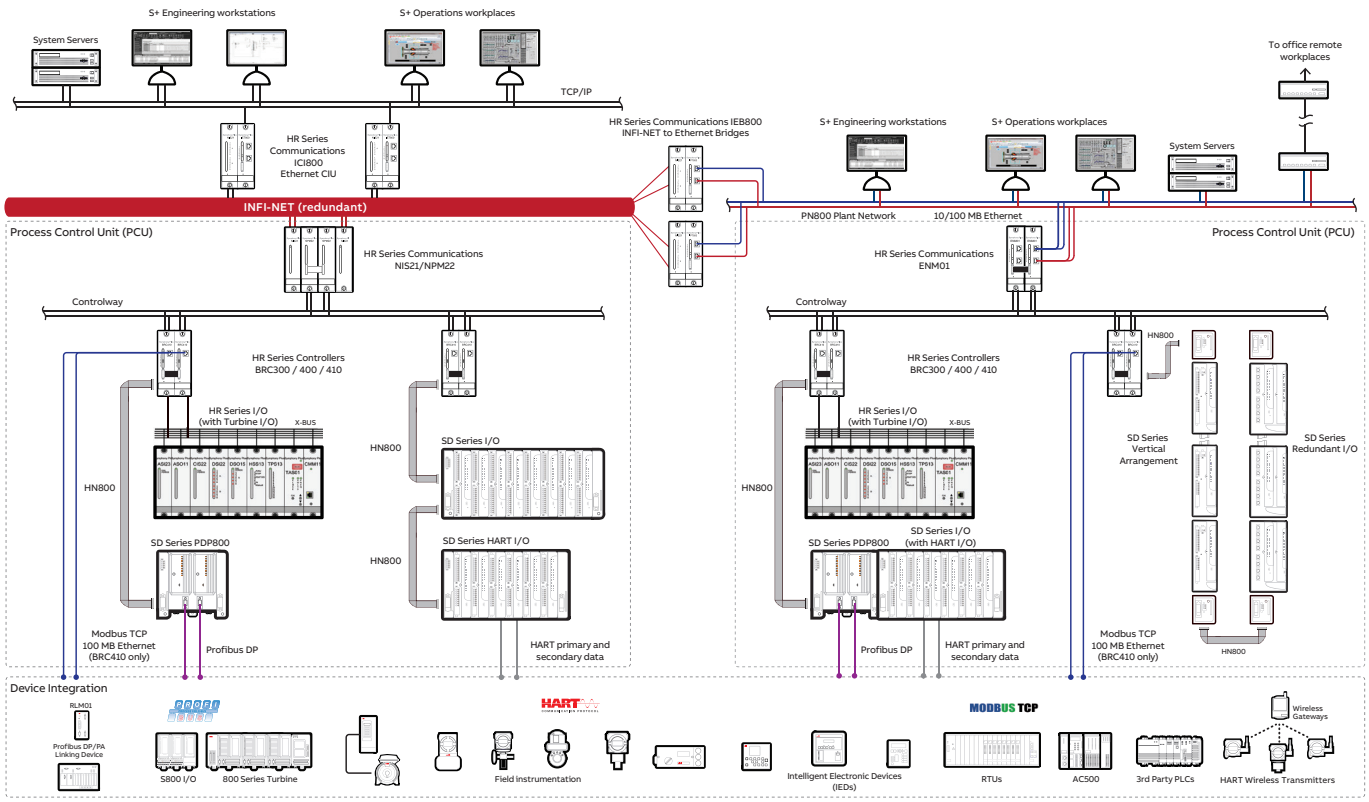
Part Number	Part Desciption	QTY	Product Line	Class	Original Price	Savings %	Final Price
U6224NZ10800E	SC POWER SUPPLY @	4	MOD 300	Refurb	$7,433.09	70%	$2,229.93
P6026BZ10300G	33 MHZ 68020 CPU, 8 MEG PRE-OWNED	2	MOD 300	Pre Owned	$4,409.90	70%	$1,322.97
P57360001-HC	DSMC112 PCB PRE-OWNED	1	MOD 300	Pre Owned	$3,738.90	70%	$1,121.67
P6214BZ10110G	SC BACK UP MEM MOD PRE-OWNED	1	MOD 300	Pre Owned	$3,597.94	70%	$1,079.38
6233BP10910B	RTD BLOCK 115VAC / 125VDC -Obsolete	2	MOD 300	New	$2,811.12	70%	$843.34
P6004BZ10200E	Control Module CPU 68000 Pre-Owned	1	MOD 300	Pre Owned	$2,755.67	70%	$826.70
6232BP10710F	Thermocouple Block 115Vac	1	MOD 300	New	$2,694.84	70%	$808.45
P57310001-KD	DSBC 172 PRE-OWNED	2	MOD 300	Pre Owned	$2,609.20	70%	$782.76
P6007BG10000C	Serial I/O RS-422/423 Card Pre-Owned	2	MOD 300	Pre Owned	$1,661.55	70%	$498.47
P6235BP10910B	CS ANLG INPUT BLK 115VAC PRE-OWNED	4	MOD 300	Pre Owned	$664.62	70%	$199.39
P6003BZ10000A	BYPASS RELAY MOD PRE-OWNED	1	MOD 300	Pre Owned	$293.65	70%	$88.10
P3BSE043660R1	CI867 Modbus TCP Interface PRE-OWNED	1	Paper - Accuray	Pre Owned	$2,476.00	70%	$742.80
P128855-104	Motor Controller Sub assy Pre-Owned	2	Paper - Accuray	Pre Owned	$1,137.40	70%	$341.22
P3BSE045584R1	AO845 ANALOG REFURB PRE-OWNED	2	Paper - Accuray	Pre Owned	$917.40	70%	$275.22
P128617-002	MANIFOLD ASSEMBLY SP1200 Pre-Owned	1	Paper - Accuray	Pre Owned	$595.00	70%	$178.50
P069884-001	IR Sample Holder PRE-OWNED	1	Paper - Accuray	Pre Owned	$309.32	70%	$92.80
P3BSE013238R1	TU837V1 PRE-OWNED	1	Paper - Accuray	Pre Owned	$162.00	70%	$48.60
P128772-001	EOS CABLE ASSEMBLY, (SP700) PRE-OWNED	2	Paper - Accuray	Pre Owned	$125.00	70%	$37.50
490176215	ControlNet Drop Cable. Right Angle T-Tap	9	Satt	New	$258.06	70%	$77.42
SF810FOA-RE-UVIRL	FOC and Guide pipe for SF810/SF810i Rigi	6	Scanner	New	$3,245.77	77%	$754.82
SF810-FOC-IR-T-C-W	FIBER OPTIC FLAME SCANNER (ATEX-RATED)	1	Scanner	New	$1,048.56	54%	$485.48
C68-10308	Spring,Compression A-987-026	12	Scanner	New	$49.98	70%	$14.99
C67-91404	Circular Push On Retaining Ring,St,5005	4	Scanner	New	$9.18	70%	$2.75
C86-80741	Pwr Supply Module,110/220	3	Scanner	New	$2,665.00	70%	$799.50
C33-33112	TRANSFORMER *1213-1000A*	18	Scanner	New	$176.00	70%	$52.80
INIIL02-L	INIIL02,Infi-Net to Infi-Net Interface	1	Symphony Harmony	New	$39,240.00	70%	$11,772.00
PHCBRC40000000	BRIDGE CONTROLLER P-HC-BRC-4000	1	Symphony Harmony	New	$38,281.00	70%	$11,484.30
PHCBRC30000000R	BRIDGE CONTROLLER	4	Symphony Harmony	Refurb	$24,428.00	70%	$7,328.40
PHCHPG80010000	HPG800 Module,Harmony PCU Gateway Module	3	Symphony Harmony	New	$21,165.00	70%	$6,349.50
SMS01R	SMS01R; Stepper Motor Module;	1	Symphony Harmony	Refurb	$12,862.00	70%	$3,858.60
PHARPS03000000	Power Supply, 24V & 24V	10	Symphony Harmony	New	$11,623.00	70%	$3,486.90
IMFAI01	IMFAI01,16-Fast Analog Input Mod,16-Bit	1	Symphony Harmony	New	$13,304.00	77%	$3,031.01
NTCF22R	NTCF22,Fiber Optic Communication System	5	Symphony Harmony	Refurb	$9,938.00	70%	$2,981.40
PPHCHPG80010000	HARMONY BRIDGE CONTROLLER, PRE-OWNED	1	Symphony Harmony	Pre Owned	$8,466.00	70%	$2,539.80
PPHCBRC10000000	HARMONY BRIDGE CONTROLLER, PRE-OWNED	2	Symphony Harmony	Pre Owned	$8,454.00	70%	$2,536.20
INNIS21R	INNIS21,Infi-Net to Node Comm Interface	8	Symphony Harmony	Refurb	$7,922.00	70%	$2,376.60
PHARPS11000000R	POWER SUPPLY ASSY	2	Symphony Harmony	Refurb	$4,598.00	70%	$1,379.40
PINNPM12	NETWORK PROCESSING MODULE, PRE-OWNED	6	Symphony Harmony	Pre Owned	$4,116.00	70%	$1,234.80
NDIS01R	ANALOG MODULE REFURB	4	Symphony Harmony	Refurb	$3,713.00	70%	$1,113.90
1949779A1024240	HPS P/S,24VDC,240W	2	Symphony Harmony	New	$3,638.00	70%	$1,091.40
1948520E1	KEYBOARD,210 KEY*900R*	3	Symphony Harmony	New	$3,398.00	70%	$1,019.40
NDCS03R	CONTROL INTERFACE SLAVE	1	Symphony Harmony	Refurb	$3,315.00	70%	$994.50
RS30-1602	RS30-1602 16 PORT GB SWITCH W 2 FIBER	9	Symphony Harmony	New	$2,946.90	71%	$852.26
NKCL01-250	Plant Communication Cable	4	Symphony Harmony	New	$2,563.00	70%	$768.90
IMDSM04R	IMDSM04,Digital Slave Input/Output Mod	3	Symphony Harmony	Refurb	$1,762.00	59%	$713.86
IMQRS22	QUICK RESPONSE MODULE 4 AI, 3DI, 4 DO, 2	1	Symphony Harmony	New	$2,078.00	70%	$623.40
PIMASO11	IMASO11,Analog Output Module,Pre-Owned	6	Symphony Harmony	Pre Owned	$1,833.00	70%	$549.90
NKLS11-35	NKLS11 Superloop Cable 35ft	2	Symphony Harmony	New	$1,794.00	70%	$538.20



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02 HR Series functional overview

Overview

Symphony Plus HR Series provides a scalable solution that spans and integrates loop, unit, area, plant and interplant controls. Its system communication architecture is based on a high-speed, high-throughput and high-security redundant INFI-Net control network. The scalable network supports any combination and quantity of control, engineering, operation and application interface nodes. Each node on the control network operates independently of other nodes. Acting as its own communication manager, the system requires no traffic directors. INFI-Net to INFI-Net communication modules support multi-network system topologies that provide a system capacity of more than 62,000 nodes.

High system reliability and availability are key characteristics of this mission-critical control network. Reliability is bolstered by redundant hardware and communication paths. Extensive use of error checking and message acknowledgment assures accurate communication of critical process data. Patented exception reporting technology optimizes the use of control network bandwidth. The store and forward ring topology of INFI-Net, along with multi-master and multi-cast messaging features result in INFI-Net having an effective bandwidth that exceeds 300 Mbaud. INFI-Net communications are also highly deterministic.

HR Series process control unit (PCUs) communication products including the NIS21/NPM22 modules provide significant increases to performance and capacity compared to previous generations. The recently available ENM01 module combines the PCU communication functions performed by NIS and NPM modules into a single module and utilizes redundant Fast Ethernet based PN800 (INFI-Net over Ethernet) Plant Network as the control network. Existing INFI 90, Symphony Harmony, Symphony Plus HR Series systems can be incrementally upgraded from INFI-Net control network to PN800 using the ENM01 and the INFI-Net to PN800 Bridge (IEB800).

The Harmony OPC server provides OPC connectivity between devices on the INFI-Net control network and OPC client applications. In non-redundant and redundant configurations, it can be used in conjunction with ABB products such as DataLink and popular non-ABB products such as OSIsoft PI System and Aspen InfoPlus.21.

HR Series ICI800 Ethernet CIU provides Ethernet-based communication between INFI-Net and the system's engineering tools, HMI and the Harmony OPC server for connection to third-party applications. As per NERC CIP-007-2 R5, SSL certifications authenticate its connections with interface applications, further safeguarding the integrity and privacy of the ICI800 communication path.

HR Series
Achieving greater levels of performance



03 HR Series scalable controllers BR300, BRC400, and BRC410



04 Modular Power System IV

Powerful, scalable control platform
HR Series controllers are the latest in a long line of field-proven multi-function rack process controllers, and include the BRC300, BRC400, and the BRC410 bridge controllers (figure 3). This scalable family of controllers, based on a 160 MHz, 32-bit Freescale Coldfire processor, can be adapted to a broad spectrum of applications and process requirements. HR Series controllers feature an extensive library of more than 150 predefined control algorithms or function codes. These functions provide the power to easily design complex control strategies to fit any control application, including continuous, sequential, batch and advanced control. In addition to standard function blocks, HR Series controllers support C programming and batch functions.

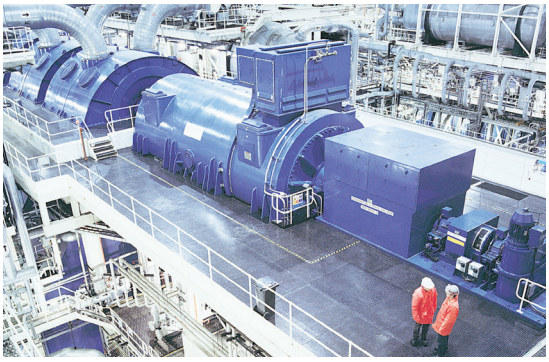
HR Series controller features include:
- Enhanced controller reliability
- More than 10x performance of previous generation controllers
- Simultaneous support for all HR Series I/O, SD Series I/O and S800 I/O subsystems
- Intelligent device integration via HART I/O and PROFIBUS DP V0, V1, V2
- Downloadable firmware
- BRC400 / BRC410 specific enhancements:
  - Extended user configuration memory (2 MB NVRAM)
  - Support for 30,000 function blocks
  - Flexible online configuration capability
  - Modbus TCP device integration via 100 MB Ethernet port (BRC410 only)

High reliability and availability
With redundant controller, communication, I/O and power options such as the recently released MPS IV (Modular Power System), HR Series controller subsystems provide the highest level of availability. Compliance with international standards assures the highest level of reliability and quality needed to meet the most rigorous global specifications and requirements. Backward compatibility through ABB's 'Evolution without obsolescence' life cycle program ensures protection of installed investments while providing the most cost-effective and seamless way of introducing new functions and technology into a running plant. Together, the HR Series provides users with fast, accurate, uninterrupted control of their process, resulting in greater production efficiency, increased availability, and lower maintenance costs.

Soft controller reduces commissioning times
For new plant, upgrade, or expansion projects, HR Series HTS-based soft controllers can dramatically reduce commissioning and start-up time and costs by permitting thorough testing and pre-tuning of control loops prior to its implementation in the field. The HR Series soft controller uses the same control logic (ie, function block configuration) as the physical HR Series controllers. Coupled with virtual communication devices, the entire HR Series control-based system can be implemented within one or more PCs which allow for testing results made in the virtual environment to be directly transferable to the operating system environment.

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05 HR Series Turbine control systems

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06 SD Series remote I/O





Comprehensive I/O product portfolio
S+ I/O, available for local and remote mounting, provides a wide variety of input/output and signal conditioning capabilities. In combination, these rack and DIN I/O modules can be combined to form the optimal automation solution.

HR Series controllers can communicate with up to 64 rack I/O modules locally with additional remote rack I/O modules connected via the RIO22 module. Use of rack sequence of events (SOE) I/O modules provides one millisecond timestamp resolution across the entire rack system.

HR Series I/O module types include:
- Analog input (ASI, FEC)
- Analog output (ASO)
- Control input/output (CIS, QRS)
- Digital input (DSI)
- Digital output (DSO)
- Pulse input (DSM)
- SOE digital input (SED)

Turbine control
In addition to traditional signal-type I/O, HR Series provides for integrated turbine control via a series of turbine control-specific modules, including:
- Hydraulic servo module (HSS)
- Turbine protection module (TPS)
- Turbine auto synchronization module (TAS)
- Condition monitoring module (CMM)

These unique modules make it possible to provide a fully integrated single-vendor solution for all aspects of turbine automation. HR Series turbine modules are based on proven technology that controls steam turbines, gas turbines and hydroelectric turbines in more than 15 different countries around the world, and have been tested, accepted, and used by several major global turbine manufacturers as part of their standard offering. The combination of HR Series controllers and turbine I/O results in a powerful governor control system solution.

SD Series remote I/O option
HR Series remote I/O capabilities are further expanded with use of the SD Series DIN rail mounted I/O products. Compatible with all HR Series controllers, BRC300 / 400 / 410, SD Series I/O connects directly to the controller via the HN800 I/O network without the need for an intermediate interface or gateway. SD Series I/O is configured using standard function blocks and includes traditional analog and digital I/O as well as integration with intelligent field devices via PROFIBUS DP and HART. 24 VDC power requirements, low module power consumption, and a module temperature rating of 70 DEGC (ambient) makes SD Series I/O the optimal choice for remote I/O applications. G3 coating makes SD Series I/O suitable for use in corrosive environments without requiring costly sealed cabinets or purging systems.

HR Series
Securing your control investments

09 Cyber security

10 Evolution without obsolescence

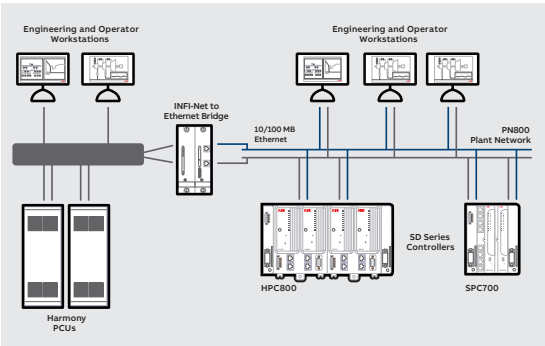




Protecting the integrity and confidentiality of system data

The process and power industries face intensifying cyber security risks. In order to increase stability, security and robustness in its solutions, ABB has established an independent Device Security Assurance Center (DSAC) where cyber security robustness is tested as part of the product development process. The DSAC test facility uses state-of-the-art open source, commercial and proprietary robustness and vulnerability analysis tools. All Symphony Plus Ethernet-based devices - including HR Series products such as the BRC410, ICI800, ENM01 and IEB800 - are continually tested at the DSAC center in different configurations and with an explicit focus on operational performance. This ensures that all Symphony Plus products are robust, secure and of the highest quality.

11 INFI-Net to Ethernet bridge (IEB800)



Seamless upgrade path protects investments

True to ABB's 'Evolution without obsolescence' commitment, HR Series products provide backward compatibility to previous generation Network 90, INFI 90, INFI 90 Open and Harmony hardware and software, including support for existing function code executions, custom user programs, and all foreign device interfaces. ABB's 'Evolution without obsolescence' ensures the protection of installed investments while providing the most predictable, cost-effective, risk-averse, and seamless way of introducing new functions and technology into a running plant.

Specifically, HR Series products:

- Replace previous generation rack products on a form/fit/function basis
- Preserve installed I/O through simultaneous connection to HR Series I/O, previous generation rack and block I/O, SD Series I/O and S800 I/O
- Use the same field-proven INFI 90 function code algorithms as previous generation controllers (ie, MFCxx and MFPxx controllers)
- Enhance existing Composer engineering tools with device management capabilities

Further, HR Series and SD Series control networks, INFI-Net and PN800 (INFI-Net over Ethernet) respectively can be connected via a self-configuring INFI-Net to Ethernet bridge (IEB800 module). This allows for the easy expansion of existing INFI-Net communication networks with INFI-Net on Ethernet technology and SD Series DIN rail mounted products. Additionally, resident data from either network is available for use in control applications or for display in applications connected to the other.