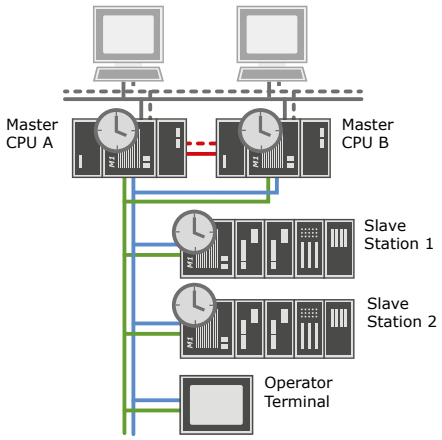



Redundancy

| Item | Item-No. |
|---|---|
| M-HS-REDU RT | 00019829-63 |

## Hot-Standby Redundancy

Mission-critical systems, applications in harsh environments and facilities where even short outages, e.g. owing to cost restraints, are not tolerated are hot-standby redundancy's main fields of activity. In addition, control engineering applications with their requirement of smooth switchover, i.e. no deviation between values when switching the master CPU, are executable in this redundancy version too.

With redundancy on all system levels (i.e. hardware, system software, application programming and maintenance, 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 ruggedness of every Bachmann module.

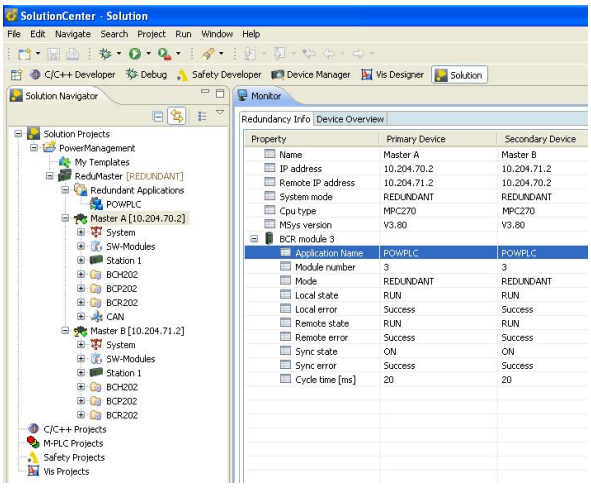
Hot-standby redundancy enhances network redundancy by the following attributes, among others:

- Fully automatic matching of process variables
- Automatic failover upon detecting internal errors
- Integrated self-tests for checking system status
- Automatic system matching (system software, configuration, applications)
- Automatic application synchronization (variance < 200 µs)
- Millisecond-precise synchronization of all stations
- Network switching time freely configurable (0 to 10 PLC cycles)
- Blumpless 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 Solution Navigator and Device Manager for configuring, monitoring and logging redundant applications
- Textual and graphical redundancy status displays
- Virtual redundancy devices with the option of applying and manipulating redundancy configurations and applications
- Redundancy master status information
- Device designation
- Current redundancy status of the entire 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.

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SolutionCenter

| Hot-standby redundancy | |
|---|---|
| **Rationale/Characteristic** | |
| 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) | Master: M1 standard CPUs of the MPC, MC, MH families or better<br>Slave: M1 standard CPUs of the MX, MPC, MC, MH families or better |
| I/O peripheral | Via MX CPU all from M1 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 (2-channel, galvanically separated Ethernet networks) |
| Switches | Industrial standard managed switch (or unmanaged switch with appropriate configuration) |
| Topologies | Star, bus, ring, mesh |
| Ring redundancy | Possible via parallel application 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 substations | Yes, for example, I/O stations can execute local applications for:<br>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 peripheral | M1 standard module portfolio |
| Redundancy network | bluecom network variables |
| Field buses | Gateway function for CAN, Profibus DP, Profinet, Modbus, EtherCAT via application possible |
| SCADA / control station & PDA | Standard protocols:<br>IEC61850, IEC61400-25, IEC60870-5-104, OPC DA,<br>Modbus TCP/UDP<br>Application development:<br>communication library M1Com and M1Com.NET |
| IT protocols | See M1 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, AS, SFC) |
| Editor | CoDeSys |
| Redundancy download | Automatic |
| Redundancy debugging | Yes |
| Redundancy synchronization | Automatic (process variables, system software) |

| Hot-standby redundancy | |
|---|---|
| **Configuration/Programming** | |
| Manual switchover | Yes<br>Switchover: triggering by user<br>Failover: automatic via software |
| Multitasking | Yes (one redundant task permissible per PLC application, total up to three independent redundancy tasks) |
| Mixed operation | Yes (non-redundant, non-synchronized applications can run parallel to redundancy applications) |
| **Diagnostics/Monitoring** | |
| I/O live display | SolutionCenter |
| Redundancy status | Yes |
| Error status | Yes |
| Diagnostic user interface (API) | Yes, integrated |
| Statistic user interface (API) | Yes, integrated |
| Network monitor | SolutionCenter |
| Network analysis | Yes (by Wireshark plug-in, Wireshark data are generated automatically on the controller) |
| Distributed logging | Yes (synchronized, granularity 1 ms) |
| **Performance data** | |
| Master cycle time | 1 to 1000 ms[1)] |
| I/O cycle time | Minimum 200 µs for non-redundant applications<br>1 ms to 1000 ms for redundant applications [1)] |
| I/O frame works | More than 100 stations[1)]<br>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)] |
| **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 prerequisites** | |
| Controller equipment | M1 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 |

1) Limit value 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.

| Order codes | | |
|---|---|---|
| **Item** | **Item no.** | **Description** |
| M-HS-REDU RT | 00019829-63 | License to operate a hot-standby redundancy on two controller CPUs as redundant main controllers (includes 2 licenses). Allows any number of IO stations (slaves) to connect redundantly to both main controllers (includes network redundancy). |