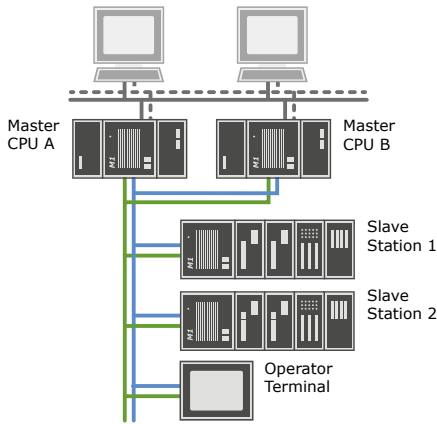


# Redundancy



## Warm-Standby Redundancy

For applications where reliable recording of critical data has priority, warm-standby redundancy is the preferred solution. Good support when configuring and monitoring the actual CPU redundancies helps during the rapid development of applications for which bumpless switchover is not required. Continuous operation during maintenance, system updating and application changes is also possible in this version.

If a master CPU for maintenance work is disconnected from the network, real-time processing is only affected to a minimum. The data transmission continues seamlessly and from the perspective of the receiving stations no packets are lost.

The matching of process variables in the master CPU has to be resolved on the application level, which means extra effort and expense and increased complexity vis-à-vis hot-standby redundancy (see Fig. 1).

Warm-standby redundancy provides the qualities of network redundancy and the following advantages as well:

- CPU redundancy
- Switching time freely configurable (0 to 10 PLC cycles)
- Selection of the data master integrated in end points (voter), the fastest switching times possible as a result
- Diagnostic interface for monitoring and analyzing the redundancy status in the SolutionCenter
- Automatic matching of the master CPUs not integrated → switchover not bumpless

Item	Item no.	Description
M-NW-REDU RT	00019828-63	License to operate a network redundancy communication master on one controller CPU. Allows any number of IO stations (slaves) to connect redundantly over the network. Two network redundancy licenses are necessary for warm-standby operation (for each master-cpu one license).

# Redundancy

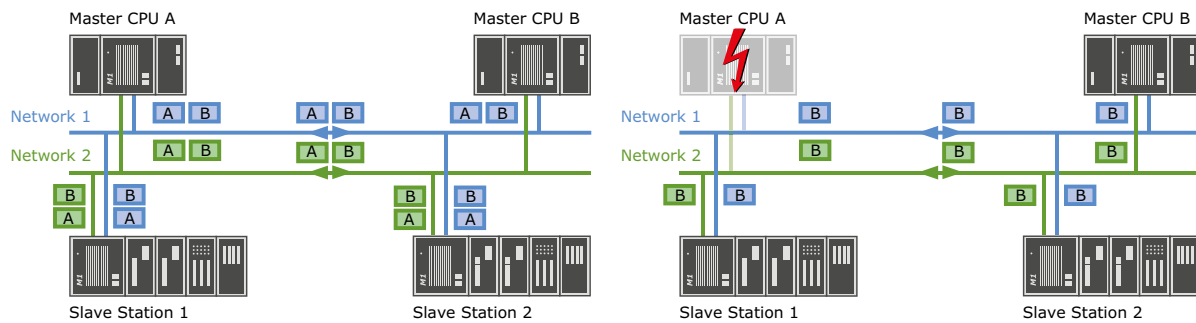


Fig. 1 Switchover of the active CPU within a PLC cycle, e.g. cycle time 1 ms – switchover  $\leq$  1 ms

Warm-standby redundancy	
Rationale/Characteristic	
High availability system type	Warm-standby redundancy with decentral I/O (1oo2 voting integrated)
CPU redundancy	Yes (no automatic synchronization and self-monitoring)
Network redundancy	Included
I/O redundancy	Possible
Sensor redundancy	Possible
Switchover	Not bumpless
Continuous dual-channel ability	Yes
Communication redundancy	Yes
Processing units (recommendation)	Master: M1 standard CPUs of the MPC, MC, MH families or better 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 - $\geq$ 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: emergency operation or load separation or local logging
Parallel data traffic	Yes, possible (Ethernet-based protocols and services, e.g. HTTP, FTP, video stream, Modbus, OPC, MMS)

# Redundancy

Warm-standby redundancy	
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: IEC61850, IEC61400-25, IEC60870-5-104, OPC DA, Modbus TCP/UDP Application development: communication library M1Com and M1Com.NET
IT protocols	See M1 software (FTP, HTTP, SNTTP, 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	Manual
Manual switchover	To integrate by user
Multitasking	To integrate by user
Mixed operation	Yes (non-redundant, non-synchronized applications can run parallel to redundancy applications)
Diagnostics/Monitoring	
I/O live display	SolutionCenter
Redundancy status	Yes (restricted to network redundancy)
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)
Performance data	
Master cycle time	1 to 1000 ms*
I/O cycle time	Minimum 200 µs for non-redundant applications 1 to 1000 ms for redundant applications*
I/O frame works	More than 100 stations* Number of channels unrestricted (*, **) - typically 400 to 600 channels per station (1/3 analog, 2/3 digital)
Switching time	Adjustable from 0 to 10 cycles

\* 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

\*\* No program-technical restriction.

# Redundancy

Warm-standby redundancy	
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 series or better (min. 2 Ethernet interfaces onboard)
Network	2x Ethernet 100 MBit/s or Gbit/s, managed switch
Software	MSys / MxCCore / M-BASE V3.80 or higher