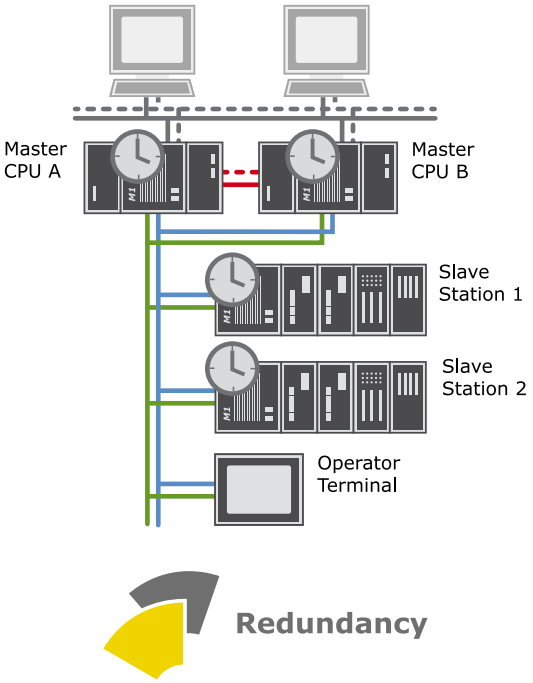


Part type designation	Part number
M-HS-REDU RT	00019829-63

Hot-Standby Redundancy

Mission-critical systems, applications in harsh environments and facilities where even short failures, e.g. owing to cost restraints, are not tolerated are the main fields of activity of Hot-Standby Redundancy. In addition, control engineering applications with their requirement of bumpless switchover, i.e. no deviation between values when switching the master CPU, can only be implemented in this redundancy version.

With redundancy on all system levels, i.e. hardware, system software, application programming and maintenance and monitoring interfaces, Hot-Standby Redundancy provides maximum reliability with outstanding convenience at the same time.

The full integration of configuration, programming and monitoring in Bachmann tools shortens application creation and minimizes deviations with respect to everyday standard operating sequences. At the same time, risks in the course of maintenance operations, error corrections and application updates decrease during the process in operation.

Hot-Standby Redundancy combines the highest redundancy technology and the best performance possible with the customary robustness of every Bachmann module.

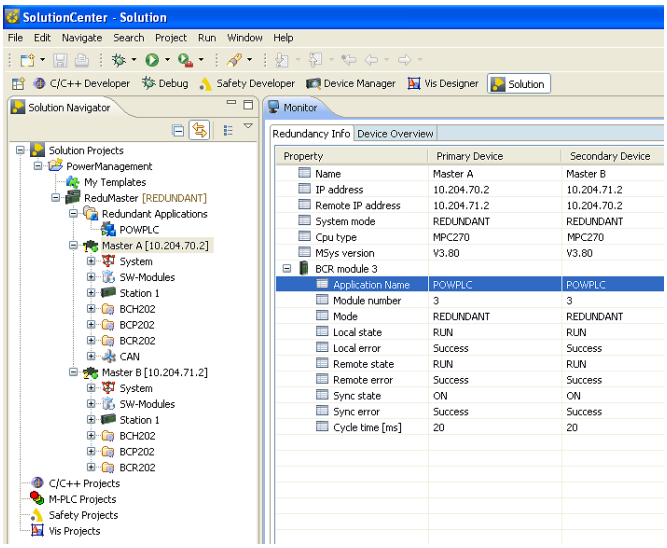
Hot-Standby Redundancy enhances network redundancy by the following attributes, among others:

Features

- Fully automatic matching of process variables
- Automatic failover upon detecting internal errors
- Integrated self-tests for checking the system status
- Automatic system matching (system software, configuration, application programs)
- Automatic application synchronization (variance < 200 µs)
- Millisecond-precise synchronization of all stations
- Network switching time freely configurable (0 to 10 PLC cycles)
- Bumpless switchover
- Redundancy programming support in M-PLC (IEC 61131-3)
- Debugging and forcing of variables in redundant applications (M-PLC)
- Resistant to single-fault events, additionally many multi-fault scenarios are overridden on a continuous basis

Integration in the SolutionCenter

- Applying, monitoring and deleting redundancy devices
- Extra support in Device Navigator and Device Manager for configuring, monitoring and logging redundant application programs
- Textual and graphical redundancy status displays
- Virtual redundancy devices with the option of applying and manipulating redundancy configurations and application programs
- Redundancy master status information
- Device designation
- Current redundancy status of the overall system
- CPU information
- System software information
- Network information
- Redundancy application status information
- Current redundancy status (REDUNDANT/SINGLE/ERROR)
- Runtime state (RUN/STOP/ERROR)
- Error status codes
- Synchronization status
- Cycle time
- Maintenance interface for redundancy systems integrated (execution of commands on both master CPUs at the same time)
- All commands and monitoring mechanisms are available to the operator as open user interfaces and/or as system variables.



bachmann.
SolutionCenter

Hot-Standby Redundancy

Rationale/Type	
High availability system type	Hot-Standby Redundancy with local I/O stations (1oo2 voting integrated)
CPU redundancy	Yes (synchronization and self-monitoring automatic)
Network Redundancy	Included
I/O redundancy	Possible
Sensor redundancy	Possible
Switchover	Bumpless
Continuous dual-channel ability	Yes
Communication redundancy	Yes
Processing units (recommendation)	Main station: M200 standard CPUs from the families MPC, MC, MH or better Substation: M200 standard CPUs from the families MX, MPC, MC, MH or better
I/O periphery	Via MX CPU all from M200 standard module portfolio
Use of special hardware	No (straight software solution and standard Ethernet)
Topology/Networking	
Protocol basis	Ethernet IEEE 802.3q, Ethertype 0x892D
Communication protocol	bluecom with redundancy enhancement (100 % IEEE 802.3q compatible)
Media redundancy	Yes (continuous 2-channel, galvanically isolated Ethernet networks)
Switches	Industrial standard managed switch (unmanaged switch with appropriate configuration)
Topologies	Star, bus, ring, mesh
Ring redundancy	Possible through parallel use of MRP, STP and RSTP
Dimension	In compliance with IEEE 802.3 - ≥ 2000 m per network section with fiber optic connection
CPUs spatially separable	Yes (see dimension)
Time synchronization	Integrated in network protocol
Number of I/O stations	More than 100
Smart SubDevices	Yes, I/O stations can execute local application programs for e.g. emergency operation, load separation or local logging
Parallel data traffic	Yes, possible (Ethernet-based protocols and services, e.g. HTTP, FTP, video stream, Modbus, OPC, MMS)
Interfaces	
I/O periphery	M200 standard module portfolio
Redundancy network	bluecom network variables
Fieldbuses	Gateway function for CAN, PROFIBUS DP, PROFINET, Modbus, EtherCAT via application program possible
SCADA / supervisory control & PDA	Standard protocols: IEC 61850, IEC 61400-25, IEC 60870-5-104, OPC DA, Modbus TCP/UDP Application program development: Communication library M1Com and M1Com.NET
IT protocols	See M200 software (FTP, HTTP, SNTP, SMTP, etc. and security versions)
Configuration/Programming	
Configuration	SolutionCenter (support via wizards)
Remote configuration	Yes (Ethernet LAN, Internet)
Network configuration	SolutionCenter (support via wizards)
Programming	M-PLC: IEC 61131-3 (IL, LD, FBD, ST, SFC)
Editor	CoDeSys

Configuration/Programming	
Redundancy download	Automatic
Redundancy debugging	Yes
Redundancy synchronization	Automatic (process variables, system software)
Manual switchover	Yes Switchover: triggering by user Failover: automatic via software
Multitasking	Yes (one redundant task per PLC application program permitted, up to three independent redundancy tasks in total)
Mixed operation	Yes (non-redundant, non-synchronized application programs can run parallel to redundancy application programs)
Diagnostics/Monitoring	
I/O live display	SolutionCenter
Redundancy status	Yes
Error state	Yes
Diagnostic user interface (API)	Yes, integrated
Statistic user interface (API)	Yes, integrated
Network monitor	SolutionCenter
Network analysis	Yes (by Wireshark plugin, Wireshark data are generated automatically on the controller)
Distributed logging	Yes (synchronized, granularity 1 ms)
Performance data	
Master cycle time	1 ms to 1000 ms [1)]
I/O cycle time	Minimum 200 µs for non-redundant application programs 1 ms to 1000 ms for redundant application programs [1)]
I/O quantity structure	More than 100 stations [1)] Number of channels unrestricted ([1)], [2)]) – typically 400 to 600 channels per station (1/3 analog, 2/3 digital)
Synchronization volume	Max. 120 * 1400 byte
Switching time	Adjustable from 0 to 10 cycles
Time precision	< 1 ms [1)]

[1)] *Limit value is subject to CPU type, memory available, application size, number of exchangeable variables, network bandwidth available and network and CPU load via non-redundant applications*

[2)] *No program-technical restriction*

Installation	
Installation medium	CD ROM or network
Installation tool	SolutionCenter
Upgrading existing systems	Possible via software / new CF card required
License protection	Data CF of the master CPUs is integrated dongle
System requirements	
Automation devices	M200 CPUs of the MX200 family or better (minimum 2 Ethernet interfaces onboard)
Network	2x Ethernet 100 MBit/s or Gbit/s, managed switch
Software	MSys / MxCCore / M-BASE V3.80 or higher

Order data

Part type designation	Part number	Description
M-HS-REDU RT	00019829-63	License to operate a Hot-Standby Redundancy on 2 controller CPUs as redundant main controllers (includes 2 licenses). Allows any number of I/O stations (SubDevices) to connect redundantly to both main controllers (includes network redundancy).