ABB CUSTOMER WORLD, MARCH 13-16, 2017

Symphony Plus Control & I/O

Product, Lifecycle and Evolution Planning Update

J. Ruhe, Director Product Management

Symphony Control & I/O Product Update

Course ID: 60106

Speaker

J. Ruhe

- ❑ Director Product Management
- ❑ ABB - IAPG
- ❑ Wickliffe, OH

Symphony Plus Control & I/O

Your safety is important to us

Please be aware of these emergency procedures

Emergency numbers: Dial 8087 from any house phone or (713) 853-8087 from any cell phone or outside line

In the event of an **emergency** please call the emergency numbers above… **Do not dial 9-1-1 directly**.

In the event of an alarm please proceed to the nearest exit, or utilize the appropriate exit as directed by Convention Center personnel.

Use the stairwells or escalators to evacuate and **do not** attempt to use the elevators.

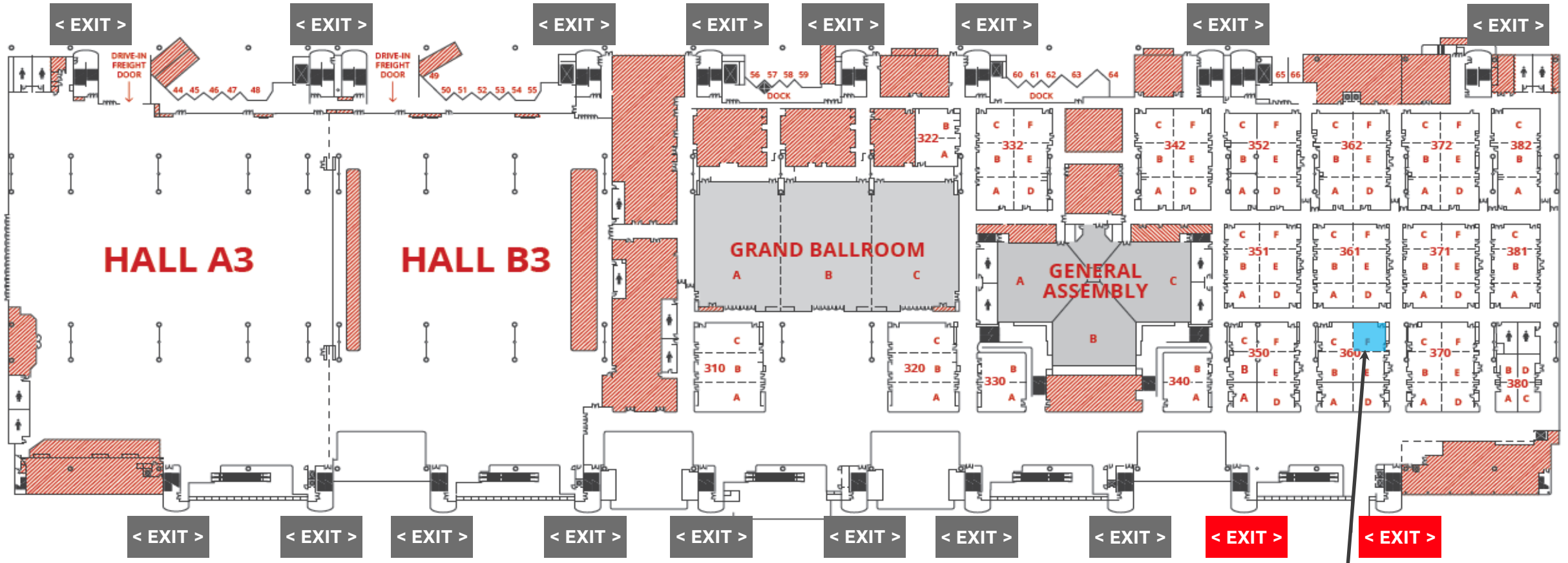
Convention Center associates will be located throughout the public space to assist in directing guests toward the closest exit.

If evacuation is required, please be alert for handicapped or disabled persons who may need your assistance.

Do not re-enter the building until advised by Convention Center personnel or an “all clear” announcement is made

George R. Brown Convention Center

Level three: locate the nearest two exits



Know your surroundings
< EXIT > Emergency exit

Symphony Control & I/O Product Update

Presentation Outline

35+ years of continuous system enhancement and support *"Evolution without obsolescence"*

6,800+
DCS installations
(all industries)
Currently running worldwide

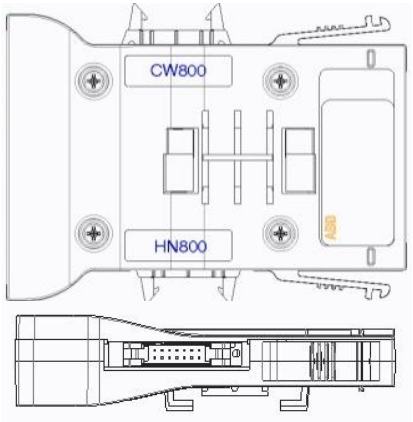
#1 supplier of DCS in the world
#1 global DCS supplier in Power Generation
Reported by ARC Advisory Group, 2016

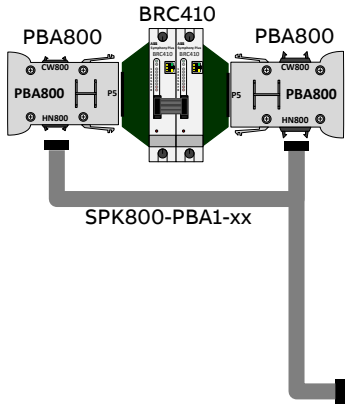
- ❑ Harmony Rack (HR) Series Product Update & Roadmap
- ❑ Symphony DIN (SD) System Architecture
- ❑ SD Series Product Update & Roadmap
- ❑ Symphony Plus Engineering Update & Roadmap
- ❑ HR \ SD Evolution Use Cases

HR Series: Symphony Plus Modules

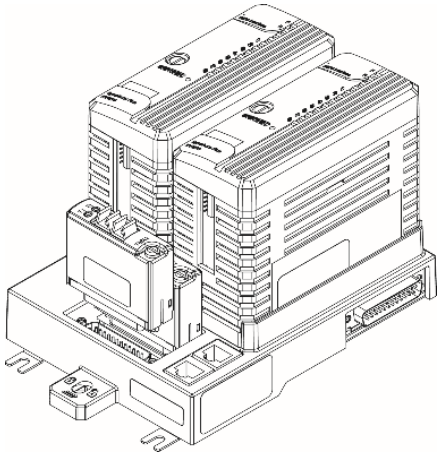
HR Series: Evolution of H-Net to HN800

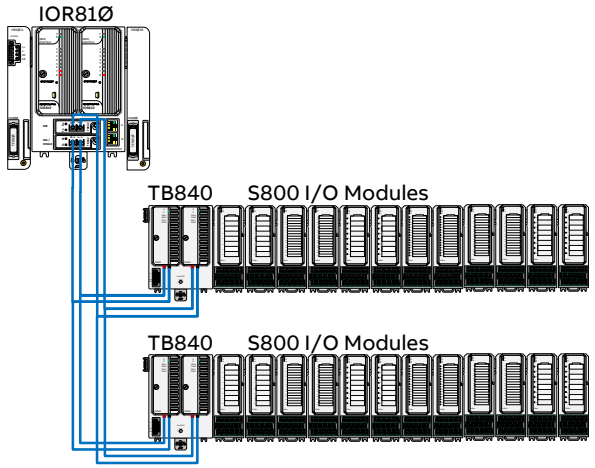
PBA800



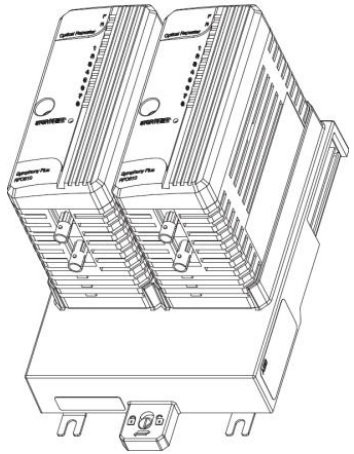


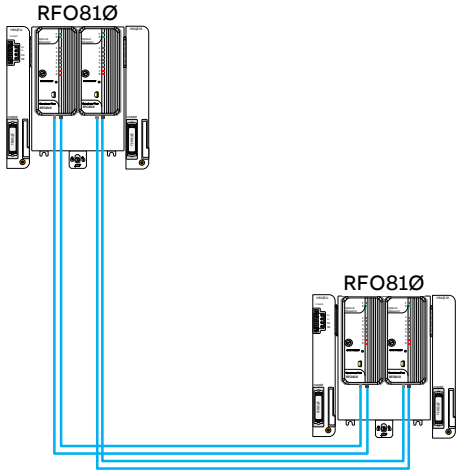
IOR810





RFO810





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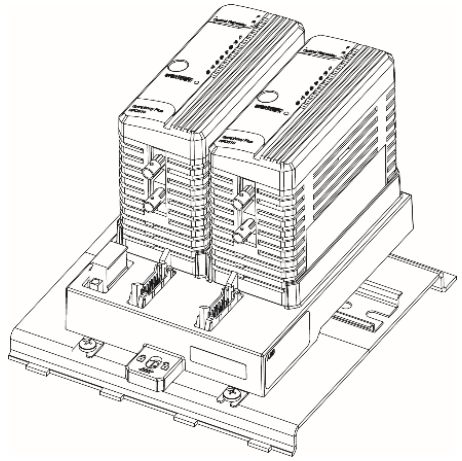
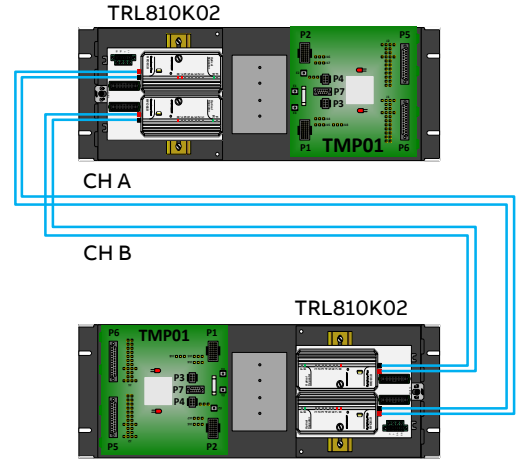


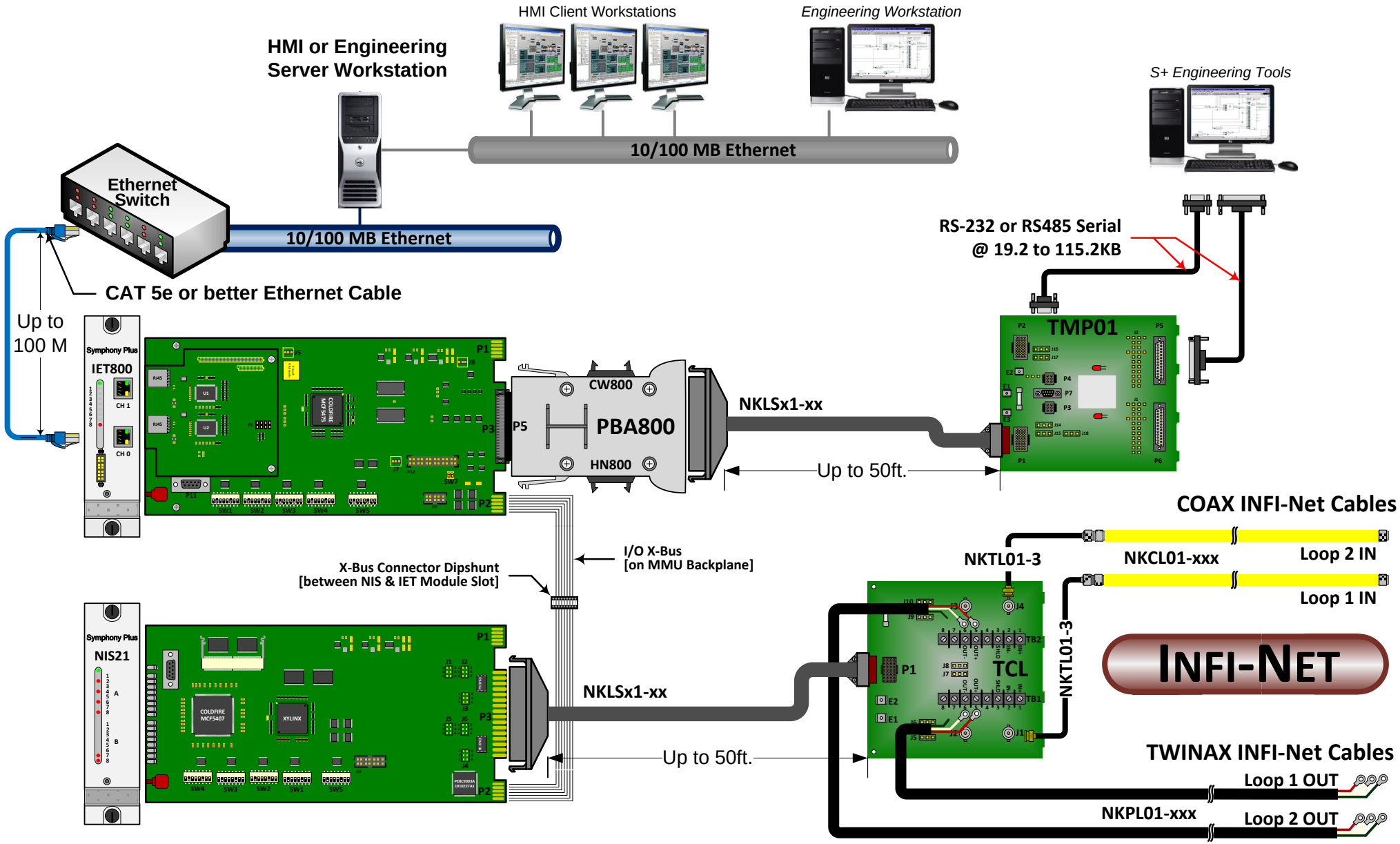


HR Series: IET8ØØ INFI-Net to Ethernet Transfer Module

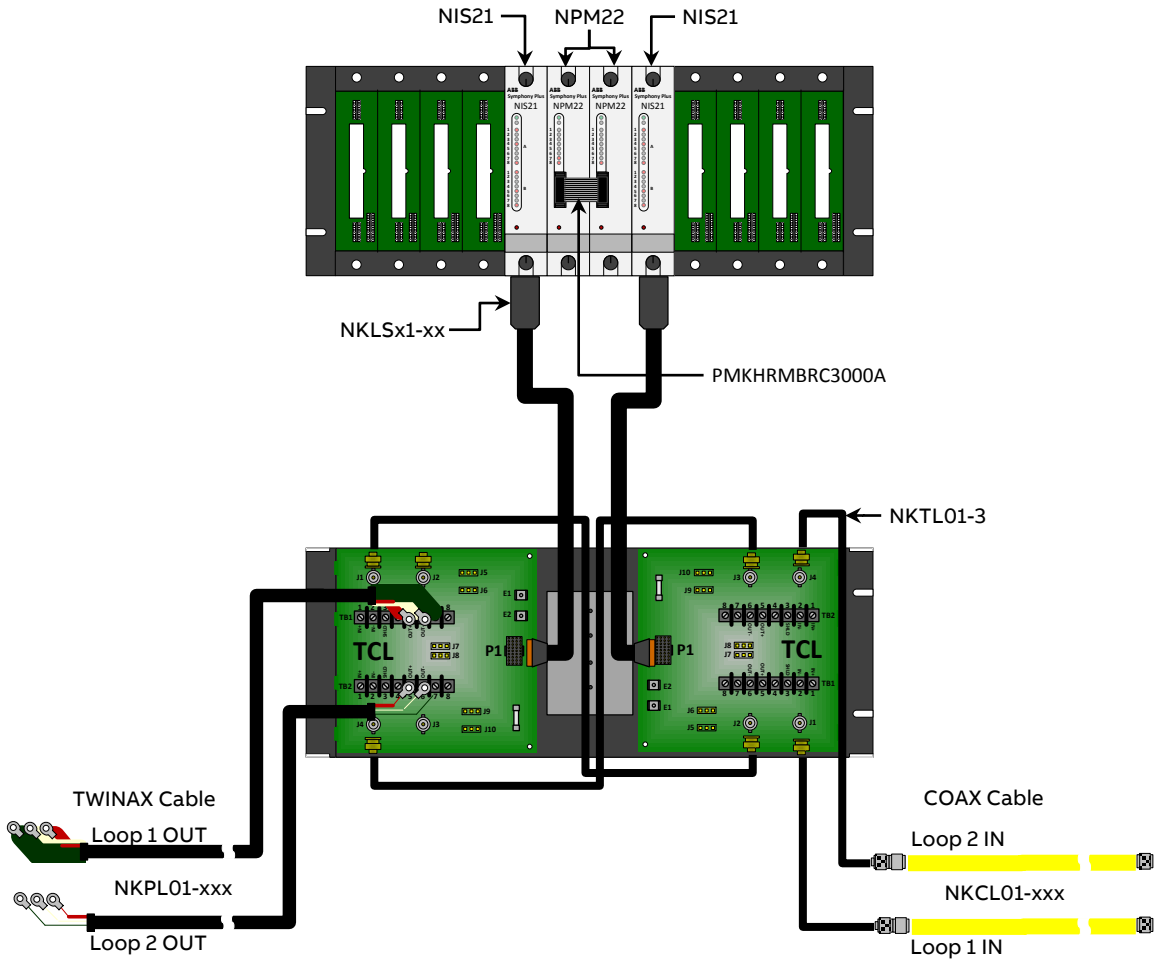
Property	Characteristic / Value
Microprocessor	MCF5475 ColdFire® 32-bit processor running at 256 MHz
Memory	4 Mbytes ROM; 64 Mbytes RAM; 2 Mbytes NVRAM
Power Requirements	Typical: 1.05 A @ +5 VDC = 5.25 W Maximum: 1.25 A @ +5 VDC = 6.25 W
Communication Ports	1x 10/100 Mbps Ethernet TCP/IP (CH 0) 2x RS-232 Serial @ 19.2, 38.4, 57.6, or 115.2 Kbps
Max Cable Lengths	Ethernet (CH 0 on module front plate): 100 M (CAT 5 or better) Serial (P5 or P6 on NTMP01): 100 ft
PC Workstation Capacities HMI or OPC Server Engineering Tools	 30,000 Tag Database 10 Client Windows
Data Security Basic, Default Advanced, Optional	 TwoFish 128-bit cypher SSL3 / TLS1 256-bit encryption
Operating Temperature	0 to +70° C (Ambient, requires forced air ventilation)
Relative Humidity	20% to 95%, 0°C (32°F) to 55°C (131°F) noncondensing 20% to 45% between 55°C and 70°C (158°F) noncondensing
Air Quality	ISA S71.04 G1 (Standard), G3 (Optional)
Certifications	CSA certified for use as process control equipment in nonhazardous (ordinary) and hazardous (Class I; Division II; Groups A, B, C, and D) locations, cCSAus. CE Mark compliant for EMC directive 2004/108/EC and LV directive 2006/95/EC

**** IET800 requires a license***

HR Series: ICI8ØØ Ethernet CIU connection details



HR Series: PCU Communications Modules NIS21 & NPM22



Property	Characteristic / Value	
	NIS21	NPM22
Microprocessor	ColdFire MCF5407 @160 MHz	
Memory	4 MB DRAM	8 MB DRAM 512 KB NVRAM
Power Requirements	4.1 W = 825 mA @ 5 VDC	10 W = 2.0 A @ 5 VDC
Communications	INFI-Net: 10 MHz or 2 MHz	ControlWay: 1.0 Mbaud
Communication Rate	Sustained: **2,000** XR's per second Bursts: > **6,000** XR's per second for up to 30 seconds	
Warm Fail-over	Time (sec)	
	Local (Exports)	Remote (Imports)
50 Analog + 100 Digital	0.30	0.90
300 Analog + 450 Digital	0.60	2.0
600 Analog + 900 Digital	1.0	3.0

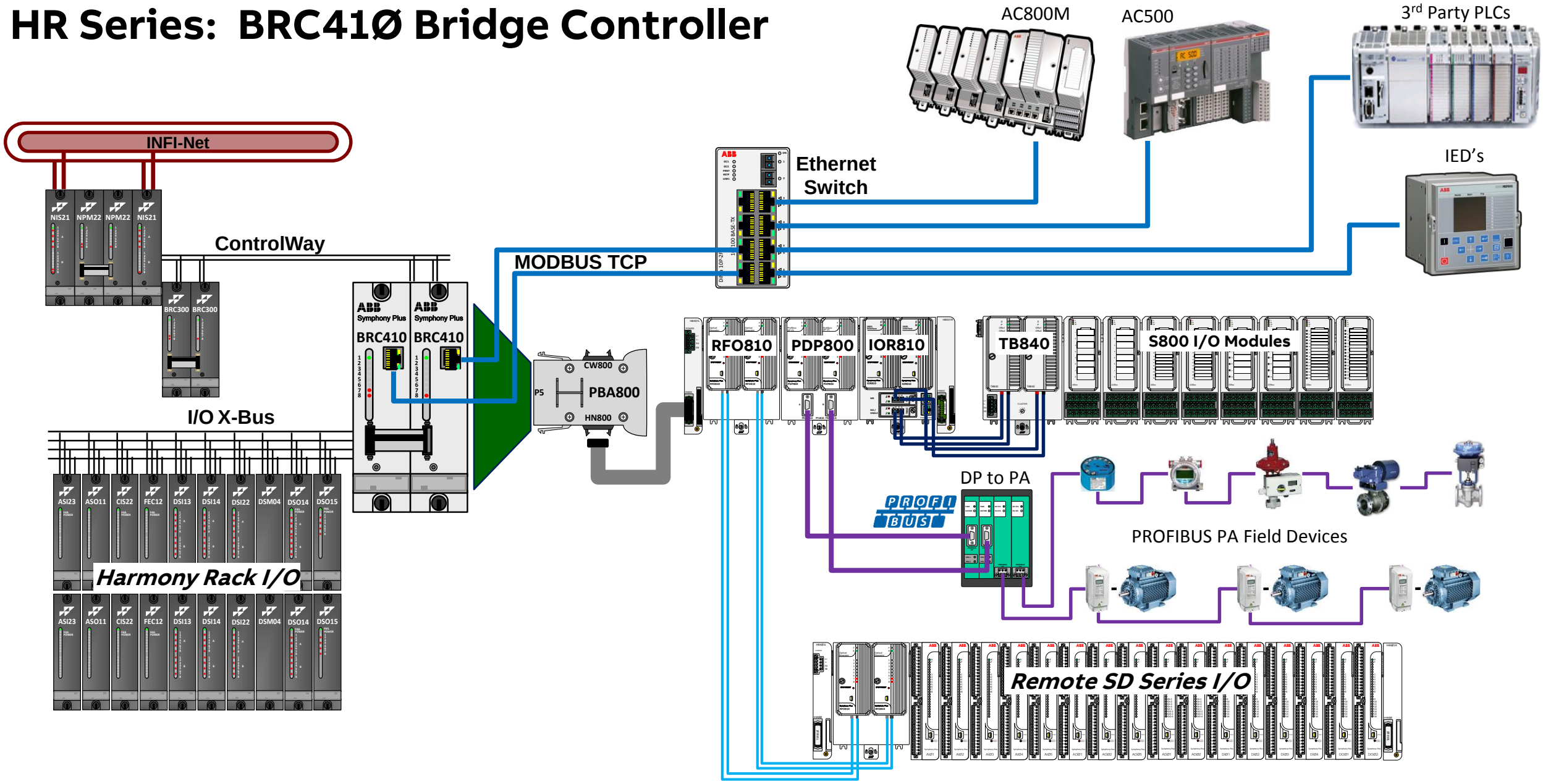
PMKHRMBRC3000A or PMKHRMBRC3000B cable is required for NPM22 redundancy

HR Series: BRC41Ø Bridge Controller

Property	Characteristic / Value
Microprocessor	MCF5475 ColdFire® 32-bit processor running at 256 MHz
Memory	2 Mbytes ROM; 8 Mbytes RAM; 2 Mbytes NVRAM
Power Requirements BRC410 Module PBA800 Process Bus Adaptor	 5 VDC at 2 A; 10 W typical 5 VDC at 100 mA; 0.5 W typical
Communications Ports Serial Ports Diagnostic Ethernet	 2x RS-232-C, or 1x RS-232-C and 1x RS-485; via PBA800 and NTMP01 1x RS-232-C via onboard DB9 (*mini USB on front plate in Future*) 1x 10/100 Mbps RJ45 Ether net port on front plate
Redundancy	[Optional], RCL cable connection on module front plate
Programmability Languages Function Block Capacity* Number of Segments (task) Execution Cycle Time	 Standard INFI 90 FC's, ANSI 'C' and Batch 90 / UDF Up to 30,000 Function Blocks Up to 8 segments Target cycle time down to 1 msec, 250 msec default
Symphony Communications	
ModBus TCP Interface Client / Server Capacity Point Capacity (Licenses)	Harmony Gateway Software 4 ModBus TCP Servers, 24 ModBus TCP Clients 500, 1500, 3000, 4000

**** BRC410 is capable of addressing 32,000 FB's. Actual FB capacity is configuration dependent.***

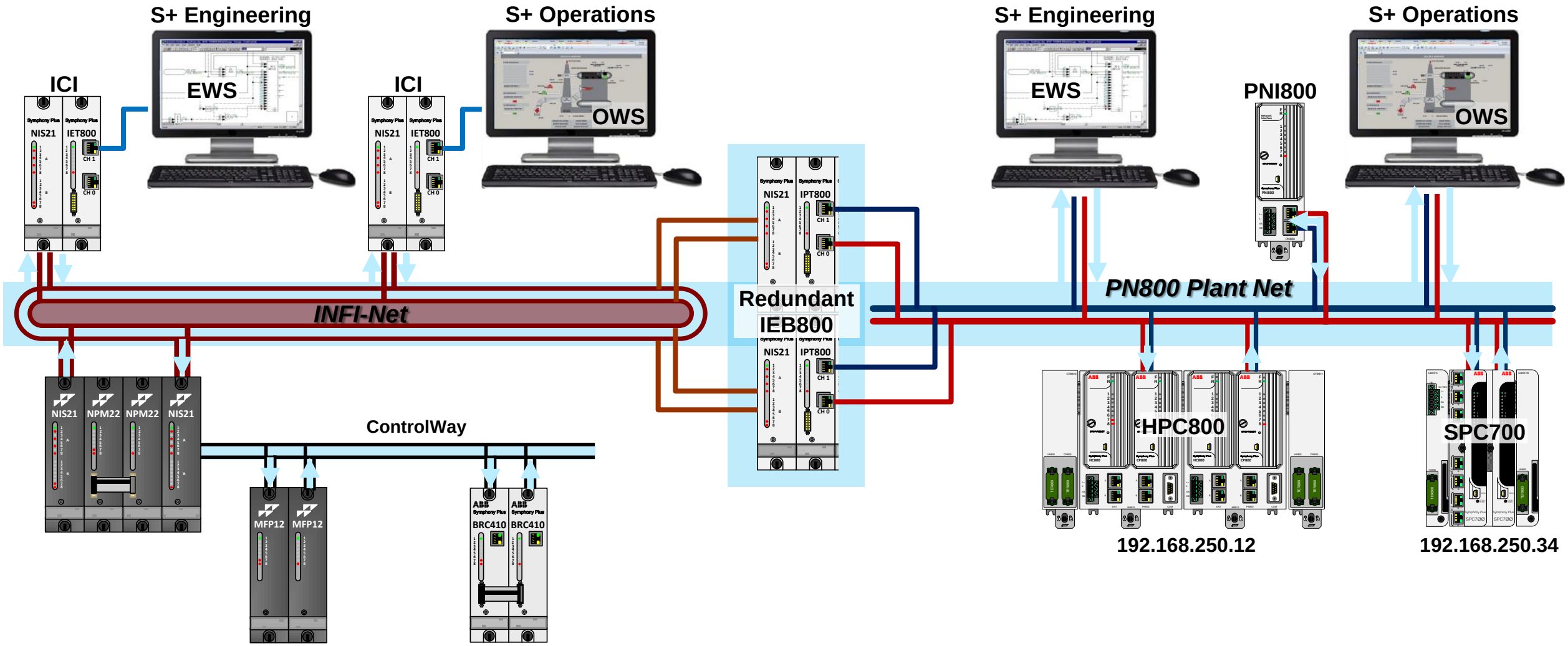
HR Series: BRC410 Bridge Controller



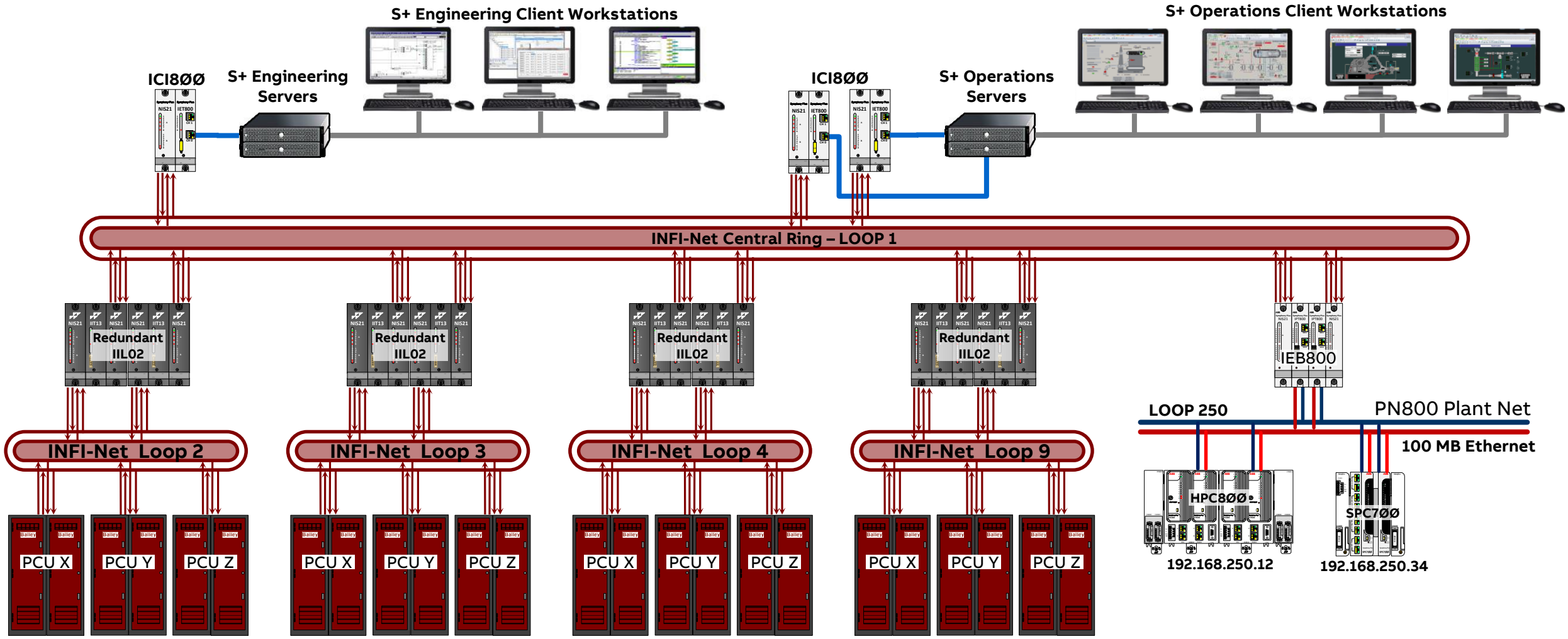
HR Series: IPT8ØØ INFI-Net to Plant Net Transfer Module

Property	Characteristic / Value
Microprocessor	MCF5475 ColdFire® 32-bit processor running at 256 MHz
Memory	4 Mbytes ROM; 64 Mbytes RAM; 2 Mbytes NVRAM
Power Requirements	Typical: 1.05 A @ +5 VDC = 5.25 W Maximum: 1.25 A @ +5 VDC = 6.25 W
Communication Ports	CH 0 & 1: 2x 10/100 Mbps Ethernet TCP/IP, CAT 5e or better cable up to 100 m
Redundancy Module Ethernet	 Via PBA800 and SPK800-RCL1 cable PN800 redundancy is based on IEC-62439 - PRP v0
Tag Capacity	30,000 Tags
Data Security	TwoFish 128-bit cypher
Operating Temperature	0 to +70° C (Ambient, requires forced air ventilation)
Relative Humidity	20% to 95%, 0°C (32°F) to 55°C (131°F) noncondensing 20% to 45% between 55°C and 70°C (158°F) noncondensing
Air Quality	ISA S71.04 G1 (Standard), G3 (Optional)
Certifications	CSA certified for use as process control equipment in nonhazardous locations CE Mark EMC directive 2004/108/EC and LV directive 2006/95/EC

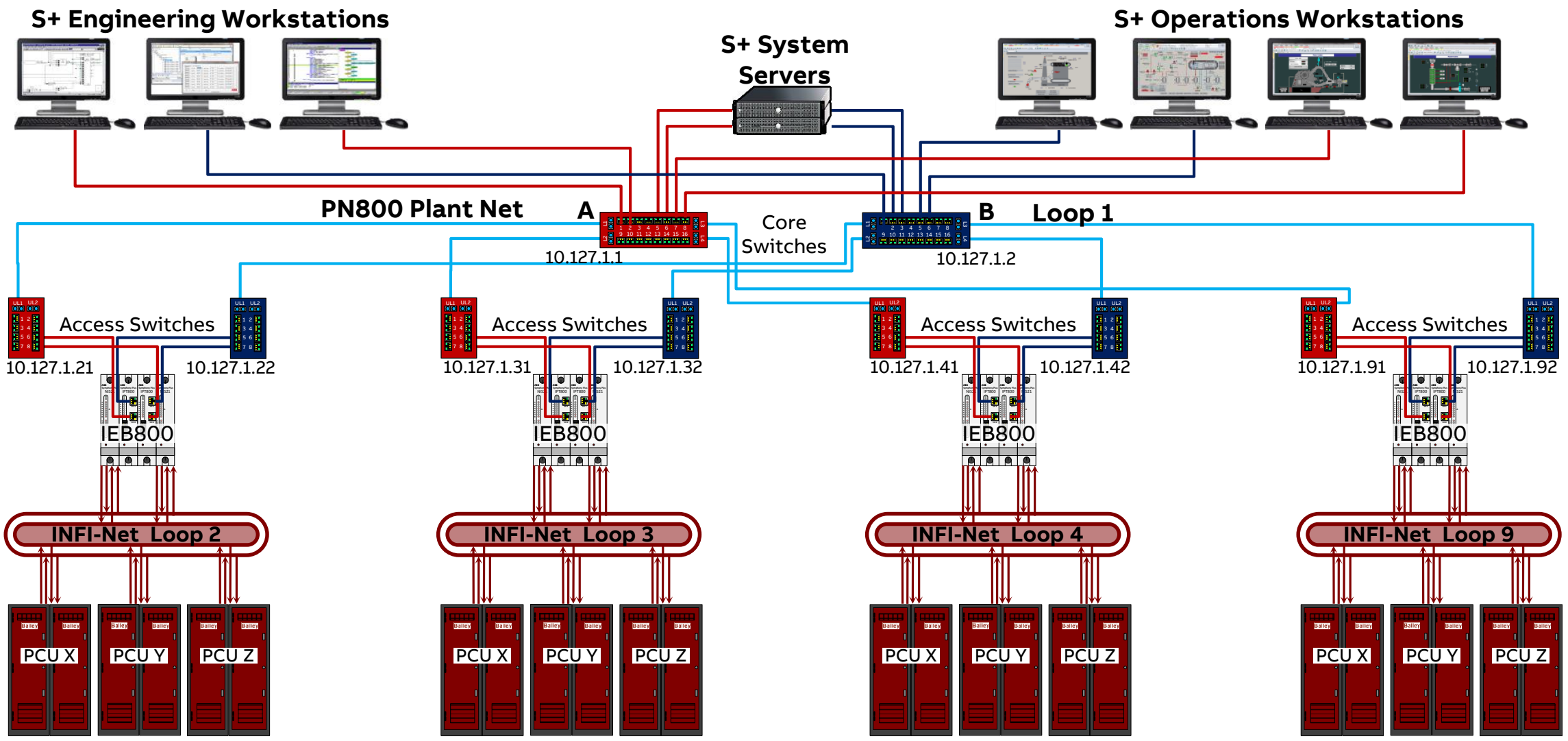
HR Series: IEB8ØØ INFI-Net to Ethernet Bridge Functional Overview



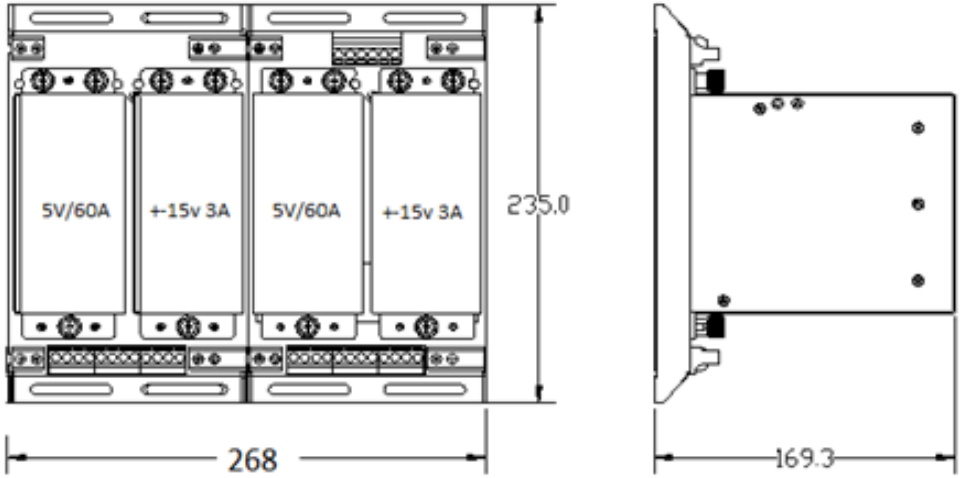
HR Series: IEB8ØØ – Adding PN800 Plant Net as Satellite Ring



HR Series: IEB8ØØ – Upgrading Central Ring to PN800 Plant Net



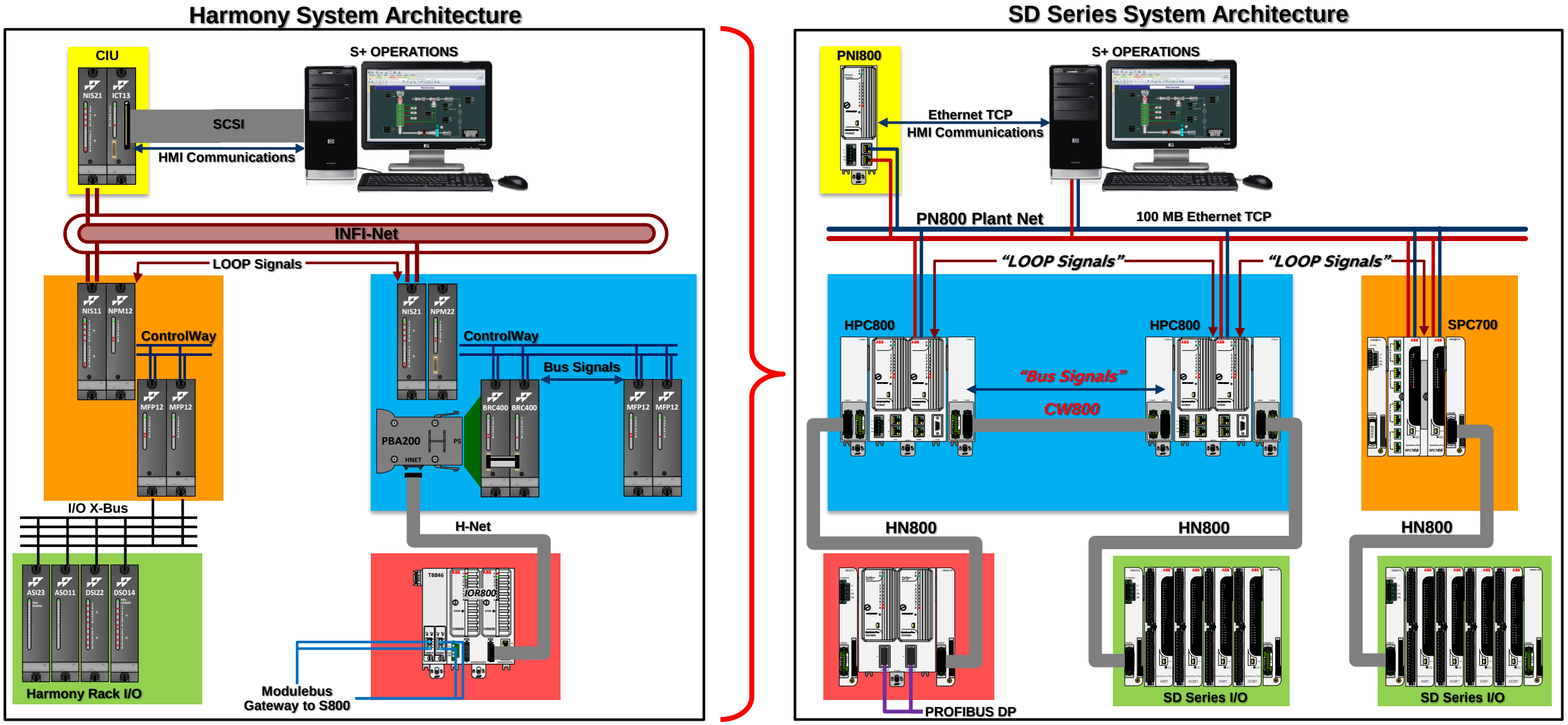
HR Series Roadmap: MPS 4



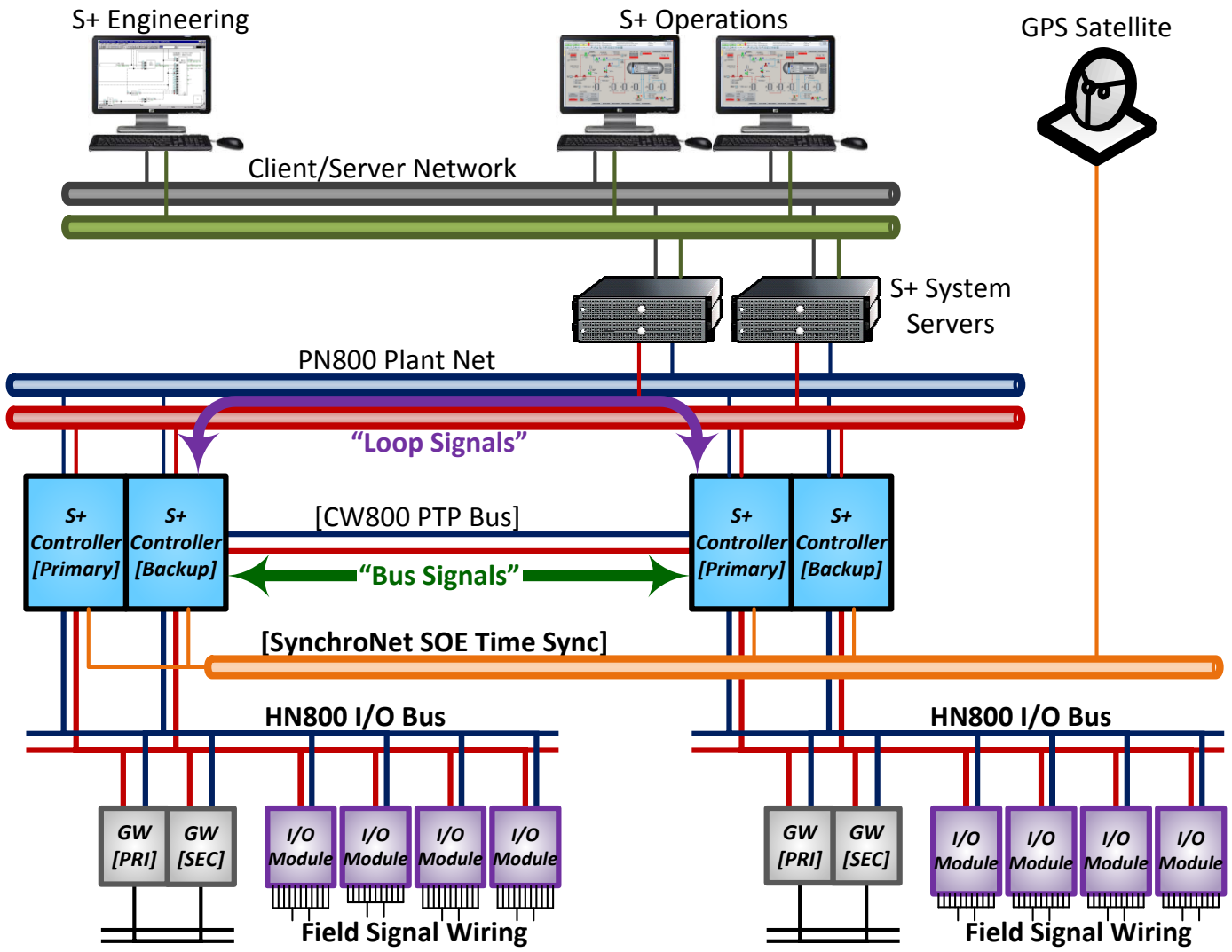
Part No.	Description
SPS01-24V	Power module, Output 10A @ +24 VDC ± 1%
SPS02-48V	Power module, Output 5A @ +48 VDC ± 1%
SPS03-5V	Power module, Output 60A @ +5 VDC
SPS03-15V	Power module, Output 3A @ ±15 VDC
BP01	Base plate for SPS01 power modules
BP02	Base plate for SPS02 power modules
BP03	Base plate for SPS03 power modules, with integrated DC bus monitoring PFI assembly

Target release date: 4Q-2017

Harmony Rack & Symphony DIN Architectural Comparison



Symphony DIN Architecture Overview

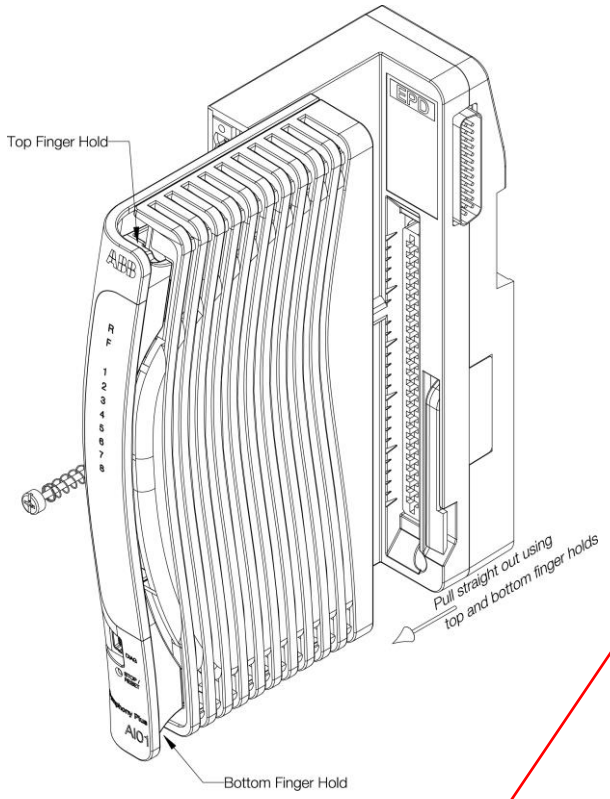


- PN800 Plant Network
  - 100 MB Ethernet TCP
  - INFI-Net over Ethernet XR based
  - PRP v.0 redundancy scheme
- CW800 PTP bus lines in the world:
  - Redundant RS485 @ 4.0 MBps
  - Synchronous update in msec
- Synchro-Net (SNTP)
  - Network for distributing time sync
- HN800 I/O Bus: (master / slave bus)
  - Redundant RS485 @ 4.0 MBps
  - Up to 64 slave nodes per bus
  - 30 m electrical, 3,000 m using MM Fiber Optic cables & repeaters

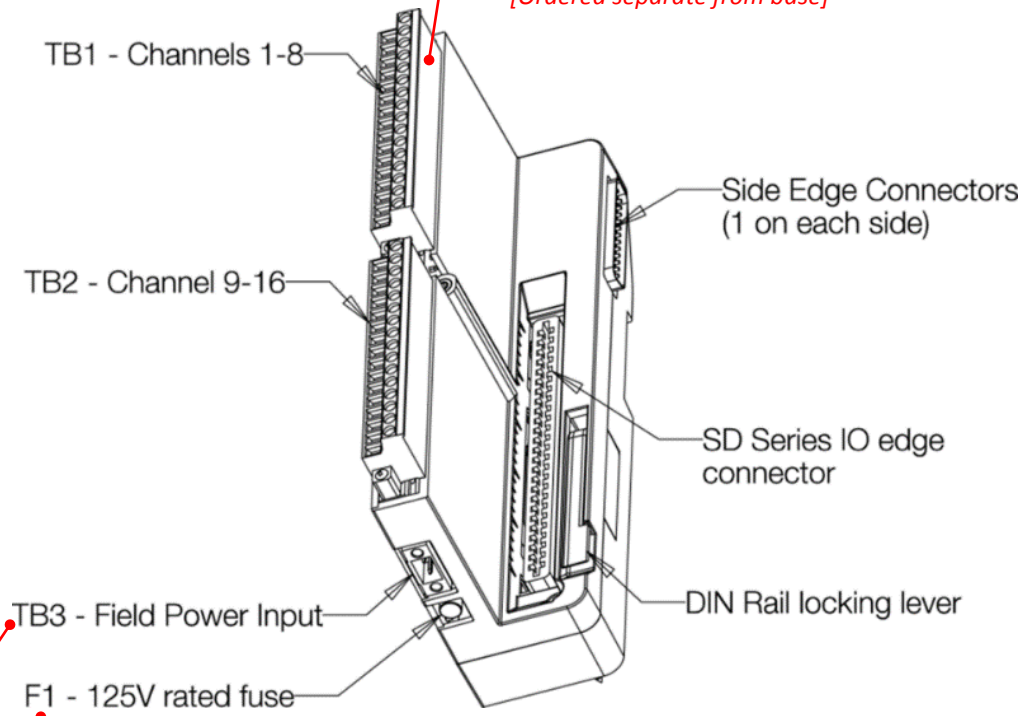
SD Series: Standard I/O

Type	Module	#CH / Signals	Description / Properties
Analog	**AIØ1**	16 AI	4-20 mADC / 1-5VDC, 2x8 Group Isolation, 16-bit ADC
	AIØ2	16 AI with HART	4-20 mADC, HART AI, 1x16 Group Isolation, 16-bit ADC
	AIØ3	8 RTD	2/3/4 Wire RTDs, 100 Ω Platinum U.S. & European Standards
	AIØ4	16 TC / mV	-100 to +100 mV, 0 to +100mV or Type: B/E/J/K/L/N/R/S/T/U TC's
	AIØ5	8 AI with HART	HART AI, Individual CH Isolation, Dedicated ADC, HART modem & 24V Field PS per CH
	AOØ1	16 AO	4-20 mADC / 1-5VDC, Group Isolation, 12-bit DAC
	AOØ2	16 AO with HART	HART AO, 1x16 Group Isolation, 4-20 mADC, 12-bit DAC
	AOØ5	8 AO with HART	HART AO, Individual CH Isolation, Dedicated DAC & HART modem per CH
Mixed	**ADØ1**	4x(AI,AO, DI,DO)	1x8 Group Isolated Analog I/O with HART, 24/48 VDC DI's, 24/48 VDC DO's
	ADØ2	4x(AI,AO, DI,DO)	1x8 Group Isolated Analog I/O with HART, 110VAC/125VDC DI's, 24/48 VDC DO's
Digital	**DIØ1**	16 DI	24 / 48 VDC Digital Inputs, SOE (1 msec resolution)
	DIØ2	16 DI	110 VAC / 125 VDC Digital Inputs, SOE (10/20 msec resolution)
	DIØ3	16 DI	24 VDC Digital Inputs [SOE not supported]
	DIØ4	16 DI	48 VDC Digital Inputs [SOE not supported]
	DOØ1	16 DO	24/48 VDC Open-Collector DO, max 250 mADC
	DOØ2	16 DO	24/48 VDC Open-Collector DO, Short-Circuit detection & protection
	PIØ1	8 PI	Modes: Freq.(5 Hz to 100 kHz), Period (1µs to 30sec), Count (0 to 1.073B)

SD Series: Modular Design Features

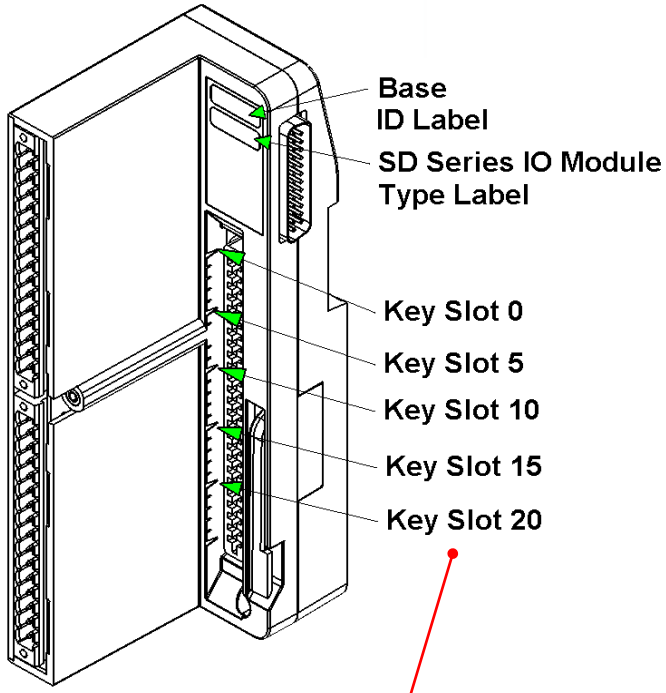


1949920A1 16-PT clamping screw type plug-in Terminal Block
AWG #26-14 solid, #12 stranded
[Ordered separate from base]



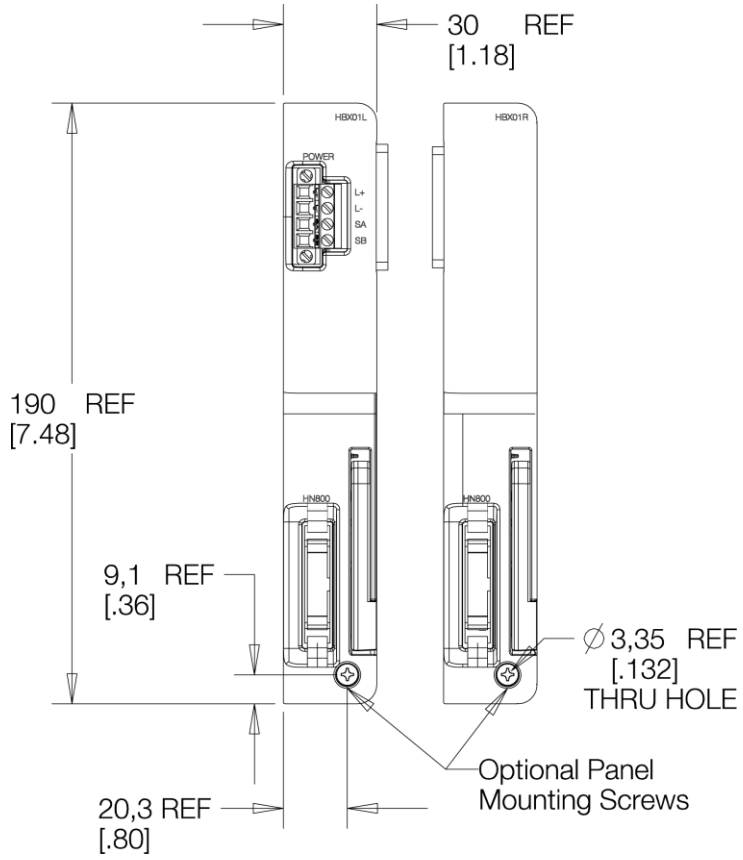
1945820A15001 5.0 A Fuse

1949926A2 2-PT clamping screw type plug-in Terminal Block
AWG #26-12 solid or stranded

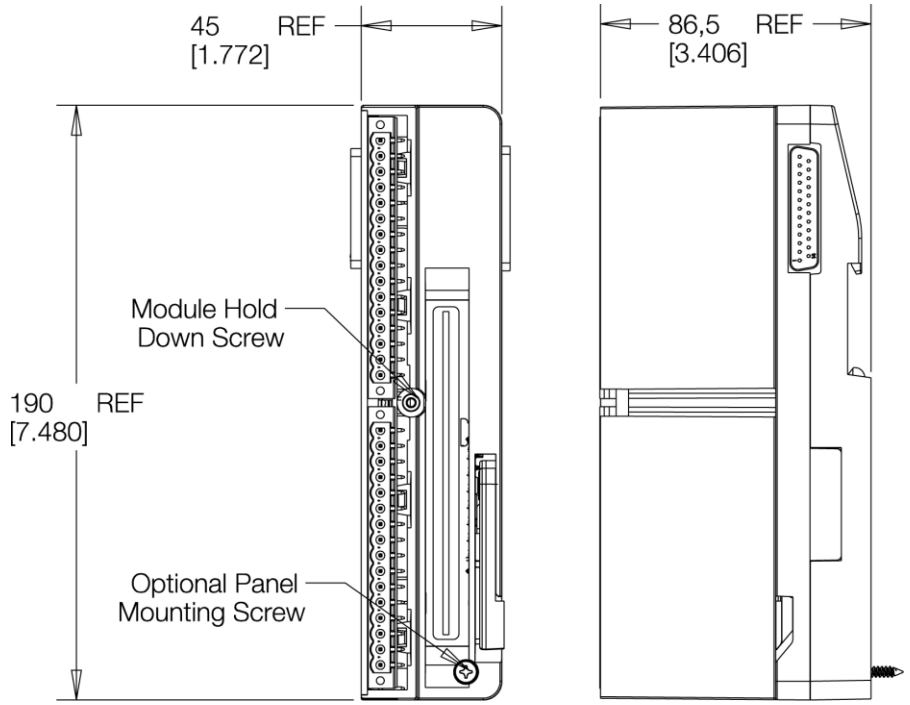


SPKEY01
Bag of 100 plastic inserts for module type keying bases

SD Series: Horizontal Row Mounting Hardware



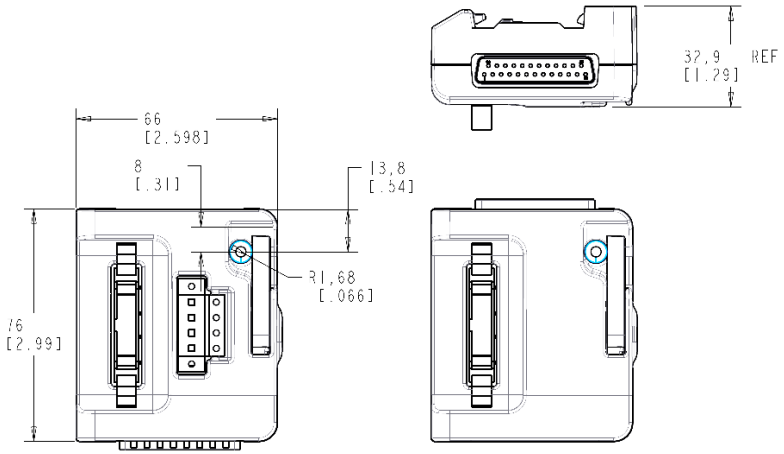
HBXØ1L/R Horizontal Bus Extenders



HBSØ1 - XXX Horizontal Base Single module

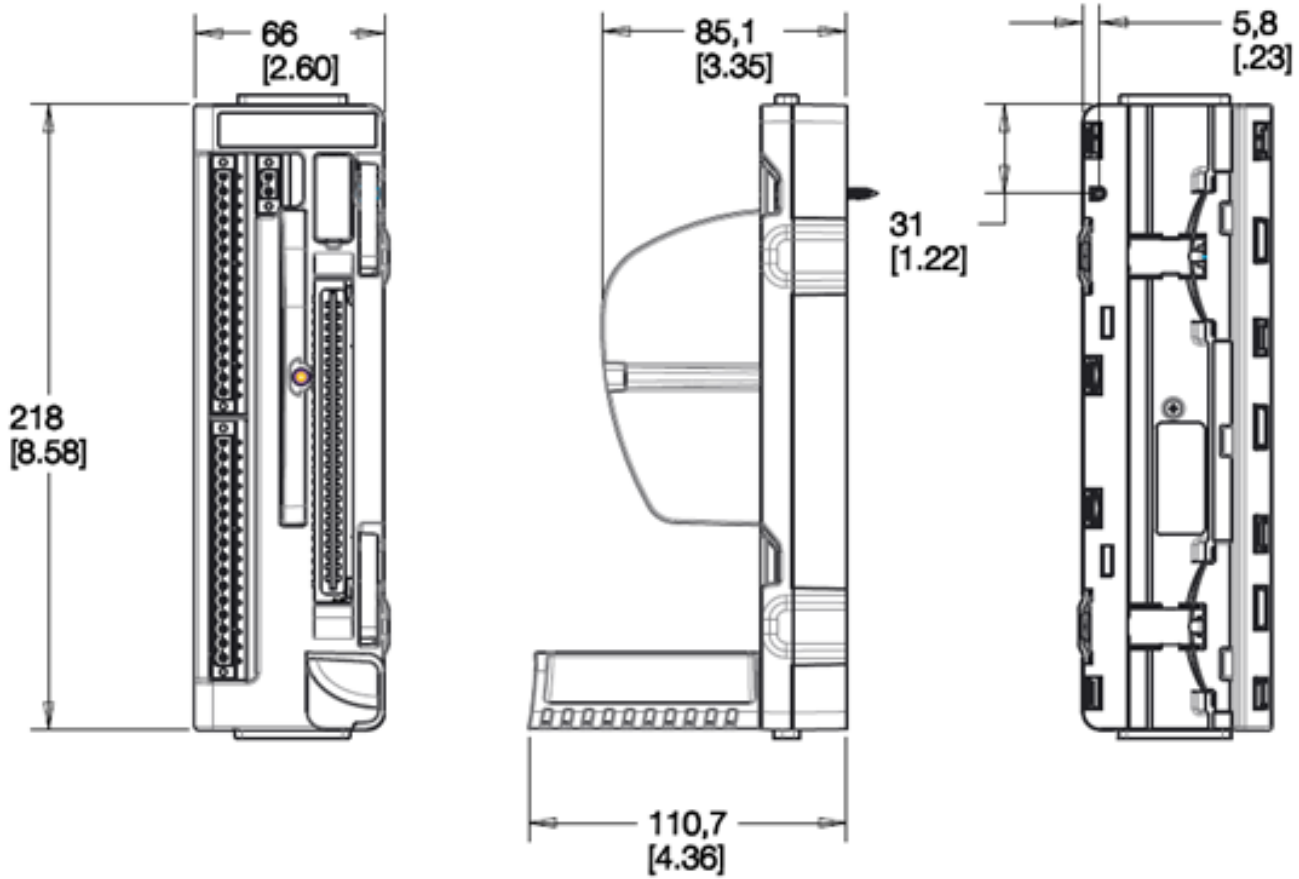
- **FPH: Field Power switch High**
- **FPN: Field Power switch Neutral**
- **EPD: External Power or Differential**
- **CJC: Cold-Junction Compensation**

SD Series: Vertical Column Mounting Hardware



VBXØ1T VBXØ1B

VBXØ1T/B Vertical Bus Extenders



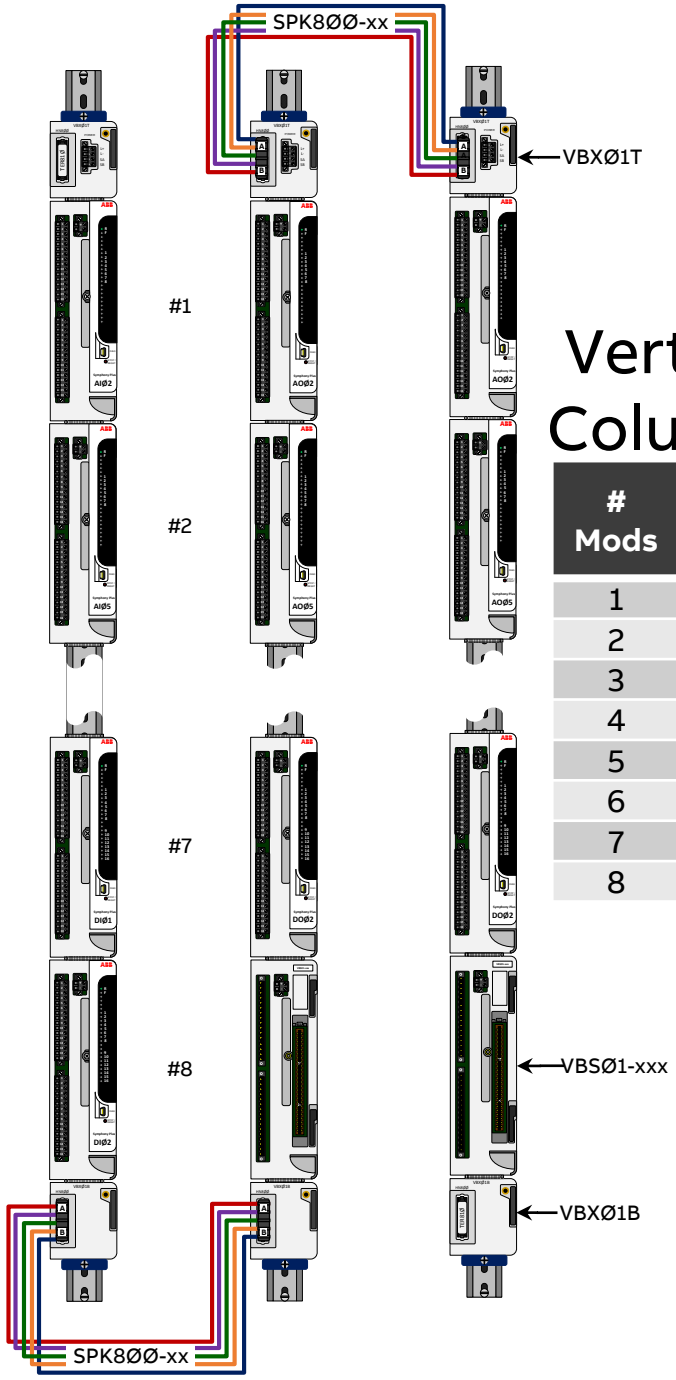
VBSØ1 - XXX Vertical Base Single module
- FPH: Field Power switch High
- FPN: Field Power switch Neutral
- EPD: External Power or Differential
- CJC: Cold-Junction Compensation

SD Series: Standard I/O Mounting Details

- Max 64 I/O modules on Electrical HN800 bus of maximum length 30 meters
- Up to 10 horizontal rows (Bus Segments) can be connected in single HN8ØØ electrical bus
- Up to 10 vertical columns (Bus Segments) can be connected in single HN8ØØ electrical bus
- Rows & columns are connected using SPK8ØØ-xx cables
- SPK8ØØ-xx cables must remain within cabinet enclosure

Horizontal Rows

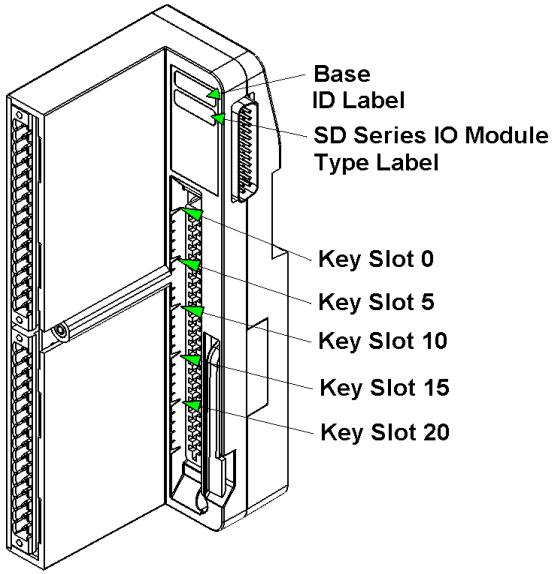
# Mods	Total Width (mm)	# Mods	Total Width (mm)	# Mods	Total Width (mm)
1	117	9	501	17	885
2	165	10	549	18	933
3	213	11	597	19	981
4	261	12	645	20	1029
5	309	13	693	21	1077
6	357	14	741	22	1125
7	405	15	789	23	1173
8	453	16	837	24	1221



Vertical Columns

# Mods	Total Length (mm)
1	376
2	597
3	818
4	1039
5	1260
6	1481
7	1702
8	1923

SD Series: I/O Module & Base Compatibility and Type Keying

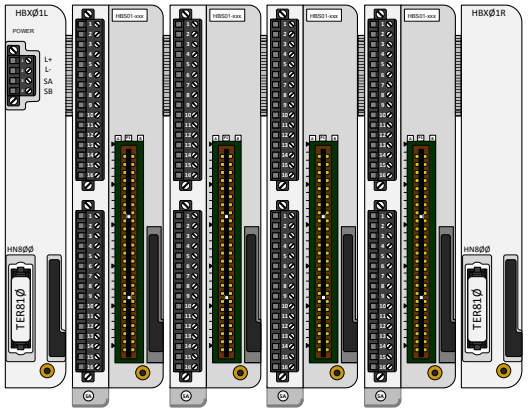


SPKEY01
Bag of 100 plastic inserts for module type keying bases

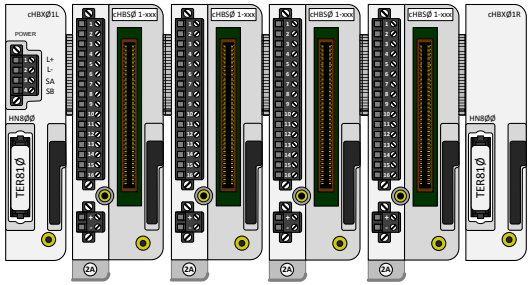
SD I/O Module	HBSØ1-xxx Horizontal Bases				VBSØ1-xxx Vertical Bases				Type Keying	
	FPH	FPN	EPD	CJC	FPH	FPN	EPD	CJC	Slot #1	Slot #2
AIØ1	X		X		X		X		5	18
AIØ2	X		X		X		X		5	19
AIØ3				X				X	13	20
AIØ4				X				X	13	20
AIØ5			X				X		8	19
AOØ1			X				X		7	19
AOØ2			X				X		7	19
AOØ5			X				X		8	19
ADØ1			X				X		11	19
ADØ2			X				X		11	19
DIØ1	X	X	X		X	X	X		9	15
DIØ2	X	X	X		X	X	X		9	15
DIØ3	X	X	X		X	X	X		9	16
DIØ4	X	X	X		X	X	X		9	16
DOØ1	X	X	X		X	X	X		10	16
DOØ2	X	X	X		X	X	X		10	16
PIØ1	X	X	X		X	X	X		12	17

SD Series: HN800 I/O Bus Length Calculation

Horizontal Rows



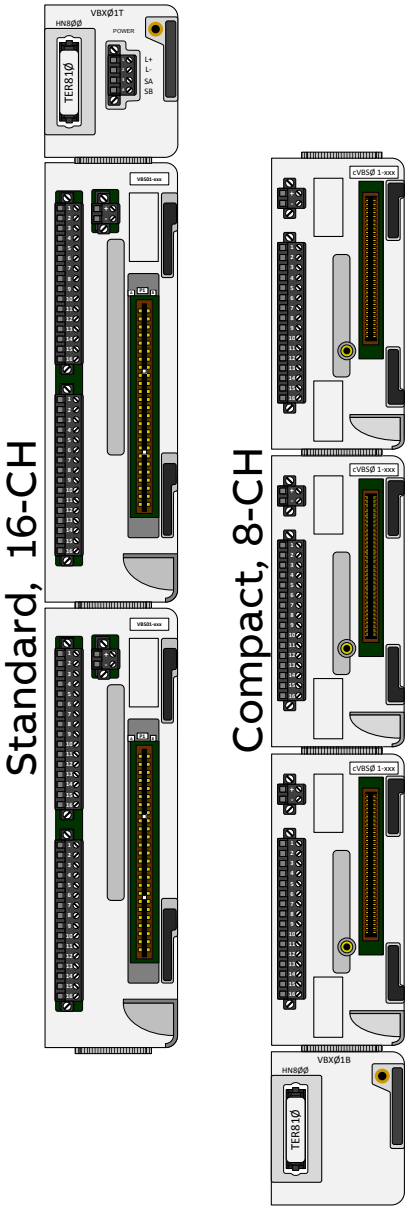
Standard, 16-CH



Compact, 8-CH

Component	Description	Bus Length mm
MB81Ø	HPC800 module mounting base	175
CTB81Ø/811	HPC800 Communications Terminal Boards	150
MB7Ø5	SPC7ØØ Horizontal row module base, Non-Redundant	150
MB71Ø	SPC7ØØ Horizontal row module base, Redundant	200
VB7Ø5	SPC7ØØ Vertical column module base, Non-Redundant	305
VB71Ø	SPC7ØØ Vertical column module base, Redundant	355
cHBSØ1-xxx	Compact Horizontal Base Single module	90
cHBxØ1L/R	Compact Horizontal Bus Extenders (Left / Right)	90
HBRØ1-xxx	Horizontal Base Redundant module	200
HBSØ1-xxx	Horizontal Base Single module	150
HBxØ1L/R	Horizontal Bus Extenders (Left / Right)	150
VBRØ1-xxx	SD Series I/O Vertical Base Redundant module	355
VBSØ1-xxx	SD Series I/O Vertical Base Single module	305
VBXØ1T/B	HN800 Vertical Bus Extenders (Top / Bottom)	75
PTU81Ø	PDP8ØØ Horizontal row module base, Redundant	175
RMU61Ø	cRBXØ1 Compact F. O. Repeater Horizontal base	175
VMU61Ø	cRBXØ1 Compact F. O. Repeater Vertical base	255
RMU81Ø	RFO81Ø Horizontal row module base, Redundant	175
IOR81Ø	IOR81Ø Horizontal row module base, Redundant	175
ITU8Ø5	HAI8Ø5/HAO8Ø5 HART Horizontal row module base	75

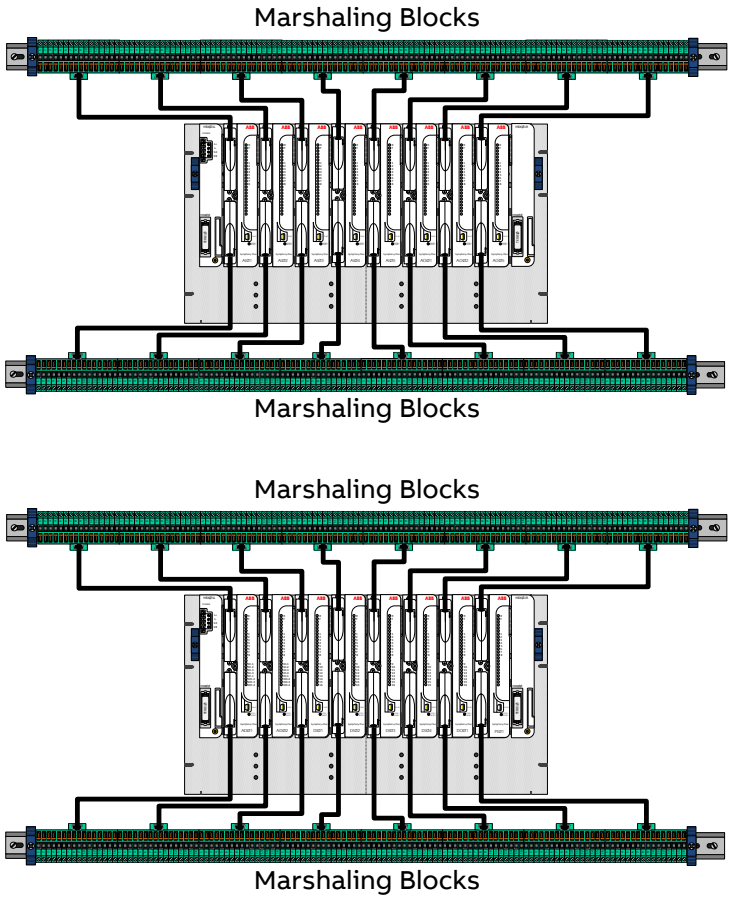
Vertical Columns

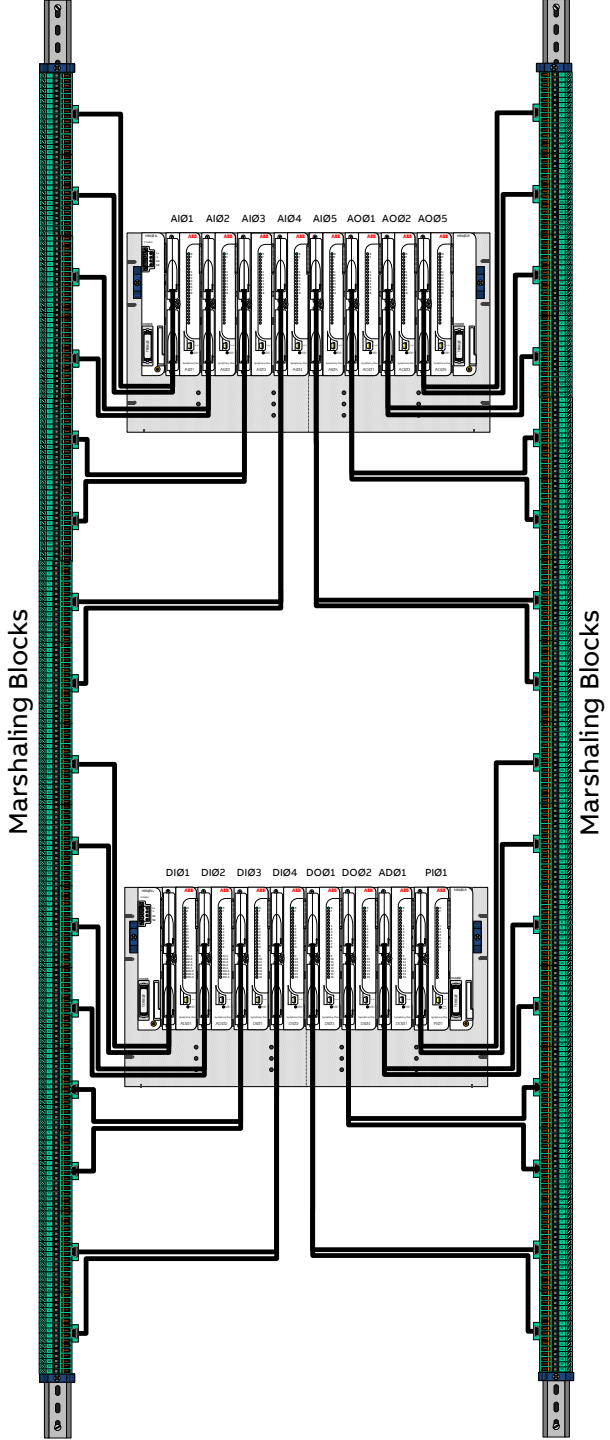


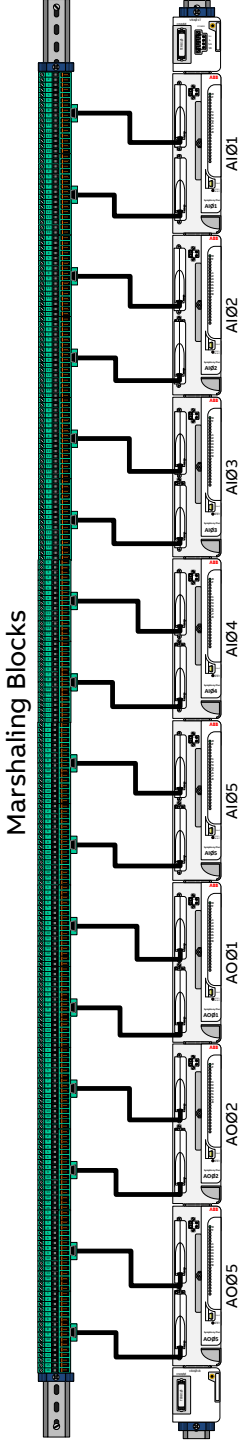
Standard, 16-CH

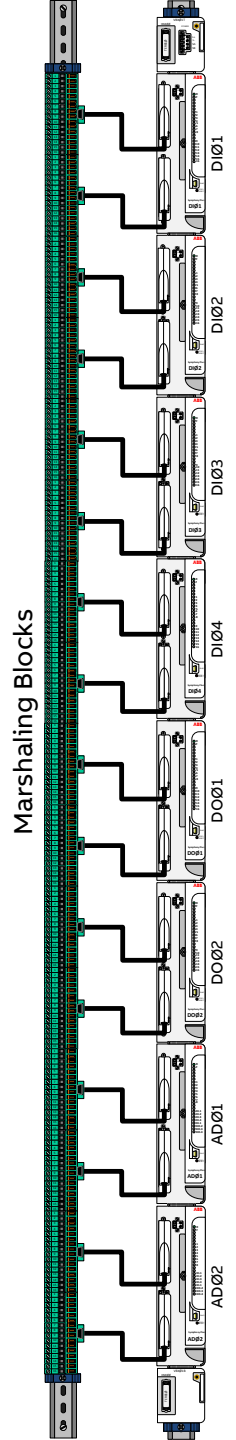
Compact, 8-CH

SD Series: I/O Marshaling



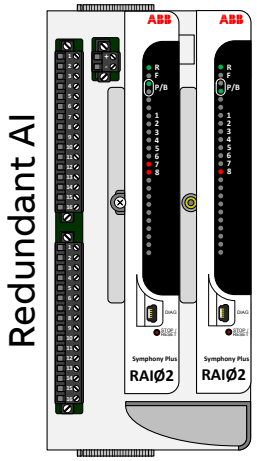




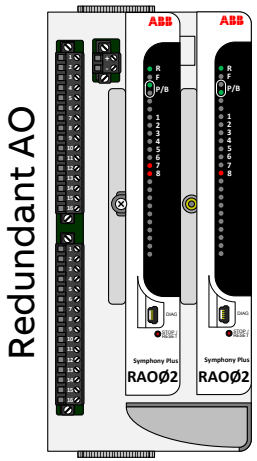


SD Series: Redundant I/O

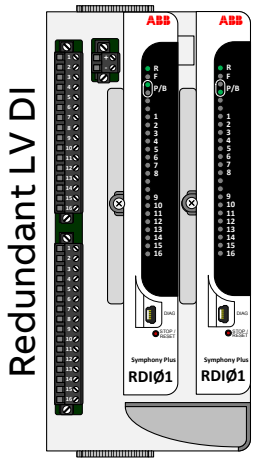
RAIØ2



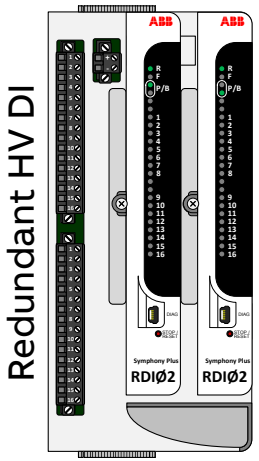
RAOØ2



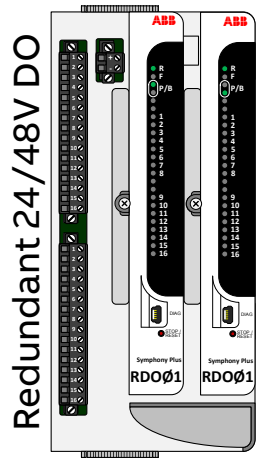
RDIØ1



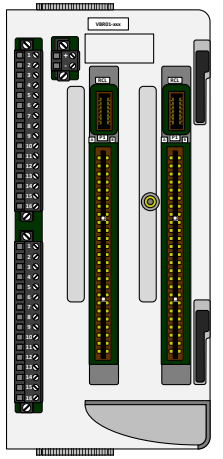
RDIØ2



RDOØ1



VBRØ1-xxx

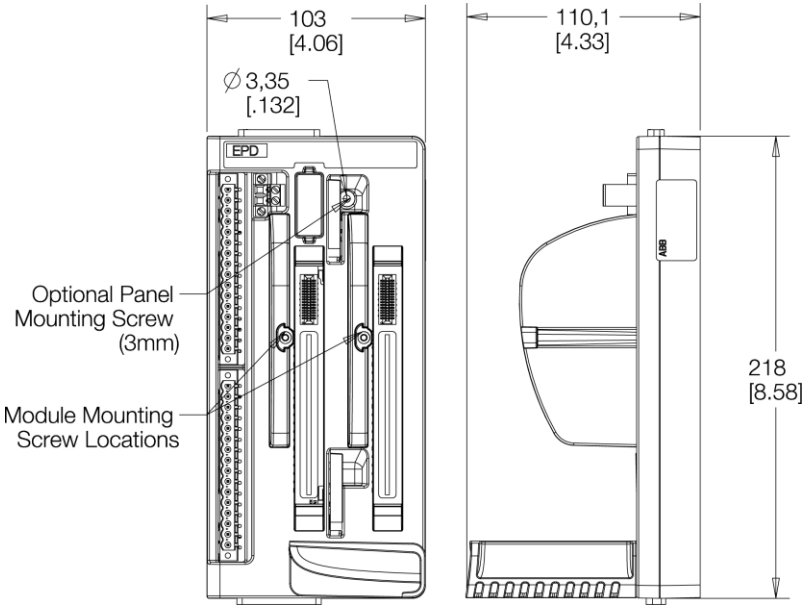


	Module	I/O Type	Description / Properties
1	RAIØ2	16 AI	Group-Isolated (1-5 VDC, 4-20 mADC) HART AI
2	RAOØ2	16 AO	Group-Isolated (1-5 VDC, 4-20 mADC) HART AO
3	RDIØ1	16 DI	24 / 48 VDC Digital Input, 1 msec SOE
4	RDIØ2	16 DI	110 VAC / 125 VDC Digital Input, 10/20 msec SOE
5	RDOØ1	16 DO	24 – 48 VDC Digital Output, max 250 mADC
6	VBRØ1-xxx	16 CH	**V**ertical **B**ase **R**edundant Modules: [xxx = FPH, FPN, EPD]

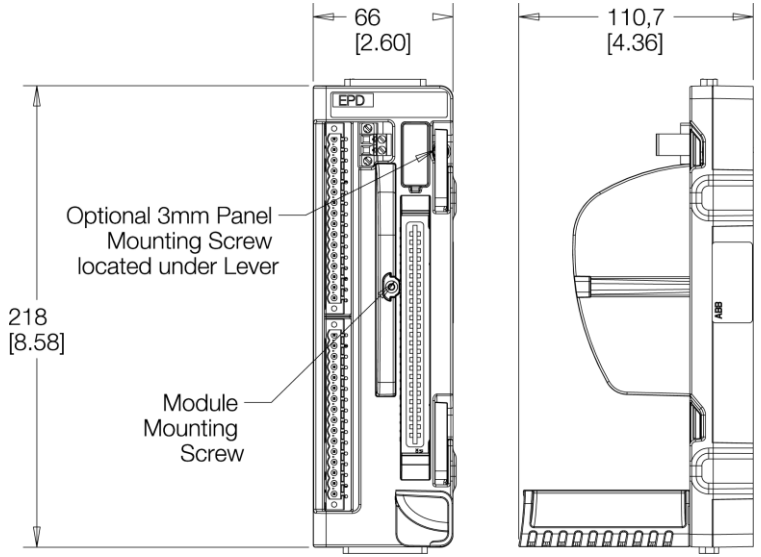
HBRØ1-XXX **H**orizontal **B**ase **R**edundant Modules Target 4Q-2017

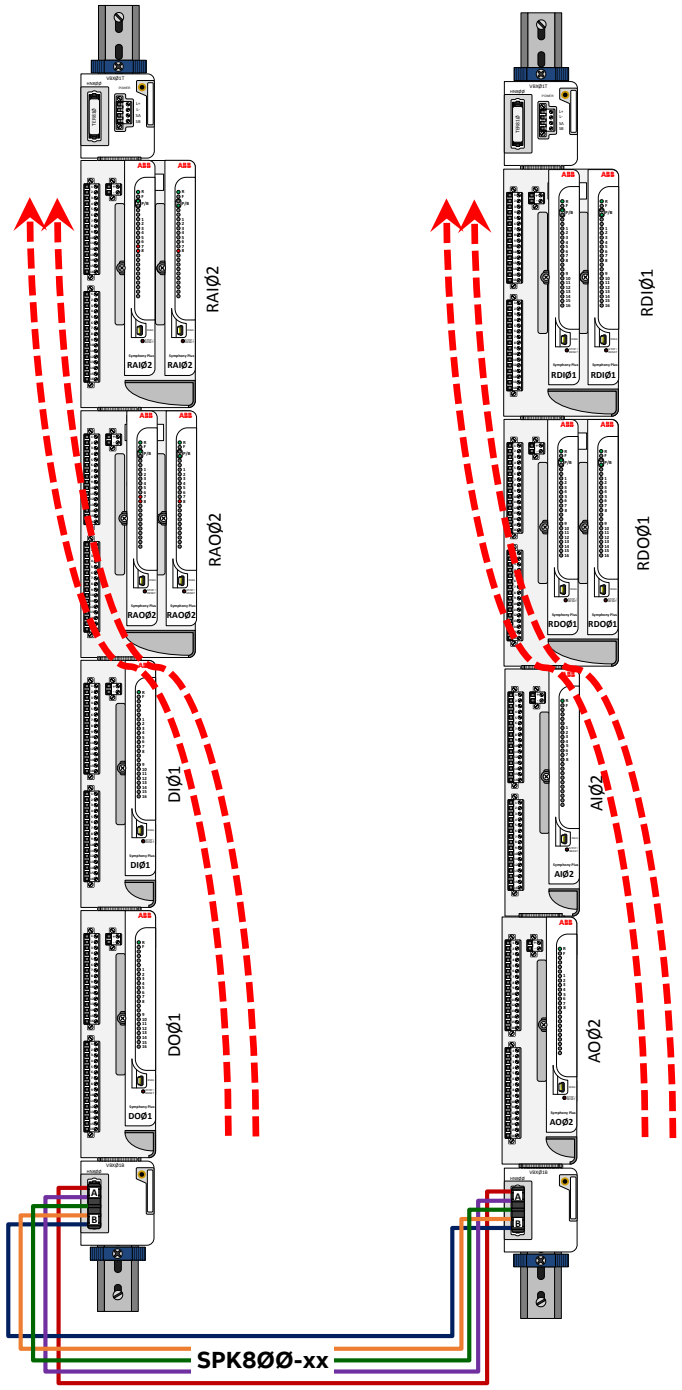
SD Series: Redundant I/O

VBRØ1-xxx



VBSØ1-xxx



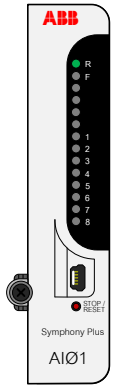


- ❑ Redundant & Non-Redundant I/O bases are 100% compatible
- ❑ Redundant & Non-Redundant I/O can be mounted in the same column
- ❑ Keep Redundant I/O at top of the column in order to minimize “Stove Pipe” effect
- ❑ Avoids need to de-rate operating temperature range: -20 to +70°C

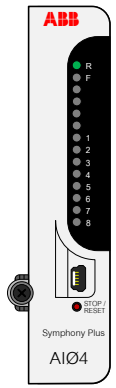
SD Series: Compact I/O

Compact Modules

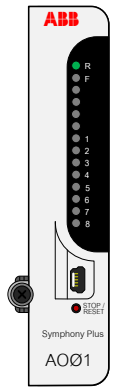
cAIØ1



cAIØ4

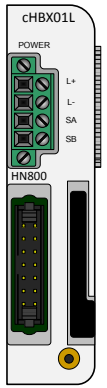


cAOØ1

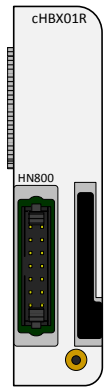


Compact Bus Extenders

cHBXØ1L

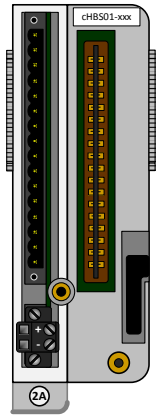


cHBXØ1R

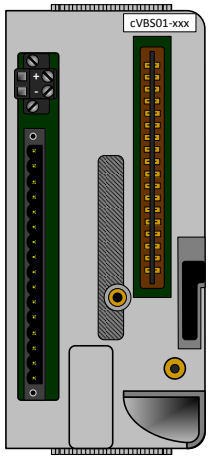


Compact Module Bases

cHBSØ1-xxx



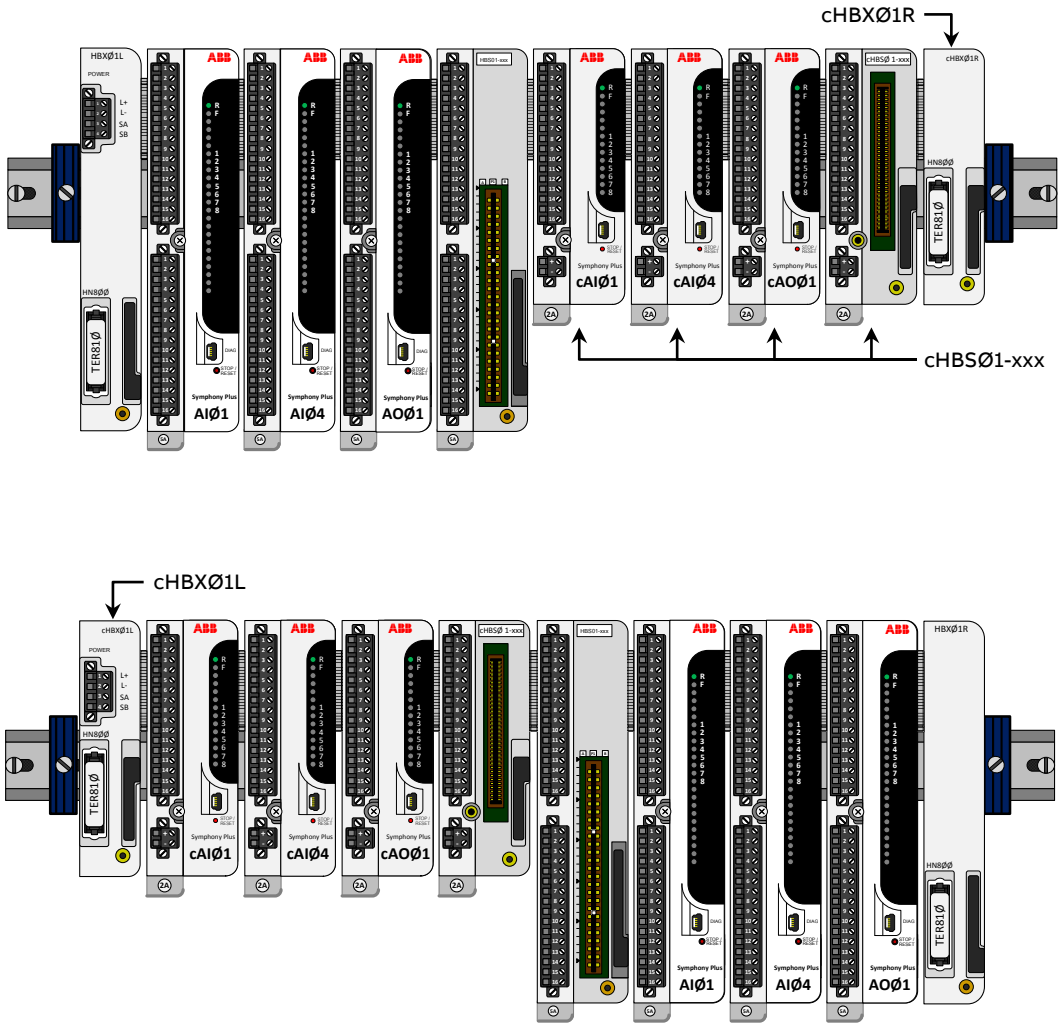
cVBSØ1-xxx



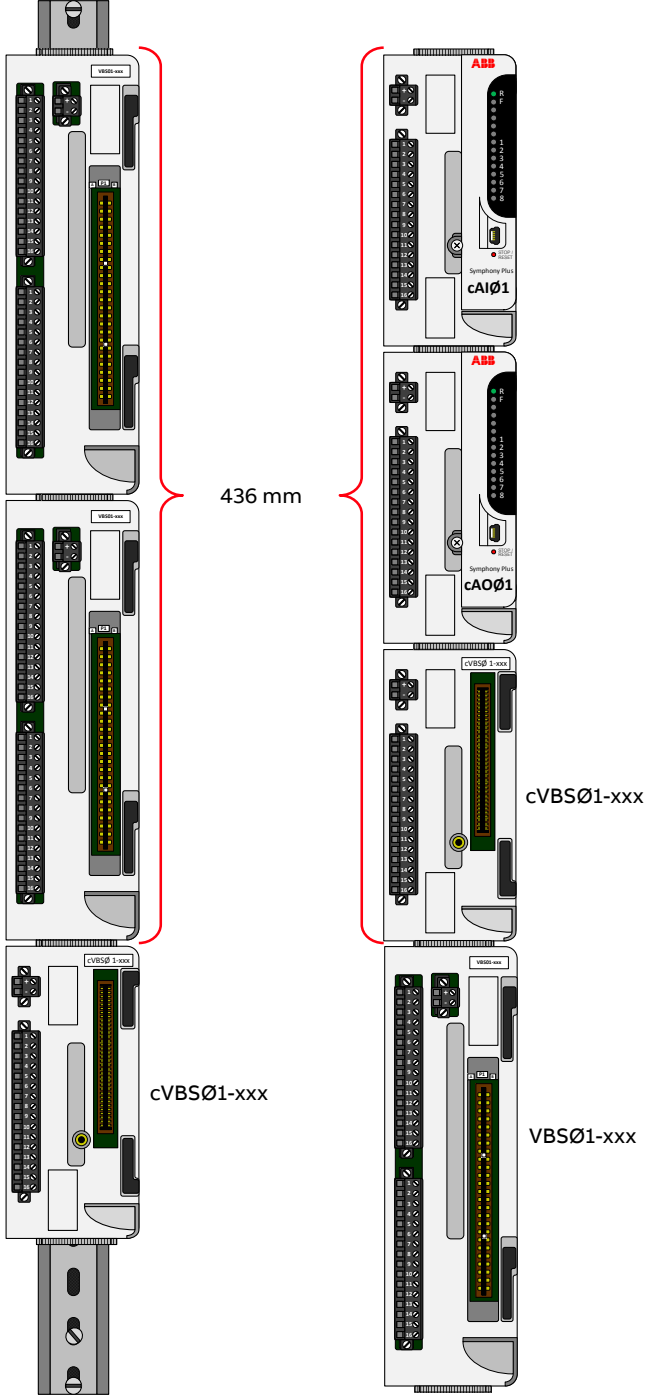
#	Module	#CH / Signals	Description / Properties
1	cAIØ1	8 AI	4-20 mADC / 1-5 VDC, AI, 1x8 Group Isolation, 16-bit ADC
2	cAIØ4	8 TC / mV	-100 to +100 mV, 0 to +100mV or Type: B/E/J/K/L/N/R/S/T/U TC's
3	cAOØ1	8 AO	4-20 mADC, HART AO, 1x8 Group Isolation, 12-bit DAC
4	cHBXØ1L / R	n/a	Compact Horizontal Bus Extenders
5	cHBSØ1-xxx	n/a	Compact Horizontal Base Single module – CJC, EPD, FPH, FPN
6	cVBSØ1-xxx	n/a	Compact Vertical Base Single module – CJC, EPD, FPH, FPN

***** Other Compact I/O Modules in Future based on Market Demand***

SD Series: Compact I/O



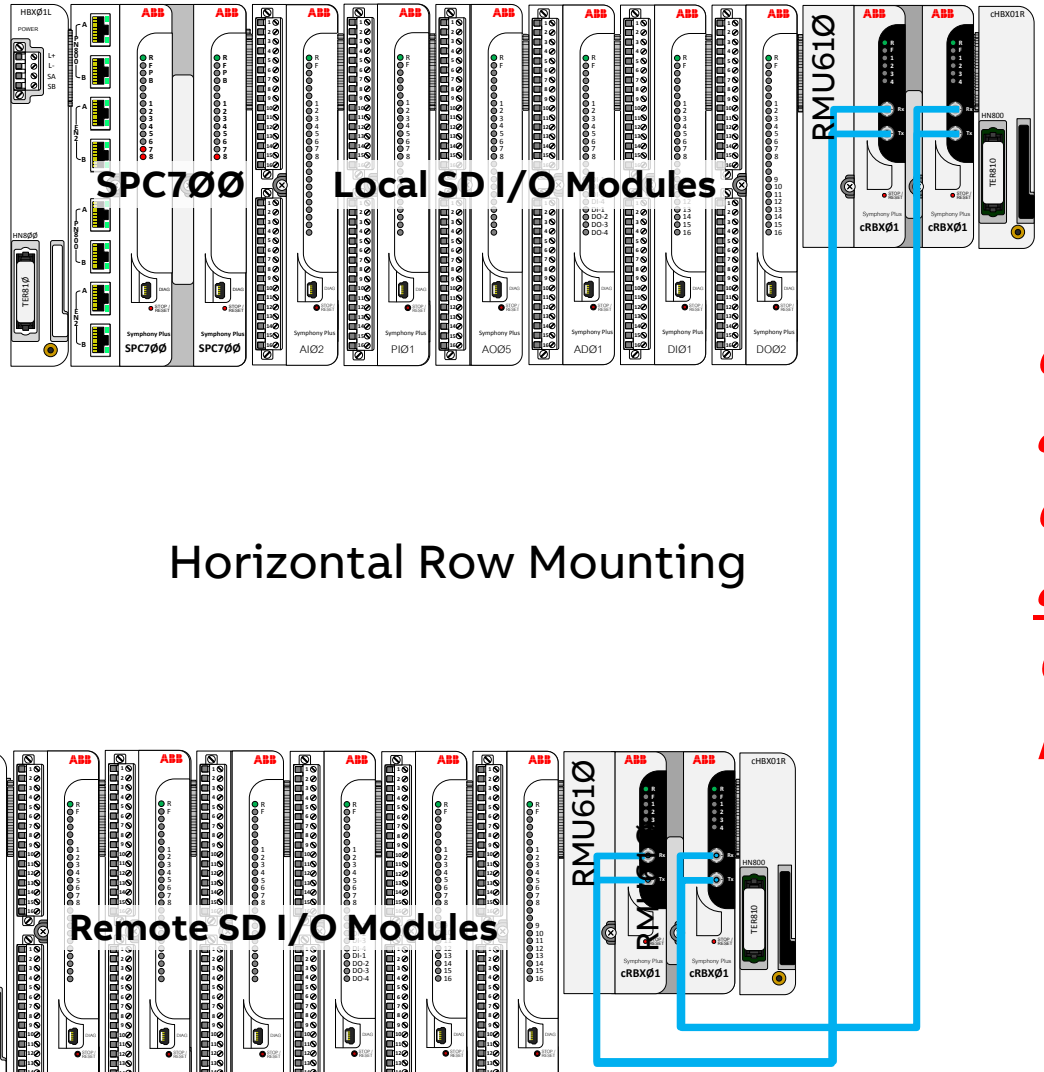
- cHBXØ1L /R Compact Horizontal Bus Extenders are 100% compatible with Full-size Bases
- cHBSØ1-xxx compact horizontal bases are 100% compatible with full-size horizontal bases
- cVBSØ1-xxx compact vertical bases are 100% compatible with full-size vertical bases
- 3 compact vertical bases fit space of 2 full-size vertical bases



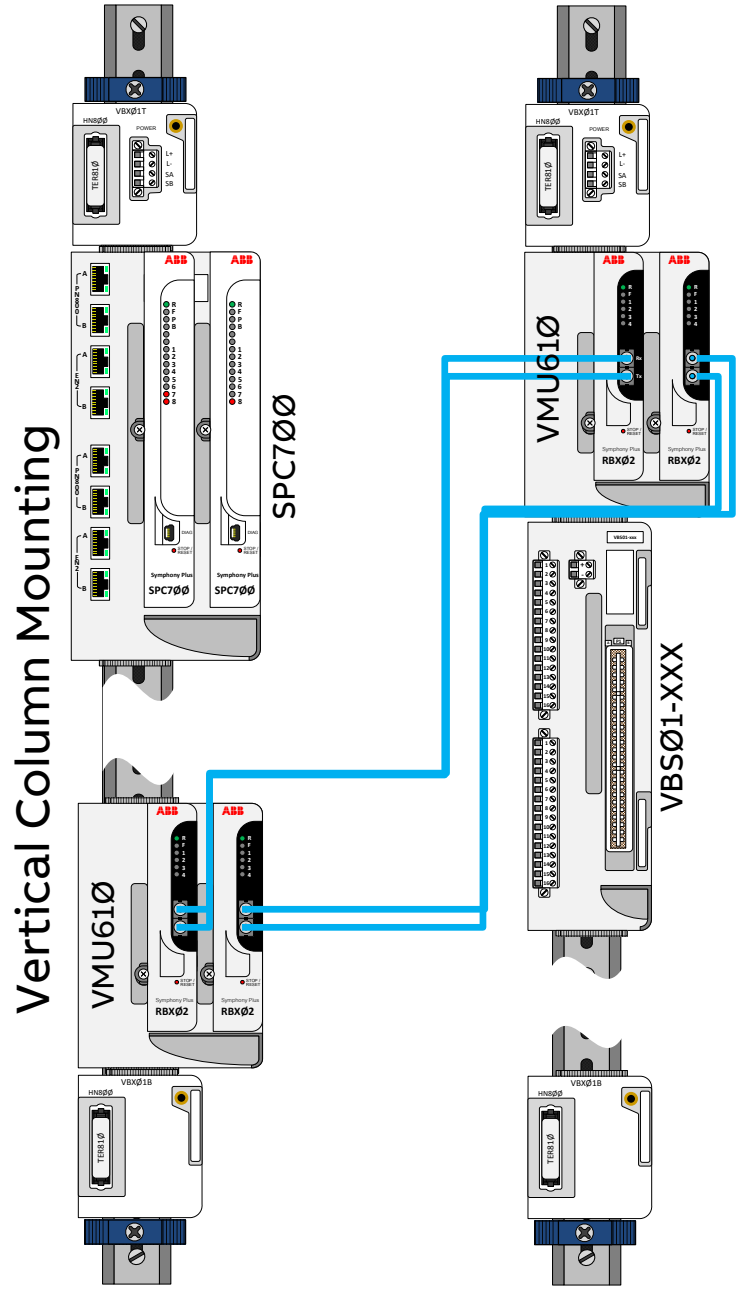
SD Series: New Compact Fiber Optic Repeater cRBXØ1

Property	Characteristic / Value	
Power Requirements	100 mA @ 24 VDC +/- 10%, 2.4 W (per module)	
Standard 35mm wide DIN Rail Mounting	Horizontal Row: RMU610 Vertical Column: VMU610	
Dimensions	cRBX0Ø1 module RMU610 VMU610	W = 27 mm, H = 127 mm, D = 107.5 mm W = 90 mm, H = 127 mm, D = 127 mm W = 101mm, H = 145mm, D = 100mm
Temperature Range	Operating: Storage:	***-20 to +70 deg C*** -40 to +85 deg C
Relative Humidity (Non-Condensing)	20% to 95% from 0 deg C to 55 deg C	
Air Quality	Standard: Optional:	ISA S71.04 G1 ISA S71.04 G3
Fiber Optic Cable	Fiber Size	62.5/125 µm
	Fiber Attenuation	-3.5 dB / km
	Index	Graded
	Wavelength	840 nm
	Bandwidth	160 MHz / km
	Connector Type	ST, right angle strain relief
	Transmission Mode	Multi-Mode

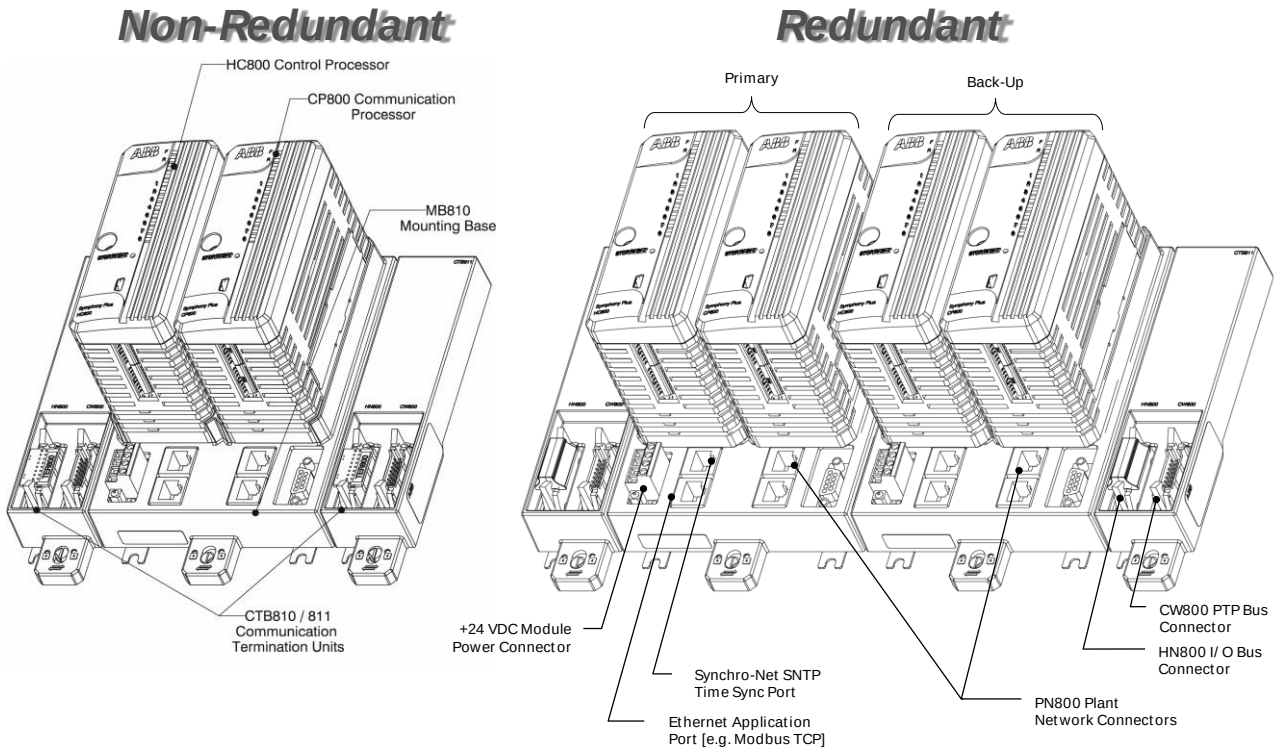
SD Series: New Compact Fiber Optic Repeater cRBXØ1



cRBXØ1 repeaters are Fully 100% compatible with all SD Series Controllers and I/O Modules



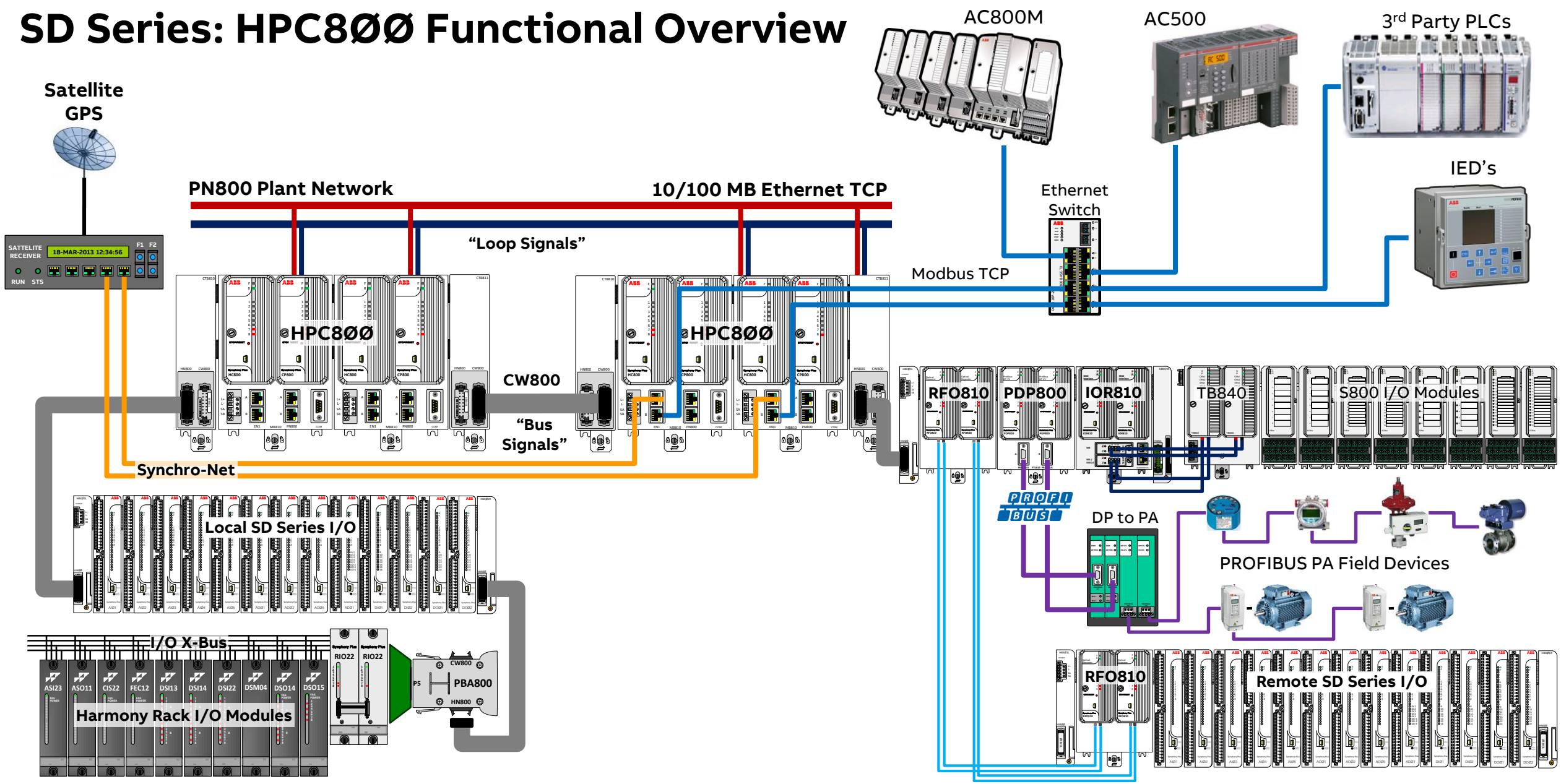
SD Series: HPC8ØØ Harmony Process Controller



Property	Characteristic / Value	
Microprocessor / MIPS	MCF5475 @ 256 MHz = 410 MIPS (1 CPU per module)	
Memory	CP800: 64 MB DRAM, 4 MB ROM HC800: 64 MB DRAM, 4 MB ROM, 2MB NVRAM	
Power Requirements	200 mA @ 24 VDC +/- 10%, 5 W (per module)	
Dimensions	HPC800 CTB810 or CTB811	W = 124 mm, H = 186 mm, D = 127 mm W = 43 mm, H = 186 mm, D = 31 mm
Temperature Range	Operating: Storage:	0 to +55 deg C -40 to +85 deg C
Relative Humidity (Non-Condensing)	20% to 95% from 0 deg C to 55 deg C	
Air Quality	Standard: Optional:	ISA S71.04 G1 ISA S71.04 G3
Control Programming	30,000 INFI 90 Function Blocks, up to 8 segments (tasks) Batch 90, UDF and 'C' programs	
Closed Loop Control Performance	Up to 5000 I/O ≤ 250 msec	
Ethernet Ports (EN 2A & 2B)	PN800 2x 10/100MB TCP [PRP redundancy] EN2 A SNTP Time Sync, EN2 B Aux. Network ModBus/TCP	
ModBus TCP Interface *	Up to 8 Servers & 128 Clients, 500 to 10,000 ModBus Points	

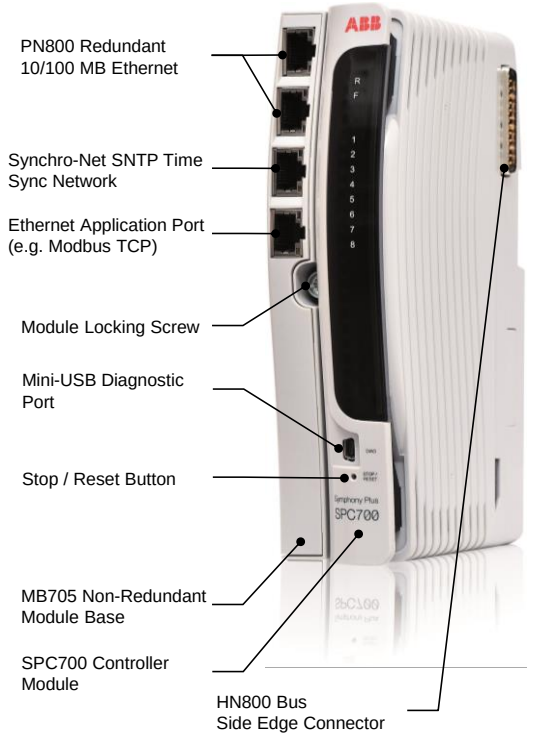
** HPC800 is capable of addressing 32,000 FB's. Actual FB capacity is configuration dependent.*

SD Series: HPC8ØØ Functional Overview

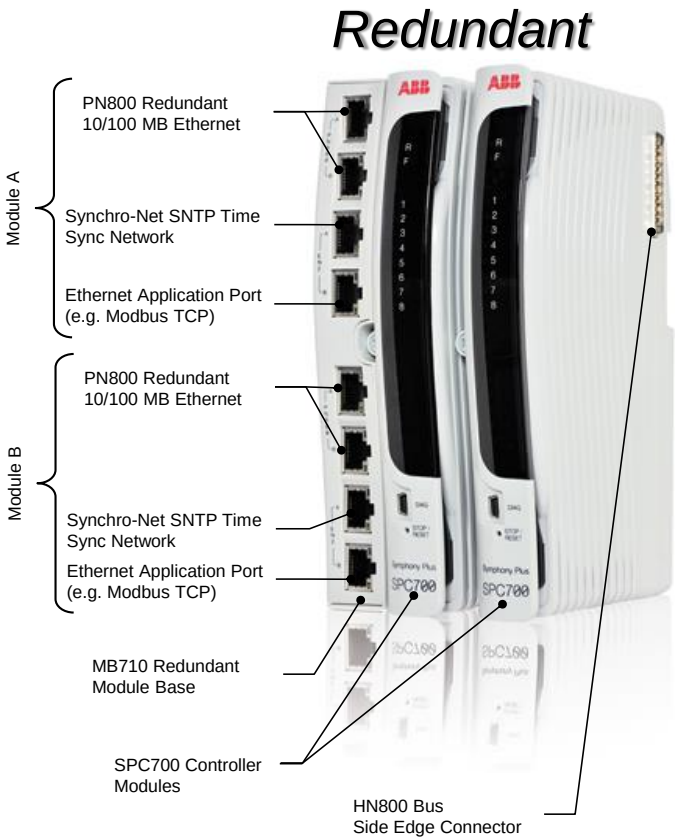


SD Series: SPC700 Symphony Process Controller

Non-Redundant

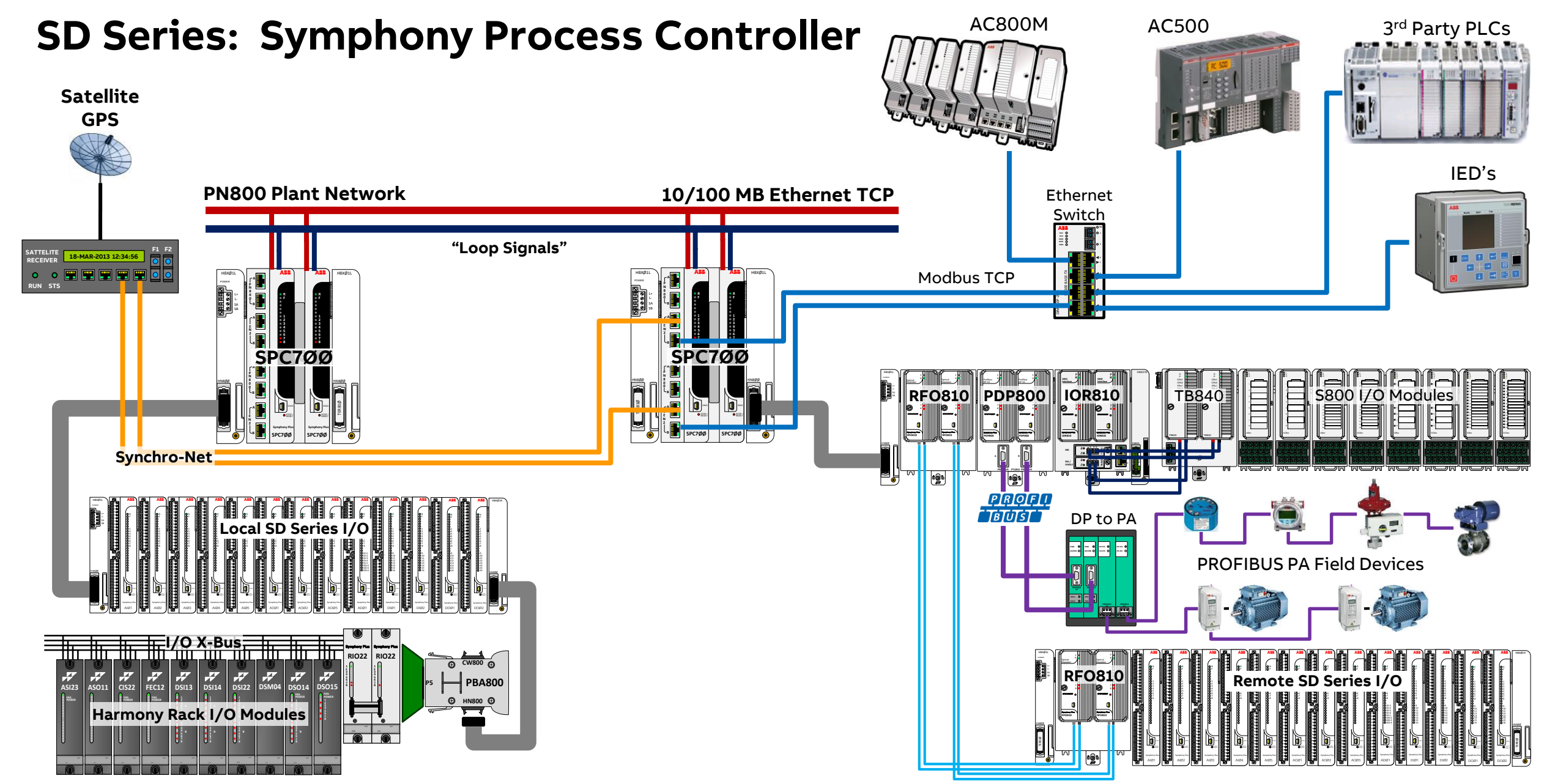


Redundant

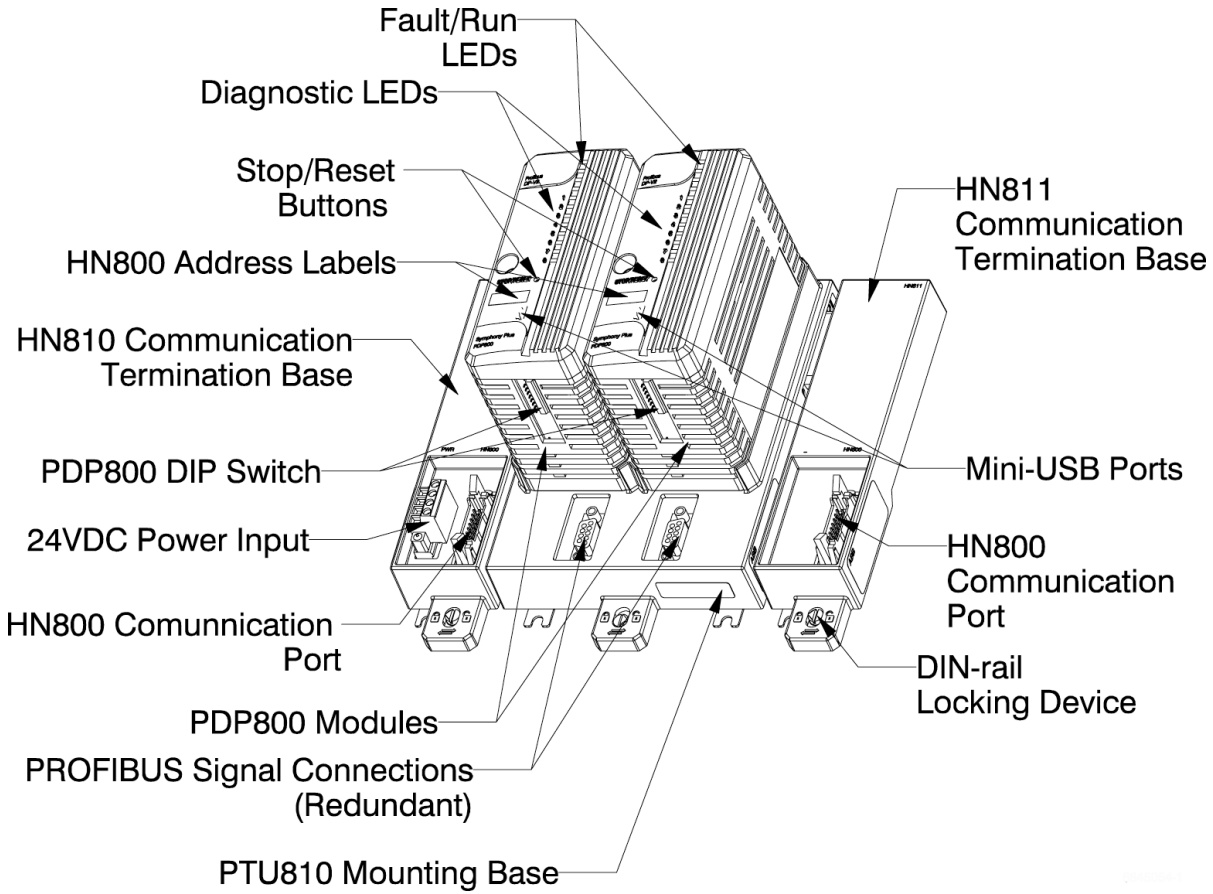


Property	Characteristic / Value	
Microprocessor / MIPS	MCF54418 @ 250 MHz = 385 MIPS	
Memory	128 MB DRAM, 512 kB NVRAM, 4 MB Flash	
Power Requirements	150 mA @ 24 VDC +/- 10%, 3.6 W (per module)	
Dimensions: [Module(s) mounted in Base]	MB705 Single: MB710 Redundant:	W = 51 mm, H = 190 mm, D = 127 mm W = 96 mm, H = 190 mm, D = 127 mm
Temperature Range	Operating: Storage:	-20 to +70 deg C -40 to +85 deg C
Relative Humidity (Non-Condensing)	20% to 95% from 0 deg C to 55 deg C, 20% to 45% from 55 deg C to 70 deg C	
Air Quality	Standard: Optional:	ISA S71.04 G1 ISA S71.04 G3
Control Programming	10,000 INFI 90 Function Blocks, [1Q-2016] Batch 90, UDF and 'C' programs)	
Closed Loop Control Performance	Up to 1000 I/O ≤ 250 msec	
Ethernet Ports (EN 2A & 2B enabled in B.0 FW)	PN800 2x 10/100MB TCP [PRP redundancy] EN2 A SNTP Time Sync, EN2 B Aux. Network ModBus/TCP	
ModBus TCP Interface [via HGS]	Up to 2 Servers & 32 Clients, 500 to 1,500 ModBus Points	

SD Series: Symphony Process Controller

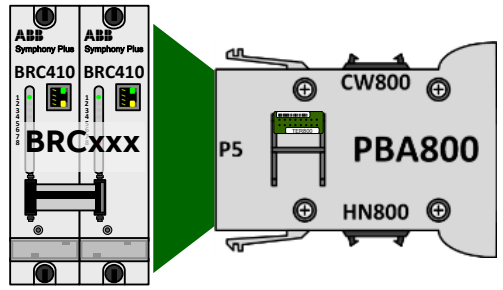


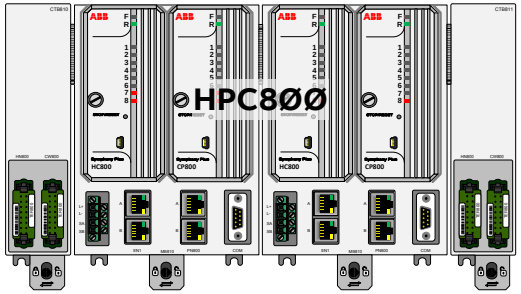
SD Series: PDP8ØØ PROFIBUS Interface

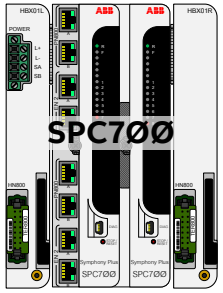


Property	Characteristic / Value	
Microprocessor	MCF54418 @ 160 MHz	
Memory	128 MB DRAM, 4 MB ROM	
Power Requirements	150 mA @ 24 VDC ± 10%, 3.6W (per Module)	
Dimensions PDP800 with Base HBX01L or HBX01R	 W = 124 mm, H = 186 mm, D = 127 mm W = 30 mm, H = 190 mm, D = 33 mm	
Temperature Range	Operating: Storage:	0 to +55 deg C -40 to +85 deg C
Relative Humidity	20% to 95% from 0 deg C to 55 deg C	
Air Quality	Standard: Optional:	ISA S71.04 G1 ISA S71.04 G3
HN800 Communication Bus	4.0 Mbps RS485 (Redundant) Max Length [Electrical] 30 M Max Length [Fiber Optic] 3.0 KM	
Max Baud Rate Max Bus Length	12.0 Mbaud, up to 100 M 1200 M, @ 9.6 kbaud to 93.75 kbaud	
PROFIBUS Protocols	DP-V0 Basic DP-V1 Acyclic DP-V2 Time-Stamp PA [via DP-PA segment coupler]	
Capacity	Each PDP800 supports up to 124 Slaves	

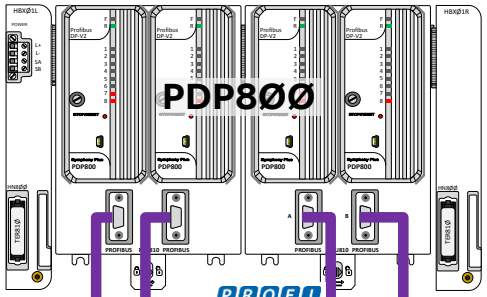
SD Series: PDP8ØØ PROFIBUS Interface





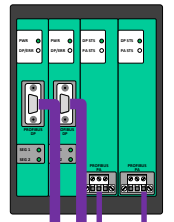


S+ Controllers



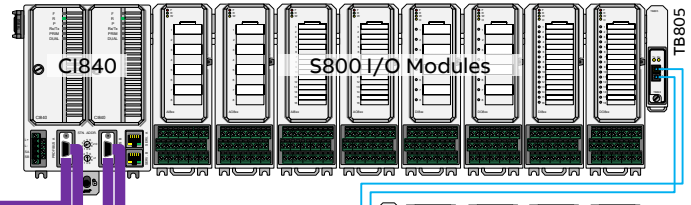
PROFIBUS

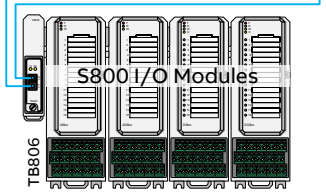
DP to PA

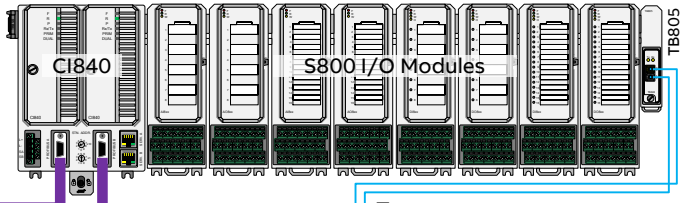


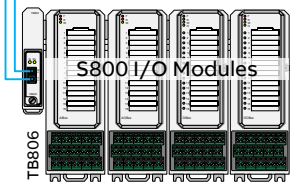
3rd Party Protocol Adapter

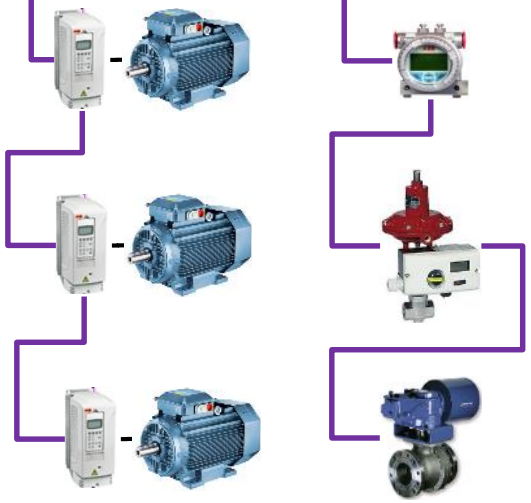
PROFIBUS PA Field Devices



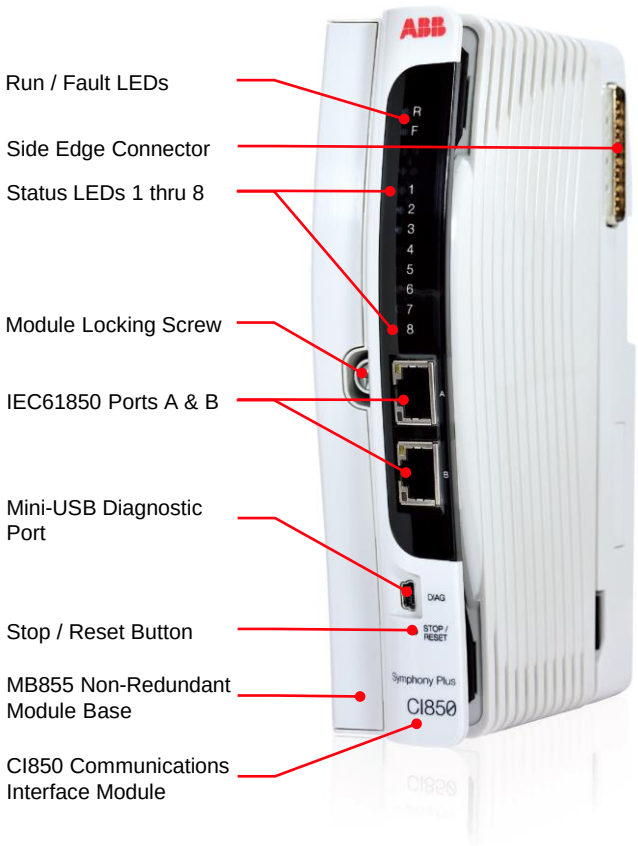






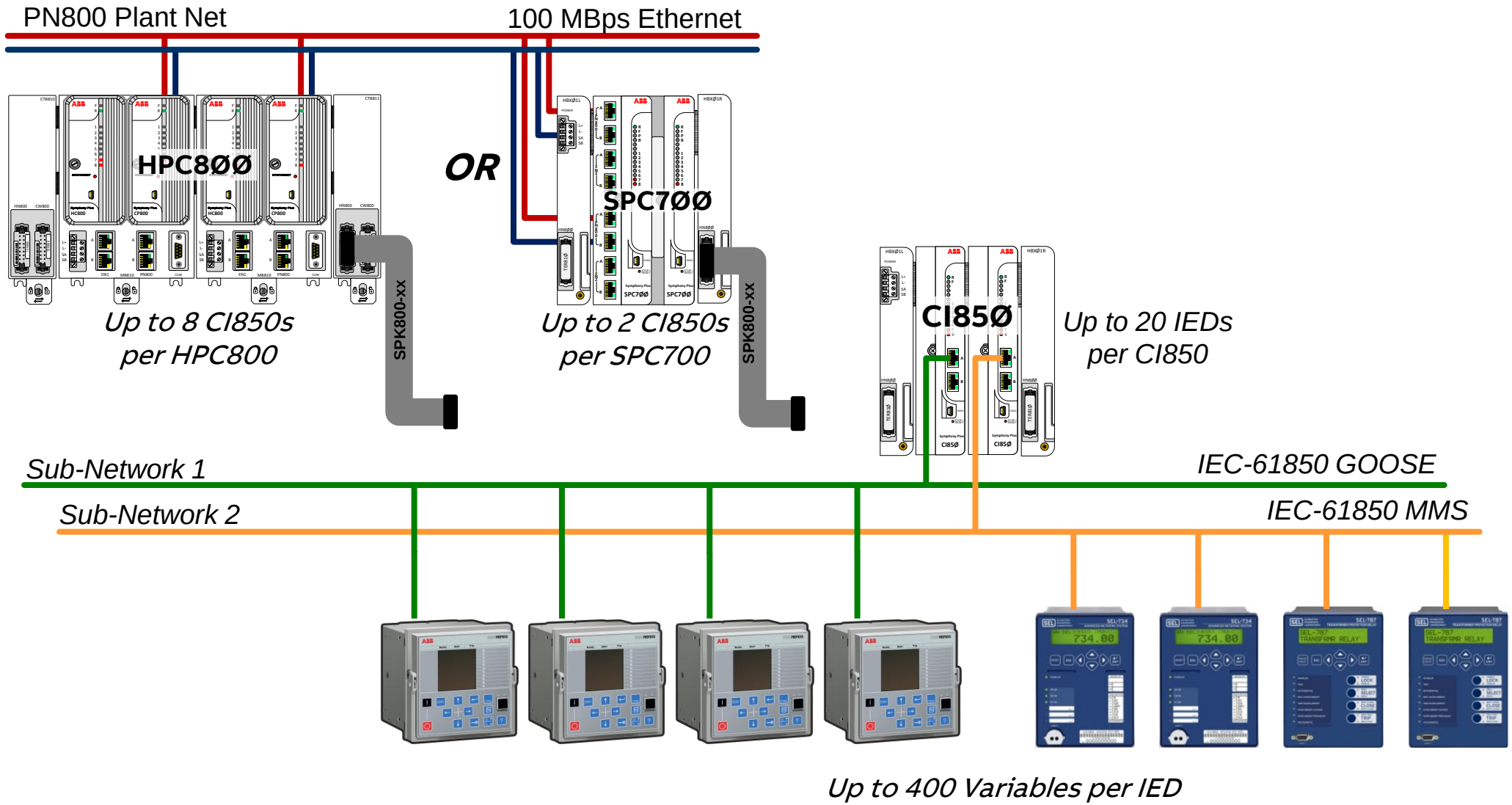


SD Series: CI85Ø Electrical Integration Interface

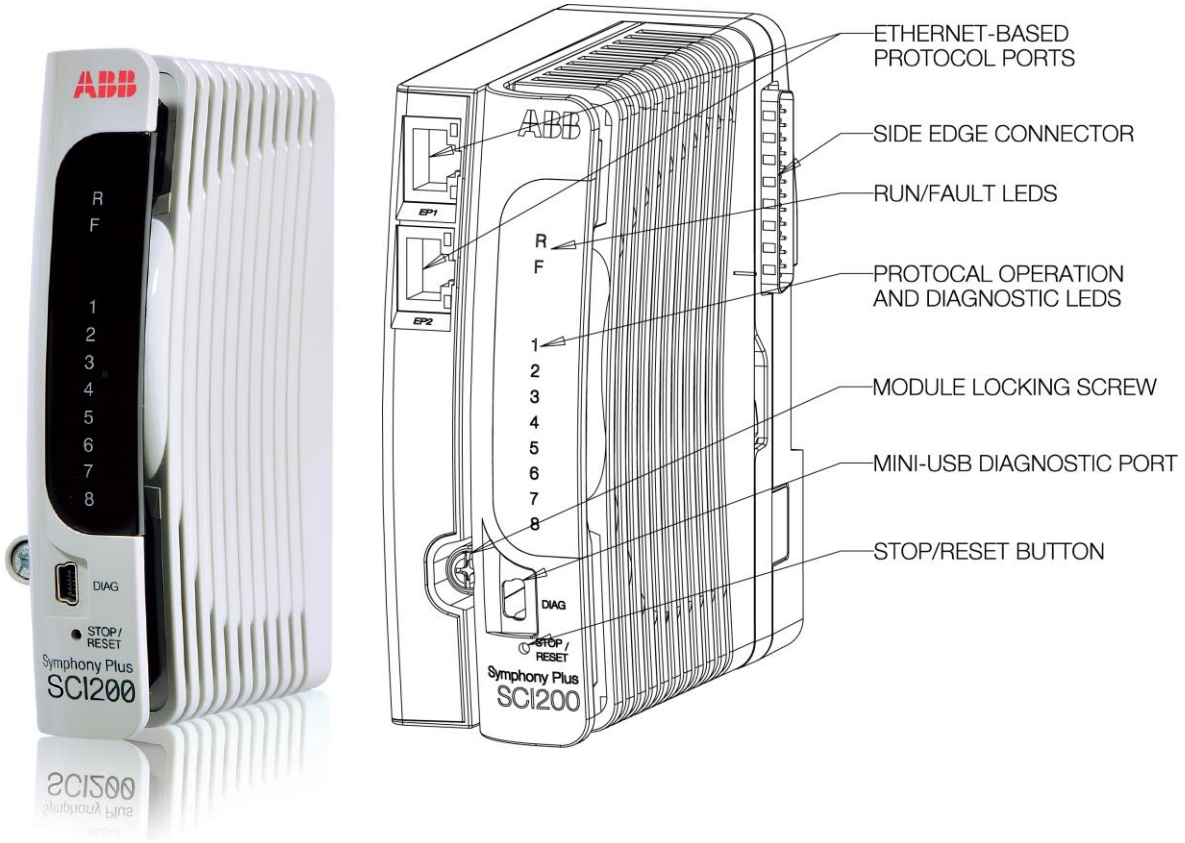


Property	Characteristic / Value	
Microprocessors	A: S+ Comm. Platform: MCF54418 @ 240 MHz (385 MIPS) B: IEC61850 Protocol: MCF5475 @ 266 MHz (410 MIPS)	
Memory	A: 128 MB DRAM, 4 MB ROM B: 128 MB DRAM, 8 MB ROM Inter-processor: 32 KB Dual-port RAM	
Power Requirements	200 mA @ 24 VDC +/- 10%, 4.8 W typical	
Dimensions:	CI850 in MB855 base	W = 45 mm, H = 190 mm, D = 135 mm
Temperature Range	Operating: Storage:	-20 to +70 deg C -40 to +85 deg C
Relative Humidity	20% to 95% @ 40 deg C, Non-Condensing	
Air Quality	Standard:	ISA S71.04 G1
Programming	Data modeling according to IEC61850-7-3/4 MMS Client according to IEC-61850-7-2 GOOSE publisher & subscriber	
Capacity	Up to 20 IED's each with up to 400 variables per CI850 module Up to 8 CI850 modules per HPC800 Up to 3 CI850 modules per SPC700	
Communications Ports	HN800, Redundant RS485 differential @ 4.0 Mbps 2x 100 Mbps Ethernet (IEC61850 Network) 1 mini USB (Diagnostics)	

SD Series: CI85Ø Electrical Integration Interface

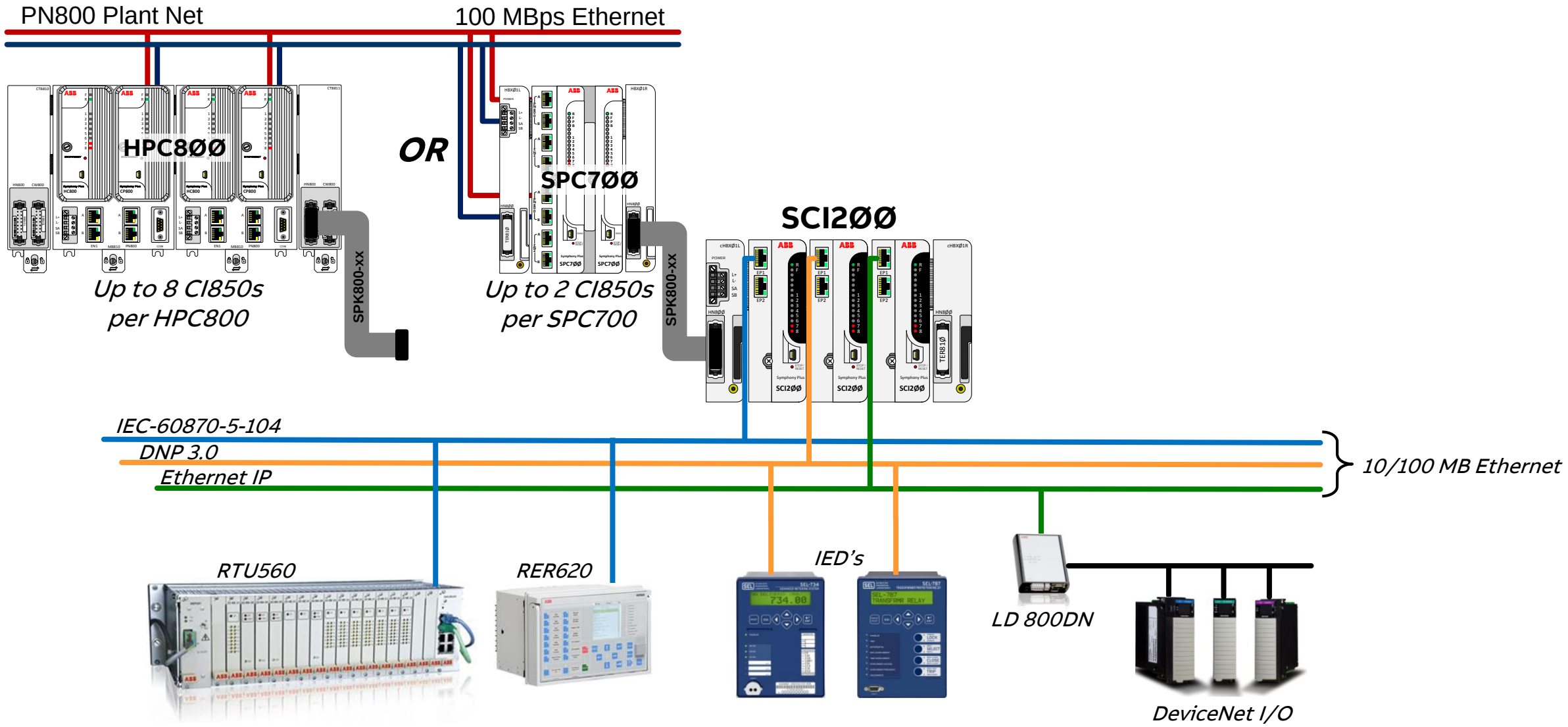


SD Series: SCI2ØØ Multi-Purpose Ethernet Interface

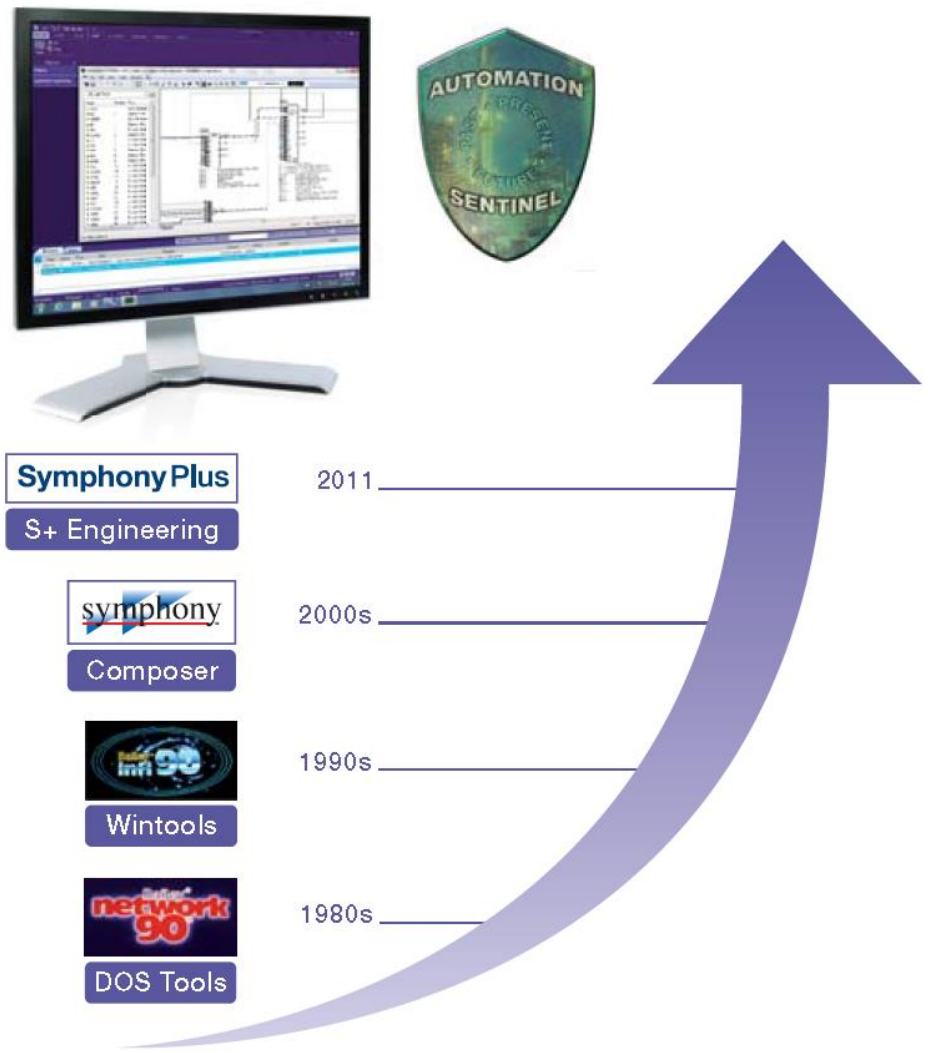


Property	Characteristic / Value	
Microprocessor / MIPS	MCF54418 @ 240 MHz = 385 MIPS	
Memory	128 MB DRAM, 4 MB Flash ROM	
Power Requirements	200 mA @ 24 VDC +/- 10%, 4.8 W typical	
Dimensions: [Module(s) mounted in Base]	MB605 Single:	W = 45 mm, H = 127 mm, D = 130 mm
Temperature Range	Operating: Storage:	-20 to +70 deg C -40 to +85 deg C
Relative Humidity	20% to 95% @ 40 deg C, Non-Condensing	
Air Quality	Standard: Optional:	ISA S71.04 G1 ISA S71.04 G3
Supported Protocols	IEC-60870-5-104 Master & Slave DNP 3.0, ***[Target 4Q-17]*** Ethernet IP	
Performance	t.b.d.	
Ethernet Ports (EN 1A & 1B)	2x 10/100 Ethernet TCP	
Controller Interface	Redundant HN800 (RS485 Differential @ 4.0 MBps)	

SD Series: SCI2ØØ Multi-Purpose Ethernet Interface

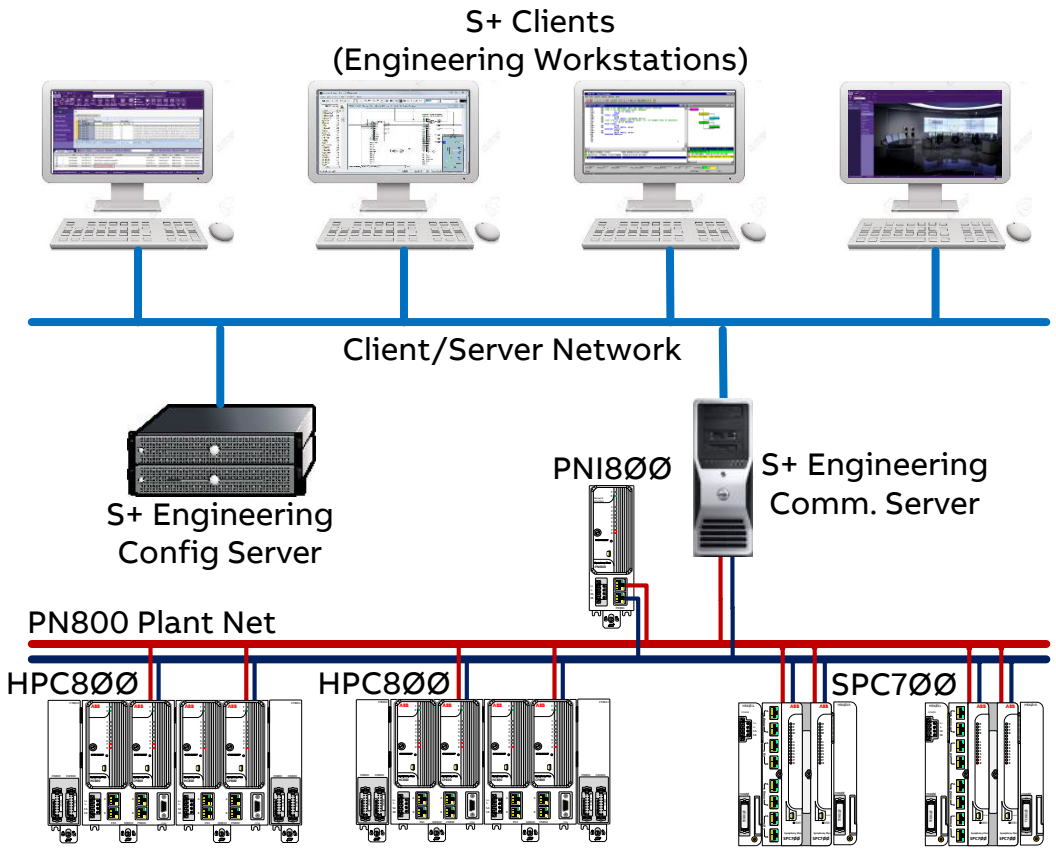


Symphony Plus Engineering Overview



- Enhancement of the time-tested and proven Composer engineering platform
- Supports all Symphony Plus product lines
  - HR (Harmony Rack) Series
  - SD (Symphony DIN) Series
  - S800 I/O, and 800 Series Turbine
- Supports all HMI
  - S+ Operations
  - 800xA for Symphony Plus Harmony
  - 3rd Party HMI and Historian products
- Software platform to engineer, configure, administer, secure, commission and maintain Symphony Plus & INFI 90 / Harmony systems
- Seamlessly evolves previous generation WinTools and Composer projects

Symphony Plus Engineering Architecture



Client / Server Architecture:

- Server supports up to 10 simultaneous client connections

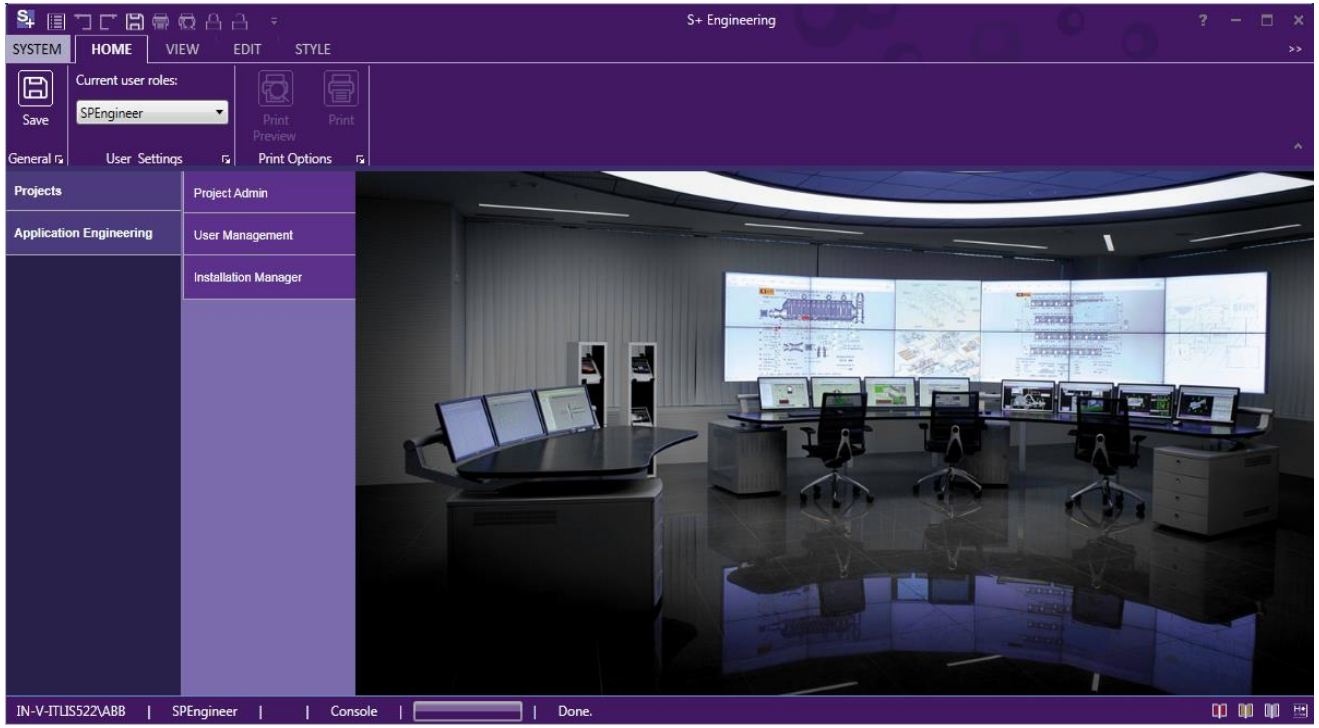
Configuration Server manages system configuration data in central location

- Configuration can be backed-up for archiving or copying to another server or system

Communication Server provides real-time communications to S+ Controllers

- Supported real-time interfaces include:
  - Ethernet modules (PNI800 or IET800)
  - Serials modules (ICT01, ICT13A, etc.)
  - VPNI (Virtual PNI) for PN800 Plant Net

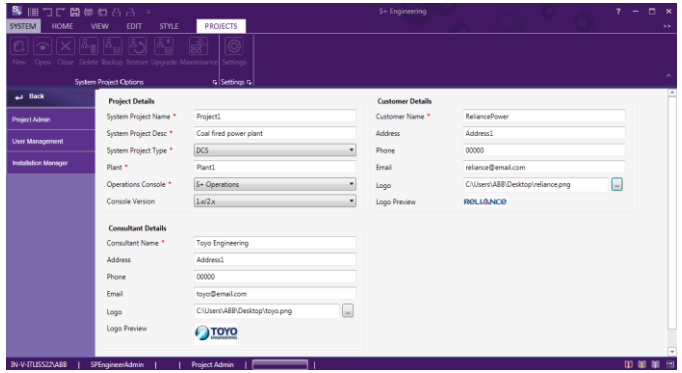
Symphony Plus Engineering Workbench Overview



Engineering Workbench common launch point for specific purpose tools:

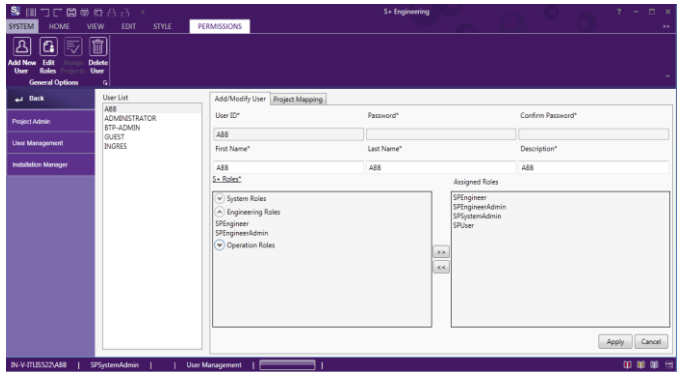
- ❑ Project administration
- ❑ User management
- ❑ System Topology design
- ❑ Bulk Tag/IO management
- ❑ Communication Engineering:
  - ❑ Modbus
  - ❑ IEC 60870-5-104
  - ❑ DNP 3.0
  - ❑ Ethernet IP (4Q-2017)
- ❑ Electrical Integration via IEC-61850
  - ❑ Horizontal and Vertical
- ❑ Integrated central Install & Update
- ❑ Support for HMI configuration

Symphony Plus Engineering System Level Tools



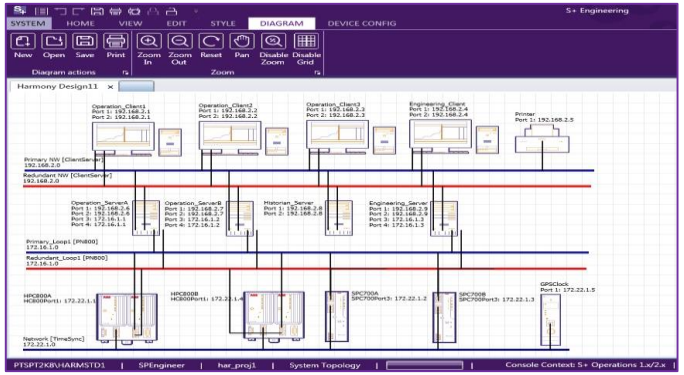
Engineering Project Administration:

- ❑ System project creation with implicit creation of control project
- ❑ Clean project deletion
- ❑ Backup & restore
- ❑ Upgrade from previous versions



User Management:

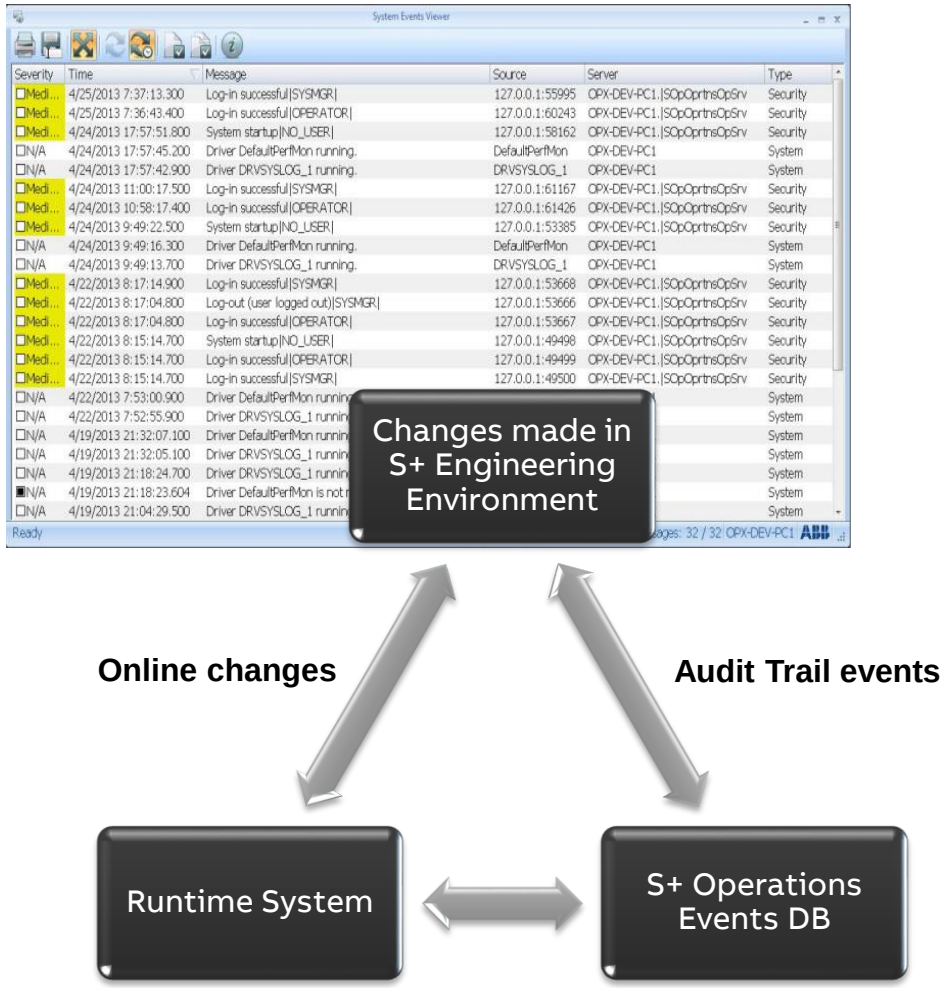
- ❑ Create/maintain users with role assignment
- ❑ Assign users to specific projects
- ❑ Automatic configuration of Active Directory and Workgroup
- ❑ Enhanced security through Role Based Access Control (RBAC)



System Topology Editor:

- ❑ Visually define system topology - PN800 Plant Net / SD Controllers / SD Series I/O
- ❑ Synchronizes control topology with control engineering
- ❑ Support system setup
  - ❑ Publish IP to reachable computer nodes
  - ❑ Shares information with Install & Update Tool (enables central I&U)

Symphony Plus Engineering Audit Trail



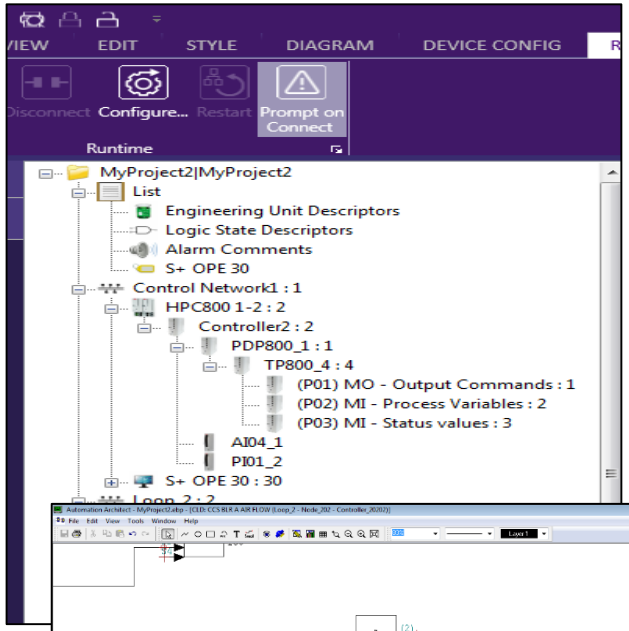
- Track and archive system changes made at any engineering station
- All event logs are traced in a central event database of S+ Operations through a configured Syslog driver*
- Long term archiving is made possible in Symphony Plus Historian
- System event viewer window in S+ Operations shows all the security events with time stamp and priority

** In systems where S+ Operations is not installed, the security event logs are stored on the local hard drive of S+ Engineering configuration server*

Symphony Plus Engineering System Explorer & Automation Architect

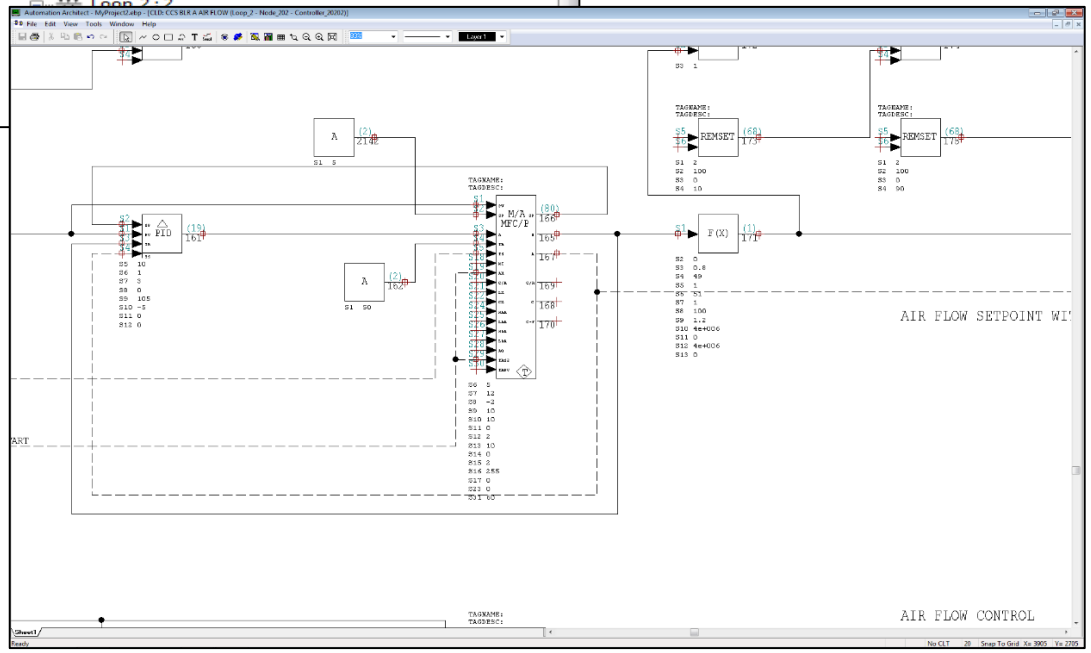
Explorer

- Manage & organize re-usable configuration components (macro's & templates)
- Microsoft Explorer style window provides hierarchical view of S+ System



Automation Architect

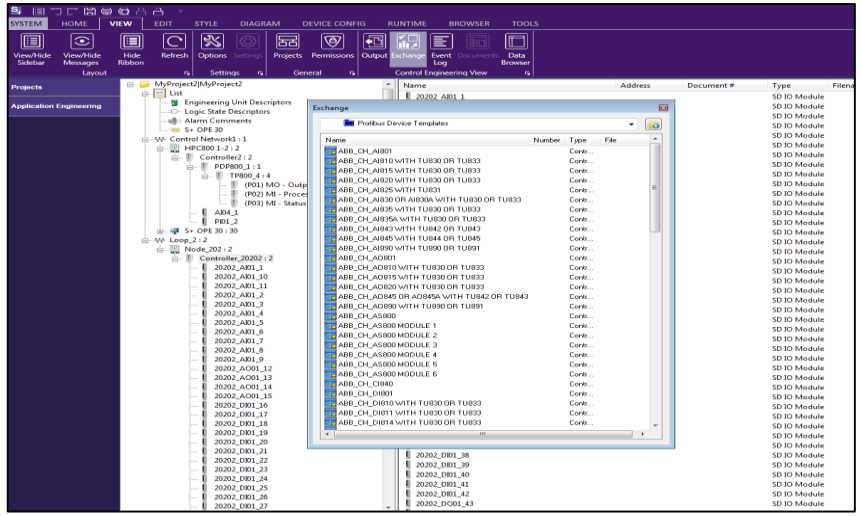
- Control Logic Document (CLD) editor
- Create, Edit, Monitor & Tune control logic
- Drag & drop FC's, Macro's and Templates



Symphony Plus Engineering Templates & Library Management

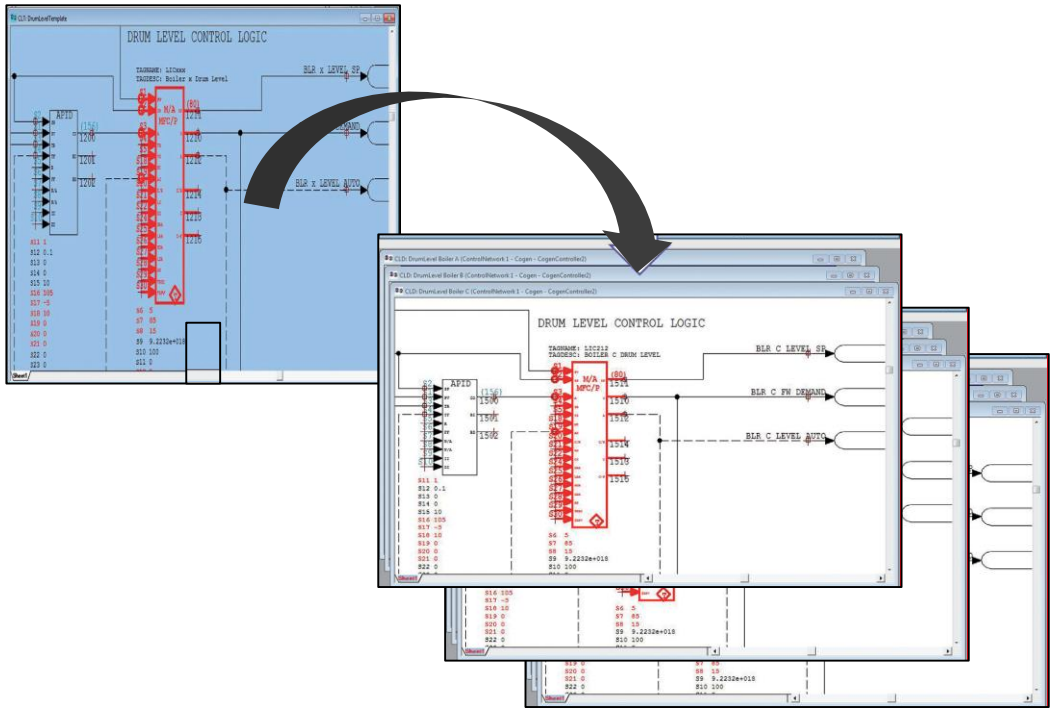
Object Exchange (Library)

- ABB Standard library includes pre-defined function codes, shapes and symbols
- Define your own objects and save them in the library
- Save time, reduce errors and share best practices between projects

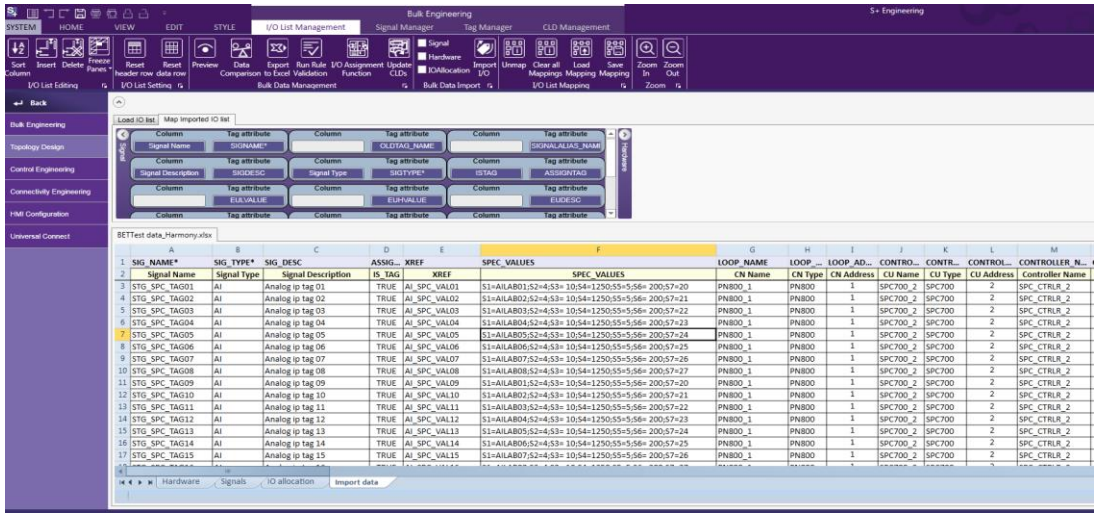


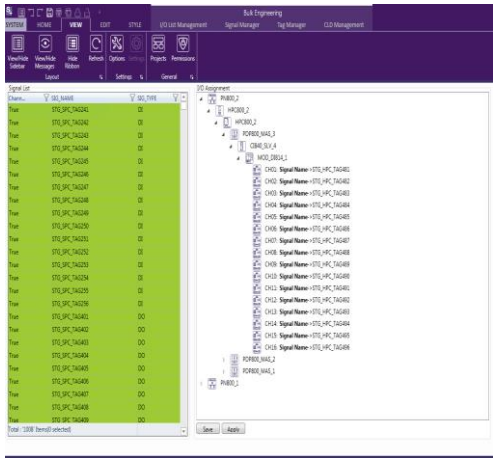
Control Logic Templates

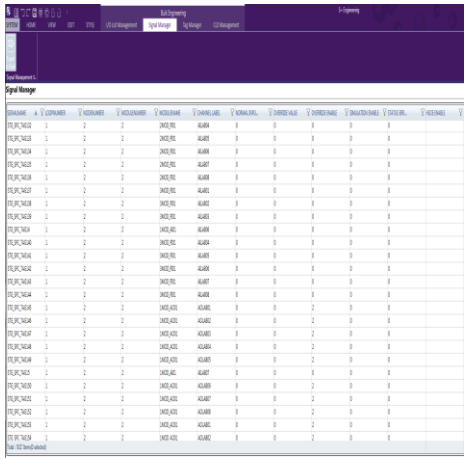
- Reduce time and cost of implementing control strategy
- Minimize risk of errors and improve quality
- Preserve the IP invested in a control strategy for repeated use



Symphony Plus Engineering Bulk Engineering Tool

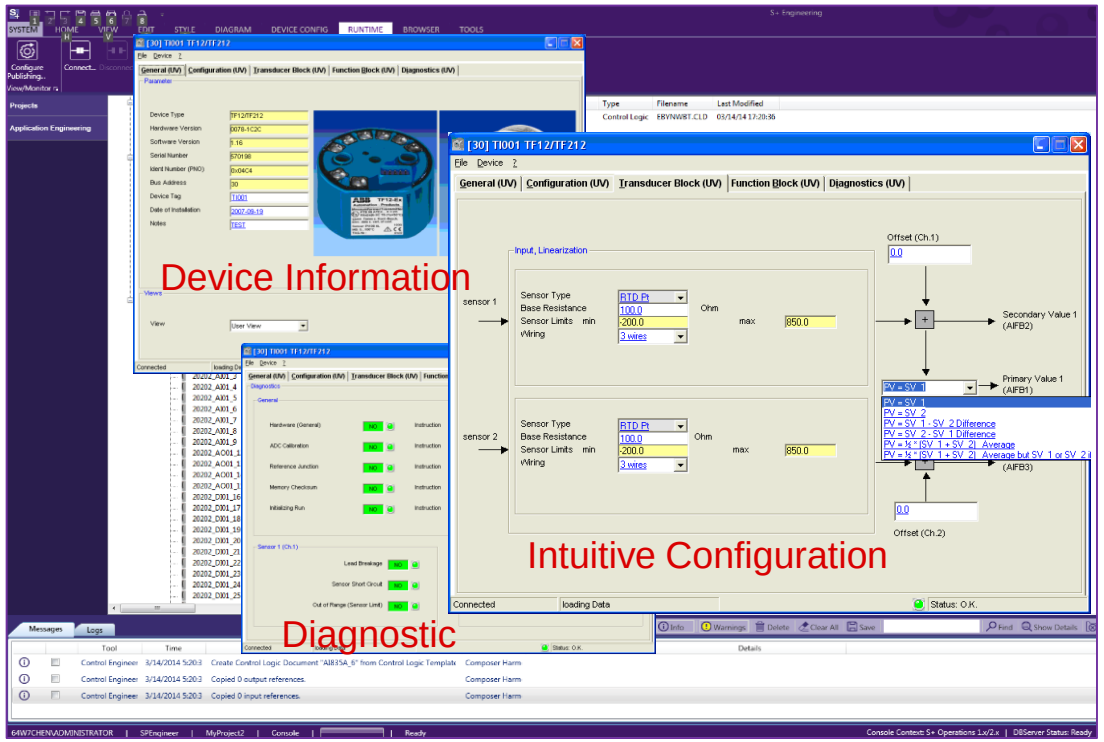






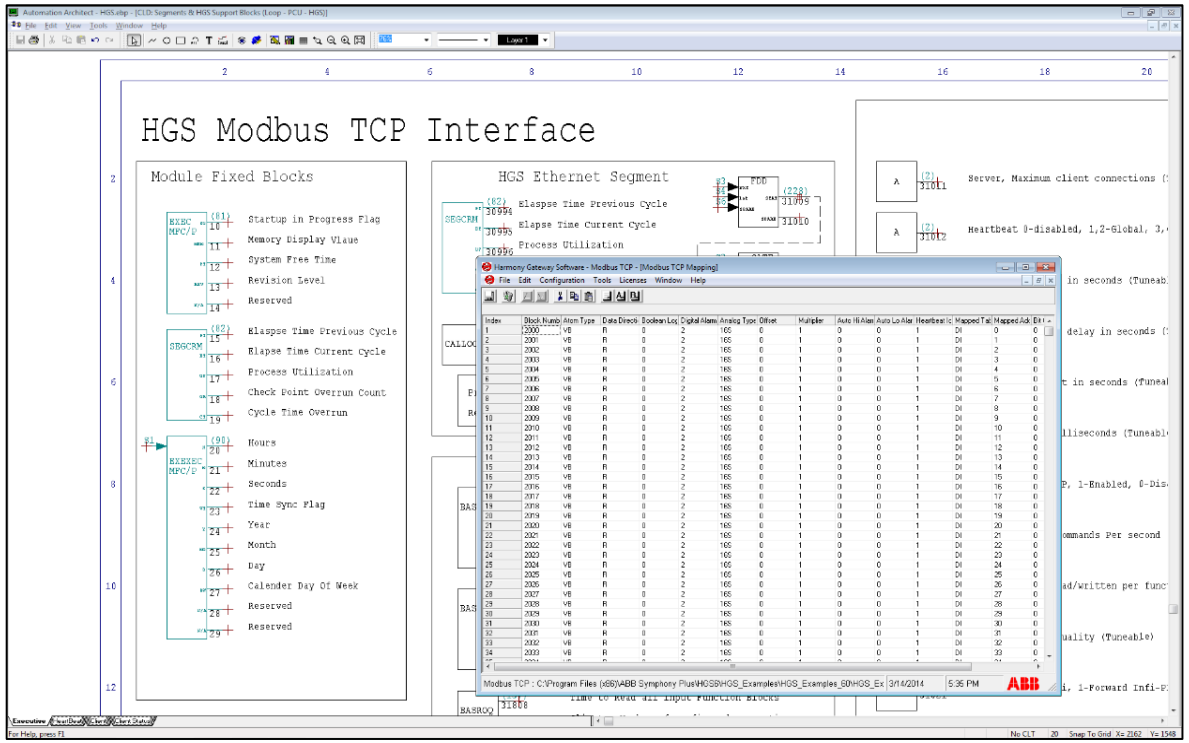
- Simple and intuitive way of handling bulk data
- Seamless import of Signal list for configuration
- Manage the bulk data in the familiar MS Excel environment and then import into configuration server
- Create hardware structure and I/O drawings
- I/O Assignment - signals to channels
- Tag/Signal management
- Instantiate process control logic drawing (based on templates)
- Import history maintained with tag list and logs for ready reference
- Reduces the burden on your engineers by easing the handling of large amounts of data
- Saves valuable time during startup and commissioning

Symphony Plus Engineering Field Engineering Tool



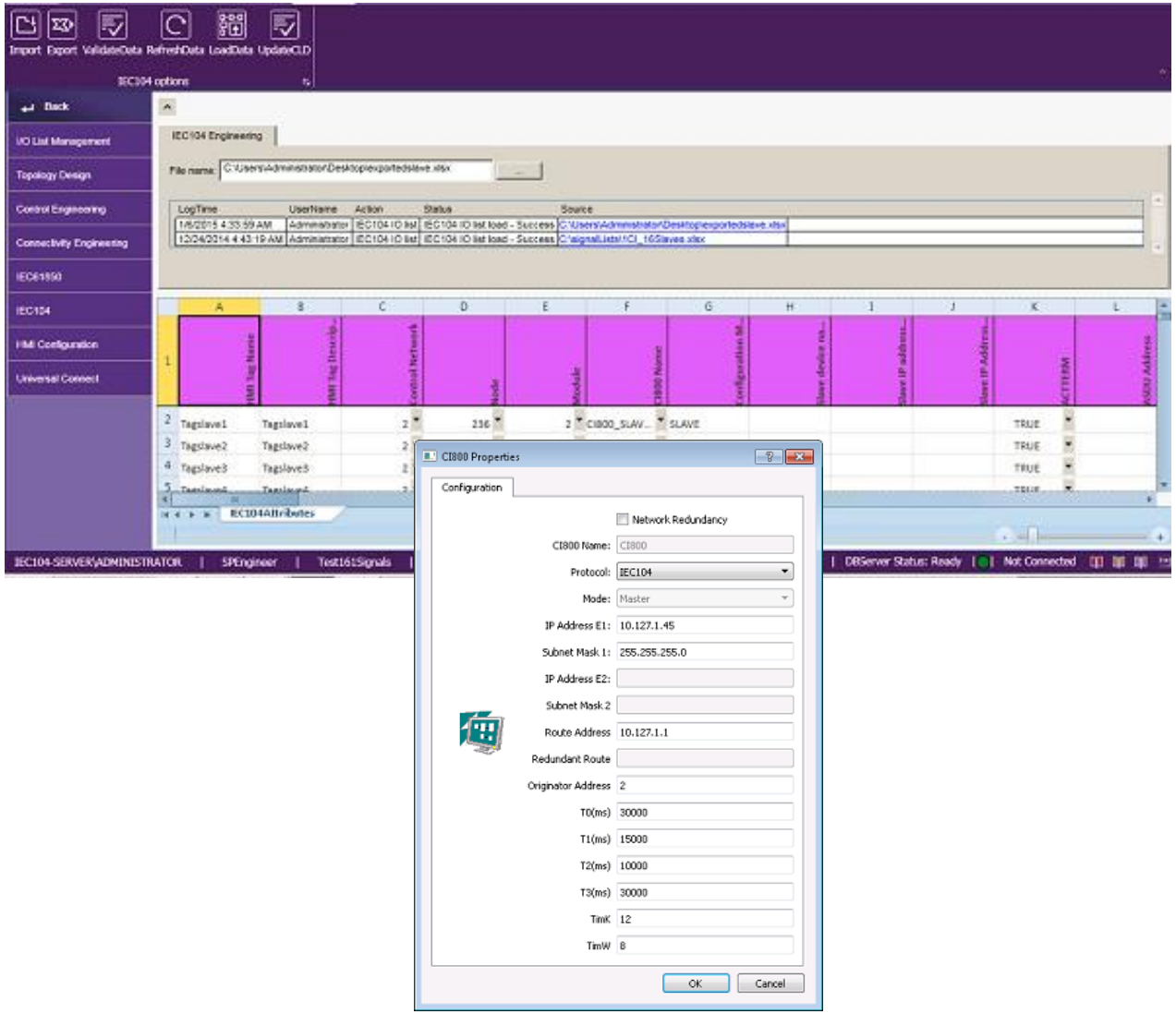
- Complete support for configuration, commissioning, maintenance and management of intelligent field and electrical devices using PROFIBUS and HART
- PROFIBUS via PDP800 interface module
- HART via SD Series HART I/O modules
- Support S800 HART pass-through via PROFIBUS
- Unlimited access to HART device parameters (including primary and secondary variables) in control application via function blocks
- Full support for PROFIBUS-DP (device management, configuration, diagnostic and maintenance) as well as PROFIBUS-PA
- Use of standard HART and PROFIBUS DTMs – intuitive graphical interface for configuration
- Shortens commissioning time by allowing single platform (without additional tools/software) for smart device configuration

Symphony Plus Engineering HGS: Harmony Gateway Software



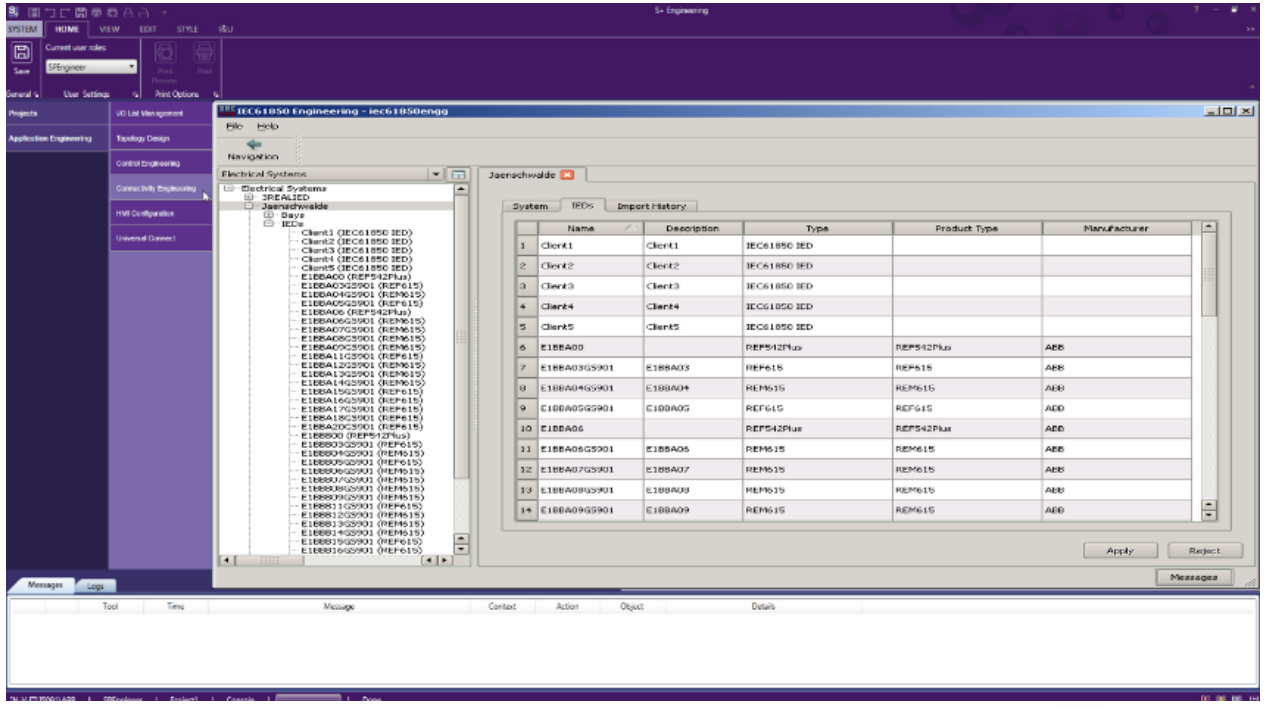
- Built-in functionality of Harmony Gateway Software (HGS) for BRC410 and HPC800 controllers
  - Complete integration of Modbus TCP data within the control application by mapping Modbus points to function blocks in the controller
  - Ultimate design flexibility - HGS can configure S+ controller as a Modbus TCP client, server or client/server concurrently
  - Data can be read from, or write to, or bi-directional with 3rd party PLCs or devices
  - Up to 10,000 Modbus TCP points, 128 clients, 8 servers per controller (capacity may vary by controller type)
- Function Code based Modbus TCP communication for SPC700 controller, with reduced capacity

Symphony Plus Engineering Ethernet Communications using SCI2ØØ



- Support IEC 60870-5-104 and DNP 3.0 protocols horizontal communication to SD Series controllers
- Via SCI200 Interface Module
- Support IEC 104 for both Master and Slave
- Support DNP 3.0 for Master
- Pre-defined template to be used to import Signals List
- Assign protocol signals to SCI200 modules
- Automatically create signal CLDs
- SCI200 will support Ethernet IP in SPE 2.1 [*Target 4Q-2017*]

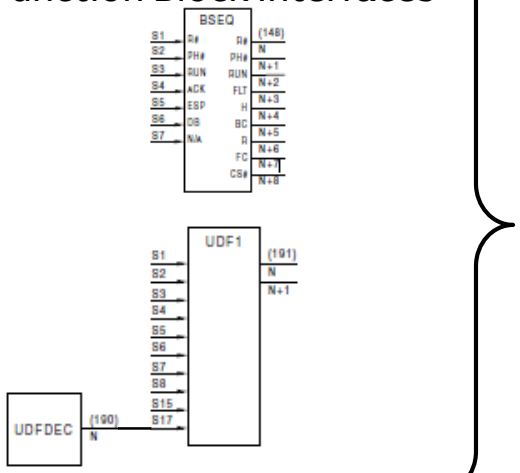
Symphony Plus Engineering Electrical Integration using CI85Ø



- Integration and communication with IEDs (Intelligent Electronic Device)
- Configuration of IEC 61850 Signals through SCD file import
- Horizontal communication to SD Series controllers
  - Via CI850 interface module
  - Support MMS and GOOSE
  - Value/Command can be exchanged between IEDs and controller logic
- Vertical communication to S+ Operations
  - Support MMS

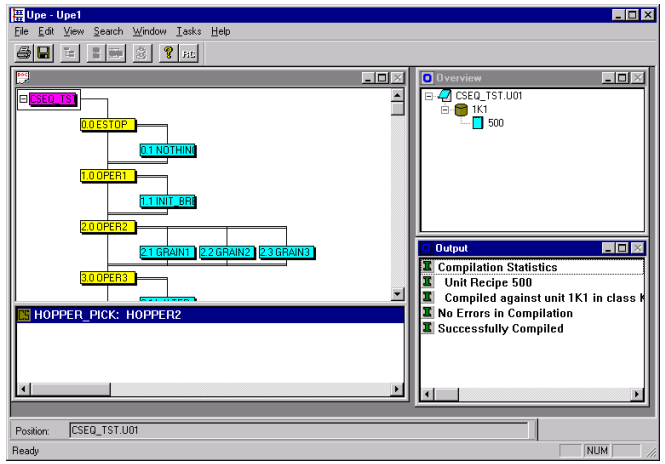
Symphony Plus Engineering Sequential Control Programming B90 & UDF

Function Block Interfaces

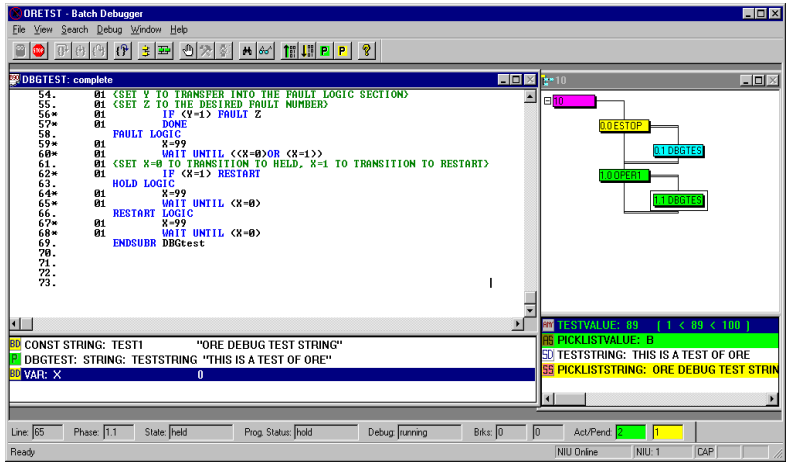



```
285.          STEP SUBR WATER
286.            ANY WATER_AMOUNT
287.            ANY FLOW_RATE
288.          DECLARATIONS
289.            MONITOR INIT_MIXER
290.            MONITOR AUTO_VALVES
291.            INTEGRATOR TOTAL_WATER (FICx04.PV, MIN)
292.          NORMAL LOGIC
293.    01      SET FICx04.MODE = AUTO
294.    01      WAIT UNTIL (FICx04.MODE = AUTO)
295.    01      START TOTAL_WATER
296.    01      SET FICx04.SP = FLOW_RATE
297.    01      SET AND WAIT HSX04.CO = OPEN
298.    01      SET AND WAIT HSX05.CO = OPEN
299.    01      WAIT UNTIL (TOTAL_WATER.VAL >= WATER_AMOUNT)
300.    01      SET AND WAIT HSX05.CO = CLOSED
301.    01      SET AND WAIT HSX04.CO = CLOSED
302.    01      SET FICx04.MODE = MANAUAL
303.    01      WAIT UNTIL (FICx04.MODE = MANUAL)
304.    01      SET FICx04.CO = 0
305.    01
306.          FAULT LOGIC
307.    01      CALL CLOSE VALVES
308.    01
309.          HOLD LOGIC
310.    01      CALL CLOSE VALVES
311.    01
312.          ENDSUBR WATER
```

High-Level Programming Language



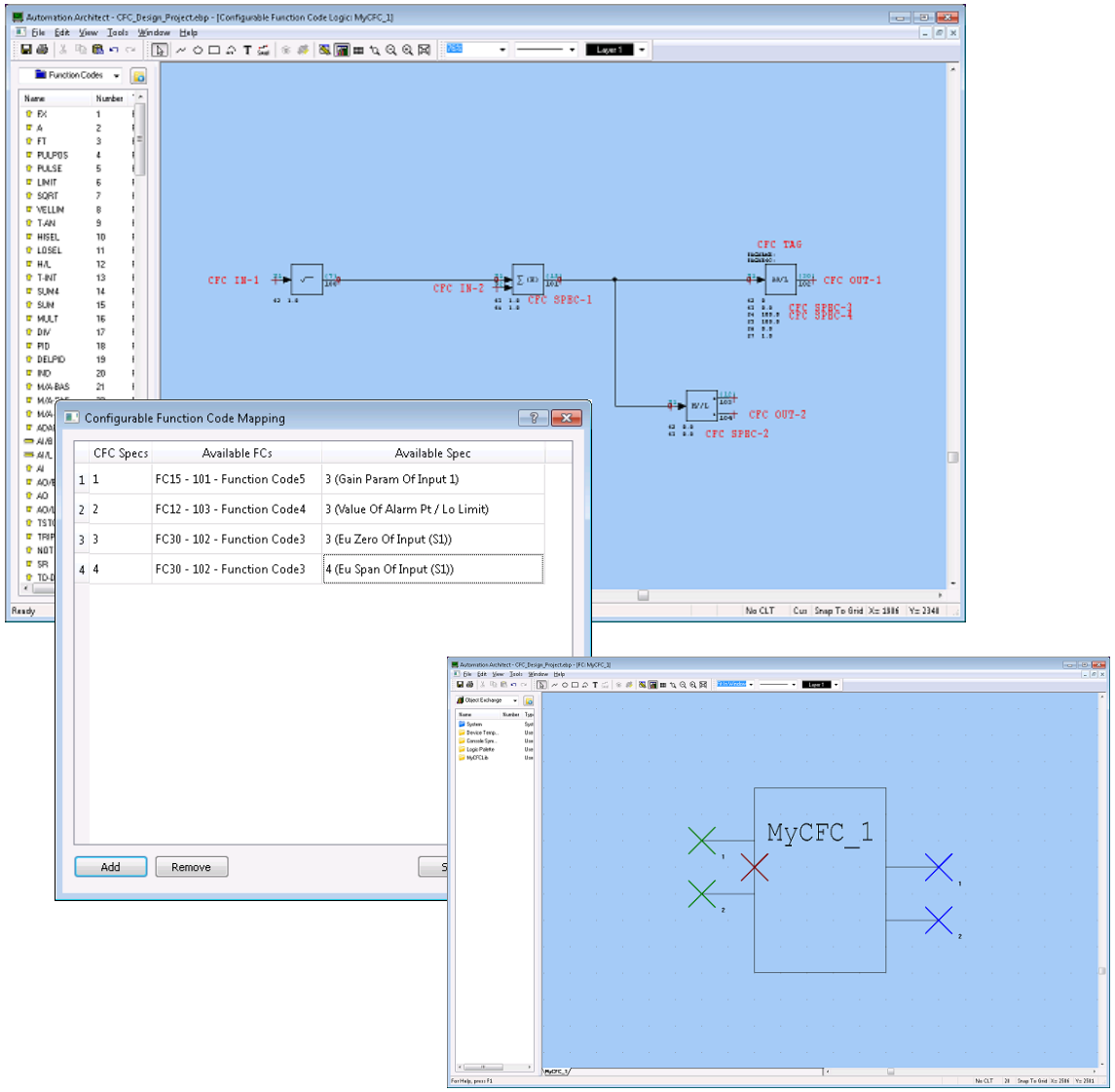
Procedure Editor



Dynamic Debugger

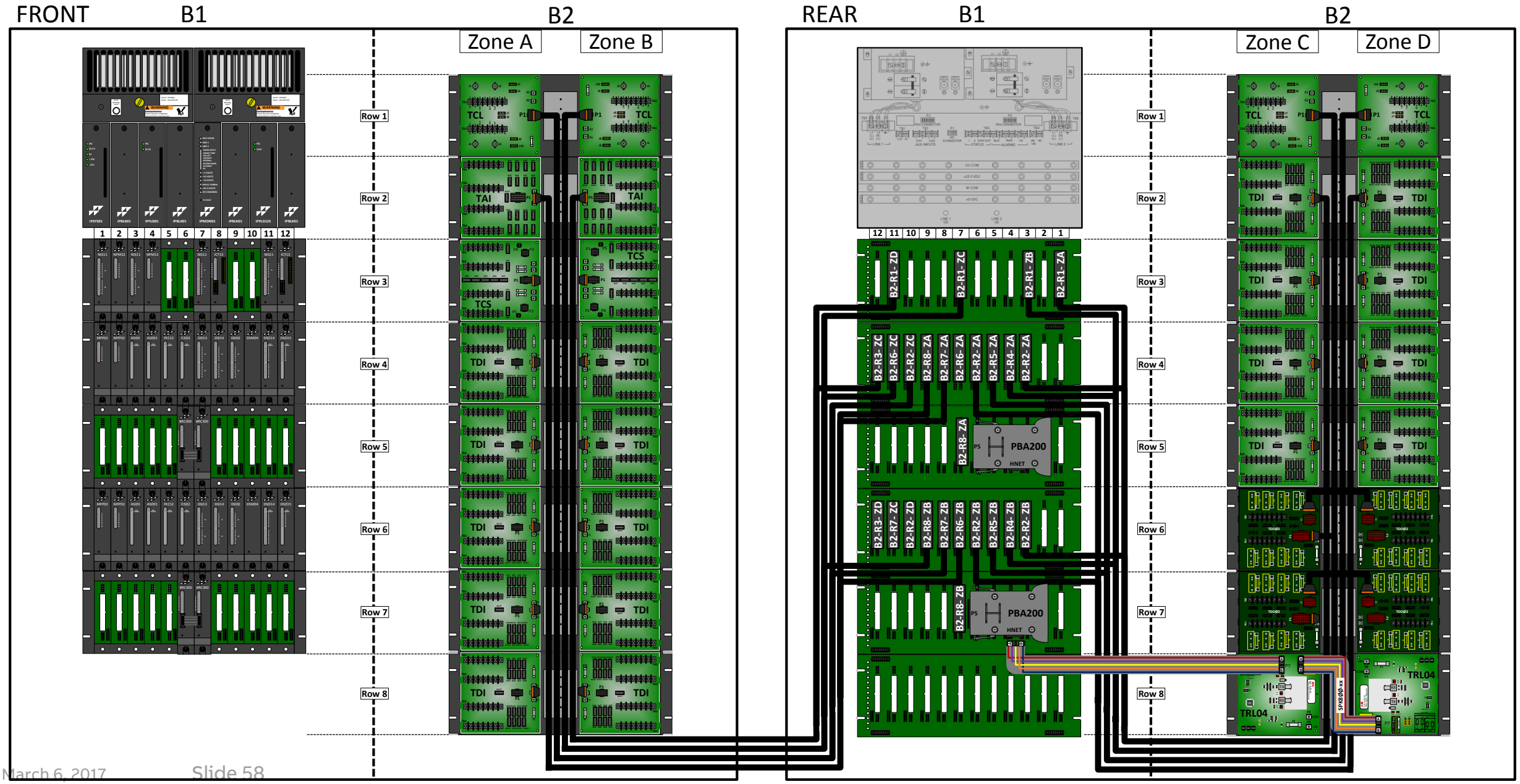
- Based on time-tested and field-proven Batch 90 & UDF programming languages
- Write Program commands to:
  - Change station (FC80) modes, set-points, or control outputs
  - Turn discrete devices (e.g. RCM, DD, MSDD, RMCB) ON or OFF
- BDM includes full feature text editor to create and compile B90 / UDF programs
- BDM also includes Procedure Editors
- User password security enhancements (e.g. expiration, complexity, account lockout, …)
- Support of additional procedure approval workflow

Symphony Plus Engineering CFC's: Configurable Function Codes

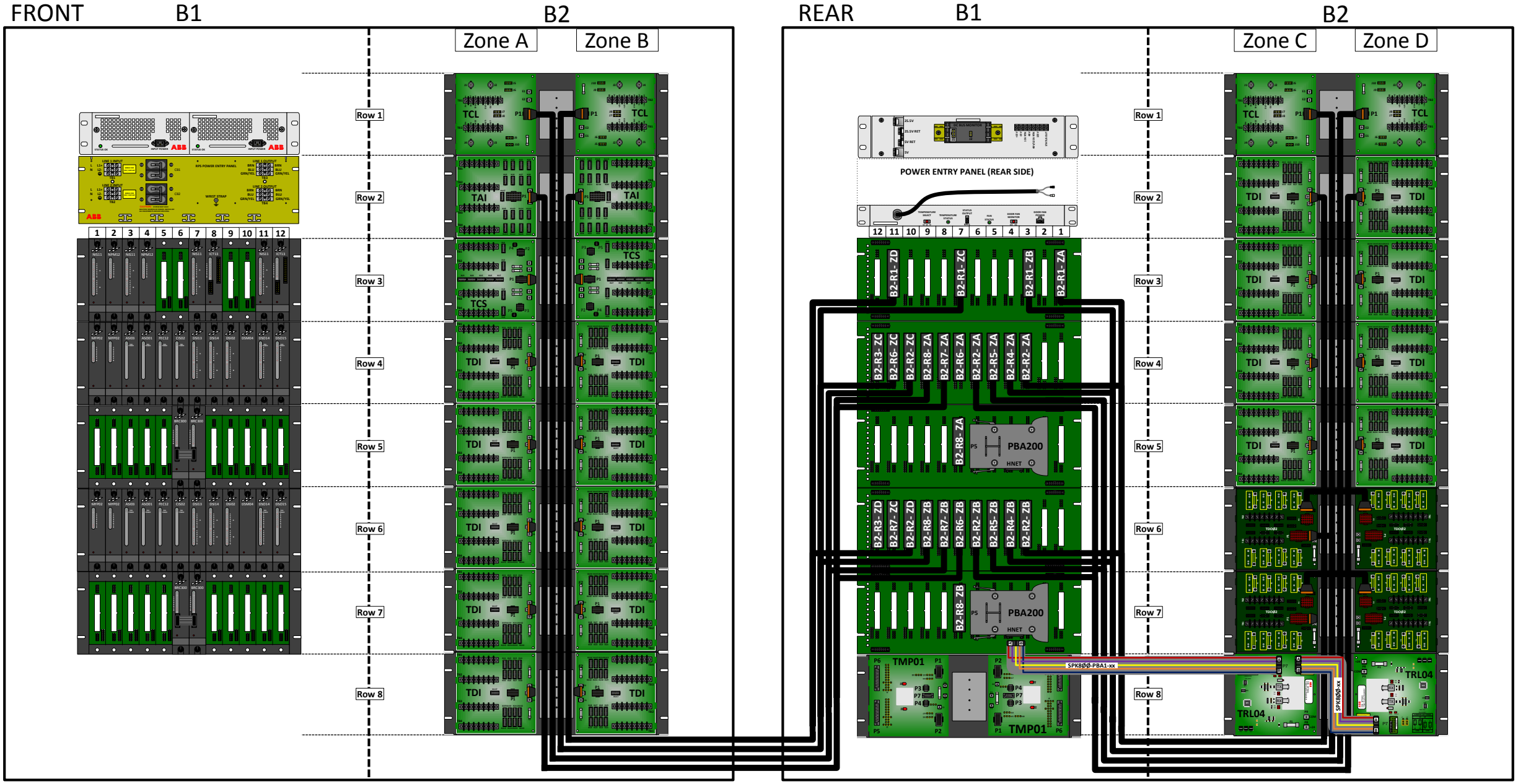


- Configurable Function Code (CFC) is a user-created group reusable of function blocks that appear and work similar to a standard Harmony function code
- CFC allows user to create control logics and encapsulate them with a new function code
- A CFC can be represented by a custom shape, control logic, defined lists of inputs/outputs/ parameters, and tag mapping.
- The main advantages of CFC are:
  - Protect intellectual property associated with control strategy
  - Reuse control logic in a more efficient way.
  - Simplify representation in control logic.
- CFC requires adequate license(s)

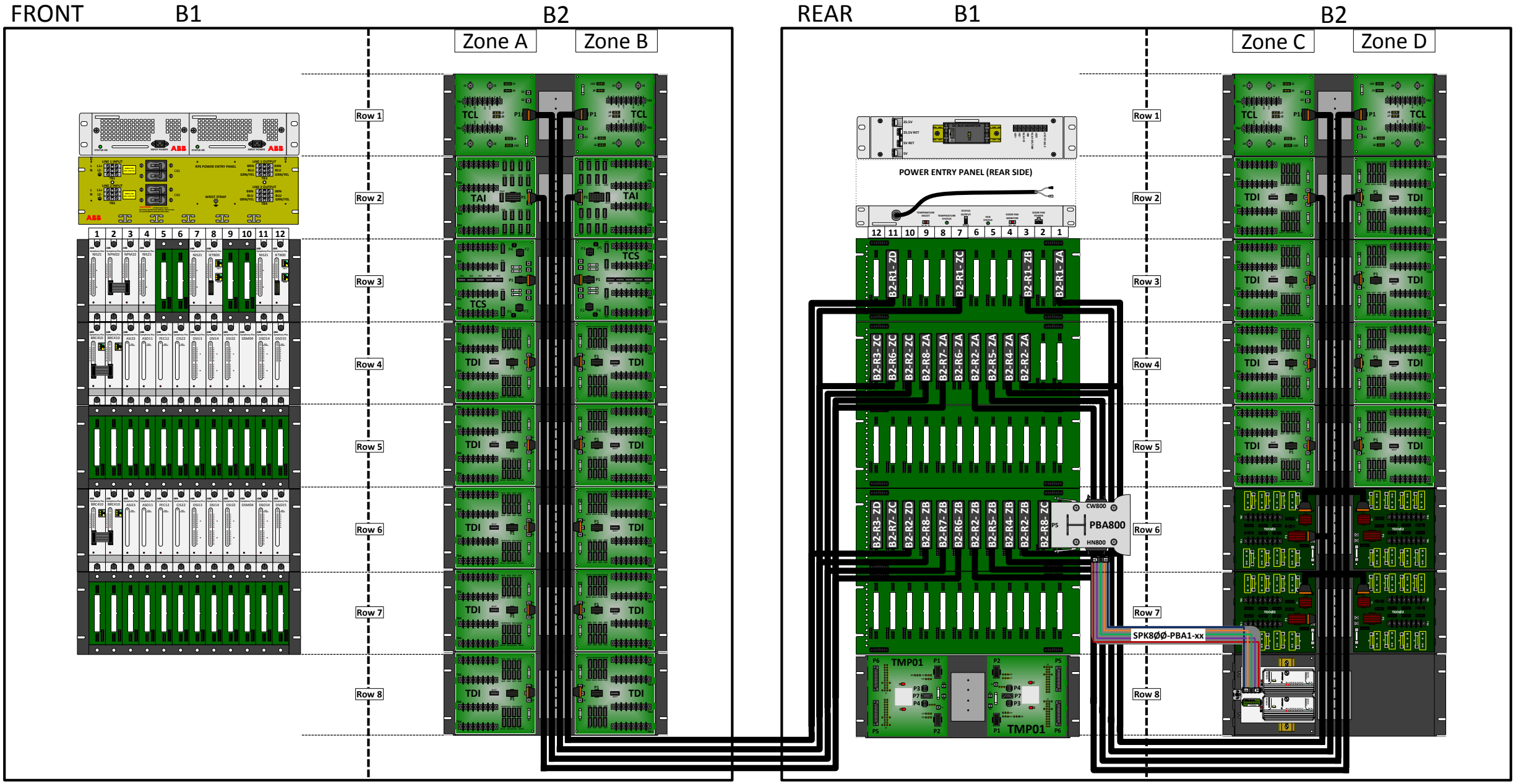
Symphony Evolution Use Case: Typical 2-Bay INFI 90 Cabinet



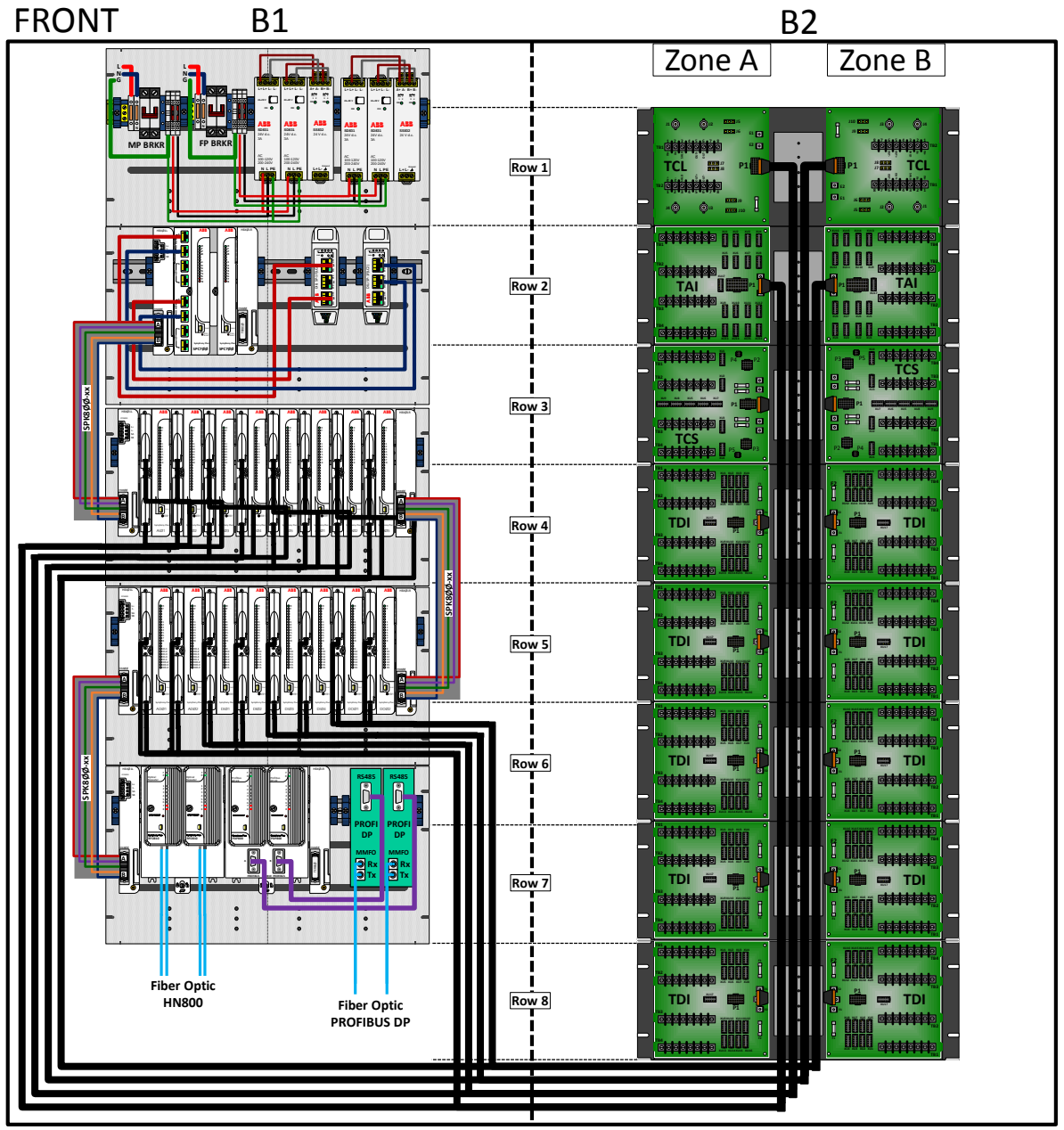
Symphony Evolution Use Case: Power System Upgrade

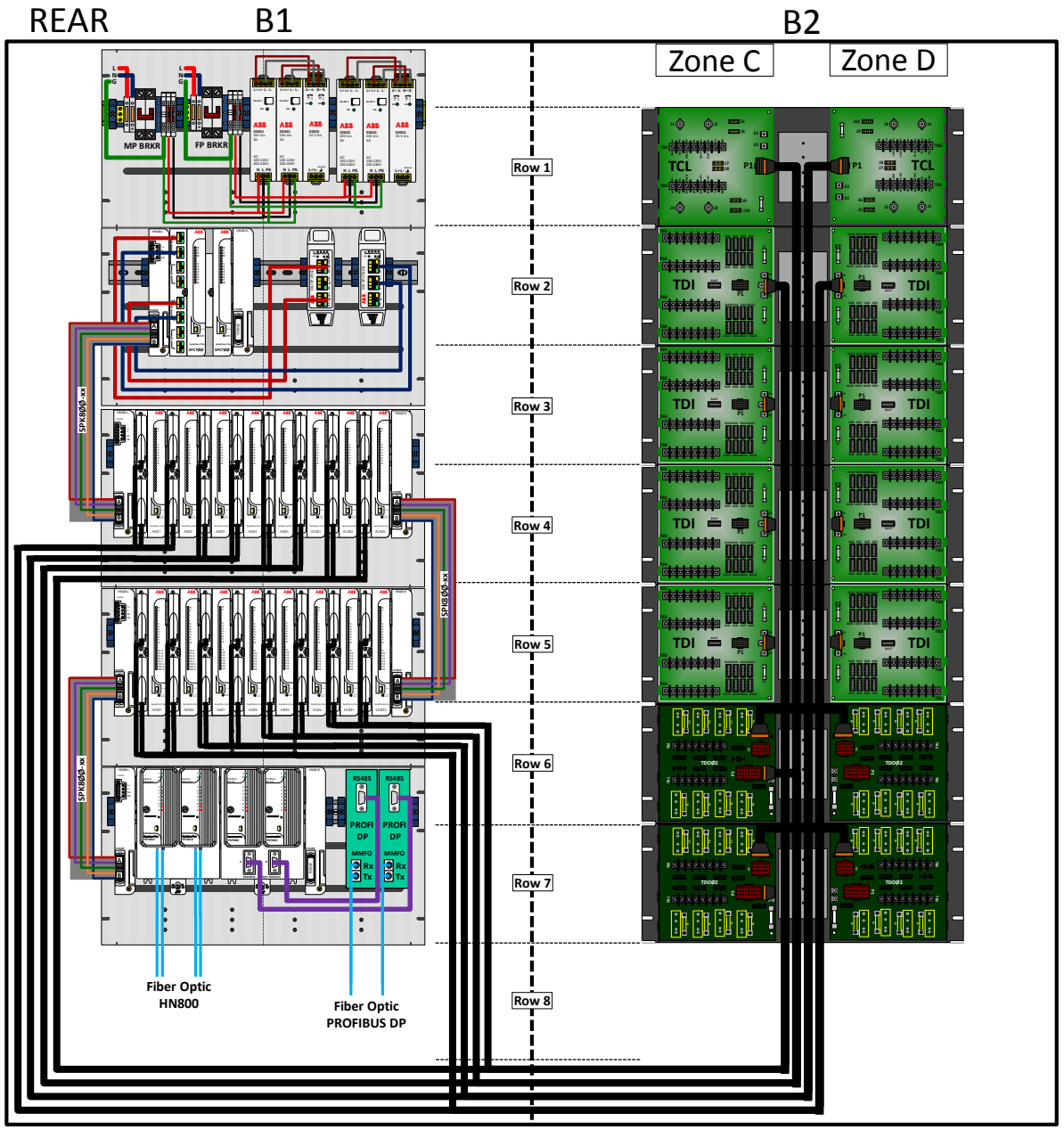


Symphony Evolution Use Case: Upgrade to latest S+ Modules



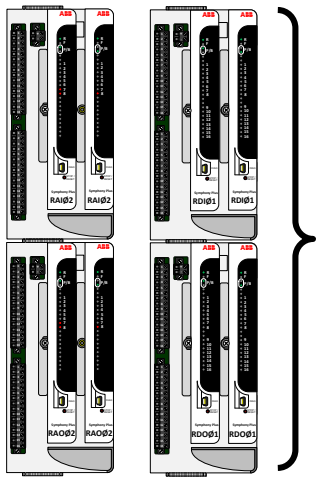
Symphony Evolution Use Case: Upgrade to SD Series Controllers & I/O





Symphony Plus DCS Roadmap

			R-W10		R2017			R2018
S+ Operations	2.0.6			2.1	3.1			3.2
S+ Engineering	1.3			1.4	2.1			2.2
S+ Controllers		SPC700 B.0 FW						SPC600
S+ I/O		STEP 4		STEP 5	STEP 6			STEP 7
	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
	2016	2017				2018			



SPC700 B.0 FW
- MODBUS TCP
- Enhanced SOE

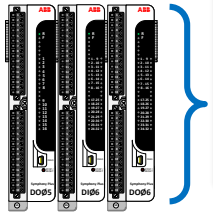
Control & I/O STEP 4
Redundant IO
- RAI02, RAO02, RDI01, RDI02, RDO1
- VBRØ1-xxx Vertical Bases

R-W10

SPO 2.1
- ❑ W10 LTSB, W7
- ❑ SRV 2016,/2008

SPE 1.4
- ❑ W10 LTSB

Control & I/O STEP 5
- ❑ 8-CH Compact I/O
- ❑ VBSØ1-SFP flexible base
- ❑ cRBXØ1 New FO Repeater



R2017

SPO 3.1
- ❑ W10 LTSB
- ❑ Server 2016
- ❑ Pocket Portal
- ❑ VPNI Support
- ❑ Smart Config PH 1
- ❑ High Speed data logging
- ❑ System Licensing

SPE 2.1
- ❑ W10 LTSB
- ❑ New DB Tech
- ❑ CFC PH 2
- ❑ Soft Controller PH 1

Control & I/O STEP 6
- ❑ Ethernet IP / DeviceNet
- ❑ DOØ5 EMR 120VAC @ 3A
- ❑ DIØ6/DOØ6 32-CH DI & DO
- ❑ Redundant TC (RDAI04)

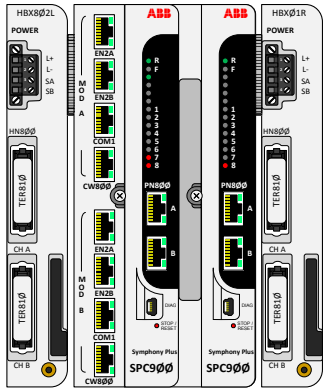
R2018

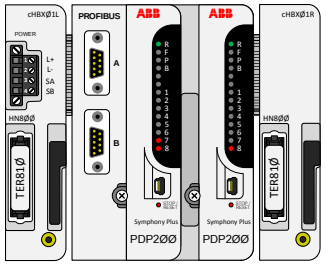
SPO 3.2
- ❑ Signal forcing
- ❑ Smart Config PH 2

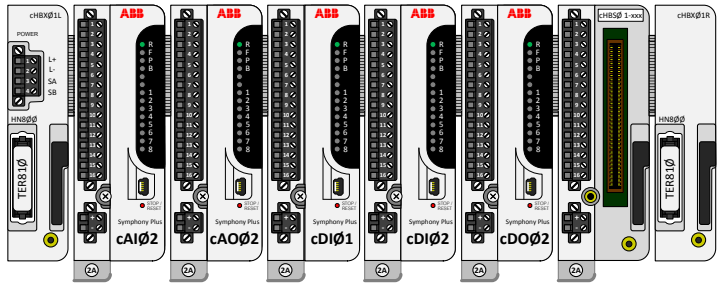
SPE 2.2
- ❑ FB Output Forcing
- ❑ CFC PH 3
- ❑ Full tag support 800xA PP

Control & IO STEP 7
- ❑ SPC600 Compact Controller
- ❑ PN800 Enhancements

Symphony Plus DCS Roadmap Possible Future Projects







SPC9ØØ Symphony Process Controller

- ❑ 8MB MRAM (NVRAM does not require battery)
- ❑ 100K Function Block capacity

PDP2ØØ Compact Profibus DP

- ❑ Operating Temperature Range: -20 to +70°C
- ❑ Compact SD Series Packaging

More Compact SD Series I/O

- ❑ cAIØ2 / cAOØ2 Compact HART Analog I/O
- ❑ cDIØ1 / cDIØ2 / cDOØ2 Compact Digital I/O

PN800 Plant Net Enhancements

- ❑ Support for HSR: High-availability Seamless Redundancy
- ❑ Cyber Security improvement (e.g. IPsec or TLS 1.x)

ENMØ1 Ethernet Network Module

- ❑ PCU Communications Interface (NIS/NPM replacement)
- ❑ Evolve from INFI-Net to PN800 Plant Net (Redundant Ethernet)

Q&A and Contact information

If you have questions, please contact me further

Speaker

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Important reminders

ABB Customer World 2017

Workshop evaluation & Professional Development Hours

Badges are automatically scanned as you enter each classroom

– You can download a transcript of the workshops attended by visiting the event portal.

Please complete a workshop evaluation

– The workshop evaluation forms can be completed online via the downloadable event application on your smart device or PC.

– Each completed session survey will be entered into a drawing to win a $25 gift card. Ten gift cards will be awarded daily.