會產生出不同之 Hidden Alarm 的定義，各子系統廠家需配合 REXCHIP 系統負責人之需求，製作出該系統之 Hidden Alarm。

5.3 警報區域

對於警報區域之分類，可由 Function Structure 及 Location Structure 加以區分，參考 4.2 物件管理及分類。

5.4 警報處理權限

警報處理權限為限制各子系統的操作人員不可操作其它系統的警報，及權限不足的人員不得操作特定的警報等之權限設定。原則上由 FMCS 廠商提供設定好之使用者帳號及密碼，供各子系統使用，但若因業主要求以致需修改設定時，各子系統廠商須配合修改。



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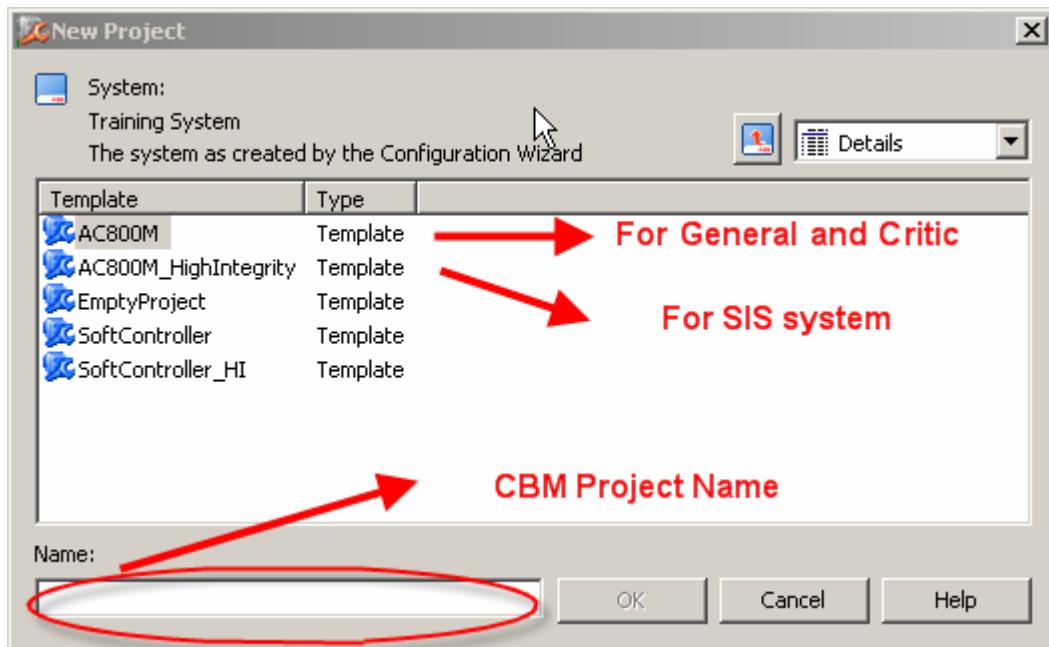
6.0 圖面、控制及操作介面相關之設計準則

圖面、控制及操作介面相關之設定是為了實踐監視及控制特定設備之運轉、操作、維護。各子系統廠商須依據本規範及REXCHIP之要求進行圖面、控制及操作介面相關之設定。

6.1 新增一個 Control Builder M Project

新增一個 Control Builder M Project 的方式如圖 6.1.1 所示

圖 6.1.1 新增 CBM Project



各子系統之 CBM Project 之名稱如表 4.1.1。若 Control Type 為 General 及 Critical 則選擇 AC800M，若為 Safety Integrated System 則選用 AC800M_HigiIntegrity。



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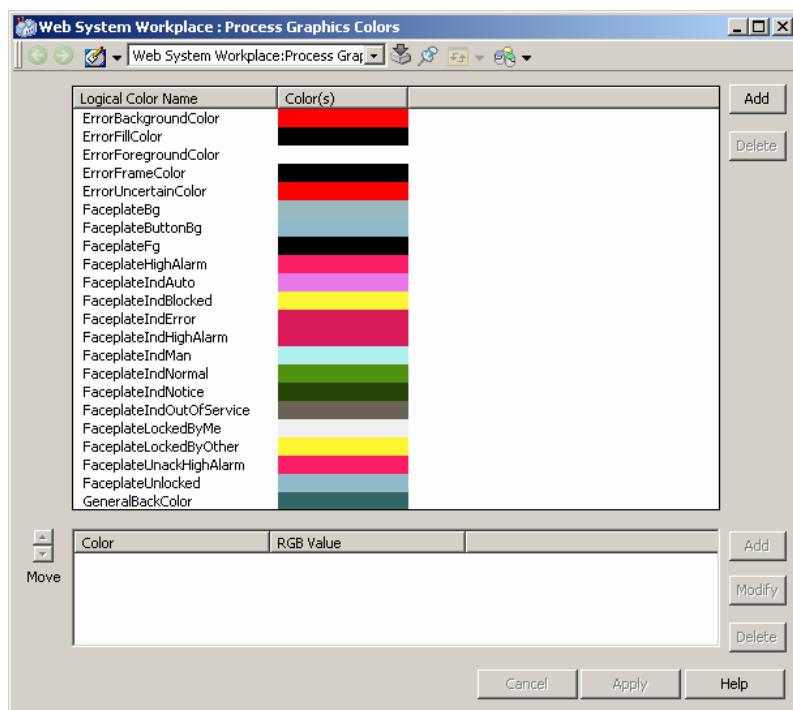
6.2 Control Builder M Library

為了維持各子系統控制邏輯規劃方式的一致性及可讀性，以及日後維護修改之便利性，故所有使用之 Library 統一由 FMCS 廠商提供及修改。各子系統廠商不得私自開發 Library。各子系統監控負責單位若因特殊緣故或應 REXCHIP 要求，必須自行開發 Library 時，則必須提出申請，經過 REXCHIP 及 FMCS 廠商同意後方可進行，並將開發好的 Library，交給 FMCS 廠商彙整。

6.2.1 圖面顏色定義

各子系統於繪製控制圖面時，必須統一使用由 FMCS 廠商提供之色板。其顏色應用之方式由 FMCS 提供表格規定之。如下圖 6.2.1 所示(僅供參考，以實際提供為準)

圖 6.2.1 色板





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下列為各顏色色碼(R.G.B)之定義：

黑色	(0, 0, 0)
藍色	(0, 0, 255)
棕色	(128, 0, 64)
淺青綠色	(0, 255, 255)
藍綠色	(64, 128, 128)
深灰色	(153, 153, 153)
綠色	(0, 225, 0)
橙色	(255, 128, 0)
青豆色	(192, 220, 192)
粉紅色	(255, 0, 255)
紅色	(255, 0, 0)
淺橙色	(255, 128, 128)
銀灰色	(221, 221, 221)
淺藍綠色	(164, 200, 240)
紫色	(128, 0, 128)
白色	(255, 255, 255)
黃色	(255, 255, 0)
深藍色	(0, 64, 128)

6.3 設備的顯示原則

各種設備的顯示原則為以下各點所列，但若有特殊需求得視實際需求修改。

- 有液位控制(或指示)點者，須建 BAR CHART。
- 開關在圖中以開關圖形（或以 TAGNAME）表示，但都有 CONTROL TARGET，以叫出控制面板(Faceplate)，做為切換之用。
- 圖中 IN/OUT 之管線要儘量標示流體之簡名；主要流程管線加粗。
- 圖形間切換之 Graphic Link 原則上擺在畫面左右兩邊。



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- 圖形之規劃原則應將屬於相關控制之設備擺在同一 GRAPHICS 中，以方便控制，應畫在一起，若無法全部放進去，則利用 Aspect Link 方式跳到較詳細的畫面。圖面空間允許時，與主設備相關之流程控制點亦需放入。

- CONTROL LINE 用白色虛線。
- GRAPHIC 中數字之顯示規定如下：

大於 1000 不要小數點。
小於 1000 設一位小數點。
小於 100 設二位小數點。
小於 1 設三位小數點。

FORMAT :XXXXX
7200
151.5
40.52
5.55
0.999

- 液位 (0 - 100%) 一位小數點。

FORMAT :XXX
62.1
100.0

- 控制閥開度設小數點兩位。
- 線與線相交則垂直線須中斷，訊號線則不必中斷。

6.3.1 各設備動態顯示圖形

各設備動態顯示圖形請參考附件 2:動態物件顯示。

6.4 圖型元件定義

圖形元件 pumps, valves, tanks, breakers, sensors, meters, controllers and equipment 等等，是畫面的基本單元，本次 P&ID 圖施作擬採用 ISA 原件符號，使用 2D 圖面，由 FMCS



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廠商提供基本圖形元件，若有不足部分或是特殊元件請各子系統監控負責單位提出變更申請，提送 REXCHIP 及 FMCS 廠商製成程式館(Library)後再交各系統使用。圖型元件變色處理一律採用色板表，各子系統為了發展或操作更方便，除 P&ID 圖外，得自行設計其他畫面或原件圖形元件。

- 英文文字使用 Arial 字型，字型大小至少為 8 粗體。
- 中文字使用新細明體字型，字型大小至少為 8 粗體。
- Description 使用英文時，每個單字字首為大寫，其餘使用小寫，使用簡寫時採用大寫。
- 警報看板顏色：警報等級

High 時為 紅(255, 0, 0) UnACK 時為 紅(255, 0, 0)閃爍

Medium 時為 橘(254, 130, 44) UnACK 時為 橘(254, 130, 44)閃爍

Low 時為 黃(255, 255, 0) UnACK 時為 黃(255, 255, 0)閃爍

6.5 Security Configuration

ABB 800xA System 之使用者帳號、群組的設定管理統一由 FMCS 廠商設定。FMCS 廠商會將設定好之使用者帳號提供給各子系統負責人，各子系統負責人需配合進行相關權限設定。

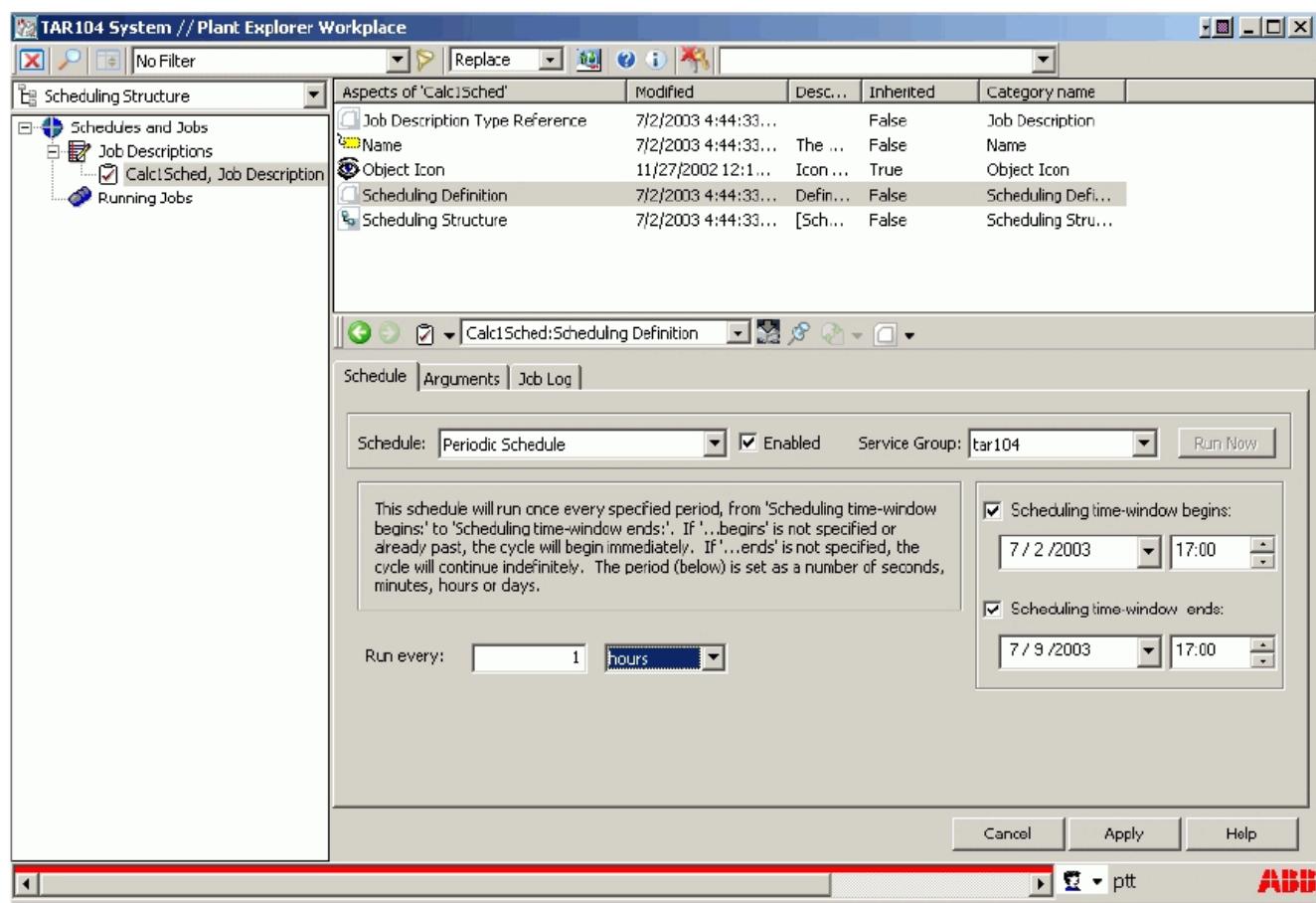
6.6 設備之中文說明

每一個控制設備或是控制點，於 800xA 系統中均會對應成一個 Tag Name，子系統需依照各系統負責人提供之資料將此 Tag Name 之中文說明(Description)鍵入。方法如附件 11 所示。

6.6.1 工作排程(Scheduling Job)

若為達到某些連續發生之工作而必需用到工作排程的功能時，請提出與 REXCHIP 及 FMCS 廠商討論後，由各廠商於單機上建立屬於各系統的 Job Folder 後，將製作好的 Scheduling Job 交由 FMCS 廠商 Import 至 800xA 系統內。如圖 6.6.2 所示。

圖 6.6.2 排程設定





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6.7 控制程式之程式館 (Libraries)

FMCS 廠商所提供之程式館，各子系統承商在引用之時，必須自行依其製程之特性作測試，若程式館有問題，須提出並與 FMCS 廠商、共同研討修正以符製程之需求，子系統承商不能免於責任之外。



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7.0 操作員操作畫面作業規定

操作員操作畫面作業規定主要要在規定如何製作出最適當的操作員畫面，讓操作員可以以最便利的方式達到所要操作處理的項目。

7.1 視窗畫面 Layout 設定

FMCS畫面佈置切分為4區(視窗)，如圖7.1.1 FMCS畫面LAYOUT。FMCS LAYOUT視窗畫面中央Display Area之圖面需由各子系統廠家繪製，及右側Menu Area由FMCS提供物件，各子系統自行製作圖面連結位置外，其餘部分皆由FMCS系統廠家建置，若圖面中有需要各家統一放置之物件，如Graphic Link則各子系統亦需配合實施。FMCS系統廠家及各子系統廠家對需就其所屬區域負責畫面修改及軟體維護之責；各子系統對於其所繪製之圖面需依照其功能屬性及位置屬性將其存放在相對應之Functional Structure及Location Structure中。

圖 7.1.1 Operator Workplace Layout





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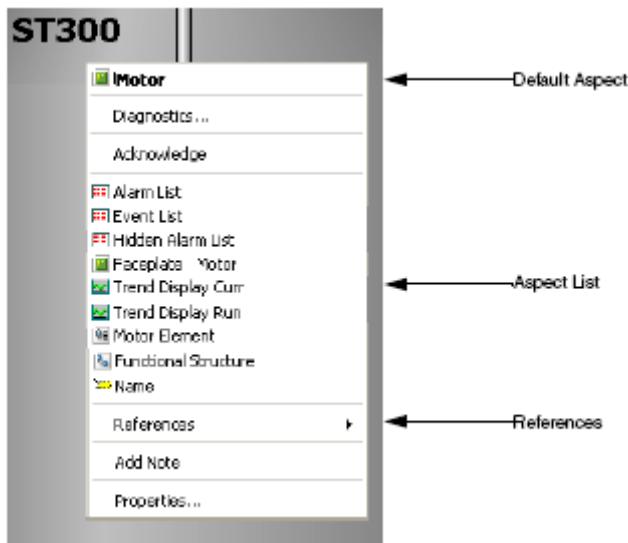
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7.2 物件選單 Context Menu

800xA 系統中，每一個物件皆具有右鍵功能。只要在物件上按滑鼠右鍵，即可帶出一個物件選單(Context Menu)如圖7.2.1所示，此選單中可顯示屬於此物件之屬性元件(Aspect)，此元件可為一Windows Application或CAD、PDF、eDMS等文件檔，因各物件所應有的屬性元件並不相同，故子系統廠商應配合REXCHIP各系統負責人的需求，製作出屬於每一個物件應有的屬性元件(Aspect)。如何使用windows application aspect呼叫物件如圖7.2.2所示。eDMS為一電子化的文件管理系統，ABB 800xA系統可透過Context Menu的連結，瀏覽到eDMS資料庫中相對應到此物件的文件，FMCS廠商需提供一如附件10 FMCS與EDMS整合之表格給各子系統廠商，各子系統廠商再依據需求標示出對應到此物件所應具備的文件有那些，並且於每一個物件中加入一個”WEB Page” Aspect，並命名為eDMS。如圖7.2.3所示。

圖7.2.1 物件選單 Context Menu





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圖 7.2.2 Windows application Aspect Setting

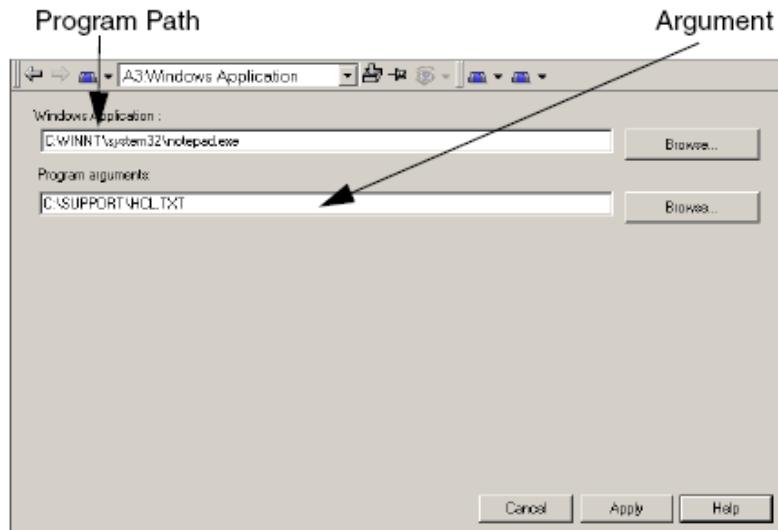


圖 7.2.3 WEB PAGE aspect for eDMS

MainFaceplate	4/10/2006 6:14:2...	Tran...	False	Faceplate	ver 1.0		
Name	4/26/2006 4:58:0...	The ...	False	Name	ver 1.0		
Object Icon	3/15/2005 3:25:0...	Obj...	True	Object Icon	ver 1.0		
ObjectErr	3/20/2006 4:08:4...	Tran...	True	Faceplate Element	ver 1.0		
Operator Note	4/10/2006 3:06:4...	Tran...	False	Operator Note	ver 1.0		
Parameters	3/20/2006 4:08:4...	Tran...	True	Faceplate Element	ver 1.0		
PriorityCmdInterlockH	3/20/2006 4:08:4...	Tran...	True	Faceplate Element	ver 1.0		
PriorityCmdInterlockL	3/20/2006 4:08:4...	Tran...	True	Faceplate Element	ver 1.0		
RedFaceplate	3/20/2006 4:08:4...	Tran...	True	Faceplate Element	ver 1.0		
Signal	3/20/2006 4:08:4...	Tran...	True	Faceplate Element	ver 1.0		
Transmitter Type Reference	4/10/2006 3:06:4...	This ...	False	Transmitter	ver 1.0		
TrimCurve	3/20/2006 4:08:4...	Tran...	True	Faceplate Element	ver 1.0		
eDMS	4/26/2006 4:58:0...	http:...	False	Web Page	ver 1.0		



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7.3 即時、歷史警報畫面 Alarm、Event List

800xA 系統可定義出多種Alarm Event List之樣板(Alarm Event Configuration)。即時、歷史警報畫面(如圖7.3.2所示)原則上統一由FMCS廠商製作，但若REXCHIP各系統負責人對其所屬的即時、歷史警報畫面為針對該系統需求而與FMCS廠商提供之有所不同時，各子系統廠商必須配合REXCHIP各系統負責人製作出屬於該系統之即時、歷史警報畫面。

警報帶Alarm Band:

警報帶可顯示出單一物件或群組的警報數量，並可分為已確認Ack、未確認Un-Ack、以及Hidden之警報。各系統廠商必須配合REXCHIP各系統負責人製作出屬於該系統之警報帶。如圖7.3.1所示。

圖 7.3.1 警報帶

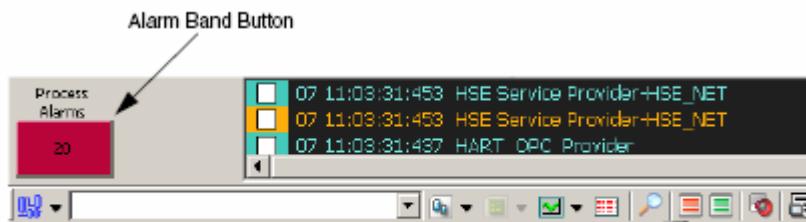
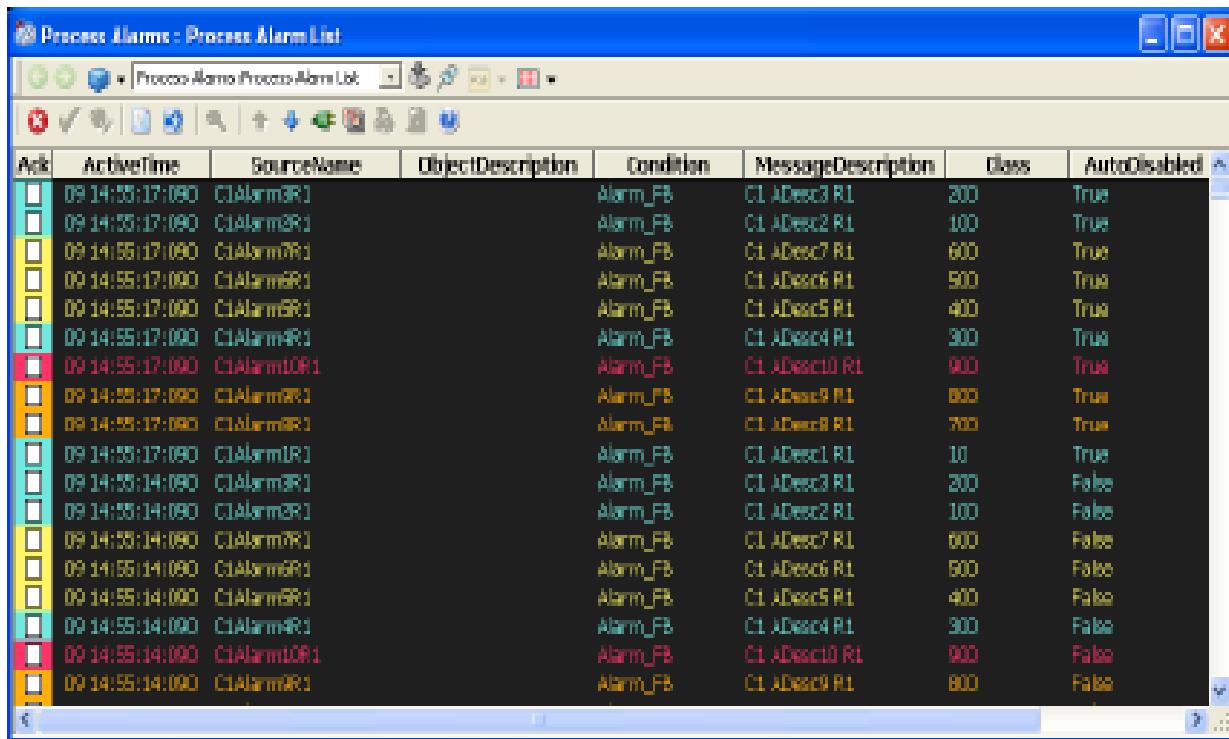


圖 7.3.2 即時、歷史警報畫面



7.4 曲線畫面 Trend Chart

800xA 系統可定義出多種Trend Chart之樣板(Trend Template)以因應各種不同之需求，原則上所有的樣板皆由FMCS廠商提供，但若因各系統負責人所要求之Trend Template不同於FMCS廠商提供時，可提出要求由FMCS廠家再行增加。

Trend Chart如圖7.4.1所示，其中Trend Table之位置為定義此Trend所要顯示之點為何，各子系統廠商必須配合REXCHIP各系統負責人將各張Trend Chart中的點置入。

圖 7.4.1 曲線畫面 Trend Chart



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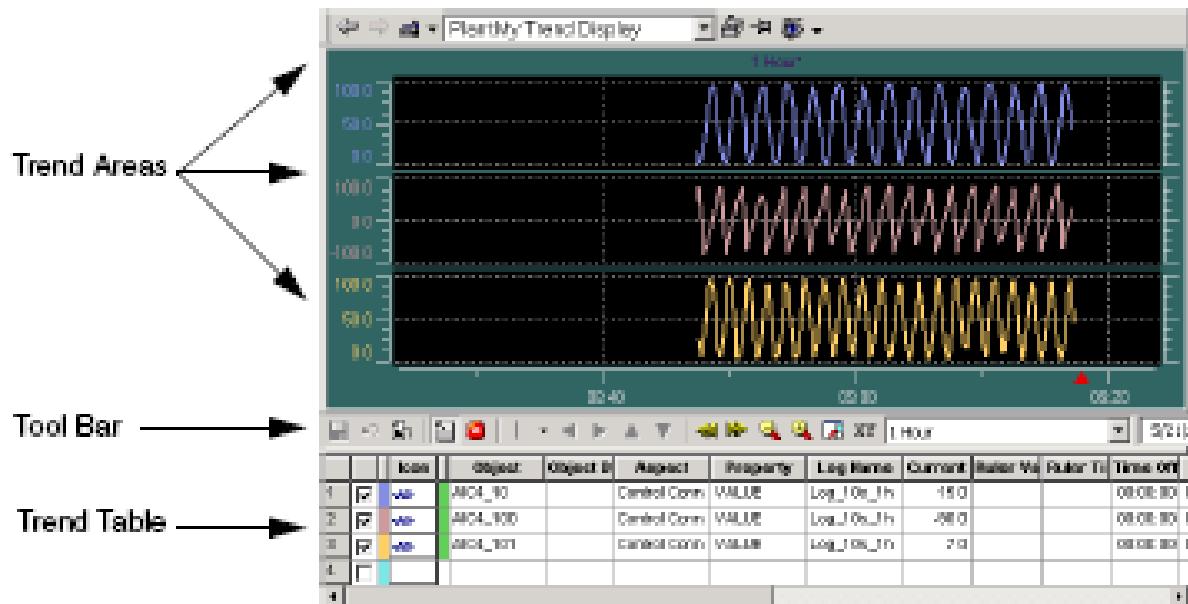
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7.5 信號總覽畫面

各子系統廠商應將各細項設備之狀態或數值作成總覽畫面(Overview)，如圖7.5.1及圖7.5.2所示。

圖7.5.1 信號總覽畫面(一)



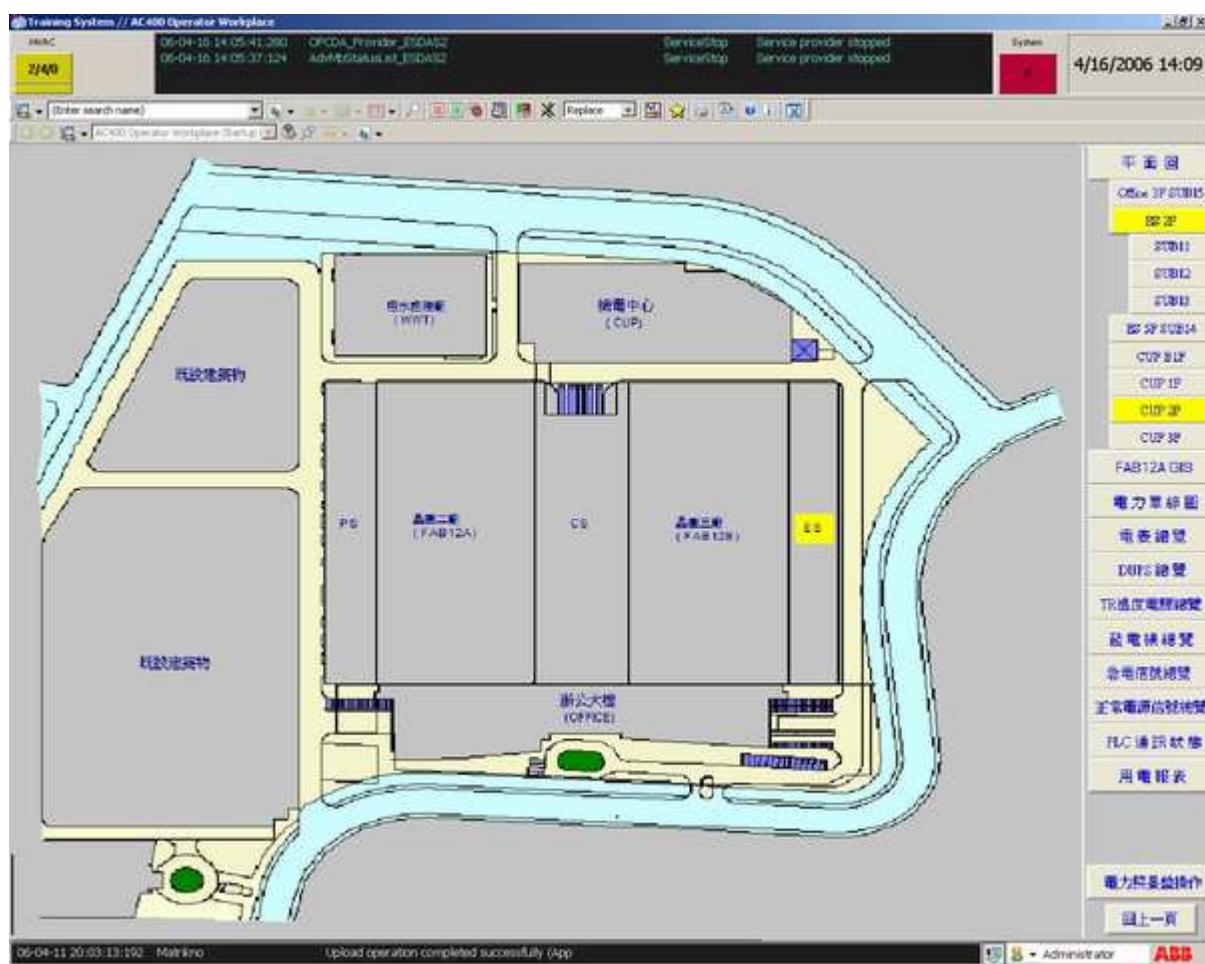
圖 7.5.2 信號總覽畫面(二)



7.6 設備位置平面圖

由FMCS廠商提供畫面底圖，請各系統於指定時間提出各棟平面圖需求後，由FMCS廠商與業主討論後製作成範本再提供給各系統使用。各棟平面圖以每層一張為單位。如圖7.6.1及圖7.6.2所示。

圖 7.6.1 設備位置平面圖(一)





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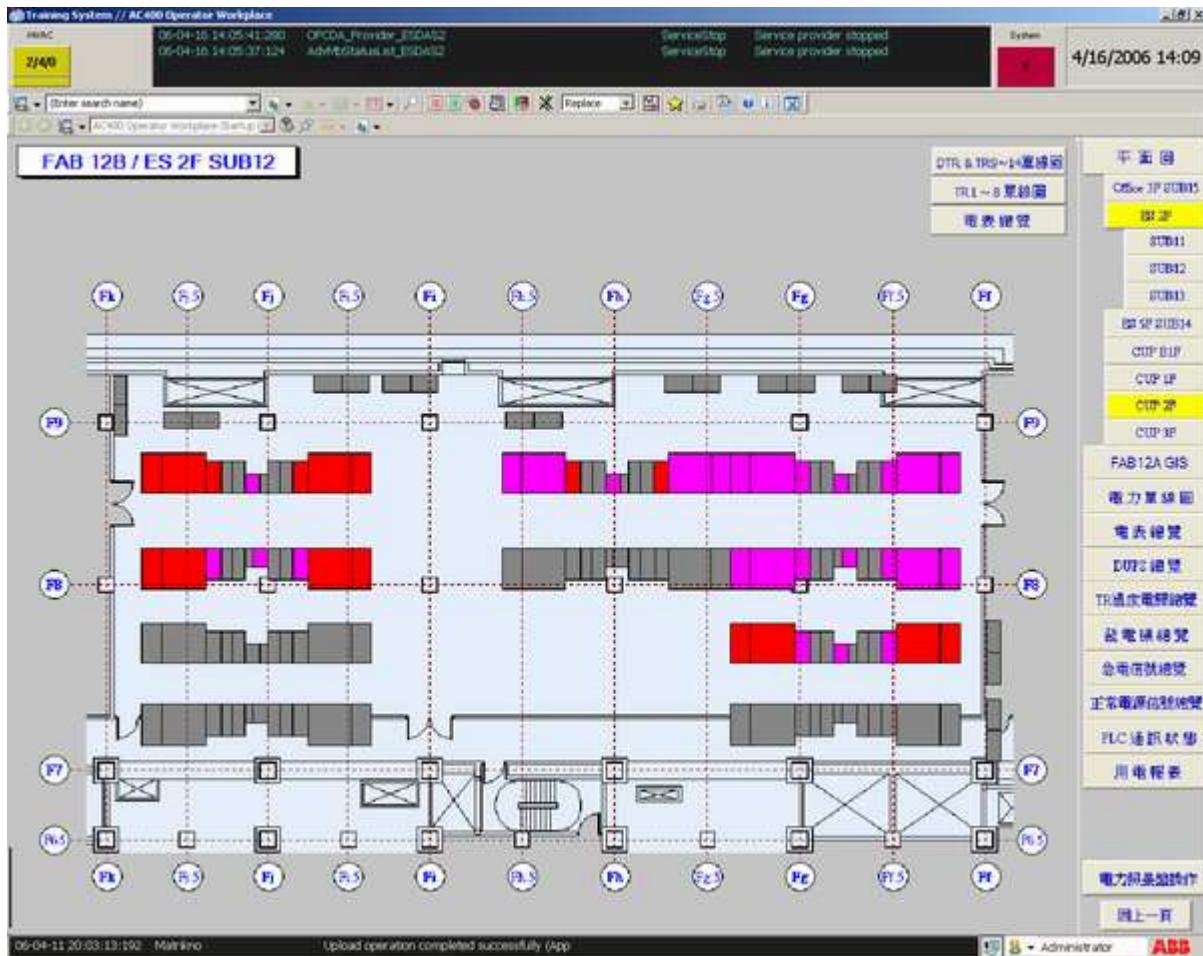
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圖 7.6.2 設備位置平面圖(二)





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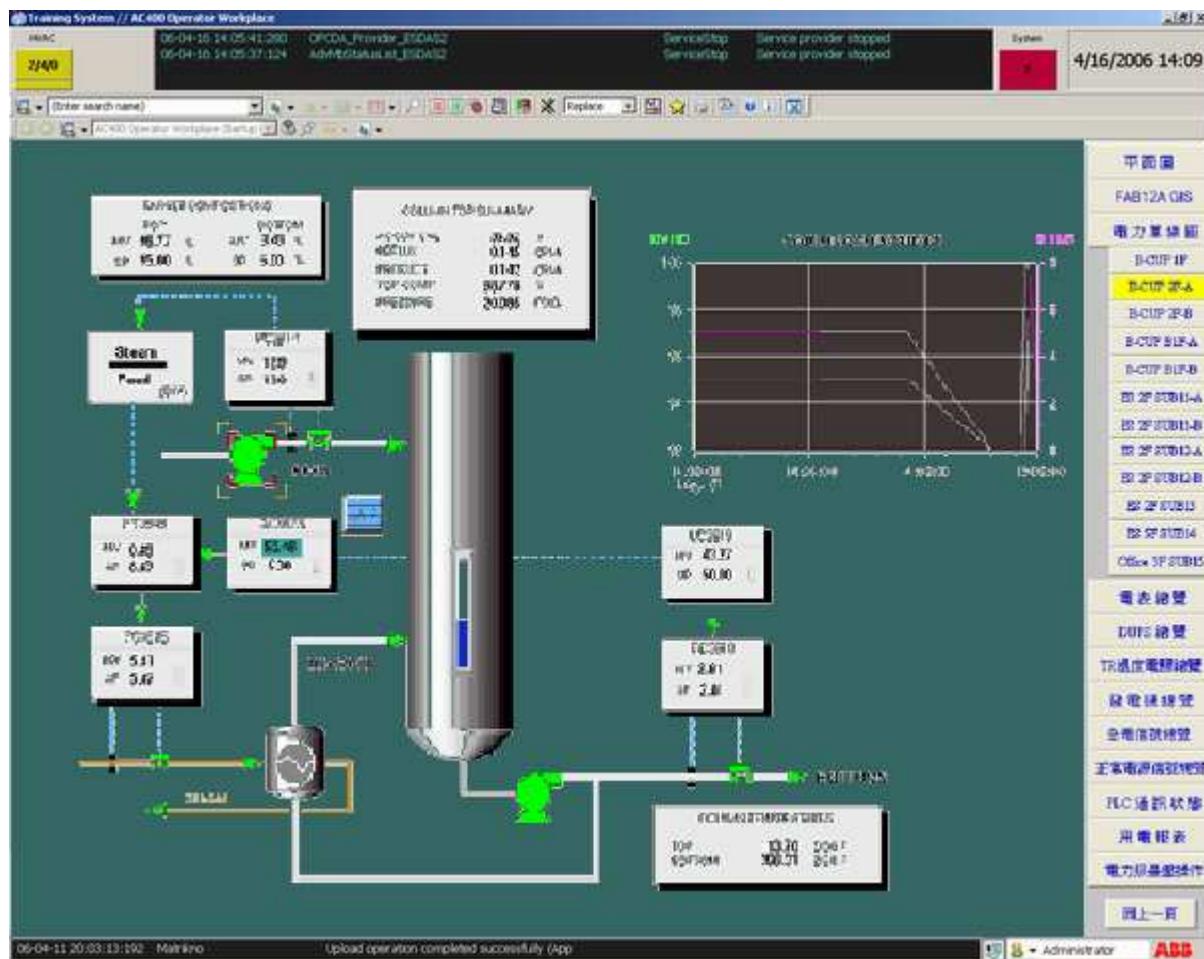
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7.7 P&ID 畫面





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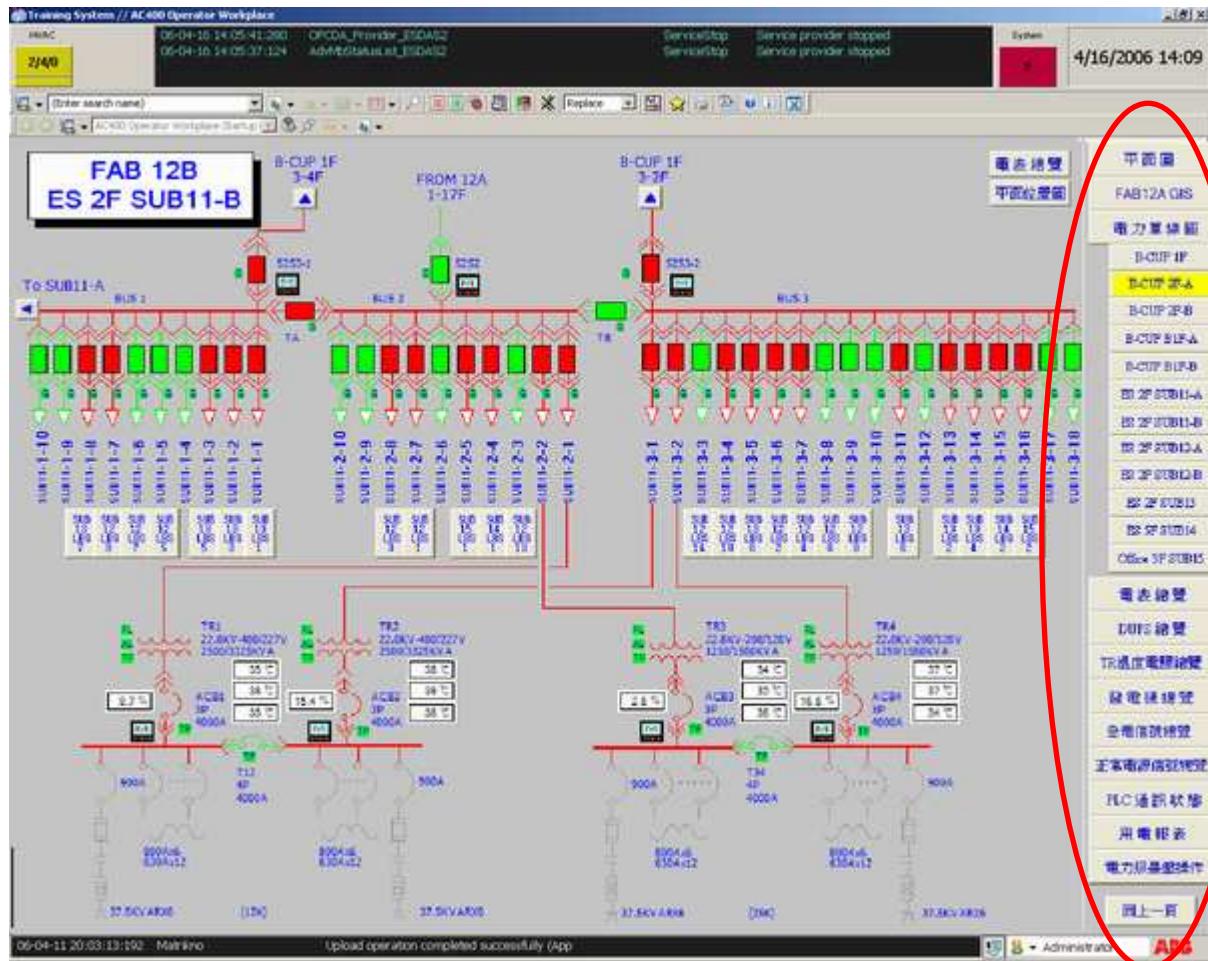
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7.8 畫面選單功能表

格式由業主及FMCS廠商討論後，再提供給各子系統廠家。其內容由各系統自行規劃。





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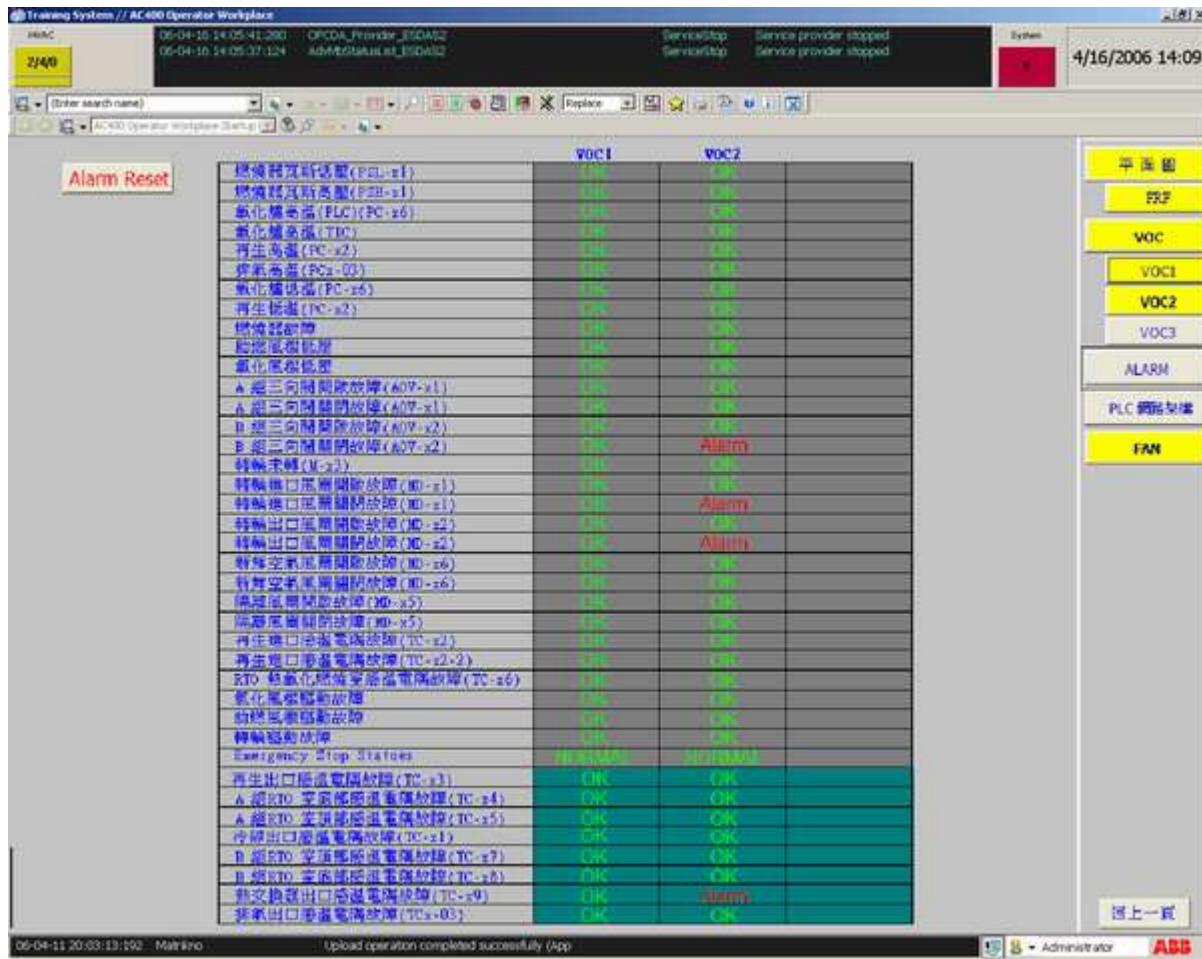
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7.9 區域/設備 警報狀態顯示畫面



7.10 各子系統主畫面

各子系統在規劃此一畫面時，必須和REXCHIP系統工程師進行畫面Layout的討論，此畫面必須規劃至少有下列幾項：

- 重要設備/單元總纜(Summary)
- 功能總纜
- 畫面總纜(含系統架構圖、通信架構圖等)
- 報表總纜
- 趨勢圖群組總纜
- 區域總纜
- 連鎖總纜



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8.0 ABB 800xA歷史曲線資料庫整合作業規範

各子系統的歷史曲線資料規劃好後，第一層的資料會存檔在各子系統的 Connectivity Server 中，第二層之後的資料則存 Information Management System 中。在 FMCS 的工作站要取得歷史資時，系統會以無縫(seamless)的方式將存在 Connectivity Server 及 Information Management Server 中的資料整合起來提供給 Trend Chart 來做顯示。Information Management Server 中所需要建立歷史資料的點，將依各系統所提之資料建檔，若未提出，各子系統的歷史曲線資料將無法紀錄在 Information Management Server，趨勢圖功能便無法正常運作。

8.1 歷史資料樣板 History Log Template

800xA 系統可定義出多種歷史資料樣板(History Log Template)，其中又分為單層及多層兩種模式，用以因應各種不同之需求。原則上所有的樣板皆由FMCS廠商提供，但若因各系統負責人所要求之Log Template不同於FMCS廠商提供時，可提出要求由FMCS廠家再行增加。

8.2 Log Template 相關參數

- rate /collection interval (秒)：請填上各Tag所需記錄之頻率(TREND_CHART 的解析度)。例如：每5秒記錄一次，就選用5s之Log Template。若有第二層以上則選用相對應之Hierarchical Log Template (記錄之頻率越高，則相對耗掉較多的硬碟空間)
- limit/collection deadband(%)： 請選擇各數值TAG可允許之記錄誤差(dead band)，例如：0~50°C 溫度計量，溫度23°C，Exception Deviation 設 1 %，則溫度變化在22.5~23.5°C 將不予記錄。(若沒有設deadband或設的相當小， 則會以RATE 設定時間每X秒記錄一次，即使數值絲毫不變，如此將耗掉硬碟空間)。
- FMCS廠商會提供各子系統廠商如圖8.2.1之一個針對該系統建立歷史曲線資料之excel 格式的檔案，各子系統廠商須於該檔案中篩選需要記錄之歷史曲線資料的點及頻率，



並將此檔案交還給FMCS廠商進行建立歷史曲線之工作，各廠商不得自行建立歷史曲線資料。

圖 8.2.1 歷史曲線建點樣板

8.3 趨勢圖曲線畫面

各趨勢圖內需顯示那些點，由各子系統廠商建立。並配合REXCHIP各系統負責人製作出所需的趨勢圖曲線畫面。

8.4 整合表格

提供歷史曲線整合資料，製作成表格後交給業主。



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9.0 ABB 800xA 系統權限管理設計(規劃)規定

ABB 800xA System 內所有的 Users、Groups、permissions 統一由 FMCS 廠商製作提供。

9.1 安全區域

每一個子系統內所應具有的權限，及子系統內各物件所應被賦予的安全規劃必須給予一個 Security Definition Aspect去定義此物件或此物件以下的安全等級。此Security Definition Aspect在各子系統以下，由各系統廠商依需求製作，其餘之部分由FMCS廠商統一規劃。

9.2 安全等級

等級	對象	登錄名稱	操作範圍	子系統配合項目
第一級	一般使用者	Guest	密碼登錄 歷史警報查詢 即時警報看板總覽 歷史資料查詢 回主畫面 系統監視	
第二級	值班工程師	PowerUser	同第一級 畫面列印 日報表列印 警報確認 關閉操作畫面 設備啓動/停止	



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第三級	系統工程師	Engineer	同第二級 警報設定 參數設定 高權限系統控制鈕	
第四級	系統維護者	Administrat	同第三級 離開系統 系統維護/修改	



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10.0 系統備份及復原

各子系統需隨時保有最新的系統備份，亦即每一次修改後，即應針對該子系統之部分進行備份。

備份及還原之方式為透過匯出/匯入的工具(Import/Export Tool)。如圖 10.0.1 所示。

各子系統於備份時，至少需包含 Control Structure、Functional Structure、Location Structure。

- 請依業主要求，統一建立監控系統備份復原機制。
- 系統備份軟體/資料的提送

圖 10.0.1 Import/Export Tool

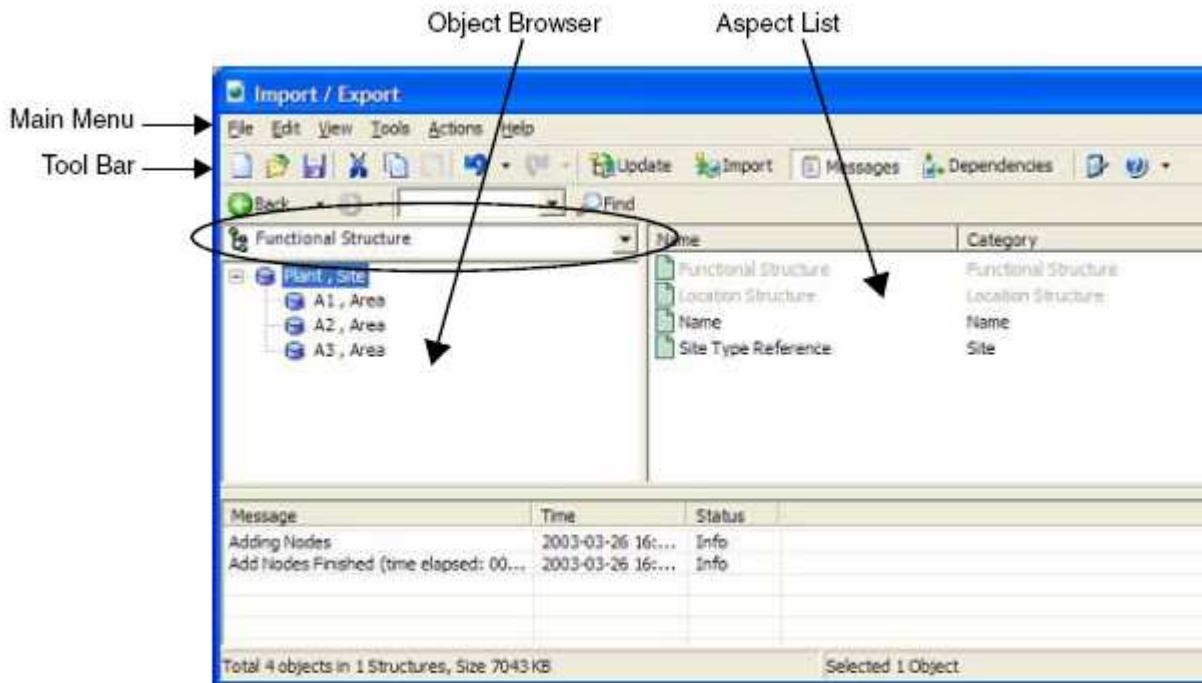


Figure 123. The Import/Export User Interface - Main View



11.0 ABB 800XA硬體設計作業規定

此 ABB 800XA 硬體設計作業規範是用來定義廠商在設計控制盤時所必須要注意及遵循的事項。

11.1 通則

此規範為基於瑞晶半導體R1/R2新建工程專案合約規範內容，故若有未提及之部份，則以瑞晶半導體R1/R2新建工程專案合約規範為準。

11.2 盤體標準

11.2.1 盤體外觀

所有的控制盤外觀皆為單一尺寸 dimensions: 120 (W) x 220 (H) x 60 (D) (all in cm),
且為單面盤雙門對開。

11.2.2 盤體銘牌

盤體名稱須以銘牌標示。命名原則為廠區代號加上系統代號加上控制器或 I/O 流水號。

例如子系統為化學供應系統，共有 2 組控制器，每一控制器有二盤 I/O 盤，則編法如下(若 REXCHIP 另有要求時，以 REXCHIP 之要求為主)：

控制器盤 1:

R1-CDS-CPU-01

控制器盤 1 之 I/O 盤 1:

R1-CDS-01-I/0-01

控制器盤 1 之 I/O 盤 2:

R1-CDS-01-I/0-02

控制器盤 2:

R1-CDS-CPU-02



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控制器盤 2 之 I/O 盤 1:

R1-CDS-02-I/0-01

控制器盤 2 之 I/O 盤 2:

R1-CDS-02-I/0-02

11.2.3 散熱及過濾

所有的控制器盤及 I/O 盤均須加裝散熱風扇及濾網，且濾網之更換、風扇之維修必須在不影響其它設備、元件之情況下，可簡易施作；另外有關風扇、濾網之型式、大小需考慮備品及維護之方便性，採用統一規格之產品。

11.3 盤內之佈置

盤內各裝置之佈置如附圖2及附圖3所示。附圖2及3僅供參考，各子系統監控負責單位需依實際情況進行盤內佈置設計，並於盤體組裝前提出設計文件經REXCHIP同意後方可進行組盤之工作。

11.4 盤內之配接線

11.4.1 軌道(rail)

所有之控組模組及端子(Terminal)、電驛(Relay)、無熔絲開關(Non-Fused Breaker)等均以 DIN-rail 軌道 DIN-Rail 固定。且端子及電驛等用以接線之軌道須以 3 公分高之銅柱墊高，以利接線之工作。

11.4.2 控制器電源

每一組控制器(PM861A, PM865)須有獨立之備援電源模組 Redundant Power Supply SD822(5A)，各模組須由獨立之端子供電。此電源模組前須有兩個容量為 3A 之無熔絲開關保護。參考圖 11.10.2。



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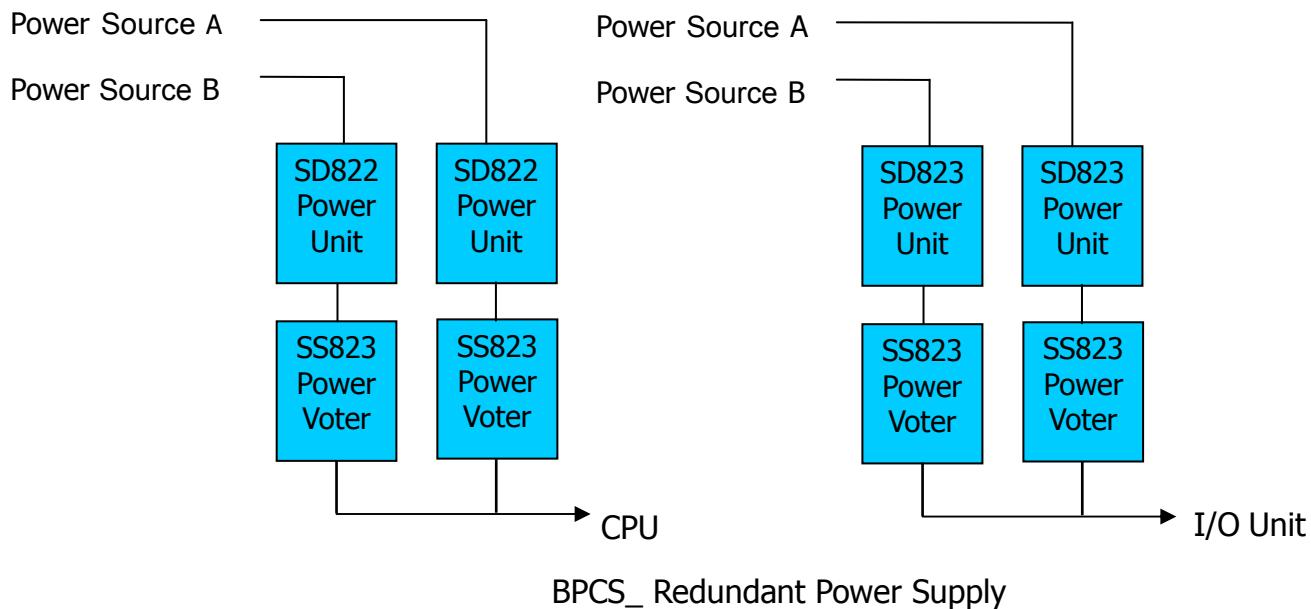
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11. 4. 3 I/O 模組電源

各控制盤(包含控制器盤及 I/O 盤)內之 I/O 卡須有獨立之備援電源模組 Redundant Power Supply SD822(5A)，不得與控制器之電源模組共用，且各 I/O 卡須由獨立之端子供電，以避免端子上之保險絲燒斷時，影響到其它卡片之正常運作。另外現場設備之信號電源亦可由此模組電源供應。此電源模組前須有兩個容量為 3A 之無熔絲開關保護。參考圖

11.10.2。

圖11.10.2： BPCS 控制器 Redundant Power Supply





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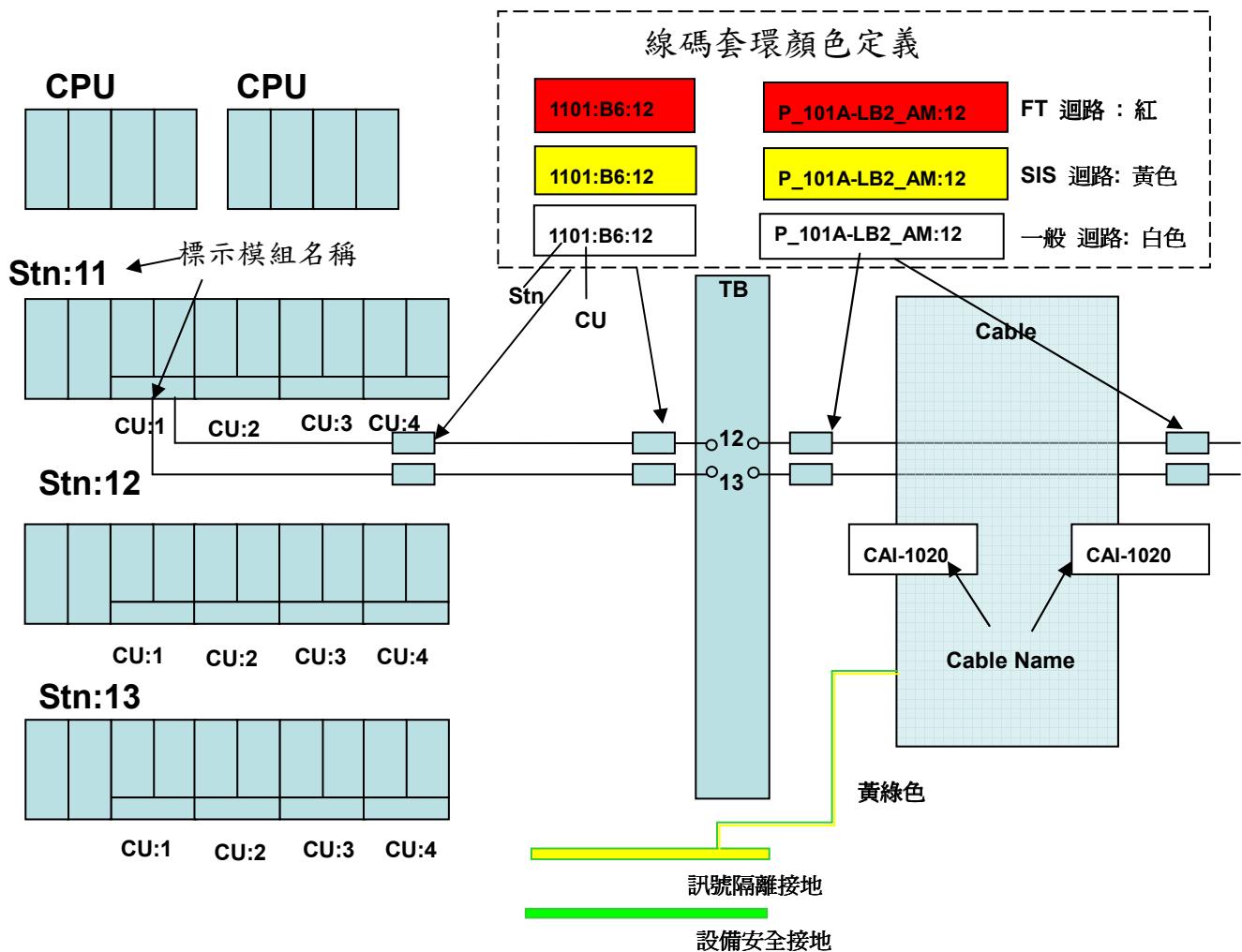
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11.4.4 控制盤及接線定義





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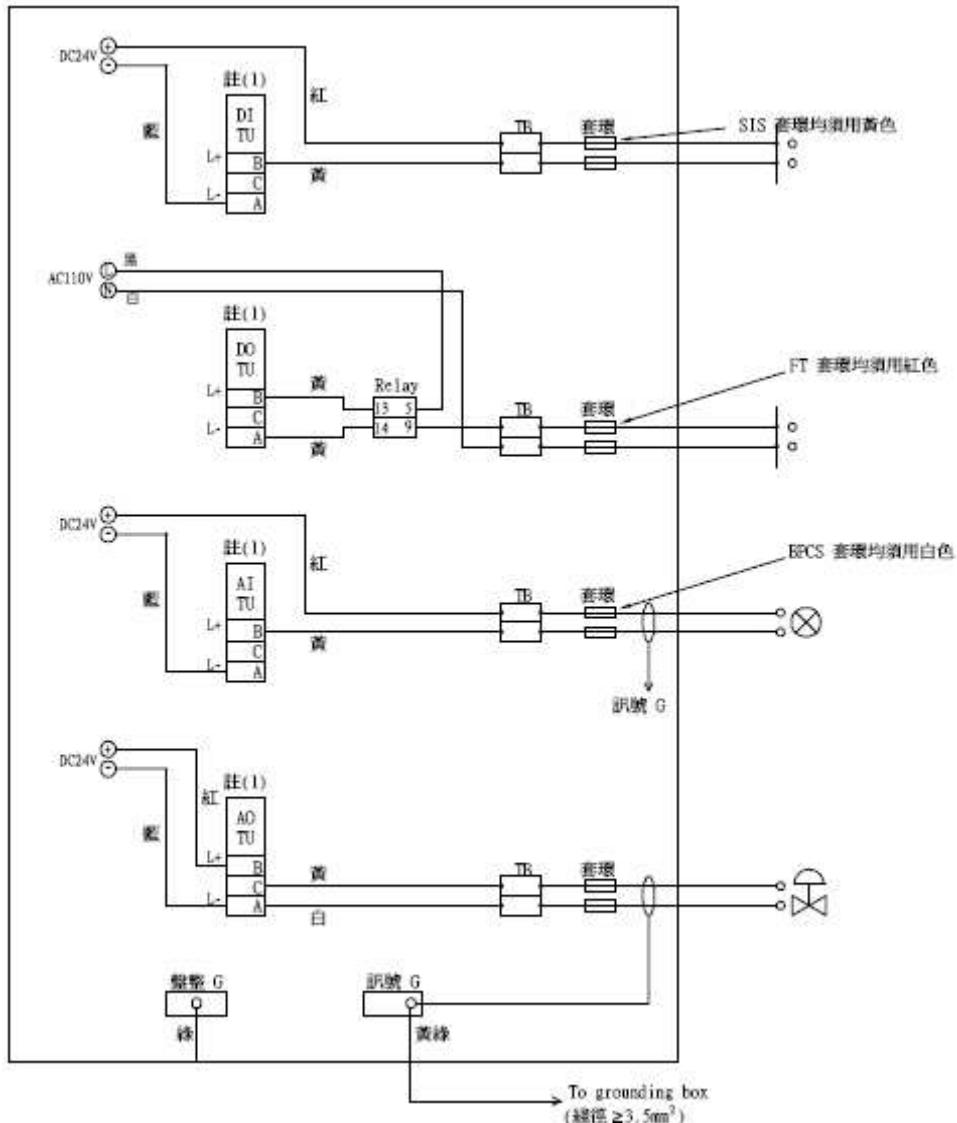
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- 盤內導線之線色及線徑相關之說明請參考圖 11.10.2。
- AC110V: 黑色(L), 白色(N), 1.25mm²。
- DC24V: 紅色(正), 藍色(負), 1.25mm²。
- 信號線: 黃色, 1.25mm² (類比訊號), 1.25mm² (數位訊號)。
- 接地線: 綠色, 5.5mm²。
- 訊號接地線, >=3.5mm²。



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11.4.5 I/O 卡未接線點之需求

選用之I/O卡為AI系列，AO系列等卡片，為了防止電氣干擾及硬體警報之問題，需串接250歐姆之電阻於未接線之I/O點。

如選用D0880，為了防止電氣干擾及硬體警報之問題則需串接250歐姆之電阻於未接線之I/O點。

11.5 控制器之選用

若控制需求為Safety Instrumented System(SIS)則必須選用Redundant PM865之CPU型號。若控制需求為Basic Process Control System(BPCS)，則不論General或Critical需選用Redundant PM861A或PM864A之CPU型號，其選用型號需考慮到程式容量。

在Critical的控制時，所有的硬體架構必須具備容錯係數為1(FT1)的型式，故除了CPU須選用Redundant PM861A或PM864A外，通訊模組及I/O卡亦須選擇具有Redundant的型式，參考11.6 I/O卡之選用。

每一組控制器所能控制的點數因控制型號及需求之不同，點型式之不同，及掃描速度之不同，所能連接控制的點數也會有所不同。原則上大約為SIS控制器(PM865): 500 - 900 點左右，BPCS控制器(PM861A): 500 點左右，BPCS控制器(PM864A): 800 點左右。承商必須以控制器之負載值為主要考量依據。如為BPCS控制器其負載值(CPU Total System Loading)須小於70%，如為SIS控制器其負載值(Total System Load)須小於60%，static cyclic load需小於50%。

記憶體(CPU Memory)使用之需求，承商於設計程式時必須考慮記憶體之使用量，否則將可能無法進行上線後之程式修改(Warm restart)。不論是BPCS控制器或SIS控制器，限制標準為全部Application 所占之記憶體容量不得超過總容量之50%，若超出上述之限制，控制器將只允許作 Cold restart之動作。



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11.6 I/O 卡之選用

若為SIS之控制器，則SIS部分之I/O卡必須選用Local I/O(Module Bus)，非SIS之I/O則可選用remote I/O(Profibus)。

若為BPCS(general and critical)之控制器，則I/O卡一律選用Remote I/O(Profibus)。Local I/O及Remote I/O之接線方式如圖11.6.1及圖11.6.2所示。

圖11.6.1 Local I/O的接線方式

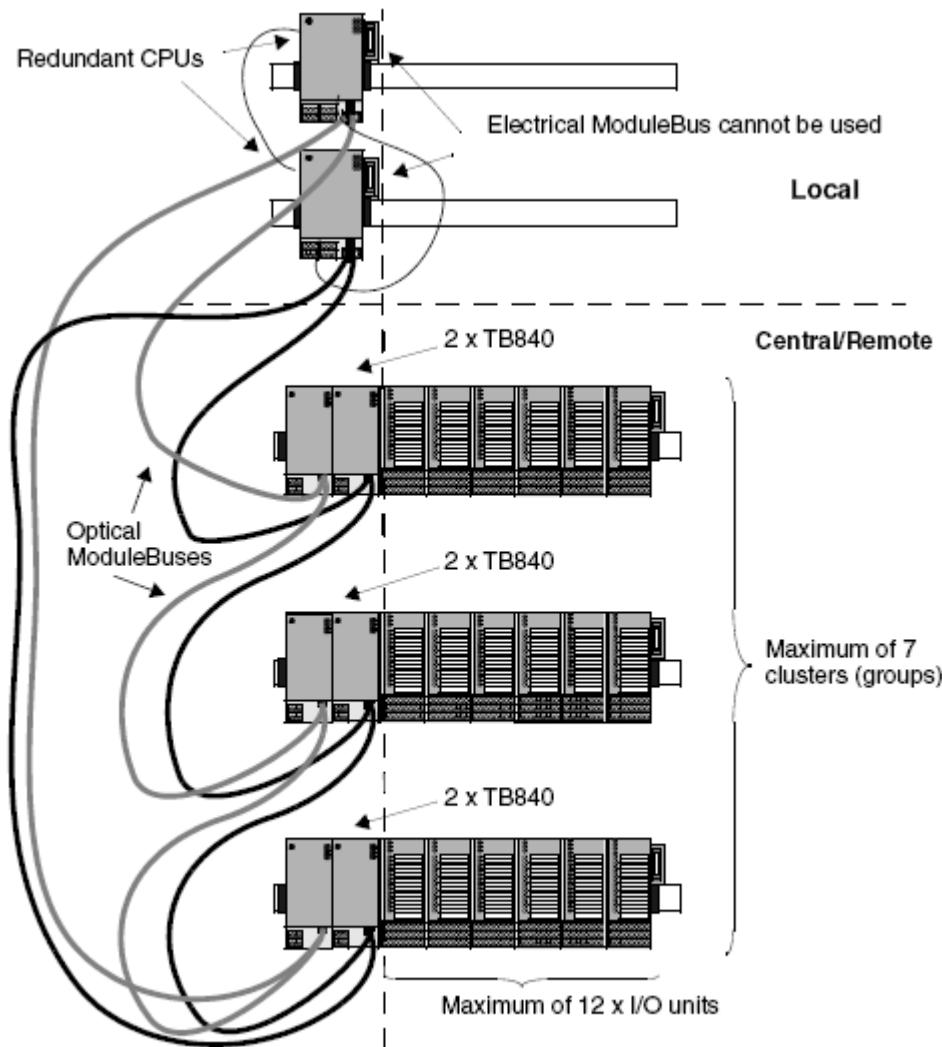
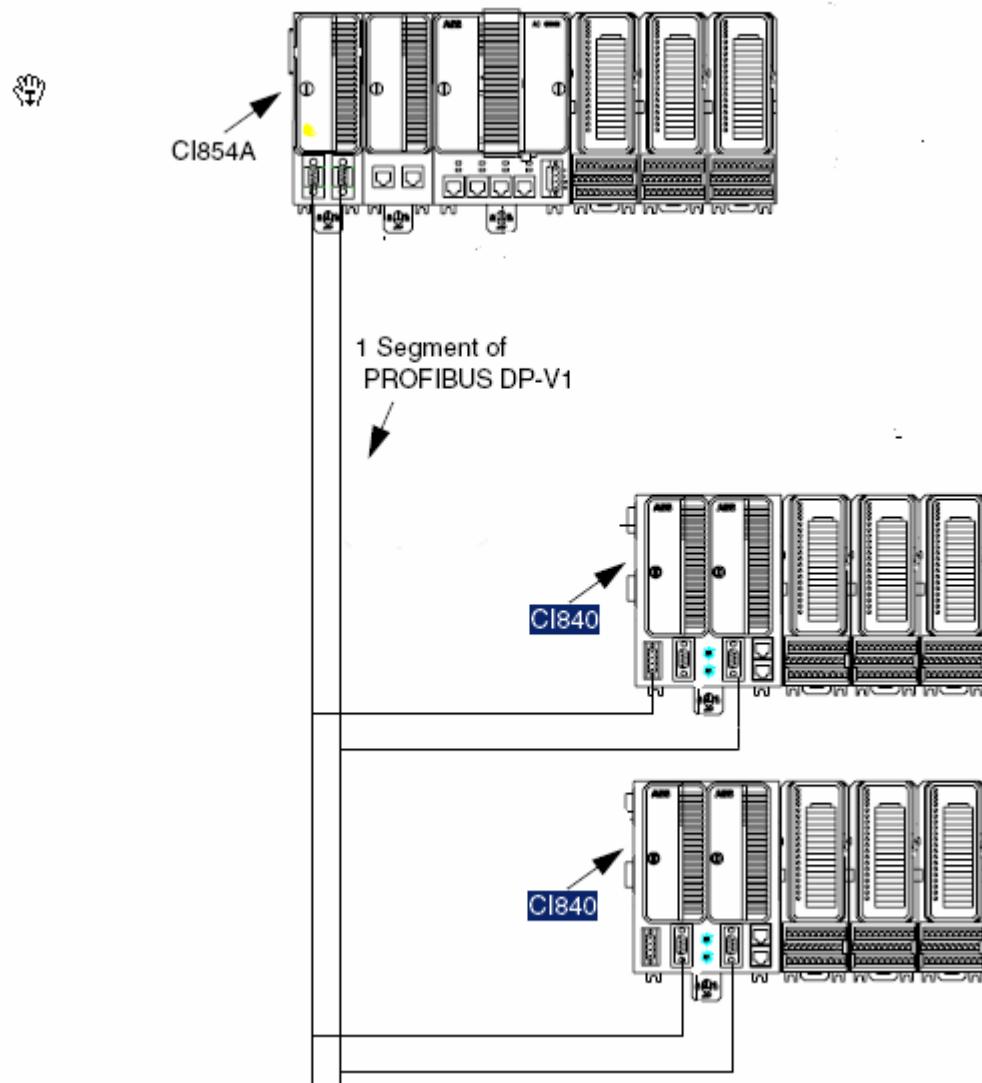


Figure 38. Optical ModuleBus connection in redundant CPU configuration

圖11.6.2 Remote I/O的接線方式





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11. 6. 1 可選用之 I/O 卡 Type

各種 I/O 卡之 Type 選用以下列為主，若所需之 I/O 種類不在下列者，請提出需求與 FMCS 廠商討論後，經 PCS 同意後，方可使用。

For Non-Redundant I/O Module:

AI810: Normal Analog Input, 1x8 channel, with non-redundant terminal unit TU810.

AI845: Normal Analog Input with HART communications, with non-redundant terminal unit TU810.

A0810: Normal Analog Output, 1x8 channel, with non-redundant terminal unit TU810.

A0845: Normal Analog Output with HART communications, with non-redundant terminal unit TU810.

DI810: Normal Digital Input, 2x8 channel, with non-redundant terminal unit TU810.

D0810: Normal Digital Output. 2x8 channel, with non-redundant terminal unit TU810.

For Redundant I/O Module:

AI845: Redundant Analog Input with HART communications, 1x8 channel, with redundant terminal unit TU844.

A0845: Redundant Analog Output with HART communications, 1x8 channel, with redundant terminal unit TU842.

DI840: Redundant Digital Input, 1x16 channel, with redundant terminal unit TU842.

D0840: Redundant Digital Output, 1x16 channel, with redundant terminal unit TU842.

For 安全儀控系統 Safety Instrumented System(SIS) I/O Module:



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AI880A: Redundant High Integrity Analog Input With HART Communications, 1x8 Channel, with redundant terminal unit TU844.

DI880A: Redundant or single High Integrity Digital Input, 1x16 Channel, with non-redundant terminal unit TU810 or redundant terminal unit TU842.

D0880: Redundant or single High Integrity Digital Output, 1x16 Channel, with non-redundant terminal unit TU810 or redundant terminal unit TU842.

For 本質安全 Intrinsic Safety (IS) system I/O Module:

AI890: IS Analog Input, 1x8 channel, with IS terminal unit TU890.

AI895: IS Analog Input with HART communications, 1x8 channel, with IS terminal unit TU890.

A0890: IS Analog Output, 1x8 channel, with IS terminal unit TU890.

A0895: IS Analog Output with HART communications, 1x8 channel, with IS terminal unit TU890.

DI890: IS Digital Input, full isolated 8 channel, with IS terminal unit TU890.

D0890: IS Digital Output, full isolated 4 channel, with IS terminal unit TU890.

11.7 保險絲(fuse)之選用

11.7.1 控制器部份之選用

所有與控制器及與其相連接之模組均使用 3A 之保險絲。

11.7.2 I/O 卡及供應現場電源之選用

參考圖 11.10.2

- I/O 卡通訊模組 CI840 or TB840，選用 1A 之保險絲。



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- AI 卡選用 1A 之保險絲。每一單一迴路選用 0.5A 之保險絲。
- AO 卡選用 1A 之保險絲。每一單一迴路選用 0.5A 之保險絲。
- DI 卡選用 3A 之保險絲。每一單一迴路選用 1A 之保險絲。
- DO 卡選用 5A 之保險絲。若迴路為直接供應 DC24V 至現場，則此種迴路需選用 1A 之保險絲。若為乾接點(Dry Contact)，則需外加 2A2B 之 relay，且現場線至 relay 間須裝有端子，現場線不可直接接在 relay 上。若為濕接點(Wet Contact)，除需外加 2A2B 之 relay 外，廠商需注意 relay 接點所能承受的電壓是否符合需求，且現場線至 relay 間須裝有端子，現場線不可直接接在 relay 上。

11.8 盤內導線色別及線徑

- 盤內導線之線色及線徑相關之說明請參考圖11.10.2。
- AC110V: 黑色(L)，白色(N)， 1.25mm^2 。
- DC24V: 紅色(正)，藍色(負)， 1.25mm^2 。
- 信號線: 黃色， 1.25mm^2 (類比訊號)， 1.25mm^2 (數位訊號)。
- 接地線: 綠色， 5.5mm^2 。

11.9 接地系統

接地系統需符合規範16010-C第3.6節。

盤體內須具有信號接地及動力接地，信號接地需與盤體及動力接地絕緣。

裝設I/O卡之軌道需與盤體絕緣，並連接一條接地線至信號接地。

同一控制盤內必須使用同一組系統接地(system grounding)，不可將不同來源之接地。

11.10各模組及導線套管命名原則及名稱標示

控制器盤內各模組設備均需以標籤貼紙標示名稱，導線則必須套上標套管，以利日後維護查



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修之便利。

11.10.1 控制器之命名原則及標籤標示

控制器之命名原則，如下表

RexChip R1 Controller 命名原則

控制器命名方式統一為 R1+系統別_子系統別_控制器別+流水號

控制器別分為 BPCS 與 SIS

流水號以 BPCS 與 SIS 獨立計數

範例如下

子系統	BPCS 控制器	SIS 控制器
C1	R1R_CR_BPCS1	R1R_CR_SIS1
C2	R1R_WT_BPCS1	R1R_WT_SIS1
C3	R1R_VOC_BPCS1	R1R_VOC_SIS1
P1	R1W_UPW_BPCS1	R1W_UPW_SIS1
P2	R1W_WWT_BPCS1	R1W_WWT_SIS1
P3	R1W_PCW_BPCS1	R1W_PCW_SIS1
P4	R1W_DWS_BPCS1	R1W_DWS_SIS1
P6	R1C_CDS_BPCS1	R1C_CDS_SIS1
P7	R1G_GAS_BPCS1	R1G_GAS_SIS1
P9	R1G_LDS_BPCS1	R1G_LDS_SIS1
R4	R1L_LMS_BPCS1	R1L_LMS_SIS1
M1	R1H_HVAC_BPCS1	R1H_HVAC_SIS1
M4	R1H_MEPM_BPCS1	R1H_MEPM_SIS1

控制器之標籤標示為控制器名稱加上控制器主從方向，例如系統為化學供應系統，共有 2 組 Redundant 控制器，則命名方式如下：



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Upper Controller 1:R1C_CDS_BPCS1_Upper

Lower Controller 1: R1C_CDS_BPCS1_Lower

Upper Controller 2:R1C_CDS_BPCS2_Upper

Lower Controller 2: R1C_CDS_BPCS2_Lower

11.10.2 通訊卡之命名原則及名稱標示

通訊卡之命名原則為系統代號加通訊卡之型號加上所規劃之位置編號，若為 Remote I/O 則定址之方式為以 Station 作為編號，Station 號碼可從 1~125；若為 Direct I/O 則定址之方式為以 Cluster 作為編號，Cluster 號碼可從 1~7。每個 Station 或 Cluster 最多可接 12 張 I/O 模組。例如所規劃之模組為 CI854A，規劃之位置為 1，則命名方式如下：

CDS-CI854A-01P

CDS-CI854A-01B

若有使用到 Redundant 通訊卡或 High Integrity Controller(SIS 控制器)時，則必須使用到 BC810 及 SM810 時，則命名原則為下：

與 Primary Controller 連接時，

CDS-BC810-P

CDS-SM810-P

與 Backup Controller 連接時，

CDS-BC810-B

CDS-SM810-B

11.10.3 I/O 卡通訊模組之命名原則及名稱標示

I/O 卡通訊模組共有兩種模組，CI840 及 TB840，其命名之方式為系統代號加模組名稱加上位置編號，例如所規劃之模組為 CI840，規劃之位置為 station:11，及 station:12，則命名方式如下(參考附圖 4)：

Station:11

CDS-CI840-11P



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CDS-CI840-11B

Station:12

CDS-CI840-12P

CDS-CI840-12B

若所規劃之模組為 TB840，規劃之位置為 Cluster1，及 Cluster2，則命名方式如下：

Cluster1:

CDS-TB840-01P

CDS-TB840-01B

Cluster2:

CDS-TB840-02P

CDS-TB840-02B

11.10.4 I/O 卡之命名原則及名稱標示

I/O 卡之命名原則為系統代號加 I/O 卡模組名稱加上位置編號，而 I/O 卡之連接方式可分為 Remote I/O 及 Local I/O，例如所規劃之模組為 AI810 其所在位置為 Remote I/O station:11 第一張，及 station:12 第二張，則命名方式如下(參考附圖 4):

CDS-AI810-11-01

CDS-AI810-12-02

若為 Redundant I/O

CDS-AI810-11-01P

CDS-AI810-11-01B

CDS-AI810-12-02P

CDS-AI810-12-02B

若為 DI810 其所在位置為 Local I/O 之 Cluster 1 第一張，及 Cluster 2 第二張，則命方式如下：

CDS-DI810-01-01



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CDS-DI810-02-02

若為 Redundant I/O

CDS-DI810-01-01P

CDS-DI810-01-01B

CDS-DI810-02-02P

CDS-DI810-02-02B

另外，每一張 I/O 卡上均有一張標籤，可標示各 Channel 所連接的 Tag Name 為何，廠商須在此標籤上標示所有 channel 相對之 Tag Name。

11.10.5 Terminal Block 標籤檔板之命名原則

每一張 I/O 卡都會對應到一組 Terminal Block，且每一組 Terminal Block 都需加上一個標籤檔板用以分隔不同之 I/O 卡及標示此 I/O 卡之型號及位置。例如 Station 11 上有 AI810, DI810, A0810, D0810，則標籤檔板之命名方式如下：

AI810-11-01

DI810-11-02

A0810-11-03

D0810-11-04

11.10.6 Relay 之命名原則

若此 D0 點為乾接點或非 DC24V 之濕接點，則必需加上 Relay 之後，再連接到錯線端子上。例如有一張 D0880 其位置在 Local I/O Cluster:1 第三張卡片上，channel:1~4 均需使用 Relay，則此 4 個 Relay 之標示如下：

RY-0103-01

RY-0103-02

RY-0103-03

RY-0103-04

11.10.7 導線套管之命名原則

每一條導線的兩端均需套上標籤套管，並標示 Tag Name(命名之方式參考附件 3)及位置。



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舉例如下(參考如下附圖):

若此 Tag Name 連接在 station 12 第一張卡 AI810 , channel:1 , C1 及 A1 之接點，則標示方式為” I/O 卡位置:接點編號 ”，舉例如下：

1201:C1

1201:A1

此導線之另一端連接在錯線端子上，則示方式為” I/O 卡位置:接點編號:terminal 編號”，

舉例如下：

1201:C1:1

1201:A1:2

若為 DO 點，則中間會先連接到 Relay, 此時之標示如下所述，若此 Tag Name 連接在 Station:12 第二張卡 D0810 , Channel:1 , C1 及 A1 之接點，其連接在 I/O 卡及錯線端子上之標示方法同上述 Tag Name 之原則，I/O 到 Relay 端之標示法為：“ Relay 編號:接點編號 ”，Relay 到錯線端子之標示法同為：“ Relay 編號:接點編號 ”。因此由 I/O 至接線端子之標法如下：(參考下圖)

I/O 側	RY 側	RY 側	TB 側	TB 側	現場側
1202:C1	RY_1202_01:13	RY_1202_01:5	1202:C1:1	HV101:1	HV101:XX
1202:A1	RY_1202_01:14	RY_1202_01:9	1202:A1:2	HV101:2	HV101:XX



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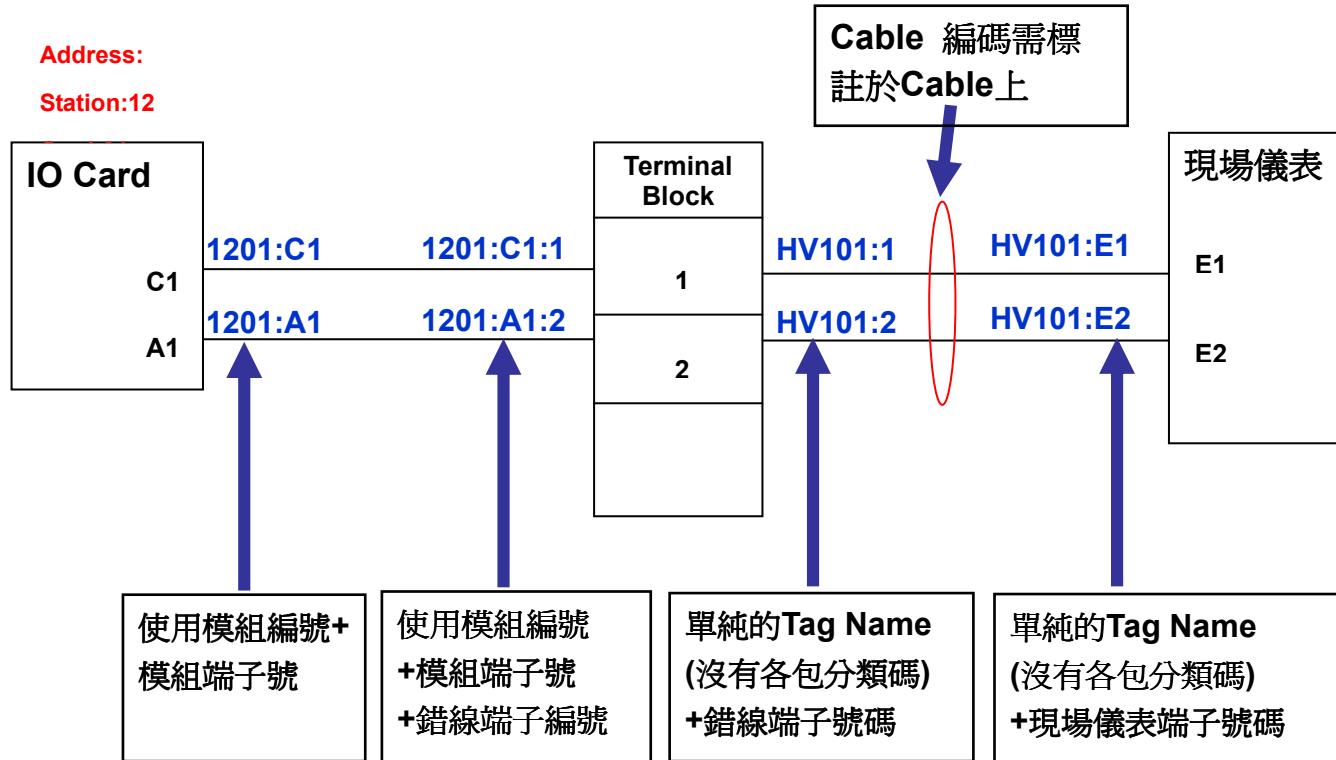
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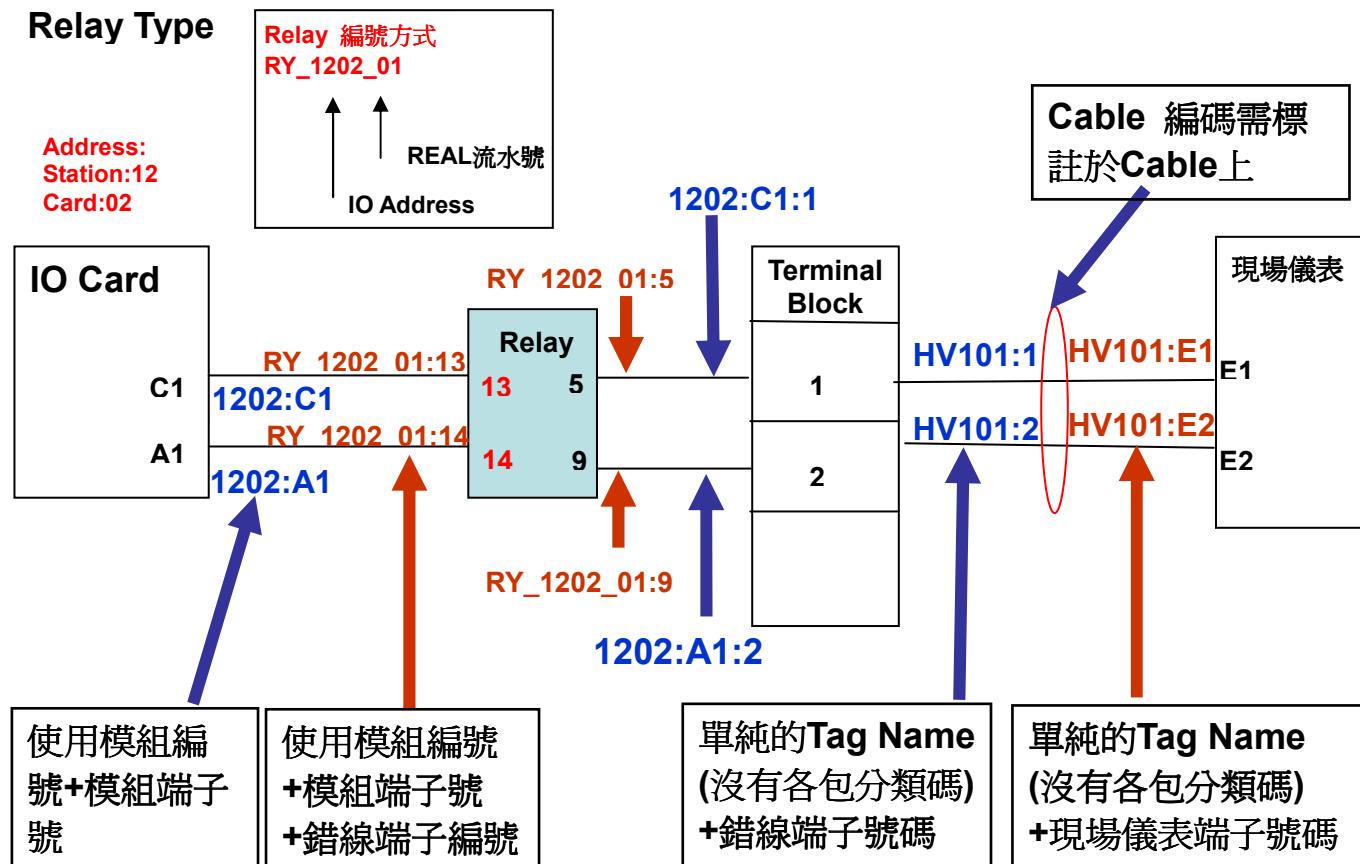
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Relay Type



11.11 通訊模式及線材之選用

11.11.1 Profi-bus Cable

Profi-bus Cable 須為 BELDEN 3079A 紫色線或同等級以上之線材，Connector 上必須具備開關式的終端電阻。

Profi-bus 之傳輸速度須為 1.5M bit/s，最大連線距離為 200 公尺，若超過 200 公尺，則必需轉接成光纖訊號。光纖規格為多模光纖，波長 850nm，內外徑 50/125 μm 。

若 Third Party 設備需透過 Profibus 連線至 AC800M 控制器時，需提供 Redundant Link Module 以便連接 AC800M redundant Profibus Module。



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11.11.2 ModBus & Serial Link Cable

MOD-bus and Serial Link Cable 須為 STP RJ-45 CAT-5e 或同等級以上之線材。

11.11.3 Ethernet Cable

Ethernet Cable 須為 UTP RJ-45 CAT-5e 或同級以上之線材。若是由現場控制盤至 Control Network 之部份，則必須使用 STP 之線材，最大連線長度為 100 公尺。若超過 100 公尺，則必需轉接成光纖訊號。光纖規格為多模光纖，波長 850nm，內外徑 50/125 μm 。

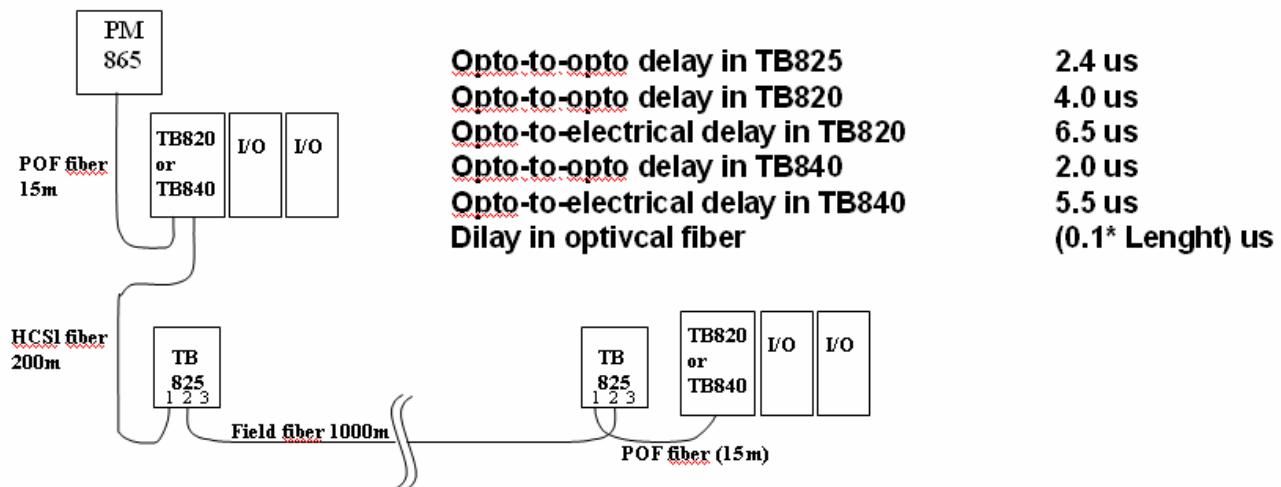
11.11.4 Local I/O ModuleBus Cable

如果為 SIS 之控制器時，必須使用 Local I/O，其 I/O 之 cable 有下列兩種：

- Plastic Fiber Optic: 最大連線距離為 15m/cluster
- HCS(Hard Clad Silica) Fiber Optic: 最大連線距離為 1500m/cluster，且 Communication Link Delay 必須小於 42 μs ，請依據圖 11.11.1 之要求計算。

圖 11.11.1 ModuleBus 最大連線距離計算

As long as the communication link delay (CLD) is < 42us



$$\begin{aligned}
 \text{CLD} = & (\text{fiber delay}) + (\text{opto-to-opto delay in TB820}) + \\
 & 2 * (\text{time delay for TB825}) + (\text{Opto-to-electrical delay in TB820}) \\
 = & 0.01 * (15 + 200 + 1000 + 15) + 4.0 + 2 * 2.4 + 6.5 = 27.6 \text{ us}
 \end{aligned}$$

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11.11.5 Ethernet Cable 顏色

Primary Client/Server Network: 藍色

Secondary Client/Server Network: 黃色

Primary Control Network: 綠色

Secondary Control Network: 紅色



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12.0 與Third Party控制器之連線

12.1 I/O 介面

當子系統廠商無法使用ABB AC800M之控制器作為其系統之邏輯控制時，經REXCHIP同意後，則可透過下列之方式連進ABB 800xA System。

- OPC
- Profibus
- Modbus
- 其它 REXCHIP 同意之 Open Interface

12.1.1 OPC

使用 OPC 之方式與 ABB 800xA 系統連結，其不同於 Profibus 及 Modbus 之處在於所連結的 Tag 不會進到控制器中，故這些點的控制如警報設定等則必須由上層的 Aspect Server 處理，其優點在於不會佔用到控制器的負載(loader)，缺點則為無法使用到控制器內的 library，故所有的 Tag 都必須在 Aspect Server 中重新規劃，規劃的方式請參考附件 7。

當廠商選擇使用 OPC 之方式作為與 ABB 系統連接之橋樑時，必須符合下列各項。

(詳細連接方式及 3rd PLC 廠商提供範圍見下面圖例)

- 提供此 3rd PLC 之 OPC Server Driver (Linkmaster) 安裝於 2 台 ABB Connectivity Server 中。ABB 將各別提供一片乙太網路卡安裝在 Connectivity Server，專司 OPC 通訊。Driver 統一由 FMCS 廠商安裝，3rd PLC 廠商協助設定。廠商需將 PLC 點之規劃提供一可匯入的檔案交由 FMCS 廠商將此檔案匯入 OPC Driver。
- 3rd PLC 廠商需提供一 FireWall (型號:ASA-55XX，依實際需要的 Port 數提供)，往上連接 2 台 Connectivity Server 及往下連接 3rd PLC 之 OPC Server，並負責此 FireWall 之設定及連線所需工作。



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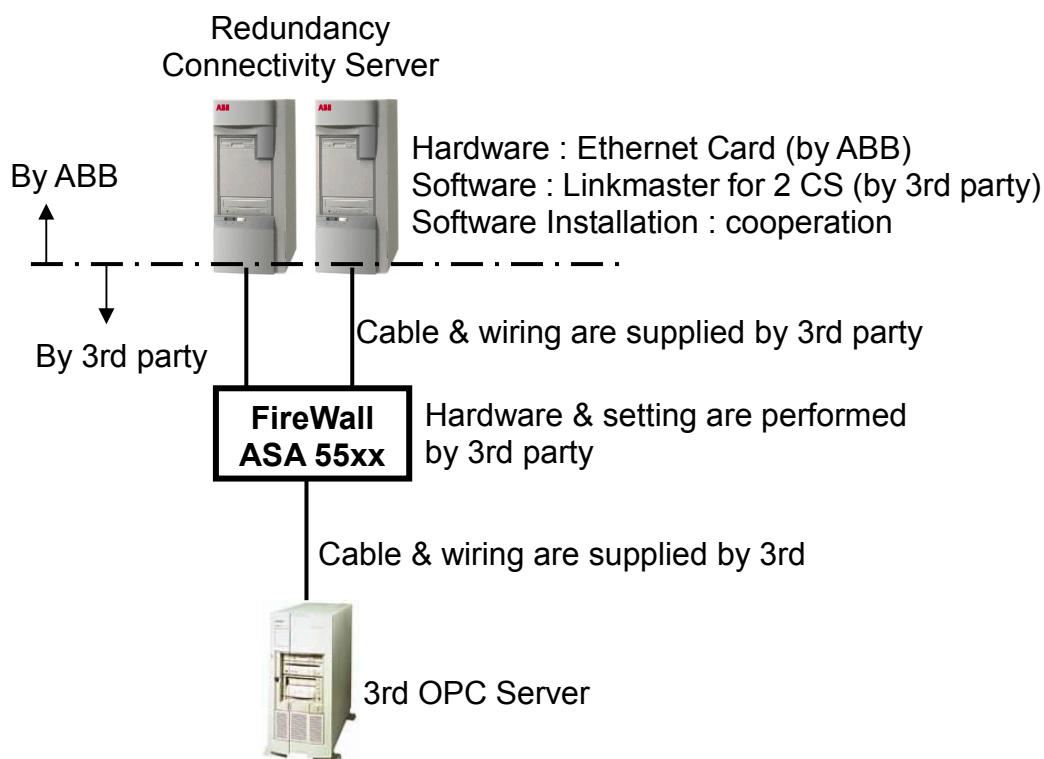
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- 3rd PLC 廠商需提供一 3rd PLC 之 OPC Server，負責將資料送出。
- 此 OPC Server 必須符合 OPC Data Access specification 2.04，
IOPCBrowseServerSpace，IPersistFile。
- Cable Type 必須符合本規範 11.11.3。
- 若採用此方式，所有 PLC 的 Tag 將無法套用 AC800M 內之 Library，故無法使用到
Library 內之 Function。
- PLC Hardware Diagnostic 的資料需自行 Mapping，系統無法自動產生。





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12.1.2 Profibus

當廠商選擇使用 Profibus 之方式作為與 ABB 系統連接之橋樑時，必須符合下列各項規定。

- 具備 AC800M CI854A Profibus Interface Card。
- 硬體之部份須符合本規範 11.11.1 之要求。
- 介面必須為 Profibus DP-V1。
- 廠商需提供 GSD Mapping file。
- PLC 內之 Tag 可使用 AC800M 之 Library。
- 需提供 Redundant Link Module 以便連接 AC800M redundant Profibus Module。
- PLC Hardware Diagnostic 的資料需自行 Mapping，系統無法自動產生。

12.1.3 ModBus

當廠商選擇使用 Modbus 之方式做為與 ABB 系統連接之橋樑時，必須符合下列各項規定。

- 具備 AC800M CI853 Modbus Interface Card。
- 硬體之部份須符合本規範 11.11.2 之要求。
- 廠商需整理提供 Mapping Table。
- 通訊模式為 RTU，Baudrate:9.6 Kbit/s; Parity: None; Databits:8; Stopbits:1;
Flow Control:None。
- PLC 內之 Tag 可使用 AC800M 之 Library。
- ModBus 的 Redundancy 的作法為同時連接兩張相同的 Modbus Card，然後以撰寫軟體的方式判斷通訊是否正常，若其中有一端無法通訊，則以軟體的方式切換到另一端。
- 若因 ModBus 無法達到 Redundancy，應於現場裝設 HMI。
- 若為重要設備，但又無法作到 ModBus Redundancy 時，建議可使用 ModBus to



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Profibus 或是 Modbus to OPC 之方式，將 ModBus 轉換成可 Redundancy 之連線方式。

- PLC Hardware Diagnostic 的資料需自行 Mapping，系統無法自動產生。

12.1.4 其它業主同意之 Open Interface

其它不在上述之介面方式，須與 REXCHIP 及 FMCS 廠商討論後，並同意 REXCHIP 所要求之方式方可施行。

12.2 HMI 介面

若各子系統需於設備附近或適當地點裝設HMI，可選擇ABB Process Panel或是Third Party HMI。

12.2.1 ABB Process Panel

透過 ABB MMS Protocol 可直接與 ABB AC800M 控制器連接。

12.2.2 Third Party HMI

若必須使用 Third Party HMI 則所選用之通訊方式必須符合 AC800M 所能接受之方式，且其中所需之通訊程式廠商必須自行寫入 AC800M 中。

AC800M 可接受之通訊方式為：

- Profibus
- RS-232 相關之通訊方式(Standard Serial Link、ModBus、COMLI、3964R)



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13.0 HART作業規範

可定址式網路遠距終端器(Highway Addressable Remote Terminal, HART)，為一個應用在工業控制上的數位式標準通訊協定。這個通訊協定被廣泛的應用在工業控制上。這個標準的通訊協定是在以數位訊號的方式載波於 4~20mA 的控制訊號上。HART 保有原本 4~20mA 的控制訊號同時可在不影響原本 4~20mA 的訊號下允許以雙向的方式通訊。子系統廠商須依業主之需求將 HART 儀錶之參數於 ABB 800XA 中建立及設定。

13.1 其本需求

- 需為智能型(SMART Device)的設備才具有HART的功能。
- 需選用可傳遞HART訊號的I/O卡(參考11.6 I/O卡的選用)。
- 子系統廠商需提供DTM(Device Type Management)，而且此DTM需符合FDT(Field Device Tool)1.2的介面。
- 若子系統廠商所選用的HART設備沒有DTM可以提供時，則只有基本的HART DTM可以使用，它可藉由標準萬用指令(Standardized Universal Commands)和HART共通實行指令(Common Practice HART Commands)完成基本的規劃及參數設定。

13.2 HART 設備及參數

HART的參數會經由具有HART功能的I/O卡傳遞到Asset Optimization Server中，各子系統廠商須於Control Structure中，在具有HART信號的I/O卡的位置建立該智能型的設備，並將該設備拖拉(drag & drop)至相對應的I/O卡的點。智能型的HART設備，其HART的參數可由ABB 800XA端建立後下載至各設備，或由各設備上載至ABB 800XA端。若現場設備安裝與資料庫建置為不同的廠商時，建議由現場設備安裝之廠商於儀錶安裝時，先行將儀錶之HART參數設定好，最後由資料庫建置之廠商將所有的HART儀錶的參數上載至ABB 800XA。若為同一廠商，則



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由ABB 800XA端下載至各儀錶較為省時。有關如何建立、設定、上載、下載HART參數，請參考附件6。



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14.0 安全儀控系統相關作業規定

安全儀控系統設計之導入、建造、規劃、安裝、實施與確效驗收，係依據 IEC61508 與 IEC61511 標準之要求進行，並規範安全儀控系統軟、硬體建置及選用之注意事項；R1 建廠專案安全儀控系統實施流程、步驟及範圍請參考文件 13840-C 及 R1 建廠專案各系統發包資料中 SRS 的規定，本章內容主要是規範安全儀控系統邏輯處理單元的軟、硬體架構以及安全儀控迴路 PFD 計算及文件管理等相關功能。

14.1 ABB 安全儀控系統邏輯處理單元 AC800 HI 系統

ABB安全儀控系統邏輯處理單元AC 800M HI系統已經獲得國際認證，可應用在有以下安規需求的安全儀控系統：

Requirement Class AK 1 – 4 according to DIN V 19250/DIN V VDE 0801

Safety Integrity Level 1 – 2 according to IEC 61508

Category 1 – 3 according to EN 954-1

AC800 HI 系統搭配之I/O 為 S800 I/O High Integrity modules (AI880/AI880A, DI880 and DO880)，這些I/O都是經認證可應用在SIL1-3 / AK 1-6 / CAT 1-4安全儀控系統上，並認可在安全功能下可以使用單模組。

所有SIL安全認可的軟體功能與程式館(Libraries)都有SIL2的辨示圖符 標示在軟體發展工具內。



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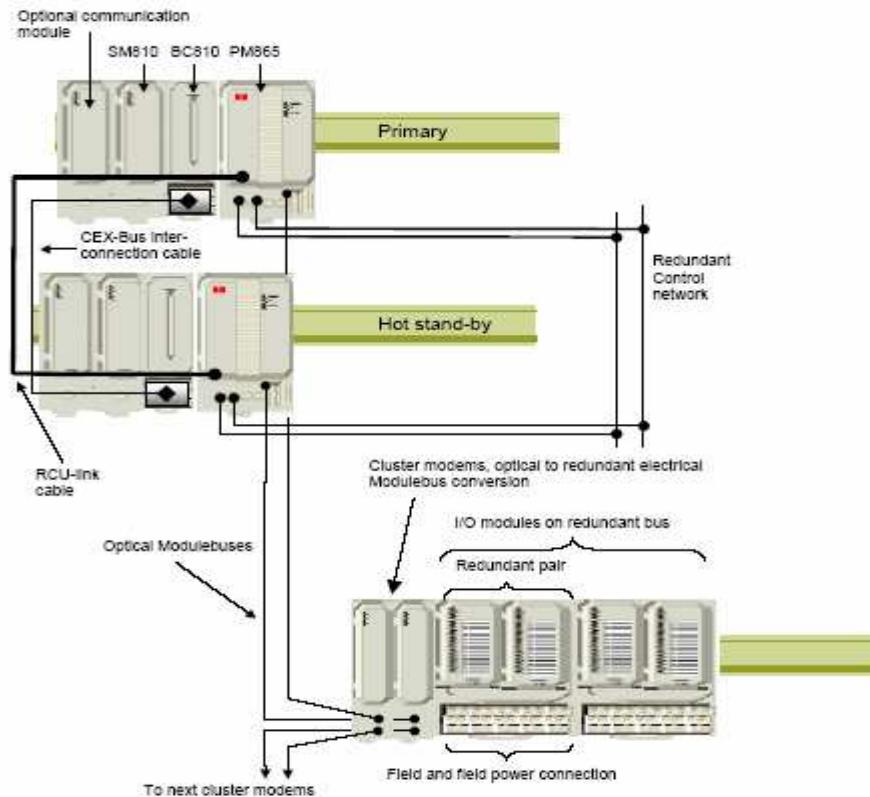
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14.1.1 AC800M HI 硬體架構

AC 800M HI 主要是由 PM865 (CPU) 與 SM810 架構成 1oo1D 系統後，再架構成 CPU Redundant (如圖 14.1.1)，SM810 負責診斷與監視 PM865 之應用執行與 I/O 掃描工作。

圖 14.1.1





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下表是 ABB 已被認證可採用在安全儀控系統之邏輯處理單元的主要元件：

Module	Description
AI880	Safety Analog Input Module
AI880A	Safety Analog Input Module with Hart support
DI880	Safety Digital Input Module
DO880	Safety Digital Output Module
PM865	Processor Module
SM810	Safety Module
SS823	Power Voting Unit with over voltage protection

14.1.1.1. AC800 HI CPU 模組 PM865

ABB 安全儀控系統邏輯處理單元 CPU 模組為 PM865 (模組特性資料請參閱 ABB 手冊)，R1 專案的各系統承商在選用組構 ABB 安全儀控系統邏輯處理單元必須遵守下列規定：

- 必須架構成Redundant CPU 模組
- 必須使用外部電池 SB821，以延長停電時程式記憶之功能
- 搭配的SM810也必須為 Redundant 模組架構
- 搭配的BC810也必須為 Redundant 模組架構.
- 必須使用獨立之電源供應模組 (不可與I/O模組或現場設備共用電源供應模組)
- PM865與I/O模組架框之通訊必須採用光纖連接，並且必須為 Redundant 模組架構(如圖14.1.1) ，每一串 I/O 模組架框最多可接12個 I/O single 模組或6個 I/O Redundant 模組，一組 CPU 最多可接7串 I/O 模組架框
- PM865與I/O模組架框之通訊距離如果超過15米，R1建廠專案的各系統承商可依據現場空間之實際距離進行計算並選擇正確之光電轉換模組，計算公式如下圖所示：



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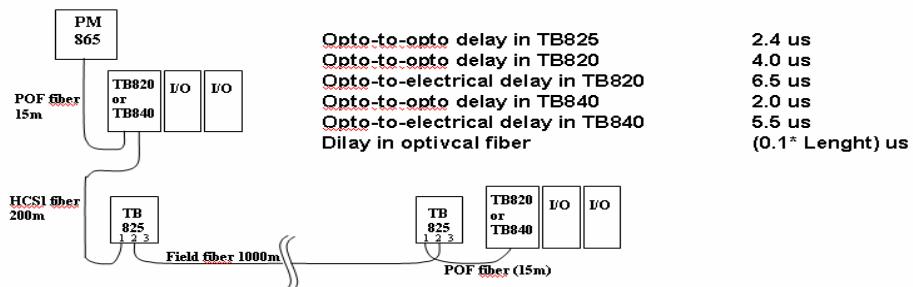
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How long distance is allowed from HI controller to the remotest cluster on modulebus ?

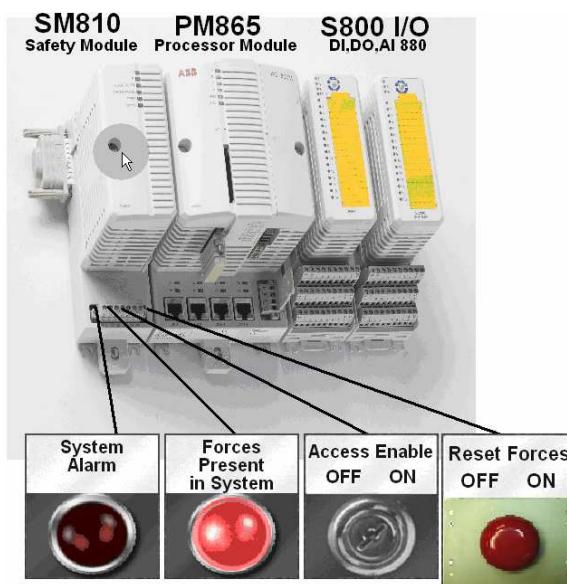
As long as the communication link delay (CLD) is < 42us



$$\begin{aligned}
 CLD = & (fiber delay) + (opto-to-opto delay in TB820) + \\
 & 2 * (time delay for TB825) + (Opto-to-electrical delay in TB820) \\
 = & 0.01 * (15 + 200 + 1000 + 15) + 4.0 + 2 * 2.4 + 6.5 = 27.6 \text{ us}
 \end{aligned}$$

14.1.1.2. AC800 HI CPU 診斷模組 SM810

SM810 主要負責診斷與監視 PM865 之應用執行與 I/O 掃描工作；R1 專案的各系統承商在選用組構 ABB 安全儀控系統邏輯處理單元，必須提供 Access Management 硬體鎖，Reset All Forced 按鈕(Reset All Forced 按鈕為 Spring Return Type 且必須有保護蓋保護，以避免誤觸)及系統警示燈號(如下圖)，以方便日後巡檢維修及緊急操作之用：





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14.1.1.3. AC800 HI I/O 模組(AI880/AI880A, DI880 and DO880)

ABB 安全儀控系統邏輯處理單元的所有 I/O 模組可靠度均具有 SIL3 水準並已獲得國際認證，R1 專案的各系統承商在選用組構 ABB 安全儀控系統邏輯處理單元，必須採用以下之 I/O 模組(模組特性資料請參閱 ABB 手冊)並遵守下列規定：

- AI880/AI880A High Integrity Analog Input Module，若使用外部電源當作 AI880/AI880A 迴路電源，必須於接線端子板外加 0.1 安培以下之保險絲來保護本模組；每一點AI需搭配一個shunt stick以區分此AI點為電流輸入或電壓輸入，安裝時必須依信號種類並注意正確安裝方向
- DI880 High Integrity Digital Input Module，若使用外部電源當作 DI880 迴路電源，必須於接線端子板外加 0.2 安培以下之保險絲來保護本模組
- DO880 High Integrity Digital Output Module，若直接由 DO880 驅動直流終端元件(Final Element)時，必須於端子排外加 1 安培以下之保險絲來保護本模組
- 為防止共同失效狀況(Common Cause Failure)之發生，如果現場儀錶是多信號來源時，這些信號需被安排到不同的 I/O 模組，以達分散風險之設計
- AC800 HI I/O 模組必須使用獨立之電源供應模組，不可與CPU模組共用電源供應模組
- R1專案的各系統承商必須遵守模組之硬體接線規定（附件9:AC800M HI I/O 模組接線及設定規定），並在施作之前將I/O 模組接線資料送審
- R1專案的各系統承商必須依據製程考量、SRS規定及ABB I/O模組之各項參數設定規定(附件9:AC800M HI I/O 模組接線及設定規定)，並在施作之前將I/O 模組設定資料送審
- 當終端元件(Final Element)使用交流電源當作驅動電源時，輔助 Relay 之選用



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必須視為安全儀控迴路元件之一並且進行元件可靠度計算

- 防爆區的控制迴路必須以SAFETY BARRIER區隔，SAFETY BARRIER必須視為安全儀控迴路元件之一，並且進行元件可靠度計算

14.1.1.4. 直流電源供應器及電源自動選擇器(SD821/ SD822/ SD823/SB821/SS823)

R1 建廠專案的各系統承商在選用組構 ABB 安全儀控系統邏輯處理單元，必須採用以下之電源模組(模組特性資料請參閱 ABB 手冊)，並遵守下列規定：

SD821	Power supply 120/230V AC mains supply (24V DC/2.5A)
SD822	Power supply 120/230V AC mains supply (24V DC/5A)
SD823	Power supply 120/230V AC mains supply (24V DC/10A)
SB821	Battery back-up unit
SS823	Power Voting Unit with over voltage protection

- 電源模組之設計必須為 Redundant 之設計，並且來自不同迴路之可靠的AC來源(DUPS/SUPS+ GEN)
- CPU模組與 I/O 模組、現場儀錶必須是由不同之 DC 電源供應器來供電，避免因現場儀錶短路造成之壓降，導致系統故障
- 安全儀控系統的控制電源(包含現場儀錶電源)，必須由符合SELV (Safety Extra Low Voltage)或PELV (Protected Extra Low Voltage) 規格之電源供應器透過 SS823 Voting Unit 進行供電。(參考下圖)



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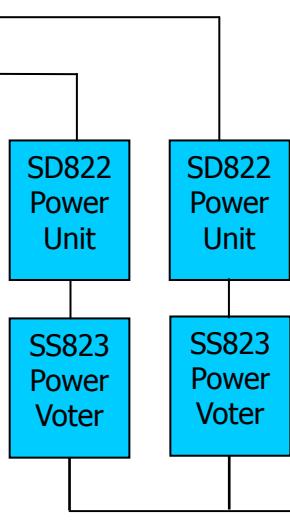
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SIS 控制器 Redundant Power Supply

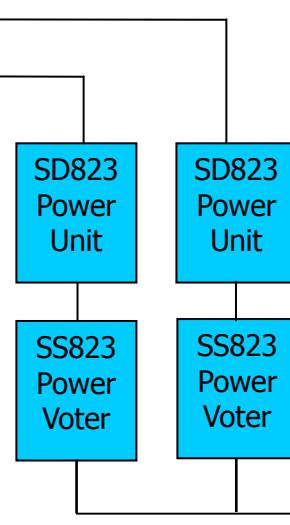
Power Source A

Power Source B



Power Source A

Power Source B



SIS_ Redundant Power Supply



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14.1.2 AC800M HI 軟體

由於 ABB Safety 的軟體規劃是結合在 ABB 800XA 軟硬體設計內，所以除了需特別注意的事項會在此文件敘述外，其他通則(如 Tag Name, Alarm priority, Application Name...)，需遵循本規範前面之章節。

安全儀控系統軟體規劃必須以 IEC61131-3 function block (FBD) 的方式進行，參與軟體規劃的 R1 建廠專案的各系統承商必須參加至少 5 天的 AC800M HI 相關教育訓練課程，並取得 ABB 安全儀控系統軟體規劃認證，才可進行軟體發展工作。

14.1.2.1. 系統軟體

當進入 AC800M HI 控制器規劃時，系統會自動產生 2 個 Applications 與 1 個 Library.

- “CTA” is the Compiler Test Application, used to make sure that the IEC 61131-3 compiler works properly (this application is not downloaded to the controller).
- “VMTxx...” is a diagnostics Application used to verify certain functions of the AC 800M HI. The name of this Application is made up of the prefix VMT_ and the name of the controller.
- VMTLib is the Virtual Machine Test library, containing types used when running the VMT Application.

這 CTA 和 VMT Applications and Library 是為診斷功能而建立的。系統會自動產生與加入這兩項功能，因此這兩項功能是不被允許刪除或修改，如被更改，系統也會在 download 之前 restore 回來。

14.1.2.2. 程式館 (Libraries)

- ABB 提供許多標準程式館供 SIS 迴路使用，承商可依 SRS 需求使用之。



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- 所有安全儀控系統功能函式，皆以 符號表示之。
- ABB 另提供其他特別應用之程式館，需要額外之 License 方可使用，承商可視需要選購之。
- 針對R1建廠專案的安全儀控系統所需的軟體功能，ABB 將建立程式館，R1建廠專案的各系統承商應優先採用，承商需自行測試Library之功能是否符合需求，有不足或變異，ABB保留修改之權力。

14.1.2.3. 安全儀控系統軟體規劃

- SIS 迴路(SIF)於程式中使用之函式、物件等名稱必須與SRS中的”SIS ID”之名稱相同(例如. HS_GAS_199)。
- AC800M HI 是允許在同一個控制器規劃與執行SIL classified functions (e.g. SIS) and non-SIL classified functions (like BPCS).)，如有此狀況需把SIL 與 non-SIL 功能規劃在軟體架構的不同Applications，因為一旦在Application 上選用SIL functions後，有關SIL applications 的相關限制會被啟動。
- ABB AC800M HI 統一採用 Control Module、Function Block Diagram、Structured Text、Sequential Function Chart 來做 SIS 程式之規劃。
- 程式書寫必須使用 SIL 認證之功能模組，以達到 SIL 之需求。
- 注意: AlarmCond, AlarmCondBasic, AlarmCondM and AlarmCondBasicM 等功能模組 其輸出不可用來作 safety critical control 。
- 基於安全儀控系統之需求，當輸出輸入信號為多選一之情況或輸出輸入信號含有診斷信號及回授信號時，程式必須加入更多判斷決策機制，以確保製程安全穩定，ABB已建立符合此需求之函式，承商需依據”儀錶架構選用表”計算出適用之硬體架構來選用適合之軟體程式碼。詳細程式碼功能描述，如(附件8: SIS 迴路



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設計邏輯說明 - loo1D/loo2D)。

- 程式規劃必須符合 de-energized to Trip 之安全要求 (AC800M HI 可以在 IO 模組上設定反轉輸出之功能，來達到正邏輯與反邏輯之使用需求)。
- 程式規劃必須使用正邏輯思考方式來規劃，以增加程式之可讀性。
- 承商設計程式時，迴路操作必須涵蓋 Override(output) , Inhibit (Input) , Bypass (Function) 功能。
- 系統可允許做Variables的retain or cold retain值，這些Variables的數值在暖啟動(warm restart)冷啟動(cold restart)甚至是電源故障時是否會被保留或是消除，是依據它們設定的屬性而定，例如當屬性為Cold Retain時，即使是冷啟動，操作員輸入之設定值依然可被保留，當使用標準Library規劃程式時，可不必考慮此設定，但如使用自行開發之Library必須考慮之。

14.1.2.4. 安全操作權限規劃及設定

安全操作權限規劃及設定，請參照(附件 5: 安全操作權限規劃及設定)。

14.1.2.5. 掃描週期及控制器效能使用限制

- 有標示SIL應用只能接到有標示 SIL 的 Task，無標示 SIL 應用只能接到無標示 SIL 的 Task。
- Task 是用來定義程式執行之反應時間快慢. 將與 CPU Loading 息息相關，承商在定義 Task 時必須考慮控制器之 Loading，以及 SIS 迴路作動應答時間之要求。
- 每一Task之Latency需設定至10%。
- 每一Task之實際執行時間(Excution Time)需保持在200ms以下。
- 承商必須保持SIS控制器之負載值低於60 % (Total System Load)，static cyclic



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load需小於50%。

- 記憶體使用之需求(CPU Memory)，承商於設計程式時必須考慮記憶體之使用量，否則將可能無法進行上線後之程式修改(Worm restart)。限制標準為全部Application 所占之記憶體容量不得超過總容量之50%，若超出上述之限制，控制器將只允許作 Cold restart之動作。
- FDRT (Fault Detection and Reaction Time) 建議設定為30 Seconds。
- Fatal Overrun Limit 建議設定為10 Interval cycle(s)

14.1.2.6. 使用者操作介面

本規範前面章節所描述之各項人機介面需求(BPCS)，皆須應用於安全儀控系統之人機介面。

14.1.2.7. 圖形介面說明

- 使用標準 SIL Library時系統將會有既有之Graphic elements elements / Faceplates / Alarm informations可供使用，於建置使用者操作畫面必須依照ABB 提供之標準物件進行系統建置，若提供之Library 不符功能需求，承商需提出變更請求，經業主與ABB 認可後，方可使用之，以求全廠統一。
- 承商必須根據發包資料中SRS章節，提供P&ID畫面中所有最終動作元件的 Fail-safe state於操作畫面中。
- 操作畫面中之動作元件必須明顯區分為Safety與Non Safety元件，例如一般控制閥與緊急遮斷閥之顯示差別。
- 滑鼠右鍵連結相關資料功能及相關資料的提供，請參考本規範7.2章。

14.1.3 AC800M HI 通訊

- 如果 AC800M HI需要與另一台 AC800M HI做通訊時，必須使用認可的 MMS



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peer-to-peer communication 軟體函式

- 軟體雖允許把 Applications 分佈在許多控制器上，但此功能不能運用在 AC800M HI 控制器
- AC800M HI 裡有一系列的功能模組，允許有標示 SIL 的應用互相交換資訊，或有標示SIL 與無標示 SIL 的程式互相交換資訊，必須使用認可的 MMS peer-to-peer communication 軟體函式，MMS peer-to-peer communication 軟體函式之使用，如(附件4-SIL應用程式間之通信)。

14.1.4 AC800 HI CPU and I/O Modules Settings

參閱附件12

14.2 非 ABB 安全儀控系統邏輯處理單元之相關整合作業規定

當採用非 ABB 安全儀控系統邏輯處理單元，其邏輯處理單元軟、硬體功能及特性必須符合規範13452-C邏輯處理單元之規定，並且必須依據文件13840-C及各系統發包資料中之 SRS 章節之規定，進行邏輯處理單元可靠度PFD計算及相關文件送審工作。除此之外R1建廠專案的各系統承商必須遵循以下規定進行連線及圖控製作之整合作業。

14.2.1 電源模組之要求

電源模組之設計必須為 Redundant 之設計，且來自不同之 AC 來源。

CPU 模組 與 I/O 模組必須是由不同之 DC 電源供應器來供電，避免因現場儀錶短路造成之壓降，導致系統故障。

電源模組必須符合 SELV 或 PELV 之需求。

註一： Safety Extra Low Voltage: An electrical system in which the voltage cannot exceed ELV (IEC 61131-2: 60V DC) under single fault conditions including earth faults in other circuits, (IEC 61140 ch. 3.26.1)



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Protected Extra Low Voltage (earthed SELV) : An electrical system in which the voltage cannot exceed ELV (IEC 61131-2: 60V DC) under single fault conditions except earth faults in other circuits, (IEC 61140 ch. 3.26.2)

14.2.2 與 FMCS 之通訊要求

非 ABB 邏輯處理單元與 ABB 控制器或 FMCS 之間通訊需求及連線方式，請依本規範 12.0 與 THIRD PARTY 控制器連線之章節要求建置，若有涉及跨系統連鎖作動之安全功能需求 則必須以硬線（Hardwire）方式連線，重大警報或診斷訊息（如 SIL 2 且迴路誤動作會影響生產者）建議以硬線方式連線。

非 ABB 邏輯處理單元與 ABB 控制器或 FMCS 之間通訊連線方式，若是無法達到 Redundant 之功能需求，則承商必須考慮與 FMCS 斷線時，子系統本身人機操作介面之需求，並提供系統架構圖送審。

14.2.3 系統診斷功能規定

非 ABB 邏輯處理單元必須提供安全儀控迴路主要元件之設備診斷資訊（CPU / I/O Module / Power Failure ...），並且整合診斷資訊至操作畫面及 Alarm List。

14.2.4 控制迴路作動警報

使用非 ABB 邏輯處理單元之安全儀控迴路作動結果或狀態必須整合設計至 FMCS 操作員介面之警報管理功能內。

14.2.5 操作參數之記錄

非 ABB 邏輯處理單元之操作參數無法由本系統紀錄並下載至該系統，故該系統軟體規劃必須自行考慮操作參數建檔及管理需求。



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14.2.6 軟體規劃(建點畫圖)

非ABB邏輯處理單元之軟體規劃原則為只監不控，強烈建議該系統應具有自己的HMI，進行操作、控制及維護，FMCS相關軟、硬體規劃方式應遵循本規範12.0與THIRD PARTY控制器連線之章節要求進行。

14.3 安全儀控系統功能測試規定

R1建廠專案的各系統承商必須送審各項測試計畫，並於工程各階段進行至少迴路測試、功能測試以及邏輯處理單元的效能等測試，並將測試報告，列入15.0之整合資料作業規定中。

14.4 安全儀控系統PFD計算

R1建廠專案的各系統承商必須對所設計之安全儀控迴路，於送審階段提供PFD計算結果，並根據ABB公司及安全顧問的指導，使用輔助的軟體工具(如Exida)進行安全儀控系統文件建檔及後續的分析管理工作，並將計算結果或報告(Exida)，列入本規範15.0之整合資料作業規定。

14.5 安全儀控系統相關資料及文件

R1建廠專案的各系統承商必須遵循文件13840-C規定以及安全需求規格(Safety Requirement Specification, SRS)文件，送審安全儀控系統相關資料及文件，針對SRS應設計未設計、設計不完整、或規格不合適處，供應商不得免除善良管理人應告知責任，於細部設計送審時提出，並依SRS內容及(附件3:安全儀控系統功能自我檢查表)完成自主檢核，以確認所有的設計正確及可行，並將結果，列入本規範15.0之整合資料作業規定。供應商針對送審文件的描述必須是清楚、精確、可驗證、可維護，並且在SIS設計的所有生命週期計畫(Safety Life-Cycle Plan)都可據以執行的。

14.6 安全儀控系統依循法規及相關作業規定

所有的安全儀控系統設計，必須遵循R1建廠專案各系統發包資料中之SRS章節及文件13840-C規定，以及IEC 61151，IEC611508等規範，此外廠務各系統設計必須遵循之其他安全標準，



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例如UL、SEMI、NFPA、UFC、FM等，請供應商參考R1建廠專案的各系統發包資料中之其他章節規定。

14.7 安全儀控系統參考文件

- Doc Title: IndustrialIT 800xA - Safety System Version 4.1 Safety Manual AC 800M High Integrity (Doc no: 3BNP004865R4101) Copyright © 2005 by ABB.
- Doc Title: 製程與廠務監控系統功能性安全設計流程與設計產出作業規範(Doc No. :13840-C)
- Doc Title: 邏輯處理單元規範(Doc No. :13452-C)



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15.0 整合資料作業規定

各子系統廠家需配合提供以下資料，並裝訂成冊，統一以此目錄製作 FMCS 整合資料章節並提供相關資料的電子檔。

- 各子系統操作圖面資料
- 各子系統之 FUNCTIONAL STRUCTURE 規劃(EXCEL)
- 各子系統之 LOCATION STRUCTURE 規劃(EXCEL)
- 歷史曲線資料庫整合表格(EXCEL)
- 特殊連線(OPC/MODBUS/PROFIBUS) 連線架構圖及相關說明資料
- 系統操作說明書
- 系統硬體架構(含控制器模組)
- CBM 程式列表(含註解)
- I/O LIST
- 警報 LIST
- 控制器及 I/O 控制盤體線路圖
- LOOP DETAIL 全迴路線路圖
- HART 參數設定表
- 儀錶設備參數資料
- 儀錶校正記錄
- 設備電源一覽表
- 監控系統備品一覽表
- 原版軟體
- 隨機手冊資料
- 各子系統備份軟體之檔案(燒製成 CD 或 DVD)

若子系統內有包含安全儀控系統(SIS)則除了上述文件外，另需提供以下之文件：



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- 安全儀控功能自我檢查表(附件 3)
- PFD 計算報告
- 安全儀控系統各項測試報告
- 安全儀控系統控制架構圖



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16.0 總則

- 整合時各廠家有必要配合提供資料及配合整合工作的進行，若有不願配合整合工作的推行，則 REXCHIP 有權拒絕其系統連線至 FMCS。
- FMCS 廠商應提供 CBM Library、色板、各式樣板(以上各章節所提及之部份)等標準物件給各子系統廠商使用，而各子系統廠商必須使用標準物件進行規劃。如有所需之功能或物件不在提供之範圍內時，請提出說明與申請，經 REXCHIP 同意後，方可使用廠商自行建立之物件。
- 監控系統須考慮全廠之整合及一致性，承包商有義務配合 REXCHIP 及 FMCS 廠商，達成此一目標。
- 監控系統之軟、硬體架構需符合本規範之要求，在不影響主要設備數量之前提下，REXCHIP 保留修改、變更之權利，各廠商須無條件配合實施。
- 各承包商於正式進行其所屬之監控系統規劃前，須通知 REXCHIP 及 FMCS 廠商進行整合會議。
- 本作業規範各廠商若有疑問請以書面方式提出。
- 各子系統監控負責單位，必須配合 REXCHIP 及 ABB 的要求，進行圖控作業階段性送審及查核的工作。

附件 1：警報優先等級風險評估表

警報優先等級風險評估表
(本表依據 EEMUA 出版品編號 191 號制定)

所有警報應賦予特定一致性之優先權(priority)，以輔助操作員如下：

- (a) 隨時迅速識別重要警報；
- (b) 區分在製程擾動之警報與穩態操作才需注意之警報；
- (c) 當操作員高工作負載時，處理該優先應變之事件。

表一定義了警報總表(Alarm summary)中如何呈現各種不同優先權之警報之基準。此基準將應一致地應用於所有SCADA警報，包含擴廠時額外所需或小修改之警報點。

表一 警報優先權定義表

Alarm Priority	Alarm/Event Type	Predominant Alarm Color on summary	Predominant Alarm Color on Process Displays	Audible
H	High	Red	Red	Yes,"urgent"
M	Medium	Orange	Red	Yes,"mild"
L	Low	Yellow	Yellow	No

每一警報之優先權應基於下列兩因子組合而設定：

- (a) 該警報若未予以處理時之後果；
- (b) 操作員處理該警報以防止後果發生時之足夠時間。



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本警報優先等級風險評估表將由 REXCHIP 廠務部門主管依照各類警報風險程度來訂定。

REXCHIP ALARM PRIORITY MATRIX					
Safety/health	-	-	-	-	Potential injury
Environmental / Regulatory	Minor spill	Non-reportable emission	Reportable violation	Community issue (powder release)	-
Economic (NT\$)	< 300k	3000k~1000k	1000k~3000k	> 3000k	人命財產損失
Examples:					

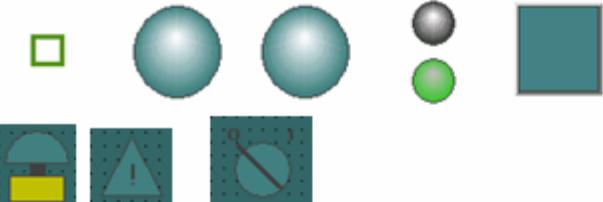
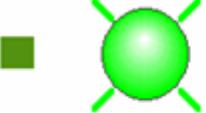
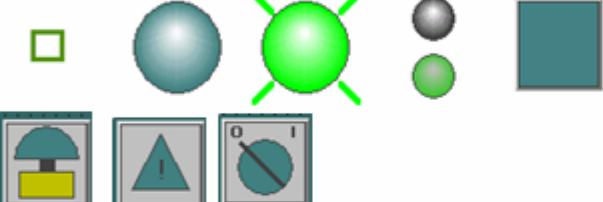
CONSEQUENCE

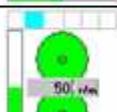
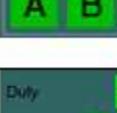
URGENCY	A	1	2	3	4	5
		Minor	Moderate	Major	Severe	Catastrophic
<= 3 min	Immediate	L	M	H	H	E
3 - 10	Prompt	L	L	M	H	E
10 - 60	Soon	L	L	L	M	E
> 60	Later	J	J	J	L	E

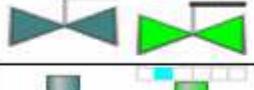
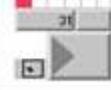
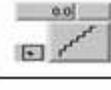
Target :

Rare	0%	E	Emergency alarm
fewer than 5 per shift	5%	H	High priority alarm
fewer than 2 per hour	15%	M	Medium priority alarm
fewer than 10 per hour	80%	L	Low priority alarm
		J	Journal only

附件 2：動態物件顯示

Symbols	Description
 	Digital Input Off Property options are RoundLamp, RayLamp, Square, Traffic, Button, Alert, Switch
	Digital Input On Property options are as above.
 	Digital Output Property options are as above.
	Motor1
	Motor - Stirrer
	Motor - Centrifugal pump
	Motor
	Motor - reciprocating pump

Symbols	Description
	Motor – compressor / turbine
	Motor – reciprocating compressor
	Motor – variable speed
 	Motor – variable speed stirrer
 	Motor – variable speed centrifugal pump
 	Motor – variable speed reciprocating pump
 	Motor – variable speed gear pump
	Duty Standby 1oo2 Duty Standby n003 similar
	Dual Transmitter Dual Transmitter4L
	Valve 1

	Valve 2
	Valve 3
	Valve 4
	Valve 5
	PID Controller
	PID Control loop
	Transmitter and Transmitter Compact Icon Totaliser Compact Icon Bargraph (Vessel level indicator)
	Ratio controller
	Setpoint ramper



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Status Indicator Icons

Icon	Icon Name	Description	Parameter
	Force	Input or Output is Forced	IO.Forced
		Warning	IO.Forced and (IO.Status & 16#380000)
		Forced and Warning	Not IO.Forced and (IO.Status & 16#380000)
	Auto	In Automatic mode	InteractionPar.Modes.AutoStat
	AutoLocked	Locked in Automatic mode	InteractionPar.Modes.LockAuto
	Manual	In Manual mode	InteractionPar.Modes.ManStat
	ManLocked	Locked in Manual mode	InteractionPar.Modes.LockMan
	Local	In Local mode	InteractionPar.Modes.LocStat
	Test	In Test mode	InteractionPar.Modes.Test
	Local and Test Mode	In Local and in Testmode	InteractionPar.Modes.LocStat and InteractionPar.Modes.Test. From release 3.1-2 onwards
	Internal	Internal Setpoint mode	
		ESDSync	Valve ESD Synchronisation set
	InternalLocked	Locked Internal Setpoint mode	
	External	External Setpoint mode	
	ExternalLocked	Locked External Setpoint mode	

Icon	Icon Name	Description	Parameter
	AddedFeedForward	Additive Feedforward input	
	Tracking	In Tracking State	
	Backtracking	In Backtracking State	
	Tuning	In PID Tuning State	PIDCC or PIDAdvCC RelayIdentificationActive
	Wound Down	Controller is Wound Down	InteractionPar.Modes.WoundDown
	Wound Up	Controller is Wound Up	InteractionPar.Modes.WoundUp
	Pause	Pause Setpoint Ramper	
	Stop	Stopped / Closed	Based on output command and/or feedback status
	Start	Started / Open	Based on output command and/or feedback status
	Reverse	Reverse Direction Motor	Based on output command and/or feedback status
	Speed1	Forward Direction Motor	Based on output command and/or feedback status
	Speed1	Low Speed Motor	Based on output command and/or feedback status
	Speed5	High Speed Motor	Based on output command and/or feedback status
	Dec	Decrease output on ECV	
	Inc	Increase output on ECV	

Icon	Icon Name	Description	Parameter
	StopButton	Immediate Action active	PCC PriCmdMan0 Release 3.1-1 and earlier
	StopButtonInhibitedAndPriCmd	Priority command, interlock and Immediate Action Button is Inhibited	InteractionPar.Modes.Inh or HSICmd.Inh Release 3.1-1 and earlier
	StopButtonInhibitedY		InteractionPar.AEInhPriCmd.Stat Release 3.1-1 and earlier
	InhibitVers3/2	a) Interlock set to Execute or b) Inhibit active, generally used on top of another symbol	InteractionPar.Modes.IILockStat InteractionPar.Modes.InhStat Releases 3.1-1 and earlier
		Incoming Priority Command or Interlock set to Execute and Inhibited	Output device Release 3.1-2 onwards
		Incoming Priority Command set to Execute	Output device Release 3.1-2 onwards
		Incoming Interlock set to Execute	Output device Release 3.1-2 onwards
		Priority Command or Interlock not set to Execute but Inhibited	Output device Release 3.1-2 onwards
		AE Object Error not Enabled	Output device Release 3.1-2 onwards
		Connected Outgoing Priority Command or Interlock set to Execute and AE not Enabled, also Inhibits Priority Command and Interlock action	Input devices Release 3.1-2 onwards.
		Connected Outgoing Priority Command or Interlock set to Execute and Inhibited	Input devices Release 3.1-2 onwards.



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Icon	Icon Name	Description	Parameter
		Connected Outgoing Priority Command set to Execute	Input devices Release 3.1-2 onwards.
		Connected Outgoing Interlock set to Execute	Input devices Release 3.1-2 onwards.
		Connected Outgoing Priority Command or Interlock not set to Execute but Inhibited	Input devices Release 3.1-2 onwards.
		AE Object Error not Enabled	Input devices Release 3.1-2 onwards.
		Connected Outgoing Priority Command or Interlock set to Execute and Inhibited	Output device feedback nodes. Release 3.1-2 onwards.
		Connected Outgoing Priority Command set to Execute	Output device feedback nodes. Release 3.1-2 onwards.
		Connected Outgoing Interlock set to Execute	Output device feedback nodes. Release 3.1-2 onwards.
		Connected Outgoing Priority command or Interlock not set to Execute, but Inhibited	Output device feedback nodes. Release 3.1-2 onwards.

Command Buttons.

The following icons are used in the Command Buttons.

Icon	Icon Name	Description	Parameter
	Force	Force Input or Output	IO.Forced or HSICmd.Force
	Unforce	Input or Output not forced	not IO.Forced and not HSICmd.Force
	Auto	In Automatic mode	InteractionPar.Modes.AutoStat
	Manual	In Manual mode	InteractionPar.Modes.ManStat
	Stop	Stopped / Closed	
	Start	Started / Open	
	Reverse	Reverse Direction Motor	
	Speed1	Forward Direction Motor	
	Speed1	Low Speed Motor	
	Speed5	High Speed Motor	
	Down	ECV Inc	o
	Up	ECV Dec	
	StopButton	Immediate Action Button	PCC.PriCmdMan0 Release 3.1-1 and earlier.
		Immediate Action active	PCC.PriCmdMan0 Release 3.1-2 onwards.

Icon	Icon Name	Description	Parameter
	Reset	Reset of Totaliser Total or pccBootToPCC input	Release 3.1-1 and earlier.
	Reset	Reset of Totaliser Total or pccBootToPCC input	From Release 3.1-2 onwards.



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附件 3：安全儀控系統功能自我檢查表

本廠 FMCS 各系統安全儀錶(Safety Instrumented System, SIS)之設計，主要係依據發包資料檢附之安全需求規格(Safety Requirement Specification, SRS)文件及 DOC13840-C 規範辦理。供應商針對 SRS 應設計未設計、設計不完整、或規格不合適處，供應商不得免除善良管理人應告知責任，於細部設計送審 SFS 設計時，除依據 DOC13840-C 規定辦理外，並應針對各 SIS 迴路設計 SRS 內容依下表完成自主檢核，以確認所有的設計正確及可行。供應商針對送審文件的描述必須是清楚、精確、可驗證、可維護，並且定在 SIS 設計的所有生命週期計畫 (Safety Life-Cycle Plan)都可據以執行的。

系統單元：

檢核日期：

SIS 回路：

檢核人員：

檢核項目	檢核結果			詳細說明	附件
	是 <input type="checkbox"/>	否 <input type="checkbox"/>	不適用 <input type="checkbox"/>		
1. 安全功能敘述，是否清楚、正確？					
2. 共同失效因子是否已被認知，並且在設計中已考慮此一因子？					
3. 設備安全狀態，是否有被正確定義在每一個安全儀控功能(SIF)？					
4. 若是同時發生多項設備失效，是否會發生組合危害的情形？					
5. 安全儀控作動頻率及安全儀控作動的條件來源，是否已被清楚定義？					
6. 定期的功能確效週期，是否已被正確定義？					
7. 安全儀控作動反應時間的要求，是否已被正確定義？					
8. 每一個安全儀控功能(SIF)的安全					



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需求等級的定義，是否需要再進一步做討論、變更？				
9. 安全儀控作動的觸發點及相關參數，是否已被正確定義？				
10. 安全儀控作動說明及最終元件作動成功的標準(例如閥件關閉後的漏率)，是否已被正確定義？				
11. 安全儀控輸入、輸出連動的功能、計算功能及允許做動的條件是否已被正確定義？				
12. 手動停機功能的需求，是否已被考量？				
13. 失能(控制電源)作動及致能作動，是否已被正確定義？				
14. 安全儀控系統作動被重置的功能，是否已納入設計考量中？				
15. 誤動作率(STR) ，是否已被正確定義？				
16. 偵測器/最終作動元件的失效模式及安全儀控相對應的反應(停機或警報) ，是否已被正確的定義？				
17. 安全儀控功能的啟動或重新啟動，若有任何特別需要注意的事項或需求，必須在此文件說明清楚。				
18. 介面定義是否清楚？(與其他系統或操作員)				
19. 在工廠作業的各種模式下(歲修、測試等) ，安全儀控的施行與否，是否已被正確的定義？				
20. 軟體功能規範，是否已被正確的定義？				
21. Override (output) , Inhibits (input) , Bypass(function)的操作與				



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需求，是否已被正確的定義？				
22. 為了確保系統安全狀態能夠在任何事故，或是人為失誤的狀態下，仍然能夠正確的到達，是否已充分考量各種狀況及相對應的措施？				
23. SIS 迴路各元件的平均修復時間，是否已被正確的定義？				
24. 潛在的輸出組合危害，是否已被認知？				
25. 任何有可能安全儀控遭遇到的極端環境（例如高溫、多塵、爆炸等），是否已被列入設計考量？				
26. 安全儀控是否已被正確的考量工廠正常或異常的操作模式？				
27. 安全儀控功能(SIF)於工廠發生重大事故或災難時，仍必須維持有效的設計，是否已被完整考量？				

附件 4：SIL 應用程式間之通信

MMS Communication Function Block

Certified communication between SIL applications for use in critical functions

For exchanging safety critical data between Applications, **the Control Modules**

MMSDef2DwordM and MMSRead2DwordM must be used. The **Valid** parameter of the MMSRead2Dword shows whether the data can be trusted, and must be used by the application to bring the related safety functions to safe state.

Fault Detection and Reaction Time(FDRT)

When safety critical signals are communicated between Applications (in the same or different controllers), the FDRT of the communication subsystem must be configured to match the process safety time of the controlled process. Requirements for process safety time given in relevant application standards (e.g. EN 298) must be considered and fulfilled.

FDRT of the communication subsystem is a function of the parameter *Faultcount* of the control module, and the cycle time of its execution.

$FDRT = 2 * \text{FaultCount} * \text{Cycle TimeClient} + \text{Cycle TimeServer}$

Example: Using FaultCount = 3, Cycle TimeClient = 500ms and CycleTimeServer = 500ms gives FDRT for the communication = $2 * 3 * 0.5\text{s} + 0.5\text{s} = 3.5\text{s}$.

The parameter FaultCount has two different, but related fields of application in the MMS communication modules. In addition to the fault count function described above, it is used as a scaling factor for defining a time delay window for acceptance of messages.

Example: Using Faultcount = 3 and a Client Cycle Time of 500ms means that a telegram older than $3 * 0.5\text{s} = 1.5\text{s}$ will be rejected and the internal fault counter of the Control Module is increased by one.

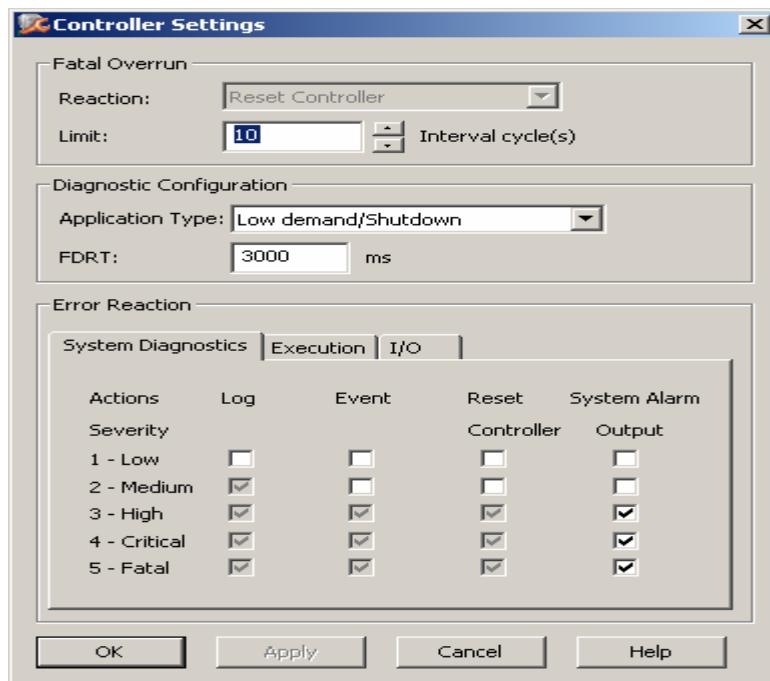
Table 3 shows the default settings on the controller

Table 3. Controller Settings

Function	Description	Options	Default
Fatal Overrun Reaction	Determines the system reaction to a fatal overrun of a task.	Reset Controller	Reset Controller
Fatal Overrun Limit	Defines the number of consecutive overruns to activate the fatal overrun reaction.	1 - 10	10
Application type	Type of the actual process to be controlled.	Shutdown Continuous	Shutdown
FDRT	Fault Detection and Reaction Time.	1000 - 60000 msec (1 - 60 seconds)	3000 msec (3 seconds)

Note to [Table 3](#): The settings described affect the whole controller.

In Reaction drop-down menu, select the action to take if Fatal Overrun occurs. Possible selection are Nothing, Stop Application, and Reset Controller. Nothing is by default selected.





Other MMS communication Function Blocks

The function block types MMSConnect, MMSDef4Bool1, MMSDef4BoolIO1, MMSDef4Dint1, MMSDef4DintIO1, MMSDef4Real1, MMSDef4RealIO1, MMSRead4Bool1, MMSRead4BoolIO1, MMSRead4Dint1, MMSRead4DintIO, MMSRead4Real1 and MMSRead4RealIO1, for communication between controllers, are allowed used in SIL classified applications, but the data communicated cannot be used for safety critical functions.

附件 5：安全操作權限規劃及設定

Force Control

The AC 800M HI supports supervision and control with the number of forces entered during operation. To enable forcing of I/O variables in a SIL classified application, the “maximum number of forces” property for the actual application must be configured (default is 0).

The force control acts on the “force” property of I/O variables (BoolIO, RealIO,DintIO and DwordIO) connected to I/O modules (both inputs and outputs). No other variables containing a force property will be affected by the force control, neither will any variable not connected to an I/O channel be affected. The function block *ForcedSignals* and Control Module *ForcedSignalsM* can be used for interfacing this functionality from the 800xA Operator Workplace, from Control Builder M Professional and from user defined application programs. By means of these types, all forces per application can be reset.

SIL Access Control

The possibility to change the content of variables in SIL applications in the AC800M HI is restricted by the “Confirmed Write” and “SIL Access” functionality. The “Access Level” must be configured for all variables that shall be possible to modify online from the 800xA Operator Workplace. Available settings are (Read only), (Confirm and Access Enable) and (Confirm).

- Read Only: Not possible to modify online, only viewing is possible.
- Confirm and Access Enable: Enables modification of values by means of the “Confirm Operation” dialog, provided the “Access Enable” input is enabled,
- Confirm: Enables modification of values by means of the “Confirm Operation” dialog. Default setting when instantiating a type is Read Only. Opening up for modification of a variable should only be done after careful considerations.

Confirmed Write Support

Confirmed Write Support is a function for enabling secure operation on objects in a SIL classified application. The Confirmed Write Support function brings up a

Confirm Operation dialog, enabling the operator to verify and acknowledge the operation to be performed, Figure 6 for example on the **Confirm Operation** dialog.

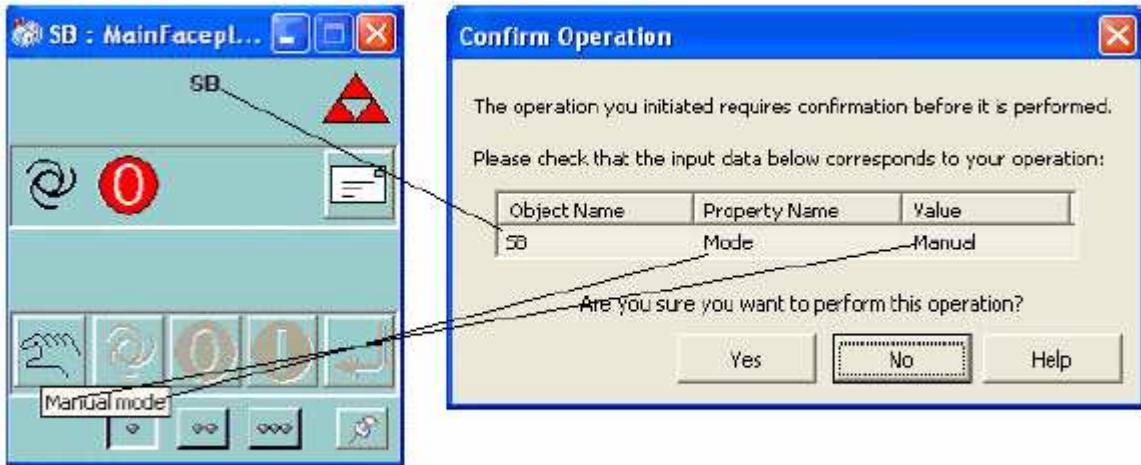


Figure 6. Confirm Operation dialog

When creating a new type with operator faceplate for use on 800xA Operator Workplace, support for the confirmed write function must be implemented to enable operators to change values of the object (in SIL classified applications). This is done by adding a Confirmed Write Support aspect to the object to be operated (in addition to configuring the SIL Access Control as described above).

The faceplate and the configuration of the Confirmed Write Support aspect must be designed so it is easy for the operator to recognize object, property and value in the **Confirm Operation** dialog. Texts displayed in the **Confirm Operation** dialog must uniquely identify the operation to be performed.



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附件 6：如何建立 HART device 於 Control Structure 中

Instancing of HART Device Objects

Instancing HART device objects can be performed only in the Plant Explorers Control Structure.



Instancing HART devices is possible via steps described in this section as well as via Bulk Data Manager. An example for Bulk Data process is described in [Bulk Data Management](#) on page 192.

Field device objects of the HART Device Library are integrated into the fieldbus topology as follows.



The HART Device Integration Library include HART Device Objects, prepared for use of vendor specific DTM. In this case the DTM has to be installed manually before instantiation. For a description of how to install specific DTMs, see [Installation of Device Type Manager \(DTM\)](#) on page 33.



Vendor specific DTMs sometimes include a license mechanism to run the DTM without limitations. Only the DTM software is part of the Device Integration Package, the specific license of a DTM not. The DTM license has to be ordered separately from the DTM vendor. Licenses for a DTM are not included in the 800xA licensing.

HART Device Objects below HART I/O modules

If they are located below multi-channel I/O modules, field devices that support the HART protocol must be assigned to the relevant channel of the I/O module. For a description of how to do this, see [Channel allocation on I/O modules](#) on page 59.

Field device of the HART Device Library are integrated into the fieldbus topology as follows:

1. Open Plant Explorer workplace.
2. Switch to the Control Structure.
3. Open the substructure below the Project object.
4. Select the object below which the device object will be placed, e.g. AI895.
5. Click with the right mouse button to open the context menu.

6. Select the *New Object* in the context menu.

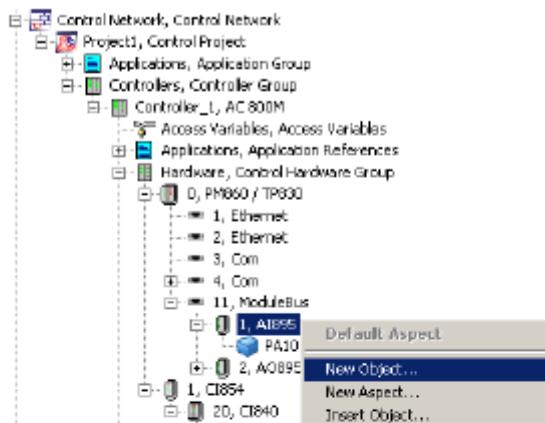


Figure 21. Creating a new device object

7. A folder structure containing the various device objects appears. Click "+" to open the next level of the partial tree and select the required device object (see also [Section 5, HART Device Integration Library](#)).

8. Enter a name for the specific device in the Name box, e.g. the TAG.

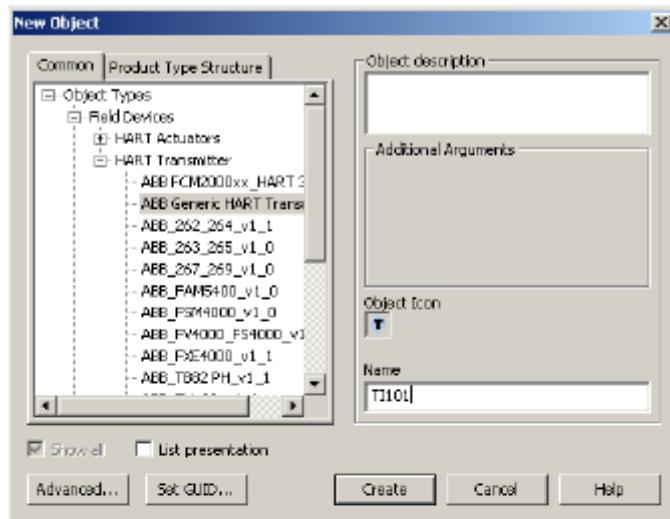


Figure 22. Selecting a device object

9. Click [Create].

The new device object is placed below the master object. Repeat steps 4 to 9 until all of the desired device objects have been placed on the I/O module.



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Channel allocation on I/O modules



Field devices that support the HART protocol may only be placed below I/O modules that support this protocol in hardware and software (DTM) technology.



HART field devices are managed exclusively by the Fieldbus Builder PROFIBUS/HART in the Control Structure of the Plant Explorer and not be visible in the Control Builder M project.

The following operations must be carried out to assign the field devices to the module channels:

1. Open Plant Explorer workplace.
2. Switch to the Control Structure.
3. Open the substructure below the Project object.
4. The field devices are added to the Control Structure of the Plant Explorer as new objects under the parent modules, e.g. AI895.
5. Select the *Fieldbus Management* aspect on the master object type, e.g. AI895.
6. The user interface of the Fieldbus Builder PROFIBUS/HART appears in the main window. The Fieldbus Builder PROFIBUS/HART copies the fieldbus tree from the Control Structure to its fieldbus tree in the main window. To improve performance levels, the partial tree is not copied in its entirety.
7. Click "+" to open the next level of the partial tree.
8. All positioned field devices, together with the channel information from the parent objects, now appear in the partial tree.

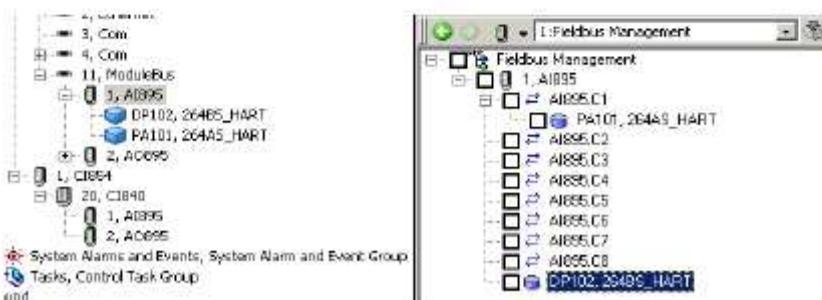


Figure 23. Fieldbus Management view

9. The field device is selected and moved to the required channel by pressing and holding down the mouse button (drag'n drop). The field device automatically moves to the channel.
10. If the check box next to the device object is selected, the status window is updated and the object information is displayed.

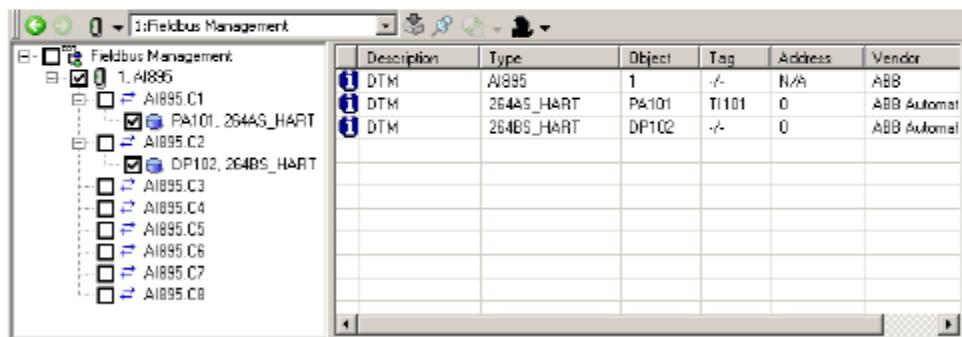


Figure 24. Assigned device objects with DTM information



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Configuration and commissioning of HART Device Objects

Once the HART Device Objects have been instanced they can be configured for the application via DTM. A configuration describes the creation of a parameter set for a particular device in the database only (in the Aspect Server). To do this, the Fieldbus Management must be switched to *Communication disabled* mode (see [Pre-settings for Instantiation](#) on page 53).

A detailed description of how to start the relevant DTM is given in [Starting the Device Type Manager \(DTM\)](#) on page 65. The configuration of the device via a DTM is described in the associated DTM documentation and is not included in this documentation.

Once the configuration phase is complete for all HART Device Objects, the data records for the relevant device or selection of devices can be

- verified,
- loaded to the device/selection of devices,
- saved in one or more export file(s)
- synchronization of DTM specific data through the 800xA system.

These functions are executed via the *Fieldbus Management* Aspect and its subconditions. Instance data can be verified and exported with the Fieldbus Management in *Communication disabled* mode, but loading is only possible in *Communication enabled* mode. In order to load fieldbus lines, select the line via the context menu of the Fieldbus Management and then click on *Download selection* to start.

Verify

Selecting the verify option in the Fieldbus Management menu compare the online device date with the inside the 800xA stored offline configuration data set. The result is *true*, if the data set are equal, otherwise *false*.



If the verification result is false, an up- or download is recommended for data synchronization.



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Download and Upload

When several devices are selected, the PROFIBUS/HART Fieldbus Builder starts a batch process for up- or download, which is processed sequentially. Execution of the batch process continues even if errors occur in individual DTMs. Each event (faulty/successful execution) is documented in the Fieldbus Management status window. If an error occurs, an error message is displayed after the end of the batch process to indicate that the batch process is faulty.



Loading errors can arise if this function is not supported by the DTM, e.g. S800 modules, or if the DTM cannot establish a connection to the device.

Export and Import

The export file of an instance data record is saved with a time stamp in a folder which is specific to the Device Object. This makes it possible to build up a device configuration history. Exported device data set can be imported again by selecting the specific export file. The export and import process is carried out manually by the user.



Further information on the Fieldbus Management Aspect can be found in [Fieldbus Management](#) on page 84.

Synchronization of DTM specific data through the 800xA system

DTMs, installed on each client, may store their private internal data in a separate file on the hard disc. This private data could be e.g. log files, last open view, etc.

However, “private internal data” does not mean the instance data set of the device parameter. As a default, the DTM stores the private data locally in the shared folder directory on each client.



The shared folder directory is described in Industrial IT, 800xA - System, Post Installation Setup 3BUA000156R4101 manual, section “Shared Folder for PROFIBUS and HART Device Integration”.

Synchronization of DTM specific data shall be executed by the user after finishing instancing and configuration of device objects in the Plant Explorers Control Structure.

To synchronize the private DTM data the following steps must be carried out by the user:



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1. Open Plant Explorer workplace.
2. Switch to the Control Structure.
3. Open the substructure below the Project object.
4. Select a device object below which hold a *Fieldbus Management* aspect
5. Select the *Fieldbus Management* aspect.
6. The *Fieldbus Management* view appears in a window of the Plant Explorer.



Double-clicking on an Aspect in the Aspect window will open up its contents in a separate process window.

7. Select the *Fieldbus Management* node in the *Fieldbus Management* tree.
8. Click with the right mouse button to open the context menu.
9. Select *Synchronize DTM related path*



It is recommended to start DTM data synchronization to the end of configuration work to keep network utilization small.

Channel Changes on I/O Modules

Channel changes can only be made in *Communication disabled* mode.

The following operations must be carried out to reassign the field devices to the module channels:

1. Open Plant Explorer workplace.
2. Switch to the Control Structure.
3. Open the substructure below the Project object.
4. Select the object below which the device object will be placed, e.g. AI895.
5. Select the *Fieldbus Management* aspect.
6. Click "+" to open the next level of the partial tree.
7. All positioned field devices, together with the channel information from the parent objects, now appear in the partial tree.

8. Select and move the field device to be reassigned to the required channel by pressing and holding down the mouse button (drag'n drop). The field device automatically moves to the channel.

Deleting Device Objects

Deleting device objects can only be made in *Communication disabled* mode.

The following operations must be carried out to delete the field device from the Control Structure:

1. Open Plant Explorer workplace.
2. Switch to the Control Structure.
3. Open the substructure below the Project object.
4. Select the field device to be deleted in the Control Structure of the Plant Explorer.
5. Click with the right mouse button to open the context menu.
6. Select *Delete* in the context menu.

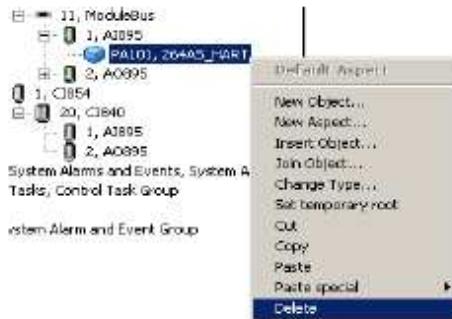


Figure 25. Delete device object

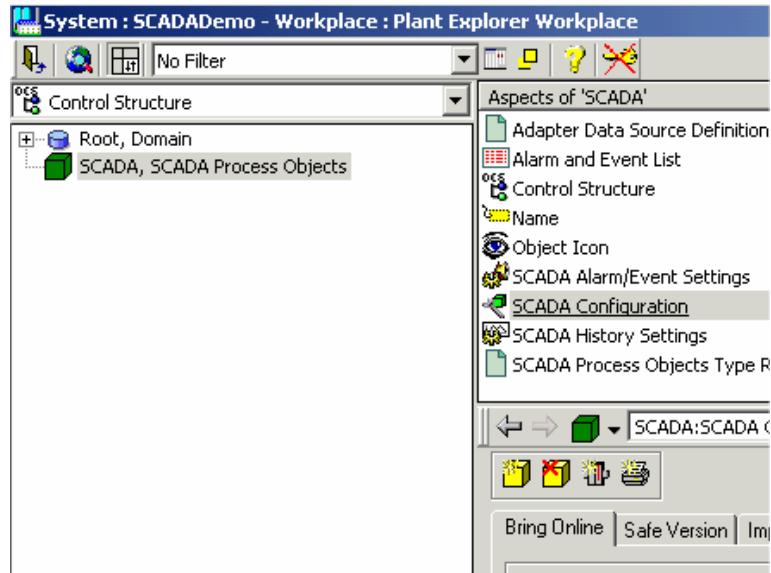
附件 7: OPC for Third Party PLC 之軟體規劃

FMCS廠商會統一製作標準的信號物件(Signal Object)，如類比輸入(Analog Input, AI)、數位輸入(Digital Input, DI)、類比輸出(Analog Output, AO)、數位輸出(Digital Output, DO)等，這四種物件的並內含警報設定及顯示的功能。原則上，所有由OPC來的點都由這四個信號物件控制，若有特殊需求，請提出與業主及FMCS廠商討論後，方可使用廠商自行製作的物件。規劃方式如下：

Creating a new Controller

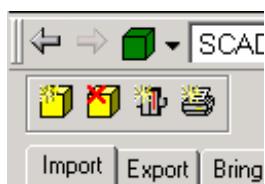
All live signals coming into the SCADA Database needs to have a Controller as a Source. Therefore we need to create a new Controller. The data for our demo controller is coming from AC800M, AC800C or the SoftController.

Go to the Control Structure and select the green SCADA Object and the SCADA Configuration Aspect

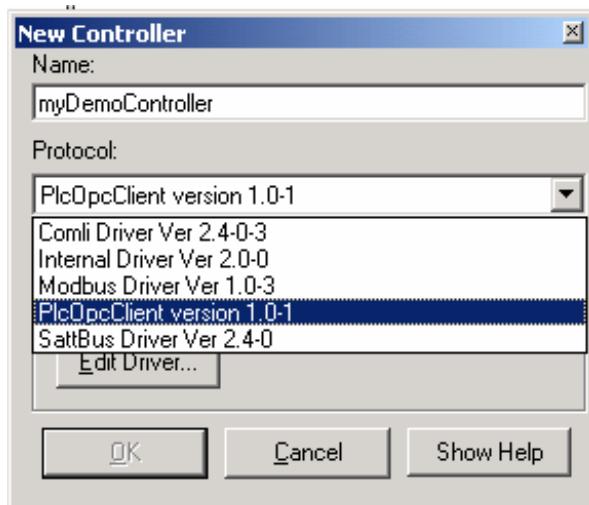


Use the icons below to

- Create Object
- Delete Object
- Create Controller
- Create Printer

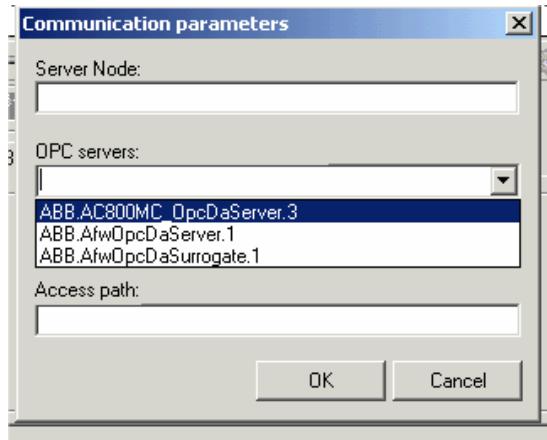


Start to create a new Controller and name the Controller myDemoController. Select what kind of protocol you would like to use for the Controller. We will go with the OPC protocol.

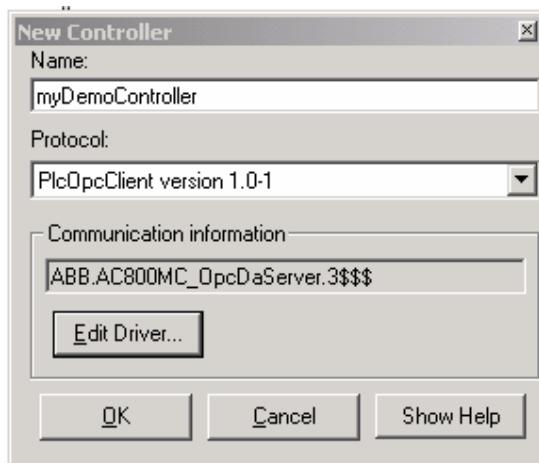


Next it is time to select the driver, i.e. in this case to select the OPC Server. Click Edit Driver

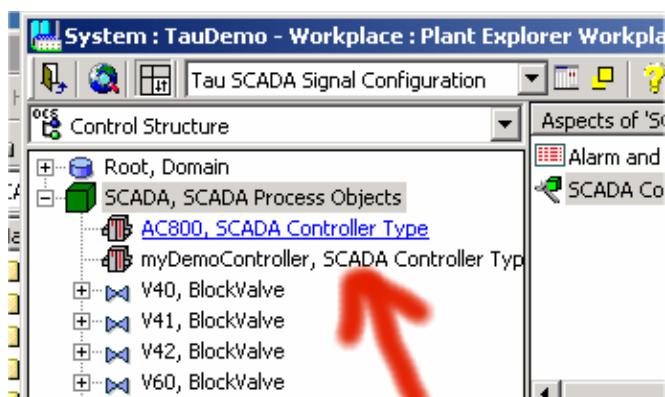
Select the driver as below



Click OK and the OK in the next Window to confirm the configuration.



The result should look as below



Creation of instances (Pumps, Valve etc.)

The Controller already contains 3 Tanks that we would like to connect to.

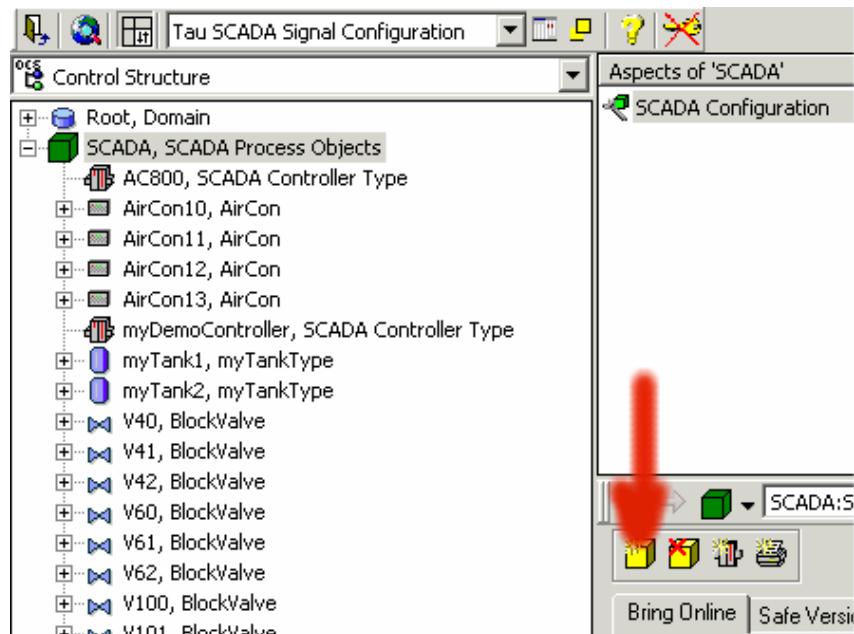
- V100
- V101
- V102

With the following attributes: **OnOff** (bool) which controller the opening of the Tank and the **Level** (dint)

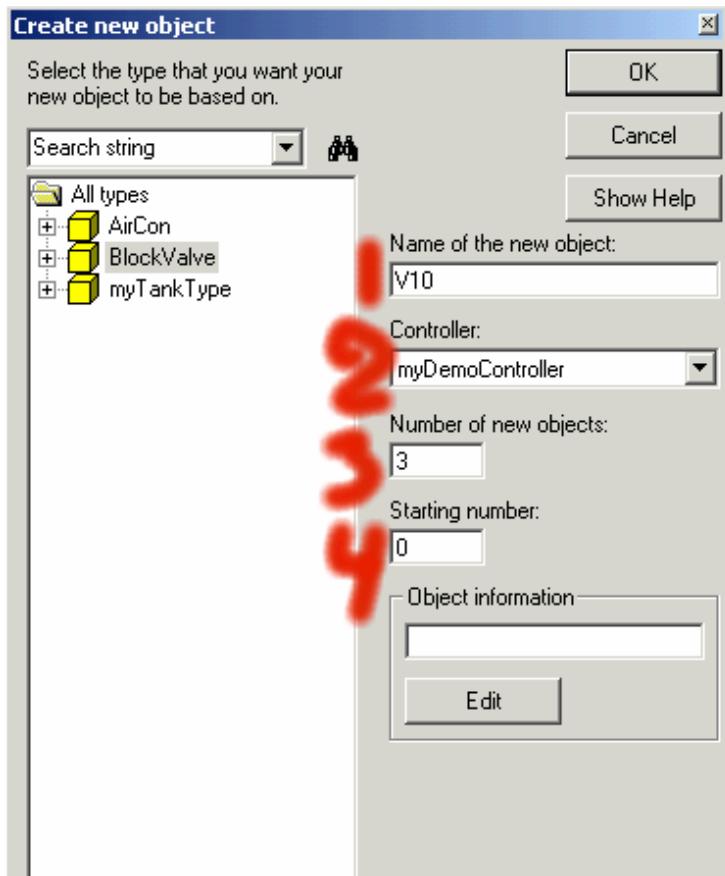
We would now like to create these 3 tanks in SCADA Portal and create an Overview Graphics of them.

Create the Valves

Select to create new Instances



You can actually create the three valves in one shot by setting up the dialog as shown below



1. All letters of the instance name except the last one that is defined in 4
2. In what controller are the signals running in
3. How many instances do you want to create
4. The starting number for the instances

The result

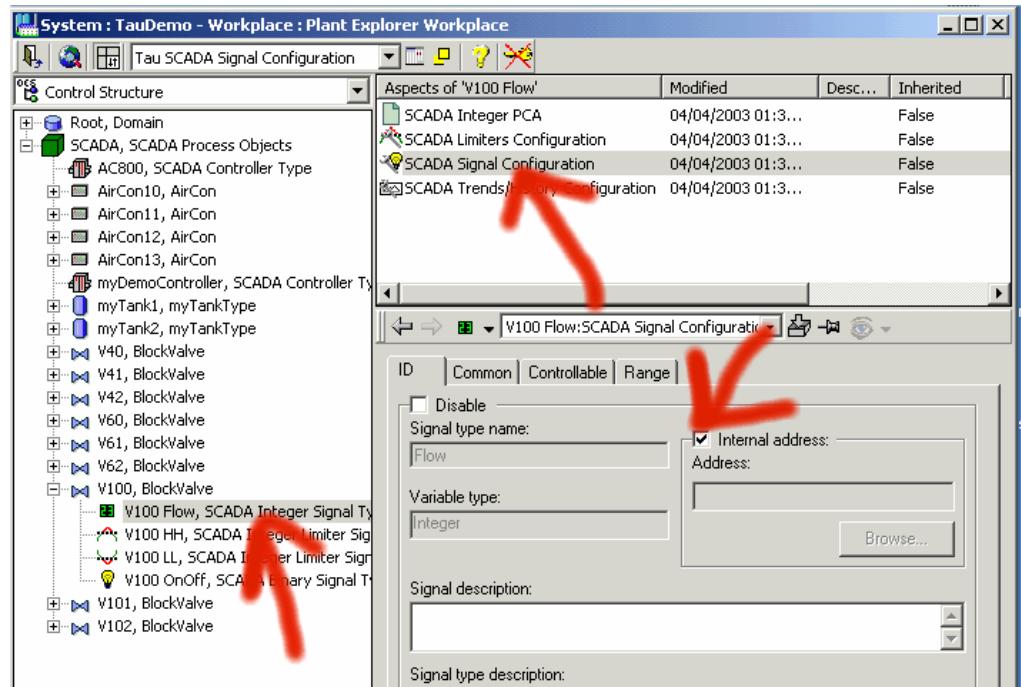
- + V100, BlockValve
- + V101, BlockValve
- + V102, BlockValve

You have got 3 valves named V100, V101 and V102

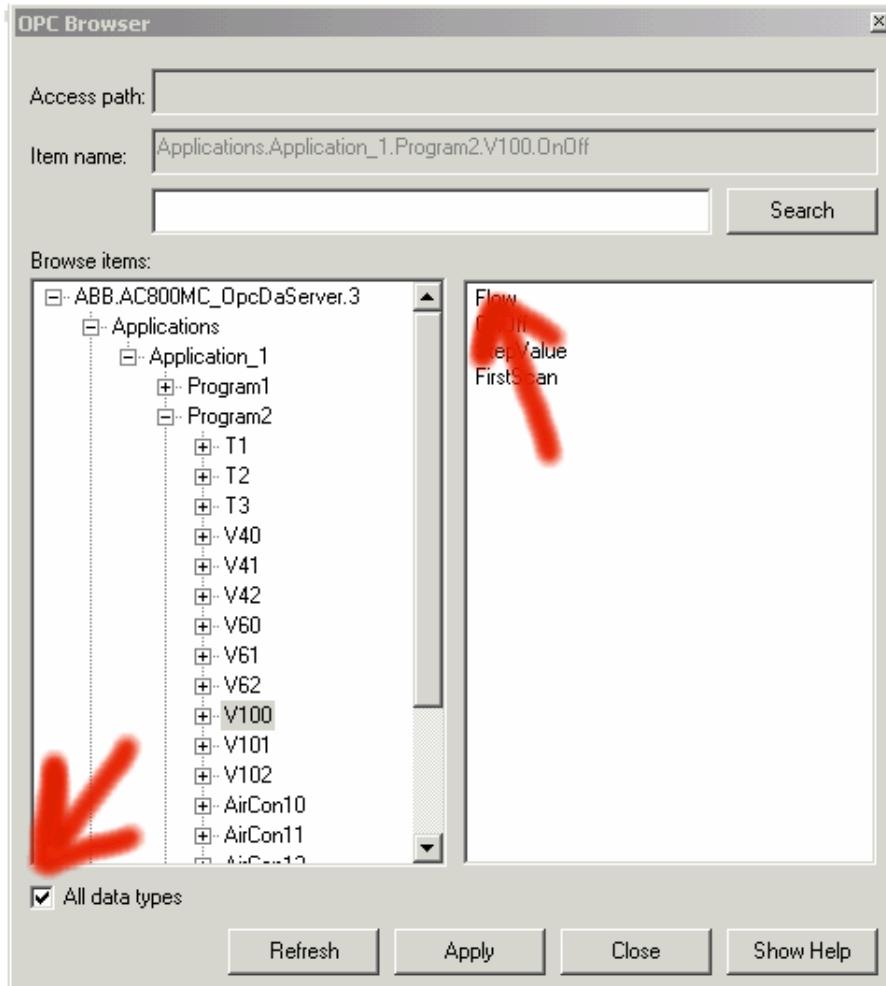
Assign the I/Os

The next step is to assign the I/Os

Select the first signal and the SCADA Signal Configuration Aspect.



Unselect internal and click Browse to browse the OPC Server. Click “All Types” and Browse to and select your signal. Press Apply to apply the changes keep the Window open. Click Apply in the SCADA Signal Configuration Aspect and continue to the next signal.



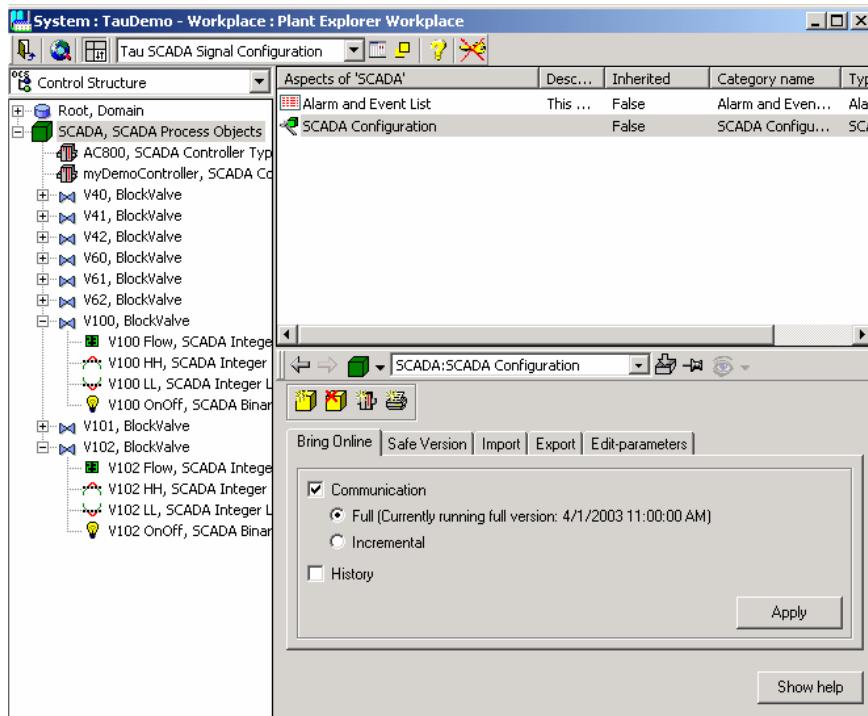
Bring On-Line

To ensure the up time of the plant, SCADA Portal has two databases

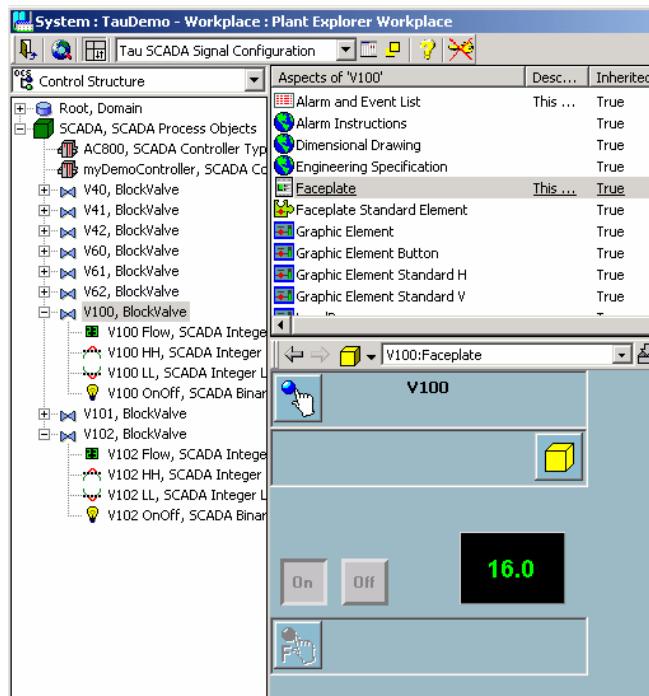
- One on-line
- One for Configuration

We have now been editing the Configuration Database, so we need to bring the Configuration Database On-Line. This is needed every time you change something in the database. The time it takes to bring the database on-line depends on the size of your application.

Click Apply in the Bring Online Window and wait.

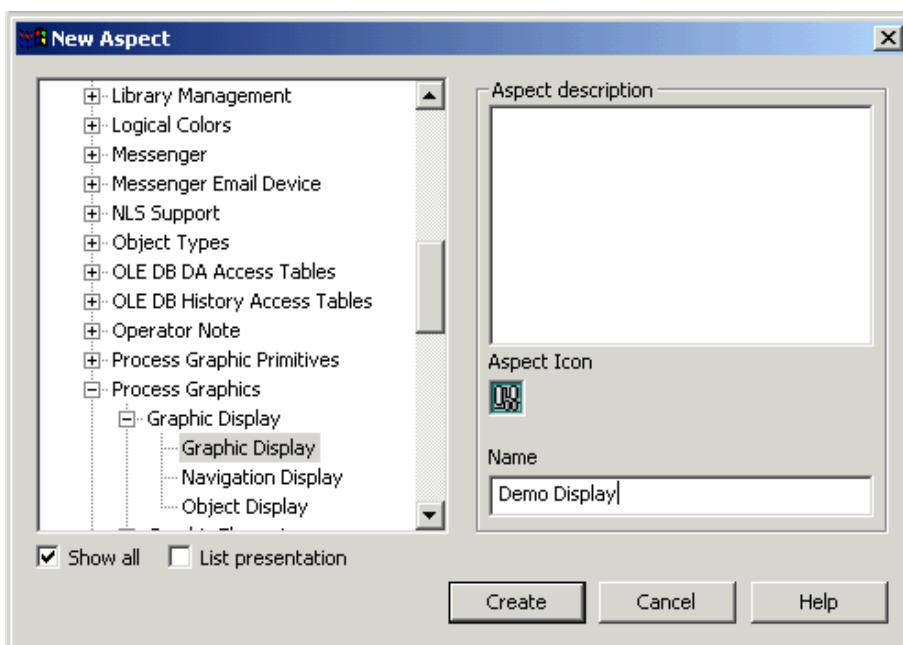
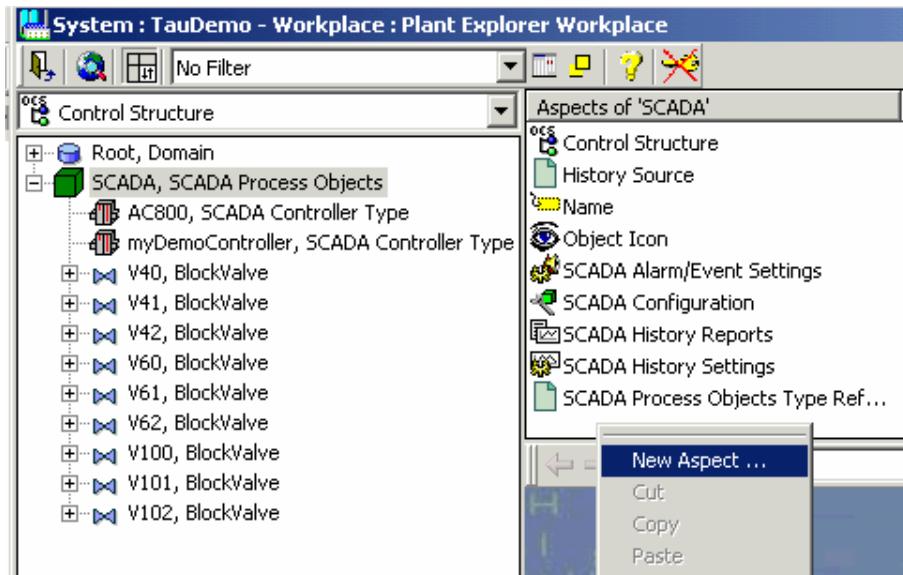


You can check that you have live data in the faceplate

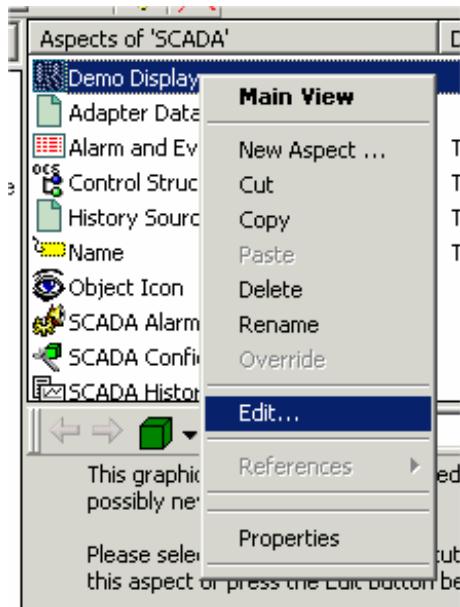


Creation of an Overview Graphics

We would like to have an Overview Graphics showing the 3 valves and 3 tanks
The first step is to create a Graphic Display and name it **Demo Display**

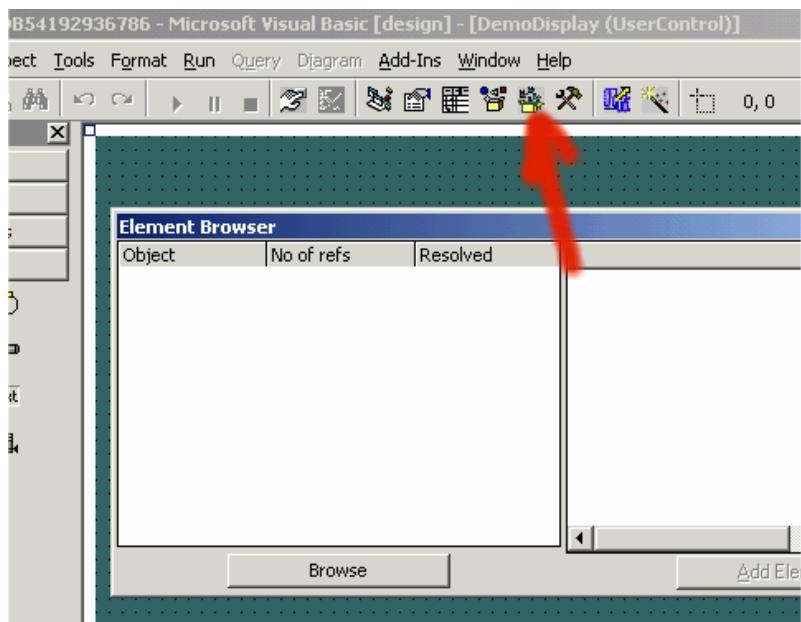


The next step is to Edit it.



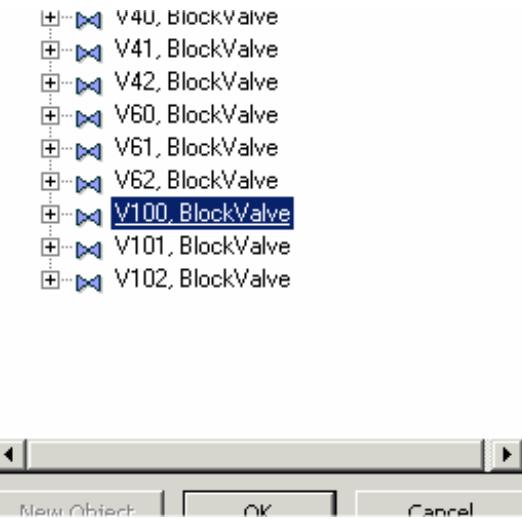
The first thing we want to do is to bring in the pre-defined Graphic Elements that each Valve has inherited from the Type.

Select the Element Browser

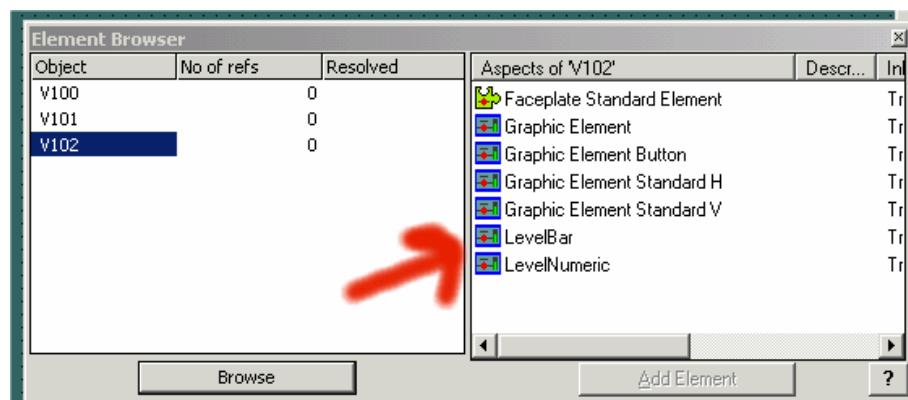


and click Browse

Select V100 and click OK and repeat the procedure for V101 and V102.

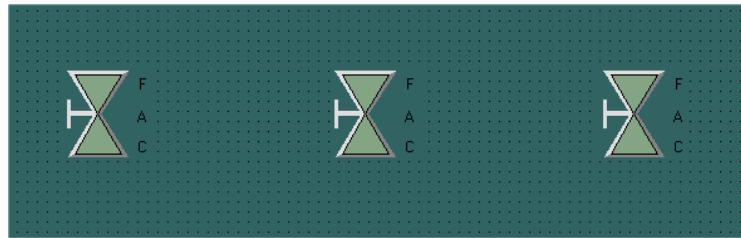


Each Valve has the pre-defined Graphic Elements to the right side.

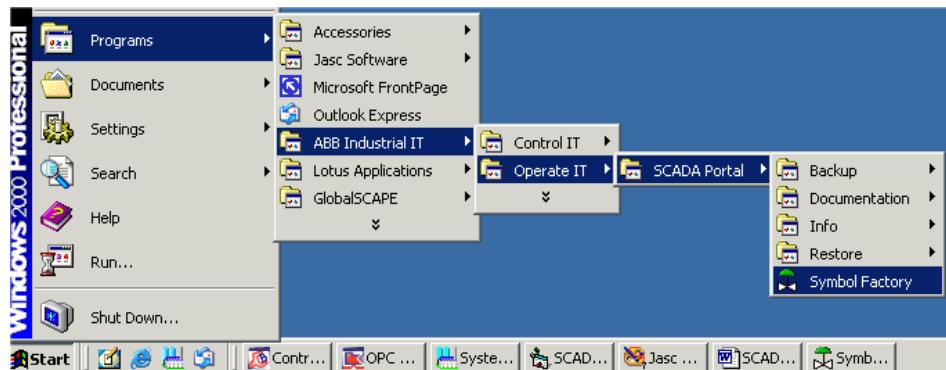


Double click, ones for each valve, on the **Graphic Element Standard V**, to bring in the Valve to the Graphic. By selecting on the object in the Element Browser all your run-time data is connected. You do not need to connect each signal. All connections are already pre-defined by the instance

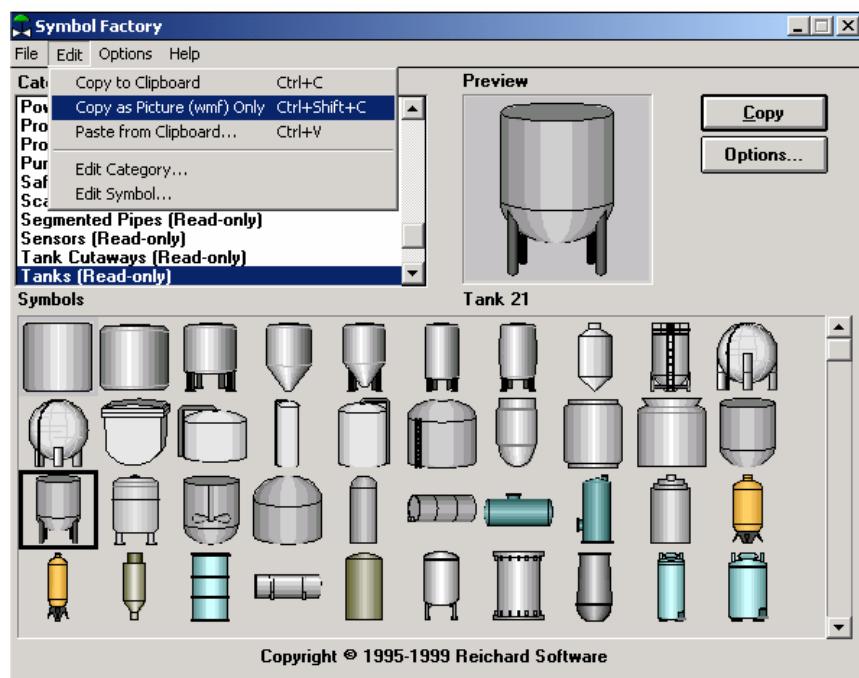
Arrange the valve in a nice way.



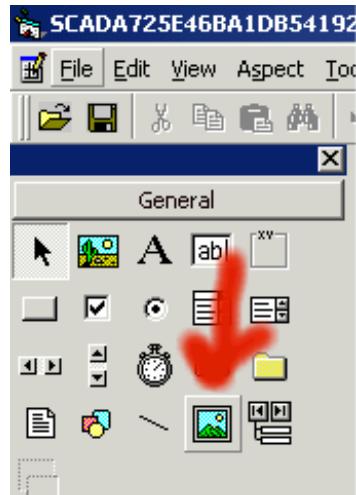
The next step is to add 3 tanks. I suggest that you use one of the 3000 Bitmaps you get in Symbol Factory.



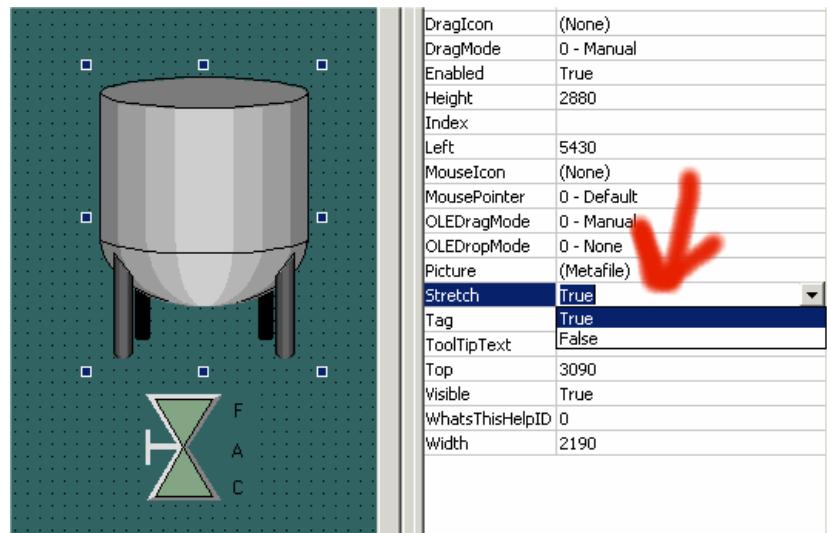
Select the bitmap you want to use and select “Copy as .wmf only”. That will give you a possibility to paste with a transparent background.



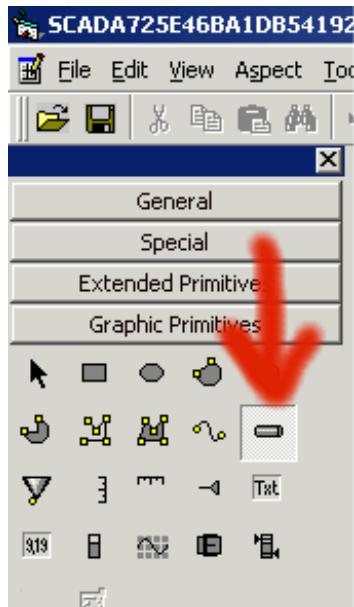
Switch over to the Graphics Builder and select the Image box and press paste.



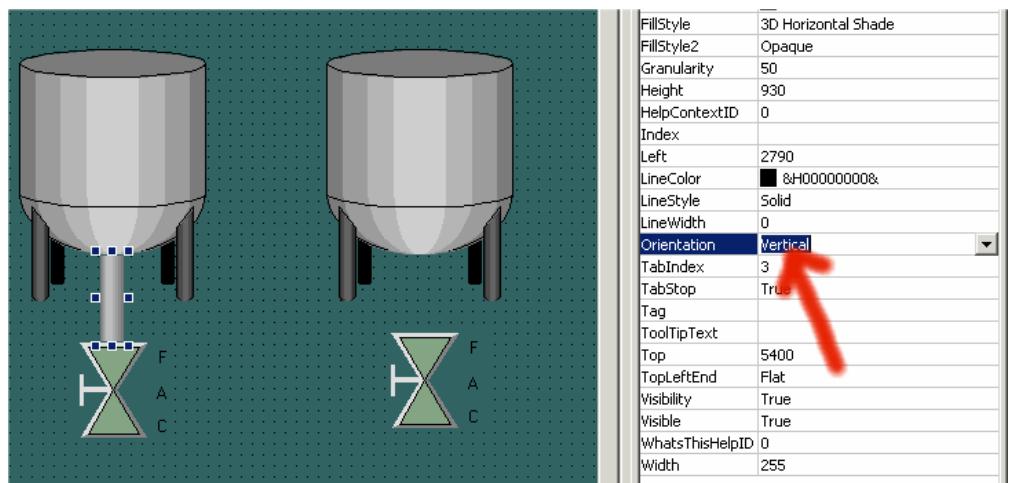
Repeat for all three valves and arrange. In order for the bitmap to scale nicely you need to set the Image Box to “Stretch” instead of “Cut”



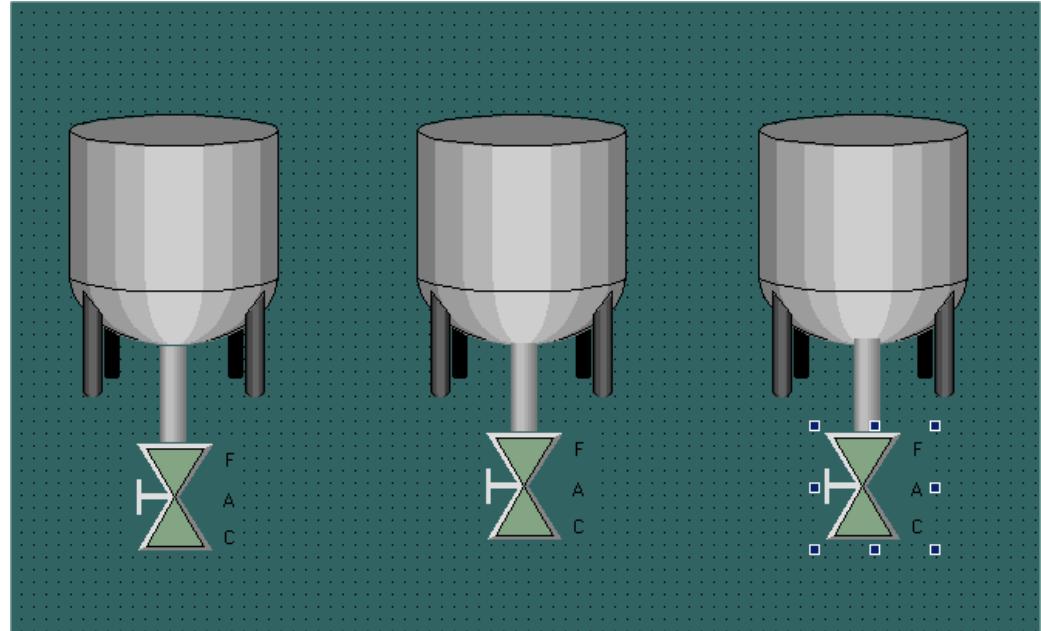
We also want to add some piping



Use the properties Window to set the properties of the pipes.

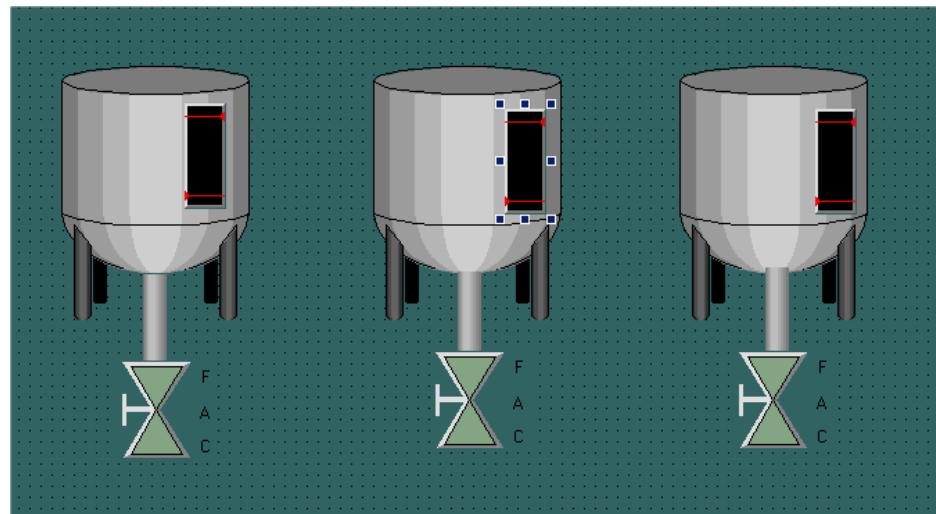


Result

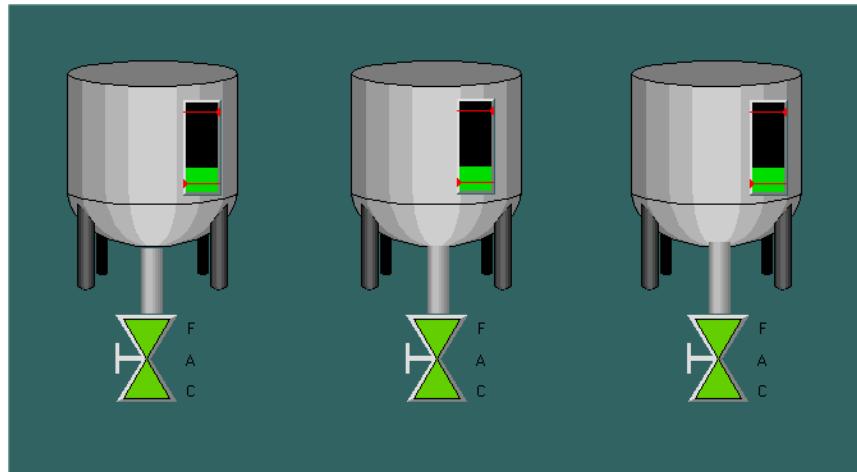


The last thing we want to do is to add the flow in the Valve. We already have a bar graph showing the Flow, we just need to add it to the graphics.

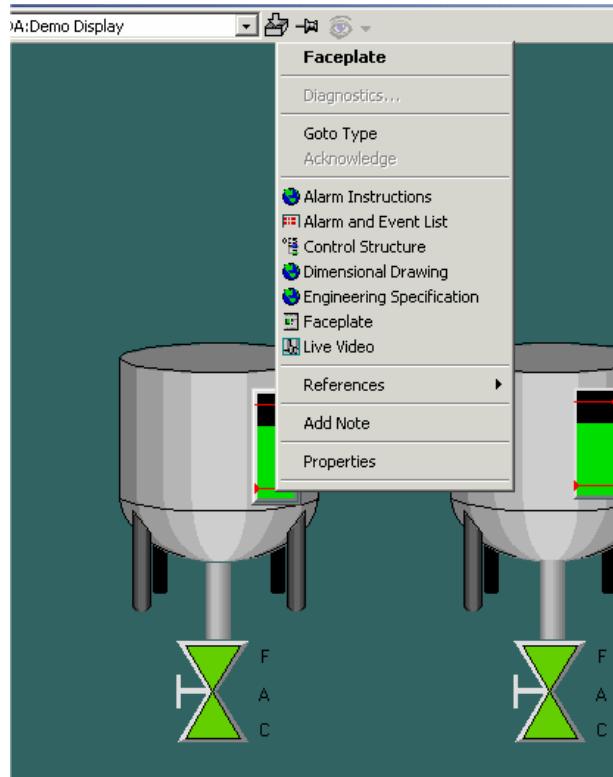
Use the Element Browser and select the Bar Graph.



Deploy the Graphic and double click on it in the Plant Explorer. You see that you have live data!



You can also see the benefit of the Aspect Objects and the Type Solutions. Right mouse click and you will find all associated Aspects.



You have a pre-defined Alarm and Event list that shows only the alarm associated the instance, you have Live Video, Dimensional Drawing etc: This is the power of the Aspect Objects.

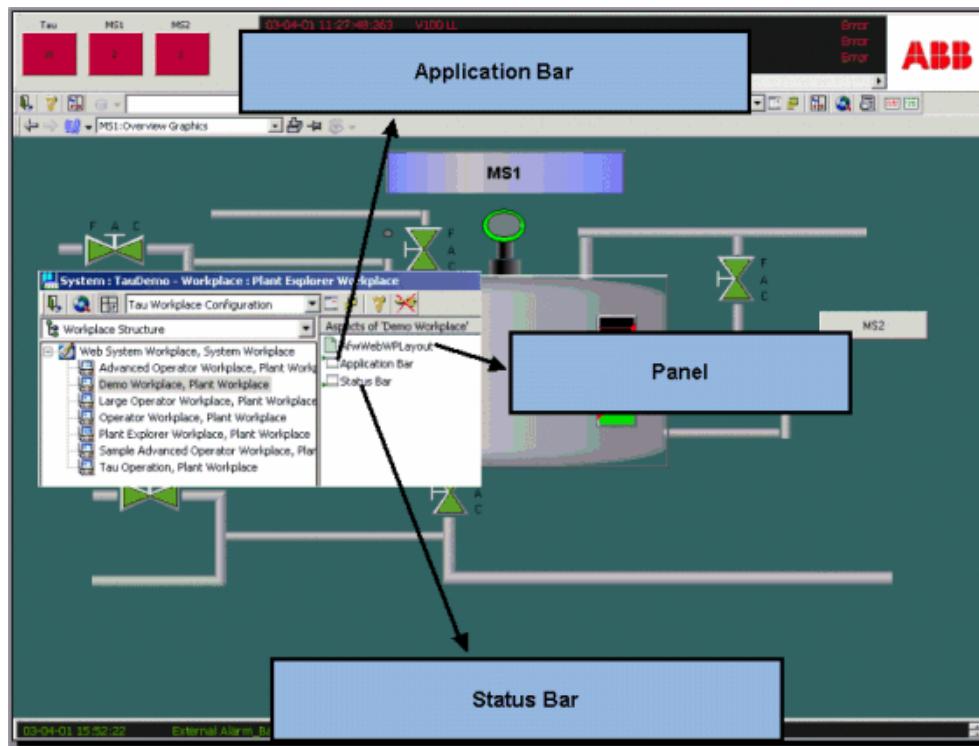
Right mouse click to look at the

- Alarm & Event List
- Faceplate
- Alarm Instructions

Create a Workplace

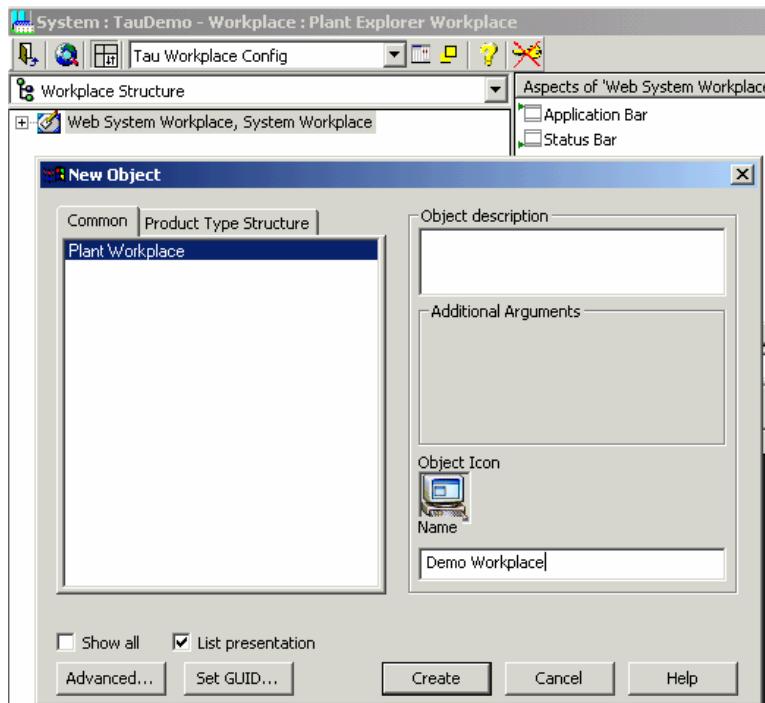
We would like to have customized layout of the screen for our project. We can achieve that by adding our own Workplace.

You can see the structure of a Workplace below

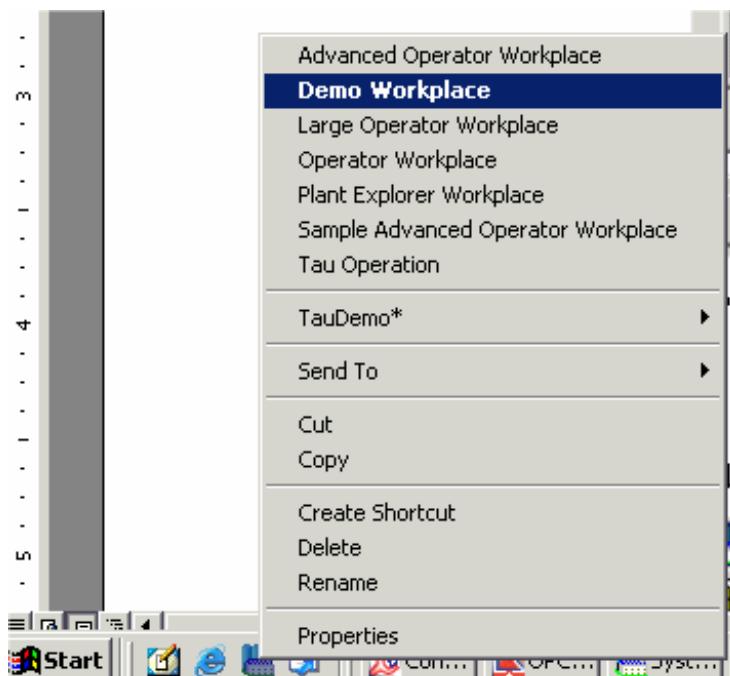


Select the Tau Workplace Configuration Filter

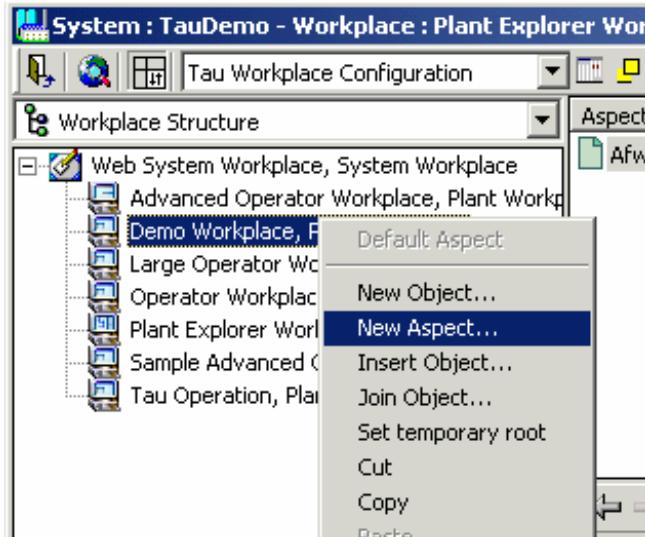
We start by adding a Workplace Object the Workplace structure.



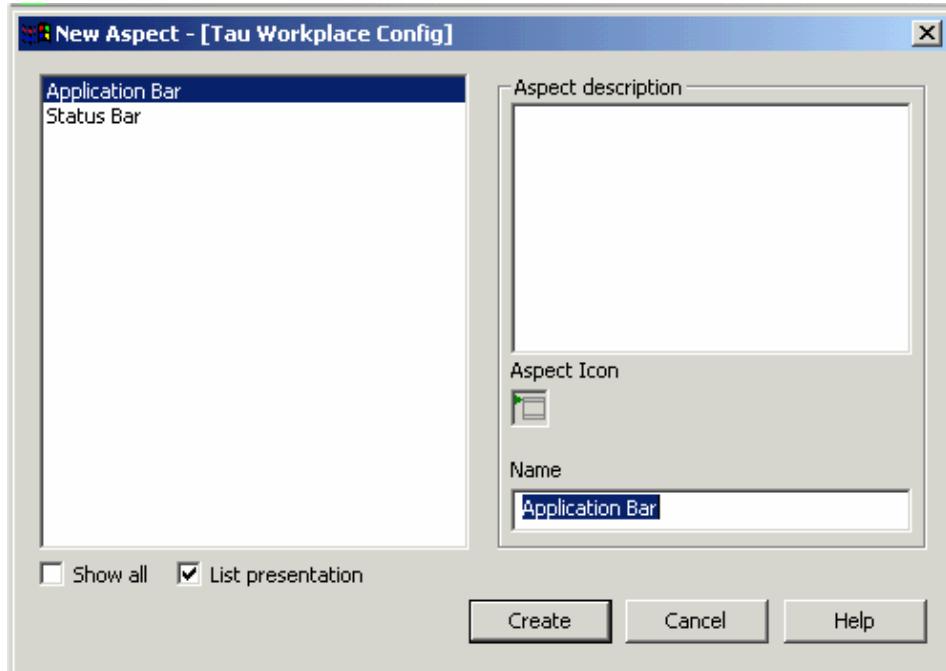
You can already now see your new Workplace in the ePlant Menu, by right mouse clicking.



The next step is to add an Application Bar, that defines the top part of the Workplace

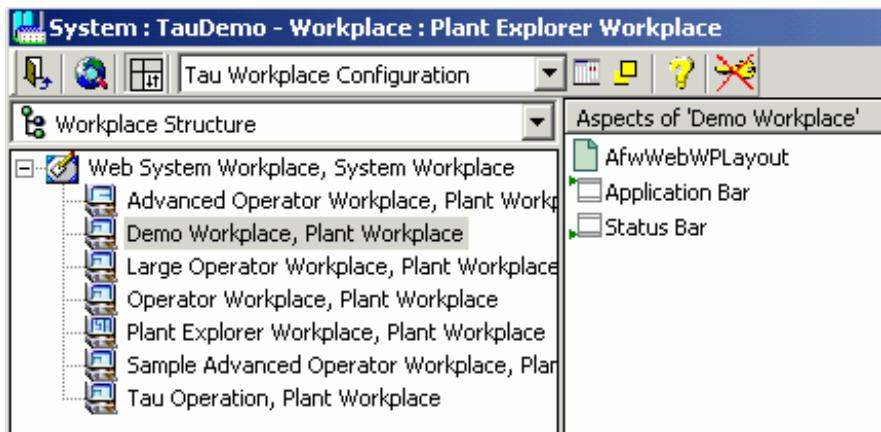


Select to Add the Application Bar



Continue to add a Status Bar, to show information at the bottom of the screen.

The result

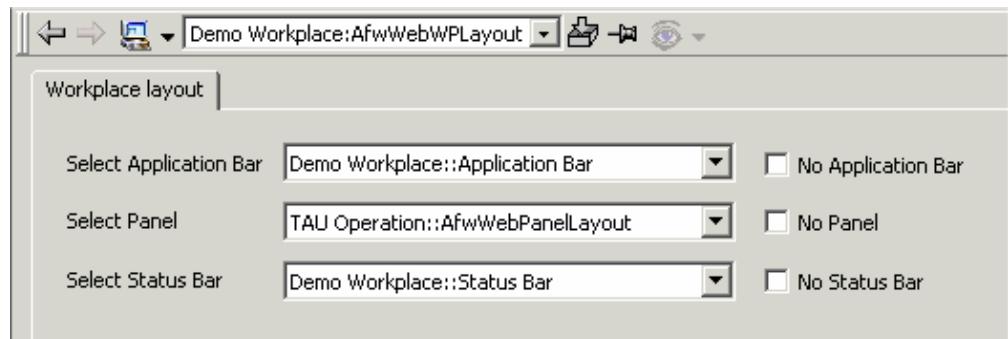


We have now created the basic parts of an Workplace.

Selecting the parts of the Workplace

The next step is to configure the Layout of the screen.

We start by selecting what Panel to use. The panel defines the Panel Area. It is the AfwWebWPLayout Aspect which we need to configure. You need to select for each item, which one you want to use. Choose the Application and the Status Bar from our newly created Demo Workplace (so we can configure them) and the Tau Operation Panel (standard layout)



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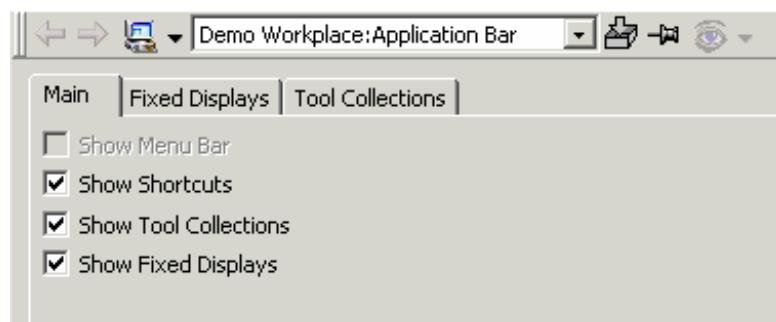
Title: FAB R1 廠務監控系統(FMCS)整合作業規範

Configuring the Application Bar

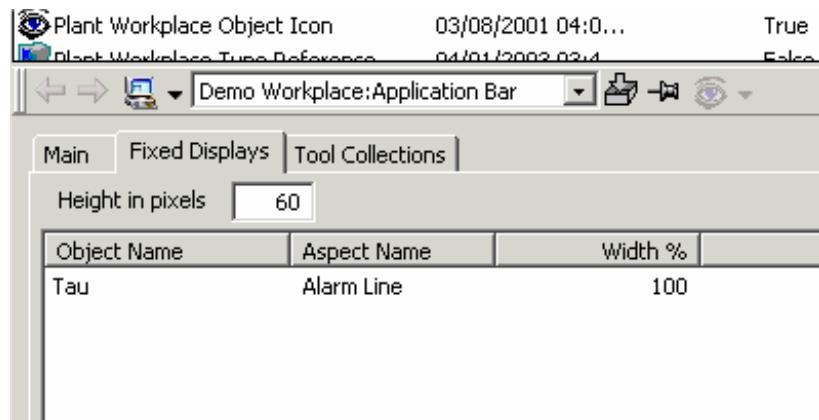
We need to select what we want to show in the Application Bar. Below is our goal



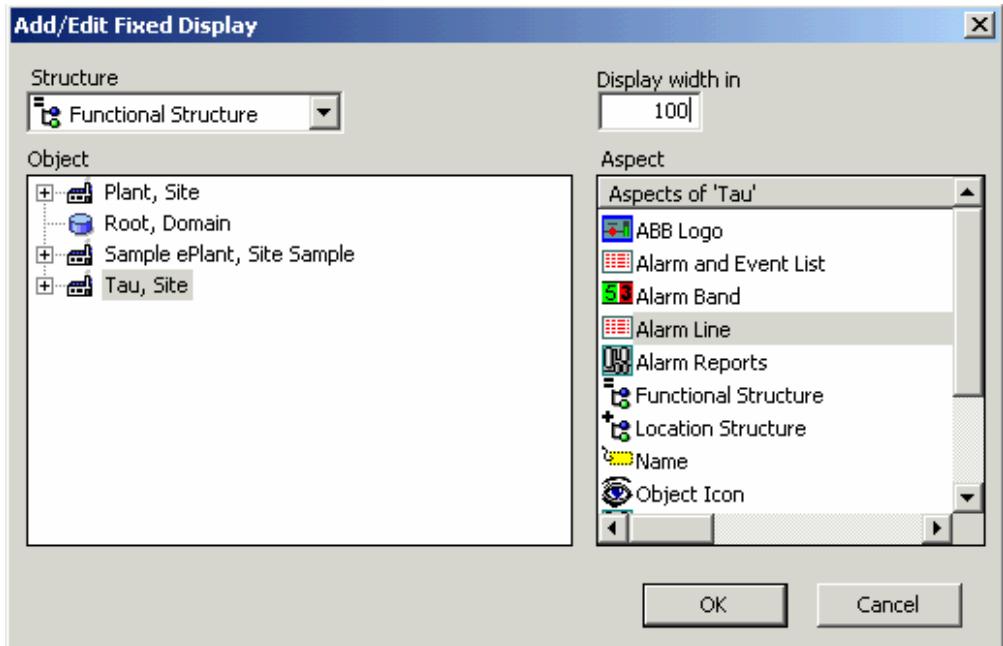
Select the ApplicationBar Aspect and leave the first tab as it is.



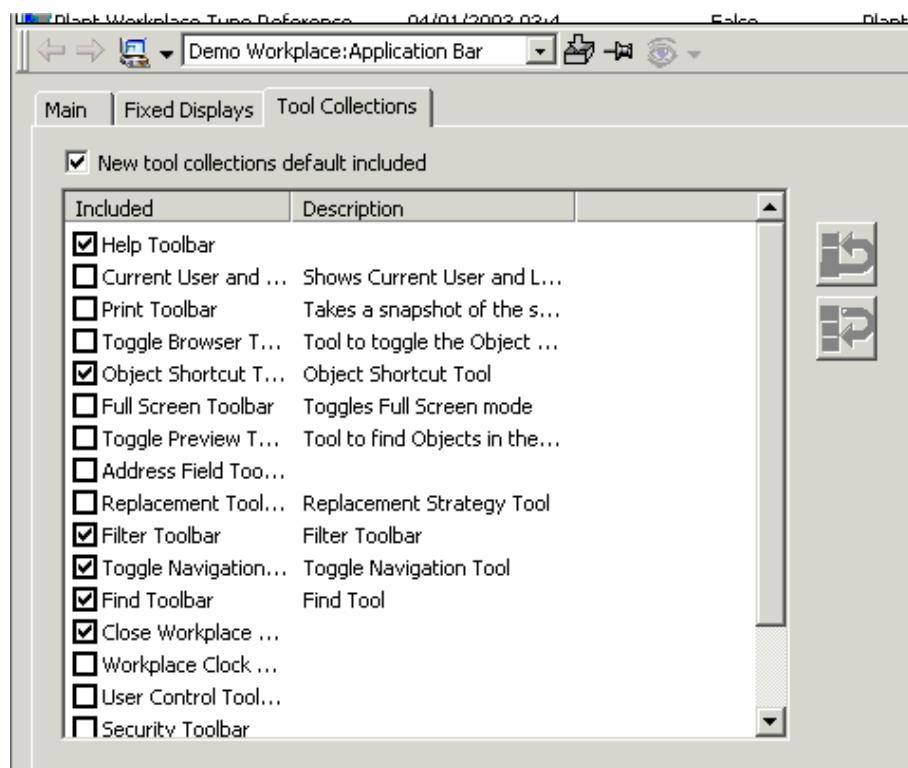
The second tab defines what Aspect that should be shown in the Application Bar



Click add and Navigate to the Tau Site in the Functional Structure and Select the Alarm Line. Select to display the Alarm Line on 100% of the Width



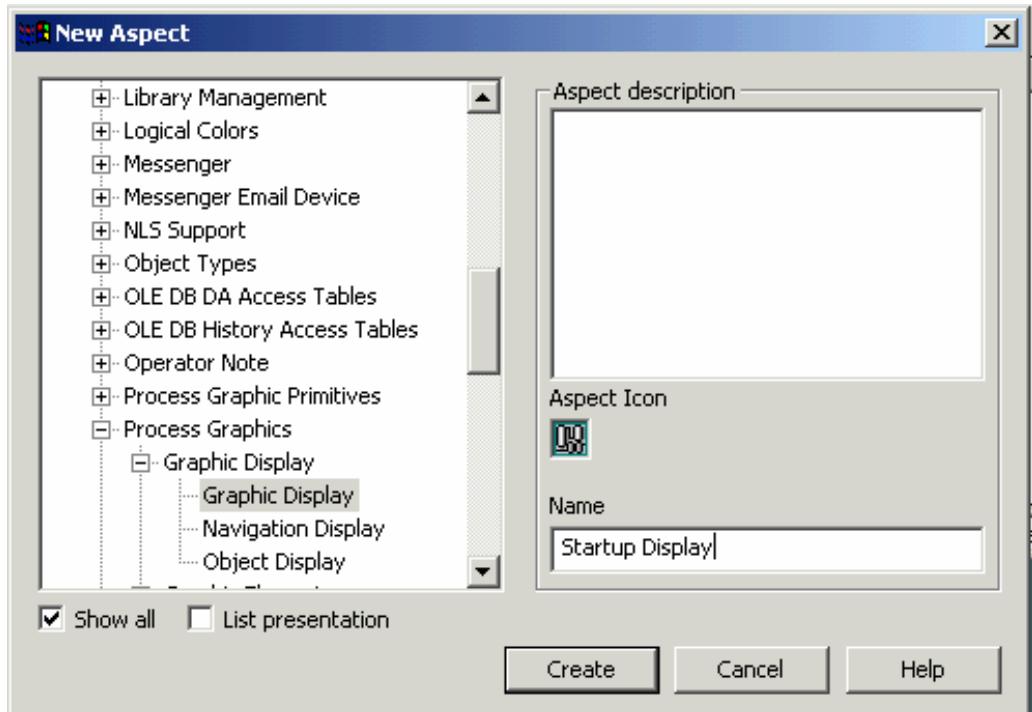
The last part is to define what tools that should be visible. I suggest the below selection.



Creating a Startup Display

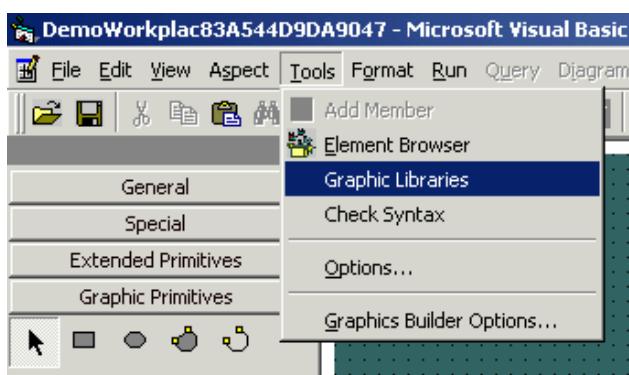
We would like to have a dedicated Start-Up Display when the users opens his Workplace.

The easiest way to get a Default Startup Display is to create a Graphical Display, on the Workplace Object, called Startup Display.

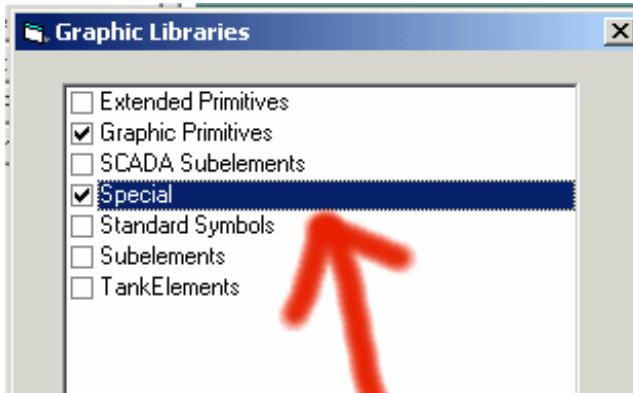


Select Edit to edit the display. We would like to have a Button to click on, to navigate to our Overview Graphics.

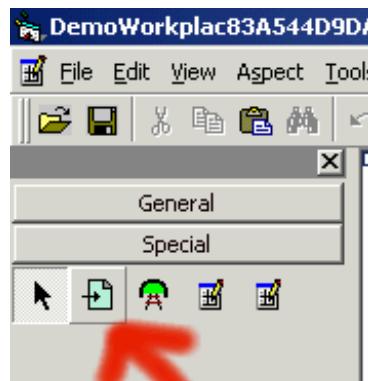
Start the Graphics Builder and add the Library for the Buttons



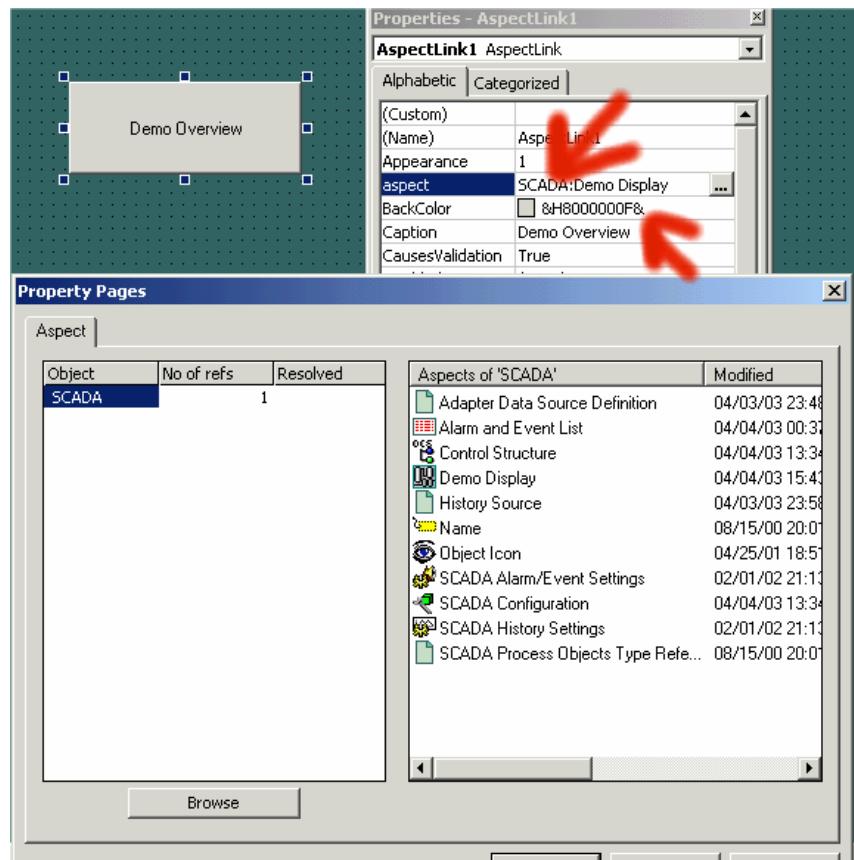
Select the Special Library



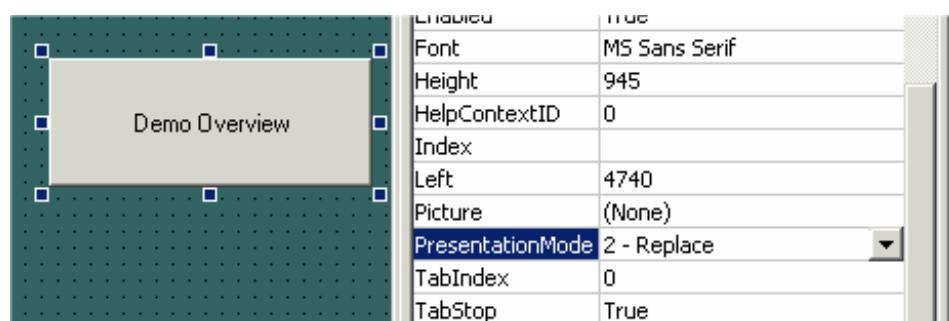
Add the Aspect Link to the Display



Select what Aspect to link to by Clicking the Aspect Property in the Property Window.



Set the Presentation Mode to base to force the location of the exchange the display rather then popping up a Window.

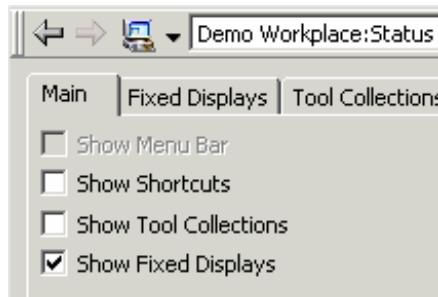


Add a Headline to the Display and Deploy.

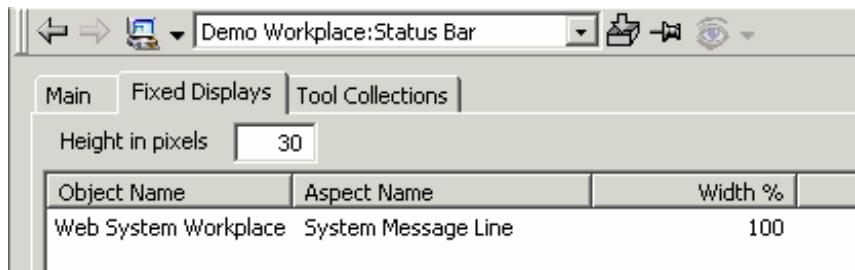
Adding a Status Bar

The last task is to configure the Status Bar.

Display on the Fixed Display



Select an already pre-defined Alarm List showing System Alarms from the Web System Workplace



The result

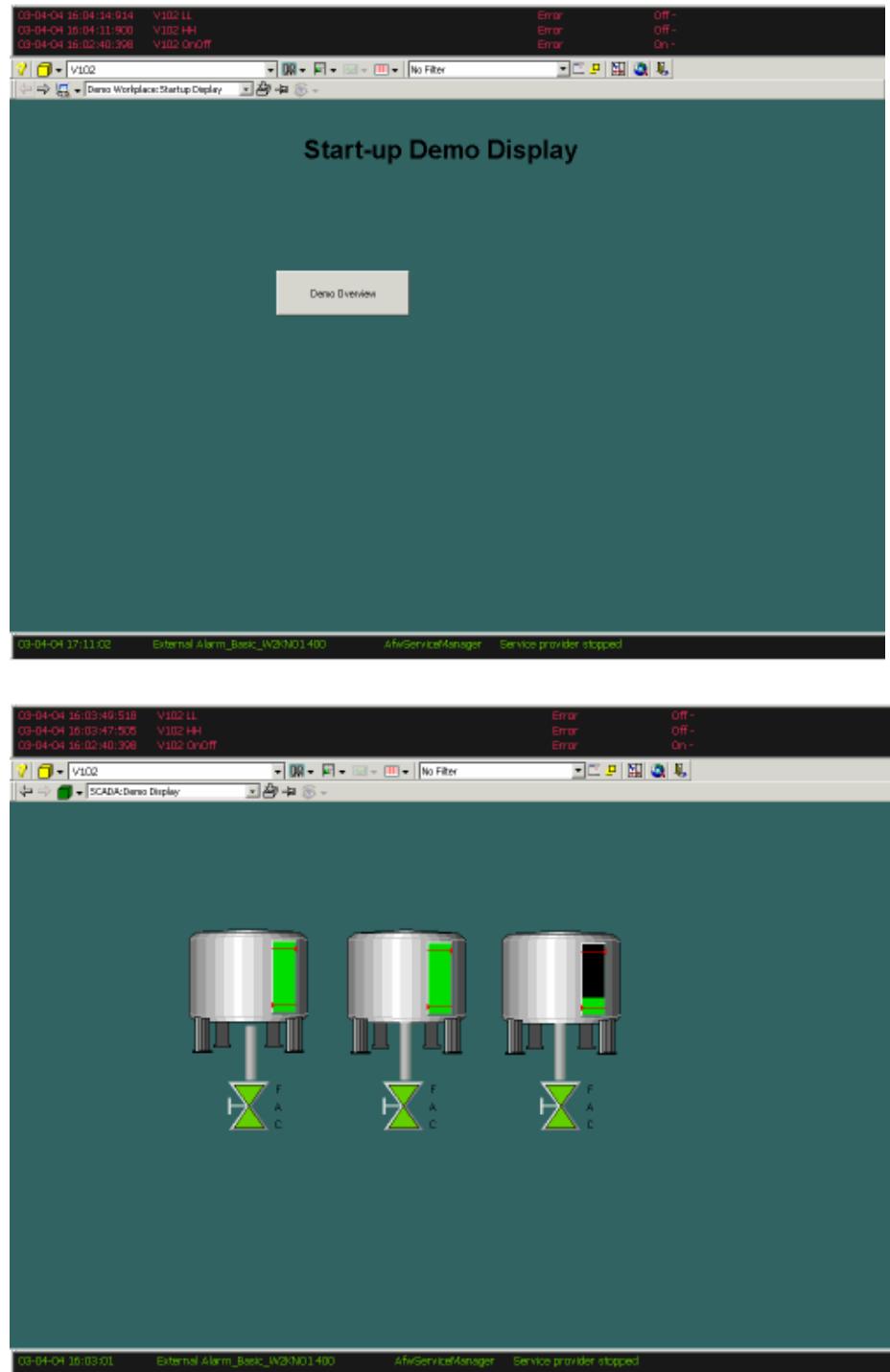
Right mouse click on ePlant and select Demo Workplace. You know have your own startup display

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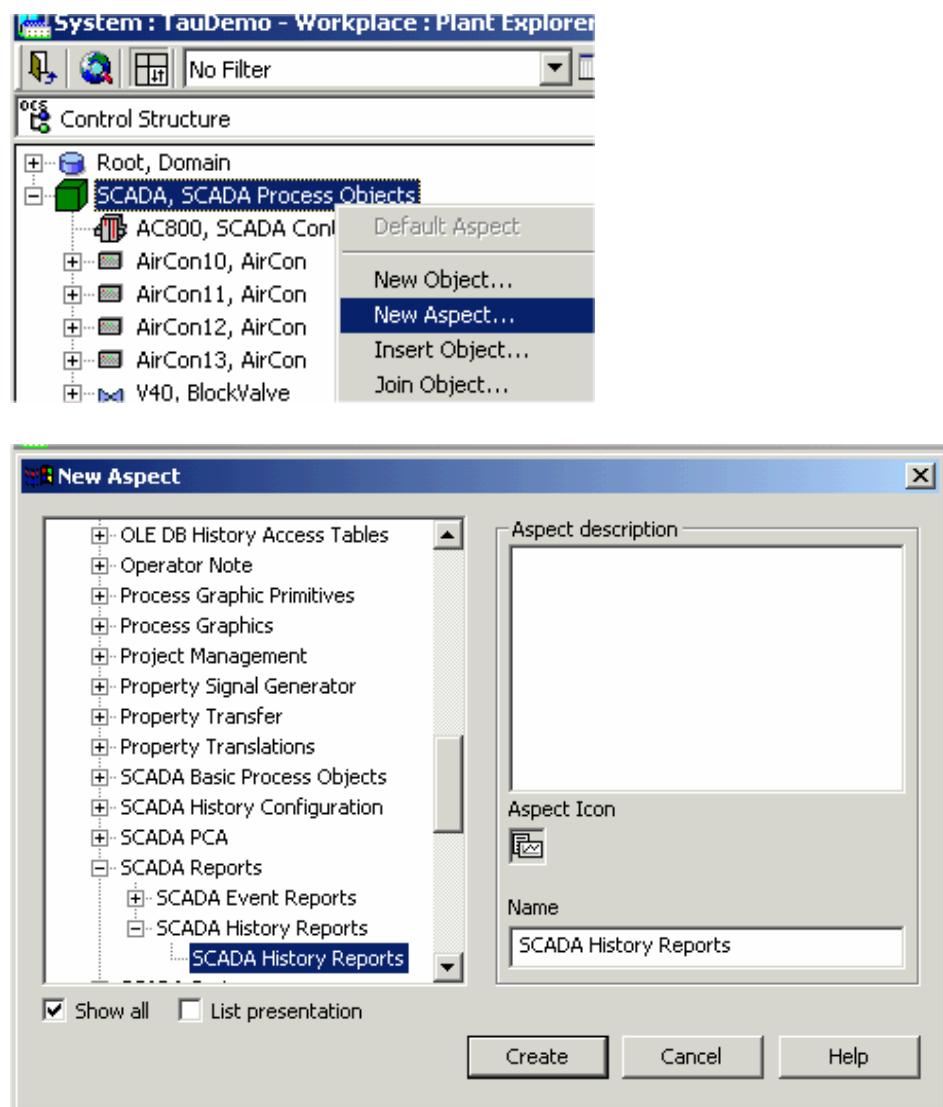
Title: FAB R1 廠務監控系統(FMCS)整合作業規範



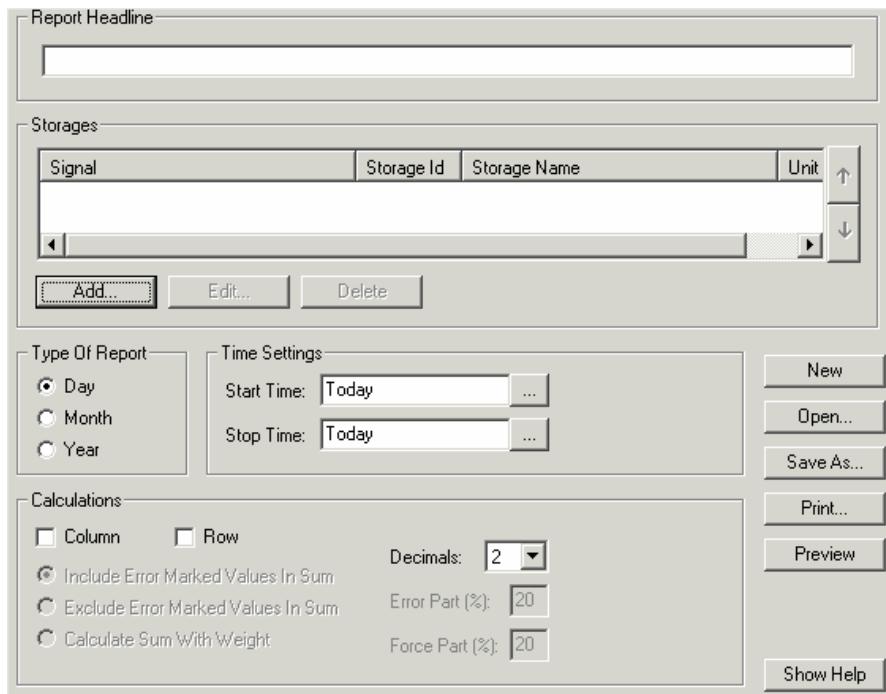
Setting up Reports

The goal is to make a report of data from the last couple of hours. You can only make reports for I/Os that has been defined to have a log. In this example we will use I/Os that already has defined logs.

Create a SCADA Report Aspect on the SCADA Object in the Control Structure.

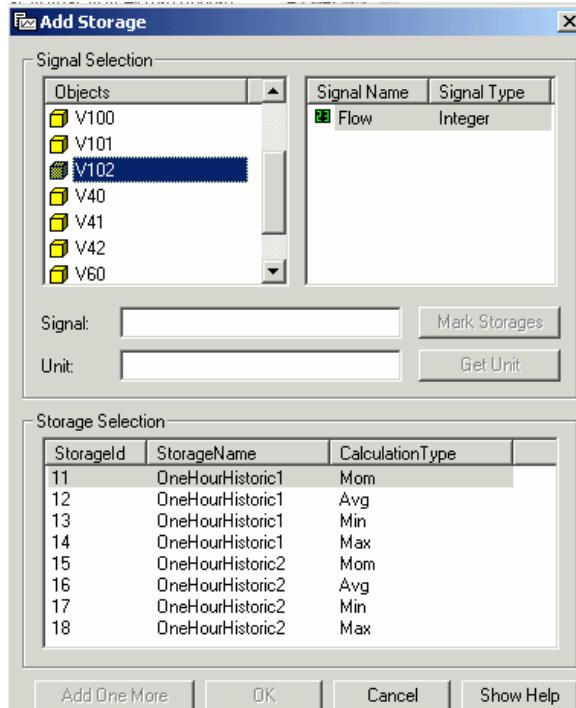


Select the SCADA Report Aspect. Below you see that you can configure the title as well as selecting what I/Os to show in the report and the time span.



Click New and then Add.

Select the Object and then the Signal **Flow** for V100, V101 and V102



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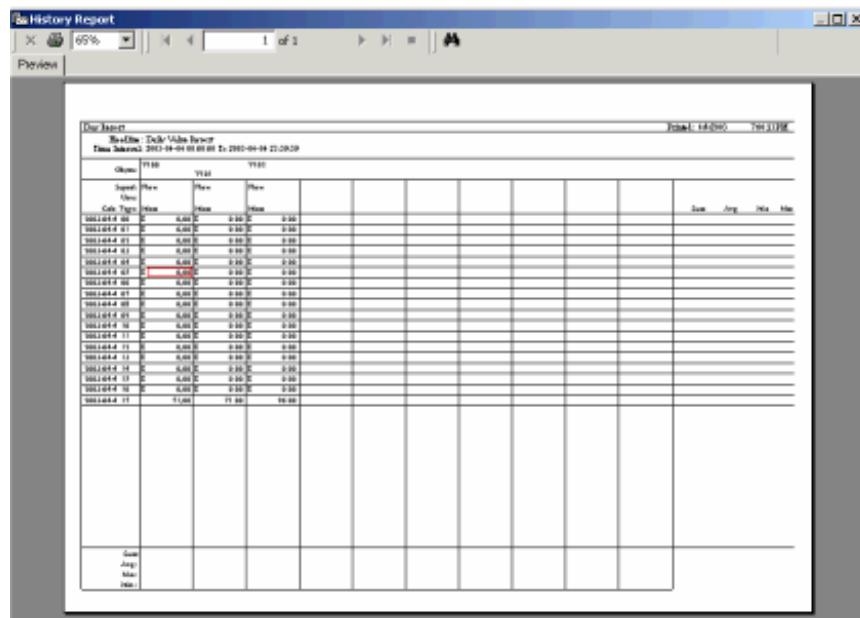
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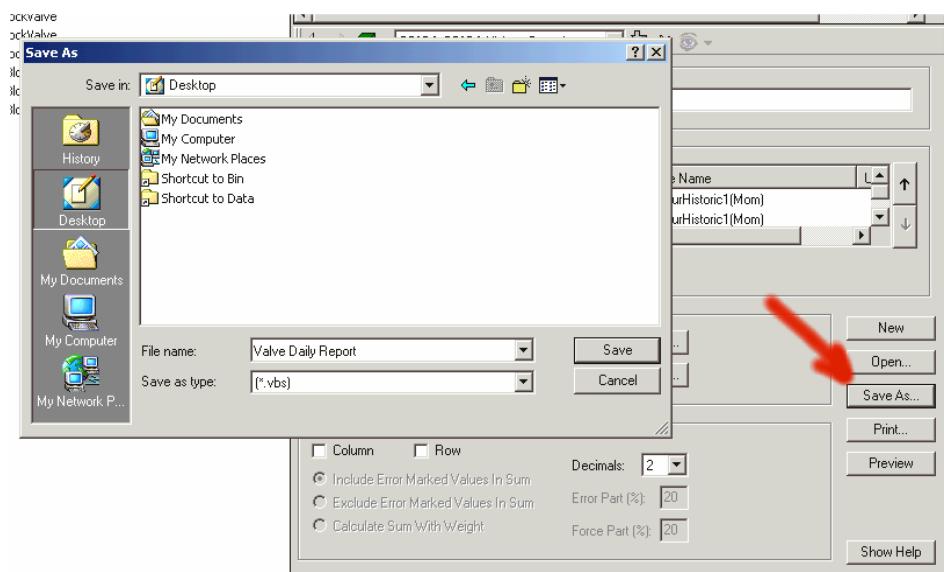
You can now select what time span, calculations and a head-line.

After you have done that, click Preview.



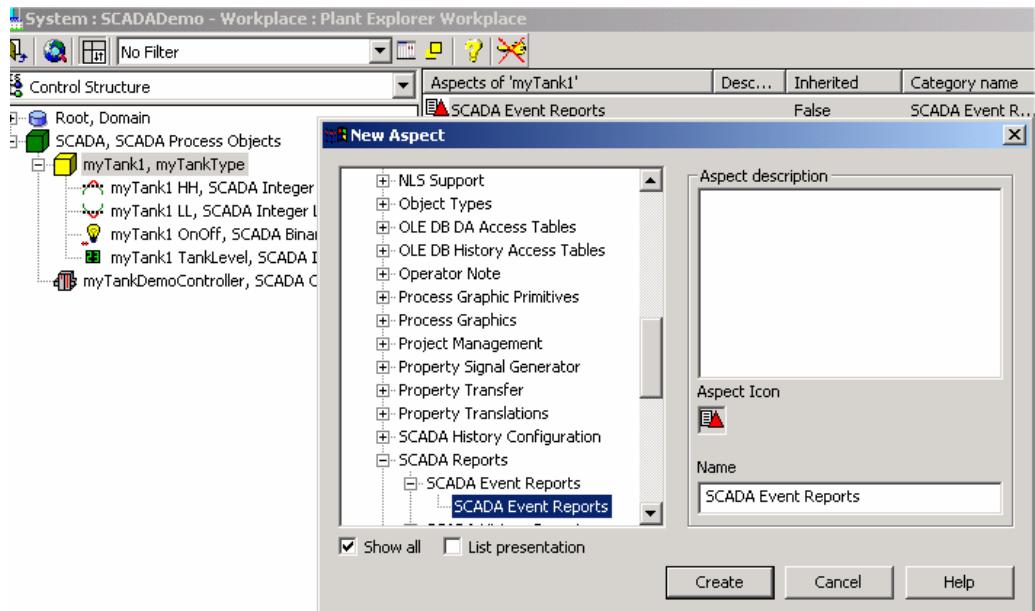
You can save the report and also schedule it for example to run daily. Please use the tool Windows Scheduler. For more help on this topic, please see on-line help

Press Save As to save the report to your Desktop as “Valve Daily Report”



Setting up Event Reports

We would like to make a report showing the Alarms & Events in the plant. Go to myTank1 and create a SCADA Event Report Aspect and call the Report myTankEventReport.



It is time to customize the Report

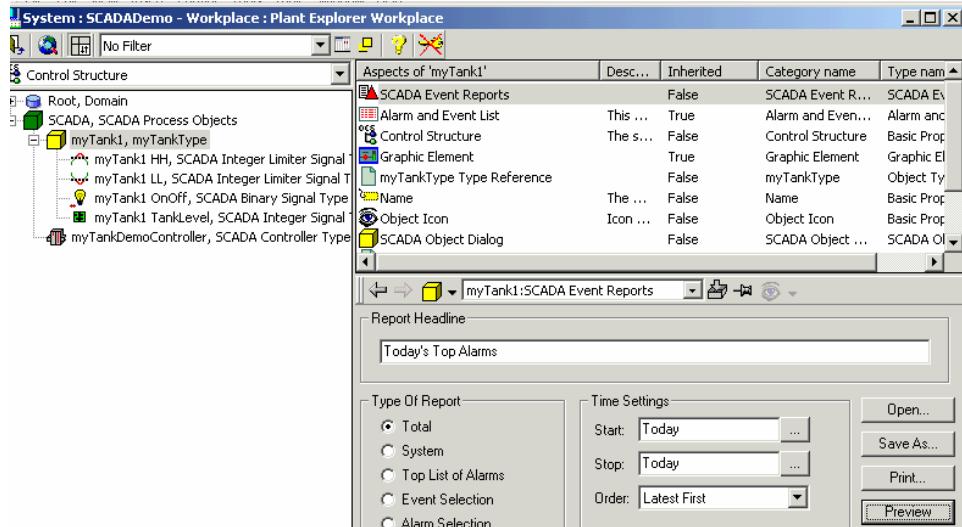
1. Select the title
2. Select what kind of report you want to make
3. Select the time span
4. Select Misc Setting
5. Process Preview, Print or Save As depending on what you want to do

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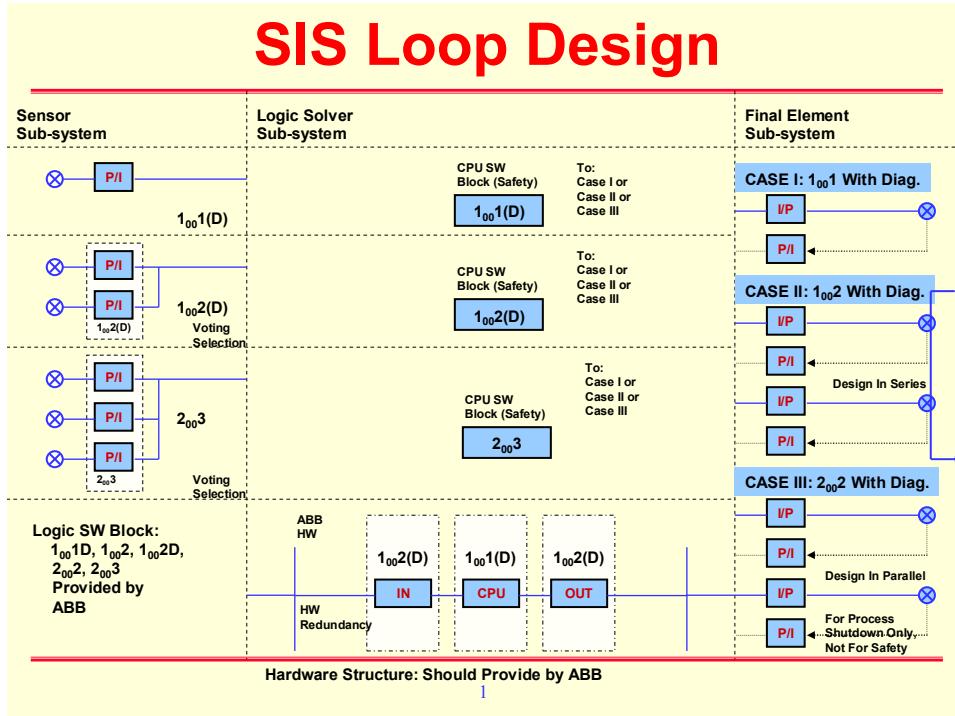


A screen dump of an Event Report.

Event Report		
Preview	200%	1 of 1
Total Report		
Max Number Of Rows: 100		
Total Number Of Rows: 2		
Time Interval: 2002-10-23 00:00:00 To 2002-10-23 23:59:59		
Search string: *		
Priority: 1 - 1000		
Class: 1 - 9999		
Message Time	Ms	Object Name
Comment		
Text		
10/23/2002 1:16:43 AM	10	myTank1 LL
Off -		
10/23/2002 1:16:40 AM	10	myTank1 HH
Off -		

You can also schedule reports, to be run for example every day or hour. Please use the tool Windows Scheduler. For more help on this topic, please see on-line help

附件 8: SIS 迴路設計邏輯說明 - 1oo1D/1oo2D



Truth Table (1)

• 1₀₀₁D for Sensor Subsystem

Case	1	2	9
S1	1	0	x
D1	0	0	1
S/D	1	0	SS
Alarm	1	0	1
Type	A1	---	A1,A5

A1→S/D Alarm; A2→S1 NE S2; A3→D1=1 OR D2=1; A4→D1=1 AND D2=1; A5→D1 EQ 1;
A6→OD1 EQ 1; A7→ OD1=1 OR OD2=1; A8→OD1=1 AND OD2=1; A9→FBER1=1; A10→FBER2=1

Truth Table (2)

- **1₀₀2D for Sensor Subsystem**

Case	1	2	3	4	5	6	7	8	9
S1	1	0	1	0	x	x	1	0	x
D1	0	0	0	0	1	1	0	0	1
S2	1	0	0	1	1	0	x	x	x
D2	0	0	0	0	0	0	1	1	1
S/D	1	0	SS	SS	1	0	1	0	SS
Alarm	1	0	1	1	1	1	1	1	1
Type	A1	---	A1,A2	A1,A2	A1,A3	A3	A1,A3	A3	A1,A4

A1→S/D Alarm; A2→S1 NE S2; A3→D1=1 OR D2=1; A4→D1=1 AND D2=1; A5→D1 EQ 1;
A6→OD1 EQ 1; A7→OD1=1 OR OD2=1; A8→OD1=1 AND OD2=1; A9→FBER1=1; A10→FBER2=1

Final Element Subsystem

- For SIS Loop:
 - SIL=2, Using SIL=2 Certification with Validation or Diagnostic Feedback Devices
 - SIL=1, Using SIL=1 Certification or UAS Devices
 - For Lower STR Loop, Using Validation or Diagnostic Feedback Devices
- 1₀₀1 Diagnostic and/or Validation for Final Element Subsystem

Case	1	2	3	4	5	6	7	8
IN	1	0	1	0	1	0	1	0
FBERR1	0	0	0	0	1	1	1	1
OD1	0	1	1	0	0	1	1	0
S/D	1	0	1	0	1	0	1	0
Alarm	1	1	1	0	1	1	1	0
Type	A1	A6	A1,A6	---	A1,A9	A6,A9	A1,A6, A9	A9

A1→S/D Alarm; A2→S1 NE S2; A3→D1=1 OR D2=1; A4→D1=1 AND D2=1; A5→D1 EQ 1;
A6→OD1 EQ 1; A7→OD1=1 OR OD2=1; A8→OD1=1 AND OD2=1; A9→FBER1=1; A10→FBER2=1

Truth Table

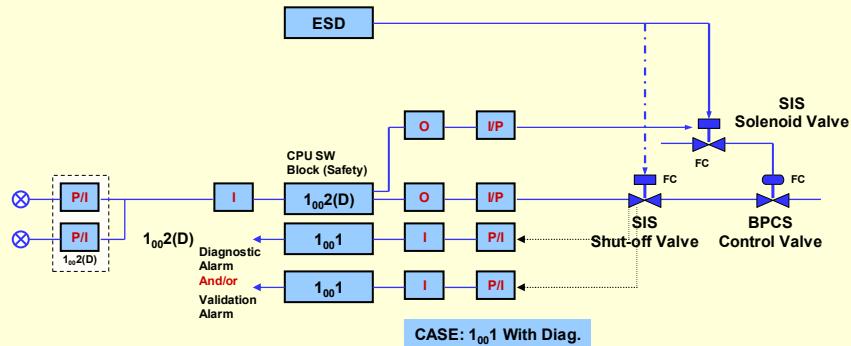
- 1₀₀2D Diagnostic and/or Validation for Final Element Subsystem

Case	1	2
IN	1	0
FBERR1	x	x
FBERR2	x	x
OD1	x	x
OD2	x	x
S/D	1	0
Alarm	1	1
Type	A1,A3~A10	A3~A10

5

Typical Design Example

- SIS Signal Linkage for a Final Element with Diagnostic and Validation Feedback Device



6

附件 9: AC800M HI I/O 模組接線及設定規定

1. AI880/AI880A 參數說明

AI880

- High Integrity Analog Input Module, with redundancy and HART support**

8 channels: 0...20 mA or 4...20 mA
 Alarm limits for over and under range and Device Malfunction high and low may be configured or set to NAMUR values.

Information: This S800 I/O unit is SIL certified. For further information related to the certificate, see the AC800M High Integrity, Safety Manual.

Information: After a controller reset or before download of a new High Integrity I/O configuration, all I/O units have to be reset. This can be done by performing a power-down followed by a power-up for all I/O units.

In the hardware configuration editor you have access to the functions of each unit under the following tabs.

Settings Tab

Parameters	Description
Operational Mode	Set the module for redundant or single operation. The parameter can be set to Single, Hot replacement or Redundant.
Safety Accuracy	For each channel a test value of 50 % of measured value is available for the module. If deviation exceeds the limit, the channel will be marked faulty. If configured to lower value than 1,3%, noise on the measurement input may cause unintended trips. Can be configured to 0,6, 1,3, 1,9, 2,5, 3,1, 3,8, 4,4, or 5,0 (in % of full scale).
HART Mode	Defines restrictions for use of HART communication. The parameter can be set to Full, Read Only or Disabled. Full: All commands are allowed. Read Only: Only standard HART read commands are allowed. Disabled: No HART communication is allowed.
ModuleBus timeout	Sets the time in milliseconds before a module goes to safe state upon loss of ModuleBus communication. Information: Set the timeout to at least 4 times higher than the ModuleBus scan cycle time. A lower setting may cause the backup I/O module to enter Safe State due to ModuleBus timeout. The parameter can be set to 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048 or 4096 ms. Information: In redundant configurations, the standby module is automatically given a ModuleBus timeout time 16 times the configured value.
Activate channel No.	Activate operation and supervision on channel No. on the module. The parameter can be set to True or False.
ISP Control channel No.	Action of channel No. when the unit goes to ISP (Input Set as Predefined) state. The ISP function is activated on channel error. The parameter can be set to Keep Current Value or Use ISP Value.
ISP Value channel No.	Value of channel No. when the unit goes to ISP state and the ISP Control channel No. parameter is set to Use ISP Value. The parameter can be set to a value between 0 and 100%. 0% corresponds to the minimum value of the channel signal range and 100% corresponds to the maximum value of the channel signal range.
Filter time channel No.	Time constant for low-pass filter on channel No. The parameter can be set to: No filtering, 20 ms, 40 ms, 80 ms, 160 ms, 320 ms, 630 ms or 1.24 s.
Signal range channel No.	This parameter is used to change the signal range of the channel No. The parameter can be set to 0-20 mA or 4-20 mA.
Field Power Output Trigger Level ch No.	Trigger value for alarm upon under-voltage on field power output (power delivered to the transmitters). If the limit is passed, the channel is error marked and enters ISP state. The parameter can be set from 15.0 V ?22.0 V in step of 0.5 V.

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Set NAMUR range 3.6,3.8-20.5,21.0 mA ch No.	Limits for over and under range can be set to fixed values according to the NAMUR recommendation NE43, or individually configured. When the parameter is set to True, the following limits are used: Device Malfunction Low: 3.6 mA/0.9 V Under Range: 3.8 mA/0.95 V Over Range: 20.5 mA/5.125 V Device Malfunction High: 21 mA/ 5.35 V
	When the parameter is set to False, the limits can be configured as described below. If one of the device malfunction limits is passed, the channel is error marked and enters ISP state.
	! When the parameter is set to True, the error marking of the channel is delayed with 4 seconds.
Device malfunction low (NAMUR=false) ch No.	If values are not used, the limit can be configured directly by selecting a fixed value in the range of 0.49 mA/0.12 V and 4.00 mA/1.00 V.
Underrange (NAMUR=false) ch No.	If NAMUR values are not used, the limit can be configured directly by selecting a fixed value in the range of 0.49 mA /0.12 V and 4.00 mA/1.00 V.
Overrange (NAMUR=false) ch No.	If NAMUR values are not used, the limit can be configured directly by selecting a fixed value in the range of 20.00 mA/5.00 V and 22.41 mA/5.60 V.
Device malfunction high (NAMUR=false) ch No.	If NAMUR values are not used, the limit can be configured directly by selecting a fixed value in the range of 20.00 mA/5.00 V and 22.41 mA/5.60 V.

Parameter	Value	Type	Unit	Min	Max
Operation Mode	Redundant	enum			
Safety Accuracy	1.9	enum	%		
HART Mode	Read Only	enum			
Modulebus timeout	512	enum	ms		
Activate channel 1	true	bool			
Activate channel 2	true	bool			
Activate channel 3	true	bool			
Activate channel 4	true	bool			
Activate channel 5	true	bool			
Activate channel 6	true	bool			
Activate channel 7	true	bool			
Activate channel 8	true	bool			
Filter time channel 1	No filtering	enum			
Filter time channel 2	No filtering	enum			
Filter time channel 3	No filtering	enum			
Filter time channel 4	No filtering	enum			
Filter time channel 5	No filtering	enum			
Filter time channel 6	No filtering	enum			
Filter time channel 7	No filtering	enum			
Filter time channel 8	No filtering	enum			

Parameter	Value	Type	Unit	Min	Max
Signal range channel 1	4-20mA	enum			
Signal range channel 2	4-20mA	enum			
Signal range channel 3	4-20mA	enum			
Signal range channel 4	4-20mA	enum			
Signal range channel 5	4-20mA	enum			
Signal range channel 6	4-20mA	enum			
Signal range channel 7	4-20mA	enum			
Signal range channel 8	4-20mA	enum			
Field Power Output Trigger Level ch 1	18.5	enum	V		
Field Power Output Trigger Level ch 2	18.5	enum	V		
Field Power Output Trigger Level ch 3	18.5	enum	V		
Field Power Output Trigger Level ch 4	18.5	enum	V		
Field Power Output Trigger Level ch 5	18.5	enum	V		
Field Power Output Trigger Level ch 6	18.5	enum	V		
Field Power Output Trigger Level ch 7	18.5	enum	V		
Field Power Output Trigger Level ch 8	18.5	enum	V		

Hardware - Controller_1.0.11.5 AI880					
Parameter	Value	Type	Unit	Min	Max
Set NAMUR range 3.6,3.8-20.5,21.0 mA ch 1	false	bool			
Set NAMUR range 3.6,3.8-20.5,21.0 mA ch 2	false	bool			
Set NAMUR range 3.6,3.8-20.5,21.0 mA ch 3	false	bool			
Set NAMUR range 3.6,3.8-20.5,21.0 mA ch 4	false	bool			
Set NAMUR range 3.6,3.8-20.5,21.0 mA ch 5	false	bool			
Set NAMUR range 3.6,3.8-20.5,21.0 mA ch 6	false	bool			
Set NAMUR range 3.6,3.8-20.5,21.0 mA ch 7	false	bool			
Set NAMUR range 3.6,3.8-20.5,21.0 mA ch 8	false	bool			
Device malfunction low (NAMUR=false) ch 1	3,64 mA/0,91 V	enum			
Device malfunction low (NAMUR=false) ch 2	3,64 mA/0,91 V	enum			
Device malfunction low (NAMUR=false) ch 3	3,64 mA/0,91 V	enum			
Device malfunction low (NAMUR=false) ch 4	3,64 mA/0,91 V	enum			
Device malfunction low (NAMUR=false) ch 5	3,64 mA/0,91 V	enum			
Device malfunction low (NAMUR=false) ch 6	3,64 mA/0,91 V	enum			
Device malfunction low (NAMUR=false) ch 7	3,64 mA/0,91 V	enum			
Device malfunction low (NAMUR=false) ch 8	3,64 mA/0,91 V	enum			
Settings Connections Properties Status Unit Status					
Row 4, Col 1					

Hardware - Controller_1.0.11.5 AI880					
Parameter	Value	Type	Unit	Min	Max
Underrange (NAMUR=false) ch 1	4,00 mA/1,00 V	enum			
Underrange (NAMUR=false) ch 2	4,00 mA/1,00 V	enum			
Underrange (NAMUR=false) ch 3	4,00 mA/1,00 V	enum			
Underrange (NAMUR=false) ch 4	4,00 mA/1,00 V	enum			
Underrange (NAMUR=false) ch 5	4,00 mA/1,00 V	enum			
Underrange (NAMUR=false) ch 6	4,00 mA/1,00 V	enum			
Underrange (NAMUR=false) ch 7	4,00 mA/1,00 V	enum			
Underrange (NAMUR=false) ch 8	4,00 mA/1,00 V	enum			
OVERRANGE (NAMUR=false) ch 1	20,00 mA/5,00 V	enum			
OVERRANGE (NAMUR=false) ch 2	20,00 mA/5,00 V	enum			
OVERRANGE (NAMUR=false) ch 3	20,00 mA/5,00 V	enum			
OVERRANGE (NAMUR=false) ch 4	20,00 mA/5,00 V	enum			
OVERRANGE (NAMUR=false) ch 5	20,00 mA/5,00 V	enum			
OVERRANGE (NAMUR=false) ch 6	20,00 mA/5,00 V	enum			
OVERRANGE (NAMUR=false) ch 7	20,00 mA/5,00 V	enum			
OVERRANGE (NAMUR=false) ch 8	20,00 mA/5,00 V	enum			
Settings Connections Properties Status Unit Status					
Row 4, Col 1					

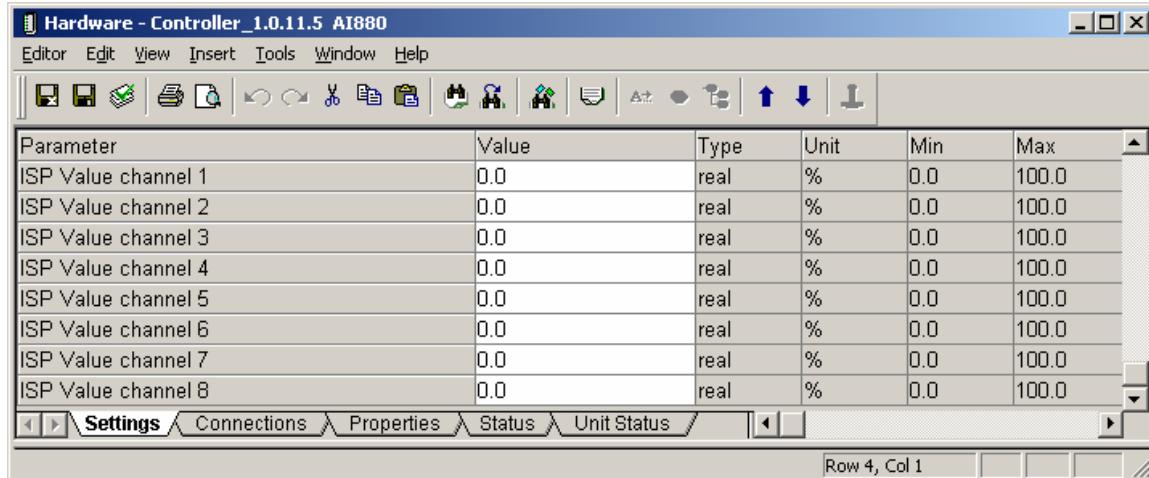
Hardware - Controller_1.0.11.5 AI880					
Parameter	Value	Type	Unit	Min	Max
Device malfunction high (NAMUR=false) ch 1	20,95 mA/5,24 V	enum			
Device malfunction high (NAMUR=false) ch 2	20,95 mA/5,24 V	enum			
Device malfunction high (NAMUR=false) ch 3	20,95 mA/5,24 V	enum			
Device malfunction high (NAMUR=false) ch 4	20,95 mA/5,24 V	enum			
Device malfunction high (NAMUR=false) ch 5	20,95 mA/5,24 V	enum			
Device malfunction high (NAMUR=false) ch 6	20,95 mA/5,24 V	enum			
Device malfunction high (NAMUR=false) ch 7	20,95 mA/5,24 V	enum			
Device malfunction high (NAMUR=false) ch 8	20,95 mA/5,24 V	enum			
ISP Control channel 1	Keep current value	enum			
ISP Control channel 2	Keep current value	enum			
ISP Control channel 3	Keep current value	enum			
ISP Control channel 4	Keep current value	enum			
ISP Control channel 5	Keep current value	enum			
ISP Control channel 6	Keep current value	enum			
ISP Control channel 7	Keep current value	enum			
ISP Control channel 8	Keep current value	enum			
Settings Connections Properties Status Unit Status					
Row 4, Col 1					

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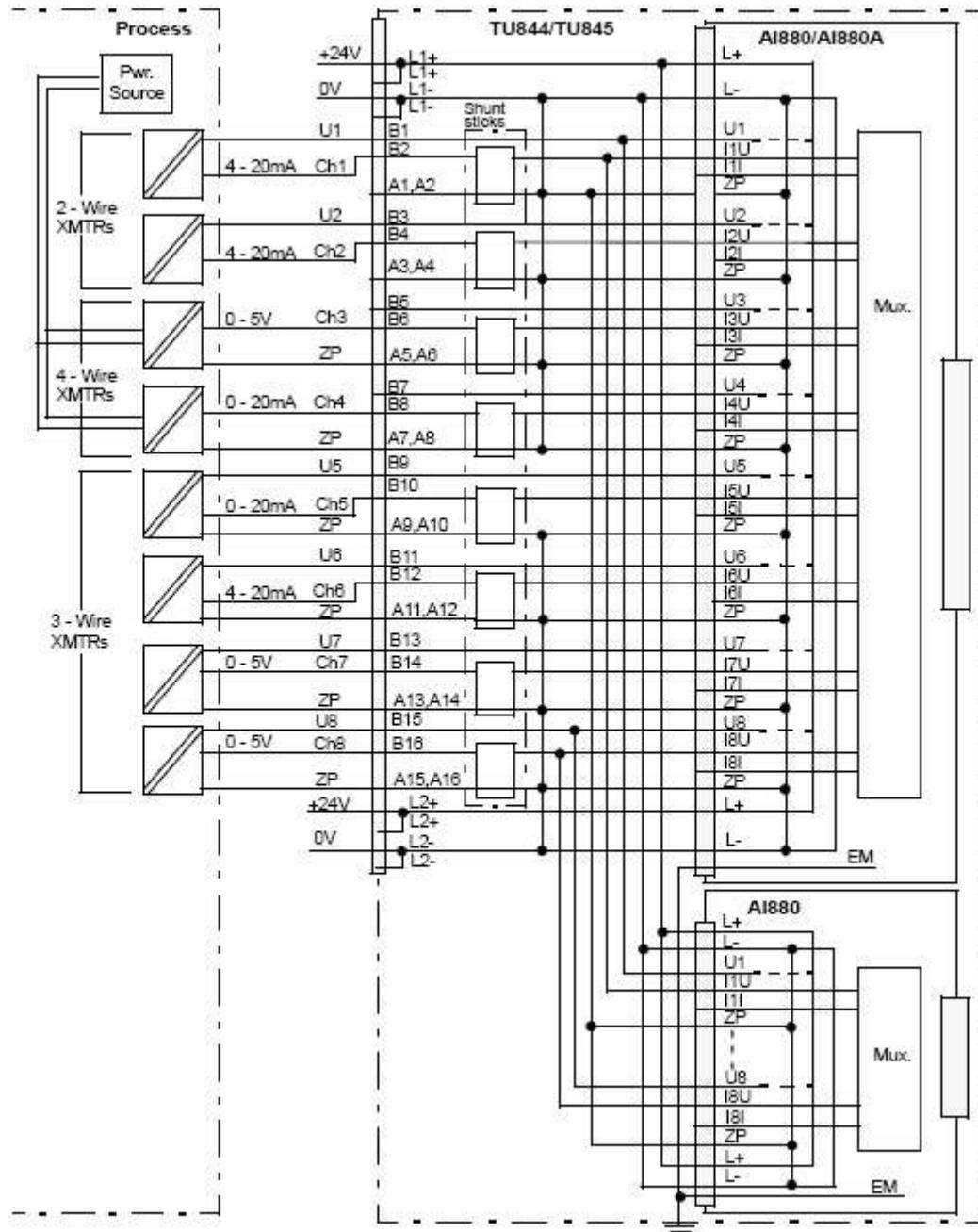


Figure A-29 AI880/AI880A with TU844 or TU845 Redundant MTU Process Connections

2. DI880 參數說明

DI880

- High Integrity Digital Input Module**
24 V, with redundancy support. 16 channels: 24 V DC current sinking. Certified for safety applications for **closed inputs**.

Information: This S800 I/O unit is SIL certified. For further information related to the certificate, see the AC 800M High Integrity, Safety Manual.

Information: After a controller reset or before download of a new High Integrity I/O configuration, all I/O units have to be reset. This can be done by performing a power-down followed by a power-up for all I/O units.

In the hardware configuration editor you have access to the functions of each unit under the following tabs.

Settings Tab	Description
Parameters	Set the module for redundant or single operation. The parameter can be set to Single, Hot replacement or Redundant.
ModuleBus timeout	Sets the time in milliseconds before a module goes to safe state upon loss of ModuleBus communication. Information: Set the timeout to at least 4 times higher than the ModuleBus scan cycle time. A lower setting may cause the backup I/O module to enter Safe State due to ModuleBus timeout. The parameter can be set to 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048 or 4096 ms. Information: In redundant configurations, the standby module is automatically given a ModuleBus timeout time 16 times the configured value.
Activate channel No.	Activate channel No. on the module. The parameter can be set to True or False.
ISP Control channel No.	Action of channel No. when the unit goes to ISP (Input Set as Predefined) state. The ISP function is activated on channel error. The parameter can be set to Keep Current Value or Use ISP Value .
ISP Value channel No.	Value of channel No. when the unit goes to ISP state and the ISP Control channel No. parameter is set to Use ISP Value . The parameter can be set to True or False.
Operation Mode channel No.	Enables or disables Sequence Of Events (SOE) for activated channels. DI+SOE: Sequence of events is enabled DI: Sequence of events is disabled
Filter Time channel No.	The filter time is a parameter that can be used to remove noise. If the filter time is increased the signal must remain longer to break through the filter. The parameter can be set to a value between 0 and 127 ms. It is recommended to set the filter time of the channel greater than the worst case HW fault detection time (36 ms). This enables a glitch free fail over to the redundant module upon an internal fault.
Normal Position channel No.	Value of the input signal during normal operation, related to the SOE function only. Can be set to True or False. False: Normal loop state is open (close for alarm) True: Normal loop state is closed (open for alarm)
Event Block channel No.	Temporary blocking of events. False: Events are not blocked True: Events are blocked
Shutter filter (no of changes) channel No.	For all channels with enabled SOE capability, a shutter filter is implemented that prevents intermediate storage for events from overflow. The shutter filter is closed as soon as the number of events generated within the "shutter filter period" exceeds the shutter filter (no of changes) . The shutter filter remains closed as long as the Shutter filter recovery time has not expired. Number of changes of the input within a Shutter Filter Period time before the shutter filter is activated. The parameter can be set to a value between 1 and 255 changes.
Shutter filter period time channel No.	Measurement time window for the shutter filter. The parameter can be set to a value between 1 and 255 seconds (second resolution).
Shutter filter rec. time channel No.	Recovery time after event generation is blocked upon bursts or noise on the input. The parameter can be set to a value between 0 and 65535 s, there 0 means deactivated shutter filter.

Hardware - Controller_1.0.11.6 DI880

Parameter	Value	Type	Unit	Min	Max
Operation Mode	Redundant	enum			
Modulebus timeout	512	enum	ms		
Activate channel 1	true	bool			
Activate channel 2	true	bool			
Activate channel 3	true	bool			
Activate channel 4	true	bool			
Activate channel 5	true	bool			
Activate channel 6	true	bool			
Activate channel 7	true	bool			
Activate channel 8	true	bool			
Activate channel 9	true	bool			
Activate channel 10	true	bool			
Activate channel 11	true	bool			
Activate channel 12	true	bool			
Activate channel 13	true	bool			
Activate channel 14	true	bool			
Activate channel 15	true	bool			
Activate channel 16	true	bool			

Hardware - Controller_1.0.11.6 DI880

Parameter	Value	Type	Unit	Min	Max
Operation mode channel 1	DI	enum			
Operation mode channel 2	DI	enum			
Operation mode channel 3	DI	enum			
Operation mode channel 4	DI	enum			
Operation mode channel 5	DI	enum			
Operation mode channel 6	DI	enum			
Operation mode channel 7	DI	enum			
Operation mode channel 8	DI	enum			
Operation mode channel 9	DI	enum			
Operation mode channel 10	DI	enum			
Operation mode channel 11	DI	enum			
Operation mode channel 12	DI	enum			
Operation mode channel 13	DI	enum			
Operation mode channel 14	DI	enum			
Operation mode channel 15	DI	enum			
Operation mode channel 16	DI	enum			

Hardware - Controller_1.0.11.6 DI880

Parameter	Value	Type	Unit	Min	Max
Filter time channel 1	50	dint	ms	0	127
Filter time channel 2	50	dint	ms	0	127
Filter time channel 3	50	dint	ms	0	127
Filter time channel 4	50	dint	ms	0	127
Filter time channel 5	50	dint	ms	0	127
Filter time channel 6	50	dint	ms	0	127
Filter time channel 7	50	dint	ms	0	127
Filter time channel 8	50	dint	ms	0	127
Filter time channel 9	50	dint	ms	0	127
Filter time channel 10	50	dint	ms	0	127
Filter time channel 11	50	dint	ms	0	127
Filter time channel 12	50	dint	ms	0	127
Filter time channel 13	50	dint	ms	0	127
Filter time channel 14	50	dint	ms	0	127
Filter time channel 15	50	dint	ms	0	127
Filter time channel 16	50	dint	ms	0	127



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Parameter	Value	Type	Unit	Min	Max
Normal position channel 1	true	bool			
Normal position channel 2	true	bool			
Normal position channel 3	true	bool			
Normal position channel 4	true	bool			
Normal position channel 5	true	bool			
Normal position channel 6	true	bool			
Normal position channel 7	true	bool			
Normal position channel 8	true	bool			
Normal position channel 9	true	bool			
Normal position channel 10	true	bool			
Normal position channel 11	true	bool			
Normal position channel 12	true	bool			
Normal position channel 13	true	bool			
Normal position channel 14	true	bool			
Normal position channel 15	true	bool			
Normal position channel 16	true	bool			

Parameter	Value	Type	Unit	Min	Max
Event block channel 1	false	bool			
Event block channel 2	false	bool			
Event block channel 3	false	bool			
Event block channel 4	false	bool			
Event block channel 5	false	bool			
Event block channel 6	false	bool			
Event block channel 7	false	bool			
Event block channel 8	false	bool			
Event block channel 9	false	bool			
Event block channel 10	false	bool			
Event block channel 11	false	bool			
Event block channel 12	false	bool			
Event block channel 13	false	bool			
Event block channel 14	false	bool			
Event block channel 15	false	bool			
Event block channel 16	false	bool			

Parameter	Value	Type	Unit	Min	Max
Shutter filter nof ch 1	4	dint		1	255
Shutter filter nof ch 2	4	dint		1	255
Shutter filter nof ch 3	4	dint		1	255
Shutter filter nof ch 4	4	dint		1	255
Shutter filter nof ch 5	4	dint		1	255
Shutter filter nof ch 6	4	dint		1	255
Shutter filter nof ch 7	4	dint		1	255
Shutter filter nof ch 8	4	dint		1	255
Shutter filter nof ch 9	4	dint		1	255
Shutter filter nof ch 10	4	dint		1	255
Shutter filter nof ch 11	4	dint		1	255
Shutter filter nof ch 12	4	dint		1	255
Shutter filter nof ch 13	4	dint		1	255
Shutter filter nof ch 14	4	dint		1	255
Shutter filter nof ch 15	4	dint		1	255
Shutter filter nof ch 16	4	dint		1	255

Hardware - Controller_1.0.11.6 DI880

Parameter	Value	Type	Unit	Min	Max
Shutter filter period time ch 1	2	dint	sec	1	255
Shutter filter period time ch 2	2	dint	sec	1	255
Shutter filter period time ch 3	2	dint	sec	1	255
Shutter filter period time ch 4	2	dint	sec	1	255
Shutter filter period time ch 5	2	dint	sec	1	255
Shutter filter period time ch 6	2	dint	sec	1	255
Shutter filter period time ch 7	2	dint	sec	1	255
Shutter filter period time ch 8	2	dint	sec	1	255
Shutter filter period time ch 9	2	dint	sec	1	255
Shutter filter period time ch 10	2	dint	sec	1	255
Shutter filter period time ch 11	2	dint	sec	1	255
Shutter filter period time ch 12	2	dint	sec	1	255
Shutter filter period time ch 13	2	dint	sec	1	255
Shutter filter period time ch 14	2	dint	sec	1	255
Shutter filter period time ch 15	2	dint	sec	1	255
Shutter filter period time ch 16	2	dint	sec	1	255

Hardware - Controller_1.0.11.6 DI880

Parameter	Value	Type	Unit	Min	Max
Shutter filter rec. time ch 1	0	dint	sec	0	65535
Shutter filter rec. time ch 2	0	dint	sec	0	65535
Shutter filter rec. time ch 3	0	dint	sec	0	65535
Shutter filter rec. time ch 4	0	dint	sec	0	65535
Shutter filter rec. time ch 5	0	dint	sec	0	65535
Shutter filter rec. time ch 6	0	dint	sec	0	65535
Shutter filter rec. time ch 7	0	dint	sec	0	65535
Shutter filter rec. time ch 8	0	dint	sec	0	65535
Shutter filter rec. time ch 9	0	dint	sec	0	65535
Shutter filter rec. time ch 10	0	dint	sec	0	65535
Shutter filter rec. time ch 11	0	dint	sec	0	65535
Shutter filter rec. time ch 12	0	dint	sec	0	65535
Shutter filter rec. time ch 13	0	dint	sec	0	65535
Shutter filter rec. time ch 14	0	dint	sec	0	65535
Shutter filter rec. time ch 15	0	dint	sec	0	65535
Shutter filter rec. time ch 16	0	dint	sec	0	65535

Hardware - Controller_1.0.11.6 DI880

Parameter	Value	Type	Unit	Min	Max
ISP Control channel 1	Keep current value	enum			
ISP Control channel 2	Keep current value	enum			
ISP Control channel 3	Keep current value	enum			
ISP Control channel 4	Keep current value	enum			
ISP Control channel 5	Keep current value	enum			
ISP Control channel 6	Keep current value	enum			
ISP Control channel 7	Keep current value	enum			
ISP Control channel 8	Keep current value	enum			
ISP Control channel 9	Keep current value	enum			
ISP Control channel 10	Keep current value	enum			
ISP Control channel 11	Keep current value	enum			
ISP Control channel 12	Keep current value	enum			
ISP Control channel 13	Keep current value	enum			
ISP Control channel 14	Keep current value	enum			
ISP Control channel 15	Keep current value	enum			
ISP Control channel 16	Keep current value	enum			



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Hardware - Controller_1.0.11.6 DI880					
Parameter	Value	Type	Unit	Min	Max
ISP Value channel 1	false	bool			
ISP Value channel 2	false	bool			
ISP Value channel 3	false	bool			
ISP Value channel 4	false	bool			
ISP Value channel 5	false	bool			
ISP Value channel 6	false	bool			
ISP Value channel 7	false	bool			
ISP Value channel 8	false	bool			
ISP Value channel 9	false	bool			
ISP Value channel 10	false	bool			
ISP Value channel 11	false	bool			
ISP Value channel 12	false	bool			
ISP Value channel 13	false	bool			
ISP Value channel 14	false	bool			
ISP Value channel 15	false	bool			
ISP Value channel 16	false	bool			



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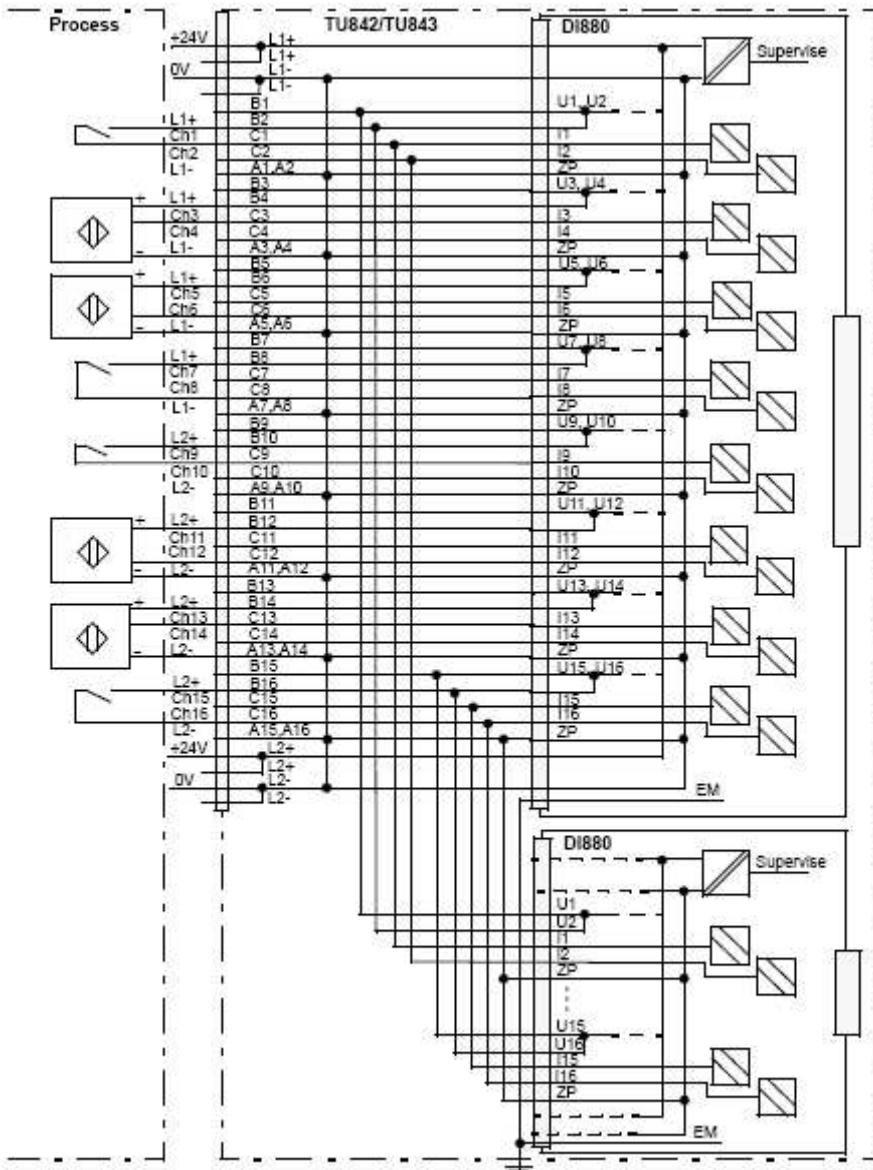


Figure A-79 DI880 with TU842 or TU843 Redundant MTU Process Connections

3. D0880 參數說明

DO880

- High Integrity Digital Output Module**
24 V, with redundancy support. 16 channels: 24 V DC current source.

 This S800 I/O unit is SIL certified. For further information related to the certificate, see the AC 800M High Integrity, Safety [Manual](#).

 After a controller reset or before download of a new High Integrity I/O configuration, all I/O units have to be reset. This can be done by performing a power-down followed by a power-up for all I/O units.

In the hardware configuration editor you have access to the functions of each unit under the following tabs.

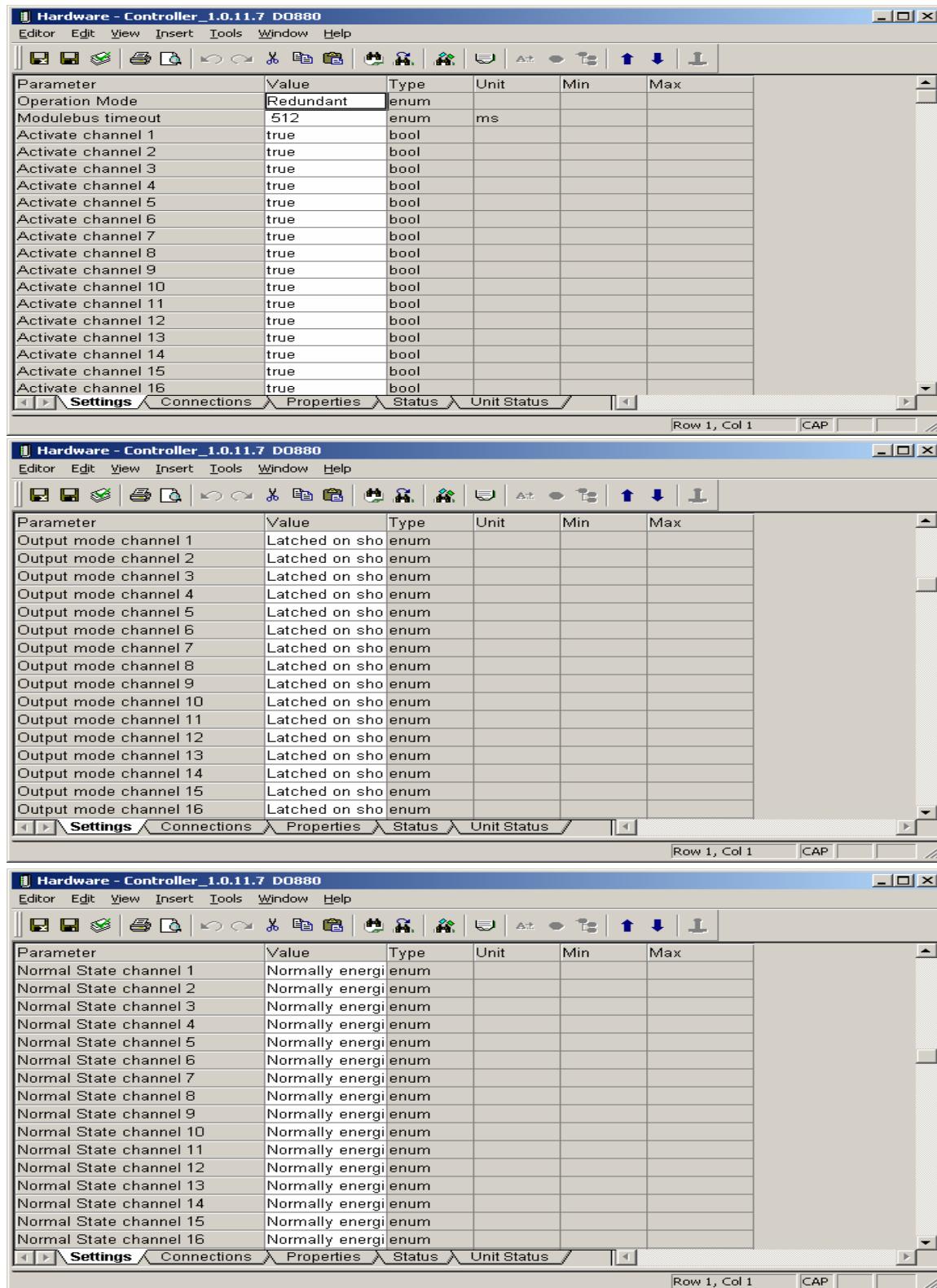
Settings Tab	
Parameters	Description
Operational Mode	Set the module for redundant or single operation. The parameter can be set to Single, Hot replacement or Redundant.
ModuleBus timeout	Sets the time in milliseconds before a module goes to safe state upon loss of ModuleBus communication. The parameter can be set to 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048 or 4096 ms.  Set the timeout to at least 4 times higher than the ModuleBus scan cycle time. A lower setting may cause the backup I/O module to enter Safe State due to ModuleBus timeout.
Activate channel No.	Activate channel No. on the module. The parameter can be set to True or False. (For deactivated channels, loop supervision is not active).  All channels that are not connected to a variable must be set to False (deactivated). A hot inserted SM810 will not be able to synchronize if channels, that are not connected to a variable, are set to True.
Output mode channel No.	The outputs are short-circuit proof, that is, if a short-circuit occurs in the field loop, the output is switched off. The behavior of the output when the short-circuit is removed is determined by this parameter. The parameter can be set to <i>automatic reset mode</i> or <i>latch on short mode</i> . <i>Latch on short mode</i> : operator (or application) must force the output low to reset the fault. <i>Automatic reset</i> : the output will reset when the fault is removed.
Normal State channel No.	Defines the channel behavior upon detection of a channel fault: <ul style="list-style-type: none"> Normally energized (NE), de-energize to trip: Will be de-energized upon an internal channel error. Normally de-energized (ND) energize to trip: Will follow the status received from the controller upon an internal channel error. Continuous Control (CC): Same behavior as ND. For all output types, safe state is defined as de-energize, that is, upon fatal errors (as CPU or power failure, loss of contact with controller), all outputs will be de-energized.
Trig limit open energized channel No.	When the output is energized, the supplied current to the loop is measured and compared with the <i>Trig limit open energized</i> . If the measured current is lower than the defined limit the channel is error marked. The parameter can be set to 0, 5, 10, 20, 40, 80, 120 or 160 mA. If the output module operates in a redundant configuration, the two modules shares the load. This must be considered when configuring the limits.
Trig limit short energized channel No.	When the output is energized, the supplied current to the loop is measured and compared with the <i>Trig limit short energized</i> . If the measured current is higher than the defined limit the channel is error marked. The parameter can be set to: 100, 200, 300, 400, 500 or 600 mA. If the output module operates in a redundant configuration, the two modules shares the load. This must be considered when configuring the limits.
Trig limit open de-energized channel No.	When the output is de-energized, the field loop resistance is measured and compared with the <i>Trig limit open de energized</i> . If the measured resistance is higher than the defined limit the channel is error marked. The parameter can be set to: 100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1500, 2000 or >2000 ohm.
Trig limit short de-energized channel No.	When the output is de-energized, the field loop resistance is measured and compared with the <i>Trig limit short de-energized</i> . If the measured resistance is lower than the defined limit the channel is error marked. The parameter can be set to: 0, 10, 20, 30, 40, 50, 100, 200, 300 or 400 ohm.

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The image displays three separate windows of the Rexchip Controller software, all titled "Hardware - Controller_1.0.11.7 DO880". Each window shows a table of parameters for a specific module type (DO880). The windows are arranged vertically.

Top Window (Parameter List):

Parameter	Value	Type	Unit	Min	Max
Operation Mode	Redundant	enum			
Modulebus timeout	512	enum	ms		
Activate channel 1	true	bool			
Activate channel 2	true	bool			
Activate channel 3	true	bool			
Activate channel 4	true	bool			
Activate channel 5	true	bool			
Activate channel 6	true	bool			
Activate channel 7	true	bool			
Activate channel 8	true	bool			
Activate channel 9	true	bool			
Activate channel 10	true	bool			
Activate channel 11	true	bool			
Activate channel 12	true	bool			
Activate channel 13	true	bool			
Activate channel 14	true	bool			
Activate channel 15	true	bool			
Activate channel 16	true	bool			

Middle Window (Output Mode List):

Parameter	Value	Type	Unit	Min	Max
Output mode channel 1	Latched on sho	enum			
Output mode channel 2	Latched on sho	enum			
Output mode channel 3	Latched on sho	enum			
Output mode channel 4	Latched on sho	enum			
Output mode channel 5	Latched on sho	enum			
Output mode channel 6	Latched on sho	enum			
Output mode channel 7	Latched on sho	enum			
Output mode channel 8	Latched on sho	enum			
Output mode channel 9	Latched on sho	enum			
Output mode channel 10	Latched on sho	enum			
Output mode channel 11	Latched on sho	enum			
Output mode channel 12	Latched on sho	enum			
Output mode channel 13	Latched on sho	enum			
Output mode channel 14	Latched on sho	enum			
Output mode channel 15	Latched on sho	enum			
Output mode channel 16	Latched on sho	enum			

Bottom Window (Normal State List):

Parameter	Value	Type	Unit	Min	Max
Normal State channel 1	Normally energi	enum			
Normal State channel 2	Normally energi	enum			
Normal State channel 3	Normally energi	enum			
Normal State channel 4	Normally energi	enum			
Normal State channel 5	Normally energi	enum			
Normal State channel 6	Normally energi	enum			
Normal State channel 7	Normally energi	enum			
Normal State channel 8	Normally energi	enum			
Normal State channel 9	Normally energi	enum			
Normal State channel 10	Normally energi	enum			
Normal State channel 11	Normally energi	enum			
Normal State channel 12	Normally energi	enum			
Normal State channel 13	Normally energi	enum			
Normal State channel 14	Normally energi	enum			
Normal State channel 15	Normally energi	enum			
Normal State channel 16	Normally energi	enum			



Rexchip

瑞晶電子股份有限公司
Rexchip Electronics Corp.

機密等級

一 般

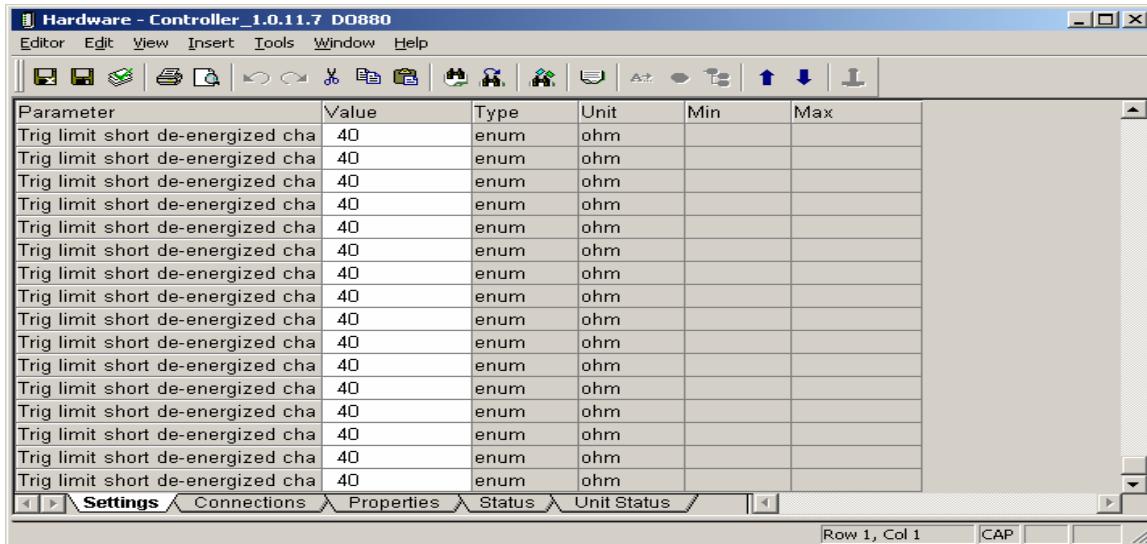
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Parameter	Value	Type	Unit	Min	Max
Trig limit open energized channel 1	5	enum	mA		
Trig limit open energized channel 2	5	enum	mA		
Trig limit open energized channel 3	5	enum	mA		
Trig limit open energized channel 4	5	enum	mA		
Trig limit open energized channel 5	5	enum	mA		
Trig limit open energized channel 6	5	enum	mA		
Trig limit open energized channel 7	5	enum	mA		
Trig limit open energized channel 8	5	enum	mA		
Trig limit open energized channel 9	5	enum	mA		
Trig limit open energized channel 10	5	enum	mA		
Trig limit open energized channel 11	5	enum	mA		
Trig limit open energized channel 12	5	enum	mA		
Trig limit open energized channel 13	5	enum	mA		
Trig limit open energized channel 14	5	enum	mA		
Trig limit open energized channel 15	5	enum	mA		
Trig limit open energized channel 16	5	enum	mA		



- 參數 Activate Channel 之設定，未使用之 Channel（亦即未設定變數之 Channel），必須設定為 False 。
- 參數 Normal State Channel 之設定，必須設定為 NE (Normal Energized)，因為前面章節已要求本廠設計為 DeEnergized to trip，承商必須充分了解承商所設計規劃之控制迴路及程式邏輯，並無抵觸安全設計之原則 。



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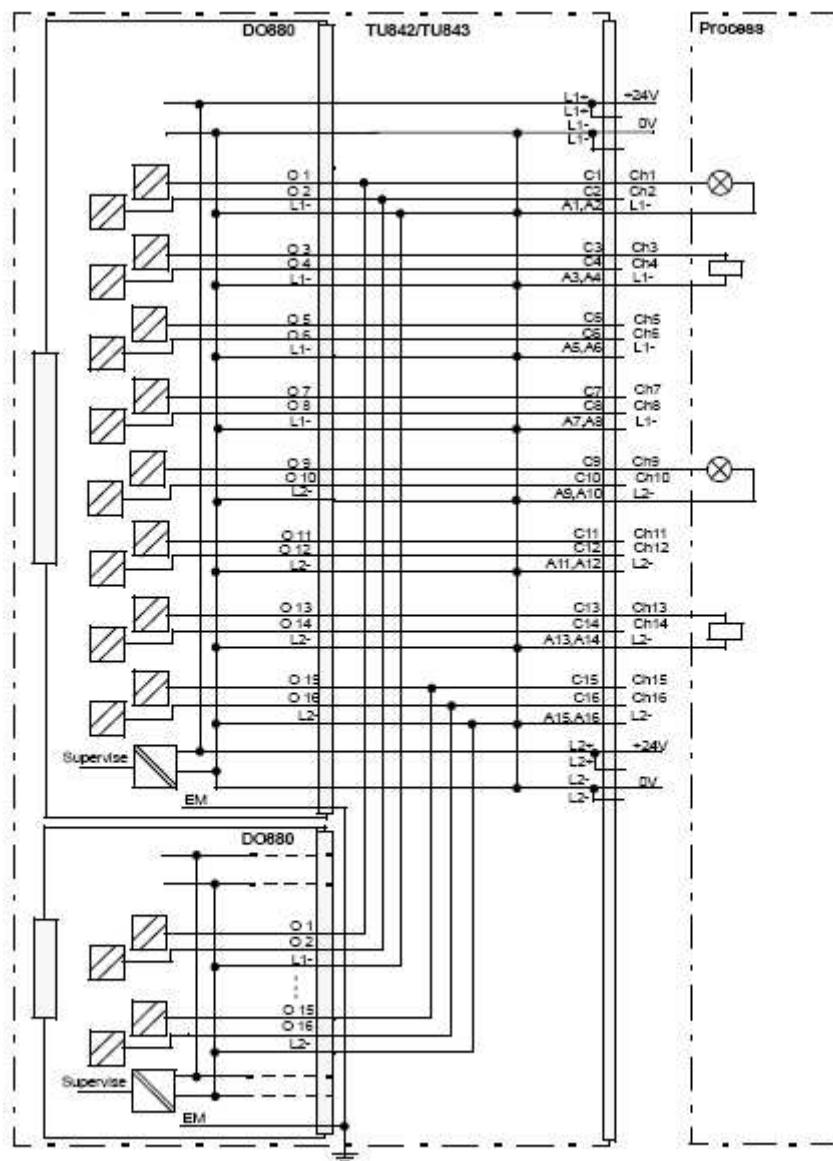


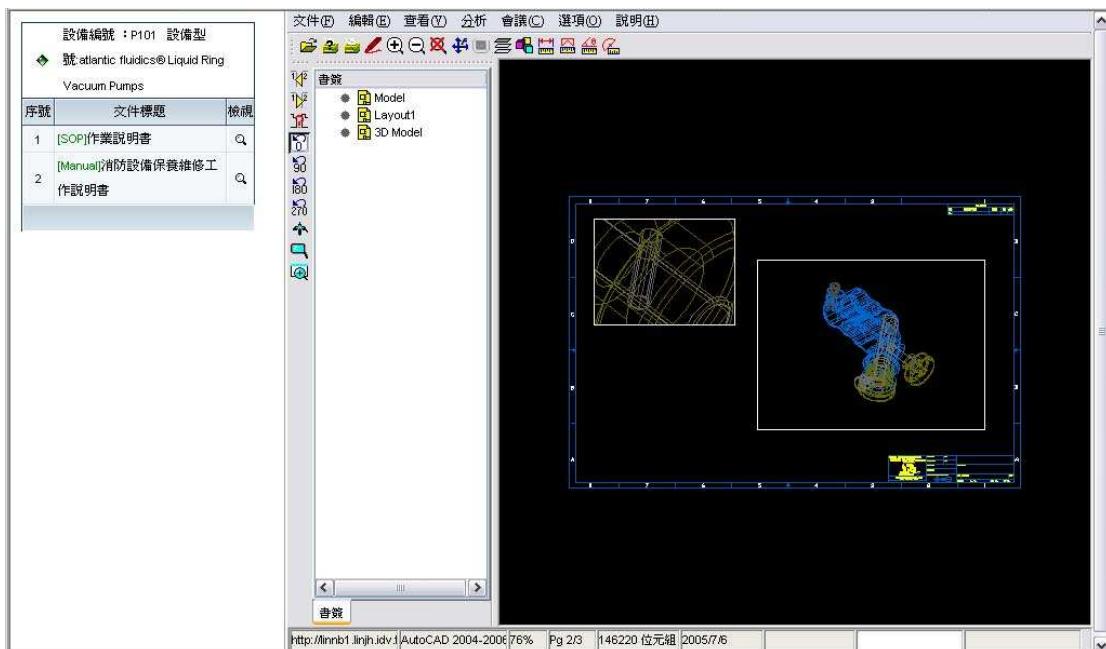
Figure A-111 DO880 with TU842 or TU843 Redundant MTU Process Connections

附件 10： FMCS 與 EDMS 整合說明

FMCS 及 EDMS 整合說明

從 FMCS 連結

當在 FMCS 操作畫面上，在任一設備按滑鼠右鍵時，右鍵功能表會有“相關文件”的功能項，點選後，會彈出一個 IE 視窗，左側顯示該設備相關的文件的列表，右側則啓動 AutoVue ，當點選某份文件時，即可透過右側的 AutoVue 內檢視該份文件的內容。



文件與資料建置及維護

透過 FMCS 只能檢視相關的文件，文件的新增及進版則要登入 EDMS 中才可以進行。

文件的新增分為二種方式：整批新增及單筆新增

文件的新增—整批新增

整批新增需要先建立一份對照檔，這份對照檔是一個 Excel 檔案，格式如下圖

設備編號	設備型號	文件類型	檔案路徑
P101		P & ID	/P & ID/8323AA20.DWG
P101		P & ID	/P & ID/8323A701.DWG
	atlantic fluidics® Liquid Ring Vacuum Pumps	型錄	/型錄/Pump.pdf
	atlantic fluidics® Liquid Ring Vacuum Pumps	作業手冊	/作業手冊/檢修程序檢查表.doc

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如果該份文件是只對照的單一設備的，請填入該設備的設備編號，如果該份文件是對照到某個型號的所有設備，則請填入設備型號。

建立這份對照檔後，連同原始檔案再透過 EDMS 整批的匯入進系統。

◆ 文件批次匯入		<input checked="" type="checkbox"/> 確定 <input type="checkbox"/> 取消
選取工程專案	FMCS	<input type="button" value="選取"/>
路徑		
文件屬性資料檔		

這時 EDMS 會將這些檔案匯入進 EDMS 系統中，同時將這些檔案與設備的編號或型號建立好關連。將來從 FMCS 查詢這些設備的相關文件時，就可以顯示這些檔案供檢視。

文件的新增—單筆新增

要單筆新增設備的文件時，要先進入 EDMS，然後透過查詢設備關連文件的方式，先找到要新增的文件所屬的設備文件列表



The screenshot shows the EDMS interface. On the left is a tree view of project files under '示範用專案'. The main area has a search bar at the top with '全部的工程專案' selected. Below it is a table titled '工程專案內容' with columns for '工程專案代碼' (DEMO), '工程專案名稱' (示範用專案), '工程專案類別' (工作中), '狀態' (正常), '契約編號', '契約名稱', '業主', and '地點'. A red dashed circle highlights the '工程專案名稱' column. At the bottom of the table, there are statistics: '文件數 (30)', '文件各版本總檔案數 (33)', and '總檔案大小 (38387.2 KB)'. The footer of the window says '©Airflex Corporation, 2004'.

透過設備編號或設備型號找到相關的文件列表

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再選取新增文件，則可以新增與該設備編號或設備型號相關的文件



文件的改版

當文件要進行修改時，必須遵循 EDMS 文件修改的程序，進行簽出修改及修改完成簽入的動作，每次簽入時就會進一個新的版本。

當透過 FMCS 檢視文件時，永遠只檢視最新版本的文件。如果要檢視歷史版本的文件，則要透過 EDMS 來操作。

文件與設備的關連維護

在任一份文件的屬性頁面中，會增加一個“關連設備”的功能連結，點選後可以在這裏新增或編輯這份文件與那些設備有關連。



FMCS 與 EDMS 整合表格:

設備編號	設備型號	文件類型	檔案路徑
P101		P & ID	/P & ID/8323AA20.DWG
P101	atlantic fluidics® Liquid Ring Vacuum Pumps	型錄	/Catalog/Pump.pdf
	atlantic fluidics® Liquid Ring Vacuum Pumps		/Manual/檢修程序檢查
		作業手冊	表.doc

附件 11： 系統 800xA 中文模式施作方式

中文模式施做方式分為兩階段。

第一階段：[Graphic Display](#) 的中文。

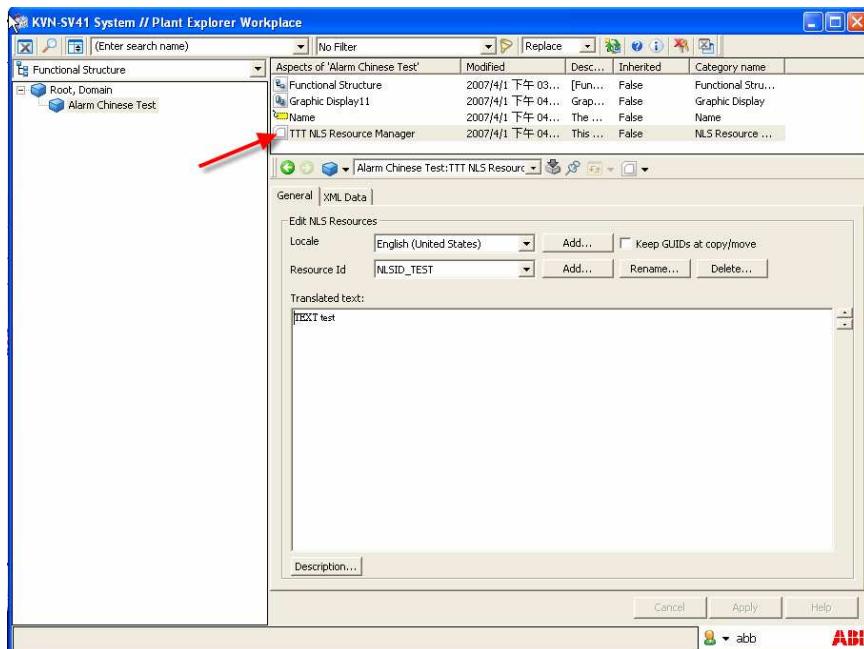
[Faceplate](#) 上 Description 的中文。

[Alarm and Event List](#) 的 Object Description 的中文。

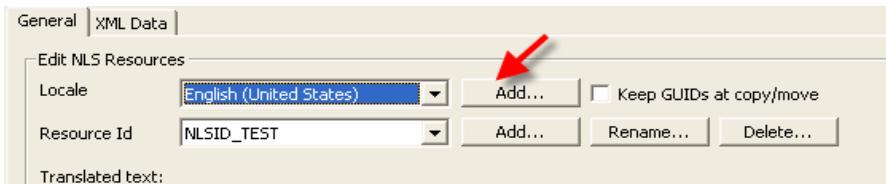
第二階段：當程式完成度 100% 時，此時可以開始針對 REXCHIPLib 中的 Msg Description 做中文的處理。此部分是為了避免有 Vendor 在純中文的環境化增加 Aspect or Aspect Object，造成該 Vendor 的 Aspect 出現中英版本不同的情形，造成維護單位的困擾。

Graphic Display 第一階段 <a>

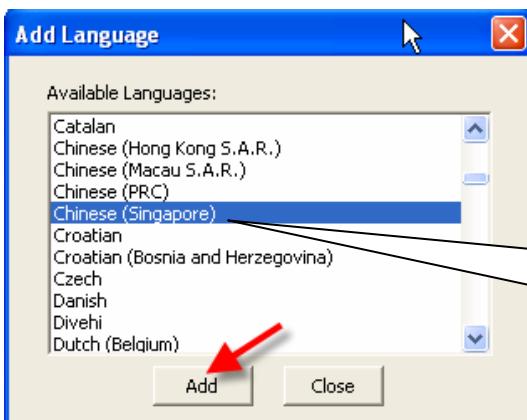
1.Create an aspect [NLS Resource Manager] to define a translate table in Function Structure.



2.New a Locale



Choose Chinese (Taiwan)



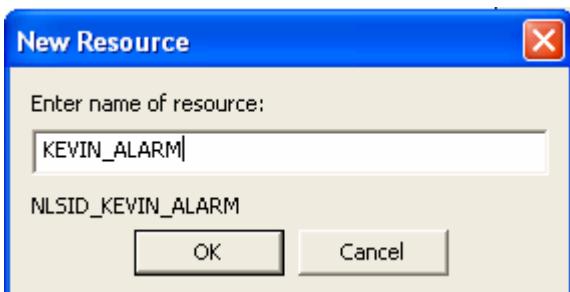
★

注意：
請選擇 Chinese(Taiwan)
圖面僅供參考

3.Add new resource ID .



4.Enter the name of Recource



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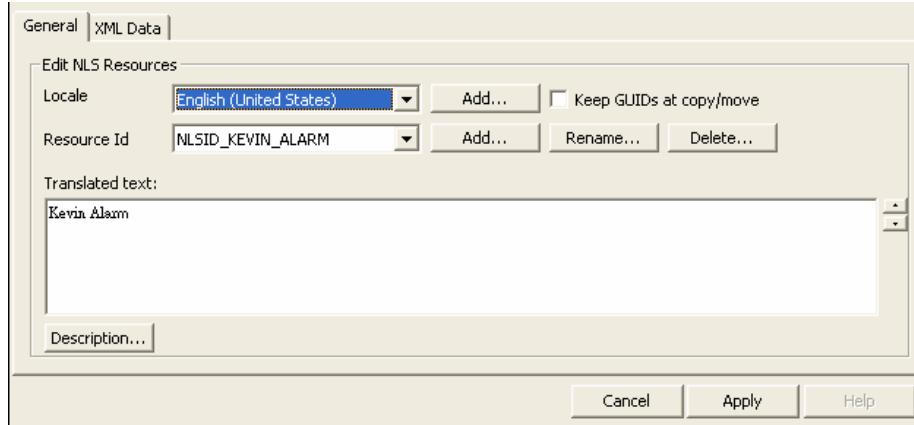
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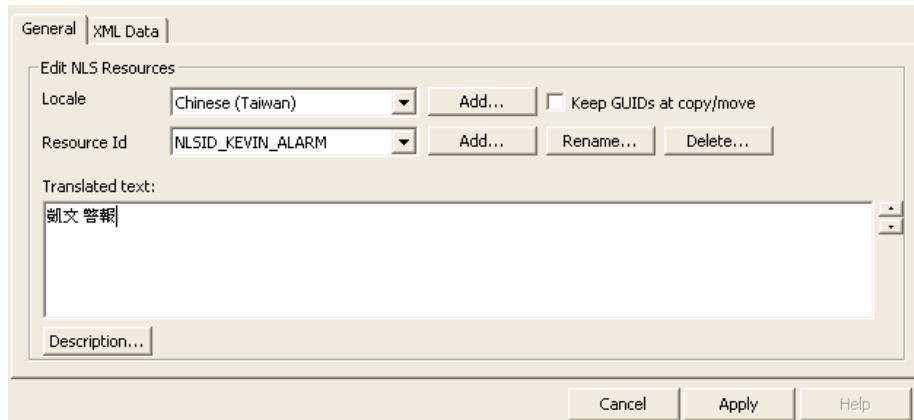
5. Define Translated text in English and Chinese.

English



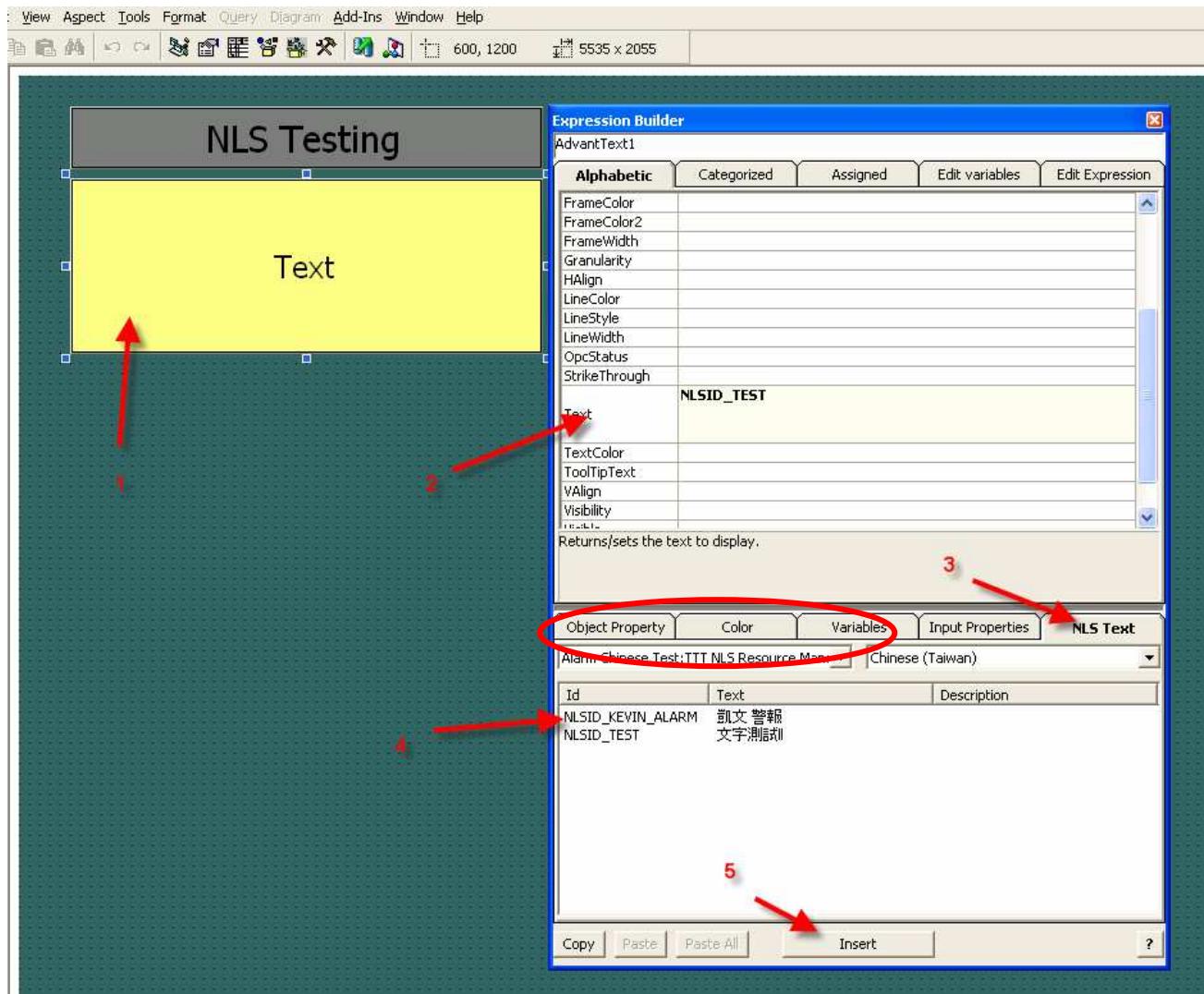
The screenshot shows the 'Edit NLS Resources' dialog for the English (United States) locale. It includes fields for Locale (selected), Resource Id (NLSID_KEVIN_ALARM), and a large text area for Translated text containing the entry 'Kevin Alarm'. Buttons at the bottom include Cancel, Apply, and Help.

Chinese

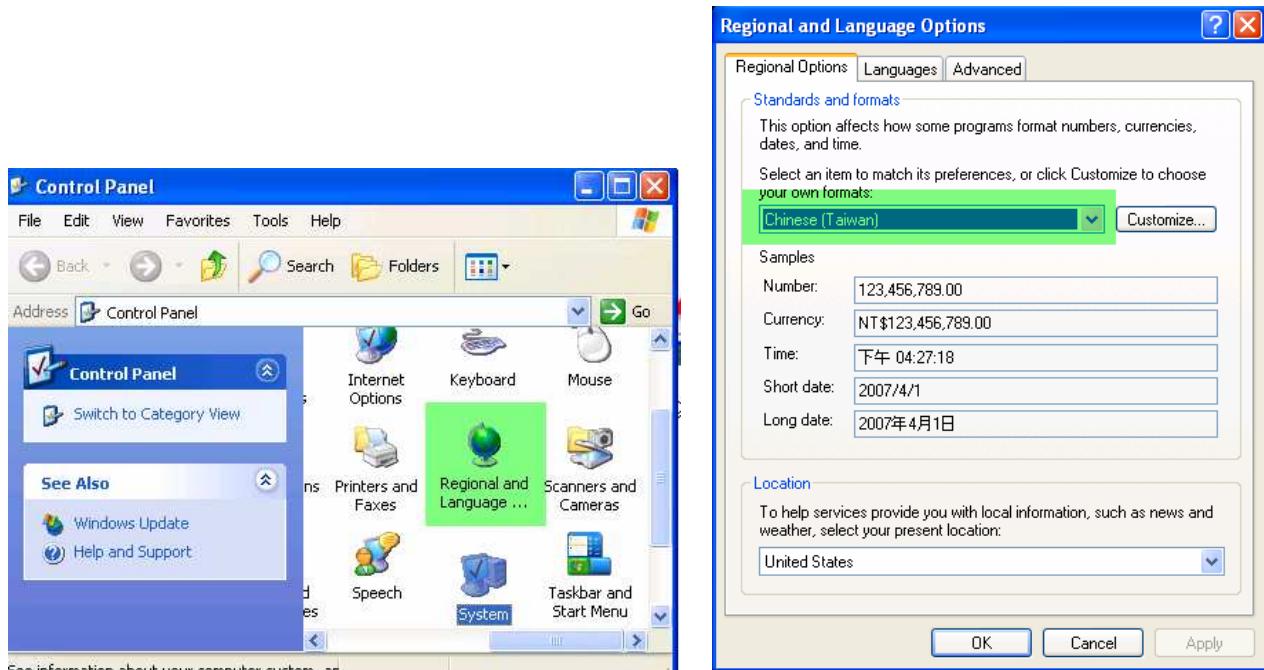


The screenshot shows the 'Edit NLS Resources' dialog for the Chinese (Taiwan) locale. It includes fields for Locale (selected), Resource Id (NLSID_KEVIN_ALARM), and a large text area for Translated text containing the entry '凱文 警報'. Buttons at the bottom include Cancel, Apply, and Help.

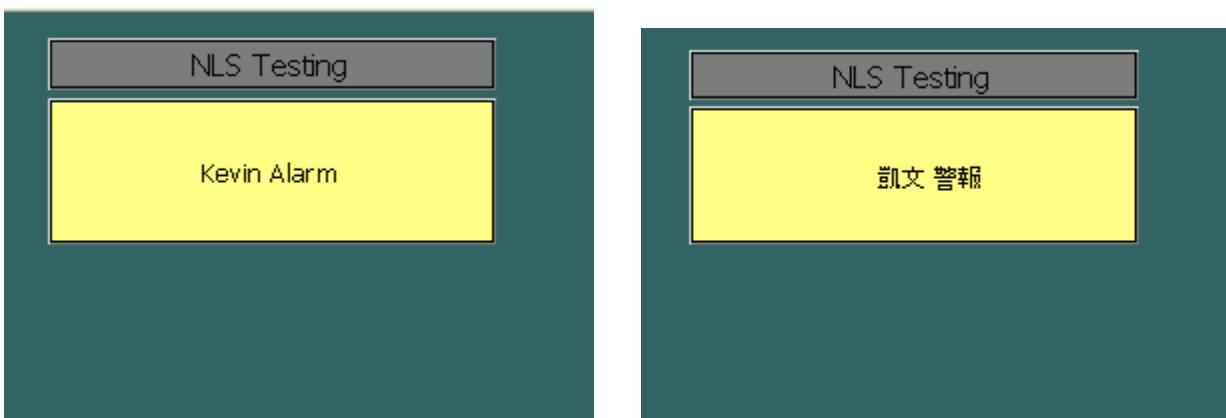
6. Use NLS Resource Manager in Graphic Display



7.NLS Resource Manager is working now, we can change Regional and Language Option location setting to test NLS working status.



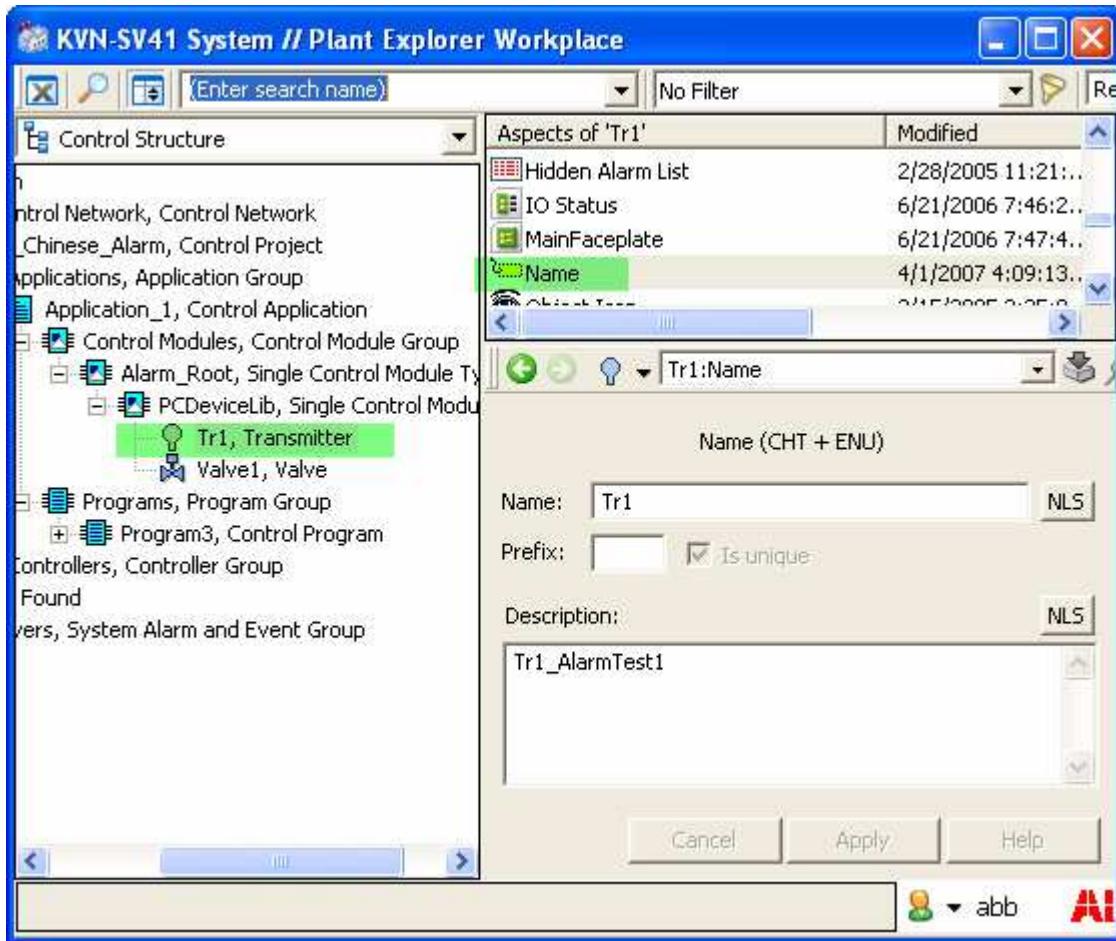
After change locale setting, you may need restart plant explorer or Operator Workplace



Alarm List and Description 第一階段 and <c>

You can define Chinese in Object Description alarm list

- 1. You need define Language translate Table at [Name] Aspect in Control Structure.**



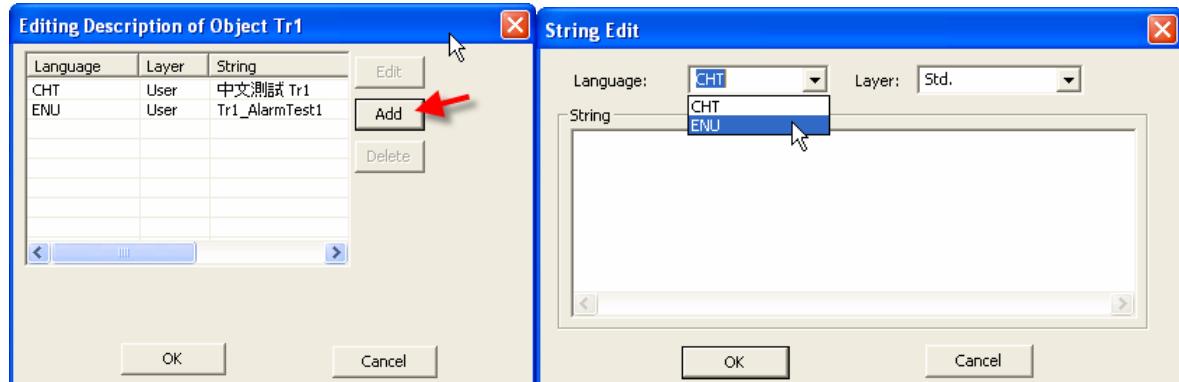
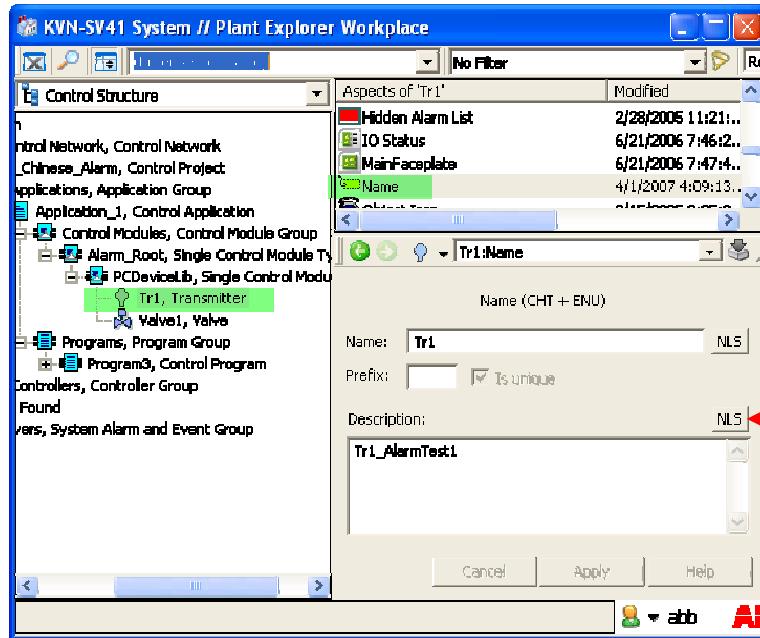
- 2. 確認目前的 Location 為 Chinese Taiwan , Default Language 為 English**

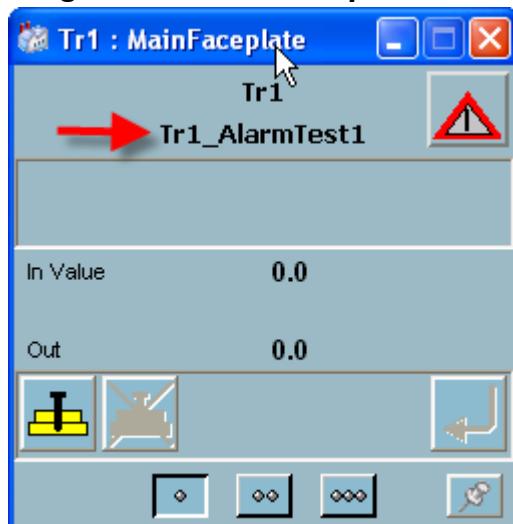
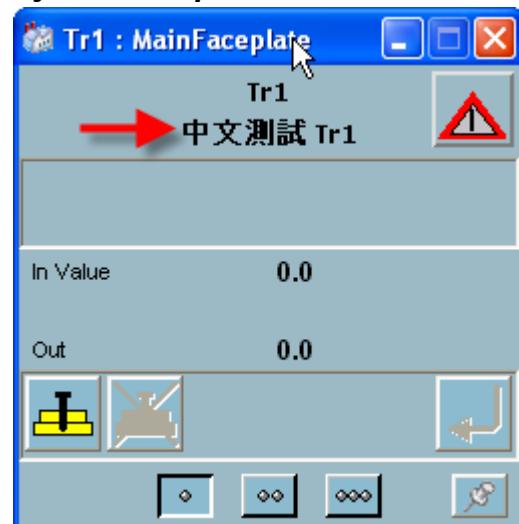
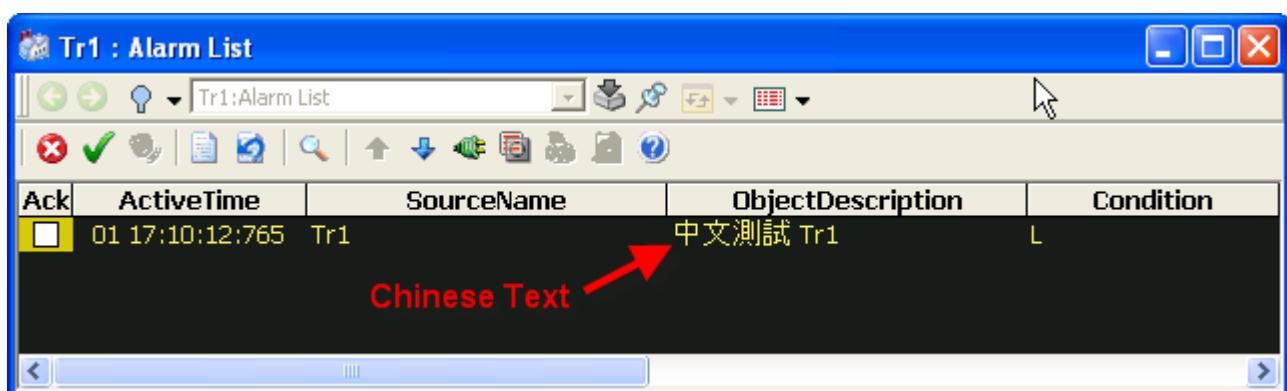
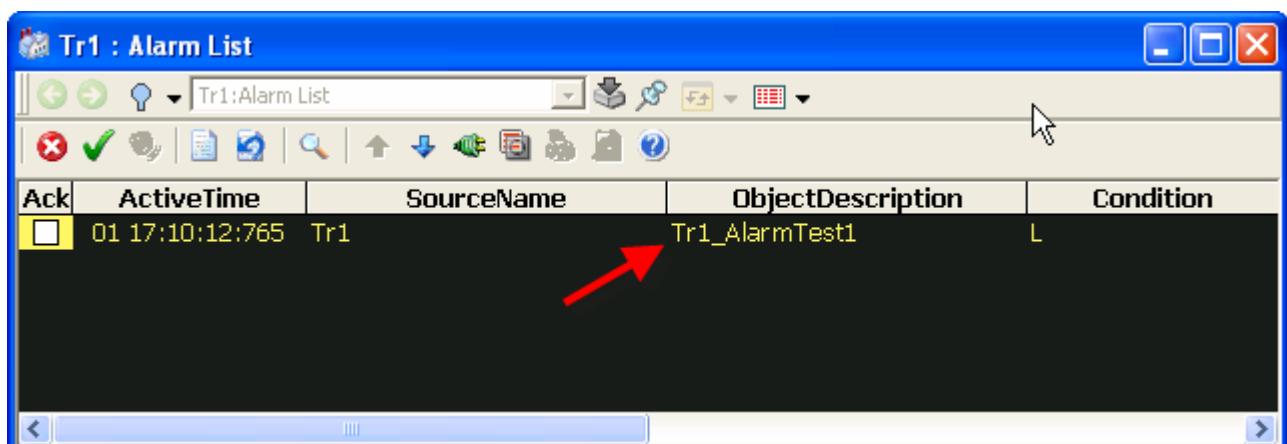
- 3. You don't have 'CHT' option in NLS. Just Follow the step below.**

- a. Change Regional and Language Option to Chinese [Taiwan].**
- b. You can key in Chinese text in Description of Name Aspect.**

c. After you key in Chinese Text in Description, 800xA system will create [CHT] option automatically.

d. After item C, you can press “NLS” button to modify Chinese text or English text .

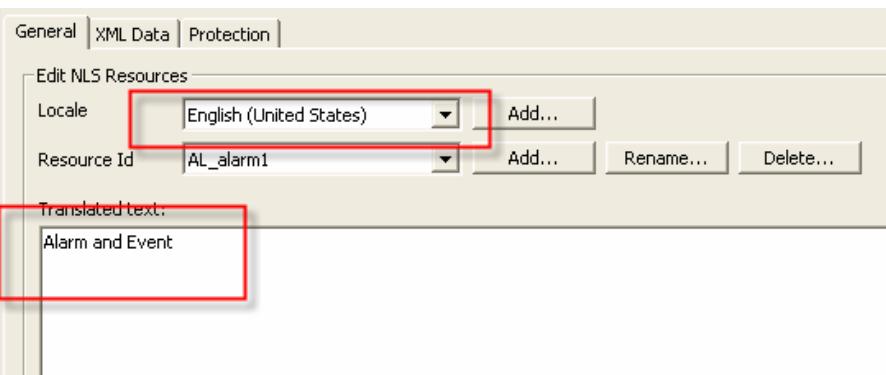
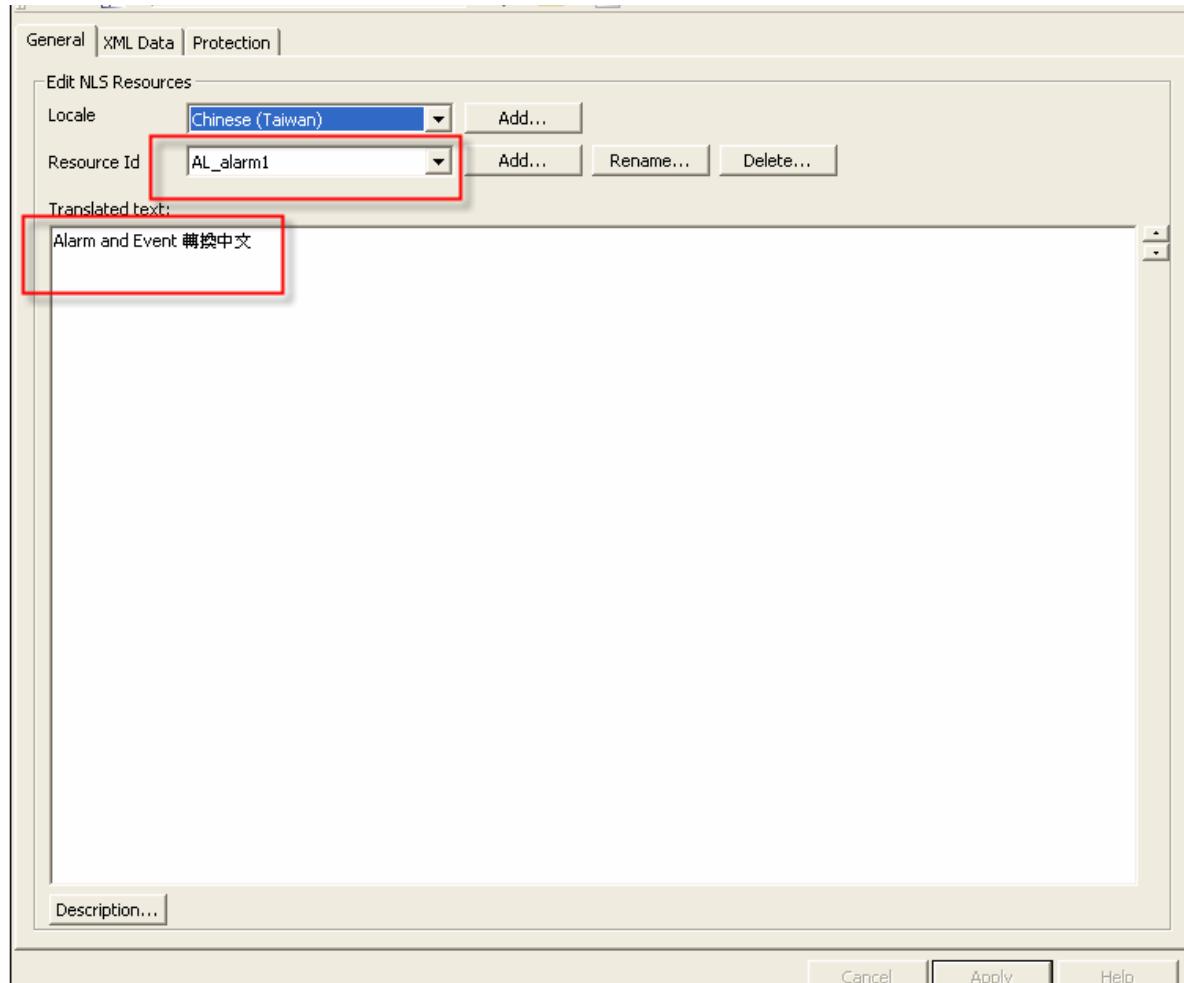


4. You will got Chinese Description and Alarm object description .

English Text in English Regional

Chinese Text in Taiwan Regional


5. If you use AlarmCondM or AlarmCond at your program , you may need Aspect [Alarm and Event Translator] to translate Chinese

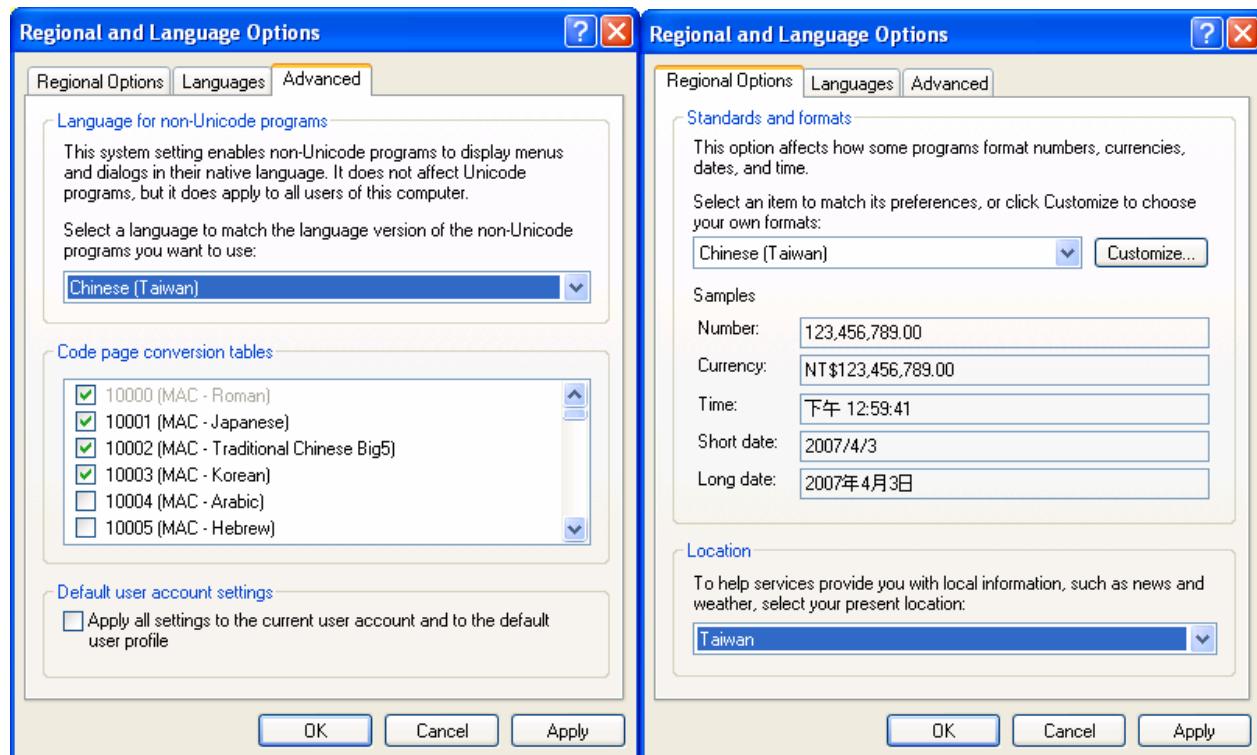
在 AlarmCond ControlMethod 的腳位 Message 輸入 ||AL_alarm1

|| 表示引用 Alarm and Event Translator, **AL_alarm1** is translator table id.

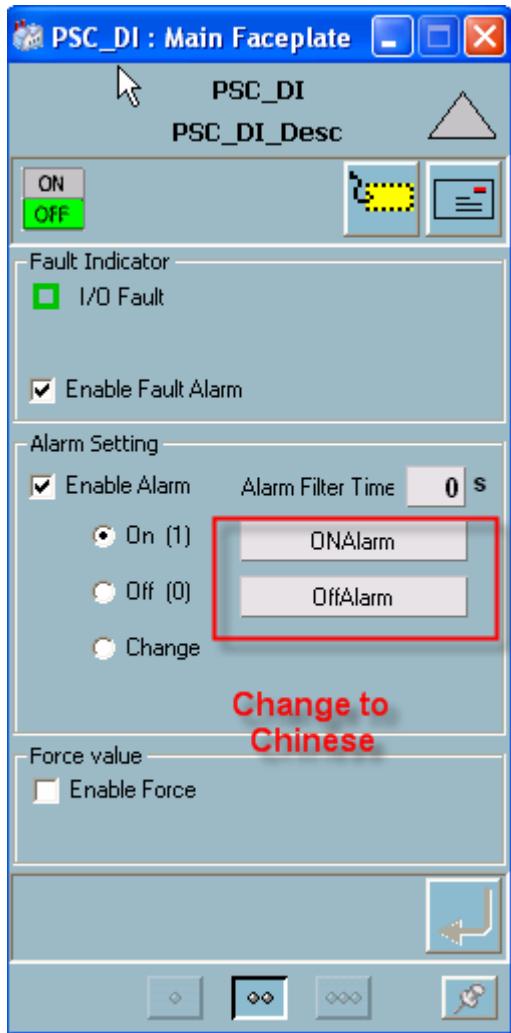


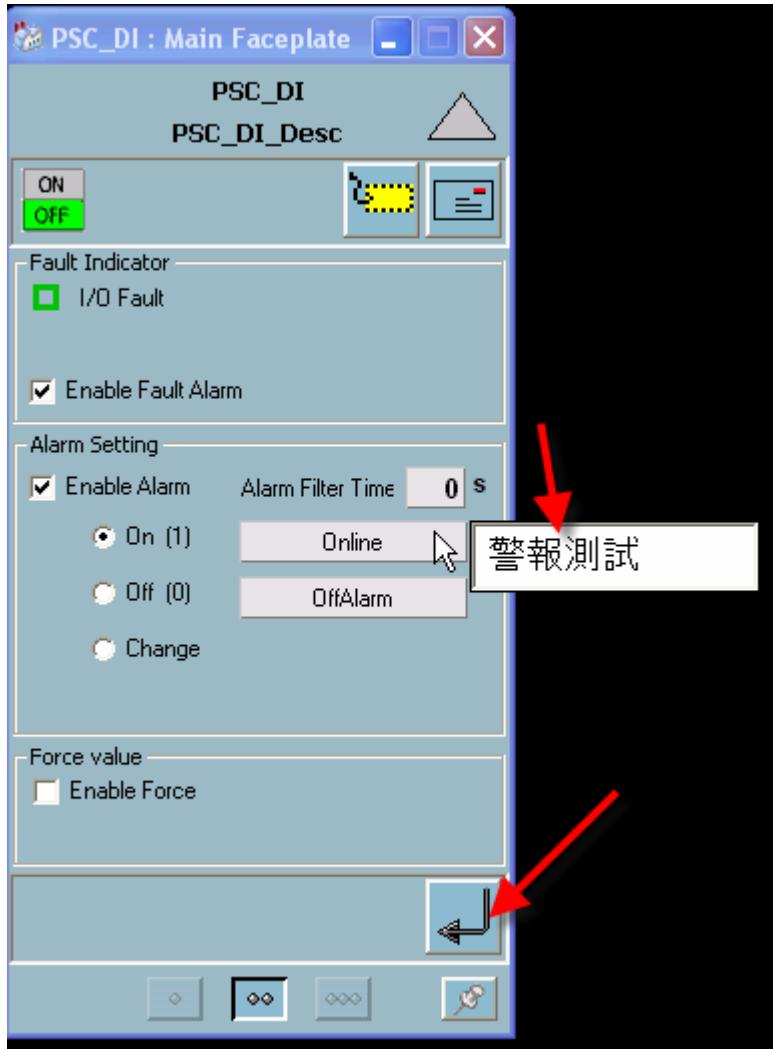
第二階段

當該承商完成程式的製作 100% ,既可開始採用下列方法製作 **Msg Description**。
 本方式需將 OS 的 **Default Language** 切換為 **Chinese** ,並且重開機後，才成繼續中文的製作。



修改 Alarm Description, 此 Description 將出現在 Alarm List 中的 Message Description 欄位

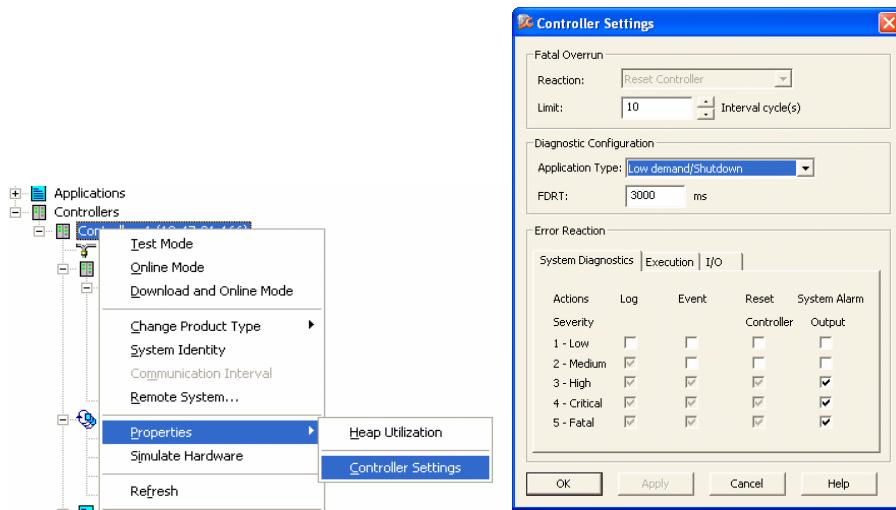


輸入中文的 *Msg Description*

附件12: AC800 HI CPU and I/O Modules Settings

The internal diagnostic and the fault reaction of AC 800M HI can be adapted to the actual process by various settings.

You can access to the controller settings from Control Builder:



The table below show available settings on controller level.

Function	Description	Options	Default	Recommended
Fatal Overrun Reaction	Determine the system reaction to fatal overrun of a task	Nothing Reset Controller Stop Application	Nothing	Reset Controller
Fatal Overrun Limit	Defines the number of consecutive overruns to activate the fatal overrun reaction	1-10	10	10
Application Type	Type of the actual process to be controlled	Shutdown Continuous	Shutdown	Continuous
FDRT	Fault Detection and Reaction Time	1000-60000 msec (1-60 seconds)	3000 msec (3 seconds)	10000 msec (10 seconds)

Fatal Overrun

Overrun is used to supervise that tasks finishes in time, that is, that they finish before they are scheduled to start the next time. If a number of consecutive overruns are made, this becomes a **Fatal Overrun**.



Fatal Overrun Limit

Fatal Overrun Limit defines the maximum number of missed scans before Fatal Overrun is performed. A value between 1 and 10 may be used. Default value is 10.

Application Type

The Application type selection determines the fault reaction of the system. If “continuous” is selected, the controller will continue its operation during some error situations that would lead to a halt of the controller if “Shutdown” were selected.

Two types of application types can be chosen.

Low Demand/shutdown

High Demand/continuous

Low demand applications are for applications that have very few shutdowns, typically on or two a year. High Demand is for applications with more shutdowns.

A typical example of a shutdown type of application (Low Demand) is process shutdown systems like ESD. Typical example of continuous type of application (High Demand) is supervision systems like F&G where e.g. a CO₂ release upon an error in the control system is not preferred.

Fault Detection and Reaction Time (FDRT)

FDRT is the maximum time from an error occurs to the defined action is taken. This time must be set according to the process safety time and the demand rate of the controlled process.

Setting the FDRT to a shorter time than necessary will reduce the performance of the system.

The Demand Response Time, DRT and Fault Detection and Reaction Time, FDRT of a loop can be calculated using the figures below.

	DRT	FDRT (max)
DI880	1.3 ms (max)	50 ms
AI880	10 ms (max)	50 ms
DO880	15 ms (max)	50 ms
AC 800M HI Processor Unit Application cycle time	Configurable min. 10 ms	Configurable min. 1000 ms
ModuleBus Cycle time	Configurable 5 -100 ms	3 times the configured cycle time

Error Reaction

Error Reaction consists of one tab for each error type

Error Type	Description
System Diagnostics	SM810, protocol handler, CEX module, redundancy problems. General system errors e.g. full queues, lost communication.
Execution	Is used for errors regarding IEC 61131-3 application execution, e.g. latency, overrun, sequence verification, CRC (memory corruption), etc. Can also be activated from user defined diagnostics by using function blocks or control modules, see User Defined Diagnostics on page 92.
I/O	I/O channel error, faulty I/O module.

Each tab contains a checkbox matrix consisting of one row for each severity and one column for each possible action. If a checkbox is checked on a tab, this means that the corresponding action will be taken when an error with the severity is reported to the Error Handler.

Actions	Description
Log	An entry is written in the system log.
Event	Event message to operator, presented in event list.
Reset Controller	If the error is originated in the PM865, the controller is set in "empty controller" mode and application programs are erased. Log files are preserved. If a healthy standby PM865 exist, a switch over will take place, otherwise the High Integrity outputs will be de-energized (safe state) after the configured timeout time. If the error is located in the SM810, the SM810 is halted. If a healthy standby SM810 exist, a switch over will take place, otherwise the High Integrity outputs will be de-energized (safe state) after the configured timeout time.
System Alarm Output	The "System Alarm" output on the SM810 is activated.

A check mark in the Reset check box results in a controller stop and crash.

For example, if the log check box is checked for severity Low on the System Diagnostics tab, this means that the log action will be taken if an error of severity Low and error type system diagnostics is reported to the Error Handler.

The Error Handler reacts dependent on the severity of the failure, for example by generating a log, an event or a system alarm. The running controller can also be reset.

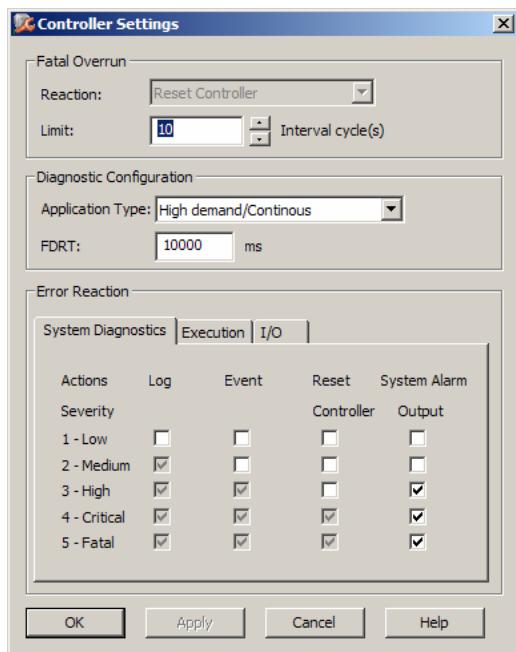
The severity levels are described below.

Severity	Description
1 – Low	Minor, of diagnostic or informative sort. Does not affect the system safety or the functionality of the reporting module.
2 – Medium	Some error, I/O channel failure, communication failed Does not affect the system safety but the functionality in the reporting module.
3 – High	Severe error but not critical, I/O module failure. May affect the system safety. The functionality in the reporting module is affected. Redundancy may maintain the function of the system.
4 – Critical	Safety critical, task stalled or SM810 failed, ModuleBus stalled. Affects the system safety; the whole reporting "subsystem" has failed.
5 – Fatal	Safety critical failures (SW) that lead to shutdown of the complete system, including redundant controller (if installed).

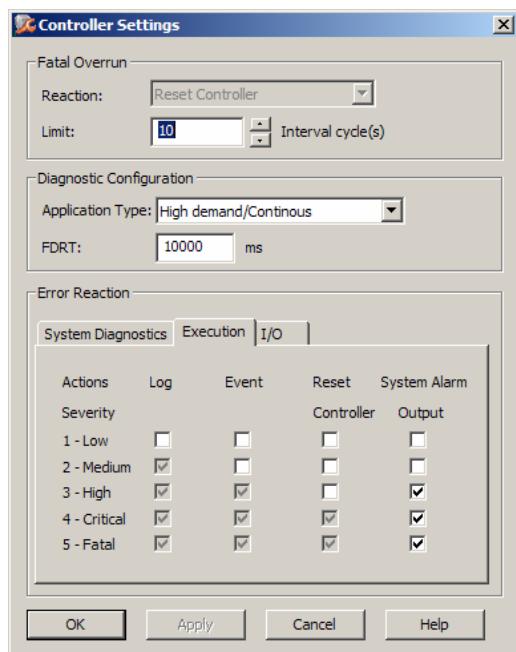
Each controller has a predefined minimum Error Handler configuration. It is not possible to remove actions from the predefined setting, but it is possible to add more actions. If the Application type is changed, the default settings corresponding to the new selected application type is shown instead.

The recommended settings for error reaction are given below.

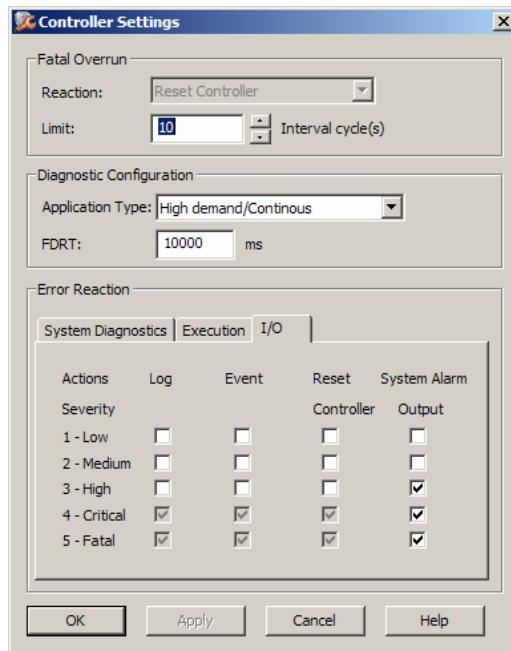
System Diagnostics Tab



Execution Tab

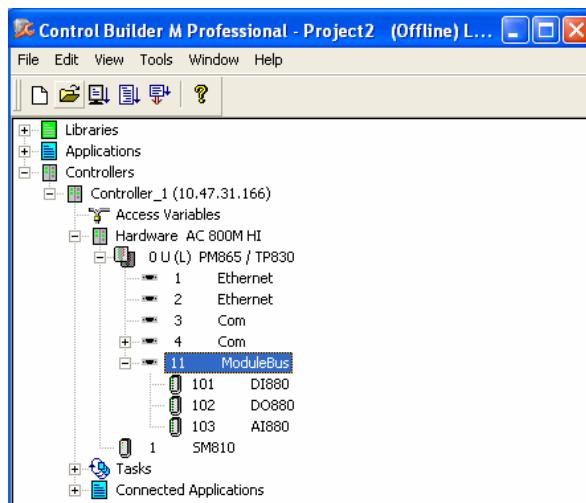


I/O Tab



I/O Configuration

The only SIL certified I/O units are AI880, DI880, and DO880, and the only communication interface certified for use SIL applications in a High Integrity controller is Module Bus, see below.



AI880 High Integrity Analog Input Module.

Parameters	Description	Recommended
Operational Mode	Set the module for redundant or single operation. The parameter can be set to Single, Hot replacement or Redundant.	As per the system requirement.
Safety Accuracy	For each channel a test value of 50 % of measured value is available for the module. If deviation exceeds the limit, the channel will be marked faulty. If configured to lower value than 1.9% noise on the measurement input may cause unintended trips. Can be configured to 0.6, 1.3, 1.9, 2.5, 3.1, 3.8, 4.4, or 5.0 (in % of full scale).	1.9%
HART Mode	Defines restrictions for use of HART communication. The parameter can be set to Full, Read Only or Disabled. Full: All commands are allowed. Read Only: Only standard HART read commands are allowed. Disabled: No HART communication is allowed	As per the system requirement.
ModuleBus timeout	Sets the time in milliseconds before a module goes to safe state upon loss of ModuleBus communication. Set the timeout to at least 4 times higher than the ModuleBus scan cycle time. The parameter can be set to 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048 or 4096 ms. In redundant configurations, the standby module is automatically given a ModuleBus timeout time 16 times the	512ms.

	configured value.	
Activate channel No.	Activate operation and supervision on channel No. on the module. The parameter can be set to True or False.	As per the system requirement.
ISP Control channel No.	Action of channel No. when the unit goes to ISP (Input Set as Predefined) state. The ISP function is activated on channel error. The parameter can be set to Keep Current Value or Use ISP Value.	As per the system requirement.
ISP Value channel No.	Value of channel No. when the unit goes to ISP state and the ISP Control channel No. parameter is set to Use ISP Value. The parameter can be set to a value between 0 and 100%. 0% corresponds to the minimum value of the channel signal range and 100% corresponds to the maximum value of the channel signal range.	As per the system requirement.
Filter time channel No.	Time constant for low-pass filter on channel No. The parameter can be set to: No filtering, 20 ms, 40 ms, 80 ms, 160 ms, 320 ms, 630 ms or 1.24 s.	No filtering
Signal range channel No.	This parameter is used to change the signal range of the channel No. The parameter can be set to 0-20 mA or 4-20 mA. For not active channels, the range must be set to 0-20mA to avoid module warnings.	4-20 mA.
Field Power Output Trigger Level ch No.	Trigger value for alarm upon under-voltage on field power output (power delivered to the transmitters). If the limit is passed, the channel is error marked and enters ISP state. The parameter can be set from 15.0 V – 22.0 V in step of 0.5 V.	18.5 Volt.

Set NAMUR range 3.6, 3.8-20.5, 21.0 mA ch No.	<p>Limits for over and under range can be set to fixed values according to the NAMUR recommendation NE43, or individually configured. When the parameter is set to True, the following limits are used:</p> <p>Device Malfunction Low: 3.6 mA/0.9 V Under Range: 3.8 mA/0.95 V Over Range: 20.5 mA/5.125 V Device Malfunction High: 21 mA/ 5.25 V</p> <p>When the parameter is set to False, the limits can be configured as described below. If one of the device malfunction limits is passed, the channel is error marked and enters ISP state.</p> <p>When the parameter is set to True, the error marking of the channel is delayed with 4 seconds.</p>	As per the system requirement.
Device malfunction low (NAMUR=false) ch No.	If values are not used, the limit can be configured directly by selecting a fixed value in the range of 0.49 mA/0.12 V and 4.00 mA/1.00 V.	As per the system requirement.
Under range (NAMUR=false) ch No.	If NAMUR values are not used, the limit can be configured directly by selecting a fixed value in the range of 0.49 mA/0.12 V and 4.00 mA/1.00 V.	As per the system requirement.
Over range (NAMUR=false) ch No.	If NAMUR values are not used, the limit can be configured directly by selecting a fixed value in the range of 20.00 mA/5.00 V and 22.41 mA/5.60 V.	As per the system requirement.
Device malfunction high (NAMUR=false) ch No.	If NAMUR values are not used, the limit can be configured	As per the system

	directly by selecting a fixed value in the range of 20.00 mA/5.00 V and 22.41 mA/5.60 V.	requirement.
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DI880 High Integrity Digital Input Module.

Parameters	Description	Recommended
Operational Mode	Set the module for redundant or single operation. The parameter can be set to Single, Hot replacement or Redundant.	As per the system requirement.
ModuleBus timeout	Sets the time in milliseconds before a module goes to safe state upon loss of ModuleBus communication. Set the timeout to at least 4 times higher than the ModuleBus scan cycle time. The parameter can be set to 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048 or 4096 ms. In redundant configurations, the standby module is automatically given a ModuleBus timeout time 16 times the configured value.	512 ms.
Activate channel No.	Activate channel No. on the module. The parameter can be set to True or False.	True.
ISP Control channel No	Action of channel No. when the unit goes to ISP (Input Set as Predefined) state. The ISP function is activated on channel error. The parameter can be set to Keep Current Value or Use ISP Value.	Keep Current Value
ISP Value channel No.	Value of channel No. when the unit goes to ISP state and the ISP Control channel No. parameter is set to Use ISP Value. The parameter can be set to True or False.	False.
Operation Mode channel No.	Enables or disables Sequence Of Events (SOE) for activated channels.	

	DI+SOE: Sequence of events is enabled DI: Sequence of events is disabled.	
Filter time channel No.	The filter time is a parameter that can be used to remove noise. If the filter time is increased the signal must remain longer to break through the filter. The parameter can be set to a value between 0 and 127 ms. It is recommended to set the filter time of the channel greater than the worst case HW fault detection time (36 ms). This enables a glitch free fail over to the redundant module upon an internal fault.	50 ms.
Normal Position channel No.	Value of the input signal during normal operation, related to the SOE function only. Can be set to True or False. False: Normal loop state is open (close for alarm) True: Normal loop state is closed (open for alarm)	As per the system requirement.
Event Block channel No.	Temporary blocking of events. False: Events are not blocked True: Events are blocked	As per the system requirement.
Shutter filter (no of changes) channel No.	For all channels with enabled SOE capability, a shutter filter is implemented that prevents intermediate storage for events from overflow. The shutter filter is closed as soon as the number of events generated within the shutter filter period exceeds the shutter filter (no of changes). The shutter filter remains closed as long as the Shutter filter recovery time has not expired. Number of changes of the input within a Shutter Filter Period time before the shutter filter is activated. The parameter can be set to a value between 1 and 255 changes.	As per the system requirement.
Shutter filter period time channel No.	Measurement time window for the shutter filter. The parameter can be set to a value between 1 and 255 seconds (second resolution).	As per the system requirement.
Shutter filter rec. time channel No.	Recovery time after event generation is blocked upon bursts or noise on the input. The parameter can be set to a value between 0 and 65535 s, there 0 means deactivated shutter filter.	As per the system requirement.

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DO880 High Integrity Digital Output Module.

Parameters	Description	Recommended
Operational Mode	<p>Set the module for redundant or single operation. The parameter can be set to Single, Hot replacement or Redundant.</p>	As per the system requirement.
ModuleBus timeout	<p>Sets the time in milliseconds before a module goes to safe state upon loss of ModuleBus communication. Set the timeout to at least 4 times higher than the ModuleBus scan cycle time. The parameter can be set to 4, 8, 16, 32, 64, 128, 256, 512, 1024, 2048 or 4096 ms.</p>	512 ms.
Activate channel No.	<p>Activate channel No. on the module. The parameter can be set to True or False. (For deactivated channels, loop supervision is not active).</p>	As per the system requirement.
Output mode channel No.	<p>The outputs are short-circuit proof, that is, if a short-circuit occurs in the field loop, the output is switched off. The behavior of the output when the short-circuit is removed is determined by this parameter. The parameter can be set to automatic reset mode or latch on short mode. Latch on short mode: operator (or application) must force the output low to reset the fault. Automatic reset: the output will reset when the fault is removed.</p>	As per the system requirement.
Normal State channel No.	<p>Defines the channel behavior upon detection of a channel fault:</p> <ul style="list-style-type: none"> • Normally energized (NE), de-energize to trip: Will be de-energized upon an internal channel error. 	NE

	<ul style="list-style-type: none"> • Normally de-energized (ND) energize to trip: Will follow the status received from the controller upon an internal channel error. • Continuous Control (CC): Same behavior as ND. <p>For all output types, safe state is defined as de-energize, that is, upon fatal errors (as CPU or power failure, loss of contact with controller), all outputs will be de-energized.</p>	
Trig limit open energized channel No.	<p>When the output is energized, the supplied current to the loop is measured and compared with the Trig limit open energized. If the measured current is lower than the defined limit the channel is error marked.</p> <p>The parameter can be set to 0, 5, 10, 20, 40, 80, 120 or 160 mA.</p> <p>Recommended parameter value (single I/O configuration): less than 0.5*nominal field loop current.</p> <p>Recommended parameter value (redundant I/O configuration): less than 0.25*nominal field loop current.</p> <p>If the output module operates in a redundant configuration, the two modules share the load, resulting in alarm at the double field current, e.g. an alarm is triggered at 80mA if the parameter is set to 40mA. This must be considered when configuring the limits, see formula for redundant I/O configuration.</p> <p>The open load monitoring for energized channel can be disabled by setting the parameter to 0mA.</p>	5
Trig limit short energized channel No.	<p>When the output is energized, the supplied current to the loop is measured and compared with the Trig limit short energized. If the measured current is higher than the defined limit the channel is error marked.</p> <p>The parameter can be set to: 100, 200, 300, 400, 500 or 600</p>	600

	<p>mA.</p> <p>Recommended parameter value: larger than 2*nominal field loop current, (if nominal field loop current is larger than 300mA, use 600mA as trigger limit)</p> <p>If the output module operates in a redundant configuration, the two modules share the load, resulting in alarm at the double field current, e.g. an alarm is triggered at 400mA if the parameter is set to 200mA. It is not recommended to do any compensation when configuring these limits since this might trigger a false alarm if one DO880 in a redundant pair is shut down.</p> <p>The shorted load monitoring for energized channel can be disabled by setting the parameter to 600mA.</p>	
Trig limit open de-energized channel No.	<p>When the output is de-energized, the field loop resistance is measured and compared with the Trig limit open de energized. If the measured resistance is higher than the defined limit the channel is error marked.</p> <p>The parameter can be set to: 100, 200, 300, 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1500, 2000 or >2000 ohm.</p> <p>Recommended parameter value: larger than 2*nominal field loop resistance, (if nominal field loop resistance is larger than 1000 ohm, use 2000 ohm as trigger limit)</p> <p>The open load monitoring for de-energized channel can be disabled by setting the parameter to >2000 ohm.</p>	As per the system requirement.
Trig limit short de-energized channel No.	When the output is de-energized, the field loop resistance is measured and compared with the Trig limit short de-energized. If the measured resistance is lower than the defined limit the channel is error marked.	40



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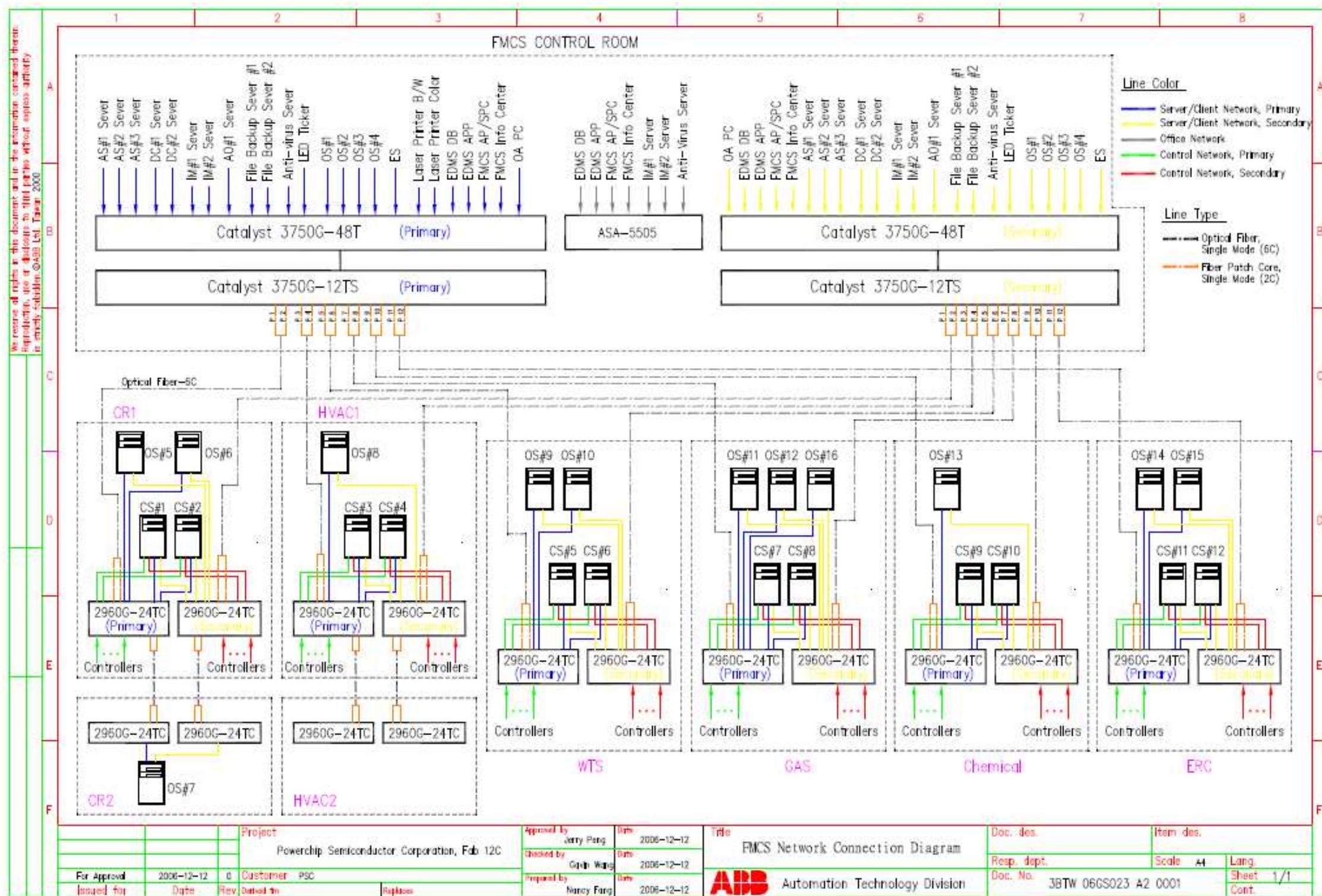
Version: 3.0

Page: 214 / 225

Title: FAB R1 廠務監控系統(FMCS)整合作業規範

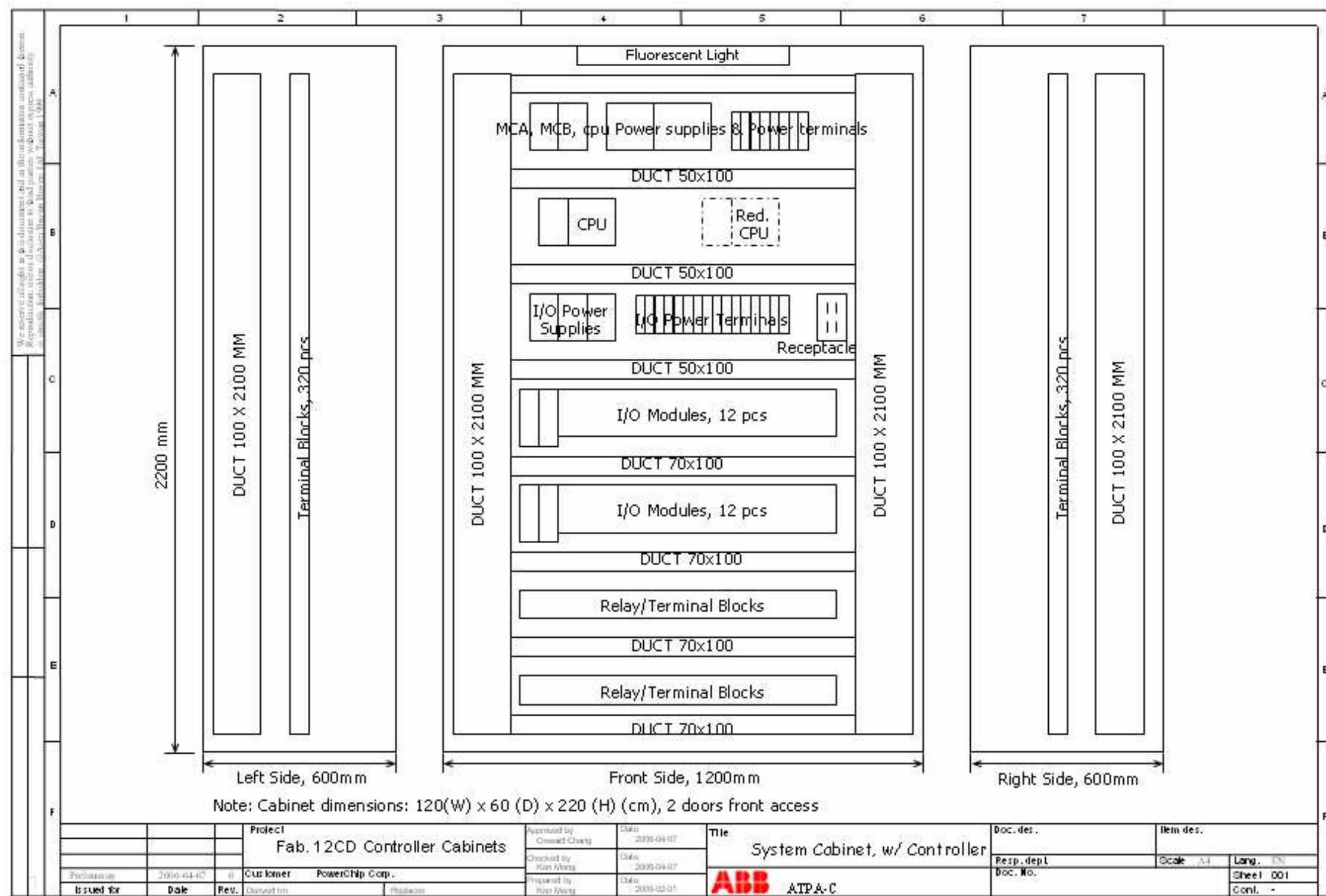
	<p>The parameter can be set to: 0, 10, 20, 30, 40, 50, 100, 200, 300 or 400 ohm.</p> <p>Recommended parameter value: less than 0.5*nominal field loop resistance.</p> <p>The shorted load monitoring for de-energized channel can be disabled by setting the parameter to 0 ohm.</p>	
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附圖 1： FMCS 主架構圖



附圖 2：控制盤內佈置圖-1

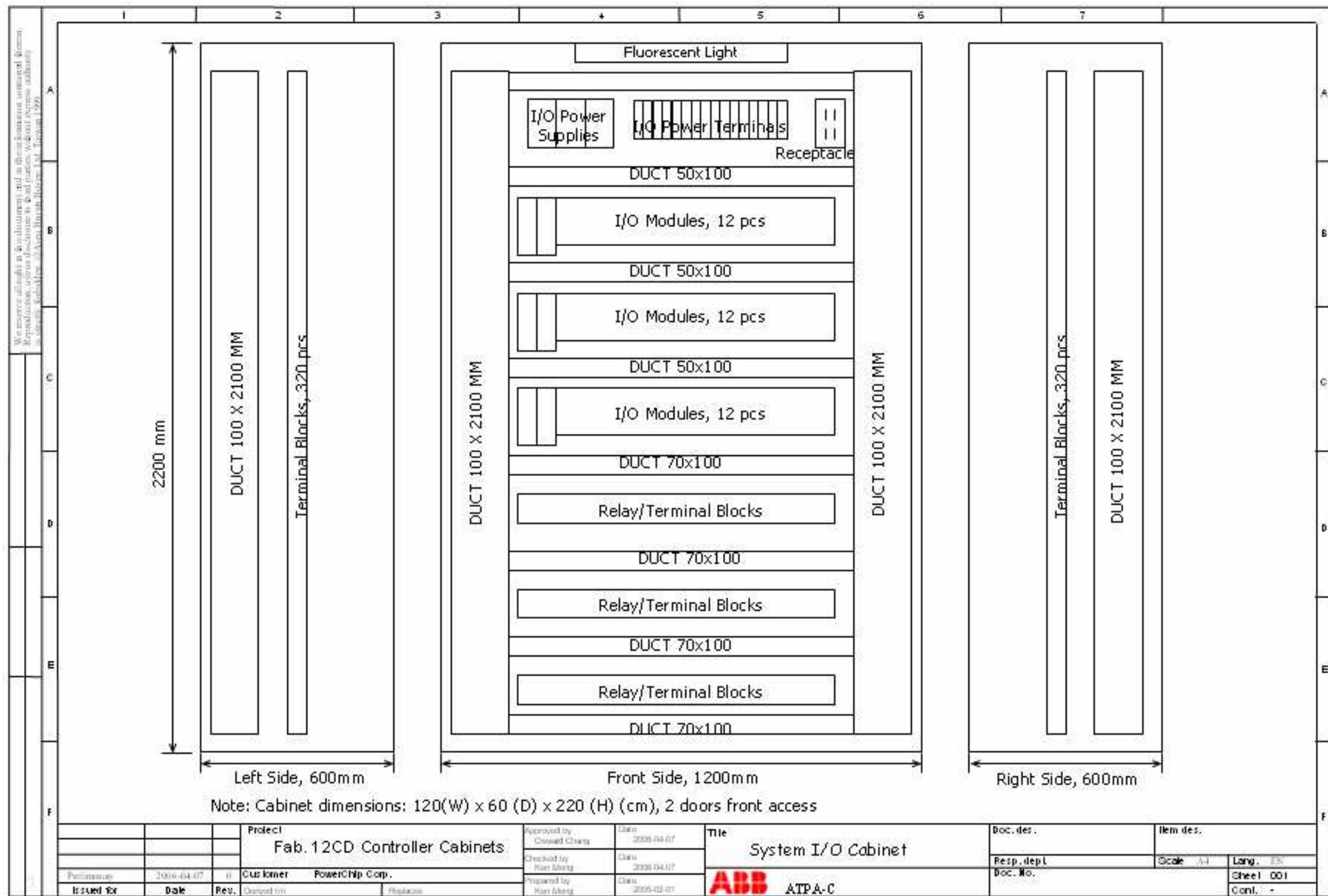
(僅供參考)





附圖 3：控制盤內佈置圖-2

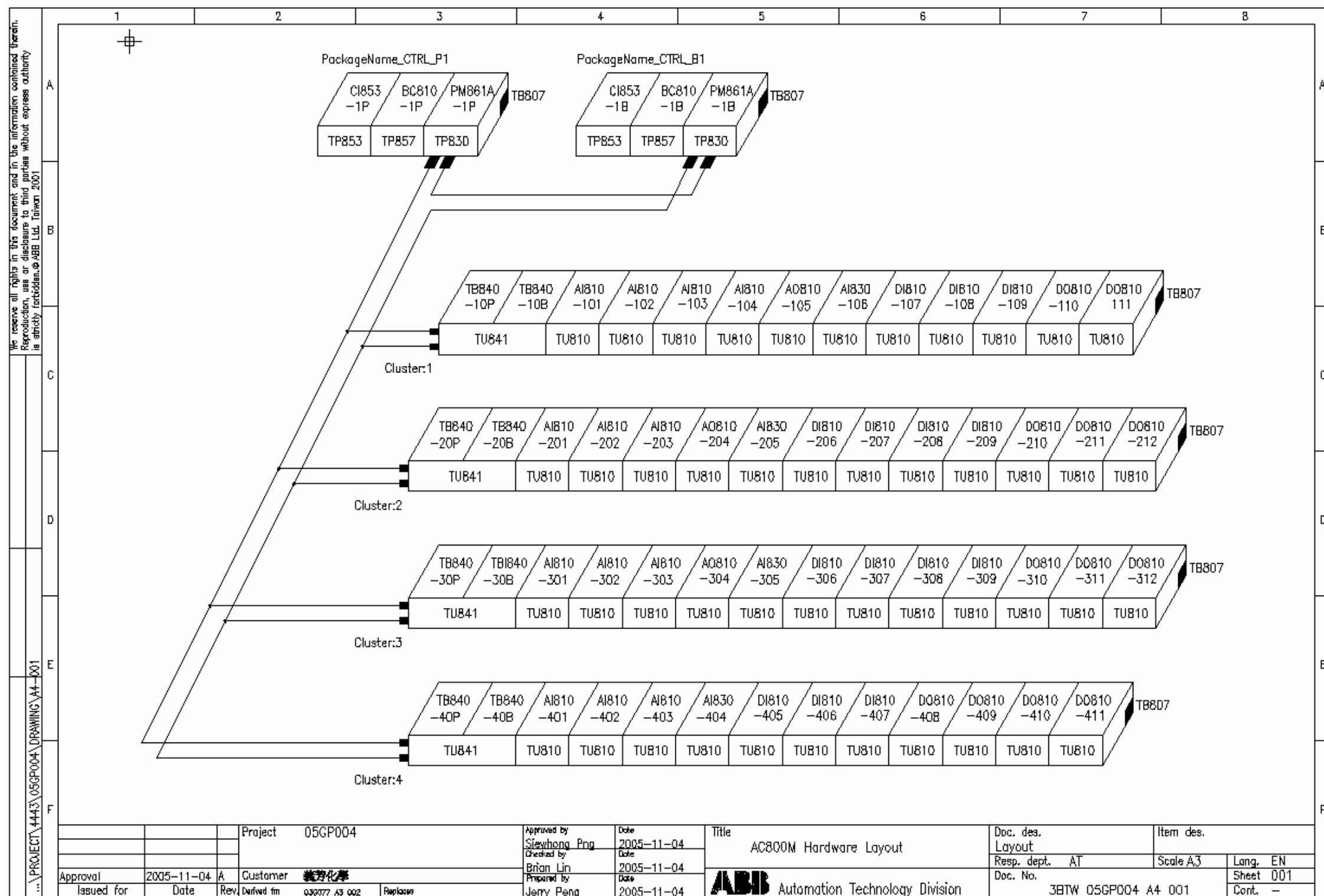
(僅供參考)





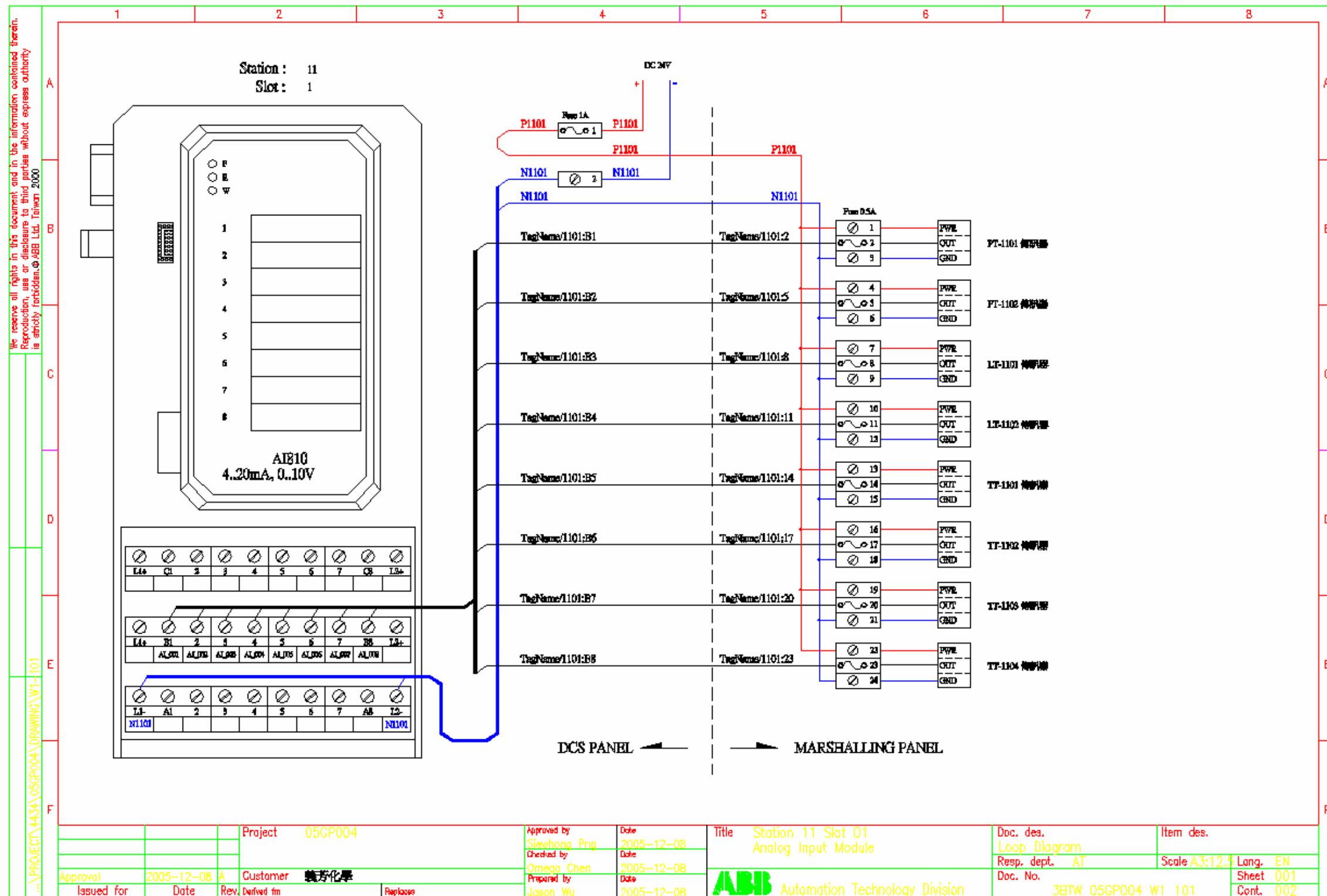
附圖 4：控制模組及 I/O 配置圖

(僅供參考)



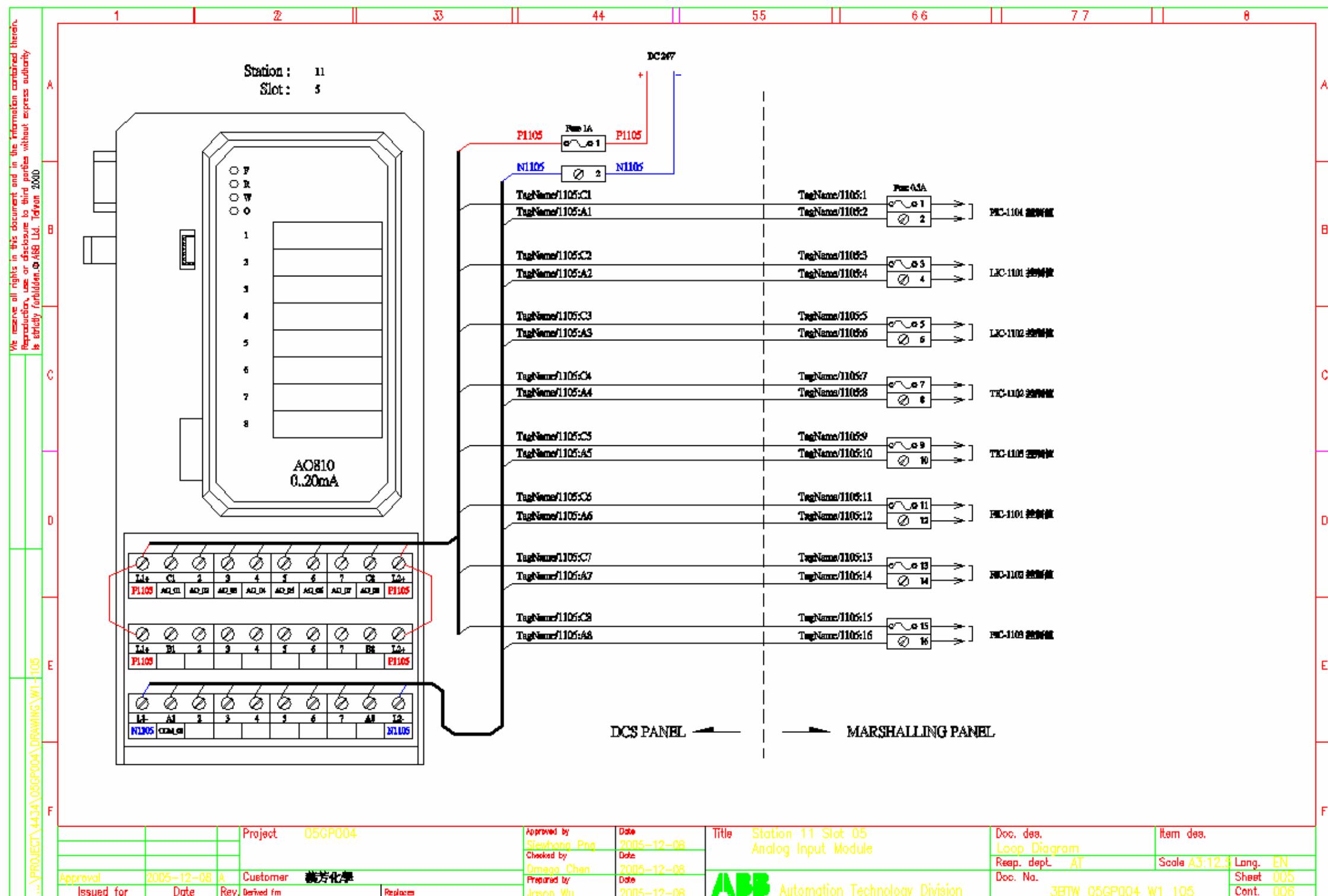
附圖 5: AI 模組接線圖

(僅供參考)



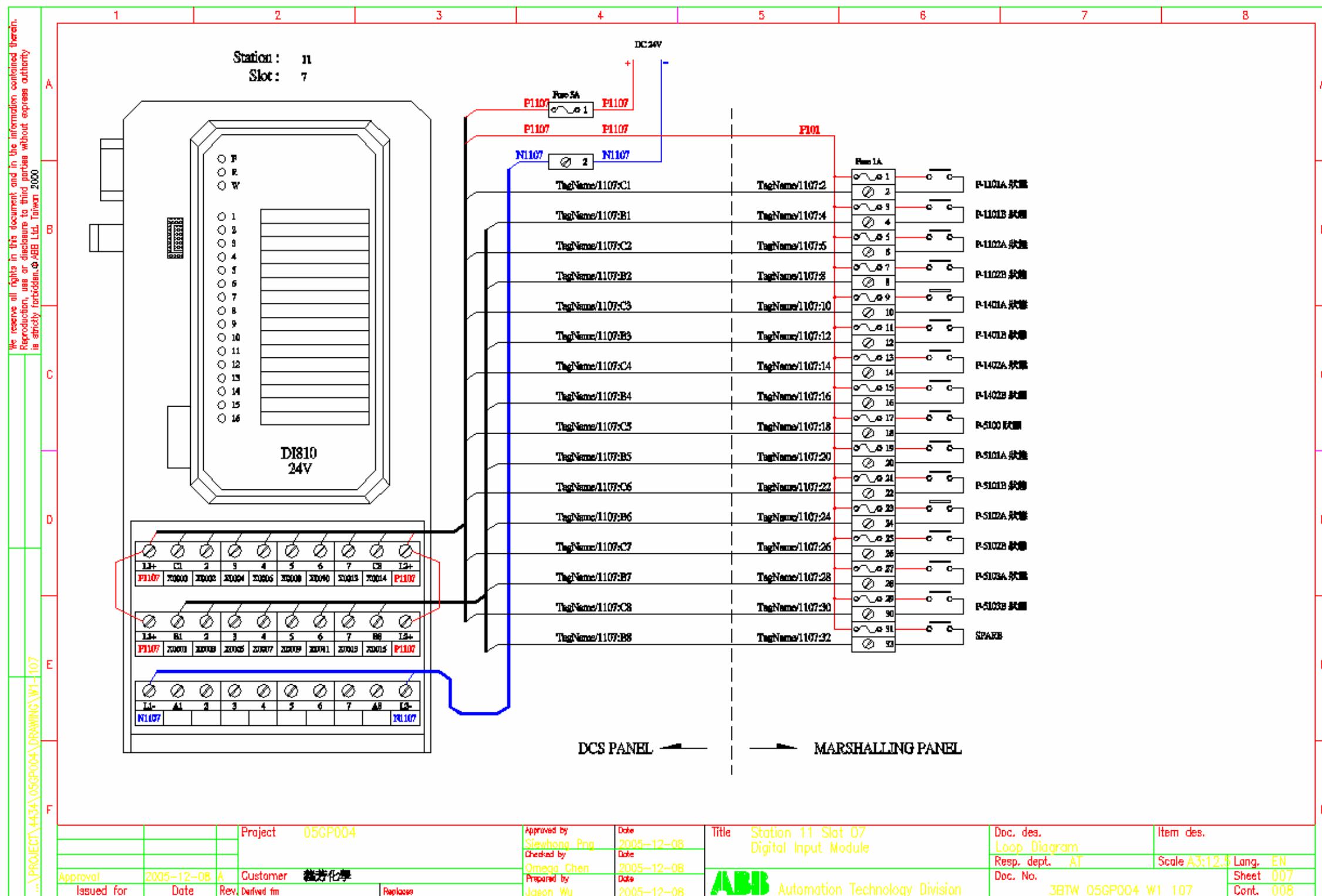
附圖 6: AO 模組接線圖

(僅供參考)



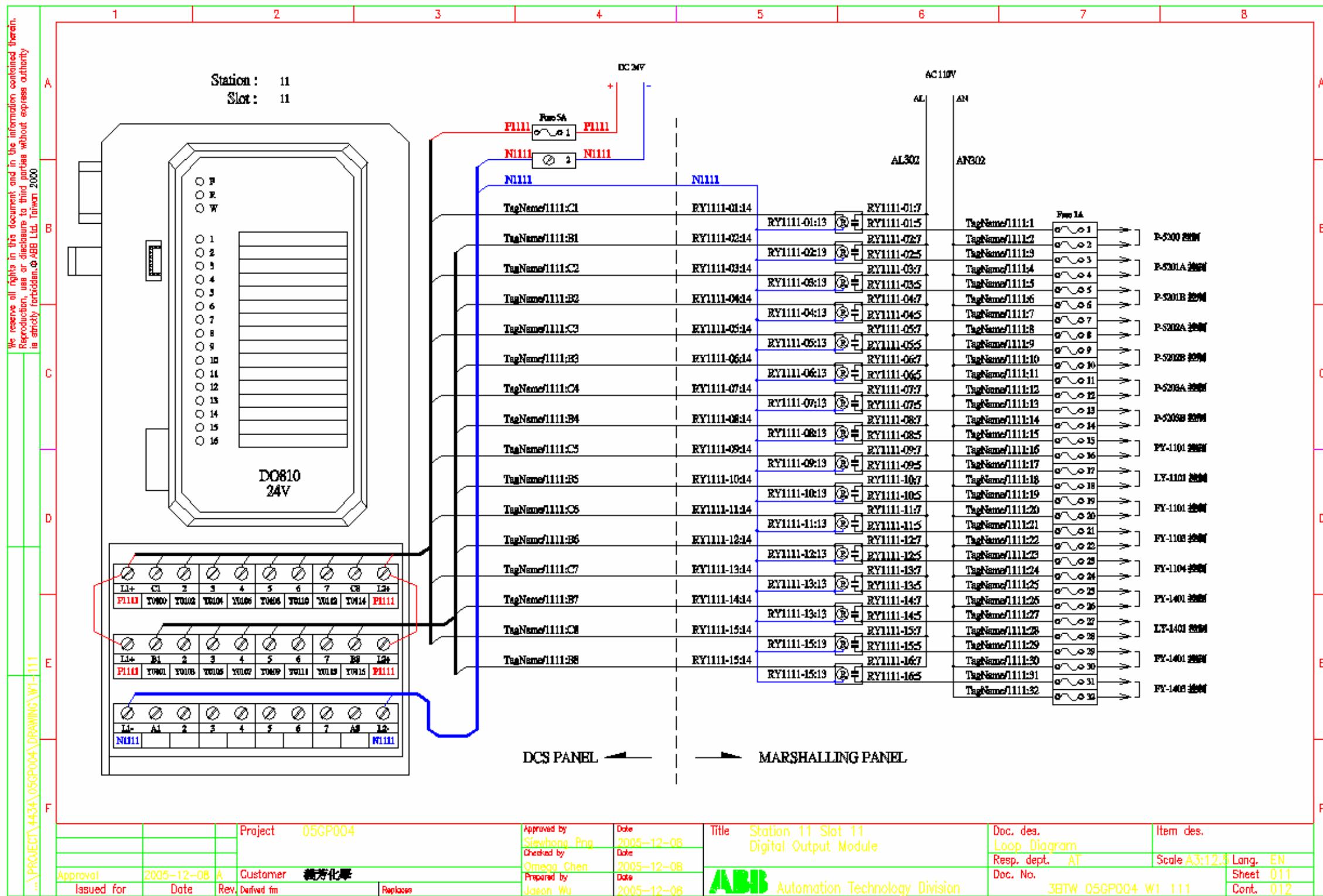
附圖 7: DI 模組接線圖

(僅供參考)

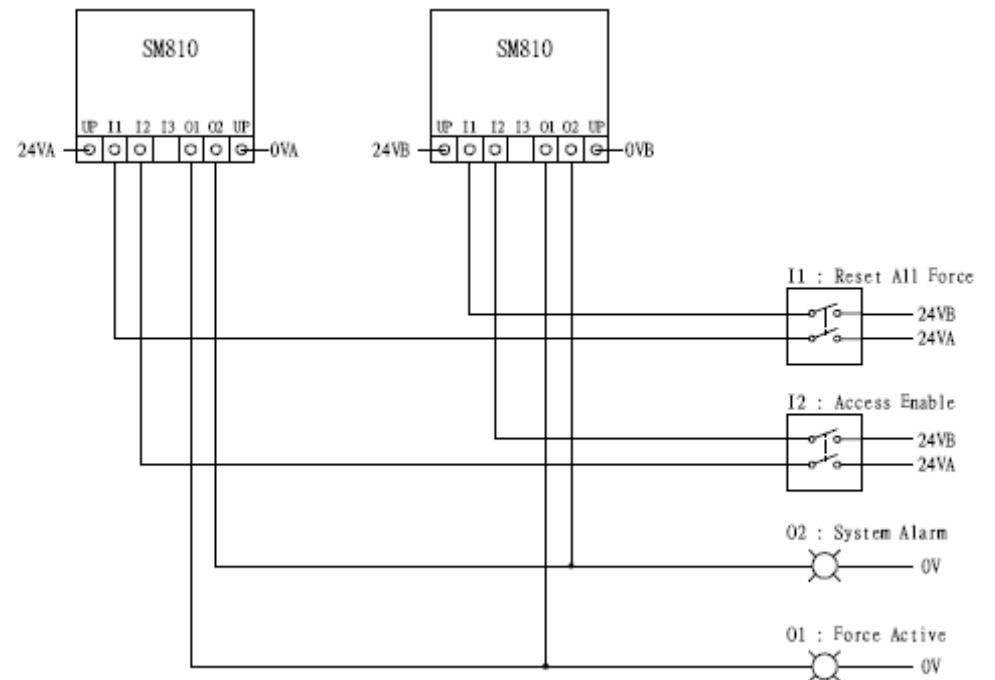


附圖 8: DO 模組接線圖

(僅供參考)



附圖 9: SM810 接線圖





附圖 10：I/O 接線表範例

Row.	CPU and I/O	Connection Unit				Wires (1.25mm²)				Relay				Wires (1.25mm²)				Cables(1.25mm²)											
		Controller	Station	Card	Ch.	Panel	Type	Tm.	Core	Name(Io Side)	Core	Pos/Neg	Name(Relay Side)	Pos/Neg	Tm.	RY UNIT	Tm.	Name(Io Side)	TB	Tm.	Name	Core	Wire Name	Name					
DA	CW_WWT_HS_1007_A	WWT01	TUBIO	CPU/WWT-DI PLEASE FOLLOW 請參考範例11.2 CPU/WWT-DI PLEASE FOLLOW 請參考範例11.2	1	CPU/WWT-DI PLEASE FOLLOW 請參考範例11.2 CPU/WWT-DI PLEASE FOLLOW 請參考範例11.2	C1 +	1202:C1	I/C	RY_1202_01:12	13	RY_1202_01:5	1202:C1:1	CPU/WWT-DI PLEASE FOLLOW 請參考範例11.2 CPU/WWT-DI PLEASE FOLLOW 請參考範例11.2	1	HE_1007_A:1	1B	CAI-1020	HE_1007_A:1										
DA	CW_WWT_HS_1007_D				2					A1 -	1202:A1	I/C	RY_1202_01:14	14	RY_1202_01:9	0		2	HE_1007_A:2	1W	CAI-1020	HE_1007_A:2							
DA	CW_WWT_HS_1007_C				3					B1 +	1202:B1	I/C	RY_1202_02:13	13	RY_1202_02:5	1202:B1:3		3	HE_1007_C:3	2B	CAI-1020	HE_1007_C:3							
DA	CW_WWT_HY_1012A				4					C2 +	1202:C2	I/C	RY_1202_03:13	13	RY_1202_03:5	1202:C2:5		4	HE_1007_C:4	2W	CAI-1020	HE_1007_C:4							
DA	CW_WWT_HY_1012B				5					B2 +	1202:B2	I/C	RY_1202_04:13	13	RY_1202_04:5	1202:B2:7		5	HE_1007_C:5	3B	CAI-1020	HE_1007_C:5							
DA	CW_WWT_HY_1005B				6					C3 +	1202:C3	I/C	RY_1202_05:12	13	RY_1202_05:5	1202:C3:9		6	HE_1007_C:6	3W	CAI-1020	HE_1007_C:6							
DA	CW_WWT_HY_1006B				7					B3 +	1202:B3	I/C	RY_1202_06:12	13	RY_1202_06:5	1202:B3:11		7	HY_1012A:7	4B	CAI-1020	HY_1012A:7							
DA	CW_WWT_HY_1015B				8					C4 +	1202:C4	I/C	RY_1202_07:13	13	RY_1202_07:5	1202:C4:13		8	HY_1012A:8	4W	CAI-1020	HY_1012A:8							
DA	CW_WWT_HY_2226B				9					B4 +	1202:B4	I/C	RY_1202_08:13	13	RY_1202_08:5	1202:B4:15		9	HY_1006B:9	6B	CAI-1020	HY_1006B:9							
DA	CW_WWT_HY_2227B				10					C5 +	1202:C5	I/C	RY_1202_09:13	13	RY_1202_09:5	1202:C5:17		10	HY_1006B:10	5W	CAI-1020	HY_1006B:10							
DA	CW_WWT_HY_2228B				11					A5 -	1202:A5		RY_1202_10:13	13	RY_1202_10:5	1202:B5:19		11	HY_1006B:11	6B	CAI-1020	HY_1006B:11							
DA	CW_WWT_HY_2229B				12					B5 +	1202:B5	I/C	RY_1202_11:13	13	RY_1202_11:5	1202:C6:21		12	HY_1006B:12	6W	CAI-1020	HY_1006B:12							
DA	CW_WWT_HY_2230B				13					C6 +	1202:C6	I/C	RY_1202_12:13	13	RY_1202_12:5	1202:B6:23		13	HY_1015B:13	7B	CAI-1020	HY_1015B:13							
DA	CW_WWT_HY_2231B				14					B6 +	1202:B6	I/C	RY_1202_13:13	13	RY_1202_13:5	1202:C7:25		14	HY_1015B:14	7W	CAI-1020	HY_1015B:14							
DA	CW_WWT_HY_2232B				15					C7 +	1202:C7	I/C	RY_1202_14:13	13	RY_1202_14:5	1202:B7:27		15	HY_2226B:15	8B	CAI-1020	HY_2226B:15							
DA	CW_WWT_HY_2233B				16					B7 +	1202:B7	I/C	RY_1202_15:13	13	RY_1202_15:5	1202:C8:29		16	HY_2226B:16	8W	CAI-1020	HY_2226B:16							
DA	CW_WWT_HY_2234B				17					C8 +	1202:C8	I/C	RY_1202_16:13	13	RY_1202_16:5	1202:B8:31		17	HY_2227B:17	9B	CAI-1020	HY_2227B:17							
DA	CW_WWT_HY_2234B				18					B8 +	1202:B8	I/C	RY_1202_16:13	14	RY_1202_16:5	1202:B8:31		18	HY_2227B:18	9W	CAI-1020	HY_2227B:18							
說明		卡片編號				IO CARD 編號+IO板組件編號												依據各線材而異				簡單Tag Name + 端子編號							
PMCS TAG NAME																						簡單Tag Name + 現場							



附圖 11: On-Line 前 Check List

PSC R1 FMCS Import Check List

Vendor :

Check Item	Ready	備註
1 Alarm Area 分類完成(Check Tag List)		
2 確認 系統已升級至最新版本		
3 確認 BPCS Library , PSCLib 版本 為最新版本		
4 確認 BPCS Library , PSCAdvLib 版本 為最新版本		
5 確認 BPCS Library , PSCCommLib 版本 為最新版本		
6 確認 SIS Library ,SISLib 版本 為最新版本		
7 Remove 測試用的程式		
8 Remove 測試用的Application		
9 上線前請Check 各Application Name,Controller Name 是否符合規範定義，切勿使用預設值		
10 檢查各畫面是否正常開啓		
11 檢查各畫面的連結是否正常開啓		
12 Import 前，ABB 使用Consistency Checker Tool 檢視專案的正確性		
13 Upgrade Controller 等 Firmware 至最新版本		
Controller Firmware 至最新版本		
CI854A Firmware 至最新版本		
SM810 Firmware 至最新版本		
14 檢查Controller 各 Application or Program 的Task是否符合實際Process使用		
15 在 Online前請存Cold retain value		
16 Controller RNRP的設定值 為 整合系統規範要求		