

# Telecontrol Protocol

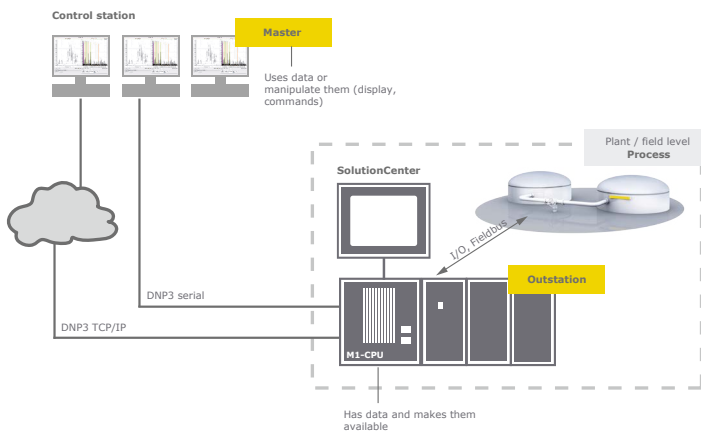


## DNP3 Distributed Network Protocol

DNP3 is telecontrol protocol that is primarily used in North America, the UK and Australia. It is used for data exchange between power generation and distribution facilities, as well as for other infrastructure installations such as in water management. The standard is maintained and further developed by the members of the DNP3 user group and is released as standard IEEE1815.

The DNP3 service for the M1 controller is a pure software solution that uses the Ethernet and COM ports on the controller so that no additional hardware is required. Depending on the configuration and license, the service enables the operation of a DNP3 master, a DNP3 outstation (slave) or both operating modes at the same time. The set of available services and functions is conform to DNP3 level 2.

Data objects can be generated on the M1 outstation and linked with the process variables of the controller software. To transfer actual values to the master (monitoring direction), there are the possibilities event polling, the polling of static data, the activation of an automatic transfer (unsolicited responses) as well as explicit read accesses. In control direction, the outstation can receive the commands (controls) of the master in order to accept setpoints, commands and parameters.



| Item                      | Item no.    |
|---------------------------|-------------|
| DNP3-Master RT            | 00024216-63 |
| DNP3-Outstation RT        | 00024219-63 |
| DNP3-Master/Outstation RT | 00024329-63 |
| DNP3 Internet Download    | 00024216-90 |

# Telecontrol Protocol

When run as a DNP3 master, the M1 can read and write values from standard compliant DNP3 outstation devices. Operation via the user program is as simple here as setting a local digital output. Through the configuration of the master, a logical IO module in accordance with the Unified Fieldbus Model (UFB) can be generated for each outstation. These UFB modules can be operated immediately in the SolutionCenter diagnostic tool or in a visualization. The values in the PLC are made available to the user program in the process image. Alternatively, an event-driven response can also be implemented to new actual values from the outstation.

Details on supported object groups, variations and function codes of the outstation are provided in the device profile document. In DNP3 there is no corresponding document for the master. However, its features largely correspond to the possibilities of the outstation.

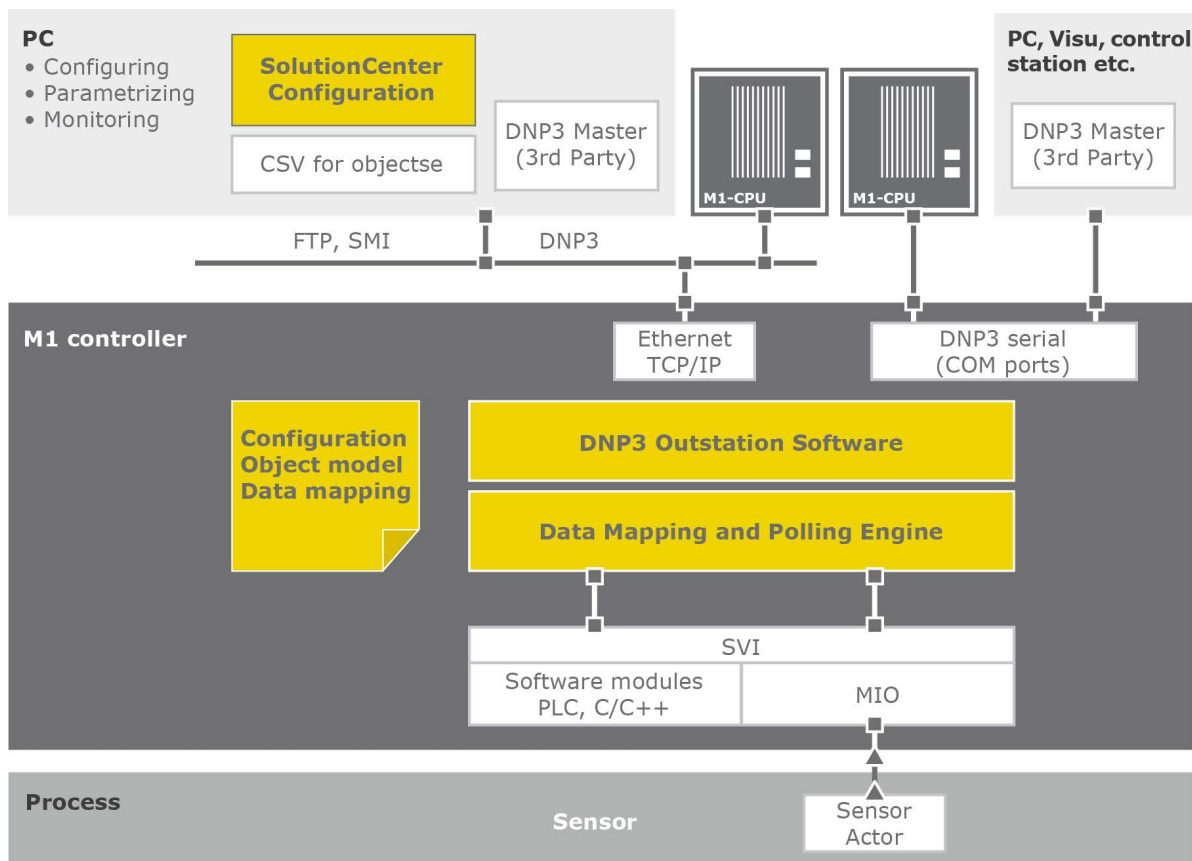
## DNP3 service for master and outstation

- Complies with Level 2 with some extensions from Level 3 and 4

- Requires for operation on the controller a license file for master, outstation or both simultaneously
- Uses the Ethernet ports and/or serial COM ports of the controller
- Support for unsolicited responses
- Support for time synchronization via DNP3

## DNP3 outstation

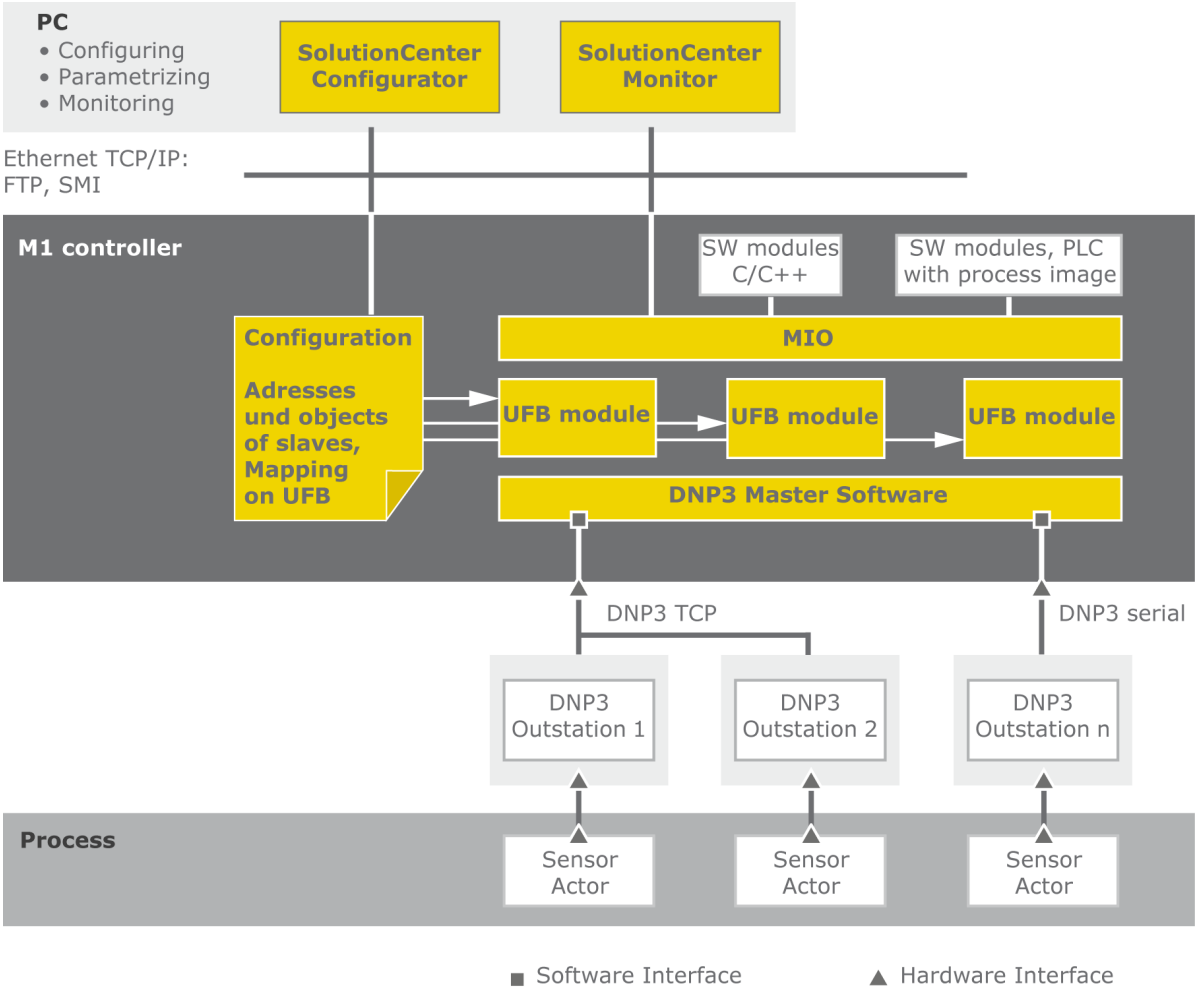
- Configuration of data objects via CSV file
- Linking of data objects with existing process variables
- Parallel connection with several masters possible (requires the configuration of several instances)
- Automatic deadband calculation (threshold value filtering) of analog actual values to reduce the data volume
- Time stamp of value changes implicit via the service
- Formation of quality information (flags) implicit via the service, can be set additionally by the application via a quality variable.
- Quality ensured by standardized certification tests



# Telecontrol Protocol

## DNP3 master

- Access to data objects of the outstation via logical UFB modules
- The currently received values are provided in the process image
- All events with flags and time stamp can be read via the function
- Event-driven handling of received actual values possible



# Telecontrol Protocol

| <b>DNP3</b>                         |  |
|-------------------------------------|--|
| <b>General product features</b>     |  |
| Type                                | Licensable service for Bachmann M1 controllers (pure software solution, subsequently installable) with configuration interface. Requires a valid license file for operation.   |
| Object groups (telegram types)      | Complies with DNP3 Level 2, additionally some groups of Level 3 and 4; For details see Device Profile Document   |
| Variations (representation formats) | Complies with DNP3 Level 2, additionally some variations of Level 3 and 4; For details see Device Profile Document   |
| Data types                          | Automatic conversion of data types between process variables (SVI) and DNP3 objects  |
| Connection diagnostics              | Diagnostic variables show the connection status and statistics, can be used for tools, HMI and application programs  |
| Log messages                        | Clear text messages in the log book, detail level changeable at runtime  |
| <b>Outstation product features</b>  |  |
| Multi master operation              | Possible by configuring several instances of the outstation with different TCP port numbers  |
| Assignment to event classes         | Selectable per data point in the CSV file  |
| Preferred variation                 | Selectable per data point in the CSV file  |
| Addressing                          | Standard compliant by configuring master address and outstation address; With TCP an IP address and port number of the slave is also required for the master   |
| Source time stamping                | Implicit via the service   |
| Quality marking (flags)             | Implicit via the service, additional setting possible via the application using quality variable. Analog values outside of the configured min./max. range are automatically marked with OVER_RANGE                         |
| Unsolicited responses               | Can be selected by the configuration; must be activated by the master  |
| Threshold value filter              | Deadband value configurable to reduce value changes per data object in the CSV file. Can also be changed by the master via DNP3.   |
| Remote/local status                 | Integrated in the token offered by M1 Access Control for write accesses. When the token is taken, LOCAL status is displayed, write accesses are denied. The local or remote status can also be set by means of a function. |
| Rights control                      | Integration in M1 Access Control to control access rights to the process variables, for the prioritization of token assignments and for the authorization of controller reboot   |
| Access logging                      | Write accesses of the master are recorded in the security log of the M1  |
| Limiting of the master              | Configurable permitted master IP. Connection attempts by other masters are denied  |
| Time synchronization                | NEED_TIME request to the master can be configured once for the start, cyclically or never  |

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| <b>DNP3</b>                                   |   |
|---|---|
| <b>Master product features</b>                |   |
| Integrity poll                                | Configurable cycle for triggering a class 0 poll (integrity poll)   |
| Event poll                                    | Free wheeling cycle for polling event classes 1, 2, 3   |
| Connection monitoring                         | Connection status detectable via diagnostic variable  |
| Receipt of unsolicited responses              | Can be selected by the configuration: The master can activate and receive the unsolicited responses of the outstations, and assign the values to the process image.   |
| API for incoming actual values                | The values of event polls and integrity polls are provided as channel values in the process image. Full information incl. flags and time stamp can be read by a function call. Additionally, an attach feature allows event-driven reaction on incoming data. |
| Network configuration on the master           | One UFB module per outstation; one UFB channel per data object. Data objects for which no UFB channel is configured are not shown but can still be received.  |
| Time synchronization                          | Is executed on request of the outstation  |
| <b>Installation</b>                           |   |
| Delivery form                                 | Separately installable product (service); supplied as download  |
| Licensing                                     | Runtime license for operation on a controller, irrespective of the number of connections or information objects. Different licenses can be purchased for master, outstation or combination.   |
| License protection                            | Hardware-dependent software key   |
| Configuration of service and instance         | Via SolutionCenter  |
| Configuration of the data objects             | Via CSV file  |
| Connection with process variables             | Mapping to the SVI variables of the controller software (IEC 61131-3, C/C++) as well as directly to IO and fieldbus values via a CSV file   |
| <b>System requirements for the controller</b> |   |
| Device  | All M1 CPU series (MH200, MC200, MPC200, MX200) except for ME203  |
| System version                                | M-Base 3.90 or better   |
| Physical Ethernet interfaces                  | Ethernet ports of the controller CPUs or of the EM213 modules; Operation with other TCP/IP-based protocols on the same interface is possible  |
| Physical serial interfaces                    | Serial COM ports of the M1 CPU or of the RS204 modules in operating modes RS232, RS422 and RS485. The parallel operation of several protocols on the same COM port is not possible  |
| <b>System requirements for the PC</b>         |   |
| SolutionCenter                                | SolutionCenter from version 1.90 (M-Base 3.90), processor requirements see SolutionCenter product data sheet  |

# Telecontrol Protocol

| Order codes                   |             |  |
|-------------------------------|-------------|--|
| Item                          | Item no.    | Description  |
| DNP3-Master RT                | 00024216-63 | License to operate the DNP3 master on one control CPU. Provides communication over the ethernet or serial interfaces with standards-compliant servers (outstations) using the DNP3 protocol in accordance with the compatibility documentation.              |
| DNP3-Outstation RT            | 00024219-63 | License to operate the DNP3 outstation (Slave) on one controller CPU. Provides communication over the ethernet or serial interface with standards-compliant clients (masters) using the DNP3 protocol in accordance with the compatibility documentation.    |
| DNP3-Master/<br>Outstation RT | 00024329-63 | License to operate the DNP3 master and outstation on one controller CPU. Provides communication over the ethernet or serial interface with standards-compliant clients (masters) using the DNP3 protocol in accordance with the compatibility documentation. |
| DNP3 Download                 | 00024216-xx | Installation media for DNP3 client (master) software (Download). Without a valid Runtime License the DNP3 client runs only temporarily for 2h in demo mode.  |