

### Features and Benefits

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#### Powerful Human-system Interface

- Process control and monitoring
- Alarm and message management
- Analog and binary trending
- Data historian and archiving
- Extensive logging functions
- Integrated diagnostics and on-line help

#### Industry Standards

- Client/server architecture,
- RISC processors
- Servers running UNIX operating system
- Clients running UNIX or Windows operating system
- Extremely reliable rack-mounted and desktop workstations
- TCP/IP protocol, Ethernet, X-Windows
- Local and remote API based on OLE2 standards
- Internet technology

#### High Level of Reliability and Availability

- Distributed, scalable redundancy
- Batch redundancy

#### Easy and Safe to Operate

- Individual configuration of operator consoles, with up to 4 monitors per workstation
- Large-screen display
- Object-oriented structure
- Window management
- Standardized and user-configurable displays
- User interface in the national language
- Remote operation and diagnosis via Internet/ Intranet, telephone, satellite etc.
- Individual access control provided by login and user profiles

#### SymBatch Integrated Recipe Processing

- NAMUR/ISA standards applied
- Structured displays (SFC) complying with IEC 1131 and FDA requirements

#### Integration of the Plant Management Level

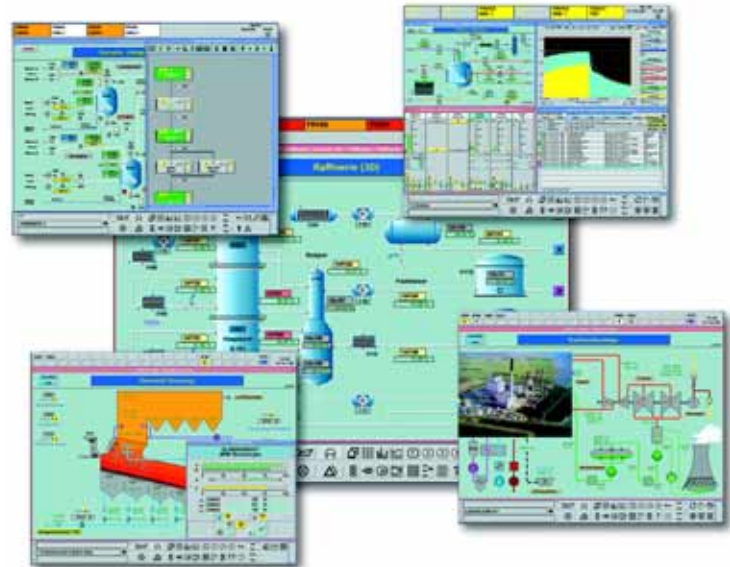
- Performer solutions can be integrated

#### System compatibility

- Melody, Freelance 2000, AC 800F
- Contronic P, Contronic E, Contronic 3

#### Support for Commissioning and Servicing

- Powerful commissioning and diagnostic tools
- Simple, consistent backup of system data



Maestro UX is a powerful human-system interface (HSI) designed specifically for the enterprise management and control system Symphony. It complements the Symphony system with a number of operator-oriented features and functions, and its aim is to make process monitoring, process control, process optimization and troubleshooting easier.

Maestro UX allows the operator direct access to plant-specific and enterprise-wide information. It offers links to Melody, AC 800F or Freelance 2000 as well as to the Contronic systems. WWW technology can also be exploited for the purpose of communication and remote operation. Internet browsers can be integrated into the UNIX servers and Windows.

Customer-specified graphic displays, alarm overviews and current or historical trend displays enable rapid access to process status and operation data. A system of different priority levels for alarms makes it possible to respond effectively to unusual process conditions. Maestro UX is expandable: from one to over a hundred operator stations - even with a design offering a high level of availability. Maestro UX is tried and tested in industry, it is reliable and already in use in many hundreds of process engineering and power generation plants.

## A Trendsetter in Process Control

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Application-oriented display and control of processes demands tailored, modern designs. Individual system solutions need to guarantee the greatest possible flexibility based on an open system using state-of-the-art technology. Maestro UX consistently meets these requirements thanks to its innovative hardware and its object-oriented software structures. The user-friendly operator concept enables users to obtain all the plant information they need quickly and systematically. Video overlays give the operator a direct insight into the process (optional).

Along with the standardized, straightforward user interface, Maestro UX also offers an integrated alarm and message management as well as a wide range of logging functions. Batch processes are automated using the integrated batch processing function SymBatch.

Each workstation can be matched to the specific requirements of the respective user and can be provided with a personal user profile and individual access rights.

In addition to process control, plant management functions can also be integrated in Maestro UX.

### Innovative Standards

The workstations run the UNIX operating system. The connected operator terminals may be either PCs or X-terminals. As a result the hardware platform benefits from the rapid progress in development enjoyed by this class of computer. The object-oriented software of Maestro UX guarantees great flexibility and future compatibility.

If necessary each workstation is capable of carrying out all the functions of the operator control level. All components of the operator control level can be configured with functional redundancy.

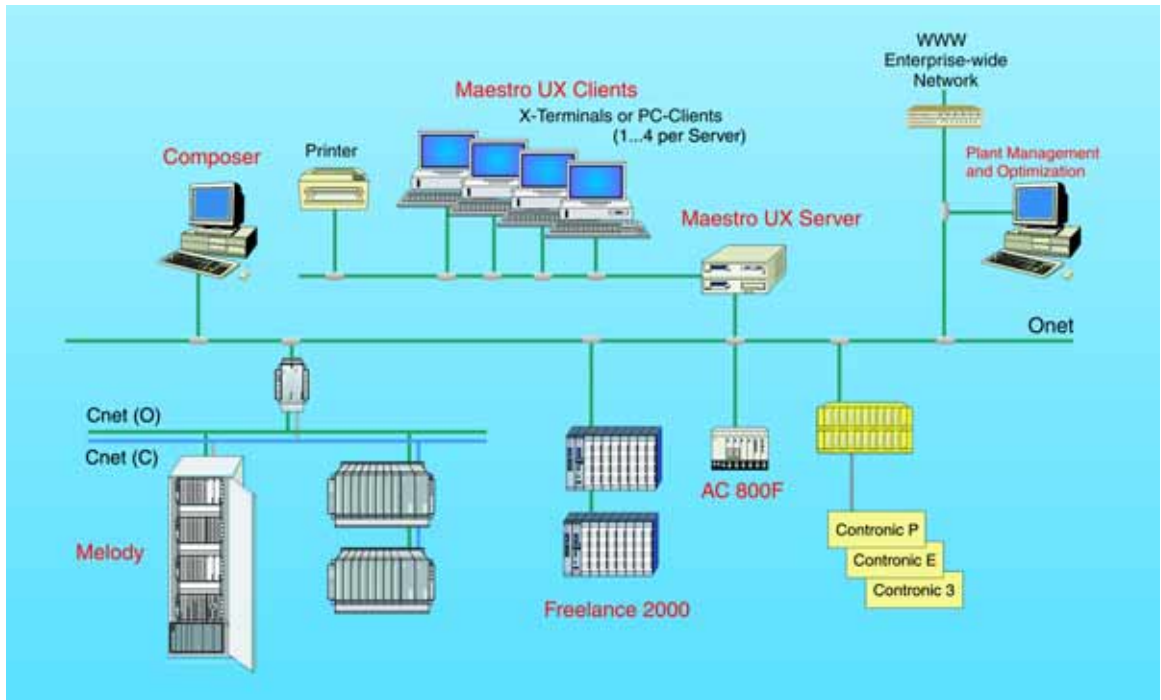
Communication between the process level and the operator control level as well as between the individual stations on the operator control level is performed via the Operation-Bus (Onet), which is based on the widespread Ethernet standard (10 Mbit/s, 100 Mbit/s). Depending on the transmission medium chosen, operator stations can also communicate over considerable distances. Using remote transmission, operator stations are able to communicate world-wide.

### Interfaces to other Process Control Systems

The object-oriented structure of the control functions enables Maestro UX to interface to the ABB process control systems. The following interfaces are available:

- Melody
- Freelance 2000
- AC 800F
- Contronic P, Contronic E, Contronic 3

Maestro UX communicates with the various process control systems across a network. Maestro UX handles the different methods for operator interventions and data acquisition by using automation classes tailored to match the relevant process control system.

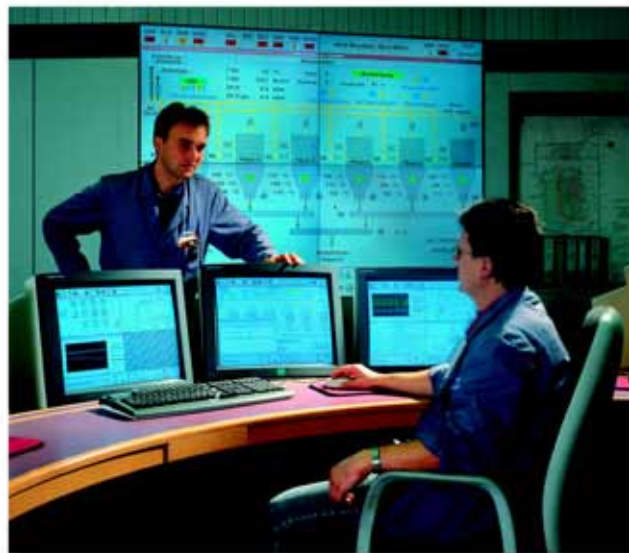


System Structure Symphony

## Operator Console Configuration

Each operator console can be configured according to requirements, and equipped with up to 4 monitors or large-screen displays for process observation. Operator input can be made using a mouse or trackball, function keyboard or standard PS/2 keyboard according to preference.

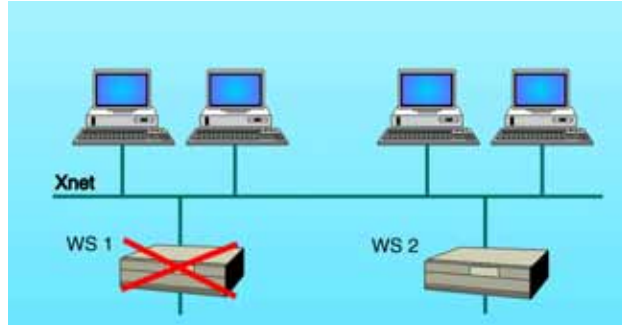
The function keyboard features the same easy-to-read graphic icons as the user finds in the dialog boxes on the monitor.



Operator consoles with large-screen display

## High-availability Operator Consoles

In addition to a redundant operator station (functional redundancy) it is also possible to configure the existing operator consoles for high availability so that no monitor or terminal is lost when an operator station fails. The consoles of the operator station that has failed are supplied by the operator station that is still running.



## User Profiles and Access Control

### User-specific Access Rights

In Maestro a personal user profile is set up for every user. In this profile the access rights for operation, observation and system functions are defined. This offers the maximum possible security for any application through detailed access rights for the operators. In this way unauthorized operator interventions are avoided, and the process is thus safeguarded.

### Operator Console Allocation

An operator console can be allocated permanently to the plant area it is to operate, or to a specific user profile. If there is more than one operator console in a control room, the operator can log in with his user profile on any free operator console and then operate “his” plant area.

### System Access / Login Procedure

Each operator must identify himself to the system by logging in either with a magnetic card and function keyboard or with a user name and password. Thus the system can be locked against unauthorized operator intervention. The magnetic card reader, which is integrated in the function keyboard, enables easy log-in to the system as well as reliable user identification.



## Display and Operation

Maestro UX supports the operator with a forward-looking operation and observation philosophy in its simple, low-stress process operation. Quick reaction times are achieved through:

- A homogenous user interface
- Simple and direct operation sequences
- Easily-understood, comprehensive user guidance with window navigation and on-line help
- Optimum information processing for process control and fault analysis
- Optimum workplace layout, with control room components arranged ergonomically

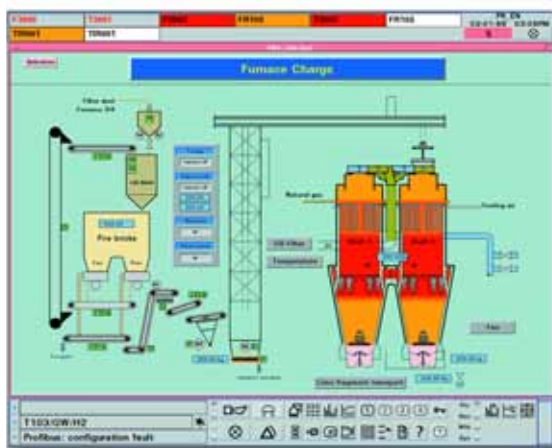
The display of process and system information in Maestro UX can be arranged individually making use of standardized basic elements. To ensure reliable process control there are display areas and display types that cannot be covered:

- Message line for indicating faults and selecting the tag responsible
- Dialog box for selecting displays and communicating with the system
- Faceplate for a tag

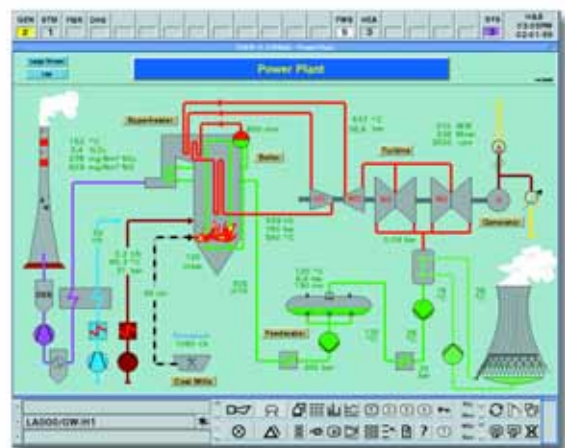
Automatic window arrangement guarantees an optimum use of the available area on the monitor or large-screen display. A situation-related selection of tags is required whenever events in the process demand a rapid response from the operator. For this purpose Maestro UX provides the possibility to select and operate the tag directly from the message line. The plant-related selection provides the user with progressively more detailed information on the plant, starting with overview displays.

### Plant-specific Displays

Graphic displays are set up in line with the plant operator's specific requirements. Information is displayed with the help of standardized basic elements such as macros or submodels, which are modified to provide exactly the information required by the user. Current process data is also incorporated. Supplementary information is provided from the archive, from functions on the plant management level, from recipes or video overlays.



Lime Kiln Graphic Display



Power Plant Graphic Display

The process data and process statuses can be displayed alphanumerically or in a variety of other standard formats such as bar graph and fill areas. Depending on process status, graphic symbols can be interchanged, flash, change color or position in the graphic display.

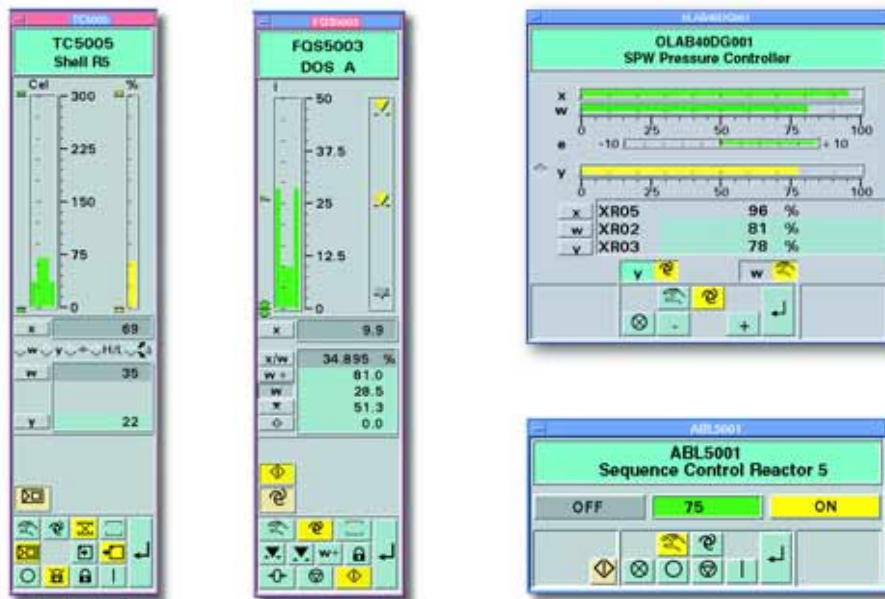
Individual selection hierarchies are defined with the help of configured display selector fields within the graphic displays.

## Standardized Displays

Standardized displays are designed to meet the requirements of process control systems in terms of structure and presentation of the process data. For example, analog values are shown as colored columns where quick information is called for, but as numeric values where precision is required. Incoming fault signals can be seen instantly as the display elements concerned change color and start to flash. Configured limit values or gradients can be read numerically or as marks.

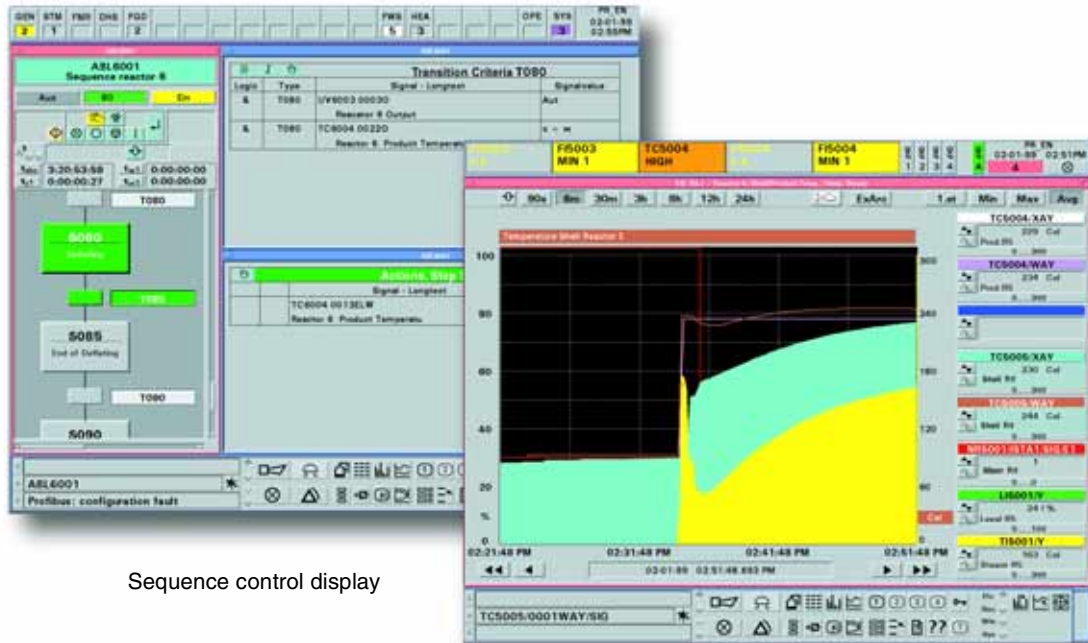
Ready-to-use observation and operation displays are provided for all the important functions, and users can avail themselves of these displays with little or no need for configuration.

- **Overview display**  
Displays up to 144 tags and functions of a plant area in a space-saving format.
- **Group display**  
Detailed display and operation of up to 12 tags and functions.
- **Faceplate**  
Detailed display and operation of one tag, offering a choice between vertical and horizontal display format.



Examples for Faceplates

- **Sequence control display (structure display)**  
Display and operation of a sequence flow in accordance with standard IEC 1131.
- **Trend display**  
Display of up to 8 curves with different time axes and time axis displacement.



Sequence control display

Trend display

- **Trend faceplate**  
Display of a current trend in a quarter display.
- **Messages**  
Message line, message page and message history are displayed.
- **Disposition display**  
Display, operation and monitoring of all control recipes.
- **Recipe display**  
The sequence of a recipe is displayed.
- **System display**  
System configuration and status are displayed.
- **Print preview**  
Screen display of a log.
- **Polar diagram display**  
Display of 4, 6 or 8 process statuses and their mutual relationship in an animated circle diagram.
- **Operating area display (XY diagram)**  
Operating points displayed in their characteristic field display (with history and replay).

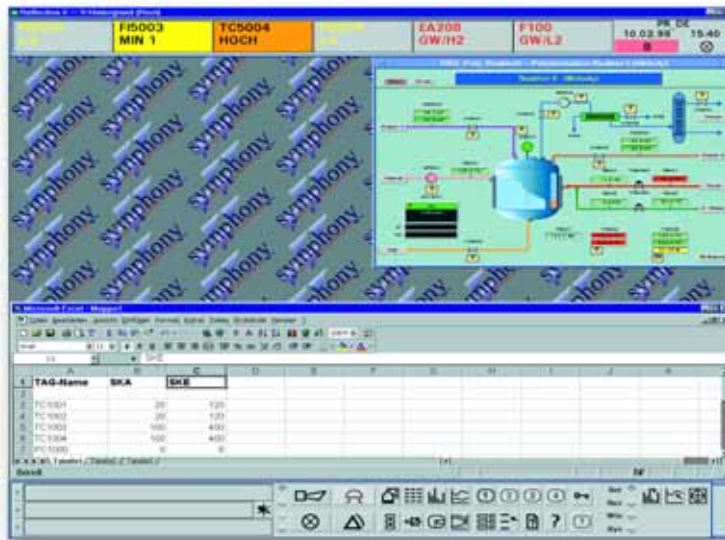
## National Language Support

In addition to German, English and French the Maestro UX user interface is available in other languages as e.g. Russian and Korean. Operation is made easier by the use of standard, language-independent symbols throughout the system for the same process displays and operator interventions, e.g. the operating modes. The language used for system configuration is German or English.

## PC Operation

The process operation and visualization may optionally be performed using PCs. The minimum requirement is a PC with Windows operating system and with the necessary client software installed. As usual the operator has access to all displays and operating functions including user profiles. The system maintains the full range of operation using mouse and keyboard.

It is thus also possible to integrate the Microsoft standard software (Office, Internet Explorer) into the process control system.



PC Client with Excel

## Messages and Alarms

Along with the standardized, straightforward user interface, Maestro UX also offers an integrated alarm and message management function. Maestro UX features the following different message types:

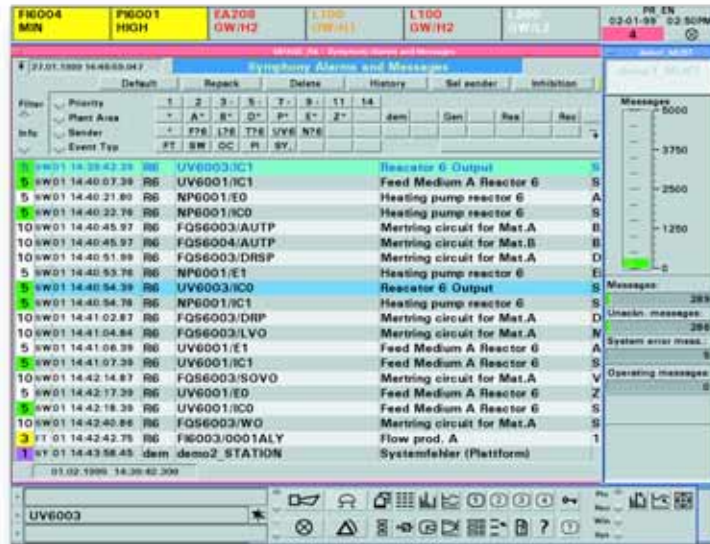
- Process message (fault or switching message)
- Operator message
- Configuration message
- System message

According to their significance in the process different priorities and plant areas can be assigned to these messages types.

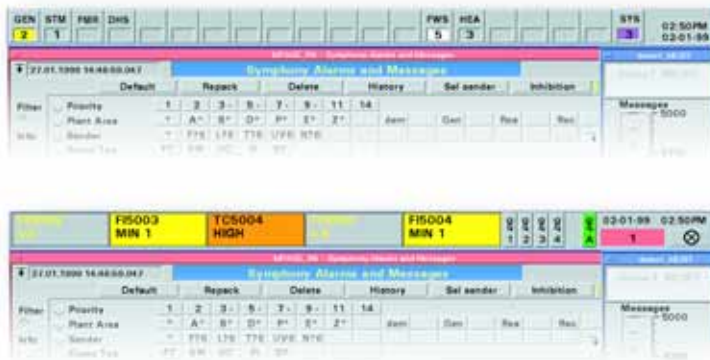
## Message Line and Message Page

The upper display region of the monitor is always reserved for messages. The way in which such messages are displayed can be customized. The message page contains an overview of all current or historical messages in chronological order.

For operation, the disturbed tag can be called up directly from the message line in the desired form, e.g. as a faceplate, graphic display or trend display.



Message area display



Message page and several message lines

## Filtering Messages

The message management function in Maestro features sophisticated filtering functions, so that the operator can retain an overview of the process even in critical process situations (e.g. a surge of messages), and can respond rapidly and safely. The use of message filters ensures that operators see only relevant messages. The filters can be set using binary signals, operator actions or configuration. Filtering is performed above all according to:

- Priority
- Plant area
- Message type
- Tag or group

## Acknowledging and Suppressing Messages

Messages can be acknowledged individually or per page. Messages which are relevant to safety can be configured in such a way that they cannot be acknowledged “accidentally”, e.g. in a group acknowledgement. For each message an acknowledgement text of up to 50 characters may be entered, and will be stored in the messages database.

Messages generated by a faulty transmitter, for example, can be suppressed manually by a user with appropriate access rights.

## Message History

As an average the history of up to 100 000 messages is available in the system. All the messages are stored in the correct chronological order. The messages are available for analysis and evaluation on the screen (history message page) or in a log. By utilizing the message history filters, the operator can track and assess the message history of specific messages on-line. The message analysis can also be printed out.

The history message page also includes simple statistical functions. Thus, for example, for any selected message the number of occurrences of the “incoming” and “outgoing” statuses during the last 24 hours is indicated.

## Archiving

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The archive function in Maestro is used to store on a secure medium data that has existed in the system over a long period of time. If necessary the archived data can be transferred back into the system, e.g. for analysis. A distinction is made in the data to be archived between individual measured values (trends) and files. System configuration data, graphics, messages, reports, recipe data etc. are all contained in files.

Each Maestro UX workstation has its own on-line archive for long-term and short-term archiving. The advantage of this arrangement is that data can be accessed quickly and communication over the network is minimized. The on-line archive can be distributed between several workstations, and can thus be enlarged to any size required (scaleable archive). This enables trends, for example, to be quickly analyzed even over lengthy periods of time. A Maestro UX system can handle up to 20 000 curves in total.

Suitable devices for storing the external archive include magneto-optical drives with a storage capacity of 2.3 GB as well as PC tape drives. The access speed with magneto-optical drives is considerably greater than with tape drives. The external archive can also be set up for high availability. This means that the data will always be present on at least two different data carriers at any given point in time.

The system data backup function (backup manager) enables all the Maestro UX configuration data to be archived and retrieved from the archive in a single step. In the archiving process, the configuration data of all the Maestro UX stations available in the system is automatically combined, compressed into a single file and transferred to the archive. The backing up of configuration data is intrinsically consistent. In the dearchiving process, the configuration data from the archive file is automatically distributed again between the available stations.

## Logs

Logs document events, states and sequences from the process, and can be displayed, printed and archived. Maestro UX features the following log types:

- **Message log**  
Printout of current messages and convenient analysis of archived messages.
- **Matrix log**  
Record of archived process values in tabular form.
- **Status log**  
Analysis of archived or current status information from the process, e.g. operation log.

The logs can be initiated either cyclically, by a specific event or through operator intervention.

The logging facility in Maestro features powerful, standardized log formats. Logs can thus be set up very quickly in DIN A4 portrait or landscape format. User-specified text is also very easy to enter in headers and footers with the help of the system dialog.

### Operator Faceplate for Logging Functions

Operators can find out the status of a log quickly and easily by calling up the log faceplate. It is also possible to start the log output on a printer or to alter time parameters.

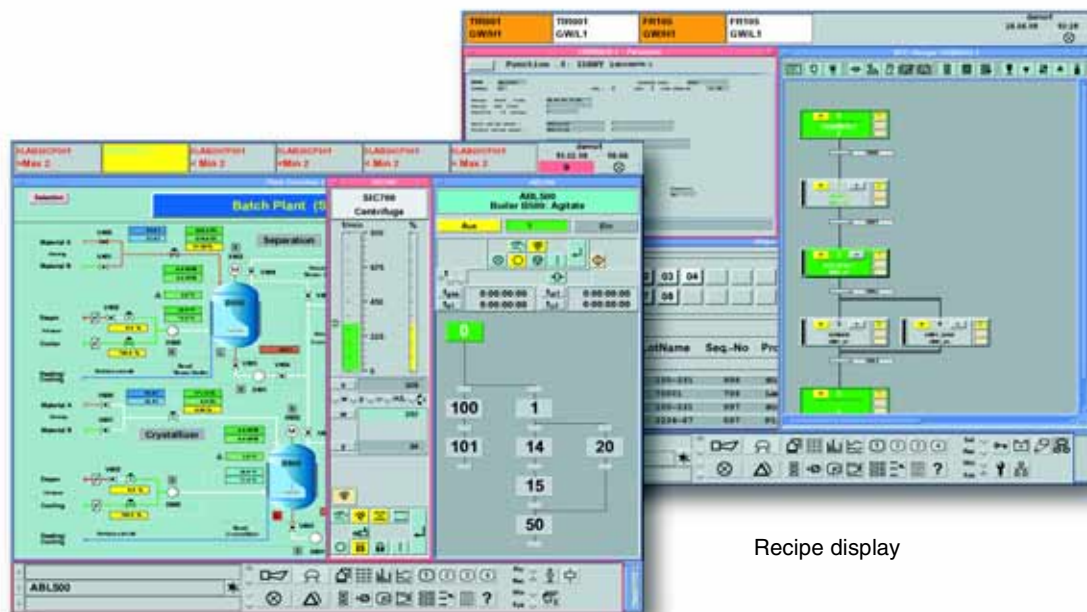


Log with operator faceplate

## Recipe Processing

The recipe processing facility, SymBatch, automates batch production processes. As SymBatch is totally integrated with the Symphony control system, it offers maximum comfort and security. SymBatch offers the following features:

- Easy recipe creation with plausibility checking including subsequent structural changes
- Consistently easy to operate, from recipe to tag
- Automatic recipe execution
- Recipe management
- Flexible equipment allocation
- Batch production with changing parameters
- Scheduling of batches and lots
- Unit prioritization
- Batch report
- User-configurable redundancy
- Integral alarm and message management
- Definable access rights
- NAMUR and ISA S88 standards applied
- Satisfies Food and Drug Administration (FDA) requirements in respect of validation.



Recipe display

Plant-specific graphic with faceplate and SFC

## Running Recipes

After a control recipe has been created, it can be started either automatically or by the operator. Maestro UX co-ordinates the whole recipe execution, assigns plant sections and defines parameters for the control functions. While the recipe is running, an authorized operator may alter parameters and add recipe structures with the help of the recipe editor. The quality of a batch is checked using user-configurable quality criteria in the active recipe. The previous degree of production success automatically influences the further progress of the batch. After the recipe is completed, Maestro UX automatically generates a batch report.

SymBatch also processes parameters from enterprise-wide plant management components. The production management module, for example, has a certificated SAP R/3 PP-PI interface as well as a Batch.21 interface.

## Creating Recipes

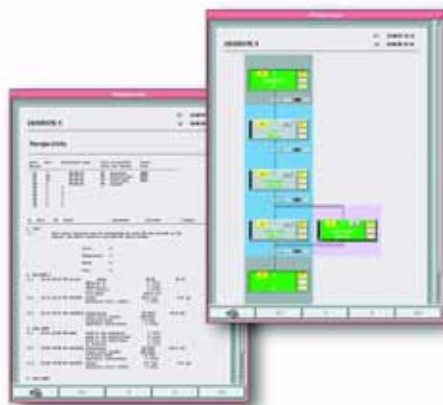
Operations, unit recipes and recipes can be set up easily and quickly using the graphical recipe editor. The following features make it easier both to create up new recipes and to maintain existing recipes:

- Predefined basic functions, phases or unit recipes (stored in libraries)
- User-friendly display of recipe procedures according to IEC 1131
- Plausibility check routines, such as automatic checking of structural changes or graphical synchronization functions

## Operating Recipes

Optimum support for operation is provided by dedicated recipe displays. Operators can find the appropriate recipe either by plant or situation, and can respond quickly when problems occur.

- **Plant-specific graphic display**  
Comprehensive graphic display of whole process cells or units.
- **Recipe display**  
In the recipe display, the sequence flow is shown in accordance with IEC 1131. The processing sequence, the status of the recipe elements and the units involved are all displayed here.
- **Scheduling display**  
This display provides a complete overview of all available and scheduled control recipes. As well as the processing sequence of batches and lots, it also contains the status of the control recipes, e.g. planned, active, completed.
- **Parameter display**  
The parameter display describes a control function for the chemist and the operator. It shows the set parameters of the production phase. Current process variables are overlaid dynamically during the recipe sequence.
- **Batch report**  
The SymBatch batch report supplies all the necessary data relating to batch production such as the parameters, recipe execution, events, operator interventions, process messages from all units, production success (measured values and trends) and operator entries.



Batch report

No.	Batch-No.	ProdNo.	LotName	Seq.No.	Product	Mode	Unit	Start Time	End Time
1	SYM0076	100-020	000	0001	00-02	00-02	00-02	20.04.2007	20.04.2007
2	SYM0076	100-020	001	0002	00-02	00-02	00-02	20.04.2007	20.04.2007
3	SYM0076	100-020	002	0003	00-02	00-02	00-02	20.04.2007	20.04.2007
4	SYM0076	100-020	003	0004	00-02	00-02	00-02	20.04.2007	20.04.2007
5	SYM0076	100-020	004	0005	00-02	00-02	00-02	20.04.2007	20.04.2007

Scheduling display

## Integration of the Plant Management Level

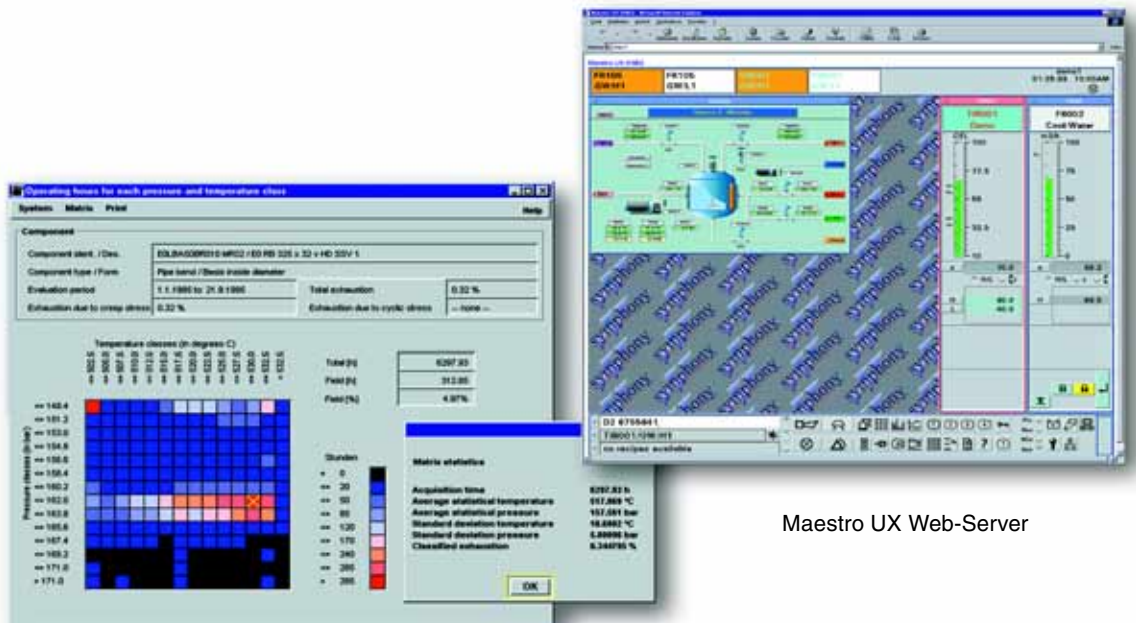
Maestro UX is accessible to the plant management level and seamlessly integrates the plant management applications into the display and message design through an application program interface (API). The benefits thus obtained are as follows:

- By using existing Maestro UX workstations, there is no need for any extra hardware.
- The sharing of a common operating philosophy has the effect of reducing the cost of training.
- The plant management solutions are available on all operator consoles.

Examples of plant management solutions:

- Process information systems
- Maestro UX web servers for remote operation
- Accounting and analysis programs
- Energy management
- Production manager for recipe processing

The results from these applications can be displayed in graphic displays, recorded in history or logged.



Evaluation

Maestro UX Web-Server

## Data Exchange with Plant Management Solutions

Plant management solutions have access to:

- All objects in the Maestro UX central object library (COL)
- The current and historical process data
- Messages and events

The use of network-wide access mechanisms simplifies the distribution of information and increases the availability of data.

## Commissioning and Servicing

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Maestro UX features optimum, comprehensive system support for all the necessary commissioning, servicing and maintenance tasks. For this purpose, the user is provided with integrated commissioning and diagnostic tools which can be used to significantly reduce the costs of commissioning, servicing and maintenance.

### Commissioning

The commissioning tool enables Maestro UX to be commissioned quickly and safely through:

- Easy installation,
- Integrated conformity and cross-reference checking,
- Update manager.

### System Diagnosis

The integrated system diagnostic function that runs in the background monitors the state of hardware and software. The results are displayed in the system and station overviews.

Other powerful diagnostic tools are available in the system to assist qualified service engineers.

### Remote Servicing

Remote servicing provides the plant operator with first aid for technical problems, giving immediate answers in the event of queries concerning automation. It can also take the place of a site visit from a system specialist, which is costly both in time and money. Service support is instantly available over any distance via ISDN, modem or satellite. All the system information, e.g. all monitor displays, keyboard inputs and mouse movements can be accessed directly by the system specialist. Other operations are also possible using this technology, from direct operation right through to complex remote maintenance.

### Performance Analysis

Performance analysis can be utilized to exploit performance reserves, to avoid system overloads and to detect sources of errors more quickly. Performance analysis provides information about the effect that individual applications have on the overall performance of a system, how the system behaves in the event of expansion or changes in loading, which parts of the system are overloaded, or where an overload is likely to occur when loading is changed. The reserves for future system expansions can also be determined.

### Documentation

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The system documentation is currently supplied on CD as on-line documentation in HTML or PDF format, and can be installed on Maestro workstations or PCs. The integrated browser enables the documentation to be read on-screen and also printed out. It thus becomes possible to “find rather than search” more and more rapidly by accessing all the current documents directly. “Paper documentation” can also be provided on request.



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