Products 2016

APROL process automation

APROL process automation

Introduction

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APROL process control system

New perspectives with the latest APROL process control system

With its flexibility and diverse functions, APROL is the optimum platform for implementing customized automation solutions. Your competitive advantages can be enhanced even further with the latest APROL release.

Already proven in countless installations across a wide range of industries

APROL is an innovative process control system that has already proven itself in countless installations across a wide range of industries. This has been made possible by its unique scalable architecture as well as the integrated CaeManager engineering tool.

High performance, maximized system reliability and availability

High performance plus maximized system reliability and availability Maximum system reliability and availability is achieved through the use of series-produced products that have been tested thoroughly.

Optimized system efficiency throughout the entire life cycle

Integrated system functions provide the reliability that allows you to achieve efficient operation of the system over the entire life cycle. Easy-to-use analysis tools increase the transparency of operating data and support both maintenance as well as the safety of automation systems. Utilizing the full range of functions helps you reduce total cost of ownership, increase system availability and optimize processes.

All of a system's upstream, downstream and auxiliary processes also automated by APROL

In addition to automating the process-oriented system, APROL can also be used to fully automate all upstream, downstream and auxiliary processes, as well as the power distribution at a production location.

Complete visualization solutions in APROL

Substantial reductions to engineering work and maintenance – included self-diagnostics of all process control system components – are possible with a central, systemwide visualization system. There is even a visualization option available for integrated, decentralized visualizations for on-site panels.

From single nodes to large plants – Ultimate scalability

The extreme flexibility of the APROL system means that it can be perfectly scaled to the requirements of systems large and small, from single-node systems all the way to highly complex client-server architectures. APROL is a process control system that grows with the application.

Whether using one controller or one hundred, one hundred I/O points or ten thousand – the scalability of APROL always provides an optimum solution.

Integrated safety technology

Integrated safety technology reduces risks to personnel and the system in addition to increasing engineering efficiency.

Integrated fieldbus systems
Optimal integration is achieved with the support of POWERLINK, CANopen, PROFIBUS DP/PA and Modbus TCP fieldbuses in the APROL hardware configuration.

Controllers and I/O modules
Wide range of powerful controllers with cycle times starting at 100 µs (typically 10 ms)
Redundant buses (process bus and control bus)
Hot-swapping (addition and replacement of components during operation)
Expansions and modifications during operation (CIR = Configuration in Run)
I/O modules for Ex environments via PROFIBUS DP (Pepperl & Fuchs, Stahl, Turck, etc.)
Timestamps on the controller level with a resolution up to 1 ms (event driver)
Optional use of X20 system with integrated safety technology

Configuration in Run: No downtime when making changes
Control computers, controllers and I/O hardware can be added, removed or modified during operation without interruptions (CiR)

Use of POWERLINK and ETHERNET TCP/IP for system communication
The use of Ethernet throughout the system ensures a high degree of investment protection – from remote I/O points all the way to the management level. Many network topologies are possible with POWERLINK; hot plugging functionality for bus stations, configuration-free topologies, flat networks for clear-cut diagnostics and simple addressability make it an optimal bus system for decentralized tasks in process automation.

International service and support guaranteed
B&R experts and system partners are available to provide consultation, service and support whenever it's needed, anywhere in the world.

Architecture

The APROL R 4.0 process control system consists of three core components:

- Engineering Server

Engineering Server
The Engineering Server contains the central system engineering database, a feature that allows all objects created and configured in the CaeManager engineering tool to undergo semantic and syntax verification within this central object directory.

Central engineering database
All objects in the process control system are downloaded to the respective target resource from this central engineering database.

- Runtime server

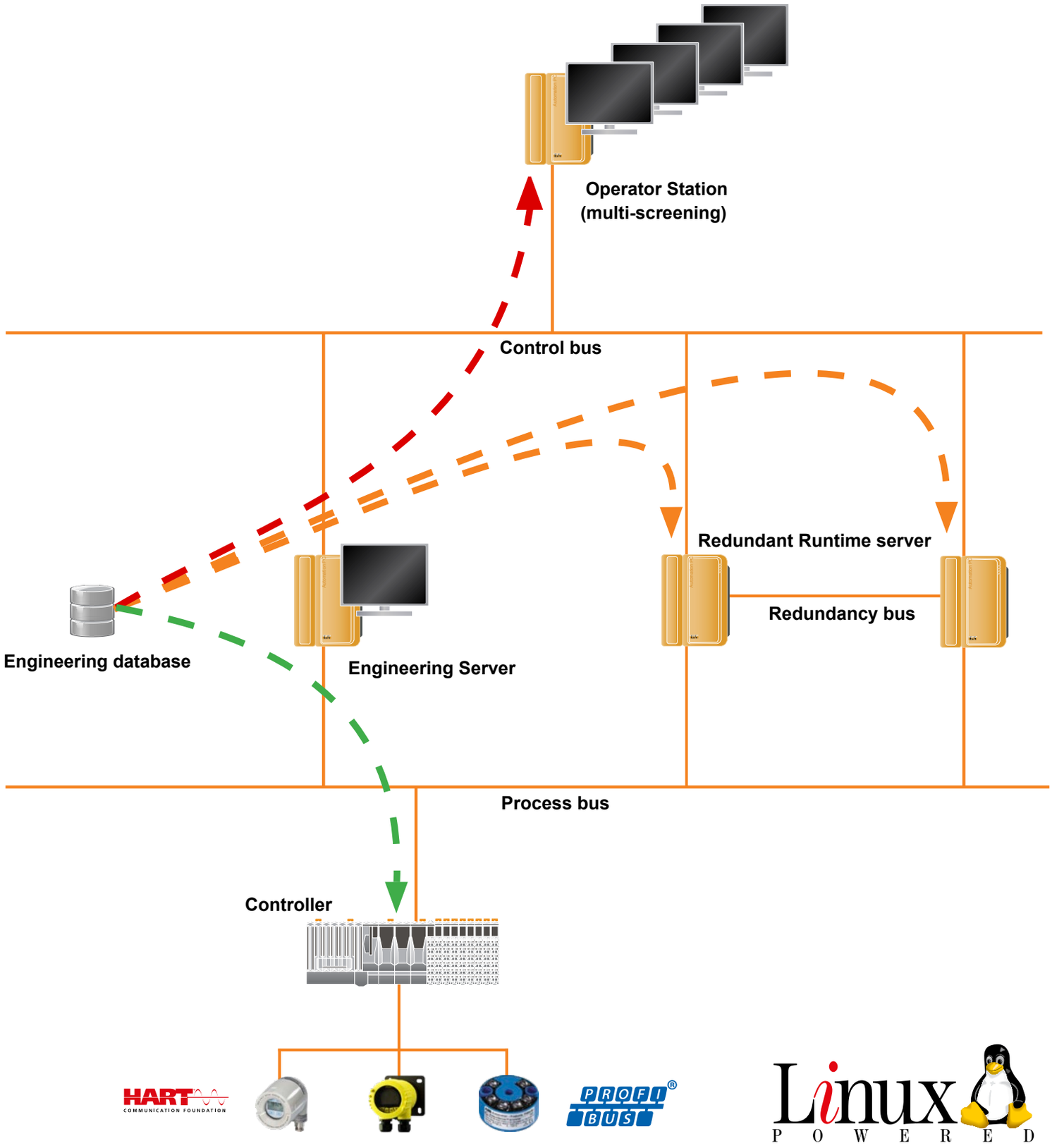
Runtime server
The Runtime server represents the real-time database of the process control system and contains all process and system values as well as messages and alarms. The archiving of process values and events in archive databases is also coordinated by the Runtime server.

- Operator Station

Operator Station
The Operator Station is used to control and monitor system processes in addition to preparing and displaying all archive data for the operator.

Downloads
During a download, all objects from the central object dictionary (central system engineering database) are loaded to the controllers, the Runtime server and the Operator Stations.

If the Runtime server is part of a redundant system, then the download takes place separately to both Runtime servers.


Operator Station
(multi-screening)
Control bus
Redundant Runtime server
Redundancy bus
Engineering database
Engineering Server
Process bus
Controller
HART
COMMUNICATION FOUNDATION
PROFI BUS
Linux
POWERED

System structure

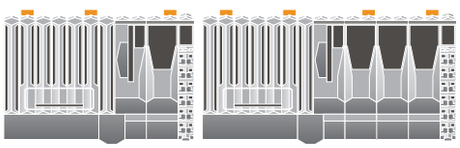
APROL operator system
The APROL Operator Station is responsible for visualizing and operating the system as well as evaluating historical process data.

Operator levels

APROL Runtime and Engineering System
The APROL Runtime and Engineering Server handles central management functions.

- Configuration of system automation in the Engineering System
- Archiving of trend, alarm and protocol data in the Runtime System
- Communication to the operating and monitoring level as well as the open-/closed-loop level

Process control server

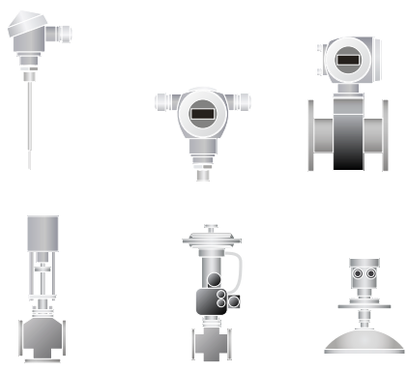


Consisting of a power supply, CPU and I/O modules, the APROL controller is used to process acquired signals. I/O expansion takes place using POWERLINK.

Open and closed loop control level

The use of various fieldbus modules allows the all sensors and actuators to be integrated according to user guidelines via PROFIBUS DP/PA, PROFIBUS FMS, RK512, Ethernet POWERLINK, TCP/IP, UDP/IP, etc.

Field level



Field device based on conventional 0/4 to 20 mA signals or fieldbuses (POWERLINK, PROFIBUS DP/PA)

Field devices

Supported operating systems	Short description
SUSE Linux enterprise server	

Visualization	Short description
Language switching	Any language possible
Supported graphics formats (import)	All common image formats, SVG (scalable vector graphics)
Max. number of process diagrams	Unlimited, scalable
Maximum number of variables/diagram	Unlimited, scalable
Standard command language	CFC, SFC, ST, ANSI C Python, Bash script
Extended alarm	SMS, email, pager
Alarm management	Messages Alarms Alarms requiring acknowledgment Alarms requiring an acknowledgment text Any priorities configurable Process diagram on alarm Alarm trends Intervention texts (help texts) for messages/alarms Any filter strategies
Alarm printer	Max. 9
Documentation	Online, product, as-built and project documentation Context-sensitive online help documentation Tooltips, Web search engines
Cross-reference list	Generic cross-reference list Generic parts lists with I/O configuration Tooltips
Number of trend groups	Max. 5000
Number of trend curves	Max. 100000
Number of trend curves / diagram	Max. 20
Number of DisplayCenter / Control computers	Max. 5

Controller	Short description
Number of task classes	Max. 8
Configurable cycle time	Starting at 100 µs
Fieldbus native I/O	POWERLINK 100Mbit/s
Integrated fieldbus systems	PROFIBUS DP, Modbus TCP, CANopen

Graphical interface	Short description
Menus	Individual menus / toolbars
Windows	Yes
Custom menu control	Yes
Process diagram selection from keyboard	Yes
Process diagram selection from mouse	Yes
Process diagram selection from touch screen	Yes

System architecture

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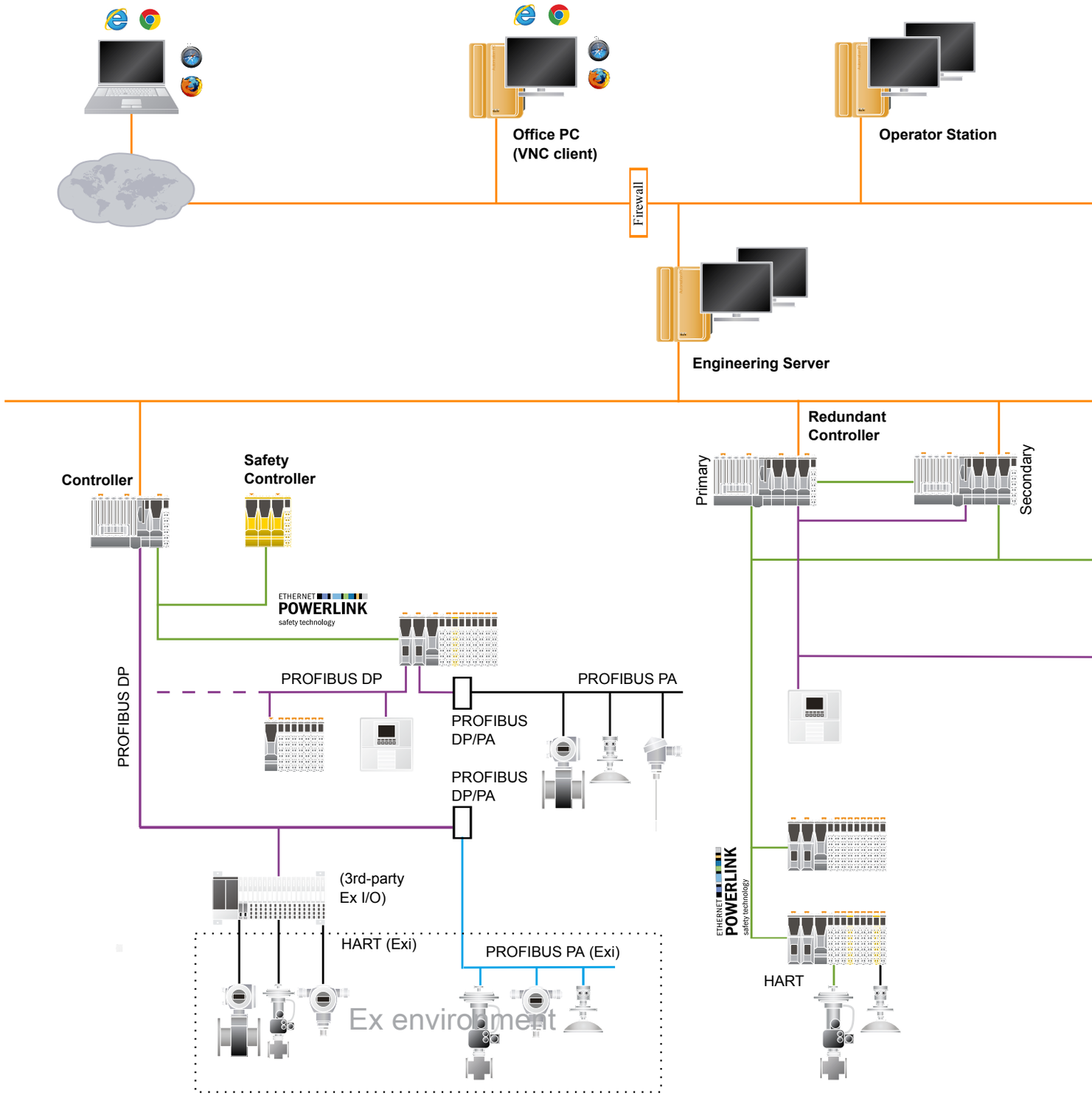
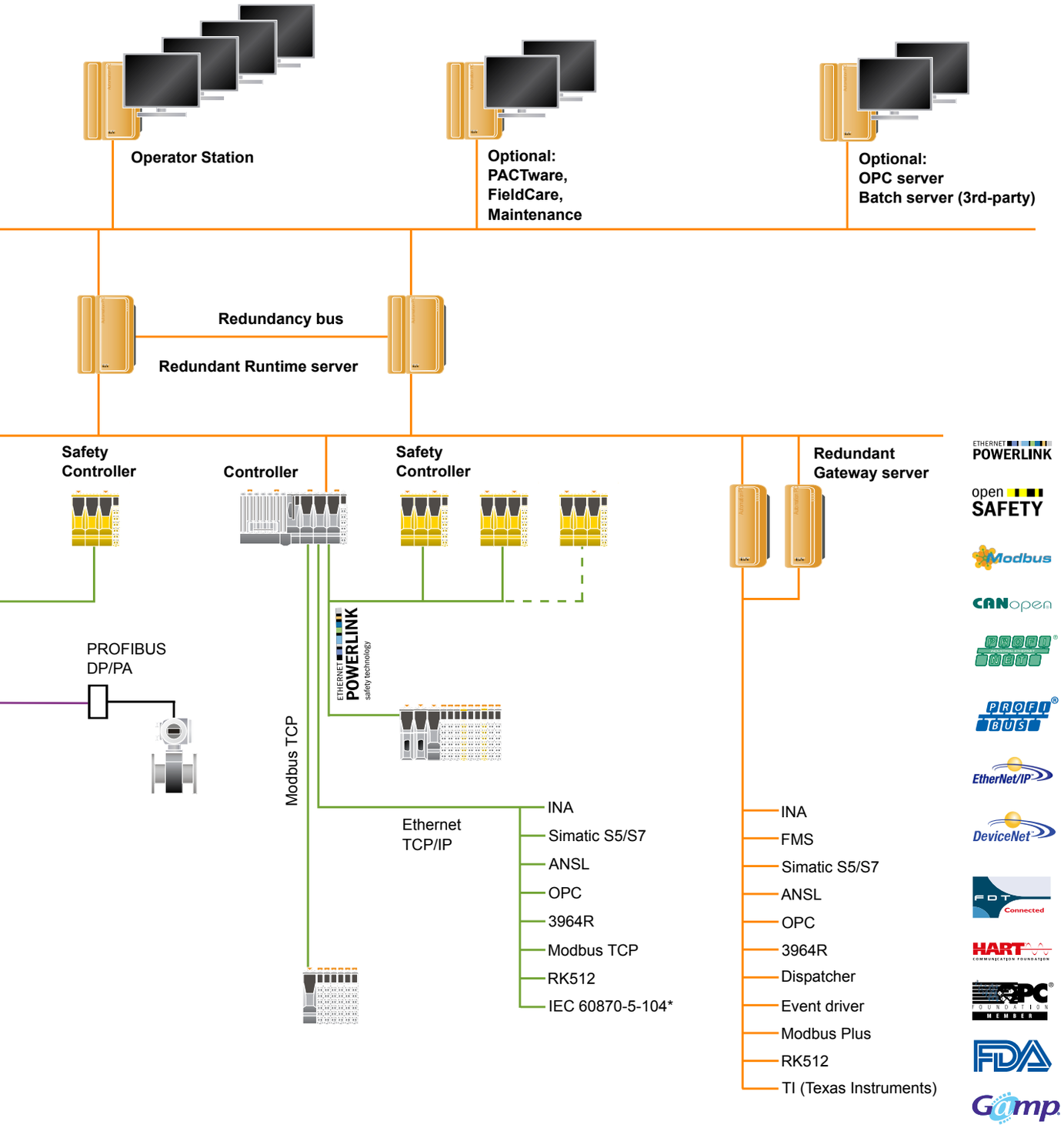
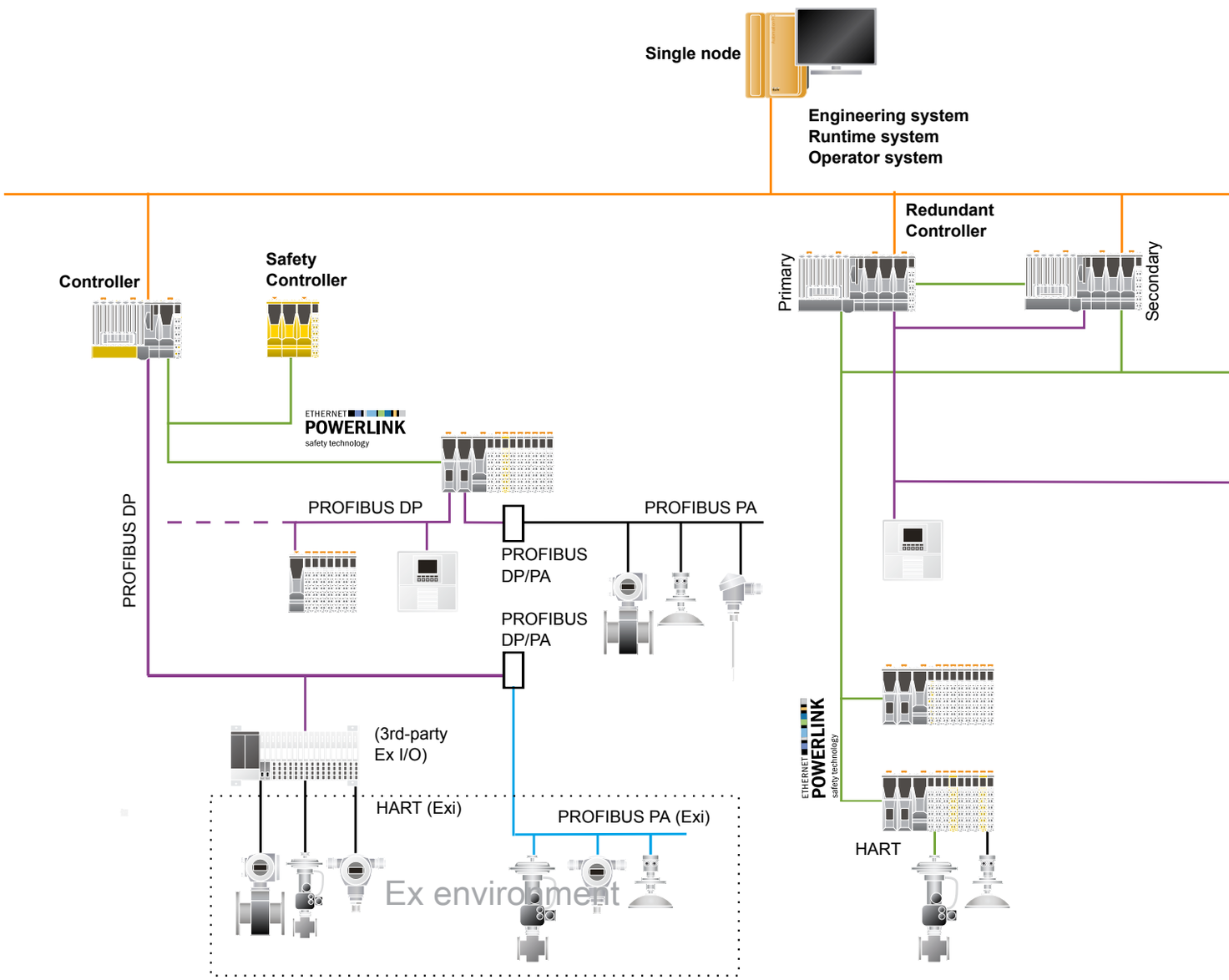
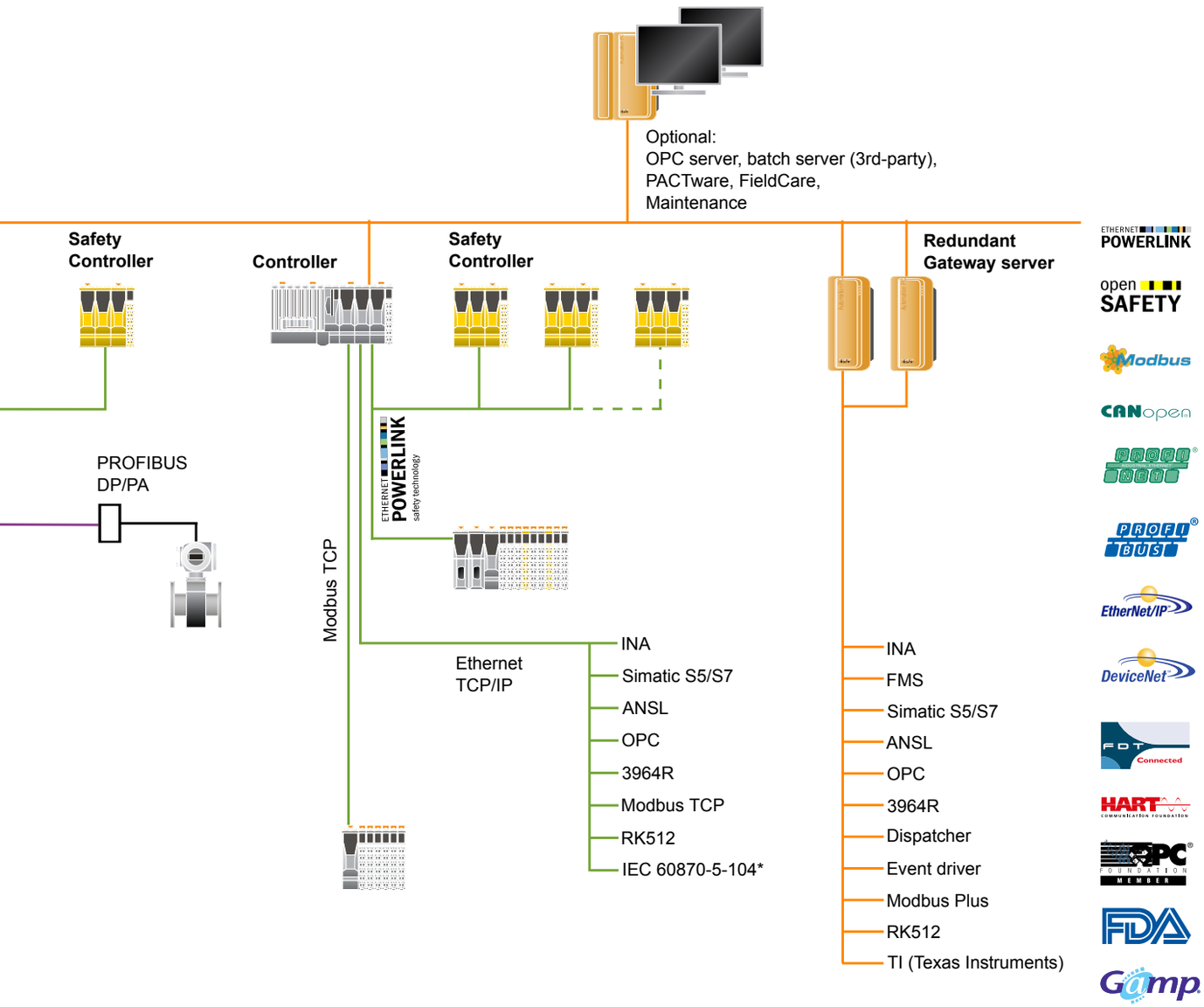
X20-based system architecture




Operator Station
Optional:
PACTware,
FieldCare,
Maintenance
Optional:
OPC server
Batch server (3rd-party)
Redundancy bus
Redundant Runtime server
Safety
Controller
Controller
Safety
Controller
Redundant
Gateway server
PROFIBUS
DP/PA
Modbus TCP
ETHERNET POWERLINK
safety technology
Ethernet
TCP/IP
INA
Simatic S5/S7
ANSL
OPC
3964R
Modbus TCP
RK512
IEC 60870-5-104*
INA
FMS
Simatic S5/S7
ANSL
OPC
3964R
Dispatcher
Event driver
Modbus Plus
RK512
TI (Texas Instruments)

System architecture – X20-based single node

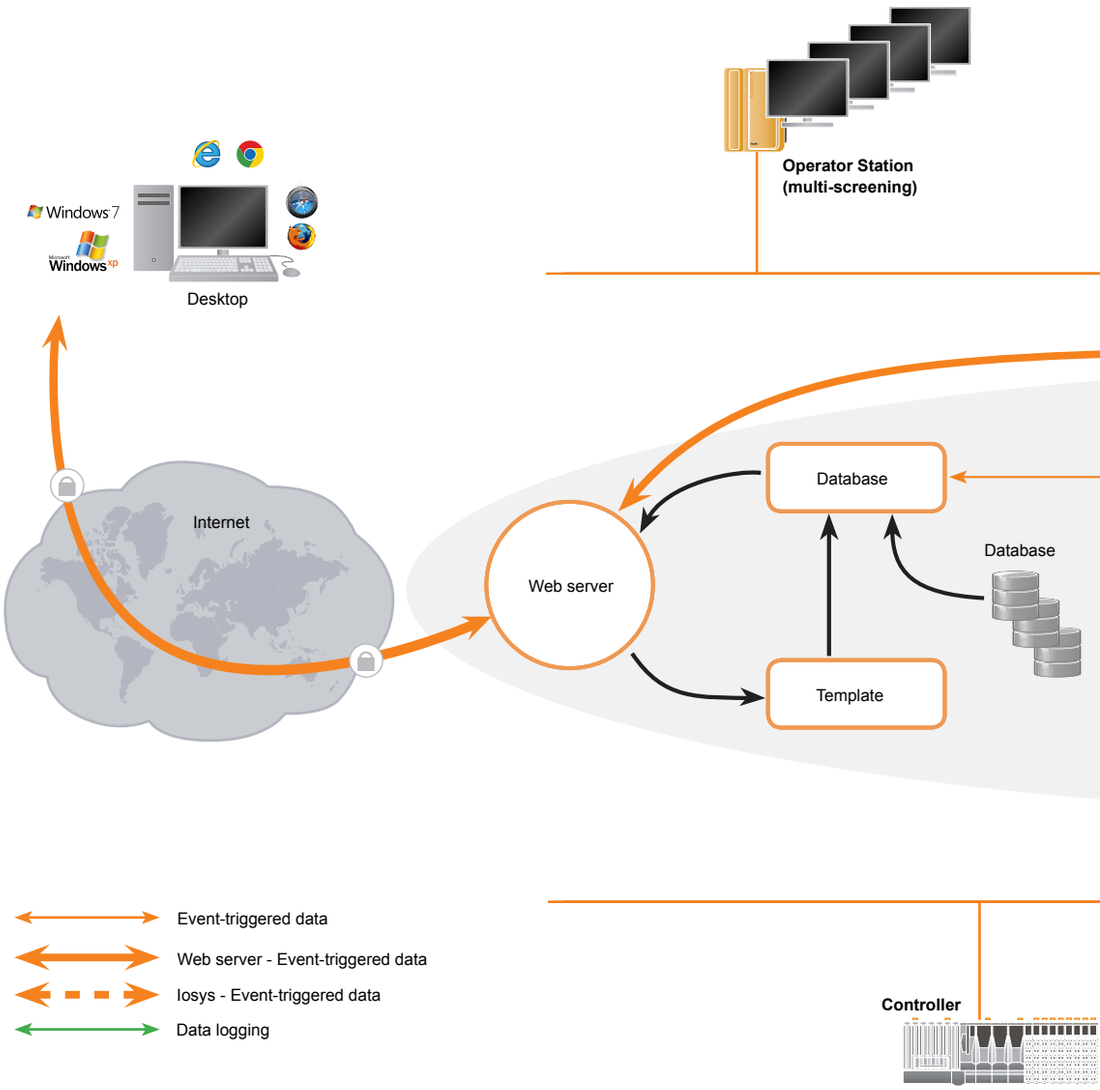


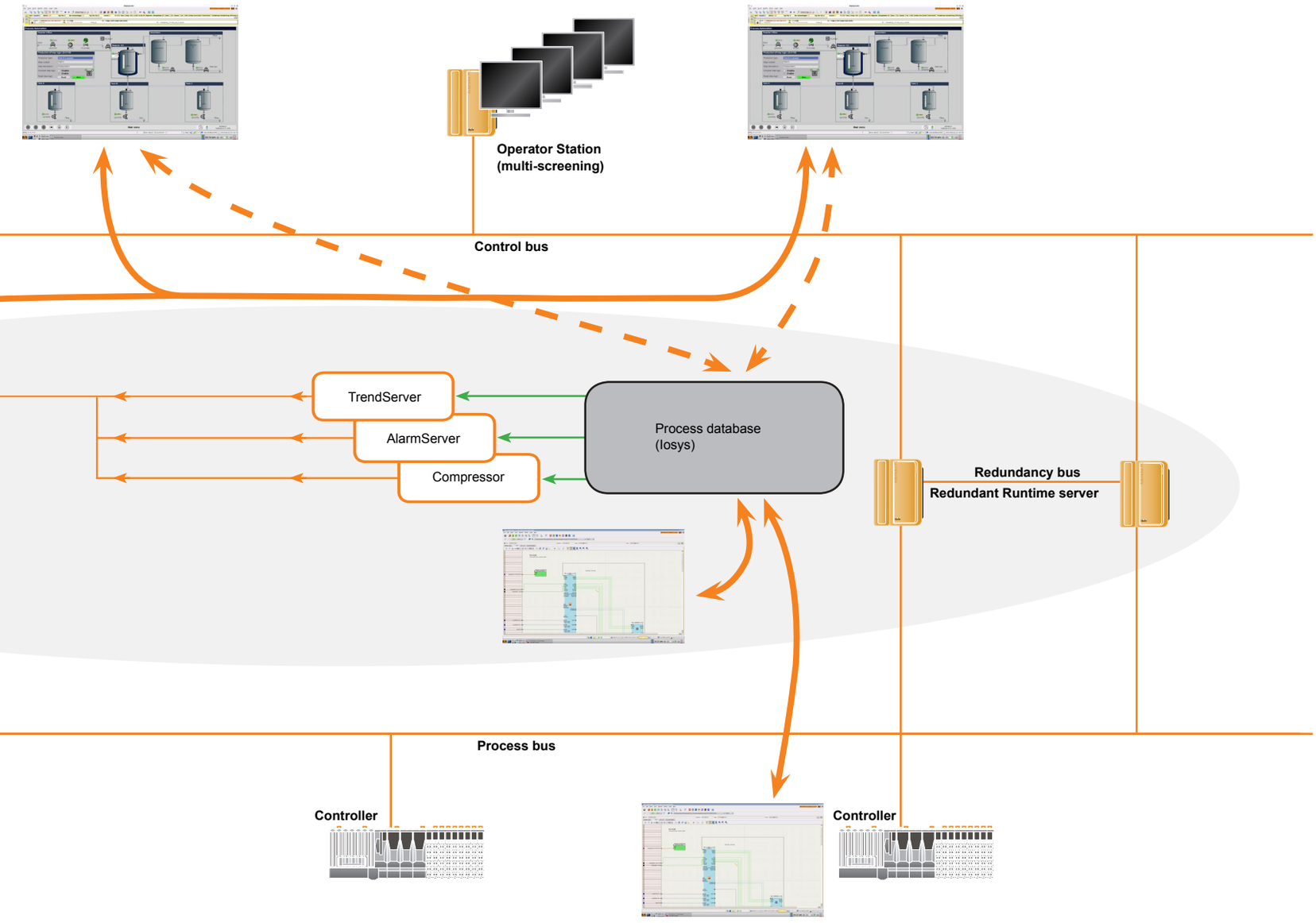

Optional:
OPC server, batch server (3rd-party),
PACTware, FieldCare,
Maintenance
Safety Controller
Controller
Safety Controller
Redundant Gateway server
PROFIBUS DP/PA
Modbus TCP
ETHERNET POWERLINK safety technology
Ethernet TCP/IP
INA
Simatic S5/S7
ANSL
OPC
3964R
Modbus TCP
RK512
IEC 60870-5-104*
INA
FMS
Simatic S5/S7
ANSL
OPC
3964R
Dispatcher
Event driver
Modbus Plus
RK512
TI (Texas Instruments)

losys - Global process database

Central real-time database losys
The central losys online process database manages all current process values. losys handles the storage, distribution and managements of data for the entire APROL system.

Read and write access
Various programs/clients (e.g. drivers for controllers, ParameterCenter, etc.) provide losys with process values. These process values are then used by other programs/clients (e.g. DisplayCenter on the Operator Station).




Operator Station
(multi-screening)
Control bus
TrendServer
AlarmServer
Compressor
Process database
(Iosys)
Redundancy bus
Redundant Runtime server
Process bus
Controller
Controller

Multi-Runtime server

Multi-Runtime server capabilities

Multiple Runtime server capabilities make it possible to use up to 63 Runtime servers in a single project.

Independent subprojects

Creation of independent subprojects possible by mapping into independent runtime systems

Load distribution of CC tasks

Load can be distributed as needed by separating control computer tasks (CC tasks) among multiple Runtime servers for execution.

Distributed server processes

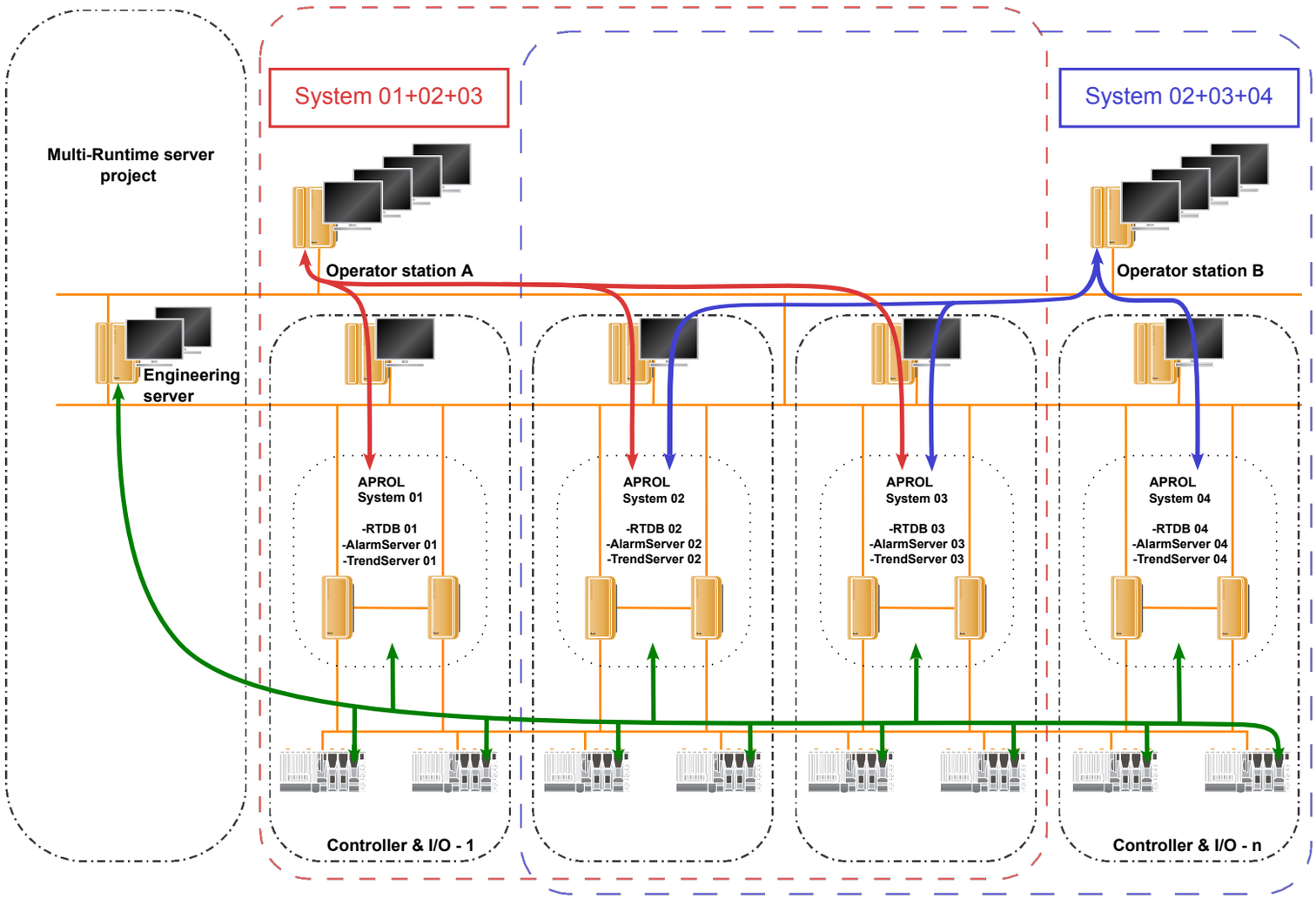
Server processes can also be distributed across multiple Runtime servers in order to divide up the load resulting from operating server processes.

Reduce side effects

Multiple Runtime server capabilities also help reduce the side effects of download requirements since the individual Runtime servers represent independent subprojects.

Several runtime systems on one computer

Operating up to 16 runtime systems on one physical computer is also supported. This makes it possible to even split up smaller projects into independent subprojects even when there is only one control computer in the project.



Higher-level control

Multiple Runtime server capabilities also make it possible to group independent subprojects into a higher-level automation system located at the management level.

Relevant real-time data and historical process data

Real-time data and historical process data are very important at the higher-level management level. All graphics, alarms, trend images and reports of associated runtime systems must be displayable.

Graphics (DisplayCenter)

Process values supplied by the process database of the associated runtime system are displayed on process graphics.

Alarms (AlarmMonitor)

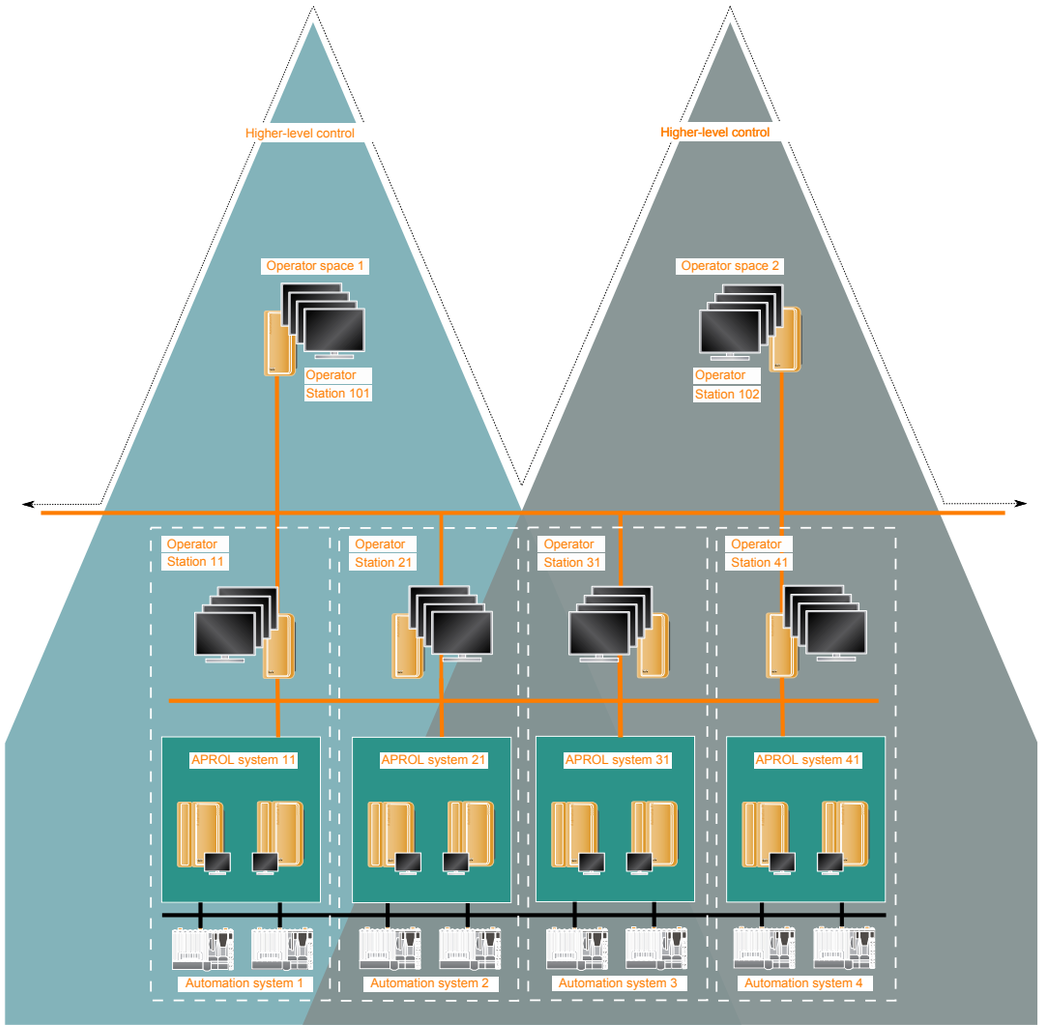
The AlarmMonitor on the higher-level management level displays all alarms of the associated runtime system in chronological order.

Trend images (TrendViewer)

The TrendViewer displays all trend curves of the associated runtime systems, with the real-time data supplied by the associated runtime systems. Historical trend data is read from the trend database of the protocol server.

Reports (historical event data)

APROL standard reports are supplied with data from the protocol server.



Centralized control system

Centralized control system

A central control system can also be built based on Multi-Runtime server capabilities in place of a higher-level management level. The main difference to the management level is that the individual systems are not displayed as Runtime servers in a project.

Independent projects

With a centralized control system, individual independent projects communicate with an additional centralized higher-level project.

Support for various releases

It is also possible for independent projects can also be of different software versions. For example, APROL projects with versions R3.6-05, R3.6-10 and R4.0-08 can all be operated together.

Relevant real-time data and historical process data

Real-time data and historical process data are very important for a centralized control system. All graphics, alarms, trend images and reports of associated runtime systems must be displayable.

Graphics (DisplayCenter)

Process graphics are displayed by calling a remote command (rsh) in DisplayCenter. This always uses the current configuration of the lower-level system without having to synchronize the project.

Alarms (AlarmMonitor)

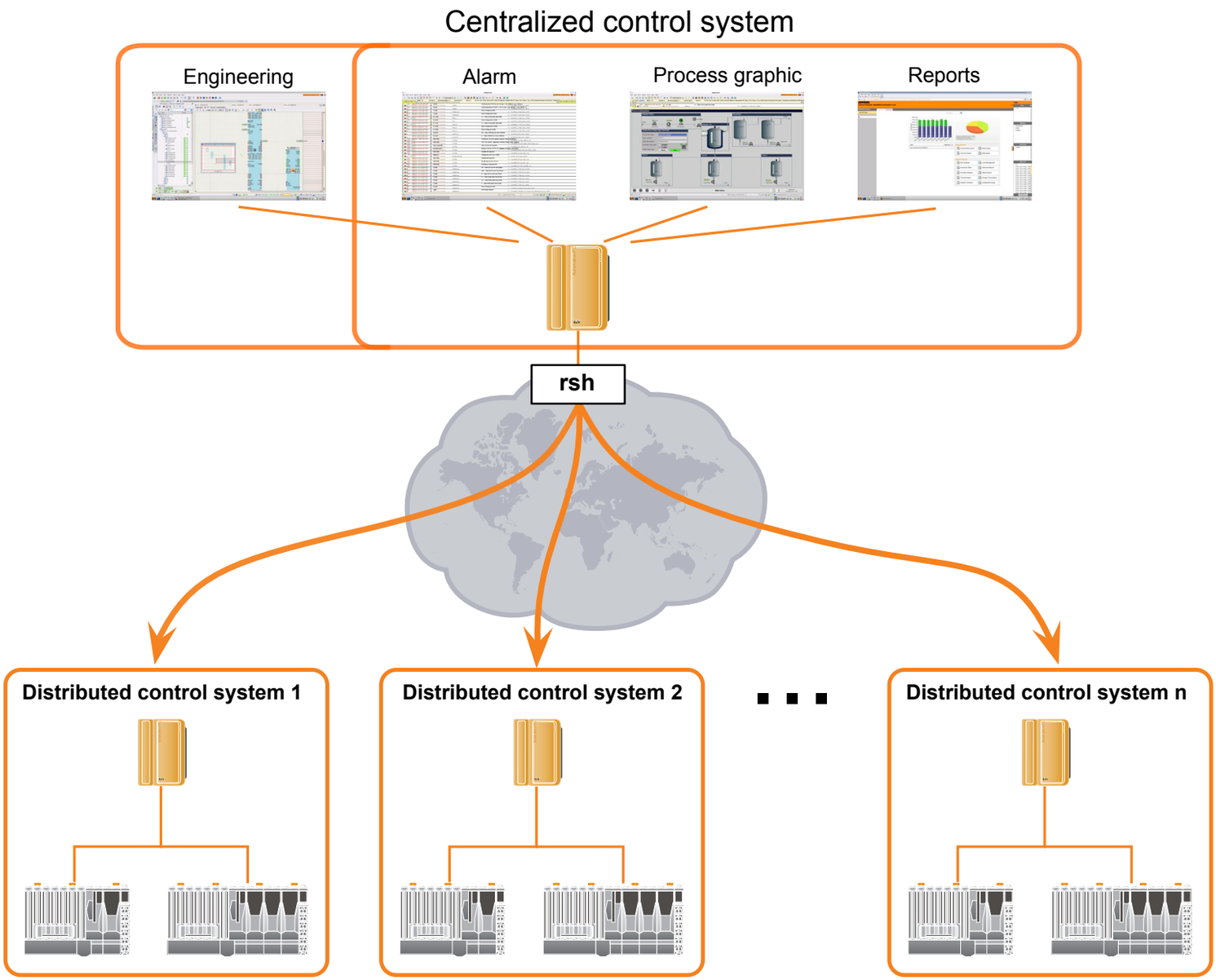
The AlarmMonitor for the centralized control system displays all alarms of lower-level systems in chronological order. Communication takes place here directly with the alarm servers of the lower-level systems.

Trend images (TrendViewer)

Trend images are displayed by calling a remote command (rsh) of the TrendViewer or through the dual acquisition of trend curves.

Reports (historical event data)

Historical event data from lower-level systems is passed from APROL to the centralized control system via a forwarding service. APROL standard reports are supplied with this data.


Centralized control system
Engineering
Alarm
Process graphic
Reports
rsh
Distributed control system 1
Distributed control system 2
Distributed control system n

Centralized historical archive

Backup function

High performance database
All historical data (alarms and messages, trends, protocol data, AuditTrail, system messages) are recorded on the APROL server and stored in containers. Optimized ChronoLog technology is used to ensure that data is recorded quickly enough (see below for technical details).

Easy transferring of archives
This saved data can be archived to external data storage media (e.g. CD, DVD, tape) or other computers on the network at any time with the backup function. Active data recording is not affected during archiving.

Automatic mounting of archive files
Archived data can be read back into the system by connecting the data storage medium to the APROL server; the data is then automatically analyzed together with the current data.

Technical details regarding ChronoLog data recording

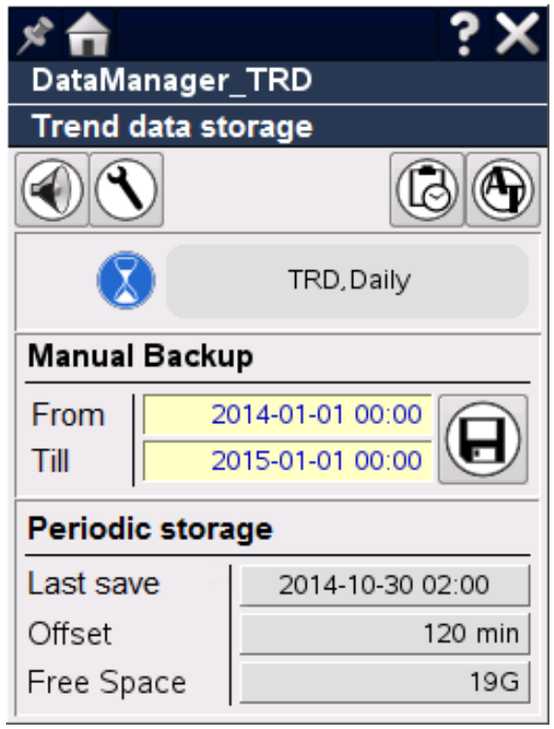
Automatic replication on redundant servers
If the APROL server is included in a redundant setup, then the ChronoLog data is automatically replicated between the redundancy master and redundancy slave. This guarantees seamless data logging.

Store and forward
If historical data should be recorded to a separate database server, this can be stored in the ChronoLog configuration. This database server can also be set up for redundancy.

Centralized historical archive
The ChronoLog mechanism also provides the opportunity to create a central database server for several self-sufficient automation islands. Historical data is temporarily buffered automatically when network communication is interrupted between an automation island and the centralized database server – an integral component of ChronoLog data recording.

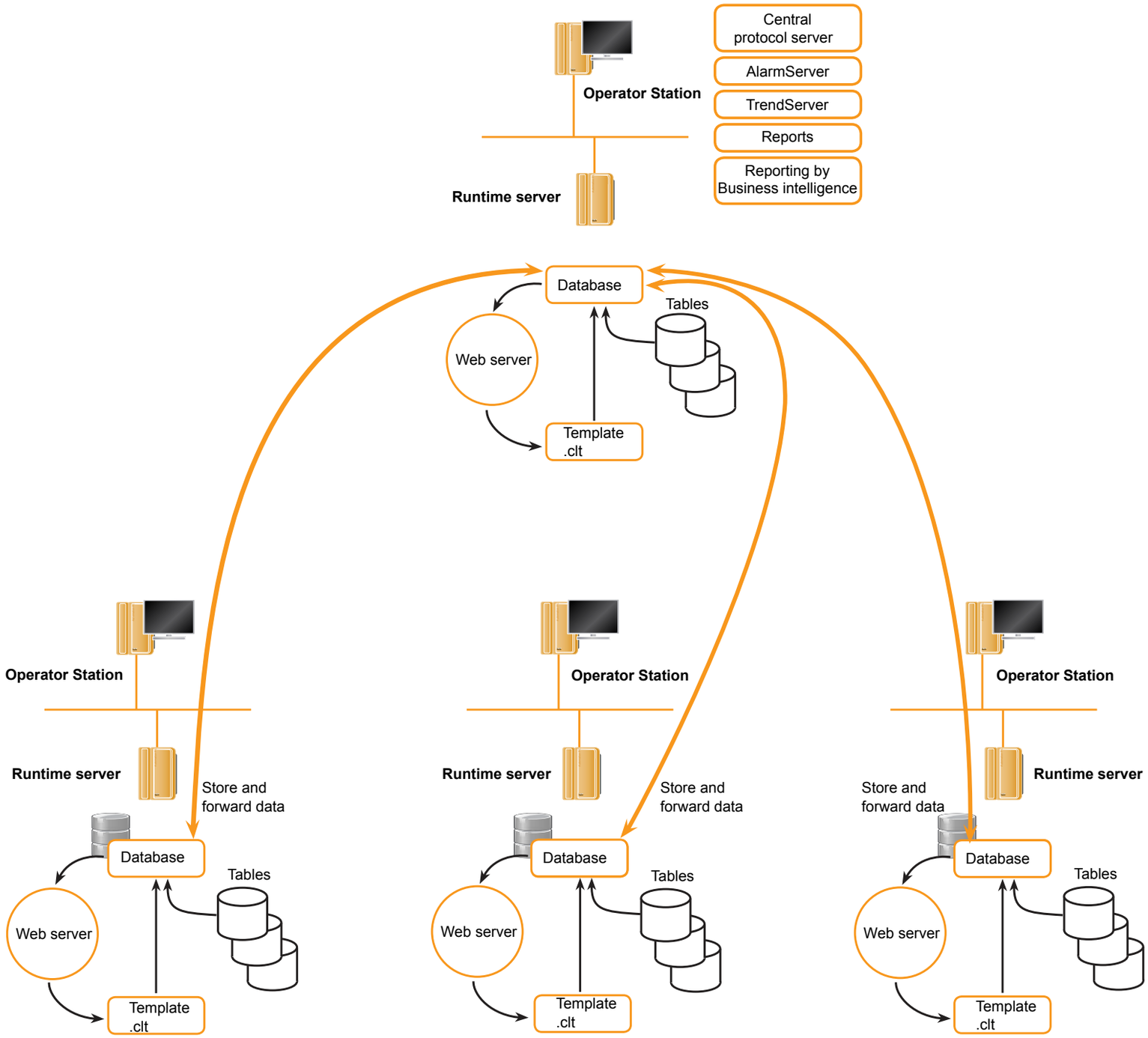
Maintenance-free database
In contrast to an SQL database, the advantage of ChronoLog technology is that no maintenance interventions are necessary.

PAL DataManager



Store and forward

The "Store and forward" function can be used to forward all data to an additional (higher-level) APROL system.



Server redundancy

Redundancy through the use of identical hardware design

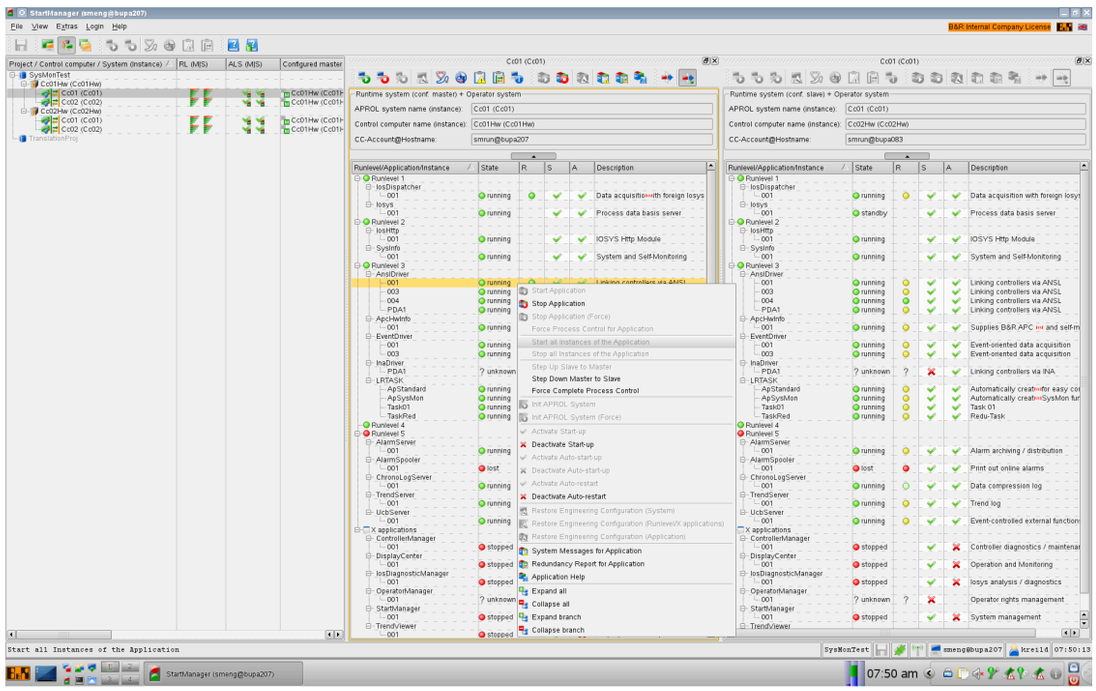
The APROL runtime system can be designed for redundancy by setting up two Runtime servers with the exact same hardware and software.

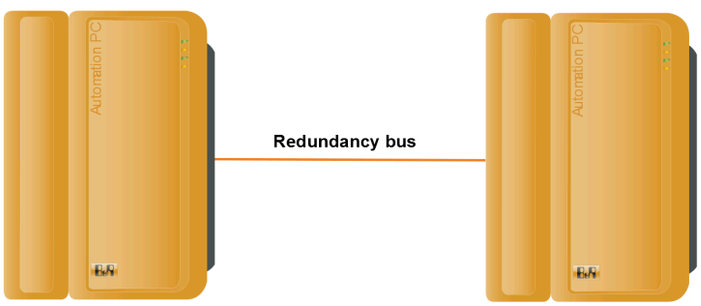
Master/Slave functionality

The same programs/clients run on both Runtime servers. One of the two is the active master Runtime server controlling the process.

Switching process control in the event of error

The redundancy software immediately switches from the master Runtime server to the slave Runtime server when an error occurs (e.g. the master Runtime server loses the network connection to the controllers) without data loss.





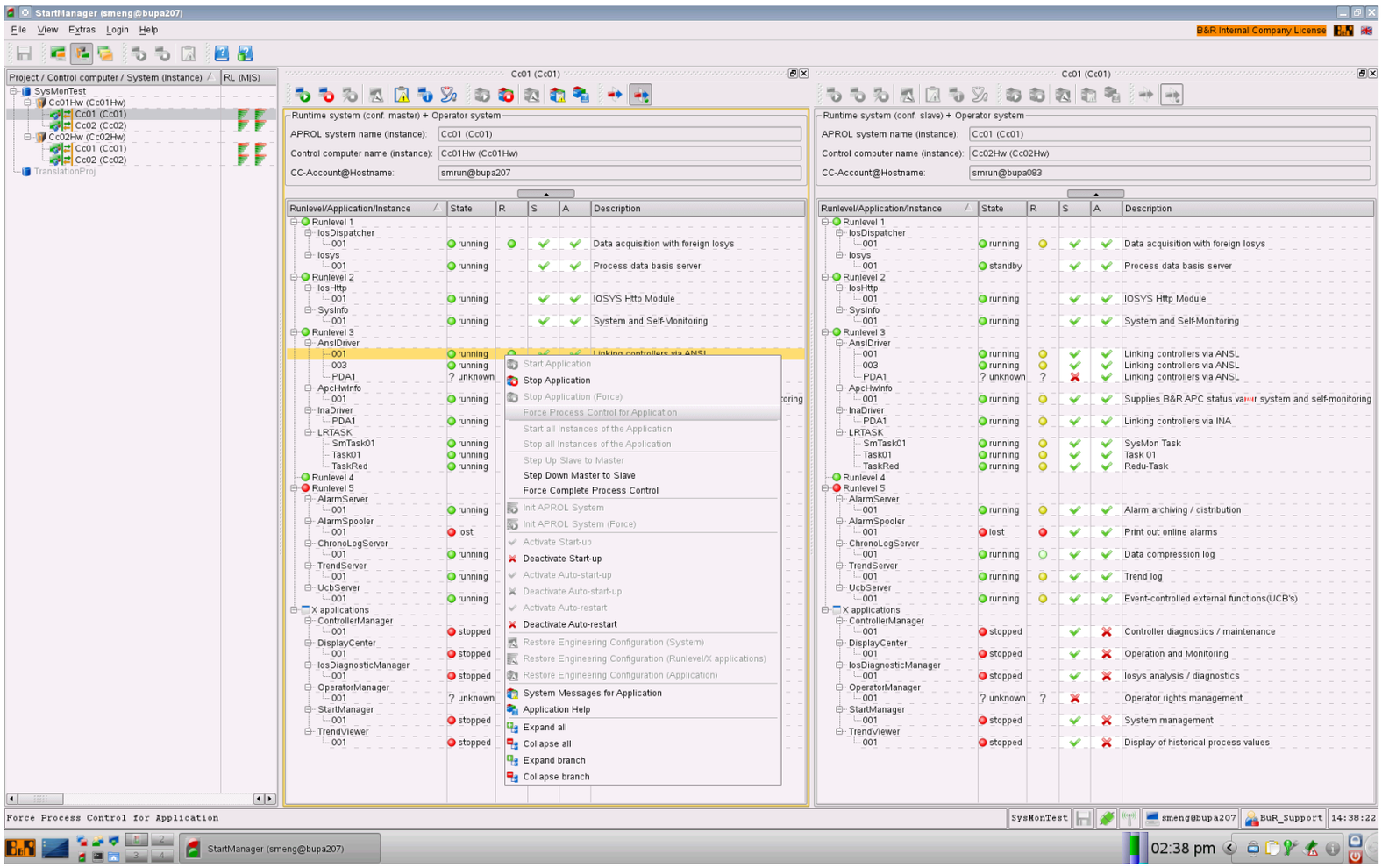
Runtime server (master) **Runtime server (slave)**

StartManager for interaction

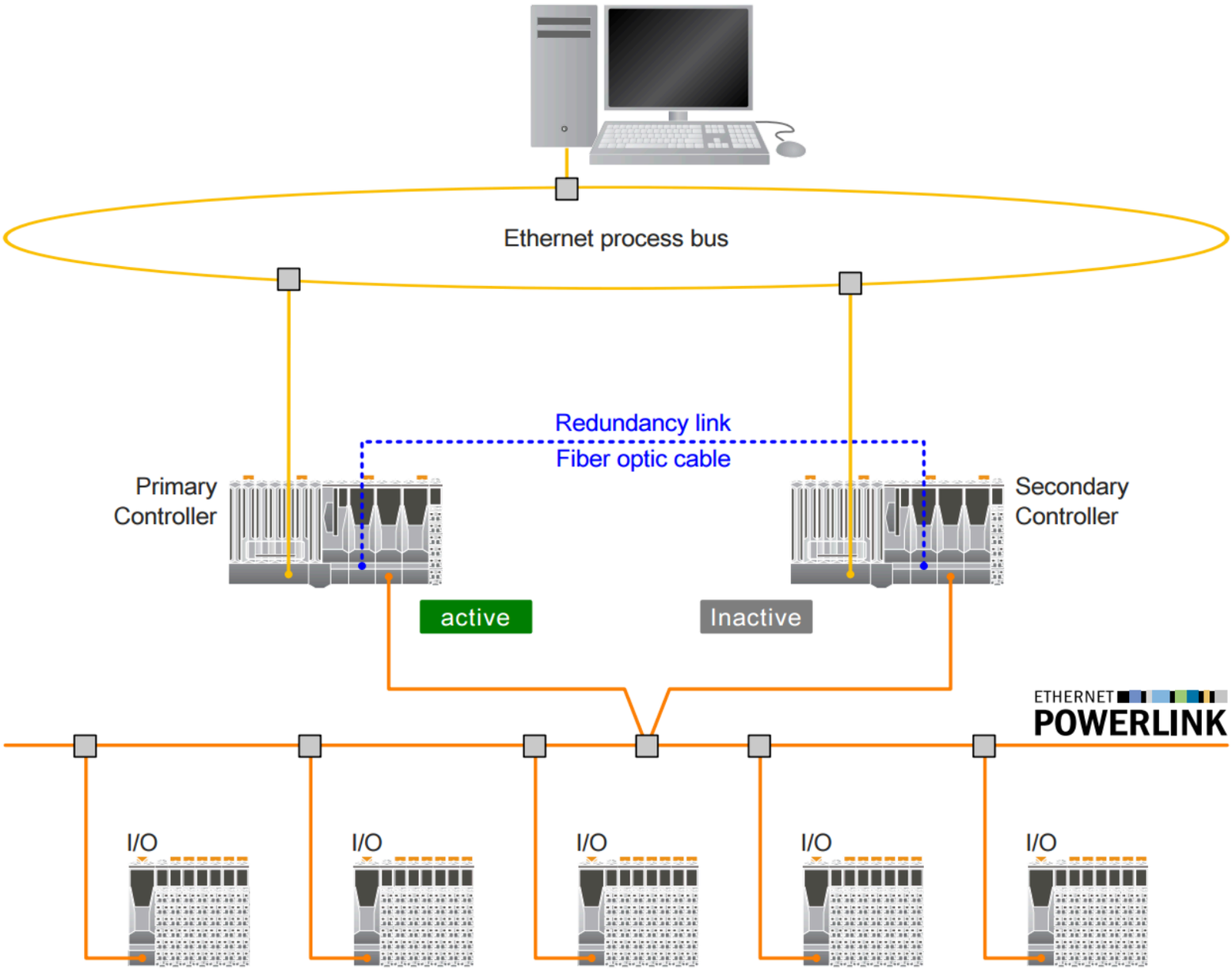
The status of the server redundancy can be displayed using the StartManager, system variables or in the visualization application. The StartManager can be used to switch redundant servers manually at any time.

Monitoring and synchronization via the redundancy bus

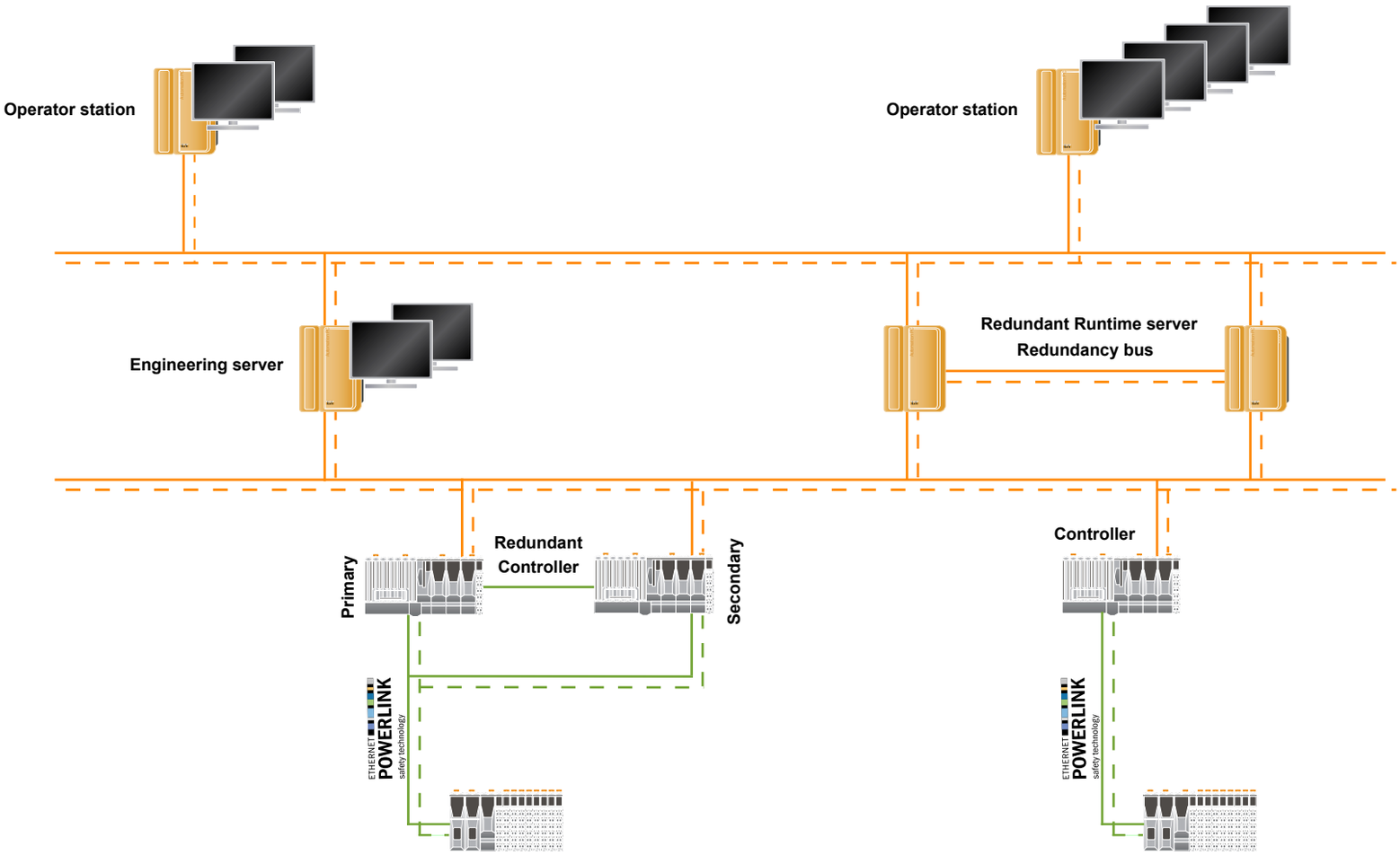
The redundancy bus is used to monitor the Runtime server and synchronize the recorded historical data.



Controller redundancy



Cable redundancy



Operator system

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Operator interface - Multi-screening

The operator interface

Composition of menus
Predefined arrangements allow minimum or maximum access to the KDE desktop KDE menus.

Starting programs via start menus
The task bar and start menu are used to start additional programs for analyzing current system information and historical data.

Tooltips with detailed information
Menu items with expressive tooltips show detailed information about the respective program.

Virtual keyboard
Virtual keyboard for touch screen solutions or "first aid" if the keyboard fails.

Access via web browser
With the necessary access rights, the entire operator interface can be started via VNC (virtual network computing), e.g. on a Microsoft Windows Vista (NT/2000/XP) computer running a VNC viewer or Web browser (Java).

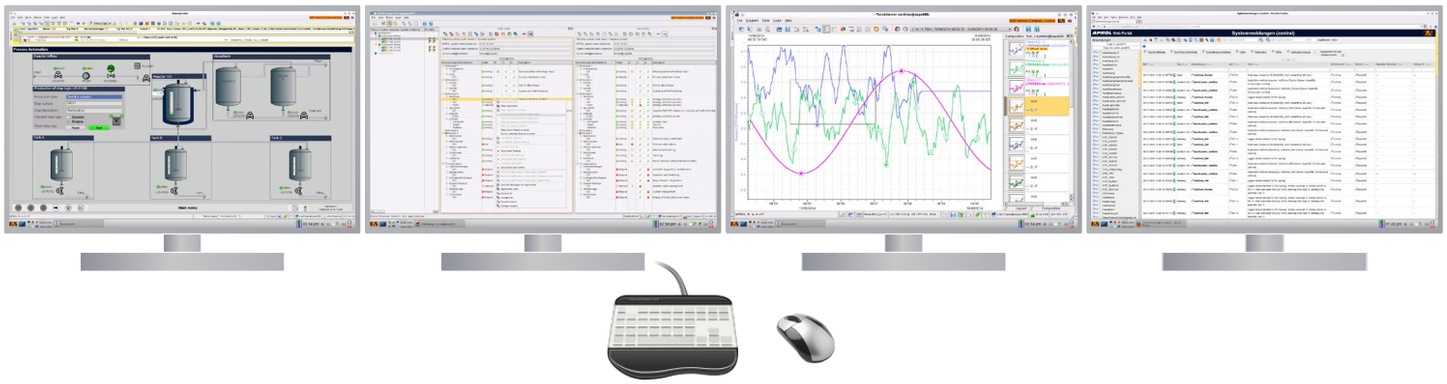
Web access without extra project configuration
Without additional project configuration and functional limitations, you can

- Perform operation and monitoring
- Perform historical analyses of alarms and trend curves
- View logs
- Open diagnostic tools for network or hardware/software components

Multi-screening with keyboard/mouse
Multi-screening makes it possible to connect several screens to one operator station. Depending on the graphics cards in use, 1, 2, 3, or 4 screens can be controlled from a single operator station.

Any diagram assignment:
A different process diagram, trend diagram or even AlarmMonitor can be shown and operated via mouse and keyboard on each of these screens.

Xinerama / Traditional mode
A desktop (workspace) can be defined for each individual monitor, or for several monitors.



Operation and monitoring

DisplayCenter for interaction

The DisplayCenter is the central application for process control. In the process diagram, the operator sees all current process states and can intervene interactively depending on his authorization level.

Personalized environment

The overall appearance (menu bar, toolbar, image tree) can be configured differently for each operator. Only the visualization elements relevant for each operator are displayed.

Process graphic history

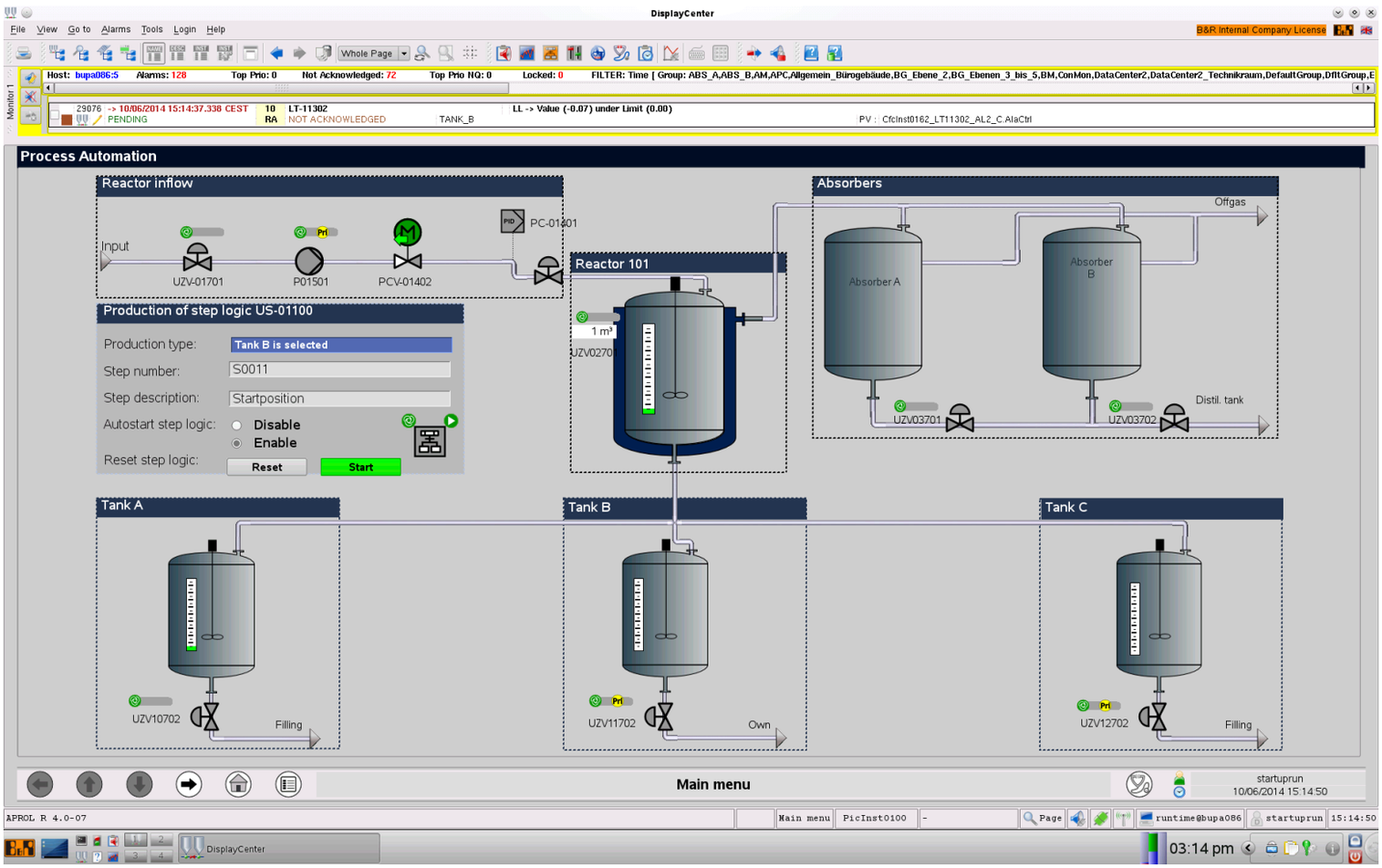
Quick activation of the most recently used process graphics using the forward and back keys (like a Web browser).
Selection of the last 11 active process diagrams directly from a menu.

Complete logging of operator actions

All operator actions are coordinated using the rights system and securely logged with the integrated AuditTrail (21 CFR Part 11, GAMP4).

Freely configurable look & feel

Adaptation of functions as well as the look and feel to the company-specific operating philosophy (user-friendly migration of old process control systems while maintaining a familiar environment and without interference of system availability).



Process diagram tree for navigation

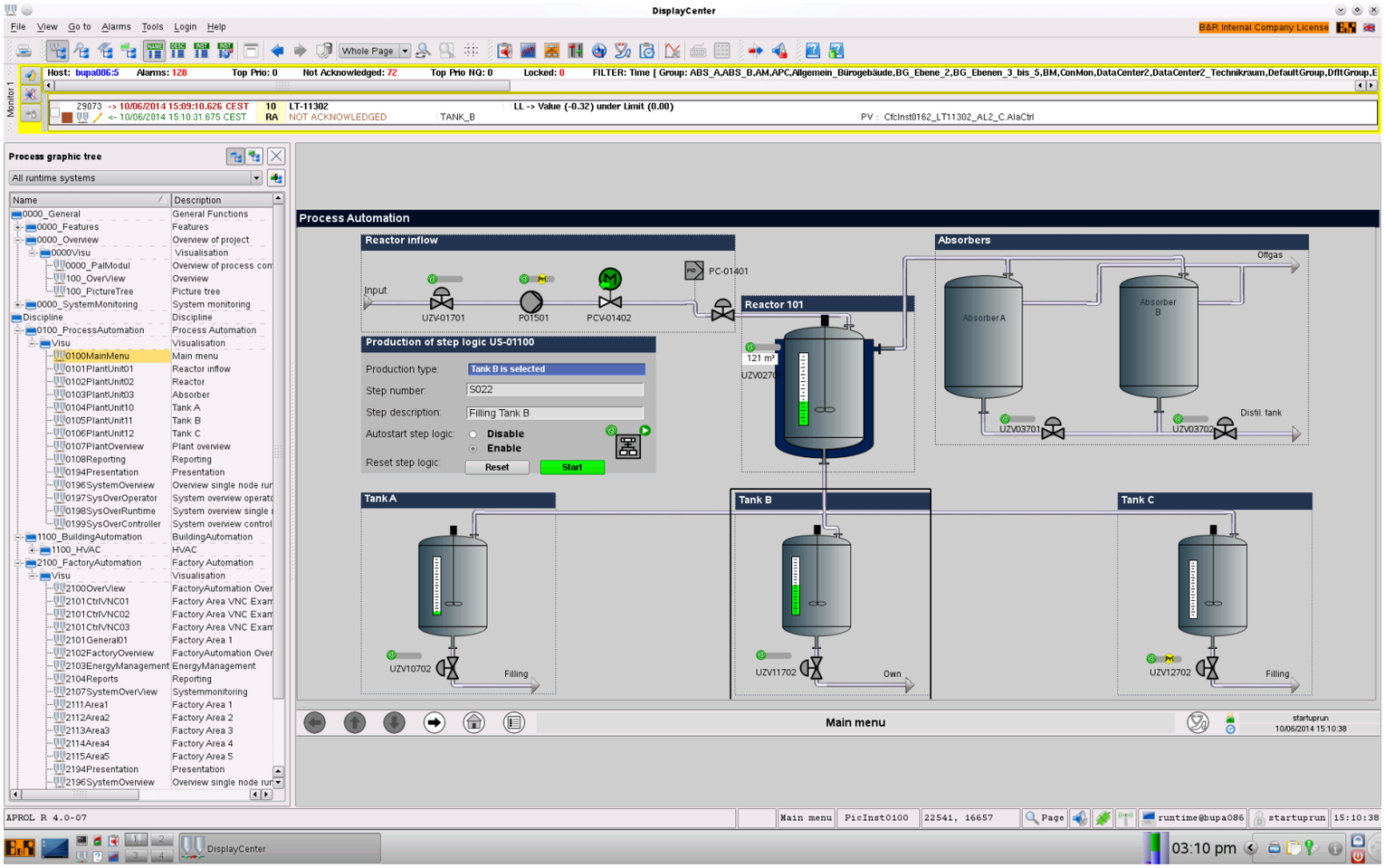
The process diagram tree shows all configured process diagrams with their names and descriptions. The diagrams can be directly selected here.

Process diagram above text search

Searching for a certain process graphic or device is possible from the diagram tree using an integrated full-text search.

Favorites for important diagrams

Each operator is able to create process graphics in the diagram tree at runtime as favorites (like a Web browser). This makes it possible to quickly open process diagrams that are used frequently.



Operation and monitoring

Process diagrams with tooltips

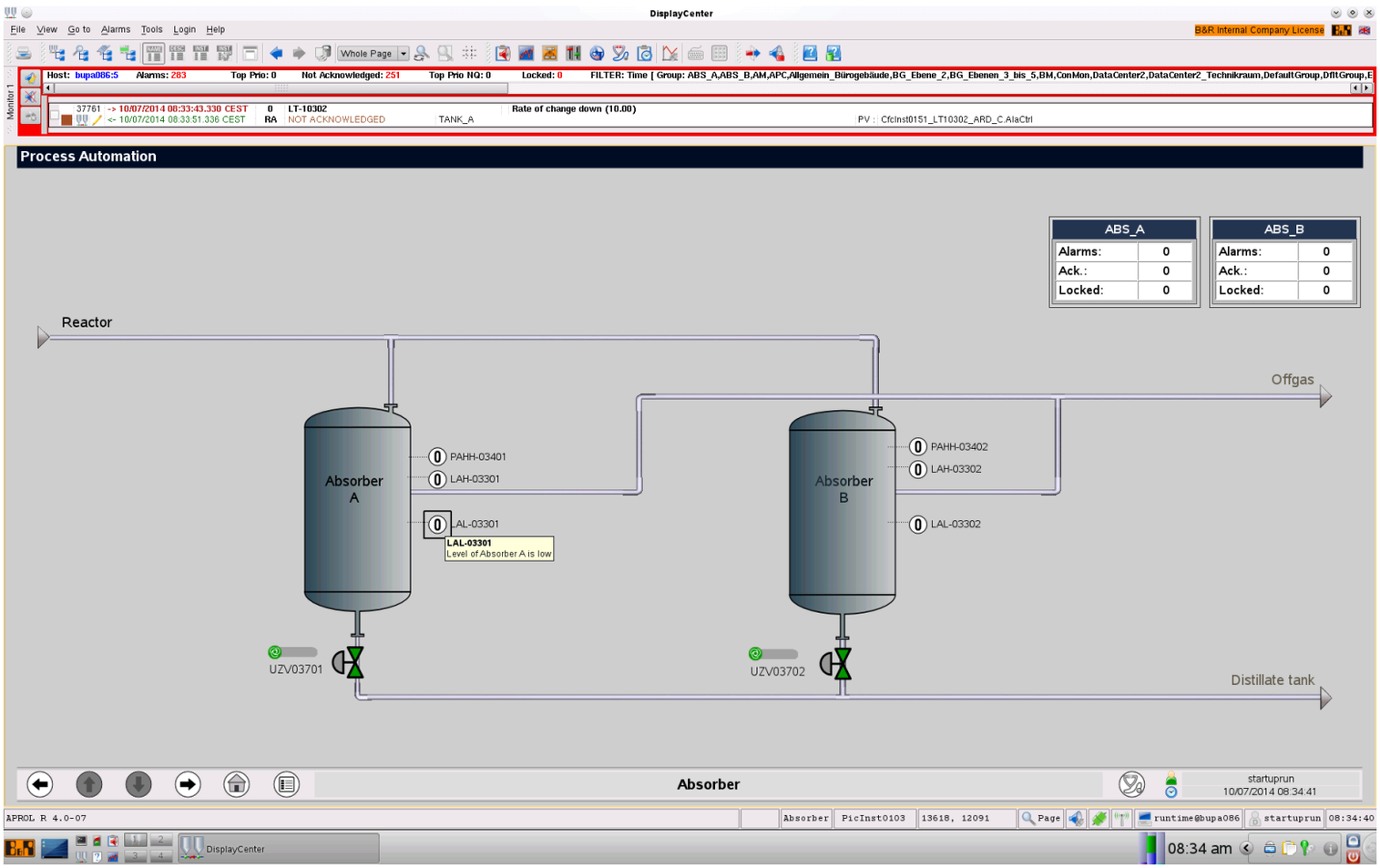
Tooltips can be created for each device in the engineering phase. These tooltips are shown when the operator places the mouse over the corresponding object. Tooltips can contain both diagram and process values.

SVG for process diagrams

For the process graphics, any picture format (.bmp, .jpg, .png, .svg scalable vector graphics, etc.) can be used as a background image.

Integrated calls from the process diagram

Opening web sites (system messages, Audit-Trail, logs, system and project documentation), playing video sequences, and remote controlling the entire computer can be integrated directly in the process graphic.



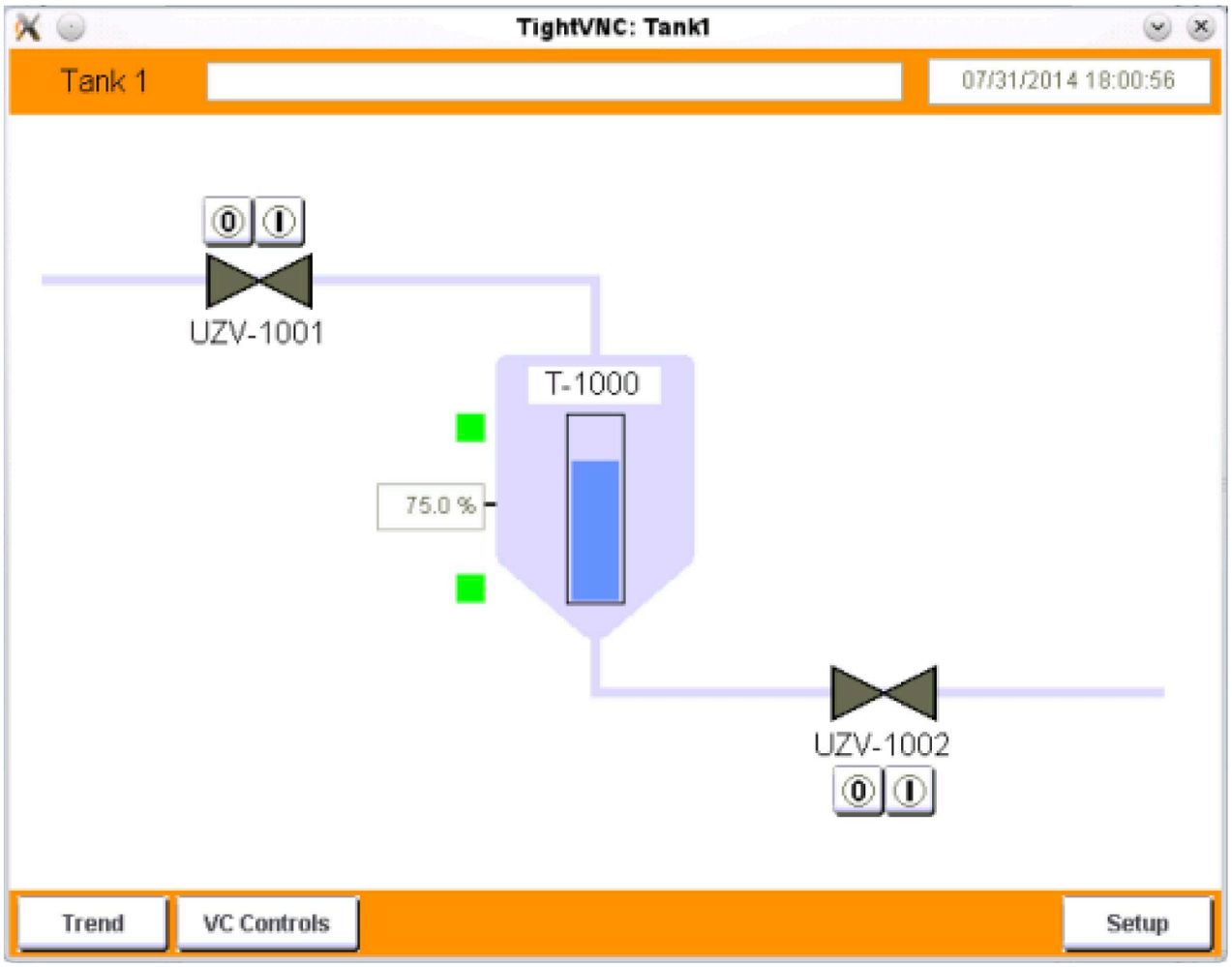
VncViewer

VncViewer

DisplayCenter provides the AprolVncViewer and VncViewer visualization elements for embedding in a process graphic.

AprolVncViewer

AprolVncViewer can be embedded in a process graphic as an "embedded app".



VncViewer visualization element

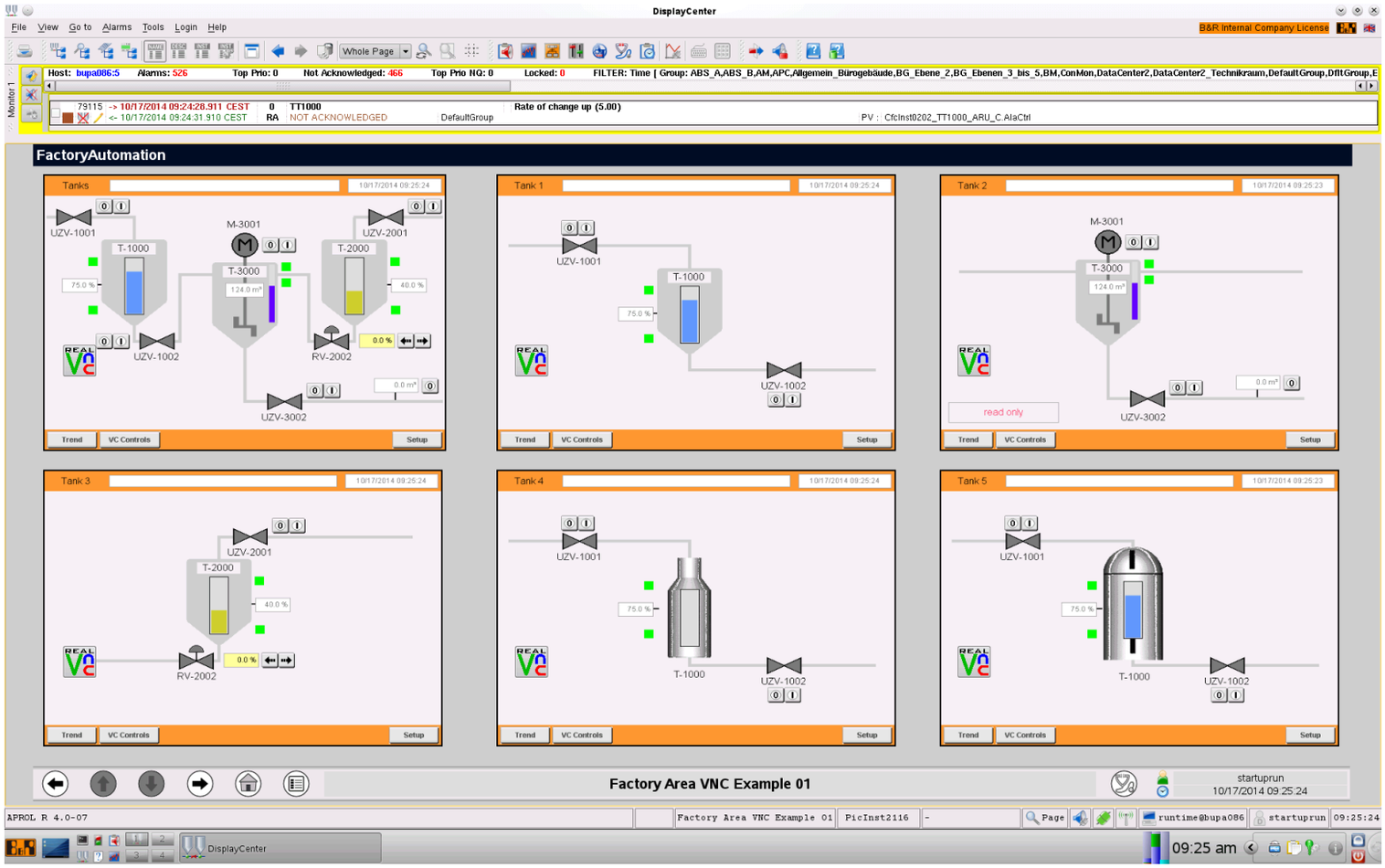
The VncViewer visualization element can be used to embed Visual Components visualizations or other visualization applications into a process graphic.

Support for authentication

The VncViewer visualization element supports all standard properties, e.g. blocking and verification, as well as advanced authentication when interacting with the visualization application (two-man rule) and logging in AuditTrail.

Frame indicates existing authorization

A VNC display is shown with a thin black frame when it is opened (read-only mode). This frame changes to the selected color (yellow) if an operator clicks in the VNC display with the mouse and has the right to operate (read/write mode).



Batch production with ParameterCenter

ParameterCenter

For discontinuous batch processes
Controlling discontinuous batch processes via the ParameterCenter

Configuration via templates
Defining system components and parameter set templates (based on the S88) in the engineering system.

Parameter set defines a product
Parameter sets represent products in the system (e.g. parameter set 1 for the production of product A and parameter set 2 for the production of product B).

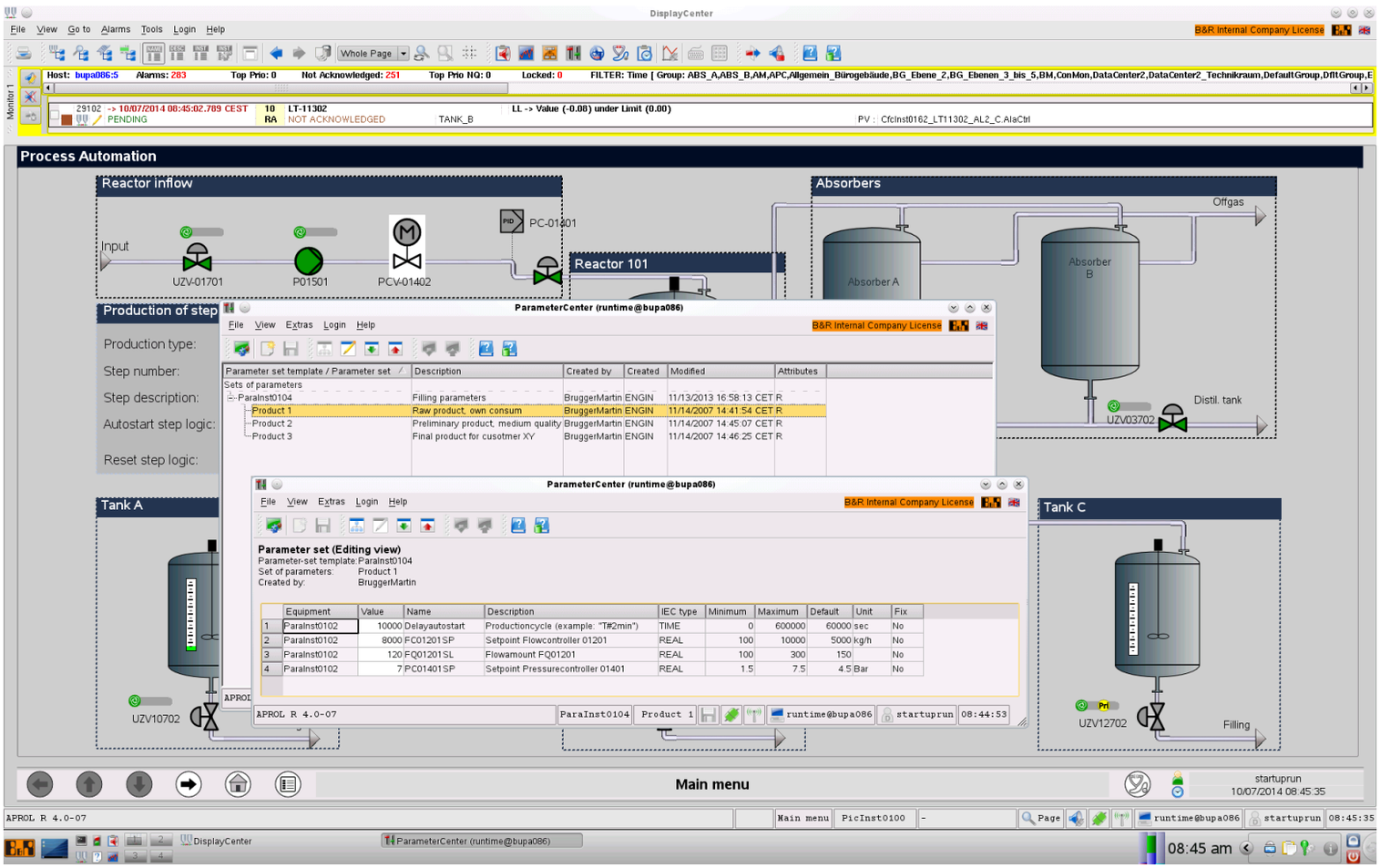
Uploads/Downloads for product handling
Parameter sets can be switched either by the operator or automatically using a selection program (e.g. to convert production from product A to product B)

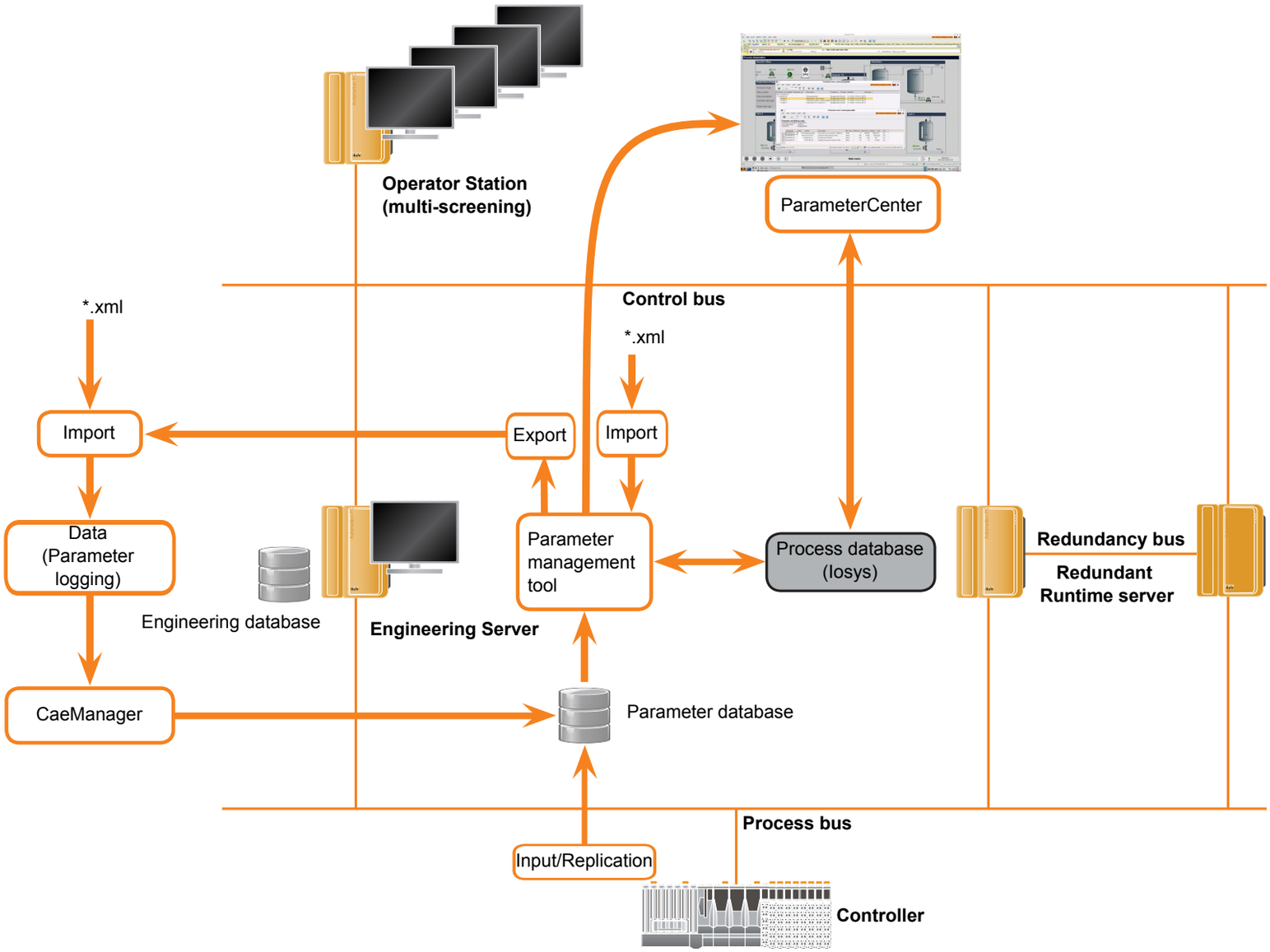
Flexible modification of parameter sets
Parameter sets are created and modified in the engineering system or by the operator during runtime.

Management with MySQL
Parameter sets are kept in a MySQL database. An open interface makes it possible to import and export data to a production planning system.

Import/Export interfaces
The ParameterManagement tool enables the import/export of data to and from the parameter set database of the Runtime server.

All actions are recorded by AuditTrail
The integrated AuditTrail (21 CFR Part 11, GAMP4) logs all operator actions in the ParameterCenter and provides important information (who, what, when, where) that can be accessed over the web.




Operator Station
(multi-screening)
ParameterCenter
Control bus
*.xml
*.xml
Import
Export
Import
Data
(Parameter
logging)
Parameter
management
tool
Process database
(Iosys)
Redundancy bus
Redundant
Runtime server
Engineering database
Engineering Server
CaeManager
Parameter database
Process bus
Input/Replication
Controller

Security login

Operator rights

The operator rights in the process visualization are determined in the Operator Rights section. These rights can be freely defined in the project.

Convenient operator management with the OperatorManager

Organized management of operators and groups in a single interface. The roles of the operators are determined by defining groups. One or more groups are assigned to the operators in the OperatorManager. With the assigned groups you determine what actions the individual operators can perform in the PCS.

Unlimited number of operators and groups

The system supports an unlimited number of operators and groups.

Uniform display in engineering and runtime environments

The uniform layout for user/operator management in the engineering and runtime environments makes rights management quick and intuitive to perform.

Export/import operator rights in secure binary format

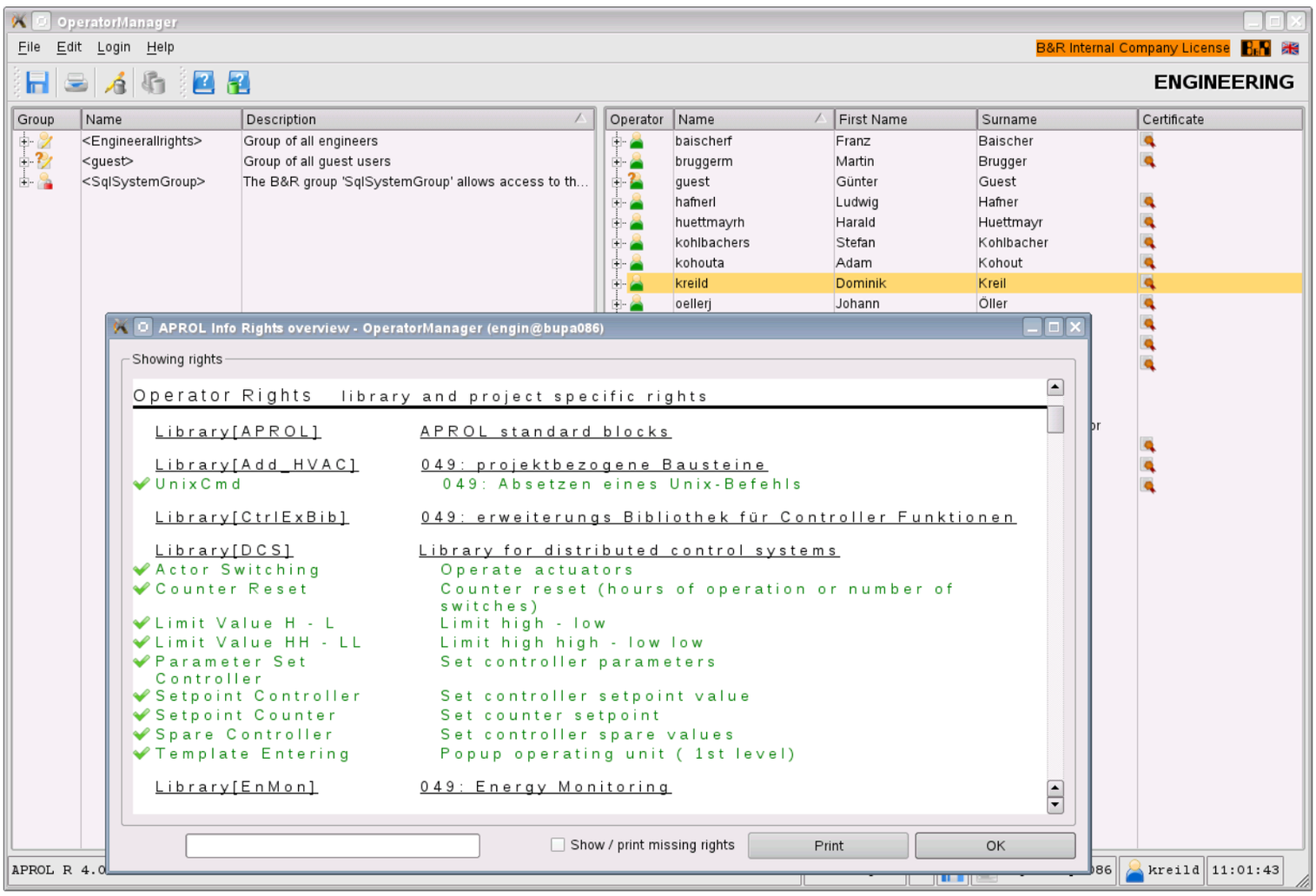
Configuration made easier by export/import interface

Block output with defined rights

When image macros are created in libraries, they are configured so that they can be used to intervene directly in the process. In the graphic macro, this object is then a block output. This block output is assigned an operator right.

Operator rights

The operator rights are inherited by libraries in the project. Additionally, there are the rights for the image function blocks, which may be overwritten in the hyper macros, as well as the rights that have been defined in the project.



Application rights

Defining the application rights determines which applications in the runtime system are permitted to be started, and which actions are permitted within these applications.

Versatile login options

It is possible to log in using the keyboard, chip card reading device, transponder reading device, and password at the operator station. The login server handles the configured rights automatically. It's also possible to integrate existing chip (ID) cards used by a company.

Personalized environment

Different process graphics, devices, and alarms are shown on the operator interface depending on the operator who is currently logged in.

Logic-dependent logins

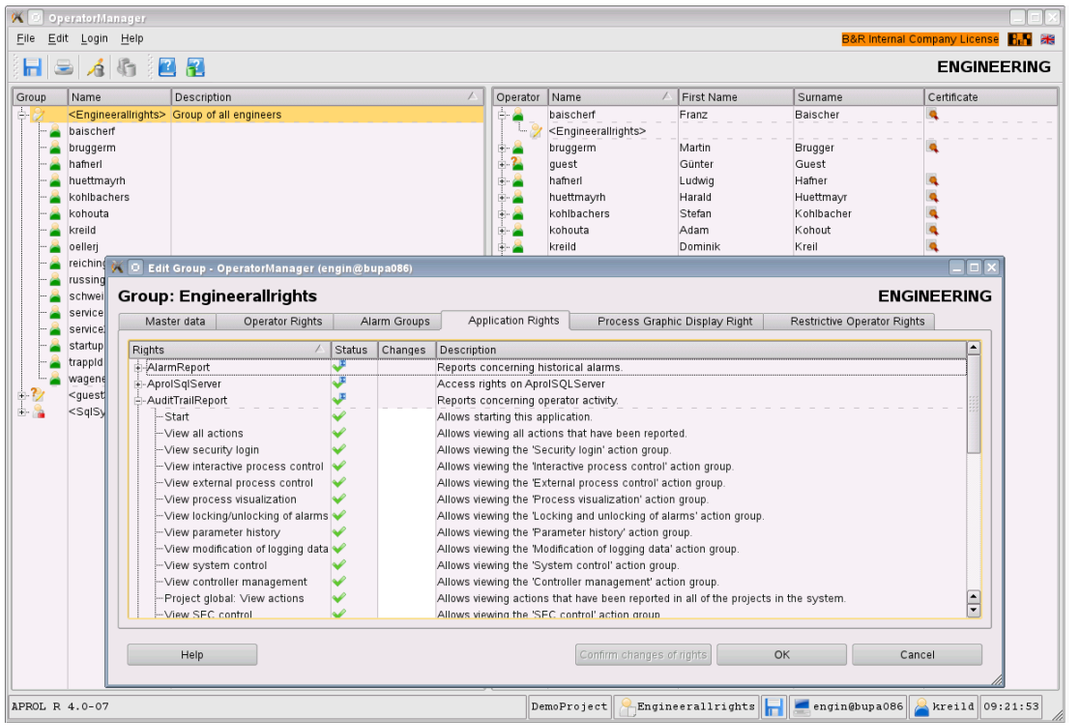
An operator can be allowed or prevented from logging in depending on different criteria, e.g. the system status.

Automatic logout

If an operator is logged in and doesn't make any entries for a defined length of idle time, the login server can log him back out automatically. This operator idle time prevents another operator from using this login name at that workstation.

AuditTrail monitors all login/logout activity

All operator activity (login/logout) is recorded in a database that is protected against manipulation called AuditTrail.



AuditTrail

Logging and monitoring of all operator activities

All operator activity is recorded in a database that is protected against manipulation called AuditTrail.

Supports fulfillment of requirements, e.g. 21 CFR Part 11 and EU 178/2002

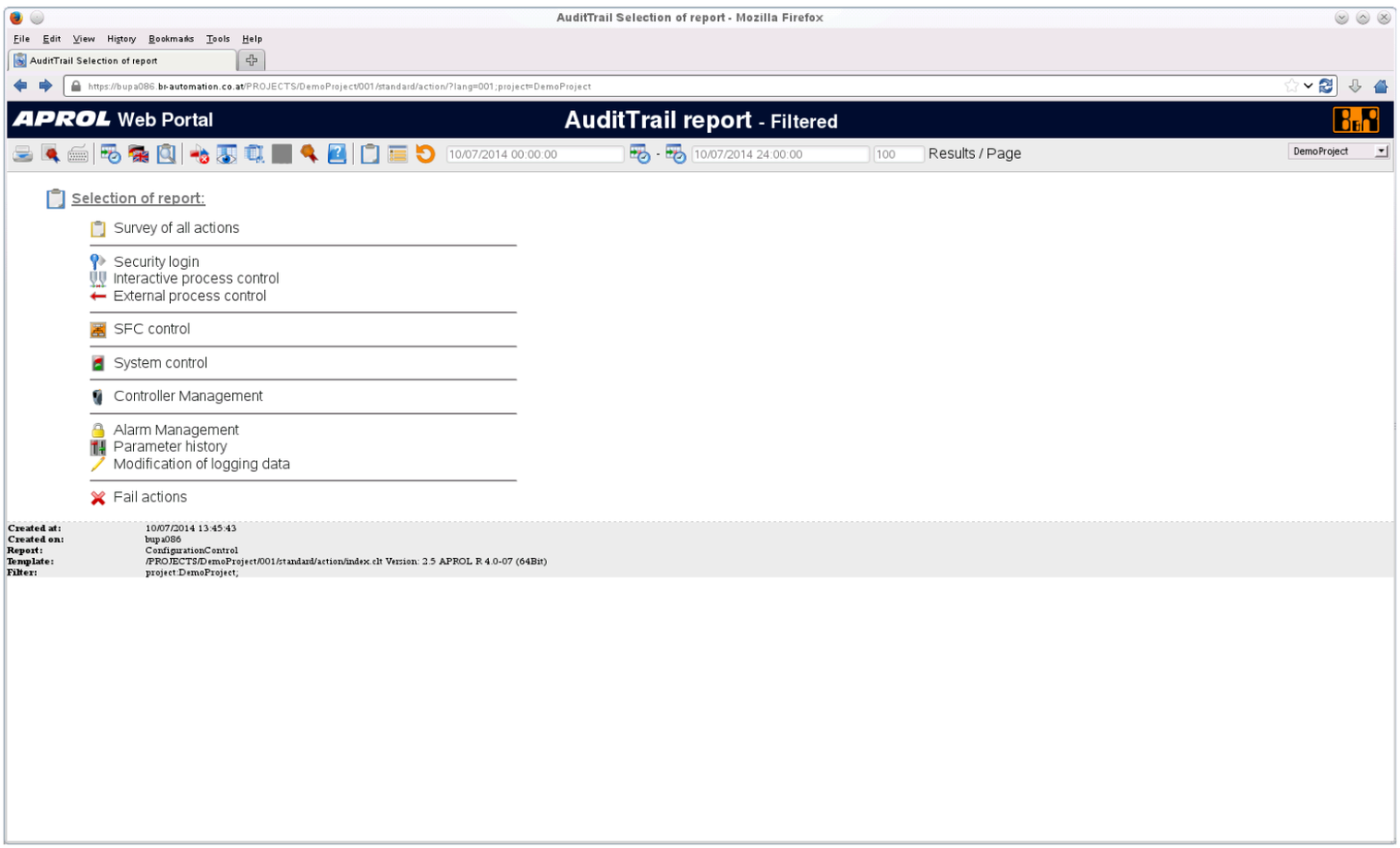
The ability to trace all operator activity makes it possible, e.g. to meet requirements in the pharmaceutical industry with GAMP (Good Automated Manufacturing Practice), with 21 CFR Part 11 of the American Food and Drug Administration (FDA), or the EU regulation 178/2002 applicable to the food, beverage and tobacco industry. Reliable records of activity in AuditTrail make it possible to meet documentation requirements with a paperless, complete record of all operator activities.

Complete overview of all operator actions

Depending on the operator activities, detailed information such as security login (operator logs in or out), interactive process execution, external process execution (Web interface), process visualization (image opened, faceplate operated), system control actions (start, end, initialize of various applications), controller management (start, end, service/diagnostics mode), alarm suppression (lock, release), parameter history (download of parameter sets, modification of parameters) and the modification of protocol data or entry of replacement values is recorded seamlessly in a database.

All detailed information contained in AuditTrail database

All important data required for a complete description of the action is recorded. Time and date of the change, operator login, device, project APROL system, server and operator terminal, controller action, old and new values, alarm and alarm group, event/function, comment/reason for change, image description and graphic block, Web access and modified process variables, parameter set, ParameterCenter mode, reason for change, category and name of changed protocol data.



Clear logging of operator actions with respect to when, what, who and where

Each entry in AuditTrail contains the following detailed information:
Date and time = When
Action performed = What (including old/new value)
Name of the operator = Who
Location of the action = Where

Extensive AuditTrail with filter functions, easy to search

Filters enable you to specifically create a display of the desired AuditTrail data. The data can easily be exported as an HTML file. The recorded data cannot be modified or deleted, making it virtually impossible to manipulate and satisfying a key FDA requirement according to 21 CFR Part 11.

AuditTrail system function runs without prior configuration

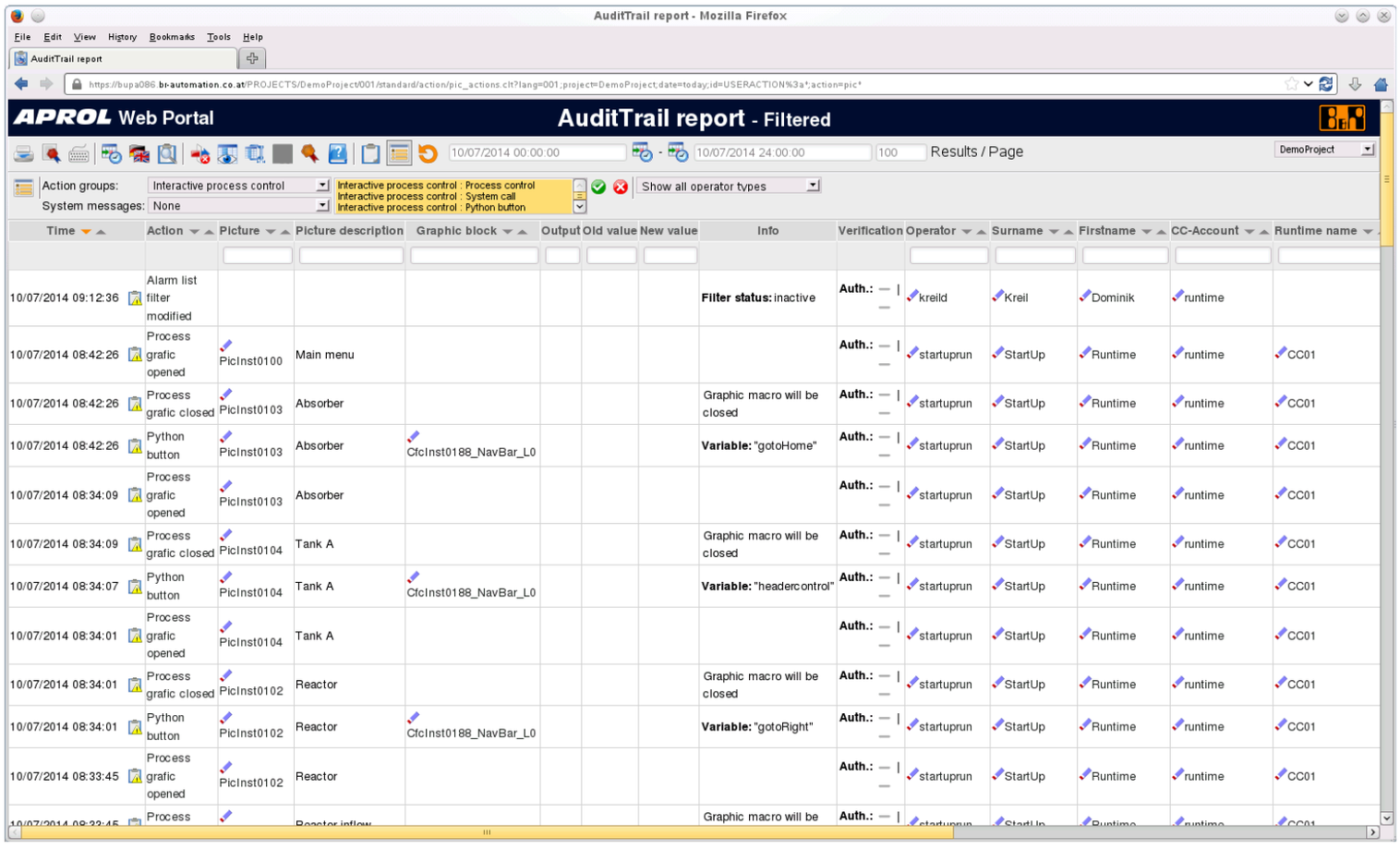
AuditTrail is always started automatically (no configuration needed / prevents configuration errors). This means that the AuditTrail data is always available.

Access rights control access to AuditTrail

Authorization to access data recorded by the AuditTrail is defined during the engineering phase using the APROL authorization system (two-component authorization consists of user login + password).

Data can then be processed using office applications.

All data can be imported (HTML, CSV format) into applications such as MS Office or Open Office, printed out, or saved as a PDF document without needing additional programs.



Language switching

Language switching

Released in both German and English
APROL releases are generally made available in both German (de) and English (en). This also applies to APROL system documentation.

TranslationManager makes translation possible
The user can use the integrated TranslationManager tool to easily create translations for APROL system software modules (e.g. DisplayCenter) as well as in the APROL project itself.

Different degrees of translation
Additional, subsequently listed languages are available with a different degree of translation. APROL system software modules for the Engineering area are usually not available since a translation is normally only required for operation and monitoring (operator station).

Partially implemented languages or prepared environments:
- Chinese (zh_CN)
- Traditional Chinese (zh_TW)
- Danish (da)
- Finnish (fi)
- French (fr)
- Italian (it)
- Japanese (ja)
- Korean (ko_KR)
- Lithuanian (lt)
- Dutch (nl)
- Norwegian (no)
- Polish (pl)
- Portuguese (pt)
- Romanian (ro)
- Russian (ru)
- Swedish (sv)
- Slovakian (sk)
- Spanish (es)
- Czech (cs)
- Turkish (tr)
- Hungarian (hu)

All alphabets and character sets
UNICODE capability (UTF-8) in APROL means that all international alphabets and character sets can be used. To use several languages at the same time (e.g. in the visualization) the corresponding information and texts can be configured separately for each language.

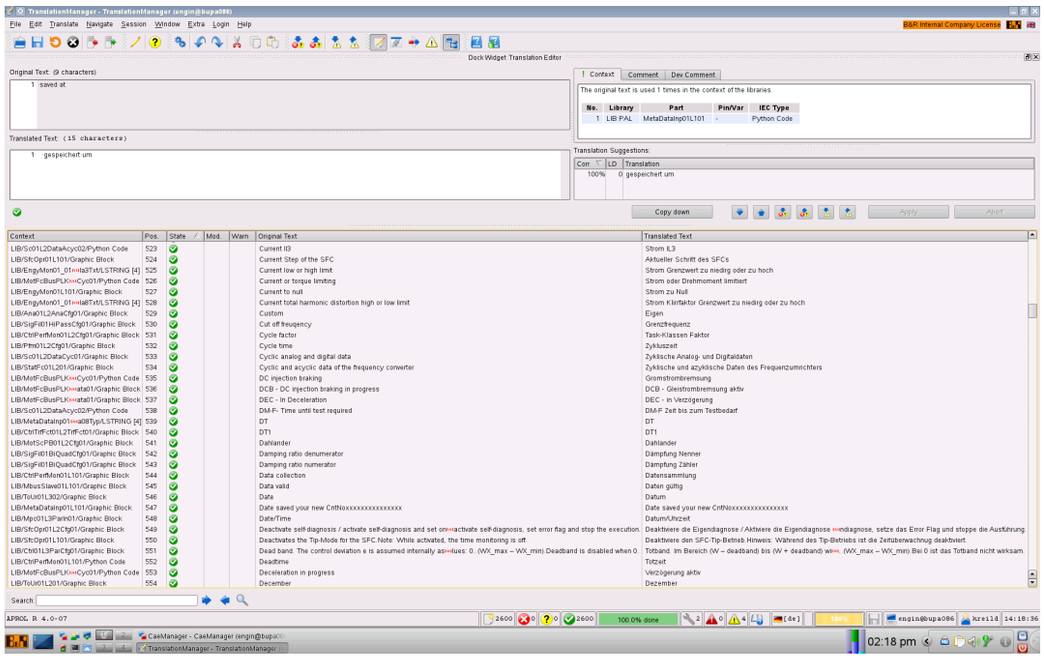
Language-dependent texts in the visualization
APROL supports language switching to all target languages supported in the visualization application. The text in process diagrams is displayed in the defined target language during runtime.

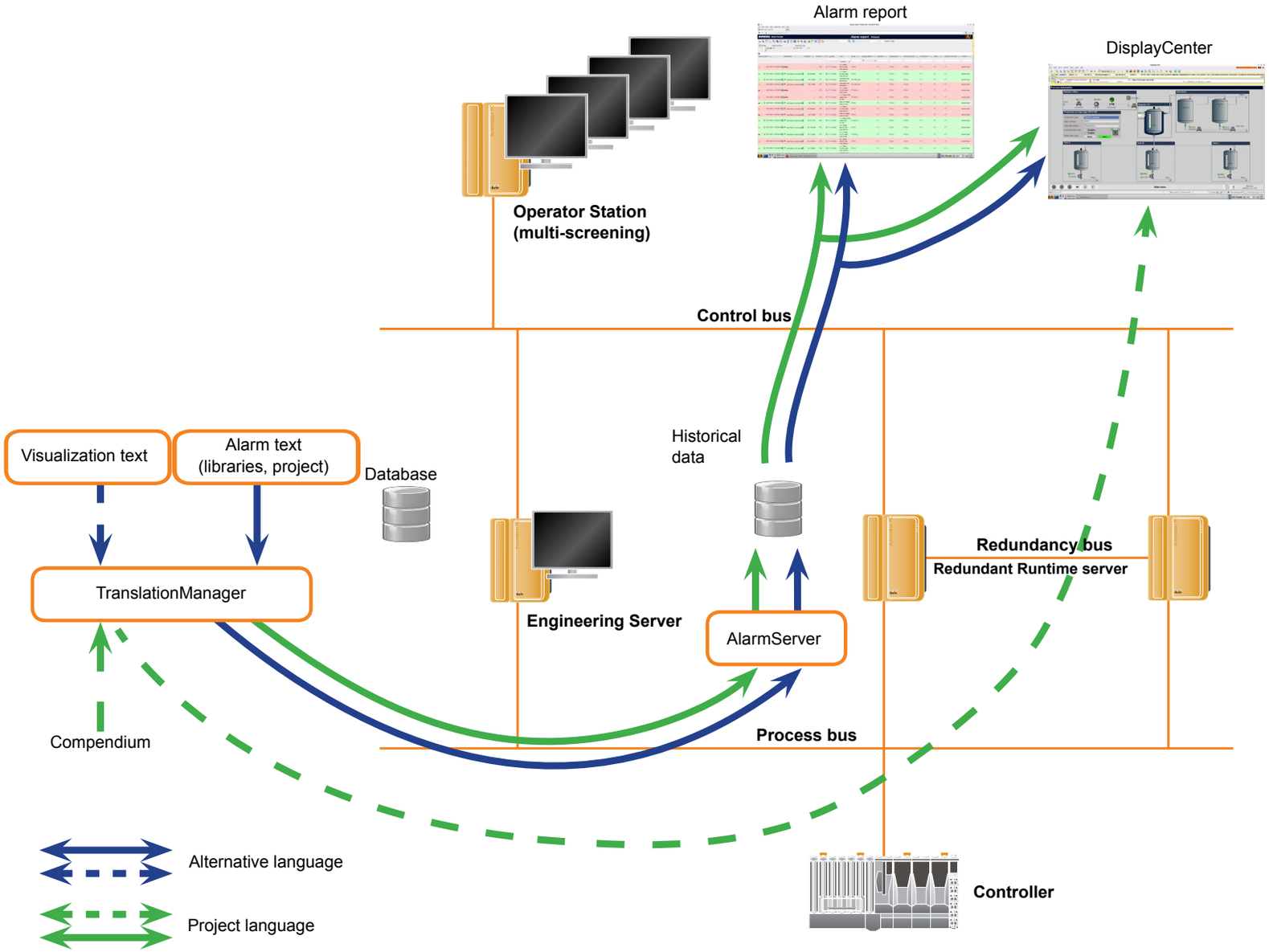
Localization for alarm text
Alarm texts can be translated to an alternative language. During runtime, alarm texts can be displayed in the translated language in the DisplayCenter on the operator station or in the alarm report.

Compendium contains all visualization texts
The texts used in the libraries for input pins, faceplates, static tooltips, etc. are grouped in a compendium to prevent having to translate the same text twice.

TranslationManager for translation in a list
The TranslationManager allows convenient translation of the visualization texts in the form of a list. Effective translations are ensured by specifying a status when displaying the original texts and translated texts plus the aid of translation suggestions based on a loadable compendium.

Automatic download of translated texts
The translated text is made available to the control computers via the usual download mechanism.




Alarm report
DisplayCenter
Operator Station
(multi-screening)
Control bus
Visualization text
Alarm text
(libraries, project)
Database
Historical
data
TranslationManager
Engineering Server
AlarmServer
Redundancy bus
Redundant Runtime server
Compendium
Process bus
Alternative language
Project language
Controller

Alarm system

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Alarm system

Multilevel alarm concept

The alarm concept is divided into four classes:

Messages
are important events that should be logged to the message / alarm archive, but that don't need to be considered in online alarm processing.

Alarms that do not require acknowledgment
are events that should be output immediately as alarms. They are displayed in the AlarmMonitor as long as the condition causing the alarm is active. If the condition causing the alarm changes, the entry is immediately removed from the AlarmMonitor and saved to the message / alarm archive.

Alarms requiring acknowledgment
are treated by the system as alarms that don't require acknowledgment. However, they are only removed from the AlarmMonitor and stored in the message / alarm archive once they have been acknowledged and are no longer outstanding.

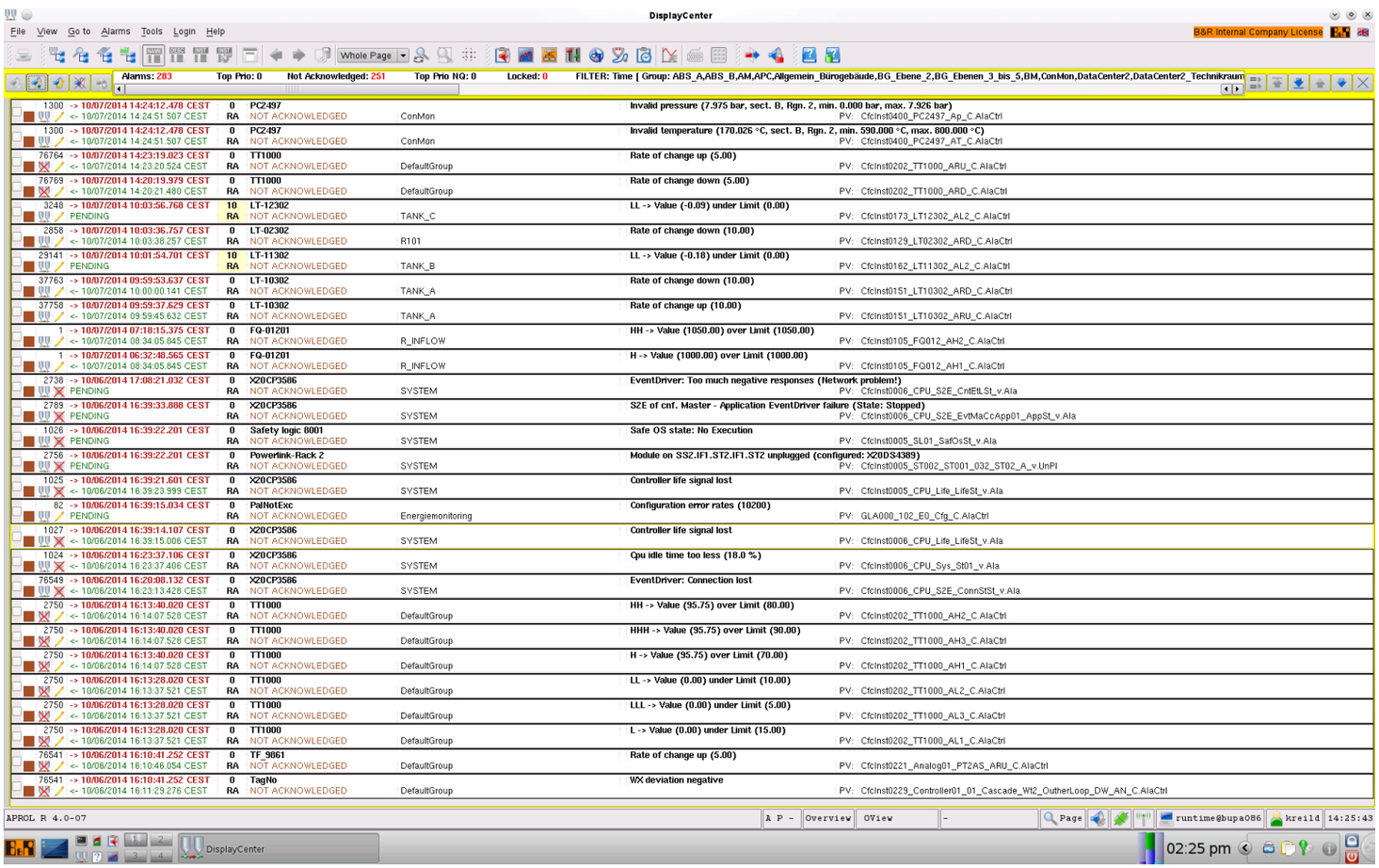
Alarms requiring text acknowledgment
need the operator to enter a text to acknowledge the alarm. The entry is only removed from the AlarmMonitor and stored in the message / alarm archive if the alarm signal is no longer outstanding and the operator has acknowledged the alarm.

Alarm handling/acknowledgment
Alarms can be acknowledged with the mouse, the keyboard, or function keys. Either all, all visible, selected or individual alarms can be acknowledged at one time.

Alarm contains significant information
For each alarm, all significant information is recorded. (name of the operator, all alarm master data, arrival and acknowledgment times, and comments).

Additional process data can be recorded
Any process data can also be recorded with each alarm.

Alarm groups
The group names used in the alarm blocks are defined for a group with respect to display, acknowledgment, and locking.



AlarmMonitor

The AlarmMonitor shows the operator all alarms that have been enabled for him with the authorization system. An acoustic signal indicates new disturbances. The authorization for acknowledging and locking these alarms can be granted selectively in the engineering phase.

Easy to sort/filter

The alarm display can be sorted and filtered according to various criteria.

Numeric display of number of alarms

The AlarmMonitor always shows the operator the number of outstanding, acknowledged, and unacknowledged alarms.

Options to print/forward

In addition to being displayed in the AlarmMonitor, alarms can also be output to an online alarm printer or forwarded to a pager, mobile telephone, or telephone system.

Look and feel can be configured

The functions, look, and feel of the AlarmMonitor can be configured, making it possible to adapt it to any company's operating philosophy.

AlarmMonitor can be fixed in place

The AlarmMonitor can be positioned anywhere in a separate window or integrated permanently in the DisplayCenter.

AlarmMonitor can be positioned separately

On an operator station with multi-screening, it's possible to open the AlarmMonitor on the second monitor without covering up important information in the process diagrams.

Display can be configured freely

How alarms are displayed in the AlarmMonitor can be defined in the engineering phase.

Alarm colors can be freely defined

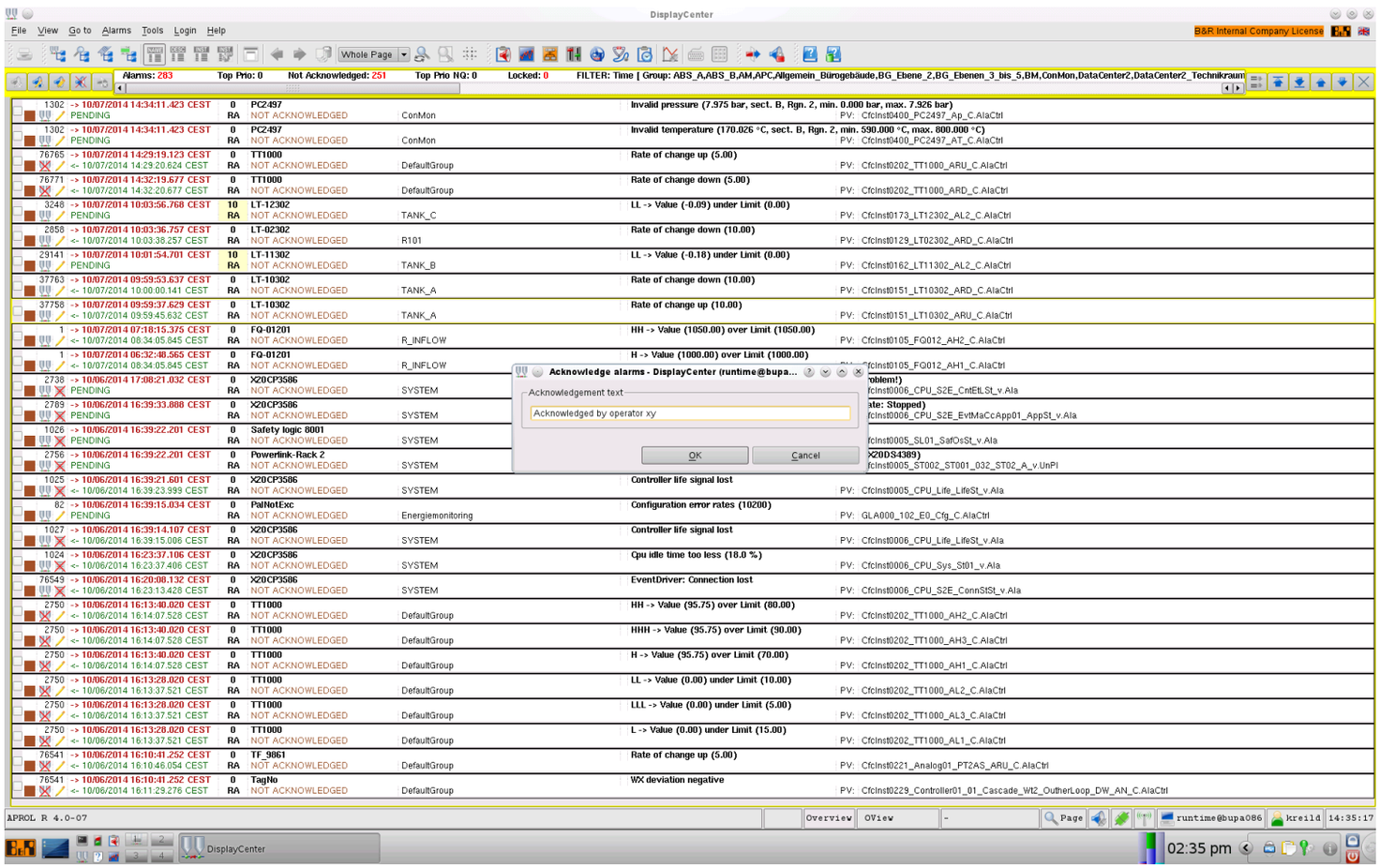
Differentiating colors for acknowledged and unacknowledged alarms in addition to outstanding and inactive alarms.

Single-line or multiple-line display options

Multi-line display of alarms as well as the possibility of configuring alarm lines into several lines.

AlarmMonitors for multiple projects can be displayed together

Possibility to display different AlarmMonitors on one operator interface to monitor several automation islands from a central location.



Alarm system

Diagram for alarm/intervention text

Image mapping

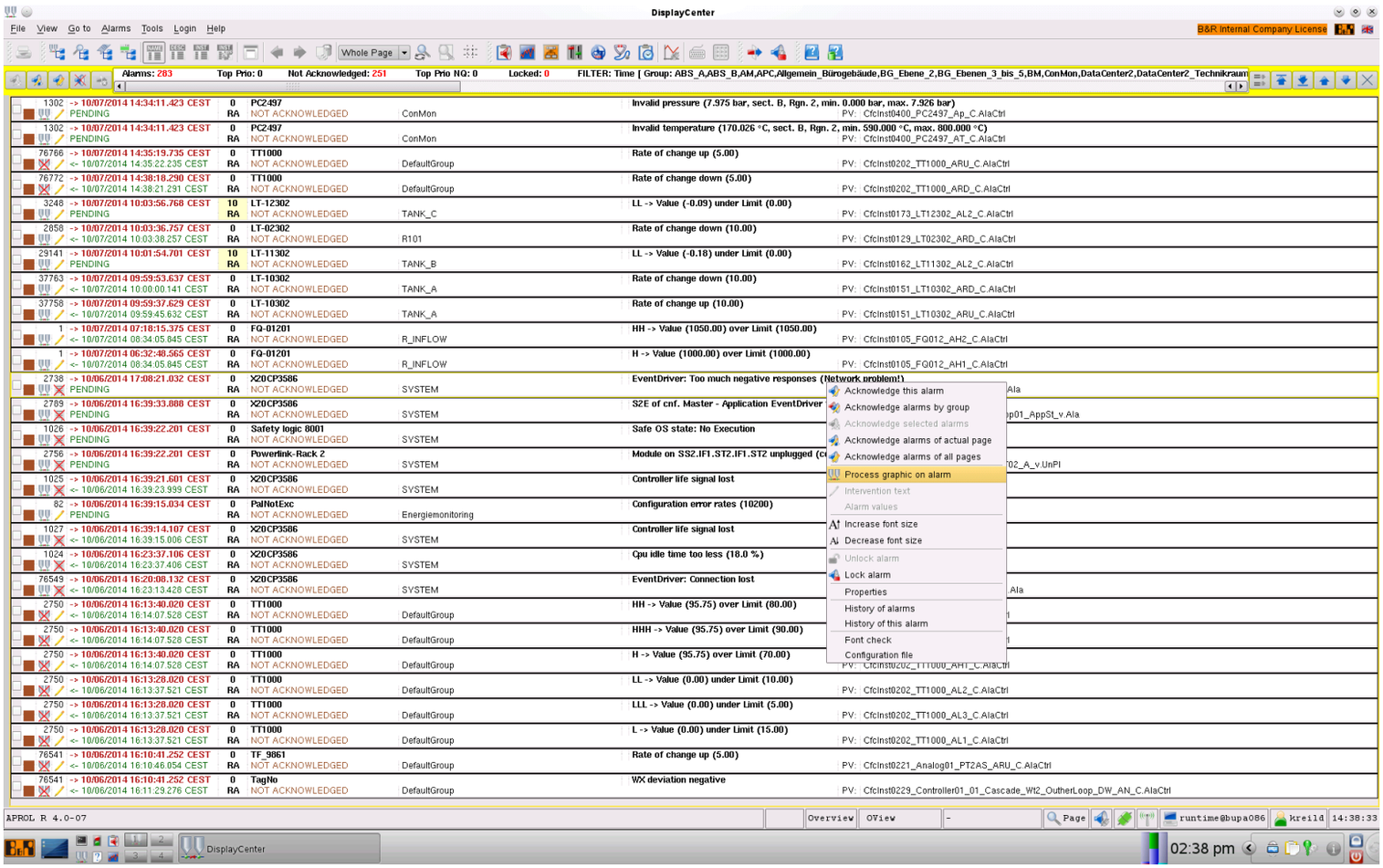
Each alarm has an accompanying process diagram. This diagram can be opened directly from the alarm entry in the AlarmMonitor.

Help text / Intervention text

An intervention text can be output as additional help when an alarm occurs. This intervention text becomes an assistant to the operator by providing text, pictures, videos or even live camera images.

SOP can be read online

The intervention text can also contain SOPs (standard operating procedures) in HTML format.



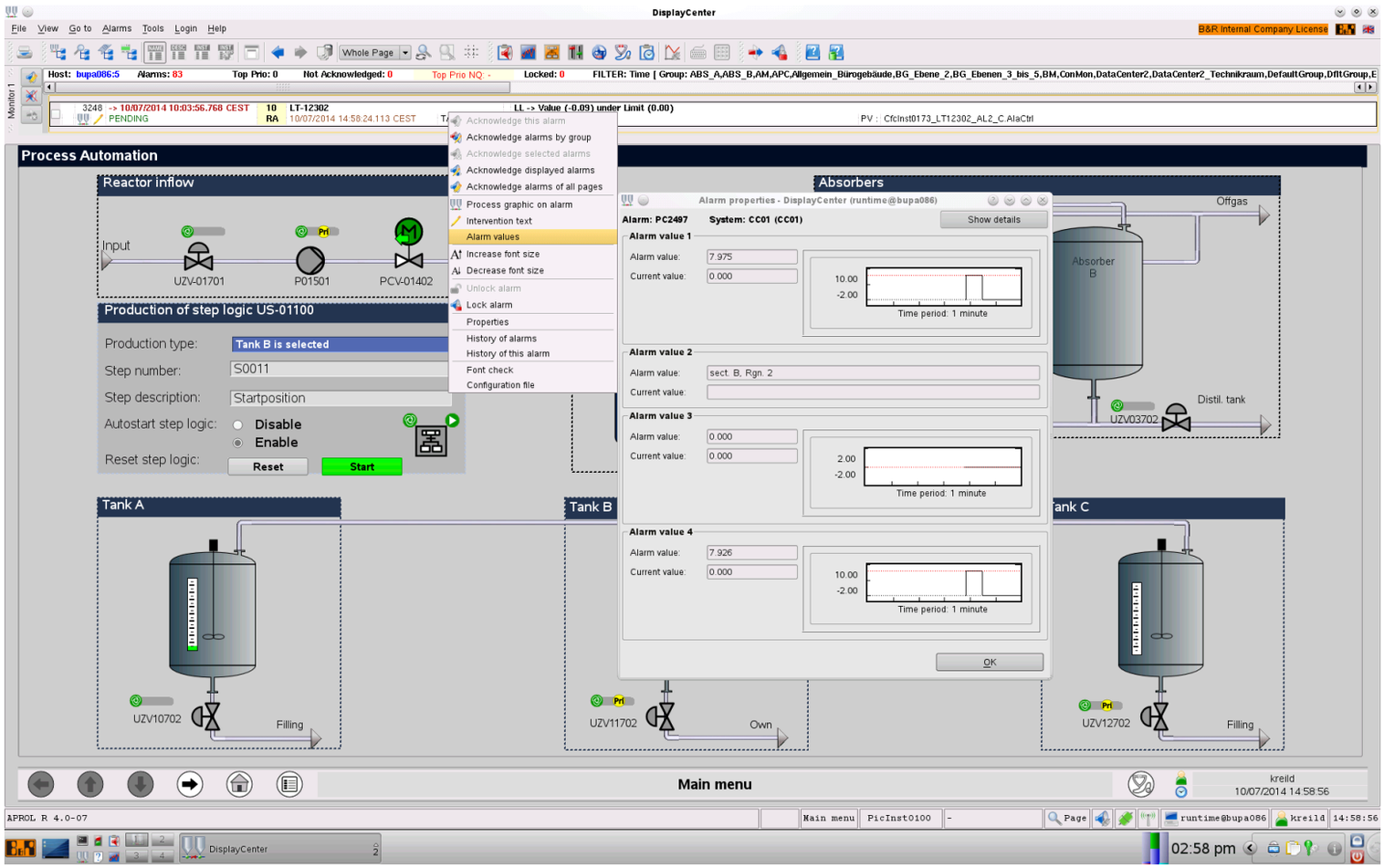
Alarm trends

Trend assignment

An alarm can be linked to various online values and status parameters. This provides additional options for fast analysis.

Assign data points freely

Any number of data points can be grouped together using drag-and-drop.



Alarm system

Locking alarms

Alarms can be locked individually or in groups

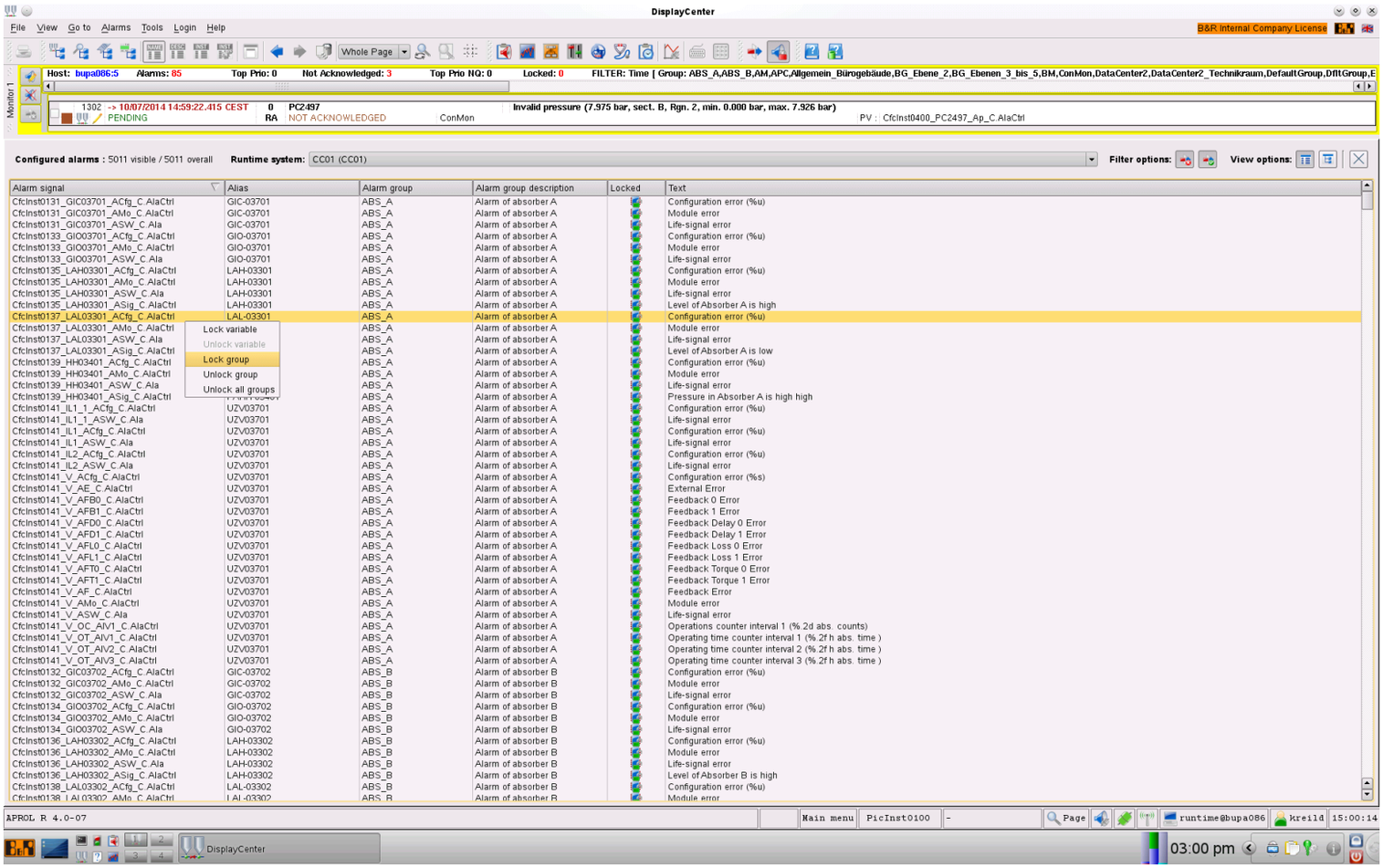
Alarms and alarm groups can be locked (disabled) and unlocked to perform commissioning or maintenance work.

Locked alarms displayed in list

Locked alarms can be displayed in a list. Alarms and alarm groups can then be locked or unlocked from this list.

AuditTrail records locking and unlocking actions

Alarms can only be locked and unlocked by an operator who has been given the necessary authorization. All lock and unlock actions are logged by the AuditTrail (21 CFR Part 11, GAMP4).



Trend system

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Trend system

State-of-the-art trend system

The trend system is one of the key components of a process control system. The powerful, state-of-the-art trend system from APROL combines an extremely fast database and an ingenious web-based query technology to fulfill the most demanding requirements.

Integrated analysis functions

Easy analysis functions in the TrendViewer enable efficient evaluation of the historical trend data. The inclusion of all the alarms and events archived in the process control system and displaying this data additionally improves the quality of the analysis.

Use of time offsets for display

Any time offset can be defined for displaying each trend curve. This makes it possible, for example, to easily compare trend curves from different shifts or days. The same trend curve can be displayed up to 20 times in a single graph with various offsets.

Multivariate analysis for determining the "golden batch"

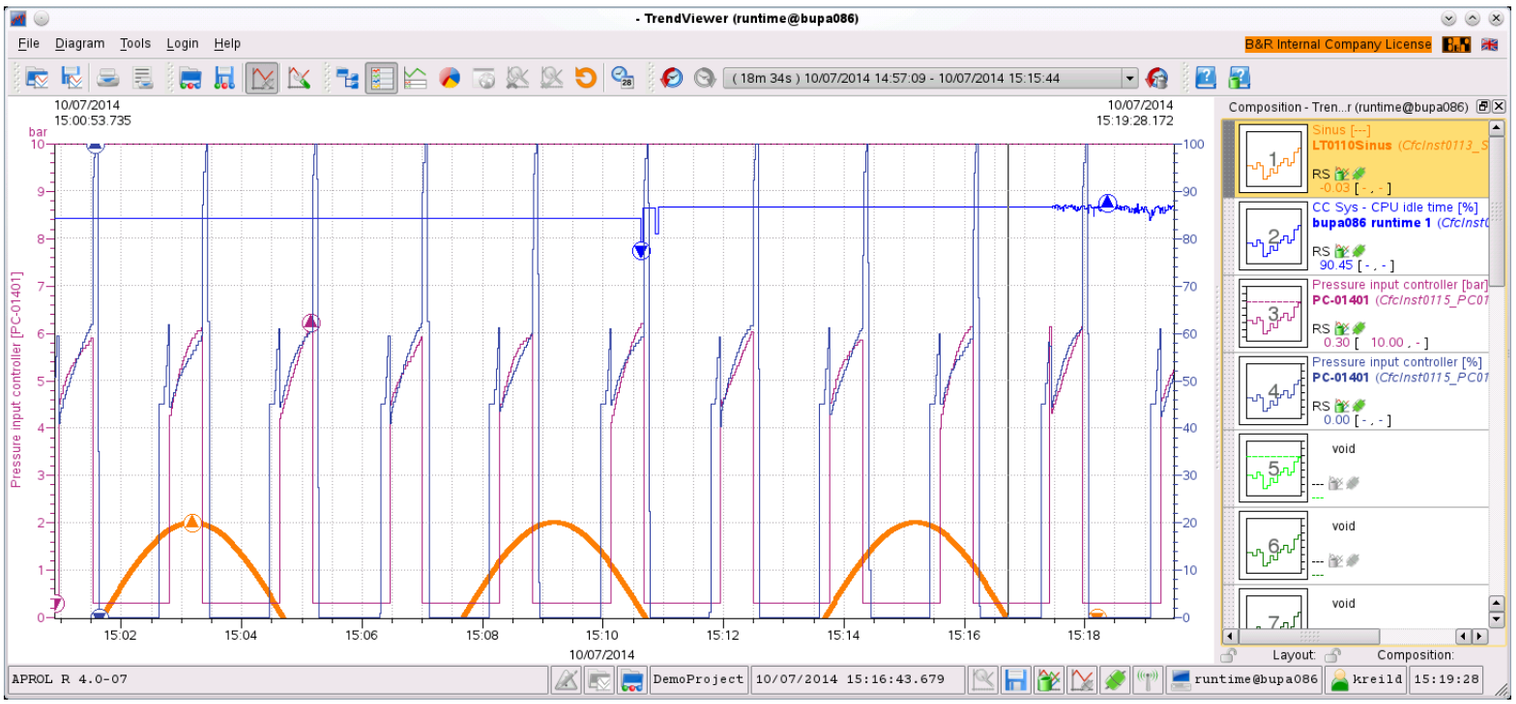
When analyzing good and bad batches with respect to product quality, simultaneously viewing up to 20 trend curves, specifying a time offset for each curve and the markings for batch start and batch stop help determine the "golden batch". The rest of the good batches can also be used to determine the tolerance range around the golden batch.

AutoFit

The AutoFit function automatically optimizes the scaling of the y-axis of the trend curve with respect to the minimum and maximum values of the displayed time range.

AutoMove

The AutoMove function optimizes the display of the trend curve by automatically moving the y-scale.



Historical mode and online mode in a single display

The trend data is retrieved via Web server (http protocol) from the Runtime server (historic trend database). When enabled, the additional online mode continuously updates the display. The display of all trend curves is automatically updated. The time range is also moved continuously.

TrendViewer

Trend system

Markers

Markers can be added in the form of a ruler or as a symbol in the graph. All data recorded with ChronoLog can be referenced. By configuring these markers, you also have the option to display various tables with the corresponding data records in the context data browser of the TrendViewer for the displayed time span. This makes it easy to mark system events such as batch start and batch end.

Rulers

Up to two rulers can be defined as time measurement points and used to evaluate the respective trend data. The user-friendly time navigation in the TrendViewer makes it quick and easy to select the desired time span. The time navigation has the following functions: Select a fixed time span, shift the fixed time span in fixed increments, shift by the amount of the current time span setting, shift the set time span in fixed increments, navigate using rulers, select the time span separately.

Graph display

By configuring the global graph settings you can determine the labeling rules for the axes, tool tips and chart types (common chart, separate chart, and X/Y display). With X/Y display, two neighboring trends are shown in relation to each other. The TrendViewer has an intelligent mechanism that optimizes the display of axis labels. The mouse and keyboard control easy, interactive scaling of the axes.

Entering comments

Entering comments for trend values allows you to label relevant process events and improves the transparency of the historical data in the process control system with completely electronic documentation. Of course, trend value comments are also managed by APROL's operator rights management.

Redundant historical trend database

The historical trend database is located on the Runtime server (redundant design optional), and is a powerful tool for providing all operator stations and Web clients with the desired historical data.

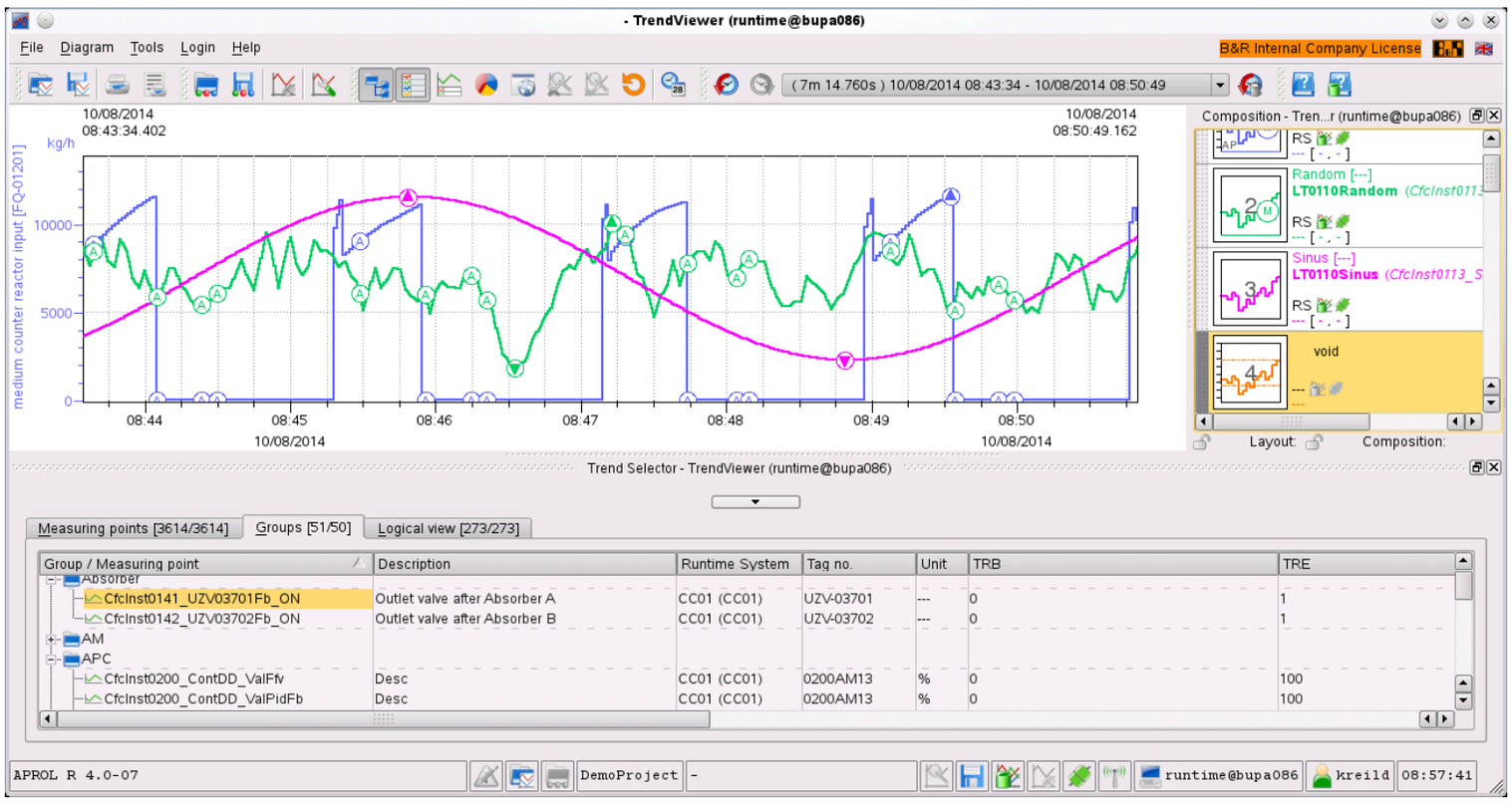
Complete configuration in the process control system

All configuration for the trend curves and trend graphs takes place in the APROL engineering system. However, the operator also has the freedom to customize or create new trend graphs.

The arrangement of trends and the layout can be tailored to individual needs, and saved.

100,000 trend curves can be configured

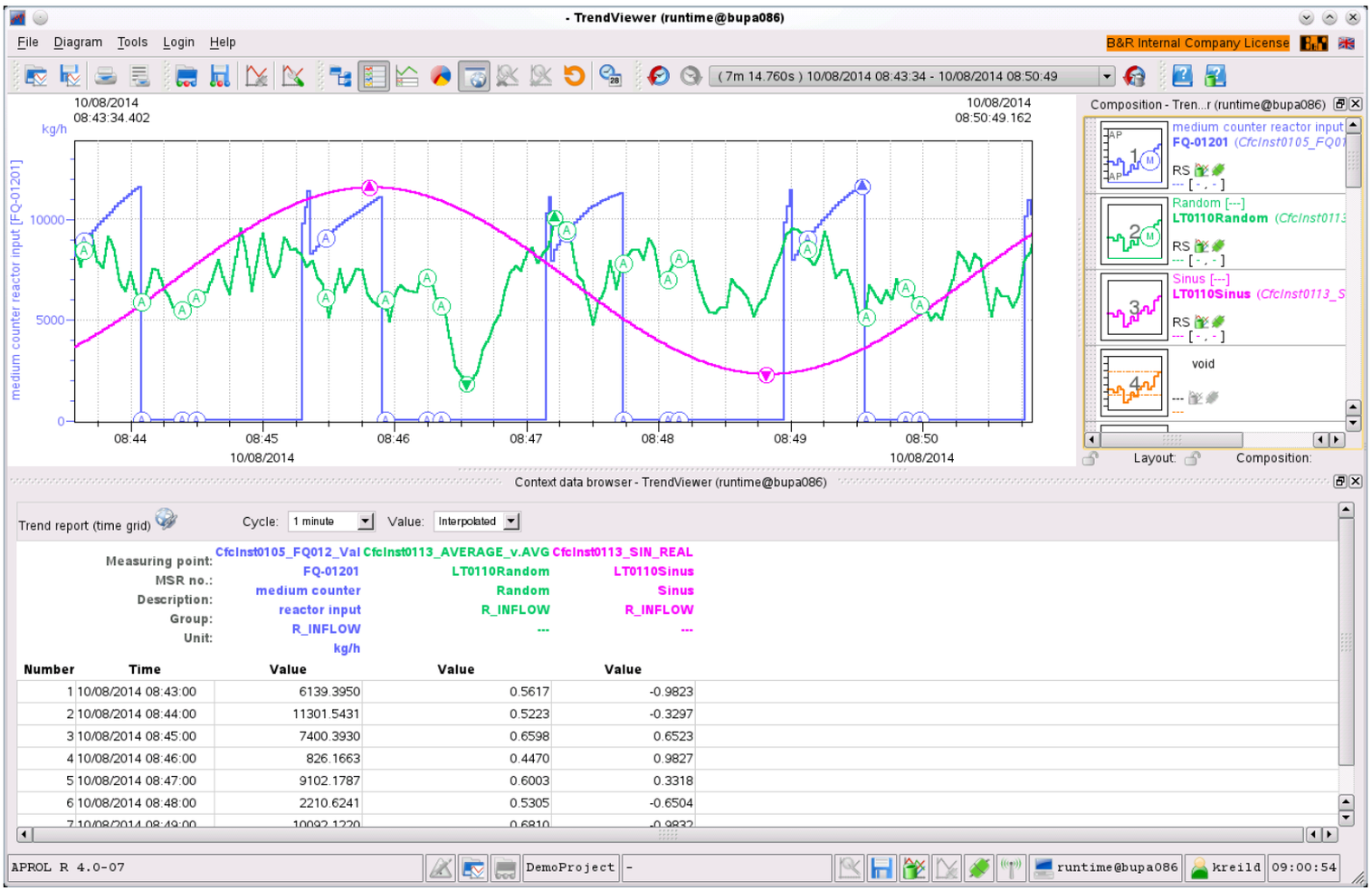
Trends can be arranged (in up to 5,000 trend groups) using the search function or by navigating the Logical View of the project. Up to 20 trend curves can be displayed at a time in one graph. Up to five instances of the TrendViewer can be opened at once.



Trend system

Context data browser

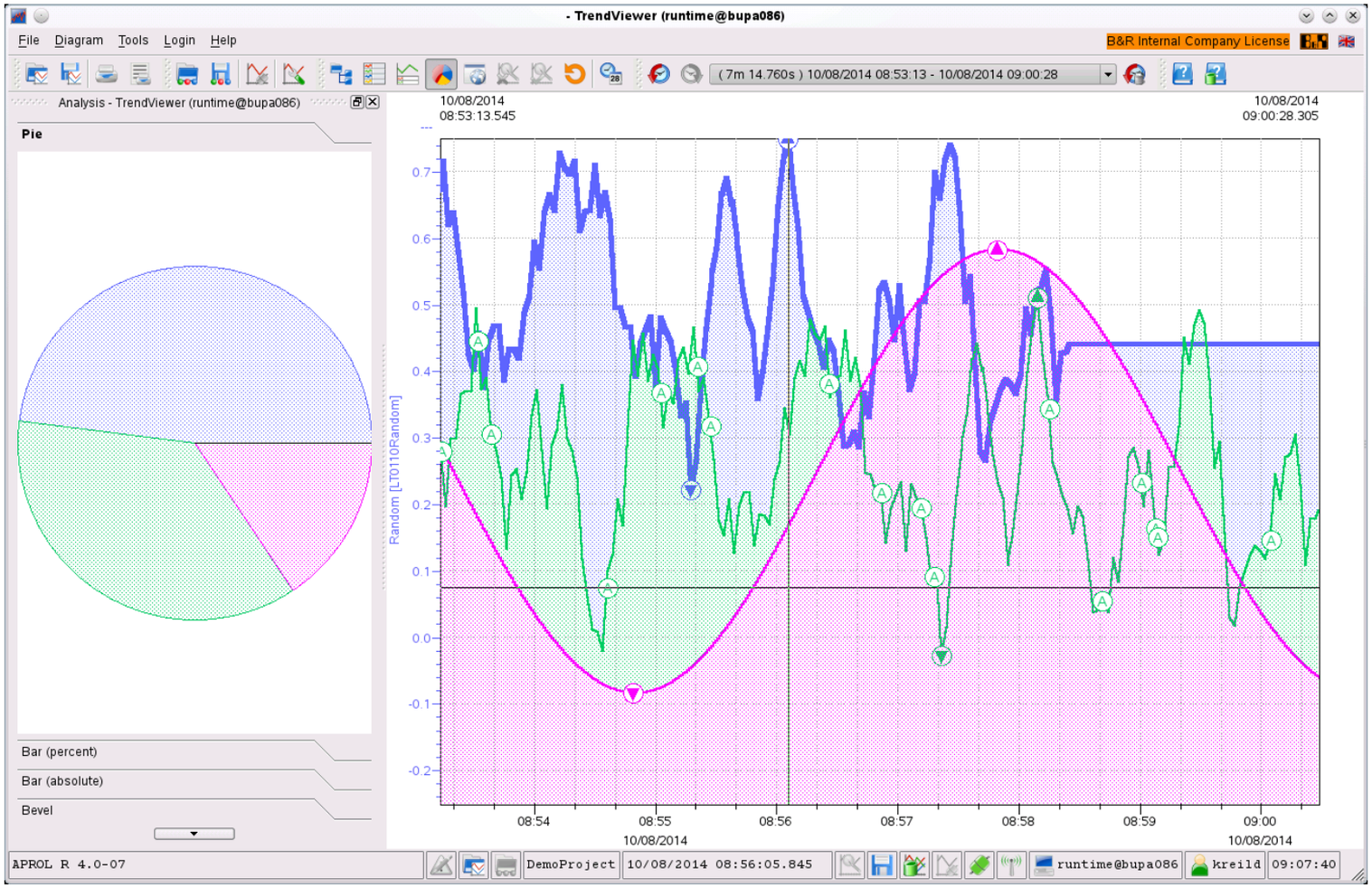
The context data browser gives you access to the information you need for detailed analysis of process behavior. This TrendViewer function generates a table of the data configured as markers in the embedded browser window. For further analysis, you can also rasterize the displayed trends chronologically in the context data browser of the TrendViewer.



Displaying trend statistics

The TrendViewer allows you to statistically evaluate all of the trend curves in the graph, and to display the results in various graphs or tables.

The options "Pie", "Bar (percent)", and "Segmented bars" display the percent parts of the individual trend values in the graphs. A "Bar (absolute)" graph provides a graphical display of the absolute values. The calculation of the minimum, maximum, and midpoint is based on the selected interpolation mode. The midpoint is the chronological midpoint of the displayed curve.

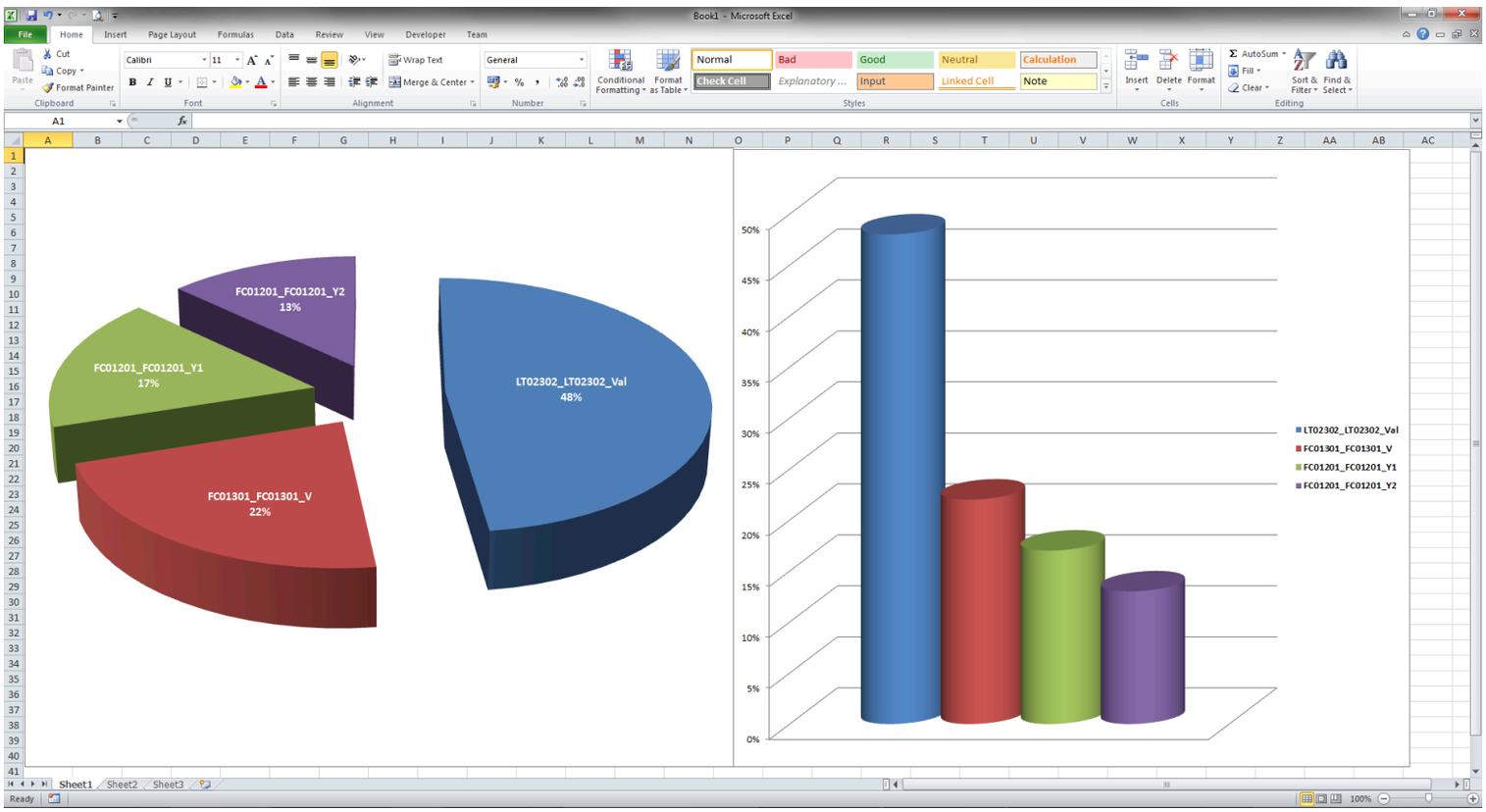


Trend system

Open connectivity
The integrated export function (XML based) transfers the recorded historical trend data to a stand-alone SQL database (MySQL). It also supports the generation of special reports using table calculations (MS Office Excel, OpenOffice.org Calc) as well as the use of reporting and analysis tools with prepared templates (Crystal Reports, Sytech XLReporter, etc.). The ability to export trend data selectively either rasterized or by exporting the recorded trend data events makes the data easy to access.

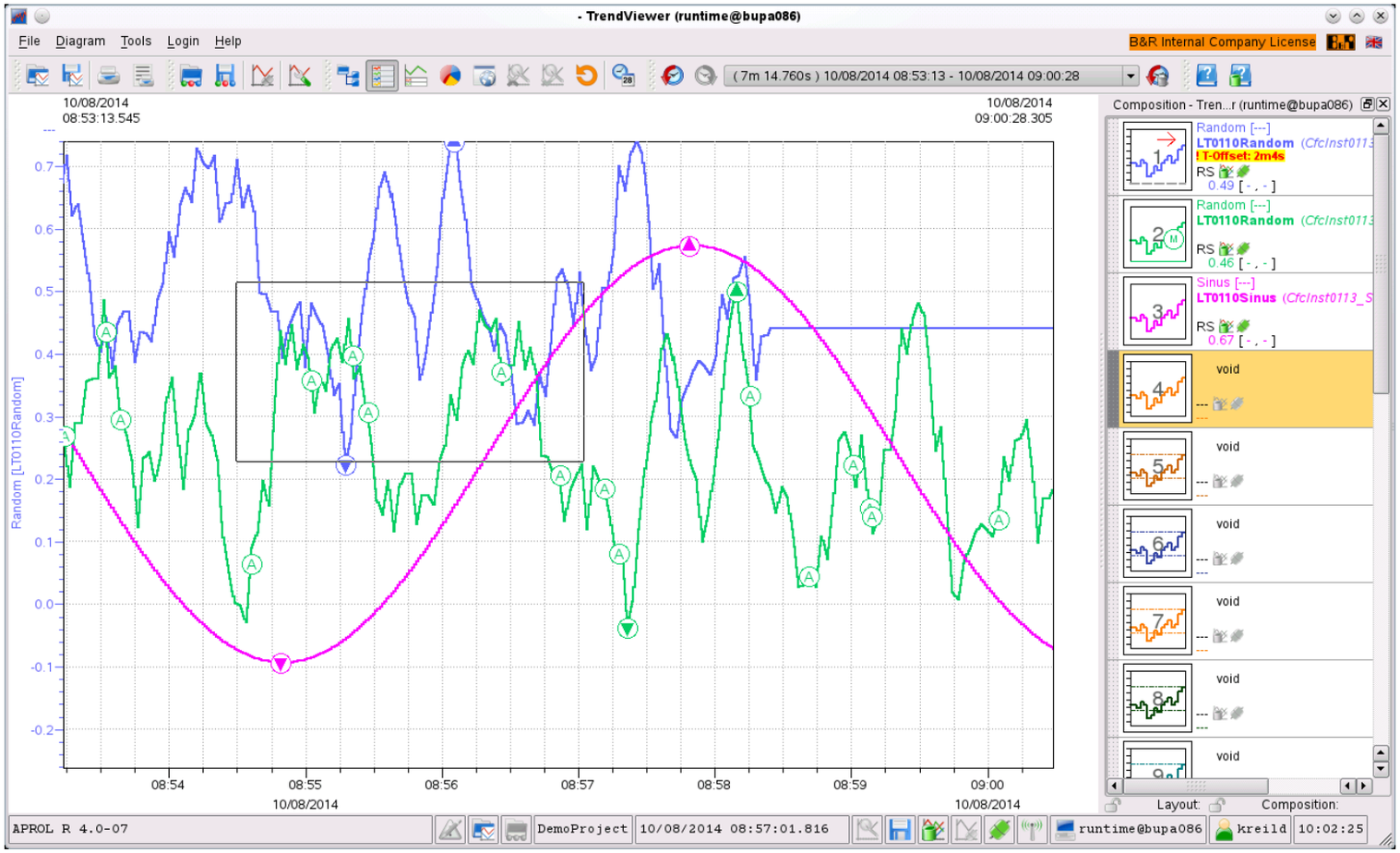
Exporting trend data
For further analysis or to generate documentation using other software, for example, the trend data can be exported in CSV files.

Trend report (rasterized)
The trend report provides access to the raw trend data as events or as rasterized data.
The rasterizing cycle can be freely selected between 0.1 second and 1 month. When querying the database, the values are interpolated; alternatively, the events immediately preceding are output.



Combi-zoom

Combi-zoom allows you to select an area (value and time axis) using the mouse. You can zoom into this area to easily view details of the trend graph, and then return to the original view. A status icon indicates when combined zoom is enabled. After an unlimited number of zoom actions, the combined zoom can be returned to the view that was displayed before the first zoom area was selected.



Reporting

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Reporting

Web-based reports

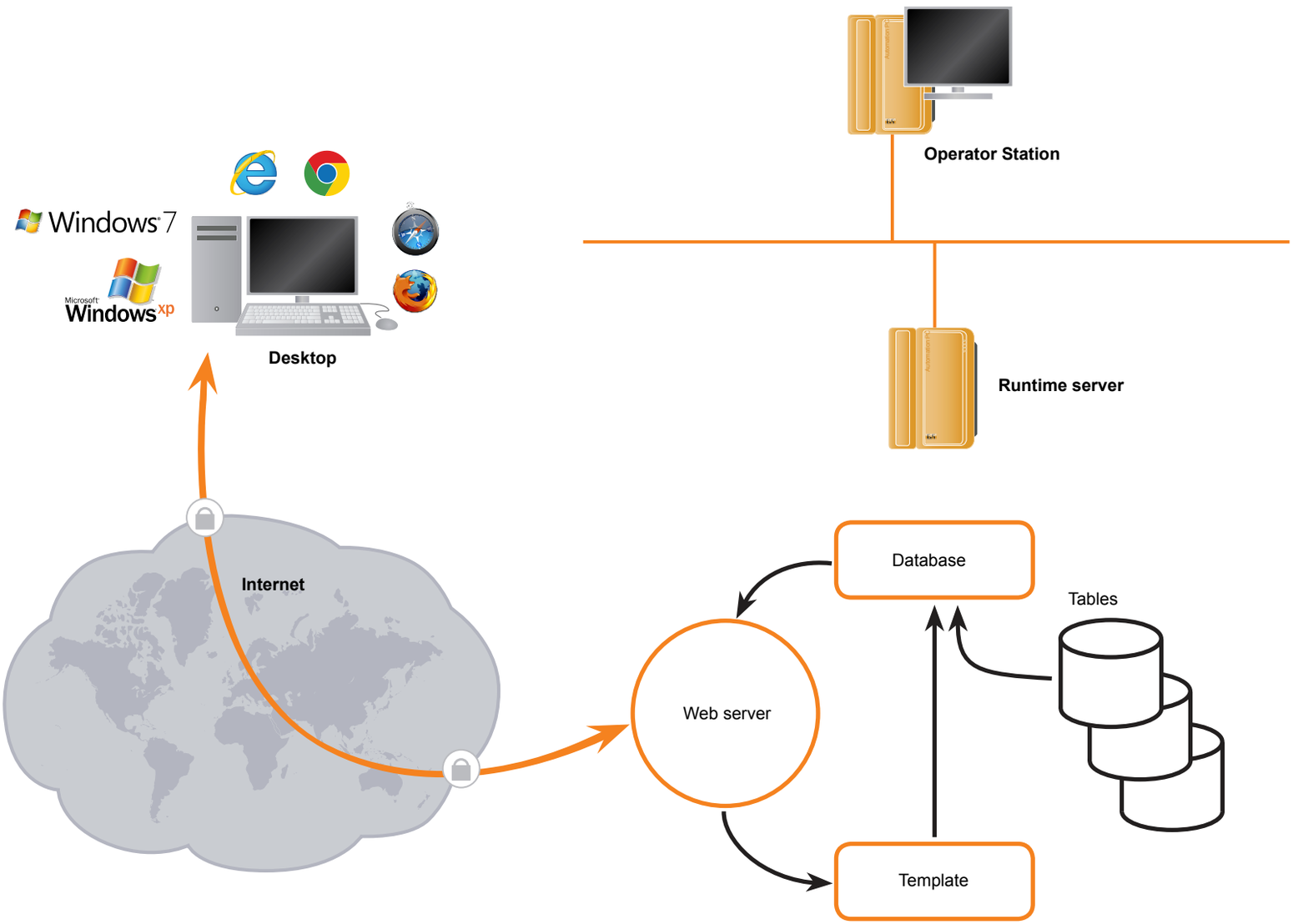
A platform-independent interface for data export (XML) provides access to historic data and events as well as to the current values of process variables. All that is needed is a workspace with an HTML browser and a network connection to the Web server running on the Runtime server. Additionally, access can be grouped according to real-time, alarm and trend data.

HTML or CSV format

The desired data can be displayed using XML, as an HTML page in any browser or saved as a CSV file (Comma Separated Values), e.g. to be imported into a table calculation program. With the use of style sheets, the query can also automatically use the language set on the desktop.

Importing XML data into Microsoft Excel / OpenOffice.org Calc

A web query can be defined so that web page data can be imported and edited in Microsoft Excel or OpenOffice.org Calc. This web query obtains the entire contents or selected tables from a web page and displays them in the cells of the table. This type of query allows you to use special notation to keep the parameters dynamic so that they can be defined using an input window or by certain cells.



Bookmarks in web browser for report queries

Every report, including the filter settings used, can be stored as a bookmark in a web browser. This makes it quick and easy to access the desired report data.

Context-based report requests

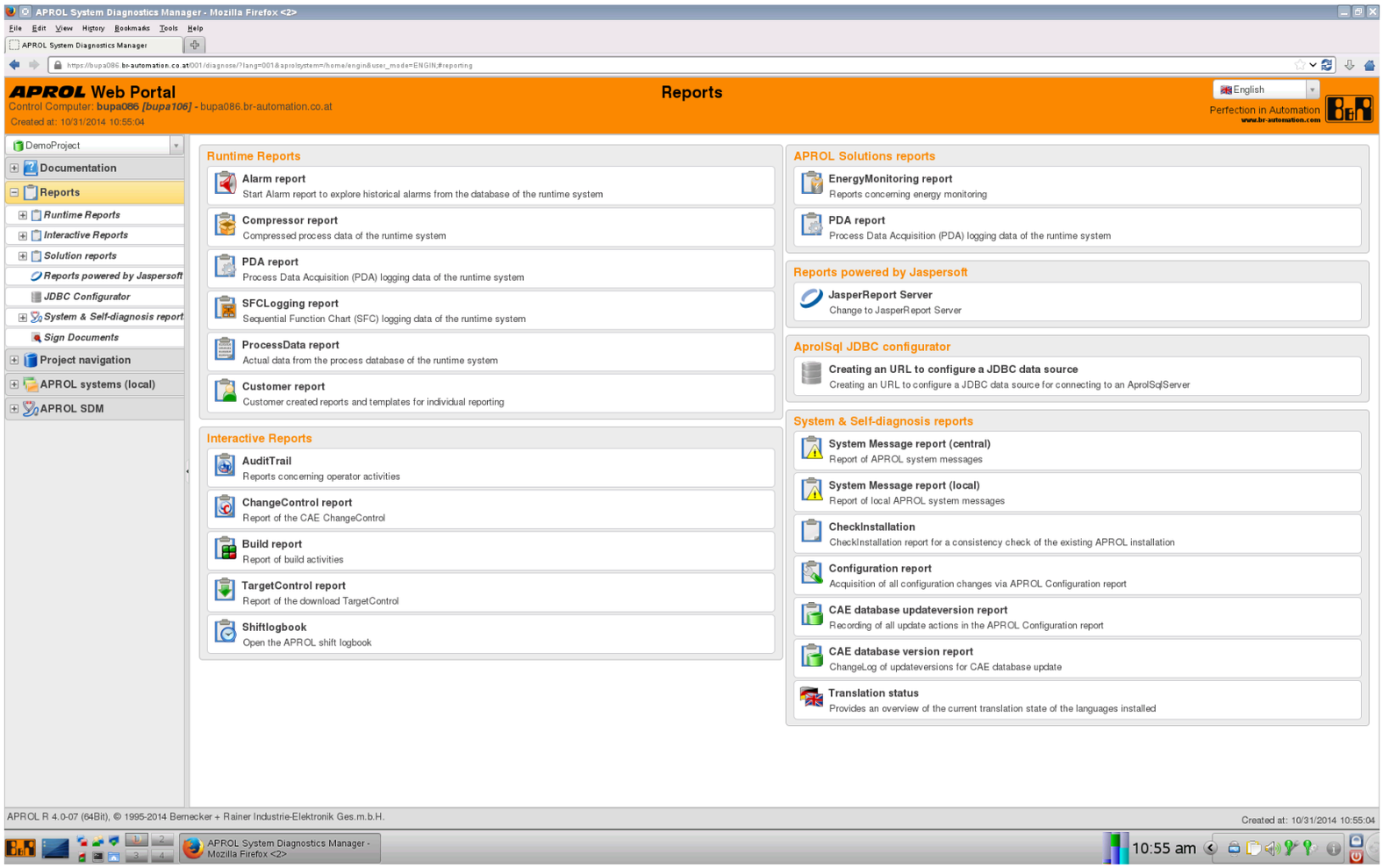
Reports can be called up with a context-based search. In this case, the system automatically defines the filters accordingly.

ChronoLog-Containers for all logs

The data is kept in separate containers in a powerful database. The ChronoLog technology allows a combined analysis of data from all containers of historical records. Direct access to the container makes it quick and easy to secure the data.

Authentication for each type of report can be enabled/disabled

An optional check can be defined project-globally to review the access rights when a report is opened to protect company-specific security policies.



Alarm report

Evaluation of historical and current alarm data

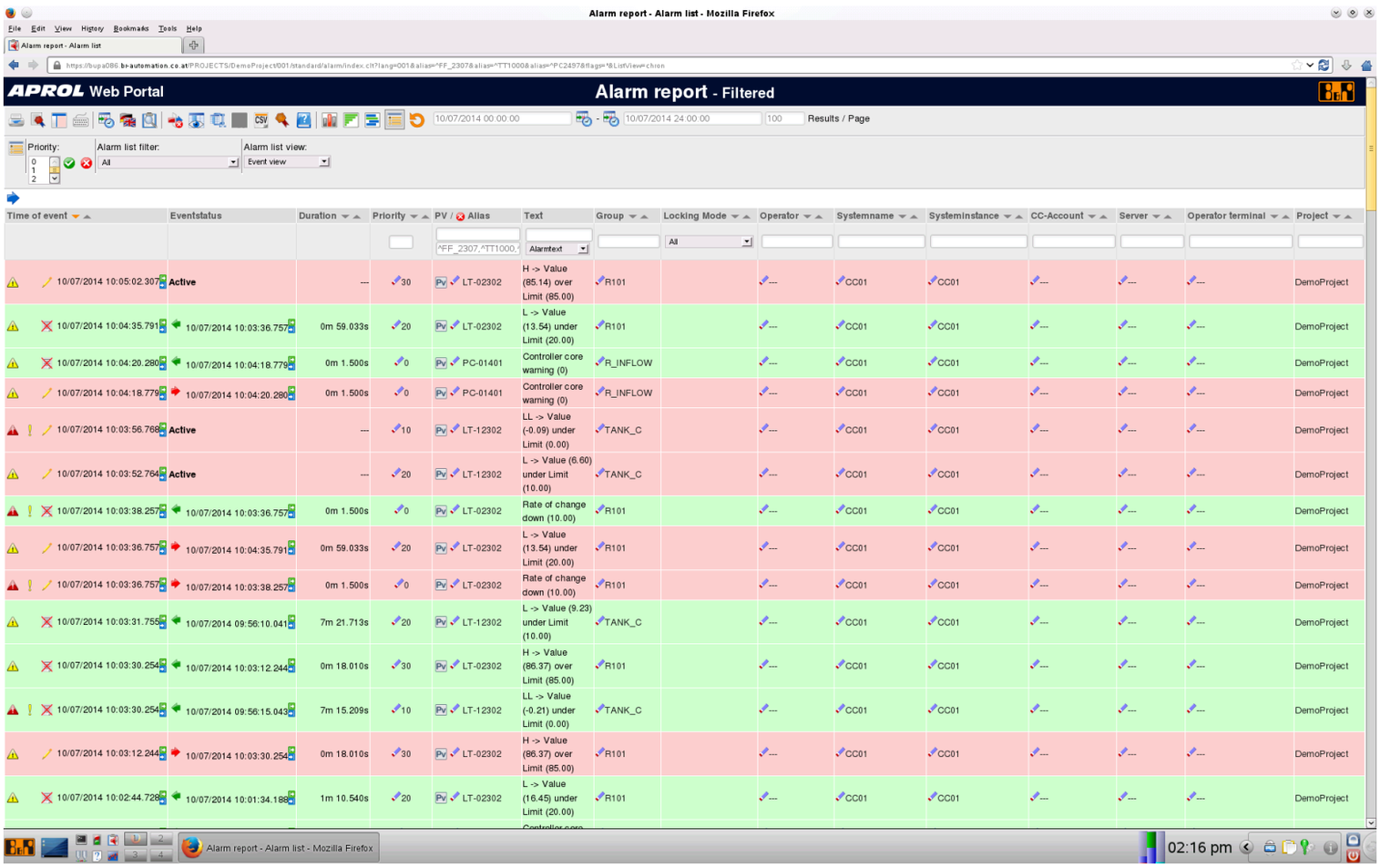
The alarm report allows a collective representation and interpretation of all of the actual and historical alarm data. This data can be analyzed, printed or, in the case of historical alarms, provided with comments.

Display as context list or event list

The alarm report's list view can be displayed either as a context list or as an event list. In the context list view, the focus is on one selected alarm. All information regarding the alarm is shown in context starting from the occurrence, through the acknowledgment and its disappearance. The event list view presents all alarms in chronological order of occurrence.

Intervention texts support the operator

An icon in the alarm report indicates whether additional information is available for the alarm in the form of intervention text. The intervention text can contain detailed instructions for error correction. In addition to displaying simple text and images, it is also possible to use other web technologies, such as flash animations.

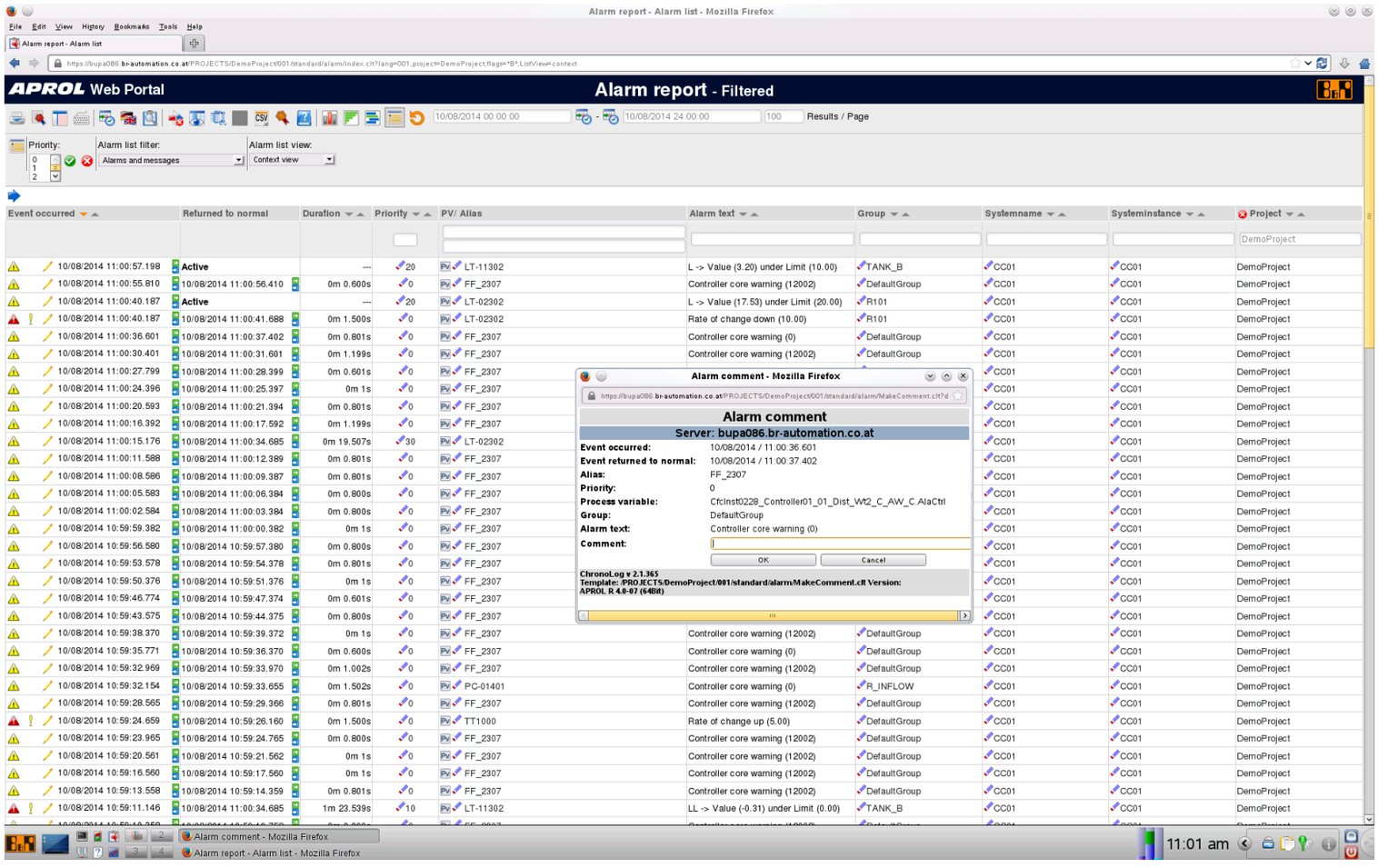


Historical alarm comments

Historical alarm comments allow you to record interpretive explanations for historical alarm events. Existing knowledge can be documented in the context of the alarm for later analysis. To be able to comment on alarms, the operator must possess the necessary rights.

Online Print from alarms

Alarms can be printed online using the alarm spooler, which can control up to 9 different printers at a time. The alarm data to be printed is defined via a URL and by specifying the desired filter settings.



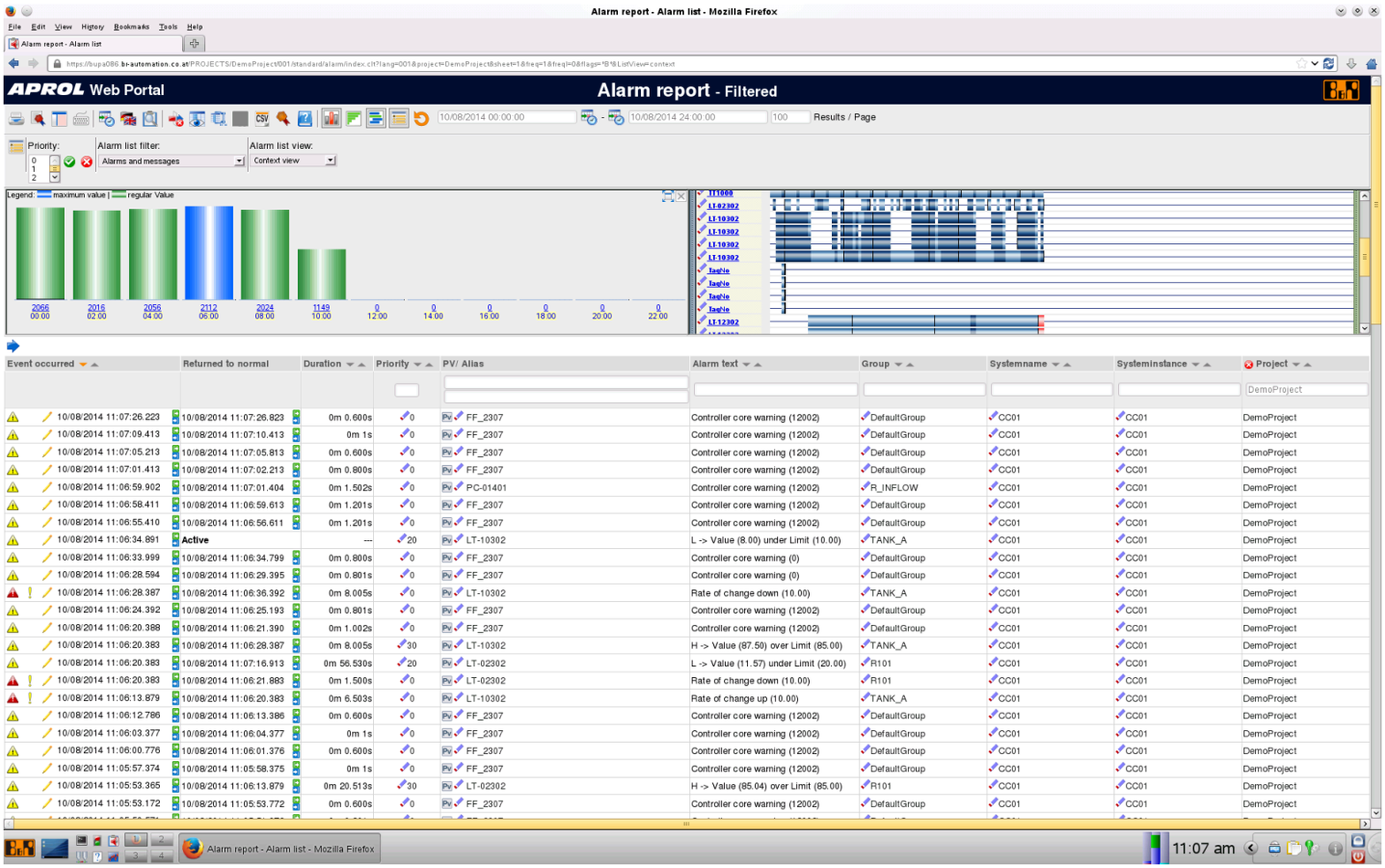
Alarm report

Runtime analysis

The runtime diagram shows all of the alarms which have "come" and "gone" within the chosen time period, in a chronological order displayed as a horizontal runtime bar. Color coding helps differentiate between alarms that have occurred once or multiple times, and identify whether or not an alarm has been acknowledged. Clicking on the bar (contains a link for further navigation) lets you zoom in directly within the range of the bar.

Chronological frequency sheet

The distribution of the alarms which have taken place within a chosen period are represented as a bar graph in the frequency distribution. The number of columns is adjusted dynamically to match the selected time range (e.g. 1 day is represented with 24 columns). The number of alarms which have occurred within this time period is shown underneath each column.



ProcessData report

Query current values

The ProcessData report provides the current values of process variables queried from the global real-time database.

Output format is determined by style sheets

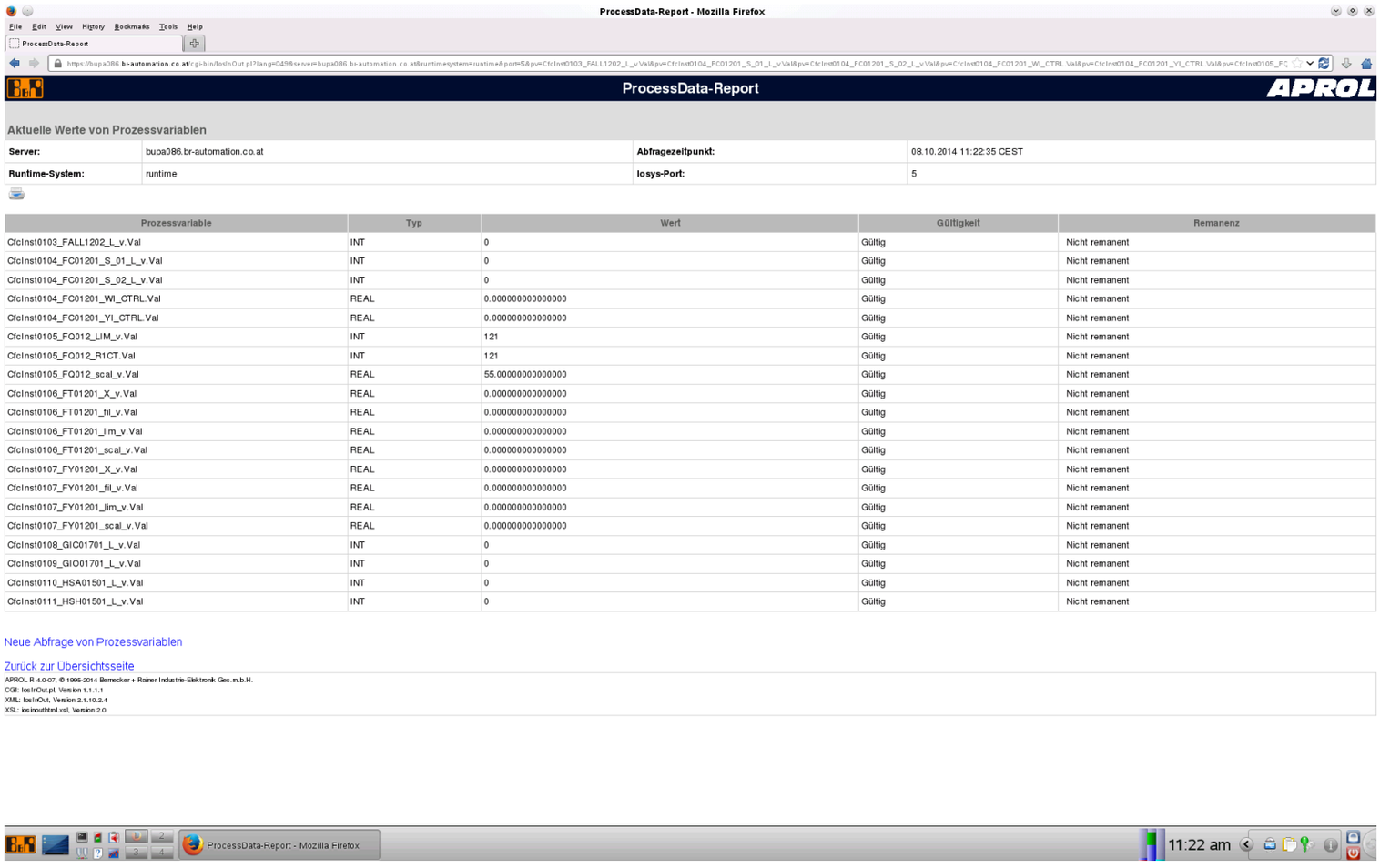
The queried values are displayed in a Web browser (in HTML format) or output directly in a CSV file. In addition to the predefined style sheets for HTML and CSV output, custom style sheets can also be created.

Definition of process variables to be queried in a file

The process variables to be queried can be defined in the form of a configuration file. This file is created in the engineering system and is automatically opened in the runtime environment when downloaded.

Definition of process variables to be queried in a list

The ProcessData report provides a list of all available process variables for selection.



Compressor report

Precalculated values over a defined time span

The Compressor report provides calculated values over a specified time span as current, minimum, maximum, or average. In APROL, cyclically calculated values over a definable time interval can be saved as a data record.

Data set with detailed information

The value at the beginning of the time interval, the chronological average over the time interval, and the minimum and maximum values within the time interval are archived in a data record.

Compression interval and output value can be selected

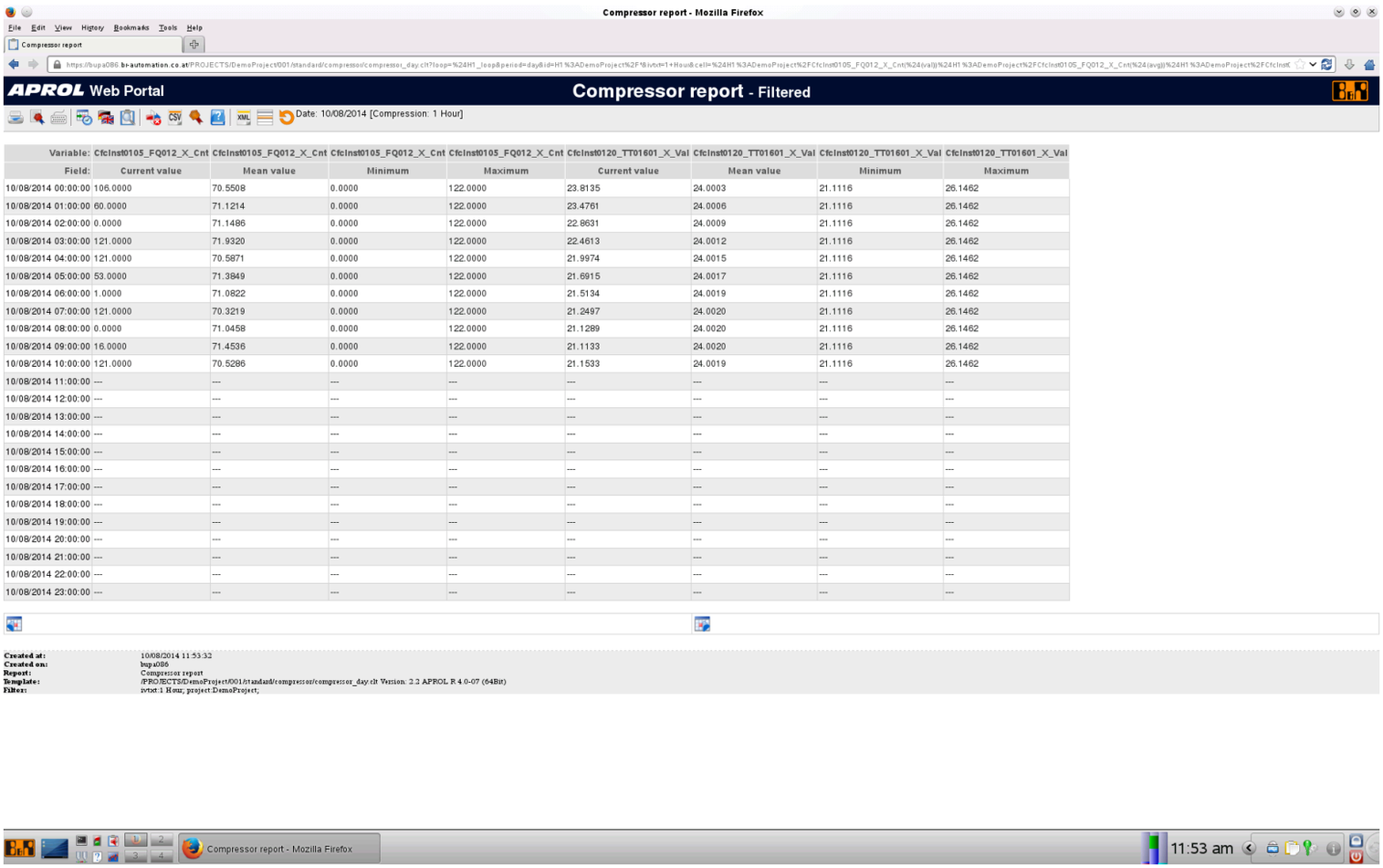
When the Compressor report is opened, first a compression interval and then the desired process variables are selected. For each variable, either the current value, minimum value, maximum value or average value can be read.

Changing/Adding data sets with replacement values

The Compressor report allows data records to be changed or added (entry of replacement values). Current value, minimum value, maximum value and average value can be set to the desired values using an input mask.

Complete logging of value changes with AuditTrail

Each and every change to the data records (entry of replacement values) is recorded in AuditTrail.



Variable:	CfcInst0105_FQ012_X_Cnt	CfcInst0105_FQ012_X_Cnt	CfcInst0105_FQ012_X_Cnt	CfcInst0105_FQ012_X_Cnt	CfcInst0120_TT01601_X_Val	CfcInst0120_TT01601_X_Val	CfcInst0120_TT01601_X_Val	CfcInst0120_TT01601_X_Val
Field:	Current value	Mean value	Minimum	Maximum	Current value	Mean value	Minimum	Maximum
10/08/2014 00:00:00	106.0000	70.5508	0.0000	122.0000	23.8135	24.0003	21.1116	26.1462
10/08/2014 01:00:00	60.0000	71.1214	0.0000	122.0000	23.4761	24.0006	21.1116	26.1462
10/08/2014 02:00:00	0.0000	71.1486	0.0000	122.0000	22.8631	24.0009	21.1116	26.1462
10/08/2014 03:00:00	121.0000	71.9320	0.0000	122.0000	22.4613	24.0012	21.1116	26.1462
10/08/2014 04:00:00	121.0000	70.5871	0.0000	122.0000	21.9974	24.0015	21.1116	26.1462
10/08/2014 05:00:00	53.0000	71.3849	0.0000	122.0000	21.6915	24.0017	21.1116	26.1462
10/08/2014 06:00:00	1.0000	71.0822	0.0000	122.0000	21.5134	24.0019	21.1116	26.1462
10/08/2014 07:00:00	121.0000	70.3219	0.0000	122.0000	21.2497	24.0020	21.1116	26.1462
10/08/2014 08:00:00	0.0000	71.0458	0.0000	122.0000	21.1289	24.0020	21.1116	26.1462
10/08/2014 09:00:00	16.0000	71.4536	0.0000	122.0000	21.1133	24.0020	21.1116	26.1462
10/08/2014 10:00:00	121.0000	70.5286	0.0000	122.0000	21.1533	24.0019	21.1116	26.1462
10/08/2014 11:00:00	---	---	---	---	---	---	---	---
10/08/2014 12:00:00	---	---	---	---	---	---	---	---
10/08/2014 13:00:00	---	---	---	---	---	---	---	---
10/08/2014 14:00:00	---	---	---	---	---	---	---	---
10/08/2014 15:00:00	---	---	---	---	---	---	---	---
10/08/2014 16:00:00	---	---	---	---	---	---	---	---
10/08/2014 17:00:00	---	---	---	---	---	---	---	---
10/08/2014 18:00:00	---	---	---	---	---	---	---	---
10/08/2014 19:00:00	---	---	---	---	---	---	---	---
10/08/2014 20:00:00	---	---	---	---	---	---	---	---
10/08/2014 21:00:00	---	---	---	---	---	---	---	---
10/08/2014 22:00:00	---	---	---	---	---	---	---	---
10/08/2014 23:00:00	---	---	---	---	---	---	---	---

Customer report

User-defined methods of display

Customer reports are available in the web browser or in PDF format. When generated, XHTML documents are converted to PDF format and formatted according to rules defined in style sheets (CSS). Using the ReportSpooler makes it possible to automatically create customer-specific reports for certain events or at defined times.

Integration of images in source documents

Images (PNG or GIF format) can also be integrated in the source documents (e.g. trend graphs can be saved as a PNG file via ChronoChart and then displayed in the log).

CSS rules for page layout are supported

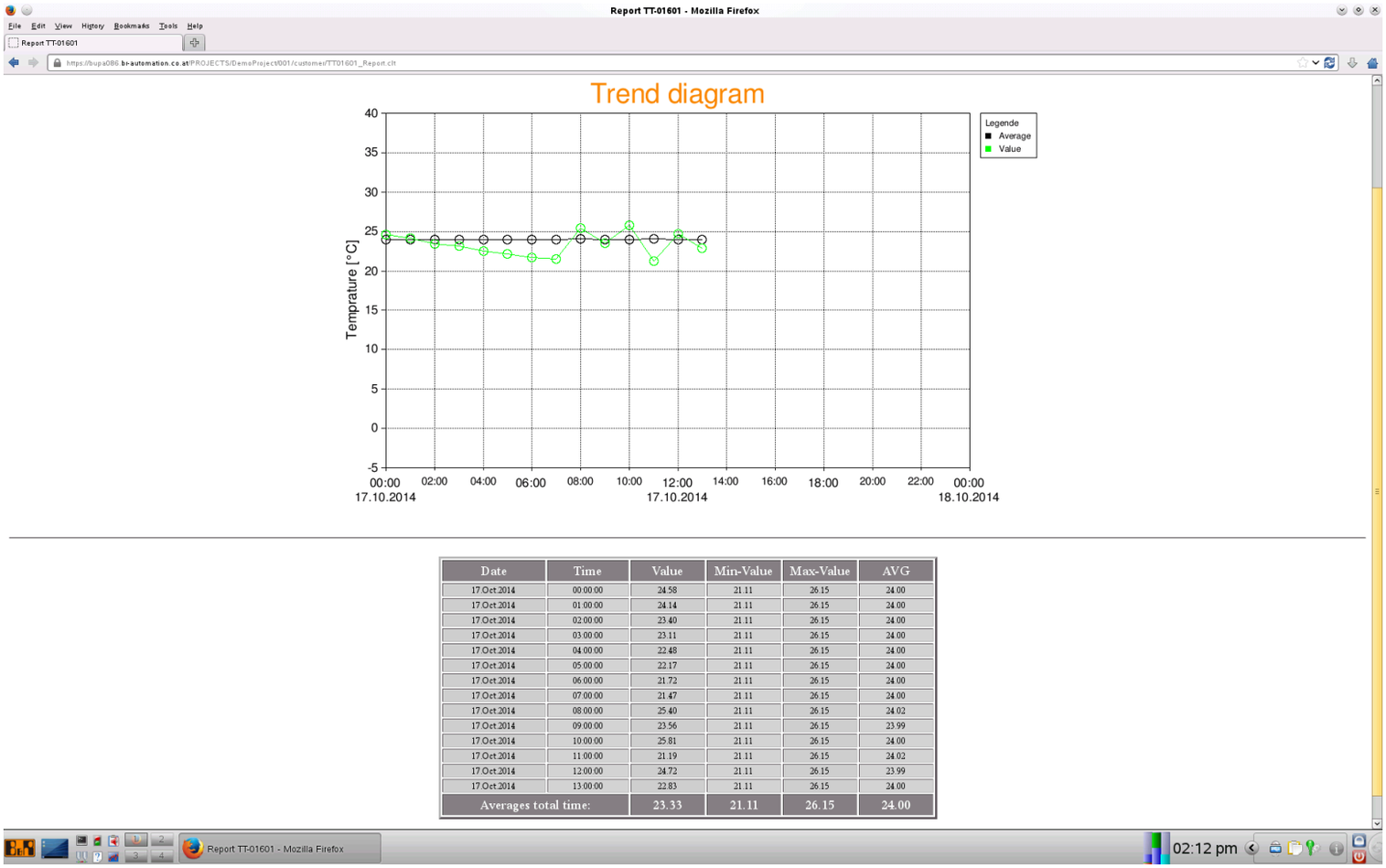
The integrated program Prince also supports CSS rules for page layout (e.g. header, footer, page break control) and for table breaks (table header, column header, column footer). Compared to conventional Web browsers, the CSS standard is much more extensively supported here.

CSS-based display of source document

Using certain CSS rules, a source document can be displayed in the web browser or as a high-resolution printout.

Historic database provides data in XHTML format

From the historic database, templates are used to create reports in XHTML format. The protocol server then converts the source documents to PDF using Prince.



Date	Time	Value	Min-Value	Max-Value	AVG
17.Oct.2014	00:00:00	24.58	21.11	26.15	24.00
17.Oct.2014	01:00:00	24.14	21.11	26.15	24.00
17.Oct.2014	02:00:00	23.40	21.11	26.15	24.00
17.Oct.2014	03:00:00	23.11	21.11	26.15	24.00
17.Oct.2014	04:00:00	22.48	21.11	26.15	24.00
17.Oct.2014	05:00:00	22.17	21.11	26.15	24.00
17.Oct.2014	06:00:00	21.72	21.11	26.15	24.00
17.Oct.2014	07:00:00	21.47	21.11	26.15	24.00
17.Oct.2014	08:00:00	25.40	21.11	26.15	24.02
17.Oct.2014	09:00:00	23.56	21.11	26.15	23.99
17.Oct.2014	10:00:00	25.81	21.11	26.15	24.00
17.Oct.2014	11:00:00	21.19	21.11	26.15	24.02
17.Oct.2014	12:00:00	24.72	21.11	26.15	23.99
17.Oct.2014	13:00:00	22.83	21.11	26.15	24.00
Averages total time:		23.33	21.11	26.15	24.00

TargetControl report

Logging all downloads

TargetControl allows for detailed logging and analysis of all downloads. The TargetControl-Report can be opened context-based from the DownloadManager or from the APROL Change-ControlReport.

Helpful tools make research easy

All of the updates/downloads that have been carried out with the DownloadManager can be researched and filtered with easy-to-use tools in the TargetControl report.

Project-specific

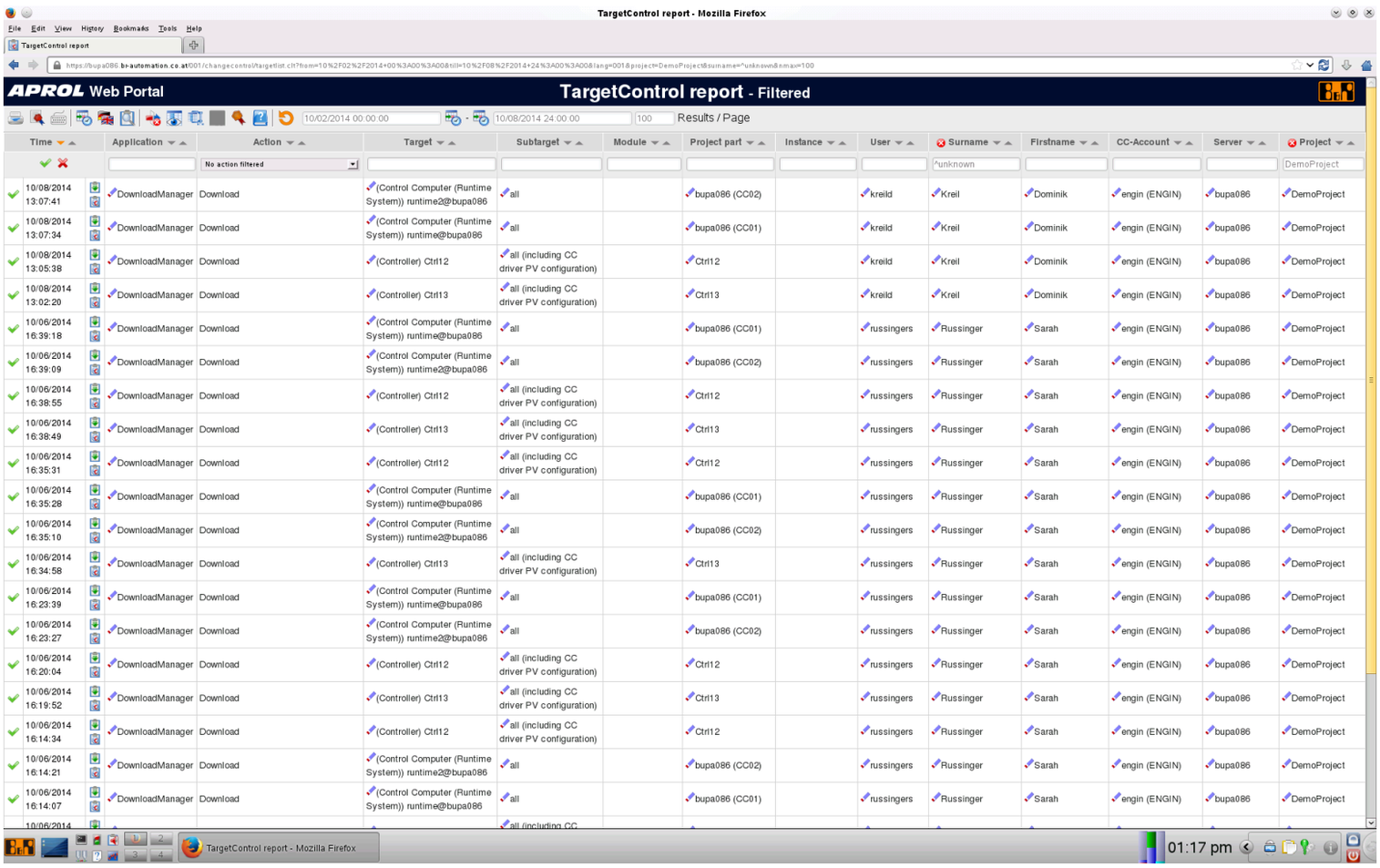
All of the downloads for the current project and the current day are displayed.

Download-specific

All of the downloads for the download job from the current day are displayed.

Target-specific

All of the downloads for the target from the current day are displayed.



Shift logbook

Recording of all events/actions in electronic form

The shift logbook allows the operator to record all relevant events, and thereby all related actions in electronic form. Information recorded this way is therefore always completely available for people with the appropriate access rights.

Shift logbook as a web application

Implemented as a web application, the shift logbook supports authentication and can be launched from any web browser regardless of the operating system being used. Authentication can be enabled or disabled based on a company's security policies.

Shift logbook completely integrated in APROL

The shift logbook is completely integrated in the APROL rights system.

Rights can be defined for operators that allow them to open the shift logbook, read entries, create new entries, or read entries for all projects.

Intuitive navigation

Navigation of the shift logbook is intuitive and is supported by a view organized according to predefined categories.

Chronological views

Instead of the category view, a selection box allows the operator to switch to a chronological View.

Customizable categories

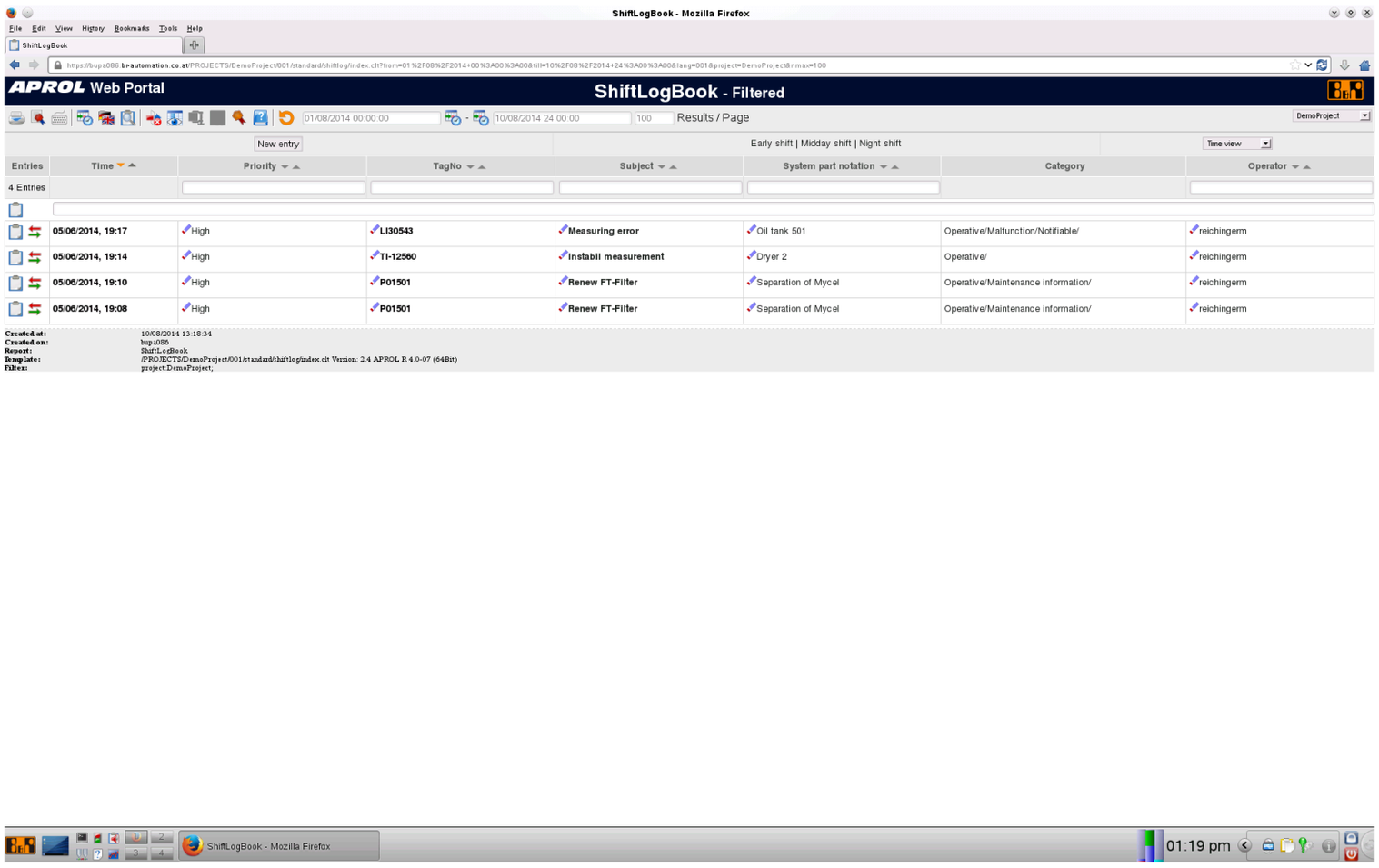
Customizable categories serve to organize entries in the shift logbook and simplify navigation later on.

Comments for topics and categories

To make it easy to comment on shift logbook entries, topics or categories can be referenced right when the entry is made.

Customized display using XML files

The structure of the shift logbook can be customized to requirements through the use of XML. Existing XML files can of course still be used or even upgraded as new aspects are added.



ChronoLog professional query

Simplification of report creation with generic templates

To simplify the creation of the CustomerReport and for testing purposes, ChronoLog professional queries are available.

Configuring the ChronoLog professional query

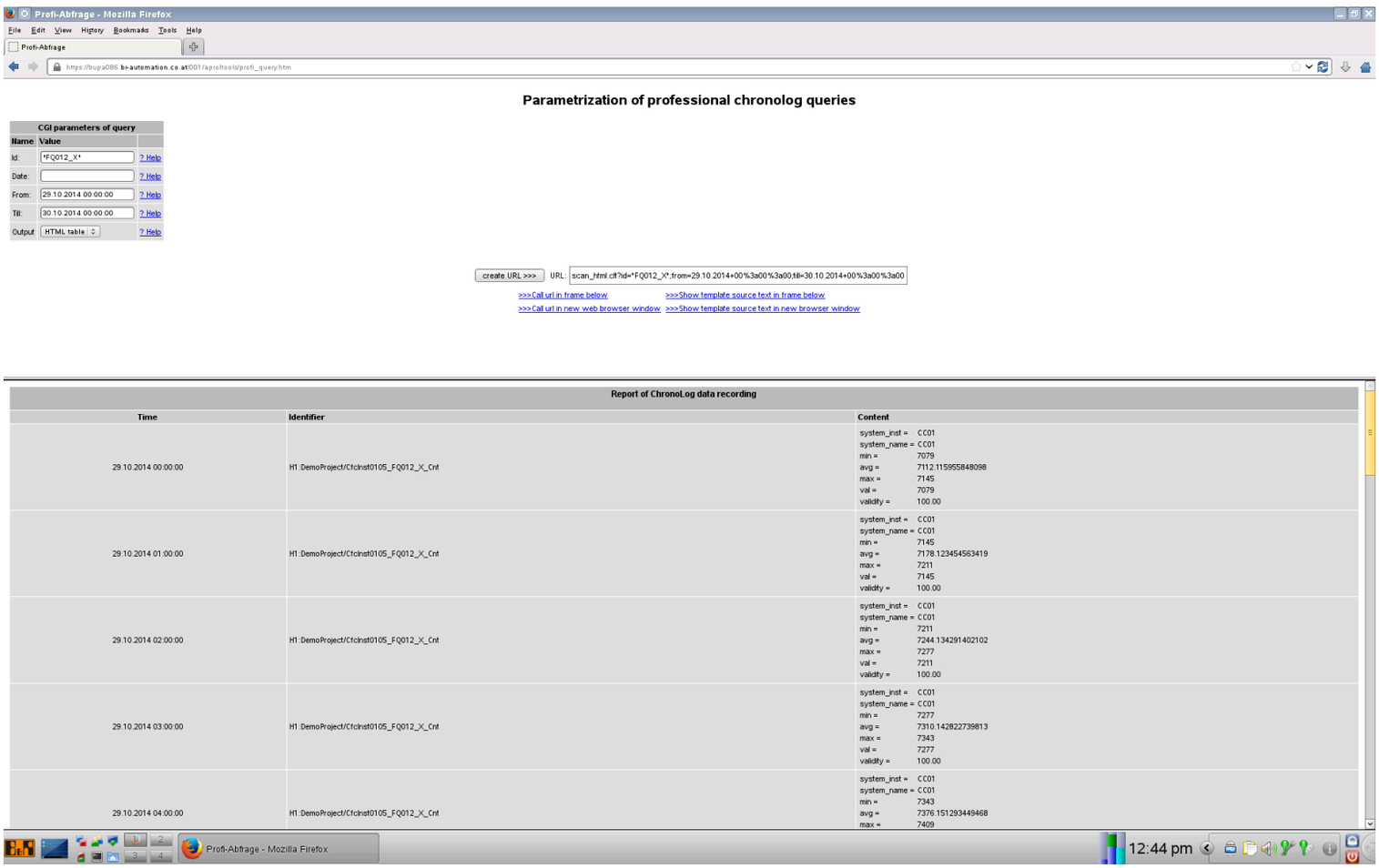
By entering an identifier, the desired time interval for the query, and a template (XML, HTML table) the necessary URL can be generated.

Reading and writing process variables

By uploading an XML file, process variables can be read and written to and from the real-time database (losys XML Web interface).

Report generation through PDF transformation

Entering a URL, filename and printer generates a PDF printout.



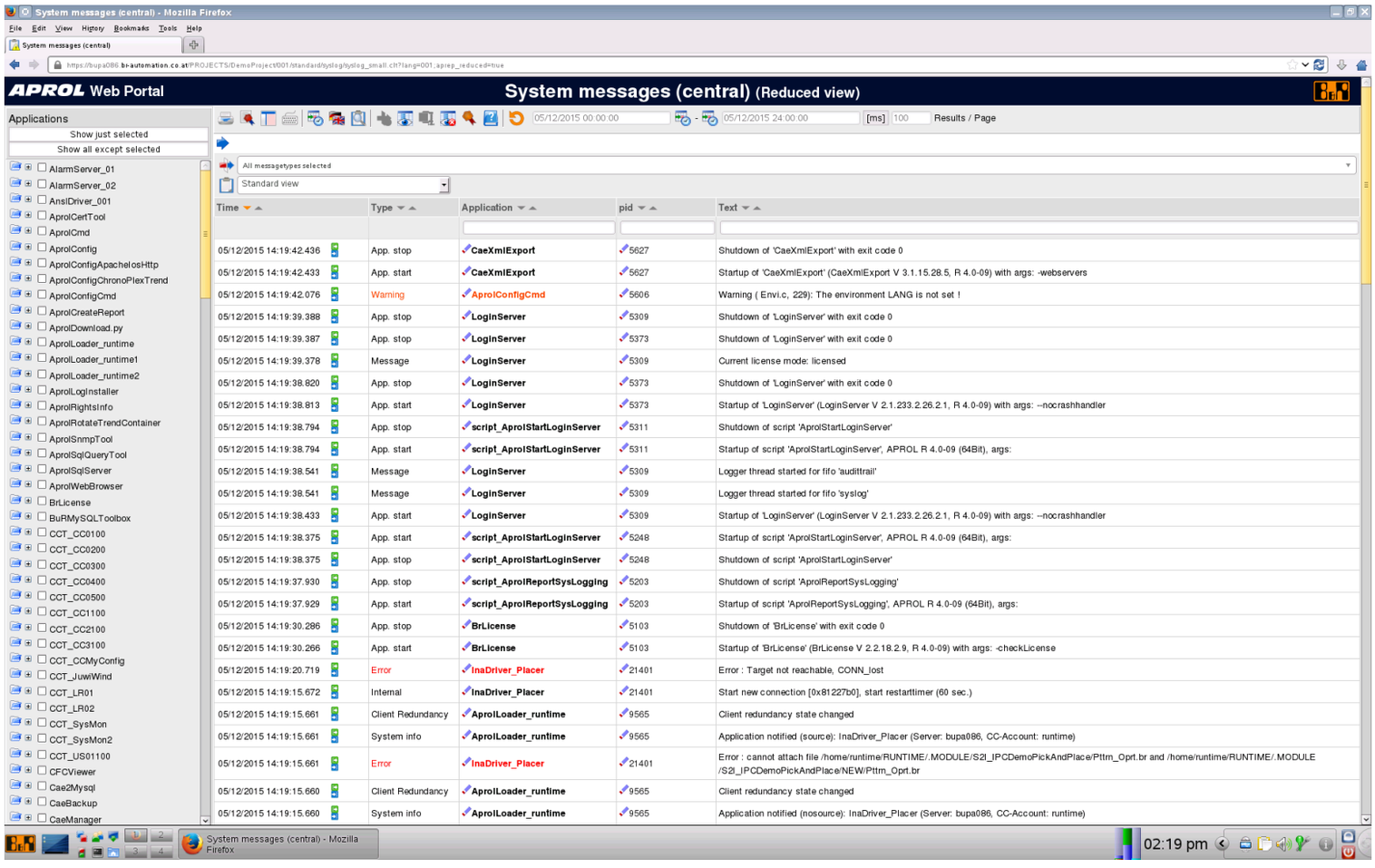
System messages

Recording the system messages from all applications

APROL records the system messages from all applications in the historical database. The recording process is started automatically by the system before any other program.

Extensive filter possibilities for analysis

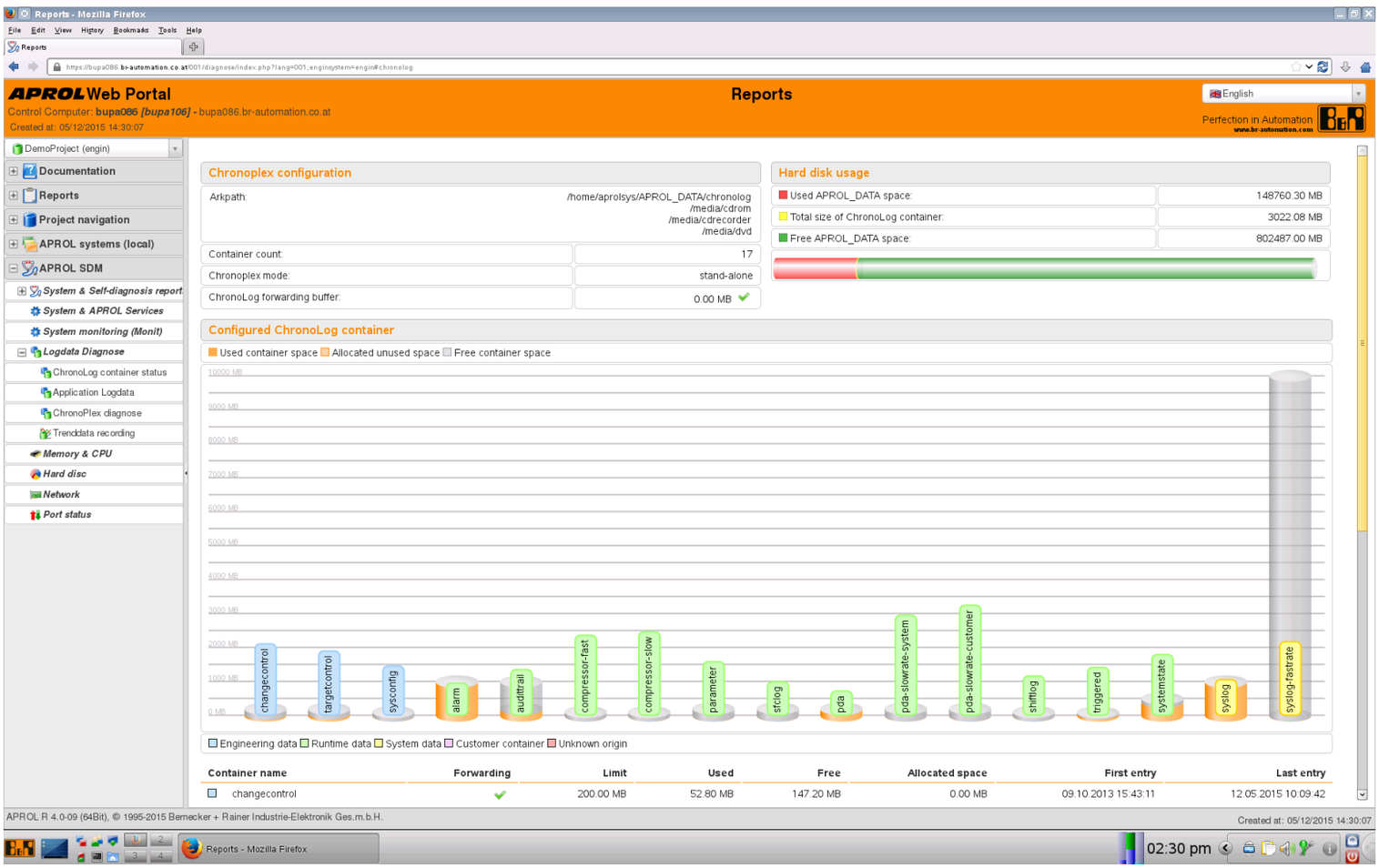
Selection options based on message type, application, process ID, message text and operator station supported for system analysis.



ChronoLog storage space info

Graphical display of storage space

Graphical display of the storage space info for the ChronoLog historical database represents the current situation in regard to available storage space. This is done by showing the fill level of the individual ChronoLog containers in detail.



Configuration report

Current configuration and history in one report

The configuration report combines all of the current states and historical events that are relevant for the APROL system configuration in a single clear and organized display.

Configuration information

The current settings (OS version, host name, etc.) are displayed in a clear and organized manner.

Check installation

The CheckInstallation display indicates whether a consistent installation of the complete system is present or not.

Configuration history

Errors and warnings for the configuration are listed in this view.

CAE database update

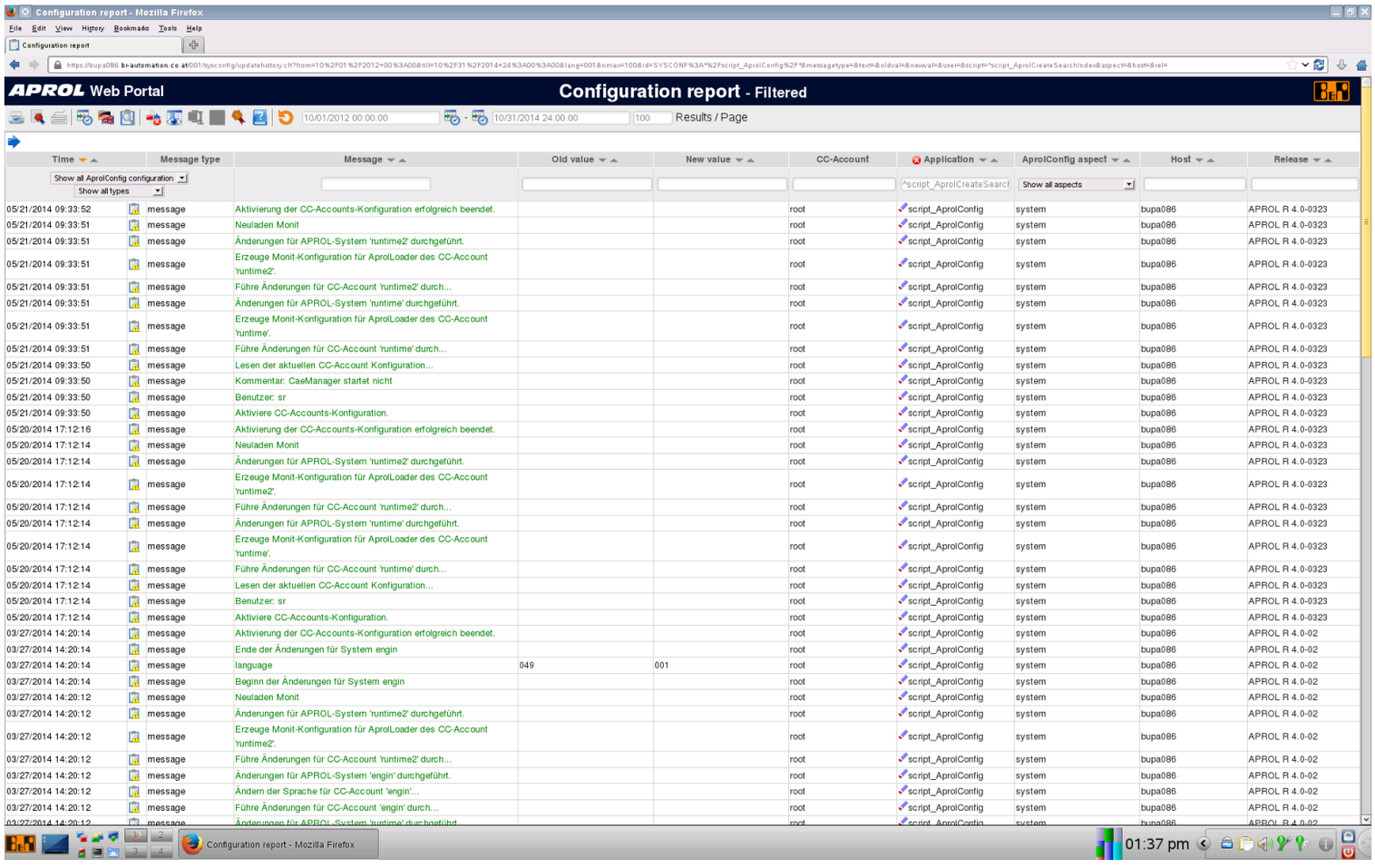
All procedures when updating the CAE database are shown here.

CAE database versions

All database versions are listed together with comments about the changes that have been made.

ChronoLog storage usage

Graphical display of the storage space info for the ChronoLog historical database represents the current situation in regard to available storage space. This is done by showing the fill level of the individual ChronoLog containers in detail.



Reporting by Business Intelligence

Table of contents

Business intelligence (BI)

Business intelligence (BI)

The term "business intelligence" (BI) has been around since the early 1990s. BI is an important area when it comes to business processes and applications.

Procedures and processes for systematic analysis

Business intelligence refers to the procedures and processes necessary to systematically collect, analyze and present data in electronic form.

Constantly growing market interest

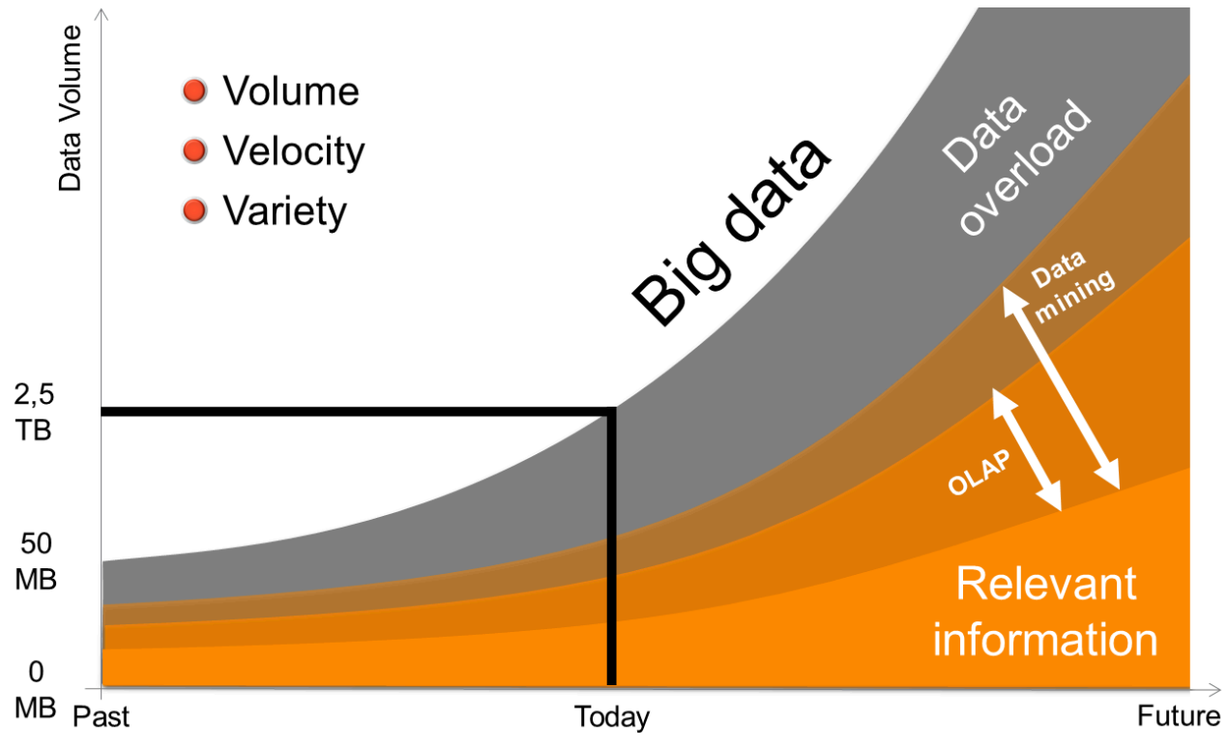
The market interest for business intelligence solutions continues to grow. Unsuitable reporting and analysis functions available in existing ERP solutions are the prime motivator for this.

Data consolidation

The need to consolidate data from front-end systems if nearly universal.

Wanted: Front-end for non-IT experts

Most of the front-end systems currently on the market are only useful for specialist users with IT training. End users require front-end systems that are easy to operate, not systems for IT experts.



3 process stages

3 process stages per process (1, 2, 3)

Collection, analysis, presentation function

Process stage 1 - Data acquisition

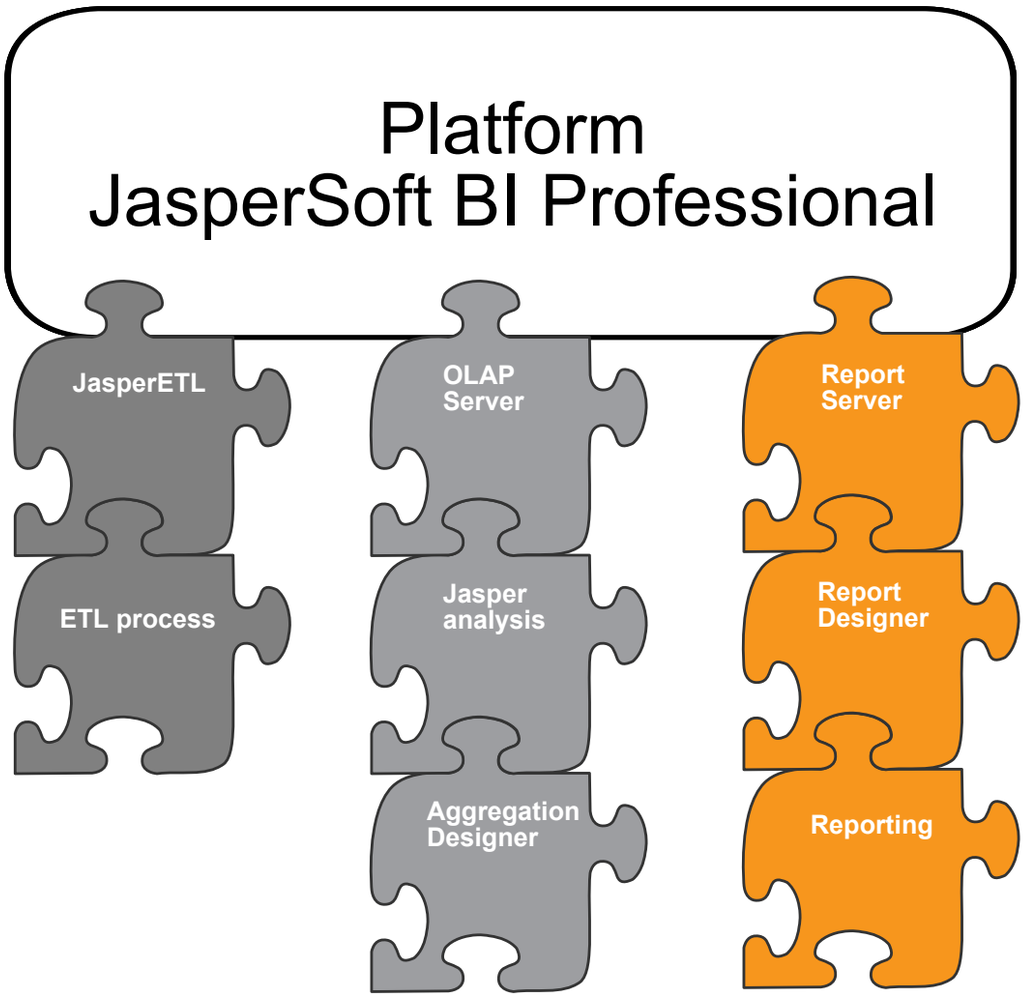
Data originates in one or more places, e.g. ERP systems, databases, files, etc. The ETL process stands for extraction, transformation and load.

Process stage 2 - Analysis

This collected data is then processed using analytical tools. Data is gathered quickly and easily with OLAP, or online analytical processing. Complex statistical analysis is carried out using methods associated with data mining.

Process stage 3 - Presentation function

In this stage, the data is prepared for presentation in the form of reports, PDF files or dashboards.



Data acquisition

Filtering (extraction phase)

Extraction and data scrubbing are managed in the filtering layer.

Staging area

The necessary data is taken from the source systems and saved to a temporary location. Before being loaded to the data warehouse, the data is temporarily stored in the "staging area".

Data scrubbing

The data is then scrubbed to remove any formal or content defects.

Harmonization (transformation)

Encodings are then matched. Synonym/Homonym problems are corrected.

Aggregation (transformation)

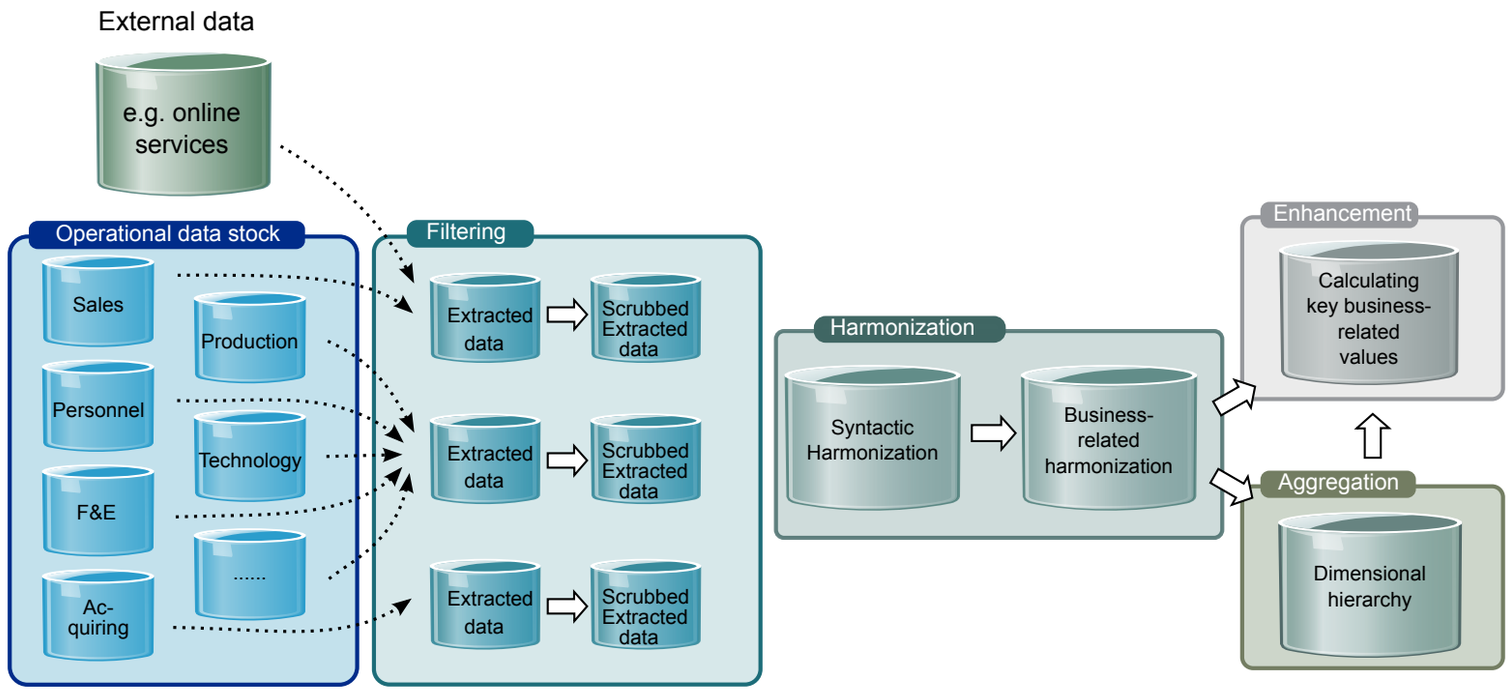
The degree of granularity is reduced, pre-totals are calculated.

Enhancement (transformation)

Calculation and integration of performance figures.

Load

After the transformation processes, the data is transported to the data warehouse (loading), where it can be picked up for analysis.



Analysis

Analysis - Online analytical processing (OLAP)

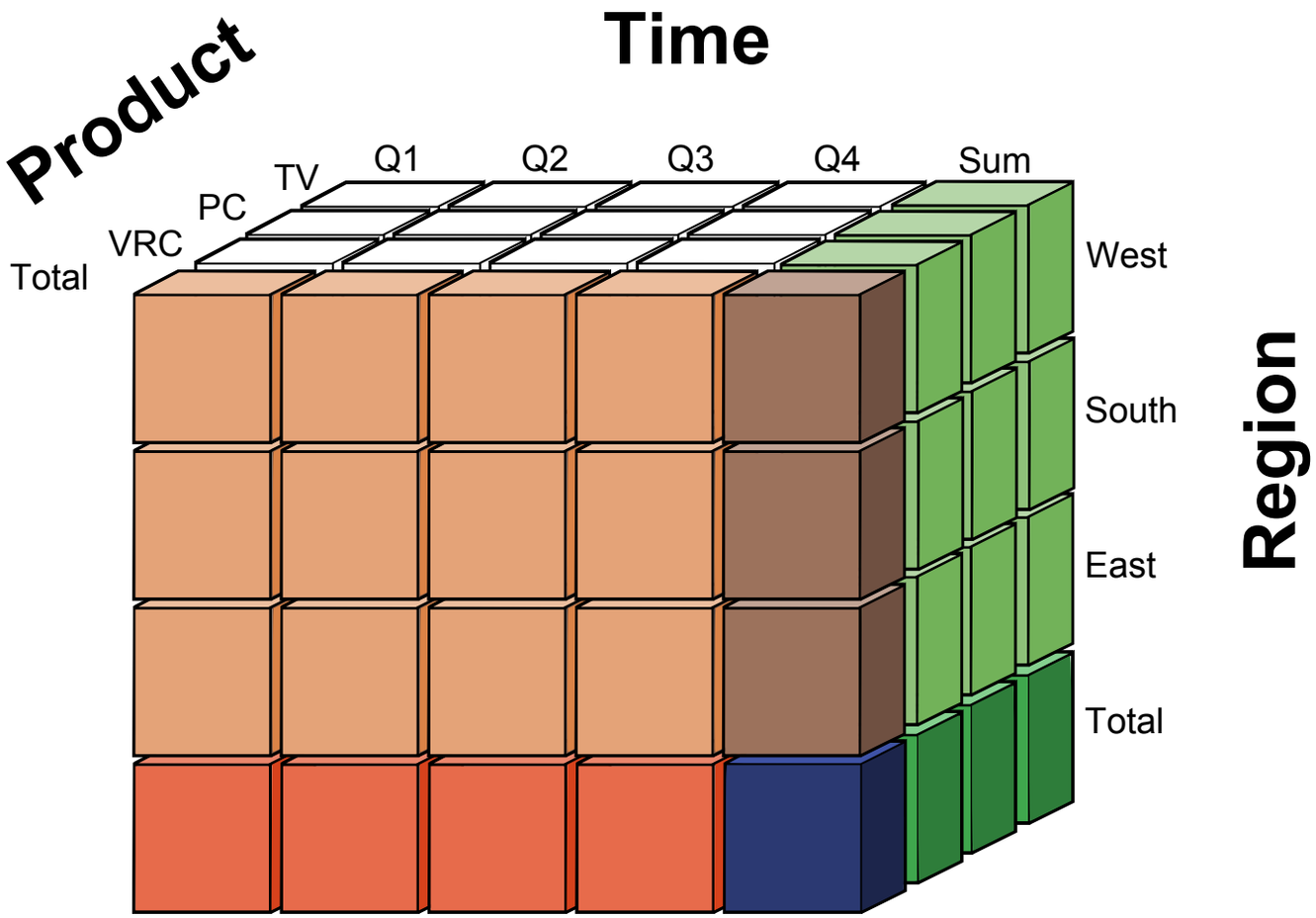
OLAP cubes
Data stored in the data warehouse is summarized and made available in an OLAP cube.

Dimensions
Represent the layers used for analysis. These are also the axes of the cube.

Jaspersoft OLAP as an add-on
An optional add-on for the Jaspersoft server is available that encompasses the Mondrian ROLAP engine for connectivity to the Microsoft SQL Server Analysis Services platform.

Analysis - Data mining and predictive analytics

Data mining and predictive analytics
The open-source statistical language R offers a wide range of functions in the areas of data mining and predictive analytics.



Presentation

Presentation function - Standard reporting

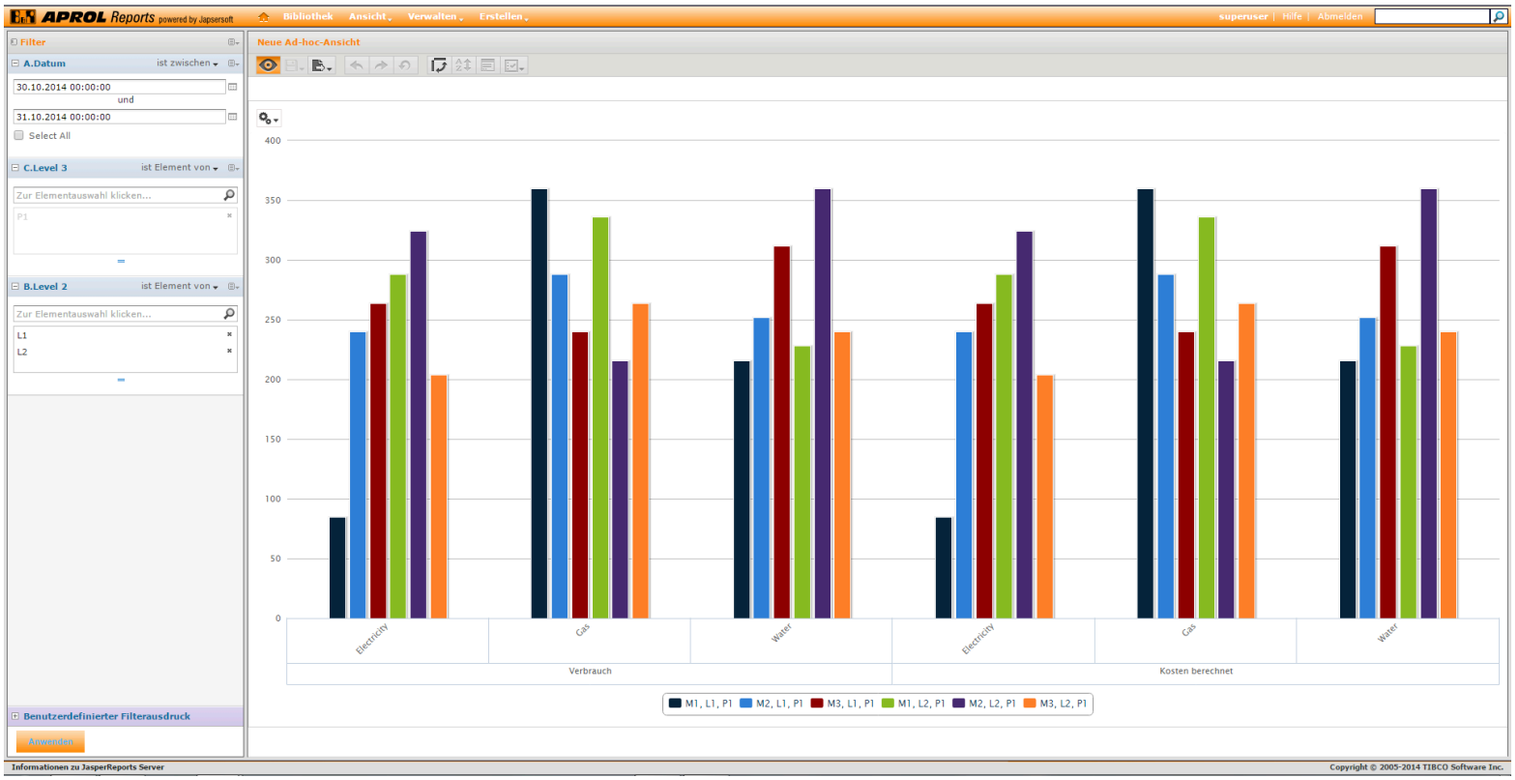
The form and contents of standard reporting are already defined for the most part, though the diagram types can easily be changed.

Interactive reports

Interactive reports with perfectly reproduced diagrams and tables can be created for print or online display in no time flat. A browser-based, interactive display tool can be used for filtering and sorting as well as changing column formats and saving data to the report repository.

Wide range of export formats

Publishing (export) in choice of PDF, XLS, XLSX, XML, HTML, XHTML, CSV, DOC or ODT format for easy processing down the line



"Ad-hoc reporting"

The user determines how the layout should look when the report is generated.

Analysis software

Self-service analytical solutions allow data to be queried easily and interactively to provide the valuable information necessary to make the right decisions.

Interactive reports

Interactive reports with perfectly reproduced diagrams and tables can be created for print or online display in no time flat. A browser-based, interactive display tool can be used for filtering and sorting as well as changing column formats and saving data to the report repository.

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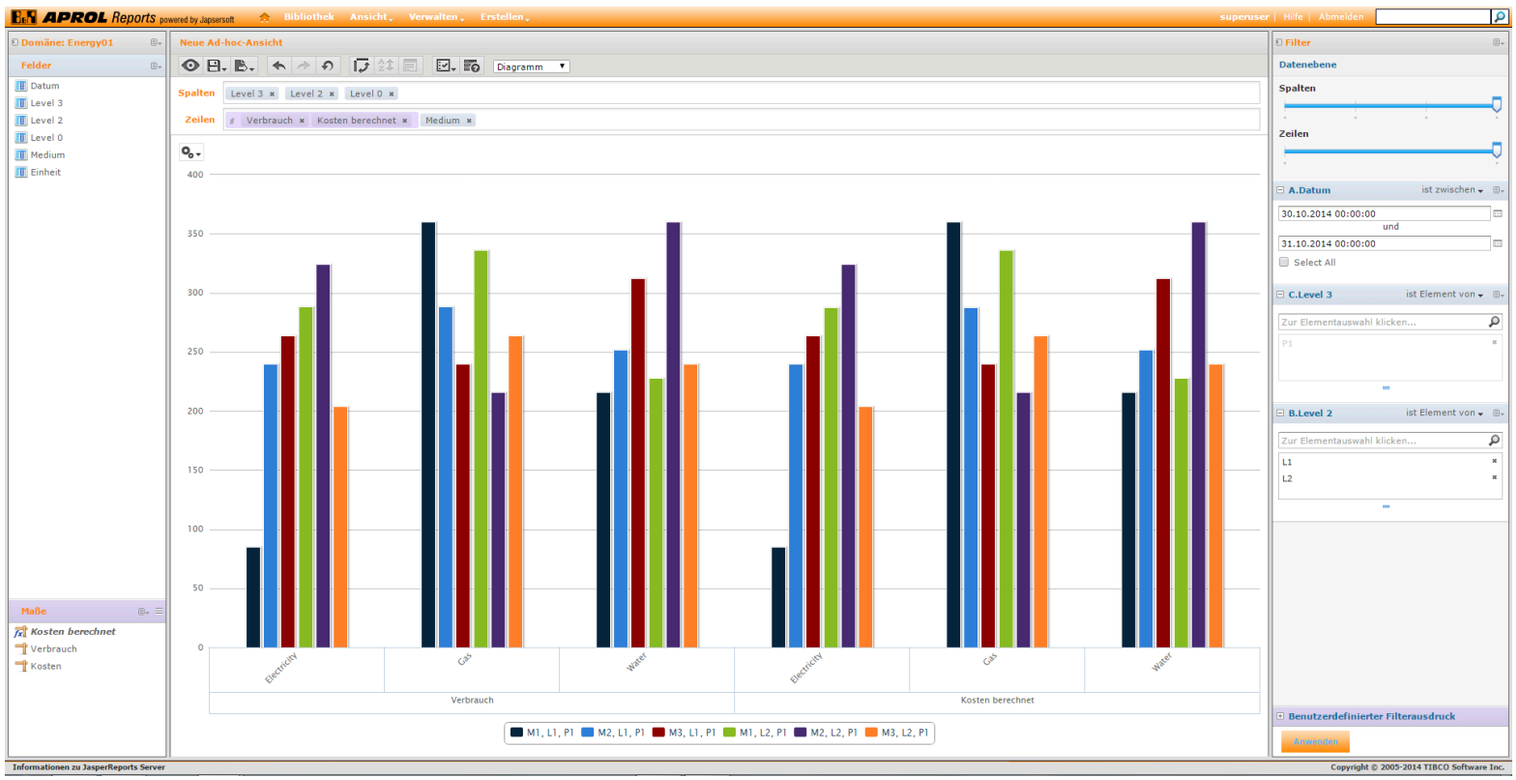


Presentation

Dashboard

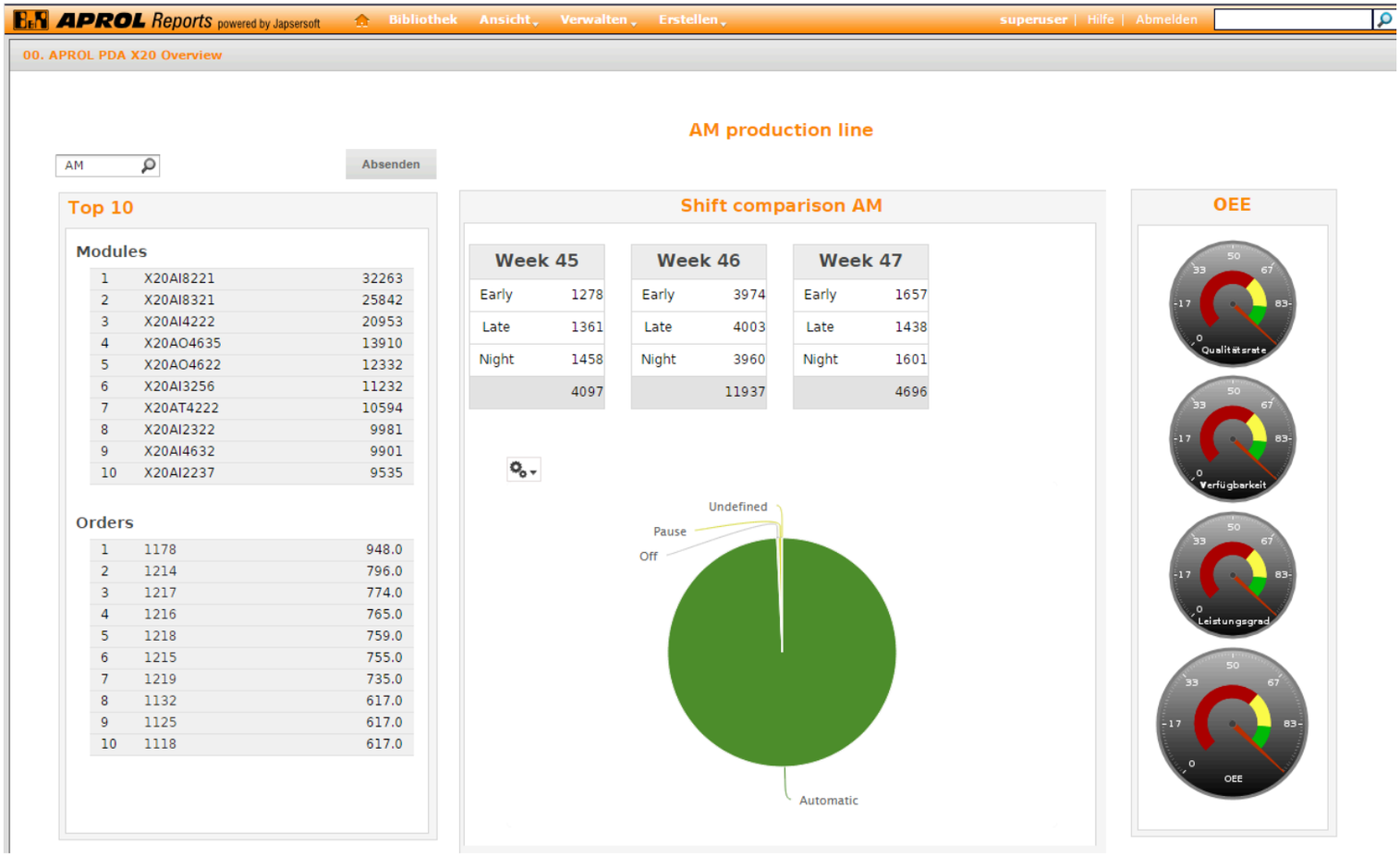
Like a pilot's cockpit, the APROL PDA dashboard provides a quick and intuitive overview of key data in speedometers, line diagrams, traffic lights and maps.

Dashboard software

Dashboard software makes it possible for users to combine data and graphic indicators and consolidate important information. Multi-report dashboards can also be created using both internal and external data.

Web-based dashboard design tool

Dashboards comprising several components can be put together using drag-and-drop with an easy-to-use, web-based design tool. Selected parameters facilitate even more interactive work and provide users with the flexibility necessary to display and analyze data in the shortest possible time.



Mobile data analysis

Apps for both iOS and Android are available that allow convenient access to both dashboards and reports.

Mobile access

Interactive reports and dashboards can be displayed in native iOS and Android apps. The touch-capable browser can also be used to create reports and analyze data on tablet devices.

Security provided by server-side authentication

The necessary security for mobile and tablet devices is guaranteed by server-side authentication.

System structure - Report/ETL/OLAP server

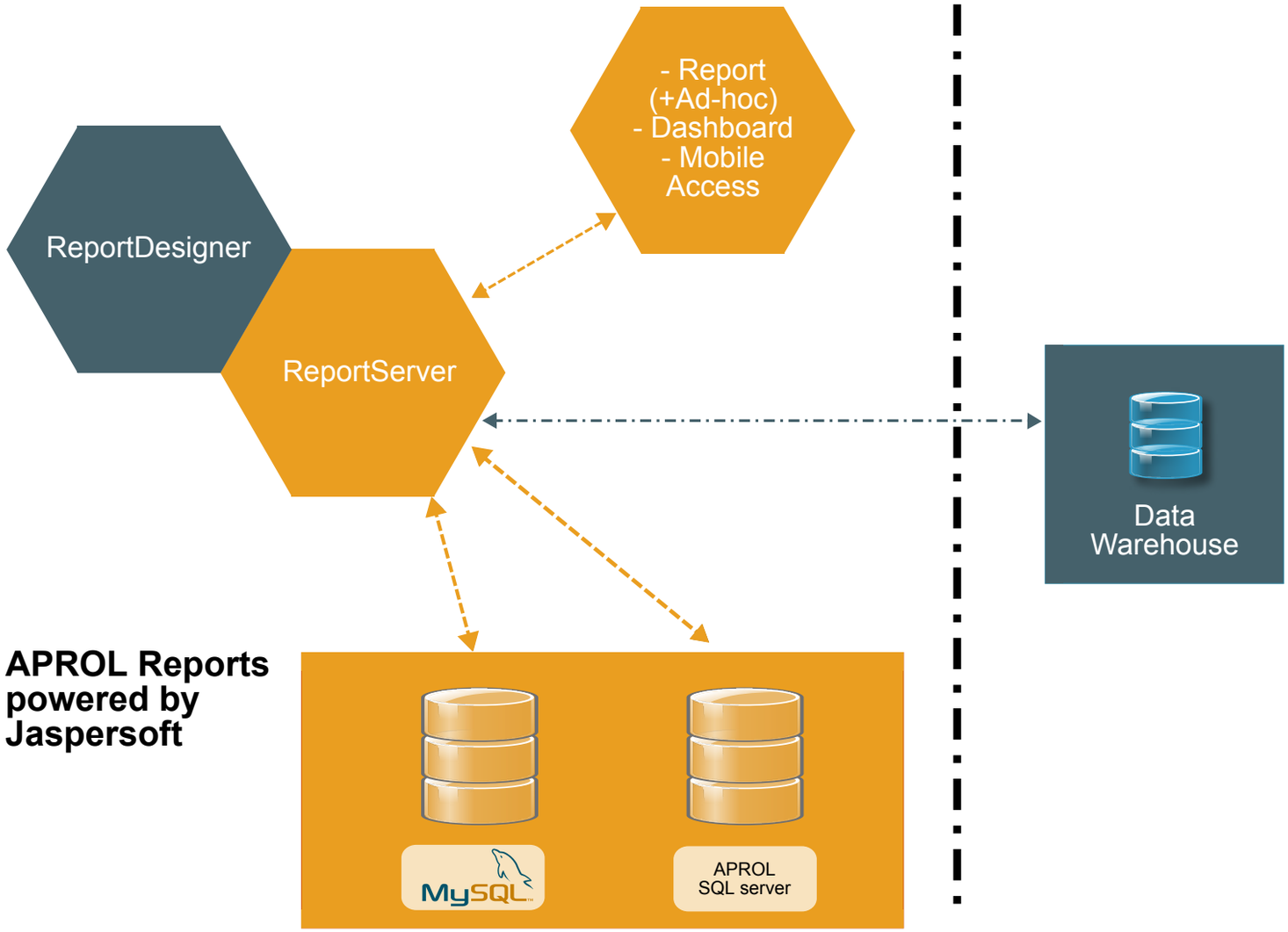
APROL Reports powered by Jaspersoft

Reporting system with BI server
The integrated Jaspersoft BI Enterprise Edition includes a BI server and offers control dashboards as well as self-service reports. Web-based tools allow users to create customized reports and display interactive dashboards without any previous technical expertise.

Report design tool
A user-friendly report design tool makes it easy to create, format and distribute reports for a standard browser or mobile devices using drag-and-drop. Reports can be generated with data from many different sources, including MySQL, JDBC, XML and CSV. A metadata layer with data visualization functions for accessing multiple data sources ensures data security and simplifies the underlying structure for users without preexisting technical knowledge at the same time.

APROL SQL server
All recorded historical data is saved in this database and available to the reporting system at any time.

Optional MySQL database
All recorded historical data is saved in this database and available to the reporting system at any time.



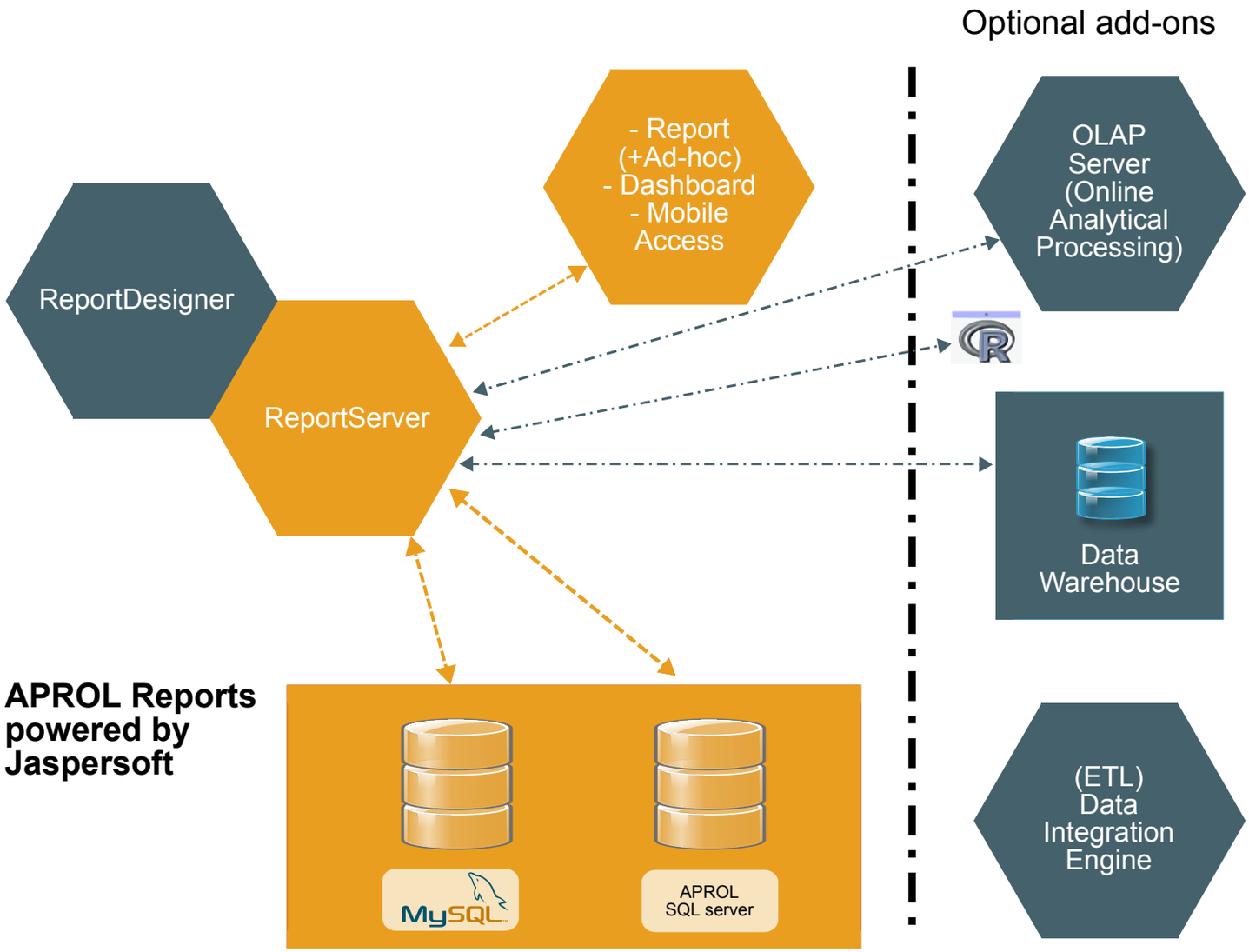
Reporting System – ETL - OLAP

Jaspersoft OLAP (separate license required)

An optional add-on for the Jaspersoft server is available that encompasses the Mondrian ROLAP engine for connectivity to the Microsoft SQL Server Analysis Services platform.

Data integration software (separate license required)

The data integration software performs extraction, transformation and loading (ETL) of data from various relational and non-relational databases into a data warehouse, where it can be accessed for reports and analyses. This ETL functionality currently offers over 450 data connectors and native integration with ERP and CRM applications like SAP and SugarCRM.



Web portal

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Web server

Web server

The APROL web server makes it possible to operate and monitor a system via the intranet/ Internet without limitations.

Simultaneous access without affecting the local interaction

The APROL web server uses the mechanisms of VNC in Linux. This means it is possible make the project data available simultaneously for any number of web clients worldwide via the Intranet / Internet. Unlike in Windows operating systems, web client access in Linux does not execute remote control of the local resources keyboard and mouse and a copy of the graphical display is not transferred to the web client.

Web clients using standard web browser (Java viewer)

The APROL web server is accessed via web clients running Mozilla Firefox, Internet Explorer or other web browsers based on a Java viewer.

Operation and monitoring or diagnostics

In addition to operating and monitoring APROL systems via web (operator station via web), remote access for diagnostics purposes (diagnostics access via web) is also possible.

"Operator station via web" licensing

"Operator station via web" usage requires the "Operator via net" licenses for the simultaneous access of 1, 5 or 10 web clients. If more than 10 licenses are required, the desired number of packages can be purchased in groups of 1, 5 or 10 licenses.

No license required for "Diagnostics via web"

An APROL control computer (even single node systems) can be accessed via web at any time. No license is required.

No configuration needed for web access

The web clients access the APROL web server via Intranet/Internet using a VNC client or web browser (Java). All APROL system functions, including Security Login, are provided identically. This means that the system can be operated and monitored in the same manner as when accessed locally.

AuditTrail records all operator actions via web

Operations made on the web client are all recorded in AuditTrail. User management ensures the highest level of safety when accessing the APROL web server.

Separate X session for each web client access

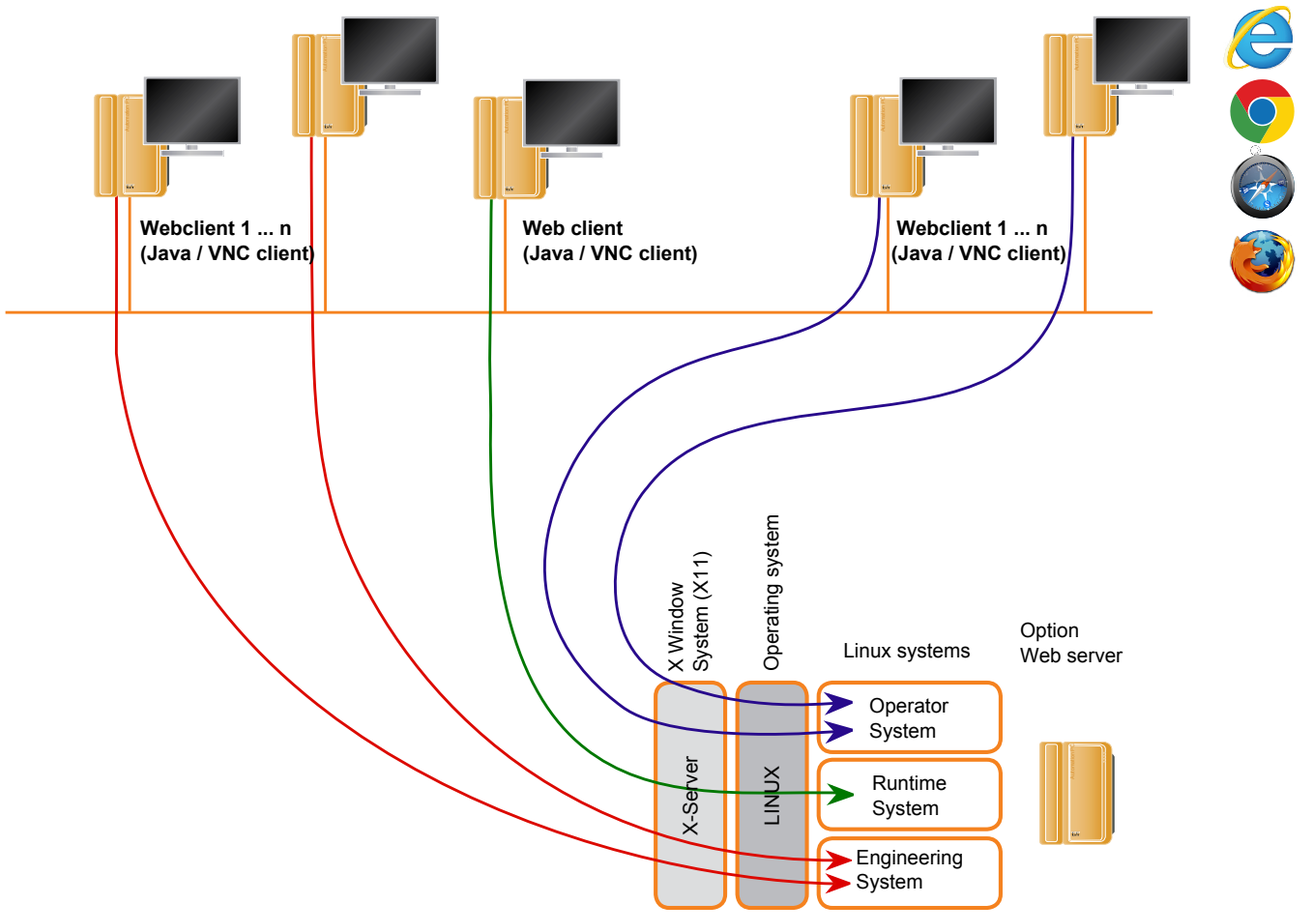
The X Window system (X11) is a protocol for the graphical user interface. In addition to the manner in which windows are displayed and used on the screen, the handling of user entries via mouse and keyboard is also a component of X11. The X display manager is part of the X window system for the graphical user interface in Linux and is therefore responsible for displaying a graphical login screen for entering a username and password. An X session is started after logging in successfully.

Operator station via web

1, 5, 10 or 25 web clients access the data of an APROL web server via Intranet/Internet.

Web-based diagnostics

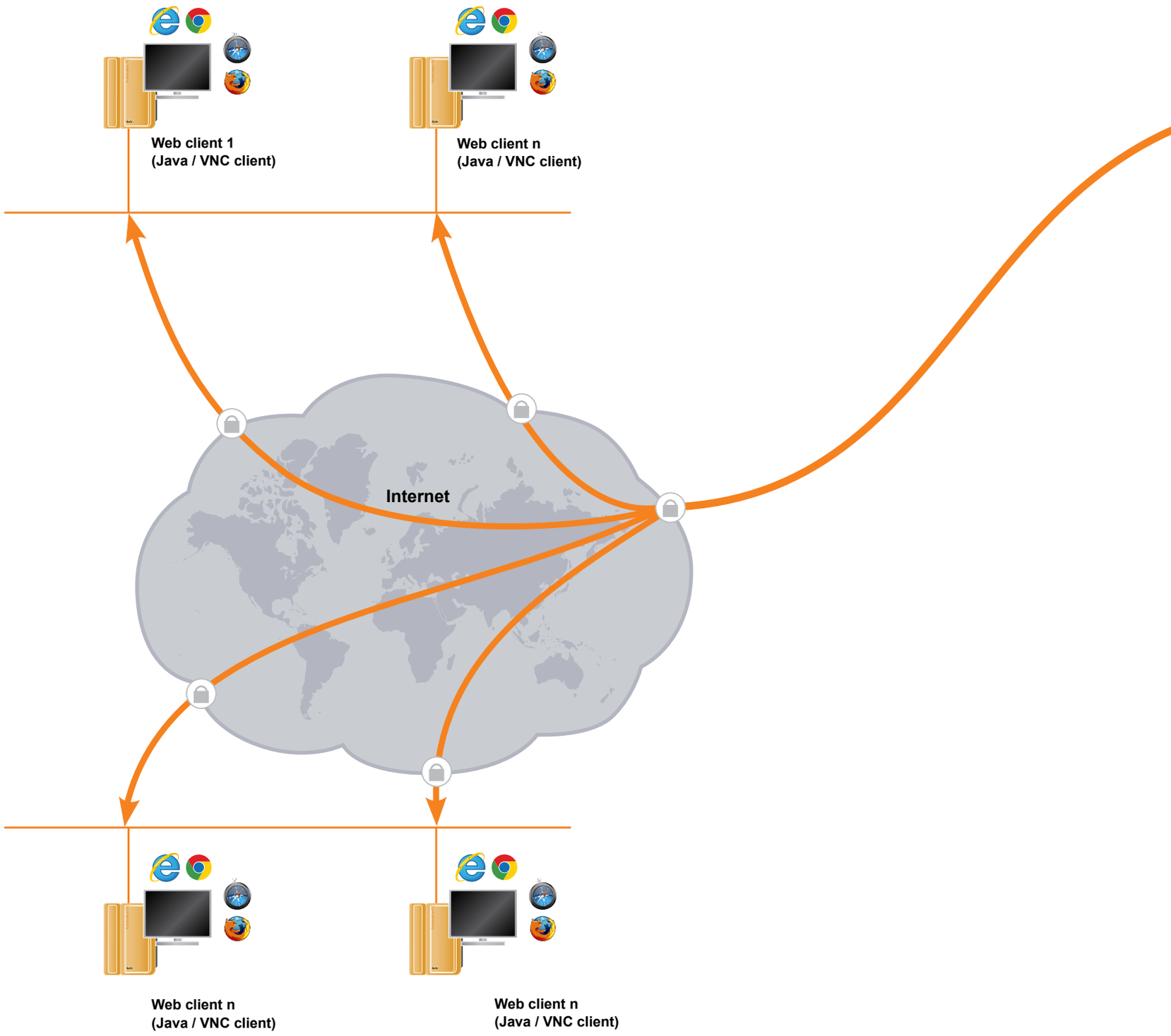
One or more web clients have access to multiple APROL web servers (also single node systems), for the purpose of remote operation, diagnostics or monitoring.

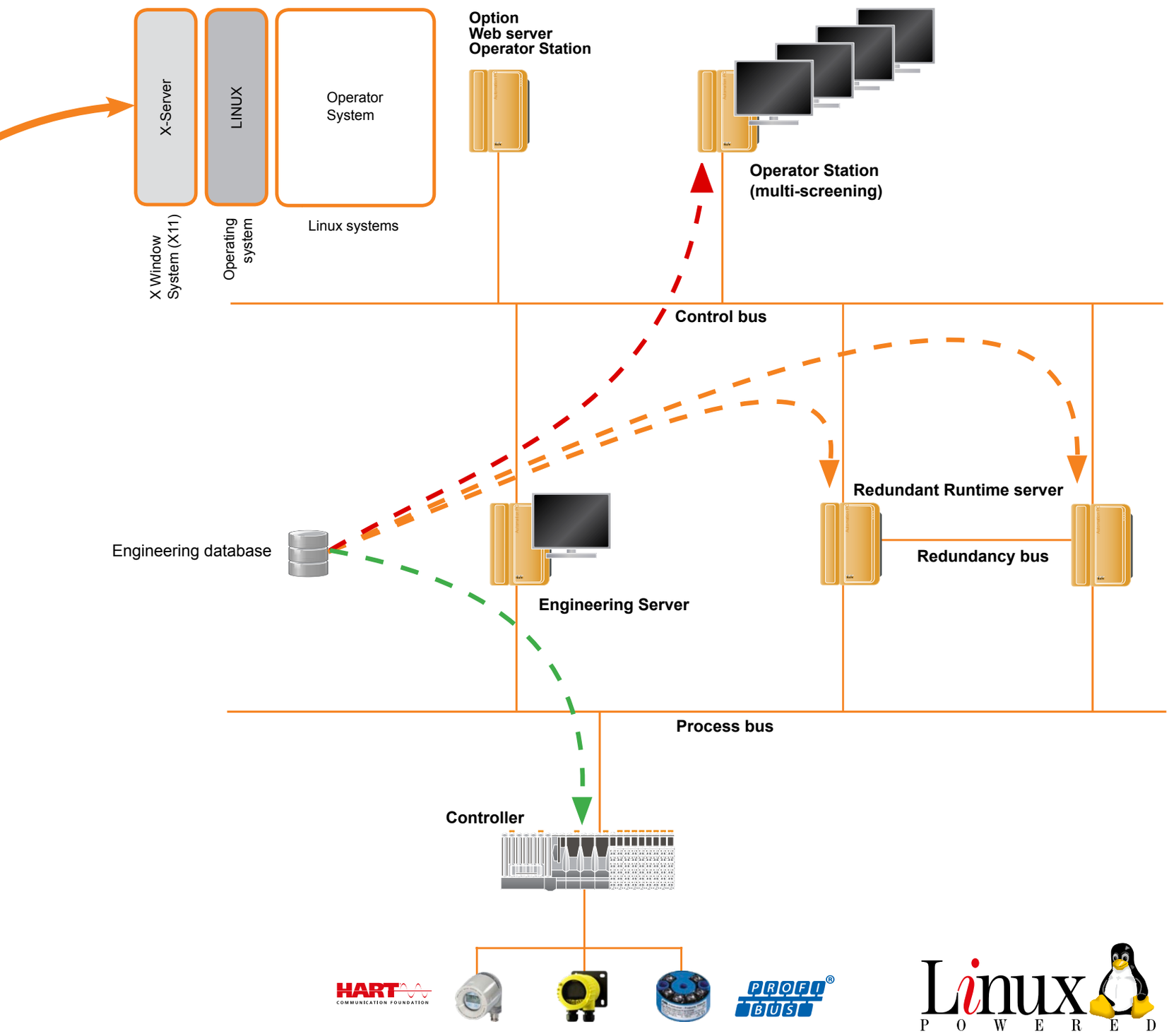


Example: Single node system

Web server

Web server




X-Server
LINUX
Operator System
X Window System (X11)
Operating system
Linux systems
Option
Web server
Operator Station
Operator Station (multi-screening)
Control bus
Redundant Runtime server
Redundancy bus
Engineering database
Engineering Server
Process bus
Controller
HART
COMMUNICATION FOUNDATION
PROFI BUS
Linux
POWERED

Engineering

Table of contents

CaeManager - General information

Engineering from the field device to the visualization object

The CaeManager is the central tool for creating the entire system configuration – from remote I/O modules, fieldbus connections, and open/closed loop control to the operating and monitoring level.

Graphical engineering

Engineering takes place graphically based on IEC 61131-3 using function blocks and hyper macros that are inserted from the APROL standard and customer-specific libraries.

Central engineering database

All engineering data is stored in a central database. Securing and backing up this engineering database is possible in the CaeManager.

Concurrent engineering

The CaeManager is a configuration tool designed for concurrent engineering, i.e. several project engineers can work together on a project at the same time over a network.

Project structure shown in tree form

Projects can be arranged according to S88 structure guidelines, an identification system, or altogether differently than predefined structures; they are displayed in a view similar to that of Windows Explorer.

Optional views

Different views can be selected by the project engineer:

Project view

Project view according to the project structure created.

Personal work progress

Personal work progress of the respective project engineer (all configuration elements).

Type view

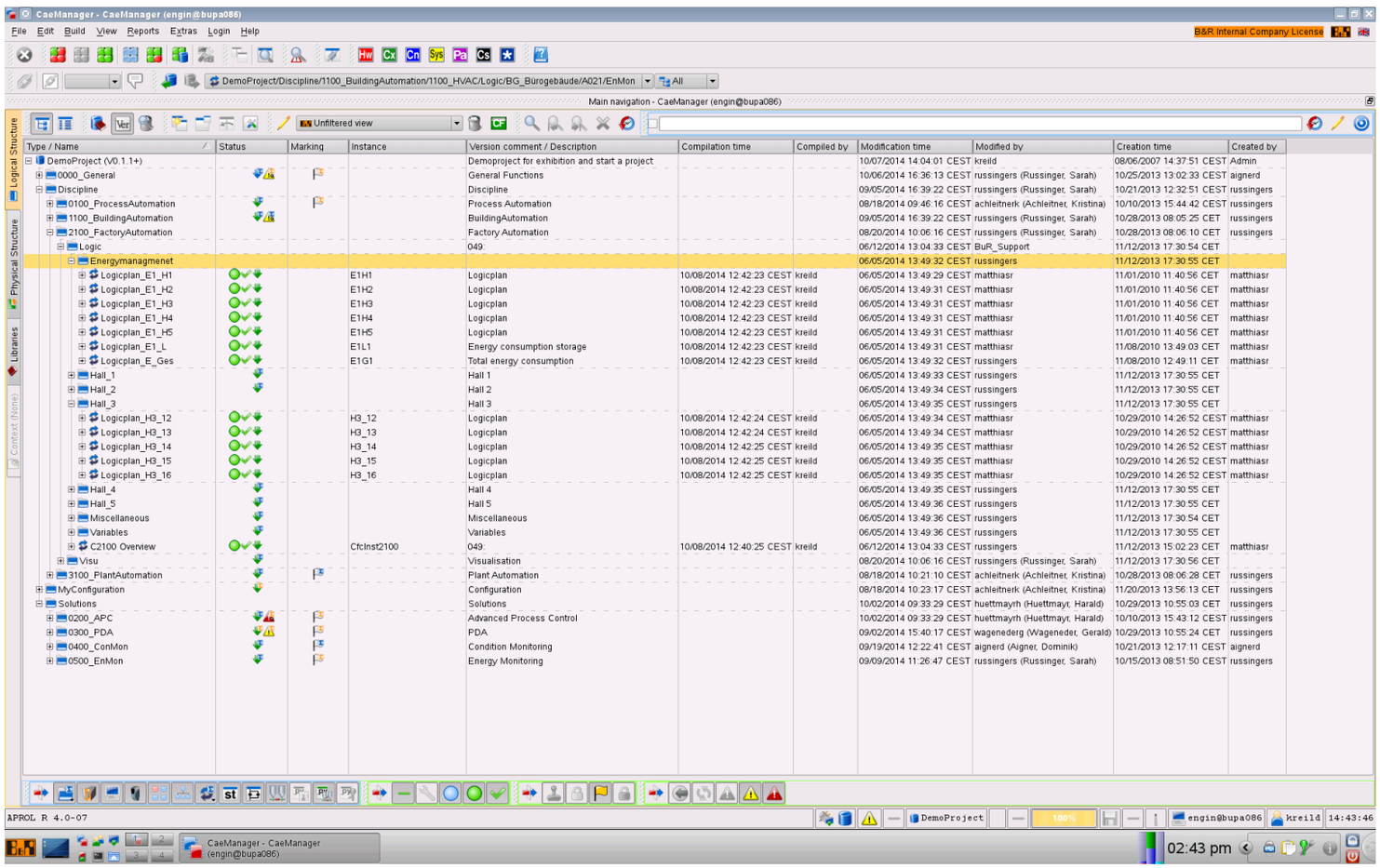
Standardized view of sorted and filtered configuration elements (e.g. to only display process graphics).

Bookmarks / Working versions

Project engineers can save their own bookmarks and working versions for configuration elements and use them for filtering.

Context-sensitive engineering tips

Engineering tips support the project engineer during configuration and prevent incorrect input or faulty configurations.



CaeManager - Version management

Automatic version management system

The CaeManager contains an automatic version management system. A complete version history is included in the project for each individual configuration element.

New version created when saving

If a change is made e.g. to a process diagram, then the CaeManager generates a new version of it. The following detailed information is collected: timestamp, original version, project engineer and version comments.

Optional version comments

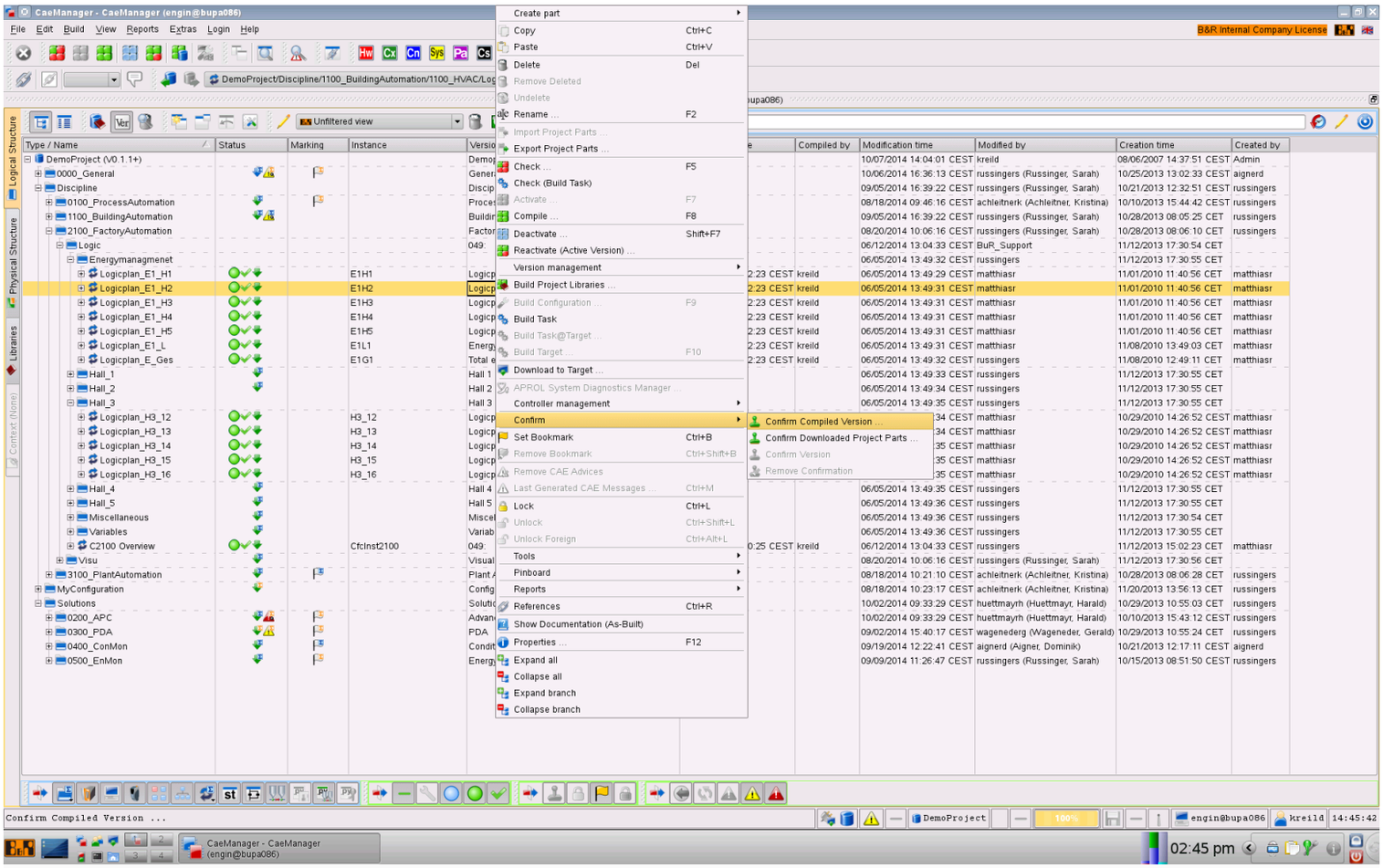
The version comment may sometimes be optional, but it's mandatory and can be configured when designing a project that conforms to CFR Part 11 or GAMP4 guidelines, for example.

Restore

Restoring older versions is possible at any time and is logged using the integrated ChangeControl logging feature (21 CFR Part 11, GAMP4).

Label for enabled versions

The enabled versions of the individual configuration elements can be given a label to make them fixed versions with a separate date and time (21 CFR Part 11, GAMP4).



CaeManager - Libraries

Standard / customer-specific libraries

The CaeManager provides several different standard libraries. Additional industry or customer-specific libraries can be easily created and tested in the CaeManager.

Different function block types can be created by the user

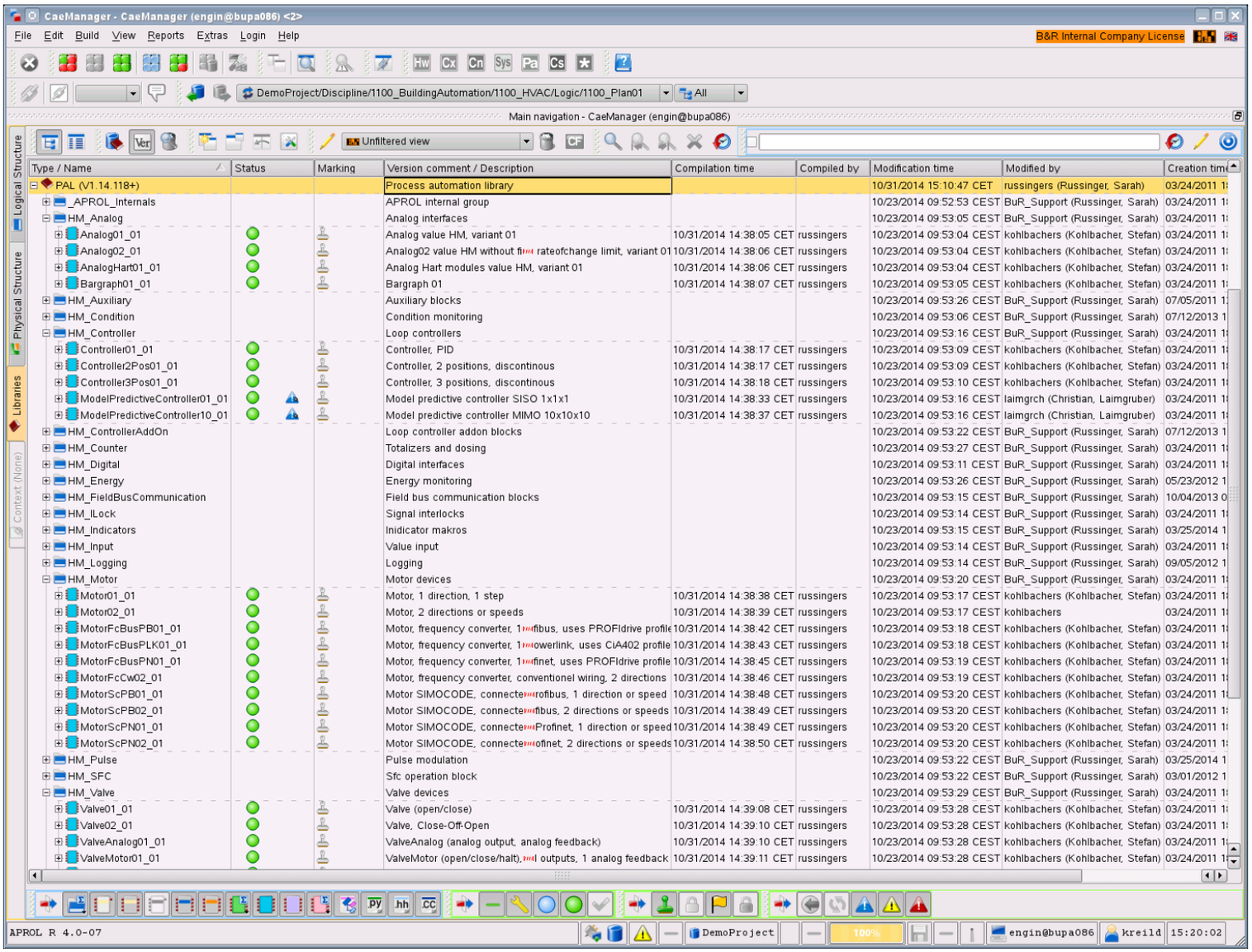
As many functions / function blocks (C-Editor), graphic blocks (DisplayEditor), UCB blocks (script language) and hyper macro blocks (graphical configuration (see hyper macro concept) can be created as necessary.

Debugging environment in CaeManager

Newly created blocks can be tested directly in the CaeManager to see if they work.

Password protection for intellectual property

The libraries can be protected with a password to prevent unauthorized access by others.



As-built documentation for all function blocks

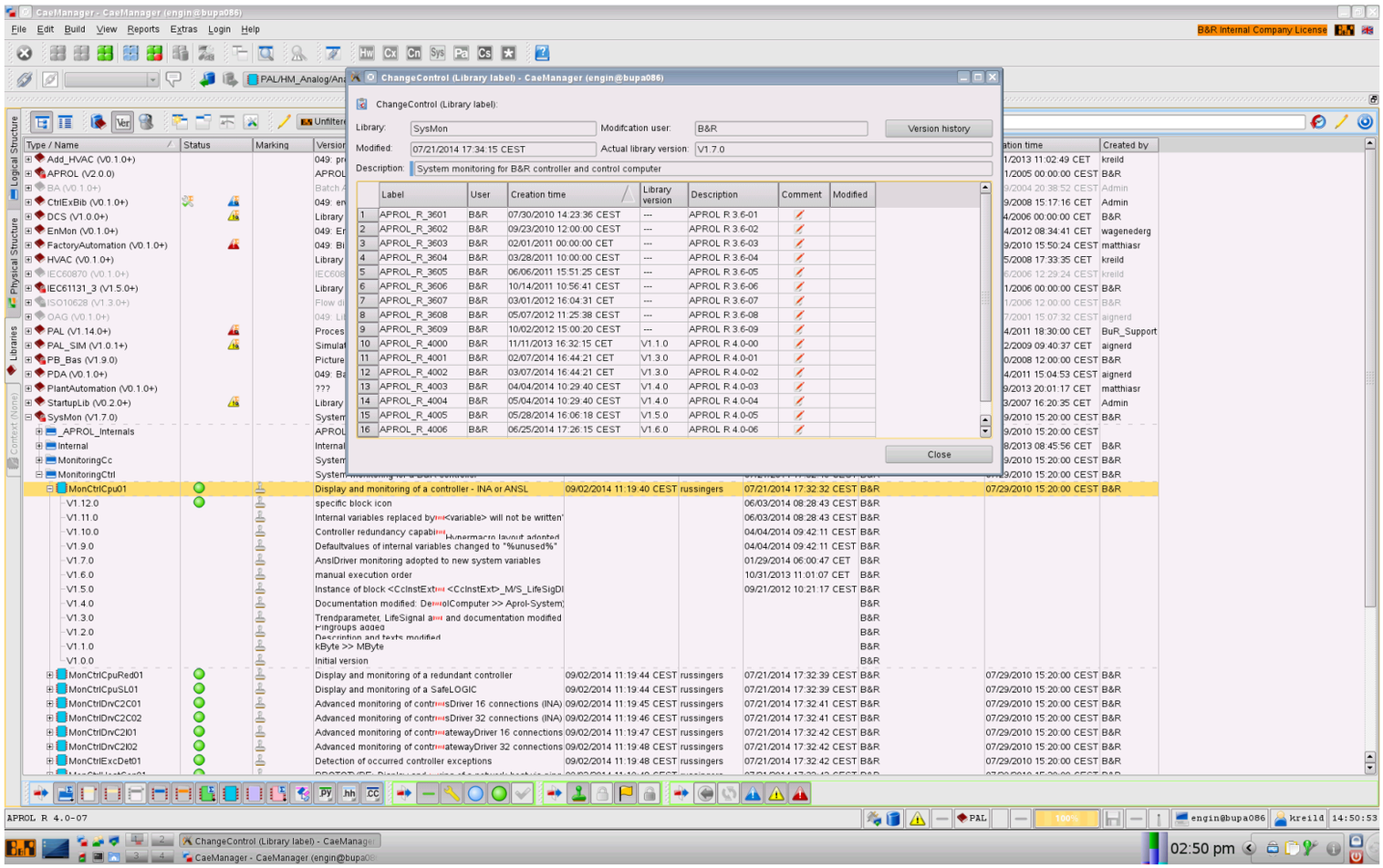
Documentation for the block is created as "as-built" documentation during development. Easy-to-use functions for entering structured as-built block documentation using XHTML. This allows description text to be structured clearly and expanded with information such as limitations, notes, links, images, etc. The extended information and the automatically generated block I/O table are listed clearly in the as-built documentation. This guarantees that the block documentation is always current and available.

Label defines unique library version

The enabled versions of the blocks can be given a label to make them fixed versions with a separate date and time (21 CFR Part 11, GAMP4).

Automatic version history from version management system

The automatic version management system in the CaeManager provides a complete version history for each block.



PAL - Process Automation Library

Process Automation Library (PAL)

PAL is a universal library that is suited for any industry, anywhere in the world. It includes easy-to-use blocks for users who value standards.

Clear faceplates with icons
Clearly arranged faceplates ensure easy usability. Modern SVG graphic icons (Scalable Vector Graphics)

Integrated system functionality
System functions such as the shift logbook for taking notes, the trend viewer, the alarm report, etc. can be opened directly on the measurement point.

Exclusive function for operator access
The operator can lock access to a tag (faceplate) selectively.

Integrated maintenance functions
Service and maintenance functions (e.g. switching cycle counter) are integrated directly into the blocks. This makes additional configuration work unnecessary.

Configurable operating philosophy
The operating philosophy can be designed with or without a confirmation requirement using parameters and connections.

Signal status
Each PAL block monitors the signal status, including configuration, software, I/O module and open connection errors. This can influence logic connected further downstream.

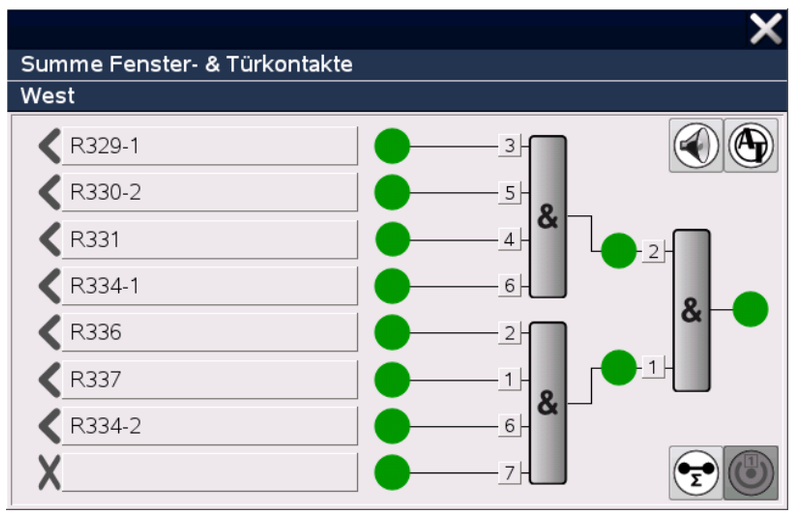
Priority commands and locking
The "Command priority" and "Command priority manual" commands can be used for prioritization. Interlocks can be used to block switching operations carried out by operators or automatic commands.

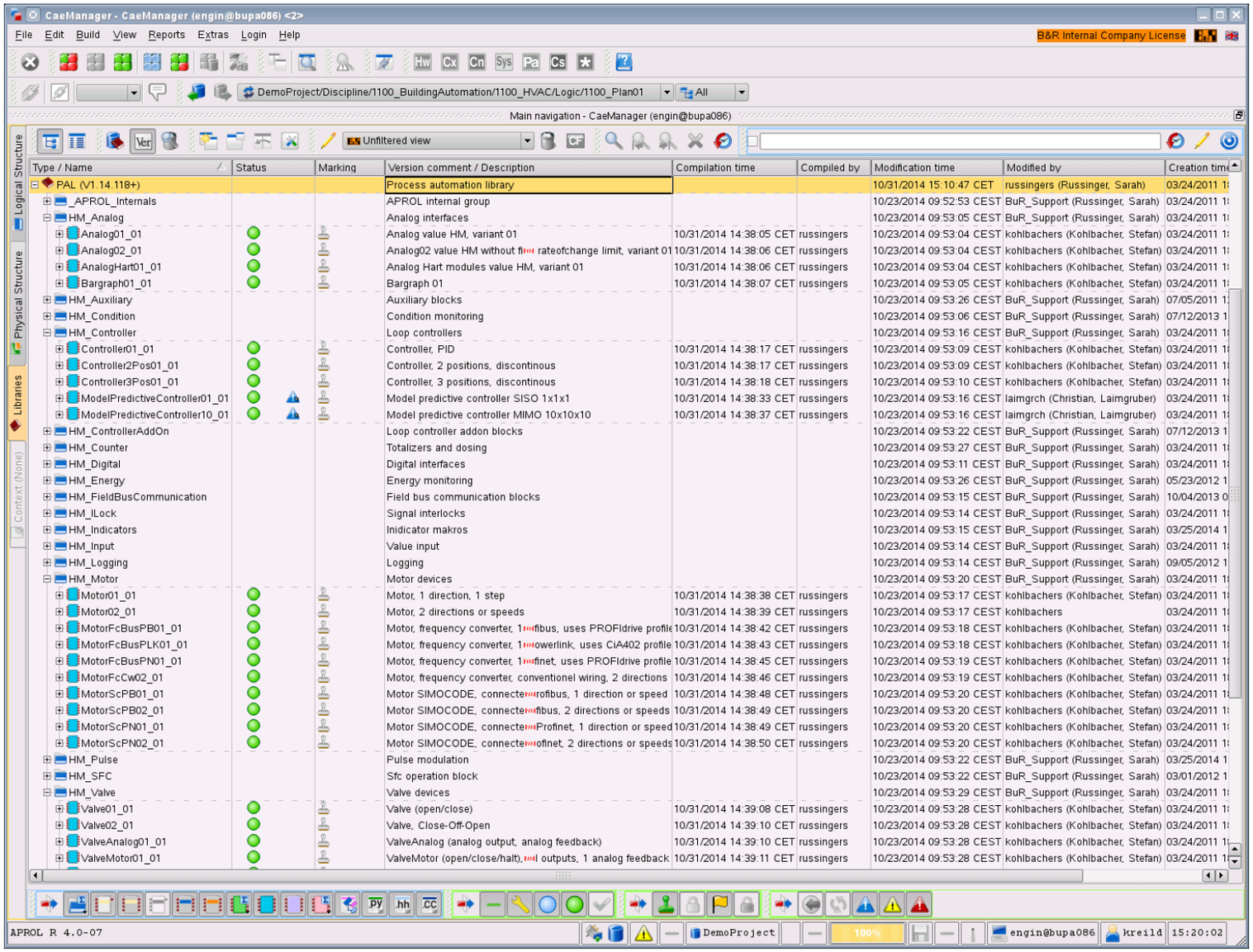
Simulation from the faceplate
Simulation of measured values is integrated in the faceplate to simplify the loop check.

Cascading interlock block
This configurable block is used to display, bypass and connect digital signals. The gate types it contains allow the flexible interconnection of input signals. Interlocking signals can be displayed flexibly with the incremental design option.

Analog value monitoring
This element offers additional scaling options in the faceplate. The average value filter can also be scaled to 30 s. Simulation is also possible by toggling between live/dummy values, and limit value monitoring can be performed for 3x high, 3x low and the rate of change.

Digital value monitoring
This block is used to display, bypass, standardize, delay, save, alarm and record trends for a digital input signal.




CaeManager - CaeManager (engin@bupa086) <2>
File Edit Build View Reports Extras Login Help
B&R Internal Company License
DemoProject/Discipline/1100_BuildingAutomation/1100_HVAC/Logic/1100_Plan01
All
Main navigation - CaeManager (engin@bupa086)
Unfiltered view
Logical Structure
Physical Structure
Libraries
Context (None)
Type / Name
Status
Marking
Version comment / Description
Compilation time
Compiled by
Modification time
Modified by
Creation time
PAL (V1.14.118+) Process automation library 10/31/2014 15:10:47 CET russingers (Russinger, Sarah) 03/24/2011 1
_APROL_Internals APROL internal group 10/23/2014 09:52:53 CEST BuR_Support (Russinger, Sarah) 03/24/2011 1
HM_Analog Analog interfaces 10/23/2014 09:53:05 CEST BuR_Support (Russinger, Sarah) 03/24/2011 1
Analog01_01 Analog value HM, variant 01 10/31/2014 14:38:05 CET russingers 10/23/2014 09:53:04 CEST kohlbachers (Kohlbacher, Stefan) 03/24/2011 1
Analog02_01 Analog02 value HM without fi rateofchange limit, variant 01 10/31/2014 14:38:06 CET russingers 10/23/2014 09:53:04 CEST kohlbachers (Kohlbacher, Stefan) 03/24/2011 1
AnalogHart01_01 Analog Hart modules value HM, variant 01 10/31/2014 14:38:06 CET russingers 10/23/2014 09:53:04 CEST kohlbachers (Kohlbacher, Stefan) 03/24/2011 1
Bargraph01_01 Bargraph 01 10/31/2014 14:38:07 CET russingers 10/23/2014 09:53:05 CEST kohlbachers (Kohlbacher, Stefan) 03/24/2011 1
HM_Auxiliary Auxiliary blocks 10/23/2014 09:53:26 CEST BuR_Support (Russinger, Sarah) 07/05/2011 1
HM_Condition Condition monitoring 10/23/2014 09:53:06 CEST BuR_Support (Russinger, Sarah) 07/12/2013 1
HM_Controller Loop controllers 10/23/2014 09:53:16 CEST BuR_Support (Russinger, Sarah) 03/24/2011 1
Controller01_01 Controller, PID 10/31/2014 14:38:17 CET russingers 10/23/2014 09:53:09 CEST kohlbachers (Kohlbacher, Stefan) 03/24/2011 1
Controller2Pos01_01 Controller, 2 positions, discontinous 10/31/2014 14:38:17 CET russingers 10/23/2014 09:53:09 CEST kohlbachers (Kohlbacher, Stefan) 03/24/2011 1
Controller3Pos01_01 Controller, 3 positions, discontinous 10/31/2014 14:38:18 CET russingers 10/23/2014 09:53:10 CEST kohlbachers (Kohlbacher, Stefan) 03/24/2011 1
ModelPredictiveController01_01 Model predictive controller SISO 1x1x1 10/31/2014 14:38:33 CET russingers 10/23/2014 09:53:16 CEST laimgrch (Christian, Laimgruber) 03/24/2011 1
ModelPredictiveController10_01 Model predictive controller MIMO 10x10x10 10/31/2014 14:38:37 CET russingers 10/23/2014 09:53:16 CEST laimgrch (Christian, Laimgruber) 03/24/2011 1
HM_ControllerAddOn Loop controller addon blocks 10/23/2014 09:53:22 CEST BuR_Support (Russinger, Sarah) 07/12/2013 1
HM_Counter Totalizers and dosing 10/23/2014 09:53:27 CEST BuR_Support (Russinger, Sarah) 03/24/2011 1
HM_Digital Digital interfaces 10/23/2014 09:53:11 CEST BuR_Support (Russinger, Sarah) 03/24/2011 1
HM_Energy Energy monitoring 10/23/2014 09:53:26 CEST BuR_Support (Russinger, Sarah) 05/23/2012 1
HM_FieldBusCommunication Field bus communication blocks 10/23/2014 09:53:15 CEST BuR_Support (Russinger, Sarah) 10/04/2013 0
HM_ILock Signal interlocks 10/23/2014 09:53:14 CEST BuR_Support (Russinger, Sarah) 03/24/2011 1
HM_Indicators Inidicator makros 10/23/2014 09:53:15 CEST BuR_Support (Russinger, Sarah) 03/25/2014 1
HM_Input Value input 10/23/2014 09:53:14 CEST BuR_Support (Russinger, Sarah) 03/24/2011 1
HM_Logging Logging 10/23/2014 09:53:14 CEST BuR_Support (Russinger, Sarah) 09/05/2012 1
HM_Motor Motor devices 10/23/2014 09:53:20 CEST BuR_Support (Russinger, Sarah) 03/24/2011 1
Motor01_01 Motor, 1 direction, 1 step 10/31/2014 14:38:38 CET russingers 10/23/2014 09:53:17 CEST kohlbachers (Kohlbacher, Stefan) 03/24/2011 1
Motor02_01 Motor, 2 directions or speeds 10/31/2014 14:38:39 CET russingers 10/23/2014 09:53:17 CEST kohlbachers 03/24/2011 1
MotorFcBusPB01_01 Motor, frequency converter, 1 fibus, uses PROFIdrive profile 10/31/2014 14:38:42 CET russingers 10/23/2014 09:53:18 CEST kohlbachers (Kohlbacher, Stefan) 03/24/2011 1
MotorFcBusPLK01_01 Motor, frequency converter, 1 owerlink, uses CiA402 profile 10/31/2014 14:38:43 CET russingers 10/23/2014 09:53:18 CEST kohlbachers (Kohlbacher, Stefan) 03/24/2011 1
MotorFcBusPN01_01 Motor, frequency converter, 1 finet, uses PROFIdrive profile 10/31/2014 14:38:45 CET russingers 10/23/2014 09:53:19 CEST kohlbachers (Kohlbacher, Stefan) 03/24/2011 1
MotorFcCw02_01 Motor, frequency converter, conventionel wiring, 2 directions 10/31/2014 14:38:46 CET russingers 10/23/2014 09:53:19 CEST kohlbachers (Kohlbacher, Stefan) 03/24/2011 1
MotorScPB01_01 Motor SIMOCODE, connecte rofibus, 1 direction or speed 10/31/2014 14:38:48 CET russingers 10/23/2014 09:53:20 CEST kohlbachers (Kohlbacher, Stefan) 03/24/2011 1
MotorScPB02_01 Motor SIMOCODE, connecte fibus, 2 directions or speeds 10/31/2014 14:38:49 CET russingers 10/23/2014 09:53:20 CEST kohlbachers (Kohlbacher, Stefan) 03/24/2011 1
MotorScPN01_01 Motor SIMOCODE, connecte Profinet, 1 direction or speed 10/31/2014 14:38:49 CET russingers 10/23/2014 09:53:20 CEST kohlbachers (Kohlbacher, Stefan) 03/24/2011 1
MotorScPN02_01 Motor SIMOCODE, connecte ofinet, 2 directions or speeds 10/31/2014 14:38:50 CET russingers 10/23/2014 09:53:20 CEST kohlbachers (Kohlbacher, Stefan) 03/24/2011 1
HM_Pulse Pulse modulation 10/23/2014 09:53:22 CEST BuR_Support (Russinger, Sarah) 03/25/2014 1
HM_SFC Sfc operation block 10/23/2014 09:53:22 CEST BuR_Support (Russinger, Sarah) 03/01/2012 1
HM_Valve Valve devices 10/23/2014 09:53:29 CEST BuR_Support (Russinger, Sarah) 03/24/2011 1
Valve01_01 Valve (open/close) 10/31/2014 14:39:08 CET russingers 10/23/2014 09:53:28 CEST kohlbachers (Kohlbacher, Stefan) 03/24/2011 1
Valve02_01 Valve, Close-Off-Open 10/31/2014 14:39:10 CET russingers 10/23/2014 09:53:28 CEST kohlbachers (Kohlbacher, Stefan) 03/24/2011 1
ValveAnalog01_01 ValveAnalog (analog output, analog feedback) 10/31/2014 14:39:10 CET russingers 10/23/2014 09:53:28 CEST kohlbachers (Kohlbacher, Stefan) 03/24/2011 1
ValveMotor01_01 ValveMotor (open/close/halt), l outputs, 1 analog feedback 10/31/2014 14:39:11 CET russingers 10/23/2014 09:53:28 CEST kohlbachers (Kohlbacher, Stefan) 03/24/2011 1
APROL R 4.0-07
DemoProject
100%
engin@bupa086
kreild
15:20:02

Automation Studio - APROL Edition

Integration of Automation Studio in APROL R 4.0

The integration of Automation Studio in APROL R 4.0 makes it possible to utilize many Automation Studio functions.

Hardware view

This view shows the active hardware tree for the selected configuration. Each component in this view can be configured by changing its property settings.

I/O configuration and I/O mapping

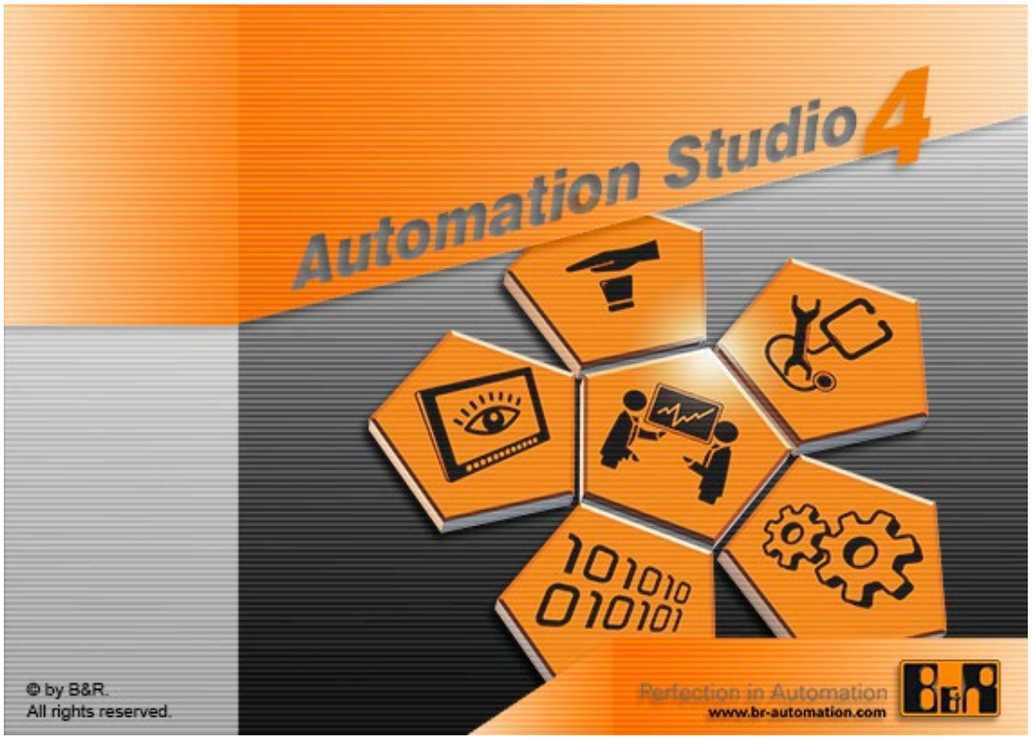
All the interface modules needed in the hardware configuration can be conveniently inserted and configured at the appropriate interfaces or on the local I/O bus.

Monitor mode

When monitor mode is turned on, the I/O modules and their channels that are configured in the project can be physically tested and the physical values of each channel can be displayed. Outputs can be set independently of the logical value assigned in the program.

Integrated visualization

The visualization system integrated in Automation Studio is an effective tool that can be used to create line displays or control integrated or remote XGA displays with keys and touch screens. Integrating the HMI application in the controller eliminates the time needed by remote visualization for communication tasks.



Diagnostic tools
Automation Studio provides a wide selection of diagnostic tools. These are divided into tools for reading control information and tools for optimizing the system.

System logbook
The Automation Runtime system records all error, warning, and and information messages that occur during runtime in nonvolatile memory. Additionally, user information can also be entered in this system log. This information can be read out as long as there is a connection with the system logbook, Automation Studio or another system tool.

Profiler
The profiler integrated in Automation Studio allows the runtime system to be analyzed with regard to system usage (load). The information gained from the profiler can be used to optimize the project, and in turn, the load on the runtime system.

AS help system
The help system in Automation Studio provides the user with comprehensive hardware and software documentation.

Scalability and investment protection
An integral component of Automation Studio is the real-time operating system, the software kernel that allows applications to run on a target system.

Fieldbus systems
In Automation Studio, a fieldbus device is added like an I/O module to the corresponding fieldbus interface. Configuration and I/O assignments take place in the project hardware tree, just like for all I/O modules. The import function provides a uniform interface for importing device descriptions from the various providers (GSD, EDS, etc.).

Automation Studio libraries
Automation Studio provides IEC 61131-3 libraries as well as additional functions for: runtime, diagnostics and system information; communication to other controllers and I/O systems; closed loop control systems, visualization systems and positioning tasks. This covers all the functions needed for all programming languages.

Process simulation
As the quality requirements in the automation industry increase, the requirements for system and control technology solutions also increase. To meet these requirements, it's necessary to have meaningful and realistic simulation models, which make it possible to make assessments in advance about the system behavior of implemented automation solutions. Preliminary verification is especially important for safety-related applications. For applications that are less critical, simulation is also an extremely helpful tool, which developers have come to rely on heavily. B&R provides an I/O switchboard based on an open simulation protocol integrated in Automation Studio and the optional programs MATLAB®/Simulink®. These are two powerful tools that can be used to meet these high demands.

I/O simulation
Based on an open simulation protocol, I/O points on the controller can be simulated graphically in Automation Studio. The I/O switchboard is an independent application - integrated in Automation Studio - for graphic simulation of I/O states on a controller.

CaeManager - Hardware configuration

Hardware view

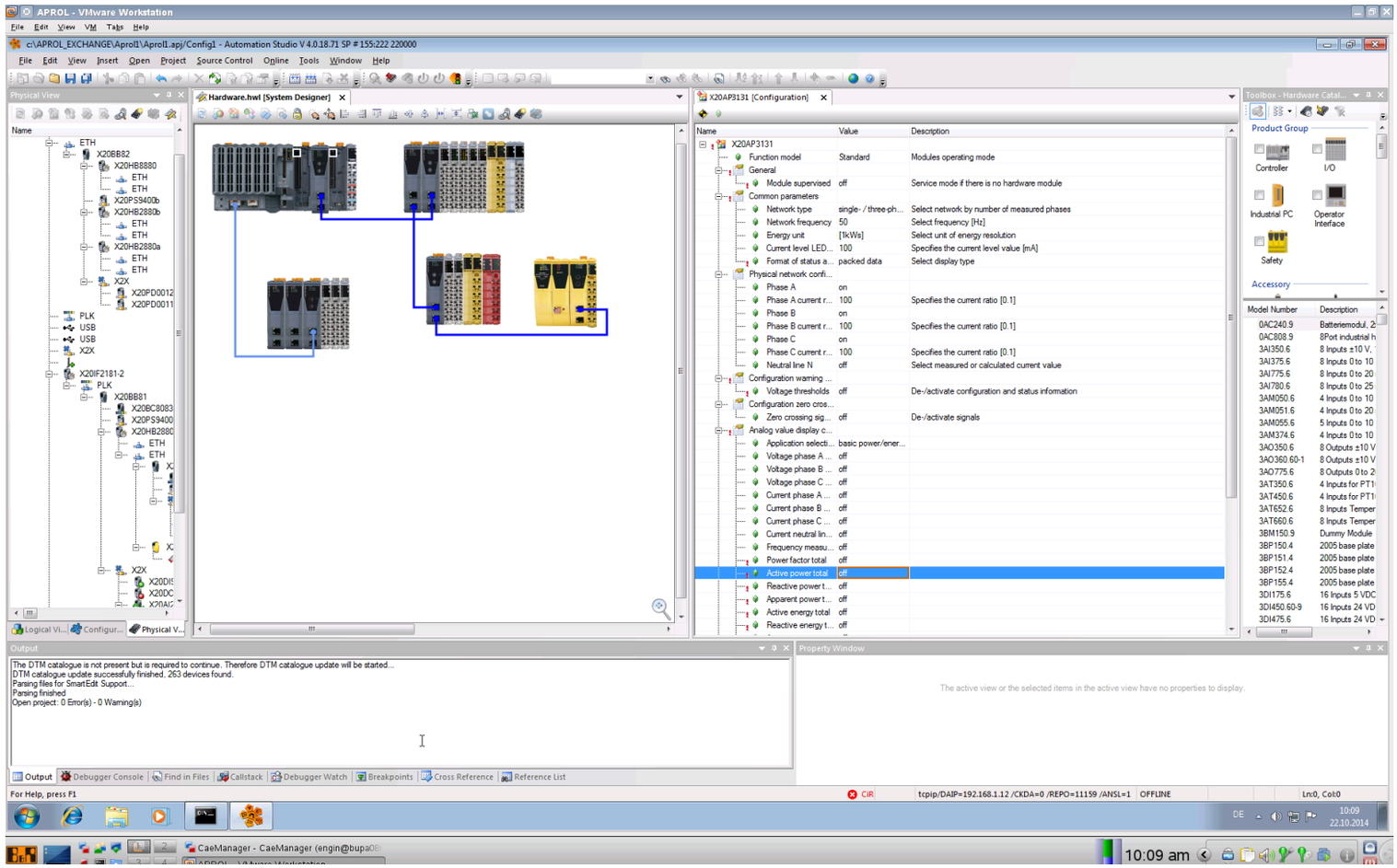
This view shows the hardware tree for the selected configuration. Each component in this view can be configured by changing its property settings.

Graphical configuration

Fully graphical configuration for controllers (including fieldbus modules) as well as the centralized and decentralized I/O and fieldbus modules.

Integrated visualization

Graphical configuration of the integrated visualization (VC) for Power Panels.



I/O mapping

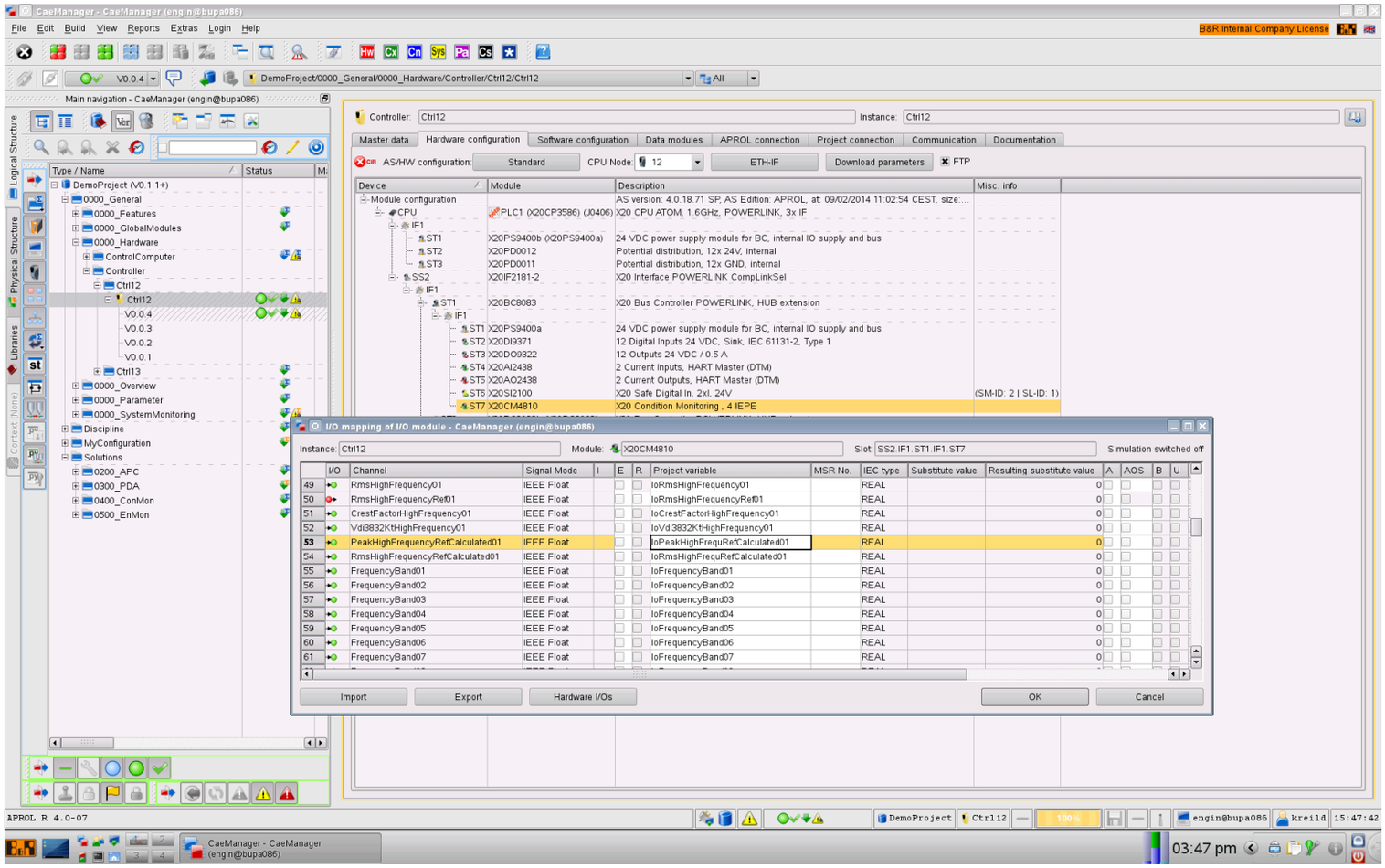
Assignments for I/O cards and I/O channels (MSR number, measurement start and end, physical device) are stored and maintained at a central location (I/O mapping).

Importing I/O assignments

I/O card assignments can also be imported using an import interface.

Project-specific hardware tree

A project-specific hardware tree shows the actual mounting locations of all hardware components in the process control system.



CaeManager - Fieldbus configuration

Fieldbus configuration

In Automation Studio, a fieldbus device is added like an I/O module to the corresponding fieldbus interface.

Configuration in the hardware tree

Configuration and I/O assignments take place in the project hardware tree, just like for all I/O modules.

Import function for device descriptions

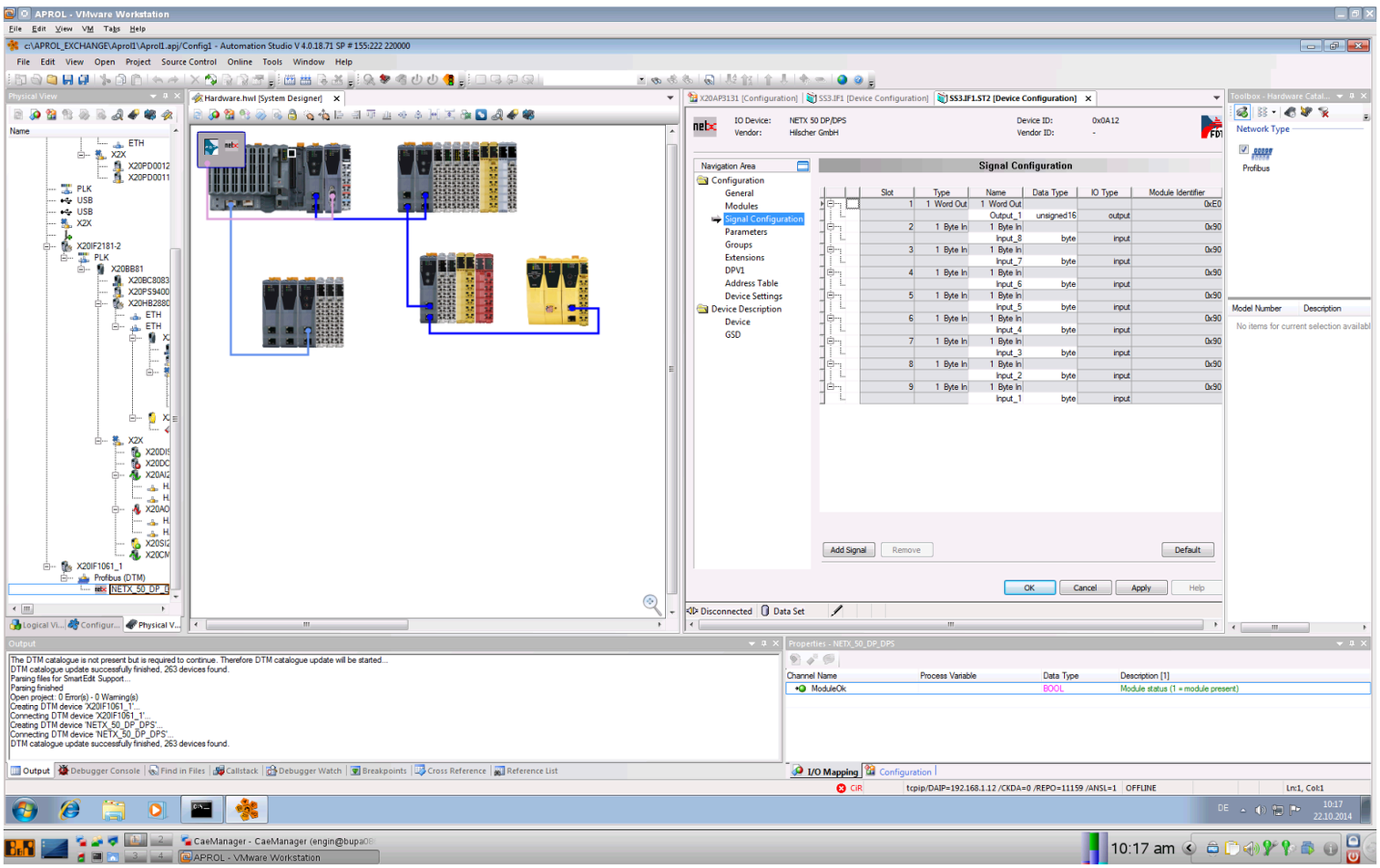
The import function provides a uniform interface for importing device descriptions from the various providers (GSD, EDS, etc.).

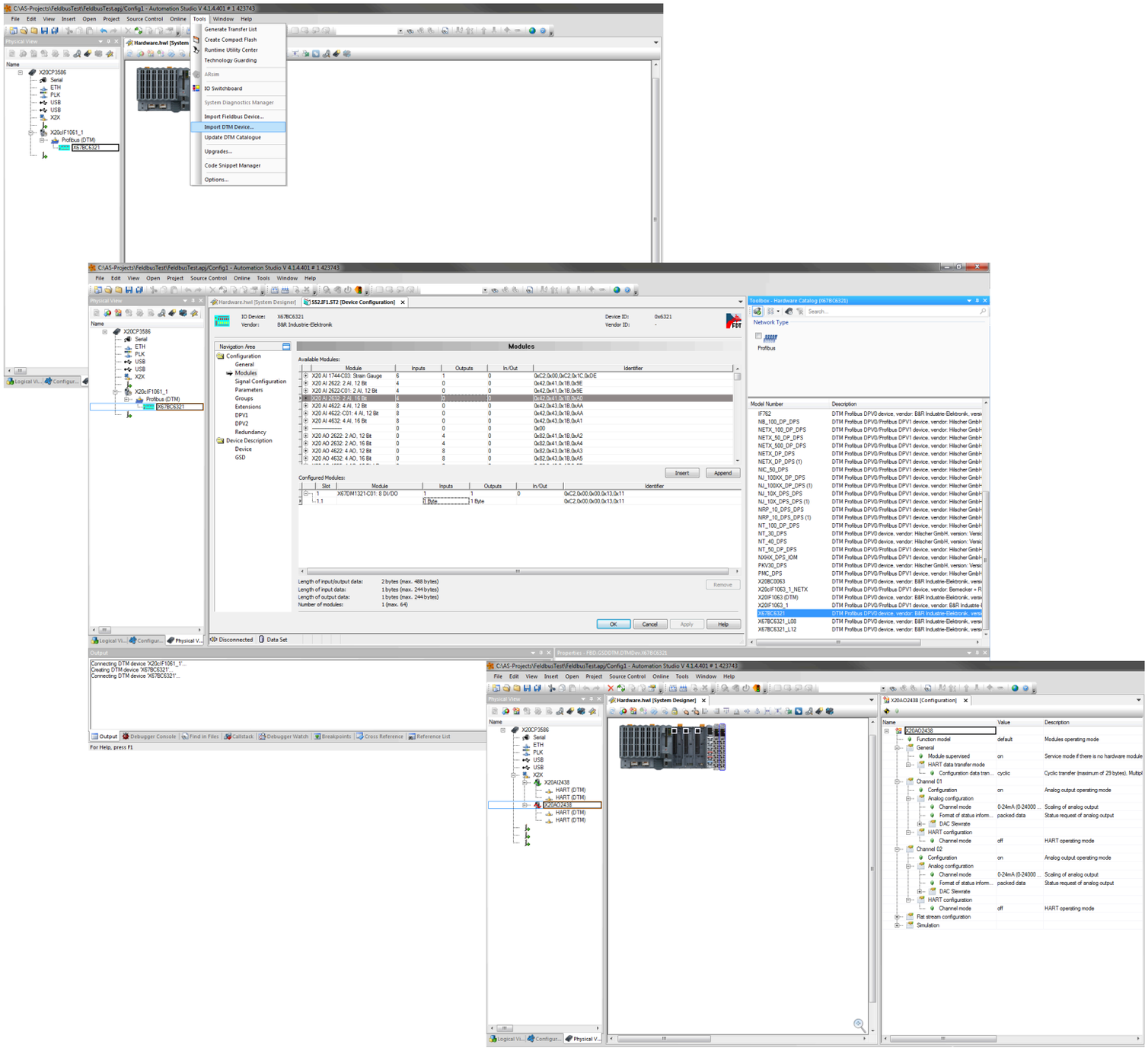
Complete integration in the Automation Studio hardware configuration

The import function for device descriptions (.GSD, .EDS, etc.), conversion to HWC file as well as the display of the fieldbus modules in the Automation Studio (AS) hardware tree are all handled in the hardware configuration.

Fieldbus integration / Available fieldbus technologies

- POWERLINK
- PROFIBUS DP
- Modbus TCP
- CANopen




C:\AS-Projects\FeldbusTest\FeldbusTest.apj/Config1 - Automation Studio V 4.1.4.401 # 1 423743
File Edit View Insert Open Project Source Control Online Tools Window Help
Generate Transfer List
Create Compact Flash
Runtime Utility Center
Technology Guarding
ARsim
IO Switchboard
System Diagnostics Manager
Import Fieldbus Device...
Import DTM Device...
Update DTM Catalogue
Upgrades...
Code Snippet Manager
Options...
Hardware.hwl [System Designer]
SS2JF1.ST2 [Device Configuration]
Modules
Available Modules:
Configured Modules:
Toolbox - Hardware Catalog (X67BC6321)
Network Type
Profibus
Output
Connecting DTM device 'X20ciF1061_1'...
Creating DTM device 'X67BC6321'...
Connecting DTM device 'X67BC6321'...
X20AO2438 [Configuration]

CaeManager - CFC (Continuous Function Chart)

IEC 61131-3 - CFC (Continuous Function Chart)

CFC (Continuous Function Chart) is a language similar to FBD (Function Block Diagram)

Technology functions created via configuration

CFC can be used to configure technology functions through easy and convenient integration of function blocks (e.g. AND, OR, PID controller, limiting functions, counters, monitoring function blocks, etc.). This completely eliminates the need for time-consuming programming that can be prone to errors.

Graphical user interface

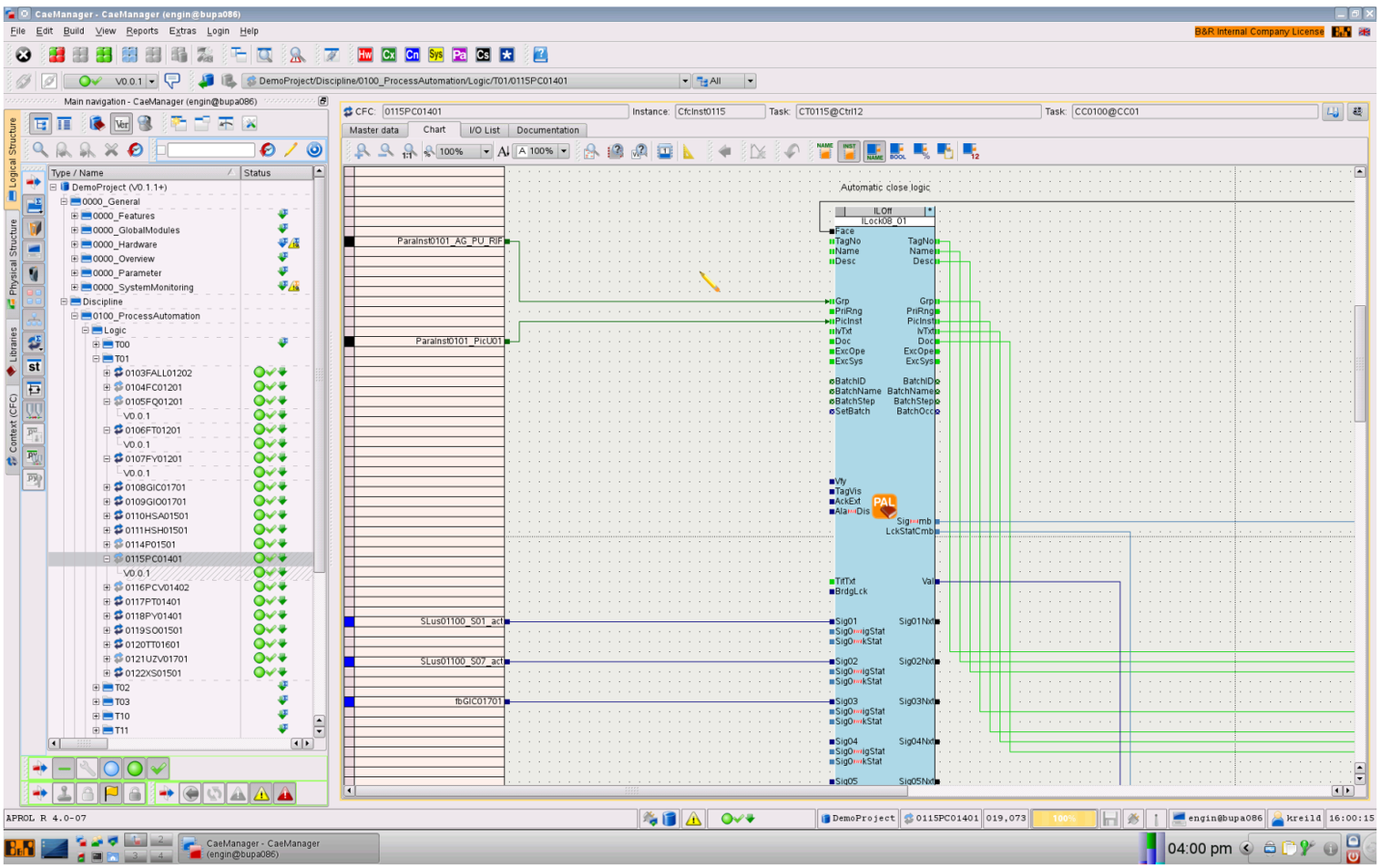
The CFC Editor is a type of graphical character interface which allows pre-defined blocks to be placed anywhere and connected with one another as needed.

I/O border as interface

The I/O border represents the interface to all of the variables in the system. Variables can be moved into a field from corresponding variable lists using drag-and-drop.

Extensive CAE libraries

The CAE function blocks contained in the APROL libraries (or libraries created by the user) are moved into the function chart using drag-and-drop. Scalable blocks (changeable number of inputs and outputs) are used to create logic with an exceptionally clear and organized overview. Default libraries are included with APROL that provide predefined blocks for the most important functions of a process control system. Furthermore, custom blocks can also be easily created and managed in customer libraries.



Auto-router creates optimum connection lines

The auto-router implemented in the CFC Editor automatically draws an optimum line between two selected points.

Hyper macro ("CFC in CFC")

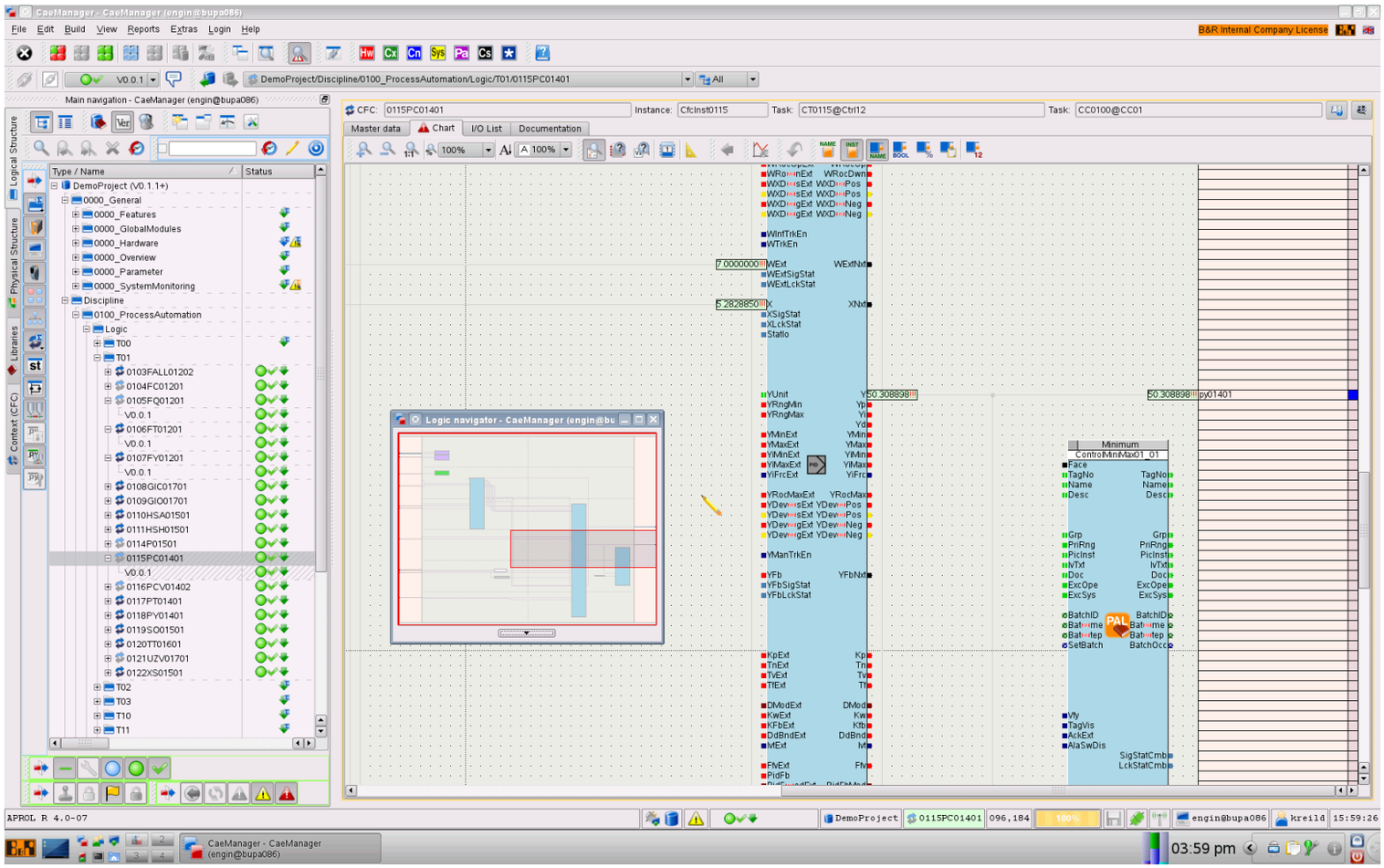
A CFC chart can be encapsulated in a block (hyper macro), making it available via a library as block for placement in a CFC chart. As a result, any changes made to the block are automatically implemented in all charts (instances).

CFC navigator

The function chart navigator is used to display and navigate the entire chart at the same time.

Debugging view (online mode)

The CFC chart can also be shown with real-time values for debugging purposes (online mode).



CaeManager - SFC (Sequential Function Chart)

IEC 61131-3 - SFC (Sequential Function Chart)

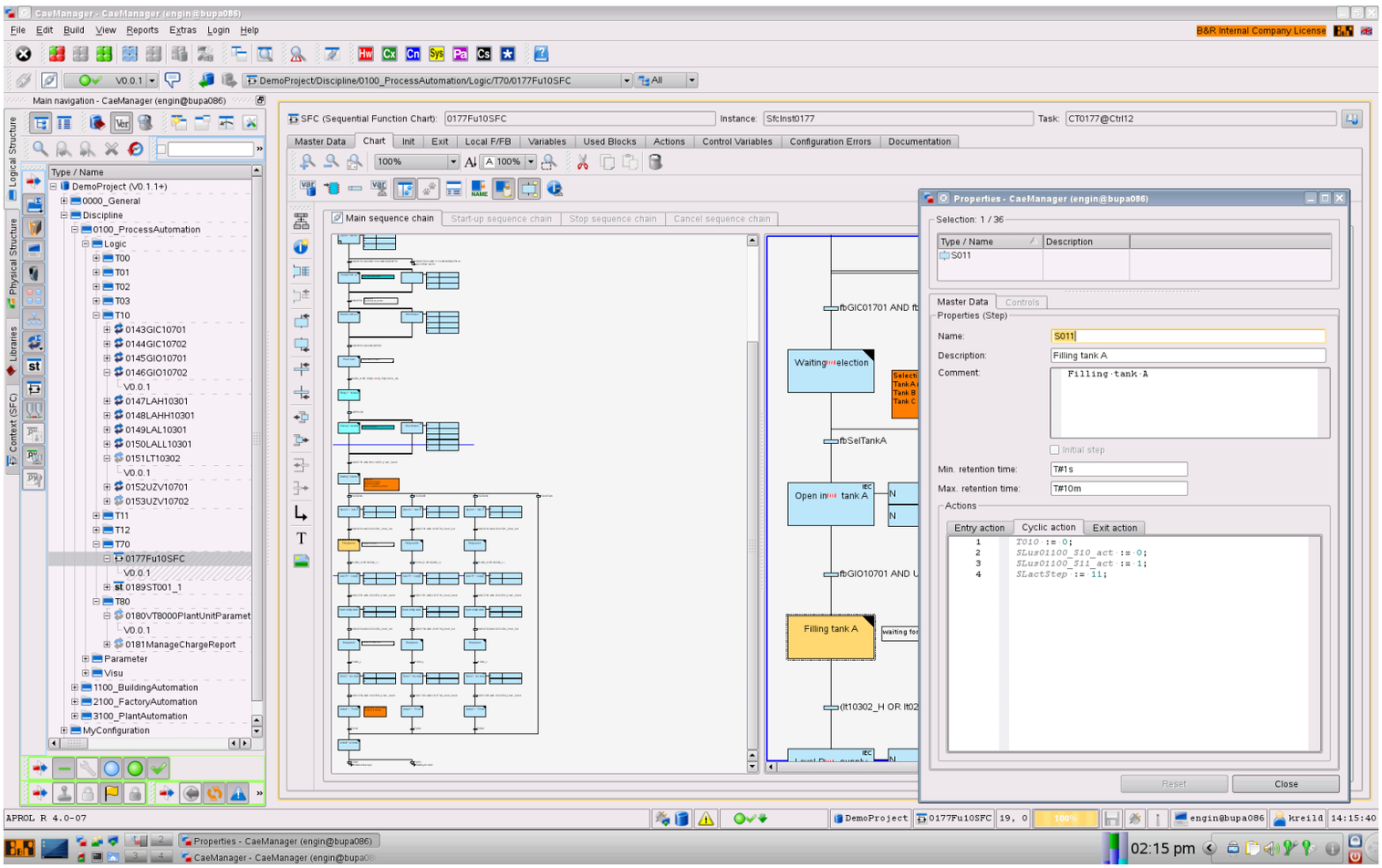
SFC is a graphics-based language that clearly illustrates control sequences. It is well-suited for both time-oriented as well as event-oriented procedures. Sequential Function Chart consists of a chain of control steps that are linked by switching conditions.

Visual programming with offline/online display

SFC enables easy, graphic configuration and implementation of sequential controls. Sequential control allows state or event-controlled execution of production processes.

SFC controls CFC

Sequential control uses basic automation functions created with CFC by selectively changing modes and states in the individual steps For example, sequential control allows the manufacturing guidelines for products to be described as event-controlled processes (recipes).

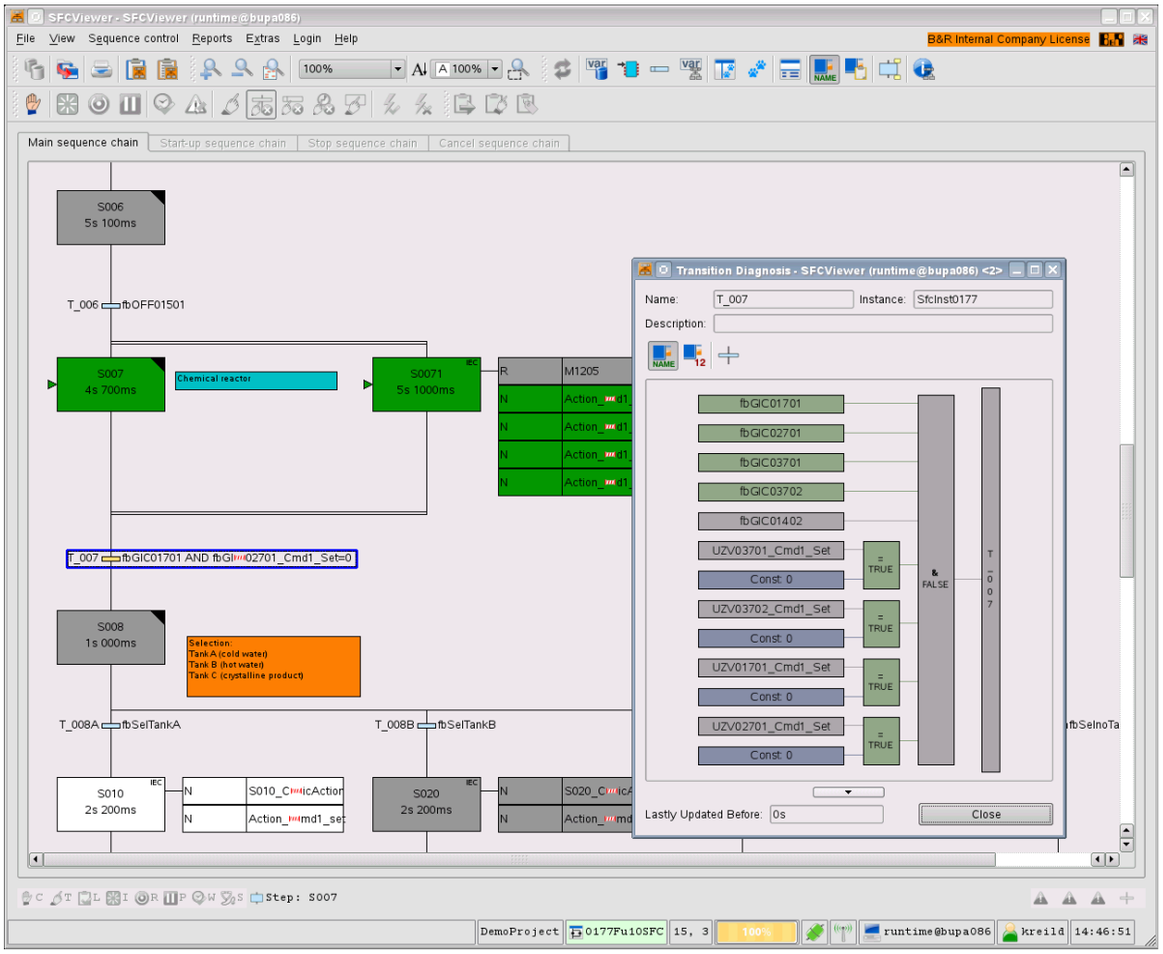


SFCViewer and PAL blocks

Manual intervention in the sequence is possible at any time via the SFCViewer or a PAL block.

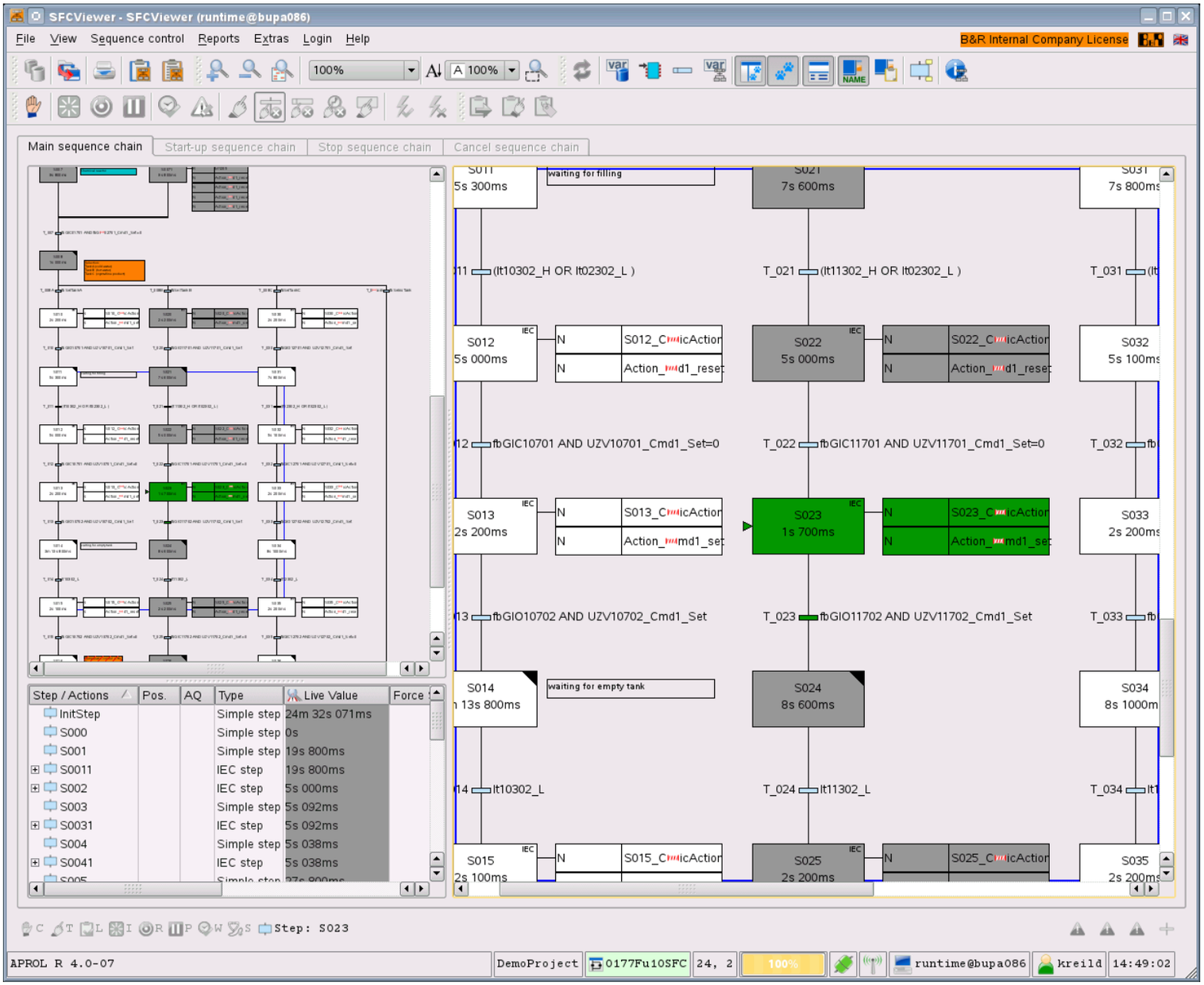
Transition diagnostics

Integrated transition diagnostics make it possible to quickly analyze transition conditions.



CaeManager - SFC (Sequential Function Chart)

Clear handling
An optimal overview of the entire process sequence is available using an additional step list and tracking view.



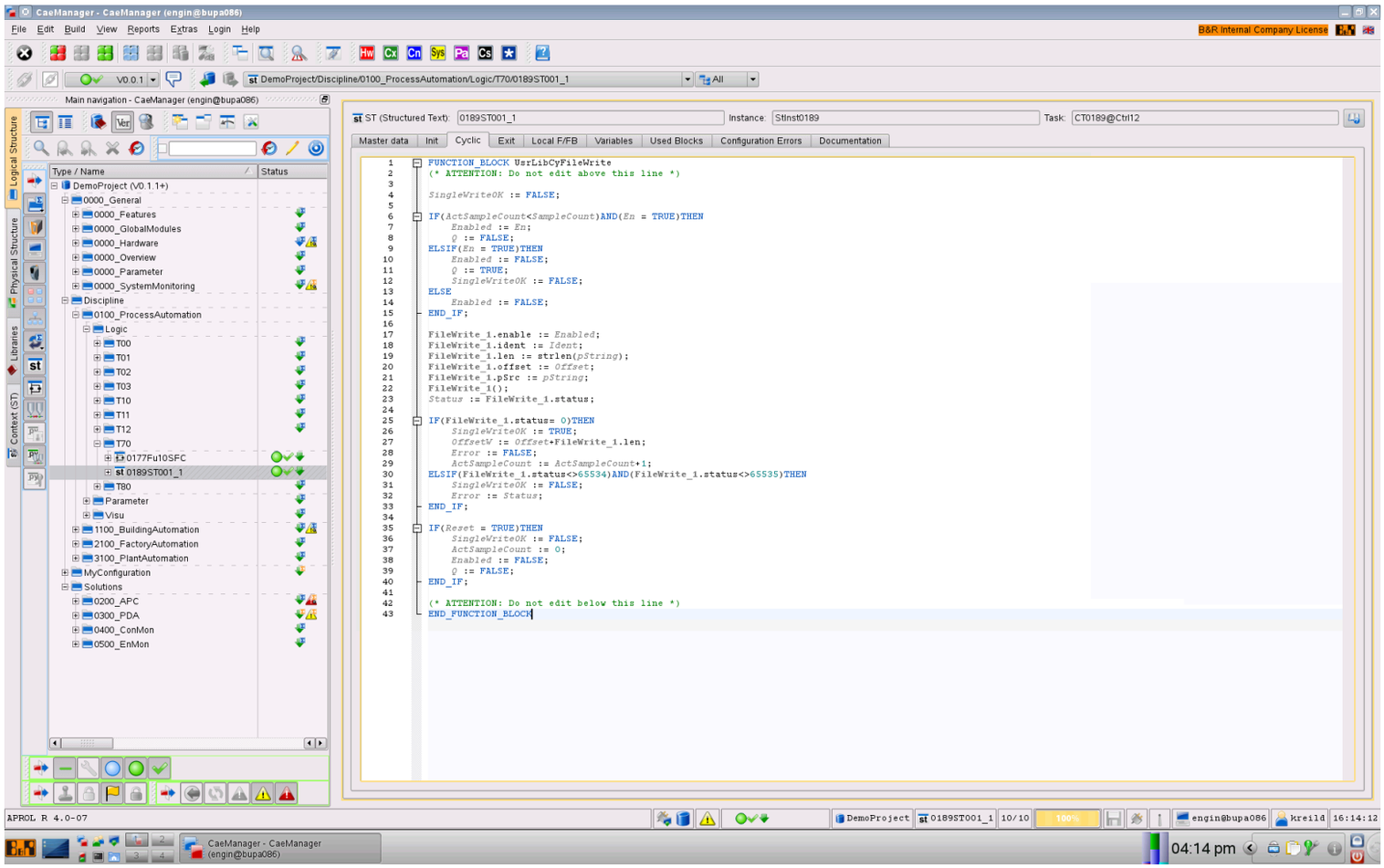
CaeManager - ST (Structure Text)

IEC 61131-3 - ST (Structured Text)

ST is a high-level language following the example of Pascal for structured programming. It is the most commonly used IEC 61131-3 language. ST offers extensive structuring options and is also frequently used in place of IL (Instruction List).

High-level language constructs for conditional programming

ST exceptionally well suited for conditional programming and for programming loops due to the high-level language constructs allowed, such as IF, WHILE, CASE and FOR. This is why experienced programmers familiar with high-level languages and 'C' or Pascal become immediately skilled with the high-level language ST.



CaeManager - Process graphics

Creating process graphics

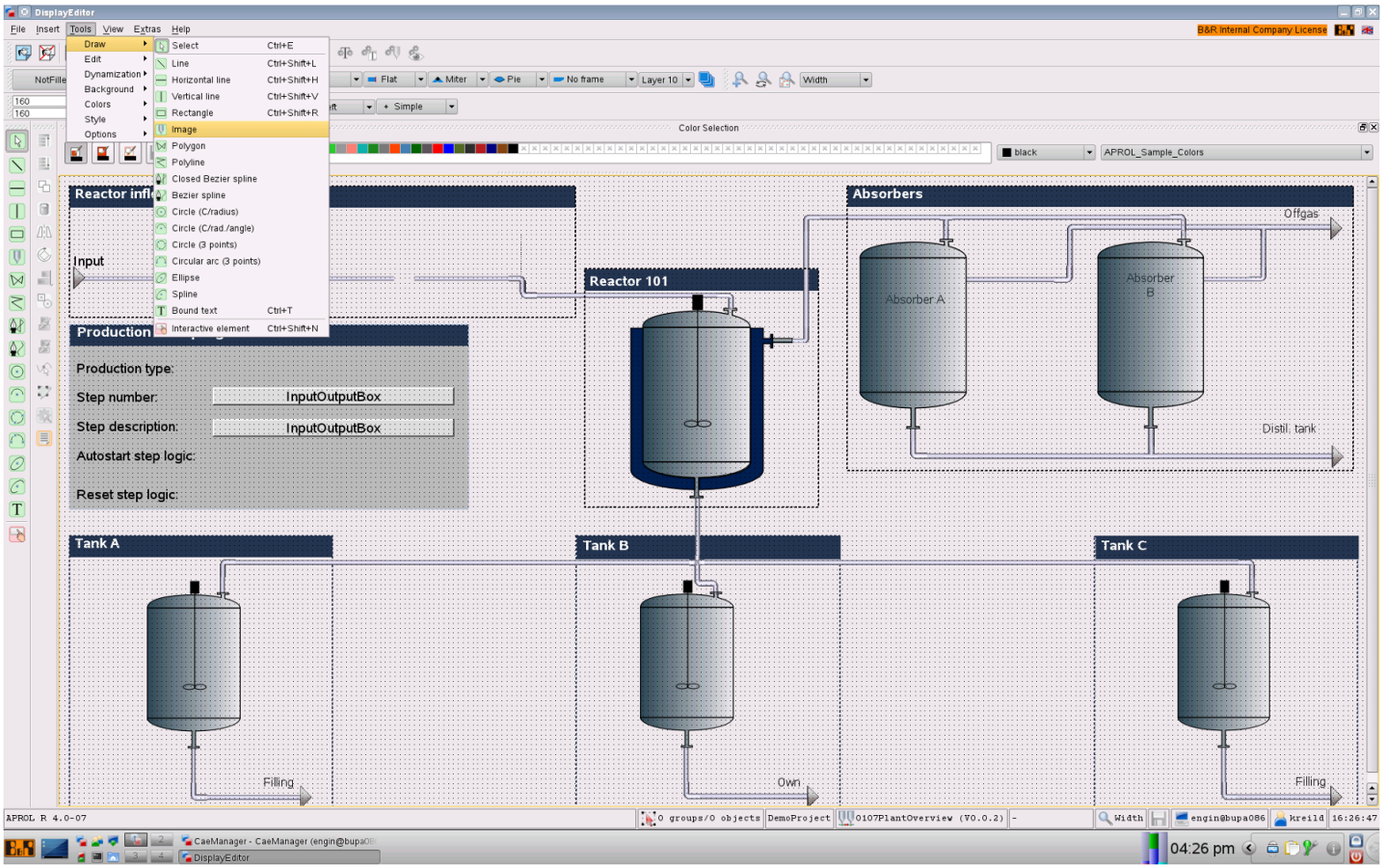
The static process graphic (background picture) without animation is created using the integrated DisplayEditor.

All image formats accepted

Any image formats (.jpg, .gif, .bmp, .tif, etc.) can be used as the background image.

Animated graphic blocks

Animated graphic blocks are moved from the function chart / hyper macro to the static process diagram using drag-and-drop.



Value assignments made in the CFC chart

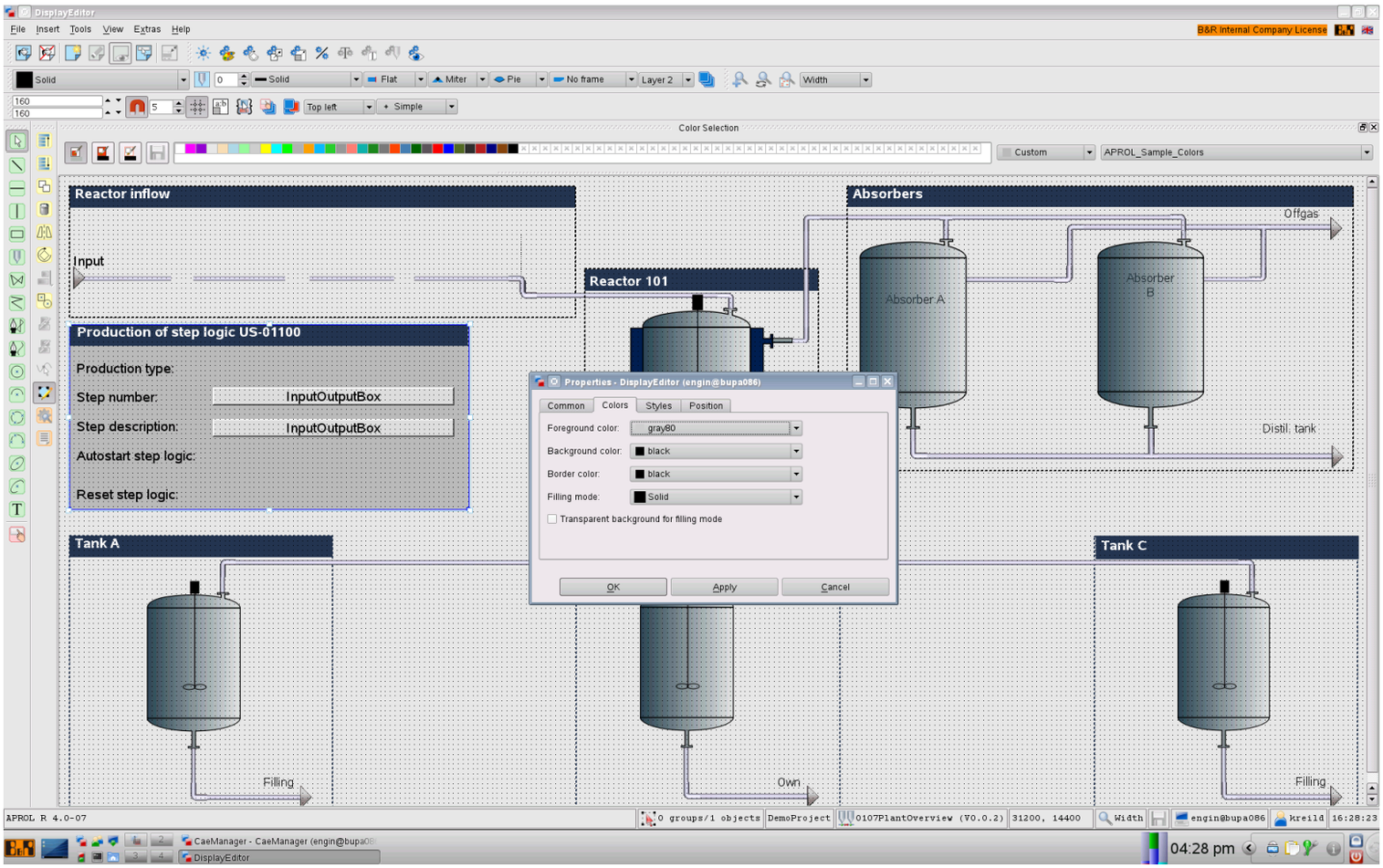
Graphic blocks are already connected with the process variables in the function chart / hyper macro, which alleviates the need to assign the graphic to the logic or variables later.

Creating process graphics with images, widgets and graphic macros

Images, widgets, and image macros are provided in the system for creating diagrams.

Zoom function allows multi-page process graphics

Process graphics that span several pages can be created easily and used conveniently using the zooming function. Configurable zoom factor for navigation.



CaeManager - Visual Components

Integrated visualization

Automation Studio provides the user with an easy-to-use tool for creating visualizations. These visualizations can be displayed on line displays and on integrated or remote XGA displays with keys and touch screen.

Characteristics of the visualization system

- Creation of process graphics using WYSIWYG tool
- Display of process graphics on the target system
- Common management of both the visualization and controller projects
- Support for displays from 2x 20 characters to XGA resolution
- Interactions via keys and touch screen
- Flexible key assignments for hardware keys and touch buttons
- Structured arrangement of visualization components in the project
- Controls for designing process images
- Language switching with Unicode support
- Management and display of current and past alarms
- Display of trend data
- Style sheets for managing the default properties of objects (GUI template)
- Management of and access to process data
- Unit switching
- Scaling and limiting process data
- Open user interface (API)
- Terminal mode
- Visualization via VNC connection

Controls

The visualization environment contains all the controls needed to create a process image. These controls can be connected to the process variables of the control program in order to animate the process graphics during runtime.

Tools

A comprehensive selection of tools is available in the context sensitive toolbar for creating professional process images. These tools will help you design a visually appealing visualization.

Project management

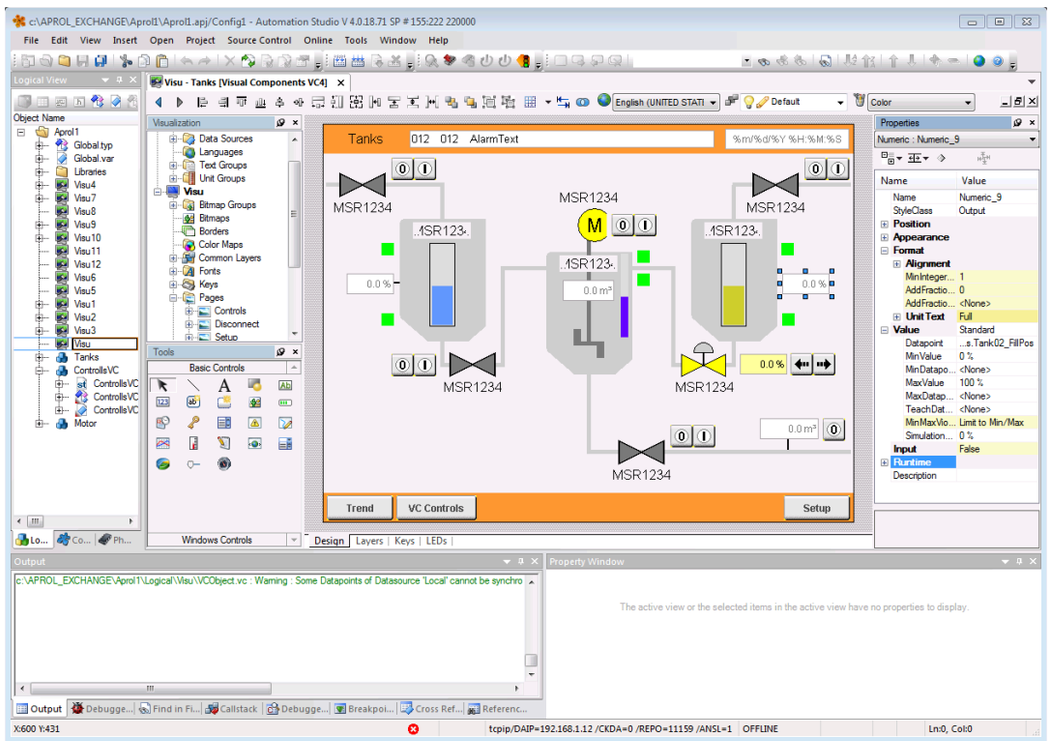
The visualization components are arranged in logical folders.

Property sheets

Every visualization component can be configured using the property sheet. This makes configuration simple and consistent.

Style sheets

The appearance of visualization objects can be configured using style sheets. This eliminates the tedious task of adjusting the properties of individual components. Styles can be used to adapt the GUI to the customer's needs.



Graphics
Graphic files can be combined and managed in logical groups.

Image layers
Every process graphic can be divided into several layers. These layers can be combined as needed and animated during runtime. Layers allow recurring image information to be defined centrally and adjusted with the simple addition of new elements.

Symbol library
A symbol library is created when installing Automation Studio. This library contains more than 6000 graphics and symbols in GIF, BMP or PNG format, which can be used anywhere in Visual Components. These graphics are divided into directories based on their functions.

Languages
To make the use of different languages more convenient, texts can be organized according to language, adapted to the project, and translated.

Character sets
In addition to multilingual support, the integration of TrueType Fonts makes Visual Components the perfect solution for international use.

Bidirectional mode
Visual Components supports the display of text from right-to-left.

Color palette
The colors of all process images are managed and set centrally using the color palette. This ensures a consistent appearance for all elements of a visualization.

Text groups
Texts for larger visualization applications are easier to manage and assign when they are combined in text groups.

Physical units
Physical units are sorted by group, which simplifies working with physical values of all types.

Data points
To create a complete visualization project without programming, the integrated data point management system allows the process variables from the control program to be easily connected with properties of a visualization object to control the runtime behavior.

Alarm system
Alarms are used to record and respond to certain system states. Alarms can be displayed in messages, warnings, and alarms by dividing them into alarm groups.

Trend system
The trend system provides a comprehensive range of tools for configuring the display of trend data.

Terminal mode
The visualizations configured in Automation Studio are sent from the control unit or a local visualization, and run on a Power Panel terminal connected via Ethernet. An image from the local visualization or a visualization created specifically for the terminal can be displayed.

Security login

Comfortable user management for the engineering environment and projects

User management provides easy and efficient rights management for the users of the engineering system. (The rights for runtime and operator systems are managed in the OperatorManager.) User management is divided into global rights for the engineering environment and project-specific rights.

Pre-defined templates with typical user profiles

Pre-defined user profiles are provided as templates to make the assignment of rights easier. The typical rights for service, guests, engineers and administrators can be assigned to new users using drag-and-drop. Rights can also be assigned from user A to user B separately or in groups using drag-and-drop.

Unlimited number of templates and users

You can create as many templates as necessary. There is also no limit to the number of users. A user's assigned and unassigned rights can be displayed in any application. Data exchange is possible via export and import in the XML format.

Security login

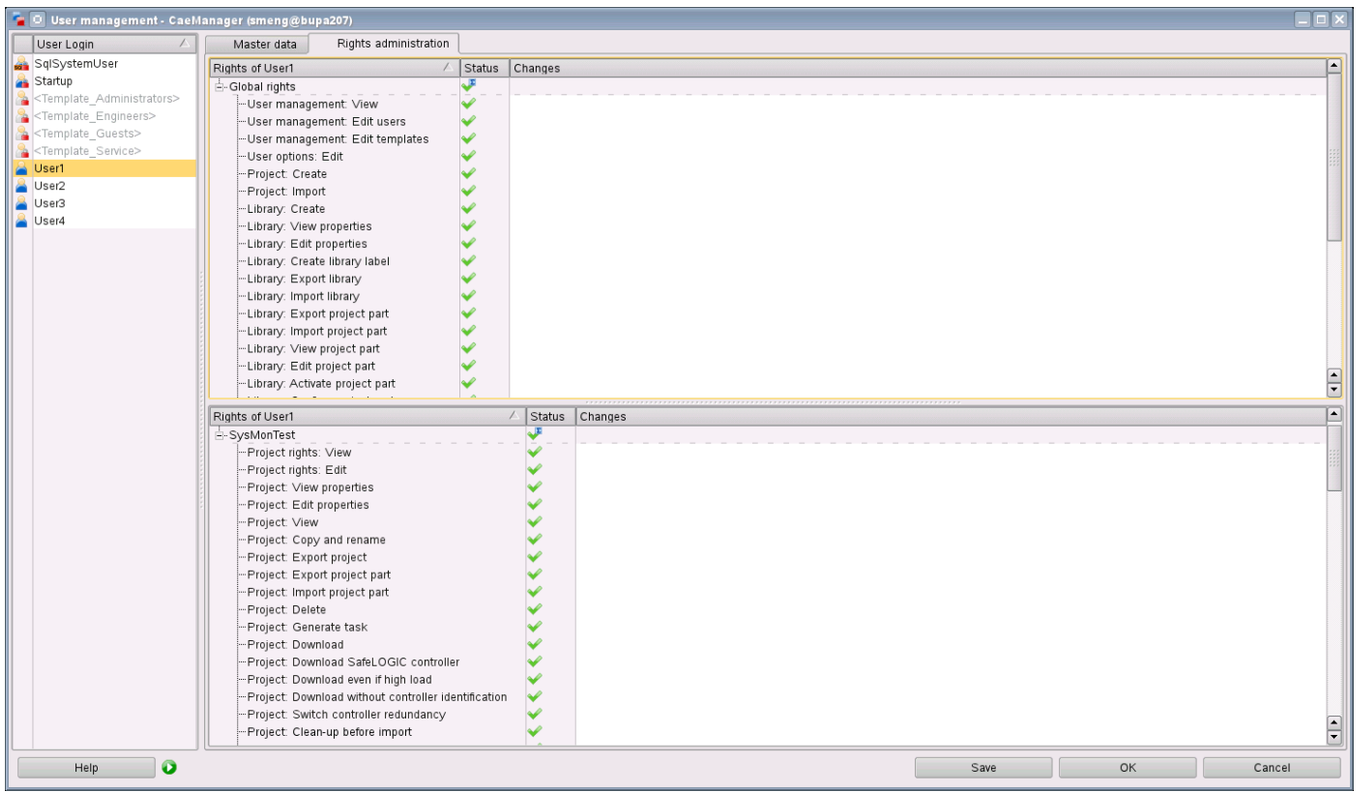
The user logs into the engineering system using the username and password (two component authorization) and receives the specified authorization for work in the libraries and in the projects from the user management.

Clear definition of possibilities for changing configuration elements

To help adhere with the FDA and GAMP Forum guidelines (21 CFR Part 11 and GAMP4, respectively), access to the individual configuration elements in the libraries and in the projects is differentiated in regard to viewing, editing, activating, confirming and downloading:

ChangeControl contains relevant detailed information

All relevant data such as login, logout and changes are recorded by the ChangeControl for full description of the action.



ChangeControl

ChangeControl is used to monitor all Engineering actions

All relevant user actions in the engineering environment are recorded in a database called the ChangeControl. ChangeControl represents the AuditTrail of the engineering environment.

ChangeControl contains relevant detailed information

All relevant data is recorded for a complete description of the action.
The action types activate / deactivate, compile, assign version, confirm / remove confirmation, etc are written to the data record in addition to the project engineering, library engineering, user management and DownloadManager.

ChangeControl system function runs without prior configuration

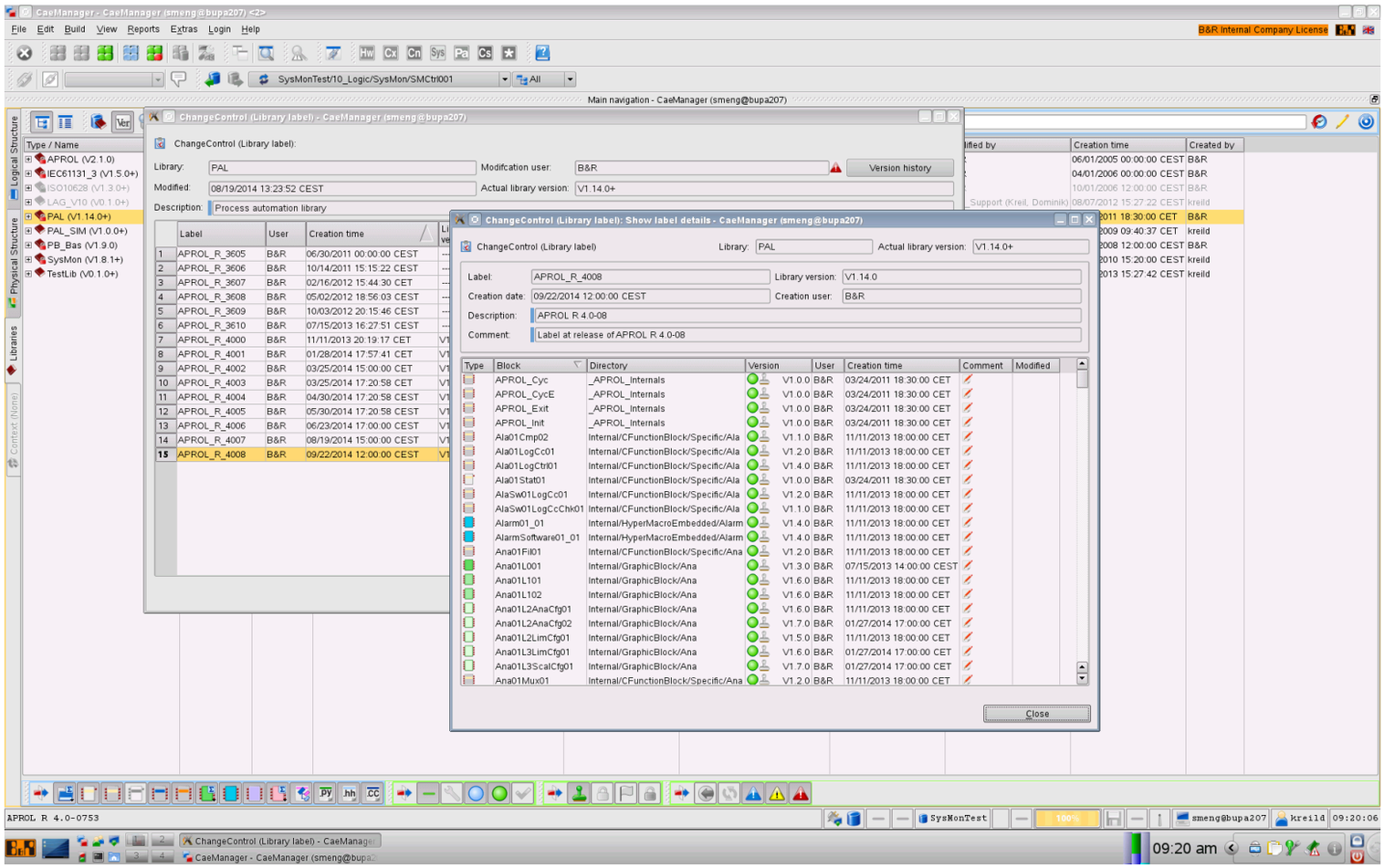
ChangeControl is always started automatically (no configuration needed / prevents configuration errors). This means that the ChangeControl data is always available.

Labeling libraries

Labeling puts a "stamp" on an entire library and sets delete protection for all activated blocks.

Confirming versions of configuration elements

Configuration elements can be confirmed. This clearly indicates that the element version is functional, tested and accepted.



ChangeControl

Labels allow selective rollback

The system offers a mechanism for reverting back to previous versions of the individual project elements. The use of labels in libraries makes it possible to group many different versions of the blocks and to save this information as a label. As a result, any subsequent changes made to the label will switch library blocks to a common previous version.

A comparison of two labels shows the differences between the libraries

Information is displayed about which user created or changed an individual block. The different blocks in the two libraries are also displayed.

ChangeControl report can be queried with filter functions

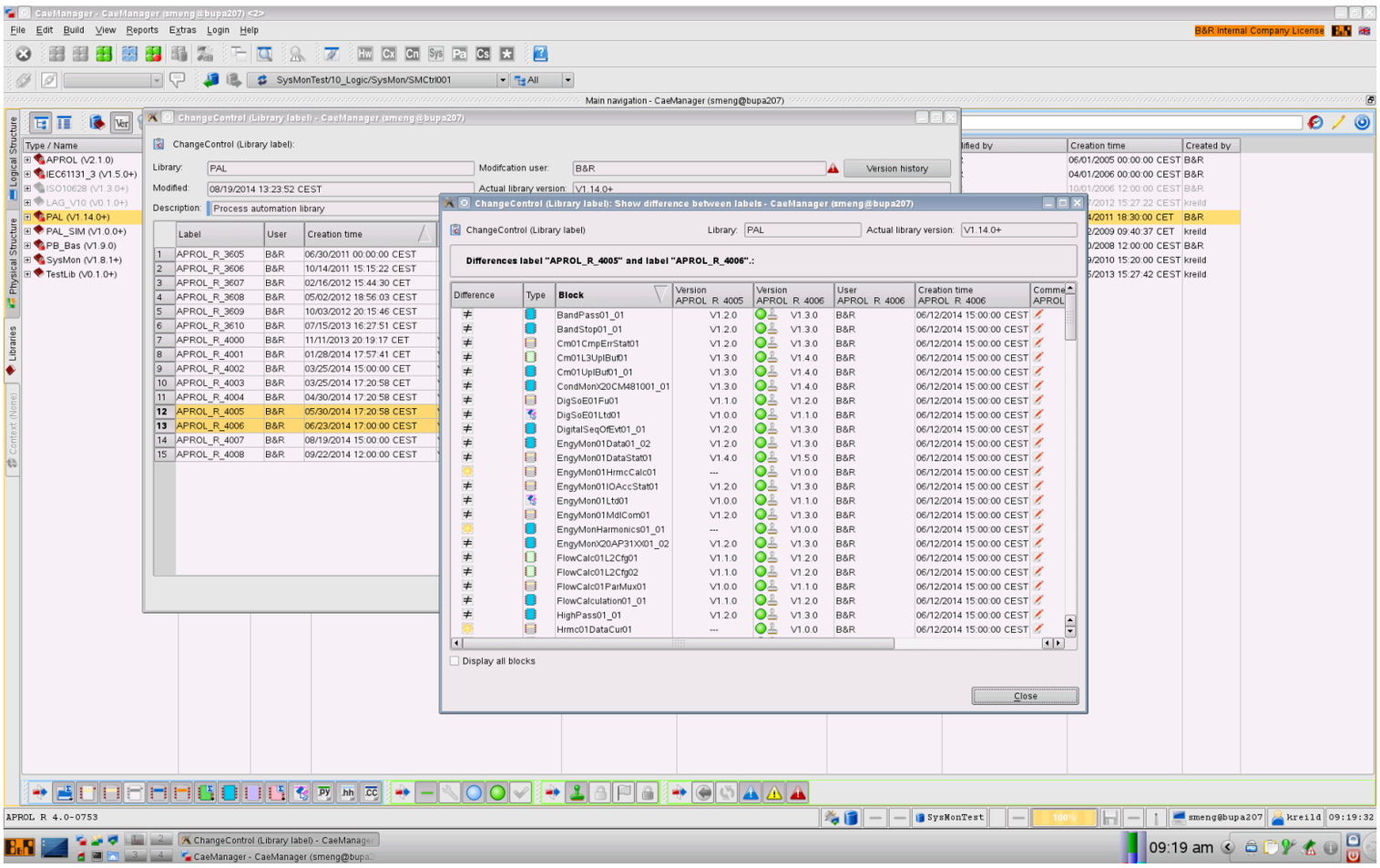
Filters enable you to specifically create a display of the desired change control data. The data can easily be exported as an HTML file. The recorded data cannot be modified or deleted, making it virtually impossible to manipulate and satisfying a key FDA requirement according to 21 CFR Part 11.

Version as unique ID for a project element

All project elements have a unique version number. When changes are made, a new version is automatically assigned and the previous version is saved in the APROL engineering database. This results in a unique, consecutive, historical configuration version. In the CaeManager, a previous version of the configuration element can be downloaded to the resource at any time by activating the previous version.

Locking/unlocking – Checking in/out configuration elements

Configuration elements can be locked (using a lock comment) and then checked out (with comment). These actions are recorded with a timestamp in the ChangeControl.



ChangeControl database

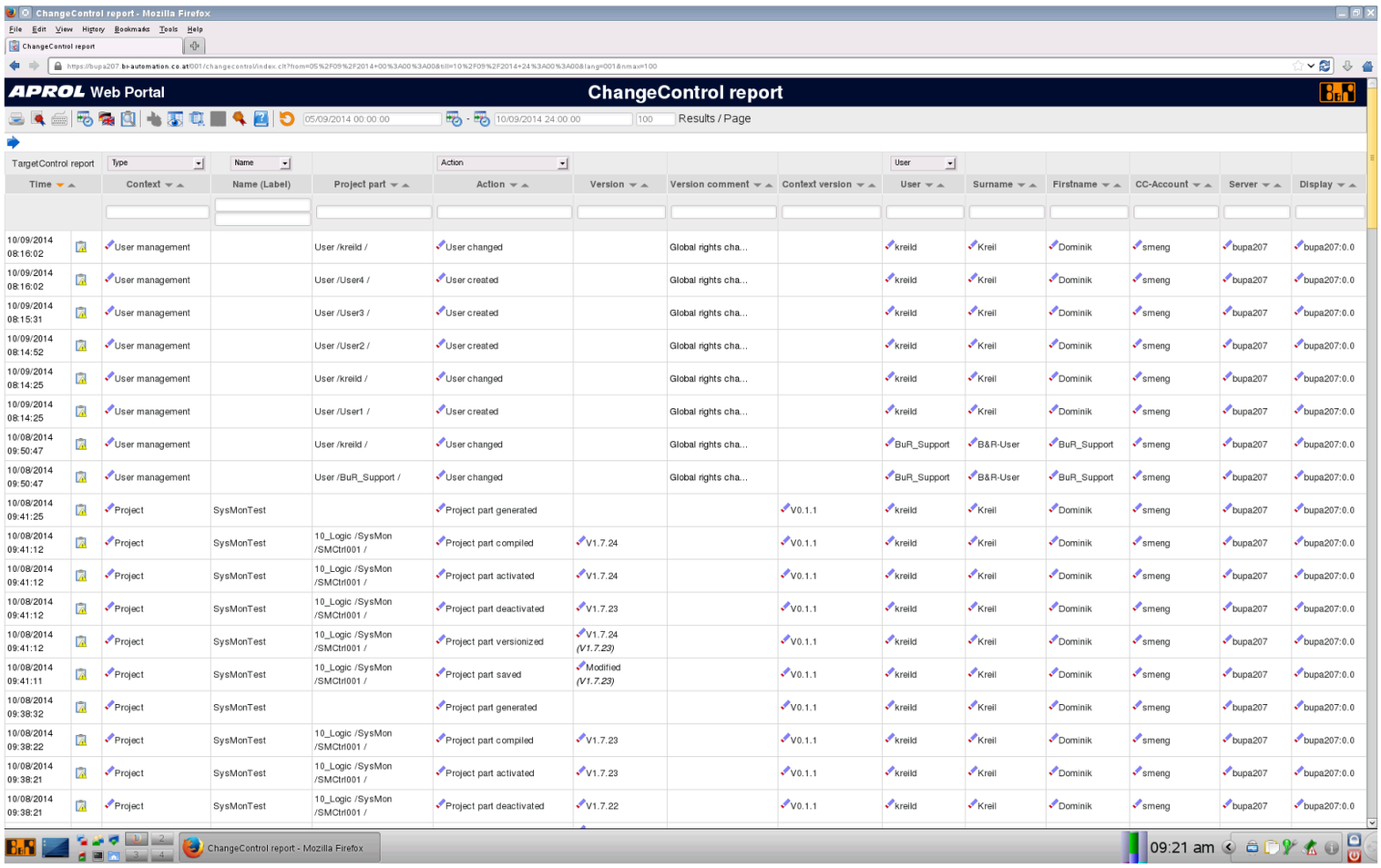
The ChangeControl application is fully integrated in APROL and saves all data in a powerful database. The desired historical data is provided with remarkable performance via web clients.

ChangeControl is a powerful tool

All configuration changes made to configuration elements (user management, hardware modules, CFC, SFC, graphics, templates, etc.) in APROL can be displayed in their entirety using ChangeControl. Revision management is made complete with the historical display of changes made in the ChangeControl.

Access rights regulate access to configuration data

Access rights (user management) enable selective definition of rights for every created user.



SafeDESIGNER

The functions of the SafeDESIGNER package expand Automation Studio to include the engineering tools needed to configure safety-related applications. This continues the "integrated but separated" concept used with SafeLOGIC. The safety-related functions are completely encapsulated and subject to an independent access rights management system. However, the central thread is the uniform look and feel as well as functions that are adjusted to each other uniformly throughout both Configuration Views.

Graphical program editor

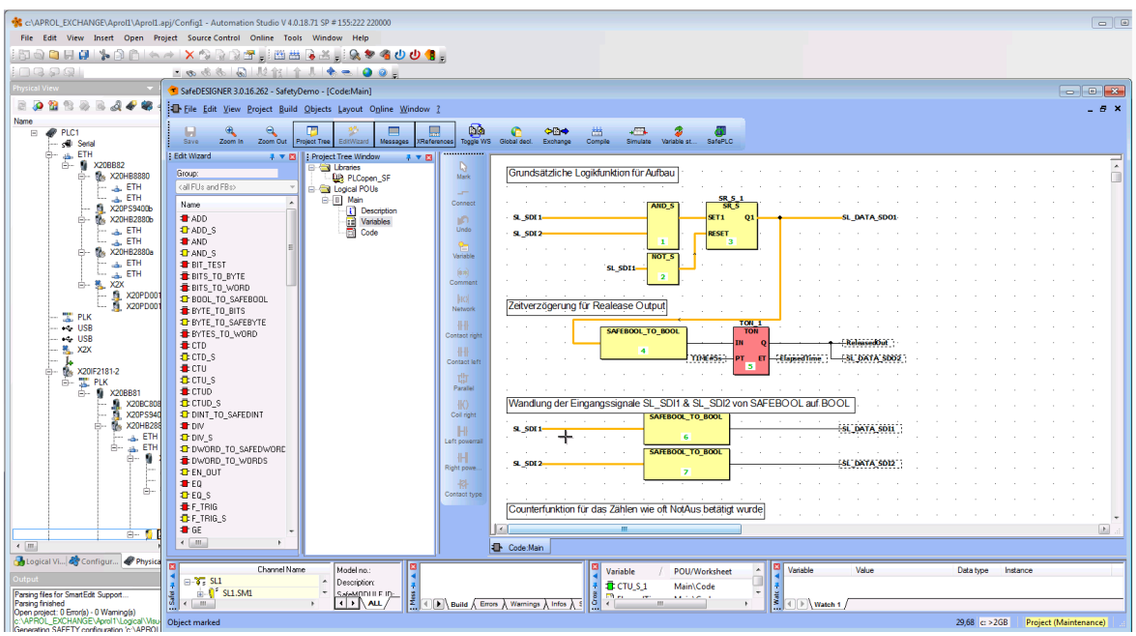
The graphical program editor is the core of the SafeDESIGNER toolset and sets new standards with regard to ergonomics and user-friendliness for safety-related editors. A modern interface and the ability to use features from the PC world such as drag-and-drop, cut and paste, etc. considerably simplify the application creation process. Intuitive operation of the system reduces development time and, more importantly, errors. In other words, it implicitly ensures simple and safe programming. In the background, the system monitors the safety and plausibility of the application being developed. A consistent and logical separation of safety-related data types from standard data types makes it easier for the user to differentiate and separate signals.

Graphical program editor - Highlights

- Ladder Diagram and function block programming (LD, FBK)
- Strict separation of data types for "safe" and "standard" signals
- Diverse compiler for highest safety

PLCopen safety function blocks

The function blocks for safety-oriented applications standardized in the PLCopen package have revolutionized the development of safety applications. Because they are certified, they save time and reduce costs throughout all phases of a safety application's life cycle. From the specification and implementation to testing and checking functions, the procedure used is more like virtual wiring than programming. Unlike "real wiring", downloading the program to the SafeLOGIC guarantees that an identical copy will be stored. This completely eliminates wiring errors during series production. Naturally, all options for a safe programmable controller are available to handle even more complex problems that can't be solved with "real wiring".



I/O mapping

The I/O mapping is the link between the standard and the safety-related Configuration Views. The modules assembled in the Physical View of the hardware tree are checked for relevance in the safety application and displayed in the I/O mapping. This allows only relevant modules to be presented to the safety-related application engineer. The I/O mapping provides different views and sorting patterns to simplify navigation. This allows the user to choose whether the objects are displayed according to their safety-related addressing or fieldbus topology or sorted according to safety-related variable names or the variable names from the standard Configuration View.

I/O mapping - Highlights

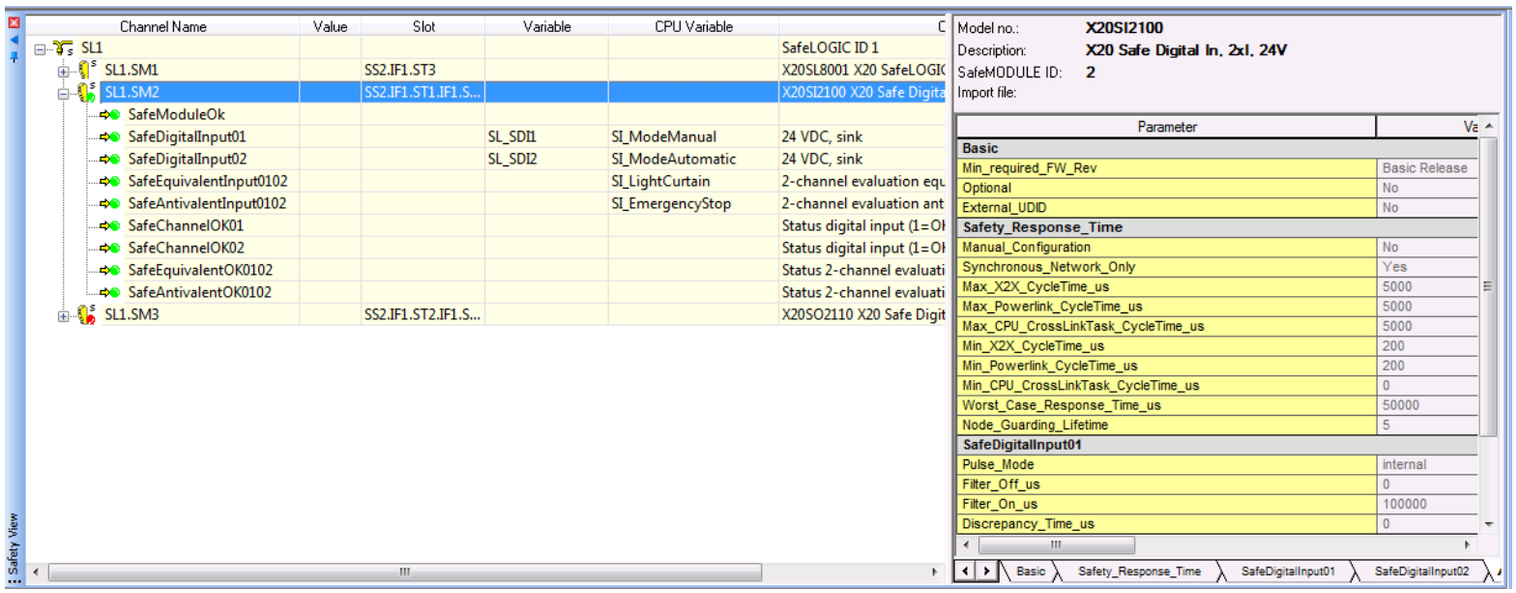
- Reduced display of safety-related components
- Clearly arranged tree display
- Simple navigation
- Separates the safety-related application from changes to the standard configuration

Parameter editor

The parameter editor is responsible for managing safety-related parameters for the modules and the application. Response times that need to be adhered to for safety or the existence of machine options can be configured here, for example. The access concept protects parameters from unauthorized or unintended changes. The safety-related application engineer has write access to all parameters. In contrast, the commissioning engineer has write access to commissioning parameters only, which must then be adjusted when commissioning the application (e.g. machine options).

Parameter editor - Highlights

- Simple configuration
- Selection lists
- Advanced access protection
- Separation of application parameters from commissioning parameters



Concurrent and offline engineering

Concurrent engineering

Several project engineers can work in a team on the same project without having to worry about access conflicts. The configuration data is stored centrally on the Engineering server.

Coordinated access to project elements

The database server coordinates access to the engineering data and the individual configuration elements. If a configuration element is currently being worked on by a project engineer, then all other project engineers only have read access to the configuration element.

Offline engineering

Makes swapping and offline engineering of configuration elements on a remote Engineering server possible.

Checking-out enables further external processing

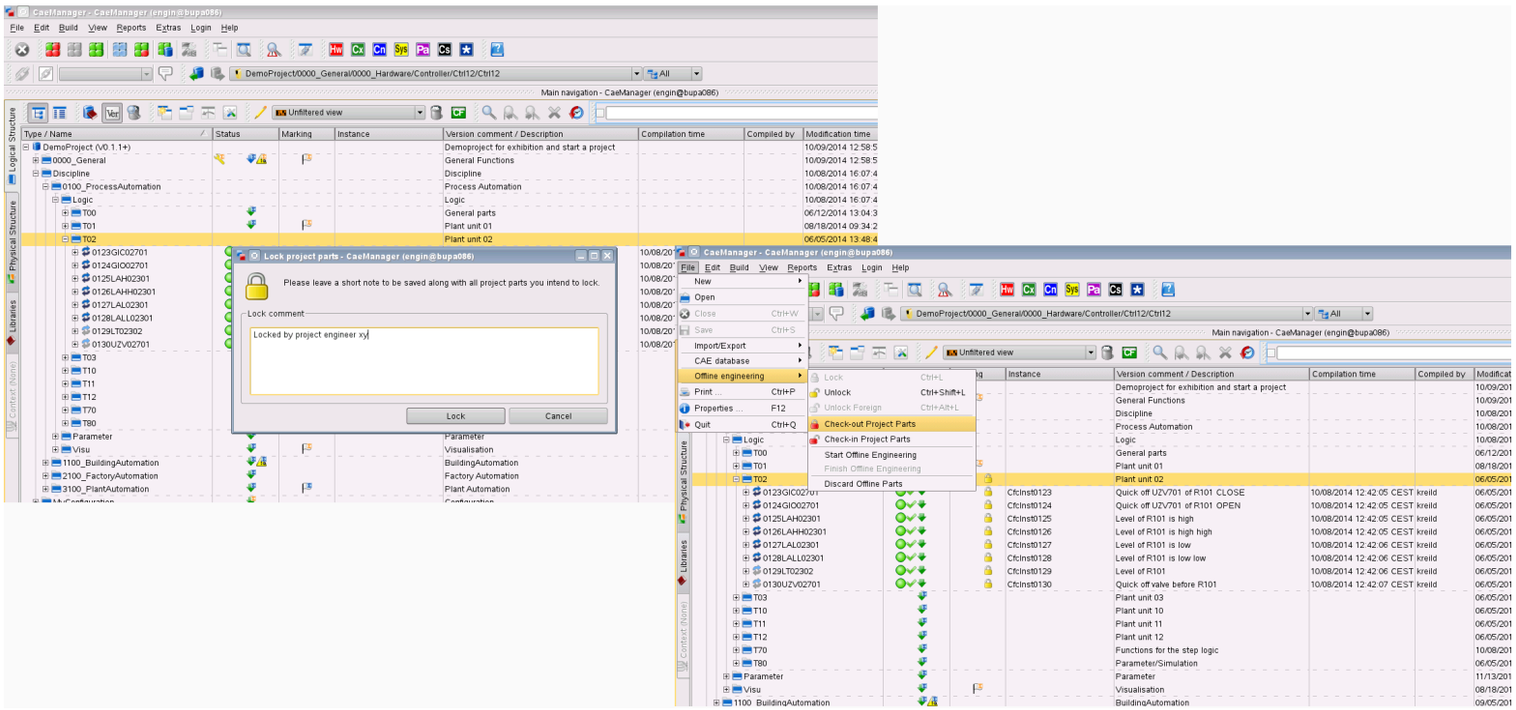
The selected configuration elements are checked out of the central engineering database and can then be transferred (e.g. over a network) to another engineering server for further processing.

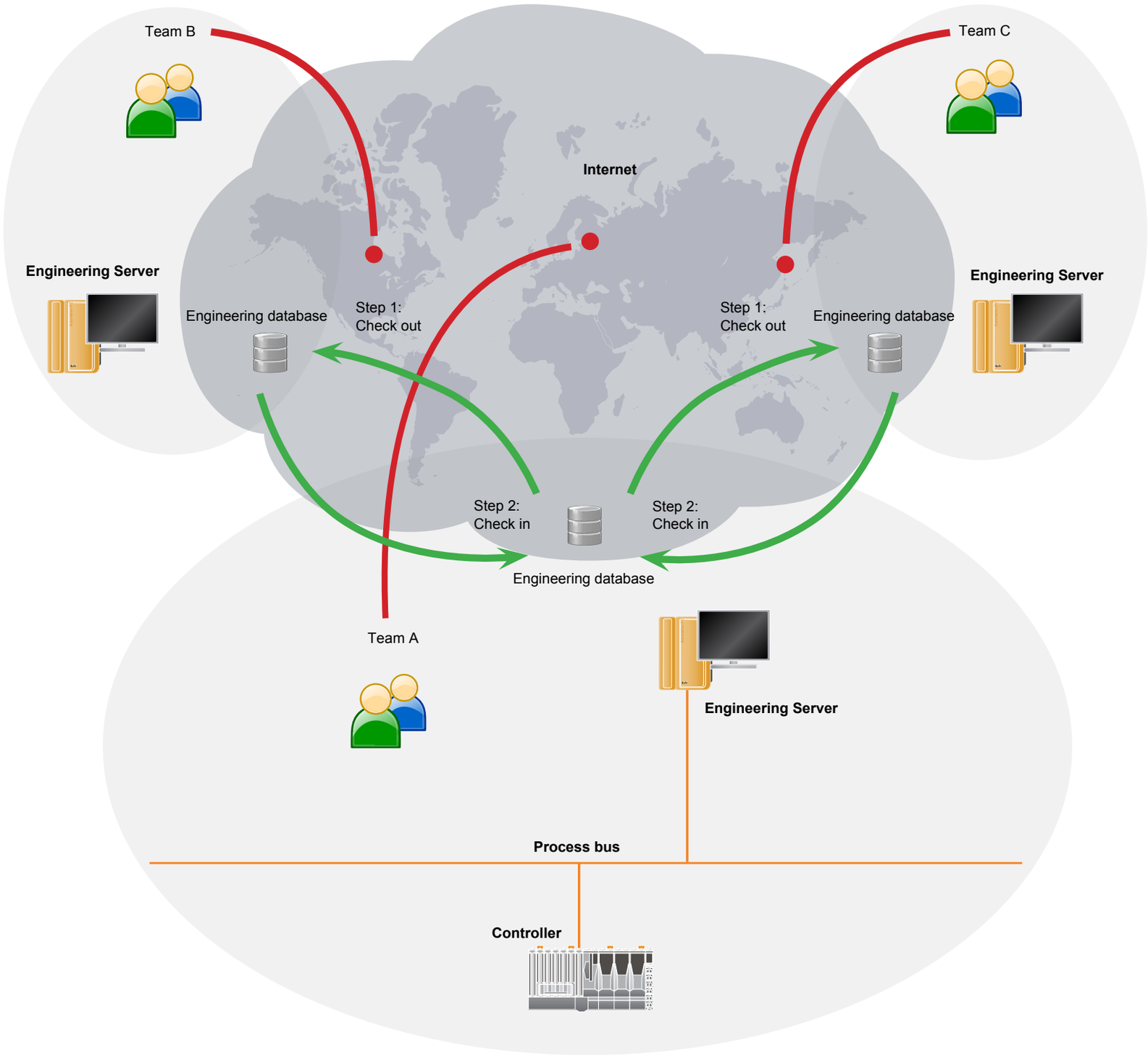
Checking back in removes write protection

"Outsourced" configuration elements are write-protected in the central engineering database until they are inserted back into the online engineering after the offline engineering. This does not affect any other areas in the configuration.

ChangeControl logging documents the changes

The version management system in APROL seamlessly traces all changes made offline and documents them using the integrated ChangeControl logging feature (21 CFR Part 11, GAMP4).




Team B
Team C
Internet
Engineering Server
Engineering database
Step 1:
Check out
Step 1:
Check out
Engineering database
Engineering Server
Step 2:
Check in
Step 2:
Check in
Engineering database
Team A
Engineering Server
Process bus
Controller

Simulation

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Simulation - WinMOD

Commissioning virtual systems with real automation systems

Shortening the time from the when an order is placed until the system is delivered is a question that concerns all system operators today. The use of modern simulation techniques throughout the entire development process and application of an automation system represents a useful and necessary measure for accomplishing this goal.

Actual commissioning now only involves configuration and optimization

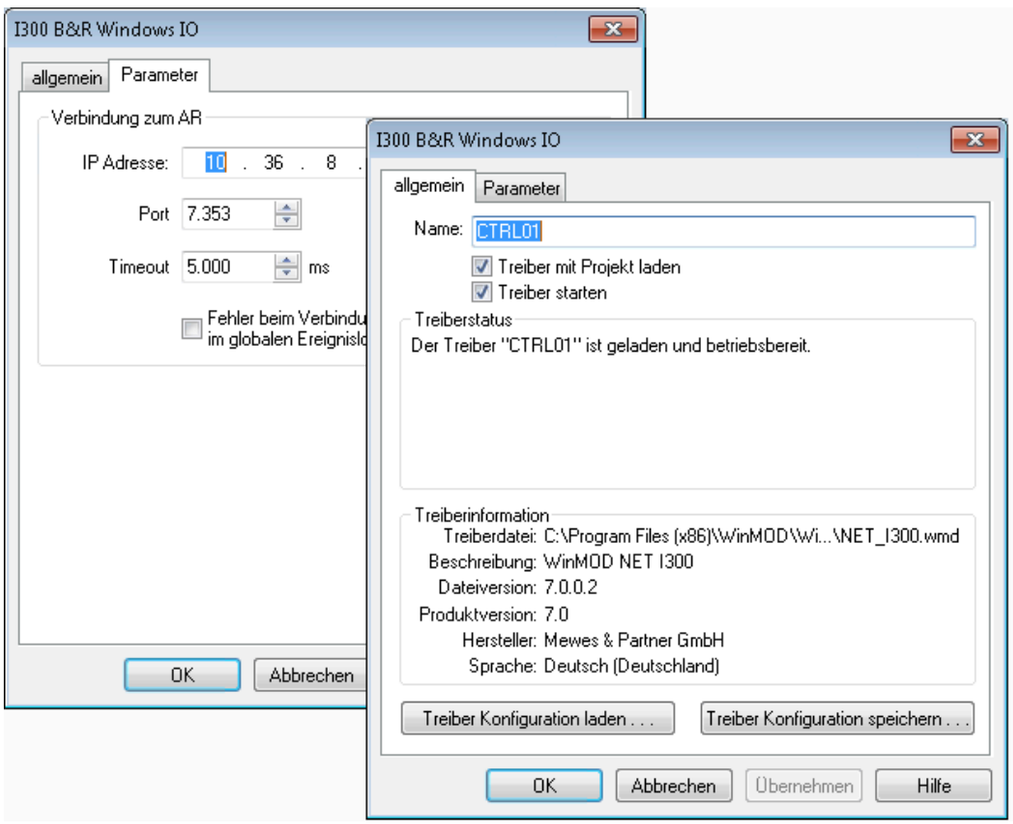
While it's true that throughput times can often be significantly shortened through parallel production in the area of mechanics and electrical engineering, the story is quite different in the area of software commissioning. Commissioning can only begin in steps once the system is fully complete mechanically and electrically. Software commissioning must occur independent of the availability of the system. The software must be handed over in time before the actual commissioning. For the most part, the final software now only has to be configured and optimized during the actual commissioning. This procedure makes it possible to considerably reduce commissioning times.

"Virtual system" with optimum testing depth

To achieve an optimum testing depth, a virtual system must be created whose behavior corresponds to the real system; with the same control and feedback signals, same timing and the same errors. The signals from the process control system are mapped using system configurations in the project.

WinMOD provides tools for creating libraries

The engineering process of a virtual machine can be compared to the construction of a real machine/system. The machine/system is divided into components and devices, which are easy to reproduce and which are combined and configured to meet the necessary requirements. The WinMOD platform offers tools that can be used to easily create libraries for virtual devices.



For all phases of software engineering

WinMOD has been used in a wide range of technology fields in all phases of software engineering. The most common applications involve FAT (Factory Acceptance Test) and validation, but also tasks for software and system planning, training systems and during commissioning and optimization of systems.

Real-time communication

Communication with the controllers occurs in real-time, system applications replace the real system with a simulation with equivalent behavior. The software in the process control system can be operated under real-time conditions.

Simulation elements and macros

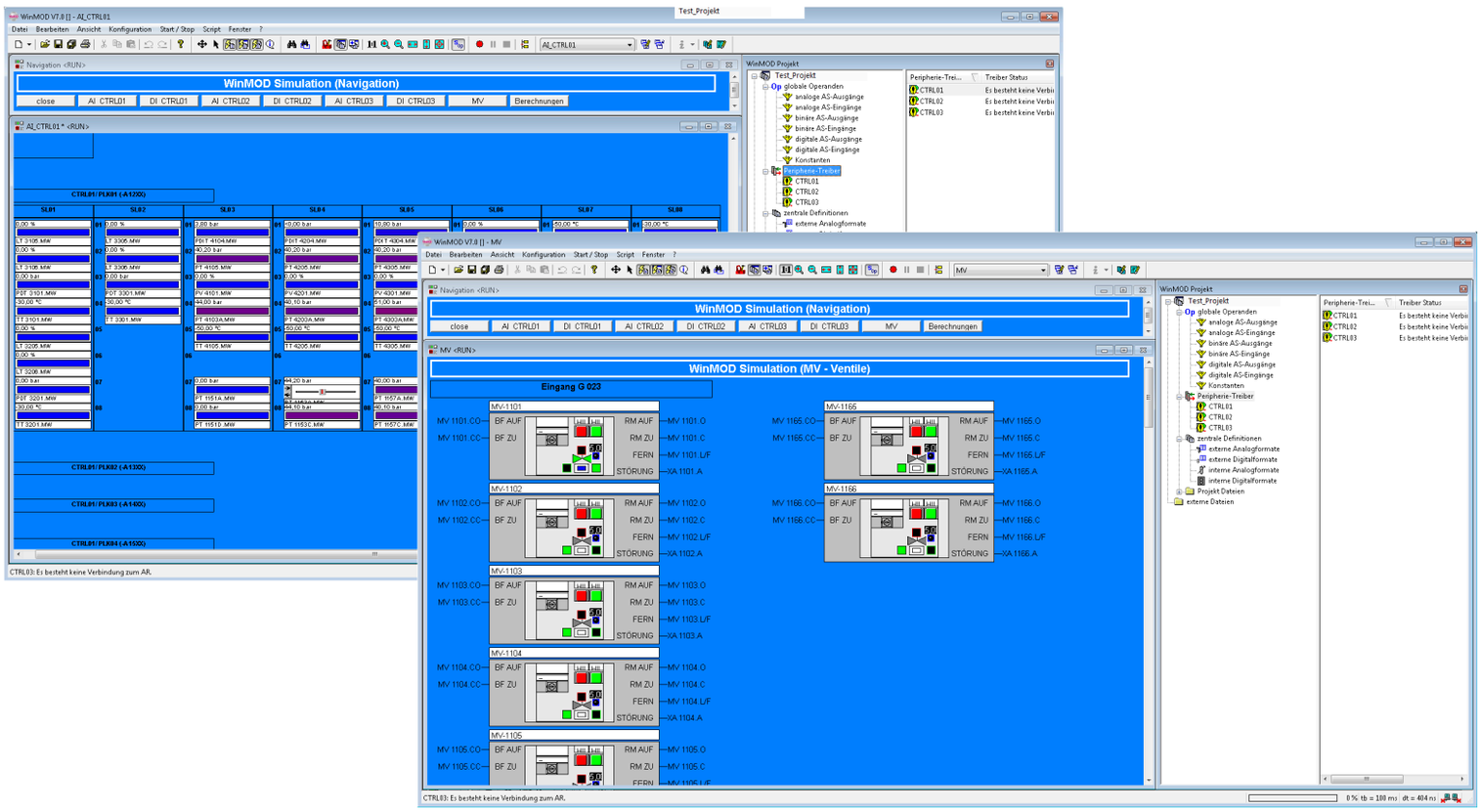
The controller's I/O data points can be fully imported. The I/O data points are assigned to the pre-defined signal elements using drag-and-drop. Forcing is possible for all signal elements via direct selection. The simulation elements are used to configure the behavior of function units. The elements are then grouped into a macro. The macros are managed in a library and are also available to the user for other projects.

Real-time simulation for Automation

Implemented using signal elements, with simulation elements and pre-edited simulation components. You can choose to structure the simulation project ranging from simple I/O simulations to process simulation according to the application. In the simulation, an error situation can also be forced upon the normal behavior, if required. Dynamically configurable simulation elements, formula blocks, runtime elements and complex drive blocks enable easy simulation of devices, components and processes.

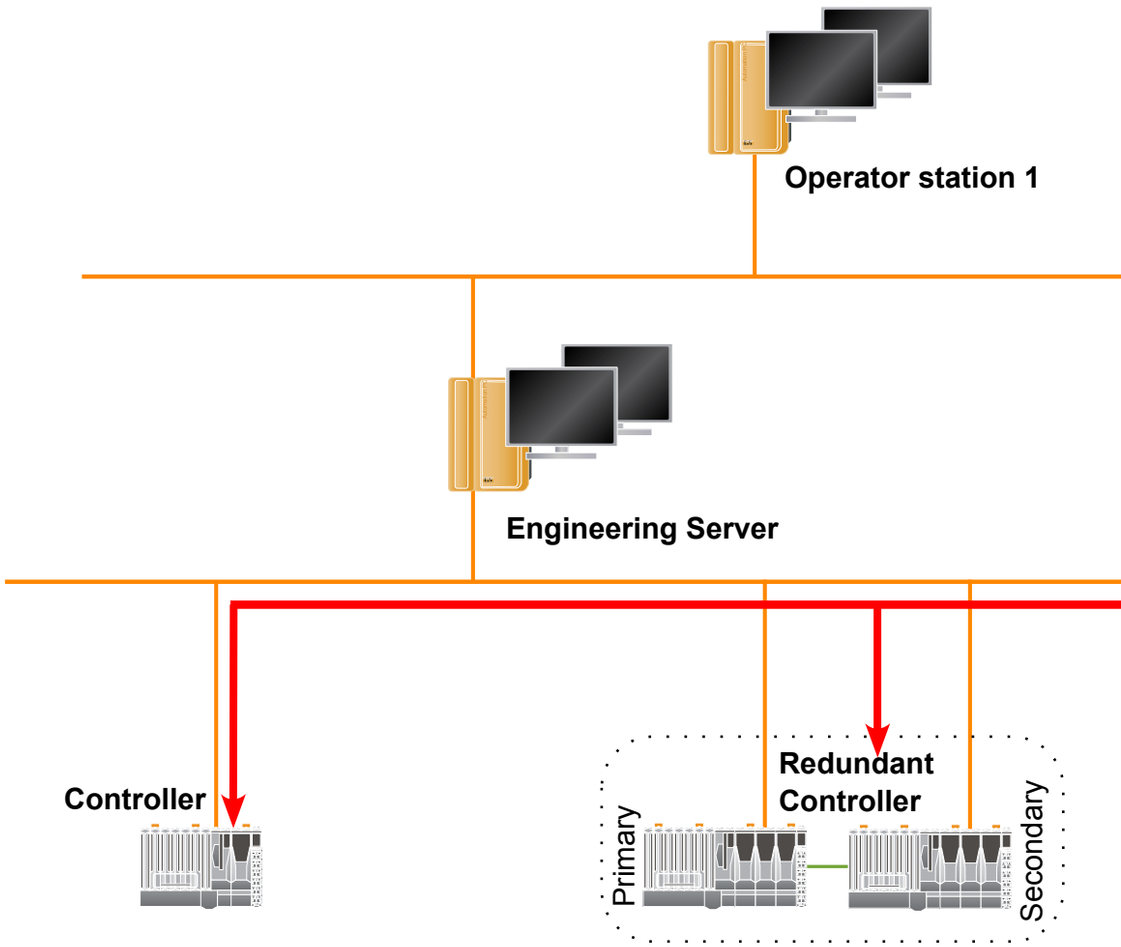
Contact address / Reference source:

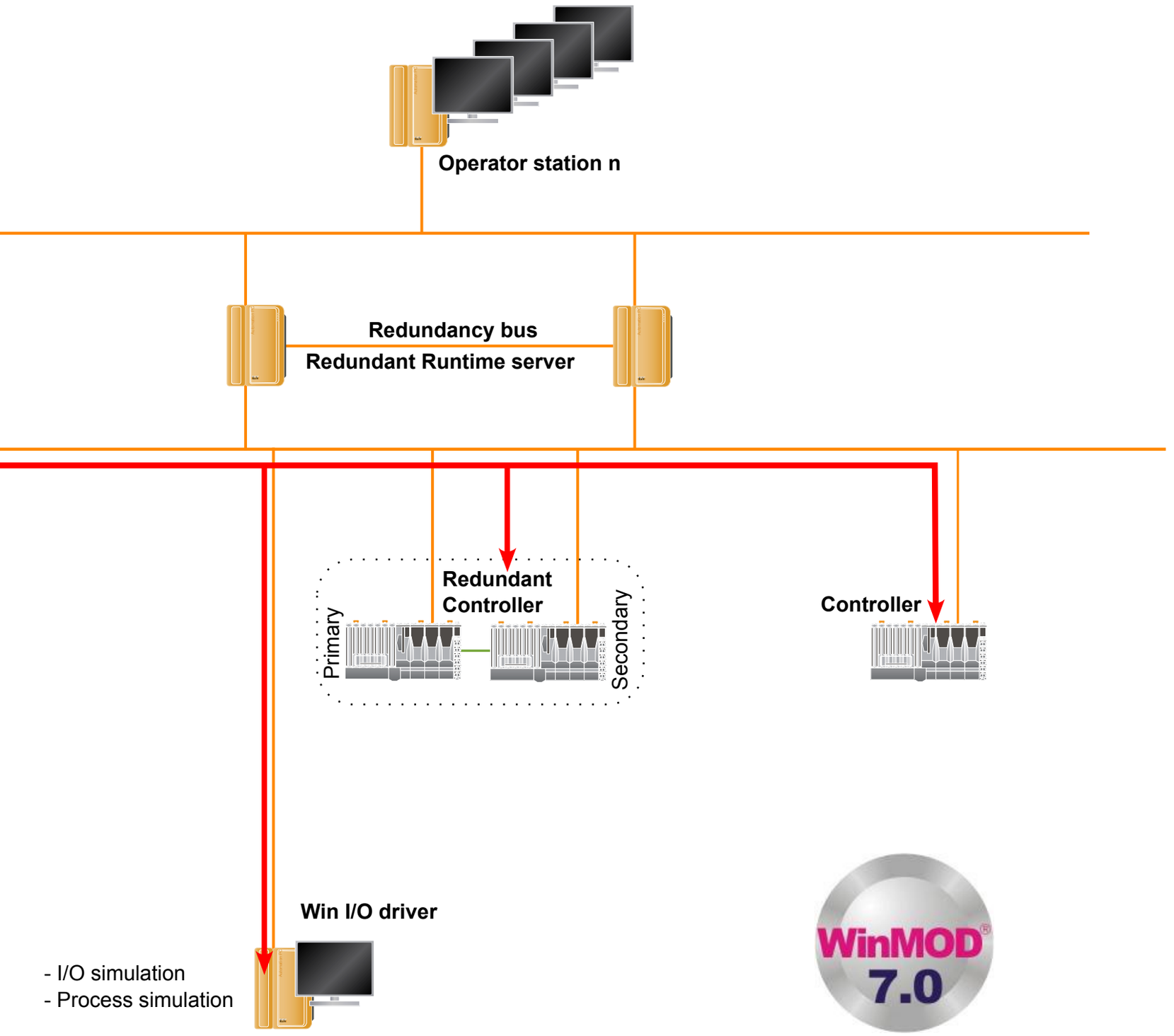
(for WinMOD)
Mewes & Partner GmbH,
Neuendorfstr. 15, D-16761 Hennigsdorf
Web: http://www.winmod.de
Email: WinMOD@Mewes-Partner.de



Simulation - WinMOD

Visualization of multiple controllers
WinMOD makes it possible to simulate 1 to n controllers at the same time.




Operator station n
Redundancy bus
Redundant Runtime server
Redundant
Controller
Primary
Secondary
Controller
Win I/O driver
- I/O simulation
- Process simulation
WinMOD®
7.0

MATLAB/Simulink

Advanced Process Control

APC encompasses all control procedures that go beyond the standard PID closed loop control and sequential control.

Optimizing process control

Optimizing process control means optimizing throughput, efficiency, product quality and the costs for energy and raw materials while maintaining reproducibility of the process.

APC methods

PID optimization and PID expansions, rapid prototyping, fuzzy control, neuronal networks and model predictive multivariable controllers (MPC) are the classical methods for Advanced Process Control.

MATLAB/Simulink

The optional "B&R Automation Studio Target for Simulink" toolkit integrated in Automation Studio is a high-performance feature also available for use with APROL.

Automatic code generation with Real-Time Workshop or Simulink Coder

The B&R Toolbox, combined with the flexibility of the Real-time Workshop Embedded Coder or Simulink Coder Embedded Coder, provides the necessary prerequisites for unlimited use of B&R target systems. The Toolbox opens completely new possibilities for designing and developing complex simulation models and control structures, which would be very difficult and time -consuming without this type of assistance. The Real-Time Workshop Embedded Coder or Simulink Coder Embedded Coder automatically generates high-language code perfectly optimized for Automation Studio from a Simulink® model.

Rapid prototyping

"Rapid Prototyping" offers unforeseen possibilities for quick and flexible implementation of sophisticated control and system-related solutions. Simulink models can easily be transferred to a B&R controller using automatic code generation and "B&R Automation Studio Target for Simulink". Tedious manual creation of source code, which always bears the risk of code error, is a thing of the past.

Hardware-in-the-loop

In order to avoid damaging the actual system when applying newly developed algorithms, it is recommended that critical system parts are replaced with an emulation system. For this purpose, an emulation task is used on the target system using "hardware-in-the-loop" that emulates the actual system in as much detail as possible. This method is used to test new developments on the target system.

Automation Studio and Stateflow

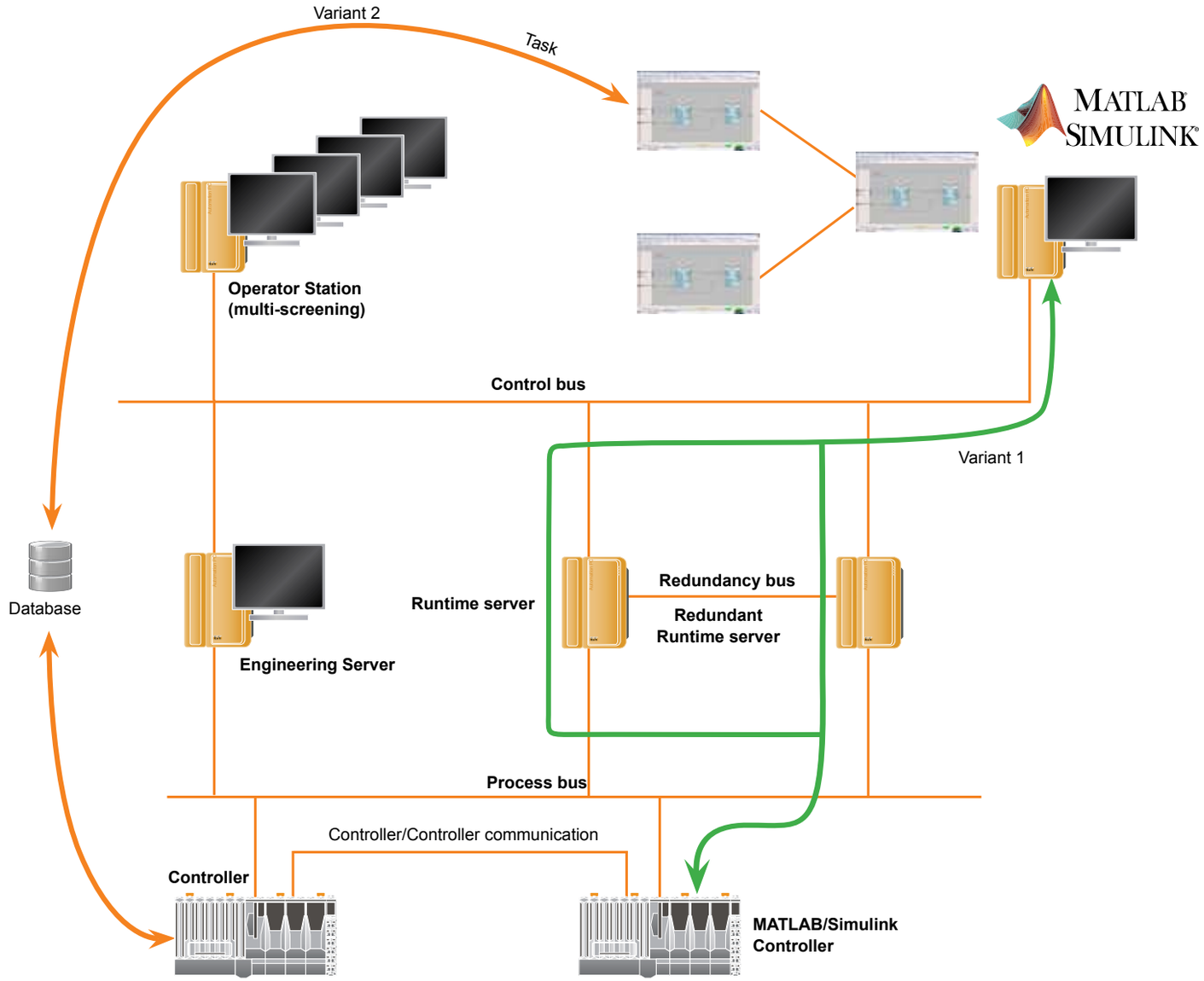
Stateflow from The MathWorks, Inc. is a comprehensive tool that can be used to implement sequential processes and branches. With the help of "B&R Automation Studio Target for Simulink", entire sequential control can be created quickly, easily and automatically. Sequences formulated in Stateflow can be added as usual to an existing Simulink model. This makes it possible to add event-driven select statements or branched flow charts to the automatically generated program code.

Variation 1 - MATLAB/Simulink controller

This offers the further possibility to operate the complete MATLAB/Simulink project in a separate controller of the APROL process control system. APROL controller communication can be used to read and write any controller variables.

Variation 2 - MATLAB/Simulink - Blocks in APROL

Blocks from MATLAB/Simulink can be made available to the user via APROL libraries. The library management in APROL is an easy-to-use tool for this purpose.



Variation 1 - MATLAB/Simulink - Controller

Variation 2 - MATLAB/Simulink - Blocks in APROL

Validation

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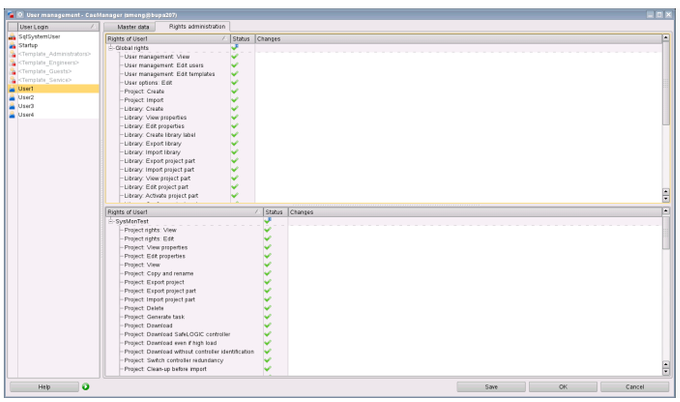
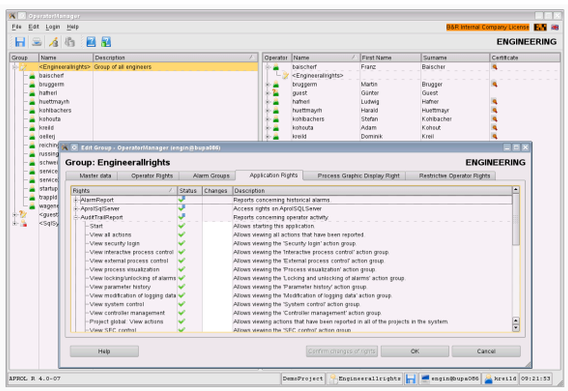
Validation

APROL supports validation

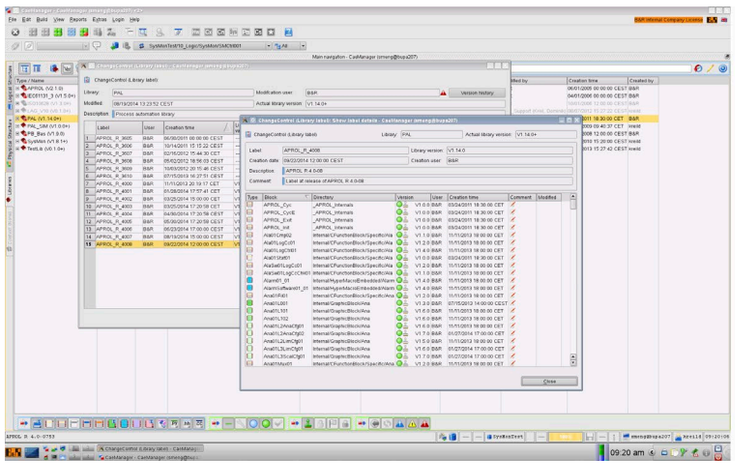
The APROL process control system integrates the following functions with regard to the validation guidelines of the FDA and GAMP forum (21 CFR Part 11 and GAMP4, respectively):

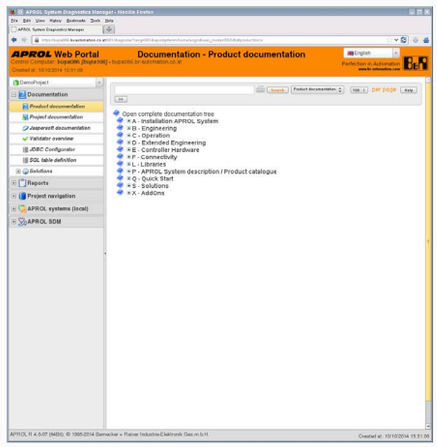
- **Integrated engineering rights management**
- **Automatic revision and modification management**
- **ChangeControl logging for the Engineering system**
- **Tested standard software libraries**
- **As-built documentation for the process control system**
- **Several configurable login mechanisms (login name, password, smart card, biometrics, transponder)**
- **Operator rights and password management (with password revision)**





- **Long-term data storage and readability of data**
- **Extensive manipulation-proof data logging (PDF document)**
- **Access rights management (system-wide).**
- **Integrated AuditTrail for all operator actions**
- **Alarm and trend modules**
- **Comprehensive system and self-monitoring**
- **Extensive system diagnostic tools**
- **Time synchronization across the entire process control system**
- **B&R certification according to ISO 9001**





Fieldbus systems

Table of contents

POWERLINK

Topology
- With POWERLINK you can create any network topology using line, tree, star and ring structures.
- Hot plug functionality for all bus stations
- Configuration-free topology
- Flat network for clear-cut diagnostics. All data can be accessed from any location.
- Topology-independent configuration function
- Addressing using node switch or software

Crosslinks
- Centralized and decentralized architectures
- Controller/Controller communication
- Direct distribution of events
- Reduced load on master / load on application
- Multiplexed mode minimizes data loss
- Enables decentralized safety architecture

Hot plugging supported
Hot plugging capability means that network stations can be activated or switched off during operation. The system detects the change automatically. With POWERLINK, hot plugging does not affect the ability of the configuration manager to handle real-time tasks.

Diagnostics
- The utilities included in the OS (standard Ethernet tools) are sufficient for network diagnostics.
- The POWERLINK advantage: It keeps reserved bandwidth available for diagnostics, which can't be misused.

Asynchronous data
- In the asynchronous phase, data that is not time-critical is transferred in standard Ethernet frames
- Asynchronous data can include service data objects or any application data
- The asynchronous phase can be used to integrate participants into the network that don't have real-time capability
- Asynchronous data can be separated from the real-time domains of the POWERLINK network using routers or gateways. Conversely, the asynchronous phase makes SDO communication with devices in the POWERLINK domain possible.

Security
- Definition of the term "security"
- Separation of real-time and non-real-time domains with POWERLINK
- Gateways and intermediary controllers prevent unwanted access to POWERLINK domains

Safety
- Integrated safety protocols
- Constant monitoring of data traffic
- openSAFETY protocol
- POWERLINK is suitable for systems up to SIL 3
- openSAFETY and CAN bus are compatible

Redundancy
- Ring redundancy, partial ring redundancy, cable redundancy and managing node redundancy

Industrial POWERLINK - Design

The cabling between the remote I/O devices can be handled directly using twisted pair (TP) cables due to the hub integrated into the POWERLINK bus controller; the maximum length of a segment is 100 m.

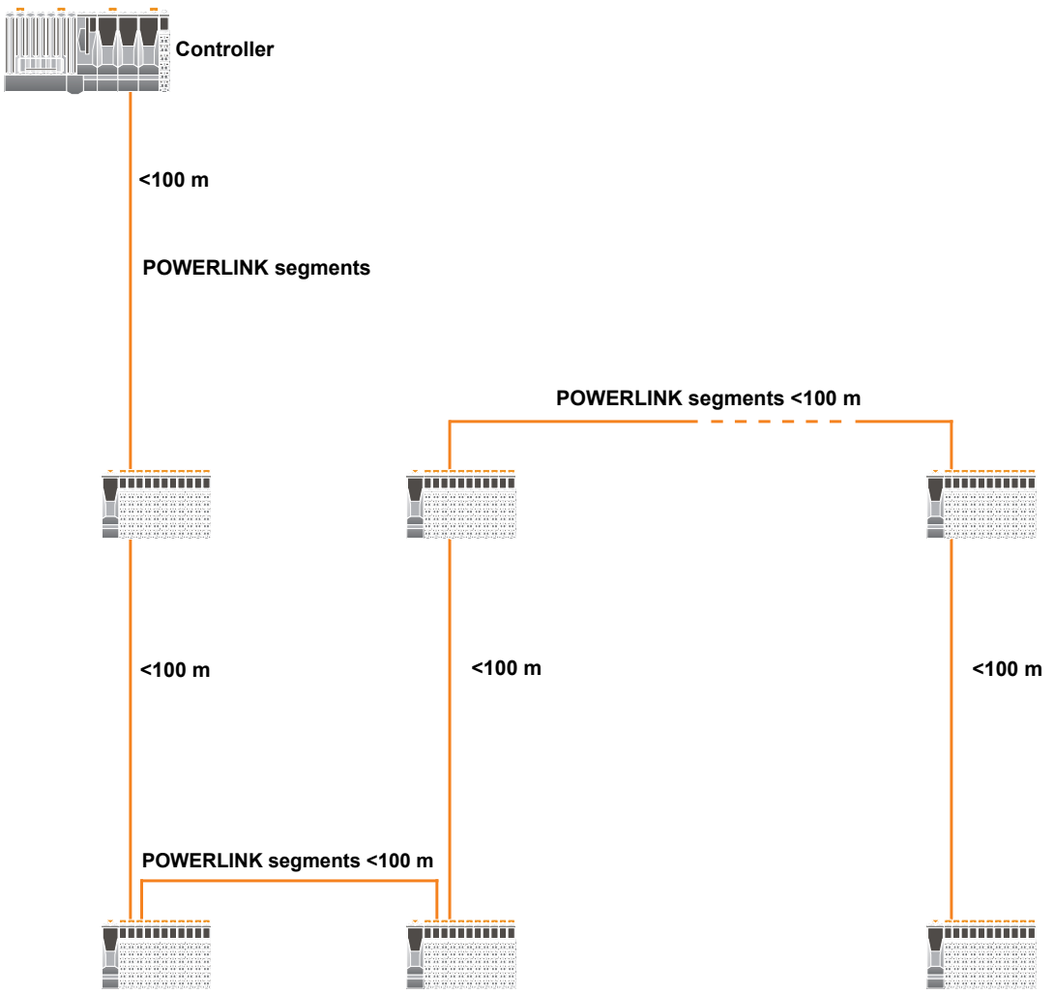
To make non-reactive handling of individual remote I/O devices possible on the POWERLINK fieldbus, we recommend using industrial hubs.

Optical cabling can also be used if made necessary by environmental conditions or topology.

Design variants:

TP cabling (CAT 5/6/7)

The cabling between the remote I/O devices can be handled using TP cables due to the hub integrated into the POWERLINK bus controller (2x RJ45); the maximum length of a segment is 100 m.



ETHERNET POWERLINK

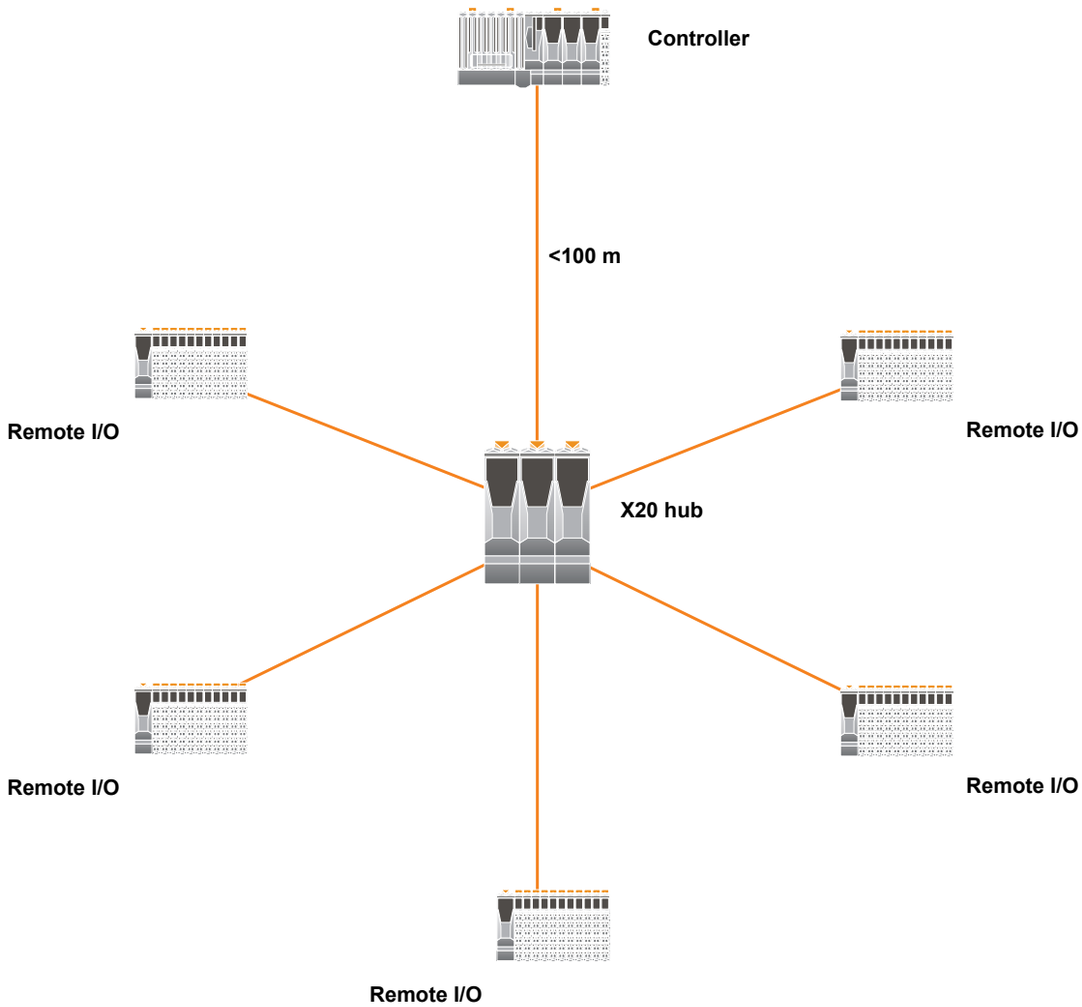
open SAFETY

Design variants:

6x Fast Ethernet hub

Non-reactive connection of remote I/O devices through the use of Fast Ethernet hubs. Short circuits or other disturbances on the segment only affect that particular segment.

- 2x/4x/6x Fast Ethernet hub



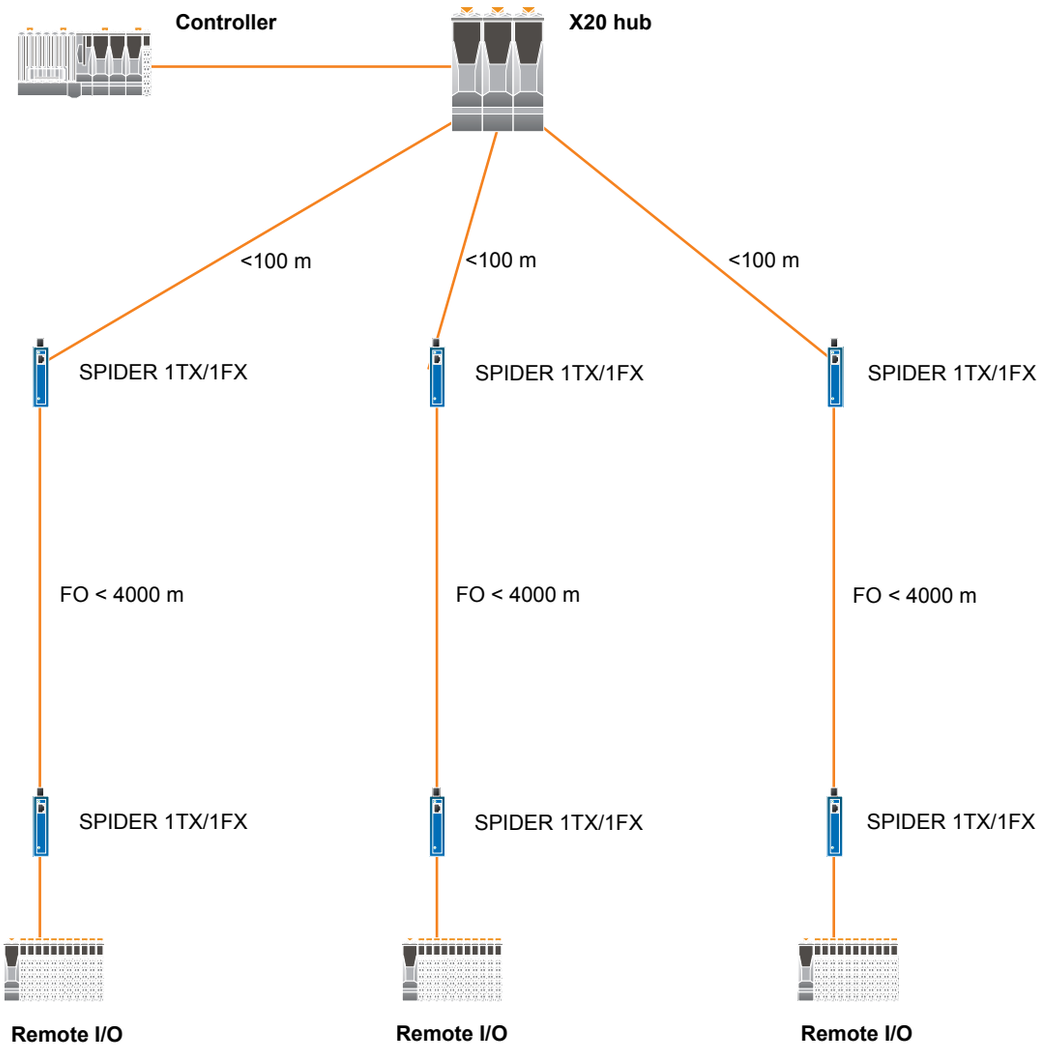
ETHERNET POWERLINK

open SAFETY

Design variants:

Transceiver for optical transmission

- For large segment lengths (over 100 m) or
- To prevent electromagnetic feedback on the fieldbus
- If the bus spans buildings (lightning danger)
- 2x/4x/6x Fast Ethernet hub



ETHERNET POWERLINK

open SAFETY

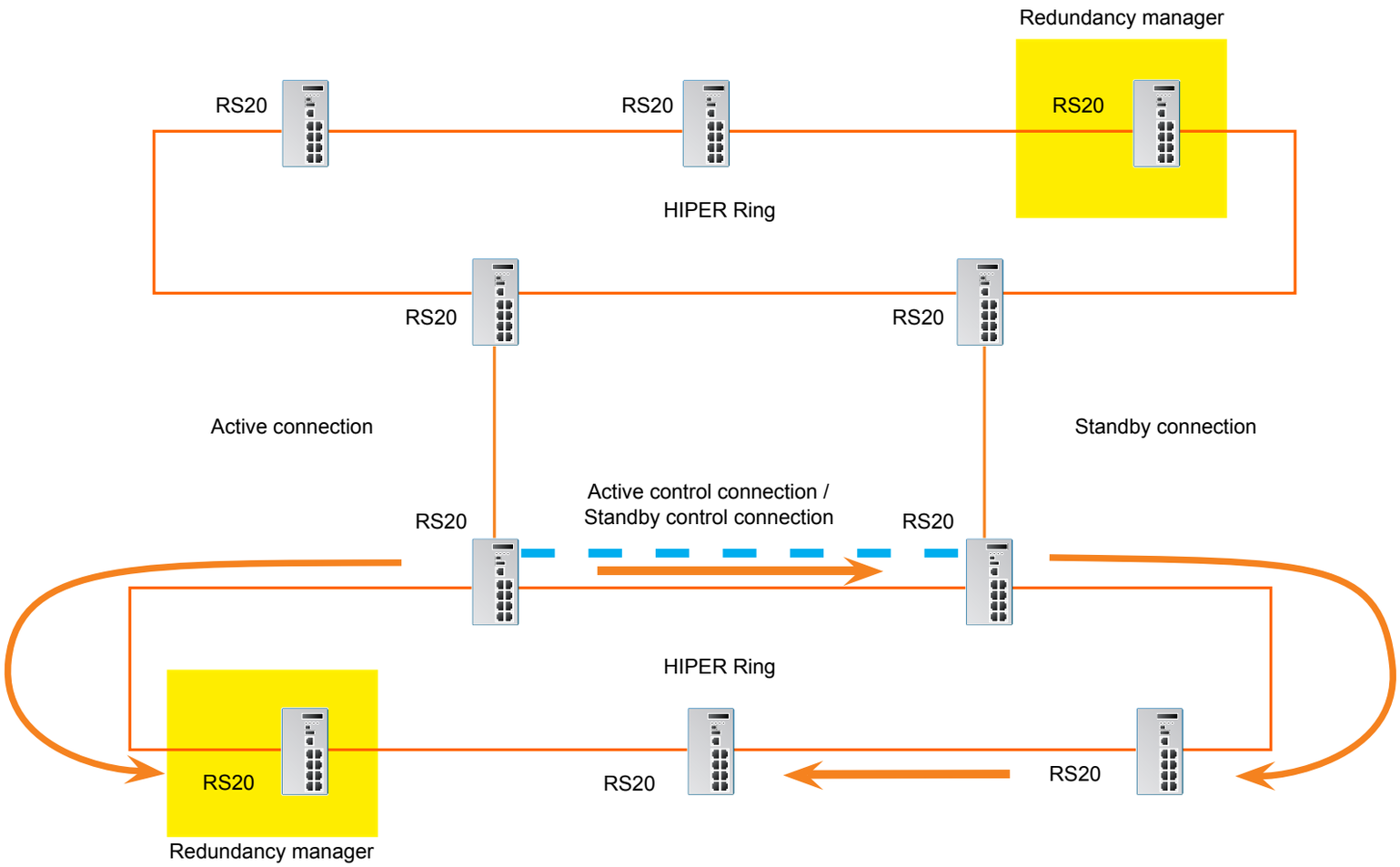
General requirements

A very important aspect when looking at the total availability of a system with respect to the process control system is the reliability and availability of data transmission from the actual core of the process automation system – the controllers – to where the process data is handled (real-time database - Runtime server) and the operator stations that are responsible for operation and monitoring. In this case, it's necessary to implement redundancies to achieve the highest possible network availability. The loss of a transmission line must be detected in a fraction of a second, with a suitable "detour" in place to make sure that the data gets transferred nonetheless.

The necessary structures can be implemented in a ring design to meet these demands. Alongside the topic of redundancy in industrial Ethernet, it also needs to be taken into consideration that, in addition to today's Fast Ethernet standard (100 Mbit/s), more and more transmission routes will need to be implemented using Gigabit Ethernet (1000 Mbit/s) in the future.

HIPER Ring redundancy

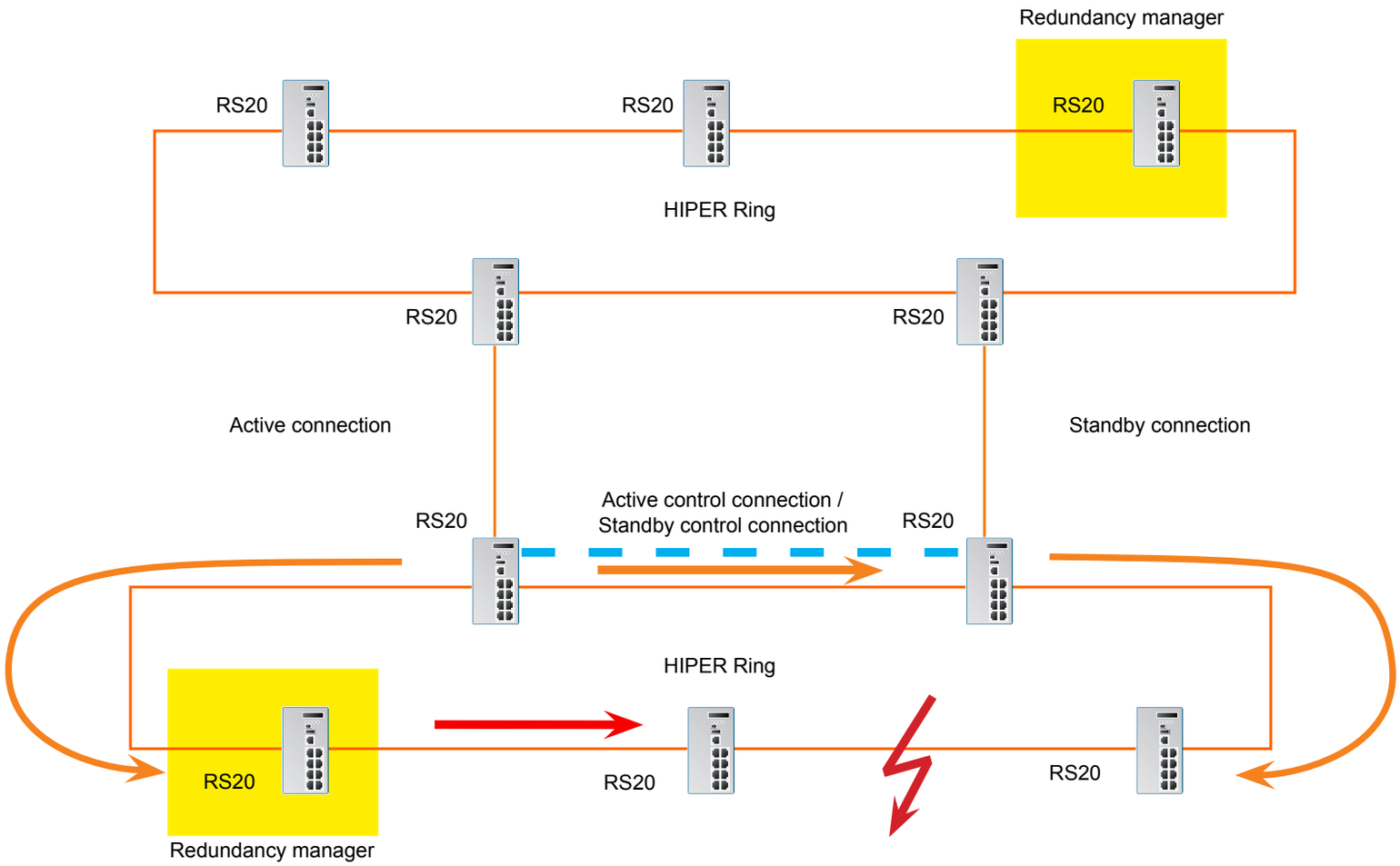
I/Os, controllers, and control computers in a process control system are usually distributed across several locations, with at least one switch in each place. These locations are best connected using fiber optic segments (protection against lightning, electrical isolation, superb EMC qualities, large distances can be bridged). This connection represents the "backbone" of the industrial Ethernet system. When a switch on this backbone fails, two subnets have the problem that they cannot communicate with each other. To prevent this from happening, it's necessary to convert the line structure of the backbone to a ring structure. This means that the first device (switch) and the last device (switch) in the backbone must be connected to each other so that ring structure actually derives from the line structure.



Redundancy manager

If the backbone has been formed into a redundant ring, then the "redundancy manager" function needs to be enabled on exactly one switch. The redundancy manager's job is to permanently check the ring using watchdog packets to detect any interruptions. However, data transmission doesn't take place over the redundant line (fiber optic segment); instead, it is only used for watchdog industrial Ethernet redundancy packets. If these watchdog data packets don't arrive on the 2nd port (2nd side of the backbone), the redundancy manager knows that the ring has been interrupted (at some position). It then begins sending all data packets over the redundant line (fiber optic segment).

Once the disturbance has been cleared, the redundancy manager uses its integrated "self-healing" function to automatically reestablish its original behavior within approx. 300 ms. This makes it possible to replace or repair the patch cables or fiber optic cables and reestablish normal HIPER-Ring operation without having to deal with software or DIP switches.



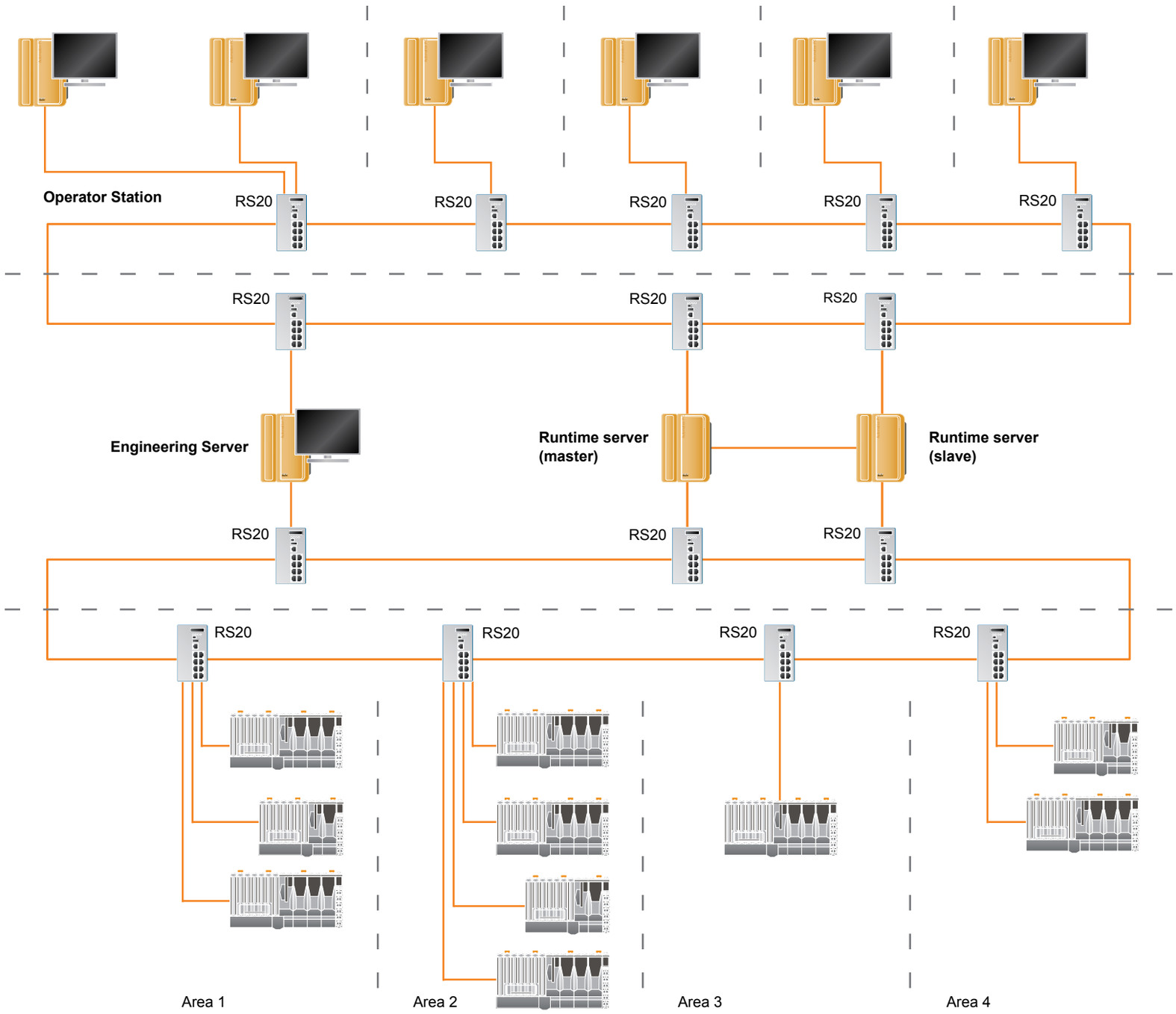
Industrial Ethernet - RS20 rail switches

Industrial Ethernet - RS20 rail switches

RS20 switches are available as unmanaged and managed industrial Ethernet rail switches. The switches are designed as compact devices for mounting on the rail. Both Ethernet (10 Mbit/s) and Fast Ethernet (100 Mbit/s) are supported. Devices are also available that have a different number of ports (the number of ports is 4 to 25). The switch is based on the "store and forward switching mode" and inherently offers important redundancy functions like HIPER-Ring (ring structure), redundant 24 VDC supply, and diagnostic functions (with message contact), which may be necessary for setting up replacement lines or reporting communication disruptions or disturbances. The ring structure (HIPER-Ring) can be extended up to 50 switches (the ring switching time is typically < 500 ms when using fiber optic cables).

RS20 switch design variants

The different RS20 switch design variants also make it possible to combine various media on the network (10/100BASE-TX and 100BASE-FX multi-mode FO, 100BASE-FX single-mode FO). A compact switch may be used if there is a decentralized topology being used. Network stations are primarily connected with 10/100BASE-TX technology. The backbone is usually designed as a fiber optic cable (multimode FO) in and through the different locations. RS20 switches are managed industrial Ethernet rail switches and are able to provide extensive diagnostic data.


Operator Station
RS20
RS20
RS20
RS20
RS20
RS20
RS20
RS20
Engineering Server
Runtime server
(master)
Runtime server
(slave)
RS20
RS20
RS20
RS20
RS20
RS20
RS20
Area 1
Area 2
Area 3
Area 4

Industrial Ethernet - SPIDER II rail switch - FIREWALL

Industrial Ethernet - SPIDER II rail switch

SPIDER II switches are entry level switches for use in industrial environments. They support Ethernet (10 Mbit/s) and Fast Ethernet (100 Mbit/s). The devices make it possible to create switched Ethernet networks with copper fiber optic cables. Depending on the variant, the devices have 8 TP ports (10/100 Mbit/s) and up to two 100 Mbit/s fiber optic ports (100BASE-FX):

Up to 8 end devices or additional segments can be connected to the 8 TP ports. The TP ports support autonegotiation, auto-polarity and auto-crossing. An additional end device or optical network component can be connected at each of the FO ports. The FO ports support full duplex (FDX).

Industrial Ethernet SPIDER II Giga rail switch

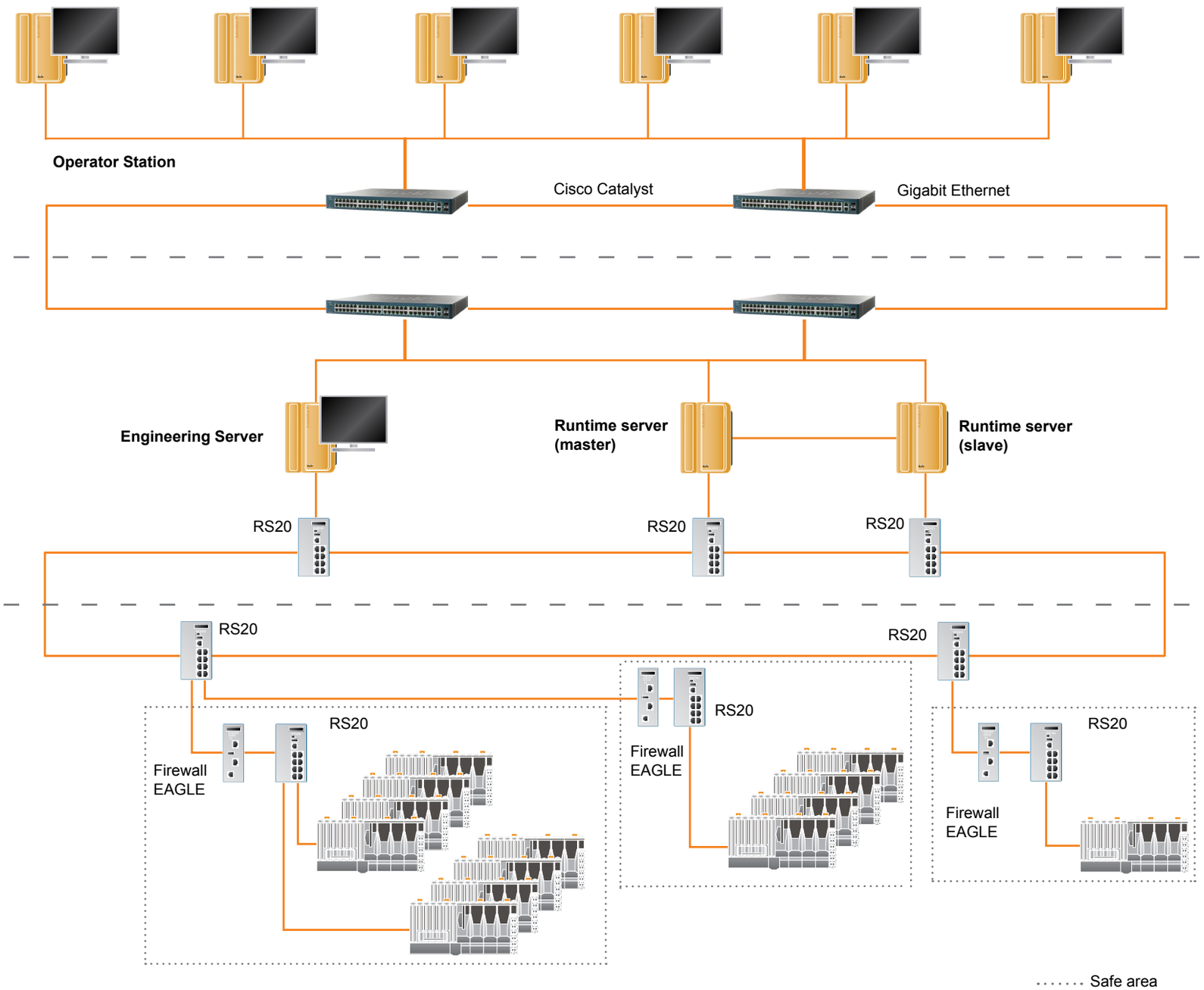
SPIDER II Giga switches are entry level switches for use in industrial environments. They support Ethernet (10 Mbit/s), Fast Ethernet (1000 Mbit/s) and gigabit Ethernet (1000 Mbit/s). The devices make it possible to create switched Ethernet networks with copper fiber optic cables. Depending on the variant, the devices have 4 or 5 TP Ports (10/100/100 Mbit/s) and up to two fiber optic ports.

Powerful Cisco switches for installation in server cabinets

The selected configuration of Cisco Catalyst switches has 24 Ethernet ports (10/100/1000 Mbit/s) and two fiber optic Ethernet uplinks (10/100/1000 Mbit/s). Status indicators provide info about each port.

Security concept with EAGLE firewall

A controller firewall provides protection against unauthorized or unintentional access to the controller. Defining port filter rules and limiting access to certain IP addresses and services can help ensure well-defined communication with the controllers. When selecting a switch, be sure that no unused ports are created, and disable any unused ports that may exist. Under no circumstances should a control computer ever be connected on the secure side of the firewall. The controllers and switches must be placed in a protected area to prevent manipulation.


Operator Station
Cisco Catalyst
Gigabit Ethernet
Engineering Server
Runtime server (master)
Runtime server (slave)
RS20
RS20
RS20
RS20
RS20
RS20
RS20
Firewall EAGLE
Firewall EAGLE
Firewall EAGLE
Safe area

PROFIBUS / HART / FOUNDATION fieldbus comparison

Expectations on fieldbus systems

The main thought when dealing with the topic of fieldbus technology is that only a single bus cable is required for the entire system, which offers enormous potential for saving money on cabinets, cables, and wires. This should also go hand in hand with massive reductions in documentation and commissioning work. Another interesting factor for system operators is that many of today's field devices have a high level of intelligence (and decentralized intelligence as well). This can only be taken advantage of through the use of a fieldbus system (digital communication). With the fieldbus, all available information from field devices can be used completely.

Fundamental advantages

One advantage that is always present when using field devices together with a fieldbus is that measurement values are transferred in digital form. If a maximum resolution of 0-65535 digits is achieved by using 4-20 mA signals (at 16-bit resolution), then fieldbus devices can display the measured value as a 32-bit floating point value. The value range is therefore between $1{,}5 \cdot 10^{-45}$ to $3{,}4 \cdot 10^{38}$. A restriction on the physical measurement range that was previously necessary to achieve the highest possible resolution is no longer required. This makes it possible to use sensors right up to their limits. In addition to the measured value, several other pieces are available in the field device if needed. TAG, software version, serial number, possibly several process values (e.g. temperature and resistance values for a temperature transmitter), unit, status, and diagnostic data are available in each fieldbus device.

FISCO model

The FISCO model (Fieldbus Intrinsically Safe Concept) makes it possible for the user and operator to quickly and easily design PROFIBUS PA and FOUNDATION fieldbus H1 systems for use in areas with explosions. If listed requirements are fulfilled afterward, a separate system certificate for a PA / H1 segment is not necessary. The devices being used must be certified according to FISCO (EC-type conformity certificate). In addition, U, I, and P must correspond to EN 50 020, the cable parameters (R, L, C) must be adhered to (type A cable), the lines have to be terminated according to guidelines, and the total length of the line system (incl. stubs) cannot exceed 1000 m.

Profiles / Blocks

Profiles and blocks are specified to guarantee the necessary interoperability (fieldbus devices from different manufacturers must run on one bus without errors), interchangeability (replacing PROFIBUS devices with the same type, but with other manufacturers as well), and availability of basic functions (to ensure the system is operated the same way throughout).

Different device representations

A field device is represented via various layers, through resource blocks, transducer blocks, and function blocks.

Resource block for maintenance information

The resource block contains data that is specific for the device hardware and software (manufacturer, device type, software version, hardware version, diagnostic information, etc.). The resource block mode checks all of the device's other function block modes.

Transducer block as the interface for operation

The transducer block isolates the function blocks from the device-specific function that handles the sensors and actuators. The transducer block specifies access to the device using an interface and defines function blocks for it. There are different transducer blocks for the fill state, flow, pressure, analysis, temperature, and valves. This provides methods for simple device settings like linearization, basic configurations, diagnostics, and security settings.

Function block for application software

Function blocks are the most important part of the FOUNDATION fieldbus specifications and are the key for implementing field-based control. The device manufacturer can decide which function blocks are available for the device (e.g. analog inputs, analog outputs, discrete inputs, discrete outputs, PID controllers, signal adjustments, etc). A FB AI can, for example, perform a simulation, scale a value, forward substitute values, and provide limit value monitoring for LL, L, H, and HH.

Function blocks

The structure of a function block contains inputs, outputs, and parameters (standard block parameters and block parameters). It is therefore possible to carry out a uniform and simple block-oriented configuration of functions. In addition, it can be clearly defined as to which information and functions need to be communicated. The distribution and execution of function blocks in field devices and their run sequence is specified by their assignment and arrangement. Transducer blocks and function blocks always return values and states. Multi-variable transmitters have n TB/FB blocks per field device. This data is transferred using cyclic (measurement value), acyclic, or spontaneous services (device diagnostics).

HART via PROFIBUS DP

Since over 80% the installed base for field devices consists of HART field devices, they clearly have to be taken into account when considering fieldbus technology. The solution with regard to integration involves HART-capable I/O modules that communicate digitally with a field device, with the data being transferred through PROFIBUS DP using a "tunneling" method (virtual I/O channels). This also makes cyclic access to multi-variable HART field devices, status, and diagnostic data possible. Naturally, transfer speed is relatively modest due to HART's modulation process (FSK). FDT/DTM technology is the foundation for manageable integration. HART devices must also frequently be used since the measurement value with a conventional 4-20 mA signal is available very quickly in comparison with fieldbus devices where this process generally takes longer.

PROFIBUS / FOUNDATION fieldbus comparison

PROFIBUS clearly scores higher with regard to its installed base, simple master/slave principle, and established FDT/DTM technology. Thanks to the Link Active Scheduler, FOUNDATION fieldbus technology includes a redundant design, direct device-to-device communication, and the option of timestamping on the device. The powerful function blocks in the field devices make possible new approaches regarding the segmentation of automation. With HSE, FOUNDATION fieldbus technology is heading towards ETHERNET; PROFIBUS is going the same way with PROFINET.

PROFIBUS DP/PA

PROFIBUS DP/PA-HART

The current PROFIBUS specifications include: PROFIBUS DP (DP = Decentralized Peripherals) for high-speed data exchange, e.g. with FIs, remote I/O, analysis devices, etc. (V0, V1, and V2 specifications exist). PROFIBUS PA (PA = Process Automation) was developed for the demands of process automation (sensors, actuators) and covers EEx requirements. Fieldbus supply and communication is handled with 2-line technology. Various device profiles (Profile 3.0) exist for PA devices (e.g. pressure, temperature, etc.).

Master/Slave principle

PROFIBUS differentiates between master and slave stations. The slaves are passive and polled by the master. On the master, tasks are divided into cyclic tasks (master class 1) and acyclic tasks (master class 2). A token controls access to multi-master mode. Effective data transfer is achieved by the master sending output data to the slave, which then responds by sending its input data directly thereafter.

GSD file

The device master file (for PROFIBUS DP / PA) is provided by the manufacturer of the field device and contains all of the data important for communication. A GSD import procedure passes this information on to the controller (PB master).

PROFIBUS topology

Limited by RS485 technology, up to 32 stations can be connected on a PROFIBUS DP segment. Up to 4 segments can be cascaded. However, there are repeaters on the market today that permit much higher levels of cascading. Despite this, the address range is still always in the range 0-125 (for master and slave), whereby each master and slave must have its own clear address.

Segment length for PROFIBUS DP

PROFIBUS DP uses RS485 (with copper cables), which allows it to cover a distance of 1200 m or 100 m depending on the transfer rate (9.6 kbit/s - 12 Mbit/s). 400 m is possible if using the recommended uncritical transfer speed of 500 kbit/s. If repeaters and fiber optic ports are used, then distances up to 15 km or more are possible. The bus is designed in a line structure since branch lines should be avoided (plugs for connections with cable input and output).

PROFIBUS PA – non-Ex

PROFIBUS PA segments can comprise up to 32 PA field devices, with 24V / 400 mA being provided for the segment. The bus for PA is designed as a line or tree structure, with the permitted length of branch lines dependent on the components being used.

PROFIBUS PA – EExi

PROFIBUS PA EExi segments can comprise up to 8 PA field devices, with max. 12.6 VDC / 100 mA being provided for the segment. The maximum length of a segment is 1000 m. What's important here is the starting current process of the field devices or the current needs of the individual field devices. This usually brings the theoretical value of 10 field devices down to around 6-8.

PROFIBUS bus cycle time

A basic rule is that the slowest station on the bus determines the transfer rate. When using PROFIBUS DP slaves with 12 Mbit/s transfer speeds, less than 1 ms is needed on the bus in order to transfer the maximum possible 244 bytes per slave. For PROFIBUS PA, the transfer rate is specified at 31.25 kbit/s, with cyclic data exchange (4 bytes for the measurement value and 1 byte for the status) typically needing 10-20 ms per slave. In practice, this means that PA segments with 20 field devices are polled every 200 - 400 ms.

Design notes

DP connections

The starting point is the PROFIBUS DP master in the controller based on RS485. This allows any number of DP slaves to be operated. Intrinsically safe and HART-capable inputs and outputs can also be structured in this way. Using suitable repeaters also allows these devices to be used in Ex zone 1. The transfer rate can fall anywhere between 9.6 kbit/s and 12 Mbit/s. The limit is 1.5 Mbit/s when using the intrinsic design. As with Ethernet TCP/IP, media converters (electrical/optical interface converters for PROFIBUS DP) can be used to set up a fiber optic ring. If there is ever an interruption, then this provides an alternative path. These repeaters also make it possible for segments that are more or less scattered across larger distances to be grouped together. These repeaters with FO ports achieve complete electrical isolation for the segments (lightning protection for bus lines spanning buildings).

PA connections

PA connections are based on the fact that the PA segment can only be operated at a transfer rate of 31.25 kbit/s. PA can only be connected to DP with a segment connector (DP/PA connector). First-generation segment connectors (SC1) triple the transfer rate (from 31.25 to 93.75 kbit/s), isolate DP and PA from each other electrically, and supply the (intrinsic) PA segment with current). This allows non-ex and ex-segments to be connected to non-ex DP segments. Second-generation segment connectors are designed as transparent gateways and can be operated at up to 12 Mbit/s. DP/PA links are not a satisfactory basis for a good fieldbus solution since they are not uniform. Through the use of accessories available on the market, transparency on PA segments can be achieved in case there is a short circuit on a branch line. In addition, the <10 device limit can be avoided when applying EExi solutions.

FDT/DTM

FDT (Field Device Tool) technology

FDT (Field Device Tool) technology standardizes the communication interface between field devices and systems. The special advantage of this technology is that its function is independent of the communication protocol and independent of the software environment on the device and on the control system. FDT therefore allows you to address any device via any system using any protocol.

Device Type Manager (DTM)

A device manufacturer develops a new Device Type Manager (DTM) for each device or group of devices. The DTM can be created directly from the device description (DD) if one is available. DTMs contain all device-specific data, functions and operating rules, such as the device structure, available communication options, internal dependencies and human-machine communication capabilities. DTMs also have functions for reading device parameters, configuring and operating devices and detecting errors. DTMs can consist of a simple graphical user interface (GUI) for setting the device parameters, or take the form of a highly developed application that, for example, performs complex real-time calculations for diagnostics and maintenance.

Frame application

The DTM is opened in an FDT container program, a so-called "frame application", and executed from there.

The system environment (host) has an FDT container that defines a number of interfaces between the host application and the DTMs. Frame applications can be tools for device configuration or for setting up the control system, or they can consist of operation consoles and tools for asset management.

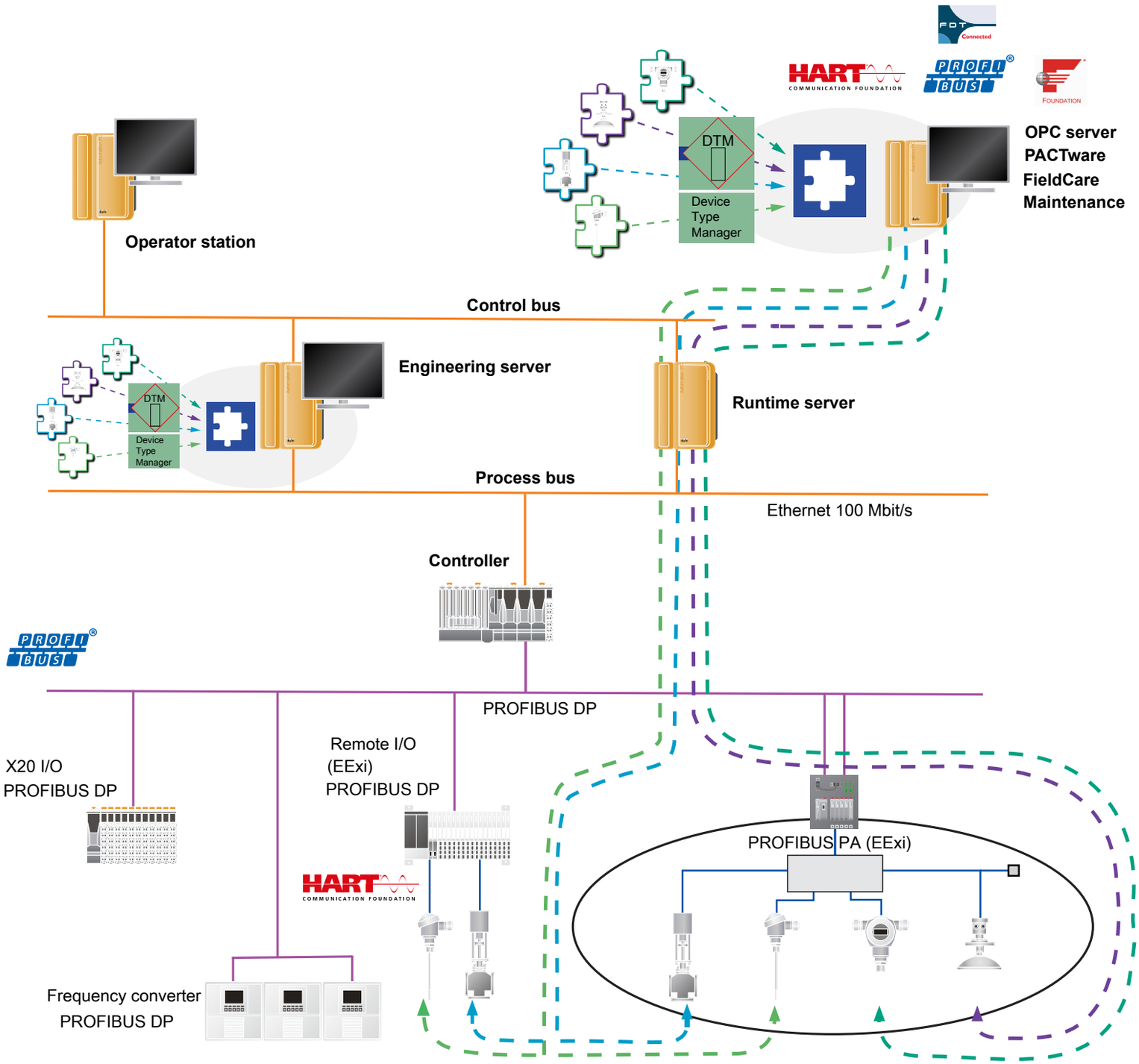
Communication functions for the host-fieldbus connection

The frame application also includes communication functions for connecting the host system fieldbuses used (e.g. HART, PROFIBUS, FOUNDATION Fieldbus, etc.). The FDT container triggers the DTM and allows the device to interact with the system's engineering and operation environment.

Synergy for end users and automation providers

Using FDT has potential advantages for both the end user and the automation provider.

FDT technology results in synergetic effects for both user groups, which will help establish it as an important, trend-setting standard.


DTM
Device Type Manager
Operator station
OPC server
PACTware
FieldCare
Maintenance
Control bus
Engineering server
Runtime server
Process bus
Ethernet 100 Mbit/s
Controller
PROFIBUS DP
X20 I/O
PROFIBUS DP
Remote I/O
(EExi)
PROFIBUS DP
PROFIBUS PA (EExi)
Frequency converter
PROFIBUS DP

Data transmission, configuration and diagnostics of field devices

The X20 palette consists of analog HART input modules and HART output modules.

X20AI2438 / X20AO2438

These modules are equipped with two inputs and outputs and use real-time Ethernet POWERLINK to transfer HART data supplied by sensors and actuators directly to the controller.

Controller routes information

To evaluate the data, the controller forwards information via the process bus to maintenance stations with FDT containers, for example B&R Automation Studio, PACTware or FieldCare.

Controller handles asset monitoring

In the other direction, this type of communication makes it possible to configure the HART devices. This is done with B&R's TCP/IP communication DTM, which scans the network and detects the entire hardware tree, including field devices.

DTM server on controller

The DTM server on the controller operates as a gateway that provides read/write access to all detailed information regarding HART field devices for asset monitoring. Read/Write function blocks support this access during logic processing as well.

One modem per channel ensures more than enough bandwidth

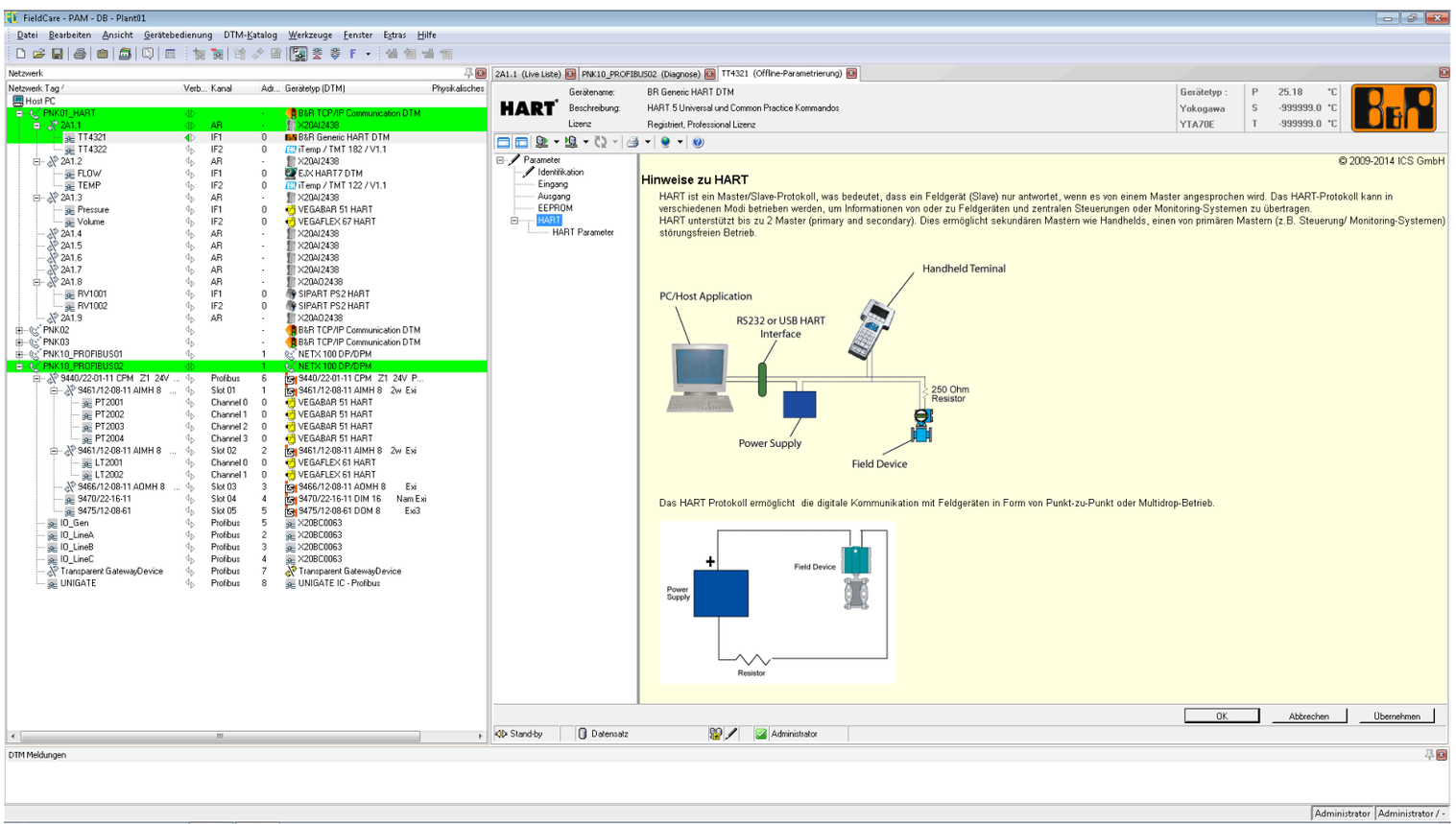
Each channel on B&R HART modules has its own HART modem in order to optimally utilize POWERLINK's high transmission bandwidth. In addition, the comparatively slow HART channels are not encumbered further by multiplexing, as is common in many other systems.

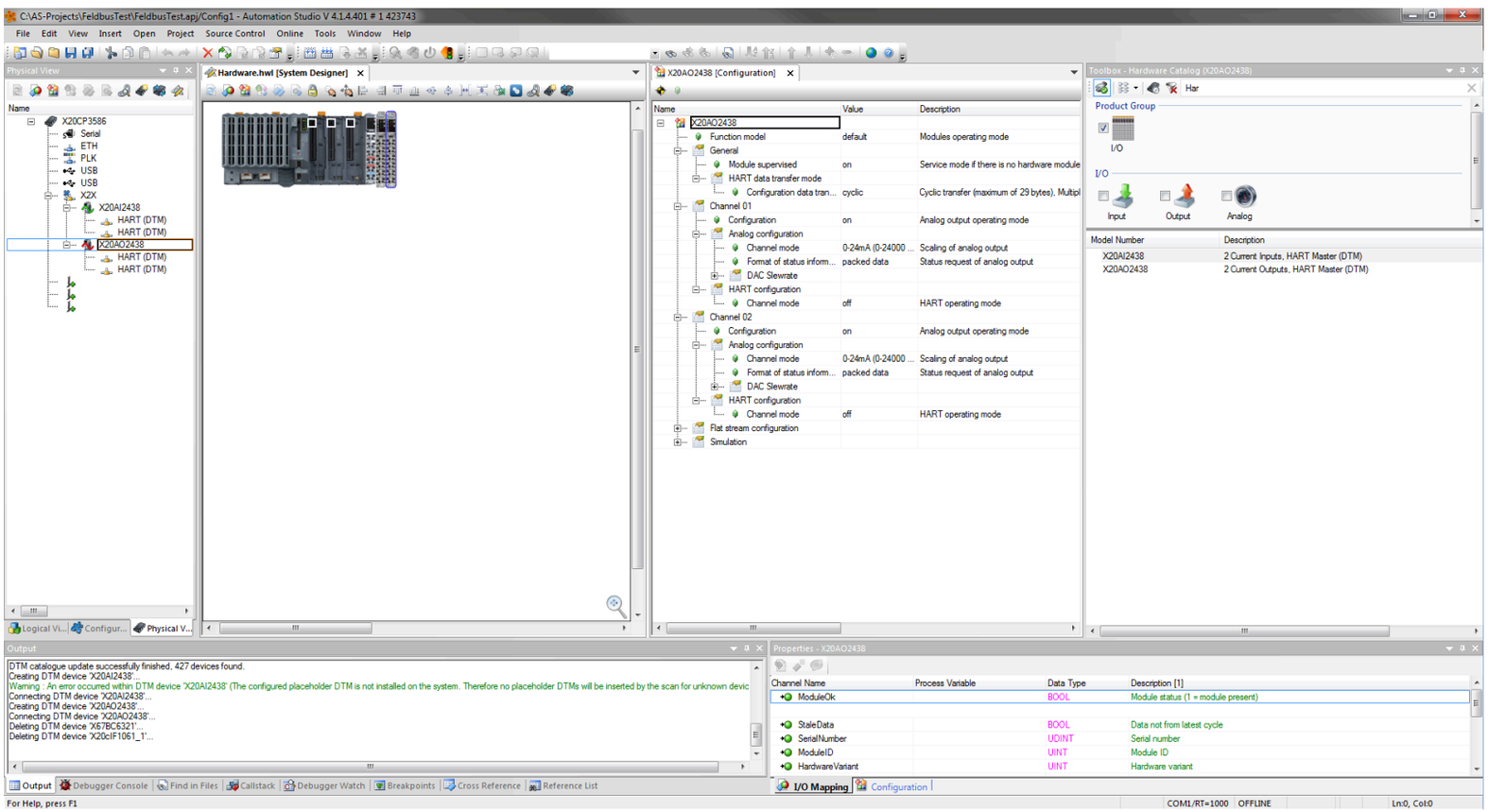
Integrated burst mode support

X20 HART modules also provide support for burst mode.

Multidrop support

Integrated multidrop functionality and advanced internal transducer feed allow up to 5 devices per channel to be supplied directly by the module.

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Name
X20CP3586
Serial
ETH
PLK
USB
USB
X2X
X20AI2438
HART (DTM)
HART (DTM)
X20AO2438
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HART (DTM)
Hardware.hwl [System Designer]
X20AO2438 [Configuration]
Name
Value
Description
X20AO2438
Function model
default
Modules operating mode
General
Module supervised
on
Service mode if there is no hardware module
HART data transfer mode
Configuration data tran...
cyclic
Cyclic transfer (maximum of 29 bytes), Multipl
Channel 01
Configuration
on
Analog output operating mode
Analog configuration
Channel mode
0-24mA (0-24000 ...
Scaling of analog output
Format of status inform...
packed data
Status request of analog output
DAC Slewrate
HART configuration
Channel mode
off
HART operating mode
Channel 02
Configuration
on
Analog output operating mode
Analog configuration
Channel mode
0-24mA (0-24000 ...
Scaling of analog output
Format of status inform...
packed data
Status request of analog output
DAC Slewrate
HART configuration
Channel mode
off
HART operating mode
Flat stream configuration
Simulation
Toolbox - Hardware Catalog (X20AO2438)
Product Group
I/O
I/O
Input
Output
Analog
Model Number
Description
X20AI2438
2 Current Inputs, HART Master (DTM)
X20AO2438
2 Current Outputs, HART Master (DTM)
Output
DTM catalogue update successfully finished, 427 devices found.
Creating DTM device 'X20AI2438'...
Warning : An error occurred within DTM device 'X20AI2438' (The configured placeholder DTM is not installed on the system. Therefore no placeholder DTMs will be inserted by the scan for unknown devic
Connecting DTM device 'X20AI2438'...
Creating DTM device 'X20AO2438'...
Connecting DTM device 'X20AO2438'...
Deleting DTM device 'X67BC6321'...
Deleting DTM device 'X20cIF1061_1'...
Output
Debugger Console
Find in Files
Callstack
Debugger Watch
Breakpoints
Cross Reference
Reference List
Properties - X20AO2438
Channel Name
Process Variable
Data Type
Description [1]
ModuleOk
BOOL
Module status (1 = module present)
StaleData
BOOL
Data not from latest cycle
SerialNumber
UDINT
Serial number
ModuleID
UINT
Module ID
HardwareVariant
UINT
Hardware variant
I/O Mapping
Configuration
For Help, press F1
COM1/RT=1000
OFFLINE
Ln:0, Col:0

PACTware

PACTware (Process Automation Configuration Tool)

PACTware is a program that can be used to select communication-capable field devices from different manufacturers from a device catalog and grouped in projects according to the communication structure in a production system.

FDT Specification 1.2.1 (Field Device Tool Specification)

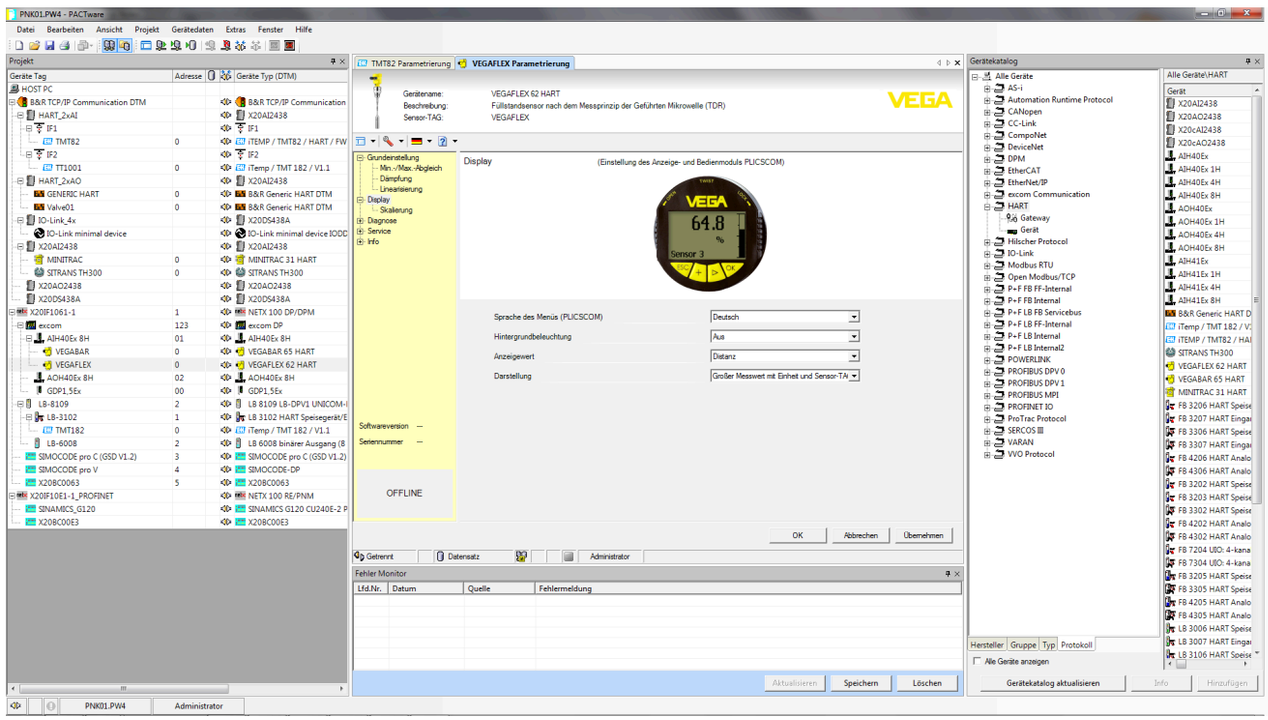
As defined in the FDT Specification 1.2.1 (Field Device Tool Specification) PACTware serves as a frame application for DTMs (Device Type Managers) that are provided as configuration software by the manufacturers of the field devices. DTMs make it possible to configure the field devices and change the device parameters. The configuration and parameter values can be saved on data storage media or printed. PACTware works together with DTMs implemented according to the FDT Specification 1.2 or 1.2.1.

CommDTM (Communication DTM)

A CommDTM (Communication DTM) is used to communicate with field devices using protocols such as HART or PROFIBUS. Gateway DTMs can be placed between a CommDTM and the field devices' DTMs to configure the functions of remote I/O systems or multiplexers. A project can include multiple CommDTMs.

Base add-ins

A large portion of the functionality of PACTware comes from add-ins, which come with it or can be downloaded when needed. To create special functions for a project, additional add-ins can be developed or existing ones can be modified. PACTware is delivered with the following add-ins: the device catalog, the project view, the plant view, the error monitor and the debug monitor.



Optional add-ins (upload/download manager, HART Advanced Scan)

PACTware also has add-ins for operating multiple field devices in one project. These include the HART Advanced Scan add-in and the Up/Download Manager add-in for downloading and uploading to/from many field devices contained in a project.

User management

User management is used to handle access rights for the various users working on a project.

Uploading from and downloading to field devices

The tool "Read data from device" is used to read data from (upload from) the field device. A connection to the field device is established automatically. Changed parameters can be written to (downloaded to) the field device using the tool "Write data to device".

Device catalog management

Device catalog management makes it possible to select and add all DTMs installed on the host PC to the project.

Project view

The structure of the project is displayed with all CommDTMs and field devices, and the host PC is at the top of the hierarchy. The field devices, remote I/O systems or multiplexers are assigned to the communication components. The field devices are arranged at the lowest level of the project structure hierarchy. Each device has a number of properties that provide information about its position within the project and the status of the DTMs.

Plant view

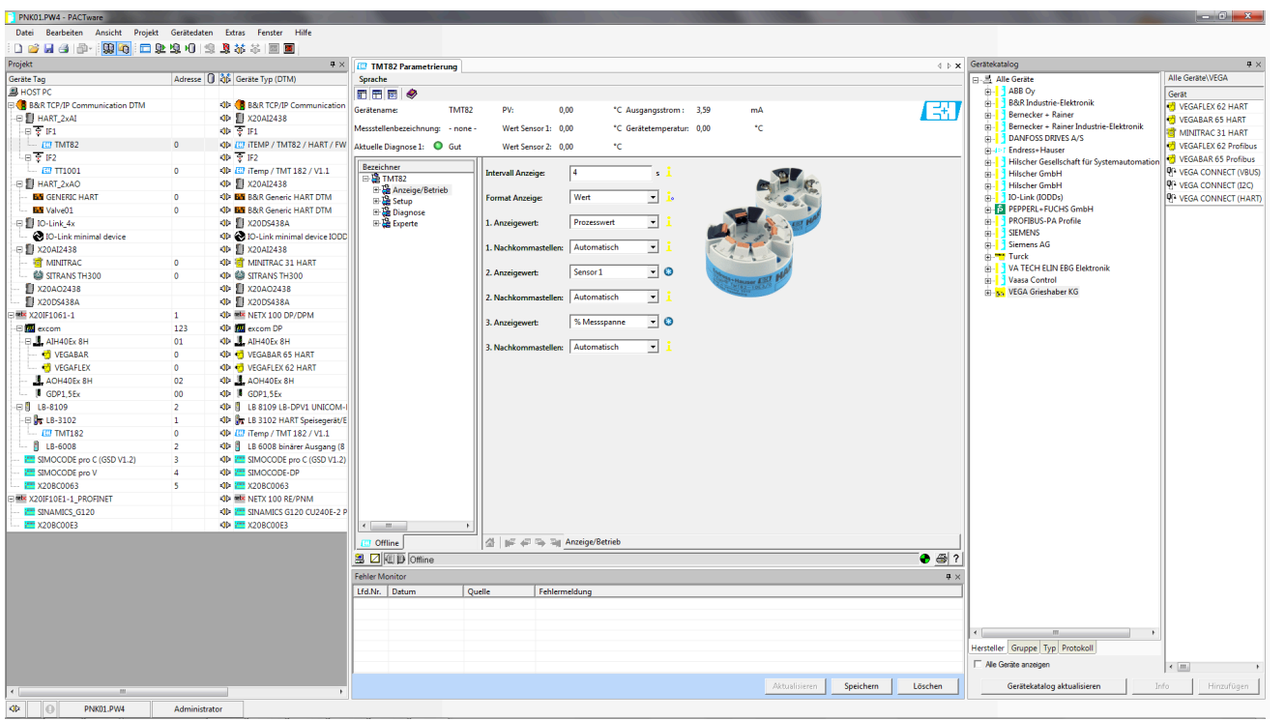
Any number of system sections can be defined in various layers using nodes in order to be viewed in the plant view.

Error monitor

The error monitor displays all errors that occur in the project during communication, upload, download etc.

Contact address / Reference source:

(for PACTware)
PACTware Consortium e.V.
Panoramastrasse 16, 76327 Pfinztal / Deutschland
Web: http://www.pactware.com
Email: hotline@pactware.com



FieldCare

Asset Management Tool

FieldCare is the FDT based, system asset management tool from Endress+Hauser with functions ranging from simple device configuration to condition monitoring solutions. Using status information it provides a simple, yet effective, method for checking the availability of the devices.

Support during the entire lifecycle of the system

FieldCare provides extensive support during the entire life cycle of the system. There are four versions available, depending on the number of devices per project and different functions: "Device Setup SFE250" ; "Lite SFE550" ; "Standard SFE551" and "Professional SFE552".

Document management

Detailed information for each node can be stored as links (file, URL) and comments, and is therefore available at any time.

Project inventory

The inventory list provides an organized overview of all devices in a project, as well as detailed information.

Import / Export

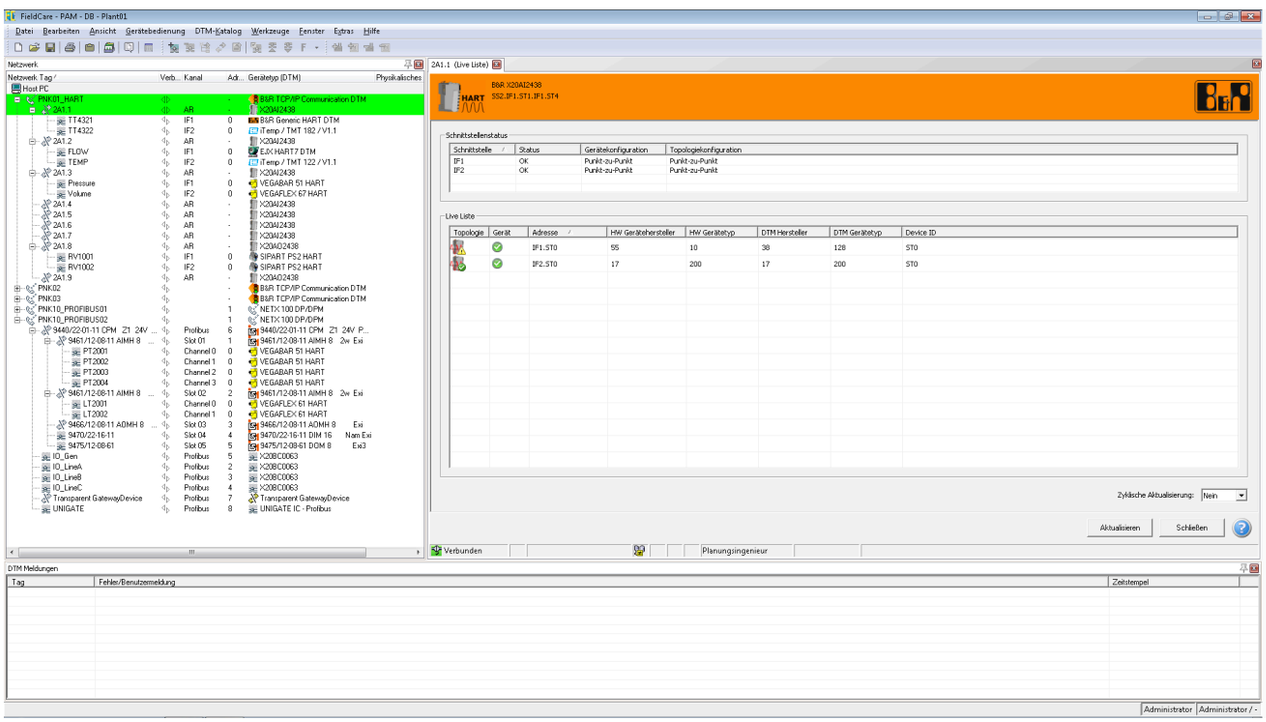
Importing/Exporting allows you to import or export a project. A CSV file can contain information about an entire project or about one part of a project.

Find TAG

Find TAG lets you navigate directly to the device corresponding to the TAG name within the project.

Event recorder

Event recorder records log entries currently displayed in the log view. The data record for each entry contains a timestamp, message, source and the event category.



Activity recorder

To meet the applicable industrial standards, FieldCare also contains the "Activity recorder" function, which makes it possible to trace user activity. With this function, all activities and events that take place in FieldCare are saved in a database, where they are available to be displayed. Additionally, filter criteria can be used to select and display specific events.

iDTM

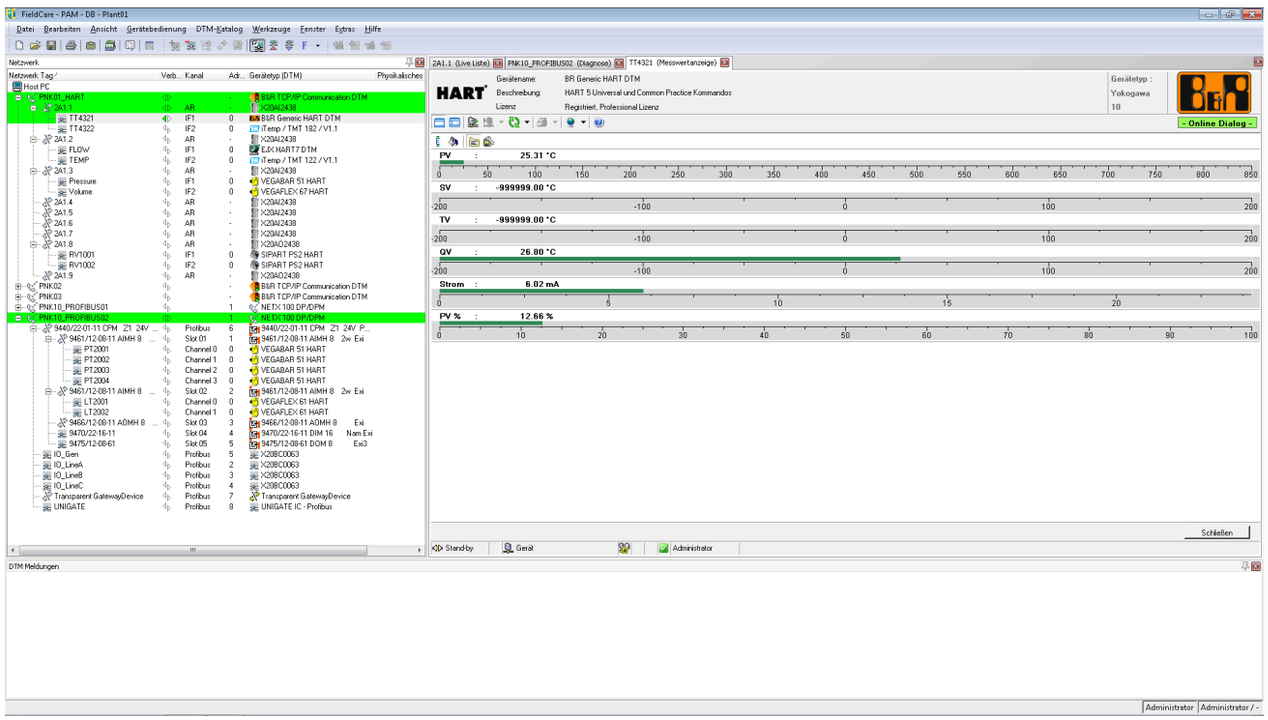
The HART iDTM (interpreter Device Type Manager) interprets HART DDs/EDDs and makes it possible for FieldCare to work with HART field devices that don't have their own DTM. All registered HART EDDs (from approx. 90 manufacturers) are thereby available for use in FieldCare. This unifies the two device integration technologies FDT/DTM and EDDL. This gives users the freedom they need when selecting a device to ensure an optimum solution.

Nested communication also for EDD-based devices

The HART iDTM combines the fundamental device functionality of EDD with the familiar DTM user interface. Thanks to FDT, EDD-based devices can participate in vertical (nested) communication. The HART iDTM works just like any other DTM in FieldCare. It is based on the EDD interpreter (Electronic Device Description) of the HART Communication Foundation (HCF) and contains over 600 registered HART® EDDs from the HCF library, which is updated regularly.

Contact address / Reference source:

(for FieldCare)
Endress+Hauser Metso AG
Kaegenstrasse 2, 4153 Reinach
Switzerland
Email: info@ch.endress.com
Web: www.ch.endress.com



Connectivity

Table of contents

Connectivity - OPC

OPC, the interoperable system interface

Over the past 15 years, OPC has become a standard technology for data exchange between applications from different manufacturers. It is a flexible, powerful, and user-friendly standard that is very widely used.

Data exchange with non-Windows applications

OPC was developed to provide secure high-speed access to data and information in Windows operating systems. However, it is now also possible to exchange data with applications in other operating systems (VxWorks, Linux) via the OPC interface.

Universal ability to communicate

OPC is an attempt to give industrial bus systems and protocols a universal ability to communicate with each other. The standard was developed by the OPC Task Force, a collaboration between various automation manufacturers with the goal of minimizing the need to adapt systems for countless manufacturer standards.

OPC Foundation

Shortly after the OPC Specification Version 1.0 was released in August 1996, the OPC Foundation was founded, which continues to be responsible for maintaining and promoting the standard to this day.

OPC Compliance Test

Today OPC is the standard for manufacturer independent communication in the automation industry. The OPC Compliance Test certification software ensures compatibility. The manufacturers of OPC servers can use it to test their servers before development is even complete. The software tests all OPC functions, simulates client errors, and checks all error codes. It also performs logic, stress and performance tests.

OPC currently uses DCOM

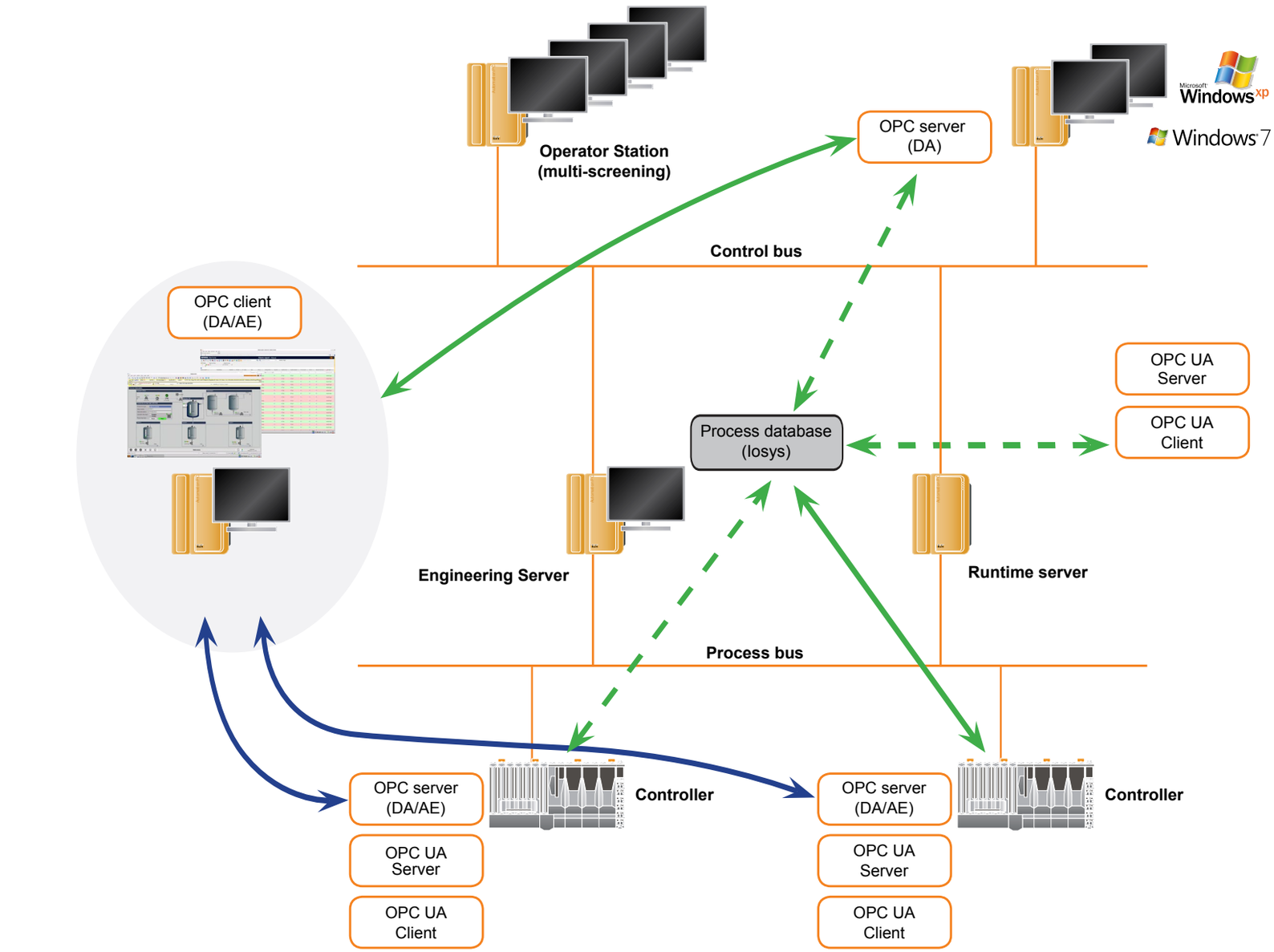
For communication between applications, OPC currently uses DCOM, which functions as a data abstraction layer. DCOM makes other applications accessible for (compiled) functions and objects. The OPC standard defines DCOM objects, i.e. the functions/interfaces that must be available to an OPC station (via DCOM) in order for it to be able to exchange data with other OPC applications.

Communication via firewalls and domains with OPC Tunnel

OPC is based on Microsoft's DCOM specification, except for very few specifications. This makes communication outside the limitations of firewalls and domains impossible without using an OPC Tunnel. These software products convert OPC communication into "normal" TCP/IP communication, transfer it on the network, and then convert it back to OPC communication when it reaches its destination.

OPC Unified Architecture

OPC Unified Architecture refers to a new generation of OPC servers. This specification will unify the various specifications used previously. The new specification no longer describes a COM interface, but rather a WSDL (Web Services Description Language), which can be used after COM and in various web service protocols to ensure portability.


Operator Station
(multi-screening)
OPC server
(DA)
Windows xp
Windows 7
Control bus
OPC client
(DA/AE)
OPC UA
Server
OPC UA
Client
Process database
(losys)
Engineering Server
Runtime server
Process bus
OPC server
(DA/AE)
OPC UA
Server
OPC UA
Client
Controller
OPC server
(DA/AE)
OPC UA
Server
OPC UA
Client
Controller
Variant 1 - Controller-oriented OPC
Variant 2 - Control computer-oriented OPC

Connectivity - XML

XML as a base

A platform-independent exchange of information between different systems, in the form of defined and structured documents is possible with XML. Historical data is recorded with ChronoLog and exported network-wide into standardized XML format via the XML interface.

Export takes place via HTTP protocol

In order to make network-wide, operating system independent data exchange possible, exports always use HTTP protocol and the CGI interface.

Query with URL

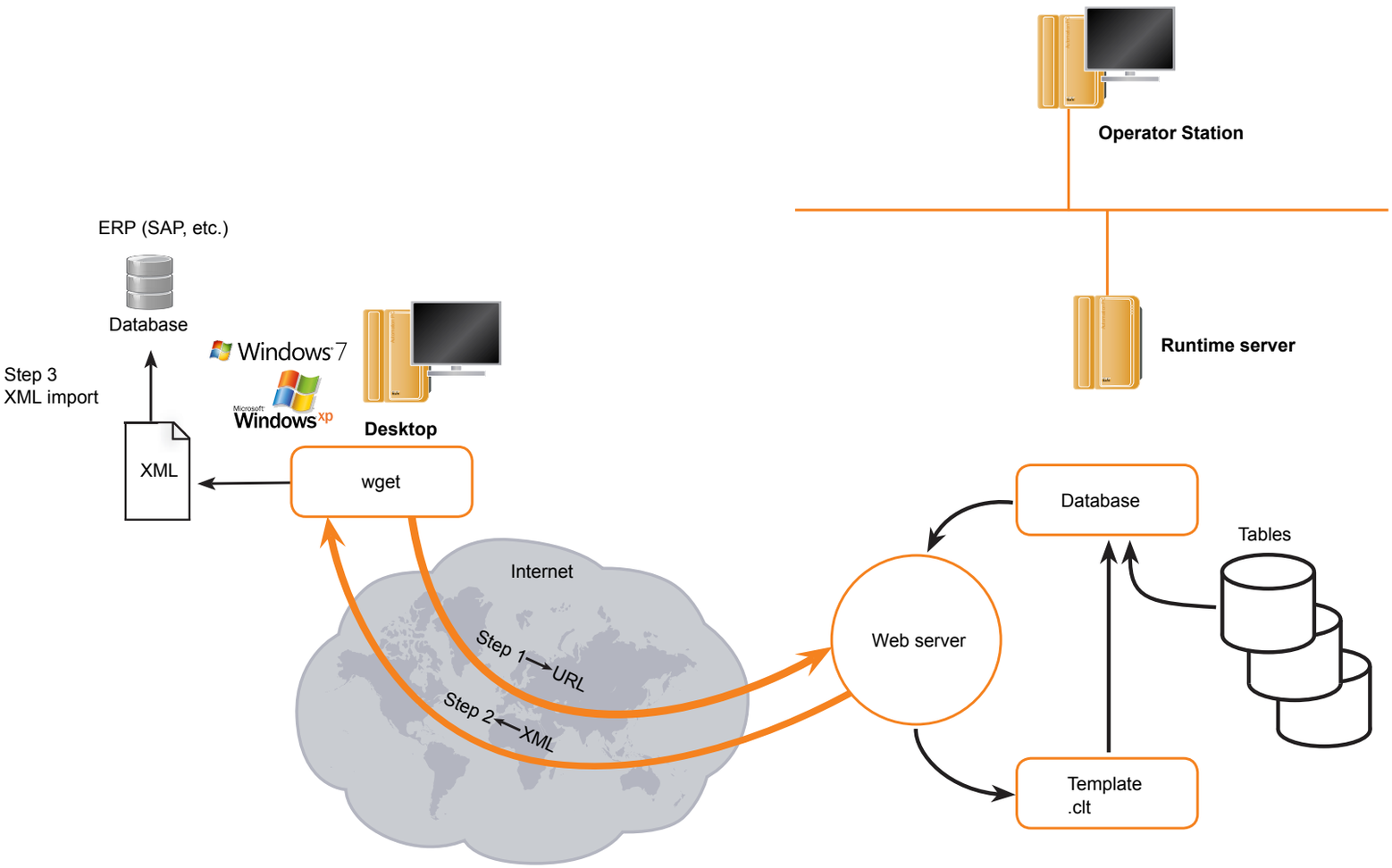
When a query is made, a URL (Uniform Resource Locator) is used on the client side to perform addressing and configuration for the query. On the server side, the database query is started in a CGI script. The result is returned in XML format to the client who sent the query, who then generates an XML file in the file system.

MySQL imports XML file

Then a MySQL function is used to import the data records from the XML file to the MySQL database.

Trend data

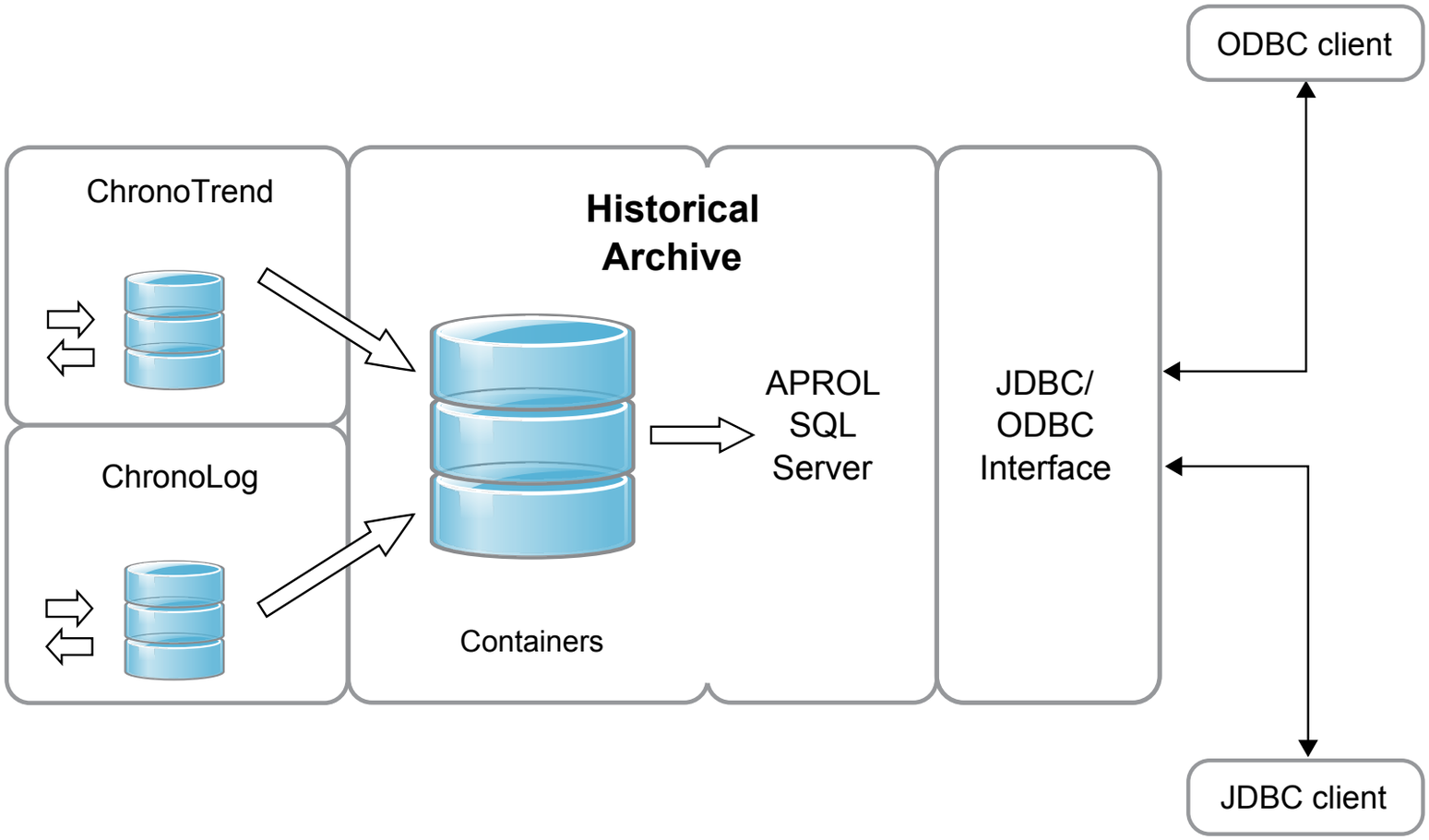
A special ChronoLog template is available to produce trend data in XML format. This makes it possible to output either preprocessed / screened values, or the raw trend data. A sampling value and a linear interpolated value are available for the screen conversion.


Operator Station
Runtime server
ERP (SAP, etc.)
Database
Step 3
XML import
Windows 7
Windows xp
Desktop
XML
wget
Internet
Step 1 URL
Step 2 XML
Web server
Database
Tables
Template
.clt

Connectivity - SQL

APROL SQL server

The new APROL SQL server for polling historical data. All historical data recorded by APROL can be retrieved and analyzed via SQL clients.


ODBC client
ChronoTrend
Historical
Archive
APROL
SQL
Server
JDBC/
ODBC
Interface
ChronoLog
Containers
JDBC client

Connectivity driver

Configuration with the CaeManager engineering tool

Various fieldbus protocols are integrated and configured directly with the central engineering tool in APROL, the CaeManager.

Rule-based gateway editor in the CaeManager

To simplify driver configuration, a rule-based Gateway Editor is available in the CaeManager.

Gateway I/Os can be used like hardware I/Os

When processed further, the input and output data (gateway I/Os) supplied by the fieldbus modules and interface cards have the same complete support as conventional I/Os from X20 system modules.

Any protocol using ANSI C programming

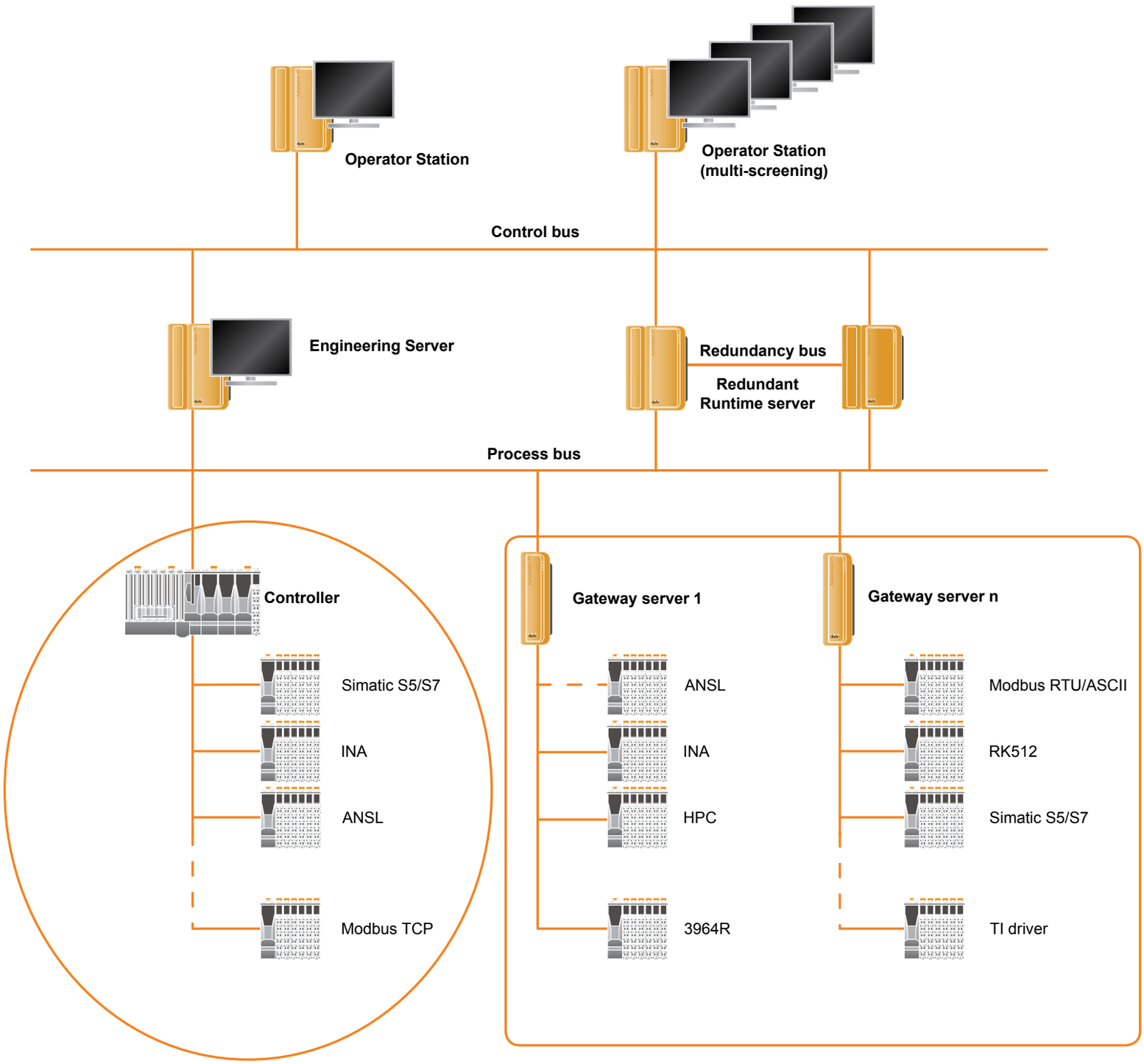
Implementing any types of protocols (scale interfaces, counter interfaces, etc.) is also easy since ANSI C can be used to completely program the fieldbus modules and interface cards.

Standard driver for controller connectivity

- INA connection
- Modbus driver
- RK512 driver
- PROFIBUS DP slave interface
- Ethernet/PROFIBUS DP gateway driver

Standard driver for control computer connectivity

- INA connection
- FMS connection
- Simatic S5/S7 connection
- HPC connection
- OPC connection
- 3964R
- Dispatcher
- Event driver
- Modbus Plus driver
- RK512
- Texas Instruments (TI) driver



3rd-party controller connectivity

3rd-party control computer connectivity

Connectivity - FOUNDATION fieldbus

FOUNDATION fieldbus

A basic goal of FOUNDATION fieldbus technology involves striving to create decentralized intelligence in field devices for process automation. When doing so, the field device is viewed as a conventional controller. Due to strong technological performance limitations in field devices, there is certainly much more development work needed by field device manufacturers.

Transfer medium for the field device

The physical layer is based on the IEC 61158 standard, just like PROFIBUS PA. The following properties result from this:

- Voltage supply and communication use 2 wires. EEx and non-Ex types are available.
- Reverse polarity protection is possible/available for the device
- The transfer rate is always 31.25 kbit/s
- Up to 32 stations can be connected per segment. For FISCO/EEx-ia IIC applications, a maximum of 10 stations are permitted.
- The line length can be up to 1900 m; for EEx applications up to 1000 m

Unique field device addressing

Each FF device has a uniquely specified address. It is derived from the combination of manufacturer number (xxxxxx), device number/type (yyyy), and serial number (zzzzzzz), i.e. an FF device address is in the following form: xxxxxxxyyyy-zzzzzzz. After the device has been detected on the fieldbus segment, the device configuration can be started through acyclic communication.

Link Active Scheduler (LAS)

The tasks of an administrator on the bus segment are handled by the LAS (Link Active Scheduler).

- Detecting and publishing newly detected field devices on the bus
- Detecting and publishing devices, that are no longer present on the bus, or that no longer communicate.
- Creating the "Live List". This list contains all available field devices. The "Live List" is updated regularly by the LAS
- Querying process variables on the field devices according to the scheduler
- Passing off the token to the field devices between the respective data transfer

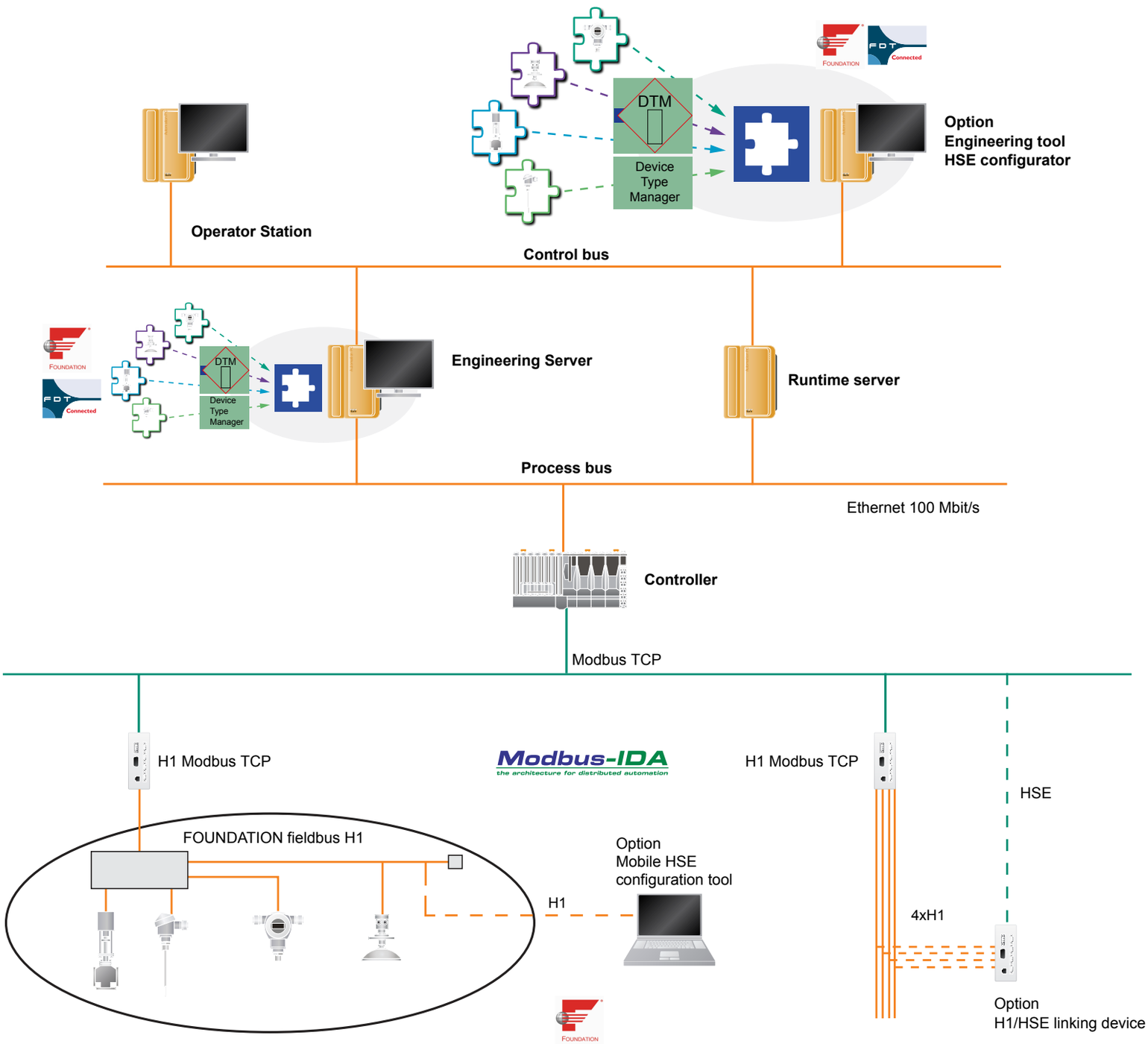
Link Master (LM): Link Master refers to the class of devices that have an Link Active Scheduler (LAS) function. Only one device with the Link Master function can be active as an LAS on the fieldbus. Redundancy is also possible using the LAS function.

Features of fieldbus device

Depending on the manufacturer, a fieldbus device includes a FOUNDATION fieldbus device with n function blocks (e.g. 3 AI, 1 AO, 1 DO, 2 PID) and n transducer blocks (e.g. 1 flow, 1 display, 1 counter, 1 diagnostics).

DD / CFF: The manufacturer provides the device description using the device description language (device description as *.FFO files, *.SYM files).

The starting point is the Modbus/TCP interface on the gateway. The connection to the controller is established physically via Ethernet using the Modbus/TCP protocol. The gateway (similar to the PROFIBUS gateway) establishes the connection between Ethernet with the Modbus/TCP protocol and the 4 H1 segments. H1 segment process data can be read and written via the Modbus/TCP protocol. The H1 configuration tool also manages FF device configurations and the import of device descriptions. Through the additional use of a linking device (HSE/H1), the complete configuration of the H1 segments can be carried out from a centralized FF engineering station. An HSE configurator is used as a tool for configuration on the Engineering station.


DTM
Device Type Manager
Option
Engineering tool
HSE configurator
Operator Station
Control bus
DTM
Device Type Manager
Engineering Server
Runtime server
Process bus
Ethernet 100 Mbit/s
Controller
Modbus TCP
H1 Modbus TCP
Modbus-IDA
the architecture for distributed automation
H1 Modbus TCP
HSE
FOUNDATION fieldbus H1
Option
Mobile HSE
configuration tool
H1
4xH1
Option
H1/HSE linking device

Remote I/O systems

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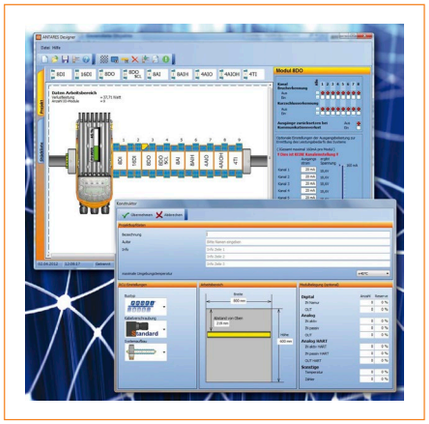
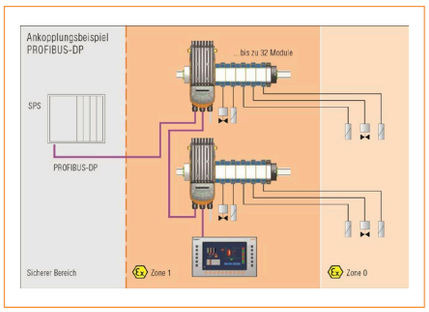
ANTARES remote I/O system from BARTEC





Contact address / Reference source:

BARTEC GmbH
Max-Eyth-Str. 16.
97980 Bad Mergentheim
Web: http://www.bartec.de
Email: daniela.deubel@bartec.de

ANTARES - Simple and flexible remote I/O solutions for Ex areas

Automating industrial installations and systems requires innovative solutions that can sustain productivity and economic viability over the long term. With ANTARES, BARTEC offers a convincing solutions for industry's increasing demands for more flexible, more reliable and more cost-effective automation solutions with remote I/O system. ANTARES provides maximum performance, unbeatable operating comfort and unmatched cost-effectiveness in an attractive design.

System design

The ANTARES remote I/O system is installed directly in the Ex area. The system's central unit is the (rail control unit) with host communication, Ethernet switch, power management, and I/O data processing. Easy integration is guaranteed with the support of numerous open communication standards, from fully redundant PROFIBUS DB to Ethernet standards such as PROFINET, Modbus TCP and EtherNet/IP. Complex Ex repeaters and separate bus topologies are not needed. The many ANTARES I/O modules allow any configuration.

Intuitive project configuration

Thanks to the intelligent ANTARES approach, the same configuration processes as used for conventional system solutions can be used. A comprehensive software tool simplifies development and verification with the ANTARES system; at the same time, critical system factors such as power management, distances, etc. are monitored automatically.

Maximum design freedom

Due to the large power reserves, efficient and compact I/O configurations are absolutely no problem even if the system is directly installed in zone 1. Up to 32 multi-channel I/O modules can be supplied via a single RCU. Bus rail expansion options are also available for real distributed I/O configurations.

Flexible system certification

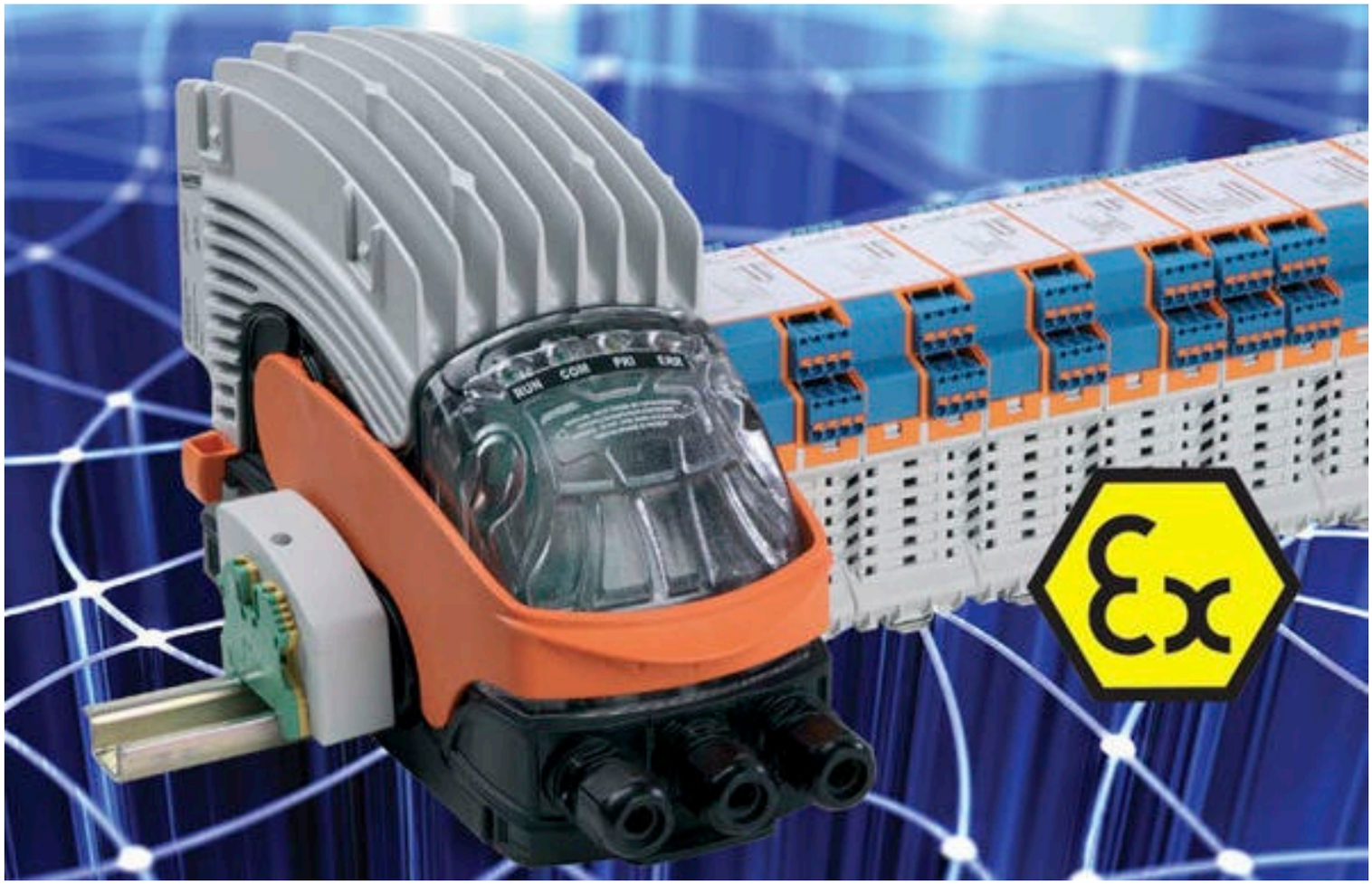
Thanks to the intelligent certification concept, it is possible to design flexible system approval. For the first time ever, the system manufacturer himself can plan and design his system as he wants it and install it in a standard mechanically protected industrial housing according to standard installation guidelines for explosive areas. Having Ex-authorized personnel on site to install systems requiring certification is no longer necessary. Even making I/O changes can be done easily while observing the existing certification for the system.

Maximum system availability

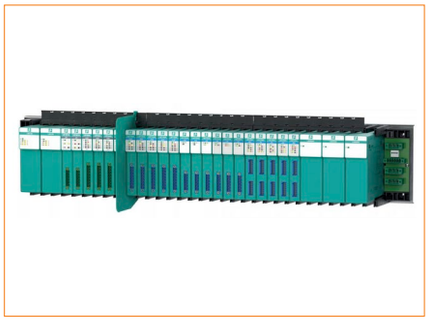
Real communication redundancy for PROFIBUS DP guarantees uninterrupted operation with host systems. Both communication lines are active in a redundant configuration. This guarantees constant availability when a line or module fails. With support for hot-swapping, ANTARES can completely rule out I/O downtime.

Optimal safety over the entire lifecycle

State-of-the-art designs, technologies and components guarantee the future of ANTARES and the use of the system in any installation. Constant design improvements have made the ANTARES concept the approach with maximum reliability. In addition, deciding on open bus communication with international support and industry expertise protects any investment in ANTARES.


RUN
COM
PRG
ERR

Remote I/O System LB from Pepperl + Fuchs



LB is a remote I/O system for Ex applications. LB remote I/O stations are installed in Zone 2/Class I, Div. 2 or 22 or in a safe area. They are a modular system for signal adjustment between field devices in areas where there is danger of explosions and controllers in a safe area. LB remote I/O connects your conventional sensors and actuators with your process control system using a single fieldbus line, and uses a standardized bus for this purpose (PROFIBUS, Modbus and others). The various I/O modules have a plug-in design; they can be inserted and removed with voltage applied, without fire permit. A broad spectrum of input and multi-channel I/O modules with Ex-i and Ex-e field device connections allow a simple and uniform system design.

- Installation/Service without fire permit
- I/O modules for Ex-i and Ex-e field device connections
- Any arrangement of I/O modules
- 1- to 8-channel I/O modules
- Standardized bus connections (PROFIBUS, Modbus, etc.)

- Configuration via bus possible
- Integrated HART communication
- Redundancy of bus and power supply possible
- FDT support
- Bus-independent SIL 2 output circuit
- FATs and GAMP4 FATs possible

Contact address / Reference source:

Pepperl+Fuchs GmbH
Lilienthalstrasse 200, 68307 Mannheim/ Germany
Web: http://www.pepperl-fuchs.com
Email: info@de.pepperl-fuchs.com

Remote I/O System I.S. 1 from STAHL

With IS1, R.STAHL has already brought the second generation of explosion-proof remote I/O systems onto the market. The IS1's simple structure, unique flexibility and enormous cost-effectiveness are its distinguishing features and make it the most widely used remote I/O system in zone 1. For a small or large number of signals, for installation in zone 1, zone 2 or in the control room - all requirements can be met in a flexible manner with the IS1. The intrinsically safe system structure with Ex-i fieldbus (with copper lines or fiber optics) permits system service and maintenance to be carried out in highly combustible areas. A redundant structure is possible if a high level of availability is required. Many additions and improvements have made IS1 remote I/O from R.STAHL better and more efficient in the last few years and also optimized the system for the mixed operation of zone 1 / zone 2 and non-Ex signals. The intrinsically safe fieldbus interface for PROFIBUS DP that meets PNO standard RS RS485-IS is available and an automatic baud rate detection and repeater function was introduced with the new fieldbus separation transmitter. Modular remote I/O system for 35 mm DIN rail installation.

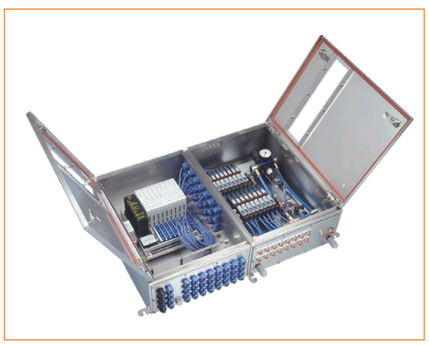
- Installation in zone 1 or zone 2 / division 2 or in safe areas
- Input and outputs, intrinsically safe EEx ia IIC
- Fieldbus communication: Modbus, PROFIBUS DP and others
- Hot swapping for all modules
- Redundant internal system bus is standard
- Redundancy for fieldbus and CPU and power module
- ServiceBus option for configuration, error diagnostics and for HART
- Communication
- HART input and output modules for transducer and position controller
- Simple configuration of PowerBus and BusRail
- Field housing in many designs, freely configurable

Contact address / Reference source:

R. STAHL AG
Am Bahnhof 30, D-74638 Waldenburg/ Germany
Web: http://www.stahl.de/kontakt.html
Email: info@stahl.de


POWER
9444
CPU
9441
Socket
9492

excom remote I/O system from TURCK



excom is a remote I/O system for Ex applications. It can be installed in zone 1 without further Ex protection measures. Field devices are connected directly at the location where they are needed, and complex wiring is not required. Modules with IP20 protection offer 4 analog or 4 / 8 binary inputs or outputs with a width of only 18.2 mm. Two redundant power supplies, two redundant gateways and up to 16 I/O modules can be installed with dimensions of only 43.2 cm x 20.6 cm x 11 cm (W x H x D). In this configuration, up to 128 binary or 64 analog channels are available at the location needed in the smallest amount of space possible.

- Remote I/O system for use in zone 1
- Redundant power supplies and gateways
- Intrinsically safe connection to PROFIBUS DP with V1 functionality
- Online configuration of all parameters possible
- Complete HART configuration from the process control system to the field device
- Working temperature range from -20 to 60°C
- Exchange and expansion of all components during operation
- Inserting and removing modules with one hand and without tools
- 128 binary or 64 analog intrinsically safe channels using one bus address
- Forcing and replacement value entry for analog and binary I/O

Contact address / Reference source:

Hans Turck GmbH & Co. KG
Witzlebenstr. 7
45472 Mülheim an der Ruhr
Germany
Web: http://www.turck.de
Email: more@turck.com


PSD24Ex
PTB 00 ATEX 2193
TURCK Germany
45466 Mülheim
DO401Ex
DM80Ex

Diagnostics

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Remote maintenance and alarms

Remote maintenance and operation via VPN

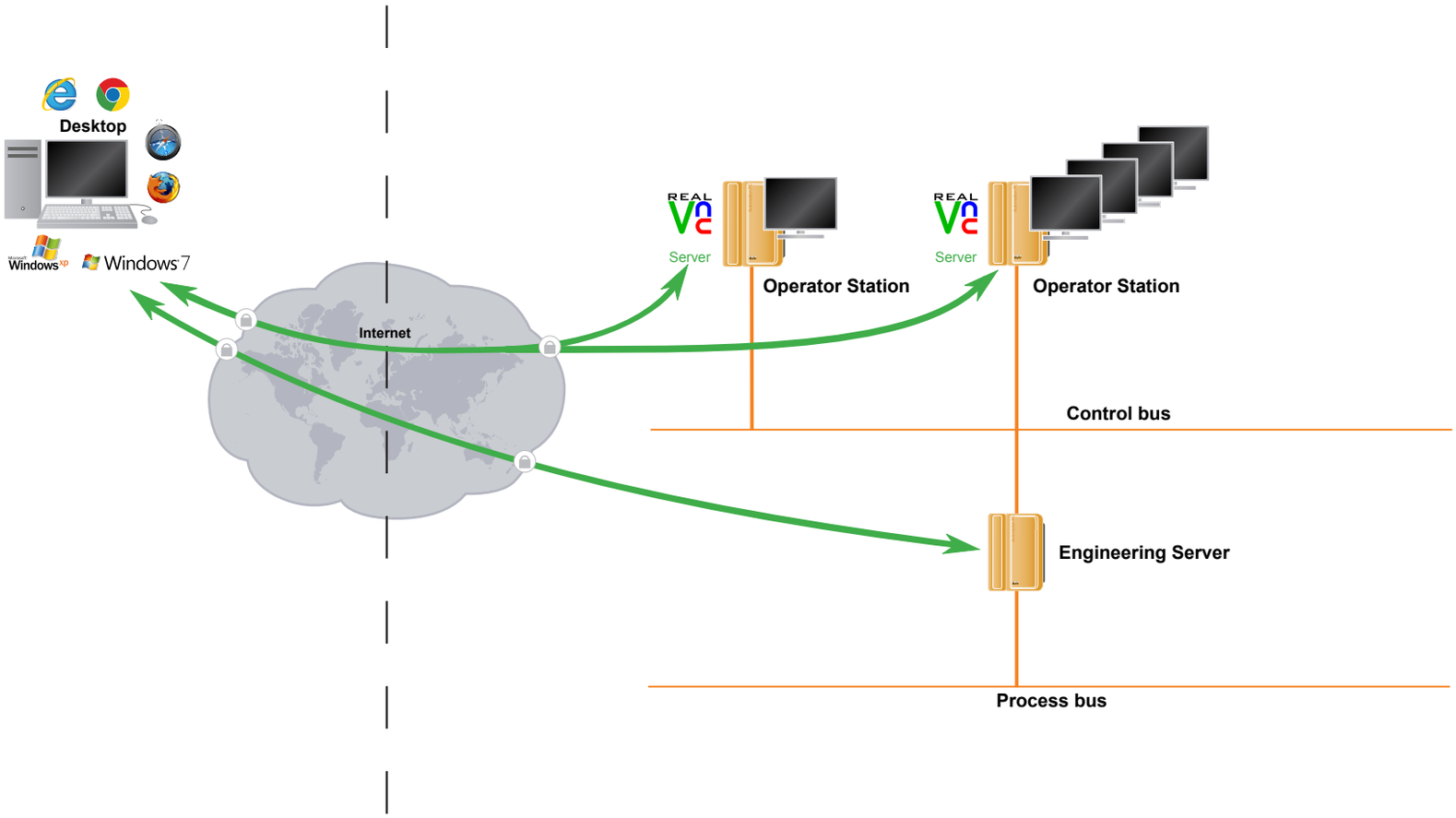
- Remote maintenance and remote operation can be performed via a standard VPN connection.

Configuration required for remote maintenance

- The operator or engineering interface can be accessed without additional configuration work or functional limitations, e.g. to start the historical analysis of alarms or trend curves, to view logs, or to open diagnostic and engineering tools.
- Remote maintenance and operation adhere to the same rules as on-site operation, i.e. a security login is necessary, and all significant operator actions in the process control system are logged by the AuditTrail (21 CFR Part 11 and GAMP4).
- Access can take place from a Microsoft Windows computer, for example, using a VNC viewer or web browser (Java-based).

Remote alarms

Alarms can be sent by SMS or call to a pager, mobile telephone or telephone system. This is configured with a function block during the engineering phase, and the alarms are sent via a modem to the respective recipient.


Desktop
Windows xp
Windows 7
Internet
REAL
Server
Operator Station
REAL
Server
Operator Station
Control bus
Engineering Server
Process bus

Diagnostics - Controller

Diagnostic tools for the controller

APROL provides a number of diagnostics tools for the controller. These are divided into tools for reading control information and tools for optimizing the system.

System log book records information in nonvolatile memory

The controller's Automation Runtime system records all error, warning, and and information messages that occur during runtime in nonvolatile memory. Additionally, user information can also be entered in this system log. This information can be read out as long as there is a connection with Automation Studio or the Controller-Loader.

Backtrace shows the source code

For exceptions that are caused by the controller, the source code that caused the error can be determined under certain circumstances. The necessary information is determined in the Backtrace window.

Online information

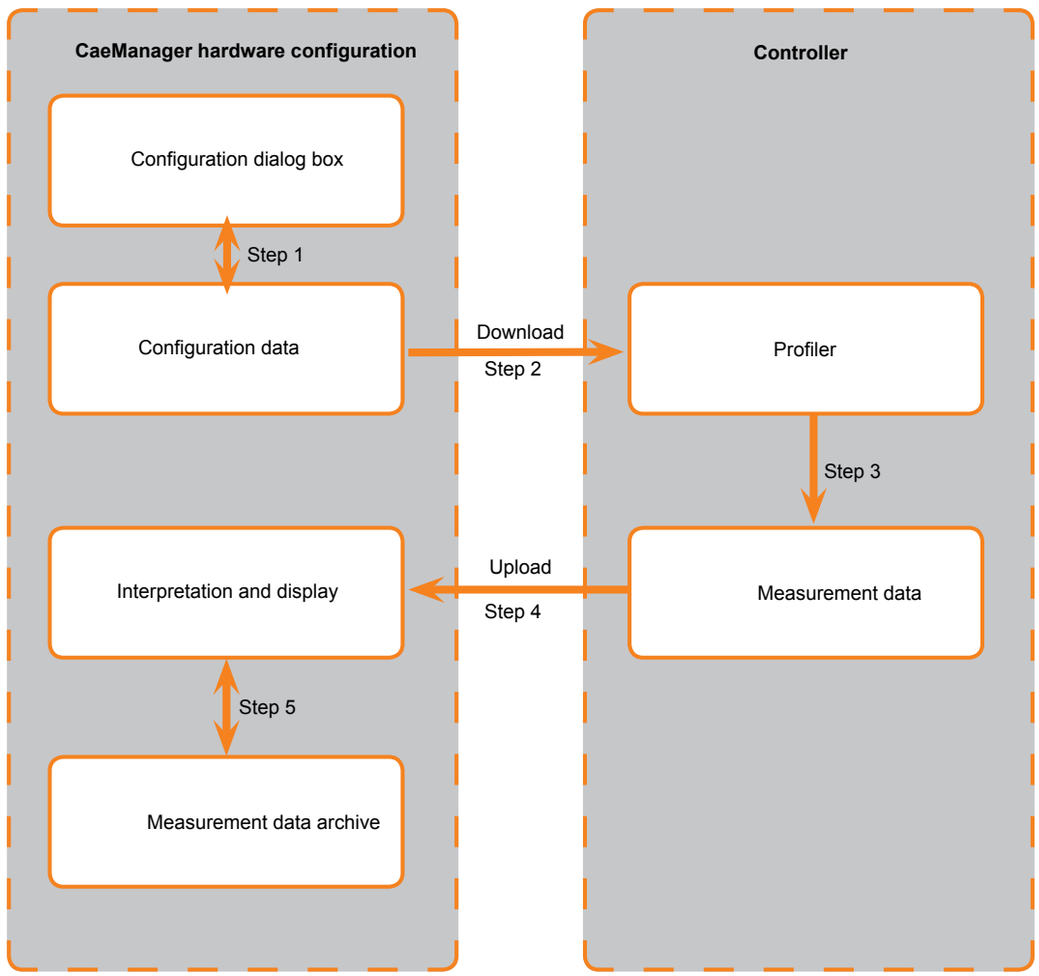
The online information shows basic system information for the controller such as battery status, node number settings, available memory, and date/time settings.

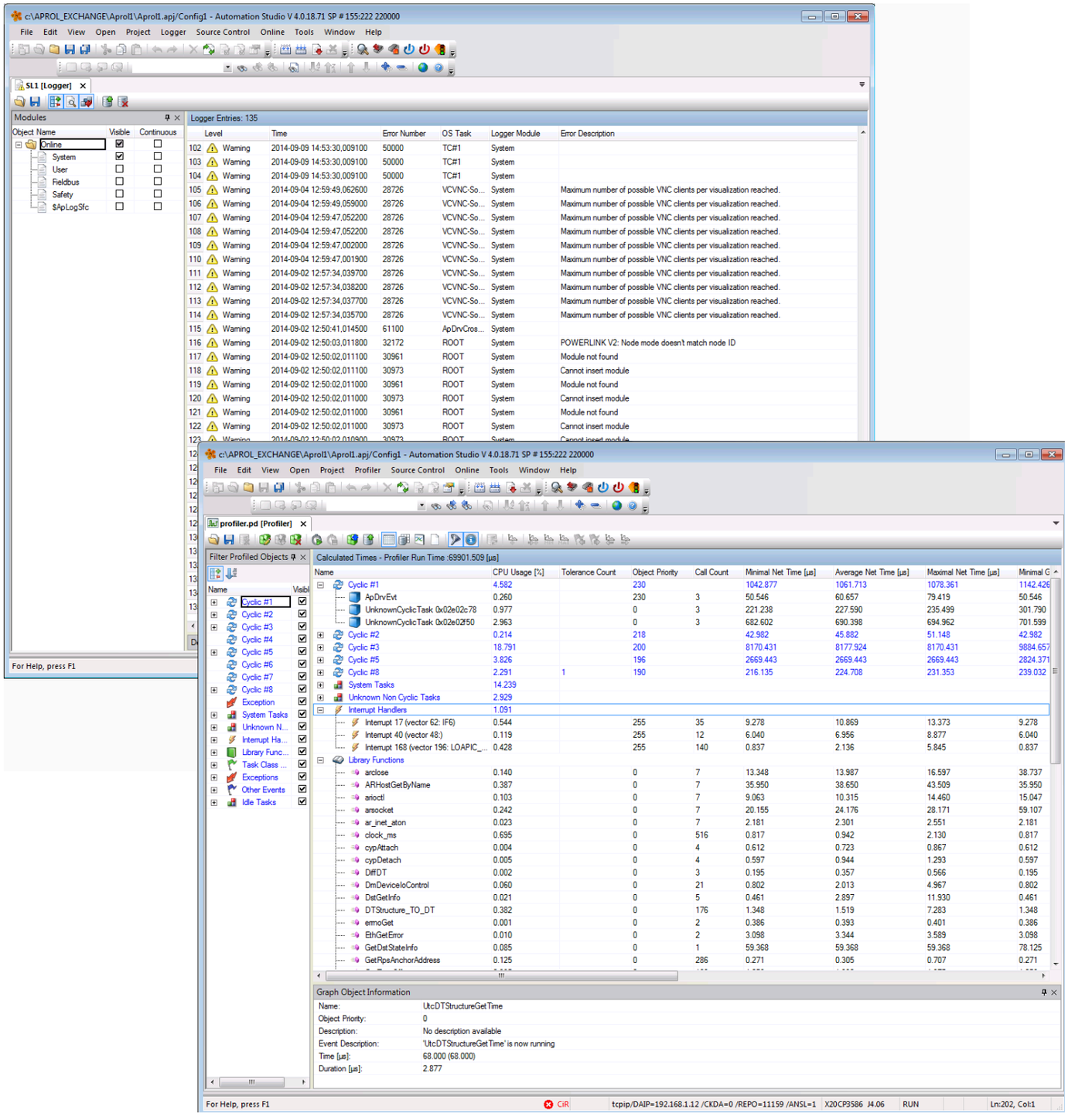
Profiler for runtime system analysis

The profiler integrated in Automation Studio allows the runtime system to be analyzed with regard to system usage (load). The information gained from the profiler can be used to optimize the project, and in turn, the load on the runtime system.

Integrated profiler measurement

Profiler measurement can be configured and operated via the connection to Automation Studio. This makes it easy to record and analyze task runtimes, stack load and the exact system load.




c:\APROL_EXCHANGE\Aprol1\Aprol1.apj/Config1 - Automation Studio V 4.0.18.71 SP # 155:222 220000
File Edit View Open Project Logger Source Control Online Tools Window Help
SL1 [Logger]
Modules
Object Name Visible Continuous
Online
System
User
Fieldbus
Safety
$ApLogSfc
Logger Entries: 135
Level Time Error Number OS Task Logger Module Error Description
Warning 2014-09-09 14:53:30,009100 50000 TC#1 System
Warning 2014-09-04 12:59:49,062600 28726 VCVNC-So... System Maximum number of possible VNC clients per visualization reached.
Warning 2014-09-02 12:50:03,011800 32172 ROOT System POWERLINK V2: Node mode doesn't match node ID
Warning 2014-09-02 12:50:02,011100 30961 ROOT System Module not found
Warning 2014-09-02 12:50:02,011100 30973 ROOT System Cannot insert module
For Help, press F1
c:\APROL_EXCHANGE\Aprol1\Aprol1.apj/Config1 - Automation Studio V 4.0.18.71 SP # 155:222 220000
File Edit View Open Project Profiler Source Control Online Tools Window Help
profiler.pd [Profiler]
Filter Profiled Objects
Cyclic #1
Cyclic #2
Cyclic #3
Cyclic #4
Cyclic #5
Cyclic #6
Cyclic #7
Cyclic #8
Exception
System Tasks
Unknown Non Cyclic Tasks
Interrupt Handlers
Library Functions
Task Class ...
Exceptions
Other Events
Idle Tasks
Calculated Times - Profiler Run Time :69901.509 [µs]
Name CPU Usage [%] Tolerance Count Object Priority Call Count Minimal Net Time [µs] Average Net Time [µs] Maximal Net Time [µs]
Cyclic #1 4.582 230 1042.877 1061.713 1078.361
ApDrvEvt 0.260 230 3 50.546 60.657 79.419
UnknownCyclicTask 0x02e02c78 0.977 0 3 221.238 227.590 235.499
UnknownCyclicTask 0x02e02f50 2.963 0 3 682.602 690.398 694.962
Cyclic #2 0.214 218 42.982 45.882 51.148
Cyclic #3 18.791 200 8170.431 8177.924 8170.431
Cyclic #5 3.826 196 2669.443 2669.443 2669.443
Cyclic #8 2.291 1 190 216.135 224.708 231.353
System Tasks 14.239
Unknown Non Cyclic Tasks 2.929
Interrupt Handlers 1.091
Interrupt 17 (vector 62: IF6) 0.544 255 35 9.278 10.869 13.373
Interrupt 40 (vector 48:) 0.119 255 12 6.040 6.956 8.877
Interrupt 168 (vector 196: LOAPIC_... 0.428 255 140 0.837 2.136 5.845
Library Functions
arclose 0.140 0 7 13.348 13.987 16.597
ARHostGetByName 0.387 0 7 35.950 38.650 43.509
arioctl 0.103 0 7 9.063 10.315 14.460
arsocket 0.242 0 7 20.155 24.176 28.171
ar_inet_aton 0.023 0 7 2.181 2.301 2.551
clock_ms 0.695 0 516 0.817 0.942 2.130
cypAttach 0.004 0 4 0.612 0.723 0.867
cypDetach 0.005 0 4 0.597 0.944 1.293
DiffDT 0.002 0 3 0.195 0.357 0.566
DmDeviceIoControl 0.060 0 21 0.802 2.013 4.967
DstGetInfo 0.021 0 5 0.461 2.897 11.930
DTStructure_TO_DT 0.382 0 176 1.348 1.519 7.283
errnoGet 0.001 0 2 0.386 0.393 0.401
EthGetError 0.010 0 2 3.098 3.344 3.589
GetDstStateInfo 0.085 0 1 59.368 59.368 59.368
GetRpsAnchorAddress 0.125 0 286 0.271 0.305 0.707
Graph Object Information
Name: UtcDTStructureGetTime
Object Priority: 0
Description: No description available
Event Description: 'UtcDTStructureGetTime' is now running
Time [µs]: 68.000 (68.000)
Duration [µs]: 2.877
For Help, press F1
CiR
tcpip/DAIP=192.168.1.12 /CKDA=0 /REPO=11159 /ANSL=1
X20CP3586 J4.06
RUN
Ln:202, Col:1

Diagnostics - Control computer

Diagnostic tools for the control computer

APROL provides a variety of diagnostics tools for the control computer. These include tools for reading detailed information from the Iosys process database and tools for displaying the real-time values (online mode) of a function chart (CFC).

IosDiagnosticManager

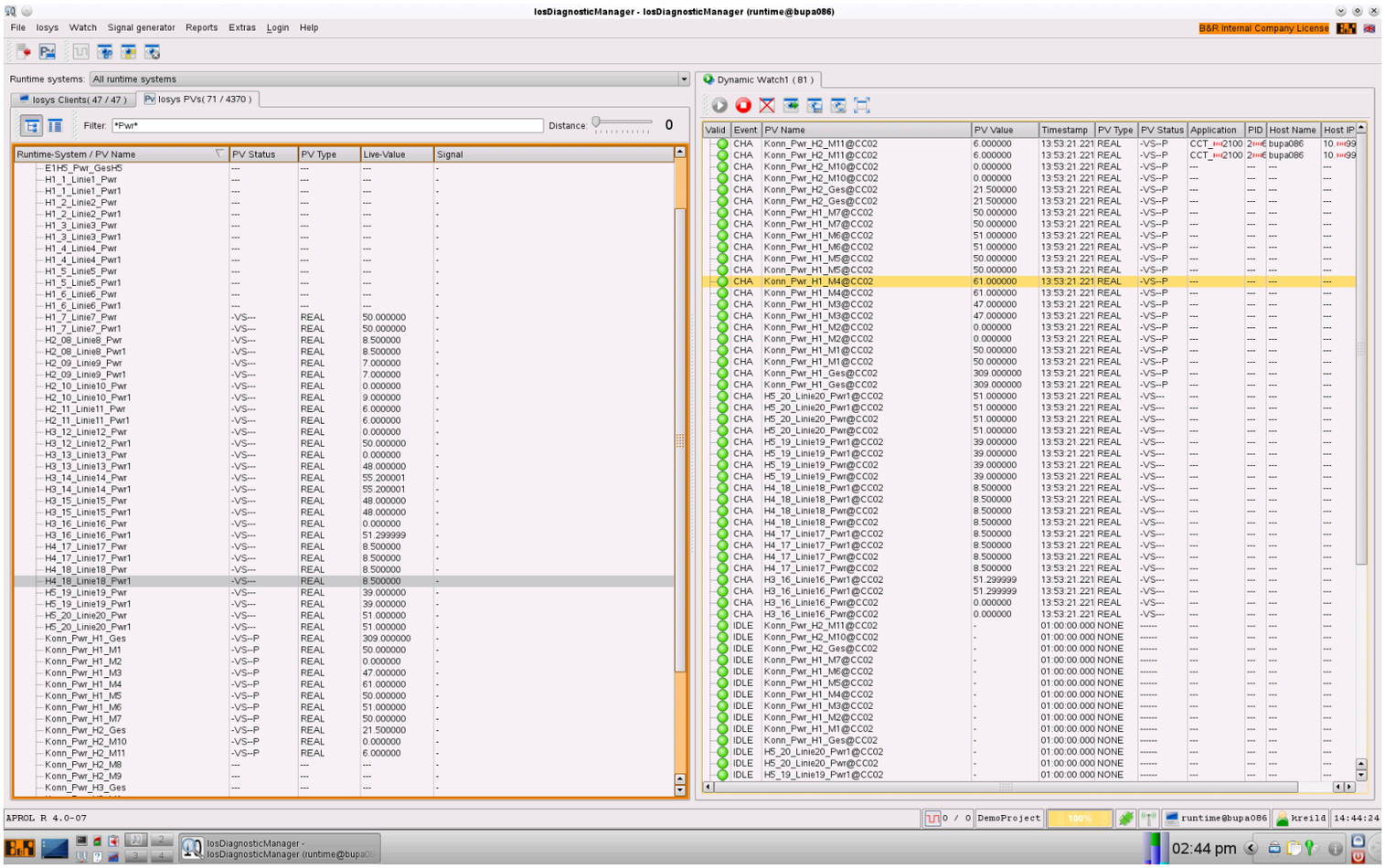
The IosDiagnosticManager can be used to call up detailed information from the Iosys process database for analysis and diagnostics purposes.

Watch

Watch enables a detailed display of dynamic processes in chronological order. Extensive filter options provide assistance for the analysis of events and states.

Signal generators

Signal generators that can be defined allow simulation of signal curves for checking system functionalities. The results can be displayed and archived

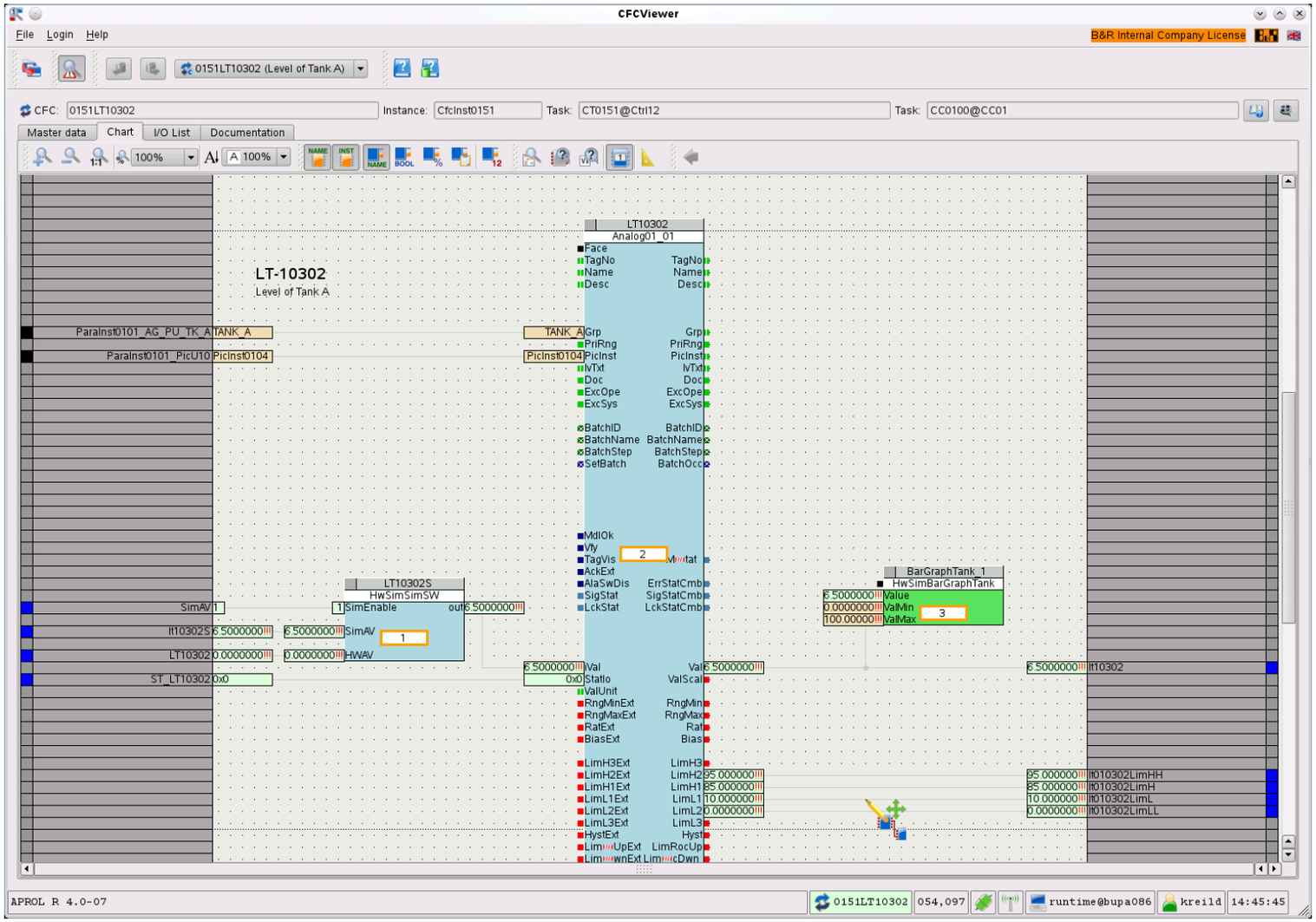


CFCViewer
The CFCViewer allows diagnosis of a device's process values, using the corresponding function chart.

Online display of the function chart
The function chart can be called up directly via the shortcut menu from the corresponding graphical symbol in the process graphic.

CFCViewer displays all input and output values
The current input and output values of a block are displayed. The option is available to selectively enable online trends for the signals.

Additional function charts can be opened directly via the project tree
Direct navigation through the viewable project tree makes it possible to switch quickly between several function charts.



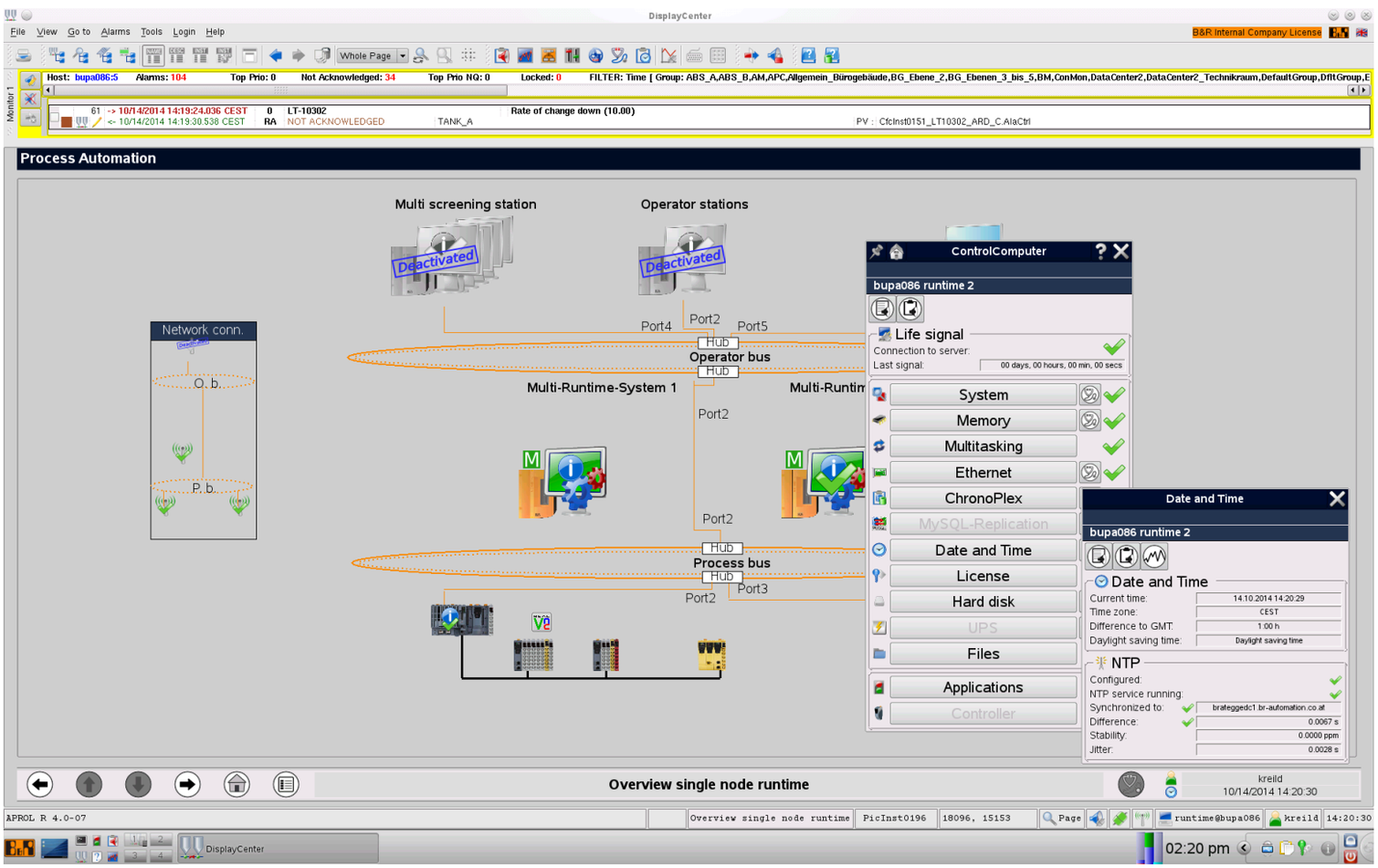
System and self-monitoring

System and self-monitoring

All information about the hardware components being used in the project (operator stations, Runtime servers, controllers, etc.) and the APROL system software is recorded by the APROL system and self-monitoring feature, and made partially available using system variables. Faceplates and graphics macros are made available to the operator. Alarms and trend curves are created and displayed without additional configuration in the system.

Monitoring operator stations and runtime/engineering servers

- Life signal
- CPU load and processes:
- Disk space usage
- Hard disk partitions
- Dongle for licensing
- Date & time
- NTP time synchronization
- Uninterruptible power supply (UPS)
- File size archive
- System software overview (e.g. driver status, server redundancy status, etc.).
- Ping connection monitoring
- ...



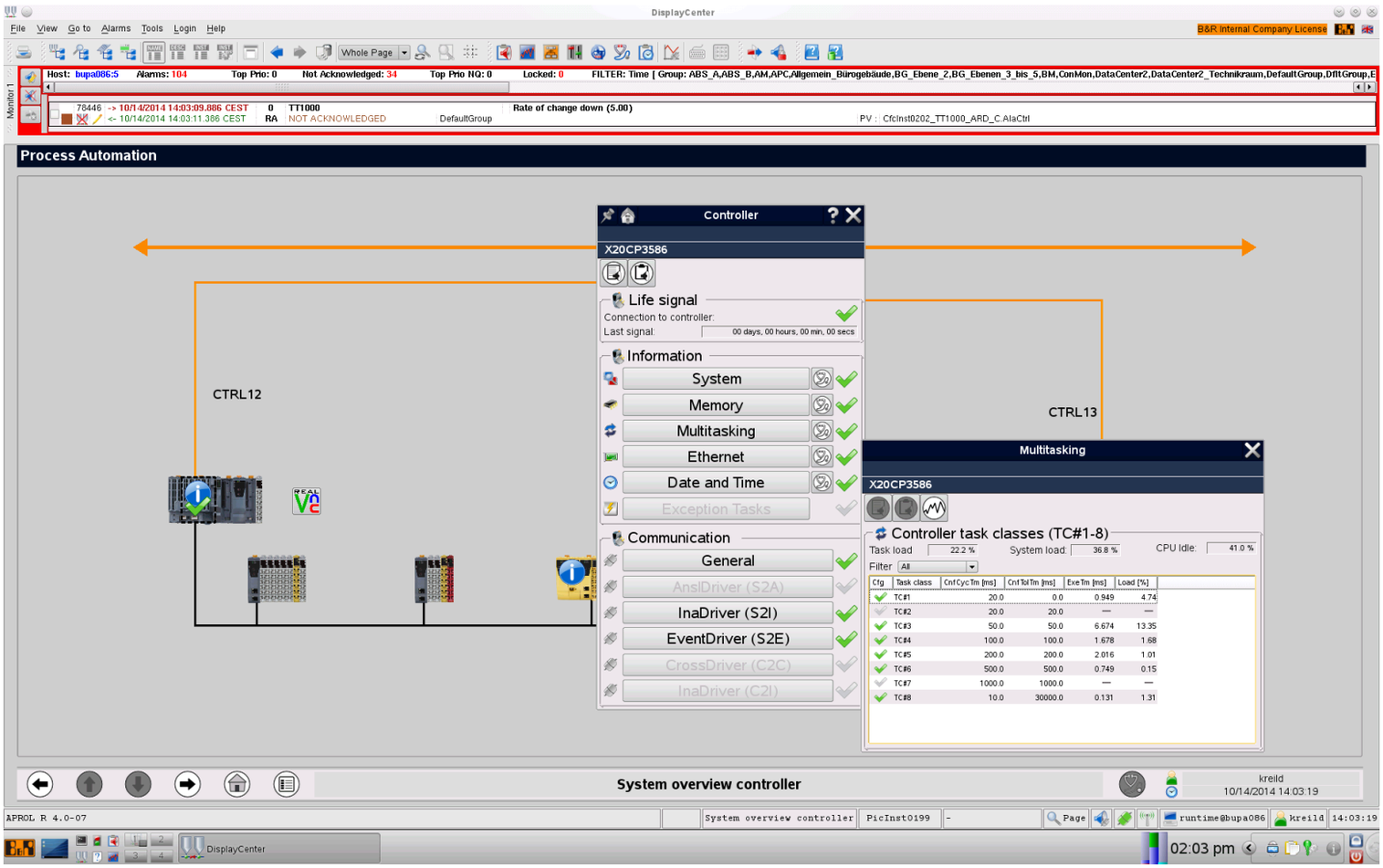
Monitoring of controllers and I/O modules

- Life signal
- OS version of the controller
- Temperature monitoring
- Battery status
- Disk space usage
- Detailed information about task classes
- Onboard Ethernet
- NTP time synchronization
- INA communication
- Event driver
- Status monitoring of I/O cards and I/O channels
- PROFIBUS DP/PA
- ...

Monitoring of other hardware components

(e.g. via the APROL UCB mechanism)

- Wireless clock for time synchronization
- Status of connected package units or 3rd-party controllers
- ...



Solutions

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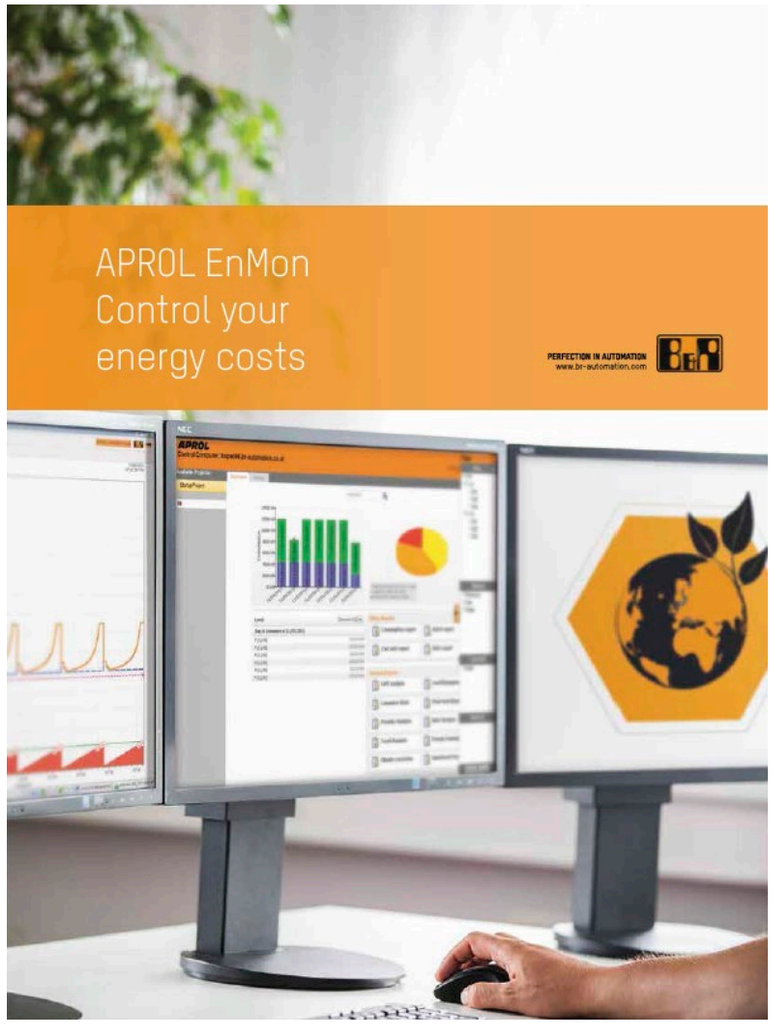
APROL EnMon - Keep your energy consumption under control

You can only manage what you can measure!

Significant savings through improved energy efficiency

The much anticipated ISO 50001 international standard "Energy management systems – Requirements with guidance for use" was published in 2011.



APROL ConMon - Predict the unpredictable

Maximize product quality while reducing maintenance costs.

Higher product quality – Lower maintenance costs

Operators of production equipment are all too familiar with the dilemma: How do you improve product quality and increase system availability while at the same time cutting back on maintenance costs?

APROL APC - Complex processes made stable and transparent

Optimize performance. Be competitive globally.

More efficiency in process control and plant operation

Automating complex production processes efficiently and safely is now even easier with the B&R APROL process control system. Advanced Process Control (APC) makes it possible to control systems even more precisely and make even better use of processing resources.

APROL PDA - Prove your quality

Prove your quality - Analyze bottlenecks

Centralized acquisition of operating and process data from machines and equipment using B&R's APROL process control system is now much easier. The APROL PDA solution has a PDA browser, PDA function blocks and a PDA visualization element.

Documentation and training

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Training - Process control system

Automation training

Our automation training program gets results quickly! A company's success is largely based on providing its employees with basic initial training and continual, specialized training. To provide support in this regard, B&R offers an extensive seminar program at all corresponding locations. Our seminars make it possible for you to improve your knowledge in the field of automation engineering. When finished, you will be able to create efficient automation solutions yourself using B&R systems. In this way, you will secure a decisive competitive edge so that you can react faster to continually changing market demands.

Precision automation training

International standards, high quality, timeliness and relevance are essential elements of a training program. A group's demands and previous knowledge vary from course to course. These aspects determine the goals and tempo of the training courses. A combination of course training and self-study provides a high level of flexibility.

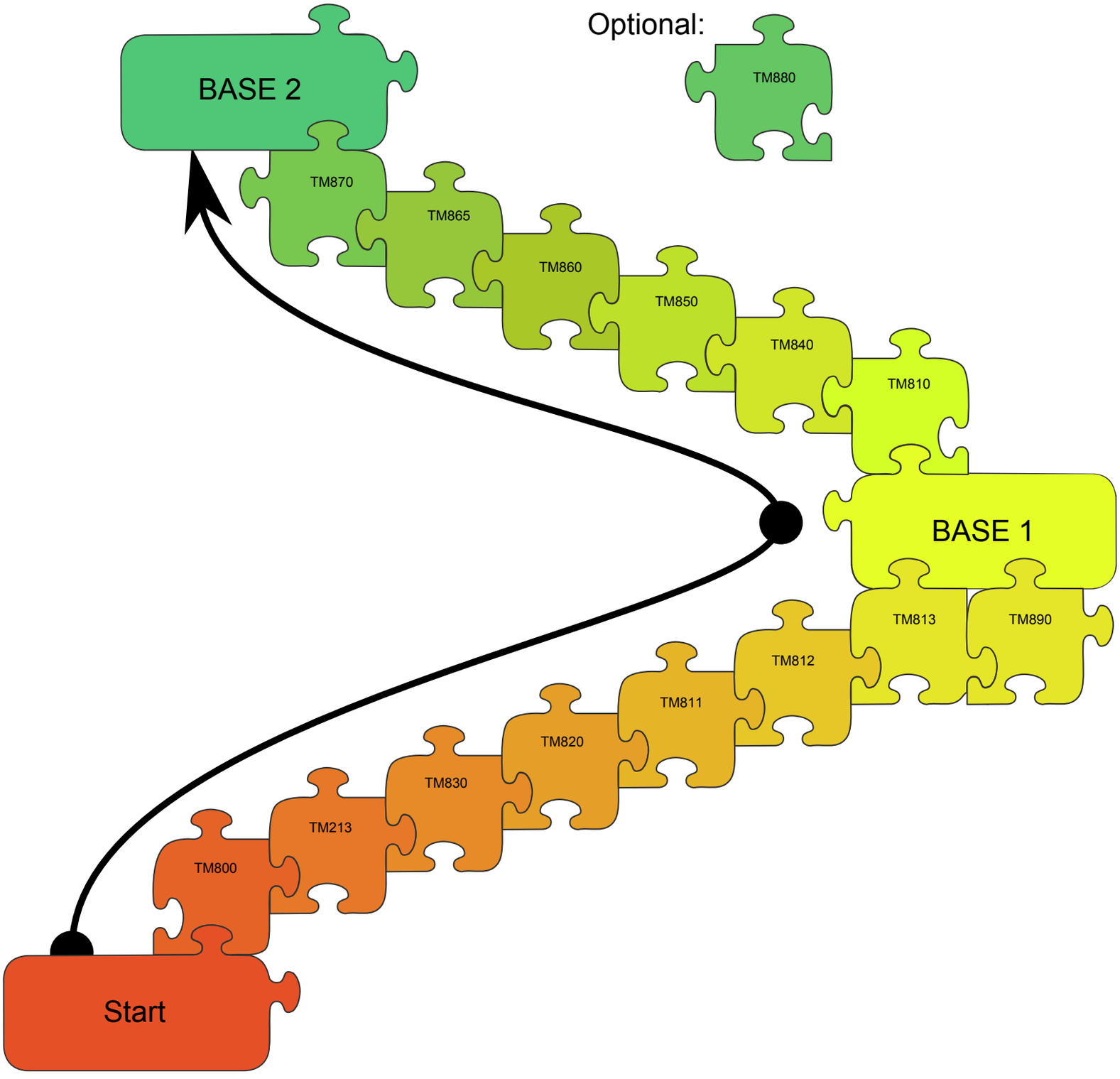
A - Installation APROL System	
TM800	APROL System Concept
TM810	APROL Setup, Configuration and Recovery
TM811	APROL Runtime System
TM812	APROL Operator Management
TM813	APROL XML Queries and AuditTrail
TM830	APROL Project Engineering
TM840	APROL Parameter Management and Recipes
TM850	APROL Controller Configuration and INA
TM860	APROL Library Engineering
TM865	APROL Library Guide Book
TM870	APROL Python Programming
TM890	Linux - Basics

Training modules

Our training modules are the basis for learning at seminars as well as for self-study. These compact modules rely on a consistent didactic concept. The structured, bottom-up presentation allows complex, interrelated topics to be learned efficiently and effectively. The material has been arranged into individual modules so that training sessions can be tailored for different groups; however, the modules are also ideal for self-study.

Dates and locations

B&R offers both standard and customer-specific seminars at all of our locations worldwide. The on-site training sessions are led by our skilled and experienced trainers. Further information regarding planned dates and locations can be found on www.br-automation.com or at the B&R subsidiary near you.

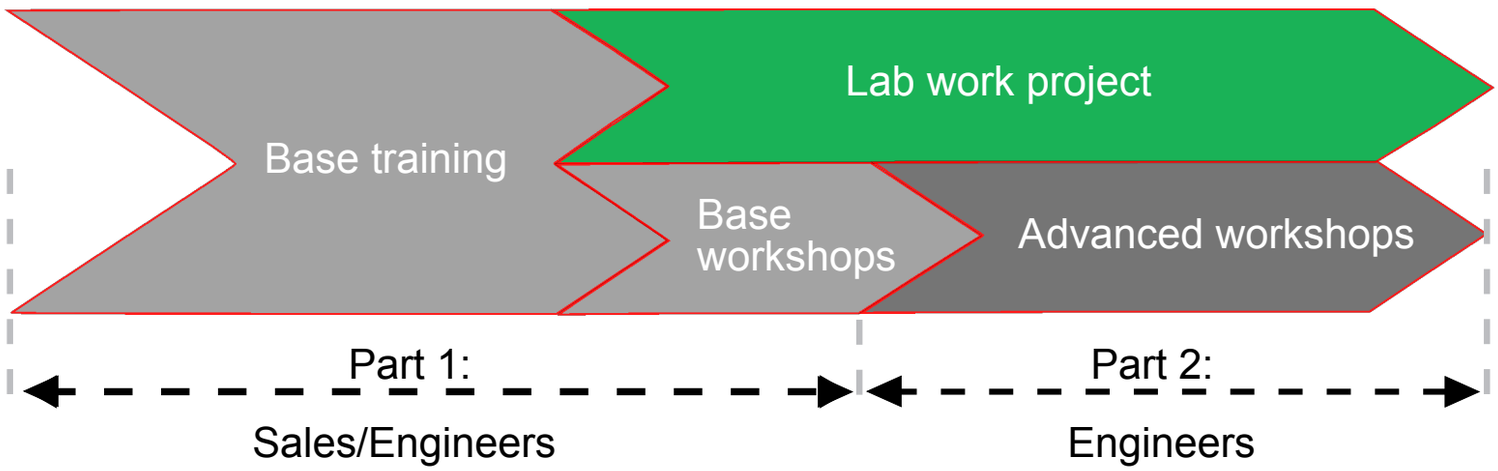

Optional:
TM880
BASE 2
TM870
TM865
TM860
TM850
TM840
TM810
BASE 1
TM813
TM890
TM812
TM811
TM820
TM830
TM213
TM800
Start

APROL Engineering Camp

E-Camp for expert training

A 2-part course allows all APROL topics to be worked through in a series of intense workshops.

In addition to the expert workshops, each participant creates a sample project (lab work) that is evaluated accordingly at the end.
This provides the best possible preparations for working with all phases of an APROL project.



APROL system documentation

Manual groups A to F, L, P, S, X

APROL system documentation is arranged in 6 manual groups (Manual group A to F), and is provided in electronic form with the setup media (APROL system software DVD). For a Windows environment, you receive an additional documentation DVD.

Library documentation

Manual group L contains the documentation for APROL system libraries.

System descriptions

Manual group P contains the APROL system descriptions (product catalogs, etc.)

Training modules for self-study

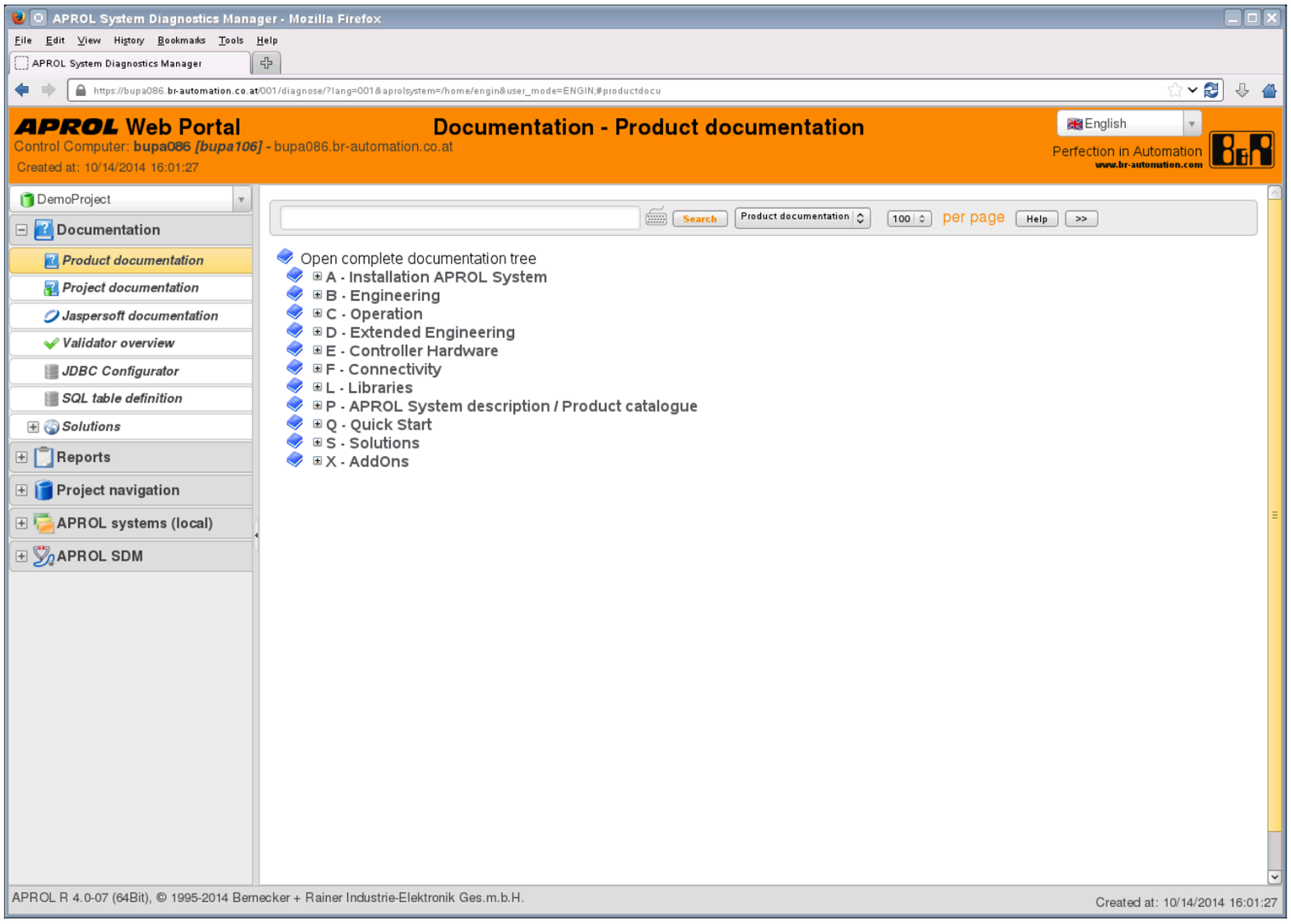
Manual group Q contains all training modules and is intended to be used for self-study.

Solutions documentation

Manual group S includes the documentation for the EnMon, ConMon, APC and PDA solutions.

Language

All manuals are available in German and English.



Licenses

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Ordering instructions for licenses - NEW / UPGRADE / Expansion

NEW ORDER = New licenses

For the first time, licenses are purchased, i.e. the following licenses are the minimum required depending on the size of the process control system:

- **Engineering** (AS client base) (hardware configuration, fieldbus configuration) +
- **Engineering** (CAE Manager) +
- **Runtime** (process database) +
- **Operator** (operator station) +
- **I/O license runtime** (in packages of 250/ 1000/ 2500/ 5000/ 10000/ 20000 I/Os, i.e. a system with 12500 I/Os would require 1x 10000 I/Os + 1x 2500 I/Os)

If the Runtime server is used redundantly, then the Redundancy For Runtime license is needed. Not only that, but the I/O license Red. Runtime is needed instead of the I/O license Runtime.

The listed core components (Runtime/Red. Runtime, Engineering, Operator) are also available in combined form. Runtime & Operator & Engineering can also be operated on the same computer, or e.g. a combination of Runtime & Operator.

The only limitations are guidelines for system performance and the possibility of intervening in the system while the system is operational. For this reason, we recommend distribution among several computers/servers for larger systems.

OPTIONS:

Add-on licenses and drivers

No upgrade is necessary for add-on licenses and drivers. When upgrading the system, they can be ordered as new licenses.

Additional engineering clients

(AS client expansion) (hardware configuration, fieldbus configuration). Additional operator (operator station).

Note regarding Runtime I/O license:

I/O licenses are divided into hardware I/Os and gateway I/Os (see separate licenses).

UPGRADE = Existing license updated to the current version

Existing licenses are updated from e.g. APROL R 3.6 to the current APROL R 4.0, i.e. upgrade licenses are necessary for existing licenses. All licenses of type Runtime, Redundancy For Runtime, Engineering, Operator, I/O License Runtime, I/O License Red. Runtime, Gateway, and their combinations can be updated to the current release (currently APROL R 4.0) using this upgrade.

No upgrade is possible for add-on licenses and drivers.

When upgrading the system, they can be ordered as new licenses. The four possible system designs are extensively explained in the "Ordering instructions for licensing a complete APROL R 4.0 process control system". All of the steps necessary to order are required in the same way for an upgrade. The only thing that needs to be changed when selecting licenses is that all model numbers AP* NEW must be replaced by the same model number and AP* UPG.

EXPANSION = Switching from I/O license Runtime to I/O license red. Runtime

If an existing APROL system license should be updated from "Runtime Without Redundancy" to "Runtime With Redundancy", then the license "Redundancy For Runtime" is required, and the existing Runtime I/O license must be updated by expansion to the I/O License, Red. Runtime.

How to count I/O and gateway variables

How to count I/O and gateway variables

The following rules have been defined to determine the necessary licenses for native I/Os, data connected via fieldbus and data connected via OPC.

X20 hardware:

1. Number of I/O channels of I/O modules (status and diagnostics don't count)

2. 3 I/O channels are counted for the X20AP31x1 special energy metering module.

3. 6 I/O channels are counted for the X20CM0985 special energy metering module.

4. 4 I/O channels are counted for the X20CM4810 special vibration measurement module.

5. HART modules: HART variables (1 to 4) are each counted as 1 to 4 I/O channels.

6. 1 channel is counted for each SOE channel in the oversampling module with SOE processing.

Fieldbus connection:

6. Each connected signal (e.g. limit switch (type 1-bit BOOL) or measurement signal (type 32-bit REAL) each count as 1 gateway variable. (associated status and diagnostic data don't count)

7. When coupling conventional devices, the following counting method is used to simplify the process of determining the number of gateway variables:

- Frequency converter: 5 gateway variables

- PROFIBUS PA transmitter: 1 gateway variable

- Remote I/O: Number of DI/DO/AI/AO corresponds to the number of gateway variables

- Energy metering modules / Energy metering devices: 3 gateway variables

OPC connection:

Uses the same counting method as fieldbus connections. For migration projects via TAG import, the number of DI/DO/AI/AO points of connected automation devices (controllers) is counted.

Special licenses

Licenses for special uses

With the following licenses, several products can be activated with only 1 serial number. These licenses are not permitted for use on live production systems; they are only permitted to be used for the use specified in each case.

System Partner license

Model number: AP.SR-PARTNER_KEY
Item text: APROL System Partner license

The APROL System Partner license allows the following functions to be enabled:

- Function 1: APROL (Engineering System/ Runtime System/ Operator System/ Gateway server)
- Function 2: Automation Studio - APROL Edition
- Function 3: SafeDESIGNER

The "B&R license code" allows activation of APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration area.

Note

The following licenses are also required for operation:

- AP.ACC-1471 - VMware Workstation 10.x Linux / Windows
- AP.ACC-1474 - Windows 7 Professional English - Box

Purpose

This license is not permitted for use on production systems; it is only permitted to be used by system partners for engineering tasks.

Valid duration of the license:

The validity of the license is not subject to time limitations. The APROL System Partner license is purchased for an APROL major release (e.g. R 4.0), and all builds for this major release (e.g. R 4.0-01 - R 4.0-10) can be downloaded from the B&R website and installed free of charge. The lifecycle for an APROL major release is typically 24 to 36 months.
If system partnership status B&R is ended, the APROL System Partner license must be returned to B&R free of charge.

Site license for system manufacturers

Model number: AP.SR-SITEONLY-NEW
Item text: APROL Site-Only license

The APROL Site-Only license allows the following functions to be enabled:

- Function 1: APROL (Engineering System/ Runtime System/ Operator System/ Gateway server)
- Function 2: Automation Studio - APROL Edition
- Function 3: SafeDESIGNER

The "B&R license code" allows activation of APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration area.

Note:
The following licenses are also required for operation:

- AP.ACC-1471 - VMware Workstation 10.x Linux / Windows
- AP.ACC-1474 - Windows 7 Professional English - Box

Purpose:
This license is not permitted for use on production systems; it is only permitted to be used by system partners for engineering tasks or temporarily when commissioning at the end customer's location.

Valid duration of the license:
The validity of the license is not subject to time limitations. The APROL System Partner license is purchased for an APROL major release (e.g. R 4.0), and all builds for this major release (e.g. R 4.0-01 - R 4.0-10) can be downloaded from the B&R website and installed free of charge. The lifecycle for an APROL major release is typically 24 to 36 months.

Special licenses

Education license

Model number: AP.SR-EDUCATION
Item text: APROL education license

The APROL Education license allows the following functions to be enabled:

- Function 1: APROL (Engineering System/ Runtime System/ Operator System/ Gateway server)
- Function 2: Automation Studio - APROL Edition
- Function 3: SafeDESIGNER

The "B&R license code" allows activation of APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration area.

Note

The following licenses are also required for operation:

- AP.ACC-1471 - VMware Workstation 10.x Linux / Windows
- AP.ACC-1474 - Windows 7 Professional English - Box

Purpose

This license is not permitted for use on production systems; it is only permitted to be used for educational purposes at educational institutions (apprenticeship workshops, schools, universities, etc.).

Valid duration of the license:

The validity of the license is not subject to time limitations. The APROL Education license is purchased for an APROL major release (e.g. R 4.0), and all builds for this major release (e.g. R 4.0-01 - R 4.0-10) can be downloaded from the B&R website and installed free of charge. The lifecycle for an APROL major release is typically 24 to 36 months.

Internal Use license

Model number: AP.SR-INTERNALUSE
Item text: APROL Internal Use license

The APROL Internal Use license allows the following functions to be enabled:

- Function 1: APROL (Engineering System/ Runtime System/ Operator System/ Gateway server)
- Function 2: Automation Studio - APROL Edition
- Function 3: SafeDESIGNER

The "B&R license code" allows activation of APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration area.

Note

The following licenses are also required for operation:

- AP.ACC-1471 - VMware Workstation 10.x Linux / Windows
- AP.ACC-1474 - Windows 7 Professional English - Box

Purpose

This license is not permitted for use on production systems; it is only permitted to be used for temporary test systems at B&R.

Valid duration of the license:

The validity of the license is not subject to time limitations. The APROL Internal Use license is purchased for an APROL major release (e.g. R 4.0), and all builds for this major release (e.g. R 4.0-01 - R 4.0-10) can be downloaded from the B&R website and installed free of charge. The lifecycle for an APROL major release is typically 24 to 36 months.

Model numbers

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APROL Solutions

APROL Solutions - Preinstalled on APC910

Model number	Short description
AP:OEM-ROEX-APC	This package includes preinstalled system software (APROL APC Standard Package) and hardware (APC910 with accessories and controller with no I/O modules) as well as all required licenses (operating system, APROL, etc.). 1.00x 0TG:220198.008-00 APROL TG. with BAS+ PAL APC edition 1.00x 1A43AP.LZ1 AS 3.0/4.0 Single License - APROL edition 1.00x 5CFCRD.1024-06 Compact Flash 1024MB B&R SMART 1.00x 5P91:220198.063-00 APC910 configuration 1310579 1.00x AP.ACC-1301 CHERRY keyboard, USB, US English layout 1.00x AP.ACC-1471 VMware Workstation 10.x Linux / Windows 1.00x AP.SR-IREPORT-S APROL Add-on JS BI License E+R Solution 1.00x AP.SR-ROEX-OEM-NEW APROL License Set --- OEM RT/Oper/Engin-- 1.00x AP.SW-0050GV-NEW APROL NEW GV License - Runtime 00050 GVs 1.00x AP.SW1-0050IO-NEW APROL IO-License - Runtime 50 I/Os 1.00x AP.SW1-APR-NOO-00 APROL Add-On - OPERATOR via Net - 1 User 1.00x AP.SW1-APR-SQLS APROL ADDON - SQL server access 1.00x C0200900 COMFORT MOUSE 4500 USB BLACK 1.00x X20CA0E61.00200 PLK connection cable RJ45 to RJ45, 2 m 1.00x X20CP3586 X20 CPU ATOM, 1.6 GHz, PLK, 3x IF
AP:OEM-ROEX-CONMON	This package includes preinstalled system software (APROL ConMon Standard Package) and hardware (APC910 with accessories and controller with no I/O modules) as well as all required licenses (operating system, APROL, etc.). 1.00x 0TG:220198.007-00 APROL TG. with BAS+ PAL ConMon edition 1.00x 1A43AP.LZ1 AS 3.0/4.0 Single License - APROL edition 1.00x 5CFCRD.1024-06 Compact Flash 1024MB B&R SMART 1.00x 5P91:220198.063-00 APC910 configuration 1310579 1.00x AP.ACC-1301 CHERRY keyboard, USB, US English layout 1.00x AP.ACC-1471 VMware Workstation 10.x Linux / Windows 1.00x AP.SOL-COM-PRO-NEW Solution ConMon - Reporting/PROJECT 1.00x AP.SR-IREPORT-S APROL Add-on JS BI License E+R Solution 1.00x AP.SR-ROEX-OEM-NEW APROL License Set --- OEM RT/Oper/Engin-- 1.00x AP.SW-0050GV-NEW APROL NEW GV License - Runtime 00050 GVs 1.00x AP.SW1-0050IO-NEW APROL IO-License - Runtime 50 I/Os 1.00x AP.SW1-APR-NOO-00 APROL Add-On - OPERATOR via Net - 1 User 1.00x AP.SW1-APR-SQLS APROL ADDON - SQL server access 1.00x C0200900 COMFORT MOUSE 4500 USB BLACK 1.00x X20CA0E61.0020 PLK connection cable RJ45 to RJ45, 2 m 1.00x X20CP3586 X20 CPU ATOM, 1.6 GHz, PLK, 3x IF
AP:OEM-ROEX-ENMON	This package includes preinstalled system software (APROL EnMon Standard Package) and hardware (APC910 with accessories and controller with no I/O modules) as well as all required licenses (operating system, APROL, etc.). 1.00x 0TG:220198.006-00 APROL TG. with BAS+ PAL EnMon edition 1.00x 1A43AP.LZ1 AS 3.0/4.0 Single License - APROL edition 1.00x 5CFCRD.1024-06 Compact Flash 1024MB B&R SMART 1.00x 5P91:220198.063-00 APC910 configuration 1310579 1.00x AP.ACC-1301 CHERRY keyboard, USB, US English layout 1.00x AP.ACC-1471 VMware Workstation 10.x Linux / Windows 1.00x AP.SOL-ENM-PRO-NEW Solution ConMon - Reporting/PROJECT 1.00x AP.SR-IREPORT-S APROL Add-on JS BI License E+R Solution 1.00x AP.SR-ROEX-OEM-NEW APROL License Set --- OEM RT/Oper/Engin-- 1.00x AP.SW-0050GV-NEW APROL NEW GV License - Runtime 00050 GVs 1.00x AP.SW1-0050IO-NEW APROL IO-License - Runtime 50 I/Os 1.00x AP.SW1-APR-NOO-00 APROL Add-On - OPERATOR via Net - 1 User 1.00x AP.SW1-APR-SQLS APROL ADDON - SQL server access 1.00x C0200900 COMFORT MOUSE 4500 USB BLACK 1.00x X20CA0E61.00200 PLK connection cable RJ45 to RJ45, 2 m 1.00x X20CP3586 X20 CPU ATOM, 1.6 GHz, PLK, 3x IF
AP:OEM-ROEX-OEM-L	This package includes preinstalled system software (APROL Standard Package) and hardware (APC910 with accessories) as well as all required licenses (operating system, APROL, etc.). 1.00x 0TG:220198.001-00 APROL Technology Guard with BAS+PAL 1.00x 1A43AP.LZ1 AS 3.0/4.0 Single License - APROL edition 1.00x 5P91:220198.063-00 APC910 configuration 1310579 1.00x AP.ACC-1301 CHERRY keyboard, USB, US English layout 1.00x AP.ACC-1471 VMware Workstation 10.x Linux / Windows 1.00x AP.SOL-ENM-PRO-NEW Solution EnMon -Reporting/PROJECT 1.00x AP.SR-ROEX-OEM-NEW APROL License Set --- OEM RT/Oper/Engin-- 1.00x AP.SW-5000GV-NEW APROL NEW GV License - Runtime 05000 GVs 1.00x AP.SW1-2500IO-NEW APROL IO License - Runtime 2500 I/Os 1.00x AP.SW1-APR-NOO-00 APROL Add-On -OPERATOR via Net - 1 User 1.00x AP.SW1-APR-SQLS APROL ADDON - SQL server access 1.00x C0200900 COMFORT MOUSE 4500 USB BLACK
AP:OEM-ROEX-OEM-S	This package includes preinstalled system software (APROL R/O/E Standard Package) and hardware (APC910 with accessories) as well as all required licenses (operating system, APROL, etc.). 1.00x 0TG:220198.001-00 APROL Technology Guard with BAS+PAL 1.00x 1A43AP.LZ1 AS 3.0/4.0 Single License - APROL edition 1.00x 5P91:220198.063-00 APC910 configuration 1310579 1.00x AP.ACC-1301 CHERRY keyboard, USB, US English layout 1.00x AP.ACC-1471 VMware Workstation 10.x Linux / Windows 1.00x AP.SOL-ENM-PRO-NEW Solution EnMon -Reporting/PROJECT 1.00x AP.SR-ROEX-OEM-NEW APROL License Set --- OEM RT/Oper/Engin-- 1.00x AP.SW-1000GV-NEW APROL NEW GV License - Runtime 01000 GVs 1.00x AP.SW1-0250IO-NEW APROL IO License - Runtime 250 I/Os 1.00x AP.SW1-APR-NOO-00 APROL Add-On -OPERATOR via Net - 1 User 1.00x AP.SW1-APR-SQLS APROL ADDON - SQL server access 1.00x C0200900 COMFORT MOUSE 4500 USB BLACK
AP:OEM-ROEX-PDA	APROL PDA Standalone Solution (ROEX) This includes the APROL PDA system software standard package as well as all required licenses (operating system, APROL, etc.). 1.00x 5P91:220198.060-00 APC910 configuration 1310498 1.00x AP.ACC-1301 CHERRY keyboard, USB, US English layout 1.00x AP.LIB-PDA-CNT-NEW PAL Edition PDA (PAL-PDA)/CC 1.00x AP.SR-IREPORT-S APROL Add-on JS BI - License-E+R solution 1.00x AP.SR-ROEX-OEM-NEW APROL License Set -- OEM RT/Oper/Engin -- 1.00x AP.SW-0050GV-NEW APROL NEW GV License - Runtime 00050 GVs 1.00x AP.SW1-APR-NOO-00 APROL Add-On - OPERATOR via Net - 1 User 1.00x AP.SW1-APR-SQLS APROL ADDON - SQL server access 1.00x C0200900 COMFORT MOUSE 4500 USB BLACK
AP:OEM-ROXX-PDA	APROL PDA Standalone Solution (ROXX) This includes the APROL PDA system software standard package as well as all required licenses (operating system, APROL, etc.). 1.00x 5P91:220198.060-00 APC910 configuration 1310498 1.00x AP.ACC-1301 CHERRY keyboard, USB, US English layout 1.00x AP.LIB-PDA-CNT-NEW PAL Edition PDA (PAL-PDA)/CC 1.00x AP.SR-IREPORT-S APROL Add-on JS BI - License-E+R solution 1.00x AP.SR-ROXX-NEW APROL License Set -- Runtime/Operator -- 1.00x AP.SW-0050GV-NEW APROL NEW GV License - Runtime 00050 GVs 1.00x AP.SW1-APR-NOO-00 APROL Add-On - OPERATOR via Net - 1 User 1.00x AP.SW1-APR-SQLS APROL ADDON - SQL server access 1.00x C0200900 COMFORT MOUSE 4500 USB BLACK
AP:OEM-RROEX-OEM-L	This package includes preinstalled system software (APROL Standard Package) and hardware (APC910 with accessories) as well as all required licenses (operating system, APROL, etc.). 1.00x 5P91:220198.063-00 APC910 configuration 1310579 1.00x AP.ACC-1301 CHERRY keyboard, USB, US English layout 1.00x T AP.SR-RROXX-NEW APROL License Set --- Red.RT/Operator --- 1.00x AP.SW-5000GV-EXP APROL EXP GV License - Runtime 05000 GVs 1.00x AP.SW1-2500IO-EXP APROL EXP I/O License - Runtime 2500 I/Os 1.00x AP.SW1-APR-SQLS APROL ADDON - SQL server access 1.00x C0200900 COMFORT MOUSE 4500 USB BLACK
AP:OEM-RROEX-OEM-S	This package includes preinstalled system software (APROL R/O/E Standard Package) and hardware (APC910 with accessories) as well as all required licenses (operating system, APROL, etc.). 1.00x 5P91:220198.063-00 APC910 configuration 1310579 1.00x AP.ACC-1301 CHERRY keyboard, USB, US English layout 1.00x T AP.SR-RROXX-NEW APROL License Set --- Red.RT/Operator --- 1.00x AP.SW-1000GV-EXP APROL EXP GV License - Runtime 01000 GVs 2.00x AP.SW1-0250IO-EXP APROL EXP I/O License - Runtime 250 I/Os 1.00x AP.SW1-APR-SQLS APROL ADDON - SQL server access 1.00x C0200900 COMFORT MOUSE 4500 USB BLACK

APROL Solutions - Software Bundles (software only)

Model number	Short description
AP:SB-ROEX-APC	APROL APC Solution Software Bundle This package includes the APROL APC system software as well as all required licenses (operating system, APROL, etc.). 1.00x 0TG:220198.008-00 APROL TG. with BAS+ PAL EnMon edition 1.00x 1A43AP.LZ1 AS 3.0/4.0 Single License APROL edition 1.00x AP.ACC-1471 VMware Workstation 10.x Linux / Windows 1.00x AP.SR-IREPORT-S APROL Add-on JS BI License-E+R solution 1.00x AP.SR-ROEX-OEM-NEW APROL License Set --- OEM RT/Oper/Engin-- 1.00x AP.SW-0050GV-NEW APROL NEW GV License - Runtime 00050 GVs 1.00x AP.SW1-0050IO-NEW APROL IO License - Runtime 50 I/Os 1.00x AP.SW1-APR-NOO-00 APROL Add-On - OPERATOR via Net - 1 User 1.00x AP.SW1-APR-SQLS APROL ADDON - SQL server access
AP:SB-ROEX-CONMON	APROL ConMon Solution - Software Bundle This includes the preinstalled APROL ConMon system software standard package and all necessary license keys (operating system, APROL, etc.) 1.00x 0TG:220198.007-00 APROL TG. with BAS+ PAL ConMon edition 1.00x 1A43AP.LZ1 AS 3.0/4.0 Single License APROL edition 1.00x AP.ACC-1471 VMware Workstation 10.x Linux / Windows 1.00x AP.SOL-COM-PRO-NEW Solution ConMon - Reporting/PROJECT 1.00x AP.SR-IREPORT-S APROL Add-on JS BI License-E+R solution 1.00x AP.SR-ROEX-OEM-NEW APROL License Set --- OEM RT/Oper/Engin-- 1.00x AP.SW-0050GV-NEW APROL NEW GV License - Runtime 00050 GVs 1.00x AP.SW1-0050IO-NEW APROL IO License - Runtime 50 I/Os 1.00x AP.SW1-APR-NOO-00 APROL Add-On - OPERATOR via Net - 1 User 1.00x AP.SW1-APR-SQLS APROL ADDON - SQL server access
AP:SB-ROEX-ENMON	APROL EnMon Solution - Software Bundle This includes the preinstalled APROL EnMon system software standard package and all necessary license keys (operating system, APROL, etc.) 1.00x 0TG:220198.006-00 APROL TG. with BAS+ PAL EnMon edition 1.00x 1A43AP.LZ1 AS 3.0/4.0 Single License APROL edition 1.00x AP.ACC-1471 VMware Workstation 10.x Linux / Windows 1.00x AP.SOL-ENM-PRO-NEW Solution EnMon - Reporting/PROJECT 1.00x AP.SR-IREPORT-S APROL Add-on JS BI License-E+R solution 1.00x AP.SR-ROEX-OEM-NEW APROL License Set --- OEM RT/Oper/Engin-- 1.00x AP.SW-0050GV-NEW APROL NEW GV License - Runtime 00050 GVs 1.00x AP.SW1-0050IO-NEW APROL IO License - Runtime 50 I/Os 1.00x AP.SW1-APR-NOO-00 APROL Add-On - OPERATOR via Net - 1 User 1.00x AP.SW1-APR-SQLS APROL ADDON - SQL server access
AP:SB-ROEX-OEM-L	APROL SW Bundle R/O/E/ 2500I/O-5000GV This includes the APROL system software standard package and all necessary license keys (operating system, APROL, etc.) 1x APROL "APROL R/O/E" licensing package includes all items listed under "APROL R/O/E standard package". Important: Windows not included!
AP:SB-ROEX-OEM-S	APROL SW Bundle R/O/E/ 500I/O-1000GV This includes the APROL R/O/E system software standard package and all necessary license keys (operating system, APROL, etc.) 1x APROL "APROL R/O/E" licensing package includes all items listed under "APROL R/O/E standard package". Important: Windows not included!
AP:SB-ROEX-PDA	APROL PDA Software Bundle This package includes the preinstalled APROL PDA system software standard package as well as all required licenses (operating system, APROL, etc.). 1.00x AP.LIB-PDA-CNT-NEW PAL Edition PDA (PAL-PDA)/CC 1.00x AP.SR-IREPORT-S APROL Add-on-JS BI License E+R solution 1.00x AP.SR-ROEX-OEM-NEW APROL License Set --- OEM RT/Oper/Engin-- 1.00 ST AP.SW-0050GV-NEW APROL NEW GV License - Runtime 00050 GVs 1.00x AP.SW1-APR-NOO-00 APROL Add-On -OPERATOR via Net - 1 User 1.00x AP.SW1-APR-SQLS APROL ADDON - SQL server access
AP:SB-ROXX-PDA	APROL PDA Software Bundle without Engineering License This package includes the preinstalled APROL PDA system software standard package as well as all required licenses (operating system, APROL, etc.), but WITHOUT Engineering license, without Windows and without VMware. 1.00x AP.LIB-PDA-CNT-NEW PAL Edition PDA (PAL-PDA)/CC 1.00x AP.SR-IREPORT-S APROL Add-on-JS BI License E+R solution 1.00x AP.SR-ROXX-NEW APROL License Set -- Runtime/Operator -- 1.00x AP.SW-0050GV-NEW APROL NEW GV License - Runtime 00050 GVs 1.00x AP.SW1-APR-NOO-00 APROL Add-On -OPERATOR via Net - 1 User 1.00x AP.SW1-APR-SQLS APROL ADDON - SQL server access
AP:SB-XOXX-OEM-X	APROL License Set --- Operator --- OEM 1.00x AP.SR-XOXX-NEW APROL License Set --- Operator --- 1.00x AP.SW1-APR-NOO-05 APROL Add-On - OPERATOR via Net - 5 User

APROL Solutions - Optional I/O licenses

Model number	Short description
AP.SW1-0050IO-NEW	APROL I/O license - Runtime 50 I/Os The I/O license authorizes the use of 50 I/Os on a "Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list"
AP.SW1-0250IO-NEW	APROL I/O license -Runtime 250 I/Os The I/O license authorizes the use of 250 I/Os on a "non-redundant Runtime server". APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list".
AP.SW1-1000IO-NEW	APROL I/O license -Runtime 1000 I/Os The I/O license authorizes the use of 1000 I/Os on a "non-redundant Runtime server". APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list".
AP.SW1-2500IO-NEW	APROL I/O license - Runtime 2500 I/Os The I/O license authorizes the use of 2500 I/Os on a "non-redundant Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list"
AP.SW1-5000IO-NEW	APROL I/O license - Runtime 5000 I/Os The I/O license authorizes the use of 5000 I/Os on a "non-redundant Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list"
AP.SW-10000IO-NEW	APROL I/O license - Runtime 10000 I/Os The I/O license authorizes the use of 10000 I/Os on a "non-redundant Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list"
AP.SW-20000IO-NEW	APROL I/O license - Runtime 20000 I/Os The I/O license authorizes the use of 20000 I/Os on a "non-redundant Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list"

APROL Software

APROL Solutions - Optional GV licenses

Model number	Short description
AP.SW-0050GV-NEW	APROL IO license - Runtime 50 GVs The I/O license authorizes the use of 50 GVs (gateway variables) on a "Runtime server" APROL software can only be operated legally if the number of licensed GVs >= the actual sum of the GVs on the Runtime server. GVs include all variables in the "Gateway variable list"
AP.SW-0250GV-NEW	APROL IO license - Runtime 250 GVs The I/O license authorizes the use of 250 GVs (gateway variables) on a "Runtime server" APROL software can only be operated legally if the number of licensed GVs >= the actual sum of the GVs on the Runtime server. GVs include all variables in the "Gateway variable list"
AP.SW-1000GV-NEW	APROL IO license - Runtime 1000 GVs The I/O license authorizes the use of 1000 GVs (gateway variables) on a "Runtime server" APROL software can only be operated legally if the number of licensed GVs >= the actual sum of the GVs on the Runtime server. GVs include all variables in the "Gateway variable list"
AP.SW-5000GV-NEW	APROL IO license - Runtime 5000 GVs The I/O license authorizes the use of 5000 GVs (gateway variables) on a "Runtime server" APROL software can only be operated legally if the number of licensed GVs >= the actual sum of the GVs on the Runtime server. GVs include all variables in the "Gateway variable list"
AP.SW-10000GV-NEW	APROL IO license - Runtime 10000 GVs The I/O license authorizes the use of 10000 GVs (gateway variables) on a "Runtime server" APROL software can only be operated legally if the number of licensed GVs >= the actual sum of the GVs on the Runtime server. GVs include all variables in the "Gateway variable list"
AP.SW-20000GV-NEW	APROL IO license - Runtime 20000 GVs The I/O license authorizes the use of 20000 GVs (gateway variables) on a "Runtime server" APROL software can only be operated legally if the number of licensed GVs >= the actual sum of the GVs on the Runtime server. GVs include all variables in the "Gateway variable list"

APROL Solutions - Optional dongles (hardware key)

Model number	Short description
AP.ACC-1500	Optional "License Protection Hardware Key" The hardware key for operation on a USB interface allows use of a "portable" license. An APROL system can be licensed (software registration) using a "License Protection Hardware Key", which allows a copy of the licensing file to be on one or more physical control computers so it's possible to operate the system with an active license using the hardware key. Supported starting with APROL R3.4-08.

APROL Solutions - Optional media sets

Model number	Short description
AP:SW1-APR-4.0	APROL R4.0-xx SETUP & DOCUMENTATION DVDs with the current APROL build (-xx) APROL -SETUP & DOCUMENTATION DVDs contain the following media: 1xDVD Installation DVD - SUSE Linux Enterprise Server 11SP3 1xDVD System Software DVD - 32-bit/64-bit -DVD1/4 1xDVD System Software DVD - 32-bit/64-bit -DVD2/4 1xDVD System Software DVD - 32-bit/64-bit -DVD3/4 1xDVD System Software DVD - 32-bit/64-bit -DVD4/4 1xDVD Language DVD 1xDVD OPC & Tools CD

APROL Solutions - Optional add-on licenses

Model number	Short description
1TG-AP.SR-SMS	APROL SMS Library/CNTR The license enables the use of basic APROL functions on a B&R controller(SG4 target). To use the license, a dongle (0TG1000.01-Technology Guard) is required.
AP.SR-IREPORT-S	APROL add-on JS BI - license E+R solution B&R license code for activating APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section.
AP.SW1-APR-NOPC-01	APROL add-on - OPC server This APROL add-on license authorizes the use of the listed APROL function on 1 APROL system (control system).

APROL Solutions - Optional driver licenses

Model number	Short description
AP.LIB-PDA-CNT-NEW	PAL Edition PDA (PAL-PDA)/CC This APROL add-on license authorizes the use of the listed APROL functions on 1 APROL control computer.

APROL Solutions - Optional libraries for additional controllers

Model number	Short description
0TG:220198.001-00	APROL Technology Guard with BAS + PAL Contains the following materials: 0TG1000.01 Technology Guard 1TG-AP.SR-LIB-BAS APROL Basic Library/CNTRL 1TG-AP.SR-LIB-PAL APROL Process Automation Lib(PAL)/CNTRL
0TG:220198.006-00	APROL TG. with BAS + PAL edition EnMon Contains the following materials: 0TG1000.01 Technology Guard 1TG-AP.SR-LIB-BAS APROL Basic Library/CNTRL 1TG-AP.SR-LIB-PAL APROL Process Automation Lib(PAL)/CNTRL
0TG:220198.007-00	APROL TG. with BAS + PAL edition ConMon Contains the following materials: 0TG1000.01 Technology Guard 1TG-AP.SR-LIB-BAS APROL Basic Library/CNTRL 1TG-AP.SR-LIB-PAL APROL Process Automation Lib(PAL)/CNTRL
0TG:220198.008-00	APROL TG. with BAS + PAL edition APC Contains the following materials: 0TG1000.01 Technology Guard 1TG-AP.SR-LIB-BAS APROL Basic Library/CNTRL 1TG-AP.SR-LIB-PAL APROL Process Automation Lib(PAL)/CNTRL

Add-on licenses SOLUTIONS for control computer

Model number	Short description
AP.LIB-PDA-CNT-NEW	PAL Edition PDA (PAL-PDA)/CC This APROL add-on license authorizes the use of the listed APROL functions on 1 APROL control computer.

APROL Solutions - Optional libraries for APC multivariable control

Model number	Short description
1TG-AP.SR-LIB-MIMO	APROL MPC(MultipleIn/MultipleOut)/CTRL The license is valid for activating 1 controlled variable(X) or 1 manipulated variable(Y) or 1 disturbance variable input(Z). Example: 7 licenses are therefore needed for an MPC with 2xX,3xZ,2xY. The license enables the use of basic APROL functions on a B&R controller(SG4 target). To use the license, a dongle (0TG1000.01-Technology Guard) is required.

APROL Solutions - Optional 3rd-party software

Model number	Short description
AP.ACC-1474	Windows 7 Professional English Includes 32-bit and 64-bit versions/ Language: English/ full version/ in box / on DVD
AP.ACC-1475	OPC-LinkMaster (kepware) license LinkMaster OPC bridging software Part number: LM3-LNKMS-NA00 Description: LinkMaster V3

APROL Process Control - New licenses

Media set

Model number	Short description
AP:SW1-APR-4.0	APROL R4.0-xx SETUP & DOCUMENTATION DVDs with the current APROL build (-xx) APROL -SETUP & DOCUMENTATION DVDs contain the following media: 1xDVD Installation DVD - SUSE Linux Enterprise Server 11SP3 1xDVD System Software DVD - 32-bit/64-bit -DVD1/4 1xDVD System Software DVD - 32-bit/64-bit -DVD2/4 1xDVD System Software DVD - 32-bit/64-bit -DVD3/4 1xDVD System Software DVD - 32-bit/64-bit -DVD4/4 1xDVD Language DVD 1xDVD OPC & Tools CD
AP.SW1-APR-4.0-09	APROL R4.0-09 SETUP & DOCUMENTATION DVDs APROL -SETUP & DOCUMENTATION DVDs contain the following media: 1xDVD Installation DVD - SUSE Linux Enterprise Server 11SP3 1xDVD System Software DVD - 32-bit/64-bit -DVD1/4 1xDVD System Software DVD - 32-bit/64-bit -DVD2/4 1xDVD System Software DVD - 32-bit/64-bit -DVD3/4 1xDVD System Software DVD - 32-bit/64-bit -DVD4/4 1xDVD Language DVD 1xDVD OPC & Tools CD

New licenses - runtime (including Linux)

Model number	Short description
AP.SR-ROEX-NEW	APROL License Set -- Runtime / Operator / Engineering -- B&R license code for activating APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section.
AP.SR-ROXX-NEW	APROL License Set -- Runtime / Operator -- B&R license code for activating APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section.
AP.SR-RXXX-NEW	APROL License Set -- Runtime -- B&R license code for activating APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section.

New licenses - redundant runtime (including Linux)

Model number	Short description
AP.SR-RROEX-NEW	APROL License Set -- Redundant Runtime / Operator / Engineering -- B&R license code for activating APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section.
AP.SR-RROXX-NEW	APROL License Set -- Redundant Runtime / Operator -- B&R license code for activating APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section.
AP.SR-RRXXX-NEW	APROL License Set -- Redundant Runtime -- B&R license code for activating APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section.

New licenses - Engineering - Operator - Gateway (incl. Linux)

Model number	Short description
AP.SR-IREPORT	APROL add-on JS BI - license E+R Jaspersoft BI Professional Edition integrated in APROL (includes license for 1x Jaspersoft Studio,1x JasperReports Library,1x JasperReports Server) B&R license code to activate APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section.
AP.SR-IREPORT-R	APROL add-on JS BI - license E+R+RR Jaspersoft BI Professional Edition integrated in APROL (includes license for 1x Jaspersoft Studio,1x JasperReports Library,2x JasperReports Server) B&R license code to activate APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section.
AP.SR-IREPORT-S	APROL add-on JS BI - license E+R solution B&R license code for activating APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section.
AP.SR-XOEX-NEW	APROL license set --- Operator/Engin. --- B&R license code for activating APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section.
AP.SR-XOXX-NEW	APROL license set --- Operator --- B&R license code for activating APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section.
AP.SR-XOXX-NEWBLK	APROL license set --- Operator --- Bulk5 - NEW consisting of the following APROL licenses: - APROL license --- OPERATOR --- - License for "SUSE Linux 10.x - OEM" operating system B&R license code for activating APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section. Notes regarding Bulk5: Bulk license, can be used on one system if >= 5 APROL licenses --- OPERATOR --- are needed. For this reason, the minimum order for AP:SW1-XOXX-NEWBLK therefore amounts to 5 pcs.
AP.SR-XOXX-UPGBLK	APROL license set --- Operator --- Bulk5 - UPGRADE consisting of the following APROL licenses: - APROL license --- OPERATOR --- UPGRADE - License for "SUSE Linux 10.x - OEM" operating system B&R license code for activating APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section. Notes regarding Bulk5: Bulk license, can be used on one system if >= 5 APROL licenses --- OPERATOR --- are needed. For this reason, the minimum order for AP:SW1-XOXX-UPGBLK therefore amounts to 5 pcs.
AP.SR-XXEX-NEW	APROL license set --- Engineering --- B&R license code for activating APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section.
AP.SR-XXXG-NEW	APROL License Set -- Gateway (Runtime Environment) -- B&R license code for activating APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section.

New licenses - Operator via Net

Model number	Short description
AP.SW1-APR-NOO-00	APROL Add-On -OPERATOR via Net - 1 User License type: New license APROL Operator Client access via network access using e.g. VNC for 1 user This APROL add-on license authorizes the use of the listed APROL function on 1 APROL system (control system).
AP.SW1-APR-NOO-05	APROL Add-On -OPERATOR via Net - 5 Users License type: New license APROL Operator Client access via network access using e.g. VNC for 5 users This APROL add-on license authorizes the use of the listed APROL function on 1 APROL system (control system).
AP.SW1-APR-NOO-10	APROL Add-On -OPERATOR via Net - 10 User License type: New license APROL Operator Client access via network access using e.g. VNC for 10 user This APROL add-on license authorizes the use of the listed APROL function on 1 APROL system (control system).

New licenses - Engineering Hardware and Fieldbus

Model number	Short description
AP.R40-E-SD-NEW	B&R SafeDESIGNER single license APROL R4.0 License Safe Designer V4.1 B&R license code for activating APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section.
AP:R40-E-AS-NEW	APROL R4.0 license set AS client base, consists of the following licenses: - Automation Studio 4 / APROL edition - SINGLE LICENSE --- This license is for HARDWARE and FIELDBUS CONFIGURATION and is required for APROL R4.0 systems! Contains: - 3rd-party license --- Windows 7 Pro 32-bit English --- - 3rd-party license --- VMware Workstation 10.x -e-Lic Win/Linux

New I/O licenses for Runtime server

Model number	Short description
AP.SW1-0050IO-NEW	APROL I/O license - Runtime 50 I/Os The I/O license authorizes the use of 50 I/Os on a "Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list"
AP.SW1-0250IO-NEW	APROL I/O license -Runtime 250 I/Os The I/O license authorizes the use of 250 I/Os on a "non-redundant Runtime server". APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list".
AP.SW1-1000IO-NEW	APROL I/O license -Runtime 1000 I/Os The I/O license authorizes the use of 1000 I/Os on a "non-redundant Runtime server". APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list".
AP.SW1-2500IO-NEW	APROL I/O license - Runtime 2500 I/Os The I/O license authorizes the use of 2500 I/Os on a "non-redundant Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list"
AP.SW1-5000IO-NEW	APROL I/O license - Runtime 5000 I/Os The I/O license authorizes the use of 5000 I/Os on a "non-redundant Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list"
AP.SW-10000IO-NEW	APROL I/O license - Runtime 10000 I/Os The I/O license authorizes the use of 10000 I/Os on a "non-redundant Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list"
AP.SW-20000IO-NEW	APROL I/O license - Runtime 20000 I/Os The I/O license authorizes the use of 20000 I/Os on a "non-redundant Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list"

New I/O licenses for Redundant Runtime server

Model number	Short description
AP.SW1-0050RIO-NEW	APROL I/O license - Redundant Runtime 50 I/Os The I/O license authorizes the use of 50 I/Os on a "redundant Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list"
AP.SW1-0250RIO-NEW	APROL I/O license - Redundant Runtime 250 I/Os The I/O license authorizes the use of 250 I/Os on a "redundant Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list"
AP.SW1-1000RIO-NEW	APROL I/O license - Redundant Runtime 1000 I/Os The I/O license authorizes the use of 1000 I/Os on a "redundant Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list"
AP.SW1-2500RIO-NEW	APROL I/O license - Redundant Runtime 2500 I/Os The I/O license authorizes the use of 2500 I/Os on a "redundant Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list"
AP.SW1-5000RIO-NEW	APROL I/O license - Redundant Runtime 5000 I/Os The I/O license authorizes the use of 5000 I/Os on a "redundant Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list"
AP.SW-10000RIO-NEW	APROL I/O license - Redundant Runtime 10000 I/Os The I/O license authorizes the use of 10000 I/Os on a "redundant Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list"
AP.SW-20000RIO-NEW	APROL I/O license - Redundant Runtime 20000 I/Os The I/O license authorizes the use of 20000 I/Os on a "redundant Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list"

Expansions I/O licenses

Model number	Short description
AP.SW1-0250IO-EXP	APROL Expansion of I/O license - Runtime 250 I/Os The Expansion of I/O license authorizes the use of 250 I/Os on a "Runtime server". APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list". Note: Valid as "APROL I/O license - Redundant Runtime 250 I/Os" if the "APROL I/O license - Runtime 250 I/Os" required for an expansion was already present.
AP.SW1-1000IO-EXP	APROL Expansion of I/O license - Runtime 1000 I/Os The Expansion of I/O license authorizes the use of 1000 I/Os on a "Runtime server". APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list". Note: Valid as "APROL I/O license - Redundant Runtime 1000 I/Os" if the "APROL I/O license - Runtime 1000 I/Os" required for an expansion was already present.
AP.SW1-2500IO-EXP	APROL Expansion of I/O license - Runtime 2500 I/Os The Expansion of I/O license authorizes the use of 2500 I/Os on a "Runtime server". APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list". Note: Valid as "APROL I/O license - Redundant Runtime 2500 I/Os" if the "APROL I/O license - Runtime 2500 I/Os" required for an expansion was already present.
AP.SW1-5000IO-EXP	APROL Expansion of I/O license - Runtime 5000 I/Os The Expansion of I/O license authorizes the use of 5000 I/Os on a "Runtime server". APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list". Note: Valid as "APROL I/O license - Redundant Runtime 5000 I/Os" if the "APROL I/O license - Runtime 5000 I/Os" required for an expansion was already present.
AP.SW-10000IO-EXP	APROL Expansion of I/O license - Runtime 10000 I/Os The Expansion of I/O license authorizes the use of 10000 I/Os on a "Runtime server". APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list". Note: Valid as "APROL I/O license - Redundant Runtime 10000 I/Os" if the "APROL I/O license - Runtime 10000 I/Os" required for an expansion was already present.
AP.SW-20000IO-EXP	APROL Expansion of I/O license - Runtime 20000 I/Os The Expansion of I/O license authorizes the use of 20000 I/Os on a "Runtime server". APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list". Note: Valid as "APROL I/O license - Redundant Runtime 20000 I/Os" if the "APROL I/O license - Runtime 20000 I/Os" required for an expansion was already present.

New Gateway - Licenses for Runtime server

Model number	Short description
AP.SW-0050GV-NEW	APROL IO license - Runtime 50 GVs The I/O license authorizes the use of 50 GVs (gateway variables) on a "Runtime server" APROL software can only be operated legally if the number of licensed GVs >= the actual sum of the GVs on the Runtime server. GVs include all variables in the "Gateway variable list"
AP.SW-0250GV-NEW	APROL IO license - Runtime 250 GVs The I/O license authorizes the use of 250 GVs (gateway variables) on a "Runtime server" APROL software can only be operated legally if the number of licensed GVs >= the actual sum of the GVs on the Runtime server. GVs include all variables in the "Gateway variable list"
AP.SW-1000GV-NEW	APROL IO license - Runtime 1000 GVs The I/O license authorizes the use of 1000 GVs (gateway variables) on a "Runtime server" APROL software can only be operated legally if the number of licensed GVs >= the actual sum of the GVs on the Runtime server. GVs include all variables in the "Gateway variable list"
AP.SW-5000GV-NEW	APROL IO license - Runtime 5000 GVs The I/O license authorizes the use of 5000 GVs (gateway variables) on a "Runtime server" APROL software can only be operated legally if the number of licensed GVs >= the actual sum of the GVs on the Runtime server. GVs include all variables in the "Gateway variable list"
AP.SW-10000GV-NEW	APROL IO license - Runtime 10000 GVs The I/O license authorizes the use of 10000 GVs (gateway variables) on a "Runtime server" APROL software can only be operated legally if the number of licensed GVs >= the actual sum of the GVs on the Runtime server. GVs include all variables in the "Gateway variable list"
AP.SW-20000GV-NEW	APROL IO license - Runtime 20000 GVs The I/O license authorizes the use of 20000 GVs (gateway variables) on a "Runtime server" APROL software can only be operated legally if the number of licensed GVs >= the actual sum of the GVs on the Runtime server. GVs include all variables in the "Gateway variable list"

New Gateway - Licenses for Redundant Runtime server

Model number	Short description
AP.SW-0050RGV-NEW	APROL IO license - Redundant Runtime 50 RGVs The I/O license authorizes the use of 50 RGVs (redundant gateway variables) on a "redundant Runtime server" APROL software can only be operated legally if the number of licensed RGVs >= the actual sum of the RGVs on the Runtime server. RGVs include all variables in the "Gateway variable list"
AP.SW-0250RGV-NEW	APROL IO license - Redundant Runtime 250 RGVs The I/O license authorizes the use of 250 RGVs (redundant gateway variables) on a "redundant Runtime server" APROL software can only be operated legally if the number of licensed RGVs >= the actual sum of the RGVs on the Runtime server. RGVs include all variables in the "Gateway variable list"
AP.SW-1000RGV-NEW	APROL IO license - Redundant Runtime 1000 RGVs The I/O license authorizes the use of 1000 RGVs (redundant gateway variables) on a "redundant Runtime server" APROL software can only be operated legally if the number of licensed RGVs >= the actual sum of the RGVs on the Runtime server. RGVs include all variables in the "Gateway variable list"
AP.SW-5000RGV-NEW	APROL IO license - Redundant Runtime 5000 RGVs The I/O license authorizes the use of 5000 RGVs (redundant gateway variables) on a "redundant Runtime server" APROL software can only be operated legally if the number of licensed RGVs >= the actual sum of the RGVs on the Runtime server. RGVs include all variables in the "Gateway variable list"
AP.SW-10000RGV-NEW	APROL IO license - Redundant Runtime 10000 RGVs The I/O license authorizes the use of 10000 RGVs (redundant gateway variables) on a "redundant Runtime server" APROL software can only be operated legally if the number of licensed RGVs >= the actual sum of the RGVs on the Runtime server. RGVs include all variables in the "Gateway variable list"
AP.SW-20000RGV-NEW	APROL IO license - Redundant Runtime 20000 RGVs The I/O license authorizes the use of 20000 RGVs (redundant gateway variables) on a "redundant Runtime server" APROL software can only be operated legally if the number of licensed RGVs >= the actual sum of the RGVs on the Runtime server. RGVs include all variables in the "Gateway variable list"

APROL Software

Expansions Gateway I/O licenses

Model number	Short description
AP.SW-0050GV-EXP	APROL EXPANSION of a GV license - Runtime 50 GVs The EXPANSION of a GV license authorizes the use of 50 RGVs on a "redundant Runtime server". APROL software can only be operated legally if the number of licensed RGVs >= the actual sum of the RGVs on the Runtime server. RGVs include all variables in the "GV channel assignment" and in the "Gateway variable list". Note: Valid as "APROL RGV license - Redundant Runtime 50 RGVs" if the "APROL GV license - Runtime 50 GVs" required for an expansion was already present.
AP.SW-0250GV-EXP	APROL EXPANSION of a GV license - Runtime 250 GVs The EXPANSION of a GV license authorizes the use of 250 RGVs on a "redundant Runtime server". APROL software can only be operated legally if the number of licensed RGVs >= the actual sum of the RGVs on the Runtime server. RGVs include all variables in the "GV channel assignment" and in the "Gateway variable list". Note: Valid as "APROL RGV license - Redundant Runtime 250 RGVs" if the "APROL GV license - Runtime 250 GVs" required for an expansion was already present.
AP.SW-1000GV-EXP	APROL EXPANSION of a GV license - Runtime 1000 GVs The EXPANSION of a GV license authorizes the use of 1000 RGVs on a "redundant Runtime server". APROL software can only be operated legally if the number of licensed RGVs >= the actual sum of the RGVs on the Runtime server. RGVs include all variables in the "GV channel assignment" and in the "Gateway variable list". Note: Valid as "APROL RGV license - Redundant Runtime 1000 RGVs" if the "APROL GV license - Runtime 1000 GVs" required for an expansion was already present.
AP.SW-5000GV-EXP	APROL EXPANSION of a GV license - Runtime 5000 GVs The EXPANSION of a GV license authorizes the use of 5000 RGVs on a "redundant Runtime server". APROL software can only be operated legally if the number of licensed RGVs >= the actual sum of the RGVs on the Runtime server. RGVs include all variables in the "GV channel assignment" and in the "Gateway variable list". Note: Valid as "APROL RGV license - Redundant Runtime 5000 RGVs" if the "APROL GV license - Runtime 5000 GVs" required for an expansion was already present.
AP.SW-10000GV-EXP	APROL EXPANSION of a GV license - Runtime 10000 GVs The EXPANSION of a GV license authorizes the use of 10000 RGVs on a "redundant Runtime server". APROL software can only be operated legally if the number of licensed RGVs >= the actual sum of the RGVs on the Runtime server. RGVs include all variables in the "GV channel assignment" and in the "Gateway variable list". Note: Valid as "APROL RGV license - Redundant Runtime 10000 RGVs" if the "APROL GV license - Runtime 10000 GVs" required for an expansion was already present.
AP.SW-20000GV-EXP	APROL EXP GV runtime license 20000 GVs

Add-on licenses

Model number	Short description
AP.SR-IREPORT	APROL add-on JS BI - license E+R Jaspersoft BI Professional Edition integrated in APROL (includes license for 1x Jaspersoft Studio,1x JasperReports Library,1x JasperReports Server) B&R license code to activate APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section.
AP.SR-IREPORT-R	APROL add-on JS BI - license E+R+RR Jaspersoft BI Professional Edition integrated in APROL (includes license for 1x Jaspersoft Studio,1x JasperReports Library,2x JasperReports Server) B&R license code to activate APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section.
AP.SW1-APR-NAUD-01	APROL add-on - AuditTrail This APROL add-on license authorizes the use of the listed APROL function on 1 APROL system (control system).
AP.SW1-APR-NOPC-01	APROL add-on - OPC server This APROL add-on license authorizes the use of the listed APROL function on 1 APROL system (control system).
AP.SW1-APR-NWEB-01	APROL add-on - Web services XML This APROL add-on license authorizes the use of the listed APROL function on 1 APROL system (control system).
AP.SW1-APR-SQLP-01	APROL Add-On - ParameterCenter License - includes ParameterCenter License This APROL add-on license authorizes the use of the listed APROL function on 1 APROL Runtime server.
AP.SW1-APR-SQLS	APROL ADD-ON - SQL server access This APROL add-on license permits the use of the listed APROL function on 1 APROL system (control system).

Driver licenses

Model number	Short description
AP.SW1-DRV-0020	APROL driver S5/S7, TCP-IP connectivity (controller) This driver license authorizes the use of this APROL function in 1 APROL system on 1 controller.... If the driver software is not in the "APROL setup" we ask that you request it from B&R with the license number and software release (e.g. R 3.0-00). Contact email address: aprol.licencing@br-automation.com
AP.SW1-DRV-0022	APROL driver, RK512 connectivity (controller) This driver license authorizes the use of this APROL function in 1 APROL system on 1 controller. If the driver software is not in the "APROL setup" we ask that you request it from B&R with the license number and software release (e.g. R 3.0-00). Contact email address: aprol.licencing@br-automation.com
AP.SW1-DRV-0034	APROL driver INA connectivity (CC) This driver license authorizes the use of this APROL function in 1 APROL system on 1 control computer (CC). If the driver software is not in the "APROL setup" we ask that you request it from B&R with the license number and software release (e.g. R 3.0-00). Contact email address: aprol.licencing@br-automation.com
AP.SW1-DRV-MODB-01	APROL driver Modbus connectivity (controller) This driver license authorizes the use of this APROL function in 1 APROL system on 1 controller. If the driver software is not in the "APROL setup" we ask that you request it from B&R with the license number and software release (e.g. R 3.0-00). Contact email address: aprol.licencing@br-automation.com
AP.SW1-DRV-PBDP-01	APROL driver, PROFIBUS DP (controller) This driver license authorizes the use of this APROL function in 1 APROL system on 1 controller. If the driver software is not in the "APROL setup" we ask that you request it from B&R with the license number and software release (e.g. R 3.0-00). Contact email address: aprol.licencing@br-automation.com
AP.SW1-DRV-SETH-01	APROL driver S5/S7 TCP-IP connectivity (CC) This driver license authorizes the use of this APROL function in 1 APROL system on 1 control computer (CC). If the driver software is not in the "APROL setup" we ask that you request it from B&R with the license number and software release (e.g. R 3.0-00). Contact email address: aprol.licencing@br-automation.com

New optional libraries for controllers

Model number	Short description
1TG-AP.SR-LIB-BAS	APROL Basic Library/CTRL The license enables the use of basic APROL functions on a B&R controller(SG4 target). To use the license, a dongle (0TG1000.01-Technology Guard) is required.
1TG-AP.SR-LIB-PAL	APROL Process Automation Lib(PAL)/CTRL The license enables the use of basic APROL functions on a B&R controller(SG4 target). To use the license, a dongle (0TG1000.01-Technology Guard) is required.
1TG-AP.SR-SMS	APROL SMS Library/CNTR The license enables the use of basic APROL functions on a B&R controller(SG4 target). To use the license, a dongle (0TG1000.01-Technology Guard) is required.

APROL Solutions - Optional libraries for APC multivariable control

Model number	Short description
1TG-AP.SR-LIB-MIMO	APROL MPC(MultipleIn/MultipleOut)/CTRL The license is valid for activating 1 controlled variable(X) or 1 manipulated variable(Y) or 1 disturbance variable input(Z). Example: 7 licenses are therefore needed for an MPC with 2xX,3xZ,2xY. The license enables the use of basic APROL functions on a B&R controller(SG4 target). To use the license, a dongle (0TG1000.01-Technology Guard) is required.

Controller redundancy licenses

Model number	Short description
1TG10X0.1	TG software license for controller redundancy

Add-on licenses solutions

Model number	Short description
0TG:220198.000-00	APROL Technology Guard with BAS + PAL + Controller Redundancy Contains the following materials: 0TG1000.01 Technology Guard 1TG-AP.SR-LIB-BAS APROL Basic Library/CNTRL 1TG-AP.SR-LIB-PAL APROL Process Automation Lib(PAL)/CNTRL 1TG10X0.1 TG software license for CPU redundancy
0TG:220198.001-00	APROL Technology Guard with BAS + PAL Contains the following materials: 0TG1000.01 Technology Guard 1TG-AP.SR-LIB-BAS APROL Basic Library/CNTRL 1TG-AP.SR-LIB-PAL APROL Process Automation Lib(PAL)/CNTRL
0TG:220198.002-00	APROL Technology Guard with BAS Contains the following materials: 0TG1000.01 Technology Guard 1TG-AP.SR-LIB-BAS APROL Basic Library/CNTRL

Optional Solutions Packages

Model number	Short description
AP.SOL-ENM-PRO-NEW	Solution EnMon Reporting /PROJECT This APROL add-on license authorizes the use of the listed APROL functions in 1 APROL system (control system).

Add-on licenses solutions

Model number	Short description
X20A:220198.049-02	X20 Hub GND distribution for the demo cube Consisting of: 1x X20BB82 X20 bus controller base + 2-slot 1x X20HB2880 X20 hub module 2x 100 BASE-T 1x X20HB2880 X20 hub module 2x 100 BASE-T 1x X20HB8880 X20 Ethernet HUB 2x 10/100 Base-T, exp. 1x X20PS9400 X20 BC supply, 24 V, bus supply 1x X20TB12 X20 standard terminal block12x 1x X20BM11 X20 bus module with continuous power bus 1x X20PD0012 X20 potential distributor, 12x 24 V, internal 1x X20TB12 X20 standard terminal block12x 1x X20BM11 X20 bus module with continuous power bus 1x X20PD0011 X20 potential distributor, 12x GND, internal 1x X20TB12 X20 standard terminal block12x 1x 999_X20ASSEM.BASE completion base price X20 assembly 6x 999_X20ASSEM.MOD completion price/module assembly 1x 999_X20LABEL.C2 completion, label to the left
X20A:220198.050-02	"Remote IO 1" for the demo cube Consisting of: 1 pc. X20BB81 X20 bus controller base + 1-slot 1 pc. X20HB2880 X20 hub module 2x 100 BASE-T 1 pc. X20BC8083 X20 bus contr. POWERLINK, HUB exp. 1 pc. X20PS9400 X20 BC supply, 24 V, bus supply 1 pc. X20TB12 X20 standard terminal block 12x 1 pc. X20BM11 X20 bus module with continuous power bus 1 pc. X20DI9371 X20 digital 12x I, 24 V, sink, 1 wire 1 pc. X20TB12 X20 standard terminal block 12x 1 pc. X20BM11 X20 bus module with continuous power bus 1 pc. X20DO9322 X20 digital 12x O, 24 V 0.5 A, source, 1 wire 1 pc. X20TB12 X20 standard terminal block 12x 1 pc. X20BM11 X20 bus module with continuous power bus 1 pc. X20AI4622 X20 analog 4xI, +/-10 V / 0-20 mA, 12-bit 1 pc. X20TB12 X20 standard terminal block 12x 1 pc. X20BM11 X20 bus module with continuous power bus 1 pc. X20AO4622 X20 analog 4xO, +/-10 V / 0-20 mA, 12-bit 1 pc. X20TB12 X20 standard terminal block 12x 1 pc. X20BM11 X20 bus module with continuous power bus 1 pc. X20AT4222 X20 analog 4xI, RTD, 3 wire 1 pc. X20TB12 X20 standard terminal block 12x 1 pc. X20BM11 X20 bus module with continuous power bus 1 pc. X20DC1396 X20 counter, 1x ABR, 24 V, 100 kHz, 1 pc. X20TB12 X20 standard terminal block 12x 1 pc. X20BM11 X20 bus module with continuous power bus 1 pc. X20BM11 X20 bus module with continuous power bus 1 pc. X20BM31 X20 bus module 25 mm with continuous power bus
X20A:220198.051-01	"Remote IO 2" for demo cube(assembled) Consisting of: 1 pc. X20BB80 X20 bus controller base 1 pc. X20BC8083 X20 bus contr. POWERLINK, HUB exp. 1 pc. X20PS9400 X20 BC supply, 24 V, bus supply 1 pc. X20TB12 X20 standard terminal block 12x 1 pc. X20BM33 X20 bus safety 25 mm, continuous power bus 1 pc. X20SI2100 X20 Safe Digital 2xI, 24 V, 1xI CAT4 1 pc. X20TB52 X20 safety terminal block, 12x 1 pc. X20BM33 X20 bus safety 25 mm, continuous power bus 1 pc. X20SO2110 X20 safe digital 2xO, 24 V, 0.5 A 1 pc. X20TB52 X20 safety terminal block, 12x
X20A:220198.068-02	X20 hub 2x100BASE-T+2x10/100Base-T 1x X20BB81 X20 bus controller base + 1-slot 1x X20HB2880 X20 hub module 2x 100 BASE-T 1x X20HB8880 X20 Ethernet HUB 2x 10/100 Base-T, exp. 1x X20PS9400 X20 BC supply, 24 V, bus supply 1x X20TB12 X20 standard terminal block 12x 1x 999_X20ASSEM.BASE completion base price X20 assembly 3x 999_X20ASSEM.MOD completion price/module assembly 1x 999_X20LABEL.C1 completion, label to the right
X20A:220198.069-00	X20 bus base X20BB81 with the following equipment: SS1: X20HB8880 SS2: X20HB2881 IF1.ST1: X20PS9400 (X20TB12 installed), X20 end plates (left and right) X20AC0SL1/X20AC0SR1 included
X20A:220198.070-02	X20 hub cntrl redundancy Cu/Cu - local I/O Consisting of: 1x X20BB82 X20 bus controller base + 2-slot 1x X20HB2885 X20 hub module 2x 100 BASE-T, redundancy 1x X20HB2885 X20 hub module 2x 100 BASE-T, redundancy 1x X20BC8084 X20 bus controller POWERLINK, redundancy 1x X20PS9400 X20 BC supply, 24 V, bus supply 1x X20TB12 X20 standard terminal 12x 1x 999_X20ASSEM.BASE completion base price X20 assembly 4x 999_X20ASSEM.MOD completion price/module assembly 1x 999_X20LABEL.C1 completion, label to the right
X20A:220198.071-02	X20 hub cntrl redundancy FO/FO - local I/O Consisting of: 1x X20BB82 X20 bus controller base + 2-slot 1x X20HB2886 X20 hub module 2x 100 BASE-FX, redundancy 1x X20HB2886 X20 hub module 2x 100 BASE-FX, redundancy 1x X20BC8084 X20 bus controller POWERLINK, redundancy 1x X20PS9400 X20 BC supply, 24 V, bus supply 1x X20TB12 X20 standard terminal 12x 1x 999_X20ASSEM.BASE completion base price X20 assembly 4x 999_X20ASSEM.MOD completion price/module assembly 1x 999_X20LABEL.C1 completion, label to the right
X20A:220198.072-02	X20 hub cntrl redundancy Cu/Cu - local PLK Consisting of: 1x X20BB82 X20 bus controller base + 2-slot 1x X20HB2885 X20 hub module 2x 100 BASE-T, redundancy 1x X20HB2885 X20 hub module 2x 100 BASE-T, redundancy 1x X20HB8884 X20 POWERLINK compact link selector 1x X20PS9400 X20 BC supply, 24 V, bus supply 1x X20TB12 X20 standard terminal 12x 1x 999_X20ASSEM.BASE completion base price X20 assembly 4x 999_X20ASSEM.MOD completion price/module assembly 1x 999_X20LABEL.C1 completion, label to the right
X20A:220198.073-02	X20 hub cntrl redundancy FO/FO - local PLK Consisting of: 1x X20BB82 X20 bus controller base + 2-slot 1x X20HB2886 X20 hub module 2x 100 BASE-FX, redundancy 1x X20HB2886 X20 hub module 2x 100 BASE-FX, redundancy 1x X20HB8884 X20 POWERLINK compact link selector 1x X20PS9400 X20 BC supply, 24 V, bus supply 1x X20TB12 X20 standard terminal 12x 1x 999_X20ASSEM.BASE completion base price X20 assembly 4x 999_X20ASSEM.MOD completion price/module assembly 1x 999_X20LABEL.C1 completion, label to the right
X20A:220198.075-00	1/2 redundant controller (assembled) Consisting of: 1 ST X20CP3586 X20 CPU ATOM, 1.6 GHz, PLK, 3x IF 1 ST 5CFCRD.1024-06 CompactFlash 1024 MB B&R SMART 1 ST X20IF10X0 X20 interface redundancy CPU 1000BASE-SX 1 ST X20IF2181-2 X20 interface POWERLINK CompLinkSel

APROL Process Control - Upgrade licenses

Upgrade media set

Model number	Short description
AP:SW1-APR-4.0	APROL R4.0-xx SETUP & DOCUMENTATION DVDs with the current APROL build (-xx) APROL -SETUP & DOCUMENTATION DVDs contain the following media: 1xDVD Installation DVD - SUSE Linux Enterprise Server 11SP3 1xDVD System Software DVD - 32-bit/64-bit -DVD1/4 1xDVD System Software DVD - 32-bit/64-bit -DVD2/4 1xDVD System Software DVD - 32-bit/64-bit -DVD3/4 1xDVD System Software DVD - 32-bit/64-bit -DVD4/4 1xDVD Language DVD 1xDVD OPC & Tools CD
AP.SW1-APR-4.0-09	APROL R4.0-09 SETUP & DOCUMENTATION DVDs APROL -SETUP & DOCUMENTATION DVDs contain the following media: 1xDVD Installation DVD - SUSE Linux Enterprise Server 11SP3 1xDVD System Software DVD - 32-bit/64-bit -DVD1/4 1xDVD System Software DVD - 32-bit/64-bit -DVD2/4 1xDVD System Software DVD - 32-bit/64-bit -DVD3/4 1xDVD System Software DVD - 32-bit/64-bit -DVD4/4 1xDVD Language DVD 1xDVD OPC & Tools CD

Upgrade licenses - Runtime (including Linux)

Model number	Short description
AP.SR-ROEX-UPG	APROL License Set -- Runtime / Operator / Engineering -- B&R license code for activating APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section. This upgrade replaces the existing APROL license. The old license (dongle) is no longer valid upon receiving the upgrade license, and it must be returned immediately to your B&R representative.
AP.SR-ROXX-UPG	APROL License Set -- Runtime / Operator -- B&R license code for activating APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section. This upgrade replaces the existing APROL license. The old license (dongle) is no longer valid upon receiving the upgrade license, and it must be returned immediately to your B&R representative.
AP.SR-RXXX-UPG	APROL License Set -- Runtime -- B&R license code for activating APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section. This upgrade replaces the existing APROL license. The old license (dongle) is no longer valid upon receiving the upgrade license, and it must be returned immediately to your B&R representative.

Upgrade licenses - Redundant Runtime (including Linux)

Model number	Short description
AP.SR-RROEX-UPG	APROL License Set -- Redundant Runtime / Operator / Engineering -- B&R license code for activating APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section. This upgrade replaces the existing APROL license. The old license (dongle) is no longer valid upon receiving the upgrade license, and it must be returned immediately to your B&R representative.
AP.SR-RROXX-UPG	APROL License Set -- Redundant Runtime / Operator -- B&R license code for activating APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section. This upgrade replaces the existing APROL license. The old license (dongle) is no longer valid upon receiving the upgrade license, and it must be returned immediately to your B&R representative.
AP.SR-RRXXX-UPG	APROL License Set -- Redundant Runtime -- B&R license code for activating APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section. This upgrade replaces the existing APROL license. The old license (dongle) is no longer valid upon receiving the upgrade license, and it must be returned immediately to your B&R representative.

Upgrade licenses - Engineering - Operator - Gateway (including Linux)

Model number	Short description
AP.SR-XOEX-UPG	APROL license set --- Operator/Engin. --- B&R license code for activating APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section.
AP.SR-XOXX-UPG	APROL license set --- Operator --- B&R license code for activating APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section. This upgrade replaces the existing APROL license. The old license (dongle) is no longer valid upon receiving the upgrade license, and it must be returned immediately to your B&R representative.
AP.SR-XOXX-UPGBLK	APROL license set --- Operator --- Bulk5 - UPGRADE consisting of the following APROL licenses: - APROL license --- OPERATOR --- UPGRADE - License for "SUSE Linux 10.x - OEM" operating system B&R license code for activating APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section. Notes regarding Bulk5: Bulk license, can be used on one system if >= 5 APROL licenses --- OPERATOR --- are needed. For this reason, the minimum order for AP:SW1-XOXX-UPGBLK therefore amounts to 5 pcs.
AP.SR-XXEX-UPG	APROL license set --- Engineering --- B&R license code for activating APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section. This upgrade replaces the existing APROL license. The old license (dongle) is no longer valid upon receiving the upgrade license, and it must be returned immediately to your B&R representative.
AP.SR-XXXG-UPG	APROL License Set -- Gateway (Runtime Environment) -- B&R license code for activating APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration section. This upgrade replaces the existing APROL license. The old license (dongle) is no longer valid upon receiving the upgrade license, and it must be returned immediately to your B&R representative.

Upgrade licenses - Operator via Net

Model number	Short description
AP.SW1-APR-UOO-00	APROL Add-On -OPERATOR via Net - 1 User License type: Upgrade license APROL Operator Client access via network access using e.g. VNC for 1 user This APROL add-on license authorizes the use of the listed APROL function on 1 APROL system (control system).
AP.SW1-APR-UOO-05	APROL Add-On -OPERATOR via Net - 5 User License type: Upgrade license APROL Operator Client access via network access using e.g. VNC for 5 user This APROL add-on license authorizes the use of the listed APROL function on 1 APROL system (control system).
AP.SW1-APR-UOO-10	APROL Add-On -OPERATOR via Net - 10 User License type: Upgrade license APROL Operator Client access via network access using e.g. VNC for 10 user This APROL add-on license authorizes the use of the listed APROL function on 1 APROL system (control system).

Upgrade licenses - Engineering Hardware and Fieldbus

Model number	Short description
AP:R40-E-AS-NEW	APROL R4.0 license set AS client base, consists of the following licenses: - Automation Studio 4 / APROL edition - SINGLE LICENSE --- This license is for HARDWARE and FIELDBUS CONFIGURATION and is required for APROL R4.0 systems! Contains: - 3rd-party license --- Windows 7 Pro 32-bit English --- - 3rd-party license --- VMware Workstation 10.x -e-Lic Win/Linux

Upgrade I/O licenses for Runtime server

Model number	Short description
AP.SW1-0250IO-UPG	APROL UPGRADE I/O license - Runtime 250 I/Os The UPGRADE I/O license authorizes the use of 250 I/Os on a "Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list". Note: This upgrade replaces the existing APROL I/O license. The old license becomes invalid when the upgrade license is received.
AP.SW1-1000IO-UPG	APROL UPGRADE I/O license - Runtime 1000 I/Os The UPGRADE I/O license authorizes the use of 1000 I/Os on a "Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list". Note: This upgrade replaces the existing APROL I/O license. The old license becomes invalid when the upgrade license is received.
AP.SW1-2500IO-UPG	APROL UPGRADE I/O license - Runtime 2500 I/Os The UPGRADE I/O license authorizes the use of 2500 I/Os on a "Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list". Note: This upgrade replaces the existing APROL I/O license. The old license becomes invalid when the upgrade license is received.
AP.SW1-5000IO-UPG	APROL UPGRADE I/O license - Runtime 5000 I/Os The UPGRADE I/O license authorizes the use of 5000 I/Os on a "Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list". Note: This upgrade replaces the existing APROL I/O license. The old license becomes invalid when the upgrade license is received.
AP.SW-10000IO-UPG	APROL UPGRADE I/O license - Runtime 10000 I/Os The UPGRADE I/O license authorizes the use of 10000 I/Os on a "Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list". Note: This upgrade replaces the existing APROL I/O license. The old license becomes invalid when the upgrade license is received.
AP.SW-20000IO-UPG	APROL UPGRADE I/O license - Runtime 20000 I/Os The UPGRADE I/O license authorizes the use of 20000 I/Os on a "Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list". Note: This upgrade replaces the existing APROL I/O license. The old license becomes invalid when the upgrade license is received.

Upgrade I/O licenses for Redundant Runtime server

Model number	Short description
AP.SW1-0250RIO-UPG	APROL UPGRADE I/O license - Redundant Runtime 250 I/Os The UPGRADE I/O license authorizes the use of 250 I/Os on a "redundant Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list". Note: This upgrade replaces the existing APROL I/O license. The old license becomes invalid when the upgrade license is received.
AP.SW1-1000RIO-UPG	APROL UPGRADE I/O license - Redundant Runtime 1000 I/Os The UPGRADE I/O license authorizes the use of 1000 I/Os on a "redundant Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list". Note: This upgrade replaces the existing APROL I/O license. The old license becomes invalid when the upgrade license is received.
AP.SW1-2500RIO-UPG	APROL UPGRADE I/O license - Redundant Runtime 2500 I/Os The UPGRADE I/O license authorizes the use of 2500 I/Os on a "redundant Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list". Note: This upgrade replaces the existing APROL I/O license. The old license becomes invalid when the upgrade license is received.
AP.SW1-5000RIO-UPG	APROL UPGRADE I/O license - Redundant Runtime 5000 I/Os The UPGRADE I/O license authorizes the use of 5000 I/Os on a "redundant Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list". Note: This upgrade replaces the existing APROL I/O license. The old license becomes invalid when the upgrade license is received.
AP.SW-10000RIO-UPG	APROL UPGRADE I/O license - Redundant Runtime 10000 I/Os The UPGRADE I/O license authorizes the use of 10000 I/Os on a "redundant Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list". Note: This upgrade replaces the existing APROL I/O license. The old license becomes invalid when the upgrade license is received.
AP.SW-20000RIO-UPG	APROL UPGRADE I/O license - Redundant Runtime 20000 I/Os The UPGRADE I/O license authorizes the use of 20000 I/Os on a "redundant Runtime server" APROL software can only be operated legally if the number of licensed I/Os >= the actual sum of the I/Os on the Runtime server. I/Os include all variables in the "I/O channel assignment" and in the "Gateway variable list". Note: This upgrade replaces the existing APROL I/O license. The old license becomes invalid when the upgrade license is received.

Upgrade gateway - Licenses for Runtime server

Model number	Short description
AP.SW-0050GV-UPG	APROL IO license - Runtime 50 GVs The I/O license authorizes the use of 50 GVs (gateway variables) on a "Runtime server" APROL software can only be operated legally if the number of licensed GVs >= the actual sum of the GVs on the Runtime server. GVs include all variables in the "Gateway variable list"
AP.SW-0250GV-UPG	APROL IO license - Runtime 250 GVs The I/O license authorizes the use of 250 GVs (gateway variables) on a "Runtime server" APROL software can only be operated legally if the number of licensed GVs >= the actual sum of the GVs on the Runtime server. GVs include all variables in the "Gateway variable list"
AP.SW-1000GV-UPG	APROL IO license - Runtime 1000 GVs The I/O license authorizes the use of 1000 GVs (gateway variables) on a "Runtime server" APROL software can only be operated legally if the number of licensed GVs >= the actual sum of the GVs on the Runtime server. GVs include all variables in the "Gateway variable list"
AP.SW-5000GV-UPG	APROL IO license - Runtime 5000 GVs The I/O license authorizes the use of 5000 GVs (gateway variables) on a "Runtime server" APROL software can only be operated legally if the number of licensed GVs >= the actual sum of the GVs on the Runtime server. GVs include all variables in the "Gateway variable list"
AP.SW-10000GV-UPG	APROL IO license - Runtime 10000 GVs The I/O license authorizes the use of 10000 GVs (gateway variables) on a "Runtime server" APROL software can only be operated legally if the number of licensed GVs >= the actual sum of the GVs on the Runtime server. GVs include all variables in the "Gateway variable list"
AP.SW-20000GV-UPG	APROL IO license - Runtime 20000 GVs The I/O license authorizes the use of 20000 GVs (gateway variables) on a "Runtime server" APROL software can only be operated legally if the number of licensed GVs >= the actual sum of the GVs on the Runtime server. GVs include all variables in the "Gateway variable list"

Upgrade gateway - Licenses for Redundant Runtime server

Model number	Short description
AP.SW-0050RGV-UPG	APROL IO license - Redundant Runtime 50 RGVs The I/O license authorizes the use of 50 RGVs (redundant gateway variables) on a "redundant Runtime server" APROL software can only be operated legally if the number of licensed RGVs >= the actual sum of the RGVs on the Runtime server. RGVs include all variables in the "Gateway variable list"
AP.SW-0250RGV-UPG	APROL IO license - Redundant Runtime 250 RGVs The I/O license authorizes the use of 250 RGVs (redundant gateway variables) on a "redundant Runtime server" APROL software can only be operated legally if the number of licensed RGVs >= the actual sum of the RGVs on the Runtime server. RGVs include all variables in the "Gateway variable list"
AP.SW-1000RGV-UPG	APROL I/O license - Redundant Runtime 1000 RGVs 1000 RGVs on a redundant Runtime server". Legal operation of APROL software is only ensured if the number of authorized RGVs is >= as number of RGVs operating on the Runtime server. All "Gateway variables" are counted as operating RGVs.
AP.SW-5000RGV-UPG	APROL IO license - Redundant Runtime 5000 RGVs The I/O license authorizes the use of 5000 RGVs (redundant gateway variables) on a "redundant Runtime server" APROL software can only be operated legally if the number of licensed RGVs >= the actual sum of the RGVs on the Runtime server. RGVs include all variables in the "Gateway variable list"
AP.SW-10000RGV-UPG	APROL IO license - Redundant Runtime 10000 RGVs The I/O license authorizes the use of 10000 RGVs (redundant gateway variables) on a "redundant Runtime server" APROL software can only be operated legally if the number of licensed RGVs >= the actual sum of the RGVs on the Runtime server. RGVs include all variables in the "Gateway variable list"
AP.SW-20000RGV-UPG	APROL IO license - Redundant Runtime 20000 RGVs The I/O license authorizes the use of 20000 RGVs (redundant gateway variables) on a "redundant Runtime server" APROL software can only be operated legally if the number of licensed RGVs >= the actual sum of the RGVs on the Runtime server. RGVs include all variables in the "Gateway variable list"

APROL Process Control - Various

SuSE Linux Enterprise operating system

Model number	Short description
AP.SW0-OPS-010XOEM	Operating system SLES - OEM SUSE Linux Enterprise Server for limited use Use according to "Bundling and special restrictions for B&R"

Partner key

Model number	Short description
AP.SR-PARTNER_KEY	The APROL System Partner license allows the following functions to be enabled: Function 1: APROL (Engineering System/ Runtime System/ Operator System/ Gateway server) Function 2: Automation Studio Edition APROL Function 3: SafeDesigner The "B&R license code" allows activation of APROL system functions via software registration at http://www.br-automation.com in the Service/Software Registration area. Note: The following licenses are also required for operation: AP:R40-E-AS-NEW - APROL R4.0 License Set AS-Client Base (VMware Workstation 10.x, Windows 7 Professional English) Intended use: This license is not permitted for use on production systems; it is only permitted to be used by system partners for engineering tasks. Valid duration of the license: The validity of the license is not subject to time limitations. The APROL System Partner license is purchased for an APROL major release (e.g. R 4.0), and all builds for this major release (e.g. R 4.0-01 - R 4.0-10) can be downloaded from the B&R website and installed free of charge. The life cycle for an APROL major release is typically 24-36 months. If system partnership status B&R is ended, the APROL System Partner license must be returned to B&R free of charge.
AP:R40-E-AS-NEW	APROL R4.0 license set AS client base, consists of the following licenses: - Automation Studio 4 / APROL edition - SINGLE LICENSE --- This license is for HARDWARE and FIELDBUS CONFIGURATION and is required for APROL R4.0 systems! Contains: - 3rd-party license --- Windows 7 Pro 32-bit English --- - 3rd-party license --- VMware Workstation 10.x -e-Lic Win/Linux

3rd-party software

Model number	Short description
AP.ACC-1471	VMware Workstation 10.x Linux / Windows Delivered as an e-license (serial number)
AP.ACC-1475	OPC-LinkMaster (kepware) license LinkMaster OPC bridging software Part number: LM3-LNKMS-NA00 Description: LinkMaster V3

APROL Process Control - Training

APROL training

Model number	Short description
SEM841.5	APROL process control training: Basic 1 length: 5 days + Complete overview of the APROL process control system + System components, project development and libraries + User management and rights assignment + Web queries, AuditTrail and Change Control
SEM842.5	APROL process control training: Basic 2 length: 5 days + Parameter sets and recipes + Controller-Controller communication + PDA and event driver coupling + Customized libraries
SEM890.3	APROL solutions training: Adv. process control length: 3 days + Basic closed-loop control terminology + Description and classification of controlled systems + Signal preparation and filtering + PID controller, manual tuning procedure, use of the autotuning function + Adjustment of PID controller parameters, assessment of the control quality + Correction terms, dynamic disturbance variable feed-forward ratio control + Split Range control + Gain scheduling (use and tuning) + Alternating control use and functionality with template + Cascade control (use and functionality with template) + Control of dead time dominant systems (Smith Predictor) + Model predictive control (MPC) + MPC functionality, settings, startup and project development with guidelines for applications
SEM801.E2	APROL Engineering Camp – Basic length: 5 days + Includes „lab work“ + Designed for technicians as well as sales engineers + Lab work based on a simple P&ID model
SEM:801.E4	APROL Engineering Camp Part 1 – Basic length: 20 days course and documentation language: English + Includes APROL standard trainings (SEM841.5 and SEM842.5) + Includes „lab work“ (SEM801.E2) + Designed for technicians as well as sales engineers + Lab work based on a simple P&ID model
SEM802.E6	APROL Engineering Camp Part 2 – Lab Work - Length: 30 days course and documentation language: English + Many new topics and intensive lab work + Theory before lunch + Lab work after lunch + The goal is fully utilizing the PAL (Process Automation Library) library
SEM870.1	APROL process control workshop: Expert length: 1 day
SEM811.1	APROL process control workshop: Operator length: 1 day

Monitors

Standard monitors

Model number	Short description
AP.ACC-1260	27" Office LED Monitor 1920x1200 / socket
AP.ACC-1262	21.5" standard TFT monitor with monitor stand Native resolution: 1920x1080 Brightness: 250 cd/m² Contrast: 1000:1
AP.ACC-1266	24" widescreen office monitor with monitor stand Native resolution: 1920 x 1200 Brightness: 350 cd/m² Contrast: 1000:1
AP.ACC-1267	22" Office LCD Monitor -1680 x 1050/Stand Native resolution: 1680 x 1050 Brightness: 250 cd/m Contrast: 1000:1

Control computers

Industrial computers - servers

Model number	Short description
AP:INDC-APC910-1SS	APC910-1Slot/64Bit-i7Q-16G-256SSD Note: Automation PC B&R APC910: 1x 5PC910.SX01-00 APC910 System 1CS 1SI 1x 5PC900.TS77-00 CPU QM77 i7-3615QE 4C 2.3/1.6 GHz 6 MB 45 W 1x 5AC901.HS00-00 APC910 active heat sink 1x 5MMDDR.8192-03 SO-DIMM DDR3 PC3-12800 8192 MB 1x 5MMDDR.8192-03 SO-DIMM DDR3 PC3-12800 8192 MB 1x 5AC901.FA01-00 APC910 fan kit 1CS 1x 5AC901.BX01-01 APC910 bus 1PCIe.x8 1x 5AC901.FF01-00 APC910 front cover 1CS OR 1x 5AC901.CSSD-05 APC910 slide-in C SSD 256 GB MLC 1x 0TB103.9 connector 24 V 5.08 3p screw clamps Onboard Ethernet 10/100/1000 Mbit/s (RJ45) for operating bus Onboard Ethernet 10/100/1000 Mbit/s (RJ45) for for process bus 1x C0200900 COMFORT MOUSE 4500 USB BLACK Keyboard not included, please order separately. Operating system not included, please order separately. With Linux & latest APROL preinstalled at B&R for compatibility test
AP:INDC-APC910-2	APROL industrial computer - APC910 2-slot based - 24 VDC Hardware: Automation PC B&R APC910 1x 5PC910.SX02-00 APC910 System 2CS 1SI 1LS 1x 5PC900.TS77-00 CPU QM77 i7-3615QE 4C 2.3/1.6 GHz 6 MB 45 W 1x 5AC901.HS00-00 APC910 active heat sink 1x 5MMDDR.8192-03 SO-DIMM DDR3 PC3-12800 8192 MB 1x 5MMDDR.8192-03 SO-DIMM DDR3 PC3-12800 8192 MB 1x 5AC901.FA02-00 APC910 fan kit 2CS 1x 5AC901.BX02-01 APC910 bus 1PCI 1PCIe.x8 1SI 1x 5AC901.FF02-00 APC910 front cover 2CS OR 1x 5AC901.CHDD-01 APC910 slide-in C HDD 500 GB (AV-25) 1x 0TB103.9 connector 24 V 5.08 3p screw clamps 1x 0TB103.91 connector 24 V 5.08 3p cage clamps 1x 99900018 completion IPC/APC/AP Onboard Ethernet 10/100/1000 Mbit/s (RJ45) for operating bus Onboard Ethernet 10/100/1000 Mbit/s (RJ45) for for process bus 1x C0200900 COMFORT MOUSE 4500 USB BLACK Keyboard not included, please order separately. Operating system not included, please order separately. With Linux & latest APROL preinstalled at B&R for compatibility test
AP:INDC-APC910-2FL	APROL industrial computer - APC910 2-slot based - 24 VDC Hardware: Automation PC B&R APC910: 1x 5PC910.SX02-00 APC910 System 2CS 1SI 1LS 1x 5PC900.TS77-01 CPU QM77 i7-3612QE 4C 2.1/1.6 GHz 6 MB 35 W 1x 5AC901.HS01-00 APC910 passive heat sink 1x 5MMDDR.8192-03 SO-DIMM DDR3 PC3-12800 8192 MB 1x 5MMDDR.8192-03 SO-DIMM DDR3 PC3-12800 8192 MB 1x 5AC901.BX02-01 APC910 bus 1PCI 1PCIe.x8 1SI 1x 5AC901.FF02-00 APC910 front cover 2CS OR 1x 5AC901.CSSD-05 APC910 slide-in C SSD 256 GB MLC 1x 0TB103.9 connector 24 V 5.08 3p screw clamps 1x 0TB103.91 connector 24 V 5.08 3p cage clamps 1x 99900018 completion IPC/APC/AP Onboard Ethernet 10/100/1000 Mbit/s (RJ45) for operating bus Onboard Ethernet 10/100/1000 Mbit/s (RJ45) for for process bus 1x C0200900 COMFORT MOUSE 4500 USB BLACK Keyboard not included, please order separately. Operating system not included, please order separately. With Linux & latest APROL preinstalled at B&R for compatibility test
AP:INDC-APC910-2SS	APROL industrial computer - APC910 2-slot based - 24 VDC Hardware: Automation PC B&R APC910: 1x 5PC910.SX02-00 APC910 System 2CS 1SI 1LS 1x 5PC900.TS77-00 CPU QM77 i7-3615QE 4C 2.3/1.6 GHz 6 MB 45 W 1x 5AC901.HS00-00 APC910 active heat sink 1x 5MMDDR.8192-03 SO-DIMM DDR3 PC3-12800 8192 MB 1x 5MMDDR.8192-03 SO-DIMM DDR3 PC3-12800 8192 MB 1x 5AC901.FA02-00 APC910 fan kit 2CS 1x 5AC901.BX02-01 APC910 bus 1PCI 1PCIe.x8 1SI 1x 5AC901.FF02-00 APC910 front cover 2CS OR 1x 5AC901.CSSD-05 APC910 slide-in C SSD 256 GB MLC 1x 0TB103.9 connector 24 V 5.08 3p screw clamps 1x 0TB103.91 connector 24 V 5.08 3p cage clamps 1x 99900018 completion IPC/APC/AP Onboard Ethernet 10/100/1000 Mbit/s (RJ45) for operating bus Onboard Ethernet 10/100/1000 Mbit/s (RJ45) for for process bus 1x C0200900 COMFORT MOUSE 4500 USB BLACK Keyboard not included, please order separately. Operating system not included, please order separately. With Linux & latest APROL preinstalled at B&R for compatibility test
AP:INDC910-2SS-DVI	APROL industrial computer - APC910 2-slot based - 24 VDC Hardware: Automation PC B&R APC910 1x 5PC910.SX02-00 APC910 System 2CS 1SI 1LS 1x 5PC900.TS77-00 CPU QM77 i7-3615QE 4C 2.3/1.6 GHz 6 MB 45 W 1x 5AC901.HS00-00 APC910 active heat sink 1x 5MMDDR.8192-03 SO-DIMM DDR3 PC3-12800 8192 MB 1x 5MMDDR.8192-03 SO-DIMM DDR3 PC3-12800 8192 MB 1x 5AC901.FA02-00 APC910 fan kit 2CS 1x 5AC901.BX02-01 APC910 Bus 1PCI 1PCIe.x8 1SI 1x 5AC901.FF02-00 APC910 front cover 2CS OR 1x 5AC901.CSSD-05 APC910 Slide-In-C SSD 256 GB MLC 1x AP.ACC-1282 graphics card 1-2 Mon. DVI -PCIx1-NVS300-1 1x 0TB103.9 connector 24V 5.08 3p screw clamp 1x 0TB103.91 connector 24V 5.08 3p cage clamp 1x 99900018 completion IPC/APC/AP Onboard Ethernet 10/100/1000 Mbit/s (RJ45) for operating bus Onboard Ethernet 10/100/1000 Mbit/s (RJ45) for for process bus 1x C0200900 COMFORT MOUSE 4500 USB BLACK Keyboard not included, please order separately. Operating system not included, please order separately. With Linux & latest APROL preinstalled at B&R for compatibility test
AP:INDC910-2SS-VGA	APROL industrial computer - APC910 2-slot based - 24 VDC Hardware: Automation PC B&R APC910 1x 5PC910.SX02-00 APC910 System 2CS 1SI 1LS 1x 5PC900.TS77-00 CPU QM77 i7-3615QE 4C 2.3/1.6 GHz 6 MB 45 W 1x 5AC901.HS00-00 APC910 active heat sink 1x 5MMDDR.8192-03 SO-DIMM DDR3 PC3-12800 8192 MB 1x 5MMDDR.8192-03 SO-DIMM DDR3 PC3-12800 8192 MB 1x 5AC901.FA02-00 APC910 fan kit 2CS 1x 5AC901.BX02-01 APC910 Bus 1PCI 1PCIe.x8 1SI 1x 5AC901.FF02-00 APC910 front cover 2CS OR 1x 5AC901.CSSD-05 APC910 Slide-In-C SSD 256 GB MLC 1x AP.ACC-1281 graphics card 1-2 Mon. VGA -PCIx1-NVS300-1 1x 0TB103.9 connector 24V 5.08 3p screw clamp 1x 0TB103.91 connector 24V 5.08 3p cage clamp 1x 99900018 completion IPC/APC/AP Onboard Ethernet 10/100/1000 Mbit/s (RJ45) for operating bus Onboard Ethernet 10/100/1000 Mbit/s (RJ45) for for process bus 1x C0200900 COMFORT MOUSE 4500 USB BLACK Keyboard not included, please order separately. Operating system not included, please order separately. With Linux & latest APROL preinstalled at B&R for compatibility test
AP:INDC910-2SS-WIN	APROL industrial computer - APC910 2-slot based - 24 VDC with 5SWWI7.1100-ENG Win7 Pro 32-bit Hardware: Automation PC B&R APC910 1x 5PC910.SX02-00 APC910 System 2CS 1SI 1LS 1x 5PC900.TS77-00 CPU QM77 i7-3615QE 4C 2.3/1.6 GHz 6 MB 45 W 1x 5AC901.HS00-00 APC910 active heat sink 1x 5MMDDR.8192-03 SO-DIMM DDR3 PC3-12800 8192 MB 1x 5MMDDR.8192-03 SO-DIMM DDR3 PC3-12800 8192 MB 1x 5AC901.FA02-00 APC910 fan kit 2CS 1x 5AC901.BX02-01 APC910 bus 1PCI 1PCIe.x8 1SI 1x 5AC901.FF02-00 APC910 front cover 2CS OR 1x 5AC901.CSSD-05 APC910 slide-in C SSD 256 GB MLC 1x 0TB103.9 connector 24 V 5.08 3p screw clamps 1x 0TB103.91 connector 24 V 5.08 3p cage clamps 1x 5SWWI7.1100-ENG Win7 Pro 32b SP1 DVD 1x 99900018 completion IPC/APC/AP Onboard Ethernet 10/100/1000 Mbit/s (RJ45) for operating bus Onboard Ethernet 10/100/1000 Mbit/s (RJ45) for for process bus 1x C0200900 COMFORT MOUSE 4500 USB BLACK Keyboard not included, please order separately. Operating system not included, please order separately. With Linux & latest APROL preinstalled at B&R for compatibility test
AP:INDC910-5	APROL industrial computer - APC910 5-slot based - 24 VDC 1x 5PC910.SX05-00 APC910 System 5CS 2SI 1LS 1x 5PC900.TS77-00 CPU QM77 i7-3615QE 4C 2.3/1.6 GHz 6 MB 45 W 1x 5AC901.HS00-00 APC910 active heat 1x 5MMDDR.8192-03 SO-DIMM DDR3 PC3-12800 8192 MB 1x 5MMDDR.8192-03 SO-DIMM DDR3 PC3-12800 8192 MB 1x 5AC901.FA05-00 APC910 fan kit 5CS 1x 5AC901.BX05-02 APC910 bus 2PCI 1PCIe.x8 2PCIe.x1 2SI 1x 5AC901.FF05-00 APC910 front cover 5CS OR 1x 5AC901.CHDD-01 APC910 slide-in C HDD 500 GB (AV-25) 1x 0TB103.9 connector 24 V 5.08 3p screw clamps 1x 0TB103.91 connector 24 V 5.08 3p cage clamps 1x 99900018 completion IPC/APC/AP 1x C0200900 COMFORT MOUSE 4500 USB BLACK Keyboard not included, please order separately. Operating system not included, please order separately. With Linux & latest APROL preinstalled at B&R for compatibility test

Standard computers - servers

Model number	Short description
AP.STDC-HP800G1	Standard computer HPDesk800G1-16GB/64Bit - 230 VAC Hardware: 1x HP Elitedesk 800 G1 Tower, 230 VAC Intel Core i7-4770, 16 GB DDR3 RAM, 1 TB HDD 7200 rpm, Intel HD graphics card 4600 Win 7 Pro 64-bit, 3 year NextBusinessDay warranty 1x INTEL Pro1000PT 1GBit RJ45 for control bus 1x INTEL Pro1000PT 1GBit RJ45 for process bus 1x onboard Ethernet 10/100/1000 Mbit/s(RJ45) for redundancy bus Number of available slots in computer 2x PCIe x1 full installation height (2 occupied with INTEL Pro1000PT) 1x PCIe x16 full installation height (0 occupied) 1x PCIe x16(x4) full installation height (0 occupied) SATA SuperMulti DVD Writer HP-PS/2 optical mouse HP Standard BasisKeyboard 2004 europ. English WITHOUT Linux operating system license!!! WITHOUT pre-installation of Linux & APROL!
AP.STDS-HPDL380G9	Standard server HP DL380G8 based - 230 VAC redundant HP server standard configuration consisting of: 01. HP DL380 Gen9 8SFF CTO Server 1 STK 02. HP Europe-Multilingual Localization 1x 03. HP DL380 Gen9 Intel Xeon E5-2650v3 1 pc. (2.3 GHz/10-core/25 MB/105 W) FIO processor kit 04. HP 8GB 1Rx4 PC4-2133P-R Kit 8x 05. HP 8GB 1Rx4 PC4-2133P-R Kit 8x 06. HP DL380 Gen9 Universal Media Bay Kit 1x 07. HP 300GB 6G SAS 10K rpm SFF (2.5") SC Enterprise HDD 5x 08. HP Factory Integrated 5x 09. HP 9.5mm SATA DVD-RW Jb Gen9 Kit 1x 10. HP Factory Integrated 1x 11. HP Smart Array P440ar/2G FIO Controller 1x 12. HP 2U SFF BB Gen8 Rail Kit 1x 13. HP Factory Integrated 1x 14. HP 500W FS Plat Ht Plg Pwr Supply Kit 2x 15. HP Factory integrated 2x 16. HP DL380 Gen9 High Perf Temp Fan Kit 1x 17. HP Factory integrated 1x 18. HP 2U Cable Mgmt Arm Gen8 Kit 1x 19. HP Factory Integrated 1x 20. HP OV for DL 3yr 24x7 FIO 1 Svr E-LTU 1x 21. HP No Additional Support Required 1x 22. Intel Pro1000PT 1GBit 2xRJ45 NIC BLK 2x 23. Hardware assembly Optical mouse not included, please order separately. Keyboard not included, please order separately! Operating system not included, please order separately. WITHOUT pre-installation of Linux & APROL !!! Server has been tested for use with APROL R 4.0-10 and higher!

Power Panel computers

Model number	Short description
5PC9:220198.036-01	PPC900-2-slot/64-bit-i7Q-16G-256SSD 1x 5PC911.SX00-00 PPC900 System active 1x 5AP933.240C-00 AP933 TFT C FHD 24.0 in T 1x 5PC901.TS77-00 CPU QM77 i7-3615QE 4C 2.3/1.6 GHz 6 MB 45 W 1x 5MMDDR.8192-03 SO-DIMM DDR3 PC3-12800 8192 MB 1x 5MMDDR.8192-03 SO-DIMM DDR3 PC3-12800 8192 MB 1x 5AC902.FA00-00 PPC900 fan kit system 1x 5AC901.CSSD-05 APC910 slide-in C SSD 256 GB MLC 1x 5AC902.BX02-01 PPC900 bus 1PCI 1PCIe.x8 1SI 1x 0TB103.9 connector 24 V 5.08 3p screw clamps

Keyboards

Model number	Short description
AP.ACC-1301	USB keyboard, English layout Linux keyboard with Linux key & XPress keys
AP.ACC-1302	USB keyboard, German layout

General and device-specific accessories

Model number	Short description
AP.ACC-1311	Slim Portable Blu-ray Writer USB2.0 BR6X DVD8X DL6X CD24X WHITE IN Samsung SE-506
AP.ACC-1318	Card reader for CompactFlash (CF card) USB2.0
AP.ACC-1320	READYNAS PRO 4 4 TB DESKTOP NAS manufactured by NetGear RNDP4410-100EUS
AP.ACC-1317	16 GB memory expansion for HP Elitedesk 800G1 Memory expansion for HP EliteDesk 800 G1 tower Consists of 2x 8 GB modules (HP 8GB DIMM)
AP.ACC-1313	HP DL380G8 SAS hard disk 300 GB, hot plugging NOT assembled in the server at B&R!
AP.ACC-1314	HP 300 GB SSD (HP DL380G8)

Standard Industrial Ethernet

Industrial Ethernet TCP/IP - RS20 managed switches

Model number	Short description
AP.ACC-1020	RS20-0800T1T1SDAEHH02.0. ETHERNET/Fast ETHERNET switch in accordance with IEEE 802.3, compact, managed, industrial switch for DIN top-hat mounting rail Store-and-Forward switching fanless design, Software Layer 2 Enhanced Total number of Fast Ethernet ports: 8; Number of standard 10/100BASE TX, RJ45: 6; Gigabit Ethernet ports: 0; 1st Uplink port: 10/100BASE-TX, RJ45; 2. Uplink port: 10/100BASE-TX, RJ45
AP.ACC-1021	RS20-0800M2M2SDAEHH02.0. ETHERNET/Fast ETHERNET switch in accordance with IEEE 802.3, compact, managed, industrial switch for DIN top-hat mounting rail Store-and-Forward switching fanless design, Software Layer 2 Enhanced Total number of Fast Ethernet ports: 8; Number of standard 10/100BASE TX, RJ45: 6; Gigabit Ethernet ports:0; 1st Uplink port: 100BASE-FX, MM-SC; 2. Uplink port: 100BASE-FX, MM-SC

Industrial Ethernet TCP/IP - SPIDER media converter

Model number	Short description
AP.ACC-1040	SPIDER 1TX/1FX Entry level industrial ETHERNET rail switch, Store and Forward switching mode, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s) Port type and quantity: 1 x 10/100BASE-TX, TP cable, RJ45 female connectors, auto-crossing, autonegotiation, auto-polarity 1 x 100BASE-FX, MM cable, SC female connectors
AP.ACC-1041	SPIDER 1TX/1FX-SM Entry level industrial ETHERNET rail switch, Store and Forward switching mode, Ethernet (10 Mbit/s) and Fast-Ethernet (100 Mbit/s) Port type and quantity 1 x 10/100BASE-TX, TP cable, RJ45 female connectors, auto-crossing, auto-negotiation, auto-polarity 1 x 100BASE-FX, SM cable, SC female connectors

Standard Ethernet TCP/ IP switches

Model number	Short description
AP.ACC-1080	Cisco SF 300-48 48-PORT FE switch Port types and quantity: 48 Ethernet 10/100 ports

GSM set

Model number	Short description
0TP710.106	SMS/GSM Modem Westermo GDW-11 900/1800 MHz RS232, 9.6 kbit/s, 10-60 VDC incl. magnet base antenna with 2.5 m cable, SMA connection With the following accessories: 1x DSUB cable RS232 1x 9-pin female / 9-pin male connector, 1.8 m 1x GSM planar antenna, control cabinet antenna, 2 dB gain, incl. 2.5 m coaxial cable, SMA connection

GPS radio-controlled clock

Model number	Short description
AP.ACC-1220	GPS radio-controlled clock set with LAN card (NTP protocol) consists of: GPS standalone system with LAN card, 100 Mbit/s, GPS antenna and lightning protection (FG6844RC12 + FG727100 + FG4490G10 + FG4495G0)
AP.ACC-1221	GPS antenna cable KA110109 for GPS systems without connector, length: 100 meters

Multi-screening

Model number	Short description
AP.ACC-1282	Graphics card for multi-screening (1-2 screens)
AP.ACC-1286	Graphics card, 1-2 monitors DVI - PCIx16 NVS315
AP.ACC-1289	Graphics card for 3-4 monitors For controlling 3 or 4 monitors Currently based on Quadro NVS 510/PCI Express x16

Network interface cards

Model number	Short description
AP.ACC-1250	NIC for computer/server-10/100/1000 Mbps for PCI 2.3 32-bit 33/66 Mhz
AP.ACC-1255	NIC for computer/server - 10/100/1000 Mbps for PCI-X 1.0 (or PCI 2.2) 32-bit or 64-bit 33/66/100/133 MHz
AP.ACC-1256	NIC for computer/server - 10/100/1000 Mbps For x1 PCI Express Serial Link (PCI Express 1.0a compliant) (also runs in x4, x8 and x16 slots)
AP.ACC-1257	NIC for server - 10/100/1000 Mbps for x1 PCI Express Serial Link (PCI Express 1.0a compliant) (also runs in x4, x8 and x16 slots)

Accessories

Model number	Short description
AP.ACC-1249	Duplex LC-LC 50/125 µm, 2 m redundancy link

Appendix

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